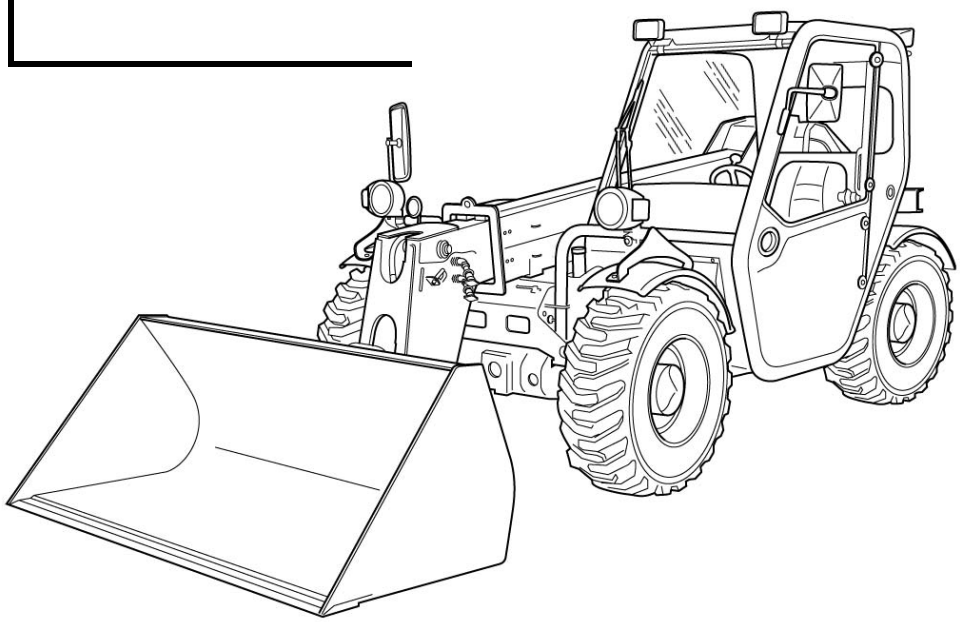
T2250

S/N A859 11001 & Above

Bobcat®

SERVICE MANUAL



6986740-EN (07-08)

Bobcat

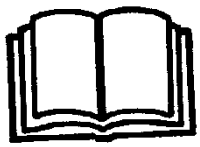
Printed in Europe

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

CORRECT

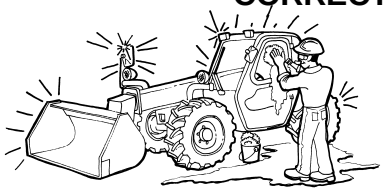


B-10731a

Never service the Bobcat Telescopic Handler without instructions.

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

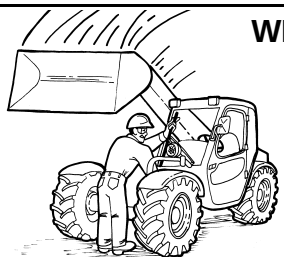
CORRECT



B-16082

Cleaning and maintenance are required daily.

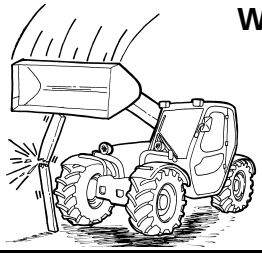
WRONG



B-16080

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

WRONG

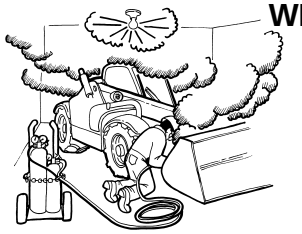


B-16079

Never work on Telescopic Handler with boom up unless boom is held by an approved boom stop. Replace if damaged.

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

WRONG



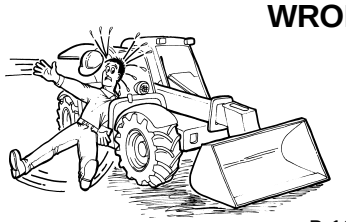
B-16081

Have good ventilation when welding or grinding painted parts.

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

Avoid exhaust fume leaks which can kill without warning. Exhaust system must be tightly sealed.

WRONG



B-16078

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.

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.**

MSW12-0805

ALPHABETICAL INDEX

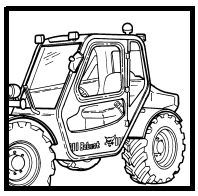
CONTENTS

FOREWORD

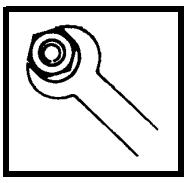
This manual is for the Bobcat Telescopic Handler mechanic. It provides necessary servicing and adjustment procedures for the Bobcat Telescopic Handler and its component parts and systems. Refer to the Operation & Maintenance Manual for operating instructions, starting procedure, daily checks, etc.

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

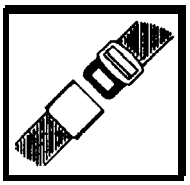
1. Check that ROPS/FOPS (including right side window) is in good condition and is not modified.



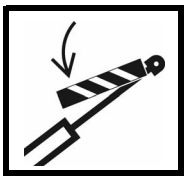
2. Check that ROPS mounting hardware is tightened and is Bobcat approved.



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

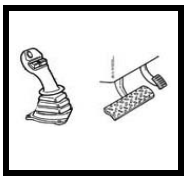


4. Check boom stop, replace if damaged.

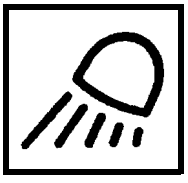


5. Machine signs (decals) must be legible and in the correct location.

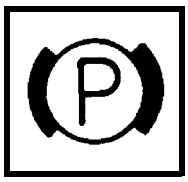
6. Joystick control lever and foot pedals must return to neutral.



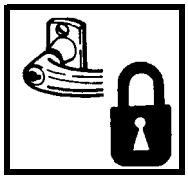
7. Check for correct function of the work lights.



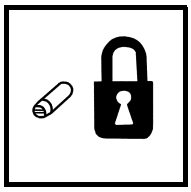
8. The parking brake must function correctly.



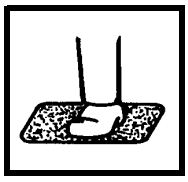
9. Enclosure door latches must open and close freely.



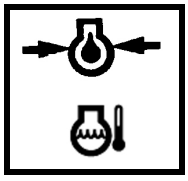
10. Attachment locking pins must function correctly and be in good condition. Bob-Tach wedges and linkages (if equipped) must function correctly and be in good condition.



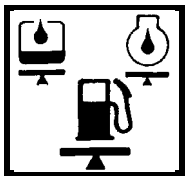
11. Safety treads must be in good condition.



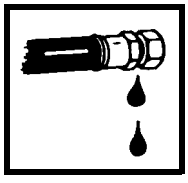
12. Check for correct function of indicator lamps and gauges.



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

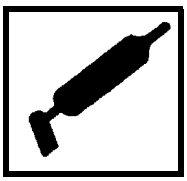


14. Inspect for fuel, oil or hydraulic fluid leaks.

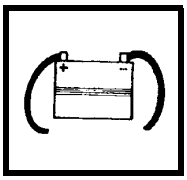


FW VH-0308 SM

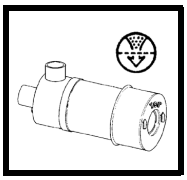
15. Lubricate the Telescopic Handler.



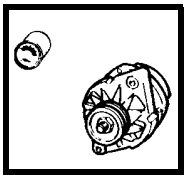
16. Check the condition of the battery and cables.



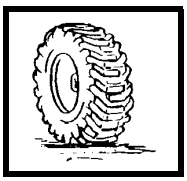
17. Inspect the air cleaner for damage or leaks. Check the condition of the element.



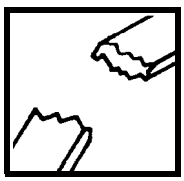
18. Check the electrical charging system.



19. Check tires for wear and pressure. Use only approved tires.

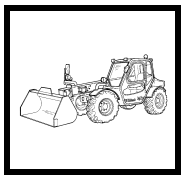


20. Inspect for loose or broken parts or connections.



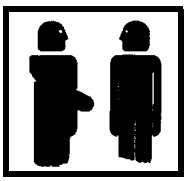
21. Check for any field modification not completed.

22. Operate the machine and check all functions.



23. Check function or condition of all equipped options and accessories (examples: back-up alarm, fire extinguisher, rotating beacon, front stabilizers, etc.).

24. 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.

FW VH-0308 SM

Safety Alert Symbol

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

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

IMPORTANT

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

I-2019-0284

DANGER

The signal word DANGER on the machine and in the manuals indicates a hazardous situation which, if not avoided, will result in death or serious injury.

D-1002-1107

WARNING

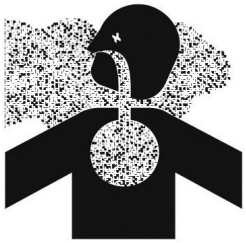
The signal word WARNING on the machine and in the manuals indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

W-2044-1107

The following publications provide information on the safe use and maintenance of the Bobcat machine 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 machine or attachment contains operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Machine signs (decals) instruct on the safe operation and care of your Bobcat machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat dealer.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.

The dealer and owner / operator review the recommended uses of the product when delivered. If the owner / operator will be using the machine for a different application(s) he or she must ask the dealer for recommendations on the new use.



Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust.

SI VH-0308 SM

FIRE PREVENTION

Maintenance

The machine and some attachments have components that are at high temperatures 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 operator's area, engine compartment and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazards and overheating.

All fuels, most lubricants and some coolants mixtures are flammable. Flammable fluids that are leaking or spilled onto hot surfaces or onto electrical components can cause a fire.

Operation

Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.

Electrical

Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part or wires that are loose or frayed.

Battery gas can explode and cause serious injury. Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting. Do not jump start or charge a frozen or damaged battery. Keep any open flames or sparks away from batteries. Do not smoke in battery charging area.

Hydraulic System

Check hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Hydraulic tubes and hoses must be properly routed and have adequate support and secure clamps. 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.

Fueling

Stop the engine and let it cool before adding fuel. No smoking! Do not refuel a machine near open flames or sparks. Fill the fuel tank outdoors.

Starting

Do not use ether or starting fluids on any engine that has glow plugs. These starting aids can cause explosion and injure you or bystanders.

Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.

SI VH-0308 SM

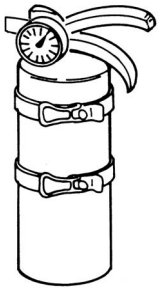
Welding And Grinding

Always clean the machine and attachment, disconnect the battery, and disconnect the wiring from the Bobcat 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.

Dust generated from repairing nonmetallic parts such as hoods, fenders or covers can be flammable or explosive. Repair such components in a well ventilated area away from open flames or sparks.

Fire Extinguishers



Know where fire extinguishers and first aid kits are located and how to use them. Inspect the fire extinguisher and service the fire extinguisher regularly. Obey the recommendations on the instructions plate.

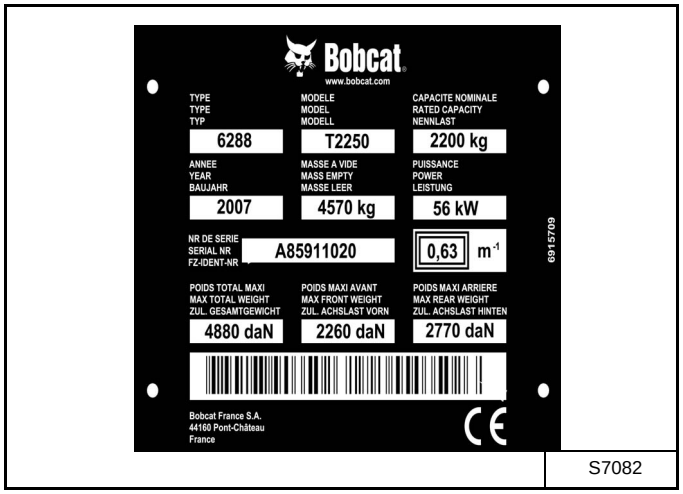
Sl VH-0208

SERIAL NUMBER LOCATION

Always use the serial number of the Telescopic Handler 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.

Figure 1

Figure 2



The Telescopic Handler serial number plate is located on the right front side of the chassis (Item 1) **[Figure 1]** & **[Figure 2]**.

Explanation of Telescopic Handler Serial Number:

XXXX XXXXX

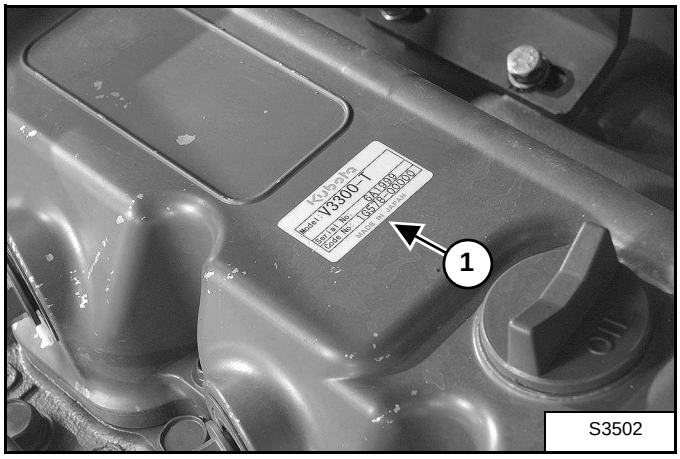
- XXXXX — Module 2. - Production Sequence (Series)
- XXXX — Module 1. - Model/Engine Combination

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 Telescopic Handler is produced.

Engine Serial Number

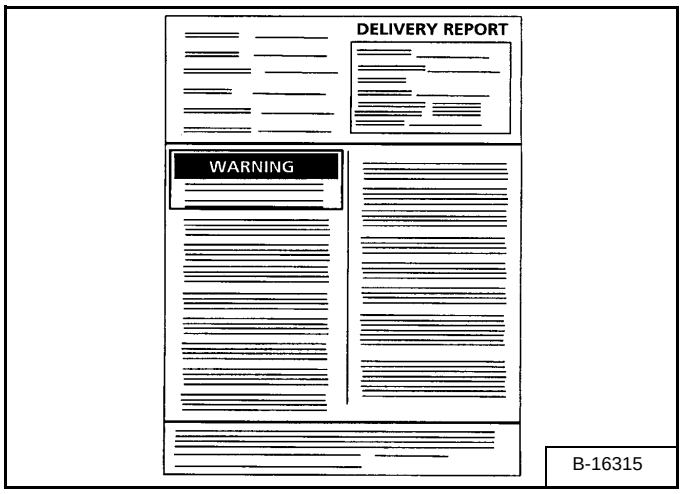
Figure 3



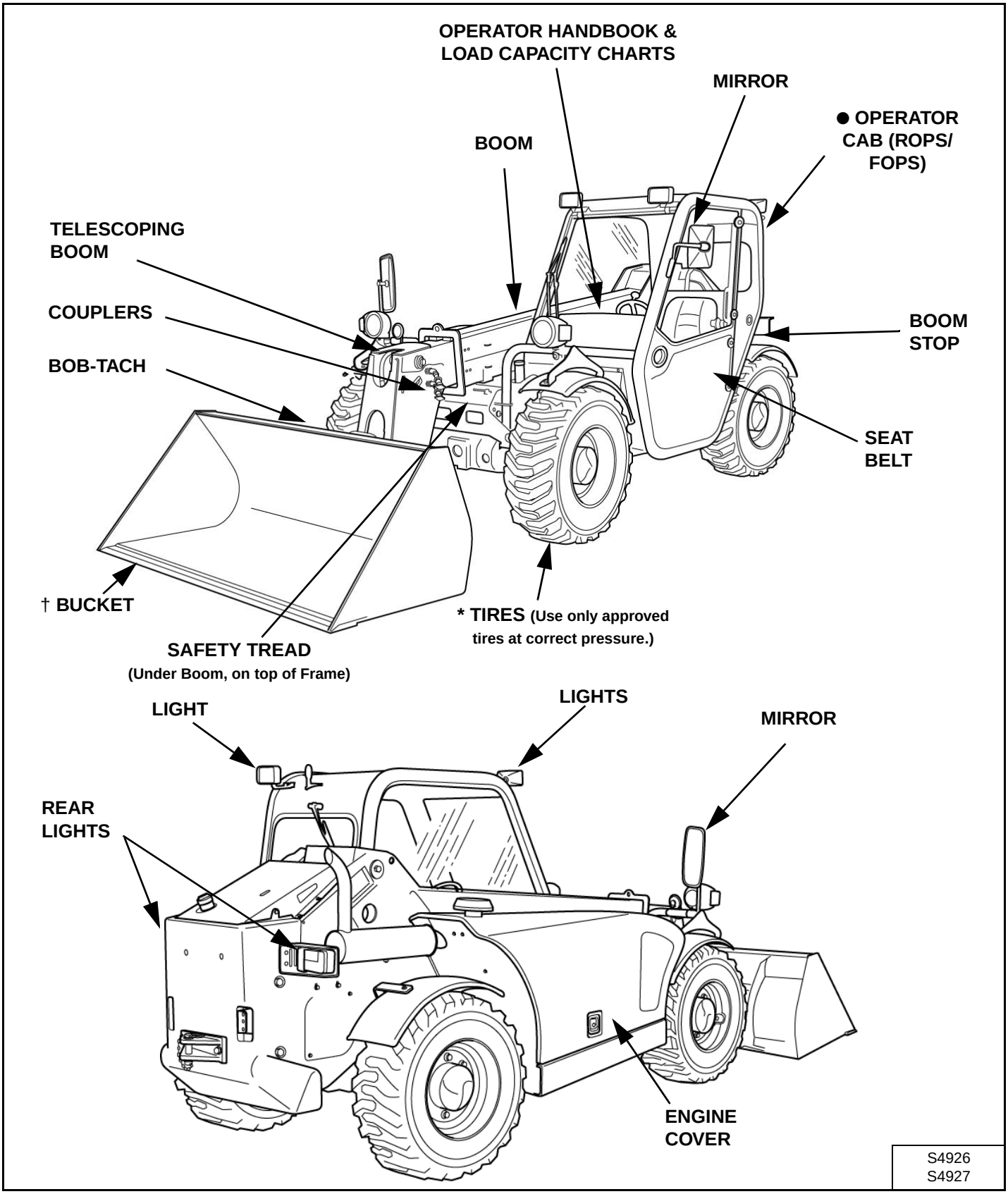
The engine serial number can be found on top of the cylinder block (Item 1) **[Figure 3]**. Always use the full number when ordering replacement parts.

