Bobcat®

Service Manual

E50

Compact Excavator

S/N AG3N11001 & Above
S/N AHHE11001 & Above
S/N B3NN11001 & Above
S/N B3NS11001 & Above

6989441enUS (01-20) (P)

Printed in U.S.A.

SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

AVOID INJURY OR DEATH

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

W-2003-0807

IMPORTANT

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

I-2019-0284

DANGER

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

D-1002-1107

WARNING

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

W-2044-1107

The following publications provide information on the safe use and maintenance of the Bobcat machine and attachments:

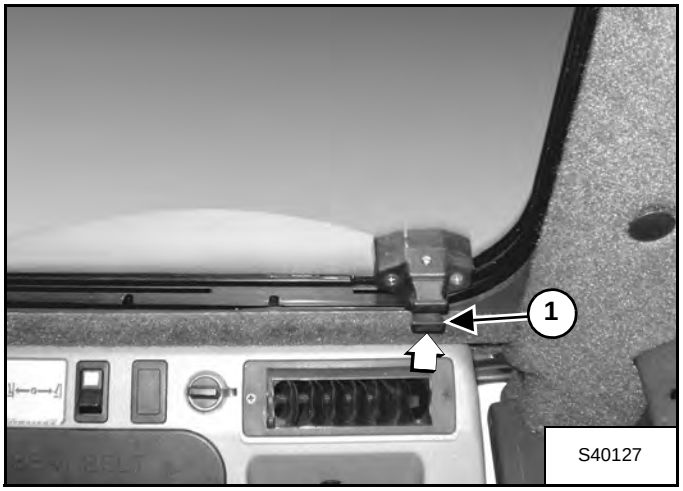
- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment contains operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Machine signs (decals) instruct on the safe operation and care of your Bobcat machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat dealer.
- An Operator's Handbook fastened to the operator cab. It's brief instructions are convenient to the operator. The handbook is available from your dealer in an English edition or one of many other languages. See your Bobcat dealer for more information on translated versions.
- The AEM Safety Manual delivered with the machine gives general safety information.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.
- The Compact Excavator Operator Training Course is available through your local dealer or at **Bobcat.com/training** or **Bobcat.com**. This course is intended to provide rules and practices of correct operation of the Bobcat excavator. The course is available in English and Spanish versions.
- Service Safety Training Courses are available from your Bobcat dealer or at **Bobcat.com/training** or **Bobcat.com**. They provide information for safe and correct service procedures.
- The Bobcat compact excavator Safety Video is available from your Bobcat dealer or at **Bobcat.com/training** or **Bobcat.com**.

SI EXC-1016 SM

Right Side Windows

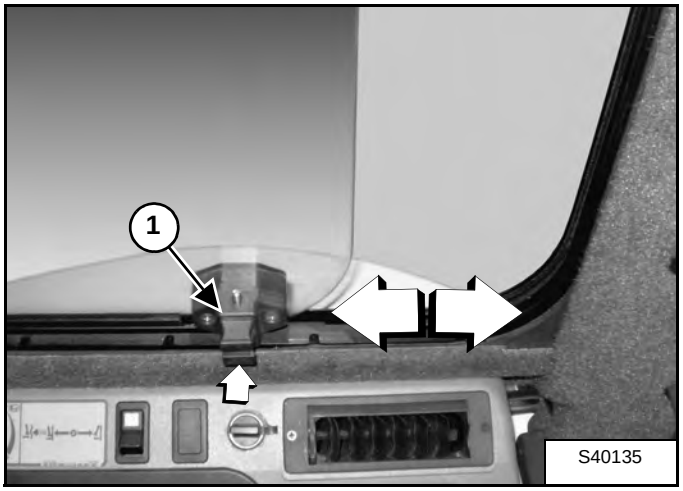
Opening The Right Rear Window

Figure 10-30-10



Pull up on the bottom latch (Item 1) **[Figure 10-30-10]**.

Figure 10-30-11



Pull the latch (Item 1) **[Figure 10-30-11]** forward to open the window until the desired stop. Release the bottom latch and snap the lock in place.

Closing The Right Rear Window

Pull up on the bottom latch (Item 1) **[Figure 10-30-10]** and push the latch back to close the window.

SERVICE SCHEDULE

Maintenance Intervals

Maintenance work must be done at regular intervals. Failure to do so will result in excessive wear and early failures.

The service schedule is a guide for correct maintenance of the Bobcat excavator.

⚠ WARNING

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W-2003-0807

Every 10 Hours (Before Starting The Excavator)

- **Engine Oil** - Check level and add as needed.
- **Engine Air Filters and Air System** - Check display panel. Service only when required. Check for leaks and damaged components.
- **Engine Cooling System** - Check coolant level COLD and add premixed coolant as needed.
- **Hydraulic Fluid** - Check fluid level and add as needed.
- **Fuel Filter** - Drain water and sediment from filter.
- **Seat Belt, Seat Belt Retractors, Seat Belt Mounting hardware, Control Console Lockout** - Check the condition of seat belt and mounting hardware. Clean or replace seat belt retractors as needed. Check the control console lockout lever for proper operation. Clean dirt and debris from moving parts.
- **Motion Alarm** - Check for proper function.
- **Operator Canopy / Cab** - Check the canopy / cab condition and mounting hardware.
- **Operator Cab and HVAC Filters** - Clean filters as needed.
- **Indicators and Lights** - Check for correct operation of all indicators and lights.
- **Safety Signs** - Check for damaged signs (decals). Replace any signs that are damaged.
- **Track Tension** - Check tension and adjust as needed.
- **Pivot Points** - Grease all machinery pivot points. Grease clamp and angle blade (if equipped).
- **X-Change / Attachment Coupler** - Check for damage or loose parts (if equipped).

First 50 Hours

- **Engine Oil and Filter** - Replace oil and filter.
- **Drive Belts (Alternator) (Air Conditioning - If Equipped)** - Check condition. Replace as needed.
- **Alternator and Starter** - Check connections.
- **Fuel Filter** – Replace filter element.
- **Travel Motors (Final Drive)** - Replace fluid.
- **Hydraulic Filter, and Case Drain Filter** - Replace the hydraulic filter and case drain filter.

Every 50 Hours

- **Swing Bearing** - Grease swing bearing and swing pinion. Service every 10 hours when operating in water.
- **Battery** - Check cables, and connections.
- **Fuel Tank** - Drain water and sediment from fuel tank and fuel filter.

SS EXC E32 - E55 iT4 T4-K-0418

Removing And Replacing Coolant

See the SERVICE SCHEDULE for correct service intervals. (See SERVICE SCHEDULE on Page 10-70-1.)

Stop the engine. Open the tailgate. (See Opening And Closing on Page 10-50-1.)

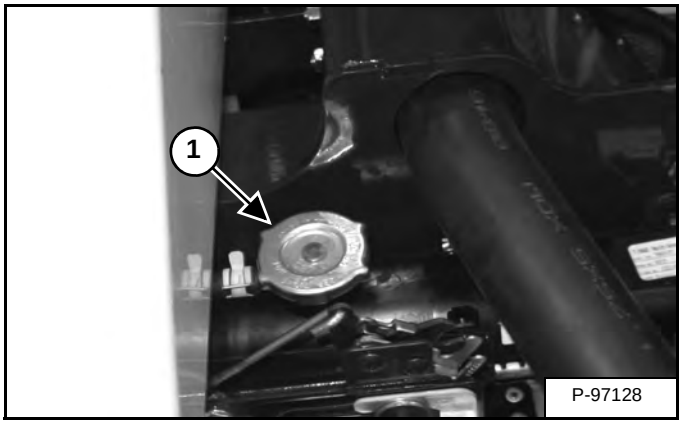
⚠ WARNING

AVOID BURNS

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

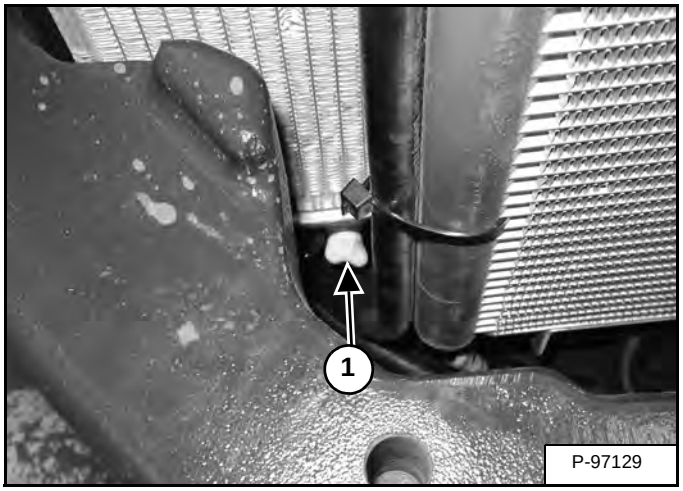
W-2070-1203

Figure 10-100-5



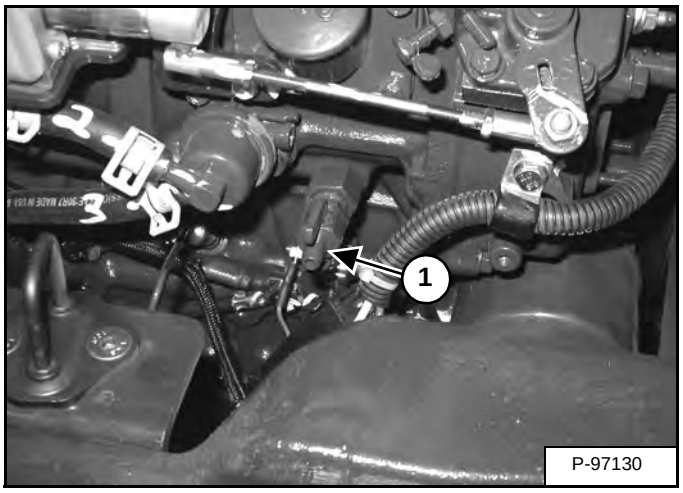
When the engine is cool, loosen and remove the radiator cap (Item 1) **[Figure 10-100-5]**.

Figure 10-100-6



Put a hose on the drain valve at the bottom of the radiator. Open the drain valve (Item 1) **[Figure 10-100-6]** and drain the coolant into a container.

Figure 10-100-7



Put a hose on the drain valve on the engine block. Open the drain valve (Item 1) **[Figure 10-100-7]** and drain the coolant into a container.

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

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

Mix the coolant in a separate container. (See ENGINE COOLING SYSTEM on Page 10-100-1.) and (See Removing And Replacing Coolant on Page 10-100-3.)

NOTE: The cooling system is factory filled with propylene glycol (purple color). DO NOT mix propylene glycol with ethylene glycol.

The correct mixture of coolant to provide a -37°C (-34°F) freeze protection is 5 L propylene glycol mixed with 4,4 L of water **OR** 1 U.S. gal propylene glycol mixed with 3.5 qt of water.

Add premixed coolant; 47% water and 53% propylene glycol to the recovery tank if the coolant level is low.

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

Add premixed coolant until the level is correct.

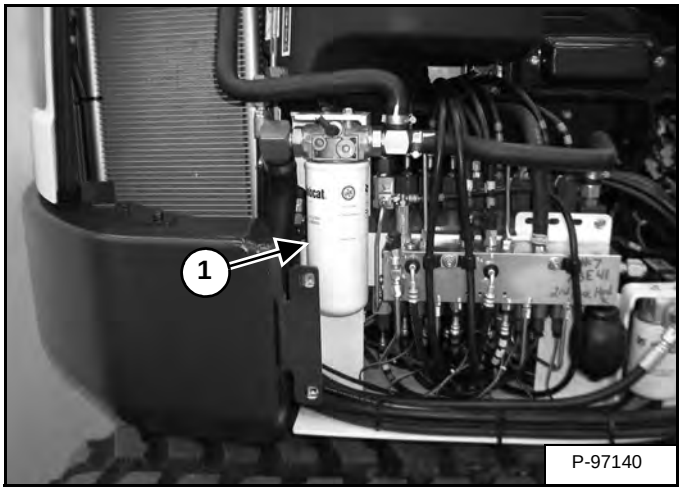
Run the engine until it is at operating temperature. Stop the engine. Check the coolant level and add as needed. Be sure the radiator cap is tight.

Add coolant to the recovery tank as needed.

Close the tailgate.

Removing And Replacing The Hydraulic Filters (Cont'd)

Figure 10-130-5



Remove the hydraulic filter (Item 1) **[Figure 10-130-5]**.

Clean the housing where the filter gasket makes contact.

Put clean hydraulic fluid on the gasket. Install the new filter and hand tighten only. Use a genuine Bobcat replacement filter.

WARNING

AVOID INJURY OR DEATH

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

W-2103-0508

Case Drain Filter

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

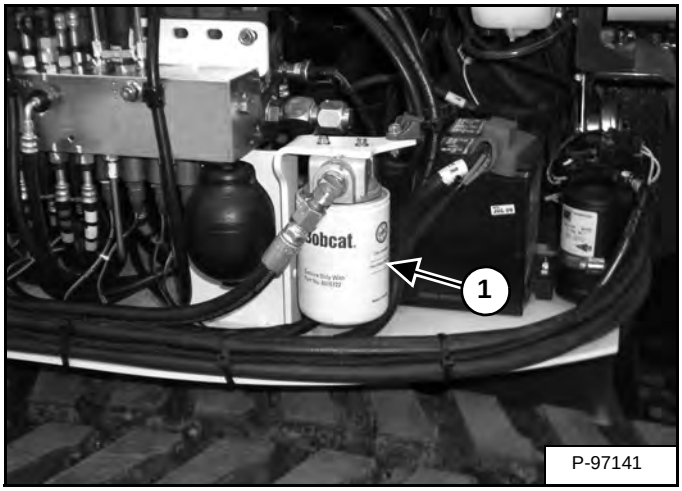
The case drain filter is located in the right front corner of the excavator.

Open the right side cover. (See Opening And Closing on Page 10-60-1.)

For easier access to change the case drain filter, remove the lower right side panel.

Remove the four bolts (Item 1) from the side panel (Item 2) **[Figure 10-130-4]**. Remove the side panel.

Figure 10-130-6



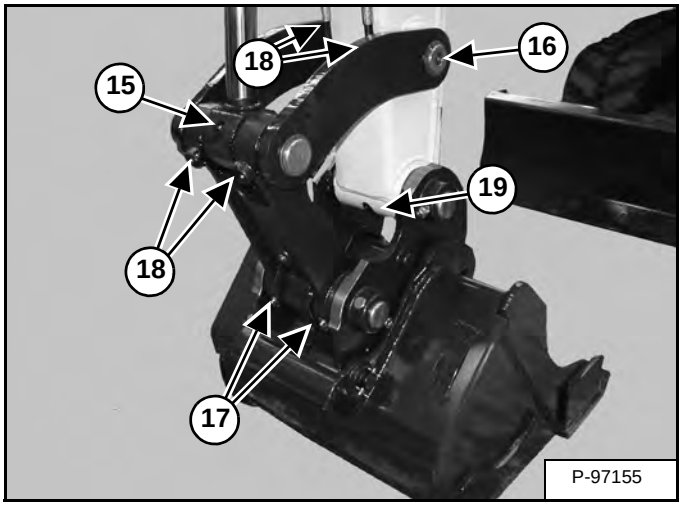
Remove the case drain filter (Item 1) **[Figure 10-130-6]**.

Clean the housing where the filter gasket makes contact.

Put clean hydraulic fluid on the gasket. Install the new filter and hand tighten only.

Lubrication Locations (Cont'd)

Figure 10-141-8



15. Bucket Cylinder Rod End (1) **[Figure 10-141-8]**

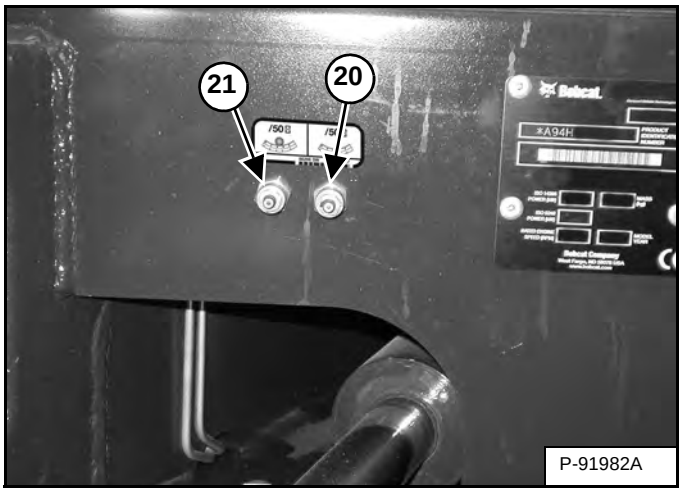
16. Bucket Link Pin (1) **[Figure 10-141-8]**

17. Bucket Pivot (3) **[Figure 10-141-8]**

18. Bucket Link - without extendable arm (2), with extendable arm (4) **[Figure 10-141-8]**

19. Arm (1) **[Figure 10-141-8]**

Figure 10-141-9



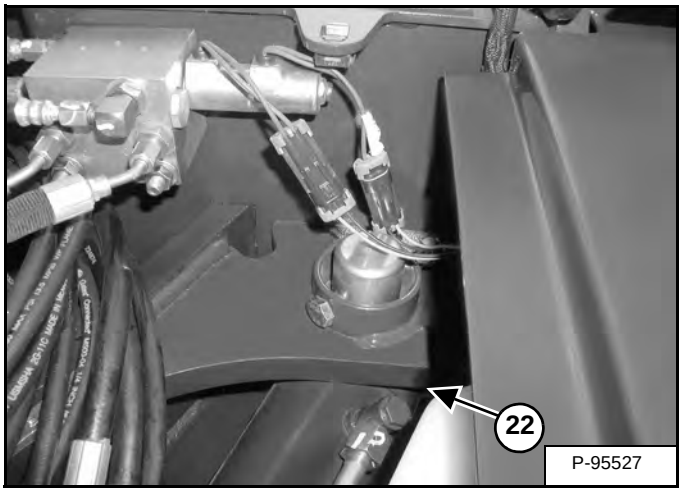
Lubricate the following locations on the hydraulic excavator **EVERY 50 HOURS**:

NOTE: Use Extra Heavy Gear Shield grease for grease fittings (Item 20, 21 and 22).

20. Swing Circle (1) **[Figure 10-141-9]**

21. Swing Pinion (1) **[Figure 10-141-9]**. (Install 3 to 4 pumps of grease then rotate the upperstructure 90°. Install 3 to 4 pumps of grease and again rotate the upperstructure 90°. Repeat this until the slew pinion has been greased at four positions.)

Figure 10-141-10



Lubricate the following location on the hydraulic excavator **EVERY 1000 HOURS**:

NOTE: Use Extra Heavy Gear Shield grease for grease fittings (Item 20, 21 and 22).

22. Boom Swing Cylinder Base (1) **[Figure 10-141-10]**.

NOTE: The boom swing grease fitting is located on the side of base end of the cylinder.

SEAT BELT

Inspection And Maintenance

WARNING

Failure to properly inspect and maintain the seat belt can cause lack of operator restraint resulting in serious injury or death.

W-2466-0703

Check the seat belt daily for correct function.

Inspect the seat belt system thoroughly at least once each year or more often if the machine is exposed to severe environmental conditions or applications.

Any seat belt system that shows cuts, fraying, extreme or unusual wear, significant discolorations due to ultraviolet UV exposure, dusty / dirty conditions, abrasion to the seat belt webbing, or damage to the buckle, latch plate, retractor (if equipped), hardware or any other obvious problem should be replaced immediately.

The items below are referenced in **[Figure 10-190-1]**.

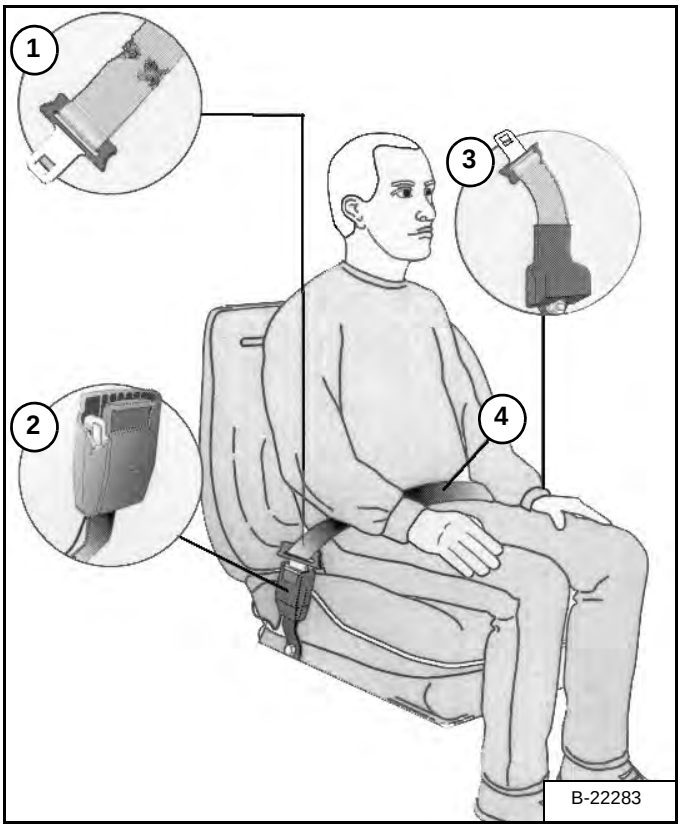
1. Check the webbing. If the system is equipped with a retractor, pull the webbing completely out and inspect the full length of the webbing. Look for cuts, wear, fraying, dirt and stiffness.

2. Check the buckle and latch for correct operation. Make sure latch plate is not excessively worn, deformed or buckle is not damaged or casing broken.

3. Check the retractor web storage device (if equipped) by extending webbing to determine if it looks correct and that it spools out and retracts webbing correctly.

4. Check webbing in areas exposed to ultraviolet (UV) rays from the sun or extreme dust or dirt. If the original color of the webbing in these areas is extremely faded and / or the webbing is packed with dirt, the webbing strength may have deteriorated.

Figure 10-190-1



REMOTE START TOOL (SERVICE TOOL) KIT - 7217666

Description

The Remote Start Tool (Service Tool) Kit is a replacement tool for MEL1563 Remote Start Tool.

The Remote Start Tool (Service Tool) Kit, P/N 7217666, can be used to service excavators 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 excavator harness.

E50 HYDRAULIC/HYDROSTATIC SCHEMATIC
S/N AHHE11001 AND ABOVE
S/N AG3N11001 AND ABOVE
S/N B3NN11001 AND ABOVE

(PRINTED DECEMBER 2019)
V-1398 legend

Printable Version Click Here

LEGEND

1. HYDRAULIC RESERVOIR: Pressurized with Fill Strainer
   Reservoir Capacity (at Site Gauge) . . . . . 15,1 L (16.0 qt)
   System Capacity . . . . 54,9 L (58.0 qt)
2. PRESSURIZED BREATHER/FILL CAP with FILTER:
   0,4 bar (6.0 psi) – Outlet
   0,04 bar (0.6 psi) - Inlet
3. HYDRAULIC FILTER ELEMENT
   15 Micron
4. FILTER BY-PASS 3,44 bar (50 psi)
5. CASE DRAIN FILTER
6. HYDRAULIC BY-PASS SWITCH
7. HYDRAULIC PISTON PUMP . . . . . 138,5 L/min (36.6 gpm) at High Engine RPM
8. PUMP MARGIN SPOOL - 16 bar (232 psi)
9. TORQUE LIMITER
10. PUMP CONTROLLER – Back-up Relief Valve 270 bar (3916 psi)
11. ORIFICE: 0,66 mm (0.026 in)
12. ORIFICE: 0,79 mm (0.031 in) Only in S/N AHH311001 AND ABOVE
13. PRESSURE SWITCH – Motion Alarm (If Equipped)
14. SHUTTLE VALVE – Motion Alarm (If Equipped)
15. PRESSURE REDUCING VALVE 30 bar (435 psi)
16. CHECK VALVE - Accumulator
17. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – Boom Offset / Secondary Auxiliary Hydraulics – If Equipped)
18. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – Arm Offset / Secondary Auxiliary Hydraulics – If Equipped)
19. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Two Speed
20. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Work group Lockout
21. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – Angle Blade (If Equipped)
22. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – Angle Blade (Optional)
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Male Coupler
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Female Coupler
25. ACCUMULATOR
26. FLUSHING VALVE 25 bar (360 psi)
27. LOAD SENSE BLEED CARTRIDGE 0.70 L/min (0.185 gpm)
28. LOAD SENSE RELIEF VALVE 250 bar (3626 psi)
29. FILTER – Control Valve
30. PRESSURE SENSOR – Auto Idle
31. COMPENSATOR
32. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (BUCKET Cylinder) 290 bar (4206 psi)
33. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (BUCKET Cylinder) 290 bar (4206 psi)
34. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (ARM Cylinder) 290 bar (4206 psi)
35. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (ARM Cylinder) 290 bar (4206 psi)
36. PORT RELIEF VALVE - (With Anti-Cavitation Valve) - (Auxiliary Pressure Port: 210 bar (3045 psi)
37. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Auxiliary Return Port: 210 bar (3045 psi)
38. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Boom Cylinder) 290 bar (4206 psi)
39. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Boom Cylinder) 290 bar (4206 psi)
40. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Blade Cylinder) 260 bar (3771 psi)
41. CHECK VALVE: 45 psi (3,1 bar) With a 1,222 mm (0.045 in) Orifice
42. CHECK VALVE: 4,2 bar (60 psi)
43. ORIFICE – Straight Travel 0,8 mm (0.31 in)
44. COUNTERBALANCE VALVE - With restrictors
45. TWO SPEED SHIFT SPOOL
46. CROSSPORT RELIEF VALVE – Travel Motor 263 bar (3810 psi)
47. Not Used For This Model
48. CHECK VALVE – Anti-Drain
49. CROSSPORT RELIEF VALVE (Ramp Pressure Increasing Type):
    Set @: 241 bar (3495 psi)
    Crack Pressure: 110 bar (1600 psi)
50. ANTI-CAVITATION VALVE (2)
51. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE – Brake Release Valve 3,9 bar (57 psi)
52. TIMER VALVE – 25 bar (363 psi) 3.7 Sec.
53. ORIFICE
54. CHECK VALVE – Brake Release
55. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - Second Auxiliary (Optional)
56. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Second Auxiliary (2) (Optional)
57. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Secondary Auxiliary) 276 bar (4000 psi)
58. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Secondary Auxiliary) 276 bar (4000 psi)
59. TEST PORT - "JP3" PORT - Pressure Reducing Valve
60. FACTORY FILL PORT
61. TEST PORT (CAP)
62. FILTER – Hydraulic X-Change Valve
63. ORIFICE - 1,78 mm (0.070 in)
64. CHECK VALVE – Load Sense
65. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
66. CHECK VALVE
67. CHECK VALVE With 0,23 mm (0.009 in) Orifice (OPTIONAL)
68. ANTI-CAVITATION VALVE
69. TEST PORT – LS PORT
70. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Angle Blade) 270 bar (3916 psi)
71. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Angle Blade) 270 bar (3916 psi)
72. TEST PORT – “P” PORT (Manifold)

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

Printed in U.S.A.

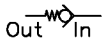
Glossary Of Hydraulic / Hydrostatic Symbols (Cont'd)

GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR EXCAVATORS

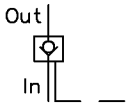
SYMBOL DESCRIPTION

NON–RETURN VALVE, SHUTTLE VALVE: Valve which allows free flow in one direction only

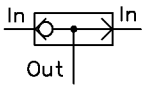
NON–RETURN VALVE (Check Valve) – Used as Replenishing Valve, Load Check Valve or Anticavitation Valve – Opens if the Inlet pressure is higher than the Outlet pressure. Often contains internal spring which has NO significant pressure value



SPRING LOADED VALVE (Bypass Valve) – Opens if the Inlet pressure is greater than the Outlet pressure plus the spring pressure



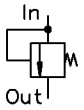
PILOT CONTROLLED NON–RETURN VALVE – It is possible to open the valve by pilot pressure



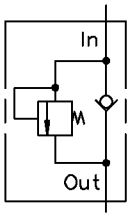
SHUTTLE VALVE – The Inlet port connected to the higher pressure is automatically connected to the Outlet port while the other Inlet port is closed

SYMBOL DESCRIPTION

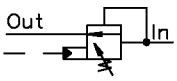
PRESSURE CONTROL VALVE: Valve ensuring the control of pressure



RELIEF VALVE – When the Inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port.



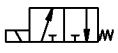
RELIEF/REPLENISHING VALVE or RELIEF/ANTICAVITATION VALVE – When the Inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port – Allows free flow in the opposite direction



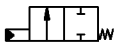
DUAL PRESSURE RELIEF VALVE – When the inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port. Pilot pressure provides a second pressure value.

DIRECTIONAL CONTROL VALVE: Valve providing for the opening (fully or restricted) or the closing of one or more flow paths (represented by several squares)

TWO PORTS and CLOSED FLOW PATHS

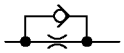


SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) – controlled by an electric solenoid (with return spring)

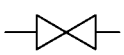


PILOT ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) – controlled by pressure (with return spring)

FLOW CONTROL VALVE: Valve controlling the flow in one or both directions



ONE WAY RESTRICTOR VALVE (Non–Return Valve with Restriction) – Unit allowing free flow in one direction but restricted flow in the other direction

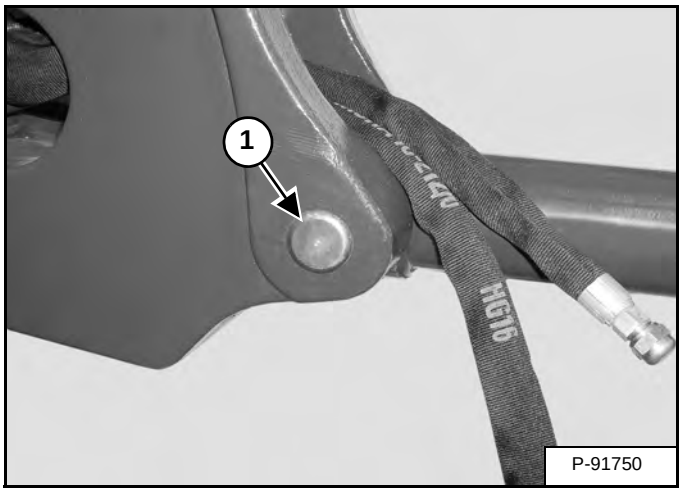


TOW VALVE – Normally in closed position

MS-1892-3

Removal And Installation (Cont'd)

Figure 20-20-15



Remove the pin (Item 1) **[Figure 20-20-15]** from the base end of the cylinder.

Remove the cylinder.

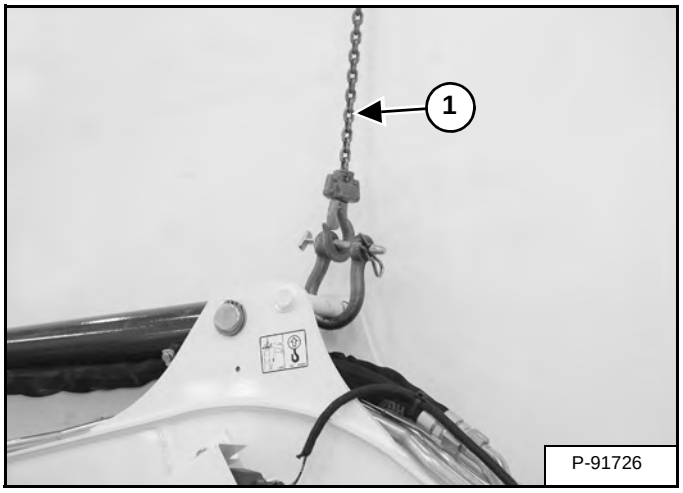
CYLINDER (BOOM) (S/N AG3N11017 & BELOW, AHHE11034 & BELOW)

Testing

Lower the work group to the ground.

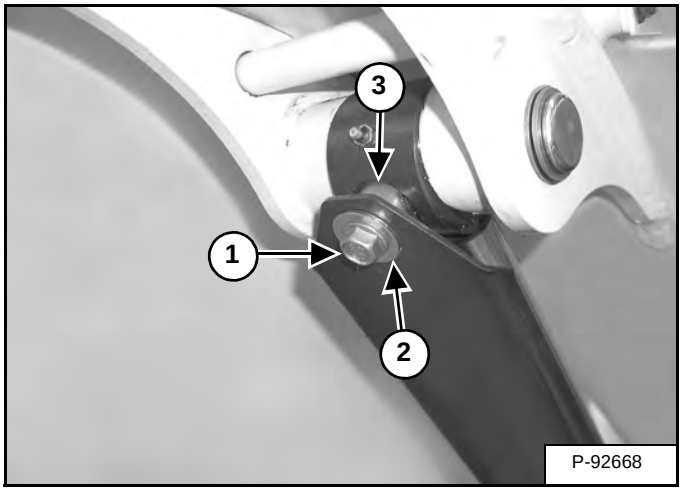
With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 20-21-1



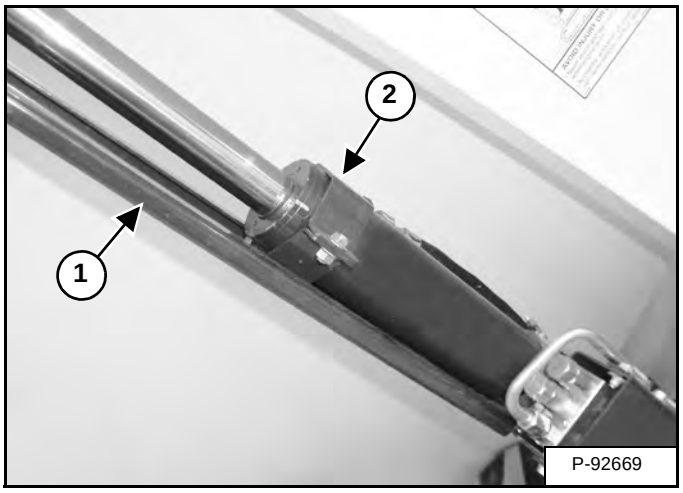
Support the boom with a chain hoist (Item 1) **[Figure 20-21-1]**.

Figure 20-21-2



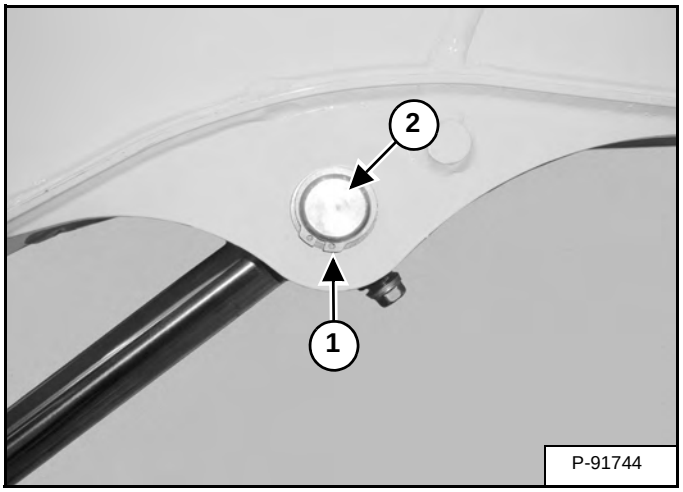
Remove the boom shield bolt (Item 1), washer (Item 2), spring washer and spacer (Item 3) **[Figure 20-21-2]**.

Figure 20-21-3



Slide the shield (Item 1) off of the bracket (Item 2) **[Figure 20-21-3]**.

Figure 20-21-4

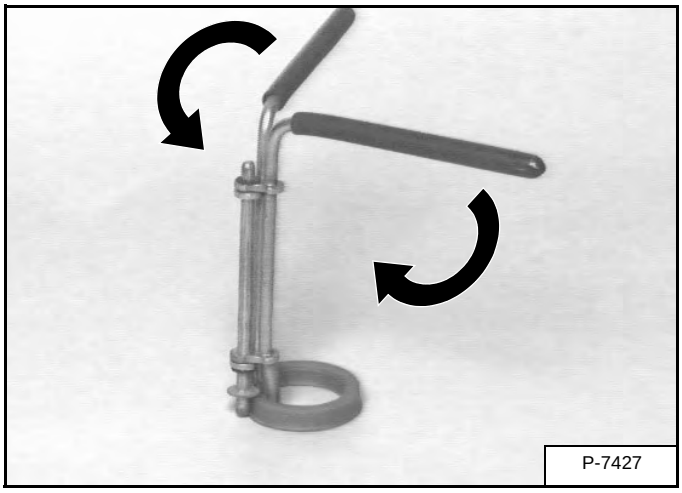


Remove the snap ring (Item 1) **[Figure 20-21-4]** and washer.

Remove the rod end pin (Item 2) **[Figure 20-21-4]**.

Assembly (Cont'd)

Figure 20-21-27

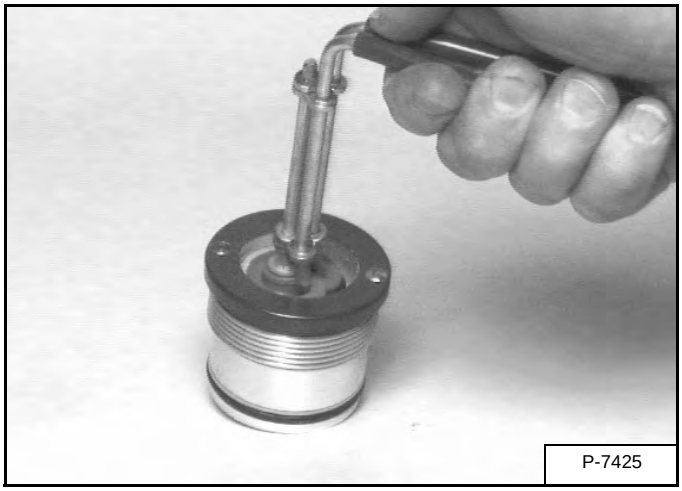


Install the rod seal on the rod seal tool **[Figure 20-21-27]**.

NOTE: During installation the spring side of the seal must be toward the inside of the cylinder.

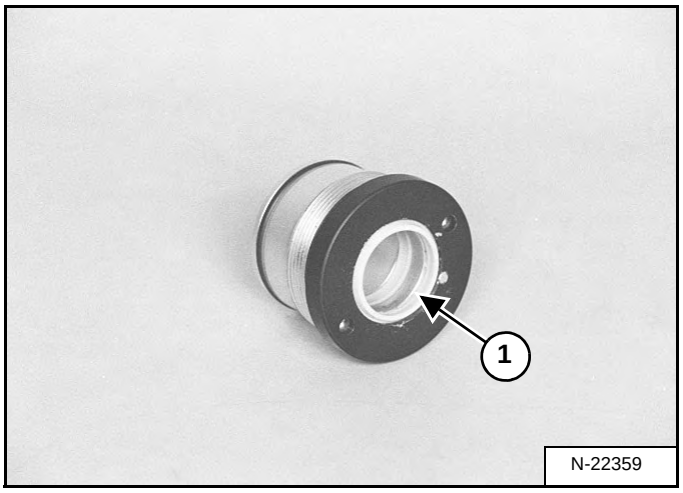
Rotate the handles to collapse the rod seal **[Figure 20-21-27]**.

Figure 20-21-28



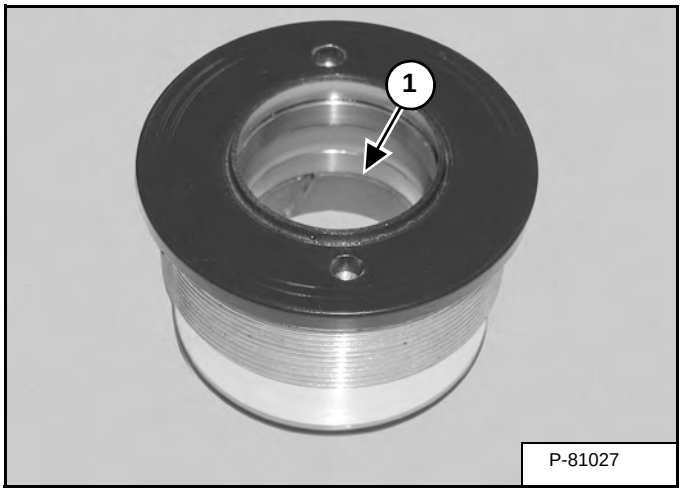
Install the rod seal in the head **[Figure 20-21-28]**.

Figure 20-21-29



Install the wiper seal with the wiper (Item 1) **[Figure 20-21-29]** toward the outside of the head.

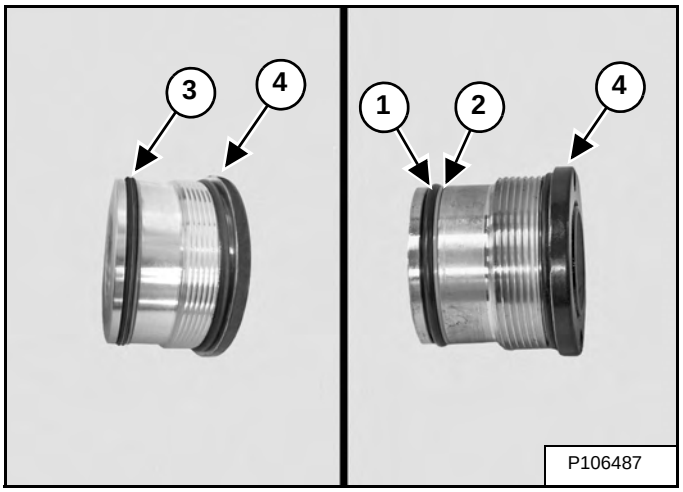
Figure 20-21-30



Install the wear ring (Item 1) **[Figure 20-21-30]**.

Disassembly (Cont'd)

Figure 20-22-17

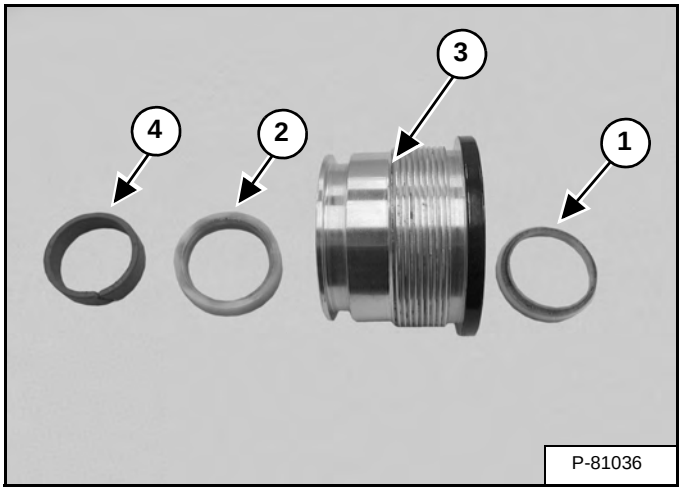


Remove the O-ring (Item 1) and the back-up ring (Item 2) or seal (Item 3) **[Figure 20-22-17]**.

NOTE: The seal kit may contain the O-ring / back-up ring or seal.

Remove the O-ring (Item 4) **[Figure 20-22-17]**.

