

Cummins **Onan**



Installation Manual

Commercial Mobile Generator Set

HGJAD (Spec A-E)

HGJAE (Spec A-E)

HGJAF (Spec A-D)

California

Proposition 65 Warning

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

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1 Safety Precautions

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

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 that will result in severe personal injury or death.

⚠ WARNING

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

⚠ CAUTION

alerts you to a hazard or unsafe practice that 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.

1.1 Gasoline and Propane Are 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 flames, sparks, pilot lights, arc-producing equipment 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. LPG sinks when released and can accumulate inside housings and basements and other below-grade spaces. Prevent leaks and the accumulation of gas.

1.2 Engine Exhaust is Deadly

- Inspect for exhaust leaks at every startup and after every eight hours of running.
- Prior to every startup and after every eight hours of running, all carbon monoxide detectors must be tested and confirmed to be working in accordance with the manufacturer's instructions or owners manual.
- Learn the symptoms of carbon monoxide poisoning in the genset Operator's Manual.
- Never occupy the vehicle while the genset is running unless the vehicle is equipped with a working carbon monoxide detector.
- Do not operate the genset when the vehicle is parked in a confined space, such as a garage.

- Disable the automatic genset starting feature (AGS) of an inverter-charger or other automatic starting device before storing the vehicle or parking it in a garage or other confined space.
- The exhaust system must be installed in accordance with the genset Installation Manual.
- Engine cooling air must not be used for heating the vehicle.

1.3 Generator Voltage is Deadly

- Disable the automatic genset starting feature (AGS) of an inverter-charger or other automatic starting device before servicing the genset.
- Generator electrical output connections must be made by a trained and experienced electrician in accordance with applicable codes.
- The genset must not be connected to shore power (utility). Back-feed to shore power can cause electrocution 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, stand on a dry wooden platform or rubber insulating mat and use tools with insulated handles.

1.4 Moving Parts Can Cause Severe Personal Injury or Death

- Disable the automatic genset starting feature (AGS) of an inverter-charger or other automatic starting device before servicing the genset.
- 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, and other moving parts.

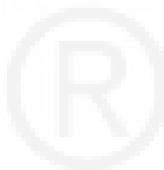
1.5 Battery Gas is Explosive

- Wear safety glasses.
- Do not smoke.
- To reduce arcing when disconnecting or reconnecting battery cables, always disconnect the negative (–) battery cable first and reconnect it last.

1.6 General Precautions

- Keep children away from the genset.
- To prevent accidental or remote starting while working on the genset, disconnect the negative (–) battery cable at the battery.
- Keep the genset and its compartment clean. Excess oil and oily rags can catch fire. Do not store gear in the compartment it can restrict cooling air.

- Make sure all fasteners are secure and torqued properly.
- Do not work on the genset when mentally or physically fatigued or after consuming alcohol or drugs.
- You must be trained and experienced to make 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 U. S. 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.
- Keep multi-class ABC fire extinguishers readily at hand. Class A fires involve ordinary combustible materials such as wood and cloth. Class B fires involve combustible and flammable liquids and gaseous fuels. Class C fires involve live electrical equipment. (ref. NFPA No. 10)
- Genset installation and operation must comply with all applicable local, state and federal codes and regulations.



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2 Introduction

2.1 About this Manual

⚠ WARNING

Improper installation can result in severe personal injury, death and equipment damage. The installer must be trained and experienced in the installation of electrical, mechanical, fuel and exhaust equipment.

⚠ WARNING

This genset is not a life support system. It can stop without warning. Children, persons with physical or mental limitations, and pets could suffer personal injury or death. A personal attendant, redundant power or an alarm system must be used if genset operation is critical.

⚠ 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.

This manual is a guide for the installation of the HGJAD and HGJAE Series of generator sets (gensets). Proper installation is essential for top performance. Read through this manual before starting the installation. Leave this manual with the vehicle.

This manual addresses the following aspects of the installation:

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

See the Operator's Manual for operation and maintenance instructions.

NOTICE

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.

2.2 Installation Codes and Standards for Safety

⚠ CAUTION

The Warranty applies only when this genset is installed in a Commercial Vehicle.

The installer 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.

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. It is recommended that the standards in [Table 1](#) be obtained for reference.

TABLE 1. REFERENCE CODES AND STANDARDS

Code of Federal Regulations, Title 49: Chapter III and Chapter V	Superintendent of Documents P. O. Box 371954 Pittsburgh, PA 15250-7954
NFPA No 58, 70, 1192	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
ANSI/RVIA-EGS-1	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

2.3 Outline Drawings

See [Appendix B](#) for installation details: mounting bolt hole locations, connection points (fuel, battery, exhaust, remote control, AC output), sizes and types of fittings, cooling air openings, weight, and overall dimensions. See your Onan dealer for a large-scale Outline Drawing and full-size floor cutout template.

2.4 Lifting and Handling Generator Set

[Figure 1](#) illustrates the four lift hook slots for generator set lifting. A lifting rig must spread the hook straps such that they do not crush or bend parts such as the control box, air filter and fuel lines while lifting. See *Specifications* ([Chapter 10](#)) for the weight of the generator set and make provisions accordingly for safe handling.

⚠ CAUTION

Avoid tipping the front (service side) down while handling the generator set. Engine oil could drain into and soak the air filter to cause hard starting and poor operation.

The underside of the generator set can be damaged by protruding objects — Always rest the generator set on a flat surface that has been cleared off — Always extend the lifting arms of a forklift beyond the base of the generator set to prevent them from protruding into the underside cover.

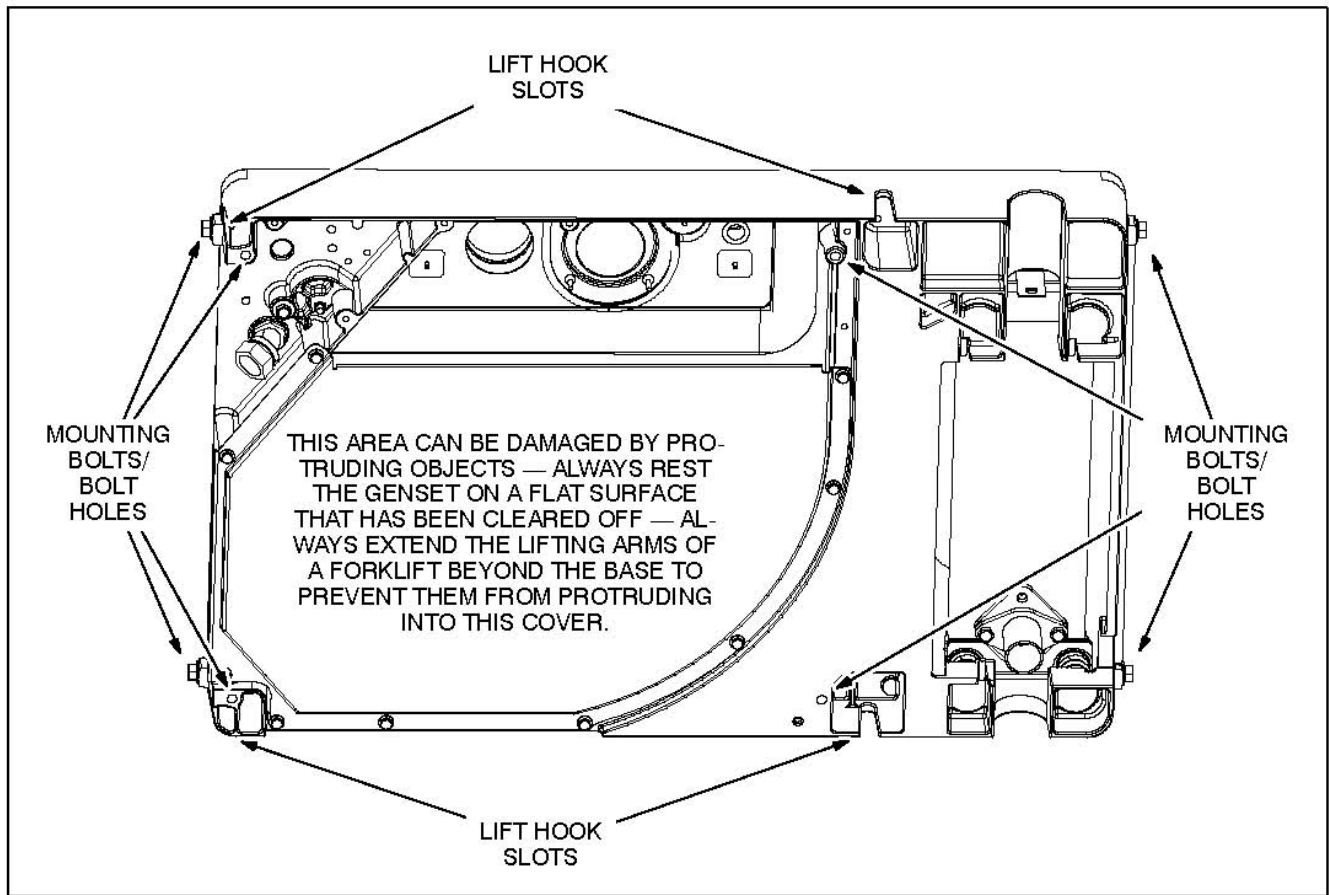
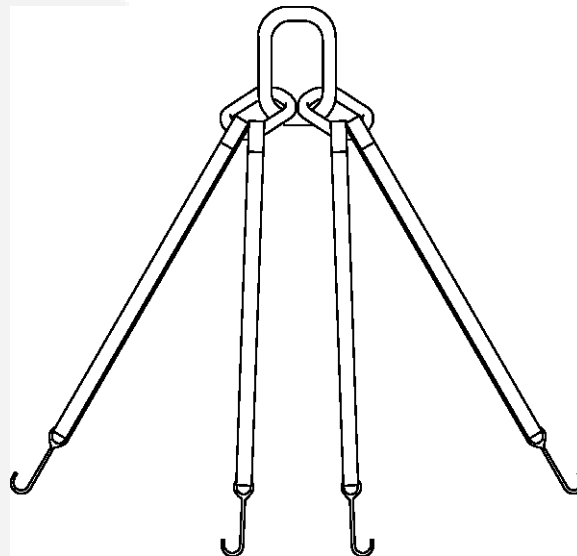


FIGURE 1. GENERATOR SET LIFT-HOOK SLOTS—MOUNTING BOLT HOLES—AREA THAT CAN BE DAMAGED

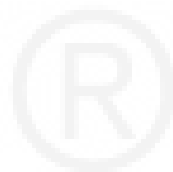


To have sling made contact local sling or rigging supplier.

FIGURE 2. LIFT HOOK SLING - EXAMPLE ONLY



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3 Location, Mounting and Ventilation

3.1 Location

Typical genset locations are illustrated in [Figure 3](#) and [Figure 4](#). The location must provide:

1. Ready access for starting and stopping the genset and performing all periodic maintenance
2. Separation from sources of flammable vapors, such as batteries and fuel tanks, which the genset can ignite
3. Access for connecting and disconnecting fuel lines, battery cables, remote control wiring and AC wiring
4. Access from below for draining engine oil and changing the oil filter
5. Unobstructed space below the genset for proper cooling air flow (see VENTILATION in this section)
6. Ground clearance of at least 12 inches (305 mm) (see VENTILATION in this section)
7. Space to mount the genset with at least 1/2 inch (12.7 mm) clearance at the top, any side of the genset and service door clearance. These minimum clearances apply to any thermal or acoustic insulation with which a compartment may be lined. See *Specifications* ([Chapter 10](#)) for minimum compartment dimensions.

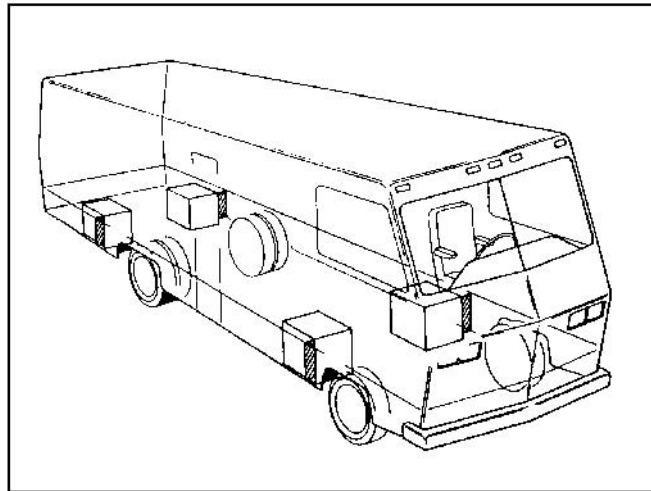


FIGURE 3. TYPICAL GENSET LOCATIONS

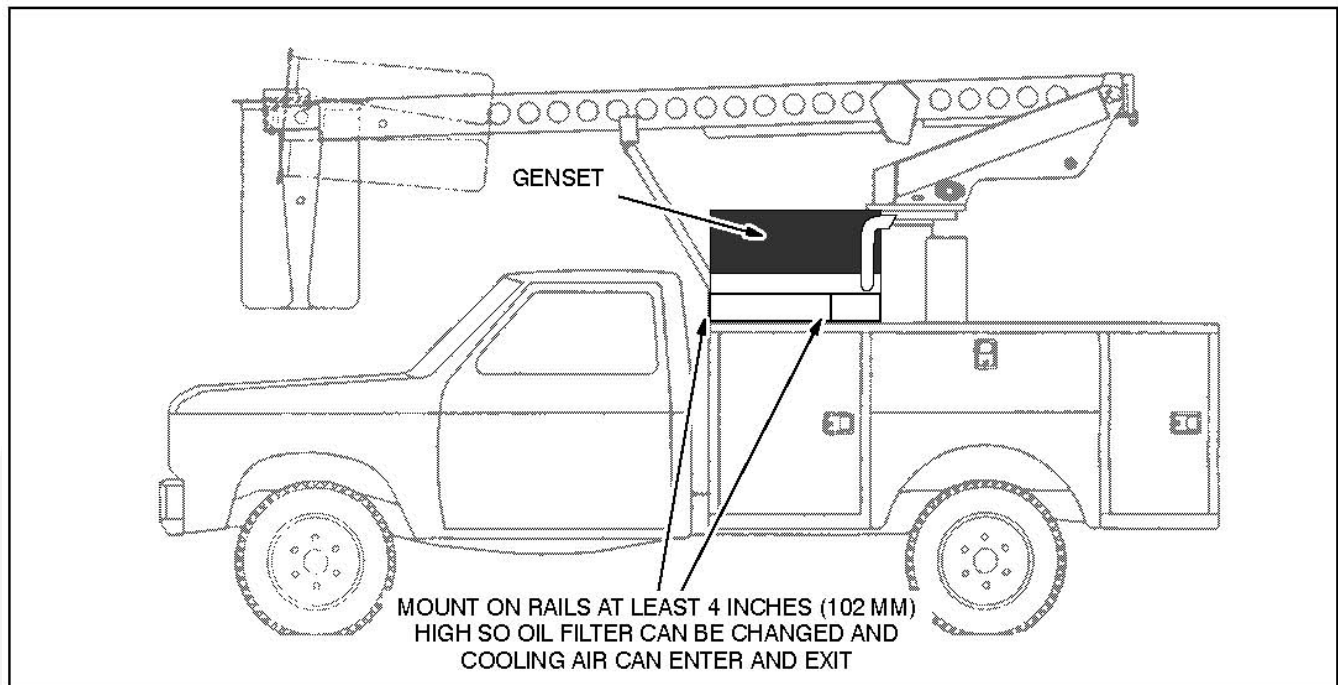


FIGURE 4. TYPICAL TRUCK APPLICATION

3.2 Heat, Fire and Exhaust Barriers

3.2.1 Insulating Materials

Acoustic/thermal insulation and adhesive must be Classified as "Self-Extinguishing" at not less than 200°F (90°C). Do not line the bottom of a compartment with insulation, which absorbs fuel and oil.

3.2.2 Fire and Exhaust Barriers

Barriers to provide vapor and fire resistance must be installed between the genset and the interior of the vehicle if the genset is mounted below the floor. If the genset is mounted in a compartment on the floor of the vehicle, the entire compartment (except the floor) must be lined with vapor and fire resistive materials. All seams and openings in the barriers for wiring, mounting screws and so forth must be sealed. Use approved materials (26 gauge galvanized steel or equivalent). See NFPA 1192 for details.

⚠ WARNING

EXHAUST GAS AND FIRE ARE DEADLY! Construct a suitable vapor and fire barrier of approved materials between the genset and vehicle interior.

3.2.3 Thermal Insulation for Model HGJAF—Below-Floor Mounted

If the floor is of combustible material, such as plywood, cover the floor above the genset and any side wall around the genset with 1/4 to 1/2 inch (6.4 to 12.7 mm) thick, 4 lb/ft³ (0.0167 kg/m³) density fiberglass thermal insulation with aluminum foil facing at least 0.001 inch (0.025 mm) thick. Secure the insulation every 12 inches (304 mm) to the surfaces being protected by means of mechanical fasteners and washers as least 1 inch (25 mm) in diameter.

