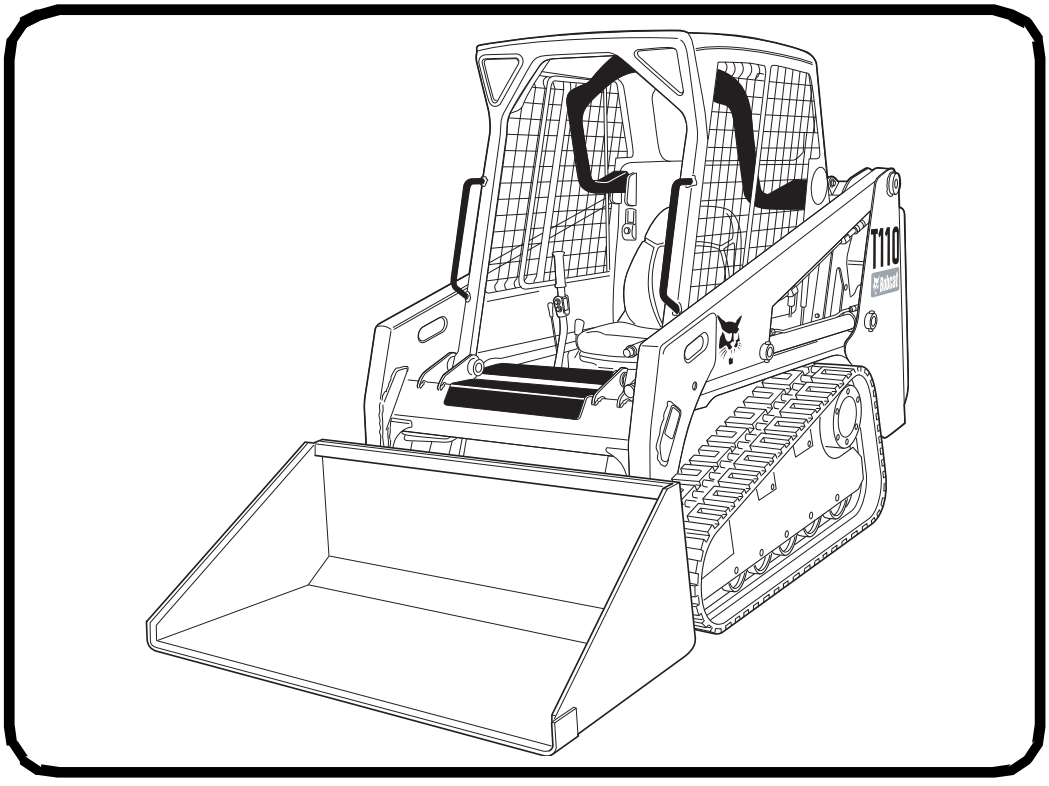
Bobcat®

Service Manual
T110 Compact Track Loader

S/N AE0H11001 & Above
S/N AE0J11001 & Above



EQUIPPED WITH
BOBCAT INTERLOCK
CONTROL SYSTEM (BICS™)

6904979enUS (08-17) (L)

Printed in U.S.A.

SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

AVOID INJURY OR DEATH

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-2003-0807

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:

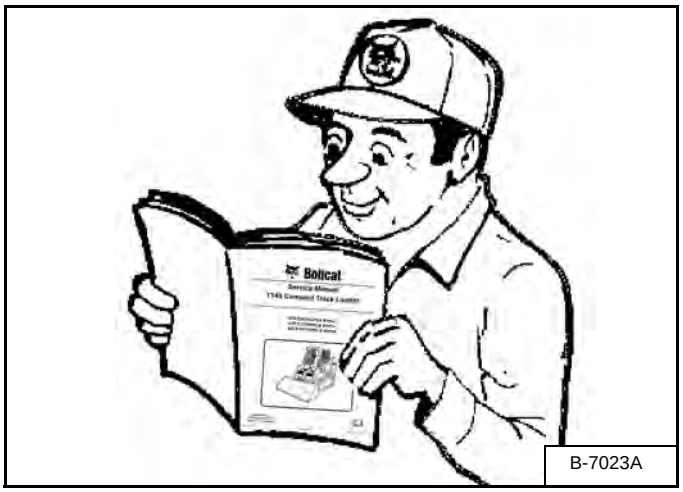
- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment contains operating information as well as routine maintenance and service 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.
- An Operator's Handbook fastened to the operator cab. It's brief instructions are convenient to the operator. The handbook is available from your dealer in an English edition or one of many other languages. See your Bobcat dealer for more information on translated versions.
- The AEM Safety Manual delivered with the machine gives general safety information.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.
- The Skid-Steer Loader Operator Training Course is available through your local dealer or at **bobcat.com/training** or **bobcat.com**. This course is intended to provide rules and practices of correct operation of the skid-steer loader. The course is available in English and Spanish versions.
- Service Safety Training Courses are available from your Bobcat dealer or at **bobcat.com/training** or **bobcat.com**. They provide information for safe and correct service procedures.
- The Skid-Steer Loader Safety Video is available from your Bobcat dealer or at **bobcat.com/training** or **bobcat.com**.

SI SSL-1016 SM

LIFTING AND BLOCKING THE LOADER

Procedure

Figure 10-10-1



WARNING

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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-2003-0807

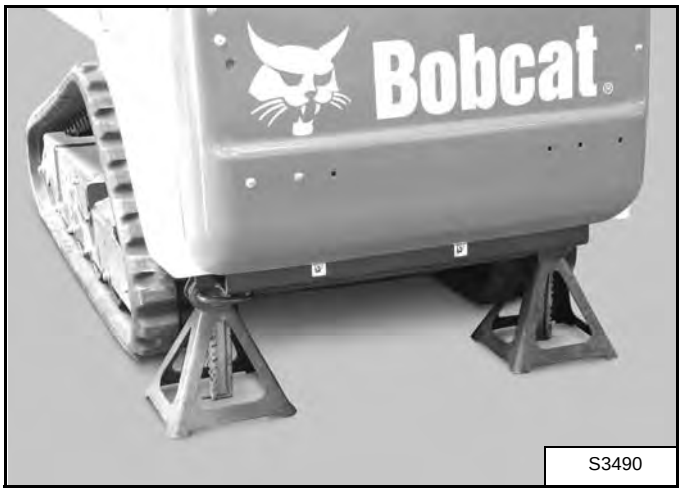
Always park the loader on a level surface.

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.

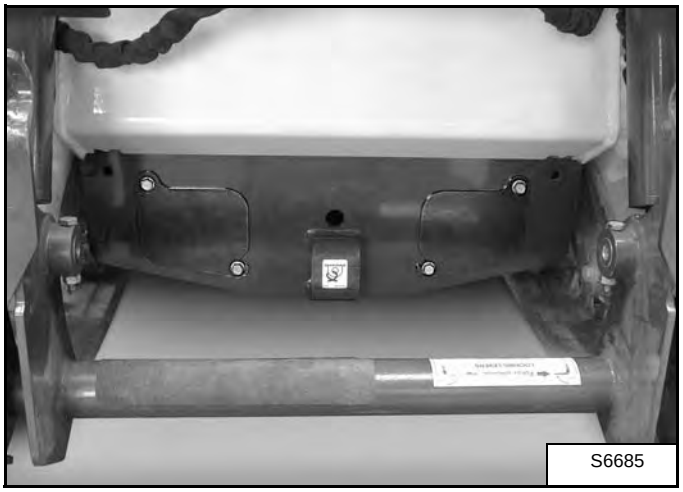
W-2017-0286

Figure 10-10-2



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

Figure 10-10-3



Remove the front cover plates **[Figure 10-10-3]**.

TOWING THE LOADER

Procedure

Because of the design of the loader, there is not a recommended towing procedure.

- The loader can be lifted onto a transport vehicle.

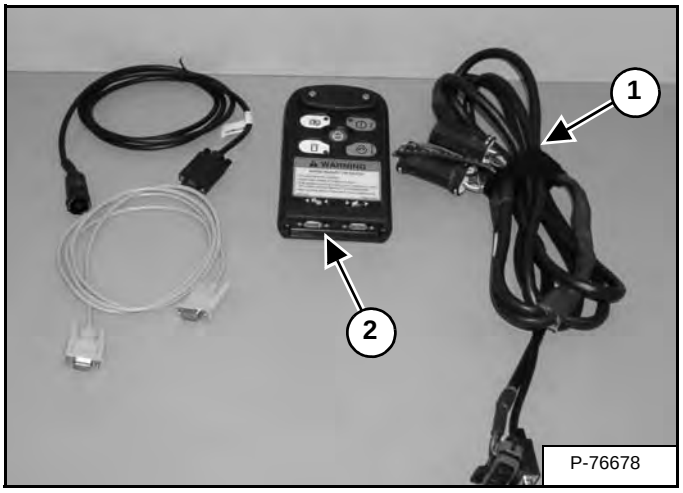
- The loader can be skidded a short distance to move for service (EXAMPLE: Move onto a transport vehicle.) without damage to the hydrostatic system. (The tracks will not turn.) There might be slight wear to the tracks when the loader is skidded.

  The towing chain (or cable) must be rated at 1.5 times the weight of the loader. (See Performance on Page SPEC-10-2.)

REMOTE START TOOL (SERVICE TOOL) KIT - 7217666 (CONT'D)

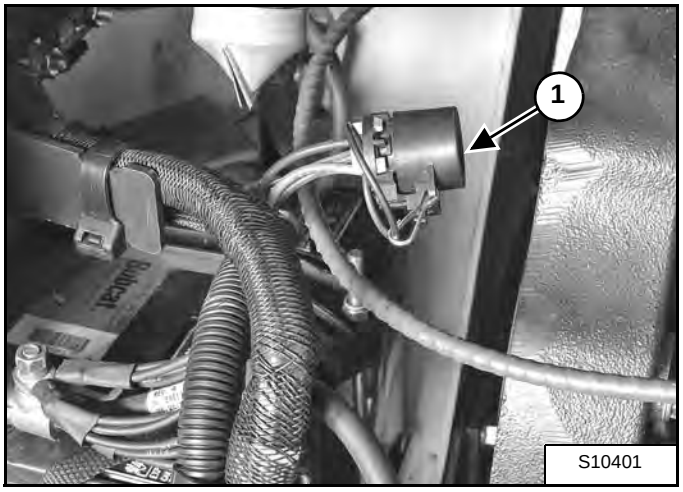
Loader Service Tool Harness - 6689747

Figure 10-61-3



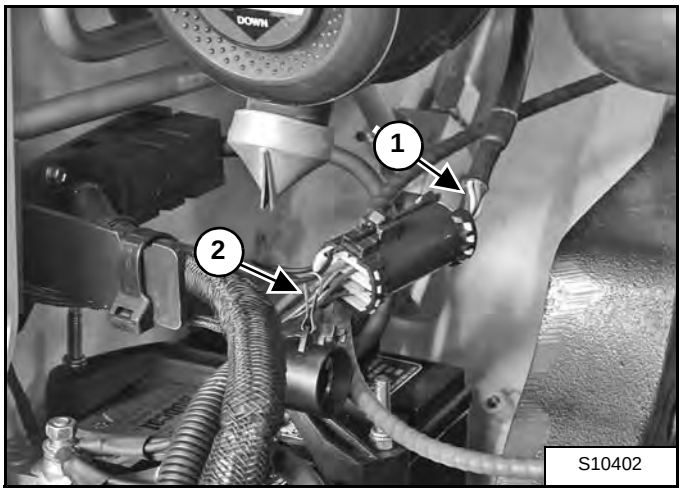
The loader service tool harness (Item 1) is used to connect the remote start tool (service tool) (Item 2) **[Figure 10-61-3]** to the electrical system on the loader.

Figure 10-61-4



Loaders without an attachment control harness, remove the loader harness cap (Item 1) **[Figure 10-61-4]** and connect the Loader Service Tool Harness, from the Remote Start Tool (Service Tool), to the loader harness connector.

Figure 10-61-5



Loaders with an attachment control harness (7 pin or 14 pin), the attachment harness (Item 1) must be disconnected from the loader harness (Item 2) **[Figure 10-61-5]**.

When the remote start procedure is completed, replace the loader connector cap (Item 1) **[Figure 10-61-4]** or reconnect the attachment control harness to the loader harness **[Figure 10-61-5]**.

ENGINE COOLING SYSTEM

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

⚠ WARNING

AVOID INJURY OR DEATH

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.**

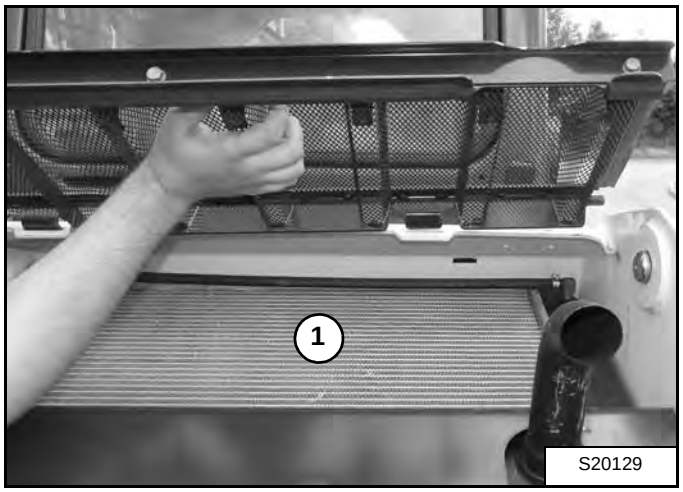
W-2019-0907

Cleaning

Open the rear door. (See the Operation & Maintenance Manual for the correct procedure.)

Remove the rear grille. (See the Operation & Maintenance Manual for the correct procedure.)

Figure 10-90-1



Use low air pressure or water pressure to clean the top of the radiator (Item 1) **[Figure 10-90-1]**.

Check the cooling system for leaks.

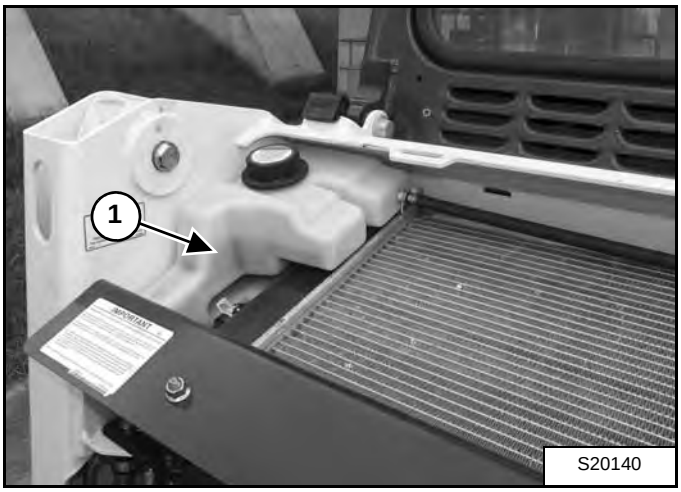
Install the rear grille and close the rear door.

Checking Level

Open the rear door. (See the Operation & Maintenance Manual for the correct procedure.)

Remove the rear grille. (See the Operation & Maintenance Manual for the correct procedure.)

Figure 10-90-2



Check coolant level using the level markers (Item 1) **[Figure 10-90-2]** on the tank. Coolant must be between the top and bottom markers when the engine is cold.

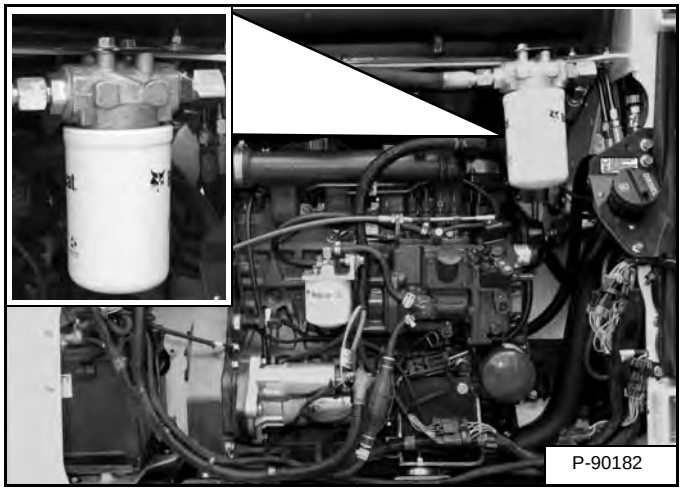
Install the rear grille and close the rear door.

Removing And Replacing Hydraulic / Hydrostatic Filter

For the correct service interval. (See SERVICE SCHEDULE on Page 10-70-1.)

Open the rear door. (See the Operation & Maintenance Manual for the correct procedure.)

Figure 10-120-5



Remove the filter (Inset) **[Figure 10-120-5]**.

Clean the surface of the filter housing where the filter seal contacts the housing.

Put clean oil on the seal of the new filter element. Install and hand tighten the filter element.

⚠ 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.

W-2103-0508

Close the rear door.

Start the engine and operate the loader hydraulic controls.

Stop the engine and check for leaks at the filter.

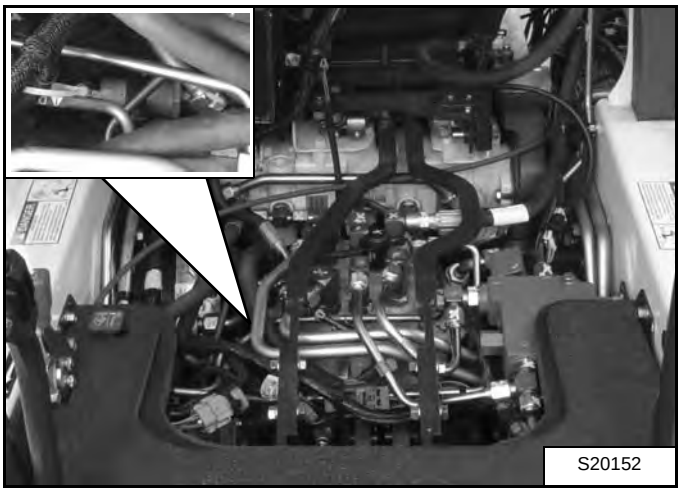
Check the fluid level in the reservoir and add as needed. (See Checking And Adding Fluid on Page 10-120-1.)

Removing And Replacing Case Drain Filters

For the correct service interval (See SERVICE SCHEDULE on Page 10-70-1.).

Raise the operator cab. (See Raising on Page 10-30-1.)

Figure 10-120-6



Disconnect the hoses and fittings at the ends of both case drain filters (Inset) **[Figure 10-120-6]**.

Remove the mounting clamp from the filters.

Install fittings on new filters.

Install new filters, install mounting clamp.

Reconnect and tighten hoses.

⚠ 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.

W-2103-0508

Lower the operator cab. (See Lowering on Page 10-30-2.)

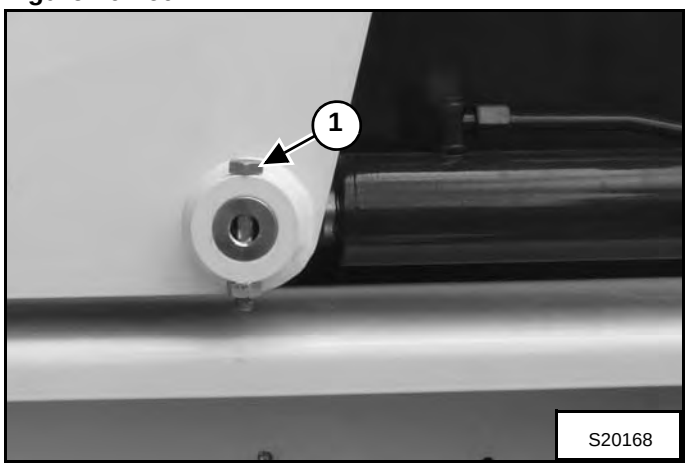
Start the engine and operate the loader hydraulic controls. Stop the engine and check for leaks.

Check the fluid level in the reservoir and add as needed. (See Checking And Adding Fluid on Page 10-120-1.)

PIVOT PINS

Inspection And Maintenance

Figure 10-160-1



All lift arm and cylinder pivots have a large pin held in position with a retainer bolt and lock nut (1) **[Figure 10-160-1]**.

Figure 10-160-2

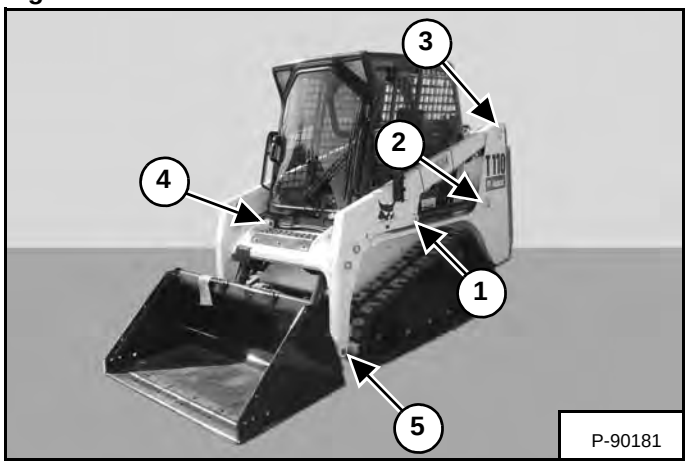
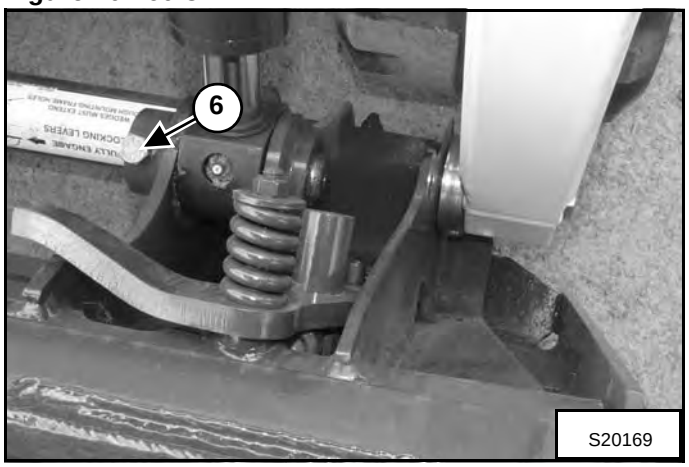


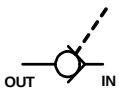
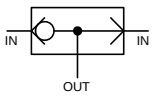
Figure 10-160-3

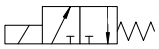
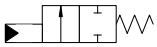
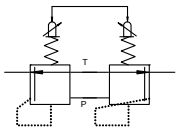
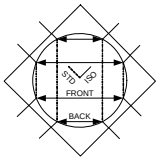
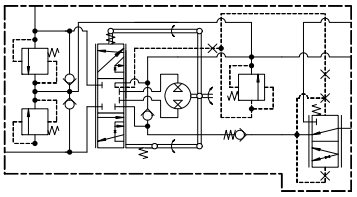
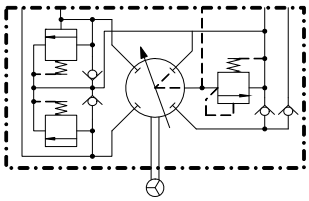
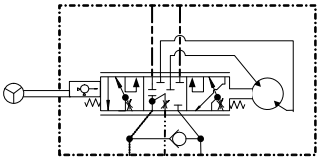


Check that the lock nuts are tightened to 48 - 54 N•m (35 - 40 ft-lb) torque (Both Sides) (Items 1 - 6) **[Figure 10-160-2]** and **[Figure 10-160-3]**.

HYDRAULIC SYSTEM

Glossary Of Hydraulic / Hydrostatic Symbols (Cont'd)

SYMBOL	DESCRIPTION
NON-RETURN VALVE, SHUTTLE VALVE: Valve which allows free flow in one direction only.	
	NON-RETURN VALVE (Check Valve) - Used as Replenishing Valve, Lock Check Valve or Anticavitation Valve - Opens if the Inlet pressure is higher than the Outlet pressure. Often contains internal spring which has NO significant pressure value.
	SPRING LOADED VALVE (bypass Valve) - Opens if the Inlet pressure is greater than the Outlet pressure plus the spring pressure.
	PILOT CONTROLLED NON-RETURN VALVE- It is possible to open the valve by pilot pressure.
	SHUTTLE VALVE - The Inlet port connected to the higher pressure is automatically connected to the Outlet port while the other Inlet port is closed.

SYMBOL	DESCRIPTION
DIRECTIONAL CONTROL VALVE: Valve providing for the opening (fully or restricted) or the closing of one or more flow paths (represented by several squares).	
	TWO PORTS and CLOSED FLOW PATHS
	SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) - controlled by an electric solenoid (with return spring).
	PILOT ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) - controlled by pressure (with return spring).
	MANUALLY ACTIVATED DIRECTION CONTROL VALVE (Variable Position) Joystick Controlled, variable pressure to shift the pilot activated directional control valve spool.
	MANUALLY ACTIVATED FLOW CONTROL VALVE (Two Position) allows for changing pilot flow to control switching joystick functions for STD / ISO Control (Excavators Only).
	STEERING CONTROL VALVE (Variable Position) - Used for controlling the hydraulic flow for the steering cylinders in relationship to the amount the steering wheel is rotated.
	
	

CYLINDER (TILT)

Testing

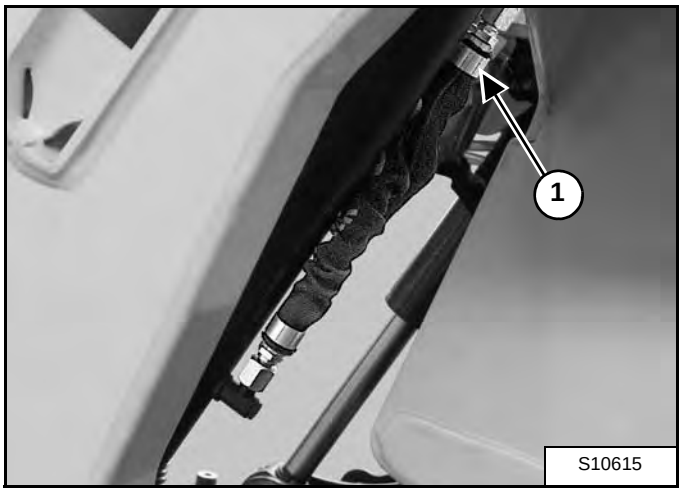
Remove the attachment. Roll the Bob-Tach fully back. Stop the engine. Raise the seat bar.

⚠ WARNING

Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possible death if proper medical treatment by a physician familiar with this injury is not received immediately.

W-2145-0290

Figure 20-21-1



Disconnect the hose which goes to the base end of the tilt cylinder (Item 1) **[Figure 20-21-1]**.

Install a cap on the hose fitting and tighten.

Engage the parking brake. Lower the seat bar.

Start the engine and push the Press to Operate button. Push the bottom (heel) of the tilt pedal.

If there is leakage from the open port, remove the tilt cylinder for repair.

