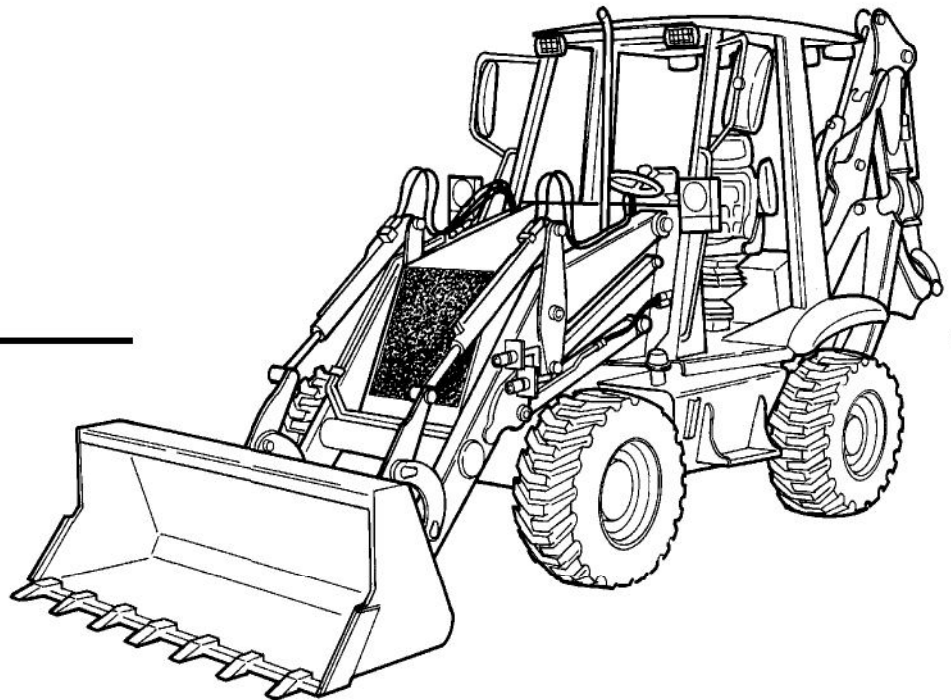


BL-470
BL-475

IR Ingersoll-Rand®

Service Manual

BL 470 (S/N 570511001 & Above)
BL 475 (S/N 571911001 & Above)



Doosan purchased Bobcat Company from Ingersoll-Rand Company in 2007. Any reference to Ingersoll-Rand Company or use of trademarks, service marks, logos, or other proprietary identifying marks belonging to Ingersoll-Rand Company in this manual is historical or nominative in nature, and is not meant to suggest a current affiliation between Ingersoll-Rand Company and Bobcat Company or the products of either.


IR Ingersoll-Rand®

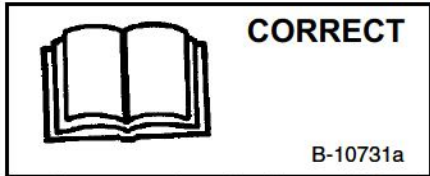
MAINTENANCE SAFETY


WARNING

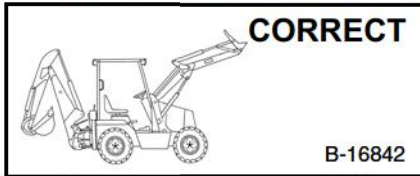
Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments,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


W-2003-0199


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

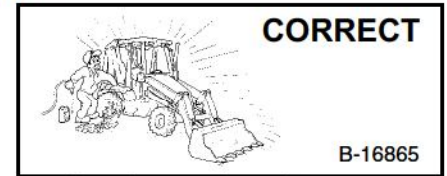



 Never service the Ingersoll-Rand Loader Backhoe without instructions.




 Always use an approved lift arm support device when servicing the loader backhoe with the lift arm raised. Replace the lift arm support device if damaged or missing.


 Disconnecting or loosening any hydraulic tubeline, hoe, fitting component, or part failure can cause lift arms or backhoe boom to drop.




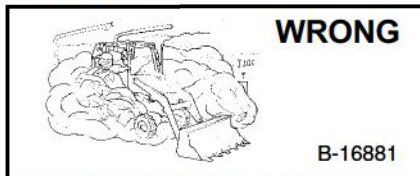
 Cleaning and maintenance are required daily.


 NEVER modify equipment or add attachments not approved by Ingersoll-Rand.




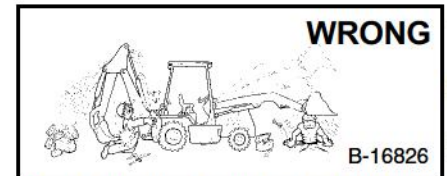
 Have good ventilation when welding or grinding painted parts.


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




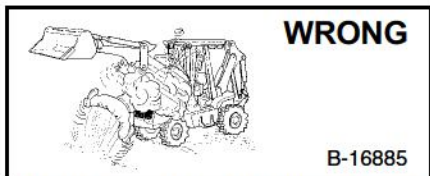
 Vent exhaust to outside when engine must be run for service.


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





 Never work on loader backhoe with lift arms raised unless supported by an approved lift arm support device.


 Always lower the backhoe bucket to the ground before doing any maintenance.

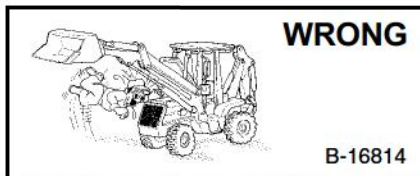



 Stop, cool and clean engine of flammable materials before checking fluids.


 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.





 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 engine cover closed except for service. Close and latch engine cover before operating the loader backhoe



 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 INGERSOLL-RAND SERVICE PERSONNEL**. Always use genuine Ingersoll-Rand replacement parts.

MSW18-0602

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X-CHANGE™50-01

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Hello dear friend!

Thank you very much for reading.

Enter the link into your browser.

The full manual is available for immediate download.

<https://www.ebooklibonline.com>

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**SAFETY &
MAINTENANCE**

**HYDRAULIC
SYSTEM**

**HYDROSTATIC
SYSTEM**

**DRIVE
SYSTEM**

MAIN FRAME

**ELECTRICAL
SYSTEM &
ANALYSIS**

**ENGINE
SERVICE**

SPECIFICATIONS

FOREWORD

This manual is for the Ingersoll Rand loader mechanic. It provides necessary servicing and adjustment procedures for the Ingersoll Rand loader 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 loader has had service or repair:

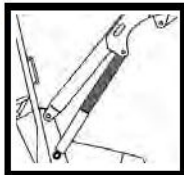
1. Check that ROPS mounting hardware is tightened and is Ingersoll Rand approved.



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



3. Check lift arm support device, replace if damaged.



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



5. Foot pedal must return to neutral.



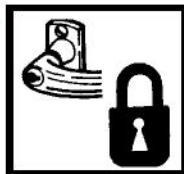
6. Check for correct function of the work lights



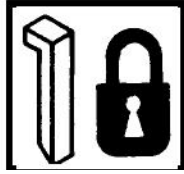
7. The parking brake must function correctly.



