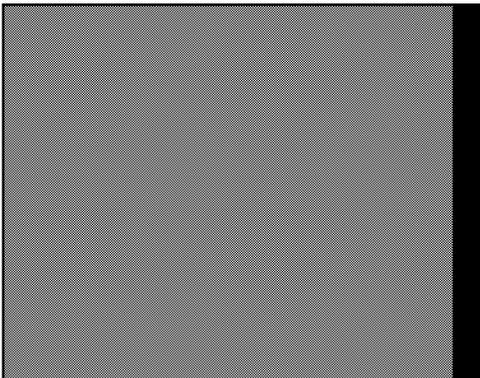
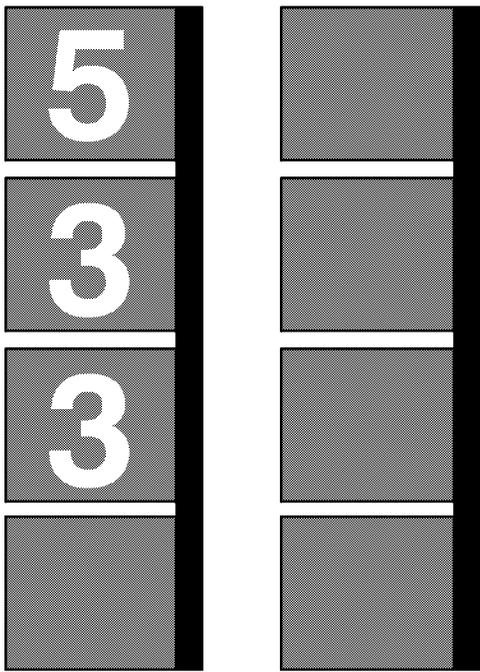
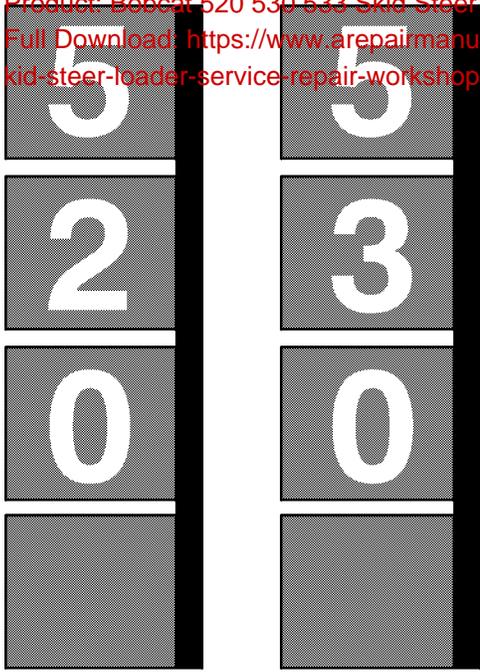
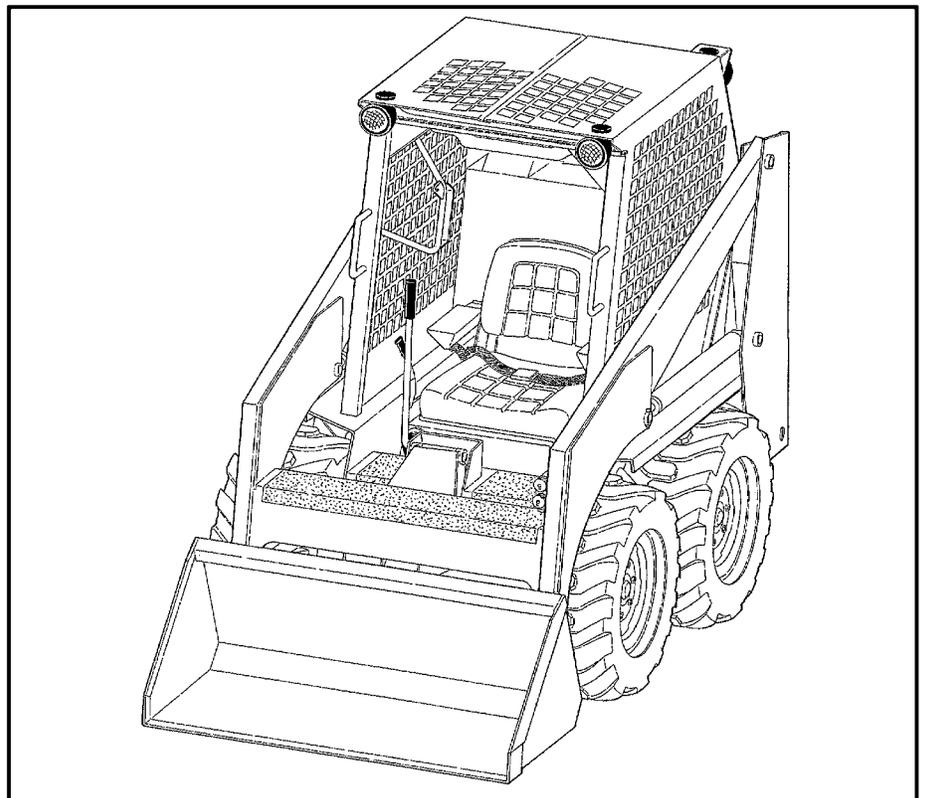


Product: Bobcat 520 530 533 Skid Steer Loader Service Repair Workshop Manual
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Service Manual



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MAINTENANCE SAFETY



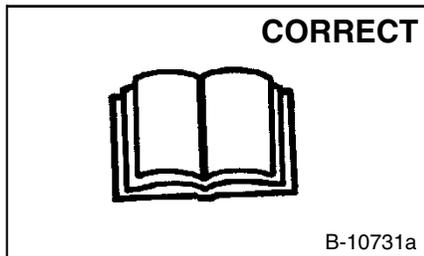
WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.

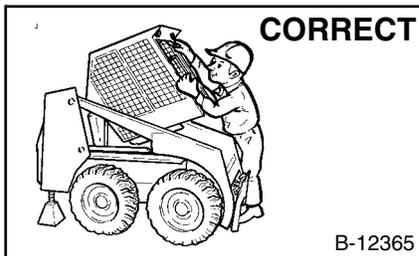
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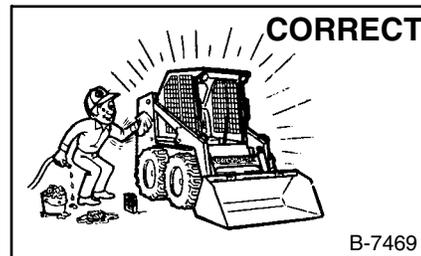
Safety Alert Symbol: This symbol with a warning statement, means: "Warning, be alert! Your safety is involved!" Carefully read the message that follows.



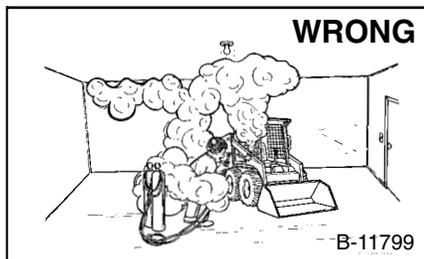
Never service the Bobcat Skid-Steer Loader without instructions.



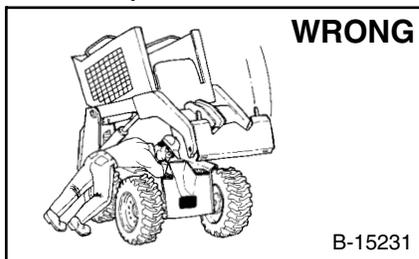
Use the correct procedure to lift or lower operator cab.



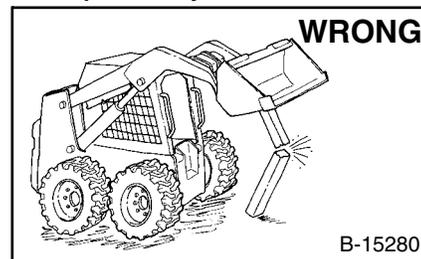
Cleaning and maintenance are required daily.



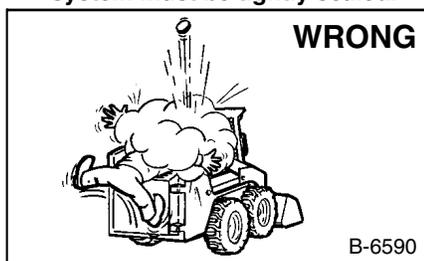
- Have good ventilation when welding or grinding painted parts.
- Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.
- Avoid exhaust fume leaks which can kill without warning. Exhaust system must be tightly sealed.



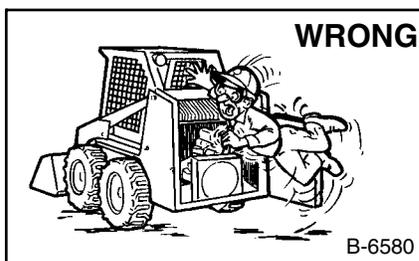
Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop. Do not go under lift arms when raised unless supported by an approved lift arm support device. Replace it if damaged.



- Never work on loader with lift arms up unless lift arms are held by an approved lift arm support device. Replace if damaged.
- Never modify equipment or add attachments not approved by Bobcat Company.



- Stop, cool and clean engine of flammable materials before checking fluids.
- Never service or adjust loader with the engine running unless instructed to do so in the manual.
- Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes.
- Never fill fuel tank with engine running, while smoking or when near open flame.



- Keep body, jewelry and clothing away from moving parts, electrical contact, hot parts and exhaust.
- Wear eye protection to guard from battery acid, compressed springs, fluids under pressure and flying debris when engines are running or tools are used. Use eye protection approved for type of welding.
- Keep rear door closed except for service. Close and latch door before operating the loader.



- Lead-acid batteries produce flammable and explosive gases.
- Keep arcs, sparks, flames and lighted tobacco away from batteries.
- Batteries contain acid which burns eyes or skin on contact. Wear protective clothing. If acid contacts body, flush well with water. For eye contact flush well and get immediate medical attention.

Maintenance procedures which are given in the Operation & Maintenance Manual can be performed by the owner/operator without any specific technical training. Maintenance procedures which are **not** in the Operation & Maintenance Manual must be performed **ONLY BY QUALIFIED BOBCAT SERVICE PERSONNEL**. Always use genuine Bobcat replacement parts. The Service Safety Training Course is available from your Bobcat dealer.



Bobcat®

FORWARD

This manual gives instructions for:

1. Correct service and adjustment of the Bobcat Loader.
2. Overhaul instructions of the engine, loader hydraulic/hydrostatic system and mainframe parts.

See the Owner's Manual for operating instructions (Starting Procedure, Regular Checks, Basic Maintenance, etc.).

Make a complete inspection of these items after completion of service or repair:

1. Check the hydraulic fluid level, engine oil level, fuel supply, and coolant level.
2. Look for any sign of fuel, oil or hydraulic fluid leaks.
3. Complete lubrication of the machine.
4. Check the battery condition, electrolyte level and cables.
5. Check the air cleaner system for damage or leaks. Check the element and replace if necessary.
6. Check the electrical system.
7. Check the warning lamps.
8. Check the tires for wear and correct pressure.
9. Check the Bob-Tach attachment for condition. Check the wedges for damage or wear.
10. Check all safety items for condition (Operator Enclosure, Seat Belt, Safety Treads, Lamps, Parking Brake, etc.).
11. Make a visual inspection for loose or broken parts or connections.
12. Operate the loader, and check operation of drive system and hydraulic system.

Tell the owner if any of the above items are in need of repair.