Removal And Installation

⚠ WARNING

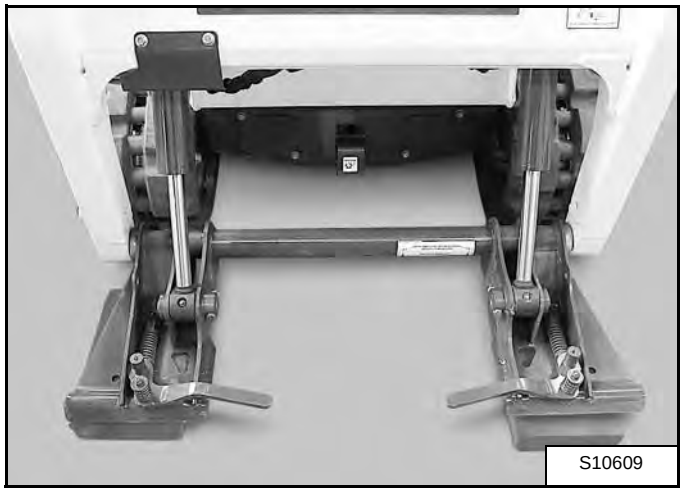
AVOID INJURY OR DEATH

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.

W-2103-0508

Removal procedure will be explained for the right tilt cylinder. Removal procedure for the left cylinder is similar.

Figure 20-21-2



Remove the attachment. Roll the Bob-Tach forward and lower the lift arms.

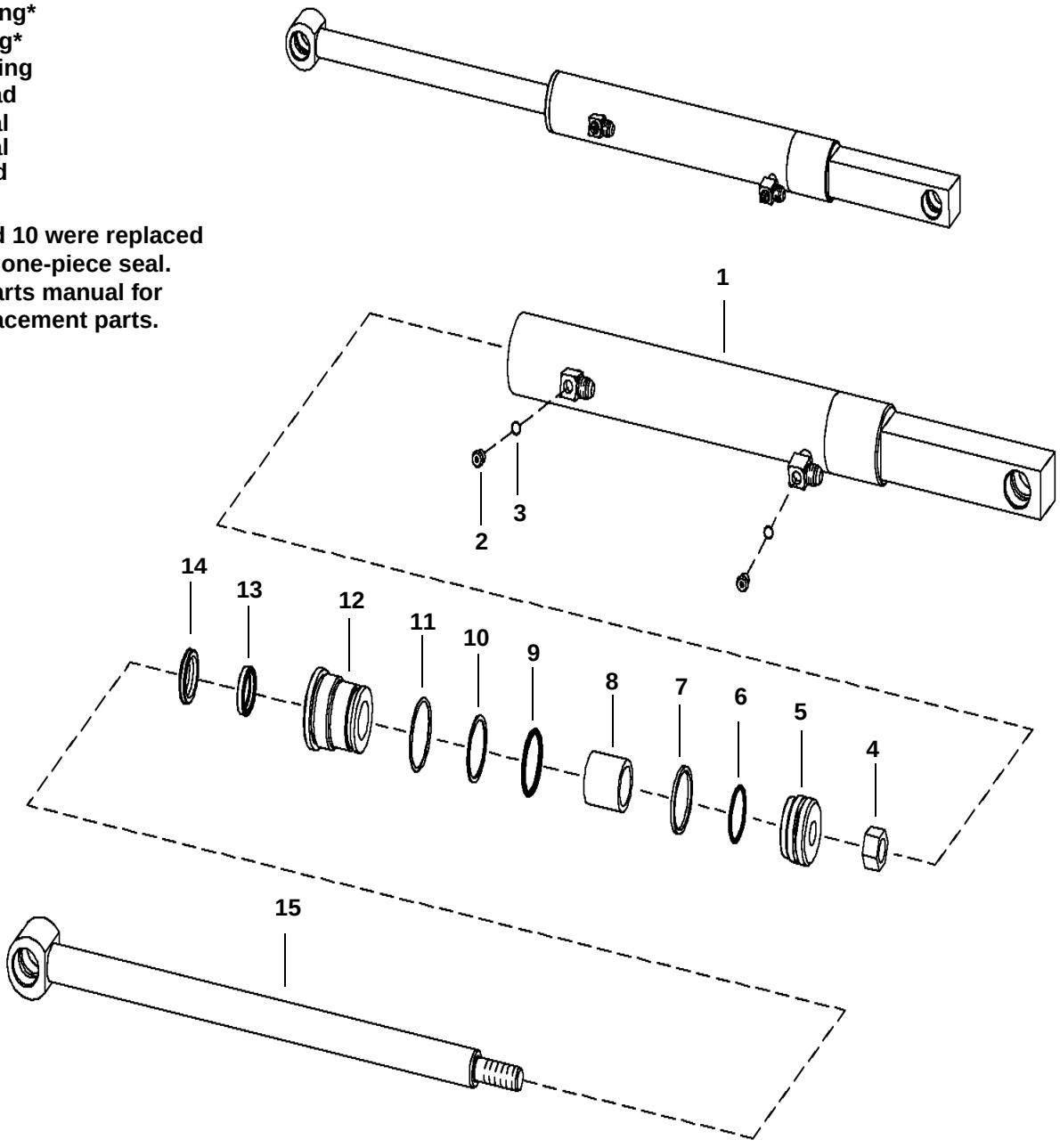
Place the Bob-Tach flat on a pallet to allow the tilt cylinder base end pin enough clearance to be removed **[Figure 20-21-2]**.

Stop the engine. Move the tilt pedal to release the hydraulic pressure. Raise the seat bar.

Parts Identification

1. Cylinder
2. Plug
3. O-ring
4. Nut
5. Piston
6. O-ring
7. Ring
8. Spacer
9. O-ring*
10. Ring*
11. O-ring
12. Head
13. Seal
14. Seal
15. Rod

* 9 and 10 were replaced by a one-piece seal. See parts manual for replacement parts.



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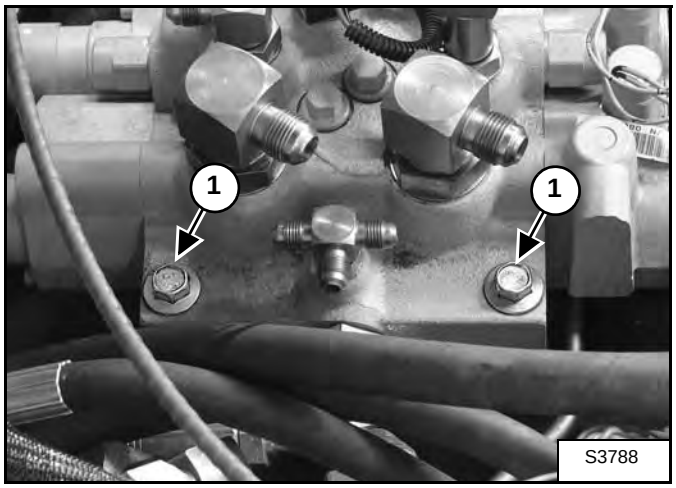
Removal And Installation (Cont'd)

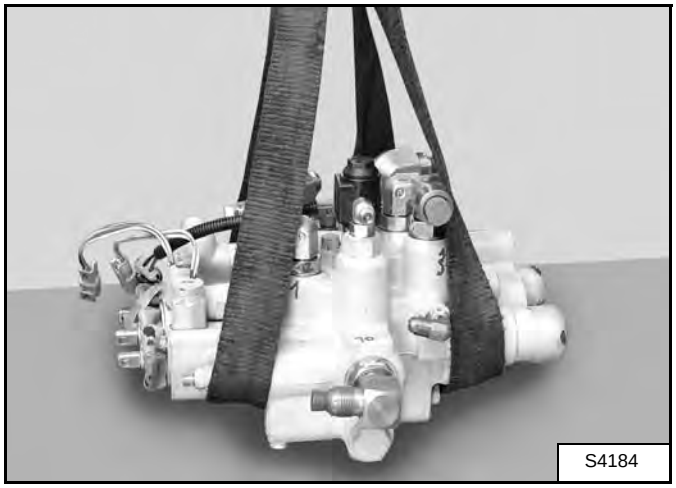
Figure 20-40-5



Remove the two screws (Item 1) **[Figure 20-40-5]**.

Installation: Tighten the bolts to 54 - 68 N•m (40 - 50 ft-lb) torque.

Figure 20-40-6

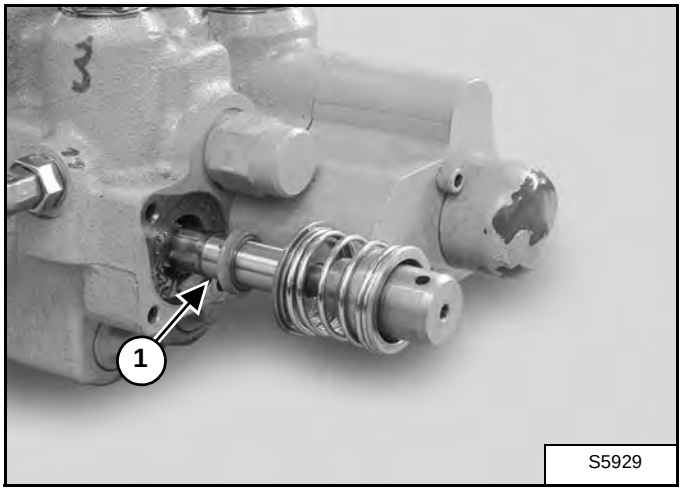


Remove the hydraulic control valve from the loader by means of a hoist **[Figure 20-40-6]**.

NOTE: Make sure the hydraulic control valve is well supported when putting it down.

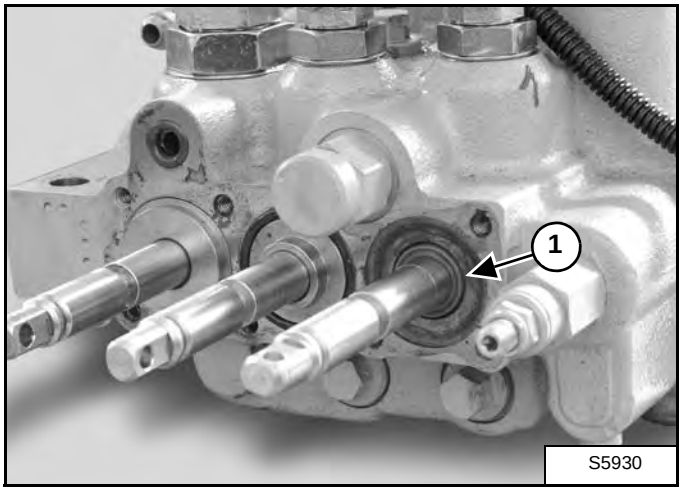
Lift Spool And Detent Removal And Installation (Cont'd)

Figure 20-40-36



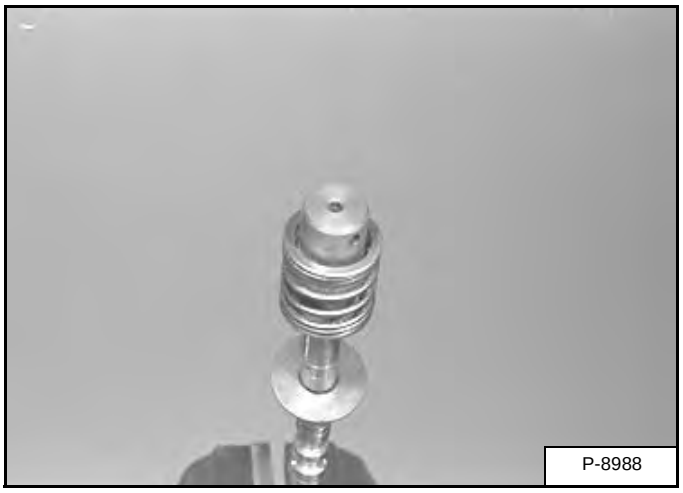
Remove the lift spool assembly and seal (Item 1) **[Figure 20-40-36]** from the control valve.

Figure 20-40-37



Remove the lift spool seal (Item 1) **[Figure 20-40-37]** from the linkage end of the valve.

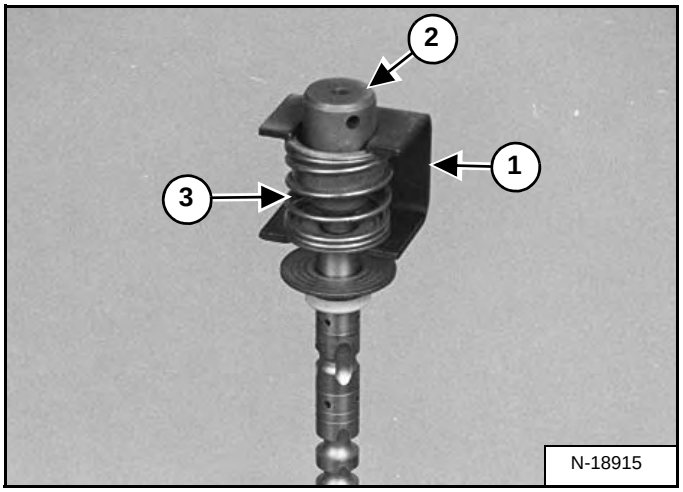
Figure 20-40-38



Clamp the linkage end of the spool in a vise **[Figure 20-40-38]**.

NOTE: Protect spool before clamping in vise.

Figure 20-40-39



Install the spring tool (Item 1) **[Figure 20-40-39]** over the centering spring.

NOTE: Be careful when removing the detent adapter (Item 2) [Figure 20-40-39] from the centering spring, as it is under spring pressure.

NOTE: The centering spring (Item 3) [Figure 20-40-39] is white on all 700 series loaders.

Auxiliary Spool Removal And Installation

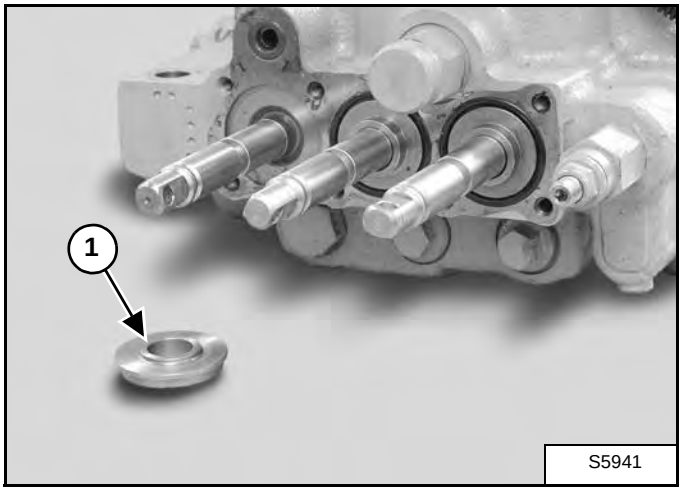
The tool listed will be needed to do the following procedure:

MEL 1278 - Detent Tool

MEL 1285 - Detent Spring Tool

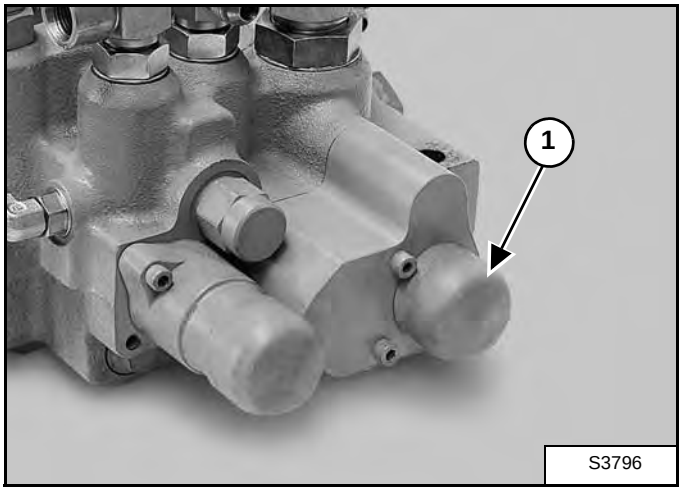
Remove the end cap / spool lock block from the control valve. (See End Cap / Spool Lock Block Removal And Installation on Page 20-40-11.)

Figure 20-40-76



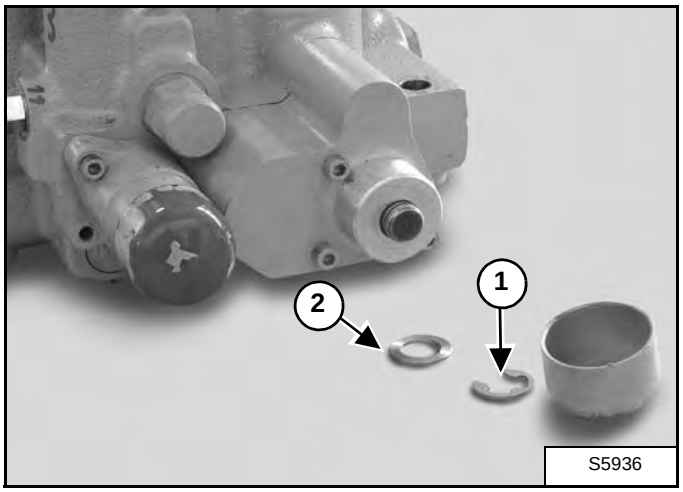
Remove the spacer (Item 1) **[Figure 20-40-76]** from the auxiliary spool.

Figure 20-40-77



Remove the end cap (Item 1) **[Figure 20-40-77]**.

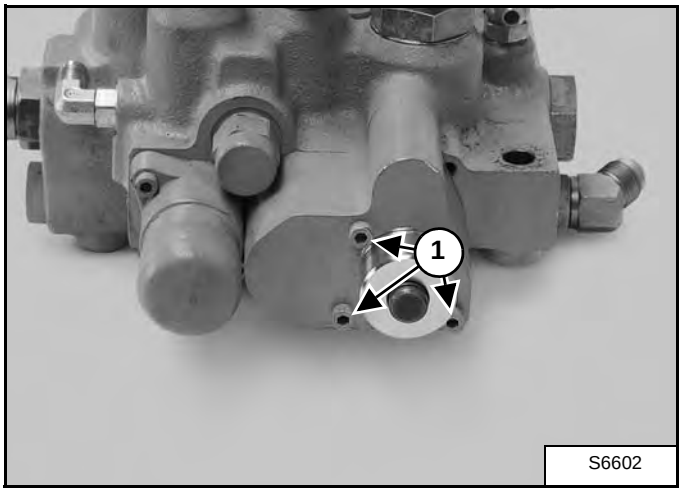
Figure 20-40-78



Use a screwdriver to remove the snap ring (Item 1) **[Figure 20-40-78]**.

Remove the washer (Item 2) **[Figure 20-40-78]**.

Figure 20-40-79

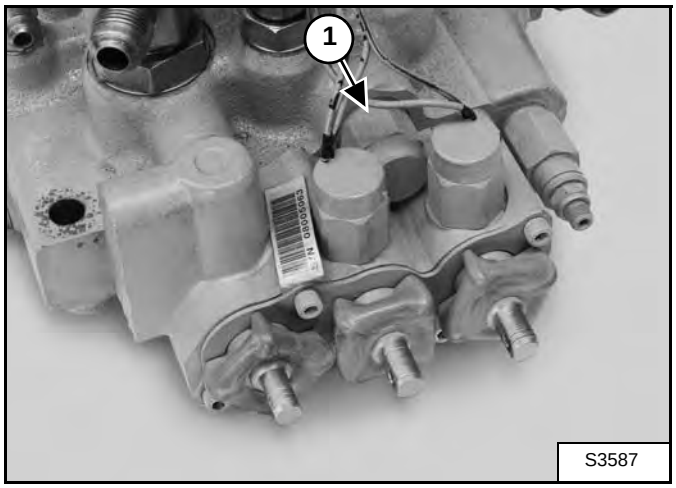


Remove the three bolts (Item 1) **[Figure 20-40-79]** from the spool centering block and remove the spool centering block.

Installation: Tighten the bolts to 10 - 11,3 N•m (90 - 100 in-lb) torque.

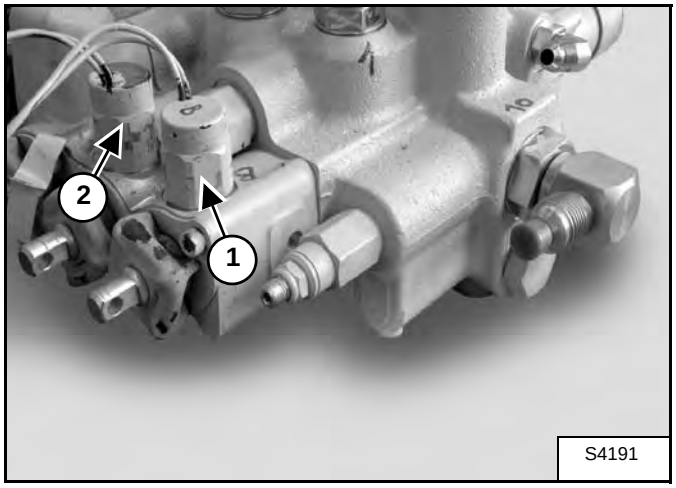
Lock Valve Removal And Installation (Cont'd)

Figure 20-40-112



Locate the tilt circuit lock valve (Item 1) **[Figure 20-40-112]**.

Figure 20-40-113

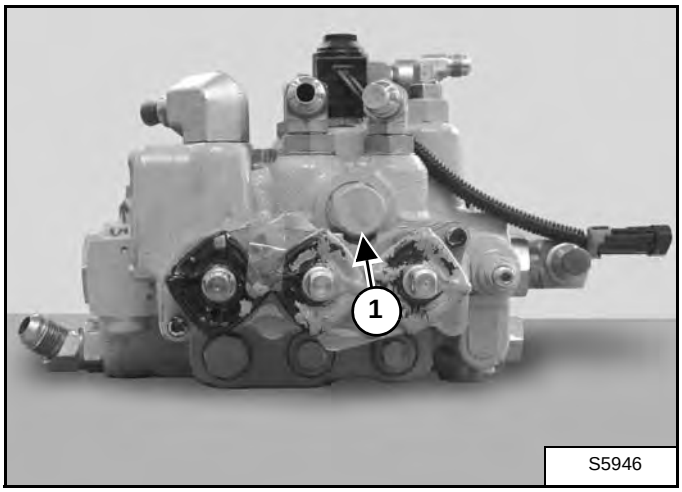


Remove the lift spool lock solenoid (Item 1) **[Figure 20-40-113]**.

Remove the tilt spool lock solenoid (Item 2) **[Figure 20-40-113]**.

Installation: Lubricate the O-rings and tighten the spool lock solenoids to 52 - 61 N•m (38 - 45 ft-lb) torque.

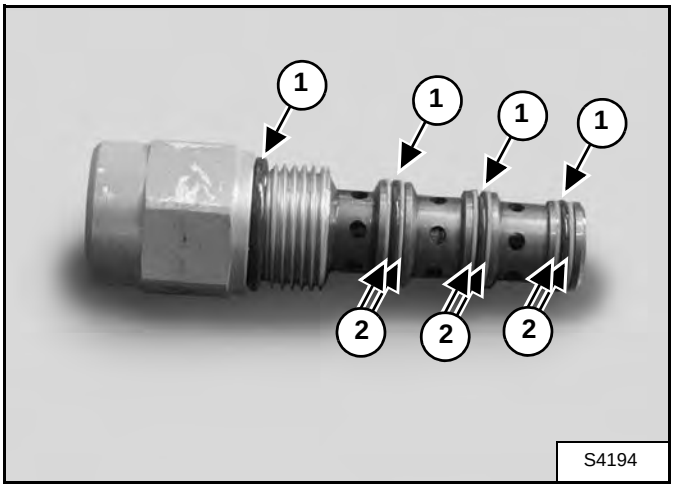
Figure 20-40-114



Remove the tilt lock valve (Item 1) **[Figure 20-40-114]** from the front of the control valve.

Installation: Lightly lubricate the lock valve O-rings and tighten to 27 - 33 N•m (20 - 24 ft-lb) torque.

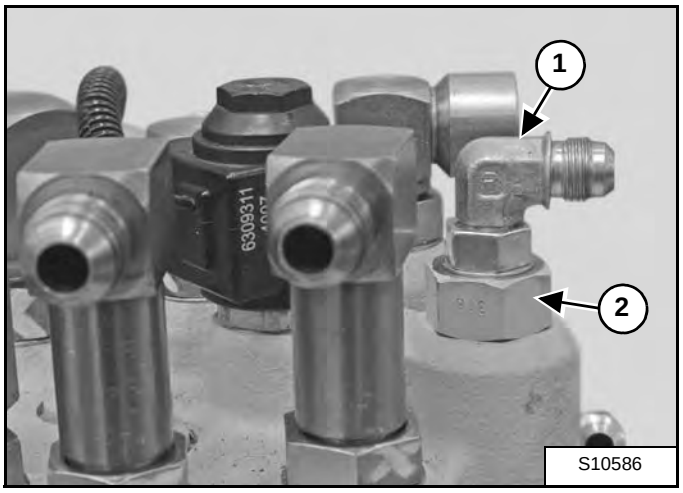
Figure 20-40-115



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-40-115]** from the tilt lock valve, and replace with new.

BICS™ Load Check Valve Removal And Installation

Figure 20-41-21

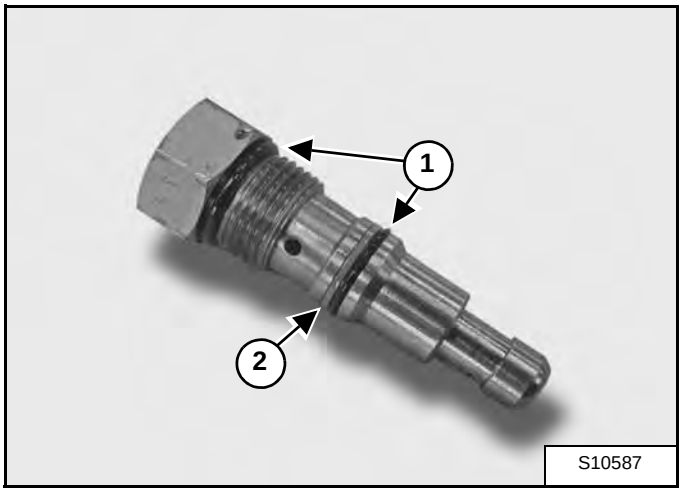


Remove the fitting (Item 1) **[Figure 20-41-21]** from the check valve.

Remove the BICS™ load check valve (Item 2) **[Figure 20-41-21]**.

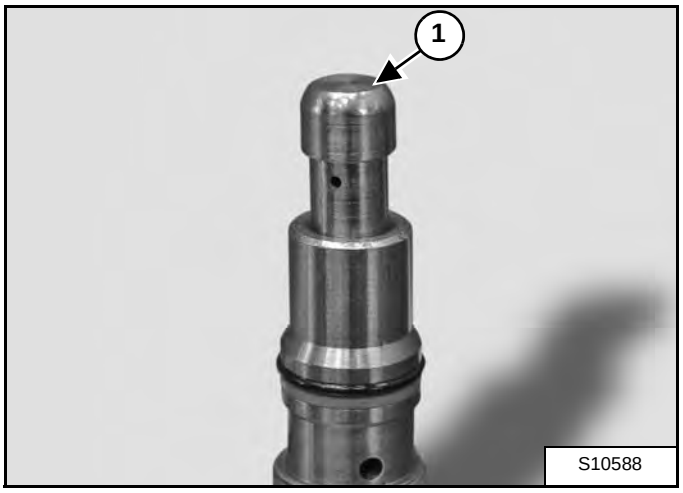
Installation: Lubricate and tighten the valve to 75 - 88 N•m (55 - 65 ft-lb) torque.

Figure 20-41-22



Remove and install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-41-22]**.

