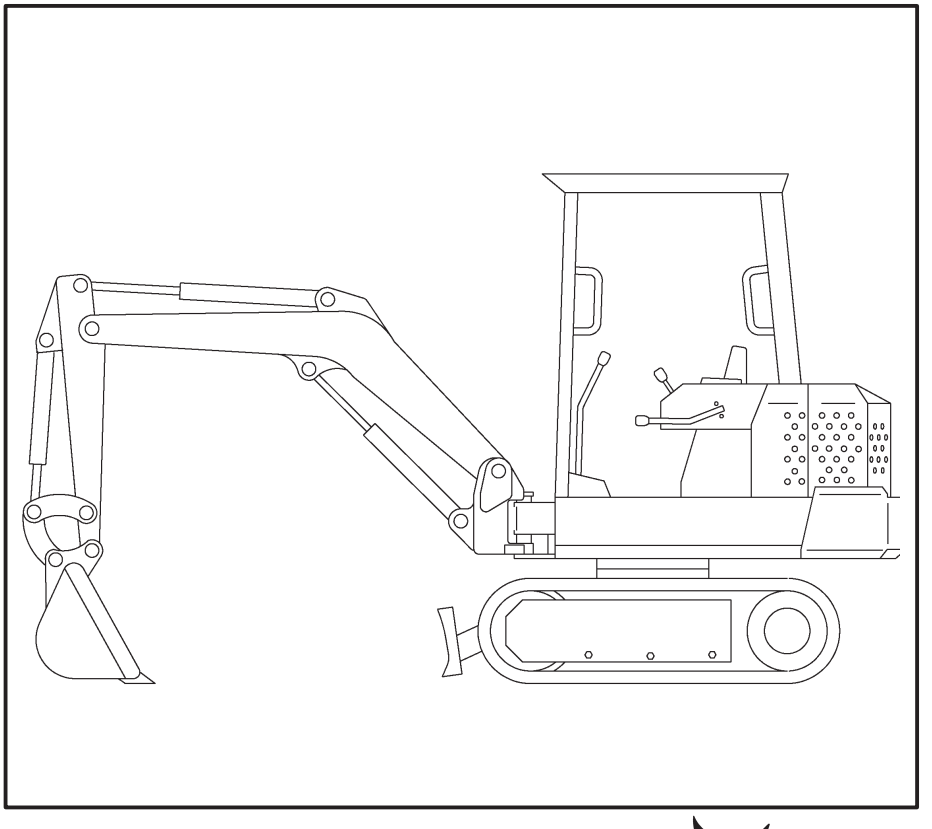
X 231

Excavator

Service Manual

(S/N 508912001 & Above)



MELROE
INGERSOLL-RAND

6722178 (3–92)

Printed in U.S.A.

bobcat®

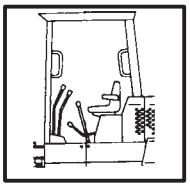
CONTENTS

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.



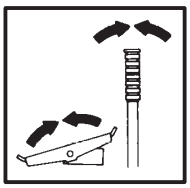
2. Check that ROPS mounting hardware is tightened and is Melroe approved.

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

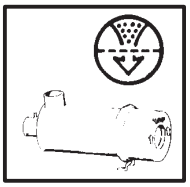
4. Inspect for loose or broken parts or connections.

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

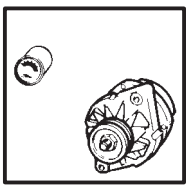
6. Steering levers, control levers and foot pedals must return to neutral. Control lock must lock controls securely.



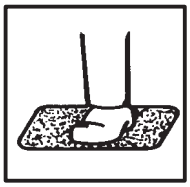
7. Inspect the air cleaner for damage or leaks. Check the condition of the element.



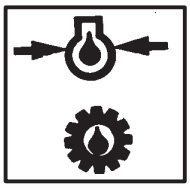
8. Check the electrical charging system.



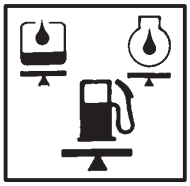
9. Safety treads must in good condition.



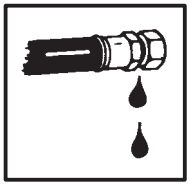
10. Check for correct function of indicator lamps.



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

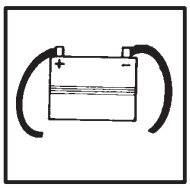


12. Inspect for fuel, oil or hydraulic fluid leaks.



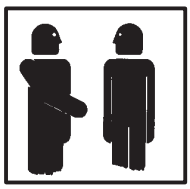
13. Lubricate the hydraulic excavator.

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 your dealer 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.

SAFETY INSTRUCTIONS (Cont'd)

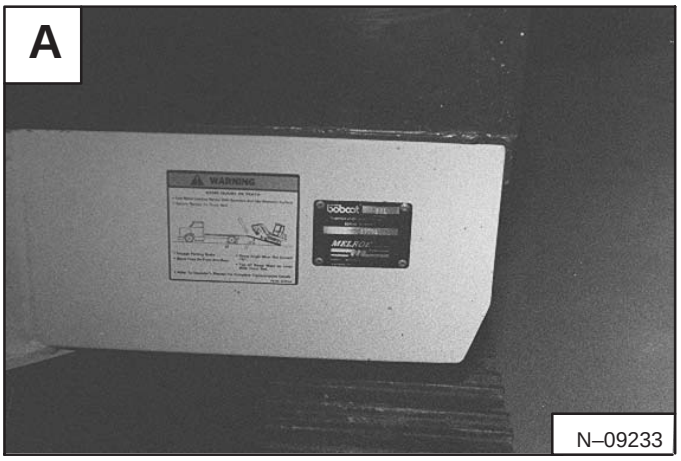
- Wear tight fitting clothing. Always wear safety glasses when maintaining or servicing the excavator. Safety glasses, hearing protection or loader special application kits are required for some work. See your dealer for Melroe Safety equipment.
- Know where fire extinguishers and first aid kits are 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.

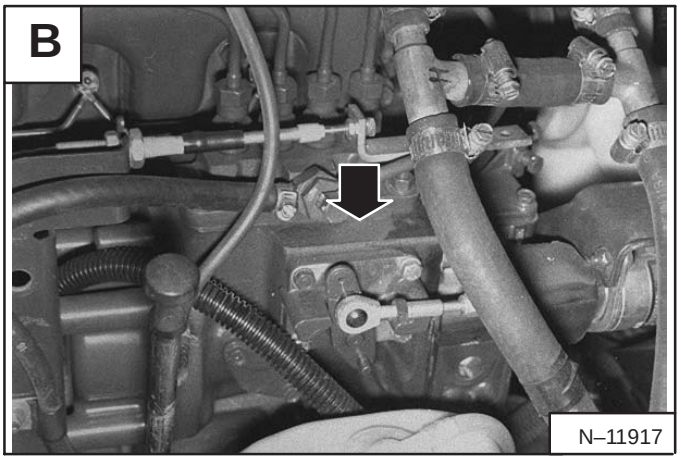
HYDRAULIC EXCAVATOR SERIAL NUMBER

The excavator serial number is on the front of the machine frame, to the left of the boom **[A]**.



