



SCANNED 8/30/06

Operation and Maintenance Manual

3500B Engines and 3500 Engines With EUI Option

3DM1-Up (Engine)	2HW1-Up (Engine)
4GM1-Up (Engine)	3DW1-Up (Engine)
5XM1-Up (Engine)	4AW1-Up (Engine)
6PM1-Up (Engine)	
7KM1-Up (Engine)	
8EM1-Up (Engine)	
8RM1-Up (Engine)	
6HN1-Up (Engine)	
6PN1-Up (Engine)	
6WN1-Up (Engine)	
7RN1-Up (Engine)	
9AN1-Up (Engine)	
3LS1-Up (Engine)	
3MS1-Up (Engine)	
3NS1-Up (Engine)	
3TS1-Up (Engine)	
3WS1-Up (Engine)	
3XS1-Up (Engine)	
1NW1-Up (Engine)	
1PW1-Up (Engine)	
2FW1-Up (Engine)	

Prime Power, Standby, and Marine Auxiliary Generator Set Engines

Important Safety Information

Most accidents that involve product operation, maintenance and repair are caused by failure to observe basic safety rules or precautions. An accident can often be avoided by recognizing potentially hazardous situations before an accident occurs. A person must be alert to potential hazards. This person should also have the necessary training, skills and tools to perform these functions properly.

Improper operation, lubrication, maintenance or repair of this product can be dangerous and could result in injury or death.

Do not operate or perform any lubrication, maintenance or repair on this product, until you have read and understood the operation, lubrication, maintenance and repair information.

Safety precautions and warnings are provided in this manual and on the product. If these hazard warnings are not heeded, bodily injury or death could occur to you or to other persons.

The hazards are identified by the "Safety Alert Symbol" and followed by a "Signal Word" such as "DANGER", "WARNING" or "CAUTION". The Safety Alert "WARNING" label is shown below.



The meaning of this safety alert symbol is as follows:

Attention! Become Alert! Your Safety is Involved.

The message that appears under the warning explains the hazard and can be either written or pictorially presented.

Operations that may cause product damage are identified by "NOTICE" labels on the product and in this publication.

Caterpillar cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this publication and on the product are, therefore, not all inclusive. If a tool, procedure, work method or operating technique that is not specifically recommended by Caterpillar is used, you must satisfy yourself that it is safe for you and for others. You should also ensure that the product will not be damaged or be made unsafe by the operation, lubrication, maintenance or repair procedures that you choose.

The information, specifications, and illustrations in this publication are on the basis of information that was available at the time that the publication was written. The specifications, torques, pressures, measurements, adjustments, illustrations, and other items can change at any time. These changes can affect the service that is given to the product. Obtain the complete and most current information before you start any job. Caterpillar dealers have the most current information available. For a list of the most current publication form numbers available, see the Service Manual Contents Microfiche, REG1139F.



When replacement parts are required for this product Caterpillar recommends using Caterpillar replacement parts or parts with equivalent specifications including, but not limited to, physical dimensions, type, strength and material.

Failure to heed this warning can lead to premature failures, product damage, personal injury or death.

Table of Contents

Foreword	4	Maintenance Interval Schedule	92
Safety Section		Maintenance Interval Schedule (Standby Generator Set Engines)	94
Safety Signs and Labels	6	Reference Information Section	
General Hazard Information	12	Engine Ratings	143
Burn Prevention	14	Customer Service	145
Fire Prevention and Explosion Prevention	14	Reference Materials	147
Crushing Prevention and Cutting Prevention	15	Index Section	
Mounting and Dismounting	16	Index	151
Before Starting Engine	16		
Engine Starting	16		
Engine Stopping	17		
Electrical System	17		
Product Information Section			
Model Views	18		
Product Identification Information	23		
Operation Section			
Engine Lifting and Storage	26		
Gauges and Indicators	27		
Engine Features and Controls	30		
Engine Starting	57		
Engine Operation	62		
Engine Stopping	63		
Cold Weather Operation	65		
Maintenance Section			
Torque Specifications	67		
Lubricant Specifications	70		
Fuel Specifications	77		
Cooling System Specifications	79		
Refill Capacities	90		

Foreword

Literature Information

This manual contains safety, operation instructions, lubrication and maintenance information. This manual should be stored in or near the engine area in a literature holder or literature storage area. Read, study and keep it with the literature and engine information.

