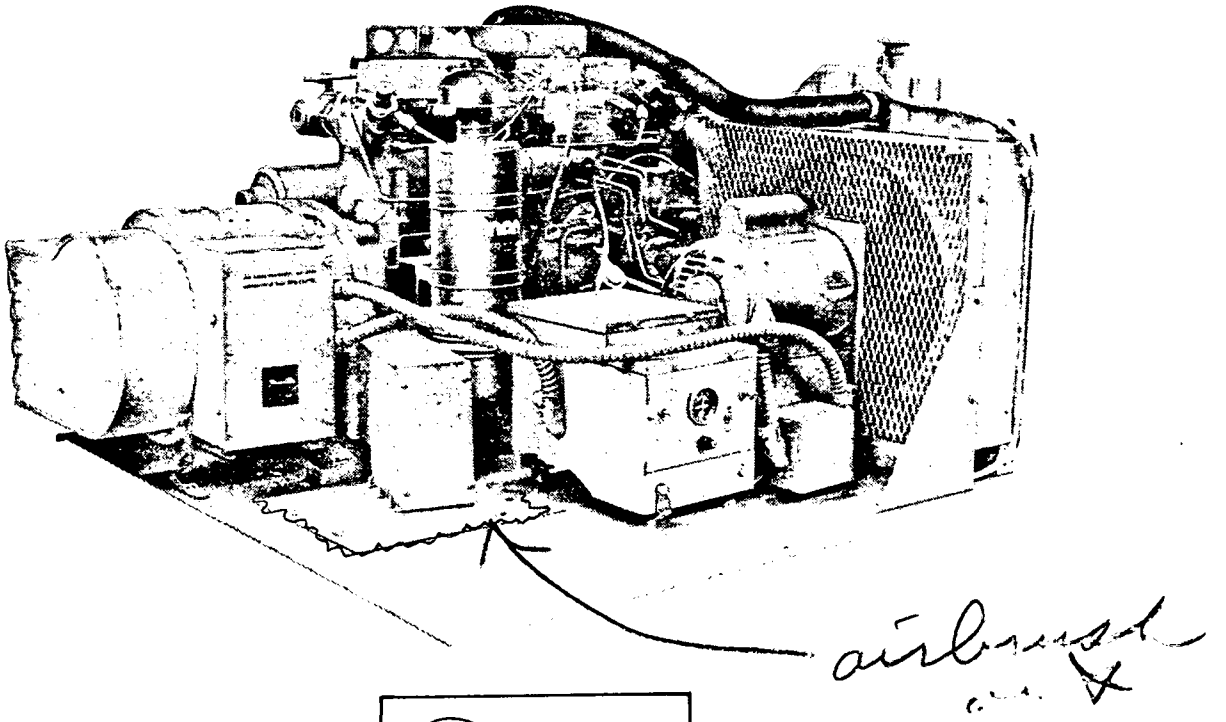
Onan

INSTALLATION GUIDE
FOR
12.0 RDJC, RV DIESEL SERIES
ELECTRIC GENERATING SETS



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SAFETY PRECAUTIONS

The following symbols in this manual signal potentially dangerous conditions to the operator or equipment. Read this manual carefully. Know when these conditions can exist. Then, take necessary steps to protect personnel as well as equipment.

WARNING **Onan uses this symbol throughout this manual to warn of possible serious personal injury.**

CAUTION **This symbol refers to possible equipment damage.**

Fuels, electrical equipment, batteries, exhaust gases and moving parts present potential hazards that could result in serious, personal injury. Take care in following these recommended procedures.

- **Use Extreme Caution Near Fuel. A constant potential explosive or fire hazard exists.**

  Do not fill fuel tank near unit with engine running. Do not smoke or use open flame near the unit or the fuel tank.

  Be sure all fuel supplies have a positive shutoff valve.

  Use steel fuel lines, adequately secured and free of leaks. Use a flexible section of fuel line between generator set and stationary fuel line in the vehicle. This flexible section must be 100% NON-METALLIC to prevent electrical currents from using it as a conductor.

  Have a fire extinguisher nearby. Be sure extinguisher is properly maintained and be familiar with its proper 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.

- **Guard Against Electric Shock**

  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 surfaces to be damp when handling electrical equipment.

  Jewelry is a good conductor of electricity and should be removed when working on electrical equipment.

  Always use an appropriately sized, approved double-throw transfer switch with any standby generator set. DO NOT PLUG PORTABLE OR STANDBY SETS DIRECTLY INTO A HOUSE RECEPTACLE TO PROVIDE EMERGENCY POWER. It is possible for current to flow from generator into the utility line. This creates extreme hazards to anyone working on lines to restore power.

  Use extreme caution when working on electrical components. High voltages cause injury or death.

  Follow all state and local electrical codes. Have all electrical installations performed by a qualified licensed electrician.

- **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 Toxic**

  Provide an adequate exhaust system to properly expel discharged gases. Check exhaust system regularly for leaks. Ensure that exhaust manifolds are secure and not warped.

  Be sure the unit is well ventilated.

- **Keep The Unit And Surrounding Area Clean**

  Remove all oil deposits. Remove all unnecessary grease and oil from the unit. Accumulated grease and oil can cause overheating and subsequent engine damage and may present a potential fire hazard.

  Do NOT store anything in the generator compartment such as oil cans, oily rags, chains, wooden blocks etc. A fire could result or the generator set operation may be adversely affected. Keep the floor clean and dry.

