Product: EXCAVATOR
Model: 235 EXCAVATOR 64R
Configuration: 235 EXCAVATOR 64R01258-UP (MACHINE) POWERED BY 3306 ENGINE

Operation and Maintenance Manual
235 EXCAVATOR

Media Number -SEBU5301-01 **Publication Date -01/06/1993** **Date Updated -11/10/2001**

Foreword

SMCS - 7606

This book 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. Circled numbers in the LUBRICATION AND MAINTENANCE CHART are to key the charted items to the instructions in the book.

Use the service meter to determine servicing intervals. Calendar intervals (daily, weekly, 2 weeks, etc.) shown may be used instead of service meter intervals if it provides more convenient servicing schedules; and approximates the indicated service meter reading.

NOTE: Under extremely severe, dusty or wet operating conditions, more frequent lubrication than is specified in the LUBRICATION AND MAINTENANCE CHART may be necessary.

Electric Service Meter

Perform previous interval items at multiples of the original requirement. For example, at EVERY 250 SERVICE HOURS OR MONTHLY, also perform those items listed under 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 unit.

Continuing improvement and advancement of product design may cause changes to your machine which may not be included in this publication. Each publication is reviewed and revised, as required, to update and include these changes in later editions.

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

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Safety

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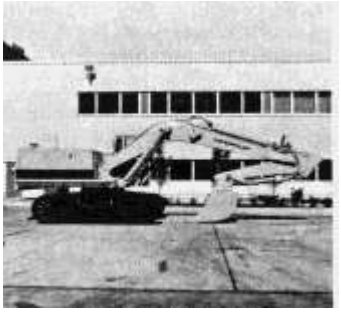
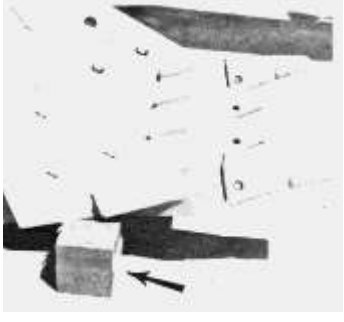


Lower all equipment before servicing excavator, unless instructed otherwise.

Use caution when removing caps, drain plugs, grease fittings or pressure taps.



Block bucket before changing bucket teeth.

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⚠ WARNING

When using pressure air, wear safety face shield and protective clothing. Use 30 PSI (2 kg/cm^2) maximum pressure air for cleaning pressure.

Operate engine only in well ventilated area.

Store oily rags and other combustible material in a safe place.

Promote good housekeeping. Keep tools and work area clean.

Do not smoke while refueling.

Do not attempt adjustments while Excavator is moving or the engine is running.

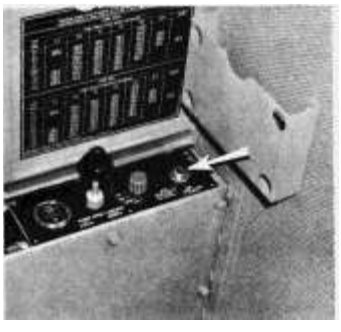
Use the proper tools. Change or repair broken or damaged equipment.

Wear protective clothing, safety glasses, respirator or other safety items when required.

Do not allow unauthorized personnel on the Excavator when it is being serviced.

Do not attempt repairs you do not understand.

Attach tags to controls while Excavator is being serviced.



Turn disconnect switch OFF and remove key before servicing electrical system.

Read warning and caution information provided on the Excavator. Follow servicing instructions carefully.

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Maintenance Recommendations

SMCS - 7606

Cooling

WARNING

Always inspect system with engine off. Remove filler cap slowly to relieve pressure, steam may cause personal injury.

WARNING

Inhibitor contains alkali, avoid contact with skin and eyes to prevent personal injury.

NOTICE

Never add coolant to an overheated engine, allow engine to cool first.

NOTICE

Measure specific gravity of antifreeze solution frequently in cold weather to assure adequate protection.

NOTICE

When permanent antifreeze and water solutions are used in the cooling system, the solution should be drained and replaced every 2000 hours, or yearly. However, when additions of inhibitor are made to the cooling system every 500 hours, or three months, it is not necessary to drain and refill yearly. An antifreeze solution providing protection to at least -20°F (-29°C) must be used to provide corrosion protection.

NOTICE

If machine is to be stored in, or shipped to, an area with below freezing temperatures, the cooling system must be drained completely, or protected to lowest expected ambient temperature.

