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Onan

RV GenSet

Installation Manual

KVD



Printed in U.S.A.

981-0631B
05-04

Supplement: 981-1054

Date: 12-05

Insert with: Installation Manual **981-0604** (09-96)
Installation Manual **981-0621** (05-00)
Installation Manual **981-0631B** (05-04)
Installation Manual **981-0636** (06-03)
Installation Manual **983-0600** (05-00)
Installation Manual **983-0601** (11-01)

This supplement transmits changes that reflect Federal and California standards for gasoline evaporative emissions that become effective January 1, 2006. Please insert this sheet under the front cover of the manual.

The following items apply in addition to the requirements covered in the *Fuel System* or *Fuel Connections* section of the generator set Installation Manual in which this Supplement is inserted:

1. **Flexible Gasoline Hoses:** The fuel hoses used inside the generator set meet the Federal and California standards for gasoline evaporative emissions. The requirements also apply to the gasoline supply hose between the tank and generator set. Special hose is required to meet these requirements for gasoline generator sets sold in or used for commerce in the State of California. See your Onan Distributor.
2. **Connecting Gasoline Hoses:** 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.*

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

⚠ WARNING ⚠
Do not use this genset on a boat
Such use may violate U. S. Coast Guard regulations and can result in severe personal injury or death from fire, electrocution, or carbon monoxide poisoning

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Safety Precautions

Thoroughly read the **OPERATOR'S MANUAL** before operating the genset. Safe operation and top performance can only be attained 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 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.

GENERAL PRECAUTIONS

- Keep children away from the genset.
- Do not use evaporative starting fluids. They are highly explosive.
- 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. Dirt and gear stowed in the compartment 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 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 to ingest, inhale or contact gasoline or its vapors.
- Keep multi-class ABC fire extinguishers handy. Class A fires involve ordinary combustible materials such as wood and cloth; Class B fires, combustible and flammable liquid fuels and gaseous fuels; Class C fires, live electrical equipment. (ref. NFPA No. 10)
- Genset installation and operation must comply with all applicable local, state and federal codes and regulations.

GENERATOR VOLTAGE IS DEADLY!

- Disable the automatic genset starting feature 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 or to any other source of electrical power. Back-feed to shore power can cause electric shock resulting in severe personal injury or death 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.

ENGINE EXHAUST IS DEADLY!

- Inspect for exhaust leaks at every startup and after every eight hours of running.
- Learn the symptoms of carbon monoxide poisoning in this manual.
- Never sleep in the vehicle while the genset is running unless the vehicle is equipped with a working carbon monoxide detector.
- Make sure there is ample fresh air when operating the genset in a confined area.
- Disable the automatic genset starting feature 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 working or living space or compartment.

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

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disable the automatic genset starting feature 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.

Specifications

	Gasoline Models		LPG Models	
GENERATOR: 2-Pole Revolving Field, Self-Excited, 1-Phase, Electronically Regulated				
Frequency	60 Hertz	50 Hertz	60 Hertz	50 Hertz
Power	2800 watts	2500 watts	2500 watts	2000 watts
Voltage	120 volts	220 volts	120 volts	220 volts
Current	23.3 amps	11.4 amps	20.8 amps	9.1 amps
Speed	3600 rpm	3000 rpm	3600 rpm	3000 rpm
FUEL CONSUMPTION:				
No load	0.20 gph (0.7 l/h)	0.16 gph (0.6 l/h)	1.0 lbs/h (0.44 kg/h)	0.9 lbs/h (0.40 kg/h)
Half load	0.30 gph (1.1 l/h)	0.23 gph (0.9 l/h)	1.5 lbs/h (0.68 kg/h)	1.3 lbs/h (0.59 kg/h)
Full load	0.43 gph (1.6 l/h)	0.32 gph (1.2 l/h)	2.5 lbs/h (1.1 kg/h)	2.1 lbs/h (0.92 kg/h)
ENGINE: 1-Cylinder, 4-Stroke Cycle, Spark-Ignited, OHV, Air Cooled, Mechanically Governed				
Bore	2.64 in (67 mm)		2.64 in (67 mm)	
Stroke	2.2 in (56 mm)		2.2 in (56 mm)	
Displacement	12 in ³ (197 cc)		12 in ³ (197 cc)	
Compression Ratio	8.5 : 1		8.5 : 1	
Oil Capacity	1 quart (0.95 liter)		1 quart (0.95 liter)	
Intake Valve Lash (Cold)	0.002 in (0.05 mm)		0.002 in (0.05 mm)	
Exhaust Valve Lash (Cold)	0.002 in (0.05 mm)		0.002 in (0.05 mm)	
Spark Plug Gap	0.025 in (0.64 mm)		0.020 in (0.64 mm)	
Spark Plug Tightening Torque	13 lbs-ft (17 N-m)		13 lbs-ft (17 N-m)	
Ignition Timing (magneto type ignition)	25° BTDC, non-adjustable		25° BTDC, non-adjustable	
DC SYSTEM:				
Nominal Battery Voltage	12 volts		12 volts	
Min CCA Rating – SAE @ 32° F (0° C)	360/450 above/below 32° F (0° C)		360/450 above/below 32° F (0° C)	
Control Fuse	5 amp		5 amp	
INSTALLATION:				
Noise	71 dB(A)*	64 dB(A)*	71 dB(A)*	64 dB(A)*
Weight of Genset (with muffler)	111.6 lbs (50.6 kg)		111.6 lbs (50.6 kg)	
Weight of Genset (without muffler)	107.2 lbs (48.6 kg)		107.2 lbs (48.6 kg)	
Minimum Compartment Size (H x D x W)**	12.52 in x 18.20 in x 20.46 in (317.9 mm x 462.2 mm x 519.8 mm)		12.52 in x 18.20 in x 20.46 in (317.9 mm x 462.2 mm x 519.8 mm)	
Minimum Free Air Inlet Area	24 in ² (155 cm ²)		24 in ² (155 cm ²)	
Gasoline Fuel Connection	1/4 in Hose Barb		-	
Maximum Gasoline Fuel Pump Lift	3 ft (1 m)		-	
LPG Vapor Fuel Connection	-		1/4 in NPTF	
LPG Vapor Connection Pressure	-		9-13 in (228-330 mm) WC	
* In a typical RV installation at half load and distance of 10 ft (3 m).				
** See the Installation Manual for additional considerations when sizing the genset compartment.				

Introduction

ABOUT THIS MANUAL

This manual is a guide for the installation of the generator sets (gensets) listed on the front cover. Proper installation is essential for top performance. Read through this manual before starting the installation.

This manual addresses the following aspects of the installation:

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

⚠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.*

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 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 gensets 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:

- ANSI A1192 (NFPA No. 1192)—Recreational Vehicles
- NFPA No. 70, Article 551—Recreational Vehicles and RV Parks
- NFPA No. 58—Liquefied Petroleum Gas Code
- 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. 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 Nos. 58, 70, 1192	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
ANSI A119.2 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

OUTLINE DRAWINGS

See OUTLINE DRAWING (Page A-1) 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 your Onan dealer for full-scale copies of the floor templates (Pages A-3 and A-4).

⚠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.*

Mechanical Installation

⚠ CAUTION *Avoid tipping the front (service side) down while handling the genset. Otherwise, engine oil could drain into and soak the air filter and cause hard starting and poor operation until the filter is replaced.*

The location, mounting and enclosure of a genset must be such that mounting is secure; engine exhaust, cooling air and fuel vapors are properly vented and 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.

LOCATION

Review *Exhaust Connections*, *Fuel Connections* and *Electrical Connections* before deciding where to locate the genset. Figure 1 shows typical genset locations.

MOUNTING

The genset support structure must be able to resist the dynamic loads of the genset: cyclical forces of ± 3 g vertical and ± 1 g horizontal. A *plywood or particle board floor must be reinforced with steel to resist the dynamic loads*. See *Specifications* (Page iv) for the weight of the specific model being installed.

The genset base pan has three 3/8-16 UNC threaded holes in the bottom for floor mounting and two on each end for under-floor mounting with brackets. Use grade 5 screws to mount the genset. To avoid interference with internal parts, the screws must not protrude more 1/2 inch (12.7 mm) from the sheet metal of the base pan.

A below-floor mounting kit is available from Onan. Carefully follow the instructions in the kit and use the full-scale floor template available (Page A-3).

⚠ WARNING *A weak supporting structure can lead to severe personal injury or death if the genset falls from the vehicle. Design the structure carefully, follow applicable mounting kit instructions and torque mounting bolts properly.*

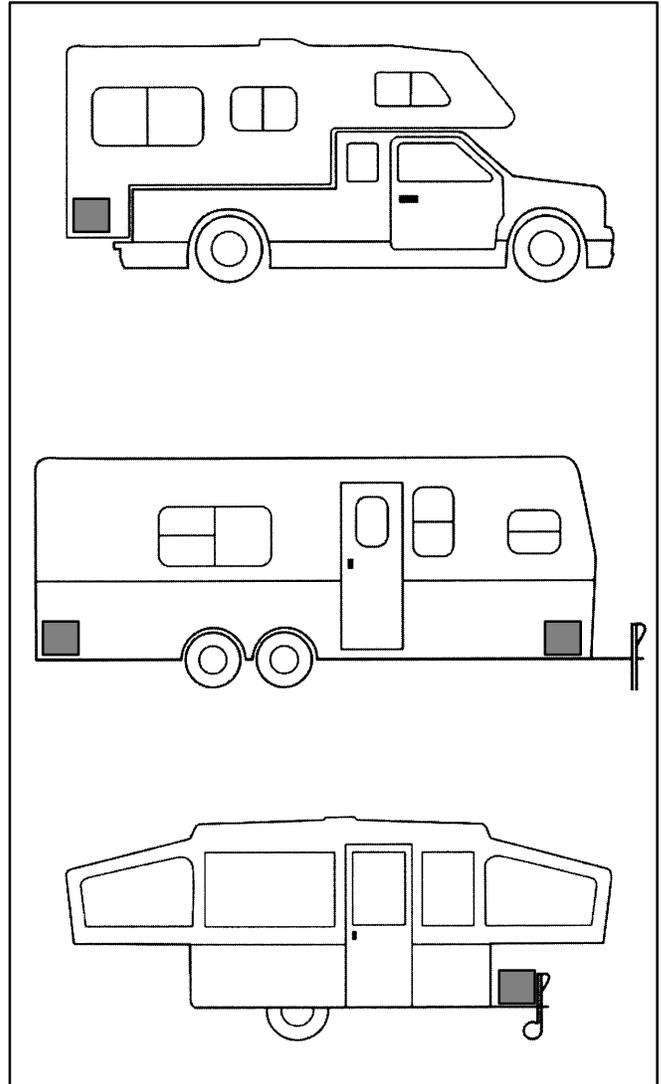


FIGURE 1. TYPICAL GENSET LOCATIONS

ENCLOSURE

General

The genset must not share a compartment or ventilation with sources of flammable vapors, such as batteries and fuel tanks. A genset can ignite flammable vapors.

