

Product: EXCAVATOR

Model: 245 EXCAVATOR 94L

Configuration: 245 EXCAVATOR 94L00255-UP (MACHINE) POWERED BY 3406 ENGINE

## **Operation and Maintenance Manual 245 TRACK-TYPE EXCAVATOR**

Media Number -SEBU5903-02

Publication Date -01/01/1987

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### **Foreword**

#### **SMCS - 7606**

This publication is a guide to equipment care. The illustrated, step-by-step instructions are grouped by servicing intervals. Items without specific intervals are listed under "When Required." Items in the "Lubrication and Maintenance Chart" are referenced to detailed instructions that follow.

Use the service meter to determine servicing intervals. Calendar intervals shown (daily, weekly, monthly, etc.) may be used instead of service meter intervals if they provide more convenient servicing schedules and approximate the indicated service meter reading. Recommended service should always be performed at the interval that occurs first.

Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the "Lubrication and Maintenance Chart" may be necessary.

Perform service on items at multiples of the original requirement. For example, at Every 500 Service Hours or 3 Months, also service those items listed under Every 250 Service Hours or Monthly, Every 50 Service Hours or Weekly and Every 10 Service Hours or Daily.

Some photographs in this publication may show details or attachments that may be different from your machine. Also, guards and covers may have been removed for illustrative purposes.

Continuing improvement and advancement of product design may have caused changes to your machine which may not be covered in this publication.

Whenever a question arises regarding your machine, or this publication, please consult your Caterpillar dealer for the latest available information.

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## Safety

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### WARNING

**Lubrication, maintenance or repair of this machine can be dangerous unless performed properly. Each person must satisfy himself that he has the necessary skill and information, proper tools and equipment, and that his work method is safe and correct. Caterpillar dealers are available to provide this service.**

**Perform all maintenance operations, unless otherwise specified, with all equipment lowered, and the hydraulic and antitravel lock lever in the inoperable position. The engine must be stopped and the disconnect off and the key removed.**

There are certain hazards which must be recognized as potential causes of personal injury. Be aware of these hazards and follow the recommendations which are listed below.

### **Crushing or Cutting**

Never attempt adjustments while the machine is moving or the engine is running.

Any implement can fall if a control is moved, or a hydraulic line breaks.

Support equipment when working beneath it. Do not depend on hydraulic cylinders to hold it up.

To avoid possible weakening of the FOPS (Falling Object Protective Structure), consult a Caterpillar dealer before altering the FOPS in any way. The protection offered by the FOPS will be impaired if it has been subjected to structural damage.

The fan blades will throw or cut any object or tool that falls or is pushed into them.

Do not use kinked or frayed cable, it is weakened. Wear gloves when handling cable.

Chips can fly from a steel object or hammer. Wear protective glasses when hammering on steel, drifts, punches or chisels. Never strike a punch, drift, or chisel that has a mushroomed end.

## **Burns**

The radiator and all lines to heaters or engine contain hot water or steam.

Never remove the radiator cap when the coolant is hot.

Check the coolant level ONLY when the engine is stopped, and the radiator cap is cool enough to touch with your hand.

Allow cooling system components to cool before draining the coolant.

Lubricants will be hot enough to cause serious burns after machine compartments are up to normal operating temperature. Allow the compartments to cool before draining lubricant.

The hydraulic system will be pressurized, by hot air in the top of the tank, when the system is at operating temperature.

Never remove the hydraulic tank cap when the oil is hot. Remove the hydraulic tank cap slowly to relieve tank pressure. Allow the tank to cool before draining oil.

## **Fire or Explosion**

Diesel fuel and all lubricants are flammable.

Do not weld or flame cut on pipes or tubes that contain oil.

Clean them thoroughly with nonflammable solvent before welding or flame cutting on them.

Do not smoke when refueling, or when working in areas containing fuels.

To avoid fires, clean up oil spills, and steam clean the machine.

Loose or damaged lines, tubes, and hoses, which leak, can cause fires.

Do not bend or strike high pressure lines. Do not install bent or damaged lines, tubes, or hoses.

Inspect all lines, tubes, and hoses, carefully. Tighten all connections to the recommended torque. Make sure that all clamps, guards, and heat shields, are installed correctly to prevent vibration, rubbing against other parts, or excessive heat during operation.