8. Enclosure door latches must open and close freely.



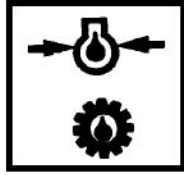
9. Bob-Tach wedges and linkages must function correctly and be in good condition.



10. Safety treads must be in good condition.



11. Check for correct function of indicator lamps (Optional on some models).



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



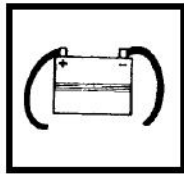
13. Inspect for fuel, oil or hydraulic fluid leaks.



14. Lubricate the loader backhoe.



15. Check the condition of the battery and cables.

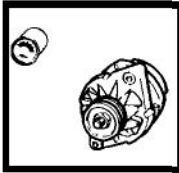


16. Inspect the air cleaner for damage or leaks. Check the condition of the element.



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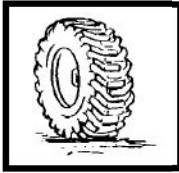
17. Check the electrical charging system.



20. Operate the loader and check all functions.



18. Check tires for wear and pressure.



21. Check for any field modification not completed.



19. Inspect for loosen or broken parts or connections.



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



**CALIFORNIA
PROPOSITION 65 WARNING**
Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

FIRE PREVENTION

The machines and some attachments have components that are at high temperature under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.

Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it can cause a fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential fire hazard.

The spark arrestor exhaust system (if equipped) is designed to control the emission of hot particles from the engine and exhaust system, but the muffler and the exhaust gases are still hot.

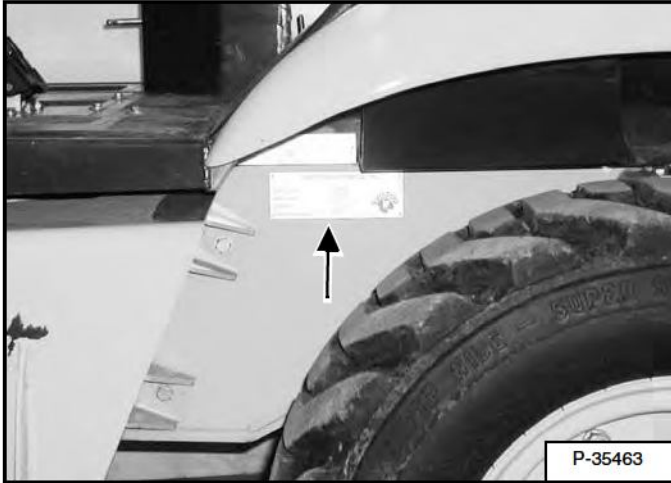
- Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.
- The operator cab, engine compartment and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazards and overheating.
- Check all electrical 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.
- Do not use ether or starting fluids on any engine which has glow plugs. These starting aids can cause explosion and injure you or bystanders.
- Always clean the machine, disconnect the battery, and disconnect the wiring from the electronic controllers before welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the machine 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 Manual for connecting the battery and for jump starting.
- Use the procedure in the Operation & Maintenance Manual for cleaning the spark arrestor muffler (if equipped).
- Know where fire extinguishers and first aid kits are located and how to use them.

SERIAL NUMBER LOCATION

Always use the serial number of the loader backhoe 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.

Loader Backhoe Serial Number

Figure 1



The loader backhoe serial number plate is located under the fender in front of the left rear tire [Figure 1].

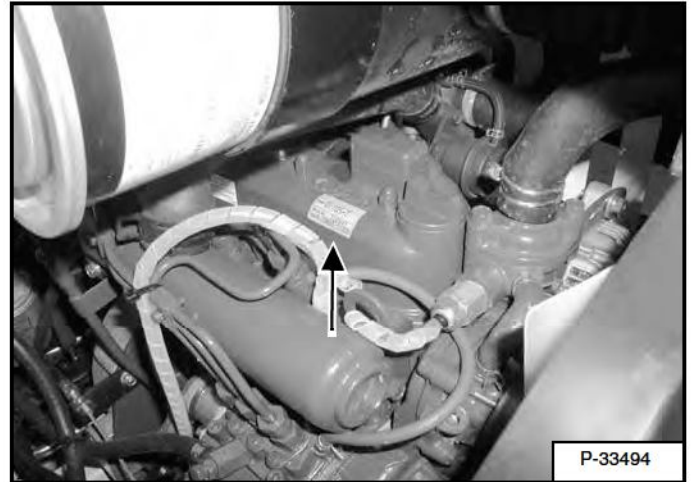
Explanation of loader Serial Number:

XXXX	XXXXX
Model 1.-Model/ Engine Combination	Model 2.-Production Sequence (Series)

1. The four digit Model/Engine Combination Module number identifies the model number and engine combination.
2. The five digit Production Sequence Number identifies the order which the loader is produced.

Engine Serial Number

Figure 2



The engine serial number is located on the valve cover at the right side of the engine [Figure 2].

