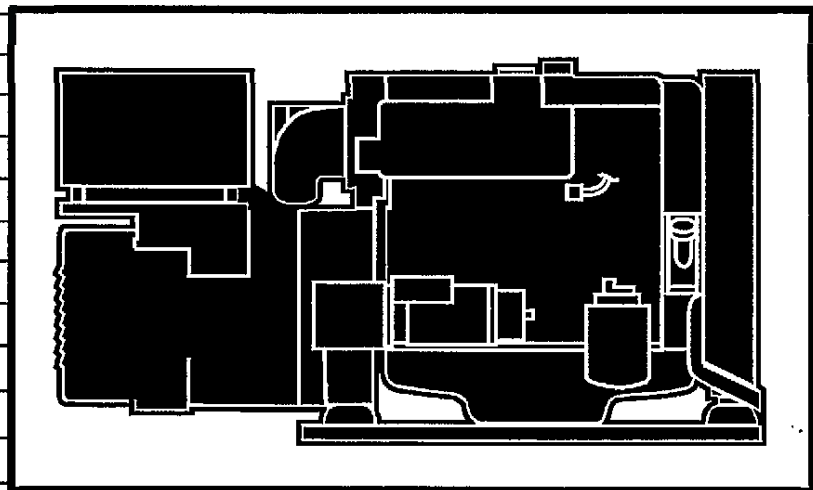


Onan

MARINE

Service Manual

MDL3
MDL4
MDL6



Printed in U.S.A.

934-0500
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Safety Precautions

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

Throughout this manual you will notice symbols which alert you to potentially dangerous conditions to the operator, service personnel, or the equipment itself.

⚠ 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, ENGINE OIL, AND FUMES ARE FLAMMABLE AND TOXIC. Fire, explosion, and personal injury can result from improper practices.

- Benzene and lead, found in some gasoline, have been identified by some state and federal agencies as causing cancer or reproductive toxicity. When checking, draining or adding gasoline, take care not to ingest, breathe the fumes, or contact gasoline.
- 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.
- Do not fill fuel tanks with the engine running. Do not smoke around the generator set area. Wipe up any oil or gas spills. Do not leave oily rags in engine compartment or on the generator set. Keep this and surrounding area clean.
- Inspect fuel system before each operation and periodically while running.
- Equip the engine fuel supply with a positive fuel shutoff.
- Always disconnect the battery ground (–) lead first and reconnect it last. Make sure you connect the battery correctly. A direct short across the battery terminals can cause an explosion. Do not smoke while servicing batteries. Hydrogen gas given off during charging is very explosive.
- Keep a fire extinguisher available in or near the engine compartment and in other areas throughout the vessel. Use the correct extinguisher for the area. For most types of fires, an extinguisher rated ABC by the NFPA is available and suitable for use on all types of fires except alcohol.

EXHAUST GASES ARE DEADLY

- Provide adequate ventilation. Equip the bilge with a power

exhauster.

- Be sure propulsion and generator set engine exhaust systems are free of leaks. Perform thorough, periodic inspections of the exhaust system and repair leaks immediately. Exhaust gases are deadly.
- Never sleep in the vessel with the generator set running unless the vessel is equipped with an operating carbon monoxide detector.

HOT COOLANT CAN CAUSE SEVERE PERSONAL INJURY

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

MOVING PARTS CAN CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not remove any belt guards or covers with the generator set running.
- Keep hands and loose clothing away from moving parts. Do not wear jewelry while servicing any part of the generator set.
- Never step on the generator set (as when entering or leaving the engine compartment). It can stress and break unit components, possibly resulting in dangerous operating conditions. . . from leaking fuel, leaking exhaust fumes, etc.
- Before performing any maintenance on the generator set, disconnect its batteries to prevent accidental starting. do not disconnect or connect battery cables if fuel vapors are present. Ventilate the generator set compartment or bilge thoroughly with the power exhauster.

ELECTRICAL SHOCK WILL CAUSE SEVERE PERSONAL INJURY OR DEATH

- Do not make adjustments in the control panel or on engine with unit running. High voltages are present. Work that must be done while unit is running should be done only by qualified service personnel standing on dry surfaces to reduce shock hazard.
- **DO NOT CONNECT THE GENERATOR SET TO THE PUBLIC UTILITY OR TO ANY OTHER ELECTRICAL POWER SYSTEM.** Electrocutation or damage to property can occur at a site remote from the boat where line or equipment repairs are being made if the set is connected to the power system. An approved transfer switch must be used if more than one power source is to be made available to service the boat.
- 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. **M8**

Copy and post these suggestions in potential hazard areas of the vessel.