- **Protect Against Moving Parts**

  Avoid moving parts of the unit. Loose jackets, shirts or sleeves should not be permitted because of the danger of becoming caught in moving parts.

  Make sure all nuts and bolts are secure. Keep power shields and guards in position.

  If adjustments *must* be made while the unit is running, use extreme caution around hot manifolds, moving parts, etc.

  Do not work on this equipment when mentally or physically fatigued.

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WARNING

TO PREVENT FIRE OR ACCIDENT HAZARD . . . THIS UNIT MUST BE INSTALLED ACCORDING TO THE MANUFACTURER'S DETAILED INSTALLATION PROCEDURES OBSERVING ALL MINIMUM CLEARANCES.

TO AVOID POSSIBLE PERSONAL INJURY OR EQUIPMENT DAMAGE, ANY INSTALLATION AND ALL SERVICE MUST BE PERFORMED BY QUALIFIED PERSONNEL.

INTRODUCTION

This manual covers detailed installation procedures for the UL Listed/Onan model 12.0 RDJC-3CR recreational vehicle electric generating set. Each Onan RV electric generating set MUST be installed properly if it is to operate reliably, quietly and most important safely, even though the set itself meets or exceeds all Listing Requirements. Being Listed means this electric generating set meets or exceeds all requirements of ANSI/NFPA 501C-1977 Chapter 4 (Electrical Systems) and Chapter 5 (Fire and Life Safety) and ANSI/RVIA-EG1-1976 as well as UL Subject 1248.

All RV installations MUST comply with these specifications as well as Article S51, ANSI C1-1975/NFPA No. 70-1978 of the National Electrical Code. The RV Manufacturer and/or the generator set installer MUSTcomply with above codes and any local codes which pertain to the generator set installation.

This manual provides detailed installation guide lines for this Onan model ONLY. For operation and maintenance procedures, refer to the individual Operator's Manual which accompanies each set. The Operator's manual is #974-0124.

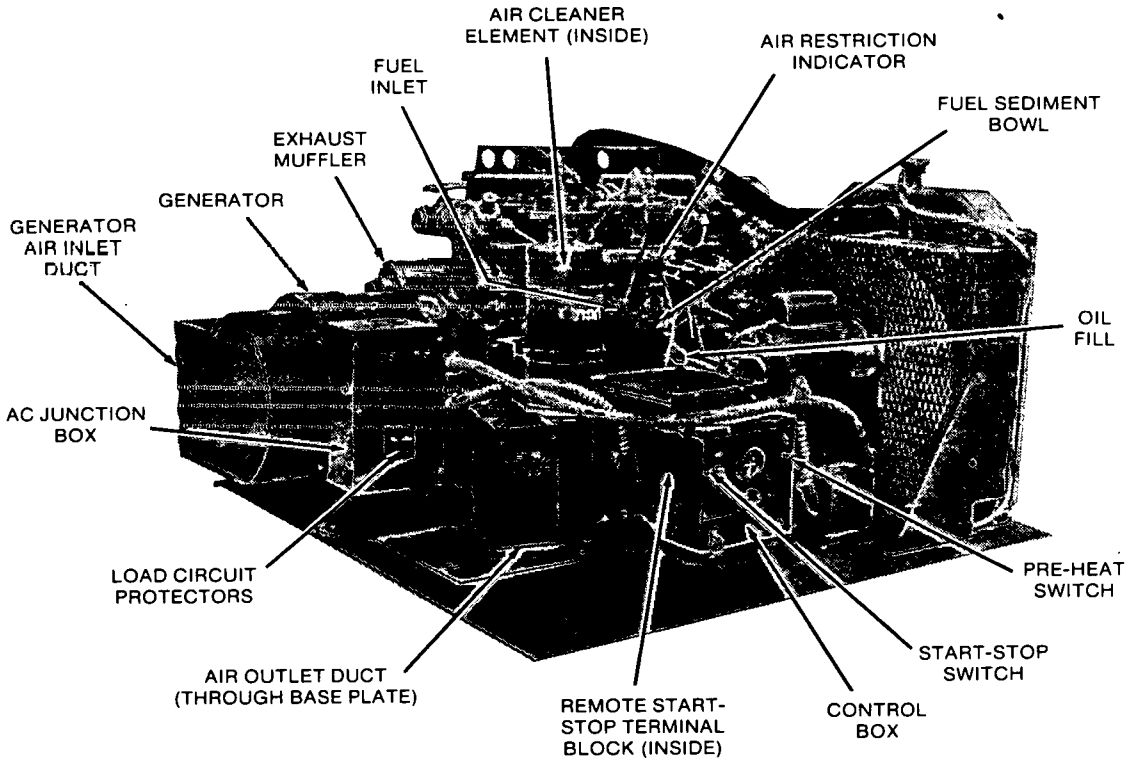

FIGURE 1. TYPICAL RDJC FOR RECREATIONAL VEHICLES

GENERAL SPECIFICATIONS

ENGINE

Onan vertical in line 4-cylinder, 4-cycle, water cooled, diesel fueled engine rated 26.5 bhp at 1800 rpm. Remote start, negative ground, 12-volt, solenoid shift starter. Preheat switch (glow plugs and manifold heater).

ALTERNATOR

Onan-built, four-pole, revolving field permanently aligned to engine. Generator produces 120/240 volts, 52 amps each leg, 60 hertz, single phase AC, 12,000 watt output.

CONTROL

Shock mounted control featuring charge rate ammeter, fused battery charging and Start Stop controls with remote start capability.