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PREVENTIVE
MAINTENANCE

HYDRAULIC
SYSTEM

HYDROSTATIC
SYSTEM

DRIVE
SYSTEM

MAIN FRAME

ELECTRICAL
SYSTEM

ENGINE SERVICE
(520, 530)

ENGINE SERVICE
(533)

TECHNICAL
DATA

ALPHABETICAL
INDEX

SAFETY INSTRUCTIONS

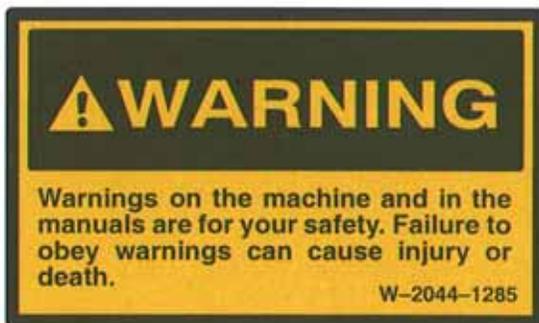
WARNING

Instructions are necessary before operating or servicing machine. Read Operation & Maintenance Manual, Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Failure to follow instructions can cause injury or death.

W-2003-1289

The following publications provide information on the safe use and maintenance of the loader and attachments:

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the loader gives operating information as well as routine maintenance and service procedures. It is a part of the loader and must stay with the machine when it is sold. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat loader dealer.
- The loader has machine signs (decals) which instruct on the safe operation and care. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat loader dealer.
- The loader has a plastic Operator's Handbook fastened to the operator cab. Its brief instructions are convenient to the operator. The handbook is available from your dealer in English edition or a combination English, French, German, Italian, Dutch & Spanish edition.
- The EMI Safety Manual delivered with the loader gives general safety information.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.
- The Skid-Steer Loader Operator Training Course is available through your local dealer. This course is intended to provide rules and practices for correct operation of the Bobcat loader.



Safety Alert Symbol: This Safety Symbol is used for important safety messages. When you see this symbol follow the safety message to avoid personal injury or death.

SAFETY INSTRUCTIONS (Cont'd)

- Wear tight fitting clothing. Always wear safety glasses when maintaining or servicing loader. Safety glasses, hearing protection or loader special applications kit are required for some work. See your dealer for Melroe Safety equipment.
- Know where fire extinguishers and first aid kits are located and how to use them.
- Do not use the Bobcat loader where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.
- The engine compartment and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazard and overheating.
- Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part.
- Check fuel and hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Tighten or replace any parts that show leakage. Always clean fluid spills. Do not use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.
- Follow any environmental safety regulations when disposing of used fluids such as engine oil, grease or anti-freeze.
- Do not use ether or starting fluids on this engine. It has glow plugs. These starting aids can cause explosion and injure you or bystanders.
- Always clean the loader and disconnect the battery before doing any welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the loader when welding. Have good ventilation when grinding or welding painted parts. Wear dust mask when grinding painted parts. Toxic dust or gas can be produced.
- Stop the engine and let it cool before adding fuel. No smoking!
- Use the procedure in the Operation & Maintenance or Service Manuals for connecting the battery.
- Use the procedure in the Operation & Maintenance or Service Manuals for cleaning the spark arrestor muffler.

A fire extinguisher is available from your local dealer. The fire extinguisher can be installed in the location shown [A].

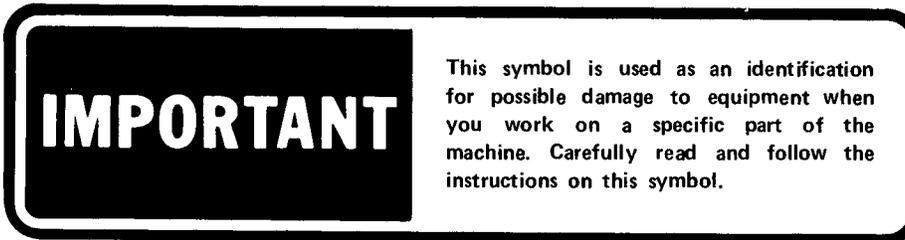
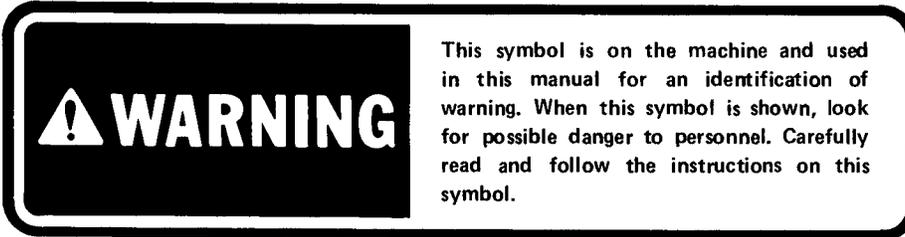
PREVENTIVE MAINTENANCE



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1-1 INTRODUCTION

1-1.1 Symbols



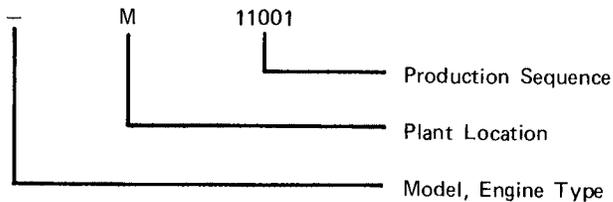
1-1.2 Serial Number Identification

It is important to make correct reference to the serial number of the loader when you make repairs or are ordering parts. Early or later models (identification made by "Lot") sometimes use different parts, or it may be necessary to use a different procedure in doing a specific job. Make reference to the parts manual for identification information.

1-1.3 Loader Serial Number

The plate for the serial number of the loader is inside the left upright (Fig. 1-1).

The serial number is made up as follows:



1-1.4 Engine Serial Number

The Kohler (520/530) engine serial number is located on the blower housing, at the right side of the engine (Fig. 1-2).

The ISUZU engine (533) engine serial number is on the left side of the engine, above the injection pump (Fig. 1-2).

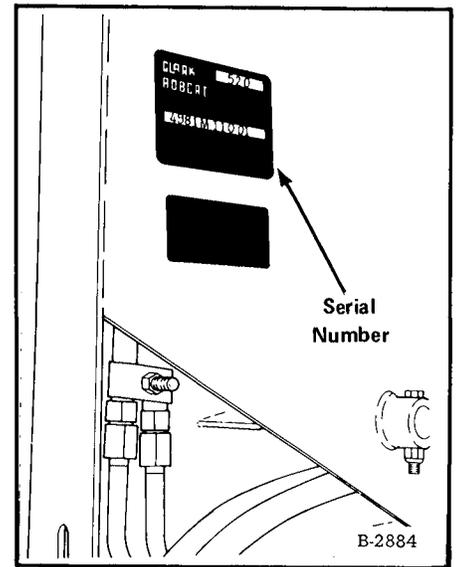


Fig. 1-1 Loader Serial Number

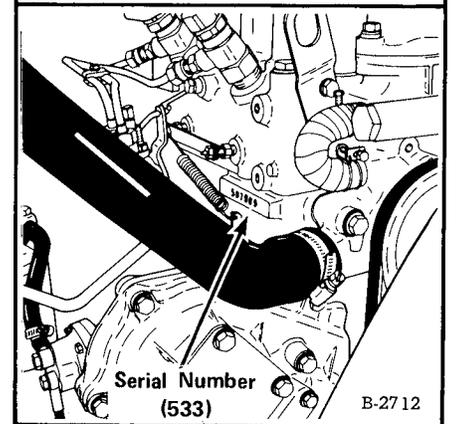
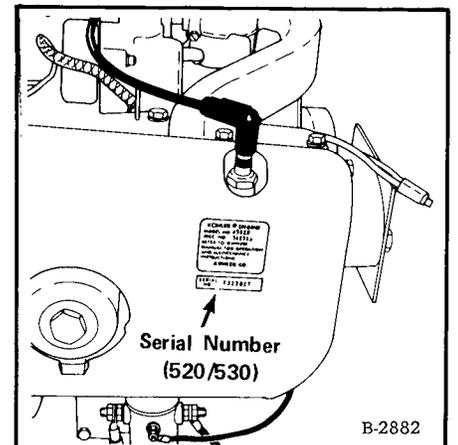
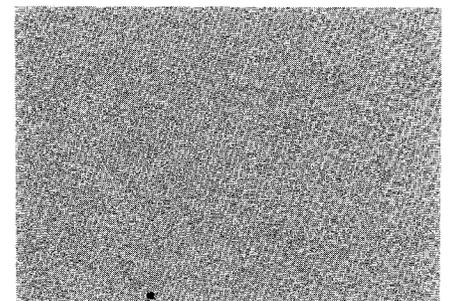


Fig. 1-2 Engine Serial Numbers



1-1.5 Pre-Delivery Inspection

The pre-delivery inspection is used to make sure that the loader is in correct operating condition when delivery is made to the dealer.

The pre-delivery inspection also helps to let the factory know when something is wrong with the loader.

All items on the inspection form (Fig. 1-3) must be completed according to specifications in this manual.

Fig. 1-3 Pre-Delivery Inspection

1-1.6 30 Hour Inspection

The 30 hour inspection must be completed soon after the first 30 hours of loader operation.

The purpose of the 30 hour inspection is as follows:

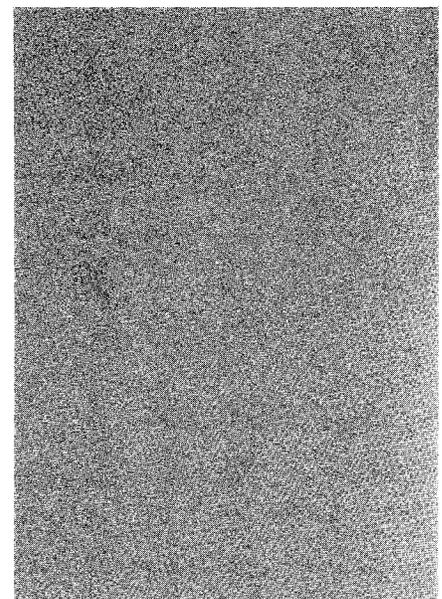
- (1) For adjustment and inspection after first work period.
- (2) To correct wrong maintenance and operating methods.
- (3) To show correct service procedures to customers.

All items on the 30 hour inspection form (Fig. 1-4) must be completed by the mechanic according to specifications in this manual.

When the 30 hour inspection is completed, the form must be signed by:

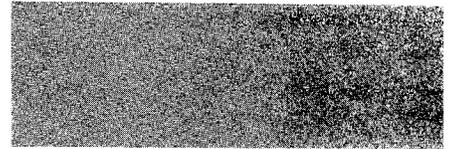
- (1) The mechanic completing the inspection.
- (2) Dealer person
- (3) Owner or operator

Fig. 1-4 30 Hour Inspection



1-2 PREVENTIVE MAINTENANCE

Maintenance work must be done at regular intervals. Failure to do this will cause damage and failure to the machine or its engine. The service schedule is a guide to maintenance of the Bobcat loader. Do not change this schedule unless to shorten the intervals during very hot, cold, dirty conditions that can cause corrosion.



1-3 BOBCAT SERVICE SCHEDULE

		HOURS					
		8-10	50	100	200	300	1000
ITEM	SERVICE REQUIRED						
Engine Air Cleaner	Clean dust cup. Inspect condition of system.						
Engine Oil	Check and add oil as necessary.						
Engine Cooling System	Check coolant level in coolant recovery tank. Add coolant when low. Remove any debris from radiator grill area.						
Tires	Inspect for damage and check tire pressure.						
All Pivot Points	Add lubricant to all fittings (12).						
Indicators, etc.	Check for correct operation of all indicators, switches, lights.						
Operator Guard	Check condition and holding bolts.						
Seat Belt	Check condition of straps and buckle and replace if defective.						
Safety Decals	Check for missing or damaged decals. Replace as necessary.						
Hydraulic Fluid	Check level and add recommended fluid if needed.						
Engine Oil & Filter	Replace oil and filter.						
Battery	Check cables.						
Control Pedals & Steering	Check operation. Make repairs and adjustments as needed.						
Bob-Tach	Inspect locking levers and wedges for condition and operation.						
Governor Lubrication	Check oil level and add as needed.						
Brakes	Check operation. Make adjustment as needed.						
Chaincase Fluid	Check level. Add fluid if needed.						
Engine Cylinder Head Bolts (533)	Tighten to correct torque after first 100 hours. Also adjust valve tappets.						
Engine Air Filter System	Inspect system for leaks. Replace element, if needed.						
Spark Arrestor Muffler	Clean carbon from the muffler.						
Hydraulic Filter	Replace element.						
Engine Air Housing (520/530)	Remove and clean housing and cooling fins.						
Engine Fuel Filter	Replace element or clean as necessary.						
Injection Pump Oil (533)	Replace oil in injection pump reservoir.						
Engine Ignition System (520/530)	Check points and timing. Replace spark plugs.						
Chaincase	Replace fluid.						
Hydraulic System	Replace fluid and filter. Clean inlet screen and vent.						