English is the primary language for all Caterpillar publications. The English used facilitates translation and consistency in electronic media delivery.

Some photographs or illustrations in this manual show details or attachments that may be different from your engine. Guards and covers may have been removed for illustrative purposes. Continuing improvement and advancement of product design may have caused changes to your engine which are not included in this manual. Whenever a question arises regarding your engine, or this manual, please consult with your Caterpillar dealer for the latest available information.

Safety

This safety section lists basic safety precautions. In addition, this section identifies hazardous, warning situations. Read and understand the basic precautions listed in the safety section before operating or performing lubrication, maintenance and repair on this product.

Operation

Operating techniques outlined in this manual are basic. They assist with developing the skills and techniques required to operate the engine more efficiently and economically. Skill and techniques develop as the operator gains knowledge of the engine and its capabilities.

The operation section is a reference for operators. Photographs and illustrations guide the operator through procedures of inspecting, starting, operating and stopping the engine. This section also includes a discussion of electronic diagnostic information.

Maintenance

The maintenance section is a guide to engine care. The illustrated, step-by-step instructions are grouped by fuel consumption, service hours and/or calendar time maintenance intervals. Items in the maintenance schedule are referenced to detailed instructions that follow.

Use fuel consumption or service hours to determine intervals. Calendar intervals shown (daily, annually, etc.) may be used instead of service meter intervals if they provide more convenient schedules and approximate the indicated service meter reading.

Recommended service should be performed at the appropriate intervals as indicated in the Maintenance Interval Schedule. The actual operating environment of the engine also governs the Maintenance Interval Schedule. Therefore, under extremely severe, dusty, wet or freezing cold operating conditions, more frequent lubrication and maintenance than is specified in the Maintenance Interval Schedule may be necessary.

The maintenance schedule items are organized for a preventive maintenance management program. If the preventive maintenance program is followed, a periodic tune-up is not required. The implementation of a preventive maintenance management program should minimize operating costs through cost avoidances resulting from reductions in unscheduled downtime and failures.

Maintenance Intervals

Perform maintenance on items at multiples of the original requirement. Each level and/or individual items in each level should be shifted ahead or back depending upon your specific maintenance practices, operation and application. We recommend that the maintenance schedules be reproduced and displayed near the engine as a convenient reminder. We also recommend that a maintenance record be maintained as part of the engine's permanent record.

See the section in the Operation and Maintenance Manual, "Maintenance Records" for information regarding documents that are generally accepted as proof of maintenance or repair. Your authorized Caterpillar dealer can assist you in adjusting your maintenance schedule to meet the needs of your operating environment.

Overhaul

Major engine overhaul details are not covered in the Operation and Maintenance Manual except for the interval and the maintenance items in that interval. Major repairs are best left to trained personnel or an authorized Caterpillar dealer. Your Caterpillar dealer offers a variety of options regarding overhaul programs. If you experience a major engine failure, there are also numerous after failure overhaul options available from your Caterpillar dealer. Consult with your dealer for information regarding these options.

California Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

Battery posts, terminals and related accessories contain lead and lead compounds. **Wash hands after handling.**

Certified Engine Maintenance

Proper maintenance and repair is essential to keep the engine and machine systems operating correctly. As the heavy duty off-road diesel engine owner, you are responsible for the performance of the required maintenance listed in the Owner Manual, Operation and Maintenance Manual, and Service Manual.

It is prohibited for any person engaged in the business of repairing, servicing, selling, leasing, or trading engines or machines to remove, alter, or render inoperative any emission related device or element of design installed on or in an engine or machine that is in compliance with the regulations (40 CFR Part 89). Certain elements of the machine and engine such as the exhaust system, fuel system, electrical system, intake air system and cooling system may be emission related and should not be altered unless approved by Caterpillar .