DELIVERY REPORT

Figure 4



The Delivery Report must be filled out by the dealer and signed by the owner or operator when the Telescopic Handler is delivered. An explanation of the form must be given to the owner. Make sure it is filled out completely **[Figure 4]**.



* TIRES - Tires shown may not be standard. The machine is factory equipped with standard tires. Other tires are available.

● ROPS, FOPS - Roll Over Protective Structure, per ISO 3471, and Falling Object Protective Structure, per ISO 3449, Level I. Level II is available.

† Bucket - Many Buckets and other Attachments are available.

Continued On Next Page

LIFTING AND BLOCKING THE TELESCOPIC HANDLER

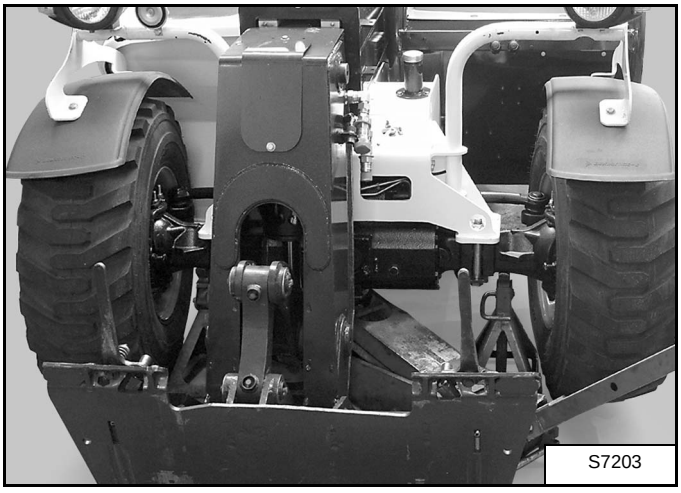
Procedure

⚠ WARNING

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

W-2017-0286

Figure 10-10-1



Always park the machine on a level surface.

STOP the engine. Put the floor jack under the center of the front axle. Lift the Telescopic Handler and install jackstands **[Figure 10-10-1]**.

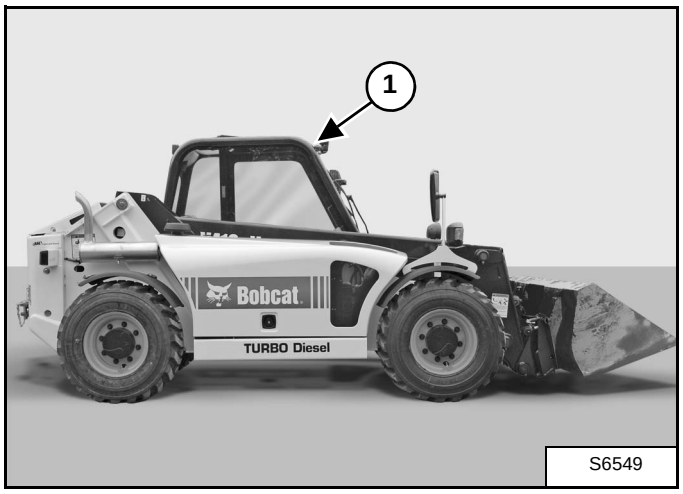
Figure 10-10-2

Put the floor jack under the center of the rear axle. Lift the Telescopic Handler and install jackstands **[Figure 10-10-2]**.


Bobcat®

OPERATOR CAB

Figure 10-20-1



The Telescopic Handler has an operator cab (ROPS and FOPS) (Item 1) **[Figure 10-20-1]** to protect the operator from rollover and falling objects. Check with your dealer if the operator cab has been damaged. Never operate without right window. The seat belt must be worn for roll over protection.

ROPS/FOPS - Roll Over Protective Structure per SAE J1040 and ISO 3471, and Falling Object Protective Structure per SAE J1043 and ISO 3449.

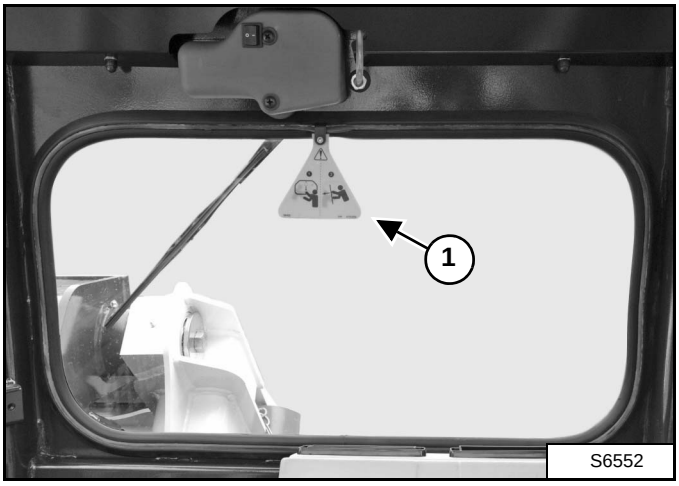
⚠ WARNING

Never modify operator cab or canopy by welding, grinding, drilling holes or adding attachments unless instructed to do so by Bobcat. Do not operate without right window. Changes to the cab or canopy can cause loss of operator protection from rollover and falling objects, and result in serious injury or death.

W-2396-1202

Emergency Exit

Figure 10-20-2



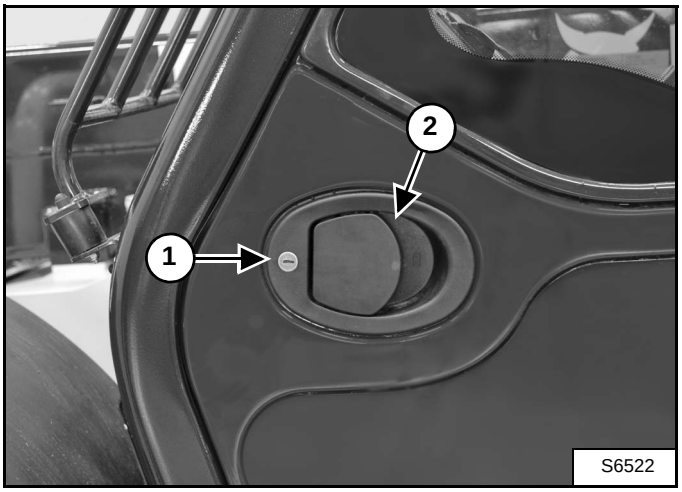
Pull the tag on top of the rear window (Item 1) **[Figure 10-20-2]** to remove the rubber cord.

Push the rear window out of the rear of the operator cab. (Models with enclosed cab only.)

Exit through the rear of the operator cab.

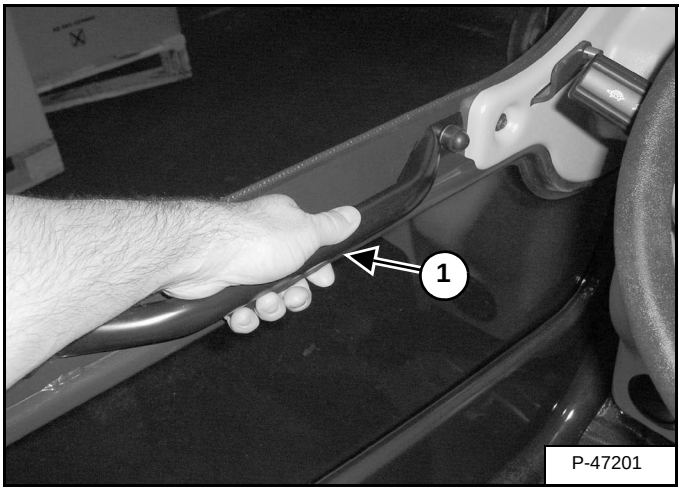
Cab Door

Figure 10-20-3



The cab door can be locked (Item 1) **[Figure 10-20-3]** with the start key.

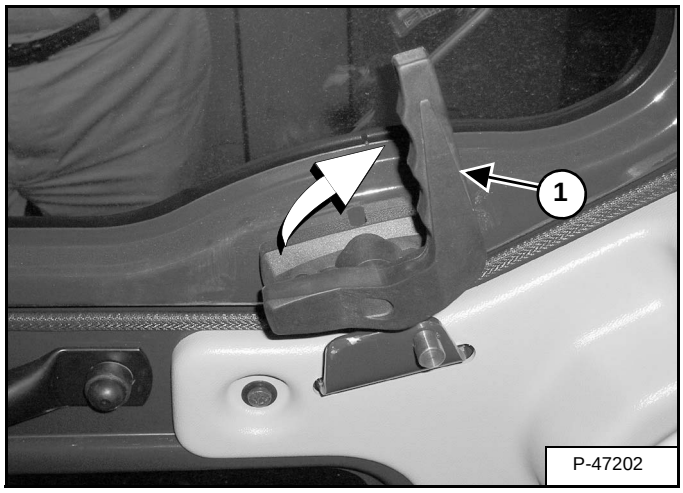
Figure 10-20-4



The cab door can be opened from the outside of the cab using the latch (Item 2) **[Figure 10-20-3]** and from the inside of the cab by squeezing the latch (Item 1) **[Figure 10-20-4]** (as shown).

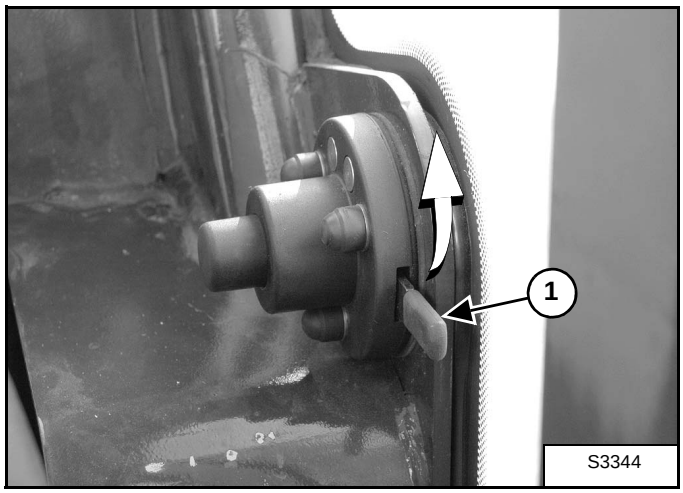
Cab Door Window

Figure 10-20-5



Turn the handle (Item 1) **[Figure 10-20-5]** (as shown). Push the window open fully until it latches against the cab.

Figure 10-20-6



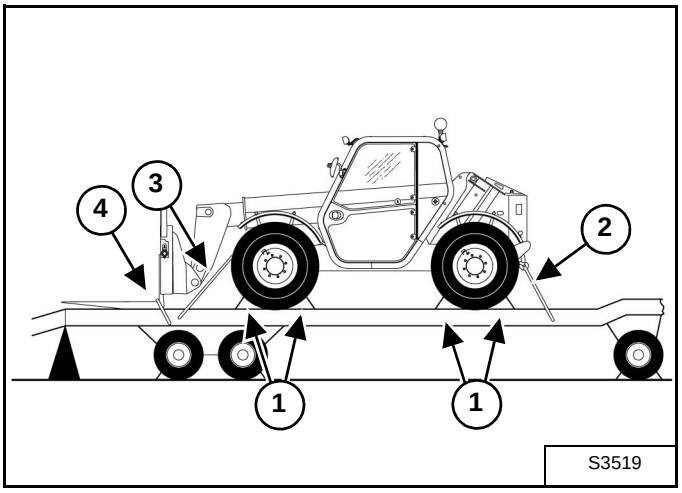
Pull up the lever (Item 1) **[Figure 10-20-6]** inside the cab to disengage the latch and close the window.

TRANSPORTING THE TELESCOPIC HANDLER

Procedure

Always drive the Telescopic Handler backwards (heavy end up) onto the transport vehicle.

Figure 10-30-1



The rear of the trailer must be blocked or supported **[Figure 10-30-1]** when loading or unloading the Telescopic Handler to prevent the front end of the trailer from raising up.

Be sure the transport and towing vehicles are of adequate size and capacity. For the weight of Telescopic Handler, (See TELESCOPIC HANDLER TELESCOPIC TOOL CARRIER (TTC) SPECIFICATIONS on Page SPEC-10-1.) Fasten the Telescopic Handler to the transport vehicle to prevent if from moving during sudden stops or when going up or down slopes.

Block the wheels (Item 1) **[Figure 10-30-1]**.

Fasten the machine frame to the transport vehicle (Items 2 & 3) **[Figure 10-30-1]**.

Attach the forks or bucket attachment to the transport vehicle (Item 4) **[Figure 10-30-1]**.

⚠ WARNING

AVOID SERIOUS INJURY OR DEATH

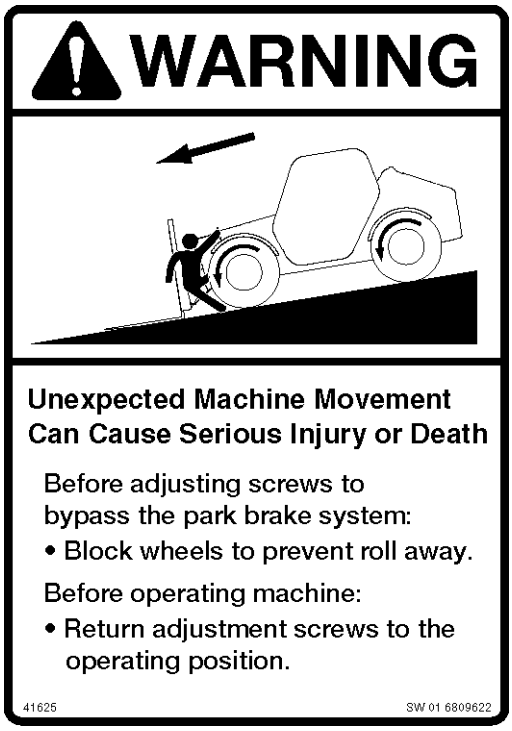
Adequately designed ramps of sufficient strength are needed to support the weight of the machine when loading onto a transport vehicle. Wood ramps can break and cause personal injury.

W-2058-0807


Bobcat®

TOWING THE TELESCOPIC HANDLER

The Telescopic Handler can be towed a short distance such as removing it from mud or loading it onto a transport vehicle.



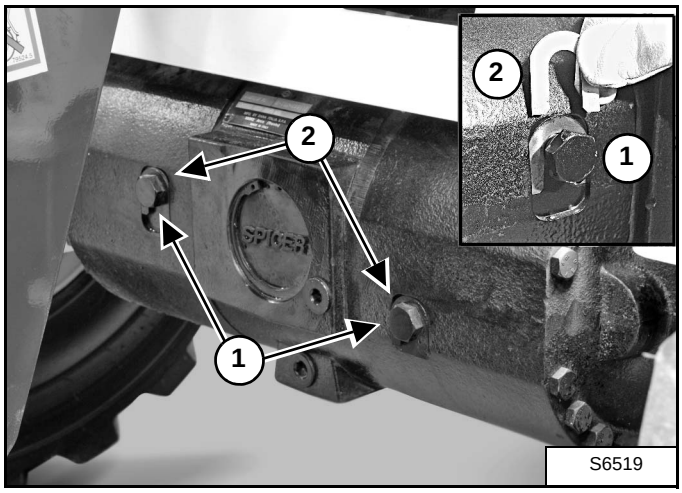
Block the wheels to prevent the machine from rolling.

