GEG00779-01

LUBRICATION & MAINTENANCE GUIDE

D4 TRACTOR

POWER SHIFT

SERIAL NUMBERS		
	83J1-83J2176	74U1-74U382
	59J1-59J1280	47H1-47H509
	7R1-7R507	

FOREWORD

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.

Perform previous interval items at multiples of the original requirement. For example, at 100 service hours or 2 weeks, also perform those items listed under "Every 50 Service Hours or Weekly" and "Every 10 Service Hours or Daily".

Service Meter

Some photographs in this publication may show details or attachments that may be different from your unit. Also, the ROPS, for some photographs, has been removed for illustrative purposes.

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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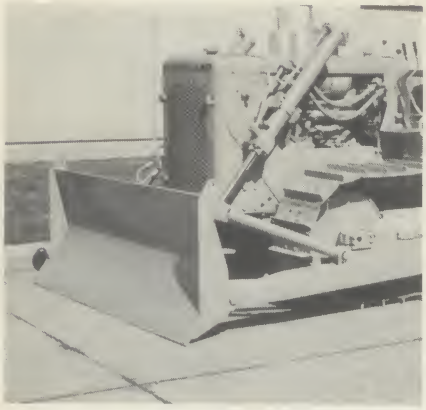
SAFETY

THIS SYMBOL WARNS OF POSSIBLE PERSONAL INJURY OR PROPERTY DAMAGE.



Lower all equipment before servicing hydraulic system.

Block blade before changing cutting edge or end bits.

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

⚠ WARNING

To avoid possible weakening of the ROPS (Rollover Protection structure), consult a Caterpillar dealer before altering the ROPS in any way. The protection offered by the ROPS will be impaired if it has been subjected to structural damage or has been involved in an overturn incident.

⚠ WARNING

When using pressure air wear safety glasses and protective clothing. Maximum air pressure must be below 30 PSI (2 kg/cm^2).

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

Wear gloves when handling cable.

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

Wear safety glasses and shoes as the job requires.

Do not attempt repairs you do not understand.

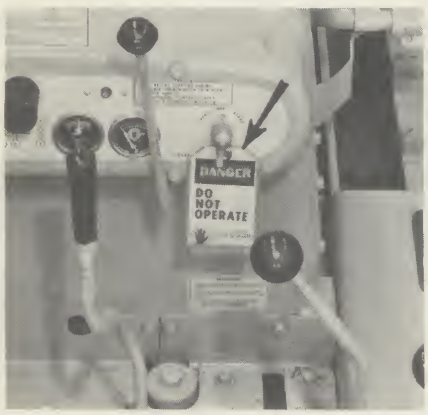
Store oily rags or other combustible material in a safe place.

Operate engine only in well ventilated area.

Promote good housekeeping. Keep tools and work area clean.

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

Do not smoke while refueling.



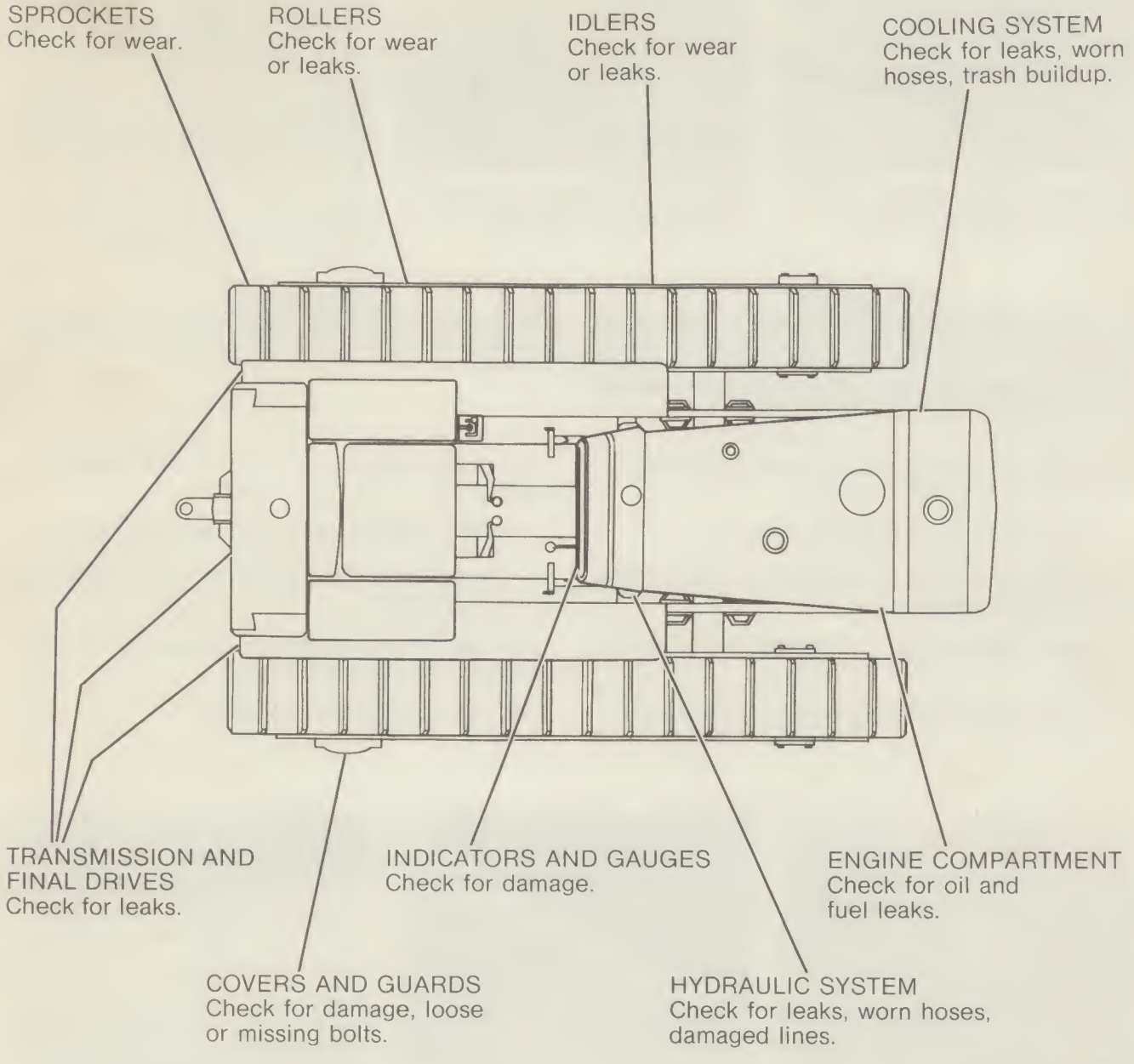
Attach warning tags to controls while tractor is being serviced.

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

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

WALK-AROUND CHECKS

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



FUEL AND LUBRICANT SPECIFICATIONS

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.

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.

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, CC.**

Hydraulic Oil (HYDO)

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

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		
Engine Crankcase	SAE 30	SAE 10W[2]
Transmission, and torque converter compartment	SAE 30	SAE 10W
Bevel gear compartment	SAE 30	SAE 10W
Track rollers and idlers	SAE 30	SAE 30
HYDO		
Hydraulic system	SAE 10W	SAE 10W
EO		
Final drives	SAE 50	SAE 30

[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.

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

General Service Recommendations

NOTE

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

Fill fuel tank at the end of each day of operation to drive out moisture laden air and prevent condensation.

Check fuel level with dipstick in filler opening.

Use clean water that is low in scale forming minerals, not softened water.

Add Caterpillar Corrosion Inhibitor to coolant. Follow recommendation given on container.

