Onan

Installation Guide

4.0 BFA and 6.5 NH

AUX

GenSets

- **Auxiliary Power Generators For Trucks**
- **Over The Rail And Side Mount**

IMPORTANT
Read Through Entire Installation Guide Prior To Actual Installation

900-0322
11-81
Printed in U.S.A.

Safety Precautions

Before operating the generator set, read the Operator's Manual and become familiar with it and your equipment. **Safe and efficient operation can be achieved only if the equipment is properly operated and maintained.** Many accidents are caused by failure to follow fundamental rules and precautions.

The following symbols, found throughout this manual, alert you to potentially dangerous conditions to the operator, service personnel, or the equipment.

⚠DANGER ***This symbol warns of immediate hazards which will result in severe personal injury or death.***

⚠WARNING ***This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.***

⚠CAUTION ***This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.***

FUEL AND FUMES ARE FLAMMABLE. Fire and explosion can result from improper practices.

- DO NOT fill fuel tanks while engine is running. Fuel contact with hot engine or exhaust is a potential fire hazard.
- DO NOT SMOKE OR USE AN OPEN FLAME near the generator set or fuel tank.
- Fuel lines must be adequately secured and free of leaks. Fuel connection at the engine should be made with an approved flexible, non-conductive line. Do not use copper piping on flexible lines as copper will work harden and become brittle.
- Be sure all fuel supplies have a positive shutoff valve.
- DO NOT SMOKE while servicing batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

EXHAUST GASES ARE DEADLY

- Never sleep in the vehicle with the generator set running unless vehicle is equipped with an operating carbon monoxide detector.
- Provide an adequate exhaust system to properly expel discharged gases. Inspect exhaust system daily for leaks per the maintenance schedule. Ensure that exhaust manifolds are secure and not warped. Do not use exhaust gases to heat a compartment.
- Be sure the unit is well ventilated.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Before starting work on the generator set, disconnect batteries. This will prevent accidental starting.
- Keep your hands away from moving parts.
- Make sure that fasteners on the generator set are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- Do not wear loose clothing near moving parts, or jewelry while working on electrical equipment. Loose clothing and jewelry can become caught in moving parts. Jewelry can short out electrical contacts and cause shock or burning.
- If adjustment *must* be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Disconnect starting battery before removing protective shields or touching electrical equipment. Use rubber insulative mats placed on dry wood platforms over floors that are metal or concrete when around electrical equipment. Do not wear damp clothing (particularly wet shoes) or allow skin surfaces to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages can cause injury or death.
- Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- DO NOT CONNECT GENERATOR SET DIRECTLY TO ANY BUILDING ELECTRICAL SYSTEM. Hazardous voltages can flow from the generator set into the utility line. This creates a potential for electrocution or property damage. Connect only through an approved device and after building main switch is open. Consult an electrician in regard to emergency power use.

GENERAL SAFETY PRECAUTIONS

- Have a fire extinguisher nearby. Maintain extinguisher properly and become familiar with its use. Extinguishers rated ABC by the NFPA are appropriate for all applications. Consult the local fire department for the correct type of extinguisher for various applications.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and engine damage, which presents a potential fire hazard.
- Do not steam clean the generator set while the engine is running. When cleaning, provide cover or protection so spray is not directed into the generator, air cleaner, control box, fuel solenoid, or electrical connectors. Do not clean with solvents. They may damage electrical connectors.
- DO NOT store anything in the generator compartment such as oil or gas cans, oily rags, chains, wooden blocks, portable propane cylinders, etc. A fire could result or the generator set operation (cooling, noise and vibration) may be adversely affected. Keep the compartment floor clean and dry.
- Do not work on this equipment when mentally or physically fatigued, or after consuming any alcohol or drug that makes the operation of equipment unsafe.

Important Safety Precautions

Read and observe these safety precautions when using or working on electric generators, engines and related equipment. Also read and follow the literature provided with the equipment.

Proper operation and maintenance are critical to performance and safety. Electricity, fuel, exhaust, moving parts and batteries present hazards that can cause severe personal injury or death.

FUEL, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC

Fire, explosion, and personal injury can result from improper practices.

- Used engine oil, and benzene and lead, found in some gasoline, have been identified by government agencies as causing cancer or reproductive toxicity. When checking, draining or adding fuel or oil, do not ingest, breathe the fumes, or contact gasoline or used oil.
- Do not fill tanks with engine running. Do not smoke around the area. Wipe up oil or fuel spills. Do not leave rags in engine compartment or on equipment. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip fuel supply with a positive fuel shutoff.
- Do not store or transport equipment with fuel in tank.
- Keep an ABC–rated fire extinguisher available near equipment and adjacent areas for use on all types of fires except alcohol.
- Unless provided with equipment or noted otherwise in installation manual, fuel lines must be copper or steel, secured, free of leaks and separated or shielded from electrical wiring.
- Use approved, non-conductive flexible fuel hose for fuel connections. Do not use copper tubing as a flexible connection. It will work–harden and break.

EXHAUST GAS IS DEADLY

- Engine exhaust contains carbon monoxide (CO), an odorless, invisible, poisonous gas. Learn the symptoms of CO poisoning.
- Never sleep in a vessel, vehicle, or room with a genset or engine running unless the area is equipped with an operating CO detector with an audible alarm.
- Each time the engine or genset is started, or at least every day, thoroughly inspect the exhaust system. Shut down the unit and repair leaks immediately.
- Warning: Engine exhaust is known to the State of California to cause cancer, birth defects and other reproductive harm.

Make sure exhaust is properly ventilated.

- Vessel bilge must have an operating power exhaust.
- Vehicle exhaust system must extend beyond vehicle perimeter and not near windows, doors or vents.
- Do not use engine or genset cooling air to heat an area.
- Do not operate engine/genset in enclosed area without ample fresh air ventilation.
- Expel exhaust away from enclosed, sheltered, or occupied areas.
- Make sure exhaust system components are securely fastened and not warped.

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any guards or covers with the equipment running.
- Keep hands, clothing, hair, and jewelry away from moving parts.
- Before performing any maintenance, disconnect battery (negative [–] cable first) to prevent accidental starting.
- Make sure fasteners and joints are secure. Tighten supports and clamps, keep guards in position over fans, drive belts, etc.
- If adjustments must be made while equipment is running, use extreme caution around hot manifolds and moving parts, etc. Wear safety glasses and protective clothing.

BATTERY GAS IS EXPLOSIVE

- Wear safety glasses and do not smoke while servicing batteries.
- Always disconnect battery negative (–) lead first and reconnect it last. Make sure you connect battery correctly. A direct short across battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is explosive.
- Do not disconnect or connect battery cables if fuel vapors are present. Ventilate the area thoroughly.

DO NOT OPERATE IN FLAMMABLE AND EXPLOSIVE ENVIRONMENTS

Flammable vapor can be ignited by equipment operation or cause a diesel engine to overspeed and become difficult to stop, resulting in possible fire, explosion, severe personal injury and death. **Do not operate diesel equipment where a flammable vapor environment can be created by fuel spill, leak, etc., unless equipped with an automatic safety device to block the air intake and stop the engine.**

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

- Hot coolant is under pressure. Do not loosen the coolant pressure cap while the engine is hot. Let the engine cool before opening the pressure cap.

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not service control panel or engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel.
- Do not connect the generator set to the public utility or to any other electrical power system. Electrocution can occur at a remote site where line or equipment repairs are being made. An approved transfer switch must be used if more than one power source is connected.
- Disconnect starting battery (negative [–] cable first) before removing protective shields or touching electrical equipment. Use insulative mats placed on dry wood platforms. Do not wear jewelry, damp clothing or allow skin surface to be damp when handling electrical equipment.
- Use insulated tools. Do not tamper with interlocks.
- Follow all applicable state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician. Tag open switches to avoid accidental closure.
- With transfer switches, keep cabinet closed and locked. Only authorized personnel should have cabinet or operational keys. Due to serious shock hazard from high voltages within cabinet, all service and adjustments must be performed by an electrician or authorized service representative.

If the cabinet must be opened for any reason:

1. Move genset operation switch or Stop/Auto/Handcrank switch (whichever applies) to Stop.
2. Disconnect genset batteries (negative [–] lead first).
3. Remove AC power to automatic transfer switch. If instructions require otherwise, use extreme caution due to shock hazard.

MEDIUM VOLTAGE GENERATOR SETS (601V TO 15kV)

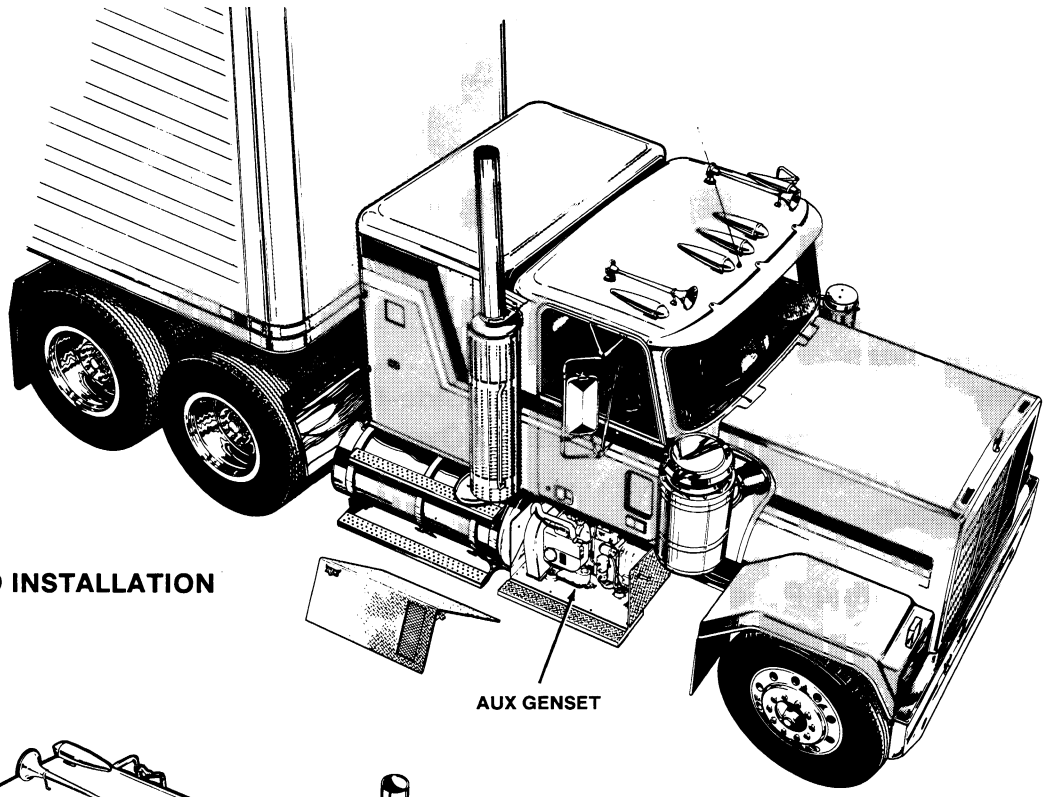
- Medium voltage acts differently than low voltage. Special equipment and training are required to work on or around medium voltage equipment. Operation and maintenance must be done only by persons trained and qualified to work on such devices. Improper use or procedures will result in severe personal injury or death.
- Do not work on energized equipment. Unauthorized personnel must not be permitted near energized equipment. Induced voltage remains even after equipment is disconnected from the power source. Plan maintenance with authorized personnel so equipment can be de-energized and safely grounded.

GENERAL SAFETY PRECAUTIONS

- Do not work on equipment when mentally or physically fatigued or after consuming alcohol or drugs.
- Carefully follow all applicable local, state and federal codes.
- Never step on equipment (as when entering or leaving the engine compartment). It can stress and break unit components, possibly resulting in dangerous operating conditions from leaking fuel, leaking exhaust fumes, etc.
- Keep equipment and area clean. Oil, grease, dirt, or stowed gear can cause fire or damage equipment by restricting airflow.
- Equipment owners and operators are solely responsible for operating equipment safely. Contact your authorized Onan/Cummins dealer or distributor for more information.

KEEP THIS DOCUMENT NEAR EQUIPMENT FOR EASY REFERENCE.

Table of Contents



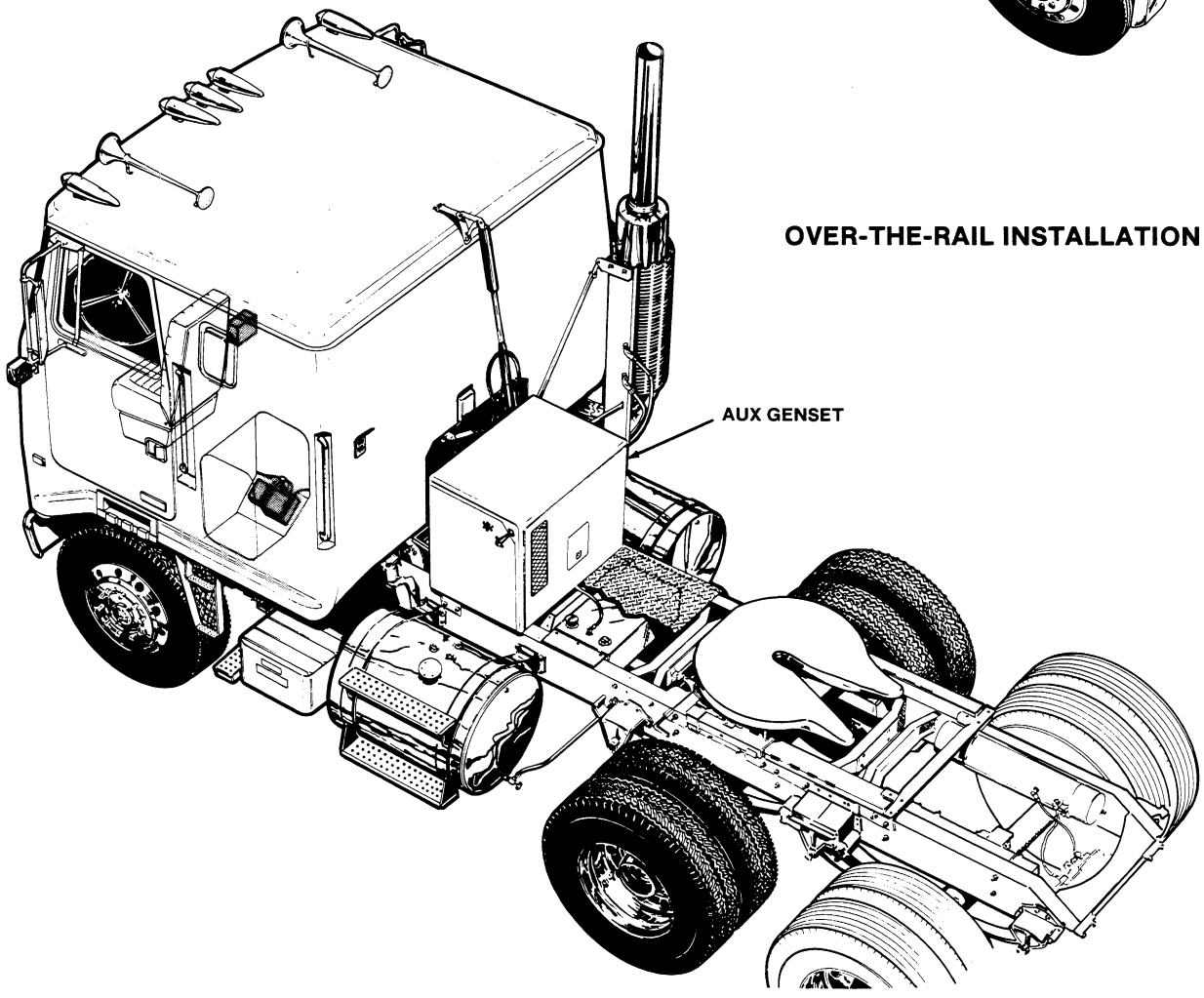


FIGURE 1. TYPICAL INSTALLATIONS

Introduction

This manual covers detailed installation procedures and recommended practices for installing the Onan 4.0BFA or 6.5NH auxiliary power generator sets in either a "SIDE-MOUNTED" or "OVER-THE-RAIL" configuration. Read through the entire installation guide for familiarity prior to actually installing either generator set. This manual is arranged in a logical sequence of steps that should be followed when performing the actual installation. Specific differences between the two types of installations are identified where appropriate.

