

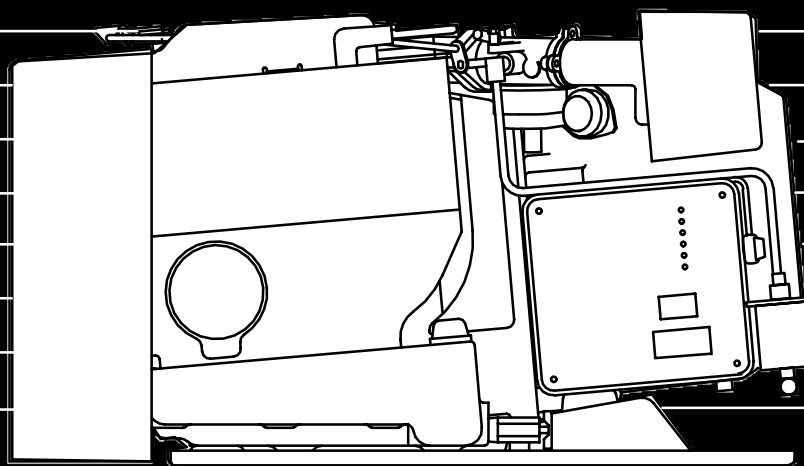
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Onan

GenSet

Installation Manual

BGD, NHD





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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Safety Precautions

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

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

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

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

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

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

GENERAL PRECAUTIONS

- Keep ABC fire extinguishers handy.
- Make sure all fasteners are secure and torqued properly.
- Keep the genset and its compartment clean. Excess oil and oily rags can catch fire. Dirt and gear stowed in the compartment can restrict cooling air.
- Before working on the genset, disconnect the negative (-) battery cable at the battery to prevent starting.

- Use caution when making adjustments while the genset is running—hot, moving or electrically live parts can cause severe personal injury or death.
- Used engine oil has been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale, or contact used oil or its vapors.
- Benzene and lead in some gasolines have been identified by some state and federal agencies as causing cancer or reproductive toxicity. Do not ingest, inhale or contact gasoline or its vapors.
- Do not work on the genset when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.

GENERATOR VOLTAGE IS DEADLY!

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

FUEL IS FLAMMABLE AND EXPLOSIVE

- Do not smoke or turn electrical switches ON or OFF where fuel fumes, tanks or equipment are present or in areas sharing ventilation. 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.
- Use approved non-conductive flexible fuel hose for fuel connections at the genset.
- 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.

ENGINE EXHAUST IS DEADLY!

- Learn the symptoms of carbon monoxide poisoning in this Manual.
- The exhaust system must be installed in accordance with the genset Installation Manual.

- Do not use engine cooling air to heat a room or compartment.
- Make sure there is ample fresh air when operating the genset in a confined area.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.
- When disconnecting or reconnecting battery cables, always disconnect the negative (-) battery cable first and reconnect it last to reduce arcing.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

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

1. Introduction

GENERAL

This manual is a guide for the installation of the Model BGD and NHD generator sets (gensets) in work vehicles. Proper installation is essential for top performance. Read through this manual before starting the installation.

This manual addresses the following aspects of the installation:

- Mounting
- Weather Protection
- Compartment Ventilation
- Acoustics (Noise Reduction)
- Exhaust Connections
- Fuel Connections
- Electrical Power Connections
- Battery Connections
- Accessibility for Maintenance and Service.

⚠ 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.*

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

INSTALLATION CODES AND STANDARDS FOR SAFETY

The builder of the work vehicle bears sole responsibility for the selection of the appropriate genset, for its proper installation and for obtaining approvals from the authorities (if any) having jurisdiction over the work vehicle. These gensets meet the basic requirements of the Standard for Safety for Engine gensets for Recreational Vehicles, ANSI/RVIA EGS-1—1986*. They are suitable for installation in accordance with:

- The Standard for the Storage and Handling of Liquefied Petroleum Gases, NFPA No. 58.
- The National Electrical Code, NFPA No. 70
- The Standard on Recreational Vehicles, NFPA No. 501C
- CSA Electrical Bulletin No. 946.

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, as a minimum, that the following standards be obtained for reference.

- | | |
|--|--|
| • NFPA No. 58
NFPA No. 70
NFPA No. 501C
NFPA No. 52 | National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210 |
| • CSA Electrical Bulletin No.946 | Canadian Standards Association
Housing and Construction Materials Section
178 Rexdale Blvd.
Rexdale, Ontario,
Canada M9W 1R3 |
| • 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 |

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.

* - Options such as the extended shaft, 50 Hertz output and output voltages greater than 300 volts are not within the scope of this standard.

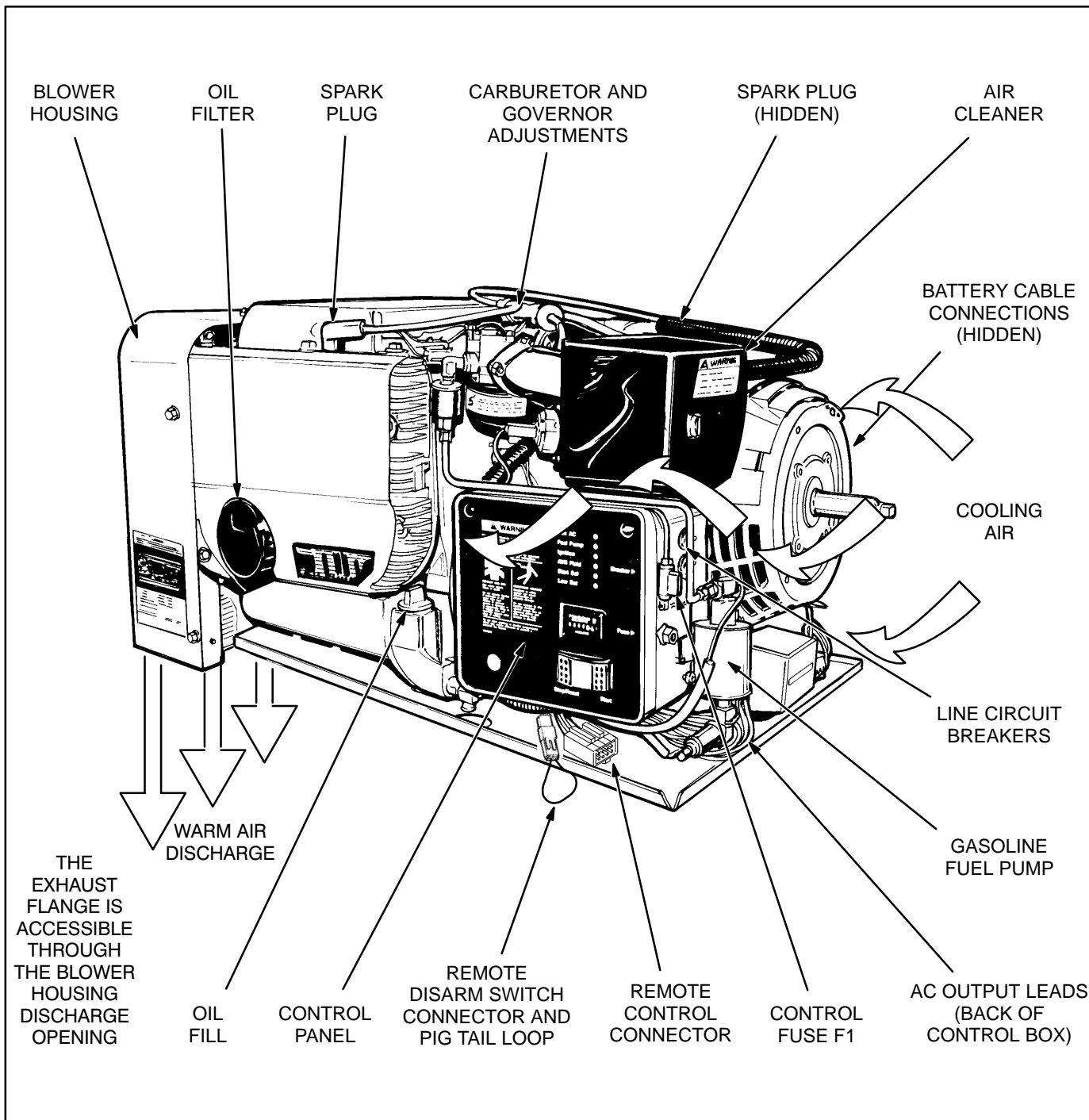


FIGURE 1-1. TYPICAL GENSET

2. Specifications

	GASOLINE MODELS			
	BGD		NHD	
GENERATOR: 4-Pole Revolving Field, Self-Excited, Electronically Regulated				
Power (watts)	4500	4000	6500	5000
Frequency (Hertz)	60	50	60	50
120/240 Volt Single-Phase Output Current (amperes @ 1.0 PF)	37.5/18.8	33.3/16.6	54/27	41.7/20.8
120/240 Volt Three-Phase Output Current (amperes @ 1.0 PF)	21.7/10.8	-	31.3/15.6	-
220/380 Volt Three-Phase Output Current (amperes @ 1.0 PF)	-	10.5/6.1	-	13.1/7.6
Speed (RPM)	1800	1500	1800	1500
FUEL CONSUMPTION:				
No load gph (l/h)	0.3 (1.1)	0.3 (1.1)	0.4 (1.5)	0.4 (1.5)
Half load gph (l/h)	0.5 (1.9)	0.5 (1.9)	0.7 (2.6)	0.7 (2.6)
Full load gph (l/h)	0.8 (3.0)	0.8 (3.0)	1.3 (4.9)	1.0 (3.8)
ENGINE: 2-Cylinder Opposed, 4-Cycle, Spark-Ignited, Side-Valve, Air Cooled				
Bore	3.250 inches (83 mm)		3.563 inches (90 mm)	
Stroke	2.875 inches (73 mm)		3.000 inches (76 mm)	
Displacement	48 inches ³ (782 cc)		60 inches ³ (980 cc)	
Compression Ratio	7.0 : 1			
Oil Capacity (with filter)*	3.5 quarts (3.3 l)			
Intake Valve Clearance (Cold)	0.005 inches (0.13 mm)			
Exhaust Valve Clearance (Cold)	0.013 inches (0.33 mm)			
Spark Plug Gap	0.025 inches (0.64 mm)			
Spark Plug Tightening Torque	8 lbs-ft (10 N-m)			
Electronic Ignition Timing	12° BTDC, non-adjustable			
CONTROL AND CRANKING SYSTEM: 12 VDC				
Nominal Battery Voltage	12 volts			
Minimum Battery Cold Cranking Capacity: Above/Below Freezing	360/450 amperes			
Nominal Regulated-Voltage Battery Charging Output	10 amperes			
Fuse F1 (control circuit)	10 amperes mini-bayonet			
* -See <i>Periodic Maintenance</i> for oil filling instructions.				

	LPG MODELS			
	BGD		NHD	
GENERATOR: 4-Pole Revolving Field, Self-Excited, Electronically Regulated				
Power (watts)	4500	4000	6300	5000
Frequency (Hertz)	60	50	60	50
120/240 Volt Single-Phase Output Current (amperes @ 1.0 PF)	37.5/18.8	33.3/16.6	52.5/26.3	41.7/20.8
120/240 Volt Three-Phase Output Current (amperes @ 1.0 PF)	21.7/10.8	-	30.3/15.2	-
220/380 Volt Three-Phase Output Current (amperes @ 1.0 PF)	-	10.5/6.1	-	13.1/7.6
Speed (RPM)	1800	1500	1800	1500
FUEL CONSUMPTION:				
No load lbs/h (kg/h)	1.8 (0.8)	1.5 (0.7)	2.2 (1.0)	2.0 (0.9)
Half load lbs/h (kg/h)	3.1 (1.4)	2.6 (1.2)	3.8 (1.7)	3.5 (1.6)
Full load lbs/h (kg/h)	4.4 (2.0)	4.0 (1.8)	6.6 (3.0)	5.1 (2.3)
ENGINE: 2-Cylinder Opposed, 4-Cycle, Spark-Ignited, Side-Valve, Air Cooled				
Bore	3.250 inches (83 mm)		3.563 inches (90 mm)	
Stroke	2.875 inches (73 mm)		3.000 inches (76 mm)	
Displacement	48 inches ³ (782 cc)		60 inches ³ (980 cc)	
Compression Ratio	7.0 : 1			
Oil Capacity (with filter)*	3.5 quarts (3.3 l)			
Intake Valve Clearance (Cold)	0.005 inches (0.13 mm)			
Exhaust Valve Clearance (Cold)	0.013 inches (0.33 mm)			
Spark Plug Gap	0.025 inches (0.64 mm)			
Spark Plug Tightening Torque	8 lbs-ft (10 N-m)			
Electronic Ignition Timing	12° BTDC, non-adjustable			
LPG Vapor Supply Pressure (Range)—Vapor-Withdrawal Models Only	9 to 13 inch (229 to 330 mm) W.C. (water column)			
CONTROL AND CRANKING SYSTEM: 12 VDC				
Nominal Battery Voltage	12 volts			
Minimum Battery Cold Cranking Capacity: Above/Below Freezing	360/450 amperes			
Nominal Regulated-Voltage Battery Charging Output	10 amperes			
Fuse F1 (control circuit)	10 amperes mini-bayonet			
* -See <i>Periodic Maintenance</i> for oil filling instructions.				

3. Location, Mounting, Enclosure, Venting, Acoustics

LOCATION AND MOUNTING

These gensets can be mounted at various locations on a work vehicle. They have built-in vibration isolators and a mounting tray for bolting directly to the vehicle floor or supporting frame. Figures 3-1 and 3-2 show typical mountings at various locations. See *Section 9* for dimensions, connection points, minimum clearances and mounting hole locations.

The frame or floor to which the genset is bolted must be strong enough to support the dynamic load of the genset when the vehicle is moving and to keep the genset from being dislodged during a sudden stop or crash. Use four 3/8-16 UNC bolts for mounting. (The rear mounting holes have weld nuts. The front holes can be used with square cage nuts.) Use three inch diameter washers under the bolt heads when bolting the genset to plywood or particle board.

⚠ WARNING *The genset must be mounted securely to prevent it from being dislodged during a sudden stop or crash. A dislodged genset can strike a person, causing severe injury or death.*

⚠ WARNING *Weight distribution affects vehicle braking performance. Check with the vehicle chassis builder to make sure the location of the genset will not adversely affect braking.*

ENCLOSURE

The genset must be protected against the weather and road splash.

⚠ CAUTION *The genset can be disabled by electrical shorts and carburetor linkage malfunctioning if rain, snow, ice, road splash or water from washer nozzles enters the genset. Also, plastic parts might deteriorate if continually exposed to sunlight. The enclosure or compartment must keep the genset dry under all conditions and shaded from the sun.*

Sets Mounted Outside the Cab or Work-Space Envelope

A cover must be provided that extends across the full width and length of the genset if it is mounted outside the envelope of the cab or work-space of the vehicle (Figure 3-1). To keep out rain when the vehicle is moving, the cover should extend down across the full width of the side or end of the genset facing the front of the vehicle. Sets mounted on a tailgate extension might need more protection on the sides to keep out road splash. The minimum allowable clearance between the genset and the enclosure or compartment is 5/8 inches (15 mm). See the appropriate outline drawing (*Section 9*).

The generator end of a full enclosure must have a minimum of 85 square inches (548 square centimeters) of free area for ventilation. See VENTILATION in this section. If the generator end faces the front of the vehicle, a baffle over the ventilating opening might be necessary to keep out rain when the vehicle is moving.

The enclosure or a separate cover should prevent personnel from touching a hot, side-mounted (above floor) muffler and tail pipe. Other components, such as a gas pressure demand regulator (LPG sets equipped for vapor withdrawal) or an auxiliary drive unit (hydraulic pump), should be protected from damage by the enclosure or by separate covers. See *Section 4*, *Section 5* and *Section 7*.

TOOL CABINET MOUNTED GENSET: MOUNT THE GENSET ON PEDESTALS OR FRAME MEMBERS SO THAT THERE IS A VERTICAL CLEARANCE OF AT LEAST 2 INCHES (51 MM) BETWEEN THE BLOWER DISCHARGE OPENING IN THE BOTTOM OF THE GENSET AND THE TOP OF THE TOOL CABINET. PROVIDE CLEARANCE AROUND THE GENSET SO THAT IT DOES NOT HAVE TO BE REMOVED FOR MAINTENANCE.

PROVIDE A COVER OVER THE FULL LENGTH AND WIDTH OF THE GENSET TO KEEP OUT RAIN, SNOW, ICE, SUN, ROAD SPLASH AND CLEANING SPRAY. THE COVER SHOULD EXTEND DOWN OVER THE SIDE FACING THE FRONT OF THE VEHICLE TO KEEP OUT RAIN WHEN THE VEHICLE IS MOVING. THE MINIMUM ALLOWABLE CLEARANCE BETWEEN THE GENSET AND THE ENCLOSURE OR COVER IS 5/8 INCHES (15 MM).

SEE SECTION 4 REGARDING MUFFLER AND TAILPIPE MOUNTING AND SHIELDING.

TAILGATE MOUNTED GENSET: CUT THE BLOWER DISCHARGE AND OIL DRAIN OPENINGS IN THE TAIL GATE ACCORDING TO THE APPROPRIATE OUTLINE DRAWING (SECTION 9), OR MOUNT THE GENSET ON PEDESTALS AT LEAST 2 INCHES (51 MM) HIGH. PROVIDE CLEARANCE AROUND THE GENSET SO THAT IT DOES NOT HAVE TO BE REMOVED FOR MAINTENANCE.

PROVIDE A COVER OVER THE FULL LENGTH AND WIDTH OF THE GENSET TO KEEP OUT RAIN, SNOW, ICE, SUN, ROAD SPLASH AND CLEANING SPRAY. THE MINIMUM ALLOWABLE CLEARANCE BETWEEN THE GENSET AND THE ENCLOSURE OR COVER IS 5/8 INCHES (15 MM).

SEE SECTION 4 REGARDING MUFFLER AND TAILPIPE MOUNTING AND SHIELDING.