Safety Section

Safety Signs and Labels

i01231232

SMCS Code: 1000; 7405

There may be several specific safety signs on your engine. The exact location and a description of the signs are reviewed in this section. Please become familiar with all of the signs.

Ensure that all of the signs are legible. Clean the signs or replace the signs if the words cannot be read or if the illustrations are not visible. Use a cloth, water, and soap for cleaning the signs. Do not use solvents, gasoline, or other harsh chemicals. Solvents, gasoline, or harsh chemicals could loosen the adhesive that secures the signs. The signs that are loosened could drop off of the engine.

Replace any sign that is damaged or missing. If a sign is attached to a part of the engine that is replaced, install a new sign on the replacement part. Your Caterpillar dealer can provide new signs.

WARNING

Do not operate or work on this engine unless you have read and understand the instructions and warnings in the Operation and Maintenance Manual. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Caterpillar dealer for replacement manuals. Proper care is your responsibility.

The safety signs that may be attached on the engine are illustrated and described below.

Crankcase Covers

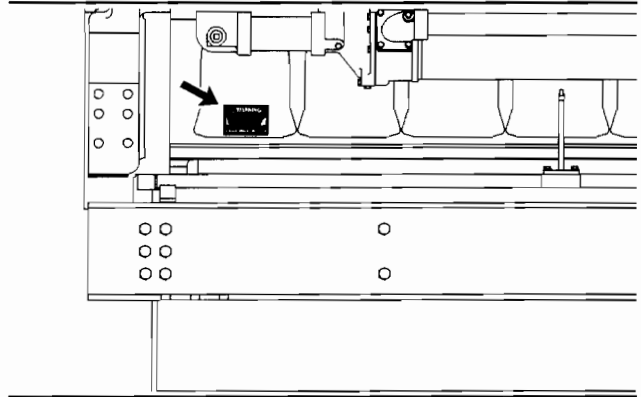


Illustration 1

g00386802

The warning labels for the crankcase covers are located on the crankcase covers.



g00123185

WARNING

Flash fire may result in personal injury, if crankcase covers are removed within fifteen minutes after emergency shut down. Do not restart engine until cause for shutdown has been corrected.

Duplex Fuel Filter and Oil Filter

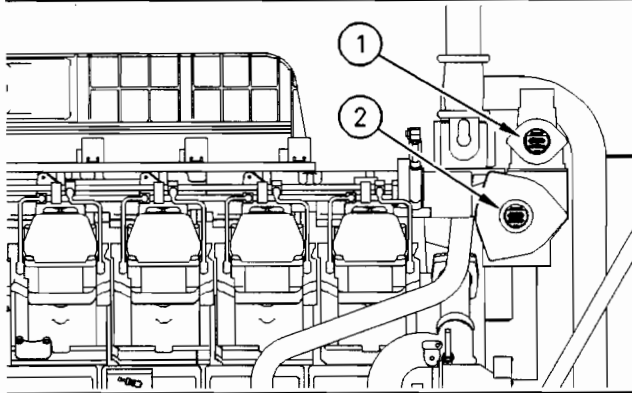


Illustration 2

g00580638

The warning label for the duplex fuel filter and the duplex oil filter is located on the cover of the fuel filter (1) and the oil filter (2).



g00306243

WARNING

Filter contains hot pressurized fluid when engine is running. Follow instructions on control valve to avoid injury if rapid air movement exists to blow fluid. Stop engine to avoid fire.

Electrical Distribution (Generator)

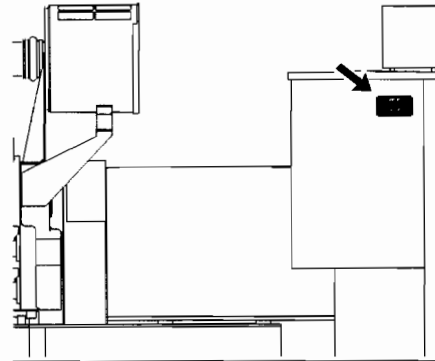
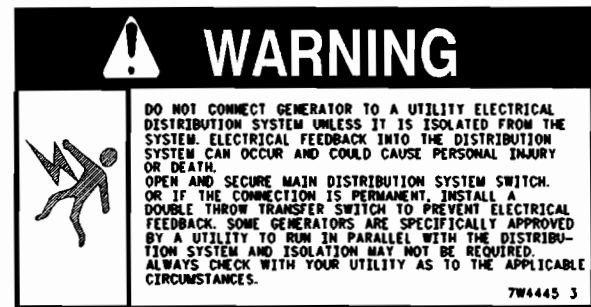