Table of Contents

SECTION	TITLE	PAGE
	SAFETY PRECAUTIONS	ii
1	INTRODUCTION	1-1
	About this Manual	1-1
	Test Equipment	1-1
	Safety Considerations	1-1
	Generator Set Removal	1-2
2	GENERATOR AND VOLTAGE REGULATOR	2-1
	Generator Description	2-1
	Generator Operation	2-2
	Voltage Regulator	2-3
	Generator Service	2-5
3	GENERATOR/REGULATOR TROUBLESHOOTING	3-1
	Preparation	3-1
	Troubleshooting Procedures	3-1
4	GENERATOR/REGULATOR TESTS	4-1
	General	4-1
	(A) Testing AC Residual Voltage	4-1
	(B) Testing Commutating Reactor	4-1
	(C) Testing Rectifier Bridge CR21 and Suppressor RV21	4-1
	(D) Flashing the Field	4-2
	(E) Testing Reference Transformer	4-2
	(F) VR21 Replacement	4-2
	(G) Testing Rotating Rectifiers	4-3
	(H) Testing Exciter Stator	4-3
	(J) Testing Exciter Rotor	4-4
	(K) Testing Generator Stator	4-4
	(L) Testing Generator Rotor	4-5
	(M) Wiring Harness Check	4-6
	(N) Testing Regulating Transformer T21	4-6
	(P) Voltage Adjustment	4-7
	(Q) Reconnection	4-7
5	ENGINE CONTROL	5-1
	General	5-1
	MDL Control	5-1
6	ENGINE CONTROL ADJUSTMENTS/TESTS	6-1
	General	6-1
	(A) Battery Checkout	6-1
	(B) Battery Cable Checkout	6-1
	(C) Battery Charging Checkout	6-1
	(D) Solenoid Checkout	6-1
	(E) Relay Checkout	6-2
	(F) Fuel Solenoid Checkout	6-2
	(G) Switch Checkout	6-2
	(H) Solenoid Checkout	7-1
7	WIRING DIAGRAMS	7-1

Section 1. Introduction

ABOUT THIS MANUAL

This manual covers troubleshooting and repair information for the generator and control. Refer to a separate engine service manual 934-0750 when servicing the engine.

This manual has separate sections for the generator and voltage regulator, engine control, and associated wiring diagrams. While the wiring diagrams at the end of the manual are included to help trace or isolate problems, it is suggested that service personnel use the wiring diagrams shipped with the unit for troubleshooting.

Repair information for solid state printed circuit boards is not extensive because they lend themselves more to replacement than repair. Application of meters or hot soldering irons to printed circuit boards by other than qualified personnel can cause unnecessary and expensive damage.

Repair of the printed circuit boards is not recommended except by the factory. A return and exchange service has been initiated whereby faulty printed circuit boards can be returned to the Distributor and exchanged for good units. For more information, contact your Onan Distributor.

CAUTION *High voltage (Megger) testing or high potential (high pot) testing of generator windings can cause damage to solid state components. Isolate these components before testing.*

TEST EQUIPMENT

Most of the test procedures in this manual can be performed with an AC-DC multimeter such as a Simpson Model 260 VOM or a digital VOM. Some other instruments to have available are:

- Megger or Insulation Resistance Meter
- Onan Multitester
- Wheatstone Bridge
- Jumper Leads
- Load Test Panel
- Variac
- AC Voltmeter
- DC Voltmeter
- Frequency Meter
- Tachometer or Strobotach

See Tool Catalog 900-0019.

Several troubleshooting guides are included in this manual to help the serviceperson locate the cause of various malfunctions. Note that some malfunctions might have several possible causes. For this reason, the service person may have to investigate several problem areas in order to isolate the source of the malfunction. Because of the complexity of the product, a troubleshooting chart cannot list every malfunction and cause. In some situations, the serviceperson will have to rely on experience and a knowledge of the product to locate the problem and service as required.

SAFETY CONSIDERATIONS

Always consider the safety aspects of any service procedure. Generator sets present several hazards that the serviceperson must be aware of to safely complete the job. Read through the safety precautions listed on the inside cover and familiarize yourself with the various hazards shown in Table 1-1. Once the hazards are known, approach the job with a safety conscious attitude. Being safety conscious is the most effective way to avoid injury to yourself or others. Reduce the chance that an accident will occur by adopting the following safeguards.

Safeguards to Avoid Hazards

- *Use Personal Protection* - Protect your body by wearing appropriate safety equipment. Protective clothing includes safety shoes, gloves, safety glasses, and hard hats. Leave rings and jewelry off and do not wear loose clothing that might get caught on equipment.
- *Work to Reduce the Hazard* - The workshop area and all pieces of equipment used can contribute to reducing the hazard potential. Keep guards and shields in place on machinery and maintain equipment in good working condition. Store flammable liquids in approved containers, or other ignition source. Keep the workshop clean and well-lighted, and provide adequate ventilation. Keep fire extinguishers and safety equipment nearby and be prepared to respond to an emergency.

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