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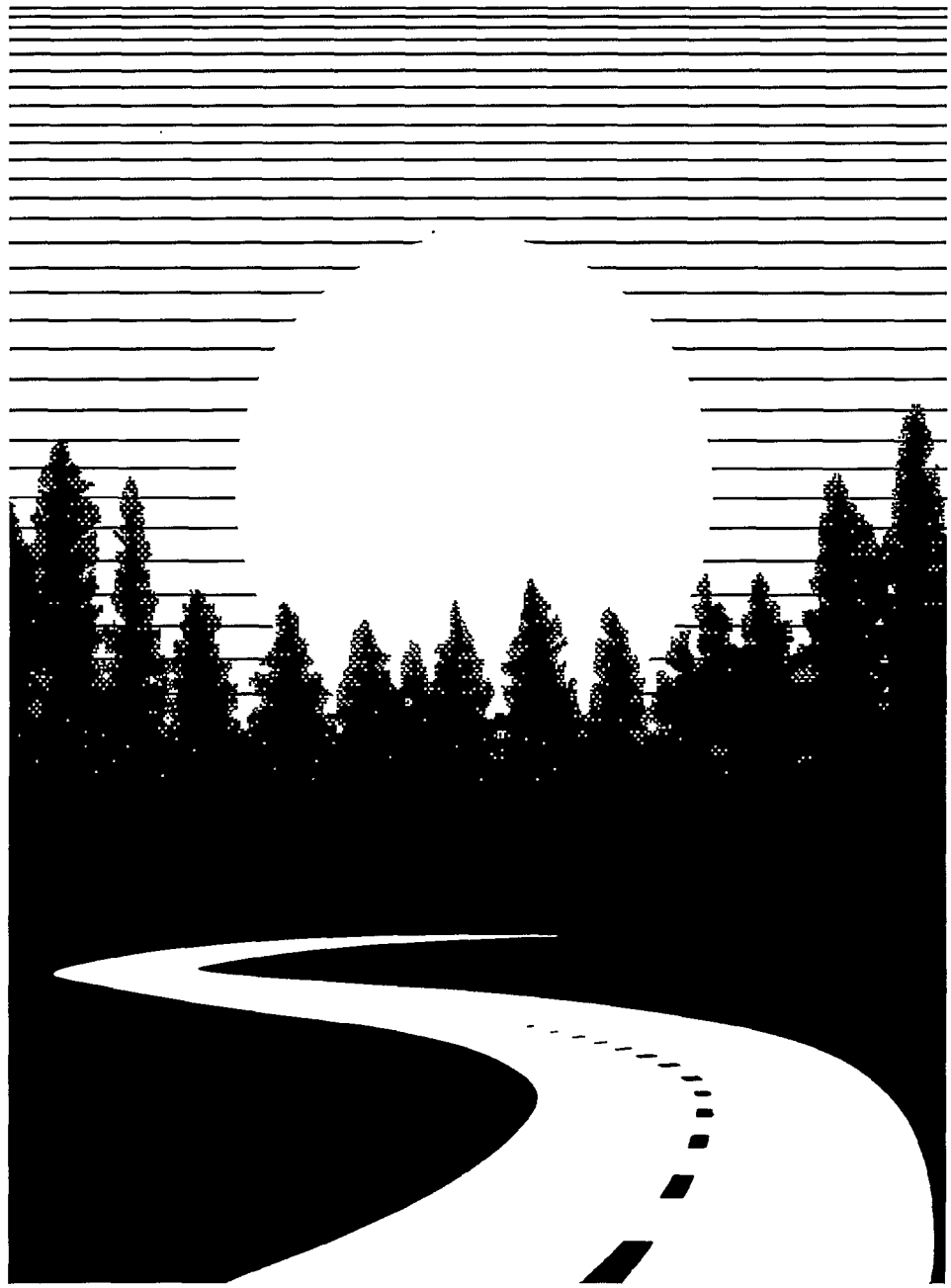
Onan RV GenSet

Installation Manual

DKD



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981-0624
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Safety Precautions

Before operating the generator set, read the Operator's Manual and become familiar with it and the 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, explosion, and personal injury or death can result from improper practices.

- DO NOT fill fuel tanks while engine is running, unless tanks are outside the engine compartment. Fuel contact with hot engine or exhaust is a fire hazard.
- DO NOT permit any flame, cigarette, pilot light, spark, arcing equipment, or other ignition source near the fuel lines 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 line. Do not use copper piping on flexible lines as copper will become brittle if continuously vibrated or repeatedly bent.
- Be sure all fuel supplies have a positive shutoff valve.
- Do not smoke while servicing lead acid batteries. Lead acid batteries emit a highly explosive hydrogen gas that can be ignited by electrical arcing or by smoking.

DIESEL FUEL MAY BE ACCIDENTALLY IGNITED BY ELECTRICAL SPARKS, presenting the hazard of fire or explosion, which can result in severe personal injury or death. When installing the generator set:

- Keep electrical and fuel lines as far apart as possible. Do not allow contact unless both lines are sheathed.

EXHAUST GASES ARE DEADLY

- Provide an adequate exhaust system to properly expel discharged gases away from enclosed or sheltered areas and areas where individuals are likely to congregate. Visually and audibly inspect the exhaust daily for leaks per the maintenance schedule. Ensure that exhaust manifolds are secured 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

- Keep your hands, clothing, and jewelry away from moving parts.
- Before starting work on the generator set, disconnect batteries. This will prevent accidental starting and electrical arcs. Disconnect the negative (-) battery cable first to reduce the risk of arcing.
- 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 or jewelry in the vicinity of moving parts, or 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

- Remove electric power 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 surface to be damp when handling electrical equipment.
- Use extreme caution when working on electrical components. High voltages can cause injury or death. 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.
- 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 isolation switch or an approved paralleling device.

GENERAL SAFETY PRECAUTIONS

- Coolants under pressure have a higher boiling point than water. DO NOT open a radiator or heat exchanger pressure cap while the engine is running. Allow the generator set to cool and bleed the system pressure first.
- Wear safety glasses and protective clothing when servicing batteries. 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.
- Used engine oils have been identified by some state or federal agencies as causing cancer or reproductive toxicity. When checking or changing engine oil, take care not to ingest, breathe the fumes, or contact used oil.
- Provide appropriate fire extinguishers and install them in convenient locations. Consult the local fire department for the correct type of extinguisher to use. Do not use foam on electrical fires. Use extinguishers rated ABC by NFPA.
- Make sure that rags are not left on or near the engine.
- Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and engine damage which present a potential fire hazard.
- Keep the generator set and the surrounding area clean and free from obstructions. Remove any debris from the set and keep the 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.

KEEP THIS MANUAL NEAR THE GENSET FOR EASY REFERENCE

1. Introduction

This manual shows how to install the Onan® DKD diesel generator set. The genset must be installed properly to operate reliably, quietly, and safely. **Read the entire manual before starting installation.**

See the Operator's Manual (981-0124) for operation and maintenance instructions.

These subjects are covered in this manual. Consider **all** these requirements before installing the set.

- Level and supportive mounting surface
- Adequate cooling air
- Adequate fresh induction air
- Discharge of circulated air
- Noise levels
- Accessibility for maintenance and service
- Exhaust connections
- Fuel supply
- Electrical connections

INSTALLATION CODES AND SAFETY RECOMMENDATIONS

When properly installed, this generator set meets or exceeds these codes:

- National Electrical Code, NFPA 70-Article 551
- ANSI/RVIA EGS-1 - 1993, Generator Set Standard
- ANSI A119.2/NFPA 501C Standard for Recreational Vehicles

The RV builder and/or the set installer must comply with all local codes that apply to generator set installation. The RV installer bears sole responsibility for the selection of the appropriate generator set, installation design, and installation.

The following Installation Codes and Safety Recommendations apply to the installation and operation of RV generator sets. The address of each agency is listed so that copies of the codes may be obtained. Installation codes and recommendations are subject to change, and may vary by location or over time. **The RV manufacturer and the genset installer bear sole responsibility for following all applicable codes and regulations.**

1. ANSI-A119.2	Recreational Vehicle Industry Association 14650 Lee Road Chantilly VA 22021
2. NFPA 70 (N.E.C.) NFPA-501C	National Fire Protection Association 470 Atlantic Avenue Boston MA 02210
3. CSA Electrical Bulletin #946	Canadian Standards Association, Housing and Construction Materials Section 178 Rexdale Blvd. Rexdale, Ontario, Canada M9W 1R3
4. California Administrative Code - Title 25 Chapter 3	State of California Documents Section P.O. Box 1015 North Highlands, CA 95660

This manual contains information that is subject to change. For this reason, use only the installation manual supplied with the generator set for the installation.

⚠WARNING ***Incorrect installation, service, or replacement of parts can result in severe personal injury, death and/or equipment damage. Service personnel must be qualified to perform electrical and/or mechanical component installation.***

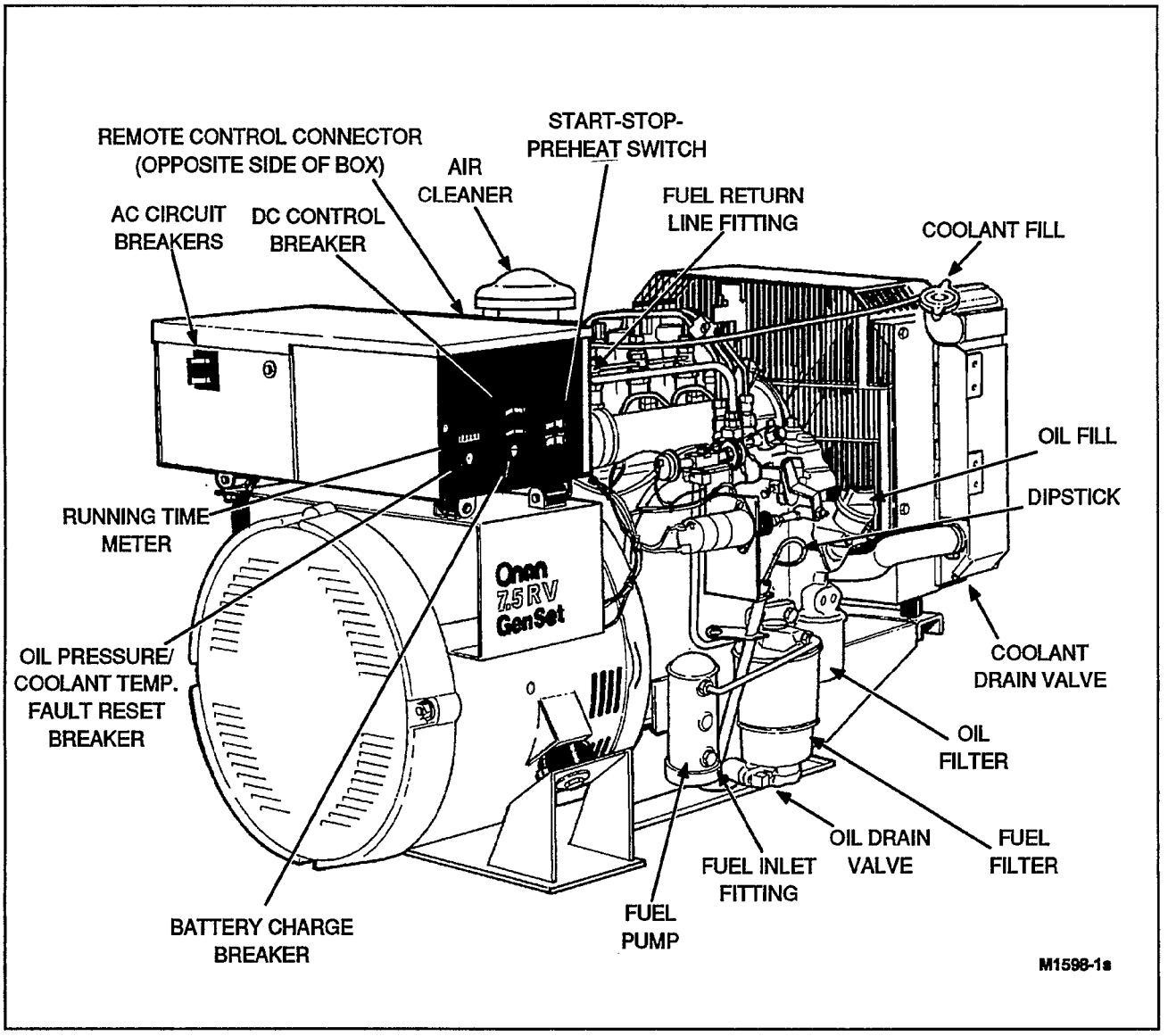


FIGURE 1-1. DKD GENERATOR SET (STANDARD VERSION)

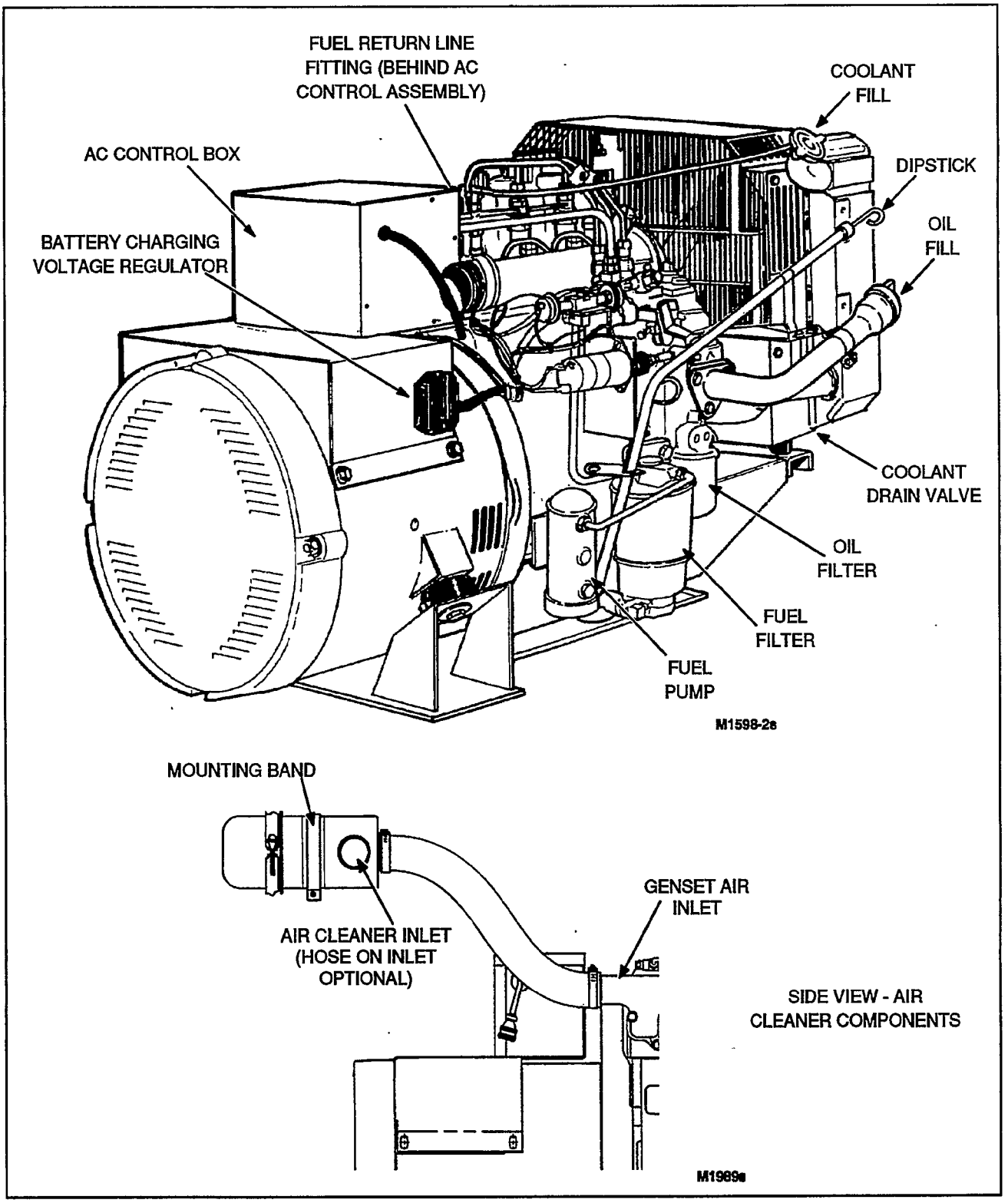


FIGURE 1-2. 6.5/7.5 DKD GENERATOR SET (EXTENDED OIL FILL VERSION WITH REMOTE MOUNTED DC CONTROL AND AIR CLEANER)