Each major sub-assembly and all loose hardware required for assembly during the installation are packaged in the unit accessory kit. Do NOT proceed with the installation if any parts are missing.

Various optional wiring kits are listed in the Electrical Loads and Connections section of this guide to simplifiy the installation. Step-by-Step instructions are provided with each kit.

WARNING

ONAN RECOMMENDS THAT GENERATOR SET INSTALLATION AND ALL SERVICE ONLY BE DONE BY PERSONS QUALIFIED TO PERFORM ELECTRICAL AND/OR MECHANICAL SERVICE. TO PREVENT POSSIBLE INJURY AND/OR EQUIPMENT DAMAGE IT IS IMPERATIVE THAT THE SERVICE PERSON BE QUALIFIED.

IF IT IS NECESSARY TO RELOCATE OR MODIFY ANY MAJOR TRUCK CHASSIS COMPONENTS SUCH AS BATTERIES, TANKS, TOOL BOXES OR ANY OTHER TRUCK ACCESSORIES, ALL WORK MUST BE PERFORMED BY AN EXPERIENCED TRUCK DEALER OR SERVICE PERSON ONLY. THESE CONDITIONS MUST BE IDENTIFIED PRIOR TO PERFORMING ANY PART OF THE AUXILIARY GENERATOR SET INSTALLATION. THE COMPLETED INSTALLATION MUST CONFORM TO FEDERAL MOTOR CARRIER SAFETY REGULATIONS, TITLE 49, PART 393 AND FOLLOW THE RECOMMENDED PRACTICES OF THE AMERICAN TRUCKING ASSOCIATION MAINTENANCE COUNCIL.

Pre-Installation Instructions

TRUCK FRAME RAIL MOUNTING CONSIDERATIONS

Most truck chassis manufacturer's assume NO WARRANTY for frame failures resulting from improperly mounted accessories. Always consult the truck manufacturer's chassis manual for specific recommendations and procedures prior to any lifting, jacking, drilling or any other frame modifications.

Manufacturers do NOT recommend welding on frame rails as these parts may be heat treated for greater strength. Clamping completely around the entire frame rail is also discouraged because of the flexing, twisting and stress placed on frame members under load and due to vibration. Any new holes drilled in frame rails cannot be located any closer to frame flanges than the existing bolt pattern regardless of frame material. NO drilling whatsoever is allowed in the top or bottom frame rail flanges.

SIDE-MOUNT INSTALLATIONS

Marks for any new mounting holes must be made with pencil lead. Do NOT use a sharp tool for making scribe marks to prevent cracks from starting or extending beyond the circumference of the drilled hole. See Figure 3 for approved method of making scribe marks on truck frame rails. All bolts should fit freely through holes and not be forced into place.

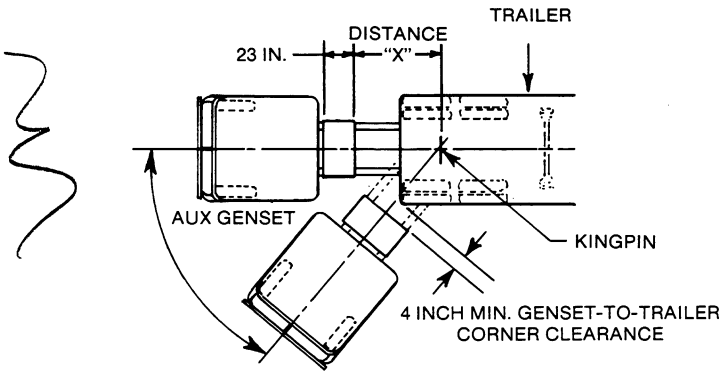
PRE-INSTALLATION EVALUATION

Each truck chassis must be evaluated and certain measurements must be made by the installer prior to starting any installation. These measurements determine whether there is sufficient, unobstructed space to permit installation of the generator set compartment and the fuel tank in their recommended locations.

The generator sets are designed primarily for installation in Class 7 or 8 long haul trucks. Exact compartment mounting location along the truck frame rail will vary between different conventional truck makes and models.

In cab-over-engine type trucks for "Over-the-Rail" installations, a location as far forward toward back wall of truck cab is most suitable for purposes of better axle weight distribution.

Distance "X" listed in Table 1, when measuring for installation, MUST be maintained to allow for any truck maneuver in order to proceed with any Over-the-Rail installation. Reference illustration when measuring distance "X".



TOP VIEW OF TRUCK

TABLE 1

Trailer Width (in.)	Kingpin Distance (in.)	"X" Dimension Minimum Distance* Required Between Aux and Fifth-wheel
96	36	64
102	36	66.5
96	48	72
102	48	74

*Dimension "X" based on square-cornered trailer including 4 inches for trailer movement.

COMPARTMENT SIZE AND LOCATION

- Design variables in truck wheelbase and cab styles may require relocation of batteries, tool boxes, etc., to make room for the generator set. Some degree of modification and possibly relocating some of these chassis components may be necessary to provide the physical space (length) required to proceed with the installation of the generator compartment.

WARNING ***If it is necessary to relocate or modify any major truck chassis components such as batteries, tanks or tool boxes or any other truck accessories, all work must be performed by an experienced truck dealer or service person only. These conditions must be identified prior to performing any part of the auxiliary generator set installation. The completed installation must conform to Federal Motor Carrier Safety Regulation, Title 49, Part 393 and follow the recommended practices of the American Trucking Association Maintenance Council.***

SIDE-MOUNT INSTALLATIONS

- The physical size (primarily length) of generator compartment and mounting frame requires a MINIMUM, UNOBSTRUCTED OPEN SPACE of 39 inches (lengthwise) along the truck frame rail. Measure along the frame rail in the desired mounting location to verify this space is available. Allowances can be made for existing bolts in this area that could interfere with the rear wall of the compartment by punching relief holes. See Figure 2 for minimum compartment over-all installation dimensions.

OVER-THE-RAIL INSTALLATIONS

- The physical size (primarily width) of the generator compartment requires a MINIMUM, UNOBSTRUCTED OPEN SPACE of 23-1/4 inches parallel to (lengthwise) the truck frame rails directly behind the cab. Measure along the frame rails in the desired mounting location to verify this space is available. See Figure 6 for minimum over-all installation dimensions.

- A minimum vertical clearance of 1/2 inch must be maintained between the generator set housing baseplate (where installed over truck frame rails) and any permanent truck chassis component underneath generator set compartment. Spacers should not be used to obtain this clearance. Housing baseplate can be moved horizontally to obtain this clearance as long as minimum space (23-1/4 inches) is not reduced. Housing baseplate must rest on truck frame rails when installed. See Figures 6 and 7.

GENSET FUEL TANK SIZE AND LOCATION

The remote fuel tank is designed for mounting between truck frame rails. It is intended to be mounted as far forward as possible between truck frame cross-support members (usually behind transmission and above drive shaft) if space permits.

- The remote fuel tank requires an unobstructed open space 16-1/2 inches in length by 25 inches wide by 10-1/2 inches deep for mounting between truck frame rails in all applications. The depth requirement includes allowance for up to 3 inches of clearance above the truck drive shaft to allow for suspension rebound under the weight of the loaded trailer and road shock vibration. See Figure 9 for typical installation.

- The fuel tank should be positioned to allow access to fill spout and provision for reading fuel level gauge along one end on top of fuel tank. If a step plate is used on truck frame ahead of fifth-wheel area, access holes may have to be punched in step plate for those items. Fuel filter spout is designed to accept ONLY NONLEADED GASOLINE.

OVER-THE-RAIL INSTALLATIONS

- The fuel tank cannot be mounted underneath the generator set compartment or outside the truck frame rails. The 16-1/2 inches (minimum) of length along the frame rails for the fuel tank is in addition to the 23-1/4 inches (minimum) space required for the generator set in the same plane parallel to (lengthwise) the truck frame rails for a complete installation.

WARNING ***Do not modify the Onan supplied fuel tank for installation outside the truck frame rails on any application. The fuel tank is not designed to comply with DOT regulations for side-mounted fuel tanks.***

Specifications

The SI metric equivalents are printed in parenthesis immediately following the U.S. customary unit of measure

COMPARTMENT SIZE (Side Mount)

Height (without muffler)	23.62 in. (600 mm)
Length	38.94 in. (989 mm)
Width (without step)	23.12 in. (587 mm)
Approximate weight including compartment	
4.0 BFA	315 lbs. (143 kg)
6.5 NH	375 lbs. (170 kg)
Exhaust Tailpipe Size	1-3/8 in. I.D. (35 mm)

COMPARTMENT SIZE (Over-The-Rail Mount)

Height	25.12 in. (638 mm)
Length	34.12 in. (867 mm)
Width	23.25 in. (590 mm)
Approximate weight including compartment	
4.0 BFA	335 lbs. (152 kg)
6.5 NH	395 lbs. (179 kg)
Starting System Voltage	12-volts DC
Battery Ground	Negative Ground Only
Starting System	Motorized Alternator Cranking
Cranking Current	200-300 Amperes
Break-away Current (Maximum)	400-500 Amperes
Fuel	NONLEADED GASOLINE
Fuel Tank Capacity	11.5 Gallons (44 L)
Length	24 in. (609 mm)
Width	15.50 in. (393 mm)
Depth	7.50 in. (190 mm)
Fuel Pump	Electric
Fuel Inlet Connection Size	SAE-4 37° Flare

NOTE: Refer to auxiliary generator set individual Operator's manual for general specifications, tune-up and adjustment information.

Compartment and GenSet Installation

SIDE-MOUNT ONLY

COMPARTMENT INSTALLATION

1. Position the entire compartment mounting frame in place against the truck frame rail and check for adequate clearance (compartment dimensions are shown in Figure 2). Top of compartment must be level with top of frame rail. Use appropriate jacking or blocking to temporarily support the compartment in place.

WARNING ***Make certain that compartment is adequately supported when it is necessary to hold compartment in place against frame rail. Injury may result if the compartment should fall from temporary mounting supports.***

2. Measure and mark the location of any existing frame rail bolts on the rear wall of the compartment. Make the necessary relief holes in compartment rear wall to avoid interference.

CAUTION ***Check the area inside the truck frame rail so that drilling of frame mounting holes will not interfere with any truck wiring, fuel, air or hydraulic lines.***

3. Use appropriate jacking equipment or blocking to hold the compartment in the required mounting position against the truck frame rail. Verify that top of compartment is level with top of frame rail. Draw the four mounting holes on the frame rail (with pencil lead) using the four pre-drilled holes in the back of the compartment mounting frame as a guide.

CAUTION ***Do NOT use a sharp tool for marking hole locations. Marks for mounting holes must be made with pencil lead. Cracks will start around the edge of the hole if a sharp tool is used to mark the location. Refer to Figure 3 for approved method of making marks on truck frame rail.***

4. Remove compartment from selected location against frame rail of truck.
5. Drill four 11/16 inch mounting holes in truck frame rail using the marks made in Step 3. Start with smaller size drill bits and work up to required size in small increments.

