Bobcat®

Service Manual

E42

Compact Excavator

S/N B2VW11001 & Above

6990716enUS (08-20) (H)

Printed in U.S.A.

T4-B

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:

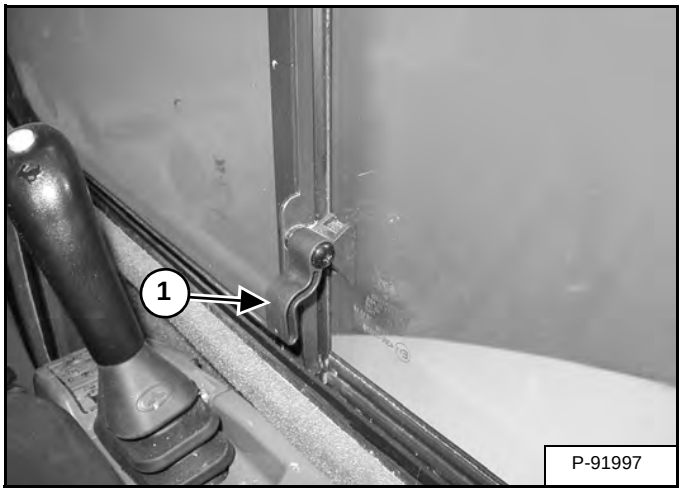
- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment contains operating information as well as routine maintenance and service 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

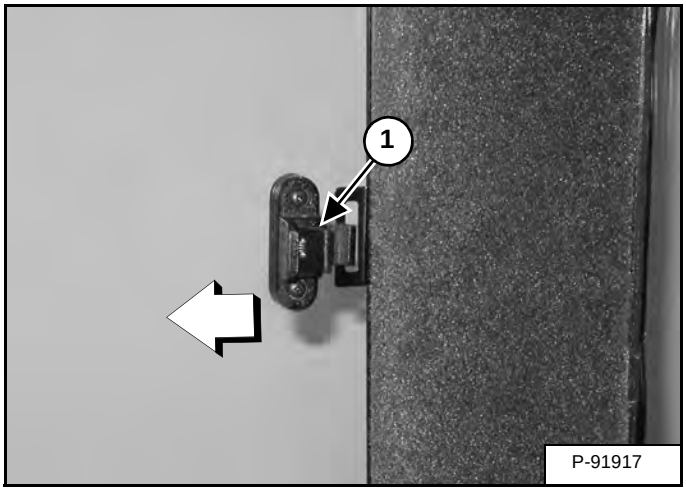
Opening The Right Rear Window

Figure 10-30-10



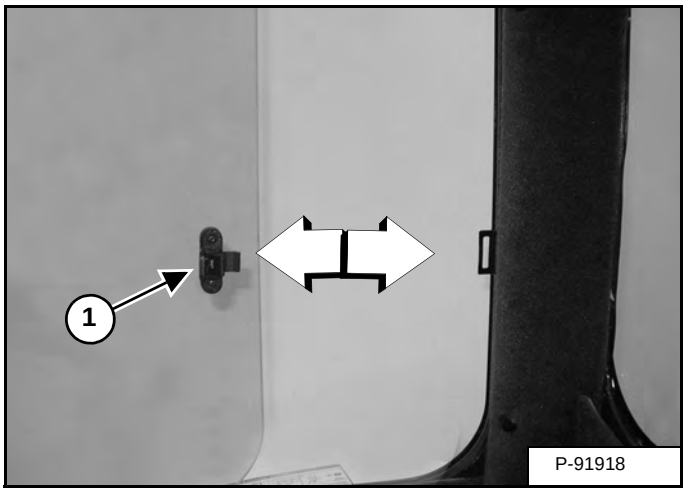
Raise the latch (Item 1) **[Figure 10-30-10]** located at the rear of the front window.

Figure 10-30-11



Pull out on the latch (Item 1) **[Figure 10-30-11]**.

Figure 10-30-12



Pull the latch (Item 1) **[Figure 10-30-12]** forward to open the window. When the window is in the open position, push down on the latch (Item 1) **[Figure 10-30-10]**.

Closing The Right Rear Window

Raise the latch (Item 1) **[Figure 10-30-12]**.

Push the latch (Item 1) **[Figure 10-30-11]** back to close the window. Rotate the latch (Item 1) **[Figure 10-30-10]** down.

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.
- **Hydraulic Filter, Case Drain Filter and Hydraulic Reservoir Breather Cap** - Replace the hydraulic filter, case drain filter and the reservoir breather cap.
- **Alternator and Starter** - Check connections.
- **Drive Belts (Alternator) (Air Conditioning - If Equipped)** - Check condition. Replace as needed.

Every 50 Hours

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

SS EXC E32 - E55 T4-B-0118

FUEL SYSTEM

Fuel Specifications

NOTE: Contact your local fuel supplier to receive recommendations for your region.

U.S. Standard (ASTM D975)

Use only clean, high quality diesel fuel, Grade Number 2-D or Grade Number 1-D.

Ultra low sulfur diesel fuel must be used in this machine. Ultra low sulfur is defined as 15 mg/kg (15 ppm) sulfur maximum.

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

TEMPERATURE	GRADE 2-D	GRADE 1-D
Above -9°C (+15°F)	100%	0%
Down to -21°C (-5°F)	50%	50%
Below -21°C (-5°F)	0%	100%

NOTE: Biodiesel blend fuel may also be used in this machine. Biodiesel blend fuel must contain no more than five percent biodiesel mixed with ultra low sulfur petroleum based diesel. This biodiesel blend fuel is commonly marketed as B5 blended diesel fuel. B5 blended diesel fuel must meet ASTM specifications.

E.U. Standard (EN590)

Use only clean, high quality diesel fuel that meets the EN590 specifications listed below:

- Ultra low sulfur diesel fuel defined as 10 mg/kg (10 ppm) sulfur maximum
- Diesel fuel with cetane number of 51.0 and above.

NOTE: Biodiesel blend fuel may also be used in this machine. Biodiesel blend fuel must contain no more than seven percent biodiesel mixed with ultra low sulfur petroleum based diesel. This biodiesel blend fuel is commonly marketed as B7 blended diesel fuel. B7 blended diesel fuel must meet EN590 specifications.

Biodiesel Blend Fuel

Biodiesel blend fuel has unique qualities that should be considered before using in this machine:

- Cold weather conditions can lead to plugged fuel system components and hard starting.
- Biodiesel blend fuel is an excellent medium for microbial growth and contamination that can cause corrosion and plugging of fuel system components.
- Use of biodiesel blend fuel may result in premature failure of fuel system components, such as: plugged fuel filters and deteriorated fuel lines.
- Shorter maintenance intervals may be required, such as: cleaning the fuel system and replacing fuel filters and fuel lines.
- Using biodiesel blended fuels containing more than five percent biodiesel can affect engine life and cause deterioration of hoses, tubelines, injectors, injector pump, and seals.

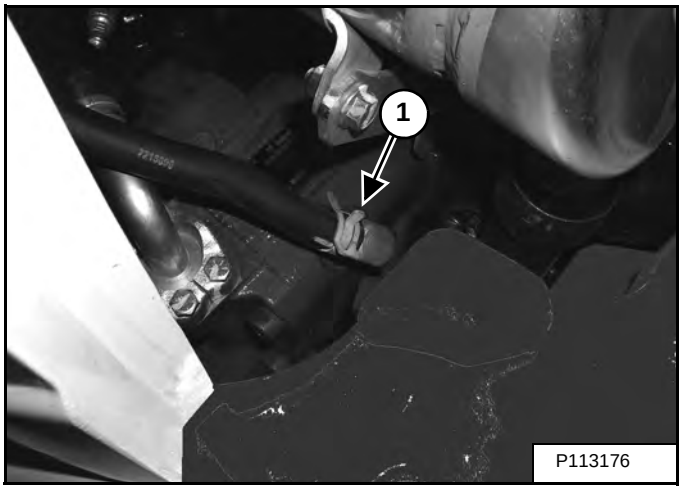
Apply the following guidelines if biodiesel blend fuel is used:

- Ensure the fuel tank is as full as possible at all times to prevent moisture from collecting in the fuel tank.
- Ensure that the fuel tank cap is securely tightened.
- Biodiesel blend fuel can damage painted surfaces, remove all spilled fuel from painted surfaces immediately.
- Drain all water from the fuel filter daily before operating the machine.
- Do not exceed engine oil change interval. Extended oil change intervals can cause engine damage.
- Before vehicle storage; drain the fuel tank, refill with 100% petroleum diesel fuel, add fuel stabilizer, and run the engine for at least 30 minutes.

NOTE: Biodiesel blend fuel does not have long term stability and should not be stored for more than 3 months.

Removing And Replacing The Hydraulic Fluid (Cont'd)

Figure 10-130-9



With the engine OFF, remove the hose (Item 1) **[Figure 10-130-9]** on the hydraulic pump until all air is purge from the system. Tighten the hose after a steady stream of hydraulic fluid, free of any air bubbles, drains from the hose. **DO NOT RUN THE MACHINE WITH THE HOSE LOOSE.**

Start the engine and operate the machine through the hydraulic functions. Stop the engine. Check the fluid level and add as needed.

EMERGENCY EXIT

The door, the right side rear window and the front window provide exits.

Right Side Rear Window

Figure 10-170-1

Exit through the window **[Figure 10-170-1]**.

Front Window

Figure 10-170-2

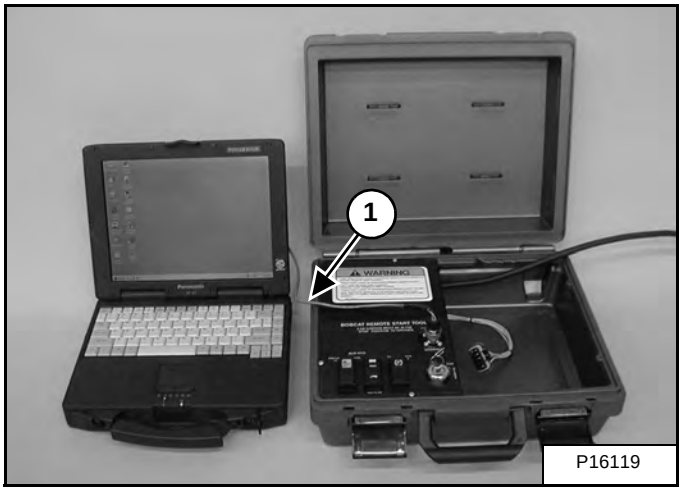
Open the front window and exit **[Figure 10-170-2]**.

NOTE: If the excavator has a Special Applications Kit installed, the front window is NOT an emergency exit.

Service Tool Harness Communicator - MEL1566

NOTE: To monitor, diagnose or load new software the Service PC must be connected to the Remote Start Tool.

Figure 10-210-6



The Service Tool Harness Communicator (Item 1) **[Figure 10-210-6]** is required to connect the Service PC to the Remote Start Tool.

Figure 10-210-7

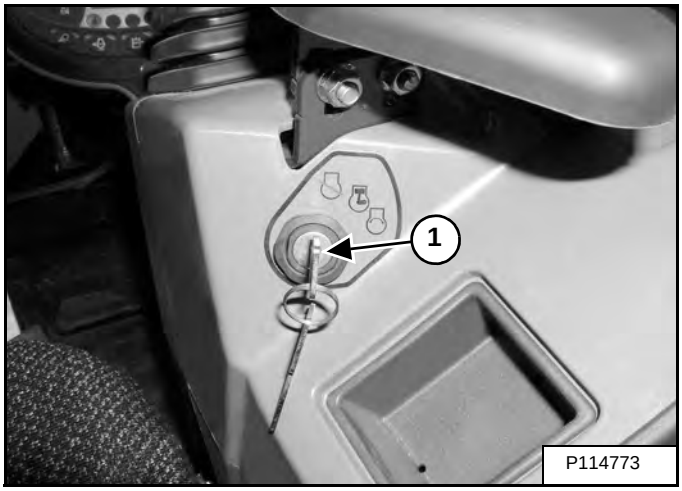
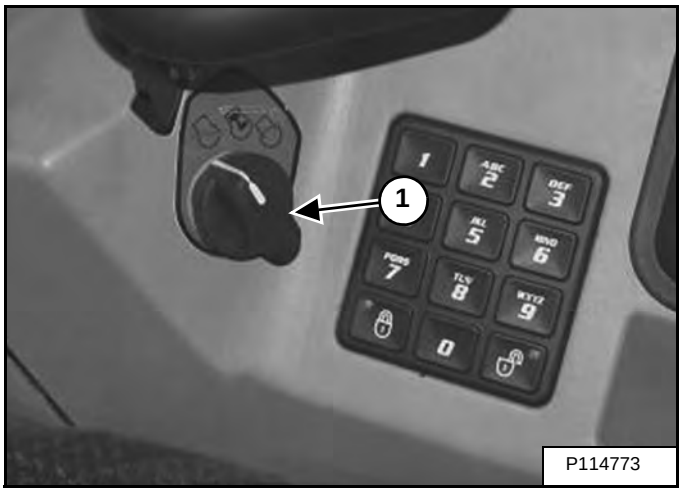


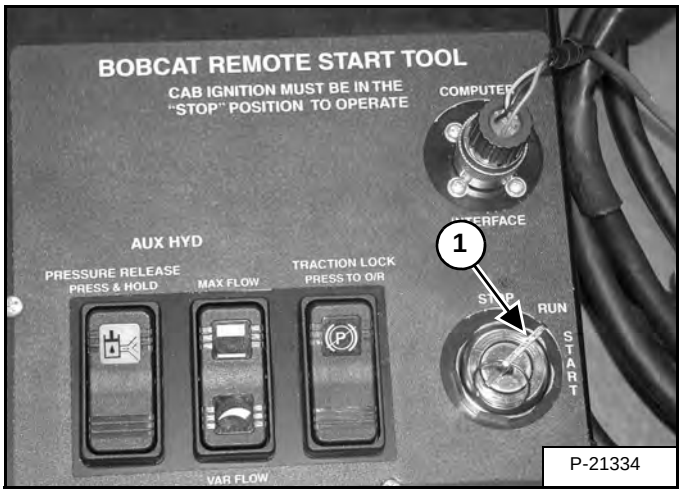
Figure 10-210-8



Turn the key (Item 1) **[Figure 10-210-8]** and **[Figure 10-210-8]** to the RUN position on the excavator.

NOTE: DO NOT start the excavator.

Figure 10-210-9



Turn the key (Item 1) **[Figure 10-210-9]** to the RUN position on the Remote Start Tool.

Troubleshooting The Cylinder Circuit

PROBLEM	CAUSE	CORRECTION
Cylinder inoperable	Control console raised	Lower control console.
	Loose fittings or broken hoses	Repair or replace
	Low psi at joystick	Check, repair or replace pressure reducing valve
	Lever linkage incorrectly adjusted	Readjust
	Control console lockout switch	Readjust or replace
	Cylinder internal leakage excessive	Repair or replace
	Joystick manifold pressure reducing valve defective	Repair or replace
	Joystick internal leakage excessive	Repair or replace
Cylinder force insufficient	Lever linkage incorrectly adjusted	Readjust
	Load Sense relief valve pressure to low	Readjust or replace
	Lever linkage incorrectly adjusted	Readjust
Cylinder speed too slow	Cylinder internal leakage excessive	Repair or replace
	Joystick manifold solenoid valve defective	Repair or replace
	Joystick manifold pressure reducing valve defective	Repair or replace
	Control valve internal leakage excessive	Repair or replace
	Low tie rod torque on control valve	Tighten tie rods to correct torque
	Joystick internal leakage excessive	Repair or replace
	Low or dirty fluid	Add or replace the hydraulic fluid
	Load Sense relief valve malfunctioning	Readjust or replace

Disassembly

Clean the outside of the cylinder before disassembly.

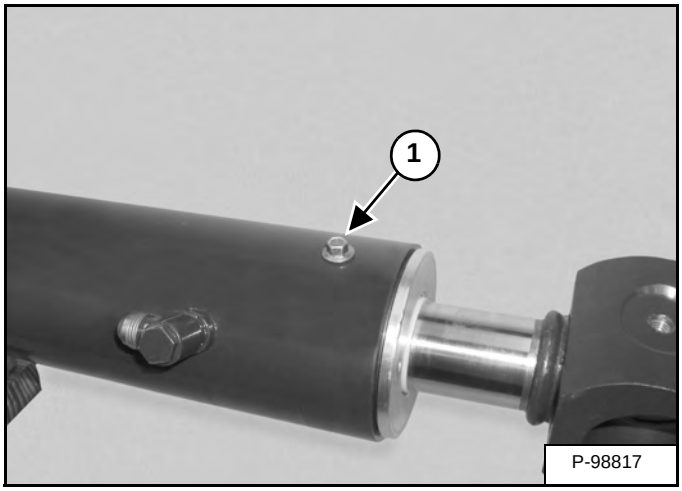
Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook
MEL1075 - Adjustable Gland Nut Wrench
MEL1075-1 - Standard Pins

Hold the hydraulic cylinder over a drain pan and move the rod in and out slowly to remove the fluid from the cylinder.

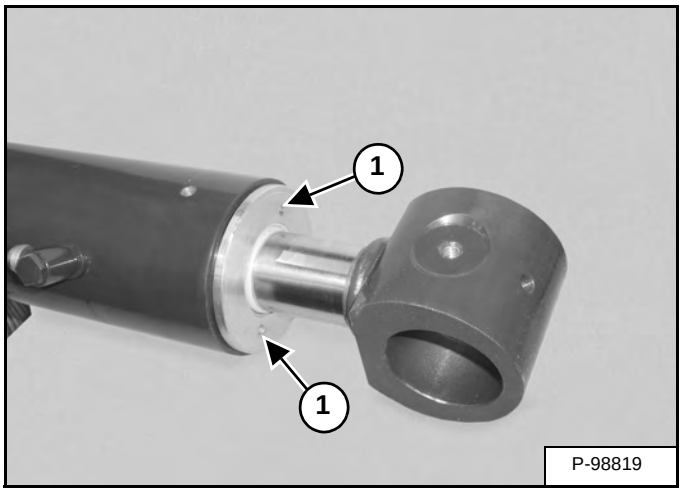
Put the base end of the cylinder in a vise.

Figure 20-20-16



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

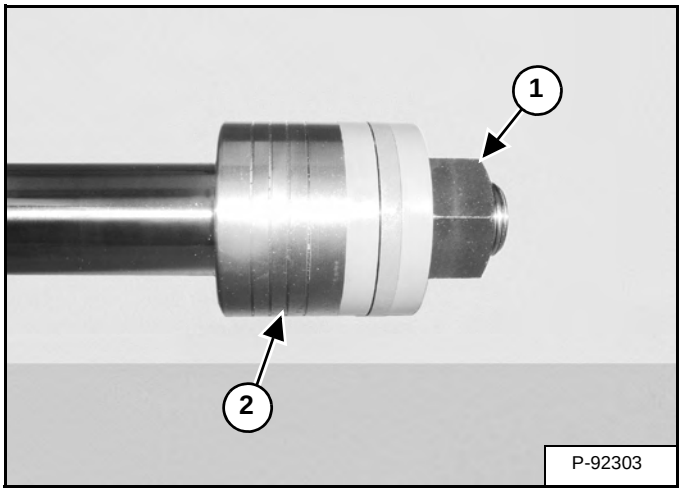
Figure 20-20-17



Insert the Adjustable Gland Nut Wrench into the holes (Item 1) **[Figure 20-20-17]** to loosen the head.

Remove the head and the rod assembly from the cylinder. Put the rod end in a vise.

Figure 20-20-18



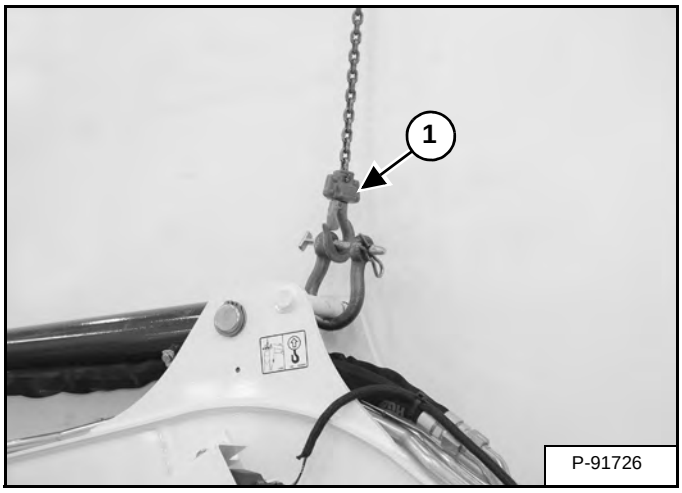
Remove the nut (Item 1), piston (Item 2) **[Figure 20-20-18]** and head.

Removal And Installation

Lower the work group to the ground.

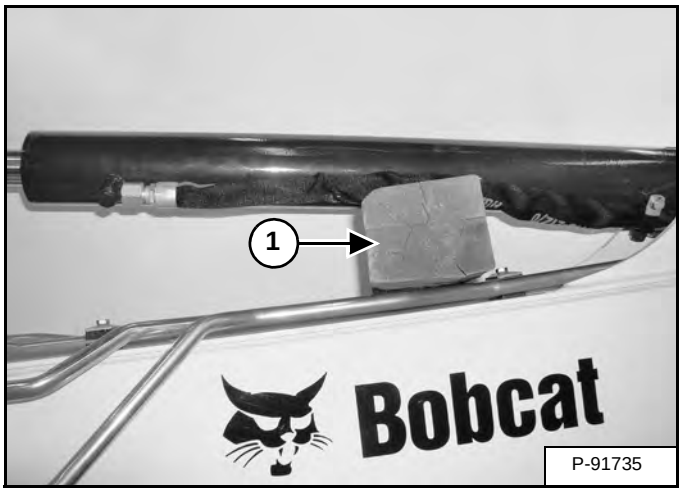
With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 20-21-7



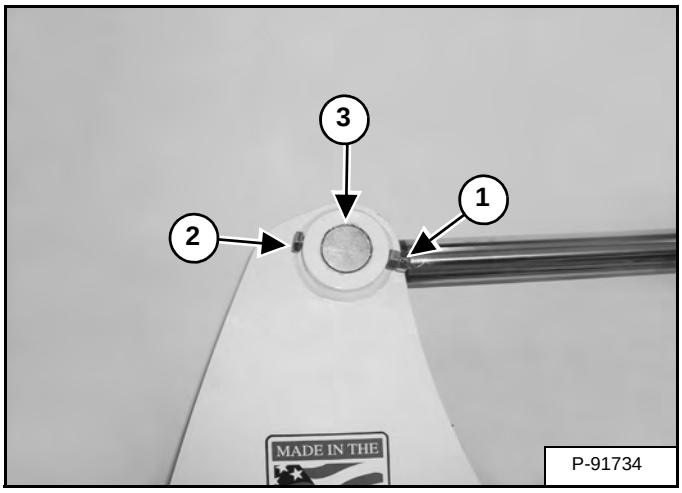
Support the boom with a chain hoist (Item 1) **[Figure 20-21-7]**.

Figure 20-21-8



Support the arm cylinder (Item 1) **[Figure 20-21-8]**.

Figure 20-21-9



Remove the nuts (Item 1) and bolt (Item 2) **[Figure 20-21-9]**.

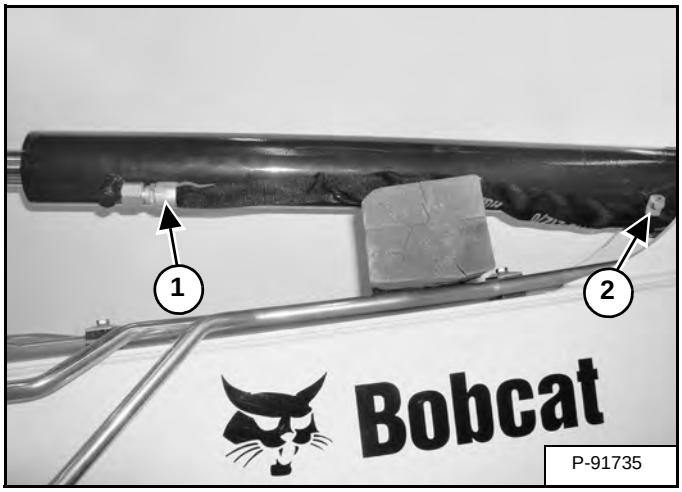
Remove the rod end pin (Item 3) **[Figure 20-21-9]**.

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 20-21-10



Remove the hose (Item 1) and hose clamp (Item 2) **[Figure 20-21-10]**.

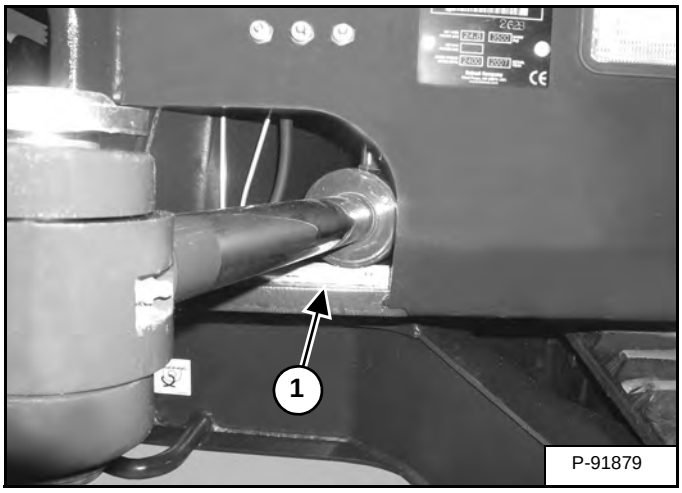
CYLINDER (BOOM SWING)

Testing

Lower the work group to the ground.

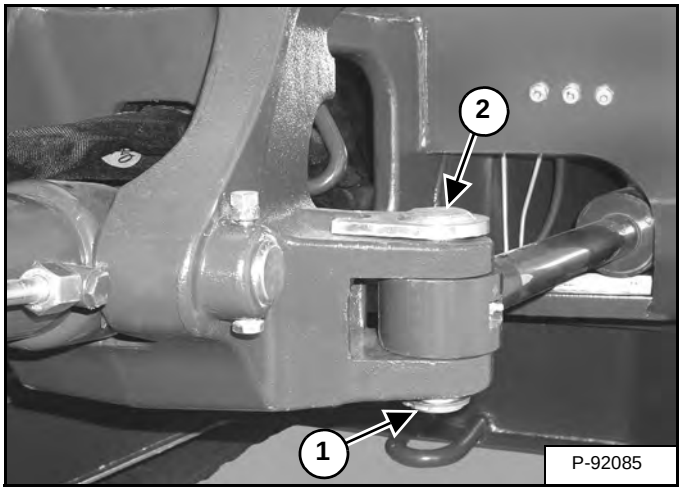
Remove the floor mat. (See Removal And Installation on Page 40-110-1.)

Figure 20-22-1



Place a block (Item 1) **[Figure 20-22-1]** under the rod end of the boom swing cylinder.

Figure 20-22-2



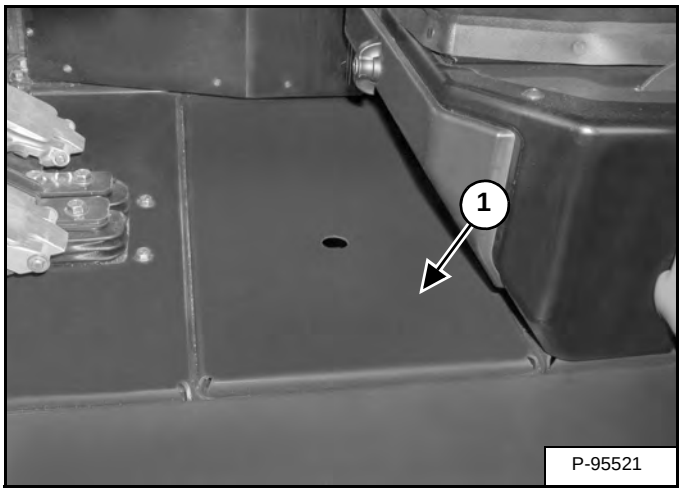
Remove the snap ring (Item 1) **[Figure 20-22-2]** and washer from the rod end pin of the cylinder.

Remove the pin (Item 2) **[Figure 20-22-2]**.

Start the engine and fully retract the cylinder rod.

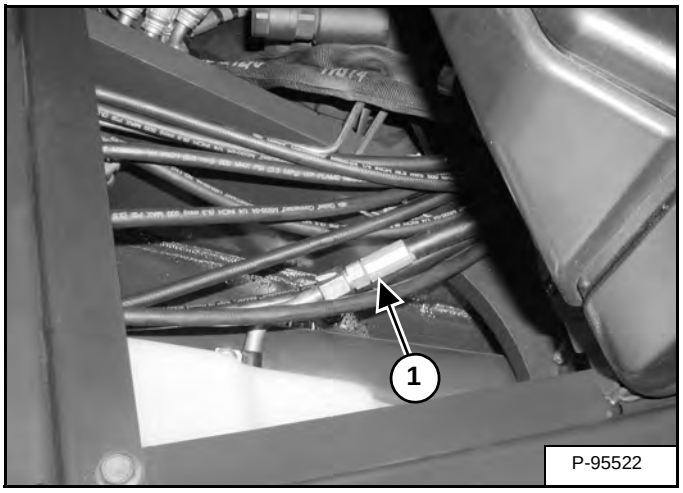
Stop the engine.

Figure 20-22-3



Remove the center floor panel (Item 1) **[Figure 20-22-3]**.

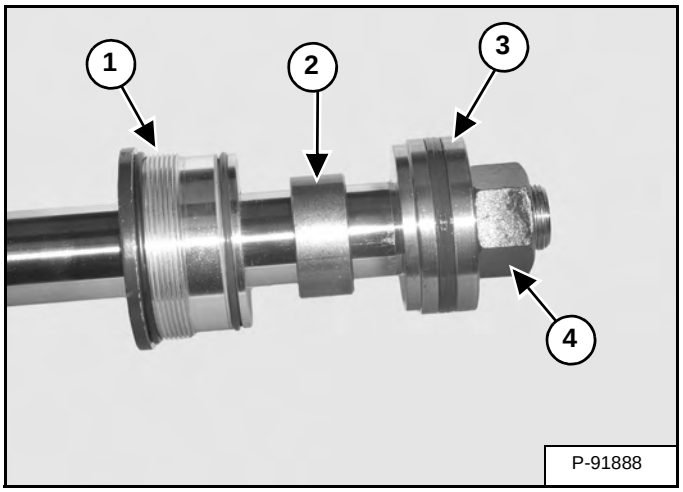
Figure 20-22-4



Remove the hose (Item 1) **[Figure 20-22-4]** from the base end of the cylinder.

Assembly (Cont'd)

Figure 20-22-29



Install the head (Item 1), spacer (Item 2) and the piston (Item 3) **[Figure 20-22-29]** on the rod as shown.

NOTE: Clean and dry the rod threads. Install a NEW NUT with preapplied Loctite®.

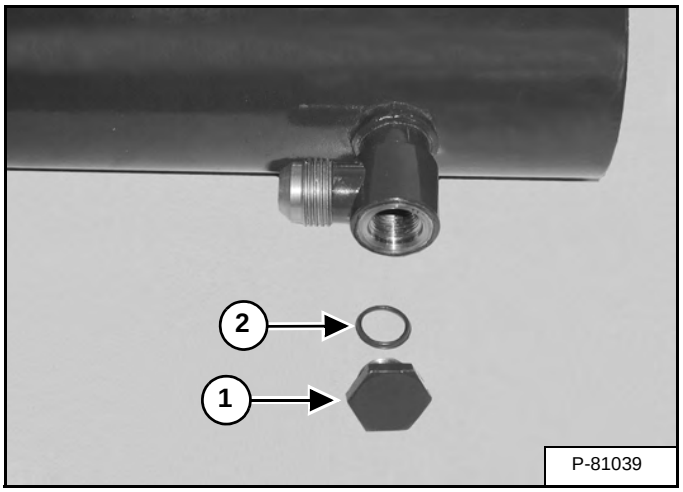
Grease the piston where the nut contacts the piston. Do not get grease on the threads.

Provide an adequate support for the cylinder before tightening.

Install the nut (Item 4) **[Figure 20-22-29]**.

Tighten the nut to 1491 N•m (1100 ft-lb) torque.

Figure 20-22-30

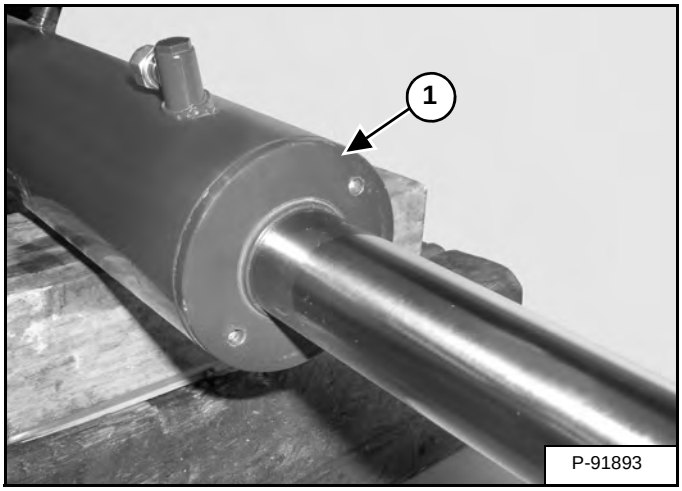


Install plug (Item 1) and O-ring (Item 2) **[Figure 20-22-30]**.

Tighten the plug to 50 N•m (37 ft-lb) torque.

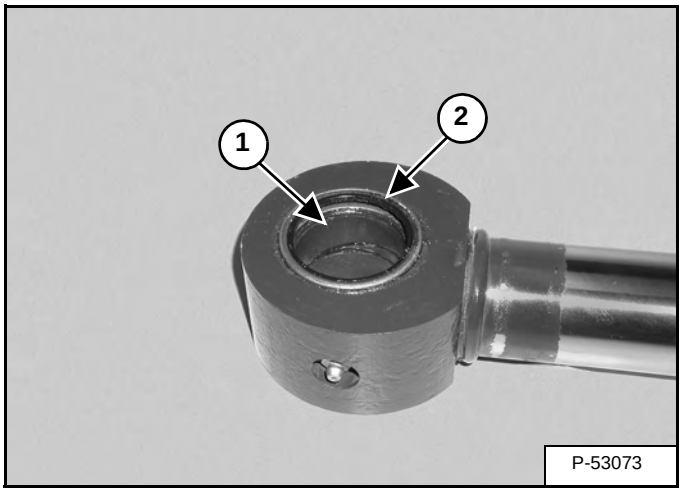
Put the base end of the hydraulic cylinder in a vise.

Figure 20-22-31



Tighten the head (Item 1) **[Figure 20-22-31]** to 373 N•m (275 ft-lb) torque.

Figure 20-22-32

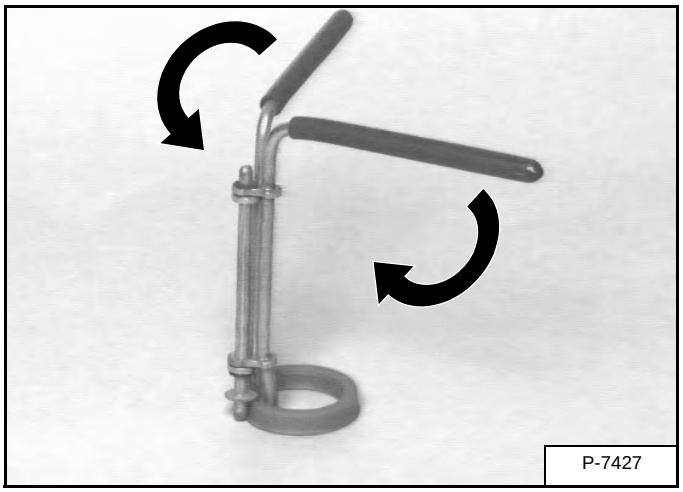


Install the bushing (Item 1) **[Figure 20-22-32]**. The bushing must be aligned with the grease channel in the rod end of the cylinder.

Install the dust seal (Item 2) **[Figure 20-22-32]** on both sides of the rod end.

Assembly (Cont'd)

Figure 20-23-22

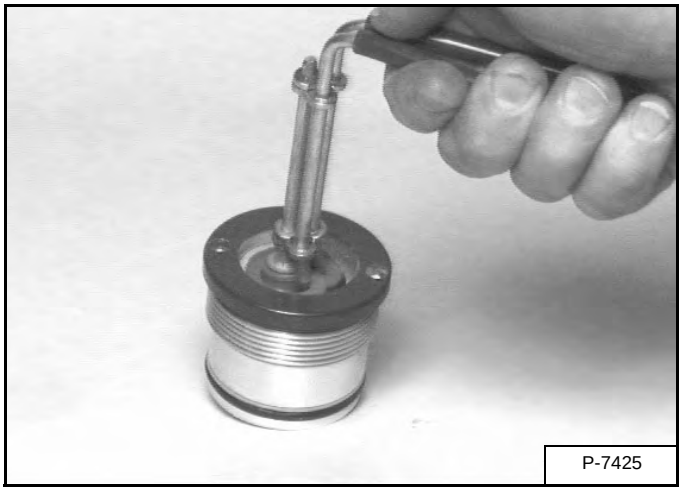


Install the rod seal on the rod seal tool **[Figure 20-23-22]**.

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

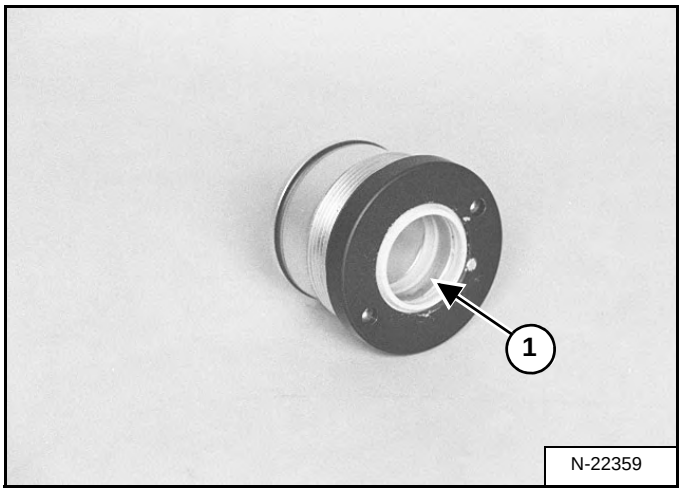
Rotate the handles to collapse the rod seal **[Figure 20-23-22]**.

Figure 20-23-23



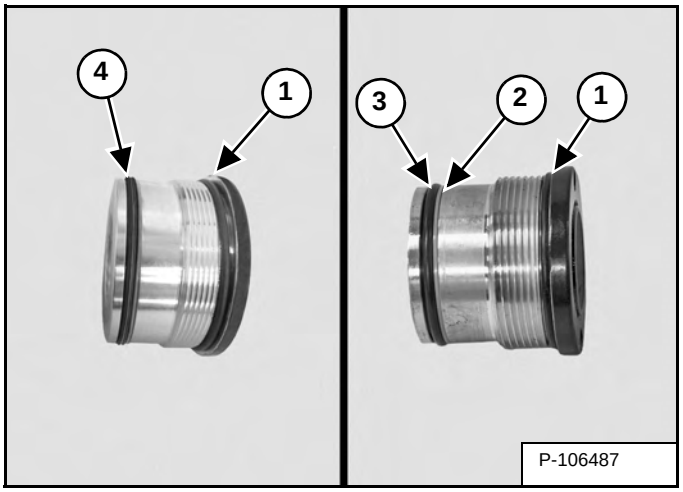
Install the rod seal in the head **[Figure 20-23-23]**.

Figure 20-23-24



Install the wiper seal with the wiper (Item 1) **[Figure 20-23-24]** toward the outside of the head.

Figure 20-23-25

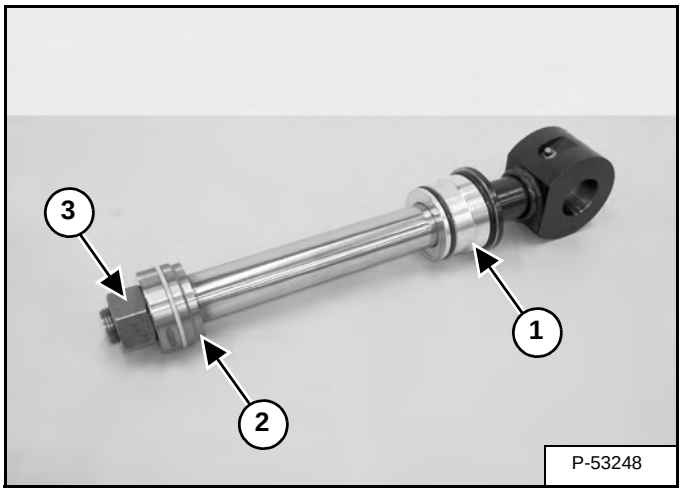


Install the O-ring (Item 1) **[Figure 20-23-25]**.

Install the back-up ring (Item 2) / O-ring (Item 3) or seal (Item 4) **[Figure 20-23-25]**.

Assembly (Cont'd)

Figure 20-24-24



Install the head (Item 1) and piston (Item 2) **[Figure 20-24-24]** on the rod.

NOTE: Clean and dry the rod threads. Install a NEW NUT with preapplied Loctite®.