The genset must be shielded from rain and from debris and water thrown up by the vehicle tires.

Do not duct genset cooling air into the vehicle: the cooling air may include deadly exhaust gases.

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

Fire and Vapor Barriers

Below-Floor Installations: When the genset is mounted below the floor of the vehicle and outside the interior envelope of the vehicle, install a vapor-tight, fire-resistant barrier above the genset equivalent to 26 gauge galvanized steel. Seal all openings through the barrier, such as for bolts and wiring.

Above-Floor Installations: When the genset is mounted on the floor of the vehicle, construct a vapor-tight, fire-resistant compartment equivalent to 26 gauge galvanized steel to isolate the genset from the vehicle interior. Seal all openings through the barrier, such as for bolts and wiring.

Note: Due to the close proximity of the muffler, the floor under the genset must be metal to attain the required 3 inch (76 mm) minimum clearance to combustible construction (Page A-1).

Compartment Dimensions

See *Specifications* (Page iv) and the outline drawing (Page A-1) to determine the minimum inside dimensions of a genset compartment. If the compartment has thermal or acoustic insulation, increase the minimum compartment dimensions by the thicknesses of the insulation. The minimum clearance required between the genset and the compartment or its insulation is 1/4 inch (6.4 mm) on the sides, back and top and 1-1/4 inch (31.8 mm) in front. The space on the left side and top must be sufficient for making fuel and electrical connections.

Acoustic Insulation

Acoustic and thermal insulation and adhesive should be Classified as “Self-Extinguishing” for use at not less than 200°F (90°C). Do not line the bottom of the compartment with insulation, which absorbs spilled fuel and oil.

Access for Operation and Maintenance

Provide ready access for starting and stopping the genset and performing all periodic maintenance procedures.

The compartment floor must not block off the oil drain plug or interfere with replacing the spark plug. See your Onan dealer for a full-size floor template to accurately locate the floor cutout openings (Page A-4).

Compartment Drain

The floor of the genset compartment must have holes which allow water and fuel to drain. Refer to the floor template (Page A-4) for recommend drain hole locations.

VENTILATION

Air for combustion, cooling and ventilation enters through the column of rectangular openings on the left front of the genset and exits through the two openings in the base pan (Figure 2).

To prevent overheating, all hot air recirculation paths must be eliminated. If the cooling air comes up through the gap between the genset and the compartment, install deflectors or baffles to prevent hot discharge air from recirculating back into the cool air inlets. If the cooling air comes through an opening in the genset compartment door, the opening in the door should line up with the genset air inlets and should have a seal around it to take up the

space between the door and genset, forming an air duct. The opening must have the equivalent of 24 square inches (155 cm²) or more of “free air” and should be baffled or louvered to keep out rain. Check with the manufacturer of the louver, grille or expanded metal to determine how to size the air opening to obtain the required area on a “free air” basis.

The compartment floor must not block off the two ventilating air outlet openings in the base pan. Also, the space below the outlets must be unobstructed and open on at least three sides to let the warm air disperse. See your Onan dealer for a full-size floor template to accurately locate the floor cutout openings (Page A-4).

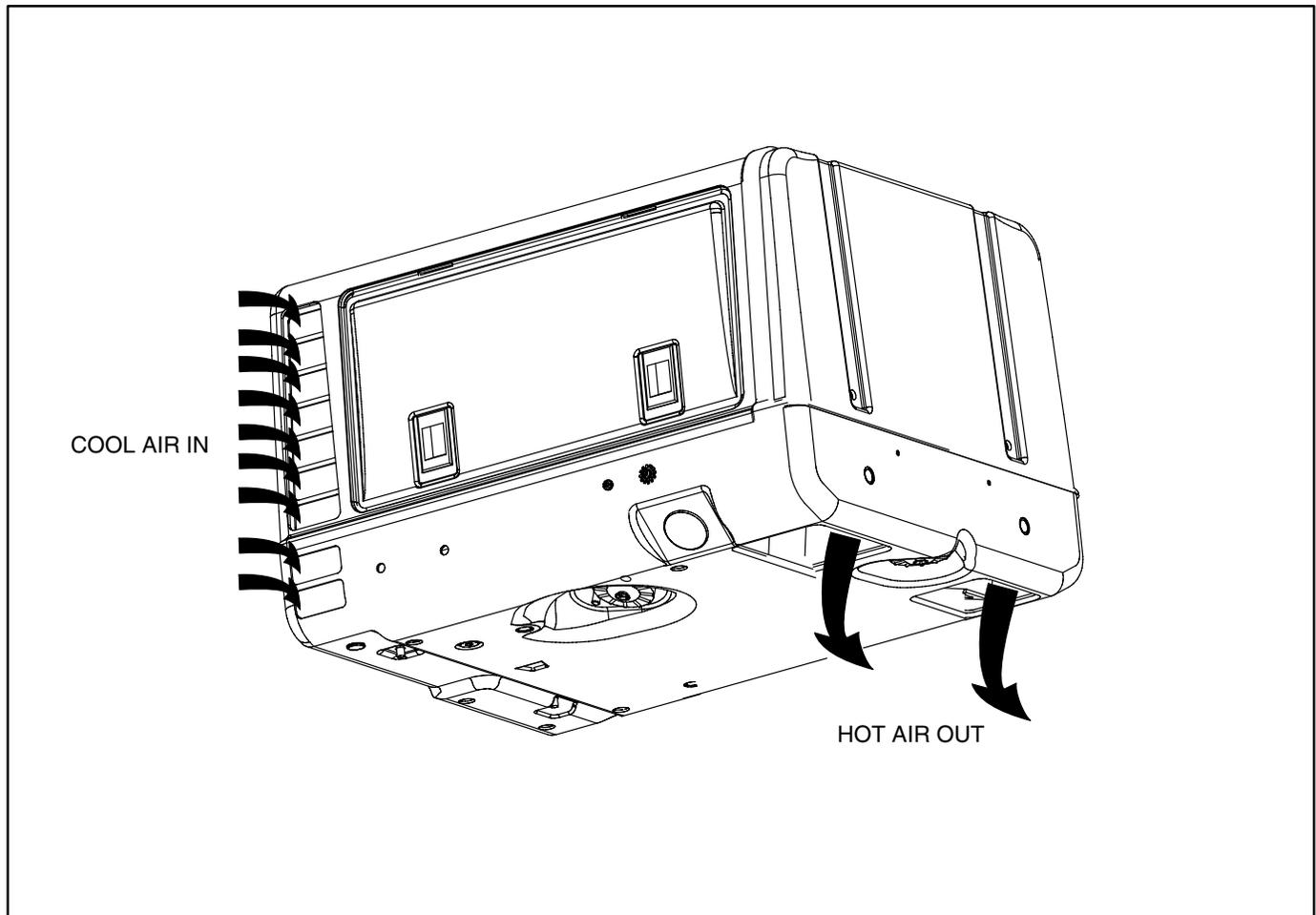


FIGURE 2. AIR FLOW THROUGH GENSET

Exhaust Connections

MUFFLER

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

The genset exhaust system must be gas-tight and prevent entry of exhaust gases into the vehicle.

Figures 3 and 4 illustrate the muffler kits available from Onan. Carefully follow the instructions in the kit. The muffler has a USDA (Forest Service) spark arrestor, meets RVIA EGS-1 requirements for construction and complies with emissions certification of the genset.

Note: A muffler must have a USDA (Forest Service) spark arrestor and meet RVIA EGS-1 requirements for construction (aluminized steel or equivalent and

welded or crimped joints). A genset without a properly installed and maintained spark arresting exhaust system can cause a brush fire or forest fire and is illegal on federal lands.

Liability for damage, injury and warranty expense due to 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.

⚠ 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.*

Do not mount the muffler 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).