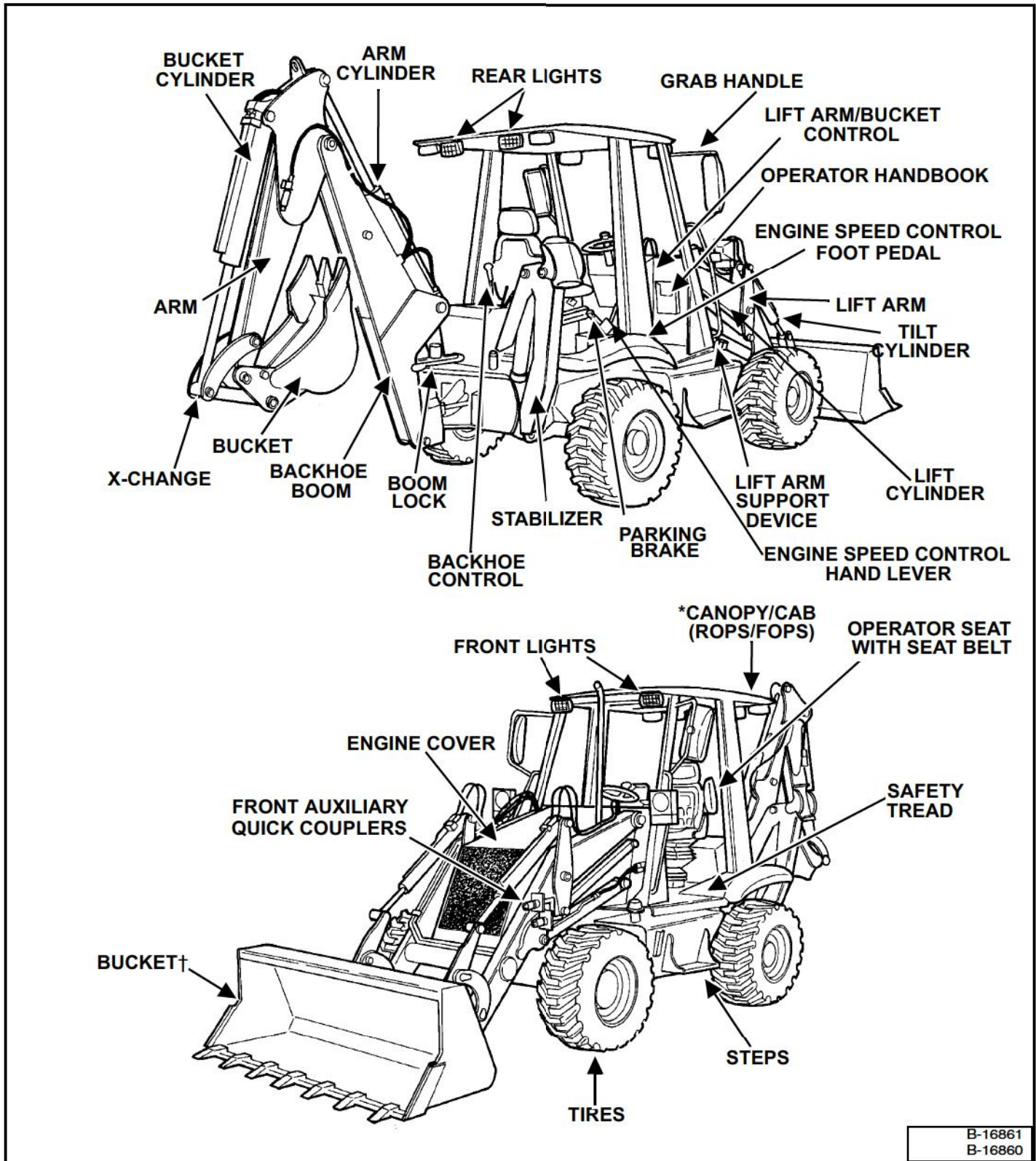
DELIVERY REPORT

Figure 3

The Delivery Report must be filled out by the dealer and signed by the owner or operator when the Ingersoll Rand loader backhoe is delivered. An explanation of the form must be given to the owner. Make sure it is filled out completely [Figure 3].

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INGERSOLL RAND LOADER IDENTIFICATION



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† BUCKET - Several different buckets and other attachments are available for the Ingersoll Rand loader backhoe.

* ROPS, FOPS - Roll Over Protective Structure, Falling Object Protective Structure, per SAE j1040 and ISO 3471 and Falling Object Protective Structure per SAE J1043 and ISO 3449, Level 1.

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LIFTING AND BLOCKING THE LOADER BACKHOE

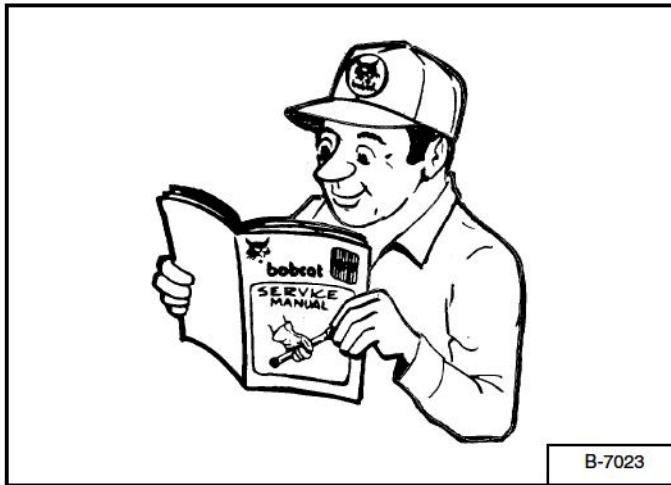
Procedure



Instructions are necessary before operating or servicing machine. Read and understand the 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. Untrained operators and failure to follow instructions can cause injury or death.

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Figure 10-10-1



Read the removal and installation, disassembly and assembly, etc., completely to become familiar with the procedure before beginning [Figure 10-10-1].

Always park the loader backhoe on a level surface.

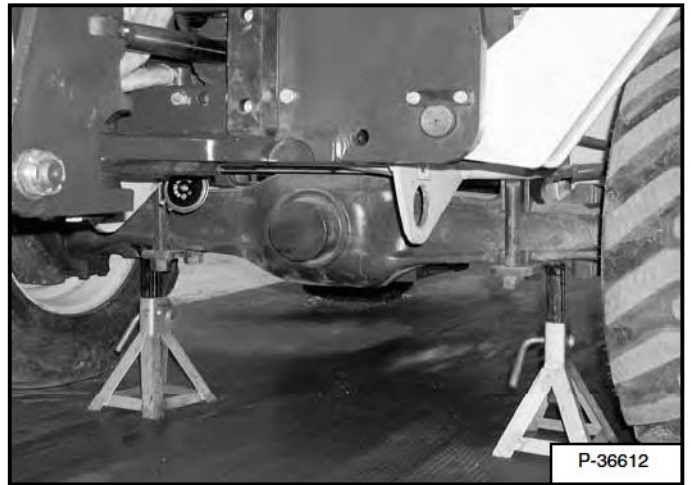
Stop the engine, and engage the parking brake.



Put jackstands under the front and rear axle before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

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Figure 10-10-2



Lift the rear of the loader backhoe and install jackstands [Figure 10-10-2].

Figure 10-10-3



NOTE: Loader lift arms are raised for photo clarity.

Lift the front of the loader backhoe and put jackstands under the axle [Figure 10-10-3].

Note: Make sure the jackstands do not touch the tires.

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LIFT ARM SUPPORT DEVICE

Installing The Lift Arm Support Device

Maintenance and service work can be done with the lift arms lowered. If the lift arms are raised, use the following procedures to install and remove the approved lift arm support device:



Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

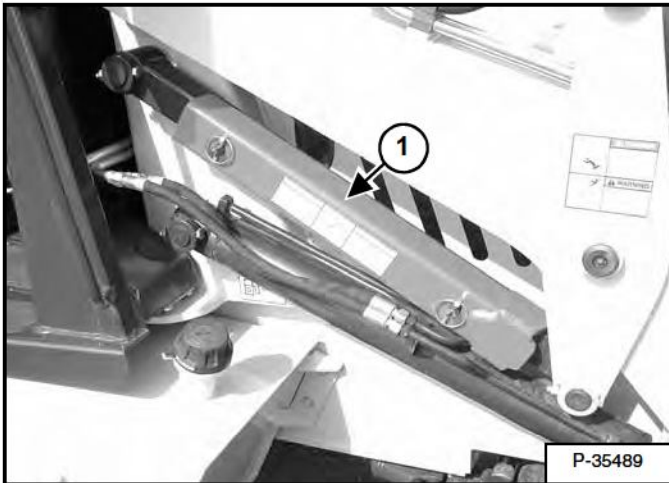
W-2059-0598



Service lift arm support device if damaged or if parts are missing. Using a damaged lift arm support or with missing parts can cause lift arms to drop causing injury or death.

W-2271-1197

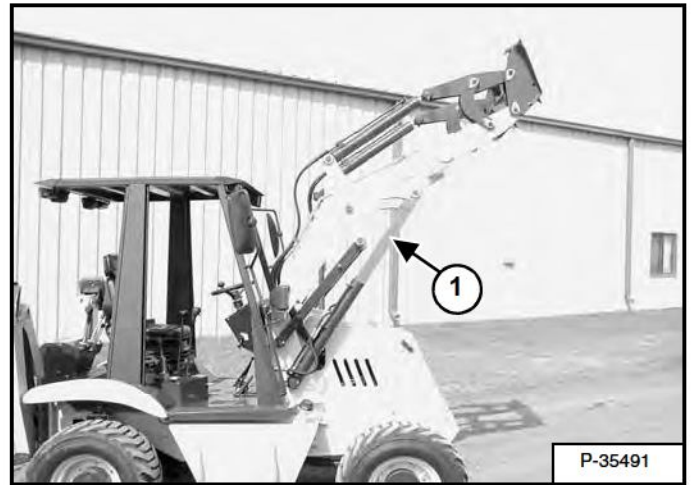
Figure 10-20-1



Remove the approved lift arm support device (Item 1) [Figure 10-20-1] from the storage position.