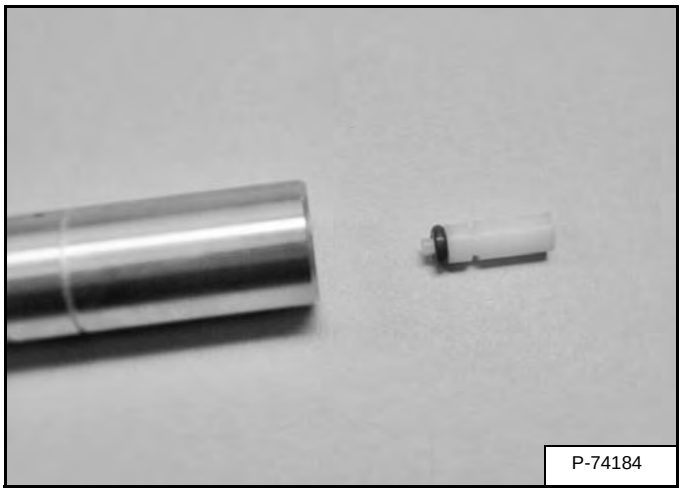
Figure 20-41-23



Check for free movement of the BICS™ load check valve (Item 1) **[Figure 20-41-23]**.

Lift Spool And Detent Removal And Installation (Cont'd)

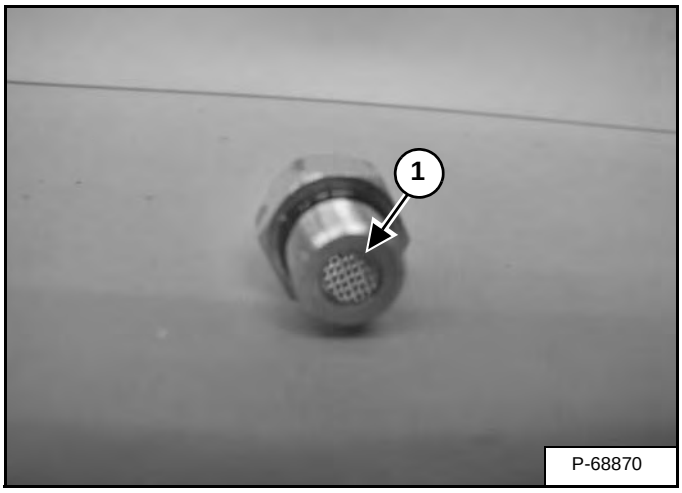
Figure 20-41-58



Install the plastic plug and O-ring in the spool **[Figure 20-41-58]**.

Check Valve Removal And Installation (Cont'd)

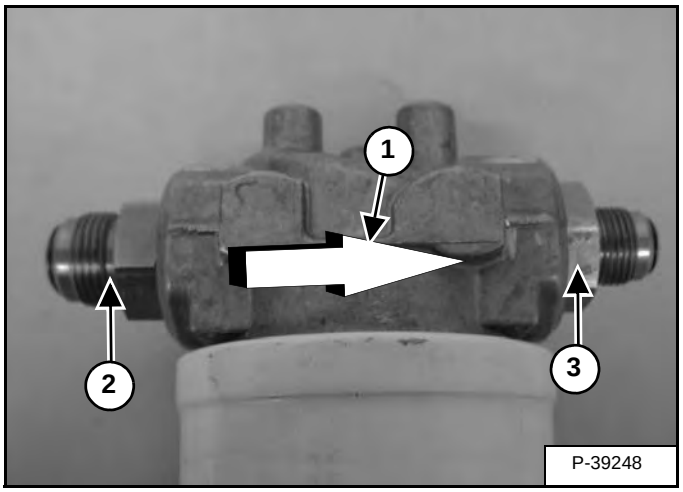
Figure 20-41-93



Inspect the screen (Item 1) **[Figure 20-41-93]**.

Direct Pump Test (Charge Section) (Cont'd)

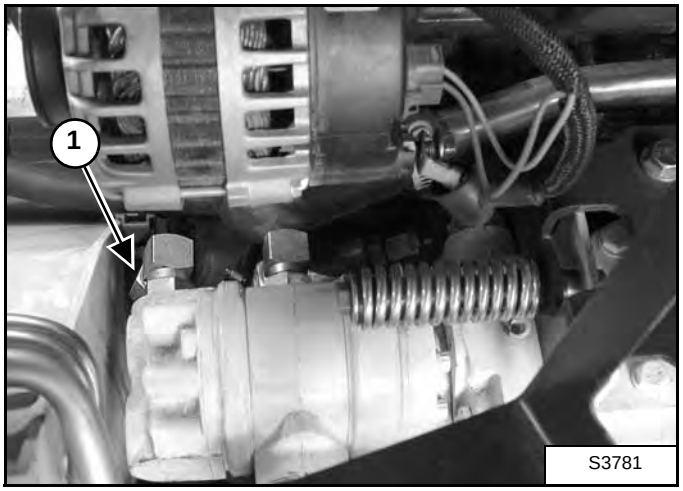
Figure 20-60-7



Install the fitting (15KB 1212-Straight Fitting) (Item 2) **[Figure 20-60-7]** in the filter housing inlet.

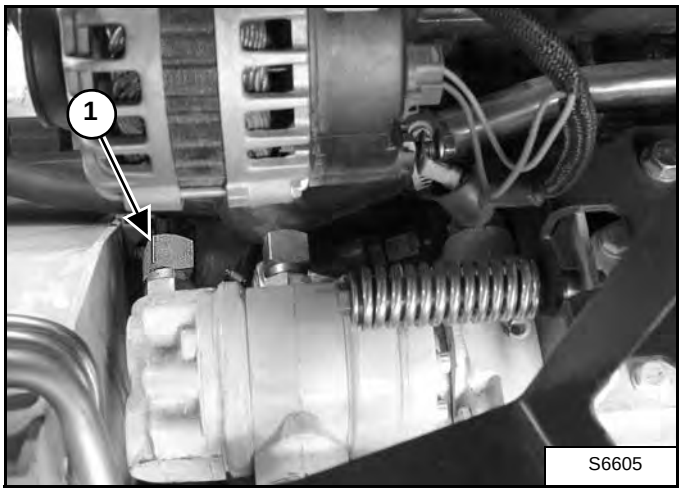
Install the fitting (15KB 0812-Reducer Fitting) (Item 3) **[Figure 20-60-7]** in the filter housing outlet.

Figure 20-60-8



Disconnect the OUTLET hose (Item 1) **[Figure 20-60-8]** from the charge pump.

Figure 20-60-9



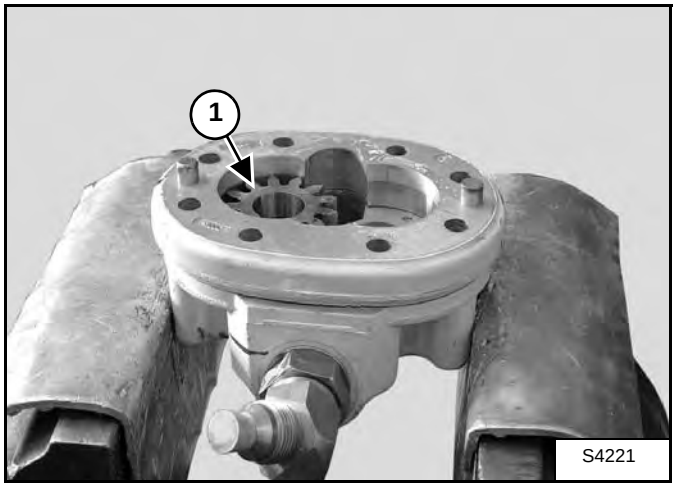
Connect the inlet hose from the hydraulic tester to the outlet fitting (Item 1) **[Figure 20-60-9]** of the charge pump.

Connect the outlet fitting on the hydraulic filter to the hose that was removed from the charge pump.

Connect the outlet hose on the hydraulic tester to the inlet fitting on the hydraulic filter assembly.

Disassembly And Assembly (Cont'd)

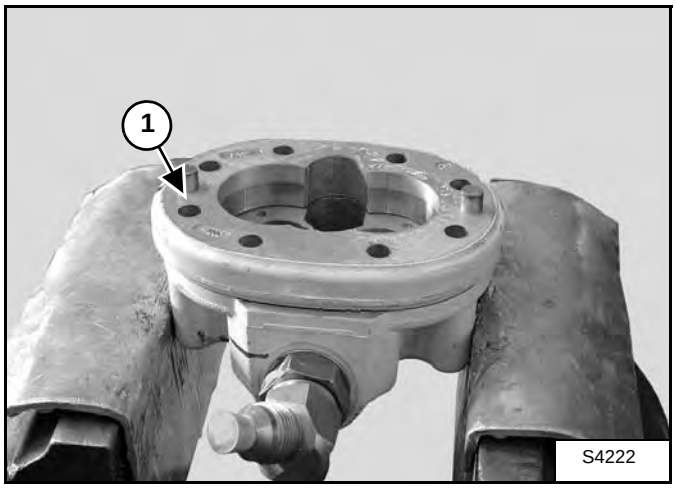
Figure 20-60-35



Remove the drive gear (Item 1) **[Figure 20-60-35]** from the charge pump section.

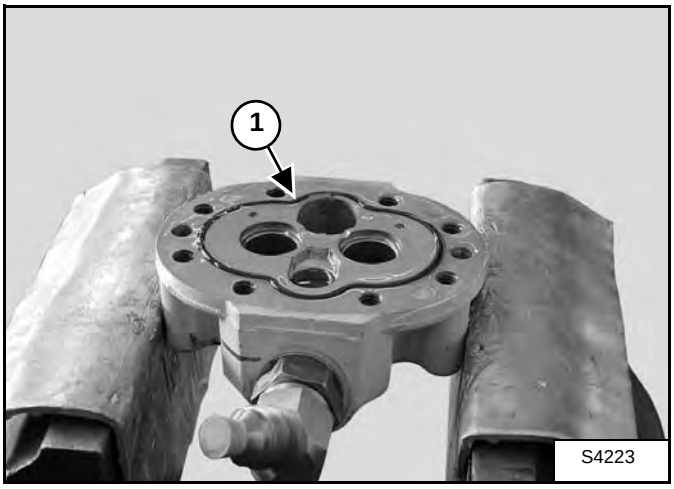
Inspect the drive gear for wear and replace if needed.

Figure 20-60-36



Remove the charge pump section (Item 1) **[Figure 20-60-36]** from the pump lower section by lifting it up.

Figure 20-60-37



Remove the section seal (Item 1) **[Figure 20-60-37]** from the pump end section.

Figure 20-60-38

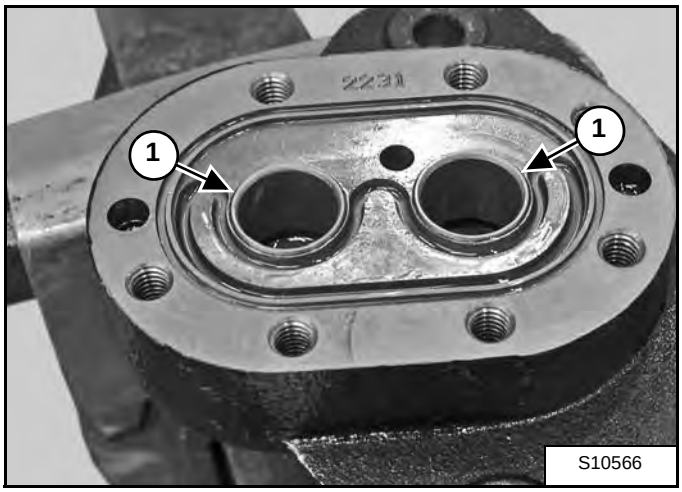
Remove the bushings and check for wear. Replace if needed **[Figure 20-60-38]**.

Hydraulic Pump Startup

Ensure the hydraulic reservoir is filled to the correct level before starting the engine. (See Checking And Adding Fluid on Page 10-120-1.)

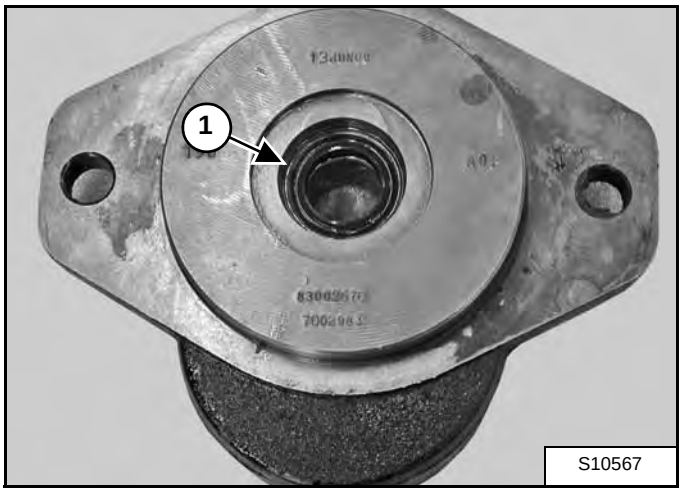
Disassembly And Assembly (Cont'd)

Figure 20-61-20



Remove the two bushings (Item 1) **[Figure 20-61-20]**.

Figure 20-61-21



Remove the seal (Item 1) **[Figure 20-61-21]**.

BUCKET POSITION VALVE

Description

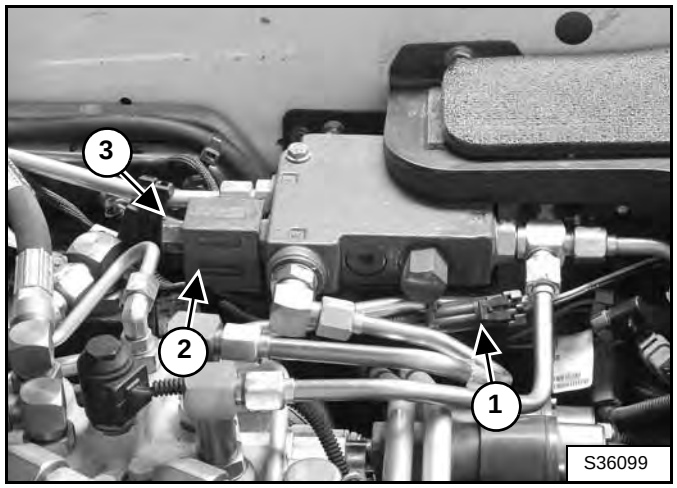
The Bucket Position Valve is an option that allows the loader to meter the lift and tilt circuits. The metering of the lift and tilt circuits allows the operator to hold the attachment in the same relative position to the ground to maximum lift height without using the tilt function.

The bucket position valve is located below the operator cab below the left side of the control panel.

See Hydraulic Schematic for more circuit information.

Solenoid Removal And Installation

Figure 20-100-1



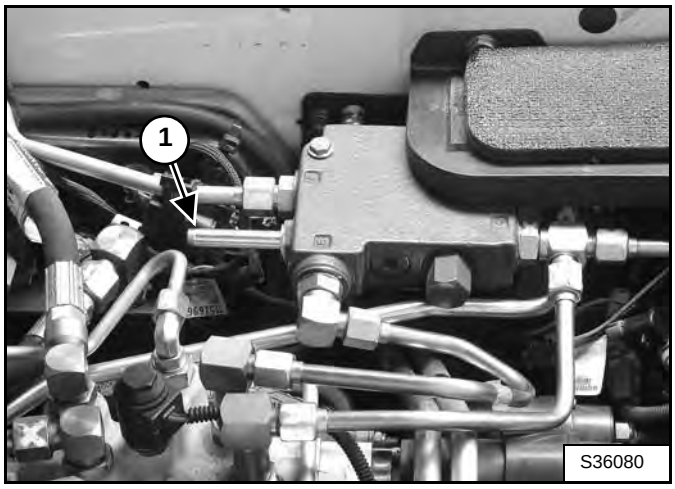
Raise the operator cab. (See Raising on Page 10-30-1.)

Disconnect the wire harness connector (Item 1) **[Figure 20-100-1]** from the bucket position shutoff solenoid.

Remove the solenoid (Item 2) from the bucket position valve by removing the nut (Item 3) **[Figure 20-100-1]**.

Installation: Tighten the solenoid nut to 6,78 N•m (60 in-lb) torque.

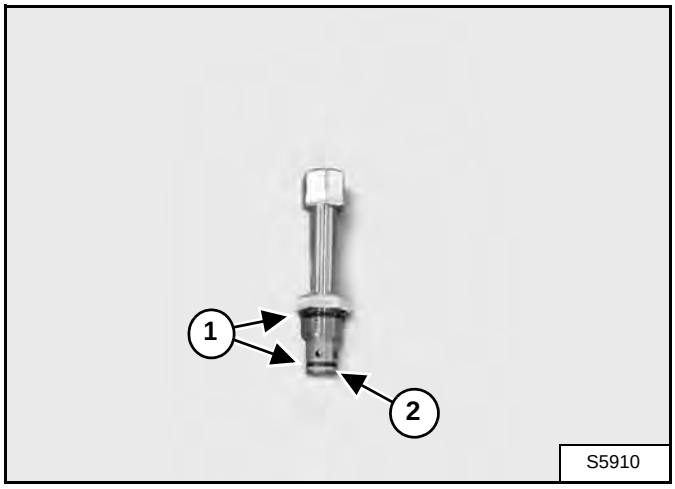
Figure 20-100-2



Remove the solenoid stem (Item 1) **[Figure 20-100-2]** from the bucket position valve.

Installation: Put oil on O-rings and back-up washers and tighten the solenoid stem to 40,8 - 47,6 N•m (30 - 35 ft-lb) torque.

Figure 20-100-3

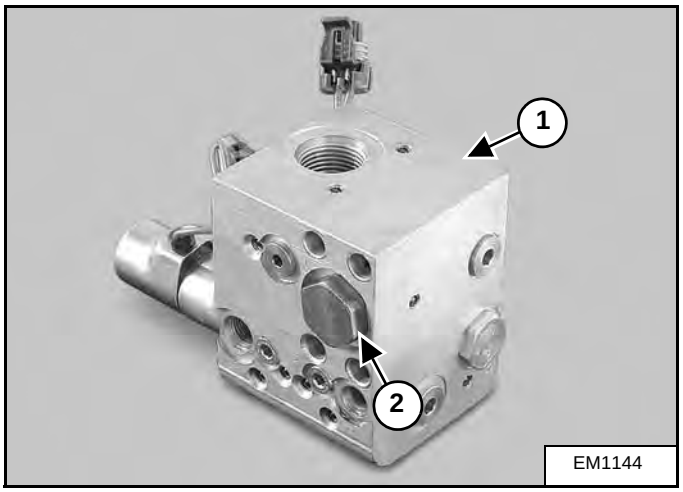


Inspect the solenoid stem and replace the O-rings (Item 1) and back-up washers (Item 2) **[Figure 20-100-3]**.

BOB-TACH (POWER) BLOCK (CONT'D)

Disassembly And Assembly

Figure 20-120-6



Clean the block (Item 1) **[Figure 20-120-6]** to remove dirt before disassembly. Block ports are labeled for correct assembly.

Remove the plug (Item 2) **[Figure 20-120-6]**.

Installation: Tighten the plug to 34 - 40,6 N•m (25 - 30 ft-lb) torque.

IMPORTANT

When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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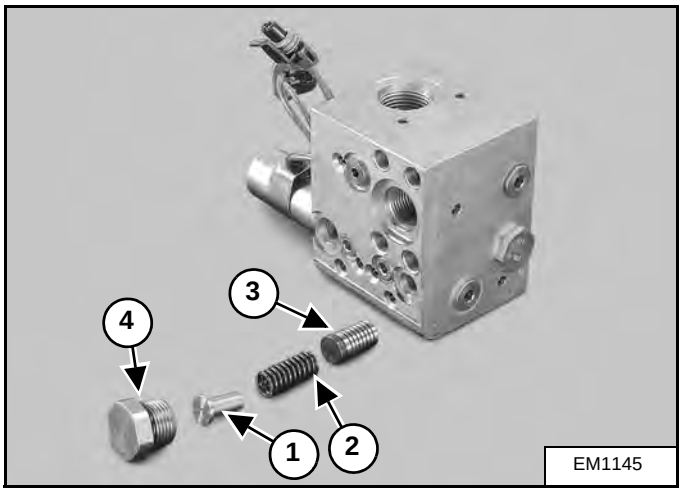
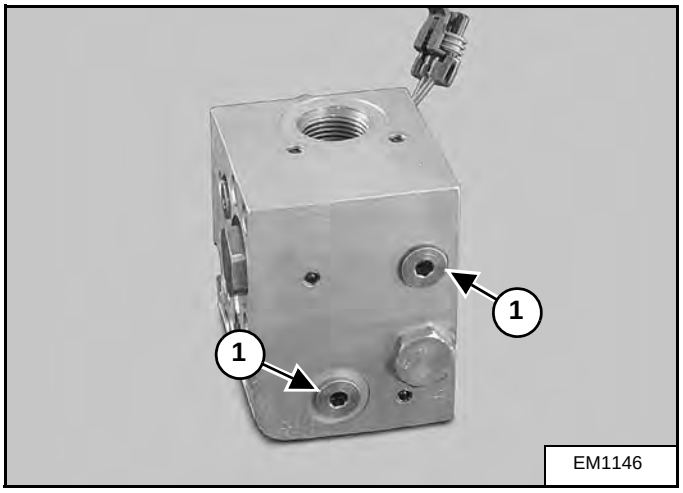
Figure 20-120-7



Remove the spring guide (Item 1), spring (Item 2) and the spool (Item 3) **[Figure 20-120-7]**.

Inspect the O-ring (Item 4) **[Figure 20-120-7]** on the plug and replace as needed.

Figure 20-120-8



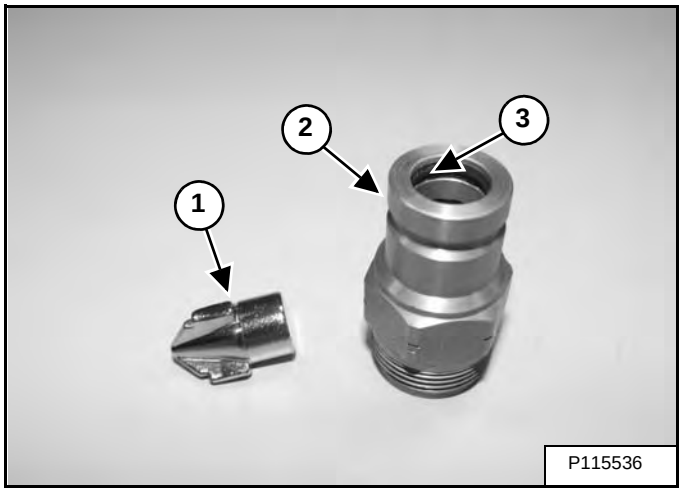
NOTE: This plug is a zero leak plug and should not be removed. If removed damage can occur and the plug and O-ring must be replaced.

Do not remove the plug (Item 1) **[Figure 20-120-8]**.

Installation: Tighten the plug to 16,3 - 19 N•m (12 - 14 ft-lb) torque.

Disassembly And Assembly (FFH/FH) (Cont'd)

Figure 20-131-14

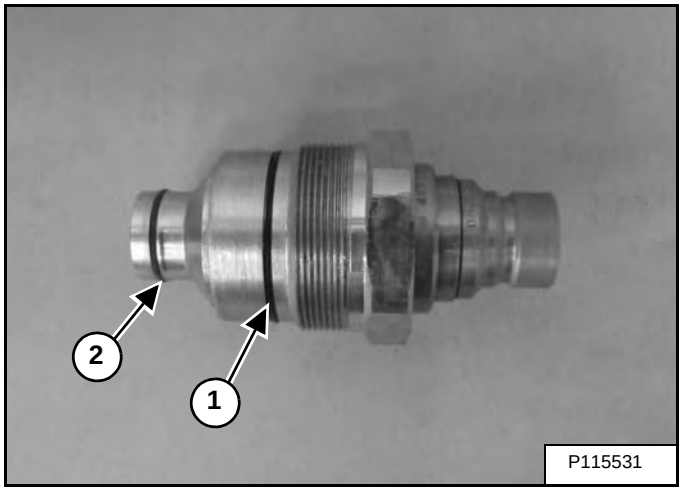


Remove the pintle (Item 1) from the case drain coupler (Item 2) **[Figure 20-131-14]**.

Inspect the pintle (Item 1), the case drain coupler (Item 2) and the seal (Item 3) **[Figure 20-131-14]**.

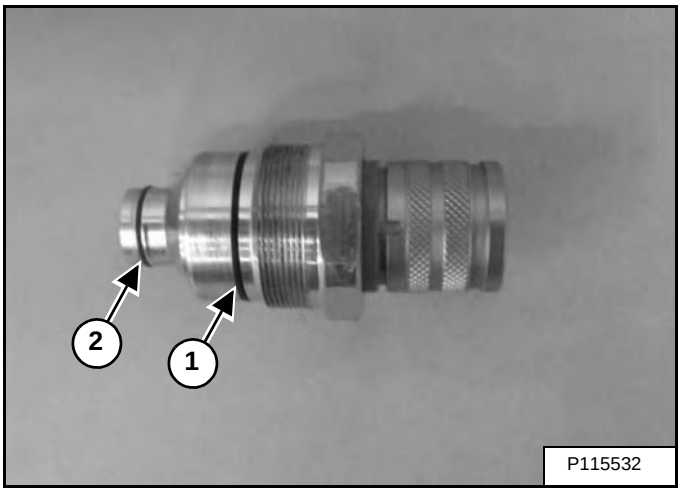
Replace the case drain coupler (Item 2) **[Figure 20-131-14]** as an assemble if any part is damaged.

Figure 20-131-15



Inspect the O-ring (Item 1) and seal (Item 2) **[Figure 20-131-15]** and replace coupler if damaged.

Figure 20-131-16

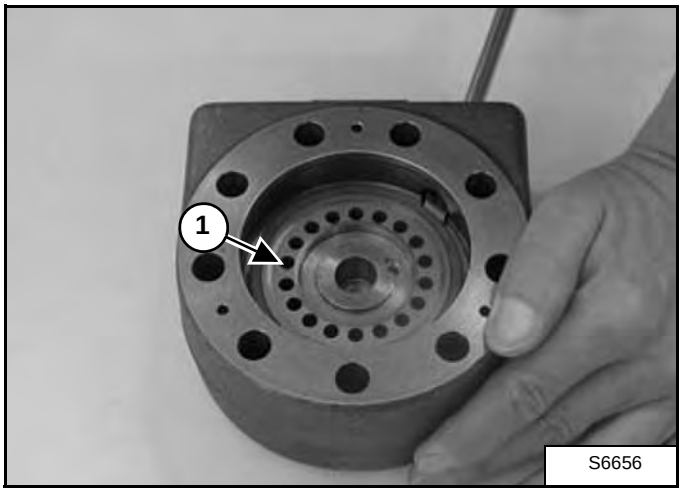


Inspect the O-ring (Item 1) and seal (Item 2) **[Figure 20-131-16]** and replace coupler if damaged.

Assembly: Lightly lubricate the O-ring and seal with oil before installation.

