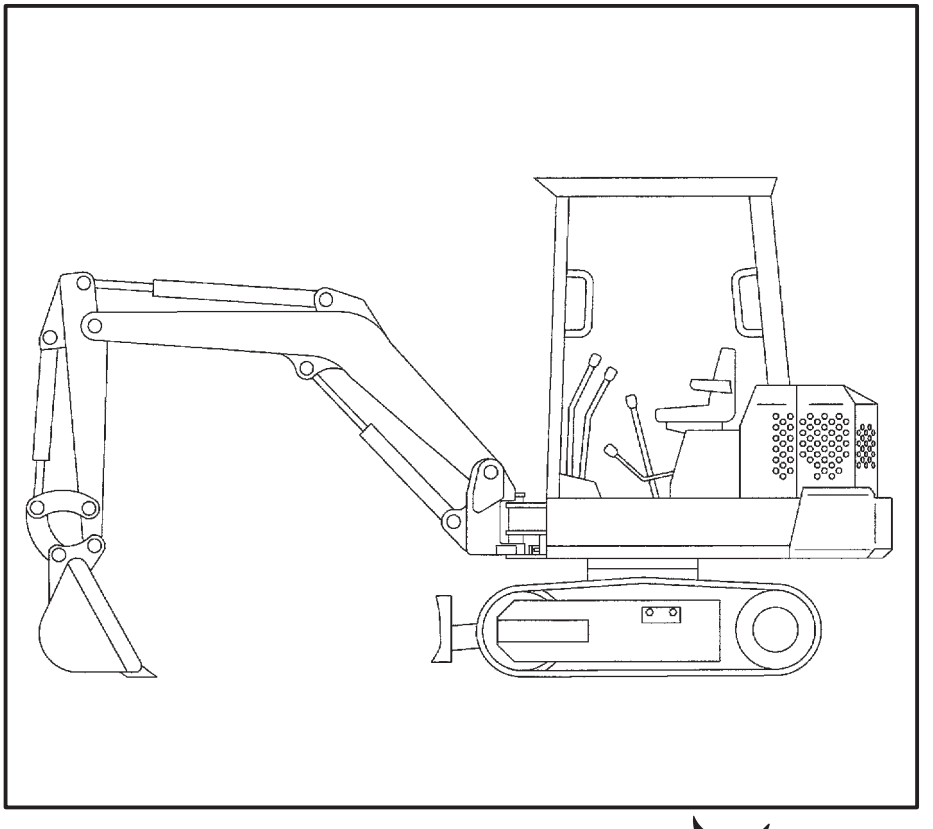
X 225

Excavator

Service Manual

(S/N 508311001–508311999)



MELROE
INGERSOLL-RAND

bobcat®

6720347 (11–89)

Printed in U.S.A.

MAINTENANCE SAFETY

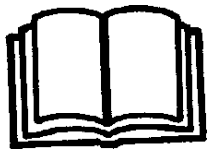
⚠ WARNING

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.

W-2003-0903

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

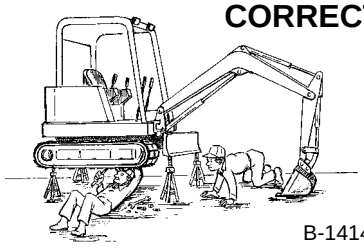
CORRECT



B-10731a

Never service the Bobcat Hydraulic Excavator without instructions.

CORRECT

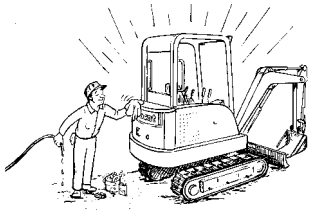


B-14148

Use the correct procedure to lift and support the excavator.

Always lift the blade fully before installing jackstands.

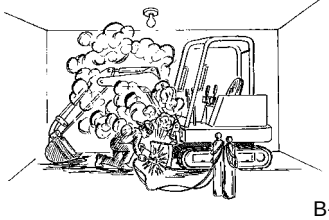
CORRECT



B-14142

Cleaning and maintenance are required daily.

WRONG

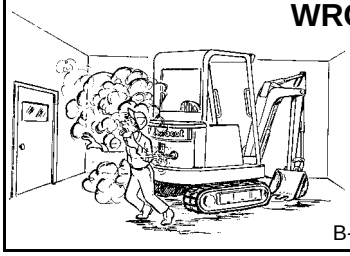


B-14147

Have good ventilation when welding or grinding painted parts.

Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

WRONG

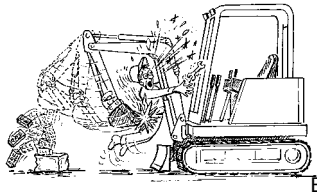


B-14141

Vent exhaust to outside when engine must be run for service.

Exhaust system must be tightly sealed. Exhaust Fumes can kill without warning.

WRONG

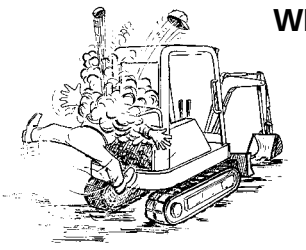


B-14145

Always lower the bucket and blade to the ground before doing any maintenance.

Never modify equipment or add attachments not approved by Bobcat Company.

WRONG



B-14146

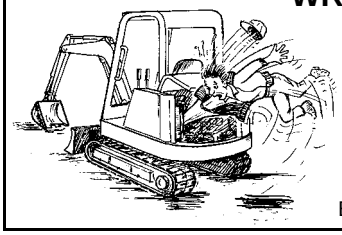
Stop, cool and clean engine of flammable materials before checking fluids.

Never service or adjust machine 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.

WRONG



B-14143

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 excavator.

WRONG

B-6589

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.

MSW20-0805

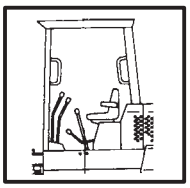
CONTENTS

FOREWORD

This manual is for the Bobcat hydraulic excavator mechanic. It provides necessary servicing and adjustment procedures for the hydraulic excavator and its component parts and systems. Refer to the Operation & Maintenance Manual for operating instructions, starting procedure, daily checks, etc.

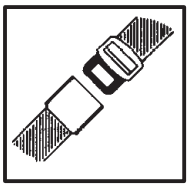
A general inspection of the following items must be made after the hydraulic excavator has had service or repair:

1. Check that the operator canopy is in good condition and is not modified.



2. Check that the operating canopy mounting hardware is tightened and is Melroe approved.

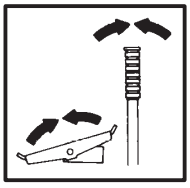
3. The seat belt must be correctly installed, functional and in good condition.



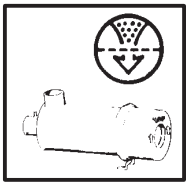
4. Inspect for loose or broken parts or connections.

5. Machine signs must be legible and in the correct location.

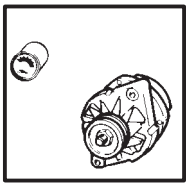
6. Steering levers, control levers and foot pedals must return to neutral. Control lock must lock controls securely.



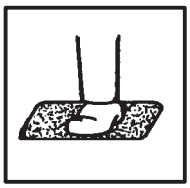
7. Inspect the air cleaner for damage or leaks. Check the condition of the element.



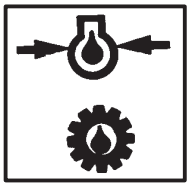
8. Check the electrical charging system.



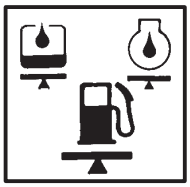
9. Safety treads must be in good condition.