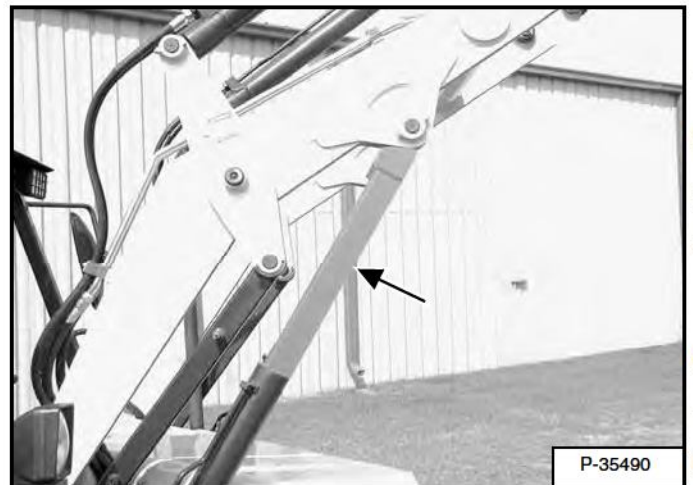
With the operator in the seat, fasten seat belt and engage the parking brake. Start the engine and raise the lift arms. After the lift arms are raised fully, stop the engine.

Figure 10-20-2



Install the lift arm support device (Item 1) [Figure 10-20-2] over the lift cylinder rod.

Figure 10-20-3



Start the engine and lower the lift arms slowly until the support device is held securely [Figure 10-20-3].

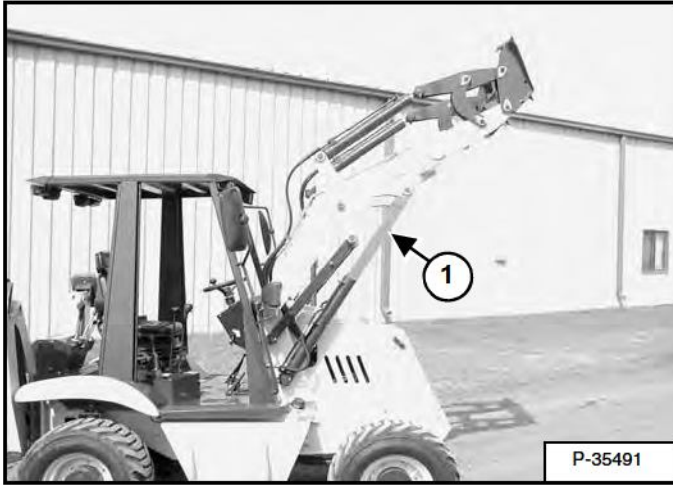
Stop the engine.

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LIFT ARM SUPPORT DEVICE (CONT'D)

Removing The Lift Arm Support Device

Figure 10-20-4

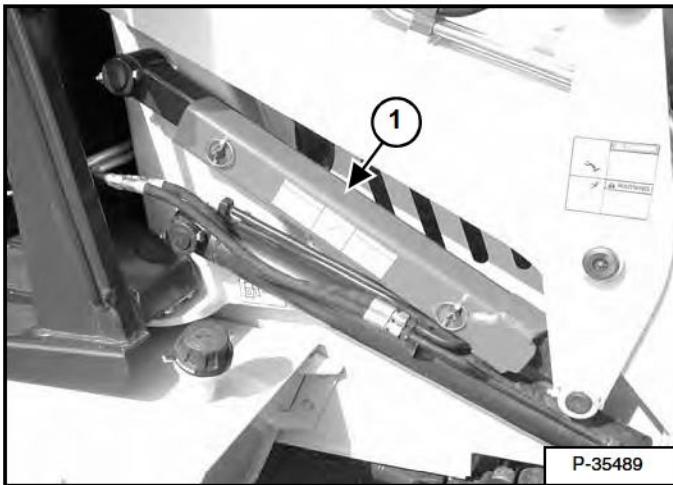


With the operator in the seat, seat belt fastened and the parking brake engaged, start the engine and raise the lift arms. After the lift arms are raised fully, stop the engine.

Remove the approved lift arm support device (Item 1) [Figure 10-20-4].

Start the engine and lower the lift arms fully.

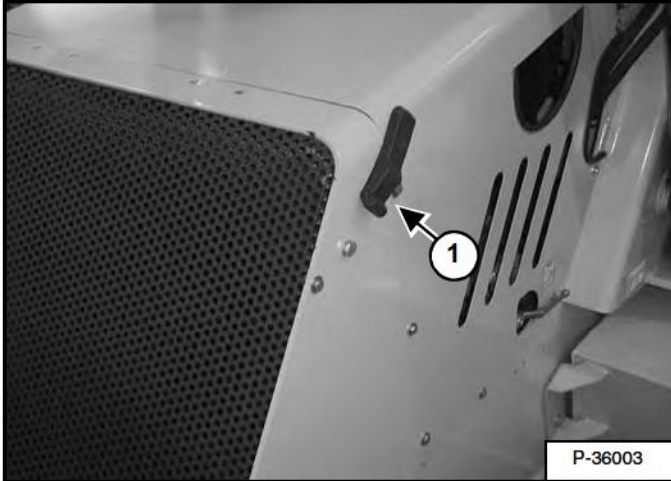
Figure 10-20-5



Put the lift arm support (Item 1) [Figure 10-20-5] in the storage position.

ENGINE COVER

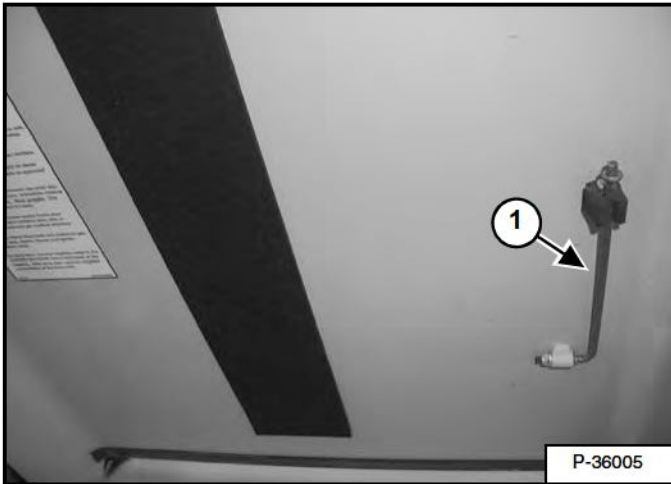
Figure 10-30-1



Open the latch (Item 1) [Figure 10-30-1] on each side of the engine cover.