NOTE: The engine cooling system is protected to -20°F (-29°C), with permanent-type antifreeze, when shipped from the factory.

Use clean water that is low in scale forming minerals, not softened water. Add Caterpillar Corrosion Inhibitor or equivalent to the water to provide corrosion protection. Follow the recommendations on the container for the quantity required.

Whenever draining and refilling cooling system, always observe the coolant level when the engine reaches normal operating temperature.

Filling at over 5 gpm rate can cause air pockets in the cooling system.

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

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

Fuel

WARNING

Do not smoke while refueling. Fumes from fuel are flammable.

NOTICE

Fill fuel tank at the end of each day of operation to drive out moisture laden air and to prevent condensation. Don't fill the tank to the brim. The fuel expands when it gets warm and may overflow.

Measure fuel level with dipstick in filler opening.

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

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

Air Intake

Inspect air intake louvers daily for accumulation of dust and debris.

Service air cleaners when RED band in indicator locks in visible position.

Electrical

Do not smoke when observing battery electrolyte level. Batteries give off flammable fumes.

NOTICE

When using external electrical source to start machines with direct electric starting turn disconnect switch off and remove key before attaching cable to emergency starting recepticle.

NOTICE

When using jumper cables be sure to connect in parallel: POSITIVE (+) to POSITIVE (+) and NEGATIVE (-) to NEGATIVE (-).

General

To prevent personal injury always lower all equipment, stop engine, set parking brake and block or restrain machine before servicing it, unless otherwise specified.

If engine is not running, do not release emergency or parking brake systems unless machine is blocked or restrained. MACHINE COULD MOVE AND CAUSE INJURY TO PERSONNEL.

Whenever draining lubricant extreme caution should be used, lubricant may be hot and can cause personal injury.

Drain moisture and sediment from air reservoirs at the beginning of each day of operation.

Wipe all fittings, caps and plugs before servicing.

Fuel System Recommendations

To prevent fuel system contamination, which can damage fuel system parts, the following recommendations must be followed:

1. Fill fuel tank at end of each day of operation to force out moisture laden air and prevent condensation in tank.

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

3. Clean fuel tank filler cap and screen every 500 hours.

4. If engine fuel system is equipped with a water separator, drain water from water separator daily before starting engine. Always drain water from separator before it becomes one-half full. Frequent draining may be necessary in areas of high humidity or when fuel supply is contaminated with water.

NOTE: Drain water and sediment from the main 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.