RV ELECTRIC GENERATING SET

Some general specifications are listed below for reference purposes.

SPECIFICATIONS

Height	28.50 in. (724 mm)
Length	43.0 in. (1092 mm)
Width	44.0 in. (1118 mm)
Weight (Approx)	1100 lbs. (499 kg)
Air Requirements	
Total (CFM)	Approx. 2250 (637.2 m^3/min)
Fuel Inlet Connection	
Size	1/4" Inverted Flare
Recomended Fuel	#1 or #2 Diesel
Battery Voltage	12 Volts
Battery AMP-HR	
Minimum	(2) SAE Group 2D-560 Cold Cranking Amps
Battery Ground	Negative
RPM (At rated load 60 Hz)	1800

NOTE: Metric values are shown in parentheses.

PRE-START CHECKS

This RV generator set is completely assembled as received except for spark arrester and any optional accessory items shipped loose with each set for installation later. After the initial installation is completed the following steps are necessary before actually starting the generator set for the first time.

1. Install the exhaust system.
2. Add oil to the engine.
3. Connect fuel line and return line to engine from fuel supply tank.
4. Connect AC load circuits.
5. Connect the start stop remote switches.
6. Connect battery leads between set and battery. Connect ground lead last.
7. Fill radiator with coolant.

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

WARNING **Do not smoke while servicing batteries. Lead acid batteries give off explosive gases while being charged.**

FUEL SYSTEM

With set running, check for leaks. Check around injector and fuel pump inlets for any leaks. Make sure fuel lines are not rubbing against anything which could cause breakage. Refer to Fuel System Section.

ELECTRICAL

AC Output

All AC leads (T1, T2, T3, and T4) terminate at the main circuit breaker in generator set's junction box. Generator main circuit breaker load wiring should be connected to distribution box with multistand wire enclosed in a flexible conduit. Check all wires (to and from the generator set) for fraying and loose connections. For information on load connections refer to ELECTRICAL LOADS AND CONNECTIONS section.

Battery Connections

Battery positive (+) connects to starter motor. Battery negative (-) connects to location on rear of generator. Check terminals on set for clean and tight connections.

WARNING

ENGINE EXHAUST GAS (CARBON MONOXIDE) IS DEADLY!

Carbon monoxide is an odorless, colorless gas formed by incomplete combustion of hydrocarbon fuels. Carbon monoxide is a dangerous gas that can cause unconsciousness and is potentially lethal. Some of the symptoms or signs of carbon monoxide inhalation are:

- **Dizziness**
- **Intense Headache**
- **Weakness and Sleepiness**
- **Vomiting**
- **Muscular Twitching**
- **Throbbing in Temples**

If you experience any of the above symptoms, get out into fresh air immediately.

The best protection against carbon monoxide inhalation is a regular inspection of the complete exhaust system. If you notice a change in the sound or appearance of exhaust system, shut the unit down immediately and have it inspected and repaired at once by a competent mechanic.

MAINTAIN THE FOLLOWING MINIMUM INSTALLATION CLEARANCES:

1. Exhaust Pipe to Top of Compartment - 2"
2. Exhaust Pipe to Side of Compartment - 3-1/2"
3. Top of Generator End of Set to Top of Compartment - 2"
4. Radiator Cap to Top of Compartment - 2-1/2"
5. Drive Belt Guide to Compartment Door - 0"
6. Muffler To Side of Compartment - 2-1/4"
7. Muffler To Top of Compartment - 1/4"
8. Rear of Engine (Above Generator) To Back of Compartment - 1/2"