10. Check for the correct function of the the indicator lamps.



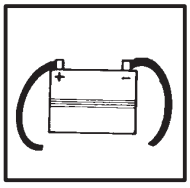
11. Check hydraulic fluid level, engine oil and fuel supply.



12. Inspect for fuel, oil or hydraulic leaks..

13. Lubricate the hydraulic excavator.

14. Check the condition of the battery and cables.



15. Check for any field modifications not completed.

Recommend to the owner that all necessary corrections be made before the machine is returned to service.

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–2003–0797

The following publications provide information on the safe use and maintenance of the excavator 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 excavator gives operating information as well as routine maintenance and service procedures. It is a part of the excavator and must stay with the machine when it is sold. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat Excavator dealer.
- The excavator 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 Excavator dealer.
- The CIMA Safety Manual delivered with the excavator gives information for safe operating and standard signals.
- The Service Manual and Parts Manual are available from Bobcat Excavator dealers for use by mechanics to do shop–type service and repair work.

WARNING

Warnings on the machine and in the manuals are for your safety. Failure to obey warnings can cause injury or death.

W–2044–1285

IMPORTANT

This notice identifies procedures which must be followed to avoid damage to the machine.

I–2019–0284

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.

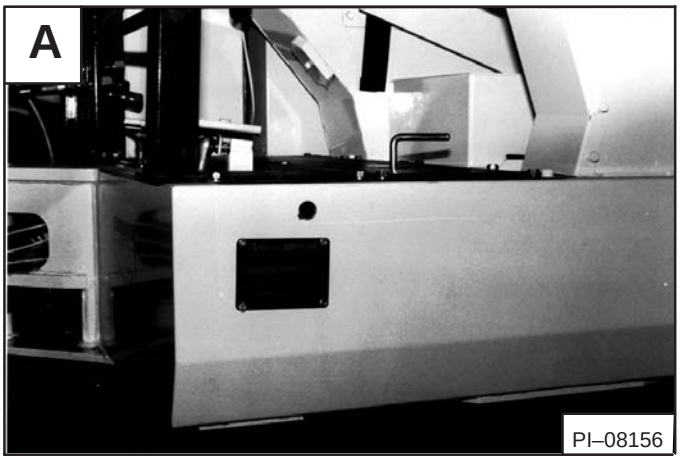
- Wear tight fitting clothing. Always wear safety glasses when maintaining or servicing the excavator. Safety glasses, hearing protection or excavator special application kits are required for some work. See your dealer for Melroe Safety equipment.
- Know where fire extinguishers and first aid kits are located and how to use them.
- Do not use the Bobcat excavator 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 a 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 an engine that has glow plugs. These starting aids can cause an explosion and injure you or bystanders.
- Always clean the excavator and disconnect the battery before doing any welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the excavator when welding. Have good ventilation when grinding or welding painted parts. Wear a 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.

SERIAL NUMBER LOCATIONS

Always use the serial number of the machine when requesting service information or when ordering parts. Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure in doing a specific service operation.

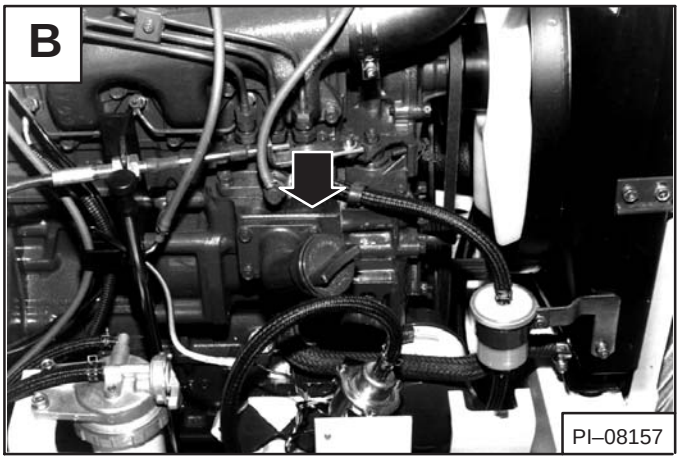
HYDRAULIC EXCAVATOR SERIAL NUMBER

The excavator serial number is on the machine frame, at the left side near the front corner **[A]**.



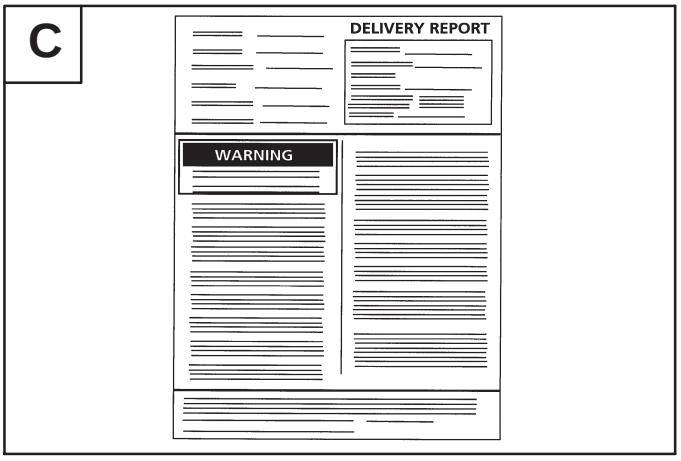
ENGINE SERIAL NUMBER

The engine serial number is located on the engine block, near the fuel injection pump **[B]**.