1-4 ENGINE SERVICE

The rear door must be opened to service the engine. Pull the door latch to the left to open the door (Fig. 1-5).

NOTE: The 530; S/N 12291 & up and 533; S/N 12121 & up loaders have a rear door stop (Fig. 1-6a). The door stop will hold the rear door open while servicing the engine. Be sure to disengage the door stop before closing the rear door.

IMPORTANT

Door must be closed when operating loader.

1-5 AIR CLEANER SYSTEM (Fig. 1-6)

Regular maintenance of the air cleaner system is very important for good engine performance and long service life.

Service as follows: (Fig. 1-7)

- (1) Remove dust cup and clean each day.
- (2) Make replacement of element only when necessary. To check for need of replacement, hold an illuminated flashlight inside the element. If light can not be seen through element or if element has holes in it, replacement is necessary (Fig. 1-8).

NOTE: Be sure the inlet of the air cleaner has the rubber elbow installed. It helps prevent water from getting into the air cleaner.

Be sure to clean the inside of the housing before installing a new element. Make sure that the gasket (Fig. 1-6, Item 1) is correctly in place and the arrow on the end of the cover is pointing up.

- (3) Check complete air inlet system and replace any parts which have a defect.

(4) Check the operating condition of the system, as follows:

- a. Run the engine at idle. Remove the rubber elbow, if installed.
- b. Hold a piece of wood over the inlet pipe of the air cleaner (Fig. 1-9). The engine must slow down then stop.

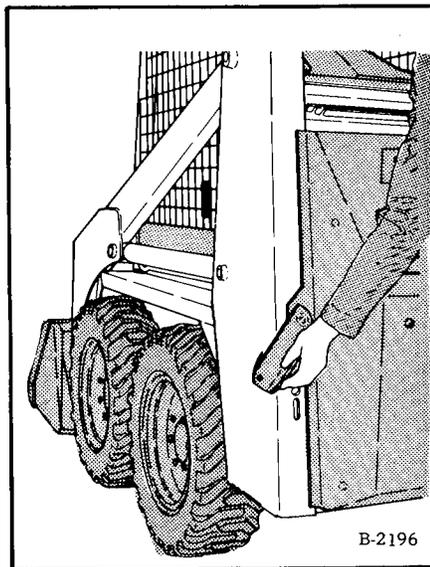


Fig. 1-5 Releasing the Rear Door

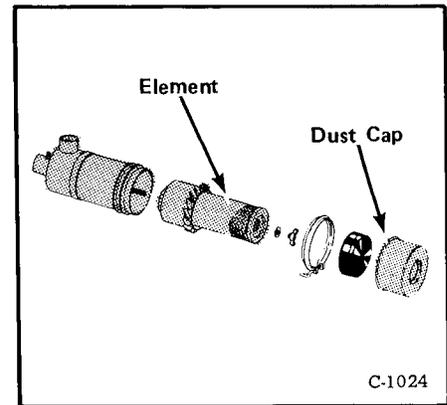


Fig. 1-6 Air Cleaner

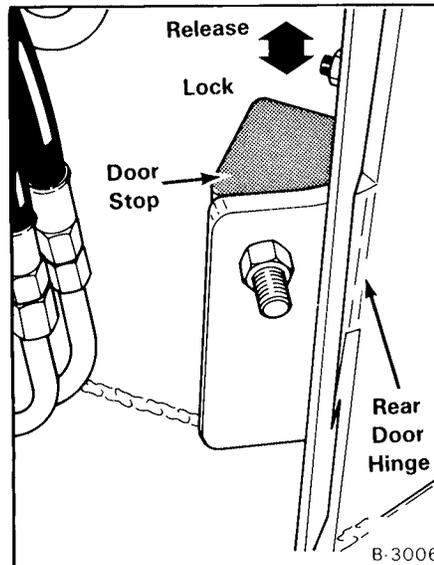


Fig. 1-6a Rear Door Stop

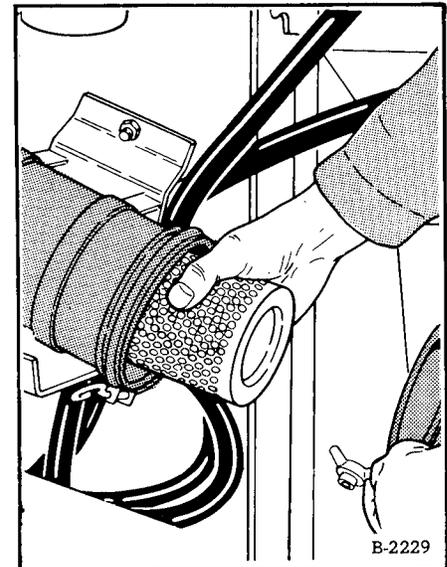


Fig. 1-7 Removing Air Cleaner Element*

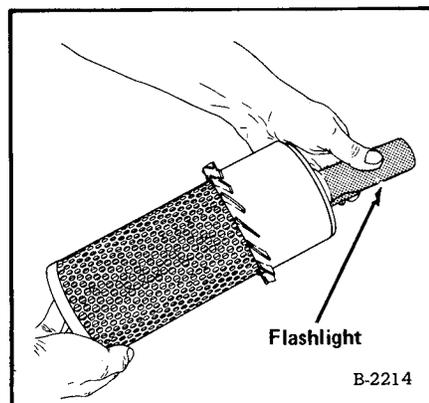


Fig. 1-8 Checking Element with Flashlight

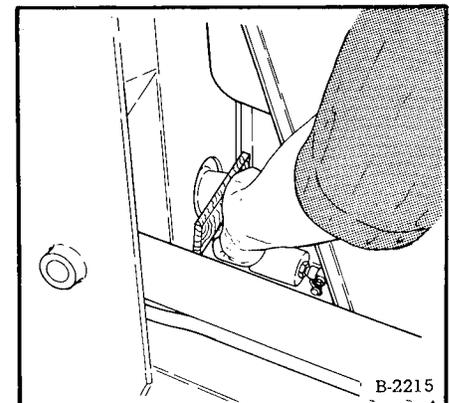


Fig. 1-9 Checking Air Cleaner System

- c. If the engine does not stop, the system has a leak. Check the system and make repairs as necessary.

NOTE: Look for a leak in the air cleaner hose or the crankcase breather hose.

1-6 FUEL SYSTEM

Use only regular grade or lead-free gasoline in the 520/530 engine.

Use No. 2 diesel fuel in 533 engine (#1 during cold weather [below +20°F -6C]).

A visual check will show the fuel level in the tank.

WARNING

Never add fuel to the loader when the engine is running or is hot!

1-7 FUEL SYSTEM SERVICE

Remove the filler cap to service the fuel tank as follows: (Fig. 1-10 & 1-11)

- (1) Ignition must be in off position and engine must be cooled.
- (2) Add fuel only in an area which has good air movement and is free from sparks. (NO SMOKING.)
- (3) Use a clean approved safety container to add fuel to the fuel tank.
- (4) Lower the spill guard (Fig. 1-10).
- (5) Use only clean fuel to fill the tank.
- (6) Be sure to tighten the cap on the filler pipe.

IMPORTANT

Be sure the air inlet hose (Fig. 1-11) is in place to prevent moisture (rain, snow, etc.) from entering the air cleaner system.

1-8 FUEL FILTER

The 520 and 530 loader has a fuel filter installed next to the shut-off valve on the fuel tank (Fig. 1-12).

To check or replace the filter element:

- (1) Close shut-off valve (1) for fuel.

NOTE: Some of the 530 & 533 loaders did not have manual shut-off valves installed. Be sure to install the fuel shut-off if it does not have one (See Parts Manual or microfiche for parts).

- (2) Loosen the tubeline nut (2) and disconnect the tubeline.

Turn the element to remove it from the shut-off valve.

Put air pressure through the element in the direction of the arrow. (Air must have free passage.)

When you install a new element, make sure that the arrow point is in direction of the carburetor (Fig. 1-12).

- (3) Tighten the tubeline nut, open the fuel shut-off valve and check for leaks.

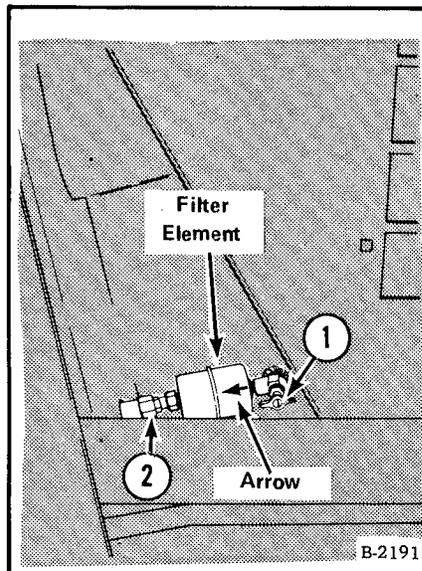


Fig. 1-12 Fuel Filter (520, 530)

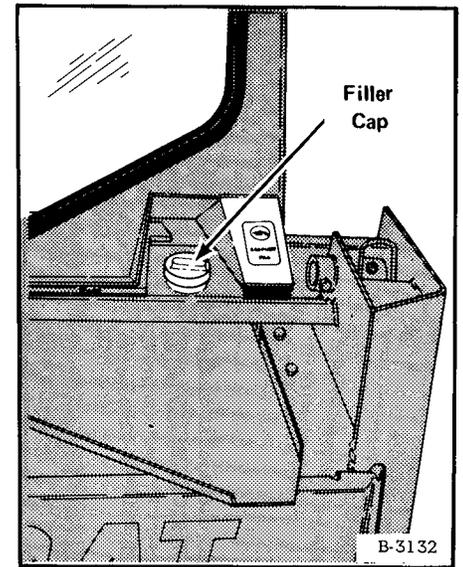


Fig. 1-10 Fuel Filling (520)

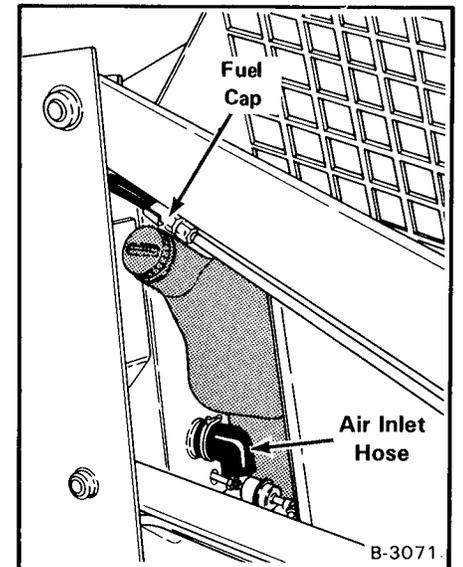


Fig. 1-11 Fuel Tank Cap (530, 533)

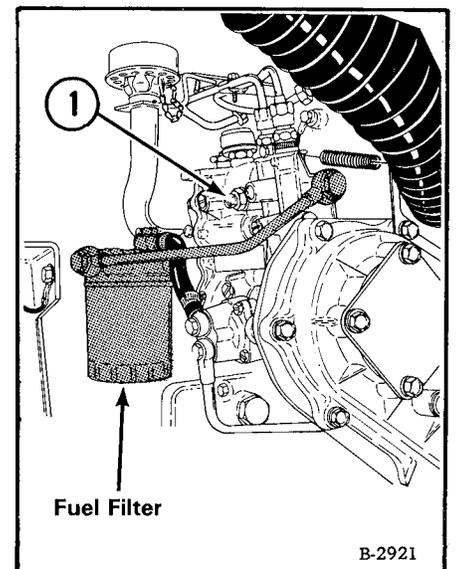


Fig. 1-13 Fuel Filter (533)

The 533 fuel system uses a "turn on" filter element, installed on the left side of the engine (Fig. 1-13).