3.2.4 Thermal Insulation for Model HGJAF—Above-Floor Mounted

If of combustible material, such as plywood, line the compartment and door, *but not the floor*, with 1/4 to 1/2 inch (6.4 to 12.7 mm) thick, 4 lb/ft³ (0.0167 kg/m³) density fiberglass thermal insulation with aluminum foil facing at least 0.001 inch (0.025 mm) thick. Secure the insulation every 12 inches (304 mm) to the surfaces being protected by means of mechanical fasteners and washers as least 1 inch (25 mm) in diameter. See *Specifications* (Page [Chapter 10](#)) regarding minimum compartment dimensions.

3.3 Mounting

3.3.1 Mounting Structure and Hardware

Support the genset on a structure able to resist the dynamic weight of the generator set: ± 3 g-force vertical and ± 1 g-force horizontal. See *Specifications* ([Chapter 10](#)) for the weight of the specific model being installed. Secure the generator set with four 3/8 inch thread-forming bolts in the ends or bottom of the base ([Figure 1](#)). Torque the bolts to 31 lb-ft (42 N-m).

WARNING

The generator set support structure must be designed and installed to support and restrain the dynamic weight of the genset. Failure to do so can result in the generator set dropping onto the roadway causing property damage, severe personal injury and death.

NOTICE

After, May 1, 2015 Cummins Power Generation will not support new mobile roof top mounted RV/CM generator applications. For reasons explained & demonstrated in application engineering bulletin AEB 104-022012, this location is an application that Cummins Power generation does not recommend or support.

3.3.2 Below-Floor Mounting

Below-floor mounting kits are available from Onan. Carefully follow the instructions in the kit. Reinforce the generator set to resist the dynamic weight. Do not mount the genset within the approach or departure angles of the vehicle or below the axle line ([Figure 11](#)).

3.4 Ventilation

Unrestricted air flow into and out of the generator set for cooling and ventilation is essential for proper generator set performance and service life ([Figure 5](#)). See [Section 9.1](#).

Generator sets (50Hz) have a slower fan speed and therefore have less cooling air flow than 60Hz generator sets. The Installer must make certain that the installation does not allow for hot air recirculation. Ducting baffles or other air handling devices may be required to prevent overheating. Be certain to perform a hot air recirculation test on each unique installation and repair as required.

1. See your Onan dealer for a full-size floor template to accurately locate the air inlet and outlet openings when installing the generator set on the floor of the vehicle. The template is illustrated in Appendix B [on page 63](#) at the end of the manual.
2. A ground clearance of at least 12 inches (305 mm) is recommended to reduce the amount of dust pulled in by the cooling fan, proper air flow, and the likelihood of blocking air flow by parking curbs, berms, or logs.
3. Shield the air inlet in the bottom of the genset from direct road splash when the genset is located in line with the road wheels. Body to ground mud flaps between generator set and tires may be required.
4. Do not duct generator set cooling air into the vehicle for heating.

⚠ WARNING
EXHAUST GAS IS DEADLY! Do not duct generator set cooling air into the vehicle for heating.

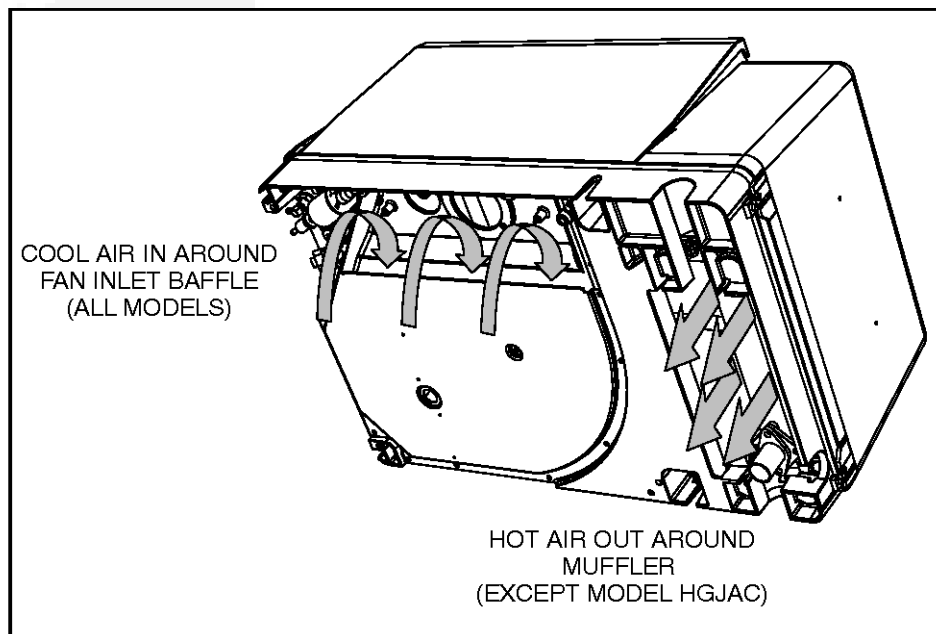


FIGURE 5. COOLING AIR FLOW INTO AND OUT OF GENERATOR SET

4 Exhaust Connections

The exhaust system must be gas-tight and designed to limit entry of exhaust gases into the vehicle.

WARNING

EXHAUST GAS IS DEADLY! To keep exhaust gases from entering the vehicle do not terminate the exhaust tailpipe underneath the vehicle or closer than specified to openings into the vehicle ([Figure 10](#)) or route it such that it is likely to be damaged ([Figure 11](#)). Use approved materials and parts only.

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.

4.1 Muffler - Models HGJAD/HGJAE

The muffler is mounted inside the generator set enclosure. It has a USDA (Forest Service) spark arrestor and meets RVIA EGS-1 construction requirements.

A generator set without a properly installed and maintained spark arresting exhaust system can cause a forest fire. It is illegal on federal lands. Liability for damage, injury and warranty expense due to the modification of the exhaust system or to the use of unapproved parts is the responsibility of the person performing the modification or installing the unapproved parts.

The muffler has a short adapter bolted to its outlet flange ([Figure 6](#)). Clamp the tail pipe to the adapter. See TAIL PIPE in this section regarding materials, clamps, support, routing and termination.

Alternatively, a tail pipe with elbow and flange can be bolted to the muffler flange to run straight out the tunnel in the front or the tunnel in the back of the generator set base. See the Outline Drawing ([Chapter 10](#)) for muffler flange dimensions. *Make sure to use a suitable flange gasket.* Use the hole shown on the drawing for the tail pipe hanger if the tail pipe runs out the front. See TAIL PIPE in this section regarding materials, clamps, support, routing and termination. *Do not route the tail pipe this way when the generator set is mounted on a combustible floor.*

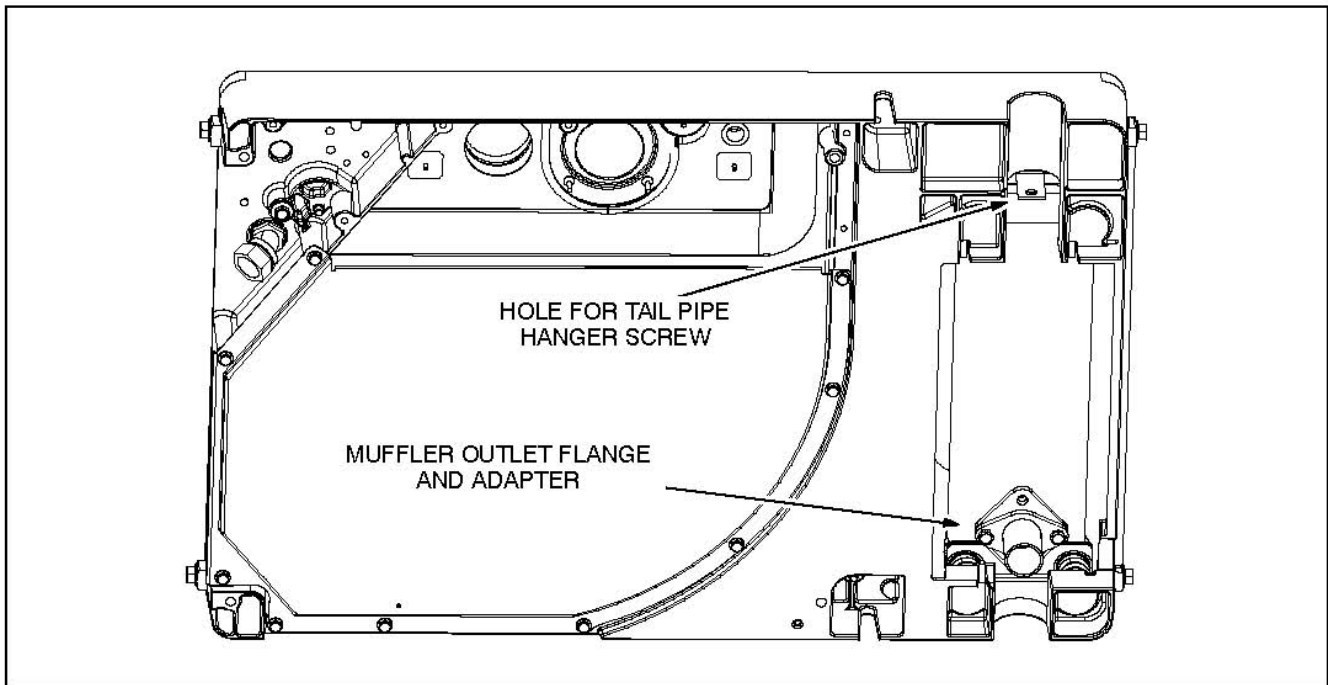


FIGURE 6. OUTLET FLANGE AND ADAPTER ON MODELS WITH INTERNALLY MOUNTED MUFFLERS

4.2 Muffler—Model HGJAF

[Figure 7](#) illustrates the exhaust outlet flange and typical muffler kits available from Onan.

The muffler must have a USDA (Forest Service) spark arrestor, meet RVIA EGS-1 requirements, be constructed of aluminized steel or material of equivalent corrosion resistance and be of welded or crimped construction. The spark arrestor may be integral to the muffler or an add-on.

A genset without a properly installed and maintained spark arresting exhaust system can cause a forest fire. It is illegal on federal lands. Liability for damage, injury and warranty expense due to the modification of the exhaust system or to the use of unapproved parts is the responsibility of the person performing the modification or installing the unapproved parts.

We recommend that you contact an Onan dealer for spark arresting mufflers that meet RVIA and USDA requirements. Side-mount and bottom-mount muffler kits are available from Onan, with front or back exhaust outlets. The kits include a USDA (Forest Service) spark screen for mounting in the end of the tail pipe.

Follow the instructions in the Onan kit when mounting the muffler. See TAIL PIPE regarding materials, clamps, support, routing and termination. Install the spark screen in accordance with the instructions in the kit.

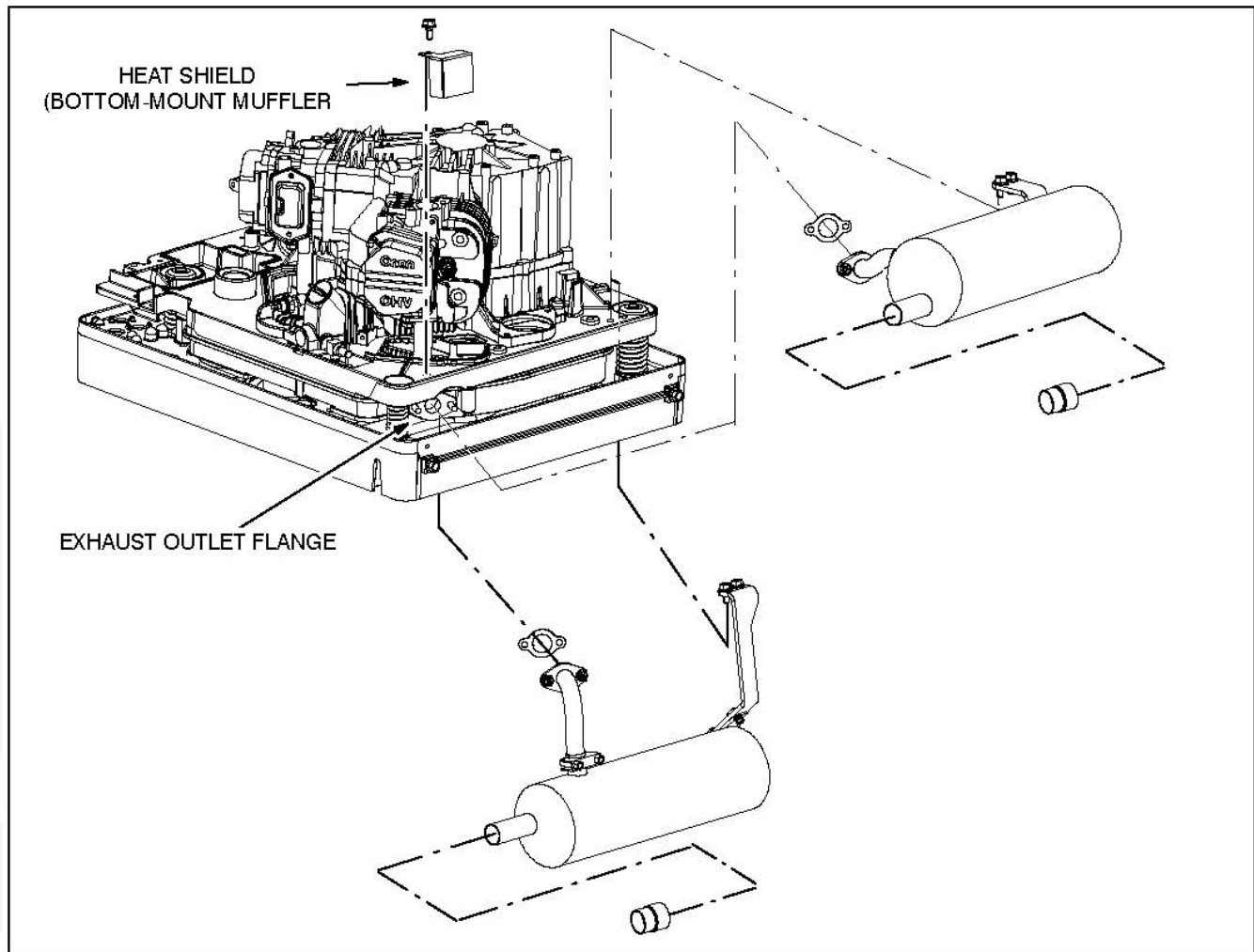


FIGURE 7. TYPICAL EXTERNAL MUFFLER KITS

4.3 Tail Pipe

⚠ WARNING

Beginning with Spec J, EPA Phase 3 and CARB Tier 3 product incorporates a catalyst which leads to subsequent higher exhaust gas temperatures. Due to higher exhaust gas temperatures, the installer must review and follow all guidelines for tail pipe installations, shielding and surrounding material requirements for compatibility.

1. Use 1-3/8 inch ID aluminized steel tubing or equivalent for the tail pipe. (Do not use flexible pipe. Flexible pipe is not gas tight or durable.)
2. Use U-bolt muffler clamps to connect sections of tail pipe. It is recommended that the overlapping pipe be slotted as shown in [Figure 8](#).
3. Use automotive-type tail pipe hangers every 2 to 3 feet (0.6 to 0.9 m). Attach the hangers to steel framework, not to wood or other combustible material.

4. Do not terminate the tail pipe underneath the vehicle. Extend it a minimum of 1 inch (25 mm) beyond the perimeter of the vehicle ([Figure 9](#)). Support the end of the tail pipe such that it cannot be pushed inward and up under the skirt of the vehicle.
5. Do not route the tail pipe underneath the oil drain or cooling air inlet.

⚠ WARNING

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

6. Do not route the tail pipe closer than 3 inches (76 mm) to combustible material vehicle body parts (wood, felt, cotton, organic fibers, fiberglass, plastic, or etc.) unless it is insulated or shielded. The temperature rise (above ambient) on adjacent combustible material must not exceed 117°F (65°C).
7. Do not route the tail pipe near fuel lines or fuel tanks.
8. Do not terminate the tail pipe such that it is closer than 6 inches (153 mm) to any opening into the vehicle interior (door, window, vent). See [Figure 10](#).
9. Do not connect the generator set to the vehicle engine exhaust system.

⚠ CAUTION

Interconnecting the engine exhaust systems will allow exhaust condensates and soot to migrate into the engine that is idle, causing engine damage.