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Walk-Around Inspection

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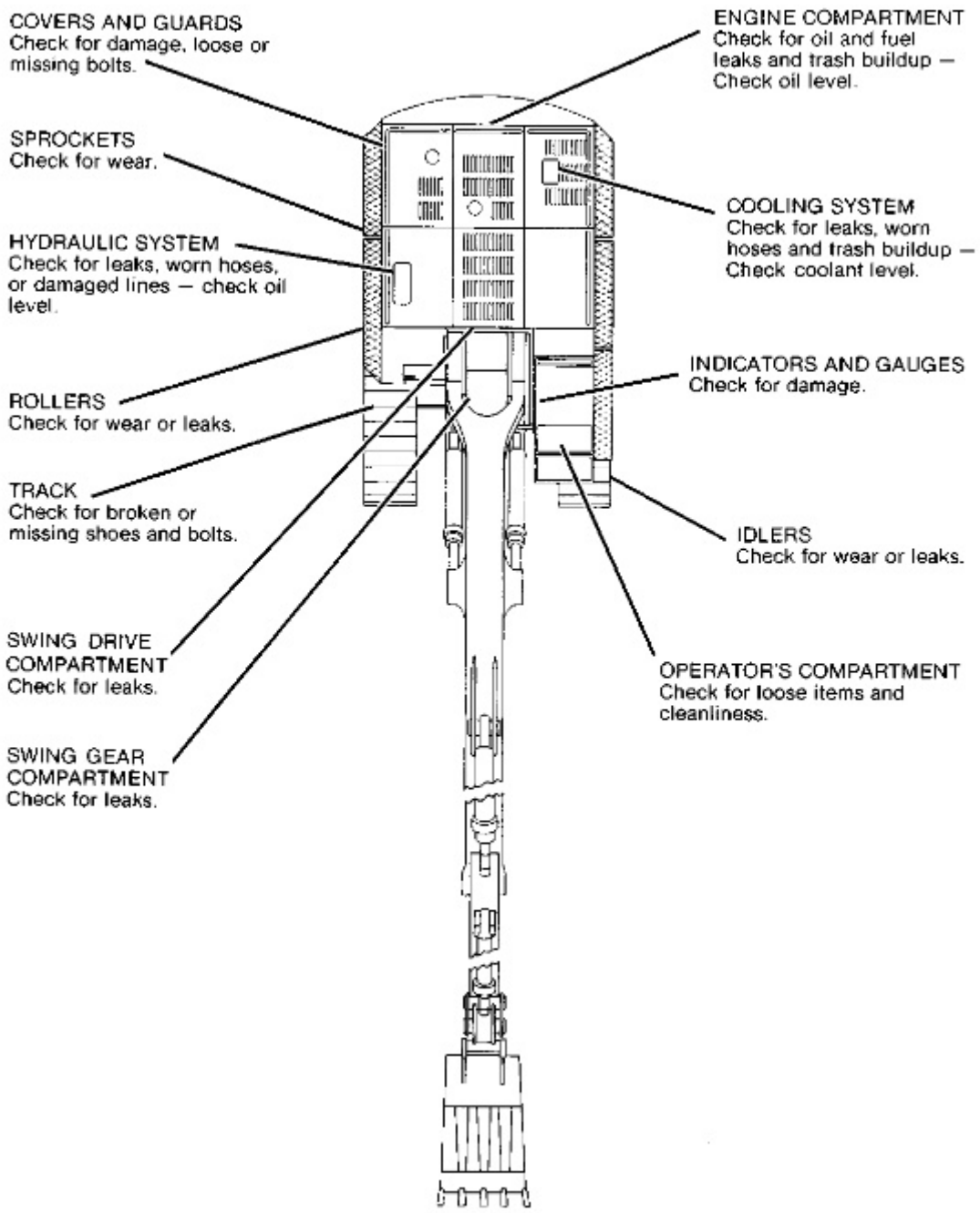
For maintenance and operator personnel safety, and maximum service life of the Excavator, make a thorough walk-around inspection when doing lubrication and maintenance work. Check under and around for such items as loose bolts, trash buildup, oil or coolant leaks.


COVERS AND GUARDS
Check for damage, loose or missing bolts.
SPROCKETS
Check for wear.
HYDRAULIC SYSTEM
Check for leaks, worn hoses, or damaged lines — check oil level.
ROLLERS
Check for wear or leaks.
TRACK
Check for broken or missing shoes and bolts.
SWING DRIVE COMPARTMENT
Check for leaks.
SWING GEAR COMPARTMENT
Check for leaks.
ENGINE COMPARTMENT
Check for oil and fuel leaks and trash buildup — Check oil level.
COOLING SYSTEM
Check for leaks, worn hoses and trash buildup — Check coolant level.
INDICATORS AND GAUGES
Check for damage.
IDLERS
Check for wear or leaks.
OPERATOR'S COMPARTMENT
Check for loose items and cleanliness.

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Fuel And Lubricant Specifications

SMCS - 7606

NOTE: 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 "RECOMMENDED LUBRICANTS" chart.

Engine Oils (EO)

CD
: Use oils that meet Engine Service Classification **CD** or MIL-L-2104C.

CC
: Use oils that meet Engine Service Classification **CC**, MIL-L-2104B or MIL-L-46152.

EO
: **CD** or **CC**.

Hydraulic Oil (HYDO)

Use (**EO**) or industrial-type hydraulic oils which are certified by the supplier as having anti-wear, anti-foam, anti-rust and anti-oxidation additive properties for heavy duty use.

Diesel Fuel

Use only distillate fuels (ASTM No. 1 or No. 2 Fuel Oil or No. 1D or No. 2D Diesel Fuel Oil) with a minimum cetane number of 35. Heavier oil is generally preferable because of its higher energy content. Contact your Caterpillar dealer regarding fuels marketed in your area.

Lubricating Grease (MPGM)

Use Multipurpose-type Grease (**MPGM**) which contains 3-5% molybdenum disulfide conforming to MIL-M-7866, and a suitable corrosion inhibitor. NLGI No. 2 Grade is suitable for most temperatures. Use NLGI No. 1 or No. 0 Grade for extremely low temperatures.