To replace the element:

- Close the shut-off valve for fuel (Fig. 1-12, Item 1).
- (2) Turn the filter element counterclockwise to remove it.
- (3) Clean the element contact area on the filter housing.
- (4) Put oil on the rubber gasket and turn the new element clockwise to install it. Use your hand to tighten the element until it is hand tight.
- (5) Open the shut-off valve for fuel.
- (6) Loosen the screw to let air out of the system (Fig. 1-13, Item 1).
- (7) Engage the starter and turn the engine until fuel flows freely from the loosened screw, then tighten the screw.

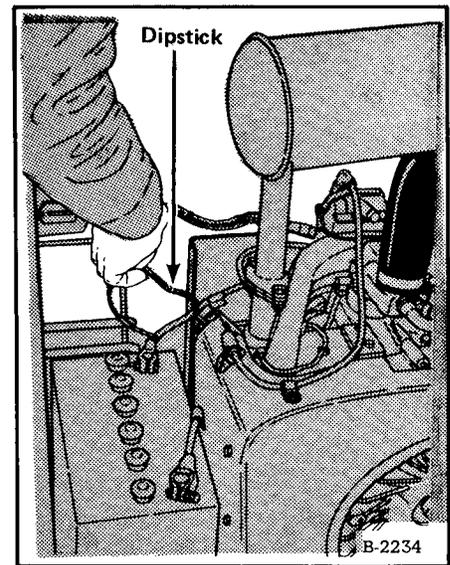


Fig. 1-14 Checking Engine Oil (520, 530)

Start the engine and let it run for several minutes. Then check for leaks.

1-9 ENGINE LUBRICATION SYSTEM

Check the oil level every 4 hours during the first 50 hours of operation. Check the oil level daily after the first 50 hours of operation.

To check the oil level, stop the engine and remove the dipstick at the left side of the engine on the model 520/530 loader (Fig. 1-14). The dipstick on the 533 loader is at the right side of the engine (Fig. 1-15), early models (left side on current models).

Oil level must be kept between the "L" (Low) and "F" (Full) marks on the dipstick. Do not overfill - - - oil level must not exceed the "F" mark. Use good quality detergent motor oil which meets recommended API Service Classifications (See chart).

Use oil of proper SAE viscosity for expected temperature conditions at the time of starting, not for the highest temperature expected during the working day (See chart on page 1-7).

1-10 CHANGING ENGINE OIL & FILTER (520/530)

The engine oil & filter should be replaced after every 50 hours of operation.

Remove the drain plug (Fig. 1-16) when the engine is hot. Let oil flow fully out for several minutes.

Use a 1" size socket or box end wrench to remove the oil filter (Fig. 1-17). Put an open reservoir or rags under filter area to catch leaking oil.

Clean the filter contact area before installing a new element.

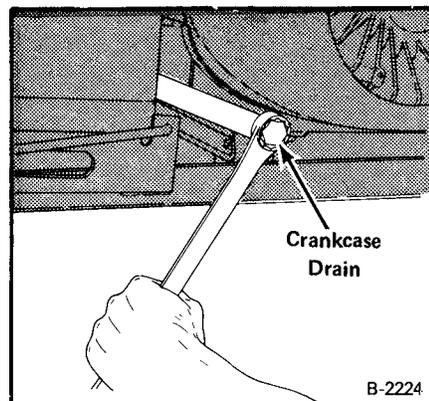


Fig. 1-16 Oil Drain Plug (520, 530)

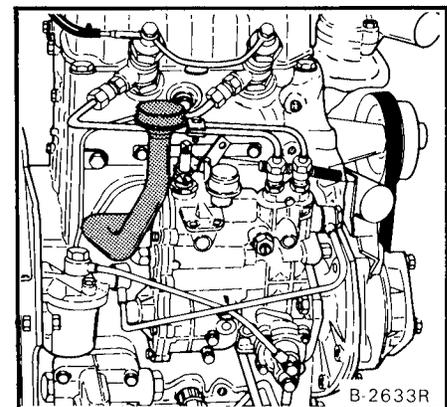


Fig. 1-15 Engine Oil Check (533)

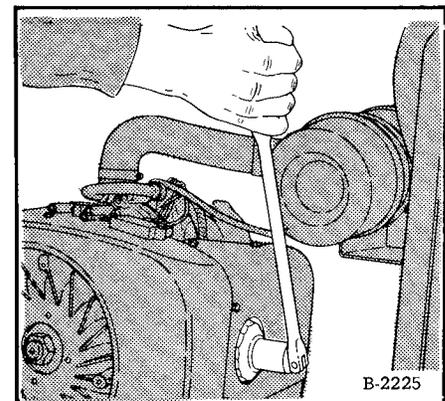


Fig. 1-17 Remove Oil Filter Element (520, 530)

Put oil on the gasket before installing the element. Turn the element on until it is hand tight and use the socket or box end wrench to tighten the element an additional 1/4 to 1/2 turn.

Install the drain plug and remove the oil filler cap. Fill with 4 quarts (3,8 L) of oil of the correct specification (See chart).

Start the engine and let it run for a few minutes and check for leaks at the filter.

Check the oil level again and add oil, if needed, to bring the level to the "F" mark on the dipstick.

NOTE: Do not overfill the crankcase.

**RECOMMENDED SAE VISCOSITY NUMBER
(LUBRICATION OILS FOR ENGINE CRANKCASE)**

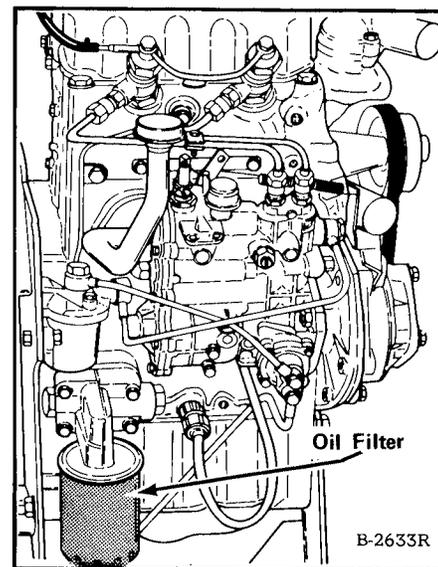
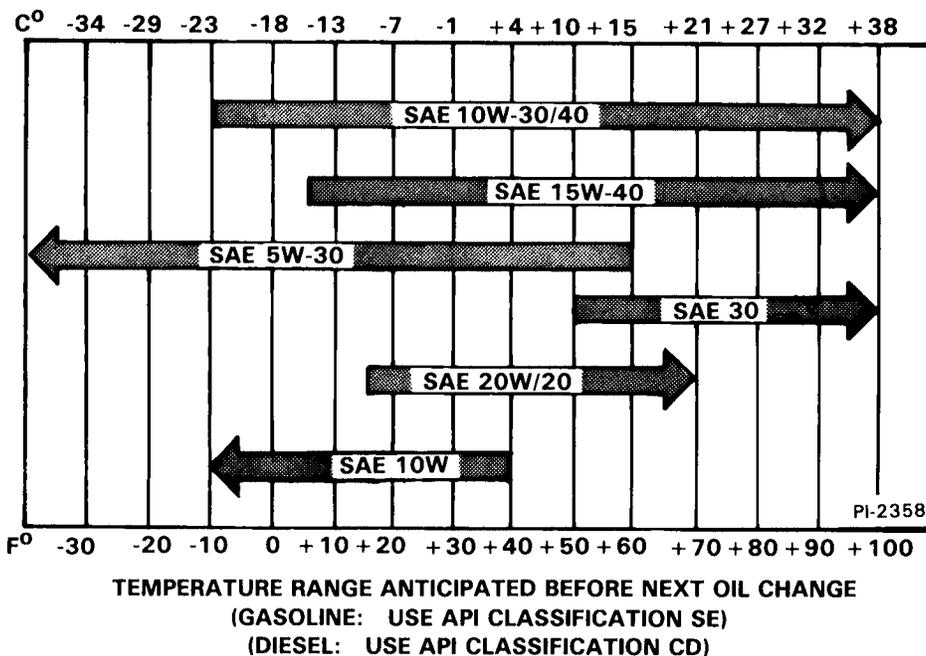


Fig. 1-18 Oil Filter Location (533)

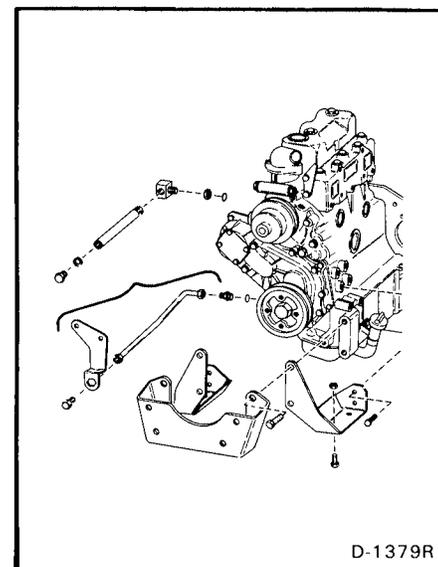


Fig. 1-18a Oil Drain (533)

1-11 CHANGING ENGINE OIL AND FILTER (533)

Change the engine oil and filter after every 50 hours of operation.

Remove the drain plug when the engine is hot. Let oil flow for several minutes.

Use a filter wrench to remove the oil filter (Fig. 1-18). Place an open reservoir or rags under filter area to catch leaking oil.

Clean the filter contact area and put on the gasket before installing the element. Turn the element on until it is hand tight.

NOTE: Be sure to check the engine oil drain for a leak which is caused by engine vibration (S/N 11339 & below). When there is a leak, you can install a new tubeline assembly (See Parts Manual or microfiche for parts).

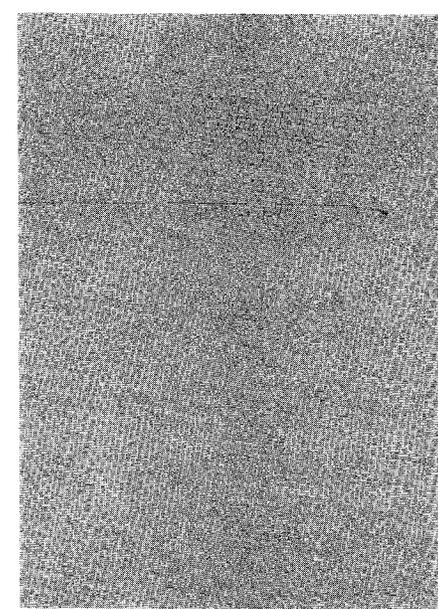
Install the drain plug and remove the oil filler cap (Fig. 1-15). Fill with 3.4 quarts (3,2 L) of oil of correct specification (See chart).

Start the engine and let it run for a few minutes. Then stop the engine and check for leaks at the filter.

NOTE: To check engine oil, the dipstick cap must touch the dipstick tube. To get the proper oil level, DO NOT tighten the dipstick in the tube.

Check the oil level and add oil, if needed, to bring the level to the "F" mark on the dipstick.

NOTE: Do not overfill the crankcase.



1-12 ENGINE COOLING SYSTEM (520/530)

The oil cooler grill and engine cylinder cooling fins must be kept clean and free of foreign material or overheating of engine will result.