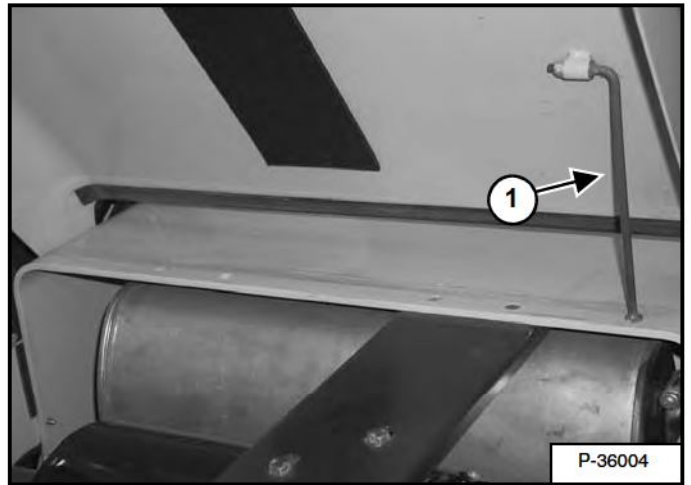
Raise the engine cover.

Figure 10-30-2



Remove the engine cover support rod (Item 1) [Figure 10-30-2] from the storage position.

Figure 10-30-3



Place the end of the support rod (Item 1) [Figure 10-30-3] into the hole located on the hood to hold the engine cover open.

TRANSPORTING THE LOADER BACKHOE

Procedure

WARNING

Adequately designed ramps of sufficient strength are needed to support the weight of the machine when loading onto a transport vehicle. Wood ramps can break and cause personal injury.

W-2058-0494

Figure 10-40-1



Be sure the transport and towing vehicles are of adequate size and capacity. (See Contents, Page SPEC-01 for weight of the loader backhoe.)

The rear of the trailer must be blocked or supported (Item 1) [Figure 10-40-1] when loading or unloading the loader backhoe to prevent the front end of the trailer from raising up.

Figure 10-40-2



Figure 10-40-3



Figure 10-40-4



Use the following procedure to fasten the loader backhoe to the transport vehicle to prevent the loader backhoe from moving during sudden stops or when going up or down slopes.

- Lower the loader bucket.
- Lower the backhoe bucket.
- Stop the engine.
- Engage the parking brake.
- Install chains at the rear of the machine [Figure 10-40-2] front of the machine [Figure 10-40-3] and the backhoe [Figure 10-40-4].
- Fasten each end of the chain to the transport vehicle

For height restrictions when transporting the loader backhoe on a trailer, the backhoe boom lock **must not** be engaged. The backhoe boom **must** be lowered onto the trailer bed and chained.

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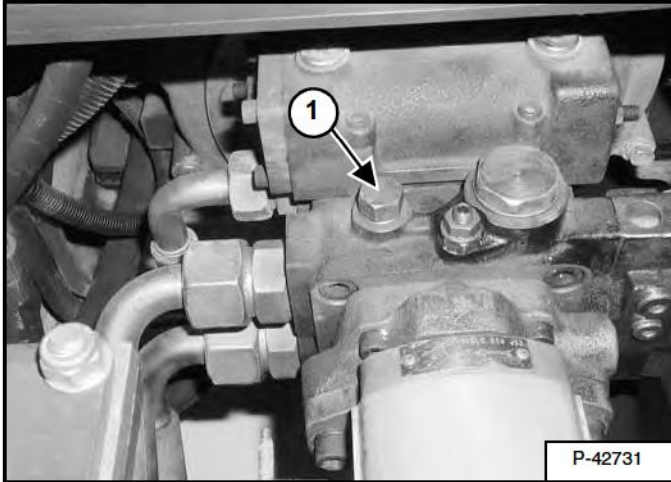
TOWING THE LOADER BACKHOE

Procedure

Place blocks in front and behind rear wheels.

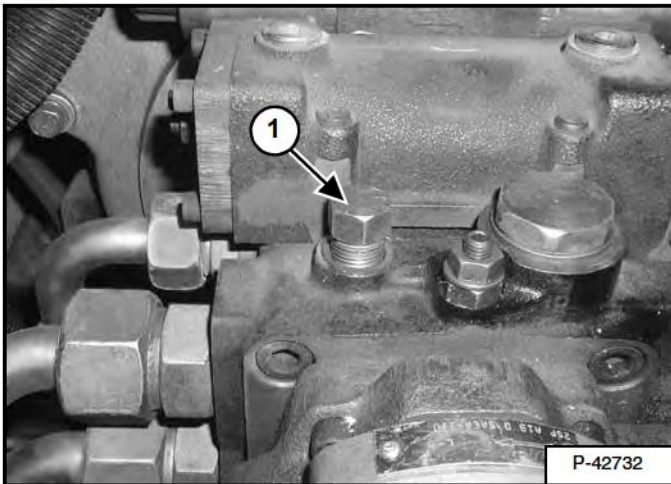
Remove the front floor panel. (See page 50-01.)

Figure 10-50-1



Loosen the tow valve (Item 1) [Figure 10-50-1].

Figure 10-50-2



Rotate the tow valve (Item 1) [Figure 10-50-2] counterclockwise approximately three turns.

To prevent damage to the loader backhoe hydrostatic system, the loader backhoe must be towed only a short distance at a low speed. (Example: Moving the loader backhoe onto a transport vehicle.)

The towing chain (or cable) must be rated at 1-1/2 times the weight of the loader. (See Contents, Page SPEC-01.)

AXLE TOE-IN

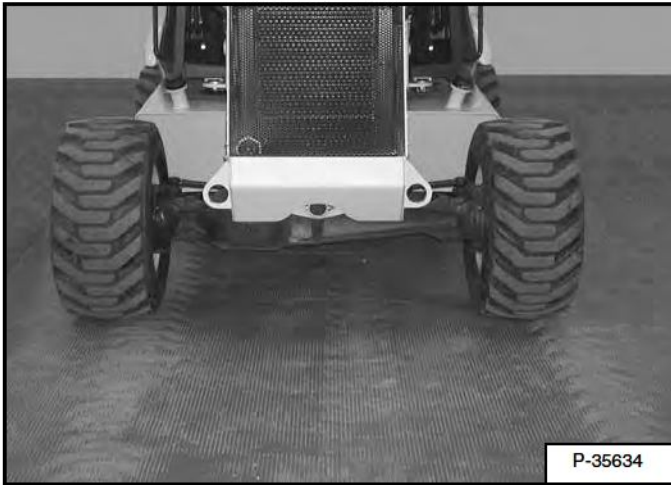
Adjustment

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 10-60-1



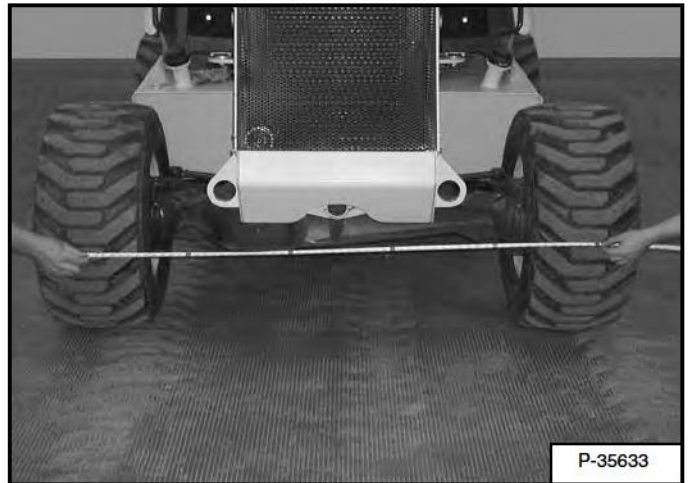
Turn the steering wheel until the front wheels are positioned as shown [Figure 10-60-1].