CAUTION ***Do NOT drill over-size mounting holes. The maximum hole size required for the Onan supplied 5/8-11 x 2 inch Grade 8 compartment mounting bolt is 11/16 inch. Over-size holes may cause frame rails to crack.***

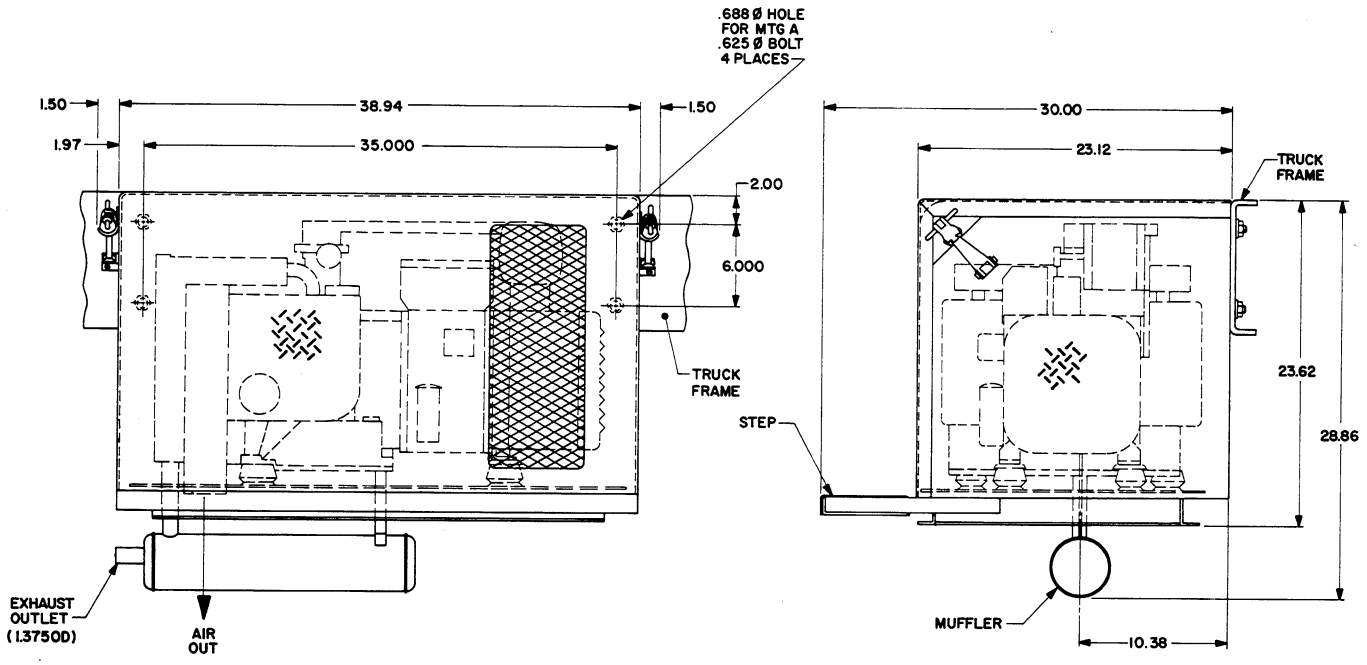


FIGURE 2. SIDE-MOUNTED COMPARTMENT INSTALLATION DIMENSIONS

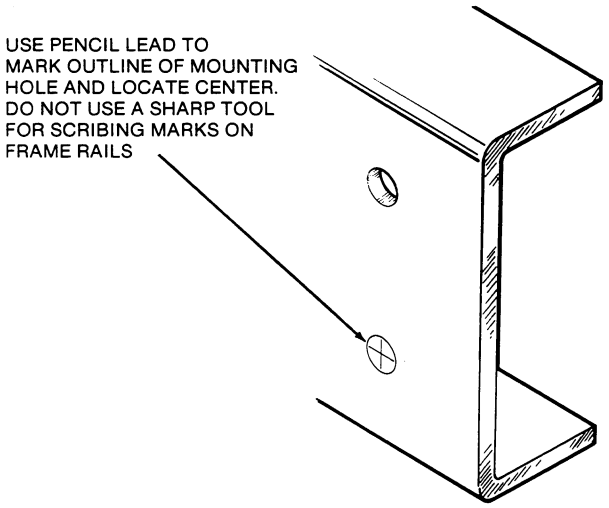


FIGURE 3. MARKING MOUNTING HOLE LOCATION ON TRUCK FRAME RAIL-SIDE MOUNT ONLY

6. Install the generator set compartment onto the truck frame rail using the four 5/8-11 x 2 inch Grade 8 hex flange mounting bolts and nuts supplied. Torque mounting bolts to 200 foot pounds (271 N•m). Compartment assembly detail is shown in Figure 4 along with additional hardware details.

CAUTION ***Use ONLY the Onan supplied Grade 8 hex flange mounting bolts and nuts to install the generator compartment on the truck frame rail. Torque specified is very important.***

COMPARTMENT ACCESS HOLE LOCATION

Five access holes must be punched in rear wall of compartment for entry of fuel supply line, AC wiring, DC wiring and both battery cables. Refer to Figure 5 for location, size and suggested function of each hole required.

Some compartments may have knockouts provided in rear wall of compartment to simplify the installation. If so, location and size is the same as shown in Figure 5.

1. Locate and punch the first compartment access hole (1/2 inch O.D.) 5 inches in (to center) from side of compartment and 12 inches down from top edge. This hole is for the fuel supply line bulkhead connector.
2. Locate and punch four additional (1-1/8 inch O.D) compartment access holes in a horizontal row 2 inches apart (center-to-center) from first hole as shown in Figure 5. These holes are used for electrical wiring and battery cable entry into compartment.
3. Install 3/4 inch water-tight metal strain relief connectors in all four holes to secure and seal wiring and cables. Do not tighten since wiring and battery cables will be installed later. *See Electrical Loads and Connections* section.

WARNING ***All holes to the inside of the truck cab must be sealed to prevent poisonous exhaust gases from entering cab interior. Use a silicone rubber sealant to seal around all openings made for electrical wiring.***

GENERATOR SET INSTALLATION

After generator compartment is installed on truck and access holes are located in compartment rear wall as shown in Figure 5, the genrator set, compartment step and compartment (inside) fuel line should be installed.

1. Install 7/16-20 bulkhead connector (SAE 37° flare fitting) into 1/2 inch O.D. hole in generator end of compartment rear wall (See Figure 5). A 7/16-20 hex nut is used to hold flare fitting in place. Install nut on the inside of the compartment rear wall.
2. Carefully slide set into compartment from front (service) side using appropriate size portable hoise or forklift. Set weights are listed in installation specifications.

WARNING ***Do not try to lift set manually. Lifting strap should be wrapped around set in the middle (near center of balance) and above the set mounting tray.***

3. Position set so that weld nuts in set mounting tray line up with mounting holes in compartment frame as shown in Figure 4.
4. Install six 3/8-16 x 3/4 inch mounting screws in the four holes along the rear wall (back) of compartment and in the two inside (center) holes along the front edge of compartment from underneath. See Figure 4. Do not tighten yet.
5. Position step as shown in Figure 4 and install four 3/8-16 x 1 inch mounting screws (two in each front corner). Torque all ten mounting screws to 31 foot pounds (42 N•m) each.

WARNING ***Visually check Vacu-Flo scroll air outlet opening underneath compartment to verify that protective screen is in position. Never use fingers or hand to check air outlet opening when set is running.***

6. Install 1/8 inch NPTF 37° flare fitting (90° male elbow) into set fuel pump inlet on bottom of fuel pump. Fitting should point toward generator end of set and slightly downward (see Figure 14).
7. Connect 29 inch fuel line between fuel pump inlet elbow and bulkhead connector in rear wall of

compartment (installed in step 1). Connect the 90° elbow fitting to the bulkhead connector in the compartment rear wall. Connect the opposite end with straight flare fitting to fuel pump inlet elbow fitting installed in step 6.

WARNING ***Use ONLY the Onan supplied fuel line assembly inside the generator compartment. Do NOT use the same SAE type fuel line as recommended for outside of the compartment. Most of those type lines contain wire used for reinforcement which could act as a conductor of electricity. SAE type 100R3 is the ONLY acceptable fuel line material for use inside generator compartment.***

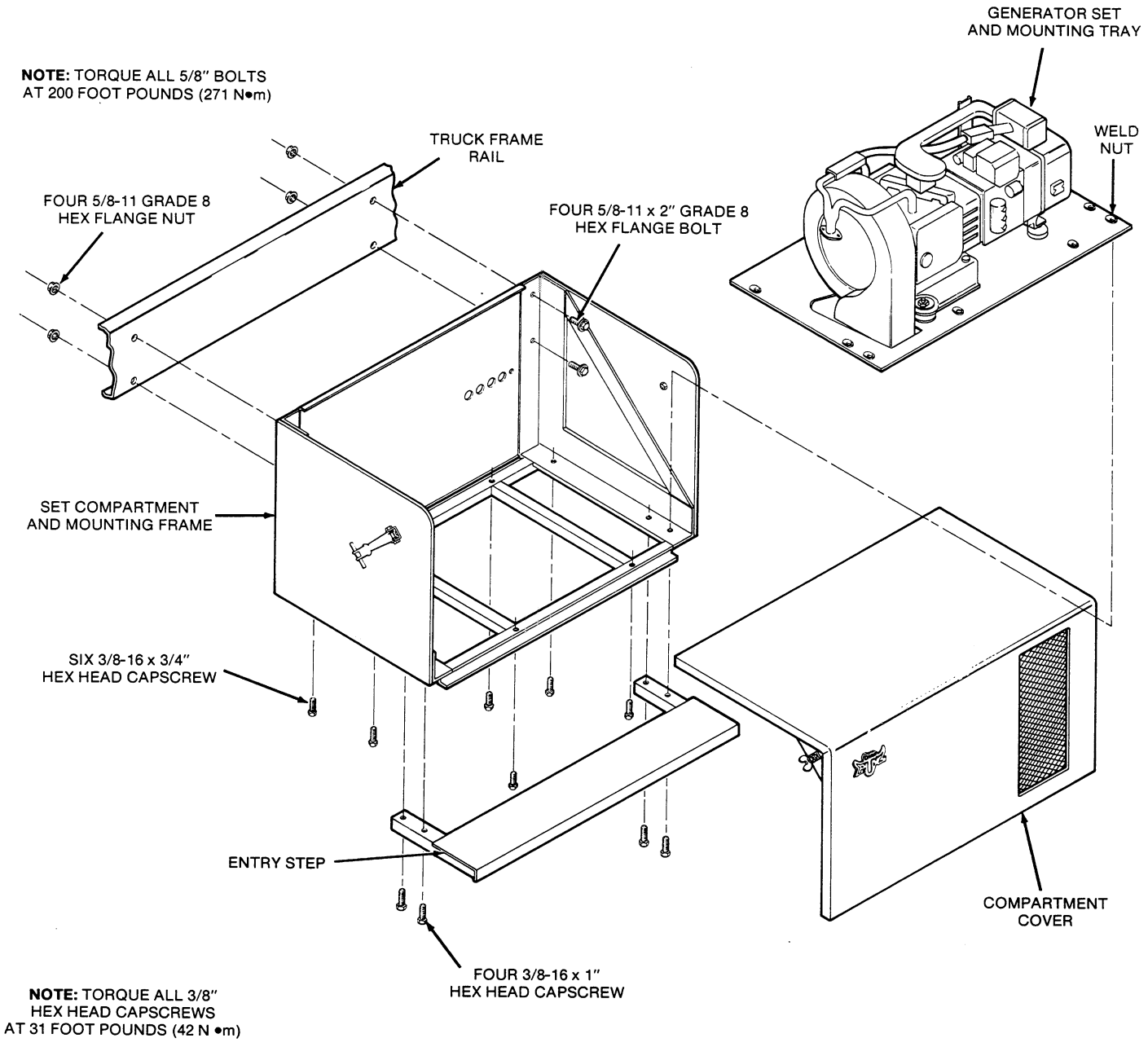


FIGURE 4. SIDE-MOUNTED GENERATOR SET AND COMPARTMENT ASSEMBLY

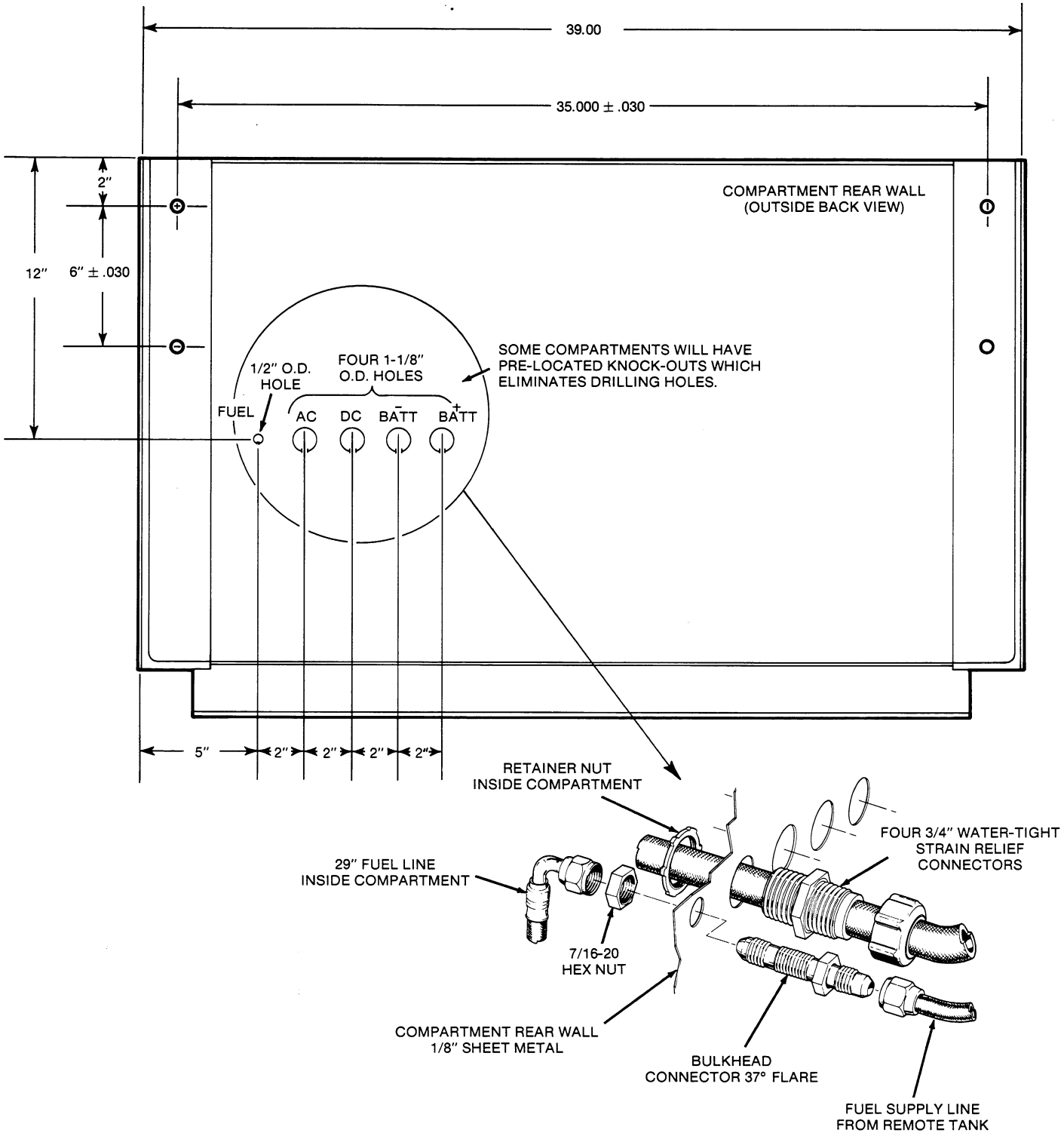


FIGURE 5. COMPARTMENT ACCESS HOLE LOCATION FOR SIDE-MOUNTED INSTALLATIONS ONLY

Compartment and GenSet Installation

OVER-THE-RAIL MOUNT ONLY

COMPARTMENT INSTALLATION (Figure 7)

1. Position the housing baseplate over the truck frame rails in the desired mounting location and check for adequate clearance (over-all compartment dimensions are shown in Figure 6). Be sure to allow adequate clearance between back of sleeper cab and rear wall of generator set compartment for wiring connections.

