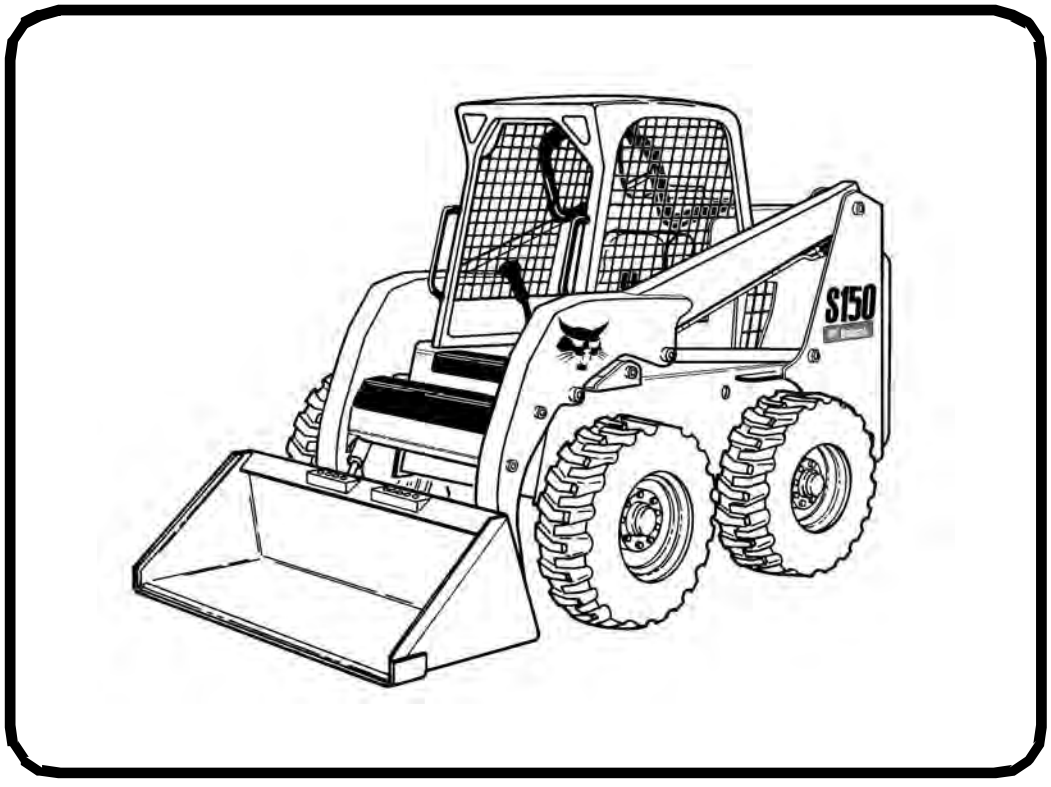
# Service Manual
# S150 Skid-Steer Loader

## S/N A8M0 60001 & Above




**EQUIPPED WITH**
**BOBCAT INTERLOCK**
**CONTROL SYSTEM (BICS)**

6987054-EN (10-08)

Printed in Europe.

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**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

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

W-2003-0903

## WARNING

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

W-2044-1285

## IMPORTANT

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

I-2019-0284

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 **www.training.bobcat.com** or **www.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 **www.training.bobcat.com** or **www.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 **www.training.bobcat.com** or **www.bobcat.com**.

SI SSL-1007 SM

TRANSPORTING THE LOADER ON A TRAILER . . . . . 10-40-1
Fastening . . . . . 10-40-1
Loading And Unloading . . . . . 10-40-1

**TIGHTEN ALL HARDWARE PER SIZE TO GRADE 5 TORQUE (SEE STANDARD TORQUE SPECIFICATIONS FOR BOLTS, SPEC SECTION ) UNLESS OTHERWISE SPECIFIED.**

## TRANSPORTING THE LOADER ON A TRAILER

### Loading And Unloading

**⚠ WARNING**

**AVOID SERIOUS INJURY OR DEATH**

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

**W-2058-0807**

Be sure the transport and towing vehicles are of adequate size and capacity for weight of loader [See “Performance” on page SPEC-10-2].

**Figure 10-40-1**

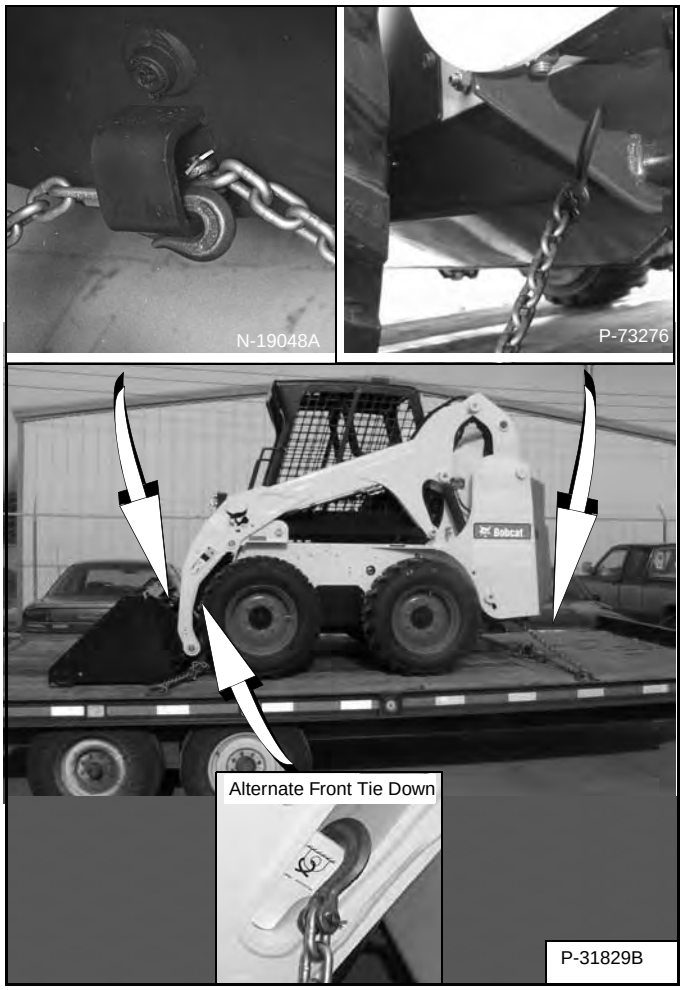



A loader with an empty bucket or no attachment must be loaded backward onto the transport vehicle **[Figure 10-40-1]**.

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

### Fastening

**Figure 10-40-2**




Use the following procedure to fasten the Bobcat Loader to the transport vehicle to prevent the loader from moving during sudden stops or when going up or down slopes **[Figure 10-40-2]**.

- Lower the bucket or attachment to the floor.
- Stop the engine.
- Engage the parking brake.
- Install chains at the front and rear loader tie down positions **[Figure 10-40-2]**
- Fasten each end of the chain to the transport vehicle.

## REMOTE START TOOL (SERVICE TOOL) KIT - 6689779

### Description

The Remote Start Tool (Service Tool) Kit is a replacement tool for MEL 1563 Remote Start Tool and MEL 1400B - BOSS® Diagnostic Tool.

The Remote Start Tool (Service Tool) Kit, P/N 6689779, can be used to service older loaders with the BOSS® system using the supplied BOSS® Service Tool Harness P/N 6689745.

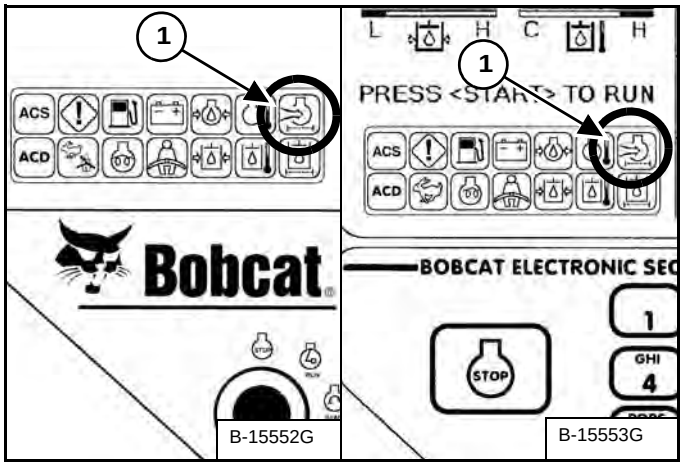
The Remote Start Tool (Service Tool) Kit, P/N 6689779, can be used to service newer loaders using the supplied harness P/N 6689747.

A computer can be connected to the Remote Start Tool (Service Tool) for diagnostics and software updates using the computer harness P/N 6689746 in conjunction with the loader harness.

## AIR CLEANER SERVICE

### Replacing Filter Elements

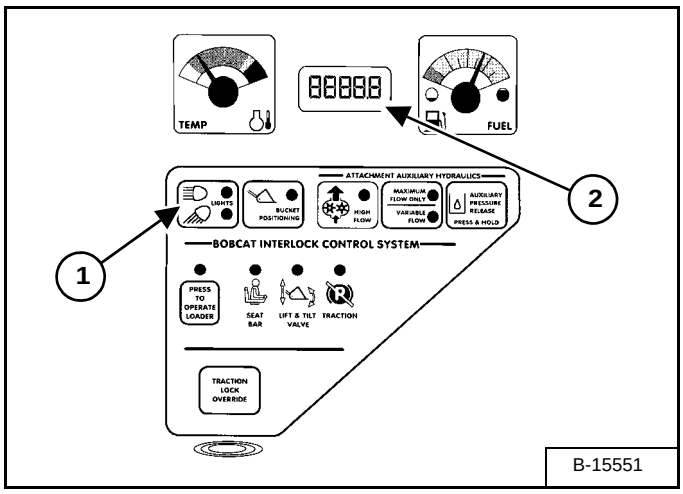
**Figure 10-80-1**




It is important to change the air filter element only when the Air Cleaner Icon in the right panel is ON (Item 1) **[Figure 10-80-1]** and you hear three beeps from the alarm.

Replace the inner filter every third time the outer filter is replaced or as indicated.

**Figure 10-80-2**

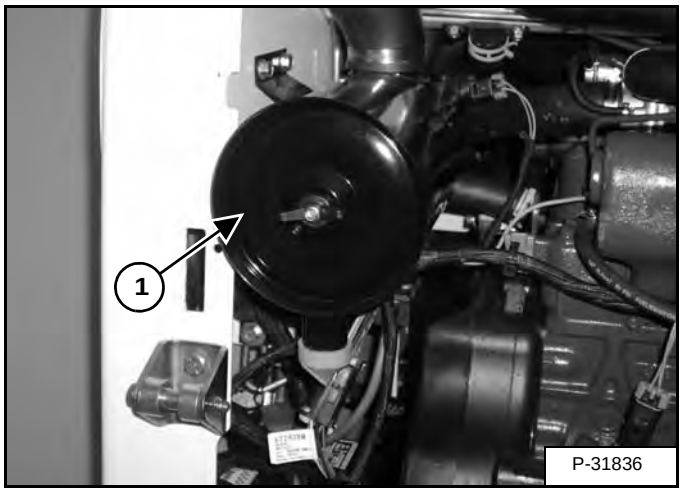



Press and hold the LIGHT Button (Item 1) **[Figure 10-80-2]** for two seconds.

If the filter element needs replacement, the CODE [01-17] (Air Filter Plugged) will show in the HOURMETER / CODE DISPLAY (Item 2) **[Figure 10-80-2]**.

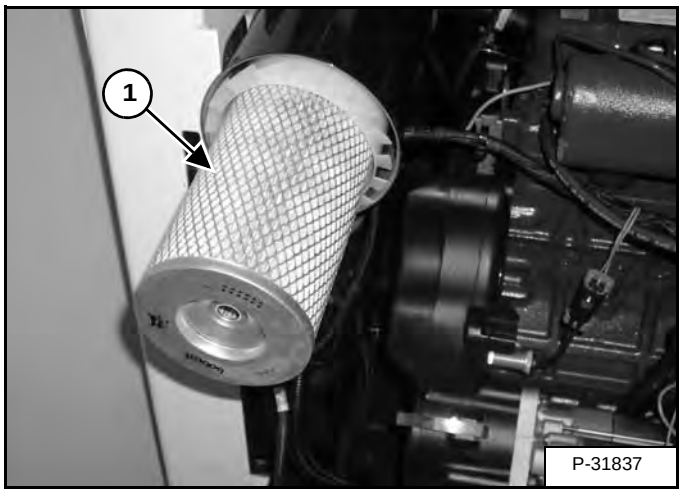
***Outer Filter***

**Figure 10-80-3**




Remove the wing nut and remove the dust cover (Item 1) **[Figure 10-80-3]**.

**Figure 10-80-4**




Remove the wing nut and pull the outer filter element (Item 1) **[Figure 10-80-4]** out and discard.

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

Install new filter. Push all the way in until it contacts the base of the housing. Install wing nut.

Install the dust cover and the wing nut **[Figure 10-80-3]**.

Check the air intake hose and the air cleaner housing for damage. Make sure all connections are tight.

## HYDRAULIC / HYDROSTATIC SYSTEM

### Checking And Adding Fluid

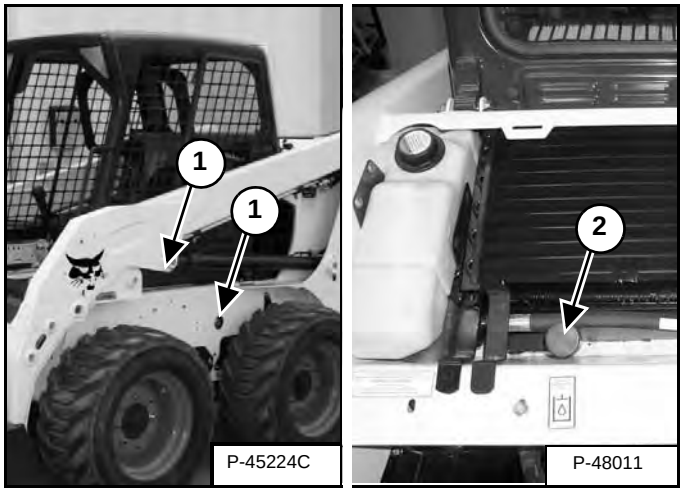
Use only recommended fluid in the hydraulic system [See “HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS” on page SPEC-40-1].

Put the loader on a level surface.

Lower the lift arms and tilt the Bob-Tach fully back.

Stop the engine.

**Figure 10-120-1**




Check the fluid level in the sight gauge (Item 1) **[Figure 10-120-1]**.

Open the rear door and raise the rear grill. Remove the fill cap (Item 2) **[Figure 10-120-1]**.

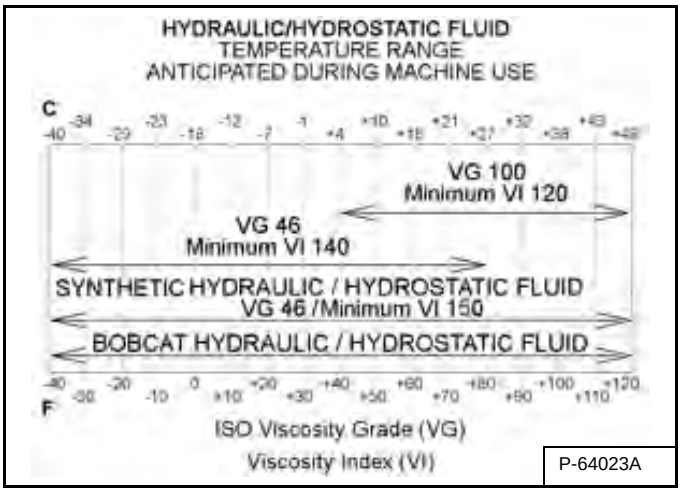
Add fluid as needed to bring the level to the center of the sight gauge (Item 1) **[Figure 10-120-1]**.

Install the fill cap (Item 2) **[Figure 10-120-1]**.

Lower the rear grill and close the rear door.

### Hydraulic / Hydrostatic Fluid Chart

**Figure 10-120-2**



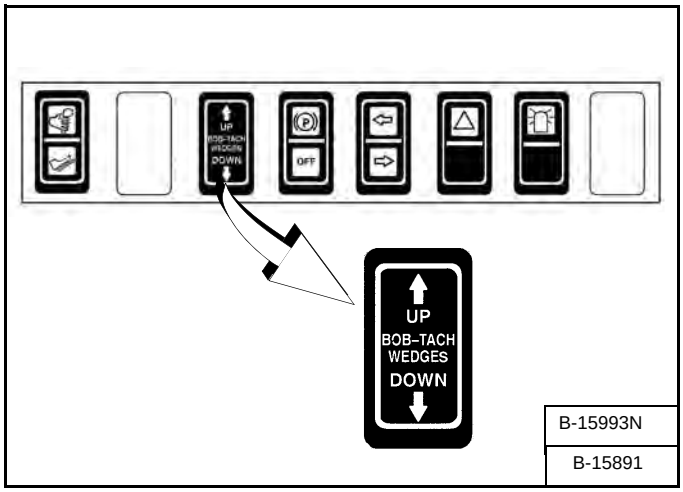

Use the correct hydraulic / hydrostatic fluid shown in hydraulic / hydrostatic fluid chart **[Figure 10-120-2]**.

## BOB-TACH (POWER)

This machine may be equipped with a Power Bob-Tach.

### Inspection And Maintenance

**Figure 10-141-1**




Push and hold the BOB-TACH "WEDGES UP" switch until wedges are fully raised. Push and hold the BOB-TACH "WEDGES DOWN" switch **[Figure 10-141-1]** until the wedges are fully down.

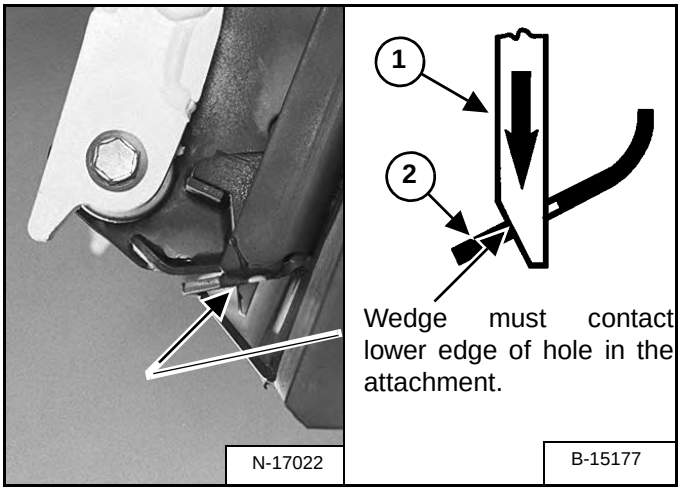
The levers and wedges must move freely.

**⚠ WARNING**

**Bob-Tach wedges must extend through the holes in attachment. Lever(s) must be fully down and locked. Failure to secure wedges can allow attachment to come off and cause injury or death.**

W-2102-0497

**Figure 10-141-2**

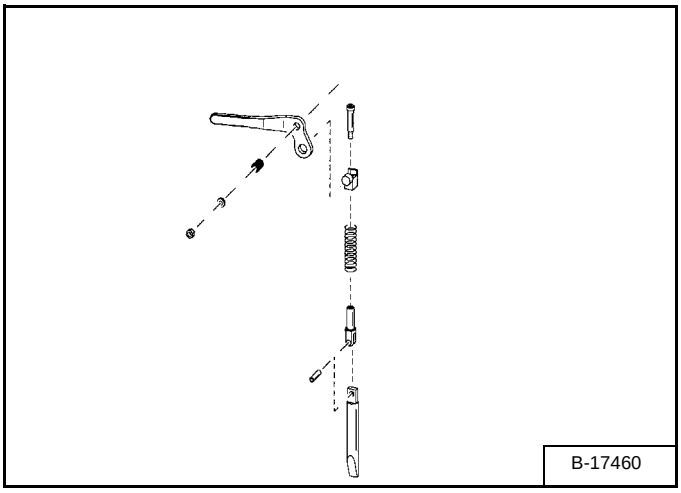



The wedges must extend through the holes in the attachment mounting frame (Item 1) **[Figure 10-141-2]**.

The spring loaded wedge (Item 1) must contact the lower edge of the hole in the attachment (Item 2) **[Figure 10-141-2]**.

If the wedge does not contact the lower edge of the hole **[Figure 10-141-2]**, the attachment will be loose and can come off the Bob-Tach.

**Figure 10-141-3**




Inspect the mounting frame on the attachment and the Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-141-3]**. Replace any parts that are damaged, bent, or missing. Keep all fasteners tight.

Look for cracked welds. Contact your Bobcat dealer for repair or replacement parts.

Lubricate the wedges [See “SERVICE SCHEDULE” on page 10-70-1] and [See “LUBRICATING THE LOADER” on page 10-150-1].

## LOADER STORAGE AND RETURN TO SERVICE

### Storage

Sometimes it may be necessary to store your Bobcat Loader for an extend period of time. Below is a list of items to perform before storage.

- Thoroughly clean the loader including the engine compartment.
- Lubricate the loader.
- Replace worn or damaged parts.
- Park the loader in a dry protected shelter.
- Lower the lift arms all the way and put the bucket flat on the ground.
- Put blocks under the frame to remove weight from the tires.
- Put grease on any exposed cylinder rods.
- Put fuel stabilizer in the fuel tank and run the engine a few minutes to circulate the stabilizer to the pump and fuel injectors.

  ***If biodiesel blend fuel has been used, perform the following:***

  Drain the fuel tank, refill with 100% petroleum diesel fuel, add fuel stabilizer and run the engine for at least 30 minutes.
- Drain and flush the cooling system. Refill with premixed coolant.
- Replace all fluids and filters (engine, hyd. / hydro.).
- Replace air cleaner and heater filters.
- Put all controls in neutral position.
- Remove the battery. Be sure the electrolyte level is correct then charge the battery. Store it in a cool dry place above freezing temperatures and charge it periodically during storage.
- Cover the exhaust pipe opening.
- Tag the machine to indicate that it is in storage condition.

### Return to Service

After the Bobcat Loader has been in storage, it is necessary to follow a list of items to return the loader to service.

- Check the engine and hydraulic oil levels; check coolant level.
- Install a fully charged battery.
- Remove grease from exposed cylinder rods.
- Check all belt tensions.
- Be sure all shields and guards are in place.
- Lubricate the loader.
- Check tire inflation and remove blocks from under frame.
- Remove cover from exhaust pipe opening.
- Start the engine and let run for a few minutes while observing the instrument panels and systems for correct operation.
- Operate machine, check for correct function.
- Stop the engine and check for leaks. Repair as needed.

# HYDRAULIC/HYDROSTATIC SCHEMATIC
# WITH 2 SPEED OPTION
# S150 (S/N A8MO60001 AND ABOVE)

(PRINTED NOVEMBER 2008)
V-1111legend

## LEGEND

1. RESERVOIR:
   Capacity . . . . . 19.2 Qts. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
3. DIFFERENTIAL PRESSURE SWITCH:
   36-44 PSI (2,5-3,0 Bar)
   Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
6. RELIEF VALVE - CHARGE INLET:
   360 PSI (24,8 Bar)
   at High Engine Idle
   With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type
   16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN:
   3250-3350 PSI (224-231 Bar)
   at Front Quick Couplers
10. RELIEF/ANTICAVITATION VALVE - PORT 3500 PSI (241,3 Bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. RELIEF/ANTICAVITATION VALVE - PORT (OPTIONAL) 3500 PSI (241,3 Bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 Bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. CHECK VALVE - With 5 PSI (0,34 Bar) Spring
38. BIDIRECTIONAL HYDROSTATIC MOTOR – 2 SPEED
39. CHECK VALVE - With 80 PSI (5,5 Bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. CHARGE PUMP -
    12.8 GPM (48,5 L/min) at High Engine Idle
43. CHECK VALVE - With 300 PSI (20,7 Bar) Spring And With 0.016 inch (0,40 mm) Orifice
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 Bar)
48. RELIEF VALVE - 1200 PSI (83 Bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. FIXED CAPACITY DISPLACEMENT HYDRAULIC MOTOR - FAN
51. ANTICAVITATION VALVE
52. PROPORTIONAL RELIEF VALVE – (Fan Speed Regulator):
    1566 - 1784 PSI (108 - 123 bar)
53. FILTER - BOB-TACH VALVE
54. RESTRICTION - 0.343 inch (8,73 mm)
55. SENSOR – CHARGE PRESSURE – Fan Filter
56. SENSOR – HYD. TEMP. – Hyd. Filter
57. HIGH PRESSURE SHUTTLE
58. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – WARM UP
59. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – 2 SPEED
60. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE – HIGH / LO SPEED
61. RELIEF VALVE – With 125 PSI (8,6 bar) Spring

**NOTE:** Unless otherwise specified springs have NO significant pressure value.

Printed in Europe

**Troubleshooting**

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

**⚠ WARNING**

**Check for correct function after adjustments, repairs or service. Failure to make correct repairs or adjustments can cause injury or death.**

W-2004-1285

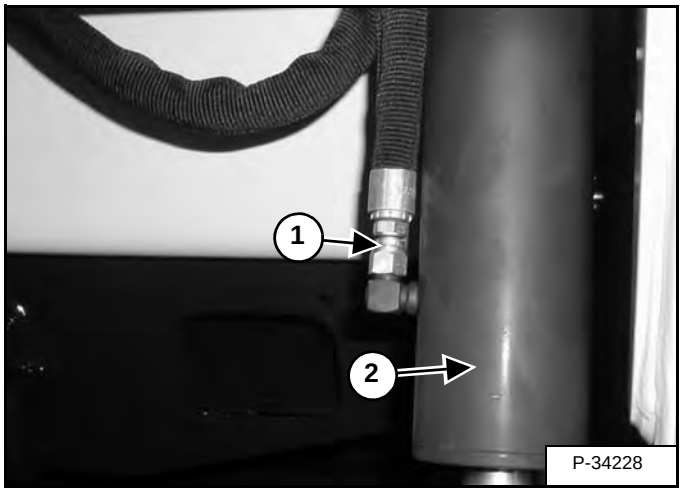
| PROBLEM | CAUSE |
|---|---|
| The hydraulic system will not operate. | 1, 2, 3, 5, 8 |
| The transmission warning light come ON when hydraulics are operating. | 1, 3 |
| Slow hydraulic system action. | 1, 3, 4, 6, 8 |
| Hydraulic action is not smooth. | 1, 4, 5, 6, 7 |
| Lift arms go up slowly at full engine RPM | 1, 3, 4, 5, 6, 7, 8, 9 |
| The lift arms or Bob-Tach will move when the pedal is in neutral position | 4 |
| The lift arms come down with the pedal is in neutral position | 4, 9, 10, 11 |
| Bypass valve stuck | 12 |
| Bypass valve stem bent or broke | 13 |

**KEY TO CORRECT CAUSE**

1. The fluid level is not correct.
2. The pedal linkage is disconnected.
3. The hydraulic pump has damage.
4. The pedal linkage is not adjusted correctly.
5. Relief valve is not at the correct pressure.
6. Suction leak on the inlet side of the hydraulic pump.
7. Fluid is cold. Wrong viscosity fluid [See “HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS” on page SPEC-40-1].
8. Using the loader for more than its rated capacity.
9. Internal leak in the lift cylinder(s).
10. External leak from the cylinder(s).
11. Damaged lift spool.
12. Rotate shaft.
13. Replace manual spool cartridge.

**Removal And Installation (Cont'd)**

**Figure 20-21-6**



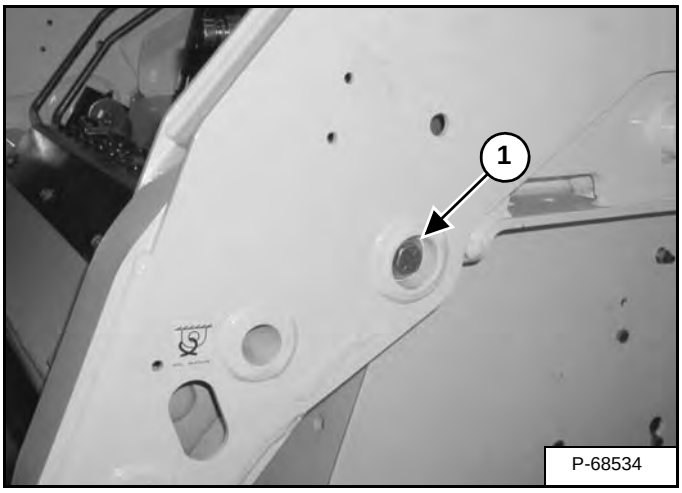

Disconnect the hose (Item 1) **[Figure 20-21-6]** from the cylinder.

Remove the cylinder (Item 2) **[Figure 20-21-6]** from the rod end pivot pin.

Remove the cylinder from the loader.

**Base End Pivot Pin Removal and Installation**

**Figure 20-21-7**




Remove the tilt cylinder from the Bob-Tach [See "Removal And Installation" on page 20-21-2].

Loosen the retainer bolt (Item 1) **[Figure 20-21-7]** from the tilt cylinder rod base end pin.

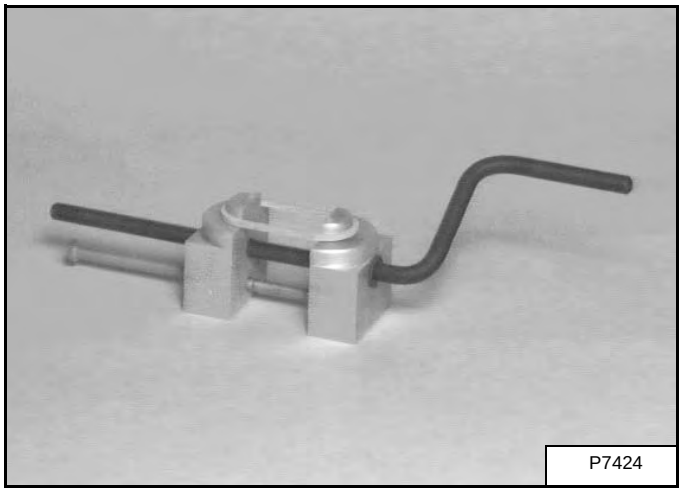
***Installation:*** Tighten the retainer bolt to 175-190 ft.-lb. (240-260 N•m) torque.

Strike the head of the bolt (Item 1) **[Figure 20-21-7]** to push the pivot pin out.

Reverse the removal procedure to install the pivot pin.

**Disassembly and Assembly (Cont'd)**

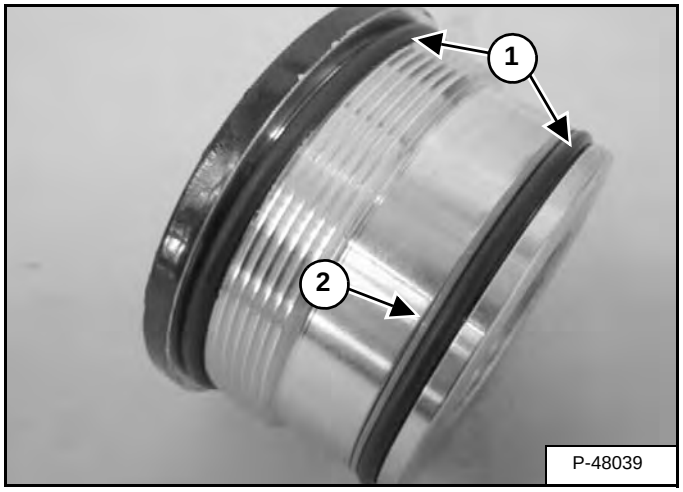
**Figure 20-22-9**




***Assembly:*** Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-22-9]**. Allow the seal to stretch for 30 seconds before installing it on the piston.

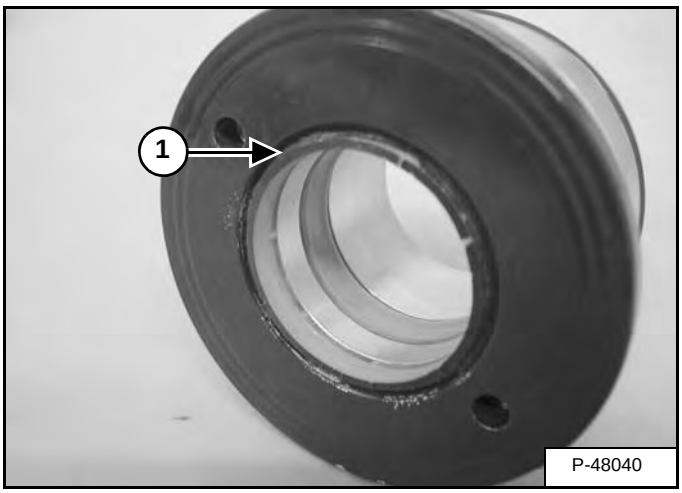
Once the seal is installed on the piston, a piston ring compressor can be used on the piston for 3 minutes to compress the seal into place.

**Figure 20-22-10**



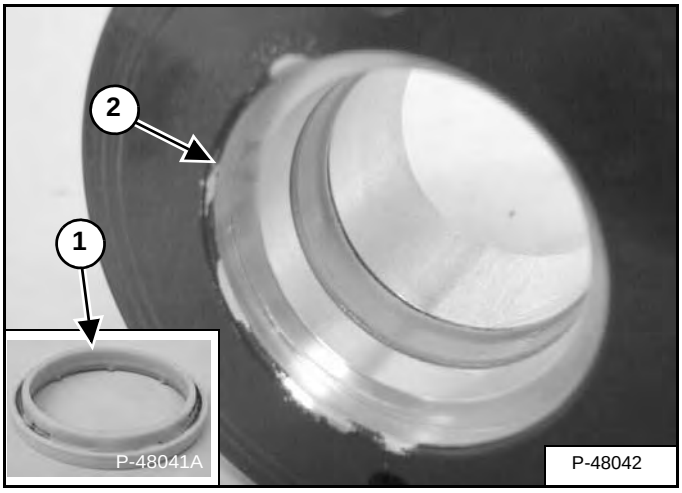

Remove the two O-rings (Item 1) and the back-up washer (Item 2) **[Figure 20-22-10]** from the cylinder head.

**Figure 20-22-11**




Remove the wiper seal (Item 1) **[Figure 20-22-11]** from the cylinder head.

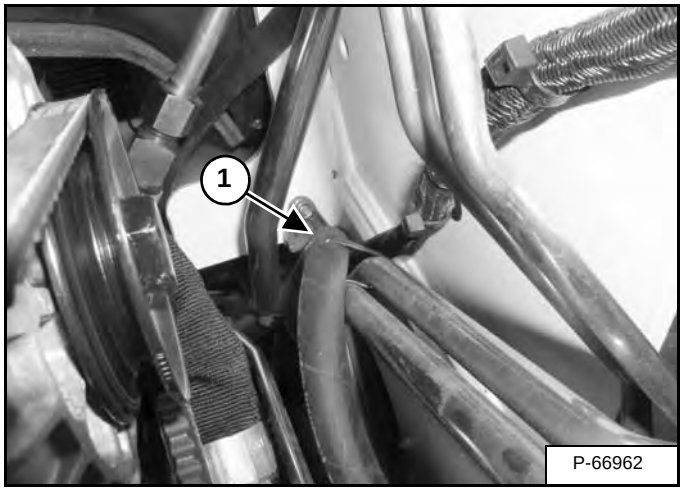
**Figure 20-22-12**




Install the wiper seal, with the wiper side of the seal (Item 1), toward the outside of the head (Item 2) **[Figure 20-22-12]**.

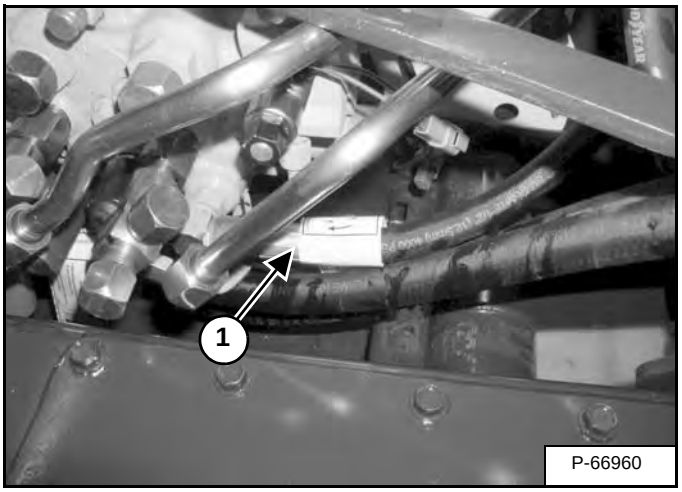
**Removal And Installation (Cont'd)**

**Figure 20-40-14**



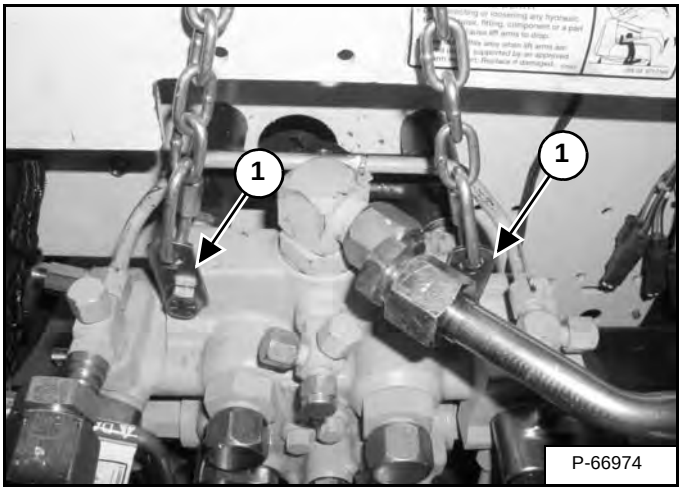

Remove any tie-straps (Item 1) **[Figure 20-40-14]** securing the fixed end main valve hose.

**Figure 20-40-15**



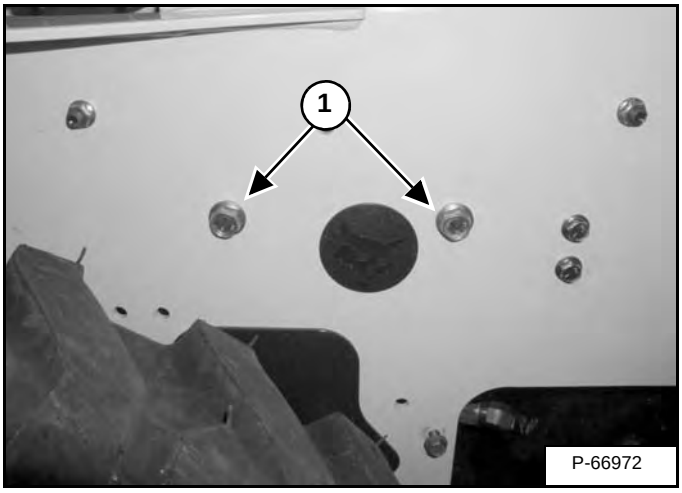

Remove the fixed-end main valve hose (Item 1) **[Figure 20-40-15]** from the main control valve fitting.

**Figure 20-40-16**




Connect a hoist to the lifting brackets (Item 1) **[Figure 20-40-16]** on the control valve.

**Figure 20-40-17**




Remove the two mounting bolts (Item 1) **[Figure 20-40-17]** fastening the control valve and bracket to the side of the loader.

Remove the control valve from the loader.

Reverse removal procedure to install the hydraulic control valve.

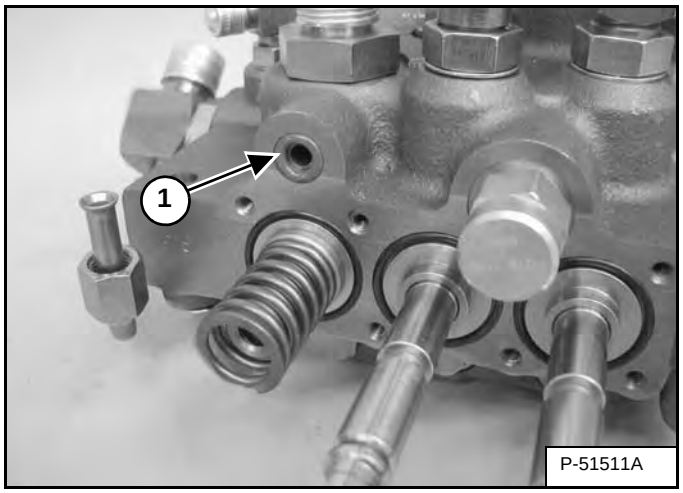
### Lift Spool And Detent Removal And Installation

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

MEL1278 - Detent Tool
MEL1285 - Detent Spring Tool

Remove the end cap/spool lock block from the control valve.