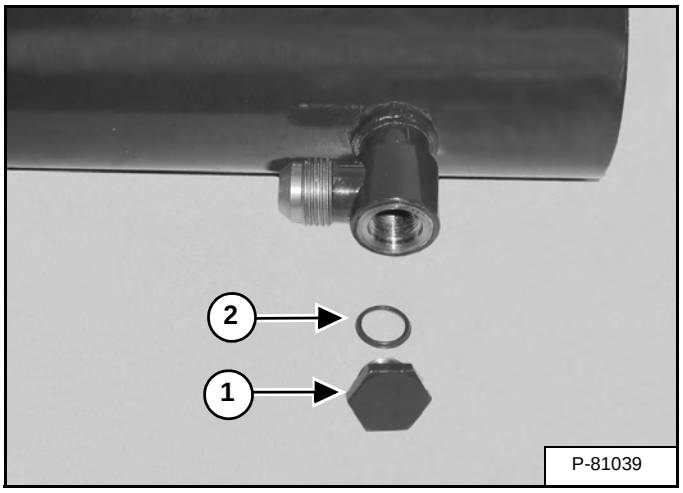
Figure 20-22-18



Remove the wiper seal (Item 1) and rod seal (Item 2) from the inside of the head (Item 3) **[Figure 20-22-18]**.

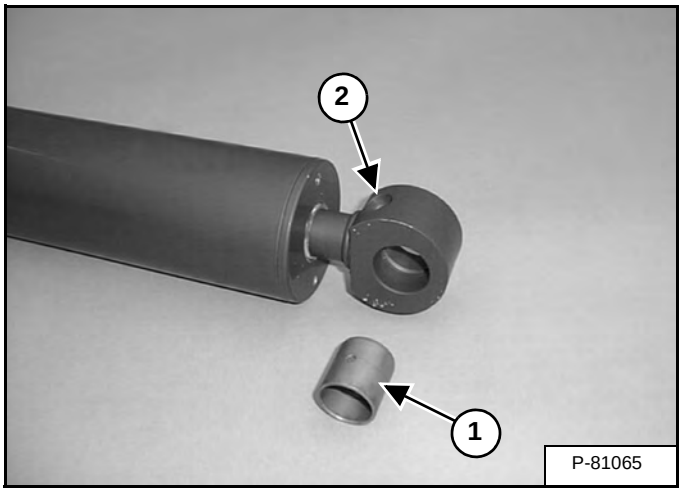
Remove the wear ring (Item 4) **[Figure 20-22-18]**.

Figure 20-22-19



Remove plug (Item 1) and O-ring (Item 2) **[Figure 20-22-19]**.

Figure 20-22-20

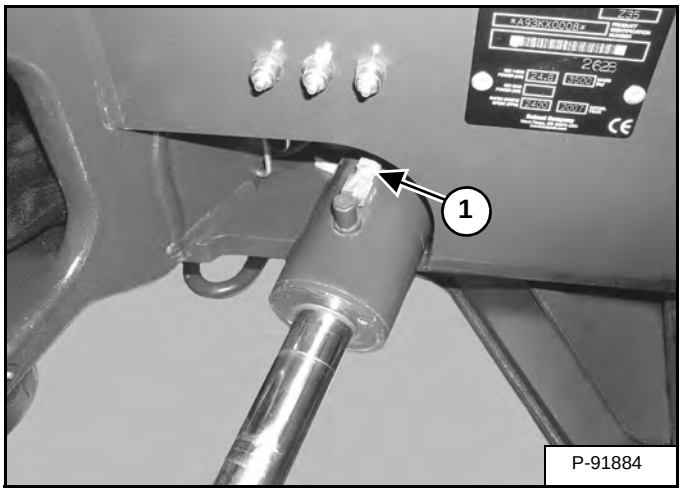


Remove the seals bushing (Item 1) **[Figure 20-22-20]**.

Replace the grease fitting (Item 2) **[Figure 20-22-20]** if damaged or missing.

Removal And Installation (Cont'd)

Figure 20-23-14



Remove the hose (Item 1) **[Figure 20-23-14]**

Remove the cylinder.

CYLINDER (BUCKET) (CONT'D)

Removal And Installation

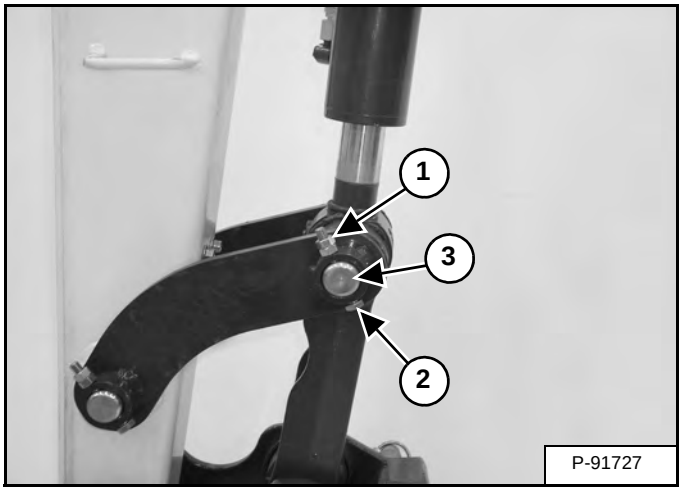
Lower the work group to the ground.

With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 20-24-6

Support the boom using a chain hoist **[Figure 20-24-6]**.

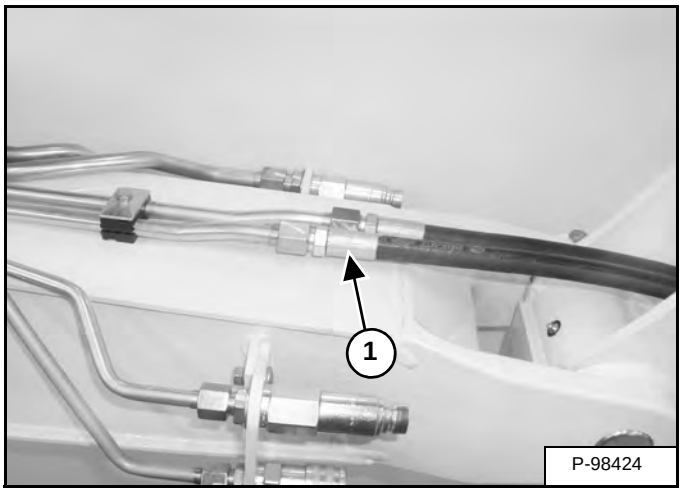
Figure 20-24-7



Remove the nuts (Item 1) and bolt (Item 2) **[Figure 20-24-7]**.

Remove the pin (Item 3) **[Figure 20-24-7]**.

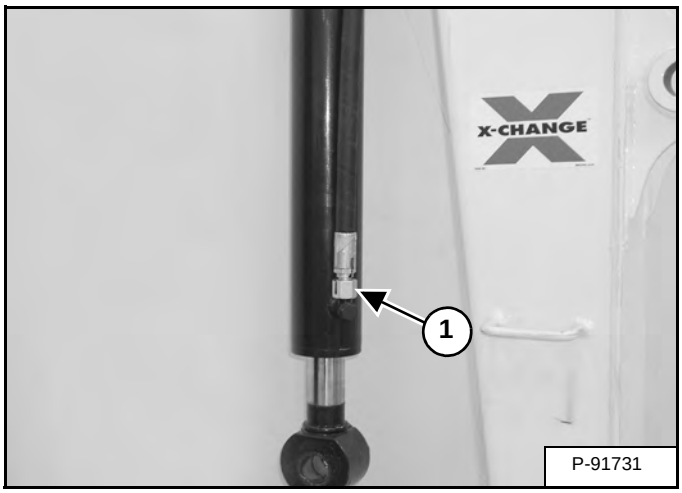
Figure 20-24-8



Remove the base end hose (Item 1) **[Figure 20-24-8]**.

NOTE: The hose will be removed with the cylinder.

Figure 20-24-9



Remove the hose (Item 1) **[Figure 20-24-9]**.

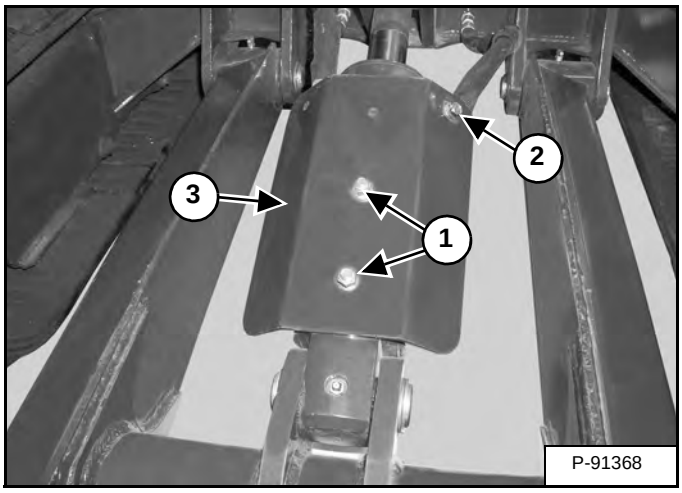
CYLINDER (BLADE) (CONT'D)

Removal And Installation

Lower the work group to the ground.

Stop the engine. With the key in the ON position, move the blade control to release the hydraulic pressure. Raise the control console.

Figure 20-25-7

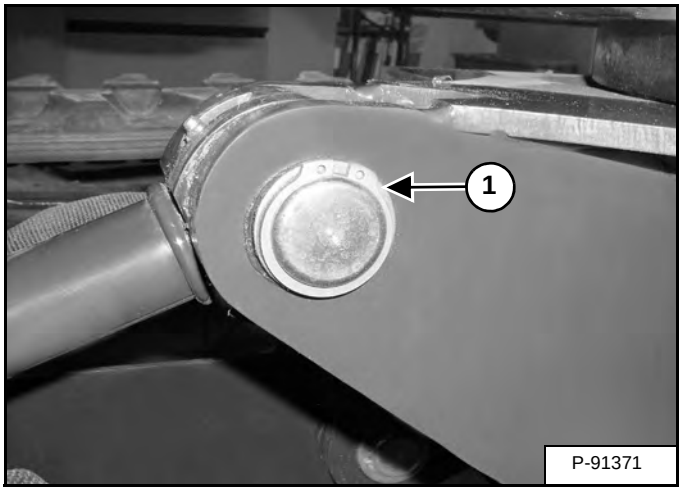


Remove the two nuts (Item 1) **[Figure 20-25-7]** from the studs.

Remove the bolt (Item 2) **[Figure 20-25-7]** and nut from the cylinder shields.

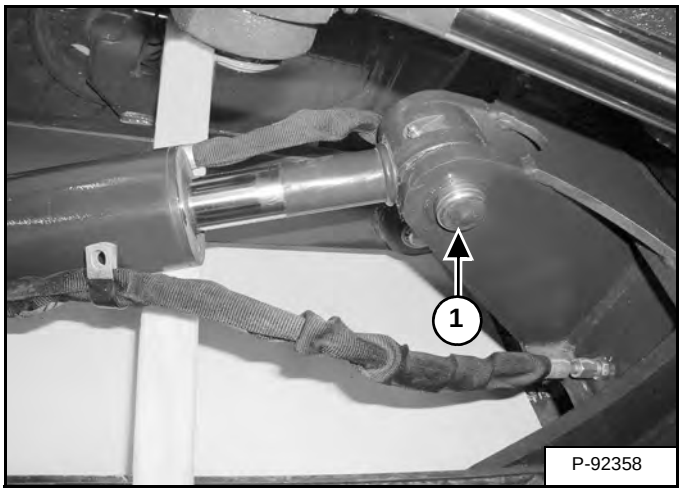
Remove the shield (Item 3) **[Figure 20-25-7]**.

Figure 20-25-8



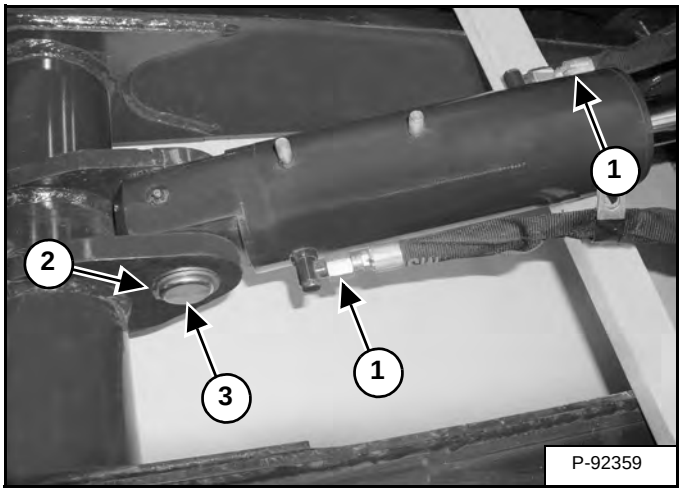
Remove the snap ring (Item 1) **[Figure 20-25-8]** and washer from the cylinder rod end.

Figure 20-25-9



Support the cylinder and remove the pin (Item 1) **[Figure 20-25-9]**.

Figure 20-25-10



Remove the hoses (Item 1) **[Figure 20-25-10]**.

Remove the base end snap ring and washer (Item 2) **[Figure 20-25-10]**.

Remove the base end pin (Item 3) **[Figure 20-25-10]** and remove the blade cylinder.

IMPORTANT

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

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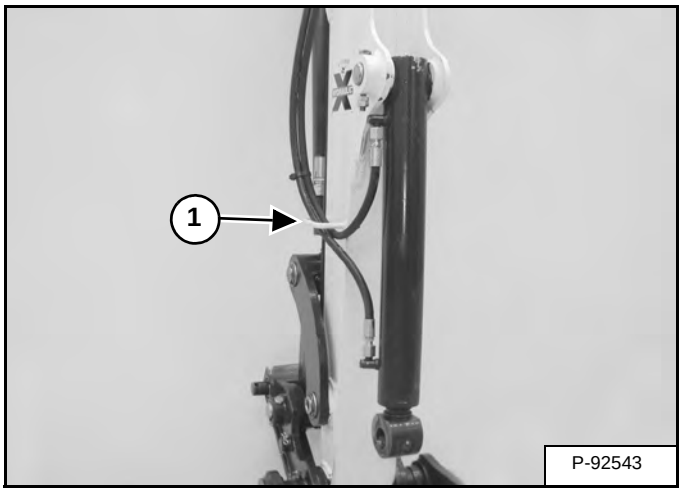
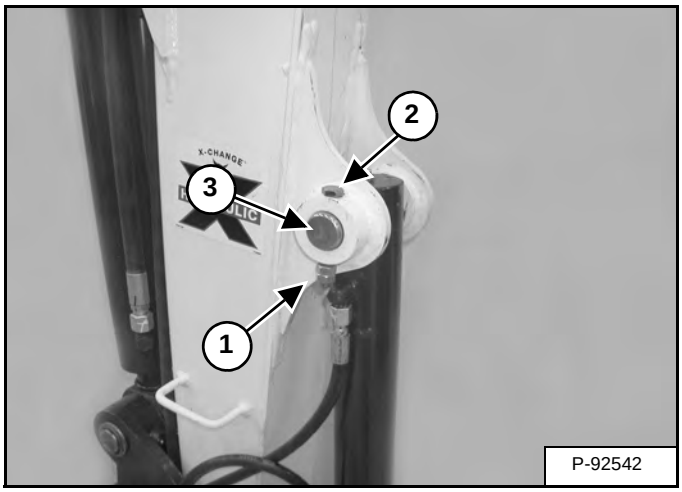
Removal And Installation (Cont'd)

Figure 20-26-8



Remove the hoses from the bottom hose guide (Item 1) **[Figure 20-26-8]**.

Figure 20-26-9



Remove the nuts (Item 1) and bolt (Item 2) **[Figure 20-26-9]**.

Remove the pin (Item 3) **[Figure 20-26-9]** and remove the cylinder.

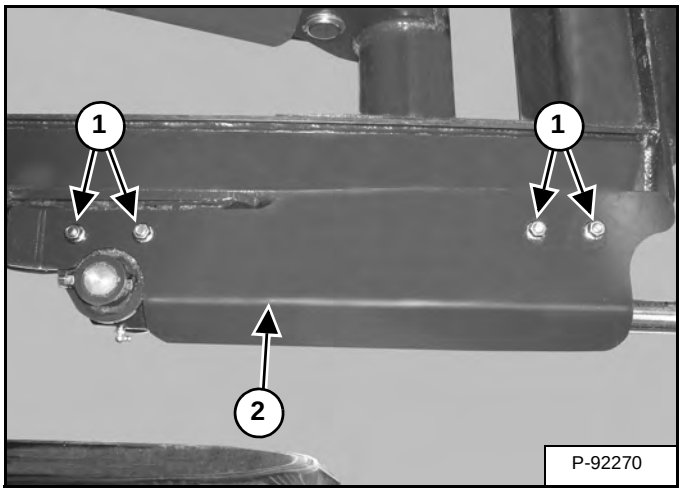
CYLINDER (ANGLE BLADE)

Testing

Lower the work equipment to the ground.

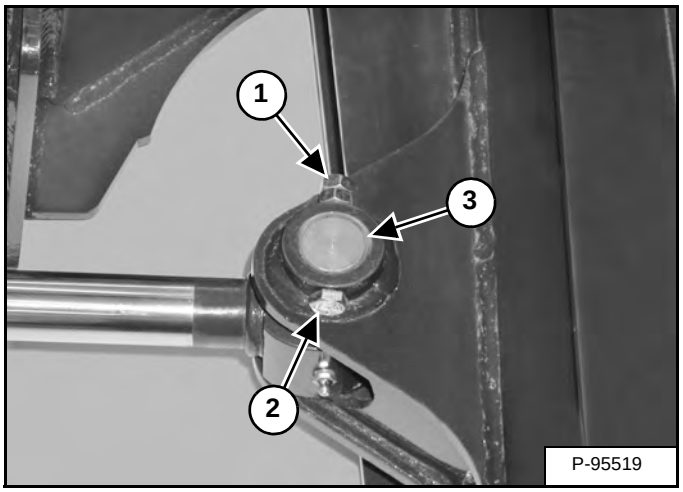
With the engine off, turn the key to the ON position, lower the console and move the blade lever. Press and hold the two speed button to activate angle blade mode, move the lever again to relieve hydraulic pressure.

Figure 20-27-1



Remove the nuts (Item 1) and shield (Item 2) **[Figure 20-27-1]**.

Figure 20-27-2



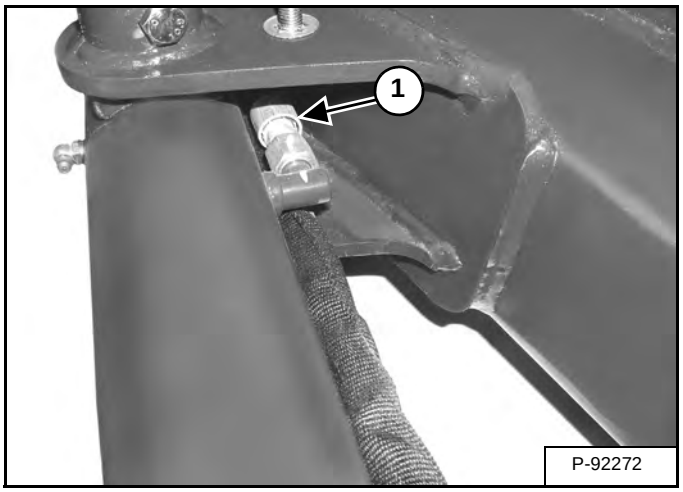
Remove the nuts (Item 1), bolt (Item 2) and pin (Item 3) **[Figure 20-27-2]** from the rod end of the angle blade cylinder.

Start the engine and retract the angle blade cylinder.

With the engine off, turn the key to the ON position and move the blade lever to relieve hydraulic pressure.

Stop the engine.

Figure 20-27-3

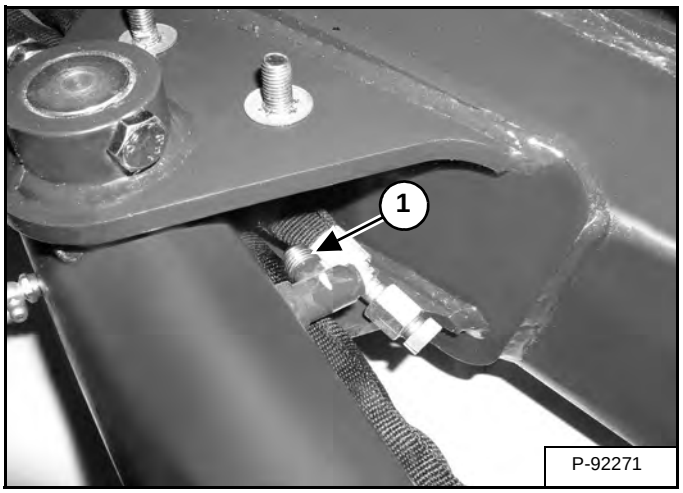


Reposition the cylinder and remove the hose (Item 1) **[Figure 20-27-3]** from the base end of the angle blade cylinder.

Install a plug in the hose.

Start the engine, and retract the angle blade cylinder.

Figure 20-27-4



If there is any leakage from the base end fitting (Item 1) **[Figure 20-27-4]**, remove the cylinder for repair or replacement.

VALVES (MAIN RELIEF)

Testing And Adjusting

The E50 excavator does not have a main relief valve, which can be removed or adjusted. The system pressure is regulated by several components within the hydraulic system. For pressure adjustment, go to the Hydraulic Pump (See HYDRAULIC PUMP on Page 20-50-1.)

HYDRAULIC CONTROL VALVE

Description

The hydraulic control valve is a ten section closed center system and has one load sense relief valve. The load sense relief valve operates at 25000 kPa (250 bar) (3626 psi). The bucket, arm and boom sections have 28999 kPa (290 bar) (4206 psi) work port reliefs.

The auxiliary section has 20995 kPa (210 bar) (3045 psi) work port reliefs.

The angle blade section has a 27000 kPa (270 bar) (3916 psi) work port relief.

The blade section has one 26000 kPa (260 bar) (3771 psi) work port relief operating on the base end of the blade cylinder.

Removal And Installation

Lower the work equipment to the ground.

Stop the engine.

With the engine off, turn the start key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Remove the hydraulic reservoir. (See Removal And Installation on Page 20-140-1.)

Remove the right upperstructure cover. (See Removal And Installation on Page 40-80-1.)

IMPORTANT

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

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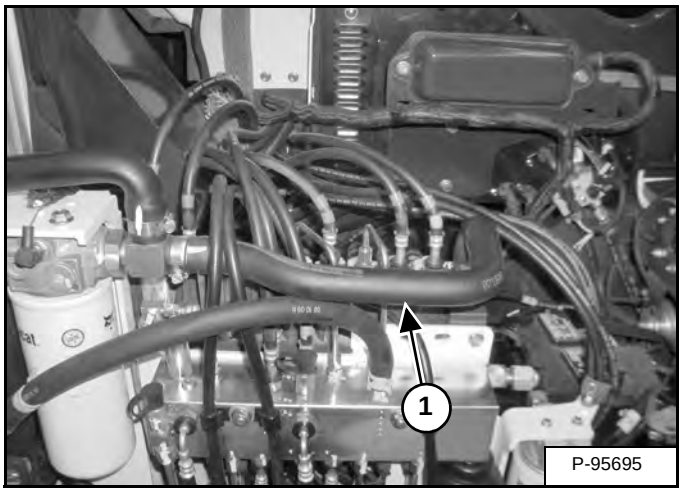
Figure 20-40-1

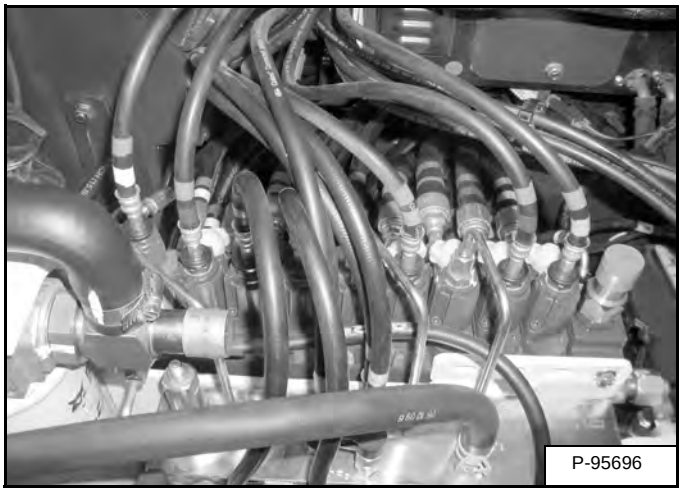


Remove the return hose (Item 1) **[Figure 20-40-1]**.

Installation: Tighten the hose clamps to 6,21 N•m (55 in-lb) torque.

Mark all tubelines and hoses for proper installation.

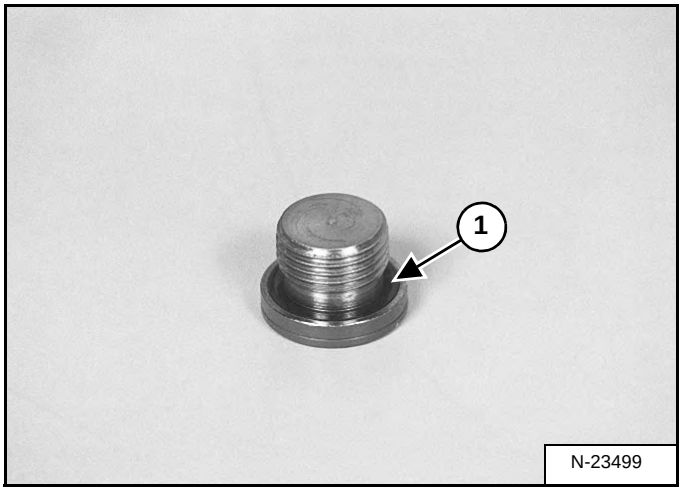
Figure 20-40-2



Remove the pilot pressure hoses and tubelines from the top of the valve **[Figure 20-40-2]**.

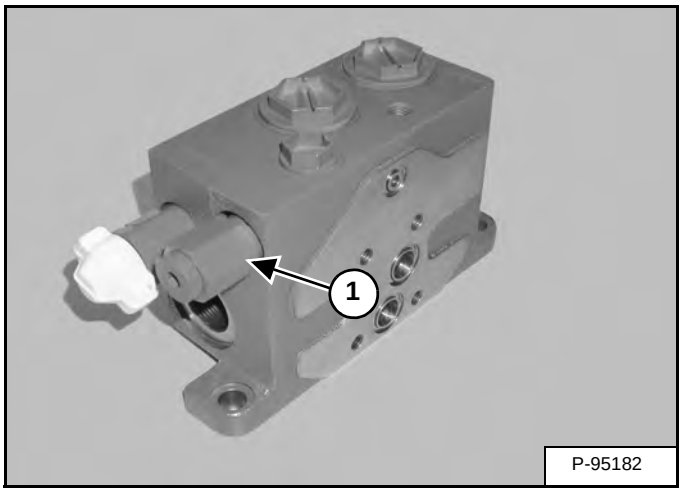
Inlet Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-30



Remove the O-ring (Item 1) **[Figure 20-40-30]**.

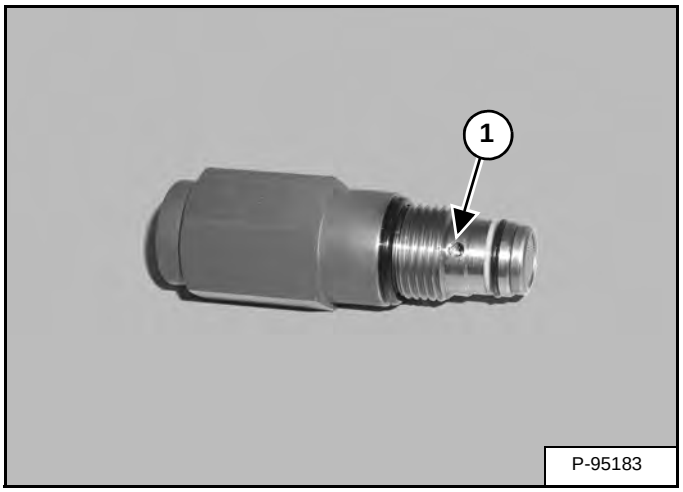
Figure 20-40-31



Remove the load sense bleed valve (Item 1) **[Figure 20-40-31]** from the Inlet section.

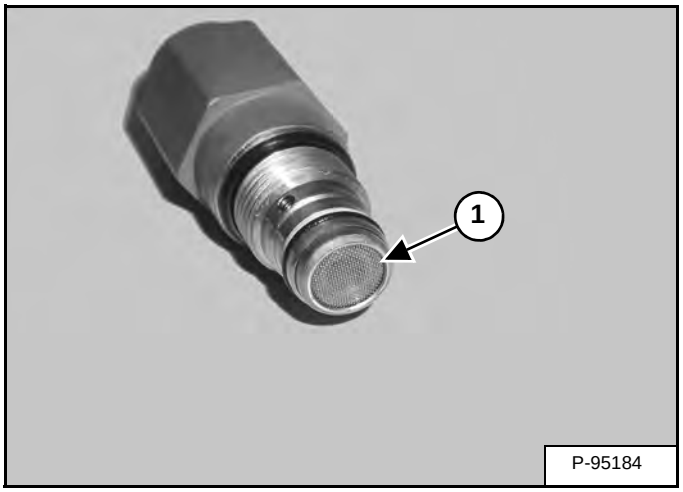
Assembly: Tighten the load sense bleed valve to 18 - 20 N•m (13 - 16 ft-lb) torque.

Figure 20-40-32



Check that the port (Item 1) **[Figure 20-40-32]** in the load sense bleed valve is not plugged.

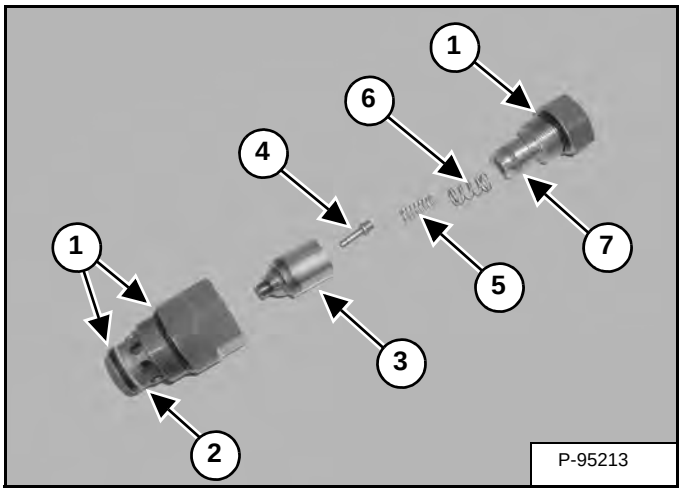
Figure 20-40-33



Check the filter (Item 1) **[Figure 20-40-33]** at the end of the load sense bleed valve.

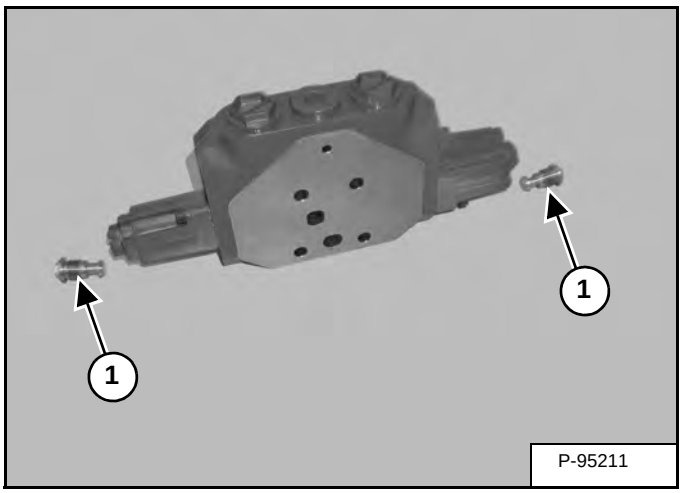
Blade Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-66



Remove the O-rings (Item 1), back-up ring (Item 2), sleeve (Item 3), poppet (Item 4), spring (Item 5), spring (Item 6), and seal (Item 7) **[Figure 20-40-66]**.

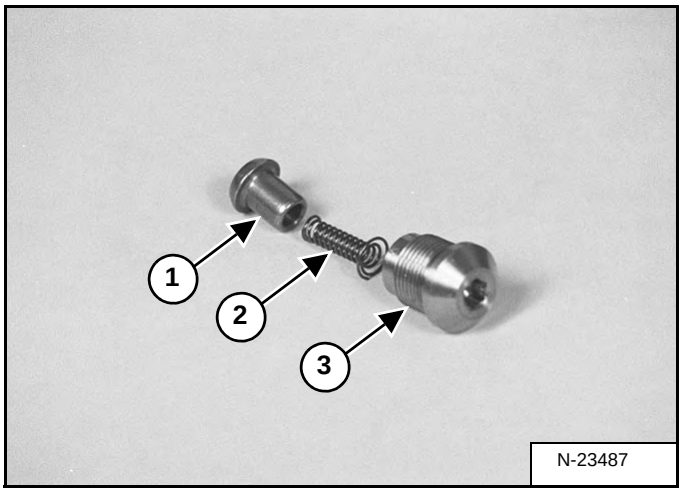
Figure 20-40-67



With a hex wrench remove the load check valve assembly (Item 1) **[Figure 20-40-67]** from both ends of the valve section.

Assembly: Tighten the load check valve assembly to 9 - 11 N•m (80 - 97 in-lb) torque.

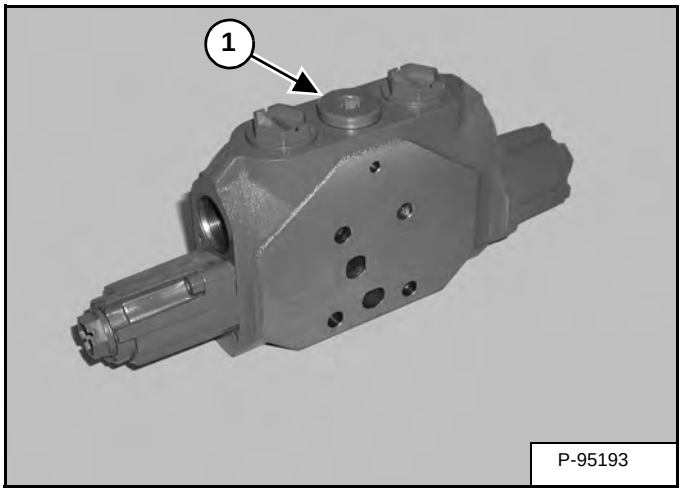
Figure 20-40-68



Remove the seat (Item 1) and spring (Item 2) from the load check valve body (Item 3) **[Figure 20-40-68]**.

NOTE: The load check valve must be replaced as a complete assembly.

Figure 20-40-69



Remove the plug (Item 1) **[Figure 20-40-69]**.

Assembly: Tighten the plug to 63 - 77 N•m (46 - 57 ft-lb) torque.

HYDRAULIC PUMP

Hydraulic Pump Work Sheet

(Please review pump procedure as illustrated in “Pump Testing”. (See Pump Testing on Page 20-50-4.)

The outline listed below, gives the six adjustments for setting the hydraulic pump. The adjustments are listed in the order in which they ***MUST*** be performed. Below each adjustment is a list of the steps. Behind each adjustment is the page location within the Service Manual for the complete adjustment procedure.

1. Run engine at High Idle. Record no load engine rpm. (See Engine on Page SPEC-10-9.)

2. Adjust Engine rpm (If necessary).

I. Test Fitting Installation. (See Test Fitting Installation on Page 20-50-4.)

3. Remove the plug from the valve. Install the coupler and the return hose from the hydraulic tester to the return fitting on the control valve.

4. Remove the cap from the valve and install the inlet hose from the tester to the fitting on the hydraulic control valve.

5. Install the jumper hose on the load sense test port and pump pressure test port.

6. With the engine at High Idle, turn the hydraulic tester flow control clockwise until 6895 kPa (69 bar) (1000 psi) is shown on the gauge. Restrict the oil until it is at a minimum of 66°C (150°F).

7. Turn the hydraulic tester flow control counterclockwise until all restriction is removed.

_____ **ENGINE RPM**

II. Minimum Displacement Adjustment. (See Minimum Displacement Adjustment on Page 20-50-6.)

8. Disconnect the load sense hose at the pump. Plug the hose and install a hose from the hydraulic load sense fitting to the reservoir.

9. Run engine at High Idle.

10. Adjust hydraulic tester to 9653 - 10342 kPa (97 - 103 bar) (1400 - 1500 psi), pump flow should be 9,5 - 17 L/min (2.5 - 4.5 U.S. gpm).

11. Record the flow.

_____ **FLOW**

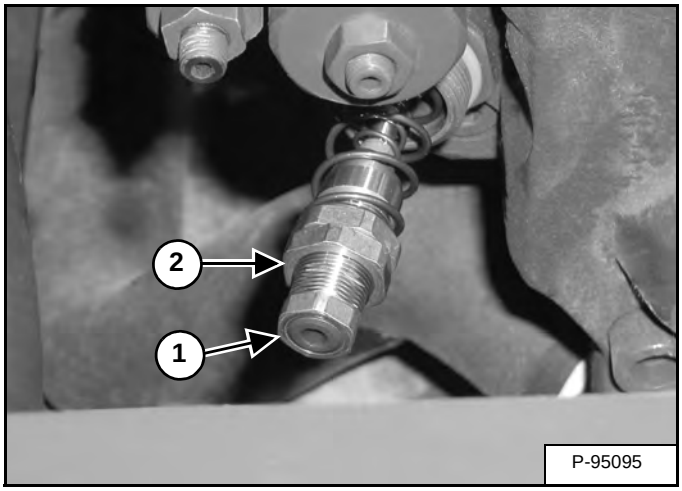
12. Adjust the minimum displacement adjustment stop screw at the pump as needed.

13. At the manifold, disconnect the hose from the pump diagnostic port to the load sense diagnostic port.

Pump Testing (Cont'd)

Torque Limiter Adjustment (Cont'd)

Figure 20-50-25



Check that the small nut (Item 1) **[Figure 20-50-25]** is locked in place.

Adjust the flow at the hydraulic pump torque limiter loosening the front large nut (Item 2) **[Figure 20-50-25]**. With a hex wrench adjust the *flow at low pressure*.

Reinstall the cap on the hydraulic pump torque limiter and tighten.

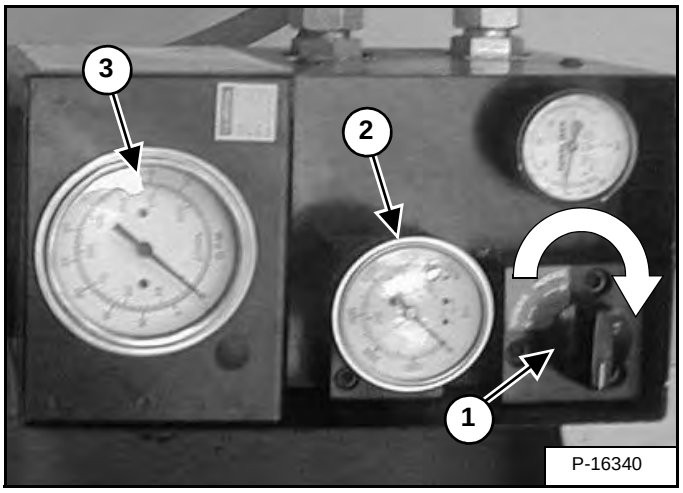
Start the engine and retest the flow rate.

When the proper flow is obtained, **98,4 - 113,5 L/min (26 - 30 U.S. gpm) at 13031 kPa (130 bar) (1890 psi)**, tighten the large nut (Item 2) **[Figure 20-50-25]**.

NOTE: When adjusting the flow at low pressure, the engine rpm must not fall below 2200 rpm.

If this flow at low pressure cannot be obtained, remove and replace the torque limiter spool assembly.

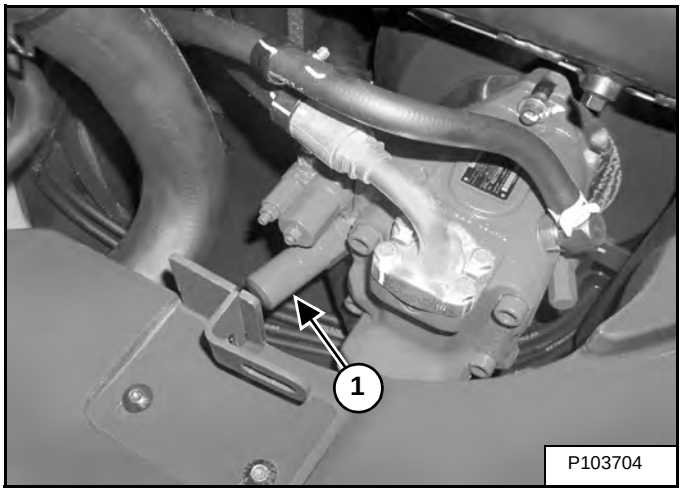
Figure 20-50-26



Turn the hydraulic tester flow control (Item 1) clockwise until the gauge (Item 2) reads **22753 kPa (228 bar) (3300 psi)**. Record the amount of flow at the tester gauge (Item 3) **[Figure 20-50-26]**, which is the *flow at high pressure*.

The flow should be approximately **49 - 54 L/min (13 - 17 U.S. gpm)**.

Figure 20-50-27

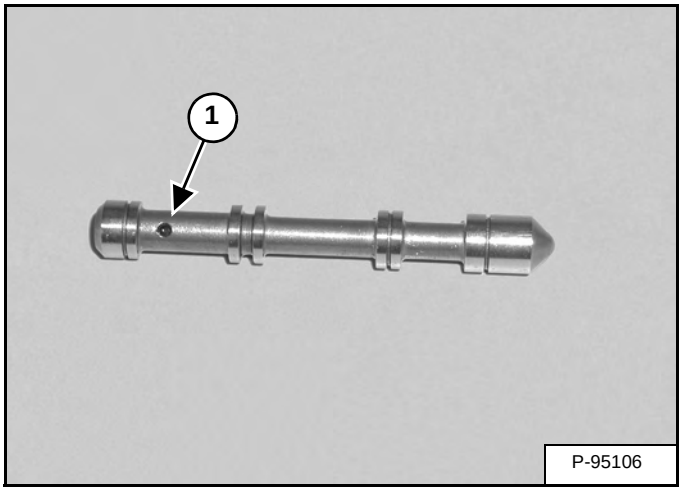


If the flow at high pressure must be adjusted, adjust the flow at the hydraulic pump torque limiter. Stop the engine, remove the torque limiter cover (Item 1) **[Figure 20-50-27]**.