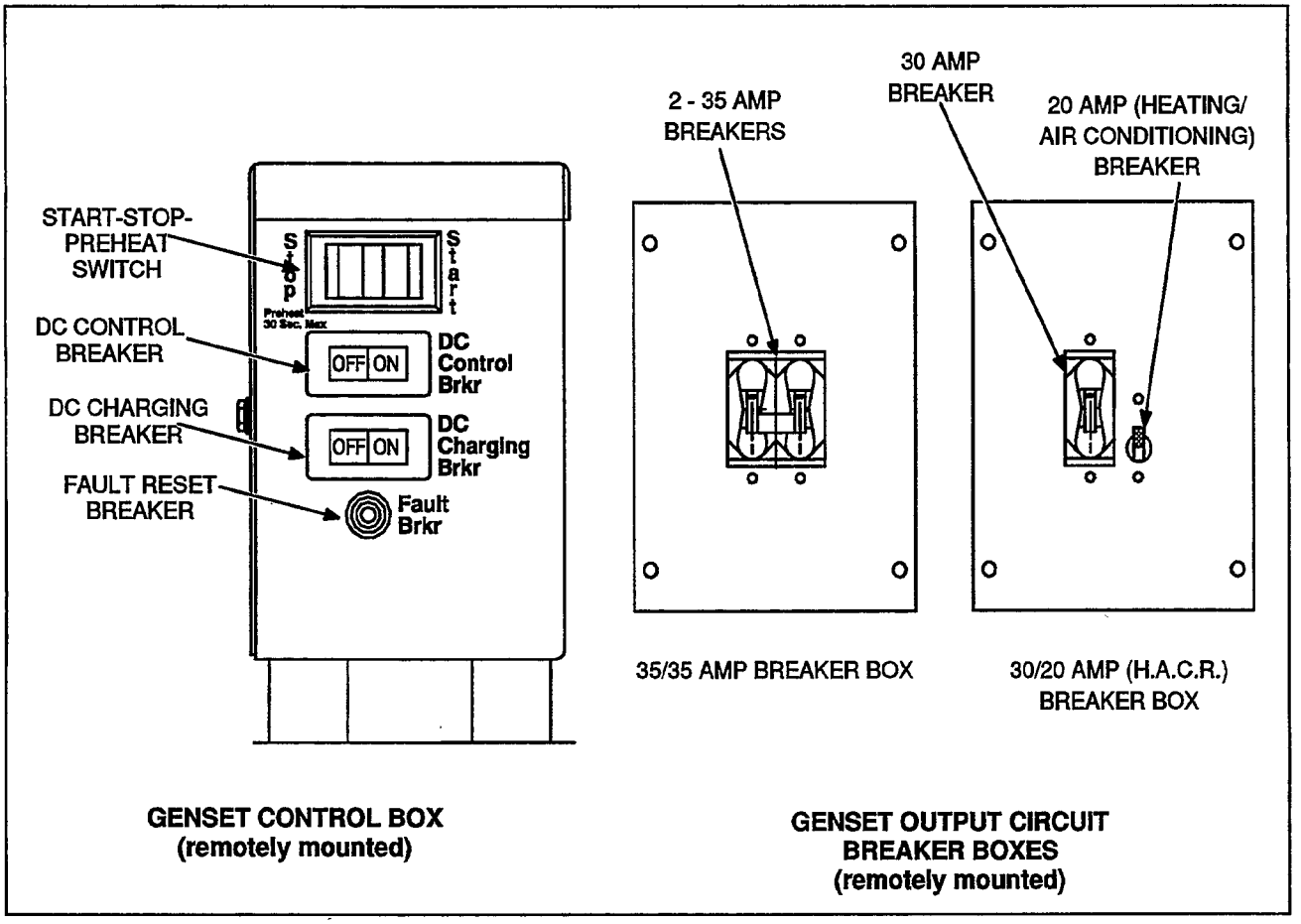


FIGURE 1-3. REMOTELY MOUNTED CONTROL BOX/BREAKER BOX FRONT PANELS (OPTIONAL ON CERTAIN MODELS)

2. Specifications

GENERATOR DETAILS

Type ..... Onan, YD revolving field, 4-pole, brushless
Phase ..... Single
Standby Ratings:
  60 Hertz
    6.5 DKD ..... 6.5 kW (6.5 kVA @ 1.0 PF)
    7.5 DKD ..... 7.5 kW (7.5 kVA @ 1.0 PF)
    8.0 DKD ..... 8.0 kW (8.0 kVA @ 1.0 PF): Includes fan load if required
  50 Hertz
    6.0 DKD ..... 6.0 kW (6.5 kVA @ 1.0 PF)
Voltage Regulation Under Varying Load: ..... 3 Hz maximum
Frequency Regulation Under Varying Load:
  60 Hz ..... ±5 percent
Random Voltage Variation: ..... ±2 percent

GENERATOR SET DETAILS

Air Requirements
  60 Hertz ..... 1200 ft³/min (34 m³/min)
  50 Hertz ..... 1000 ft³/min (28.3 m³/min)
Engine Speed
  60 Hertz ..... 1800 r/min
  50 Hertz ..... 1500 r/min
Fuel ..... No. 2 diesel
Fuel Pump Inlet Thread Size ..... 1/8 NPTF
Fuel Return Outlet Thread Size ..... 1/8 NPTF
Fuel Pump Maximum Lift ..... 3 ft. (0.9 m)
Exhaust Outlet ..... Flange or 1-1/4 in. NPT external
Starting System Voltage 12
Battery Requirements
  Battery Voltage 12
  Quantity Required 1
  Cold Cranking Amps @ 0° F (-17.8° C) 425
*Cooling System Capacity (Engine and Radiator) ..... 4 qt (3.8 L)
Engine Oil Capacity with Filter ..... 4 qt (3.8 L)
Weight: ..... 497 - 515 lbs (225.4 - 233.6 kg)
Dimensions:
  6.5, 7.5 DKD ..... length 36.25 in., width 20.2 in., height 24 in.
    (length 92.1 cm., width 51.3 cm., height 61 cm.)
  8.0 DKD ..... length 31.25 in., width 19 in., height 22.22 in.
    (length 79.4 cm., width 48.3 cm., height 56.4 cm.)

*Remote mount radiator systems may require additional coolant.

THE 6.5, 7.5 AND 8.0 DKD ARE LISTED BY NATIONWIDE CONSUMER TESTING INSTITUTE, INC.

3. Installation Outline

INTRODUCTION

This section briefly describes the steps in a typical installation. The installer is responsible for complying with all applicable installation codes and safety requirements. This section includes:

- Preparation
- Compartment Mounting
- Connecting to Vehicle Systems
- Exhaust System

Refer to the detailed instructions that are given in each section, covering mounting, ventilation, fuel system, electrical connections, and exhaust system, for specific procedures and important safety precautions.

PREPARATION

1. Remove the wooden shipping crate by prying the bottom of the crate's sides and ends out from the wooden skid base. Carefully lift the crate off the genset and discard.

   Remove the plastic bag covering the genset. Collect loose shipped items, like the Operator's Manual, and add them to the vehicle documentation package.

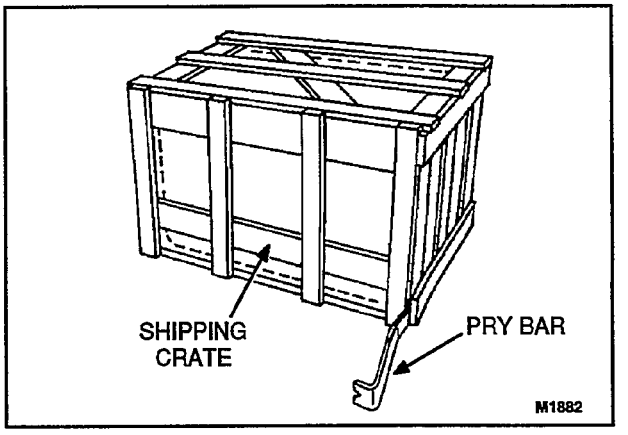


FIGURE 3-1. CRATE REMOVAL

2. Remove the mounting bolts that secure the wooden skid to the genset base.

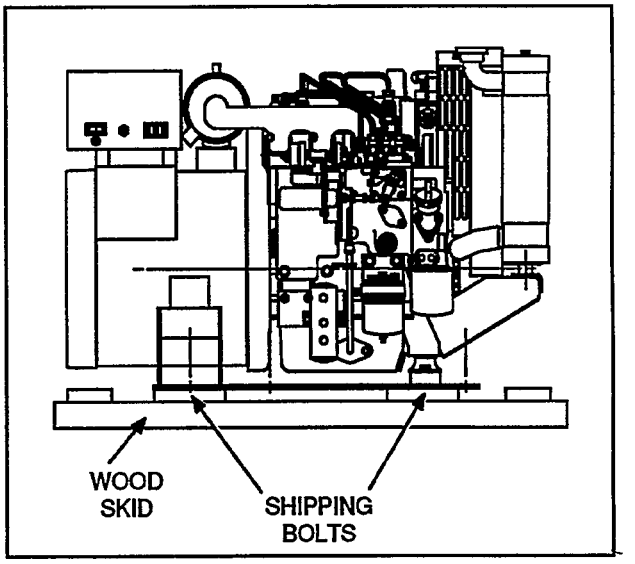


FIGURE 3-2. SKID BASE REMOVAL

COMPARTMENT MOUNTING

Install the generator set in its own compartment. If any part of the compartment is above the vehicle floor, separate the compartment from the living quarters with vapor-tight walls. Refer to the *Mounting* section for compartment construction details.

⚠WARNING ***Exhaust gases present the hazard of severe personal injury or death. Make the compartment walls vapor tight to the interior of the vehicle to prevent exhaust fumes from entering the living quarters.***

A compartment-mounted DKD generator set requires an unobstructed air inlet area of at least 260 in^2 (2239 cm^2) and an outlet area of at least 200 in^2 (1290 cm^2). Refer to the *Mounting* and *Ventilation* section for details. Provide access to the set for maintenance. Provide space for removing the set either through the door or out the bottom of the compartment.

1. Carefully measure the compartment to provide proper clearance for the generator set. See the diagrams in Section 4 of this manual for the compartment dimensions. Add 1/2 inch to the compartment depth if 1/2-inch insulation is used inside the door.

   Adding one to two inches of extra space on the left side of the compartment will make electrical and fuel connections easier. See Figure 3-5.

2. Make holes in the bottom of the compartment for genset mounting, air outlet and oil drain (Figure 3-4). If there is wood under the compartment, remove the section under the compartment and replace it with a sheet metal floor and an adequate steel support frame. Check the drip pan diagram for your generator set for the correct hole pattern.

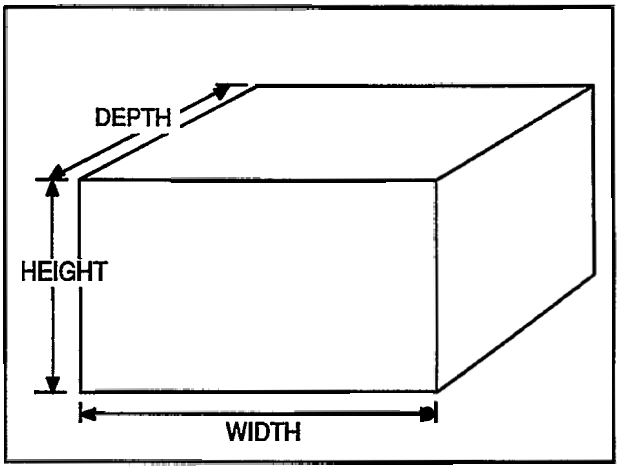


FIGURE 3-3. COMPARTMENT DIMENSIONS

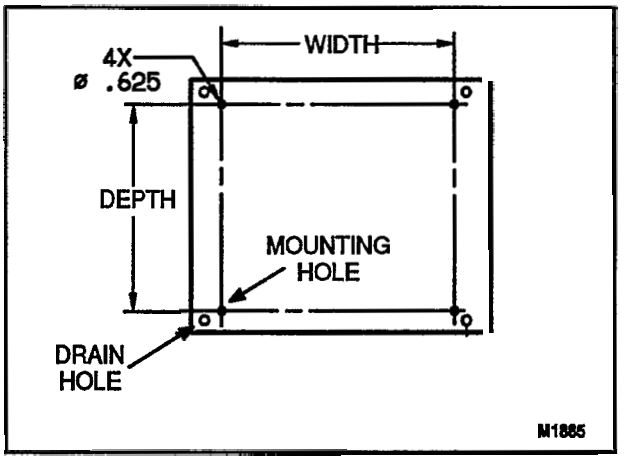


FIGURE 3-4. COMPARTMENT FLOOR MOUNTING HOLE PATTERN

3. Put holes in the compartment to run connections for the fuel line, battery cable, remote control harness and AC conduit. Design holes so they will not chafe or restrict the lines.

   If the remote control harness or AC conduit go directly into the interior of the vehicle, seal around the wires and inside the conduit to prevent the passage of exhaust gases. The fuel line must not be routed through the interior of the vehicle.

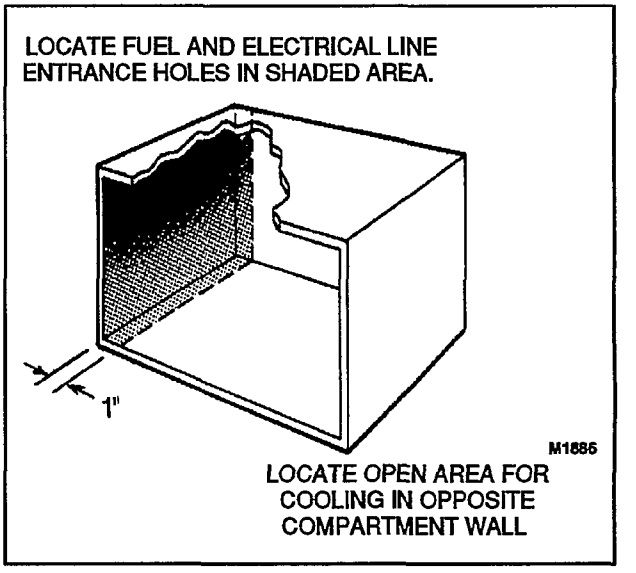


FIGURE 3-5. GENSET TO VEHICLE SYSTEMS CONNECTIONS

4. Mount the generator set in the compartment with four 1/2" diameter bolts and nuts. Screw length must not protrude more than 1/2-inch (13 mm) through the genset base (Figure 3-6).
5. Proceed to Connecting To Vehicle Systems (page 3-4).

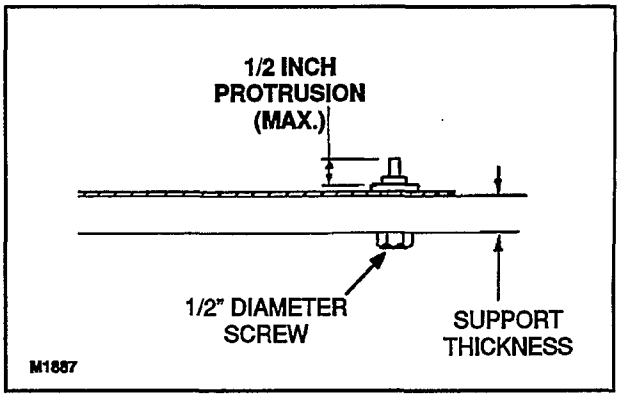


FIGURE 3-6. COMPARTMENT MOUNTING

CONNECTING TO VEHICLE SYSTEMS

1. Route fuel line separate from electrical wires or separate them with conduit or other sheathing.

   ⚠WARNING ***Fuel presents the hazard of fire or explosion that can result in severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment or other ignition sources near fuel or in the installation area. Read the Important safety precautions in the Fuel Systems section.***

2. Use steel fuel hose fittings (not copper) with 1/8-27 NPT female connectors for fuel tank pickup line (to fuel pump) and return line (from injectors). Use protective sleeving over frame rails. Protect holes with rubber grommets. Secure fuel line every 18 inches. Connect the fuel lines to bulkhead connectors. Do not "tee" into existing fuel lines used for vehicle propulsion engine operation. Doing this may restrict fuel delivery to the generator set. Make certain that fuel lines do not pinch, crimp or contact hot sharp or abrasive surfaces.

3. Connect the fuel lines to bulkhead connectors at the compartment, or protect them where they leave the compartment. Direction of fuel tank fittings must be adjusted during connection of fuel lines to prevent kinks or sharp bends.

4. Install a listed 1/2-inch or 3/4 inch flexible watertight conduit over the AC wiring. Secure the conduit to the fitting on the generator set.

   ⚠WARNING ***Accidental starting of the genset can cause severe personal injury or death. Do not connect the battery cables to the genset starting battery until instructed to in the Initial Start and Checks section.***

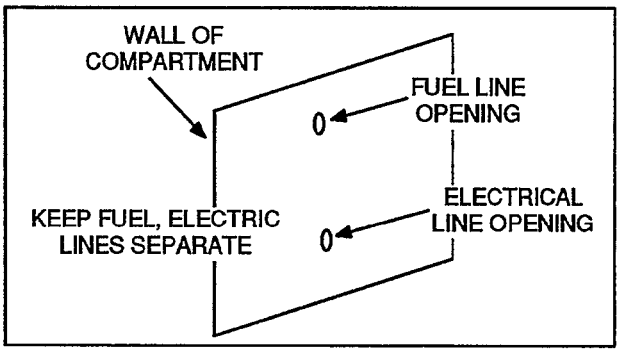


FIGURE 3-7. FUEL AND ELECTRIC LINES

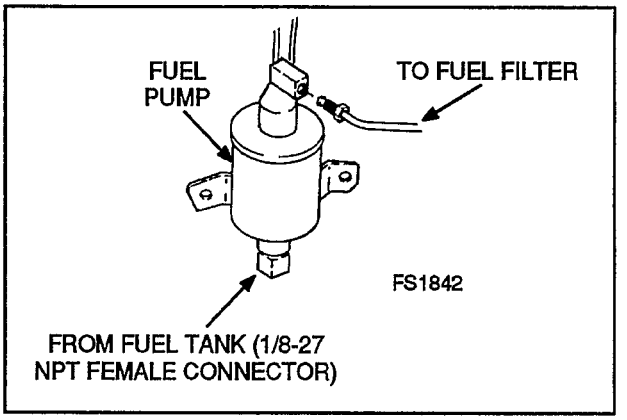


FIGURE 3-8. FUEL LINE CONNECTION

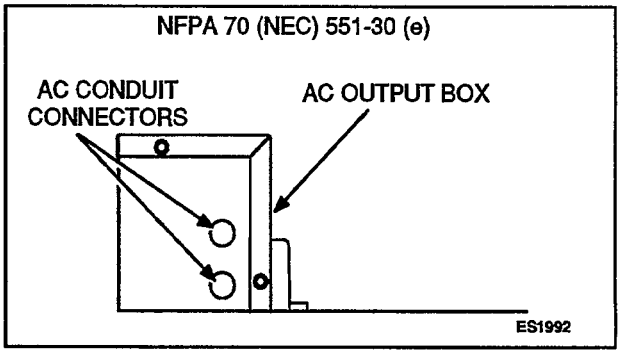


FIGURE 3-9. AC CONDUIT CONNECTION

5. Route the battery positive (+) cable through an access hole in the compartment. Connect the battery positive (+) cable to the B+ connection on the start solenoid.