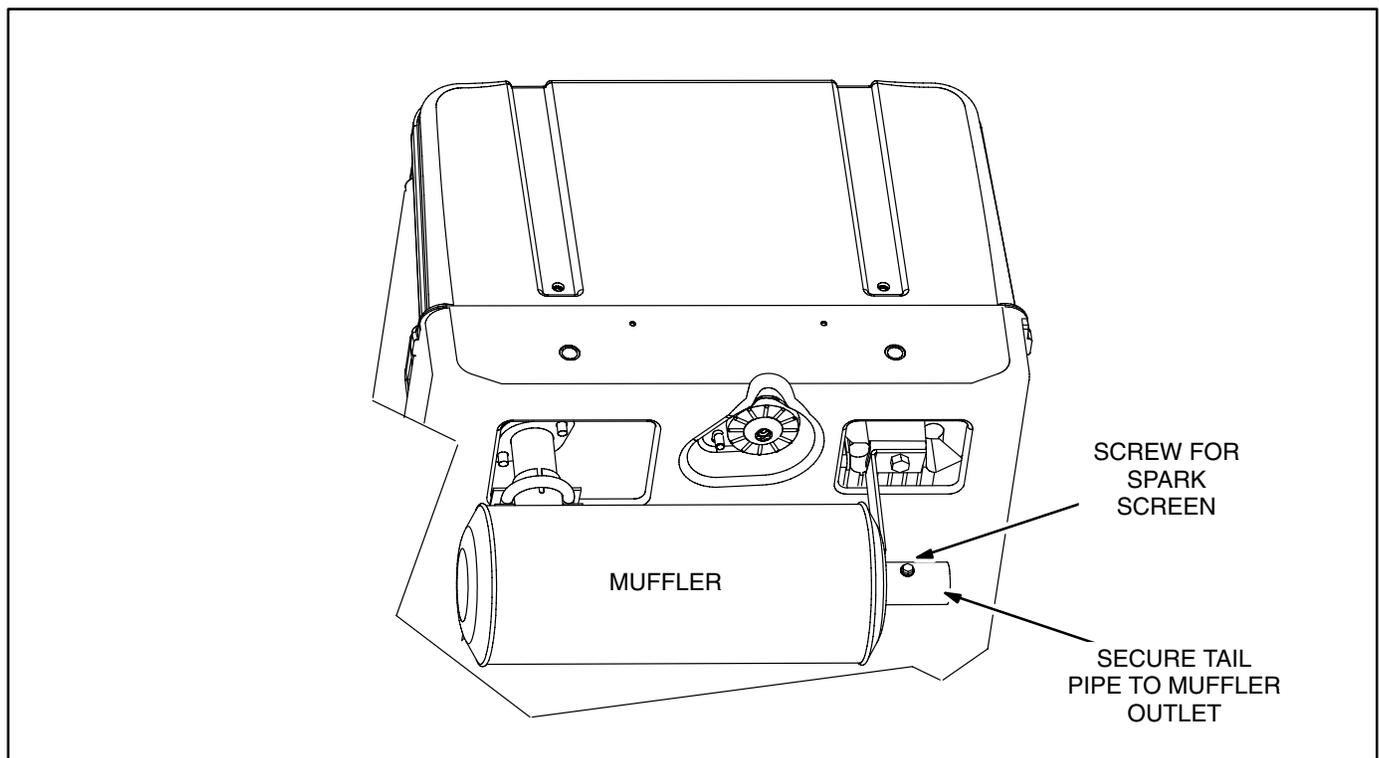
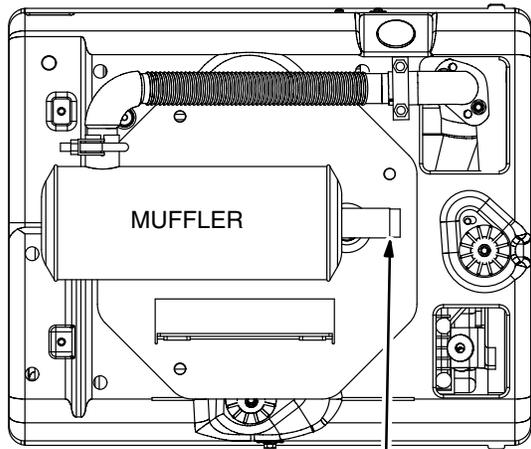
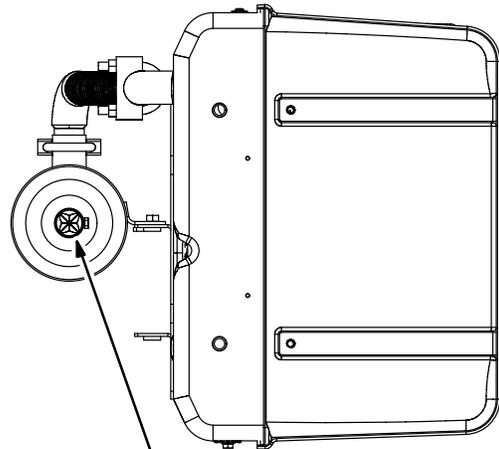


FIGURE 3. DIRECT-MOUNT MUFFLER FOR 60 HZ GENSETS ONLY

FORWARD MOUNTING

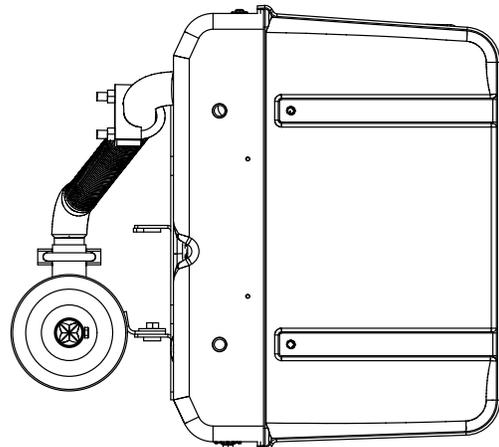
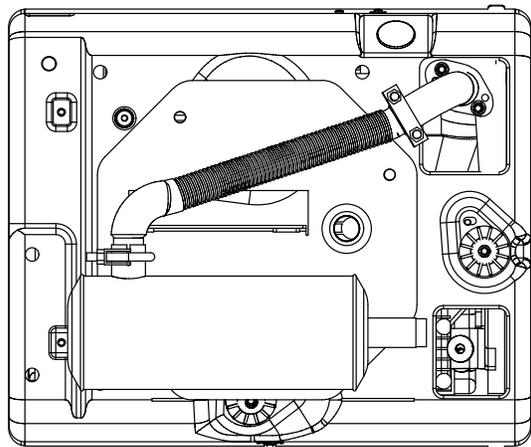


SECURE TAIL PIPE TO MUFFLER
OUTLET



SPARK
SCREEN

REARWARD MOUNTING



MUFFLER
MOUNTING
BRACKET

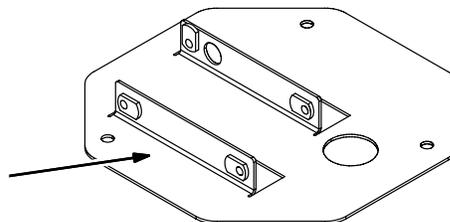


FIGURE 4. FLEX-PIPE CONNECTED MUFFLER FOR 50 HZ AND 60 HZ GENSETS

TAIL PIPE

1. For the tail pipe, use 18-gauge, 1-1/8 inch I. D. aluminized steel tubing or material of equivalent heat and corrosion resistance. Do not use flexible tubing, which is neither gas tight nor durable.
2. Use U-bolt muffler clamps (available from Onan) for tail pipe connections. Overlapping pipe should be slotted (Figure 5).
3. Support the tail pipe near its end and at intervals of 3 feet (0.9 m) or less. Use automotive-type tail pipe hangers (available from Onan). Tail pipe hangers must hang straight down. Otherwise, the hanger will pull the tail pipe to side, front or back causing noise and/or damage to the muffler and tail pipe.
4. Do not route the tail pipe near fuel lines and fuel tanks or 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).
5. To prevent damage to the tail pipe while the vehicle is moving, keep it out of the approach and departure angles and above the axle clearance line (Figure 6).
6. Do not terminate the tailpipe underneath the vehicle. Extend it a minimum of 1 inch (25 mm) beyond the perimeter of the vehicle (Figure 7). Support the end of the tail pipe such that it cannot be pushed in and up under the skirt of the vehicle.
7. Do not terminate the tail pipe 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 8)
8. 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 may void emissions certifications and cause engine damage.