Fire may result, from lubricating oil or fuel sprayed on hot surfaces, causing personal injury or property damage.

Keep all exhaust manifold and turbocharger shields in place to reduce fire hazards.

The vapor, hydrogen gas, from a charging battery is explosive. Do not smoke when checking batteries, or working around them. Make certain the disconnect switch is off when working around batteries.

A spark at a connection near a battery can cause an explosion. See the operation guide for special precautions when boost starting.

## **Fluids**

Cooling system conditioners contain alkali, do not drink them or allow them to get in eyes.

Battery electrolyte is an acid. It will harm skin and eyes.

Keep all lubricants stored in properly marked containers and away from children.

Never put maintenance fluids in glass bottles or glasses.

## **Safety Equipment**

Wear a hard hat, protective shoes and protective glasses when performing lubrication and maintenance operations.

Limit air pressure to 205 kPa (30 psi) when cleaning with air.

Never point air nozzle toward anyone.

Know the rating on cable, chains and slings before using them.



If start up could cause injury, attach a "DO NOT OPERATE," or similar warning tag to the machine start switch when working on the machine. These tags are available from your Caterpillar dealer, form number SEHS7332.

Use steps and grab irons and face the machine when climbing on or off the machine.

Store rags that have oil, or other flammable material on them, in a protective container, away from open fires, welding or flame cutting areas.

Operate the engine only in a well ventilated area. If it is necessary to operate in a closed area, vent the exhaust to the outside.

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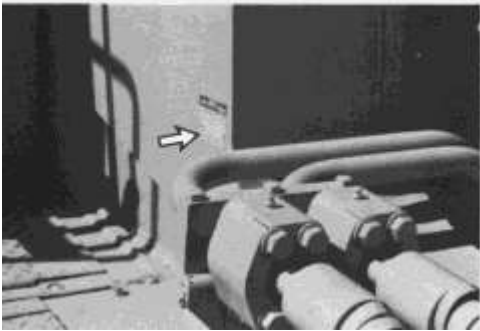
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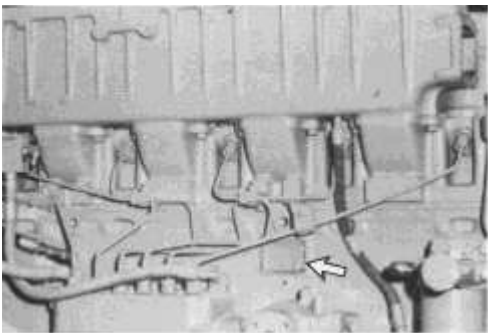
### Serial Number Locations

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For quick reference, record your machine's serial numbers in the spaces provided below the photographs.



Vehicle Serial Number \_\_\_\_\_



Engine Serial Number \_\_\_\_\_



Swing Bearing Serial Number \_\_\_\_\_



Combined Vehicle and Engine Serial Number Plate

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# **Maintenance Recommendations**

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## **Cooling System**

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### **NOTICE**

**Never add coolant to an overheated engine; allow the engine to cool first.**

**Check the specific gravity of the antifreeze solution frequently in cold weather to ensure adequate protection.**

**If the machine is to be stored in, or shipped to, an area with below freezing temperatures; the cooling system must be protected against freezing to the lowest expected outside temperature.**

**All water is corrosive at engine operating temperature. The cooling system should be protected with conditioner at all times regardless of the concentration of antifreeze. This can be done by using Caterpillar Coolant Conditioner Elements. Use a precharge element when filling the system or changing coolant. Install a new maintenance element every 250 service hours during operation.**

**Do not use Caterpillar Coolant Conditioner Elements with Dowtherm 209 Full-Fill coolant. Follow the instructions provided with the Dowtherm 209 Full-Fill coolant.**

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Coolant should be drained and replaced "Every 2000 Service Hours or 1 Year." However, when Coolant Conditioner Maintenance Elements are replaced every 250 service hours as recommended, the drain period can be extended to "4000 Service Hours or 2 Years."

Premix antifreeze solution to provide protection to the lowest expected outside temperature. Pure undiluted antifreeze will freeze at -23°C (-10°F).