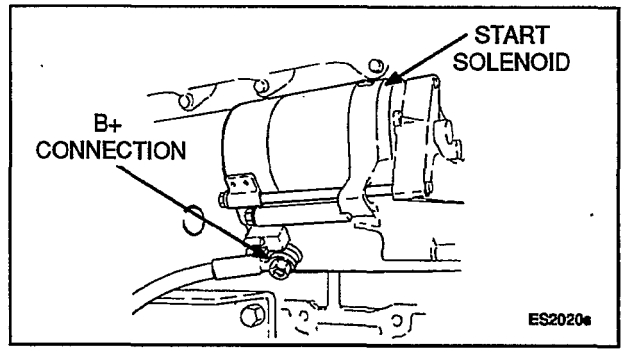


FIGURE 3-10. BATTERY POSITIVE (+) CONNECTION

6. Connect the battery negative (-) cable to a hole in the engine block as shown. A recommended connection for the negative cable is to one of the control box mounting bolts (see Figure 6-2 for location). Do not use the drip tray as a ground - it can be a high resistance path.

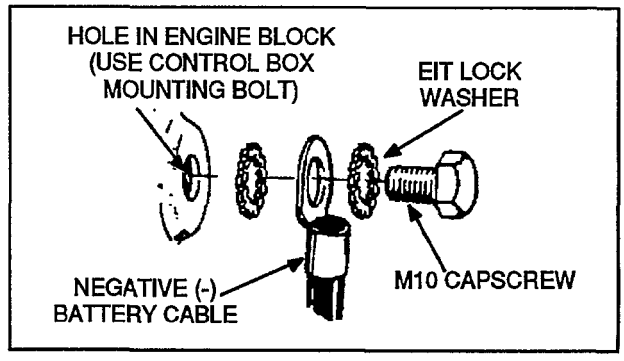


FIGURE 3-11. BATTERY NEGATIVE (-) CONNECTION

7. Route the remote control connector through an opening in the compartment. Connect the remote control connector to the mating connector (J3) on the DC control box.

8. Proceed to the next section on connecting the exhaust system.

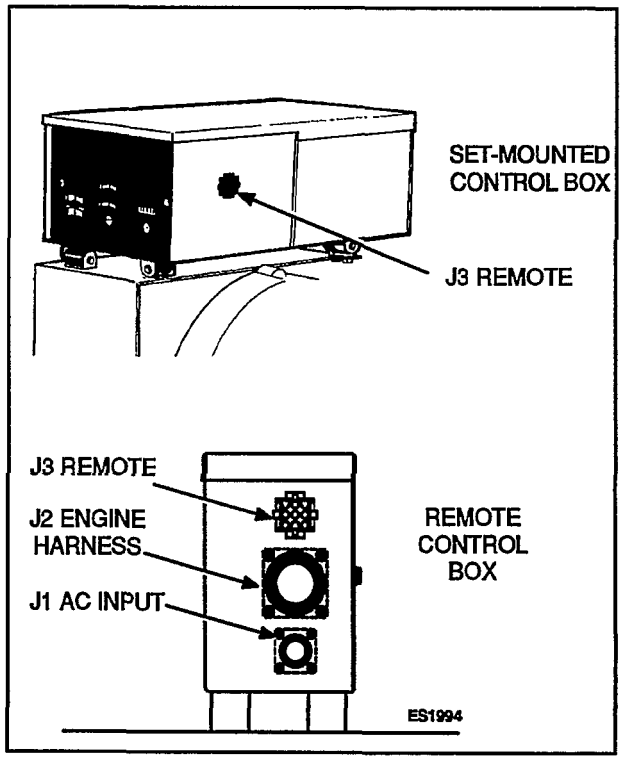


FIGURE 3-12. REMOTE CONTROL CONNECTION

EXHAUST SYSTEMS

⚠WARNING ***Exhaust gas presents the hazard of severe personal injury or death. Do not terminate the exhaust pipe under the vehicle. The exhaust pipe must not terminate so that any vent, window, or opening into the living area is within a six inch (152.4 mm) radius of the tail pipe as shown in Figure 3-17. Keep all openings closed when the genset is running.***

1. Connect the exhaust pipe (1.25-inch I.D., installer-supplied) to the genset as shown in Figure 3-13.

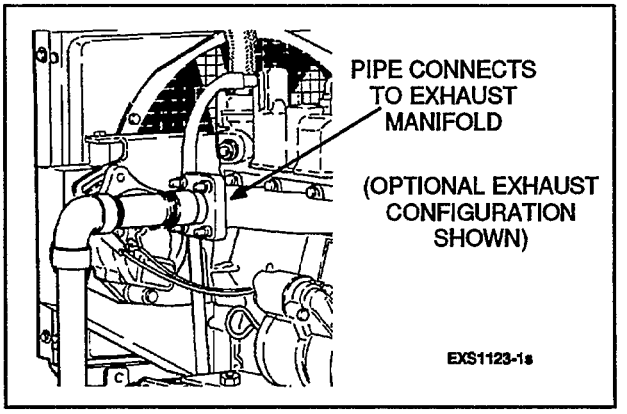


FIGURE 3-13. EXHAUST PIPE CONNECTION

2. Do not terminate the exhaust tail pipe under the vehicle. The exhaust tail pipe must extend a minimum of 1 inch (25.4 mm) beyond the side or end of the vehicle (Figure 3-14).

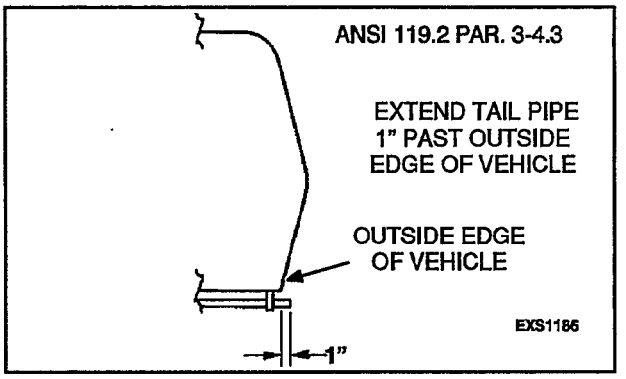


FIGURE 3-14. TAIL PIPE EXTENSION BEYOND VEHICLE

3. Support the tail pipe as close to the outside of the vehicle as possible (Figure 3-15).

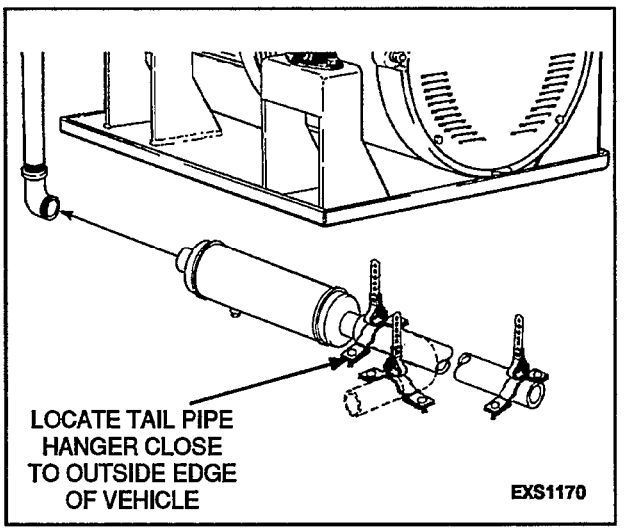


FIGURE 3-15. EXHAUST PIPE SUPPORT

4. Termination of the exhaust tail pipe below the angle of departure (lowest point on rear of vehicle to the tire ground contact point) must be protected by a skid bar, trailer hitch, or some frame member (Figure 3-16).

   ⚠WARNING ***Tailpipe must be protected by skid bar or other structure. If tailpipe is accidentally bent or crushed, exhaust gases might not be able to escape, and may be drawn into the living quarters of the vehicle, causing severe personal injury or death.***

5. Be aware that any vent, window, or opening that can be opened and that is not permanently sealed from the vehicle living space, can be an avenue for carbon monoxide.

   The tail pipe must not terminate so that any vent, window, or opening into the living area is within a six inch radius of the tailpipe as shown in Figure 3-17.

6. Refer to each of the sections in this manual for detailed installation instructions and for important safety precautions. Always follow the procedures in the Initial Start and Checks section when the installation is complete.

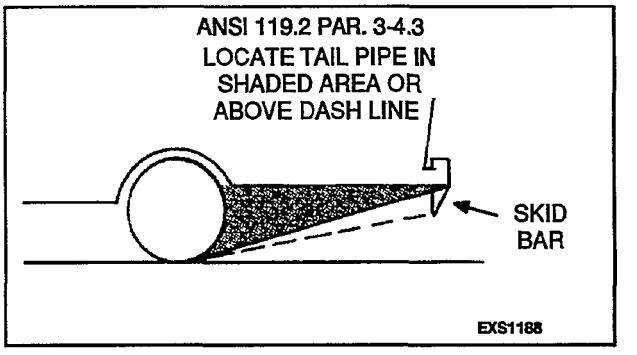


FIGURE 3-16. TAIL PIPE PROTECTION

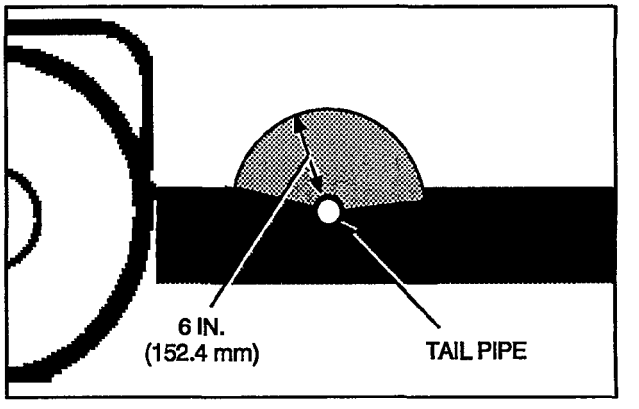


FIGURE 3-17. TAIL PIPE LOCATION

4. Mounting

COMPARTMENT MOUNT

The DKD genset is designed for above-floor compartment mounting. The RV frame must be able to support the weight of the generator set with a generous margin, so that the set may remain firmly positioned over rough roads. See Section 2, *Specifications*, for the weight of the set. Mounting hole locations are shown in Figure 4-1. **The vehicle manufacturer and the installer must provide a structurally sound support frame.**

The support structure must be designed to support the weight of the generator set in a dynamic environment. Each unique application should be evaluated and designed to provide an adequate generator set support structure.

⚠WARNING ***Failure to provide an adequate support structure can result in the genset falling from the vehicle, which can result in severe personal injury, death, and/or equipment damage. Carefully follow installation instructions and provide an adequate support structure. Use specified hardware and tighten all screws and nuts to the recommended torque settings.***

Carefully follow these design parameters when developing the genset support structure:

- The dynamic conditions imposed on the set should not exceed cyclic vertical forces of ± 1500 lb (± 3 g-force) and cyclic horizontal forces of ± 500 lb (± 1 g-force).
- The mounting surface of the vehicle support structure must be flat and it must be able to support the housing in such a way that mounting fasteners, when properly torqued, do not imbed or compress the mounting surface.
- All fasteners used in the installation must be properly torqued according to the installation instructions.

Construct the genset compartment according to the ANSI and safety-approved specifications listed in Section 1 of this manual. Figure 4-2 shows compartment dimensions, including clearances between the genset and the compartment.

Minimum clearance between the set and compartment insulation is one inch (25 mm). Minimum space between unshielded engine exhaust components and combustible material is 3 inches (76 mm).

If the compartment is large, allow extra space at the generator end. Use a foam gasket at the radiator to prevent recirculation of air through the radiator.

When constructing the genset compartment, allow for airflow restrictions caused by duct work and grilles. To purge the compartment of hot air, the air openings' position must permit airflow while the set is running. On shutdown, the openings must allow hot air to escape the compartment.

Make the access opening large enough to remove the set, with openings for engine and generator cooling air (see Figure 4-2). An engine fan and a generator fan cool the set. The engine fan pushes air through the radiator. (A suction fan is optional.) A centrifugal blower mounted on the generator drive disc draws generator cooling air into the end bell and discharges it at the blower outlet. See the *Ventilation* section of this manual for more details.

Allow extra clearance to access the following components:

- Oil fill
- Oil drain
- Oil filter
- Oil dipstick
- Air cleaner
- Start/Stop switch
- Circuit breaker
- DC fuse
- Coolant drain
- Coolant fill

Mount the coolant recovery tank (part of the accessory package) so coolant can be added easily, but make sure that the tank top is not above the radiator. Hoses are connected similarly, as shown in Figure 7-1.

Compartment Construction

1. Construct a vapor-tight wall to separate the compartment area from the living quarters and fuel supply. See Figure 4-2 for set dimensions.

2. Line the compartment walls with 26-gauge galvanized steel or a material of comparable strength and fire resistance (see ANSI 119.2/NFPA 501C, NEC and California Title 25 for complete details).

   ⚠WARNING ***Exhaust gases present the hazard of severe personal injury or death. Make the compartment walls vapor-tight to the interior of the vehicle to prevent exhaust fumes from entering.***

3. Construct the compartment floor to prevent oil, fuel or water from accumulating.

   ⚠WARNING ***Fuel and oil leakage is a fire hazard that can cause serious personal injury or death. Do not position the muffler directly below the drain hole.***

   Do NOT use absorbent soundproofing material on the compartment floor. The floor should have as few openings as possible, to reduce the noise level.

4. Make holes or other provisions for diesel fuel supply and return lines to the compartment, and for the exit of the breather hose and the exhaust plumbing. See the *Fuel System* and *Exhaust System* sections of this manual for guidance and code references.

5. Install an approved junction box for connecting generator and load leads. See the *Electrical* section of manual for guidance and code references.

If the compartment penetrates the vehicle floor, be sure all joints and corners of the compartment are vapor-tight to the interior. Seal all joints and bolts to prevent entrance of exhaust gas.

⚠WARNING ***Exhaust gases are deadly. Inhalation of exhaust gas can result in severe personal injury or death. Be sure the compartment is sealed tightly to prevent entrance of deadly exhaust gas into the vehicle coach.***

To minimize noise, line the entire genset compartment (except the compartment floor) with a 1/2 to 1 inch (12.7 to 25.4 mm) thickness of self-extinguishing acoustical material, rated for 250° F (121° C) minimum. Adjust the compartment height, width and depth dimensions to fit the acoustical material. See Figures 4-1 and 4-2.

A combination of materials works better than a single material to reduce noise. For example, a sheet of dense material and a layer of acoustical foam is more effective than either alone. Insulation must not reduce the minimum clearances specified in Figure 4-2, to meet UL, ANSI and CSA insulation temperature rise limits for recreational vehicles.

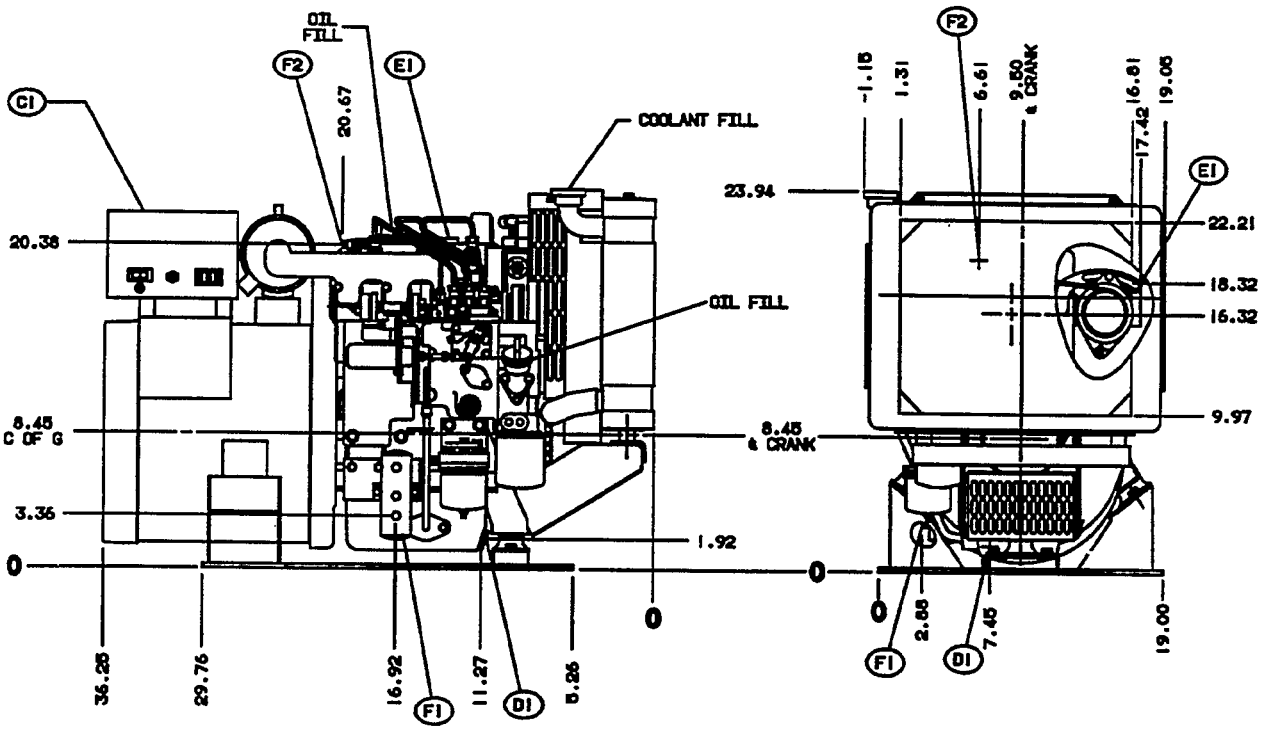
⚠WARNING ***Hot engine parts can ignite insulation materials if too close, resulting in fire which can cause severe personal injury or death. Insulation must not reduce the specified minimum clearances.***

LOCATION

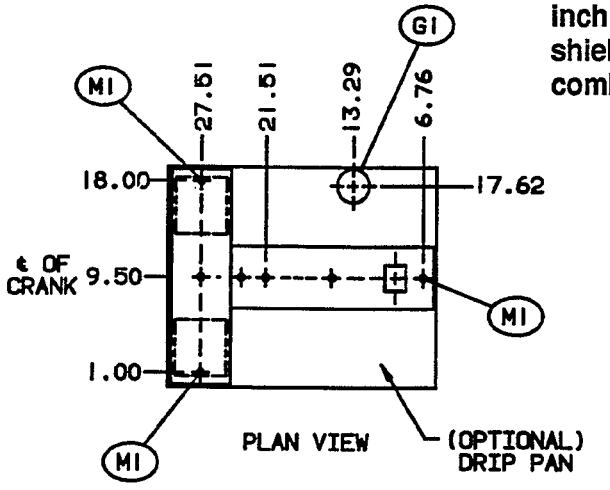
The genset location must be well ventilated, insulated, close to the fuel supply and close to the center of electrical load distribution. These conditions may be in the same room or compartment as the RV propulsion engine. However, a genset cannot be installed in the propulsion engine compartment unless specific conditions are met.