Pump Control Disassembly And Assembly (Cont'd)

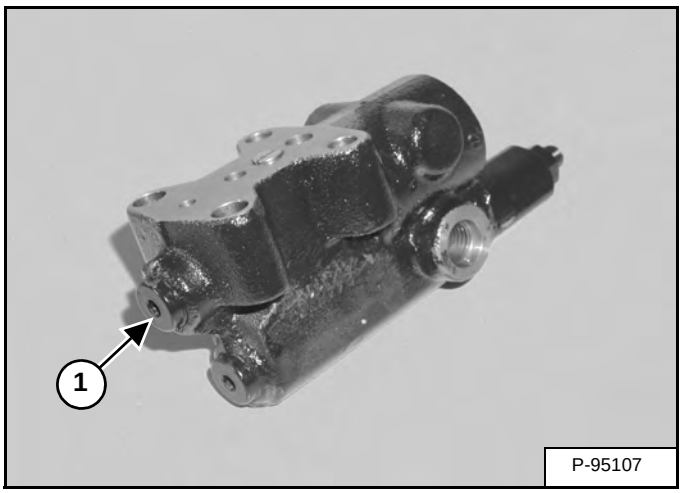
Back-up Relief Valve (Cont'd)

Figure 20-50-49



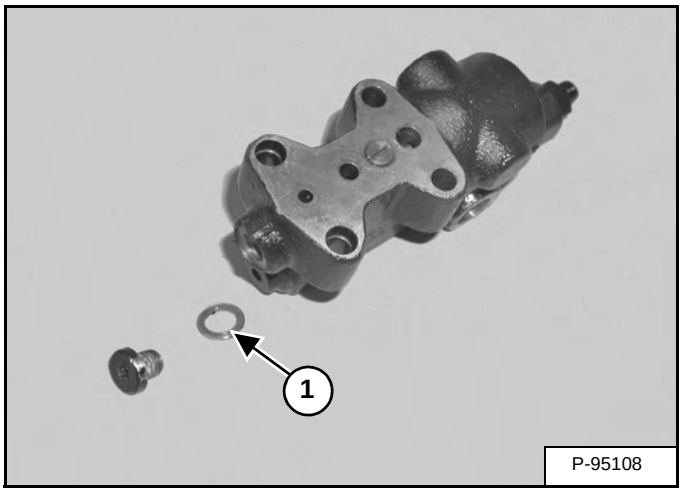
Check the spool for scratches. Make sure the orifice (Item 1) **[Figure 20-50-49]** is not plugged.

Figure 20-50-50



Remove the plug (Item 1) **[Figure 20-50-50]** from the back-up relief valve on the pump control.

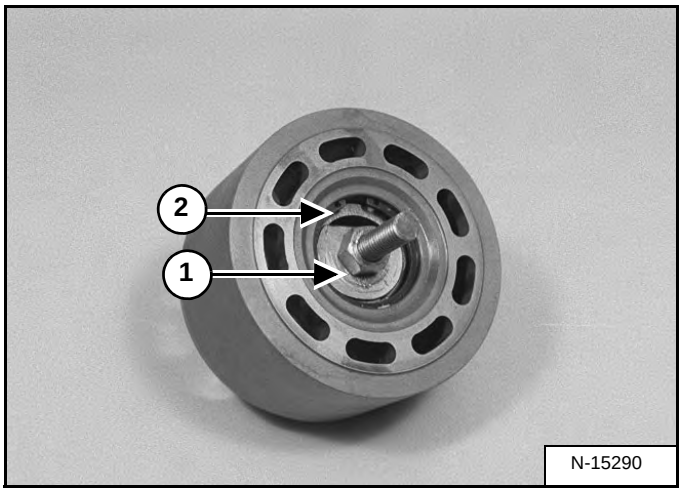
Figure 20-50-51



Check the O-ring washer (Item 1) **[Figure 20-50-51]** and replace as needed.

Disassembly And Assembly (Cont'd)

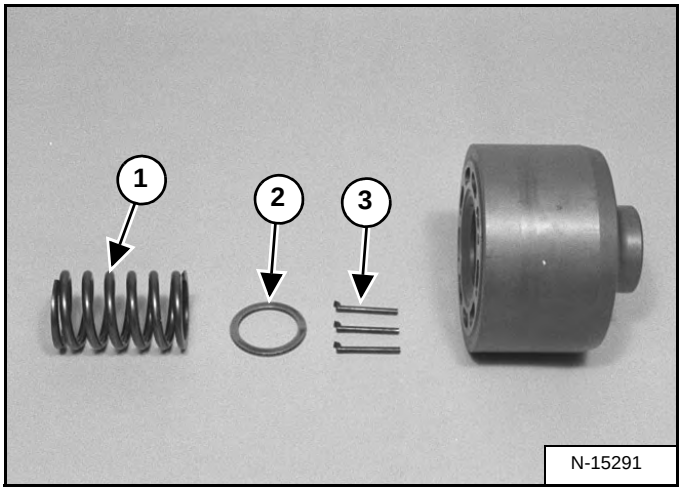
Figure 20-50-81



Tighten the nut (Item 1) until the spring is compressed enough to remove the snap ring (Item 2) **[Figure 20-50-81]**.

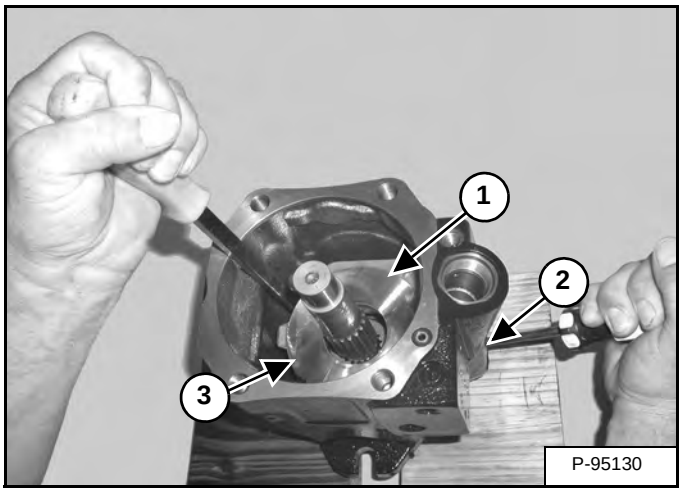
Loosen the nut to release the tension on the spring and remove the bolts and washers.

Figure 20-50-82



Remove the spring (Item 1), the washer (Item 2), and the pins (Item 3) **[Figure 20-50-82]** from the cylinder block.

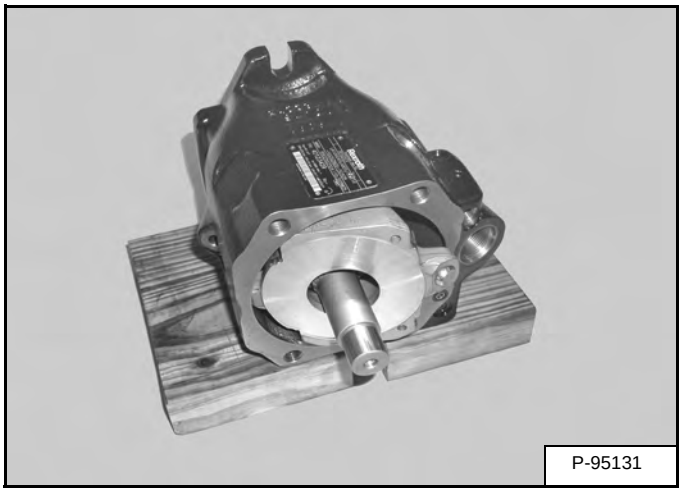
Figure 20-50-83



NOTE: The swash plate is held in place with the tension of a spring (Item 1) [Figure 20-50-83]. The spring must be collapsed to allow the swash plate to pivot upwards for removal and installation.

Remove the swash plate (Item 1) by accessing the spring from the side of the pump housing (Item 2) and compressing the spring towards the bench. Pivot the side of the swash plate (Item 3) **[Figure 20-50-83]** up and out of the pump housing.

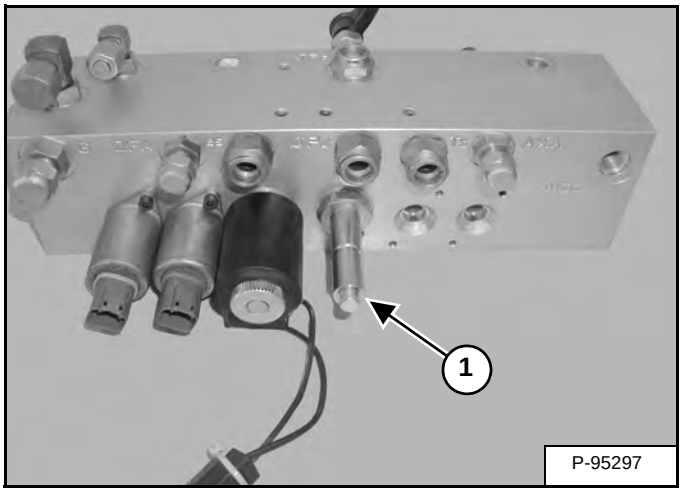
Figure 20-50-84



Remove the shaft and swash plate **[Figure 20-50-84]**.

Disassembly And Assembly (Cont'd)

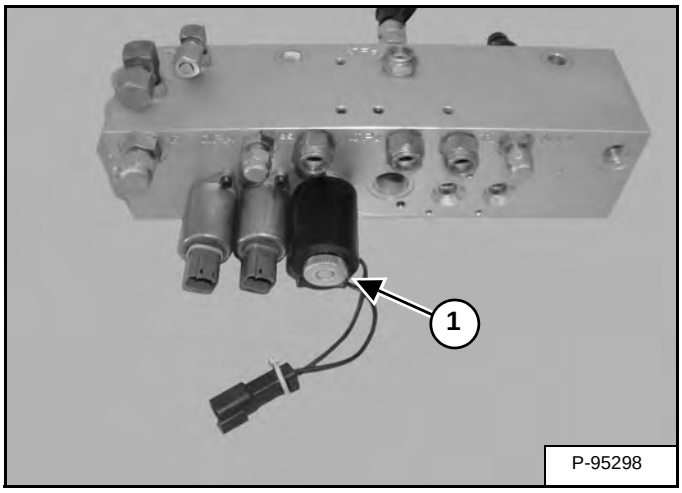
Figure 20-60-13



Remove the spool (Item 1) **[Figure 20-60-13]**.

Installation: Tighten the spool to 30 N•m (22 ft-lb) torque.

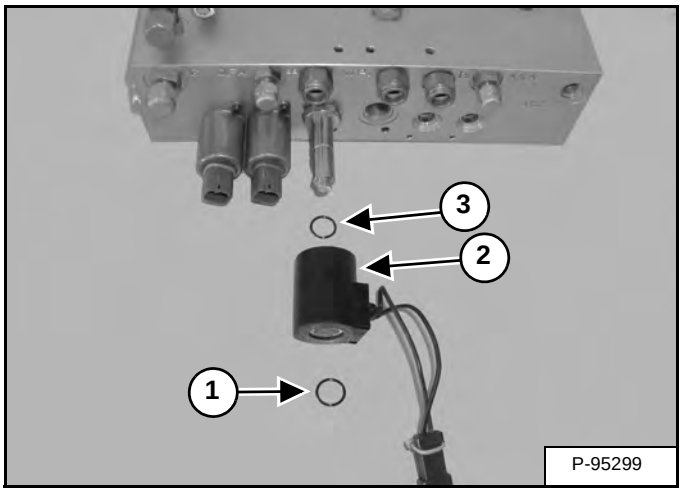
Figure 20-60-14



Remove the nut (Item 1) **[Figure 20-60-14]**.

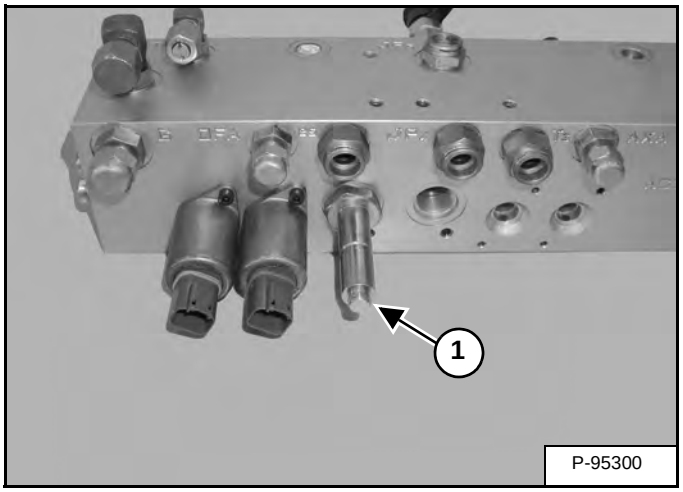
Installation: Tighten the nut to 4,1 - 6,1 N•m (36 - 54 in-lb) torque.

Figure 20-60-15



Remove the O-ring (Item 1), coil (Item 2) and O-ring (Item 3) **[Figure 20-60-15]**.

Figure 20-60-16

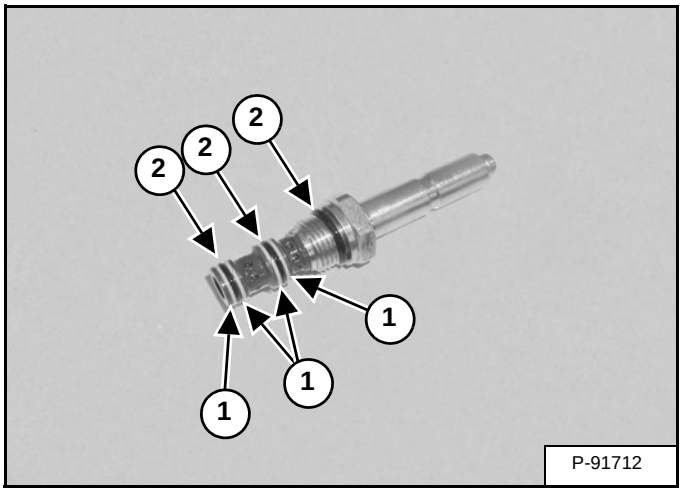


Remove the spool (Item 1) **[Figure 20-60-16]**.

Installation: Tighten the spool to 30 N•m (22 ft-lb) torque.

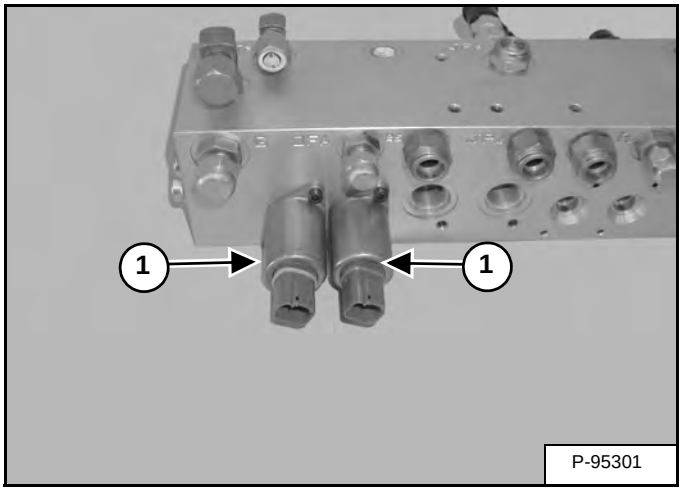
Disassembly And Assembly (Cont'd)

Figure 20-61-17



Remove the back-up rings (Item 1) and O-rings (Item 2) **[Figure 20-61-17]** from both spools.

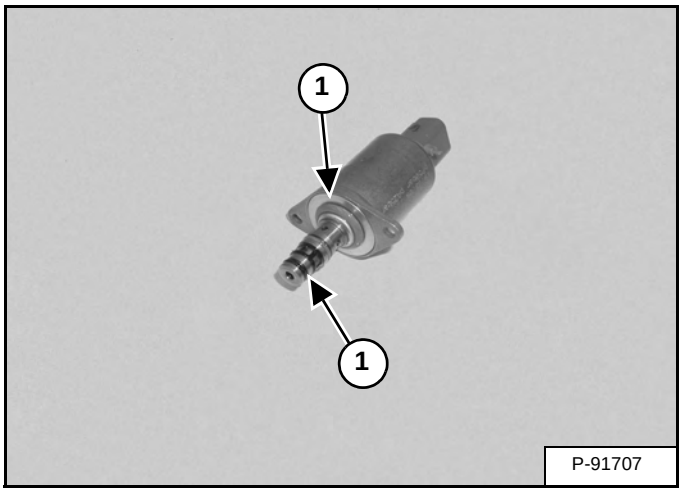
Figure 20-61-18



Remove the screws and solenoids (Item 1) **[Figure 20-61-18]**.

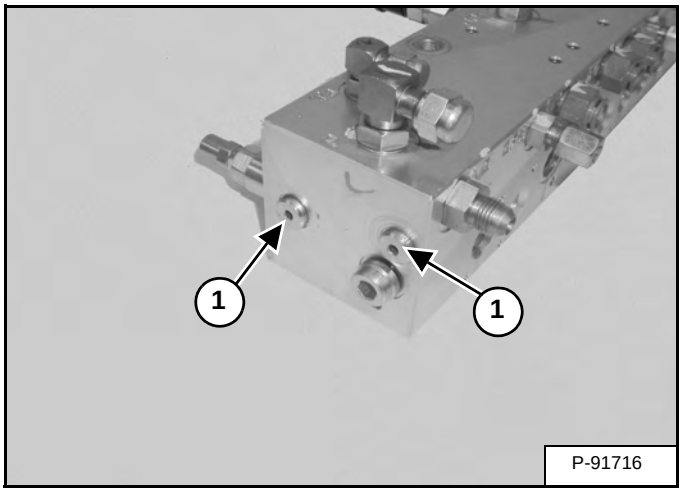
Installation: Tighten the screws to 3 N•m (27 in-lb) torque.

Figure 20-61-19



Remove the O-rings (Item 1) **[Figure 20-61-19]**.

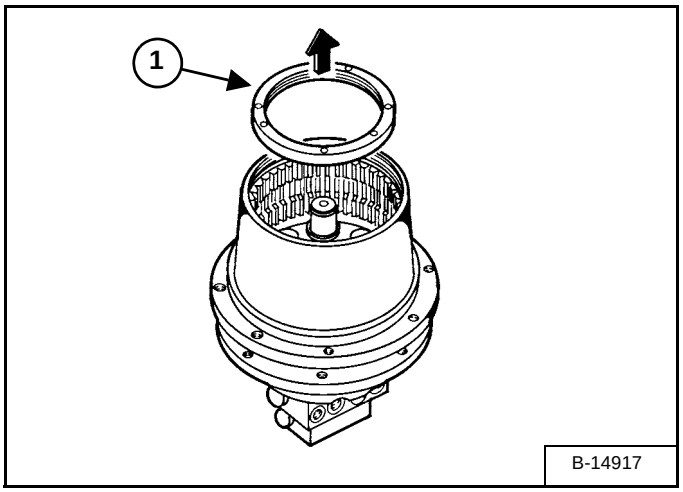
Figure 20-61-20



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

Disassembly (Cont'd)

Figure 20-70-15



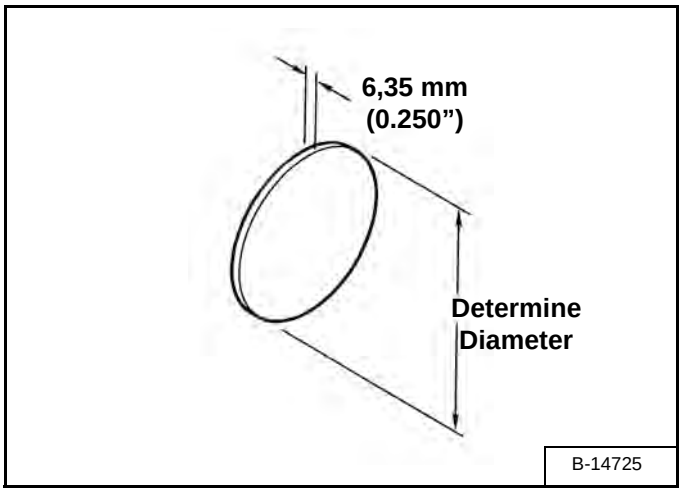
Use the spanner wrench to remove the ring nut (Item 1) **[Figure 20-70-15]**.

Remove the shim(s) (if equipped) from the hub.

Before the housing can be pulled from the hub, a plate must be placed on the three pins of the planetary carrier.

The plate will provide support for the three jaw puller.

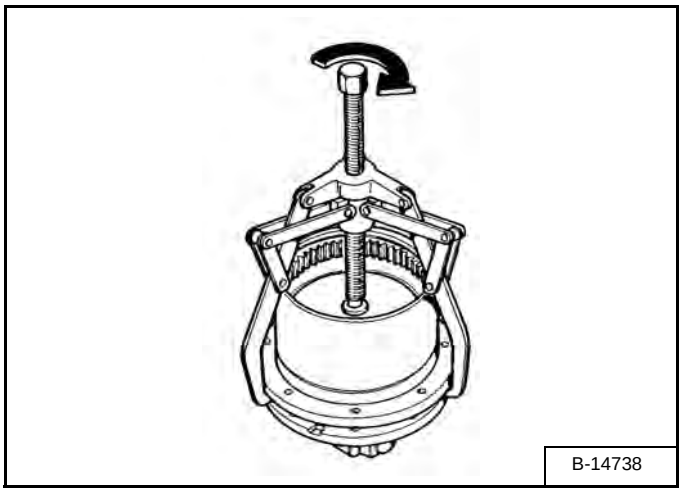
Figure 20-70-16



Fabricate or obtain the plate locally **[Figure 20-70-16]**.

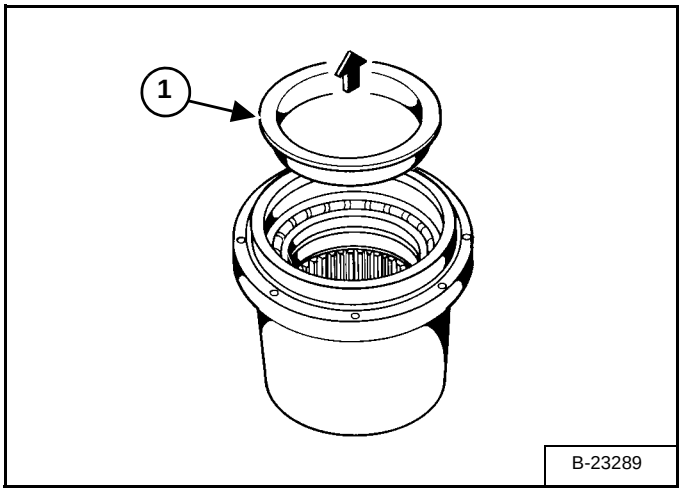
Select a plate that fits over the outer edges of the three pins.

Figure 20-70-17



Using a three jaw puller, separate the hub and housing **[Figure 20-70-17]**.

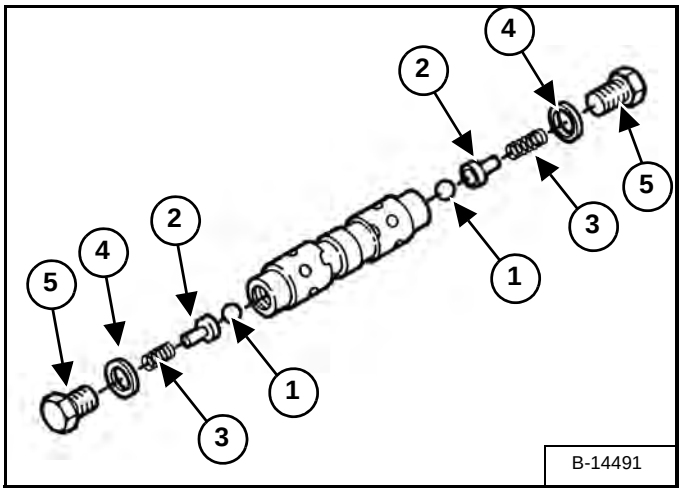
Figure 20-70-18



Remove the seal ring (Item 1) **[Figure 20-70-18]** from the housing.

Assembly (Cont'd)

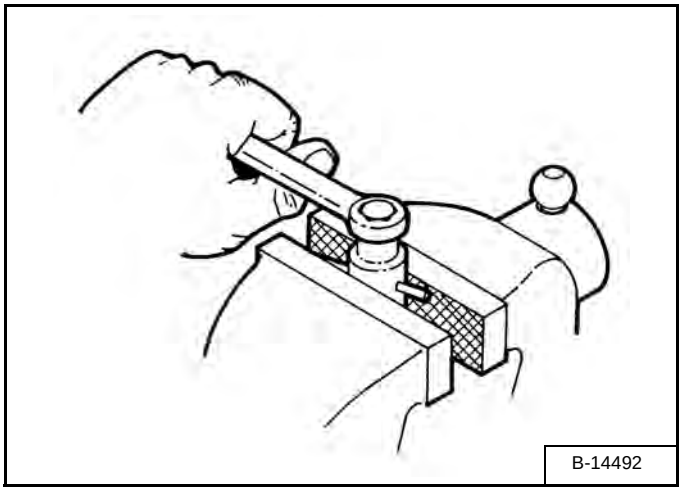
Figure 20-70-55



Install the check ball (Item 1), poppet (Item 2) and spring (Item 3) **[Figure 20-70-55]** in both ends of the spool.

Apply oil to and install the new O-rings (Item 4) on the plugs (Item 5) **[Figure 20-70-55]**.

Figure 20-70-56



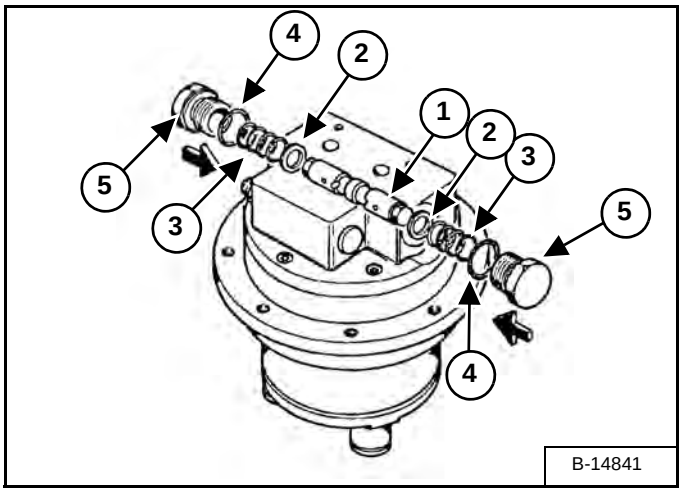
To assemble the spool, insert a hardened pin through the hole in the spool and use a vise with protective jaws to hold the spool **[Figure 20-70-56]**.

NOTE: Do not use any type of tool to grip the spool or damage to the spool will result.

Install the plug in both ends of the spool **[Figure 20-70-56]**.

Tighten the plugs to 25 - 30 N•m (18 - 22 ft-lb) torque.

Figure 20-70-57



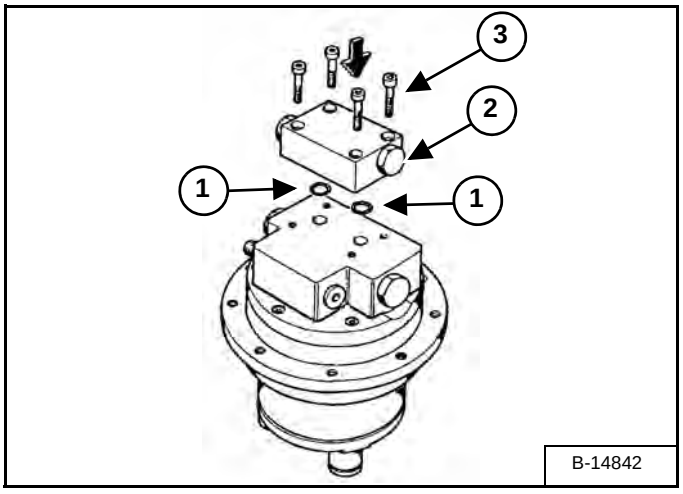
Apply oil to and install the spool (Item 1) **[Figure 20-70-57]** in the motor cover.

Install the washers (Item 2) and springs (Item 3) on both ends of the spool (Item 1) **[Figure 20-70-57]**.

Apply oil to and install new O-rings (Item 4) on the plugs (Item 5) **[Figure 20-70-57]**.

Install the plugs (Item 5) **[Figure 20-70-57]** in the motor cover.

Figure 20-70-58

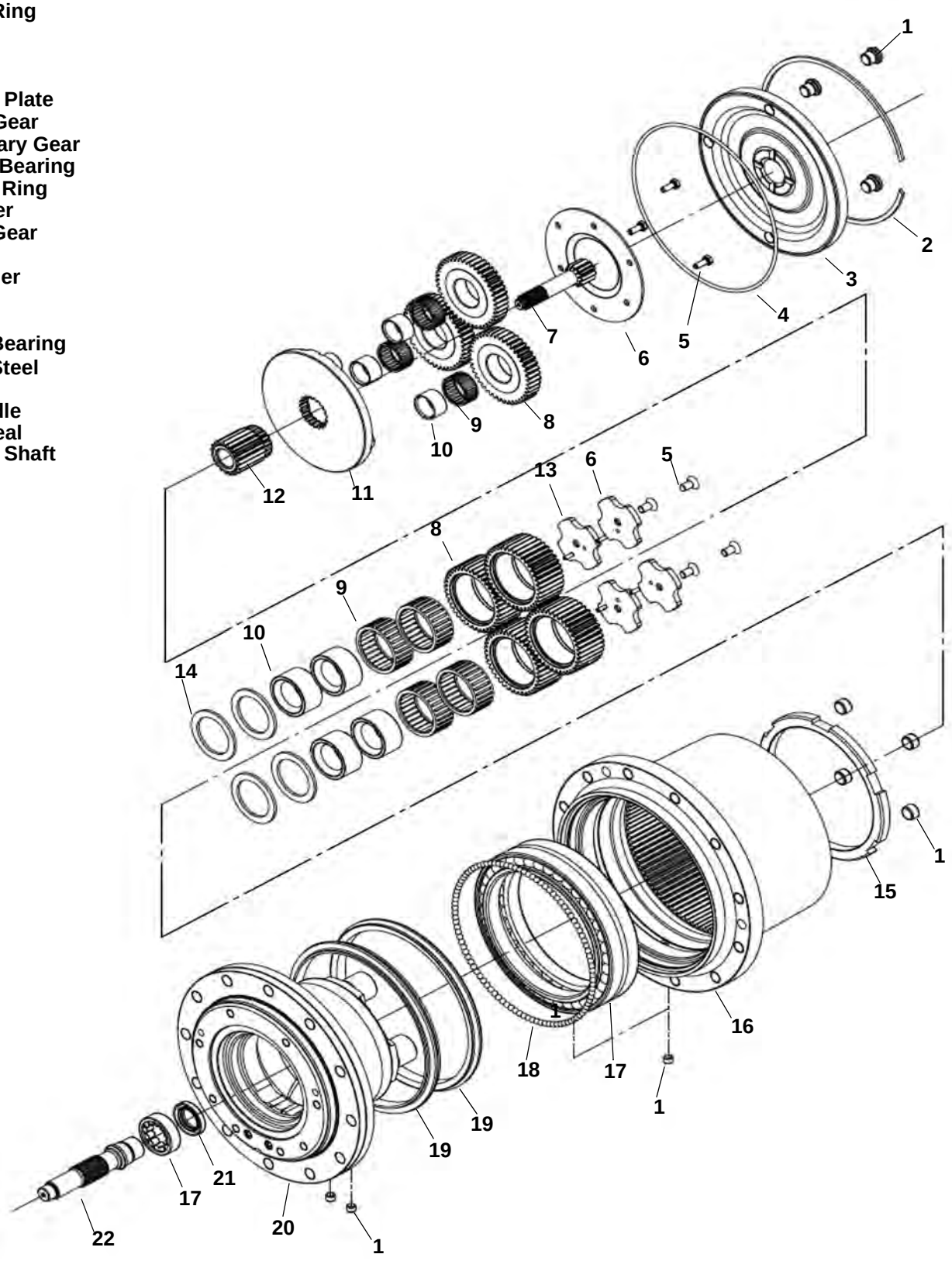


Apply oil to and install the two O-rings (Item 1) **[Figure 20-70-58]**.

Install the relief valve (Item 2) and the four screws (Item 3) **[Figure 20-70-58]**. Tighten the screws to 25 - 28 N•m (18 - 21 ft-lb) torque.

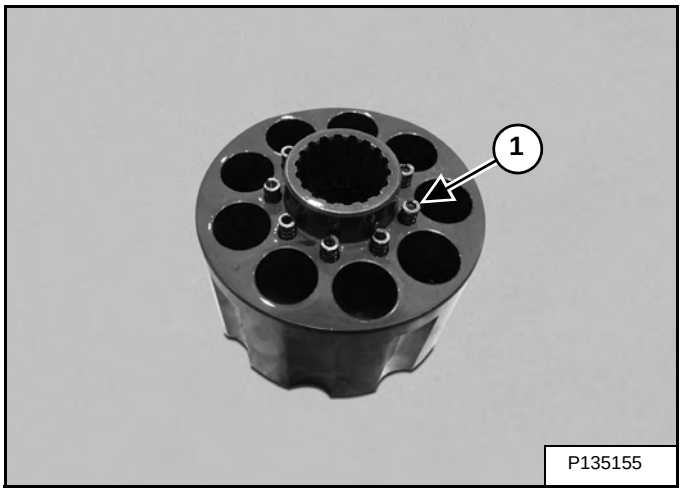
Parts Identification Gear Reduction Hub

1. Plug
2. Snap Ring
3. Cover
4. O-ring
5. Bolt
6. Thrust Plate
7. Drive Gear
8. Planetary Gear
9. Roller Bearing
10. Inner Ring
11. Carrier
12. Sun Gear
13. Pin
14. Washer
15. Nut
16. Hub
17. Ball Bearing
18. Ball Steel
19. Seal
20. Spindle
21. Oil Seal
22. Drive Shaft



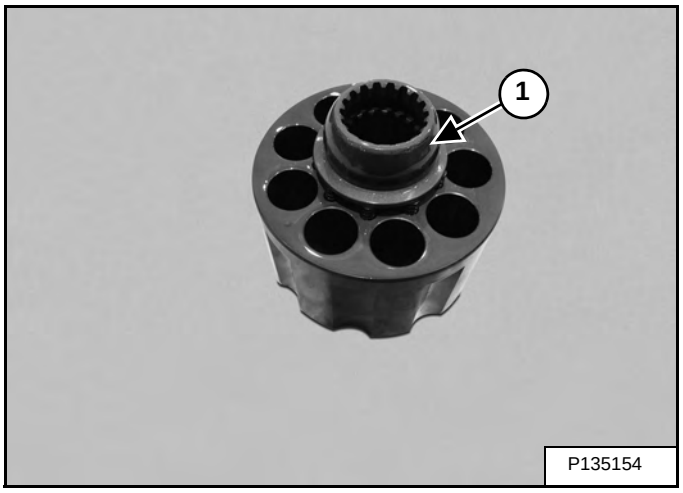
Assembly (Cont'd)

Figure 20-71-37



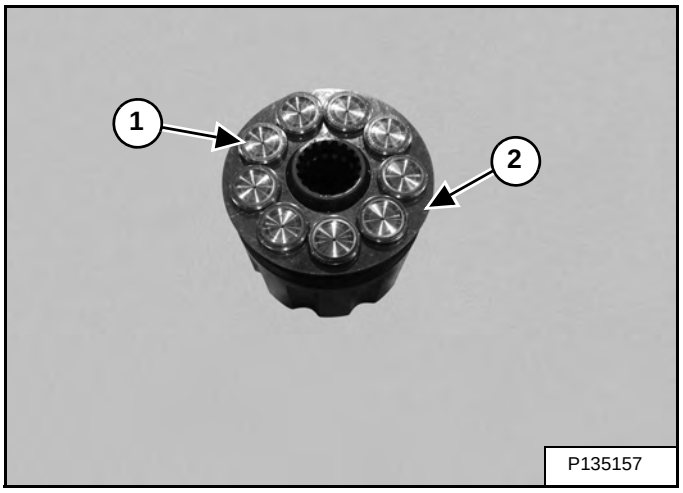
Install the springs (Item 1) **[Figure 20-71-37]** into the cylinder block.

Figure 20-71-38



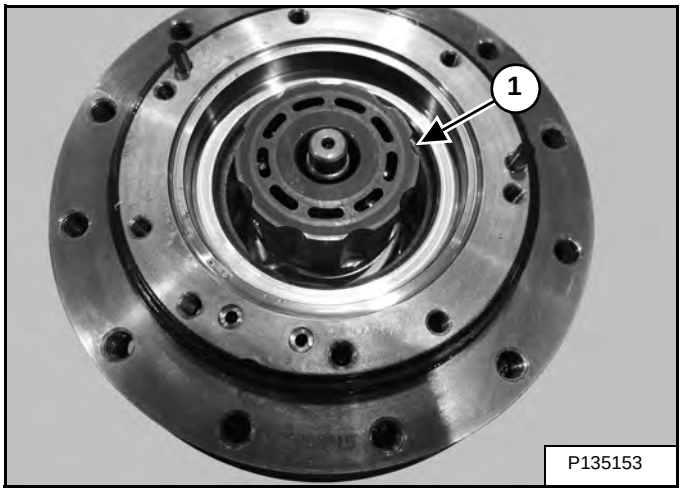
Install the thrust ball (Item 1) **[Figure 20-71-38]** onto the cylinder block.

Figure 20-71-39



Install the piston and retainer assembly (Item 1) **[Figure 20-71-39]** onto the cylinder block.

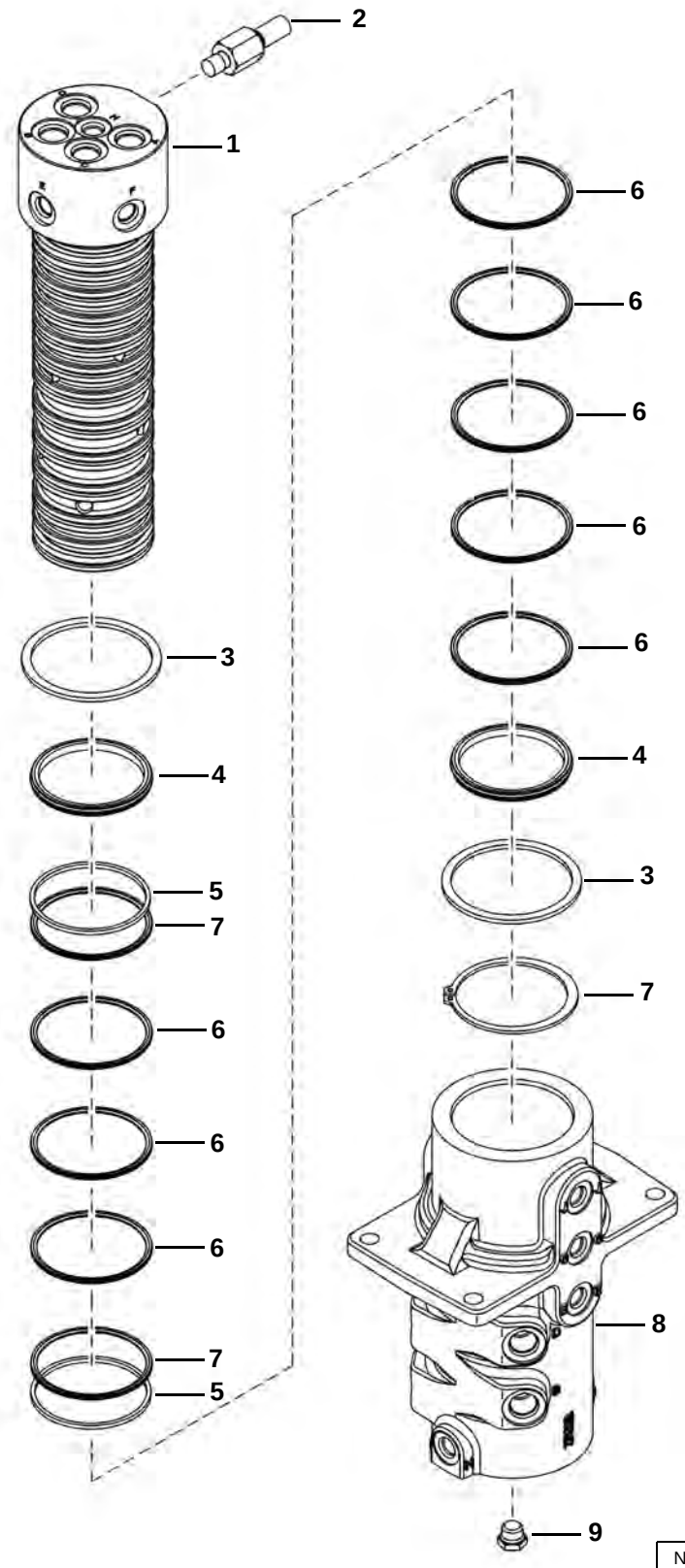
Figure 20-71-40



Install the cylinder block assembly (Item 1) **[Figure 20-71-40]** onto the shaft.