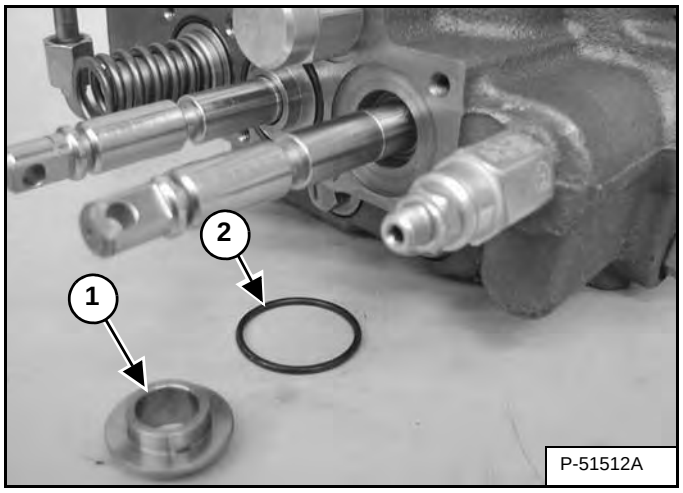
**Figure 20-40-49**




Remove the O-ring (Item 1) **[Figure 20-40-49]**.

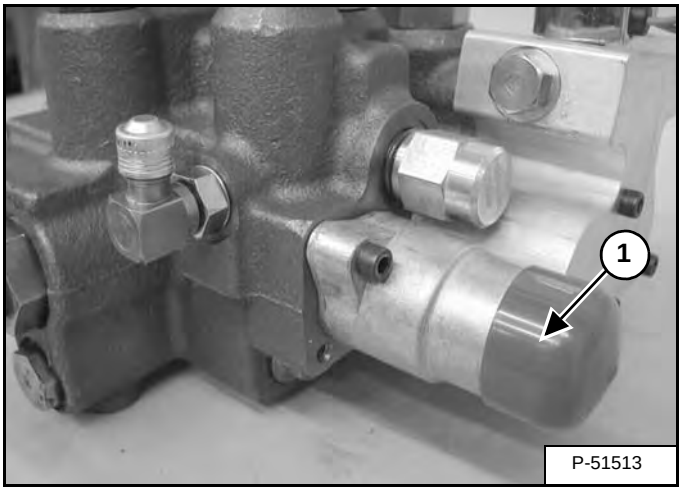
***Installation:*** Replace the O-ring, and lubricate lightly with oil before installation of the end cap/spool lock block.

**Figure 20-40-50**



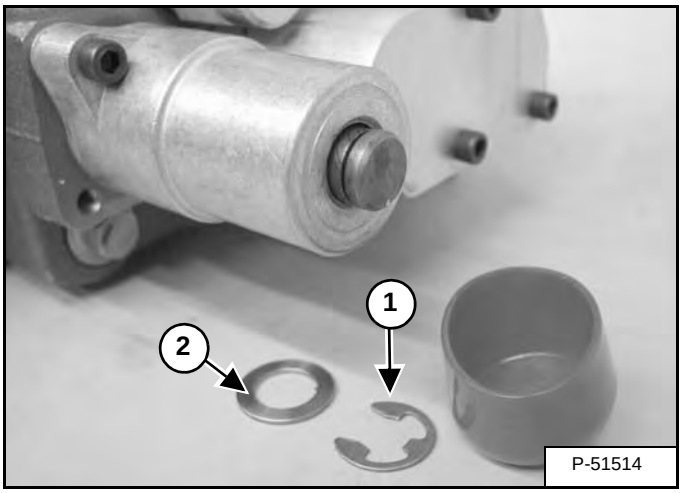

Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-40-50]** from the lift spool.

**Figure 20-40-51**




Remove the end cap (Item 1) **[Figure 20-40-51]**.

**Figure 20-40-52**



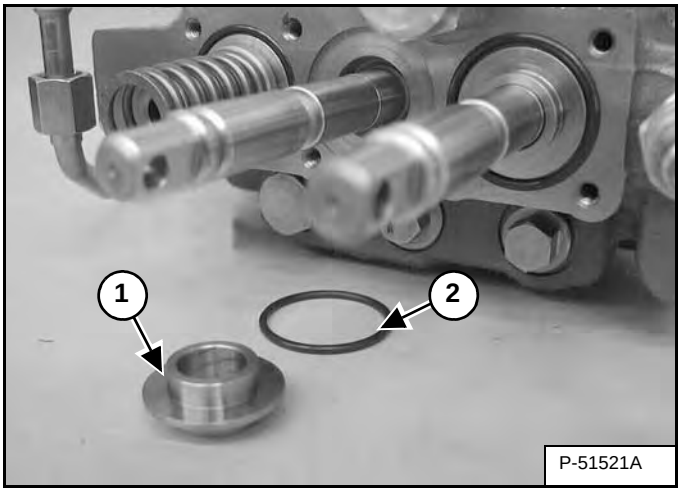

Use a screwdriver to remove the snap ring (Item 1) **[Figure 20-40-52]**.

Remove the washer (Item 2) **[Figure 20-40-52]**.

### Tilt Spool Removal And Installation

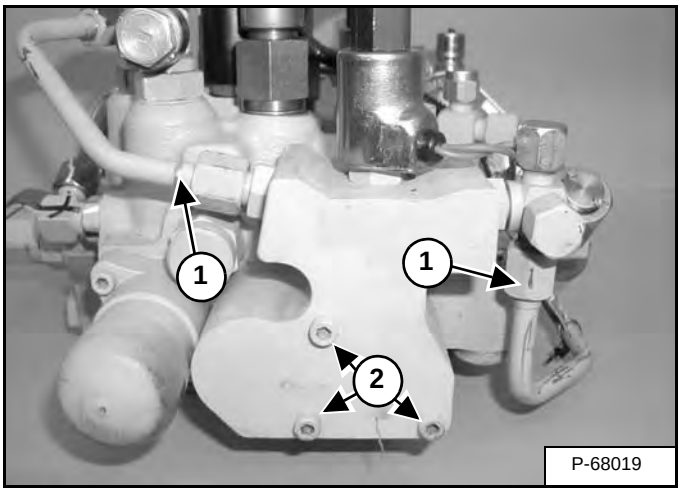
Remove the lift and tilt end cap/spool lock block [See “End Cap/Spool Lock Block Removal And Installation” on page 20-40-14].

**Figure 20-40-87**




Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-40-87]** from the tilt spool.

**Figure 20-40-88**

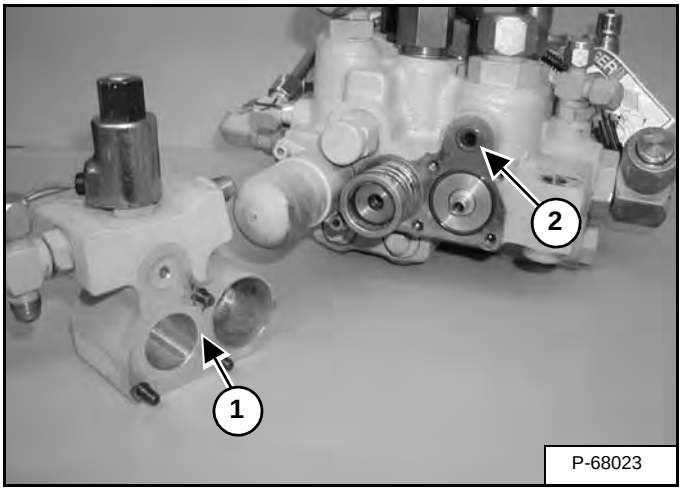



Remove the two tubelines (Item 1) **[Figure 20-40-88]**.

Remove the three bolts (Item 2) **[Figure 20-40-88]** from the spool centering block.

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

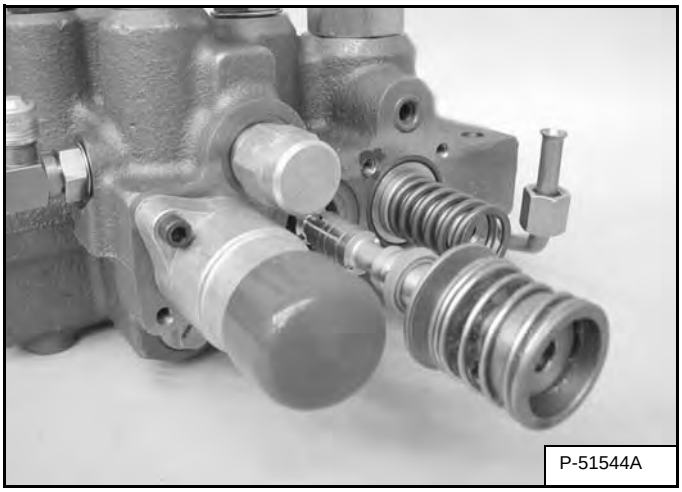
**Figure 20-40-89**




Remove the spool centering block (Item 1) **[Figure 20-40-89]** from the control valve.

Check and replace the O-ring (Item 2) **[Figure 20-40-89]** before replacing the spool centering block.

**Figure 20-40-90**



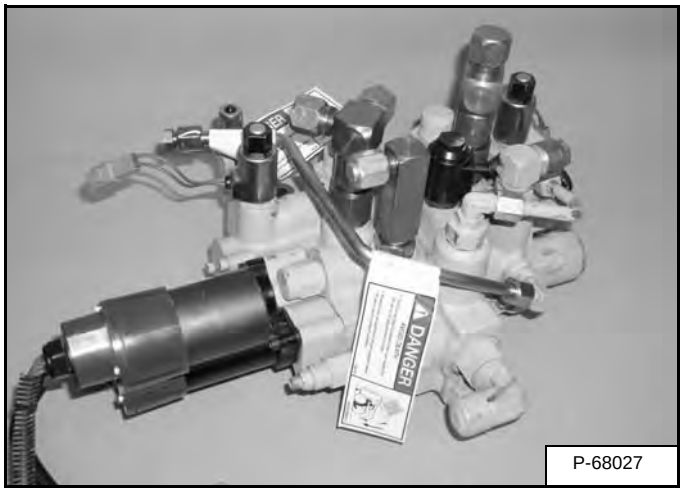

Remove the tilt spool, centering spring, back-up washer and spool seal **[Figure 20-40-90]**.

***Installation:*** Always use a new spool seal.

## HYDRAULIC CONTROL VALVE (ACS) OR (SJC)

### Description

**Figure 20-41-1**




The hydraulic control valve is located inside the main frame on the right hand side, below the operators cab.

The hydraulic control valve **[Figure 20-41-1]** is the hydraulic component that uses spools to direct the flow of hydraulic fluid to the lift, tilt and auxiliary functions.

The lift and tilt functions in the ACS or the SJC hydraulic control valve are operated using electronic control handle/ levers or foot pedals that send an electronic signal to the electronic actuators to move the lift and tilt spools in the control valve.

The auxiliary function is operated by pilot pressure. There is one solenoid located by each side of the spool. Only one solenoid at a time is activated by the switch on the right side control handle/lever. The activated solenoid sends pilot pressure oil to one side of the spool and forces the spool to shift.

The hydraulic control valve also contains a main relief valve which is adjustable.

### 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

**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

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 10-30-2].

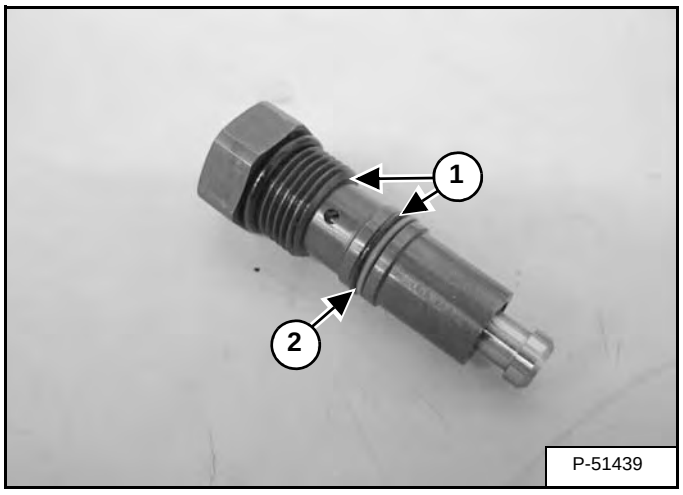
Clean the area around the control valve.

Drain the hydraulic reservoir [See “Removing And Replacing Hydraulic Fluid” on page 10-120-2].

Remove the control panel [See “Removal and Installation” on page 50-100-2].

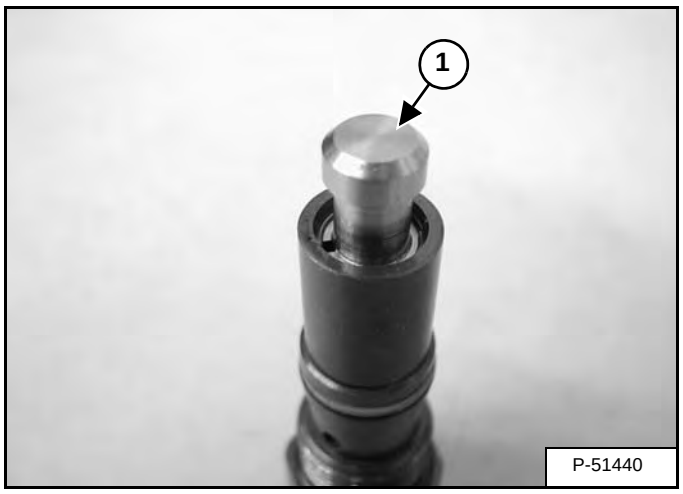
**Lift Load Check Valve Removal And Installation (Cont'd)**

**Figure 20-41-30**




Remove and install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-41-30]**.

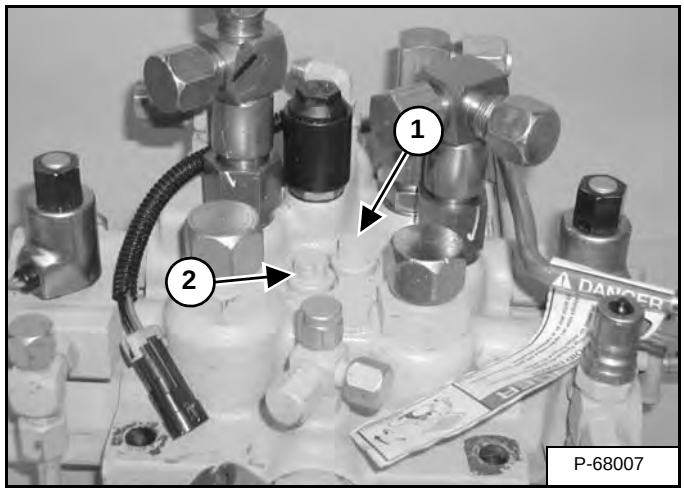
**Figure 20-41-31**




Check for free movement of the load check valve (Item 1) **[Figure 20-41-31]**.

**Load Check Valve Removal And Installation (Tilt & Auxiliary)**

**Figure 20-41-32**

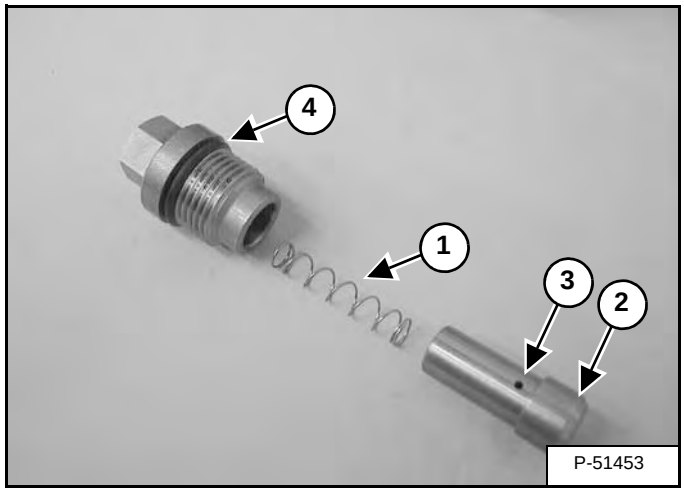



At the front side of the control valve locate the tilt section load check valve (Item 1) **[Figure 20-41-32]**.

At the front side of the control valve locate the auxiliary section load check valve (Item 2) **[Figure 20-41-32]**.

**NOTE: The tilt and auxiliary load check valves are interchangeable.**

**Figure 20-41-33**



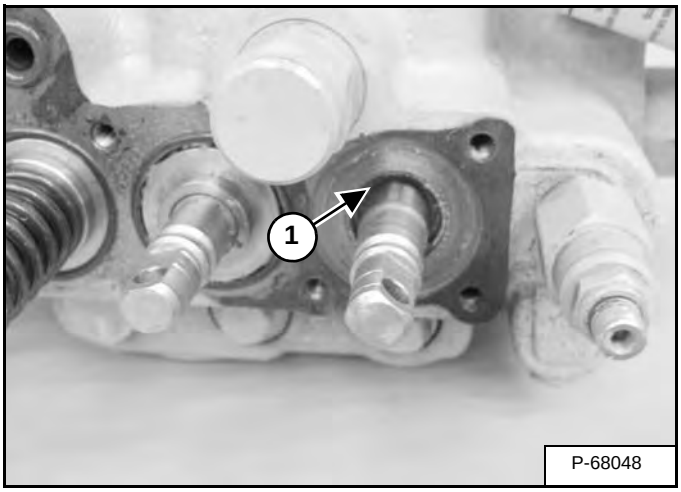

Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-41-33]**.

Check the orifice (Item 3) **[Figure 20-41-33]** in the poppet to be sure it is not plugged.

***Installation:*** Install a new O-ring (Item 4) **[Figure 20-41-33]** on the plug and lightly lubricate with oil before installing. Tighten the plug to 38-45 ft.-lb. (52-61 N•m) torque.

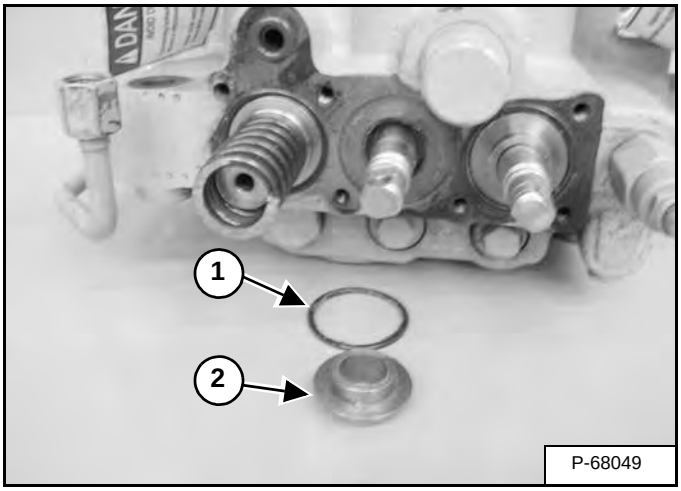
**Lift Spool And Detent Removal And Installation (Cont'd)**

**Figure 20-41-68**



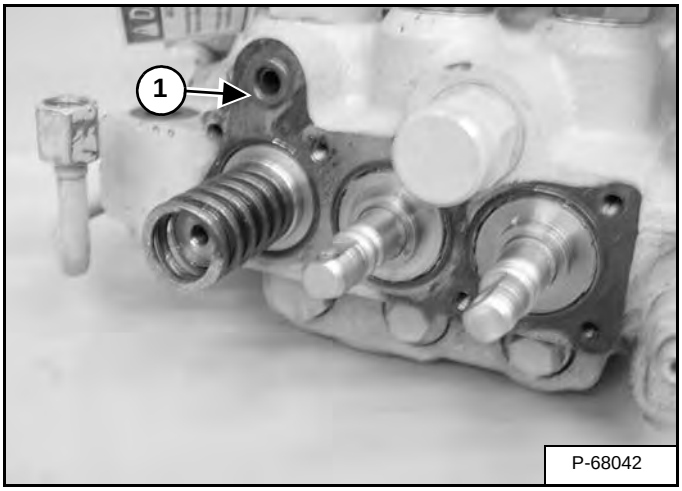

Install the spool seal (Item 1) **[Figure 20-41-68]** on the actuator end of the valve.

**Figure 20-41-69**



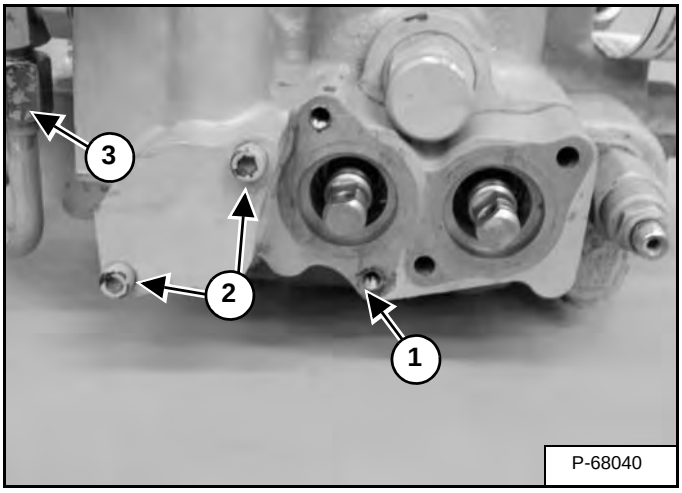

Install the O-ring (Item 1) and spacer (Item 2) **[Figure 20-41-69]** on the lift spool.

**Figure 20-41-70**




Install the O-ring (Item 1) **[Figure 20-41-70]** on the control valve.

**Figure 20-41-71**




Install the end cap block (Item 1) and the two mount bolts (Item 2) **[Figure 20-41-71]**.

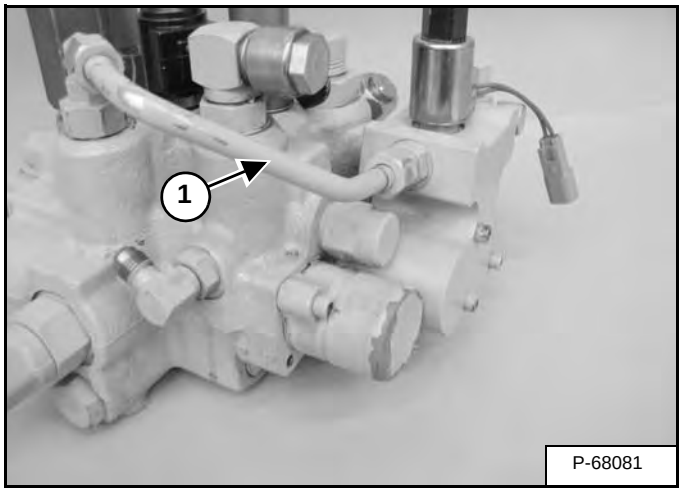
***Installation:*** Tighten the screws to 90-100 in.-lb. (10-11,3 N•m) torque.

Connect the tube line (Item 3) **[Figure 20-41-71]** to the end cap block.

Install the lift and tilt actuators to the control valve.

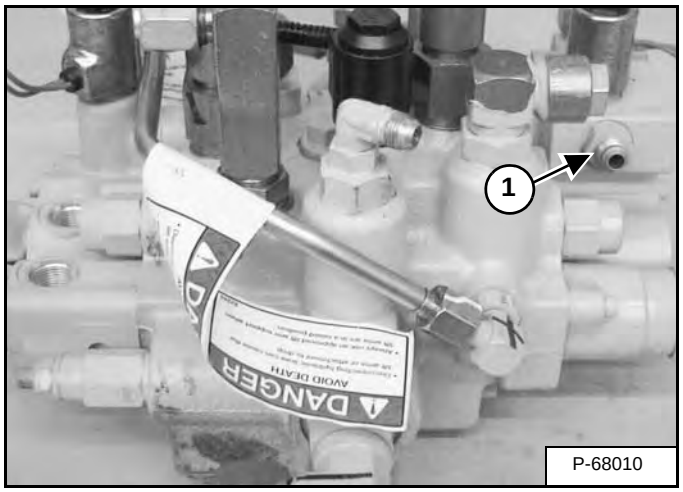
**Check Valve Removal And Installation**

**Figure 20-41-103**



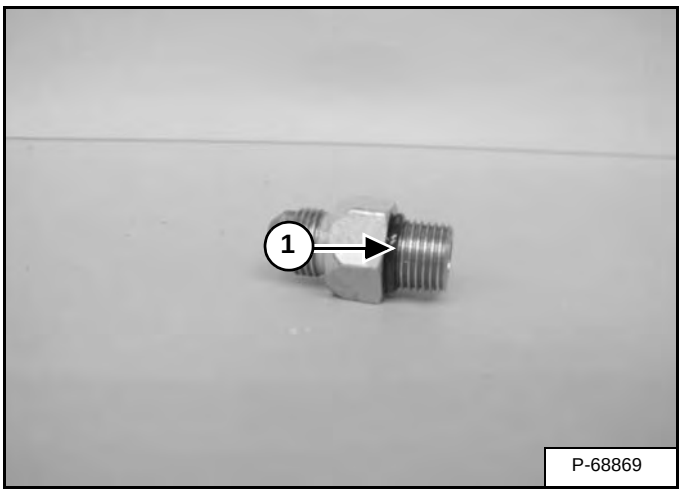

Remove the tubeline (Item 1) **[Figure 20-41-103]**.

**Figure 20-41-104**



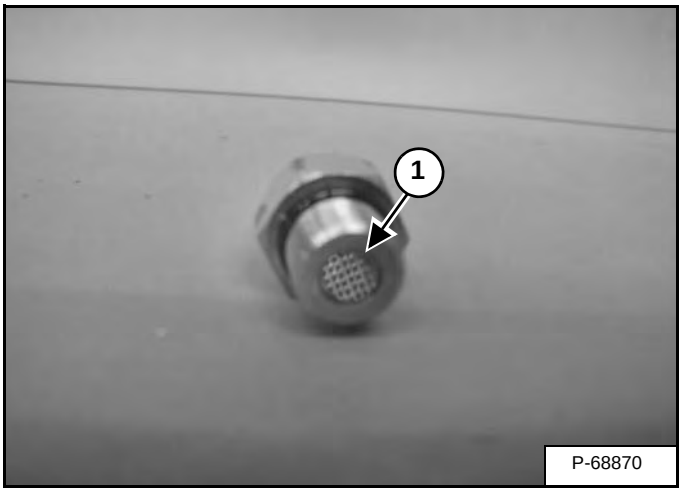

Remove the check valve fitting (Item 1) **[Figure 20-41-104]** from the hydraulic control valve.

**Figure 20-41-105**




***Installation:*** Lubricate the O-ring (Item 1) **[Figure 20-41-105]** and tighten the fitting to 20-24 ft.-lb. (27-33 N•m) torque.

**Figure 20-41-106**




Inspect the screen (Item 1) **[Figure 20-41-106]**.

**Removal And Installation (Cont'd)**

**Figure 20-60-11**

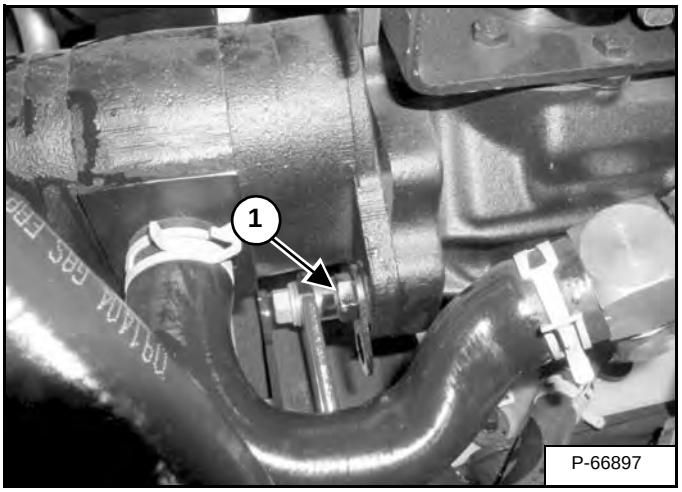
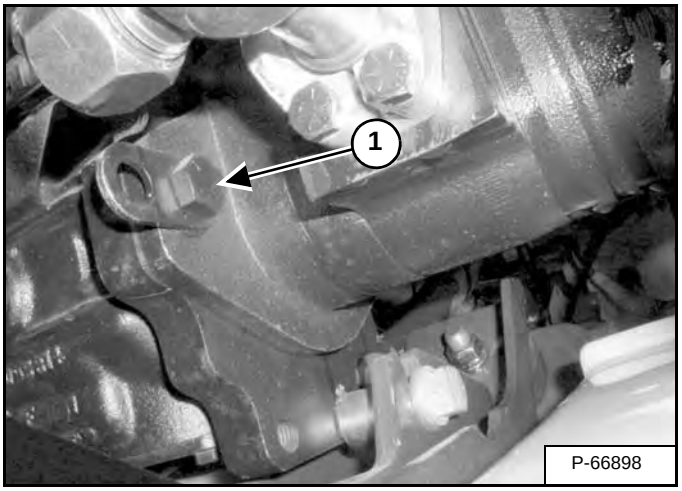



**Figure 20-60-12**

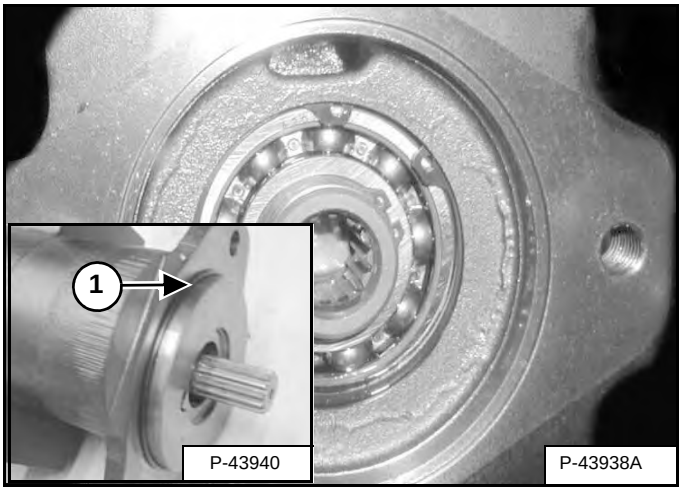



Remove the two mounting bolts (Item 1) **[Figure 20-60-11]** and **[Figure 20-60-12]** from the hydraulic pump.

***Installation:*** Tighten the mounting bolts to 55-60 ft.-lb. (75-85 N•m) torque.

Remove the hydraulic pump from the loader.

**Figure 20-60-13**




Replace the O-ring (Item 1) **[Figure 20-60-13]** on the hydraulic pump.

Reverse the removal procedure to install the hydraulic pump.

**Disassembly And Assembly (Cont'd)**

**Figure 20-60-43**

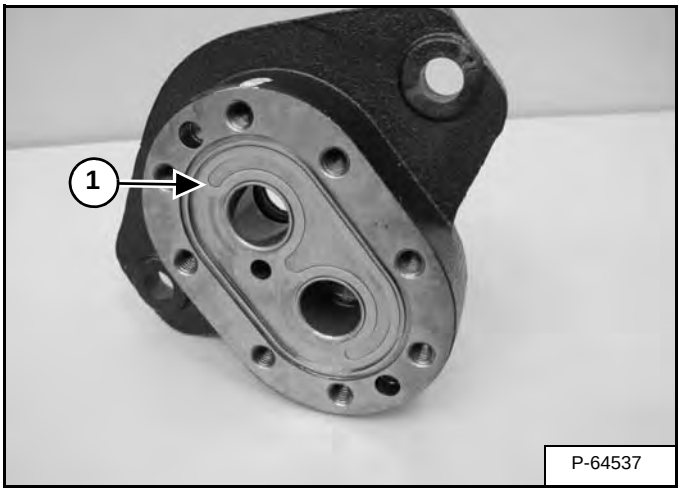
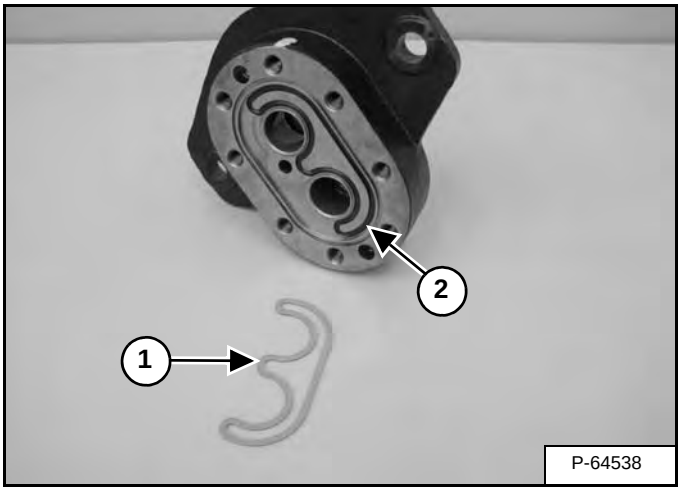


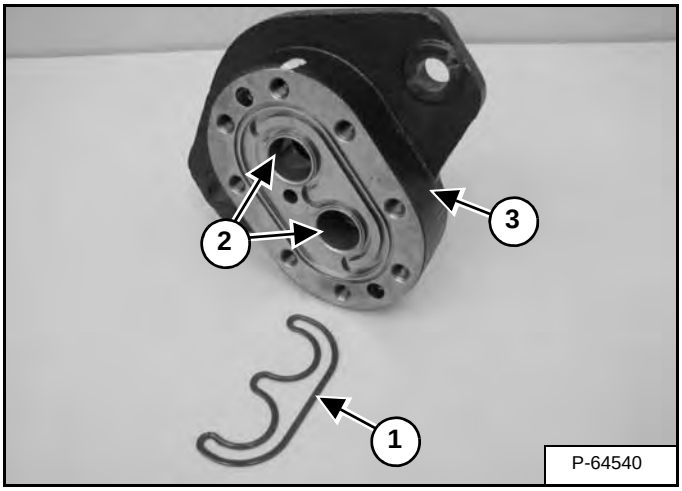

**Figure 20-60-44**




Remove the load seal (Item 1) **[Figure 20-60-43]** and **[Figure 20-60-44]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-60-44]**.

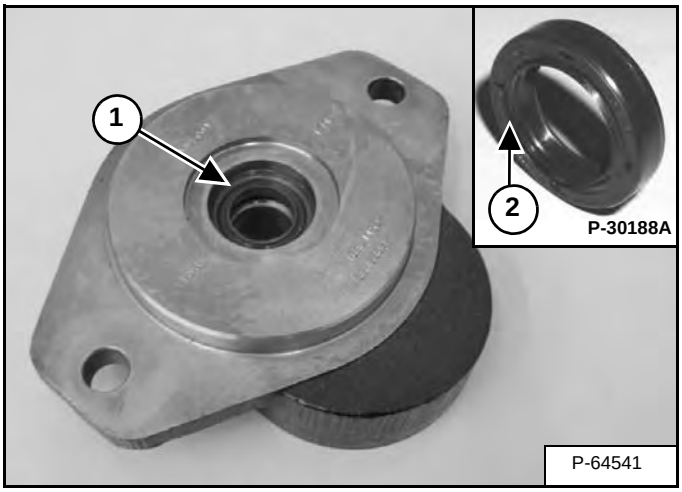
**Figure 20-60-45**




Inspect the pre-load seal (Item 1) **[Figure 20-60-45]** for damage and replace as needed.

**NOTE: Inspect the pump flange section (Item 2) and bushings (Item 3) [Figure 20-60-45]. If excessive wear or damage is visible, the pump must be replaced.**

**Figure 20-60-46**




Remove the shaft seal (Item 1) **[Figure 20-60-46]** from the pump flange section.

***Installation:*** The shaft seal flush surface (Item 2) **[Figure 20-60-46]** must be facing out away from the pump.

**Removal And Installation (Cont'd)**

**Figure 20-61-15**

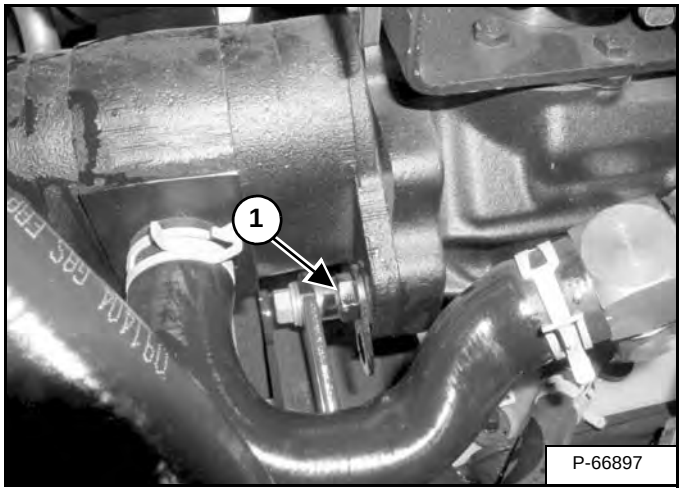
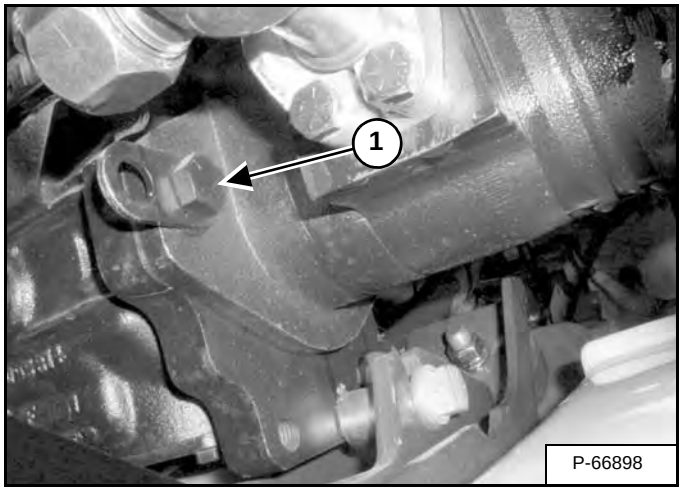



**Figure 20-61-16**

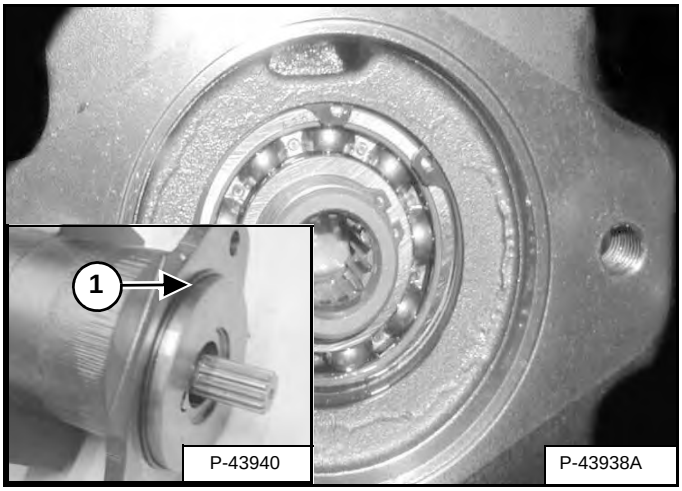



Remove the two mounting bolts (Item 1) **[Figure 20-61-15]** and **[Figure 20-61-16]** from the hydraulic pump.

***Installation:*** Tighten the mounting bolts to 55-60 ft.-lb. (75-85 N•m) torque.

Remove the hydraulic pump from the loader.

**Figure 20-61-17**




Replace the O-ring (Item 1) **[Figure 20-61-17]** on the hydraulic pump.

Reverse the removal procedure to install the hydraulic pump.