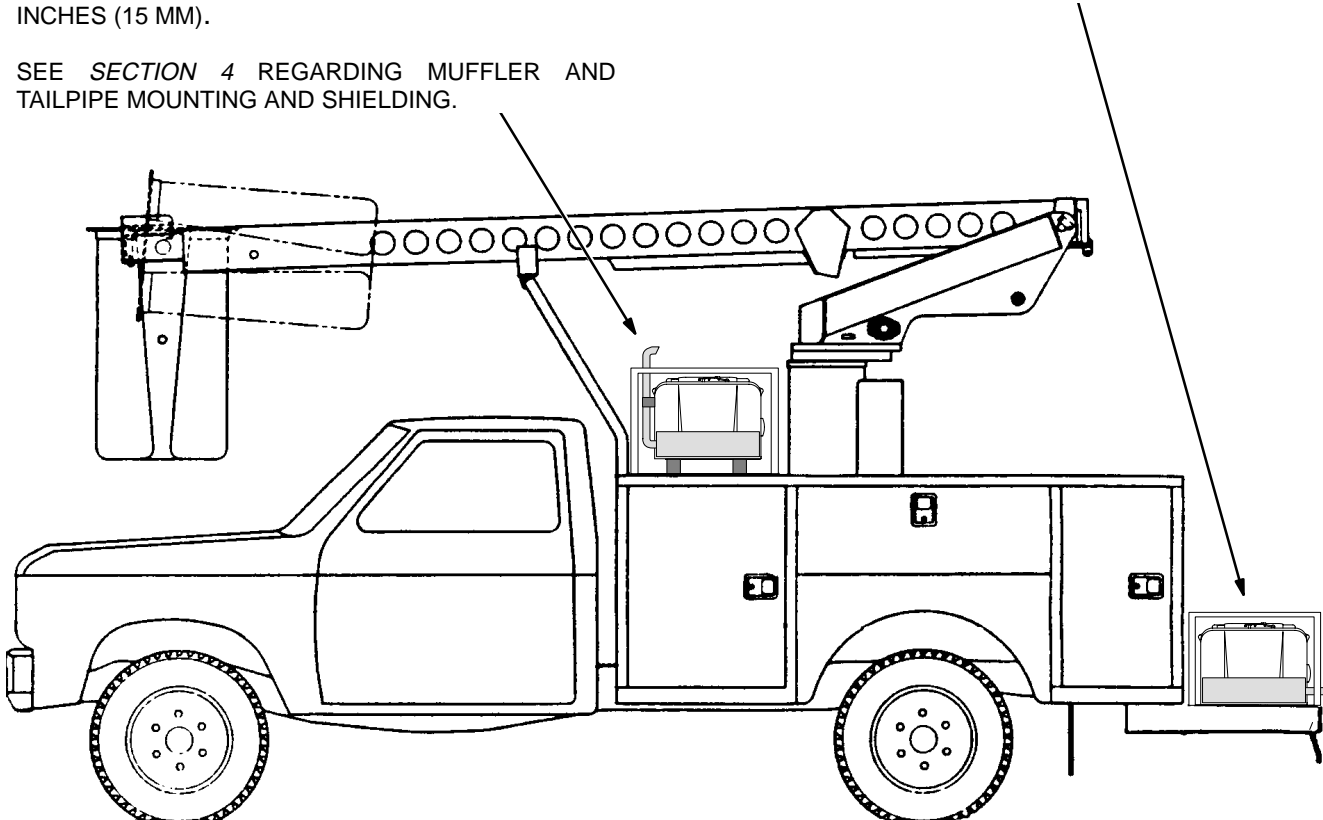


FIGURE 3-1. TYPICAL GENSET MOUNTINGS OUTSIDE THE CAB OR WORK-SPACE ENVELOPE

Gensets Mounted Inside the Cab or Work-Space Envelope

A compartment having vapor-tight, fire-resistant walls must be provided if the genset is mounted within the envelope of the cab or work-space of the vehicle (Figure 3-2). The ventilation openings must be to the outside of the vehicle. See Ventilation in this Section.

⚠WARNING *Exhaust gas is deadly, and fuel vapors are highly flammable and explosive. The generator compartment walls must be vapor-tight to keep exhaust gas and fuel vapors from entering the vehicle.*

The minimum allowable clearance between the genset and the enclosure or compartment is 5/8 inches (15 mm). See the appropriate outline drawing (*Section 9*). Additional room will be required for a genset with an auxiliary drive (hydraulic pump) on the end of the generator or a pressure demand regulator (LPG fueled sets). See *Section 5* and *Section 7*.

The bottom of the enclosure or compartment must have drain holes or be constructed so that oil and water cannot collect. Absorbent acoustic material must not be placed between the genset and the compartment floor.

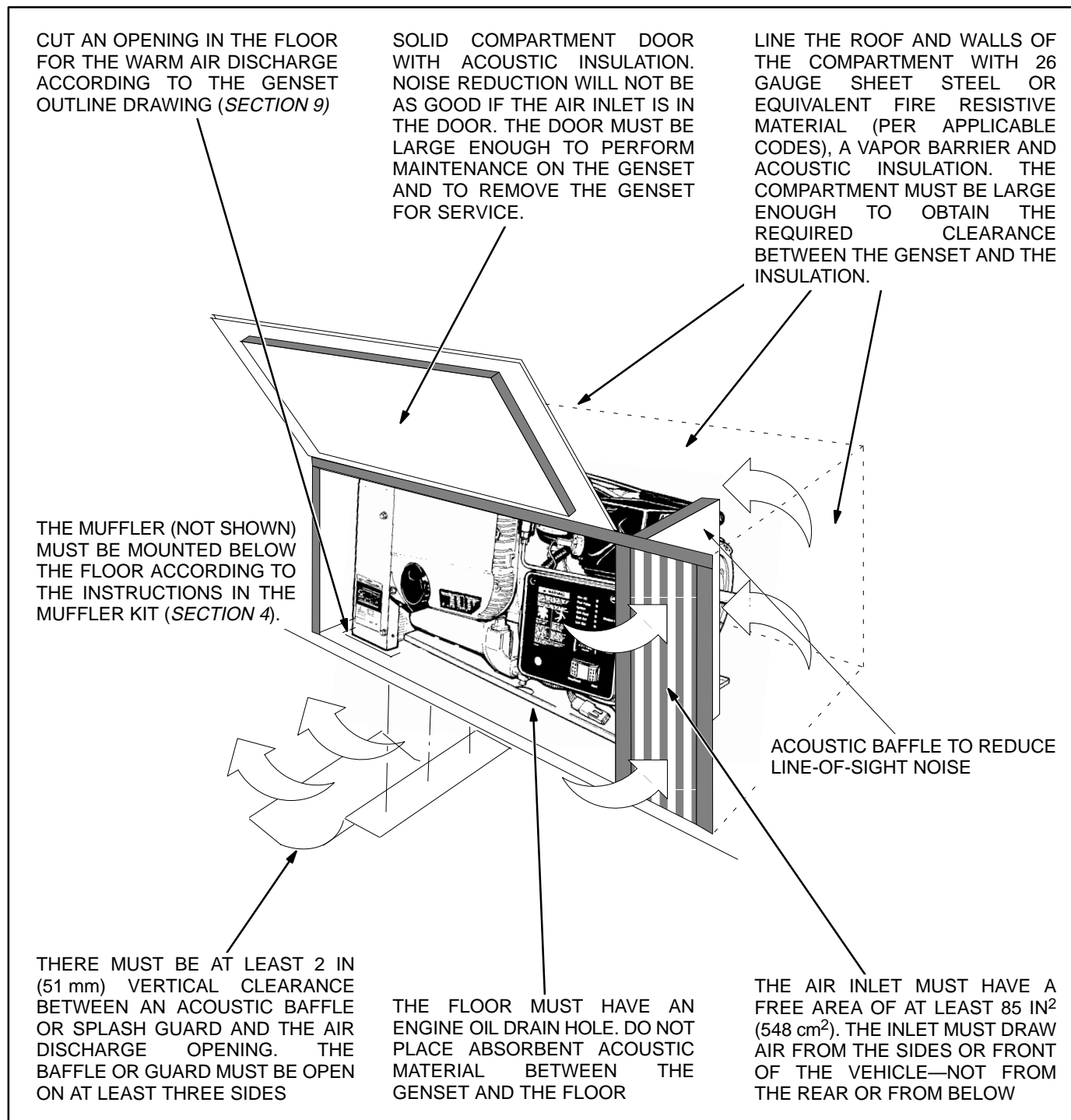


FIGURE 3-2. TYPICAL GENSET MOUNTING INSIDE THE CAB OR WORK-SPACE ENVELOPE

Maintenance and Service Access

The genset should be removable for service without having to remove other equipment on the vehicle. The enclosure or compartment must be removable or have access doors and there must be enough clearance between the genset and other equipment and bulkheads to perform the following maintenance:

- Checking the oil level
- Adding oil

- Draining oil
- Changing the oil filter
- Changing the air filter element
- Changing both spark plugs
- Adjusting the carburetor
- Adjusting the governor
- Starting and stopping the genset
- Resetting the line circuit breaker.

See Figure 3-3 to locate these points.

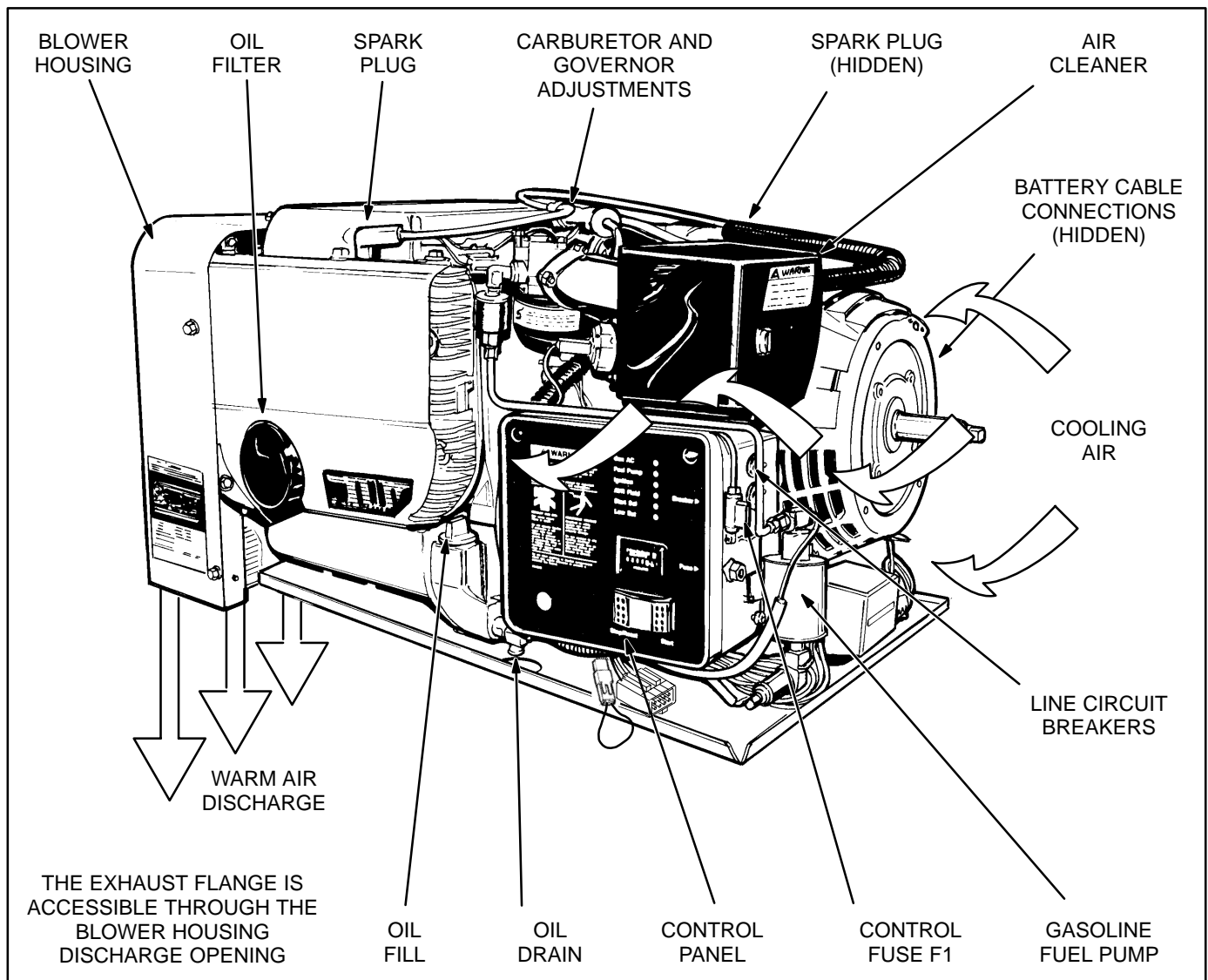


FIGURE 3-3. TYPICAL GENSET

VENTING

The genset has an air cooled engine. The air that is drawn through the generator and across the engine cooling fins is discharged downwards through the bottom of the fan housing (Figure 3-3). See the appropriate outline drawing (*Section 9*) for the location and size of the opening required if the genset is mounted on a floor. A splash shield or acoustic baffle or the surface above which the genset is mounted must not be located closer than 2 inches (51 mm) to the air discharge opening (Figures 3-1 and 3-2).

The air inlet of the enclosure or compartment must have at least 85 square inches (548 square centimeters) of free area. (Subtract the total area blocked by the air inlet grill when calculating the free area.) The inlet must draw air from the sides or front of the vehicle—not from the rear of the vehicle or from below. The opening should be located as high as possible in the enclosure or compartment to promote convective cooling when the genset is shut down.

⚠ CAUTION *Drawing ventilating air from the rear of the vehicle or from below can cause recirculation of the hot air discharged from the genset, causing high compartment air temperatures that can disable the genset.*

See *Section 8* for instructions concerning the enclosure temperature test. The temperature rise test

must be done to ensure proper cooling of a new compartment installation.

ACOUSTICS

Gensets rated 4.5 kW have a 72 dBA noise rating. Gensets rated 6.5 kW have a 74 dBA noise rating. These ratings are at 10 feet (3 meters) and are exclusive of exhaust noise. The exhaust accessory kit (*Section 4*) includes a muffler with a 23 dBA noise attenuation rating.

Noise can be further reduced by lining the enclosure or compartment with acoustic insulation, by reducing the number and size of openings to the minimum required for ventilation and by baffling the openings to reduce direct, line-of-sight noise (Figure 3-2). Acoustic insulation should be 1/2 to 1 inch (13 to 25 mm) thick and have a 250° F (121° C), “Self-Extinguishing” fire hazard classification. The compartment must be sized so that at least the minimum clearance of 5/8 inches (15 mm) is obtained between the genset and the insulation.

⚠ WARNING *Because of the hot surfaces of the genset, clearances of less than 5/8 inches (15 mm) or use of insulation not having a 250° F (121° C) “Self-Extinguishing” fire hazard classification can lead to ignition of the insulation, causing severe personal injury, death or damage to the equipment.*

4. Exhaust System

The exhaust system must be laid out and constructed carefully to prevent the entrance of exhaust gases into the cab or work spaces of the vehicle.

⚠ WARNING *Exhaust gas is deadly. The exhaust system must discharge all engine exhaust away from the vehicle, and it must not leak. Follow these instructions carefully and use only the appropriate Onan-supplied exhaust accessory kit.*

MUFFLER

Mufflers having various outlet orientations are available for mounting below the floor or on the end of the genset, as shown in Figure 4-1. The muffler kits include all the hardware necessary for mounting the muffler. They do not include any parts for connecting and hanging the tailpipe.

The spark-arrest muffler supplied in the exhaust accessory kit is approved by the U.S. Forest Service and meets many installation codes. Failure to install and maintain a spark-arrest muffler may violate the law. The muffler also has a 23 dBA noise attenuation rating.

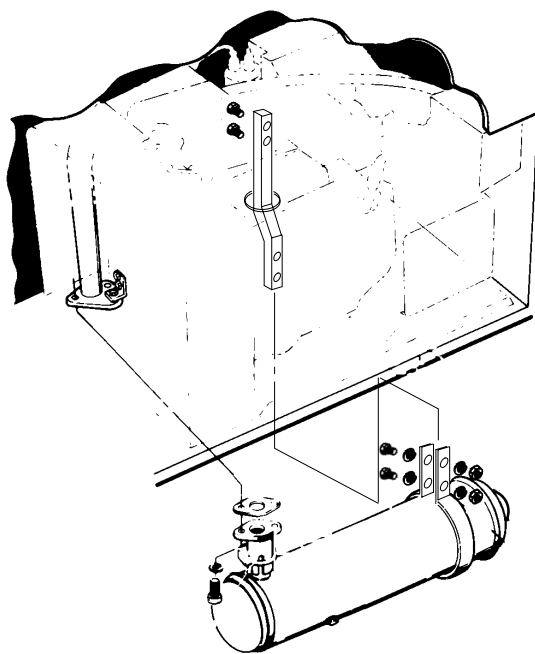
Install the muffler exactly according to the instructions in the muffler kit selected for the installation.

⚠ WARNING *Liability for injury, death, damage, and warranty expense due to use of unapproved mufflers or to modifications becomes the responsibility of the person installing the unapproved muffler or performing the modification. Contact an Onan distributor for approved exhaust system parts.*

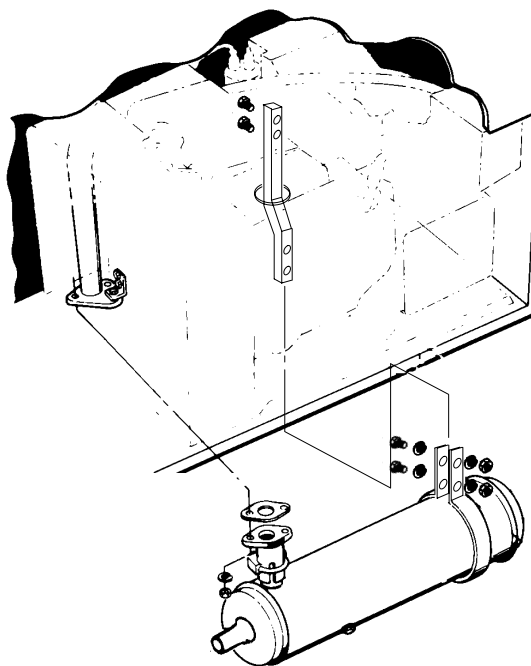
A clearance of at least 3 inches (76 mm) must be maintained between combustible material (wood, felt, cotton, organic fibers, etc.) and all parts of the exhaust system. The clearance may be reduced by shielding or by insulating the parts in accordance with the applicable installation codes. The temperature rise of adjacent combustible material must not exceed 117° F (65° C).

⚠ CAUTION *The muffler and tailpipe get hot and can ignite combustible material closer than 3 inches (76 mm), leading to severe personal injury, death or damage to the equipment.*

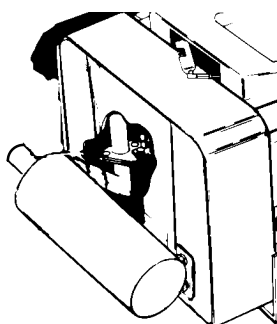
Provide guards as necessary to prevent accidental contact with the hot muffler during normal use of the vehicle.



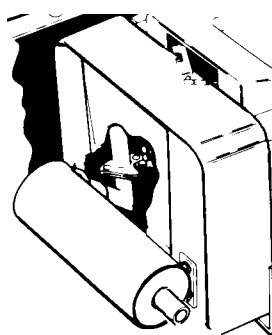
BELOW-FLOOR,
RIGHT-EXIT MUFFLER



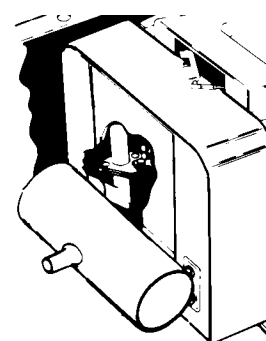
BELOW-FLOOR,
LEFT-EXIT MUFFLER



ABOVE-FLOOR,
REAR-EXIT MUFFLER



ABOVE-FLOOR,
FRONT-EXIT MUFFLER



ABOVE-FLOOR,
LEFT-EXIT MUFFLER

FIGURE 4-1. BELOW-FLOOR AND ABOVE-FLOOR MUFFLERS

EXHAUST TAILPIPE

The exhaust tailpipe must not terminate underneath the vehicle for any reason. It must extend at least 1 inch (25 mm) beyond the perimeter of the vehicle, exclusive of bumpers. It must also be supported at the perimeter to prevent it from being pushed up under the skirt of the vehicle.