Use clean water that is low in scale forming mineral. Do not use softened water.

Filling at over 20 liters (5 U.S. gallons) per minute can cause air pockets in the cooling system.

After draining and refilling the cooling system, run the engine with the filler cap off until the coolant level stabilizes. Add coolant as necessary to fill the system.

The engine cooling system is protected to -28°C (-20°F), with permanent type antifreeze, when shipped from the factory.

Operate with a thermostat in the cooling system all year-round. Cooling system problems can arise without a thermostat.

To help prevent engine overheating at outside temperatures above 43°C (110°F), the optional High Temperature Cooling System is recommended.

It provides an increased cooling capacity that helps protect the system from overheating up to 55°C (125°F). Consult your Caterpillar dealer for information.

## **Electrical System**

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### **NOTICE**

**When boost starting machine, follow the instructions in the Operation Guide to properly start the machine.**

**When using external electrical source to start machine, turn disconnect switch off and remove key before attaching booster cables.**

**This machine has a 24 Volt starting system. Use only equal voltage for boost starting. Use of welder or higher voltage will damage electrical system.**

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## **Hydraulic System**

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### **NOTICE**

**Make-up oil added to the hydraulic system must mix with the oil already in the tank. Use only petroleum products unless the system is equipped for use with special products.**

**Water or air can cause pump failure. If hydraulic oil becomes cloudy, then water or air is entering the system. Drain fluid, retighten hydraulic suction line clamps, purge and refill the system. Consult your Caterpillar dealer for purging instructions.**

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If hydraulic system drift is experienced while operating at high outside temperatures, SAE30 hydraulic oil should be used.

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## NOTICE

**SAE30 IS NOT recommended if start up temperatures will be below 4° C (40°F).**

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SAE30 hydraulic oil in high temperatures will minimize drift and increase pump life at temperatures up to 55°C (125°F).

A mixture of 55% SAE40 and 45% SAE10 oil is the equivalent of SAE30.

The equivalent of SAE30 oil in the hydraulic system can be obtained by draining the SAE10W oil from the tank and refilling with SAE40 oil.

See "Hydraulic System" at "2000 Service Hours or Yearly" for hydraulic tank drain and refill instructions.

## Fuel System

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## NOTICE

**Fill the fuel tank at the end of each day of operation to drive out moist air and to prevent condensation. Do not fill the tank to the top. The fuel expands as it gets warm and may overflow.**

**Do not fill fuel filters with fuel before installing them. Contaminated fuel will cause accelerated wear to fuel system parts.**

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check the fuel level with the dipstick in the filler opening.

Drain the fuel tank of water and sediment as required by prevailing conditions.

Water and sediment should be drained from the fuel tank at the start of a shift or after the fuel tank has been filled and allowed to stand for 5 to 10 minutes.

After changing fuel filters, always bleed the fuel system to remove air bubbles from system.

Drain water and sediment from any fuel storage tank weekly, and before the tank is refilled. This will help prevent water or sediment from being pumped from the storage tank into the machine fuel tank.

Use only fuel as recommended in the "Fuels, Lubricants, and Coolant" Section of this Guide.

## Air Intake System

Check the precleaner screen daily for accumulation of dust and debris.

Service the air filters when the Air Filter EMS light goes on.

The primary element can be cleaned up to 6 times before replacement. The element, when cleaned, should be thoroughly checked for rips or tears in the filter material. Replace the primary element every year even though it has not been cleaned 6 times.

The secondary filter element has a tab on the outer end of the element to keep a record of when the secondary element should be changed. A section of the tab should be pulled off each time a primary element is serviced. At the time of the third change of a primary element, the secondary element must be replaced.

### **Scheduled Oil Sampling**

Use scheduled oil sampling to monitor machine condition and maintenance requirements. Each oil sample should be taken when the oil is hot and well mixed, to ensure the sample is representative of the oil in the compartment.

<b>Sampling Interval Chart</b>	
<b>Compartment</b>	<b>Interval</b>
Engine Crankcase	At Oil Change
Pump Drive	500 Service Hours
Swing Drive	500 Service Hours
Final Drives	500 Service Hours
Hydraulic System	500 Service Hours

Consult your Caterpillar dealer for complete information and assistance in establishing a scheduled oil sampling program for your equipment.