Disassembly And Assembly (Cont'd)

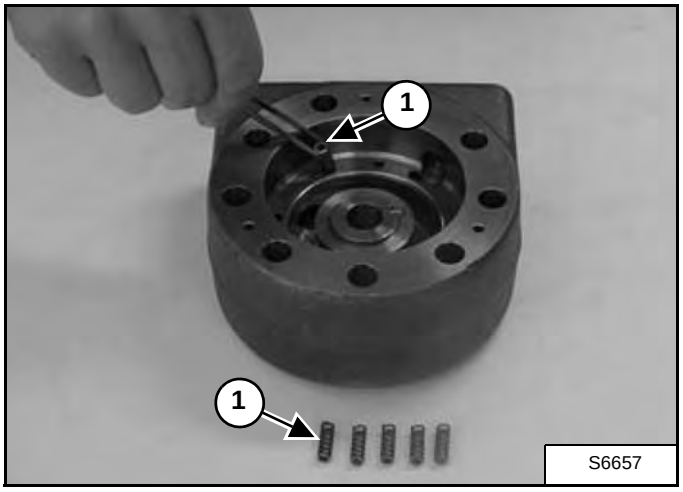
Figure 30-20-8



With a screwdriver through the connection port, separate the balance plate (Item 1) **[Figure 30-20-8]** from the end cover.

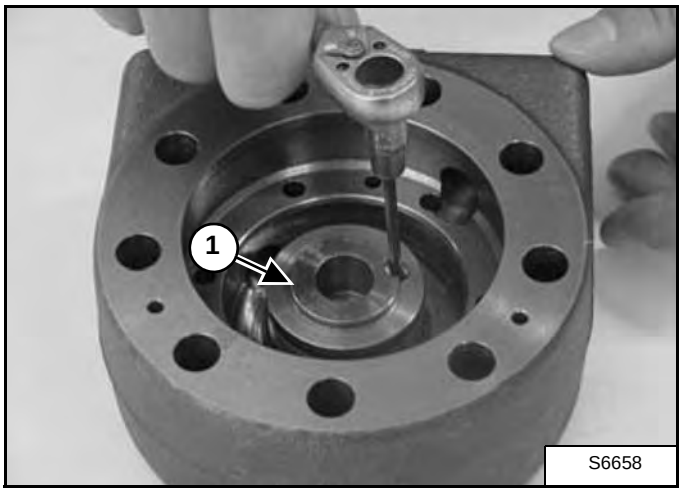
Installation: Install the balance plate into the end cover and press in (if so required, use the hydraulic press). Make sure that the balance plate is still springy.

Figure 30-20-9



Remove springs (Item 1) **[Figure 30-20-9]**.

Figure 30-20-10



With an Allen key, remove the orifice (Item 1) **[Figure 30-20-10]**.

Installation: Tighten the orifice to 4,5 - 7,5 N•m (39.8 - 66.4 in-lb).

Adjusting

Non SJC Machines

IMPORTANT

When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

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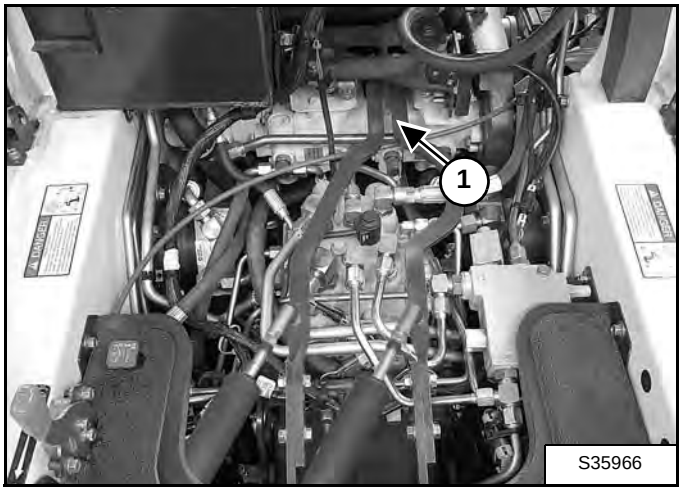
Figure 30-30-5

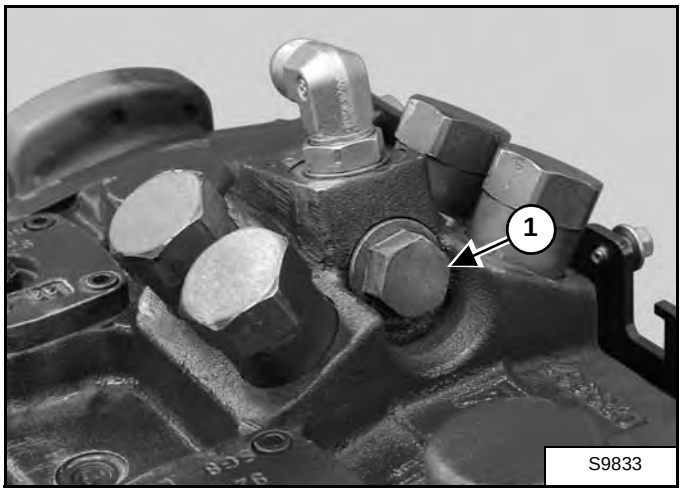


The charge relief valve is located inside the left hand machine side hydrostatic pump (Item 1) **[Figure 30-30-5]**. For disassembly of the charge inlet relief valve (See Disassembly (Cont'd) on Page 30-40-7.)

The charge inlet relief valve can not be adjusted.

SJC Machines

Figure 30-30-6

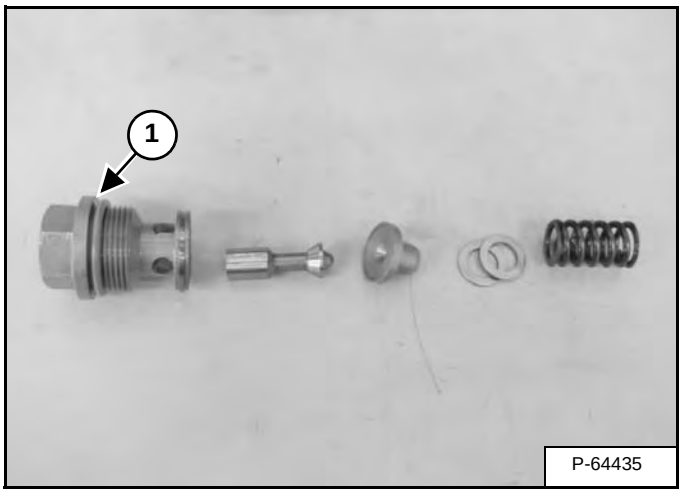


The charge relief valve (Item 1) **[Figure 30-30-6]** is located on the front of the hydrostatic pump.

If the charge pressure is not correct remove the charge relief valve (Item 1) **[Figure 30-30-6]**.

Assembly: Always use a new O-ring. Tighten the charge relief valve to 70 N•m (52 ft-lb) torque.

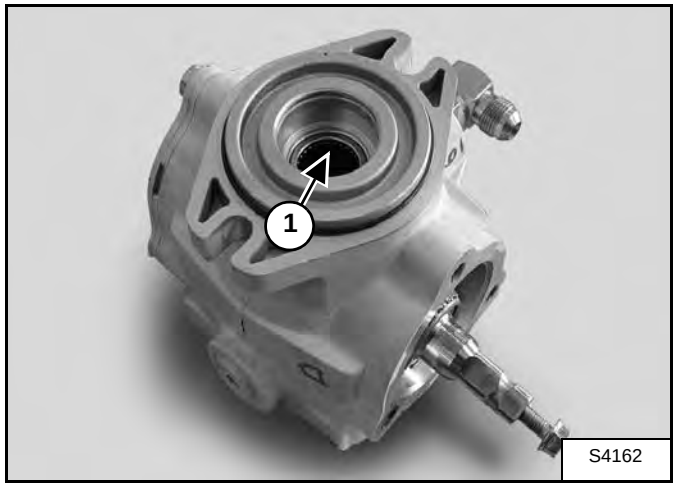
Figure 30-30-7



Check and replace the O-ring (Item 1) **[Figure 30-30-7]**.

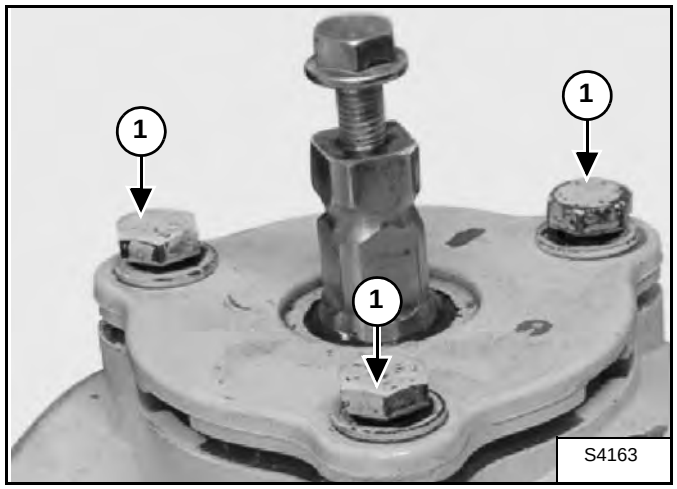
Disassembly (Cont'd)

Figure 30-40-23



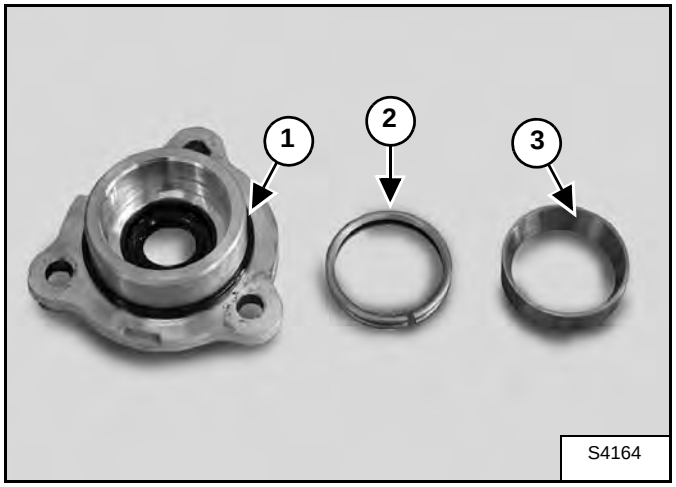
Remove the bearing (Item 1) **[Figure 30-40-23]** from the pump housing.

Figure 30-40-24



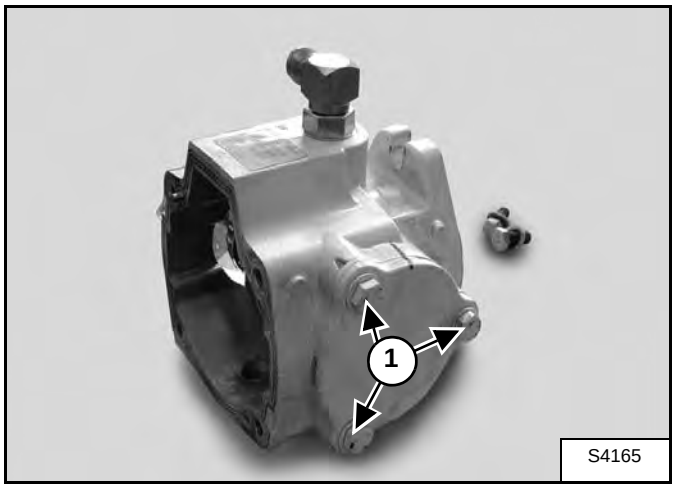
Remove the cover from the pump housing by removing the three bolts (Item 1) **[Figure 30-40-24]**.

Figure 30-40-25



Remove the O-ring (Item 1), the crush ring (Item 2) and the bearing race (Item 3) **[Figure 30-40-25]** from the cover. Inspect them and replace if needed.

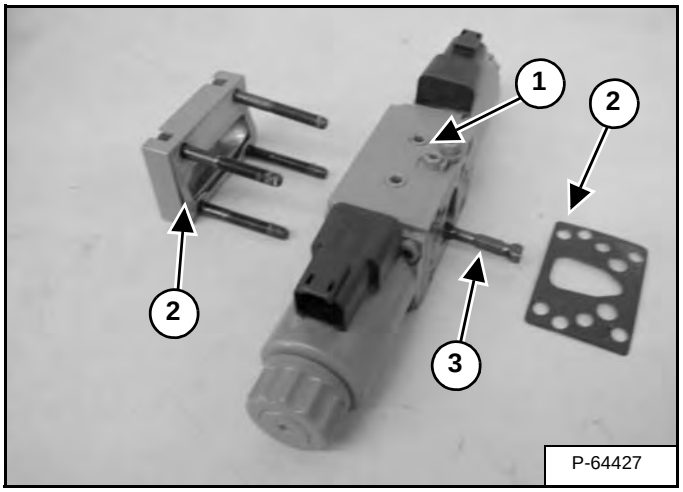
Figure 30-40-26



Remove the lower cover from the pump housing by removing the three bolts (Item 1) **[Figure 30-40-26]**.

Hydraulic Controller Removal And Installation (Cont'd)

Figure 30-41-4

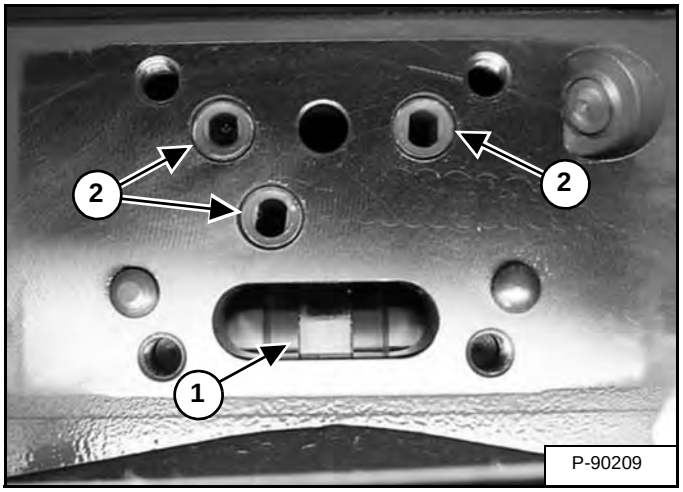


Remove the controller (Item 1) **[Figure 30-41-4]** from the pump.

Remove the controller gaskets (Item 2) **[Figure 30-41-4]** from the pump.

Installation: Use a small amount of grease on a new gasket and install the gasket on the hydraulic controller (Item 1) **[Figure 30-41-4]**.

Figure 30-41-5



Install the controller with the feedback lever (Item 3) **[Figure 30-41-4]** in the center of the servo piston groove (Item 1) **[Figure 30-41-5]**.

NOTE: DO NOT remove the three screens (Item 2) [Figure 30-41-5] they will be damaged during removal and must be replaced.

NOTE: When a hydraulic controller is replaced, the hydrostatic pumps must be calibrated. (See Hydraulic Controller Neutral Adjustment on Page 30-41-24.)

Removal And Installation

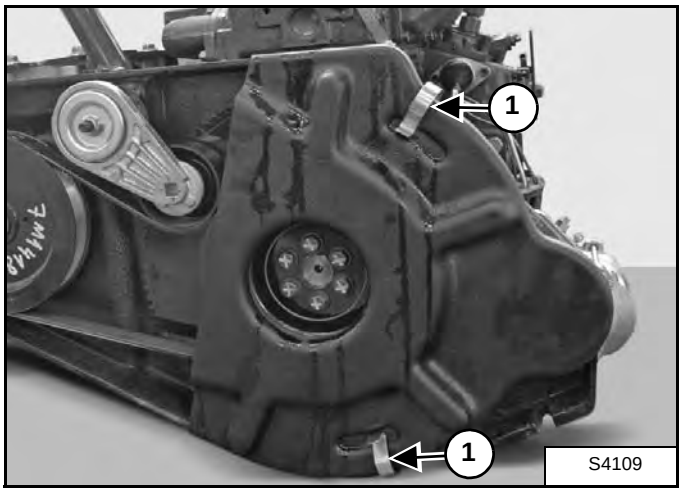
Remove the engine / hydrostatic pump assembly from the loader. (See Engine Removal And Installation on Page 70-10-10.)

IMPORTANT

When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0888

Figure 30-41-6



Remove the cover on the left side of the engine by removing the two brackets (Item 1) **[Figure 30-41-6]**.

Remove the Drive Belt. (See Belt Removal And Installation on Page 30-50-2.)

Disassembly And Assembly (Cont'd)

Figure 30-41-34

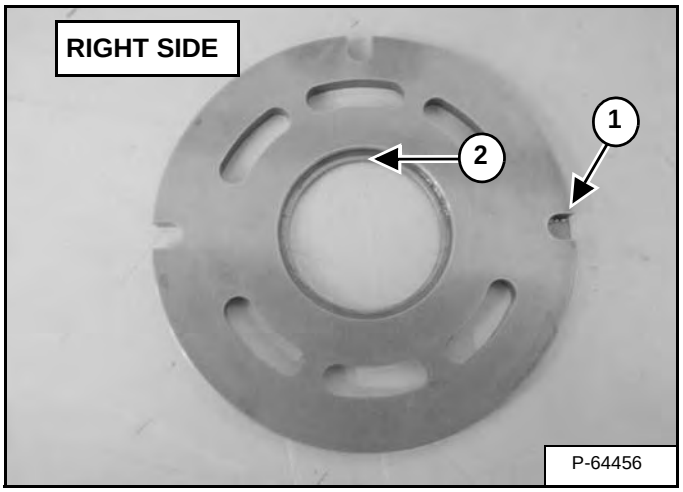
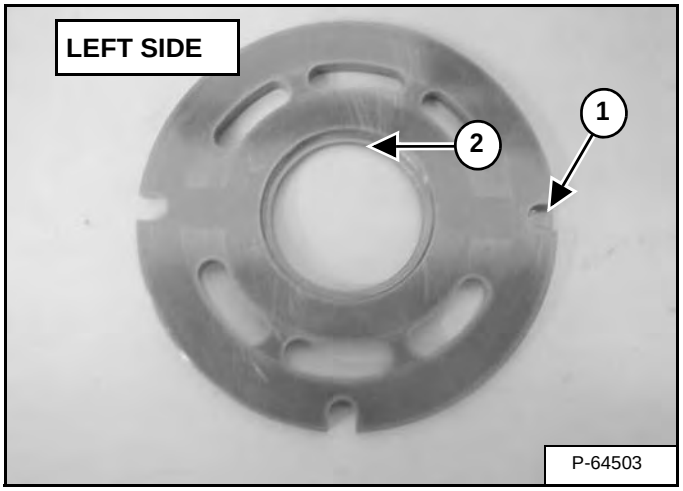


Figure 30-41-35

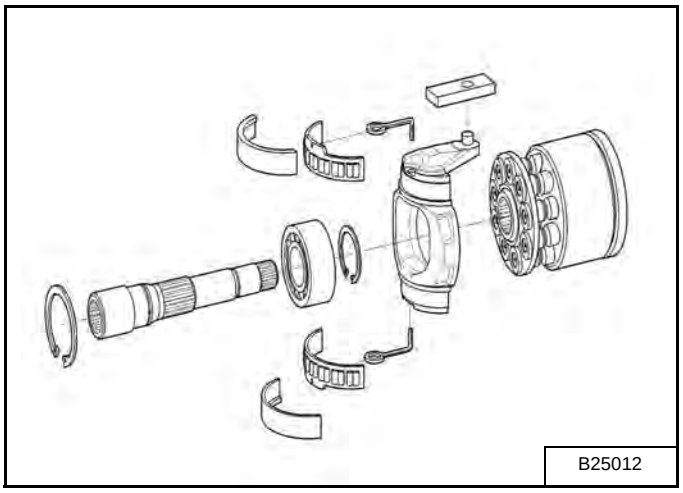


Assembly: Align the timing pin (Item 1) **[Figure 30-41-32]** and **[Figure 30-41-33]** in the case housing with the notch (Item 1) **[Figure 30-41-34]** and **[Figure 30-41-35]** that does not go through the valve plate.

Align the shoulder of the roller bearing (Item 2) **[Figure 30-41-32]** and **[Figure 30-41-33]** with the beveled edge on the valve plate (Item 2) **[Figure 30-41-34]** and **[Figure 30-41-35]**.

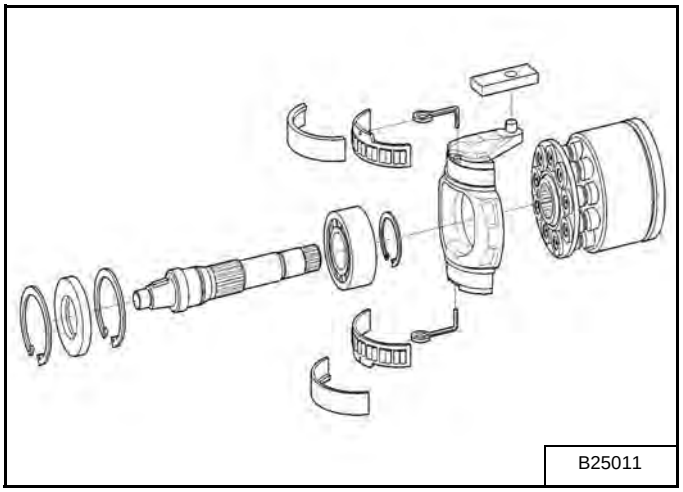
NOTE: Valve plate should sit FLUSH with the case housing when properly installed.

Figure 30-41-36



Disassemble the right side rotating group **[Figure 30-41-36]**.

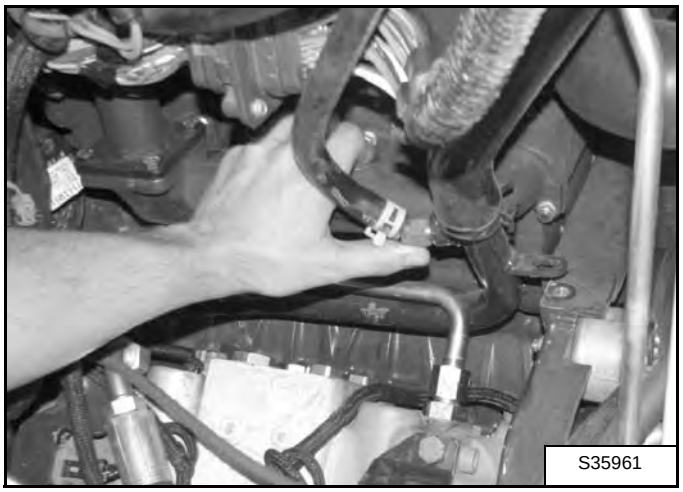
Figure 30-41-37



Disassemble the left side rotating group **[Figure 30-41-37]**.

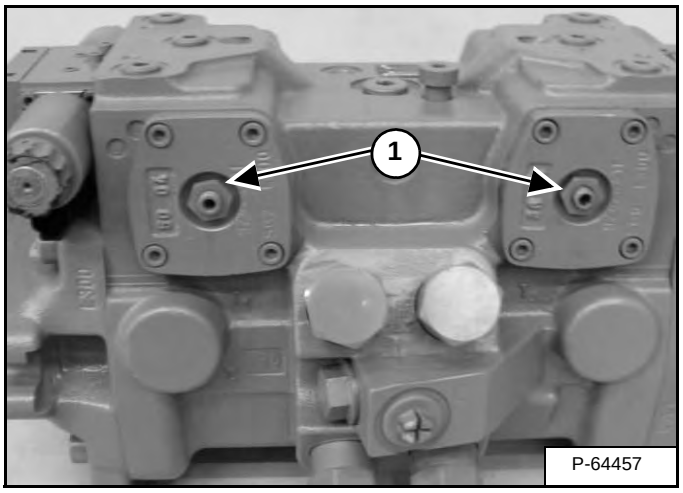
Mechanical Neutral Adjustment (Cont'd)

Figure 30-41-71



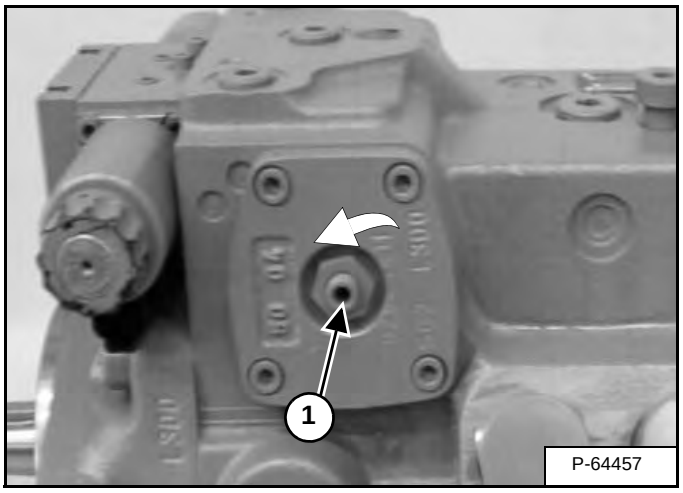
Move the tube and hose assembly out of the way to gain access to the hydrostatic pumps **[Figure 30-41-71]**.

Figure 30-41-72



When engine is cold, loosen the pump neutral adjustment lock nut (Item 1) **[Figure 30-41-72]** for the sides on which the wheels are turning.

Figure 30-41-73

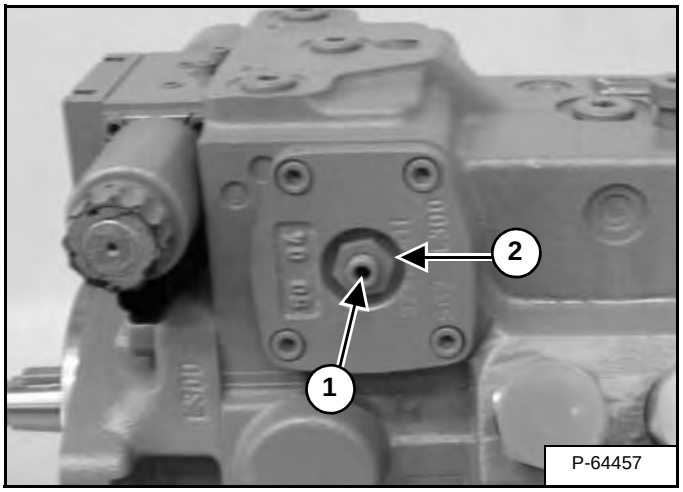


Turn the adjustment screw (Item 1) **[Figure 30-41-73]** either clockwise or counterclockwise 90°. Start the loader using the remote start tool and note if the wheel rotation changed direction.

If the wheel rotation did not reverse, shut down the engine, let it cool, and turn the adjustment screw (Item 1) **[Figure 30-41-73]** the opposite direction 180°.

Repeat these steps, adding 90°, until the direction reverses and mark the position. Turn back 45° from the last adjustment.

Figure 30-41-74



While holding the adjustment screw (Item 1) in position, tighten the lock nut (Item 2) **[Figure 30-41-74]** to 30 N•m (22 ft-lb) torque.

NOTE: Hydraulic Controller Neutral Adjustment must be performed whenever a Mechanical Neutral Adjustment is done. (See Hydraulic Controller Neutral Adjustment on Page 30-41-24.)

DRIVE SYSTEM

Adjusting Tension

Figure 40-20-4

A bleed tool **[Figure 40-20-4]** is available and recommended to decrease track tension. The bleed tool will direct the flow of grease to aid in cleanup.