RECOMMENDED LUBRICANTS AT STARTING TEMPERATURES FROM −10°F (−23°C) TO +120°F (+48°C)[1]		
COMPARTMENT OR SYSTEM	STARTING TEMPERATURE	
	ABOVE 32°F (0°C)	BELOW 32°F (0°C)
CD		
Pump drive	SAE 30	SAE 30
Track rollers and idlers	SAE 30	SAE 30
Engine crankcase	SAE 30	SAE 10W[2]
EO		
Swing drive	SAE 50[3]	SAE 50
Swing gear	SAE 50[3]	SAE 50
Final drive	SAE 50[3]	SAE 50
HYDO		
Hydraulic system	SAE 10W	SAE 10W

[1]Below −10°F (−23°C) consult your oil supplier for special Arctic Lubricants.

[2]SAE 10W oil may be used in the diesel engine even if daytime ambient temperature rises to 70°F (21°C). Below −10°F (−23°C) it may be necessary to warm the engine oil so the engine can be cranked and the oil will circulate freely.

[3]If SAE 50 is not available, consult your Caterpillar dealer.

Key to Lubricants:

CD - Engine Service Classification CD, or MIL-L-2104C

CC - Engine Service Classification CC, MIL-L-2104B, or MIL-L-46152

EO - CD, CC

HYDO - EO, or certified Industrial-type Hydraulic Oils

MPGM - Multipurpose-type Grease with 3 to 5% Molybdenum Disulfide

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Lubrication And Maintenance Chart

SMCS - 7606

LUBRICATION AND MAINTENANCE CHART

ITEM	SERVICE	LUBRICANT	MAINTENANCE	PAGE NO.
EVERY 10 SERVICE HOURS OR DAILY				
(1) Radiator	Check coolant level		●	10
(2) Precleaner	Check — clean		●	10
(3) Engine crankcase	Check oil level	CD		10
EVERY 50 SERVICE HOURS OR WEEKLY				
(4) Swing bearing	Lubricate 1 fitting	MPGM		11
(5) Swing gear[4]	Check oil level	EO		11
(6) Hydraulic system[3]	Check oil level	HYDO		11
(7) Batteries	Check electrolyte		●	12
(8) Boom, stick, linkage and bucket	Lubricate 20 fittings	MPGM		12
EVERY 250 SERVICE HOURS OR MONTHLY				
(9) Engine crankcase	Change oil[2] and filter	CD	●	13
(10) Fan and alternator belts	Check — adjust		●	14
(11) Fan bearing	Lubricate 1 fitting	MPGM		14
EVERY 500 SERVICE HOURS OR 3 MONTHS				
(12) Hydraulic system[3]	Change filter elements and wash filter screen	HYDO	●	15
(13) Engine crankcase	Wash breather		●	17
EVERY 2000 SERVICE HOURS OR 1 YEAR				
(14) Engine valve lash	Check — adjust		●	18
(15) Cooling system	Change antifreeze solution		●	21
(16) Swing gear[4]	Change oil	EO		22
(17) Pump drive	Change oil	CD		22
(18) Hydraulic system	Change oil and wash filler strainer		●	23

LUBRICATION AND MAINTENANCE CHART

ITEM	SERVICE	LUBRICANT	MAINTENANCE	PAGE NO.
WHEN REQUIRED				
(19) Air intake system	Clean when AMBER light comes on with engine running		●	25
(20) Fuel system	Change filter when fuel gauge registers OUT with engine running		●	28
(21) Fuel tank	Drain moisture and sediment when engine misfires or frequent fuel filter replacement is necessary		●	29
(22) Swing gear[4]	Check lubricant if unusual noise develops[5]	MPGM		29
(23) Swing Drive[5]	Check oil level if leakage develops or is suspected	EO		30
(24) Final drives[5]	Check oil level if leakage develops or is suspected	EO		30
(25) Pump drive	Check oil level if leakage develops or is suspected	CD		30
(26) Cooling system	Drain and clean when engine overheats or solution is dirty		●	31
(27) Track adjustment	Adjust whenever 1 to 1½ inches (25 to 35 mm) of sag is not maintained		●	32
(28) Swing brake	Adjust whenever brake does not hold boom for swinging when applied		●	33

[1]Check frequently if leakage develops or is suspected.

[2]Normal oil change interval when fuel sulphur content is less than 0.4%. When sulphur content is 0.4% to 1.0%, reduce oil change interval one-half. When sulphur content is above 1.0% reduce oil change to one-fourth normal interval.

[3]At normal interval or when AMBER light comes on.

[4]Do items (5) and (16) using **EO**, on machines 32K1-32K529 that have not been converted to use **MPGM**. Do item (22) using **MPGM** on machines 32K580-Up and machines prior to 32K580 that have been converted to use **MPGM**.