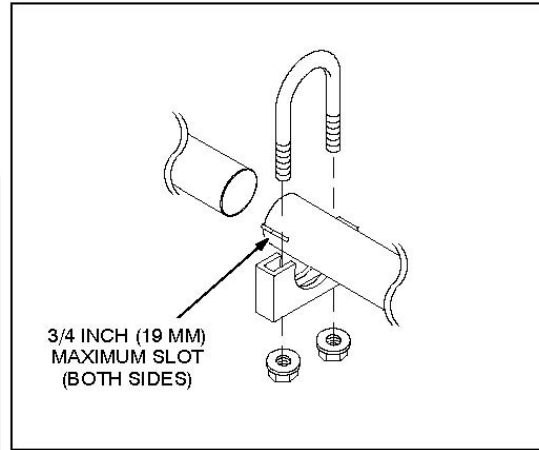


FIGURE 8. EXHAUST TAILPIPE CONNECTIONS

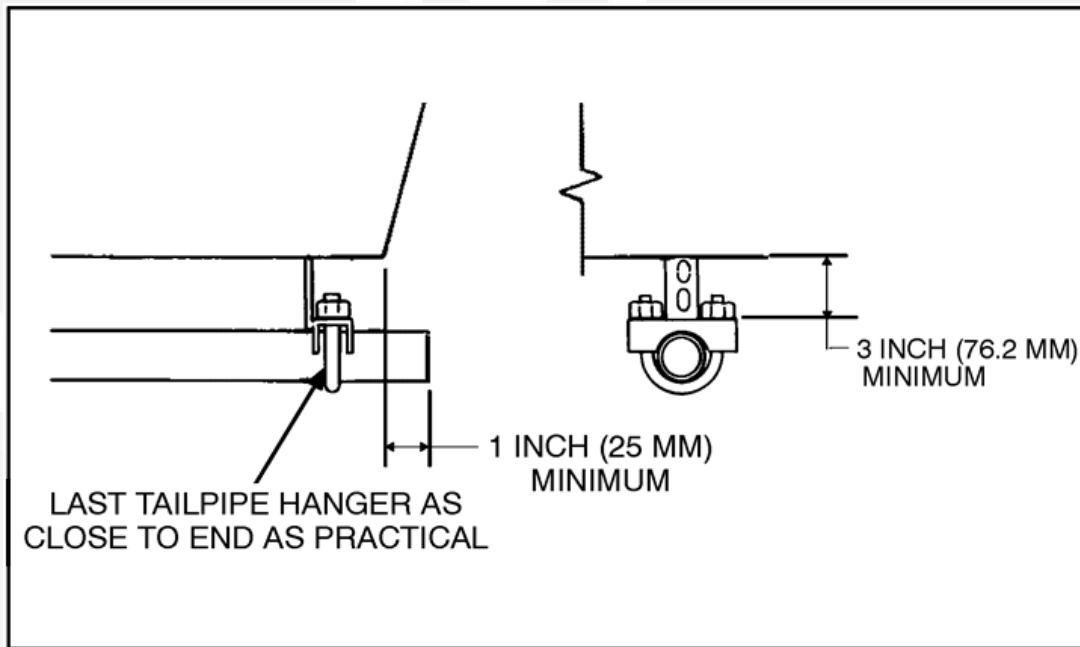
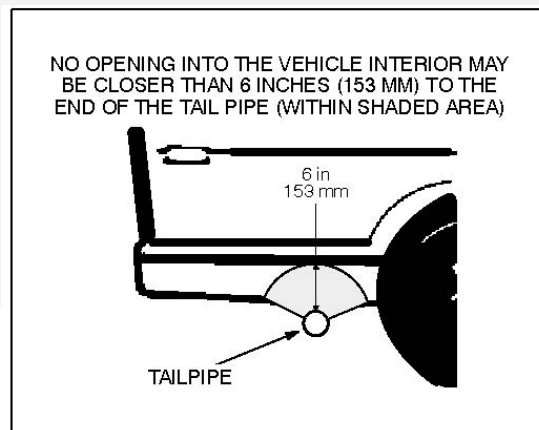


FIGURE 9. TERMINATING EXHAUST TAILPIPE



10. Route the tail pipe such that it is not likely to be struck when the vehicle is moving. Keep it out of the approach and departure angles of the vehicle and above the axle clearance line ([Figure 11](#)).
11. Make sure a tail pipe deflector will not cause excessive back pressure or interfere with removing a spark arresting screen, if so equipped.

⚠ CAUTION

Excessive back pressure can cause loss of performance and engine damage.

12. To keep rain out, terminate a vertical tail pipe ([Figure 12](#)) with a rain cap or bend that points towards the rear of the vehicle. Provide guards as necessary to prevent accidental contact with the hot tailpipe during normal use of the vehicle.
13. Exhaust back pressure cannot exceed 6 to 8 inches of water column (1/3 psi). Pressure is measured by drilling a hole located in the rear muffler outlet flange. Install a barb fitting in the hole. Using a u-tube manometer the difference of the water in the water column should be 6 to 8 inches (1/3 psi). After testing, remove barb fitting and weld a patch over test port hole.

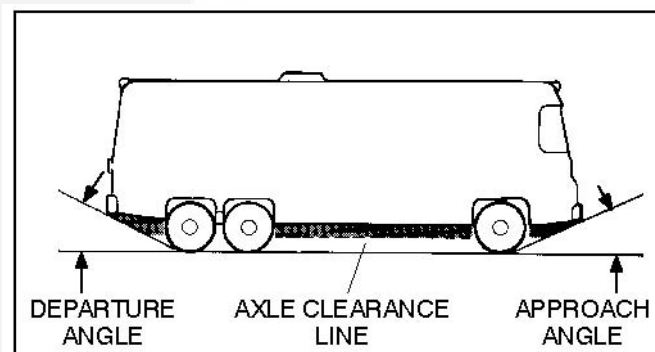


FIGURE 11. VEHICLE CLEARANCES

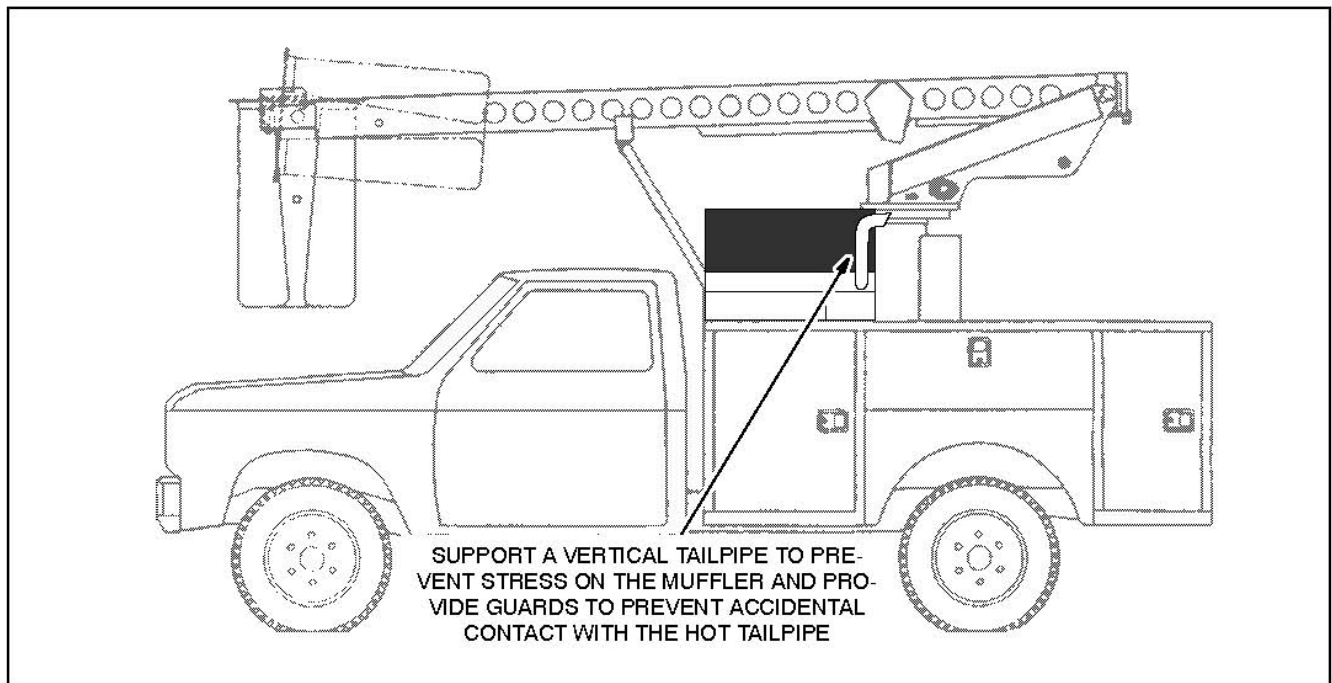


FIGURE 12. VERTICAL TAILPIPE

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5 Fuel Connections

See the Operator's Manual for recommended fuels and *Specifications* ([Chapter 10](#)) for fuel consumption.

⚠ WARNING

Gasoline and Propane are flammable and explosive and can cause severe personal injury or death — Do not smoke — Keep flames, sparks, pilot lights, switches, arc-producing equipment and all other ignition sources away from fuel, fuel components and areas sharing ventilation — Keep an ABC fire extinguisher handy.

⚠ CAUTION

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

5.1 Gasoline—Model HGJAD

NOTICE

The installer is responsible for meeting all CARB and EPA *evaporative emissions* requirements that may be applicable for the fuel system. Beginning January 1, 2011 all 50 states require evaporative law compliance.

NOTICE

Installation instructions for motorized vehicles utilizing existing vehicle tank.

5.1.1 Remote Fuel Pump Kit

These generator sets have an electronic fuel injection system supplied by a remote electric pump. Install only the pump kit available for use in the make and model of the vehicle in which the generator set is installed. Follow the installation instructions in the pump kit. [Figure 13](#) illustrates the wiring connector at the remote pump.

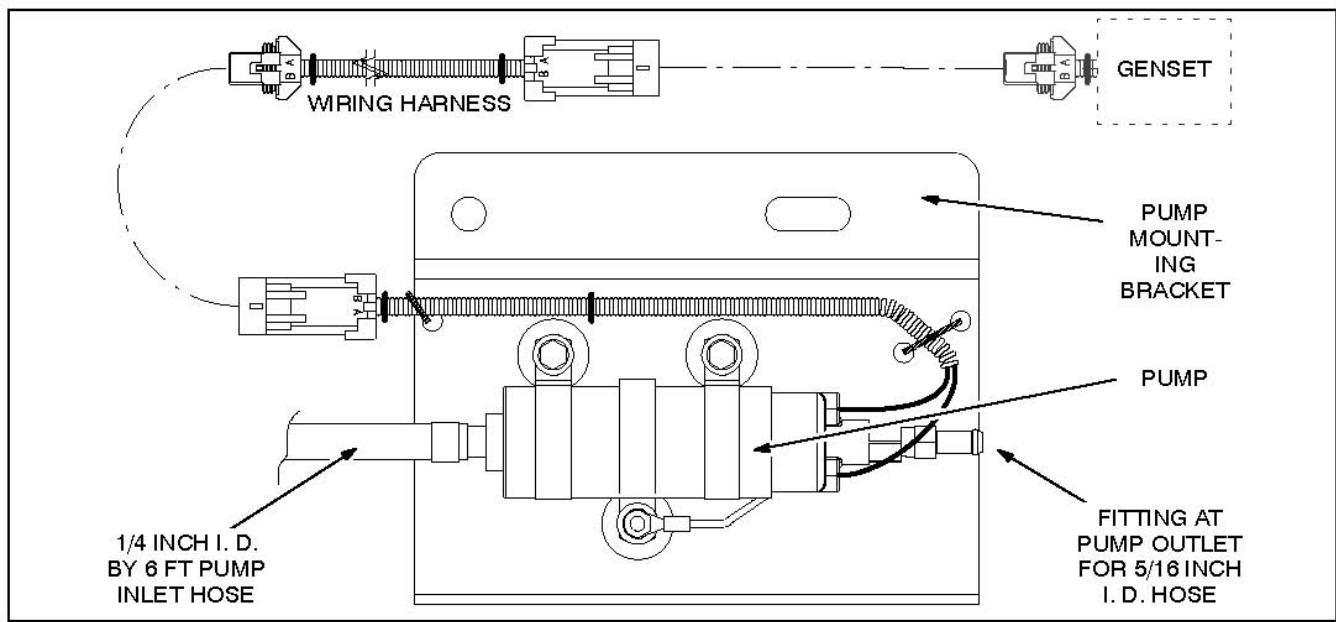


FIGURE 13. FUEL PUMP KIT

5.1.2 Fuel Connections

[Figure 15](#) illustrates the supply and return fuel fittings on the genset and [Figure 16](#) the type of hose clamps and hose beads required for fuel connections. Use stainless steel stepless ear clamps, Onan P/N 0503-1951-13 (Oetiker P/N 16700013).

⚠ CAUTION

When connecting fuel hoses, only use soap-free lubricants such as WD40, which runs through fuel without leaving residues that can clog fuel jets.

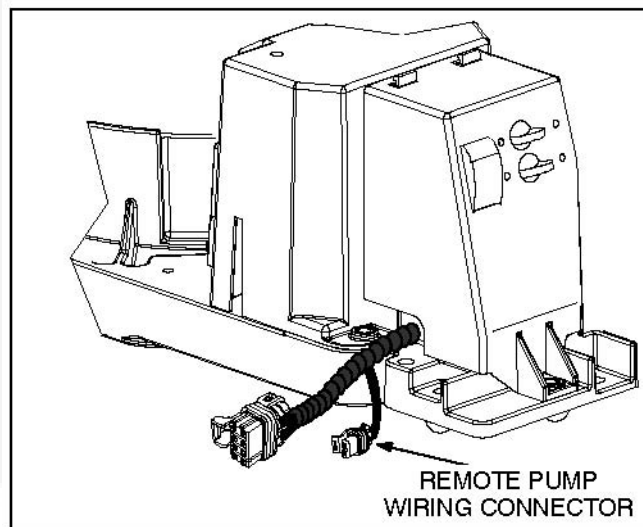


FIGURE 14. REMOTE PUMP WIRING CONNECTOR

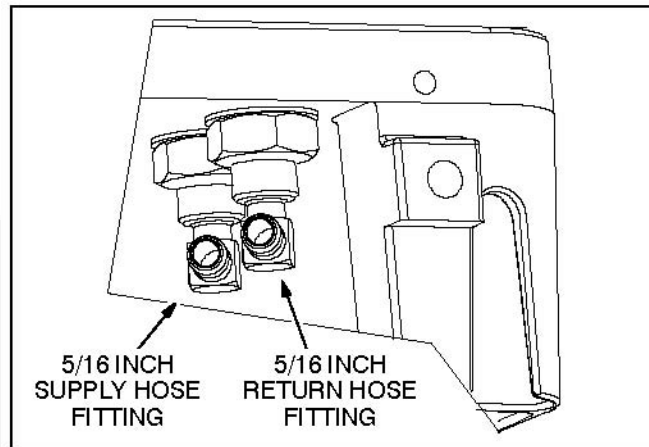


FIGURE 15. FUEL FITTINGS—LEFT END OF BASE

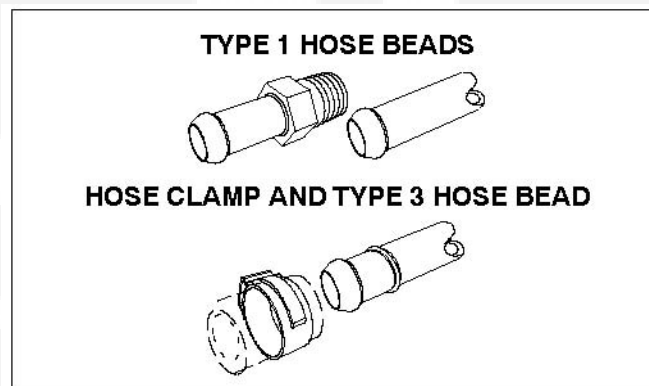


FIGURE 16. DOUBLE-FLARE SAE J1231 HOSE BEADS AND STEPLESS EAR CLAMP

5.1.3 Routing Fuel Lines

Route the supply and return lines side-by-side along bulkheads and frame members such that they are protected, *and at or above the top of the fuel tank to reduce siphoning if a line breaks or a hose comes off.* The entire length of a fuel line must be visible for inspection and accessible for replacement.

Support fuel lines to restrain movement and prevent chaffing or contact with sharp edges, electrical wiring and hot exhaust parts.

⚠ WARNING

Electric arcs can ignite gasoline leading to severe personal injury or death. Do not run wiring and fuel lines together.

Requirements for fuel line routing near propulsion engine and generator exhaust.

5.2 Gasoline—Models HGJAE/HGJAF

NOTICE

The installer is responsible for meeting all CARB and EPA *evaporative emissions* requirements that may be applicable for the fuel system. Beginning January 1, 2011 all 50 states require evaporative law compliance.

NOTICE

Installation instructions for motorized vehicles utilizing existing vehicle fuel tank.

5.2.1 Fuel Tank

Do not change or remove the fuel fill tube, fill limiter vent, vapor canister, vapor lines, filler cap or any other part of the chassis fuel system without the express approval of the vehicle chassis manufacturer. Modifications must conform with applicable sections of the Code of Federal Regulations, Titles 40 and 49, and other standards.

Onan requires 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.

The maximum fuel pump lift is 36 inches (914 mm). If the base of the generator set is more than 36 inches above the lowest fuel level in the tank an auxiliary pump must be used.