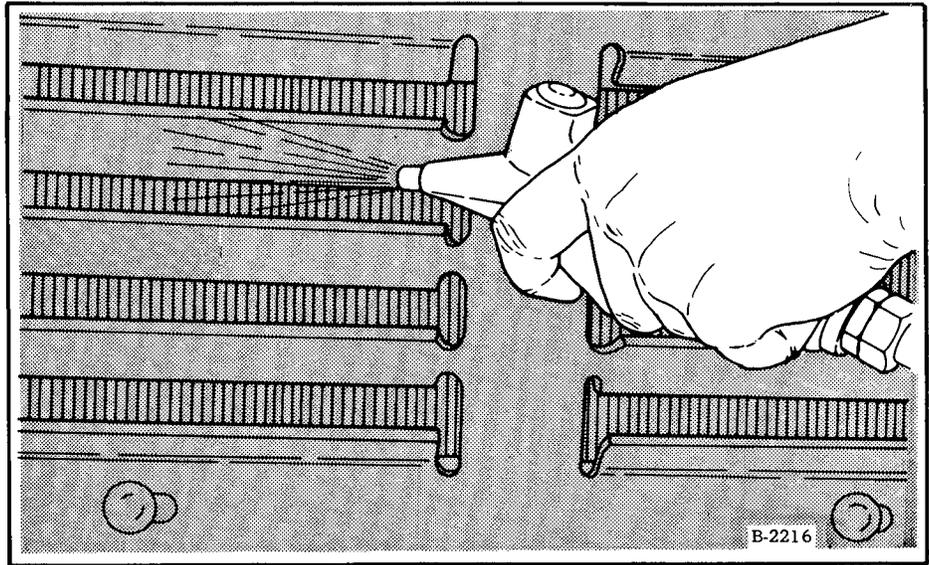
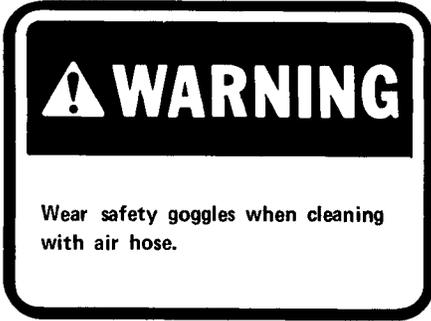


Fig. 1-19 Cleaning Oil Cooler Grill (520, 530)

Use air pressure or water spray to clean oil cooler grill area (Fig. 1-19).

Remove the shrouding on the engine to clean the cooling fins. Be sure to wear safety goggles when using water spray or air pressure to clean cooling fins.

Use a hard brush and scraper tool to remove hard deposits on the cooling fins (Fig. 1-20). The oil cooler can be removed for better cleaning.

NOTE: Do not use a scraper on the oil cooler.

Be sure to replace all covers after cleaning.

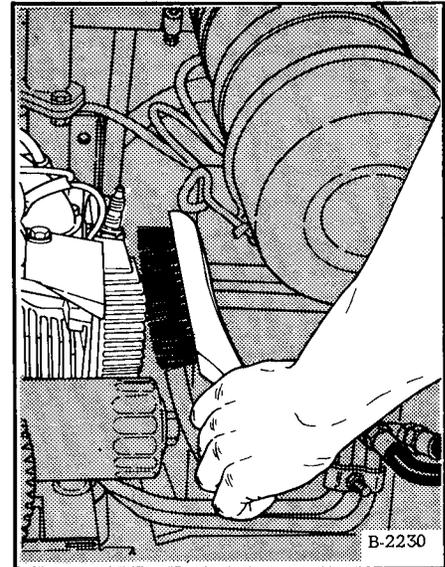
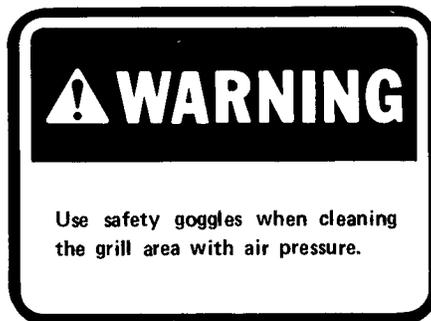


Fig. 1-20 Cleaning Cooling Fins (520, 530)

1-13 ENGINE COOLING SYSTEM (533)

The radiator grill area must be kept clean and free of foreign material or the engine will become too hot.

Keep the blower fan clean and free from debris (Fig. 1-21).



Check coolant level daily at the coolant recovery tank (Fig. 1-22). Correct tank level is 1/3 full when the engine is cold and 2/3 full when the engine is warm.

Add coolant at the recovery tank only.

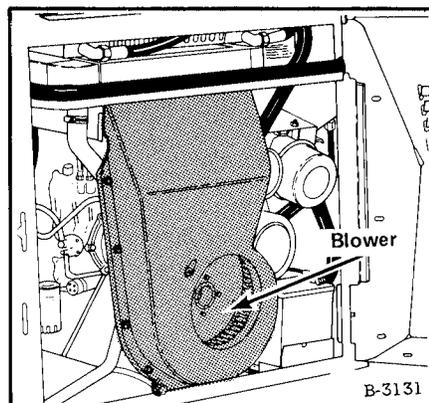


Fig. 1-21 Blower & Housing (533)

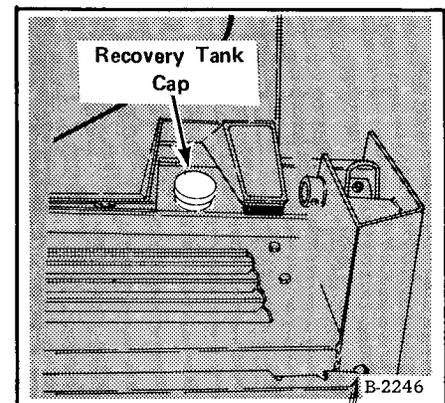


Fig. 1-22 Coolant Recovery Tank (533)

⚠ WARNING

Do not remove the radiator cap to check coolant level unless the engine is cold.

To protect against freezing in cold climate, add anti-freeze as necessary.

The cooling system must be made empty and flushed clean once each year. Fill with new, clean coolant, containing a rust inhibitor.

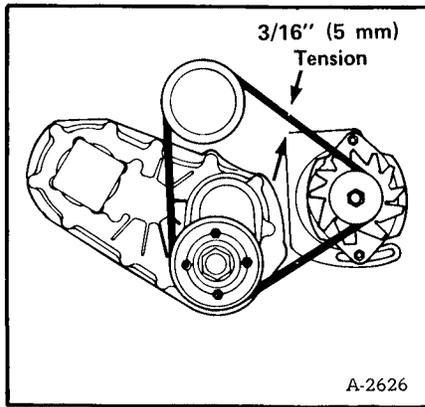


Fig. 1-23 Alternator Belt Tension

IMPORTANT

Never operate the engine with any part of the blower shrouding removed.

Check the water pump and alternator belt tension and adjust when necessary. The correct belt tension is 3/16" (5 mm) with a little amount of finger pressure at the center of the belt span (Fig. 1-23).

1-14 ELECTRICAL SYSTEM

The 520/530 loader is equipped with a 12 volt, 15 amp, flywheel generator charge system. (See Section 6 for wiring diagram.)

The 533 loader uses a 12 volt, 37 amp, belt driven alternator charge system. (See Section 6 for wiring diagram.)

Service the electrical system as follows:

- (1) Check the battery electrolyte level and if it is low, fill to the mark with distilled water. (Not required on "Maintenance Free" type battery.)
- (2) Keep the battery cables and terminals clean and tight. Remove acid corrosion with a baking soda and water solution. Coat the terminals with grease to prevent corrosion build up.

To remove the battery, pull back and lift up on the holddown lever (Fig. 1-24). On later model loaders remove nuts and clamp. Use a carrystrap to lift the battery out of the engine compartment.

Be sure to fasten the battery in place with the holddown lever or clamp when installing.

NOTE: On the 520; all 530; 11080 & below and 533; 11165 & below, the battery holddown can bend. Install a new hold-down rod which has been heat treated. (See Parts Manual or microfiche for parts) (P/N has not been changed).

- (3) Check for worn or loose wiring.

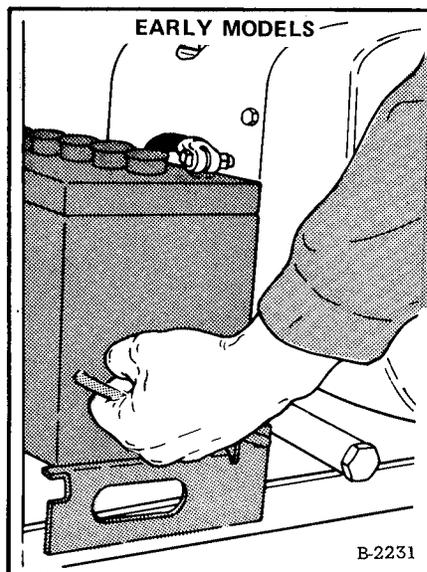


Fig. 1-24 Battery Hold Down

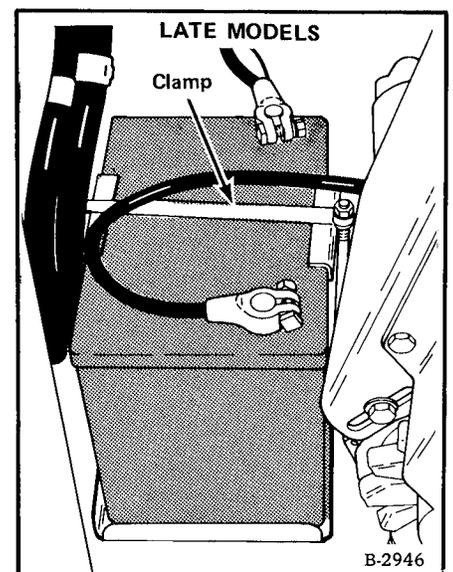


Fig. 1-24A Battery Hold Down

1-15 HYDRAULIC SYSTEM

The loader hydraulic and hydrostatic systems use fluid from the same hydraulic fluid reservoir.

The engine driven vane pump moves fluid to the control valve to give power to the lift and tilt cylinders (Fig. 1-25).

Fluid also goes from the control valve to the hydrostatic transmission pumps to be used to give power to the drive system.

The 10 micron hydraulic filter is installed at the right side of the engine compartment (Fig. 1-26). This filter cleans the fluid for the hydrostatic transmission.

The oil cooler (Fig. 1-27) cools the fluid before it returns to the inlet of the vane pump.

NOTE: Be sure the hydraulic hoses for the oil cooler are in the position as shown in figure 1-27 to prevent damage to the hoses.

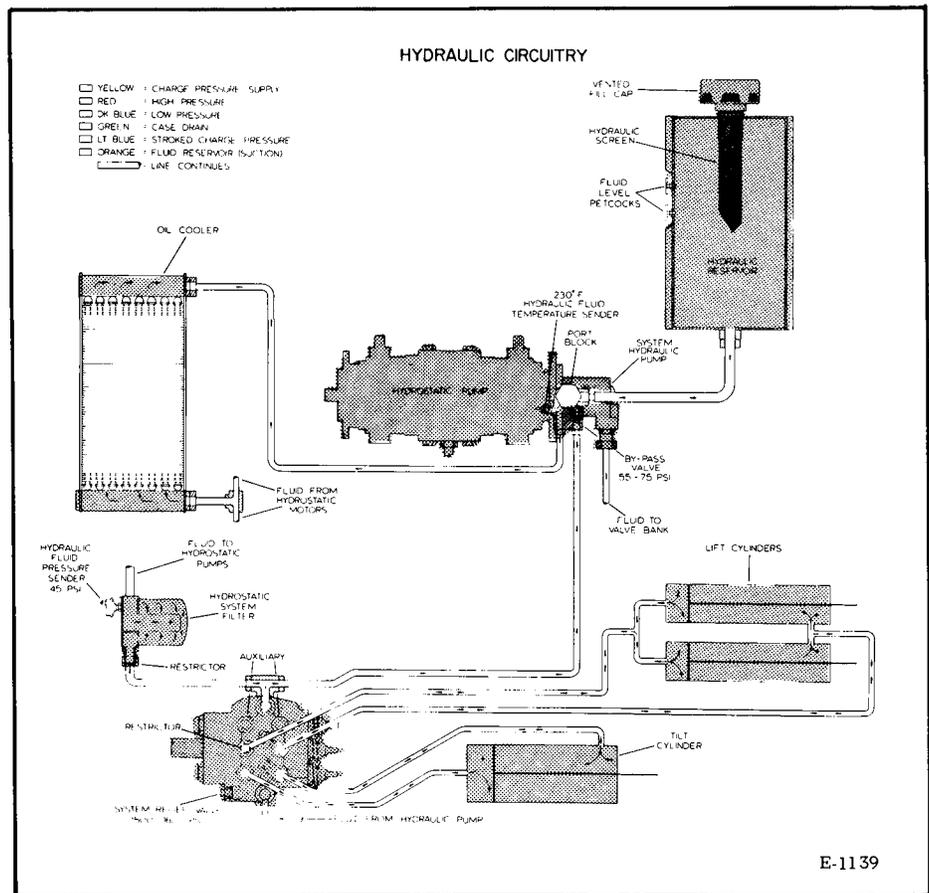


Fig. 1-25 Hydraulic Flow Diagram

1-16 HYDRAULIC/HYDROSTATIC FLUID

Use only 10W-40 SE motor oil in Bobcat hydraulic reservoir. When the starting temperature is below -10°F [-23°C] use 5W-30 SE motor oil in the hydraulic system.