[5]Lubricant is to be changed at time of overhaul.

Key to Lubricants:

- **CD** - Engine Service Classification **CD** or MIL-L-2104C
- **CC** - Engine Service Classification **CC**, MIL-L-2104B or MIL-L-46152
- **EO** - **CD**, **CC**
- **HYDO** - **EO** or certified Industrial-type Hydraulic Oils
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3. Clean fuel tank filler cap and screen every 500 hours.

4. If engine fuel system is equipped with a water separator, drain water from water separator daily before starting engine. Always drain water from separator before it becomes one-half full. Frequent draining may be necessary in areas of high humidity or when fuel supply is contaminated with water.

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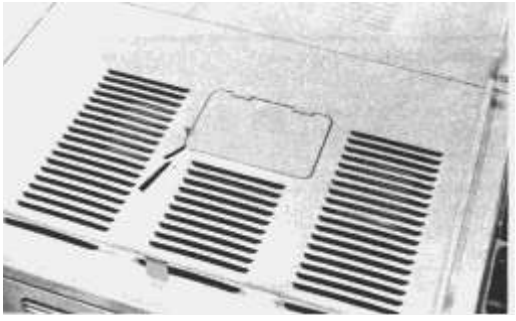
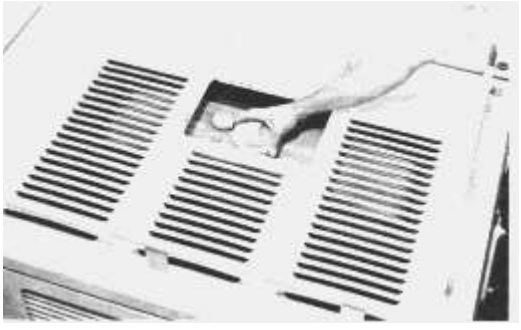
Every 10 Service Hours Or Daily

SMCS - 7606

(1)Radiator



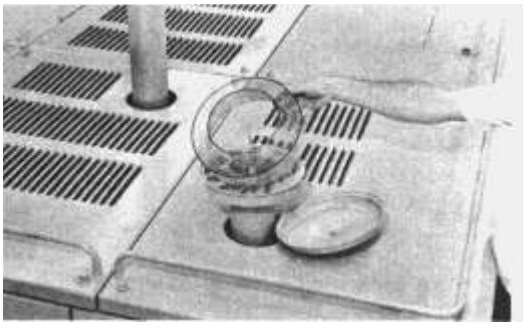
1. Open radiator fill spout access door.



2. Remove cap slowly to relieve pressure. Maintain coolant to bottom of fill pipe. Close door.

(2)Precleaner

1. Check accumulation of dust in precleaner cup. If dust level is up to full mark, remove and empty cup.



2. Periodically remove and wash precleaner in clean water.

(3)Engine Crankcase

1. Excavator must be level and safety control in upper position. Open center rear access door. Check can be made ...

2. ... before starting. Level must be in SAFE STARTING RANGE on ENGINE STOPPED side of dipstick, or ...

3. ... with engine warm and running. Maintain level between ADD and FULL marks on ENGINE RUNNING side of dipstick.

4. Check and add oil as necessary.

5. Close and secure access door.

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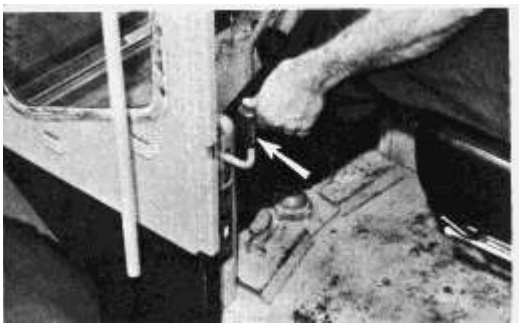
Every 50 Service Hours Or Weekly

SMCS - 7606

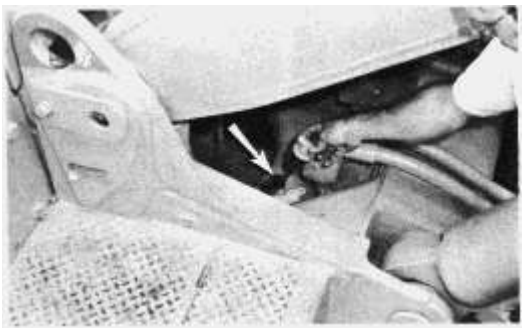
(4)Swing Bearing

The upper structure will have to be rotated 720° (two full rotations). Stop and lubricate at each 90° interval.