### **General**

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#### **NOTICE**

**Accumulated grease and oil on a machine is a fire hazard. Remove this debris with steam cleaning or high pressure water, at least every 1000 hours or each time any significant quantity of oil is spilled on a machine.**

**Wipe all fittings, caps and plugs before servicing.**

**Keep a close watch for leaks. If leaking is observed, find and correct the source of the leak.**

**Check the fluid levels more frequently than the recommended periods if leaking is suspected or observed.**

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### Bolt Torques for Ground Engaging Tools

<b>Bolt Size</b>	<b>Recommended Torque*</b>	
	<b>N·m</b>	<b>lb.ft</b>
5/8	265 ± 35	195 ± 25
3/4	475 ± 70	350 ± 50
7/8	765 ± 115	565 ± 85
1	1220 ± 150	900 ± 110

\*These values are applicable only to Caterpillar cutting edge bolts.

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# **Fuel, Coolant, and Lubricant Specifications**

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## **Fuel Specifications**

Caterpillar Diesel Engines have the ability to burn a wide variety of fuels. These fuels are divided into two general groups, preferred and permissible.

### **Types of Fuel**

The preferred fuels provide maximum engine service life and performance. They are distillate fuels. They are commonly called fuel oil, furnace oil, diesel fuel, gas oil, or kerosene.

The permissible fuels are crude oils or blended fuels. Use of these fuels can result in higher maintenance costs and reduced engine service life.

See Caterpillar Form Number SEHS7067, "Fuels for Caterpillar Diesel Engines," for a detailed summary of preferred and permissible fuels and their specifications.

### **Cetane Requirement**

The minimum cetane number recommended for the engine is 40.

### **Fuel Cloud Point**

Fuel waxing can plug the fuel filters in cold weather. The fuel cloud point must be below the temperature of the surrounding air to prevent filter waxing and power loss. Fuel heating attachments are available from your Caterpillar dealer to minimize fuel filter waxing.

### **Fuel Sulfur Content**

The percentage of sulfur in the fuel will affect the engine oil recommendations. If the fuel has over 0.5% sulfur content, the engine oil must have a TBN of 20 times the percentage of fuel sulfur (TBN as measured by the ASTM D-2896 method). If the sulfur content is greater than 1.5%, consult your Caterpillar dealer for correct engine oil recommendations.

## **Coolant Specifications**

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## NOTICE

**Always use conditioner elements. Never use plain water only.**

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Use a mixture of fill water and antifreeze, and a coolant conditioner element.

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## NOTICE

**Do not use Caterpillar Coolant Conditioner Elements with Dowtherm 209 Full-Fill coolant. Follow the instructions provided with the Dowtherm 209 Full-Fill coolant.**

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Caterpillar Form Number SEBD0518 titled, "Know Your Cooling System," can provide more detailed specifications.

### Fill Water

Acceptable water for use in the ethylene glycol-type antifreeze and water mixture is shown on the chart below:

<b>Acceptable Water</b>		
<b>Water Content</b>	<b>50% or More Antifreeze</b>	<b>Less Than 50% Antifreeze</b>
Chlorides	100 ppm or less	50 ppm or less
Sulfates	100 ppm or less	50 ppm or less
Hardness as CaCO <sub>3</sub>	200 ppm or less	100 ppm or less
Dissolved Solids	500 ppm or less	250 ppm or less
pH	6.5 or higher	6.5 or higher

ppm = parts per million

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### Antifreeze

Use ethylene glycol-type antifreeze. Use the correct amount to provide freeze protection to the lowest expected outside temperature.

## **Coolant Conditioner Elements**

Coolant Conditioner Elements should be used to maintain a 3% to 6% concentration of conditioner in the coolant. Use a precharge element when filling the system or changing coolant. Install a new maintenance element every 250 service hours during operation. Use the Coolant Conditioner Elements shown in the chart below.