IMPORTANT

Never use automatic transmission fluid in the Bobcat hydraulic system.

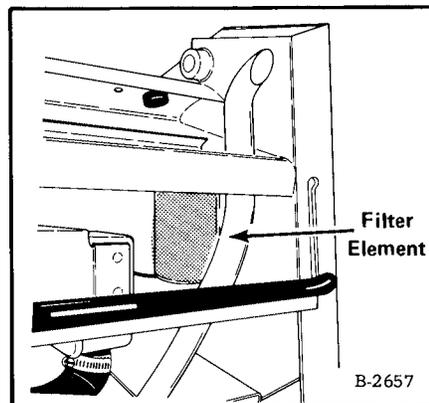
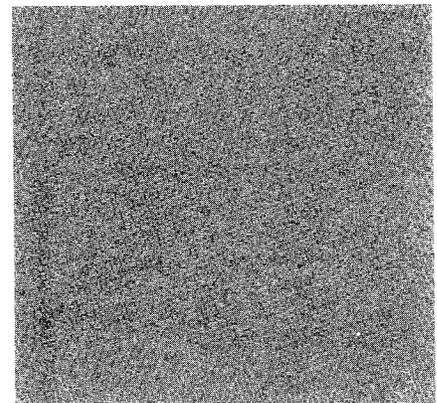


Fig. 1-26 10 Micron Filter



1-16.1 Checking and Adding Fluid

To check the fluid level in the hydraulic reservoir:

- (1) Put the loader on a level surface.
- (2) Open the lower valve on the side of the reservoir (Fig. 1-28, Item 1). If no fluid flows, close the valve.

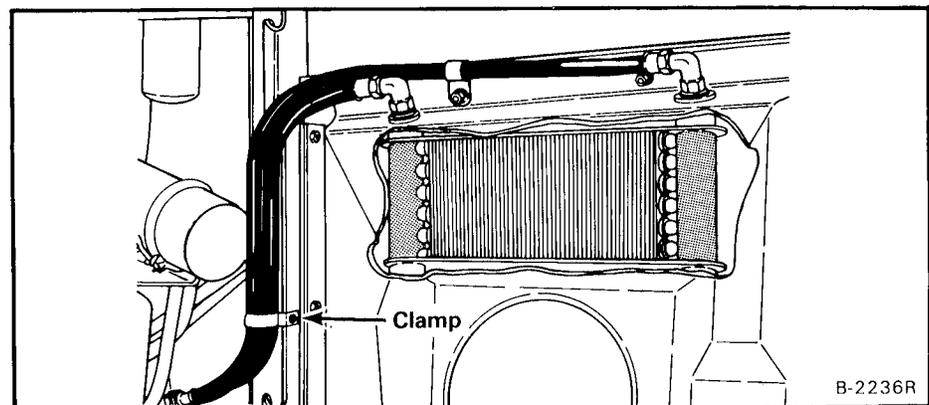


Fig. 1-27 Hydraulic Oil Cooler (520, 530)

(3) Open the upper valve (Fig. 1-28, Item 2). Remove the reservoir fill cap (Fig. 1-29) and add recommended fluid. When the fluid flows from the upper valve, close the valve and install the fill cap.

1-16.2 Hydraulic/Hydrostatic Fluid Replacement

Remove the fluid from the hydraulic reservoir and replace it with new approved fluid after every 1000 hours of operation, or sooner, if the fluid is dirty.

To remove fluid from the reservoir:

(1) Remove the hose from the outlet elbow on the oil cooler (long hose) and put the end into a clean reservoir (Fig. 1-30).

(2) After all fluid has been removed, connect the hose to the cooler.

(3) Remove the spring clip and remove the screen from the reservoir filler pipe (Fig. 1-31). Wash the screen in clean solvent and install it in the filler pipe. (Clean the reservoir screen only when necessary.)

(4) Open the upper valve at the side of the reservoir (Fig. 1-28, Item 2). Add recommended fluid (about 4 gallons [15 Ltrs.]) to the reservoir. When fluid flows at the open valve, close the valve and install the filler cap.

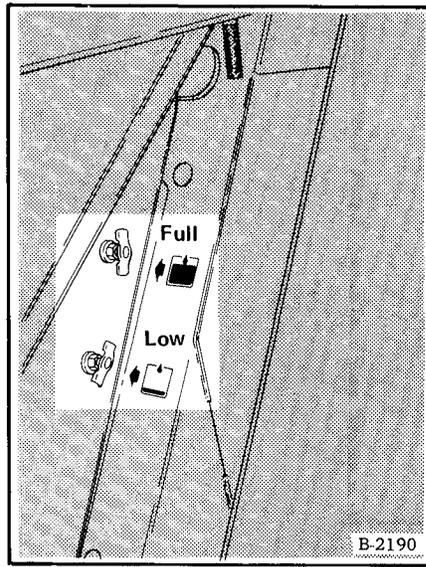


Fig. 1-28 Hydraulic Reservoir Level Check

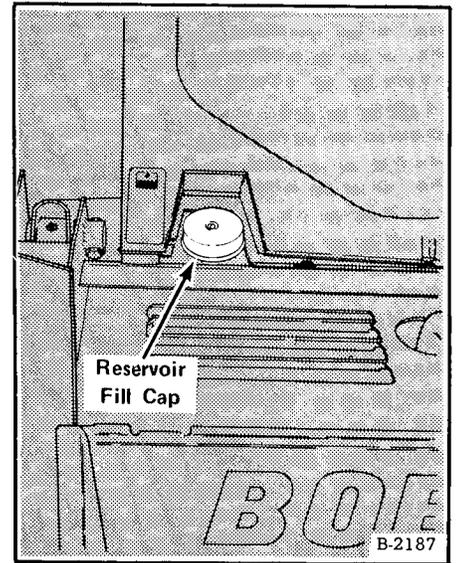
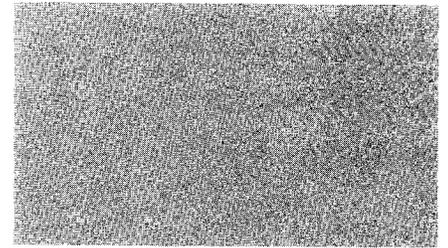


Fig. 1-29 Hydraulic Reservoir Fill Point



1-17 HYDRAULIC FILTER REPLACEMENT

Replace the hydraulic filter element after every 100 hours of operation, or sooner, if necessary (indicated by illuminated "tran" light).

To replace the element:

(1) Remove the element (Fig. 1-32). (Use an open reservoir to catch leaking fluid.)

(2) Clean the element contact area of the filter housing.

(3) Put oil on the rubber gasket on the new filter element.

(4) Install the element. Tighten it until it is hand tight only.

(5) Start the loader engine and check for leaks.

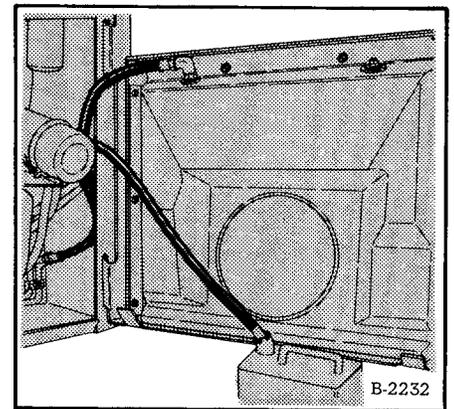


Fig. 1-30 Draining Reservoir (520, 530)

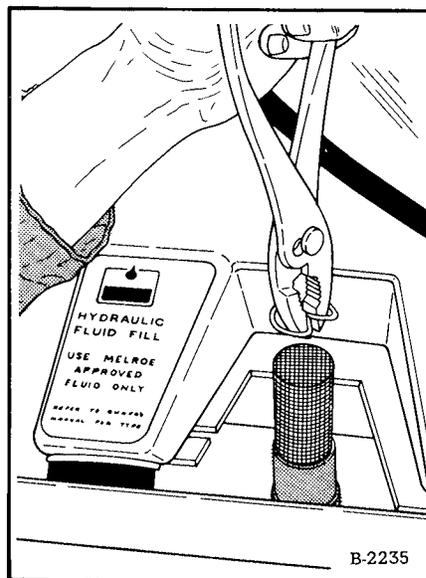


Fig. 1-31 Removing Filler Pipe Section

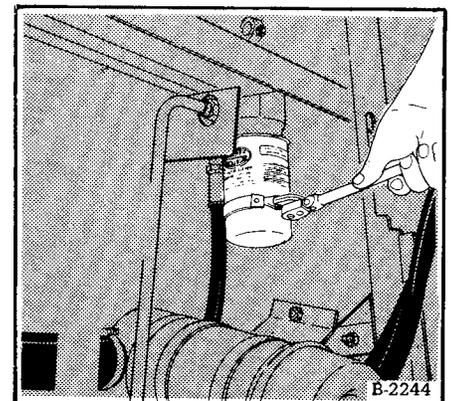


Fig. 1-32 Remove Hydraulic Oil Filter

1-18 FINAL DRIVE TRANSMISSION (CHAINCASE)

The chaincase is the housing for the final drive sprockets and chains. The chaincase is filled with the same fluid as the hydraulic/hydrostatic transmission.

To check the fluid level:

(1) Put loader on a level surface.

(2) Remove the plug, located at the front of the chaincase housing (Fig. 1-33).

(3) Add recommended fluid into the hole until the fluid is level with the hole. Install the plug.

(4) To remove fluid from the chaincase, put the rear end of the loader on blocks and remove the fluid through the opening in the front end of the chaincase.

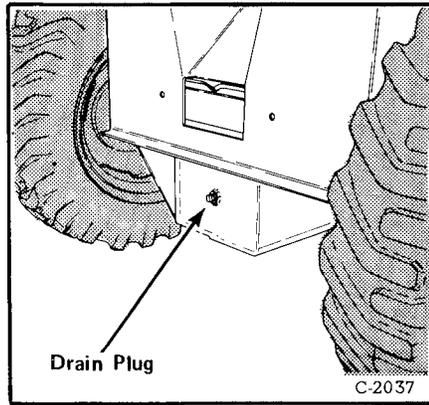


Fig. 1-33 Chaincase Check, Fill, Drain Plug

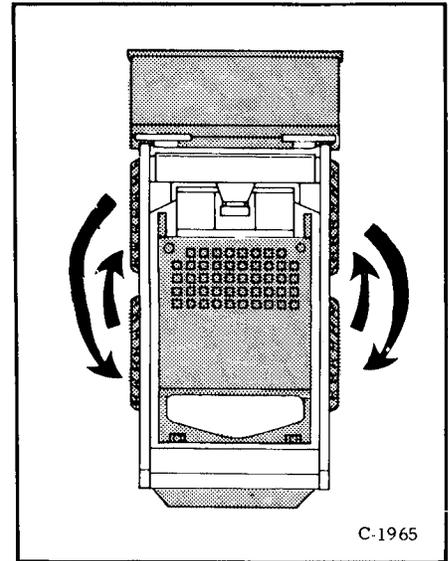


Fig. 1-34 Tire Rotation

1-19 TIRE MAINTENANCE

Check the tires regularly for wear, damage and correct pressure (See specification, page 8-3).