Parts Identification Angle Blade Swivel (S/N AG3N11001 - AG3N14896, AHHE11001 - AHHE15388)

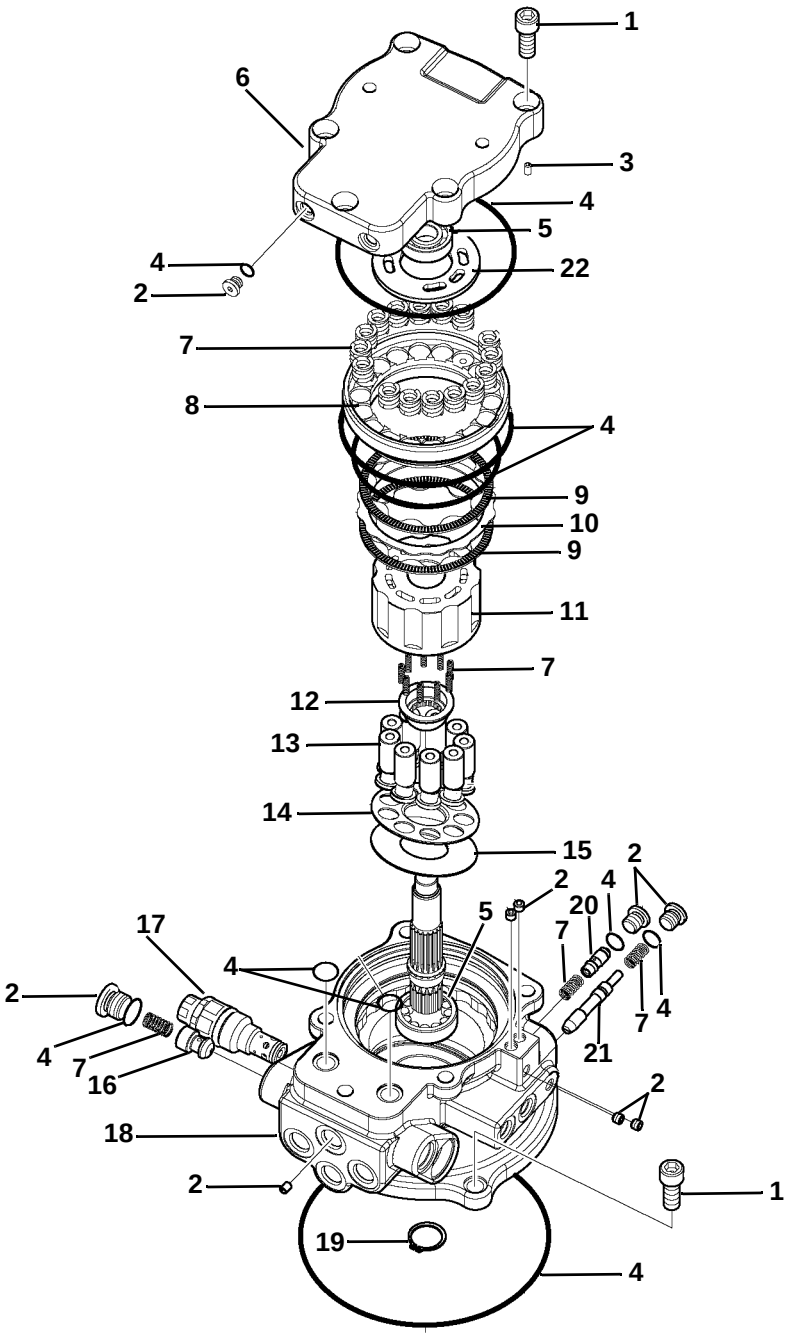
1. Rotor
2. Stop
3. Wear Ring
4. Crown Seal
5. Back-up Ring
6. Seal
7. Snap Ring
8. Housing
9. Plug



NA8567S

Parts Identification

1. Bolt
2. Plug
3. Dowel Pin
4. O-ring
5. Bearing
6. End Cap
7. Spring
8. Brake Piston
9. Friction Plate
10. Separation Plate
11. Cylinder Block
12. Bushing
13. Piston Assembly
14. Retainer
15. Thrust Plate
16. Poppet
17. Relief Valve
18. Housing
19. Snap Ring
20. Plunger
21. Spool
22. Valve Plate



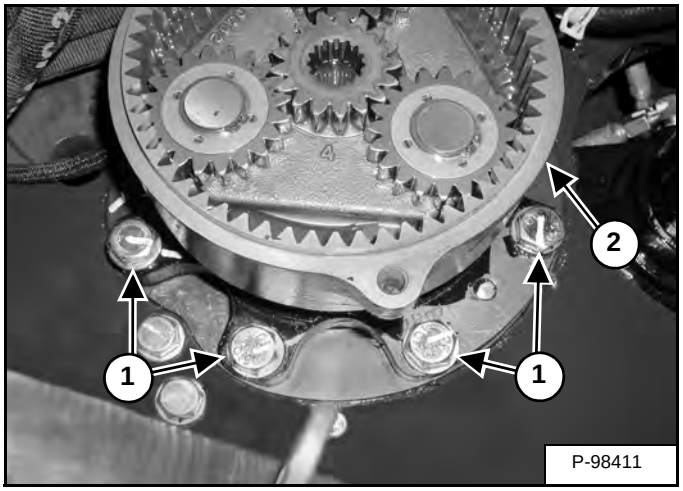
NA-1303

SWING MOTOR (DRIVE CARRIER)

Removal And Installation

Remove the swing motor. (See Removal And Installation on Page 20-90-1.)

Figure 20-91-1



Remove the bolts (Item 1) and remove the swing motor drive carrier (Item 2) **[Figure 20-91-1]**.

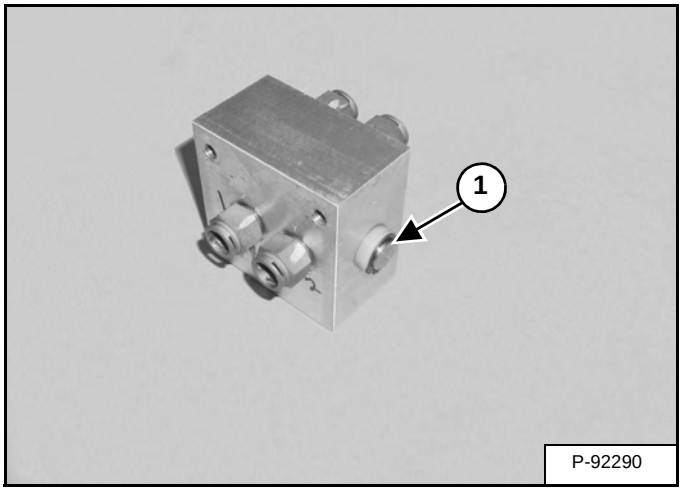
Installation: Tighten the bolts to 255 - 285 N•m (188 - 210 ft-lb) torque.

CONTROL PATTERN SELECTOR VALVE (CONT'D)

Disassembly And Assembly

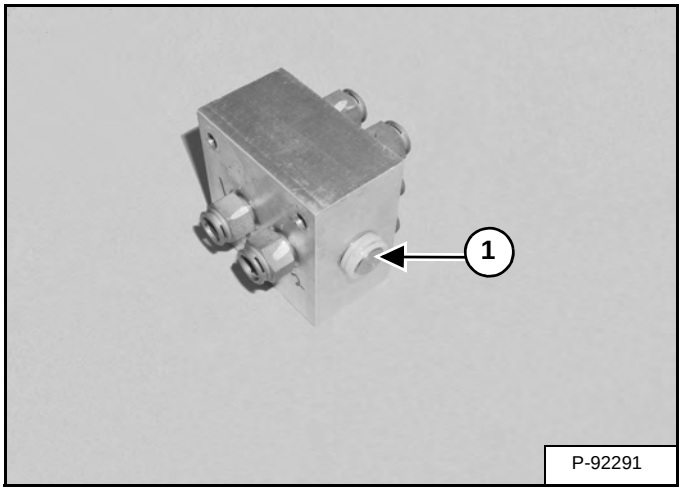
Clean the outside of the valve before disassembly.

Figure 20-100-3



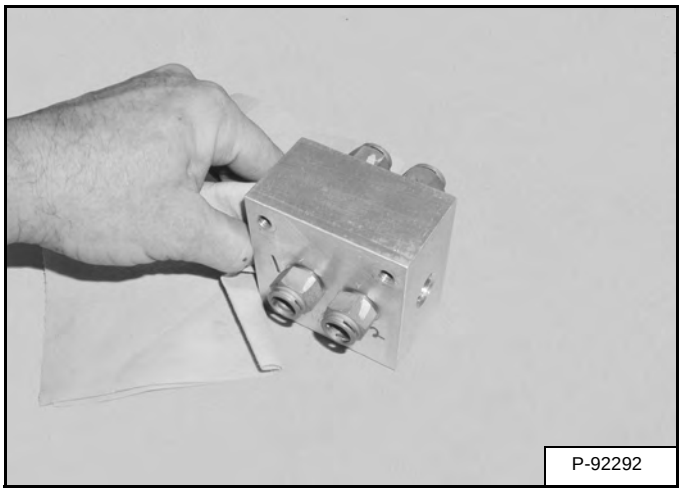
Remove the snap ring (Item 1) **[Figure 20-100-3]**.

Figure 20-100-4



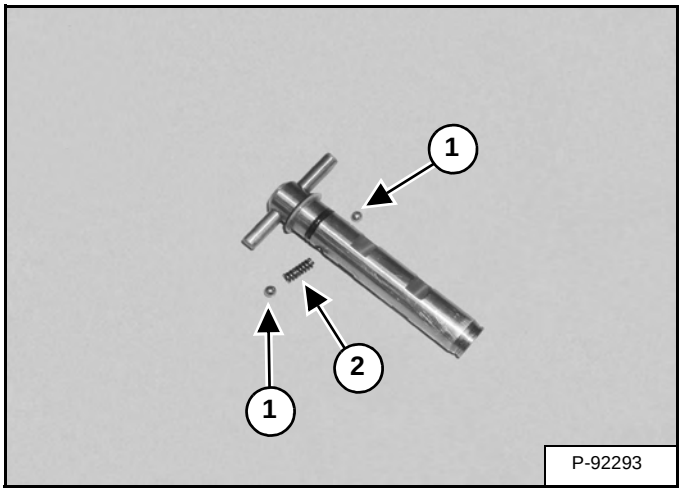
Remove the nylon washers (Item 1) **[Figure 20-100-4]**.

Figure 20-100-5



Wrap a shop towel around the spool and pull the spool out of the valve **[Figure 20-100-5]**.

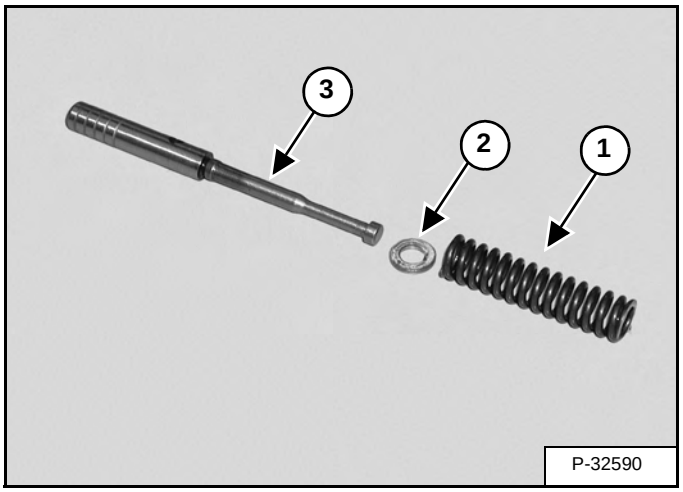
Figure 20-100-6



Remove the detent balls (Item 1) and spring (Item 2) **[Figure 20-100-6]**.

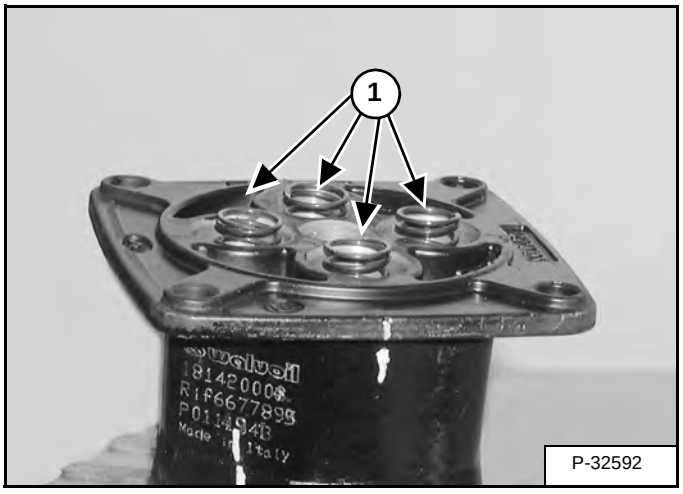
Disassembly (Cont'd)

Figure 20-110-28



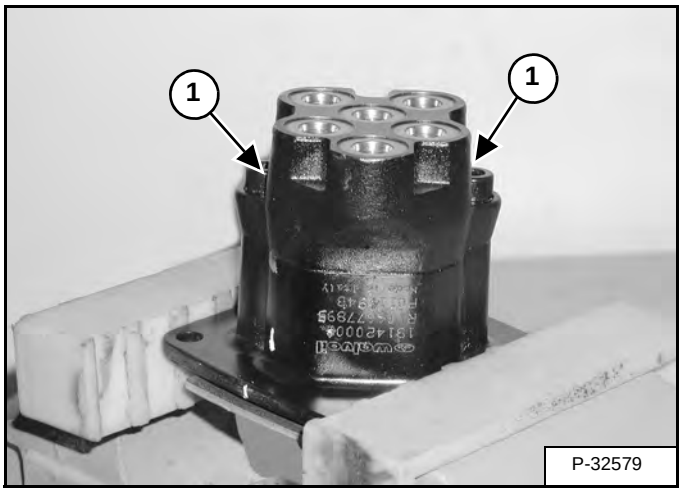
Remove the spring (Item 1) and shim (Item 2) from the spool (Item 3) **[Figure 20-110-28]**.

Figure 20-110-29



Remove the springs (Item 1) **[Figure 20-110-29]** from the housing.

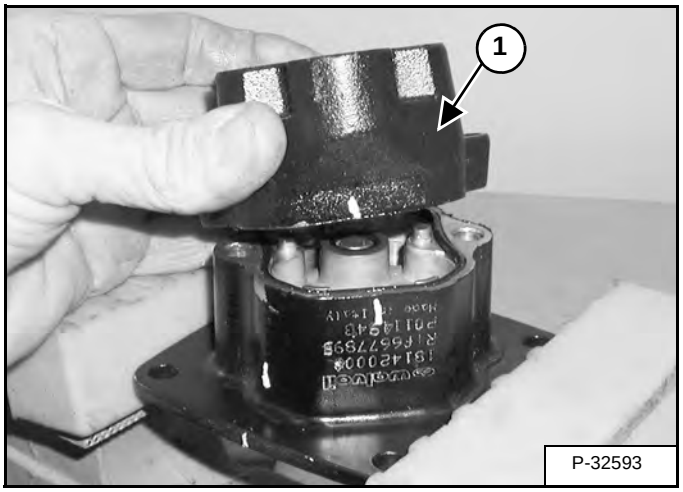
Figure 20-110-30



Clamp the housing in a vise that is equipped with padded jaws **[Figure 20-110-30]**.

Remove the two bolts (Item 1) **[Figure 20-110-30]**.

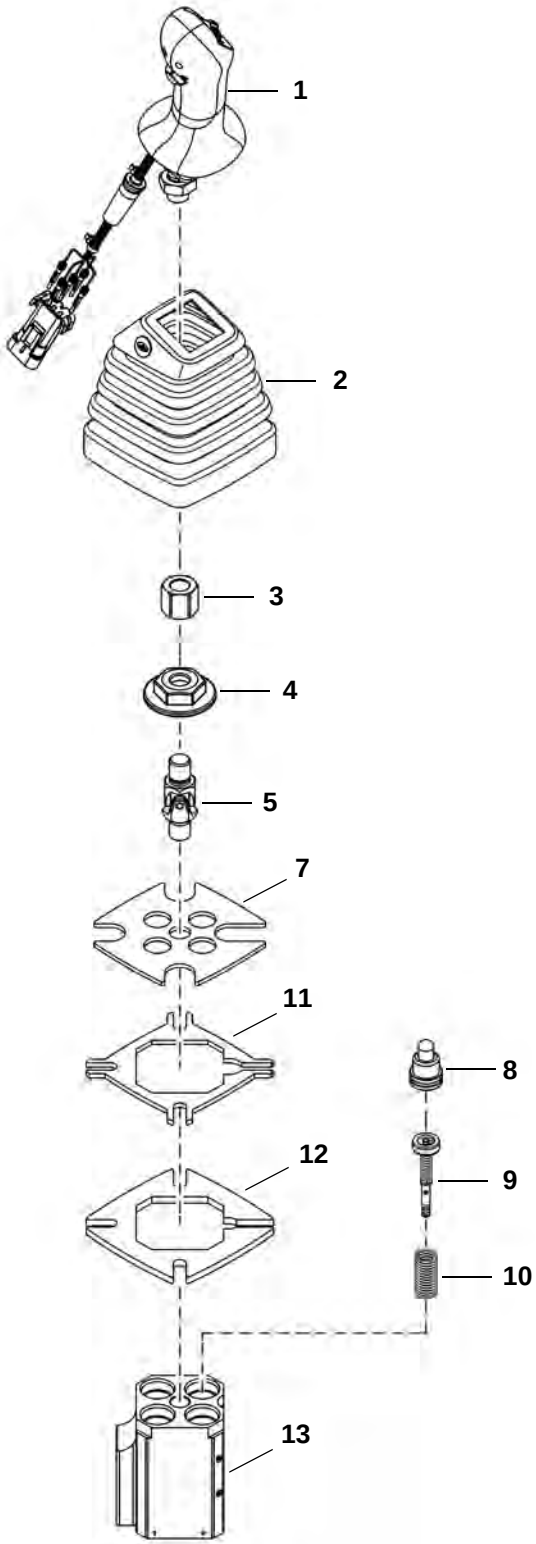
Figure 20-110-31



Remove the end cap (Item 1) **[Figure 20-110-31]**.

Parts Identification

1. Handle
2. Dust Boot
3. Coupler
4. Control Plate
5. U-Joint
6. Grommet
7. Plate
8. Plunger
9. Spool
10. Spring
11. Intermediate Flange
12. Flange
13. Housing



NA8317S

LEFT CONTROL LEVER (JOYSTICK) (S/N AG3N11001 - AG3N13999 AND AHHE11001 - AHHE13999)

Testing

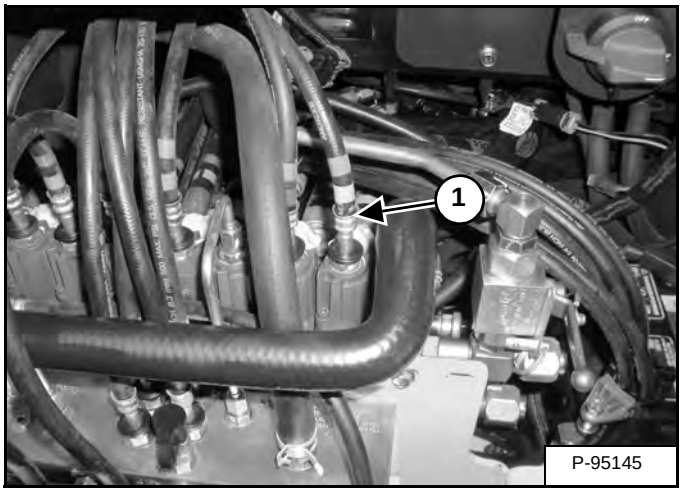
The following tools will be needed to do the procedure:

MEL1355 - Hydraulic Test Kit

Stop the engine.

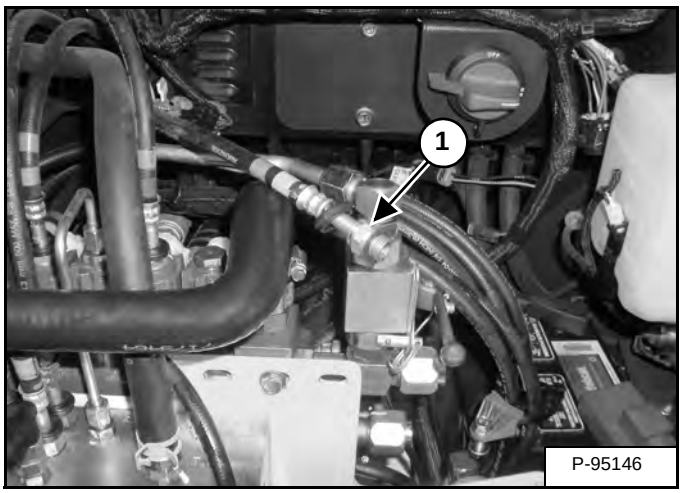
Open the right side cover. (See Opening And Closing on Page 10-60-1.)

Figure 20-120-1



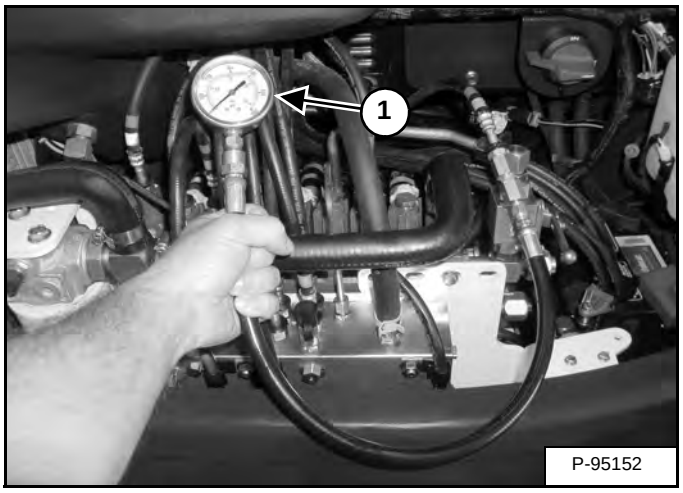
At the control valve assembly (Item 1) **[Figure 20-120-1]**, find the pilot line of the control lever (joystick) that is to be checked. (Boom, Arm, Slew, Bucket)

Figure 20-120-2



Disconnect the hydraulic fitting (Item 1) **[Figure 20-120-2]** from the control valve.

Figure 20-120-3



From the test kit install a 3447 kPa (35 bar) (500 psi) gauge (Item 1) **[Figure 20-120-3]** on the pilot line. Start the excavator, and warm the hydraulic oil to operating temperature.

Engage the circuit to be tested. Record the operating pressure.

The operating pressure should be approximately 2799 - 3103 kPa (28 - 31 bar) (406 - 450 psi).

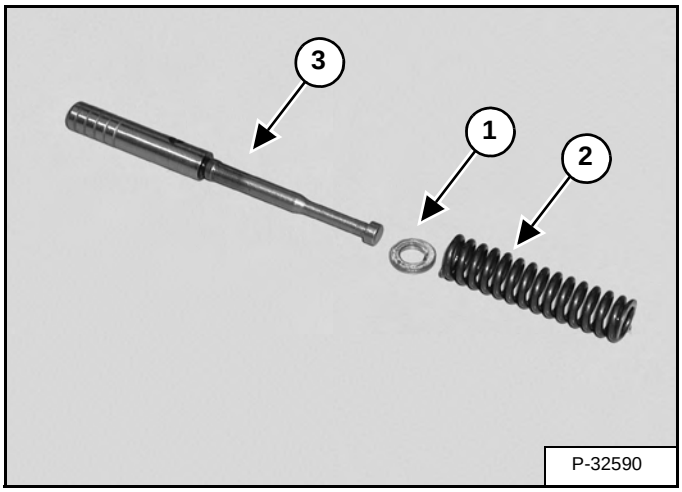
If the operating pressure is correct, check the valve section spool for proper operation. If the operating pressure is incorrect, remove the pressure reducing valve, clean, install and retest. (See Testing And Adjusting on Page 20-33-1.)

If the pressure is still incorrect replace the pressure reducing valve. (See Testing And Adjusting on Page 20-33-1.)

LEFT CONTROL LEVER (JOYSTICK) (S/N AG3N11001 - AG3N13999 AND AHHE11001 - AHHE13999) (CONT'D)

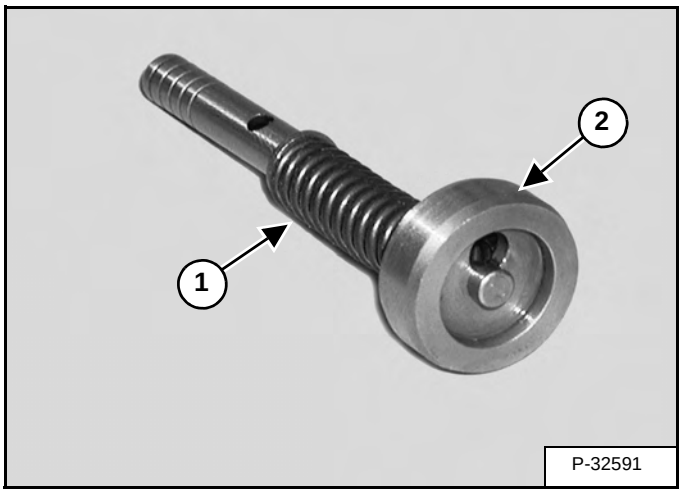
Assembly (Cont'd)

Figure 20-120-35



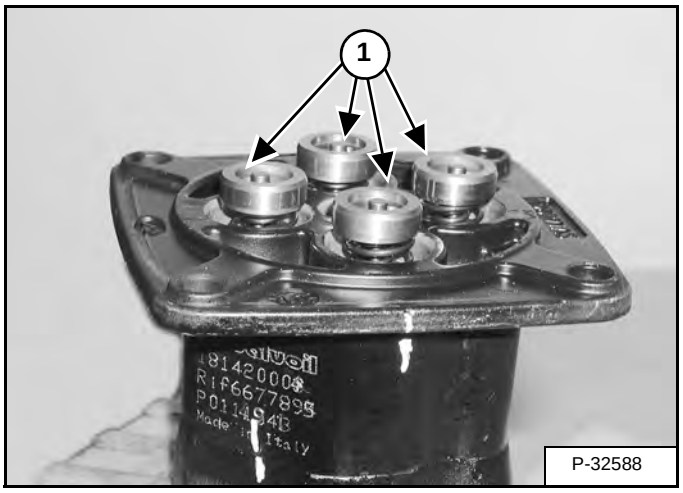
Install the shim (Item 1) and spring (Item 2) on the spool (Item 3) **[Figure 20-120-35]**.

Figure 20-120-36



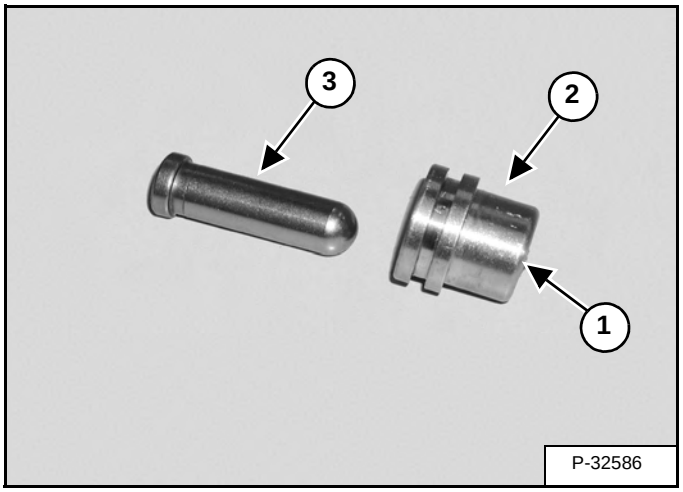
Compress the spring (Item 1) and install the spring seat (Item 2) **[Figure 20-120-36]**.

Figure 20-120-37



Install the spool assemblies (Item 1) **[Figure 20-120-37]** into the housing.

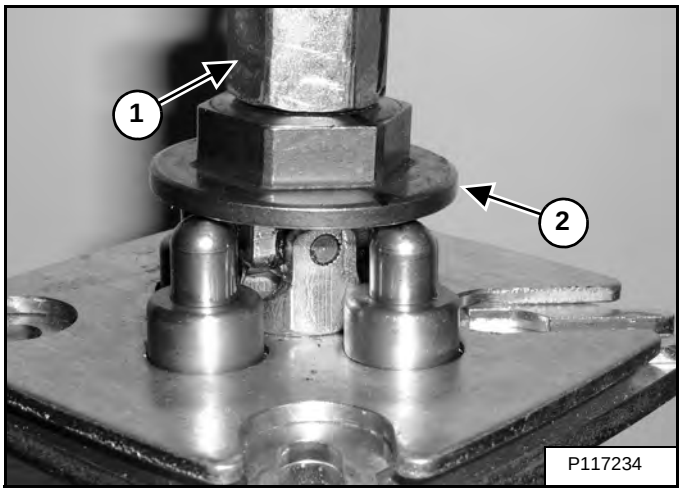
Figure 20-120-38



Install the O-ring (Item 1) into the bushing (Item 2). Install the plunger (Item 3) **[Figure 20-120-38]** into the bushing.

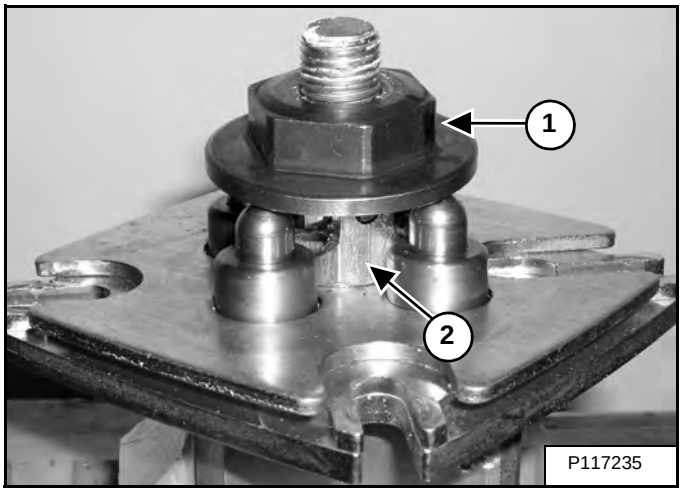
Disassembly (Cont'd)

Figure 20-121-18



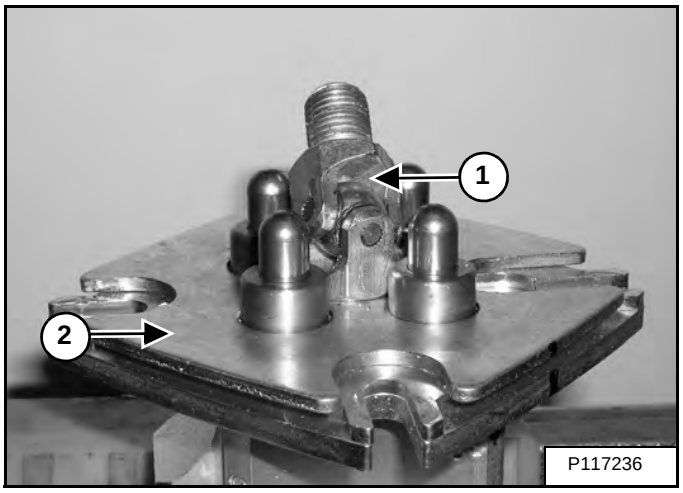
Remove the coupler (Item 1) from the control plate (Item 2) **[Figure 20-121-18]**.

Figure 20-121-19



Remove the control plate (Item 1) from the U-joint (Item 2) **[Figure 20-121-19]**.

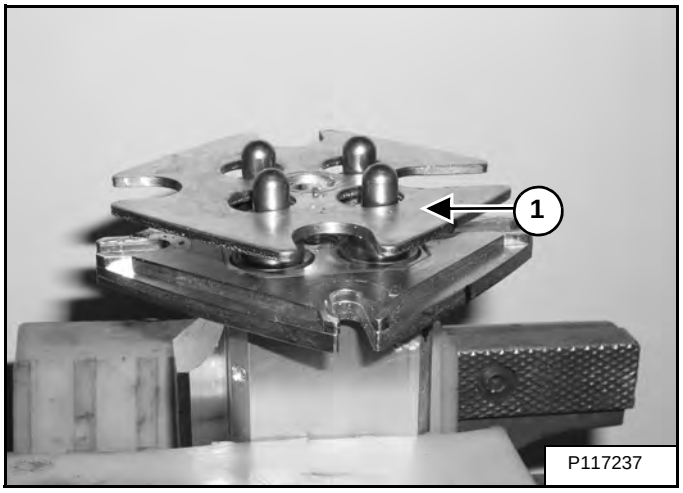
Figure 20-121-20



Mark the plate and housing for correct installation. Remove the U-joint (Item 1) **[Figure 20-121-20]**.

NOTE: The plate (Item 2) [Figure 20-121-20] is spring loaded and will come up as the U-joint is removed.

Figure 20-121-21



Remove the plate (Item 1) **[Figure 20-121-21]**.

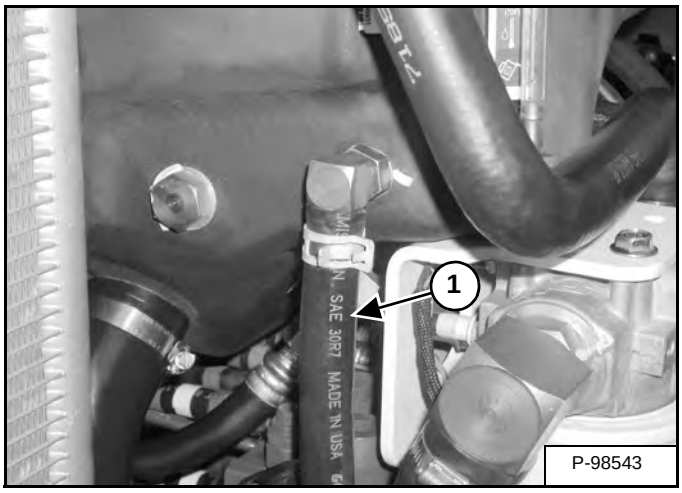
HYDRAULIC RESERVOIR

Removal And Installation

Drain the reservoir. (See Removing And Replacing The Hydraulic Fluid on Page 10-130-4.)

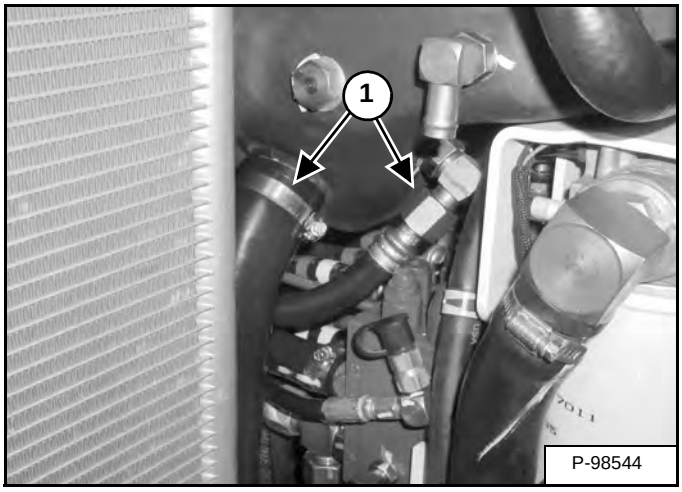
Remove the right upperstructure cover. (See Removal And Installation on Page 40-80-1.)

Figure 20-140-1



Remove the hose (Item 1) **[Figure 20-140-1]**.

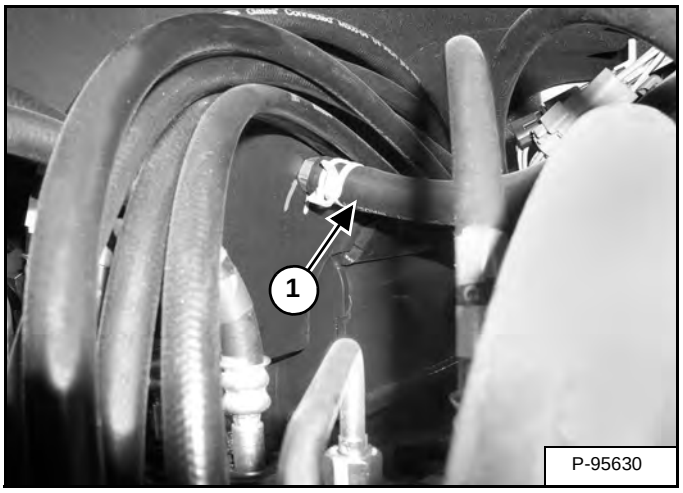
Figure 20-140-2



Remove the hose (Item 1) **[Figure 20-140-2]**.

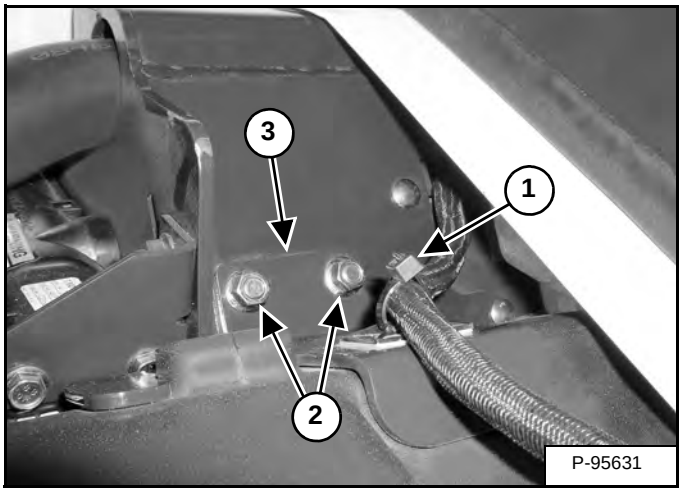
Installation: Tighten the hose clamps to 6,21 N•m (55 in-lb) torque.

Figure 20-140-3



Remove the hose (Item 1) **[Figure 20-140-3]**.

Figure 20-140-4

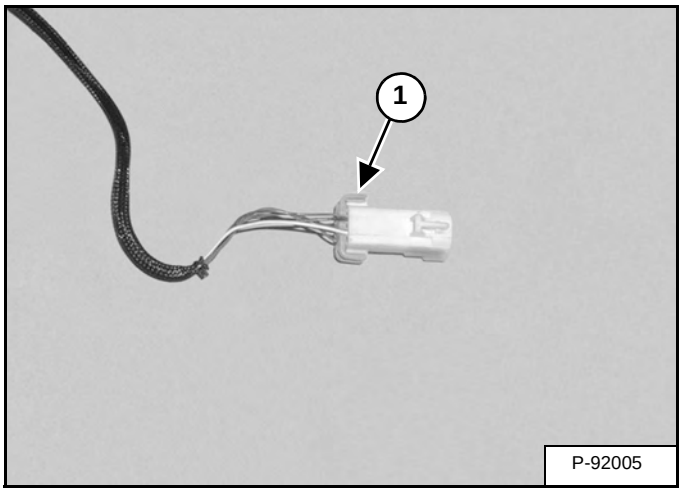


Remove the cable tie (Item 1) **[Figure 20-140-4]**.

Remove the nuts (Item 2) and bracket (Item 3) **[Figure 20-140-4]**. Remove the reservoir.

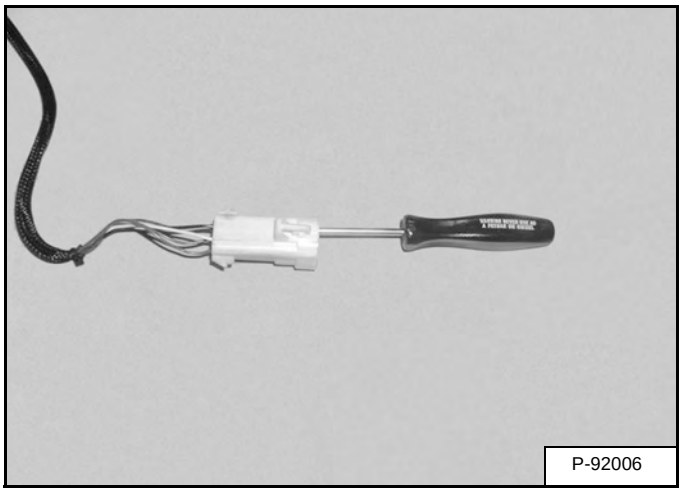
Disassembly And Assembly

Figure 20-170-14



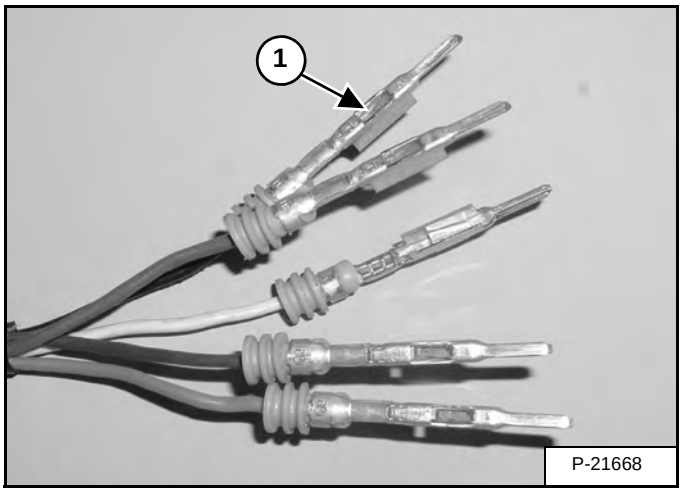
Remove the connector lock (Item 1) **[Figure 20-170-15]**.

Figure 20-170-15



Depress the wire terminal tabs and remove the wires from the back of the electrical connector **[Figure 20-170-15]**.

Figure 20-170-16



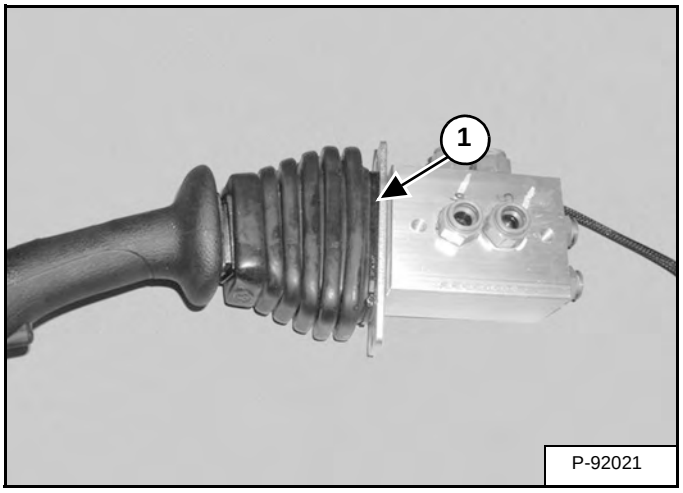
Installation: Re-bend the tab (Item 1) **[Figure 20-170-16]** on each wire before installing the electrical connector.

Installation: The wires must be installed in the proper locations in the wire connector, listed below.

A Green
B Brown
C Red
D Black
E White

Check each wire to be certain the tab locks into position.

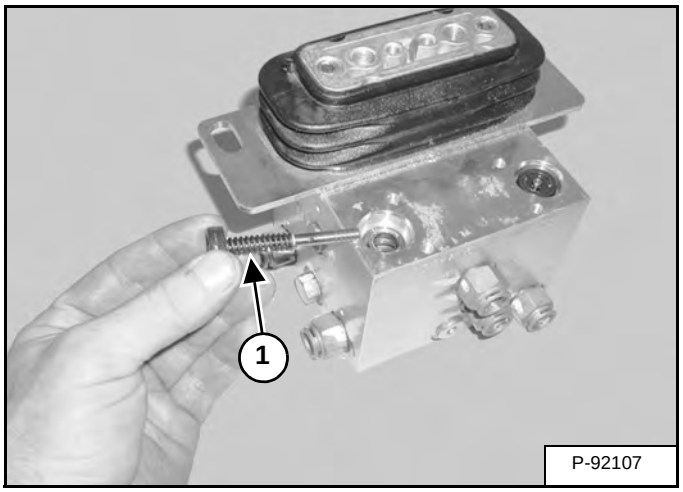
Figure 20-170-17



Cut and remove the cable tie (Item 1) **[Figure 20-170-17]**.