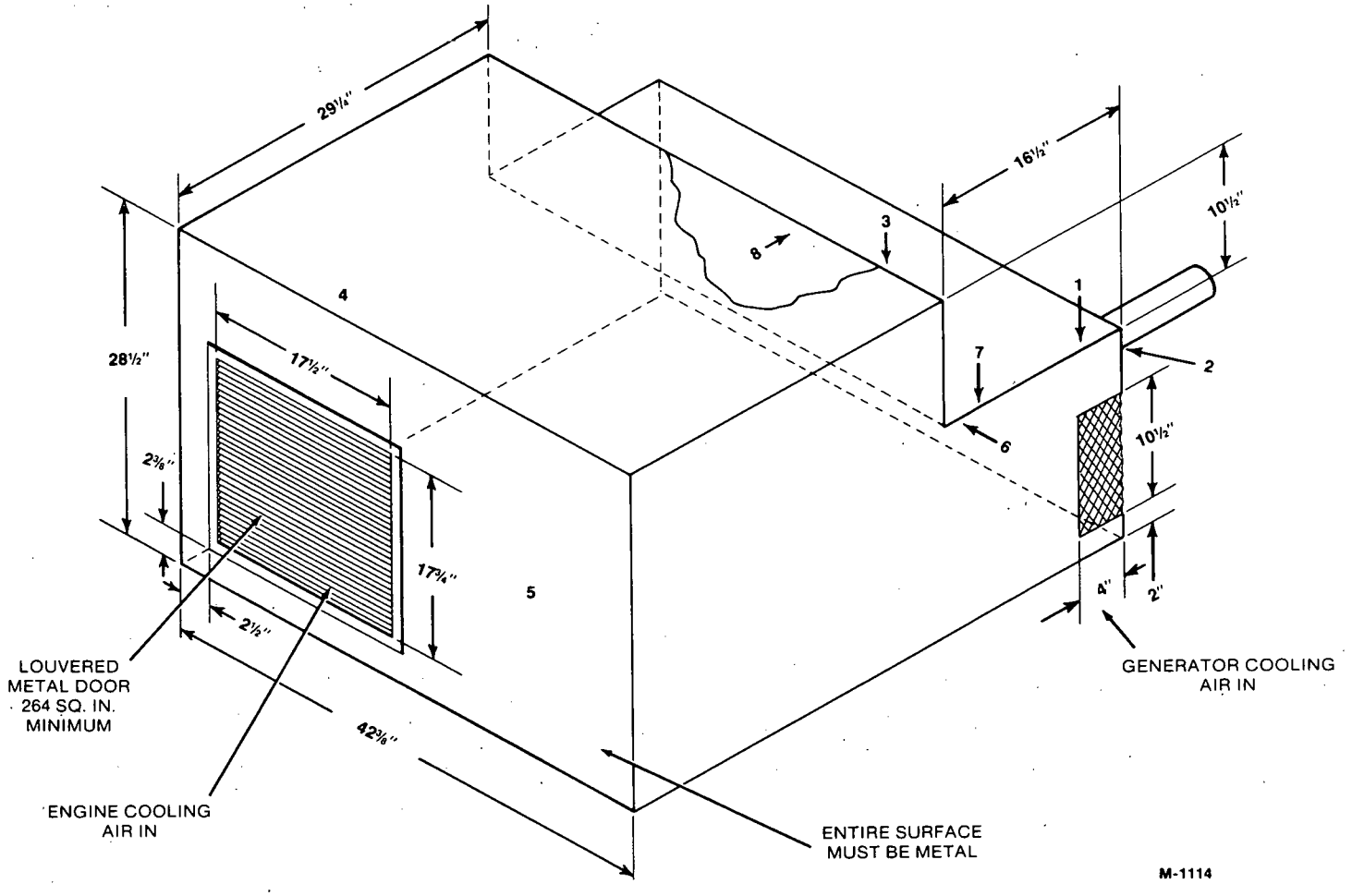

FIGURE 2. COMPARTMENT SIZE AND MINIMUM DIMENSIONS

COMPARTMENT SIZE AND LOCATION

COMPARTMENT SIZE AND LOCATION

Compartment location is determined largely by:

1. Physical size.
2. Access opening.
3. Mounting support—most important of all.

Physical Size

The area in the vehicle for the electric generating set must be large enough for the compartment, with specified minimum clearance between the electric generating set and compartment walls or ceiling (and acoustical material, if used.) See Figure 2.

ACCESS OPENING

Plan the location for an access opening large enough to permit set removal. Compartment door should be designed for easy removal or for easy access for operator or service personal.

MOUNTING SUPPORT

Because of compartment weight, the most desirable mounting location is between the main frame members of the recreational vehicle. However, this is seldom possible. Most common installations are on the side of the vehicle and most difficult to reinforce. One side of the compartment is fastened to the frame and the opposite side secured to the body. Compartment floor must be metal.

Channel, box or angle iron can be used for a compartment frame with a sheet metal cover.

COMPARTMENT

1. Compartment or installation area must be separated from living quarters by a vapor-tight wall.

WARNING **Separate installation area or compartment from living quarters by a vapor-tight wall to prevent entrance of noxious fumes to interior and possible asphyxiation hazard.**

2. Line the compartment or separate from living quarters with a fire barrier of sheet metal or other noncombustible material. The compartment can also be readily sealed and lends itself easily to sound or accoustical treatment.

WARNING **Do not use flammable material directly above or around the electric generating set compartment. Heat transferred through the sheet metal compartment structure or other material can be HOT enough to discolor, char or ignite fiberboard, seat cushions, etc. Use of asbestos or other noncombustible temperature insulating material in high temperature areas may be necessary.**

3. See Figure 2 for minimum clearances and compartment size.
4. DO NOT use absorbent sound proofing material on compartment floor. The floor should have minimum openings to reduce entrance of road dirt. Compartment floor must be so constructed as to prevent accumulation of oil, fuel or water in any corner. Drainage can be accomplished through the use of a 1/2" diameter hole near each corner or other suitable means.

WARNING **Be sure holes are not directly above muffler to prevent fire hazard.**

VIBRATION ISOLATORS

Rubber vibration isolators are furnished with all Onan recreational vehicle models.

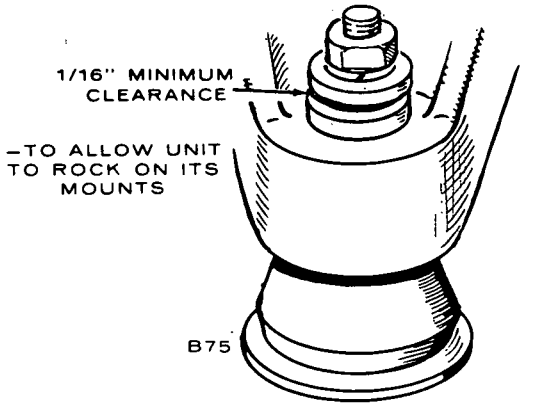

FIGURE 3. VIBRATION ISOLATORS

1. Onan mounts are a "through bolt" type which prevent the set from breaking loose if they are damaged.
2. Vibration isolators of the type shown (with snubbing washers) in Figure 3 must be installed properly to minimize vibration. Leave 1/16-inch minimum clearance between the snubbing washers as shown in Figure 3.