Figure 4-2 shows the protected zones underneath the vehicle where the muffler and tailpipe may be routed, which are above the lower axle clearance line and the departure angle. Provide skid bars or other protection if the tailpipe has to be run outside this zone.

The tailpipe must not terminate near any openings such as vents, windows and doors that are not permanently sealed shut.

⚠ WARNING *Exhaust gas is deadly. Do not terminate the exhaust system underneath the vehicle or near openings into the vehicle, such as vents, windows and doors. The entire exhaust system must be above the departure angle and the lower axle clearance line.*

Terminate the exhaust tailpipe aft of the genset if located on the same side of the vehicle and point it down and aft to prevent recirculation of exhaust.

Terminate a vertical tailpipe with a rain cap or bent section that points towards the rear of the vehicle to keep rain out.

Provide guards as necessary to prevent accidental contact with the hot tailpipe during normal use of the vehicle.

Use 1-3/8 inch I.D., 18 gauge rigid steel tubing for the tailpipe.

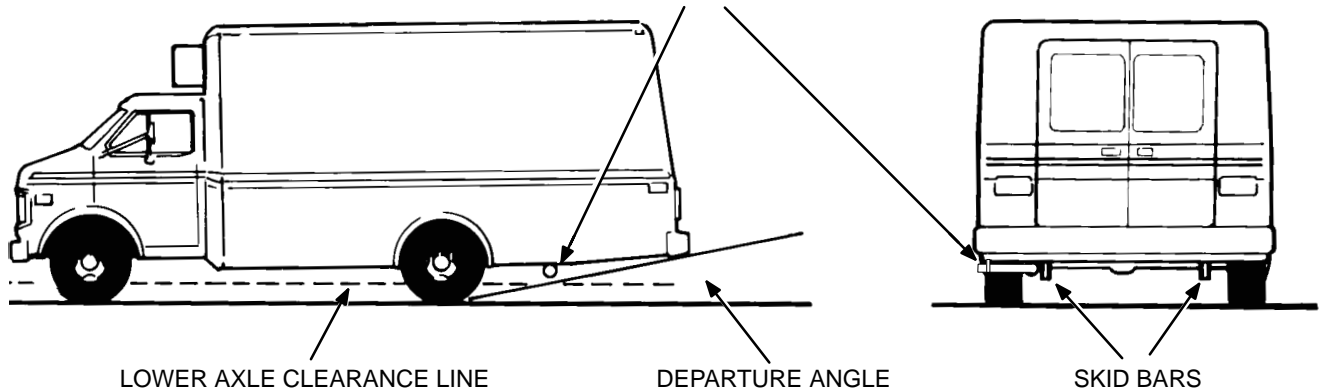
Use 1-3/8 inch U-bolt muffler clamps and double rubber, U-shaped shock-mount hangers to support the tailpipe.

⚠ CAUTION *Excessive exhaust back pressure can cause damage to the engine. A tailpipe deflector, if used, must be large enough to not cause backpressure.*

⚠ CAUTION *Do not interconnect exhaust systems. Soot, high temperature and corrosive condensate can damage idle engines connected to a common exhaust system.*

BELOW-FLOOR MOUNTED MUFFLERS

EXTEND THE TAILPIPE AT LEAST 1 INCH (25 mm) BEYOND THE SKIRT AND SUPPORT IT SO THAT IT CANNOT BE PUSHED UP UNDER THE SKIRT



ABOVE-FLOOR MOUNTED MUFFLERS

PROVIDE A RAIN CAP OR TAILPIPE BENT AS SHOWN TOWARDS THE REAR TO KEEP RAIN OUT

THE MUFFLER AND TAILPIPE SHOULD BE INSIDE THE ENCLOSURE (SIDE REMOVED TO SHOW LOCATION) OR BE SEPARATELY GUARDED TO PREVENT ACCIDENTAL CONTACT

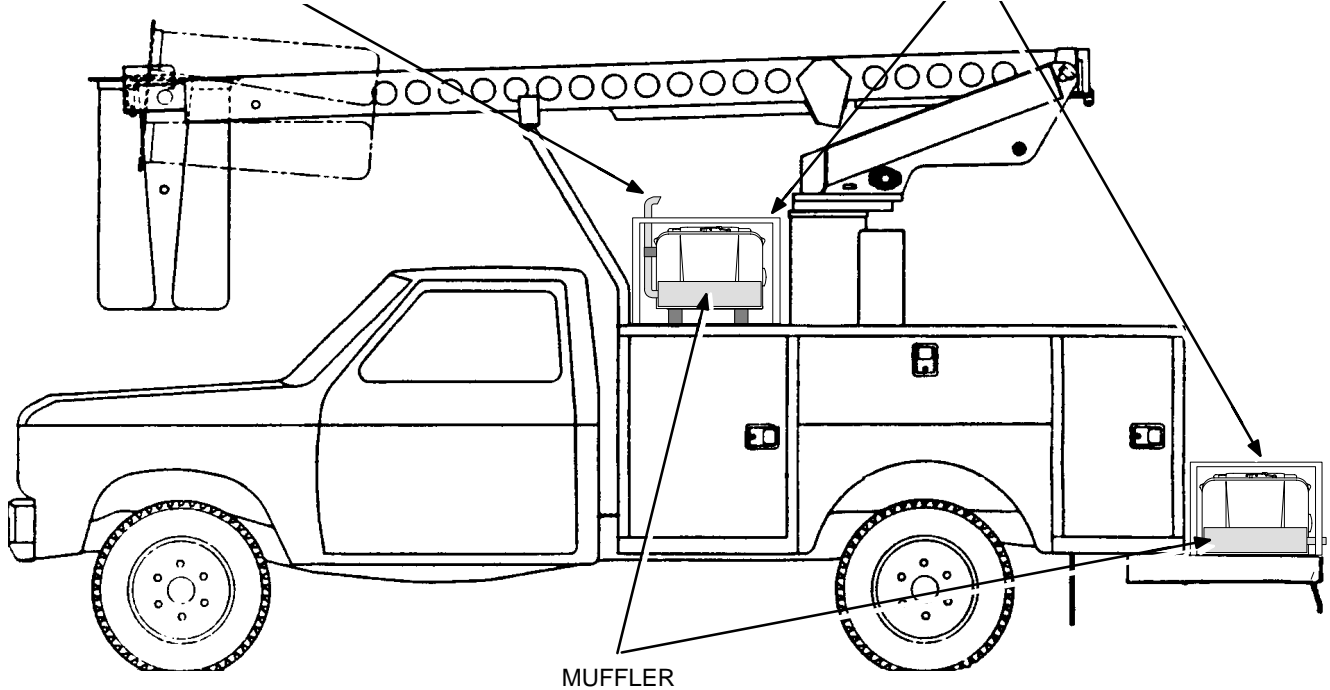


FIGURE 4-2. MUFFLER AND TAILPIPE ROUTING AND TERMINATION

5. Fuel Systems

GASOLINE-FUELED GENSETS

See the Operator's Manual for fuel recommendations. See *Section 2* regarding fuel consumption.

⚠WARNING *Gasoline is a highly flammable fuel and can cause severe personal injury or death. Do not smoke if you smell gasoline or are near fuel tanks or fuel-burning equipment or are in an area sharing ventilation with such equipment. Keep flames, sparks, pilot lights, electrical arcs, switches, arc-producing equipment and all other sources of ignition well away. Keep a type ABC fire extinguisher in the vehicle.*

An electric fuel pump is mounted on the genset (Figure 5-1). It delivers fuel to the carburetor at 4 to 5 psi and has a lift capacity (suction) of 3 feet (0.9 meters).

Fuel Supply Line

Connect the genset to the fuel supply line with approved flexible fuel hose to take up the movement allowed by the vibration isolators. The hose must be non-metallic (non-conductive) so that it does not become an alternative path for cranking current.

The fuel supply line should be seamless steel tubing with approved flare fittings. It should be run above the tank to prevent siphoning if the line breaks and away from hot exhaust parts to prevent

vapor lock. It should be supported and protected to prevent chaffing, kinking and pinching. It must be accessible throughout its length for inspection and replacement.

⚠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.*

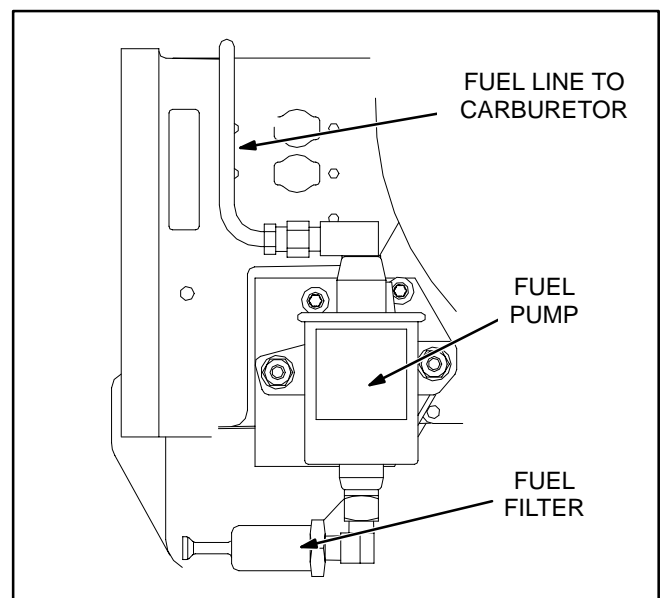


FIGURE 5-1. FUEL PUMP AND FILTER

Fuel Tanks and Supply Pressure

A separate fuel pickup tube for the genset is recommended when using the vehicle fuel supply tank. The fuel pickup tube for the genset should extend down into the fuel supply tank only so far as will leave a quarter-tank of fuel for the vehicle engine.

Fuel pressure greater than 6 psi (41 kPa) at the carburetor fitting can cause flooding. It should be noted that in most cases the fuel pump for the vehicle engine puts both the fuel supply line and the fuel return line under high pressure (up to 40 psi) when the engine is running. If the genset is connected to the vehicle engine fuel line, fuel pressure in the line to the genset must be regulated to 6 psi (41 kPa) or less. The Fuel Pressure Test under *Section 8* is recommended for every installation.

⚠WARNING *Carburetor flooding can cause poor performance, lead to serious engine damage and cause a fire leading to severe personal injury or death. Fuel pressure at the carburetor fitting must not exceed 6 psi (41 kPa) under any operating condition.*

Federal standards for vehicle fuel tanks may require the installation of a fuel shutoff solenoid valve at the fuel pickup tube to prevent leakage in the event of a roll-over.

Also, federal standards for vehicle impact, roll-over and emissions may be applicable when an auxiliary fuel tank is provided for the genset. Check with the vehicle chassis manufacture regarding these standards.

Remounting the Fuel Pump

If the genset is mounted at an elevated location above the lift capacity of the fuel pump (3 feet [0.9 meters]), remount the pump as follows.

1. Disconnect the fuel pump lead and unbolt the fuel pump from the genset.
2. Bolt the fuel pump to the vehicle chassis at a location that is within a vertical distance of 3 feet (0.9 meters) of the bottom of the fuel pickup tube in the tank. It must be in a protected location. The ground wire eyelet should be secured under the head of one of the pump mounting bolts.

⚠WARNING *Do not substitute an automotive fuel pump for the standard pump removed from the genset. Other pumps can cause carburetor flooding because of the high pressures they develop. Carburetor flooding can cause poor performance and can lead to serious engine damage and to fire that could cause severe personal injury or death.*

3. It is recommended that a 30 micron fuel filter be installed at the inlet to the carburetor and a 50 to 80 micron filter ahead of the pump.
4. Run a stranded copper conductor of at least No. 18 AWG between the genset and the fuel pump. Also, make sure there is a reliable ground path from the pump to the battery negative (-) terminal. Run a stranded copper conductor of at least No. 18 AWG as a ground path, if necessary.
5. Federal standards for vehicle roll-over may require that a fuel shutoff solenoid valve be installed at the fuel pickup tube to prevent fuel leakage in the event of a roll-over. Use a listed electric safety shutoff valve marked suitable for gasoline. It must have a 12 VDC coil rating of not more than 1.2 amps. Connect the solenoid in parallel with the genset fuel pump.
6. Run the Fuel Pressure Test in accordance with *Section 8*.

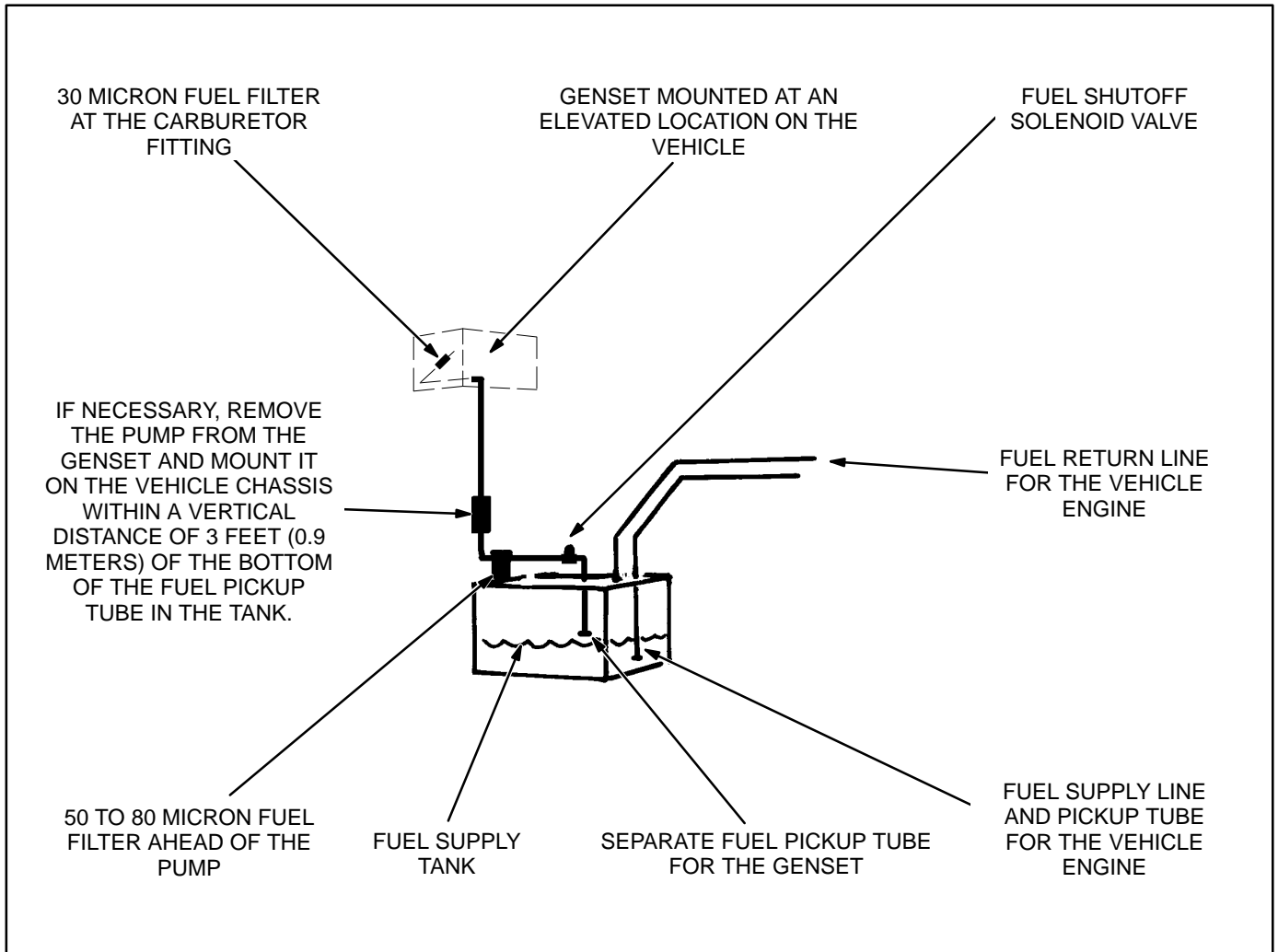


FIGURE 5-2. TYPICAL GASOLINE FUEL SYSTEM

LPG SYSTEM—LIQUID WITHDRAWAL

Figure 5-3 illustrates the fuel handling parts of an LPG-fueled genset equipped for liquid withdrawal of LPG and a typical supply system. See *Section 2* regarding fuel consumption.

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

⚠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.*

⚠WARNING *LPG is a highly flammable fuel and can cause severe personal injury or death. Do not smoke if you smell gas or are near fuel tanks or fuel-burning equipment or are in an area sharing ventilation with such equipment. Keep flames, sparks, pilot lights, electrical arcs, switches, arc-producing equipment and all other sources of ignition well away. Keep a type ABC fire extinguisher in the vehicle.*

It is recommended that the Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA

No. 58) be used as a guide for the installation of the LPG fuel system.

To take up the movement allowed by the vibration isolators, the genset must be connected to the fuel supply line with approved flexible fuel hose marked **350 PSI Working Pressure** and **LP-Gas** or **Propane**. The hose must be non-conductive between the end connectors so that it cannot become an alternative path for cranking current.