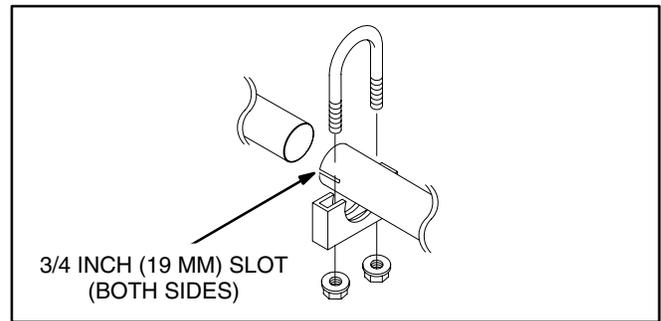


FIGURE 5. EXHAUST TAIL PIPE CONNECTIONS

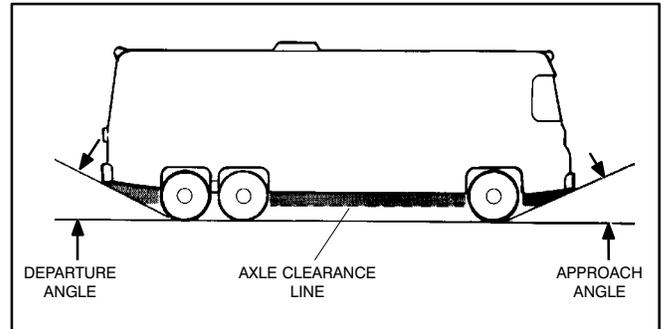


FIGURE 6. APPROACH AND DEPARTURE ANGLES AND AXLE CLEARANCE

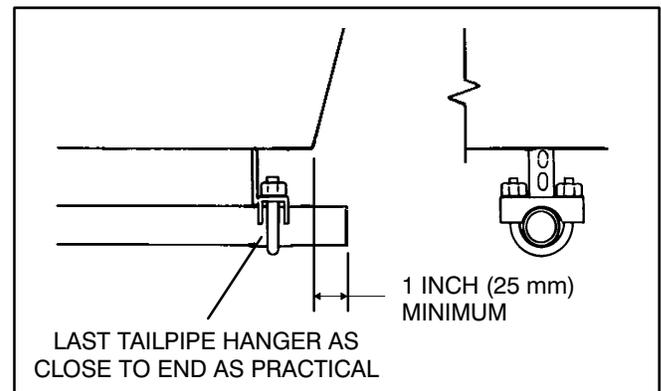


FIGURE 7. TERMINATING THE TAILPIPE

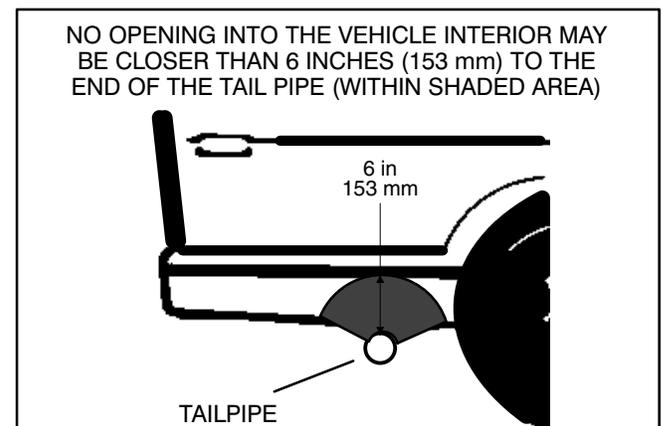


FIGURE 8. MINIMUM DISTANCES TO OPENINGS

Fuel Connections

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

⚠WARNING *Gasoline and LPG 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 the State of California.*

GASOLINE

Fuel Tanks

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.*

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 express approval of the vehicle chassis manufacturer. Modifications must conform with applicable sections of the Code of Federal Regulations, Title 49, and other standards.

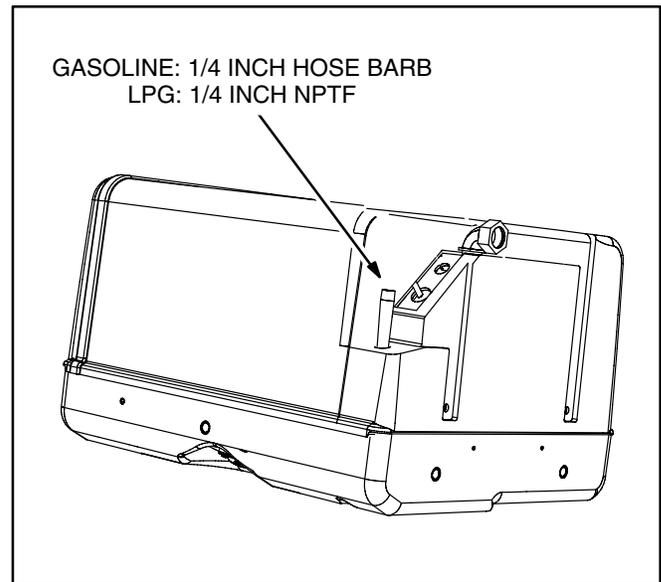


FIGURE 9. FUEL CONNECTION

The maximum fuel pump lift is 36 inches (914 mm).

The genset fuel pickup should be terminated higher in the supply tank than the propulsion engine pickup to keep from running the vehicle out of fuel.

Fuel Lines

Use 1/4 in I. D. SAE J30R7 or better hose.

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 *Sparks can ignite fuel, 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 (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 LPG fuel system. Figure 9 illustrates the fuel fitting.

▲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.*

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

▲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 (Page iv) 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 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.*

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 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.*

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.*

Electrical Connections

GENERATOR

The genset is equipped with 50 inch (1270 mm) long AC power output leads that exit through a 1/2 inch flexible steel conduit fitting (Figure 10). See Figure 11 for typical connections and Page A-5 or A-6 for internal genset wiring.

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.

6. Bond the genset and all connected AC and DC equipment and controls to a common grounding point in accordance with applicable codes. (See Figure 11, Page 11 for AC grounding and Figure 19, Page 15 for DC grounding.)

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

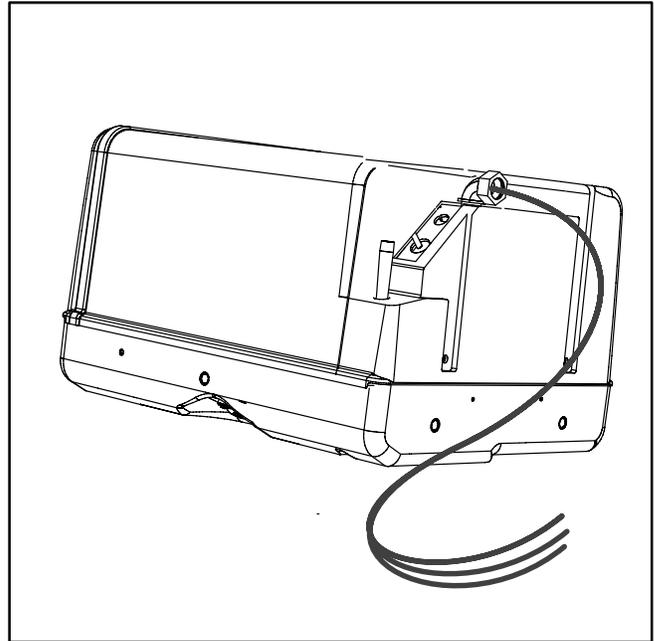


FIGURE 10. AC OUTPUT LEADS

Connecting the Vehicle to Shore Power

When the vehicle has provision for connecting shore power it must have an approved device to keep the genset and utility from being interconnected. See Figure 11 for typical connections.

⚠WARNING *Backfeed to shore power can cause electric shock resulting in severe personal injury or death and damage to equipment. The vehicle must have an approved device to prevent the genset from being interconnected with shore power.*

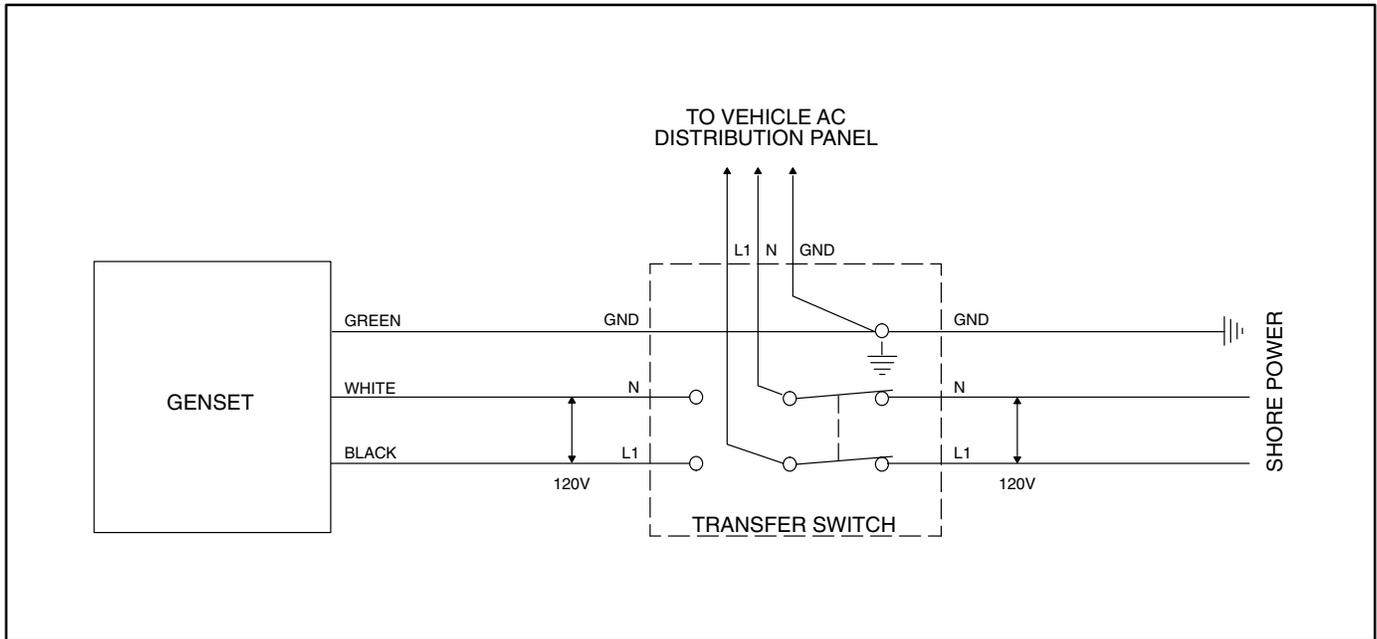


FIGURE 11. TYPICAL CONNECTIONS WITH TRANSFER SWITCH AND UTILITY

REMOTE CONTROL

Onan offers three varieties of remote control panel:

- Remote start/stop switch with indicator lamp only (Figure 12).
- Remote start/stop switch with indicator lamp and hour meter (Figure 13).
- Remote start/stop switch with indicator lamp and DC voltmeter (Figure 14).

The genset has an 8-pin connector for remote control connections (Figure 15). Remote control wiring harnesses in several lengths are available separately. To make connections to a remote control panel:

1. Snap the connector together with its mate in the wiring harness from the remote panel. If the wiring harness is made up by others, insulated 18 AWG copper conductors should be used for distances up to 30 feet (9 meters) and heavier gauge conductors for distances that are greater. Use flexible sheathing to protect remote control wiring. Figure 16 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.