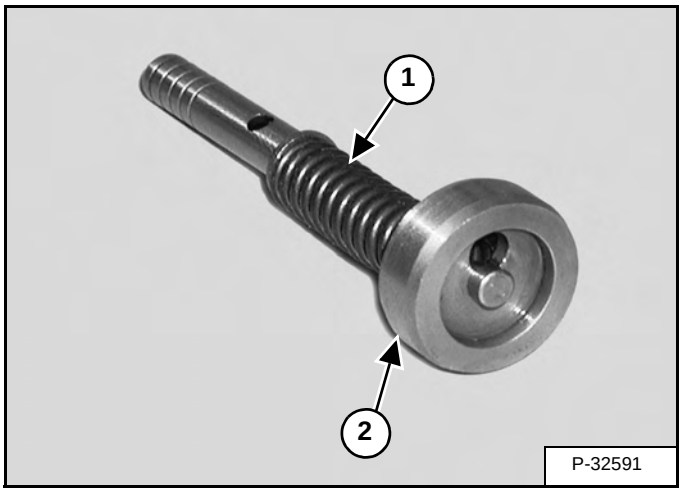
Disassembly And Assembly (Cont'd)

Figure 20-190-11



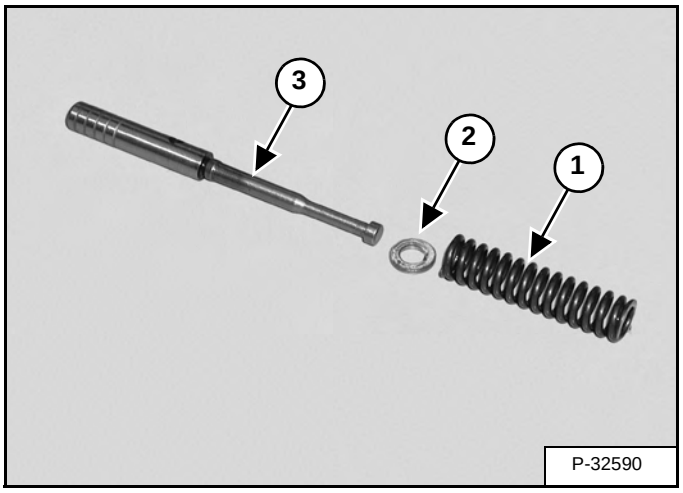
Remove the spool assemblies (Item 1) **[Figure 20-190-11]**.

Figure 20-190-12



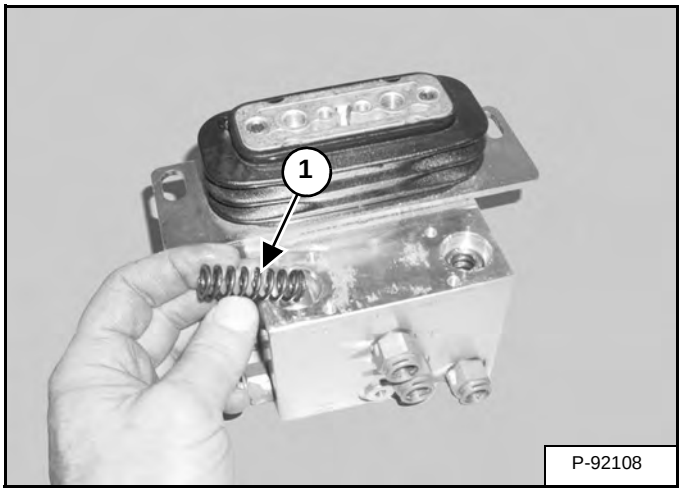
Compress the spring (Item 1) and remove the seat (Item 2) **[Figure 20-190-12]**.

Figure 20-190-13



Remove the spring (Item 1) and shim (Item 2) from the spool (Item 3) **[Figure 20-190-13]**.

Figure 20-190-14

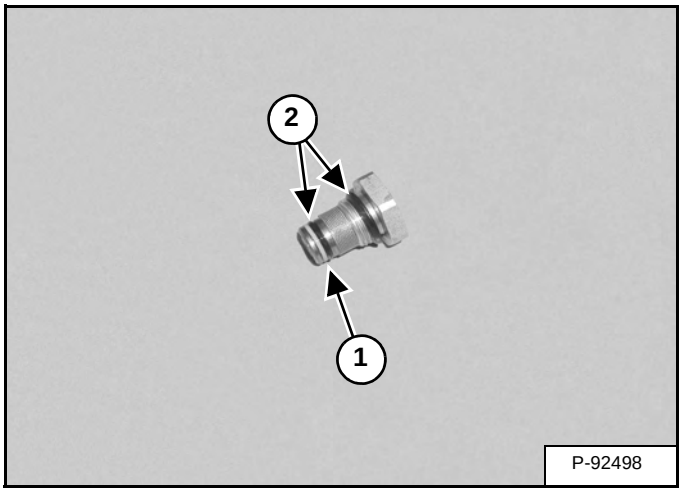


Remove the spring (Item 1) **[Figure 20-190-14]**.

Repeat the procedure for the right travel side of the valve.

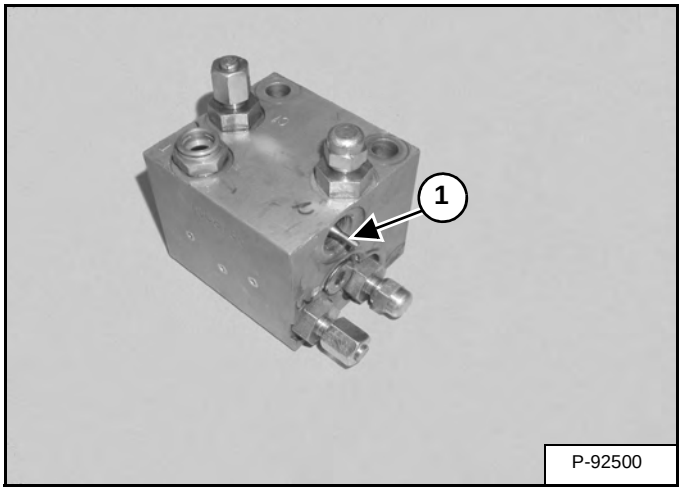
Disassembly And Assembly (Cont'd)

Figure 20-210-12



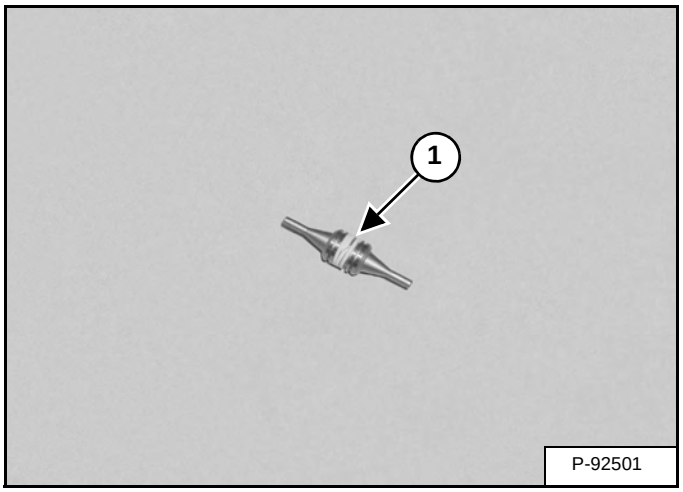
Remove the back-up ring (Item 1) and O-rings (Item 2) **[Figure 20-210-12]**.

Figure 20-210-13



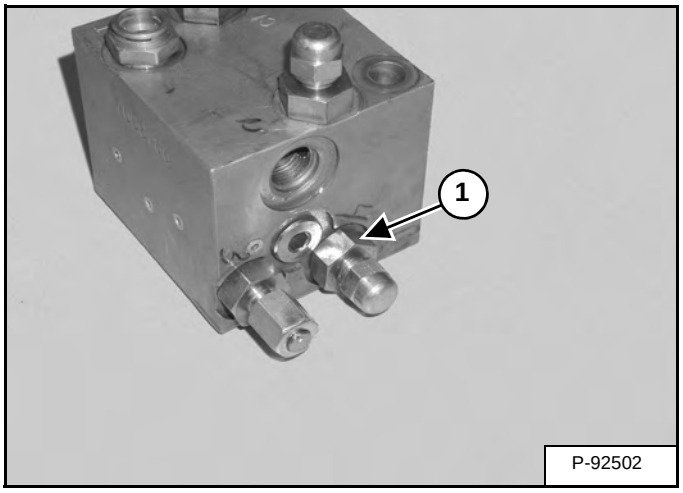
Remove the spool (Item 1) **[Figure 20-210-13]**.

Figure 20-210-14



Remove the rings (Item 1) **[Figure 20-210-14]**.

Figure 20-210-15



Remove the fitting (Item 1) **[Figure 20-210-15]** from the "S" port.

MANIFOLD (PIN GRABBER)

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

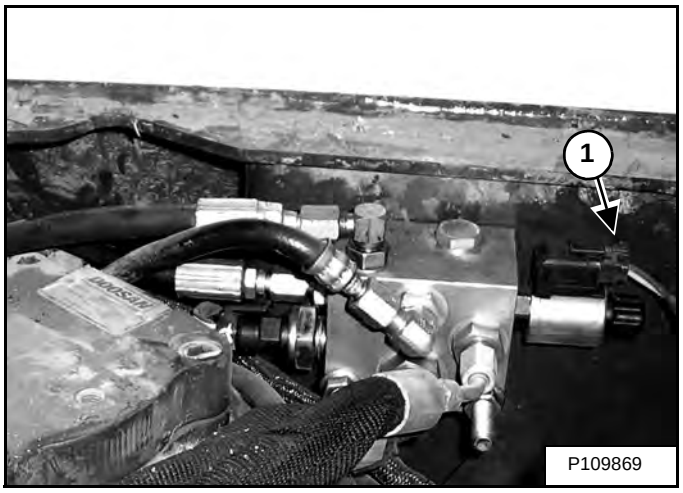
Lower the work group to the ground.

With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic.

Remove the floor mat and floorplate. (See Removal And Installation on Page 40-110-1.)

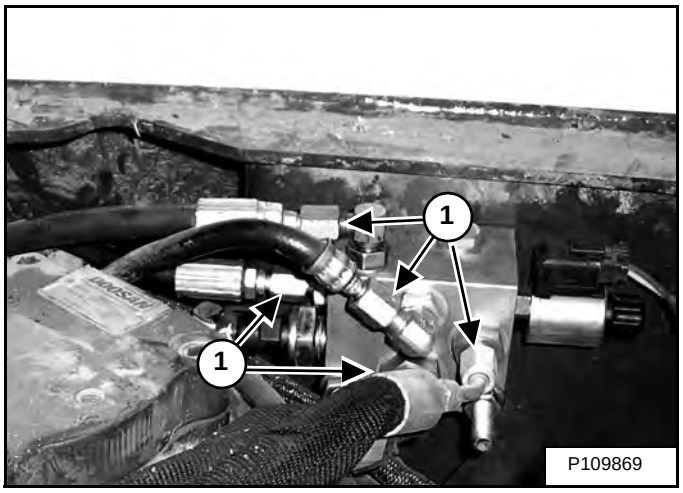
Remove the tool box. (See Removal And Installation on Page 40-230-1.)

Figure 20-212-1



Disconnect the coil connector (Item 1) and pressure sensor connector (Item 2) **[Figure 20-212-1]**.

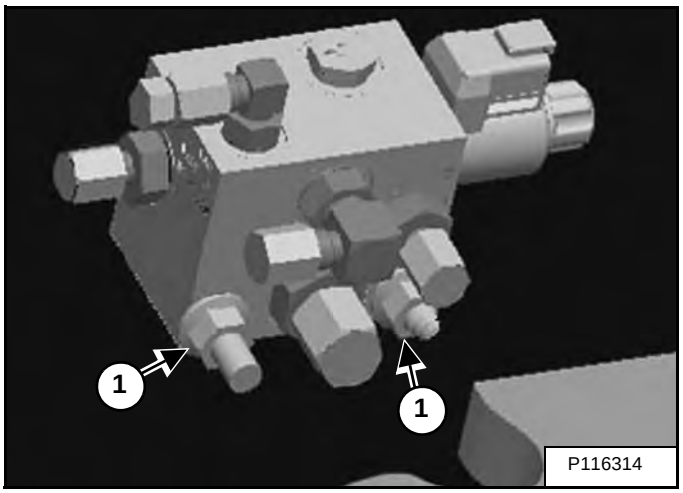
Figure 20-212-2



Mark all hoses for proper installation.

Remove the hoses (Item 1) **[Figure 20-212-2]**.

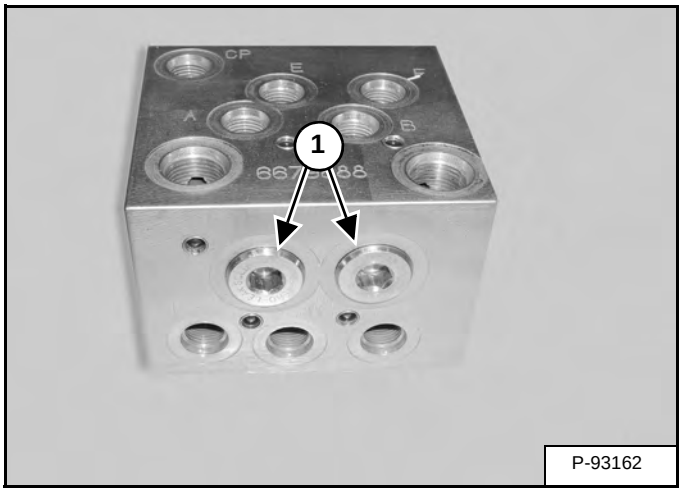
Figure 20-212-3



Remove the nuts (Item 1) **[Figure 20-212-3]**. Remove the manifold.

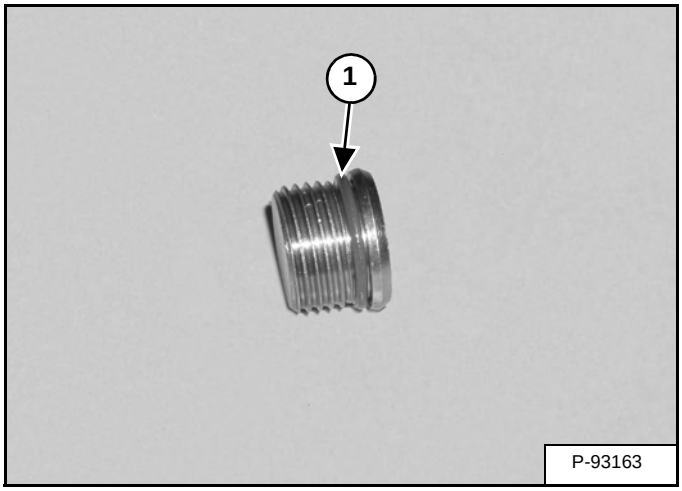
Disassembly And Assembly (Cont'd)

Figure 20-220-18



Remove the plugs (Item 1) **[Figure 20-220-18]**.

Figure 20-220-19



Remove the O-rings (Item 1) **[Figure 20-220-19]**.

Clean all parts in solvent and dry with compressed air.

Inspect all parts for wear or damage. Replace any worn or damaged parts.

Always install new O-rings. Lubricate the O-rings with clean hydraulic fluid before installation.

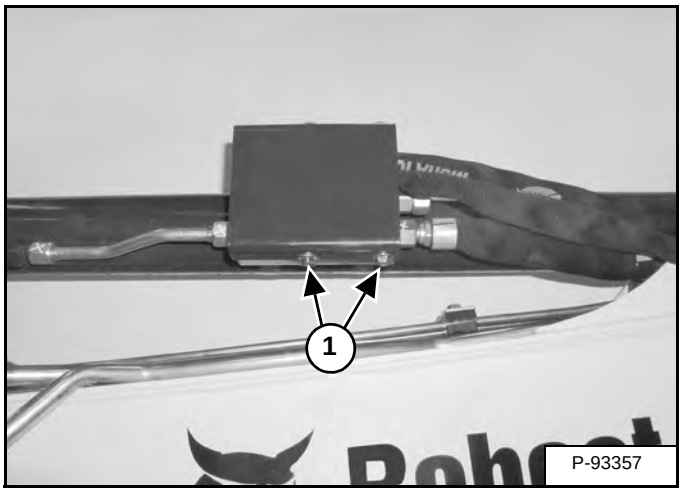
VALVE (ARM LOCK)

Removal And Installation

Lower the work equipment to the ground.

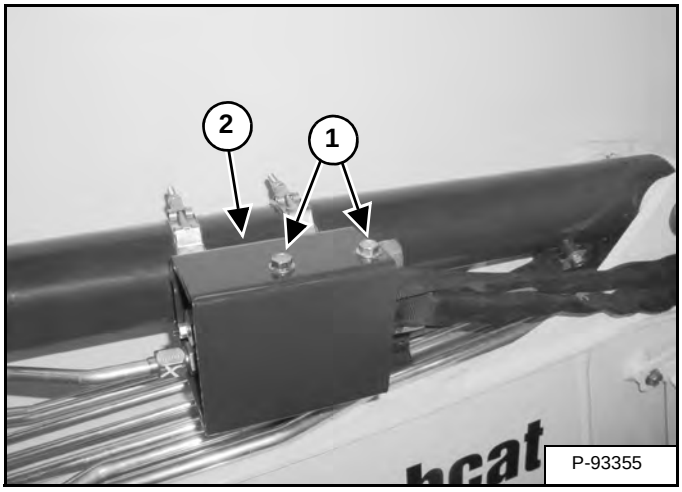
With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 20-231-1



Remove the bolts (Item 1) **[Figure 20-231-1]**.

Figure 20-231-2



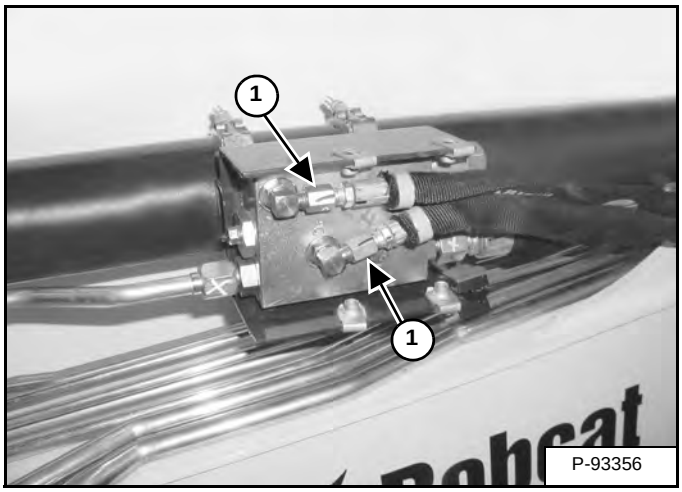
Remove the bolts (Item 1) and cover (Item 2) **[Figure 20-231-2]**.

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.

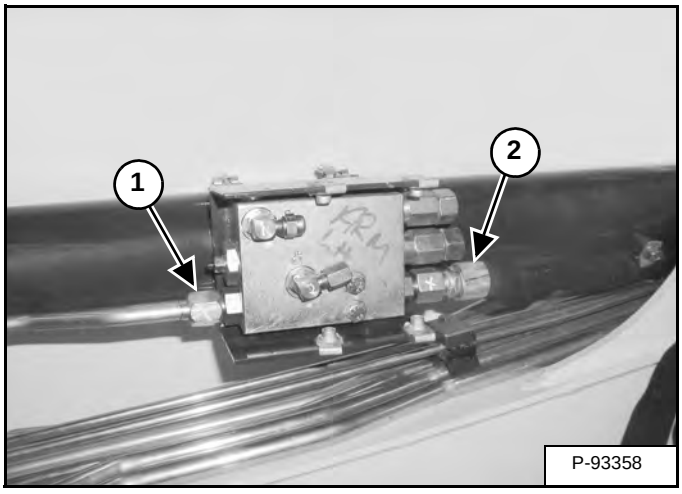
I-2003-0888

Figure 20-231-3



Remove the hoses (Item 1) **[Figure 20-231-3]**.

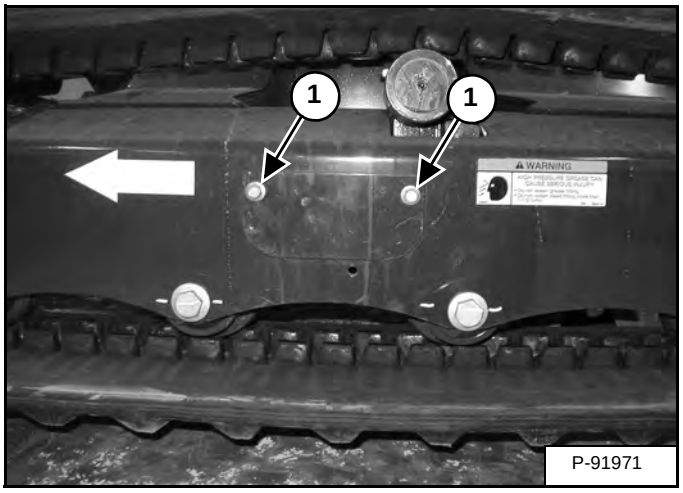
Figure 20-231-4



Remove the tubeline (Item 1) and hose (Item 2) **[Figure 20-231-4]**.

Adjusting Tension

Figure 30-20-5



Loosen the two bolts on the cover (Item 1) **[Figure 30-20-5]**. Pivot the cover downward.

WARNING

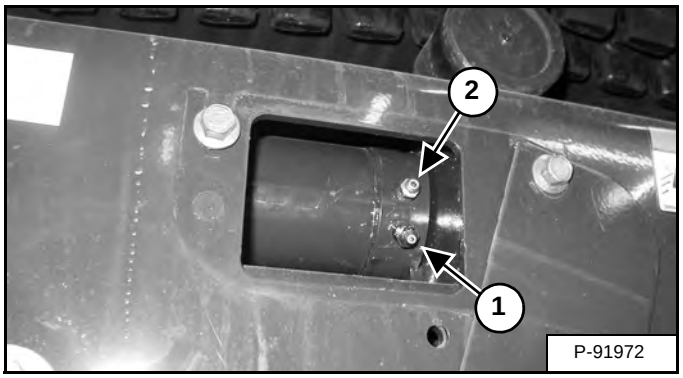
HIGH PRESSURE GREASE CAN CAUSE SERIOUS INJURY

- **Do not loosen the track tension fitting more than 1 - 1/2 turns.**

W-2994-0515

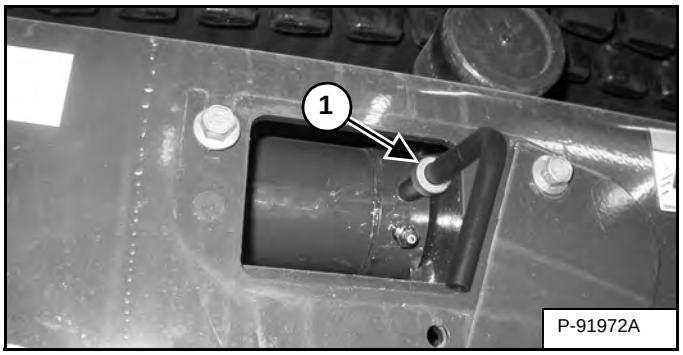
With Bleed Screw And Track Tension Fitting

Figure 30-20-6



Add grease to the track tension fitting (Item 1) **[Figure 30-20-6]** until the track tension is correct.

Figure 30-20-7



The tension removal tool (P/N 6675936) is available and recommended to direct the flow of grease to aid in cleanup. Always dispose of the grease in an environmentally friendly manor.

Use tool 6675936 (Item 1) **[Figure 30-20-7]** to loosen the bleed fitting (Item 2) **[Figure 30-20-6]** to release tension from the track. Do not loosen the bleed fitting more than 1-1/2 turns.

The tool is sized to fit the bleed fitting (Item 2) **[Figure 30-20-6]**.

NOTE: Do not loosen the track tension fitting (Item 1) [Figure 30-20-6].

Repeat the procedure for the opposite side.

Track Tensioner Removal And Installation

DO NOT DISASSEMBLE OR REPAIR THE COIL SPRING ASSEMBLY (Item 1) **[Figure 30-20-33]**.

⚠ WARNING

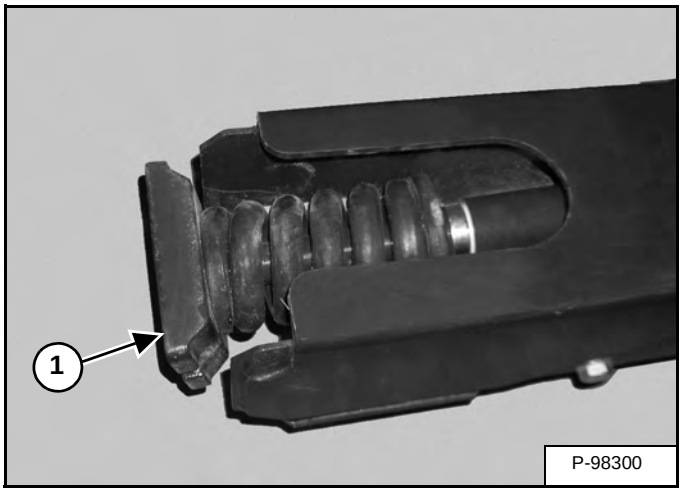
P-62574

AVOID INJURY OR DEATH

- **Spring loaded components under pressure can cause serious injury or death.**
- **Do not disassemble the coil spring assembly**

W-2617-1004

Figure 30-20-33



Remove the recoil spring (Item 1) **[Figure 30-20-33]**.

Figure 30-20-34

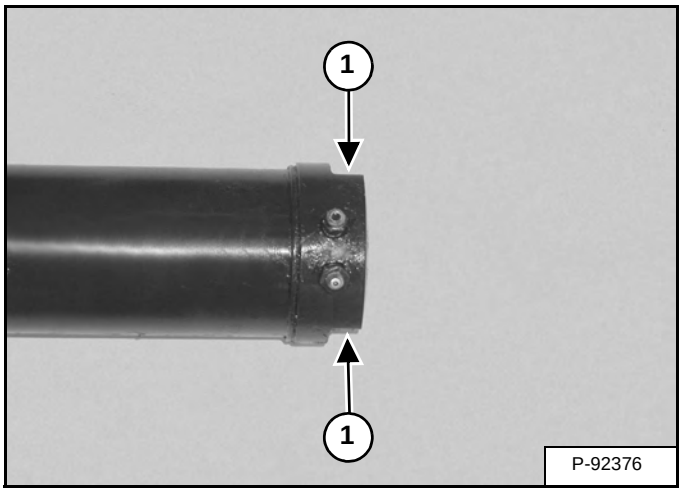
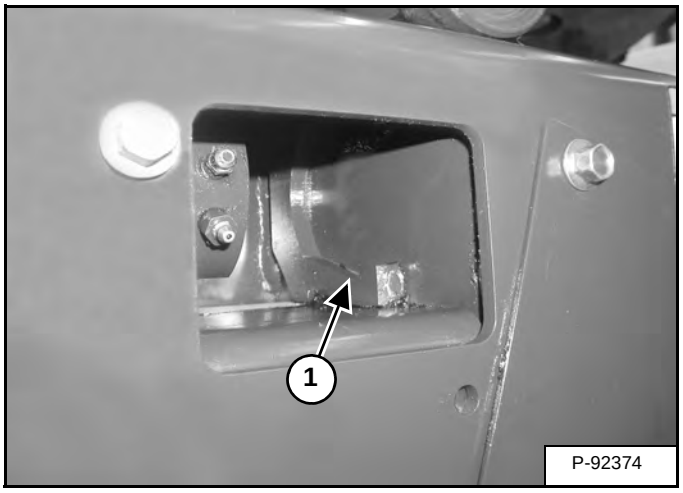


Figure 30-20-35



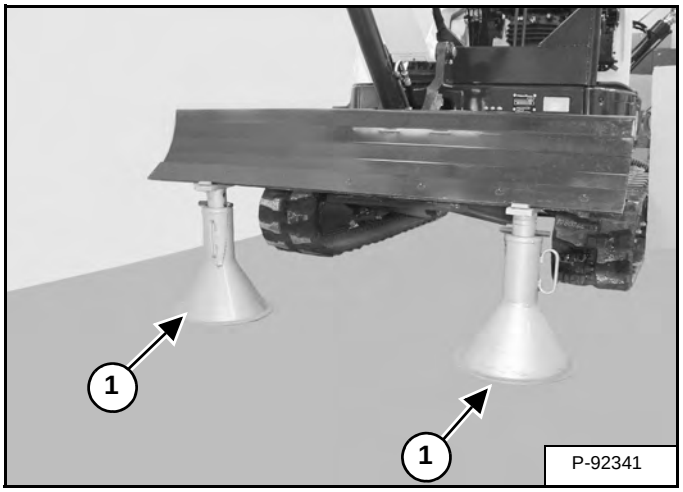
The flat sides (Item 1) **[Figure 30-20-34]** of the recoil spring grease cylinder must engage the mount (Item 1) **[Figure 30-20-35]** of the track frame.

Track Removal

Lift and block both sides of the machine as follows:

Raise the blade fully.

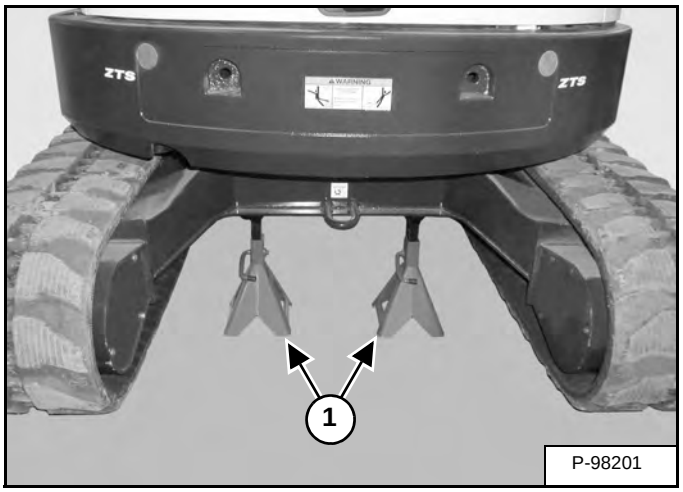
Figure 30-21-8



Use the boom and arm to lift the blade end of the machine up about 75 mm (3.0 in) and install jackstands (Item 1) **[Figure 30-21-8]** under the blade.

Raise the boom.

Figure 30-21-9



Swing the upperstructure 180 degrees and use the boom and arm to slowly lift the opposite end of the undercarriage and install jackstands under the undercarriage (Item 1) **[Figure 30-21-9]**.

Raise the boom until the weight of the machine is supported by the jackstands.

⚠ WARNING

Put jackstands under the blade and rear corners of the undercarriage before working under the machine. Failure to block up the machine may allow it to move or fall and result in injury or death.

W-2218-1195

Stop the engine.

Release track tension. (See Adjusting Tension on Page 30-21-3.)

With the excavator raised and the bleed fitting loosened, start the excavator. (See Adjusting Tension on Page 30-21-3.)

Slowly turn the track. This will force more grease out of the grease spring.

Stop the engine.

⚠ WARNING

AVOID INJURY OR DEATH

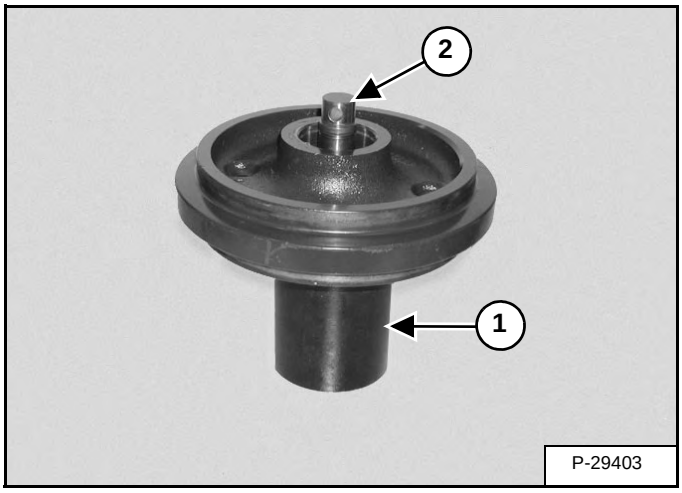
Keep fingers and hands out of pinch points when removing the track.

W-2173-0195

The track can be removed either as a complete assembly or by removing a connecting pin and separating the track.

Idler Assembly (Cont'd)

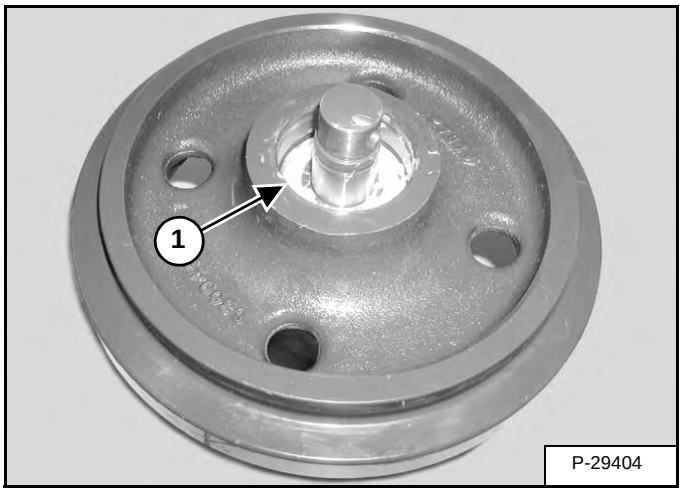
Figure 30-21-31



Turn the idler over and place the idler on the support fixture (Item 1) **[Figure 30-21-31]**.

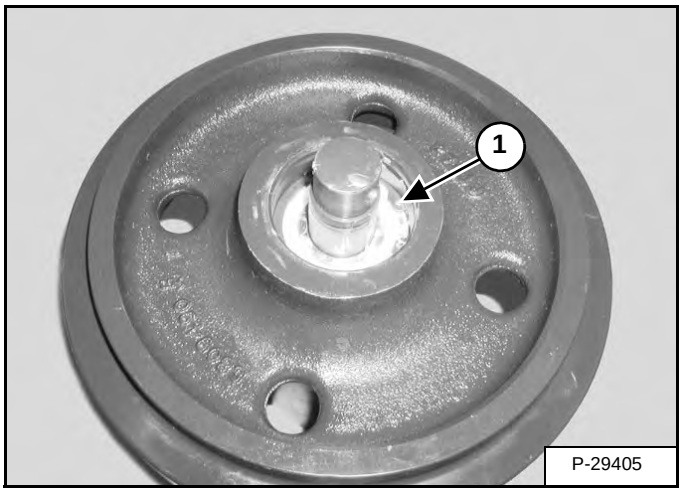
Install the shaft (Item 2) **[Figure 30-21-31]**.

Figure 30-21-32



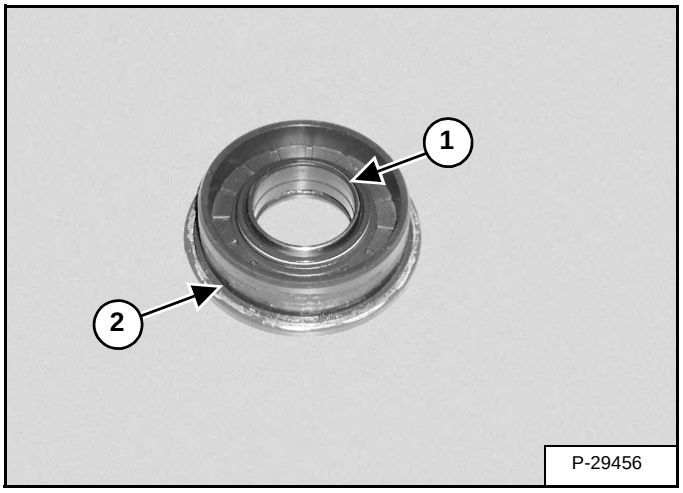
Install the bearing (Item 1) **[Figure 30-21-32]**. Use a brass drift to seat the bearing.

Figure 30-21-33



Install the snap ring (Item 1) **[Figure 30-21-33]**.

Figure 30-21-34



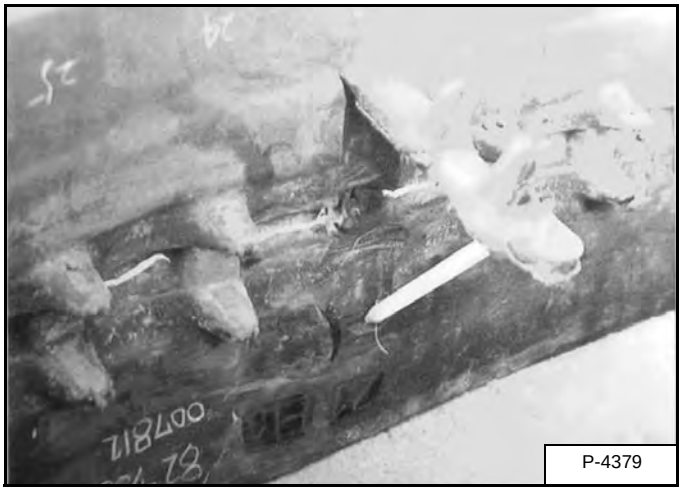
Apply assembly lube to the inside diameter (Item 1) **[Figure 30-21-34]** of the seal.

Apply a small bead of high temperature silicone sealant around the flange surface (Item 2) **[Figure 30-21-34]** of the seal.

Track Damage Identification (Cont'd)

Separation Of Embedded Metals

Figure 30-30-6



Damage:

Extraordinary outer forces applied to embedded metals cause their separation from the rubber track's body **[Figure 30-30-6]**.

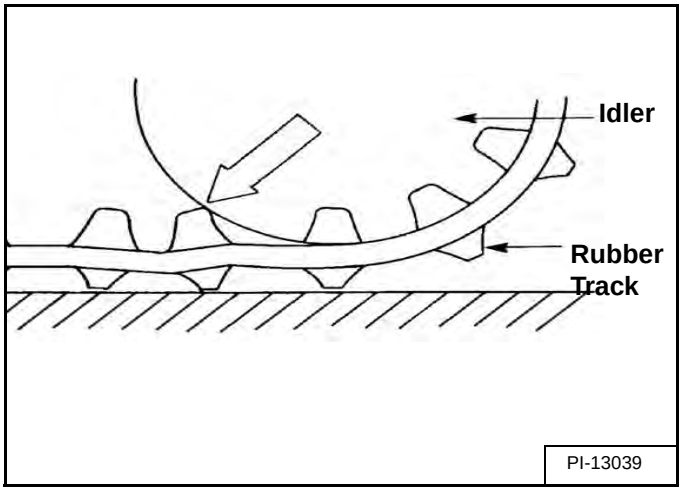
Replacement:

Even a partial separation of embedded metals requires replacement of the track.

Causes of the damage:

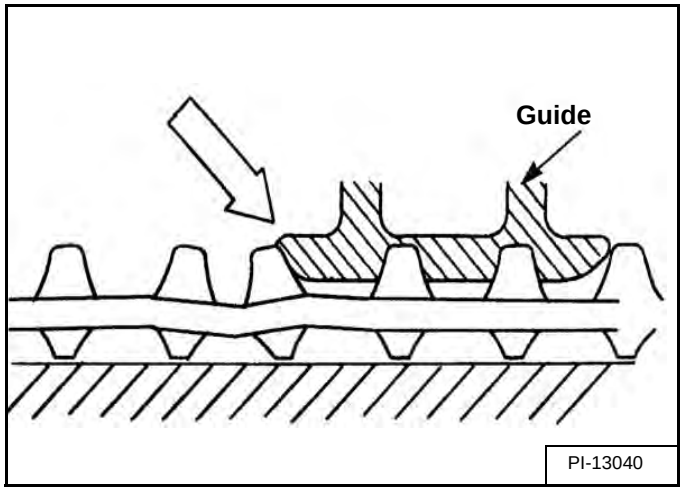
Embedded metals are adhered between the steel cords and the rubber body. The following cases generate external forces greater than the adhesion strength, causing separation of the embedded metals:

Figure 30-30-7



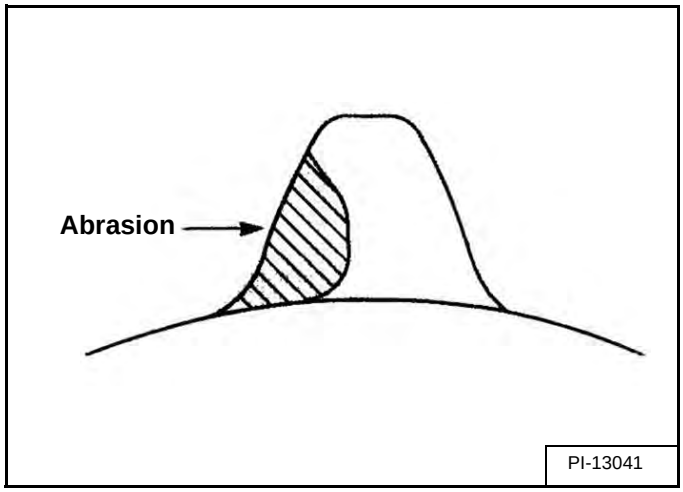
When the idler continually rides on the projections of embedded metals, the embedded metals will eventually peel off **[Figure 30-30-7]**.

Figure 30-30-8



When a rubber track is detracted, it becomes stuck between the guide or the undercarriage frame, causing the separation of embedded metals **[Figure 30-30-8]**.

Figure 30-30-9



Abnormally worn sprockets will pull embedded metals out **[Figure 30-30-9]**.

Prevention:

Similar to the prevention against the cutting of the steel cords:

Track tension should be periodically checked.

Quick turns on bumpy and rocky fields should be avoided.

If abnormal wear of sprockets is observed, they should be immediately replaced.

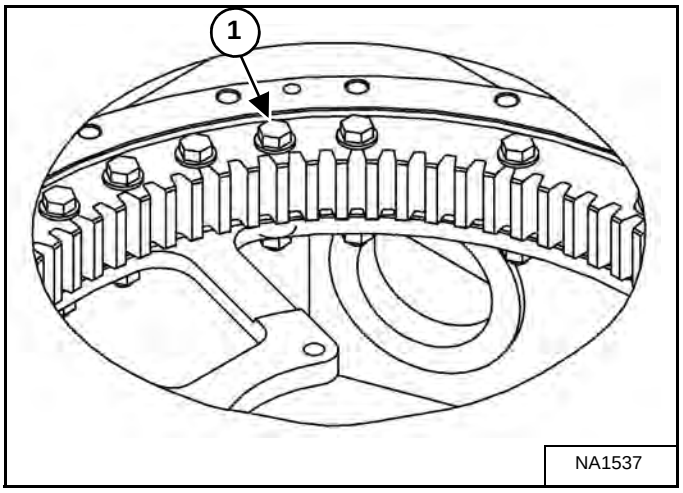
SWING CIRCLE GEAR

Swing Bearing Removal

Remove the upperstructure. (See Removal on Page 40-10-1.)

Mark the swing bearing to track frame.

Figure 30-40-1



Remove the twenty four bolts (Item 1) **[Figure 30-40-1]** and nuts that hold the swing bearing to the track frame.

Remove the swing bearing.