**Disassembly And Assembly (Cont'd)**

**Figure 20-61-47**

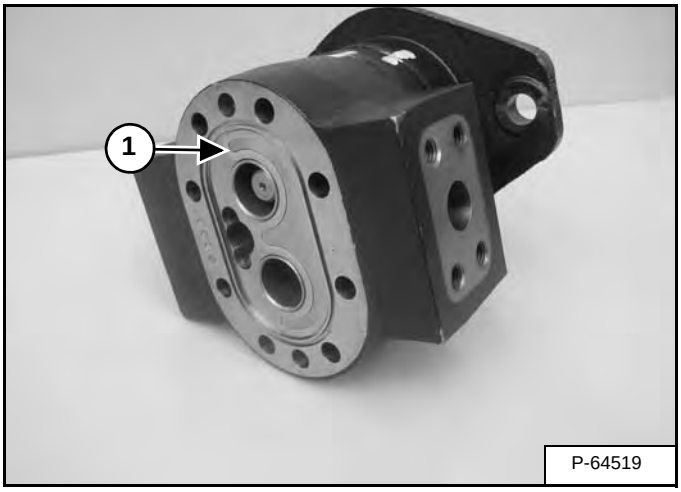
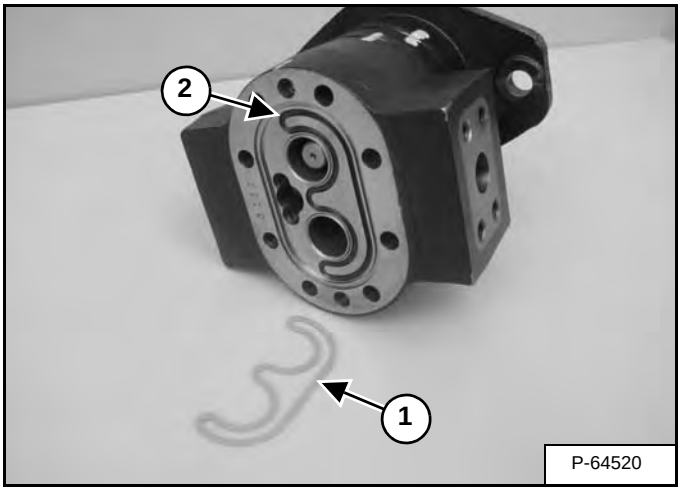


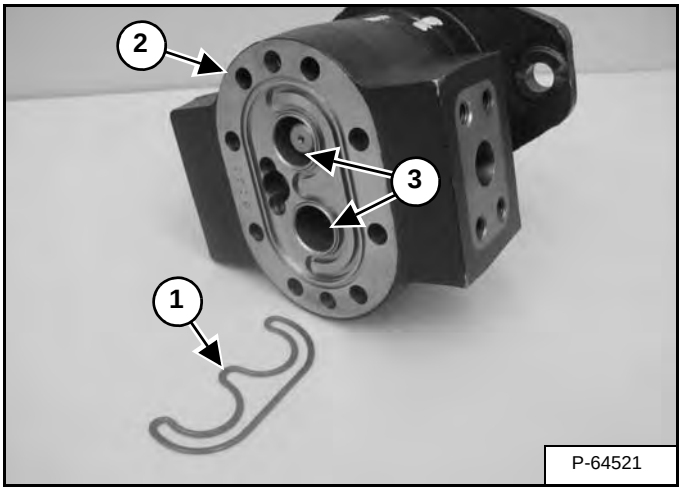

**Figure 20-61-48**




Remove the load seal (Item 1) **[Figure 20-61-47]** and **[Figure 20-61-48]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-61-48]**.

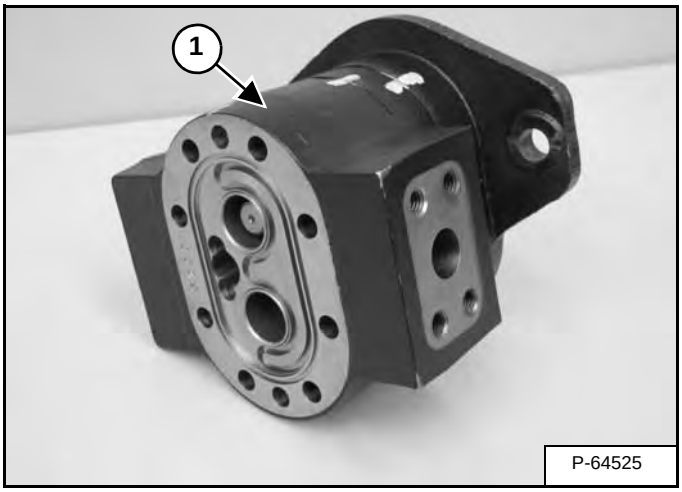
**Figure 20-61-49**




Inspect the pre-load seal (Item 1) **[Figure 20-61-49]** for damage and replace as needed.

**NOTE: Inspect the auxiliary center section (Item 2) and bushings (Item 3) [Figure 20-61-49]. If excessive wear or damage is visible, the pump must be replaced.**

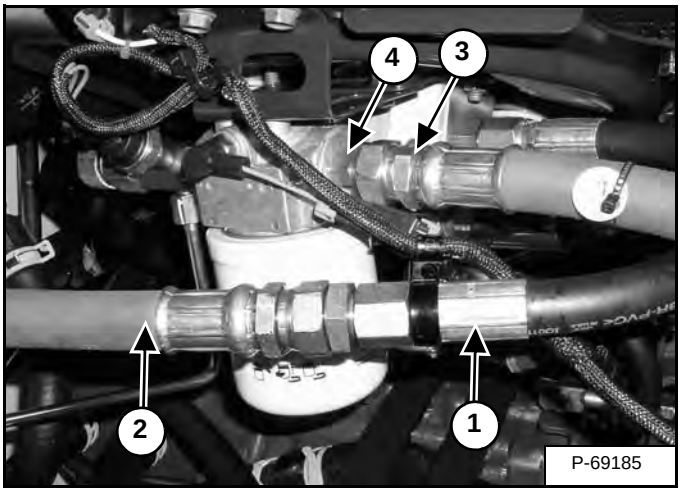
**Figure 20-61-50**




Remove the auxiliary center section (Item 1) **[Figure 20-61-50]**.

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

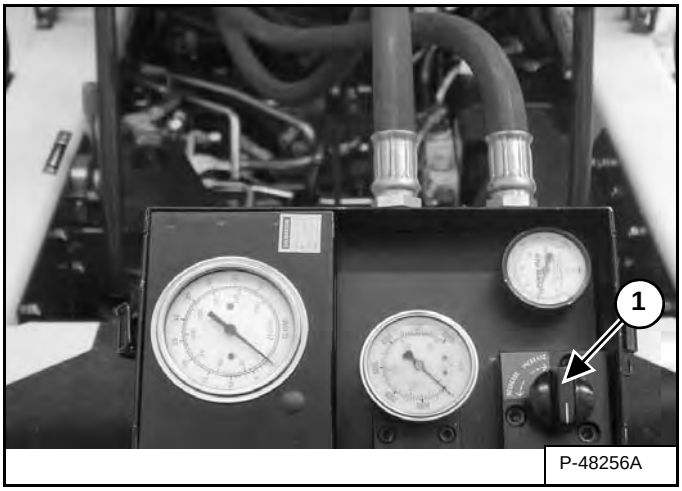
**Figure 20-70-7**




Connect the filter inlet hose (Item 1) to the inlet side of the tester (Item 2) **[Figure 20-70-7]**.

Connect the OUTLET hose (Item 3) from the hydraulic tester to the inlet fitting (Item 4) of the charge filter **[Figure 20-70-7]**.

**Figure 20-70-8**




Be sure all connections are tight and that the hoses are not touching any moving parts before starting the loader **[Figure 20-70-8]**.

# IMPORTANT

**The hydraulic tester must be in the fully open position before you start the engine.**

**I-2024-0284**

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F (60°C) by turning the restrictor control (Item 1) **[Figure 20-70-8]** on the tester to about 600 PSI (41,4 bar). DO NOT exceed **1200 PSI** (82,7 bar). Open the restrictor control and record the free flow (GPM) at full RPM*.

Turn the restrictor down to system operating pressure approximately 1000 PSI (69 bar). **DO NOT EXCEED 1200 PSI** (82,7 bar). Refer to Hydraulic Schematics for flow. The high pressure flow must be at least 80% of free flow.

$$\% = \frac{\text{HIGH PRESSURE FLOW (GPM [L/min])}}{\text{FREE FLOW (GPM [L/min])}} \times 100$$

A low percentage may indicate a failed pump.

*Refer to the Hydraulic Schematics for pump flow and RPM.

**Disassembly And Assembly (Cont'd)**

**Figure 20-70-35**

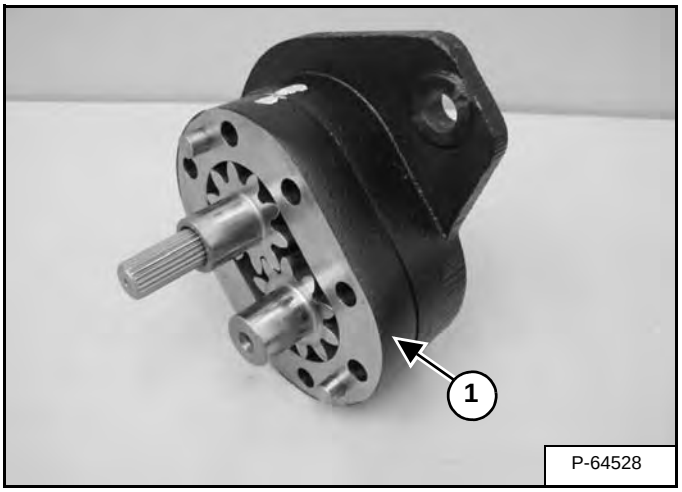
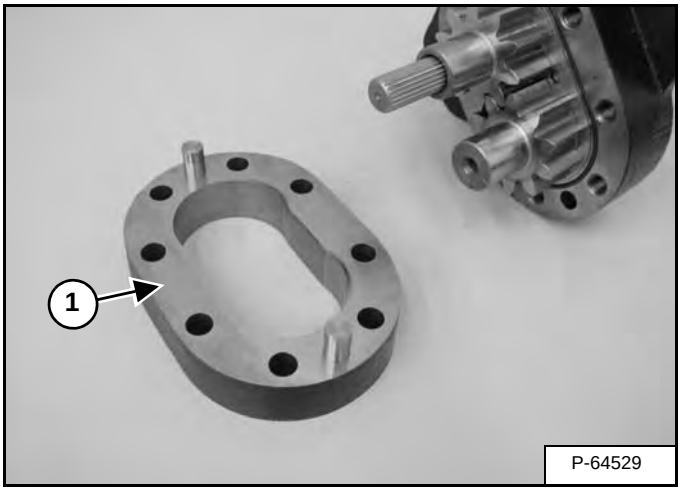


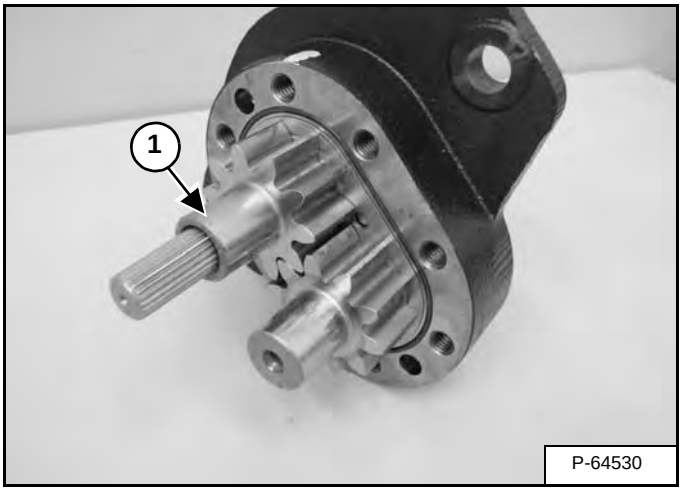

**Figure 20-70-36**




Remove the auxiliary pump section (Item 1) **[Figure 20-70-35]** and **[Figure 20-70-36]** from the pump flange section.

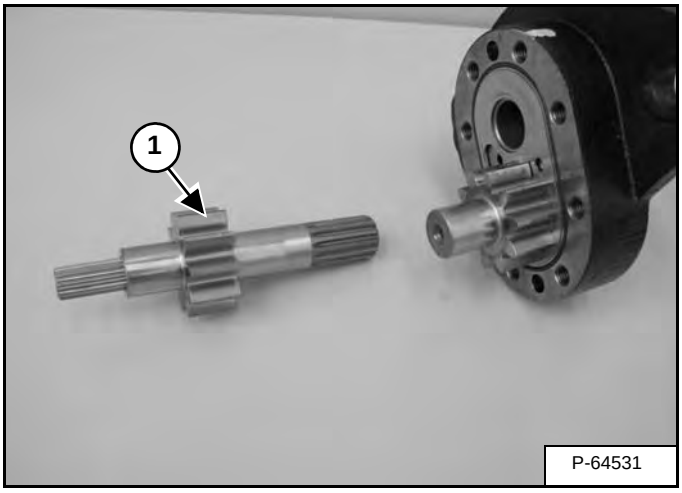
**NOTE: Inspect the pump section (Item 1) [Figure 20-70-36]. If excessive wear or damage is visible, the pump must be replaced.**

**Figure 20-70-37**




Remove the drive gear (Item 1) **[Figure 20-70-37]** from the pump flange section.

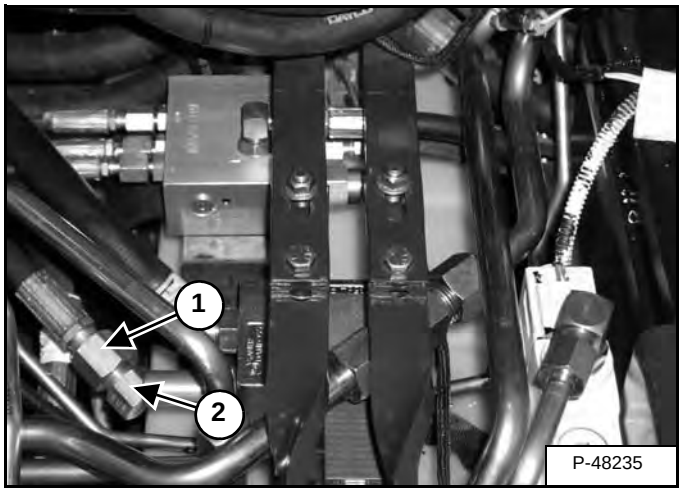
**Figure 20-70-38**




**NOTE: Inspect the drive gear (Item 1) [Figure 20-70-38]. If excessive wear or damage is visible, the pump must be replaced.**

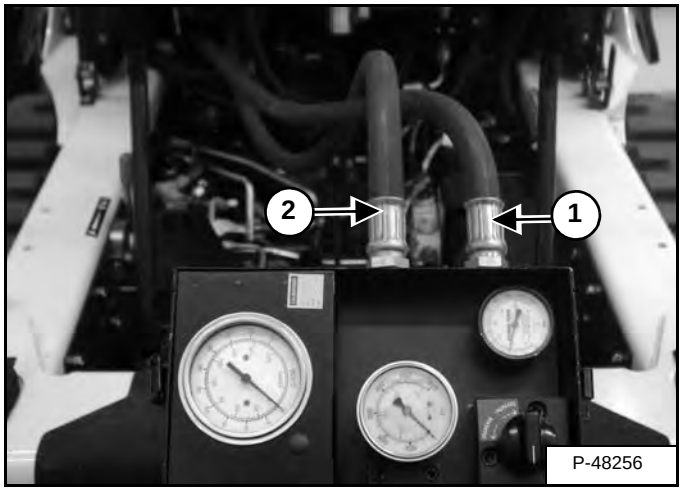
**Direct Pump Test (High Flow Section) (Cont'd)**

**Figure 20-71-10**




Disconnect the high flow pump OUTLET hose (Item 1) from the high flow valve INLET fitting (Item 2) **[Figure 20-71-10]**.

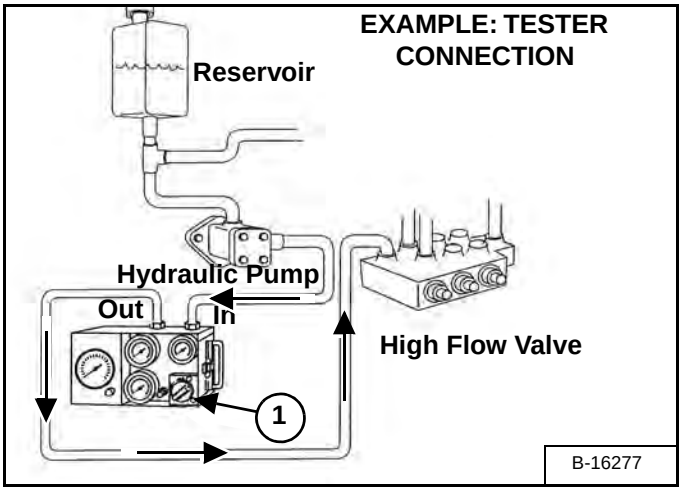
**Figure 20-71-11**




Connect the INLET hose (Item 1) **[Figure 20-71-11]** from the tester, to the high flow pump OUTLET hose (Item 1) **[Figure 20-71-10]**. Connect the OUTLET hose (Item 2) **[Figure 20-71-11]** from the tester, to the high flow valve INLET fitting (Item 2) **[Figure 20-71-10]** on the High Flow valve.

Lower the cab.

**Figure 20-71-12**




Sample tester connection shown **[Figure 20-71-12]**.

Start the engine and run at low idle RPM. Press the front auxiliary button. Press the High Flow button. Push the button (on the right control lever) for fluid flow to the quick coupler. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F (60°C) by turning the restrictor control (Item 1) **[Figure 20-71-12]** on the tester to about 1000 PSI (69 bar).

**NOTE: DO NOT EXCEED 3300 PSI (228 bar).**

Open the restrictor control and record the free flow (GPM) at full RPM. Turn the restrictor control on the tester to 3300 PSI and the flow should go to zero GPM.

If pressure readings are not obtained go to the High Flow Valve, relief valve adjustment procedure [See “High Flow Relief Valve Adjustment” on page 20-150-2].

Record the highest pressure (PSI [bar]) and flow (GPM [L/min]). The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM [L/min])}}{\text{FREE FLOW (GPM [L/min])}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to ***Hydraulic Schematics*** Legend for system relief pressure and full RPM.

**Disassembly And Assembly (Cont'd)**

**Figure 20-71-40**

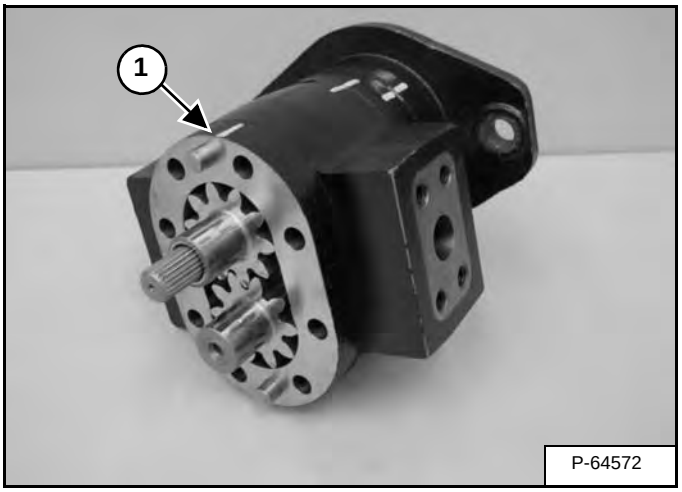
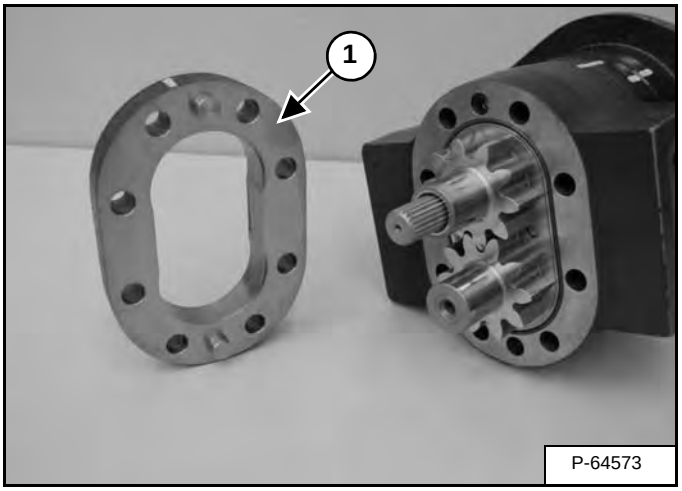


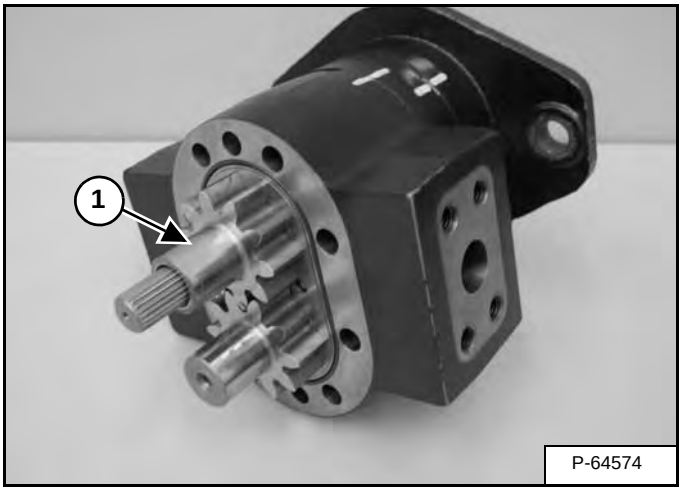

**Figure 20-71-41**




Remove the charge pump section (Item 1) **[Figure 20-71-40]** and **[Figure 20-71-41]** from the auxiliary pump center section.

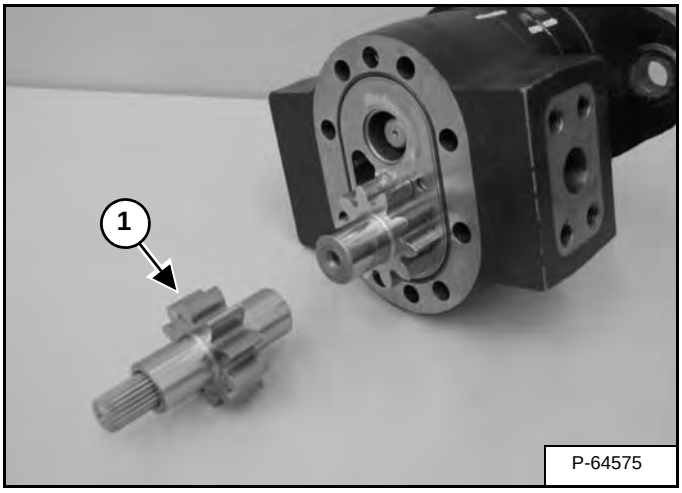
**NOTE: Inspect the charge pump section (Item 1) [Figure 20-71-41]. If excessive wear or damage is visible, the pump must be replaced.**

**Figure 20-71-42**




Remove the drive gear (Item 1) **[Figure 20-71-42]** from the auxiliary center section.

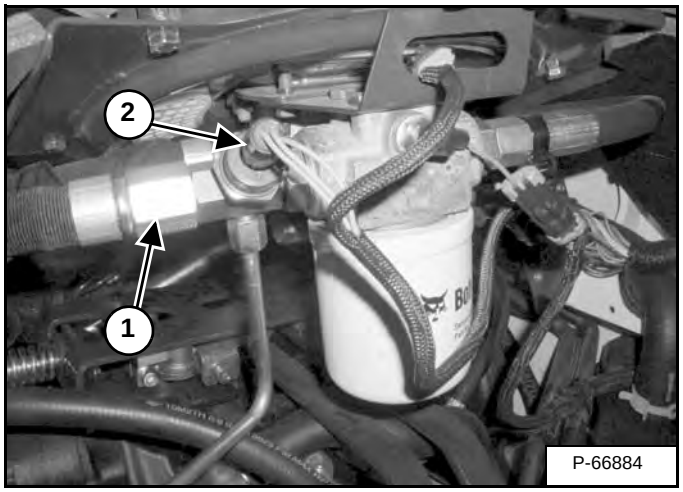
**Figure 20-71-43**




**NOTE: Inspect the drive gear (Item 1) [Figure 20-71-43]. If excessive wear or damage is visible, the pump must be replaced.**

**Charge Filter Housing Removal And Installation**

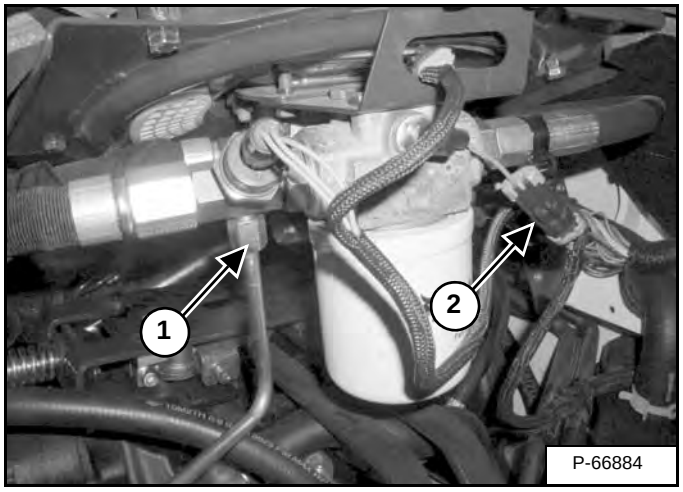
**Figure 20-80-5**




Remove filter outlet hose (Item 1) **[Figure 20-80-5]**.

Disconnect the electrical connector (Item 2) **[Figure 20-80-5]** from the charge pressure sender.

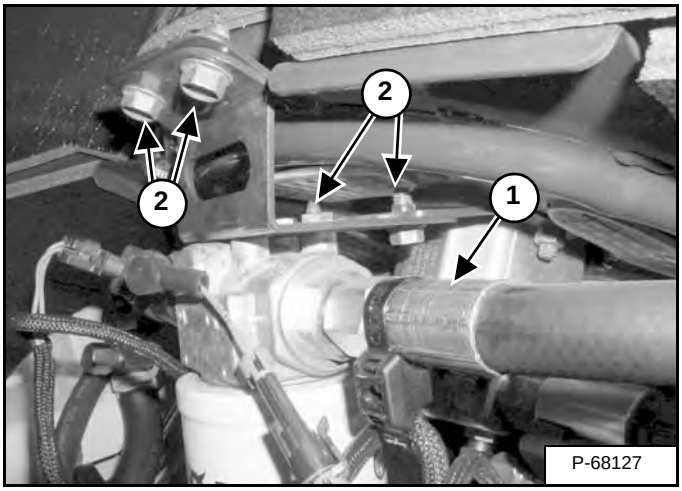
**Figure 20-80-6**




Disconnect the charge pressure tubeline (Item 1) **[Figure 20-80-6]** that connects to the control valve.

Disconnect the electrical connector from the filter sensor (Item 2) **[Figure 20-80-6]**.

**Figure 20-80-7**



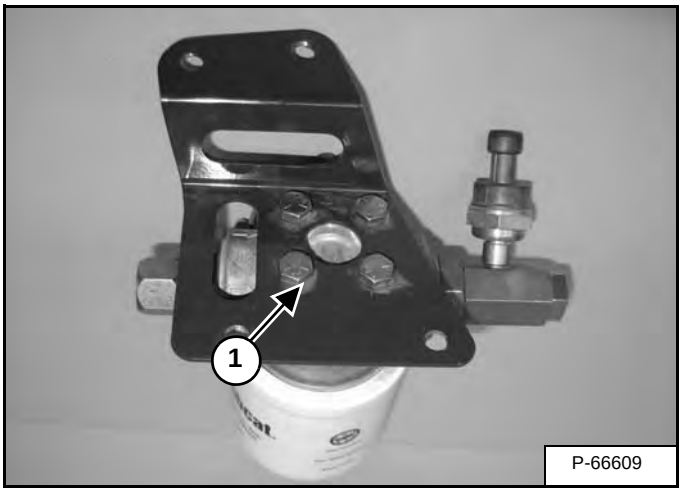

Remove filter inlet hose (Item 1) **[Figure 20-80-7]**.

Remove the four mounting screws (Item 2) **[Figure 20-80-7]**.

***Installation:*** Tighten the mount screws to 15-20 ft.-lb. (20-27 N•m) torque.

Remove filter assembly from the loader.

**Figure 20-80-8**




Remove the four mounting bolts (Item 1) **[Figure 20-80-8]**.

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

**Removal And Installation**

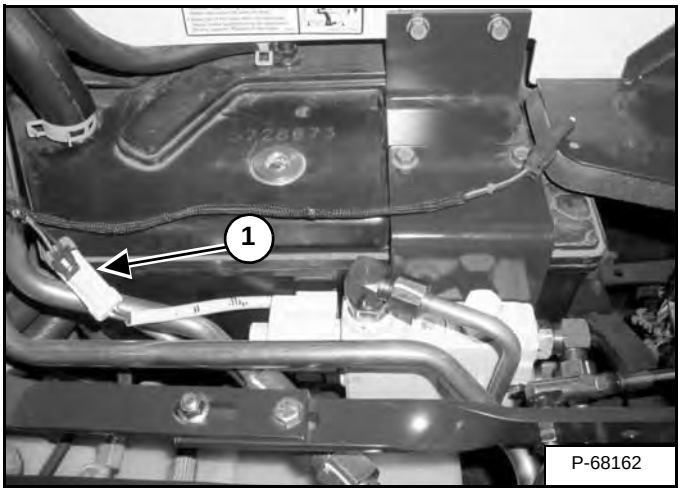



**WARNING**

**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

**Figure 20-110-6**




Start the engine. Raise the lift arms and install an approved lift arm support device [See “Installing” on page 10-20-1].

Stop the engine.

Raise the operator cab [See “Raising” on page 10-30-2].

Disconnect the electric solenoid connector (Item 1) **[Figure 20-110-6]**.

**Figure 20-110-7**

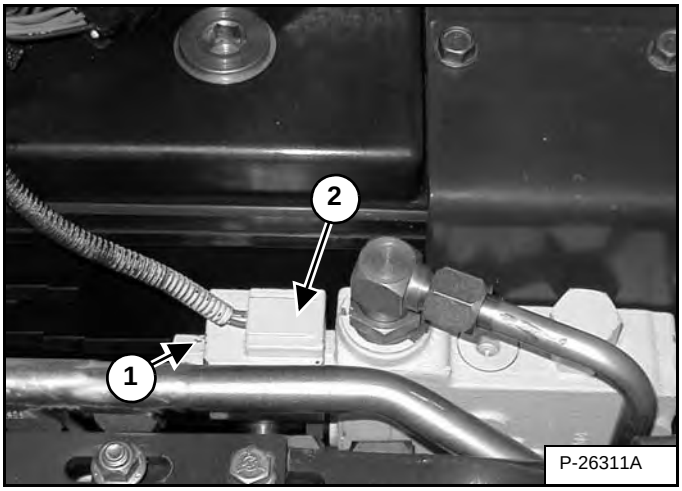
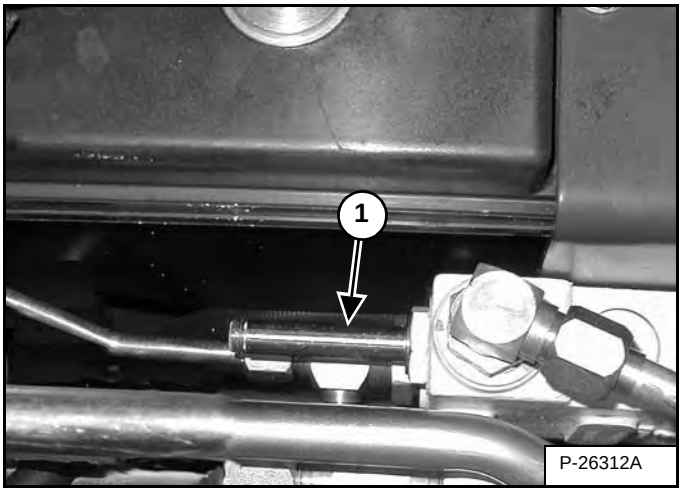



**Figure 20-110-8**




Remove the solenoid nut (Item 1) **[Figure 20-110-7]**.

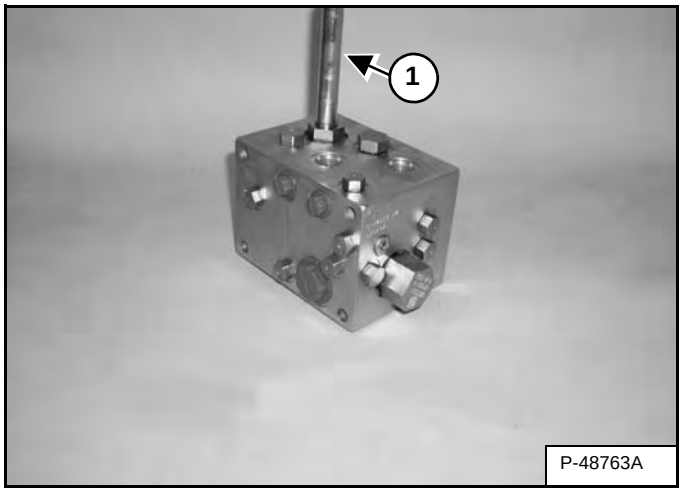
***Installation:*** Tighten the nut to 4-6 ft.-lb. max. (5-8 N•m max.) torque. Overtightening may cause valve failure.

Remove the solenoid (Item 2) **[Figure 20-110-7]** and the solenoid stem (Item 1) **[Figure 20-110-8]**.

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

**Disassembly And Assembly (Cont'd)**

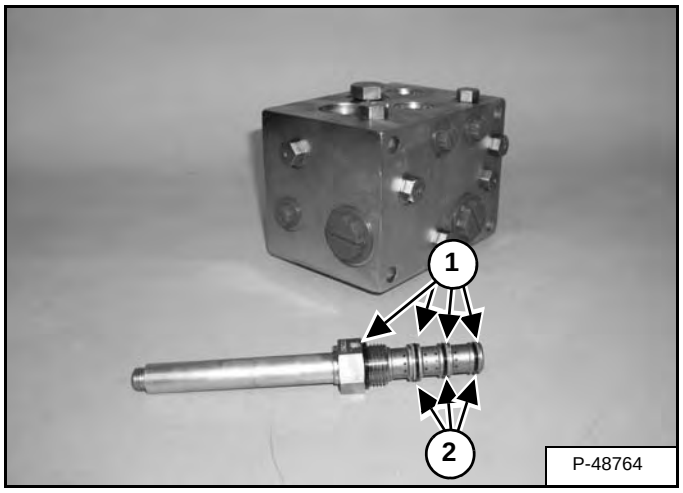
**Figure 20-120-21**




Remove the solenoid valve stem (Item 1) **[Figure 20-120-21]**

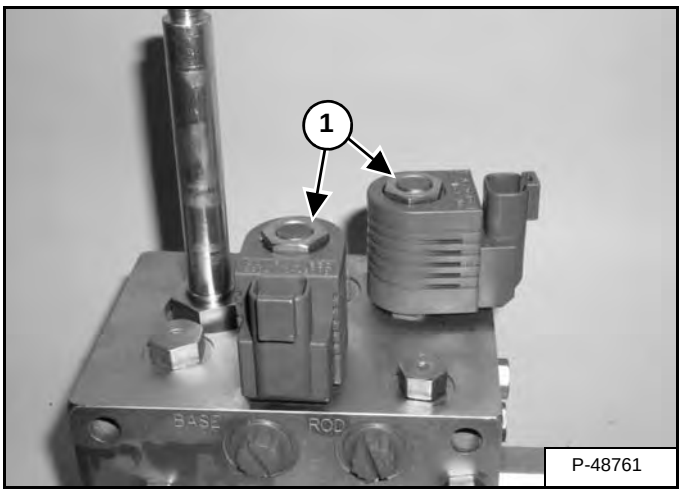
***Assembly:*** Put oil on the O-rings and back-up washers. Tighten to 25 ft.-lb. (34 N•m) torque.

**Figure 20-120-22**




Inspect the O-rings (Item 1) and back-up washers (Item 2) **[Figure 20-120-22]** for damage.

**Figure 20-120-23**

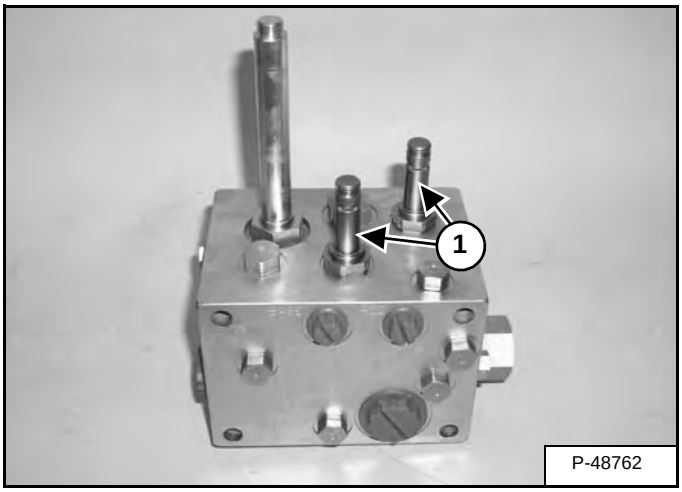



**NOTE: Before removing the solenoid coils, mark the coils for proper alignment.**

Remove the nuts (Item 1) **[Figure 20-120-23]** from the solenoid valve stems.

***Assembly:*** Tighten the nut to 4-6 ft.-lb. (5-8 N•m) torque.

**Figure 20-120-24**




Remove the solenoid valve stems (Item 1) **[Figure 20-120-24]**.

***Assembly:*** Put oil on the O-rings and back-up washers. Tighten to 25 ft.-lb. (34 N•m) torque.

## FRONT AUXILIARY HYDRAULIC COUPLER BLOCK

### Description

The front auxiliary hydraulic coupler block is the connection block that houses the two main auxiliary couplers along with a case drain coupler. These couplers are for suppling hydraulic flow for various attachments.

The front auxiliary coupler block is located at the front of the left side lift arm.

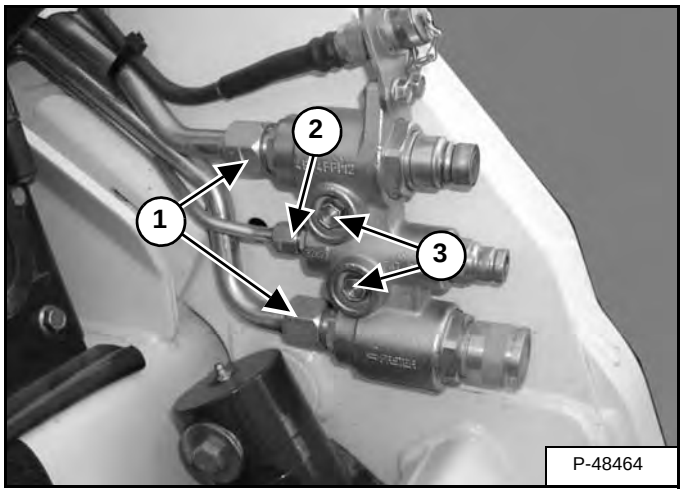
### Removal and Installation

# 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 20-140-1**




Disconnect the auxiliary tubelines (Item 1) and drain tubeline (Item 2) from the coupler block **[Figure 20-140-1]**.

Remove the two mounting bolts (Item 3) **[Figure 20-140-1]**.

### Disassembly And Assembly

**Figure 20-140-2**

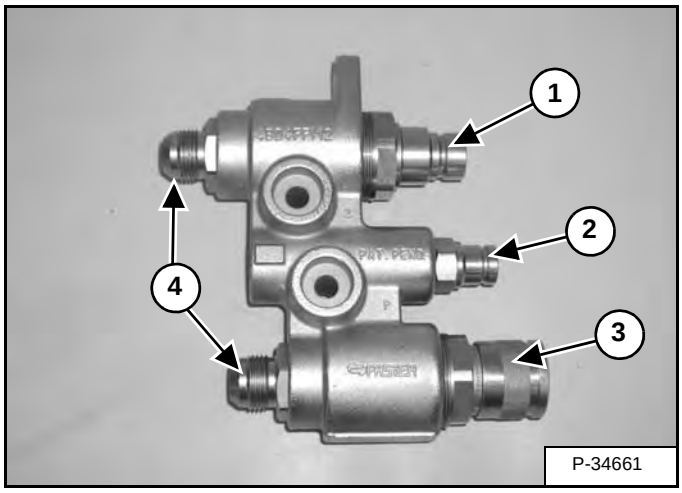
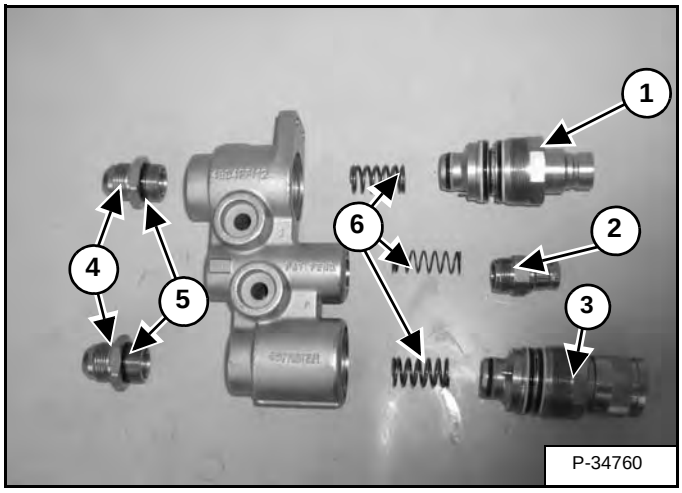



**Figure 20-140-3**




Remove the male coupler (Item 1) **[Figure 20-140-2]** and **[Figure 20-140-3].**

***Assembly:*** Tighten the male coupler (Item 1) **[Figure 20-140-2]** and **[Figure 20-140-3]** to 59 ft.-lb. (80 N•m)

Remove the drain coupler (Item 2) **[Figure 20-140-2]** and **[Figure 20-140-3].**

***Assembly:*** Tighten the drain coupler (Item 2) **[Figure 20-140-2]** and **[Figure 20-140-3]** to 37 ft.-lb. (50 N•m)

Remove the female coupler (Item 3) **[Figure 20-140-2]** and **[Figure 20-140-3].**

***Assembly:*** Tighten the female coupler (Item 3) **[Figure 20-140-2]** and **[Figure 20-140-3]** to 59 ft.-lb. (80 N•m)

Remove the fittings (Item 4) **[Figure 20-140-2]** and **[Figure 20-140-3]** check the O-rings (Item 5) **[Figure 20-140-3]** and replace as needed.