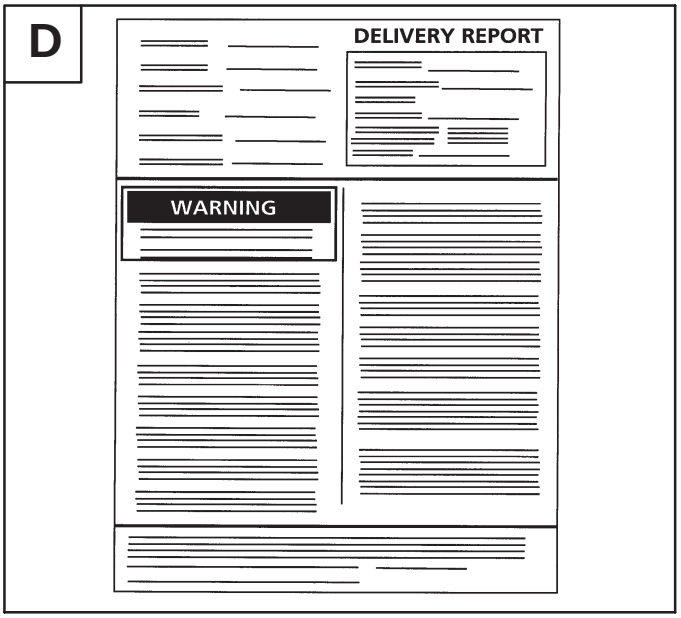
ENGINE SERIAL NUMBER

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

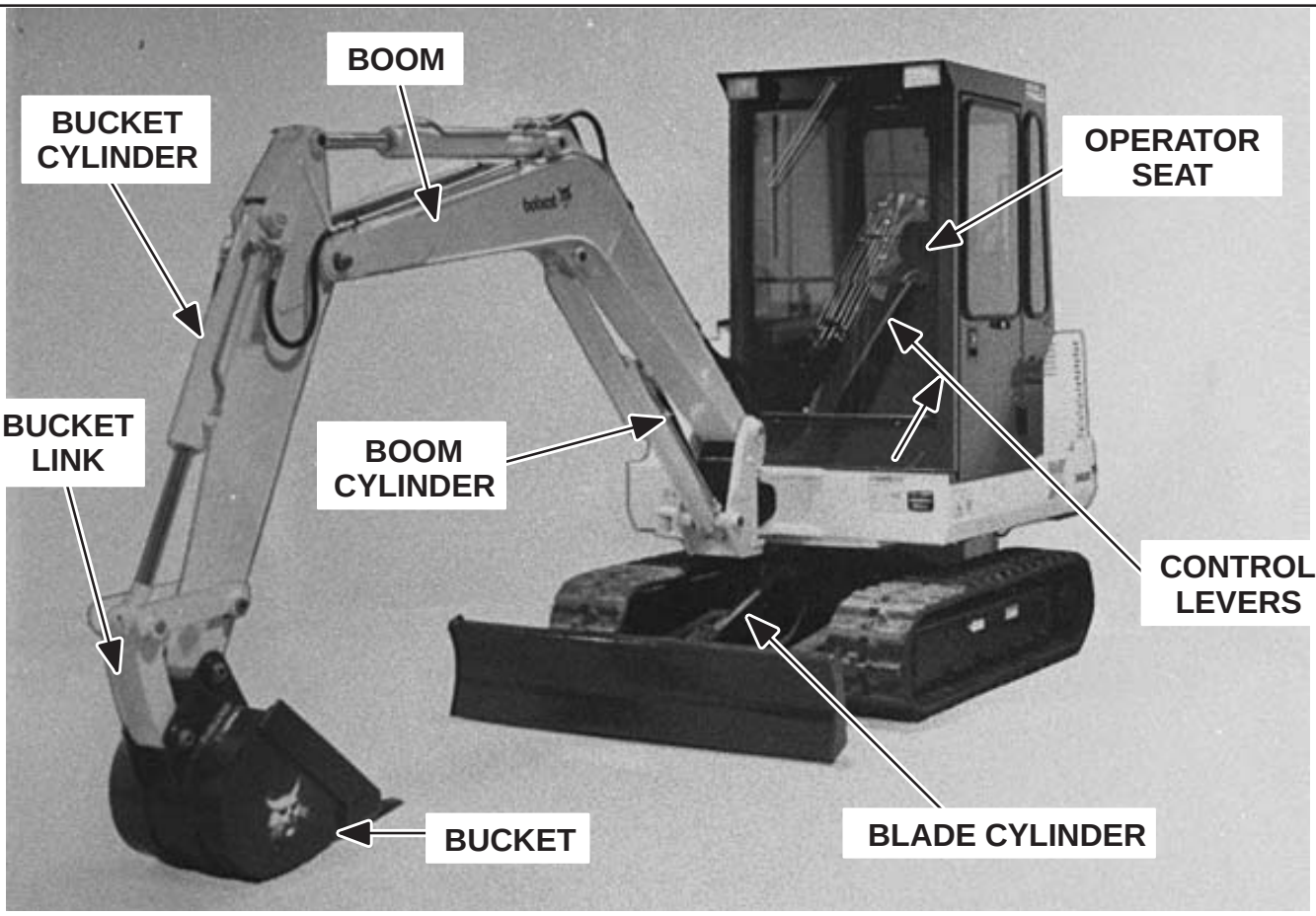


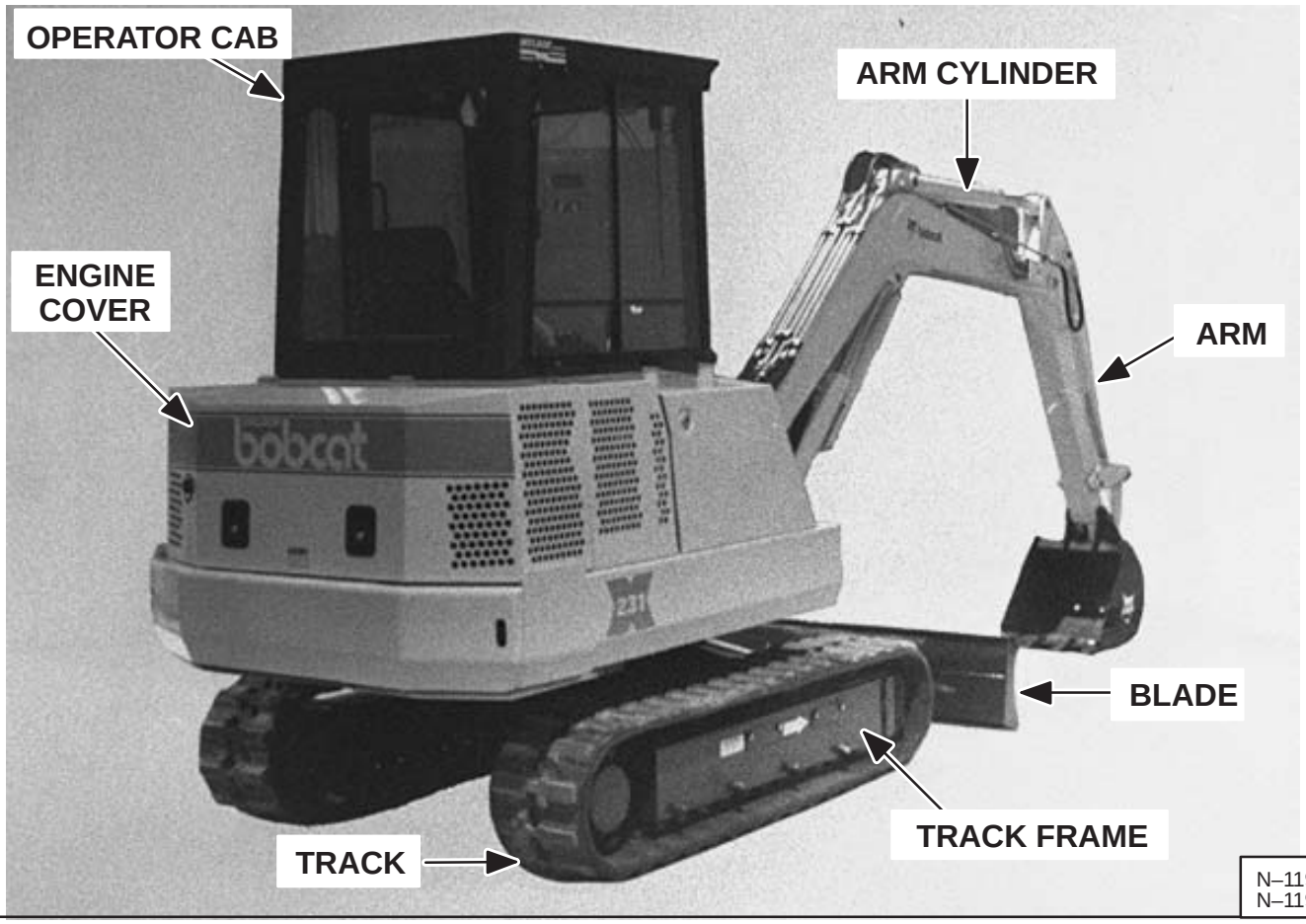
DELIVERY REPORT

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



HYDRAULIC EXCAVATOR IDENTIFICATION

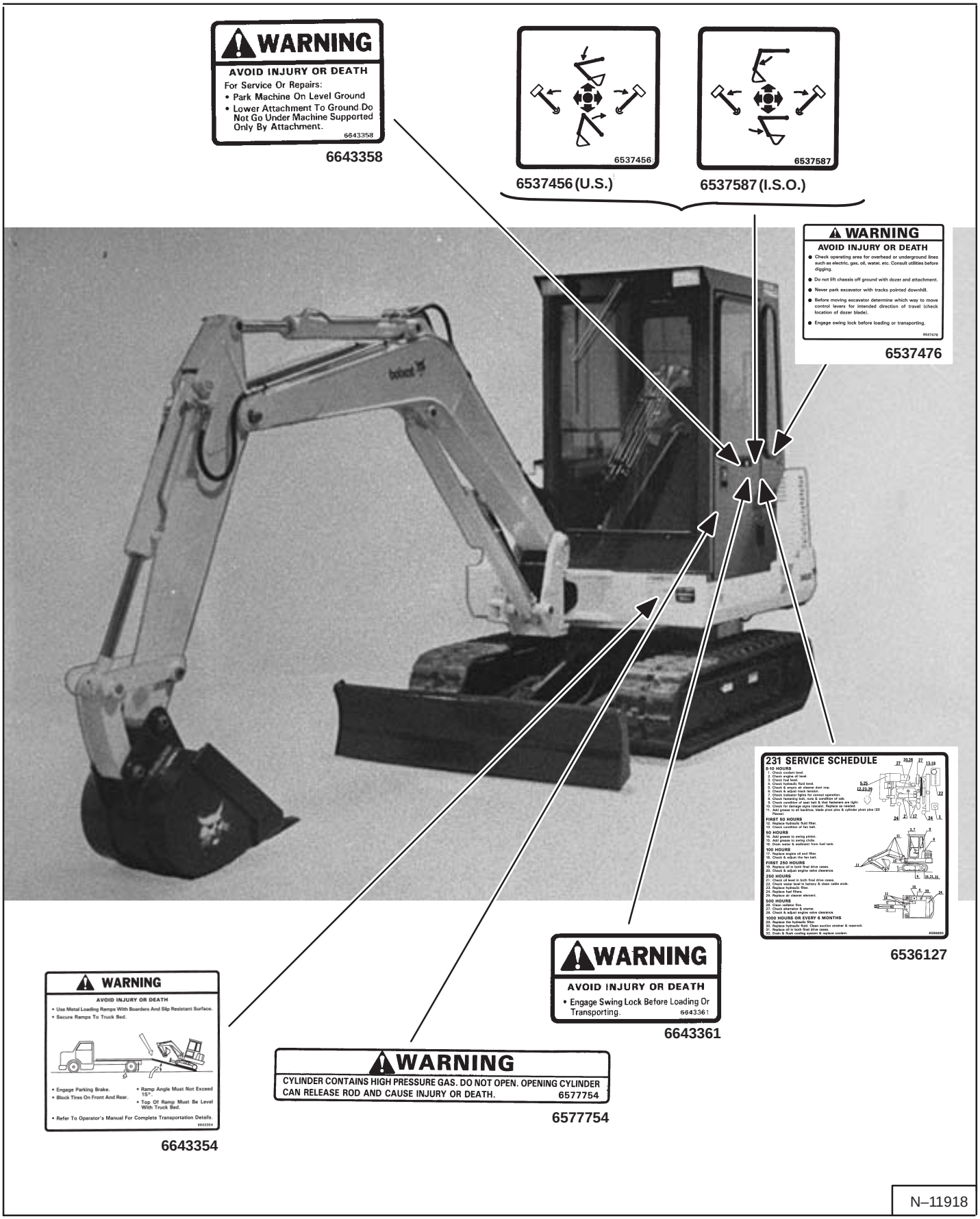




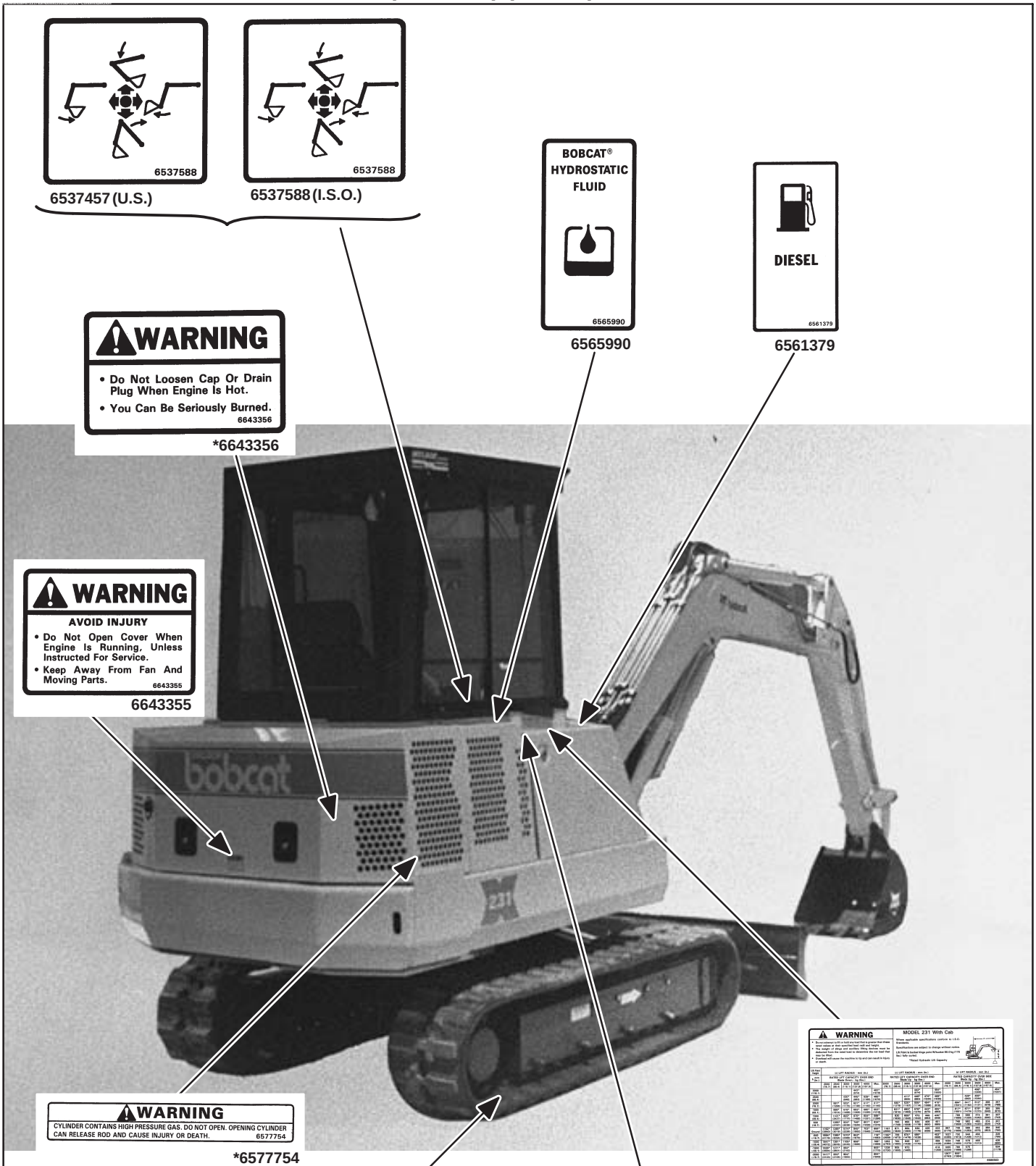
N–11918
N–11919

MACHINE SIGNS TRANSLATIONS (DECALS)

Follow the instructions on all the Machine Signs (Decals) that are on the excavator. Replace any damaged machine signs and be sure they are in the correct locations. Machine signs are available from your Bobcat Hydraulic Excavator dealer.



MACHINE SIGNS TRANSLATIONS (DECALS) (Cont'd)



*** Decal Located In Engine Compartment**

N–11919

PREVENTIVE MAINTENANCE

SERVICE SCHEDULE

Maintenance work must be done at regular intervals. Failure to do so may result in excessive 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 cup as required.	■					
Engine Oil	Check the oil level & add oil as needed.	■					
Engine Coolant System	Check coolant recovery bottle.	■					
Indicator Lights	Check for correct operation.	■					