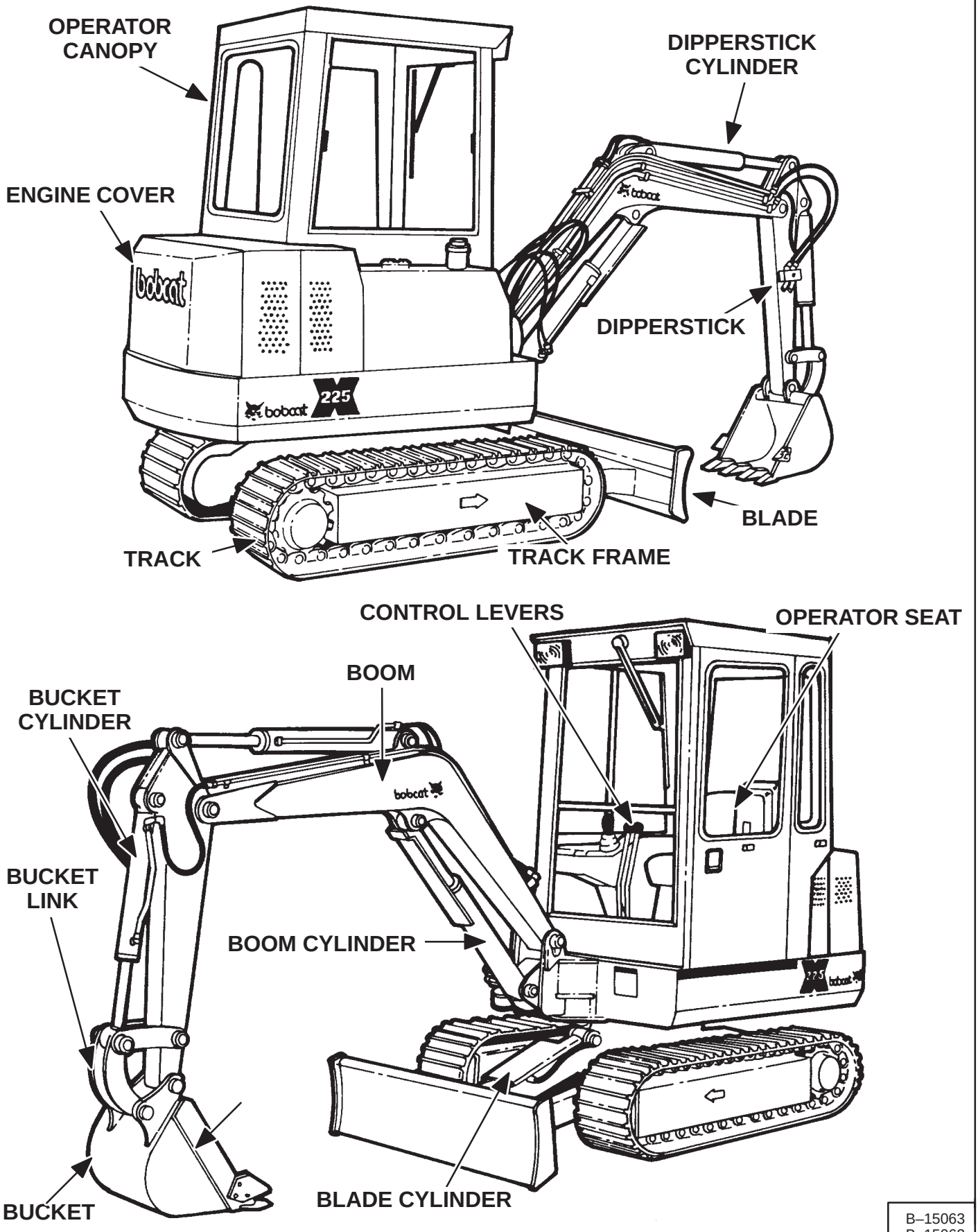


DELIVERY REPORT

The Delivery Report must be explained to the owner/operator by the dealer. The dealer is to fill out the form and the owner/operator sign the form to indicate his understanding **[C]**.



HYDRAULIC EXCAVATOR IDENTIFICATION



B–15063
B–15062

SERVICE SCHEDULE

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures. The service schedule is a guide for correct maintenance of the Hydraulic Excavator.

⚠ 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–2003–0797

SERVICE SCHEDULE		HOURS					
ITEM	**SERVICE REQUIRED**	**8–10**	**50**	**100**	**250**	**500**	**1000**
Engine Air Cleaner	Check & empty dust cap as required.	■					
Engine Oil	Check the oil level & add oil as needed.	■					
Engine Coolant System	Check radiator coolant level.	■					
Indicator Lights	Check for correct operation.	■					
Operator Canopy	Check the fastening bolts, nuts & condition of canopy.	■					
Seat Belt & Control Locks	Check the condition & that fasteners are tight.	■					
Safety Signs (Decals)	Check for damaged signs (decals) and safety treads	■					
Safety Treads	replace as needed.	■					
Tracks	Check and adjust tension.	■					
Hydraulic Reservoir	Check fluid level.	■					
All Machinery Pivot Pts.	Lubricate 20 grease fittings.	■					
Fuel Tank	Drain water & sediment from fuel tank.		■				
Swing Circle	Lubricate two grease fittings.		■				
Swing Pinion	Lubricate one grease fitting.		■				
Alternator Belt	Check & adjust tension.			■			
Engine Oil & Filter	Replace oil & filter element.			■			
Final Drive Case	Check fluid level & add oil as needed.				■		
Hydraulic Filter	Replace filter element.				■		
Fuel Filters	Replace filter elements.				■		
Battery	Check & clean cable ends & check electrolyte level.				■		
Air Cleaner	Replace the filter element.				■		
Cooling System	Clean the radiator fins.					■	
Alternator & Starter	Check the condition.					■	
Engine Valve Clearance	Check & adjust valve clearance.					■	
Cooling System	Drain, flush & add new coolant to the cooling system.						■
Hydraulic Tank	Change the fluid, clean fill neck strainer & suction strainer.						■
Final Drive Case	Change the oil.						■

After the first 250 hours of machine operation do the following:

- **Change oil in final drive case.**
- **Check and adjust engine valve clearance.**

ENGINE COVER

Procedure

WARNING

AVOID INJURY

Never service or adjust the machine when the engine is running unless instructed to do so in the manual.

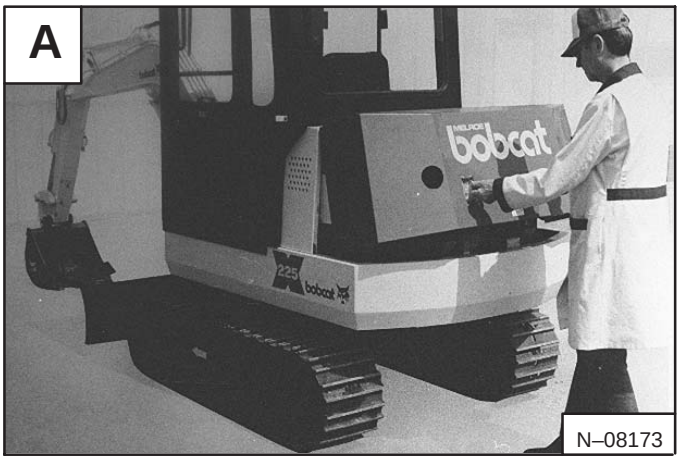
W–2012–0290

WARNING

Keep the engine cover closed when operating the machine.

W–2141–0189

Open the engine cover to service the engine. Pull on the latches and lift the engine cover until it is fully raised **[A]**.



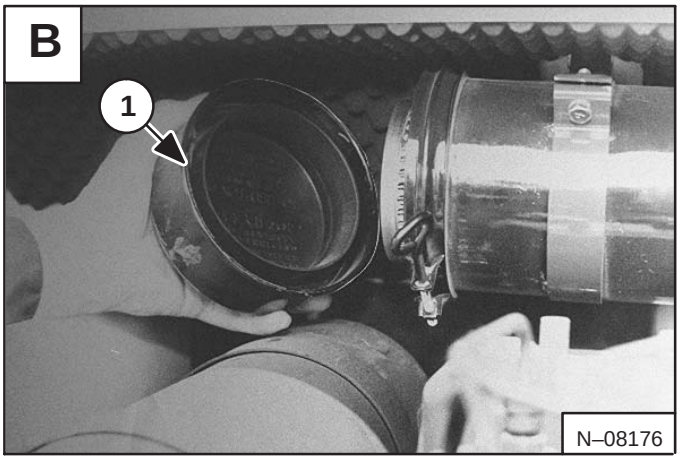
AIR CLEANER SERVICE

Replacing The Filter Element

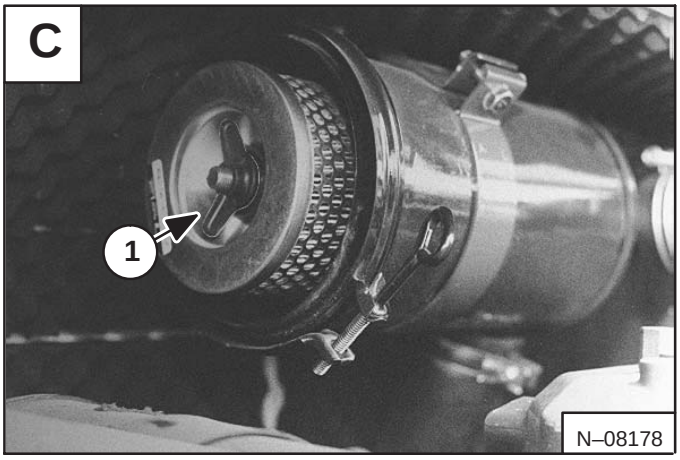
See the *SERVICE SCHEDULE* Page 1–1 for the correct service interval.