Releasing The Brake Discs

The brakes are engaged by spring pressure and released by hydraulic pressure. The parking brake must be released manually before towing (if the engine can not be started to release the brakes or there is no hydraulic pressure). Only the front axle has brakes.

The following procedure describes how to release the brakes:

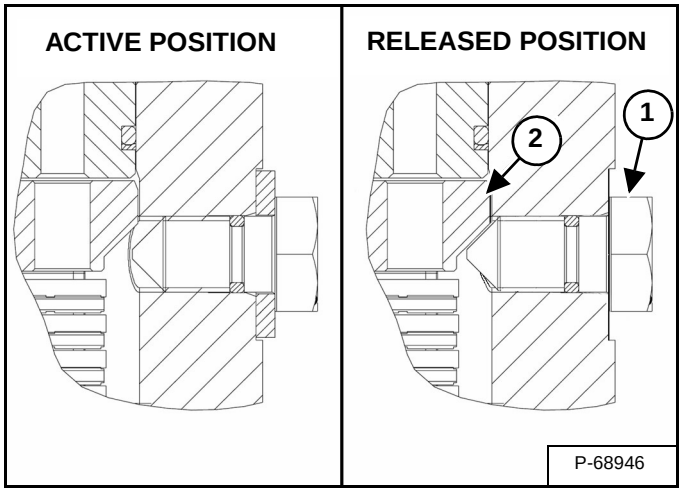
Figure 10-40-1



Loosen the four bolts (Item 1) until the slotted spacers (Item 2) **[Figure 10-40-1]** can be removed from under the bolt heads (the bolts and spacers are located on both the front and rear side of the front axle).

Remove the spacers (Item 2) **[Figure 10-40-1]** and save for reuse.

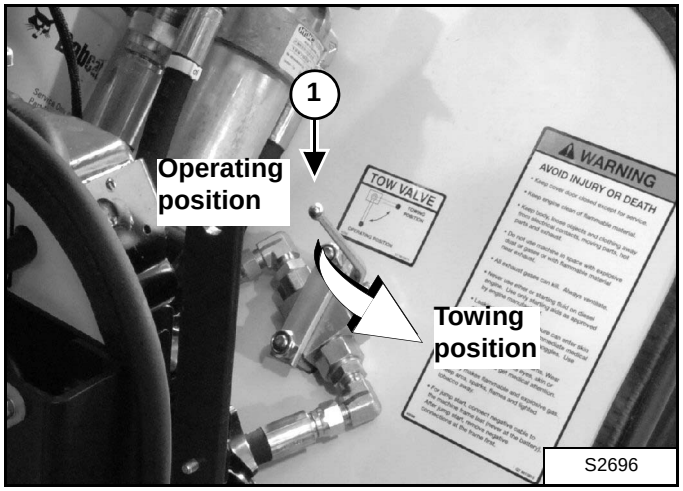
Figure 10-40-2



After removing the spacers, evenly tighten the front and rear bolts (Item 1) to hold the parking brake piston (Item 2) **[Figure 10-40-2]** in the released position.

Towing

Figure 10-40-3

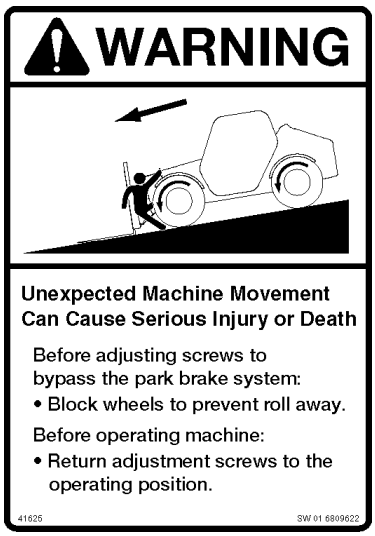


Raise the engine cover.

Turn the tow valve (Item 1) **[Figure 10-40-3]** counterclockwise 90 degrees to TOWING POSITION.

Tow the Telescopic Handler at a slow speed.

NOTE: The vehicle will not be able to brake until the four bolts (Item 1) [Figure 10-40-3] & [Figure 10-40-3] are returned to their original position.



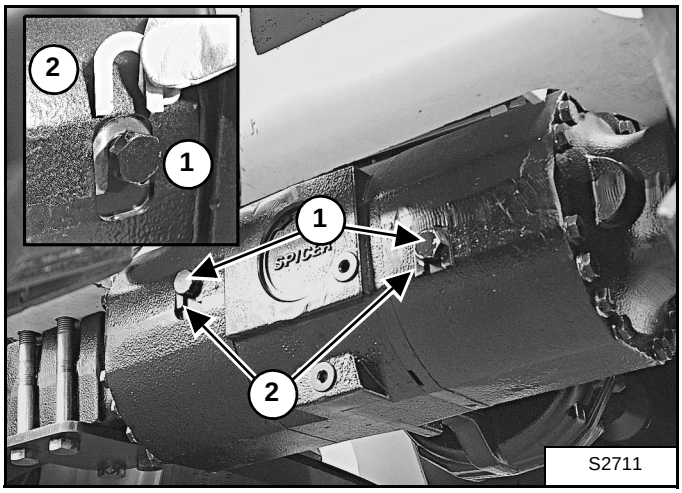
Block the wheels to prevent the machine from rolling.

After towing is completed, turn the tow valve (Item 1) **[Figure 10-40-3]** clockwise 90 degrees to the OPERATING POSITION.

NOTE:If the tow valve is not returned to the operating position, the machine will not be able to be driven forward or backward.

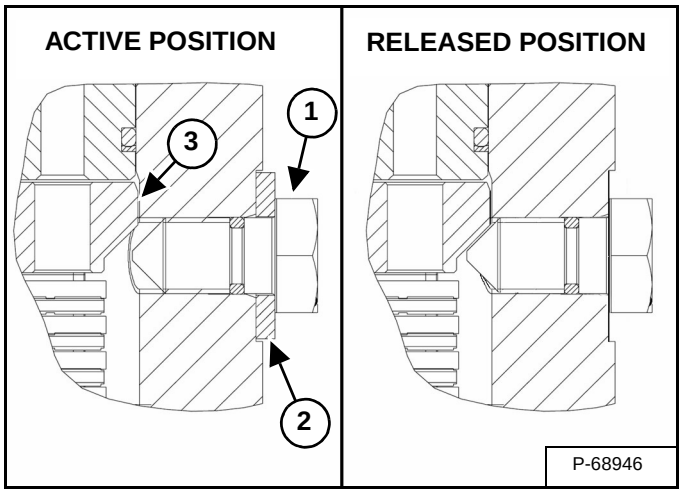
Engaging The Brake Discs

Figure 10-40-4



Loosen the four bolts (Item 1) until the spacers (Item 2) **[Figure 10-40-4]** can be installed under the bolt heads (the bolts and washers are located on both the front and rear side of front axle).

Figure 10-40-5



Evenly tighten the front and rear bolts (Item 1) to hold the spacers (Item 2) **[Figure 10-40-4]** & **[Figure 10-40-5]**.

Tighten the bolts to 70-85 ft.-lb. (95-115 N•m) torque.

This will allow the parking brake piston (Item 3) **[Figure 10-40-5]** to be active again.

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 Bobcat Telescopic Handler.

⚠ 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

SERVICE SHEDULE		HOURS					
ITEM	**SERVICE REQUIRED**	**10**	**50**	**100**	**250**	**❑ 500**	**■ 1000**
Engine Oil	Check the oil level and add as needed. Do not overfill.						
Hydraulic Fluid	Check the fluid level and add as needed.						
Safety Signs, Safety Tread and Mirrors	Check for damaged signs (decals), safety treads, load charts and mirrors. Replace if damaged or missing.						
Fuel Filter	Remove the trapped water.						
Tires	Check for damaged tires and correct air pressure. Inflate to MAXIMUM pressure shown on sidewall of the tire.						
Seat Belt & Restraint Bar (LORS™) (If Equipped)	Check the condition of the seat belt. Check the restraint bar (If equipped). Clean dirt and debris from moving parts.						
Brakes and Controls	Check for function. Service as necessary.						
Gauges, Horn and Backup Alarm	Check for function. Repair or replace as necessary.						
General	Check for loose or broken parts, damaged cab, seat belt and instrument operations. Check for installation of right hand cab window. Clean mirrors and windows. Repair or replace as needed.						
Engine Cooling System	Clean debris from oil cooler, radiator and air conditioner condenser. Check coolant level COLD in reservoir and add 50% ethylene glycol premixed with 50% water as needed. Check cooling system for leaks.						
Engine Air Filter	Check condition indicator. Service only when required. Do not use compressed air to clean elements. Empty dust cup.						
Engine Air Intake System	Check for leaks and damaged components.						
Bob-Tach Pivot, Wedges, Cylinder and Link Pin Pivots	Lubricate with multi-purpose lithium based grease.						
Axle Steering Pivot Points	Lubricate with multi-purpose lithium based grease.						
Rear Axle Pivot	Lubricate with multi-purpose lithium based grease.						
Boom and Cylinder Pivot	Lubricate with multi-purpose lithium based grease.						
Hydraulic Hoses and Tubelines	Check condition of hoses, tubelines and connections. Repair or replace as needed						
Universal Joints and Slip Yoke on Drive Shaft	Lubricate with multi-purpose lithium based grease.						
Cab Filter	Clean dust out of the cab filter. Replace every 500 hours.						
Battery	Check electrolyte level. Add distilled water as needed.						
Wheel Nuts	Check wheel nut torque. Tighten as needed [265 ft.-lb. (360 N•m)].	†					
Fuel Filter	Replace the fuel filter element. Use the genuine Bobcat Filter.		●				
Engine / Hydro. Drive Belt	Check for wear or damage. Check tension and adjust or replace as needed.						
Alt. & Air Cond. Belt (If Equipped)	Check belt tension and adjust as needed.						
LORS™ or door hinges (If Equipped)	Lubricate restraint bar spring pivot or door hinges with multi-purpose lithium based grease.						
Hydraulic/Hydrostatic Oil Filters	Replace the hydraulic/hydrostatic oil filter elements. Use a genuine Bobcat filter.		●				
Engine Oil and Filter	Replace the engine oil and filter. Use a genuine Bobcat filter.		●				
Cab Filter	Replace the cab filter.						
Axle Fluids	Check all fluid levels.			♦			
Front & Rear Axle Fluid	Replace the axle oil in the central casings.			♦		❍	
Gear Box Fluid	Replace the gear box (drive box) fluid.			♦		❍	
Wheel Gear Fluid	Replace the wheel gear fluid.			♦		❍	
Hydraulic Fluid	Replace the hydraulic fluid.						
Engine Coolant	Flush cooling system and replace coolant with 50% ethylene glycol premixed with 50% water. Check freeze protection of antifreeze -34°F (-30°F)						
Telescopic Boom Wear Blocks	Check for wear and adjust as needed. Replace if necessary.						
Pivot Pins and Bushings	Check for wear on the pivot pins and bushings.						
Breathers	Clean gear box, axle housing, and hydraulic tank breathers. Replace as needed.						

† Check wheel nut torque every 8 hours for the first 24 hours.

● Perform service first time at 50 hours, then as indicated in chart.

♦ Perform fluid level check first time at 100 hours, then as indicated in chart.

❍ Replace fluid first at 500 hours, then as indicated in chart.

❑ or every 6 months.

■ or every 12 months.

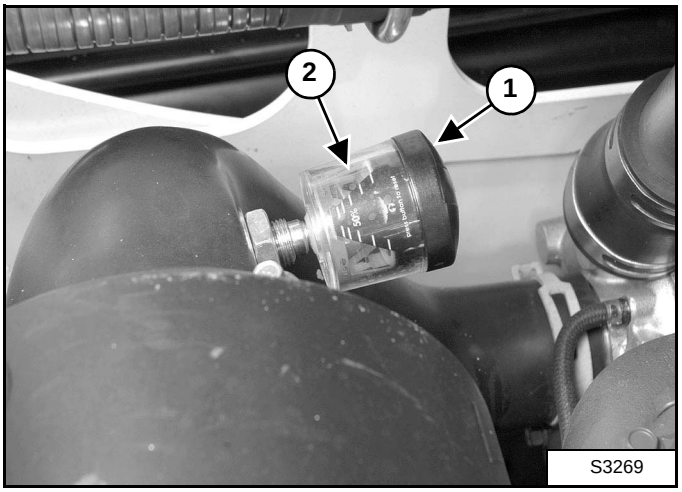

Bobcat®

AIR CLEANER SERVICE

Replacing The Filter Element

Outer filter

Figure 10-60-1

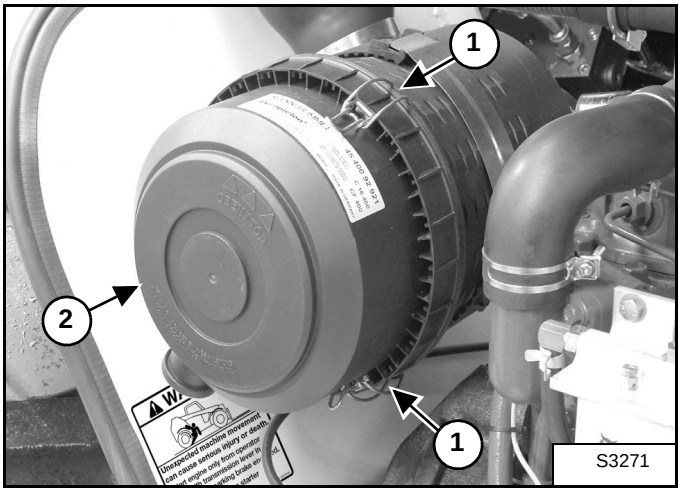


Replace the large (outer) filter element only when the red ring shows in the window of the condition indicator (Item 1) **[Figure 10-60-1]**.

NOTE: Before replacing the filter element, push the button on the condition indicator (Item 2) [Figure 10-60-1]. Start the engine. If the red ring does not show, do not replace the filter element.

Replace the inner filter every third time the outer filter is replaced or when the red ring still shows in the indicator window after the outer filter has been replaced.

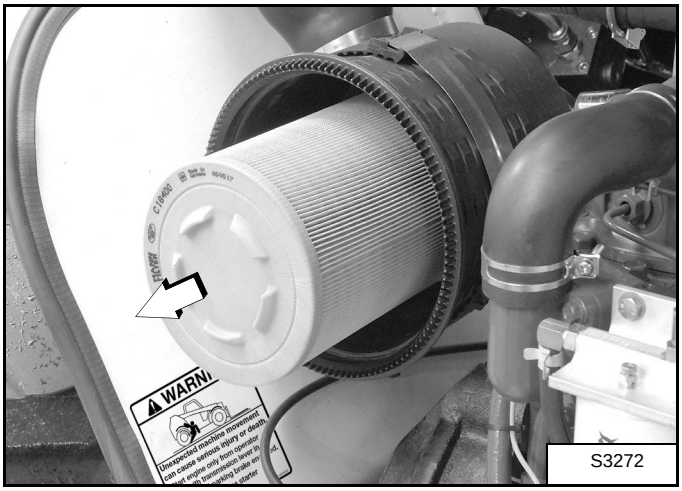
Figure 10-60-2



Loosen the filter housing clamps (Item 1) **[Figure 10-60-2]**.

Release the fastener and remove the cover (Item 2) **[Figure 10-60-2]**.

Figure 10-60-3

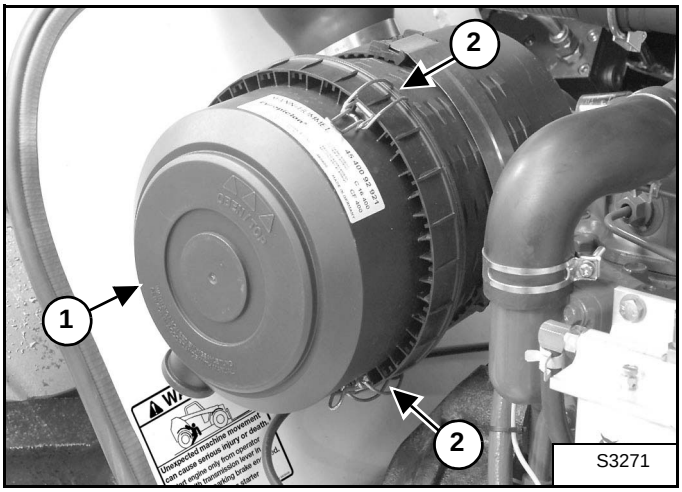


Pull the element straight out **[Figure 10-60-3]**.

NOTE: Make sure all sealing surfaces are free of dirt and debris. Do not use compressed air to remove dirt or debris.

Install a new outer element.

Figure 10-60-4



Install the dust cover (Item 1) **[Figure 10-60-4]** and fasten.

Connect the filter housing clamps (Item 2) **[Figure 10-60-4]**.