WARNING ***Make certain that housing baseplate is adequately supported when setting it in place on frame rails. Injury may result if the baseplate should fall off frame rails during the installation procedure.***

2. Choose any two of seven possible pairs of mounting holes (pre-drilled in housing baseplate) that do NOT interfere with any existing chassis hardware, frame cross members or any other chassis components (underneath baseplate) on each side of truck.
3. Temporarily hold one mounting clamp in position (inside from underneath) against top frame rail flange of truck as shown in Figure 7. Determine the number of 1/4 inch and/or 1/16 inch thick spacers (in any combination NOT to exceed 3/4 inch per mounting clamp) required to fill any gap between baseplate and mounting clamp under baseplate. These spacers are necessary to balance out the leverage of each mounting clamp. The number spacers used will vary depending upon the thickness of the truck frame rails. Total thickness of spacers used must match truck frame rail flange thickness under each of the four mounting clamps. Use the same combination and number of spacers with each of the four mounting brackets. Do NOT exceed the 3/4 inch maximum spacer thickness. See Figure 7, detail B.
4. Remove housing mounting clamp and assemble required number of spacers to all four mounting clamps using 5/16-18 x 1-1/2 inch allen head cap screws and 5/16 lock nuts provided. Torque nuts to 15 foot pounds (20 N•m). See Figure 7. Top spacer has recessed mounting hole to accept special allen head capscrews.
5. Install four mounting clamps with spacers (as required), two on each side under top flange of truck frame rails (from inside frame rails) using 1/2-13 x 2 inch hex head cap screws and two special 1/2 inch conical washers on each capscrew positioned as shown in Figure 7, detail C. Tighten all eight capscrews until conical washers are flat (approximately 10-20 foot pounds-13.5 -27 N•m). Mounting clamps have weld nuts to simplify installation. These special washers determine the correct amount of clamping force on the bearing surfaces of the mounting clamps. The mounting bolts are torqued correctly when the special conical washers are flat. See Figure 7 and detail C.

CAUTION ***Do NOT overtighten conical washers.***

GENERATOR SET INSTALLATION

After installing housing baseplate on truck, install the generator set, housing and housing (inside) fuel line.

1. Carefully place generator set onto housing baseplate from top or side using appropriate size portable hoist or forklift. Set weights are listed in installation specifications.

WARNING ***Do not try to lift set manually. Lifting strap should be wrapped around set in the middle (near center of balance) and above the set mounting tray.***

2. Position set so that the four mounting holes in set mounting tray line up with mounting holes in housing baseplate as shown in Figure 7.
3. Install four 3/8-16 x 1 inch hex head capscrews and 3/8 lock nuts and torque to 25 foot pounds (34 N•m).
4. Position housing in place around baseplate as shown in Figure 7. Install seven 3/8-16 x 1 inch hex head capscrews, flat washers and lock nuts as shown in Figure 7. Torque to 25 foot pounds (34 N•m).

Right front housing bolt and electrical ground strap to truck frame are left out until battery cables are installed. See page 27 (step 2) Figure 15.

5. A tether strap shown in Figure 7 must be installed under any one of the five hex head capscrews (step 4) on the side of the housing to control movement of the set when the truck is in operation. Location shown in Figure 7 is for reference ONLY.

CAUTION ***Do NOT use the right front housing bolt which is purposely left out until the battery cables are installed. This bolt should be used for grounding cables ONLY.***

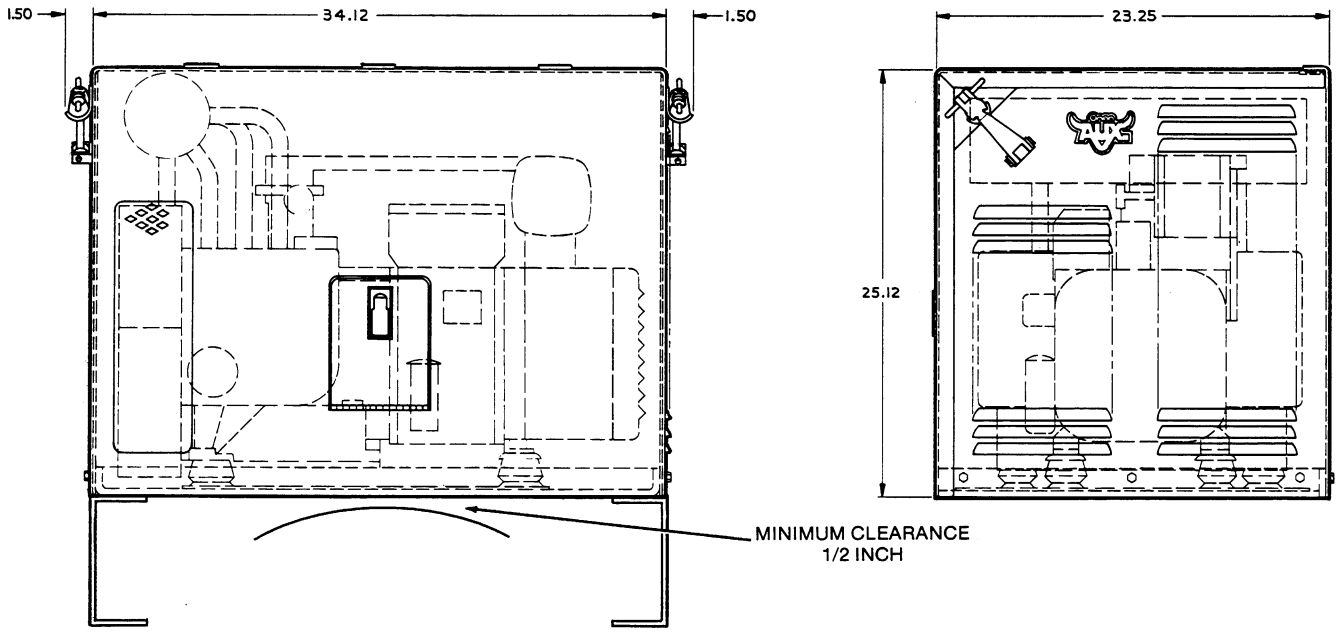


FIGURE 6. OVER-THE-RAIL MOUNTED COMPARTMENT INSTALLATION DIMENSIONS

Choose a tether location that is close or convenient to an existing frame bolt or frame hole. Use at least a 3/8 inch Grade 5 bolt for attaching tether to truck frame rail. If no existing bolt or bolt hole is available, installer must drill a new hole in the side of the truck frame rail. Refer to Pre-Installation Section for special precautions PRIOR to drilling any new holes in truck frame rails.

CAUTION ***Check the area inside the truck frame rail so that the drilling of frame mounting holes will not interfere with any truck wiring, fuel, air or hydraulic lines.***

CAUTION ***Do NOT use a sharp tool for marking hole locations. Marks for mounting holes must be made with pencil lead. Cracks will start around the edge of the hole if a sharp tool is used to mark the location. Refer to Figure 3 for approved method of making marks on truck frame rail.***

6. Install 1/8 inch NPTF 37° flare fitting (90° male elbow) into set fuel pump inlet on bottom of fuel pump. Fitting should point toward generator end of set and slightly downward (see Figure 15).
7. Install 7/16-20 bulkhead connector (SAE 37° flare fitting) into 1/2 inch O.D. hole in generator end of compartment rear wall (see Figure 7, detail A). A 7/16-20 hex nut is used to hold flare fitting in place. Install nut on the inside of the housing rear wall.
8. Connect 28 inch fuel line between fuel pump inlet elbow and bulkhead connector in rear wall of housing (installed in step 6). Connect the 90° elbow fitting to the bulkhead connector in the compartment rear wall. Connect the opposite end with straight flare fitting to fuel pump inlet elbow fitting installed in step 5. See Figure 7, detail A.

WARNING ***Use ONLY the Onan supplied fuel line assembly inside the generator compartment. Do NOT Use the same SAE type fuel line as recommended for outside of the compartment. Most of those type lines contain wire used for reinforcement which could act as a conductor of electricity. SAE type 100R3 is the ONLY acceptable fuel line material for use inside generator compartment.***

9. Pre-located knock-outs (shown in Figure 7, detail A) are used for entry of AC wiring, DC wiring and both battery cables.
10. Install 3/4 inch water-tight metal strain relief connectors in all four knock-outs to secure and seal all wiring and cables as shown in Figure 7, detail A. Do not tighten since wiring and battery cables will be installed later. Optional power and control wiring kits (containing these connectors) are available from Onan to complete the installation. See Electrical Loads and Connections section.

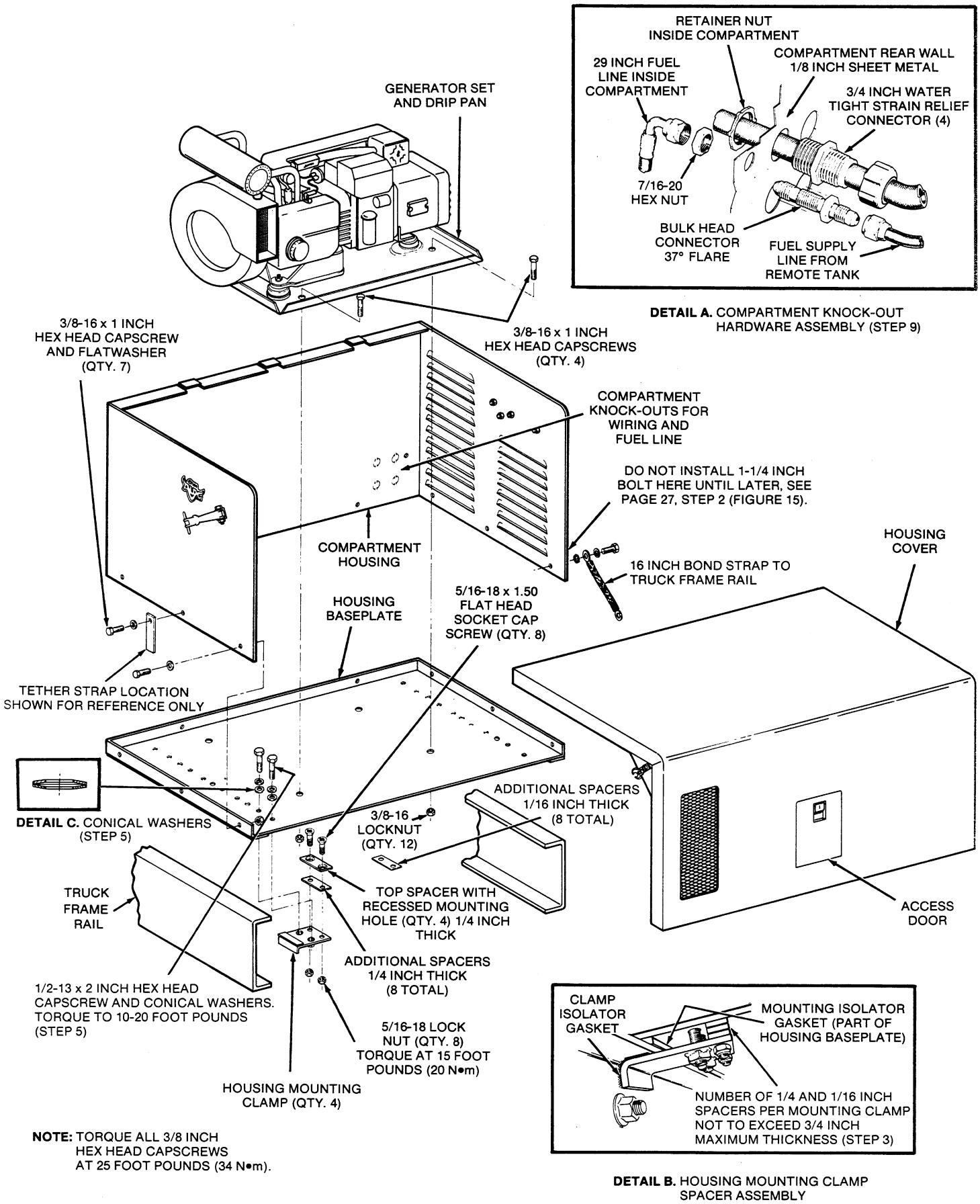


FIGURE 7. OVER-THE-RAIL MOUNTED GENERATOR SET AND COMPARTMENT ASSEMBLY

Exhaust System

WARNING

EXHAUST GAS IS DEADLY!

Exhaust gases contain carbon monoxide, an odorless and colorless gas. Carbon monoxide is poisonous and can cause unconsciousness and death. Symptoms of carbon monoxide poisoning can include:

- ***Dizziness***
- ***Nausea***
- ***Headache***
- ***Weakness and Sleepiness***
- ***Throbbing in Temples***
- ***Muscular Twitching***
- ***Vomiting***
- ***Inability to Think Coherently***

IF YOU OR ANYONE ELSE EXPERIENCE ANY OF THESE SYMPTOMS, GET OUT INTO THE FRESH AIR IMMEDIATELY. If symptoms persist, seek medical attention. Shut down the unit and do not operate until it has been inspected and repaired.

Never sleep in vehicle with the generator set running unless the vehicle interior is equipped with an operating carbon monoxide detector. Protection against carbon monoxide inhalation also includes proper exhaust system installation and visual and audible inspection of the complete exhaust system at the start of each generator set operation.

1-RV

Observe all recommended precautions to prevent entrance of exhaust gases into the truck interior. Keep window, vent, and door openings on the set side CLOSED when the generator set is operating. Seal any existing access holes in the cab, sleeper, or tool storage compartment with silicone rubber sealant.

MUFFLER INSTALLATION (Side Mount Only)

1. Connect exhaust down pipe to exhaust manifold flange and secure with 5/16-18 x 1-1/4 inch bolts, nuts and lockwashers. Install asbestos gasket between exhaust manifold flanges to prevent leaks as shown in Figure 8. Torque bolts to 11 foot pounds (15 N•m).
2. Position muffler underneath compartment mounting tray as shown in Figure 8 with outlet facing toward rear of truck. Slide inlet pipe of muffler over exhaust down pipe and support in place with blocking temporarily until opposite end (with hanger strap) is installed.
3. Route 4-3/4 inch hanger strap extending from top side of muffler through 3 inch diameter hole in the bottom of mounting tray underneath compartment. Connect this strap to a hanger strap suspended from (below) engine-to-generator adapter (but above mounting tray) using 5/16-18 x 3/4 inch bolt, flat washer and lock nut. See Figure 8.
4. Install 1-5/8 inch muffler clamp over inlet pipe connection on opposite end of muffler (step 2) and torque nuts to 11 foot pounds(15 N•m).See Figure 8.