Operator Cab	Check the fastening bolts, nuts, & condition of cab.	■					
Seat Belt	Check the condition & that fasteners are tight.	■					
Safety Signs (Decals)	Check for damaged signs (decals) replace as needed.	■					
Tracks	Check & adjust tension.	■					
Hydraulic Reservoir	Check fluid level.	■					
All Machinery Pivot Points	Lubricate 24 grease fittings.	■					
Fuel Tank/Fuel Filters strainer.	Drain water and sediment from fuel tank/filter. Check fill neck		■				
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.						■
Final Drive Case	Change the oil.				**		■

***After the first 50 hours of machine operation do the following:**

- **Replace the hydraulic fluid filter.**
- **Check condition of fan belt.**
- **Replace the engine oil and filter.**

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

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

■ **Or every 12 months.**

ENGINE COVER

Procedure

⚠ WARNING

AVOID INJURY OR DEATH

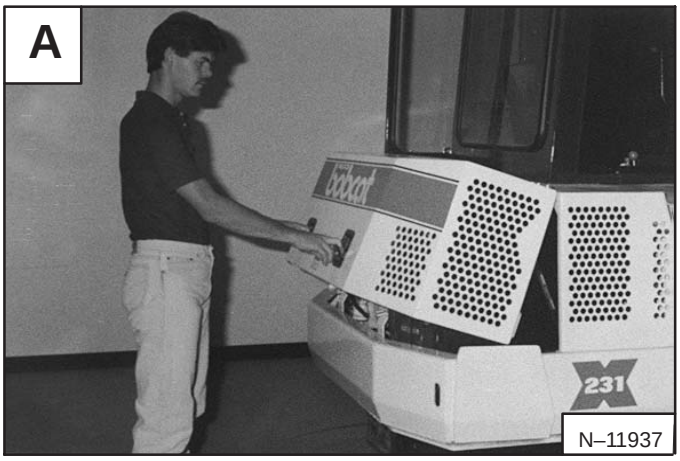
Never service or adjust the machine when the engine is running unless instructed to do so in the manual.

W–2012–0290

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 up until it is fully open **[A]**.