Figure 10-60-2



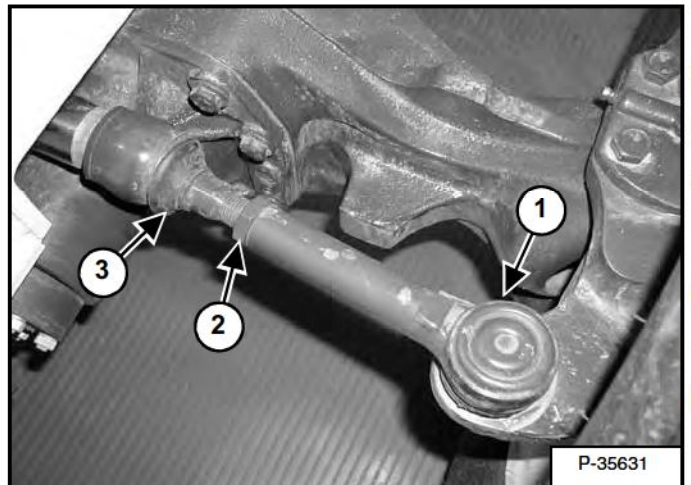
Measure the exposed part of the cylinder rod on each side of the steering cylinder housing making sure they are the same length [Figure 10-60-2].

Figure 10-60-3



Measure the distance between the centerlines on the front of the tires and compare it to the measurement taken from the centerlines on the backside of the tires [Figure 10-60-3]. The measurement must be equal.

Figure 10-60-4




If measurement is not the same, adjust both tie rod ends (Item 1) [Figure 10-60-4] by loosening both jam nuts (Item 2) [Figure 10-60-4], loosen or tighten the track rod (Item 3) [Figure 10-60-4] of both tie rods until the measurement is the same.

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SERVICE SCHEDULE

Chart

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 Ingersoll Rand loader backhoe.



WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual 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-2003-1285

SERVICE SCHEDULE		HOURS					
ITEM	SERVICE REQUIRED	8-10	50	100	250	500	■ 1000
Engine Oil	Check the engine oil level and add as needed.						
Hydraulic Fluid	Check fluid level and add as needed.						
Fuel Filter	Remove trapped water.						
Engine Air System	Check for leaks and damaged components.						
Engine Cooling System	Clean debris from oil cooler, radiator & grill. Check coolant level.						
Lift Arms, Cyl., Bob-Tach Pivot Pins, Wedges, Etc.	Lubricate with multi-purpose lithium based grease.						
Tires	Check for correct size, damaged tires and correct air pressure.						
Seat Belt, Seat Belt Retractors	Check the condition of seat belt. Clean or replace seat belt retractors as needed.						
Mirrors	Clean, adjust, replace if damaged						
Steering Valve	Check and set steering as required.						
Safety Signs and Safety Treads	Check for damaged signs (decals) and safety treads. Replace any signs or safety treads that are damaged or worn.						
Operator Cab	Check the fastening bolts, washers and nuts. Check the condition of the cab.						
Indicators and Lights	Check for correct operation of all indicators and lights.						
Neutral Start System	Check for proper function						
Parking Brake	Check operation, adjust as required.						
Backup Alarm	Check operation. Repair or replace as required.						
Hydraulic Fluid, Hoses and Tubelines	Check fluid level & add as needed. Check for damage & leaks. Repair or replace as needed.						
Front and Rear Differential	Check oil level. Add oil as needed.						
Wheel Nuts	Check for loose wheel nuts and tighten to 140 ft.-lbs.	☐					
Battery	Check cables, connections and electrolyte level. Add distilled water as needed.						
Spark Arrestor Muffler	Empty the spark chamber (if equipped).						
Alternator/Fan Belt	Check tension and adjust as needed.		*				
Fuel Filter	Replace the filter element.		●				
Engine Oil and Filter	Replace oil & filter. Use CD or better grade oil and Ingersoll Rand filter.		†				
Hydraulic Oil Filter	Replace the filter element.						
Engine Air Filter	Replace the air filter element.		#				
Engine Cooling System	Flush cooling system and add new coolant.						
Hydraulic Reservoir	Replace the fluid and the filter.						
Differential Oil	Replace the differential oil.						

- ☐ Check wheel nut torque every 8 hours for the first 24 hours.
- * Inspect the new belt after first 50 hours.
- Also replace hydraulic/hydrostatic filter element when the transmission warning light comes ON.
- † First oil and filter change must occur at 50 hours; 250 hours thereafter.
- # After the first 500 hours on new engine, adjust engine valves; 1000 hours thereafter. (See Service Manual for procedure.)
- Or every 12 months.

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AIR CLEANER SERVICE

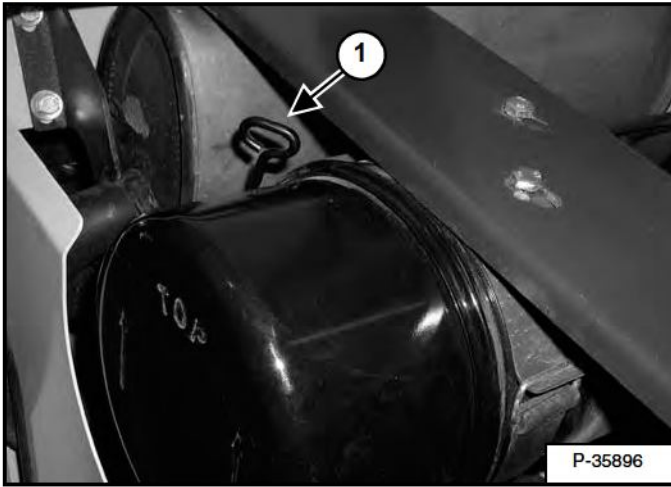
Replacing Filter Element

See Contents, Page 10-01 for the correct service interval.

Raise the lift arms and install an approved lift arm support device. (See Contents, Page 10-01.)

Open the engine cover. (See Contents, Page 10-01.)

Figure 10-80-1



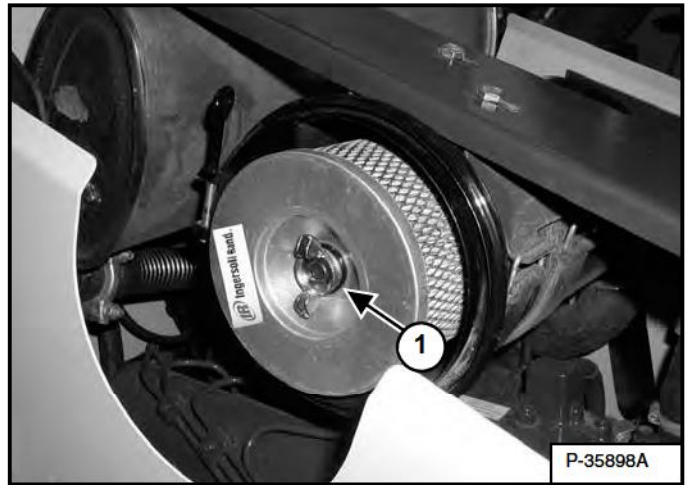
Loosen the cover clamp (Item 1) [Figure 10-80-1]

Figure 10-80-2



Remove the cover [Figure 10-80-2].