CAUTION ***The ONLY acceptable means of fastening the exhaust downpipe to the muffler is approved SAE 1-5/8 inch U-bolt type automotive muffler clamps.***

5. Verify that muffler is in a level position as shown in Figure 8. Recheck and tighten all bolts, nuts and clamps.

TAILPIPE REQUIREMENTS (Side-Mount Only)

Plan each individual exhaust system carefully. A proper installation must be free of any leaks and comply with all applicable codes and regulations.

Exhaust tailpipe is NOT supplied because of variation in length requirement between truck chassis manufacturers. An optional exhaust tailpipe kit (155-1902*) is available. After muffler is installed and prior to installing exhaust tailpipe, refer to the recommendations that follow for additional tips and safety considerations.

- Use 1-3/8 inch I.D. 18 gauge rigid steel tubing (for tailpipe) to terminate exhaust to the rear of generator compartment air intake (prevents recirculation of exhaust gases) and extend the tailpipe at least one inch beyond the outside edge of cab or sleeper compartment. Direct tailpipe down and away from truck cab and sleeper area.

CAUTION ***Do NOT use flexible type exhaust tailpipe since it may break due to road shock and vibration.***

WARNING ***Do NOT terminate poisonous carbon monoxide exhaust gas under truck. Direct tailpipe away from any window, vent or door openings. Keep all openings to cab area on set side closed when generator set is operating. Do NOT operate generator set WITHOUT an exhaust tailpipe.***

- Install exhaust tailpipe at least 1-1/2 inches away from any combustible material or fuel tank location. Use suitable shielding if tailpipe routing is within 1-1/2 inches of combustible materials.

- Route the exhaust tailpipe as far away as possible from any fuel tank. Do not terminate tailpipe near any fuel tank fill spout.

WARNING ***Be careful not to spill gasoline on exhaust tailpipe when filling fuel tank. A hot exhaust pipe may cause spilled gasoline to ignite.***

- Use 1-1/2 inch U-bolt type automotive muffler clamps and shock mounted hangers for supporting the exhaust system. If exhaust tailpipe is routed upward toward roof of truck it must be located above and to the rear of the entire cab area.

CAUTION ***The ONLY acceptable means of fastening the exhaust tailpipe to muffler is approved SAE 1-1/2 inch U-bolt type automotive muffler clamps.***

EXHAUST SYSTEM (Over-The-Rail Mount Only)

The muffler is contained inside the compartment as part of the generator set itself on these models. Exhaust gases are expelled along with discharged cooling air through the vent in the compartment cover. No tailpipe is required.

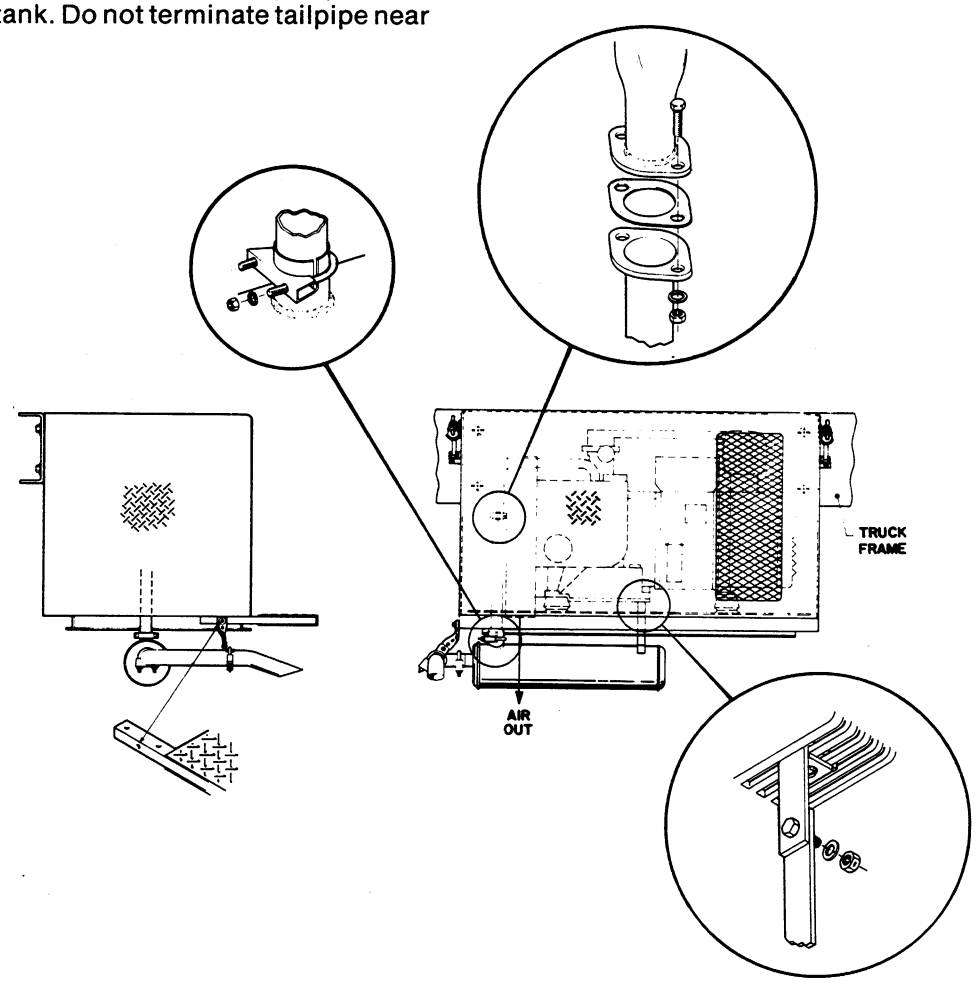


FIGURE 8. TYPICAL SIDE-MOUNTED EXHAUST SYSTEM AND TAILPIPE REQUIREMENTS

Fuel System

FUEL TANK LOCATION

The remote fuel tank is designed for mounting between truck frame rails in all applications. It is intended to be mounted as far forward as possible between truck frame cross-support members (usually behind transmission and above drive shaft) if space permits. Mounting the gasoline fuel tank requires an unobstructed opening measuring 16-1/2 inches lengthwise (parallel to truck frame rail) by 25 inches wide (between frame rails) by 10-1/2 inches of depth (above truck drive shaft). The 10-1/2 inch depth requirement includes up to 3 inches of vertical clearance above truck drive shaft to allow for suspension rebound under the weight of the loaded trailer and road shock vibration.

WARNING ***Do NOT modify the Onan supplied fuel tank for installation outside the truck frame rails without checking for compliance with Federal Motor Carrier Safety Regulation, Title 49, Part 393.67 (b)(2). The fuel tank is not designed to comply with DOT regulations for side-mounted fuel tanks.***

FUEL TANK INSTALLATION

Install remote fuel tank using the assembly sequence illustrated in Figure 9. Perform the steps in order listed to minimize installation problems. All component parts necessry to install the fuel tank are supplied in fuel tank kit 415-0506.

SIDE-MOUNT ONLY

1a. Position fuel tank in the selected unobstructed opening between truck frame rails. Tank may be installed with fuel fill, fuel pick-up and fuel level gauge on either driver or curb side as desired by the owner.

OVER-THE-RAIL MOUNT ONLY

b. Place fuel tank in the selected unobstructed opening between truck frame rails. Fuel tank must be positioned so that fill spout is on curb side of truck chassis (opposite side as generator set exhaust).

WARNING ***Fuel tank fill spout must NOT be positioned on same side of truck as generator set exhaust outlet to prevent fire hazard. Never fill fuel tank with truck engine or generator set running.***

2. Position the two L-shaped mounting brackets on the inside (underneath) of the top truck frame rail flange (one on each side), so that weld nuts in brackets line up with pre-drilled mounting holes in fuel tank flanges as shown in Figure 9. The rubber vibration isolator pads on both the fuel tank flanges and fuel tank mounting brackets must contact the truck frame rail flange.

Pre-drilled mounting hole location in fuel tank flange is usually adequate to securely fasten fuel tank in most installations. Some trucks may have variations in width of frame rail flange area or width between truck frame rails that could require spacing and drilling new mounting holes in fuel tank flanges. When installed, the vertical surface of the mounting bracket should rest against the side of the fuel tank and the wider surface area of the mounting bracket (surface with rubber isolation pad) should be relatively close to radius of truck frame rail. See detail A in Figure 9. If not, new 3/8 inch mounting holes will have to be spaced and drilled in fuel tank flange as required so that fuel tank is held securely in position.

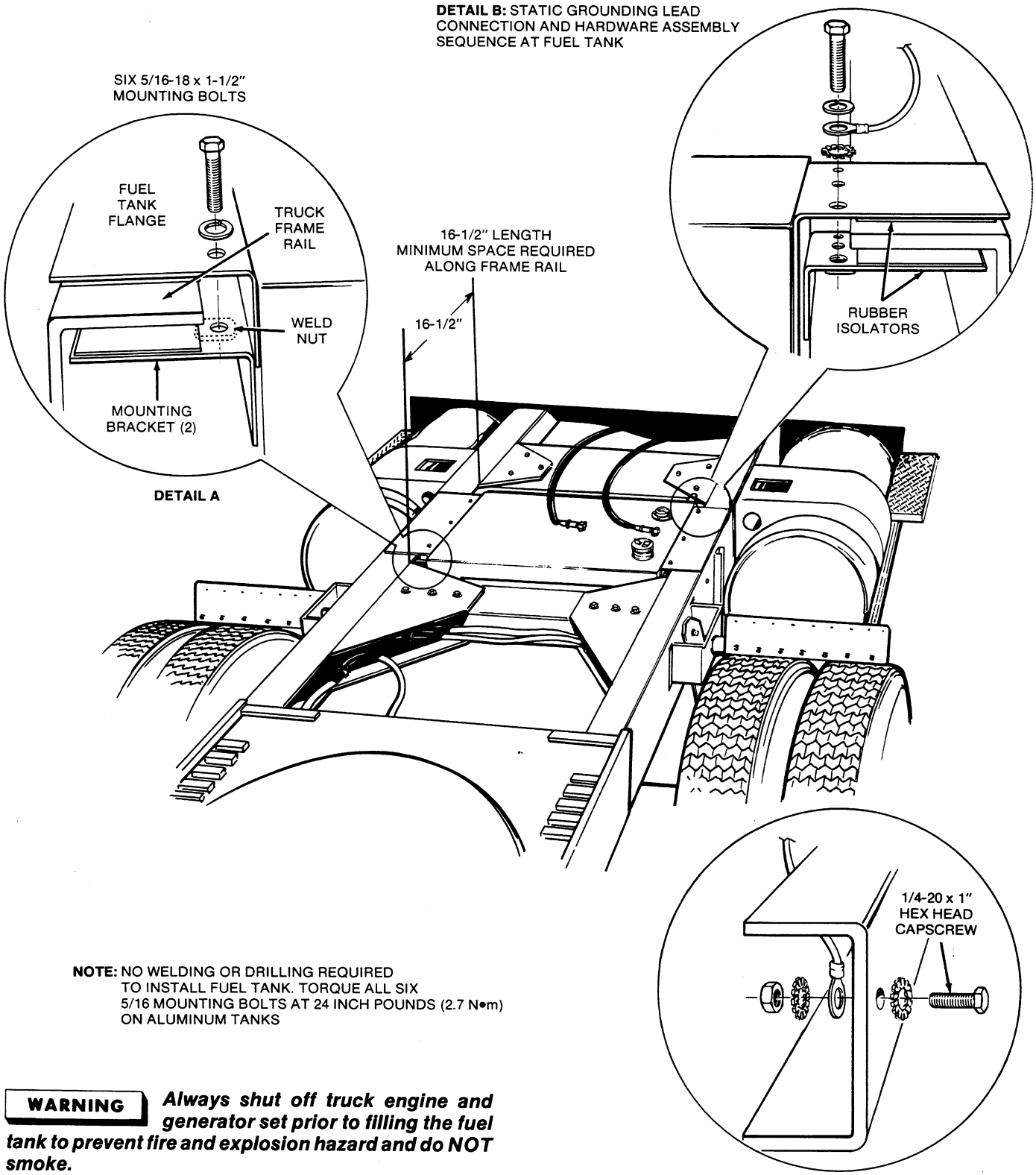
3. Install 5/16-18 x 1-1/2 inch hex head capscrews and lockwashers in center mounting holes only (one on each side). Mounting hardware assembly sequence is shown in Figure 9, detail A.
4. The 18 inch 12-gauge static ground lead must be installed under the most convenient fuel tank mounting screw as dictated by physical location and layout of truck chassis components in each installation. Fuel tank terminal end of ground lead is a 5/16 inch eyelet terminal. Install this terminal under most convenient 5/16 inch capscrew and lockwasher on top of fuel tank mounting flange. See Figure 9, detail B. The remaining chassis end of static grounding lead has 1/4 inch eyelet terminal. Locate a nearby hole in truck frame rail within reach of the lead and attach terminal with 1/4-20 x 1 inch screw, lockwashers, and nut. Hardware assembly sequence is shown in Figure 9, detail C.

If no existing hole is available, a 5/16 inch hole must be drilled (within reach of grounding lead) in the side (vertical surface) of truck frame rail. Hole must be located as close to vertical center of the frame rail as possible. Be careful not to locate hole where drilling might puncture fuel tank.

CAUTION ***Do NOT drill any new holes in truck frame rails any closer than 2 inches to top or bottom flange area of frame rail. Bolt holes in frame rails MUST NOT be located any closer to frame rail flanges than present bolt hole pattern. If in doubt, consult truck manufacturer's chassis manual. Refer to Figure 3 for additional recommendations regarding marking of any new frame holes. No drilling whatsoever is allowed in the top or bottom frame rail flanges.***

5. Install three remaining 5/16-18 x 1-1/2 inch hex head capscrews and lockwashers in fuel tank mounting brackets. Hardware assembly sequence is shown in Figure 9, detail B. Torque all six mounting screws to 24 inch pounds (2.7 N•m).

6. Verify that the ground strap and all mounting bolts are securely tightened following torque specifications where listed. With installation completed, check for adequate clearance above truck drive shaft and bottom of gasoline fuel tank. Allow 3 inch clearance for suspension rebound and road shock vibration with loaded trailer coupled to truck.