Terminate the genset fuel pickup above the vehicle engine pickup in the supply tank to keep the genset from running the vehicle out of fuel.

Connect 1/4 inch fuel line from vehicle fuel tank to generator set ([Figure 17](#)).

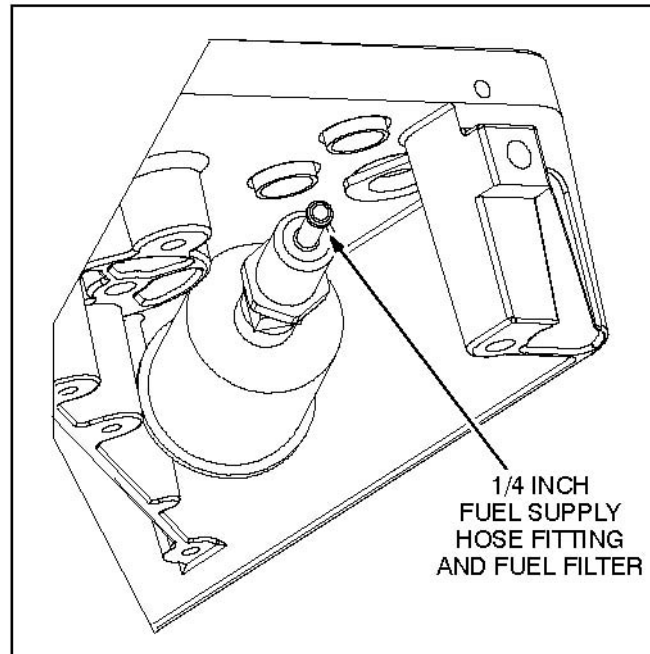


FIGURE 17. FUEL FITTING - LEFT END OF BASE

5.2.2 Fuel Lines

[Section 5.2.2](#) illustrates the fuel inlet fitting at the generator set.

5.2.3 Routing Fuel Lines

Route the fuel line along bulkheads and frame members such that it is protected, *and at or above the top of the fuel tank to reduce siphoning if a line breaks or a hose comes off.* The entire length of a fuel line must be visible for inspection and accessible for replacement.

Support fuel lines to restrain movement and prevent chaffing or contact with sharp edges, electrical wiring and hot exhaust parts.

⚠ WARNING

Electric arcs can ignite gasoline leading to severe personal injury or death. Do not run wiring and fuel lines together.

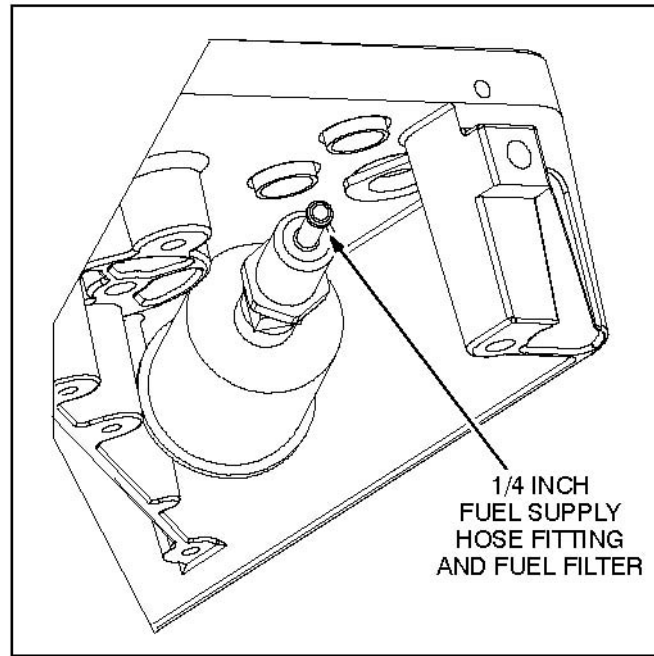


FIGURE 18. FUEL FITTING—LEFT END OF BASE

5.3 Gasoline Evaporative system installation

Evaporative generator sets are used in trailers, fifth wheel trailers and other non-motorized vehicles. This application requires a carbon canister, fuel tank, vapor hose and fuel return lines depending on generator set.

These instructions cover installation of the generator set fuel evaporative system provided for compliance with all 50 states evaporative regulations for small off-road equipment effective January 1, 2011. The instructions apply to the following Evaporative generator set models:

- 5.5HGJAA-600 - RV EFI
- 5.5HGJAA-1273 - RV EFI
- 7HGJAA-97 - RV EFI
- 5.5HGJAB-6755 - RV Carburetor
- 5.5HGJAB-7103 - RV Carburetor
- 7HGJAB-6756 - RV Carburetor
- 5.5HGJAE-6757 - Commercial Mobile Carburetor
- 7HGJAE-6758 - Commercial Mobile Carburetor
- 5.5HGJAD-6759 - Commercial Mobile EFI
- 7HGJAD-6760 - Commercial Mobile EFI

Completing the installation of the genset evaporative fuel system is required for all towable or similar generator set applications where on-board gasoline fuel storage is self-contained in the trailer equipment.

It is the responsibility of the towable equipment manufacturer OEM to complete the installation of the evaporative fuel system exactly as specified in the CARB EO & EPA certification for the Onan product being installed. These requirements are detailed in the procedure below. Any deviations from this installation procedure will forfeit the emission certification on the fuel system and transfer engine evaporative emission certification responsibility to the trailer equipment manufacturer/OEM per CFR 40 Part 1060.

If purchasing a complete or partial fuel system kit of components from a third party fuel system manufacturer, the requirements of the Onan installation manual shall be met and the system must be verified by the OEM & fuel system supplier as meeting these requirements before completing the installation.

Any questions regarding these installation instructions or evaporative emission certification should be directed to Cummins Power Generation for clarification.

5.3.1 System Components

The evaporative system consists of the fuel tank, carbon canister, generator set and connecting hoses. Gasoline vapors in the fuel tank accumulate in the carbon canister when the generator set is not running. They are drawn into the engine combustion chamber and burned while the generator set is operating.

5.3.2 Fuel Tank

NOTICE

The following specifications apply only to evaporative emissions performance. The installer is also responsible for the selection and installation of the fuel tank to meet other safety and performance requirements that may be applicable.

For compliance with evaporative emissions regulations, the fuel tank shall:

1. Be metal.
2. Have a 13 to 35 gallon capacity.
3. Have a permanently tethered cap.
4. Have cap that provides a vapor seal and that audibly signals that the vapor seal has been established (click or snap).
5. Have a roll-over vent valve with connection for 5/16 inch ID hose. This hose connects to the carbon canister.
6. Have a fill-neck and an anti-spit-back valve if it is a non top-fill tank.
7. Be constructed to meet the requirements of Section 393.67 (joints, fittings and threads) of the Federal Motor Carrier Safety Administration Regulations.
8. Have connections that meet the requirements of the following SAE standards, when applicable: J1231 (Formed Tube Ends for Hose Connections and Hose Fittings), J1508 (Hose Clamp Specifications), J2260 (Nonmetallic Fuel System Tubing with one or More Layers), J2044 (Quick Connector Specification for Liquid Fuel and Vapor/Emissions Systems), and J2599 (Fuel Filler Pipe Assembly Design Practice to Meet Low Evaporative Emission Requirements).

5.3.3 Carbon Canister

Use a Delphi carbon canister shown below. No other carbon canisters are acceptable.

Part Number	Description	Onan Part Number
17208238	3.1L, 196.5g working capacity	0159-1755
17208252	3.3L, 233.8g working capacity	0159-1754

Mount the canister in an acceptable orientation, any orientation except hose barbs pointing down is acceptable.

([Figure 19](#)) in accordance with its instructions.

Connect the 5/16 inch hose barb (identified by the fuel pump icon) to the hose from the fuel tank and the adjacent 3/8 inch hose barb to the hose from the generator set. See [Figure 20](#) or [Figure 23](#).

NOTICE

Use 5/16 inch hose for vapor lines. Use an SAE J2044 quick connect fuel fitting on the canister hose barb or use a soap-free lubricant such as WD40 to slip the hoses on the canister hose barbs. Secure the hoses with Oeitiker® ear-type clamps or equivalent.

To prevent dirt from entering the canister vent when it is mounted in a "dirty" location, connect the 5/8 inch hose barb to a hose terminated outside the living space of the vehicle at a location that is not exposed to road splash or dust. Alternatively, secure Onan Part Number 0148-1343 vent filter to the hose barb.

NOTICE

If generator set is more than 36 inches above fuel tank add low pressure pump if required. See [Figure 20](#)

⚠ CAUTION

Blockage of the canister vent or vent hose could lead to collapse of system components due to vacuum.

⚠ WARNING

Do not vent the canister into the vehicle or other confined space where the vapors could accumulate to a flammable level.

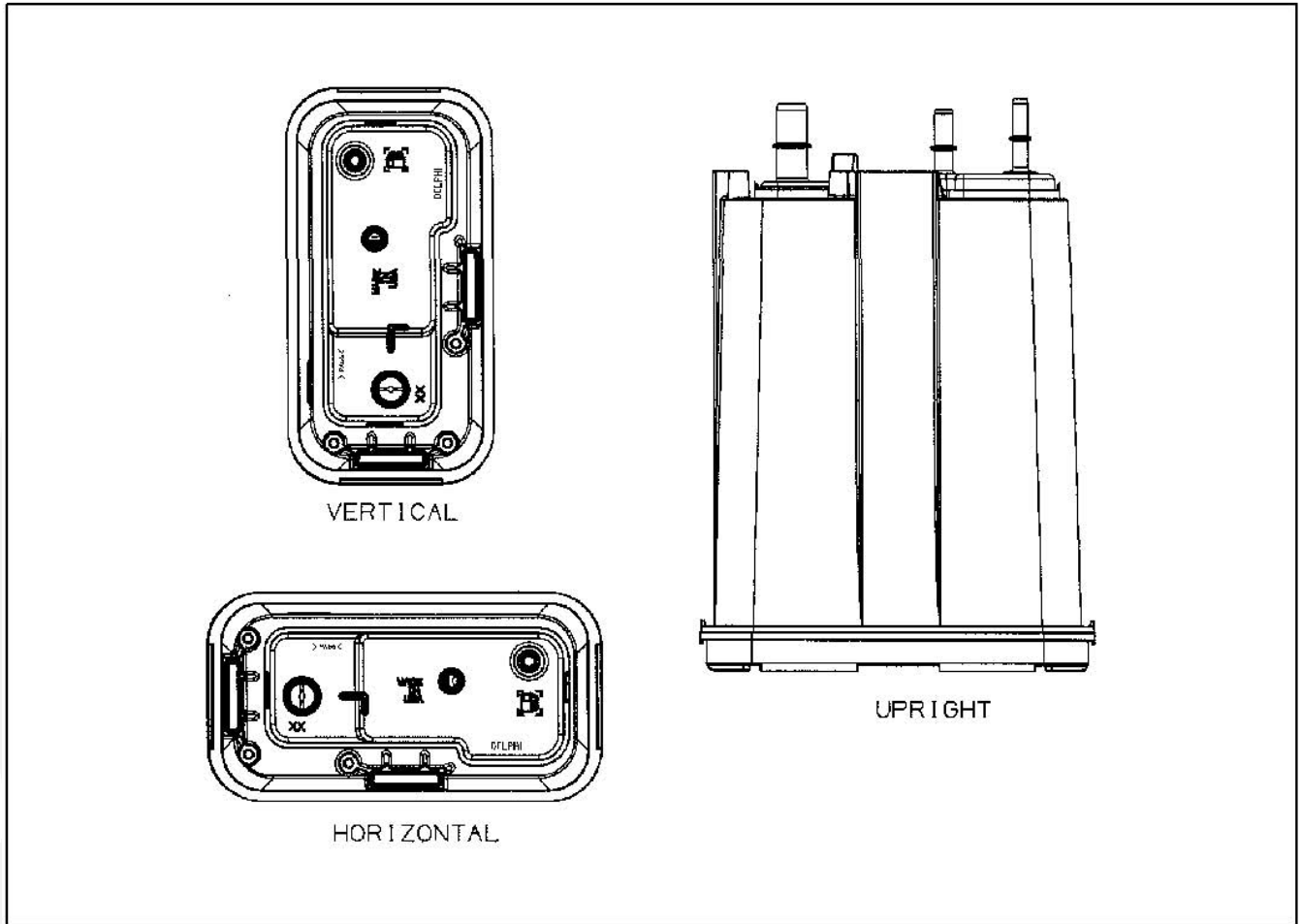


FIGURE 19. ACCEPTABLE CANISTER MOUNTING ORIENTATIONS



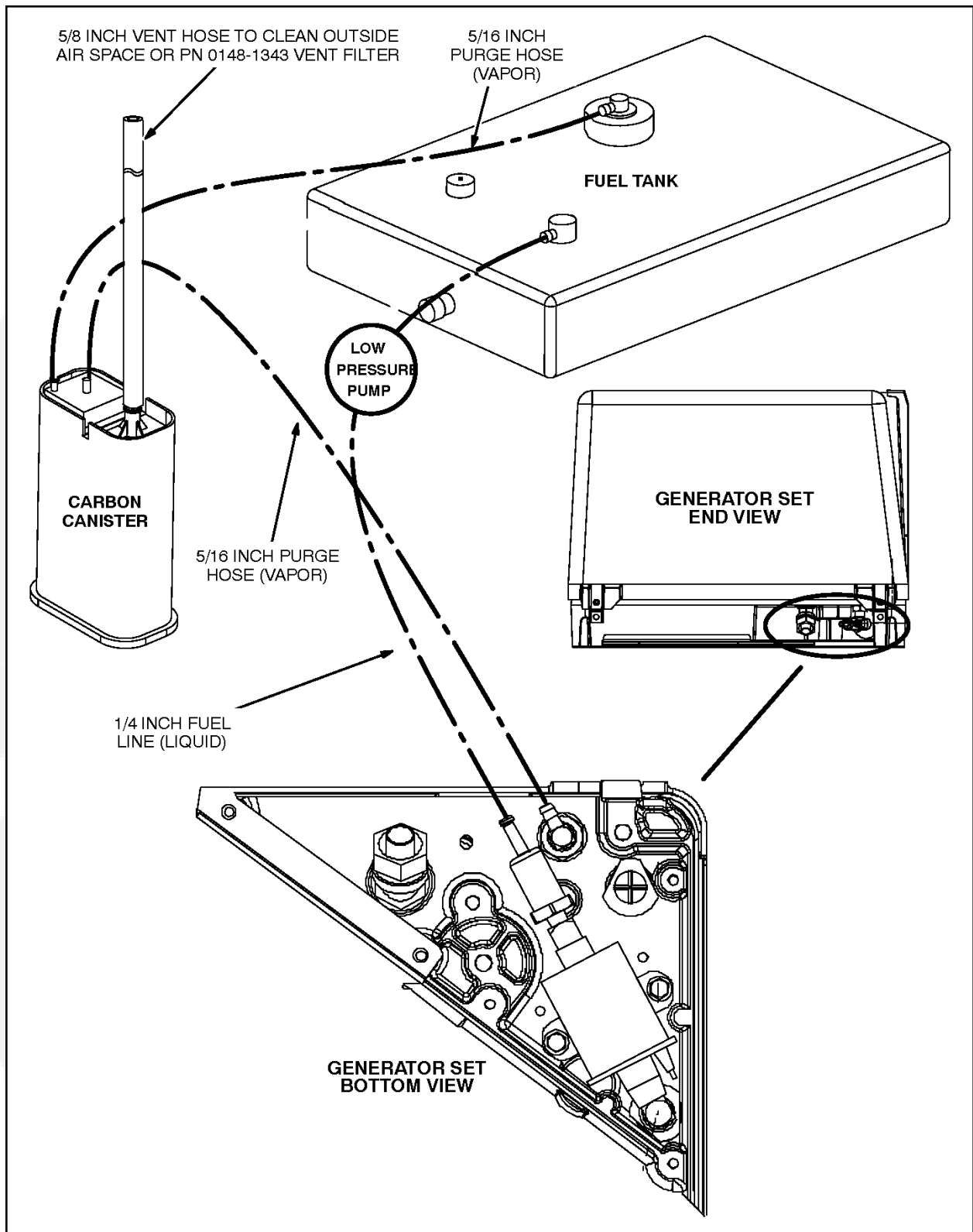


FIGURE 20. EVAPORATIVE COMPONENTS OF CARBURETOR SYSTEM

5.3.4 Carburetor Fuel System Generator Sets

Connect the 5/16 inch generator set hose barb to the vapor hose from the carbon canister. Connect the 1/4 inch generator set hose barb to the fuel supply hose from the fuel tank. See [Figure 20](#).