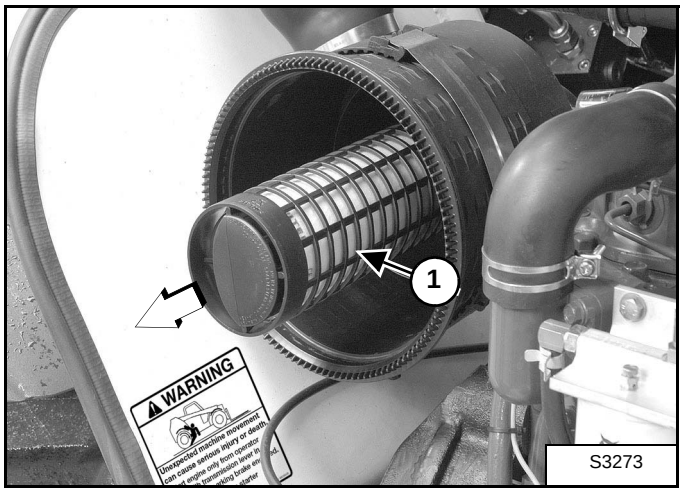
Replacing The Filter Element (Cont'd)

Inner Filter

Remove the outer element.

NOTE: Make sure all sealing surfaces are free of dirt and debris. Do not use compressed air to remove dirt or debris

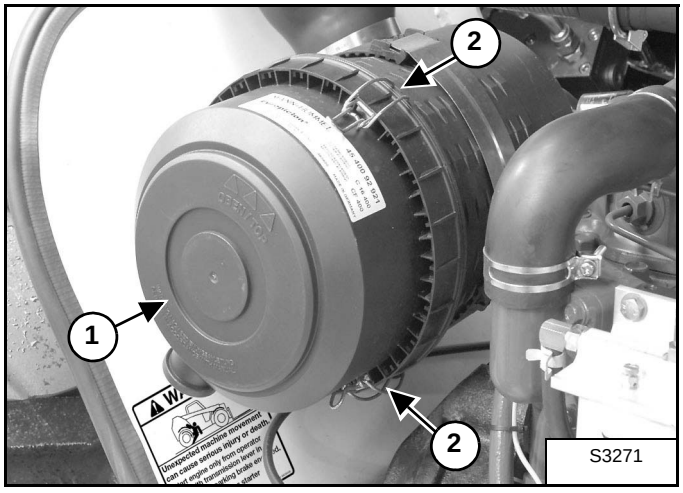
Figure 10-60-5



Remove the inner filter (Item 1) **[Figure 10-60-5]** and install a new element.

Install the outer element.

Figure 10-60-6



Install the dust cover (Item 1) **[Figure 10-60-6]** and fasten.

Connect the filter housing clamps (Item 2) **[Figure 10-60-6]**.

ENGINE COOLING SYSTEM

Check the cooling system every day to prevent overheating, loss of performance or engine damage.

⚠ WARNING

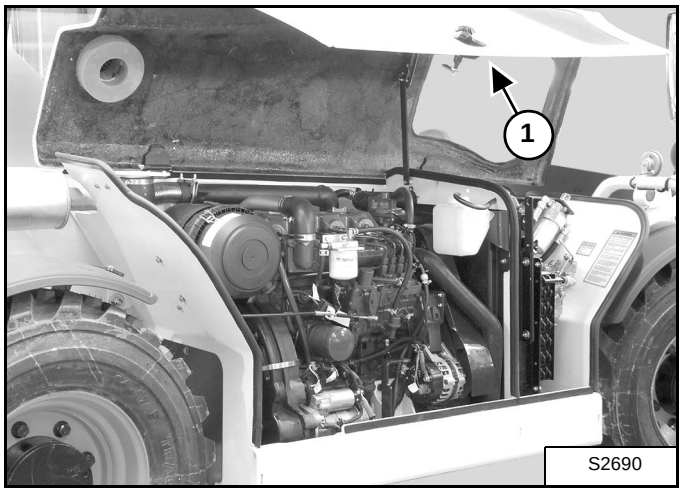
Wear safety glasses to prevent eye injury when any of the following conditions exist:

- **When fluids are under pressure.**
- **Flying debris or loose material is present.**
- **Engine is running.**
- **Tools are being used.**

W-2019-1285

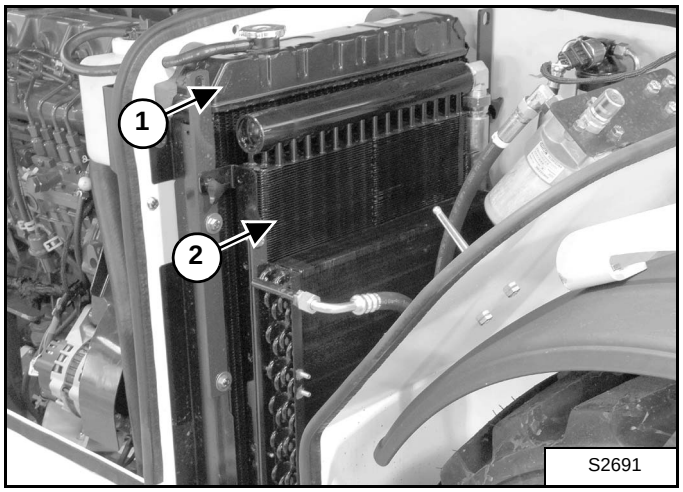
Cleaning The Cooling System

Figure 10-70-1



Open the engine cover (Item 1) **[Figure 10-70-1]**.

Figure 10-70-2

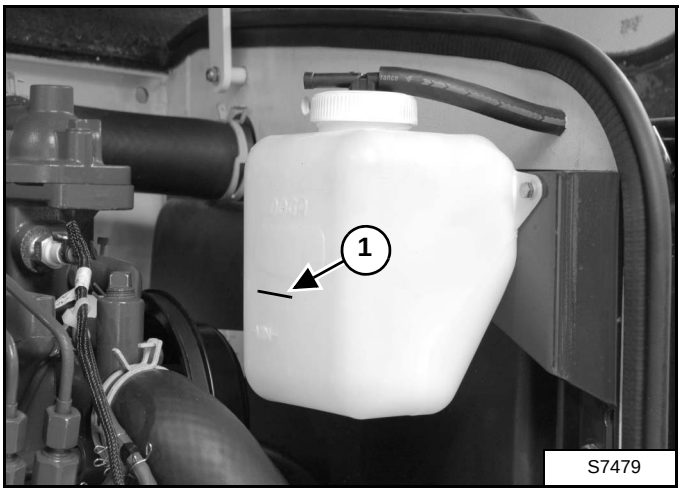


Use low air pressure or water pressure to clean the radiator (Item 1) and oil cooler (Item 2) **[Figure 10-70-2]**.

Checking The Coolant Level

Open the engine cover.

Figure 10-70-3



When the engine is cold, the coolant level must be at least at the MIN mark (Item 1) **[Figure 10-70-3]** on the overflow bottle.

IMPORTANT

AVOID ENGINE DAMAGE

Always use the correct ratio of water to antifreeze.

Too much antifreeze reduces cooling system efficiency and may cause serious premature engine damage.

Too little antifreeze reduces the additives which protect the internal engine components; reduces the boiling point and freeze protection of the system.

Always add a premixed solution. Adding full strength concentrated coolant can cause serious premature engine damage.

I-2124-0497

Replacing The Coolant

WARNING

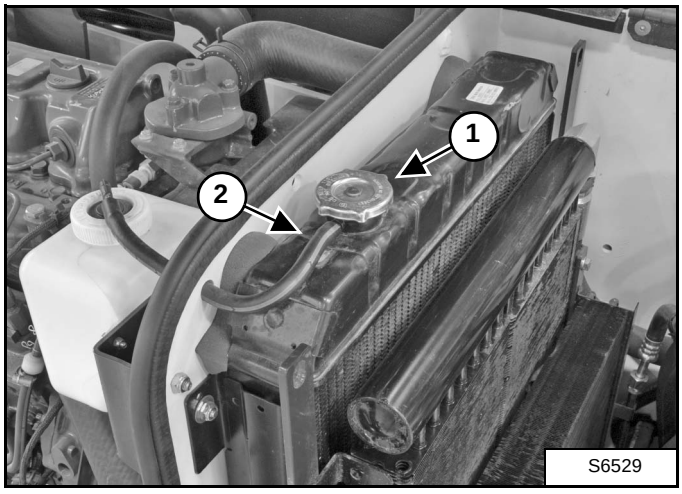
AVOID BURNS

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

W-2070-1203

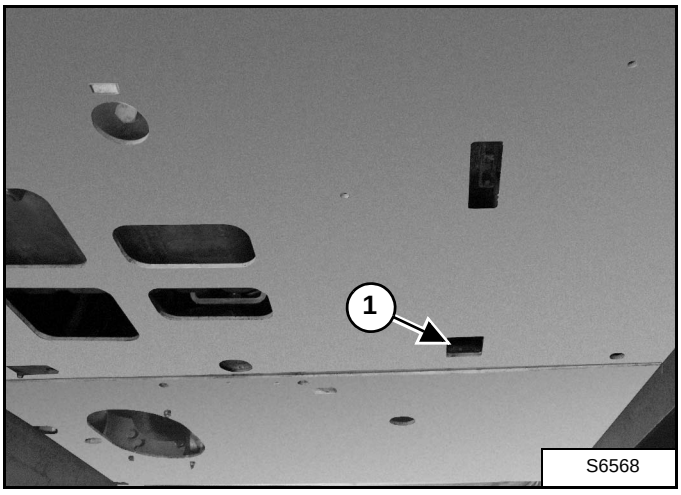
Open the engine cover.

Figure 10-70-4



Remove the radiator cap (Item 1) **[Figure 10-70-4]**.

Figure 10-70-5



Open the drain valve (Item 1) **[Figure 10-70-5]** at the bottom of the engine compartment.

Drain the coolant into a container. Recycle or dispose of coolant in an environmentally safe manner.

Close the drain valve (Item 1) **[Figure 10-70-5]**.

Mix the coolant in a separate container.

NOTE: The Telescopic Handler is factory filled with ethylene glycol coolant.

Add premixed coolant, 50% water and 50% ethylene glycol to the reservoir if the coolant level is low.

One gallon (3,8 L) of ethylene glycol mixed with one gallon (3,8 L) 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.

Add coolant to the radiator. The coolant level must be right below the connection with the overflow bottle (Item 2) **[Figure 10-70-4]**.

Install the radiator cap.

Add coolant to the overflow bottle as needed.

Run the engine until it is at operating temperature.

Stop the engine.

Check the coolant level when the engine is cold and add as needed.

IMPORTANT

AVOID ENGINE DAMAGE

Always use the correct ratio of water to antifreeze.

Too much antifreeze reduces cooling system efficiency and may cause serious premature engine damage.

Too little antifreeze reduces the additives which protect the internal engine components; reduces the boiling point and freeze protection of the system.

Always add a premixed solution. Adding full strength concentrated coolant can cause serious premature engine damage.

I-2124-0497

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 problems in cold temperatures:

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

At a minimum, Low Sulfur (500 ppm sulfur) Diesel Fuel must be used in this machine.

The following fuels may also be used in this machine:

- Ultra Low Sulfur (15 ppm sulfur) Diesel Fuel.
- Biodiesel Blend Fuel - Must contain no more than five percent biodiesel mixed with low sulfur or ultra low sulfur petroleum based diesel. This is commonly marketed as B5 blended diesel fuel.

Filling The Fuel Tank

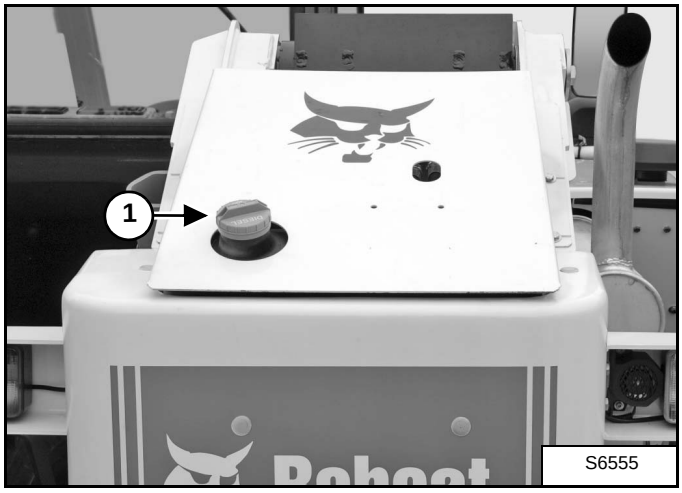
⚠ WARNING

AVOID INJURY OR DEATH

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

W-2063-0807

Figure 10-80-1



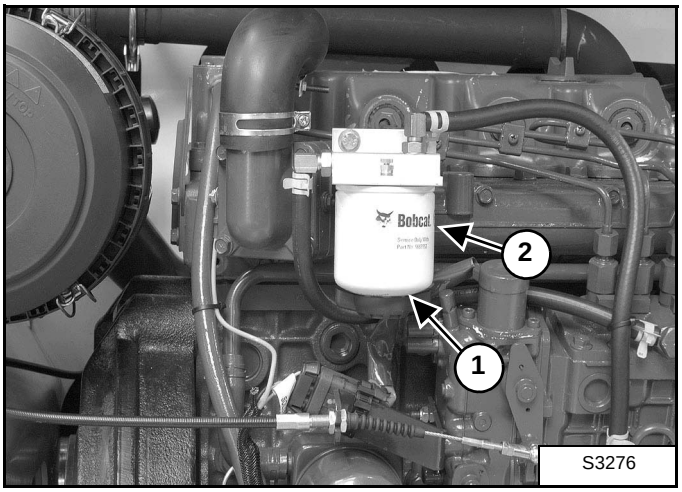
Remove the fuel fill cap (Item 1) **[Figure 10-80-1]**.

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!**

Install and tighten the fuel fill cap **[Figure 10-80-1]**.

Fuel Filter

Figure 10-80-2



For the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.)

Loosen the drain (Item 1) **[Figure 10-80-2]** at the bottom of the filter element to remove water from the filter.

Remove the filter element (Item 2) **[Figure 10-80-2]**.

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

AVOID INJURY OR DEATH

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.

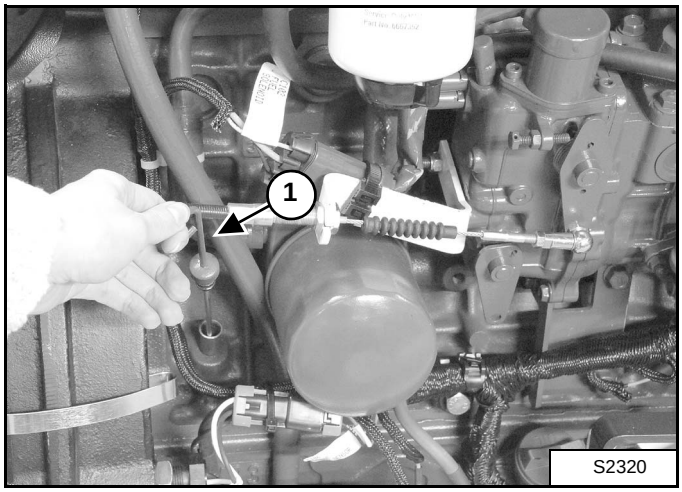
W-2103-0807

ENGINE LUBRICATION SYSTEM

Checking Engine Oil

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

Figure 10-90-1

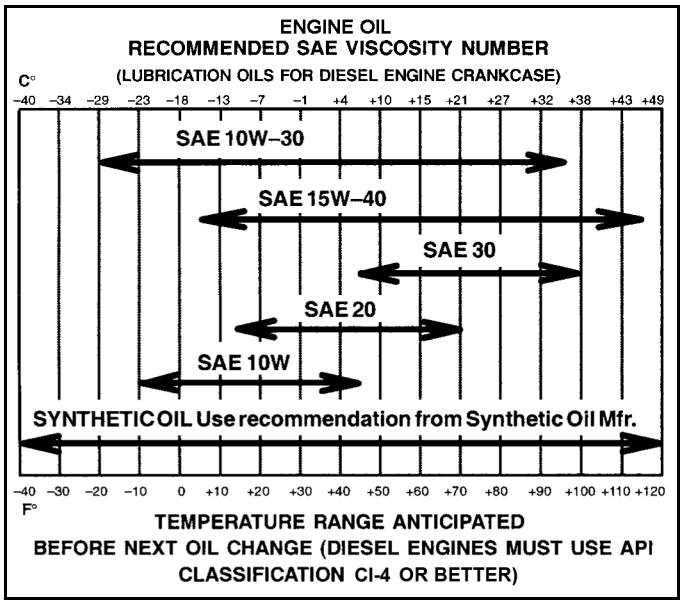


Open the engine cover and remove the dipstick (Item 1) **[Figure 10-90-1]**.

Keep the oil level between the marks on the dipstick.