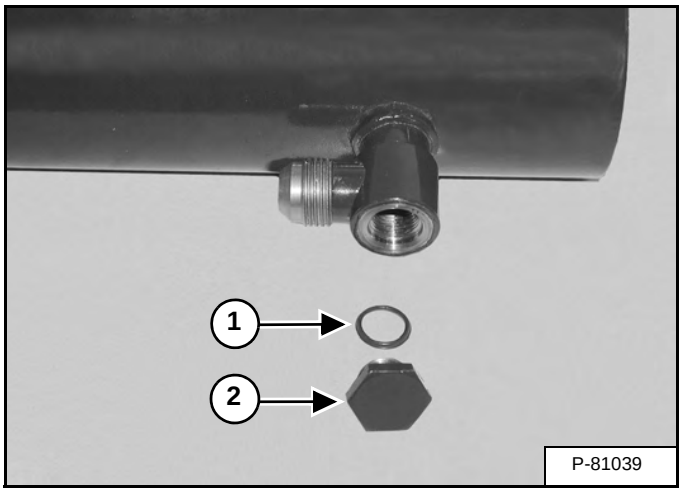
Grease the piston where the nut contacts the piston. Do not get grease on the threads.

Provide an adequate support for the cylinder before tightening.

Install the nut (Item 3) **[Figure 20-24-24]**.

Tighten the nut to 1491 N•m (1100 ft-lb) torque.

Figure 20-24-25

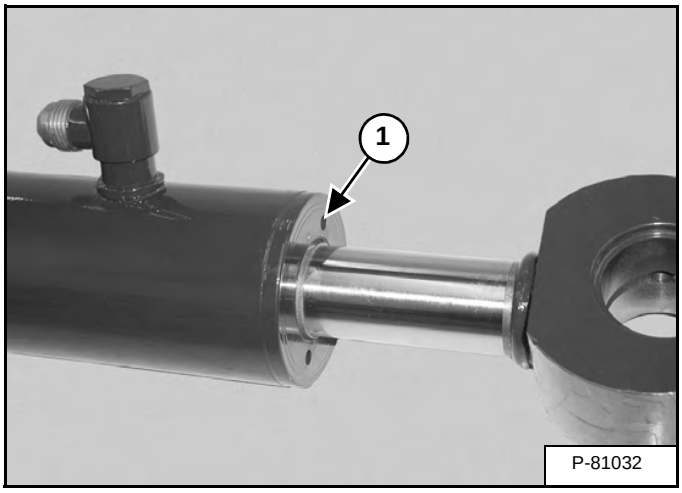


Install O-ring (Item 1) and plug (Item 2) **[Figure 20-24-25]**.

Tighten the plug to 50 N•m (37 ft-lb) torque.

Put the base end of the cylinder in a vise.

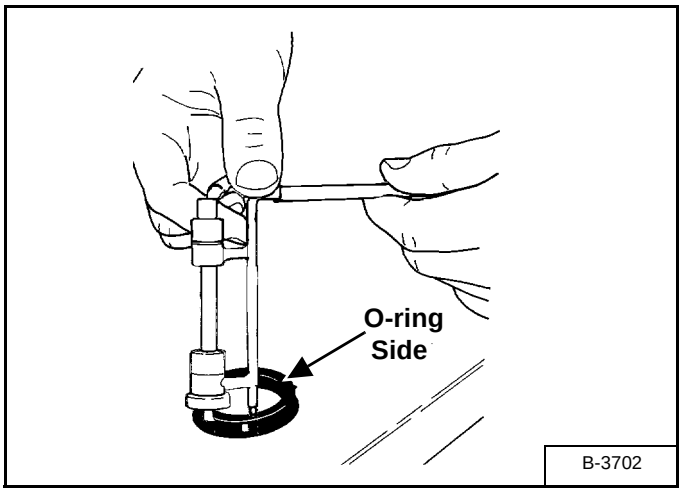
Figure 20-24-26



Tighten the head (Item 1) **[Figure 20-24-26]** to 373 N•m (275 ft-lb) torque.

Assembly (Cont'd)

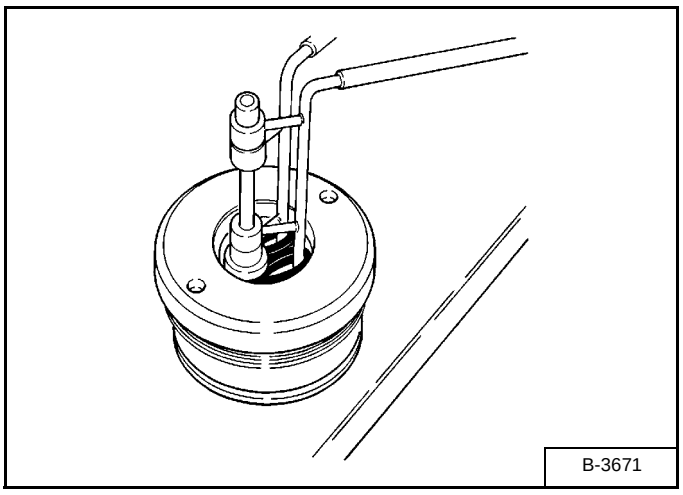
Figure 20-25-23



Install the oil seal on the rod seal tool **[Figure 20-25-23]**.

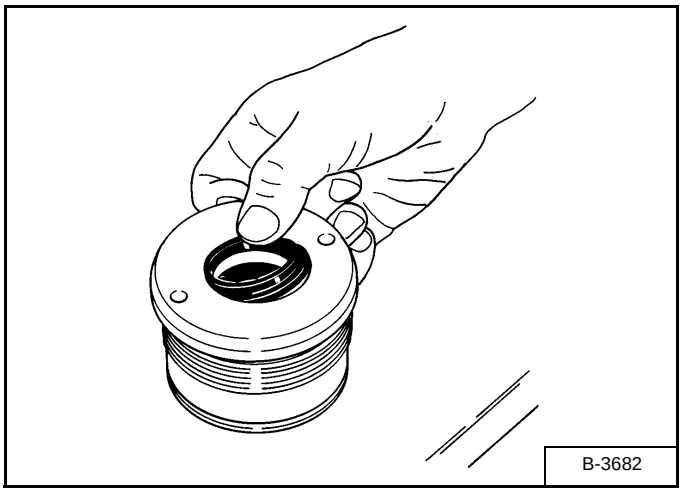
NOTE: The O-ring side of the oil seal goes toward the inside of the cylinder.

Figure 20-25-24



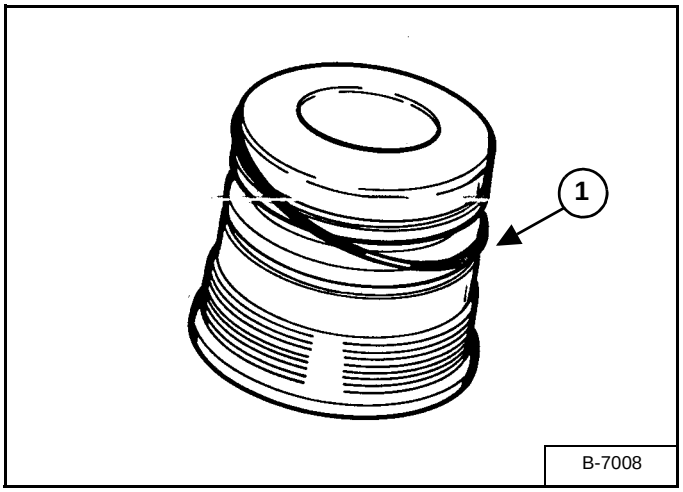
Install the oil seal in the head **[Figure 20-25-24]**.

Figure 20-25-25



Install the wiper seal with the lip toward the outside of the head **[Figure 20-25-25]**.

Figure 20-25-26



Install the O-ring (Item 1) **[Figure 20-25-26]** on the head.

Assembly

Clean all parts in solvent and dry with compressed air.

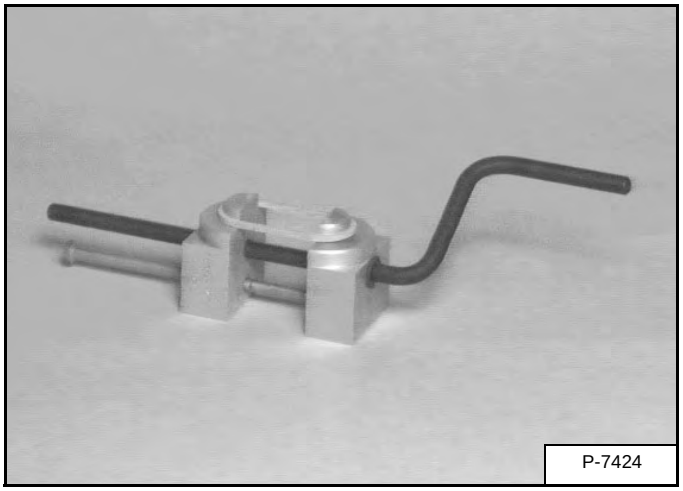
Inspect all parts for wear or damage. Replace any worn or damaged parts.

Always install new seals and O-rings. Lubricate all seals and O-rings with clean hydraulic fluid before installation.

Use the following tools to assemble the cylinder:

MEL1396 - Universal Seal Expander
MEL1033 - Rod Seal Installation Tool
MEL1396-2 - Piston Ring Compressor
MEL1075 - Adjustable Gland Nut Wrench
MEL1075-1 - Standard Pins

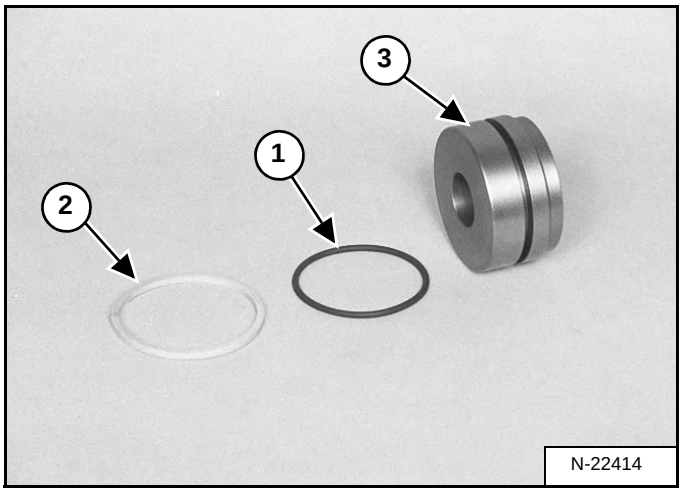
Figure 20-26-16



Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-26-16]**.

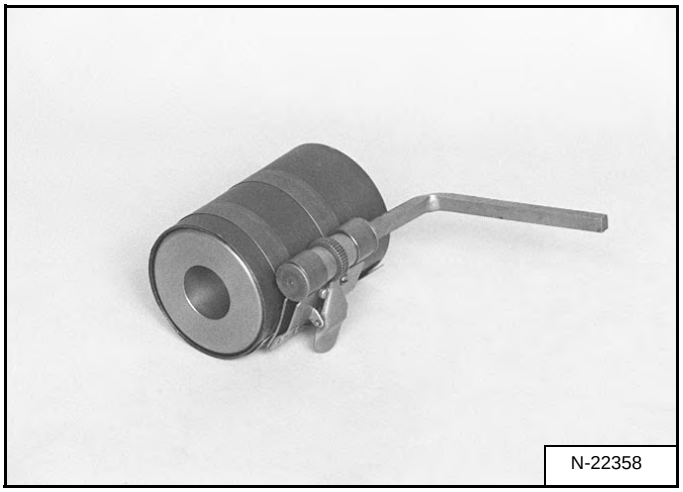
Allow the seal to stretch for 30 seconds before installing it on the piston.

Figure 20-26-17



Install the O-ring (Item 1) and seal (Item 2) on the piston (Item 3) **[Figure 20-26-17]**.

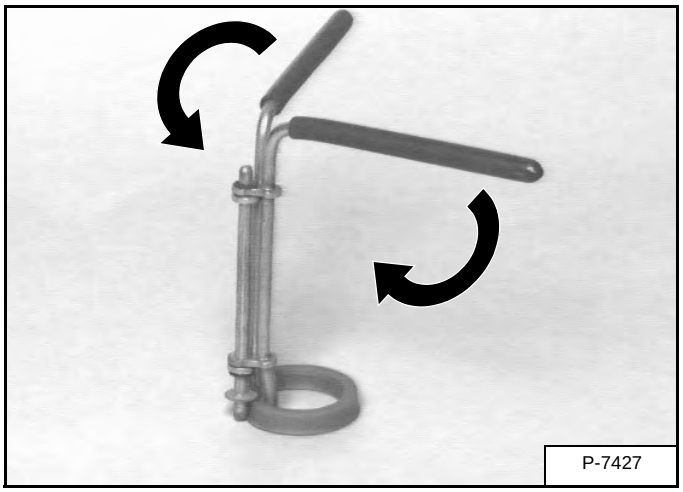
Figure 20-26-18



Use a ring compressor to compress the seal to the correct size. Leave the piston in the compressor for about 3 minutes **[Figure 20-26-18]**.

Assembly (Cont'd)

Figure 20-27-16

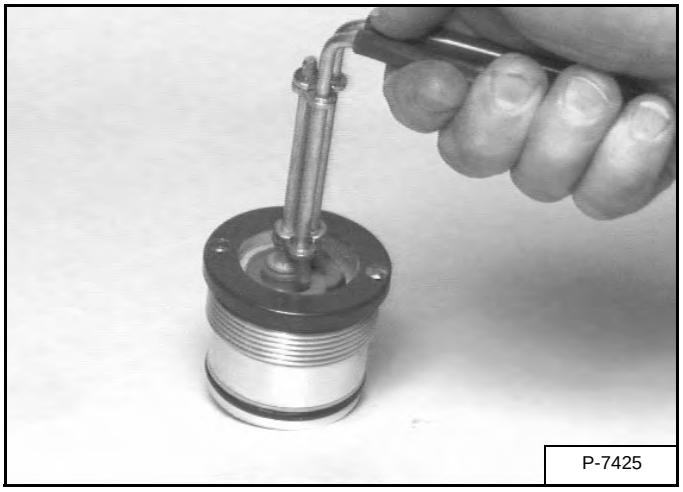


Install the rod seal on the rod seal tool **[Figure 20-27-16]**.

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

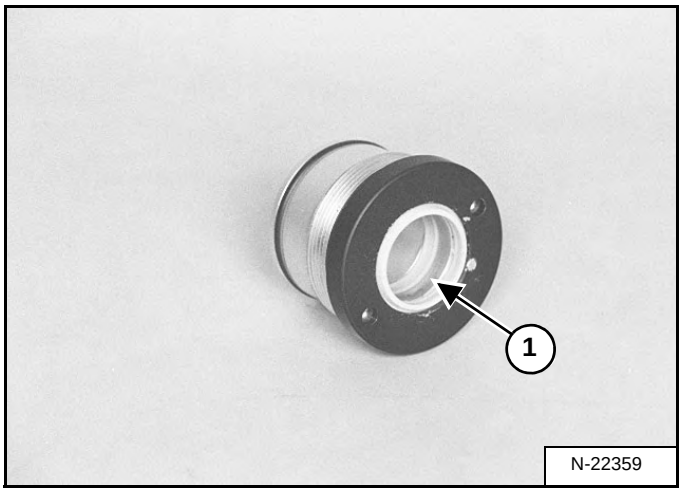
Rotate the handles to collapse the rod seal **[Figure 20-27-16]**.

Figure 20-27-17



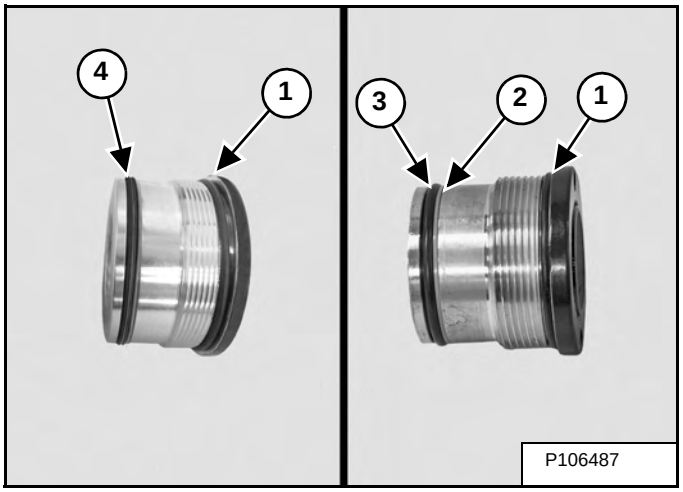
Install the rod seal in the head **[Figure 20-27-17]**.

Figure 20-27-18



Install the wiper seal with the wiper (Item 1) **[Figure 20-27-18]** toward the outside of the head.

Figure 20-27-19



Install the O-ring (Item 1) **[Figure 20-27-19]**.

Install the back-up ring (Item 2) / O-ring (Item 3) or seal (Item 4) **[Figure 20-27-19]**.

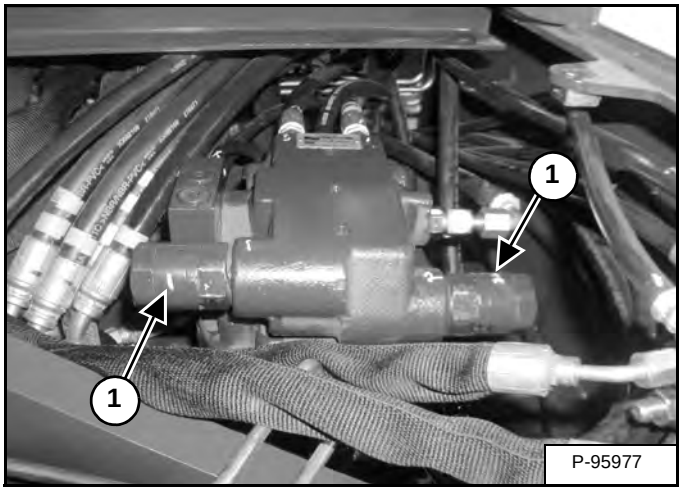
Removal And Installation

Drain the hydraulic reservoir. (See Lubrication Locations on Page 10-140-1.)

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

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

Figure 20-32-4

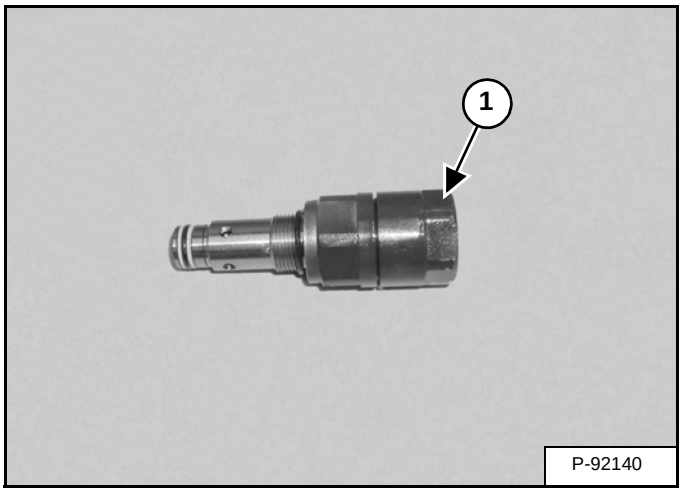


Mark and remove the crossport relief valves (Item 1) **[Figure 20-32-4]**.

NOTE: Install the valves in the original location.

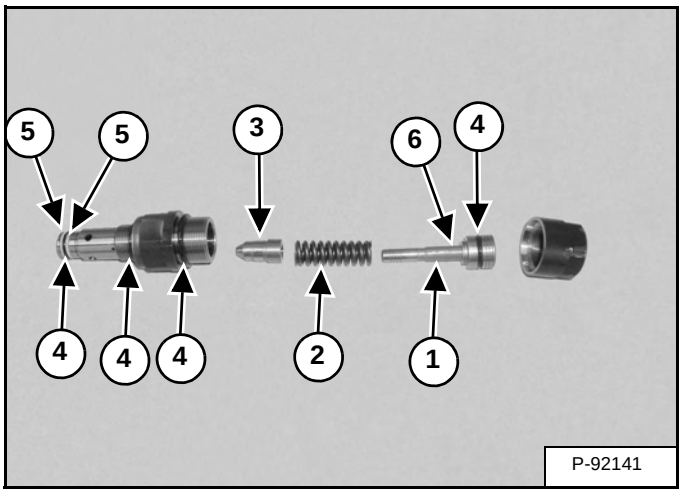
Cross Port Relief Valve Disassembly And Assembly

Figure 20-32-5



Remove the cap (Item 1) **[Figure 20-32-5]**.

Figure 20-32-6

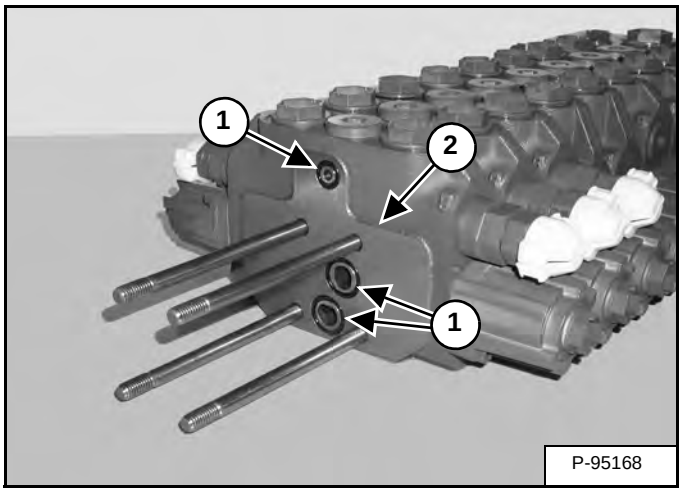


Remove the spool (Item 1), spring (Item 2) and poppet (Item 3). Remove the O-rings (Item 4) and back-up rings (Item 5) **[Figure 20-32-6]**.

NOTE: Shims (Item 6) [Figure 20-32-6] may be installed on the spool. Always install the same number of shims that were removed.

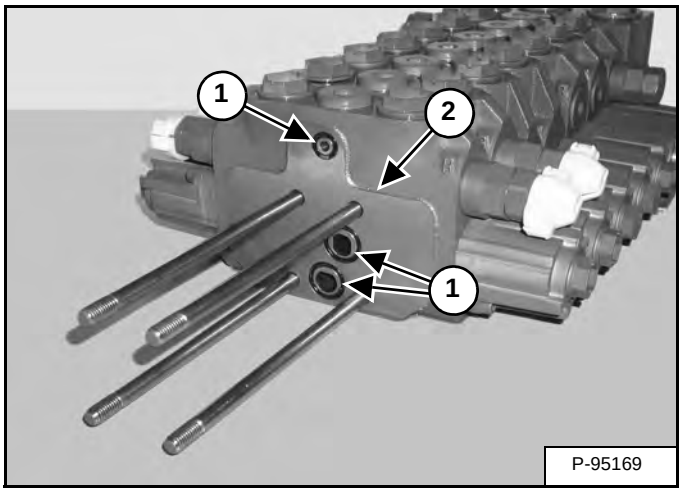
Disassembly And Assembly (Cont'd)

Figure 20-40-17



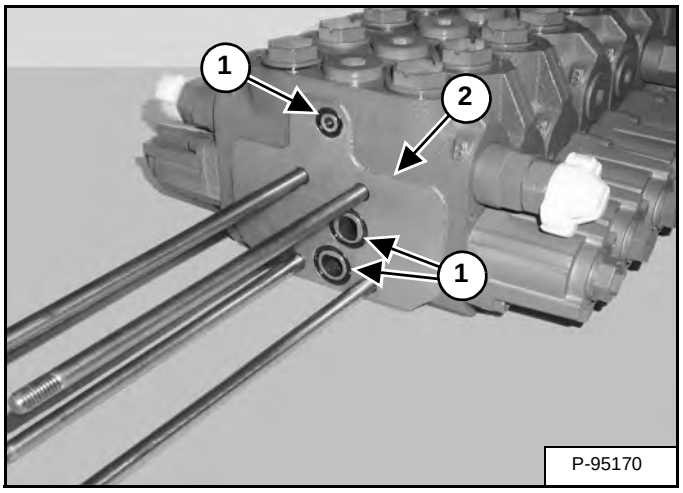
Remove the three O-rings (Item 1) and remove the auxiliary valve section (Item 2) **[Figure 20-40-17]**.

Figure 20-40-18



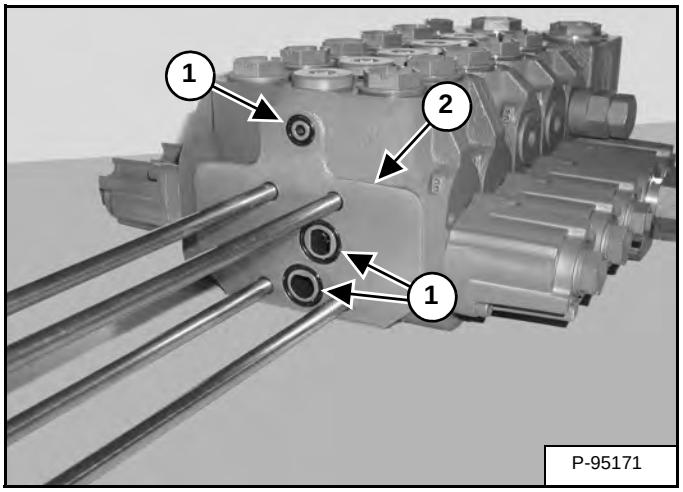
Remove the three O-rings (Item 1) and remove the boom valve section (Item 2) **[Figure 20-40-18]**.

Figure 20-40-19



Remove the three O-rings (Item 1) and remove the angle blade section (Item 2) **[Figure 20-40-19]**.

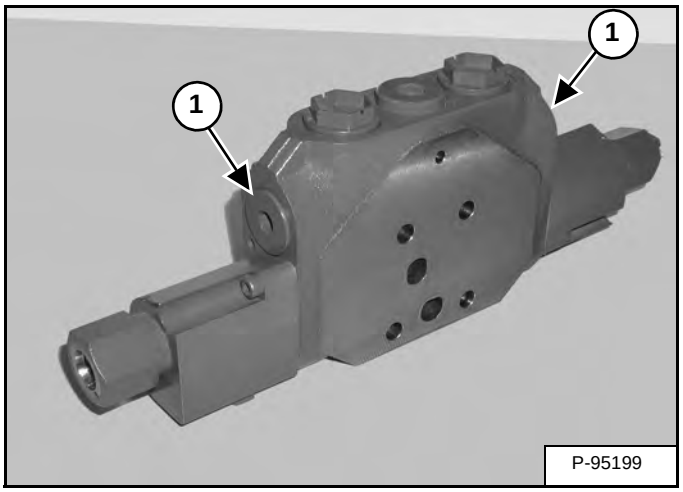
Figure 20-40-20



Remove the three O-rings (Item 1) and remove the right travel section (Item 2) **[Figure 20-40-20]**.

Slew Valve Section Disassembly And Assembly

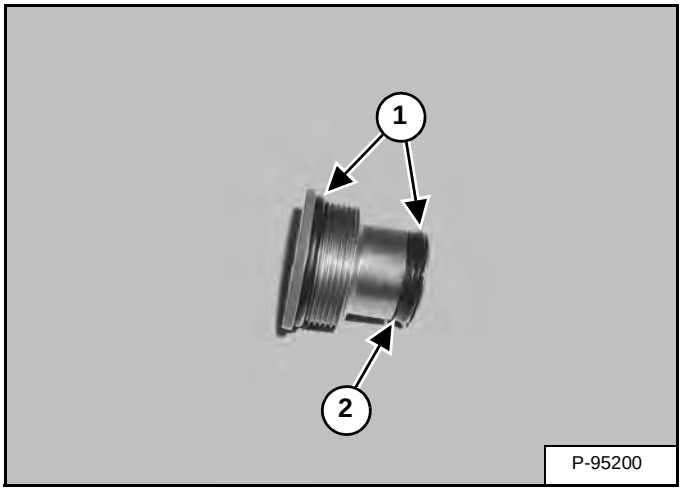
Figure 20-40-49



Remove the plug (Item 1) **[Figure 20-40-49]** from both ends of the valve section.

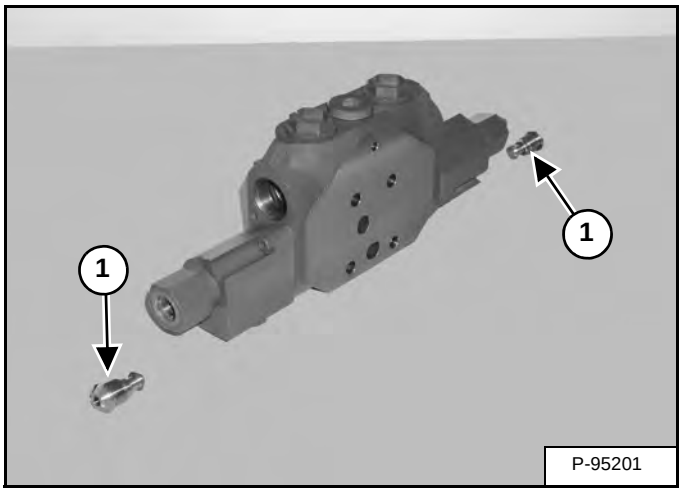
Assembly: Tighten the plugs to 63 - 77 N•m (46 - 57 ft-lb) torque.

Figure 20-40-50



Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-50]**.

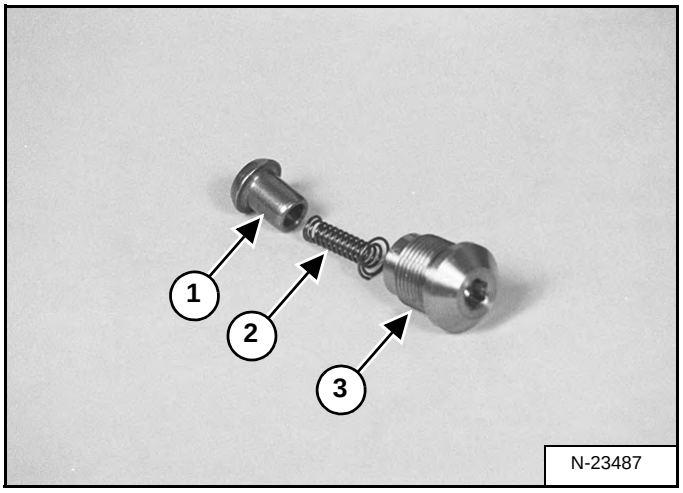
Figure 20-40-51



With a hex wrench remove the load check valve assembly (Item 1) **[Figure 20-40-51]** from the valve section.

Assembly: Tighten the plugs to 9 - 11 N•m (80 - 97 in-lb) torque.

Figure 20-40-52

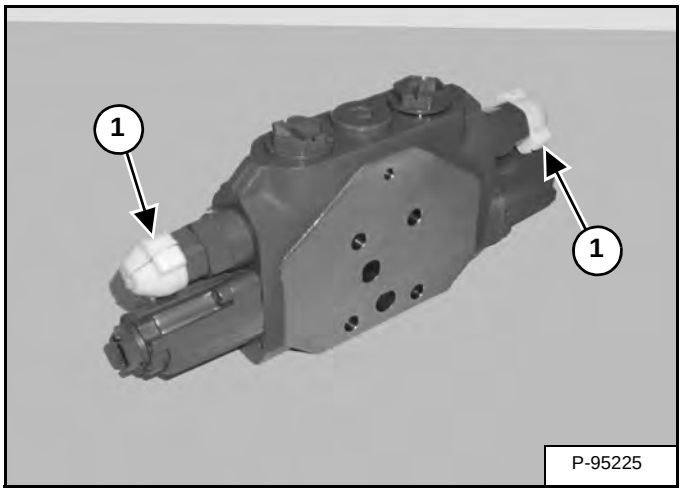


Remove the seat (Item 1) and spring (Item 2) from the load check valve body (Item 3) **[Figure 20-40-52]**.

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

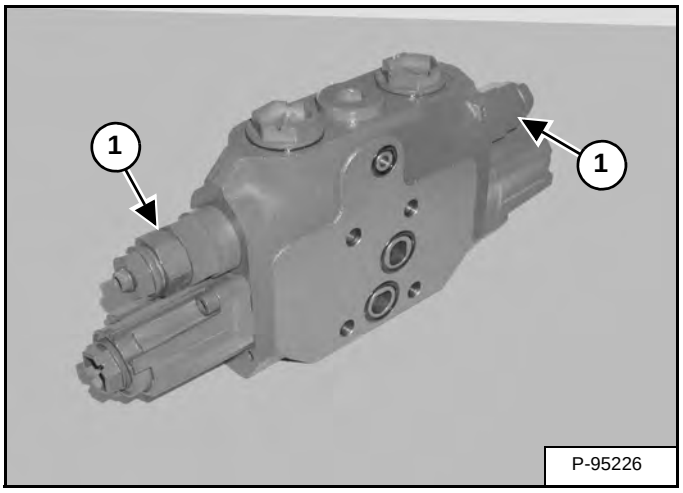
Angle Blade, Boom, Auxiliary, Arm And Bucket Valve Section Disassembly And Assembly

Figure 20-40-85



Remove the covers (Item 1) **[Figure 20-40-85]**.

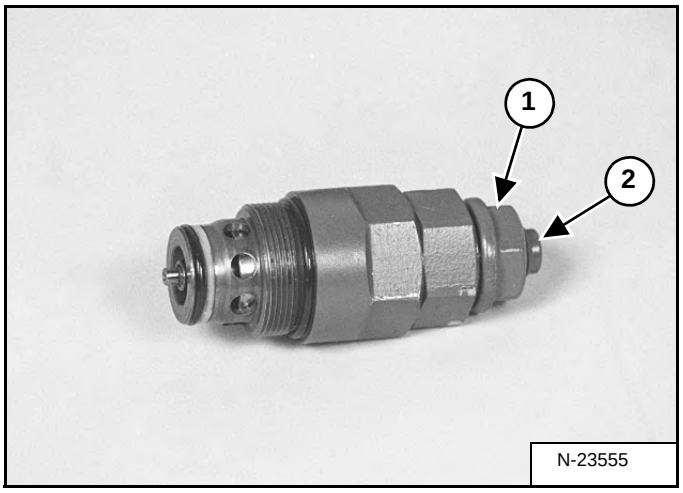
Figure 20-40-86



Remove the port relief (Item 1) **[Figure 20-40-86]** from both ends of the valve section.

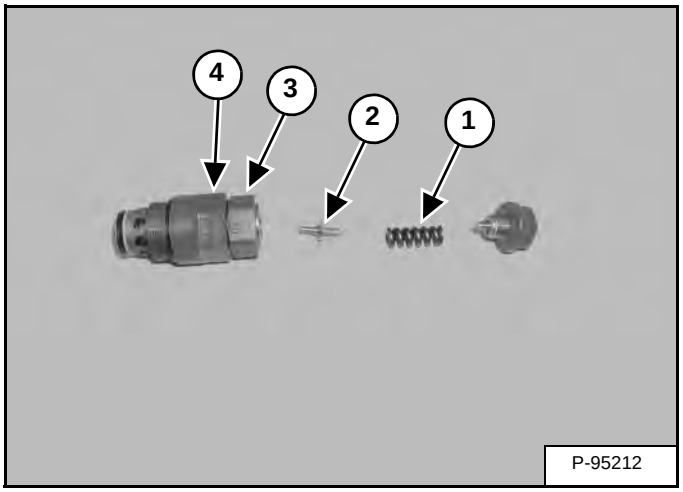
Assembly: Tighten the port relief to 63 - 77 N•m (46 - 57 ft-lb) torque.

Figure 20-40-87



Remove the nut (Item 1) and adjustment screw (Item 2) **[Figure 20-40-87]** from the port relief.

Figure 20-40-88

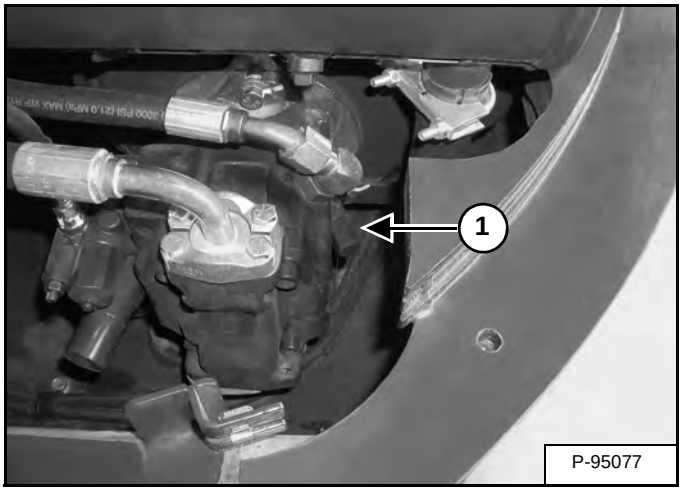


Remove the spring (Item 1), poppet (Item 2) and nut (Item 3) from the front housing (Item 4) **[Figure 20-40-88]**.

Pump Testing (Cont'd)

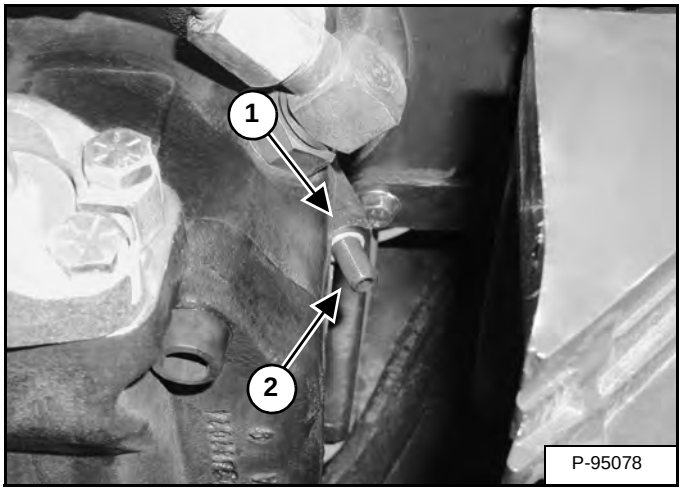
Minimum Displacement Adjustment (Cont'd)

Figure 20-50-12



Remove the cap (Item 1) **[Figure 20-50-12]**.

Figure 20-50-13



To adjust the flow, loosen the locknut (Item 1) and turn the adjustment stop screw (Item 2) **[Figure 20-50-13]** ***clockwise to increase the flow and counterclockwise to decrease the flow***.

NOTE: 1/2 turn is approximately 3,8 L/min (1.0 U.S. gpm).

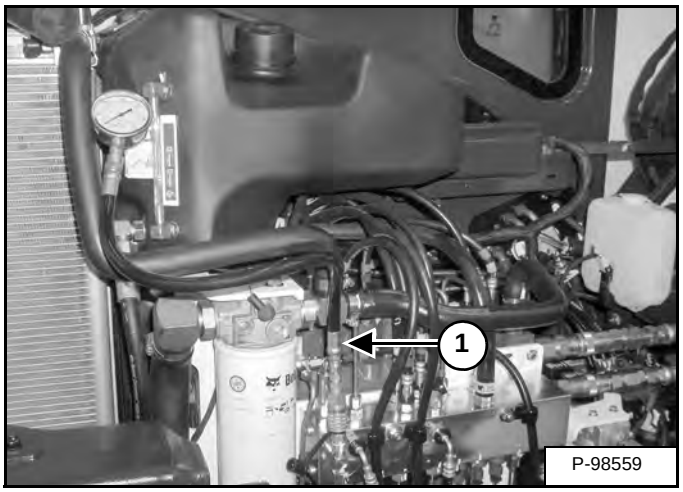
At the manifold, disconnect the hose from the pump diagnostic port to the load sense diagnostic port.

NOTE: Leave the load sense hose disconnected.

Minimum Displacement Adjustment is now completed.

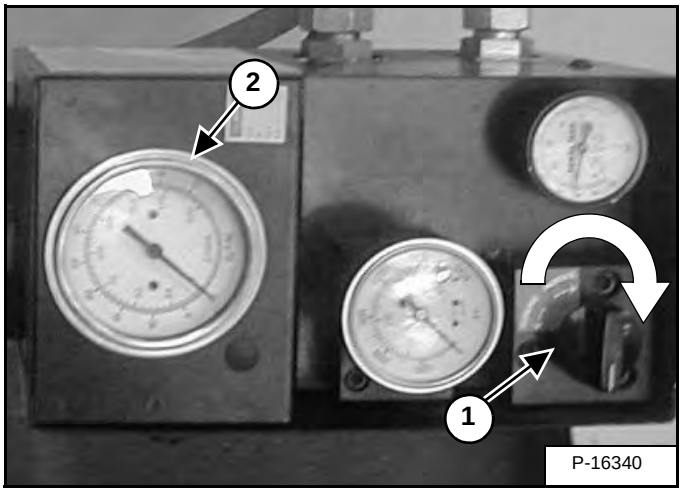
Pump Margin Pressure Adjustment

Figure 20-50-14



Install a 3447 kPa (34,5 bar) (500 psi) gauge on the P port (Item 1) **[Figure 20-50-14]** of the manifold.

Figure 20-50-15



With the engine at high idle, turn the hydraulic tester flow control (Item 1) clockwise until **37,8 L/min (10 U.S. gpm)** flow is shown at the hydraulic tester gauge (Item 2) **[Figure 20-50-15]**.