<b>Coolant Conditioner Elements</b>		
<b>Type</b>	<b>Qty.</b>	<b>Part Number</b>
<b>Precharge</b>	<b>1</b>	<b>1W5518</b>
<b>Maintenance</b>	<b>1</b>	<b>9N3368</b>

## **Lubricant Specifications**

The abbreviations listed below follow S.A.E. J754 nomenclature. The classifications follow S.A.E. J183 classifications. The MIL specifications are U.S.A. Military Specifications. These definitions will be of assistance in purchasing. The specific classifications for this machine are found on the "Lubricant Viscosity Recommendations" chart.

### **Engine Oils or Pump Drive (CD or CD/TO-2)**

Use oils that meet the Engine Service Classification CD (MIL-L-2104D) or oils that have satisfactory performance in the Caterpillar Oil Test Number TO-2. These oils are referred to as Service Classification CD/TO-2.

Consult the "EMA Lubricating Oils Data Book," form SEBU5939, for a listing of CD oil brands.

### **Hydraulic Oils (HYDO)**

Use Engine Service Classification CC (MIL-L-2104B), CC/SF (MIL-L-2104D) or industrial-type hydraulic oils that are certified by the oil supplier to have antiwear, antifoam, antirust, and antioxidation additive properties for heavy duty use.

### **Swing and Final Drives and Track Rollers and Idler (CC, CD or CD/TO-2)**

Use oils that meet Engine Service Classification CC (MIL-L-2104B or MIL-L-46151), or CD (MIL-L-2104D) or CD oils that have satisfactory performance in the Caterpillar Oil Test No. TO-2: Referred to as Service Class CD/TO-2 oil.

### **Lubricating Grease (MPGM)**

Use Multipurpose-type Grease (MPGM) which contains 3% to 5% molybdenum disulfide. NLGI No. 2 Grade is suitable for most temperatures. Use NLGI No. 1 or No. 0 Grade for extremely low temperatures.

<b>Compartment or System</b>	<b>Liters</b>	<b>U.S. Gal.</b>	<b>Imperial Gal.</b>
Engine Crankcase	38	10.0	8.3
Engine Crankcase if equipped with by-pass filters	42	11.0	9.1
Pump Drive	6	1.5	1.3
Swing Drive	35	9.8	7.7
Hydraulic System	403	106	89
Final Drives (each side)	60	16	13.2
Fuel Tank	597	158	131
Cooling System	87	23	19

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## **Lubricant Viscosity Recommendations**

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For Temperature Ranges °C and °F*					
Compartment or System	Oil Viscosities	°C		°F	
		Min	Max	Min	Max
Engine Crankcase CD or CD/TO-2	SAE 5W-20 (SPC)	-30	+10	-22	+50
	SAE 5W-20	-25	+10	-13	+50
	SAE 10W	-20	+10	-4	+50
	SAE 10W-30	-20	+40	-4	+104
	SAE 15W-40	-15	+50	+5	+122
	SAE 30	0	+40	+32	+104
	SAE 40	+5	+50	+41	+122
Pump Drive CD or CD/TO-2	SAE 5W-20 (SPC)	-30	+40	-22	+104
	SAE 5W-20	-25	+10	-13	+50
	SAE 10W	-20	+50	-4	+122
Hydraulic System HYDO	SAE 5W-20 (SPC)	-30	+40	-22	+104
	SAE 5W-20	-25	+10	-13	+50
	SAE 10W	-20	+40	-4	+104
	SAE 10W-30	-20	+40	-4	+104
	SAE 15W-40	-15	+50	+5	+122
	SAE 30	+10	+50	+50	+122
Swing Drive, Final Drives CC, CD or CD/TO-2	SAE 5W-20 (SPC)	-30	0	-22	+32
	SAE 10W	-30	0	-22	+32
	SAE 30	-20	+25	-4	+77
	SAE 40	-10	+40	+14	+104
	SAE 50	0	+50	+32	+122
Track Rollers and Idlers CC,CD or CD/TO-2	SAE 30	-30	+50	-22	+122

\* When operating below -30°C (-22°F) refer to the Operation and Maintenance Guide, for Cold Weather Recommendations, Form SEBU5898, available from your Caterpillar dealer.