Oil Chart

Figure 10-90-2



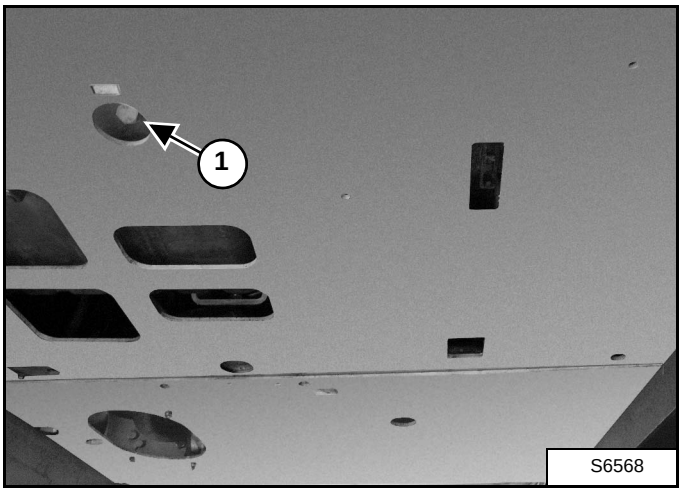
Use good quality motor oil that meets API Service Classification of CI-4 or better (See Oil Chart, **[Figure 10-90-2]**).

Replacing Oil And Filter

For the correct service interval for replacing the engine oil and filter. (See SERVICE SCHEDULE on Page 10-50-1.)

Run the engine until it is at operating temperature. Stop the engine.

Figure 10-90-3



Remove the oil plug (Item 1) **[Figure 10-90-3]** at the bottom of the engine compartment.

Drain the oil into a container and recycle or dispose of used oil in an environmentally safe manner.

NOTE: Oil at engine operating temperature is extremely hot. Take all necessary precautions to avoid injury and make sure the container is heat resistant.

Install the oil plug (Item 1) **[Figure 10-90-3]**.

⚠ WARNING

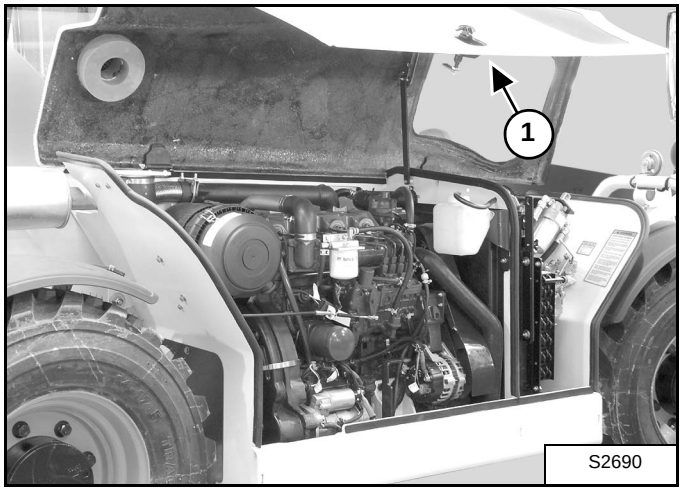
AVOID INJURY OR DEATH

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-2103-0807

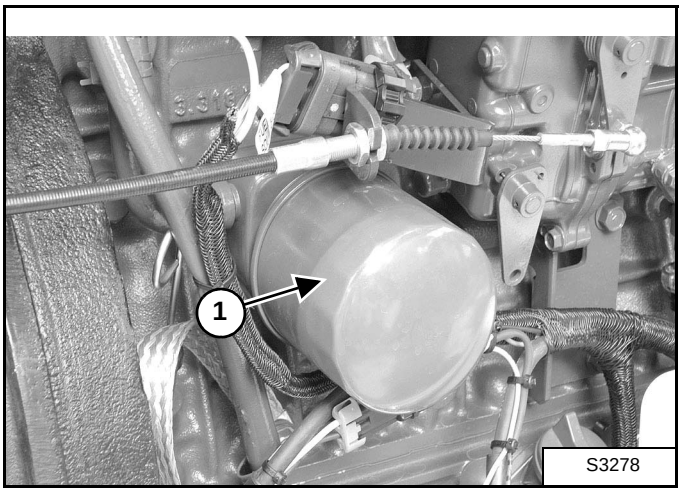
Replacing Oil And Filter (Cont'd)

Figure 10-90-4



Open the engine cover (Item 1) **[Figure 10-90-4]**.

Figure 10-90-5

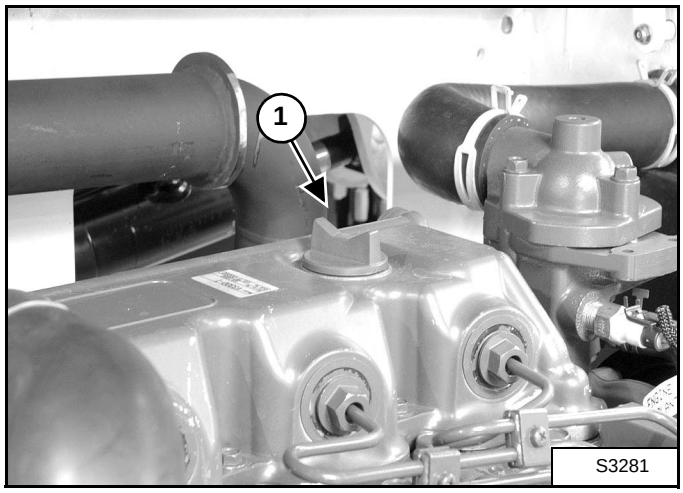


Remove the oil filter (Item 1) **[Figure 10-90-5]**.

Clean the filter housing surface.

Put clean oil on the new oil filter gasket. Install the filter and hand tighten.

Figure 10-90-6



Remove the fill cap (Item 1) **[Figure 10-90-6]**.

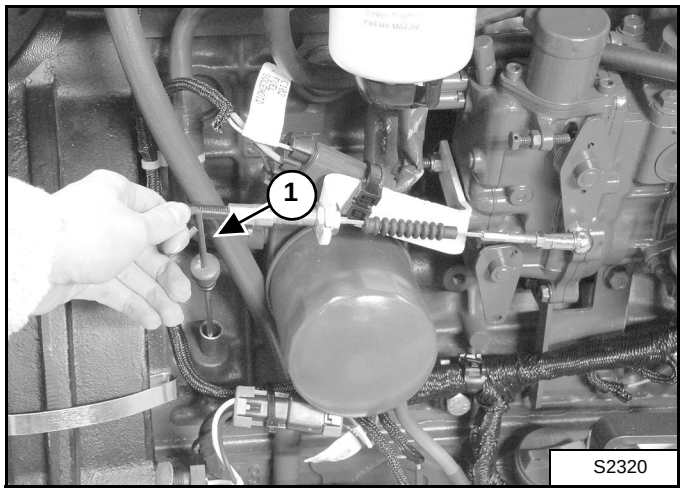
Put oil in the engine. (See Capacities on Page SPEC-10-3.) (See Oil Chart on Page 10-90-1.)

Install the fill cap, start the engine and let it run for several minutes.

Stop the engine, and check for leaks at the oil filter.

Let the engine cool.

Figure 10-90-7



Remove the dipstick (Item 1) **[Figure 10-90-7]** and check the oil level. Add oil as needed if it is not at the top mark on the dipstick.

Recycle or dispose of the fluid in an environmentally safe manner. Reinstall the dipstick.

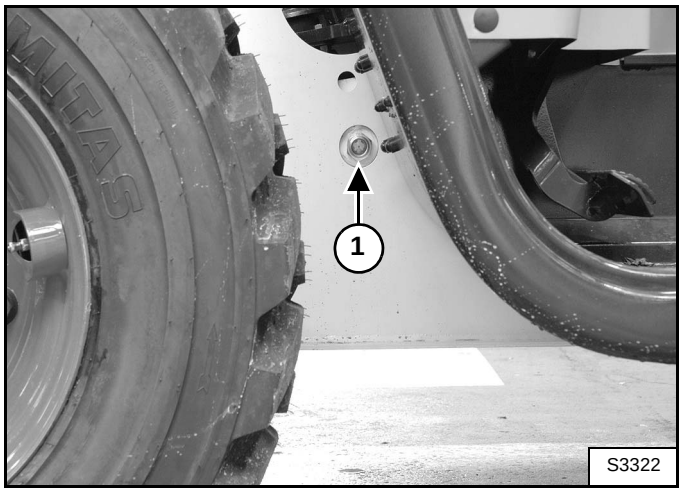
Checking And Adding Fluid

Use only recommended fluid in the hydraulic system. (See HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS on Page SPEC-60-1.)

Stop the machine on a level surface. Lower the boom all the way and tilt the Bob-Tach fully back.

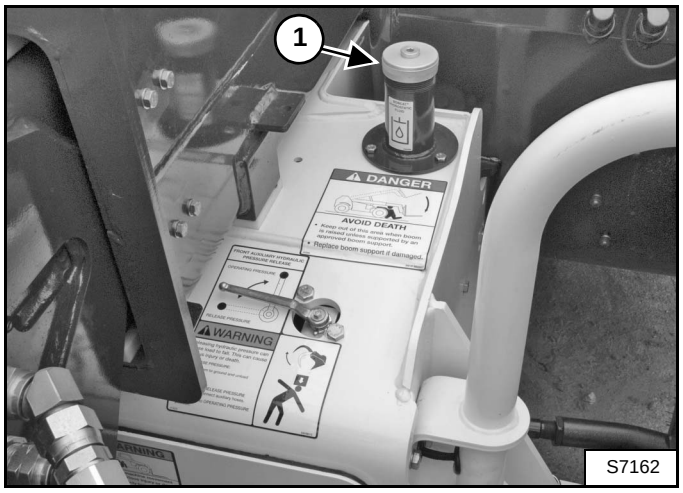
Stop the engine.

Figure 10-100-1



Check the fluid level at the sight gauge (Item 1) **[Figure 10-100-1]** behind the front left wheel.

Figure 10-100-2



Clean the area around the hydraulic fill cap.

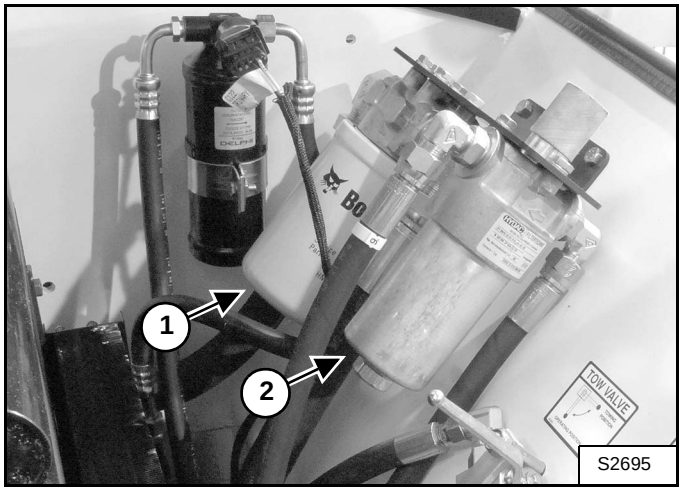
Remove the fill cap (Item 1) **[Figure 10-100-2]** at the front left side of the Telescopic Handler and add hydraulic fluid until visible in the sight gauge.

Install the fill cap.

Replacing The Hydraulic / Hydrostatic Filters

For the correct service interval for replacing the hydraulic / hydrostatic filters. (See SERVICE SCHEDULE on Page 10-50-1.)

Figure 10-100-3



Stop the engine and open the engine cover.

Remove the two filter elements (Items 1 & 2) **[Figure 10-100-3]**.

Clean the surface of the filter housings where the filter seals contacts the housings.

Put clean oil on the seals of the new filters. Install and hand tighten the two new filter elements.

WARNING

AVOID INJURY OR DEATH

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-2072-0807

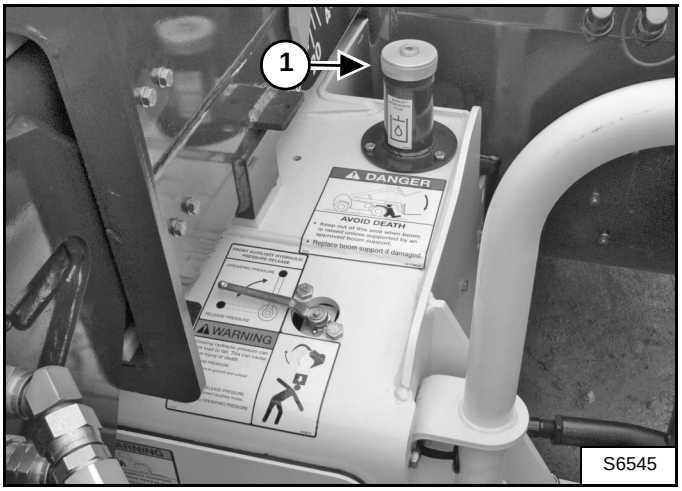
Replacing Hydraulic Fluid

Use only recommended fluid in the hydraulic system. (See HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS on Page SPEC-60-1.)

Stop the machine on a level surface. Lower the boom all the way and tilt the Bob-Tach fully back.

Stop the engine.

Figure 10-100-4



Remove the fill cap (Item 1) **[Figure 10-100-4]** at the front left side of the Telescopic Handler.

WARNING

AVOID INJURY OR DEATH

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-2072-0807

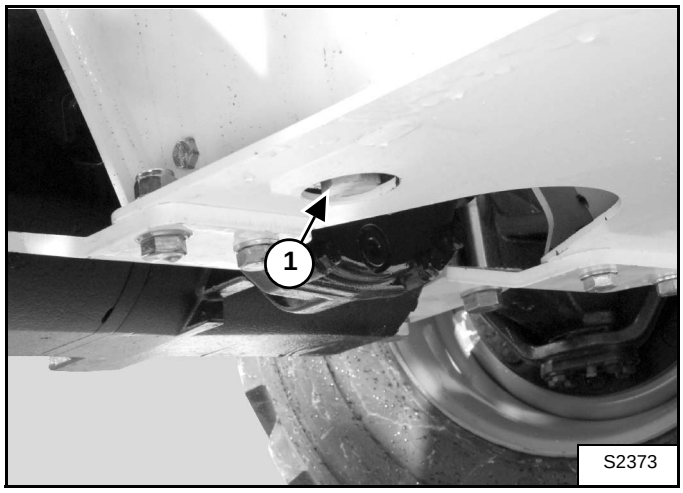
WARNING

AVOID INJURY OR DEATH

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.

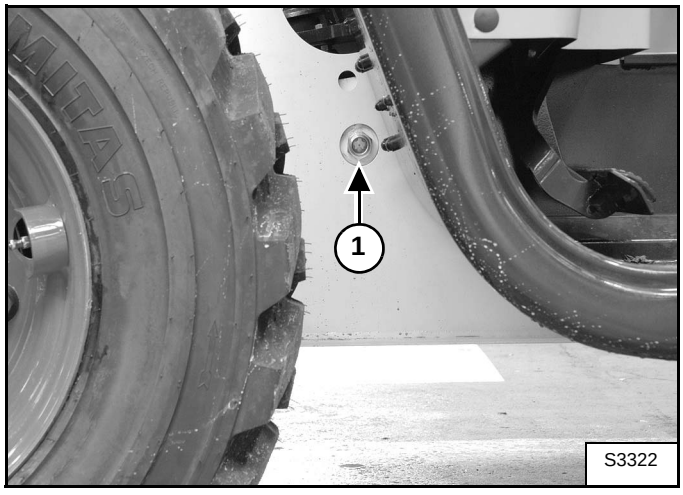
W-2103-0807

Figure 10-100-5



Remove the reservoir drain plug (Item 1) **[Figure 10-100-5]** behind the right front tire and drain the fluid into a container. Recycle or dispose of the fluid in an environmentally safe manner. Reinstall the drain plug and tighten.

Figure 10-100-6

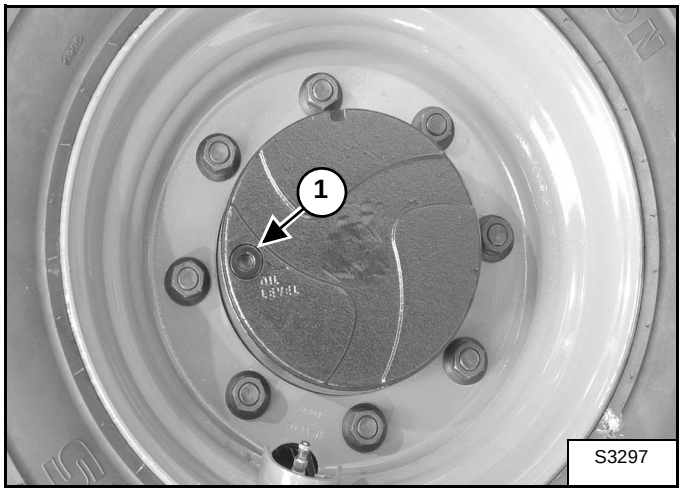


Add fluid until visible in the sight gauge (Item 1) **[Figure 10-100-6]** behind the front left tire.

Install the fill cap (Item 1) **[Figure 10-100-4]**.

Checking Oil Level (Planetary Carrier)

Figure 10-110-1



Put the machine on a level surface with the plug (Item 1) **[Figure 10-110-1]** positioned as shown.