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 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.*

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.*

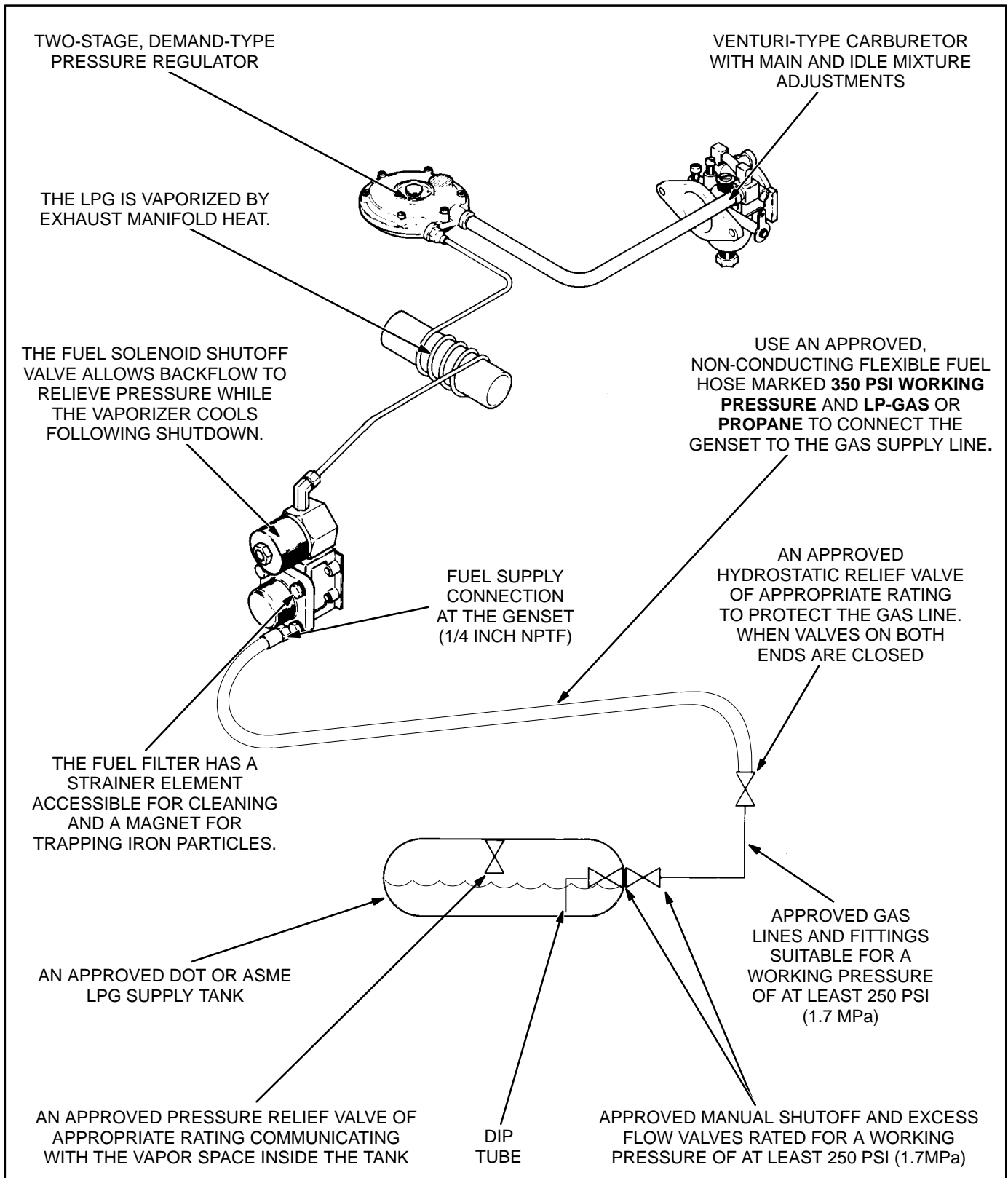


FIGURE 5-3. TYPICAL LPG FUEL SYSTEM—LIQUID WITHDRAWAL

LPG SYSTEM—VAPOR WITHDRAWAL

Figure 5-4 illustrates an LPG-fueled genset equipped for vapor withdrawal of LPG and a typical installation of the pressure regulator and gas solenoid, which are supplied in a kit. See *Section 2* regarding fuel consumption.

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

⚠ 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.*

⚠ WARNING *LPG is a highly flammable fuel and can cause severe personal injury or death. Do not smoke if you smell gas or are near fuel tanks or fuel-burning equipment or are in an area sharing ventilation with such equipment. Keep flames, sparks, pilot lights, electrical arcs, switches, arc-producing equipment and all other sources of ignition well away. Keep a type ABC fire extinguisher in the vehicle.*

It is recommended that the Standard for the Storage and Handling of Liquefied Petroleum Gases (NFPA No. 58) be used as a guide for the installation of the LPG fuel system.

Install the gas pressure regulator and solenoid valve exactly in accordance with the instructions in the kit.

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

⚠ CAUTION *High gas supply pressure can damage the sensitive demand-type pressure regulator and lead to poor engine performance.*

Gas lines should 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 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.*

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.*

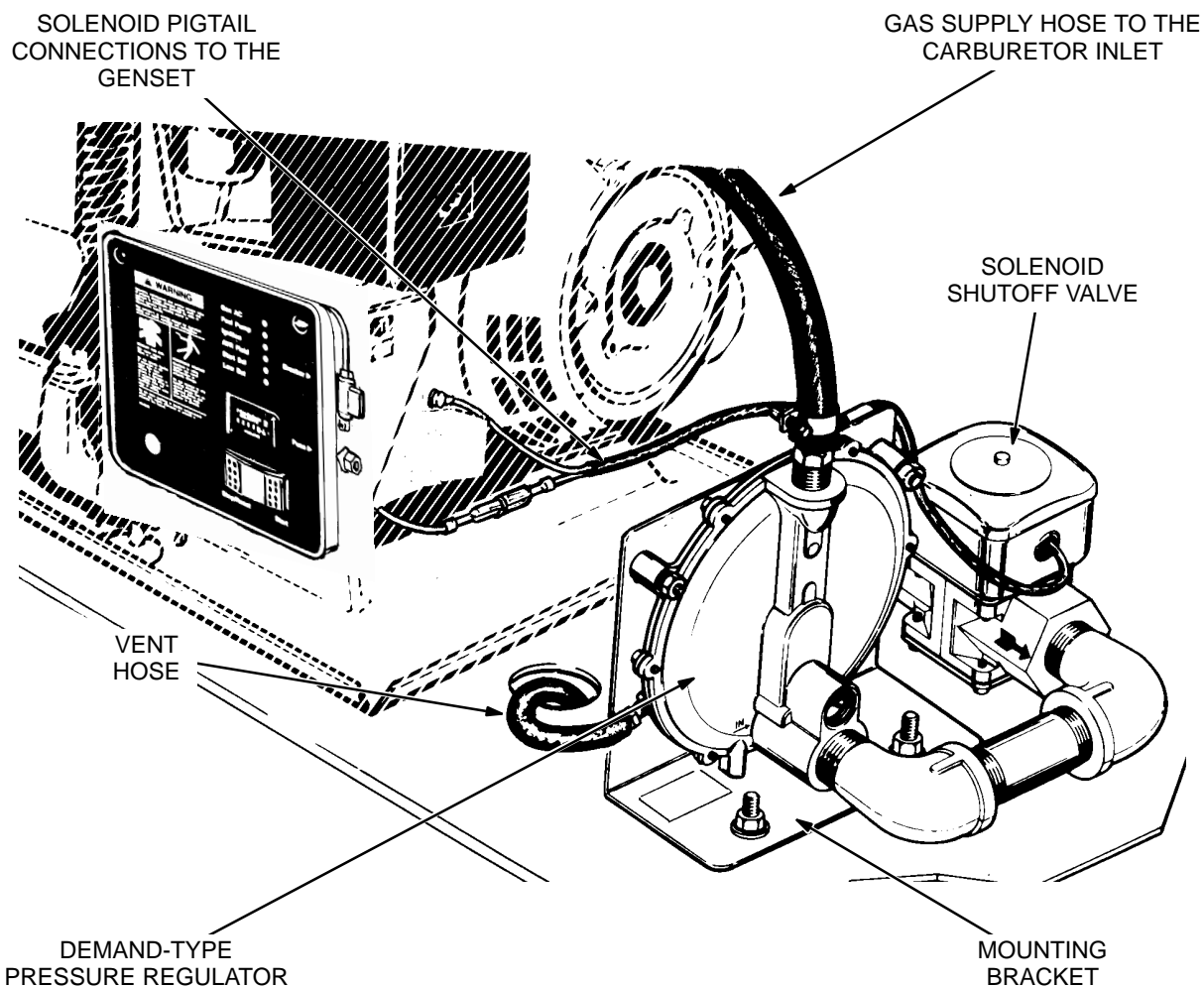


FIGURE 5-4. TYPICAL INSTALLATION OF DEMAND PRESSURE REGULATOR AND FUEL SHUTOFF SOLENOID—VAPOR WITHDRAWAL

6. Electrical Connections

AC OUTPUT CONNECTIONS

These gensets are equipped with No. 12 AWG leads approximately 3 feet (0.9 meter) long for AC output connections. The leads exit through a 1/2-inch trade-size flexible conduit connector. Line circuit breakers are mounted inside the control box. See the appropriate reconnection diagram in Figures 6-2 through 6-6 for proper connections.

Wiring Methods

The National Electrical Code (NFPA No. 70) should be used as a guide for all AC wiring on the work vehicle. Give special consideration to the following.

1. The flexible conduit run to the genset must have enough slack and be routed such that it does not interfere with free movement of the genset on its vibration isolators.
2. Rain-tight conduit, fittings and junction boxes should be used for all external wiring.
3. Ground-fault circuit interrupters (GFCI) should be used for all branch circuits with convenience receptacles.
4. To keep out exhaust gases, seal the opening where wiring enters the cab or workspace by sealing the wiring conduit connector inside and outside.

⚠️ WARNING *Exhaust gas is deadly. To keep out exhaust gases, seal the opening where wiring enters the cab or workspace by sealing the wiring conduit connector inside and outside.*

5. Do not run AC wiring and fuel lines together.

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

Grounding

The genset, power supply wiring and all connected electrical equipment must be bonded to a common grounding point in accordance with applicable codes or standards.

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

Line Circuit Breakers

These gensets are equipped with line circuit breakers to protect the generator. Although three-phase generators are reconnectable for 380 volts and higher, the circuit breakers mounted in the control box are **not** rated for such service. Consult the factory concerning reconnections and circuit protection for such applications.

⚠️ CAUTION *Improper line circuit protection can result in substantial equipment damage. For the warranty to apply, the generator must be protected from overcurrents and shortcircuits by factory-approved methods.*

Utility Power Supply Cord

⚠️ WARNING *Interconnecting the genset and utility can lead to the electrocution of utility line workers. Approved methods must be used to prevent the genset and utility from becoming interconnected.*

For a work vehicle equipped with a utility power supply cord, provision must be made so that the genset and utility cannot be interconnected. Recommended methods for 1-phase, 120/240 volt, 3-wire generators, as shown in Figure 6-1, are as follows.

1. A triple-pole, double-throw, positive-off switch having an appropriate electrical rating may be used for manually switching to the power source desired. All current carrying conductors must be switched.
2. The leads from the genset may terminate in a 50 amp, 125/250 volt, 3-pole, 4-wire, grounded-type power **receptacle**. The vehicle power supply cord can then be plugged into the genset receptacle or a utility receptacle.

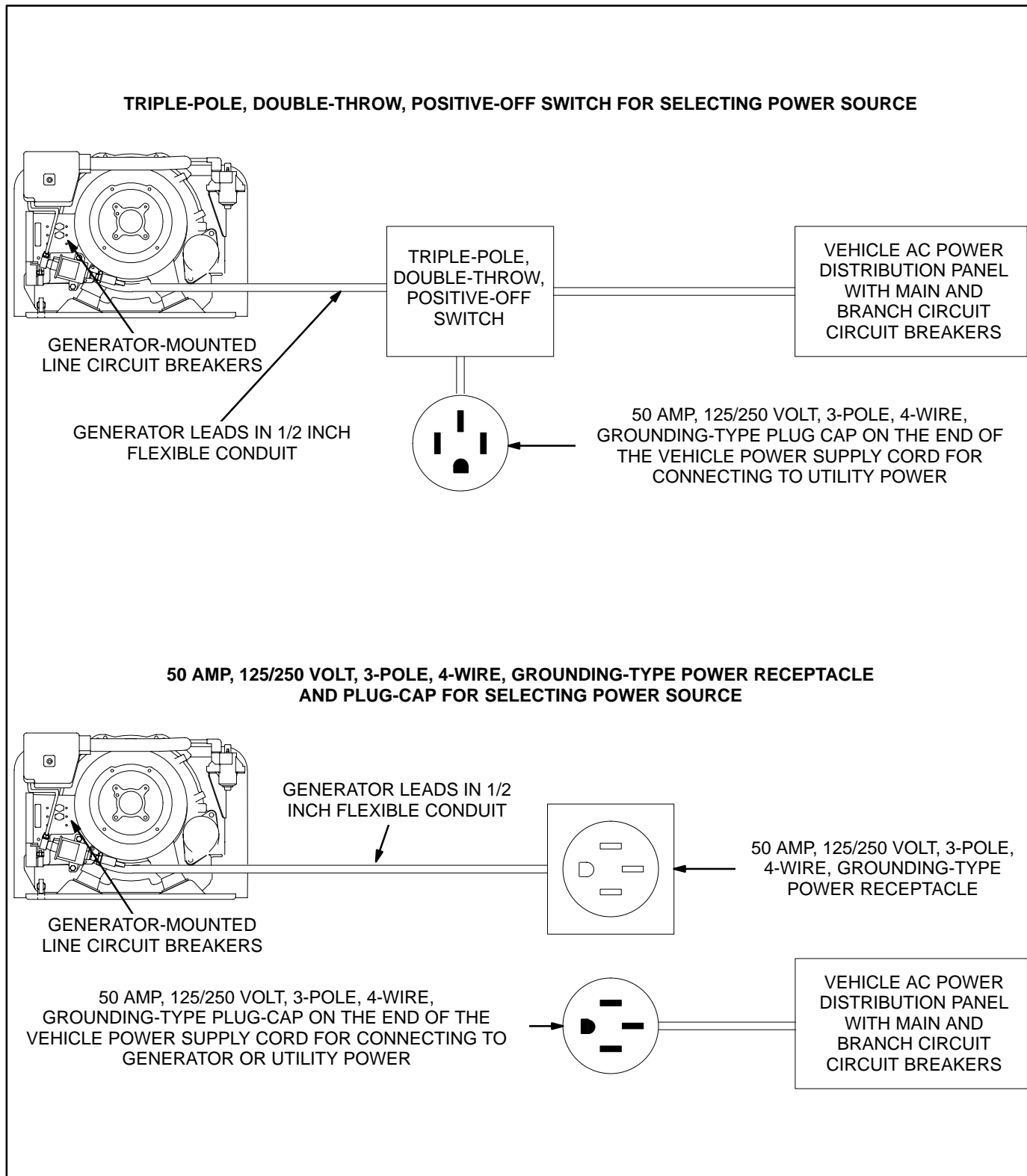


FIGURE 6-1. RECOMMENDED CONNECTIONS—SINGLE-PHASE GENSETS AND UTILITY POWER CORD

Generator Reconnections

Reconnections: When it is necessary to reconnect a generator to provide the voltage required for the application, remove the control panel and reconnect the leads at terminal block **TB1** and circuit breakers **CB1**, **CB2** and **CB3** as shown in the appropriate diagram (Figures 6-2 through 6-6). Note that other leads are also connected to terminal

block **TB1**. If they are disconnected inadvertently, see the appropriate wiring diagram in *Section 9* for proper reconnections.

Voltage Readjustments: Check voltage output after reconnections have been made and readjust if necessary (Figure 6-7). On three-phase generators make sure the 50/60 Hz selection switch is in the right position for the application.