Select a location that will allow adequate space on all sides for ventilation and servicing the set. Keep the genset away from living quarters.

Figure 4-1 shows the drip pan dimensions and genset mounting dimensions of the 6.0, 6.5, and 7.5 kW DKD generator sets. Figure 4-2 shows the control box dimensions and genset mounting dimensions of the 8.0 DKD generator set. Install two through-bolts to the drip pan (8.0 kW set: mounting pads) on both sides of the genset. Tighten the bolts securely to the mounting base with bolts and flat washers.



NOTE: Minimum clearance between the set and compartment insulation is one inch (25 mm). Minimum space between unshielded engine exhaust components and combustible material is 3 inches (76 mm).



C1 - CONTROL BOX
C2 - CIRCUIT BREAKER OPTIONAL
C3 - ELECTRICAL CONNECTION/LEAD
D1 - OIL DRAIN
E1 - EXHAUST (1-1/4 NPT MALE)
F1 - FUEL IN (1/4 HOSE FITTING)
F2 - FUEL OUT (5/16 HOSE FITTING)
G1 - EXHAUST HOLE (Ø3.00)
M1 - MOUNTING HOLES (4) 5/8" ID.

NOTES:
1. NET WEIGHT: 515 LBS
2. DIMENSIONS ARE INCH. FOR METRIC CONVERSION, MULTIPLY BY 25.4 TO OBTAIN MILLIMETERS.

FIGURE 4–1. 7.5 DKD, 6.5 DKD AND 6.0 DKD DRIP PAN AND GENERATOR SET MOUNTING DIMENSIONS

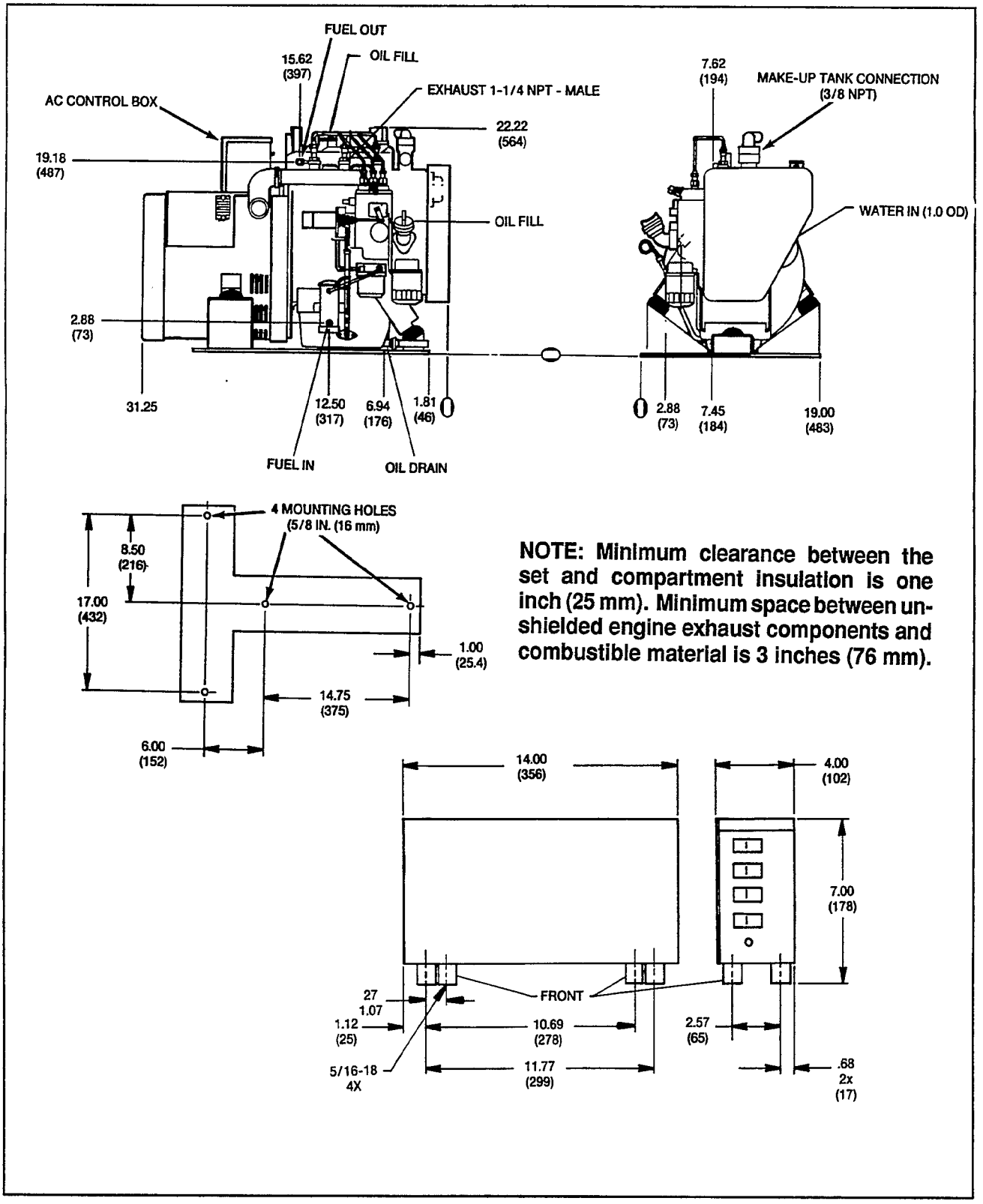


FIGURE 4–2. 8.0 DKD GENERATOR SET AND CONTROL BOX MOUNTING DIMENSIONS

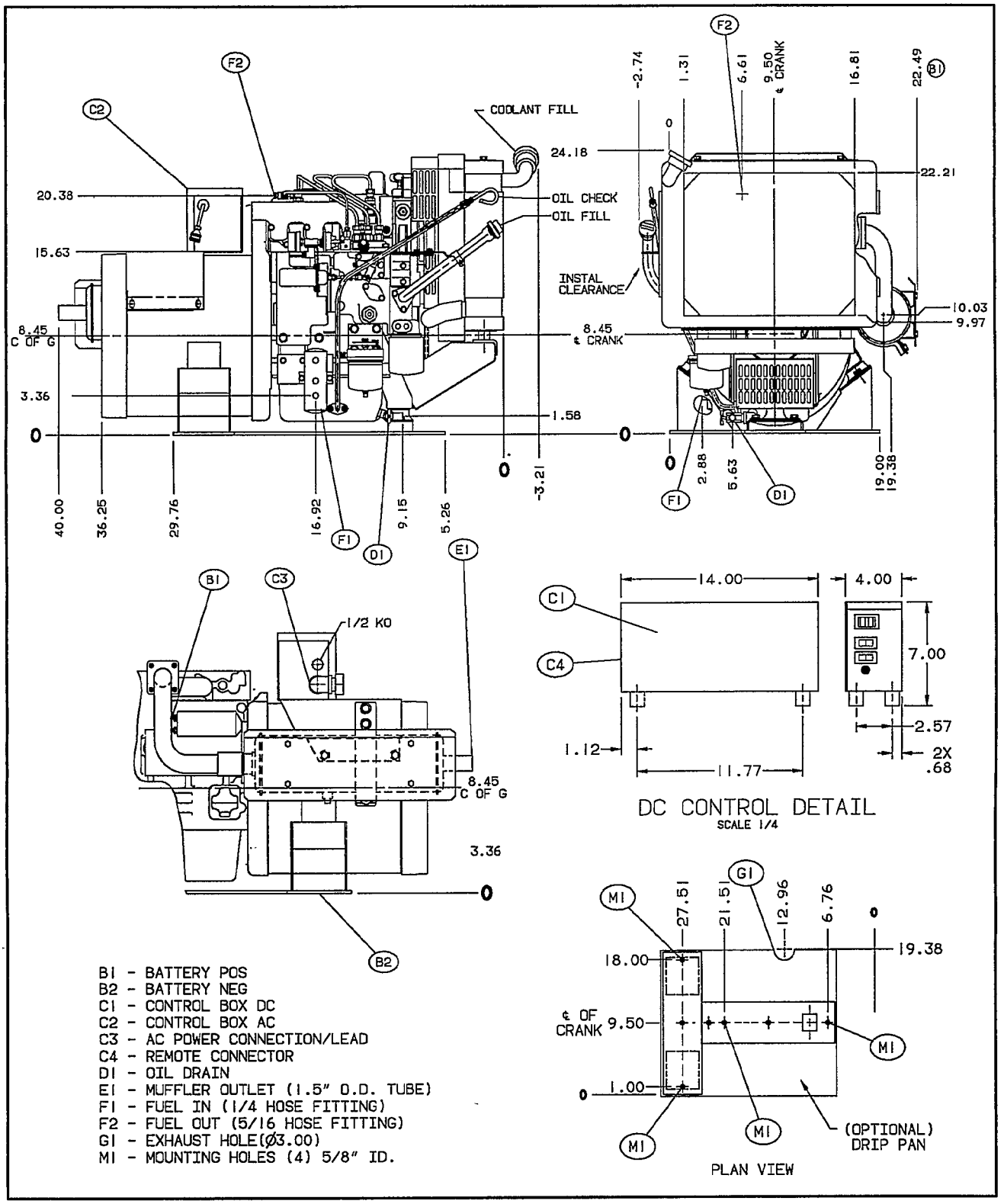


FIGURE 4-3. 7.0 DKD GENERATOR SET WITH ATTACHED EXHAUST SYSTEM

INSTALLATION OF GENSET REMOTE DC CONTROL BOX (OPTIONAL ON CERTAIN MODELS)

Control Box Location and Mounting

Locate the control box in an area that will not be contaminated by grease, oil, dust or dirt. A low-vibration area with maximum accessibility is the best location.

The control box must be mounted in an area with a temperature less than 160° F (71.1° C). Higher temperatures may damage the control.

⚠ CAUTION ***Failure to mount the control box in an environment with a temperature less than 160° F (71.1° C) may cause equipment damage or failure.***

Unscrew the bolts from the four vibration isolators (rubber mounting feet) that support the control box. Drill holes of the appropriate size and place the box into position. Make certain that there is enough room to insert and remove the wiring harness connector plugs in the back of the control box (see Figure 4-4). Make certain that the genset controls are easily viewed and readily accessible to the operator.

It is not mandatory that the vibration isolators be used. In a low-vibration environment, the genset may be mounted directly to a surface without using the isolators.

However, if using the isolators, note the following: **The toothed washers (provided) must be mounted under the vibration isolators as shown in Figure 4-4.** These washers, when mounted correctly as shown in the illustration, will prevent the vibration isolators from rotating. When the isolators rotate under pressure, they can deteriorate rapidly.

⚠ CAUTION ***If mounting the control box with the rubber vibration isolators, use the toothed washers to make certain that the isolators do not rotate. Failure to follow this guideline may promote deterioration of the control box mounting, and subsequent equipment damage.***

Electrical Connection to Generator Set

The generator set is shipped with two long harnesses. After mounting the control box, plug the harness connectors into the control box. The J2 harness (see Figure 4-4) has the largest connector. This harness conducts control and annunciation functions to and from the set. The J1 harness has a smaller four-conductor connector. This provides AC monitoring from the AC control box on the set.

Route the harnesses against the walls of the genset compartment, mounting them so that they are out of the way and will not interfere with genset operation. Make certain that the harnesses are kept away from sharp edges or heavy objects that could cut, fray, pinch or otherwise damage them. Neatly coil and store any excess harness length in a position where it is out of harm's way.

5. Ventilation and Acoustics

The most important factors of ventilation for radiator-cooled RV gensets are:

- Sufficient incoming cooling air
- Adequate exhausting of heated air

The DKD is normally supplied with pusher-type fan. The pusher fan is normally used with sets that are mounted in the central area of the RV, at the perimeter of the chassis.

(A suction fan is available for certain installations. The suction fan is normally used with center-mounted generator sets, mounted in the front of large bus-type RVs.)

⚠WARNING ***Never use discharged cooling air for heating since it may contain poisonous gases. Inhalation of exhaust gases can result in severe personal injury or death.***

Cooling air requirements for Onan generator sets vary with type and size. Since the discharge area cannot be changed, the air inlet and outlet openings are critical. Be sure nothing obstructs or restricts discharged airflow.

The DKD generator set with a pusher fan is recommended for all compartment installations and requires an air inlet area of 260 in^2 (1677 cm^2) and an air outlet area of 200 in^2 (1290 cm^2).

The DKD generator set with a suction fan is not recommended for installation in a restricted or closed compartment. These sets are designed for front vehicle mounting or other locations where free air movement is not restricted. The suction fan option requires an air inlet area of 200 in^2 (1290 cm^2) and an air outlet area of 615 in^2 (3968 cm^2). Contact the Onan distributor or factory for help on special installation considerations.

Use a foam gasket around the radiator opening on the inside of the compartment. An expanded metal grille can be used over the inlet and outlet. However, some provide only 60 percent free inlet area per square foot. Even the most efficient grille only provides about 90 percent free inlet area per square foot. The free inlet area of the material can be obtained from the grille manufacturer.

⚠WARNING ***Leakage of fuel in or around the compartment can cause an explosion or fire resulting in severe personal injury or death. The ventilation system must provide a constant flow of air to expel an accumulation of fuel vapor. Compartments must be vapor-tight to the vehicle interior to keep fumes from entering.***

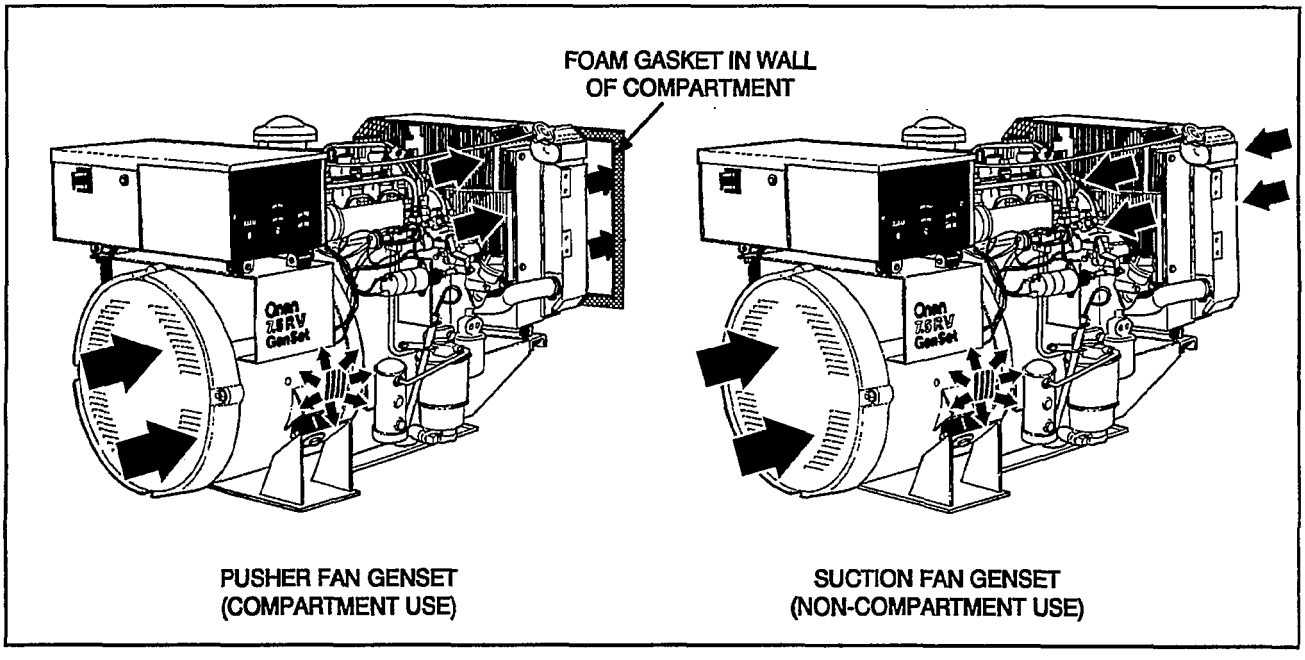


FIGURE 5-1. GENERATOR AND ENGINE COOLING AIRFLOW

6. Exhaust System

GENERAL

Plan the exhaust system carefully. A vapor-tight, well-executed installation allows the genset to be operated quietly and safely. The exhaust system installation must comply with all applicable standards, local codes and regulations. Study the following recommendations.

MUFFLER RECOMMENDATIONS

The Onan spark arrester muffler is U.S. Forest Service-approved, and meets code requirements. Failure to provide and maintain a spark arrester can be a violation of applicable standards, codes and regulations.

If the Onan RV genset was supplied without a muffler, we recommend the purchase of an Onan RV spark arresting muffler that Onan has constructed to meet RVIA and USDA standards for your RV genset.

The RVIA/ANSI EGS-1 standard requires that the muffler must be constructed of aluminized steel or other corrosion resistant material, and it must be of a welded or crimped construction. The maximum allowable back pressure is 35 inches (889 mm) water column (WC).

A USDA approved spark arrestor that is designed for use with the muffler must be installed. The spark arrestor may be an integral part of the muffler or it may be an add-on type. Failure to use and maintain a spark arresting exhaust system is illegal on federally-owned lands, and could cause brush or forest fires.

Liability for damage or injury, and warranty expenses due to use of unapproved mufflers or installation modifications becomes the responsibility of the person installing the substitute muffler or performing the modifications. Contact an Onan distributor or dealer for approved exhaust system parts.

EXHAUST INSTALLATION GUIDELINES

The exhaust system must be located no closer than 3 inches (76 mm) from combustible material (wood, felt, cotton, organic fibers, etc.), or be so located, insulated or shielded that it does not raise the temperature of any combustible material more than 117° F (65° C) above the ambient air inlet temperature.