Remove the springs (Item 6) **[Figure 20-140-3].**

# HYDROSTATIC SYSTEM


CASE DRAIN FILTER . . . . . .30-80-1
Description . . . . . .30-80-1
Disassembly And Assembly . . . . . .30-80-1

CHARGE PRESSURE . . . . . .30-40-1
Adjusting . . . . . .30-40-3
Description . . . . . .30-40-1
Sender Removal And Installation . . . . . .30-40-2
Testing . . . . . .30-40-1

DRIVE BELT . . . . . .30-60-1
Adjusting . . . . . .30-60-1
Belt Removal And Installation . . . . . .30-60-3
Belt Tensioner Assembly . . . . . .30-60-7
Belt Tensioner Disassembly . . . . . .30-60-6
Belt Tensioner Parts Identification . . . . . .30-60-5
Belt Tensioner Removal And Installation . . . . . .30-60-4
Description . . . . . .30-60-1
Shield Removal And Installation . . . . . .30-60-1

HYDROSTATIC MOTOR . . . . . .30-20-1
Description . . . . . .30-20-1
Disassembly and Assembly . . . . . .30-20-5
Parts Identification . . . . . .30-20-4
Removal And Installation . . . . . .30-20-1

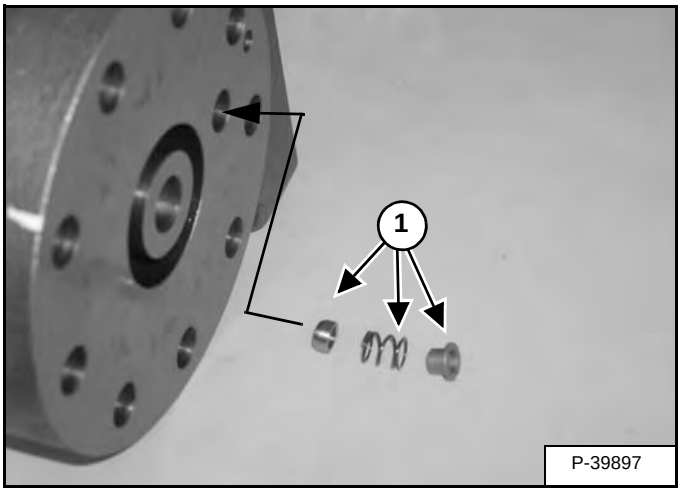
HYDROSTATIC MOTOR (TWO-SPEED) . . . . . .30-21-1
Assembly . . . . . .30-21-19
Description . . . . . .30-21-1
Disassembly . . . . . .30-21-9
Parts Identification . . . . . .30-21-8
Removal And Installation (Left Side) . . . . . .30-21-2
Removal And Installation (Right Side) . . . . . .30-21-5

HYDROSTATIC MOTOR CARRIER (SINGLE AND TWO-SPEED WITH MANUAL CONTROLS) . . . . . .30-30-1
Description . . . . . .30-30-1
Disassembly and Assembly . . . . . .30-30-6
Parts Identification . . . . . .30-30-5
Removal And Installation . . . . . .30-30-3
Shaft Seal Removal And Installation . . . . . .30-30-1


**Continued On Next Page**

**Disassembly and Assembly (Cont'd)**

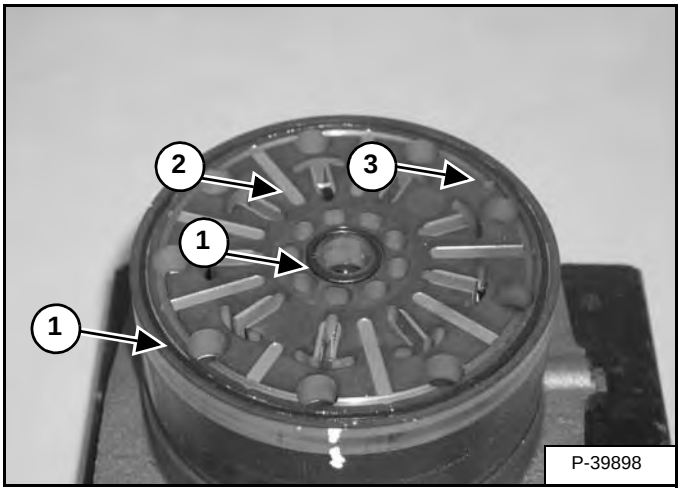
**Figure 30-20-13**




Remove the remaining pieces to the shuttle valve assembly (Item 1) **[Figure 30-20-13]** from the inside of the end cap. Inspect for broken or damaged parts. Parts should move freely in bore.

***Assembly:*** Apply grease to shuttle valve parts to help hold in place during assembly.

**Figure 30-20-14**

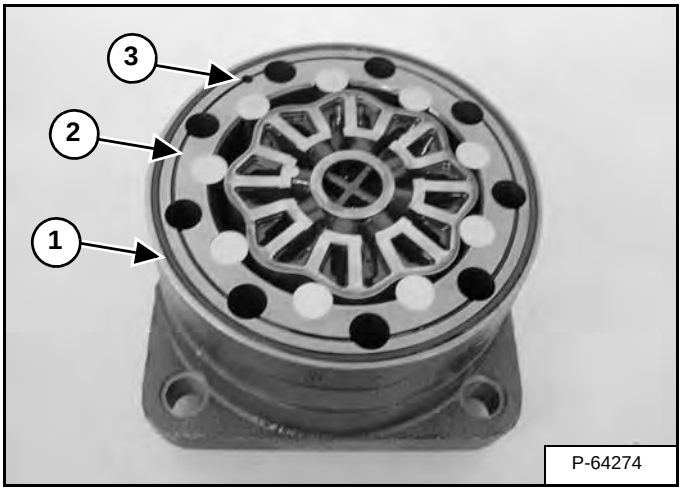



Remove and inspect/replace seals (Item 1) **[Figure 30-20-14]**.

Remove the valve plate (Item 2) **[Figure 30-20-14]**.

***Assembly:*** Apply grease to seals. Note location of case drain hole (Item 3) **[Figure 30-20-14]**. Align hole with other sections on hydrostatic motor.

**Figure 30-20-15**



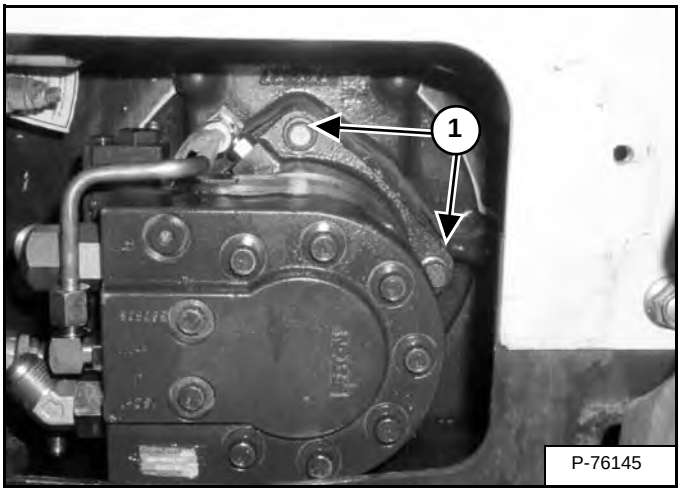

Remove and inspect/replace seal (Item 1) **[Figure 30-20-15]**.

Remove the Geroler® section as an assembly (Item 2) **[Figure 30-20-15]**.

**NOTE: There are two check balls on the backside of the Geroler® section. Be carefull not to lose these check balls. See [Figure 30-20-16]. Note location of case drain hole (Item 3) [Figure 30-20-15]. Align hole with other sections on hydrostatic motor.**

**Removal And Installation (Right Side) (Cont'd)**

**Figure 30-21-15**

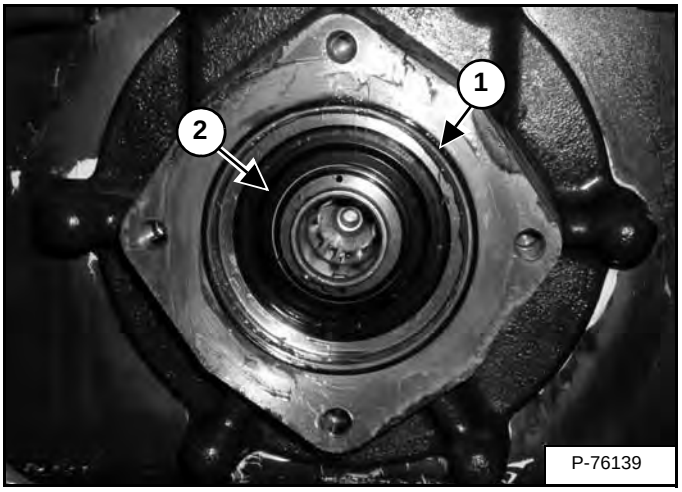



Remove two mounting bolts (Item 1) **[Figure 30-21-15]** from the motor.

***Installation:*** Tighten the mounting bolts to 210 ft.-lb. (285 N•m) torque.

Remove the motor from the access hole in the loader frame.

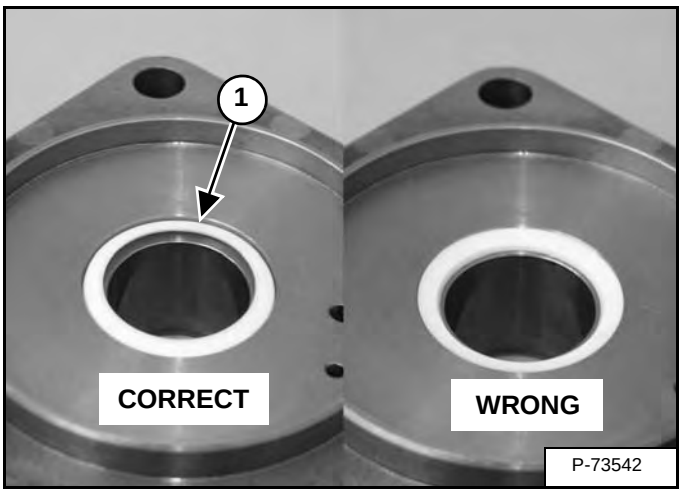
**Figure 30-21-16**




Lubricate and install a new hydrostatic motor O-ring (Item 1) **[Figure 30-21-16]**.

Inspect the hydrostatic motor carrier shaft seal (Item 2) **[Figure 30-21-16]**.

**Figure 30-21-17**

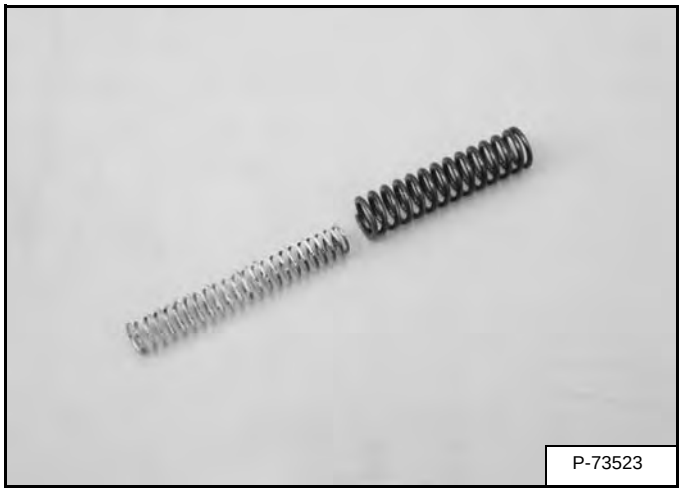



***Installation:*** Ensure you have correctly installed a new shaft seal (Item 1) **[Figure 30-21-17]** in the mounting flange cavity with the convex surface facing outward.

Reverse the removal procedure to install the two speed hydrostatic motor.

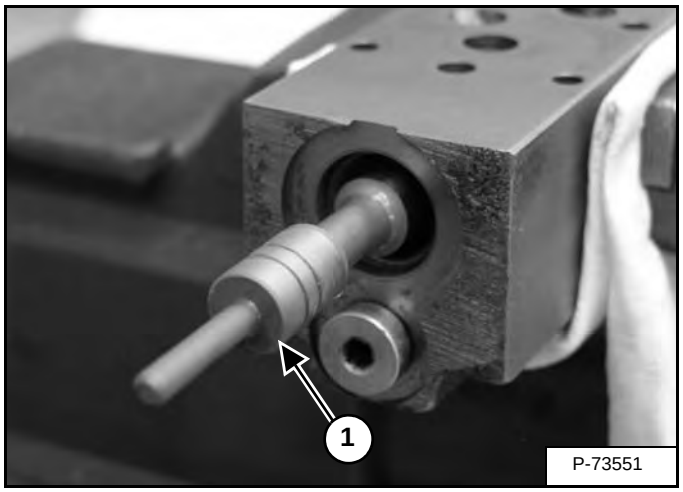
**Disassembly (Cont'd)**

**Figure 30-21-50**



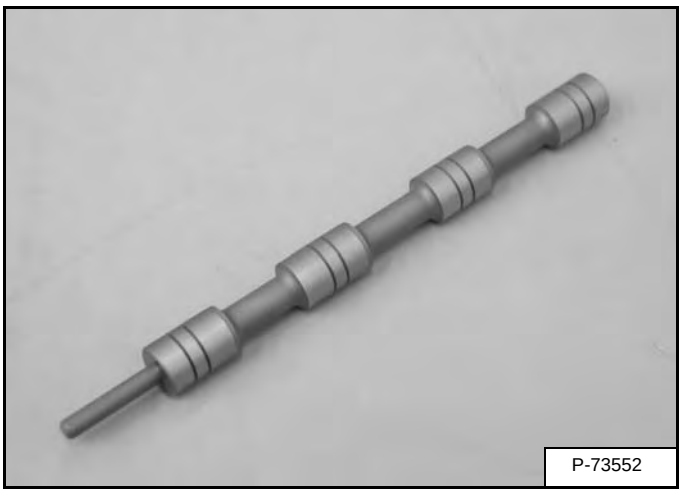

Inspect springs for wear and deformation **[Figure 30-21-50]**.

**Figure 30-21-51**




Remove the spool (Item 1) **[Figure 30-21-51]** from the spool housing.

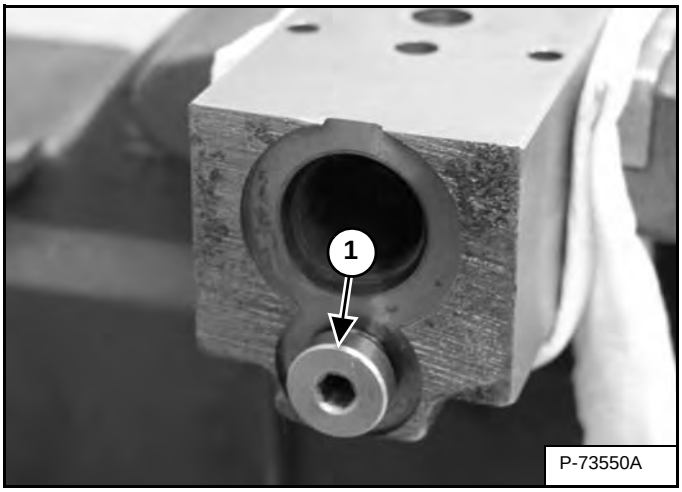
**Figure 30-21-52**




Inspect the spool for wear or damage **[Figure 30-21-52]**.

Clean the spool and spool housing.

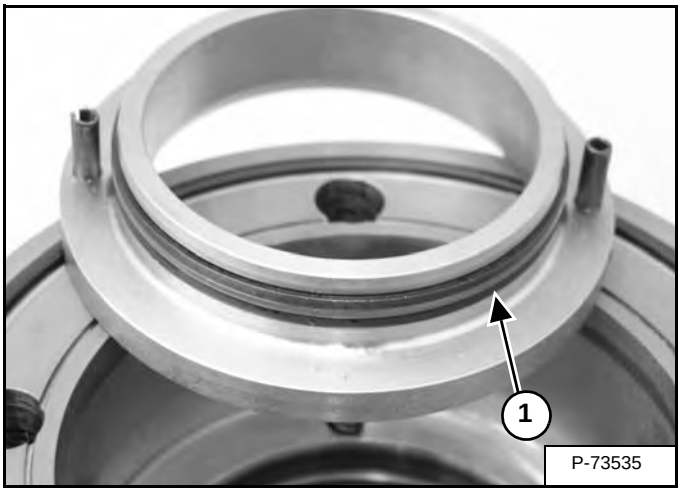
**Figure 30-21-53**




Remove the plug (Item 1) **[Figure 30-21-53]** from the spool housing.

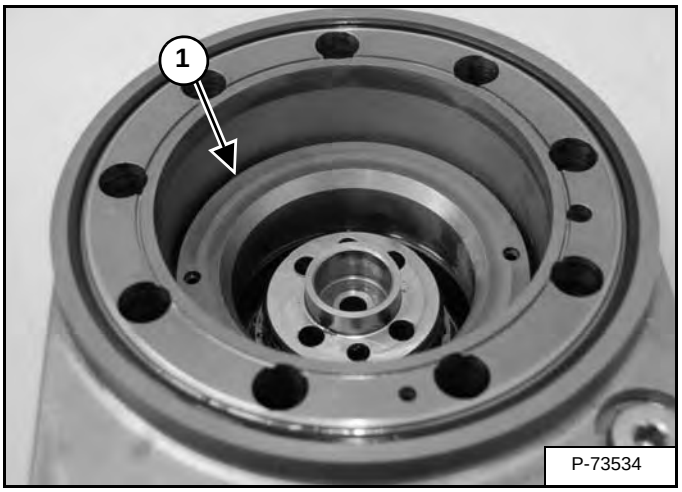
**Assembly (Cont'd)**

**Figure 30-21-87**



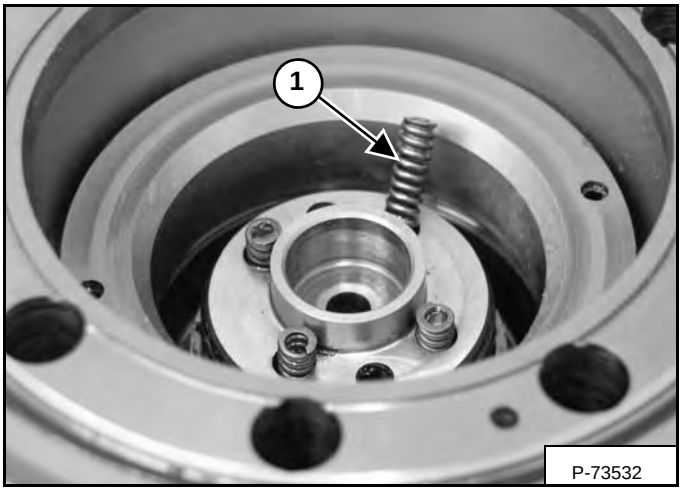

Lubricate and install the O-ring and two backup rings (Item 1) **[Figure 30-21-87]** on the outer balance ring.

**Figure 30-21-88**



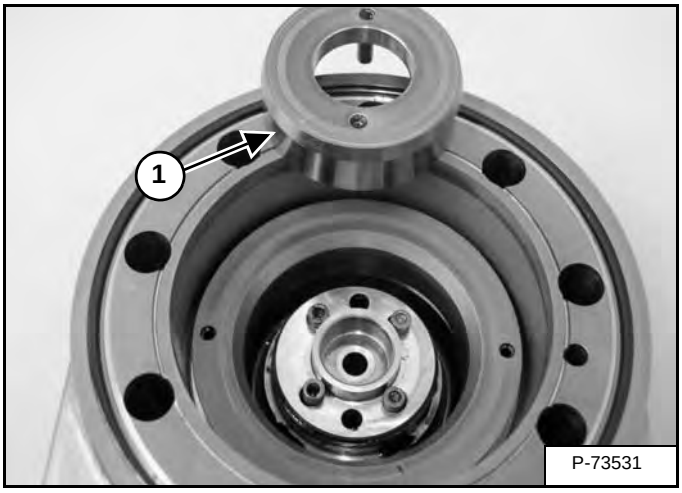

Install the outer balance ring (Item 1) **[Figure 30-21-88]** in the valve housing.

**Figure 30-21-89**




Install four compression springs (Item 1) **[Figure 30-21-89]**.

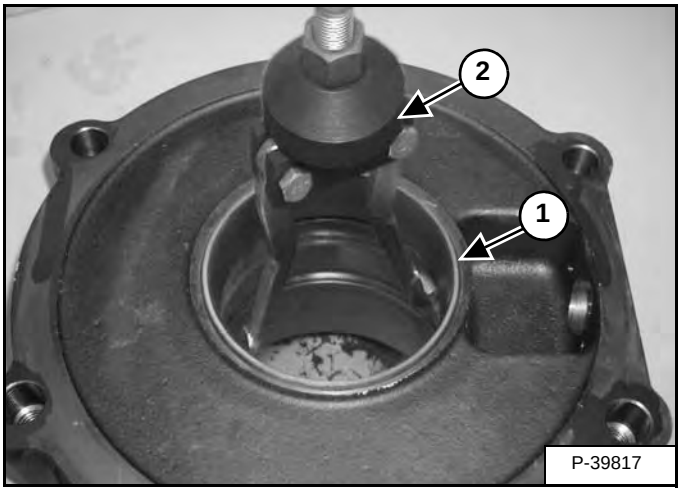
**Figure 30-21-90**




Install the inner balance ring (Item 1) **[Figure 30-21-90]** in the valve housing.

**Disassembly and Assembly (Cont'd)**

**Figure 30-30-15**

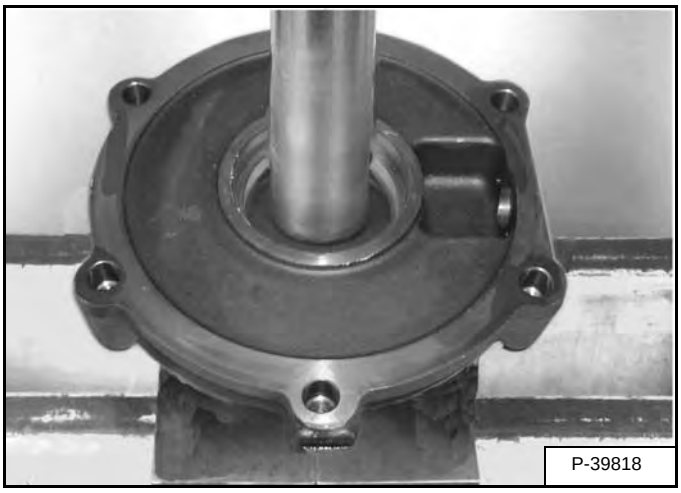



Fasten the carrier motor housing to the work surface securely with the inner bearing race (Item 1) **[Figure 30-30-15]** facing up.

Install the slide hammer with puller end (Item 2) **[Figure 30-30-15]** on the bottom side of the bearing race.

Remove the bearing race from the carrier housing **[Figure 30-30-15]**.

**Figure 30-30-16**

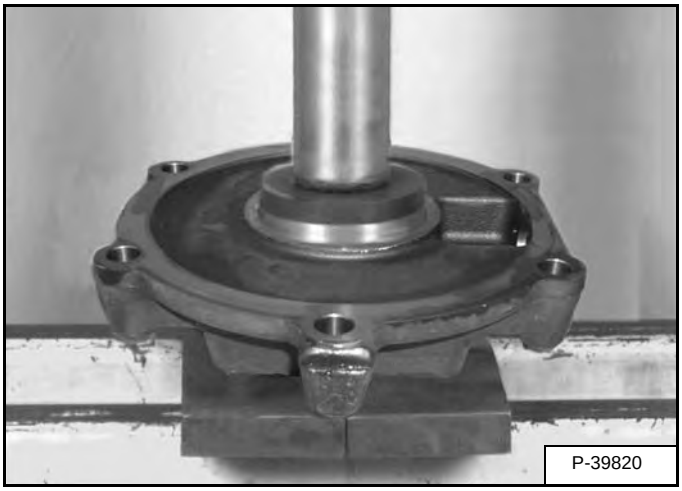



Put the motor carrier housing in the hydraulic press as shown **[Figure 30-30-16]**.

Use a 3-7/8 inch driver tool and press the outer bearing race from the housing.

Check all parts for wear and damage. Replace the bearing race when new bearings are to be installed.

**Figure 30-30-17**

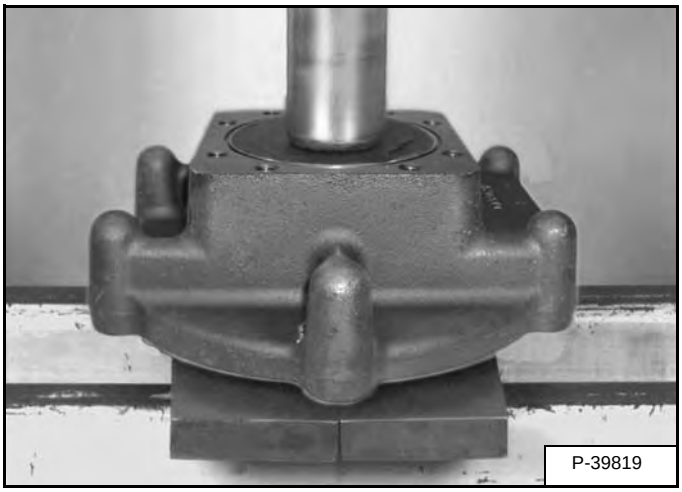



Put the motor carrier housing in the press as shown **[Figure 30-30-17]**.

Use 4-5/16 inch driver tool and press the new inner bearing race into the motor carrier housing **[Figure 30-30-17]**.

Press the bearing race in until it is fully seated in the carrier housing.

**Figure 30-30-18**



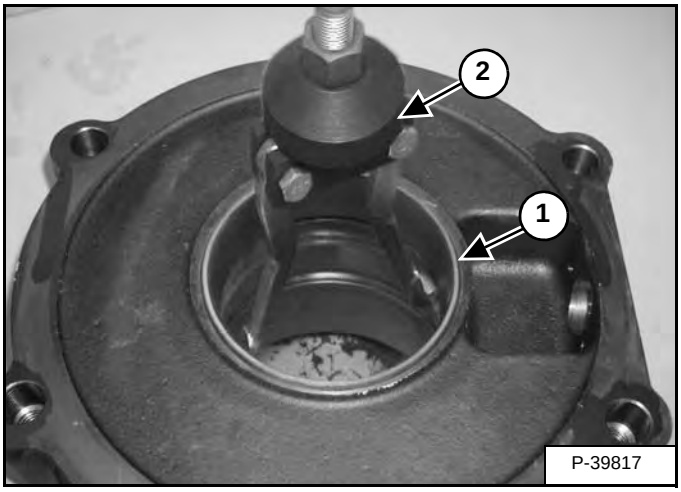

Turn the motor carrier housing over as shown **[Figure 30-30-18]**.

Use 4-5/16 in. driver tool and press the new outer bearing race into the motor carrier housing **[Figure 30-30-18]**.

Press the bearing race in until it is fully seated in the carrier housing.

**Disassembly and Assembly (Cont'd)**

**Figure 30-31-15**

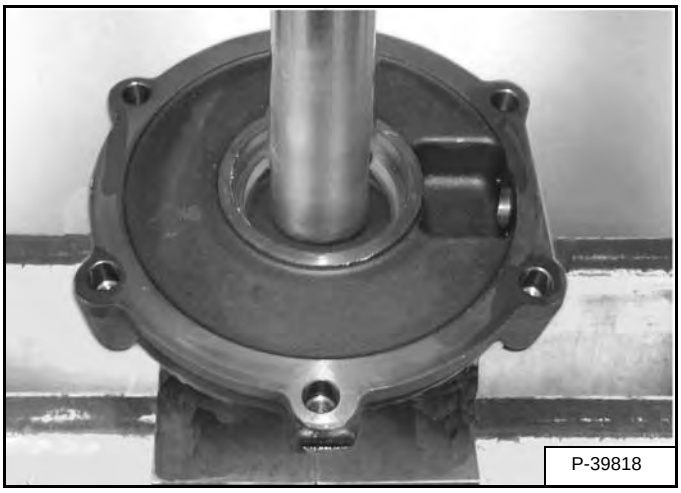



Fasten the carrier motor housing to the work surface securely with the inner bearing race (Item 1) **[Figure 30-31-15]** facing up.

Install the slide hammer with puller end (Item 2) **[Figure 30-31-15]** on the bottom side of the bearing race.

Remove the bearing race from the carrier housing **[Figure 30-31-15]**.

**Figure 30-31-16**

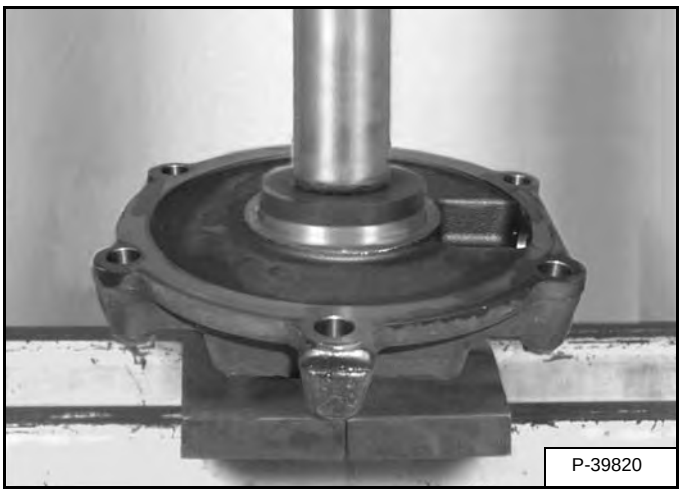



Put the motor carrier housing in the hydraulic press as shown **[Figure 30-31-16]**.

Use a 3-7/8 in. driver tool and press the outer bearing race from the housing.

Check all parts for wear and damage. Replace the bearing race when new bearings are to be installed.

**Figure 30-31-17**

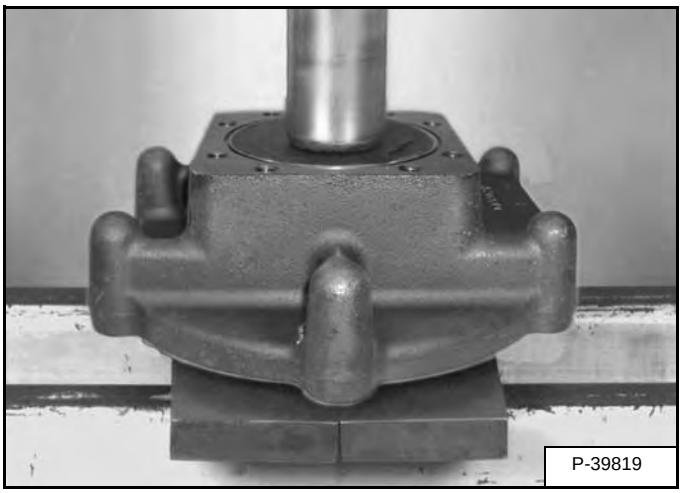



Put the motor carrier housing in the press as shown **[Figure 30-31-17]**.

Use 4-5/16 in. driver tool and press the new inner bearing race into the motor carrier housing **[Figure 30-31-17]**.

Press the bearing race in until it is fully seated in the carrier housing.

**Figure 30-31-18**



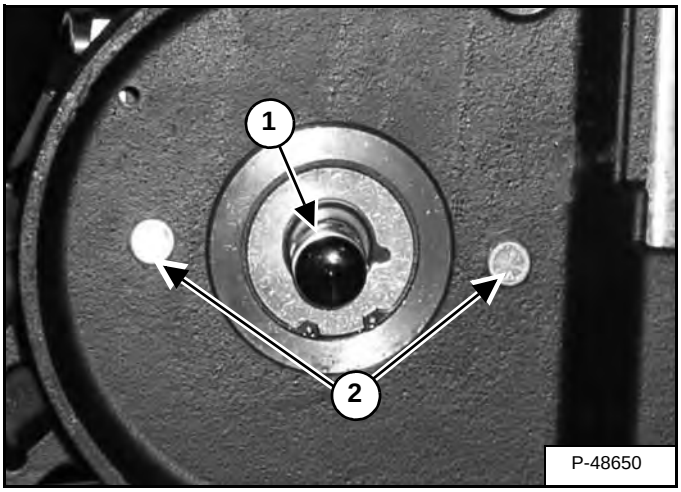

Turn the motor carrier housing over as shown **[Figure 30-31-18]**.

Use 4-5/16 in. driver tool and press the new outer bearing race into the motor carrier housing **[Figure 30-31-18]**.

Press the bearing race in until it is fully seated in the carrier housing.

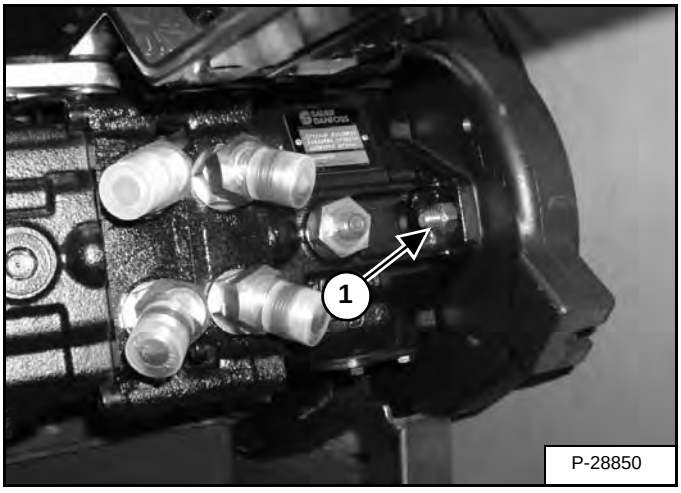
**Removal And Installation (Cont'd)**

**Figure 30-50-6**




***Installation:*** Install the key in the hydrostatic pump shaft (Item 1) **[Figure 30-50-6]** before installing the pump drive pulley.

**Figure 30-50-7**




Hold the nut (Item 1) **[Figure 30-50-7]** on the two hydrostatic pump mounting bolts (Item 2) **[Figure 30-50-6]**.

Remove the two hydrostatic pump mounting bolts from the pump and drive belt housing.

***Installation***: Tighten the pump mounting bolts to 65-70 ft.-lb. (88-95 N•m) torque.

Reverse the removal procedure to install the hydrostatic pump assembly.

**Hydrostatic Pump Start Up**

Follow the hydraulic pump start up procedure [See "Hydraulic Pump Start Up" on page 20-60-8].

**⚠ WARNING**

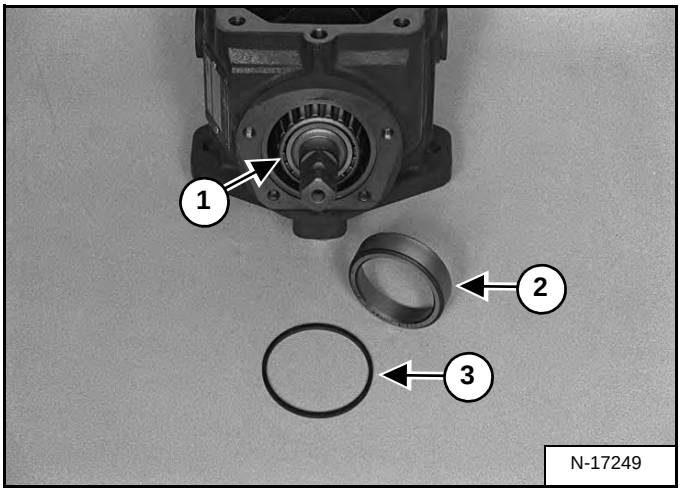
**AVOID INJURY OR DEATH**

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

W-2103-0807

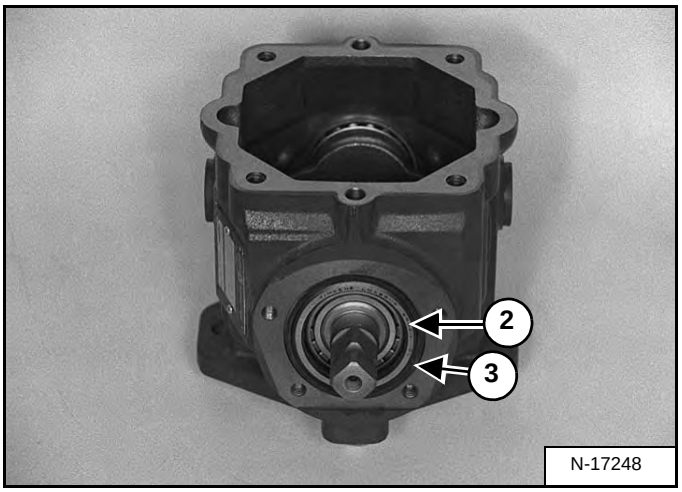
**Assembly (Cont'd)**

**Figure 30-50-34**



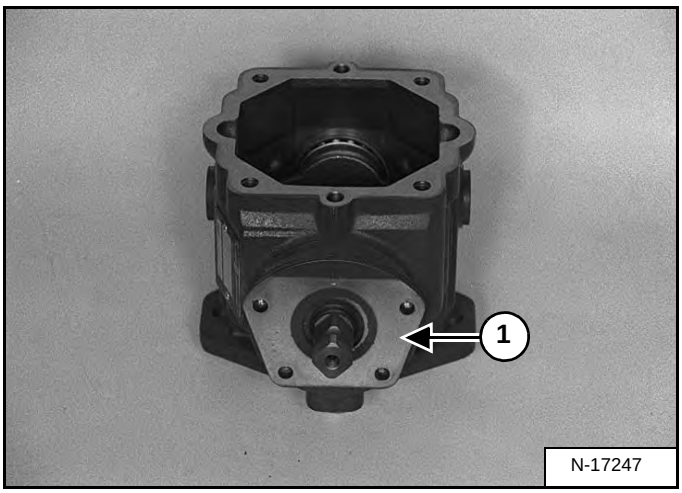

Install the tapered bearing (Item 1) **[Figure 30-50-34]** on the swashplate shaft.

**Figure 30-50-35**



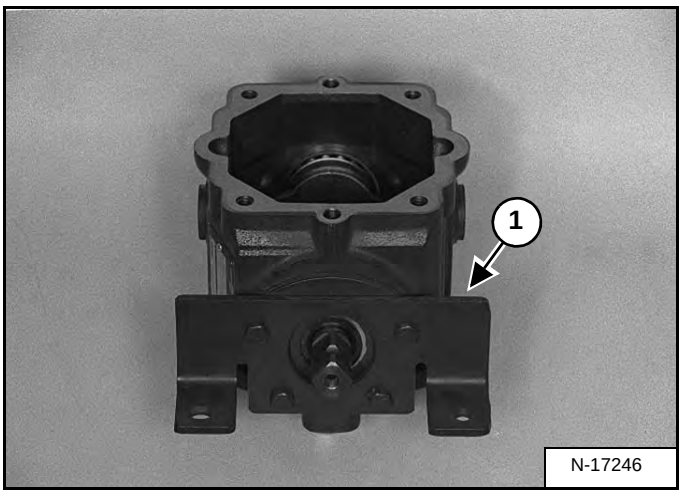

Install the bearing race (Item 2) and O-ring (Item 3) as shown in **[Figure 30-50-34]** and **[Figure 30-50-35]**.

**Figure 30-50-36**




Install the upper trunnion seal (Item 1) **[Figure 30-50-36]** and cover.

**Figure 30-50-37**




Install the linkage bracket (Item 1) **[Figure 30-50-37]** and the four mounting bolts and tighten to 18-22 ft.-lb. (24-30 N•m) torque.