1-19.1 Tire Rotation

Tires must be rotated (front to rear, rear to front, Fig. 1-34) for even wear.

When tires are installed new, install them two per each side of the loader.

Do not put fluid (ballast) in the tires on this loader.

Check the wheel fastening bolts or nuts often and make sure that they are tight (See specifications, page 8-3).

1-20 LUBRICATION OF LOADER

For good performance, lubricate the loader regularly as specified in the service schedule on page 1-3.

Figure 1-35 shows the location of the grease fittings on the Bobcat loader.

Use a good quality lithium based, multi-purpose grease when servicing the loader with lubricant. Add lubricant until it comes out of the area being serviced.

Also, lubricate the seat rails (Fig. 1-36A) to make easy movement for seat adjustment.

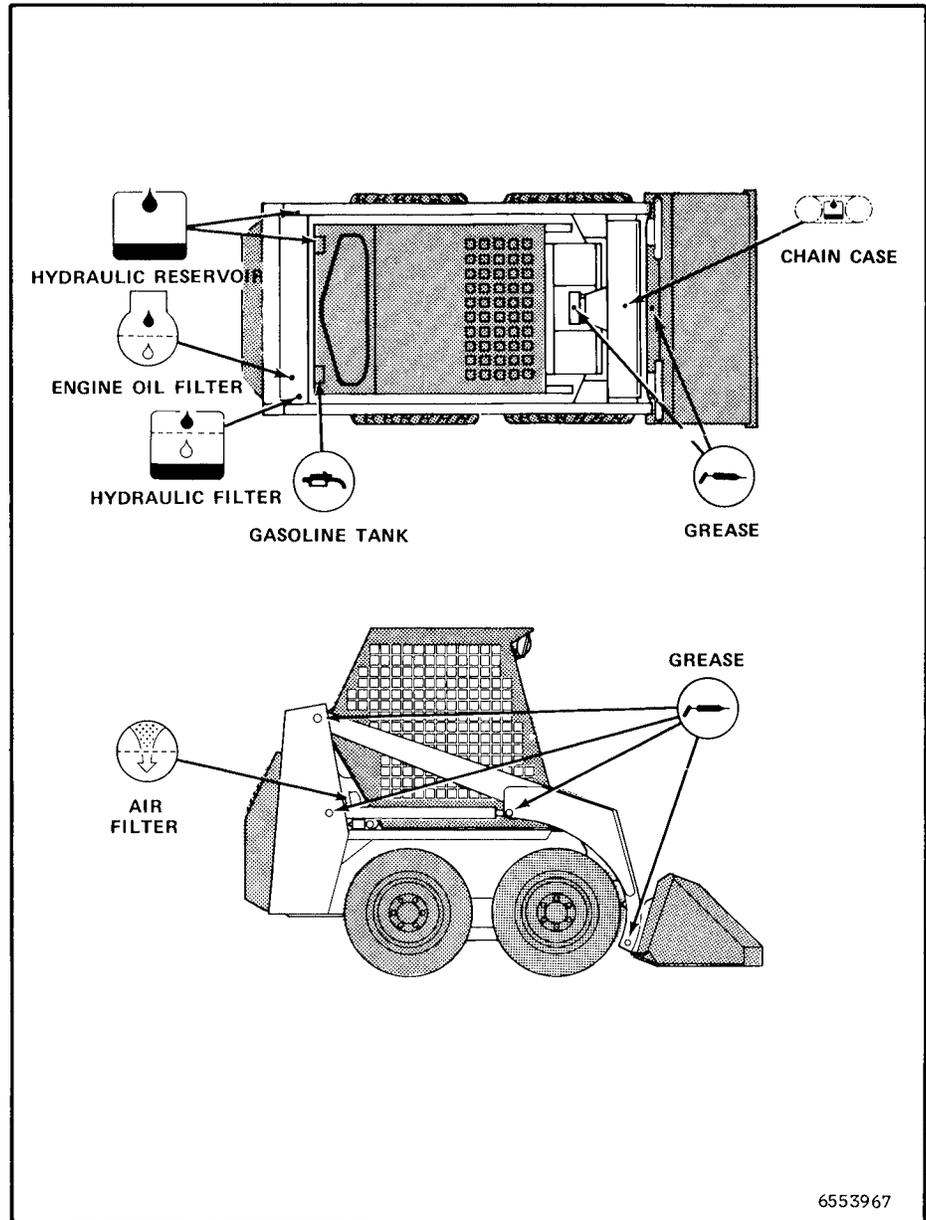


Fig. 1-35 Lubrication Points

Add oil to the oil hole in the steering control shaft (Fig. 1-36). Use regular motor oil for this purpose. Remove the seat and seat pan to reach the steering mechanism.

1-21 BOB-TACH

Check the Bob-Tach regularly (See service schedule, page 1-3) for condition and wear.

When the levers are in the "locked" position (Fig. 1-37), the wedges must extend through the slots in the attachment (Fig. 1-38).

NOTE: Some Bob-Tachs will not fit into mounting frame of attachments (Example: Pallet Fork and Angle Broom). Grind 1/4" (6,35 mm) of material from each side of the Bob-Tach (Fig. 1-37).

1-22 PIVOT PINS

All pivot points (lift arm, Bob-Tach and cylinder) use pins which are held in place by lockbolts (Fig. 1-39).

Check lockbolt nuts for tightness. (See the "Service Schedule" for interval of check.)

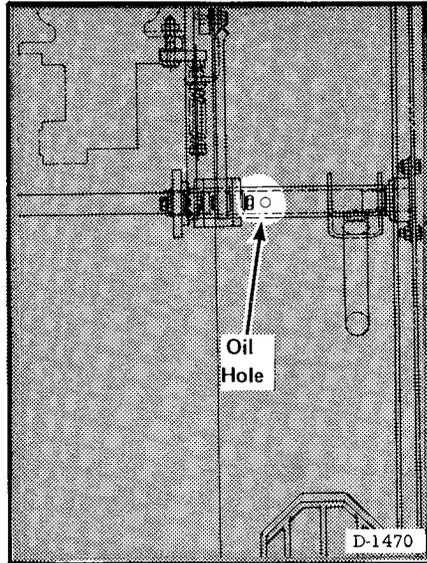


Fig. 1-36 Lubrication Steering Shaft

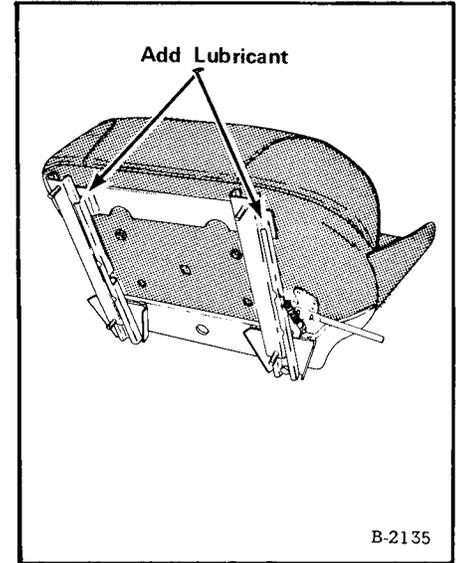


Fig. 1-36A Seat Rails

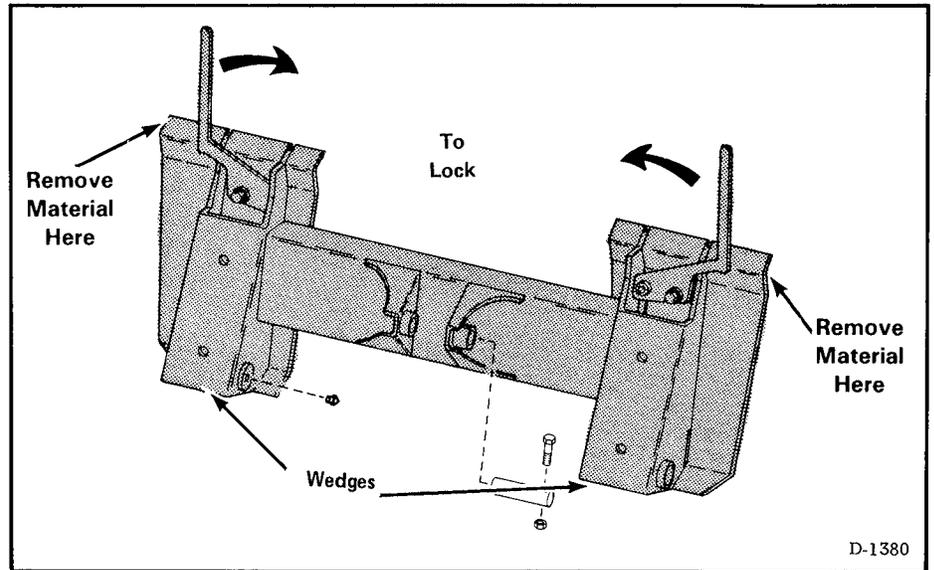


Fig. 1-37 Bob-Tach

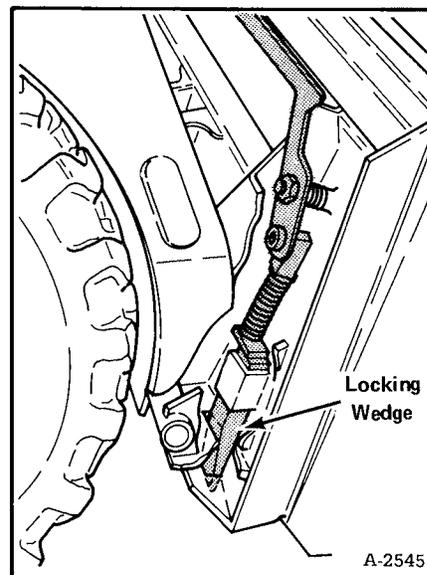


Fig. 1-38 Locking Wedges

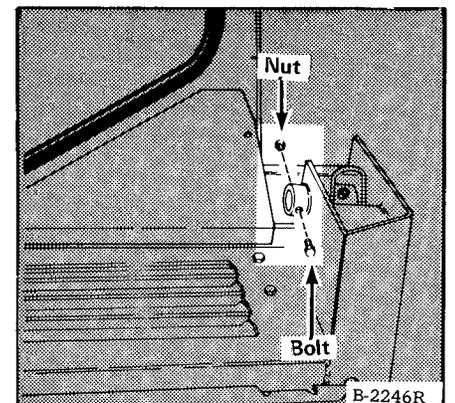


Fig. 1-39 Pivot Pin Lockbolt

1-23 FUEL INJECTION PUMP RESERVOIR (533)