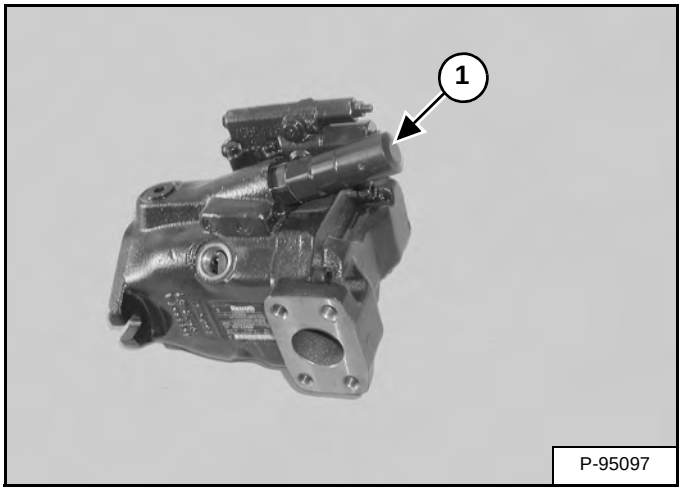
Torque Limiter Assembly Removal And Installation

IMPORTANT

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

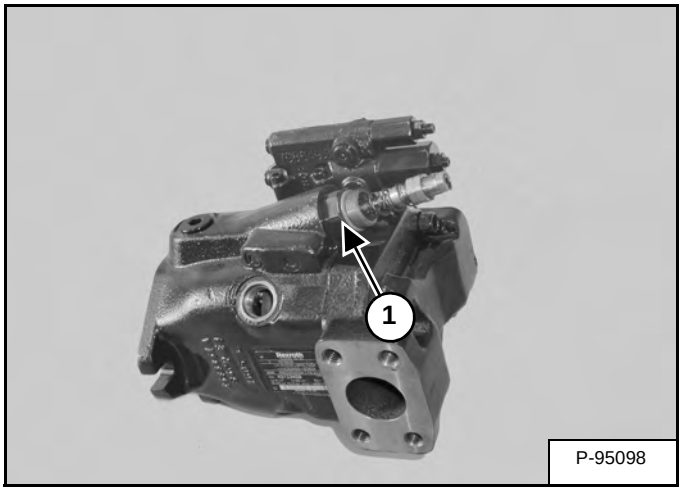
I-2003-0888

Figure 20-50-39



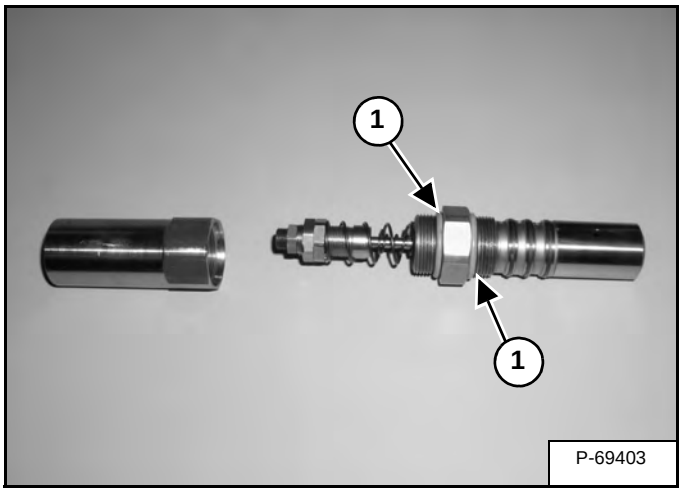
Remove the cap (Item 1) **[Figure 20-50-39]** from the torque limiter valve assembly.

Figure 20-50-40



Remove the torque limiter valve assembly (Item 1) **[Figure 20-50-40]** from the hydraulic pump.

Figure 20-50-41



Remove the O-rings (Item 1) **[Figure 20-50-41]**.

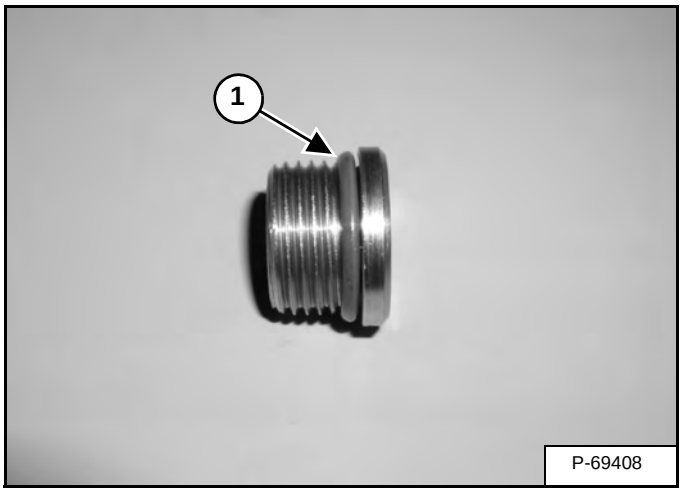
NOTE: Care should be taken not to scratch or damage the mounting surface on the valve body.

Torque Limiter Valve Assembly Disassembly And Assembly

NOTE: The torque limiter valve assembly is not serviceable and should be replaced as a complete assembly from Bobcat Parts.

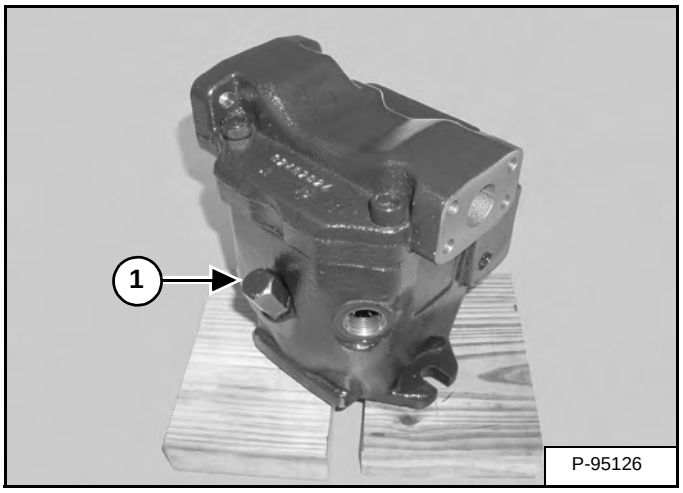
Disassembly And Assembly (Cont'd)

Figure 20-50-65



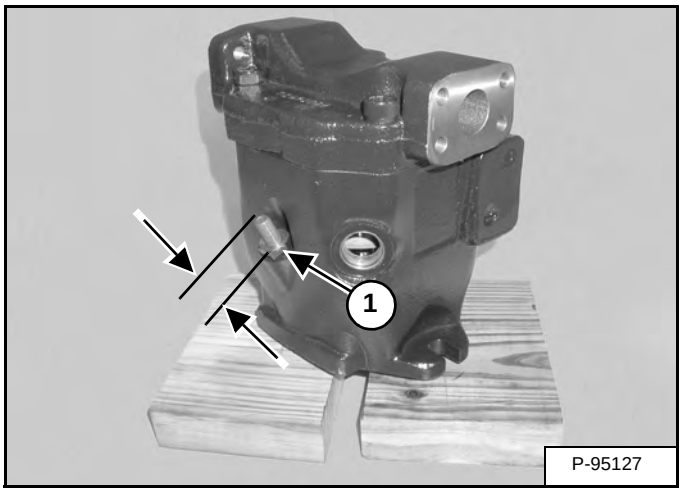
Remove the O-ring (Item 1) **[Figure 20-50-65]** from the plug.

Figure 20-50-66



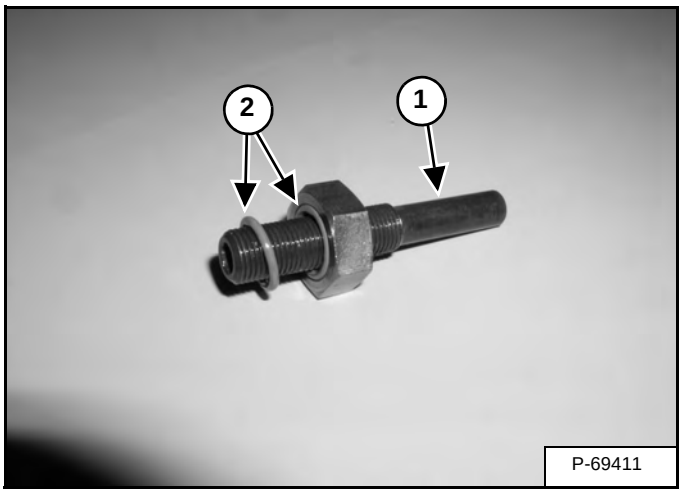
Remove the cap (Item 1) **[Figure 20-50-66]** from the minimum displacement screw.

Figure 20-50-67



Before loosening the nut (Item 1) **[Figure 20-50-67]** measure the distance of the stroking piston adjustment screw to the nut.

Figure 20-50-68

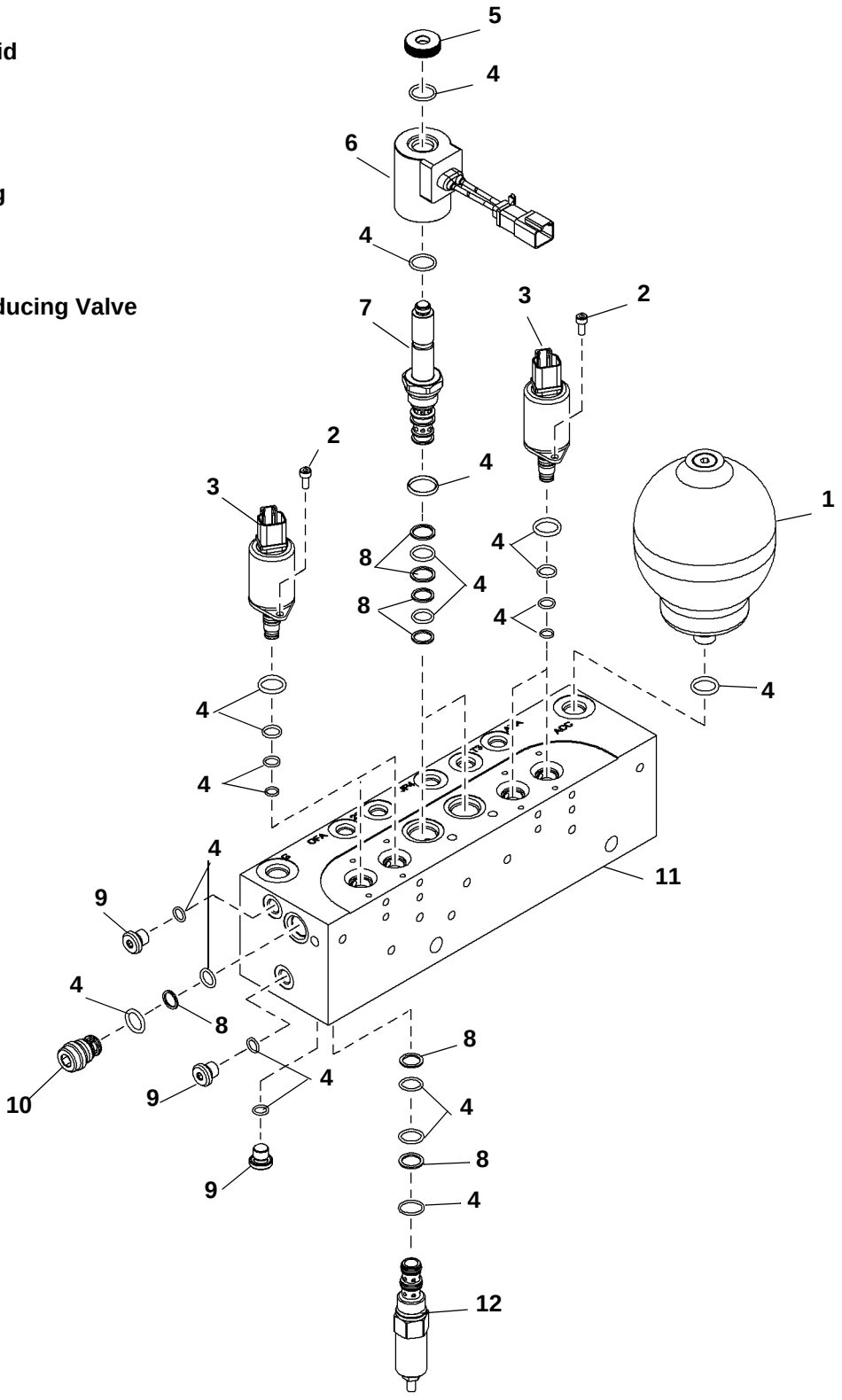


Remove the adjustment screw and nut (Item 1) **[Figure 20-50-68]** from the housing.

Remove the O-rings (Item 2) **[Figure 20-50-68]** from the housing.

Parts Identification

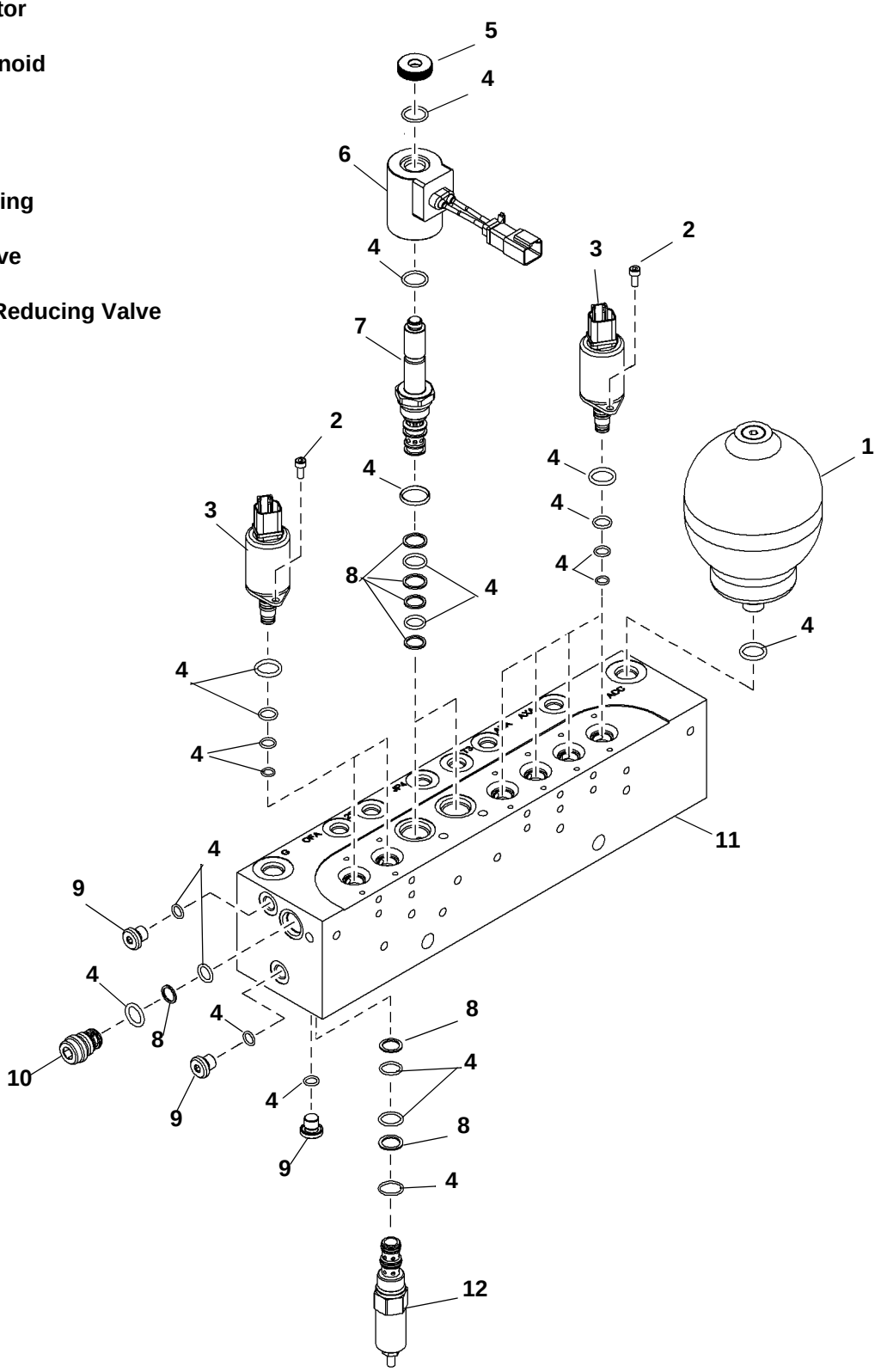
1. Accumulator
2. Screw
3. Coil / Solenoid
4. O-ring
5. Nut
6. Coil
7. Solenoid
8. Back-up Ring
9. Plug
10. Check Valve
11. Body
12. Pressure Reducing Valve



NA1976S

Parts Identification

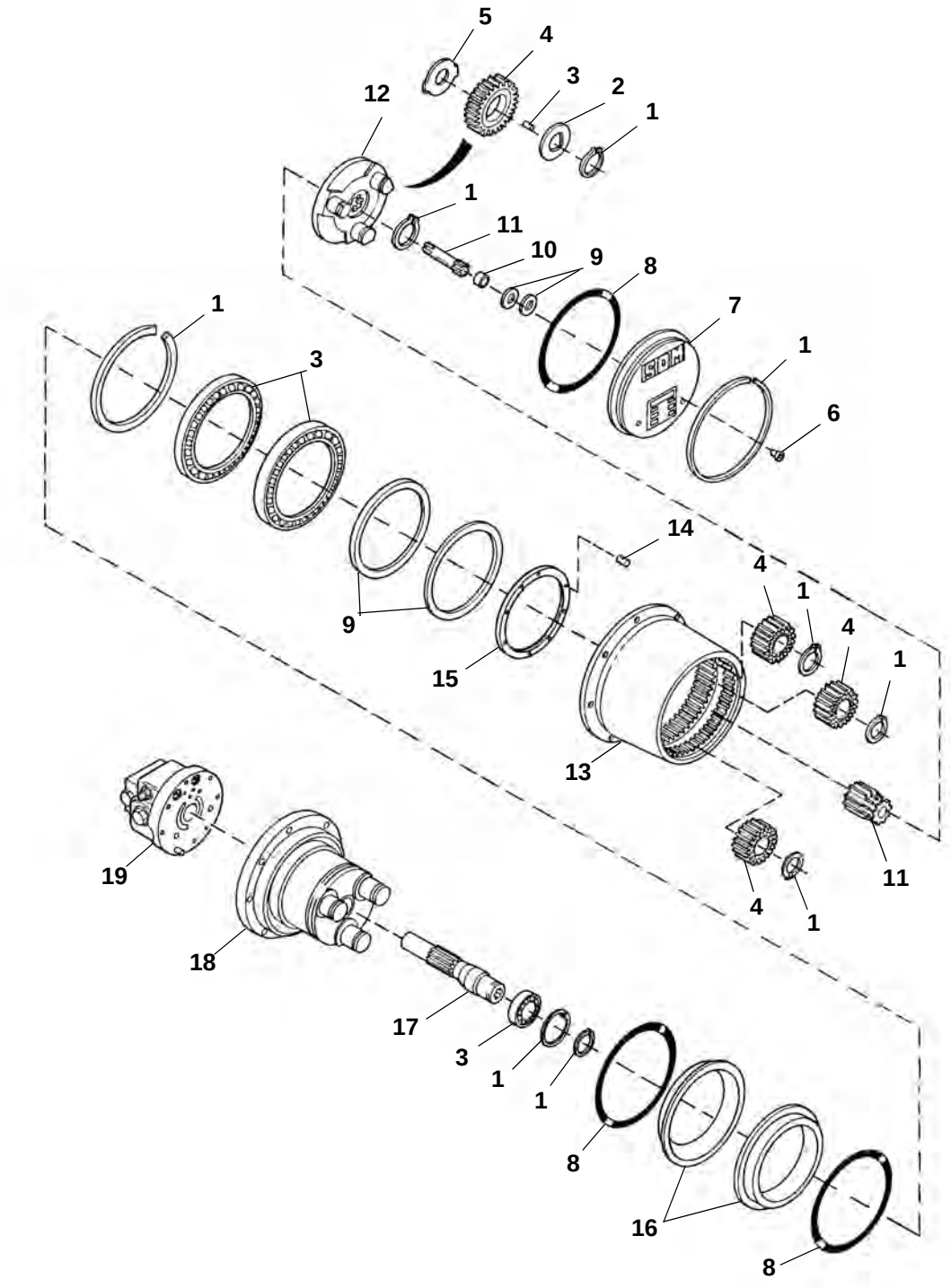
1. Accumulator
2. Screw
3. Coil / Solenoid
4. O-ring
5. Nut
6. Coil
7. Solenoid
8. Back-up Ring
9. Plug
10. Check Valve
11. Body
12. Pressure Reducing Valve



NA1975S

Parts Identification Gear Reduction Hub

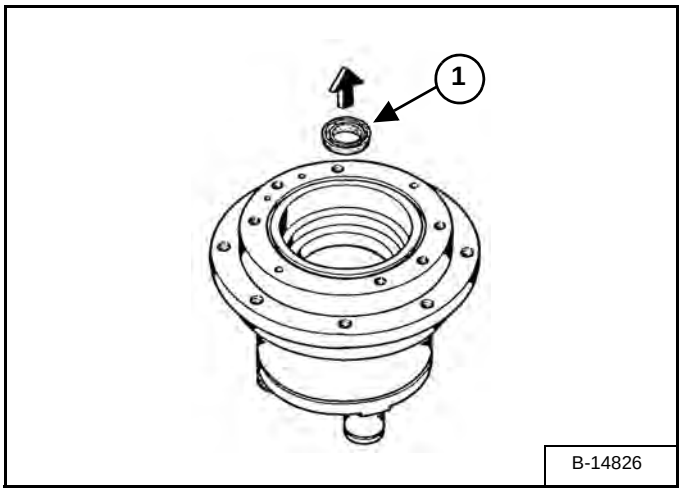
1. Snap Ring
2. Anti-rotation Washer
3. Bearing
4. Planetary Gear
5. Thrust Washer
6. Plug
7. Cover
8. O-ring
9. Shim
10. Bushing
11. Sun Gear
12. Planetary Carrier
13. Housing
14. Screw
15. Nut
16. Seal Ring
17. Drive Shaft
18. Hub
19. Motor Cover



NA5598S

Disassembly (Cont'd)

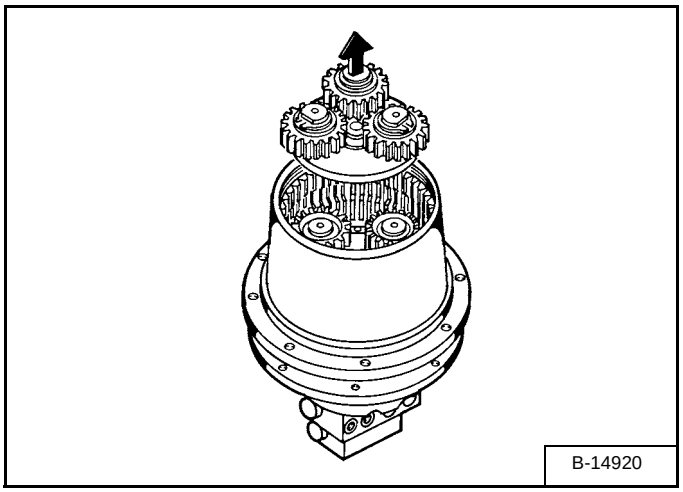
Figure 20-70-39



Remove the seal (Item 1) **[Figure 20-70-39]** from the hub.

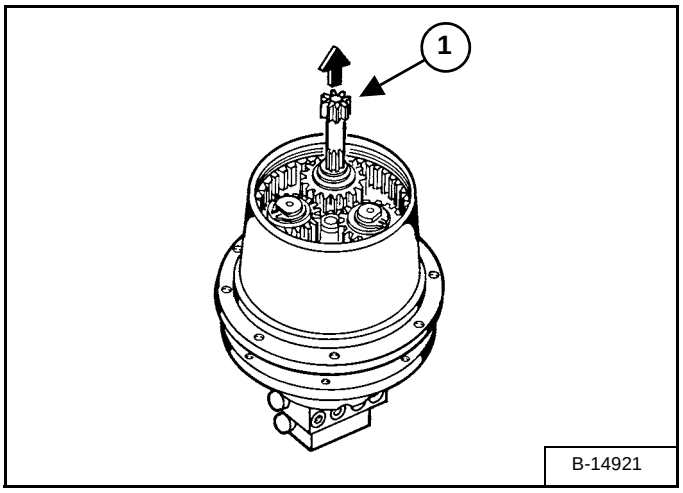
Assembly (Cont'd)

Figure 20-70-75



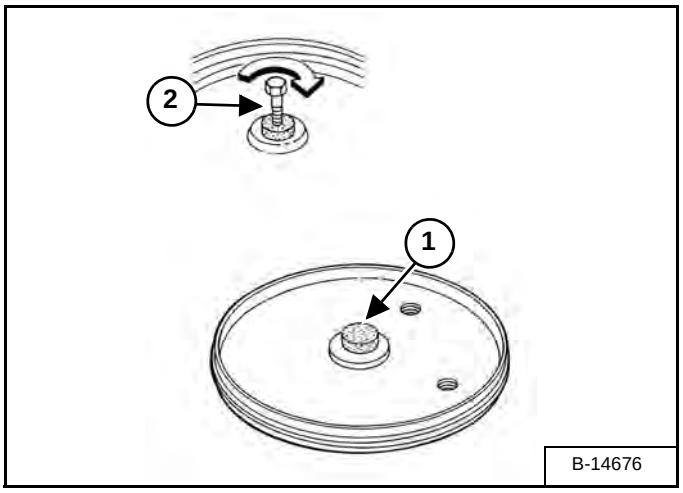
Install the planetary assembly in the housing **[Figure 20-70-75]**.

Figure 20-70-76



Install the sun gear (Item 1) **[Figure 20-70-76]** in the planetary assembly.

Figure 20-70-77



Inspect the cover bushing (Item 1) **[Figure 20-70-77]** for wear.

If the bushing (Item 1) **[Figure 20-70-77]** needs to be replaced, drill a hole in the center of the bushing using a number 3 drill bit.

Thread the hole with a 1/4 x 28 inch N.F. tap.

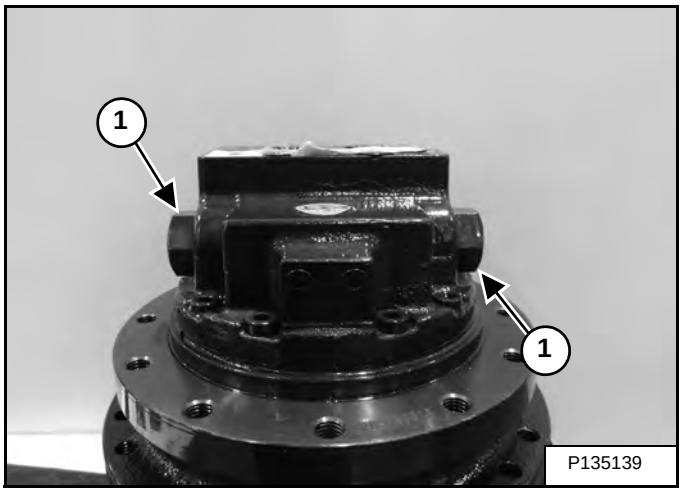
Install a 1/4 x 28 inch bolt (Item 2) **[Figure 20-70-77]** in the bushing and pull the bushing out of the cover.

Install the new bushing in the cover with the bevel down.

The clearance between the cover bushing and the sun gear must be 0,4 - 0,8 mm (0.016 - 0.031 in).

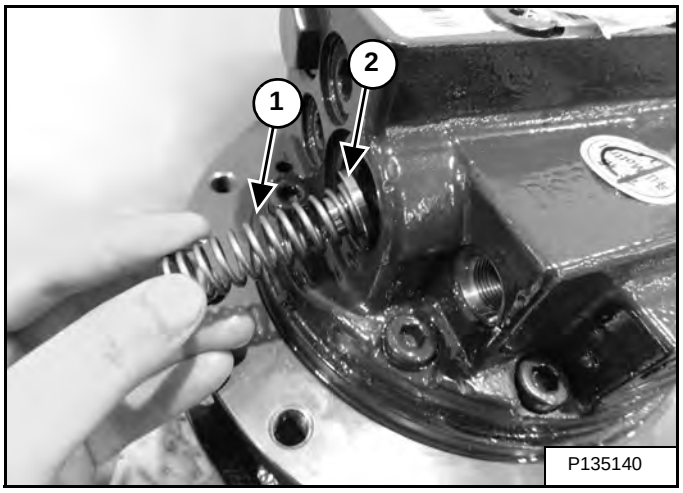
Disassembly (Cont'd)

Figure 20-71-14



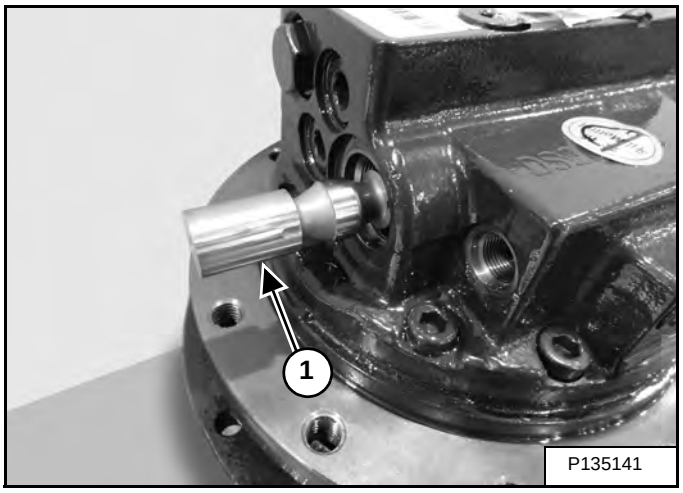
Remove the plugs (Item 1) **[Figure 20-71-14]**.

Figure 20-71-15



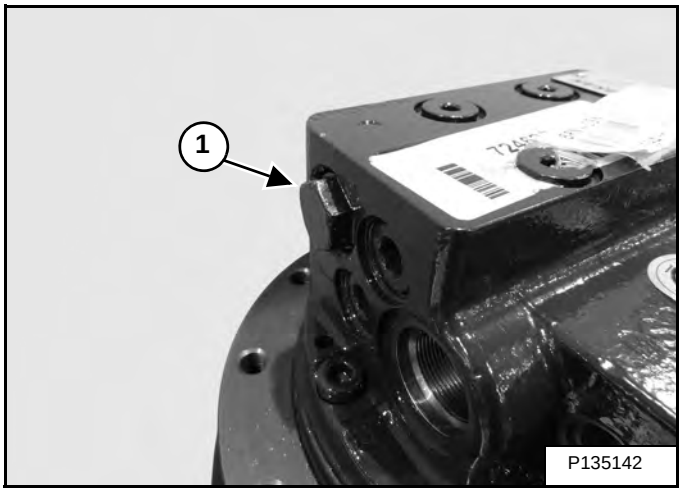
Remove the spring (Item 1) and spring seats (Item 2) **[Figure 20-71-15]** from both sides of the rear flange.

Figure 20-71-16



Remove the spool (Item 1) **[Figure 20-71-16]**.

Figure 20-71-17



Remove the plugs (Item 1) **[Figure 20-71-17]** on both sides.

Assembly (Cont'd)

Figure 20-71-53

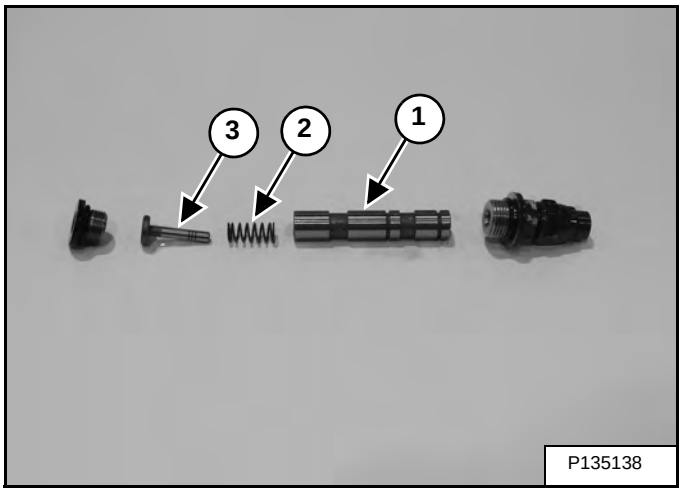
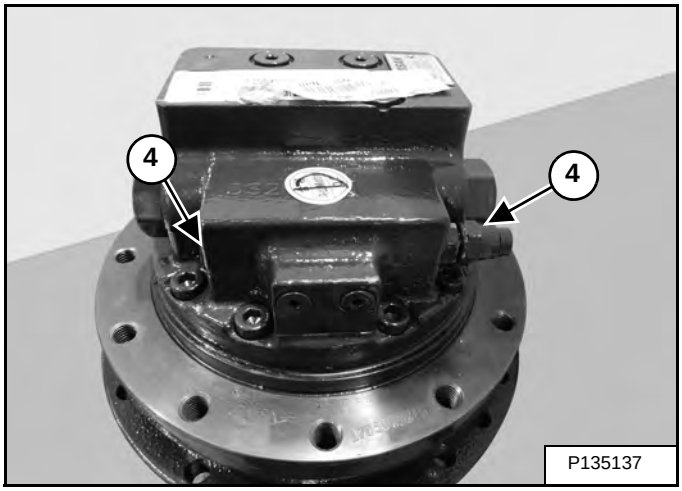


Figure 20-71-54

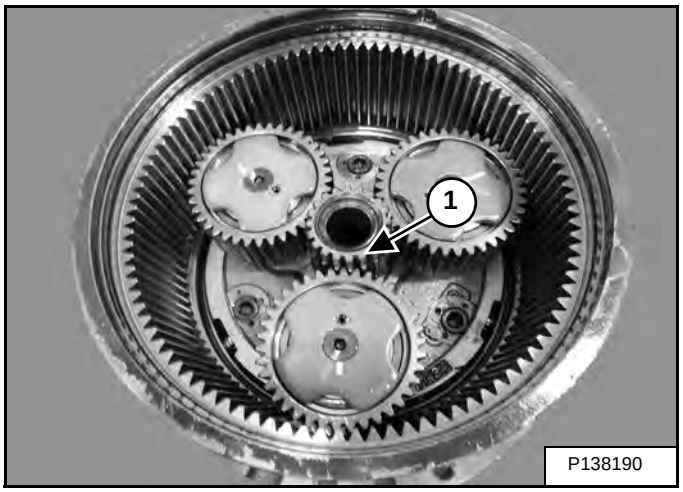


Install the spool (Item 1), spring (Item 2), and spring seat (Item 3) **[Figure 20-71-53]** into the flange.

Install the plugs (Item 4) **[Figure 20-71-54]**.

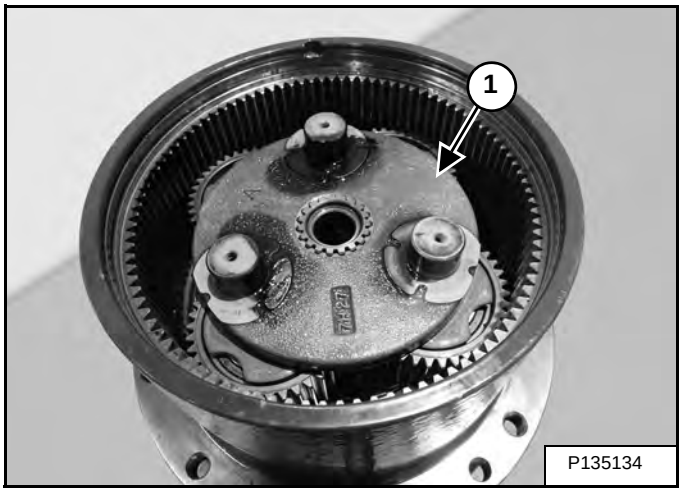
Tighten the plugs to 45 - 65 N•m (33 - 48 ft-lb) torque.

Figure 20-71-55



Install the sun gear (Item 1) **[Figure 20-71-55]**.

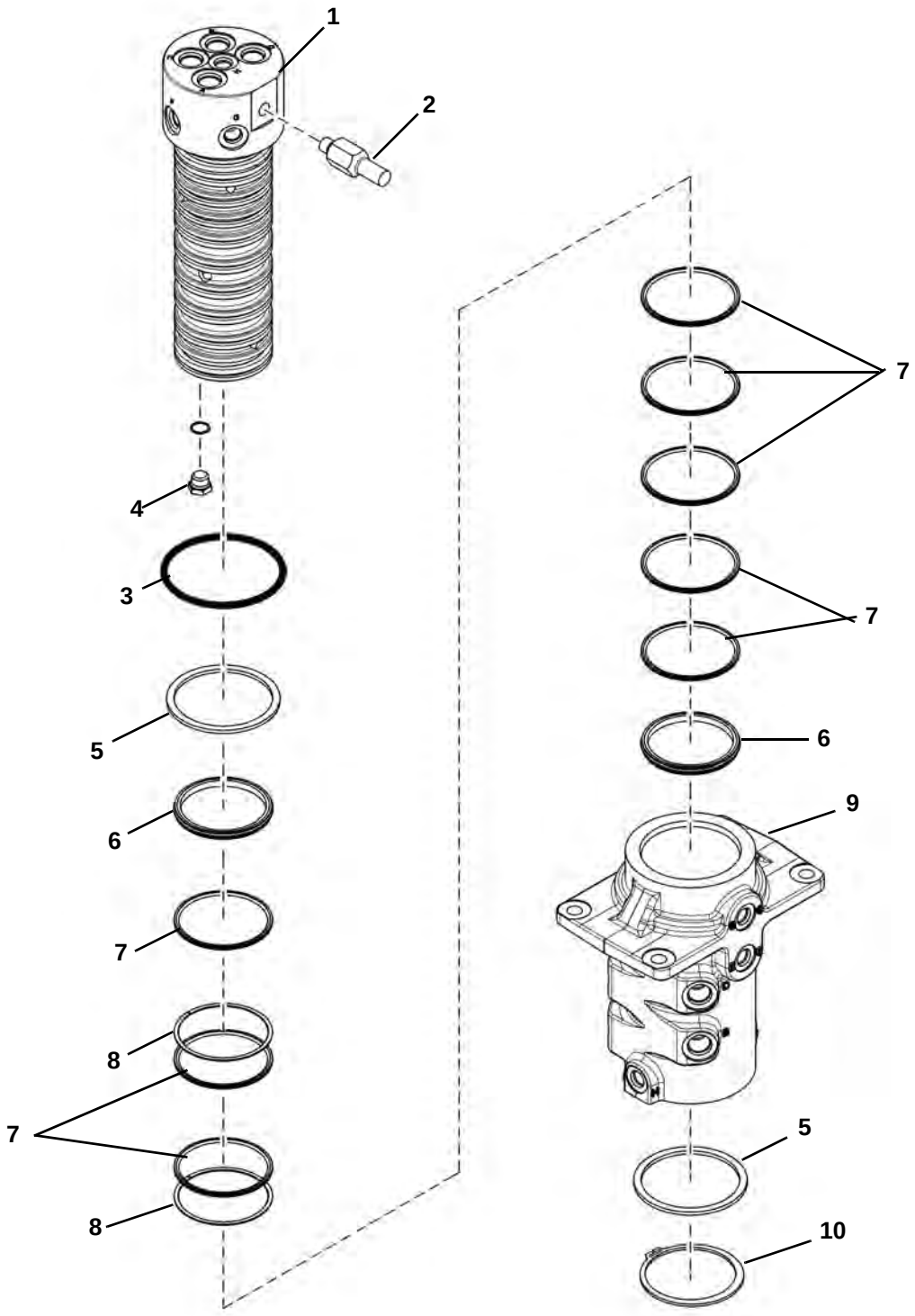
Figure 20-71-56



Install the carrier assembly (Item 1) **[Figure 20-71-56]**.