Service the air cleaner as follows:

Remove the dust cup (Item 1) **[B]**.



Remove the wing nut (Item 1) **[C]**.



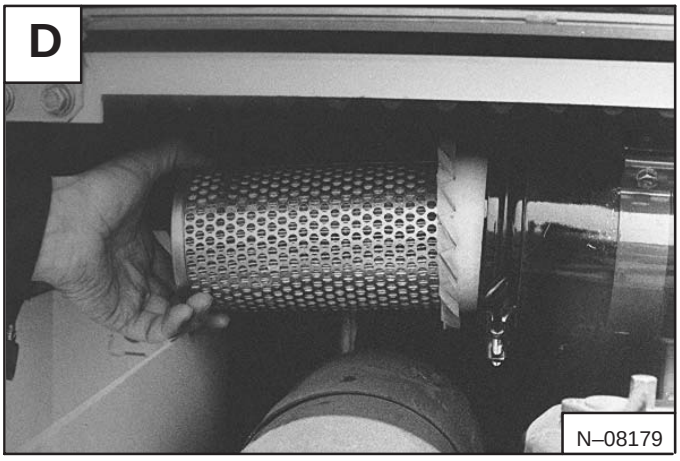
Remove the filter element **[D]**.

Check the air cleaner housing for damage.

Install a new air filter element. Install and tighten the wing nut.

Install the dust cup so the arrow points up.

Check that the air cleaner hose clamps are tight.



FUEL SYSTEM

Fuel Specifications

Use Number 2 diesel fuel in the engine. During very cold temperatures, Number 1 fuel can be used.

Fuel System Service

The fuel level in the tank is indicated by the fuel gauge or by the sight tube (Item 1) **[A]** on the side of the fuel tank.

⚠ WARNING

Stop and cool the engine before adding fuel. NO SMOKING! Failure to obey warnings can cause an explosion or fire.

W–2063–0887

Use the key to un–lock the fuel fill cap **[B]**.

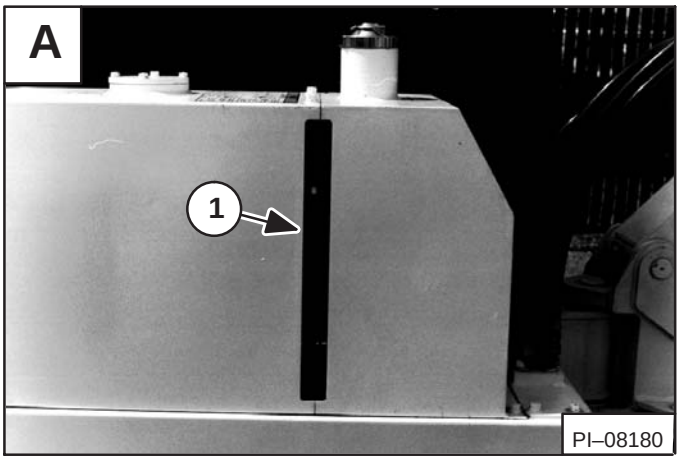
Turn the fill cap to remove it from the fuel tank **[C]**.

NOTE: The fuel fill strainer can be removed for cleaning. Make sure it is installed before adding fuel to the tank.

Use a clean, approved safety container to add fuel to the tank.

Add fuel only in an area that has a free movement of air and no open flames or sparks. NO SMOKING!

After the tank is full, install and tighten the fuel fill cap.



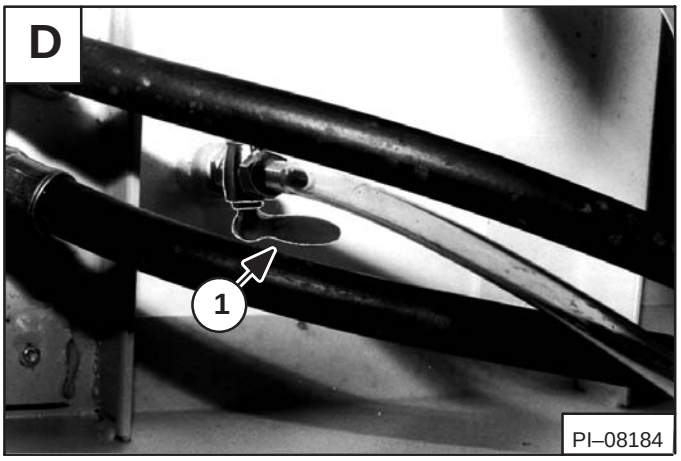
FUEL SYSTEM (Cont'd)

To remove the water and sediment from the fuel tank, open the drain (Item 1) **[A]** on the bottom of the tank.

⚠ WARNING

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire which can result in injury or death.

W–2103–1285



ENGINE LUBRICATION SYSTEM

Checking The Engine Oil

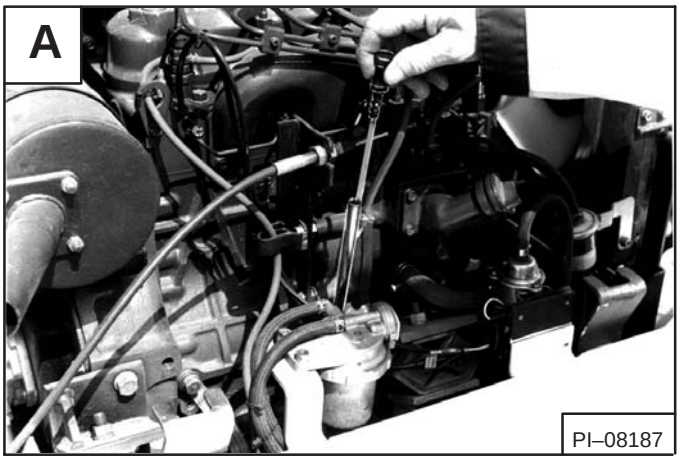
Check the engine oil every day.

Stop the engine. Open the engine cover.

Remove the dipstick **[A]**.

Keep the oil level between the marks on the dipstick.

Use a good quality motor oil that meets API Service Classification of CC or CD (See *FUEL, COOLANT AND LUBRICANTS Chart*, Page 8–1).

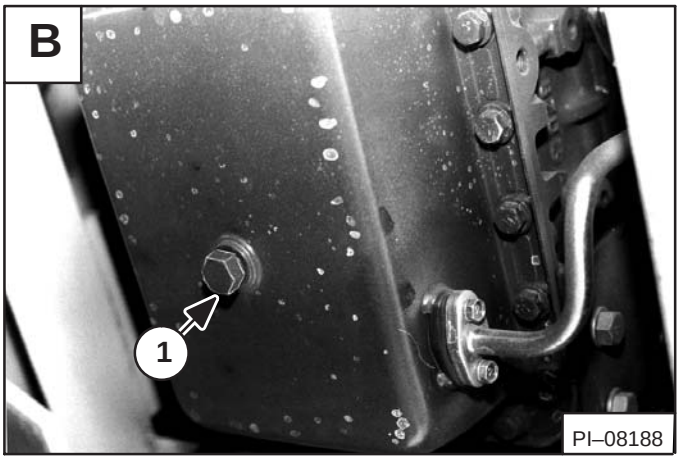


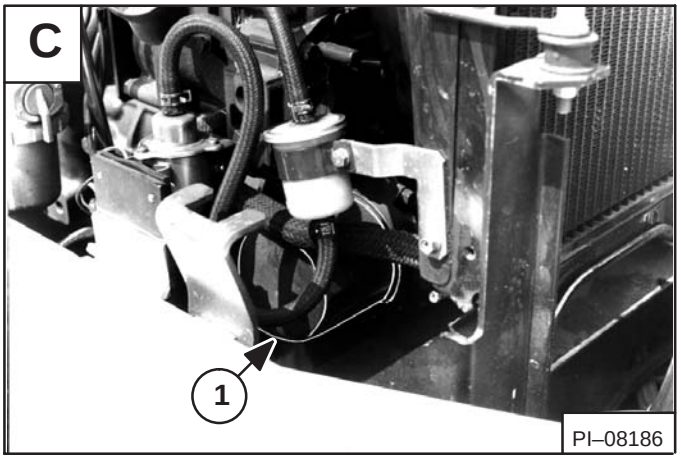
Engine Oil And Filter Replacement

See the *SERVICE SCHEDULE* Page 1–1 for the correct service interval.