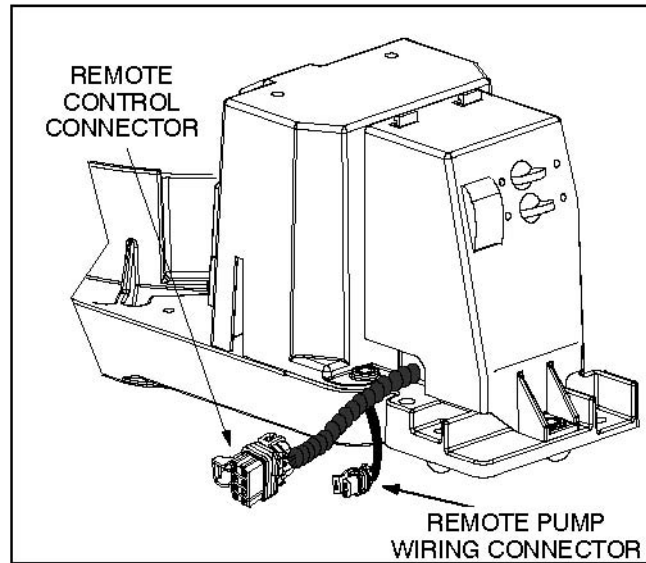


FIGURE 21. REMOTE PUMP WIRING CONNECTOR

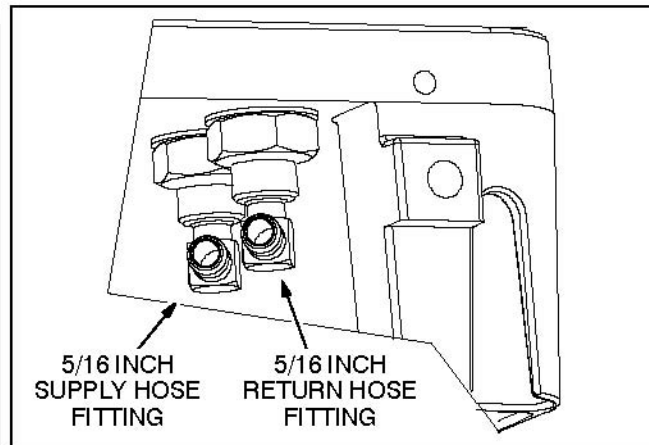


FIGURE 22. FUEL FITTINGS - LEFT END OF BASE

5.3.5 Fuel Injection (EFI) System Generator Sets

Connect the 5/16 inch generator set hose barb farthest from the corner of the base to the vapor purge hose from the carbon canister. Connect the other 5/16 inch hose barb to the fuel supply hose from the fuel pump. Connect the 1/4 inch hose barb to the fuel return hose. See [Figure 23](#).

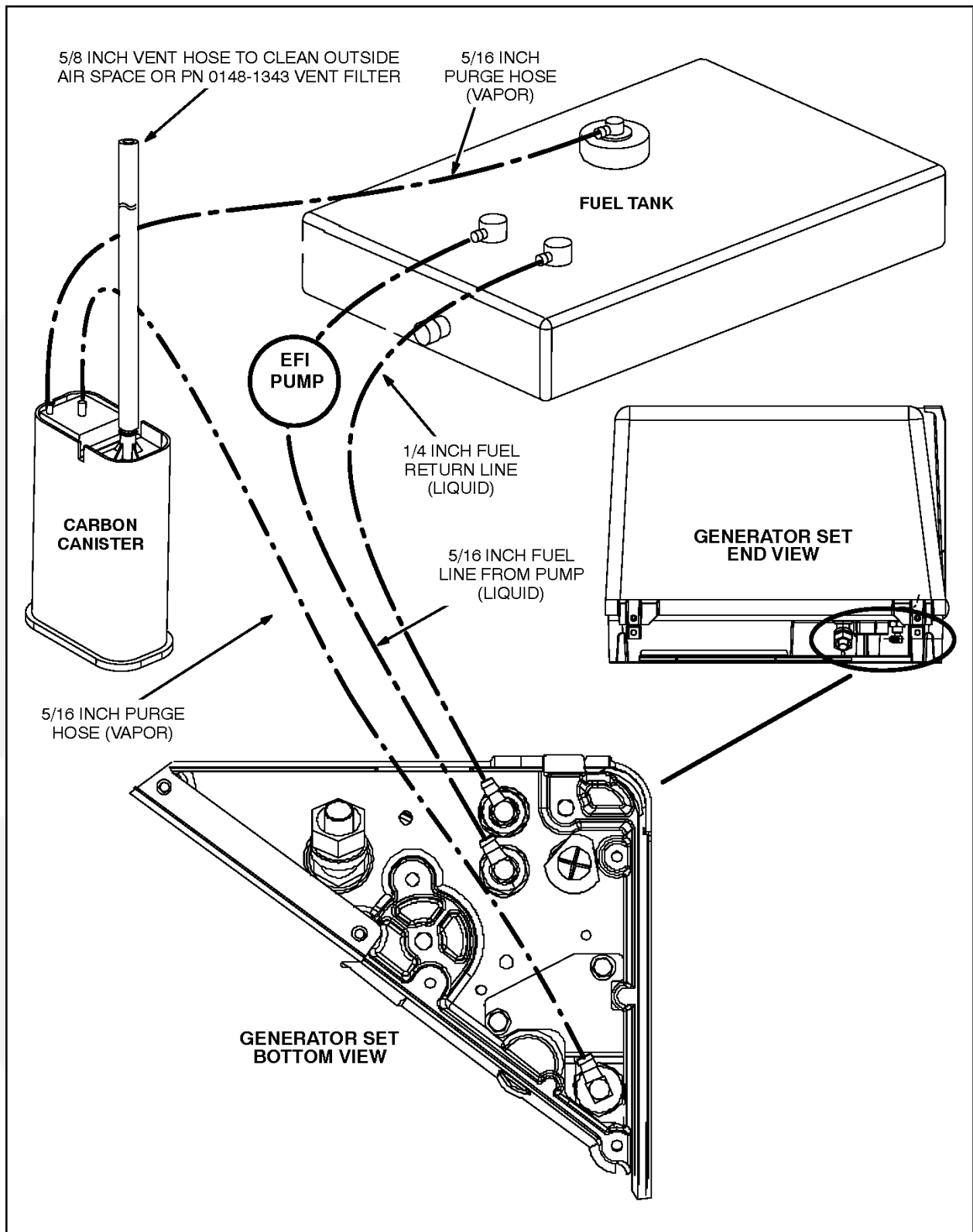


FIGURE 23. EVAPORATIVE COMPONENTS OF FUEL INJECTION (EFI) SYSTEMS

5.3.6 Fuel Hoses

The fuel hoses used inside the generator set are low permeation fuel hoses which meet Federal 50 state standards for gasoline evaporative emissions.

The vapor and liquid hoses connecting the fuel tank to the generator set, the fuel tank to the carbon canister and the carbon canister to the generator set must also be low permeation fuel hoses. Low permeation fuel hose is required to meet these requirements for gasoline generator sets sold in or used for commerce in all 50 states. The following hose materials are acceptable:

- Avon Automotive "Greenbar" (EO# G-5-018) SAE J30R7
- Avon Automotive "Greenbar 1200" (EO# C-U-05-009) SAE J30R12
- Gates 4219D (EO# C-U-06-002) SAE J30R9
- Gates Barricade (EO# Q-09-019)
- Kubota (EO# C-U-05-003) SAE J30R7
- Mark IV Automotive "Gen2" (EO# C-U-05-002) SAE J30R7
- Mark IV Automotive "Fluoroperm" (EO# C-U-07-017) SAE J30R9
- Mark IV Automotive "Dayperm" (EO# C-U-06-030) SAE J30R7
- Mark IV Automotive "Dayperm" (EO# G-05-016)
- Mold-Ex Division of SETi, Inc. "SETIFLEX II" (EO# G-05-017A) (EO# G-05-017) SAE J30R7
- Parker Hannifin Corp "Super Flex FL-7 series 389XX" (EO# Q-08-013)
- Veyance Technologies Inc. "goodyear Flexshield" (EO# Q-09-022)

Lubricants used when connecting fuel hoses can leave residues that can clog fuel jets. Only use "soap-free" lubricants such as WD40.

⚠ CAUTION

When connecting fuel hoses, only use soap-free lubricants such as WD40, which runs through with the fuel without leaving residues that can clog fuel jets.

5.4 Low Pressure Propane Supply (Vapor Withdrawal)

Use the Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58) as a guide for the installation of the propane fuel system. [Figure 24](#) illustrates the fuel fitting and regulator vent screen.¹

⚠ WARNING

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

The generator set must be connected to the *vapor withdrawal* fitting on the propane tank. The tank must have a manual shutoff valve and 2-stage pressure regulator. Adjust the regulator to deliver 9 to 13 inches (229 to 330 mm) Water Column (WC) pressure at the generator set.

⚠ WARNING

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

Use approved fuel line materials of 3/8-inch I. D. for runs up to 3 feet (0.9 m) and 1/2-inch I. D. for runs up to 15 feet (4.6 m).

Do not connect the generator set fuel supply line to any appliance fuel supply line. The generator set 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 generator set 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 propane appliance can lead to explosive accumulations of gas inside the vehicle and the danger of severe personal injury or death. Do not connect the generator set fuel supply line to any vehicle appliance supply line.

Gas lines must be routed away from hot exhaust parts and electrical wiring, be supported and protected to prevent chaffing, kinking and pinching and be accessible throughout for inspection and replacement.

⚠ WARNING

Sparks can ignite propane, leading to severe personal injury or death. Do not run electrical wiring and fuel lines together.

Upon completing the installation, fill the propane tank and test every joint and fitting in the propane 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.

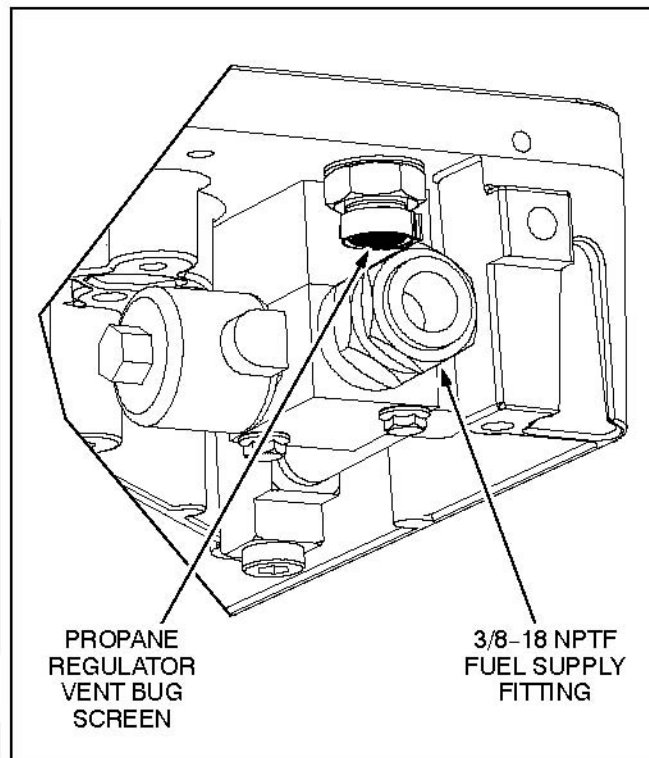


FIGURE 24. FUEL FITTING—LEFT END OF BASE

¹The generator set fuel regulator is vented to this location to prevent variations in compartment air pressure from affecting fueling and to vent propane outside the generator set compartment if the regulator diaphragm develops a leak.

5.5 High Pressure Propane Supply (Liquid Withdrawal)

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 propane fuel system. [Figure 25](#) illustrates the genset fuel fitting and [Figure 26](#) the fuel handling parts of a typical high pressure propane-fuel supply system.

⚠ WARNING

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

Connect the genset to the propane supply line with flexible hose that is non-conductive between its end fittings so that the fuel line cannot become an alternative path for cranking currents. The hose must be Listed for **350 psi working pressure** and **LP-Gas or Propane**.

Gas lines must be routed away from hot exhaust parts and electrical wiring, be supported and protected to prevent chaffing, kinking and pinching and be accessible throughout for inspection and replacement.

⚠ WARNING

Sparks can ignite propane, leading to severe personal injury or death. Do not run electrical wiring and fuel lines together.

Upon completing the installation, fill the propane tank and test every joint and fitting in the propane 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.

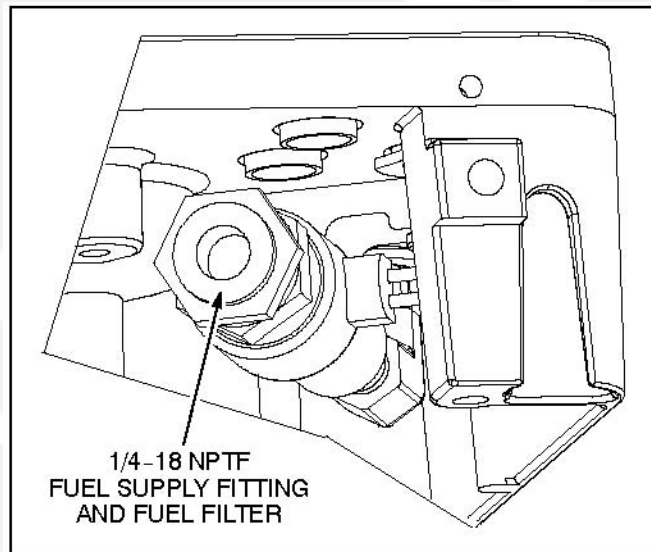


FIGURE 25. FUEL FITTING—LEFT END OF BASE

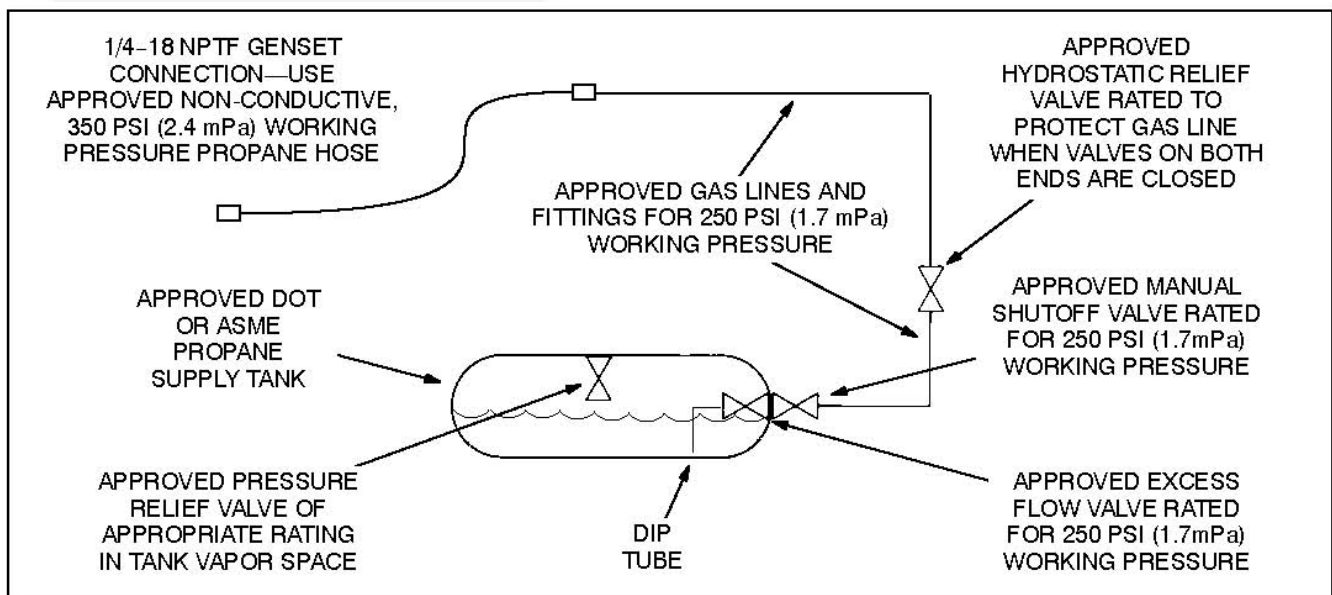


FIGURE 26. TYPICAL HIGH PRESSURE PROPANE SUPPLY SYSTEM (LIQUID WITHDRAWAL)

6 Electrical Connections

To prevent accidental starting of the generator set during installation, do not connect the battery cables at the battery until so instructed in STARTUP ([Section 9.3](#)).

⚠ WARNING

Accidental starting of the generator set can cause severe personal injury or death. Do not connect the starting battery until so instructed in STARTUP.

Also, when so equipped, the generator set must not be started before the hydraulic pump has been connected to the hydraulic system and filled with oil.

⚠ CAUTION

Running the generator set without oil in the hydraulic pump will destroy the pump.

6.1 AC Power Output Connections

The generator set is equipped with circuit breakers (30/30, 30/20, or 25) and 120 inch (3 m) long, 30A (10 AWG) leads (125° C rated insulation) for AC power output, which exit through a rain-tight 1/2 inch trade size conduit connector. See [Figure 27](#) for the connection diagrams and the location of the conduit connector. These leads can be terminated at a Main AC Distribution Panel where individual breakers can be provided for vehicle/trailer AC loads. If longer AC cable is required or code stipulates, a 4 x 4 junction box is mounted near the generator set. When extending this cable use the proper size wire for amperage and insulation temperature rated wire (typically 10 AWG) to the Main AC Distributor panel. For internal genset wiring see [Appendix A](#).