Remove the plug (Item 1) **[Figure 10-110-1]**. The oil level should be at the bottom edge of the plug hole.

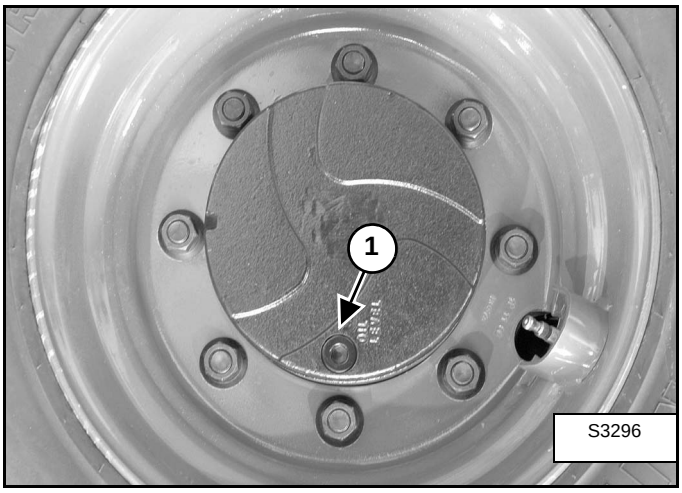
Add gear lube through the hole if the oil level is below the hole. (See Capacities on Page SPEC-10-3.)

Install and tighten the plug.

Repeat the procedure for the other side.

Draining Oil (Planetary Carrier)

Figure 10-110-2



For the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.)

Put the machine on a level surface with the plug (Item 1) **[Figure 10-110-2]** positioned as shown.

Remove the plug (Item 1) **[Figure 10-110-2]** and drain into a container. Recycle or dispose of the used lubricant in an environmentally safe manner.

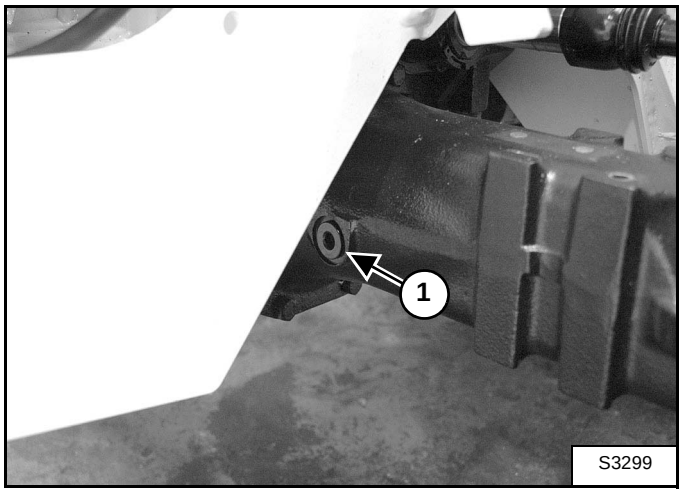
Reposition the plug hole (Item 1) **[Figure 10-110-1]** and add gear lube until the lube level is at the bottom edge of the plug hole.

Install and tighten the plug.

Repeat the procedure for the other side.

Checking Oil Level (Rear Differential)

Figure 10-110-3



With the machine on a level surface, remove the fill plug (Item 1) **[Figure 10-110-3]**. The oil level should be at the bottom edge of the plug hole.

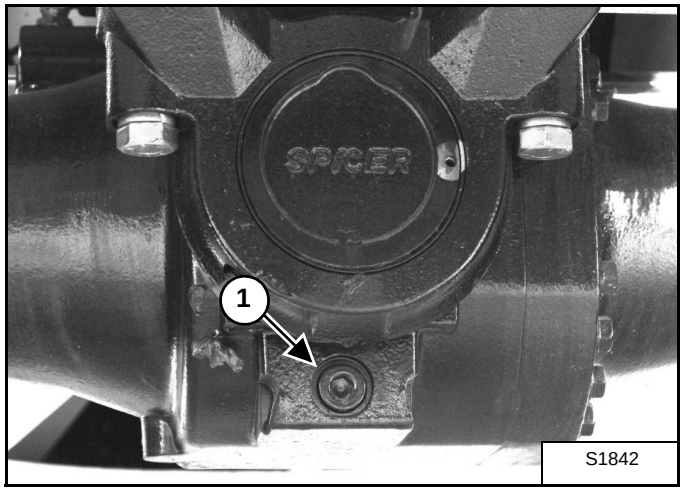
Add oil through the hole if the oil level is at the bottom edge of the hole. (See Capacities on Page SPEC-10-3.)

Install and tighten the fill plug.

Draining Oil (Rear Differential)

For the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.)

Figure 10-110-4



With the machine on a level surface remove the drain plug (Item 1) **[Figure 10-110-4]** and drain into a container.

Recycle or dispose of the used lubricant in an environmentally safe manner.

Install and tighten the drain plug.

Remove the fill plug (Item 1) **[Figure 10-110-3]**.

Add oil through the hole until the oil level is at the bottom edge of the plug hole.

Install and tighten the fill plug.

Checking Oil Level (Front Differential)

Figure 10-110-5

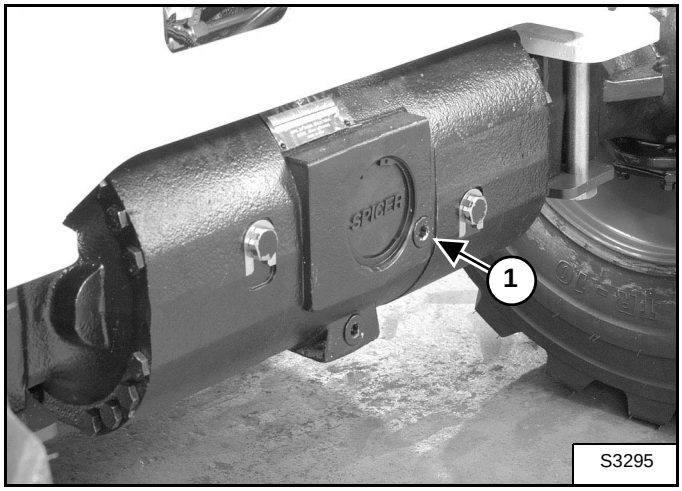
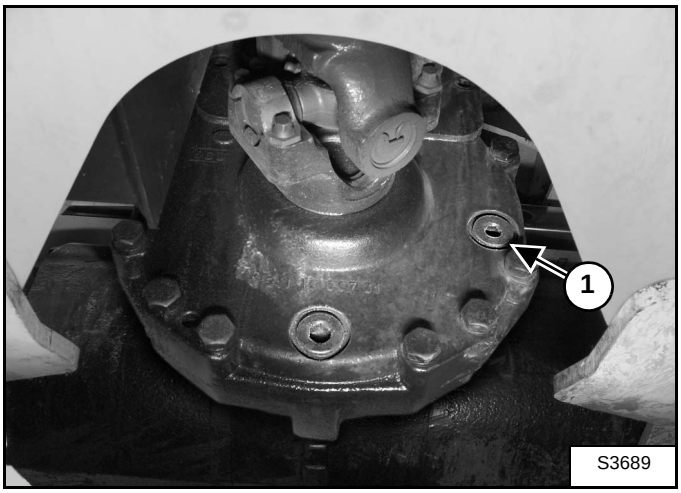


Figure 10-110-6



With the machine on a level surface, remove the fill plugs (Item 1) **[Figure 10-110-5]** & **[Figure 10-110-6]**. The oil level should be at the bottom edge of the plug holes.

Add oil through the holes if the oil level is below the holes. (See Capacities on Page SPEC-10-3.)

Install and tighten the fill plugs.

Draining Oil (Front Differential)

For the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.)

Figure 10-110-7

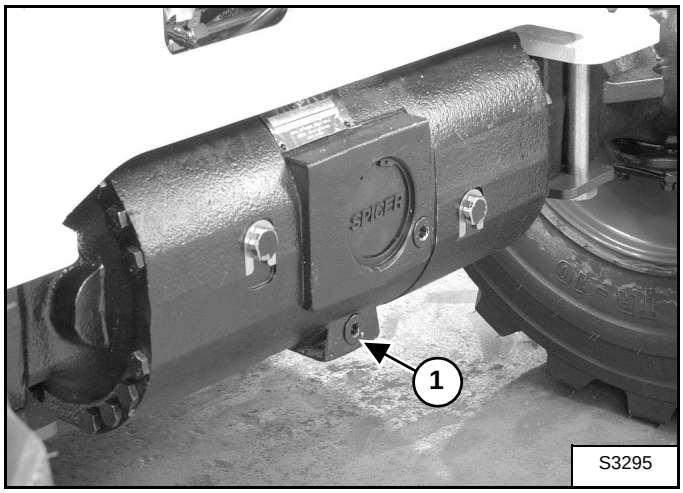
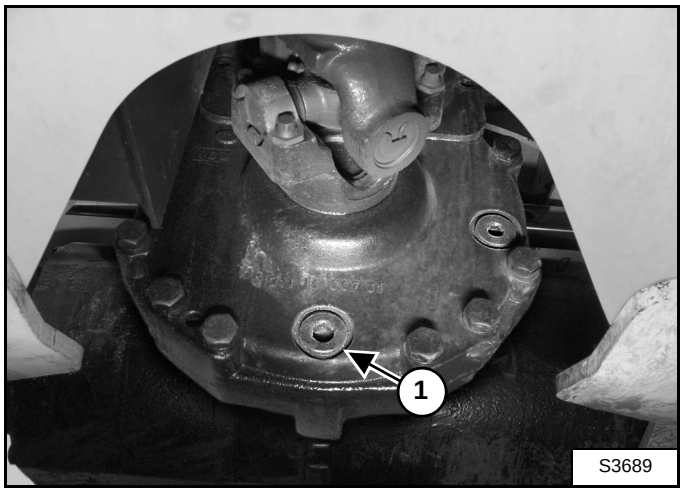


Figure 10-110-8



With the machine on a level surface, remove the drain plugs (Item 1) **[Figure 10-110-7]** & **[Figure 10-110-8]** and drain into a container.

Recycle or dispose of the used lubricant in an environmentally safe manner.

Install and tighten the drain plugs.

Remove the fill plugs (Item 1) **[Figure 10-110-5]** & **[Figure 10-110-6]**.

Add oil through the holes until the oil level is at the bottom edge of the plug holes.

Install and tighten the fill plugs.


Bobcat

LUBRICATION

Procedure

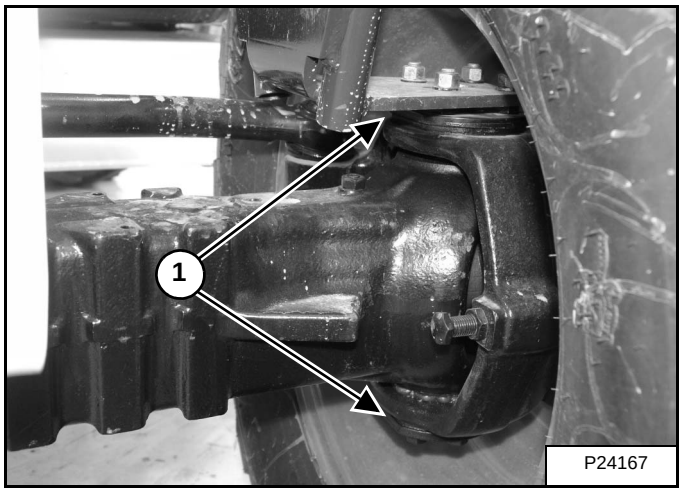
Lubricate as specified (See SERVICE SCHEDULE on Page 10-50-1.) for the best performance of the machine.

Record the operating hours each time you lubricate so that it is performed at the correct interval.

Always use a good quality lithium based multi-purpose grease. Apply lubricant until extra grease shows.

Lubricate the following locations on the Telescopic Handler:

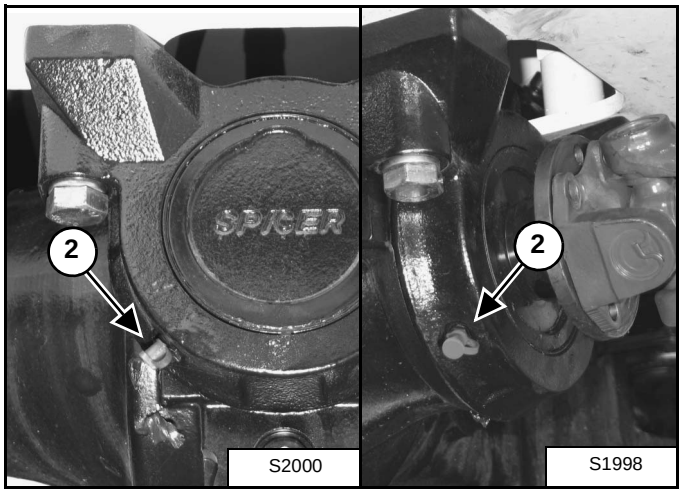
Figure 10-120-1



Ref. Description (# of Fittings)

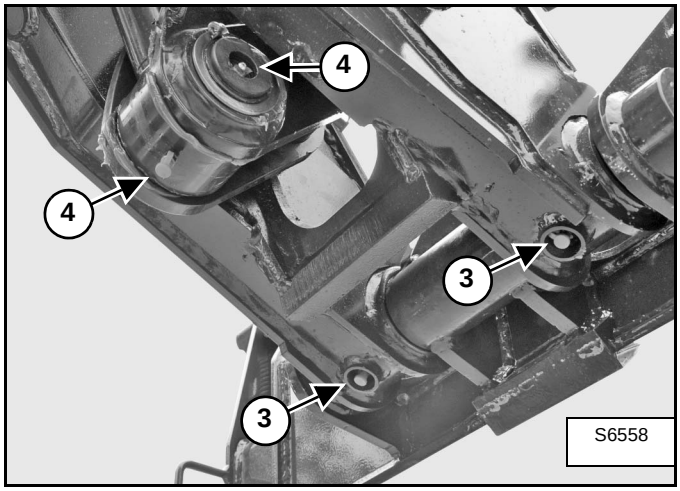
1. Axle Pivots - Top and bottom (2) **[Figure 10-120-1]** of all four wheels.

Figure 10-120-2



2. Axle Oscillation, Rear Axle - Front and Back (2) **[Figure 10-120-2]**.

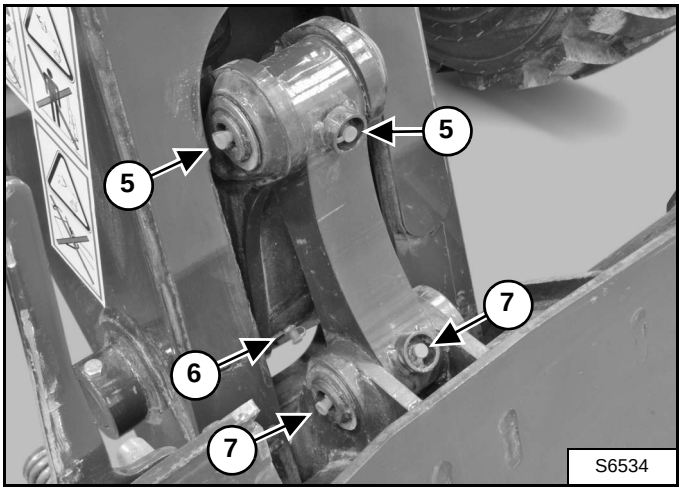
Figure 10-120-3



3. Bob-Tach Frame Pivot - Both sides (2) **[Figure 10-120-3]**.

4. Tilt Cylinder, Rod End - Both sides and middle (3) **[Figure 10-120-3]**.

Figure 10-120-4

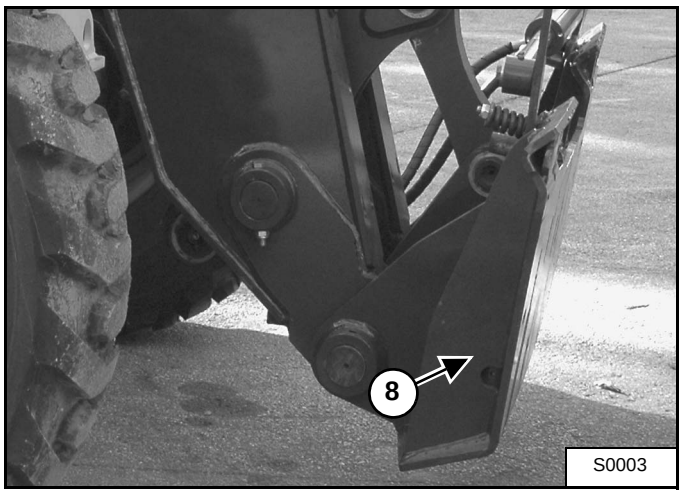


5. Link Pivot - Both sides and middle (3) **[Figure 10-120-4]**.

6. Link Pivot - Middle (1) **[Figure 10-120-4]**.

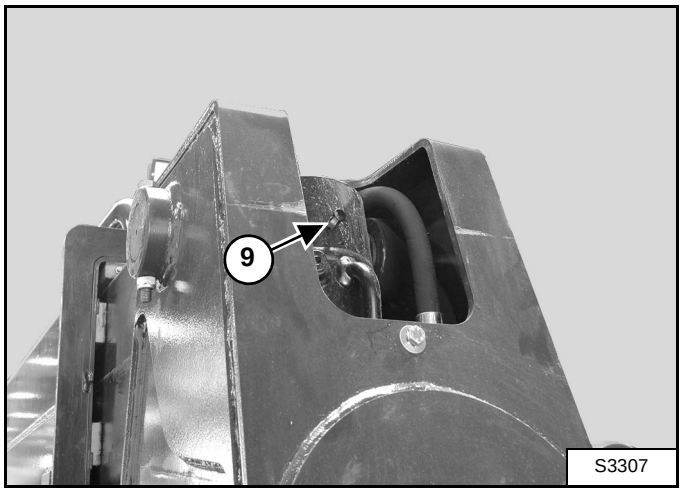
7. Link Pivot - Both sides and middle (3) **[Figure 10-120-4]**.