NOTE: NO WELDING OR DRILLING REQUIRED TO INSTALL FUEL TANK. TORQUE ALL SIX 5/16 MOUNTING BOLTS AT 24 INCH POUNDS (2.7 N•m) ON ALUMINUM TANKS

WARNING ***Always shut off truck engine and generator set prior to filling the fuel tank to prevent fire and explosion hazard and do NOT smoke.***

FIGURE 9. FUEL TANK INSTALLATION

FUEL LINE RECOMMENDATIONS

The fuel supply line from remote fuel tank to generator set compartment inlet fitting is not supplied due to variation in length requirement between trucks. The following recommendations pertain to material, size and routing of fuel supply line:

- Use an approved flexible, double fabric reinforced, non-organic fuel line such as SAE type 100R5 or 100R3 in 1/4 inch I.D. size.
- Route fuel line as far away as possible from hot engine or exhaust areas. This reduces chance of vapor lock and fire danger.
- Do NOT route or bundle fuel line together with any AC or DC electrical wiring.
- Install fuel line so it is accessible for service but protected from physical damage.
- Do NOT drill any additional holes in frame rails or frame cross support members for routing of fuel line.

FUEL LINE INSTALLATION

1. Use fuel hose fittings with 7/16-20 thread size and SAE 37° flare to match fittings provided for compartment connector and fuel tank pick-up connector.
2. Use protective sleeving such as heater hose over sections of fuel line that pass over frame rails. Any existing holes in frame cross support members used for routing of fuel line should be protected with rubber grommets to prevent chaffing.
3. Use clamps or ties without sharp edges to secure fuel line approximately every 18 inches along the run.
4. Connect fuel supply line to bulkhead connector on rear wall of compartment (installed during generator set installation). Connect opposite end of fuel supply line to 37° flare fitting on remote fuel tank. Direction of fuel tank fitting must be adjusted during connection of fuel supply line to prevent kinks or sharp bends in fuel supply line.

WARNING ***Always shut off truck engine and generator set prior to filling the fuel tank.***

Electrical Loads and Connections

Onan offers separate optional power and control wiring kits for all Aux models to simplify the installation. Refer to instruction sheet A250 for 4.0 BFA models or A251 for 6.5 NH models (included with each Aux model shipped) for appropriate kit number. Contact your authorized Onan parts and service center for kits.

GENERAL WIRING RECOMMENDATIONS

Wiring harnesses for interconnection of the auxiliary generator set, load distribution panel, individual AC load circuits and remote start panel must be fabricated and hand wired during the installation of the generator set.

WARNING ***Installation of all wiring must conform to all applicable codes and follow National Electrical Code standards and recommended practices. A qualified electrician should inspect all wiring.***

- Use multistrand wire throughout the truck during installation. Specific sizes for main feeder conductors and individual AC load circuit wiring are specified (where required) in this section of the installation guide. All wiring must be of adequate size, properly insulated, and supported in an approved manner. Observe all wiring size recommendations and amperage specifications where listed.

CAUTION ***Do NOT use solid metal conductors anywhere in this installation. They may develop metal fatigue from vibration and eventually break.***

- Mount all switches and controls securely to prevent damage from vibration and road shock. All switches must be vibration-proof to prevent accidental opening or closing while the truck is in motion.

- Route all AC and DC wiring along the inside of the truck frame rails where possible. Keep away from rotating or moving shafts and linkages of the truck. Use insulated hold-down clamps spaced approximately every 18 inches and closer together in bends or near high heat sources. Plastic tie wraps can be used in between heavier insulated clamps. Use additional protective sleeving (such as heater hose) over wiring wherever it crosses over frame rails or in sharp bends. Any existing holes in truck cross suport frame members used for routing of wiring should be grommeted to protect wiring.

WARNING ***Do NOT tie any electrical wiring to the fuel or hydraulic lines of the truck because of fire hazard. Keep all wiring away from the exhaust pipe.***

CAUTION ***Do NOT drill any additional new holes in the truck frame rails or cross-support frame members for routing wiring through. Any existing holes used for routing of wiring should be protected with grommets.***

- Use water-tight strain relief connectors (1/2 inch or 3/4 inch) whenever wiring passes through any housing compartment, shelf, panel, cab wall or partition.

WARNING ***All holes leading to the inside of the truck cab for electrical wiring must be sealed to prevent poisonous exhaust gases from entering the cab interior.***

MAIN FEEDER CONDUCTORS

The main feeder conductors supply the AC current from the generator set to the main bus terminal for the circuit breakers in the load distribution panel. The number of individual conductors (wires) and wire size (gauge) is determined by the kilowatt rating and amperage output of the generator set.

The main feeder conductors of the auxiliary generator set must have an ampacity of not less than 110 percent of the nameplate current rating of the generator set. Neutral conductors must be of the same size as the conductors of the outside legs. Do NOT splice any wiring in the main AC feeder conductors.

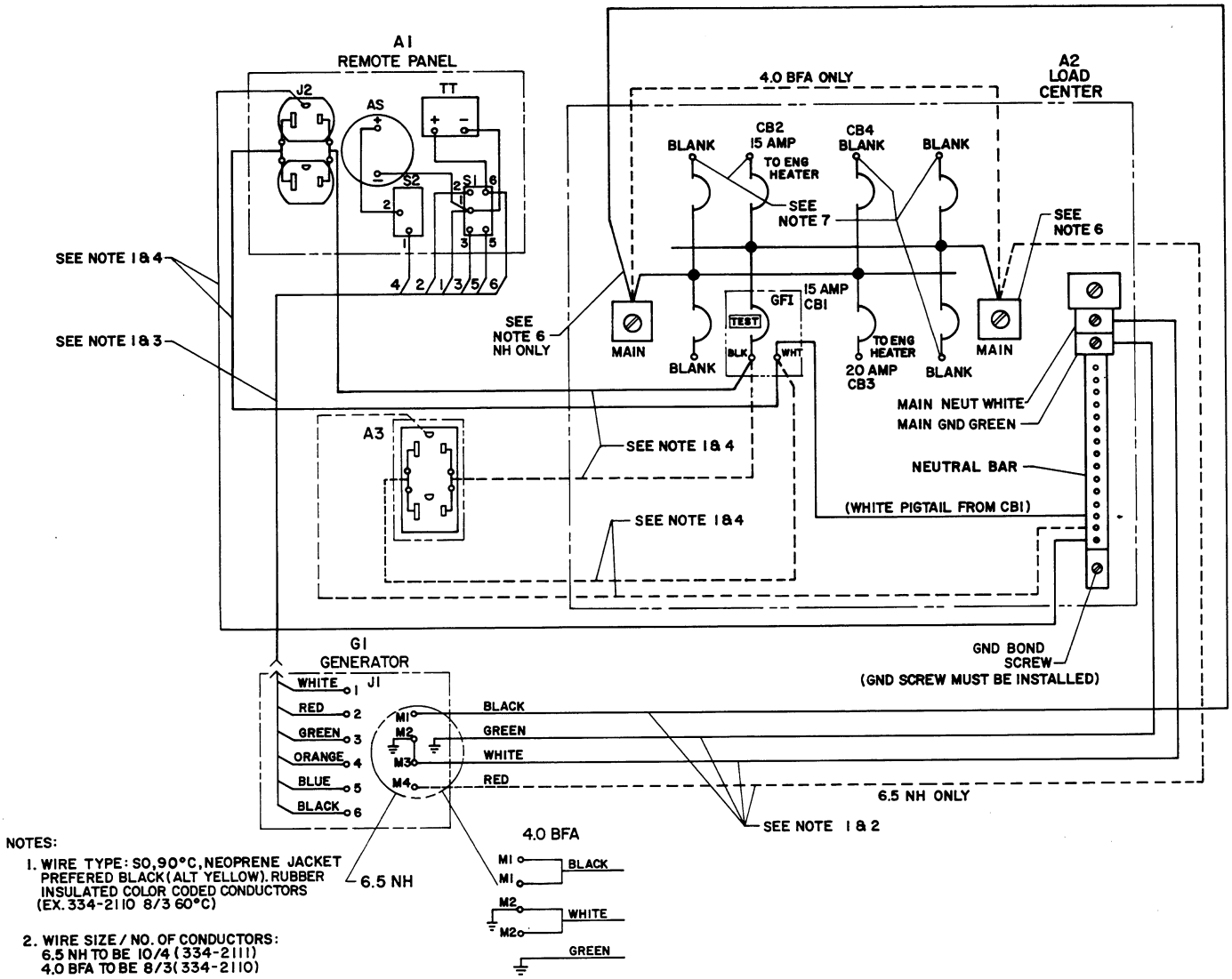
6.5 NH Models

The main feeder (supply) conductor cable for the AC output leads of the 6.5 NH set should be 10-gauge, 4-conductor (type SO) neoprene-jacketed multistrand wire rated for 600 volt AC 90°C operation.

4.0 BFA Models

The main feeder (supply) conductor cable for the AC output leads of the 4.0 BFA set should be 8-gauge, 3-conductor (type SO) neoprene-jacketed multistrand wire rated for 600 volt AC 60°C operation (90°C preferred if available).

WARNING ***Do NOT use Poly-vinyl-chloride type wire on any AC or DC load or control circuit wiring in this application. Overloading this type of wire causes a chlorine gas emission which creates a poisonous hydrochloric acid condition.***



NOTES:

1. WIRE TYPE: SO, 90°C, NEOPRENE JACKET PREFERED BLACK (ALT YELLOW). RUBBER INSULATED COLOR CODED CONDUCTORS (EX. 334-2110 8/3 60°C)
2. WIRE SIZE / NO. OF CONDUCTORS:
   6.5 NH TO BE 10/4 (334-2111)
   4.0 BFA TO BE 8/3 (334-2110)
3. WIRE SIZE / NO. OF CONDUCTORS:
   6.5 NH & 4.0 BFA TO BE 16/6 (334-2116)
4. WIRE SIZE / NO. OF CONDUCTORS
   6.5 NH & 4.0 BFA TO BE 14/3 (334-2115)
5. BALANCE LOADS AT THE LOAD CENTER ON THE 6.5 NH
6. BARREL CONNECTOR (332-0417, 10 GA) FOR THE 6.5 NH & (332-0418, 8 GA) FOR THE 4.0 BFA MUST BE CRIMPED ON THE HOT LEADS.
7. BARREL CONNECTOR (332-0430, 14 GA) MUST BE CRIMPED ON THE HOT LEADS OF "LOAD CIRCUITS WHEN 14 GA WIRE IS USED."

	REF DES	QTY	DESCRIPTION
	A1	1	CONTROL PANEL ASSY
	A2	1	LOAD CENTER
*	A3	1	HANDY BOX
		1	RECEPTACLE-DUPLEX
		1	COVER-DUPLEX RCPT
	CB1	1	BREAKER-CIRCUIT GFI (15 A)
	CB2	1	BREAKER-CIRCUIT (20 A)
	CB3	1	BREAKER-CIRCUIT (15 A)
*	CB4	1	BREAKER-CIRCUIT (10 A)
	G1	1	GENERATOR
		1	STRAIN RELIEF-CABLE (3/4)
		1	STRAIN RELIEF-CABLE (1/2)

* WHEN USED

FIGURE 10. ELECTRICAL SYSTEM WIRING DIAGRAM

WARNING ***If wire nuts are used for wiring connections, wrap all connections with electrical tape after installation as further protection against short circuits or loosening due to vibration.***

CONNECTING FEEDER CONDUCTORS TO GENERATOR AC OUTPUT LEADS

The generator AC output wires (four wires) terminate within the AC junction box on top of the generator set behind the control panel. The leads must be connected as shown in the AC interconnection diagram in Figure 10 and 12.

6.5 NH Models

The generator AC output load wires (labeled M1, M2 M3 and M4) must be connected to the individual color coded conductors (wires) of the main feeder (supply) cable as indicated. Refer to section on main feeder conductors for specific wire size. (See Figure 10 and 12).

1. Connect M1 generator lead to the black conductor of the main feeder cable.
2. Connect M4 generator lead to the red conductor of the main feeder cable.
3. Connect M2 and M3 generator leads to the white conductor of the main feeder cable.
4. Attach a solderless terminal to the end of the green conductor and fasten securely (with star washer) to the AC junction box on top of the generator set.

4.0 BFA Models

The generator AC output load wires (labeled M1, M1, M2 and M2) must be connected to the individual color coded conductors (wires) of the main feeder (supply) cable as indicated. Refer to section on main feeder conductors for specific wire size. See Figure 10 and 12.

1. Connect both generator leads labeled M1 (Hot) to the black conductor of the main feeder cable.
2. Connect both generator leads labeled M2 (Neutral) to the white conductor of the main feeder cable.
3. Attach a solderless terminal to the end of the green conductor and fasten securely (with star washer) to the AC junction box on top of the generator set.

ONAN LOAD DISTRIBUTION PANEL INSTALLATION

The standard Onan supplied load distribution panel has one 20-amp and one 15-amp combination circuit breaker/switch and one 15-amp combination circuit breaker/switch with built-in ground fault circuit interrupter protection. Provisions for five additional separate AC load circuits are available for optional combination circuit breaker/switches which may be purchased from Onan. Each additional branch load circuit should be on a separate circuit breaker using wire sized according to the amperage of each load. Refer to section on load circuit wiring for additional wiring recommendations.

CAUTION ***Use ONLY the type of circuit breakers as supplied by Onan. Other types may nuisance trip because of road shock or vibration.***

MOUNTING LOAD DISTRIBUTION PANEL

Mount the distribution panel in a weather protected area (inside the cab if possible or in a storage compartment) as close as possible to the generator set to minimize wiring length requirements.

WARNING ***All holes to the inside of the truck cab must be sealed to provent poisonous exhaust gases from entering the interior or a storage compartment. Use water tight strain reliefs (1/2 inch or 3/4 inch) or silicone rubber sealant to seal around all openings made for electrical wiring.***

Selected mounting location should be convenient for driver to operate. Distribution panel should be through-bolted using 1/4-20 screws of suitable length with flat washers, lockwashers and nuts. Circuit breakers should be switched off prior to starting generator set or whenever air conditioning, heaters, engine block or lube oil heaters are not required.

CAUTION ***Do NOT use any wood or sheet metal screws to mount load distribution panel. The panel must be through-bolted because vibration will cause wood or sheet metal screws to loosen.***

Insert plastic cover into the extra blank circuit breaker position in the cover of the distribution panel (as shown in Figure 11) prior to installing circuit breaker cover on distribution panel.