LUBRICATION AND MAINTENANCE CHART

ITEM	SERVICE	LUBRICANT	MAINTENANCE	PAGE NO.
EVERY 10 SERVICE HOURS OR DAILY				
① Radiator	Check coolant level		●	8
② Air cleaner precleaner	Check		●	8
③ Bevel gear compartment	Check oil level[1]	CD		8
④ Hydraulic system	Check oil level	HYDO		8
⑤ Engine crankcase	Check oil level	CD		8
⑥ Transmission and torque converter	Check oil level[1]	CD		8
EVERY 50 SERVICE HOURS OR WEEKLY				
⑦ Hydraulic control linkage	Lubricate 2 fittings	MPGM		9
⑧ Tilt control linkage	Lubricate 2 fittings	MPGM		9
⑨ Steering clutch release bearing	Lubricate 2 fittings	MPGM		9
⑩ Cylinder lower trunnion bearings	Lubricate 2 fittings	MPGM		9
⑪ Bulldozer cylinder support bearings	Lubricate 4 fittings	MPGM		9
⑫ Tool bar adjusting screws	Lubricate 4 fittings	MPGM		9
⑬ Track roller frame inner and outer bearings	Lubricate 4 fittings	MPGM		9
⑭ Ripper	Lubricate 11 fittings	MPGM		9
⑮ Tracks[5]	Check — adjust		●	10
⑯ Batteries	Check electrolyte level		●	11
Do items 25 and 27 at first 50 service hours on reconditioned unit to ensure a clean system.				
EVERY 100 SERVICE HOURS OR 2 WEEKS				
⑰ Final drives	Check oil level[4]	EO		12
⑱ Bulldozer tilt braces	Lubricate 4 fittings	MPGM		12
⑲ Tilt brace ball and sockets	Lubricate 2 fittings	MPGM		12
⑳ Tool bar	Lubricate 4 fittings	MPGM		12
Do item 32 at 100 service hours on new or reconditioned machine.				
EVERY 250 SERVICE HOURS OR MONTHLY				
㉑ Fan bearing	Lubricate 1 fitting	MPGM		13
㉒ Track adjusting screws	Lubricate 2 fittings	MPGM		13
㉓ Steering clutch brakes	Check — adjust		●	13
㉔ Fan belts	Check — adjust		●	13
㉕ Transmission and torque converter	Change filter element		●	14
Do item 32 at 250 service hours on new or reconditioned machine.				

LUBRICATION AND MAINTENANCE CHART

ITEM	SERVICE	LUBRICANT	MAINTENANCE	PAGE NO.
EVERY 500 SERVICE HOURS OR 3 MONTHS				
(26) Engine crankcase	Change oil[2] — change filter element — wash breather	CD	●	15
(27) Hydraulic control system	Change filter element[3]	HYDO	●	16
(28) Fuel tank	Drain moisture and sediment — wash filler cap		●	16
(29) Transmission and torque converter	Wash breather		●	16
Do items 30 and 33 at 500 service hours if operating in deep mud or water.				
EVERY 1000 SERVICE HOURS OR 6 MONTHS				
(30) Final drives	Change oil	EO	●	17
(31) Steering clutches	Lubricate 2 fittings	MPGM		17
(32) Sprocket hub bearing	Check — adjust		●	17
(33) Steering clutches	Wash compartment — adjust clutches		●	18
(34) Transmission and torque converter	Change oil — wash suction screen	CD	●	20
(35) Bevel gear compartment	Change oil & breather	CD	●	20
Do item 36 at 1000 service hours if operating in ambient temperatures of 100°F (38°C) or above for extended periods.				
EVERY 2000 SERVICE HOURS OR 1 YEAR				
(36) Hydraulic control system	Change oil — wash filler screen	HYDO		21
(37) Brake pedal shafts	Lubricate 2 fittings (if equipped)	MPGM		22
(38) Steering clutch control lever bearings	Lubricate 2 fittings	MPGM		22
(39) Engine valve lash	Check — adjust		●	22
WHEN REQUIRED				
(40) Engine air intake system	These areas require periodic maintenance that cannot be given a definite service hour interval. Maintenance information for specific items in these areas is found on the indicated pages.		●	24
(41) Engine fuel system			●	26
(42) Cooling system			●	27
(43) Bulldozer			●	28
(44) Ripper			●	29

[1] Change oil anytime it becomes thick and black.

[2] Normal change interval when sulphur content is 0.4% or less. 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 the normal interval.

[3] Change anytime filter indicator shows RED with engine running and oil is at operating temperature.

[4] Check frequently if any signs of leakage develop or are suspected.

[5] When operating in abrasive material check adjustment frequently.

Key to Lubricants:

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EO - **CD**, **CC**

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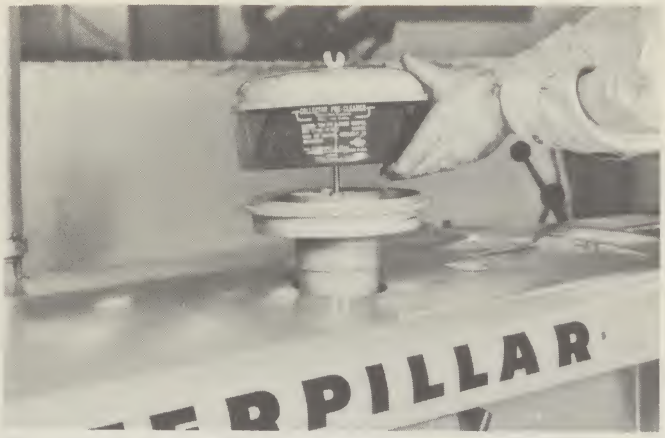
MPGM - Multipurpose-type Grease with 3 to 5% Molybdenum Disulfide

EVERY 10 SERVICE HOURS OR DAILY

(1) RADIATOR

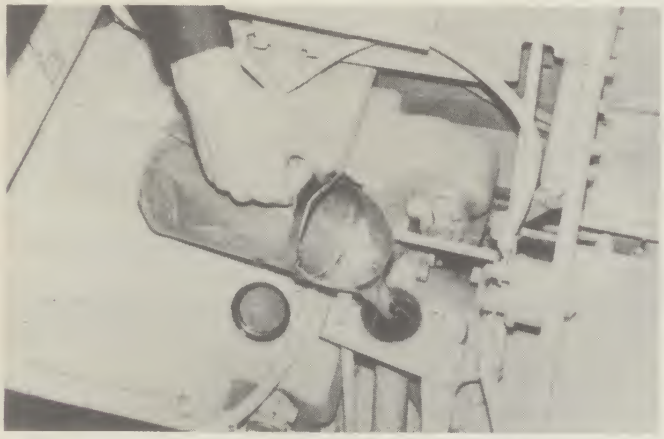
Check coolant level. Remove cap slowly to relieve pressure. Maintain level to within ½ inch of the bottom of the filler pipe.

(2) PRECLEANER



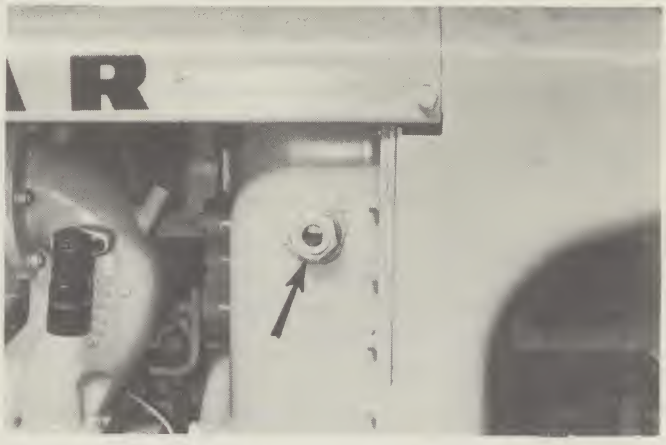
Remove and empty dirt. Periodically remove and wash entire precleaner in water.

(3) BEVEL GEAR COMPARTMENT



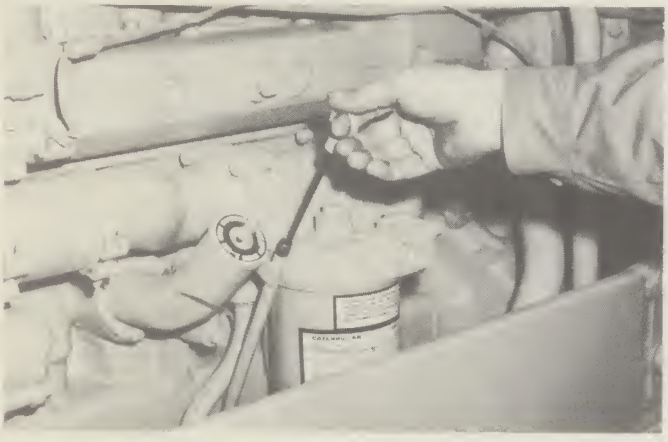
Check oil level with engine stopped. Maintain oil level at FULL mark on gauge.

(4) HYDRAULIC SYSTEM



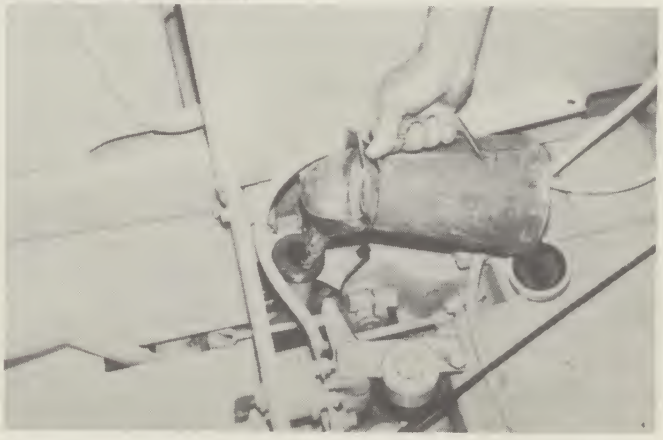
Check oil level with engine stopped, machine level and equipment lowered. Maintain level to be visible in sight gauge.