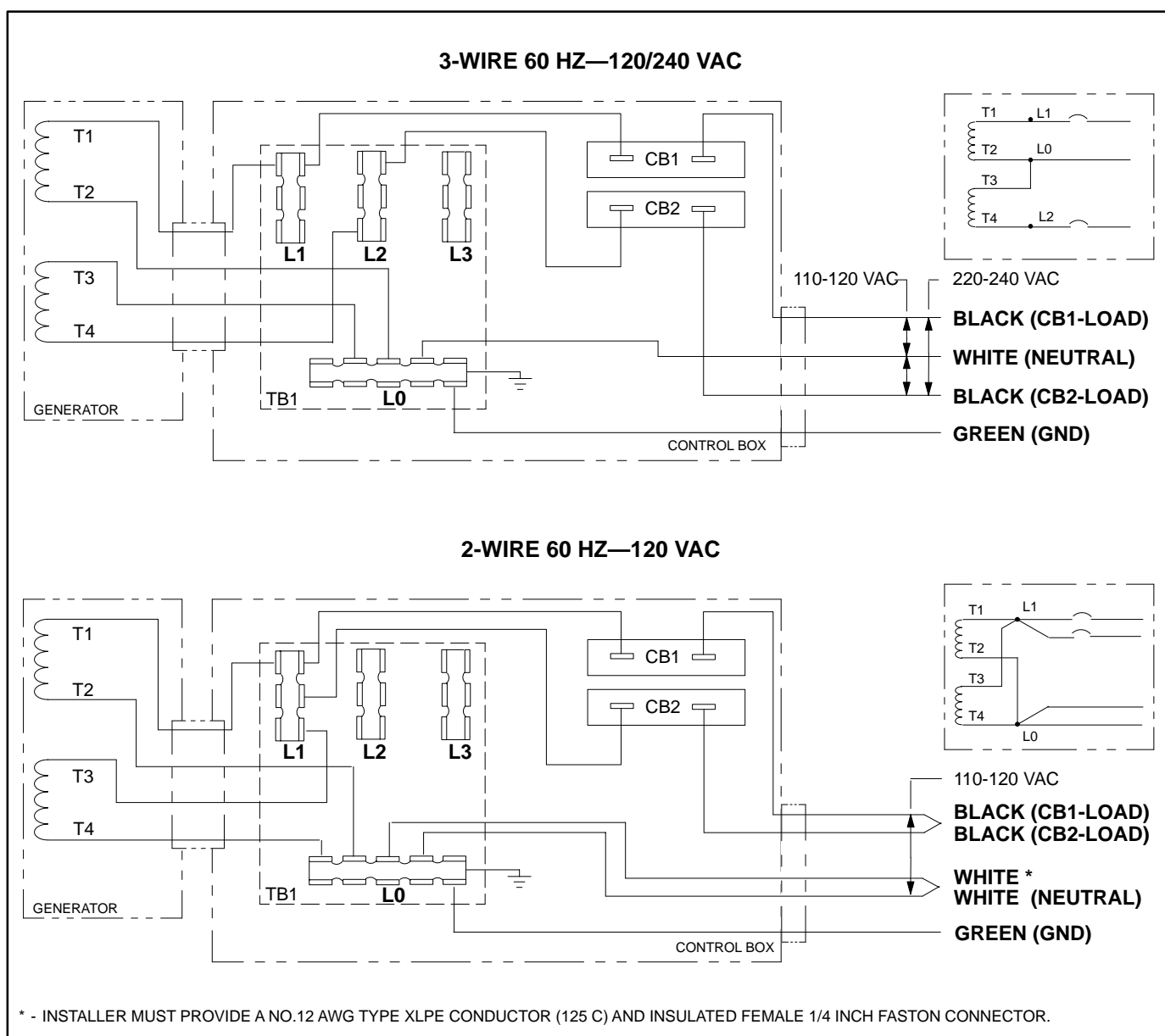


FIGURE 6-2. SINGLE-PHASE (4-LEAD) GENERATOR RECONNECTIONS

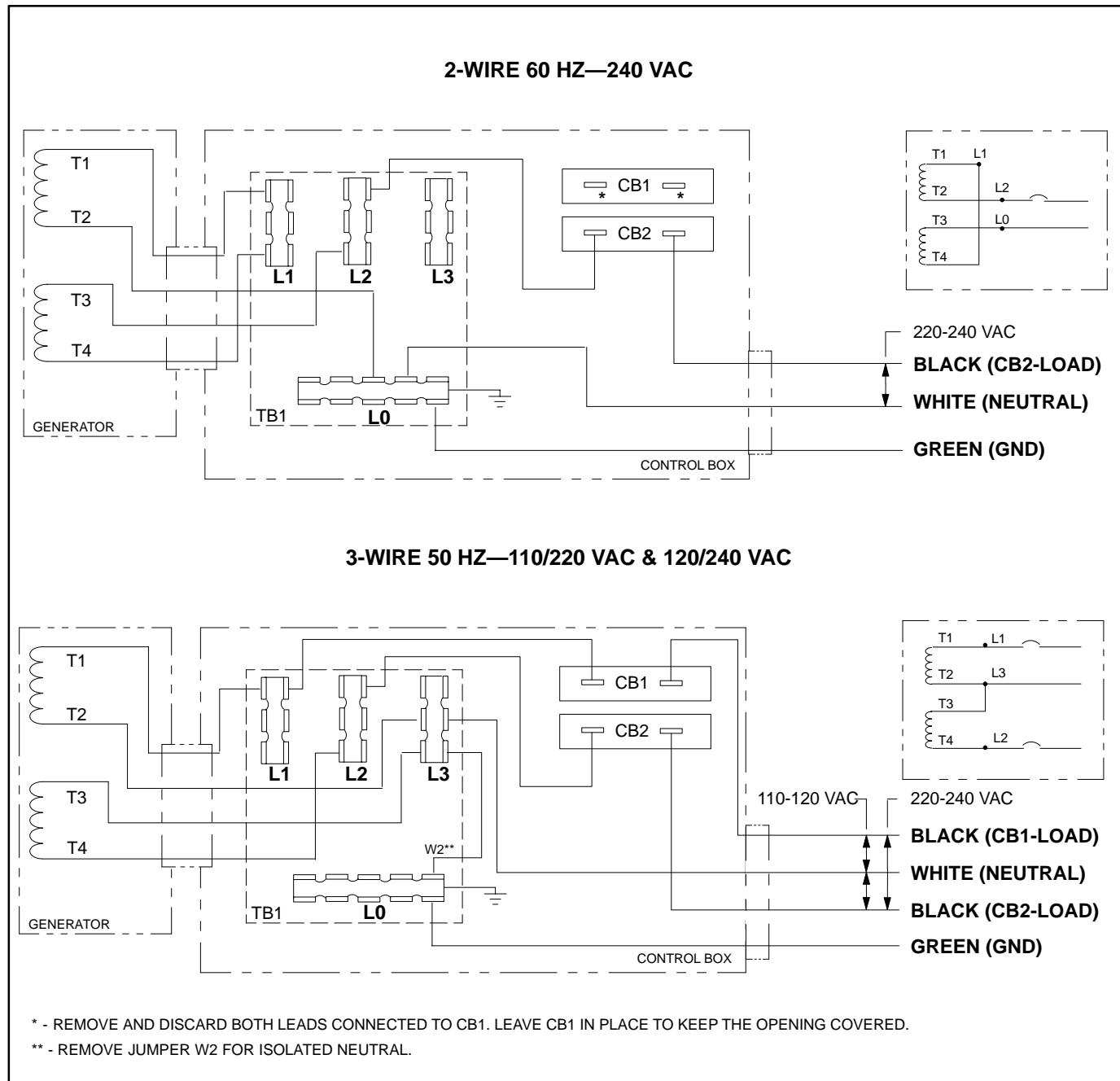
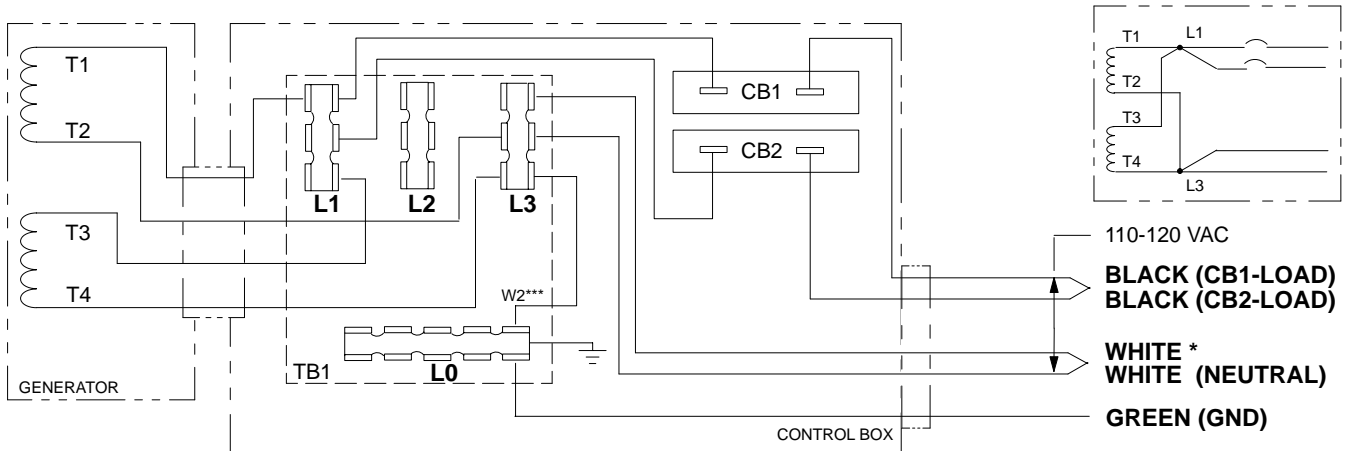
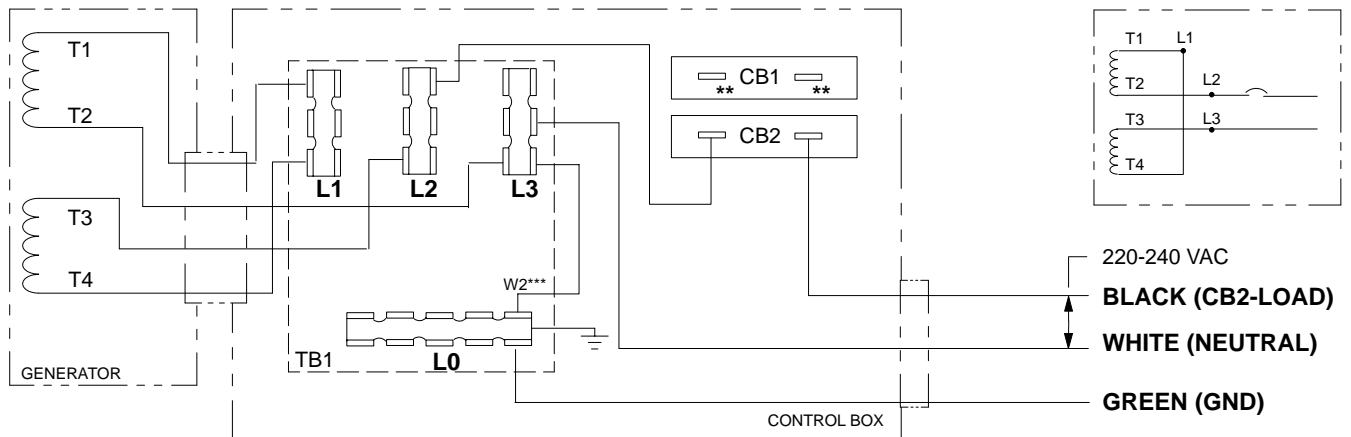


FIGURE 6-3. SINGLE-PHASE (4-LEAD) GENERATOR RECONNECTIONS (CONT.)

2-WIRE 50 HZ—110 VAC & 120 VAC



2-WIRE 50HZ—220 VAC & 240 VAC



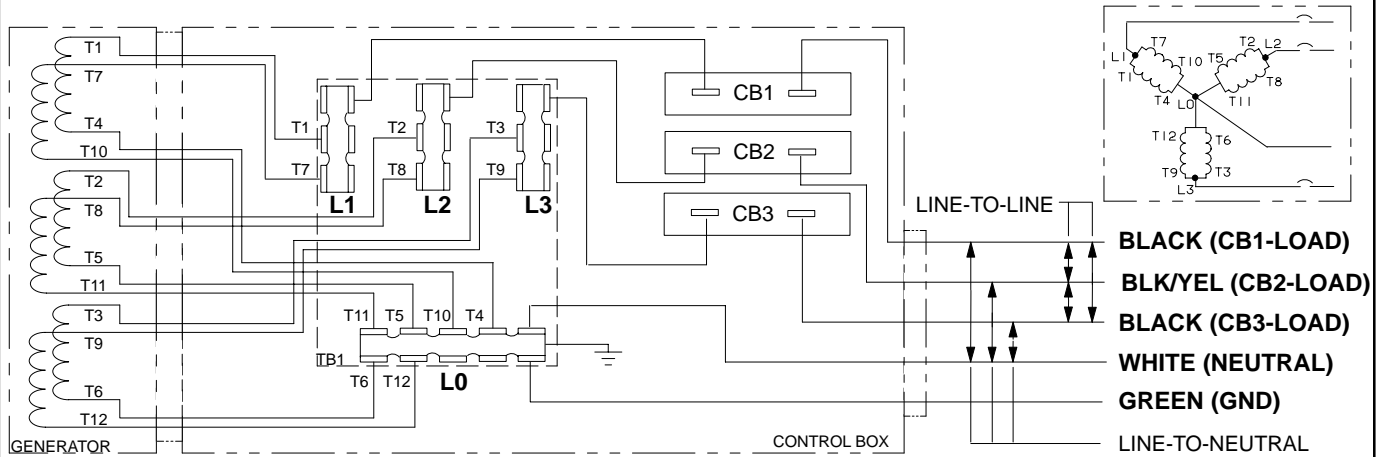
* - INSTALLER MUST PROVIDE A NO.12 AWG TYPE XLPE CONDUCTOR (125 C) AND INSULATED FEMALE 1/4 INCH FASTON CONNECTOR.

** - REMOVE AND DISCARD BOTH LEADS CONNECTED TO CB1. LEAVE CB1 IN PLACE TO KEEP THE OPENING COVERED.

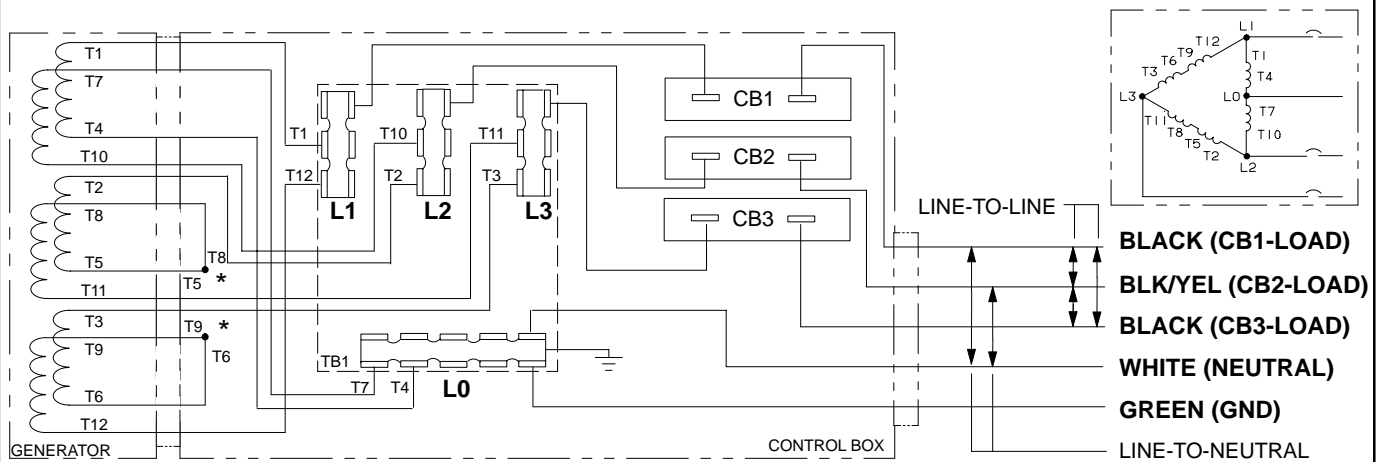
*** - REMOVE JUMPER W2 FOR ISOLATED NEUTRAL.

FIGURE 6-4. SINGLE-PHASE (4-LEAD) GENERATOR RECONNECTIONS (CONT.)

4-WIRE WYE 60 HZ—120/208 VAC, 127/220 VAC & 139/240 VAC
4-WIRE WYE 50 HZ—110/190 VAC, 115/200 VAC, 120/208 VAC & 127/220 VAC



4-WIRE DELTA 60 HZ—120/240 VAC
4-WIRE DELTA 50 HZ—110/220 VAC, 115/230 VAC & 120/240 VAC



* - USE A DOUBLE-END MALE 1/4 INCH FASTON CONNECTOR TO CONNECT THE GENERATOR LEADS.

FIGURE 6-5. THREE-PHASE (12-LEAD) GENERATOR RECONNECTIONS

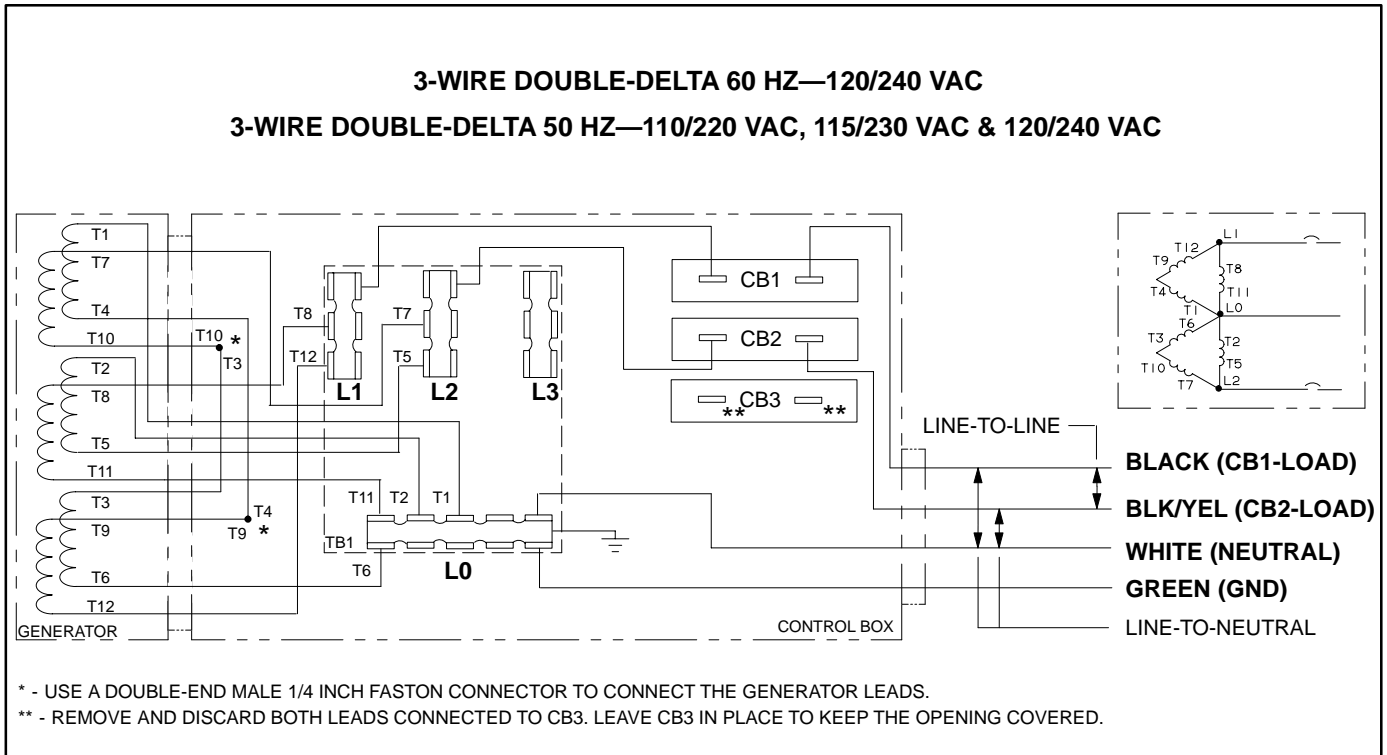


FIGURE 6-6. THREE-PHASE (12-LEAD) GENERATOR RECONNECTIONS FOR SINGLE-PHASE OUTPUT

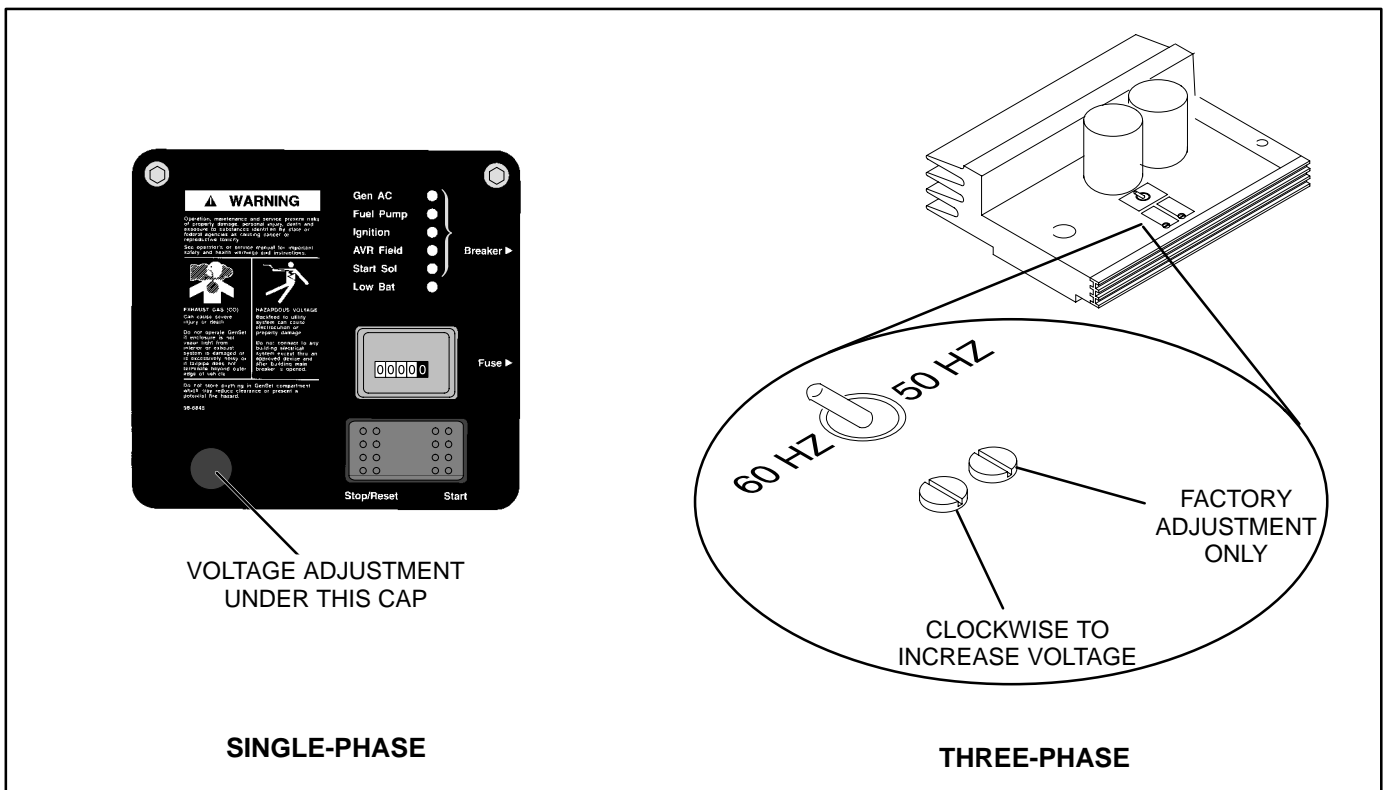


FIGURE 6-7. VOLTAGE ADJUSTMENT

REMOTE CONTROL CONNECTIONS

Remote Control

Remote Control Panels Available from Onan:

The genset has a connector for remote control connections (Figure 6-8). A choice of three remote control panels is available from Onan for these gensets (Figure 6-9). The simplest has a **START-STOP** switch with a built-in run indicator lamp. Of the other two, one has an hour meter and the other a battery voltmeter. Follow the installation instructions and safety precautions in the remote control kit.