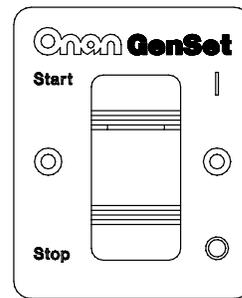


FIGURE 12. REMOTE SWITCH

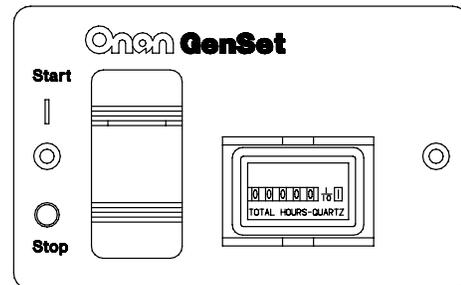


FIGURE 13. REMOTE SWITCH / HOUR METER

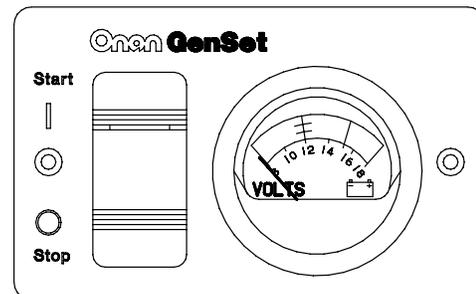


FIGURE 14. REMOTE SWITCH / DC VOLTMETER

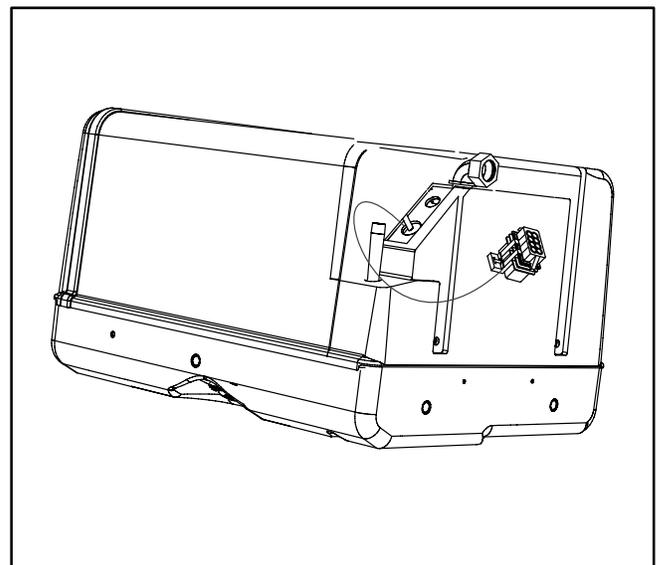


FIGURE 15. REMOTE CONTROL CONNECTOR

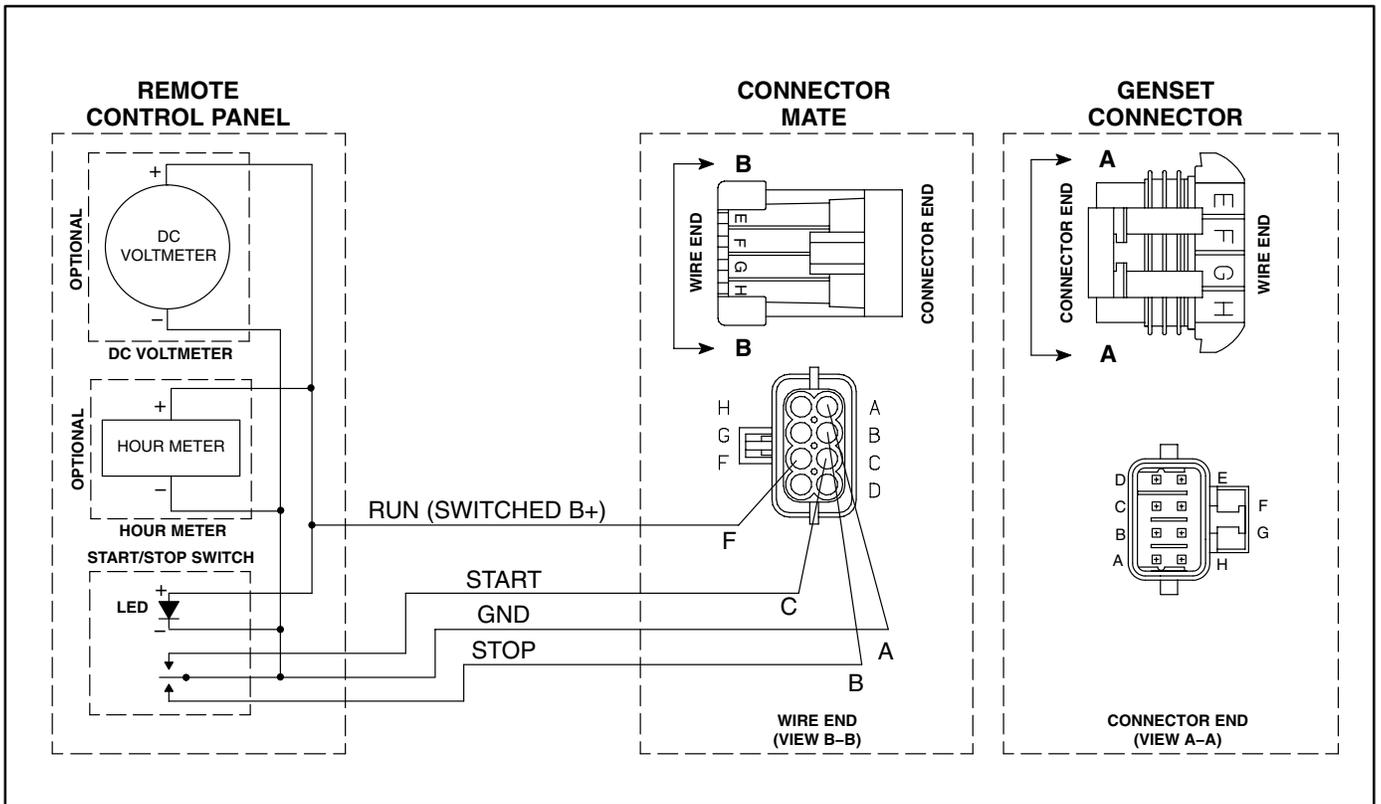


FIGURE 16. SCHEMATIC OF TYPICAL REMOTE CONTROL CONNECTIONS

BATTERY

To prevent accidental starting, do not connect the battery cables to the battery until you are ready to perform *Installation Review and Startup* (Page 16)

⚠WARNING *Accidental starting of the genset can cause severe personal injury or death. Do not connect the starting battery until you are ready to perform Installation Review and Startup (Page 16).*

The genset has a 12 VDC, negative-ground engine control and cranking system. See *Specifications* (Page iv) 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 centimeters) 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 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 17). Note also that codes may require a bonding conductor between the genset 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 genset (Figure 18), all frame members in the path of battery cranking currents must have substantial cross-sections. 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 18). 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.***

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).	

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.*

Battery Connections

Positive (+) Cable: Bolt the positive (+) battery cable to the eyelet connector on the genset with a 3/8 inch bolt and nut (Figure 19). Slide the rubber insulating boot over the bolted connection and secure it with a nylon wire tie.

Negative (-) Cable: Secure the negative (-) battery cable with a 3/8-16 UNC screw and external/internal toothed washer (EIT) at one of the locations shown in Figure 19. The EIT washer must be between the cable lug and the base pan. If a frame grounding strap is necessary (Figure 17), bolt it with the same bolt as the battery cable.

To avoid interference with internal parts, the screw must not protrude more 1/2 inch (12.7 mm) from the sheet metal of the base pan.

Note: Use the rear location for securing the negative (-) battery cable in under-floor installations where the side holes are used for genset mounting. A poor electrical connection results when a mounting bracket is interposed between the battery cable and base pan.