**Removal And Installation (Cont'd)**

**Figure 30-51-12**

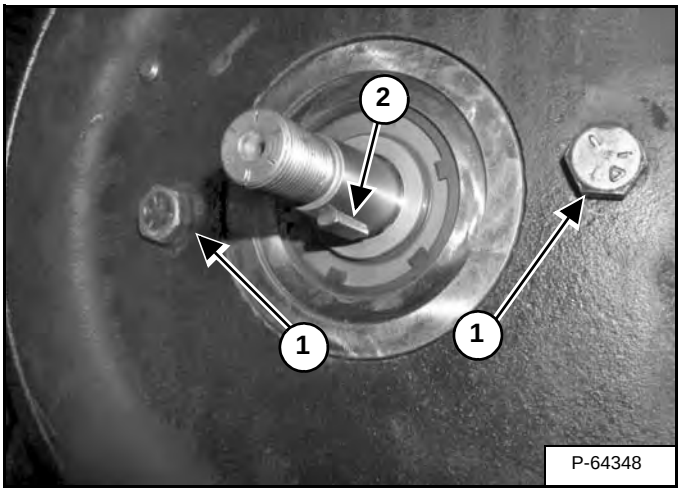
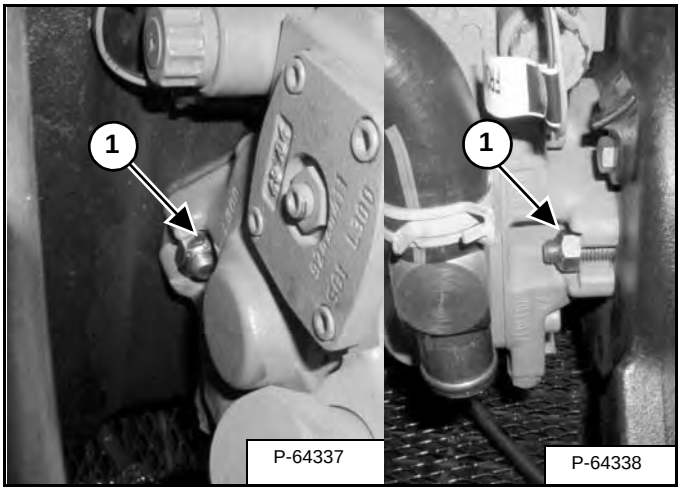



**Figure 30-51-13**

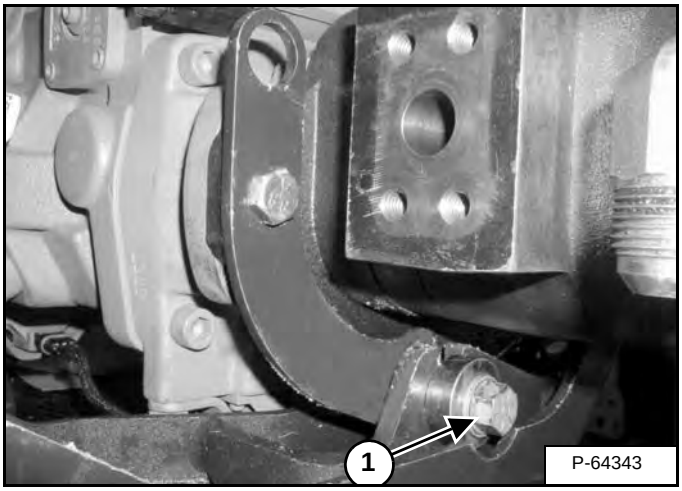



Remove the two mounting bolts (Item 1) **[Figure 30-51-12]** and nuts (Item 1) **[Figure 30-51-13]**.

***Installation:*** Tighten the mounting bolts and nuts to 65-70 ft.-lb. (88-95 N•m) torque.

Make sure the key (Item 2) **[Figure 30-51-12]** is installed.

**Figure 30-51-14**




Remove the mounting bolt (Item 1) **[Figure 30-51-14]** at the hydraulic pump mounting bracket.

***Installation:*** Tighten mounting bolt to 90-100 ft.-lb. (125-135 N•m) torque.

**NOTE: The mounting bolt is a special purpose bolt. Only replace with original Bobcat Parts.**

Remove the hydrostatic pump from the mounting bracket and drive belt housing.

**BEFORE START UP:** Fill the hydrostatic pump with hydraulic oil. This will remove trapped air in the hydrostatic pump before start up [See "Hydrostatic Pump Start Up" on page 30-51-6].

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**Disassembly and Assembly (Cont'd)**

**Figure 30-51-37**

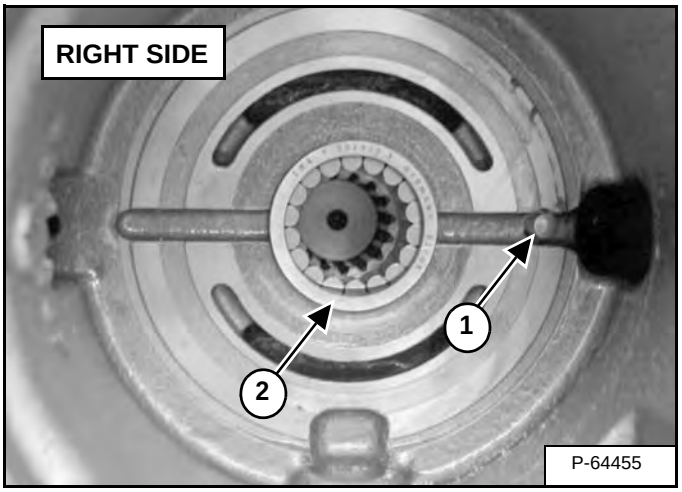



**Figure 30-51-38**

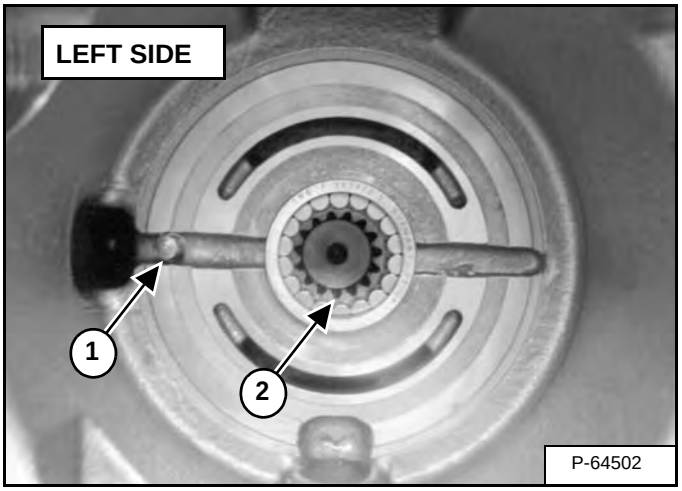



**Figure 30-51-39**

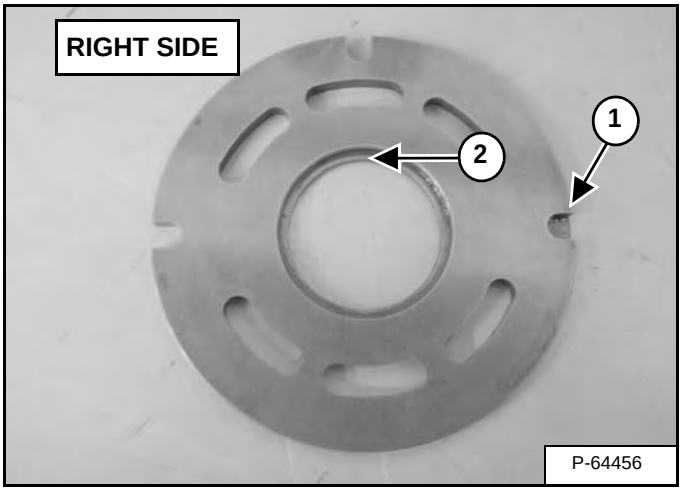
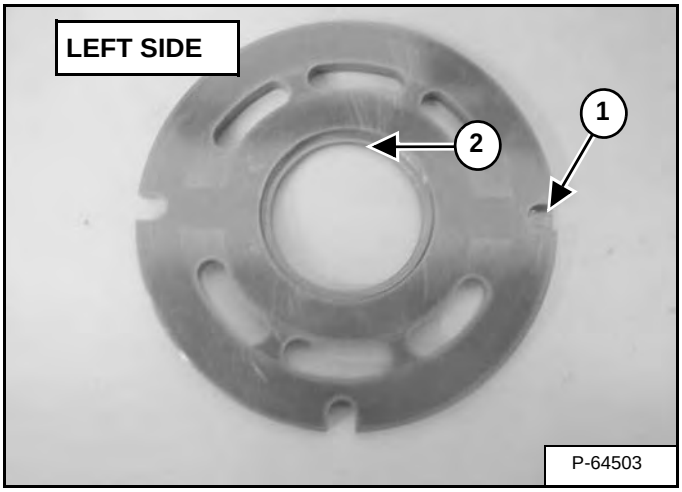



**Figure 30-51-40**



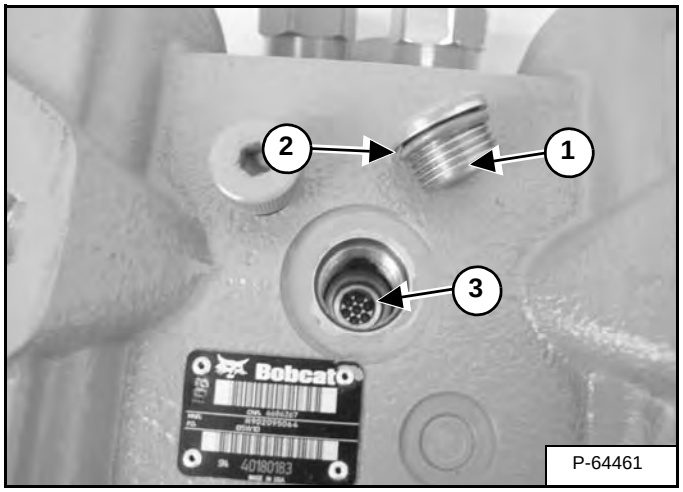

***Assembly:*** Align the timing pin (Item 1) **[Figure 30-51-37]** and **[Figure 30-51-38]** in the case housing with the notch (Item 1) **[Figure 30-51-39]** and **[Figure 30-51-40]** that does not go through the valve plate.

Align the shoulder of the roller bearing (Item 2) **[Figure 30-51-37]** and **[Figure 30-51-38]** with the beveled edge on the valve plate (Item 2) **[Figure 30-51-39]** and **[Figure 30-51-40]**.

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

**Disassembly and Assembly (Cont'd)**

**Figure 30-51-75**




Remove the plug (Item 1) from the top center of the case housing. Replace O-ring (Item 2) **[Figure 30-51-75]**.

***Assembly:*** Tighten plug to 7.4 ft.-lb. (10 N•m) torque.

Remove internal screen (Item 3) **[Figure 30-51-75]**.

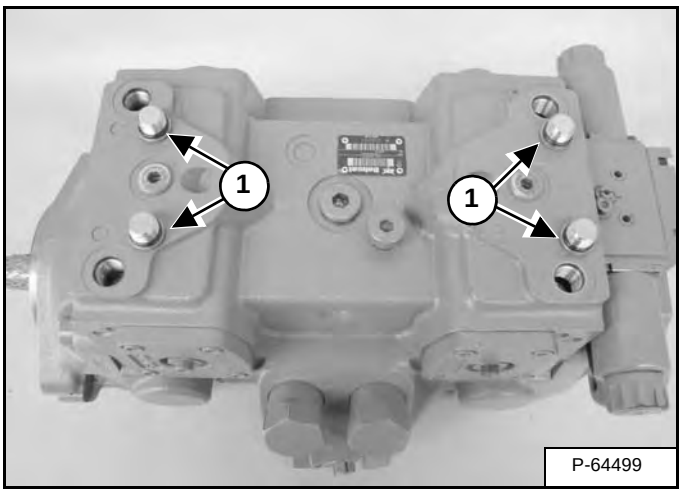
***Assembly:*** Tighten internal screen to 45 ft.-lb. (62 N•m) torque.

**Figure 30-51-76**




Ensure screen is clean **[Figure 30-51-76]**.

**Figure 30-51-77**

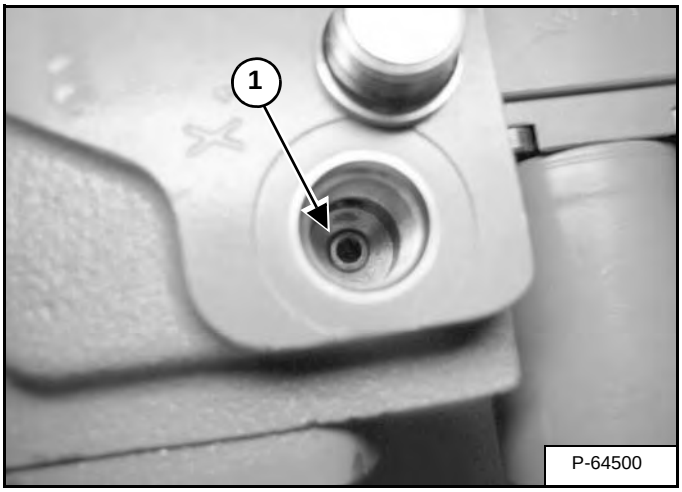



Remove the four control pressure plugs (Item 1) **[Figure 30-51-77]** at the top of the case housing to gain access to the four orifices (Item 1) **[Figure 30-51-78]**.

Replace O-rings on plugs.

***Assembly:*** Tighten plugs to 18 ft.-lb. (25 N•m) torque.

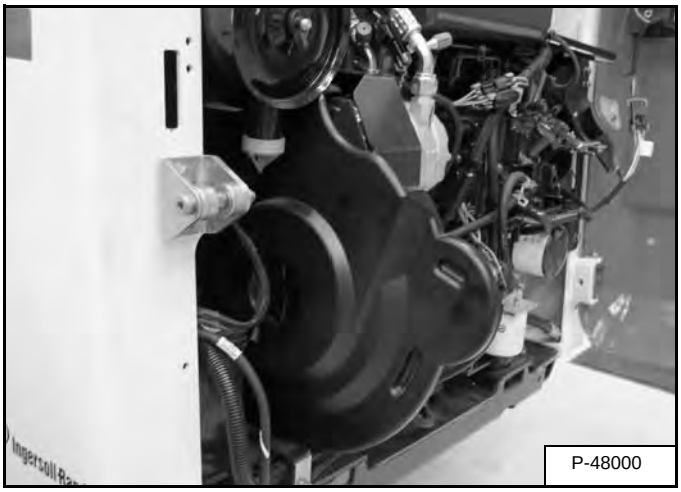
**Figure 30-51-78**




Ensure the four orifices (Item 1) **[Figure 30-51-78]** in case housing are clean and not plugged.

## Belt Removal And Installation

**Figure 30-60-6**



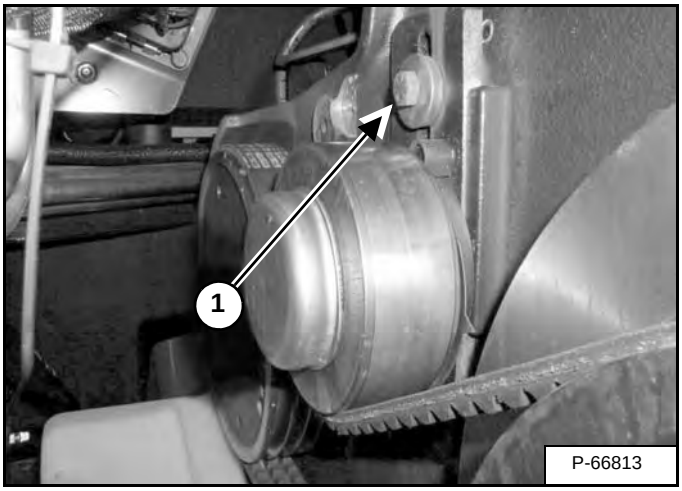

Stop the engine. Open the rear door.

Raise the operator cab [See "Raising" on page 10-30-2].

Remove the negative (-) cable from the battery. The battery may be removed for additional working clearance [See "Removal And Installation" on page 60-20-1].

Remove the belt shield **[Figure 30-60-6]** [See "Shield Removal And Installation" on page 30-60-1].

**Figure 30-60-7**




The belt tensioner is located between the flywheel and pump pulley. Loosen and remove the bolt (Item 1) **[Figure 30-60-7]** from the belt tensioner.

Remove the belt tensioner assembly.

**Figure 30-60-8**




Remove the drive belt from the pump pulley and flywheel. Remove the drive belt from the loader **[Figure 30-60-8]**.

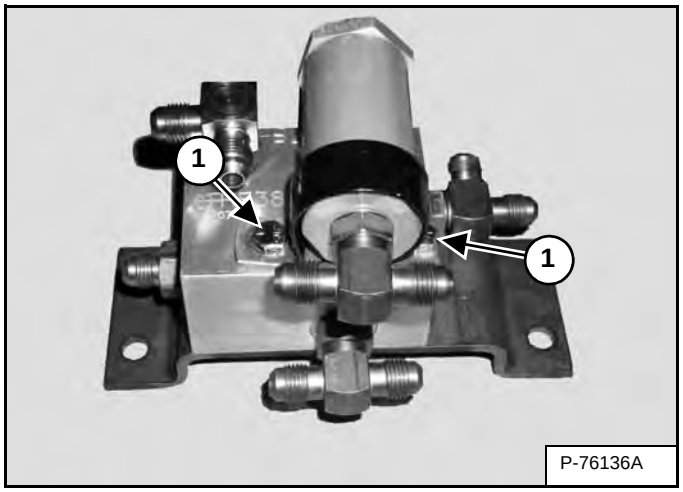
Install the new drive belt. Install the belt tensioner assembly.

Adjust the drive belt [See "Adjusting" on page 30-60-1].

Reinstall belt shield and connect the negative (-) cable to the battery.

**Valve Disassembly And Assembly (Cont'd)**

**Figure 30-70-10**



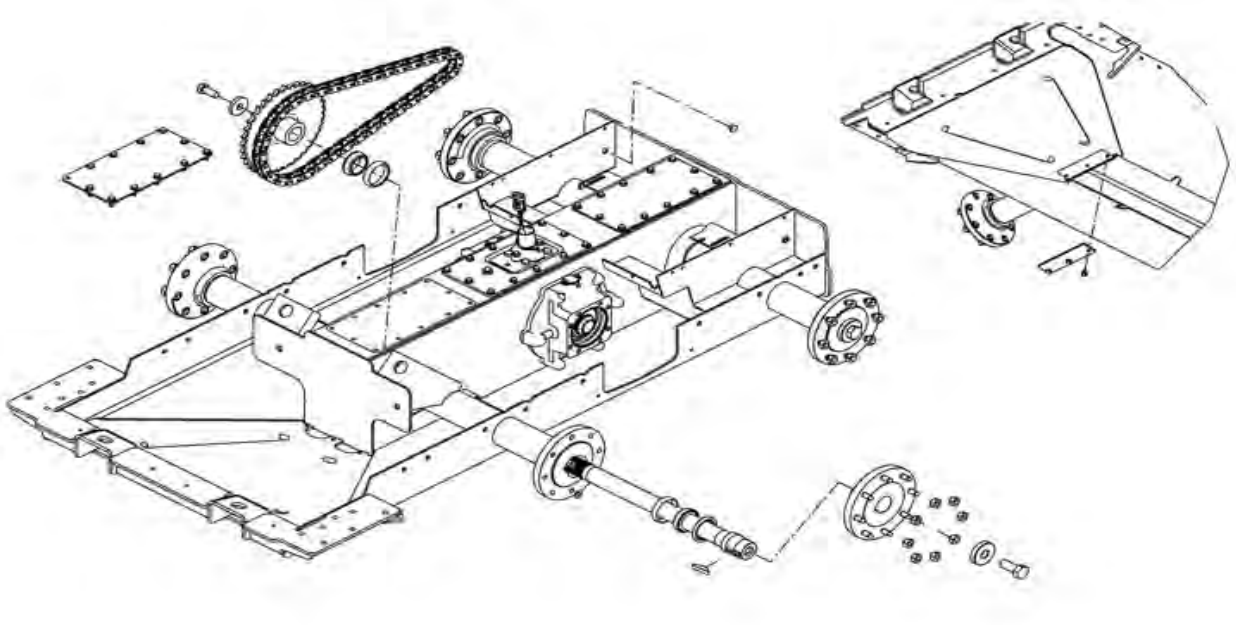

Remove the two bolts and nuts (Item 1) **[Figure 30-70-10]** fastening the two-speed valve and case drain filter clamp to the valve mounting bracket.

Remove the two-speed valve (Item 1) and case drain filter clamp (Item 2) **[Figure 30-70-10]** from the valve mounting bracket.

***Assembly:*** Tighten the two mounting bolts to 80-90 in.-lb. (9-10 N•m) torque.

## DRIVE COMPONENTS

### Description



P-66933

The drive components consist of the chaincase, drive chains, sprockets, axleshafts, hubs and a brake.

The chaincase is partially filled with hydraulic fluid to lubricate the chains and bearings.

On the bottom of the chaincase, these is a cover for access to the fuel tank drain plug.

## CHAINCASE

### Description

The chaincase contains the drive components.

### Front Cover Removal And Installation

Raise the loader lift arms and install an approved lift arm support device [See “Installing” on page 10-20-1].

Raise the loader operator cab [See “Raising” on page 10-30-2].

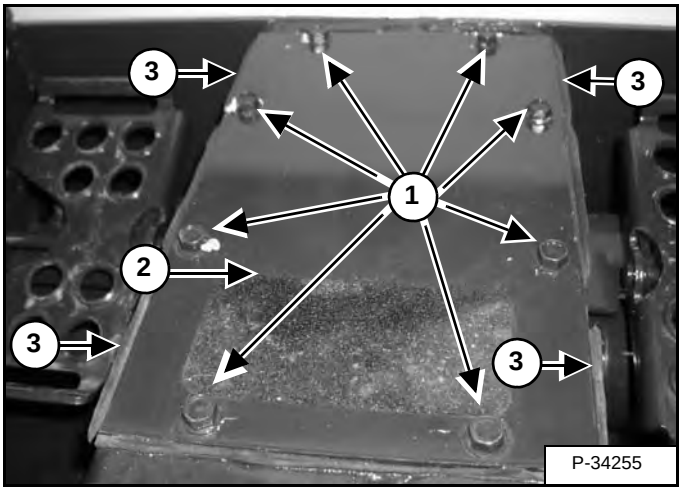



**WARNING**

**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 40-30-1**




Remove the front chaincase cover mounting screws (Item 1) **[Figure 40-30-1]**.

Remove the front chaincase cover (Item 2) **[Figure 40-30-1]** from the loader.

**NOTE: There are machined recesses (Item 3) [Figure 40-30-1] on the bottom side of the cover to help pry the covers off.**

***Installation***: Apply polyurethane sealer to mating surfaces. Polyurethane sealant should be applied to the screw threads to stop oil leakage. Tighten the mounting screws to 20-25 ft.-lb. (27-34 N•m) torque.

**Disassembly And Assembly**

**Figure 50-10-7**

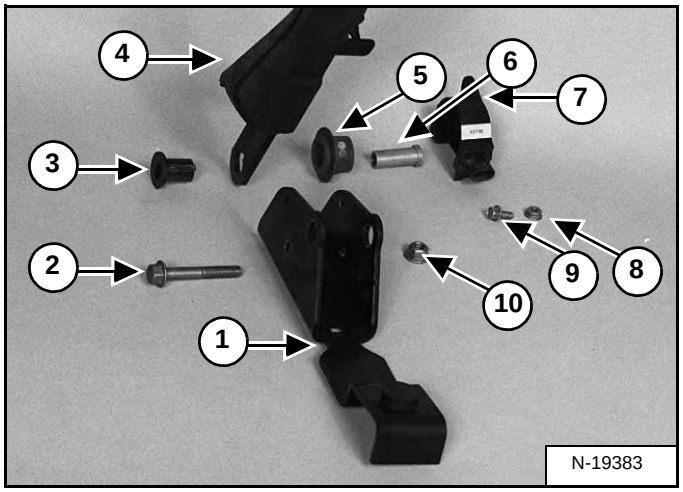
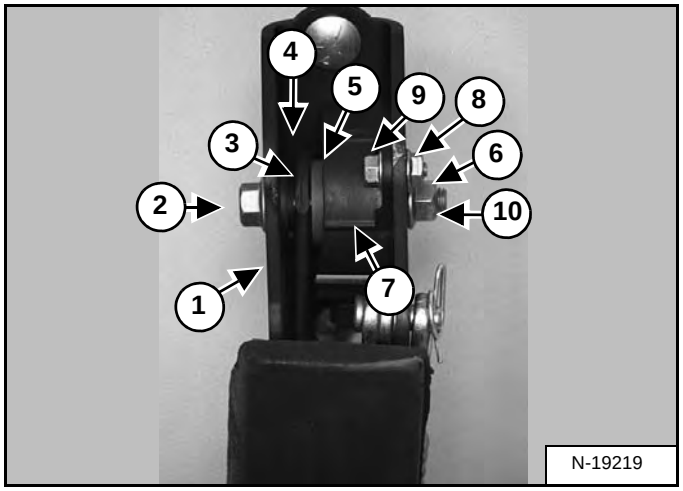



**Figure 50-10-8**




Assemble the parts as shown for the left side of the seat bar pivot assembly **[Figure 50-10-7]** and **[Figure 50-10-8]**.

Seat Bar Mount (Item 1)
Mounting Bolt (Item 2)
Keyed Plastic Bushing (Item 3)
Seat Bar (Item 4)
Magnetic Bushing Assembly (Item 5)
Pivot Bushing (Item 6)
Sensor Bracket (Item 7)
Sensor Mounting Nut (Item 8)
Sensor Mounting Bolt (Item 9)
Mounting Nut (Item 10)

***Installation***: Tighten the mounting bolt (Item 2) **[Figure 50-10-7]** and **[Figure 50-10-8]** to 50-70 in.-lb. (5,6-7,9 N•m) torque.

**Figure 50-10-9**

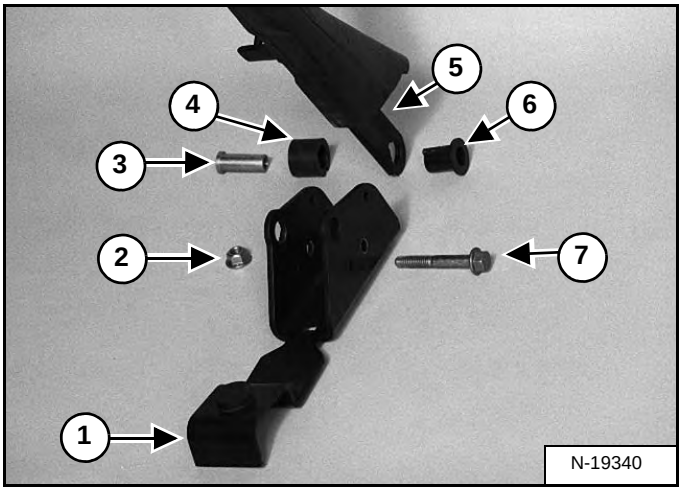
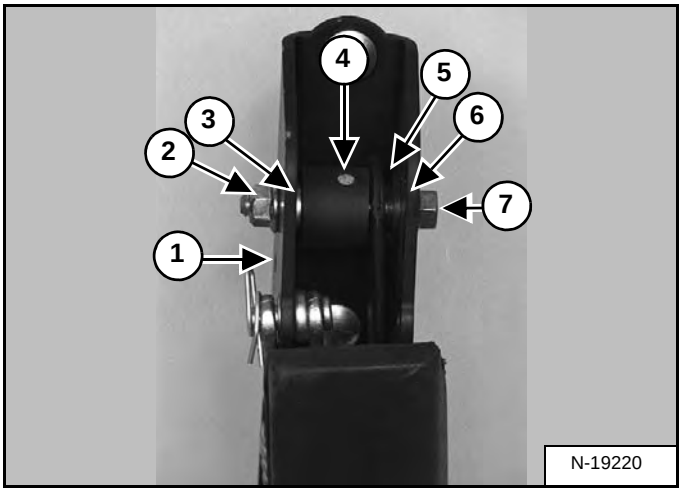



**Figure 50-10-10**




Assemble the parts as shown for the right side of the seat bar pivot assembly **[Figure 50-10-9]** and **[Figure 50-10-10]**.

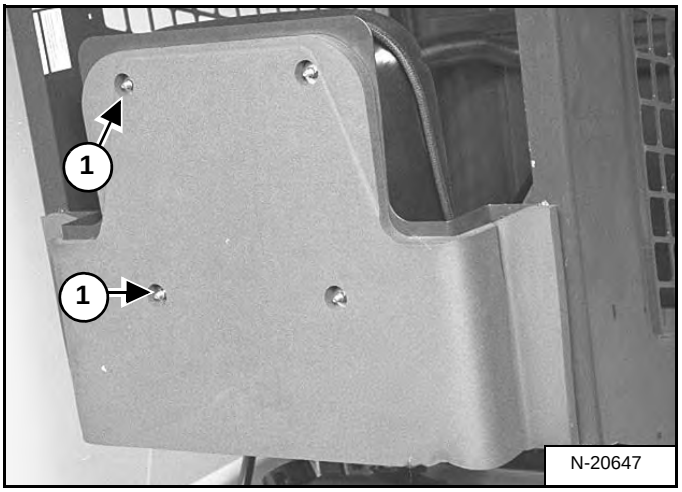
Seat Bar Mount (Item 1)
Mounting Nut (Item 2)
Pivot Bushing (Item 3)
Spacer Bushing (Item 4)
Seat Bar (Item 5)
Keyed Plastic Bushing (Item 6)
Mounting Bolt (Item 7)

***Installation***: Tighten the mounting bolt (Item 7) **[Figure 50-10-9]** and **[Figure 50-10-10]** to 50-70 in.-lb. (5,6-7,9 N•m) torque.

## OPERATOR SEAT (SUSPENSION)

### Removal And Installation

**Figure 50-31-1**

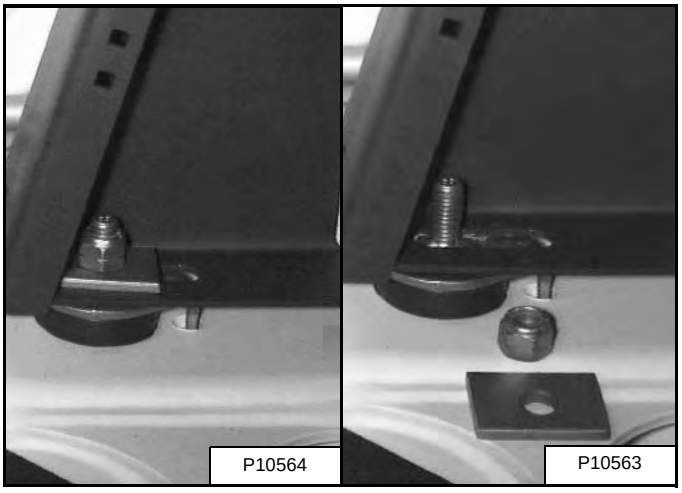



Raise the operator cab [See “Raising” on page 10-30-2].

Remove the four seat mounting nuts (Item 1) **[Figure 50-31-1]** and washers from the operator seat mounting studs.

***Installation***: Tighten the mounting nuts to 20 ft.-lb. (27 N•m) torque.

**Figure 50-31-2**

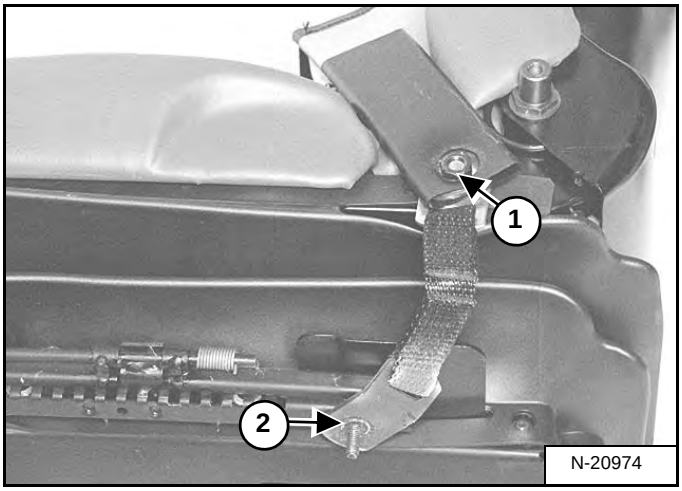



Lower the cab and install one of the mounting washers and a nut **[Figure 50-31-2]**.

**NOTE: With the seat removed, the cab will raise.**

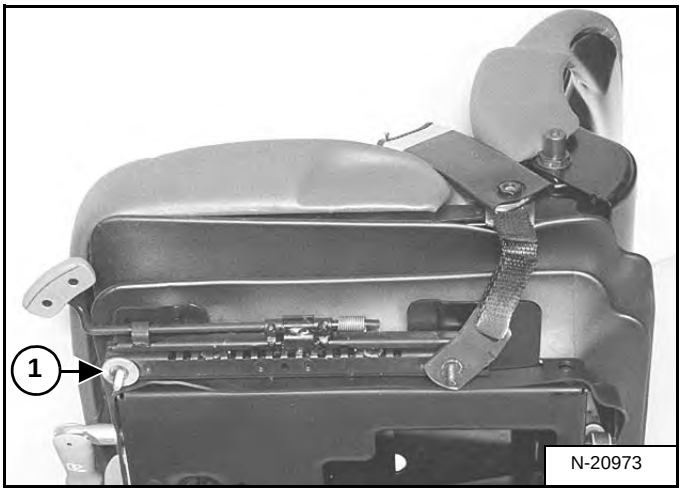
Reverse the removal procedure to install the operator seat.

**Figure 50-31-3**




**NOTE: Assure seat tethers are securely fastened to seatbelt studs (Item 1) and seat rail studs (Item 2) [Figure 50-31-3].**

**Figure 50-31-4**




**NOTE: Verify the front two seat rail studs have washers attached (Item 1) [Figure 50-31-4].**

## BOB-TACH (POWER-OPTION)

### Description

The Bob-tach is the section of the loader lift arm that attachments mount to. The Power Bob-tach option uses two hydraulically operated, spring assisted, locking wedge and lever assemblies to secure the attachment to the Bob-tach.

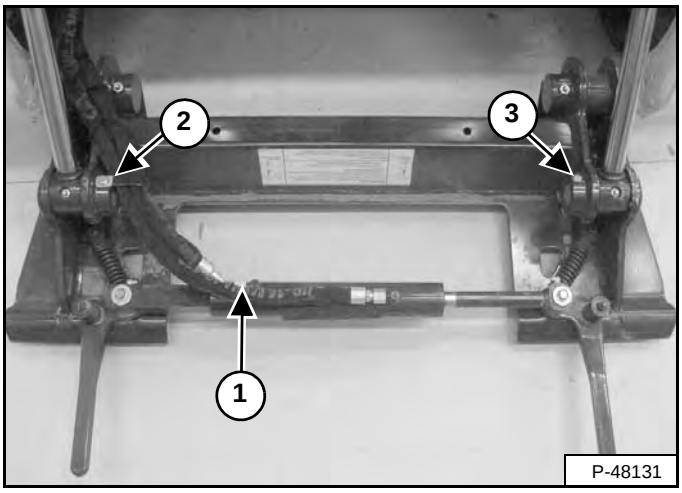
The hydraulically operated Power Bob-tach has a hydraulic cylinder that opens and closes both wedge and lever assemblies by pressing a switch on the front accessory panel. The switch activates the Power Bob-tach block to allow flow into or out of the hydraulic cylinder connected to the levers on the Bob-tach.

The Power Bob-tach block is located on the rear of the gear pump.

The Bob-tach is located on the front of the loader connected to the loader lift arms.

### Removal And Installation

**Figure 50-41-1**




Tilt the Bob-Tach forward, so it is parallel to the floor. Put blocks (approximately 3 in. [75 mm]) under each side of the Bob-Tach **[Figure 50-41-1]**.

Lower the Bob-Tach onto the blocks.

Remove the hoses to the cylinder fittings **[Figure 50-41-1]**.

**NOTE: The hose with the 45° end (Item 1) [Figure 50-41-1] is connected to the base end fitting on the cylinder.**

Remove the hose clamp on the hoses and use the bolt (Item 2) **[Figure 50-41-1]** on the tilt cylinder pivot pin to secure the clamp.

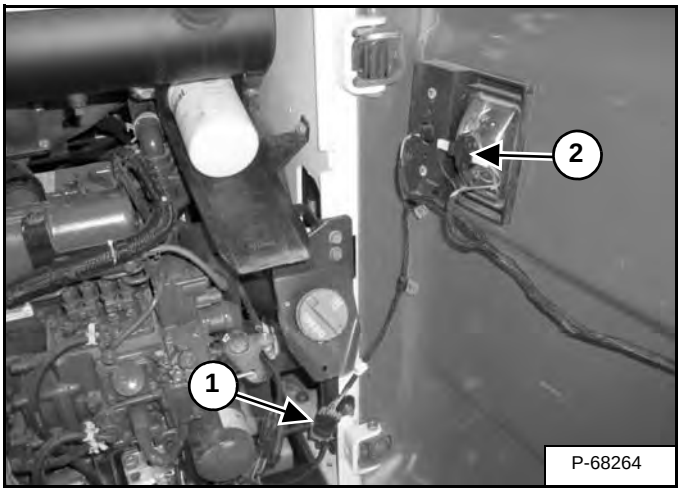
Remove the retainer bolt (Item 3) **[Figure 50-41-1]** and nut from the tilt cylinder rod end pin (both sides).

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

## REAR DOOR

### Removal And Installation

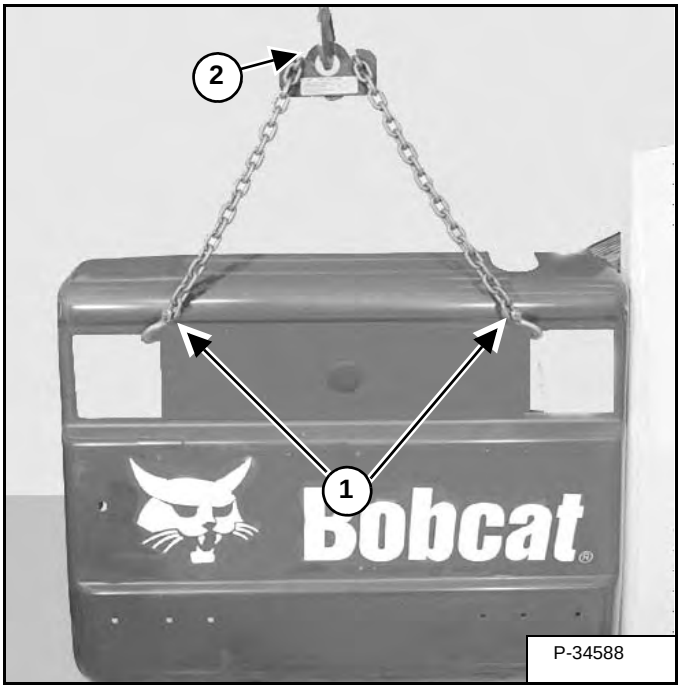
**Figure 50-70-1**




Disconnect the light harness connector **(Item 1) [Figure 50-70-1]** from the engine harness.

Remove both rear lights (Item 2) **[Figure 50-70-1]** from the door [See “Rear Removal And Installation” on page 60-60-2].

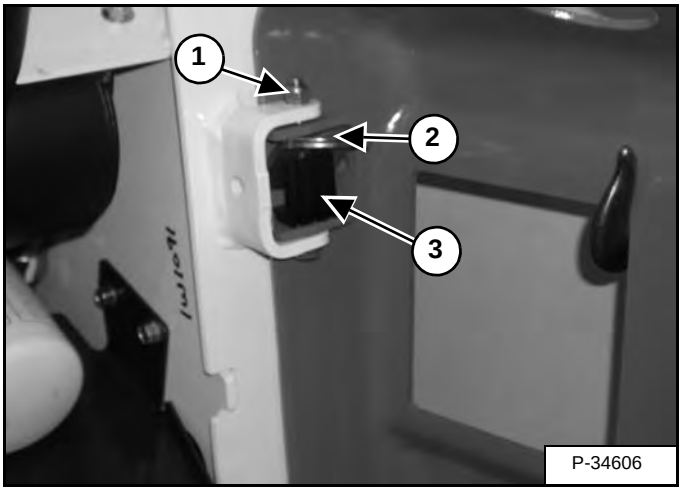
**Figure 50-70-2**




Secure the chain hooks (Item 1) **[Figure 50-70-2]** to the door as shown.

Connect a chain hoist (Item 2) **[Figure 50-70-2]** to the lifting chain.

**Figure 50-70-3**




Remove the top and bottom door hinge mounting bolts (Item 1) **[Figure 50-70-3]** and nuts.