The bleed tools are sized differently:

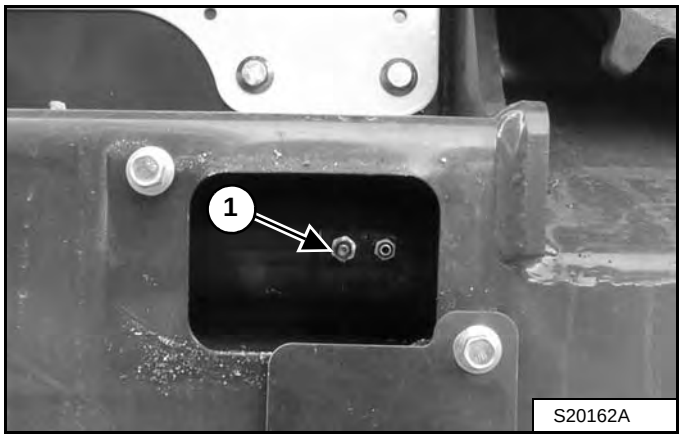
Part number 6675936 – Used for machines with two track tension fittings.

Part number 7277225 – Used for machines with one track tension fitting.

Adjusting Tension (Earlier Models With Two Track Tension Fittings)

Increase Track Tension

Figure 40-20-5



Loosen the cover bolts and turn the access cover down **[Figure 40-20-5]**.

Add grease to the grease fitting (Item 1) **[Figure 40-20-5]** until the track adjustment is correct **[Figure 40-20-2]** and **[Figure 40-20-3]**. (Left side shown.)

NOTE: Do not remove grease fitting unless pressure is released using the bleed fitting. [Figure 40-20-6 on Page 3].

NOTE: If replacement is necessary, always replace grease fitting (Item 1) [Figure 40-20-5] with genuine Bobcat Parts. The grease fitting is a special fitting designed for high pressure.

Decrease Track Tension

⚠ WARNING

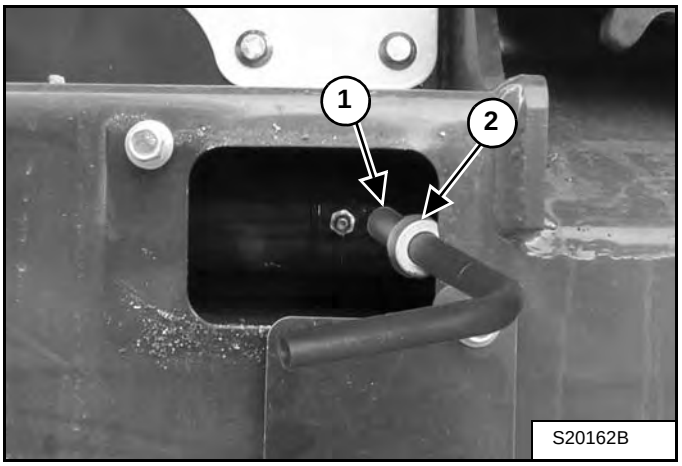
HIGH PRESSURE GREASE CAN CAUSE SERIOUS INJURY

- **Do not loosen grease fitting.**
- **Do not loosen bleed fitting more than 1 - 1/2 turns.**

W-2781-0109

Pressure must be released from the grease cylinder to decrease track tension.

Figure 40-20-6



Install the bleed tool (6675936) on the bleed fitting (Item 1), adjust and tighten the collar (Item 2) **[Figure 40-20-6]** to fit behind the edge of the access cover hole.

TRACK MAINTENANCE

Track Damage Identification

Cutting Of Steel Cords

Figure 40-30-1

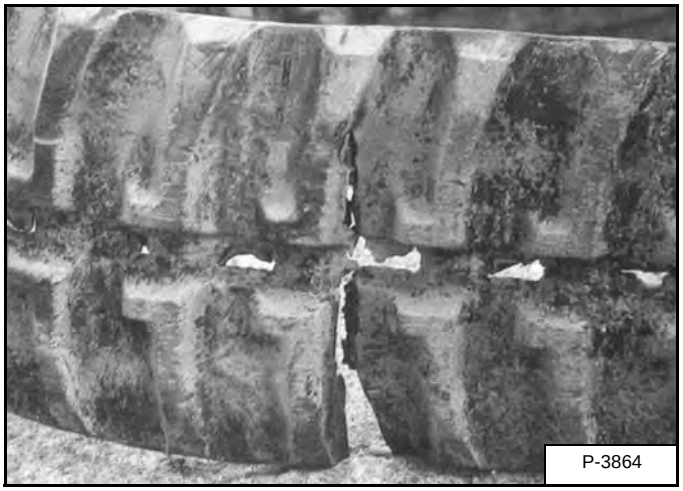
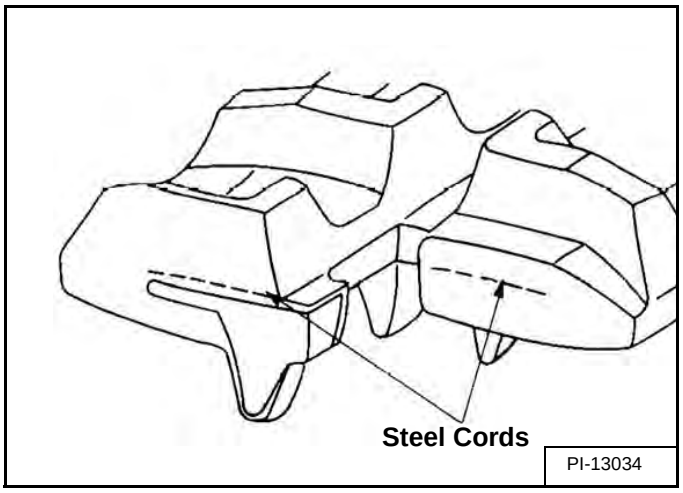


Figure 40-30-2



The following pages show photos and illustrations of track damage and the probable cause of the damage. It is intended to be used for identifying the reason for track damage and how to avoid future track damage.

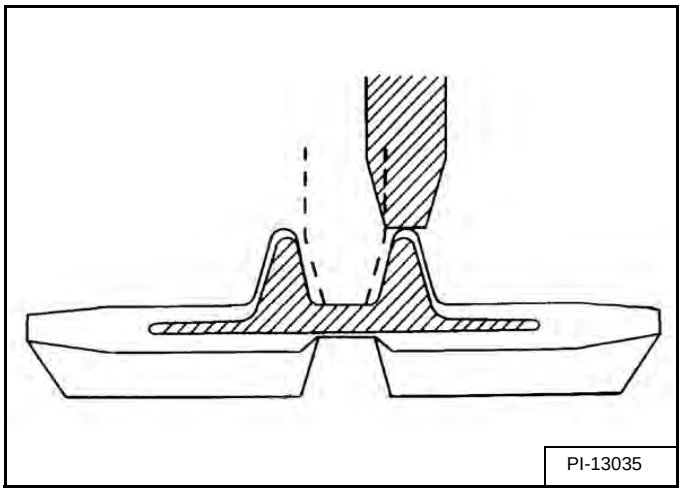
Damage:

Embedded steel cords are cut off **[Figure 40-30-1]** and **[Figure 40-30-2]**.

Replacement:

Replacement is required **[Figure 40-30-1]** and **[Figure 40-30-2]**.

Figure 40-30-3



Causes of the damage:

When applied to rubber tracks under the following circumstances, tension in excess of the breaking strength of the embedded steel cords causes steel cords to be cut:

When the rubber track is detracking, the idler or sprocket rides on the projections of the embedded metal **[Figure 40-30-3]**.

When the rubber track is detracked, projections of rubber tracks get stuck between the frame of the undercarriage.

The rubber track is clogged with stones or foreign obstacles.

Furthermore, when moisture invades through a cut on the lug side rubber surface, the embedded steel cords will corrode. The deterioration of the design strength can lead to the breaking off of the steel cords.

Prevention:

The following preventions should be taken to minimize the risk of this damage:

Periodical checking on site of the recommended track tension. (See Checking Tension on Page 40-20-2.)

Avoiding quick turns on bumpy and rocky fields.

Drive carefully to avoid having stones and other articles clog the rubber tracks.

Driving over sharp objects should be avoided. If this is impossible, do not make turns while driving over sharp objects.

Track Damage Identification (Cont'd)

Cuts On The Edges Of Track Roller Side

Figure 40-30-22

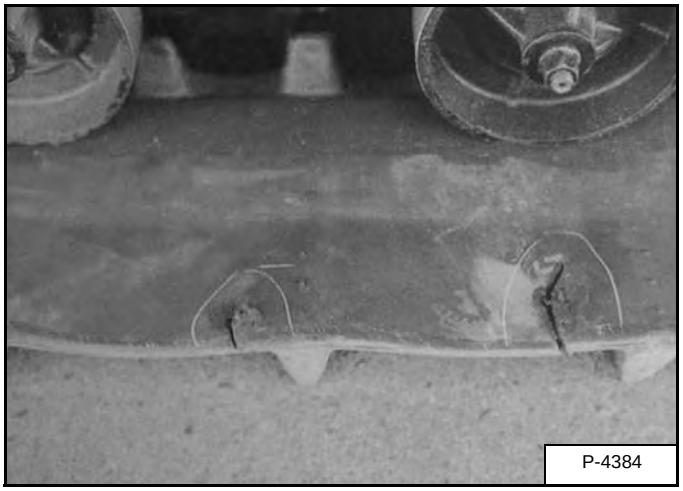
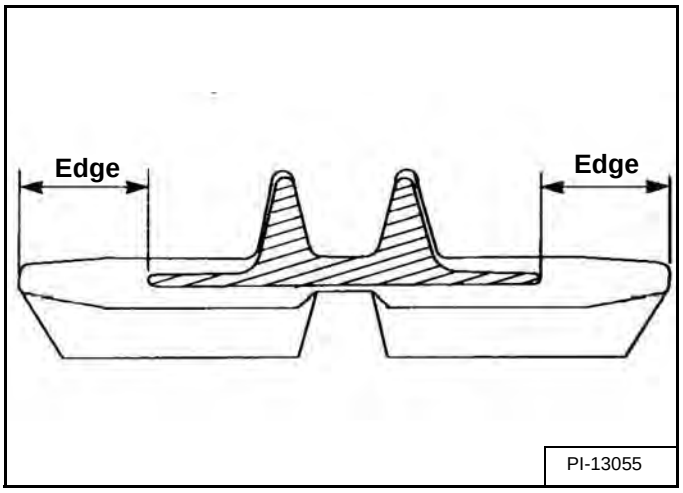


Figure 40-30-23



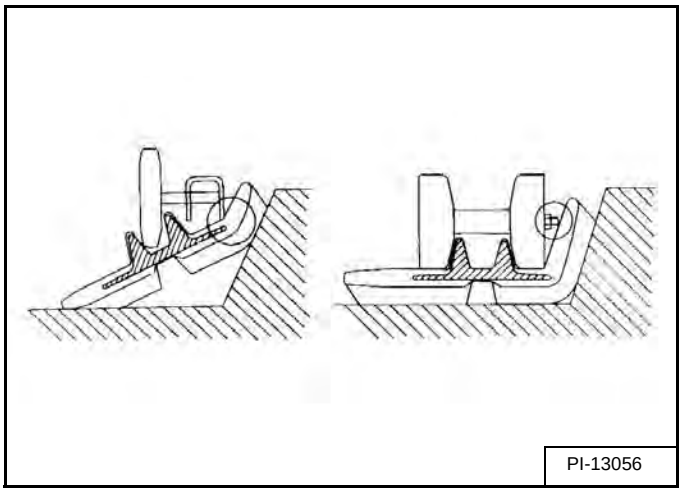
Damage:

Both edges of a rubber track have no special reinforcements. It sometimes occurs during operation that they are cut or torn off **[Figure 40-30-22]** and **[Figure 40-30-23]**.

Replacement:

In such case, the rubber track does not have to be replaced.

Figure 40-30-24



Causes of the damage:

This damage is caused by objects on the field or by interference with the machine frame.

In case of damage by objects on the operating ground:

The edges of rubber track are often deformed largely due to a bumpy ground surface, stones and other objects, which cause extensive stress on the edges resulting in the damage. Especially, when a machine drives over concrete ridges, this type of damage easily occurs **[Figure 40-30-24]**.

Gas Cylinder Removal And Installation

WARNING

Cylinder contains high pressure gas. Do not open. Opening cylinder can release rod and cause injury or death.

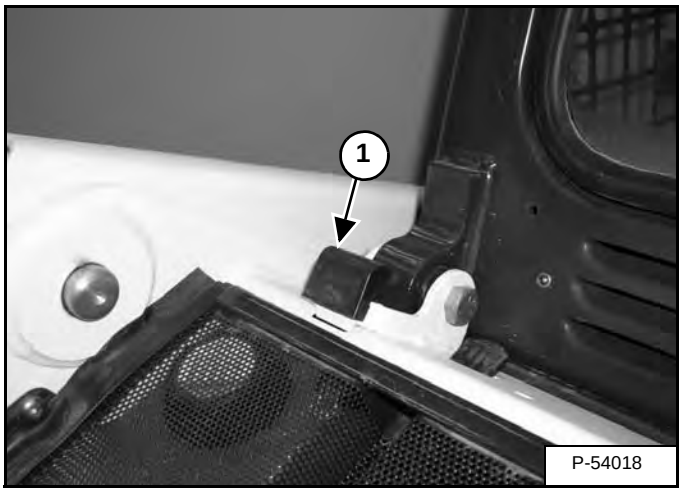
W-2113-0288

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.

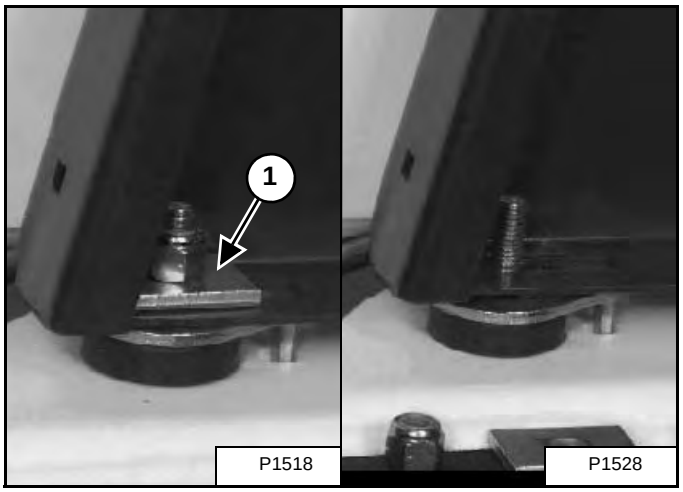
W-2059-0598

Figure 50-20-1



Remove the operator cab stop (Item 1) (both sides) **[Figure 50-20-1]**.

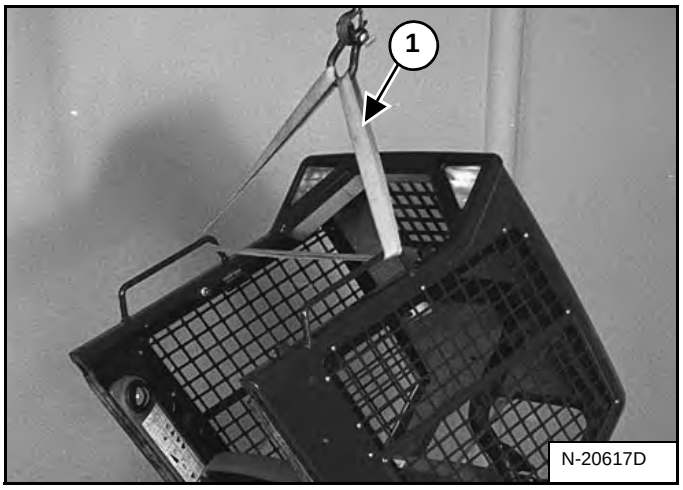
Figure 50-20-2



Remove the cab nut and hold down plate (Item 1) **[Figure 50-20-2]** (both sides).

Installation: Tighten the nut to 54 - 68 N•m (40 - 50 ft-lb) torque.

Figure 50-20-3

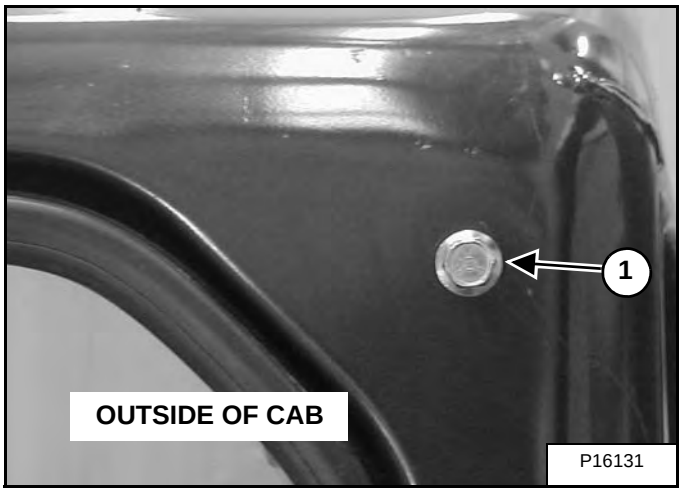


Install a strap (Item 1) **[Figure 50-20-3]** to the cab handles to prevent the cab from falling forward.

Raise the operator cab. (See Raising on Page 10-30-1.), to release the tension on the gas cylinder.

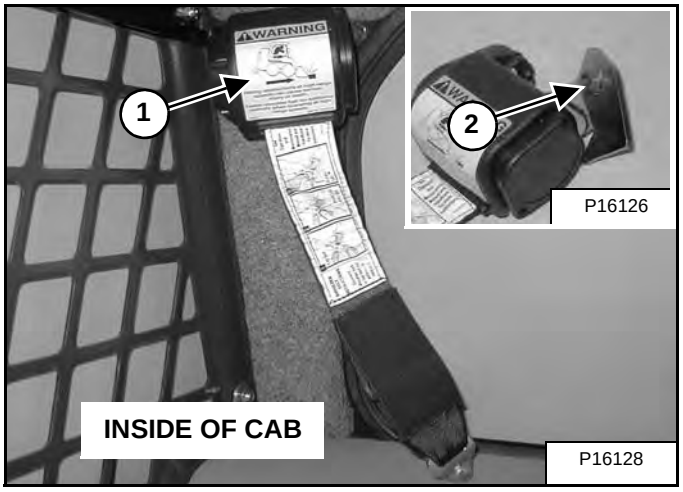
3-Point Seat Belt Removal And Installation (Cont'd)

Figure 50-30-14



Remove the mounting bolt (Item 1) **[Figure 50-30-14]**.

Figure 50-30-15



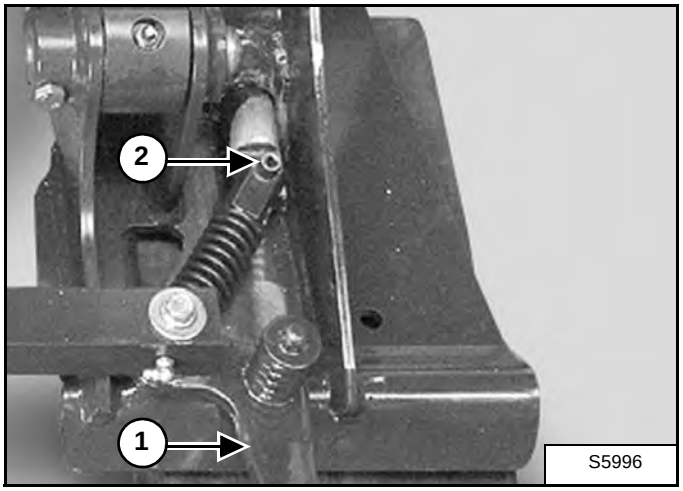
Remove the shoulder harness retractor (Item 1) **[Figure 50-30-15]**.

Installation: Line up the bolt (Item 1) **[Figure 50-30-14]** with the mounting bracket (Item 2) **[Figure 50-30-15]** on the inside of the cab.

Lever And Wedge Disassembly And Assembly

Remove the Power Bob-Tach cylinder. (See Removal And Installation on Page 50-41-1.)

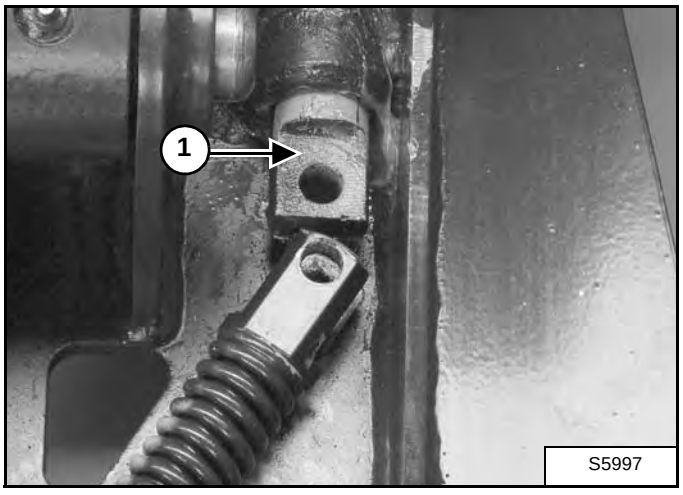
Figure 50-41-5



Use the following procedure to remove and install the Bob-Tach lever (Item 1) **[Figure 50-41-5]** spring and wedge.

Use a punch and hammer, remove the roll pin (Item 2) **[Figure 50-41-5]** from the Bob-Tach Wedge and spring clevis.

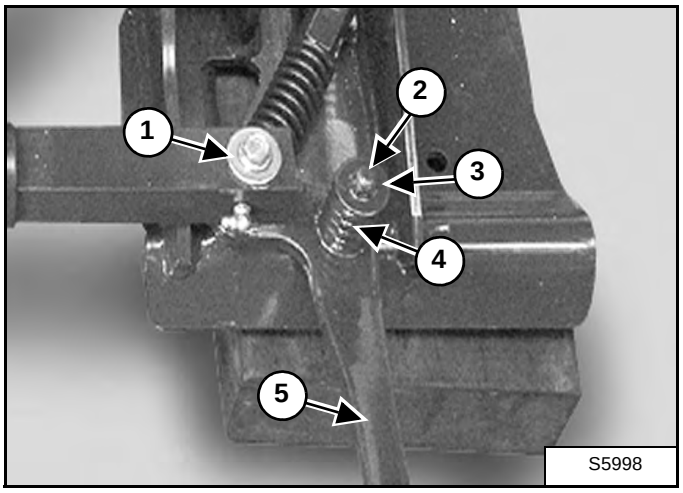
Figure 50-41-6



Remove the wedge (Item 1) **[Figure 50-41-6]**.

Always replace bent or broken wedges.

Figure 50-41-7



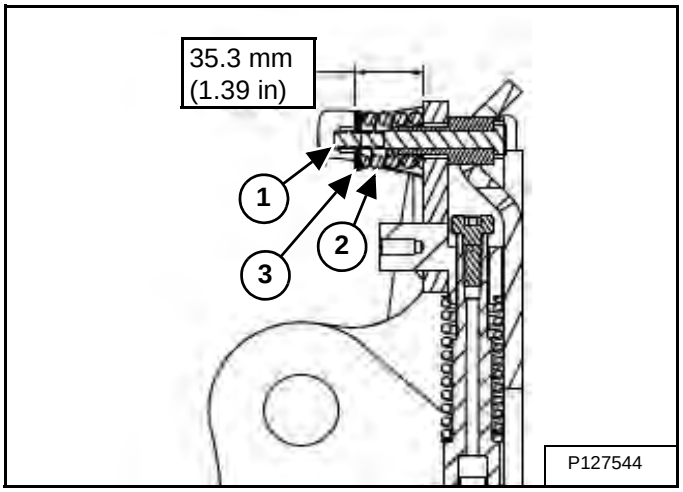
Remove the washer and bolt (Item 1) **[Figure 50-41-7]**.

Installation: Tighten the bolts to 34 - 38 N•m (25 - 28 ft-lb) torque.

Remove the cylinder off the lever pivots. Position the rod end to the left with the grease fitting holes to the bottom **[Figure 50-41-7]**.

Remove the lever mounting nut (Item 2), washer (Item 3), spring (Item 4) and lever (Item 5) **[Figure 50-41-7]**.

Figure 50-41-8



Installation: Tighten the nut (Item 1) until the spring (Item 2) and washer (Item 3) **[Figure 50-41-8]** are compressed to 35.3 mm (1.39 in).

REAR GRILLE

Removal And Installation

Open the rear door.

Figure 50-60-1

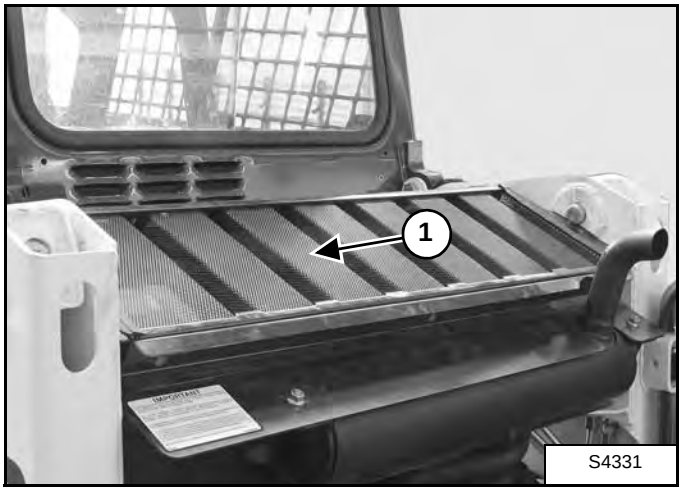
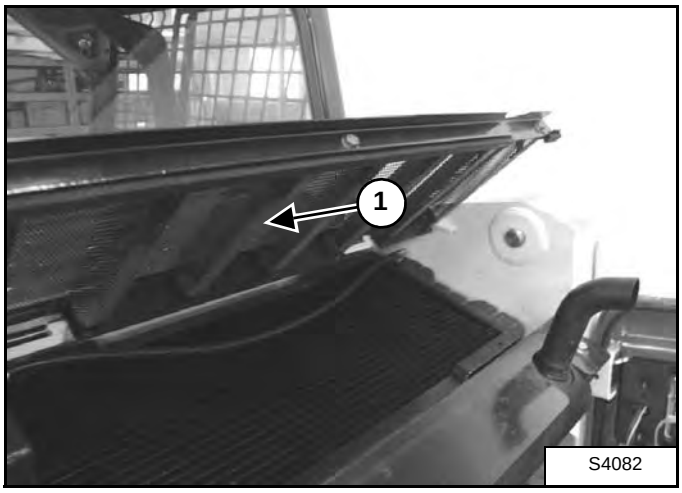


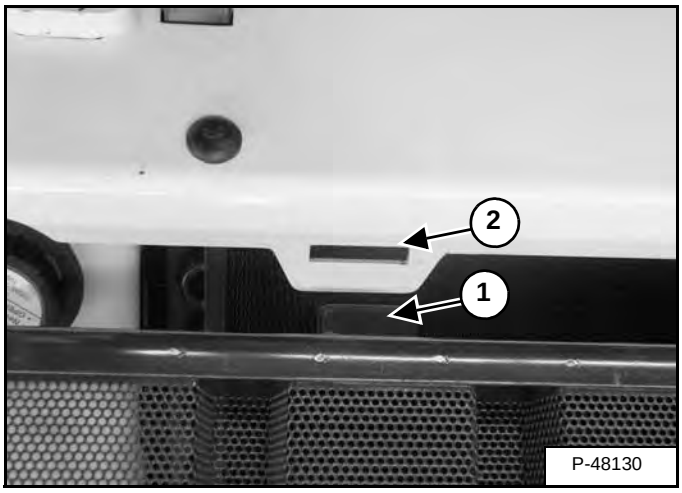
Figure 50-60-2



Lift up on the rear grille (Item 1) **[Figure 50-60-1]** and **[Figure 50-60-2]**.