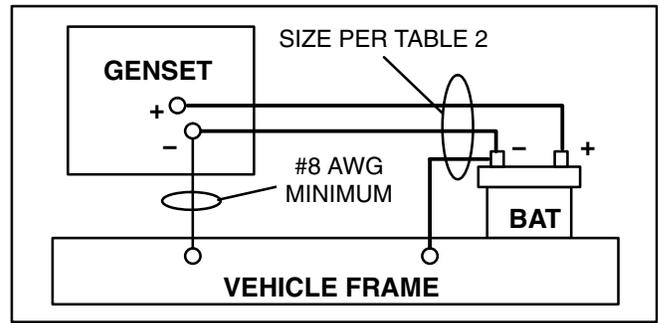


FIGURE 17. FULL-LENGTH CABLE FROM BATTERY NEGATIVE (-) TERMINAL

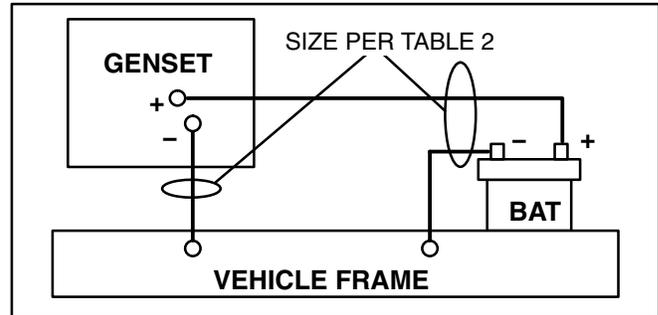


FIGURE 18. VEHICLE FRAME AS PATH FROM BATTERY NEGATIVE (-) TERMINAL

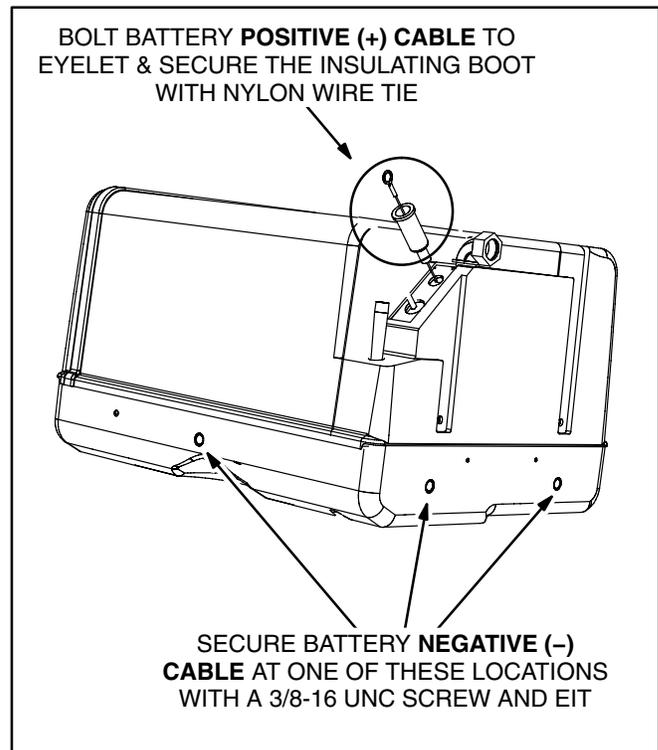


FIGURE 19. BATTERY CABLE CONNECTIONS

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 the hot air discharge blocked from recirculating into the air inlet?
- [] 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 and separated by approved vapor-tight 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 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

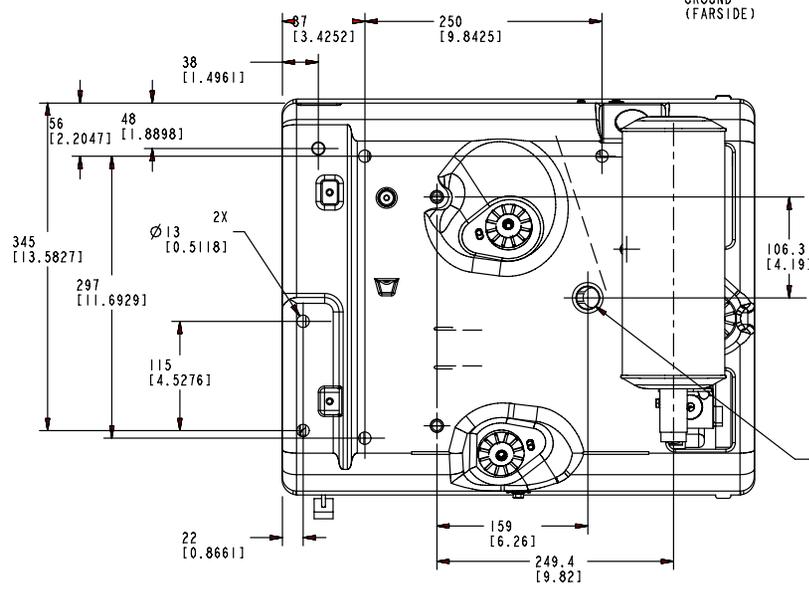
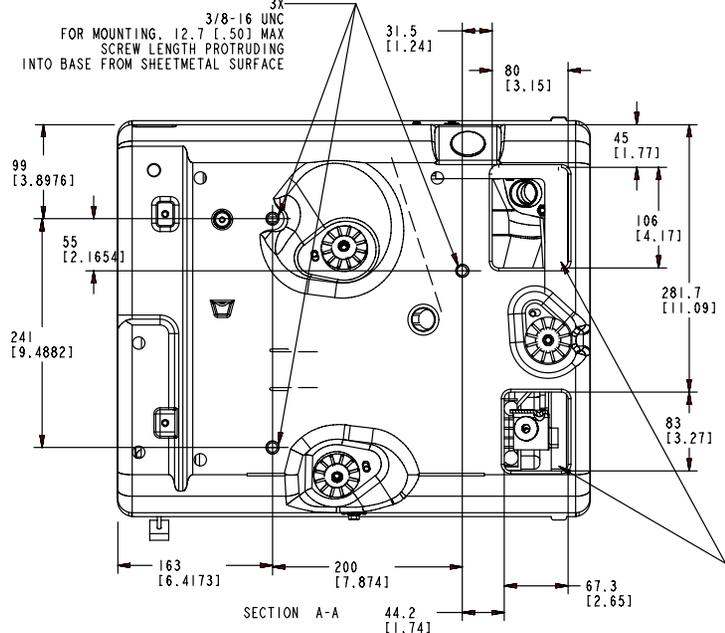
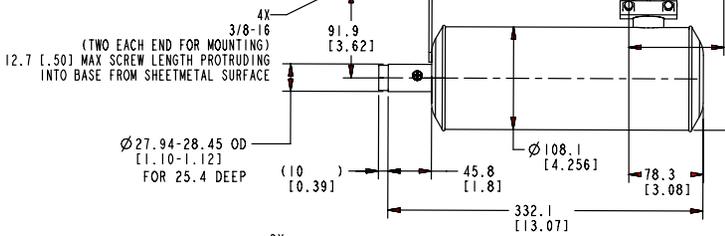
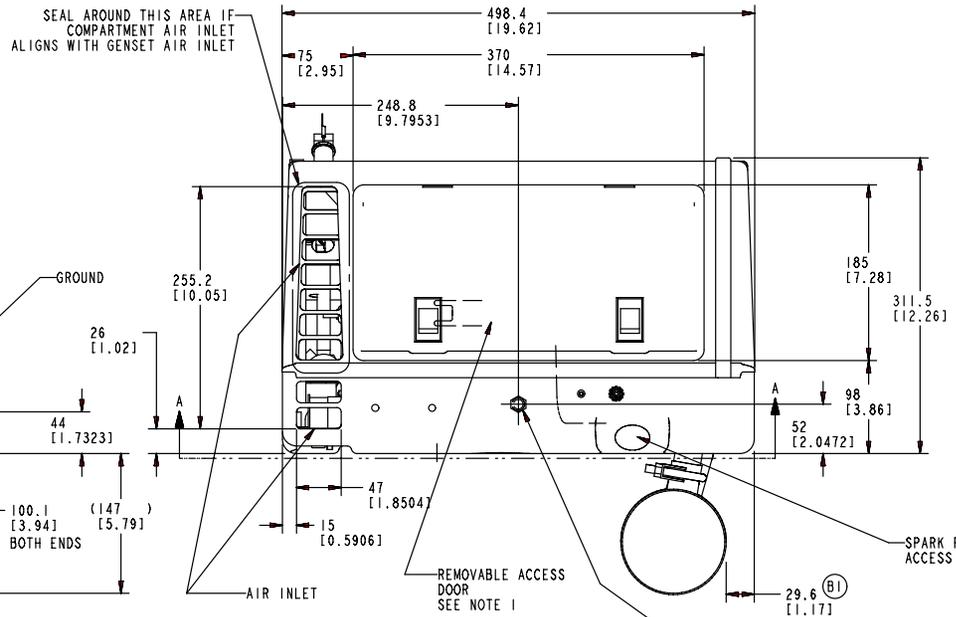
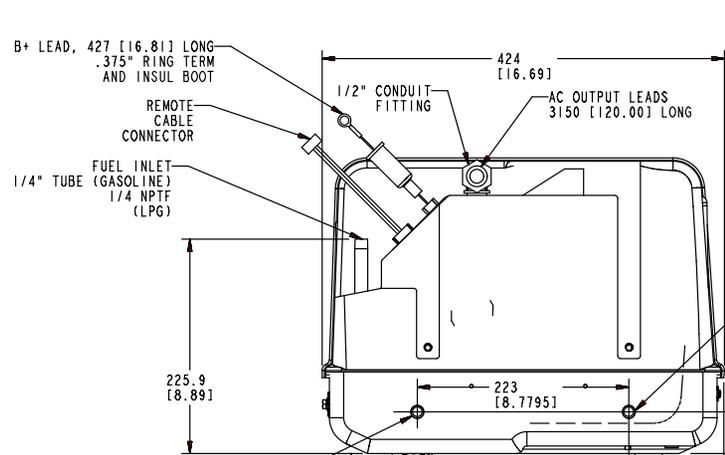
When all the items on the Installation Review check list have been checked, connect the battery cables to the battery, positive (+) cable first.

▲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:
- ACCESS FOR:
START - STOP SWITCH
FUSES
CIRCUIT BREAKER
OIL CHECK AND FILL
AIR CLEANER SERVICE
GOVERNOR ADJUSTMENTS
CARBURETOR ADJUSTMENTS
 - MIN UNIT CLEARANCES FROM
COMPARTMENT SURFACES:
TOP 6.4 [2.5]
ENGINE END 6.4 [2.5]
GENERATOR END 6.4 [2.5]
SERVICE SIDE 31.8 [1.25]
BACKSIDE 6.4 [2.5]
 - MIN FREE AIR INLET 155cm²
[24. IN]²
 - UNIT WEIGHT:
W/O MUFFLER AND EXT. PIPE
48.6 KG (107.2 LBS)
W/ MUFFLER AND EXT. PIPE
50.6 KG (111.6 LBS)

THIS PAGE SHOWS MUFFLER KIT 0541-0618 INSTALLED.
THIS KIT IS FOR USE WITH 60 HZ MODELS ONLY.
NOT FOR USE WITH 50 HZ MODELS.