Wiring Methods: Use 18 AWG copper conductors or a wiring harness. Harnesses are available in various lengths. See Figure 6-10 for typical connections.

Do not run remote control wiring and fuel lines together. To keep out exhaust gases, seal the opening where wiring enters the cab or workspace.

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

⚠ WARNING Exhaust gas is deadly. To keep out exhaust gases, seal the opening where remote control wiring enters the cab or workspace.

Remote Control Panels from Other Suppliers:

Use Figure 6-10 as a guide for connecting remote control panels from other suppliers.

Remote Enable Switch

The smaller, two-pin connector with the wire loop (Figure 6-8) is for remote enable switch connections. Cut the loop at the location shown and connect the pigtails to the wires from the enable switch. It is recommended that the connections be soldered and insulated with heat-shrink insulating tubing.

An adaptor kit is available for interfacing with other enable circuit configurations. It includes a relay for mounting on the genset, a two-pin connector plug, and a lead for an external B+ signal connection. See Figure 6-11.

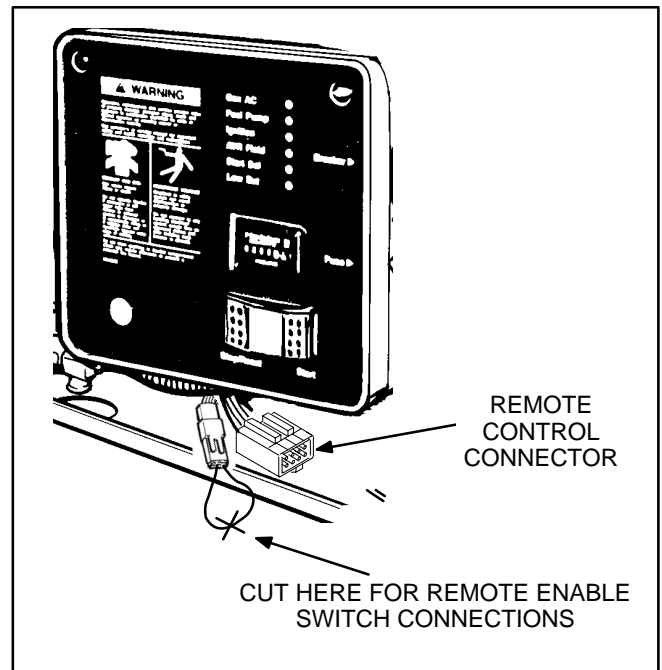


FIGURE 6-8. REMOTE CONTROL CONNECTORS

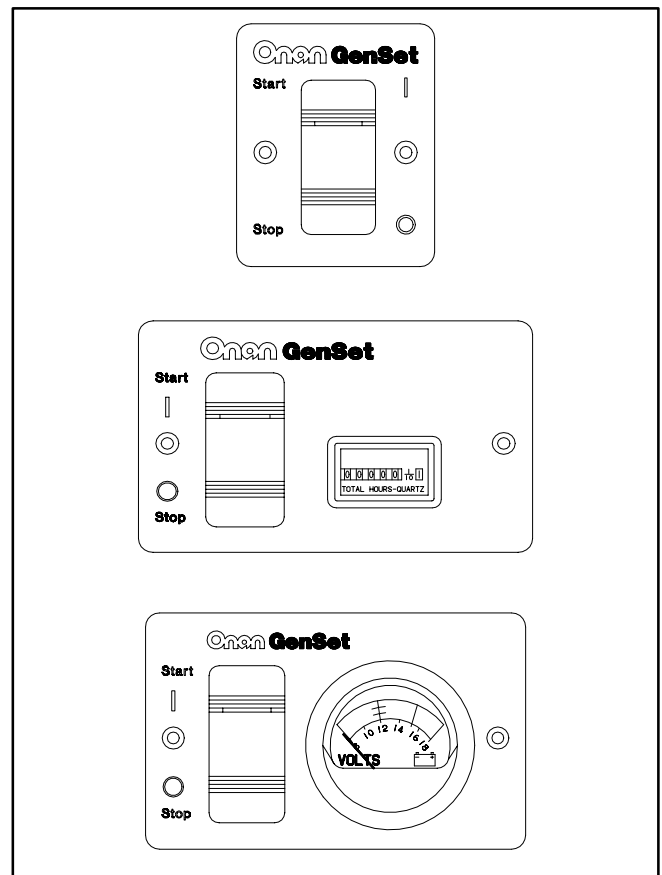


FIGURE 6-9. REMOTE CONTROL PANELS

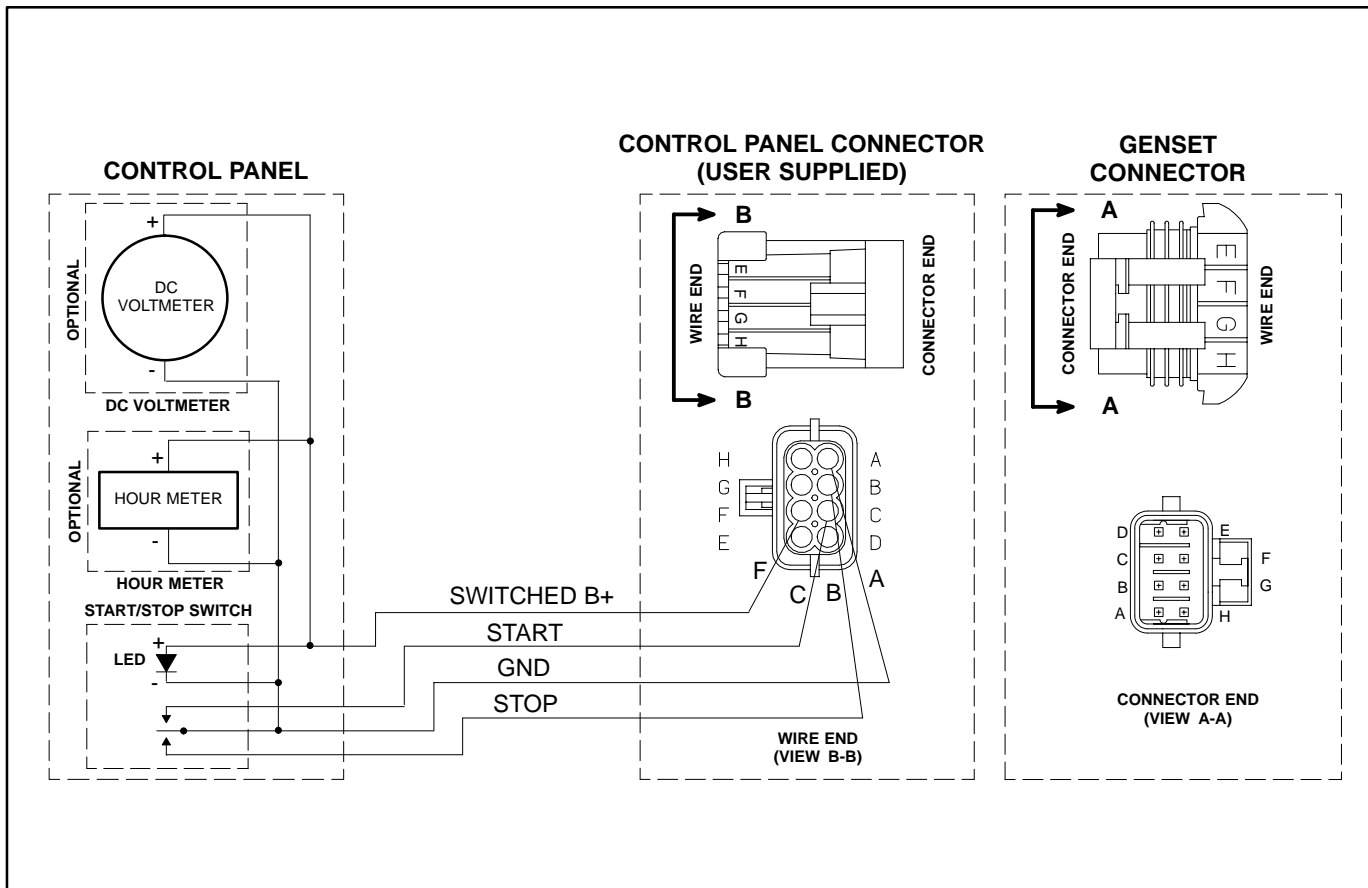


FIGURE 6-10. TYPICAL REMOTE CONTROL WIRING DIAGRAM

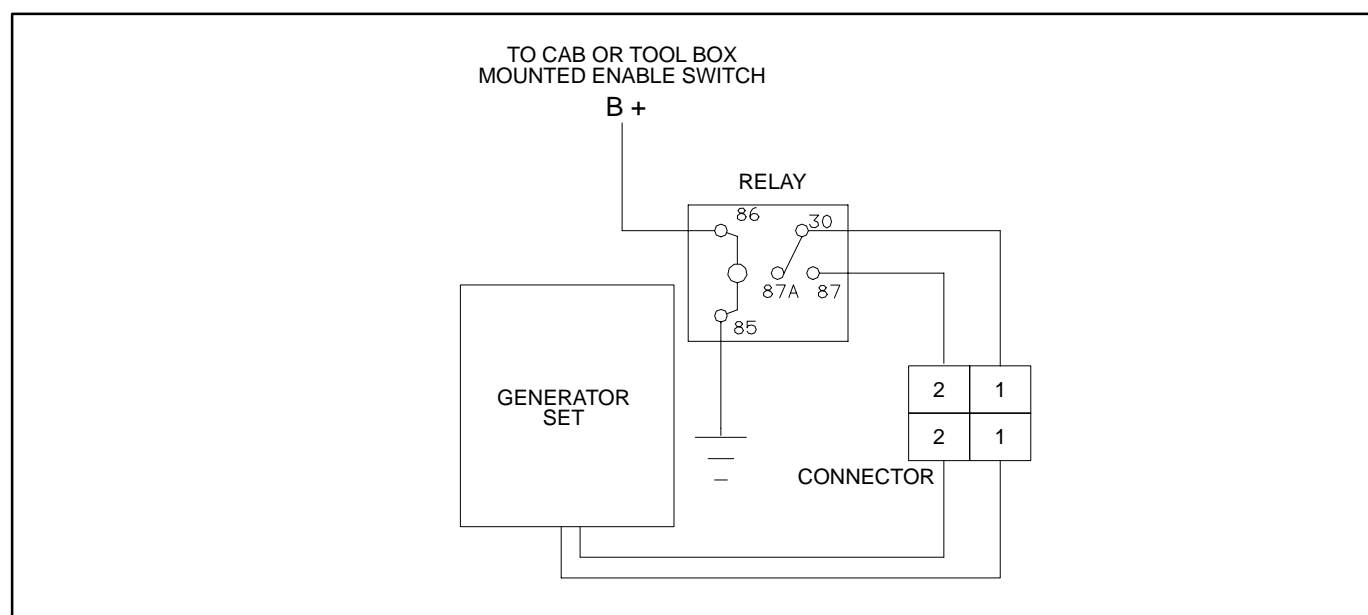


FIGURE 6-11. ENABLE SWITCH CONNECTIONS

BATTERY CONNECTIONS

These gensets require a 12 volt, negative-grounded battery for powering control and engine cranking systems.

To prevent accidental starting of the genset during installation, do not connect the battery cables at the battery until it is time to start up the genset. See *Section 8*.

⚠WARNING *Accidental starting of the genset can cause severe personal injury or death. Do not connect the starting battery until it is time to start up the genset.*

Battery

A separate battery should be provided for the genset. Battery capacity and battery cable size must be sufficient to obtain a minimum of 10 volts at the starter motor terminals during cranking under the coldest ambient temperatures expected. See *Section 2* for minimum battery requirements.

Battery Recharging

The genset is equipped with an automatic battery charging circuit. See *Section 2* for characteristics of the charging circuit.

Battery Compartment

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

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

Battery Cables

Cables should be run from both terminals of the battery to the genset. It is not recommended that the vehicle chassis frame be used as a path to the battery negative (-) terminal because of the high cranking currents involved. Size the cables according to Table 6-1. Total cable length is the sum of the lengths of the positive (+) and negative (-) cables. In other words, total cable length will be approximately twice the distance between the battery and the genset.

TABLE 6-1. BATTERY CABLE SIZES FOR AMBIENT TEMPERATURES DOWN TO -20° F (-29° C)

TOTAL CABLE LENGTH, FEET (METRES)	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
* - No. 2 cable can be used for total cable lengths of up to 20 feet (6 metres) in warmer climates.	

Do not run the battery cables and fuel lines together.

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

Connect the cables from the battery to the genset as shown in Figure 6-12.

Vehicle Frame Bonding Conductor

When a battery cable is run directly to the genset from the negative (-) terminal, the genset/battery system must be bonded to the vehicle frame by a No. 8 AWG or larger conductor at the genset, as shown in Figure 6-12.

⚠ WARNING *Faulty bonding of the genset to the vehicle frame (grounding) can result in severe personal injury or death. The genset must be grounded in accordance with applicable codes.*

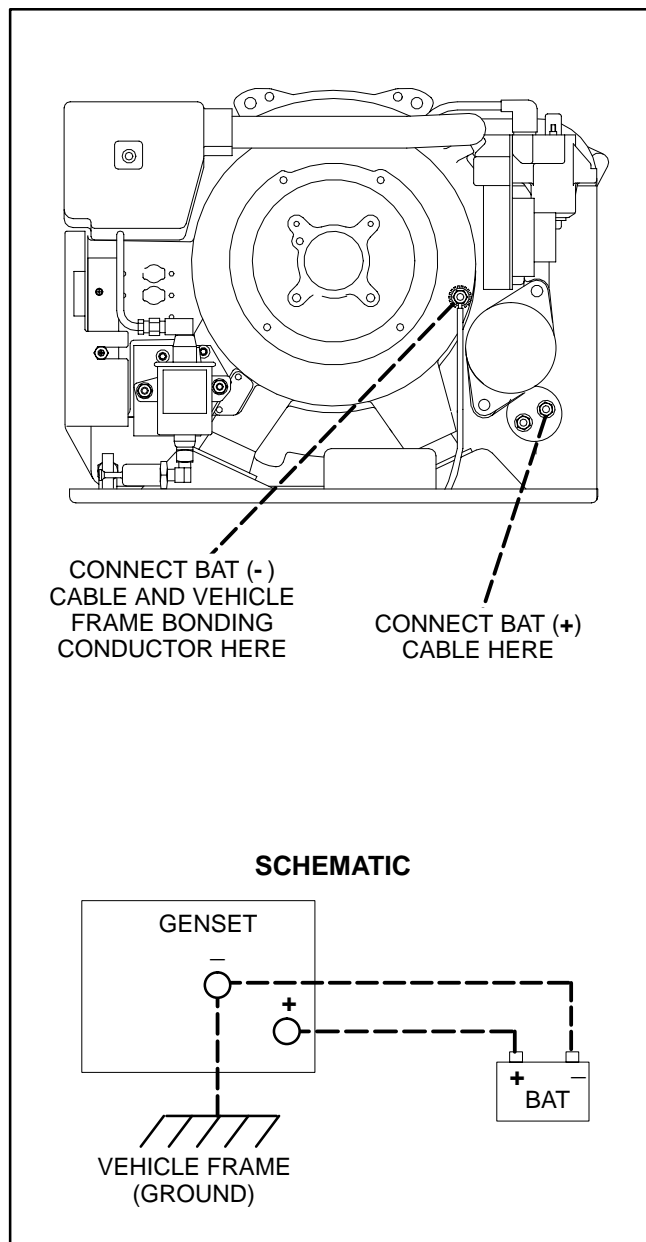


FIGURE 6-12. BATTERY CABLES AND VEHICLE FRAME BONDING CONDUCTOR

EXTENDED SHAFT

As an option, these sets can be equipped from the factory with an extended generator shaft for driving auxiliary equipment at full engine power. The shaft and mounting flange conform to SAE J609A, flange B specifications.

The following must be considered during the installation.

1. The auxiliary loads must be disconnectable to allow for engine cranking without external loads.

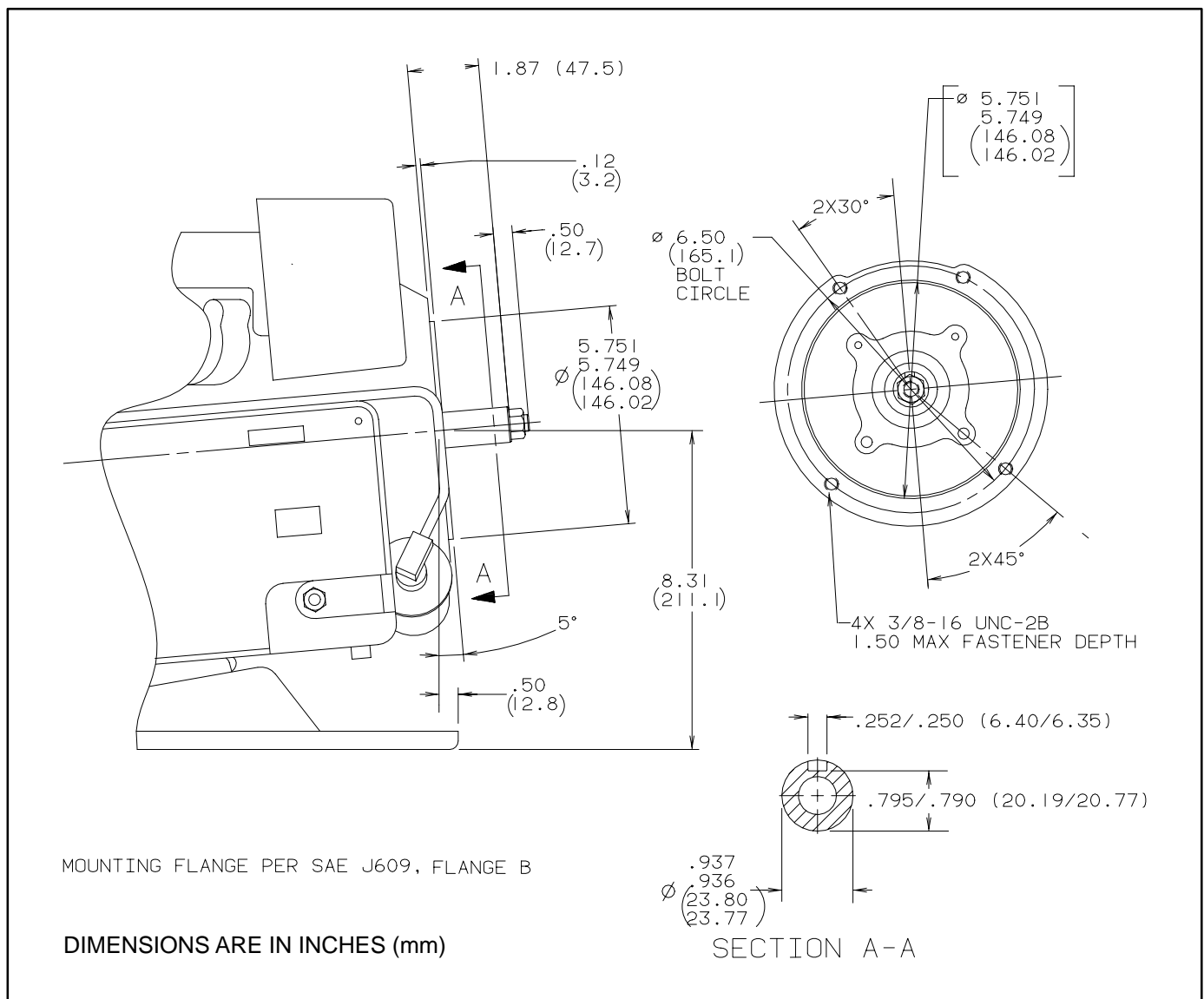


FIGURE 7-1. DETAILS OF THE EXTENDED SHAFT AND FLANGE

8. Checks, Start-Up, Break-In, Tests

PRE-START CHECKS

1. Follow the Installation Review at the end of this section. Do not continue on until each question can be answered with a "Yes".
2. Add engine oil, if necessary. See the Operator's Manual.