Lift the grille away from the loader.

Figure 50-60-3



Installation: Line up the tab (Item 1) on the grille with the slot (Item 2) **[Figure 50-60-3]** on the loader mainframe. Insert the tab fully and then push down.

Reverse the removal procedure to install the grille.

CONTROL PEDALS AND LINKAGES

Description

The control pedals and linkages are connected to the control valve. The control pedals will mechanically move the lift and tilt spools on the control valve.

The control pedals and linkages are located on the lower mainframe at the operator's feet.

Pedal Removal And Installation

WARNING

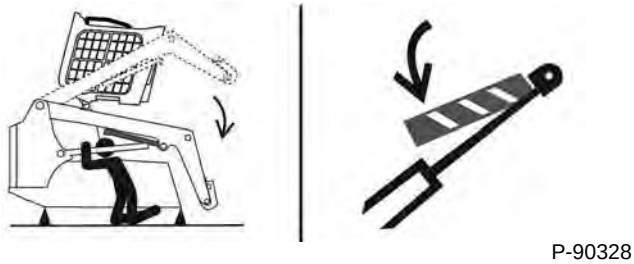
Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-1.)

Raise the operator cab. (See Raising on Page 10-30-1.)

DANGER



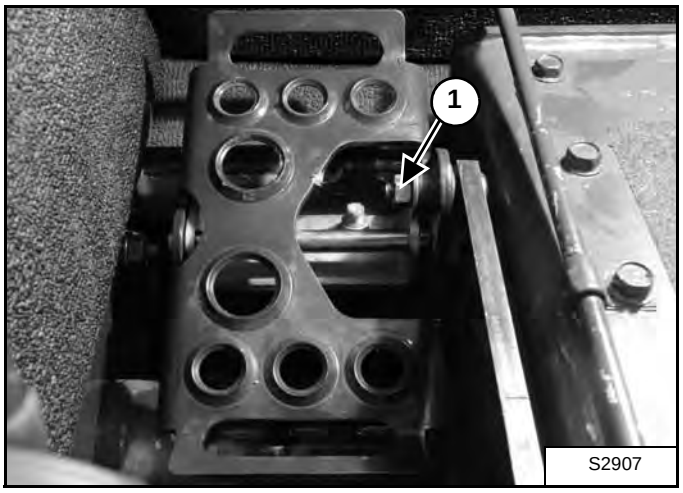
P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

Figure 50-90-1

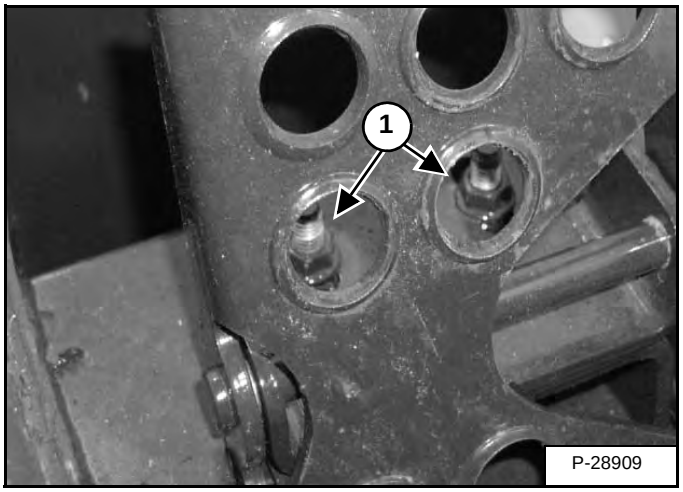


Remove the bolt (Item 1) **[Figure 50-90-1]** and nut from the pedal linkage.

Installation: Tighten the bolt and nut to 34 - 38 N•m (25 - 28 ft-lb) torque.

Check the rubber bushing in the pedal for wear and replace as needed.

Figure 50-90-2



Remove the two mounting bolts (Item 1) **[Figure 50-90-2]** from the pedal mounting bracket.

Remove the pedal assembly from the loader.

Linkage Removal And Installation

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

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.

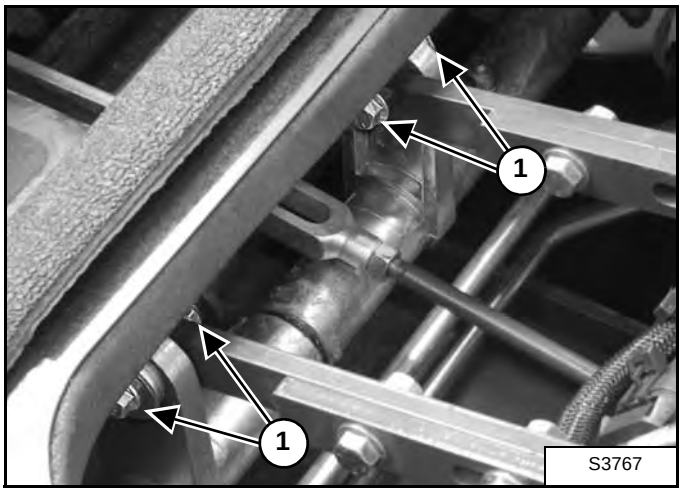
W-2017-0286

Lift and block the loader. (See LIFTING AND BLOCKING THE LOADER on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-1.)

Raise the operator cab. (See Raising on Page 10-30-1.)

Figure 50-100-15



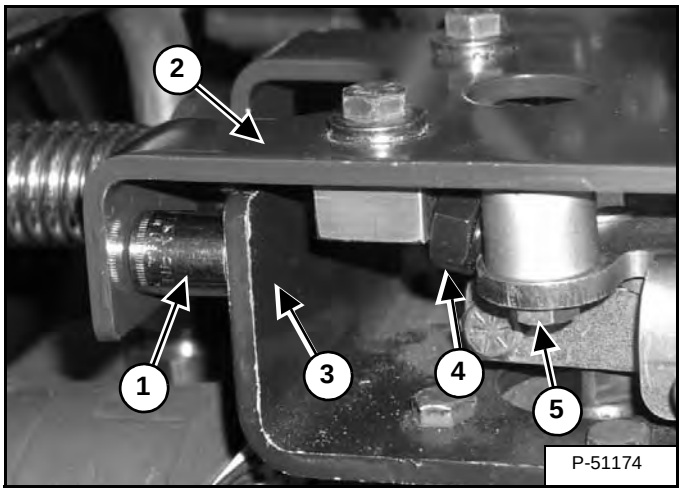
Remove the shocks. (See Shock Removal And Installation on Page 50-100-6.)

Remove the steering linkage mounting bolt and nut (Item 1) **[Figure 50-100-15]**. Do this for both steering linkages.

Installation: Tighten the steering linkage mounting bolts to 47,5 - 54,2 N•m (35 - 40 ft-lb) torque.

Linkage Travel (Adjusting) (Cont'd)

Figure 50-100-41

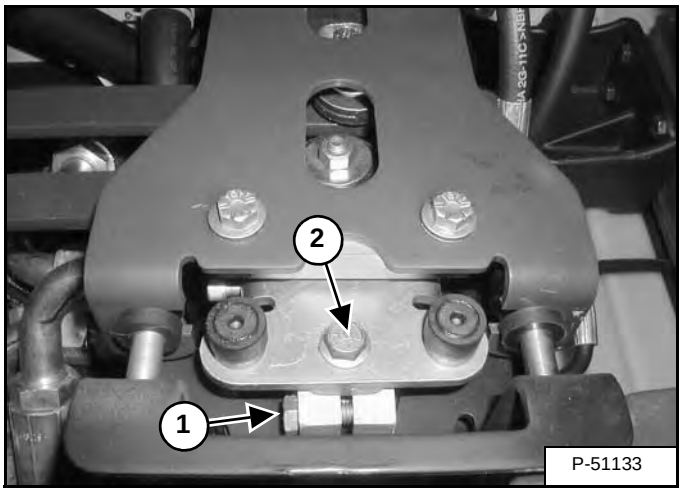


Move the right side steering lever forward and install a 28,57 mm (1-1/8 in) thick spacer (Item 1) between the center plate (Item 2) and the mounting plate (Item 3) **[Figure 50-100-41]**.

This will allow the pintle arms to move freely while adjusting the steering linkage for full forward travel speed.

Remove the 10 mm (3/8 in) thick spacer (Item 4) **[Figure 50-100-41]**.

Figure 50-100-42

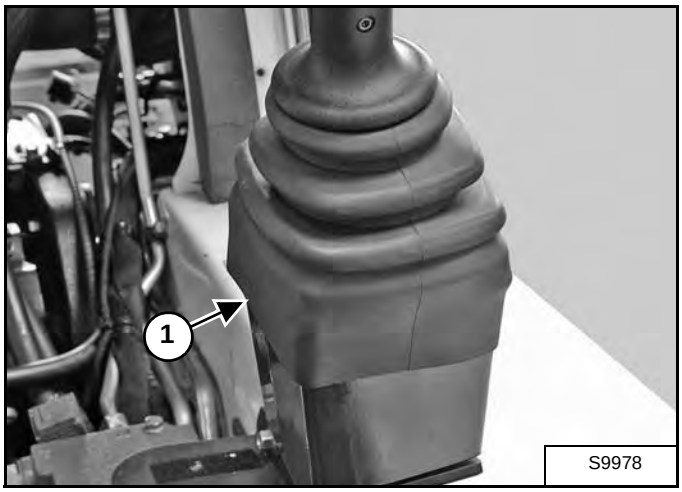


Before adjusting the linkage, check that the base pintle arm mounting bolt (Item 1) and both of the upper pintle mount bolts (Item 2) **[Figure 50-100-42]** and tighten to 48 - 54 N•m (35 - 40 ft-lb) torque. There should be no play between the pintle arm and the square pump shaft.

Also check that the cam mounting nuts or bolts (Item 5) **[Figure 50-100-41]** are tight, 48 - 54 N•m (35 - 40 ft-lb) torque.

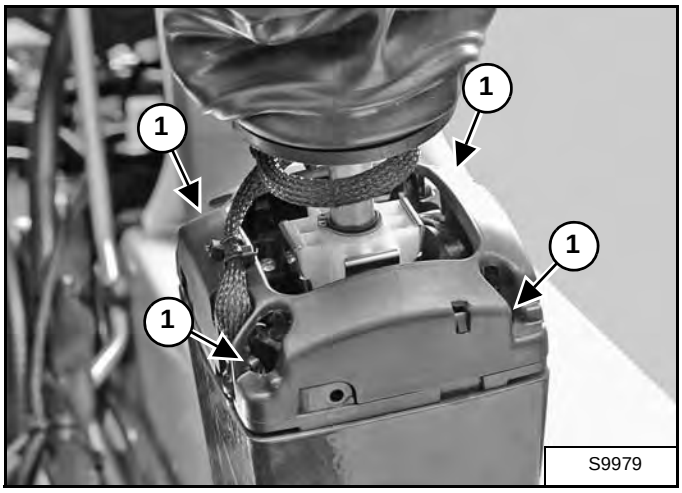
Joystick Removal And Installation

Figure 50-111-5



Lift the rubber boot (Item 1) **[Figure 50-111-5]**.

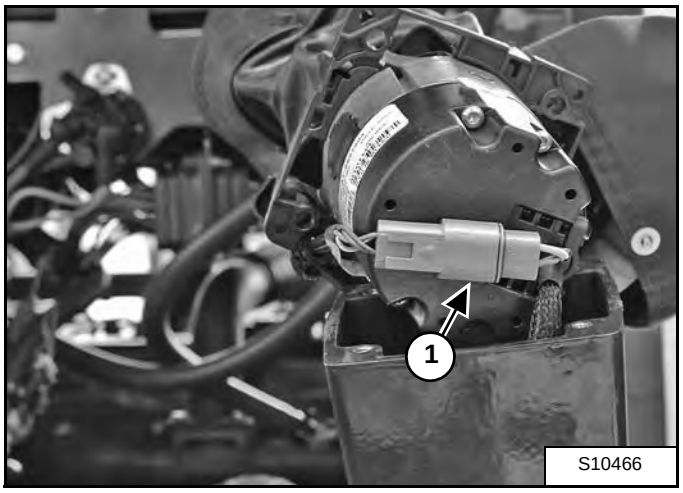
Figure 50-111-6



Remove the four screws (Item 1) **[Figure 50-111-6]** to lift the joystick control from the base.

Installation: Tighten screws (Item 1) **[Figure 50-111-6]** to 4,0 - 4,5 N•m (35 - 40 in-lb) torque.

Figure 50-111-7

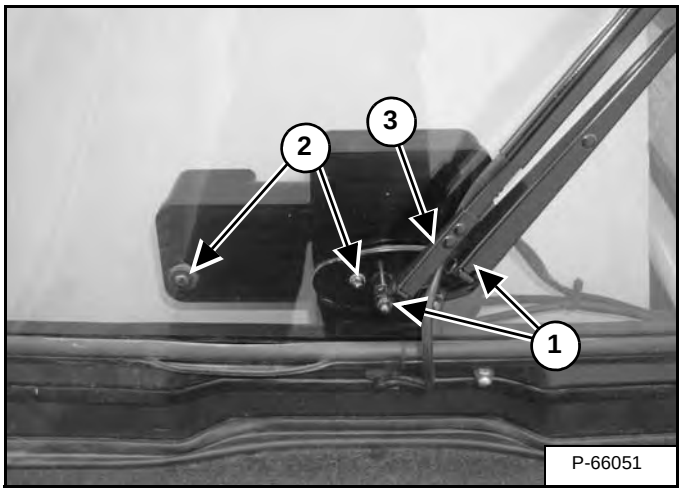


Disconnect the joystick connector (Item 1) **[Figure 50-111-7]** from the harness connector.

WINDOW (CAB DOOR)

Removal (Standard Window)

Figure 50-123-1

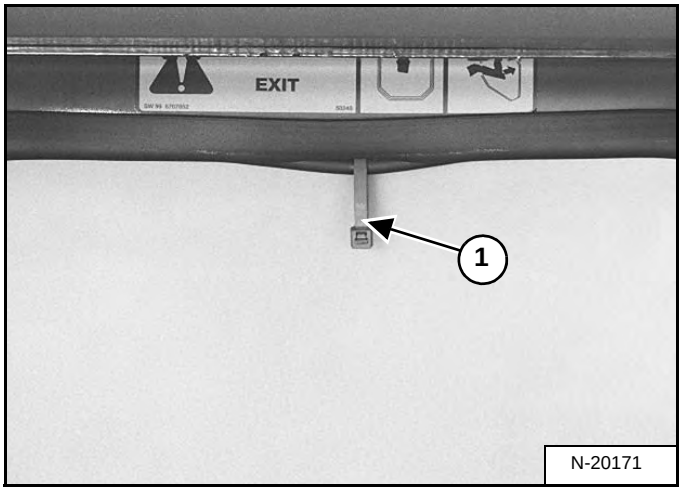


Remove the wiper arm assembly (Item 1) **[Figure 50-123-1]**.

Remove the two screws (Item 2) and the nut (Item 3) **[Figure 50-123-1]**.

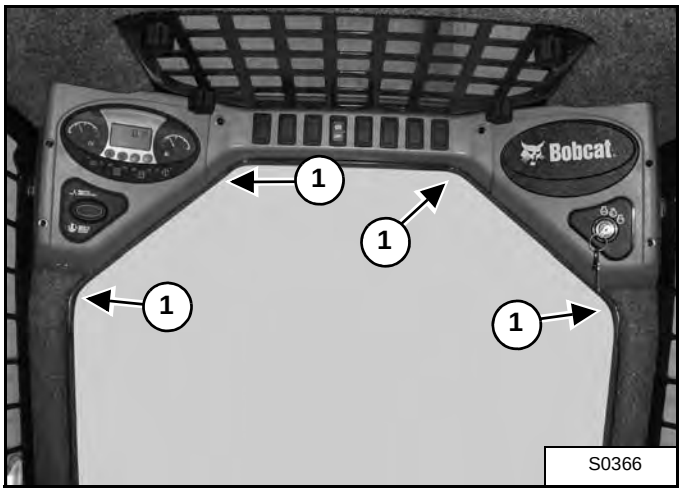
Secure the wiper motor inside the cab.

Figure 50-123-2



Pull the plastic loop (Item 1) **[Figure 50-123-2]** at the top of the window to remove the rubber cord.

Figure 50-123-3



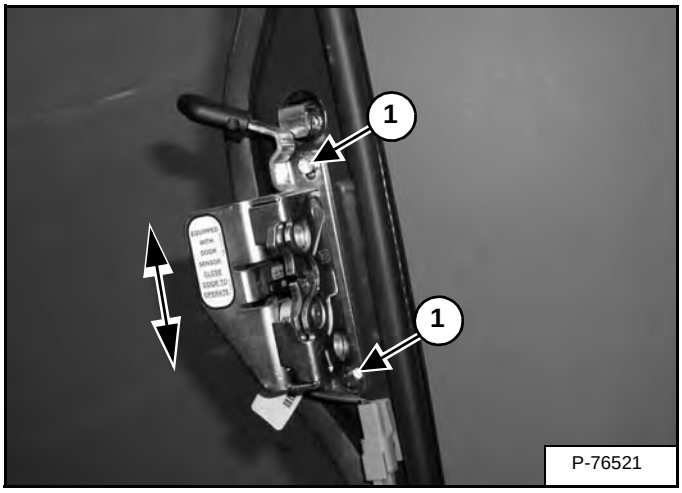
Push the window out at any corner of the window (Item 1) **[Figure 50-123-3]**.

NOTE: The window can fall when pushing on the corners. Have a second technician assist you during the removal of the window.

CAB DOOR (SPECIAL APPLICATIONS KIT DOOR) (CONT'D)

Adjusting

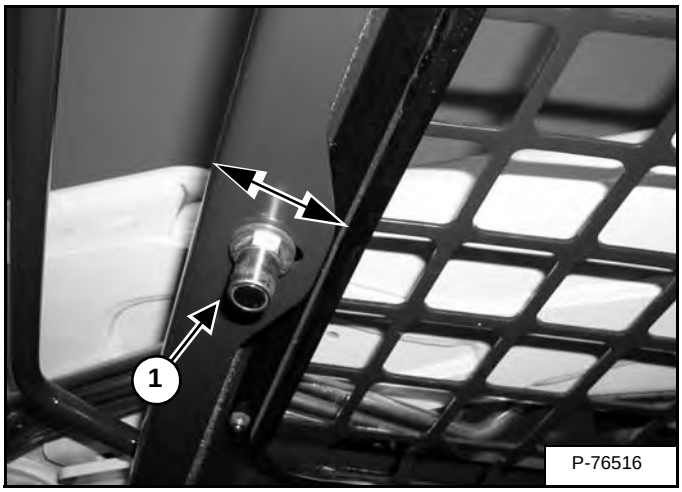
Figure 50-131-6



Loosen the two bolts (Item 1) **[Figure 50-131-6]** and adjust the latch as needed.

NOTE: For the initial adjustment, position the latch toward the bottom of the door.

Figure 50-131-7



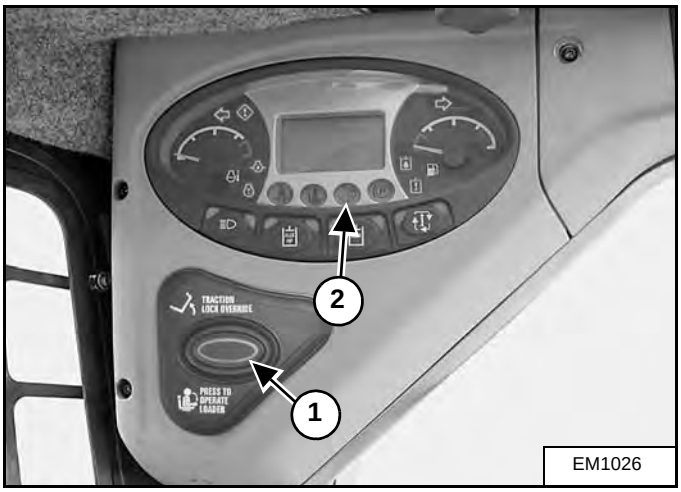
Loosen the striker and adjust as needed (Item 1) **[Figure 50-131-7]**.

NOTE: For the initial adjustment, position the striker toward the front of the machine.

After adjusting the striker and latch recheck the alignment of the door sensor. (See Aligning on Page 50-131-2.)

Checking Operation

Figure 50-131-8



Sit in operator's seat. Turn key ON. (Standard Key Panel), press RUN / ENTER button (Deluxe Instrumentation Panel), lower seat bar and close the door. Press the PRESS TO OPERATE LOADER button (Item 1) **[Figure 50-131-8]**.

Open the door. The LIFT & TILT VALVE light (Item 2) **[Figure 50-131-8]** will flash, an audible tone will sound, and the message [door] will appear in the display.

Close the door and the LIFT & TILT VALVE light (Item 2) **[Figure 50-131-8]** will go out and the display will return to machine hours.

ELECTRICAL SCHEMATIC
DELUXE CAB

T110 (S/N AE0H12128 AND ABOVE)
(S/N AE0J11458 AND ABOVE)

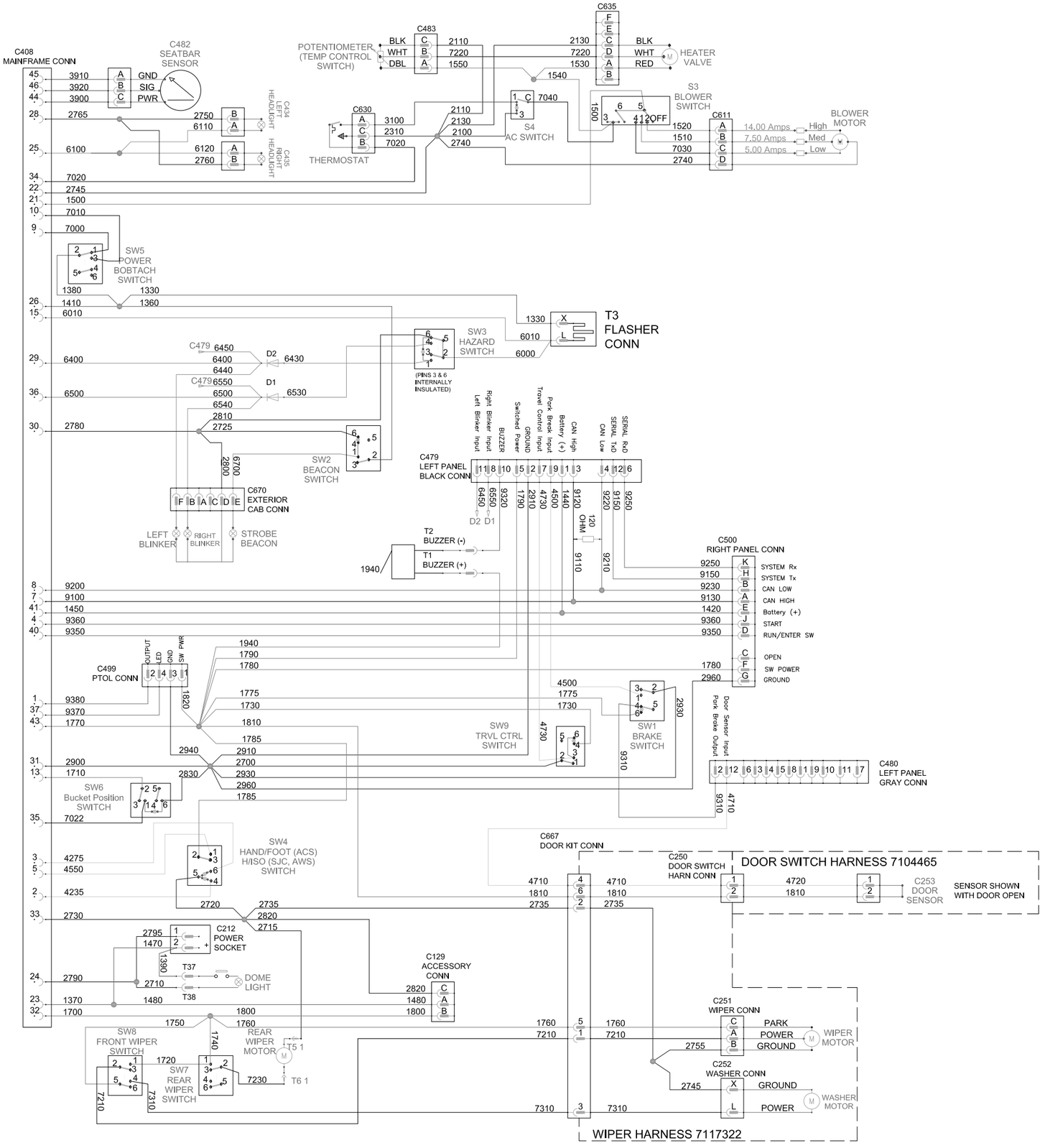
7309359

(PRINTED AUGUST 2017)

Printable Version Click Here

DLX CAB HARNESS 7245963

TO MAINFRAME HARNESS



Troubleshooting

The following troubleshooting chart is provided for assistance in locating and correcting BICS™ system problems. It is recommended that these procedures be done by authorized Bobcat Service Personnel only.

WARNING

AVOID INJURY OR DEATH

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.

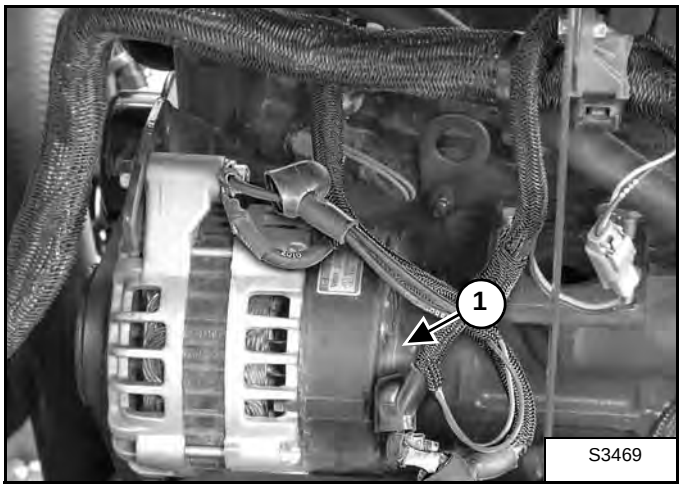
W-2003-0807

PROBLEM	CAUSE
Battery will not take a charge.	1, 2, 3, 4, 5
Alternator will not charge.	1, 2, 5
Starter will not turn the engine.	2, 3, 4, 6, 7, 8, 9

KEY TO CORRECT THE CAUSE
1. Alternator belt is loose or damaged.
2. Battery connections are dirty or loose.
3. Battery is damaged.
4. The cable and wire connection are not making a good contact.
5. The alternator is damaged.
6. The engine is locked.
7. The starter is damaged.
8. The wiring or the solenoid is damaged.
9. Check the fuses.