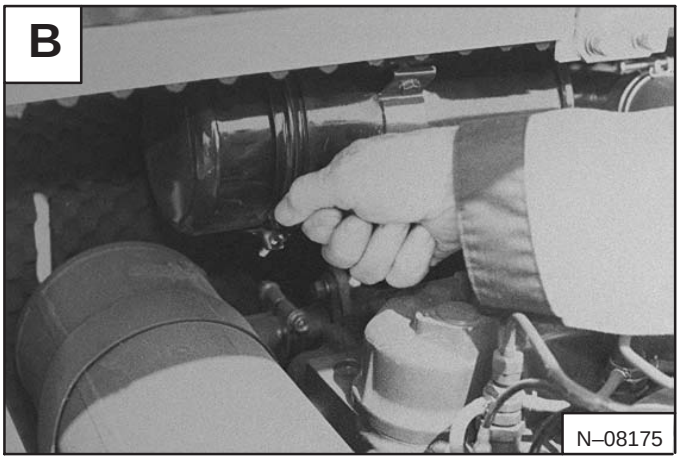
AIR CLEANER SERVICE

Replacing the Filter Element

See the Service Schedule (Page 1–1) for the correct service interval.

Replace the filter element when the red ring shows in the window of the condition indicator located at the top of the filter inlet.

NOTE: Push the button on the condition indicator and start the engine. If the red ring does not show, do not replace the filter element.

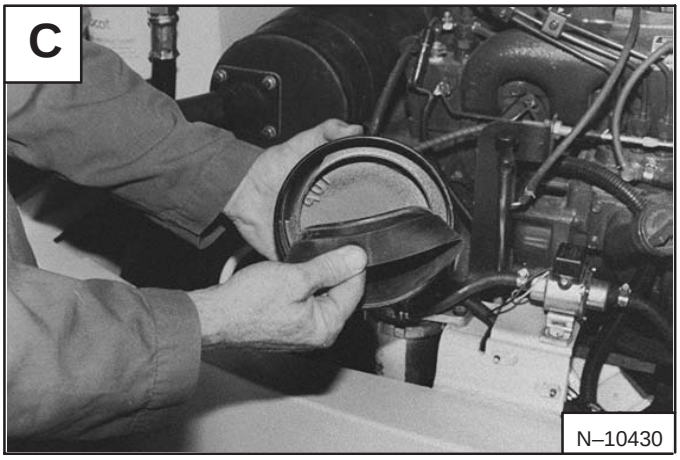


Service the air cleaner as follows:

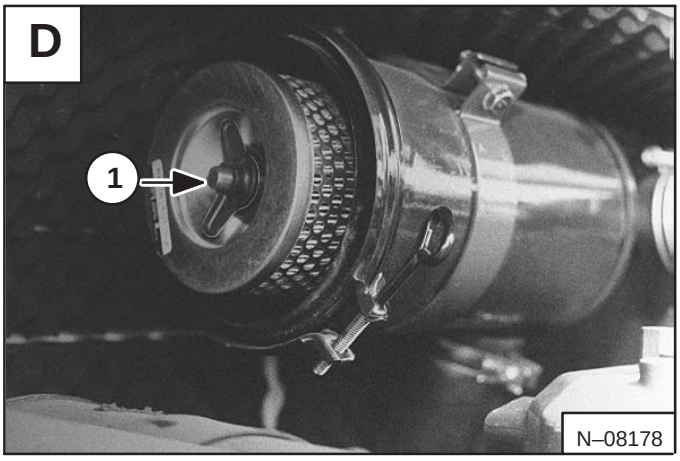
Loosen the clamp on the dust cup **[B]**.

Remove the dust cup.

Remove the rubber cup to clean the dust cup **[C]**.



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



AIR CLEANER SERVICE (Cont'd)

Replacing the Filter Element (Cont'd)

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

Check the air cleaner housing for damage.

Check the condition of the element replace if necessary.

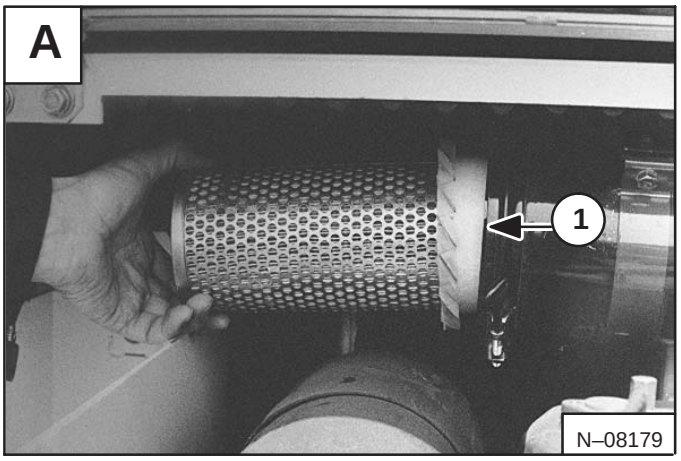
Check the seal (Item 1) **[A]**.

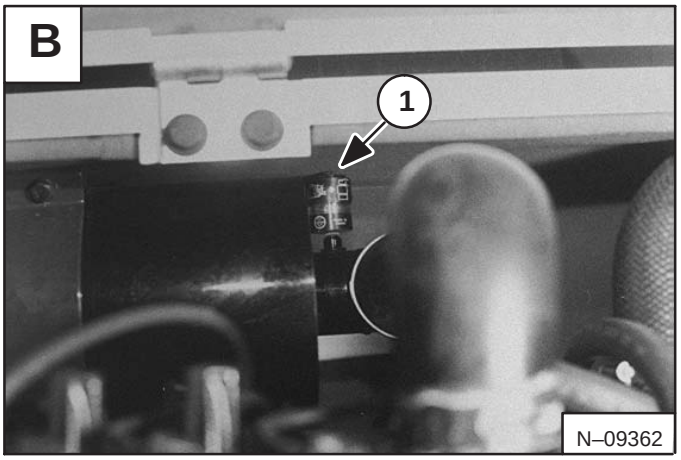
nstall a new filter element. Install and tighten the wing nut.

Install the dust cup so the arrow points up.

Check that all the air cleaner hose clamps are tight.

Push the button on the condition indicator (Item 1) **[B]** so the red ring does not show.





FUEL SYSTEM

Fuel Specifications

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

WARNING

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

W–2063–0887

Fuel System Service

The fuel level in the tank is indicated by the fuel gauge (Item 1) **[A]** when the key is on.

Use the key to unlock the fuel fill cap and turn the fill cap to remove it **[B]**.

Remove and inspect the fill neck screen **[C]**.

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!

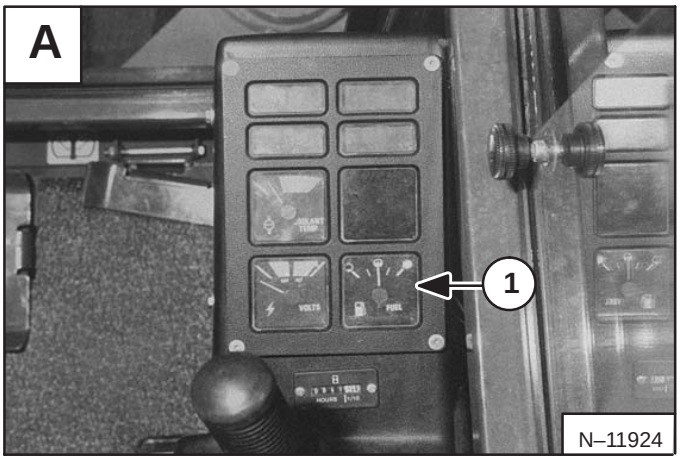
After the tank is full, install and tighten the fuel fill cap.

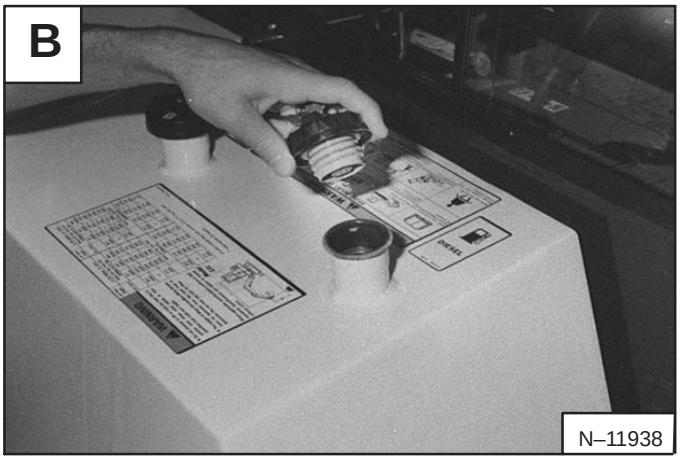
WARNING

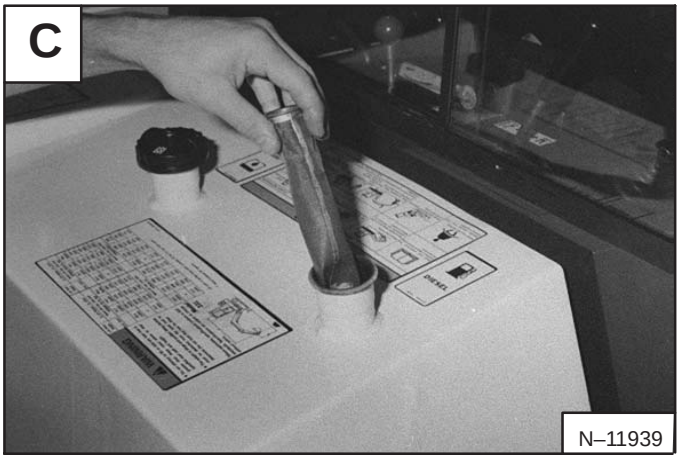
Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire which can result in injury or death.