The exhaust system must extend a minimum 1 inch (25 mm) beyond the perimeter of the vehicle. Do not terminate the exhaust tailpipe under the vehicle. Be aware that any vent, window, storage compartment or opening that can be opened and that is not permanently sealed from the vehicle living space can be an avenue for carbon monoxide to enter the vehicle. The tailpipe must not terminate so that any vent, window, or opening into the living area is within the circular area shown in Figure 6-1. This area is defined as a circle with a radius of six inches (152.4 mm) measured from the outside of the tailpipe.

⚠WARNING ***Exhaust gas is deadly and presents the hazard of severe personal injury or death. Do not terminate an exhaust pipe under the vehicle. The tailpipe must not terminate so that any vent, window, or opening into the living area is within the circular area shown in Figure 6-1. Keep all openings closed when the generator set is running.***

To reduce the chance of damaging the tailpipe and emitting exhaust gases under the vehicle, make certain that no part of the exhaust system intrudes into the departure angle or approach angle of the vehicle, unless it is protected by a skid bar or other protection device. The shaded areas in Figure 6-1 illustrate typical mounting locations.

⚠WARNING ***Exhaust gas presents the hazard of severe personal injury or death. Do not mount any portion of the exhaust system into the approach or departure angle unless it is adequately protected. Use only Onan-specified exhaust equipment with the generator set. Use a sufficient number of hangers to prevent dislocation of the system.***

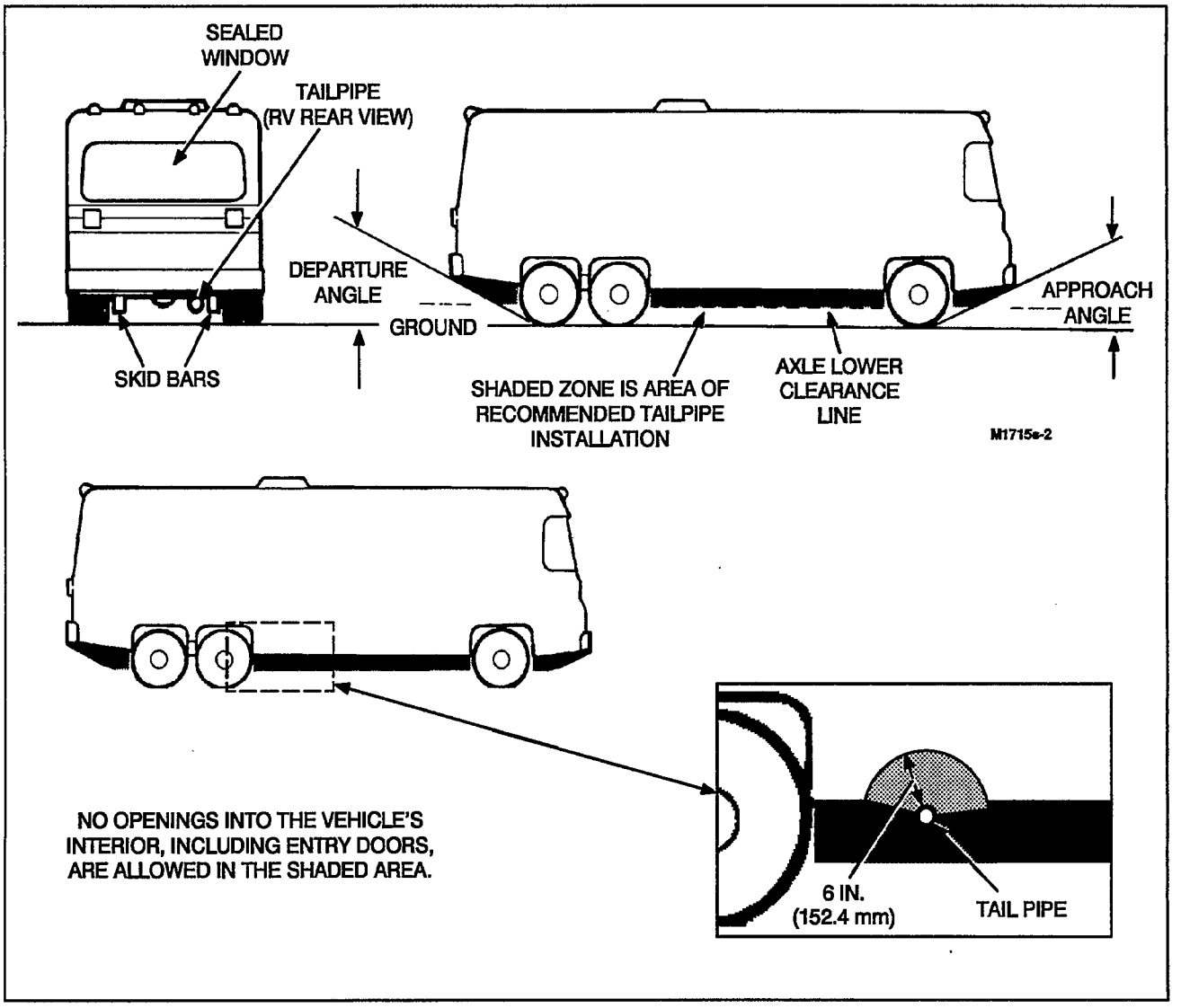


FIGURE 6-1. TAILPIPE INSTALLATION

TAILPIPE RECOMMENDATIONS

An exhaust tailpipe is not supplied with the generator set because length requirements vary between vehicle manufacturers. Refer to the following recommendations for information and safety considerations.

Use 1-1/4 inch I.D. 18 gauge rigid steel tubing for tailpipe. This size is sufficient for 20 foot (6 m) lengths. Greater lengths may require a larger pipe size to prevent excessive back pressure.

The maximum allowable back pressure measured at the exhaust manifolds is 1.2 inches (30 mm) mer-

cury (4 kPa). Back pressure readings higher than this might adversely affect engine performance.

⚠WARNING ***Exhaust gas presents the hazard of severe personal injury or death. Do not use flexible exhaust tailpipe as the only source of vibration isolation, because it can leak or break from road shock or vibration. Do not terminate the exhaust system under the vehicle. Direct exhaust gases away from any window, door, or compartment openings. Do not operate the generator set without an exhaust tailpipe.***

Use U-bolt type automotive muffler clamp marked 1-1/4 inch to connect exhaust tailpipe to muffler outlet.

If the tailpipe extends beyond 1-1/2 foot (0.46 m) from the generator set, attach an automotive tailpipe hanger for additional support. Also use additional automotive type tailpipe hangers every 2 to 3 feet (0.6 to 0.9 m) of tailpipe run. Support the exhaust system at or near the perimeter of the vehicle to prevent the pipe from being damaged and pushed up under the vehicle skirt. Attach hangers to steel framework, not wood or other floor materials. Refer to Figure 6-2 for typical tailpipe installations.

⚠CAUTION ***Excessive exhaust back pressure can cause engine damage. If a tailpipe deflector is used, make sure it is large enough to prevent back pressure.***

⚠CAUTION ***Water vapor can cause engine damage. Do not connect the generator set exhaust to the vehicle exhaust system, because water vapor from one engine can damage the other.***

The following procedure refers to the exhaust installation drawing in Figure 6-2.

1. The downpipe plumbing from the engine exhaust manifold should be completed before the unit is set in place and secured.
2. Install elbow on downpipe, then turn muffler onto the elbow. The muffler cleanout plug must face downward.
3. Attach tailpipe to muffler with a U-bolt type exhaust system clamp and hanger. Use an automotive tailpipe hanger for additional support at the perimeter of the vehicle.

⚠CAUTION ***Angular mounting of muffler and tailpipe hanger brackets can result in exhaust system damage. Properly mounted hanger brackets will absorb much road shock vibration and prolong the use of exhaust system components. Mount muffler and tailpipe hanger brackets directly above the component supported, not at an angle. Do not twist the rubber sections of any hangers.***

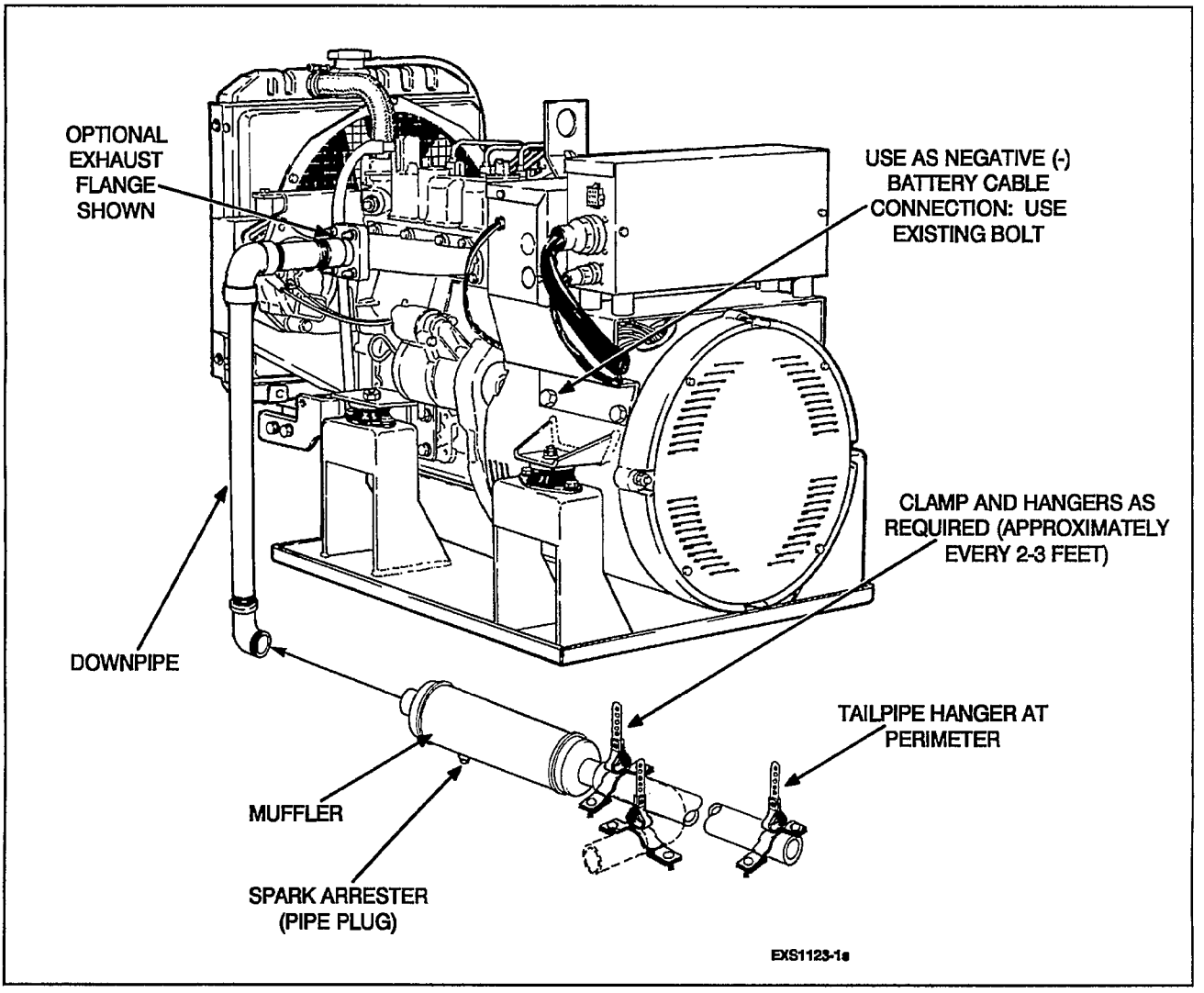


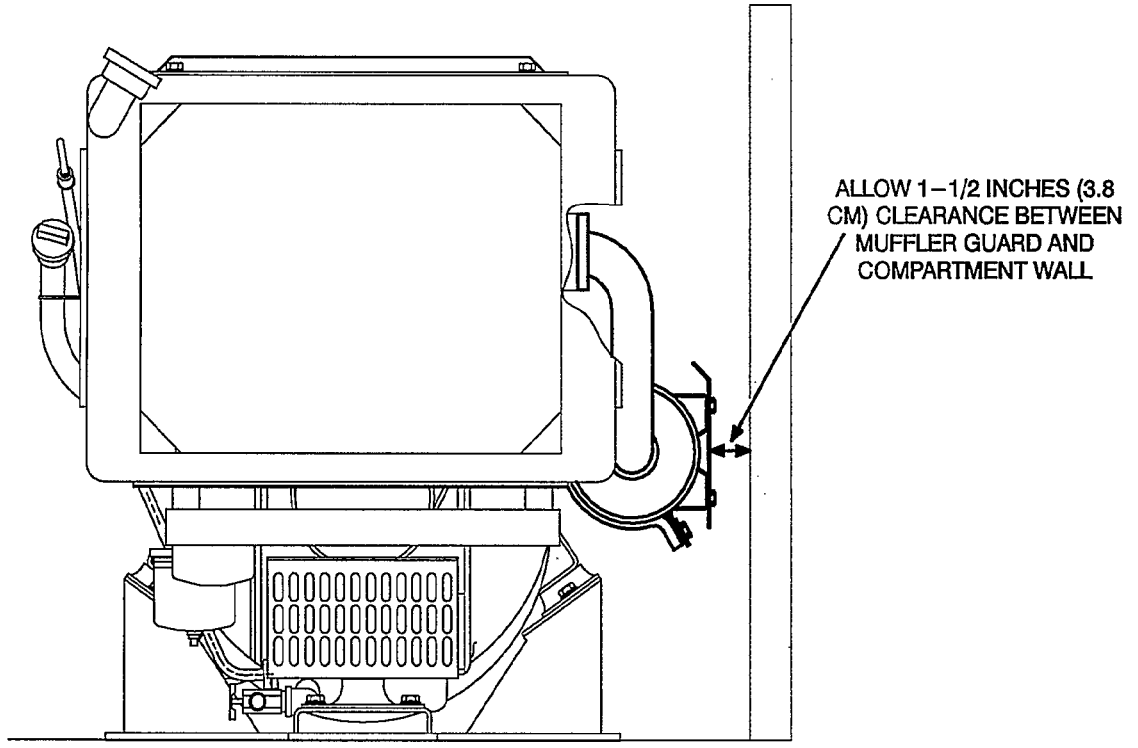
FIGURE 6-2. TYPICAL EXHAUST INSTALLATION (10 KW DKG GENSET SHOWN)

EXHAUST SYSTEM CLEARANCES

Figure 6-3 illustrates the exhaust system on the attached–muffler version of the DKD generator set. When constructing the set compartment, allow a minimum clearance between the muffler guard and the compartment wall of 1–1/2 inches (3.8 cm).

A typical size for the compartment might be 28" w by 26" h by 40" l. Follow the guidelines in this manual and check the outline drawings of the set when configuring your compartment.

⚠WARNING ***The exhaust system and its guard get very hot during normal operation, and can cause severe burns if touched. Contact with the hot exhaust system can cause combustion of wood, plastic or other RV construction materials. Do not touch the exhaust system during and after set operation. Do not allow the exhaust system to contact any portion of the compartment or other RV components. Allow the set to cool down before working on or near the exhaust system.***



NOTE: Minimum clearance between the set and compartment insulation is one inch (25 mm). Minimum space between unshielded engine exhaust components and combustible material is 3 inches (76 mm).

FIGURE 6-3. DKD GENSET WITH OPTIONAL ATTACHED EXHAUST SYSTEM

7. Cooling System

COOLANT RECOVERY TANK

A coolant recovery tank is an optional accessory. Figure 7-1 shows a typical installation with the tank accessible on the service side of the engine. It should be located so the hose between the radiator and tank is pitched slightly downward.

Use the bracket as a template to locate mounting holes. Allow a minimum of 2 inches (51 mm) from the top of the tank to any upper structure so the tank can be lifted off the bracket for servicing. Mount with two 5/16 inch (8 mm) bolts.

Use a length of hose from the kit between the radiator overflow and the dip-tube connector on the recovery tank. This hose is heavier and resists collapse from vacuum. The original hose may be used on the overflow side to the drain. Allow sufficient hose lengths so the tank can be easily removed from the bracket to add coolant.

Engine coolant is at proper level when the recovery tank level is between Full and Low (engine cold).