Low Voltage Testing

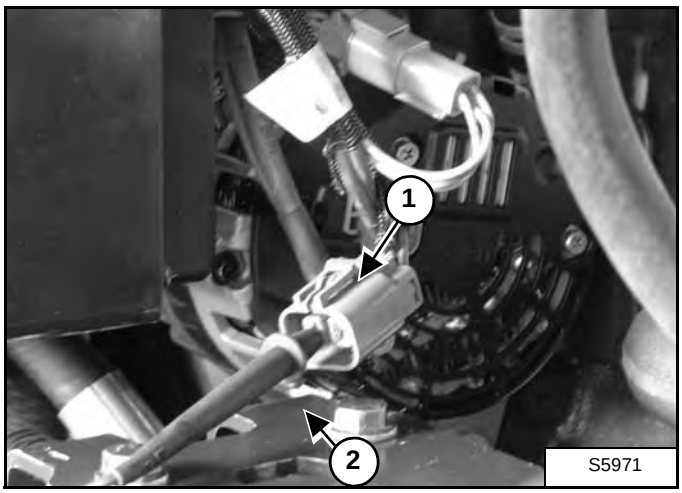
Figure 60-30-3



Turn engine OFF and remove the L & S-terminal connector (Item 1) **[Figure 60-30-3]** from the alternator.

Turn the remote start tool key switch to the ON position.

Figure 60-30-4

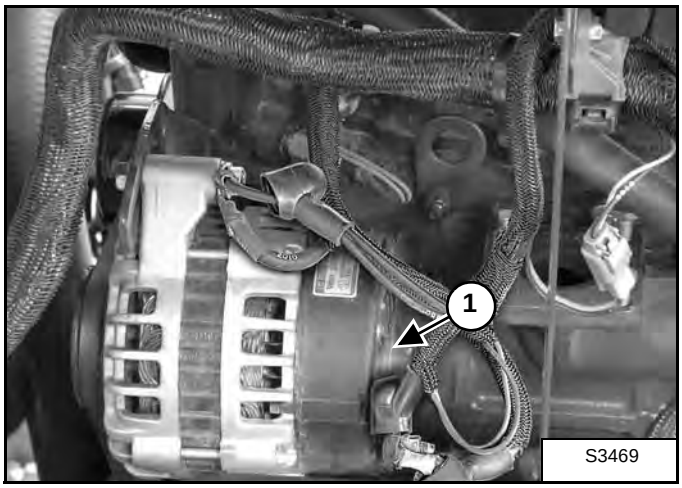


Check the voltage across the L & S-terminal (Item 1) and a good ground source (Item 2) **[Figure 60-30-4]**. The voltage should be what the battery voltage is. If not, check wire harness, relay and fuses.

If the wire harness, relay and fuses are good then remove the alternator for replacement or repair. To repair, (See Alternator Voltage Testing on Page 60-30-3.) for further component testing.

High Voltage Testing

Figure 60-30-5



Turn engine OFF and remove the L & S-terminal connector (Item 1) **[Figure 60-30-5]** from the alternator.

NOTE: Check the continuity between the "S" terminal and the positive (+) terminal on the battery or starter. There should be continuity. If no continuity, replace wire harness.

If the voltage is still above 14.7 volt at 21°C (70°F) (Alternator Temperature), then remove alternator for replacement or repair. To repair, (See Alternator Voltage Testing on Page 60-30-3.) for further component testing.

Standard Key Panel

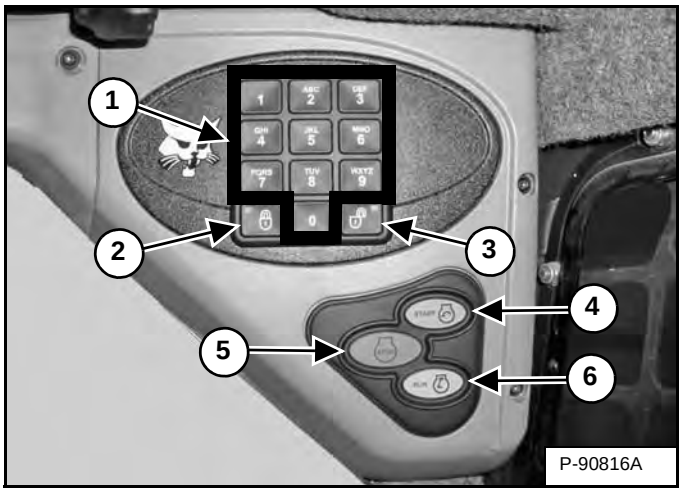
Figure 60-50-2

This machine may be equipped with a Standard Key Panel **[Figure 60-50-2]**.

The Standard Key Panel is used to turn the loader electrical system on and off, and to start and stop the engine.

Keyless Start Panel

Figure 60-50-3



This machine may be equipped with a Keyless Start Panel **[Figure 60-50-3]**.

1. **Keypad (keys 1 through 0):** Used to enter a number code (password) to allow starting the engine. An asterisk will show in the left panel display screen for each key press.

2. **LOCK Key:** Used to lock keypad. The lock key will display a red light to indicate a password is required to start the loader. (See Password Lockout Feature on Page 60-171-1.)

3. **UNLOCK Key:** Used to unlock keypad. The unlock key will display a green light to indicate the loader can be started without a password. (See Password Lockout Feature on Page 60-171-1.)

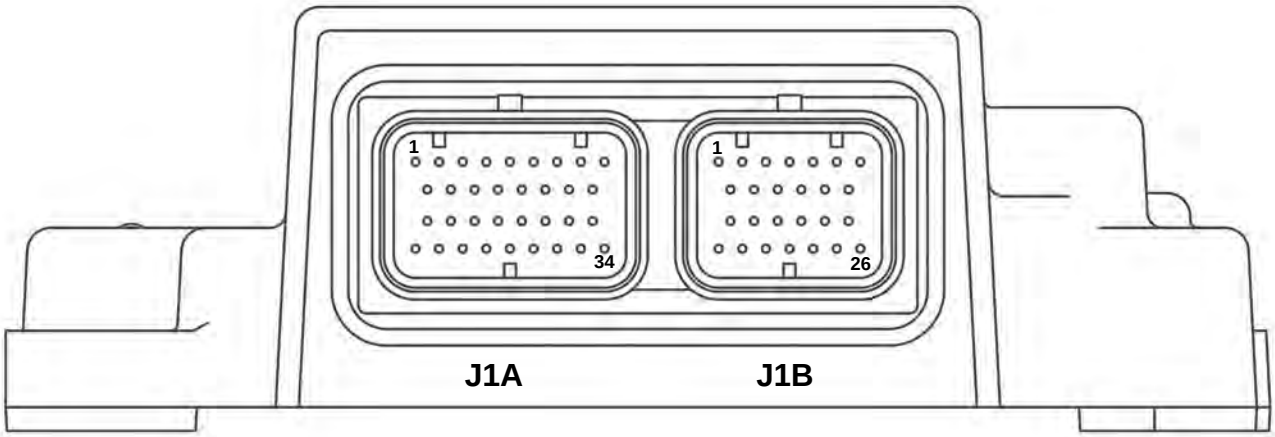
4. **START Button:** Used to start the engine.

5. **STOP Button:** Used to stop the engine and shut down the loader's electrical system.

6. **RUN Button:** Used to turn on the loader's electrical system.

Connector Identification

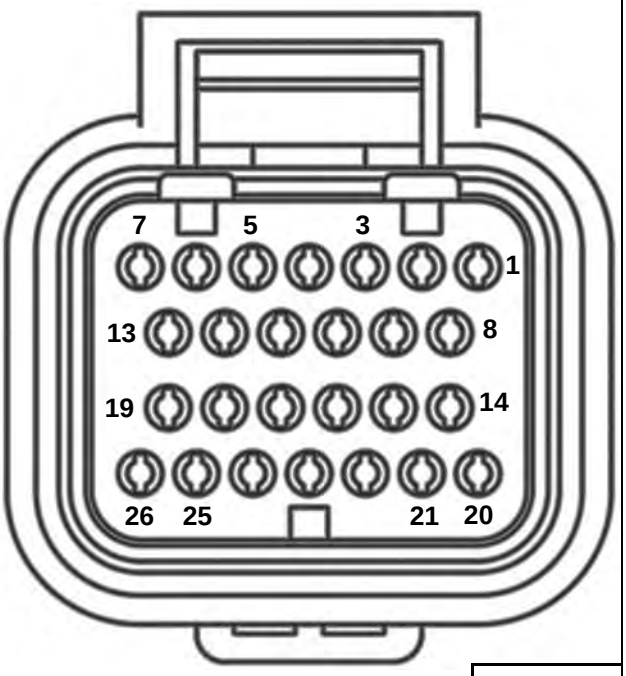
Gateway Controller



Harness Connector View

J1A

Harness Connector View

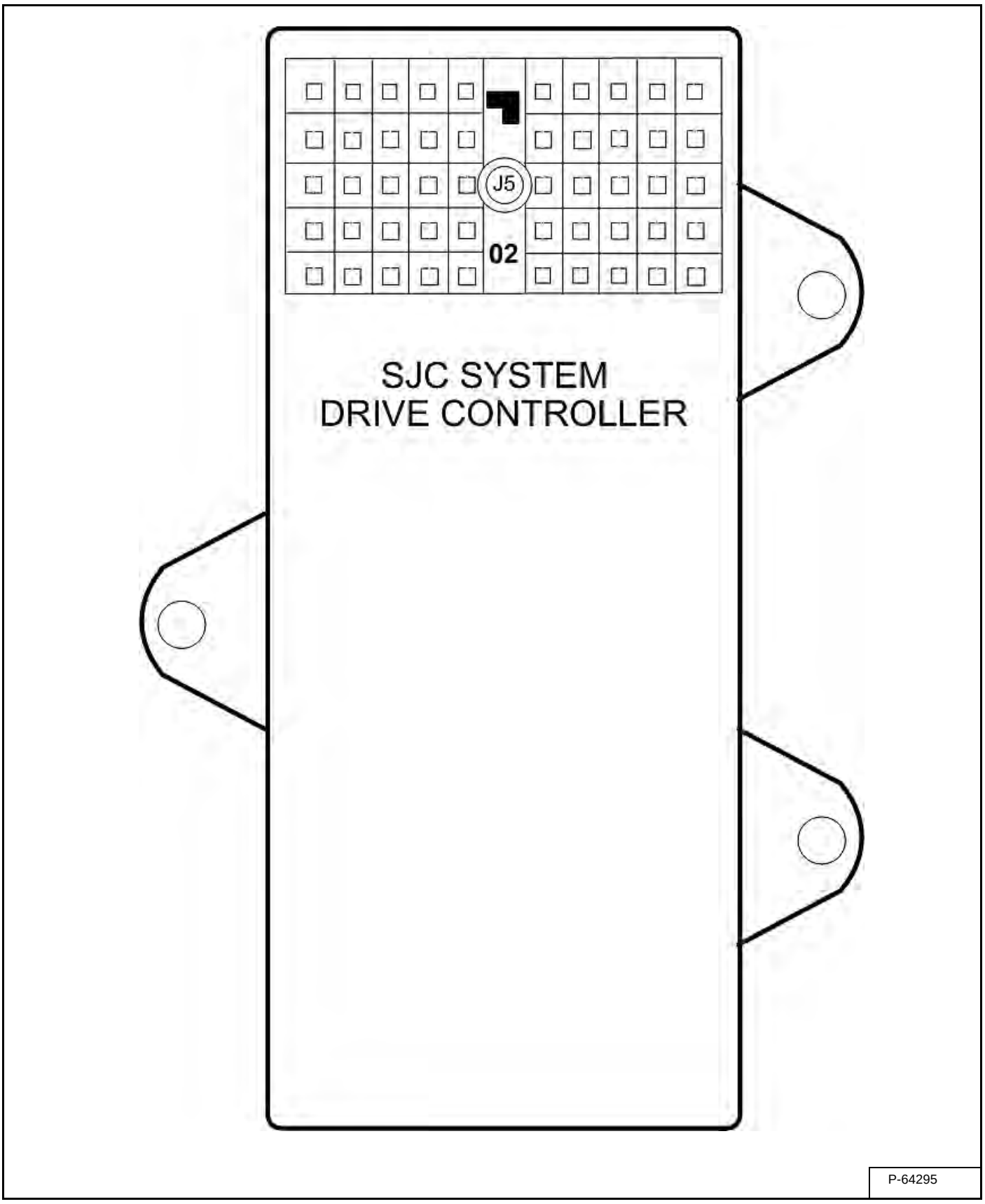


J1B

P-76622
P-76623
P-76624

BOBCAT CONTROLLER (DRIVE) (SJC) (CONT'D)

Connector Identification

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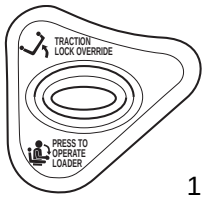
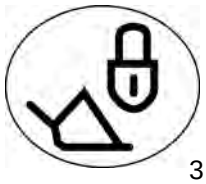
Troubleshooting (Cont'd)

The following list shows the probable causes when the BICS™ system lights are off or flashing and the associated service codes. (See DIAGNOSTIC SERVICE CODES on Page 60-80-1.)

Indicator Light	Light OFF	Light ON	Effect on Operation of Loader when Light is ON	Flashes	Service Code
 1	PRESS TO OPERATE LOADER button is NOT pressed.	PRESS TO OPERATE LOADER button IS pressed.	Lift and tilt functions will operate. Loader can be moved forward and backward.	Continuous Flashing	M-52-02
				Continuous Flashing	M-52-21
				Continuous Flashing	M-52-22
 2	Seat Bar is down.	Seat Bar is up.	Lift and tilt functions will not operate.	Continuous Flashing	M-11-21
				Continuous Flashing	M-11-22
 3	Control valve can be used.	Control valve cannot be used.	Lift and tilt functions will not operate.	Continuous Flashing	M-17-05
				Continuous Flashing	M-17-06
				Continuous Flashing	M-17-07
				Continuous Flashing	M-18-05
				Continuous Flashing	M-18-06
				Continuous Flashing	M-18-07
				Continuous Flashing	M-54-05
				Continuous Flashing	M-54-06
				Continuous Flashing	M-54-07
				Continuous Flashing	M-79-74
				Solid (battery) Icon	M-03-09
				Solid (battery) Icon	M-03-10
				Solid (battery) Icon	M-03-11
				Solid (battery) Icon	M-03-14
				Solid (battery) Icon	M-03-22
 4	Loader can be moved forward and backward	Loader cannot be moved forward and backward.	Loader cannot be moved forward and backward.	Continuous Flashing	M-15-02
				Continuous Flashing	M-15-03
				Continuous Flashing	M-16-05
				Continuous Flashing	M-16-06
				Continuous Flashing	M-16-07
				Continuous Flashing	M-25-02
				Continuous Flashing	M-25-03
				Continuous Flashing	M-25-07
				Solid (battery) Icon	M-03-09
				Solid (battery) Icon	M-03-10
				Solid (battery) Icon	M-03-11
				Solid (battery) Icon	M-03-14
				Solid (battery) Icon	M-03-22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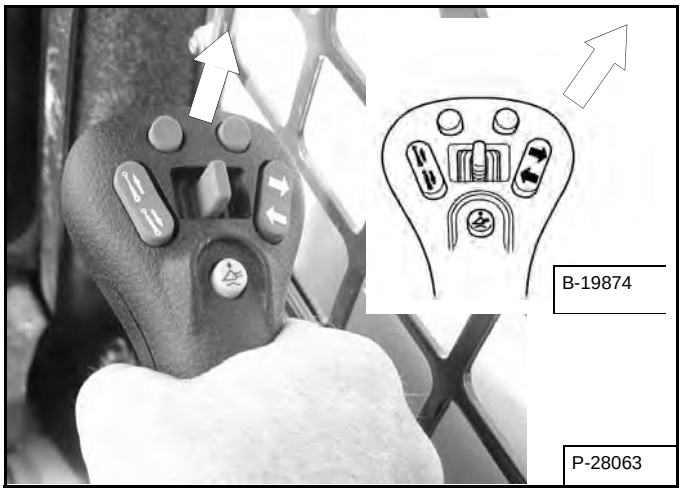
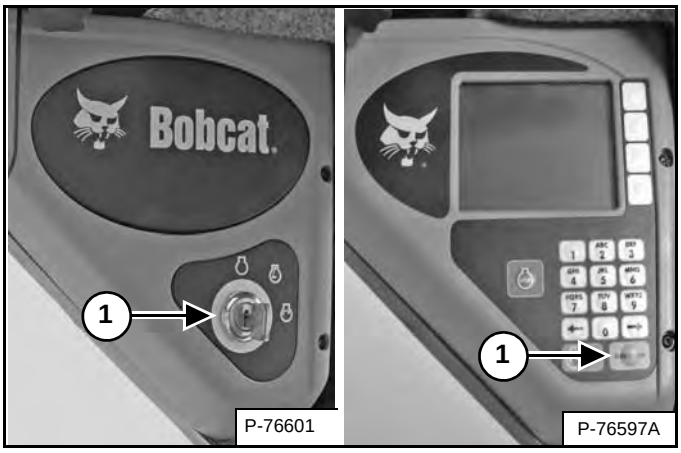
Lift And Tilt Calibration (SJC) (Cont'd)

Figure 60-140-4



Move the right joystick to the forward-right corner position **[Figure 60-140-4]** and hold in position.

Figure 60-140-5

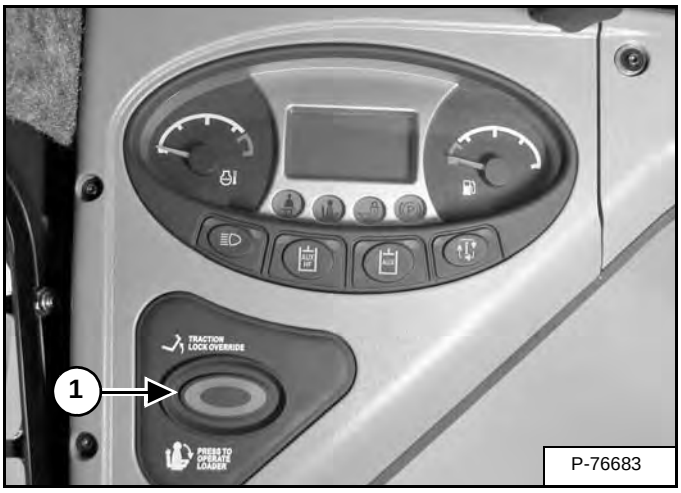


With the seat bar down, turn the ignition key switch ON (Deluxe Instrumentation Panel press RUN / ENTER) **[Figure 60-140-5]**.

NOTE: Do not start the engine.

The loader Control Pattern Switch (Item 1) **[Figure 60-140-5]** will start flashing and will continue to flash until the calibration procedure is completed.

Figure 60-140-6



At the left panel, press the PRESS TO OPERATE Button (Item 1) **[Figure 60-140-6]** while holding the right joystick in position.

Release the joystick.

NOTE: During the calibration cycle, the system will beep three times. Once the calibration is complete code W3224 (Calibration Performed) will be generated.

The *ACS* controller will cycle the actuators.

The lift and tilt calibration is complete.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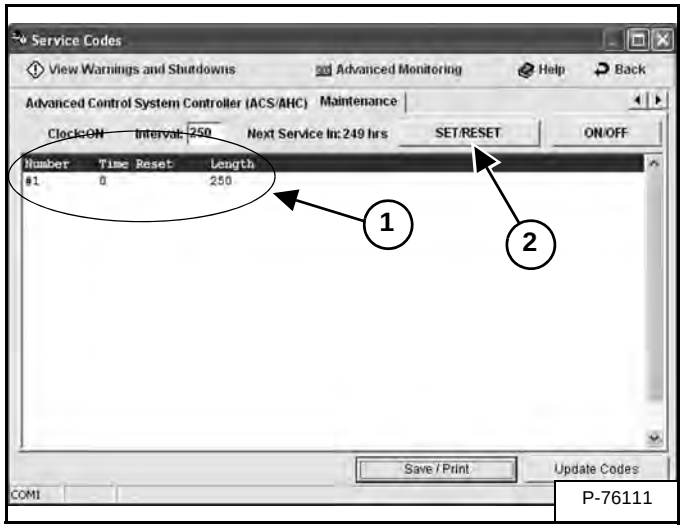
Setup (Cont'd)

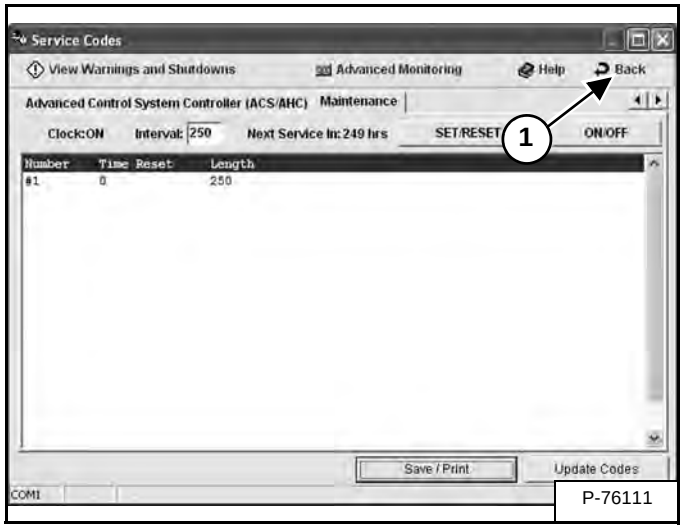
Figure 60-180-12



The current maintenance clock **Length** (Interval) and **Time Reset** will be displayed (Item 1). This screen will also store the most recent 20 entries of history. Once an entry is added, it can not be changed. If an entry is made and the interval is not correct, make another entry and click **SET / RESET** (Item 2) **[Figure 60-180-12]**.

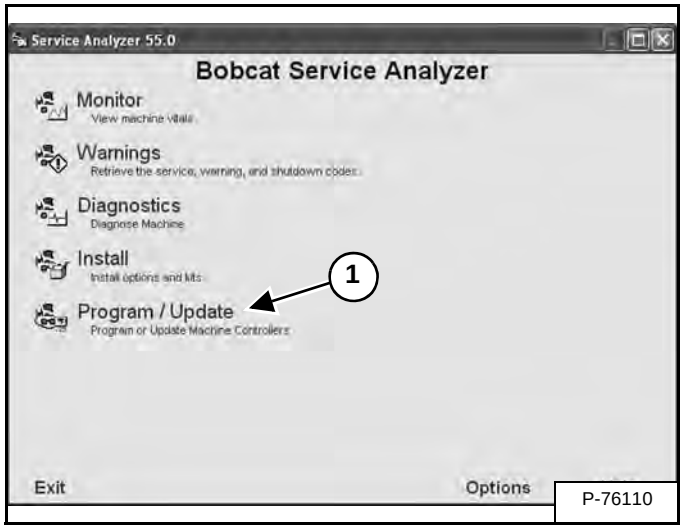
NOTE: If the interval is set to 10 hours or less, the maintenance clock will reset and log a reset time but the wrench icon, hour interval and service icon will NOT be removed from the left and right instrument panel display screens.

Figure 60-180-13



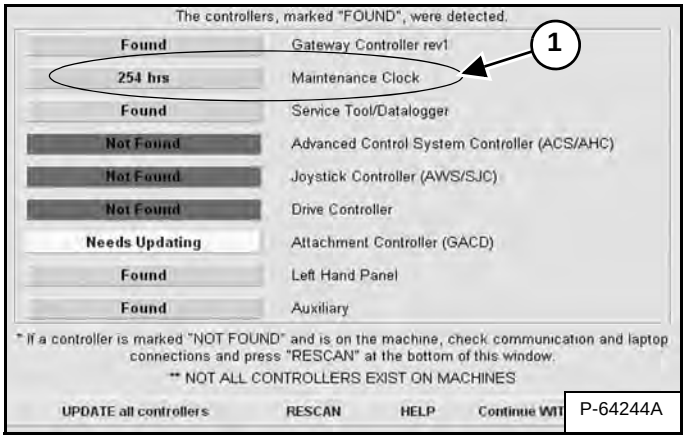
Select **Back** (Item 1) **[Figure 60-180-13]** to return to the main menu.

Figure 60-180-14



Select **Program / Update** (Item 1) **[Figure 60-180-14]** to view the maintenance clock.

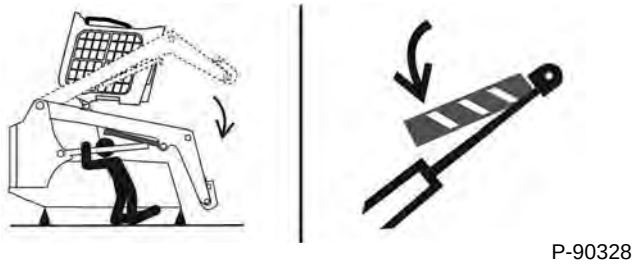
Figure 60-180-15



After the maintenance clock has been activated, the first analyzer screen shows the hours remaining on current maintenance interval (Item 1) **[Figure 60-180-15]**. If past the interval, the number will reflect negative hours.

Engine Removal And Installation

DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

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

Put jackstands under the rear corners of the loader.

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-1.)

Raise the operator cab. (See Raising on Page 10-30-1.)

Drain the hydraulic reservoir. (See Removing And Replacing Hydraulic Fluid on Page 10-120-2.)

Disconnect the steering linkages from the hydrostatic pump (if equipped).

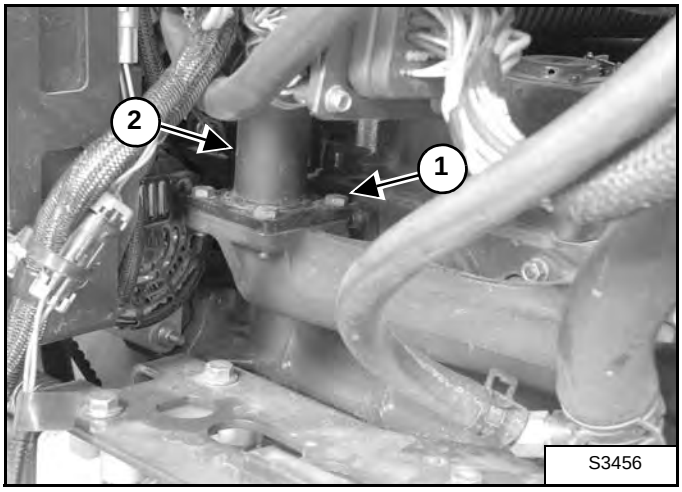
Remove the battery from the loader. (See Removal And Installation on Page 60-20-1.)

Drain the engine coolant from the cooling system. (See Removing And Replacing Coolant on Page 10-90-2.)

Remove the air cleaner. (See Housing Removal And Installation on Page 70-40-1.)

Remove the muffler. (See Removal And Installation on Page 70-30-1.)

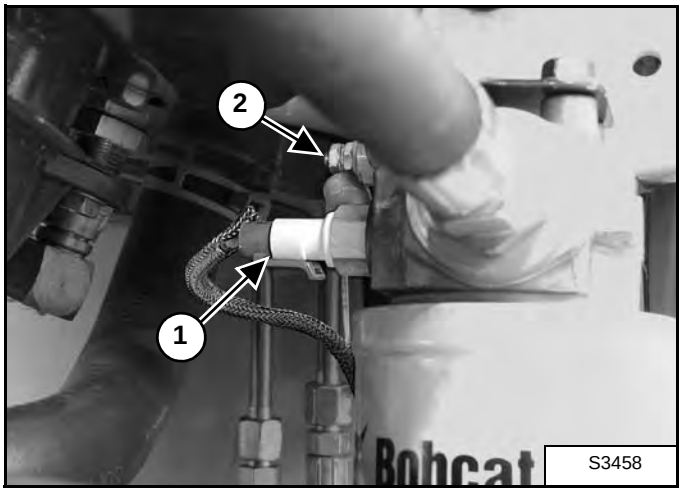
Figure 70-10-2



Remove the four bolts (Item 1) from the exhaust pipe and remove the pipe (Item 2) **[Figure 70-10-2]**.