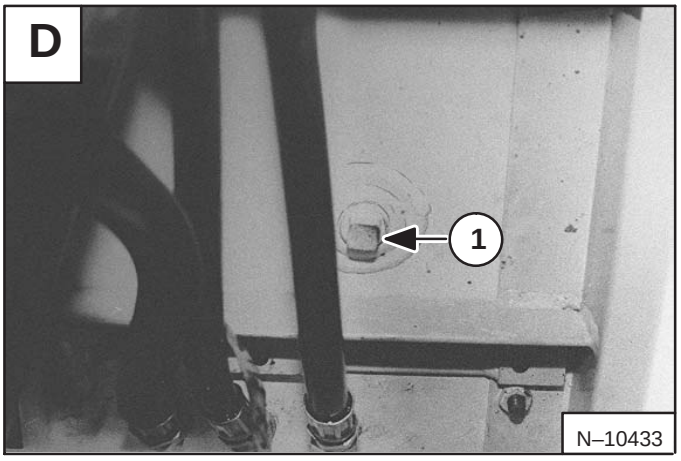
W–2103–1285

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







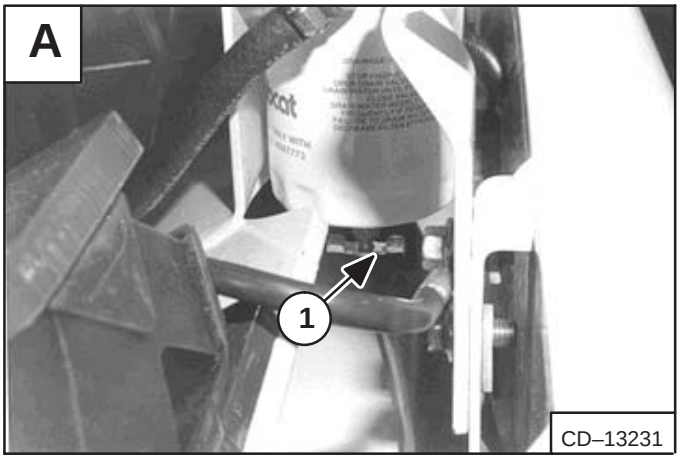


Fuel Filters

See the Service Schedule (Page 1–1) for the correct service interval.

To remove the water from the fuel filter element, open the drain valve (Item 1) **[A]** at the bottom of the fuel filter element.

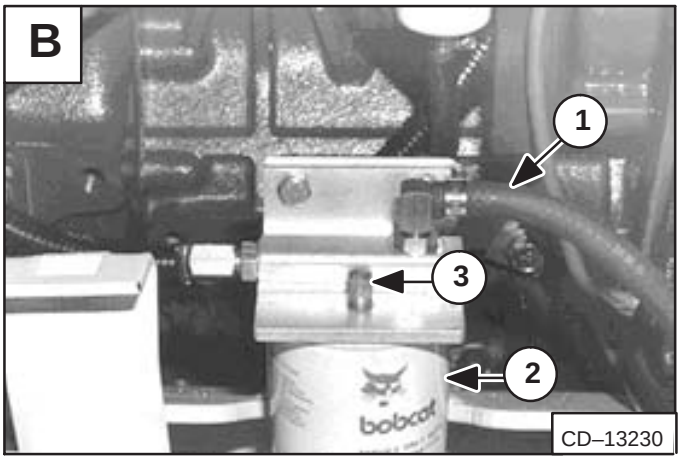
When fuel, free of water emerges from the drain valve, close the drain valve.



See the Service Schedule (Page 1–1) for the correct service interval for fuel filter element replacement.

Remove the hose (Item 1) **[B]** from the filter housing and plug the hose, or firmly squeeze the hose, to eliminate the fuel from siphoning out of the tank when the element is removed.

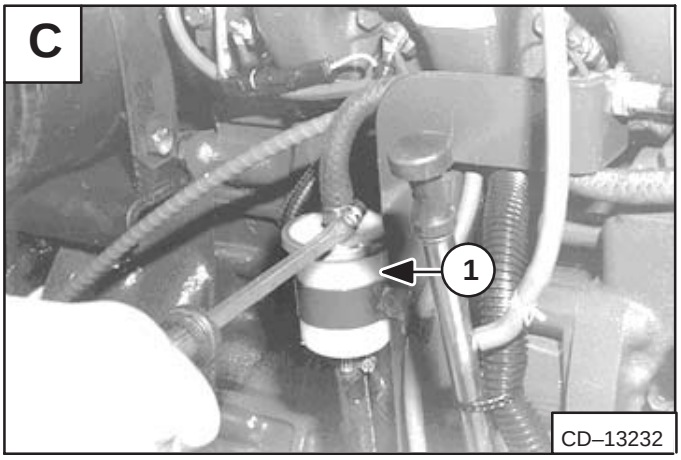
Remove the fuel filter element (Item 2) **[B]**. Clean the area around the filter housing. Put oil on the seal of the new filter element. Install the new fuel filter element and hand tighten only.



In–line Fuel Filter (If Equipped)

Remove the in–line fuel filter (Item 1) **[C]** and replace it with a new fuel filter.

(In–line fuel filters used on early models only.)

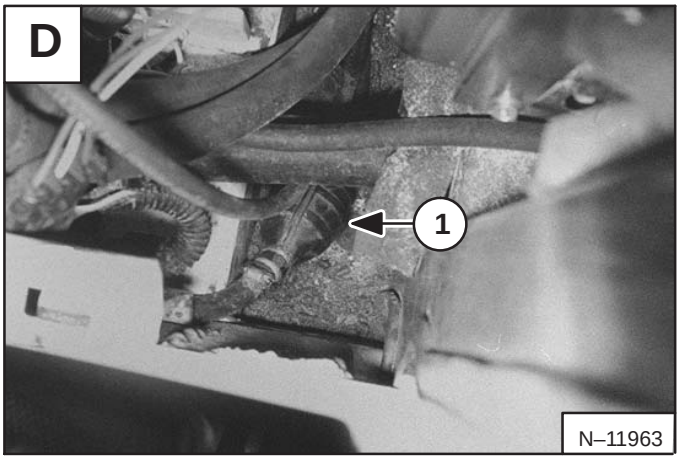


Removing Air From The Fuel System

Loosen the bleed screw (Item 3) **[B]** on the filter housing.

Pump the priming ball (Item 1) **[D]** until fuel, free of air bubbles emerges from the bleed screw.

Tighten the bleed screw.



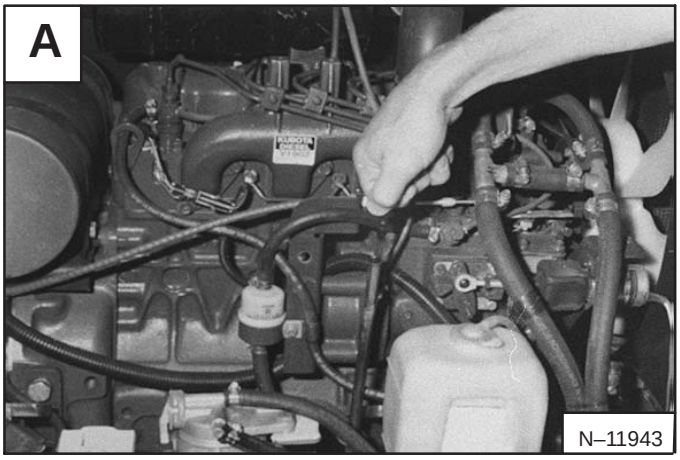
ENGINE LUBRICATION SYSTEM

Checking The Engine Oil

Check the engine oil every day.

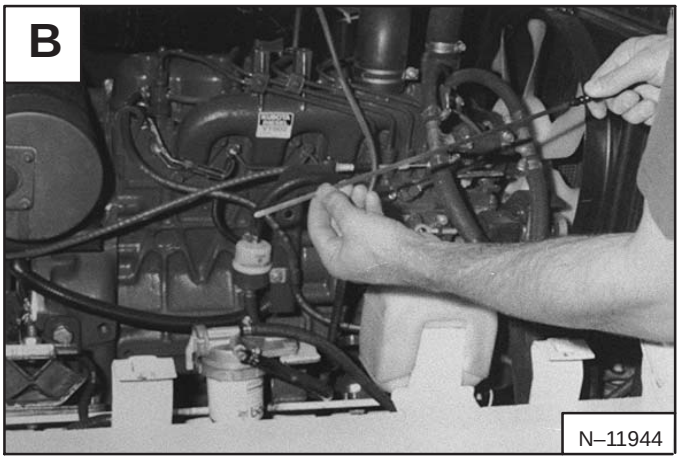
Stop the engine. Open the engine cover.

Remove the dipstick **[A]**.



Keep the oil between the marks on the dipstick **[B]**.

Use a good quality motor oil that meets API Service Classification of CC or CD. (See Fuel, Coolant and Lubricants Chart, Page 8–8.)