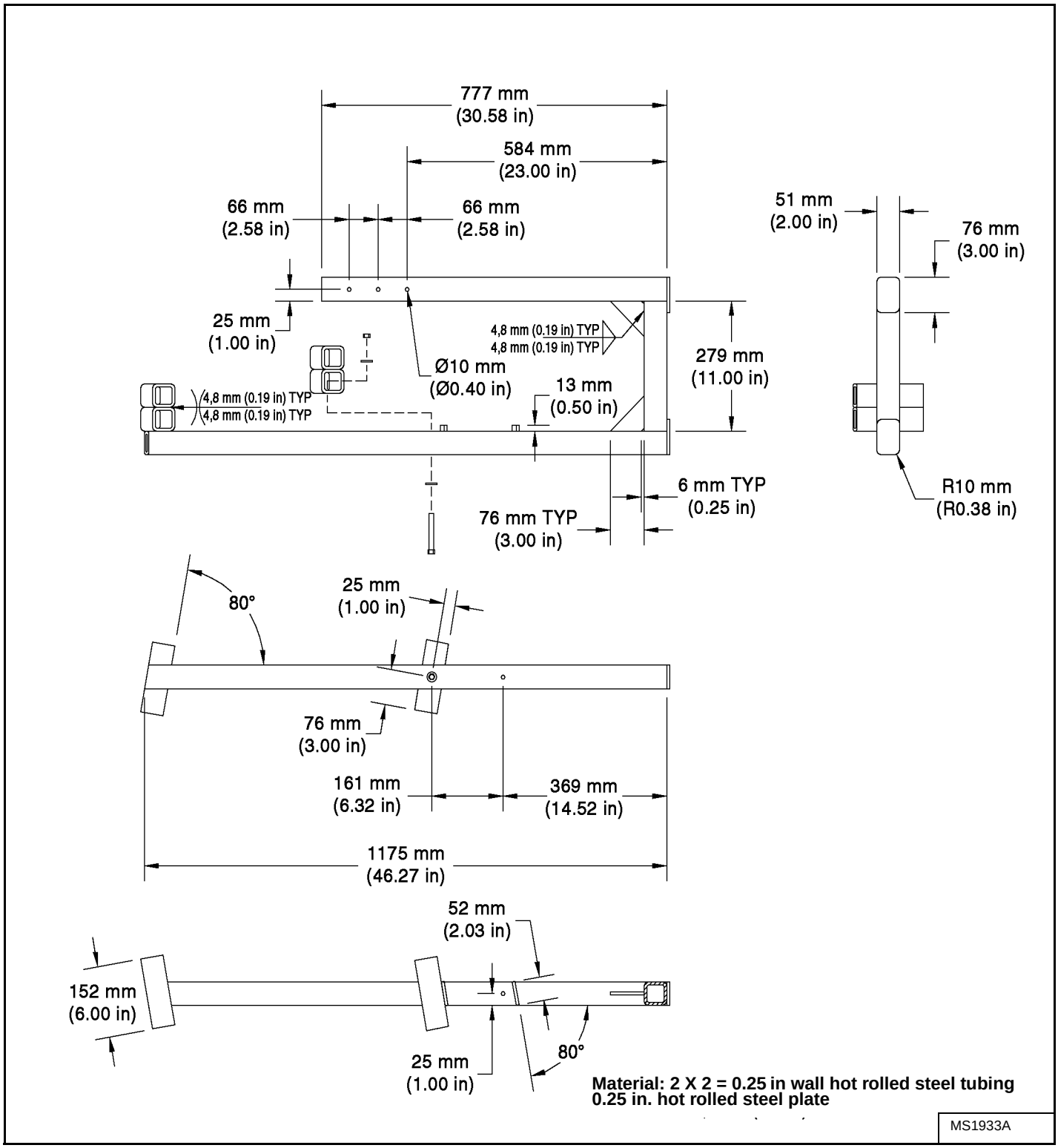
Clean and inspect the grease cover for damage. Replace as necessary.

ROPS CANOPY

Removal And Installation

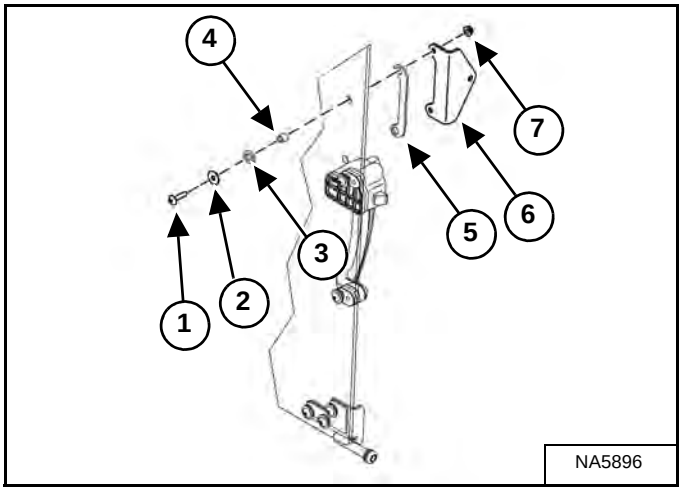
Build the service lifting bracket used to remove and install the ROPS canopy. Use the dimensions shown **[Figure 40-20-1]** to build the service lifting bracket.

Figure 40-20-1



Front Window Disassembly And Assembly (Later Models)

Figure 40-30-19



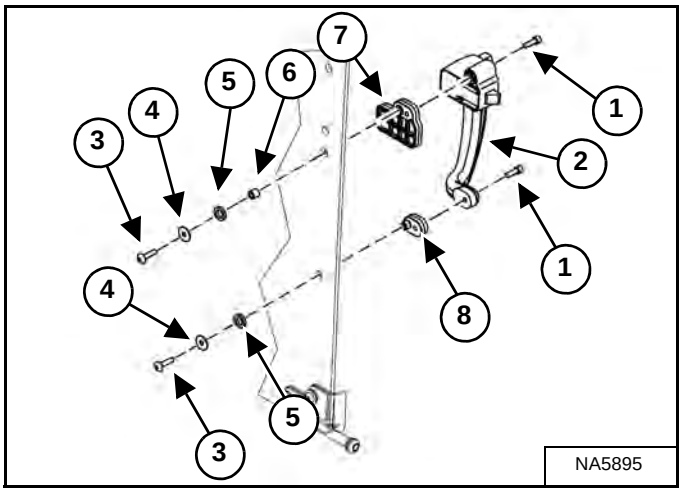
Remove the bolts (Item 1), washers (Item 2), gasket washers (Item 3), and spacers (Item 4) **[Figure 40-30-19]** from the window.

Remove the gasket (Item 5), mount (Item 6) and nuts (Item 7) **[Figure 40-30-19]**.

Repeat the procedure for the right mount.

Installation: Tighten the bolts to 6,8 - 7,8 N•m (60 - 69 in-lb) torque.

Figure 40-30-20



Remove the bolts (Item 1) and handle (Item 2) **[Figure 40-30-20]**.

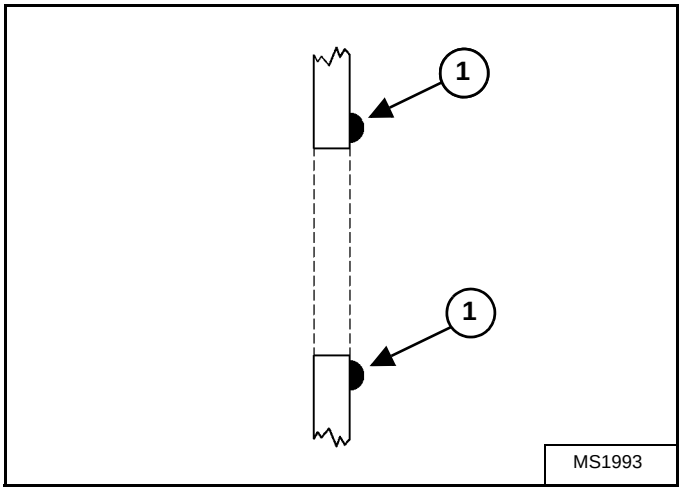
Remove the bolts (Item 3), washers (Item 4), gasket washers (Item 5), and spacer (Item 6). Remove the top spacer (Item 7) and bottom spacer (Item 8) **[Figure 40-30-20]**.

Installation: Tighten the bolts to 6,8 - 7,8 N•m (60 - 69 in-lb) torque.

Glass Installation (Cont'd)

Right And Left Side Glass (Cont'd)

Figure 40-30-41



Apply a 6,4 X 9,5 mm (0.25 X 0.375 in) bead of urethane adhesive (Item 1) **[Figure 40-30-41]** to the perimeter of the cab.

Figure 40-30-42

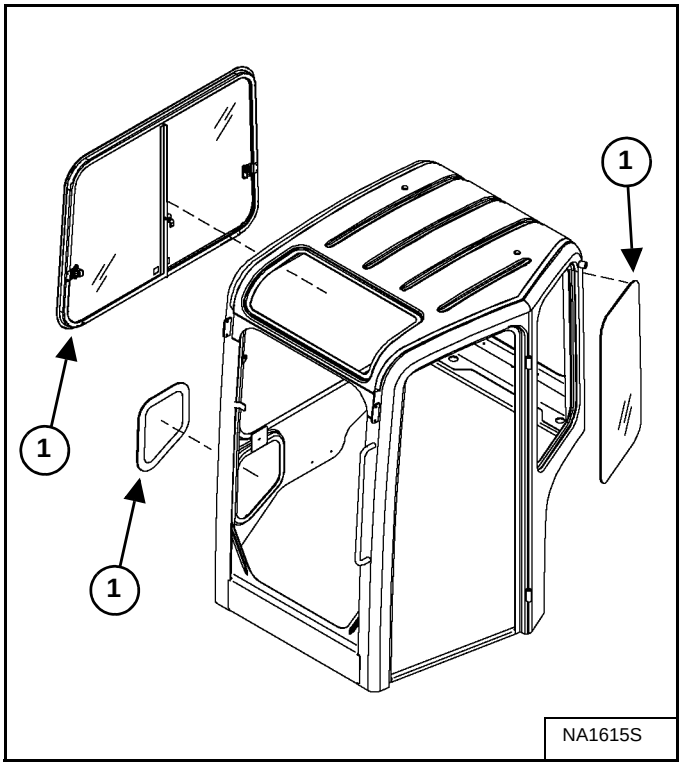
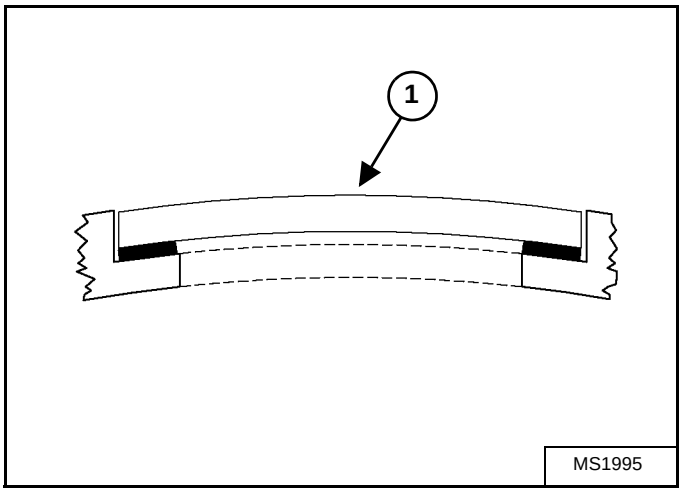


Figure 40-30-43



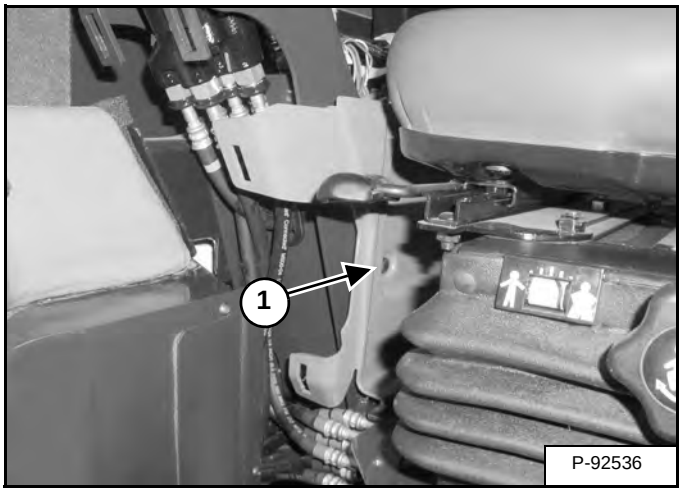
Install the glass (Item 1) **[Figure 40-30-42]** and **[Figure 40-30-43]**. Press the glass into the cab to make complete contact with the adhesive. Tape the glass in place.

Allow the adhesive to cure for a minimum of eight hours at 24°C (75°F) and 25% relative humidity.

Remove the tape after the adhesive is cured.

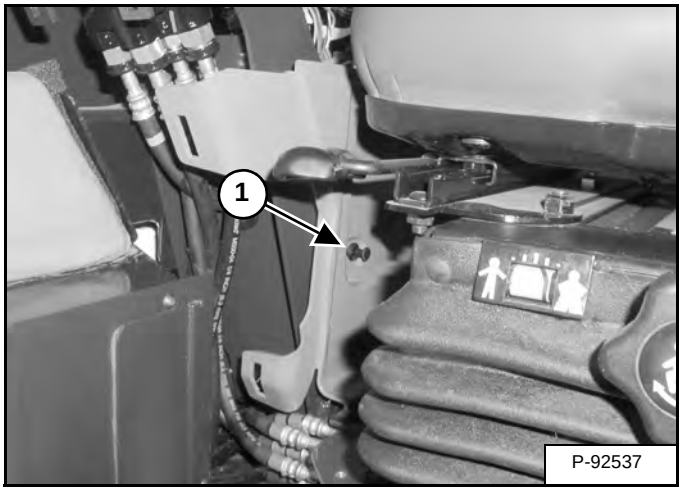
Console Cover Removal And Installation (Cont'd)

Figure 40-50-17



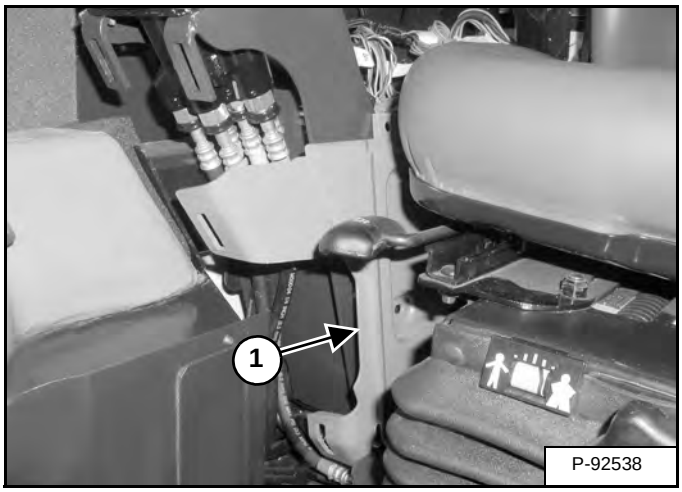
Pull up on the center pin (Item 1) **[Figure 40-50-17]**.

Figure 40-50-18



Remove the pin assembly (Item 1) **[Figure 40-50-18]**.

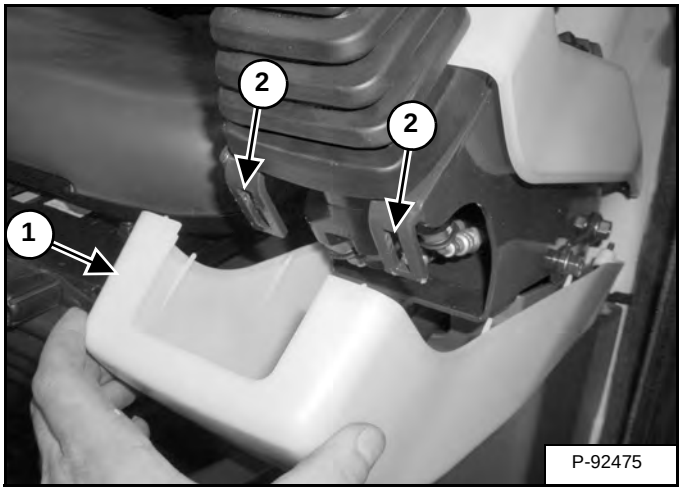
Figure 40-50-19



Remove the cover (Item 1) **[Figure 40-50-19]**.

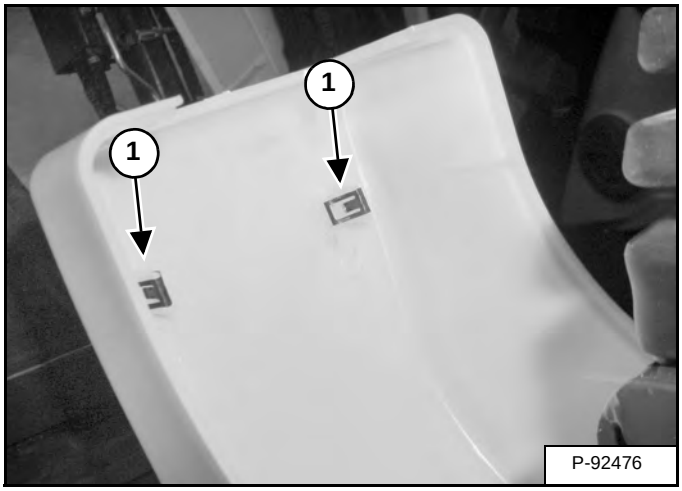
Upper Console Cover Removal And Installation (Cont'd)

Figure 40-60-6



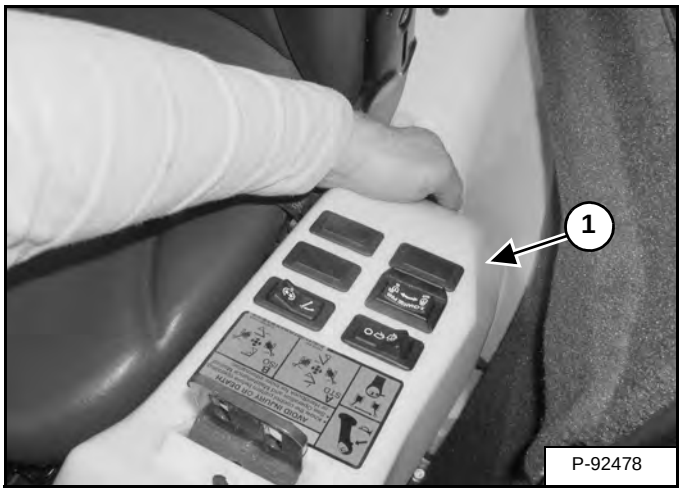
Pull down on the front of the bottom cover (Item 1) **[Figure 40-60-6]**.

Figure 40-60-7



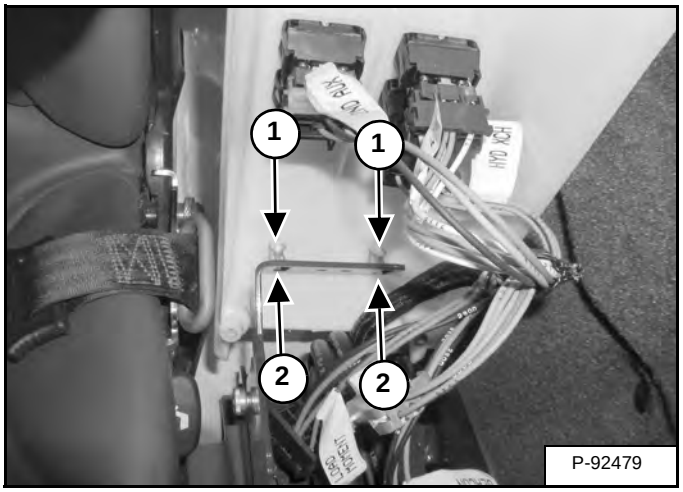
Installation: Push up on the bottom cover until the lock tabs (Item 1) **[Figure 40-60-7]** engage the slots (Item 2) **[Figure 40-60-6]**.

Figure 40-60-8



Pull up on the rear of the top cover (Item 1) **[Figure 40-60-8]**.

Figure 40-60-9



Installation: Push down on the top cover until the lock tabs (Item 1) engage the slots (Item 2) **[Figure 40-60-9]**.

COUNTERWEIGHT

Removal And Installation

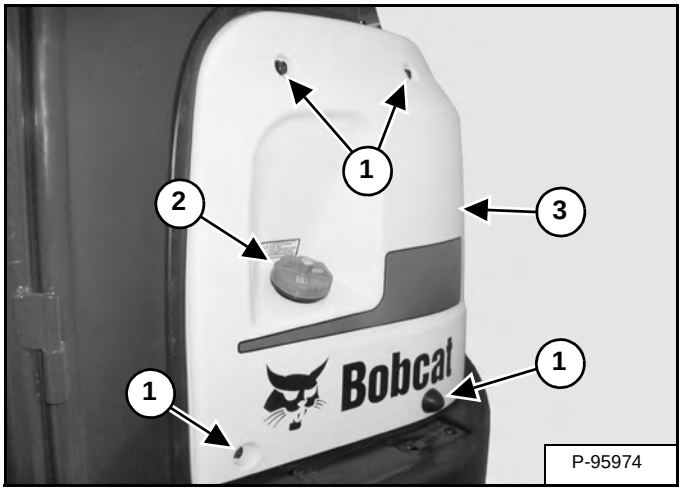
Remove the left upperstructure cover. (See Removal And Installation on Page 40-70-1.)

Remove the right upperstructure cover. (See Removal And Installation on Page 40-80-1.)

Remove the tailgate. (See Removal And Installation on Page 40-190-1.)

Remove the long arm counterweight (if equipped). (See Long Arm Counterweight Removal And Installation on Page 40-90-4.)

Figure 40-90-1



Remove the four bolts (Item 1), fuel cap (Item 2) and side cover (Item 3) **[Figure 40-90-1]**.

Reinstall the fuel cap (Item 2) **[Figure 40-90-1]**.

NOTE: Reinstall the fuel cap to prevent any contamination from entering the fuel tank.

Figure 40-90-2

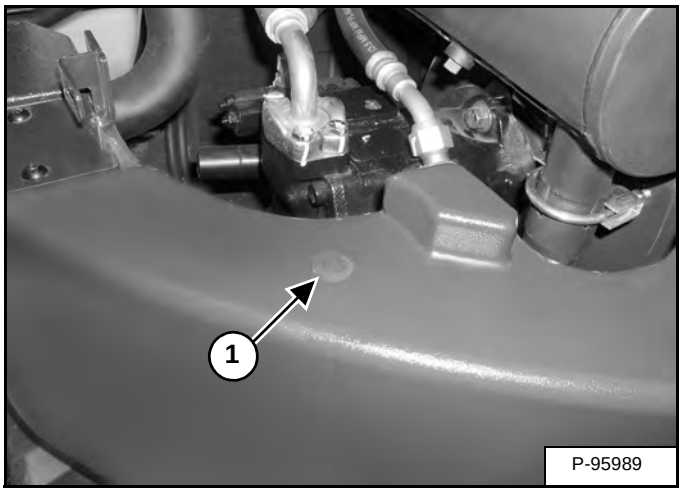
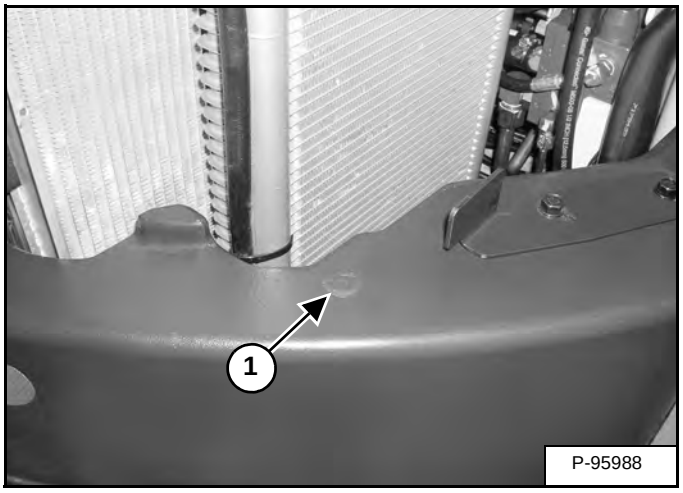


Figure 40-90-3



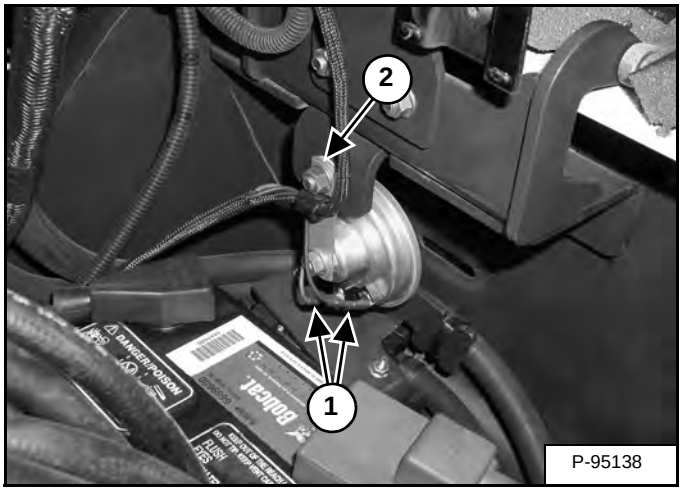
Remove the plugs (Item 1) **[Figure 40-90-2]** and **[Figure 40-90-3]**.

HORN

Removal And Installation

Open the right side cover. (See Opening And Closing on Page 10-60-1.)

Figure 40-130-1



Disconnect the wire harness (Item 1) **[Figure 40-130-1]**.

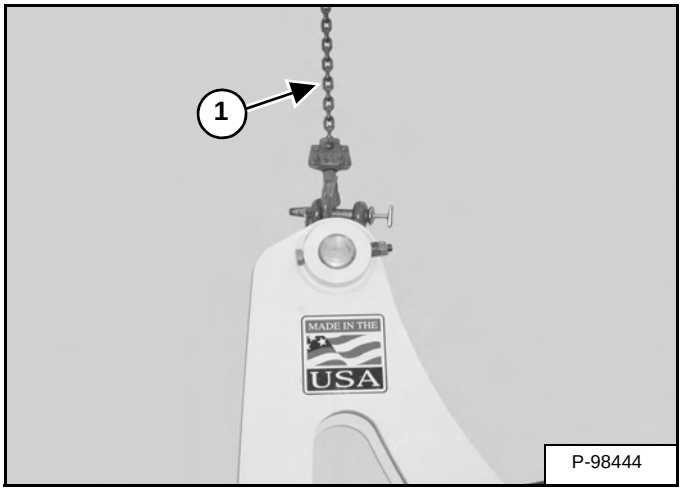
Remove the nut (Item 2) **[Figure 40-130-1]** and remove the horn.

ARM (STANDARD AND LONG)

Removal And Installation

Remove the arm cylinder. (See Removal And Installation on Page 20-22-3.)

Figure 40-160-1



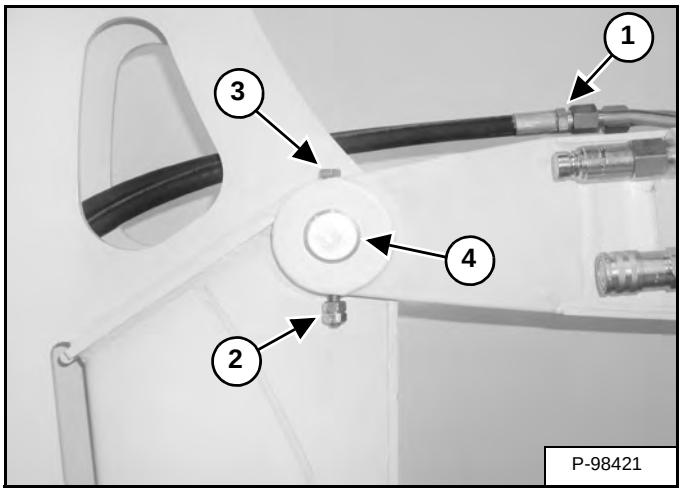
Support the arm with a chain hoist (Item 1) **[Figure 40-160-1]**.

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 40-160-2



Remove the hydraulic hoses (Item 1) **[Figure 40-160-2]**.

Remove the nuts (Item 2) and bolt (Item 3) **[Figure 40-160-2]**.

Remove the pin (Item 4) **[Figure 40-160-2]**.

Remove the arm from the boom.

X-CHANGE

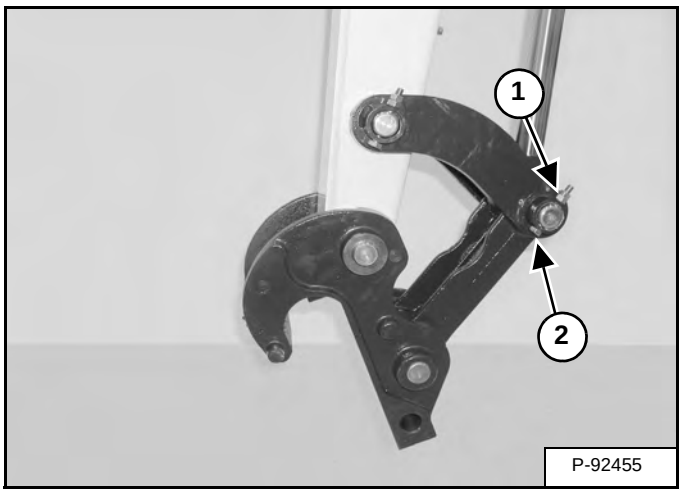
Removal And Installation

Remove the bucket. (See Operation & Maintenance Manual for correct removal procedure.)

Figure 40-200-1

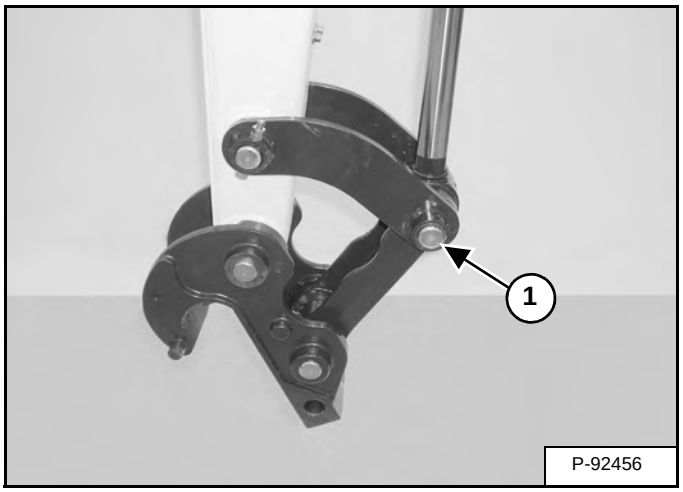
Support the boom with a hoist **[Figure 40-200-1]**.

Figure 40-200-2



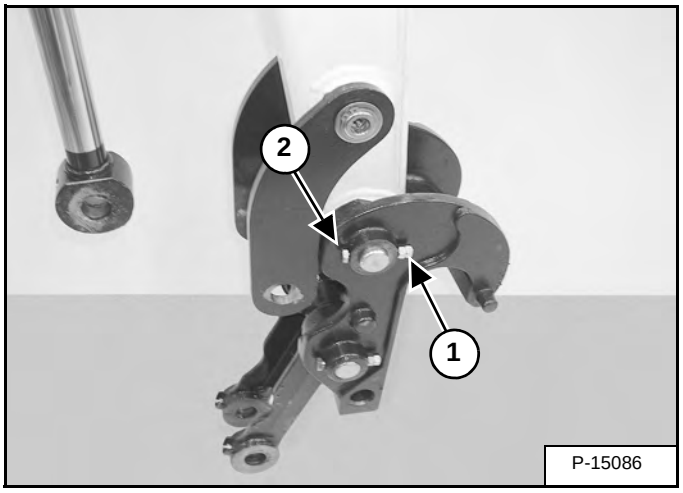
Remove the nuts (Item 1) and bolt (Item 2) **[Figure 40-200-2]**.

Figure 40-200-3



Remove the pin (Item 1) **[Figure 40-200-3]**.

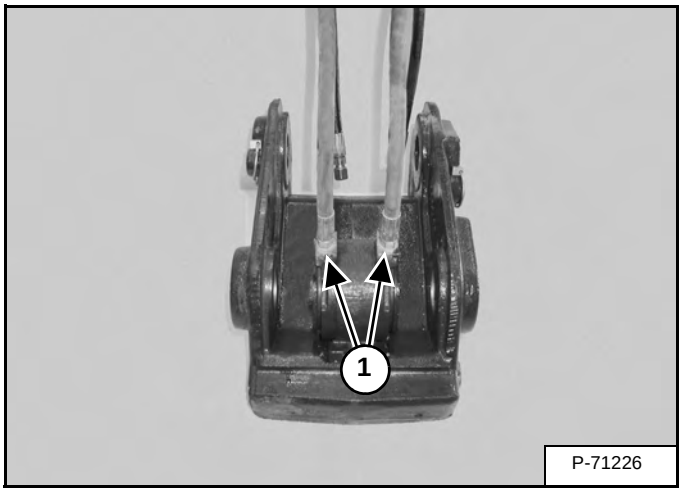
Figure 40-200-4



Remove the nuts (Item 1) and bolt (Item 2) **[Figure 40-200-4]**.

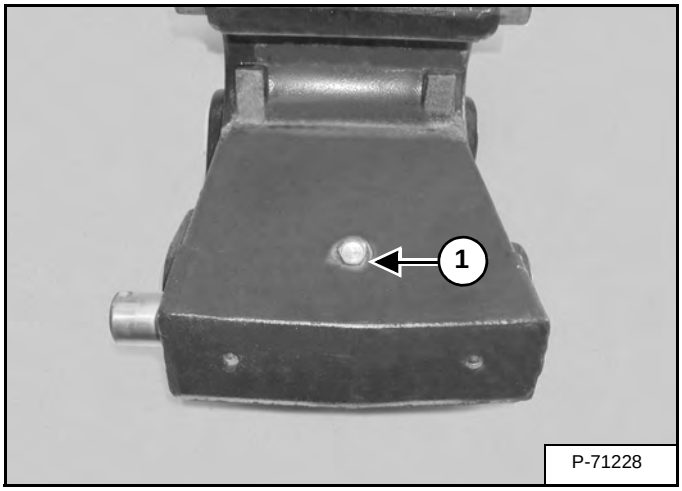
Disassembly (Cont'd)

Figure 40-201-13



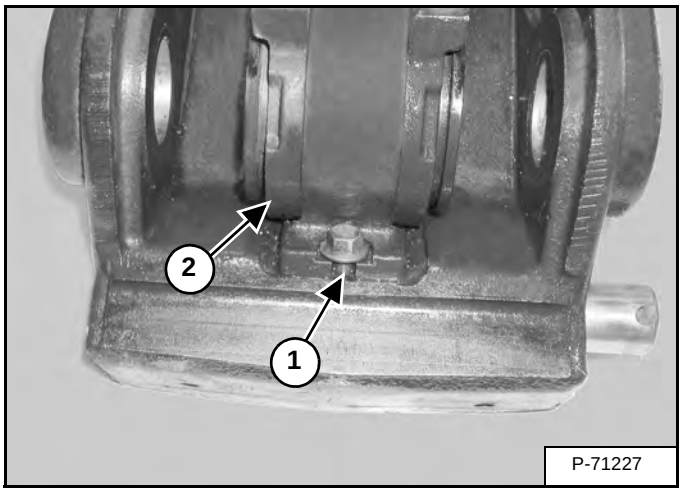
Remove the two hydraulic hoses (Item 1) **[Figure 40-201-13]** from the swivel ends.

Figure 40-201-14



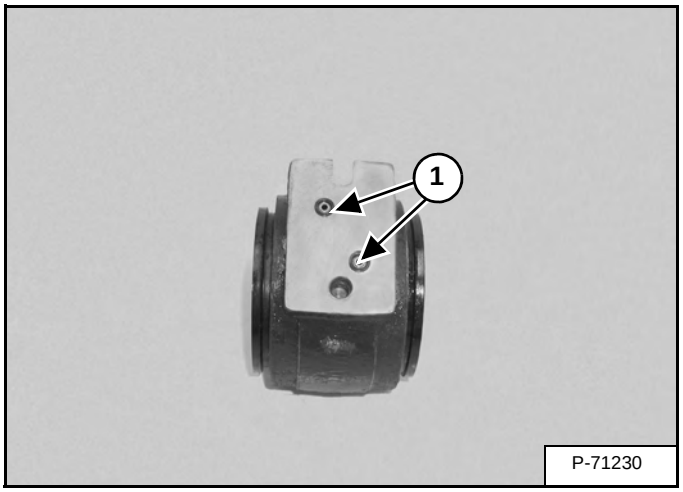
Remove the bolt (Item 1) **[Figure 40-201-14]**.

Figure 40-201-15



Remove the bolt (Item 1), nut, and the swivel assembly (Item 2) **[Figure 40-201-15]**.

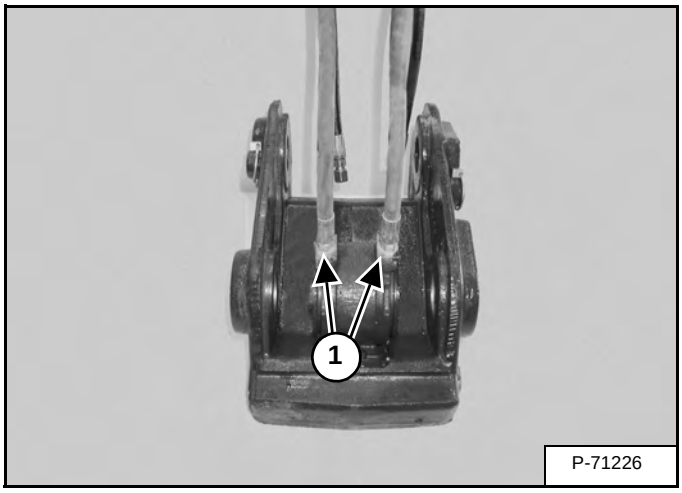
Figure 40-201-16



Remove the O-rings (Item 1) **[Figure 40-201-16]** from the swivel assembly.

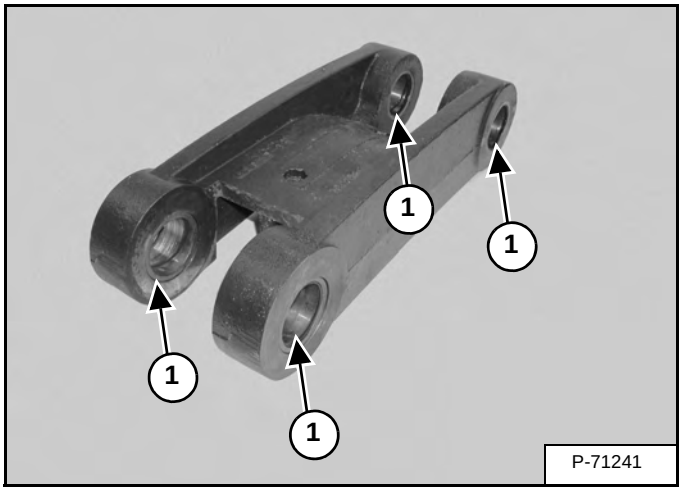
Assembly (Cont'd)

Figure 40-201-53



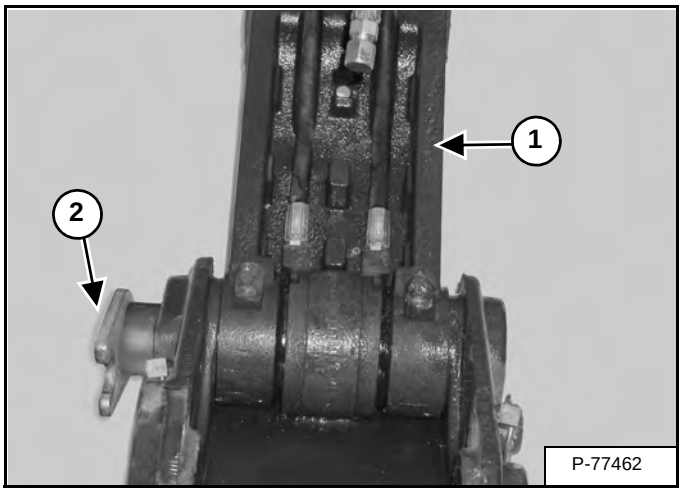
Install the hydraulic hoses (Item 1) **[Figure 40-201-53]** onto the swivel ends.

Figure 40-201-54



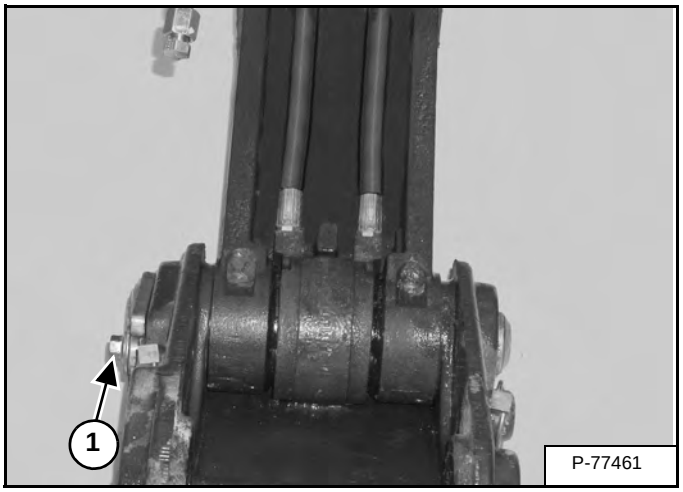
Install the bushings (Item 1) **[Figure 40-201-54]** and dust seals into the bucket link.

Figure 40-201-55



Install the bucket link (Item 1) and pin (Item 2) **[Figure 40-201-55]**.

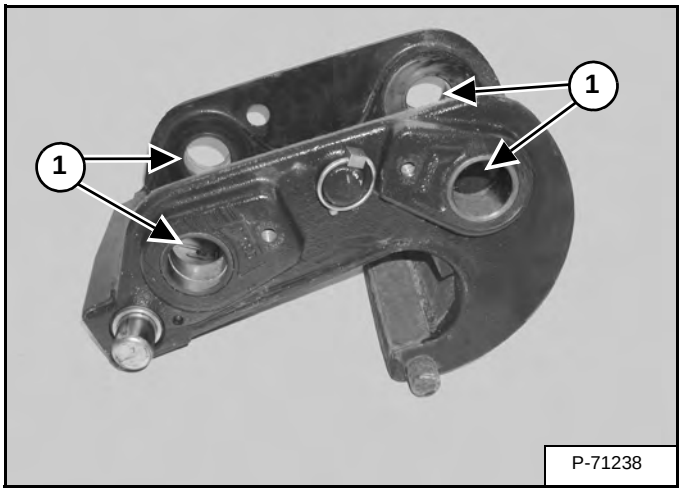
Figure 40-201-56



Install the spacer, flat washer and bolt (Item 1) **[Figure 40-201-56]**.