⚠ CAUTION *The engine can be severely damaged if it is started without oil in the crankcase.*

3. Connect the battery. Always connect the negative (-) cable last and disconnect it first.

⚠ WARNING *Arcing can ignite the explosive hydrogen gas given off by the battery, causing severe personal injury. Arcing can occur when the negative (-) battery cable is connected first and the tool being used to connect or disconnect the the positive (+) battery cable accidentally touches the frame or other grounded metal part.*

Prevent arcing by always disconnecting the negative (-) cable first and connecting it last. Never disconnect the battery while the genset is cranking or running.

Protect yourself by wearing safety glasses and by not smoking near batteries.

INITIAL START-UP

1. Push the Start/Stop switch to **START** and hold it there until the engine starts. The first start

might take extra cranking because it takes a few seconds to prime the fuel system. If the genset does not start, see *Troubleshooting* in the Operator's Manual.

⚠ WARNING *Exhaust gas is deadly. Do not start and run the genset while the vehicle is parked inside a building.*

2. Check for fuel leaks as soon as the engine starts. Stop the genset and fix a fuel leak immediately.

⚠ WARNING *Small fuel leaks can lead to fire or explosion in the vehicle, causing severe personal injury or death. Repair leaks immediately.*

3. Look and listen for exhaust system leaks. Repair exhaust leaks before putting the vehicle into service.

⚠ WARNING *Small exhaust leaks can result in a deadly accumulations of exhaust gas in the vehicle. Repair exhaust leaks before putting the vehicle into service.*

4. Push the Start/Stop switch to **STOP**. The genset should stop.
5. If the installation has a remote control panel, repeat Steps 1 and 4 with the remote control switch.
6. After the genset starts, check the battery voltmeter (if so equipped) for proper operation.

BREAK-IN

The vehicle should not be released for service without having performed this break-in procedure. Break-in reduces oil consumption, plug fouling and engine cylinder glazing. Break-in is vital for applications that involve extended periods of idling or operation under light load.

1. Start the genset and let it run for two hours under 1/2 rated load.
2. Continue running the genset for two more hours under 3/4 rated load.
3. Tag the genset to indicate to the customer that break-in has already been accomplished in accordance with the Operator's Manual.

FUEL PRESSURE TEST (GASOLINE)

The vehicle should not be released for service without having conducted this test or meeting the fuel pressure specification.

Method

1. Disconnect the fuel line at the outlet of the fuel pump and connect a pressure gauge at the pump outlet. A gauge calibrated for 0 to 15 psi (0 to 100 kPa) is recommended. Do not tee into the fuel line. This is a static pressure test.
2. Push the Start/Stop switch to **START** and hold it there for several seconds until the fuel pressure stabilizes. Fuel pressure should stabilize between 3.5 and 6 psi (24 and 41 kPa).
3. Repeat the test with the vehicle engine running.

Fuel Pressure Specification

Normal fuel pressure is between 3.5 and 6 psi (24 and 41 kPa).

A fuel pressure greater than 6 psi (41 kPa) is not acceptable. Find out why the pressure is high. If it is high when the vehicle engine is not running, check to see that the proper Onan pump is being used. If it is high when the vehicle engine is running, a separate fuel pickup tube in the fuel tank will be required.

⚠WARNING *High fuel pressure can cause carburetor flooding. Carburetor flooding can cause poor engine performance and can lead to serious engine damage and to fire that could cause severe personal injury or death. Carburetor fuel inlet pressure must not exceed 6 psi under any condition.*

If the fuel pressure is less than 3.5 psi (24 kPa), check for fuel restrictions in the system. The pump will have to be re-located closer to the fuel tank if it is located more than 3 feet (0.9 meters) above the end of the fuel pickup tube in the fuel tank. If the pump is defective, replace it with an identical Onan pump. The pump is not serviceable.

TEMPERATURE TEST

This test should be conducted on the first installation representative of a new application of the genset. If necessary, the application should be modified and re-tested to meet the temperature specifications before production is continued.

Method

1. Conduct the test at a location where the ambient air temperature will remain between 60° F and 100° F (16° C and 38° C) during the test.
2. Use thermocouples not heavier than No. 24 AWG (0.21 mm²) to measure temperature. Locate them as indicated in Figure 8-1.
3. Use a load bank that can be adjusted to load the genset to rated full-load.
4. Start the genset, close all compartment doors and connect full-load.
5. Record temperatures at 15 minute intervals until they stabilize. Stable temperature is indicated when there is no change in temperature rise over ambient air temperature for three consecutive temperature readings at 15 minute intervals. See Table 8-1 for an example of how the data can be arranged for recording and analysis. (To determine temperature rises, subtract the ambient air temperature from the other temperatures in the same column in Table 8-1.)

Temperature Specifications

The rise in engine air inlet temperature over ambient air temperature must not exceed 8° F (4.4° C).

The rise in engine oil temperature over ambient air temperature must not exceed 190° F (106° C). Also, the oil temperature must not exceed 320° F (160° C).

The rise in compartment air temperature over ambient air temperature must not exceed 25° F (14° C).

High temperature rises indicate that warm discharged air is recirculating back into the engine compartment or that the inlet or outlet air openings

are restricted. Find out why. Make whatever corrections are necessary to meet the specification. See *Section 3*.

TABLE 8-1. TEMPERATURE DATA

THERMOCOUPLE LOCATION	TEMPERATURE F° (C°)				
	Time Of Reading				
AMBIENT AIR					
ENGINE AIR INLET					
ENGINE OIL					
COMPARTMENT AIR					

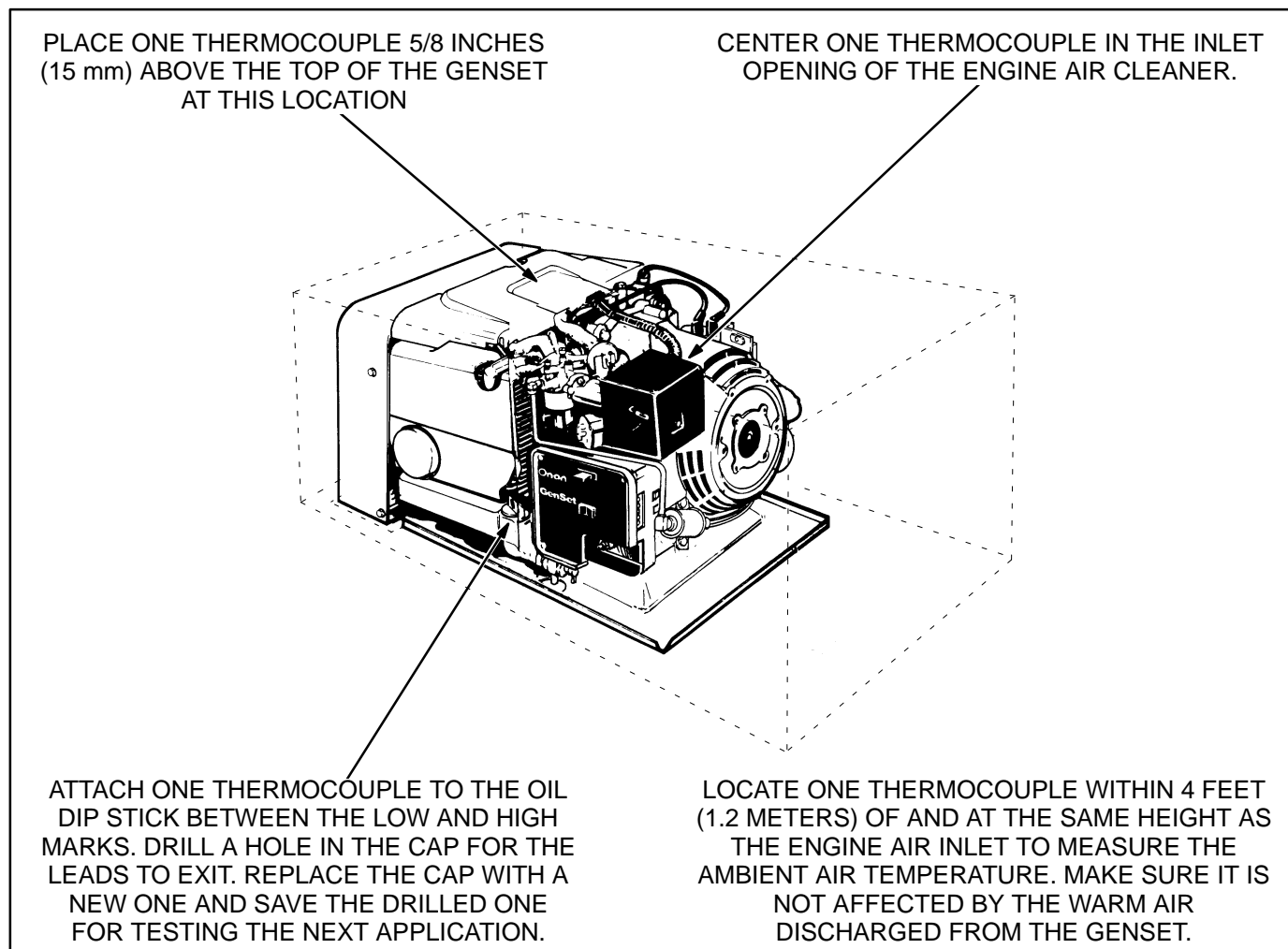


FIGURE 8-1. THERMOCOUPLE LOCATIONS FOR THE TEMPERATURE TEST

INSTALLATION REVIEW

Check (✓) each item below before the initial start-up. Make all corrections necessary in order to be able to answer “Yes” to each question.

Mounting and Enclosure

- ☐ Does the installation allow 1/2 inch (13 mm) free movement of the genset on its mounts?
- ☐ Is there at least 2 inches (51 mm) between the warm air discharge opening and any air deflector or adjacent equipment below the opening?
- ☐ Is the genset protected from rain, snow, sun and road-splash?
- ☐ Can the following routine maintenance be performed?
 - ☐ Checking oil level
 - ☐ Adding oil
 - ☐ Draining oil
 - ☐ Adjusting the carburetor
 - ☐ Adjusting the governor
 - ☐ Starting and stopping the genset from the control panel
 - ☐ Resetting the line circuit breaker
 - ☐ Changing the oil filter
 - ☐ Changing the air filter element
 - ☐ Changing both spark plugs
- ☐ When required, are the compartment walls vapor-tight and fire-resistant?

Ventilation

- ☐ Is there at least 85 square inches (548 square mm) of free air inlet to the compartment?
- ☐ Is the cool air drawn from the side or front of the vehicle—not from the rear or from below?

Exhaust System

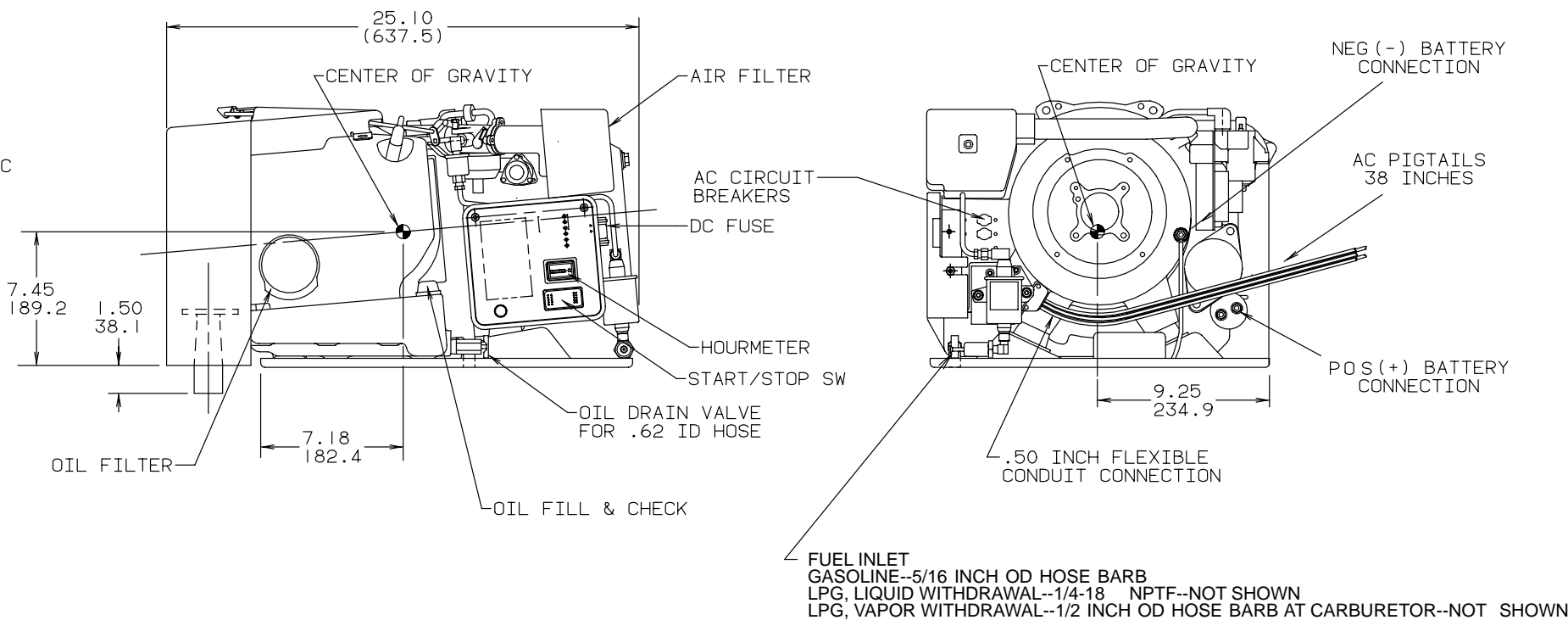
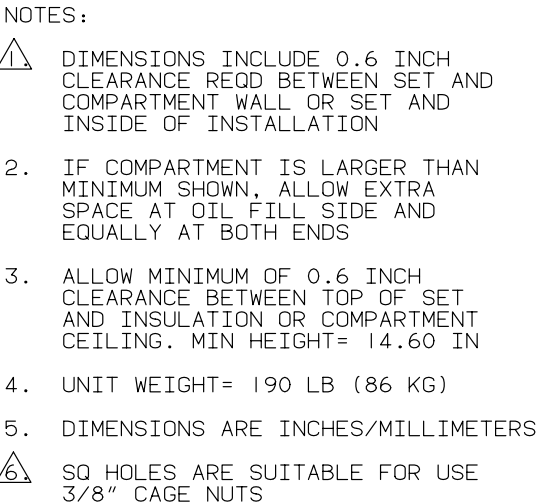
- ☐ Is the muffler an approved Onan part?
- ☐ Is the muffler supported in accordance with the instructions in the exhaust accessory kit?
- ☐ Are all clamps, hangers and support straps in place in accordance with the instructions in the exhaust accessory kit?
- ☐ Is combustible material properly protected where it runs closer than 3 inches (76 mm) to the muffler or tailpipe?
- ☐ Is the tail pipe supported along its centerline and at its termination at the vehicle skirt by hanger straps with double U-shaped rubber isolators?
- ☐ Does the tailpipe extend at least 1 inch (25 mm) beyond the perimeter of the vehicle and not terminate below a vent or openable door or window?

Fuel System

- ☐ Are all fuel filters accessible for servicing?
- ☐ Has a 30 micron filter been installed at the carburetor fitting (gasoline gensets only)?
- ☐ Has a 50 to 80 micron filter been installed ahead of the fuel pump (gasoline gensets only)?
- ☐ Is a flexible section of approved non-conducting fuel line installed between the fuel inlet and the fuel line from the tank?
- ☐ Are all fuel connections and hose clamps tight?
- ☐ Are fuel lines and electrical wires run separately?

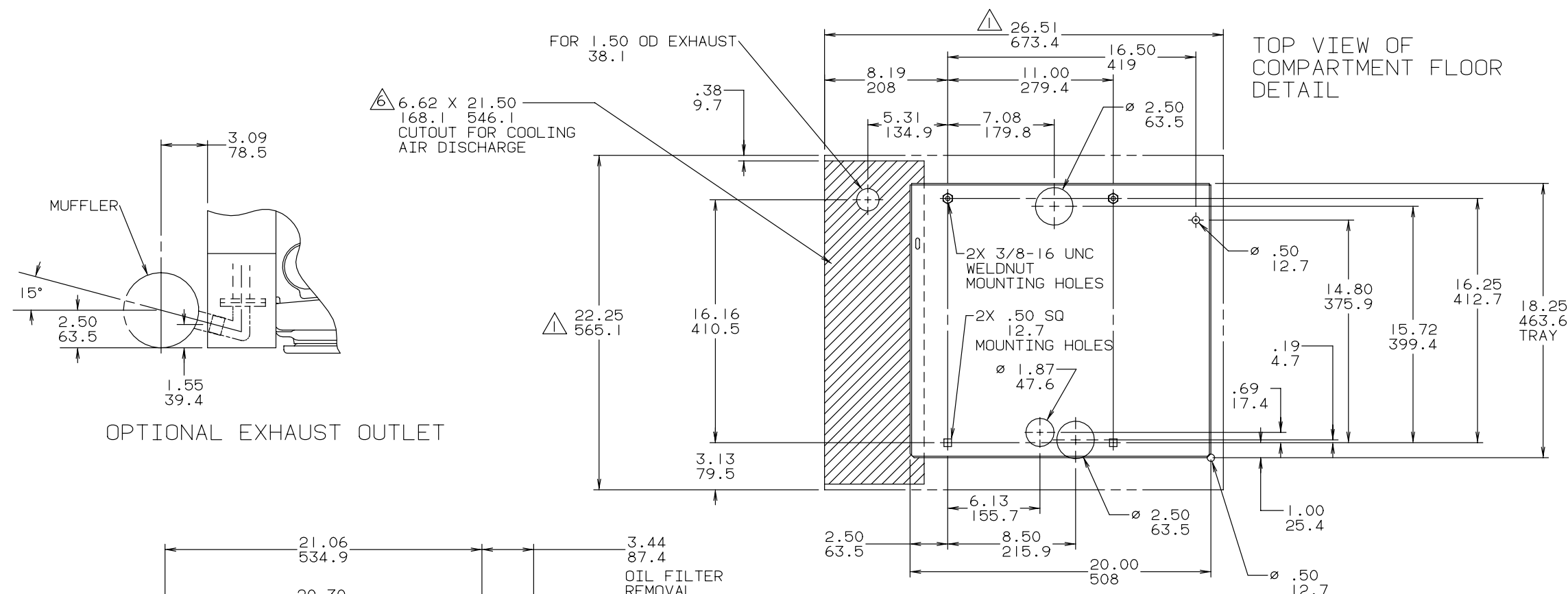
Electrical Systems

- ☐ Are the power supply conductors run in conduit and properly supported?
- ☐ Are wiring holes into the inside of the work-space (including the inside of AC conduit) sealed to prevent entrance of exhaust gas?
- ☐ Are the battery and battery cables properly sized for the lowest ambient temperature?
- ☐ Is full rated power from the genset available through the vehicle power distribution panel?