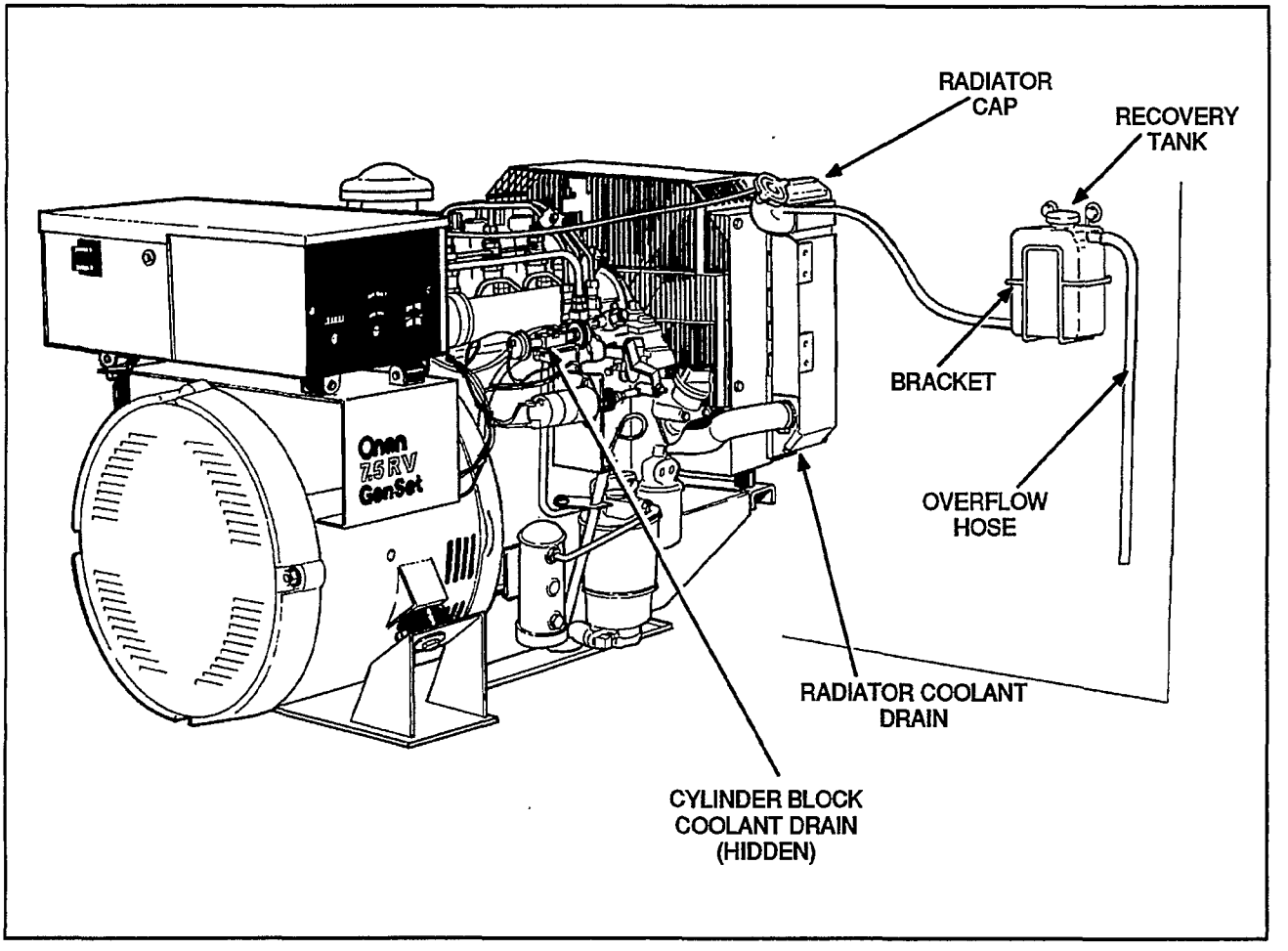


FIGURE 7-1. TYPICAL COOLANT RECOVERY TANK INSTALLATION

8. Fuel System

GENERAL

This section describes fuel system installations for recreational vehicles.

⚠WARNING ***Fuel presents the hazard of fire or explosion that can result in severe personal injury or death. Do not smoke or allow any flame, spark, pilot light, arc-producing equipment or other ignition sources around fuel or fuel components, or in the installation area. Keep a type ABC fire extinguisher nearby. The ventilation system must provide a constant flow of air to expel any accumulation of fuel vapor while the vehicle is in transit. Compartments must be vapor-tight to the vehicle interior to prevent any fumes from entering these areas.***

FUEL SYSTEM

Fuel System Provisions

On some vehicles, the generator set can share the vehicle fuel supply tank with the vehicle engine. Connection to the vehicle fuel tank must be made according to the chassis or vehicle manufacturer's detailed instructions. See *Fuel Line Installation*, in this section.

Onan recommends a separate fuel pickup tube or a separate fuel tank. Connection with the vehicle fuel line is not recommended.

Onan recommends installing an in-line manual fuel shutoff valve, to close the fuel line when the set is removed for service.

Recommended Fuel

Use ASTM 2-D (no. 2 Diesel) or ASTM 1-D (No. 1 Diesel) fuel with a minimum Cetane number of 45. Number 2 diesel fuel gives the best economy and performance under most conditions. Use number 1 diesel fuel when ambient temperatures are below 32° F (0° C), and during long periods of light engine load.

Use low sulfur content fuel which has a cloud point at least 10 degrees below the lowest expected fuel temperature. (Cloud point is the temperature at which wax crystals begin to form in diesel fuel.)

⚠WARNING ***Fuel presents the hazard of fire or explosion that can cause severe personal injury or death. Never fill the fuel tank when the engine is hot or is running. Do not permit any flame, spark, pilot light, cigarette or other ignition source near the fuel system.***

Fuel Consumption

Generator set fuel consumption varies proportionately to differing electrical loads. Refer to the *Specifications* section for approximate fuel consumption at no load, half load, and full load.

Fuel Line Installation

Vehicle fuel systems operate at a specified fuel pressure. For this reason, do not change or remove the fuel fill tube, fill limiter vent, vapor canister, vapor lines, filler cap and all parts of the fuel system without the approval of the vehicle manufacturer. Check the filler cap to make sure that the pressure vacuum relief valve functions properly: replace it if necessary.

If a separate connection is not supplied for the generator, add a second fuel pickup in the tank. This pickup should not extend below the bottom 1/4 of the tank, so the vehicle will run after the generator runs out of fuel.

Do not tee off the vehicle fuel pickup line. This may cause the generator set or the vehicle engine to run poorly. Consult the vehicle manufacturer for information on shared fuel supplies. Unauthorized fuel system modifications can cause dangerous operating conditions.

⚠CAUTION ***Never use galvanized or copper fuel lines, fittings or fuel tanks with diesel fuel systems. Condensation in the tank and lines combines with the sulfur in diesel fuel to produce sulfuric acid. The molecular structure of the copper or galvanized lines or tanks reacts with the acid and contaminates the fuel.***

⚠ CAUTION ***The generator set could starve for fuel when the vehicle is operated at highway speeds if its fuel line is connected to the main fuel line with a tee. The generator set fuel pump has neither the capacity nor the power to overcome the draw of the vehicle engine fuel pump. For this reason, use a separate fuel line to the generator set, or use a separate fuel tank.***

Install an approved flexible non-metallic and non-organic fuel line between the vehicle fuel system and the generator set to absorb vibration. Wire-reinforced fuel line connecting leads must be electrically isolated from each other, to prevent AC or DC current from flowing through to ground. Flexible line must be long enough to prevent binding, stretching or breaking during set movement. Connect the fuel line to the generator set fuel pump using a 1/8-27 NPT male connector.

Onan recommends seamless steel tubing and flared connections for long runs between the fuel tank and the flexible connector to the generator set.

Run fuel lines at the same height as the top level of the tank, to a point as close to the engine as possible. This reduces the danger of fuel siphoning out of the tank if the line should break.

Keep fuel lines away from hot engine or exhaust areas, to reduce the chance of vapor lock. Fuel lines should be accessible and protected from damage. Use metal straps without sharp edges to secure fuel lines. Do not run fuel lines where they may contact sharp or rough surfaces, or where they may be kinked, pinched, chafed, or struck.

⚠ WARNING ***Diesel fuel can be accidentally ignited by electrical sparks, presenting the hazard of fire or explosion, which can result in severe personal injury or death. For this reason, when installing the generator set:***

- ***Do not tie electrical wiring to fuel lines.***
- ***Do not run electrical lines and fuel lines through the same compartment openings.***
- ***Keep electrical and fuel lines as far apart as possible.***
- ***Place a physical barrier between fuel lines and electrical lines wherever possible.***
- ***If electrical and fuel lines must pass through the same compartment opening, make certain that they are physically separated by running them through individual channels, or by passing each line through a separate piece of tubing.***

9. Electrical Connections

GENERAL

Installing the generator set electrical system includes connecting the load and connecting the battery. Always connect the battery last to avoid accidental starting of the unit during installation.

⚠WARNING ***Accidental starting of the generator set during installation can cause severe personal injury or death. Do not connect the starting battery until instructed to later in this section.***

⚠CAUTION ***Improper operation can result in overheating and equipment damage. On installations that use a common radiator for both vehicle engine and generator set cooling, the units must be wired to prevent operation of the vehicle engine and the generator set at the same time or equipment damage can result due to overheating.***

Wiring must be protected from sharp edges (screw heads, burrs, fins, moving parts), hot engine parts, exhaust system, fuel system, or any other objects that might damage the insulation.

The wiring must meet all applicable electrical codes. Have a qualified electrician install and inspect the wiring. All remote controls and switches must be vibration-proof and securely mounted to prevent accidental closing or opening when the vehicle is moving.

CONDUIT

Route load conductors from the generator set control to the junction box in approved flexible conduit. See Figure 9-1. Make sufficient slack in conduit to allow the unit free movement and for maintenance.

Be sure all openings made through the compartment for conduit and wiring and into the coach interior are sealed and vapor-tight. Seal wiring within the conduit if conduit terminates in the coach.

⚠WARNING ***Inhalation of exhaust gases can cause severe personal injury or death. Seal all openings into the vehicle interior to prevent the entrance of exhaust gases.***

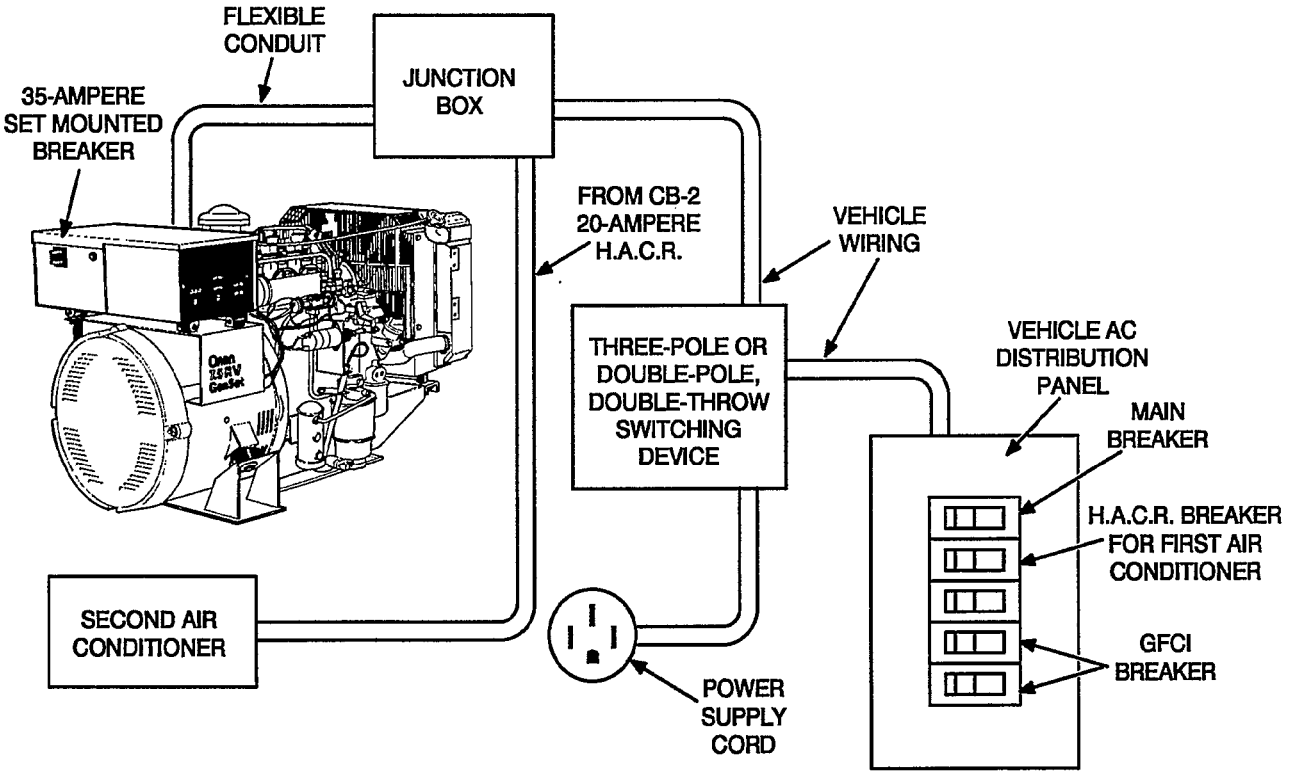


FIGURE 9-1. TYPICAL POWER SWITCHING DEVICE

WIRING REFERENCES

NOTE: Refer to the diagrams in Section 11 of this manual for all AC and DC wiring details discussed in this section. Set wiring varies depending on the type of DKD generator set being installed.

WIRING DISCONNECT

The feeder conductors from the generator set compartment must terminate at a disconnecting device or a double-pole double-throw switching device if 120 VAC, or a 3-pole double throw device if 120/240 VAC, so that the outside power source cannot be connected to the generator set.

Never remove the grounding pin from power supply assemblies. Incorrect or no ground can cause the vehicle to be electrically "hot" and result in shock or electrocution.

⚠WARNING ***Contact with electrically "hot" equipment can result in severe personal injury or death. It is extremely important that bonding and equipment grounding be properly done. All metallic parts which could become energized under abnormal conditions must be properly grounded.***

LINE CIRCUIT BREAKERS

The 7.5 kW DKD generator set has one dual 35-ampere, 120-volt, two-pole circuit breaker mounted on the side of the control box, or in a remotely mounted AC box. This breaker provides short circuit or other overload protection for the generator.

LOAD CONNECTIONS

The generator output voltage(s) and maximum current rating(s) are specified on the generator nameplate. Line-to-neutral voltage is always the lower voltage shown on the nameplate and line-to-line voltage is the higher rating.

Connecting the Load

Install the generator output-conductors (supplied) in approved flexible conduit. Cut conduit to desired length, leaving extra wire in the junction box for making connections to the load. Route conduit so movement of set is not interfered with.

Load wiring must be appropriately sized and insulated for the specified current rating. Grounding procedure must comply with codes.

NOTE: For the supply connection, use wires suitable for at least 90° C (194° F).

A lead to be connected to an output feeder conductor shall be not more than two AWG sizes smaller than the output feeder conductor and the insulation shall be rated for at least 45 amps and be:

- **Rubber (with a braid), neoprene, or thermoplastic, with a wall thickness of at least 0.030 inch (0.76 mm)**
- **Other material having the same or better electrical and mechanical properties.**

⚠WARNING ***Improper wiring can result in fire and severe personal injury or death. Do not allow contact between electrical wiring and the fuel line.***

⚠WARNING ***Electrical shock can result in severe personal injury or death. Properly applied and maintained ground fault interrupters can afford additional protection against the hazard of electrical shock. Equip the recreation vehicle with adequate ground fault protection devices to meet the National Electrical Code Code NFPA 70, 551-9 (c).***

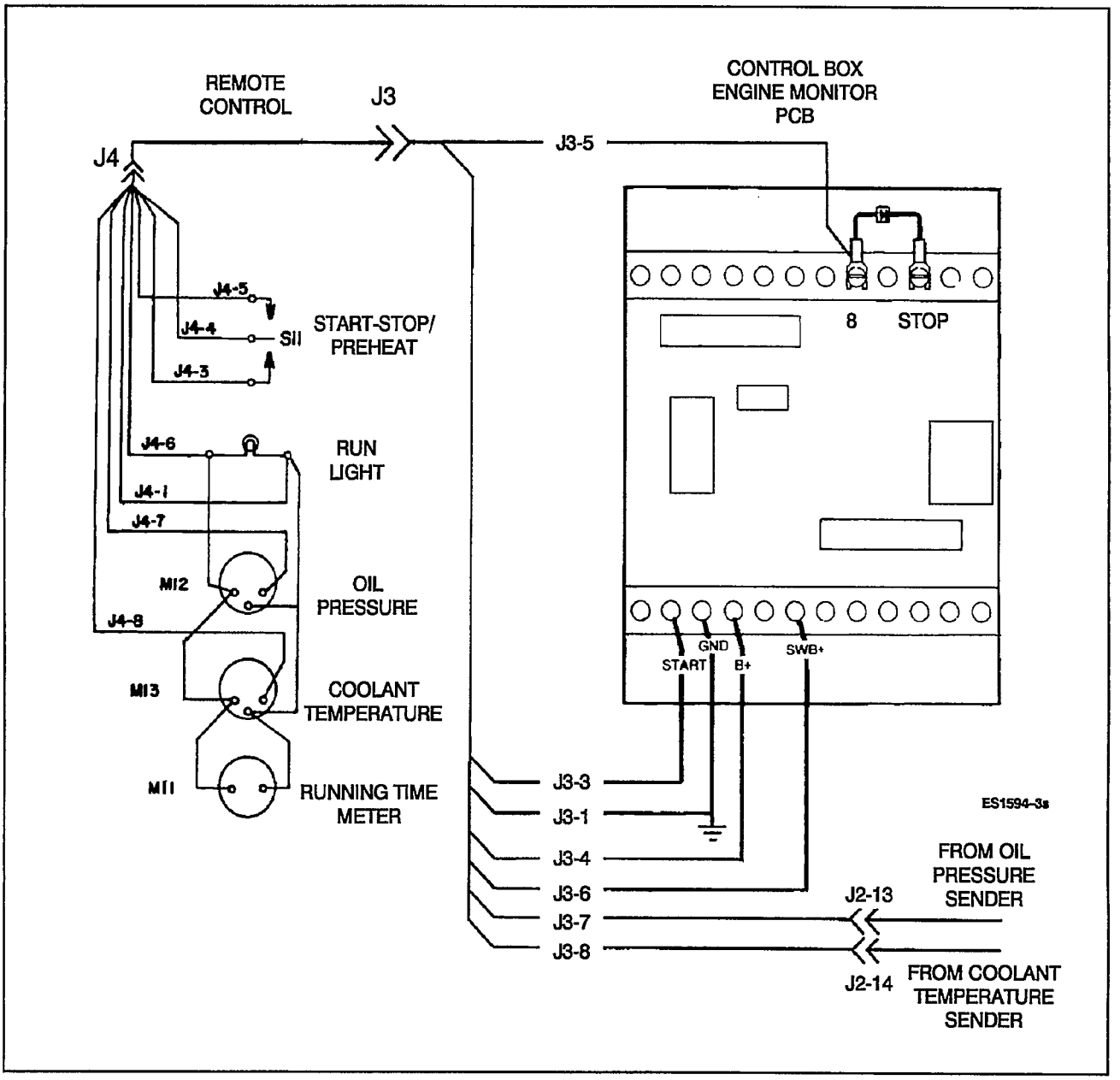


FIGURE 9-2. REMOTE CONTROL CONNECTIONS

REMOTE CONTROL CONNECTIONS

Provision is made for addition of remote starting and stopping of the generator set. A nine-pin remote connector (J3) mounted on the control box connects the harness assembly to connector J4 on the remote control assembly. Onan has a remote control kit complete with installation instructions. Also available are complete harness assemblies with connectors in 15 and 25 foot lengths (4.6 and 7.6 m). Call the Onan dealer or distributor for assistance in securing these items.