**NOTE: Install the door stop (Item 2) and the door stop retainer (Item 3) in the top hinge as shown [Figure 50-70-3].**

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

Lift the door away from the loader frame and put the door flat on the floor.

## CONTROL PEDALS (ACS)

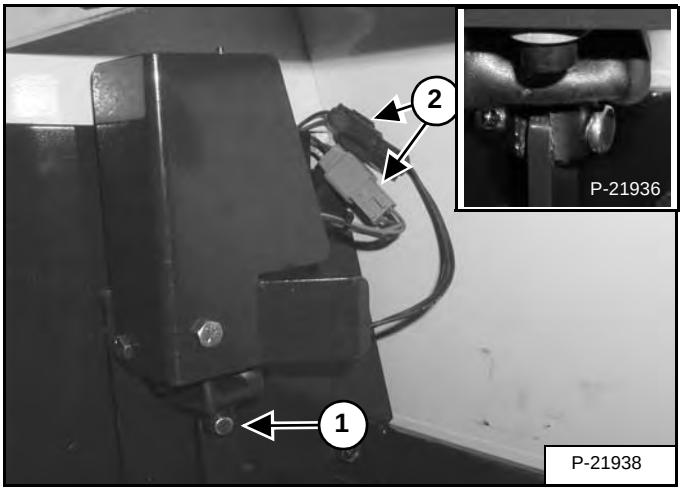
### Description

The control pedals send an electronic pulse to the actuators on the control valve. The electronic pulse tells the actuators to move the lift or tilt spools on the control valve.

The control pedals are located on the lower mainframe at the operators feet.

### Foot Sensor Removal And Installation

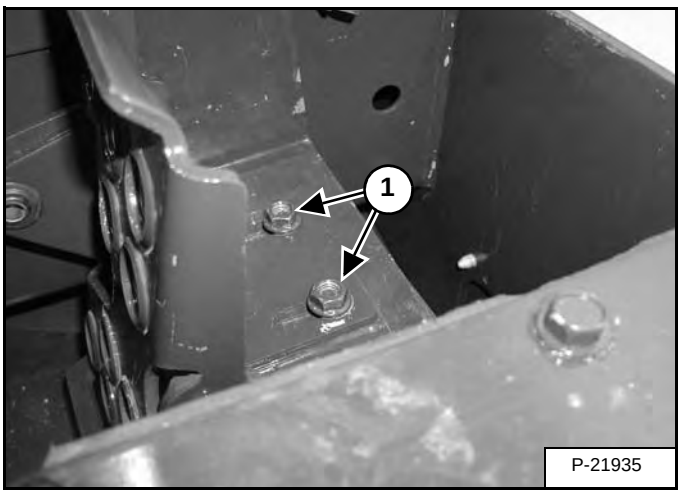
**Figure 50-91-1**




Pull the pin (Item 1) **[Figure 50-91-1]** holding the foot pedal linkage to the sensor.

Disconnect the two connectors (Item 2) **[Figure 50-91-1]** from the sensor and lock solenoid.

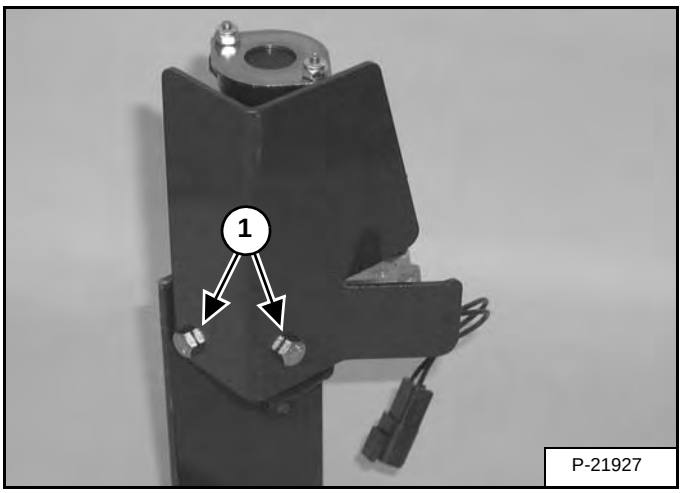
**Figure 50-91-2**




Tilt the foot pedal up and remove the two nuts (Item 1) **[Figure 50-91-2]**.

Remove the foot pedal and sensor assembly from the loader.

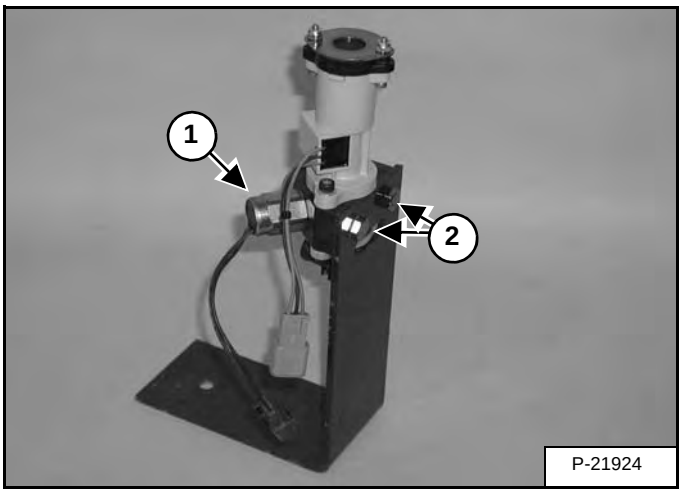
**Figure 50-91-3**




Remove the two bolts (Item 1) **[Figure 50-91-3]** from the foot sensor shield.

***Installation:*** Tighten the bolts to 80-90 in.-lb. (9,0-10,2 N•m) torque.

**Figure 50-91-4**




Remove foot lock solenoid (Item 1) **[Figure 50-91-4]**.

***Installation:*** Apply a drop of oil to the solenoid threads and tighten the solenoid to 35-40 ft.-lb. (47-54 N•m) lubed torque.

Remove the two bolts (Item 2) **[Figure 50-91-4]** from the bracket and sensor assembly.

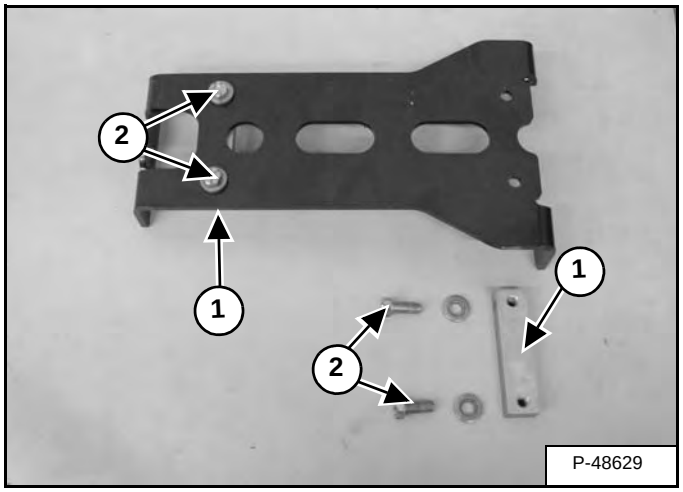
***Installation:*** Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the sensor assembly.

**NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller [See "CALIBRATION" on page 60-160-1].**

**Linkage Removal And Installation (Cont'd)**

**Figure 50-100-18**




Check the wear on the centering blocks (Item 1) **[Figure 50-100-18]**.

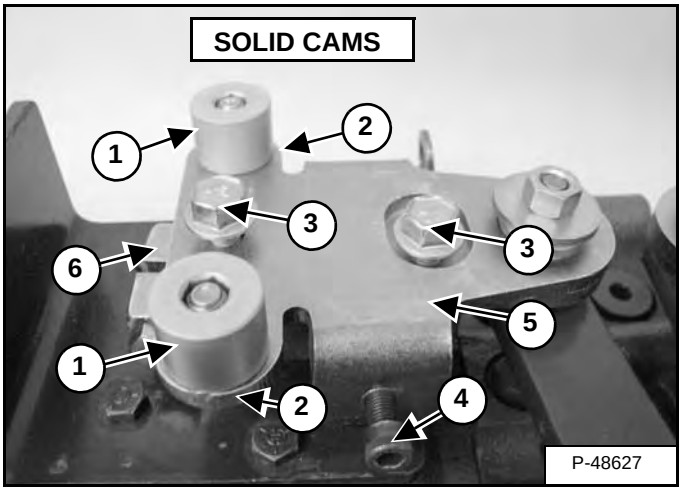
If the centering blocks need replacement, remove the bolts (Item 2) **[Figure 50-100-18]**. Remove the centering blocks.

***Installation***: Tighten the centering block bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

**NOTE: The washers go between the bolts and the centering plate.**

**NOTE: If the centering blocks are worn, they can be removed and rotated 180 degrees and reinstalled. If the solid cams are worn, they can be loosened and rotated 90 degrees and reinstalled.**

**Figure 50-100-19**




If the surface of any of the four solid pintle cams (Item 1) are worn, loosen the bolt (Item 2) and rotate the cams 1/4 turn **[Figure 50-100-19]**.

Remove the bolts and washers (Item 3) **[Figure 50-100-19]** from the pintle.

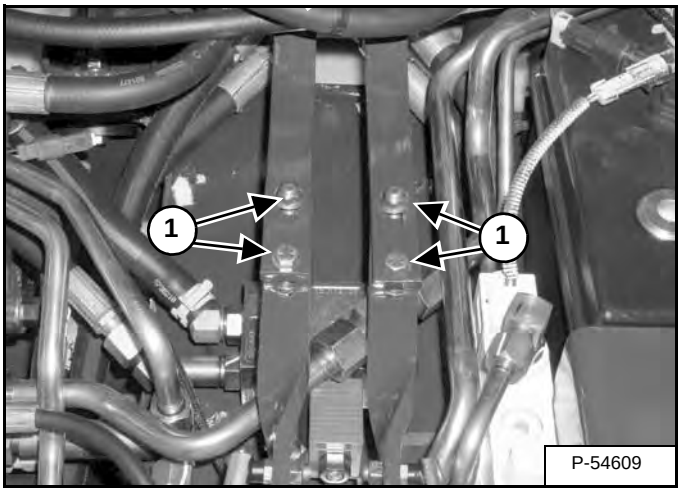
***Installation:*** Tighten the bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

Loosen the creep adjustment bolt (Item 4) **[Figure 50-100-19]**.

Remove the pintle arm (Item 5) from the pintle base (Item 6) **[Figure 50-100-19]**.

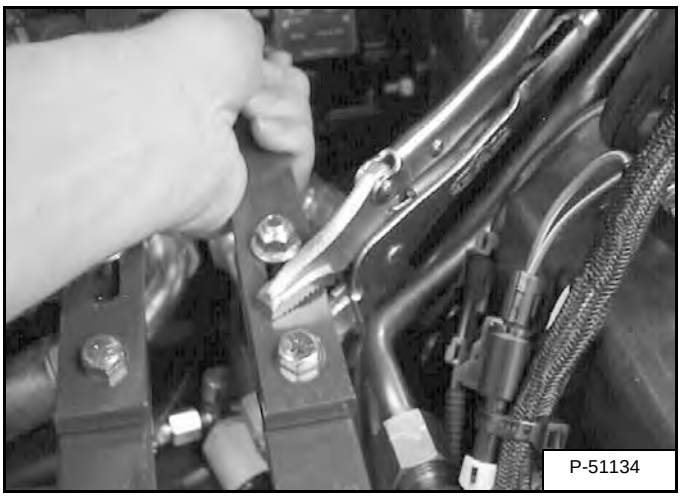
**Linkage Travel Adjustment (Cont'd)**

**Figure 50-100-43**




Loosen the two bolts and nuts (Item 1) **[Figure 50-100-43]** on each steering linkage bar.

**Figure 50-100-44**



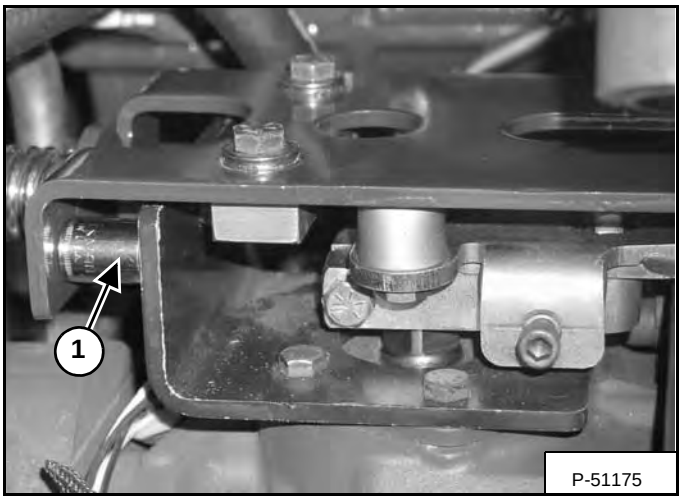

Move the left control lever to the full forward position, then pull forward on the left rear linkage bar until the pintle arm is rotated to the front as far as possible **[Figure 50-100-44]**. Use a locking plier, clamp the two linkage bars together.

***Installation:*** Tighten the nuts and bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

Check the lever movement to make sure that the pintle arm and the control lever are both at full stroke at the same time. This will allow for maximum forward speed.

Repeat the linkage travel adjustment procedure for the right side linkage.

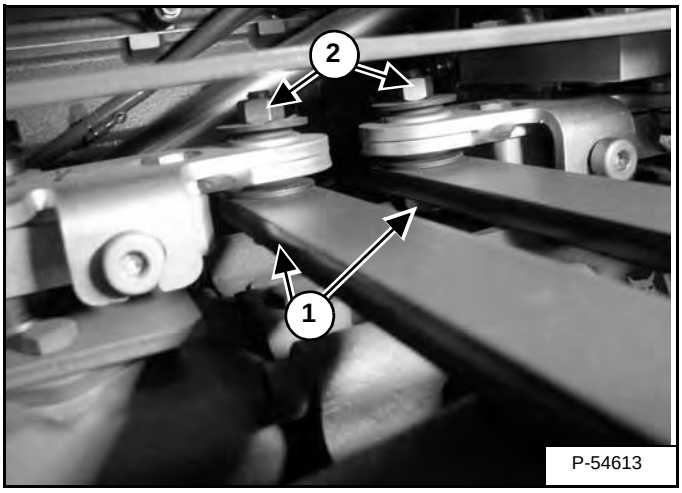
**Figure 50-100-45**




Remove the spacer (Item 1) **[Figure 50-100-45]**.

Disconnect the remote start tool [See “REMOTE START TOOL KIT -MEL1563” on page 10-60-1].

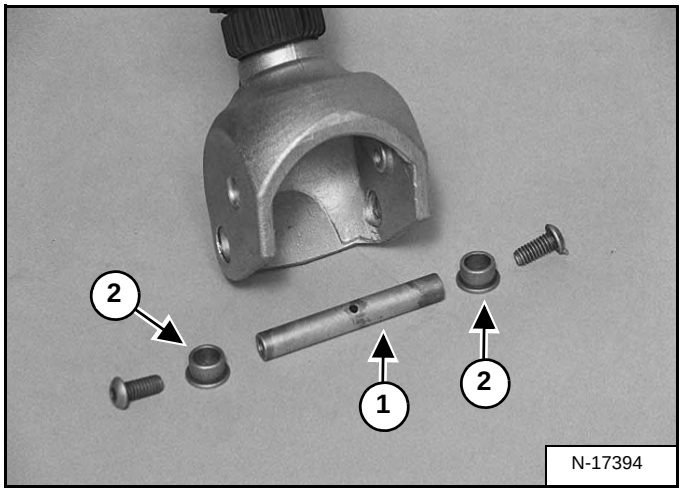
**Figure 50-100-46**




Tighten the two bolts (Item 1) and nuts (Item 2) to 35-40 ft.-lb. (47,5-54,2 N•m) **[Figure 50-100-46]**.

**Handle Disassembly and Assembly**

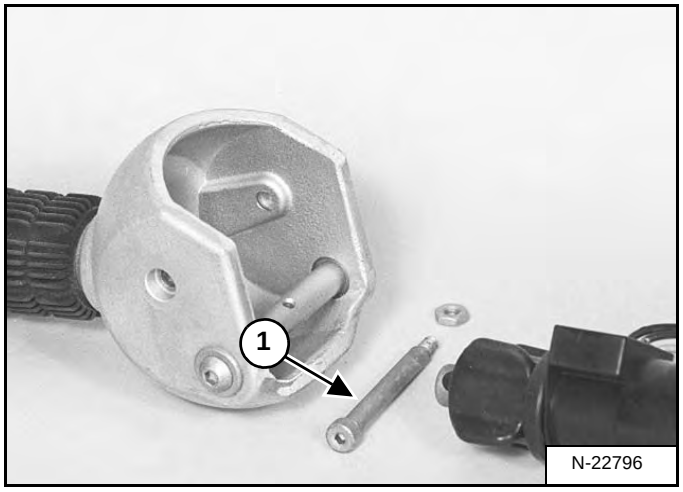
**Figure 50-111-16**




Remove the handle sleeve (Item 1) and bushings (Item 2) from the handle **[Figure 50-111-16]**.

Check all parts for wear and replace as needed.

**Figure 50-111-17**




Check the mounting bolt (Item 1) **[Figure 50-111-17]** that connects the handle to the handle sensor for wear, replace as needed.

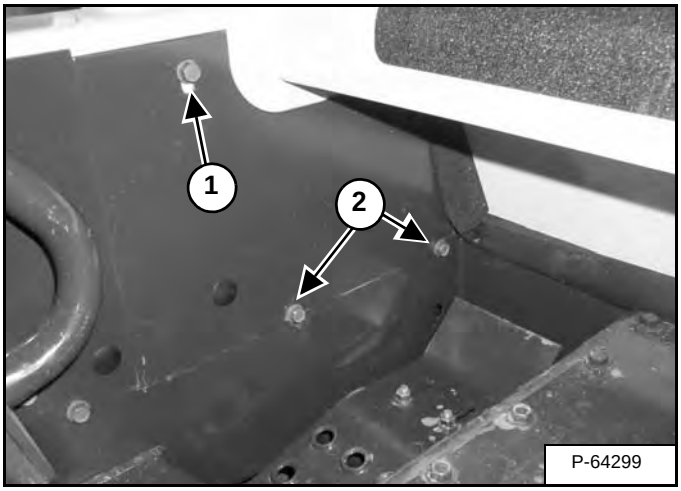
## ACCESS PANEL (INSIDE) (SJC)

### Removal And Installation (Left)

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 10-30-2].

**Figure 50-121-1**

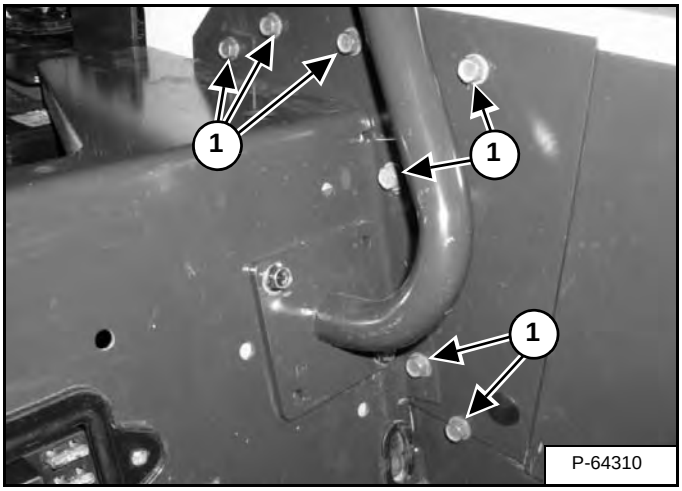



Remove the top mounting screw (Item 1) and loosen the two bottom screws (Item 2) **[Figure 50-121-1]**.

***Installation:*** Tighten the screws to 15-20 ft.-lb. (20-27 N•m) torque.

Remove the inside front access panel from the loader.

**Figure 50-121-2**




Remove the seven mount screws (Item 1) **[Figure 50-121-2]**

***Installation:*** Tighten the screws to 15-20 ft.-lb. (20-27 N•m) torque.

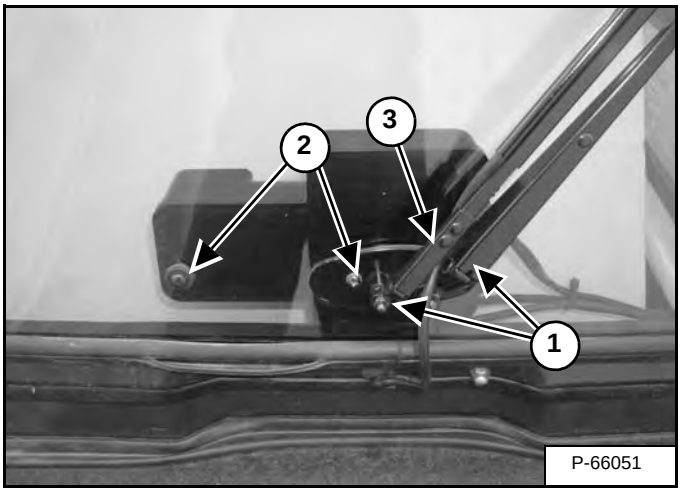
Move the lever assembly a slight amount toward the center of the loader, to allow clearance for the panel to be removed.

Remove the inside rear access panel from the loader.

## WINDOW (FRONT DOOR)

### Removal (Standard Window)

**Figure 50-133-1**

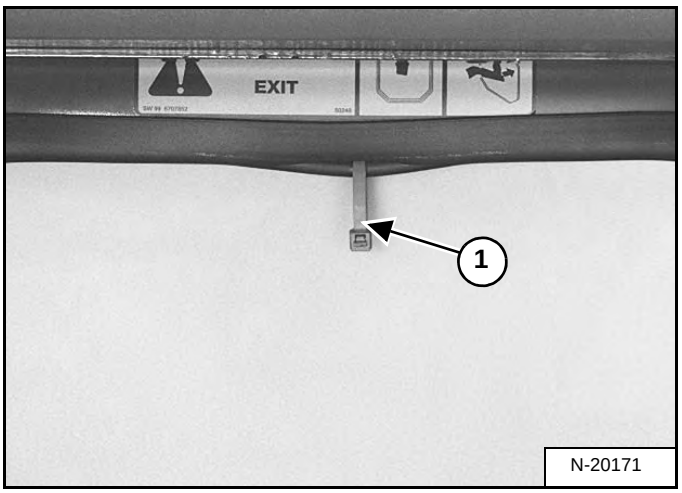



Remove the wiper arm assembly (Item 1) **[Figure 50-133-1]**.

Remove the two screws (Item 2) and the nut (Item 3) **[Figure 50-133-1]**.

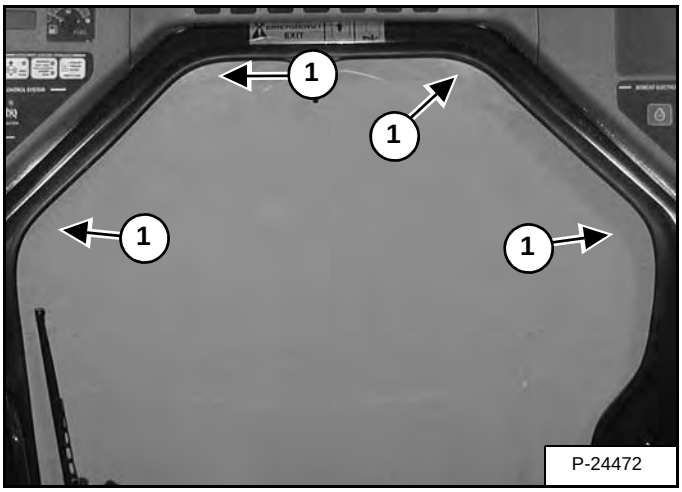
Secure the wiper motor inside the cab.

**Figure 50-133-2**




Pull the plastic loop (Item 1) **[Figure 50-133-2]** at the top of the window to remove the rubber cord.

**Figure 50-133-3**




Push the window out at any corner of the window (Item 1) **[Figure 50-133-3]**.

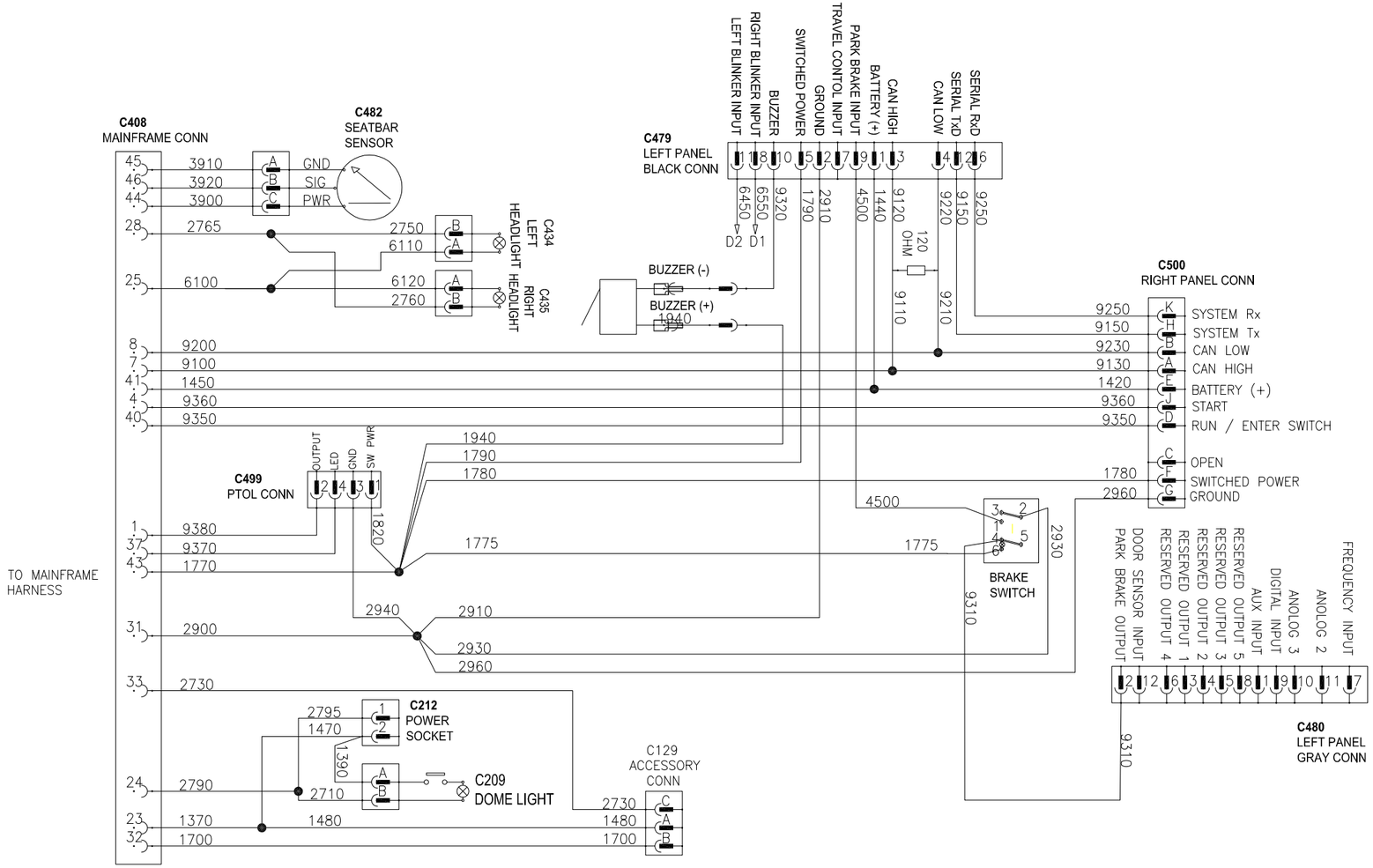
**NOTE: The window may fall when pushing on the corners. Have a second technician assist you during the removal of the window.**

**WIRING SCHEMATIC**
**(STANDARD CAB)**
**S150 (S/N A8MO60001 AND ABOVE)**

**(PRINTED NOVEMBER 2008)**

**7149336**

STD CAB HARNESS 7149336

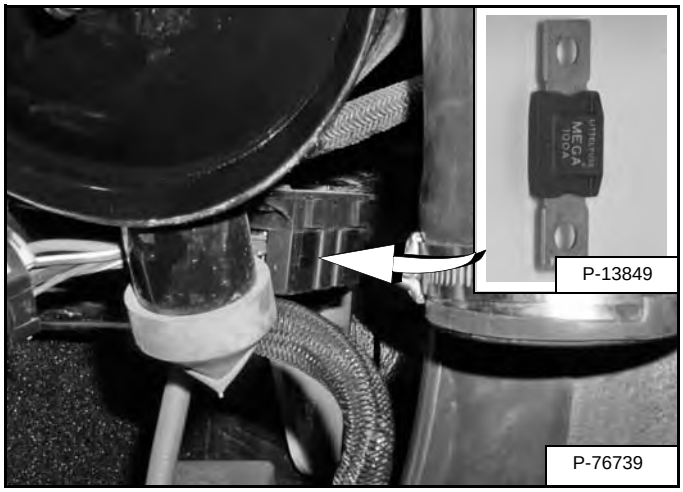



**PRINTED IN EUROPE**

**7149336 (11-1-08)**

## Description

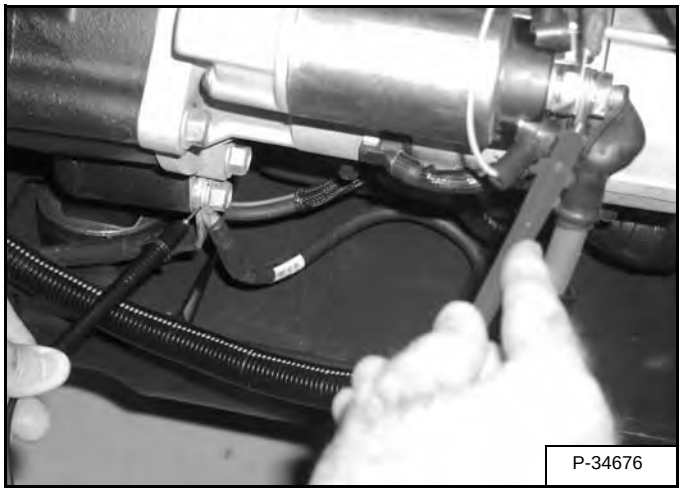
**Figure 60-10-1**




The loader has a 12 volts, negative ground alternator charging system. The electrical system is protected by fuses located in the cab on the steering control panel, and a 100 amps master fuse **[Figure 60-10-1]** in the engine compartment on the left side of the engine, under the air cleaner. The fuses will protect the electrical system when there is an electrical overload. The reason for the overload must be found before starting the engine again.

**Alternator Voltage Testing**

**Figure 60-30-3**




Open the rear door.

Connect the remote start tool to the loader [See "REMOTE START TOOL KIT -MEL1563" on page 10-60-1].

Turn the engine on with the remote start tool and run at idle. With a voltmeter, check the voltage between the B+ terminal and ground at the starter **[Figure 60-30-3]**.

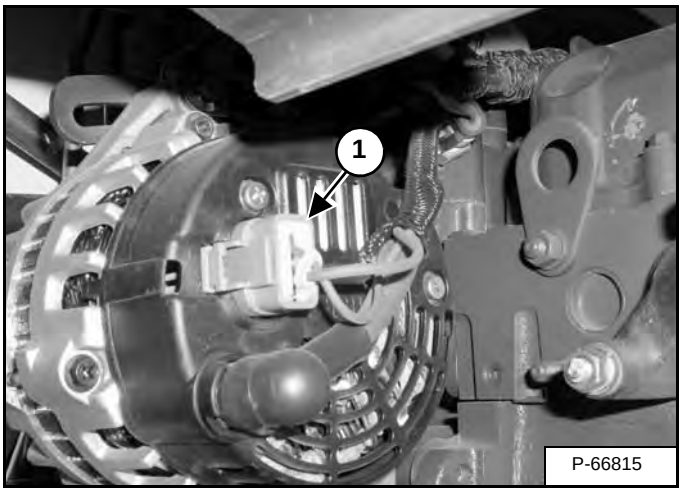
The voltage must be higher than 13.5 volts but lower than 14.7 volts at 70°F (21°C) (Alternator Temperature).

If the voltage is higher that 14.7 volts, proceed to the following high voltage test.

If the voltage is lower than 13.5 volts, run the engine at high idle and recheck voltage. If voltage is still below 13.5 volts, proceed with the following low voltage test.

**Low Voltage Testing**

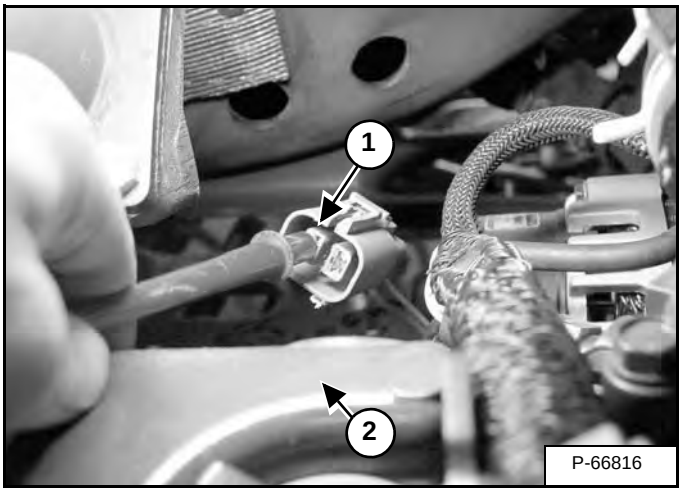
**Figure 60-30-4**




Turn engine OFF and remove the L and S terminal connector (Item 1) **[Figure 60-30-4]** off the alternator.

Turn the remote start tool key to the ON position.

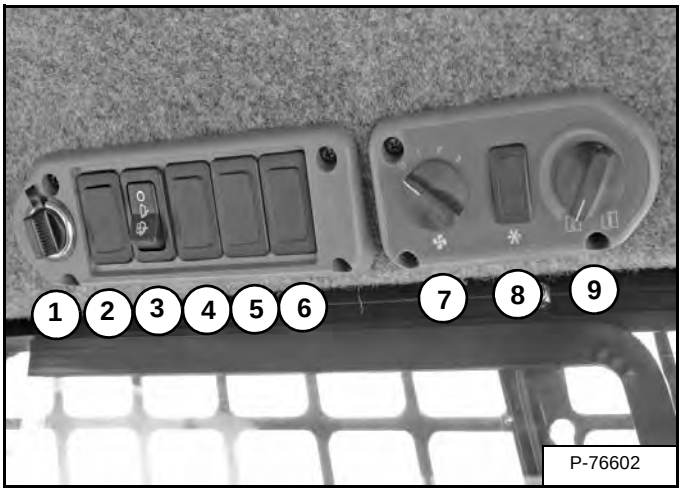
**Figure 60-30-5**




Check the voltage across the "L" terminal (Item 1) and a good ground source (Item 2) **[Figure 60-30-5]**. 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 ok then remove alternator for replacement or repair. To repair, [See "Alternator Voltage Testing" on page 60-30-3] for further component testing.