Parts Identification Straight Blade Swivel (B2VW12365 - B2VW13732)

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



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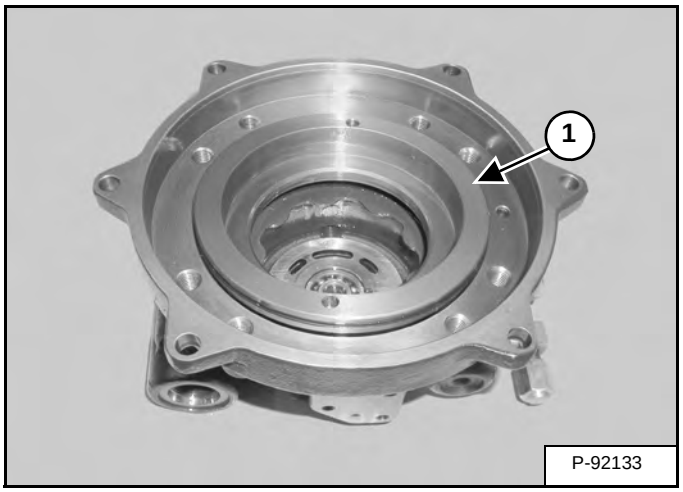
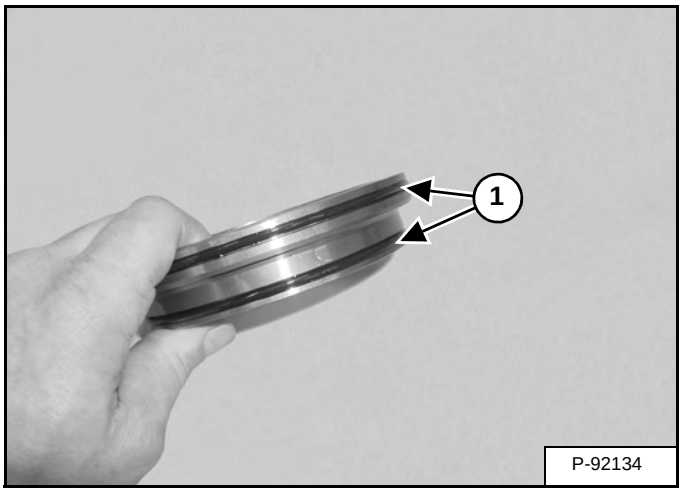
Disassembly And Assembly (Cont'd)

Figure 20-90-21



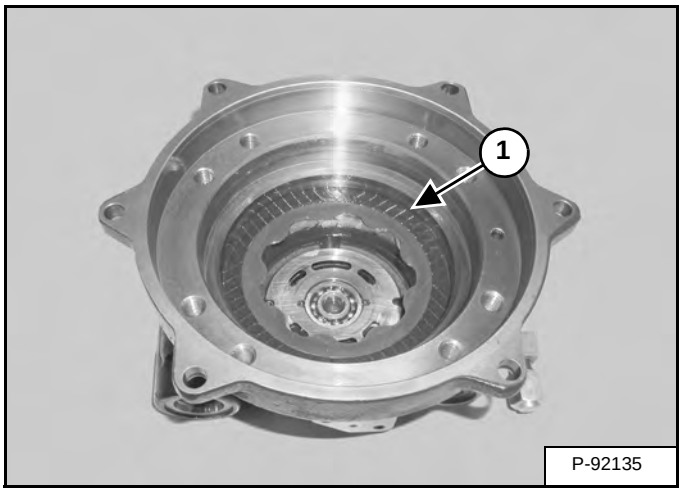
Remove the brake piston (Item 1) **[Figure 20-90-21]**.

Figure 20-90-22



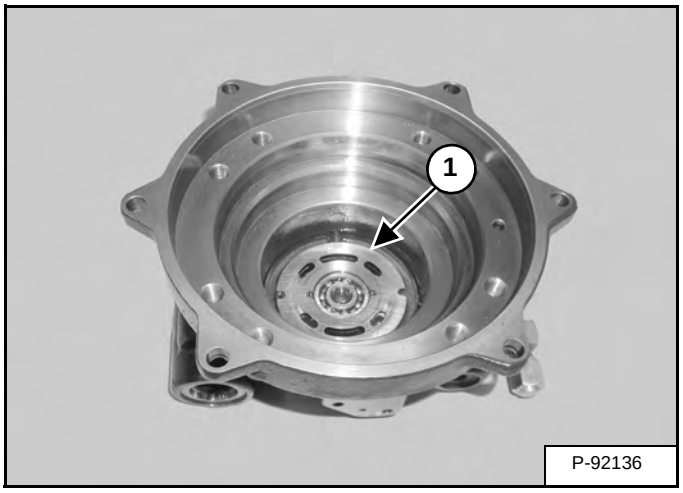
Remove the O-rings (Item 1) **[Figure 20-90-22]**.

Figure 20-90-23



Remove the brake disc (Item 1) **[Figure 20-90-23]**.

Figure 20-90-24



Remove the valve plate (Item 1) **[Figure 20-90-24]**.

CONTROL PATTERN SELECTOR VALVE

Removal And Installation

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

Mark all hydraulic hoses for proper 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.

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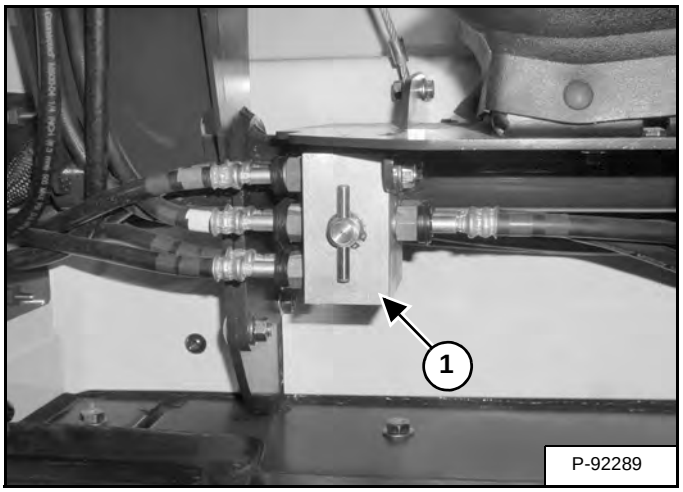
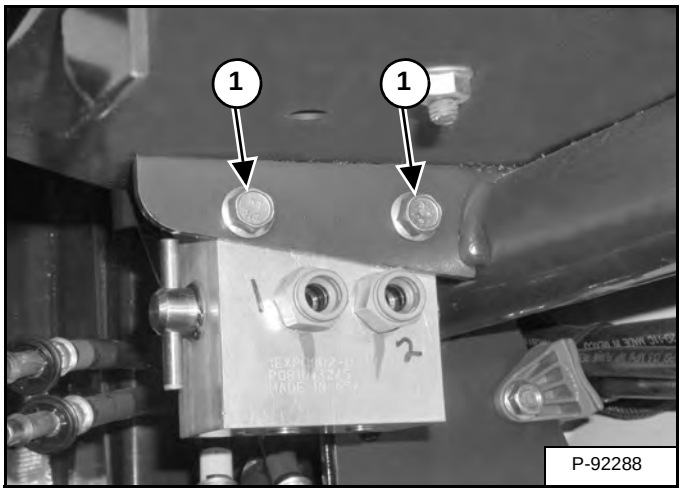
Figure 20-100-1



Remove the eight hydraulic hoses from the control pattern selector valve (Item 1) **[Figure 20-100-1]**.

Figure 20-100-2

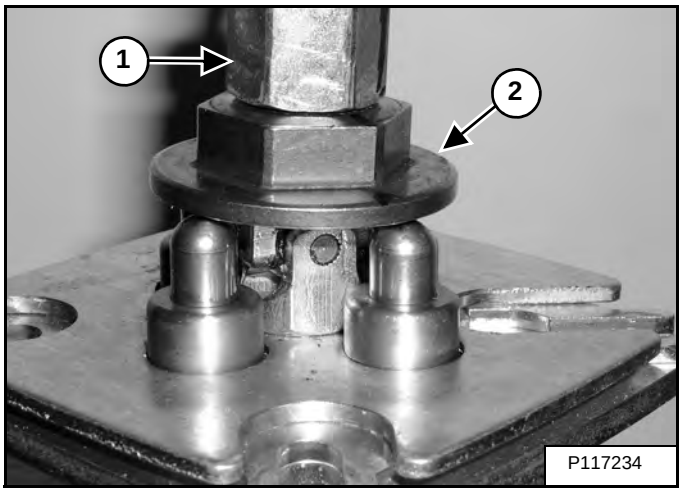


Remove the bolts (Item 1) **[Figure 20-100-2]**.

Remove the control pattern selector valve from the excavator.

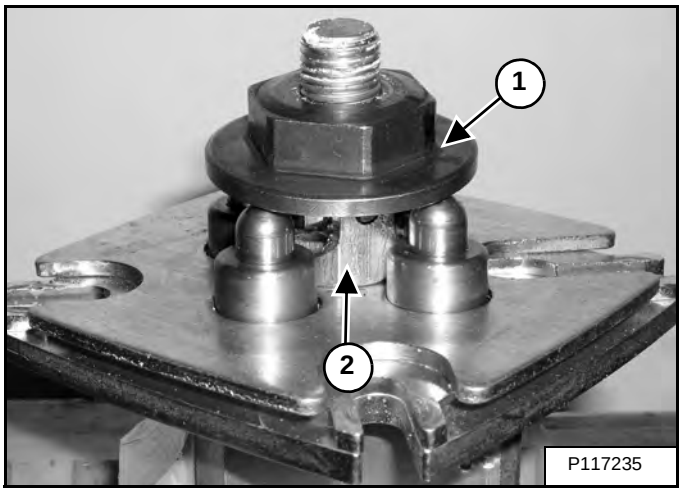
Disassembly (Cont'd)

Figure 20-110-20



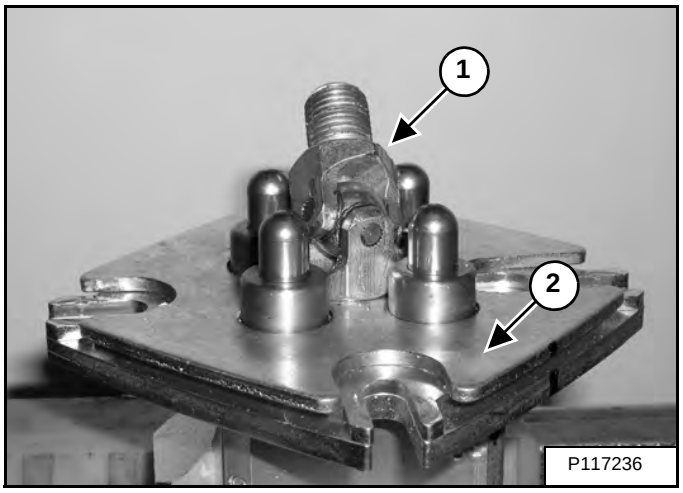
Remove the coupler (Item 1) from the control plate (Item 2) **[Figure 20-110-20]**.

Figure 20-110-21



Remove the control plate (Item 1) from the U-joint (Item 2) **[Figure 20-110-21]**.

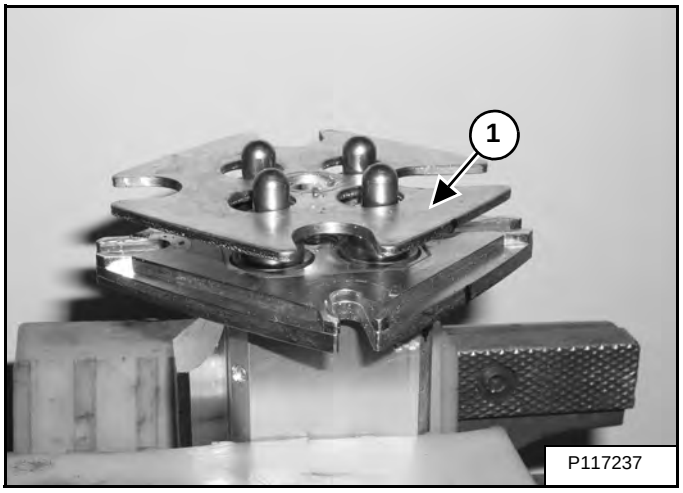
Figure 20-110-22



Mark the plate and housing for correct installation. Remove the U-joint (Item 1) **[Figure 20-110-22]**.

NOTE: The plate (Item 2) [Figure 20-110-22] is spring loaded and will come up as the U-joint is removed.

Figure 20-110-23

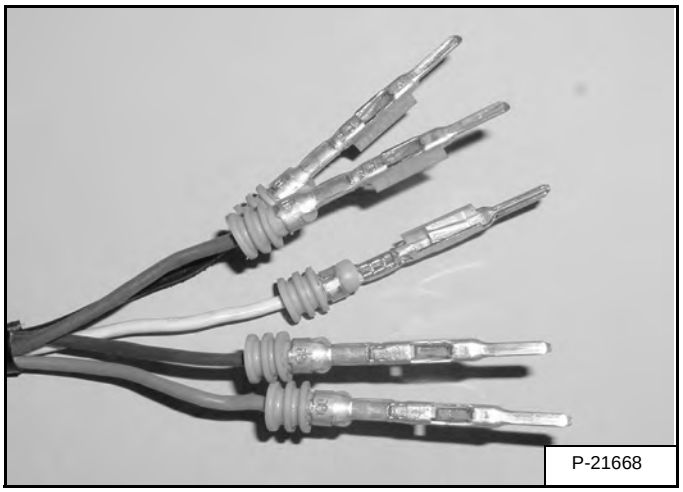


Remove the plate (Item 1) **[Figure 20-110-23]**.

LEFT CONTROL LEVER (JOYSTICK) (CONT'D)

Handle Removal And Installation (Cont'd)

Figure 20-120-7

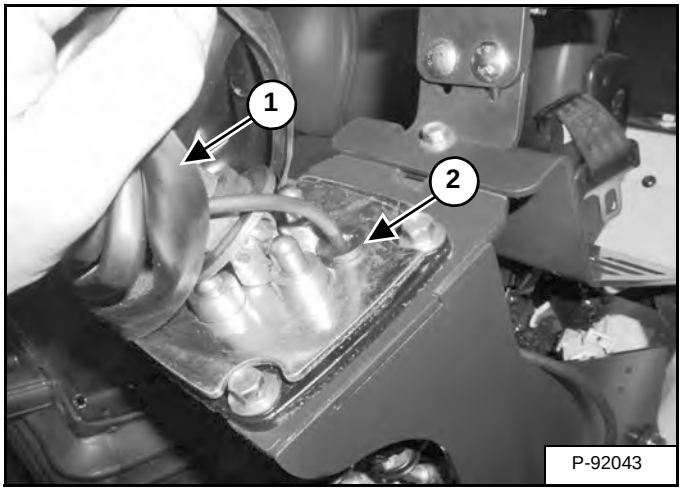


Installation: The wires must be installed in the proper locations in the wire connector, listed below **[Figure 20-120-7]**.

A Green
B Brown
C Red
D Black
E White

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

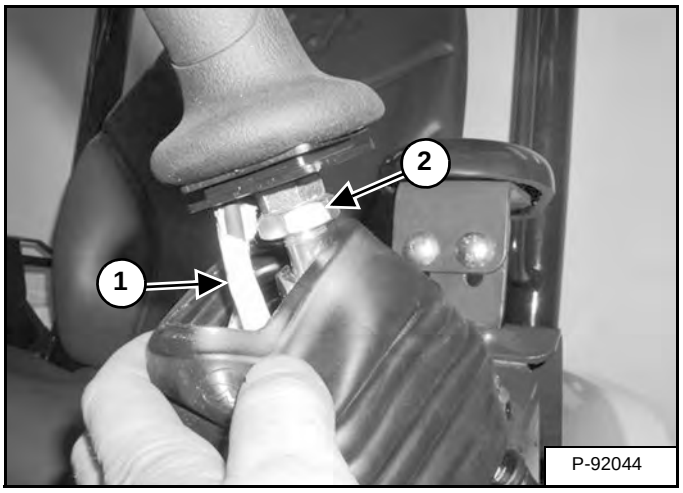
Figure 20-120-8



Raise the boot (Item 1) and pull the grommet (Item 2) **[Figure 20-120-8]** up out of the housing.

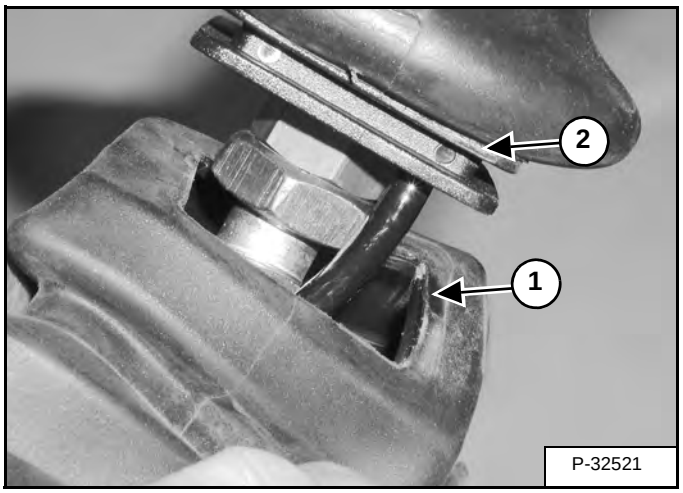
Remove the wire and grommet.

Figure 20-120-9



Pull the boot down and pull the wire harness (Item 1) out of the boot. Loosen the nut (Item 2) **[Figure 20-120-9]** and remove the handle.

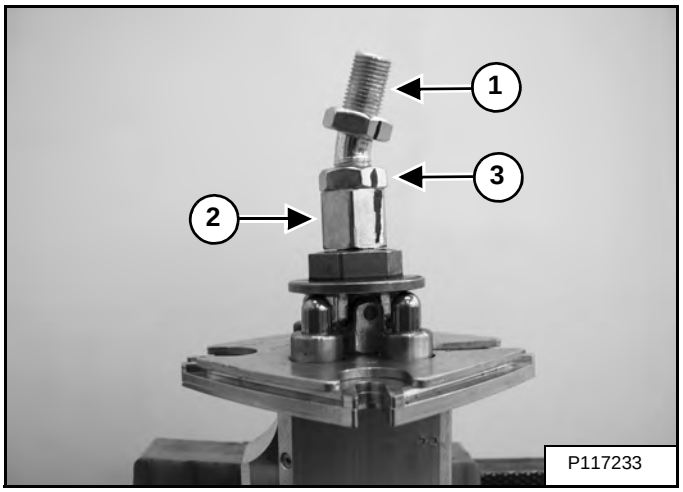
Figure 20-120-10



Installation: Align the top of the dust boot (Item 1) with the groove (Item 2) **[Figure 20-120-10]**.

Assembly (Cont'd)

Figure 20-120-41



Install the connector (Item 1) **[Figure 20-120-41]**.

Align the connector with the coupler (Item 2) and tighten the nut (Item 3) **[Figure 20-120-41]**.

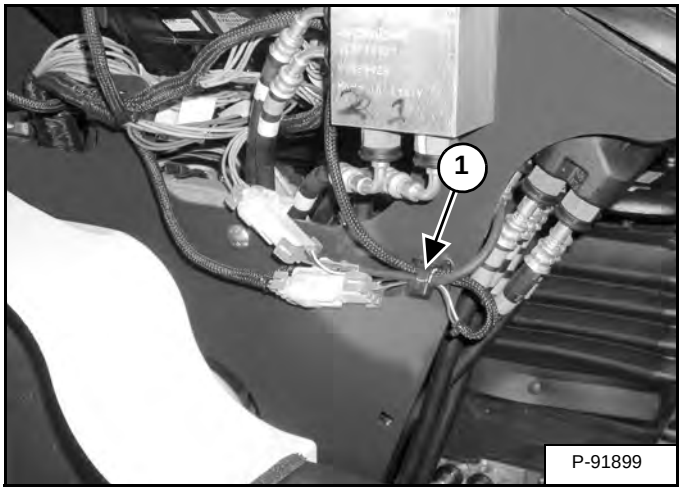
Install the handle. (See Handle Removal And Installation on Page 20-120-2.)

BLADE CONTROL LEVER

Handle Removal And Installation

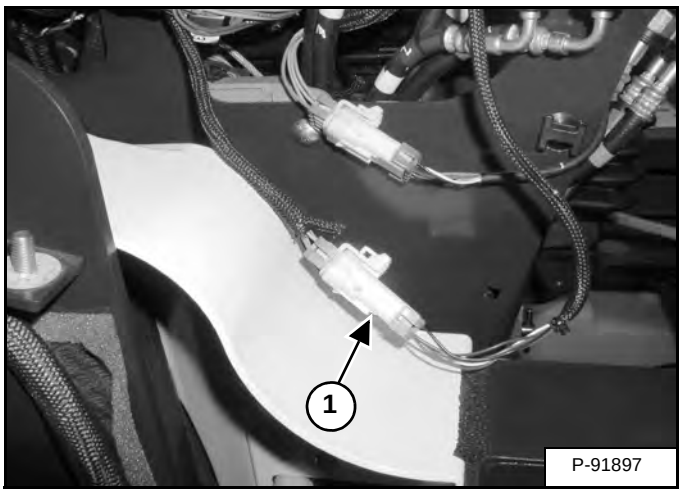
Remove the right console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

Figure 20-170-1



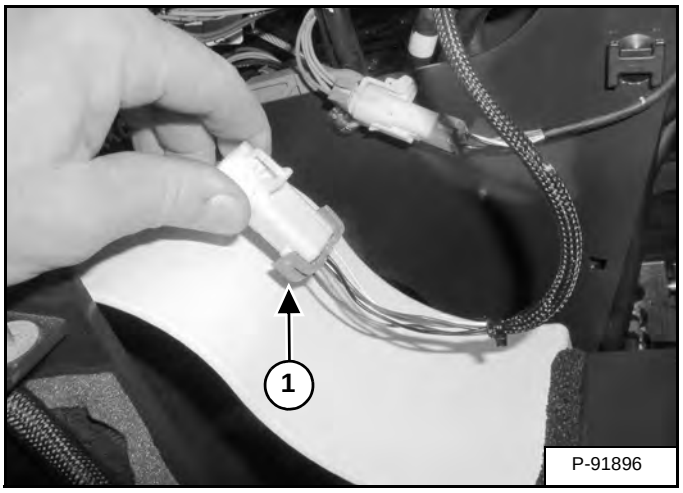
Cut and remove the cable tie (Item 1) **[Figure 20-170-1]**.

Figure 20-170-2



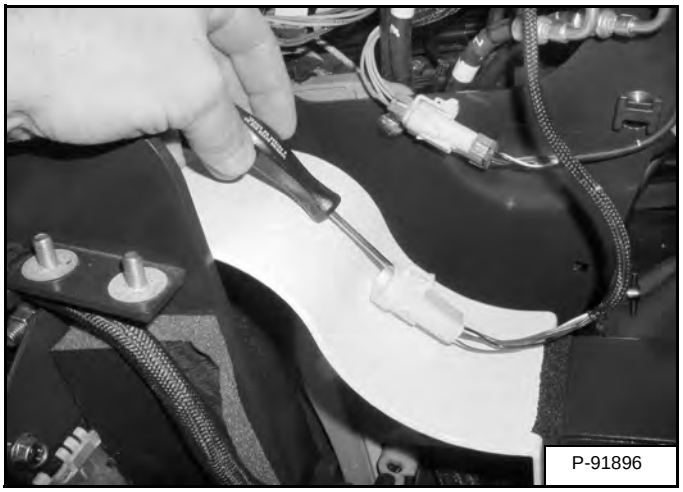
Disconnect the wire harness (Item 1) **[Figure 20-170-2]**.

Figure 20-170-3



Remove the connector lock (Item 1) **[Figure 20-170-3]** from the connector.

Figure 20-170-4



Depress the wire terminal tabs and remove the wires from the back of the electrical connector **[Figure 20-170-4]**.

CASE DRAIN FILTER MOUNT

Removal And Installation

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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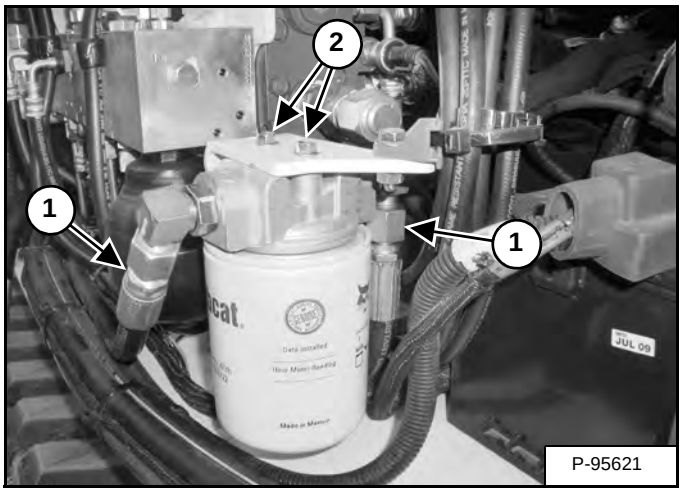
Figure 20-170-1



Remove the two hoses (Item 1) **[Figure 20-170-1]**.

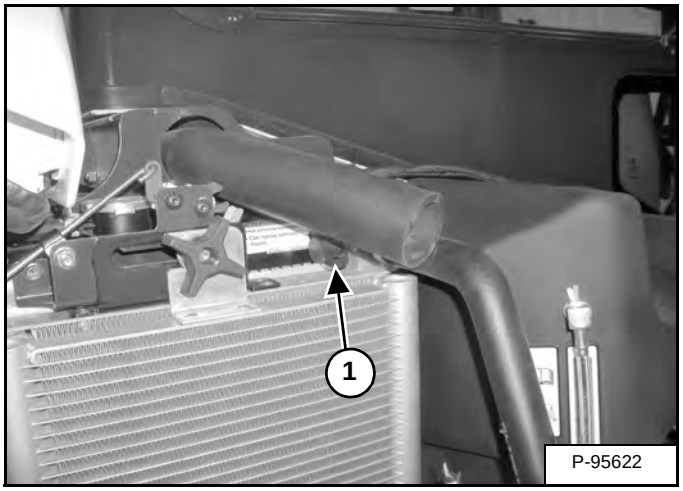
Remove the two bolts (Item 2) **[Figure 20-170-1]** and remove the filter mount assembly.

REMOVING AIR FROM THE HYDRAULIC SYSTEM

Procedure

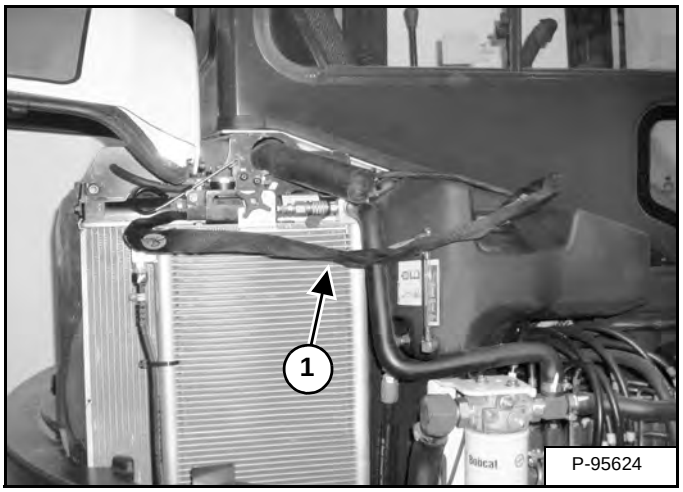
Open the right side cover. (See Opening And Closing on Page 10-60-1.)

Figure 20-200-1



Install a female quick coupler and hose on the male quick coupler (Item 1) **[Figure 20-200-1]**.

Figure 20-200-2



Remove the fill cap from the reservoir. Route the hose (Item 1) **[Figure 20-200-2]** into the reservoir.

NOTE: Be sure the hydraulic system is filled with oil before starting the excavator to prevent damage to the system.

Start the excavator.

The excavator piston pump has a minimum displacement stop, approximately 11,4 - 13,2 L/min (3 - 3.5 U.S. gpm) which is being circulated through the valve even when all functions are in NEUTRAL.

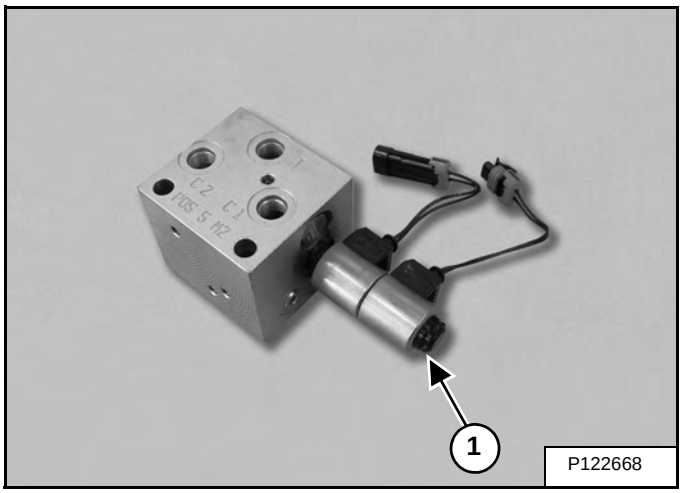
If additional air has gotten into some of the circuits (motors or cylinders), the excavator can be operated with the bleed tool in place.

NOTE: When the excavator is operated with bleed hose in place, the reservoir cap is removed. The hydraulic system must be protected from contamination and spill.

Disassembly And Assembly

Clean the outside of the hydraulic X-Change manifold before disassembly.

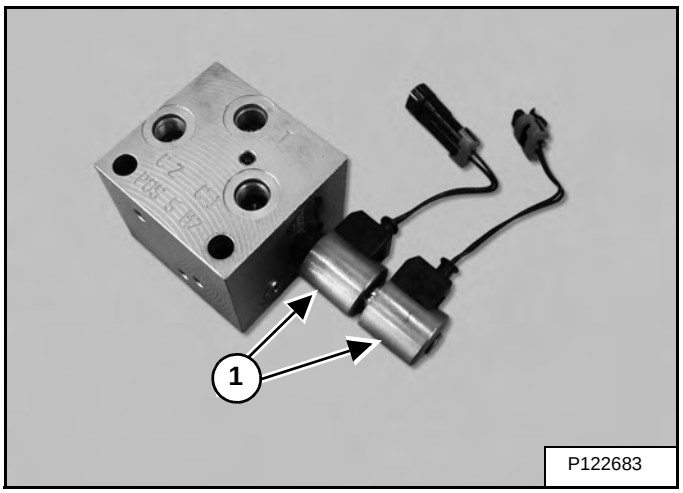
Figure 20-211-4



Remove the nut (Item 1) **[Figure 20-211-4]**.

Installation: Tighten the nut to 7 N•m (5 ft-lb) torque.

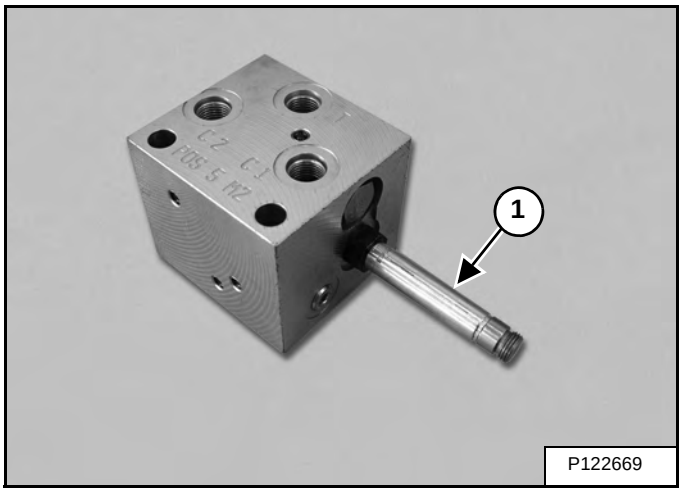
Figure 20-211-5



Remove the two coils (Item 1) **[Figure 20-211-5]**.

NOTE: Mark the coils for correct assembly.

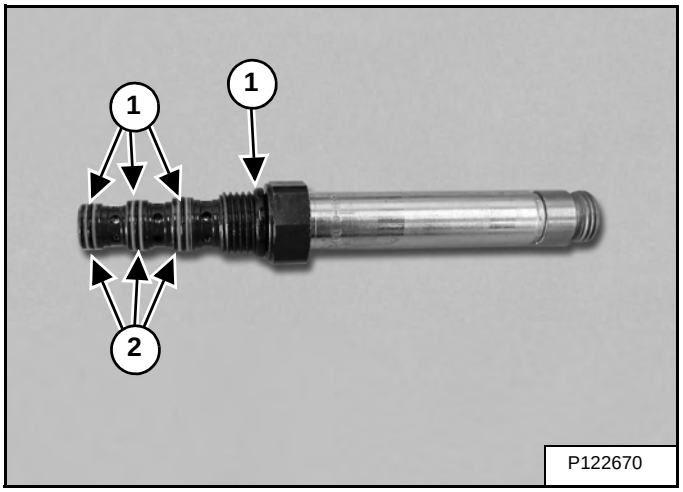
Figure 20-211-6



Remove the spool (Item 1) **[Figure 20-211-6]**.

Installation: Tighten the spool to 16 - 20 N•m (12 - 15 ft-lb) torque.

Figure 20-211-7



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-211-7]** from the spool.

SECONDARY AUXILIARY VALVE (EARLIER MODELS)

Removal And Installation

Lower the work group 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.

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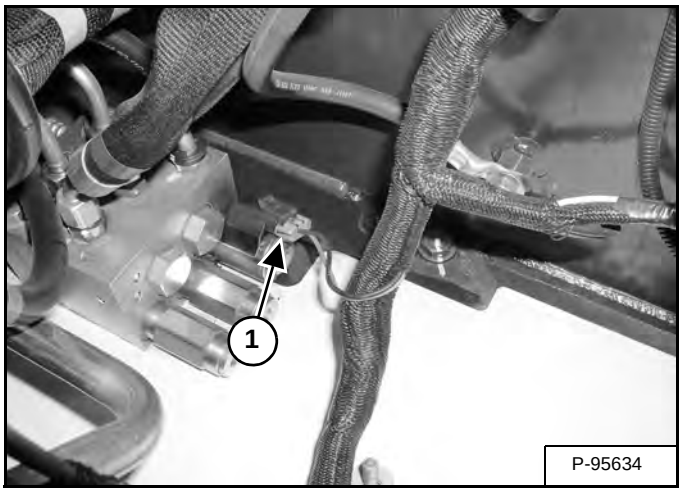
Remove the right upperstructure cover. (See Removal And Installation on Page 40-80-1.)

Remove the battery. (See Removing And Installing on Page 50-20-3.)

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

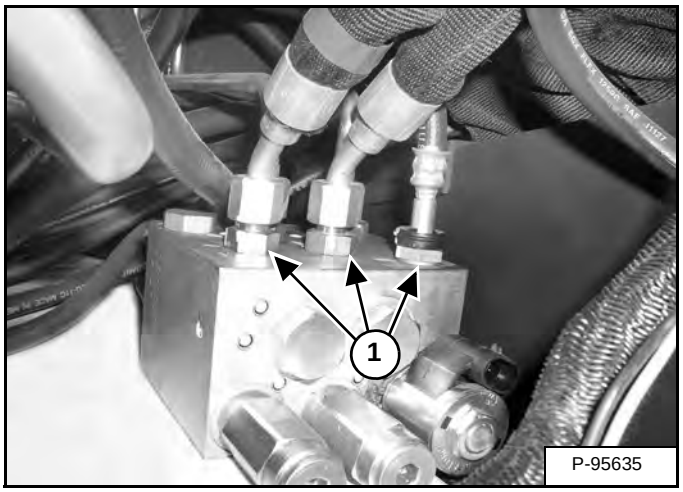
Figure 20-220-1



Disconnect the harness (Item 1) **[Figure 20-220-1]**.

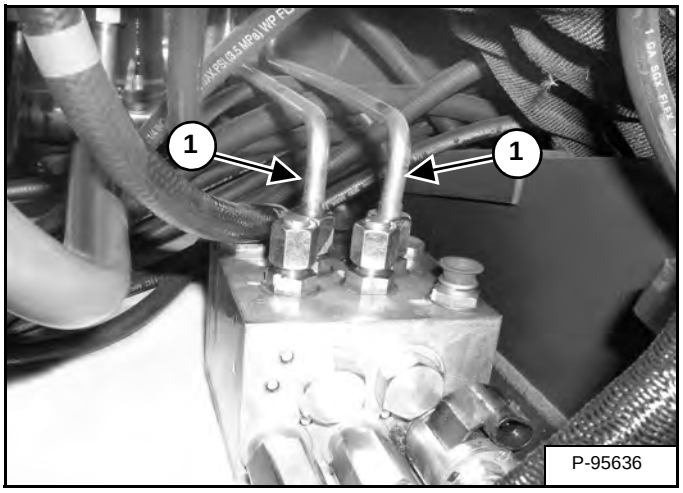
Mark all hoses for proper installation.

Figure 20-220-2



Remove the hoses (Item 1) **[Figure 20-220-2]**.

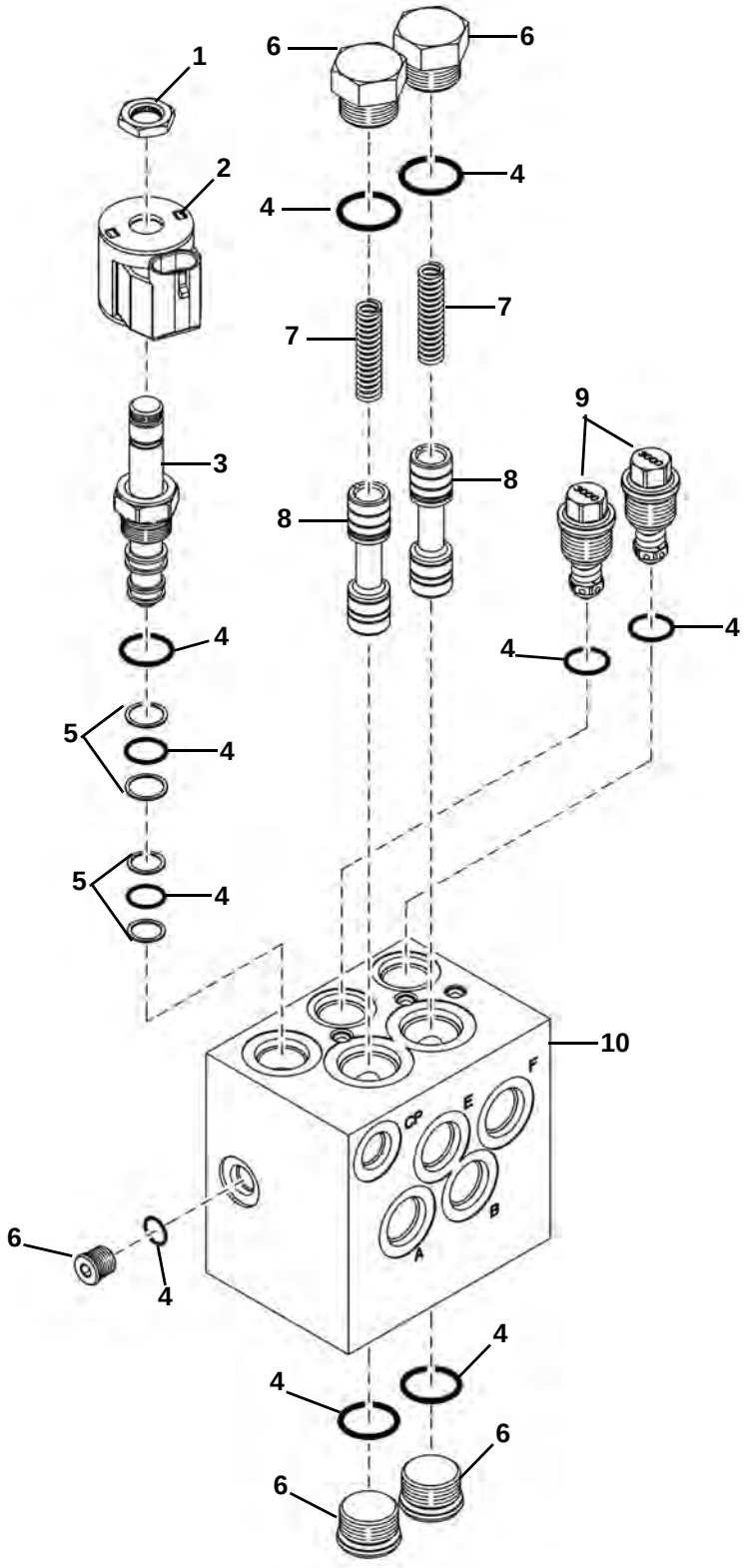
Figure 20-220-3



Remove the tubelines (Item 1) **[Figure 20-220-3]**.

Parts Identification

1. Nut
2. Coil
3. Solenoid
4. O-ring
5. Back-up Ring
6. Plug
7. Spring
8. Spool
9. Relief Valve
10. Body



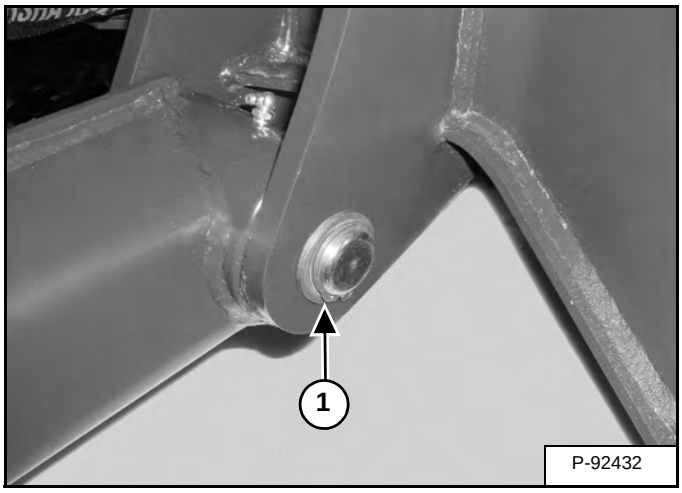
BLADE

Removal And Installation

Lower the work group to the ground.

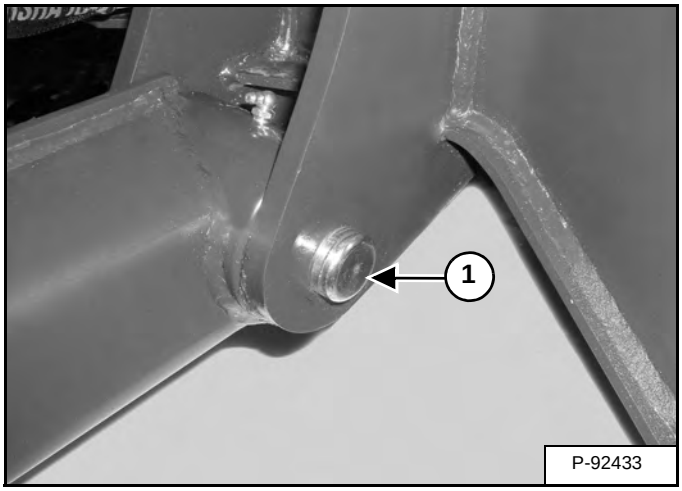
Remove the blade cylinder. (See Removal And Installation on Page 20-24-3.)