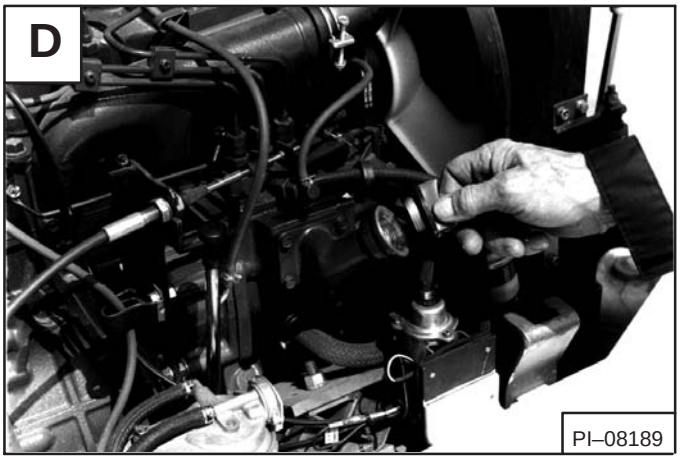
Use the following procedure to change the oil and filter:

1. Run the engine until it is at operating temperature.
2. Turn the upper works so there is clearance for the engine oil drain plug. Stop the engine.
3. Remove the drain plug (Item 1) **[B]**. Drain the oil into a container.
4. Remove the oil filter (Item 1) **[C]**, using a filter wrench.
5. Clean the filter housing surface. Put clean oil on the filter gasket. Install the new filter and hand tighten only.





6. Remove the oil fill cap **[D]**. Put 6.34 quarts (6,0 L) of oil into the engine (See *FUEL, COOLANT AND LUBRICANTS Chart* Page 8–1).
7. Start the engine and let it run for several minutes. Stop the engine. Check the oil filter for leaks.
8. Check the oil level and add oil as needed to bring it to the *top* mark on the dipstick.



COOLING SYSTEM

Coolant Level

When the engine is cool, the coolant level in the recovery tank (Item 1) **[A]** must be half full.

If the coolant level is low, add pre–mixed coolant (50% water and 50% ethylene glycol) to the recovery tank.

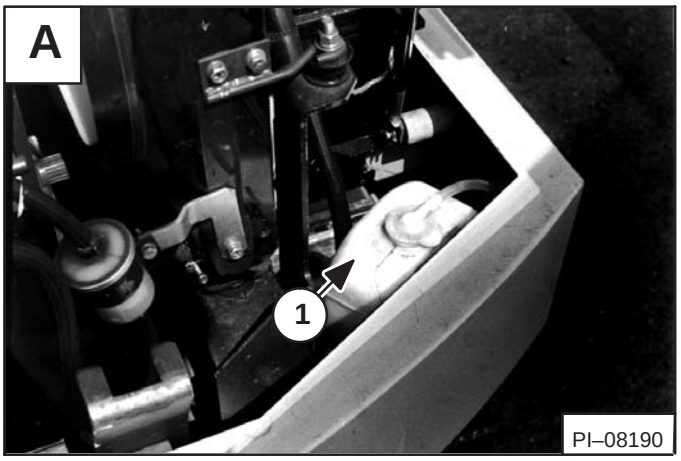
Coolant Replacement

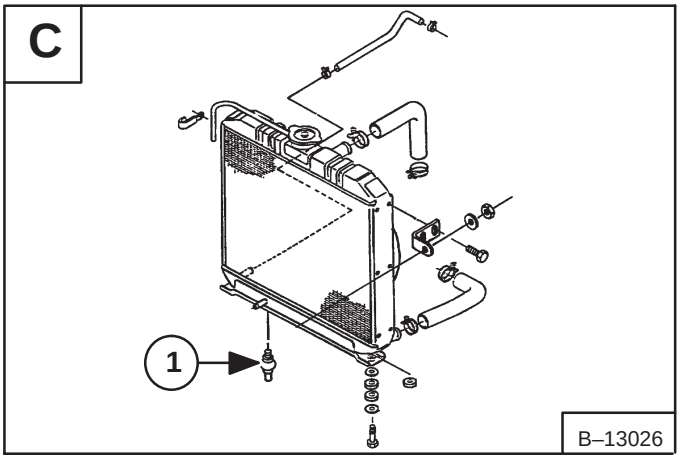
⚠ WARNING

Do not remove radiator cap when the engine is hot. You can be seriously burned.

W–2070–1285

1. Turn the upper works so there is access to the engine and radiator from underneath. Stop the engine.
2. Loosen and remove the radiator cap **[B]**.
3. Open the radiator drain valve (Item 1) **[C]**.
4. Drain all the coolant from the system.
5. When all the coolant is removed, close the drain valve.
6. Pre–mix 50% water and 50% ethylene glycol in a separate container. Fill the radiator with pre–mixed coolant until it is full. Add coolant to the recovery tank until it is half full.
7. Run the engine at idle speed for about five to ten minutes to remove the air from the cooling system (leave the radiator cap off during this operation).
8. Stop the engine. Check the coolant level and add as needed to bring it up to the radiator filler neck. Install the radiator cap and tighten.





HYDRAULIC SYSTEM

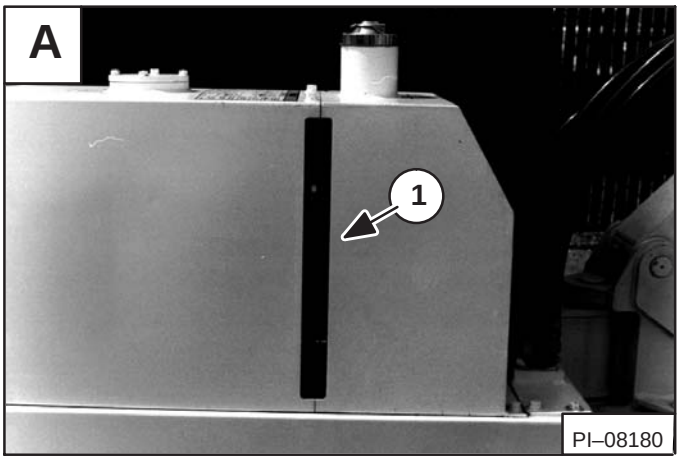
Checking And Adding Fluid

To check and add hydraulic fluid to the reservoir, use the following procedure:

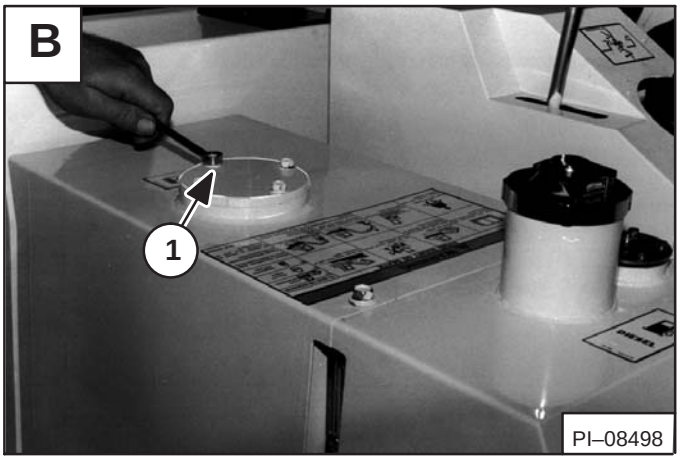
Put the machine on a flat level surface.