Figure 10-80-3



Loosen and remove the screw (Item 1) [Figure 10-80-3].

Figure 10-80-4



Remove the filter element [Figure 10-80-4].

NOTE: Make sure all sealing surfaces are free of dirt and debris.

Install a new element into the housing cover.

Install filter cover [Figure 10-80-2].

Tighten the filter cover clamp (Item 1) [Figure 10-80-1].

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ENGINE COOLING SYSTEM

Coolant Replacement

See Contents, Page 10-01 for the correct service intervals.



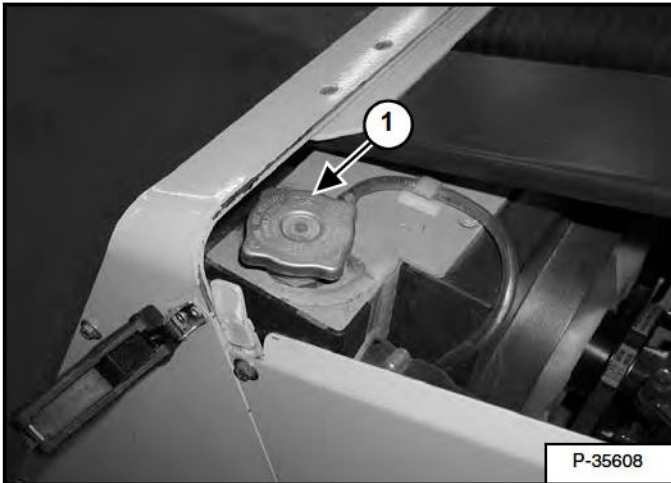
Do not remove radiator cap when the engine is hot. You can be seriously burned.

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Raise the lift arms and install an approved lift arm support device. (See Contents, Page 10-01.)

Stop the engine, engage the parking brake and open the engine cover.

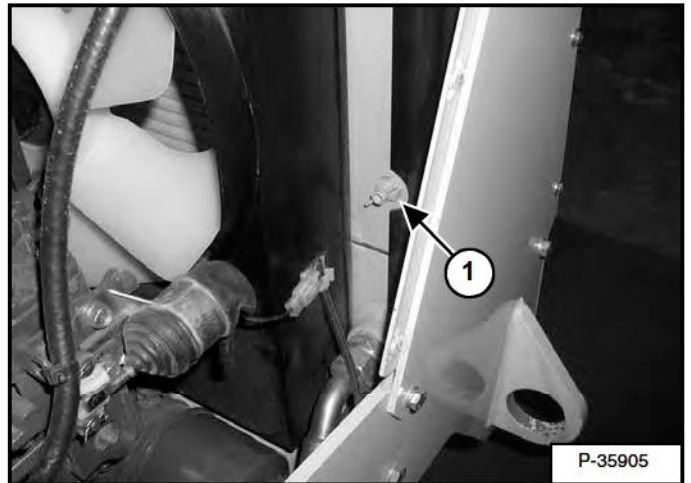
Figure 10-90-1



When the engine is cool, loosen and remove the radiator cap (Item 1) [Figure 10-90-1].

Remove the engine side covers.

Figure 10-90-2



Open the radiator drain valve (Item 1) [Figure 10-90-2] at bottom of radiator. Drain the coolant into a container.

After all the coolant is removed, close both drain valves.

Recycle or dispose of coolant in an environmentally safe manner.

Mix the coolant in a separate container. (See Contents, Page SPEC-01, for correct capacity.)

NOTE: The loader backhoe is factory filled with ethylene glycol. DO NOT mix propylene glycol with ethylene glycol.

Add premixed coolant; 50% water and 50% ethylene glycol to the recovery tank if the coolant level is low.

One gallon and one pint of ethylene glycol mixed with one gallon of water is the correct mixture of coolant to provide a -34°F (-37°C) freeze protection.

Use a refractometer to check the condition of ethylene glycol in your cooling system.

Fill the radiator with the premixed coolant until it is 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.

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FUEL SYSTEM

Fuel Specifications

Use only clean, high quality diesel fuel, Grade No. 2 or Grade No. 1.

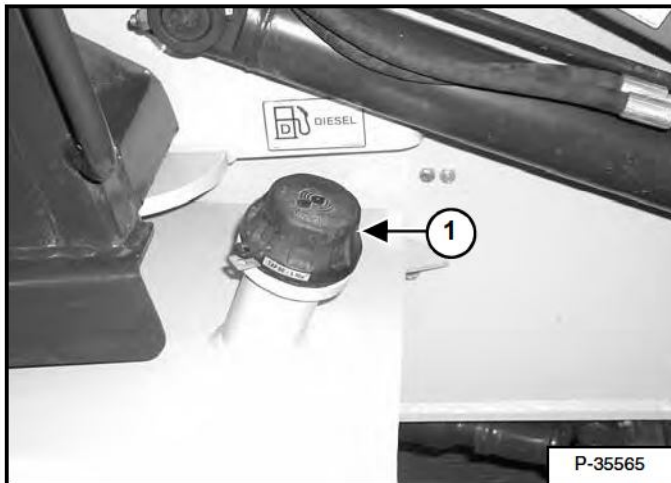
The following is one suggested blending guideline which should prevent fuel gelling during cold temperatures:

TEMP. F° (C°)	NO. 2	NO. 1
+15° (9°)	100%	0%
Down to -20° (-29°)	50%	50%
Below -20° (-29°)	0%	100%

Contact your fuel supplier for local recommendations.

Filling The Fuel Tank

Figure 10-100-1



Remove the fuel fill cap (Item 1) [Figure 10-100-1].

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.

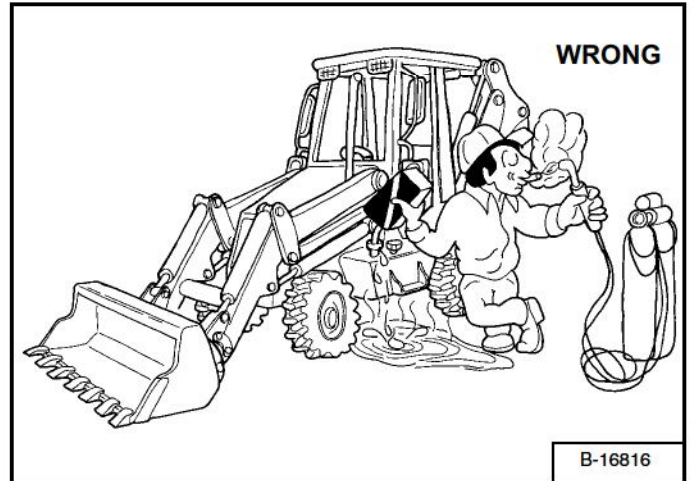
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WARNING

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

W-2063-0887

Figure 10-100-2



Use a clean, approved safety container to add fuel of the correct specifications. Add fuel only in an area that has free movement of air and no open flames or sparks. **NO SMOKING!** [Figure 10-100-2].