Figure 30-10-1



Remove the snap ring (Item 1) **[Figure 30-10-1]** and washer from the blade arm pivot pin (both sides).

Figure 30-10-2

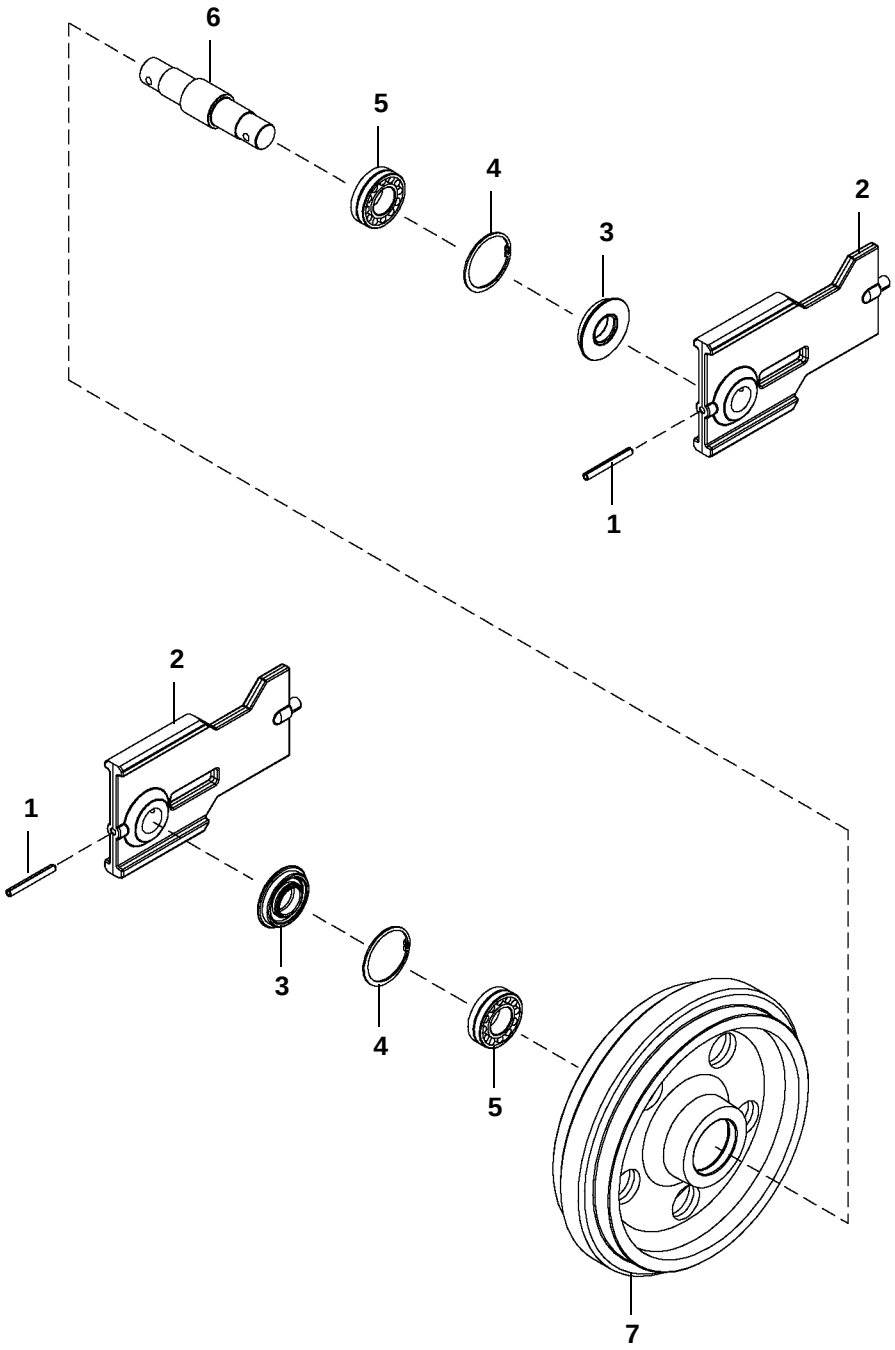


Remove the blade arm pivot pin (Item 1) **[Figure 30-10-2]** (both sides).

Remove the blade.

Idler Parts Identification

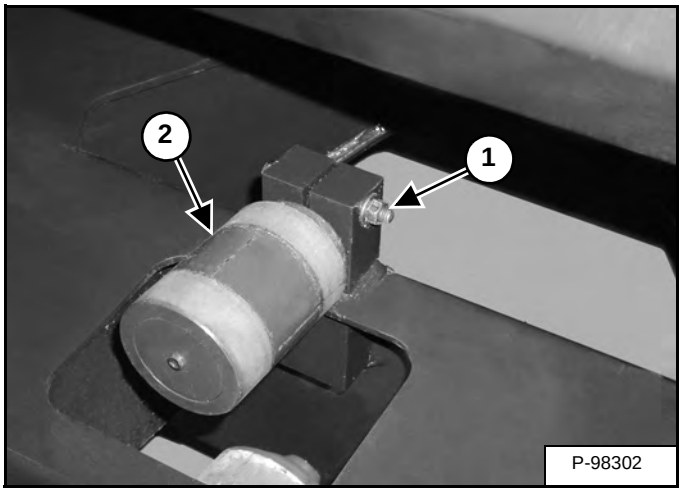
1. Roll Pin
2. Block
3. Seal
4. Snap Ring
5. Bearing
6. Shaft
7. Idler



PE1911S

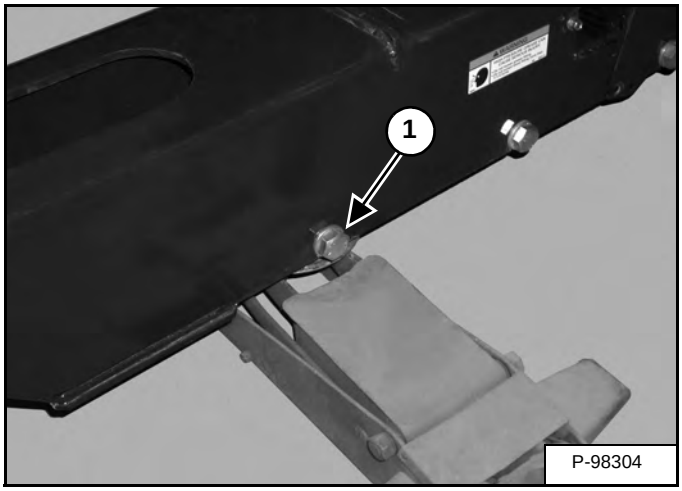
Roller Removal And Installation

Figure 30-20-40



Loosen the bolt (Item 1) and nut. Remove the top roller (Item 2) **[Figure 30-20-40]**.

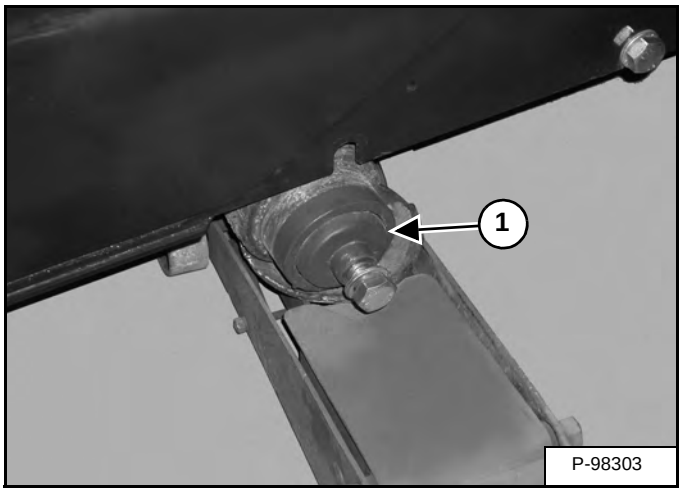
Figure 30-20-41



Loosen the bolts (Item 1) **[Figure 30-20-41]** on the track roller on both sides of the track frame.

Installation: Tighten the bolts to 544 - 604 N•m (401 - 445 ft-lb) torque.

Figure 30-20-42



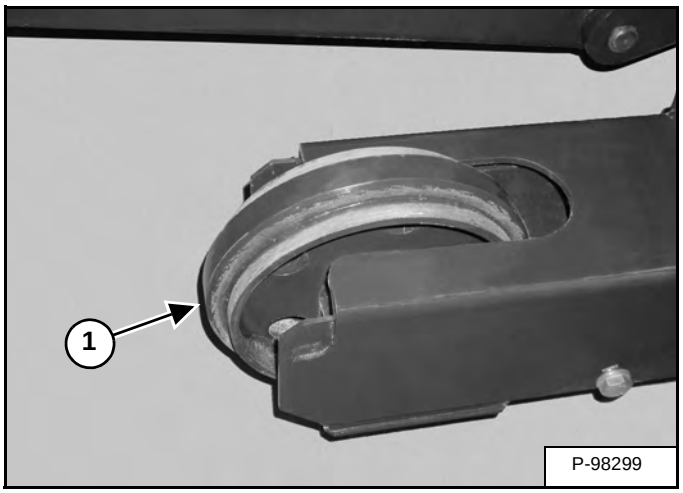
Remove the bottom roller (Item 1) **[Figure 30-20-42]**.

NOTE: The top and bottom rollers are not serviceable. Replace the roller if it is damaged.

Idler Removal And Installation

Remove the track. (See Track Removal on Page 30-21-5.)

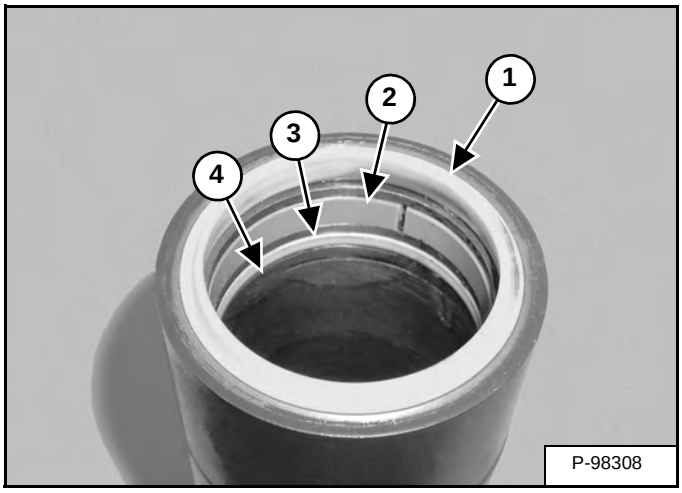
Figure 30-21-19



Slide the idler (Item 1) **[Figure 30-21-19]** out of the track frame.

Track Tensioner Disassembly And Assembly (Cont'd)

Figure 30-21-43



Remove the wiper seal (Item 1), wear ring (Item 2), back-up ring (Item 3) and O-ring (Item 4) **[Figure 30-21-43]**.

Track Damage Identification (Cont'd)

Lug Abrasion

Figure 30-30-16

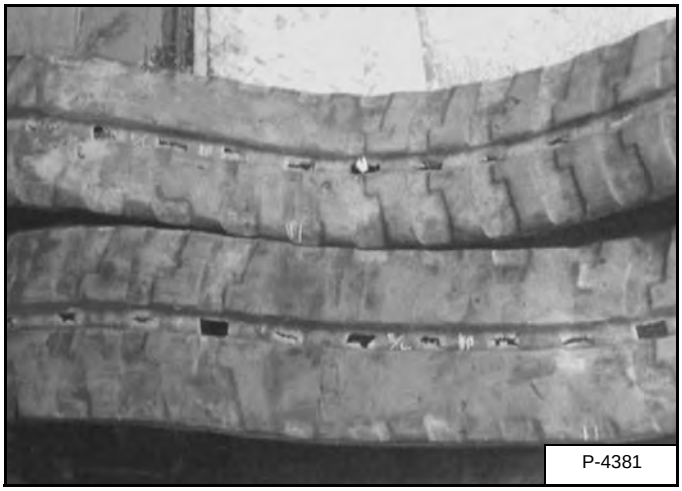
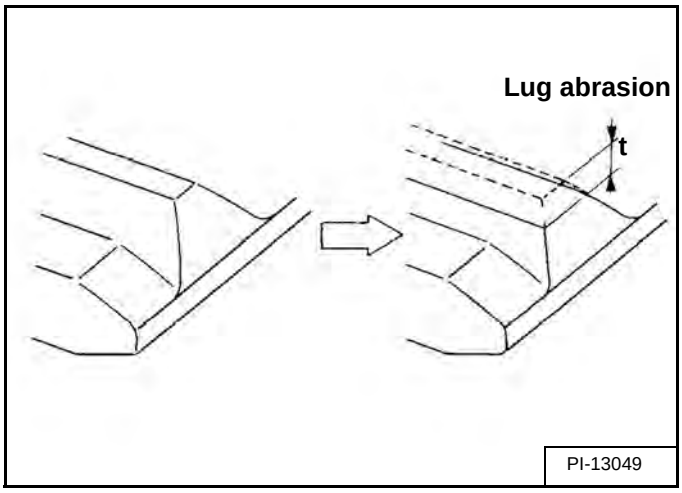


Figure 30-30-17



Damage:

As its service time proceeds, the lug side inevitably undergoes abrasion **[Figure 30-30-16]** and **[Figure 30-30-17]**.

Replacement:

No replacement is required.

Causes of the damage:

Lug abrasion is inevitable. Even if lug abrasion is proceeding, the rubber track can be used. As the traction performance deteriorates accordingly, it is highly recommended to replace the abraded tracks with new ones when the lug height becomes less than 5 mm (0.197 in).

Prevention:

In order to prevent the rubber track from abnormal or premature abrasion, following operating conditions should be avoided:

Making quick and repeated turns on concrete and asphalt roads

Driving up and down hilly paths with slippage

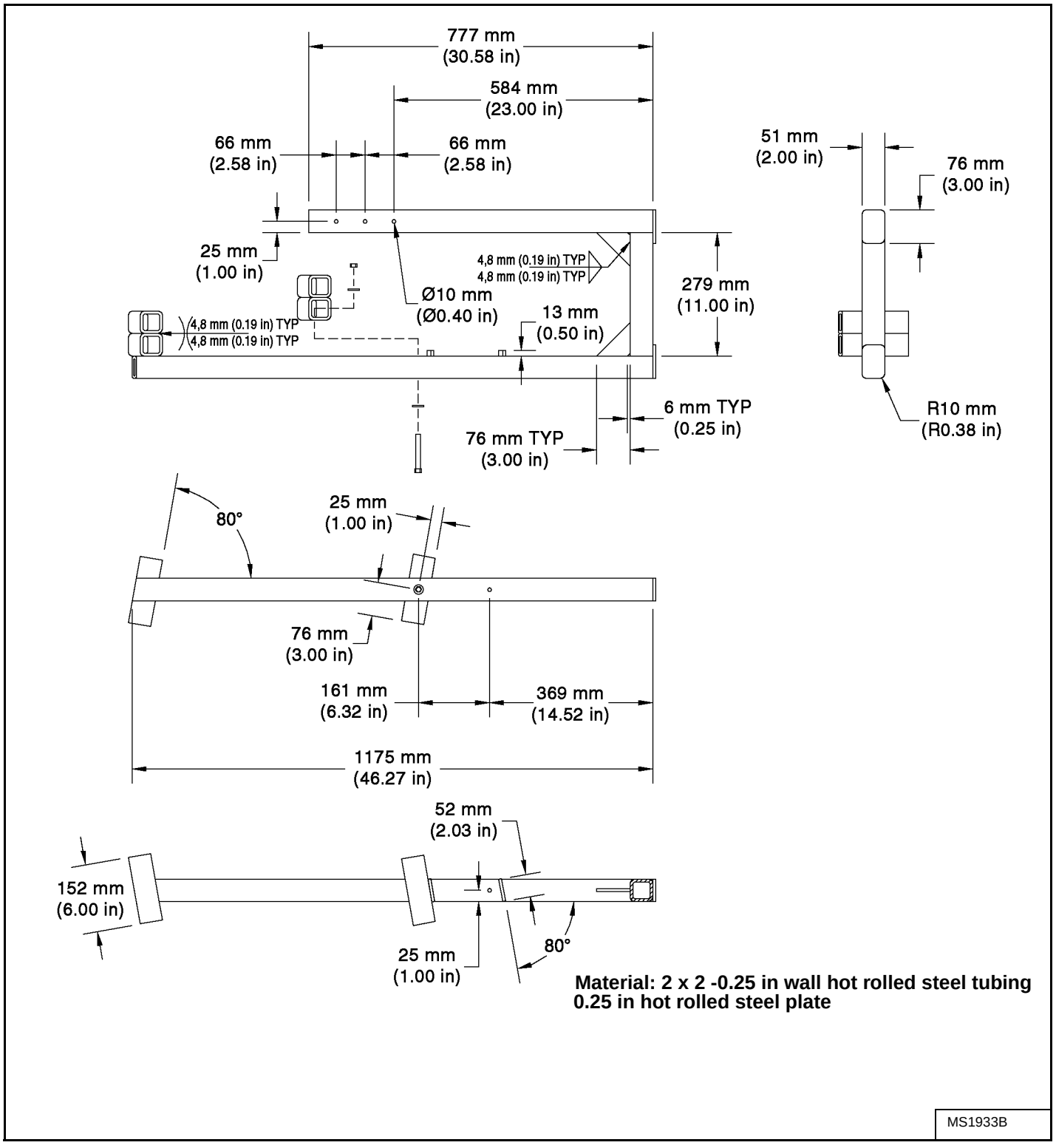
Making frequent turns on paths covered with rocks and wood

CAB

Removal And Installation

Build the service lifting bracket used to remove and install the cab. Use the dimensions shown **[Figure 40-30-1]** to build the service lifting bracket.

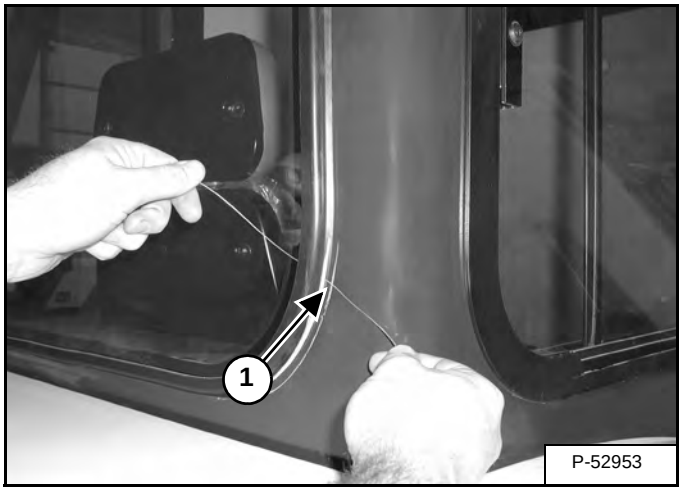
Figure 40-30-1



Glass Removal

Use the following procedure to remove the glass from the cab and right side window assembly.

Figure 40-30-31



Push a small diameter wire (Item 1) **[Figure 40-30-31]** through the adhesive. Pull the wire around the perimeter of the glass to cut the adhesive.

Remove the glass.

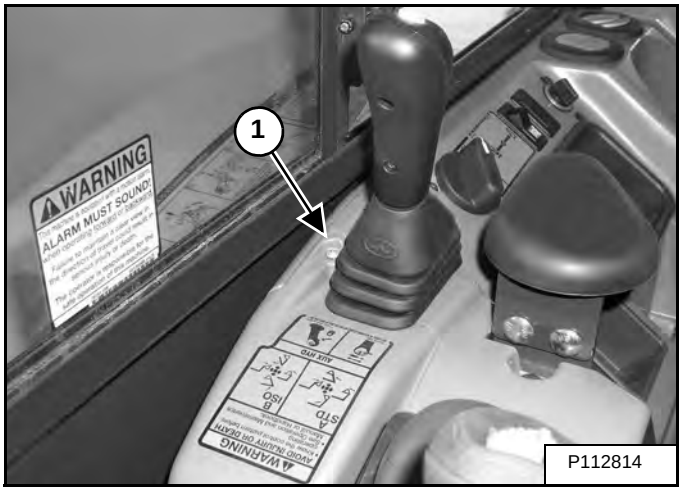
NOTE: The right side window frame is aluminum and will be destroyed when removed.

RIGHT CONSOLE

Console Cover Removal And Installation

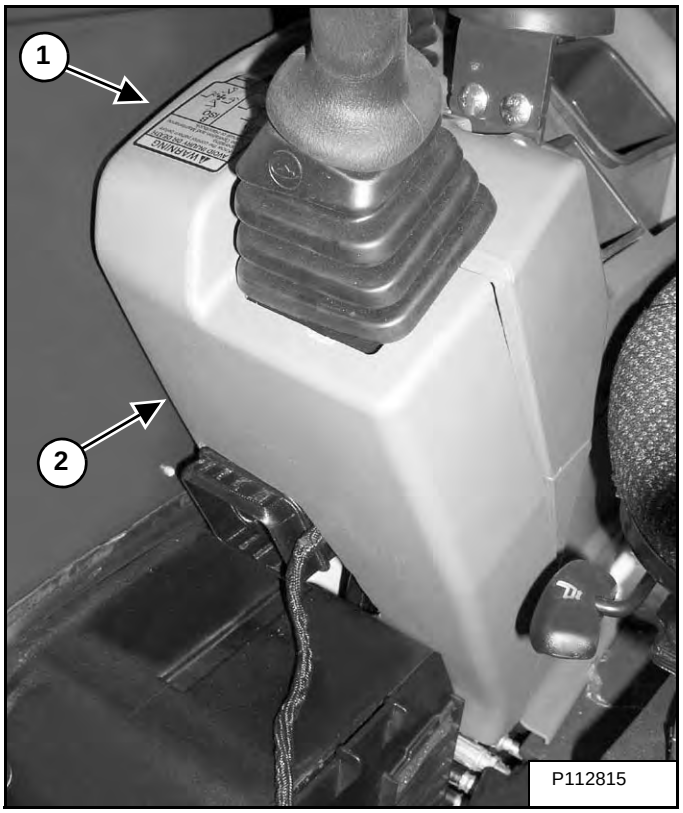
Remove the instrument panel / controller. (See Removal And Installation on Page 50-100-1.)

Figure 40-50-1



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

Figure 40-50-2



Pull the side cover (Item 1) away from the front cover (Item 2) **[Figure 40-50-2]**.

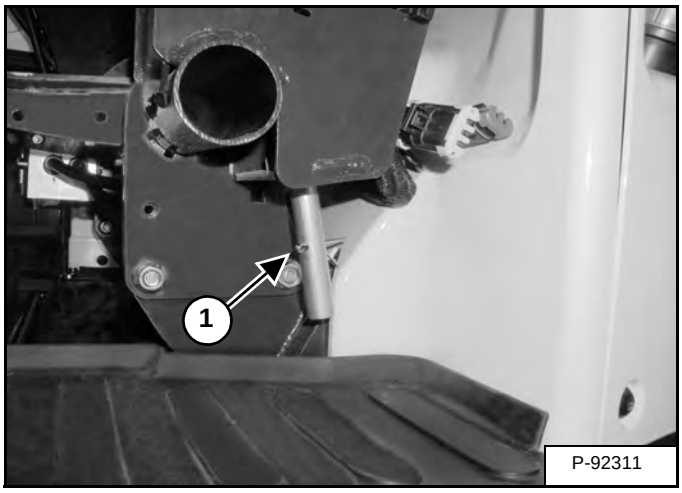
Pull the front cover (Item 2) **[Figure 40-50-2]** towards the front of the excavator and remove the cover.

Compression Spring Removal And Installation

Remove the lower console cover. (See Lower Console Cover Removal And Installation on Page 40-60-1.)

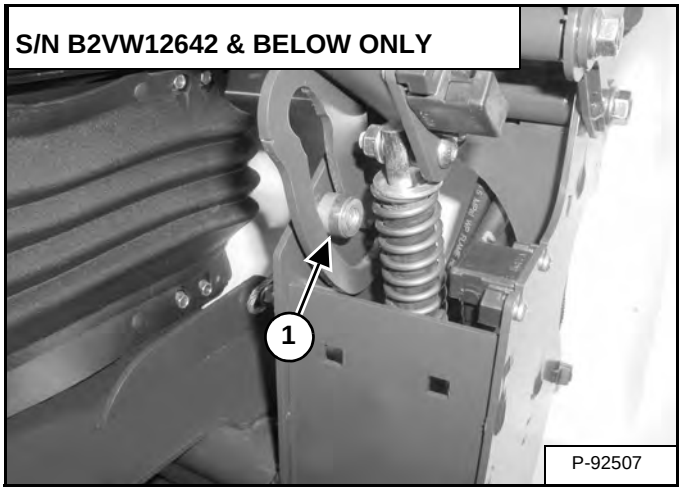
Lower the console.

Figure 40-60-11



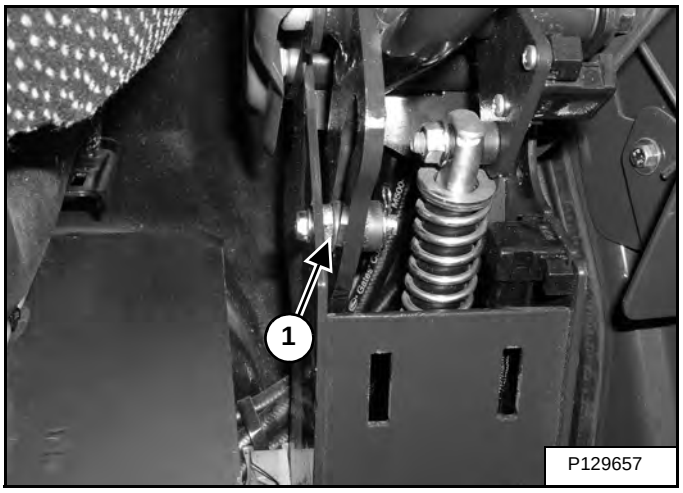
Install a pin (Item 1) **[Figure 40-60-11]** in the bottom of the compression spring rod.

Figure 40-60-12



Support the console in the raised position. Remove the bolt and roller (Item 1) **[Figure 40-60-12]**.

Figure 40-60-13

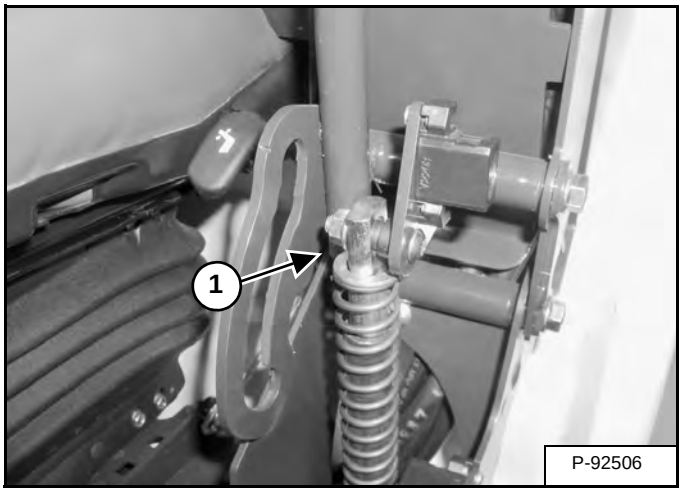


Support the console in the raised position. Remove the bolt and roller (Item 1) **[Figure 40-60-13]**.

Lower the console and remove the pin from the rod.

Raise and support the console.

Figure 40-60-14



Remove the nut (Item 1) **[Figure 40-60-14]**.

Removal And Installation (Cont'd)

Figure 40-90-8

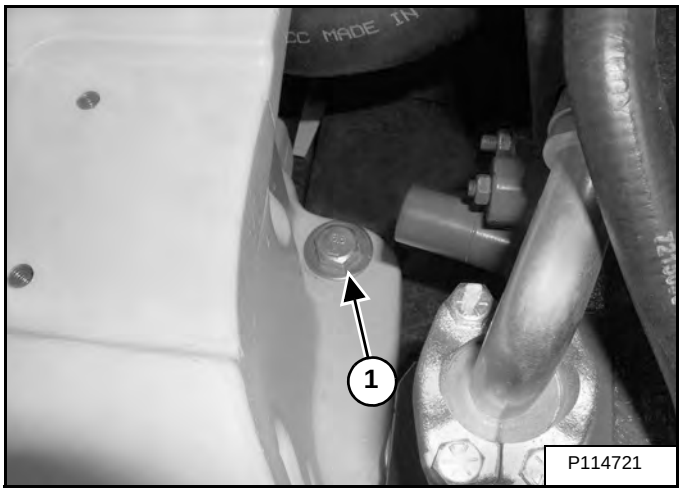


Figure 40-90-9

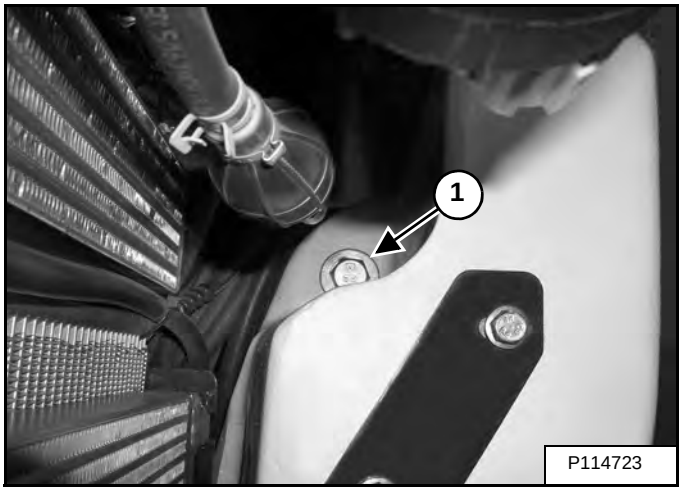
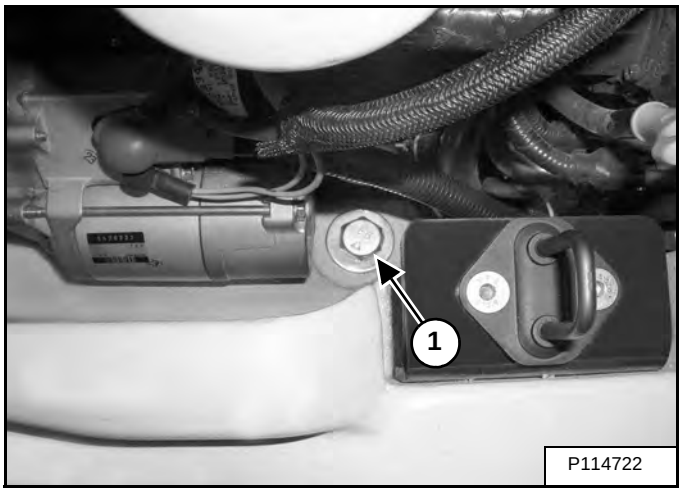


Figure 40-90-10



Remove the bolts (Item 1) **[Figure 40-90-8]**, **[Figure 40-90-9]** and **[Figure 40-90-10]**.

Installation: Tighten the bolts to 370 - 410 N•m (275 - 300 ft-lb) torque.

Remove the counterweight.

SWING FRAME

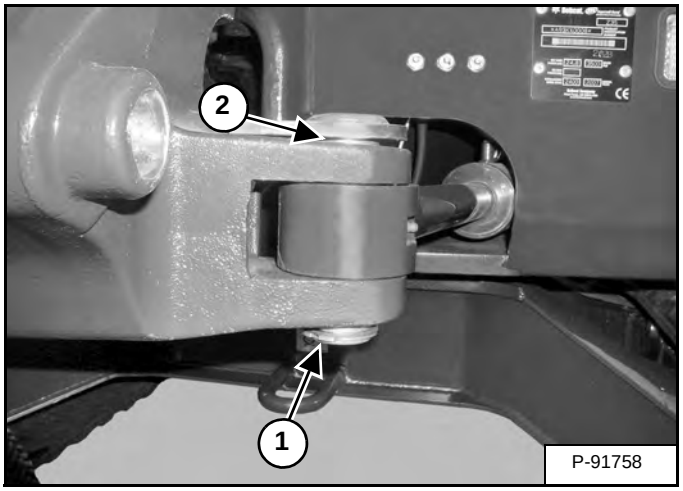
Removal And Installation

Rotate the upperstructure so the blade is to the rear of the excavator.

Remove the arm. (See Removal And Installation on Page 40-160-1.)

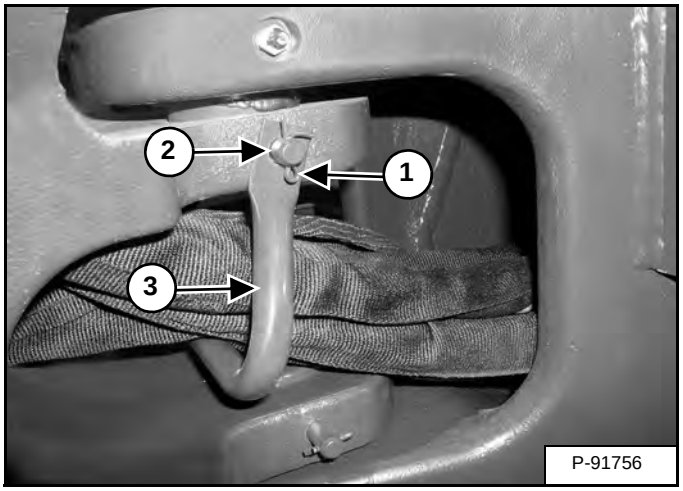
Remove the boom. (See Removal And Installation on Page 40-150-1.)

Figure 40-140-1



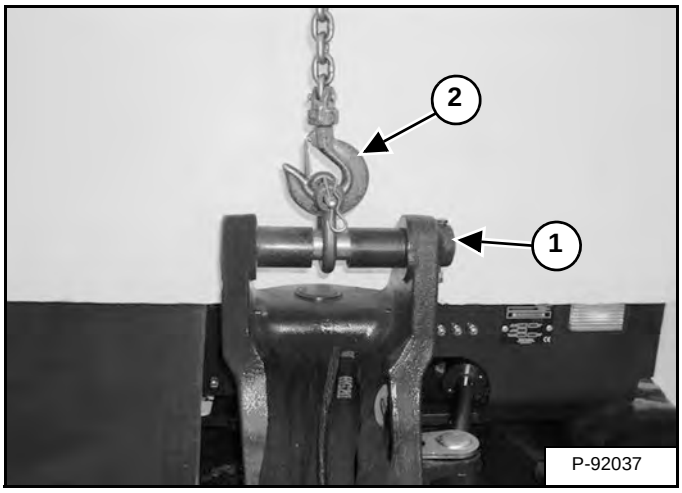
Remove the snap ring (Item 1), washer, and pin (Item 2) **[Figure 40-140-1]** from the rod end of the swing cylinder.

Figure 40-140-2



Remove the cotter pin (Item 1), retaining pin (Item 2) and hose bracket (Item 3) **[Figure 40-140-2]**.

Figure 40-140-3



Install the boom pin (Item 1) using spacers to position a lifting clevis (Item 2) **[Figure 40-140-3]** on the center of the boom pin.

NOTE: The spacers will prevent the clevis from sliding on the boom pin causing the swing frame to tip from side to side.

IMPORTANT

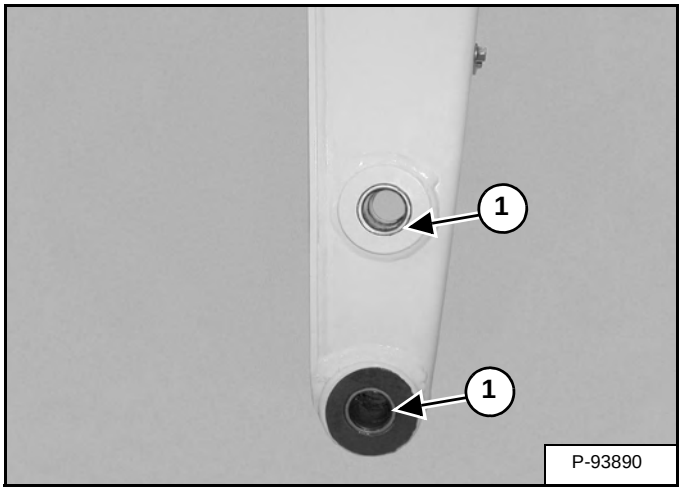
Do Not use a porta-power to press out the swing frame pivot pins without the lower pin being supported. Excess pressure can cause the swing frame casting to crack.

I-2092-1204

Support the bottom pin with a jack.

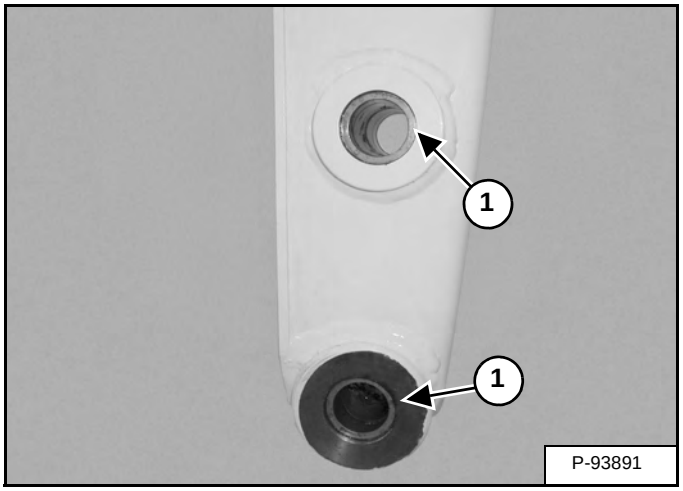
Arm To Bucket And Bucket Link Bushing Removal And Installation

Figure 40-160-5



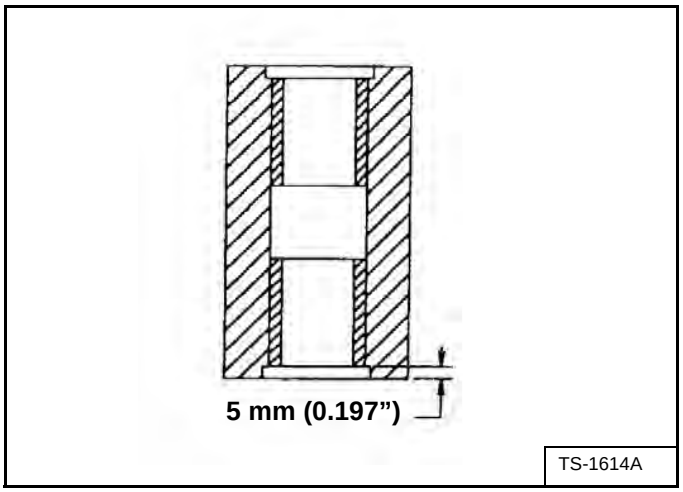
Remove the seals (Item 1) **[Figure 40-160-5]** from both sides of the arm.

Figure 40-160-6



Remove the bushings (Item 1) **[Figure 40-160-6]** from both sides of the arm.

Figure 40-160-7

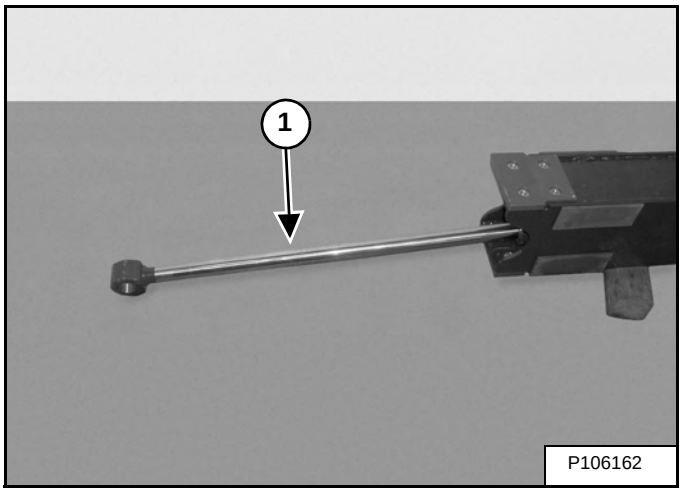


Install the bushings until they are seated 5 mm (0.197 in) in the pin boss **[Figure 40-160-7]** (both sides).

Install new seals on both sides of the arm.