The wiring diagram in Figure 9-2 is furnished so a harness can be fabricated if desired. Use 16 AWG wire. The electrical code does not allow the remote control harness/wiring to be routed through the same conduit as the AC load wiring. Follow all national electrical codes and any local codes that may apply.

NOTE: See Section 4 of this manual for guidelines on installing the remote-mounted DC control box (optional on certain sets).

Be sure to seal all openings made for wiring so exhaust or fuel vapors cannot enter the living quarters. If flexible metal conduit is used it must be sealed internally at the end where it terminates within the junction box or panelboard. Flexible metal conduit is not vapor-tight along its length due to its unique construction.

⚠WARNING ***Inhalation of exhaust gas or ignition of fuel vapor can cause severe personal injury or death. Be sure to vapor-seal flexible metal conduit and all openings made during installation of the generator set with a silicone/rubber based sealant.***

STARTING BATTERY

The generator set must have sufficient cranking power to the starter under various operating conditions. choose a battery and cables that are appropriate for the application and then devise an adequate battery compartment.

Battery and Cable Selection

The DKD generator set requires a 12-volt battery with a rating of 425 cold cranking amps. A larger capacity battery may be desirable if it is also used to power other coach accessories. Onan does not recommend use of the vehicle starting battery for operation of the generator set. Doing so might discharge the battery under some operating conditions. Long lengths of battery cable may also be required depending on location.

For reliable cold weather starting, the voltage drop from the battery terminals to the starter terminal should not exceed 0.12 volts per 100 amperes of current. The starter motor draws (100) amperes at 12 VDC. Table 9-1 shows the recommended cable sizes for different cable lengths necessary for reliable cold weather starting to -20° F (-29° C).

TABLE 9-1. CABLES FOR COLD WEATHER STARTING TO -20°F (-29°C)

*CABLE LENGTH IN FEET (METERS)	CABLE SIZE
0-10 (0-3)	2**
11-15 (3-4.5)	0
16-20 (4.5-6)	000

* Distance from battery to set.

** For warm weather operation, #2 cable can be acceptable up to 20 feet (6.1 m).

Battery Compartment

House the battery in its own compartment, away from the generator set and any spark-producing device. The compartment must be properly ventilated with a minimum opening at the top and bottom of 1.7 in^2 (11 cm^2) and in a location where leaks and accidental spills will not damage the generator set, fuel lines, and wiring.

⚠WARNING ***Fire or explosion hazards can cause severe personal injury or death. Be sure to mount the battery in a separate compartment away from the generator set or other spark-producing device.***

Battery Connections

Be sure the frame connection (major frame member, if possible) is sufficient to minimize resistance. Try to avoid connection at a weld or mechanical joint. For short distances, one negative battery cable can be used between set and battery rather than separate cables to chassis ground.

The battery positive (+) terminal connects to the start solenoid (Figure 9-3). Connect negative battery cable last. Use the same size cable to connect battery negative terminal to ground as used for battery positive. Be sure terminal connections are clean and tight.

⚠WARNING ***Ignition of explosive battery gases can cause severe personal injury. Do not smoke while servicing batteries.***

⚠WARNING ***Sparks can ignite battery gases and result in an explosion and severe personal injury. Do not disconnect battery cables while generator set is cranking or running.***

The belt-driven battery charge alternator has a maximum output rating of 12 amps. The actual output amperage depends on the battery state-of-charge and any load that may be connected.

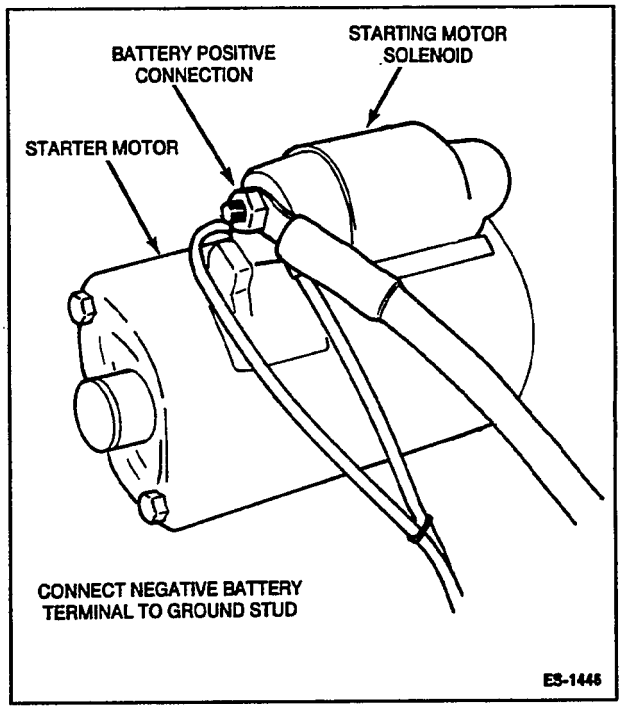


FIGURE 9-3. BATTERY CONNECTIONS

10. Initial Start and Checks

⚠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

INSTALLATION REVIEW

Before initial start up of the generator set, check (√) each of the following items. For a good installation, each answer must be yes: if not, that part of the installation should be reworked, or provision made to satisfy the requirement.

⚠WARNING ***Incorrect installation, service, or parts replacement can result in severe personal injury, death, and/or equipment damage. Installing personnel must be qualified to perform electrical and mechanical component installations and service.***

[ ] Is the compartment metal-lined and sealed around all edges?

[ ] Are all fuel connections and hose clamps tight?

[ ] Are fuel lines and electrical wires protected from chafing and damage and are they insulated from each other?

[ ] Are wiring holes into the inside of coach (including the inside of AC conduit) sealed to prevent passage of exhaust gases?

[ ] Are all electrical leads connected and protected, and is the conduit adequately supported?

[ ] Are there openable windows, doors or storage compartments within a circle with a six inch (152.4 mm) radius centered on the exhaust pipe? Refer to the *Exhaust System* section.

[ ] Does the exhaust system extend beyond the perimeter of the vehicle a minimum of 1 inch (25 mm)?

[ ] If the exhaust system is run into the angle of approach or departure (see Figure 6-1), is it protected from bottoming out by use of skid bars, rollers, etc.?

[ ] Is the exhaust system secure and are all connections tight? Are all required exhaust clamps, hangers, and support straps in place per the *Exhaust System* section of this manual and the kit instructions?

[ ] Are air inlet and exhaust openings clear and sufficiently sized (see *Mounting* section) for proper airflow?

[ ] Is the generator set protected from direct road splash from vehicle wheels?

[ ] Can the following routine maintenance items be performed through the vehicle access panel?
- Change oil
- Start/stop the unit
- Change air filter
- Access AC circuit breaker and control fuse
- Access coolant fill and drain

[ ] Has the crankcase oil been added to the engine and is the oil level correct?

INITIAL STARTING AND CHECKS

⚠WARNING ***Exhaust gas presents the hazard of severe personal injury or death. Do not operate the generator set inside any room or building.***

1. Start the generator set by first holding the Start/Stop/Preheat switch on the engine control panel in the Preheat position for 15 to 30 seconds. Then hold the switch in the Start position. The engine should start within a few seconds.
2. Monitor the remote mounted engine control panel and note the oil pressure, coolant temperature, and battery charge voltage gauges (if equipped). Refer to the Operator's Manual for normal readings. At operating temperature, all readings should stay within the normal range.
3. Check the exhaust system for leaks, visually and audibly. Note the security of the exhaust system supports. If any leaks are found, shut down the generator set immediately and repair.

   ⚠WARNING ***Exhaust gas is deadly. For this reason, shut down the generator set immediately if you discover an exhaust leak or exhaust component needing replacement. Do not use the generator set until you have the exhaust system repaired.***
4. Check the generator set for fuel, oil or coolant leaks. If any are found, shut down the generator set and repair leak before making any more checks.
5. Connect an accurate AC voltmeter and frequency meter across two line terminals. Apply load to the generator and check output voltage and frequency. The voltage can be adjusted if not within specs shown in Figure 9-2 for the generator connection used, per the following procedure.

   ⚠WARNING ***Generator output presents a shock hazard which can result in severe personal injury or death. Use caution when measuring output voltage and frequency.***

Voltage Adjustment Procedure

Output voltage on the DKD generator set is adjusted at the factory. If adjustment is necessary, it bay be due to high resistance in the coach wiring. **If the voltage at the output side of the circuit breakers is 120 ± 4, do not readjust the voltage.** However, if adjustment is still necessary, perform the following procedure:

1. With the genset running, note if the voltage needs to be increased or decreased.
2. Stop the generator set. Disconnect the starting battery ground cable.

   ⚠WARNING ***Accidental starting of the set can cause severe personal injury or death. Disconnect the battery cables, negative (-) cable first, when repairs are made to the engine, controls, or generator.***
3. Move the taps on T21 (Figure 10-1) inside the control box as shown on the AC Control Schematic (page 11-4 of this manual).
4. Reconnect the starting battery ground cable. Operate the unit and recheck the voltage. If necessary, repeat steps 1 through 4.

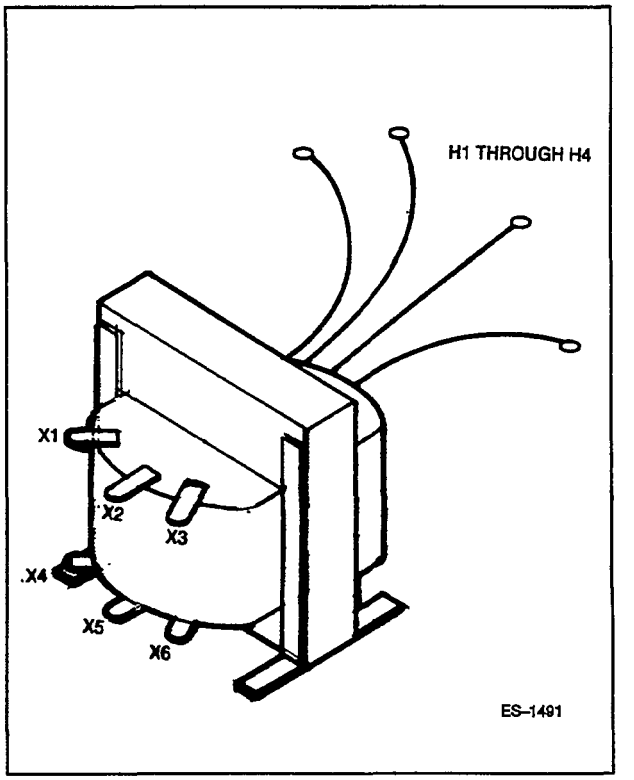


FIGURE 10-1. TRANSFORMER REGULATOR

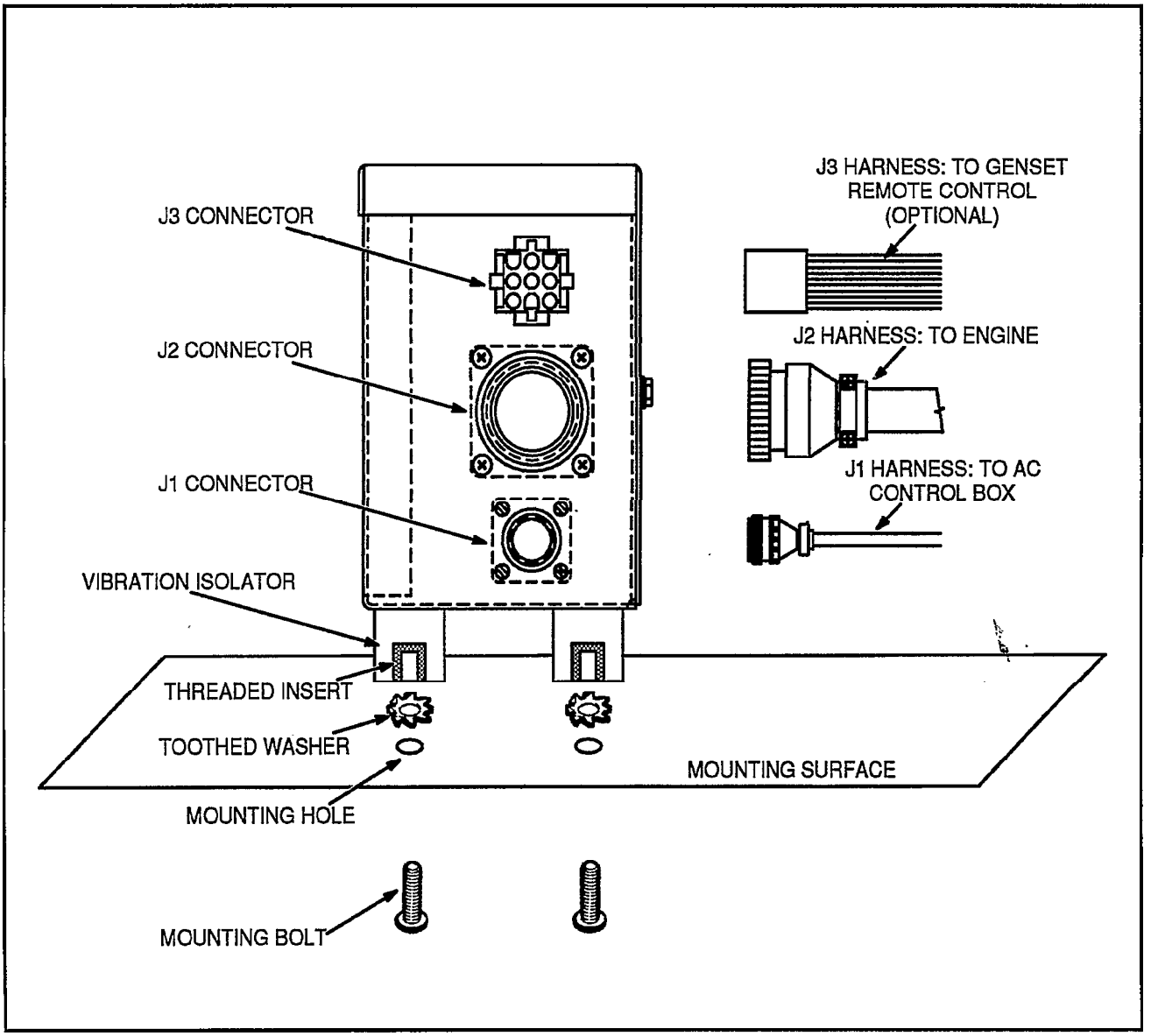
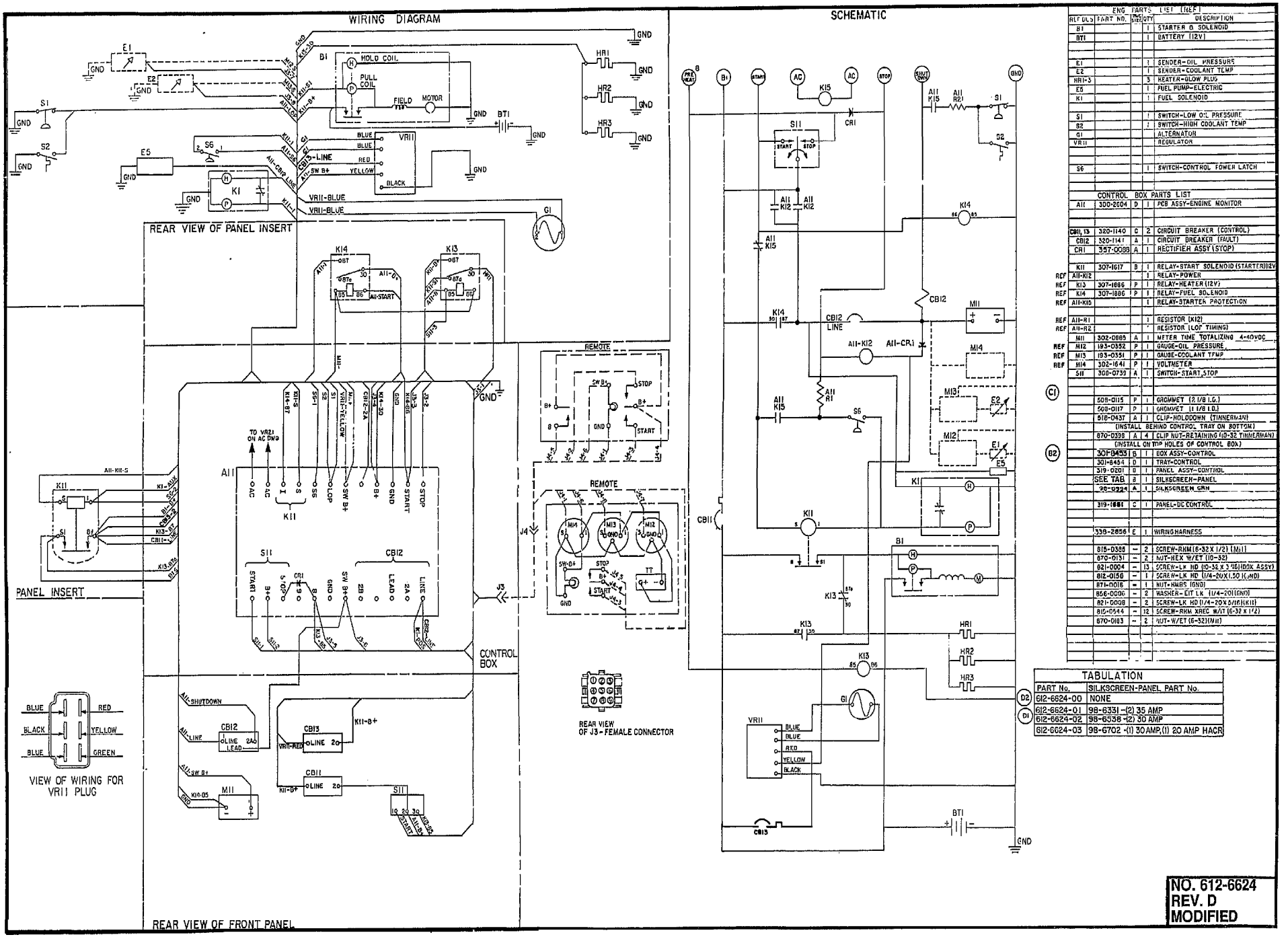


FIGURE 4-4. REMOTE DC CONTROL BOX MOUNTING (OPTIONAL ON CERTAIN MODELS)

11. Wiring Diagrams

The DC control schematic/wiring diagrams and AC schematic/wiring diagrams for the 6.5 kW, 7.5 kW and 8.0 kW DKD generator sets are duplicated in this section. Refer to these diagrams when installing and maintaining the set.