Retract the dipperstick and bucket cylinders, put the bucket on the ground and raise the blade. Stop the engine.

Check the hydraulic fluid level, it must be visible and between the marks in the sight gauge (Item 1) **[A]**.



If fluid level is not correct, remove the four bolts (Item 1) **[B]** from the reservoir cover.

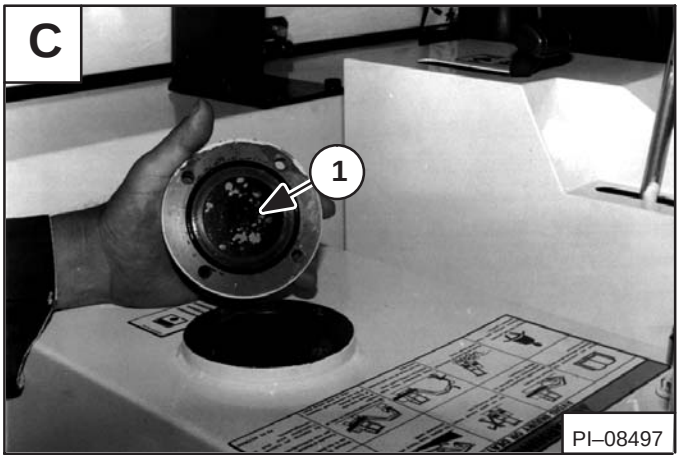


Remove the reservoir cover **[C]**.

Add the correct fluid to the reservior until it is at the top mark in the sight gauge **[A]**. (See *FUEL, COOLANT AND LUBRICANTS Chart*, Page 8–8.)

Install the reservoir cover, make sure the O–ring is in the correct position.

Install the four bolts and tighten.



HYDRAULIC SYSTEM (Cont'd)

Replacement Of The Hydraulic Filters

See the *SERVICE SCHEDULE* Page 1–1 for the correct service interval.

Open the engine cover. Use a filter wrench and remove the filter elements (Item 1) **[A] [B]**.

Clean the housing where the filter gasket makes contact.

Put clean fluid on the gasket. Install the new filter element and hand tighten only.

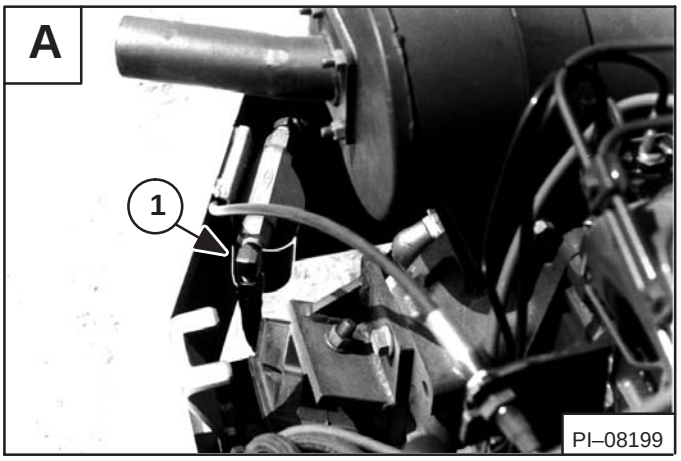
Start the engine. Run the machine through the hydraulic functions. Stop the engine. Check the fluid level at the reservoir and add as needed. Check the filter area for leaks.

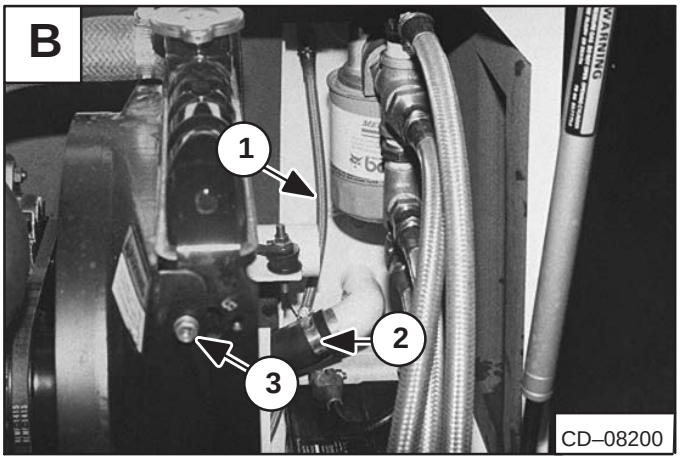
Hydraulic Reservoir

See the *SERVICE SCHEDULE* Page 1–1 for the correct service interval.

Move the upper works so there is clearance for the reservoir between the track frame.

Retract the dipperstick and bucket cylinders, lower the bucket to the ground. Stop the engine.





⚠ WARNING

Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire which can result in injury or death.

W–2103–1285

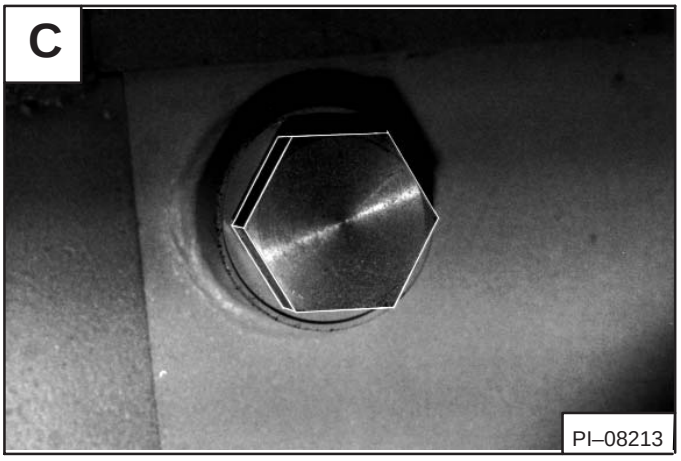
Remove the hydraulic filters. Remove the drain plug from the bottom of the reservoir **[C]**.

Remove the hose clamp (Item 2) **[B]** and disconnect the hose. Remove the bolts (Item 3) **[B]**. Remove the flange/mesh screen assembly from the reservoir.

Clean all the parts with clean solvent and air dry them. Replace the parts and tighten the bolts, hose clamp and drain plug.

Add approximately 10.0 gals. (37,9 L.) of fluid to the reservoir. (See *FUEL, COOLANT AND LUBRICANTS Chart*, Page 8–8.)

Run the machine through the hydraulic functions. Stop the engine. Check the fluid level and add as needed.



USING A BOOSTER BATTERY (JUMP STARTING)

Procedure

If it becomes necessary to use a booster battery to start the engine, BE CAREFUL! Make sure the control lock pin is engaged.

The key switch must be in the OFF position.

The booster battery must be 12 volt.

Open the engine cover.

Connect the end of the first cable to the positive (+) terminal of the booster battery. Connect the other end of the same cable to the positive (+) terminal (Item 1) **[A]** of the machine battery.