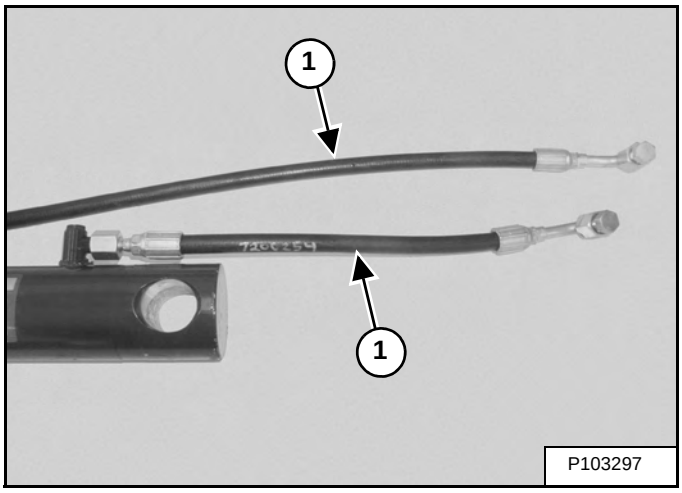
Disassembly And Assembly (Cont'd)

Figure 40-161-27



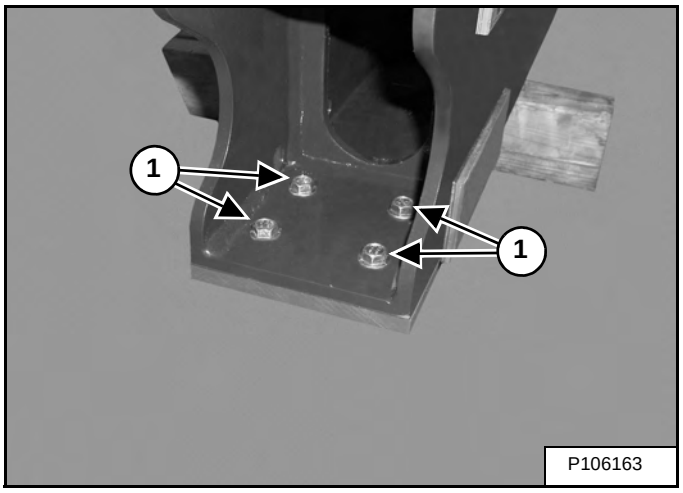
Remove the cylinder (Item 1) **[Figure 40-161-27]**.

Figure 40-161-28



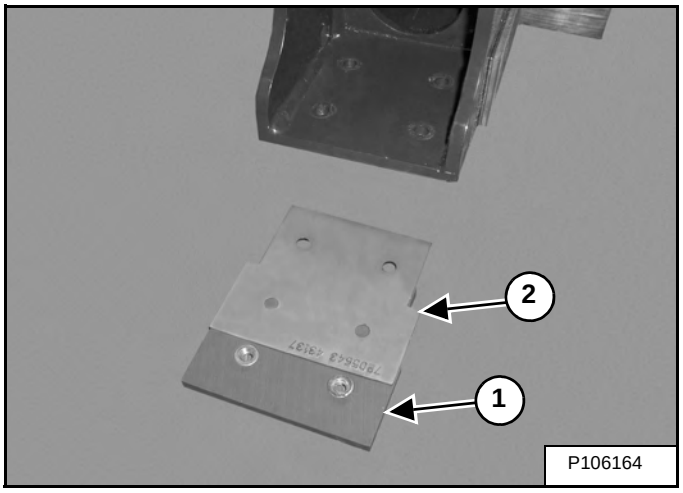
NOTE: Install the hoses (Item 1) [Figure 40-161-28] as shown to align the hoses with the bulkhead fittings on the inner arm assembly. Hose orientation can not be changed after the cylinder is installed. Install the cylinder with the hoses facing up, towards the bucket cylinder.

Figure 40-161-29



Remove the bolts (Item 1) **[Figure 40-161-29]**.

Figure 40-161-30



Remove the wear pad (Item 1) and shims (Item 2) **[Figure 40-161-30]**.

X-CHANGE

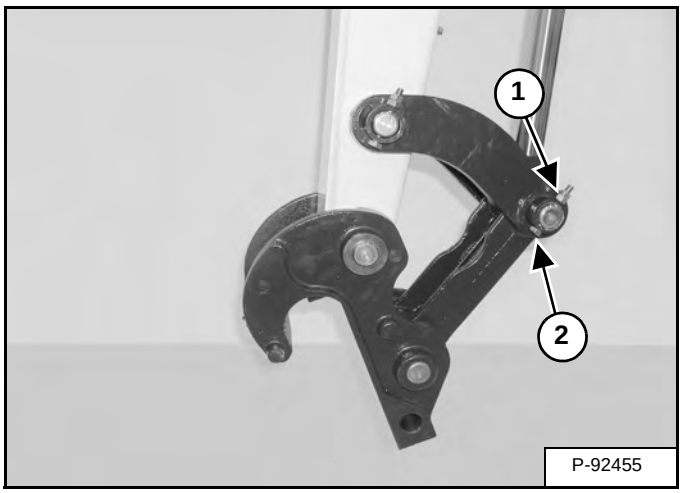
Removal And Installation

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

Figure 40-200-1

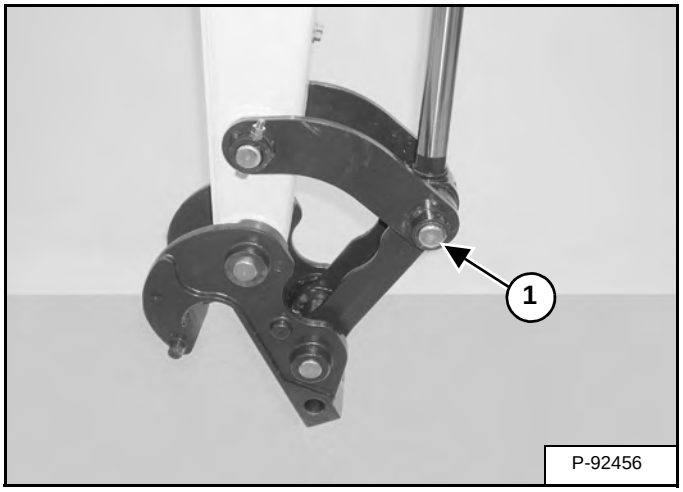
Support the boom with a hoist **[Figure 40-200-1]**.

Figure 40-200-2



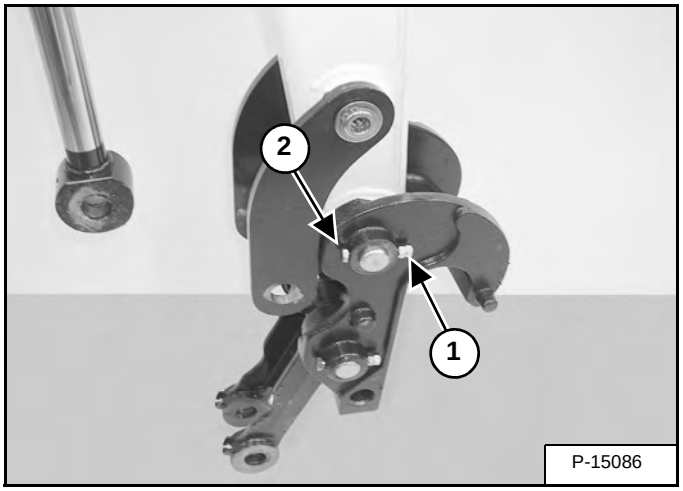
Remove the nuts (Item 1) and bolt (Item 2) **[Figure 40-200-2]**.

Figure 40-200-3



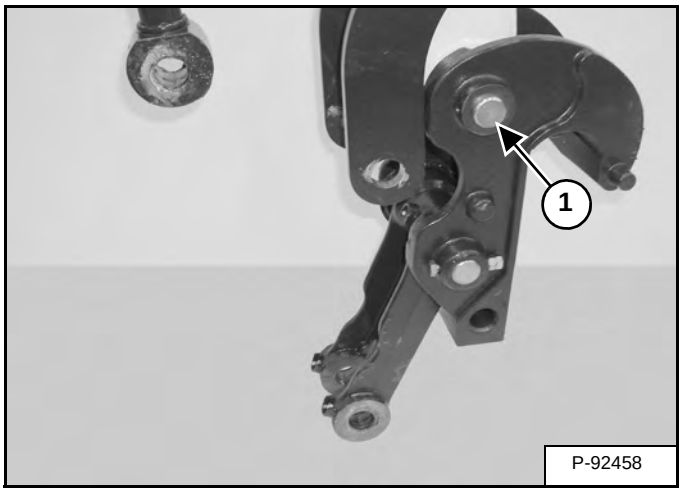
Remove the pin (Item 1) **[Figure 40-200-3]**.

Figure 40-200-4



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

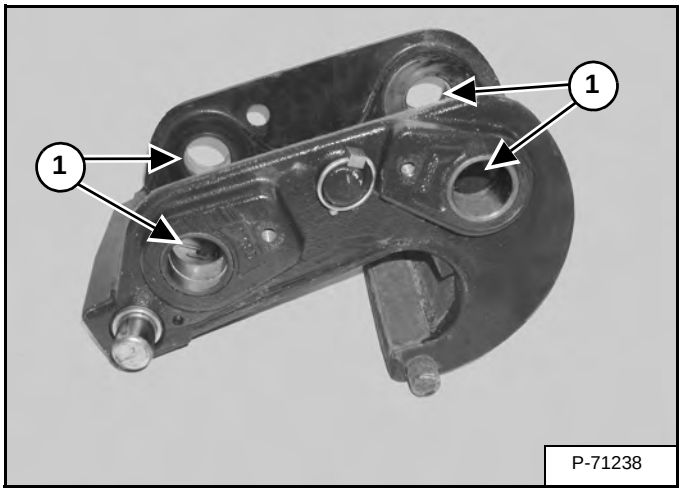
Figure 40-200-5



Remove the pin (Item 1) **[Figure 40-200-5]** and remove the X-Change from the arm.

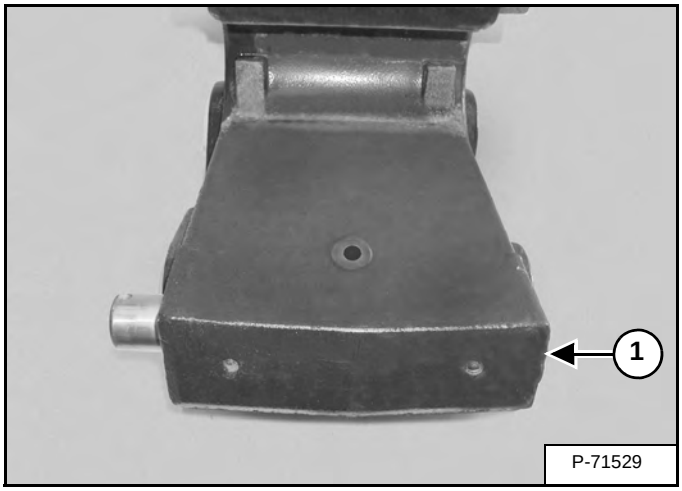
Disassembly (Cont'd)

Figure 40-201-21



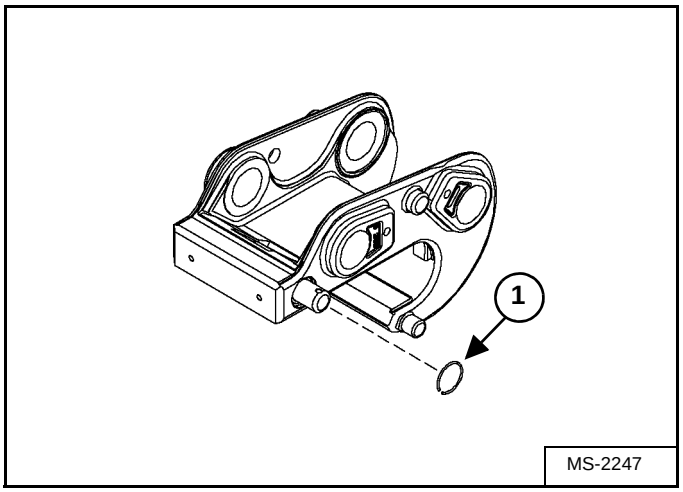
Remove the four bushings (Item 1) **[Figure 40-201-21]**.

Figure 40-201-22



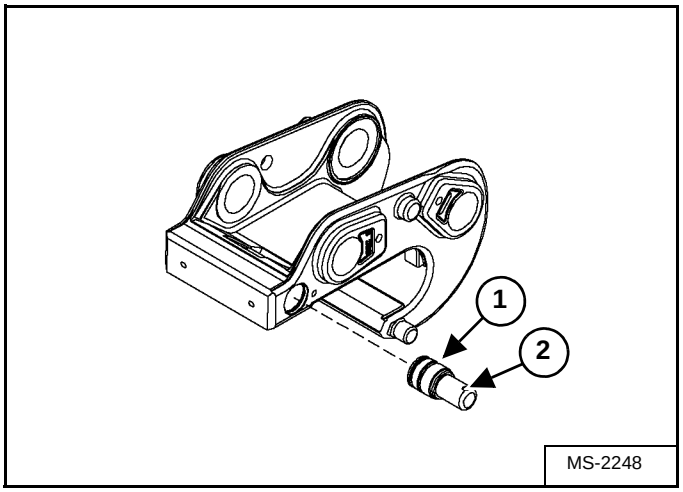
Apply inward pressure on the piston (Item 1) **[Figure 40-201-22]**.

Figure 40-201-23



Remove the retaining ring (Item 1) **[Figure 40-201-23]**.

Figure 40-201-24



Remove the piston head (Item 1) and the piston (Item 2) **[Figure 40-201-24]**.

Repeat **[Figure 40-201-22]** through **[Figure 40-201-24]** to remove the piston head and piston from the opposite side of the X-Change.

Expansion Plug Installation

Figure 40-201-58

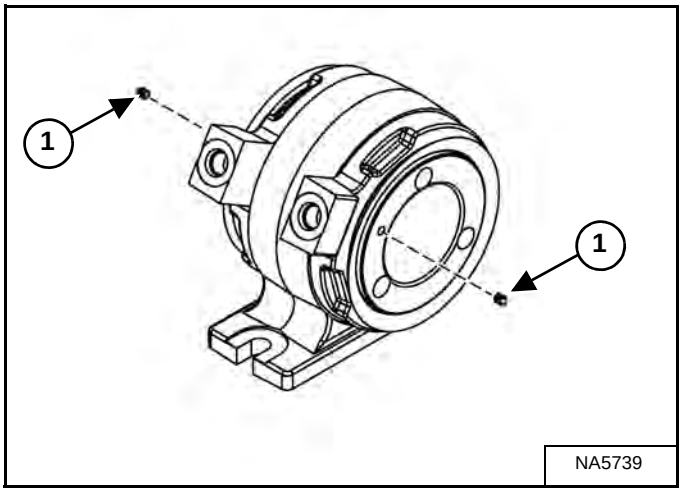
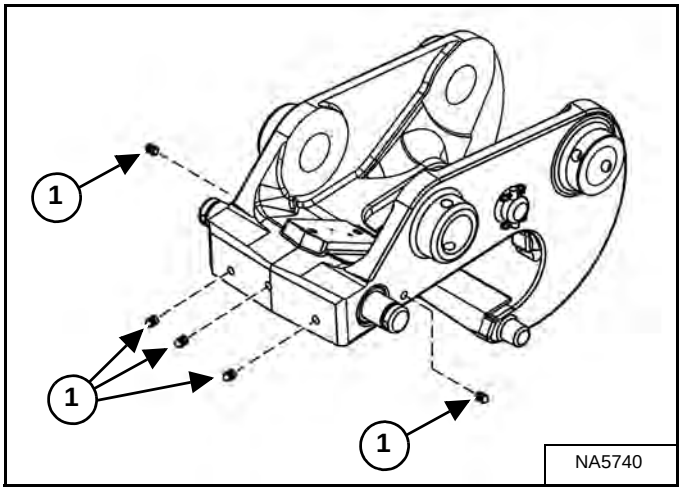
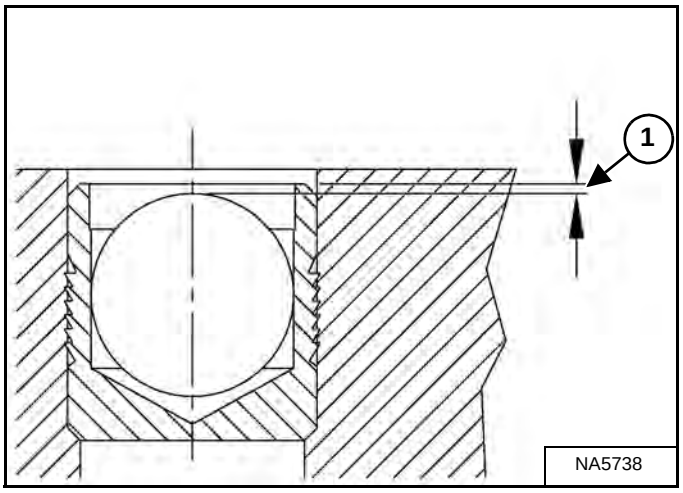


Figure 40-201-59



Use the correct size pin punch and air hammer to seat the expander plugs (Item 1) **[Figure 40-201-58]** and **[Figure 40-201-59]**.

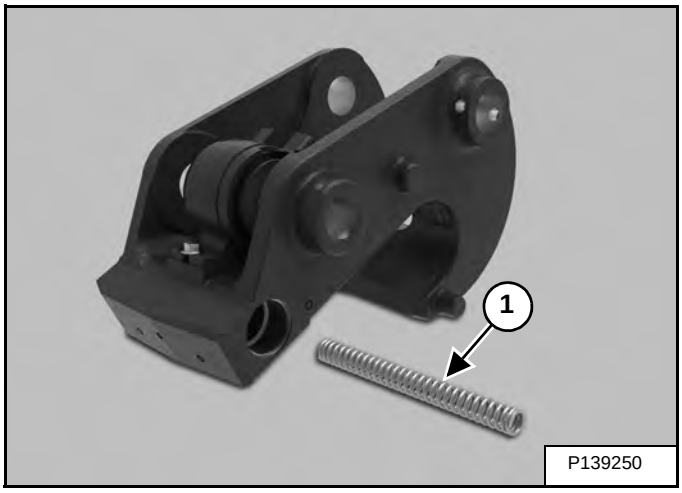
Figure 40-201-60



Seat the 4 mm (0.157 in) plugs on the swivel to a depth of 0,2 mm (0.008 in) ± 0,2 mm (0.008 in). Seat the 9 mm (0.354 in) plugs on the X-Change to a depth of 0,4 mm (0.016 in) ± 2 mm (0.008 in) (Item 1) **[Figure 40-201-60]**.

Disassembly (Cont'd)

Figure 40-202-29



Remove the compression spring (Item 1) **[Figure 40-202-29]**.

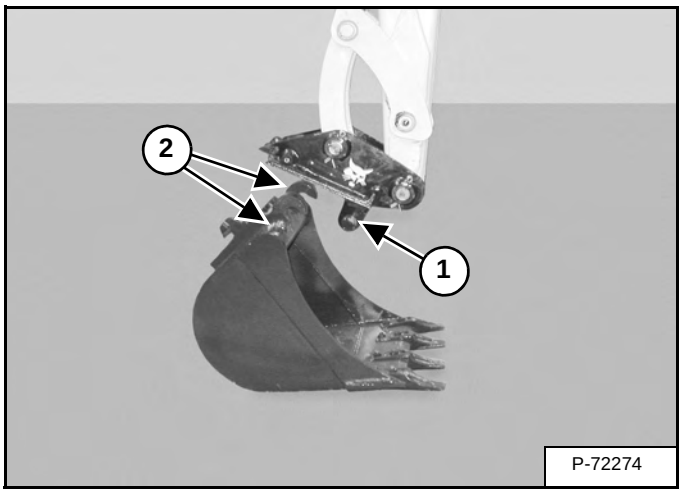
QUICK COUPLER (KLAC™ SYSTEM)

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 40-210-1

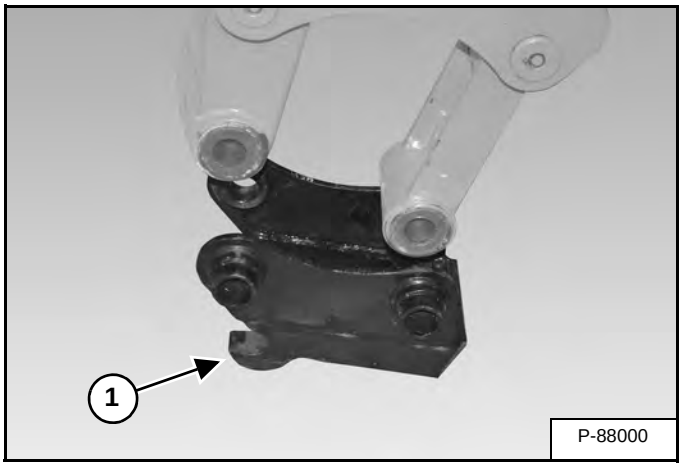


Inspect the quick coupler for wear or damage. Inspect the quick locking shaft (Item 1) and the hooks (Item 2) **[Figure 40-210-1]** (on the attachment) for wear or damage.

Repair or replace damaged parts.

Installation (MS03 And MS08)

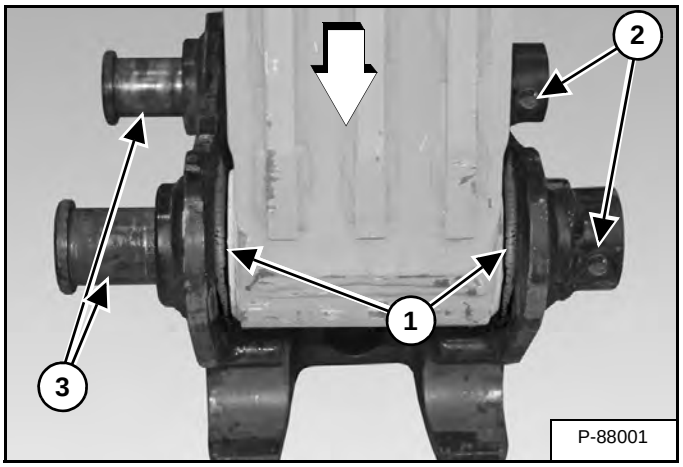
Figure 40-211-5



Place the coupler on the ground with the hooks (Item 1) **[Figure 40-211-5]** facing towards the excavator.

Align the arm and bucket link with the coupler **[Figure 40-211-5]**.

Figure 40-211-6



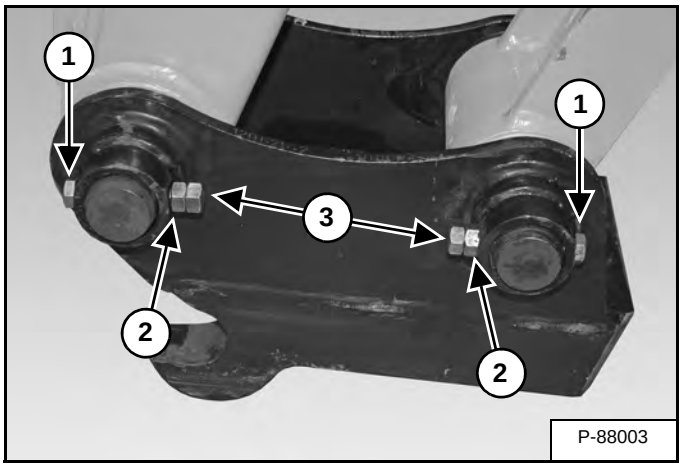
Install the O-rings (Item 1) **[Figure 40-211-6]** between the coupler pivot point and the arm and bucket link when lowering into position.

NOTE: The O-rings will prevent dirt and debris from entering the pivot points of the coupler.

Align the holes of the connecting pins with the holes (Item 2) **[Figure 40-211-6]** in the coupler.

Install the two pins (Item 3) **[Figure 40-211-6]** through the coupler, arm and bucket link.

Figure 40-211-7



Install the two bolts (Item 1) **[Figure 40-211-7]**.

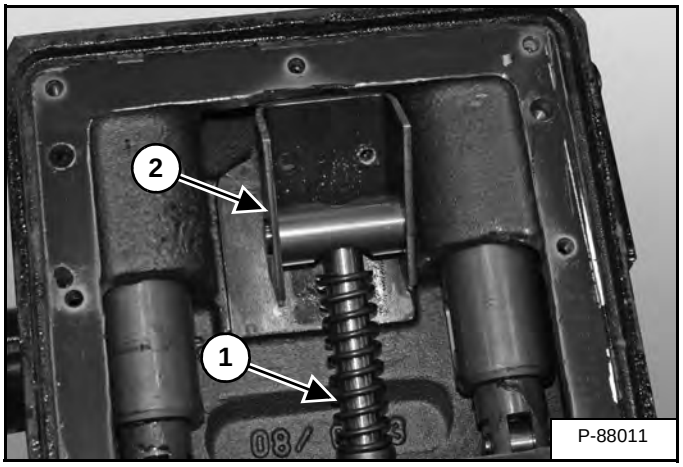
Install nuts (Item 2) **[Figure 40-211-7]** just until contact is made with the coupler.

NOTE: Do Not tighten nuts (Item 2) [Figure 40-211-7] against the coupler. The retaining bolt must rotate freely.

Install and tighten nuts (Item 3) securely against the two nuts (Item 2) **[Figure 40-211-7]**. The retaining bolts must rotate freely.

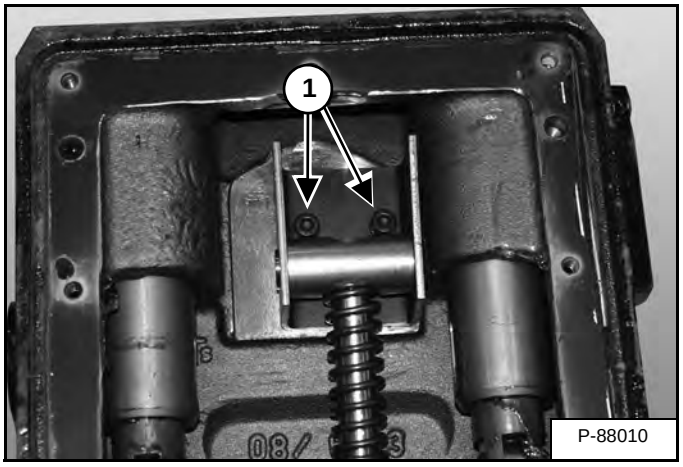
Assembly (MS08) (Cont'd)

Figure 40-211-34



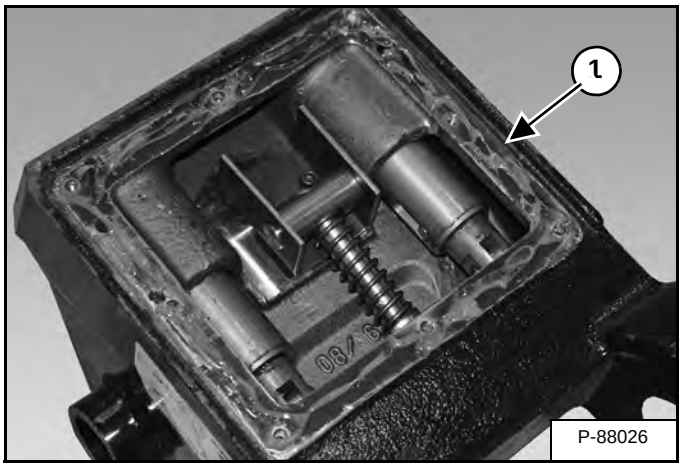
Install pressure spring (Item 1) on the spring guide. Tilt the bearing block and pivoting journal (Item 2) **[Figure 40-211-34]** down and install on the spring guide.

Figure 40-211-35



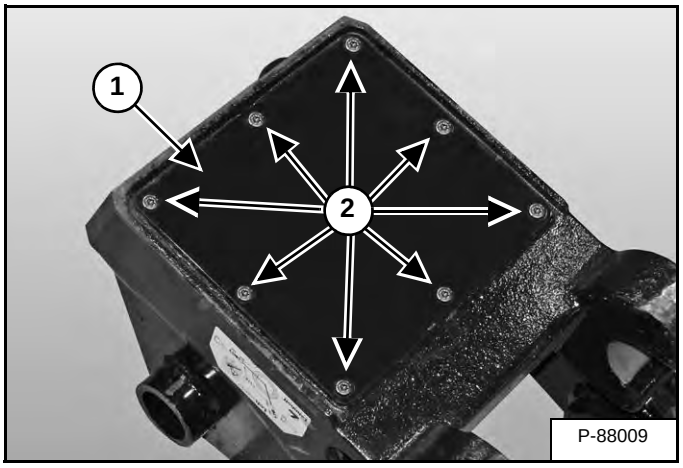
Install the two bolts (Item 1) **[Figure 40-211-35]**.

Figure 40-211-36



Apply a bead of sealant around the cover mounting surface (Item 1) **[Figure 40-211-36]**.

Figure 40-211-37



Install the cover (Item 1) **[Figure 40-211-37]**.

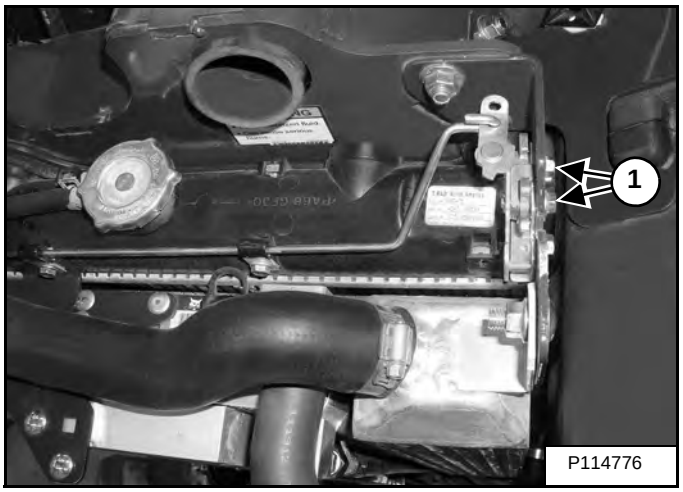
Apply Loctite® 242 on the eight bolts.

Install the eight bolts (Item 2) **[Figure 40-211-37]**.

RIGHT SIDE COVER (EARLIER MODELS) (CONT'D)

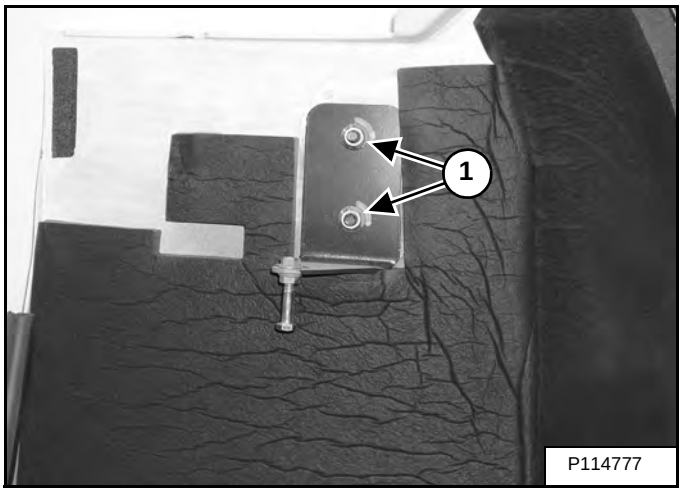
Latch Adjustment

Figure 40-220-6



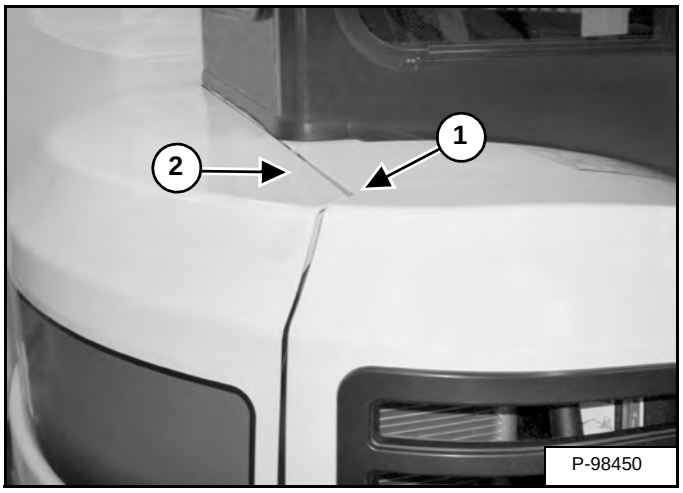
Loosen the two bolts (Item 1) **[Figure 40-220-6]** and adjust the latch.

Figure 40-220-7



Loosen the two nuts (Item 1) **[Figure 40-220-7]** and adjust the striker bracket.

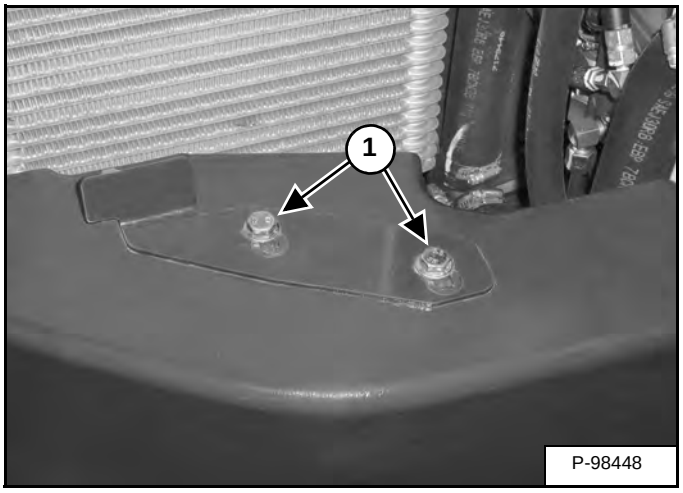
Figure 40-220-8



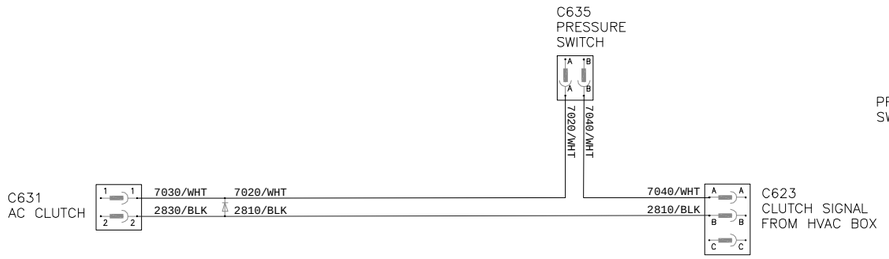
Adjust the latch and striker until the top edge of the right side cover (Item 1) is even with the top edge of the tailgate (Item 2) **[Figure 40-220-8]**.

Tighten the bolts and nuts.

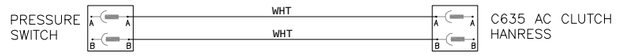
Figure 40-220-9



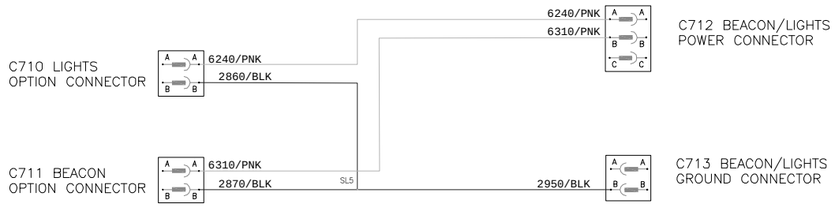
Loosen the two bolts (Item 1) **[Figure 40-220-9]** and adjust the alignment bracket.



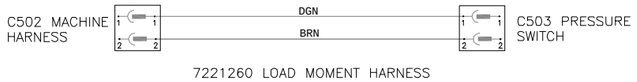
7168895 HARNESS AC CLUTCH



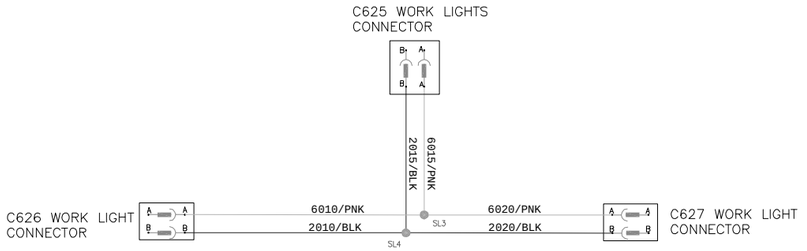
7286434 AC DRIER HARNESS



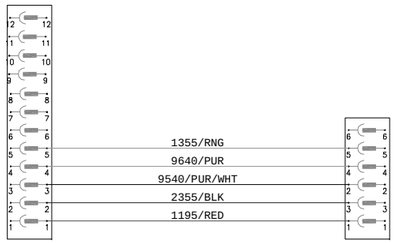
7172977 HARNESS CANOPY L/B



7221260 LOAD MOMENT HARNESS

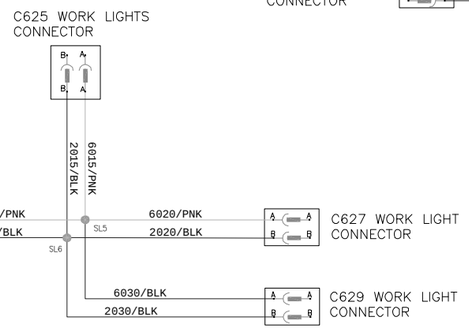


7104649 HARNESS LIGHT



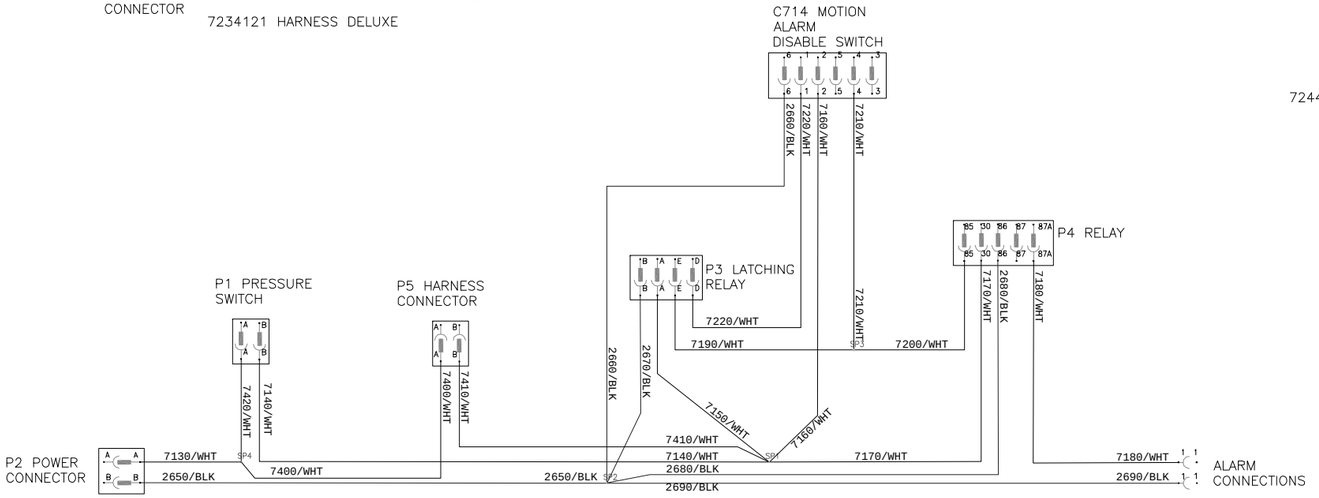
7234121 HARNESS DELUXE

7320997 LOAD MOMENT ALARM HARNESS

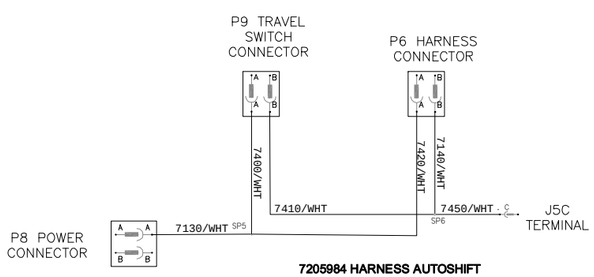


7244464 HARNESS LIGHT 3

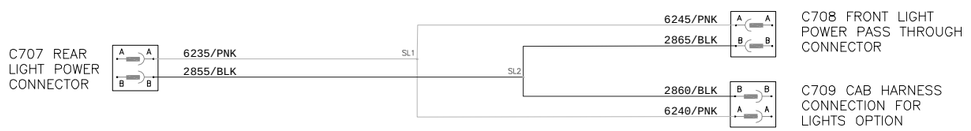
7172972 HARNESS BEACON/STROBE



7205969 HARNESS MOTION ALARM



7205984 HARNESS AUTOSHIFT



7173612 HARNESS LIGHT REAR

Printable Version Click Here

WIRING SCHEMATIC OPTIONS

Sheet 1 of 6

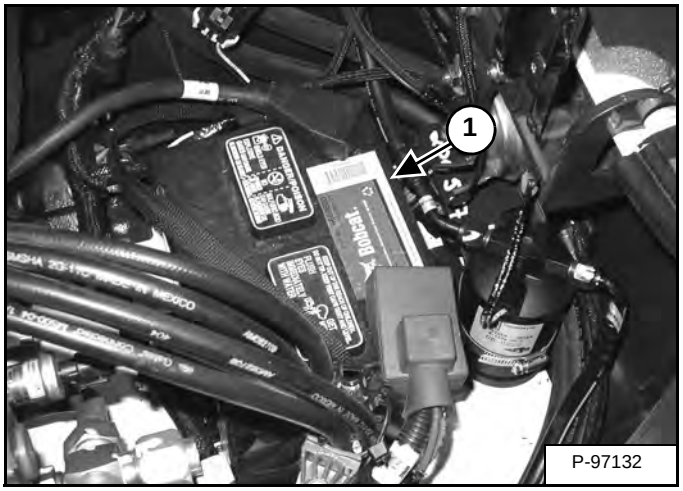
JANUARY 2019

BATTERY

Servicing

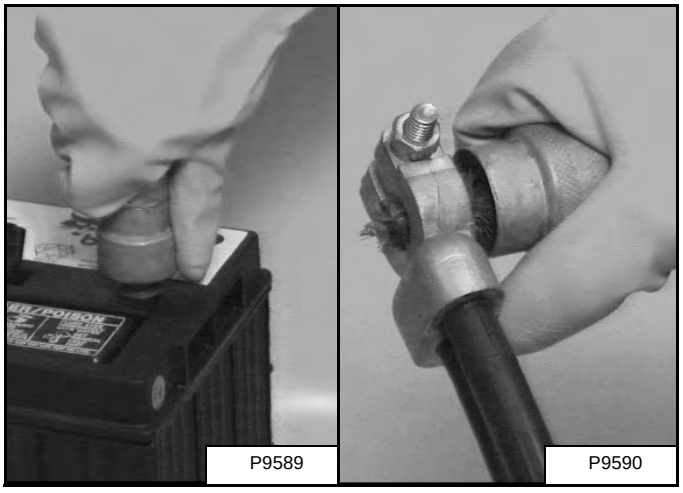
Open the right side cover. (See RIGHT SIDE COVER on Page 10-60-1.).