**Side Panel**

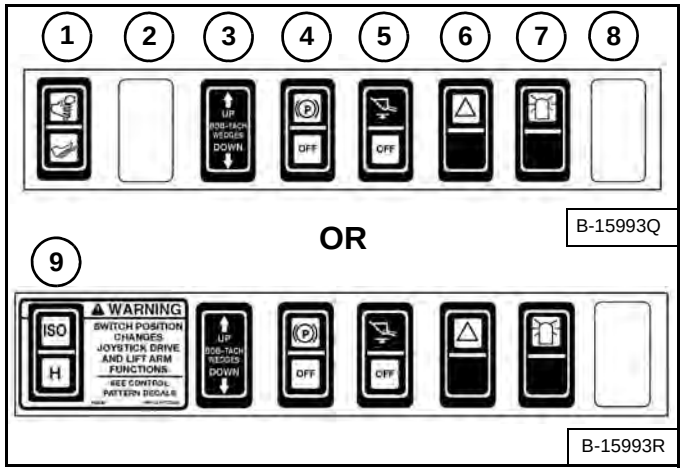
**Figure 60-50-5**




| REF. NO. | DESCRIPTION | FUNCTION / OPERATION |
|---|---|---|
| 1 | POWER PORT | Provides a 12 volts receptacle for accessories. |
| 2 | NOT USED | - - - |
| 3 | FRONT WIPER (Option) | Press the bottom of the switch to start the front wiper (press and hold for washer fluid). Press the top of the switch to stop the wiper. |
| 4 | REAR WIPER (Option) | Press the bottom of the switch to start the rear wiper (press and hold for washer fluid). Press the top of the switch to stop the wiper. |
| 5 | NOT USED | - - - |
| 6 | NOT USED | - - - |
| 7 | FAN MOTOR (Option) | Turn clockwise to increase fan speed; counterclockwise to decrease. There are four positions; OFF-1-2-3. |
| 8 | NOT USED | - - - |
| 9 | TEMPERATURE CONTROL (Option) | Turn clockwise to increase the temperature; counterclockwise to decrease. |

**Front Panel**

**Figure 60-50-6**

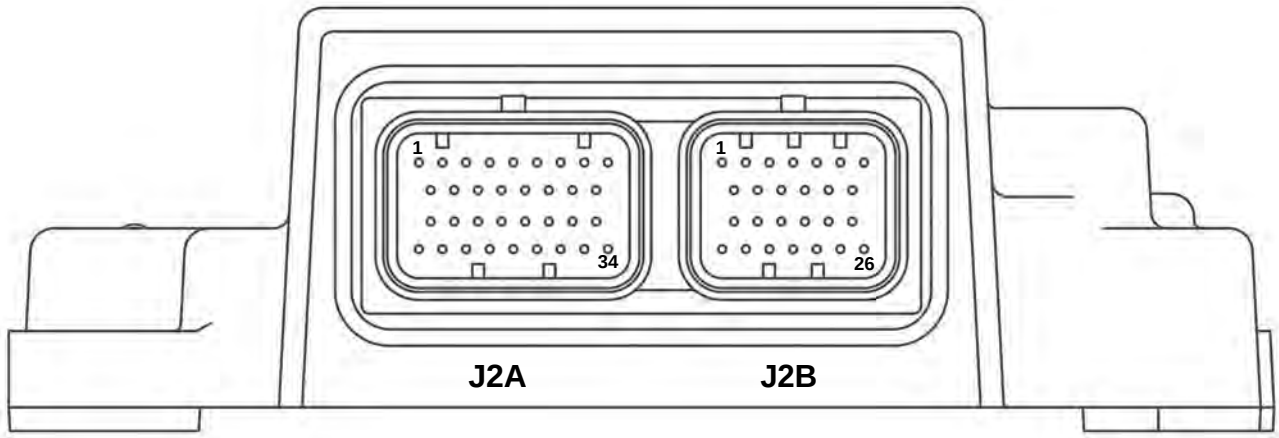



**NOTE: Parking Brake (Item 4) [Figure 60-50-6] is standard on all loaders.**

| REF. NO. | DESCRIPTION | FUNCTION / OPERATION |
|---|---|---|
| 1 | ADVANCED CONTROL SYSTEM (ACS) (Option) | Press the top to select Hand Controls; bottom to select Foot Controls. |
| 2 | NOT USED | - - - |
| 3 | POWER BOB-TACH (Option) | Press and hold the up arrow to disengage the Bob-Tach wedges. Press and hold the down arrow to engage the wedges into the mounting frame holes. |
| 4 | PARKING BRAKE (Standard on all loaders) | Press the top to engage the PARKING BRAKE; bottom to disengage. |
| 5 | HYDRAULIC BUCKET POSITIONING (Option) | Press the top to engage Hydraulic Bucket Positioning; bottom to disengage. |
| 6 | HAZARD LIGHTS (Option) | Press the top to turn the HAZARD LIGHTS ON; bottom to turn OFF. |
| 7 | ROTATING BEACON (Option) | Press the top to turn the ROTATING BEACON ON; bottom to turn OFF. |
| 8 | NOT USED | - - - |
| 9 | SELECTABLE JOYSTICK CONTROLS (SJC) (Option) | Press the top to select 'ISO' Control Pattern; bottom to select 'H' Control Pattern. |

**Connector Identification (Cont'd)**

**Auxiliary Controller**

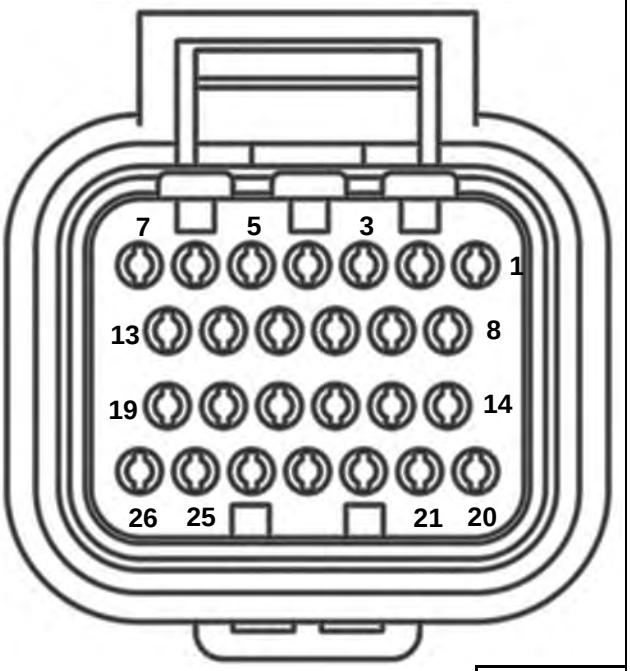



**Harness Connector View**




**J2A**

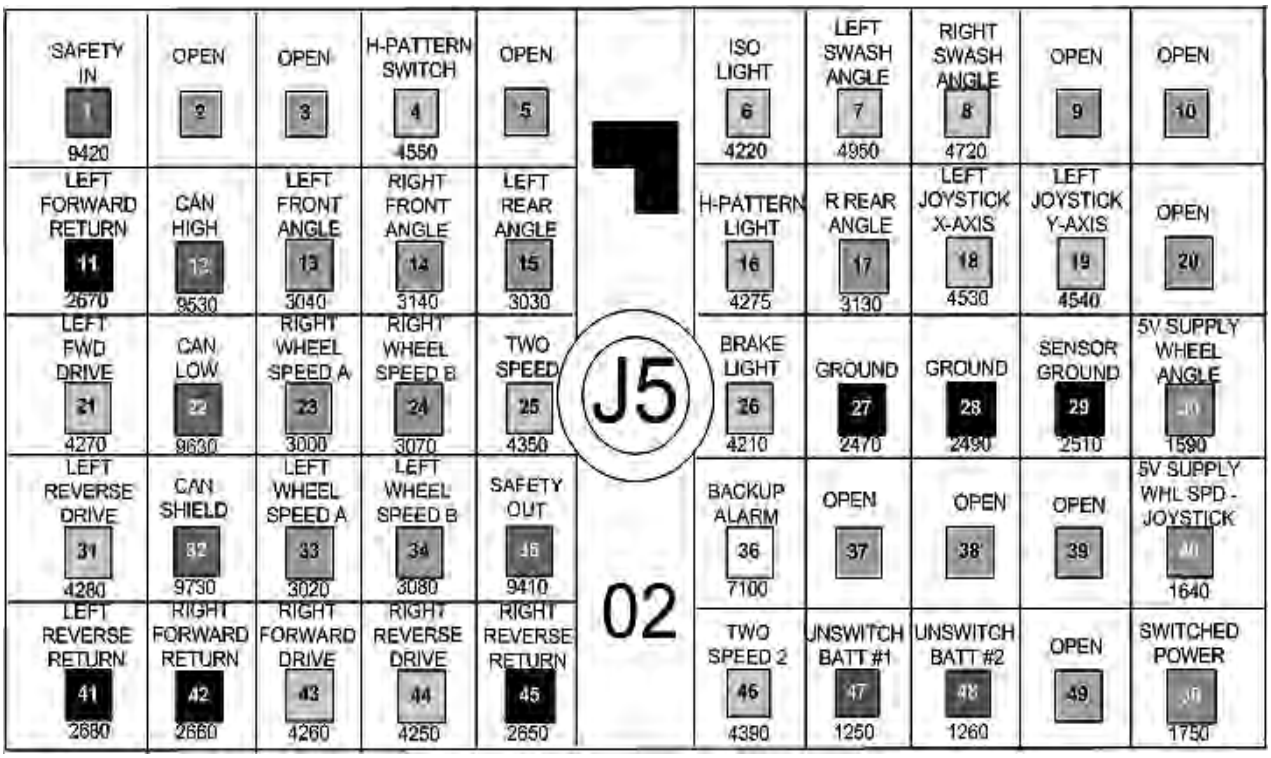
**Harness Connector View**




**J2B**

P-76647
P-76646
P-76645

**Connector Identification (Cont'd)**



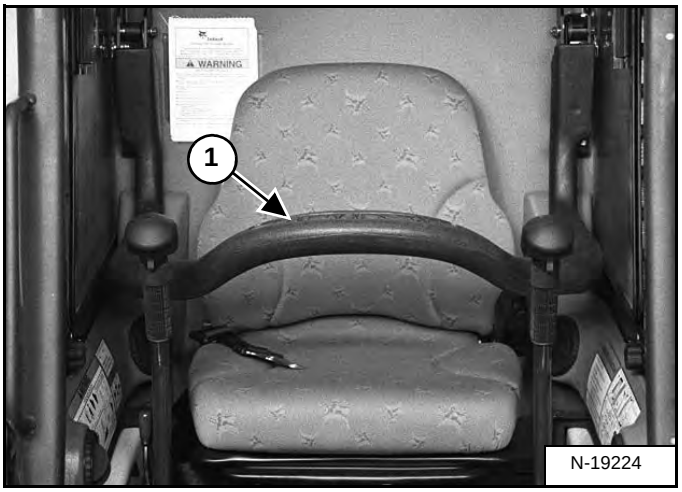

P-64296

**Service Codes List (Cont'd)**

| CODE | DESCRIPTION | CODE | DESCRIPTION |
|---|---|---|---|
| D7566 | Back-up alarm error OFF | H2606 | Front base solenoid short to ground |
| D7567 | No communication from Gateway controller | H2607 | Front base solenoid open circuit |
| D7568 | Angle sensors not calibrated | H2632 | Front base solenoid overcurrent |
| D7569 | Battery voltage out of range high | H2705 | Front rod solenoid short to battery |
| D7570 | Interrupted power | H2706 | Front rod solenoid short to ground |
| D7571 | Battery voltage out of range low | H2707 | Front rod solenoid open circuit |
| D7572 | Drive pump not calibrated | H2732 | Front rod solenoid overcurrent |
| D7573 | Operating mode switch flipped while operating | H2805 | Diverter rod solenoid short to battery |
| D7574 | Right speed uncommanded motion | H2806 | Diverter rod solenoid short to ground |
| D7575 | Left speed uncommanded motion | H2807 | Diverter rod solenoid open circuit |
| D7577 | Left speed sensor out of range high | H2905 | High-flow solenoid short to battery |
| D7578 | Right speed sensor out of range high | H2906 | High-flow solenoid short to ground |
| D7579 | Left speed sensor out of range low | H2907 | High-flow solenoid open circuit |
| D7580 | Right speed sensor out of range low | H2932 | High-flow solenoid overcurrent |
| D7581 | Right front steer retract short to battery | H3128 | Interrupted power failure |
| D7582 | Left front steer retract short to battery | H3648 | ACD multiple |
| D7583 | Right rear steer retract short to battery | H3913 | Left joystick grip no communication |
| D7584 | Left rear steer retract short to battery | H3916 | Left joystick not connected |
| D7585 | Sensor supply 1 out of range high | H3928 | Left joystick failure |
| D7586 | Sensor supply 2 out of range high | H3948 | Left joystick multiple |
| D7587 | Software update required | H4013 | Right joystick grip no communication |
| D7588 | Switched power stuck ON | H4016 | Right joystick not connected |
| D7591 | Left Swash Sensor Reversed | H4028 | Right joystick failure |
| D7592 | Right Swash Sensor Reversed | H4048 | Right joystick multiple |
| D7593 | Right speed sensor unresponsive | H4423 | Auxiliary not programmed |
| D7594 | Left speed sensor unresponsive | H4721 | Sensor supply 1 out of range high |
| D7595 | Left speed sensor reversed | H4722 | Sensor supply 1 out of range low |
| D7596 | Right speed sensor reversed | H7314 | Remote control failure |
| D7597 | Controller programmed | H7328 | Remote control no signal |
| D7598 | In drive calibration mode | H7404 | Main controller no communication |
| D7599 | In angle calibration mode | H7604 | Left hand panel no communication |
| | | | |
| H1221 | Right Primary out of range high | L0102 | Left panel button 1 error ON |
| H1222 | Right Primary out of range low | L0202 | Left panel button 2 error ON |
| H1224 | Right Primary not in neutral | L0302 | Left panel button 3 error ON |
| H1321 | Left Primary out of range high | L0402 | Left panel button 4 error ON |
| H1322 | Left Primary out of range low | L7404 | Left panel main controller no communication |
| H1324 | Left Primary not in neutral | L7672 | Left panel programming error |
| H2305 | Rear base solenoid short to battery | | |
| H2306 | Rear base solenoid short to ground | M0116 | Air filter not connected |
| H2307 | Rear base solenoid open circuit | M0117 | Air filter plugged |
| H2332 | Rear base solenoid overcurrent | M0216 | Hydraulic/Hydrostatic filter not connected |
| H2405 | Rear rod solenoid short to battery | M0217 | Hydraulic/Hydrostatic filter plugged |
| H2406 | Rear rod solenoid short to ground | M0309 | Battery voltage low |
| H2407 | Rear rod solenoid open circuit | M0310 | Battery voltage high |
| H2432 | Rear rod solenoid overcurrent | M0311 | Battery voltage extremely high |
| H2505 | Rear aux relief short to battery | M0314 | Battery voltage extremely low |
| H2506 | Rear aux relief short to ground | M0322 | Battery voltage out of range low |
| H2605 | Front base solenoid short to battery | M0409 | Engine oil pressure low |

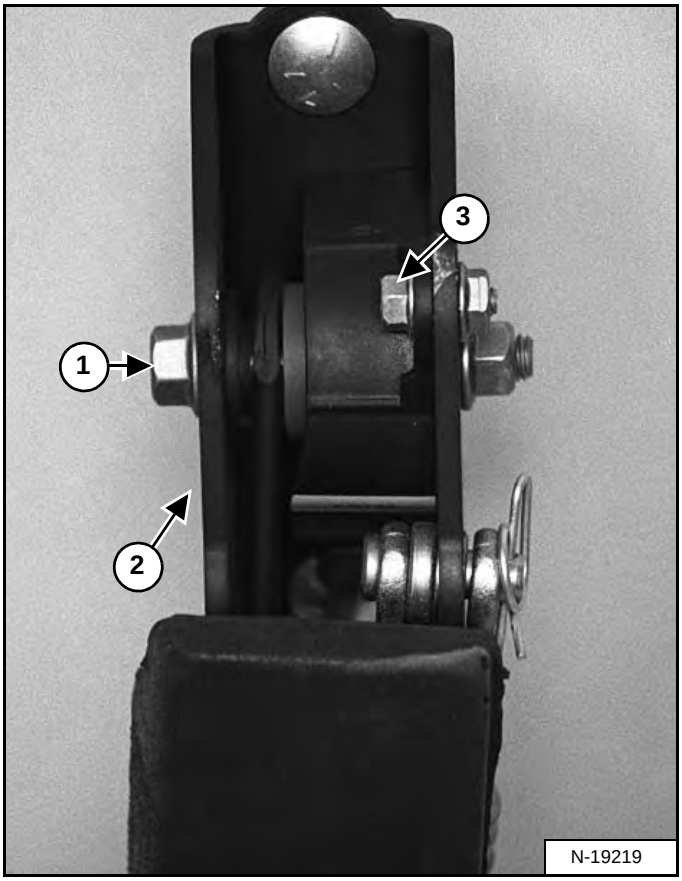
## Removal And Installation

**Figure 60-110-5**




Remove the seat bar (Item 1) **[Figure 60-110-5]** from the loader [See “Removal And Installation” on page 50-10-1].

**Figure 60-110-6**




Remove the mounting bolt (Item 1) from the seat bar mount (Item 2) **[Figure 60-110-6]**.

***Installation***: Tighten the mounting bolt to 50-70 in.-lb. (5,6-7,9 N•m) torque.

Remove the sensor mounting bolt (Item 3) **[Figure 60-110-6]** and nut.

## CONTROL SYSTEM (ACS)

### Description

The (ACS) Actuator Control System system is an option that allows the operator to quickly switch between foot and hand control modes.

The ACS control uses the electric actuators on the main hydraulic control valve to control the lift and tilt spools in the hydraulic control valve, foot sensors, handle sensors and a specially designed control handle.

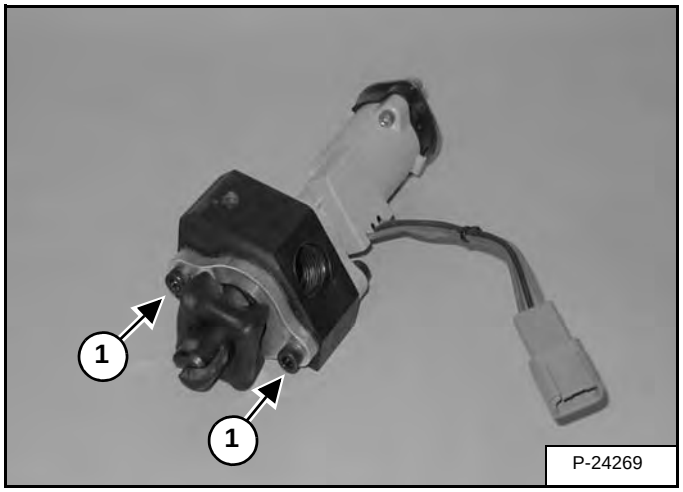
Hand controls contain a locking solenoid which lock when the switch on the center control panel is switched to foot mode.

Foot controls also contain solenoids which lock when the switch on the center control panel is switched to hand mode.

Both the hand and foot controls contain sensors that relay information to the ACS controller as to which function should be activated and how far the spool should be moved.

**Foot Sensor Disassembly And Assembly**

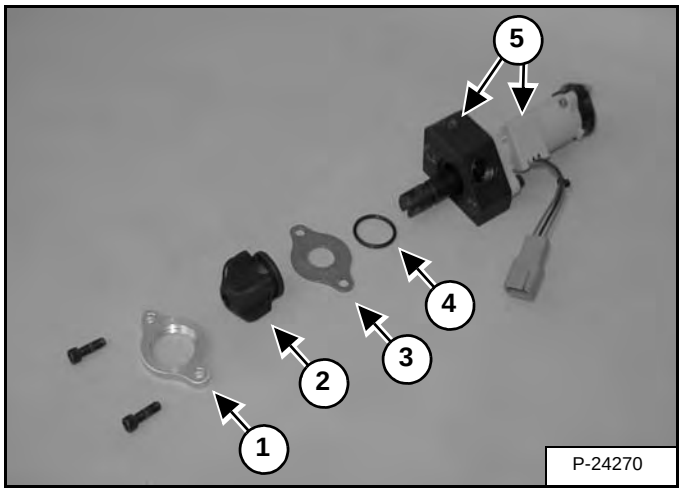
**Figure 60-130-28**




Remove the two bolts (Item 1) **[Figure 60-130-28]** from the end of the foot sensor.

***Installation:*** Tighten the bolts to 90 in.-lb. (10,2 N•m) torque. Apply LOCTITE® 242 to the threads.

**Figure 60-130-29**




Remove the boot retainer (Item 1), boot (Item 2), spool stop plate (Item 3), O-ring (Item 4) **[Figure 60-130-29]**.

**NOTE: Do not disassemble the sensor assembly (Item 5) [Figure 60-130-29]. The sensor assembly is a calibrated assembly and cannot be serviced. Order through Bobcat Parts.**

## CALIBRATION

### Description

Calibration procedures must be followed when replacing a hydraulic control valve, actuator, Drive / Drive+ Controller, ACS Controller, pump controller, hydrostatic pump, or hydrostatic motor. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

The **Actuator Test** is performed with the Service PC. The Actuator Test should be used if reduced performance codes are present or when replacing a controller or actuator.

**NOTE: The Actuator Test should be used as the preferred method of actuator and valve spool calibration.**

The **Lift and Tilt Calibration (ACS)** provides set points to the ACS controller to actuate the lift and tilt valve. The Lift and Tilt Calibration (ACS) should be used if reduced performance codes are present or when replacing a controller or actuator.

The **Lift and Tilt Calibration (SJC)** provides set points to the ACS controller to actuate the lift and tilt valve. The Lift and Tilt Calibration (SJC) should be used if reduced performance codes are present or when replacing a controller or actuator.

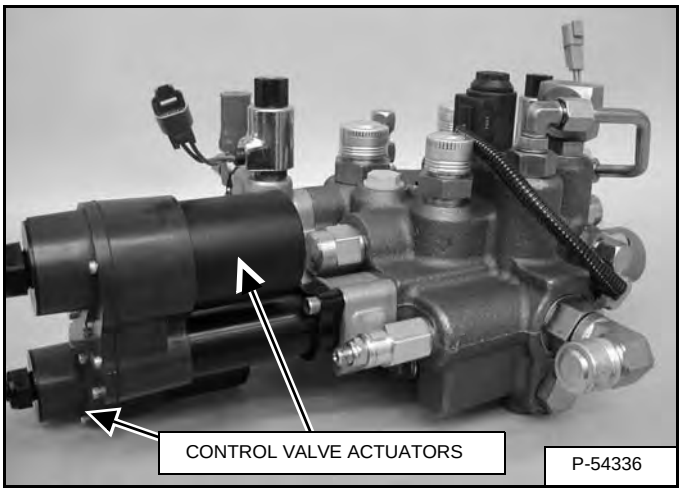
The **Hydrostatic Pump Calibration (SJC)** provides set points to the Drive controller to actuate the hydrostatic controller that directs flow to a servo piston. Hydrostatic Pump Calibration (SJC) should be performed when a desired travel path can not be attained or replacing the hydrostatic pump, hydrostatic motor, or controller. After Performing a Hydrostatic Pump Calibration (SJC), Steering Drift Compensation can be used to fine tune the hydrostatic pump control.

For more information on Steering Drift Compensation [See “STEERING DRIFT COMPENSATION” on page 60-161-1].

**NOTE: The Actuator Test is the only test that uses a Service PC. The Lift and Tilt Calibration (ACS or SJC) does not need to be performed if the Actuator Testing is being performed with the Service PC. The Hydrostatic Pump Calibration does not need to be performed with the Actuator Test or Lift and Tilt Calibration (SJC).**

### Actuator Testing

**Figure 60-160-1**




**[Figure 60-160-1]** Excessive actuator loading can occur if the actuator and valve spool components are misaligned. Misalignment may reduce spool stroke performance and reduce the life of the actuator. Starting with software version 36, the Bobcat Service Analyzer will be able to perform tests to diagnose actuator and valve spool misalignment.

Connect the Service PC [See “SERVICE PC (LAPTOP COMPUTER)” on page 60-150-1].

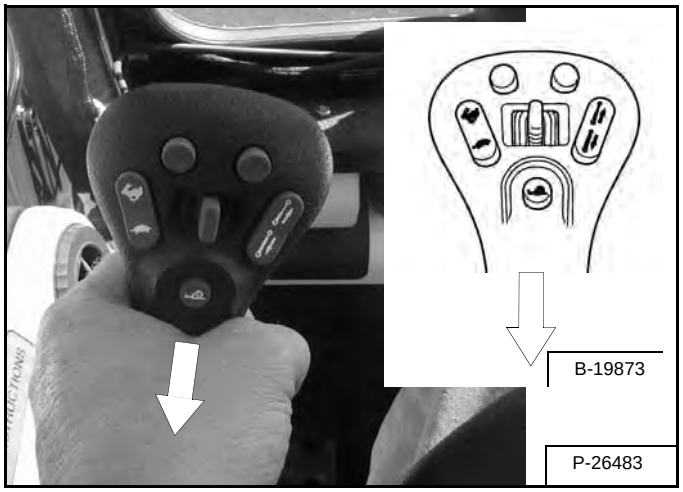
If a Service PC is not available [See “Lift And Tilt Calibration (ACS)” on page 60-160-3] **or** [See “Lift And Tilt Calibration (SJC)” on page 60-160-5].

**NOTE: Warm the hydraulic oil to room temperature 72°F (22°C), stop the engine and clear all active service codes before running the test.**

Once the test is initiated, an automatic calibration sequence will start. When calibration is complete, the test will be performed and the results can be viewed on the Service PC (Laptop) monitor.

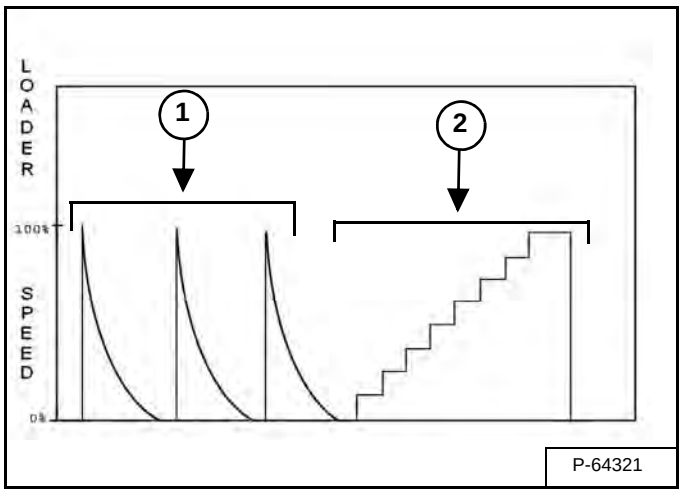
**Hydrostatic Pump Calibration (SJC) (Cont'd)**

**Figure 60-160-25**




Move and hold the left joystick to the reverse position **[Figure 60-160-25]** until the reverse calibration is completed.

**Figure 60-160-26**




The loader speed will “ramp up” quickly (Item 1) **[Figure 60-160-26]** and slow down 3 times in a row.

The loader will then “stair step” the speed (Item 2) **[Figure 60-160-26]** until it reaches full speed and then come to a stop.

Continue to hold the left joystick in the reverse position until the loader wheels or tracks come to a stop and an audible beep is heard.

Reverse calibration is complete.

**NOTE: If the wheels or tracks do not stop moving in Full Speed Reverse in 2 minutes or less, there was an error in the calibration procedure. The operator must shut the loader OFF, and start the calibration procedure from the beginning.**

There will be an audible beep and the PRESS TO OPERATE LOADER and TRACTION lights will go out. The SEAT BAR and LIFT AND TILT lights will remain on. The **75-98** error code will clear. There should be no other codes in the display area.

Allow the joystick to go to the neutral position.

Once the calibration procedure is complete the Steering Drift Compensation values will be reset to [S----] or neutral.

Press the ***PRESS TO OPERATE LOADER*** button. Move the left joystick to forward position **[Figure 60-160-23]** and check for normal forward wheel or track rotation.

Move the left joystick to the reverse position **[Figure 60-160-25]** and check for normal reverse wheel or track rotation.

Stop the engine, and remove the loader from jackstands.

The calibration procedure is completed.

After calibration is complete, use Steering Drift Compensation for fine tuning or if an acceptable line of drift can not be achieved [See “STEERING DRIFT COMPENSATION” on page 60-161-1].

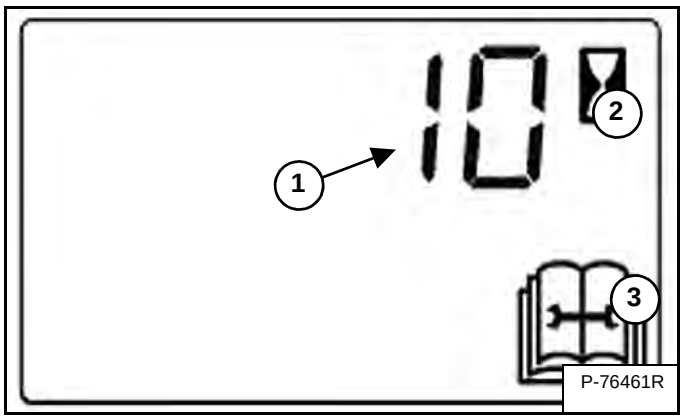
If loader does not maintain a desired travel path with Steering Drift Compensation at maximum setting **[S-r10]** or **[S-L10]**, see the electrical and hydrostatic troubleshooting [See “Troubleshooting” on page 30-10-1] or [See “Troubleshooting” on page 60-10-8].

## MAINTENANCE CLOCK

### Description

The Maintenance Clock alerts the operator when the next service interval is due. ***EXAMPLE:*** The Maintenance Clock can be set to a 250 hour interval as a reminder for the next 250 hour planned maintenance.

**Figure 60-200-1**



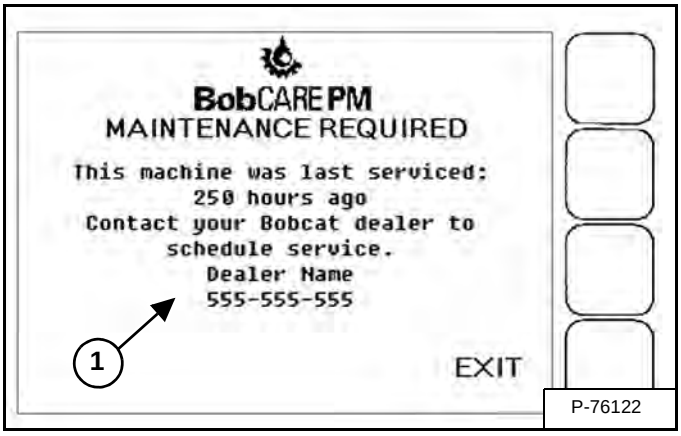

During machine operation, a two beep alarm will sound when there are less than 10 hours until the next planned maintenance.

The remaining hours before maintenance is required will appear in the data display (Item 1) for five seconds while the service icon (Item 3) and hourmeter icon (Item 2) **[Figure 60-200-1]** flash.

**NOTE: The display will show negative numbers after counting down to zero.**

The display will then revert back to the previous display and will appear for 5 seconds every time the machine is started until the maintenance clock is reset.

**Figure 60-200-2**



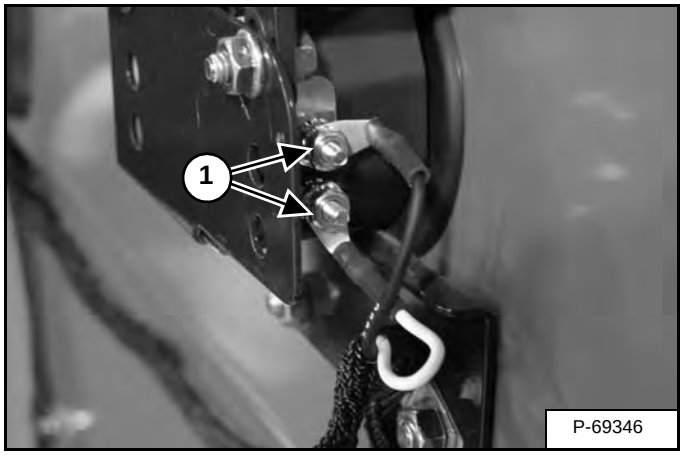

The Deluxe Instrumentation Panel, if equipped, will display a message (Item 1) **[Figure 60-200-2]** alerting the operator to service the machine. This message will remain for 10 seconds before reverting back to the previous screen and will appear for 10 seconds every time the machine is started until the maintenance clock is reset.

**NOTE: Standard Key Panel machines will not display the BobCARE$^{SM}$ PM message on the right panel.**

### Alarm Removal And Installation

Stop the engine and open the tailgate.

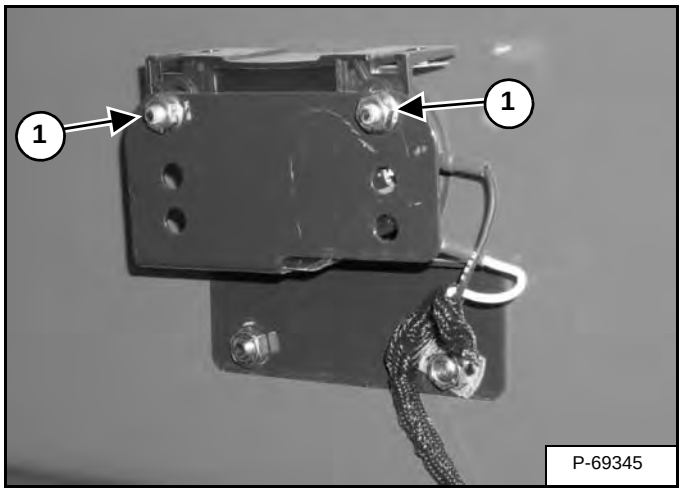
**Figure 60-210-4**




Mark the wires for ease of assembly. Disconnect the wires (Item 1) **[Figure 60-210-5]** from the alarm.

***Installation:*** Make sure the wire harness ends do not touch the mounting bolts during assembly.

**Figure 60-210-5**




Remove the two hex head bolts, washers, and lock nuts (Item 1) **[Figure 60-210-5]**. Remove the alarm from the mounting bracket.

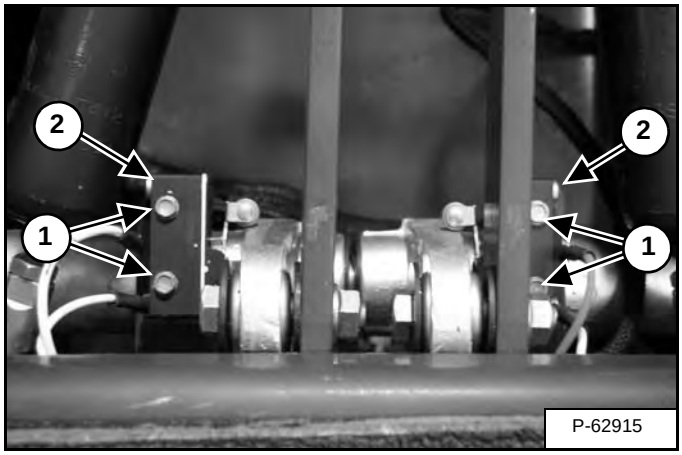
### Switch Removal And Installation

**NOTE: Joystick equipped machines do not have back-up alarm switches and can not be adjusted.**

***Standard Controls and ACS (If Equipped)***

Stop the engine and raise the operator cab [See "Raising" on page 10-30-2].

**Figure 60-210-6**




Place the steering levers in the neutral position.

Loosen the screws (Item 1) securing the back-up alarm switches. Slide the switch assemblies (Item 2) **[Figure 60-210-6]** off the mounting bracket.

***Installation:*** Slide the alarm switches onto the mounting bracket so the threaded plates are under the mounting bracket. The rollers will face to the inside. During installion of switches, adjusting the switches [See "Adjusting Switch Position" on page 60-210-2] and inspecting back-up alarm operation [See "Inspecting" on page 60-210-1] are required.

**Troubleshooting (Cont'd)**

| KEY TO CORRECT THE CAUSE | |
|---|---|
| 1. Alternator belt is loose or damaged. | 28. Worn valve and seats. |
| 2. Bad electrical connections. | 29. Broken or worn piston rings. |
| 3. Faulty starter motor. | 30. Worn valve stems or guides. |
| 4. Incorrect grade of oil. | 31. Worn or damaged bearings. |
| 5. Low cranking speed. | 32. Not enought oil in the crankcase. |
| 6. Fuel tank empty. | 33. Switch/sensor is defective. |
| 7. Faulty stop control operation. | 34. Oil pump worn. |
| 8. Plugged fuel line. | 35. Relief valve is sticking open. |
| 9. Plugged fuel filter. | 36. Relief valve is sticking closed. |
| 10. Restriction in the air cleaner. | 37. Broken relief valve spring. |
| 11. Air in the fuel system. | 38. Faulty suction pipe. |
| 12. Faulty fuel injection pump. | 39. Plugged oil filter. |
| 13. Faulty fuel injectors. | 40. Piston seizure. |
| 14. Broken injection pump drive. | 41. Incorrect piston height. |
| 15. Incorrect injection pump timing. | 42. Faulty engine mounting. |
| 16. Incorrect valve timing. | 43. Incorrect flywheel alignment. |
| 17. Poor compression. | 44. Faulty thermostat. |
| 18. Plugged fuel tank vent. | 45. Restriction in water jacket. |
| 19. Incorrect grade of fuel. | 46. Loose alternator belt. |
| 20. Exhaust pipe restriction. | 47. Plugged radiator. |
| 21. Cylinder head gasket leaking. | 48. Faulty water pump. |
| 22. Overheating. | 49. Plugged breather pipe. |
| 23. Cold running. | 50. Damaged valve stem deflectors. |
| 24. Incorrect tappet adjustment. | 51. Coolant level to low. |
| 25. Sticking valves. | 52. Plugged oil pump pipe strainer. |
| 26. Incorrect fuel lines. | 53. Broken valve spring. |
| 27. Worn cylinder bores. | 54. Damaged Battery |

## ENGINE SPEED CONTROL

### Removal And Installation

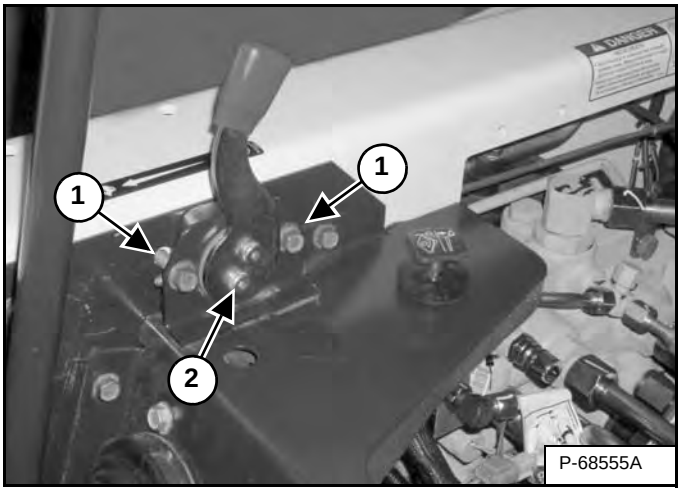



**WARNING**

**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

**Figure 70-20-1**




Raise the lift arms and install an approved lift arm device [See “Installing” on page 10-20-1].

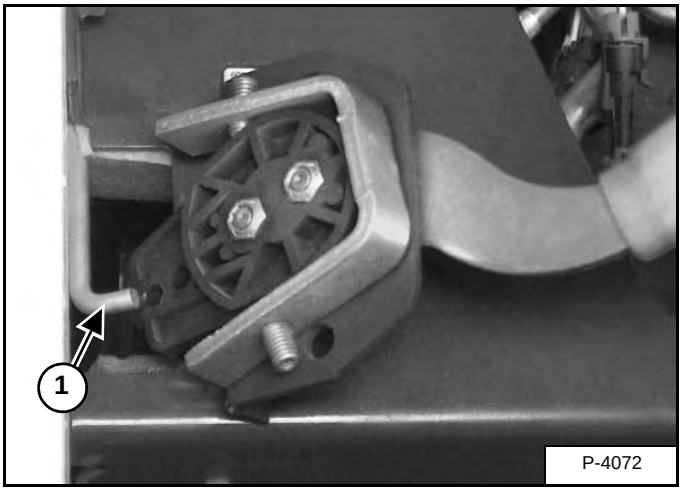
Raise the operator cab [See “Raising” on page 10-30-2].

Remove the two mounting screws (Item 1) **[Figure 70-20-1]** from the speed control mounting bracket.

***Installation:*** Tighten screws to 15-20 ft.-lb. (20-27 N•m) torque.

***Installation***: Tighten the mounting bolts (Item 2) **[Figure 70-20-1]** evenly until the speed control lever moves back and forth at a comfortable tension.

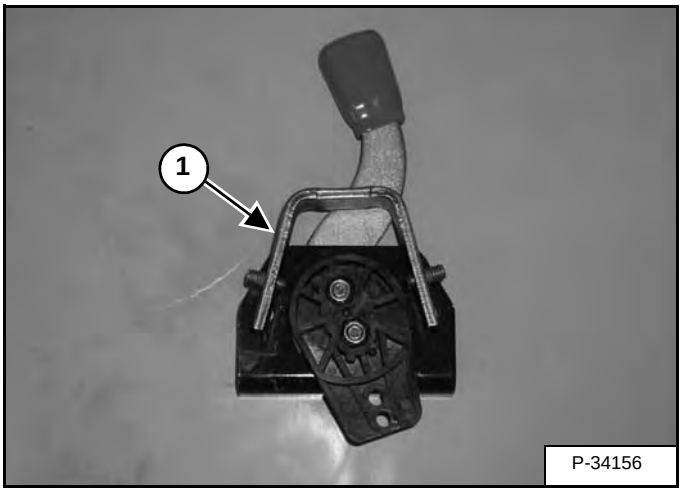
**Figure 70-20-2**




Pull the speed control away from the loader frame and disconnect the speed control rod (Item 1) **[Figure 70-20-2]** from the control.

***Installation***: Be sure to install the speed control rod in the bottom hole of the speed control lever.

**Figure 70-20-3**




***Installation***: Install the stop bracket (Item 1) **[Figure 70-20-3]** in the same location. It is necessary for the front and rear stop on the bracket to be located correctly.

Reverse the removal procedure to install the engine speed control.

## ENGINE COOLING SYSTEM

### Radiator Removal And Installation

Stop the engine and open the rear door.

Remove the rear grill [See “Removal And Installation” on page 50-60-1].

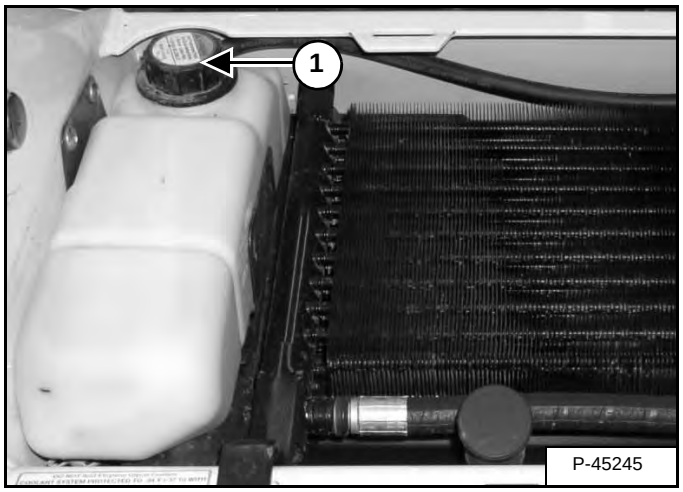
Remove the oil cooler [See “Removal and Installation” on page 20-100-1].

**⚠ WARNING**

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

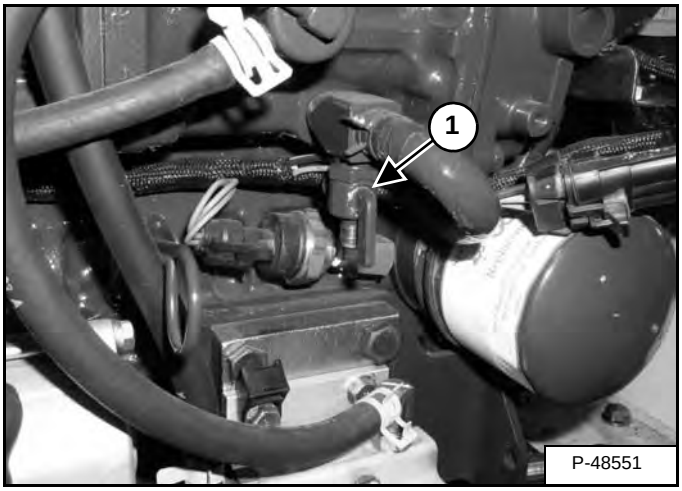
W-2070-1285

**Figure 70-50-1**



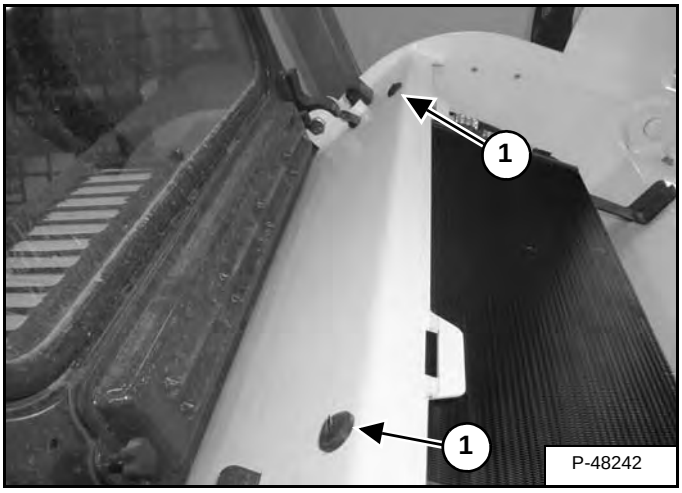

Loosen the radiator cap (Item 1) **[Figure 70-50-1]** from the pressurized expansion tank.