VENTILATION AND ACOUSTICS

The most important factors of ventilation for an air-cooled RV electric generating set are sufficient incoming cooling air and exhausting heated air. Before considering the installation problems, knowledge of how an Onan unit cools itself is needed. See Figure 4.

WARNING **Never use discharged cooling air for heating since it can contain poisonous gases.**

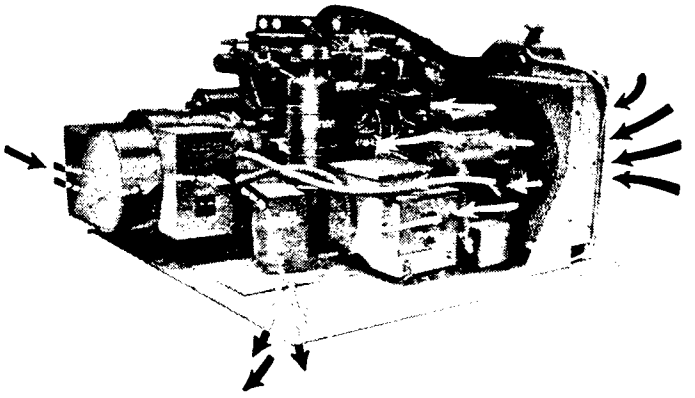

FIGURE 4. TYPICAL ONAN RV COOLING SYSTEM

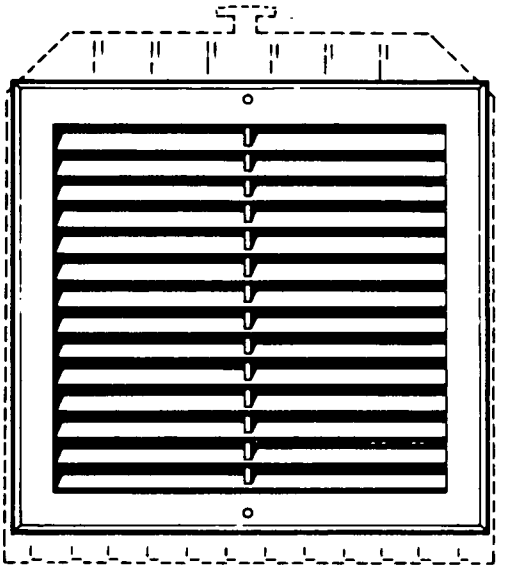

FIGURE 5. RADIATOR AIR REQUIREMENTS

AIR REQUIREMENTS

The 12.0 RDJC running at 1800 rpm requires a minimum radiator air inlet opening 17.5" wide x 17.75" high with no restrictions. The cooling air through the floor discharge duct is 160 cubic feet per minute. See Figure 4 and 5.

WARNING **Insulation must not reduce the minimum clearances as specified in Figure 2, to comply with temperature rise and safety requirements of recreational vehicles, to prevent fire hazard.**

RESTRICTED AIR OPENINGS

Sheet metal with louvers can be used over inlet areas. 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 manufacturer. Unrestricted air inlet requirements for this set is 264 square inches (1.8 square feet). See Figure 5.

COMPARTMENT ACOUSTICAL LINING

1. Be sure all joints and corners of the compartment are vapor tight to coach interior before lining with acoustical material.

   Lining the compartment does little if opening, cracks, door and joints are not sealed. Also make sure compartment door edge is sealed to eliminate noise-air leaks around the door perimeter.
2. Cover the sound reflective surfaces, back, top and sides (not compartment base) with fiberflass or other noncombustible acoustical material. It should be no less than one inch thick and approximately two pounds per square foot in density. Be sure adhesive used is also noncombustible. Test acoustical material and adhesive for heat effects before using.
3. Rather than using one single material of two pound per square foot density, a combination of materials can reduce noise even more. For example, a sheet of lead or visoelastic material of one-half to one pound per square foot density and a layer of one inch acoustical material of two pound per square foot density, respectively, is far more superior.

WARNING **Separate installation area or compartment from living quarters by a vapor-tight wall to prevent entrance of noxious fumes to interior and possible asphyxiation hazard.**

WARNING **Insulation must not reduce the minimum clearances as specified in Figure 2 to comply with temperature rise and safety requirements for recreational vehicles to prevent fire hazard.**

FUEL SYSTEM

RECOMMENDED FUEL

Use ASTM 2-D or 1-D fuel with a minimum Cetane number of 45*. Number 2 diesel fuel gives the best economy for most operating conditions; however, use ASTM 1-D fuel during the following conditions:

1. When ambient temperatures are below 32°F (0°C)
2. During long periods of light engine load; or no load.

***NOTE: Fuels with Cetane numbers higher than 45 may be needed in higher altitudes or when extremely low ambient temperatures are encountered to prevent misfires.**

Use low sulfur content fuel having a pour point (ability to filter) of at least 10°F (6°C) below the lowest expected temperature. Keep the fuel clean and protected from adverse weather. Leave some room for expansion when filling the fuel tank.

CAUTION **Due to the precise tolerances of diesel injection systems, it is extremely important the fuel be kept clean. Dirt in the system can cause severe damage to both the injection pump and the injection nozzle.**

WARNING **Leakage of fuel in or around the compartment is a serious fire hazard. The ventilation system should 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 interior to keep fumes from within the vehicle.**

FUEL CONSUMPTION

It should be noted that under varying electrical loads, fuel consumption of engines for recreational vehicle generator sets varies accordingly. Average fuel consumption at rated load is 1.30 gallons per hour.