Illustration 3

g00305862

The warning label for electrical distribution (generator) is located on the covers of the generator.



g00296980

WARNING

Do not connect generator to a utility electrical distribution system unless it is isolated from the system. Electrical feedback into the distribution system can occur and could cause personal injury or death.

Open and secure main distribution system switch, or if the connection is permanent, install a double throw transfer switch to prevent electrical feedback. Some generators are specifically approved by a utility to run in parallel with the distribution system and isolation may not be required. Always check with your utility as to the applicable circumstances.

Electrical Shock

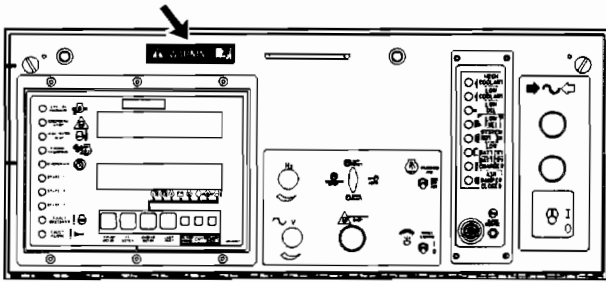


Illustration 4

g00580740

The warning label for electrical shock is located on the control panel.



g00580695

Electrical shock can cause personal injury or death. Before electrical equipment is serviced, disconnect the power. Electrical equipment includes the following components: engine control system, wiring harnesses, and sensors.

Emergency Stop

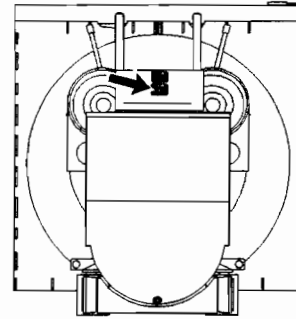


Illustration 5

g00305895

The warning label for emergency stop is located on the outside of the door of the control panel.



g00305896



Always operate this unit with the vandal door open. Operating the unit with the vandal door closed restricts access to the emergency stop button and could result in injury or death.

Radiator Coolant

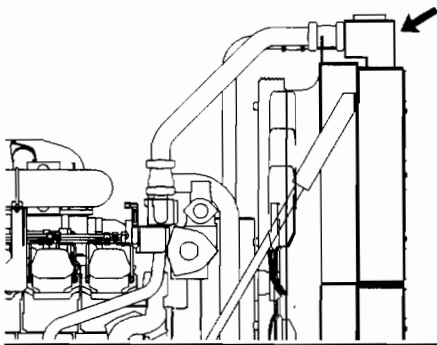
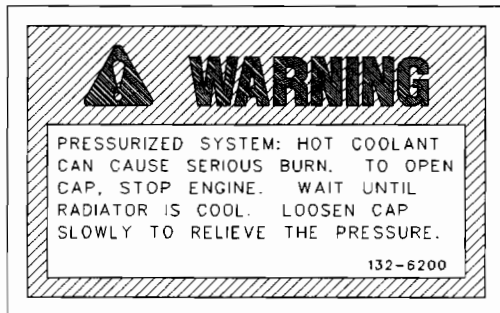


Illustration 6

g00658509

The radiator coolant warning label is located near the front of the radiator filler cap.



g00658535

WARNING

Pressurized system: hot coolant can cause serious burn. To open cap, stop engine. Wait until radiator is cool. Loosen cap slowly to relieve the pressure.