Connect the end of the second cable to the negative (–) terminal of the booster battery. Connect the other end of the same cable to the machine frame (Item 2) **[A]**.

NOTE: Also see *Cold Starting Procedure*, in Operation & Maintenance Manual.

Start the engine. After the engine is running, remove the cable (Item 2) **[A]** connected to the frame first. Disconnect the cable from the machine battery (Item 1) **[A]**.

IMPORTANT

Damage to the alternator can occur if:

- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the loader (Remove both cables from the battery).**
- **Extra battery cables (booster cables) are connected wrong.**

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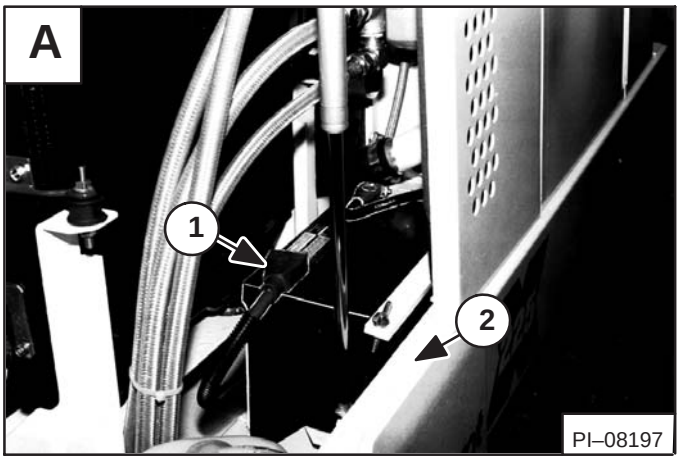


⚠ WARNING

Keep arcs, sparks, flames and lighted tobacco away from batteries. When *jumping* from booster battery make final connection (negative) at engine frame.

Do not jump start or charge a frozen or damaged battery. Warm battery to 60°F. (16°C.) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

Battery gas can explode and cause serious injury.

W–2066–1296

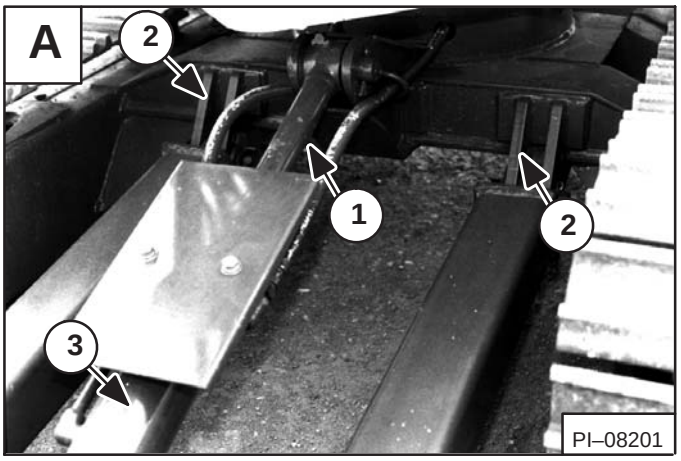
LUBRICATION OF THE HYDRAULIC EXCAVATOR

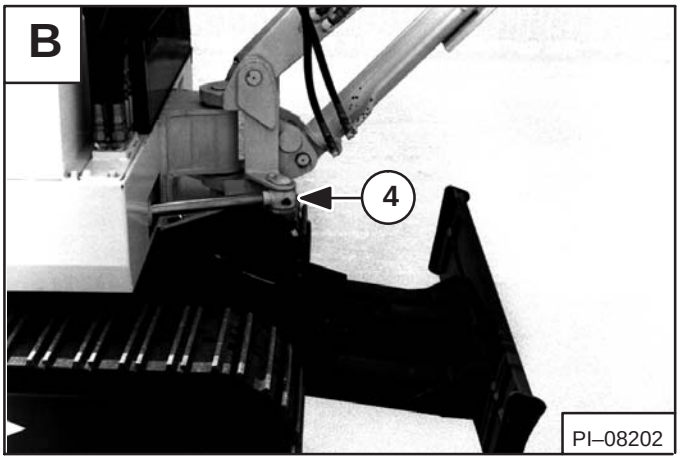
Procedure

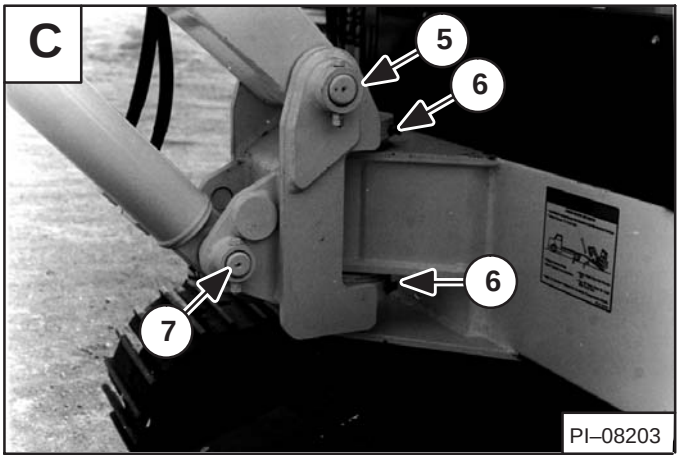
Lubricate the Hydraulic Excavator as specified in the *SERVICE SCHEDULE* Page 1–1 for the best performance of the machine.

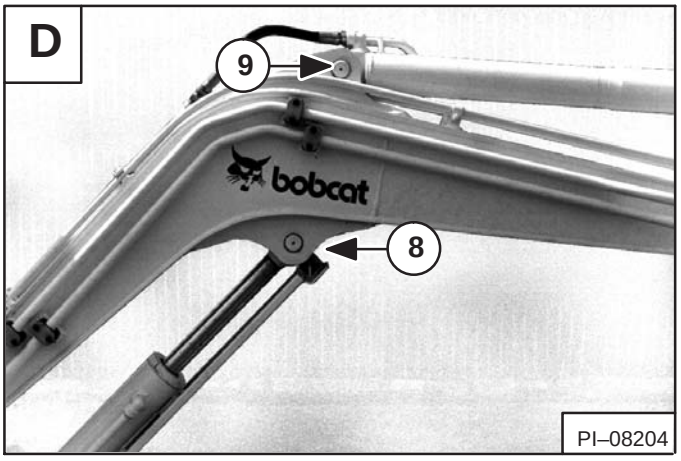
Always use a good quality lithium based multi–purpose grease when lubrication the machine. Apply the lubricant until extra grease shows.

Ref.	Description (# of Fittings)
1.	Blade Cylinder Rod End (1) **[A]**.
2.	Blade Pivots (2) **[A]**.
3.	Blade Cylinder Base End (1) **[A]**.
4.	Boom Swing Cylinder Rod End (1) **[B]**.
5.	Boom Base Pivot Pin (1) **[C]**.
6.	Boom Swing Bracket Pivot (2) **[C]**.
7.	Boom Cylinder Base End (1) **[C]**.
8	Boom Cylinder Rod End **[D]**.
9	Dipperstick Cylinder Base End (1) **[D]**.