Engine Oil and Filter Replacement

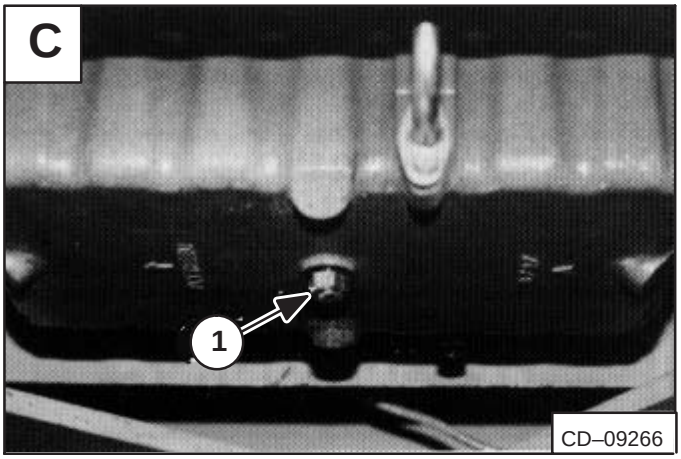
See the Service Schedule (Page 1–1) for the correct service interval.

Use the following procedure to change the oil and filter:

Run the engine until it is at operating temperature.

Turn the upper works so there is clearance for the engine oil drain plug. Stop the engine.

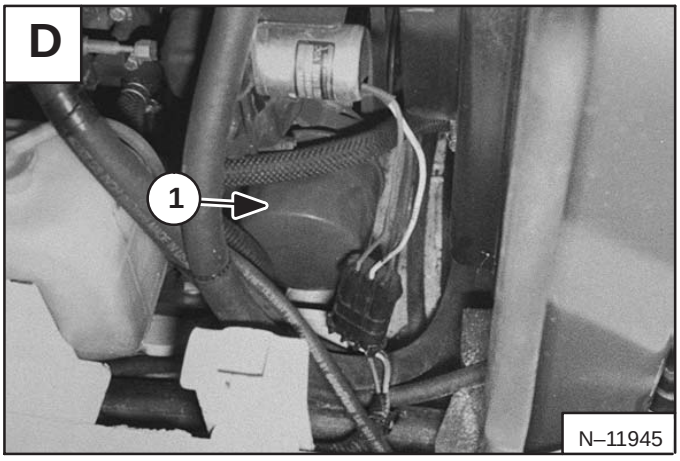
Remove the drain plug (Item 1) **[C]**. Drain the oil into a container.



Remove the oil filter (Item 1) **[D]**, using a filter wrench.

Clean the filter housing surface. Put clean oil on the filter gasket. Install the new filter and hand tighten only.

Install and tighten the oil drain plug.

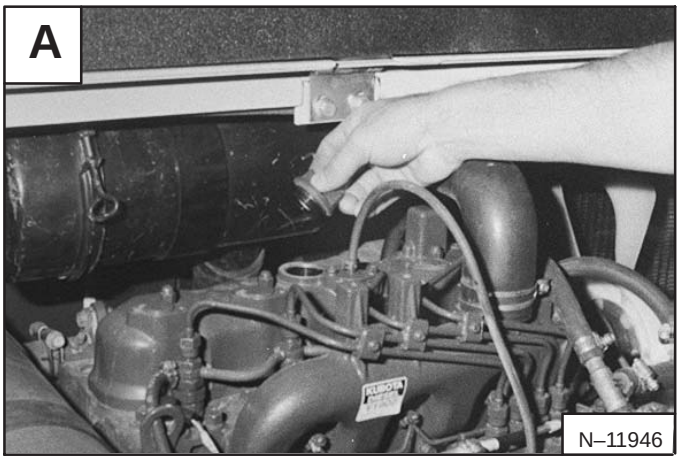


Engine Oil and Filter Replacement (Cont'd)

Remove the oil fill cap **[A]**. Put 9.0 quarts (8,5 L.) of oil into the engine. (See Fuel, Coolant and Lubricants Chart, Page 8–8.)

Start the engine and let it run for several minutes. Stop the engine. Check for leaks at the oil filter.

Check the oil level and add oil as needed to bring it to the *TOP* mark on the dipstick.



COOLING SYSTEM

Coolant Level

When 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.

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Turn the upper works so there is access to the engine and radiator from underneath. Stop the engine.

Loosen and remove the radiator cap **[B]**.

Open the radiator drain valve (Item 1) **[C]**.

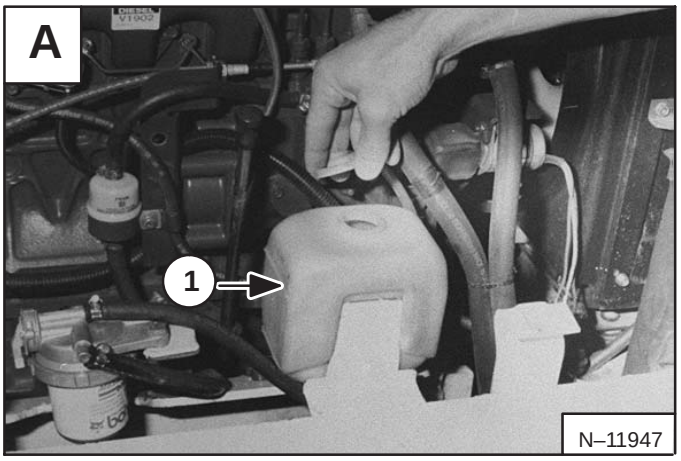
Drain all the coolant from the system.

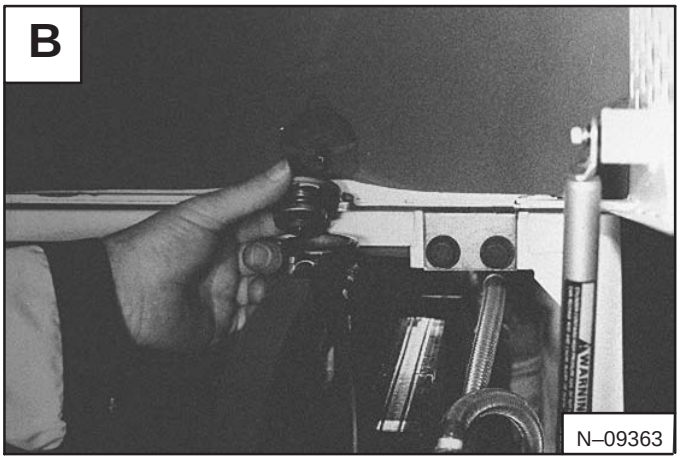
When all the coolant is removed, close the drain valve.

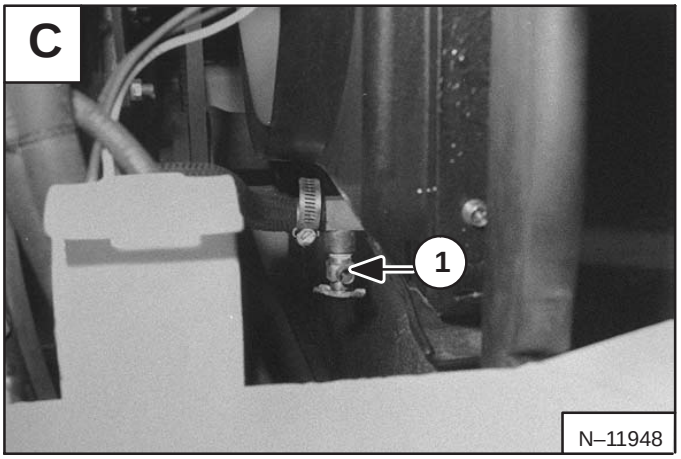
Pre–mix 50% water and 50% ethylene glycol in a separate container. This mixture will protect the cooling system to approximately –30° F (–34° C). Fill the radiator with the pre–mixed coolant until it is full. Add coolant to the recovery tank until it is half full.

Run the engine at idle speed for about 5–10 minutes to remove the air from the cooling system (leave the radiator cap off during this operation).

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

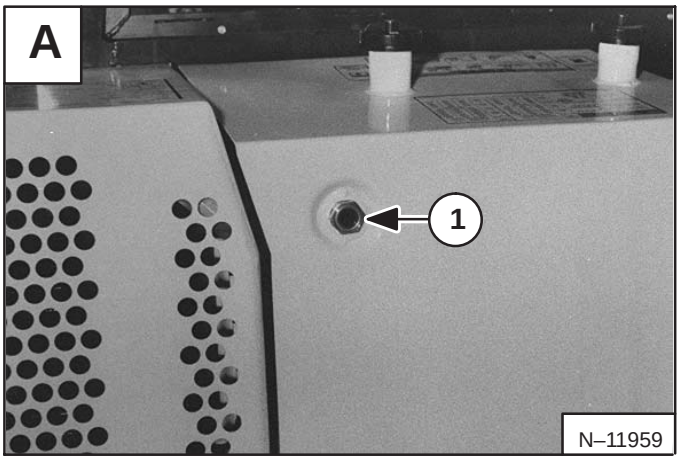
Checking and Adding Fluid

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

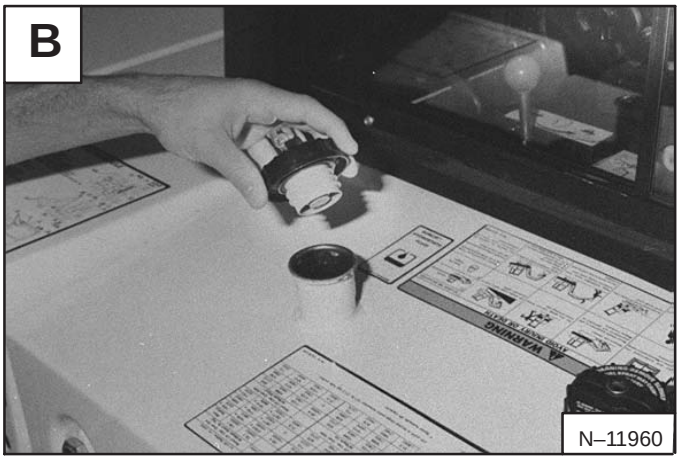
Put the machine on a flat level surface.