(5) ENGINE CRANKCASE



Check oil level with engine at low idle, oil hot, brake on, transmission in NEUTRAL and machine level. Maintain level between ADD and FULL mark on gauge.

(6) TRANSMISSION AND TORQUE CONVERTER



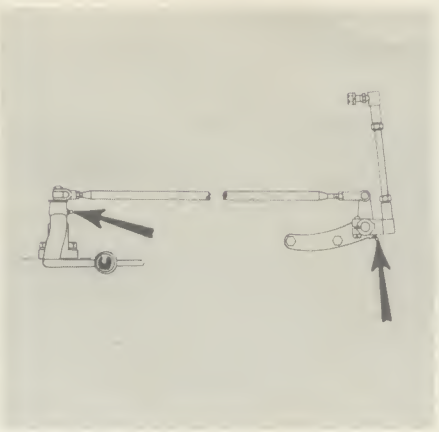
Check oil level with engine at low idle, transmission in NEUTRAL, brake on and machine level. Maintain level to FULL mark on gauge.

EVERY 50 SERVICE HOURS OR WEEKLY

(7) HYDRAULIC CONTROL

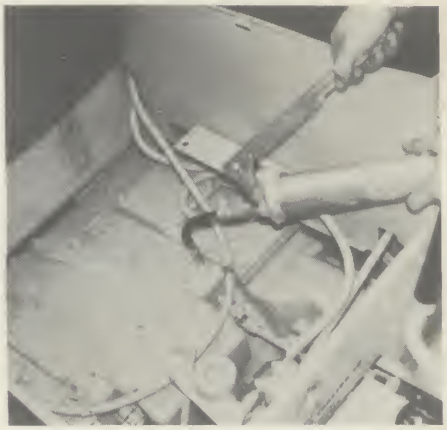
Lubricate 2 linkage pivots.

(8) TILT CONTROL



Lubricate 2 linkage pivots.

(9) STEERING CLUTCHES

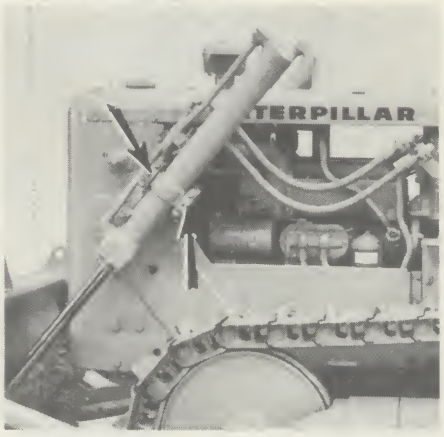


Remove seat cushion. Lubricate 2 release bearings.

(10) CYLINDER TRUNNIONS

Lubricate 1 fitting on each lower trunnion. Total - 2 fittings.

(11) BULLDOZER CYLINDERS



Lubricate 2 fittings at each support. Total - 4 fittings.

(12) TOOL BAR

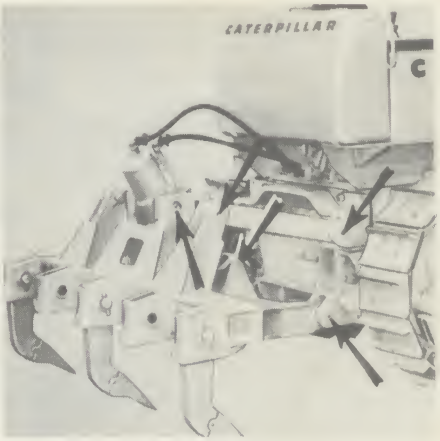
Lubricate 2 fittings on each adjusting screw. Total - 4 fittings.

(13) TRACK ROLLER FRAME

Lubricate 1 fitting at each inner bearing. Total - 2 fittings.

Lubricate 1 fitting at each outer bearing. Total - 2 fittings.

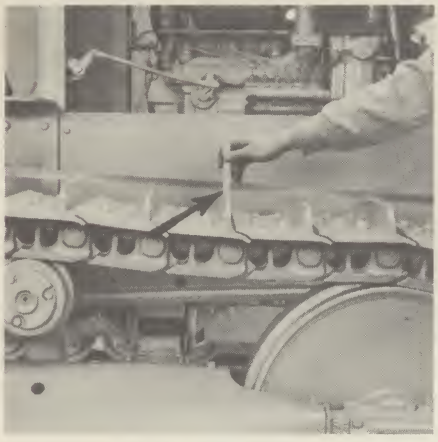
(14) RIPPER



Lubricate 11 fittings.

EVERY 50 SERVICE HOURS OR WEEKLY

(15) TRACK - Screw Adjustment

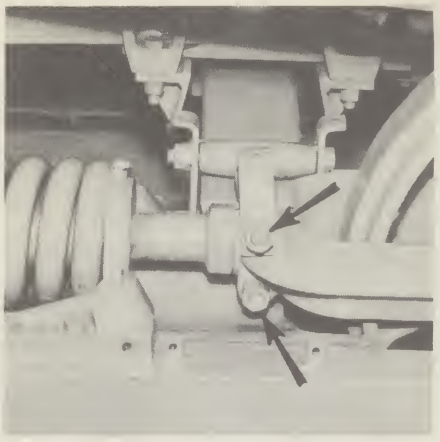


Check adjustment. Correct adjustment allows 1 to 1.5 inches (25 to 38 mm) sag at this point.

CAUTION

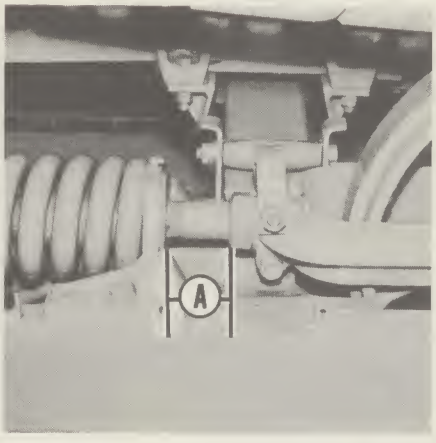
Do not attempt to adjust track if dimension A is or will exceed 6.7 inches (170 mm). Damage to screw could result.

Contact your Caterpillar dealer if correct adjustment cannot be obtained.



1. Remove guard. Loosen rod clamp nuts.

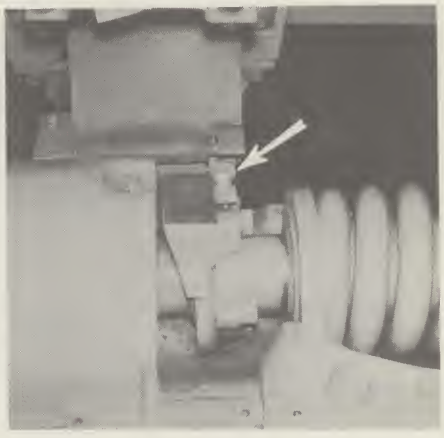
2. Turn adjusting nut counterclockwise to tighten track, clockwise to loosen.



3. Drive tractor back and forth. Recheck adjustment and dimension A.

4. Tighten clamp nuts and install guard.

Hydraulic Adjustment
If track is too loose



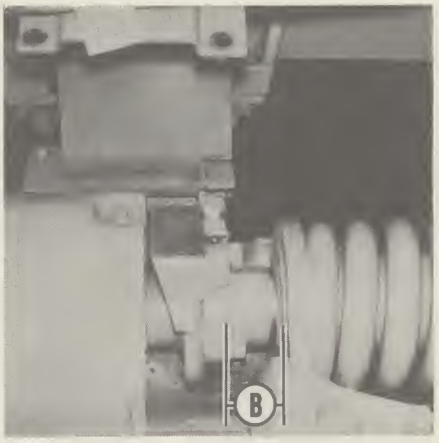
1. Remove bolt and open valve access cover.

2. To tighten, add multipurpose-type grease at fill valve fitting.

CAUTION

Do not attempt to adjust track if dimension B is or will exceed 5.1 inches (30 mm). Damage to cylinder could result.

Contact your Caterpillar dealer if correct adjustment cannot be obtained.



3. Drive tractor back and forth to equalize pressure. Recheck adjustment and dimension B.

4. Close cover and install bolt.

If track is too tight

1. Be sure idler can retract. Loosen relief valve one turn to allow grease to escape.

WARNING
Never visually inspect relief valve or fill valve to see if grease is escaping. Always observe track to see if it has loosened.