FUEL LINES, RETURN LINE AND FUEL FILTERS

Fuel Lines

1. Most electric generating set installations are designed to share the vehicle fuel supply tank with the vehicle engine. All connections to vehicle fuel system must be in accordance with chassis (vehicle) manufacturers' detailed installation instructions.
2. Install an approved flexible non-metallic and non-organic fuel line between the vehicle fuel system and the engine to absorb vibration.
3. Use of seamless steel tubing and flared connections are recommended for long runs between the fuel tank and the flexible connector to the generator set.
4. Run fuel lines at the top level of tank to a point as close to the engine as possible to reduce danger of fuel siphoning out of tank if the line should break.
5. Keep fuel lines away from hot engine or exhaust areas.
6. Connect 7/16 inch fuel return line from bleeder valve on injection pump to top of fuel supply tank.
7. When sharing the fuel tank with vehicle engine, use a separate fuel line for each engine to avoid starving the generator set. Keep fuel tank pick-up off the bottom of the tank to reduce the chance of contaminants clogging the fuel line.
8. Flexible line must be long enough to allow for 4" of set movement to prevent binding, stretching or breaking because of set movement.
9. Install lines so they are accessible and protected from damage.
10. Use metal straps without sharp edges to secure the fuel lines.
11. Do not run fuel line in conjunction with electrical wiring.
12. For servicing, install a shut-off valve at the fuel tank.

Fuel Filters

This generator set is equipped with a primary and secondary in-line fuel filters.

Operating the generator set from a tee in the main fuel line can cause erratic operation when vehicle is operated at highway speeds. The set's fuel pump has neither the capacity nor the power to overcome the draw of vehicle engine fuel pump.

EXHAUST SYSTEM

Plan each individual exhaust system carefully. A proper installation is not only gas tight, but usually quieter, too. Be sure to check all applicable recreational vehicle standards, local codes and regulations.

WARNING **Plan the exhaust system carefully. Exhaust gases are deadly!**

CAUTION **Do not connect the electric generating set exhaust to the vehicle system. Water vapor from one engine can damage the other engine.**

1. The exhaust system must be no closer than 2 inches from any combustible material, or be so located, insulated or shielded so it does not raise the temperature of any combustible material by more than 117°F (65°C) above the ambient air inlet temperature.

2. The exhaust system must extend a minimum of one inch beyond the perimeter of the vehicle. If the generator set tailpipe is on the same side of the coach as the compartment, it should terminate aft of the air intake to prevent recirculation of exhaust fumes.

WARNING **Do not terminate poisonous carbon monoxide exhaust gas under vehicle. Direct exhaust gases away from window and door openings. Keep all openings above or to the rear of exhaust pipes closed when generator set is operating.**

3. Exhaust pipe must terminate a minimum of three feet from the vehicle fuel filler spout (more distance if required by local codes).

4. Use automotive type tail pipe hangers for hanging the exhaust system from vehicle undercarriage.

CAUTION **If tail pipe deflector is used, be sure it is large enough to prevent excessive back pressure.**

EXHAUST SPARK ARRESTERS

Exhaust spark arresters are necessary for SAFE OPERATION. All require periodic clean-out (every 50 to 100 operating hours) to maintain maximum efficiency. Some state and federal parks require them. To clean spark arrester remove pipe plug in bottom of muffler. Run set under load for 5 minutes. Replace plug.

WARNING **All exhaust shielding supplied with unit MUST be properly installed to prevent overheating of compartment walls or the possibility of fire.**

WARNING **Check exhaust system (visually and audibly) for leaks daily (at least every 8 hours of running time). Excessive exhaust noise may indicate on exhaust line leak.**

Modifications of exhaust system will void the UL listing and Onan warranty. Liability for damage or injury and warranty expenses due to any changes become the responsibility of the person making such changes.

IMPORTANT: Certain states (particularly California) have state ordinances pertaining to the type and usage of exhaust muffler/spark arresters on internal combustion engines or engine driven equipment when used in a recreational vehicle such as electric generating sets. Be sure your installation meets all Federal, State and local codes pertaining to your unit. Failure to provide and maintain a spark arrester may be in violation of the law.

ELECTRICAL LOADS AND CONNECTIONS

All of the following description pertains to alternating currrent Onan electric generating sets for recreational vehicles.

1. All wiring must meet applicable local electrical codes. Have a qualified electrician install and inspect the wiring.
2. Wires must be adequate size, properly insulated and supported in an approved manner.
3. Mount switches and controls securely to prevent damage from vibration and road shocks. All switches must be vibration-proof to prevent accidental opening or closing while the vehicle is in motion.
4. Install an approved junction box for feeder conductors from the electric generating set. It must have a blank cover and be inside compartment (not on set).

WARNING **To prevent noxious gases from entering vehicle interior, seal any openings made in the set's compartment for conduit, wiring, etc. Sickness or asphyxiation may result.**

WIRE TYPES

Use multistrand wire which meets all applicable codes as feeder conductors, from electric generating set to compartment junction box. Many installers use multistrand wire throughout the vehicle to reduce the danger of breakage from vibration.

The conductors of the electric generating set shall have an ampacity not less then 115 percent of the nameplate current rating of the generator. Neutral conductors shall be the same size as the conductors of the outside legs.

Supply conductors from the electric generating set to the junction box on the compartment wall must be installed in flexible metalic conduit.