Installation: Make sure the gasket is fit in between the flanges when installing.

Figure 70-10-3



Disconnect the temperature sender connector (Item 1) **[Figure 70-10-3]** from the filter housing.

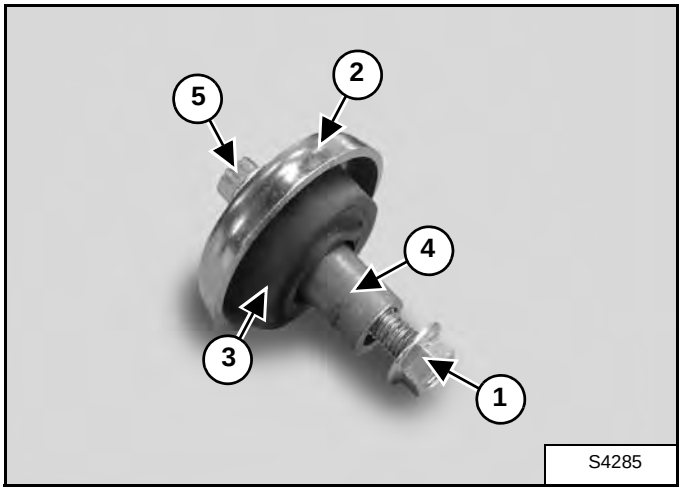
Disconnect the wire connector (Item 2) **[Figure 70-10-3]** for the differential pressure switch on the filter housing.

Engine Mount Replacement

Use the following procedure to install engine mounts:

- Remove the existing mount from the engine. See engine removal and installation for engine mount locations.
- Replace all four engine mounts (two front and two rear).

Figure 70-10-39



- Use the parts shown to install the new engine mounts **[Figure 70-10-39]**:
- Hex Nut (Item 1).
- Engine Mount (Item 2).
- Tube Spacer (Item 3).
- Tube (Item 4).
- Mounting Bolt (Item 5).

Tighten the mounting bolts to 95 N•m (70 ft-lb) torque.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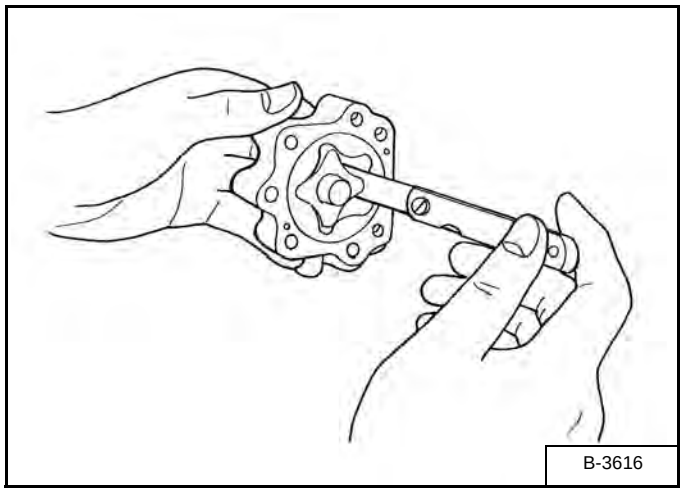
Oil Pump Inspection

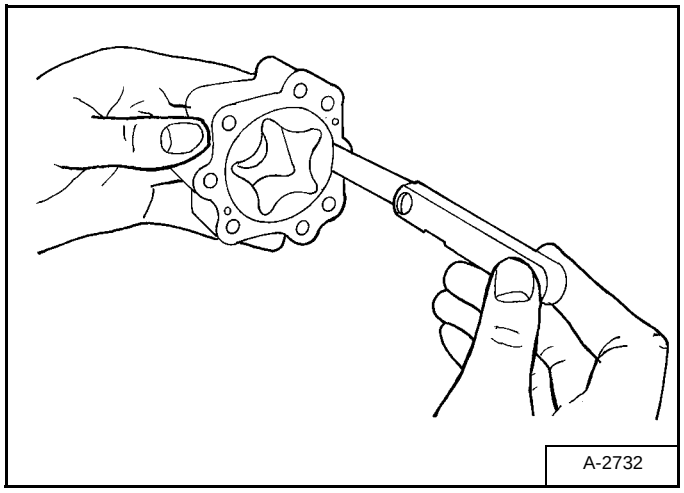
Figure 70-60-4



Measure the clearance between the lobes of the inner rotor and the outer rotor with a feeler gauge **[Figure 70-60-4]**.

Clearance	0,03 - 0,14 mm (0.0012 - 0.0055 in)
Allowable Limit	0,2 mm (0.0079 in)

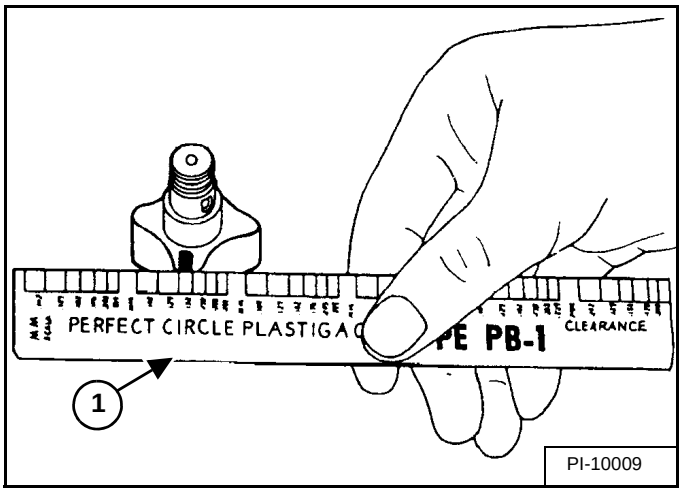
Figure 70-60-5



Measure the clearance between the outer rotor and the pump body with a feeler gauge **[Figure 70-60-5]**.

Clearance	0,11 - 0,19 mm (0.0043 - 0.0075 in)
Allowable Limit	0,25 mm (0.0098 in)

Figure 70-60-6



Put a strip of plastigauge (Item 1) **[Figure 70-60-6]** onto the rotor face.

Install the cover and tighten the bolts.

Remove the cover carefully. Measure the width of the pressed plastigauge (Item 1) **[Figure 70-60-6]**.

If the clearance exceeds the factory specifications, replace the oil pump rotor assembly.

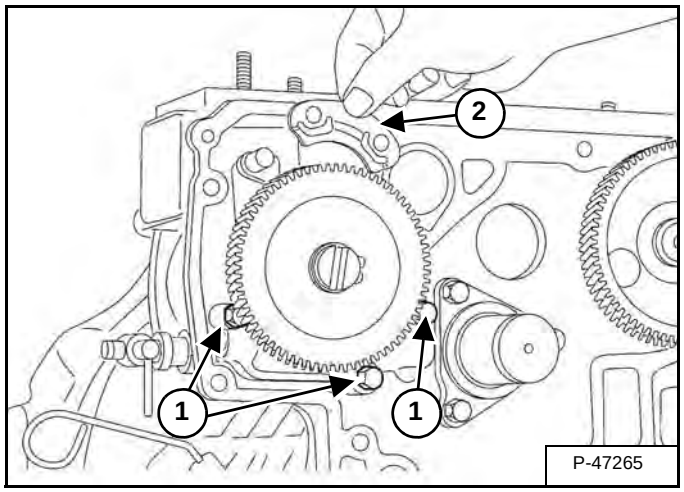
End Clearance	0,105 - 0,150 mm (0.00413 - 0.00591 in)
Allowable Limit	0,2 mm (0.0079 in)

Fuel Camshaft Removal And Installation

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-1.)

Remove the idler gear. (See Idler Gear And Camshaft Removal And Installation on Page 70-100-4.)

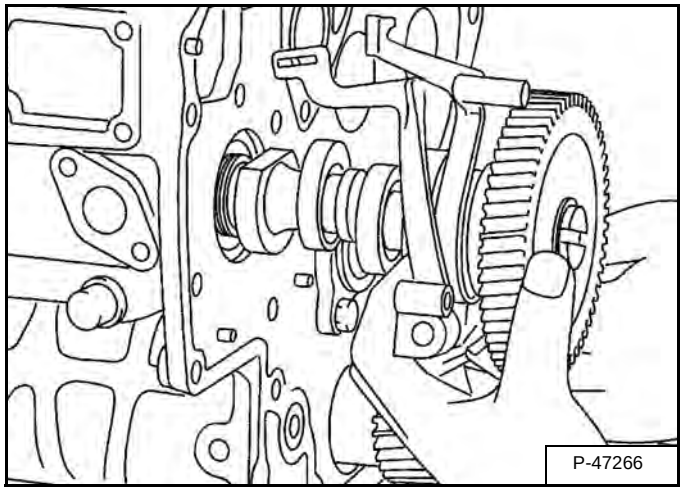
Figure 70-70-19



Remove the three bolts (Item 1) **[Figure 70-70-19]**.

Remove the two bolts and fuel camshaft retainer plate (Item 2) **[Figure 70-70-19]**.

Figure 70-70-20



Remove the fuel camshaft and fork lever assembly at the same time **[Figure 70-70-20]**.

Installation: Apply a thin layer of engine oil to the fuel camshaft before installation.

Fuel Injection Pump - Timing

Timing the injection pump is done by changing the number of shims between the injection pump and the injection pump mounting surface.

⚠ 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.

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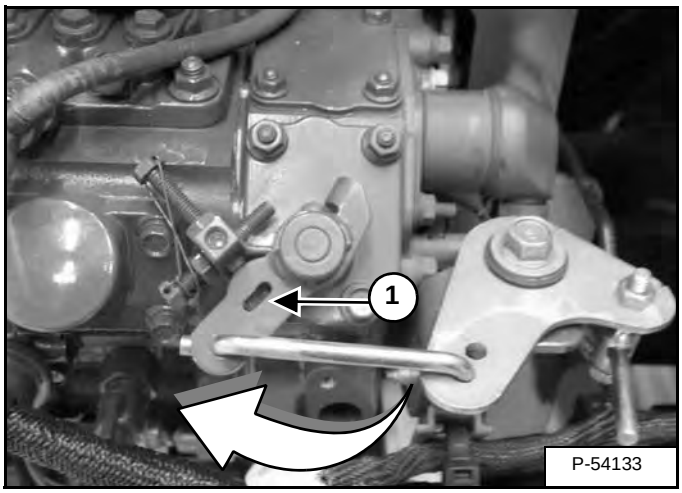
Disconnect the number one (closest to water pump) cylinder high pressure line from the injection pump.

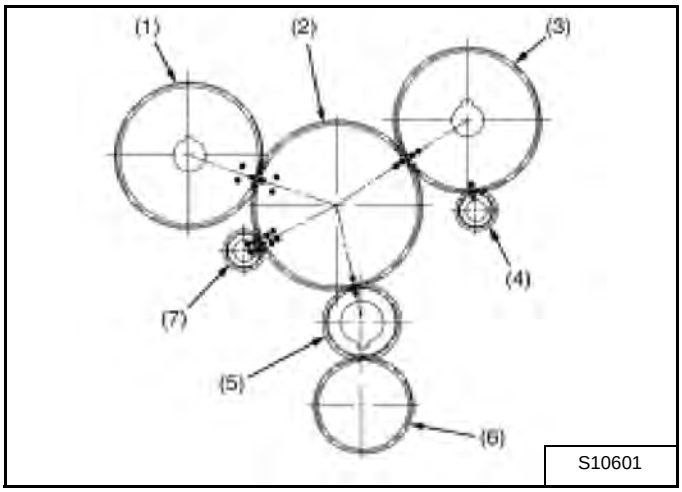
Figure 70-70-21



Turn the fuel supply lever (Item 1) **[Figure 70-70-21]** to the ON position.

Valve Timing - Checking

Figure 70-80-11



Remove the engine. (See Engine Removal And Installation on Page 70-10-10.)

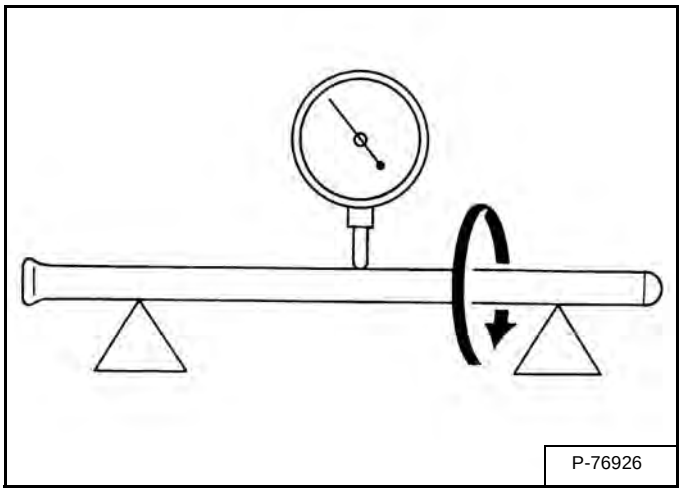
Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-1.)

Check to see that each gear is aligned with its aligning mark:

- Idle gear (Item 2) and crank gear (Item 5), cam gear (Item 3) and balancer gear (Item 4) **[Figure 70-80-11]**.
- Cam gear (Item 3) and idle gear (Item 2) **[Figure 70-80-11]**.
- Idle gear (Item 2) and injection pump gear (Item 1) **[Figure 70-80-11]**.
- Idle gear (Item 2) and balancer gear (Item 7) **[Figure 70-80-11]**.

Push Rod Alignment - Checking

Figure 70-80-40



Place the push rod on V blocks **[Figure 70-80-40]**.

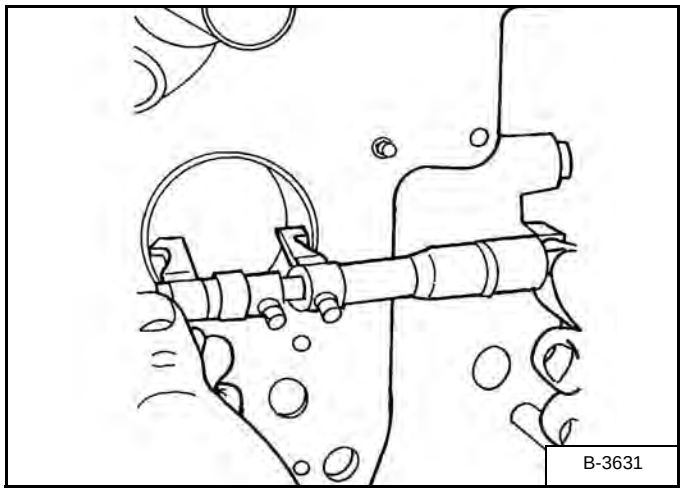
Measure the push rod alignment **[Figure 70-80-40]**.

If the push rod exceeds the allowable limit, replace the push rod.

Push Rod Alignment Allowable Limit	0,25 mm (0.0098 in)

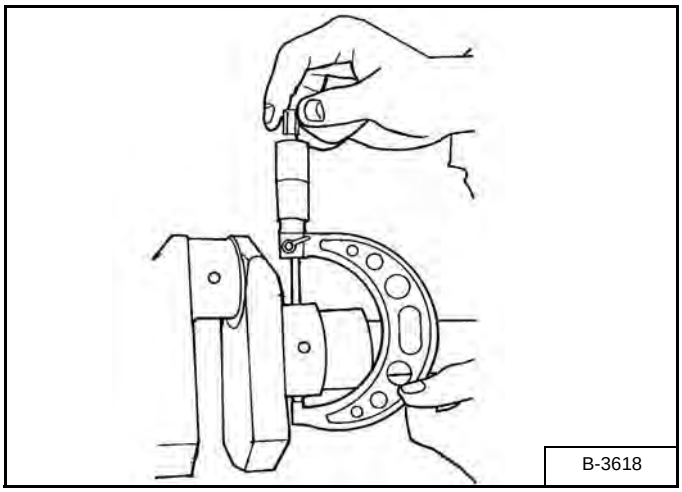
Crankshaft And Bearings - Servicing (Cont'd)

Figure 70-90-29



Measure the I.D. of the No. 1 crankshaft bearing **[Figure 70-90-29]**.

Figure 70-90-30



Measure the O.D. of the crankshaft journal **[Figure 70-90-30]**.

Calculate the oil clearance.

If the clearance exceeds the allowable limit, replace the crankshaft bearing.

Bearing 1:

Bearing I.D.	59,980 - 60,039 mm (2.36142 - 2.36374 in)
Journal O.D.	59,921 - 59,940 mm (2.35909 - 2.35984 in)
Oil Clearance	0,040 - 0,118 mm (0.00157 - 0.00465 in)
Allowable Limit	0,2 mm (0.0079 in)

NOTE: Make sure to use the correct size bearing when installing. Oversize bearings are generally marked.

Balancer Shaft Servicing (Cont'd)

Figure 70-100-20

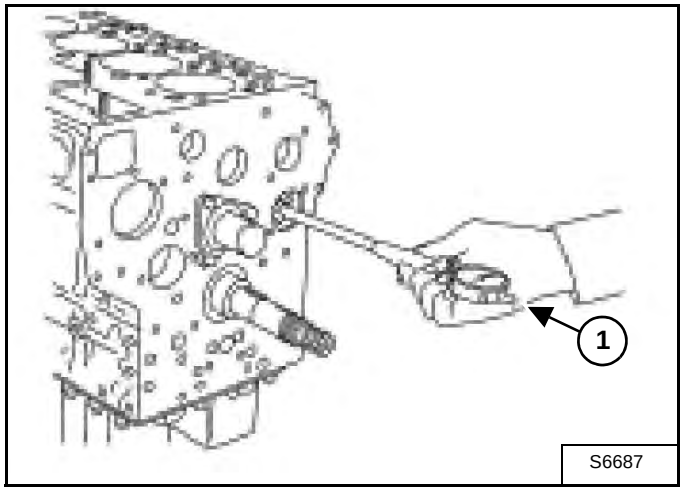
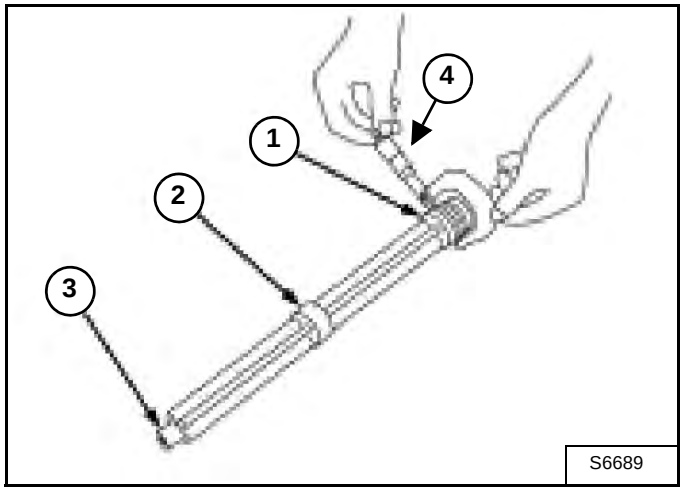


Figure 70-100-21



Measure the O.D. of the balancer shaft journals (Items 1, 2 and 3) with an outside micrometer (Item 4) **[Figure 70-100-20]**.

Measure the cylinder block bore I.D. for balancer shaft with an inside micrometer or cylinder gauge (Item 1) **[Figure 70-100-21]**.

If the clearance exceeds the allowable limit, replace the balancer shaft.

Oil clearance of balancer-shaft journal 1	Factory spec.	0,030 - 0,111 mm (0.00118 - 0.00437 in)
	Allowable limit	0,2 mm (0.0079 in)
Balancer-shaft journal 1 O.D.	Factory spec.	43,934 - 43,950 mm (1.72968 - 1.73031 in)
Balancer-shaft bearing 1 I.D.	Factory spec.	43,980 - 44,045 mm (1.73149 - 1.73405 in)
Oil clearance of balancer-shaft journal 2	Factory spec.	0,030 - 0,111 mm (0.00118 - 0.00437 in)
	Allowable limit	0,2 mm (0.0079 in)
Balancer-shaft journal 2 O.D.	Factory spec.	41,934 - 41,950 mm (1.65094 - 1.65157 in)
Balancer-shaft bearing 2 I.D.	Factory spec.	41,980 - 42,045 mm (1.65275 - 1.65531 in)
Oil clearance of balancer-shaft journal 3	Factory spec.	0,020 - 0,094 mm (0.00079 - 0.00370 in)
	Allowable limit	0,2 mm (0.0079 in)
Balancer-shaft journal 3 O.D.	Factory spec.	21,947 - 21,960 mm (0.86405 - 0.86456 in)
Balancer-shaft bearing 3 I.D.	Factory spec.	21,980 - 22,041 mm (0.86535 - 0.86775 in)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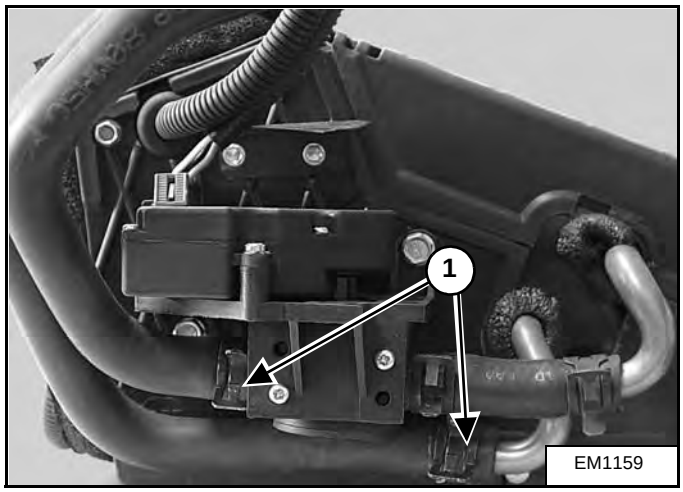
Removal And Installation (Cont'd)

Figure 80-40-5



Remove the heater hoses (Item 1) **[Figure 80-40-5]** from the heater coil.

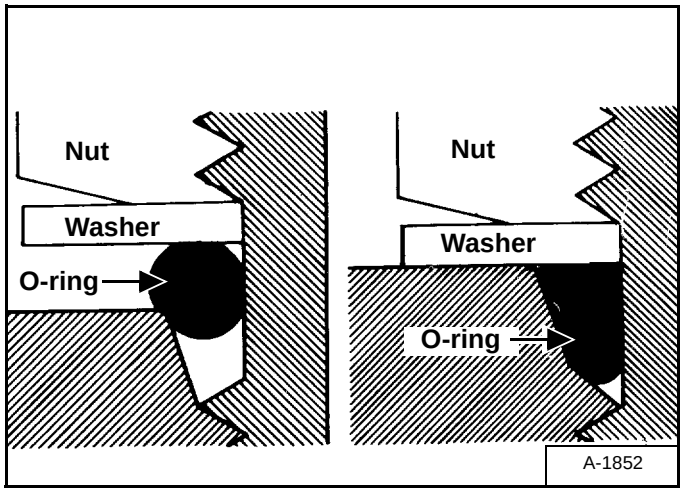
Remove the heater unit from the loader.

Reverse the removal procedure to install the heater unit.

Certain specification(s) are based on engineering calculations and are not actual measurements. Specification(s) are provided for comparison purposes only and are subject to change without notice. Specification(s) for your individual Bobcat equipment will vary based on normal variations in design, manufacturing, operating conditions, and other factors.

Straight Thread O-ring Fitting

Figure SPEC-40-3



Lubricate the O-ring before installing the fitting. Loosen the jam nut and install the fitting. Tighten the jam nut until the washer is tight against the surface **[Figure SPEC-40-3]**.

Tubelines And Hoses

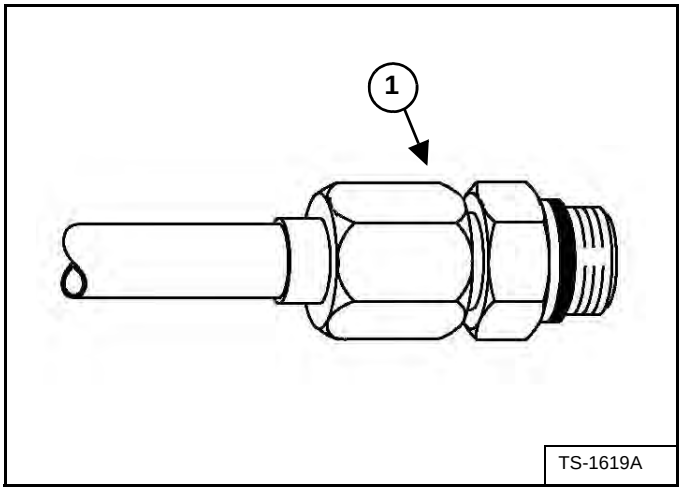
Replace any tubelines that are bent or flattened. They will restrict flow, which will slow hydraulic action and cause heat.

Replace hoses which show signs of wear, damage or weather cracked rubber.

Always use two wrenches when loosening and tightening hose or tubeline fittings.

Flare Fitting

Figure SPEC-40-4



Use the following procedure to tighten the flare fitting:

Tighten the nut until it makes contact with the seat. Make a mark across the flats of both the male and female parts of the connection (Item 1) **[Figure SPEC-40-4]**.

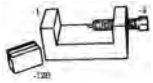
Use the chart **[Figure SPEC-40-5]** to find the correct tightness needed. If the fitting leaks after tightening, disconnect it and inspect the seat area for damage.

Figure SPEC-40-5

Flare Fitting Tightening Torque		
Tubeline Outside Diameter	**Thread Size**	**TORQUE N•m (ft-lb)**
1/4”	7/16” - 20	18 (13)
5/16”	1/2” - 20	23 (17)
3/8”	9/16” - 18	30 (22)
1/2”	3/4” - 16	54 (40)
5/8”	7/8” - 14	81 (60)
3/4”	1-1/16” - 12	114 (84)
7/8”	1-3/16” - 12	133 (98)
1”	1-5/16” - 12	160 (118)
1-1/4”	1-5/8” - 12	209 (154)
1-1/2”	1-7/8” - 12	221 (163)
2”	2-1/2” - 12	342 (252)

SERVICE TOOLS REQUIRED (CONT'D)

Mainframe And Drive Tools

TOOL PART NUMBER	DESCRIPTION	MODELS USED ON	COMMENT	IMAGE
MEL1399	Seal Driver Tool	S450		
MEL1525	Seal Driver Tool	S70		
MEL1242	Power Ram	S100 S450 - S850		
MEL1202	Axle Bearing Service Set	S70, S100 S450 - S770	MEL1202 Includes: MEL1202-1 thru MEL1202-13	
MEL1714	Axle Seal Installation Tool	S850		
6675936 (MEL1560)	Bleed Tool	T110 - T870	Machines with two track tension fittings.	
7277225	Bleed Tool	T110 - T870	Machines with one track tension fittings.	
MEL1246	Chain Link Tool	S450 - S850 A770		
MEL1604	Seal Driver	A770		
MEL1269	Chain Breaker	S450 - S595		
MEL1364	Chain Link Tool	S450 - S595		
MEL1685	Pivot Point Tapered Reamer	S630 - S850 T630 - T870		
MEL1734	Pivot Point Tapered Reamer	S450 - S595 T450 - T595		
MEL1605	Bearing Race Installer	A770		

See BobcatDealerNET.com for parts ordering information. (For EMEA dealers see the Bobcat Special Tools Catalogue and Doosan Shop for parts ordering information.)

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