2. Tighten relief valve when adjustment is correct.

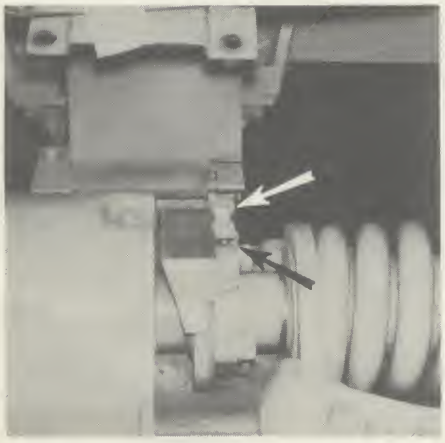
If track did not loosen

3. Operate tractor back and forth to equalize pressure.

4. Recheck adjustment.

1. Remove guard and loosen fill valve one turn. Operate tractor back and forth.

2. Loosen relief valve until it touches guard.
3. Loosen fill valve until it touches guard.



4. Tighten fill and relief valves when adjustment is correct.
5. Install guard.

Contact your Caterpillar dealer if correct adjustment cannot be obtained.

(16) BATTERIES

Maintain electrolyte level to triangles at bottom of filler opening. (1) Keep batteries clean.

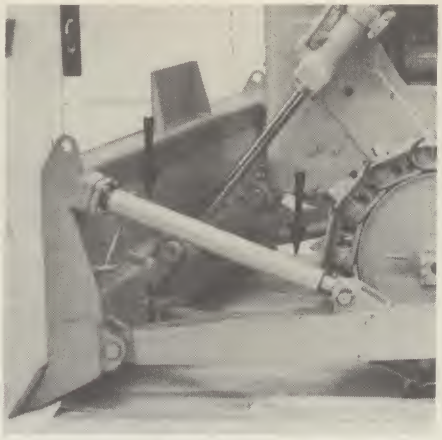
(1) At proper charge rate, battery will not require more than 1 ounce (30 cc) of water per cell per week.

EVERY 100 SERVICE HOURS OR 2 WEEKS

(17) FINAL DRIVES

Maintain oil level to bottom of level plug openings at rear of final drive cases.

(18) TILT BRACES



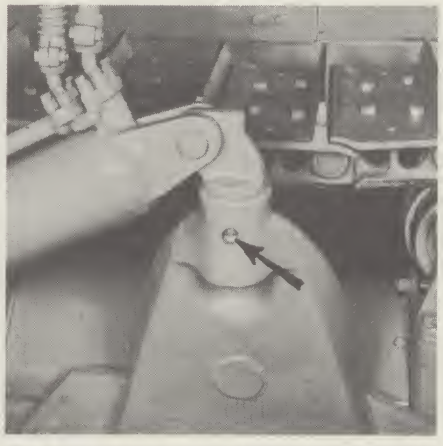
Lubricate 2 fittings on each bulldozer tilt brace. Total - 4 fittings.

(19) BALL AND SOCKETS

Lubricate one fitting on each tilt ball and socket. Total - 2 fittings.

(20) TOOL BAR BRACKET

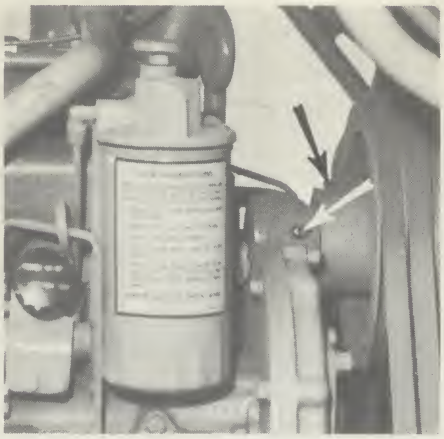
1. Lubricate one fitting on each cylinder eyebolt bracket. Total - 2 fittings.



2. Lubricate one fitting on each cylinder pivot pin. Total - 2 fittings.

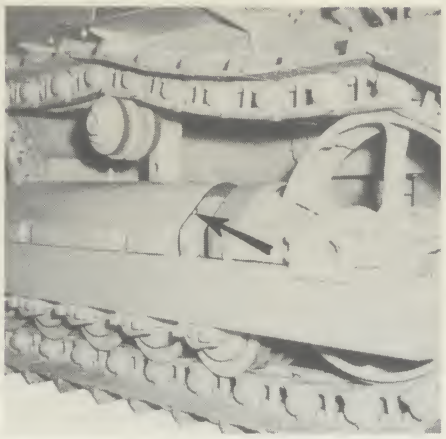
EVERY 250 SERVICE HOURS OR MONTHLY

(21) FAN BEARING



Lubricate at fitting until grease appears at relief valve.

(22) TRACK SCREWS



Lubricate track adjusting screws on both tracks. Total - 2 fittings.

(23) STEERING BRAKES

1. Adjust steering clutch brakes through access holes at rear of compartments. Release pedals. Remove covers.

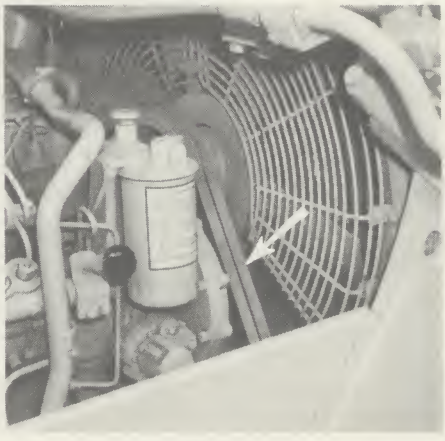
2. Tighten adjusting screw until linings are tight on drum.

3. Loosen brake support screw locknut.

4. Tighten support screw until it just contacts brake drum. Back out one full turn and tighten locknut.

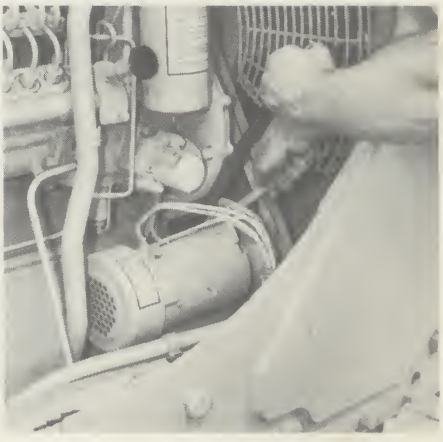
(24) FAN BELTS

5. Back adjusting screw out 3 full turns to provide approximately 3 inches (76 mm) pedal free travel.



Check condition and adjustment. Belts should deflect 7/8 inch (22 mm) under 25 lbs. (11,5 kg) force.

To adjust belts:



Loosen generator mounting bolts and move generator in or out as required. Tighten bolts.

EVERY 250 SERVICE HOURS OR MONTHLY

(25) TRANSMISSION AND TORQUE CONVERTER — Change Filter

1. Remove floor plate.

2. Remove cover and element.

3. Remove and discard element.

4. Inspect seal, install new if necessary. Install new element, tighten retaining nut to 10 ± 2 lb. ft. (1,4 ± 0,3 mkg).

5. Install element and cover.

6. Start engine. Check oil level. Oil level should be at FULL mark on gauge. Add oil if necessary.

EVERY 500 SERVICE HOURS OR 3 MONTHS

(26) DIESEL ENGINE CRANKCASE — With Spin on Type Filter

1. Run engine long enough to warm the oil. Stop engine. Open drain valve and drain oil.

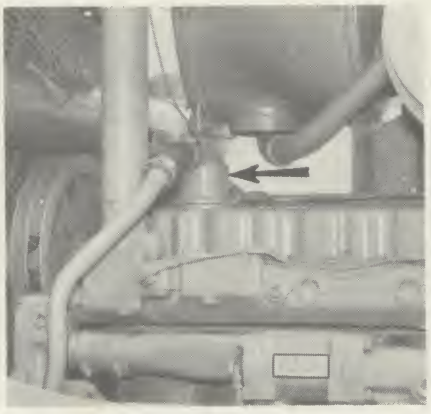
2. Remove old filter.

3. Clean filter housing base. Be sure all of old seal is removed.

4. Apply a thin film of clean oil to the seal of the new filter.

5. Install filter, tighten until filter seal just contacts filter base. Tighten filter an additional 3/4 turn. Do not over tighten.