**Figure 70-50-2**




Open the drain valve (Item 1) **[Figure 70-50-2]** on the engine block and drain the coolant into a container.

**Figure 70-50-3**




Remove the two sta-straps (Item 1) **[Figure 70-50-3]** holding the pressurized expansion tank fill hose (Item 3) **[Figure 70-50-4]**.

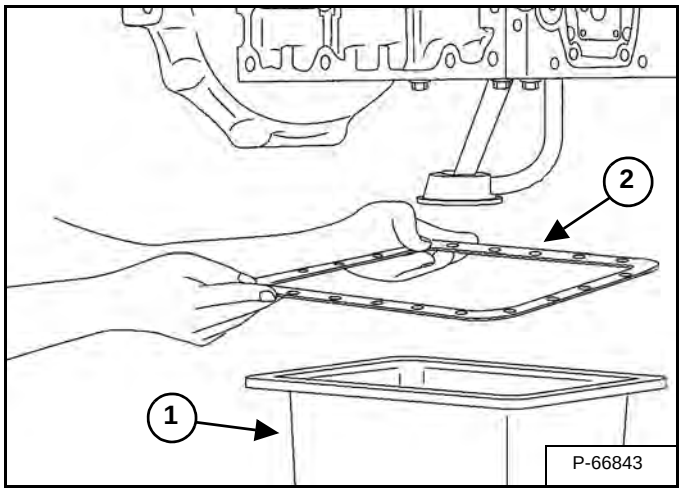
## LUBRICATION SYSTEM

### Oil Pan Removal And Installation

Remove the engine and hydrostatic pump assembly from the loader [See “Removal And Installation” on page 70-10-8].

The engine will have to be on an engine stand or suspended in the air safely to remove the oil pan.

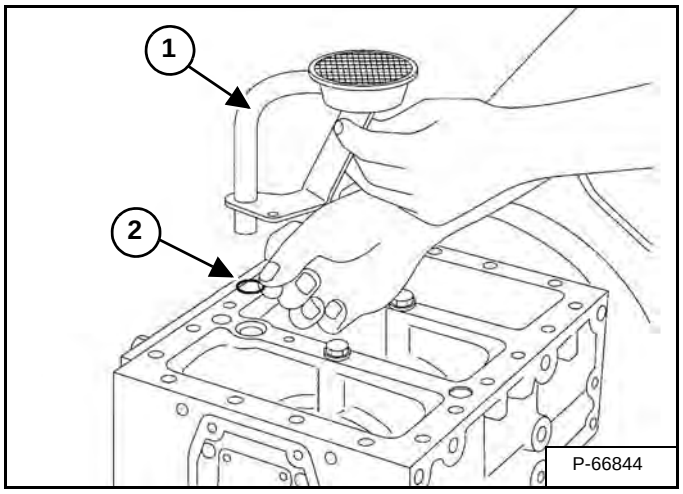
**Figure 70-60-1**




Remove oil pan bolts securing oil pan (Item 1) **[Figure 70-60-2]**. Slightly tapping on the oil pan with a soft mallet will break loose the oil pan from the engine block.

***Installation:*** Use a liquid gasket adhesive to the oil pan side of the oil pan gasket. Tighten oil pan bolts to 29-33 ft.-lb. (39-75 N•m) torque.

**Figure 70-60-2**




Remove the oil strainer (Item 1) and O-ring (Item 2) **[Figure 70-60-2]** from the engine block.

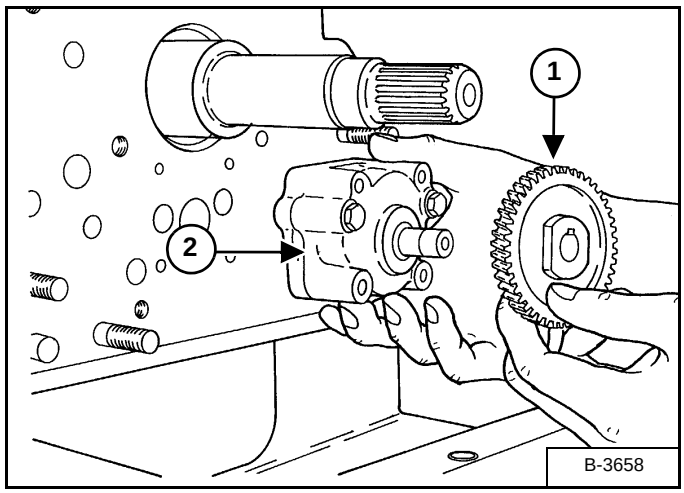
***Installation:*** Apply oil to O-ring.

### Oil Pump Removal And Installation

Remove the timing gearcase cover [See “Timing Gearcase Cover Removal And Installation” on page 70-100-1].

Remove the crankshaft gear.

**Figure 70-60-3**



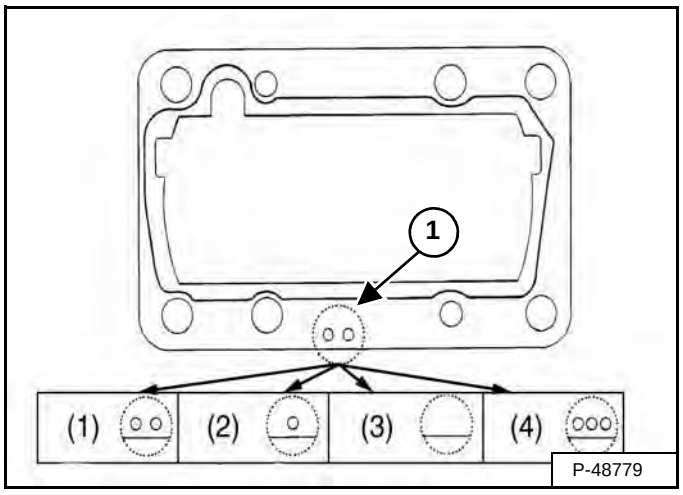

Remove the nut from the oil pump shaft. Use a puller to remove the oil pump gear (Item 1) **[Figure 70-60-3]**.

Remove the oil pump mounting bolts. Remove the oil pump (Item 2) **[Figure 70-60-3]**.

***Installation:*** Tighten the oil pump mounting bolts to 60-72 in.-lb. (6,9-8,1 N•m) torque.

**Fuel Injection Pump Removal And Installation (Cont'd)**

**Figure 70-70-19**




The size of shims are identified by a symbol (Item 1) **[Figure 70-70-19]** on the shims.

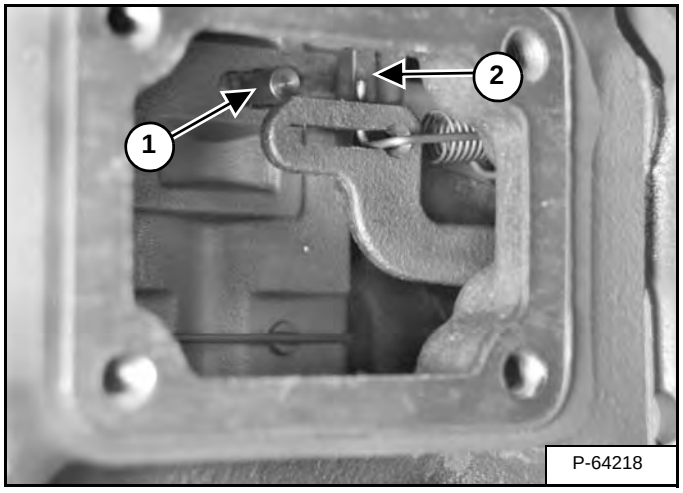
(1) Two holes means 0.0008 in. (0,20 mm) shim.

(2) One hole means 0.0010 in. (0,25 mm) shim.

(3) Without hole means 0.0012 in. (0,30 mm) shim.

(4) Three holes means 0.0014 in. (0,35 mm) shim.

**Figure 70-70-20**




Install the injection pump in the engine.

Ensure the control rack pin (Item 1) is to the left side of the fork lever (Item 2) **[Figure 70-70-20]**.

**Injection Pump - Timing**

# IMPORTANT

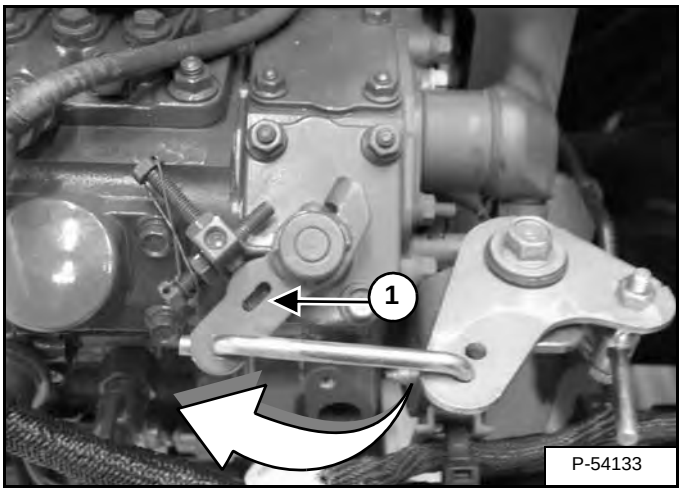
**Do not attempt to maintain or adjust unless you are trained and have the correct equipment.**

I-2028-0289

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

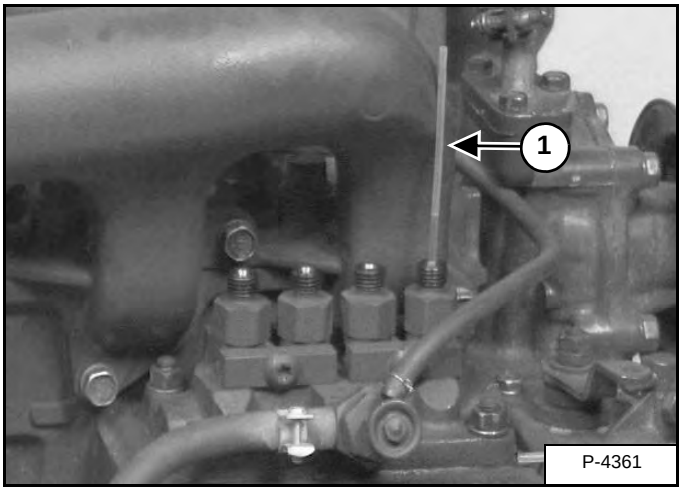
Disconnect the number one (closest to water pump) cylinder high pressure line from the injection pump.

**Figure 70-70-21**




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

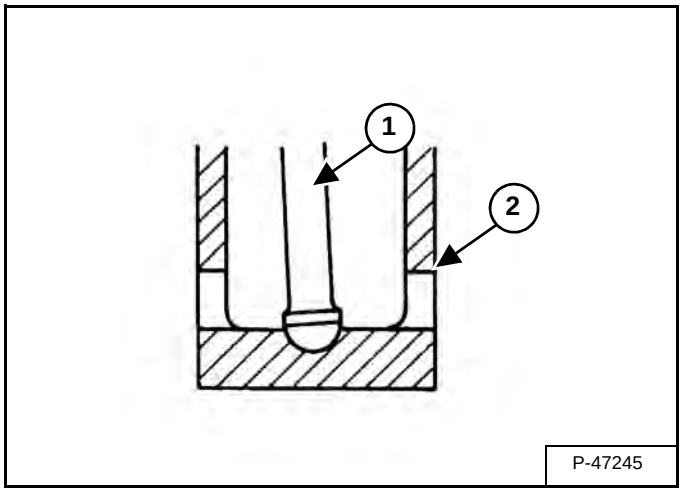
**Figure 70-70-22**




Install a short plastic tube (Item 1) **[Figure 70-70-22]** in the number one cylinder port of the injection pump. The tube should fit securely in the port and point upward.

**Cylinder Head Removal And Installation (Cont'd)**

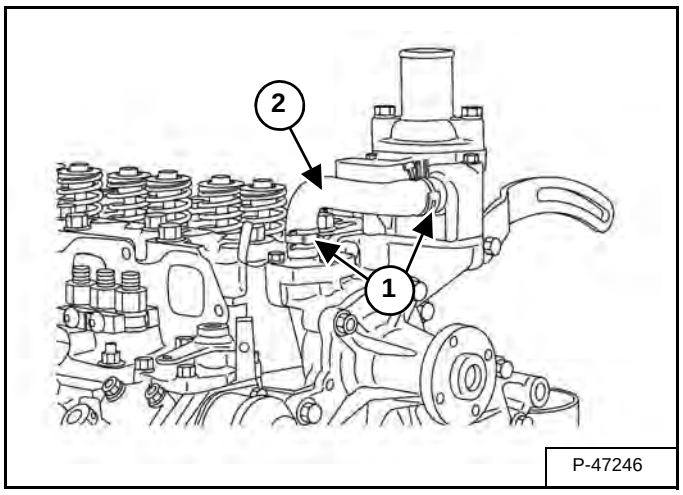
**Figure 70-80-14**




***Installation:*** The push rod (Item 1) must be seated in the tappet (Item 2) **[Figure 70-80-14]** correctly or the push rods will be damaged.

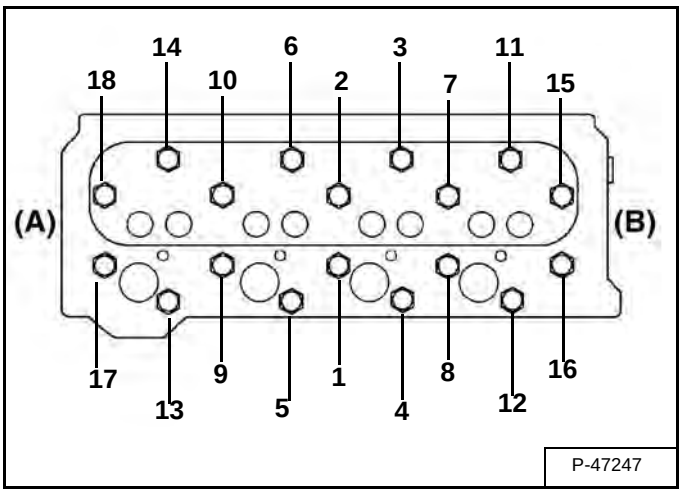
After installing the rocker arm assembly and push rods, the valve lash must be adjusted [See "Valve Clearance Adjustment" on page 70-80-2].

**Figure 70-80-15**




Remove the clamps (Item 1) and remove the hose (Item 2) **[Figure 70-80-15]** from the thermostat housing.

**Figure 70-80-16**



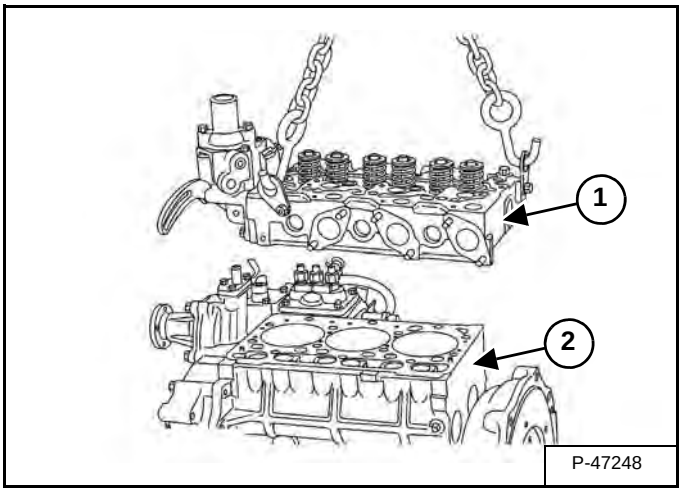

Remove the cylinder head bolts in order of #18 to #1 **[Figure 70-80-16]**.

**NOTE: (A) is the water pump side, (B) is the flywheel side.**

***Installation:*** Put oil on the bolt threads. Tighten the bolts in the correct sequence in order of #1-#18 to 68-72 ft.-lb. (93-98 N•m).

**NOTE: Re-tighten the cylinder head bolts in the correct sequence after the engine has been run for 30 minutes.**

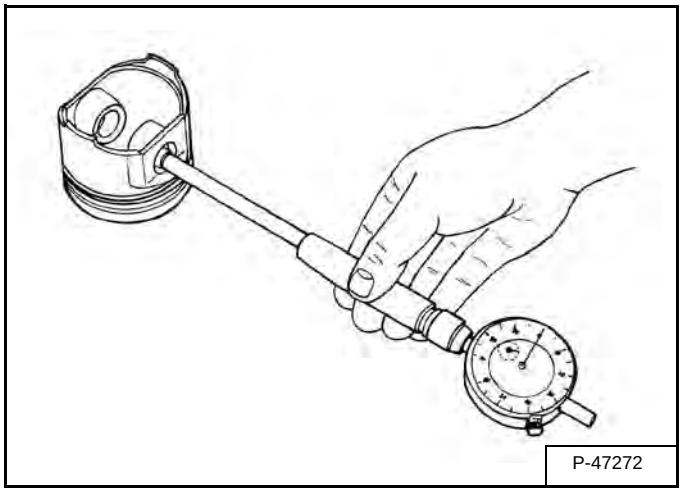
**Figure 70-80-17**




Remove the cylinder head (Item 1) and gasket (Item 2) **[Figure 70-80-17]**.

## Piston And Connecting Rod - Servicing

**Figure 70-90-7**

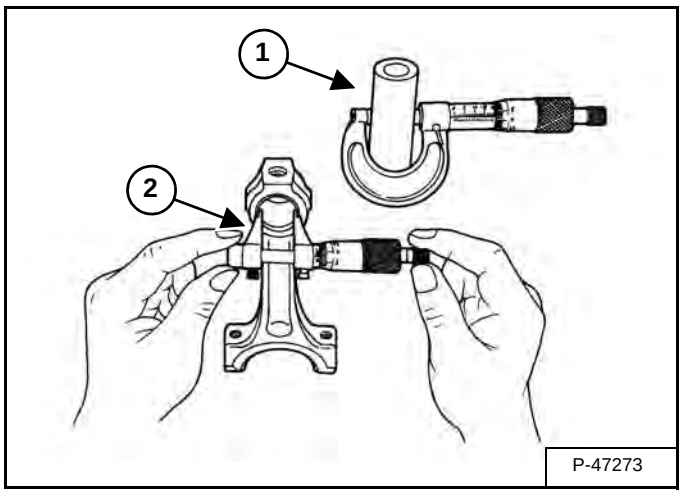



Measure the I.D. of the piston pin bore in both horizontal and vertical directions **[Figure 70-90-7]**.

If the measurement exceeds the allowable limit, replace the piston.

| | |
|---|---|
| Piston Bore I.D. | 0.9843-0.9848 in. (25,0-25,013 mm) |
| Allowable Limit | 0.9862 in. (25,05 mm) |

**Figure 70-90-8**



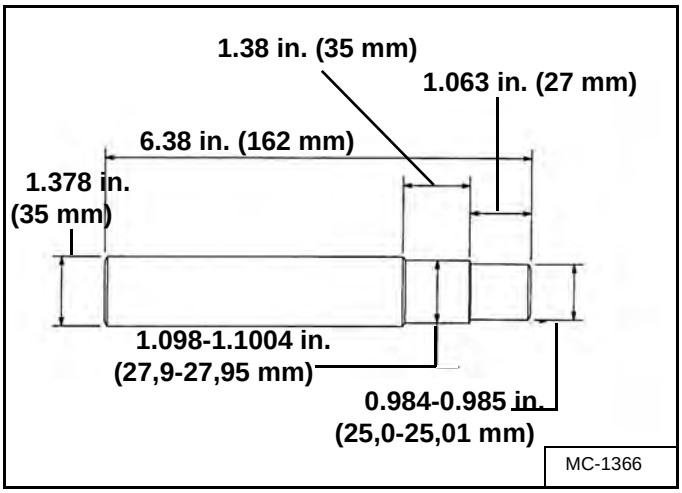

Measure the O.D. of the piston pin (Item 1) **[Figure 70-90-8]**.

Measure the I.D. of the connecting rod small end (Item 2) **[Figure 70-90-8]**.

Calculate the oil clearance. If the clearance exceeds the allowable limit, replace the bushing. If it still exceeds the specifications, replace the piston pin.

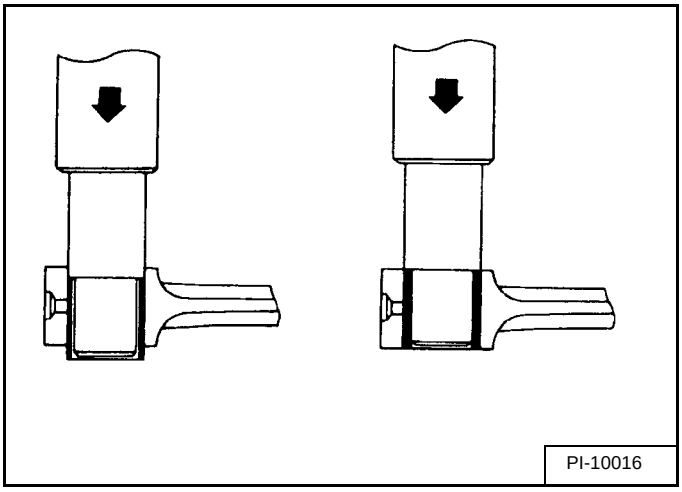
| | |
|---|---|
| Piston Pin O.D. | 0.9843-0.9847 in. |
| | (25,0-25,011 mm) |
| Bushing I.D. | 0.9852-0.9858 in. |
| | (25,03-25,04 mm) |
| Oil Clearance Between Piston Pin & Bushing | 0.0006-0.0015 in. (0,014-0,038 mm) |
| Allowable Limit | 0.0059 in. (0,15 mm) |

**Figure 70-90-9**




To replace the connecting rod small end bushing, make a driver tool as shown in figure **[Figure 70-90-9]**.

**Figure 70-90-10**



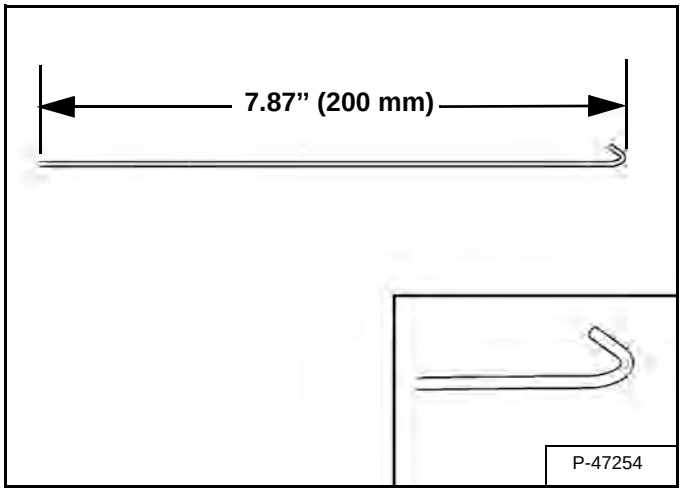

Use a press and special driver tool to remove the small end bushing **[Figure 70-90-10]**.

***Installation:*** Clean the small end bushing and bore. Put oil on the bushing and press into the connecting rod until it is flush **[Figure 70-90-10]**.

## CAMSHAFT AND TIMING GEARS

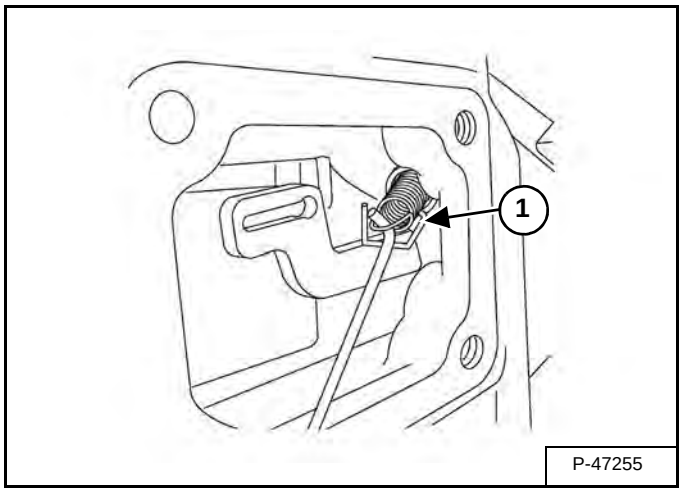
### Timing Gearcase Cover Removal And Installation

**Figure 70-100-1**



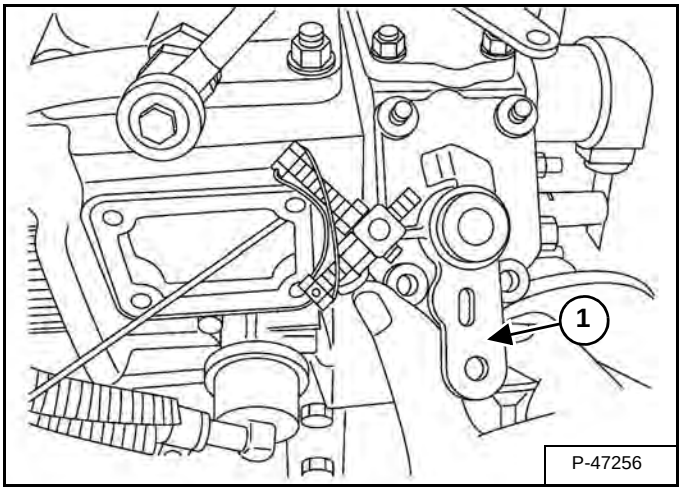

Bend a hook on the end of a 7.87 in. (200 mm) long, 0.050 in. (1.2 mm) diameter hard wire **[Figure 70-100-1]**.

**Figure 70-100-2**



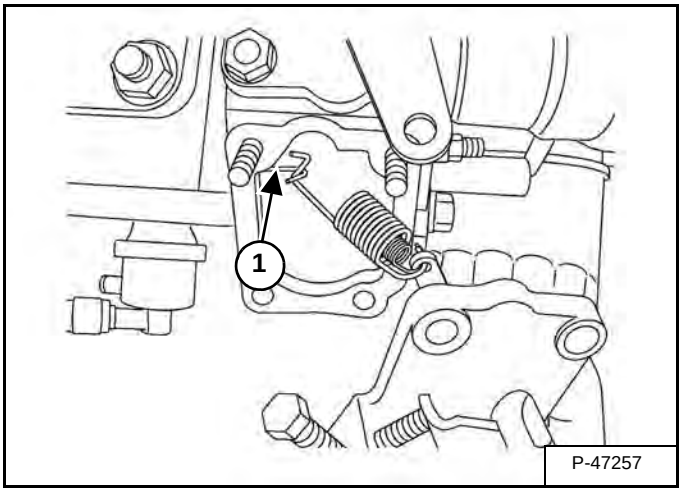

Disconnect the two governor springs (Item 1) **[Figure 70-100-2]**.

**Figure 70-100-3**




Remove the speed control plate (Item 1) **[Figure 70-100-3]**.

**Figure 70-100-4**




Remove the wire (Item 1) **[Figure 70-100-4]** from the springs.

***Installation:*** Do not drop the governor springs into the gear case.

Remove the crankshaft pulley nut.

***Installation:*** Tighten the nut to 101-116 ft.-lb. (137-157 N•m) torque.

# HEATER


HEATER COIL . . . . . .80-50-1
Removal And Installation. . . . . .80-50-1

HEATER FAN . . . . . .80-60-1
Blower Removal And Installation. . . . . .80-60-1
Connector Identification. . . . . .80-60-4
Disassembly And Assembly . . . . . .80-60-2

HEATER SYSTEM . . . . . .80-10-1
Description . . . . . .80-10-1

HEATER UNIT . . . . . .80-40-1
Removal And Installation. . . . . .80-40-1

HEATER VALVE . . . . . .80-70-1
Disassembly And Assembly . . . . . .80-70-2
Removal and Installation . . . . . .80-70-1

REGULAR MAINTENANCE . . . . . .80-20-1
Cleaning The Heater Coil . . . . . .80-20-2
Filter Elements Removal And Installation . . . . . .80-20-1

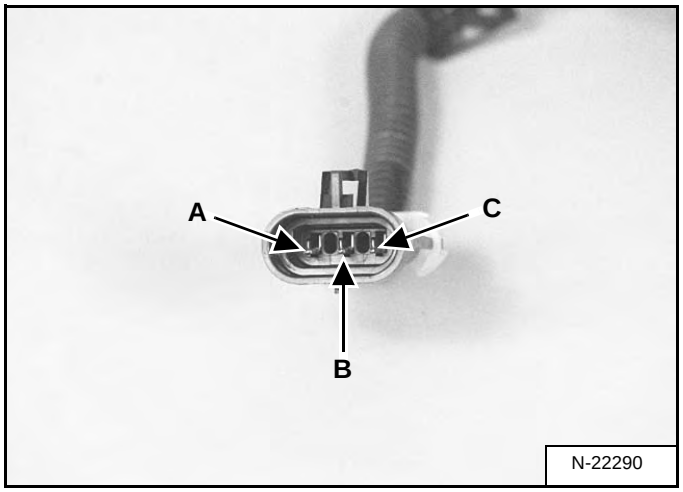
TROUBLESHOOTING . . . . . .80-30-1
Blower Motor Does Not Operate . . . . . .80-30-1
Blower Motor Operators Normally, But Air Flow Is Insufficient . . . . .80-30-1
Electrical System. . . . . .80-30-2
Engine Coolant Bypassing The Heater Valve . . . . . .80-30-6
Heater Valve Not Opening Or Closing. . . . . .80-30-7




**TIGHTEN ALL HARDWARE PER SIZE TO GRADE 5 TORQUE (SEE STANDARD TORQUE SPECIFICATIONS FOR BOLTS, SPEC SECTION) UNLESS OTHERWISE SPECIFIED.**

**Electrical System (Cont'd)**

**Figure 80-30-10**

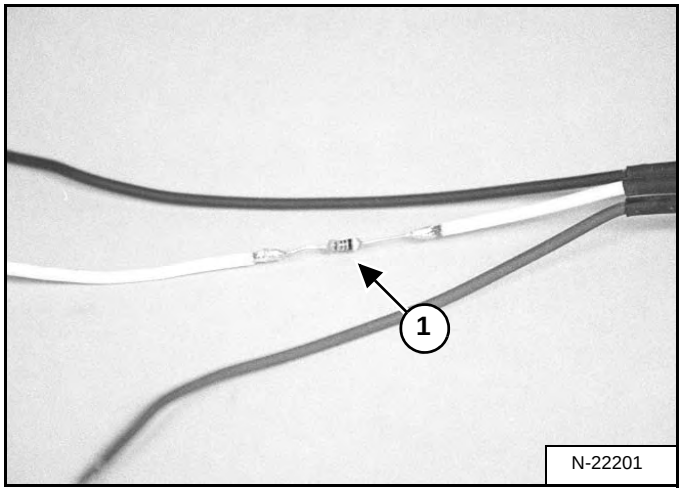



If there is voltage at the wiring harness, check the potentiometer **[Figure 80-30-10]** for resistance.

The resistance should be 10 KOhm between wire terminal **A** and wire terminal **C** frame **[Figure 80-30-10]**.

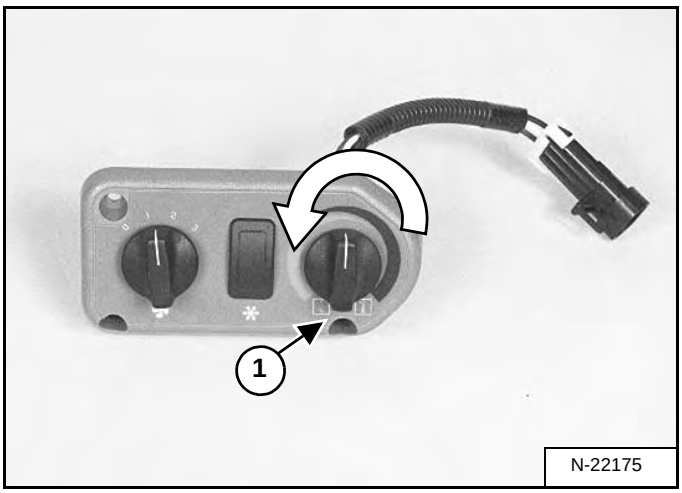
If no resistance is found replace the potentiometer.

**Figure 80-30-11**



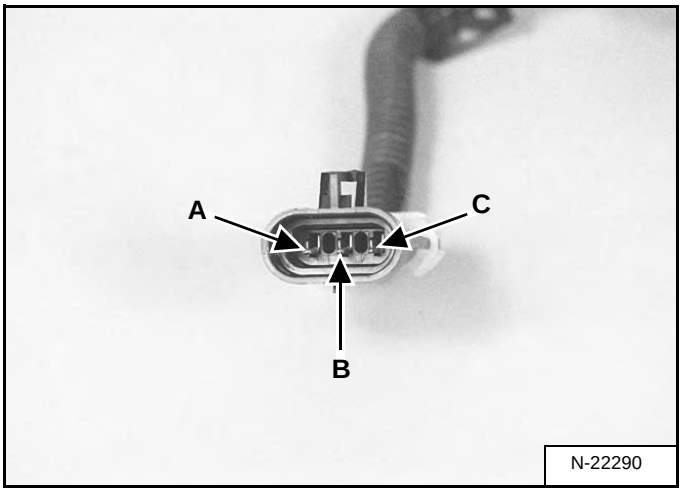

The white wire **B**, (Item 1) **[Figure 80-30-11]**, on the potentiometer, is a resistor wire.

**Figure 80-30-12**




To check the resistance of the white wire, turn the potentiometer control (Item 1) **[Figure 80-30-12]** to the full A/C position.

**Figure 80-30-13**




The resistance between the wire terminal **A** and wire terminal **B** frame **[Figure 80-30-13]** should be approximately 49 KOhm

Check the resistance between the wire terminal **C** and wire terminal **B** frame **[Figure 80-30-13]** should be approximately 39 KOhm.

**Disassembly And Assembly (Cont'd)**

**Figure 80-60-8**

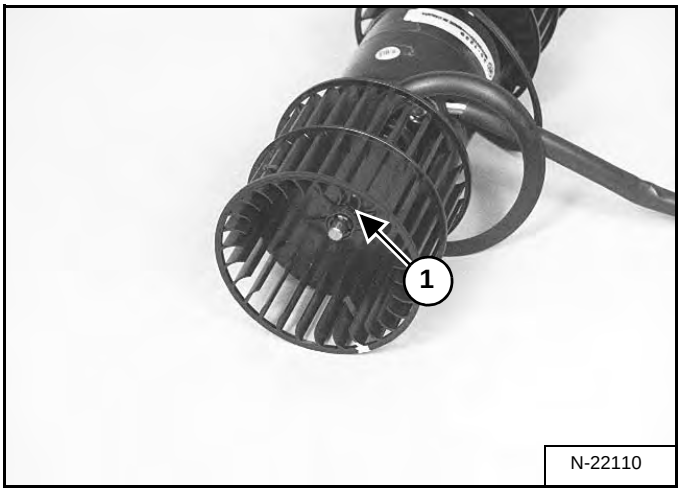
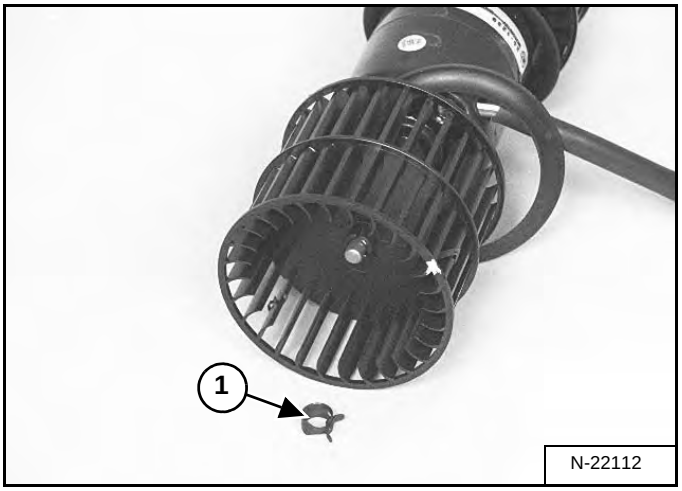
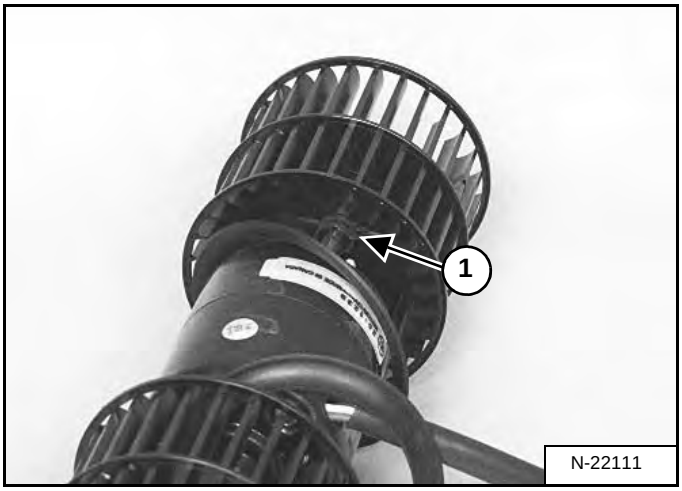



**Figure 80-60-9**



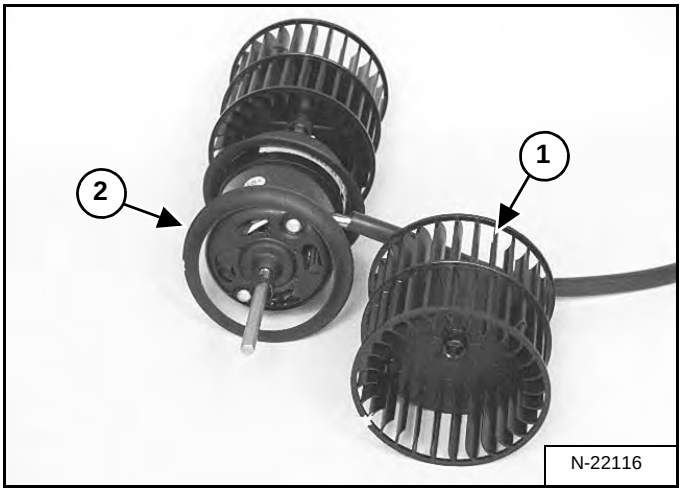

Remove the outside blower wheel clamp (Item 1) **[Figure 80-60-8]** and **[Figure 80-60-9]** from the blower wheel.

**Figure 80-60-10**




Remove the inside blower wheel clamp (Item 1) **[Figure 80-60-10]** from the blower wheel.

**Figure 80-60-11**




**NOTE: Before removing blower wheels, mark their orientation to ensure they are assembled back on the correct side and the fins are facing the same direction.**

Remove the blower wheel (Item 1) and inside ring (Item 2) **[Figure 80-60-11]** from the blower fan motor shaft.

Repeat the procedure for the other blower wheel.

**TORQUE SPECIFICATIONS FOR BOLTS**

**Torque For General SAE Bolts**

The following table shows standard torque specifications for bolts with zinc phosphate coating. Bolts purchased from Melroe that have zinc phosphate coating are specified by the letter H following the part number.

| | Thread Size | SAE Grade 5 | SAE Grade 8 |
|---|---|---|---|
| INCH. LBS. (Nm) | .250 | 80-90 (9,0-10,2) | 110-120 (12,4-13,6) |
| | .3125 | 180-200 (20,3-22,6) | 215-240 (24,2-27-1) |
| FOOT LBS. (Nm) | .375 | 25-28 (34-38) | 35-40 (47-54) |
| | .4375 | 40-45 (54-61) | 60-65 (81-88) |
| | .500 | 65-70 (88-95) | 90-100 (122-136) |
| | .5625 | 90-100 (122-136) | 125-140 (170-190) |
| | .625 | 125-140 (170-190) | 175-190 (240-260) |
| | .750 | 220-245 (300-330) | 300-330 (410-450) |
| | .875 | 330-360 (450-490) | 475-525 (645-710) |
| | 1.000 | 475-525 (645-710) | 725-800 (985-1085) |
| | 1.125 | 650-720 (880-975) | 1050-1175 (1425-1600) |
| | 1.250 | 900-1000 (1200-1360) | 1475-1625 (2000-2200) |
| | 1.375 | 1200-1350 (1630-1830) | 2000-2200 (2720-2980) |
| | 1.500 | 1500-1650 (2040-2240) | 2600-2850 (3530-3870) |
| | 1.625 | 2000-2800 (2720-2980) | 3450-3800 (4680-5150) |
| | 1.750 | 2500-2750 (3390-3730) | 4300-4800 (5830-6500) |
| | 1.875 | 3150-3500 (4270-4750) | 5500-6100 (7450-8300) |
| | 2.000 | 3800-4200 (5150-5700) | 6500-7200 (8800-9800) |

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