Figure 50-20-1



The battery (Item 1) **[Figure 50-20-1]** is located in the front of the right side upperstructure.

Figure 50-20-2



The battery cables must be clean and tight **[Figure 50-20-2]**. Remove acid or corrosion from the battery and cables using a sodium bicarbonate and water solution. Cover the battery terminals and cable ends with battery saver grease to prevent corrosion.

Check for broken or loose connections.

If the battery cables are removed for any reason, disconnect the negative (-) cable first. When installing the battery cables, make the last connection the negative (-) cable to the battery.

The original equipment battery is maintenance free. If a replacement battery is installed, check the electrolyte level in the battery.

If the electrolyte level is lower than 13 mm (0.50 in) above the plates, add distilled water only.

⚠ 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.

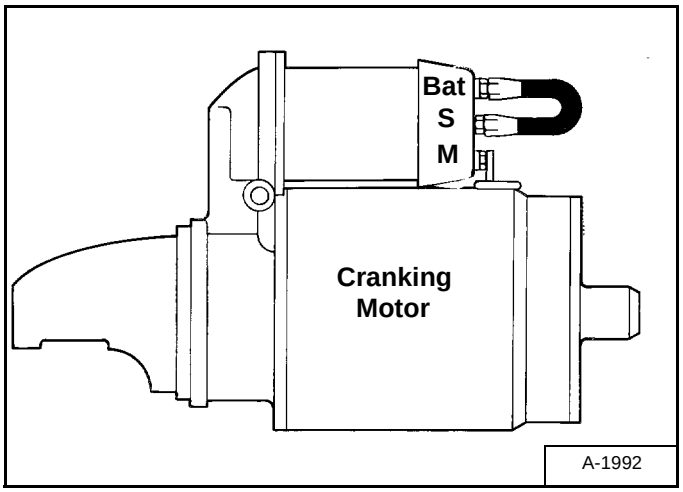
If electrolyte is taken internally drink large quantities of water or milk! DO NOT induce vomiting. Get prompt medical attention.

W-2065-0807

STARTER

Testing

Figure 50-40-1



The key switch must be in the OFF position.

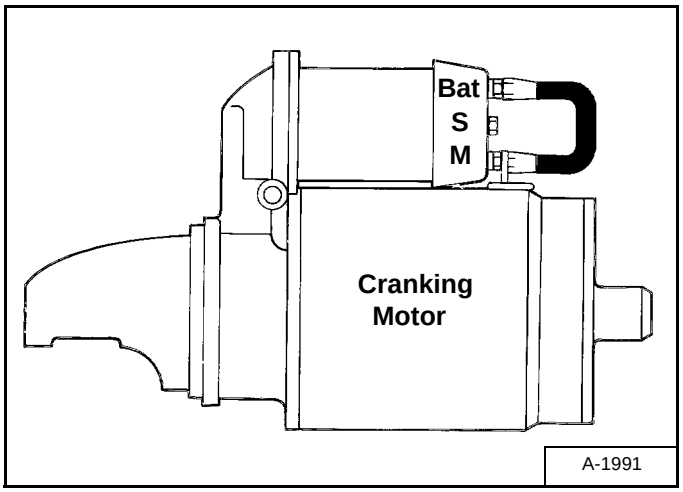
The battery must be at full charge.

The cable connections on the battery must be clean and tight.

Connect a jumper wire between S terminal and BAT terminal **[Figure 50-40-1]**.

If the starter turns but does not turn the engine, the starter drive has a defect.

Figure 50-40-2



Connect a jumper wire (of at least 4 gauge in size) between the M terminal and the BAT terminal **[Figure 50-40-2]**.

If the starter turns, the defect is in the solenoid.

If the starter does not turn, the starter is defective.

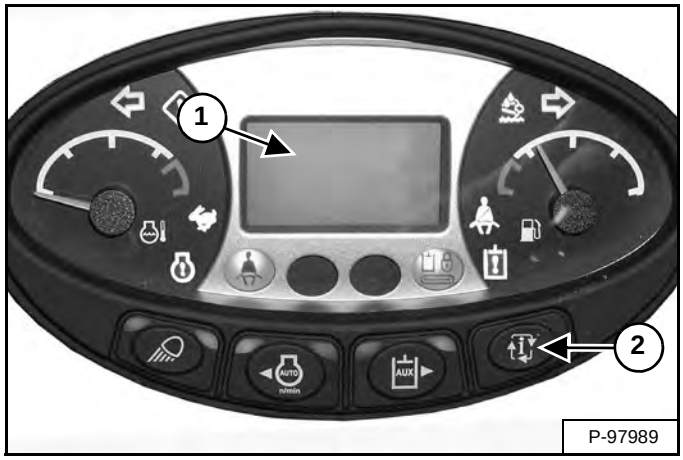
DIAGNOSTIC SERVICE CODES

Viewing Service Codes

The Service Codes will aid your dealer in diagnosing conditions that can damage your machine.

Standard Instrument Panel

Figure 50-80-1



Press the Information button (Item 2) to cycle the data display (Item 1) **[Figure 50-80-1]** until the service code screen is displayed. If more than one service code is present, the codes will scroll on the data display.

When no service code is present, **[NONE]** is displayed **[Figure 50-80-1]**.

NOTE: Corroded or loose grounds can cause multiple service codes and / or abnormal symptoms. All instrument panel lights flashing, alarm sounding, headlights and taillights flashing, can indicate a bad ground. The same symptoms can apply if the voltage is low, such as loose or corroded battery cables. If you observe these symptoms, check grounds and positive leads first.

Deluxe Instrument Panel

The last 40 codes stored in history can also be viewed using the Deluxe Instrument Panel.

	Press a scroll button (Item 1) repeatedly until the Active Warnings screen icon (Inset) is highlighted.
	The ACTIVE WARNINGS screen displays active service codes. Press **[9]** to view the next service code if more than one is present. Press **[4]** to display a history of service codes.
	The WARNINGS HISTORY screen will list the Service Code Number **(CODE)**, Hourmeter reading when the error occurred **(HOUR)**, and the User **(USER)** who was logged in to operate the machine when the error occurred.
Press **[9]** to view the next eight service codes. A total of 40 codes can be stored. When more than 40 codes occur, the oldest code will disappear and the newest code will be in the number 1 position.	
	Press the list number next to the service code for more detail. Press the left scroll button to back up one screen.

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

ECO MODE

	Press a scroll button (Item 1) repeatedly until the Security screen icon (Inset) is highlighted.
	Select **[3. MACHINE PERFORMANCE]**.
	Select **[2. ECO MODE]**. ECO Mode will set the maximum engine rpm to be at 85% of the high idle setting. Example: If the machine maximum engine speed is 2450 rpm, when ECO Mode is enabled, the maximum engine speed will be approximately 2080 rpm.

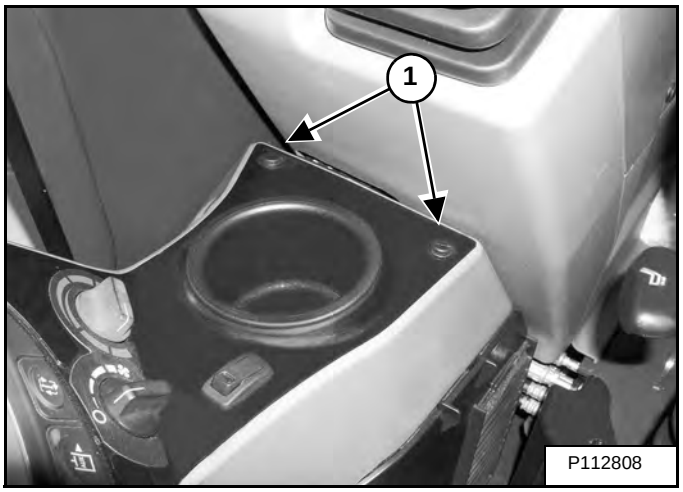
Machine History - Log In Information

	Press a scroll button (Item 1) repeatedly until the Security screen icon (Inset) is highlighted.
	**MACHINE SETTINGS** is visible on screen. Select **[2. MACHINE HISTORY]**.
	Select **[1. LOG-IN INFORMATION]**.
	View User Log hours and last time / dated used. Individual information can be viewed and reset back to zero Select user **[KEY PAD 1 - 9]** to access individual user.

INSTRUMENT PANEL

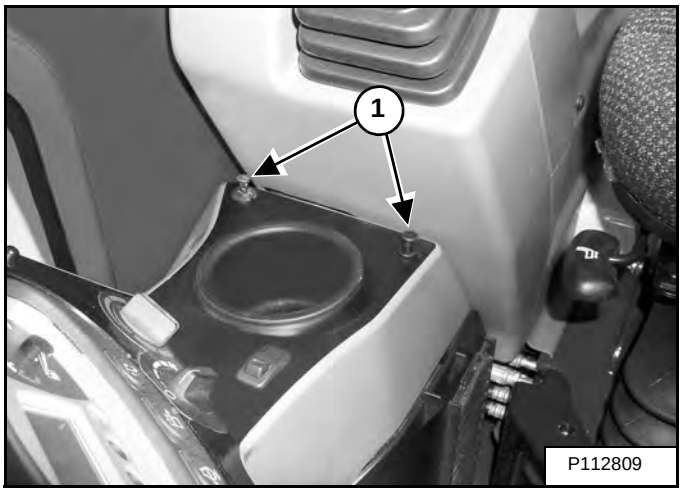
Removal And Installation

Figure 50-100-1



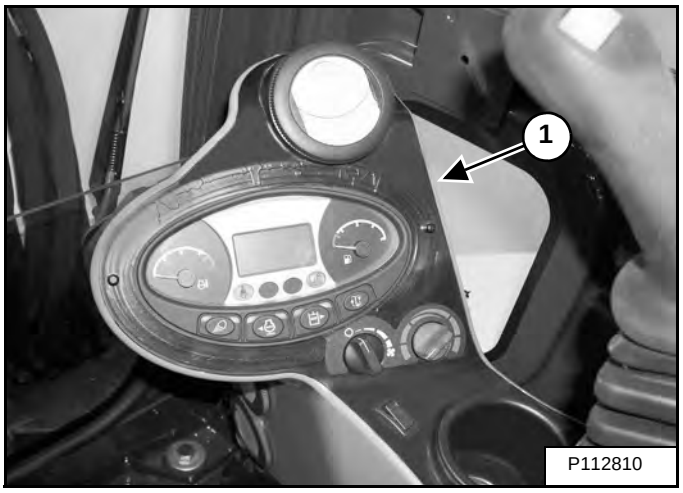
Pull up on the center pin (Item 1) **[Figure 50-100-1]**.

Figure 50-100-2



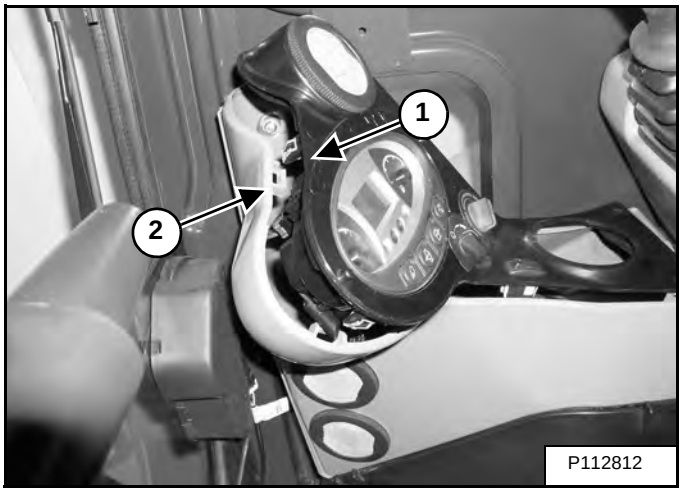
Remove the pin assembly (Item 1) **[Figure 50-100-2]**.

Figure 50-100-3



Pull up on the instrument panel (Item 1) **[Figure 50-100-3]**.

Figure 50-100-4



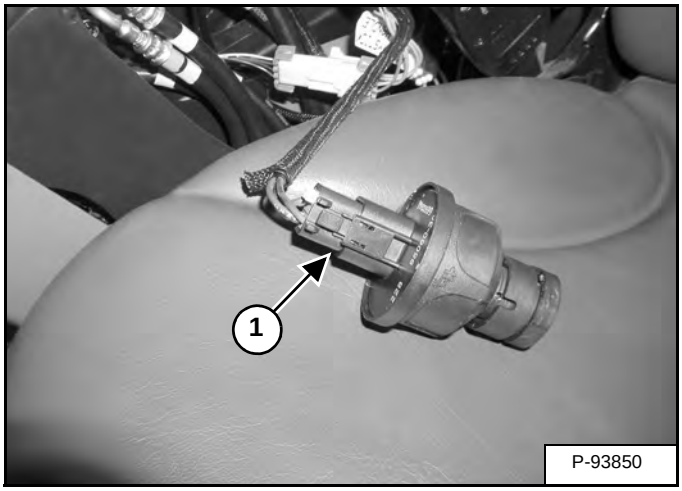
Installation: Install the tabs (Item 1) into the cover (Item 2) **[Figure 50-100-4]**.

KEY SWITCH

Removal And Installation

Remove the console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

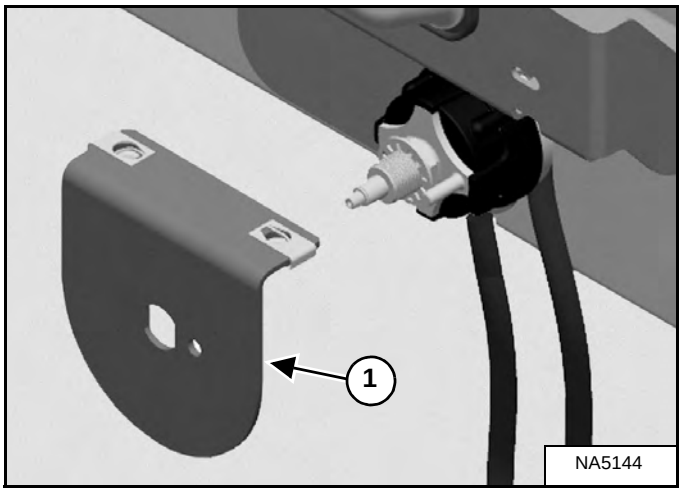
Figure 50-130-1



Disconnect the wire harness (Item 1) **[Figure 50-130-1]** from the switch. Remove the switch.

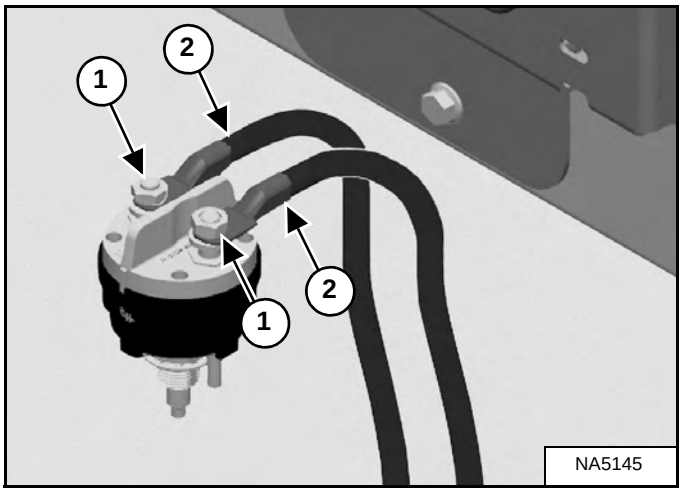
Removal And Installation (Cont'd)

Figure 50-170-6



Remove the bracket (Item 1) **[Figure 50-170-6]**.

Figure 50-170-7



Tilt the switch down. Remove the nut (Item 1) and washer from both switch terminals. Remove the cables (Item 2) **[Figure 50-170-7]** from the switch.

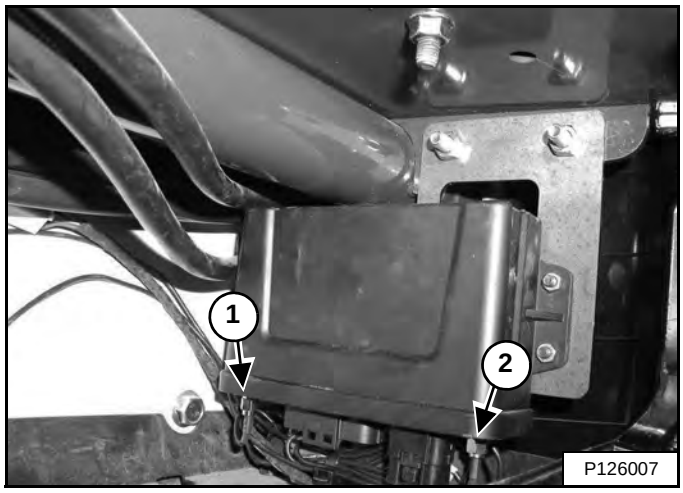
Antenna Removal And Installation

3G

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

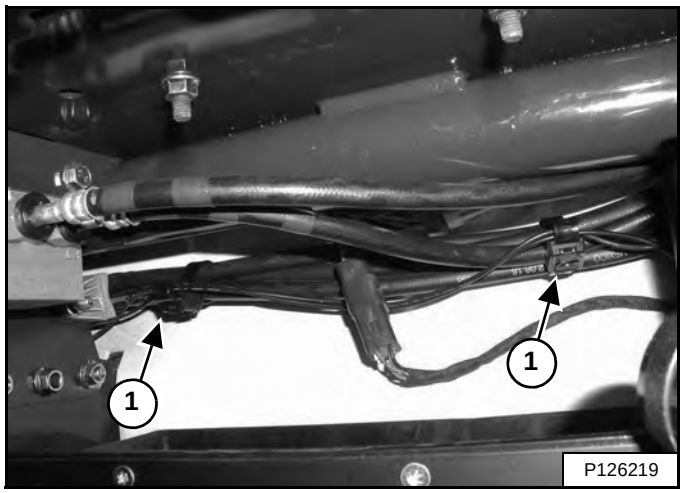
Open the tool box door under the operator's seat.

Figure 50-200-6



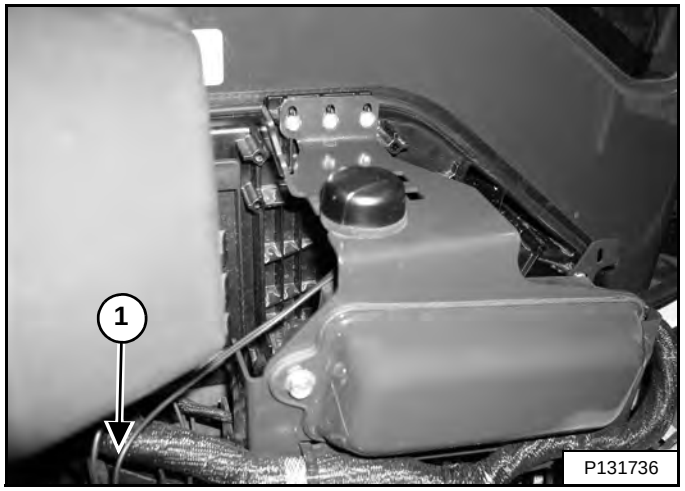
Disconnect the cellular wire (Item 1) and GPS wire (Item 2) **[Figure 50-200-6]** from the controller.

Figure 50-200-7



Remove any tie straps (Item 1) **[Figure 50-200-7]** securing the antenna wires.

Figure 50-200-8



Carefully remove the antenna wires (Item 1) **[Figure 50-200-8]** through the cab side wall opening.

Specifications (Cont'd)

Connecting Rod

Piston Pin O.D.	30,995 - 31,000 mm (1.2203 - 1.2205 in)
Small End Bushing I.D.	31,025 - 31,038 mm (1.2215 - 1.2220 in)
Oil Clearance Between Piston Pin And Small End Bushing	0,025 - 0,043 mm (0.0010- 0.0017 in)

Oil Pump

Oil Pressure Rated rpm	392 - 593 kPa (3,9 - 5,4 bar) (57 - 78 psi)
Idle Speed Allowable Limit	147 kPa (7,47 bar) (21 psi)

Crankshaft

Connecting Rod Large End Bore	57,0 - 57,015 mm (2.2440 - 2.2447 in)
Connecting Rod Oil Clearance (Large End Bore)	0,026 - 0,064 mm (0.0001 - 0.0025 in)
Connecting Rod End Play	0,15 - 0,30 mm (0.0059 - 0.0118 in)
Crankshaft Connecting Rod Journal	53,955 - 53,970 mm (2.1242 - 2.1248 in)
Oil Clearance Between Rod Journal and Bearing	0,029 - 0,059 mm (0.0011 - 0.0023 in)
Crankshaft End Play	0,10 - 0,31 mm (0.0039 - 0.0122 in)
I.D. of Cylinder Block Main Bearing Bore	
Class A	62,000 - 62,007 mm (2.4409 - 2.4412 in)
Class B	62,007 - 62,014 mm (2.4412 - 2.4415 in)
Class C	62,014 - 62,021 mm (2.4415 - 2.4418 in)
OD of Crankshaft Main Journal	
Class A	57,955 - 57,960 mm (2.2817 - 2.2819 in)
Class B	57,960 - 57,965 mm (2.2819 - 2.2821 in)
Class C	57,965 - 57,970 mm (2.2821 - 2.2823 in)
Main Bearing Thickness	
Blue	1,995 - 2,000 mm (0.0785 - 0.0787 in)
Yellow	2,000 - 2,005 mm (0.0787 - 0.0789 in)
Red	2,005 - 2,010 mm (0.0789 - 0.0791 in)

Timing Gear

Timing Gear Backlash:	
Fuel Injection Pump Gear To Idle Gear	0,087 - 0,200 mm (0.0034 - 0.0080 in)
Idle Gear To Crankshaft Gear	0,087 - 0,200 mm (0.0034 - 0.0080 in)
Idle Gear To Camshaft Gear	0,087 - 0,200 mm (0.0034 - 0.0080 in)
Crankshaft Gear To Oil Pump Gear	0,060 - 0,259 mm (0.0024 - 0.0010 in)

Thermostat

Valve Opening Temperature	82°C (180°F)
Valve Fully Open	97°C (207°F)

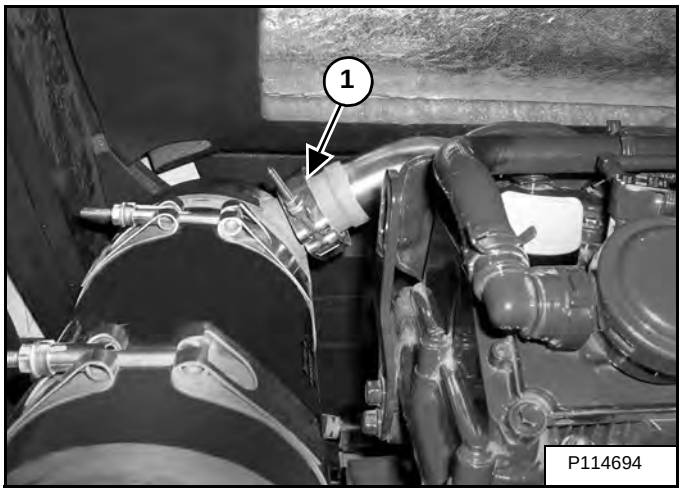
Troubleshooting (Cont'd)

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

DIESEL OXIDATION CATALYST (DOC)

Removal And Installation

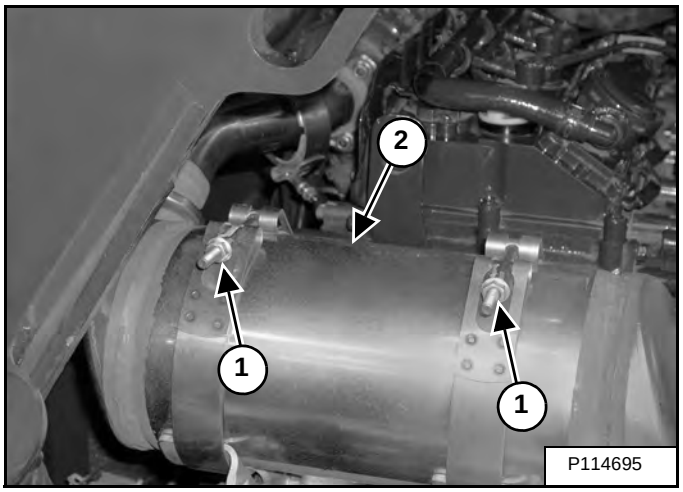
Figure 60-20-1



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

Installation: Tighten the clamps to 8 N•m (6 ft-lb) torque.

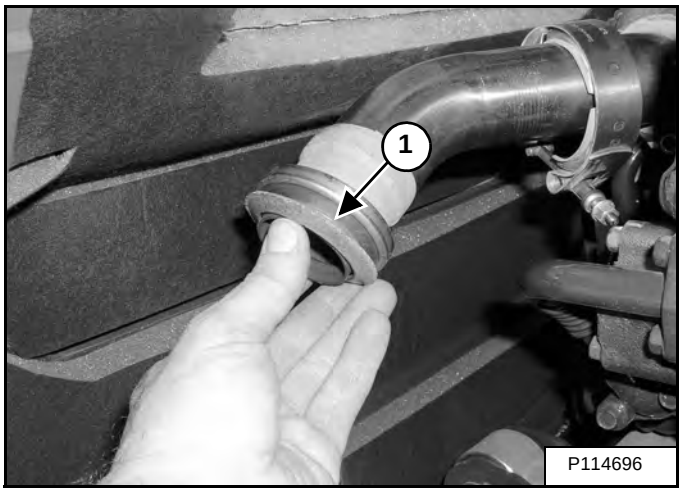
Figure 60-20-2



Loosen the two clamps (Item 1). Remove the DOC assembly (Item 2) **[Figure 60-20-2]**.

Installation: Tighten the clamps to 12 N•m (8.9 ft-lb) torque.

Figure 60-20-3

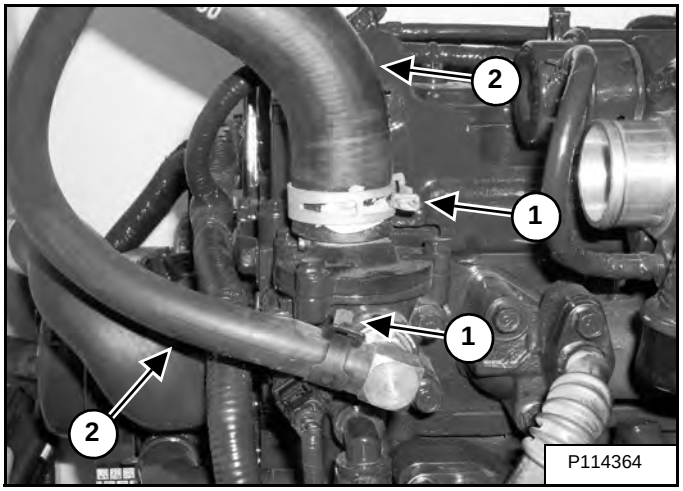


Remove the gasket (Item 1) **[Figure 60-20-3]**.

Thermostat Housing Removal And Installation

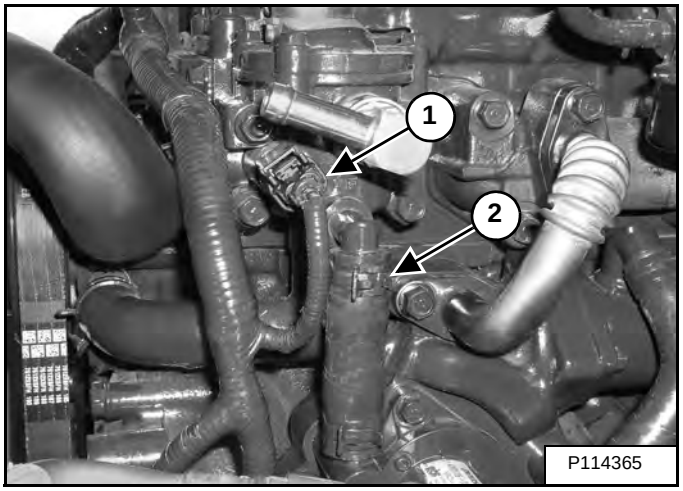
Drain the coolant. (See Removing And Replacing Coolant on Page 10-100-3.)

Figure 60-40-21



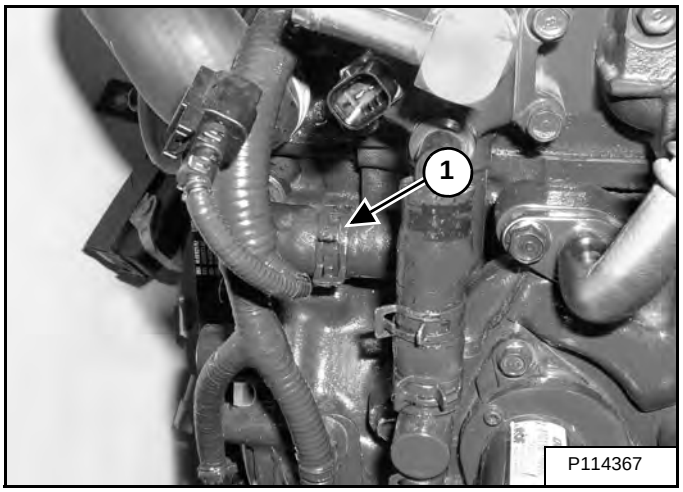
Reposition the clamps (Item 1) and remove the hose (Item 2) **[Figure 60-40-21]** from the thermostat housing.

Figure 60-40-22



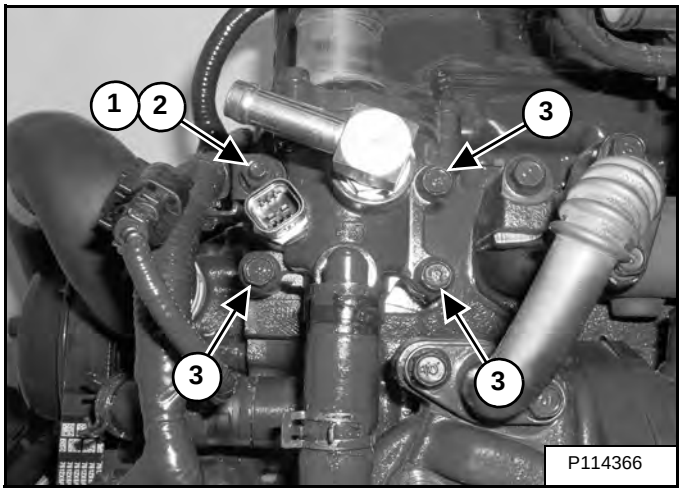
Disconnect the wire harness (Item 1). Reposition the clamp (Item 2) **[Figure 60-40-22]**.

Figure 60-40-23



Reposition the clamp (Item 1) **[Figure 60-40-23]**.

Figure 60-40-24



Remove the nut (Item 1). Reposition the wire harness bracket and remove the stud (Item 2) **[Figure 60-40-24]**.

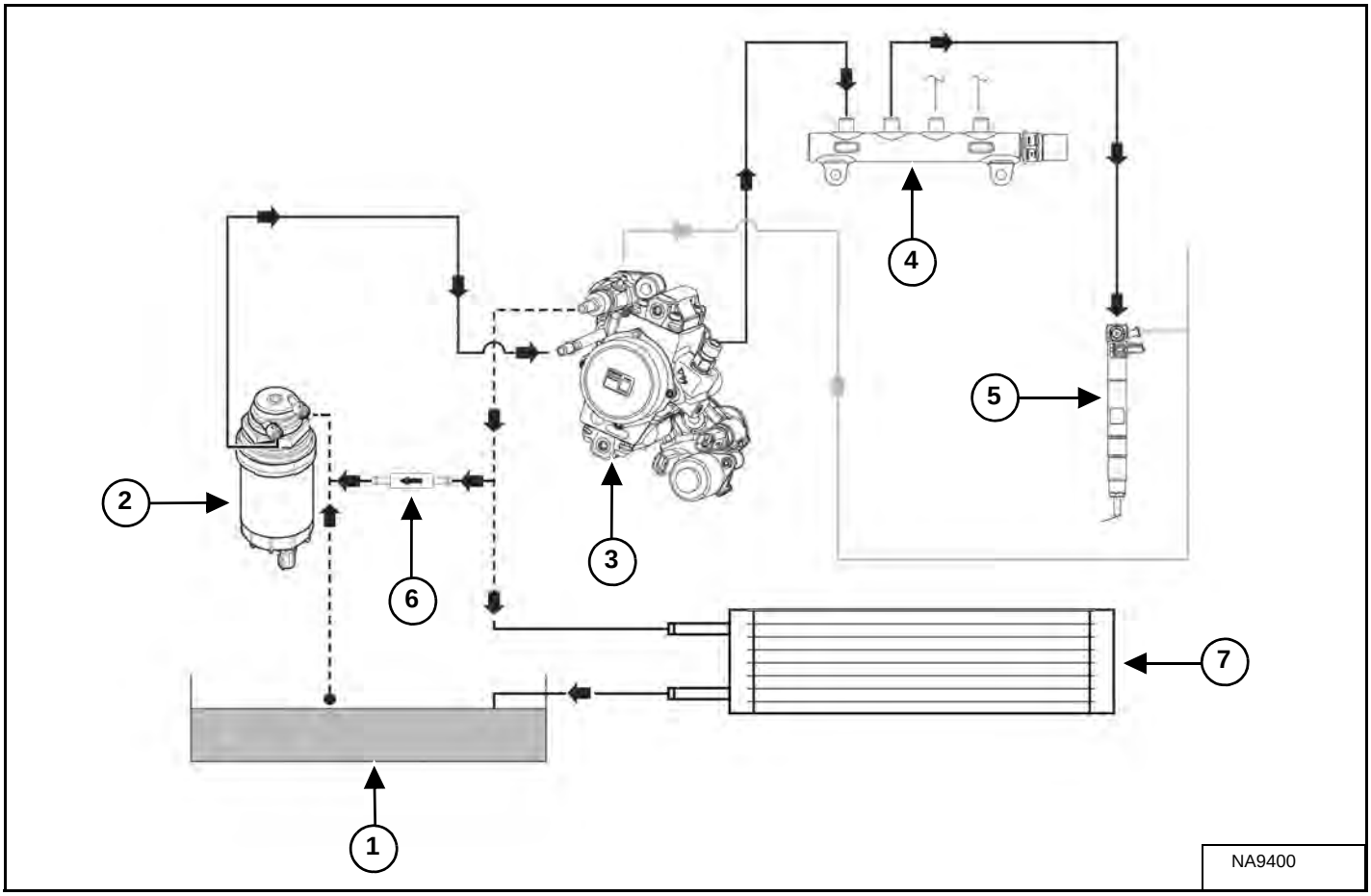
Remove the bolts (Item 3) **[Figure 60-40-24]** and remove the thermostat housing.

Installation: Tighten the bolts and stud to 22 N•m (16 ft-lb) torque.

FUEL SYSTEM

Description

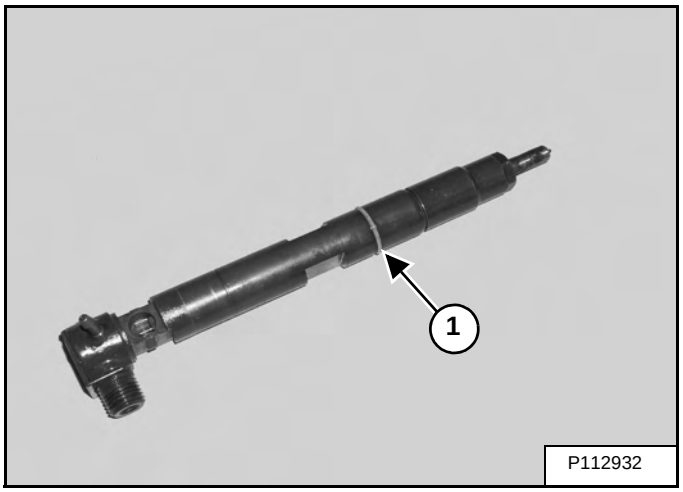
Figure 60-60 1



The fuel flows from the fuel tank (Item 1) to the fuel filter (Item 2). From the filter, fuel flows to the transfer pump / high pressure pump (Item 3). Fuel at as high of a pressure as 179264 kPa (1793 bar) (26,000 psi) is delivered from the fuel pump to the common rail (Item 4). From the rail, fuel is delivered to the fuel injector (Item 5). Unused fuel from the injector flows back to the pump (Item 3). Unused fuel from the pump will flow to the fuel bypass valve (Item 6). When the fuel is colder than 27°C (81°F), the bypass valve will be open. When the bypass valve is open, fuel will flow through the bypass valve and back to the inlet side of the fuel filter (Item 2). When the fuel is warmer than 27°C (81°F), the bypass valve will be closed. When the valve is closed, fuel will flow to the fuel cooler (Item 7) **[Figure 60-60-2]** and back to the fuel tank.

Fuel Injector Removal And Installation (Cont'd)

Figure 60-60-33



Remove the O-ring (Item 1) **[Figure 60-60-33]** from the injector.

Removing Air From The Fuel System

After removing or replacing fuel system components (high pressure pump, fuel rail, injectors or fuel cooler) the following procedure must be used to remove air from the fuel system if equipped with a fuel recirculation valve.

NOTE: The same procedure can be used for either the Earlier or later fuel recirculation valve.

⚠ WARNING

AVOID INJURY OR DEATH

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

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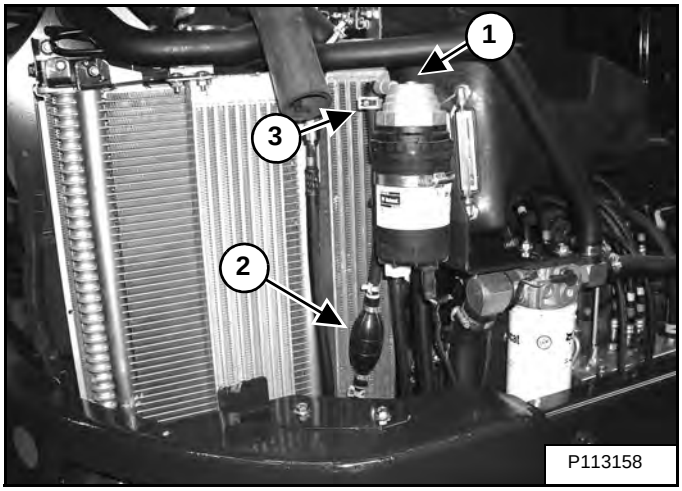
Open the tailgate. (See TAILGATE on Page 10-50-1.)

Open the right side cover. (See RIGHT SIDE COVER on Page 10-60-1.)

Figure 60-60-34



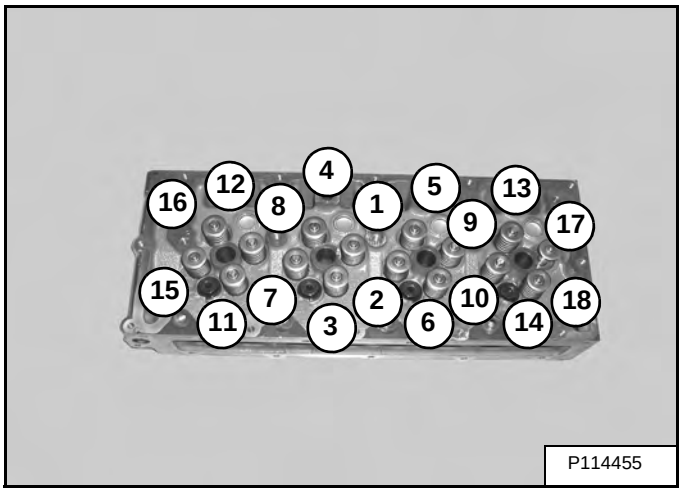
Open the air vent plug (Item 1) **[Figure 60-60-34]** on the fuel filter assembly three full turns.

Squeeze the hand pump (primping bulb) (Item 2) **[Figure 60-60-34]** until the fuel flows from the air vent plug with no air bubbles.

Close the air vent plug (Item 1) **[Figure 60-60-34]**.

Cylinder Head Removal And Installation (Cont'd)

Figure 60-70-27



Installation: Tighten the head bolts in the sequence shown **[Figure 60-70-27]**.

Initial torque 40 N•m (30 ft-lb).