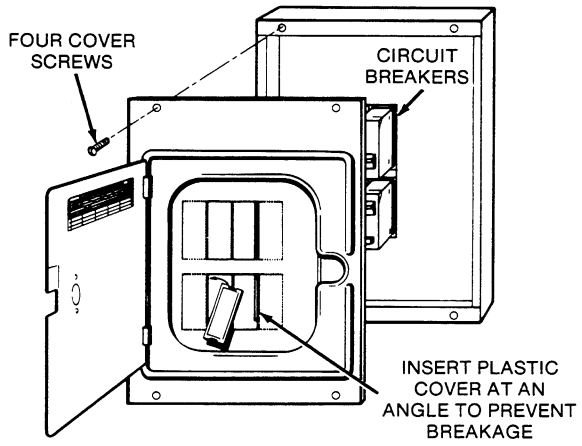


FIGURE 11.
INSTALLING PLASTIC COVER IN LOAD DISTRIBUTION PANEL

CAUTION ***Plastic cover must be inserted exactly as shown to prevent breakage. Arrangement of the three Onan supplied circuit breakers dictates exact location of plastic cover. If an optional fourth circuit breaker is used, cover is not required. Always use the four screws provided to fasten circuit breaker cover to distribution panel or vibration may cause cover to work loose.***

CONNECTING FEEDER CONDUCTORS TO DISTRIBUTION PANEL

With the distribution panel mounted in the desired location, the AC feeder cables from the generator compartment must be routed and properly secured (see section on general wiring recommendations). The individual conductors (already connected at the generator set) can now be connected to the main bus terminal of the circuit breakers inside the distribution panel.

1. Install the AC output load wires according to the following:

   6.5 NH Model

   Connect the black M1 conductor and red M4 conductor to the large main outside terminals of the circuit breaker bus bar (one conductor on each outside terminal). Barrel connectors must be crimped to both conductors prior to connecting to respective terminals in order to fill the large connectors properly (see Figure 10).

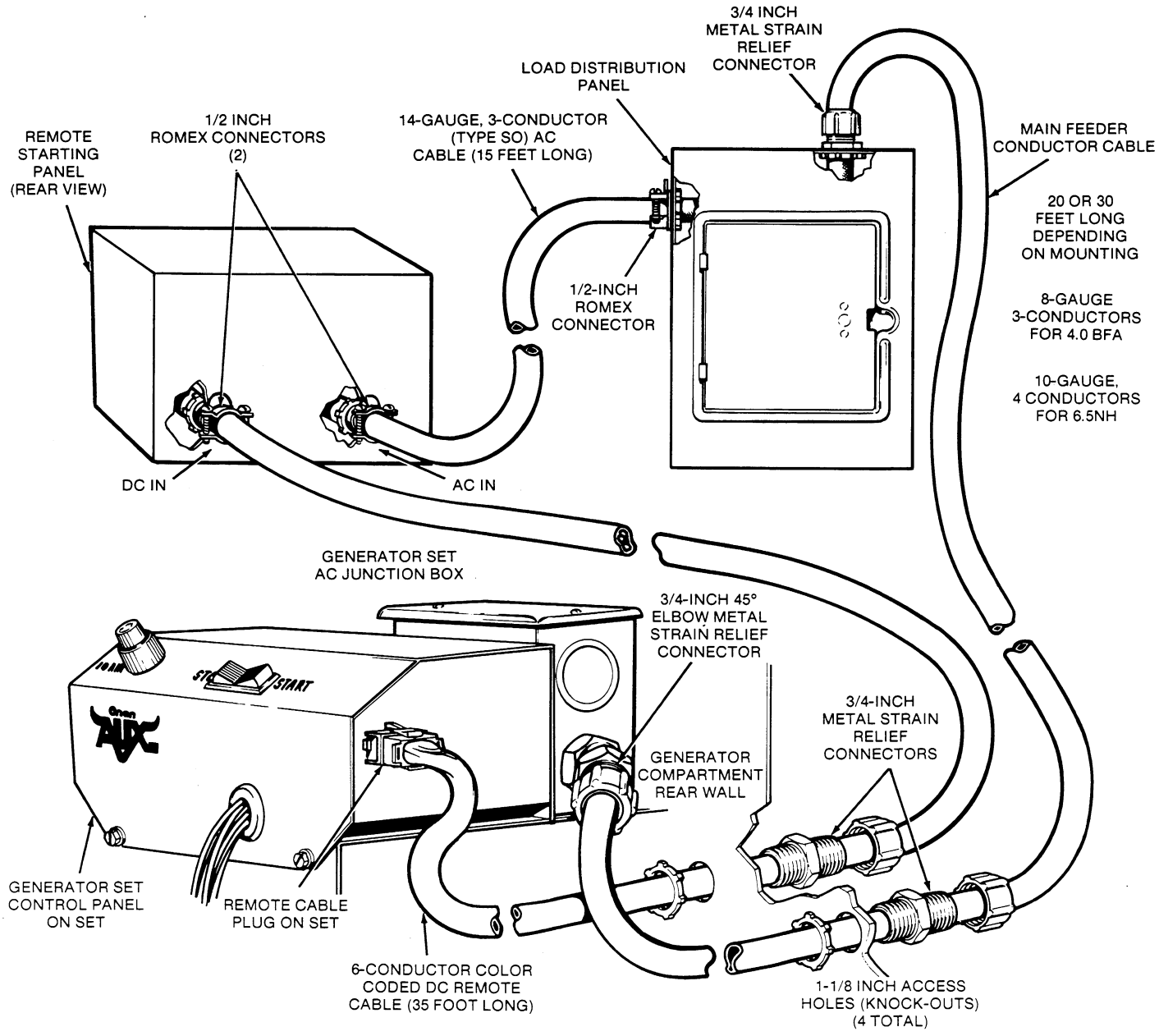


FIGURE 12. PICTORIAL SYSTEM WIRING DIAGRAM

4.0 BFA Model

Connect the black M1 conductor to either one of the large outside terminals on the circuit breaker main bus bar. Also connect a jumper wire (8-gauge wire size) to this same outside terminal on the main bus bar. Connect the other end of the jumper wire to the opposite large outside terminal on the circuit breaker main bus bar (See Figure 10). A barrel connector must be crimped to this end of jumper wire in order to fill the large connector of the main bus bar properly.

2. Neutral and ground conductors (white and green conductors) for both NH and BFA models do not require barrel connectors. Connect both conductors to the grounding bar within distribution panel (see Figure 10).
3. Install bond screw in the grounding bar as shown in Figure 10.

WARNING ***Failure to properly install the bond screw in the grounding bar inside the distribution panel will disable the ground fault circuit breaker which could present an electrical shock hazard through the chassis of the truck.***

Current for any one output conductor must not exceed the nameplate rating. When more than one load circuit is available, divide the load equally between them. Refer to AC interconnection diagram shown in Figure 10.

WARNING ***All holes to the inside of the truck cab must be sealed to prevent poisonous exhaust gases from entering the interior or a storage compartment. Use water tight strain reliefs (1/2 inch or 3/4 inch) or silicone rubber sealant to seal around all openings made for electrical wiring.***

LOAD CIRCUIT WIRING RECOMMENDATIONS

- All AC load circuits throughout truck chassis should be on separate circuit breakers for each load. Onan recommends using 12-gauge, 3-conductor (type SO) neoprene-jacketed multistrand wire rated at 600 volts, AC 90° C operation for all 20-amp circuits such as engine block heaters or sleeper cab air conditioners. Most other truck chassis starting aids such as lube oil heaters, battery heaters, electric cab heaters, etc should use 14-gauge, 3-conductor (type SO) neoprene-jacketed multistrand wire rated at 600 volts AC, 90° C operation for these 15-amp circuits. Romex connectors must be used in distribution panel knock-outs to secure wiring. Some slack should be allowed in wiring for movement caused by vibration to prevent breakage. Barrel connectors must be used on load wiring connections at 15-amp circuit breakers to safely secure wiring connections because of size.
- Onan recommends using 14-gauge, 3-conductor (type SO) neoprene-jacketed multistrand wire rated at 600 volts AC, 90° C operation for all 15-amp circuits such as AC duplex receptacles or other accessory loads not to exceed 15 amps. Romex connectors must be used in distribution panel knock-outs to secure wiring. Some slack should be allowed in wiring for movement caused by vibration to prevent breakage. Barrel connectors must be used on load wiring connections at 15-amp circuit breakers to safely secure wiring connections because of size. Ground fault circuit breaker does not require barrel connectors.
- All AC duplex receptacles must be connected to the 15-amp ground fault circuit breaker in the load distribution panel. Both the hot and neutral load conductors must be connected to the hot and neutral terminals on the ground fault circuit breaker. The green ground lead is connected to the grounding bus bar inside the load distribution panel. Any external AC duplex receptacles must have weather protective covers and nickel plated contacts in the receptacle suitable for heavy-duty use. All AC duplex receptacles regardless of where installed, must have the hot and neutral load conductors connected to a ground fault protected circuit breaker. The AC receptacle box (if not water-proof) must be installed inside a weather protected area such as a tool box, storage compartment or sleeper cab.

WARNING ***All AC convenience receptacles regardless of use, must be protected by ground fault protection devices for safety. Any cold weather starting aids may be connected to standard circuit breakers if they are three wire devices.***

- If 120 volt AC plug-in type loads (such as engine heaters) are used, use a water and dust tight 3-prong hospital grade connector with nickel plated contacts and rubber 0-ring or equivalent for sealing.
- Onan has an optional branch load and remote receptacle kit for all Aux models. This kit includes an external weather-proof AC duplex receptacle and all wiring and hardware for up to three separate plug-in type AC load circuits (usually engine heaters). Complete step-by-step installation instructions provided with each kit supersede the general recommendations in this section of the installation guide. Contact your authorized Onan Parts and Service Center for kit 335-0128.

In addition, an optional separate heater protection kit is available for all Aux models. Its purpose is to prevent accidental operation of any engine heater(s) with the truck engine running to avoid the possibility of burning out any heater(s). It automatically disconnects the engine heater(s) from the AC output of the Aux generator set through a relay. Complete step-by-step installation instructions are included in each kit. Contact your authorized Onan Parts and Service Center for kit 300-2319.

Remote Starting Panel Installation

MOUNTING REMOTE PANEL

A remote control panel is provided which allows the driver to start the generator set from within the cab area of the truck. The panel contains start-stop and on/off alarm rocker switches, running time meter, buzzer alarm and one AC duplex receptacle.

Remote panel has three 5/16 inch mounting holes in bottom panel for shelf mounting and two 7/8 inch holes in back panel for DC control harness and AC supply conductor for receptacle. Use 14-20 screws of suitable length to securely bolt panel in desired location.

Exact location of remote panel varies according to owner preference and set location as well as type of truck chassis. Remote panel is usually located near driver's seat in cab or in a convenient location within sleeper cab. Generator set can be started at compartment location if desired.

CONNECTING REMOTE PANEL TO GENERATOR SET

A 6-conductor, 16-gauge (type SO) neoprene-jacketed multistrand wire cable is required for splicing into the remote connector plug on set control panel. The cable must be fabricated during the installation, cut to required length and hand wired to components inside remote panel. Crimp-type cable splices should be used to connect remote cable to wire leads of remote connector plug. Suitable sleeving should be used on the assembled cable. Secure cable with insulated hold-down clamps or plastic tie wraps at least every 18 inches along the wiring run.

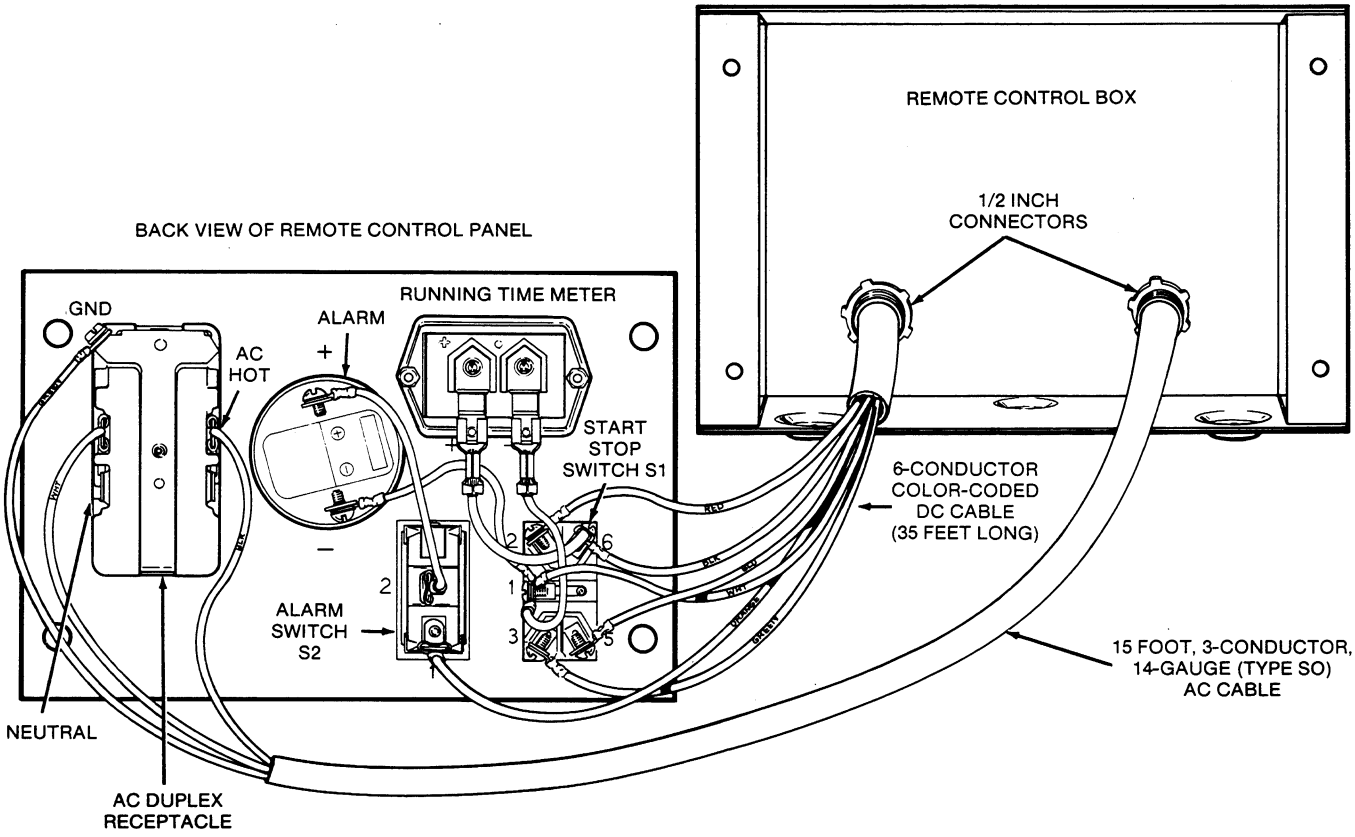
WARNING ***Do NOT install remote starting panel without the remote control box housing. A potential shock hazard exists because of the exposed terminals of the AC receptacle.***

Remote cable is NOT supplied due to variation in length requirement between truck makes and models. Color coded bulk cable (6-conductor, 16-gauge type SO multistrand wire in a neoprene jacket) is available from Onan as part of the separate optional power and control wiring kits referenced in the beginning of the *Electrical Loads and Connections section.* *This portion of the kit includes all necessary wiring and hardware to interconnect the remote starting panel (with duplex receptacle) to the generator set control and load distribution panel. Step-by-step installation instructions provided with each kit supersede the general recommendations in this section of the installation guide.*

CAUTION ***Do NOT use solid wire or wire smaller than 16-gauge in size. Solid wire will fatigue due to vibration and break. Wire smaller than 16-gauge will result in poor starting from remote panel and short service life.***

Refer to interconnection wiring diagram shown in Figures 10 or 12 and remote panel wiring connections according to circuit function, component location and suggested color code illustrated in Figure 13 (see chart). Use Heyco strain reliefs or Romex connectors on cable when routing through entry holes in remote panel to secure wiring and seal any entry holes.