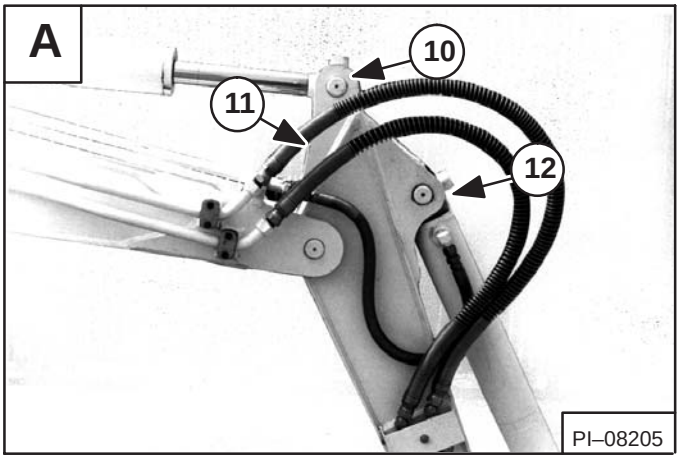


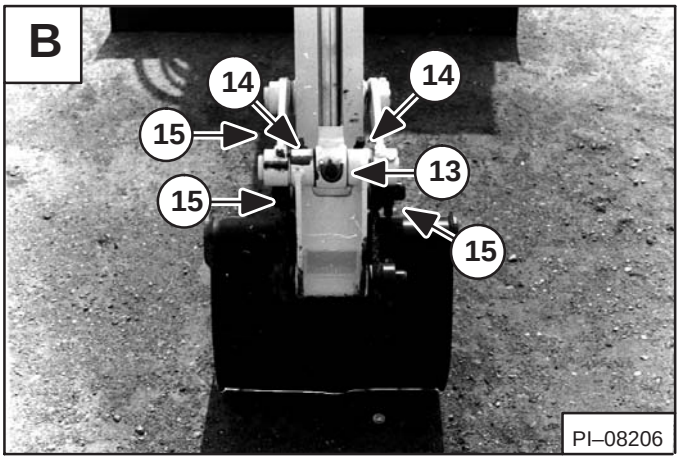


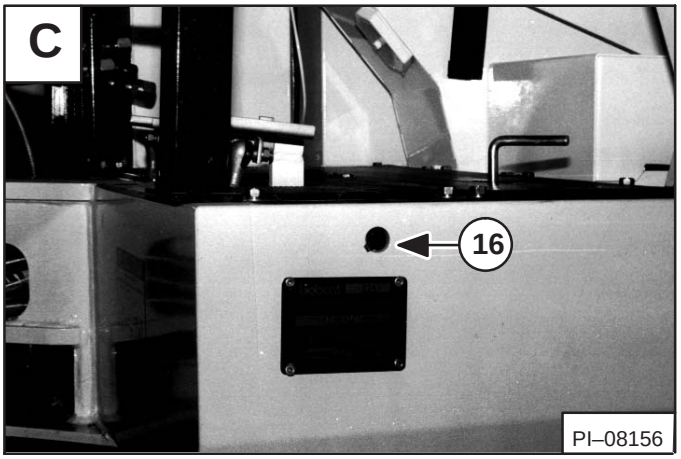


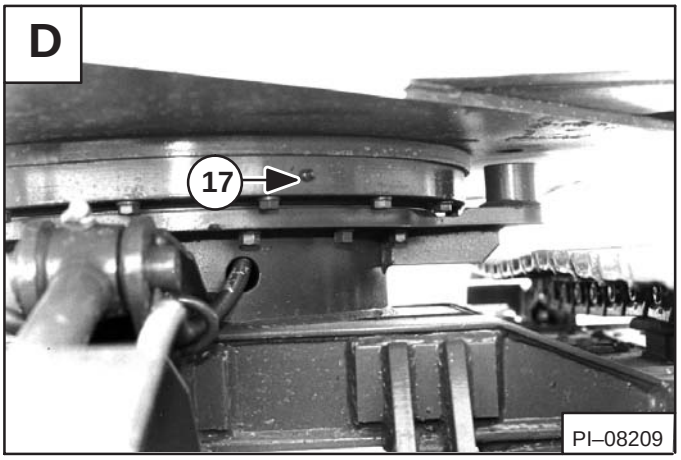
Procedure (Cont'd)

Ref.	Description (# of Fittings)
10.	Dipperstick Cylinder Rod End (1) **[A]**.
11.	Dipperstick Base Pivot Pin (1) **[A]**.
12.	Bucket Cylinder Base End (1) **[A]**.
13.	Bucket Cylinder Rod End (1) **[B]**.
14.	Bucket Link Pivots (12 **[B]**.
15.	Bucket Pivots (4) **[B]**.
16.	Swing Circle Pinion (1) **[C]**.
17.	Swing Circle Ball Bearings (2) **[D]**



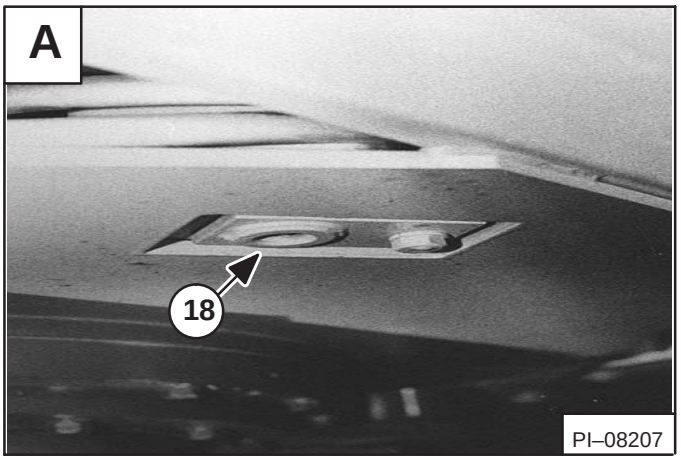






Procedure (Cont'd)

Ref.	Description (# of Fittings)
18.	Boom Swing Cylinder Base End (1) **[A]**.



FINAL DRIVE CASE

Checking Oil Level

Put the machine on a flat level surface.

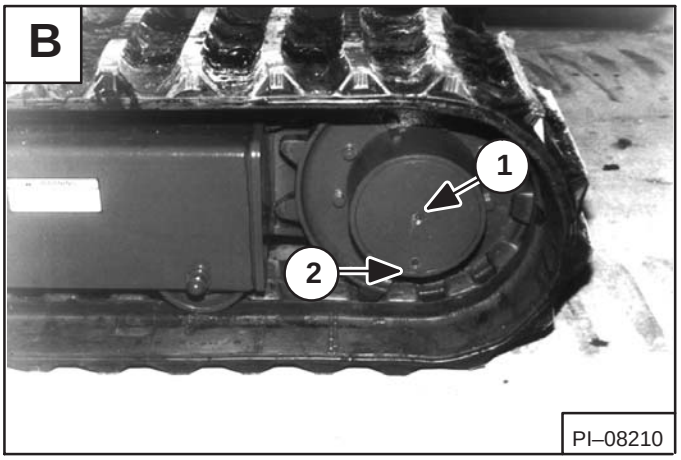
Position the plugs as shown.

Remove the plug (Item 1) **[B]**.

Add oil through the hole if the oil level is below the hole (See *FUEL, COOLANT AND LUBRICANT Chart*, Page 8–8).

Install and tighten the plug.

Repeat the procedure for the other side.



Draining Final Drive Case

See the *SERVICE SCHEDULE* Page 1–1 for the correct service interval.

Put the machine on a flat level surface with the plugs position as shown in figure **[B]**.

Remove the bottom plug (Item 2) **[B]** and the top plug (Item 1) **[B]**.

After the oil is removed, install and tighten the bottom plug.

Add .32 quarts (0,3 L) of oil to the top plug hole. Install the plug.

Repeat the procedure for the other side.

Thank you very much for your reading.

Please Click Here Then Get More Information.