Figure 10-120-5



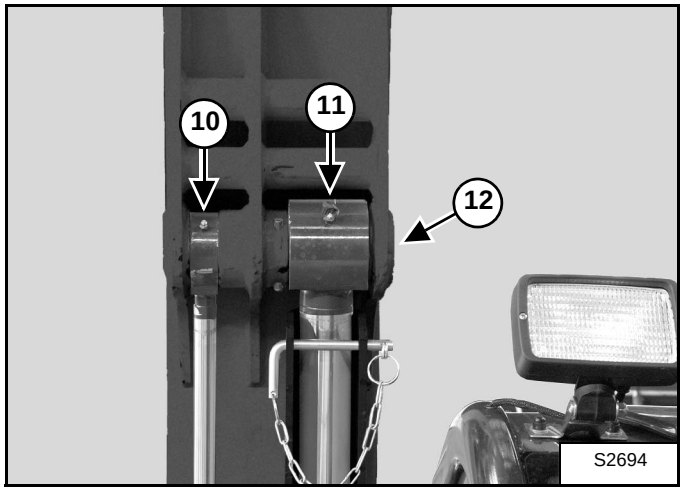
8. Bob-Tach Wedge - Both sides (2) **[Figure 10-120-5]**.

Figure 10-120-6



9. Tilt Cylinder, Base End (1) **[Figure 10-120-6]**.

Figure 10-120-7



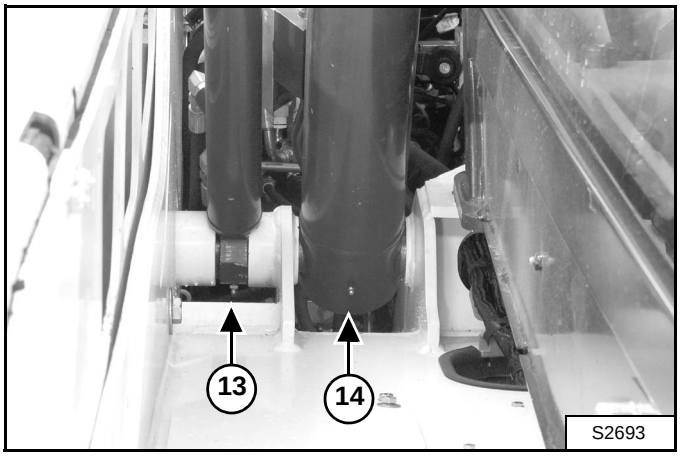
NOTE: Raise the boom and install the approved Boom Stop (See Installing The Approved Boom Stop on Page 10-150-1.) before lubricating the Lift and Slave Cylinders.

10. Slave Cylinder, Rod End (1) **[Figure 10-120-7]**.

11. Lift Cylinder, Rod End (1) **[Figure 10-120-7]**.

12. Lift Cylinder, Pivot (1) **[Figure 10-120-7]**.

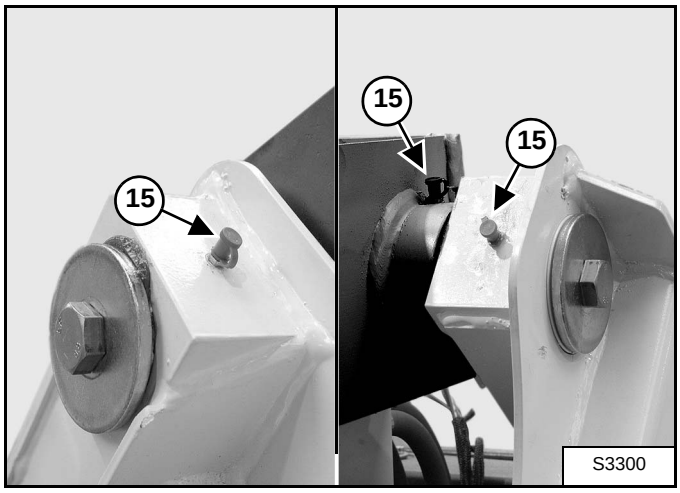
Figure 10-120-8



13. Slave Cylinder, Base End (1) **[Figure 10-120-8]**.

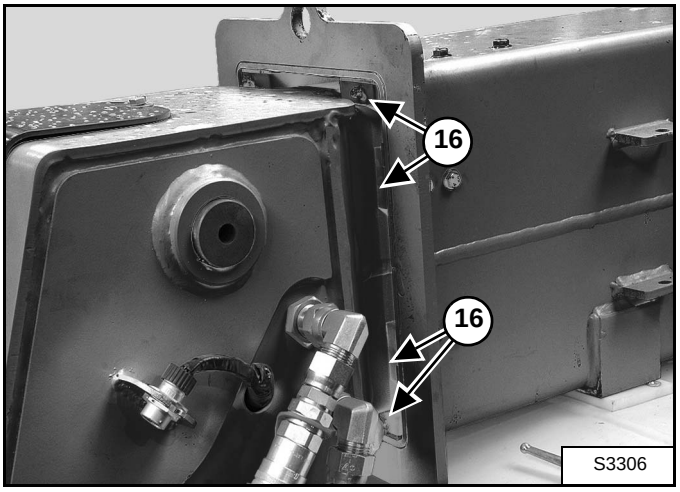
14. Lift Cylinder, Base End (1) **[Figure 10-120-8]**.

Figure 10-120-9



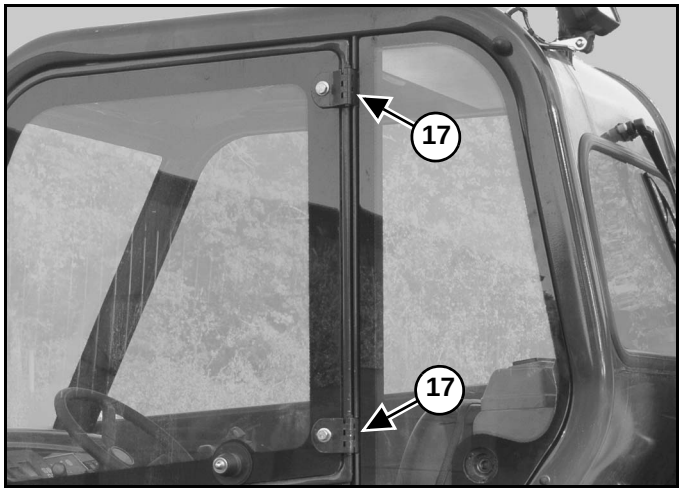
15. Boom Pivot (3) **[Figure 10-120-9]**.

Figure 10-120-10



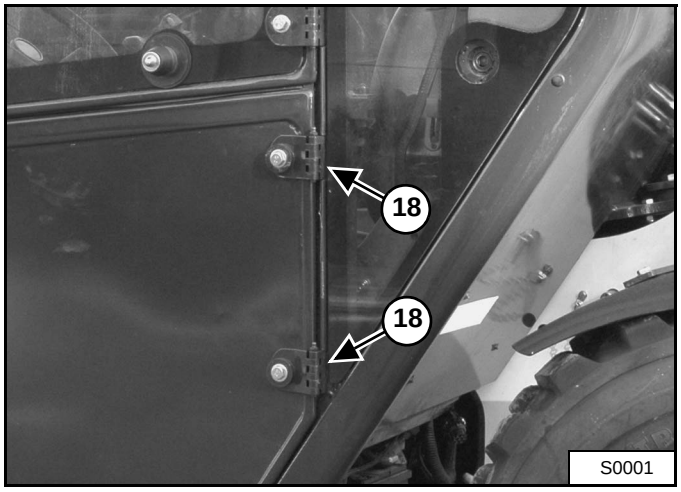
16. Boom Slide - Both sides, top, and bottom (8) **[Figure 10-120-10]**.

Figure 10-120-11



17. Cab Door Hinges - Upper (17) **[Figure 10-120-11]**.

Figure 10-120-12



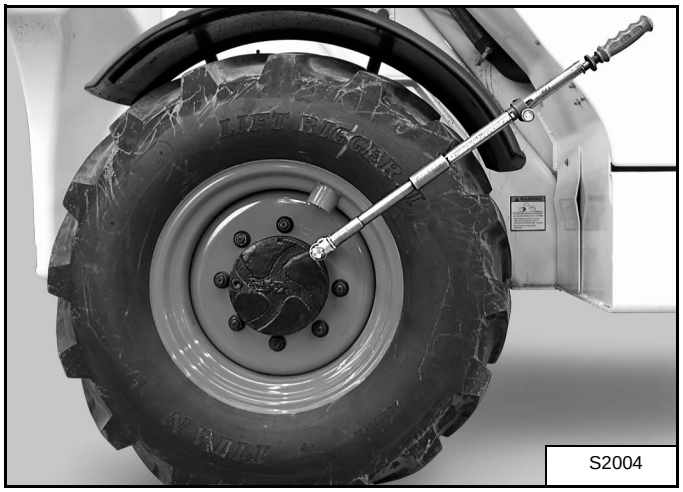
18. Cab Door Hinges - Lower (18) **[Figure 10-120-12]**.


Bobcat®

TIRE MAINTENANCE

Wheel Nuts

Figure 10-130-1



For the correct service interval to check the wheel nuts (See SERVICE SCHEDULE on Page 10-50-1.).

The correct torque is 265 ft.-lb. (360 N•m) torque **[Figure 10-130-1]**.

Tire Mounting

Tires are to be repaired only by an authorized person using the correct procedures and type of equipment.

Tires and rims must always be checked for correct size before mounting. Check rim and tire bead for damage. The rim flange must be cleaned and free of rust. The tire bead and rim flange must be lubricated with a rubber lubricant before mounting the tire.

Avoid excessive pressure which can rupture the tire and cause serious injury or death.

During inflation of the tire, check the tire pressure frequently to avoid over inflation.

Tire Rotation

Check the tires regularly for wear, damage and pressure. For the correct tire pressure, (See Tires on Page SPEC-10-3.)

Rear tires usually wear faster than front tires. To keep the wear even, move the front tires to the rear and rear tires to the front.

It is important to keep the same size tires on each side of the Telescopic Handler. If different sizes are used, each tire will be turning at a different rate and cause excessive wear and loss of stability. The tread bars of all the tires must face the same direction.

Recommended tire pressure must be maintained to avoid excessive tire wear and loss of stability and handling capacity. Check for the correct pressure before operating the Telescopic Handler.

Tire Pressure

For correct inflation: (See Tires on Page SPEC-10-3.)


Bobcat®

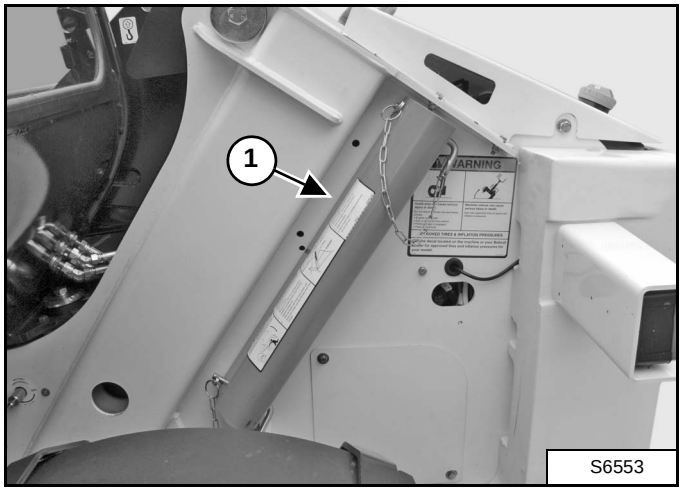
APPROVED BOOM STOP

If the boom is raised for service or maintenance, use the following procedure to install and remove the approved boom stop.

Installing The Approved Boom Stop

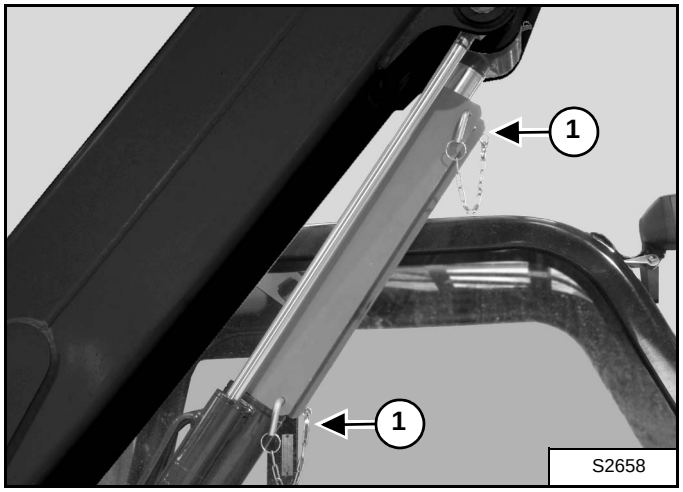
- Put the Telescopic Handler on a flat, solid and level surface.
- With the operator in the seat, the seat belt fastened, Travel Direction Control in neutral and the parking brake engaged, start the engine and raise the boom fully. Stop the engine.

Figure 10-150-1



- Remove the boom stop (Item 1) **[Figure 10-150-1]** from the storage position.

Figure 10-150-2



- Position the boom stop over the boom cylinder rod and install the pins and secure with fasteners (Item 1) **[Figure 10-150-2]**.
- Start the engine and lower the boom slowly **[Figure 10-150-2]** so that the boom stop is held securely.

Removing The Approved Boom Stop

- Start the engine and raise the boom. Stop the engine.
- Remove the fasteners, pins and boom stop.


Bobcat®

ENGINE COVER

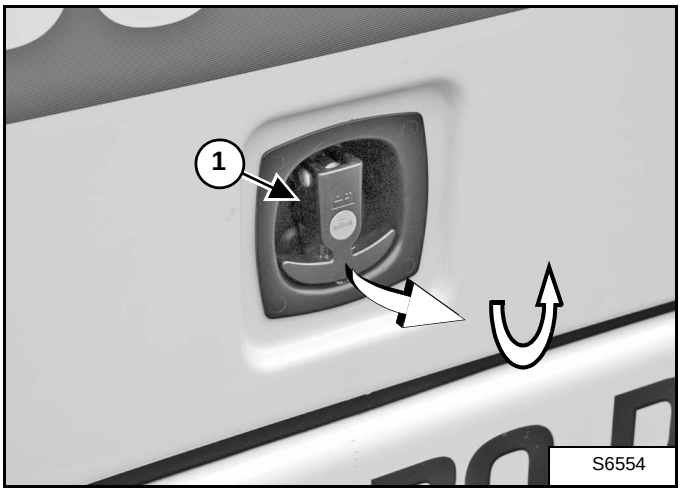
Opening And Closing The Engine Cover

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-2012-0497

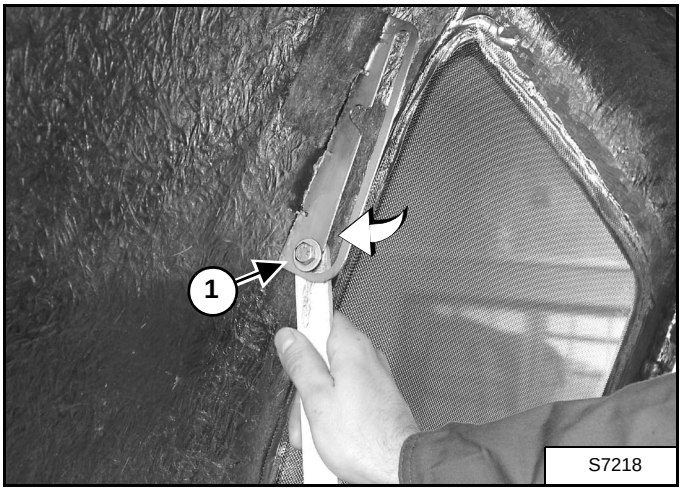
Figure 10-160-1



Pull the latch handle (Item 1) **[Figure 10-160-1]** out and rotate it counterclockwise. Raise the engine cover to provide access for maintenance.

Close the engine cover before operating the Telescopic Handler.