REF DES	PART NO.	MFG SIZE	QTY	DESCRIPTION
B1			1	STARTER & SOLENOID
BT1			1	BATTERY (12V)
E1			1	SENDER-OIL PRESSURE
E2			1	SENDER-COOLANT TEMP
HR1-3			3	HEATER-GLOW PLUG
E5			1	FUEL PUMP-ELECTRIC
K1			1	FUEL SOLENOID
S1			1	SWITCH-LOW OIL PRESSURE
S2			1	SWITCH-HIGH COOLANT TEMP
G1				ALTERNATOR
VR11				REGULATOR
S6			1	SWITCH-CONTROL POWER LATCH
	CONTROL BOX PARTS LIST			
A11	300-2604	D	1	PCB ASSY-ENGINE MONITOR
CB11, 13	320-1140	C	2	CIRCUIT BREAKER (CONTROL)
CB12	320-1141	A	1	CIRCUIT BREAKER (FAULT)
CR1	357-0089	A	1	RECTIFIER ASSY (STOP)
K11	307-1617	B	1	RELAY-START SOLENOID (STARTER) 12V
REF A11-K12			1	RELAY-POWER
REF K13	307-1886	P	1	RELAY-HEATER (12V)
REF K14	307-1886	P	1	RELAY-FUEL SOLENOID
REF A11-K15			1	RELAY-STARTER PROTECTION
REF A11-R1			1	RESISTOR (K12)
REF A11-R2			1	RESISTOR (LOP TIMING)
M11	302-0885	A	1	METER TIME TOTALIZING 4-40VDC
REF M12	193-0352	P	1	GAUGE-OIL PRESSURE
REF M13	193-0351	P	1	GAUGE-COOLANT TEMP
REF M14	302-1641	P	1	VOLTMETER
S11	300-0739	A	1	SWITCH-START, STOP
C1	508-0115	P	1	GROMMET (2 1/8 I.D.)
	508-0117	P	1	GROMMET (1 1/8 I.D.)
	618-0437	A	1	CLIP-HOLDDOWN (TINNERMAN)
	(INSTALL BEHIND CONTROL TRAY ON BOTTOM)			
	870-0398	A	4	CLIP NUT-RETAINING (10-32 TINNERMAN)
	(INSTALL ON TMP HOLES OF CONTROL BOX)			
B2	301-8453	S	1	BOX ASSY-CONTROL
	301-8454	D	1	TRAY-CONTROL
	319-0201	D	1	PANEL ASSY-CONTROL
	SEE TAB	B	1	SILKSCREEN-PANEL
	98-0324	A	1	SILKSCREEN GRN
	319-1681	C	1	PANEL-DC CONTROL
	330-2856	E	1	WIRING HARNESS
	815-0388	–	2	SCREW-RHM (6-32 X 1/2) (M11)
	870-0151	–	2	NUT-HEX W/ET (10-32)
	821-0004	–	13	SCREW-LK HD (10-32 X 3/16) (BOX ASSY)
	812-0156	–	1	SCREW-LK HD (1/4-20 X 1.50 K) (IND)
	871-0016	–	1	NUT-HMBS (GND)
	856-0006	–	2	WASHER-EIT LK (1/4-20) (GND)
	821-0008	–	2	SCREW-LK HD (1/4-20 X 5/16) (K11)
	815-0544	–	12	SCREW-RHM XREC W/T (6-32 X 1/2)
	870-0183	–	2	NUT-W/ET (6-32) (M11)

TABULATION	
PART No.	SILKSCREEN-PANEL PART No.
612-6624-00	NONE
612-6624-01	98-6331-(2) 35 AMP
612-6624-02	98-6538-(2) 30 AMP
612-6624-03	98-6702-(1) 30 AMP, (1) 20 AMP HACR

NO. 612-6624
REV. D
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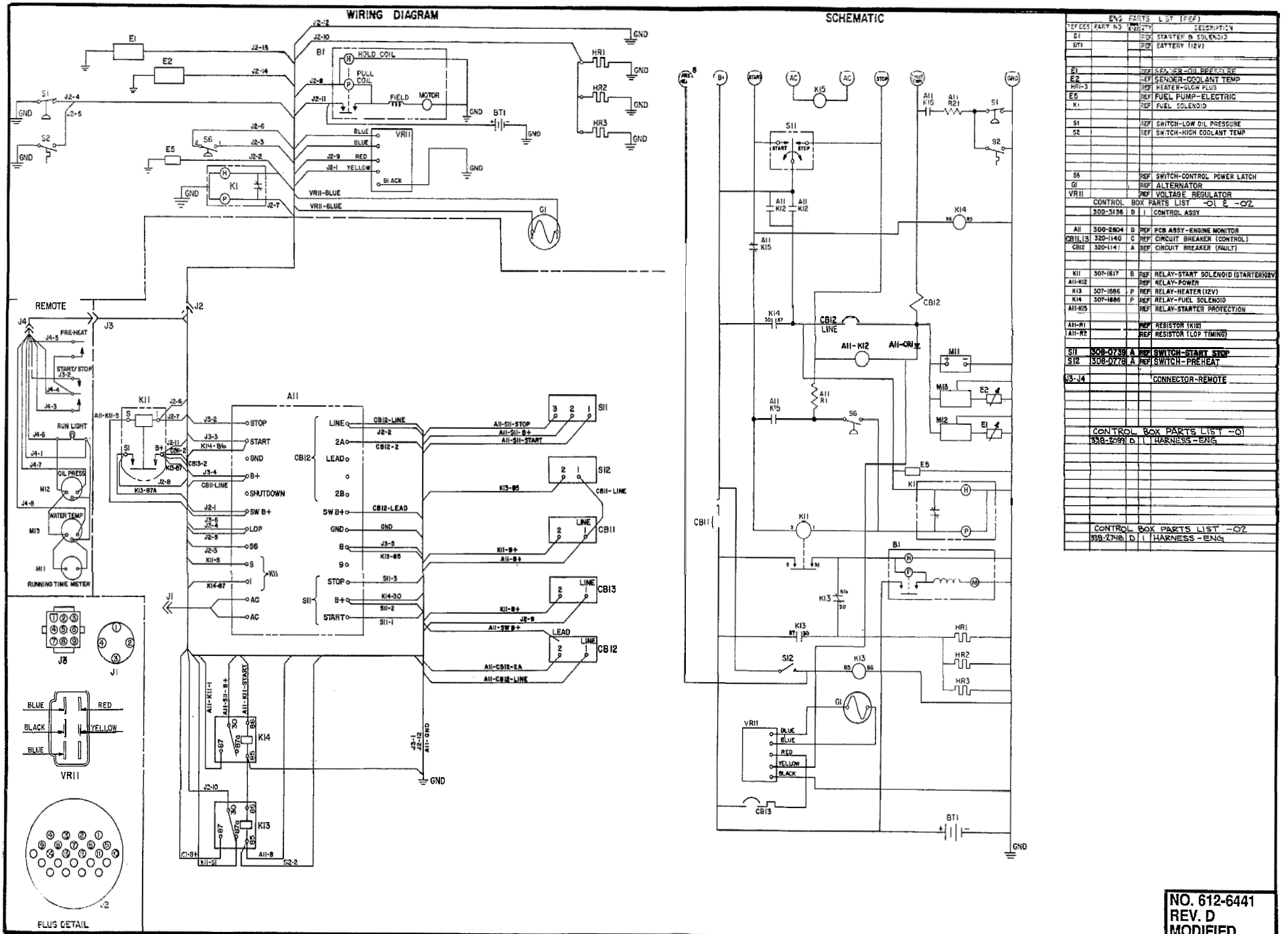
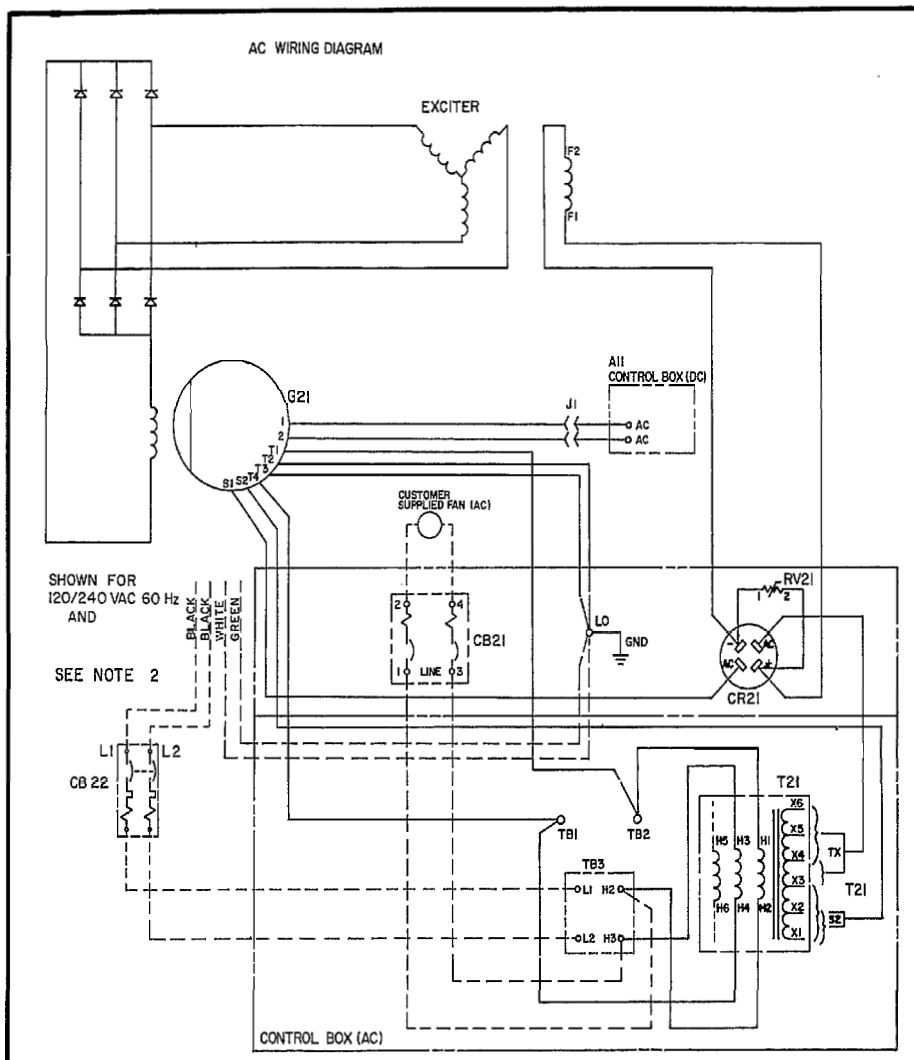
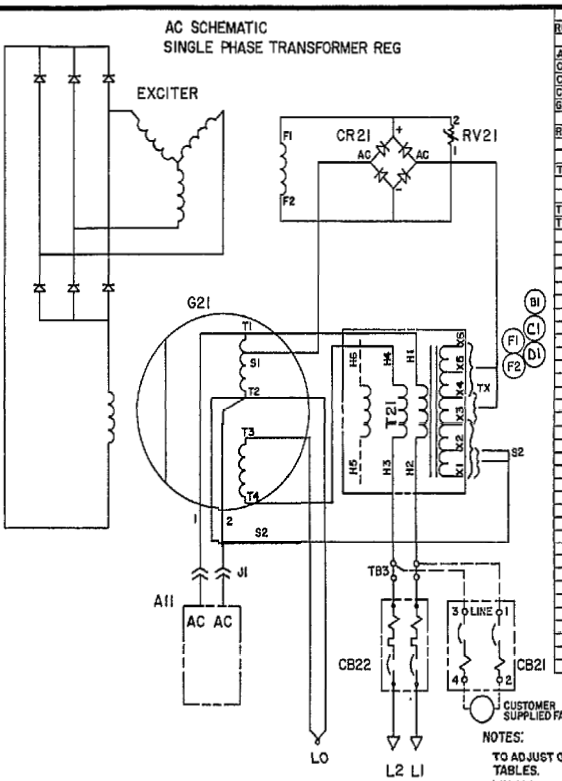


REFDES	PART NO	REV	QTY	DESCRIPTION
B1			REF	STARTER & SOLENOID
BT1			REF	BATTERY (12V)
E1			REF	SENDER-OIL PRESSURE
E2			REF	SENDER-COOLANT TEMP
HR1-3			REF	HEATER-GLOW PLUG
E5			REF	FUEL PUMP-ELECTRIC
K1			REF	FUEL SOLENOID
S1			REF	SWITCH-LOW OIL PRESSURE
S2			REF	SWITCH-HIGH COOLANT TEMP
S6			REF	SWITCH-CONTROL POWER LATCH
G1			REF	ALTERNATOR
VR11			REF	VOLTAGE REGULATOR
	CONTROL BOX PARTS LIST -01 & -02			
	300-3136	D	1	CONTROL ASSY
A11	300-2604	D	REF	PCB ASSY-ENGINE MONITOR
CB11,13	320-1140	C	REF	CIRCUIT BREAKER (CONTROL)
CB12	320-1141	A	REF	CIRCUIT BREAKER (FAULT)
K11	307-1617	B	REF	RELAY-START SOLENOID (STARTER)12V
A11-K12			REF	RELAY-POWER
K13	307-1686	P	REF	RELAY-HEATER(12V)
K14	307-1686	P	REF	RELAY-FUEL SOLENOID
A11-K15			REF	RELAY-STARTER PROTECTION
A11-R1			REF	RESISTOR (K12)
A11-R2			REF	RESISTOR (LOP TIMING)
S11	308-0736	A	REF	SWITCH-START STOP
S12	308-0778	A	REF	SWITCH-PREHEAT
J3-J4				CONNECTOR-REMOTE
	CONTROL BOX PARTS LIST -01			
	338-2069	D	1	HARNESS-ENG
	CONTROL BOX PARTS LIST -02			
	338-2748	D	1	HARNESS-ENG



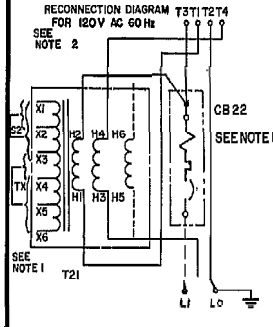


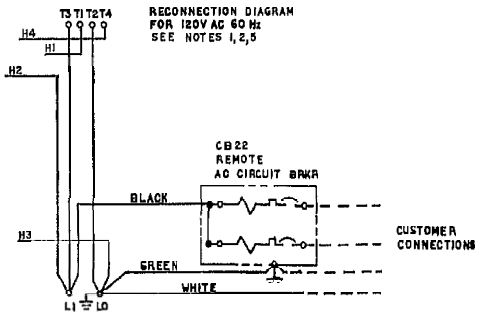
REF DES	PART NO.	MFR SYM	QTY	DESCRIPTION
				REF PARTS LIST- (ALL DASH NOS.)
A11			REF	PCB ASSY-ENGINE MONITOR
CB21	320-1576	B	REF	CIRCUIT BREAKER
CB22			REF	CIRCUIT BREAKER (LOAD)
CR21	305-0696	B	REF	BRIDGE-RECTIFIER
G21			REF	GENERATOR
RV21	305-0703	A	REF	SUPPRESSOR ASSY
T21	315-0572	C	REF	TRANSFORMER ASSY (-01)
	315-0571	C	REF	TRANSFORMER ASSY (-02)
	315-0553	C	REF	TRANSFORMER ASSY (-03)
TB1,2	332-2370	P	REF	STANDOFF-INSULATOR
TB3			REF	TERMINAL BLOCK
				PARTS LIST
	300-3135	C	1	CONTROL ASSY-AC (-01)
	300-3158	C	1	CONTROL ASSY-AC (-02)
	300-3199	C	1	CONTROL ASSY-AC (-03)
	300-3335-01	C	1	CONTROL ASSY-AC (-04)
	300-4236	C	1	CONTROL ASSY-AC (-05) (120V)
	300-4237	C	1	CONTROL ASSY-AC (-06)
	320-1605	-	REF	AC CIRCUIT BRKR -05
	320-1746	-	REF	AC CIRCUIT BRKR -06

NOTES:

TO ADJUST OUTPUT VOLTAGE, MOVE TAPS ON T21 ACCORDING TO TABLES.

1. IN ALL VOLTAGE CONNECTIONS LEAVE T1 AND T4 CONNECTED TO H1 AND H4 RESPECTIVELY.
2. FOR 60Hz: USE S2 LEAD (FROM GEN) ON TAPS X1-2 (4 TAPS) USE TX LEAD ON TAPS X3-4
3. UNLESS OTHERWISE NOTED, ALL COMPONENTS ARE SHOWN IN THE DE ENERGIZED POSITION.
4. DASHED LINES INDICATE WHEN USED.
5. IF CB22 IS NOT USED CONNECT LEADS DIRECTLY TO THE LOAD





	OUTPUT VOLTAGE ADJUSTMENT	60Hz (-01) (-04) LINE-01 120,120/240V TAP POSITION S2	TX
DKD	↑ INCREASE	X2	X3
		X1	X3
	STD	X2	X4
	↓ DECREASE	X1	X4

	OUTPUT VOLTAGE ADJUSTMENT	60Hz (-02) 120,120/240V TAP POSITION S2	TX
DKC	↑ INCREASE	X2	X3
	STD	X1	X3
	↓ DECREASE	X2	X4
		X1	X4

	OUTPUT VOLTAGE ADJUSTMENT	60 Hz. (-03) 120,120/240V TAP POSITION TX	S2
DL3	↑ INCREASE	X3	X4
		X2	X4
		X1	X4
	STD	X3	X5
	↓ DECREASE	X2	X5
		X1	X5
		X3	X6
		X2	X6
		X1	X6

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