Retract the arm 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 in the right gauge (Item 1) **[A]**.



If fluid level is not correct, remove the reservoir cap **[B]**.



Remove and inspect the fill neck screen. Install the screen **[C]**.

Add the correct fluid to the reservoir until it shows in the sight gauge. (See Fuel, Coolant and Lubricants Chart, Page 8–8.)

Install the reservoir cap.

Replacement of the Hydraulic Filter

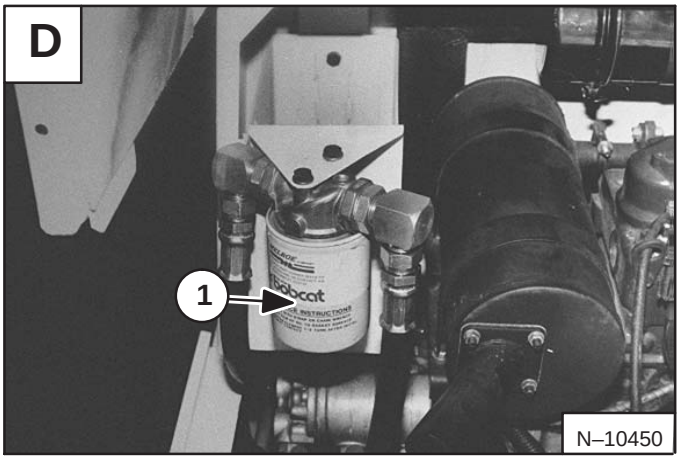
See the Service Schedule (Page 1–1) for the correct service interval.

Open the engine cover.

Use a filter wrench and remove the filter element Item 1) **[D]**.

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 around the filter for leaks.



Hydraulic Reservoir

See the Service Schedule (Page 1–1) for the correct service interval.

Move the upper works so the reservoir is between the tracks at the rear of the machine.

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

Remove the drain plug (Item 1) **[A]** and drain fluid into a container.

Install the drain plug.

Add approximately 12 gals. (45,4 L.) of fluid to the reservoir. (See Fuel, Coolant and Lubricants Chart, Page 8–8.)

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

Remove the plate (Item 1) **[B]** to remove the oil and any debris from the radiator/cooler area.

⚠ 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.

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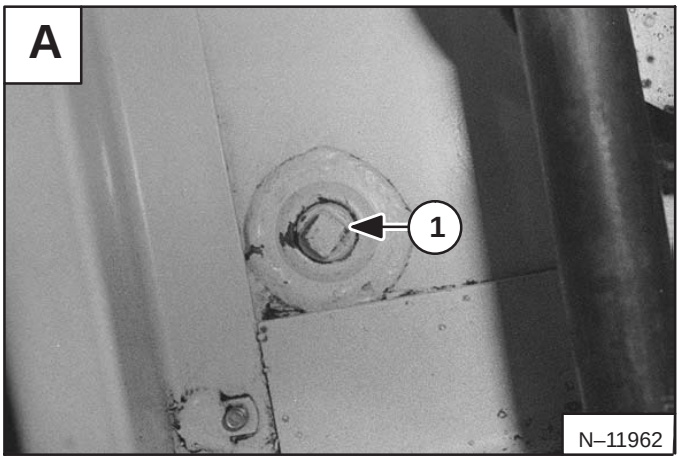
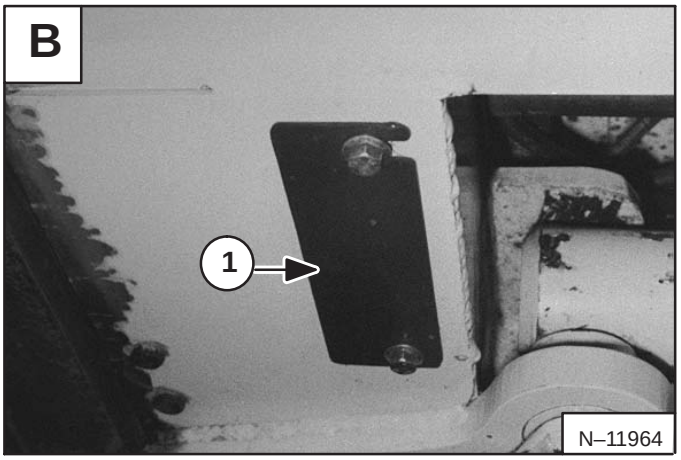
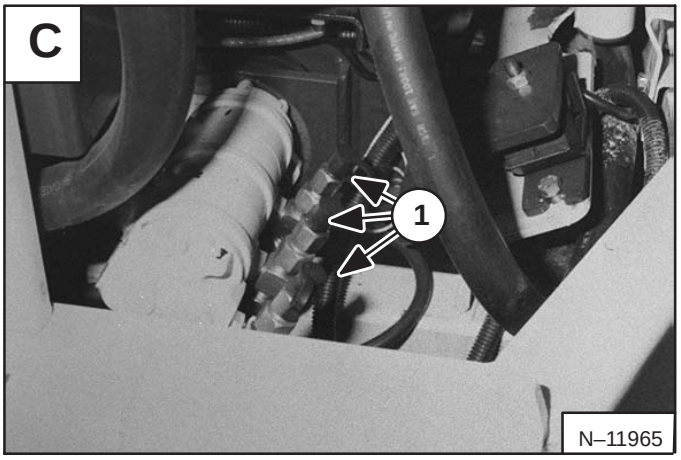
Diagnostic Couplers

The diagnostic couplers (Item 1) **[C]** located on each hydraulic pump are used to check circuit pressures.







USING A BOOSTER BATTERY (JUMP STARTING)

Procedure

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

The key switch must be in the OFF position.

The booster battery must be 12 volt.

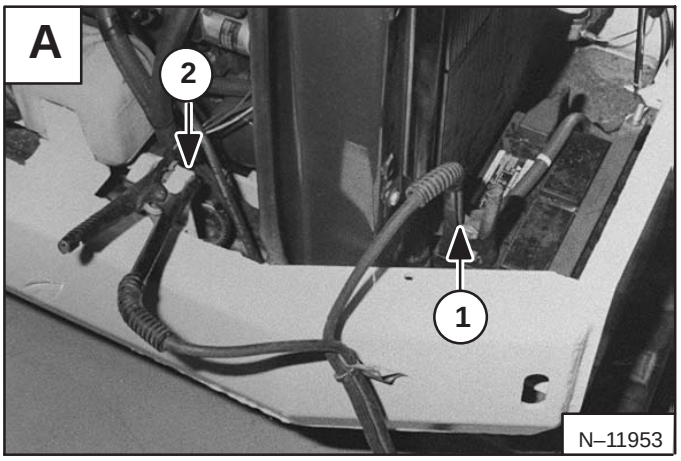
Open the engine cover.

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: 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.

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LUBRICATION OF THE HYDRAULIC EXCAVATOR

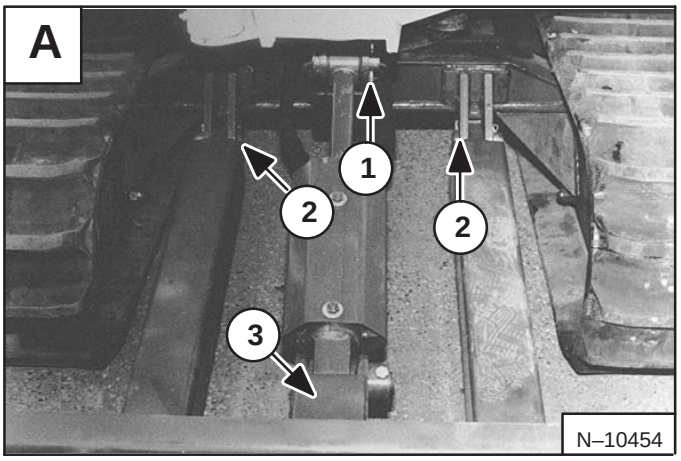
Procedure

Lubricate the Hydraulic Excavator as specified in the Service Schedule (Page 1–1) for the best performance of the machine.