These generator sets are not reconnectable for voltages other than stated on the nameplate.

If the generator leads are replaced, their ampacity must be equal to or greater than the ampere rating marked on the genset circuit breakers. Unless 125° C rated wiring is available, heavier gauge wiring may be required to obtain the required ampacity.

6.1.1 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 equivalent 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.

6. Bond the generator set 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.

6.1.2 Connecting Shore Power

A vehicle with provisions for connecting shore power (utility) must have an approved device to keep the generator set and utility from being interconnected.

⚠ WARNING

Backfeed to shore power (utility) can cause electrocution or damage to equipment. Use an approved device to prevent the generator set from being interconnected with shore power.

6.2 Remote Control Connections

The generator set has an 8-pin connector for remote control connections ([Figure 28](#)). Wiring harnesses in several lengths are available separately for connections between the generator set and a remote control panel. For internal generator set control wiring see [Appendix A](#).

The 2-pin connector on Model HJGAD EFI generator sets is for the remote fuel pump.

Onan offers a variety of three remote control panels, as follows:

- Remote start/stop switch with status indicator light only ([Figure 29](#)).
- Remote start/stop switch with status indicator light and hour meter ([Figure 30](#)).
- Remote start/stop switch with status indicator light and DC voltmeter ([Figure 31](#)).

To make connections to a remote control panel:

1. Push the generator set remote control connector through the entrance hole in the side of the generator set housing and snap it together with the remote wiring harness connector mate.
2. Refer to [Figure 32](#) to fabricate the remote control panel and/or wiring harness when not using the accessories available from Onan. Mark the remote control end of each lead to identify the connector pin number at the generator set. Use insulated 18 AWG copper conductors for distances up to 30 feet (9 meters) and heavier gauge conductors for greater distances. Protect the wiring with full-length flexible sheathing.
3. Route control leads separately from AC power leads to reduce the possibility of erratic operation due to false induced signals.
4. Seal the opening where the leads enter the vehicle interior with silicone rubber or equivalent sealant to keep out exhaust gas.

 **WARNING**

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

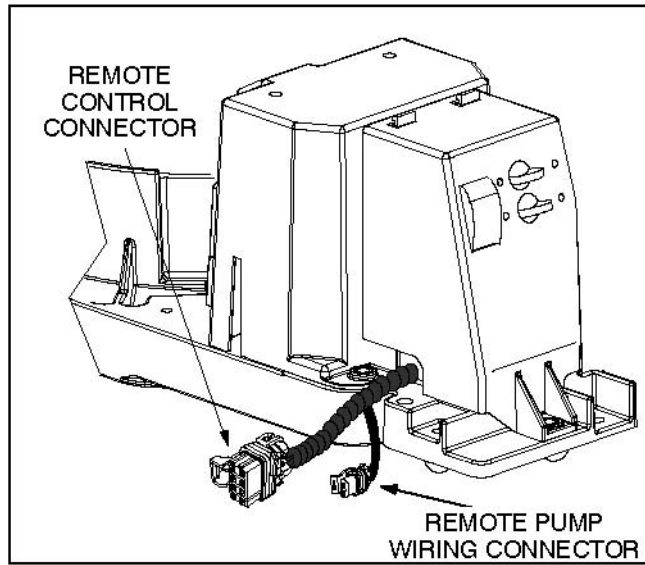


FIGURE 28. REMOTE CONNECTORS

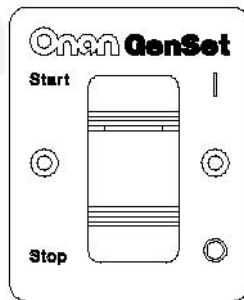


FIGURE 29. REMOTE SWITCH

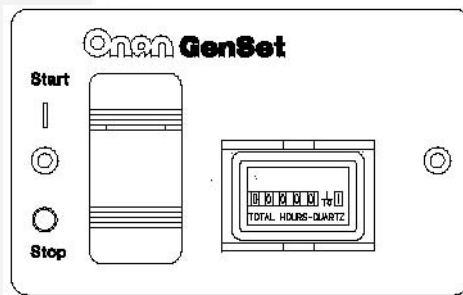


FIGURE 30. REMOTE SWITCH / HOUR METER

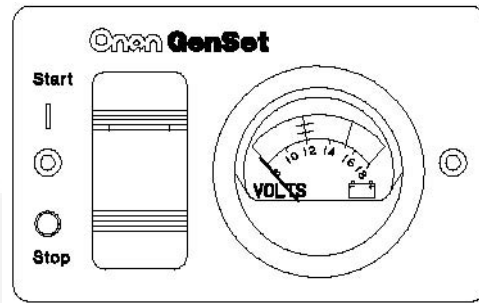


FIGURE 31. REMOTE SWITCH / DC VOLTMETER

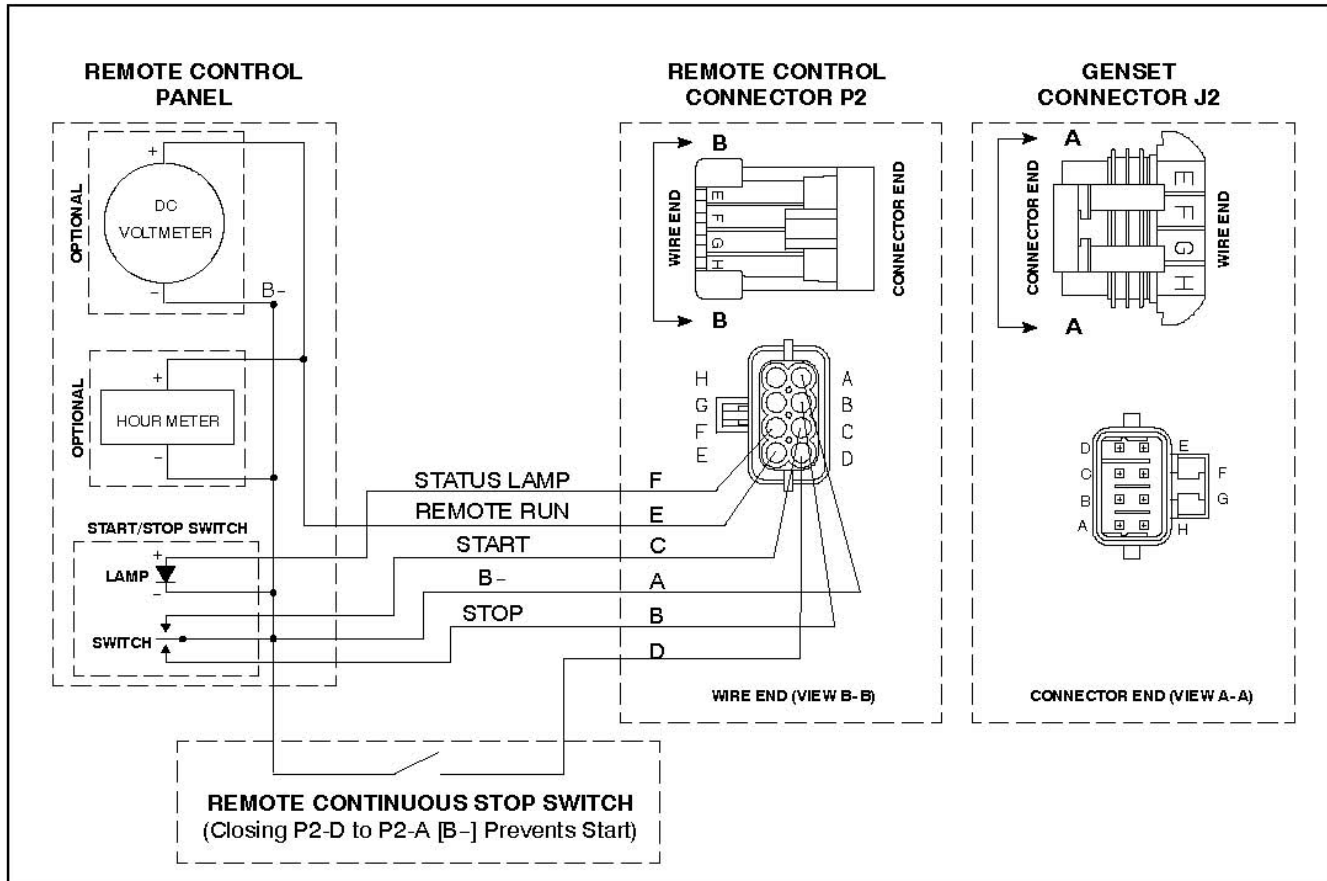


FIGURE 32. SCHEMATIC OF TYPICAL REMOTE CONTROL CONNECTIONS

6.3 Battery Connections

The generator set has a 12 VDC, negative-ground engine control and cranking system. See *Specifications* ([Chapter 10](#)) for the requirements for cranking batteries.

To prevent accidental starting of the generator set during installation, do not connect the battery cables at the battery until so instructed in [STARTUP](#) ([Section 9.3](#)).

⚠ WARNING

Accidental starting of the generator set can cause severe personal injury or death. Do not connect the starting battery until so instructed in STARTUP.

Also, when so equipped, the generator set must not be started before the hydraulic pump has been connected to the hydraulic system and filled with oil.

⚠ CAUTION

Running the generator set without oil in the hydraulic pump will destroy the pump.

6.3.1 Battery Charging

The generator set provides up to 5 amps of regulated battery charging current.

6.3.2 Battery Compartment

Batteries must be mounted in a compartment separate and away from spark-producing equipment including the generator set. A compartment must have openings of at least 1.7 square inches (11 square centimeters) at the top and bottom for ventilation of battery gasses. It should be located 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.

6.3.3 Battery Cables

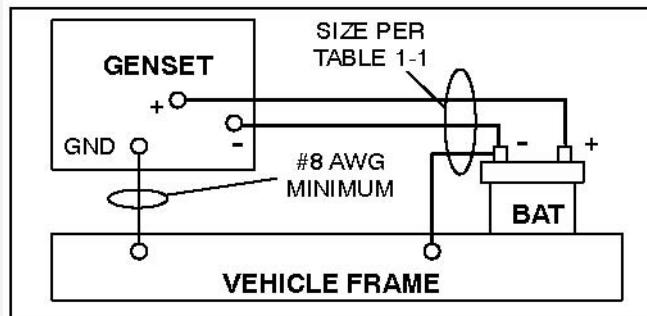
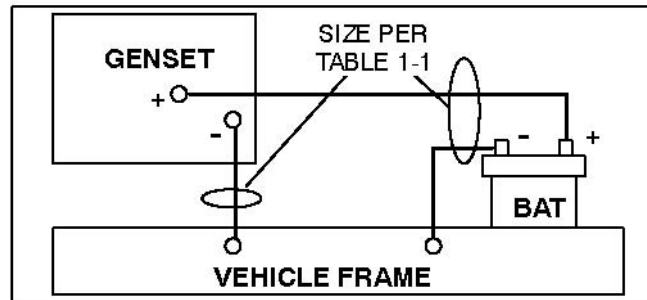
Size battery cables according to [Table 2](#). The current path between the generator set and the negative (-) battery terminal must also be able to carry full cranking current without causing excessive voltage drop. It is highly recommended that a full length cable be used to connect the generator set to the negative (-) battery terminal ([Figure 33](#)). Note also that codes may require a bonding conductor between the generator set and vehicle frame and between the battery and vehicle frame.

If the vehicle frame is used as the path between the negative (-) battery terminal and the generator set ([Figure 34](#)), all frame members in the path of battery cranking currents must have substantial cross sections. Riveted or bolted frame joints must not be used or it will cause corrosive conditions. A cable sized according to [Table 2](#) must be used to connect the frame to the designated negative (-) terminal on the generator set ([Figure 34](#)). ***The generator set mounting bolts are not considered adequate means for bonding the generator set to the vehicle frame, either for the purpose of carrying cranking currents or for complying with requirements for generator set/system grounding.***

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

TOTAL CABLE LENGTH* FEET (METERS)	CABLE SIZE AWG
0 to 45 (0 to 13.7)	2
46 to 60 (14 to 18.3)	0
61 to 80 (18.6 to 24.4)	000

* - * Battery cable lengths are total lengths from the battery to the generator back to the battery and when using a total of 1000CCA (Cold Cranking Amps).

**FIGURE 33. FULL LENGTH CABLE FROM BATTERY NEGATIVE (-) TERMINAL****FIGURE 34. VEHICLE FRAME AS PATH FROM BATTERY NEGATIVE (-) TERMINAL**

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.

6.3.4 Battery Cable Connections at Generator Set

Terminate the battery cables with ring terminals sized for 5/16-inch screws and connect them to the generator set as shown in [Figure 35](#) and [Figure 36](#). Secure the insulating boot on the positive (+) terminal and tie it to the battery cable with the tie wrap in the bag with the manuals.

Torque the positive (+) cable terminal to 4.5 lb-ft (6 N-m).

6.3.5 Generator Set (Equipment) Grounding Screw

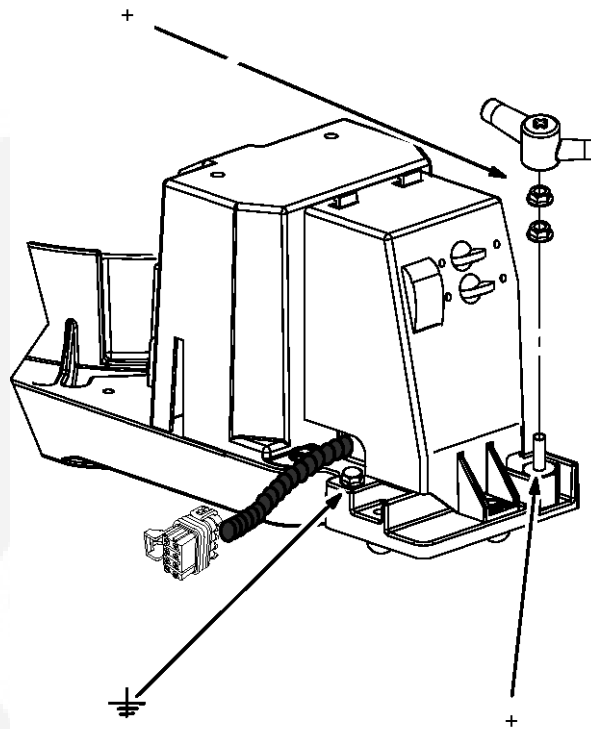


FIGURE 35. POSITIVE (+) CABLE TERMINAL

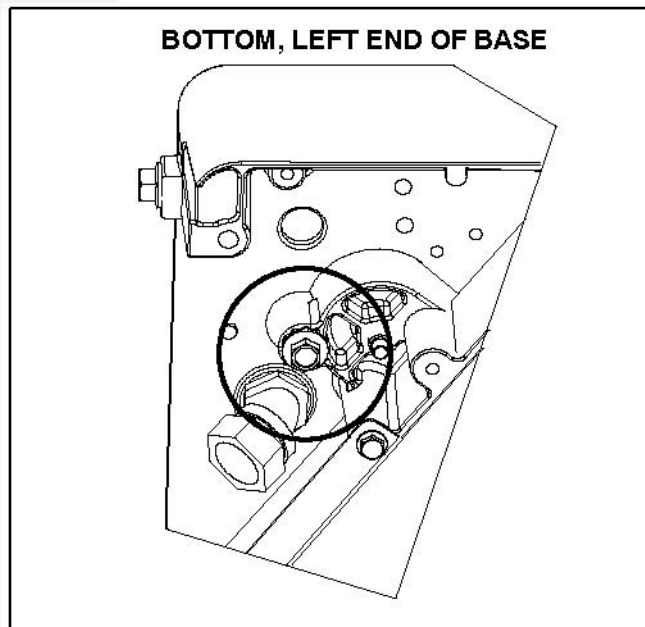


FIGURE 36. NEGATIVE (-) CABLE SCREW

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7 Hydraulic Pump Connections

[Figure 37](#) illustrates the hydraulic pump mounted atop the generator set. See *Specifications (Chapter 10)* regarding hose fittings, fluid specifications and inlet conditions.

WARNING

The high pressure spray from a leak in a hydraulic line or fitting can penetrate the skin, leading to possible blood poisoning — Wear safety glasses — Shut down the generator set before loosening or tightening fittings — Do not delay getting proper medical attention if exposed to high pressure oil spray.

CAUTION

Running the generator set without oil in the hydraulic pump will destroy the pump.

The generator set must not be started before the hydraulic pump has been connected to the hydraulic system and filled with oil.