Figure 10-160-2



Raise the engine cover until the hold open latch (Item 1) **[Figure 10-160-2]** is in the secure position.

To make sure the latch (Item 1) **[Figure 10-160-2]** is fully engaged into secure position, push forward on the bottom of the latch while holding the engine cover up.

Close the engine cover before operating the Telescopic Handler.


Bobcat®

Connecting to the Telescopic Handler

Tools that will be needed to complete the following steps are:

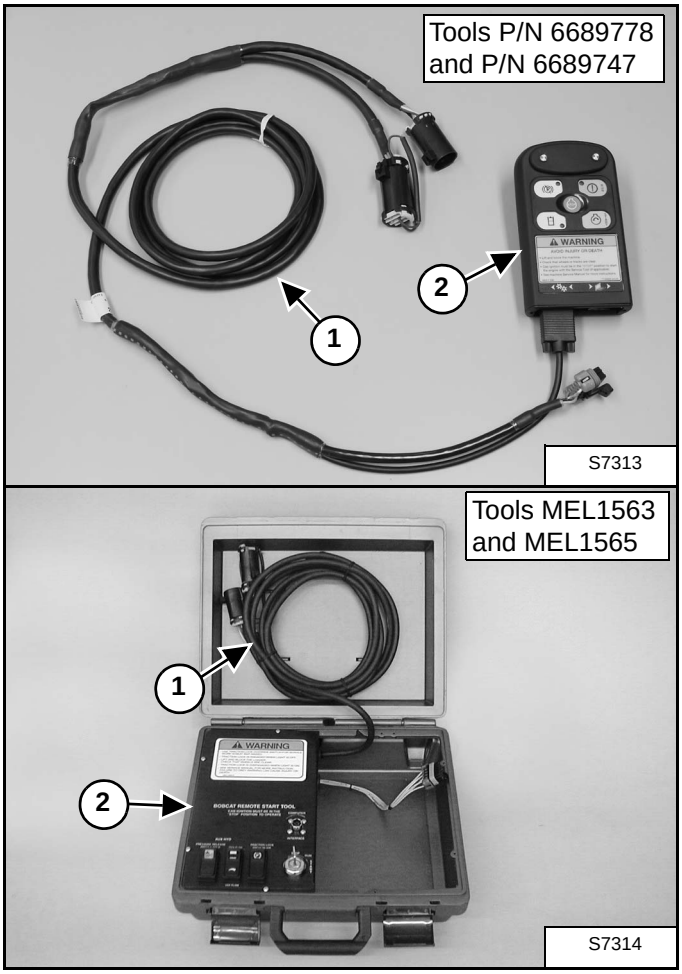
Order from Bobcat Parts P/N: 6689779 - Remote Start Tool (Service Tool) Kit

Kit P/N 6689779 Includes:
6689778 - Remote Start Tool (Service Tool)
6689747 - Service Tool Harness
6689746 - Computer Service Tool Harness
6689745 - BOSS® Service Tool Harness

OR, instead of kit P/N 6689779, the following two tools can be used:

MEL1563 - Remote Start Tool
MEL1565 - Service Tool Harness Control

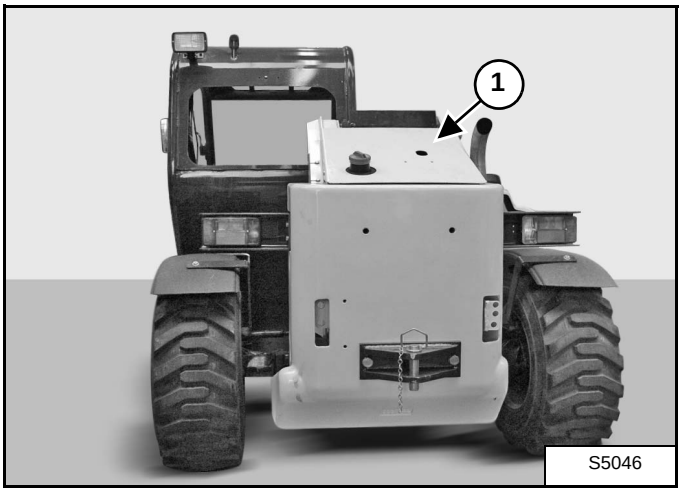
Figure 10-180-1



The service tool harness control (Item 1) is used to connect the remote start tool (Item 2) **[Figure 10-180-1]** to the electrical system on the Telescopic Handler.

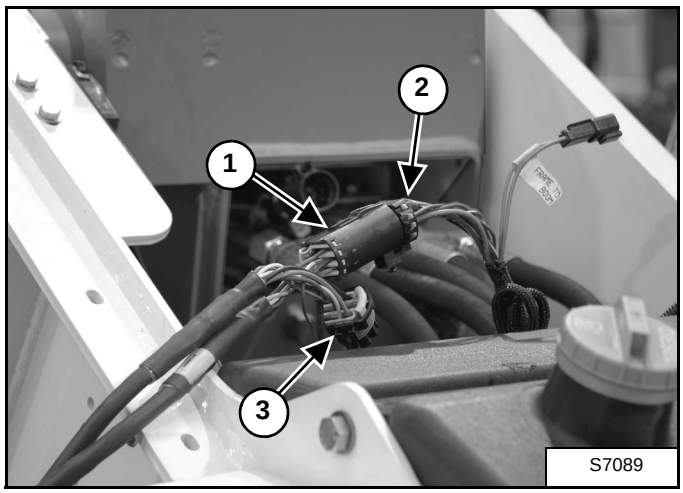
Connecting to the Telescopic Handler (Cont'd)

Figure 10-180-2



Remove the rear cover (Item 1) **[Figure 10-180-2]** from the Telescopic Handler.

Figure 10-180-3



Connect the main connector (Item 1) of the Service Tool Harness Control to the machine frame harness connector (Item 2) **[Figure 10-180-3]**, located in the rear of the machine.

For machines with an attachment control harness, the attachment harness must first be disconnected from the Telescopic Handler harness.

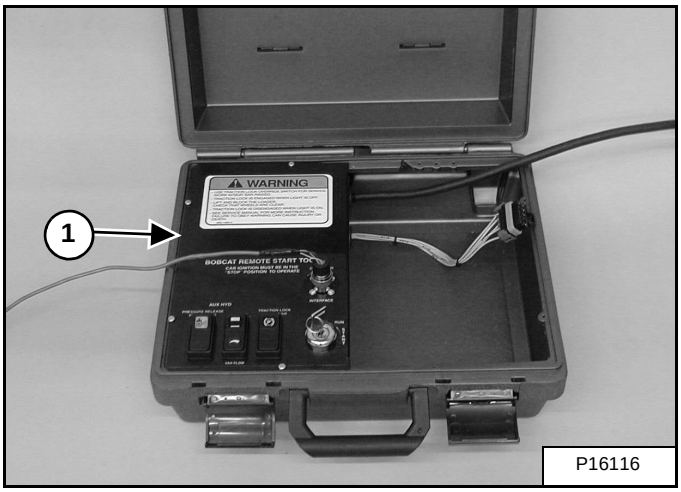
NOTE: The remote start tool connection harness has two connectors (Item 1) and (Item 3). The main connector (Item 1) is always used for connection to the engine harness [Figure 10-180-3].

The second connector (Item 3) [Figure 10-180-3] is used for attachment ACD upgrades or attachment operational diagnostics only. This connector has a cap attached to it to prevent damage or corrosion when not in use.

NOTE: The key switch on the machine operator panel must be in the off position or the Remote Start Kit will not operate.

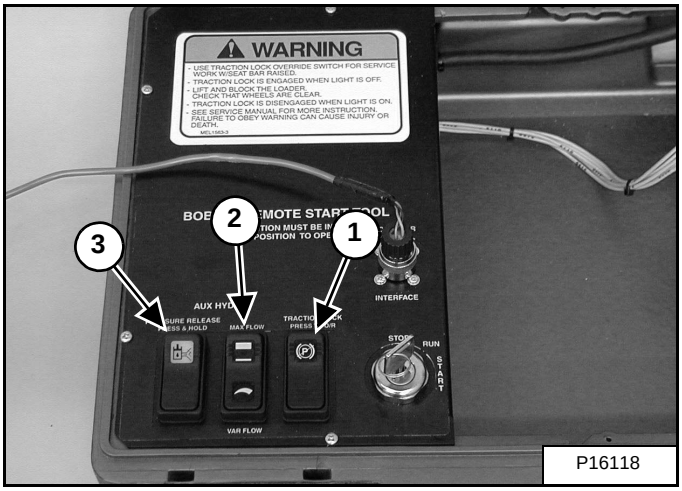
Remote Start Procedure (For Tools MEL1563 and MEL1565)

Figure 10-180-4



The remote start tool (Item 1) **[Figure 10-180-4]** has three rocker switches.

Figure 10-180-5



The traction lock switch (Item 1) **[Figure 10-180-5]** is used to turn traction lock on or off. Push the switch to the override position. The switch will illuminate to indicate traction lock OVERRIDE, in this position the wheels are able to turn.

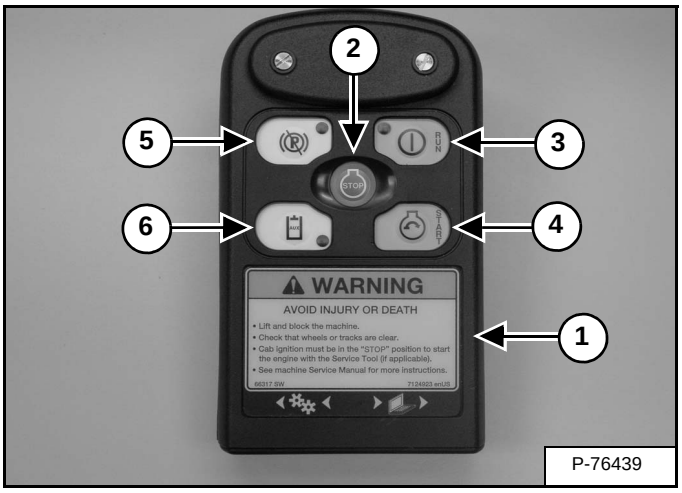
The maximum flow/variable flow switch (Item 2) **[Figure 10-180-5]** is used to activate the auxiliary hydraulics. Pressing the switch once will activate variable flow. Pressing the switch again will activate maximum flow. The switch will illuminate to indicate which flow rate is active. Pressing the switch a third time will turn the flow OFF. The switch is used when checking pressures and flow rate.

The auxiliary pressure release (Item 3) **[Figure 10-180-5]** is used to release hydraulic pressure to the front and/or rear auxiliary couplers. To release pressure; push and hold the switch for three seconds.

NOTE: With the engine running; pushing and holding the pressure release switch will cause the engine to stop in three seconds. To relieve the pressure; continue to press the switch after the engine has stopped.

Remote Start Procedure (For Tool Kit P/N 6689779)

Figure 10-180-6



The Remote Start Tool (Service Tool) (Item 1) **[Figure 10-180-6]** has five buttons.

The STOP button (Item 2) **[Figure 10-180-6]** is used to stop the Remote Start Tool (Service Tool) from communicating and stop the Telescopic Handler engine.

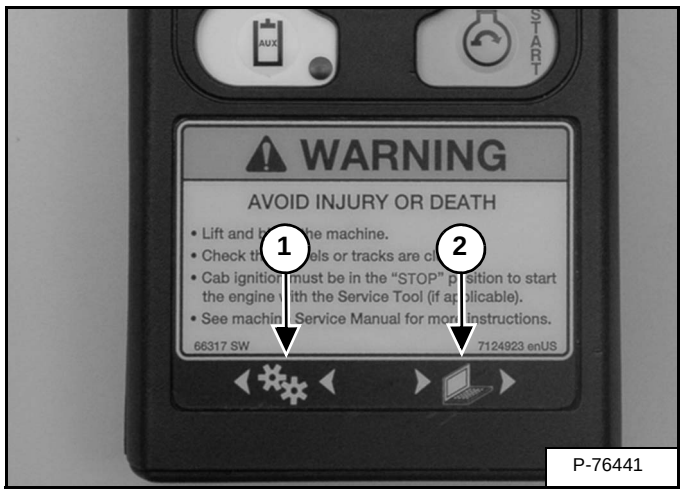
The RUN button (Item 3) **[Figure 10-180-6]** is used to turn the Remote Start Tool (Service Tool) on and activates the ignition power. The button will illuminate to indicate the service tool is active.

The START button (Item 4) **[Figure 10-180-6]** is used to start the engine.

The traction lock button (Item 5) **[Figure 10-180-6]** is used to turn traction lock ON or OFF. Push the button and the button will illuminate indicating the traction lock is disabled in which the wheels or tracks are able to turn.

The auxiliary button (Item 6) **[Figure 10-180-6]** is used to activate the auxiliary hydraulics. The button will illuminate to indicate the auxiliary hydraulics are active. Pressing the button a second time will turn the flow OFF. The button is used when checking pressures and flow rate.

Figure 10-180-7



The gear icon with the left facing arrows (Item 1) **[Figure 10-180-7]** will illuminate and blink when the RUN key is pressed and the Telescopic Handler is communicating with the service tool.

The computer icon with the right facing arrows (Item 2) **[Figure 10-180-7]** will illuminate and blink when the Remote Start Tool (Service Tool) is transmitting data to and from the computer.

NOTE: To relieve the pressure at the rear or secondary front auxiliary, (if equipped) press the RUN button on the remote start tool. Then press the auxiliary (AUX) hydraulics button on the remote start tool and move the AUXILIARY Hydraulic Switch on the Telescopic Handler to the right and left several times.

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GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS

SYMBOL DESCRIPTION

FLOW LINES and CONNECTIONS

WORKING CIRCUITS - Continuous, Solid Line - Working (Main) Line, Return Line (line conducting fluid from working devices to the reservoir) and Feed Line (main line conductor)

PILOT PRESSURE - Dashed Line - Pilot Line (line which conducts control fluid)

DRAIN CIRCUITS - Dotted Line - Drain Line (drain or bleed line - line conducting fluid from a component housing to the reservoir)

COMPONENTS - Long Chain Line - Enclosure outline for several components assembled in one unit

MECHANICAL CONNECTIONS - Double Line (Shaft, Lever, Piston Rod)

CONNECTED JUNCTION OF OIL LINES (Flow Line Connection)

OIL LINES CROSSING (NOT Connected)

COUPLER - Quick-Acting Coupling (uncoupled, closed by non-return valve)

SYMBOL DESCRIPTION

BASIC and MISCELLANEOUS SYMBOLS

RESTRICTION - Line with Fixed Restriction - Affected by Viscosity (property of resistance to flowing fluid)

VARIABLE ADJUSTMENT RESTRICTION - Regulated or Variable Restriction

TEMPERATURE CONTROL - (indication of temperature)

TEMPERATURE INDICATOR - (temperature measurement - thermometer)

FILTER (strainer or screen) - For fluid conditioning

VENTED AND FILTERED RESERVOIR (reservoir open to atmosphere)

OIL COOLER (heat exchanger) - The arrows in the diamond indicate the extraction of heat (heat dissipation)

PRESSURE SENSOR - Varies electric signal with pressure

DIFFERENTIAL PRESSURE SWITCH - Switch activates when pressure difference reaches specified level

PRESSURE SWITCH - Switch activates when pressure reaches specified level

MUFFLER (silencer) - Reduces noise

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GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS

SYMBOL DESCRIPTION

CYLINDER: Equipment to convert hydraulic energy into linear energy and in which the fluid pressure operates alternately in both directions (forward and backward strokes)

DOUBLE ACTING HYDRAULIC CYLINDER, UNEQUAL DISPLACEMENT - With single piston rod

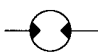
DOUBLE ACTING HYDRAULIC CYLINDER, UNEQUAL DISPLACEMENT and CUSHION ON ONE END - With single piston rod

PUMP: To convert mechanical energy into hydraulic energy

FIXED CAPACITY DISPLACEMENT HYDRAULIC PUMP - With one direction of flow

VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDRAULIC PUMP - With two directions of flow (bidirectional)

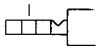
MOTOR: To convert hydraulic energy into rotary mechanical energy



FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDRAULIC MOTOR - With two directions of flow (bidirectional)

SYMBOL DESCRIPTION

CONTROL MECHANISMS



CONTROL VALVE WITH DETENT (Holds Valve in Position) - device for maintaining a given position (mechanical)

CONTROL VALVE ACTIVATED BY A PULL BUTTON (manual)

CONTROL VALVE ACTIVATED BY A PUSH-PULL BUTTON (manual)

CONTROL VALVE ACTIVATED BY A LEVER (manual)

CONTROL VALVE ACTIVATED BY A PEDAL (manual)

CONTROL VALVE WITH SPRING RETURN (mechanical)

CONTROL VALVE ACTIVATED BY AN ELECTRIC SOLENOID (electrical)

CONTROL VALVE ACTIVATED BY PILOT PRESSURE (indirect control, pilot actuated by application of pressure)

mc-2340-2

Thank you very much for your reading.

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