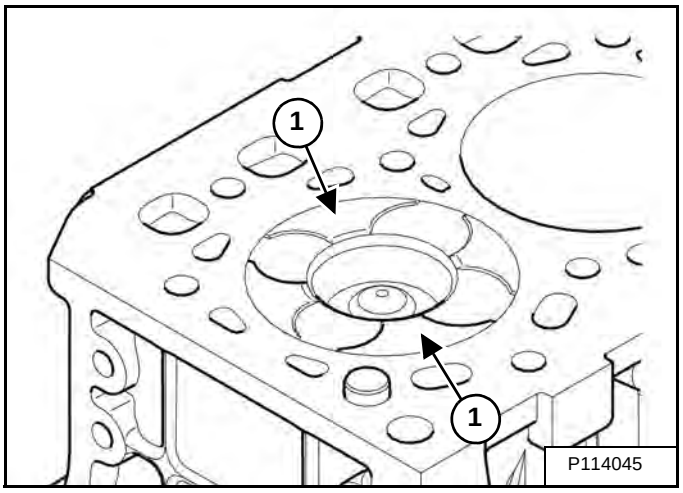
2nd torque 90°.

3rd torque 90°.

4th torque 90°.

NOTE: Before installing the cylinder head, piston step height must be measured to determine the correct head gasket thickness required.

Figure 60-70-28



Rotate the crankshaft until the piston is at top dead center. Measure the piston step height in the areas shown (Item 1) **[Figure 60-70-28]**.

Repeat the procedure for all four pistons.

Piston step height	0,11 - 0,39 mm (0.0043 - 0.0154 in)

CRANKSHAFT AND PISTONS

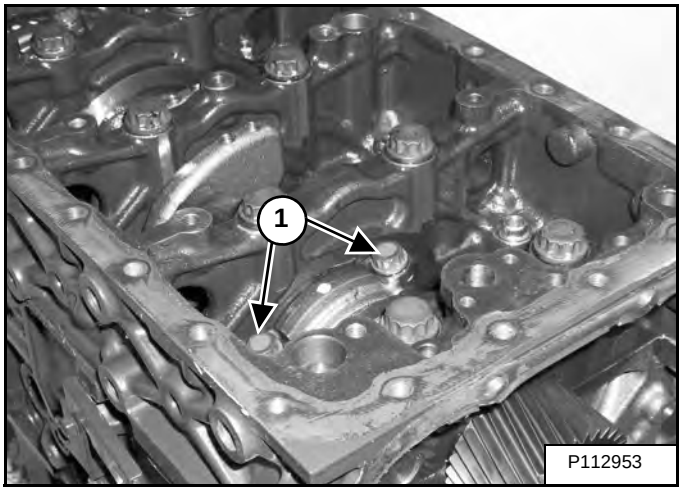
Piston And Connecting Rod Removal And Installation

Remove the cylinder head. (See Cylinder Head Removal And Installation on Page 60-70-5.)

Remove the top edge from the cylinder bore with a ridge reamer.

Remove the oil pan and oil pump strainer. (See Oil Pan Removal And Installation on Page 60-50-2.)

Figure 60-80-1

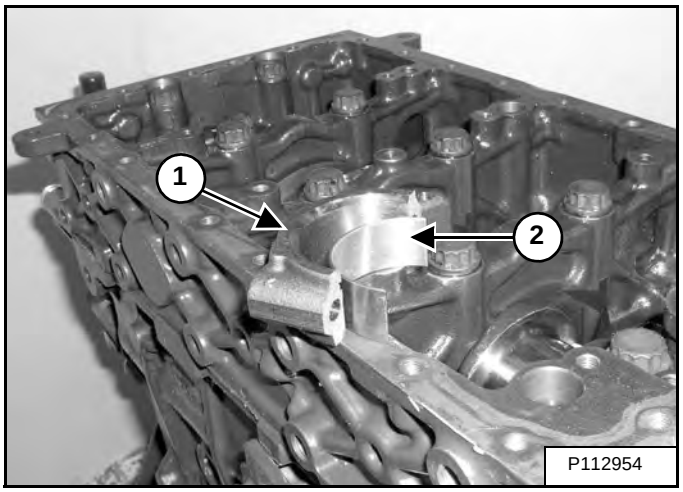


Remove the connecting rod bolts (Item 1) **[Figure 60-80-3]**.

Installation: Tighten the bolts to an initial torque of 19,6 N•m (14.5 ft-lb). Tighten the bolts an additional 90°.

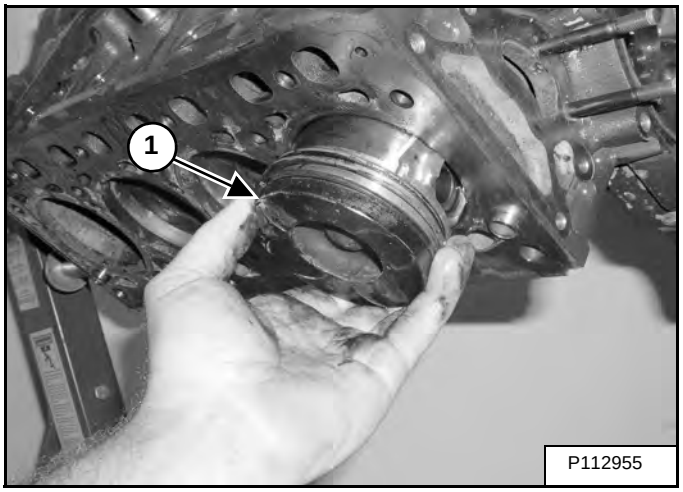
NOTE: The rod bolts are a one time use bolt. Use new bolts when installing the connecting rods.

Figure 60-80-2



Remove the cap (Item 1) and bearing (Item 2) **[Figure 60-80-2]**.

Figure 60-80-3



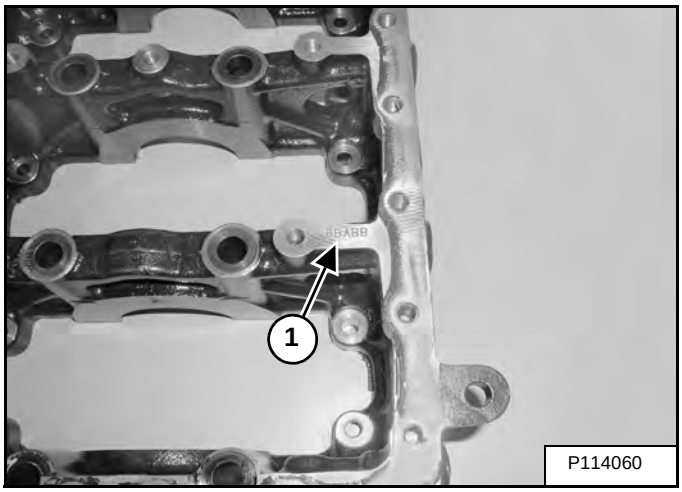
Remove the piston / connecting rod (Item 1) **[Figure 60-80-3]** from the cylinder block.

NOTE: Install the piston / connecting rod assembly in to the bore it was removed from.

Repeat the procedure to remove the remaining piston / connecting rod assemblies.

Engine Component Class (Cont'd)

Figure 60-80-34



The cylinder block bearing bore class (Item 1) **[Figure 60-80-34]** is engraved on the flange of the crankcase.

Cylinder Block Main Journal Diameter	
Class A	62,000 - 62,007 mm (2.4409 - 2.4412 in)
Class B	62,007 - 62,014 mm (2.4412 - 2.4415 in)
Class C	62,014 - 62,021 mm (2.4415 - 2.4418 in)

When replacing crankshaft bearings, use the chart below.

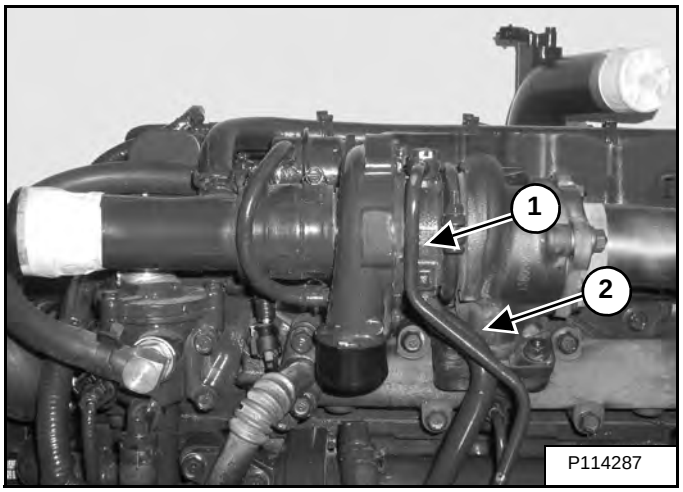
Cylinder Block Main Journal Diameter	**Crankshaft Main Journal Diameter**		
	Class A	Class B	Class C
Class A	Yellow Bearing	Blue Bearing	Blue Bearing
Class B	Yellow Bearing	Yellow Bearing	Blue Bearing
Class C	Red Bearing	Red Bearing	Yellow Bearing

TURBOCHARGER

Description

The turbocharger is placed between the exhaust and intake manifolds. It is driven by hot exhaust gases and supplies air at more than atmospheric pressure to the intake. It is lubricated by oil from the main galley. The location of the turbo is between the engine and the blower housing.

Figure 60-110-1



The oil is delivered to the turbocharger through a tubeline (Item 1) and returns to the engine block through a drain line (Item 2) **[Figure 60-110-1]**.

The turbocharger internal components are not serviceable.

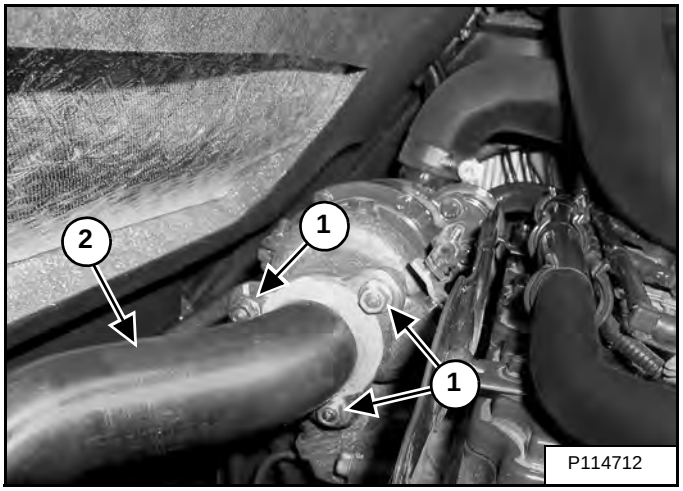
Removal And Installation

Remove the left side panel.

Remove the air cleaner assembly. (See AIR CLEANER on Page 60-30-1.)

Remove the DOC assembly. (See Removal And Installation on Page 60-20-1.)

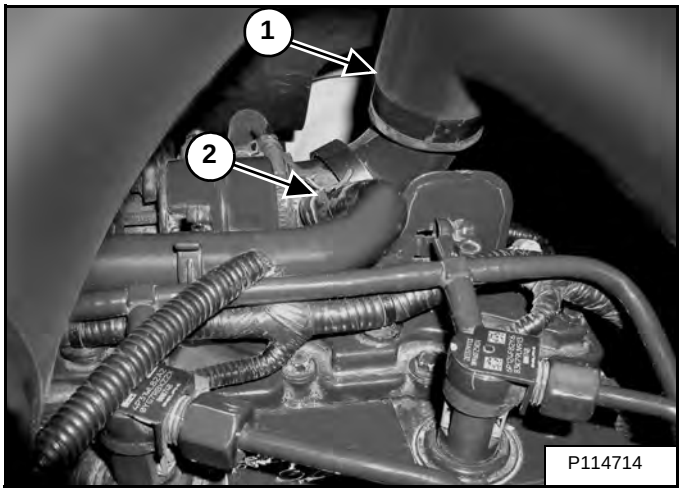
Figure 60-110-2



Remove the nuts on the exhaust pipe (Item 1) and remove the pipe (Item 2) **[Figure 60-110-2]**.

Installation: Tighten the nuts (Item 1) **[Figure 60-110-2]** to 22 N•m (16 ft-lb) torque.

Figure 60-110-3



Remove the turbo hose inlet (Item 1) **[Figure 60-110-3]** and plug the turbo inlet.

Remove the breather hose (Item 2) **[Figure 60-110-3]**.

Removal And Installation (Cont'd)

Figure 60-130-8

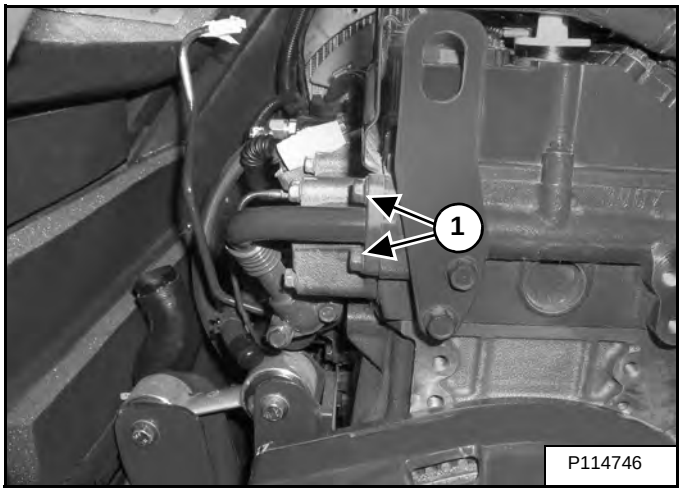
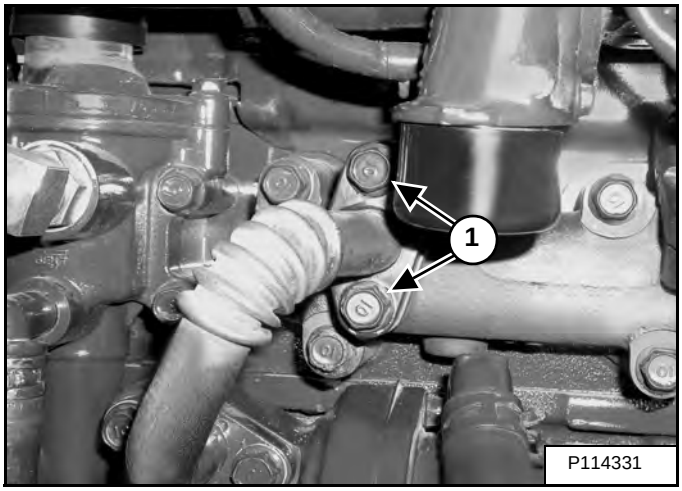


Figure 60-130-9



Remove the coolant tube bolts (Item 1) **[Figure 60-130-8]** and **[Figure 60-130-9]**.

Installation: Tighten bolts to 22 N•m (16 ft-lb) torque.

Figure 60-130-10

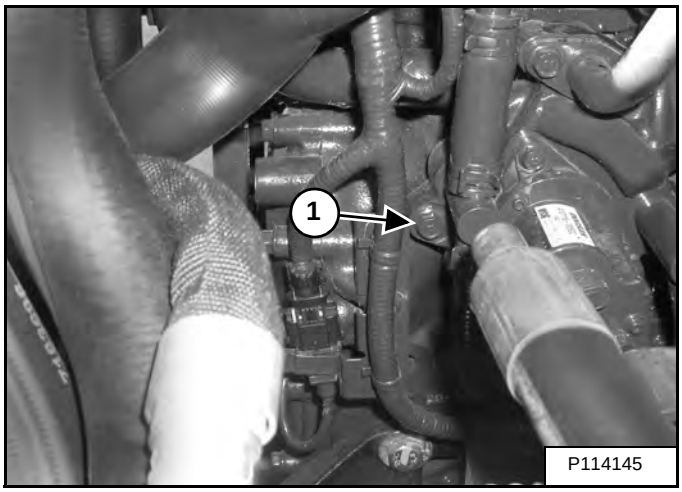
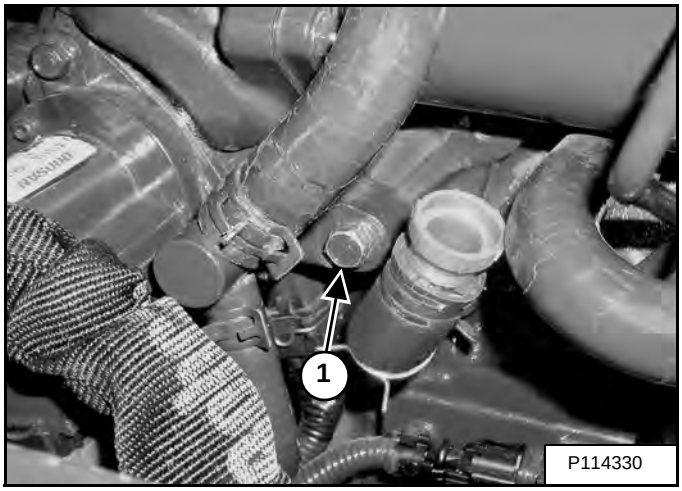


Figure 60-130-11



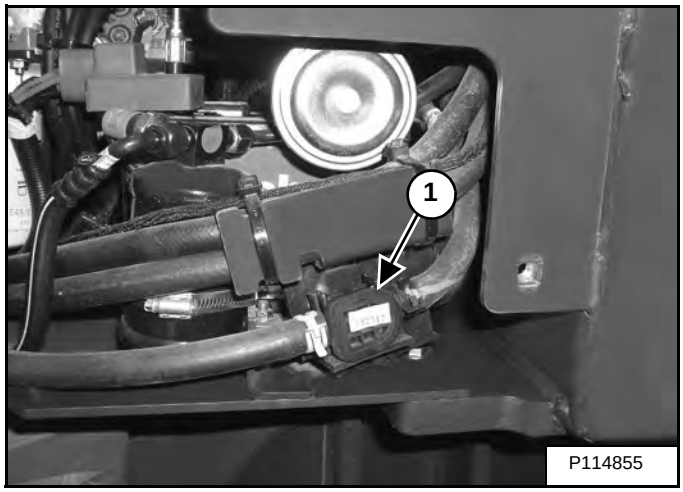
Remove the bolts (Item 1) **[Figure 60-130-10]** and **[Figure 60-130-11]**.

Installation: Tighten the bolts to 22 N•m (16 ft-lb).

Remove the EGR assembly.

Components (Cont'd)

Figure 70-10-8

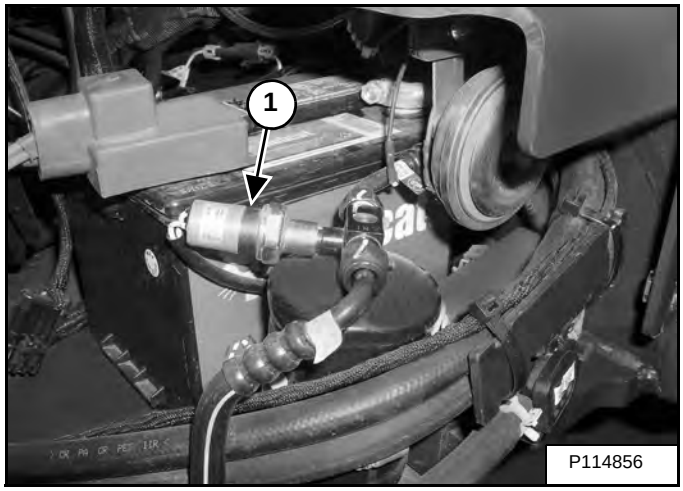


Heater Valve: The heater valve (Item 1) **[Figure 70-10-8]** is used to control the amount of engine coolant that flows to the heater coil.

The heater valve is located in front of the battery.

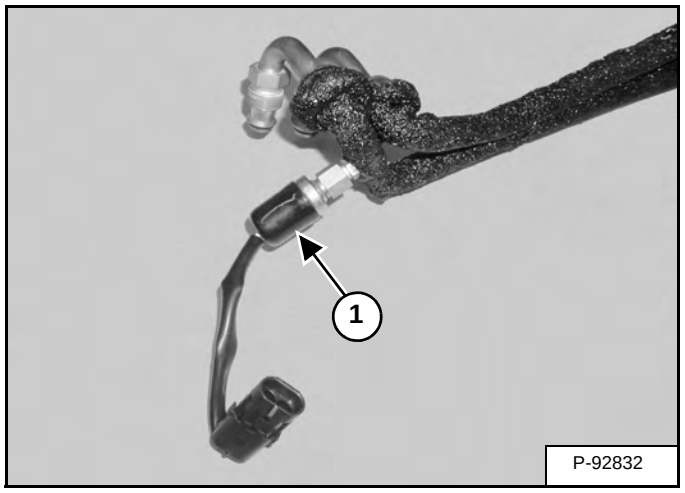
NOTE: For Earlier Models follow [Figure 70-10-9] and [Figure 70-10-10].

Figure 70-10-9



High Pressure Switch: The high pressure (Item 1) **[Figure 70-10-9]** will disengage the compressor clutch at high pressure readings over 2689 - 2827 kPa (26,9 - 28,3 bar) (390 - 10 psi) on the high side. The clutch will engage when the pressure is at 2103 - 2379 kPa (21 - 23,8 bar) (305 - 345 psi).

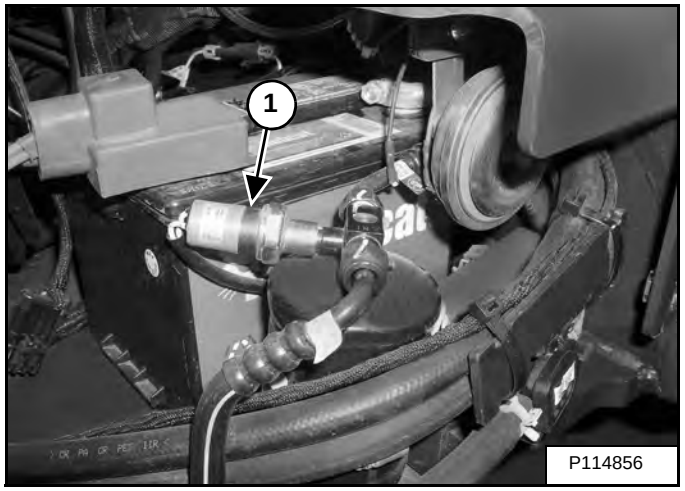
Figure 70-10-10



Low Pressure Switch: The low pressure switch (Item 1) **[Figure 70-10-10]** will disengage the compressor clutch at low pressure readings below 34 - 76 kPa (0,34 - 0,76 bar) (5 - 11 psi) on the low side. The clutch will engage when the pressure is at 117 - 186 kPa (1,2 - 1,9 bar) (17 - 27 psi).

NOTE: For Later Models follow [Figure 70-10-11].

Figure 70-10-11



High Pressure Switch / Low Pressure Switch: The high pressure / low pressure switch (Item 1) **[Figure 70-10-11]** will engage the compressor between 186,2 - 2303 kPa (1,86- 2,41 bar) (27 - 35 psi). The switch will disengage the compressor at pressure below 179,3 - 220,6 kPa (1,79 - 2,21 bar) (26 - 32 psi) and above 2503 - 2903 kPa (25 - 29 bar) (263 - 421 psi).

Temperature / Pressure Chart

TEMP F	PSIG	TEMP F	PSIG
16	15.69	93	110.20
18	17.04	94	112.10
20	18.43	95	114.10
22	19.87	100	124.30
24	21.35	102	128.50
26	22.88	104	132.90
28	24.47	106	137.30
30	26.10	108	141.9
32	27.79	110	146.50
34	29.52	112	151.30
36	31.32	114	156.10
38	33.17	116	161.10
40	35.07	118	166.10
42	37.03	120	171.30
44	39.05	122	176.60
45	40.09	124	182.00
50	45.48	126	187.50
55	51.27	128	193.10
60	57.47	130	198.90
65	64.10	135	213.70
70	71.19	140	229.40
75	78.75	145	245.80
80	86.80	150	263.00
85	95.40	155	281.10
90	104.40	160	300.10
91	106.30	165	320.10
92	108.20	170	340.80

Evaporator

Pressures represent gas temperatures inside the coil, not the coil surface. For an estimate of the temperature of the air coming off the coil add -13 - -12°C (8 - 10°F) to the temperature on the chart.

Condenser

Temperatures are not ambient temperatures but condensing temperatures. Add 4°C (40°F) to the ambient temperature to get the condensing temperature and then refer to the pressure chart to see appropriate pressure for ambient temperature.

Example: Ambient Temperature = 90°F

90°F
+ 40°F
130°F condenser temperature = 200 psig

Conditions and pressures will vary from system to system.

COMPRESSOR

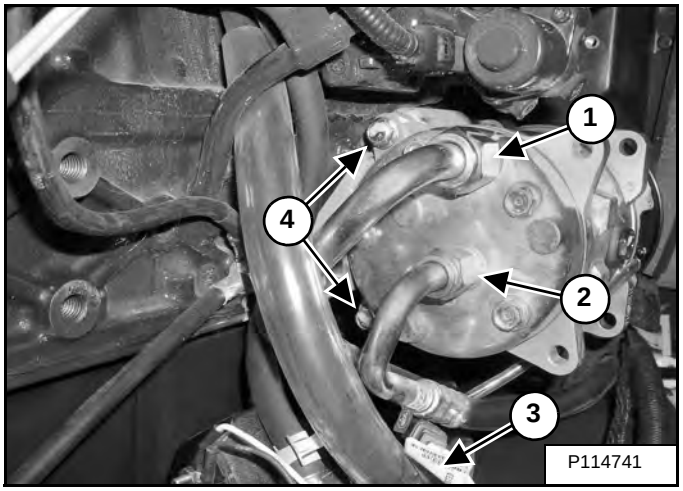
Removal And Installation

Remove the counterweight. (See Removal And Installation on Page 40-90-1.)

Remove the compressor belt. (See Air Conditioning Compressor Belt Replacement on Page 70-20-2.)

Evacuate the A/C system. (See Reclamation And Charging With Recovery / Charging Unit on Page 70-40-3.)

Figure 70-50-1



Remove the hose (Item 1 and Item 2) **[Figure 70-50-1]**.

Installation: Tighten the hose (Item 1) to 28 - 37 N•m (21 - 27 ft-lb) torque. Tighten the hose (Item 2) **[Figure 70-50-1]** to 20 - 27 N•m (15 - 20 ft-lb) torque.

⚠ WARNING

In the event of a leak, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R-134a refrigerant gives a toxic gas.

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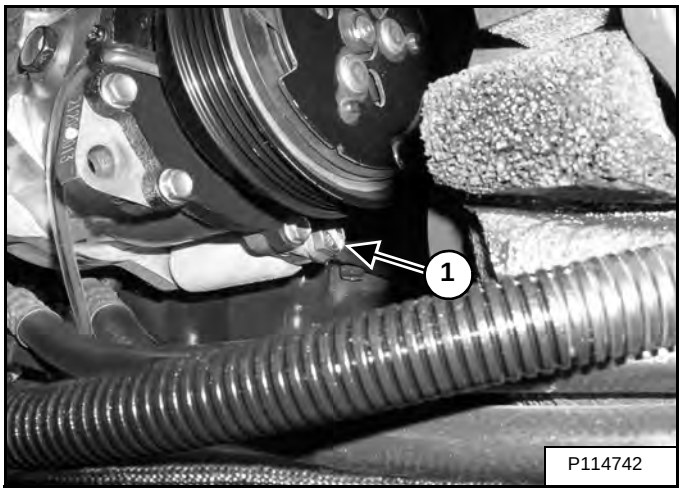
Disconnect the wire harness (Item 3) **[Figure 70-50-1]**.

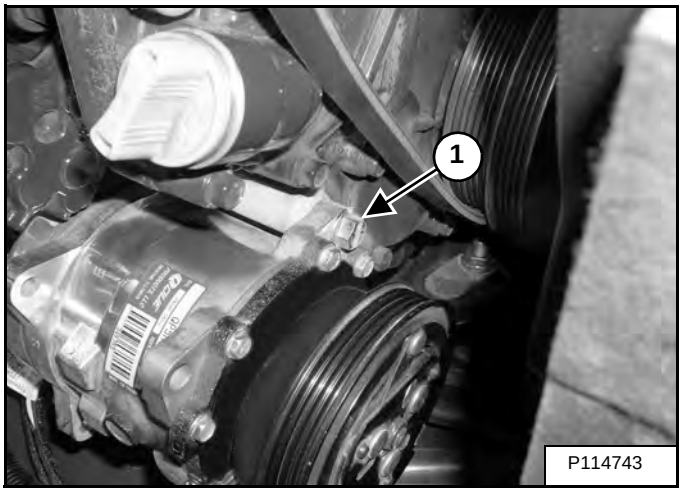
Remove the bolts (Item 4) **[Figure 70-50-1]**.

Figure 70-50-2



Remove the bolt (Item 1) **[Figure 70-50-2]**.

Figure 70-50-3



Remove the bolt (Item 1) **[Figure 70-50-3]**.

Remove the compressor.

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

THERMOSTAT

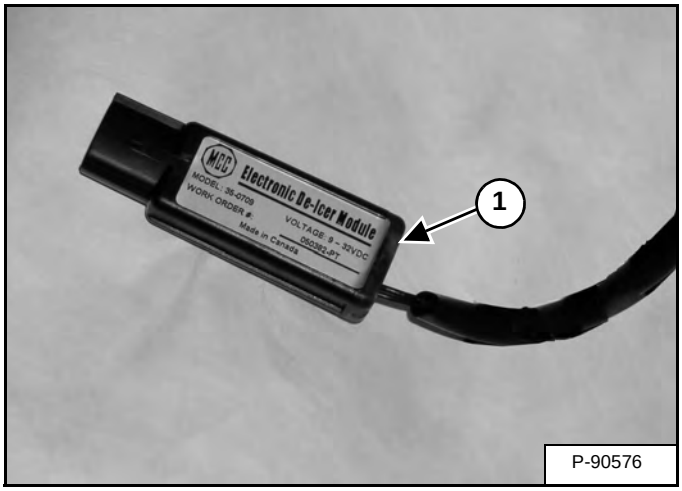
Description

The Electronic De-icing Thermostat (EDT) is a micro controller based module that measures evaporator coil temperature and cycles the compressor clutch to maintain a constant evaporator pressure. Onboard circuit protection and diagnostics are also built into the module.

NOTE: The EDT has a 6 second delay before startup to protect the compressor clutch.

The EDT will turn the clutch on when the evaporator coil temperature is above 2°C (35.6°F). If the EDT does not detect any malfunction, it will continue to operate and the status LED will be lit continuously. When the evaporator temperature is below -2°C (28.4°F), the EDT will turn off the clutch and status LED.

Figure 70-90-1



When the EDT detects an open or short from the temperature sensor, the status LED (Item 1) **[Figure 70-90-1]** will blink once per second and the output signal to the clutch will be turned off. The status LED will flash two times per second when EDT detects an open circuit (current draw less than 200 mA), short circuit or over current (current draw greater than 7A) from the clutch output. The status LED will flash three times per second when the compressor clutch is shorted to ground.

NOTE: The EDT will attempt to restart every 20 seconds until the fault is repaired.

The EDT has the following protection built in:

1. Over temperature
2. Over current from clutch output
3. Voltage (Above and below operational limits or reverse voltage)
4. Short circuit protection (Output shorted to ground)
5. Temperature sensor open and short detection

MALFUNCTION	DETECTION INTERVAL	STATUS LED
Temperature sensor	Continuous	1x per second
Temperature sensor open and short detection	At A/C startup	2x per second
Compressor clutch short to battery	Continuous	3x per second

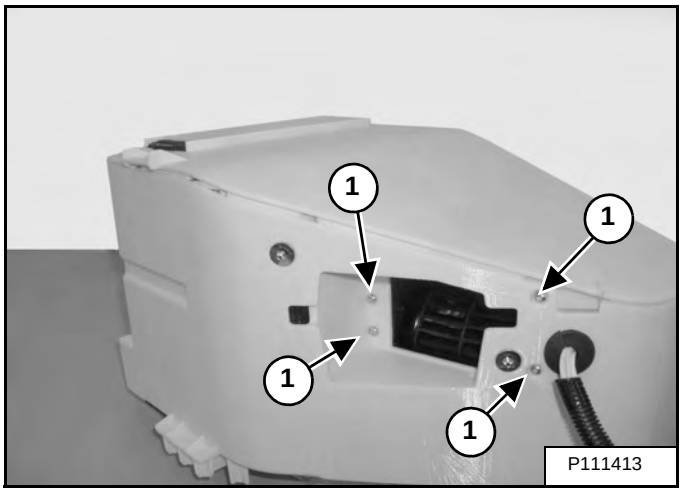
BLOWER FAN

Removal And Installation

Figure 70-130-1

Mark and remove the wire connectors from the motor **[Figure 70-130-1]**.

Figure 70-130-2

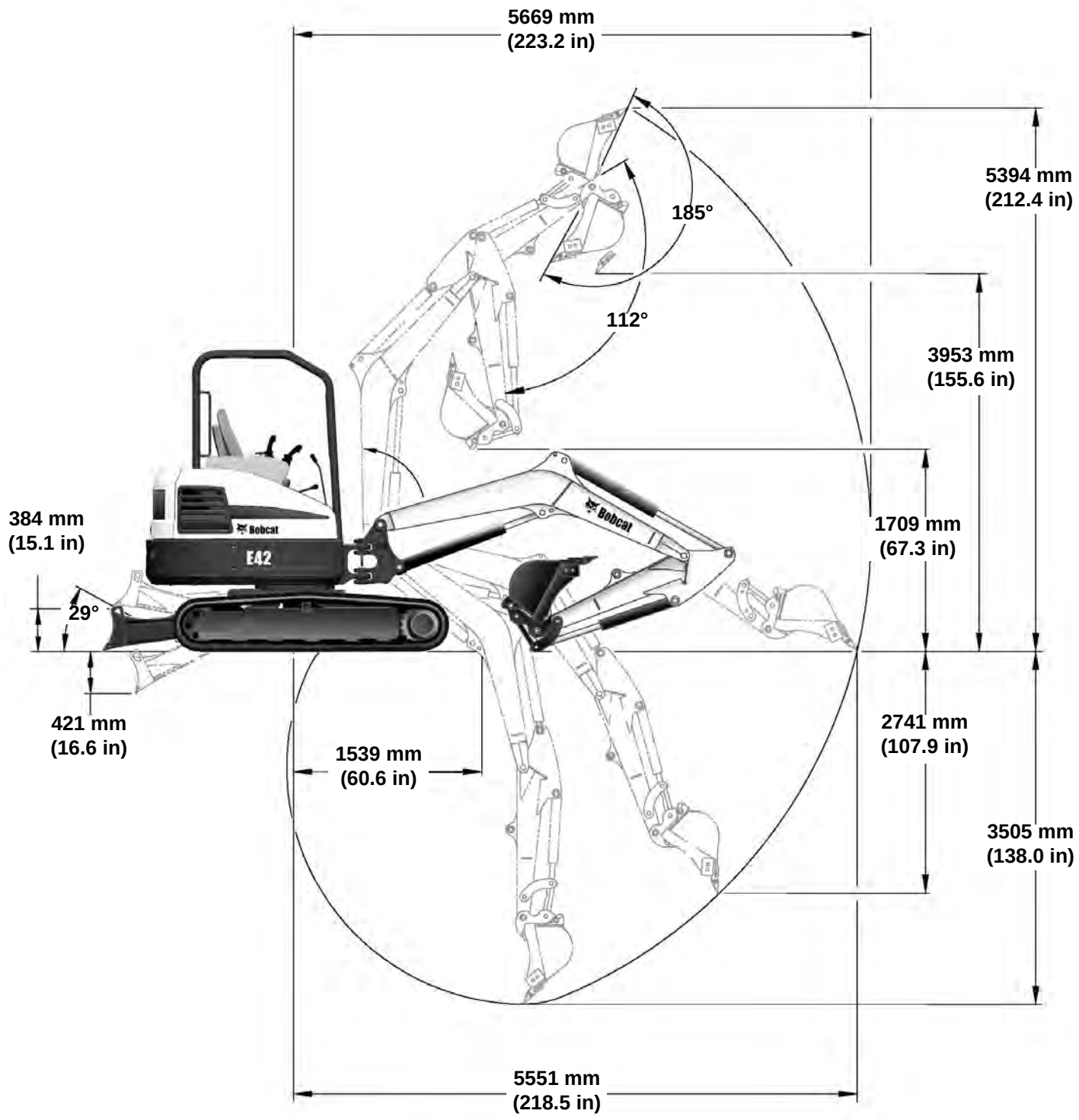


Remove the two bolts (Item 1) **[Figure 70-130-2]**.

Remove the motor.

Machine Dimensions (Long Arm)

- Where applicable, specification conform to SAE or ISO standards and are subject to change without notice.



NA5026

TECHNICAL SERVICE GUIDE SPECIFICATIONS

Engine

Engine Oil Pressure at Low Idle	147 kPa (1,47 bar) (21.3 psi)
Engine Oil Pressure at High Idle	392 - 539 kPa (3,92 - 5,39 bar) (57 - 78 psi)
Location of Number 1 Cylinder	Closest to water pump
Crankshaft Rotation (Facing Crankshaft Pulley)	Clockwise
Valve Clearance (Cold) Intake	0,4 mm (0.016 in)
Valve Clearance (Cold) Exhaust	0,45 mm (0.018 in)

NOTE: For additional engine specifications, (See Specifications on Page 60-10-2.)

Engine Torques

Fuel Injection Tubeline Nuts	29,4 N•m (21.7 ft-lb)
Fuel Injector Retaining Bolt	39 - 46 N•m (29 - 34 ft-lb)
Glow Plugs	8,8 - 11,8 N•m (6.5 - 8.7 ft-lb)
Valve Cover Bolts	7,8 N•m (5.8 ft-lb)
Head Bolts	Initial torque 39 N•m (29 ft-lb) + 90° + 90° + 90°

NOTE: For additional engine torques, (See Engine Removal And Installation on Page 60-10-14.)

Cooling System

Coolant Type and Mix	47% Water and 53% Propylene Glycol
Radiator Cap Pressure	89 kPa (0,9 bar) (13 psi)
Thermostat	Fully Open at 97°C (207°F)

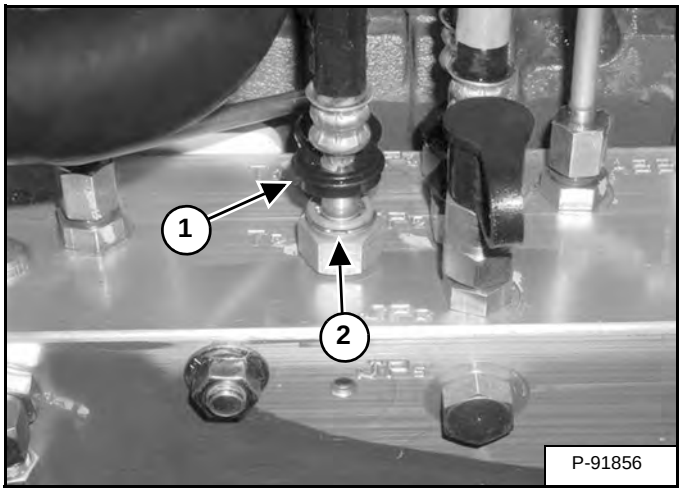
NOTE: For additional cooling system information, (See ENGINE COOLING SYSTEM on Page 60-40-1.)

Excavator Torques

Drive Motor To Frame Bolt	160 - 180 N•m (118 - 133 ft-lb)
Sprocket To Drive Motor	108 N•m (80 ft-lb)
Swing Bearing To Frame Bolt	105 - 115 N•m (78 - 85 ft-lb)
Swing Bearing To Upperstructure Bolt	105 - 115 N•m (78 - 85 ft-lb)
Swing Motor Drive Carrier	255 - 285 N•m (188 - 210 ft-lb)
Swing Motor Mounting Bolts	35 - 39 N•m (25.5 - 28.5 ft-lb)

Push To Connect Fittings (Cont'd)

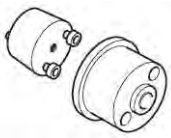
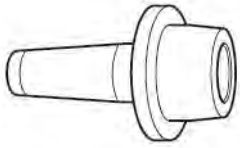
Figure SPEC-40-14



Push the grommet (Item 1) down and over the top of the fitting (Item 2) **[Figure SPEC-40-14]**.

SERVICE TOOLS REQUIRED (CONT'D)

Engine Tools

TOOL PART NUMBER	DESCRIPTION	MODELS USED ON	COMMENT	IMAGE
7009358	Bobcat Diagnostic Interface Box	E63, E85	Interface for using Yanmar SA-D SmartAssist-Direct diagnostic service software.	No Image Available
7031222	Bobcat Engine Analyzer Diagnostic Tool Kit	T4 Bobcat Engine Applications	Includes: Diagnostic Service Tool (7031223), Vehicle Cable 6 pin (7031398), Vehicle Cable 14 pin (7031356), USB Cable (7031357)	
7391655	Perkins Electronic Diagnostic Tool (EDT)	E145,E165 Excavators		
7391656	Cab Diagnostic Harness Adapter	E145,E165 Excavators, Used with 7391655 (EDT)		
7031370	Rear Main Seal Installer	1.8L & 2.4L Bobcat Engine Models	Used for installing rear main seal	
7031369	Front Seal Installer	T4 Bobcat Engine Applications	Used for installing front seal	
7031371	Valve Spring Compressor	T4 Bobcat Engine Applications	Used for compressing valve springs	
MEL10630	Engine Compression Test Kit	E08 - E55	Includes: MEL1352, MEL1433, MEL1489, MEL1546, MEL1551, MEL1594, MEL1594, MEL10630-1 - MEL10630-11 and MEL10630-14	

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

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