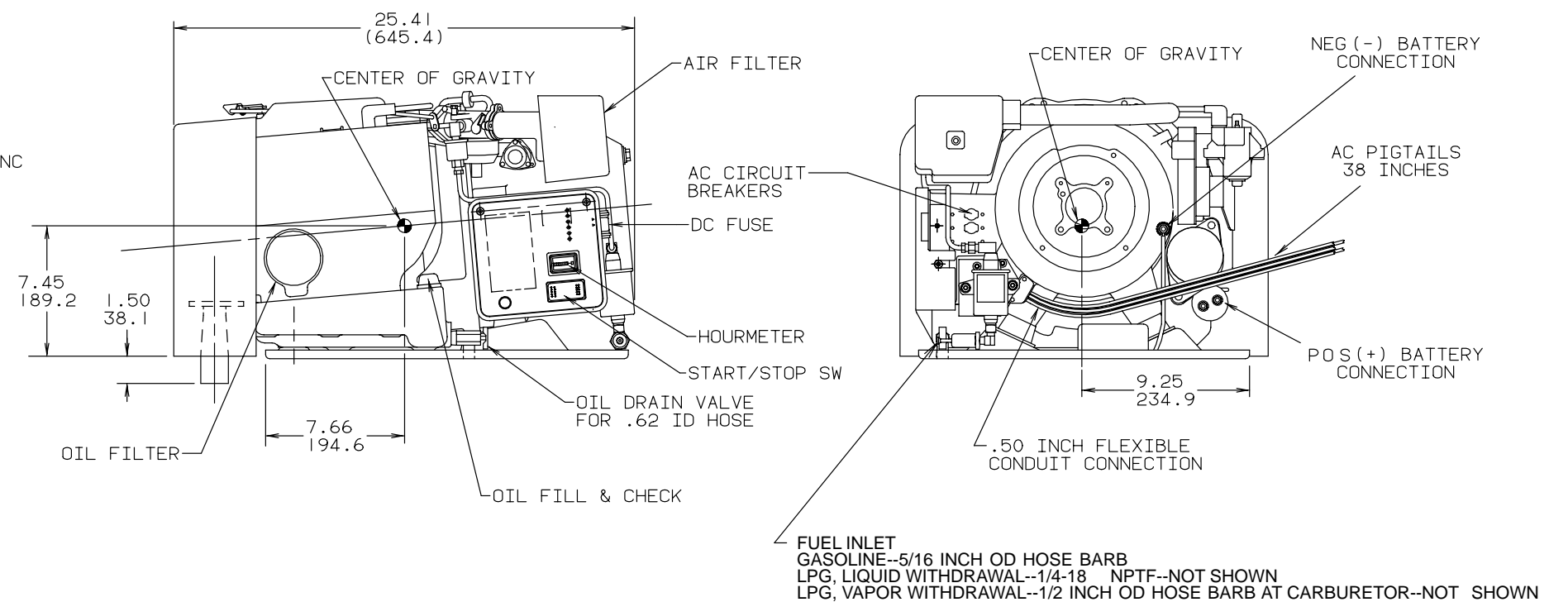
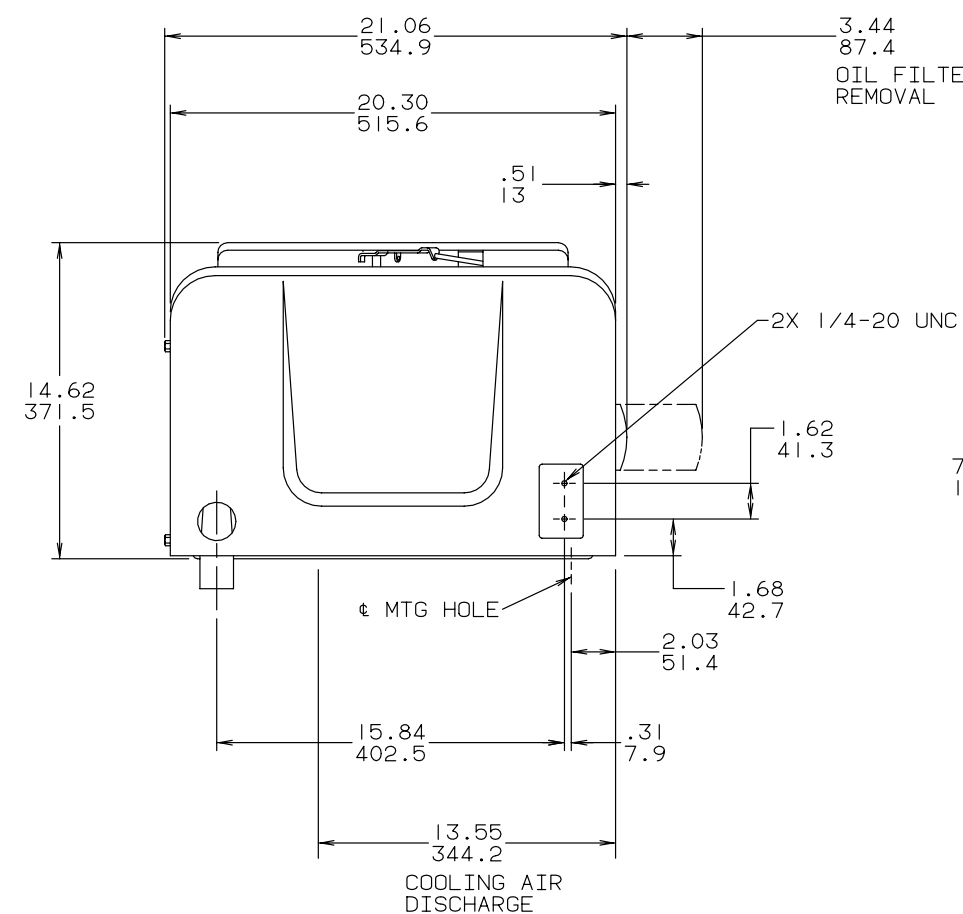
OUTLINE DRAWING—BGD GENSET

Dimensions are in Inches/Millimeters

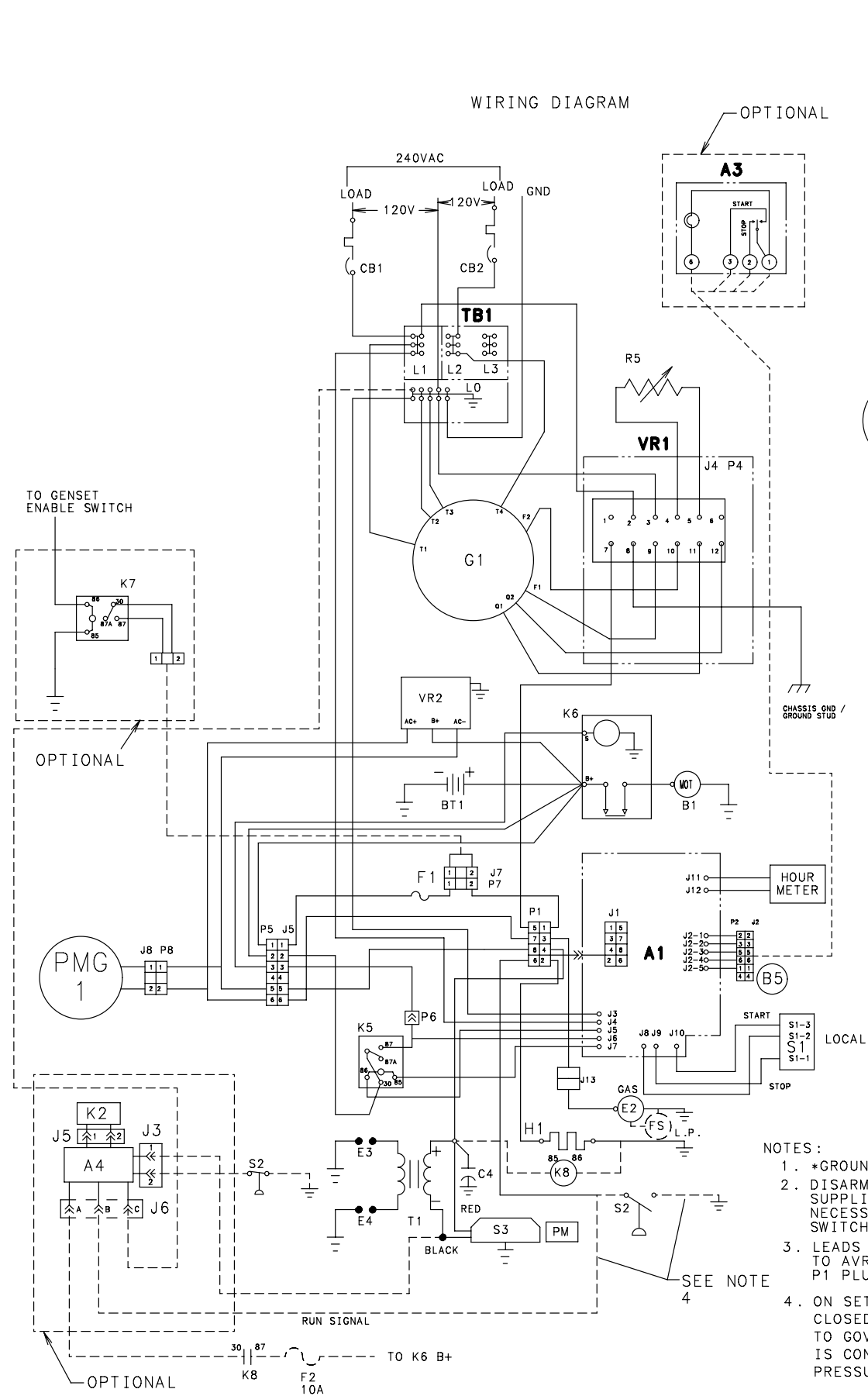


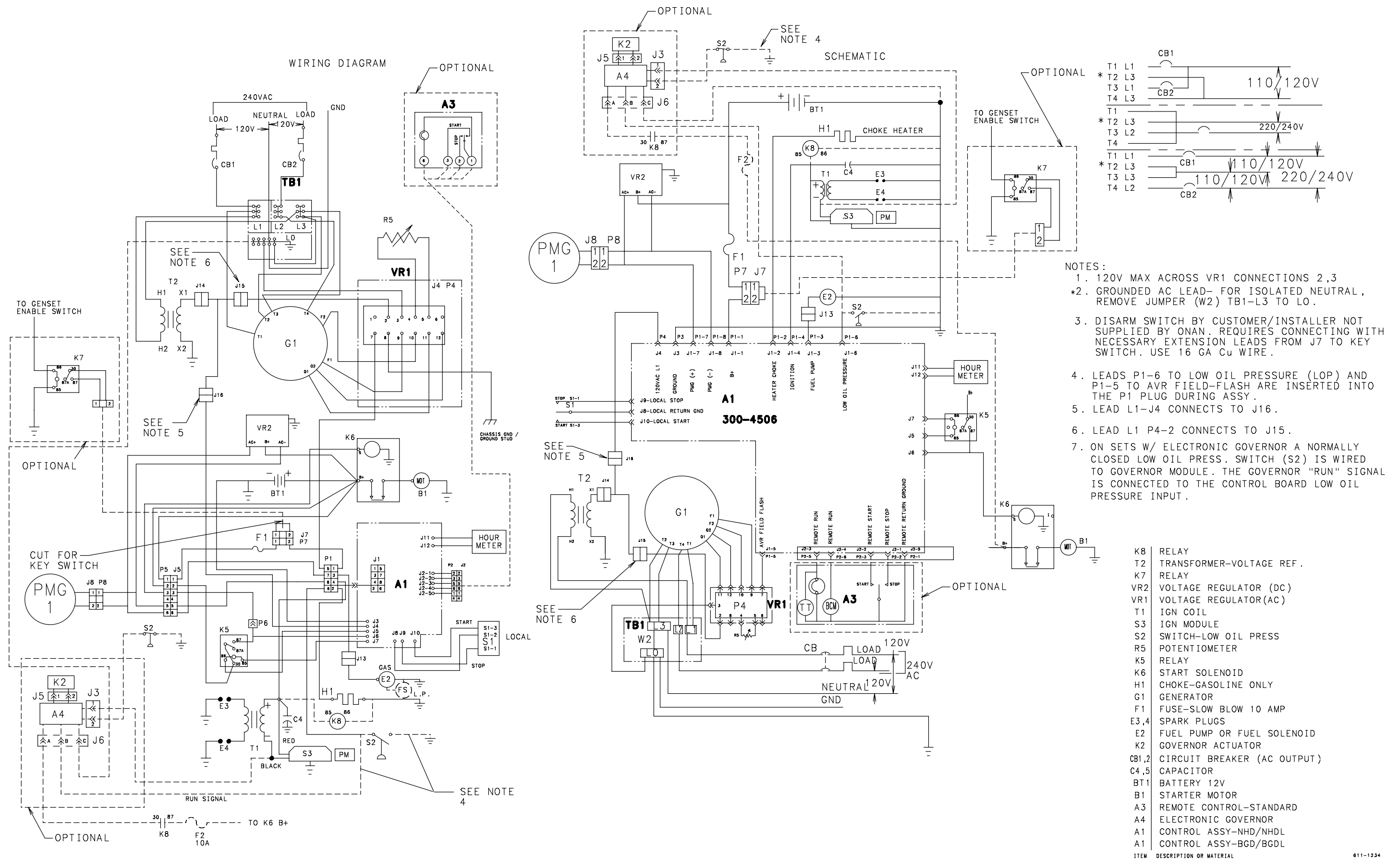
NOTES:

1. DIMENSIONS INCLUDE 0.6 INCH CLEARANCE REQD BETWEEN SET AND COMPARTMENT WALL OR SET AND INSIDE OF INSTALLATION
2. IF COMPARTMENT IS LARGER THAN MINIMUM SHOWN, ALLOW EXTRA SPACE AT OIL FILL SIDE AND EQUALLY AT BOTH ENDS
3. ALLOW MINIMUM OF 0.6 INCH CLEARANCE BETWEEN TOP OF SET AND INSULATION OR COMPARTMENT CEILING. MIN HEIGHT= 15.22 IN
4. UNIT WEIGHT= 230 LB (104 KG)
5. DIMENSIONS ARE INCHES/MILLIMETERS
6. SQ HOLES ARE SUITABLE FOR USE 3/8" CAGE NUTS



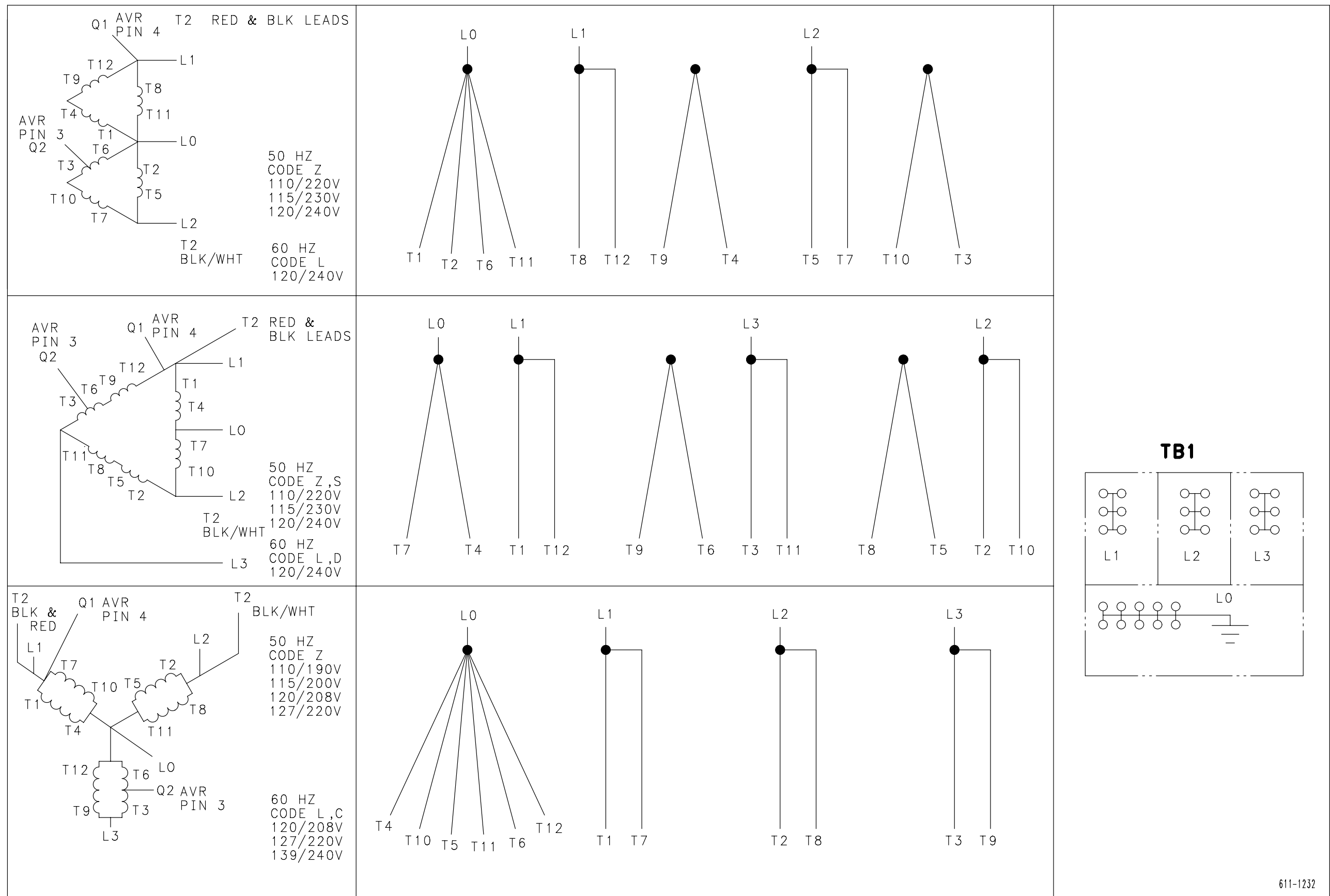
OUTLINE DRAWING—NHD GENSET





SINGLE-PHASE 50 HERTZ GENSET WIRING DIAGRAM

RECONNECTION CHART





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