6. Close drain valve.



7. Remove breather. Wash breather in clean solvent.

8. Inspect seal, install new seal if necessary. Install breather. Tighten bolt to 10 ± 2 lb. ft. (1,4 ± 0,3 mkg).

9. Fill crankcase. See Refill Capacities.

10. Start engine and run at low idle to fill filter housing. Check oil level. Add oil if necessary.

11. Check for leaks.

DIESEL ENGINE CRANKCASE — With Cartridge-Type Filter

1. Run engine long enough to warm the oil. Stop engine. Open drain valve and drain oil.

2. Remove filter housing drain plug.

3. Remove housing and element.

4. Inspect cover seal. Install a new seal if necessary.

5. Install new element. Install filter housing drain plug.

6. Close drain plug.

7. Remove breather. Wash breather in clean solvent.

8. Inspect seal. Install new seal if necessary. Install breather. Tighten bolt to 10 ± 2 lb. ft. (1,4 ± 0,3 mkg).

9. Fill crankcase. See Refill Capacities.

10. Start engine and run at low idle to fill filter housing. Check oil level. Add oil if necessary.

11. Check for leaks.

EVERY 500 SERVICE HOURS OR 3 MONTHS

(27) HYDRAULIC CONTROL SYSTEM - Change Filter Element

1. Lower all equipment and stop engine. Loosen tank bleed plug to relieve pressure.

2. Remove filter cover and element. Inspect cover and use new seals if necessary.

3. Install new element. Install cover and tighten to 43 ±4 lb. ft. (6 ±0, 6 mkg).

4. Open bleed valve and start engine. Fill tank (refill capacity on Page 31).

5. Close bleed valve when oil flows without bubbles.

6. Operate equipment for a short time.

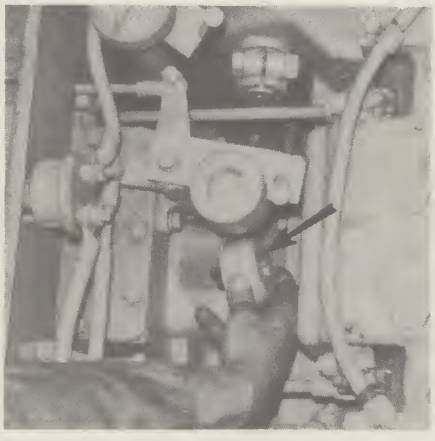
7. Check oil level and add oil if necessary.

(28) FUEL TANK

Drain water and sediment from tank through drain valve.

(29) TRANSMISSION AND TORQUE CONVERTER BREATHERS

Remove and disassemble cap. Wash in solvent. Assemble cap, and oil filter lightly. Install cap.



Remove both breathers and wash in clean solvent. Oil lightly and install breathers.

EVERY 1000 SERVICE HOURS OR 6 MONTHS

(30) FINAL DRIVES

1. Remove drain plugs at rear of both final drives and allow to drain.

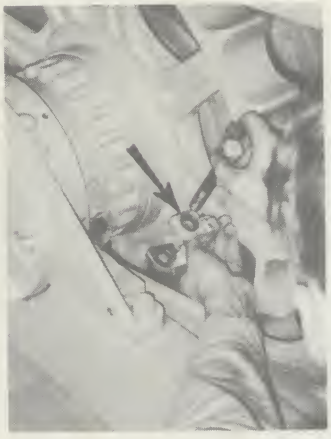
2. Clean and install drain plugs. Fill through fill plug openings (refill capacity on page 31).

(31) STEERING CLUTCHES

Remove seat cushion. Lubricate 3 control shaft fittings.

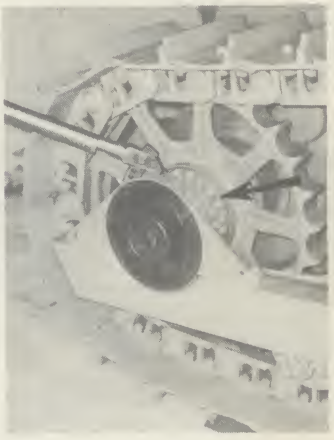
(32) SPROCKET HUB To Adjust

Pry against each side of sprocket with 5 ft. (1,5 m) bar. It sprocket moves, adjust bearing.



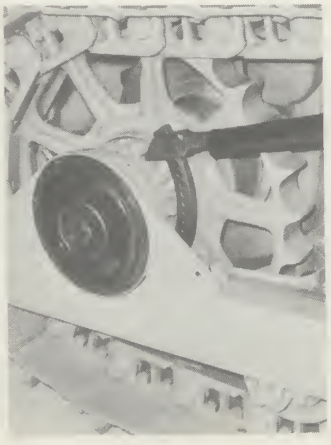
1. Remove guard. Remove lock bolt and lock.

2. Remove outer cap and retaining nut lock.



3. Loosen adjusting nut.

4. Tighten retaining nut to 500 to 600 lb. ft. (69-83 mkg).



5. Tighten adjusting nut. Use 5 ft. (1,5 m) extension.

6. Install retaining nut lock and outer cap.

7. Install lock and lock bolt.

8. Install guards.

EVERY 1000 SERVICE HOURS OR 6 MONTHS

(33) STEERING CLUTCHES - Wash Compartment

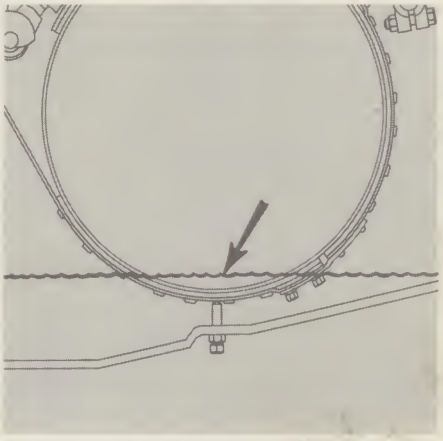
1. Machine must be level. Remove clutch compartment drain plugs and allow oil accumulation present to drain.

2. Clean and install drain plugs. Remove clutch compartment access cover plates.

3. Add enough non-flammable cleaning fluid to cover lower section of steering brake bands.

4. Drive machine back and forth for five minutes without disengaging steering clutches.

5. Drain compartments. Clean and install drain plugs.



6. Add fresh cleaning fluid to cover lower section of brake bands.

7. Drive machine back and forth for five minutes. Occasionally apply brakes.

8. Drain compartments. Clean and install drain plugs.

9. Inspect access cover plate gaskets. Use new gaskets if necessary. Install cover plates.

10. Lubricate steering clutch release bearings.

Adjust Steering Clutches

Free travel of each steering clutch lever should be 3 inches (76 mm).

1. Remove seat cushion.

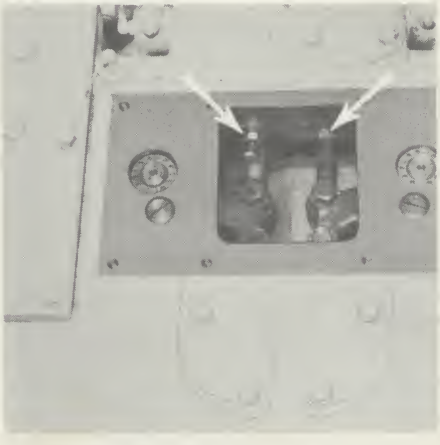
2. Remove adjusting nut covers at top of each clutch compartment.

3. Loosen adjusting nut locknut.

4. Turn adjusting nut to obtain correct lever free travel.

5. Tighten locknut and install cover.

6. Remove control lever stop access cover.



7. Loosen stop bolt locknut. Adjust stop bolt for at least 15/16 inch (23 mm) clearance.

8. Tighten locknut. Install cover and seat cushion.

EVERY 1000 SERVICE HOURS OR 6 MONTHS

(34) TRANSMISSION AND TORQUE CONVERTER

1. Engine stopped and machine level. Remove transmission and torque converter drain plugs and allow to drain.

2. Remove suction screen.

3. Remove screen housing.

4. Remove screen. Wash in clean solvent.

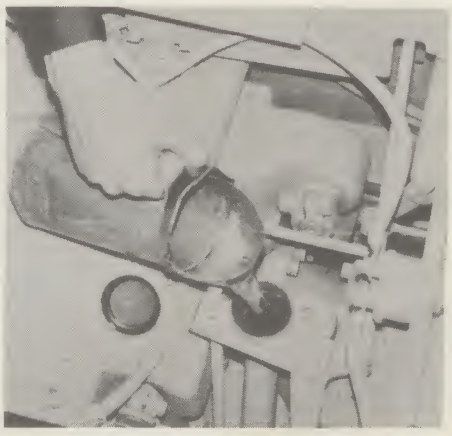
5. Install screen assembly and housing.

7. Clean and install drain plugs.

(35) BEVEL GEAR COMPARTMENT

8. Fill to FULL mark on gauge. Start engine. Check oil level and add if necessary (refill capacity on Page 31).

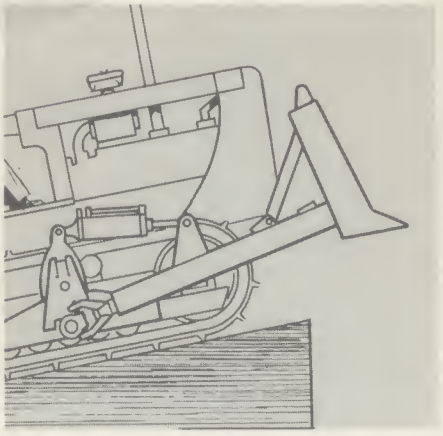
1. Remove drain plug and allow to drain.