CAUTION **Do not use solid metal conductors in compartment. They may develop metal fatigue from set movement and eventually break.**

WARNING **Because of fire hazard, do not tie electrical wiring to fuel line.**

RECONNECTIBLE, SINGLE-PHASE GENERATOR

Voltage selection on reconnectible single-phase generators is for use as 120/240 volts, 3-wire; or 120 volts, 2 wire. Balance the load when connecting for three wire service. Current for any one output lead must not exceed nameplate rating. When two or more single-phase circuits are available, divide the load equally between them. See Figure 6.

SAFETY DISCONNECT

The feeder conductors from the set compartment must terminate in a three-pole, double-throw, positive off, switching device for 120/240 operation ahead of the vehicle distribution panel. This assures the outside power source cannot be connected simultaneously with the electric generating set. Neutral must be switched.

WARNING **Use only approved power supply assemblies. Never remove grounding pin from power supply assembly. Incorrect or no ground may cause the recreational vehicle to be electrically "hot." This is a potential shock hazard.**

On recreational vehicles which have provisions for using outside AC utility power (separate from the electric generating set) the neutral as well as the "HOT" lead MUST be completely isolated from the RV when load or power is switched.

The operation of a typical transfer device is shown in Figure 7. In addition to the transfer device, an over current protection device (circuit breaker or fuse) shall be provided between the transfer device and the AC circuit in RV. A ground fault circuit interrupter should be installed in the wiring system to protect all branch circuits.

STARTING CONTROLS

Remote control Onan electric generating sets are designated by an "R" in the model number and allow the operator to start the set inside the vehicle. Refer to operator's manual for specific information.

POWER REQUIREMENTS FOR APPLIANCES

Appliance or Tool	Approximate Running Wattage
Refrigerator	600-1000
Electric broom	200-500
Coffee percolator	550-700
Electric frying pan	1000-1350
Hair dryer	350-500
Electric stove (per element)	350-1000
Electric iron	500-1200
Radio	50-200
Electric water heater	1000-1500
Space heater	1000-1500
Electric blanket	50-200
Television	200-600
Electric drill	250-750
Battery charger	Up to 800
Electric water pump	500-600
Air Conditioner	1400-2200
Converter	300-350
Microwave oven	700-1500