A-1

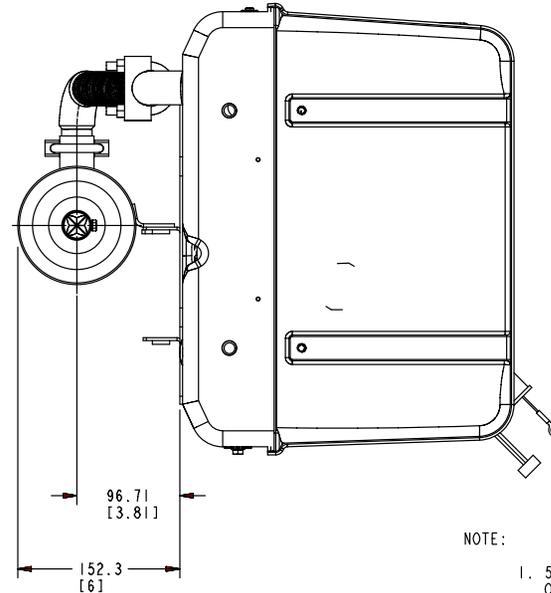
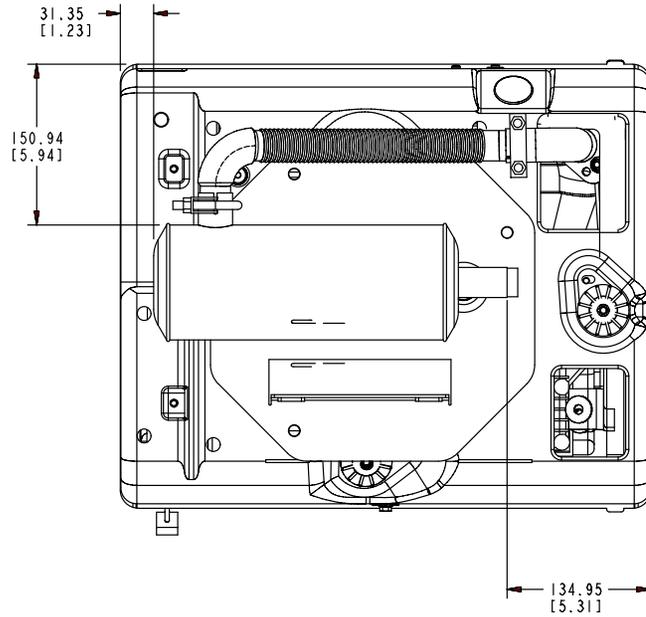
GENSET OUTLINE DRAWING—SHEET 1

500-3389



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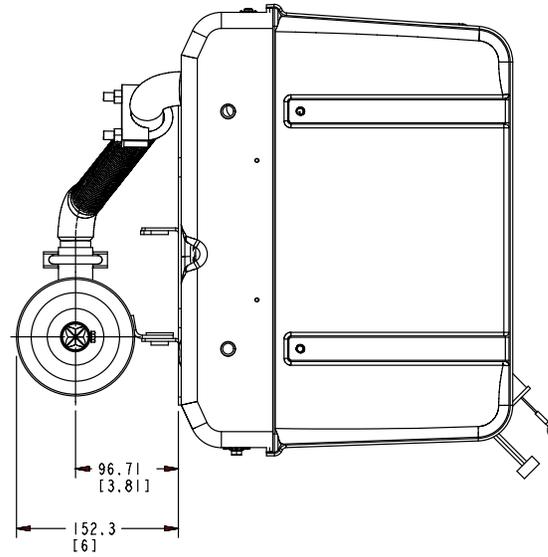
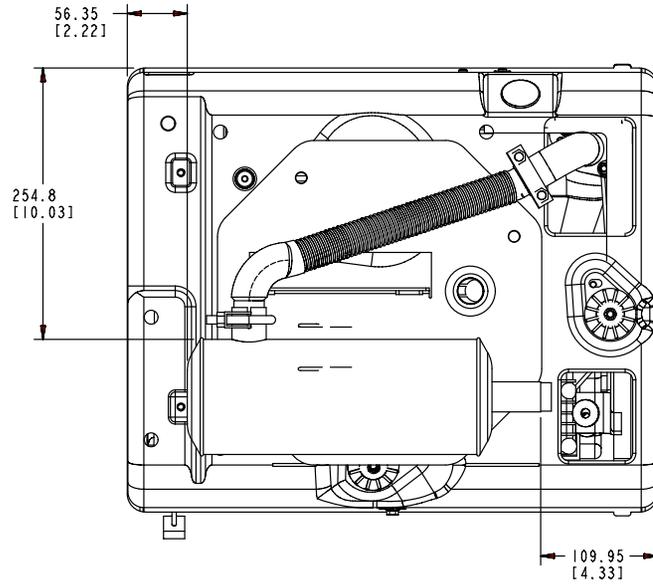
A-2



MUFFLER MOUNTED IN FORWARD POSITION

NOTE:

1. 541-1050 MUFFLER KIT SAME AS ONAN INDIANA 699-01185.



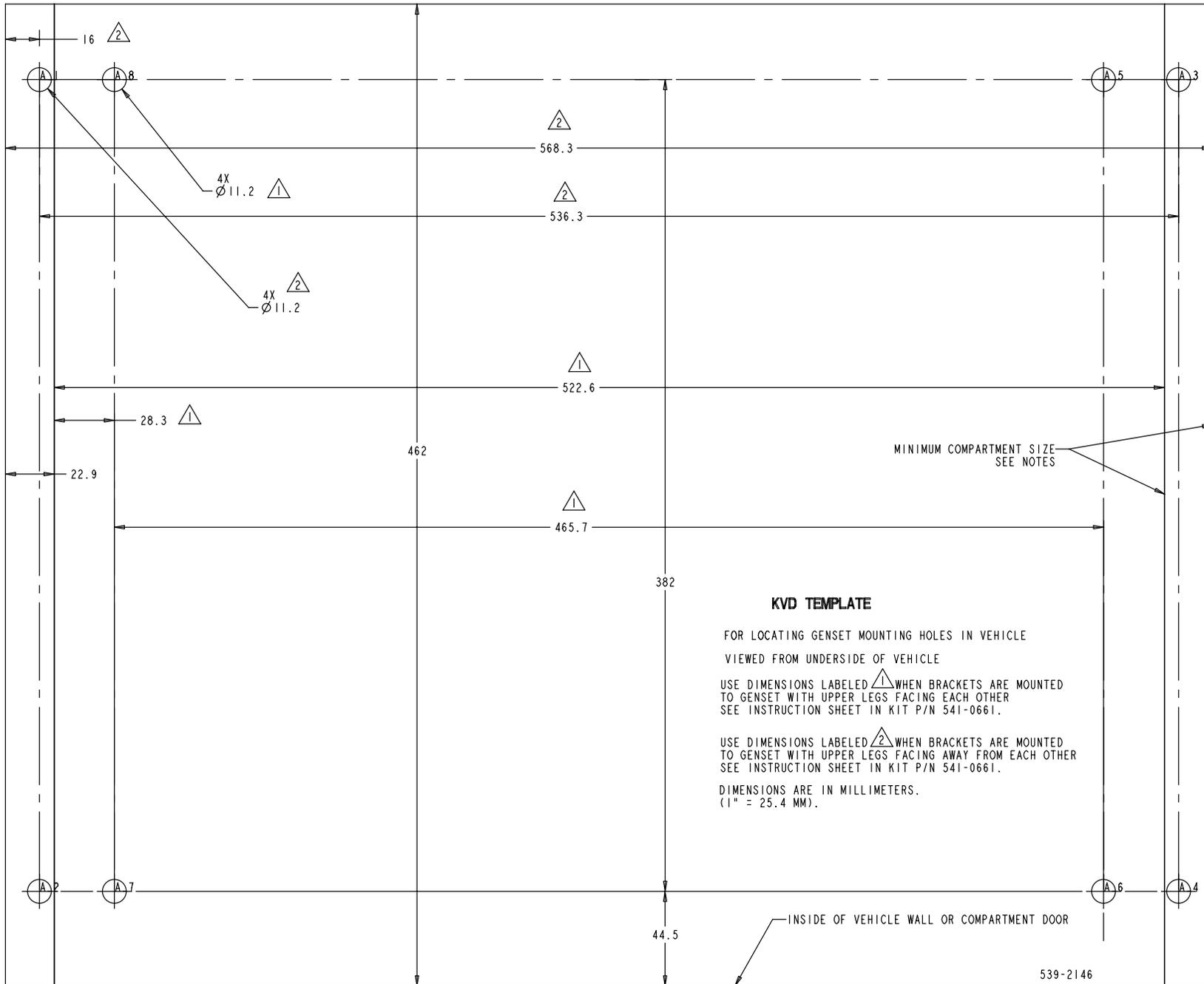
MUFFLER MOUNTED IN REAR POSITION

THIS PAGE SHOWS MUFFLER KIT 0541-1050 INSTALLED. THIS KIT IS FOR USE ON 50 HZ AND 60 HZ MODELS.