CAUTION

The slightest amount of dirt in an hydraulic system can damage precisely machined internal components. Keep dirt out:

- *Thoroughly clean the outside of a fitting or cap before disconnecting or removing it.*
- *Keep all openings in components and hoses capped with proper JIC caps until just before making connections.*
- *Thoroughly flush hoses before connecting.*
- *Regularly replace the oil filter.*
- *Never reuse hydraulic fluid that has been drained from a system.*

When connecting hoses and starting up the system:

1. Consider that hoses shrink slightly in length and expand slightly in diameter under pressure.
2. There must be enough slack in the connected hoses to prevent strain due to movement of the pump.
3. Support, restrain and protect hydraulic hose as necessary to prevent chaffing.
4. Do not bend hose tighter than the hose manufacturer recommends.
5. Use wide-sweep 90-degree fittings where ever possible.
6. Always use two wrenches when tightening hydraulic fittings.
7. Install an SAE Class 4 filter (10 micron) in the system.
8. The system oil reservoir should be above the pump and the hose from the pump should slope up to the reservoir.
9. To fill the pump, first fill the reservoir and crank the engine with the spark plug cables disconnected from the spark plugs to prevent the engine from starting. Replenish oil in the reservoir as necessary.

10. The hydraulic system has air in it as long as there continues to be sharp metallic noise. While filling the system, run the genset only for a few seconds at a time until all air has been purged.

Onan part number 0121-0122-02 is available for generator sets with PTO or "spline engine" option. This pump bolts directly to the top of the engine through an access hole. The pump will produce 1.6 Gpm @ 2000 psi on the 5.5 kW and 1.8 Gpm @ 2000 psi on the 7.0 kW. If these flow rates are too high or low a pump can be purchased from a hydraulic supply company. The following specifications must be used:

- SAE AA 9 tooth spline
- CCW rotation
- High temperature or 'high line' shaft seal
- Side ports
- Select flow of pump @ 2400 rpm on 5.5 kW and 2900 rpm on 7.0 kW
- Do not select a pump that will flow more than 5 Gpm or the engine will be over powered

⚠ WARNING

DO NOT run the engine without oil in the pump

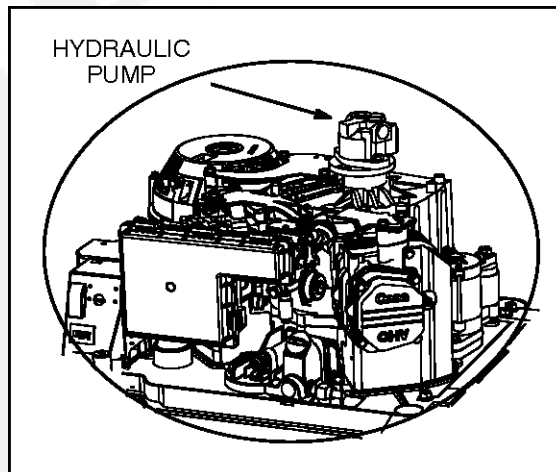


FIGURE 37. HYDRAULIC PUMP

8 Voltage Adjustments

8.1 Voltage Adjust Mode

Voltage is adjusted by means of the control switch. Rapidly pressing the switch to **START** 6 times *during the first minute after startup* puts the genset controller into *voltage set mode*. The *amber* status indicator lamp will begin blinking once every second to confirm voltage set mode. The *green* status indicator lamp will remain on. The controller resumes normal operating mode 20 seconds after the last adjustment.

NOTICE

If a fault shutdown occurs or the control switch is pressed to **STOP** during voltage set mode, voltage adjustments will not be stored in controller memory.

8.2 Adjusting Voltage

To adjust voltage:

1. Make sure that proper fuel, exhaust and battery connections have been made and that the engine has the proper level of oil. See the Operator's Manual. Complete **INSTALLATION REVIEW** ([Section 9.2](#)).
2. Disconnect all generator loads and connect accurate meters to measure AC volts and frequency.

⚠ WARNING

HAZARDOUS VOLTAGE! *Touching uninsulated live parts inside the generator set or connected equipment can result in severe personal injury or death. For your protection, stand on a dry wooden platform or rubber insulating mat, make sure your clothing and shoes are dry, remove jewelry from your hands and body and use tools with insulated handles.*

3. Start the generator set and let voltage and frequency stabilize for 5 to 10 seconds.
4. Rapidly press the control switch to **START** 6 times within 10 seconds.
5. **To adjust voltage up**, press the control switch to **START** and release quickly. Each time the switch is released, voltage will rise approximately 0.6 volt.
6. **To adjust voltage down**, press the control switch to **START** and release in approximately 2 seconds. Each time the switch is released, voltage will drop approximately 0.6 volt.
7. Normal operation will resume in 20 seconds after the last adjustment.

For voltage specifications refer to the Service Manual.

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9 Installation Review and Startup

9.1 Hot Air Recirculation Test

A representative installation of the generator set must be tested to determine that the generator set will not overheat due to recirculation of hot air back into the generator set.

9.1.1 Test Method

1. Complete a representative installation.
2. Set up a load bank to run the generator set at rated full-load or apply the maximum load available.
3. Conduct the test at a location where the ambient air temperature will remain between 60 and 100° F (16 and 38° C).

⚠ WARNING
<i>EXHAUST GAS IS DEADLY! Do not operate the genset when the vehicle is parked indoors or where exhaust can accumulate.</i>

4. Measure temperatures with thermocouples not heavier than No. 24 AWG (0.21 mm²).
 - a. Measure generator set inlet air temperature with one thermocouple tied in the middle of the inlet air grille ([Figure 38](#)).
 - b. Measure ambient air temperature with a shielded thermocouple within 4 feet (1.2 meters) of the genset and at approximately the same height. Make sure the thermocouple will not be affected by warm air discharged from the generator set or by sunlight. Use 2-inch diameter white PVC piping at least 6 inches long as a thermocouple shield.
5. Close all compartment doors and run the generator set at full-load for at least an hour. Record temperatures at 10 minute intervals until they stabilize. Temperature is considered stable when there is no change in three consecutive readings. [Table 3](#) illustrates how the data can be arranged for recording and analysis.

TABLE 3. TEMPERATURE DATA

THERMOCOUPLE LOCATION	TEMPERATURE C° (F°)				
	Time Of Reading				
	1	2	3	4	5
AMBIENT AIR					
INLET AIR					

9.1.2 Test Requirement

Run the generator set with the most load available for an hour or so until temperature readings stabilize (each reading is plus or minus 3 degrees) not rising or falling. The best scenario is temperature ambient and temperature inlet are identical. The difference in readings should not exceed 25° F (14° C). A rise in inlet air temperature indicates hot air recirculation. If the rise exceeds the requirement, steps must be taken to reduce recirculation to an acceptable level. Review VENTILATION ([Section 3.4](#)).

⚠ CAUTION

High ambient operating temperatures could reduce maximum genset power output if the air temperature rise measured in this test is on the high end of the acceptable range.

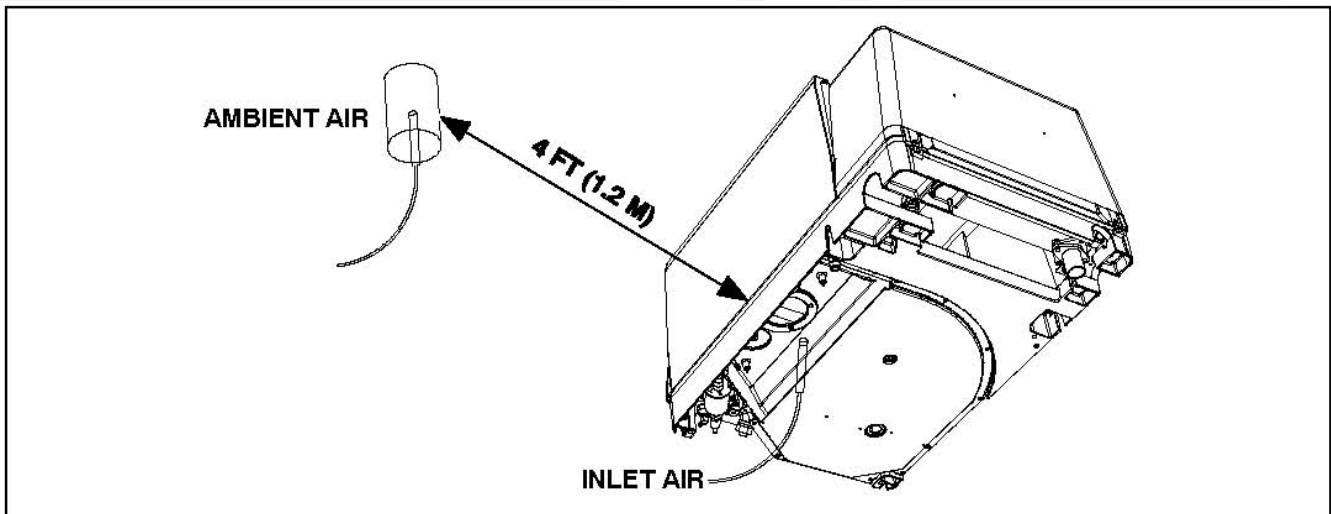


FIGURE 38. THERMOCOUPLE LOCATIONS FOR HOT AIR RECIRCULATION TEST

9.2 Installation Review

Before starting the generator set 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 generator set easily accessible for starting and stopping the generator set and resetting the circuit breaker?
- Is there easy access for checking and adding engine oil, replacing the spark plugs and changing the air filter?
- Is the generator set 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 tail pipe connections tight and all hangers and support straps secure?
- Does the tail pipe 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 generator set located outside the vehicle interior or separated by approved vapor- and fire-resistive 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 been installed in a ventilated compartment isolated from the generator set?
- 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?
- Have the fuel lines been secured at sufficiently close intervals to prevent chaffing and contact with sharp edges, electrical wiring and hot exhaust parts?
- **Fuel Injected Models** - Has the fuel pump been installed in accordance with the instructions in the kit? *Has a fuel return line been provided?*
- Has the HOT AIR RECIRCULATION TEST been conducted on a representative installation with acceptable results?

9.3 Startup

WARNING

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

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 — Keep flames, sparks, pilot lights, switches, arc-producing equipment and all other ignition sources away.

Read the Operator's Manual and perform the maintenance and pre-start checks instructed. *Check the oil level and fill as necessary.*

Recheck all fuel connections for tightness. On gasoline models check for leaks by priming the fuel system in accordance with the genset Operator's Manual. Fix all leaks before starting the generator set.

WARNING

Gasoline is flammable and explosive and can cause severe personal injury or death. Stop priming immediately if you smell gasoline or see fuel leaking. Clean up spilled fuel and ventilate the area before starting the generator set or vehicle.

Start and operate the generator set, following all the instructions and safety precautions in the Operator's Manual. Check for fuel and exhaust leaks and unusual noises while the generator set is running under full and intermediate loads. Do not place the generator set in service until all fuel and exhaust leaks have been fixed and operation is satisfactory.



10 Specifications (HGJAD and HGJAE)

	GASOLINE MODELS				
	7.0 HGJAD	7.0 HGJAE	5.8 HGJAD	5.5 HGJAD	5.5 HGJAE
GENERATOR: 2-Pole Revolving Field, 2-Bearing, Self-Excited, 1-Phase, Vertical Shaft, Capped Digital Voltage Regulation					
Power (1.0 PF)	7000 watts		5800 watts	5500 watts	
Frequency	60 Hertz		50 Hertz	60 Hertz	
1-Ph, 4-Wire V/A	120 / 240 Volts, 29.2 Amps		120 / 240 Volts, 22.9 Amps		
1-Ph, 2-Wire V/A	120 Volts, 58.3 Amps		230 Volts, 25.2 Amps	120 Volts, 45.8 Amps	
3-Ph V/A	120 / 240 Volts, 16.8 Amps		120 / 240 Volts, 12 Amps		
Speed	3600 rpm		3000 rpm	3600 rpm	
FUEL CONSUMPTION:					
No load	0.43 gph (1.6 l/h)		0.34 gph (1.3 l/h)		
Half load	0.70 gph (2.7 l/h)	0.73 gph (2.8 l/h)	0.58 gph (2.2 l/h)		0.60 gph (2.3 l/h)
Full load	1.13 gph (4.3 l/h)	1.22 gph (4.6 l/h)	0.89 gph (3.4 l/h)		0.95 gph (3.6 l/h)
ENGINE: Air-Cooled, 4-Cycle Spark-Ignited, OHV, 90° V Twin Cyl, Vertical Shaft					
Fueling Method	SFI ¹	Carburetor	SFI ¹		Carburetor
Governor	Digital	Mechanical	Digital		Mechanical
Speed	2880 rpm		2400 rpm		
Bore	3.15 in (80 mm)				
Stroke	2.56 in (65 mm)				
Displacement	39.8 in ³ (653 cc)				
Comp. Rati	8.0 : 1				
Oil Capacity	2.0 quart (1.8 l)				
Valve Lash (Cold)	0.004 in (0.10 mm), Intake & Exhaust				
Spark Plug	18-25 lbs-ft (23-32 N-m)				
Ignition Timing	20° BTDC, non-adjustable magneto				
Magneto Air Gap	0.012 in (0.3 mm)				
Spark Plug Gap	0.025 in (6-7 mm)				
HYDRAULIC PUMP:	Fixed-displacement gear pump—1.8 gpm @ 2500 psi		Fixed-displacement gear pump—1.6 gpm @ 2500 psi		
DC SYSTEM:					
Battery Voltage	12 volts				

	GASOLINE MODELS				
	7.0 HGJAD	7.0 HGJAE	5.8 HGJAD	5.5 HGJAD	5.5 HGJAE
Battery Charging	2 amps regulated				
Min. Battery CCA	450 @ 0° F (-18° C)				
INSTALLATION:					
Exhaust O. D.	1-1/4 in				
Max. Exhaust Back Pressure	-				
Fuel Supply Connection	5/16 in. SAE J1231 Type 1	1/4 in. SAE J1231 Type 1	5/16 in. SAE J1231 Type 1		1/4 in. SAE J1231 Type 1
Fuel Return Connection	5/16 in. SAE J1231 Type 1	-	5/16 in. SAE J1231 Type 1		-
Hydraulic Fluid	Transmission or Petroleum-Based Hydraulic Fluid—Operating Viscosity: 80-1000 SSU—Maximum Start-Up Viscosity: 4000 SSU				
Hydraulic Pump Inlet Conditions	Not to exceed 5 in Hg Vacuum or 20 psi Pressure				
Hydraulic Pump Connections Outlet Inlet	3/4-16 UNF-2B SAE 7/8-14 UNF-2B SAE				
Noise dB(A) ²	66	67	66		67
Weight	299 lb (136 Kg)			288 lb (131 Kg)	
Compartment (H x D x W) ³	HGJAD/HGJAE: 17.2 in x 23.2 in x 34.6 in (438 mm x 589 mm x 879 mm)				
1. Sequential Multiport Fuel Injection 2. Measurements @ 10 ft (3 m) in a typical installation, under an 4 kW load. 3. With 1/2 in. clearances. See the Installation Manual for additional considerations when sizing the genset compartment.					

	LPG MODELS			
	6.5 HGJAD	6.5 HGJAE	5.5 HGJAD	5.5 HGJAE
GENERATOR: 2-Pole Revolving Field, 2-Bearing, Self-Excited, 1-Phase, Vertical Shaft, Capped Digital Voltage Regulation				
Power (1.0 PF)	6500 watts		5500 watts	
Frequency	60 Hertz			
1-Ph, 4-Wire V/A	120 / 240 Volts, 27 Amps		120 / 240 Volts, 22.9 Amps	
Speed	3600 rpm			
FUEL CONSUMPTION:				
No load	2.2 lbs/h (1.0 kg/h)		1.8 lbs/h (0.8 kg/h)	
Half load	3.9 lbs/h (1.8 kg/h)		3.3 lbs/h (1.5 kg/h)	
Full load	5.3 lbs/h (2.4 kg/h)		4.6 lbs/h (2.1 kg/h)	

	LPG MODELS			
	6.5 HGJAD	6.5 HGJAE	5.5 HGJAD	5.5 HGJAE
ENGINE: Air-Cooled, 4-Cycle Spark-Ignited, OHV, 90° V Twin Cyl, Vertical Shaft				
Fueling Method	Air/Fuel Mixer			
Governo	Mechanical			
Speed	2880 rpm		2400 rpm	
Bore	3.15 in (80 mm)			
Stroke	2.56 in (65 mm)			
Displacement	39.8 in ³ (653 cc)			
Comp. Rati	8.0 : 1			
Oil Capacity	2.0 quart (1.8 l)			
Valve Lash (Cold)	0.004 in (0.10 mm), Intake & Exhaust			
Spark Plu	18-25 lbs-ft (23-32 N-m)			
Ignition Timing	20° BTDC, non-adjustable magneto			
Magneto Air Gap	0.012 in (0.3 mm)			
Spark Plug Gap	0.025 in (6-7 mm)			
HYDRAULIC PUMP:	Fixed-displacement gear pump—1.8 gpm @ 2500 psi		Fixed-displacement gear pump—1.6 gpm @ 2500 psi	
DC SYSTEM:				
Battery Voltage	12 volts			
Battery Charging	10 amps regulated			
Min. Battery CCA	450 @ 0° F (-18° C)			
INSTALLATION:				
Exhaust O. D.	1-1/4 in			
Max. Exhaust Back Pressure	-	35 in (889 mm) WC	-	35 in (889 mm) WC
LPG Vapor: Connection Pressure	3/8-18 NPTF 9-13 in (228-330 mm) WC			
LPG Liquid: Connection Pressur	1/4-18 NPTF Tank Pressure			
Hydraulic Fluid	Transmission or Petroleum-Based Hydraulic Fluid—Operating Viscosity: 80-1000 SSU—Maximum Start-Up Viscosity: 4000 SSU			
Hydraulic Pump Inlet Conditions	Not to exceed 5 in Hg Vacuum or 20 psi Pressure			
Hydraulic Pump Connections Outlet Inlet	3/4-16 UNF-2B SAE 7/8-14 UNF-2B SAE			
Noise dB(A) ¹	67	75	67	75
Weight	299 lb (136 Kg)	299 lb (136 Kg)	288 lb (131 Kg)	288 lb (131 Kg)
Compartment (H x D x W) ²	HGJAD/HGJAE: 17.2 in x 23.2 in x 34.6 in (438 mm x 589 mm x 879 mm)			

	LPG MODELS			
	6.5 HGJAD	6.5 HGJAE	5.5 HGJAD	5.5 HGJAE
1. Measurements @ 10 ft (3 m) in a typical installation, under an 4 kW load. 2. With 1/2 in. clearances. See the Installation Manual for additional considerations when sizing the genset compartment.				