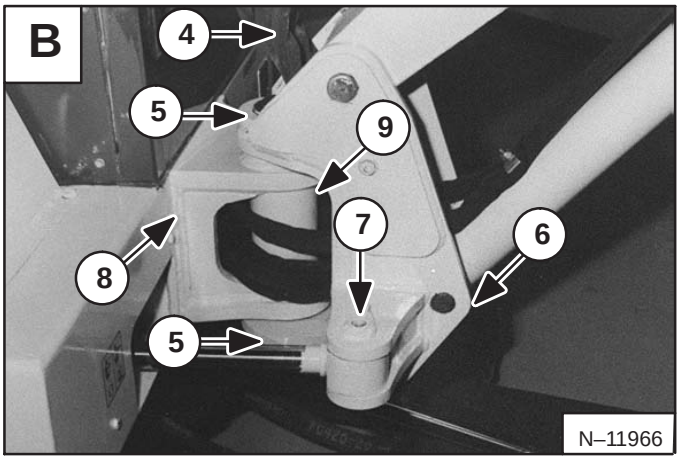
Always use a good quality lithium based multi–purpose grease when lubricating the machine. Apply the lubricant until extra grease shows.

Ref. Description (# of Fittings)

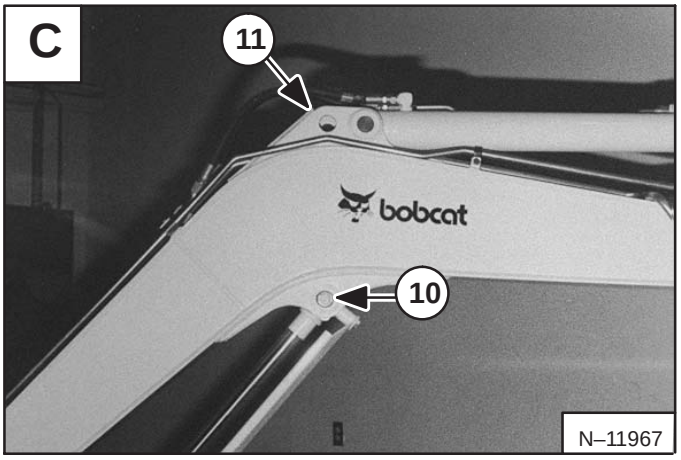
1. Blade Cylinder Rod End (1) **[A]**.
2. Blade Pivots (2) **[A]**.
3. Blade Cylinder Base End (1) **[A]**.



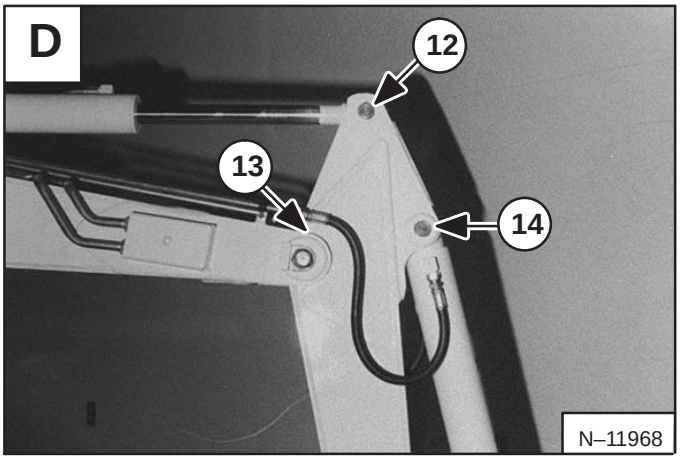
4. Boom Base Pivot (1) **[B]**.
5. Boom Swing Bracket Pivot (2) **[B]**.
6. Boom Cylinder Base End (1) **[B]**.
7. Boom Swing Cylinder Rod End (1) **[B]**.
8. Swing Circle Pinion (1) **[B]**.
9. Swing Shaft (1) **[B]**.



10. Boom Cylinder Rod End (1) **[C]**.
11. Arm Cylinder Base End (1) **[C]**.



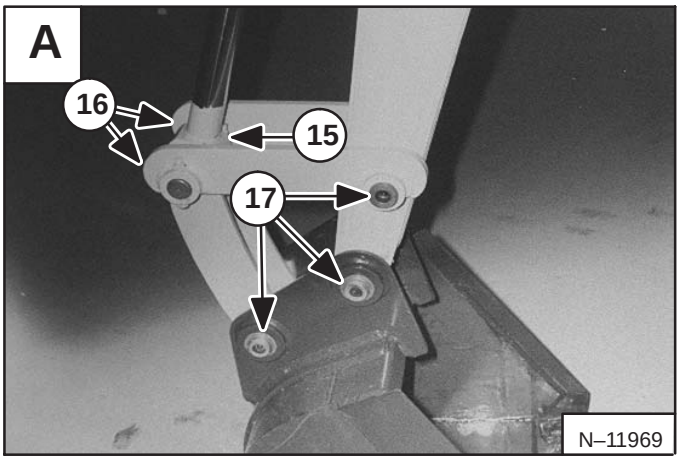
12. Arm Cylinder Rod End **[D]**.
13. Arm Base Pivot (1) **[D]**.
14. Bucket Cylinder Base End (1) **[D]**.



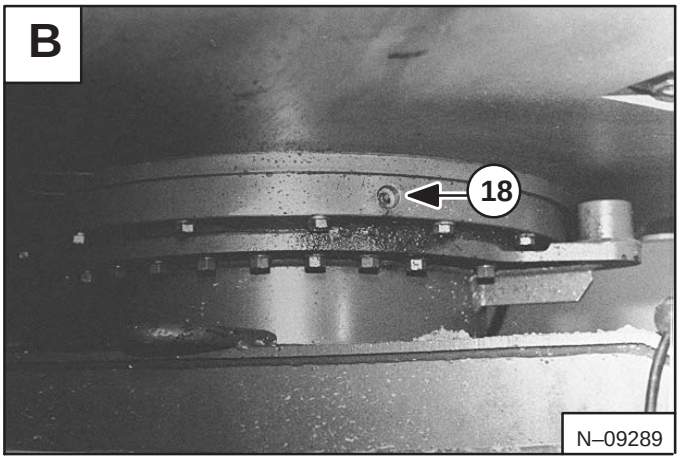
Procedure (Cont'd)

Ref. Description (# of Fittings)

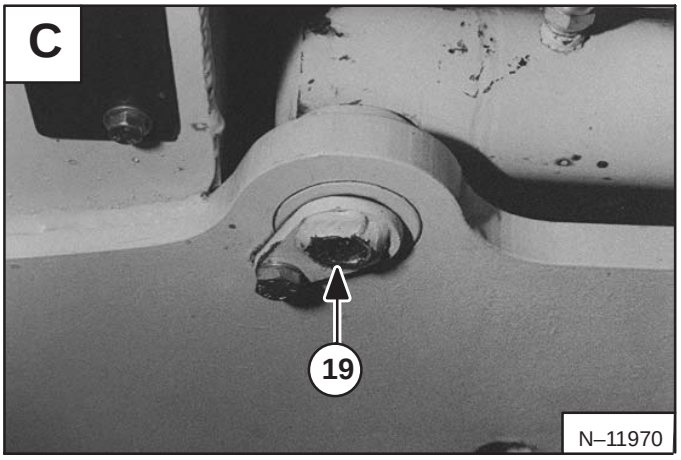
15. Bucket Cylinder Rod End (1) **[A]**.
16. Bucket Link Pivots (2) **[A]**.
17. Bucket Pivots (3) **[A]**.



18. Swing Circle Ball Bearings (2) **[B]**.



19. Boom Swing Cylinder Base End (1) **[C]** (under the right front of upper frame).



FINAL DRIVE CASE

Checking Oil Level

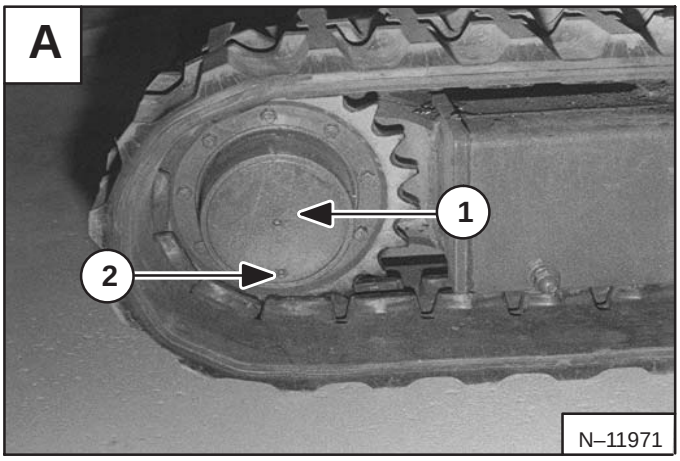
Put the machine on a flat level surface with the plugs positioned as shown in figure **[A]**.

Remove the top plug (Item 1) **[A]**.

Add SAE 90 gear lube through the hole if the oil level is below the hole. (See Fuel, Coolant and Lubrication 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 flat level surface with the plugs positioned as shown in figure **[A]**.

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

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

Add 0.55 quarts (0,5L) of SAE 90 gear lube 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.