GENSET OUTLINE DRAWING—SHEET 2

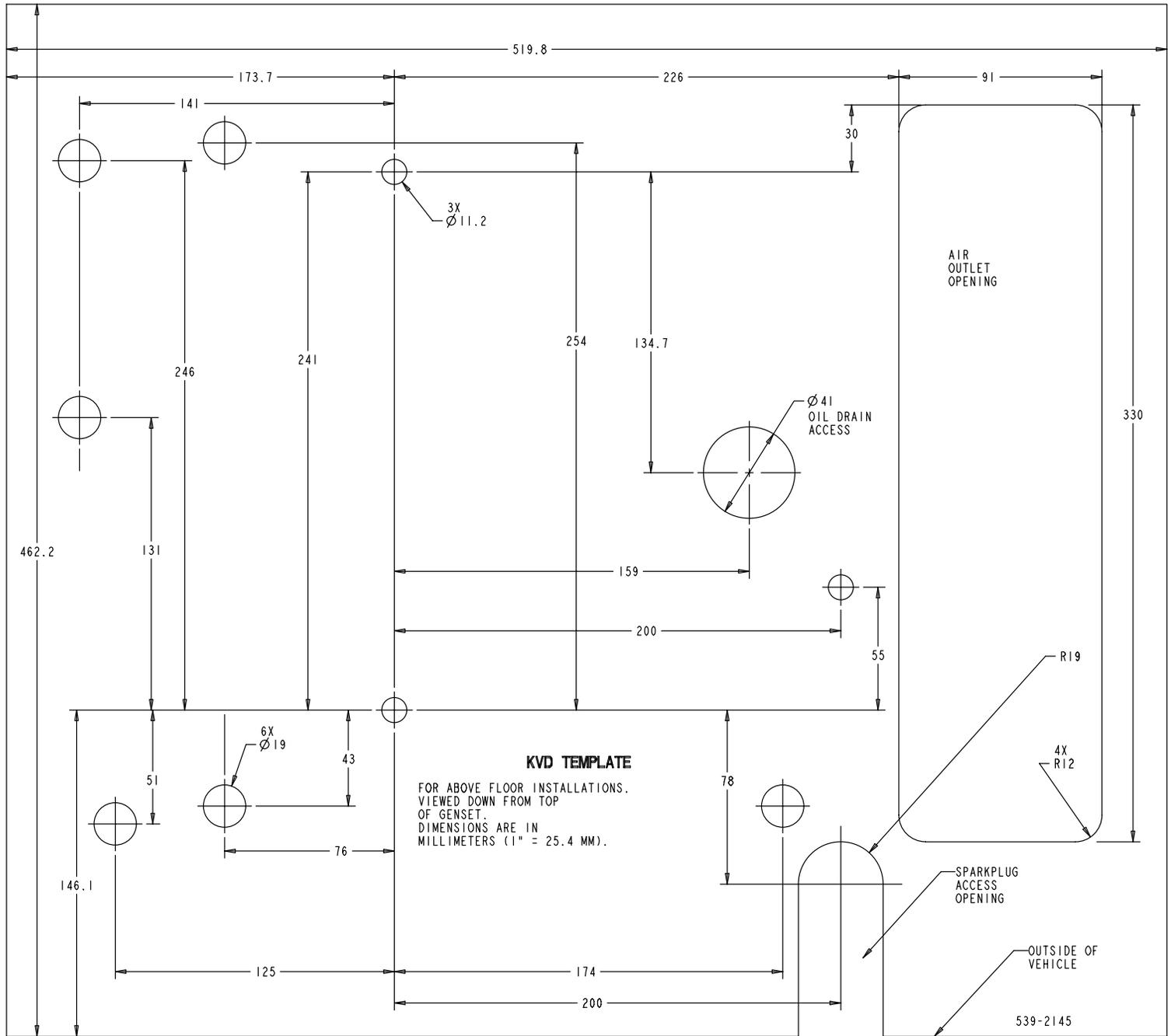
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A-3

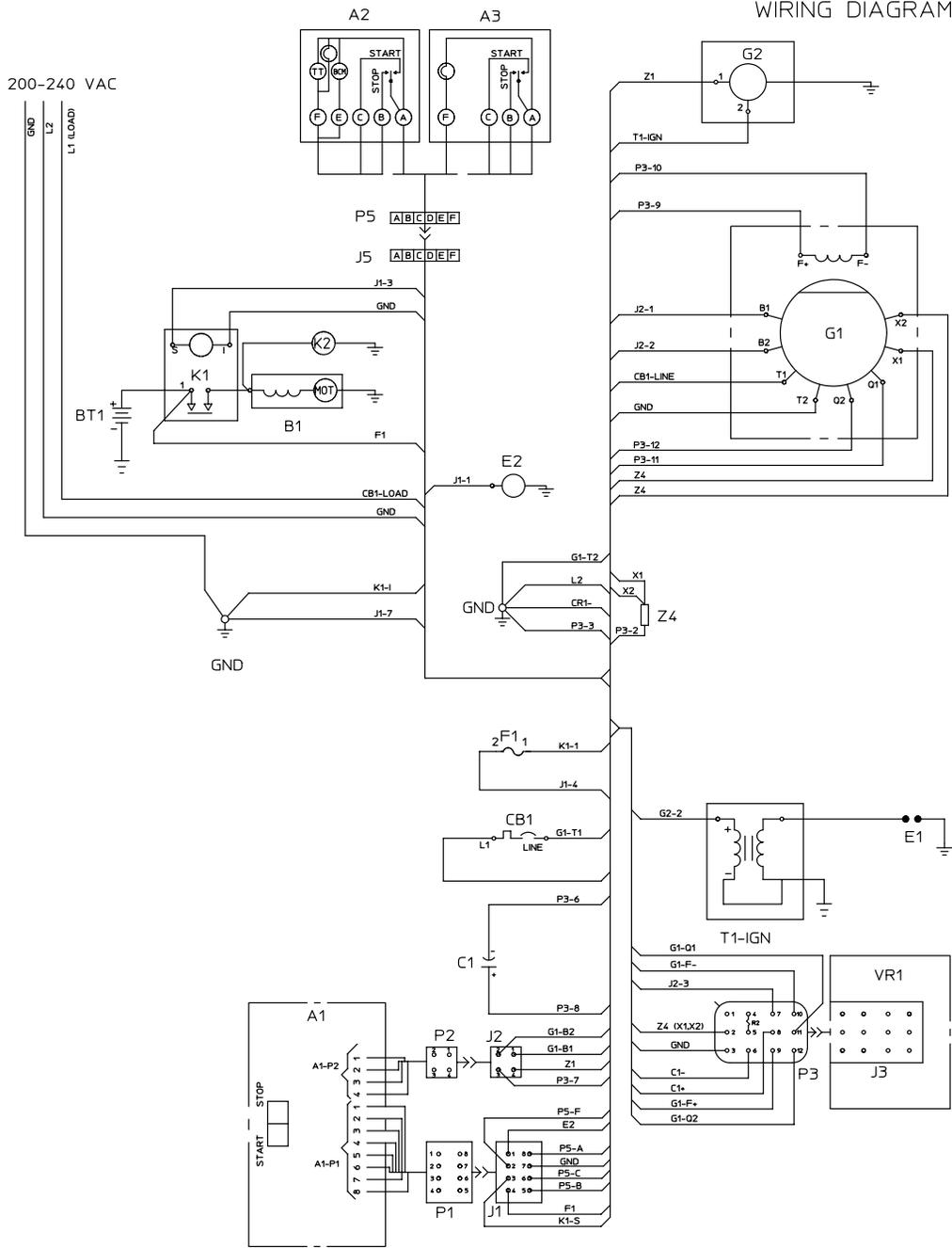


UNDER-FLOOR MOUNTING TEMPLATE 539-2146 (FOR ILLUSTRATION ONLY—NOT SHOWN FULL SIZE)

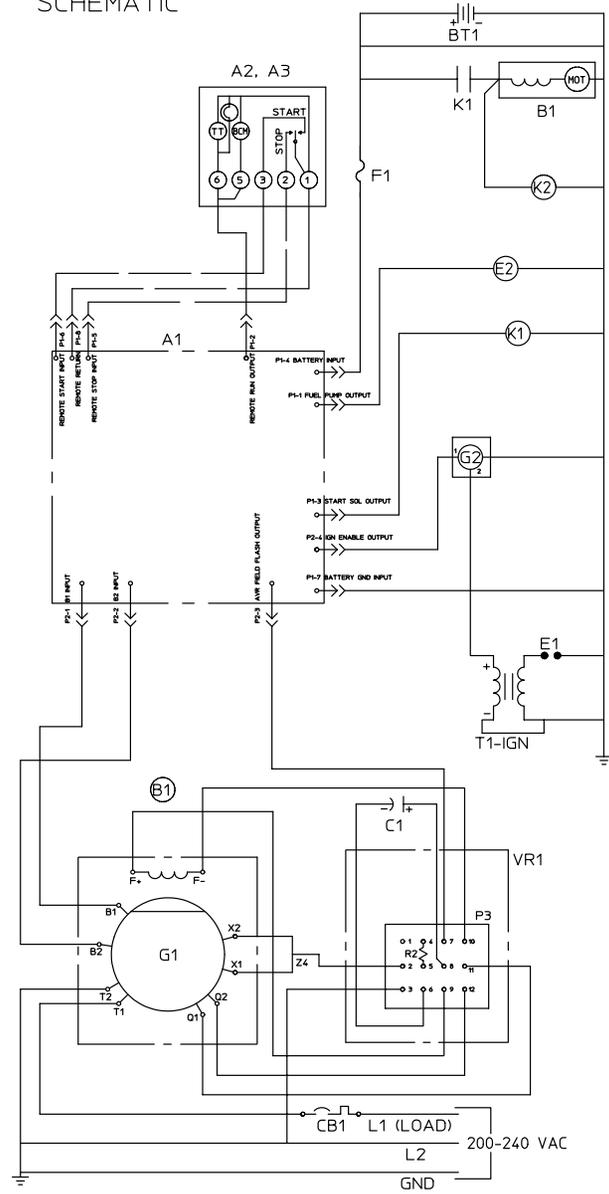
A-4



ABOVE-FLOOR MOUNTING TEMPLATE 539-2145 (FOR ILLUSTRATION ONLY—NOT SHOWN FULL SIZE)



SCHEMATIC



50 HERTZ WIRING DIAGRAM AND SCHEMATIC

Onan

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