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## **Lubrication and Maintenance Chart**

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Item	Service	Lube.	Page
<b>When Required</b>			
Engine Air Cleaner	Service filters when the indicator lights, with the engine running at high idle.		15
Fuel System	Service the fuel filters if the engine lacks power. See "Fuel System" at "Every 500 Service Hours or 3 Months."		20
Cooling System	Drain and clean the system if it is contaminated, if the engine overheats or if foaming occurs in the system.		20
Cooling System Relief Valve	Clean or replace the valve if coolant loss or overheating occurs.		23
Starting Aid (Ether) Cylinder	Replace the cylinder when it is empty.		24
Swing Gear	Check the lubricant level if swing gear noise develops – drain water from the housing prior to freezing weather.	<b>MPGM</b>	25
Hydraulic System	Replace filters when the indicator lights, with the oil warm and the engine running at high idle. See "Hydraulic System" at "Every 500 Service Hours or 3 Months."	<b>HYDO</b>	27
Swing Brake	Adjust the brake if it does not prevent the upper structure from swinging against motor torque.		28
Track	Adjust.		29
Circuit Breakers and Fuses	Reset the breakers or check fuses if an electrical circuit does not function.		30
Windshield Wiper and Washer	Change wiper blades if worn or streaking – refill the washer bottle when empty.		32
Bucket Teeth and Side Cutters	Replace or rotate before the mounting surfaces become worn.		33
Carbody to Roller Frame Bolts	Tighten if loose.		35
Suspension Seat	Lubricate 9 fittings if the suspension is noisy.	<b>MPGM</b>	35
<b>Every 10 Service Hours or Daily</b>			
Cooling System	Check coolant level.		36
Engine Air Inlet Screen	Inspect – clean.		37
Engine Crankcase	Check oil level.	<b>CD or CD/TO-2</b>	37
Fuel Tank	Drain moisture and sediment.		38
Electronic Monitoring System (EMS)	Test.		39
Travel Alarm	Test.		40
Front Shovel Boom, Stick and Bucket	Lubricate 28 fittings (34 fittings with bottom dump bucket).	<b>MPGM</b>	41
Swing Bearing	Lubricate under severe operating conditions where mud, water and abrasives may enter the bearings.	<b>MPGM</b>	
Backhoe Boom, Stick and Bucket			

Item	Service	Lube.	Page
<b>Every 50 Service Hours or Weekly</b>			
Pump Drive	Check oil level.	CD or CD/TO-2	44
Hydraulic System	Check oil level.	HYDO	45
Batteries	Check electrolyte levels.		46
Swing Bearing	Lubricate 1 fitting.	MPGM	47
Backhoe Boom, Stick and Bucket	Lubricate 20 fittings.	MPGM	48
Air Conditioner	Clean filter.		49
<b>Every 250 Service Hours or Monthly</b>			
Swing Drive	Check oil level.	CC or CD	50
Engine Crankcase	Change oil and filter. The percentage of sulfur in the fuel will affect the engine oil recommendations. If the fuel has over 0.5% sulfur content, the CD engine oil must have a TBN of 20 times the percentage of fuel sulfur (TBN as measured by the ASTM D-2896 method). Your oil supplier should be able to furnish the correct oils.	CD or CD/TO-2	50
Fan and Alternator Drive Belts	Inspect – adjust.		52
Fan Belt Adjusting Pulley	Lubricate 1 fitting.	MPGM	54
Fan Bearing	Lubricate 1 fitting.	MPGM	54
Refrigerant Compressor Belt	Inspect – adjust.		55
Cooling System	Change cooling system conditioner elements. (Do not change elements monthly unless the engine has operated 250 hours.)		56
Final Drives	Check oil level.	CC or CD	58
<b>Every 500 Service Hours or 3 Months</b>			
Hydraulic System	Change filter elements and wash screen.	HYDO	59
Fuel System	Service fuel filters – wash the fuel tank cap and strainer.		63
Seat Belt	Inspect – replace at least every 3 years.		66
Engine Crankcase Breather	Wash.		67
<b>Every 2000 Service Hours or 1 Year</b>			
Swing Gear	Check lubricant level.	MPGM	69
Hydraulic System	Change oil – wash the filter strainer – inspect suction hoses.	HYDO	69
Pump Drive	Change oil.	CD or CD/TO-2	71
Cooling System	Change coolant.		72
Engine Valve Lash	Check – adjust.		75

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