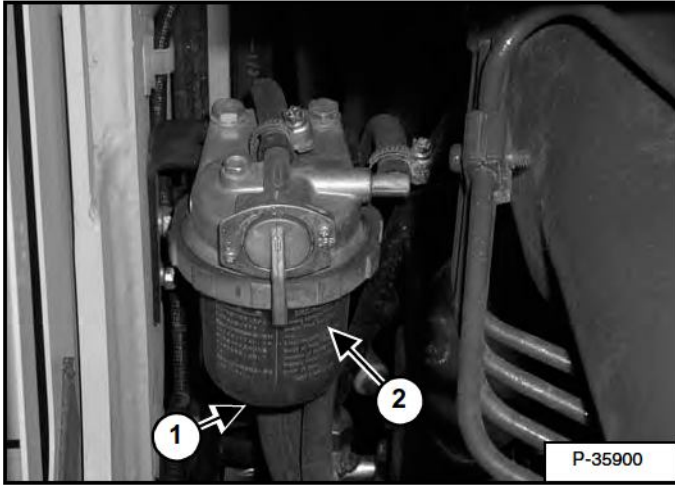
Install and tighten the fuel fill cap (Item 1) [Figure 10-100-1].

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FUEL SYSTEM (CONT'D)

Fuel Filter

Figure 10-100-3



Raise the lift arms and install an approved lift arm support device. (See Contents, Page 10-01.)

See Contents, Page 10-01 for the service interval for removing water from, or replacing the fuel filter.

Open the engine cover.

Removing Water

Loosen the drain (Item 1) [Figure 10-100-3] at the bottom of the filter element to remove water from the filter.

Replacing Element

Remove the filter element (Item 1) [Figure 10-100-3].

Clean the area around the filter housing. Put clean oil on the seal of the new filter element. Install the fuel filter, and hand tighten.

! WARNING

Diesel fuel or hydraulic fluid under pressure can penetrate skin or eyes, causing serious injury or death. Fluid leaks under pressure may not be visible. Use a piece of cardboard or wood to find leaks. Do not use your bare hand. Wear safety goggles. If fluid enters skin or eyes, get immediate medical attention from a physician familiar with this injury.

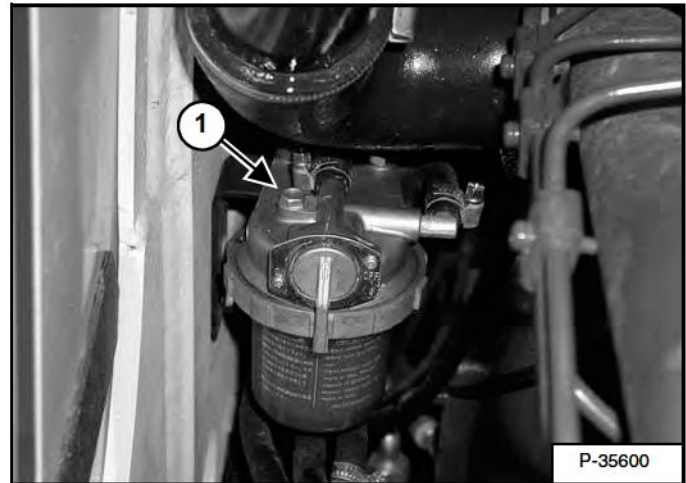
W-2072-0496

! 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

Figure 10-100-4



Remove the air from the fuel system [Figure 10-100-4].

After replacing the filter element or when the fuel tank has run out of fuel, the air must be removed from the fuel system before starting the engine.

Open the vent (Item 1) [Figure 10-100-4] on the fuel filter housing.

Turn the engine over with the starter until fuel flows from the vent with no air bubbles.

Close the vent (Item 1) [Figure 10-100-4].

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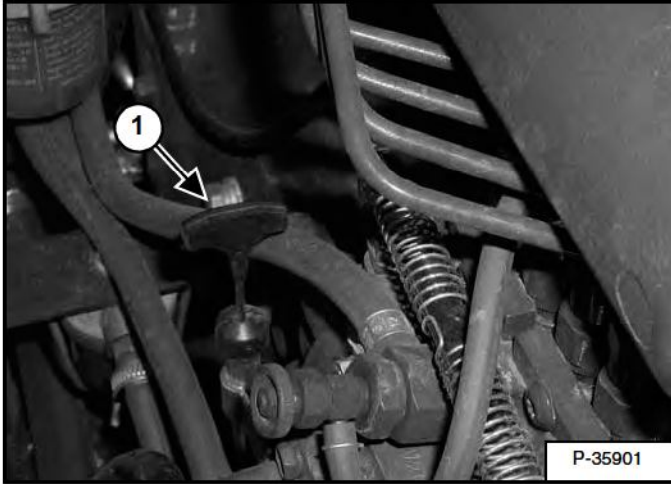
Thank you so much for reading

ENGINE LUBRICATION SYSTEM

Checking Engine Oil

Check the engine oil level every day before starting the engine for the work shift.

Figure 10-110-1



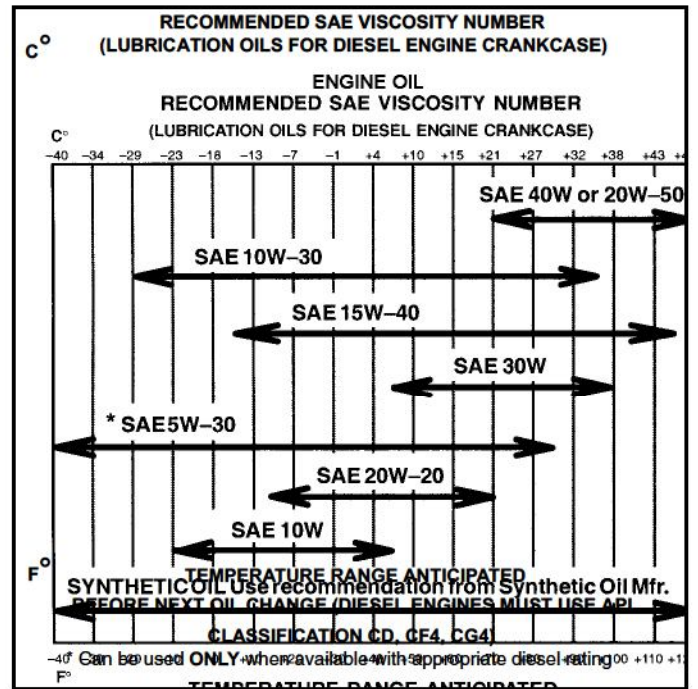
Open the engine cover and remove the dipstick (Item 1) [Figure 10-110-1].

Keep the oil level between the marks on the dipstick.

Engine oil is also used to provide engine cooling. Check oil level every day for correct engine lubrication and cooling.

Use a good quality motor oil that meets API Service Classification of CD or better. (See Oil Chart on Page 1.)

Oil Chart



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