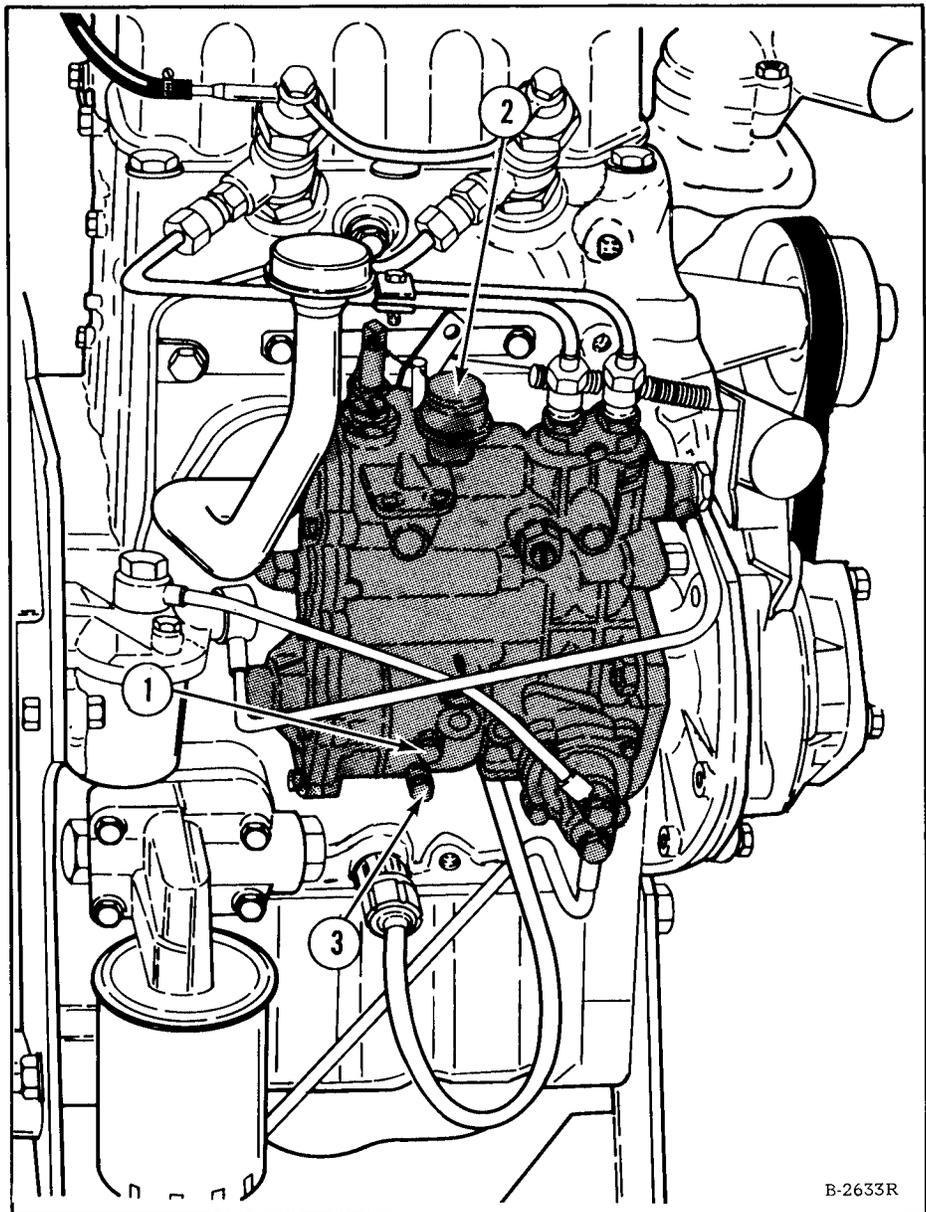
The oil reservoir level in the injection pump must be checked every 100 hours.

To check level: (Fig. 1-40)

- (1) Remove the check plug (Fig. 1-40, Item 1).
- (2) If no oil can be seen at the opening, remove the breather on top of the pump (Item 2).
- (3) Add oil of same specification as recommended for engine (See chart). Add until oil flows out of check opening.
- (4) Install the breather and the check plug.

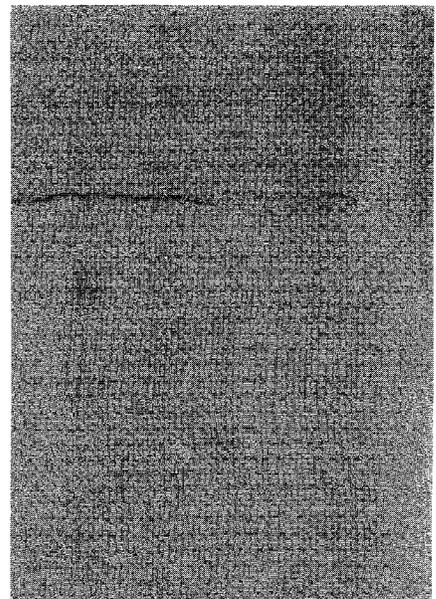
Every 300 hours replace oil as follows:

- (1) Remove the plug at the bottom of the pump (Item 3) and let out the oil.
- (2) After all oil has been removed, install plug. Remove the level check plug (Item 1).
- (3) Remove the breather (Item 2) and fill the reservoir to check plug level with new oil, according to engine oil spec chart. Install the breather and the plug.



B-2633R

Fig. 1-40 Injection Pump



HYDRAULIC SYSTEM

	Paragraph Number	Page Number
CHECKING CONTROL VALVE AND CYLINDERS	2-8	2-6
CHECKING OUTPUT OF VANE PUMP	2-6	2-4
CHECKING RELIEF VALVE	2-5	2-4
CONTROL VALVE REPAIR	2-10	2-7
GENERAL INFORMATION	2-2	2-1
HYDRAULIC CIRCUIT	2-1	2-1
HYDRAULIC CYLINDER REPAIR	2-9	2-6
PROBLEM ANALYSIS CHARTS	2-4	2-3
TROUBLESHOOTING HYDRAULIC SYSTEM .	2-3	2-2
VANE PUMP REPAIR	2-7	2-5

HYDRAULIC SYSTEM

SYSTEM OPERATIONS

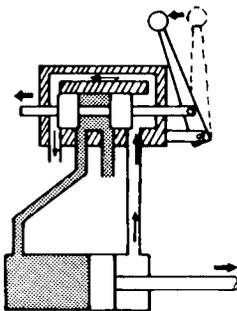


520, 530, 533 HYDRAULIC/HYDROSTATIC SYSTEM (Open Center System) (Chart # PI 2499, 2500 or 2501)

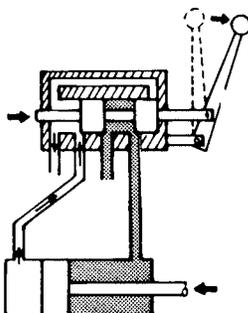


The oil flows by gravity from the reservoir **1** to the port block **4** which is on top of the hydraulic pump **6**. Return oil from the bypass valve **5** and the oil cooler **15** join with reservoir oil to supply oil to the hydraulic pump **6**. "Case drain" oil from the hydrostatic pumps **16** flows through the bearing of the hydrostatic pumps **16** and also supplies oil to the hydraulic pump **6**.

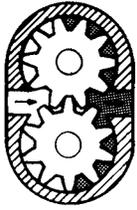
The hydraulic pump **6** is a "vane type" pump and is driven by a shaft through the hydrostatic pumps **16**. The oil goes from the hydraulic pump **6** to the hydraulic control valve **12**.



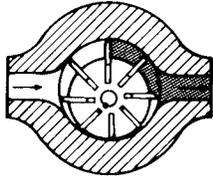
The hydraulic control valve **12** has a pilot operated main relief valve **11**. When all three spools are in neutral position, the oil goes through the control valve **12** and out to the "Tee" fitting. If one of the spools is activated, the oil goes out the respective port and to either the base end, or the rod end of the hydraulic cylinder(s). As the oil goes into one end of the cylinder(s), return oil comes from the opposite end of the cylinder(s) and back into the control valve **12**. When the cylinder reaches the end of the stroke, the oil flow stops and causes hydraulic pressure to increase. When the pressure reaches the setting of the relief valve **11** it opens and lets the oil bypass the hydraulic circuit (internally) and goes out the "Tee" fitting. When this happens, there is no oil going to the down-stream sections of the control valve **12**. If you let the spool go back to the neutral position, then there is oil available for the other sections. Two sections of the control valve **12** can be used at the same time if the main relief valve **11** is not open.



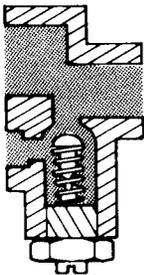
The oil which goes to the "Tee" fitting on the control valve **12** will go two places, one is to the hydraulic filter **10** and to the bypass



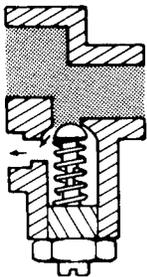
valve 5 . The normal flow of oil is through the hydraulic filter 10 and to the hydrostatic pumps 16 . The hydraulic filter 10 has a bypass valve 14 to allow oil flow when it cannot go through the filter element (plugged).



When the oil gets to the hydrostatic pumps 16 , it activates the high pressure replenishing valves 3 . As the pressure increases the replenishing valves 3 open and let oil into the hydrostatic pumps 16 , for replenishing, lubrication and cooling. This oil is called "charge oil". The hydrostatic pumps 16 do not need the full volume of the charge oil so there is extra oil. This extra oil goes through the other side of the "Tee" fitting to the charge bypass valve 5 . When the pressure reaches the setting of the charge bypass valve 5 and it opens and lets this extra oil go back to the inlet of the hydraulic pump 6 .

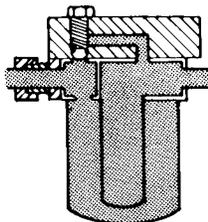


There are two hydrostatic pumps 16 and two hydrostatic motors 9 . One pump and one motor work together as a pair to drive one side of the machine. The other pump and motor work as a pair to drive the opposite side of the machine.



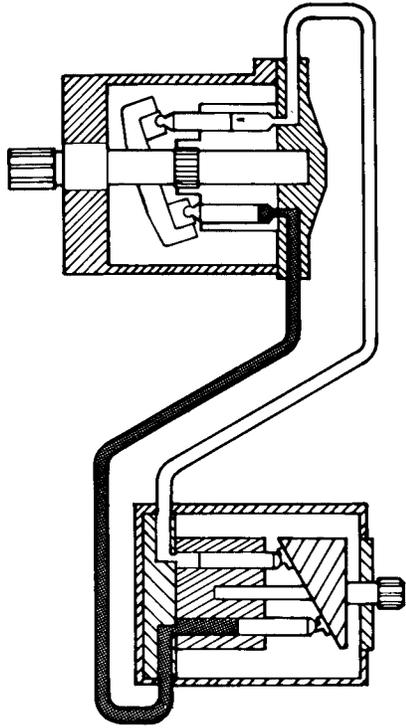
When the replenishing valves 3 open and charge oil goes into the hydrostatic pumps 16 , the flow becomes "drive loop oil". When the steering levers are in neutral, the hydrostatic pumps 16 and the hydrostatic motors 9 are not working but do have charge pressure. When the steering levers are moved; the swashplates in the hydrostatic pumps 16 are angled and oil is pumped out of the pressure side of the hydrostatic pumps 16 to the hydrostatic motors 9 .

This flow of oil is called "drive pressure". Drive pressure is much higher than charge pressure causing the high pressure replenishing valves 3 to close allowing the flow of oil to go to the hydrostatic motors 9 .



When the machine is driven with the bucket down, into a pile of dirt, there is resistance causing high pressure oil in the drive loop. There is a relief valve built into the high pressure replenishing valves 3 . This relief valve releases the high pressure in the drive loop. When the relief valve opens the extra oil goes from the drive loop to the charge loop to

be used again. If the oil pressure gets above the setting of the relief valves, the pressure could break tubelines, damage the hydrostatic pumps 16 or the hydrostatic motors 9 . There are four high pressure replenishing valves 3 , two for each side of the hydrostatic pumps 16 . One is forward travel and one is for reverse travel.



The hydrostatic motors 9 are a "geroller type" and have a built in shuttle (pin and balls) that meters oil to the oil cooler 15 . The oil flows from the oil cooler 15 to the port block 4 located on top of the hydraulic pump 6 . The shuttle (pin and balls) operates when the steering levers are moved. When the hydrostatic pumps 16 , forces drive pressure oil to the hydrostatic motors 9 , one ball in the shuttle is forced tight against its' seat. As the ball is forced against the seat it moves the shuttle pin and pushes the ball on the other end of the pin off its' seat. Low pressure oil is then metered out through case drain to the oil cooler 15 . When the direction of the steering levers are changed, the shuttle (pin and balls) move so the opposite ball is seated but low pressure oil continues to be metered out through case drain and to the oil cooler 15 . The open center system will allow oil flow to the oil cooler 15 from the hydrostatic motors 9 in neutral position because both balls cannot seat at the same time. The pin is longer than the seat area to allow this.

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