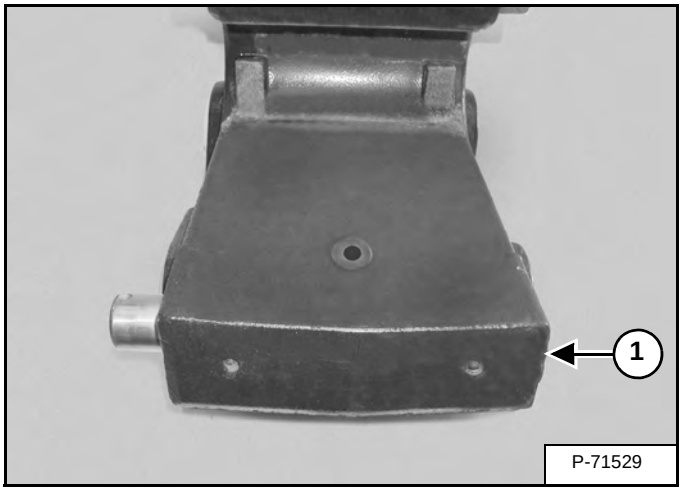
Disassembly (Cont'd)

Figure 40-202-21



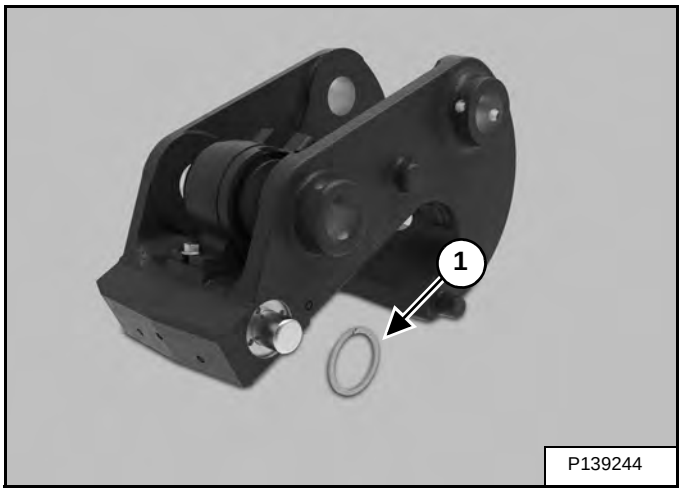
Remove the four bushings (Item 1) **[Figure 40-202-21]**.

Figure 40-202-22



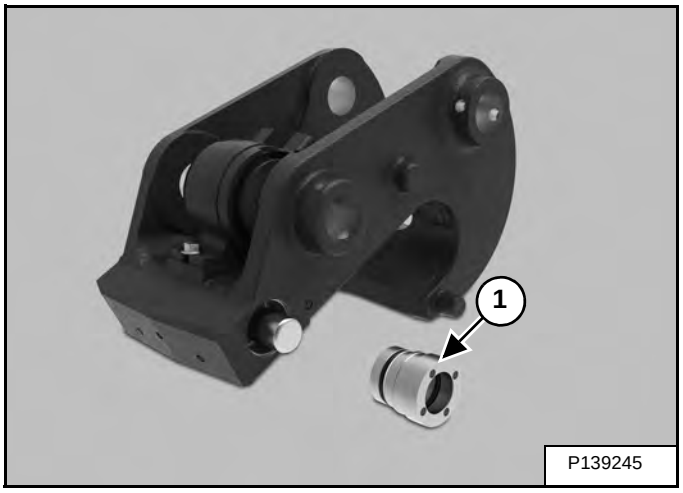
Apply inward pressure on the piston (Item 1) **[Figure 40-202-22]**.

Figure 40-202-23



Remove the retaining ring (Item 1) **[Figure 40-202-23]**.

Figure 40-202-24

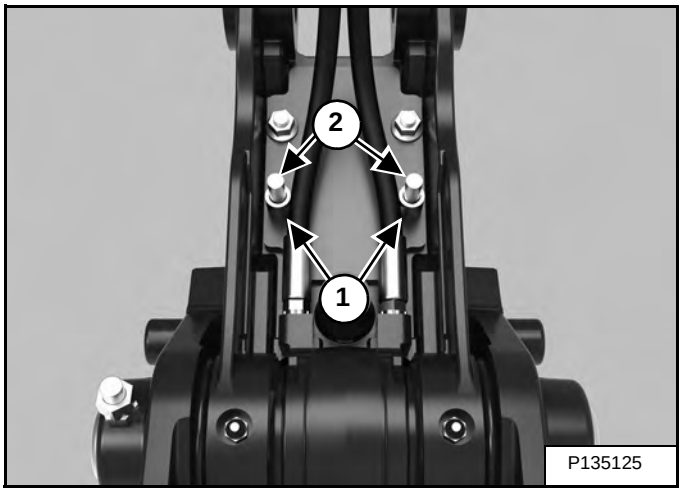


Remove the piston head (Item 1) **[Figure 40-202-24]**.

Repeat **[Figure 40-202-22]** through **[Figure 40-202-24]** to remove the piston head from the opposite side of the X-Change.

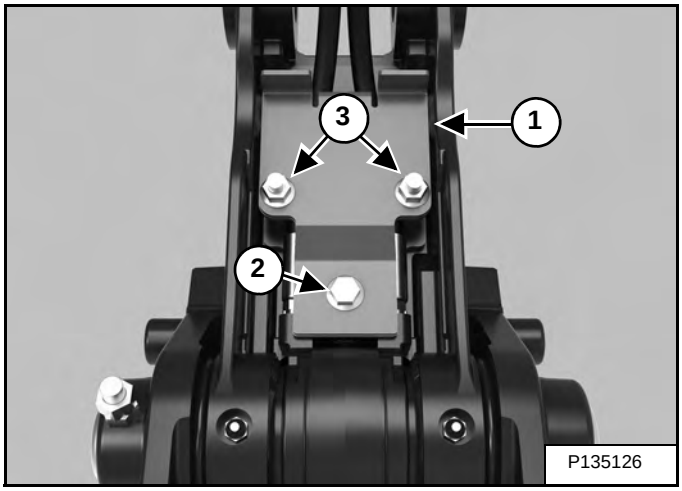
Assembly (Cont'd)

Figure 40-202-57



Install the two bolts (Item 1) and spacers (Item 2) **[Figure 40-202-57]**.

Figure 40-202-58



Install hose guard (Item 1) **[Figure 40-202-58]**.

Install the bolt (Item 2) and three nuts (Item 3) **[Figure 40-202-58]**.

QUICK COUPLER (LEHNHOFF® SYSTEM)

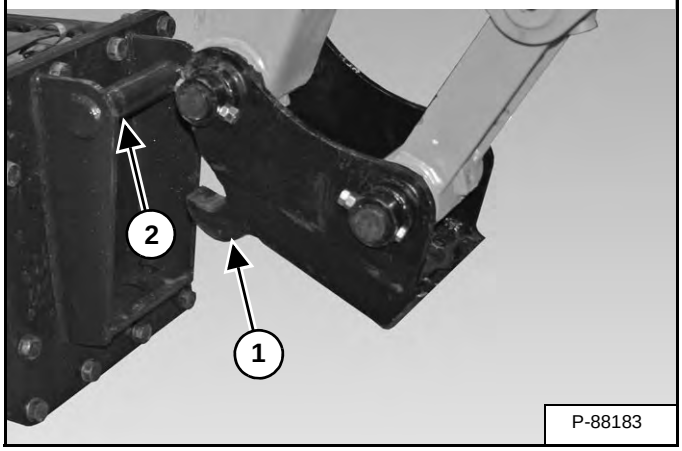
Troubleshooting

PROBLEM	CAUSE	CORRECTION
Coupler does not seat properly on the attachment mounting frame.	Mud, dirt, stones or debris are lodged between the coupler and the attachment mounting frame.	Remove mud, dirt, stones and debris from between the coupler and the attachment mounting frame.
	Worn locking mechanism.	Repair or replace worn pins and locking mechanisms.
	Attachment mounting frame damaged.	Repair or replace the attachment mounting frame.

Daily Inspection

Figure 40-211-1

(MS03 And MS08)

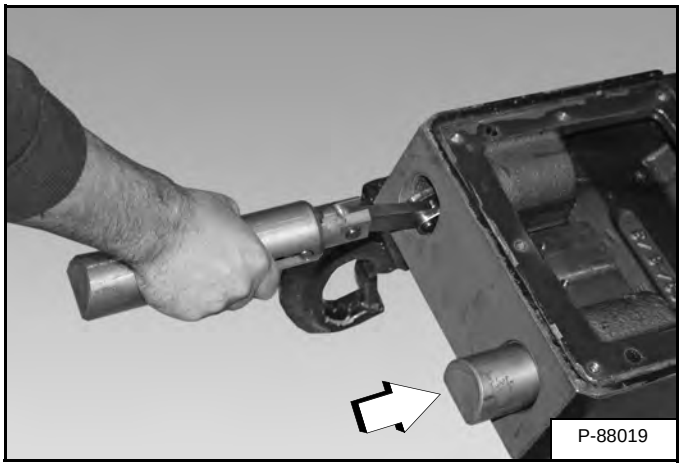


Inspect the quick coupler for wear or damage. Inspect the hooks (Item 1) and coupler locking shaft (Item 2) **[Figure 40-211-1]** (on the attachment) for wear or damage.

Repair or replace damaged parts.

Assembly (MS08) (Cont'd)

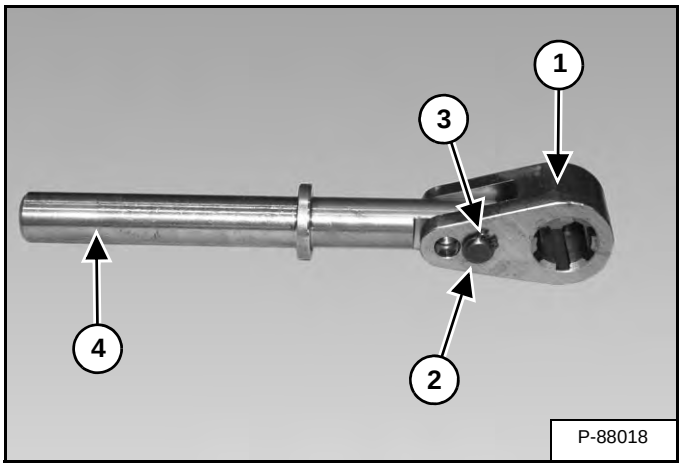
Figure 40-211-26



Install the locking pin assemblies **[Figure 40-211-26]**.

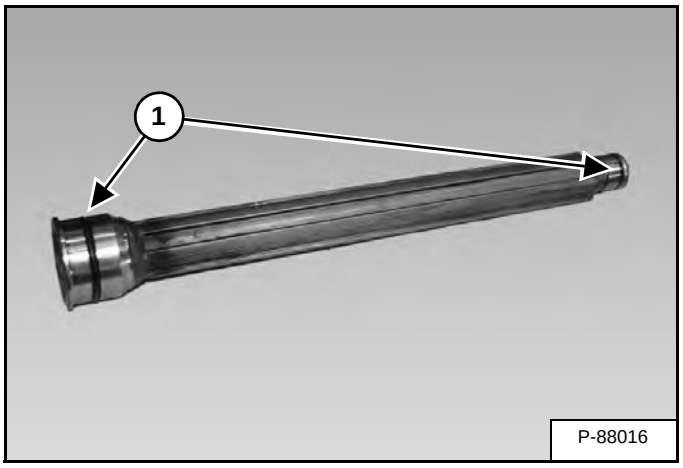
NOTE: Position the locking levers with the flat side down and away from the cover.

Figure 40-211-27



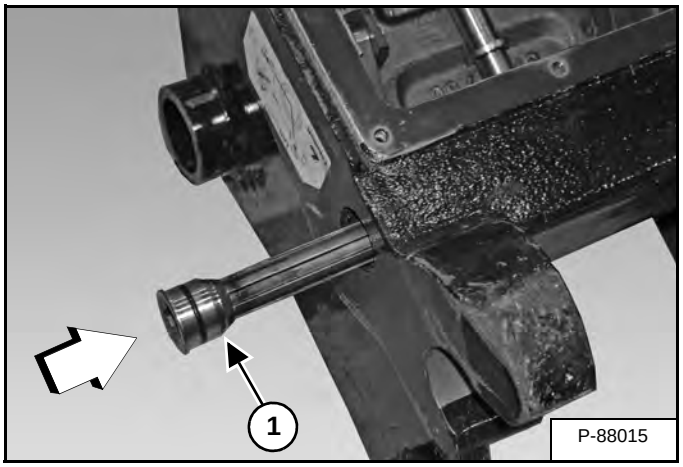
Install the driving fork (Item 1), pin (Item 2) and snap ring (Item 3) on the spring guide (Item 4) **[Figure 40-211-27]**.

Figure 40-211-28



Install the O-rings (Item 1) **[Figure 40-211-28]**.

Figure 40-211-29



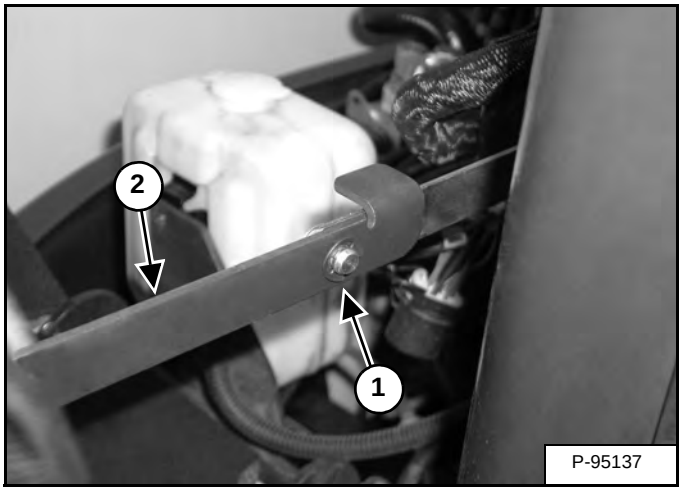
Install the control shaft (Item 1) **[Figure 40-211-29]**.

RIGHT SIDE COVER (EARLIER MODELS)

Removal And Installation

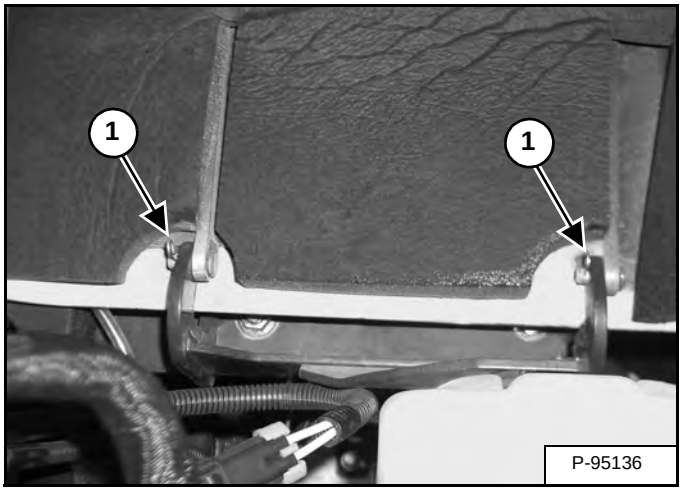
Open the right side cover. (See Opening And Closing on Page 10-60-1.)

Figure 40-220-1



Remove the clip (Item 1). Support the cover and separate the support (Item 2) **[Figure 40-220-1]**.

Figure 40-220-2



Support the cover and remove the two clips (Item 1) **[Figure 40-220-2]**.

Slide the cover to the right and remove the cover from the excavator.

ELECTRICAL SYSTEM AND ANALYSIS

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND/RETURN	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPPLY	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

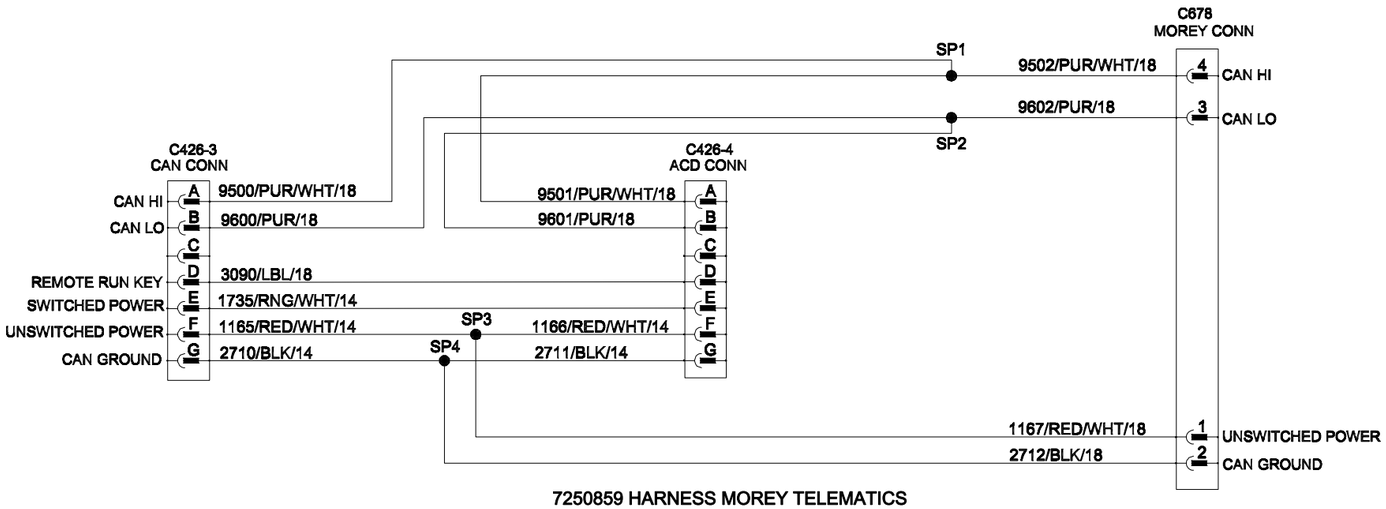
LEGEND

PARTIAL CONNECTOR

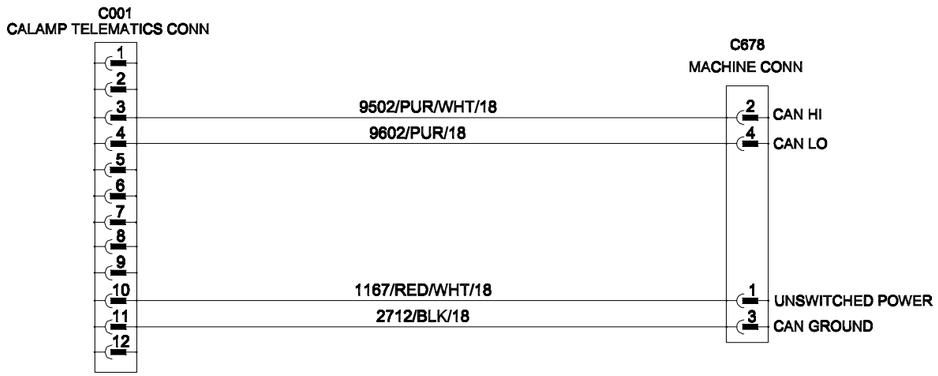
CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS JOIN ONE WIRE)

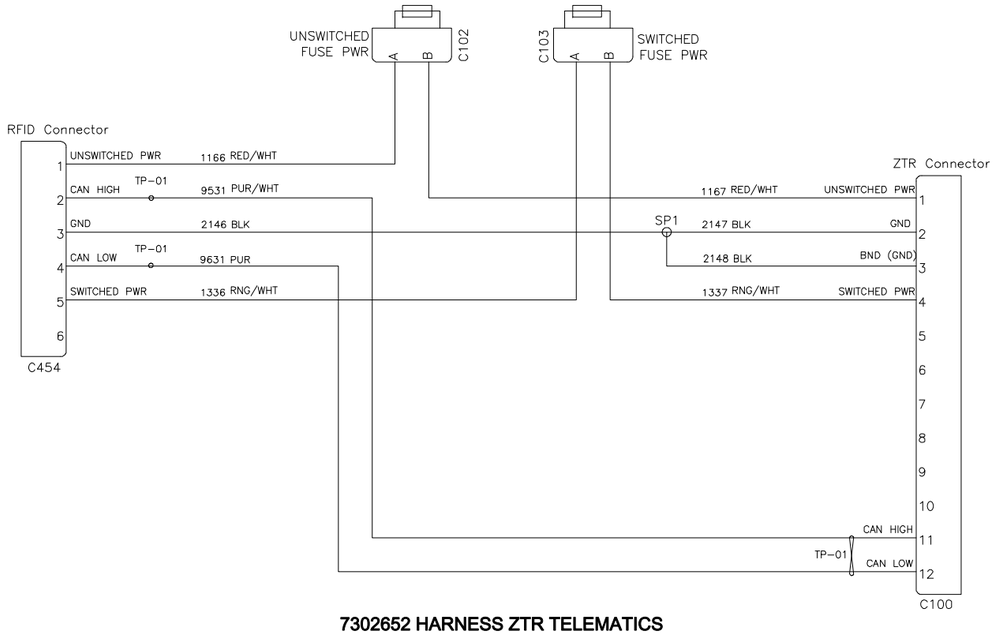
SHEET #



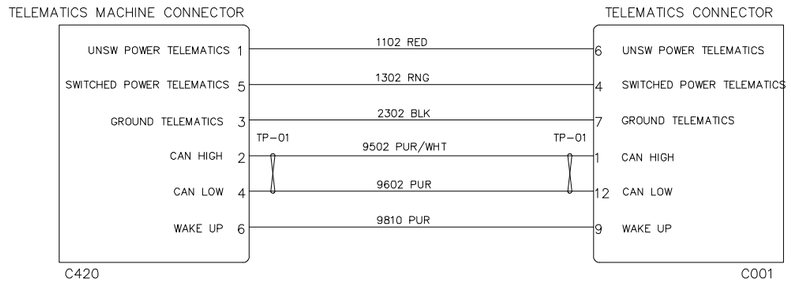
7250859 HARNESS MOREY TELEMATICS



7315161 HARNESS CALAMP TELEMATICS



7302652 HARNESS ZTR TELEMATICS



7353240 HARNESS TELEMATICS ADAPTOR

Printable Version Click Here

WIRING SCHEMATIC OPTIONS

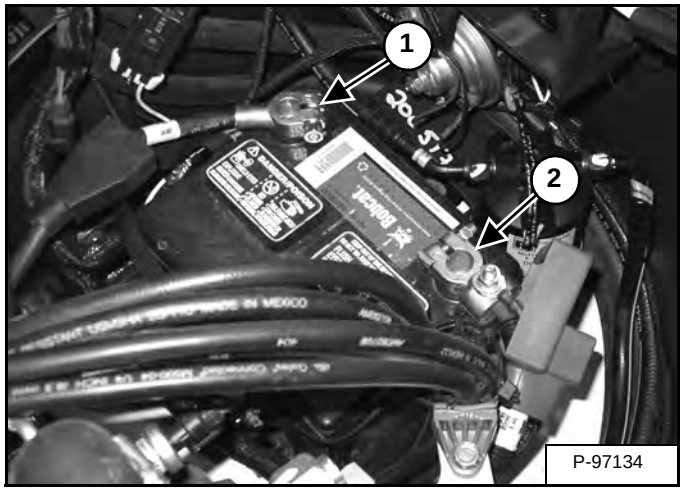
Sheet 2 of 6

JANUARY 2019

Removing And Installing

Open the right side cover. (See Opening And Closing on Page 10-60-1.)

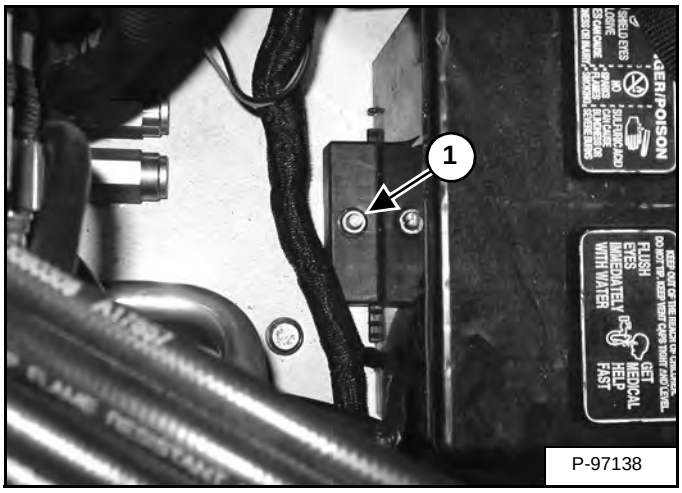
Figure 50-20-3



Disconnect the negative (-) cable (Item 1) **[Figure 50-20-3]** first.

Disconnect the positive (+) cable (Item 2) **[Figure 50-20-3]**.

Figure 50-20-4



Remove the bolt (Item 1) **[Figure 50-20-4]** and remove the hold down clamp.

Remove the battery.

Always clean the terminals and the cable ends, even when installing a new battery.

Install the battery. Install the hold down clamp and tighten the bolts.

Connect the battery cables. Connect the negative (-) cable (Item 1) **[Figure 50-20-3]** last to prevent sparks.

⚠ WARNING

AVOID INJURY OR DEATH

Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

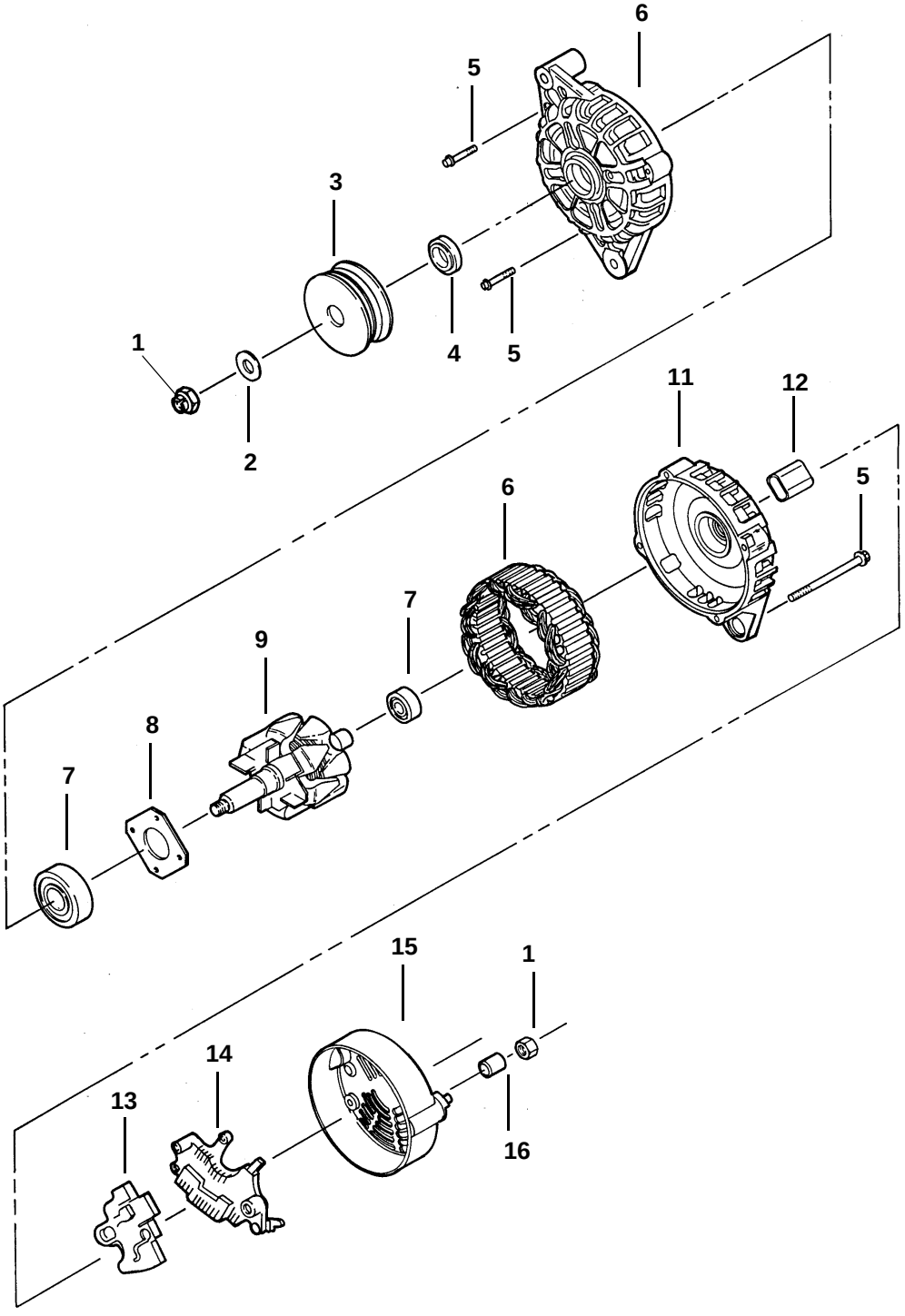
In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

If electrolyte is taken internally drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2065-0807

Parts Identification

1. Nut
2. Washer
3. Pulley
4. Spacer
5. Bolt
6. Case Half
7. Bearings
8. Retainer
9. Rotor
10. Stator
11. Case half
12. Sleeve
13. Regulator
14. Rectifier
15. Cover
16. Spacer

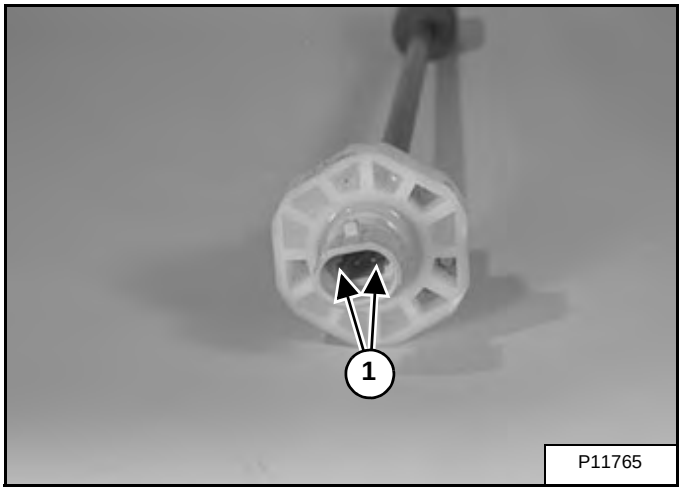


C-3529

Testing

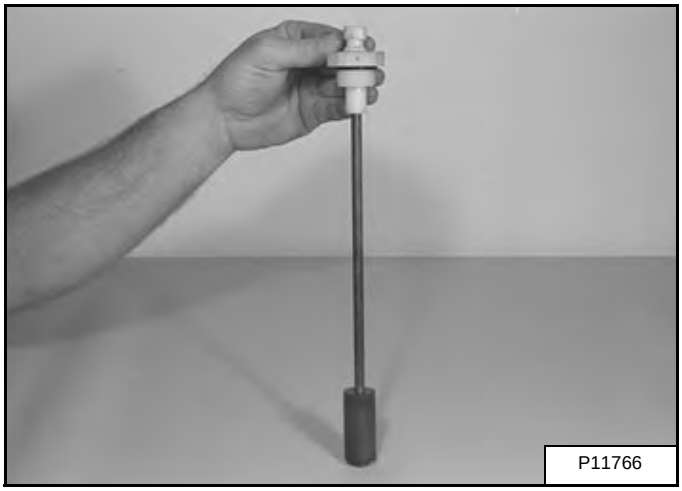
Use an ohmmeter to check the resistance of the fuel sender.

Figure 50-70-5



Insert one of the ohm tester leads into each of the fuel sender electrical connectors (Item 1) **[Figure 50-70-5]** in the end of the fuel sender.

Figure 50-70-6

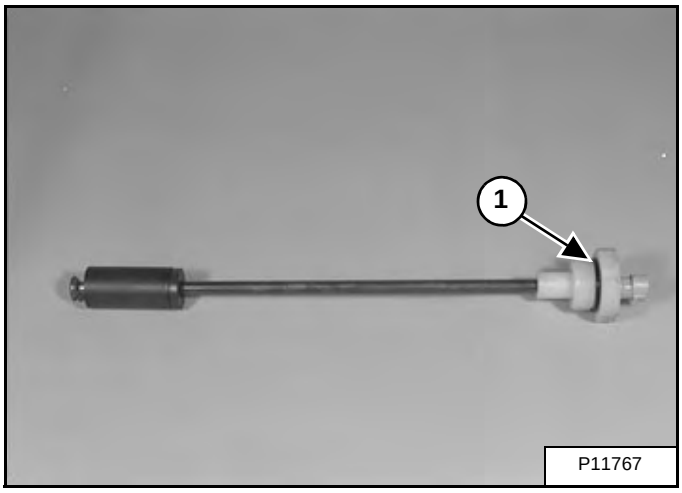


With the fuel sender in the position shown **[Figure 50-70-6]**, read the ohm in the empty position. Slide the float upwards and the ohm reading will decrease. See resistance chart below.

The resistance should read as follows:

FULL: 30 ohm
HALF: 150 ohm
EMPTY: 270 ohm

Figure 50-70-7



Inspect the O-ring (Item 1) **[Figure 50-70-7]** and replace as needed.

CONTROL PANEL SETUP (S/N AG3N14000 & ABOVE, AHHE14000 & ABOVE, B3NN11001 & ABOVE AND B3NS11001 & ABOVE) (CONT'D)

Panel Setup (Deluxe Instrument Panel) (Cont'd)

Date And Time

	Press a scroll button (Item 1) repeatedly until the Display screen icon (Inset) is highlighted.
	Select **[1. CLOCKS]**.
	Select **[1. TIME]**.
	Use the keypad to enter time. Select AM / PM / 24hr. Press **[ENTER]** to continue.
	Select **[2. DATE]**.
	Use the keypad to enter date. Press **[ENTER]** to continue.

Languages

	Press a scroll button (Item 1) repeatedly until the Display screen icon (Inset) is highlighted.
	Select **[2. LANGUAGES]**.
	Select the desired language.

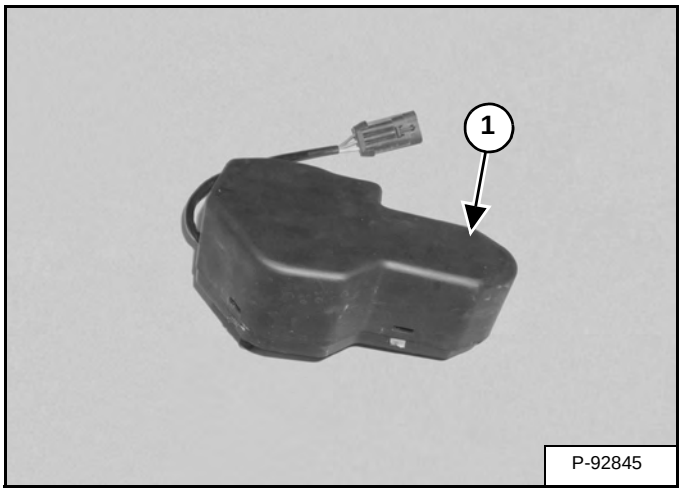
English / Metric Display

	Press a scroll button (Item 1) repeatedly until the Display screen icon (Inset) is highlighted.
	Select **[4. DISPLAY SETTINGS]**. Press **[1]** to cycle between ENGLISH and METRIC.


Bobcat®

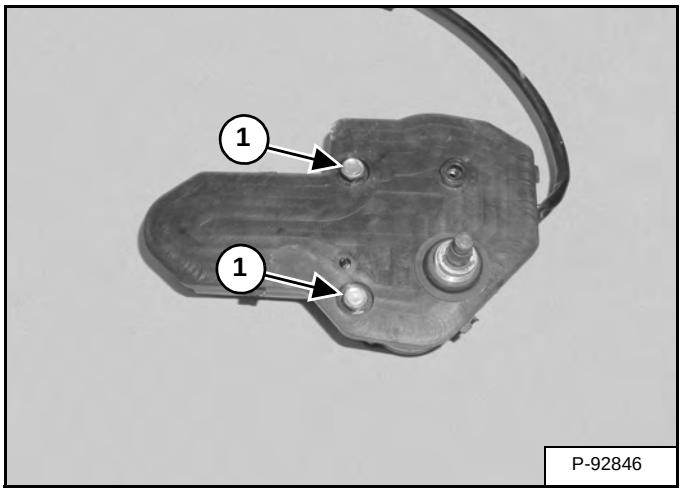
Removal And Installation (Cont'd)

Figure 50-120-5



Pry up on and remove the cover (Item 1) **[Figure 50-120-5]**.

Figure 50-120-6



Remove the bolts (Item 1) **[Figure 50-120-6]** and remove the wiper motor from the plate.

TRAVEL MOTOR AUTO-SHIFT (CONT'D)

Troubleshooting

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. All tests are performed with the engine running and left console lowered.

Failure Mode	Causes	Symptom	Troubleshooting	Controller Response
No input from two-speed switch.	Failed switch.	Travel motors will not shift to high range, two-speed icon does NOT illuminate.	Inspect two-speed switch, connectors and wire harness.	No service code shown.
	Wire harness disconnected.			
	Wire harness or connectors damaged.			
	Short to ground.			
Constant voltage input from two-speed switch.	Failed switch. Short to battery.	Travel motors will not shift to high range, two-speed icon does NOT illuminate.	Inspect two-speed switch, connectors and wire harness.	No service code shown.
			Inspect switch for short to battery.	
Two-speed solenoid valve stuck in default (off) position.	Failed solenoid valve or travel lever pressure switch.	Travel motors will not shift to high range.	Inspect two-speed solenoid, connectors, wiring, travel lever pressure switch, connectors, wiring.	No service code shown.
	Wire harness disconnected.		Check for voltage on travel lever pressure switch when operating one track to isolate solenoid issue vs. travel lever pressure switch issue.	Service code detected for short to ground only.
	Wire harness or connectors damaged.		If cause is short to ground, service code will be displayed on controller.	
	Short to ground.			
Two-speed solenoid valve stuck on.	Short to battery.	Travel motors will not manually shift to low range.	If cause is short to battery, service code will be displayed on controller.	Service code detected for short to battery only.
	Failed solenoid.		If no service code is displayed replace solenoid.	
Travel lever pressure switch stuck open.	Failed switch.	Travel motors will not shift to high range.	If two-speed icon does illuminate when two-speed switch is depressed, inspect two-speed solenoid, connectors, wiring, travel lever pressure switch.	No service code shown.
	Wire harness disconnected.		Check for voltage on travel lever pressure switch when operating one track to isolate solenoid issue vs. travel lever pressure switch issue.	
	Wire harness or connectors damaged.			
	Short to ground.			
Travel lever pressure switch stuck closed.	Failed switch.	Travel motors will not shift to low range when travel levers are in neutral position.	Test for pilot pressure when traveling in high range. There is no pilot pressure present when in low range or neutral.	No service code shown.
	Short to battery.			

BOBCAT MACHINE IQ WIRELESS COMMUNICATIONS (CONT'D)

Procedure (Cont'd)

LTE/4G

This device is equipped with three Status LED's.

1. CAN
2. GPS
3. COM 1 - For wireless network status

The LED's use the following blink patterns to indicate service.

CAN - LED (Red) Definitions	
Condition	**CAN - LED**
No CAN traffic	Off
CAN traffic detected no VIN	Slow Blinking
Default Configuration (No PEG found)	Very Slow Blinking
CAN Traffic detected and VIN found	Solid

GPS - LED (Yellow) Definitions	
Condition	**GPS - LED**
GPS Off	Off
GPS On	Slow Blinking
GPS Time Sync	Fast Blinking
GPS Fix	Solid

COM 1 - LED (Orange) Definitions	
Condition	**COM 1 - LED**
Modem Off	Off
Comm On - Searching	Slow Blinking
Network Available	Fast Blinking
Registered but no Inbound Acknowledgment	Alternates from Solid to Fast Blink every 1s
Registered and Receiving Inbound Acknowledgment	Solid

CAN:

- Slow Blink ~ Key ON / CAN detected / missing VIN.
- Very Slow Blink ~ Incorrect software / software update needed.
- Solid LED ~ Fully Operational

GPS:

- Slow Blink - not observed, may be a very brief moment.
- Fast Blink ~ 2 minutes.
- Solid LED achieved within 2 minute.

Times may vary depending on systems ability to pickup GPS satellites.

Com 1 will go through the sequence listed above. Initial experience is:

- Slow Blink ~ 15 seconds.
- Fast Blink ~ 40 seconds.
- Solid LED achieved within 1 minutes.
- If solid LED is not achieved after 1 minute, the system will reset and try again. This may occur several times if the appropriate type of cell coverage is marginal in the area.

More information can be found on BobcatDealerNet.com: Connected Machine.

Specifications (Cont'd)

Timing Gear

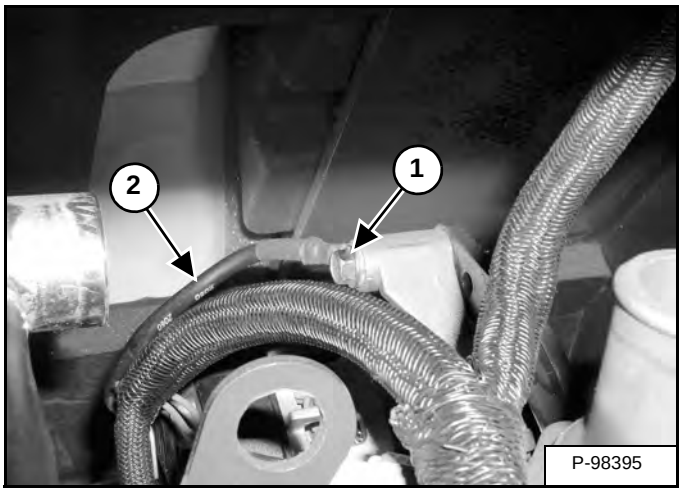
Timing Gear Backlash	
Crank Gear - Idle Gear	0,042 - 0,112 mm (0.0016 - 0.0044 in)
Idle Gear - Cam Gear	0,042 - 0,115 mm (0.0016 - 0.0045 in)
Idle Gear - Injection Pump Gear	0,042 - 0,115 mm (0.0016 - 0.0045 in)
Crank Gear - Oil Pump Gear	0,042 - 0,109 mm (0.0016 - 0.0043 in)
Allowable Limit	0,15 mm (0.006 in)
Idle Gear Shaft O.D.	37,959 - 37,975 mm (1.494 - 1.495 in)
Idle Gear Bushing I.D.	38,000 - 38,025 mm (1.496 - 1.497 in)
Clearance Between Idle Gear Shaft And Idle Gear Bushing	0,025 - 0,066 mm (0.001 - 0.0026 in)
Allowable Limit	0,10 mm (0.004 in)
Idler Gear Side Clearance	0,12 - 0,48 mm (0.005 - 0.019 in)
Allowable Limit	0,9 mm (0.04 in)

Thermostat

Valve Opening Temperature	81 - 84°C (177 - 182°F)
Valve Fully Open	95°C (203°F)

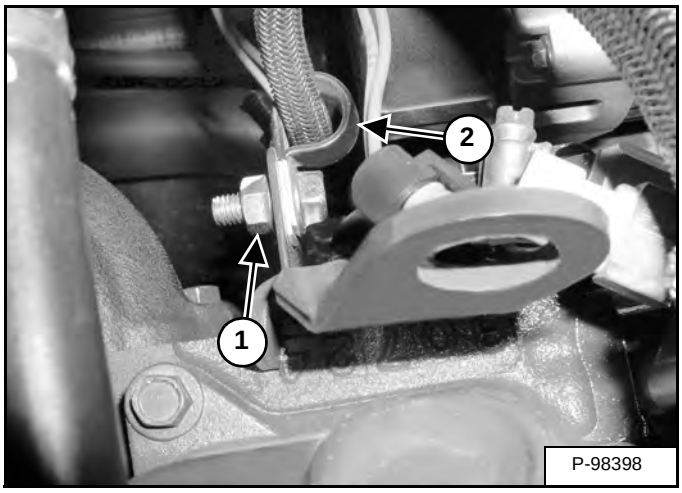
Removal And Installation (Cont'd)

Figure 60-10-21



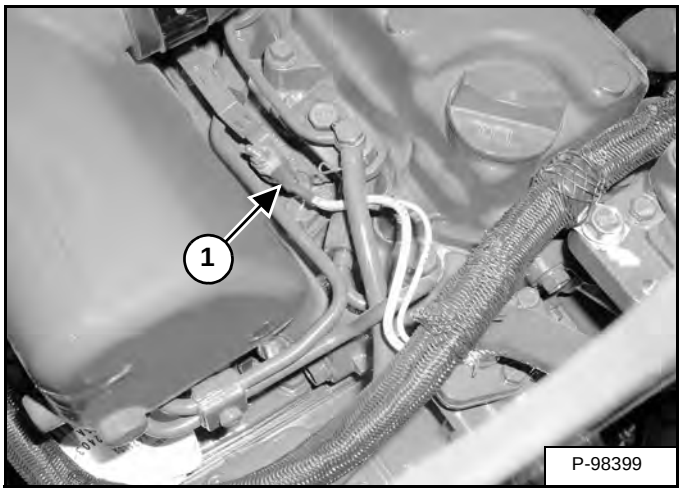
Remove the bolt (Item 1) and ground wire (Item 2) **[Figure 60-10-21]**.