Base Lifting

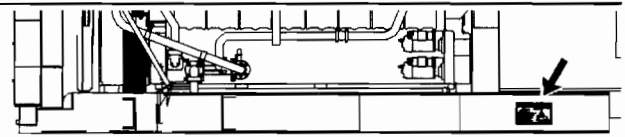
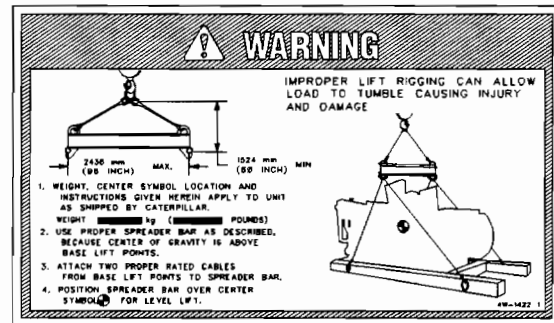


Illustration 7

g00658557

The base lifting warning label is located on the base.



g00658561

WARNING

Improper lift rigging can allow unit to tumble causing injury and damage.

Before lifting the generator set, read this Operation and Maintenance Manual, "Engine Lifting" topic (Operation Section).

If improper equipment is used to lift the generator set, injury and damage can occur. Use cables that are properly rated for the weight. Use a spreader bar and attach the cables according to the information on the warning label.

High Voltage

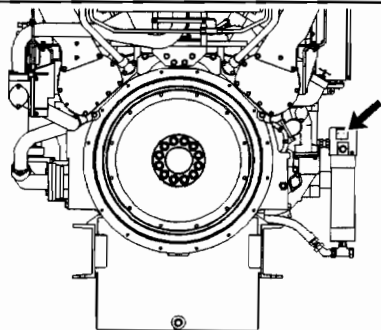
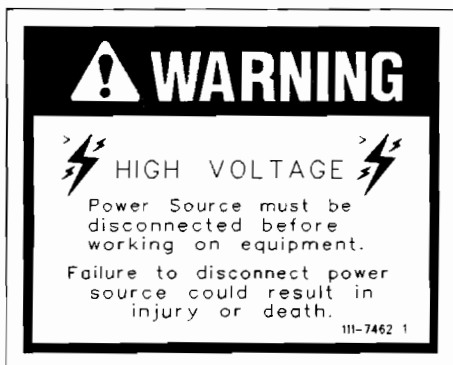


Illustration 8

g00664982

The warning label for high voltage is located on the jacket water heater.



g00481390

WARNING

Power source must be disconnected before working on equipment.

Failure to disconnect power source could result in injury or death.

Engine Lifting

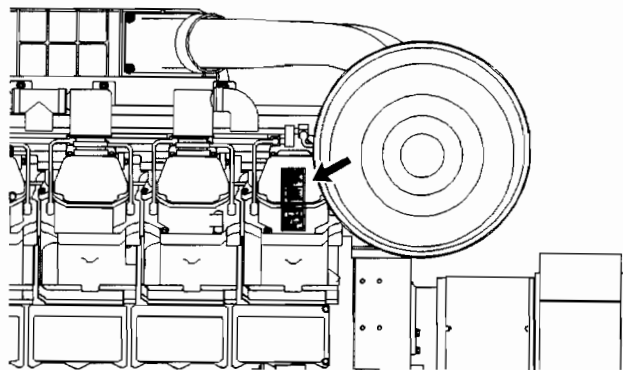
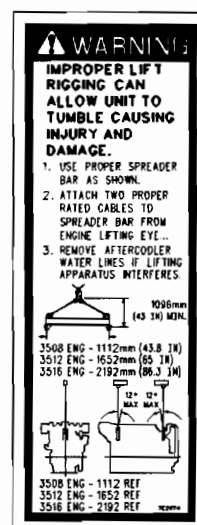


Illustration 9

g00580494

The warning label for lifting the engine is located on the valve covers.



g00306083

WARNING

Improper lift rigging can allow unit to tumble causing injury and damage.

Before lifting the engine, read this Operation and Maintenance Manual, "Engine Lifting" topic (Operation Section).

If improper equipment is used to lift the engine, injury and damage can occur. Use cables that are properly rated for the weight. Use a spreader bar and attach the cables according to the information on the warning label.