WARNING ***All holes leading to the inside of the truck cab for electrical wiring must be sealed to prevent poisonous exhaust gases from entering the cab interior.***



GENSET REMOTE PLUG TERMINAL NO.	REMOTE PANEL CONNECTION POINT	CIRCUIT FUNCTION	WIRING COLOR CODE	TYPE OF TERMINAL
1	Pin 1 of Start-Stop Switch S1 in Remote Panel	Ground	White	Ring
2	Pin 2 of Start-Stop Switch S1 in Remote Panel	Stop	Red	Ring
3	Pin 3 of Start-Stop Switch S1 in Remote Panel	Start	Green	Ring
4	Pin 1 of Alarm On/Off Switch S2 in Remote Panel	Remote Alarm Signal	Orange	Blade
5	Pin 5 of Start-Stop Switch S1 in Remote Panel	Battery Condition Meter (NOT USED)	Blue	Ring
6	Pin 6 of Start-Stop Switch S1 in Remote Panel	Running Time Meter and Switch S1 Integral Running Light	Black	Ring

FIGURE 13. REMOTE STARTING PANEL INSTALLATION

Connecting GenSet To Truck Battery

STARTING SYSTEM

The battery cables must be properly sized and connected to the 12-volt (negative ground only) accessory side of the truck battery rack in order for the generator set to crank properly under all operating conditions. Most trucks have 12-volt batteries wired in parallel.

BATTERY CABLE RECOMMENDATIONS

- Double 00 (2/0) cable conforming to SAEJ1127-type SGR is recommended for both positive (+) and negative (-) battery cables up to 10 feet in length (per cable).

Battery cables are not supplied as length requirements vary between installations. Double 00 (2/0) battery cable is available from Onan for use in cables of 10 feet or less. Order part number 334-0885 and specify length when ordering.

- For longer length cable runs, cable size increases and voltage drop must meet the requirements of SAE J-541a. The maximum allowable voltage drop (between set and truck battery while cranking) for the generator set is 0.48 volts.

ROUTING BATTERY CABLES

Route battery cables through 1-1/8 inch O.D. holes (or knock-outs) in compartment rear wall as shown in Figures 5 or 7. Route cables through access holes prior to installing any battery terminal connectors. Water-tight 3/4 inch metal strain relief connectors must be used on each cable going through compartment access holes. Use suitable sleeving or grommets at entry point to existing truck battery compartment.

Battery terminal connectors of suitable size and type must be obtained through a local truck dealer or service outlet.

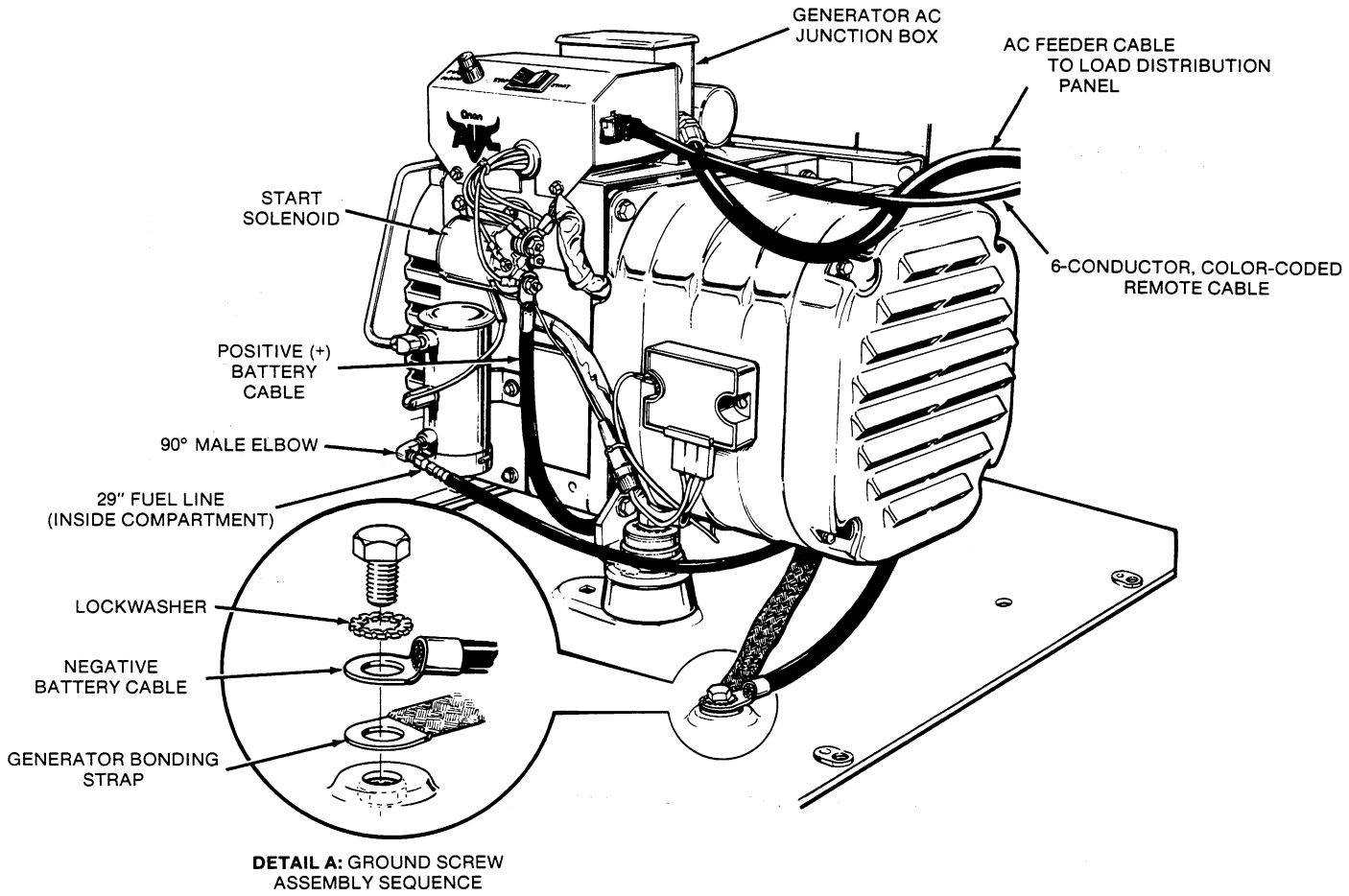


FIGURE 14. BATTERY AND GROUND CABLE CONNECTIONS FOR SIDE-MOUNTED INSTALLATIONS ONLY

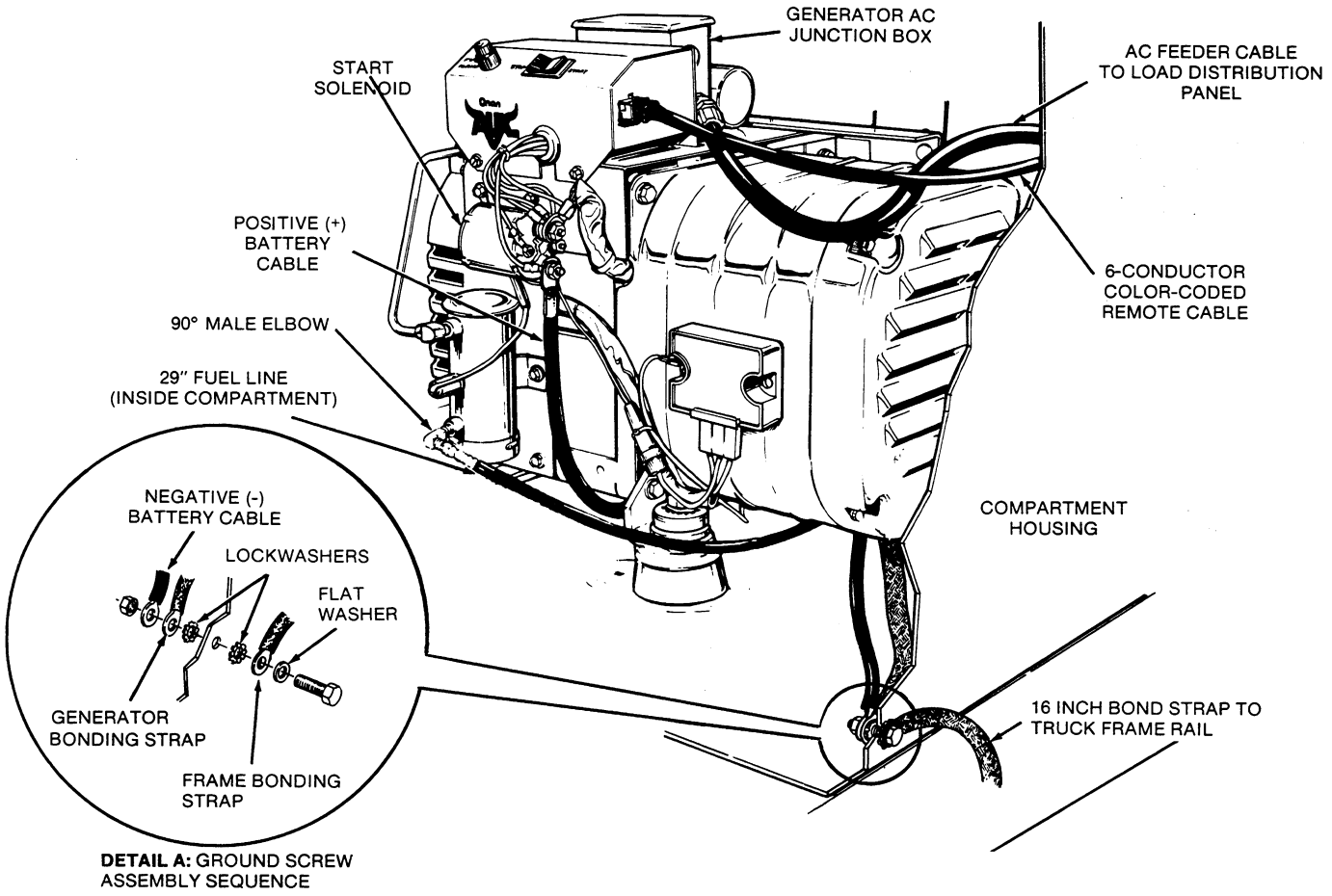


FIGURE 15. BATTERY AND GROUND CABLE CONNECTIONS FOR OVER-THE-RAIL MOUNTED INSTALLATIONS ONLY

CONNECTING BATTERY CABLES

1. Connect positive battery cable to large bottom terminal on start solenoid. It is located on the front of the generator set (below control) as shown in Figures 14 and 15.

   SIDE-MOUNT INSTALLATIONS ONLY

2. Connect negative battery cable to the same location on set mounting tray as the bonding strap for the generator set as shown in Figure 14. Set bonding strap mounting bolt must be disconnected and then reconnected along with negative battery cable to this same location. Assemble mounting hardware and negative battery cable lug as shown in Figure 14, detail A. Mounting hardware is supplied in accessory package.

   OVER-THE-RAIL MOUNT INSTALLATIONS ONLY

2. Connect the negative battery cable, generator set ground strap and housing-to-truck frame electrical bonding strap to the same location on the side of the compartment (generator end) as shown in the assembly sequence in Figure 15. Assemble mounting hardware and all three cable terminals as shown in Figure 15, detail A. Mounting hardware is supplied in accessory package. Opposite end of 16 inch truck electrical bonding strap must be attached to a convenient bolt on the side of the truck frame rail. If no existing bolt or bolt hole is available, installer must drill a new hole in the side of the truck frame rail within reach of the electrical bonding strap. Refer to Pre-Installation Section for special precautions PRIOR to drilling any new holes in truck frame rail.

CAUTION ***A negative battery cable must be installed. Do NOT rely on truck chassis to carry generator set cranking current.***

3. Connect positive (+) and negative (-) cables to corresponding truck battery terminals (attach negative last). Check terminals at battery and on set for clean, tight connections. Re-inspect periodically.

Vehicle chassis (truck frame) ground and the battery and generator set ground should all be electrically connected to be a 0 ground potential. All Onan units are designed for negative ground application.

CAUTION ***For 24-volt truck battery starting systems, generator set must be connected across 12-volt battery that is grounded during cranking. Do NOT connect across battery(s) that are switched for cranking at 24 volts.***

Use a voltmeter (0-30 volts DC minimum) to determine which truck battery is always grounded. Connect the voltmeter negative (-) lead to the truck chassis. Connect the voltmeter positive (+) lead to one 12-volt battery positive (+) terminal. It should read 12 volts with truck not running. Now crank the truck engine. If voltage remains at 12 volts or less while cranking, connect the auxiliary generator set battery cables to that same battery. If the voltage increases to approximately 24 volts while cranking, do NOT connect to that battery. Connect the generator set to the other 12-volt truck battery.

CAUTION ***Connecting the generator set to the truck battery that is switched during cranking may damage the grounded battery and the truck charging system.***

Refer to Pre-start section in Operator's manual prior to initial operation of the auxiliary generator set.

Onan Corporation
1400 73rd Avenue N.E.
Minneapolis, Minnesota 55432

Telephone: (612) 574-5000
Telex: 275477
Cable ONAN