Figure 60-10-22



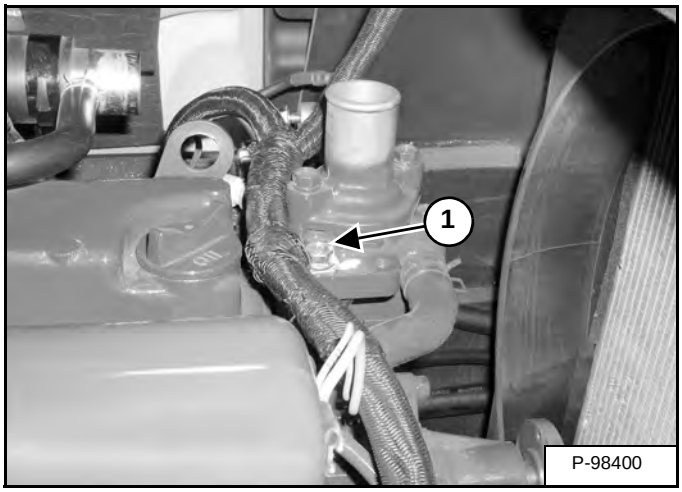
Remove the nut (Item 1), bolt and clamp (Item 2) **[Figure 60-10-22]**.

Figure 60-10-23



Remove the wire (Item 1) **[Figure 60-10-23]** from the glow plugs.

Figure 60-10-24

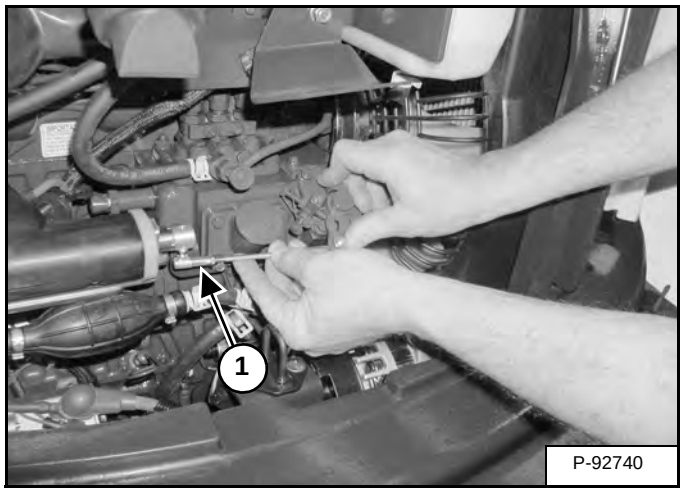


Remove the bolt (Item 1) **[Figure 60-10-24]**.

ENGINE SPEED CONTROL (CONT'D)

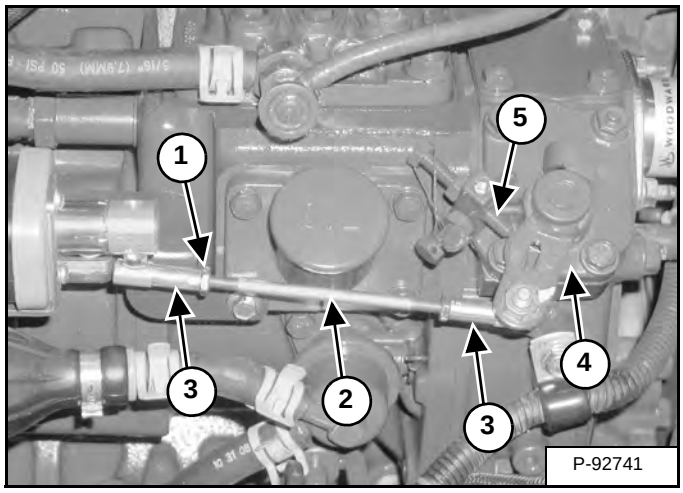
Calibration (Cont'd)

Figure 60-20-12



Connect the linkage (Item 1) **[Figure 60-20-12]** to the actuator.

Figure 60-20-13



Loosen the nuts (Item 1). Push down and disconnect the linkage (Item 2). Turn the ball joints (Item 3) a small amount and reconnect the linkage. Repeat the procedure until the lever (Item 4) fully contacts the stop (Item 5) **[Figure 60-20-13]**.

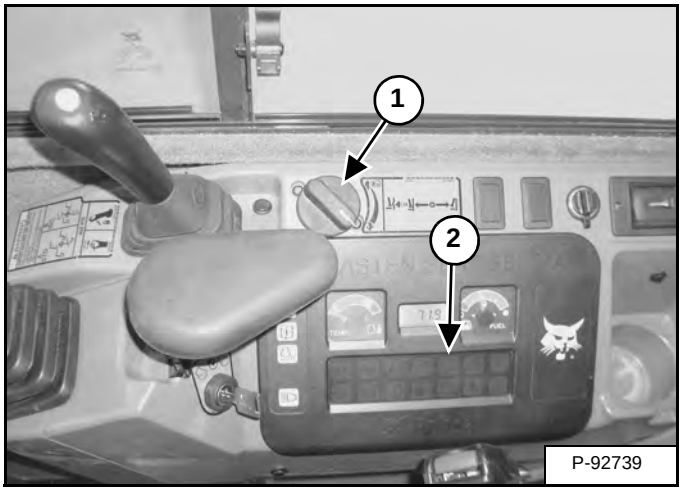
Tighten the nuts (Item 1) **[Figure 60-20-13]**.

The following procedure must be completed within 7.5 seconds:

With the engine off and the engine speed control dial at the high speed position, turn the key to the ON position.

Turn the engine speed control dial (Item 1) **[Figure 60-20-14]** from the high speed position to the low speed position four times:

Figure 60-20-14



High Speed
Low Speed
High Speed
Low Speed
High Speed
Low Speed
High Speed
Low Speed

NOTE: The auto idle icon (Item 2) [Figure 60-20-14] will flash while the calibration procedure is in process.

NOTE: The calibration procedure may start after the third rotation of the speed control dial.

When the calibration procedure is complete, the operator warning alarm will sound twice. Turn the key to the STOP position.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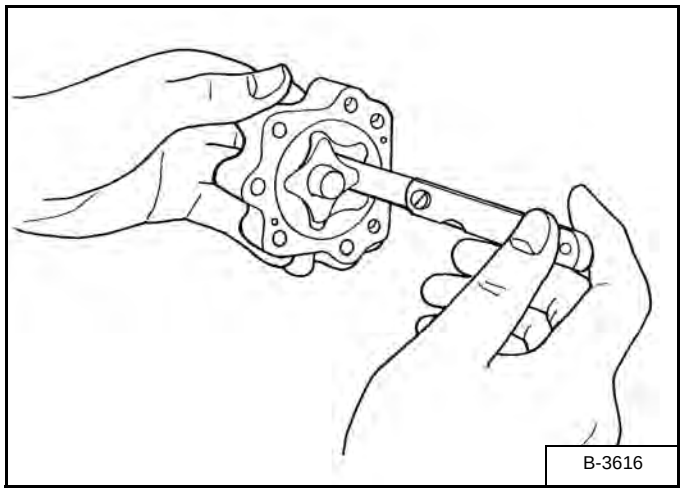
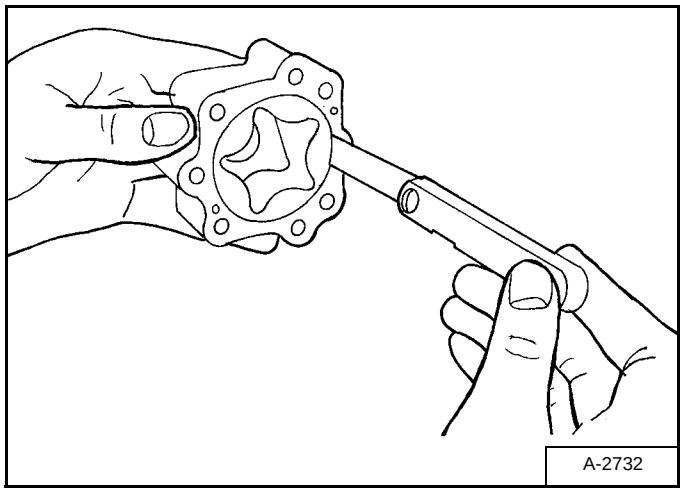
Oil Pump Inspection

Figure 60-60-4



Measure the clearance between the lobes of the inner rotor and outer rotor **[Figure 60-60-4]**.

Figure 60-60-5

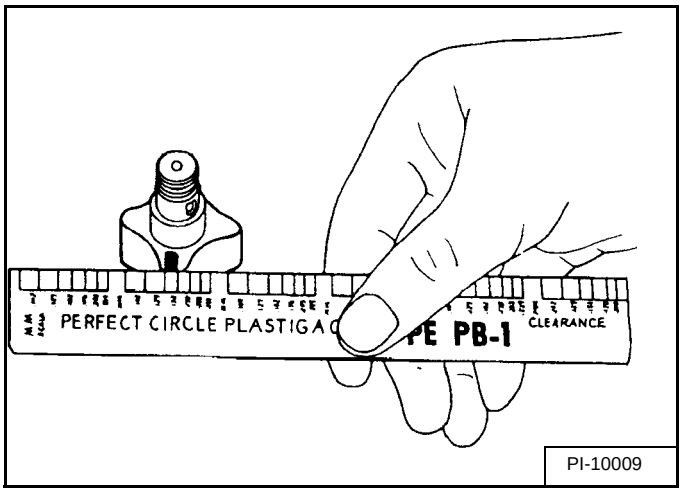


Measure the clearance between the outer rotor and pump body **[Figure 60-60-5]**.

If the clearance exceeds the allowable limit, replace the oil pump.

Clearance Between Inner & Outer Rotor	0,03 - 0,14 mm (0.0012 - 0.0055 in)
Allowable Limit	0,2 mm (0.008 in)
Clearance Between Outer Rotor & Body	0,11 - 0,19 mm (0.0043 - 0.0075 in)
Allowable Limit	0,25 mm (0.0098 in)

Figure 60-60-6



Put a piece of press gauge on the rotor face **[Figure 60-60-6]**.

Install the cover and tighten the bolts.

Remove the cover carefully. Measure the width of the press gauge **[Figure 60-60-6]**.

If the clearance exceeds the allowable limit replace the oil pump.

End Clearance	0,104 - 0,15 mm (0.0041 - 0.0059 in)
Allowable Limit	0,20 mm (0.008 in)

Fuel Injection Pump - Timing (Cont'd)

Figure 60-70-18

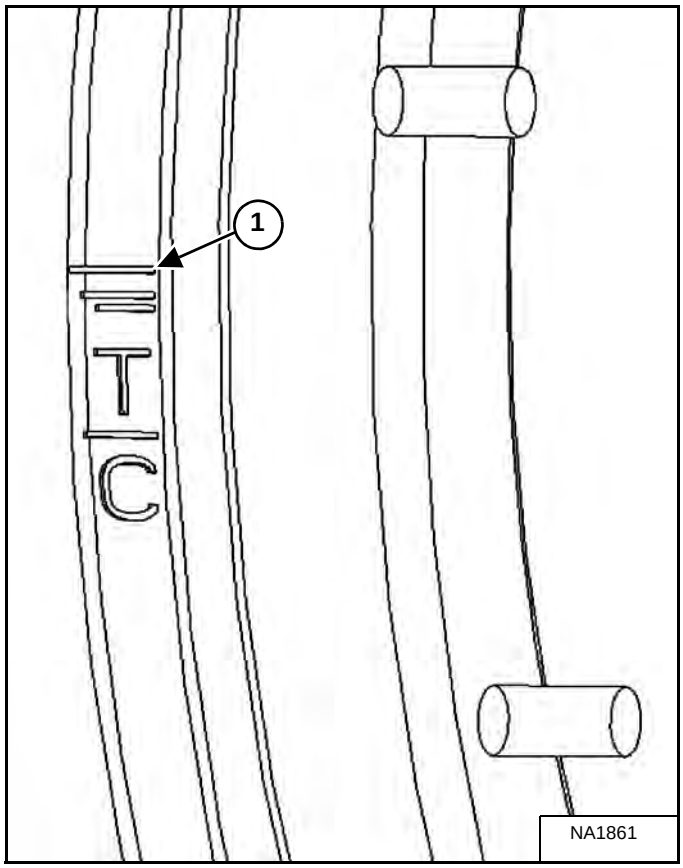
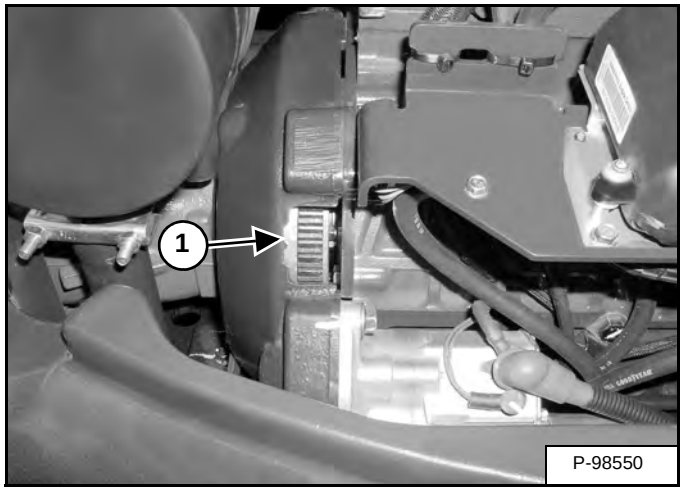
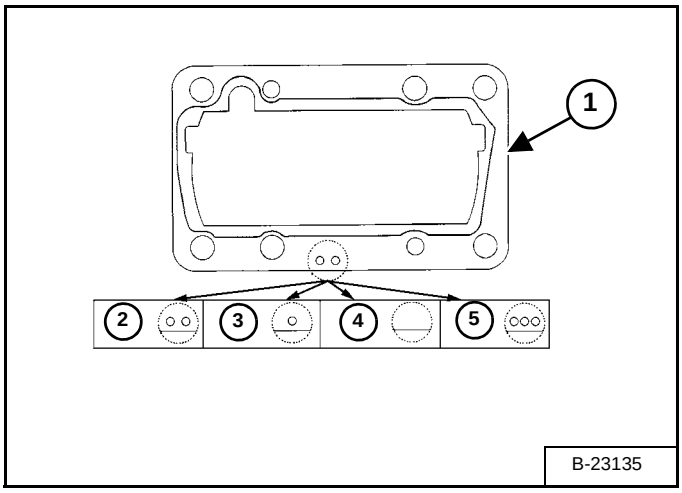


Figure 60-70-19



Continue to turn the engine slowly (for approximately one and three-quarter turns after fuel stops flowing from the injection pump nozzle), until the timing mark on the side of the flywheel (Item 1) **[Figure 60-70-18]** is at the edge of the timing hole (Item 1) **[Figure 60-70-19]** in the flywheel housing.

Figure 60-70-20



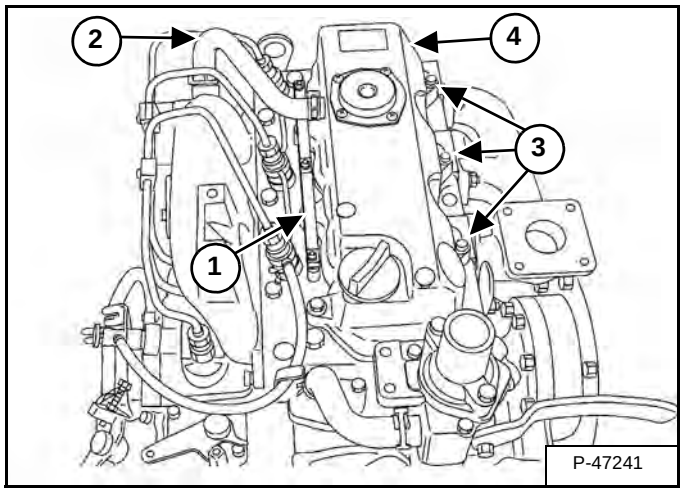
The correct engine timing is 6.5° B.T.D.C. Add or subtract shims (Item 1) **[Figure 60-70-20]** to time the engine to 5.5° B.T.D.C. The engine is correctly timed when the correct mark on the flywheel is aligned with the notch in the timing hole.

NOTE: Shims (Item 1) are available in four thicknesses, shims with the two holes (Item 2) are 0,20 mm thick, shims with one hole (Item 3) are 0,25 mm thick, shims with no holes (Item 4) are 0,30 mm thick and shims with three holes (Item 5) [Figure 60-70-20] are 0,35 mm thick.

NOTE: Increasing the thickness of the shim pack by 0,050 mm retards the injection timing by 0.50 degrees. Decreasing the shim pack by 0,050 mm advances the timing by 0.50 degrees.

Cylinder Head Removal And Installation

Figure 60-80-8

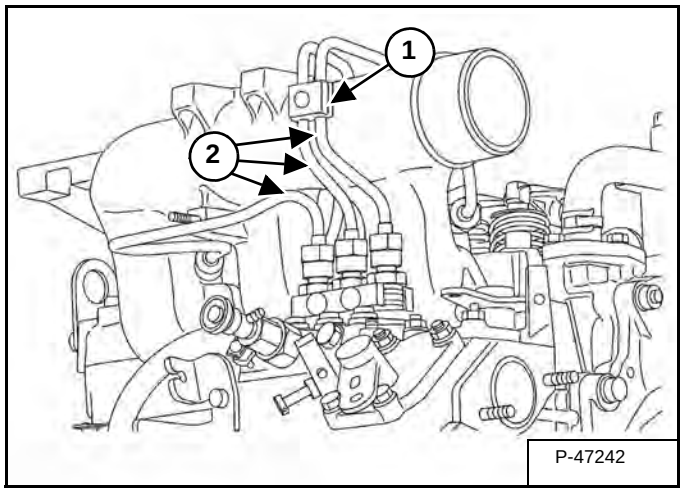


Remove the glow plug lead (Item 1), breather hose (Item 2), and valve cover bolts (Item 3) **[Figure 60-80-8]**.

Remove the valve cover (Item 4) **[Figure 60-80-8]** and gasket.

Installation: Tighten the valve cover bolts to 7 - 11 N•m (5 - 8 ft-lb).

Figure 60-80-9

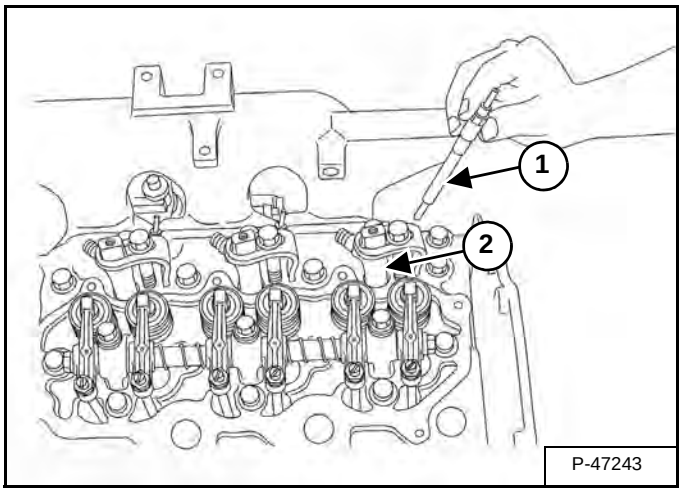


Loosen the bolts on the clamps (Item 1) and remove the injection tubes (Item 2) **[Figure 60-80-9]**.

Tighten the injection tube nuts to 15 - 24 N•m (11 - 18 ft-lb) torque.

Remove the overflow tube assembly.

Figure 60-80-10

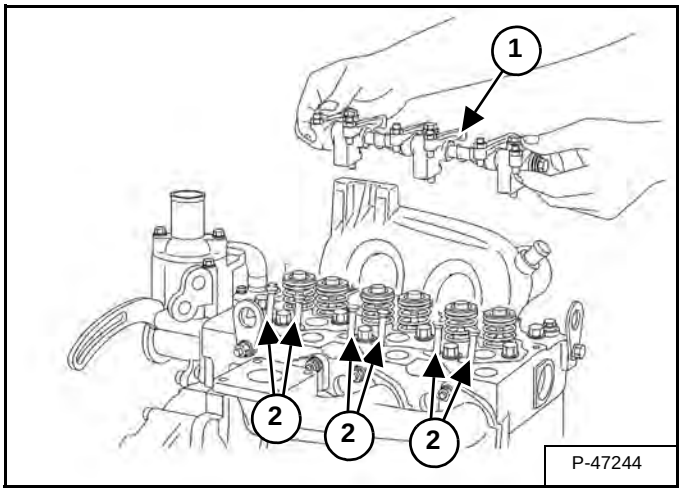


Remove the glow plugs (Item 1) and fuel injector holder assemblies (Item 2) **[Figure 60-80-10]**.

Installation: Tighten the glow plugs to 20 - 24 N•m (15 - 18 ft-lb) torque.

Tighten the injector holders to 26 - 29 N•m (19 - 22 ft-lb) torque.

Figure 60-80-11



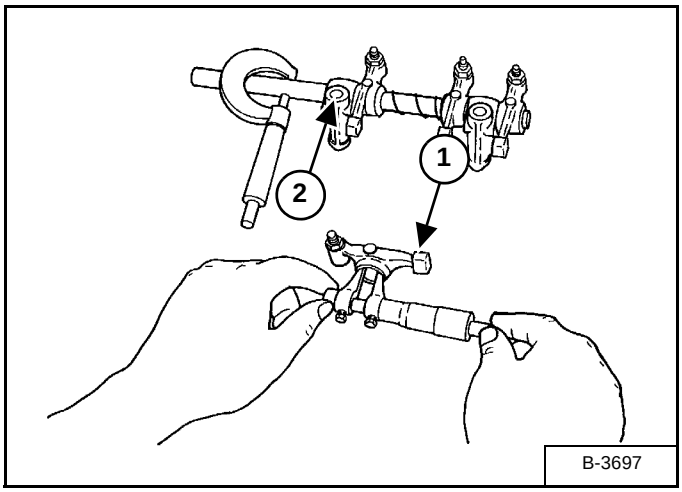
Remove the rocker arm bolts and remove the rocker arm assembly (Item 1) **[Figure 60-80-11]**.

Installation: Tighten the bolts to 24 - 27 N•m (18 - 20 ft-lb) torque.

Remove the push rods (Item 2) **[Figure 60-80-11]**.

Rocker Arm And Shaft - Checking

Figure 60-80-36



Measure the rocker arm I.D. (Item 1) **[Figure 60-80-36]** with an inside micrometer.

Measure the rocker arm shaft O.D. (Item 2) **[Figure 60-80-36]** with an outside micrometer.

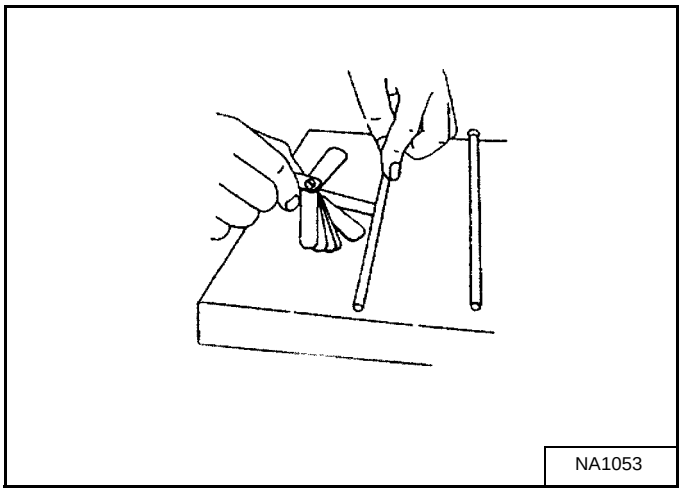
If the clearance exceeds the allowable limit, replace the bushing.

If the clearance still exceeds the allowable limit after the bushing is replace, replace the rocker arm shaft.

Oil Clearance Between Rocker Arm & Shaft	0,02 - 0,05 mm (0.0006 - 0.0017 in)
Allowable Limit	0,1 mm (0.004 in)
Rocker Arm Shaft O.D.	13,97 - 13,98 mm (0.5501 - 0.5506 in)
Rocker Arm I.D.	14,0 - 14,02 mm (0.5512 - 0.5519 in)

Push Rod Alignment - Checking

Figure 60-80-37

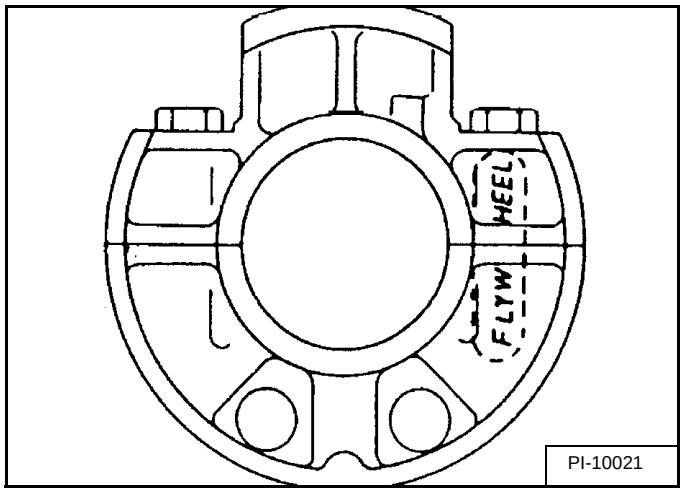


Place the push rod on an inspection block. Use a feeler gauge (Item 1) **[Figure 60-80-37]** to measure the gap.

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

Crankshaft And Bearings Removal And Installation (Cont'd)

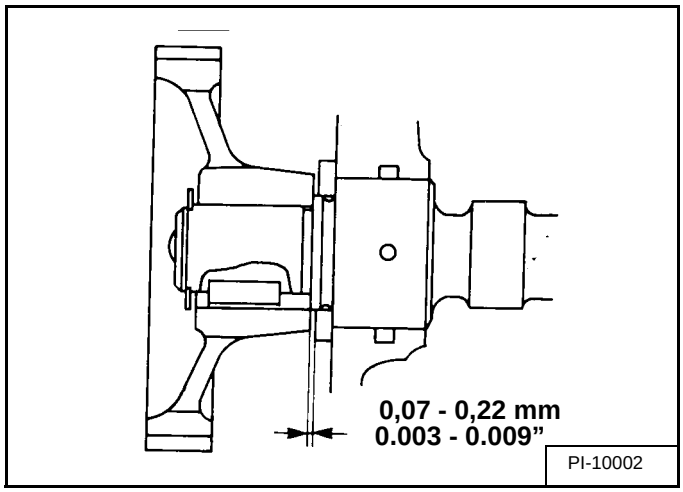
Figure 60-90-23



Installation: When installing the main bearing case assemblies, face the mark FLYWHEEL to the flywheel side of the engine block **[Figure 60-90-23]**. The thrust washers oil grooves must face outward.

Idle Gear And Camshaft Removal And Installation (Cont'd)

Figure 60-100-14



Installation: Check the camshaft end play. If clearance exceeds the allowable limit, replace the camshaft retainer plate **[Figure 60-100-14]**.

Camshaft End Play	0,07 - 0,22 mm (0.0028 - 0.0087 in)
Allowable Limit	0,3 mm (0.012 in)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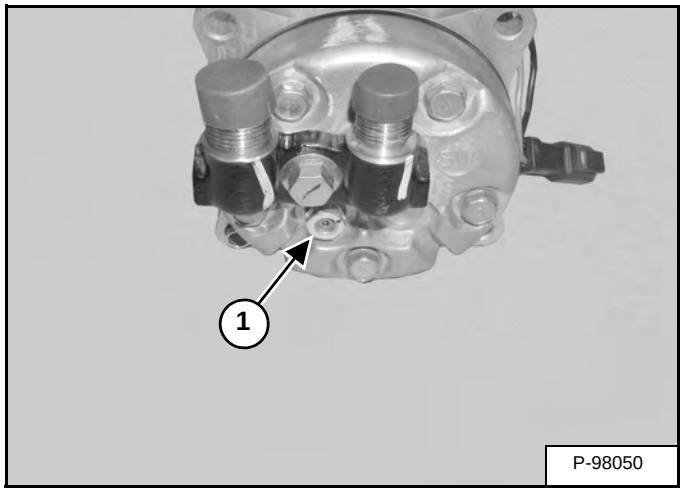
Components (Cont'd)

Figure 70-10-12



Compressor Relief Valve: The relief valve (Item 1) **[Figure 70-10-12]** is set at 3503 - 4102 kPa (35-41 bar) (508 - 595 psi).

Poor A/C Performance

Start the excavator. Engage the A/C system with the blower fan on high. Run the excavator at full RPM for approximately 15 minutes, with the cab door closed.

Figure 70-30-1

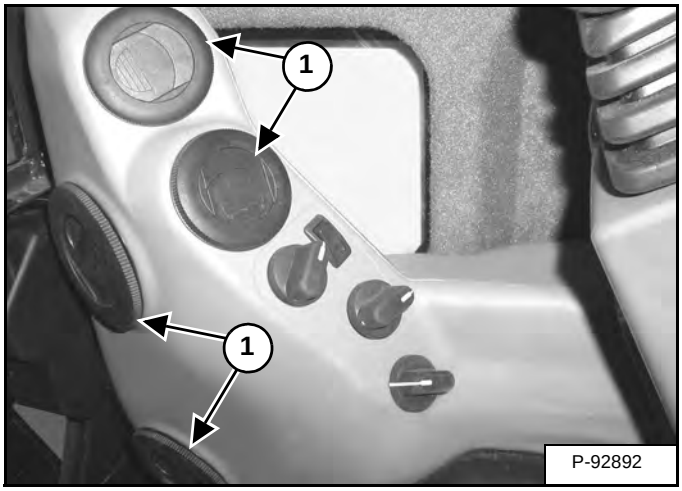
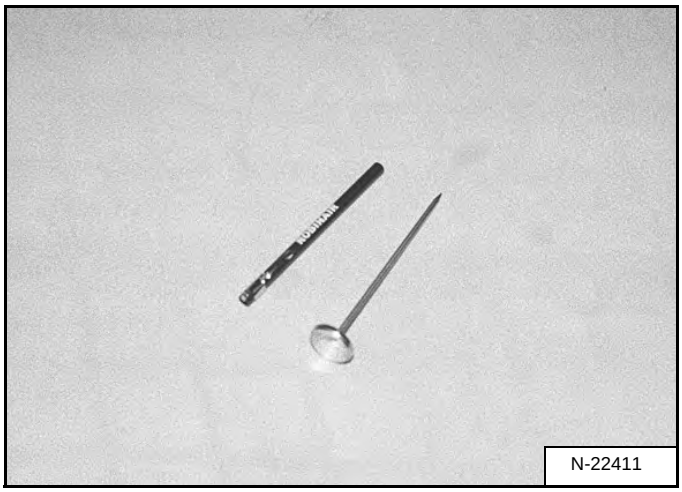


Figure 70-30-2



Check the temperature at the louvers (Item 1) **[Figure 70-30-1]** with a thermometer **[Figure 70-30-2]**.

The louver temperature should be between 2,2 - 11,6°C (36 - 53°F) depending on the amount of humidity in the air.

If louver temperature is too high see the System Troubleshooting Chart. (See Gauge Pressure Related Troubleshooting on Page 70-30-2.)

Check the blower fan for proper operation, and replace if necessary. (See Removal And Installation on Page 70-130-1.)

Check the air conditioning compressor belt for wear or damage. (See Air Conditioning Compressor Belt Replacement on Page 70-20-2.)

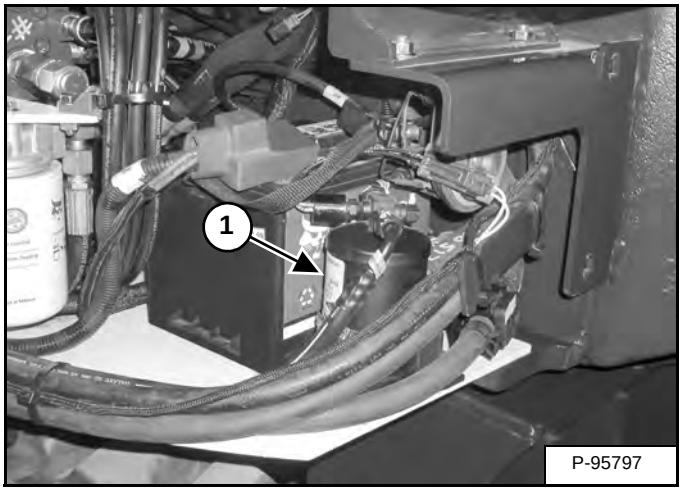
Check the A/C evaporator coil for dirt or mud, and clean if necessary. (See Evaporator / Heater Coil on Page 70-20-3.)

Inspect the sight glass located on the receiver / drier for air bubbles. (See Gauge Pressure Related Troubleshooting on Page 70-30-2.)

Check the engine coolant to see if it is bypassing the heater valve.

HVAC Repair And Leaks

Figure 70-30-3

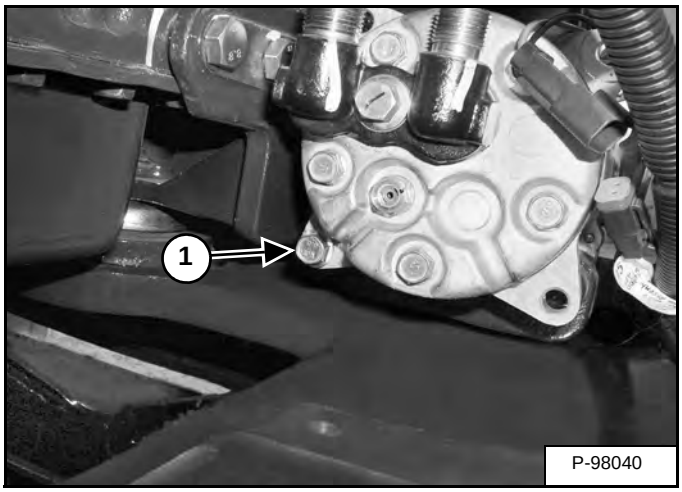


Whenever the A/C system is opened to the atmosphere or there has been a leak in the system, the receiver / drier (Item 1) **[Figure 70-30-2]** must be changed.

Never leave hose fittings, compressor fittings or components uncapped while working on the A/C system.

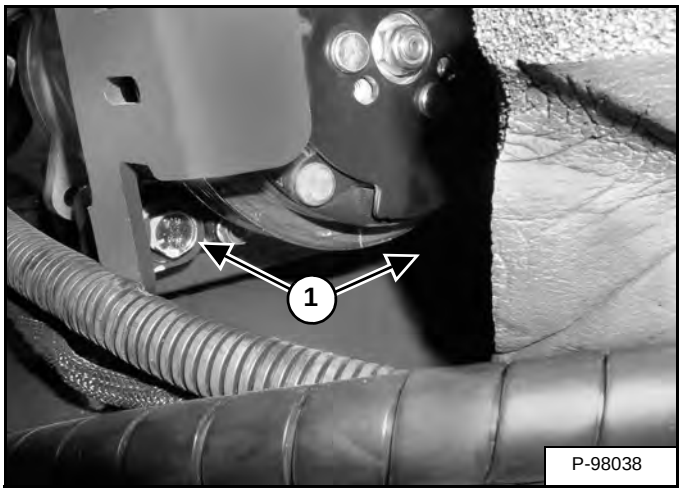
Removal And Installation (Cont'd)

Figure 70-50-4



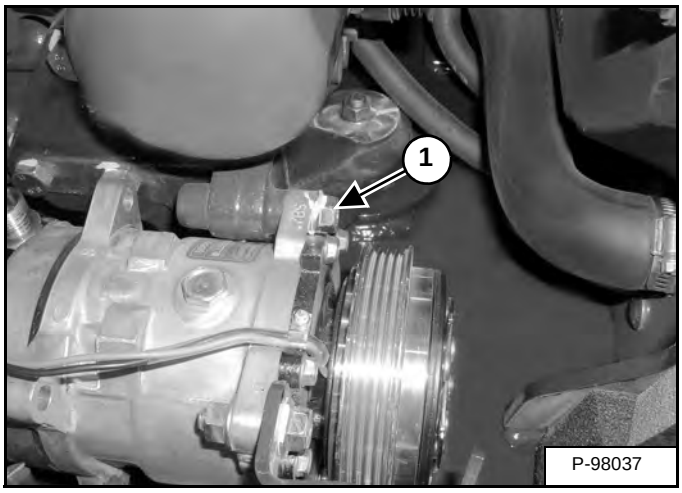
Remove the bolt (Item 1) **[Figure 70-50-4]**.

Figure 70-50-5



Remove the two bolts (Item 1) **[Figure 70-50-5]**.

Figure 70-50-6



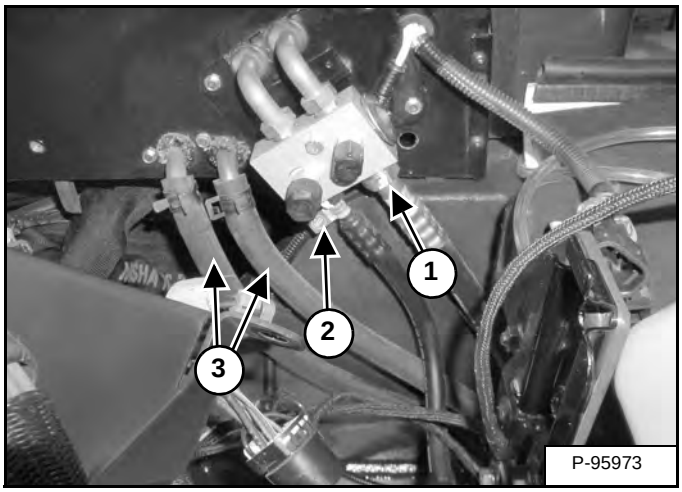
Remove the bolt (Item 1) **[Figure 70-50-6]**.

Remove the compressor.

The compressor is not serviceable and must be replaced as an assembly.

Removal And Installation (Cont'd)

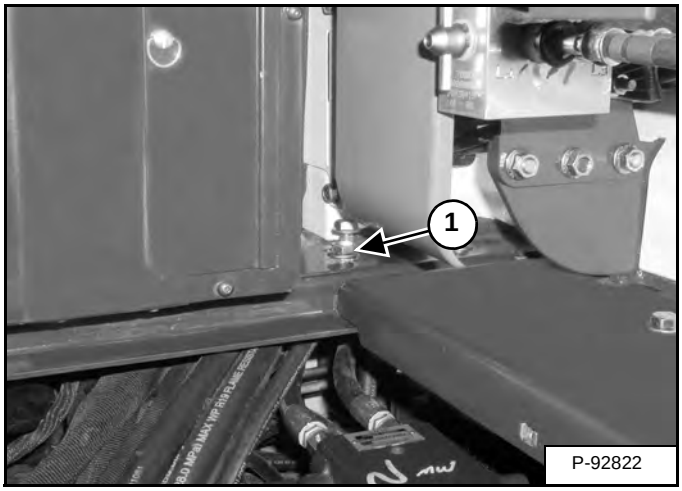
Figure 70-80-4



Remove the air conditioning hoses (Item 1) and (Item 2). Remove the heater hoses (Item 3) **[Figure 70-80-4]**.

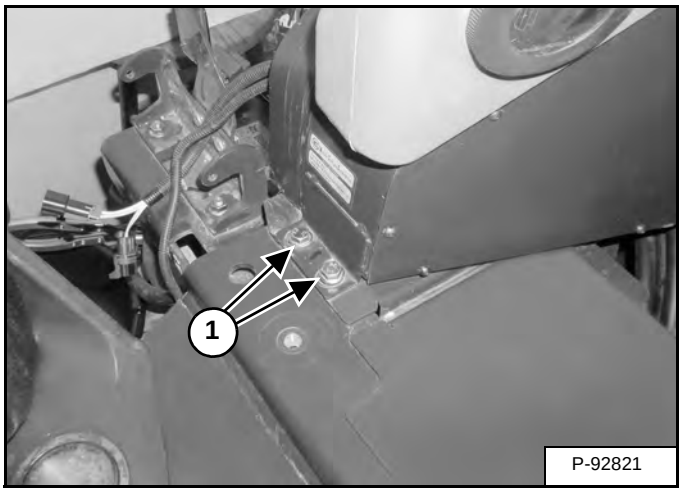
Installation: Tighten the hose (Item 1) to 28 - 37 N•m (21 - 27 ft-lb) torque. Tighten the hose (Item 2) **[Figure 70-80-4]** to 20 - 27 N•m (15 - 18 ft-lb) torque.

Figure 70-80-5



Remove the bolt (Item 1) **[Figure 70-80-5]**.

Figure 70-80-6

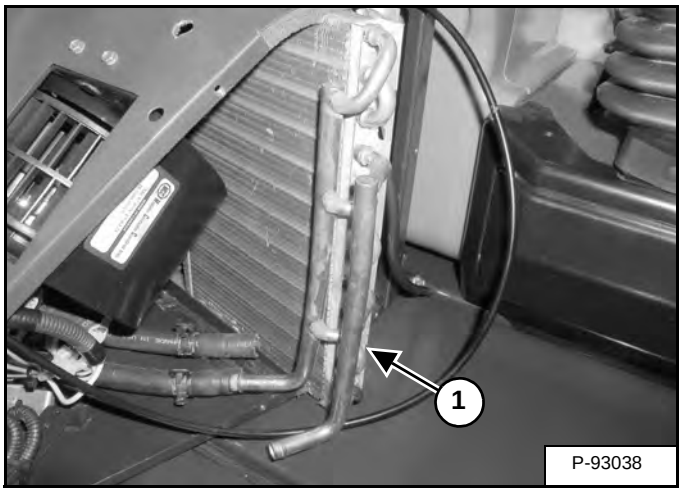


Remove the two bolts (Item 1) **[Figure 70-80-6]**.

Remove the evaporator / heater unit.

Removal And Installation (Cont'd)

Figure 70-120-5



Remove the coil (Item 1) **[Figure 70-120-5]**.

AIR CONDITIONING SYSTEM FLOW (CONT'D)

Chart