2. Clean and install drain plug. Start engine. Check oil level and add if necessary (refill capacity on page 31).

EVERY 2000 SERVICE HOURS OR 1 YEAR

(36) HYDRAULIC CONTROL SYSTEM



1. Position tractor so that hydraulic cylinders can move a complete stroke. Raise equipment.

2. Stop engine. Remove fill cap and drain plug. Allow oil to drain.

3. Lower equipment.

4. Clean and install drain plug.

5. Change filter element. See Item 27.

6. Remove filler strainer lock and strainer. Wash in clean solvent. Install strainer.

7. Fill tank until oil is visible in sight gauge (refill capacity on page 31).

8. Open tank bleed valve, start engine.

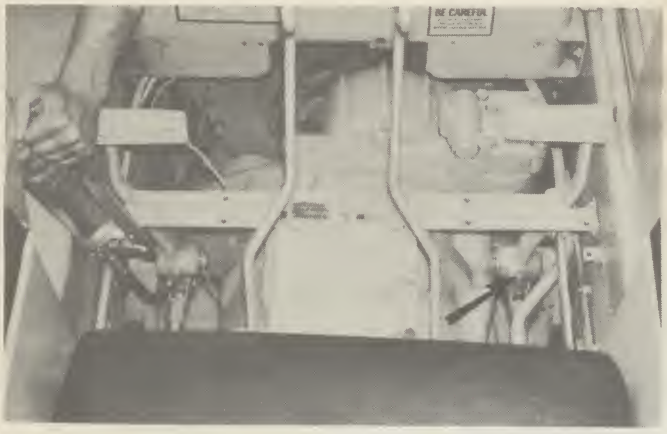
9. Close bleed valve when oil flows without air bubbles.

10. Raise equipment and move tractor to level surface.

11. Lower equipment and check oil level. Add oil as required.

EVERY 2000 SERVICE HOURS OR 1 YEAR

(37) BRAKE PEDALS



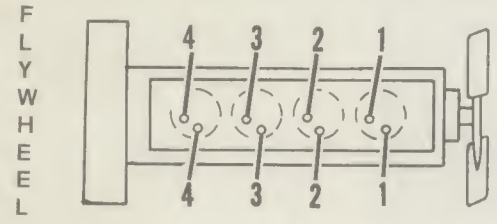
Lubricate 1 fitting at each pedal pivot. Total - 2 fittings. (if equipped.)

(38) STEERING CLUTCH

Lubricate 1 fitting at each lever pivot. Total - 2 fittings.

(39) ENGINE VALVE LASH - Check and Adjust

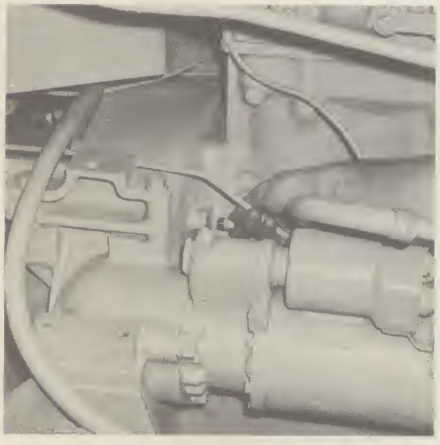
INLET VALVES - .015 inch (0,38 mm)

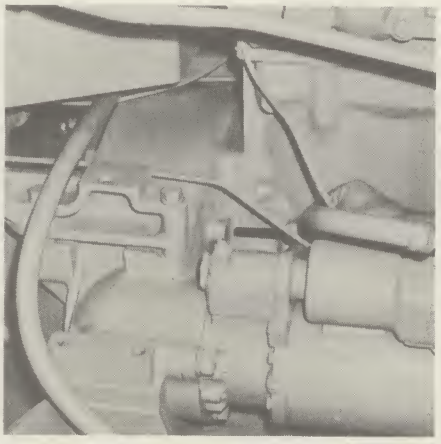


EXHAUST VALVES - .025 inch (0,64 mm)

Check valve lash with engine stopped. Do not use starter to turn flywheel.

1. Remove rocker arm covers. Check valve lash and adjust if necessary (see page 23).

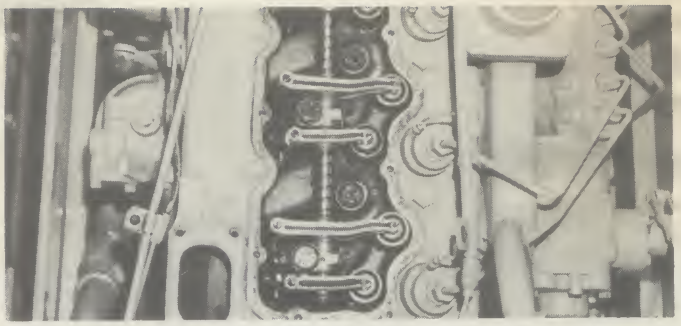




2. Remove plug from flywheel housing. Turn flywheel to close No. 1 inlet and exhaust valves and allow timing bolt to be inserted. Turn engine slowly when installing bolt. Do not use starting motor.

Check lash of No. 1 and No. 2 inlet valves. Check lash of No. 1 and No. 3 exhaust valves.

Adjust valves if necessary (see page 23).



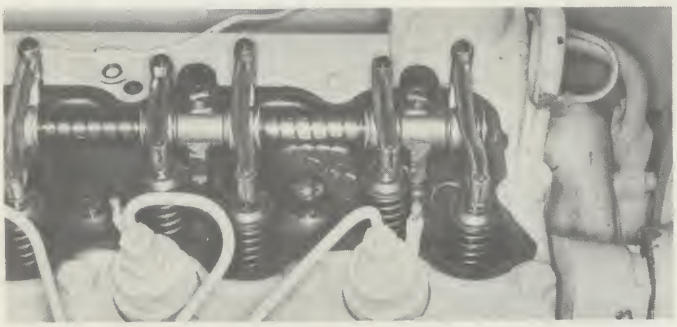
3. Remove bolt and turn flywheel 360° to close No. 4 exhaust and inlet valves.

Check lash of No. 3 and No. 4 inlet valves.

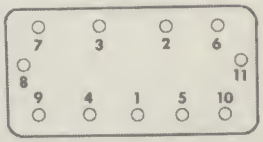
Check lash of No. 2 and No. 4 exhaust valves.

Adjust valves if necessary.

Remove bolt from flywheel and install plug in flywheel housing.

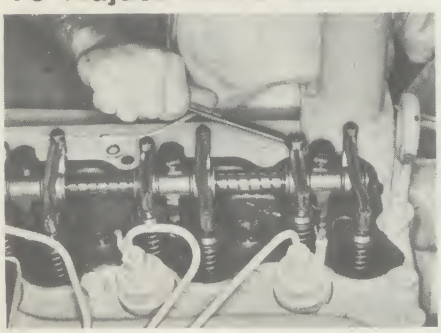


4. Start engine and run at low idle. Check valve rotators. If valves do not rotate, see your Caterpillar dealer.

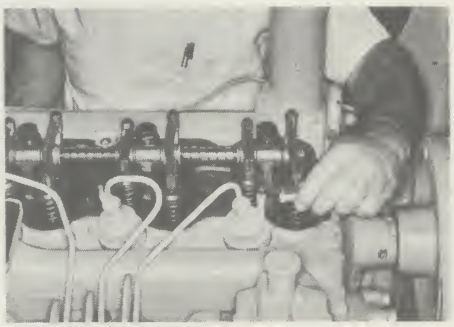


5. Stop engine and install valve cover. Tighten bolts to 6 to 10 lb. ft. (0,83 to 1,39 mkg), in sequence shown. DO NOT overtighten.

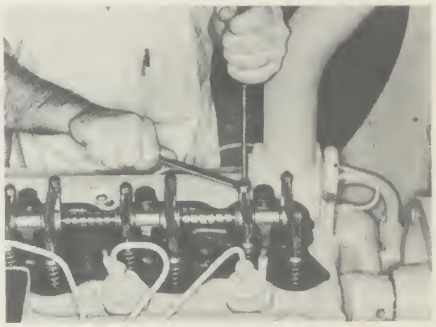
To Adjust Valve Lash:



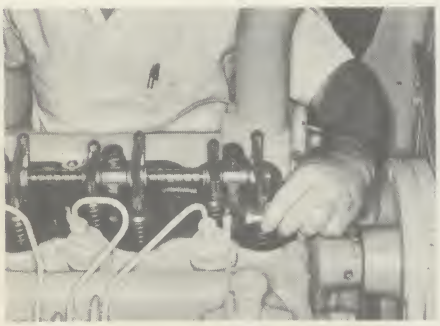
1. Loosen adjusting screw locknut.