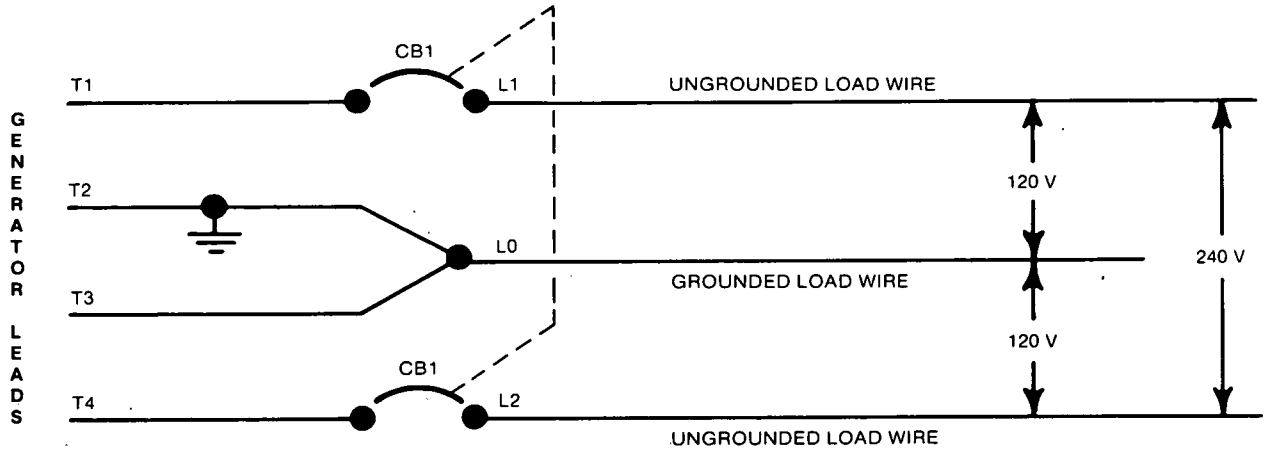

FIGURE 6. SINGLE-PHASE, "3C" VOLTAGE CODE GENERATOR CONNECTIONS

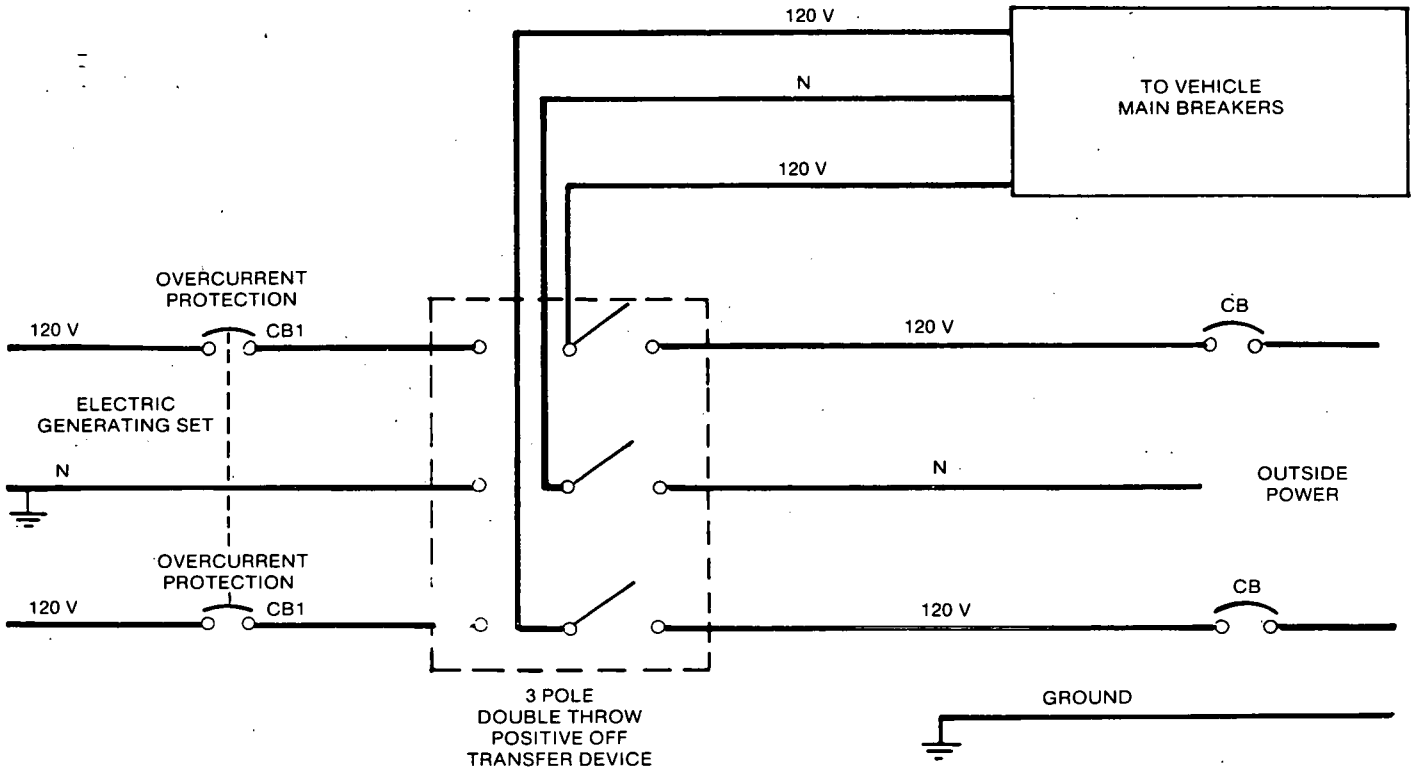

FIGURE 7. SCHEMATIC OF TRANSFER DEVICE AND OVERLOAD PROTECTION

BATTERIES

BATTERY CARE

To increase battery life, the operator can perform a number of routine checks and some preventive maintenance.

1. Keep the battery case clean and dry.
2. Make sure the battery cable connections are clean and tight. Use a terminal puller when removing cables for any reason.
3. Coat the battery terminals with a mineral grease or petroleum jelly to reduce corrosion and oxidation.
4. Identify each battery cable to be positive or negative before making any connection. Always connect the ground (negative) cable last.
5. Maintain the electrolyte level by adding water (drinking quality or better) as needed for filling to split level marker. (The water ingredient of the electrolyte evaporates, but the sulphuric acid ingredient remains. Therefore, add water, not electrolyte).
6. Avoid overcharging when recharging. Stop the boost charge when the specifc gravity is 1.260 and the electrolyte is 80° F (26.7° C).

BATTERIES AND BATTERY CABLES

In order for the electric generating set to crank efficiently under various operating conditions, the battery and battery cables must be correctly chosen and installed. Before selecting a battery, be sure the installation area is compatible and properly designed. The compartment for the battery must provide:

1. Rigid mounting support.
2. A location where accidental acid spills or leaks won't damage set, battery cables, etc.
3. Provide a minimum of 2 square inches at top and 2 square inches at bottom of battery for ventilation purposes.
4. Battery cable entry points should be sealed (vapor tight) if they enter or pass through living area.

WARNING **Mount the battery in a separate compartment from the set or any spark-producing device to prevent fire or explosion.**

CAUTION **Never disconnect the battery with either engine running and never crank both engines simultaneously.**

BATTERY CABLES

For reliable starting, voltage drop from the battery terminals to the exciter cranking windings of the generator should not exceed 0.12 volts per 100 amperes of break-away current *while cranking.* Disconnect lead to fuel solenoid during test to prevent set from starting. Measure voltage at battery terminals and at start solenoid terminal *while cranking.* Connect the battery negative to ground with the same size cable as used for battery positive.

Be sure the frame connection (major frame member if possible) is sufficient to minimize resistance. Try to avoid a connection at a weld or mechanical joint.

For short distances, one negative battery cable can be used between set and battery rather then separate cables to chassis ground.

The 12.0RDJC draws 475 amperes of cranking current.

The break-away current is approximately 715 amperes.

The charging current varies from 2-5 amperes depending on battery condition (state of charge).

For additional information on installation contact your Onan Service Representative.

Onan recommends using a separate battery for operation of the generator in addition to the regular vehicle starting battery.

WARNING **Do not disconnect battery cables from battery while generator set is cranking or running; sparks may cause an explosion.**

TABLE 1. MINIMUM 12 VOLT BATTERY SIZE* (OR USE 2-6 VOLT BATTERIES IN SERIES)

Above 32° F (0° C)	Above 0° F (-18° C)
BCI Group 2 565 Cold Cranking Amps	BCI Group 5D 800 Cold Cranking Amps

***Larger capacity batteries may be required if battery is also used to power other coach accessories.**