(5)Swing Gear

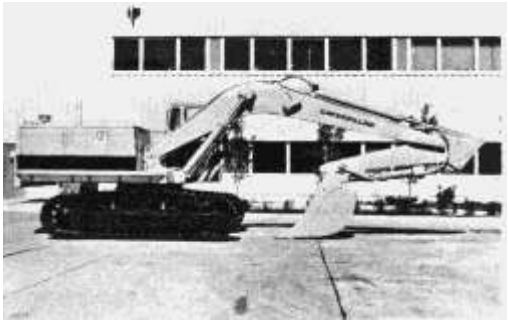


1. Excavator level, bucket on ground, engine OFF and safety control in upper position.



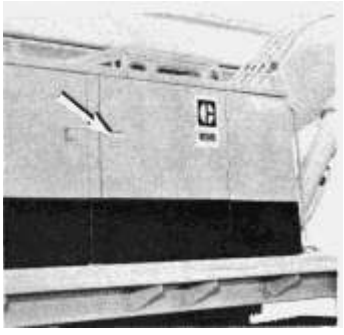
2. Check oil level. Maintain oil level to FULL mark on dipstick. (32K1-32K579), if equipped.

(6)Hydraulic System



NOTICE

Machine level, bucket on ground with bucket and stick cylinders fully extended, safety control in upper position, oil cool and engine OFF.



2. Open right side front access door.

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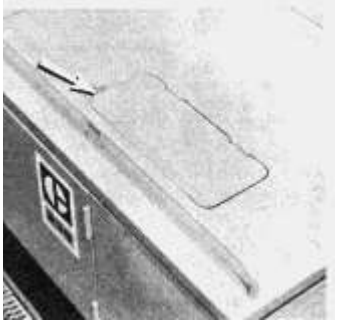
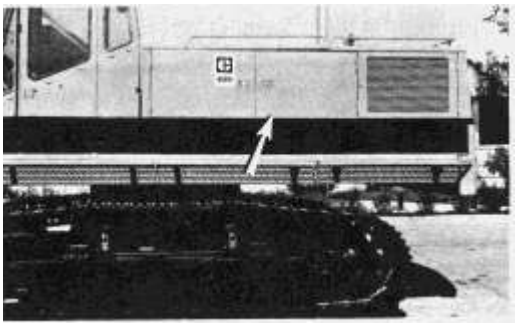
3. Maintain oil level at FULL mark in sight gauge.



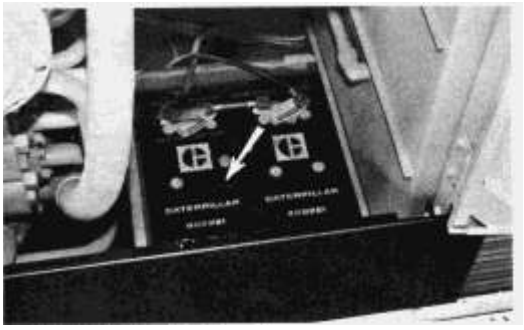
4. To add oil open hydraulic tank filler cap access door.

5. Remove filler cap slowly to relieve system pressure and add oil as necessary. Replace filler cap. Close and secure doors.

(7)Batteries



1. Open left side rear access door. Clean batteries.

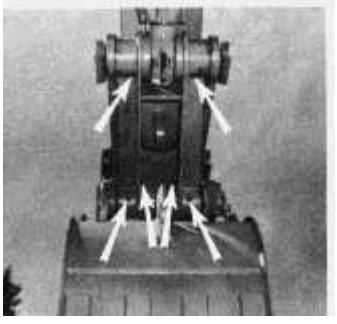


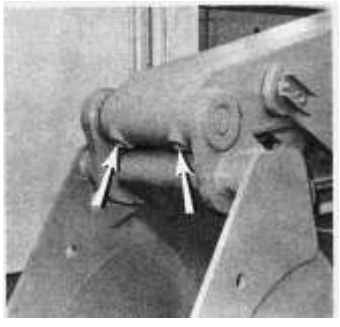
2. Maintain electrolyte level to bottom of filler openings. Close door.

(8)Boom, Stick, Linkage And Bucket

Lubricate 20 fittings.

NOTE: At proper charging rate battery will not require more than 1 ounce (30 cc) of water per cell per week.





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