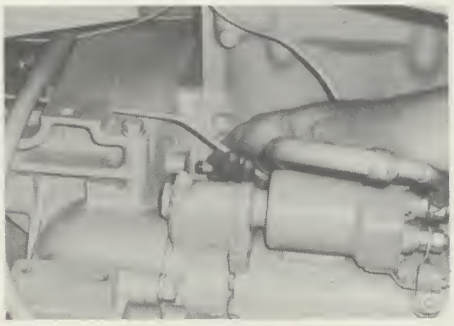
2. Turn adjusting screw in to close gap, out to open gap (see page 22 for correct lash).



3. Hold adjusting screw with screwdriver and tighten locknut.



4. Recheck adjustment.



5. Remove bolt from flywheel and install plug in flywheel housing.

6. Install rocker arm cover (see above for correct bolt tightening sequence and torque).

WHEN REQUIRED

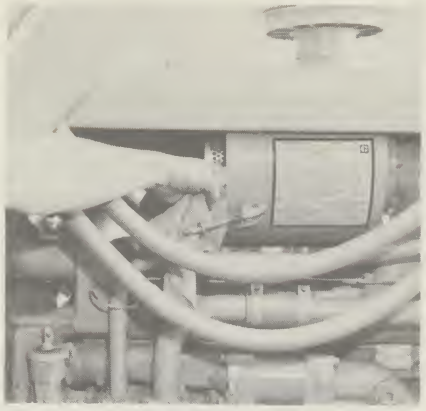
(40) ENGINE AIR INTAKE SYSTEM

⚠ WARNING
Never service air cleaners with engine running.

Service filter elements when RED indicator locks in the visible position.

Primary Element

1. Remove cover and primary element.



2. Clean inside of body and cover.

3. Clean and inspect element. (See Page 25.)

4. Install clean element and cover.

5. Reset indicator.

If indicator shows RED shortly after installation of clean primary element, and element has been cleaned 6 to 8 times, change element.

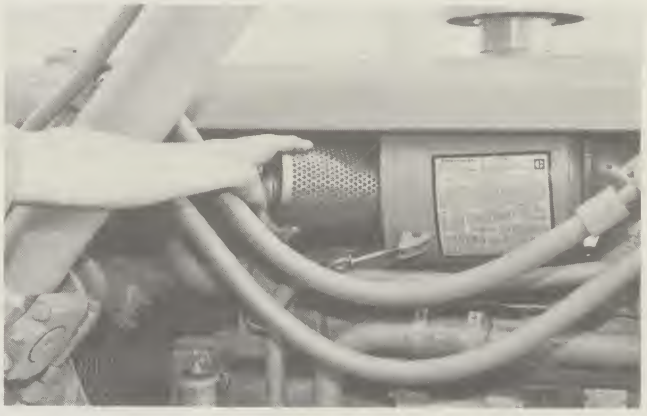
If new primary element was used, and indicator shows RED, change secondary element.

CAUTION
Do not clean secondary element.

4. Clean entire air cleaner including precleaner if necessary.

5. Uncover air inlet.

Secondary Element



1. Remove cover and primary element.

2. Remove secondary element.

3. Cover air inlet opening.

6. Install new element, torque element nuts to 20 ± 5 lb. ft. (2.8 ± .69 mkg).

7. Install clean primary element.

8. Install covers.

9. Reset indicator.

Cleaning Air Cleaner Elements

Pressure Air — 30 PSI (2 kg/cm^2) Maximum

1. Direct air inside element along length of pleats.

2. Direct air outside along length of pleats. Direct air inside along length of pleats. Check element.

Water — 40 PSI (3 kg/cm^2) Maximum

1. Direct water inside element along length of pleats.

Detergent

2. Direct water outside along length of pleats. Rinse, air dry thoroughly and check element.

1. Wash in warm water and non-sudsing household detergent.

2. Rinse with clean water, 40 PSI max. (3 kg/cm^2), see above.

3. Air dry thoroughly and check element.

Checking Element

1. Insert light inside clean and dry element and check. Discard element if pinholes or tears are found.

2. Wrap and store good elements in a clean dry place.

⚠ WARNING

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

CAUTION

Do not clean elements by bumping or tapping.

Do not use elements with damaged pleats, gaskets or seals.

NOTE

Have spare elements on hand to use while cleaning used elements.

WHEN REQUIRED

(41) FUEL SYSTEM FILTERS - Service When Fuel Pressure Gauge Registers OUT With Engine Running.

Primary Fuel Filter

1. Close fuel supply valve.

2. Remove bowl and element.

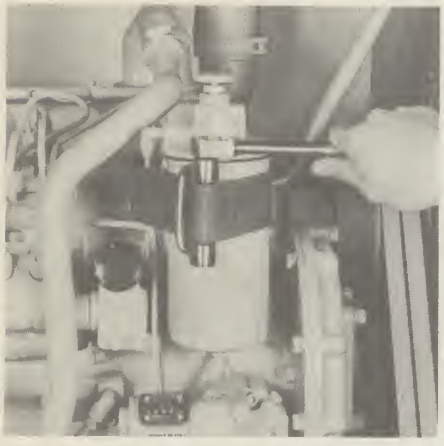
3. Wash element and bowl in clean solvent.

4. Install element and bowl.

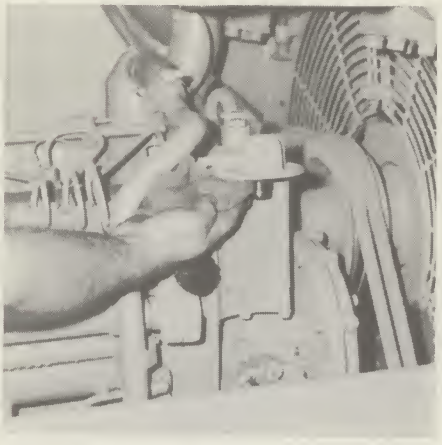
5. Open fuel valve and start engine.

If fuel pressure gauge still registers OUT, change final fuel filter.

Final Fuel Filter



1. Close fuel supply valve and remove filter.



2. Clean filter base gasket surface. Lubricate new filter gasket with clean diesel fuel.

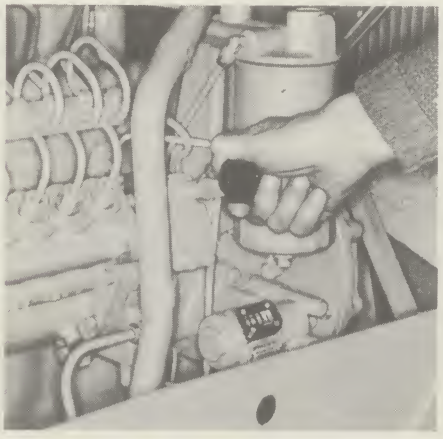
3. Install new filter. Tighten filter until gasket surface contacts base, then tighten additional 1/2 turn.

4. Open fuel valve and prime fuel system.

5. Start engine and check for leaks.

Priming Fuel System

1. Move governor control to off position. Open vent valve.



2. Unlock priming pump plunger and operate pump until . . . .

3. Flow of fuel from drain line is free of air bubbles. Lock pump plunger and close vent valve.

WHEN REQUIRED

(42) COOLING SYSTEM

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

Remove cap slowly to relieve pressure. Maintain coolant level to within ½ inch (1 cm) of the bottom of the fill pipe.

Use clean water that is low in scale forming minerals — not softened water.

Never add coolant to an overheated engine. Allow it to cool first.

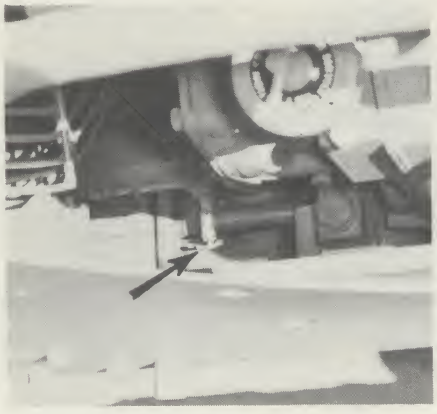
⚠ WARNING
Inhibitor contains alkali, avoid contact with skin and eyes.

Add Caterpillar Corrosion Inhibitor. Follow recommendations given on container.

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

Cleaning Cooling System — Run engine until coolant is warm.