Appendix A. Wiring Diagram

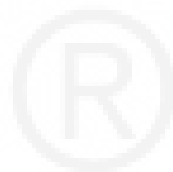
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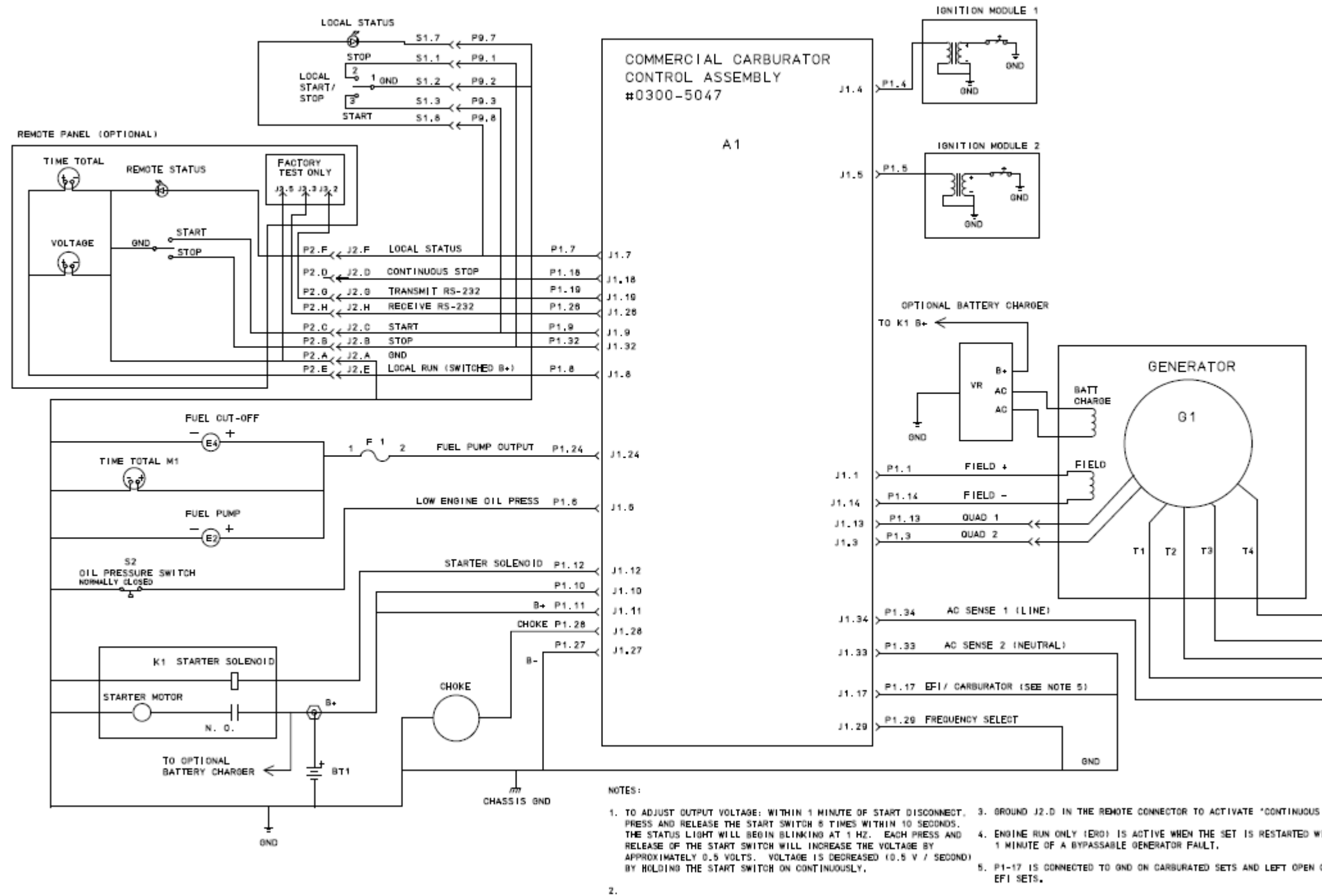




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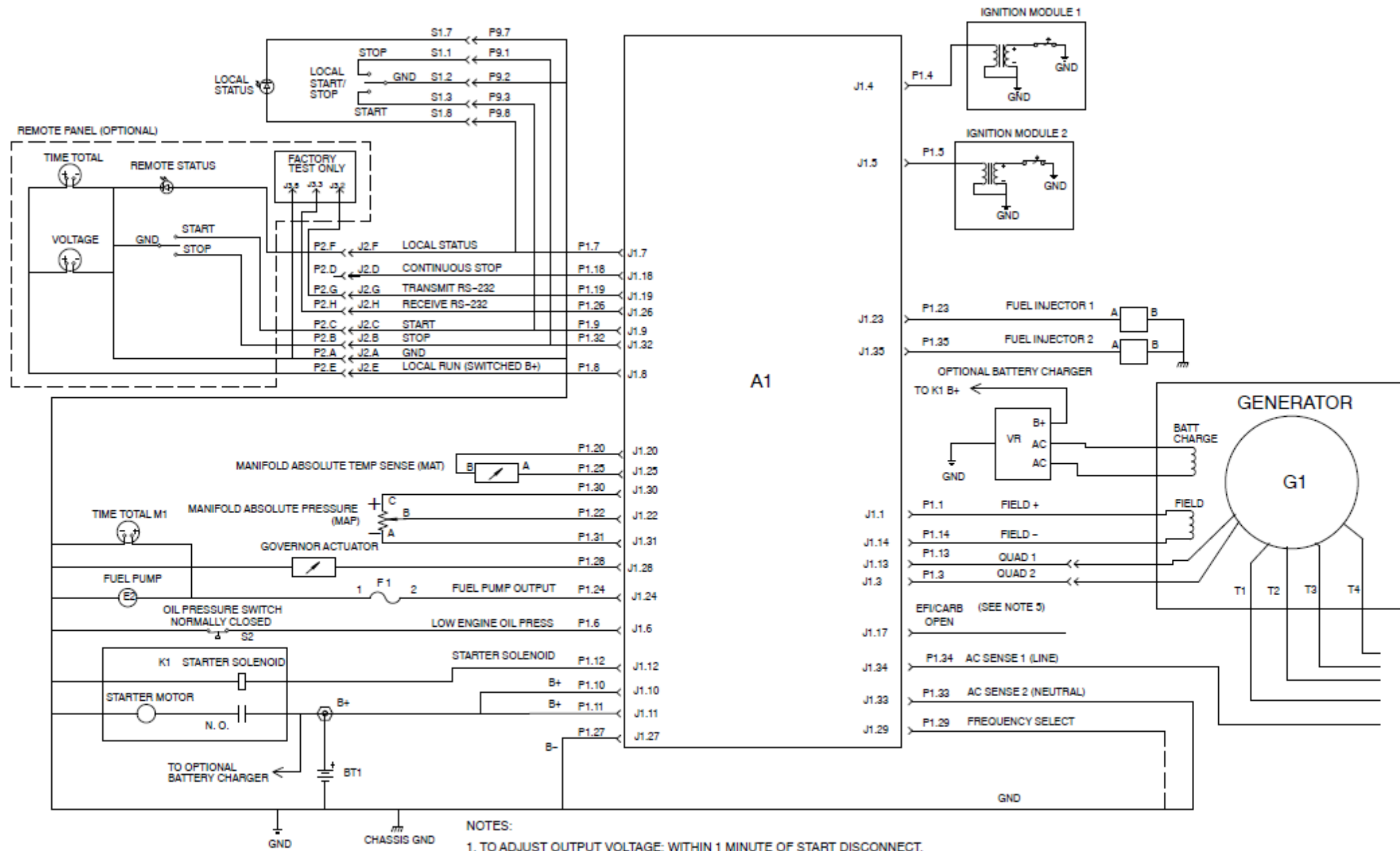


A.0 Wiring Diagrams



611-1273

FIGURE 39. WIRING DIAGRAM 611-1273 - HGJAE/HGJAF



611-1274

FIGURE 40. WIRING DIAGRAM 611-1274 - HGJAF

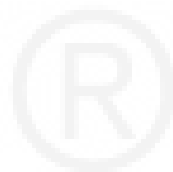
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B.0 Outline Drawings

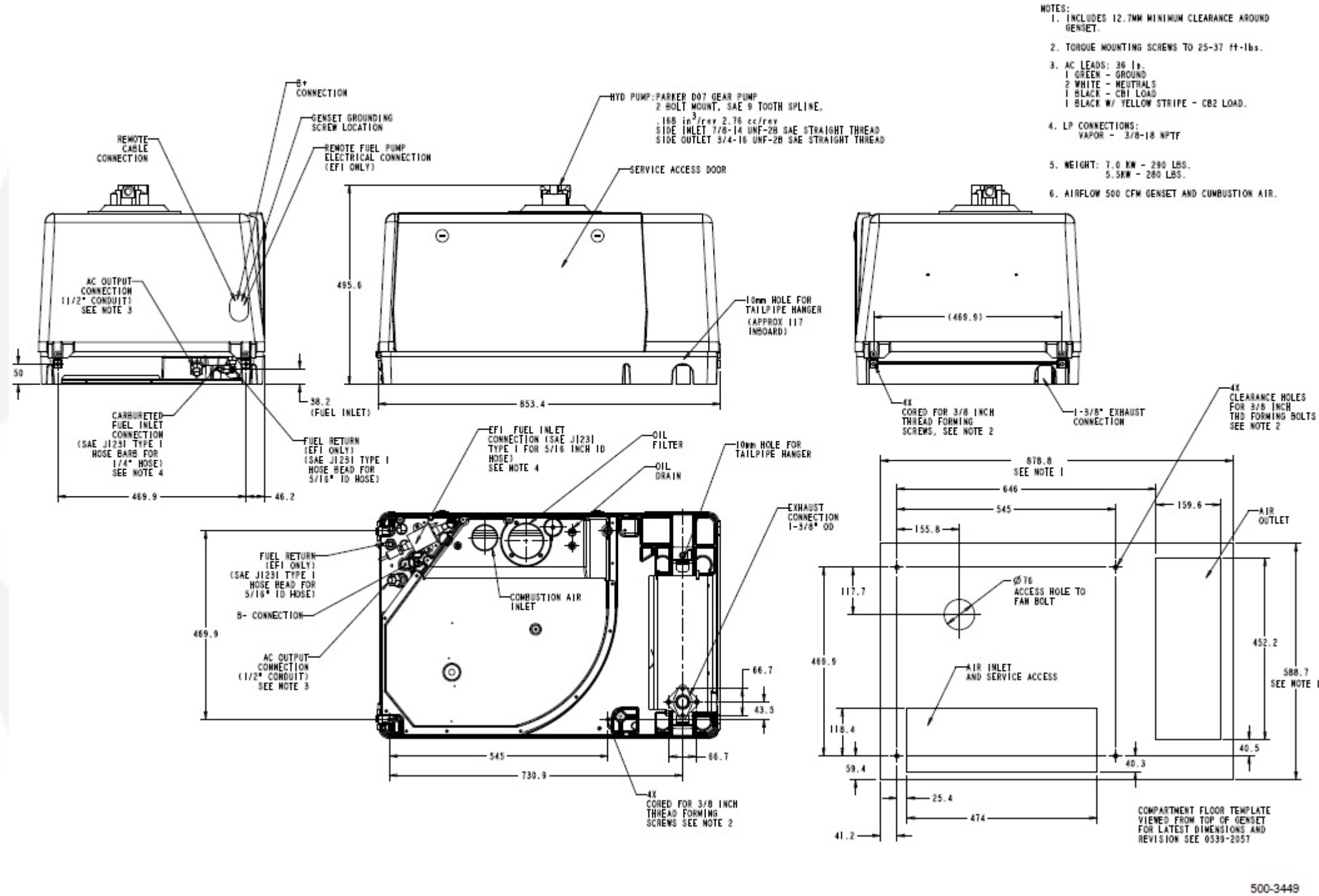
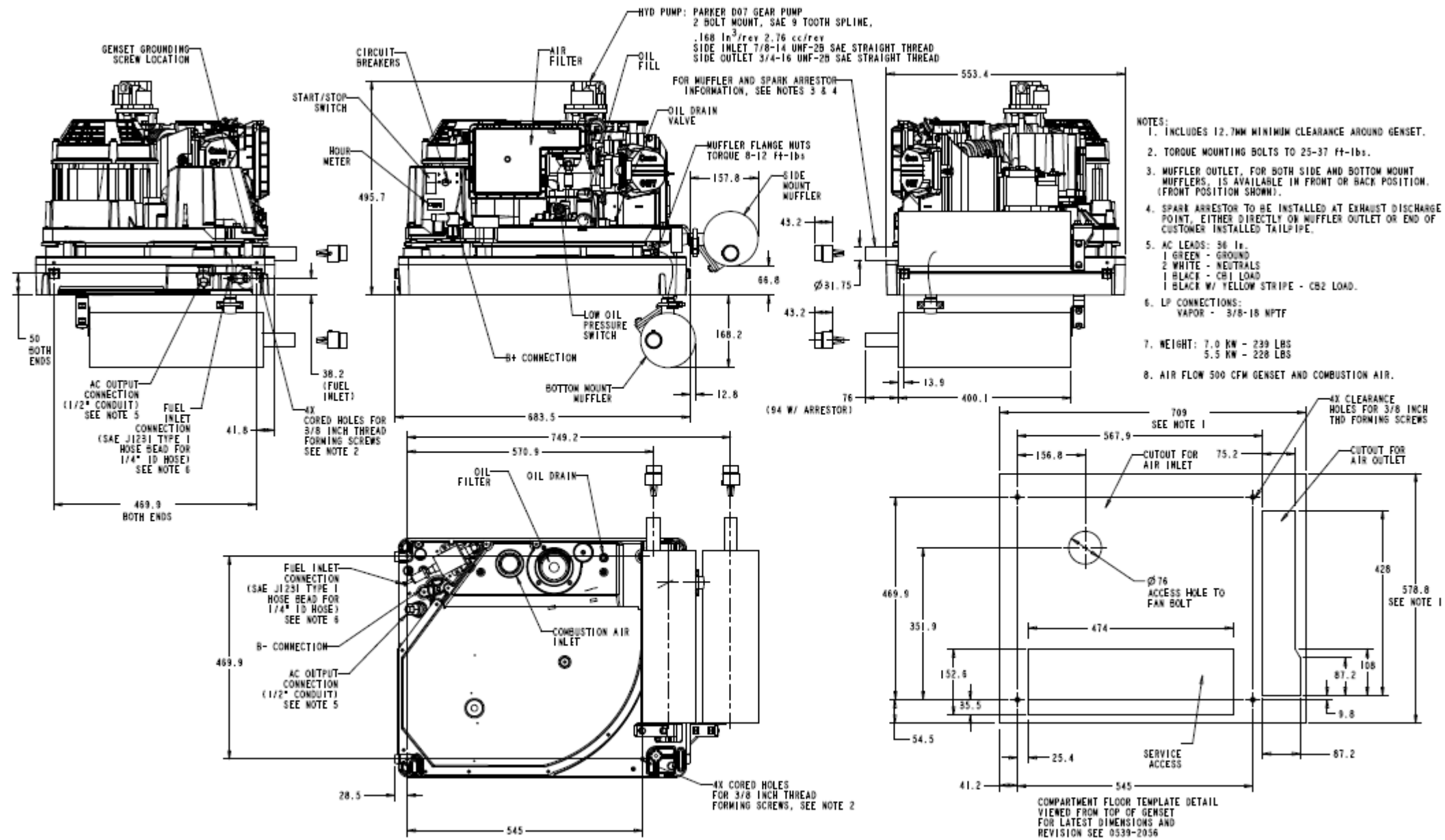


FIGURE 41. OUTLINE DRAWING 500-3449 - HGJAD/HGJAE



500-3450

FIGURE 42. OUTLINE DRAWING 500-3450 - HGJAF

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