1. Stop engine and loosen filler cap to release pressure. Remove filler cap.



2. Open drain valve and drain coolant.

3. Close drain valve and fill system with cleaning solution.[1]

4. Start engine and operate for ½ hour.

5. Stop engine and open valve. Flush system with clean water until draining water is clear.

6. Close drain valve and fill system with neutralizing solution.[2]

7. Start engine and operate for 10 minutes.

8. Stop engine, open drain valve and flush system.

9. Close drain valve and add coolant to proper level.

[1]2 lb. Sodium Bisulphate ($NaHSO_4$) per 10 gal. water (mix 25 grams per 1 liter of water).

[2]½ lb. Sodium Carbonate Crystals ($Na_2CO_3 \cdot 10\ H_2O$) per 10 gal. water (mix 6 grams per 1 liter of water).

NOTE
Most commercial type cooling system cleaners may be used.

WHEN REQUIRED

(43) BULLDOZER

Replace Cutting Edge And End Bits

1. Lower blade arms on blocks. Engage parking brake and stop engine.

2. Remove bolts and remove cutting edge.

3. Remove end bits if worn. Inspect all bolts and use new ones where necessary.

Adjust Tilt Brace Ball And Socket

4. Reverse cutting edge if only worn on one edge. Install cutting edge and end bits.

1. Remove cap bolts. Shorten brace and remove shims. Clean ball, socket and shims.

2. Lengthen brace. Install and tighten bolts evenly.

3. Measure clearance between cap and socket with shims.

4. Remove bolts and shorten brace. Install shims equal to measured distance plus 1 shim.

5. Lengthen brace and install bolts. Tighten to 150 ± 20 lb. ft. (20,7 ± 2,7 kmg).

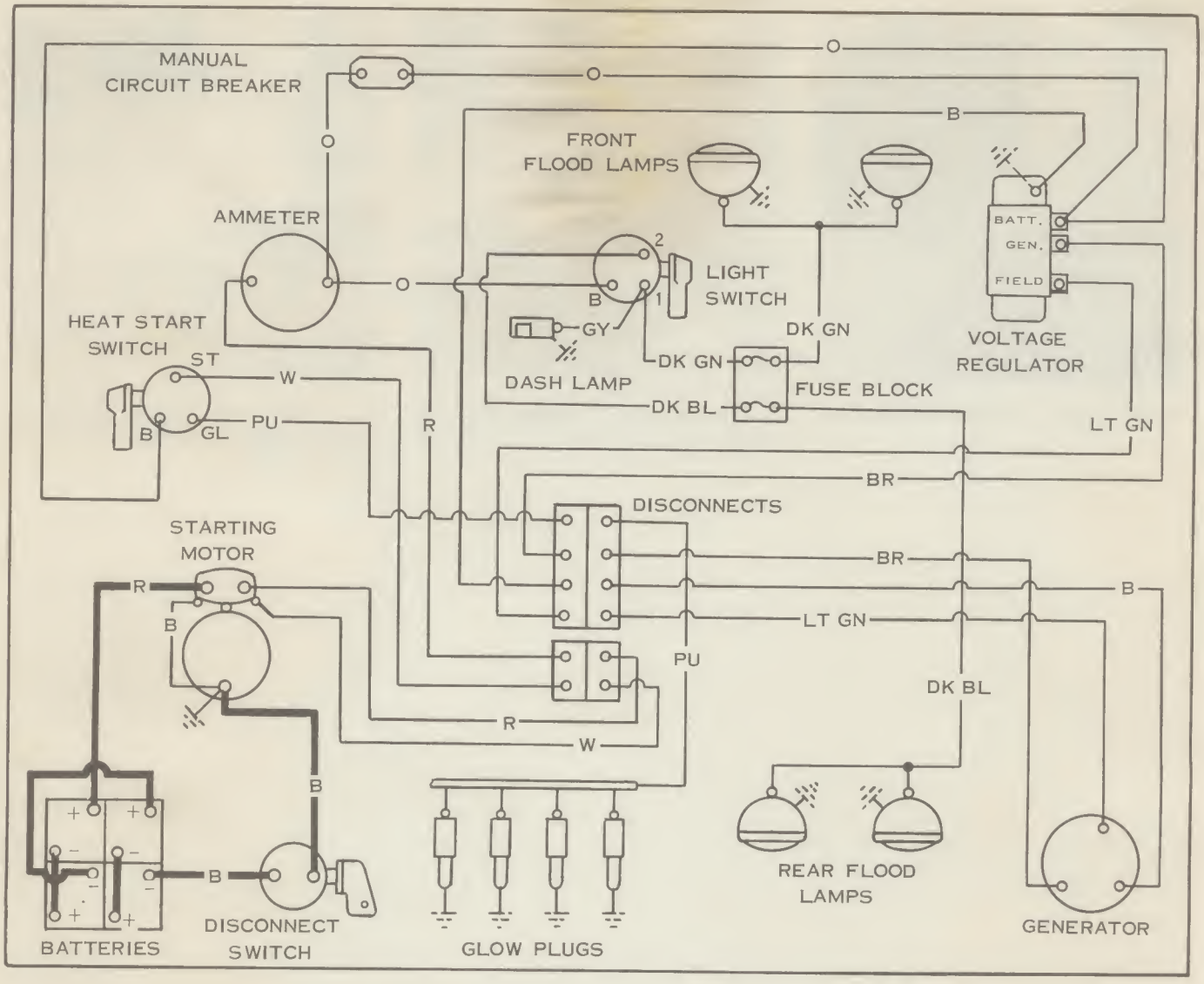
(44) RIPPER TIP - Replace

1. Drive pin out and remove tip.

2. Check plug. Metal part of plug must be towards pin hole.

3. Install tip in either digger or runner position. Align pin holes and install pin.

WIRING DIAGRAM



COLOR	ABBREVIATIONS
R	RED
B	BLACK
W	WHITE
O	ORANGE
GY	GRAY
BR	BROWN
PU	PURPLE
DK BL	DARK BLUE
LT GN	LIGHT GREEN
DK GN	DARK GREEN

SYMBOL	DESCRIPTION
o	WIRING TERMINAL
•	JUNCTION OF WIRES
	CROSSING OF WIRES
	VISIBLE GROUNDING
	INTERNAL GROUNDING

REFILL CAPACITIES (Approximate)

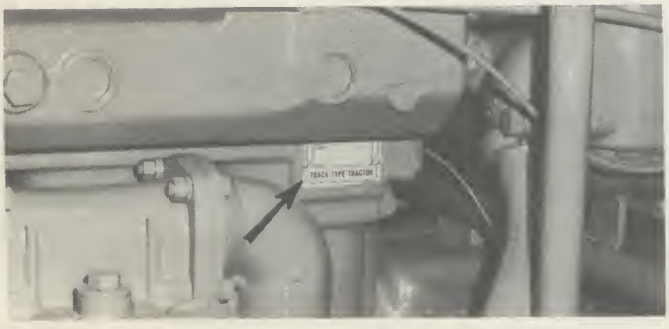
COMPARTMENT OR SYSTEM		U.S. MEASURE	METRIC MEASURE	IMPERIAL MEASURE
Diesel engine crankcase		5.0	19 ltr.	4 gal.
Hydraulic control system		8.50 gal.	33,20 ltr.	7 gal.
Final drives (each)	47H, 83J, 59J, 69K	2.50 gal.	9,5 ltr.	2 gal.
	7R	2.75 gal.	10 ltr.	2.3 gal.
*Transmission and torque converter		7 gal.	26,5 ltr.	6.5 gal.
*Bevel gear compartment		4.5 gal.	17 ltr.	3.75 gal.
Fuel tank	83J, 59J, 69K	42 gal.	160 ltr.	35 gal.
	47H, 7R	62.50 gal.	236 ltr.	52 gal.
Cooling system		8 gal.	30.20 ltr.	7 gal.

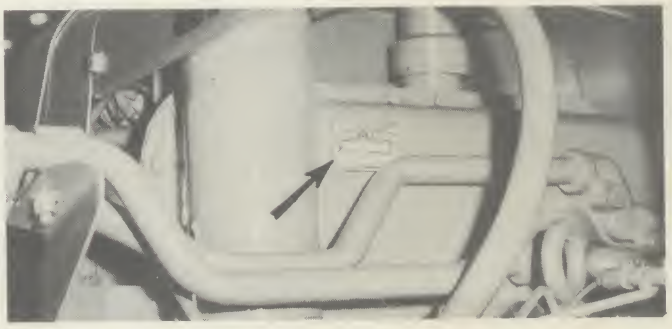
*Quantity may be increased up to 10% when operating on severe slopes.

SERIAL NUMBER LOCATIONS

Dash


Bevel Gear Case


Engine


Hydraulic Control


Bulldozer


Tool Bar


Ripper

CATERPILLAR

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