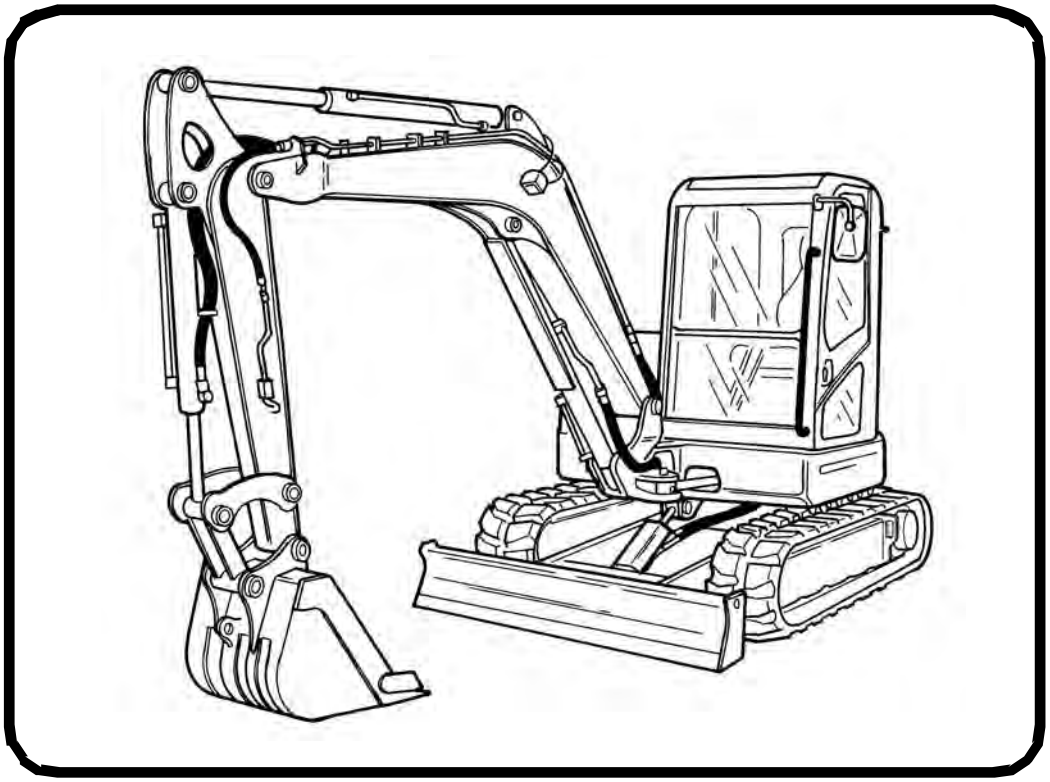
Bobcat®

Service Manual
E80 Excavator

S/N AETB11001 & Above
S/N AET311001 & Above



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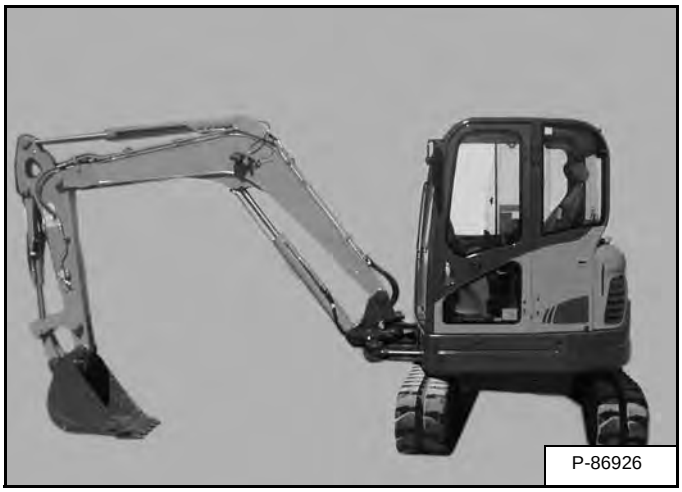
LIFTING AND BLOCKING THE EXCAVATOR

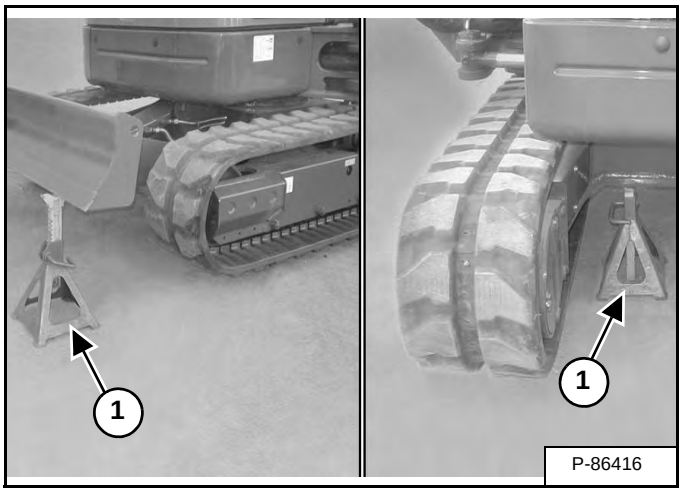
Procedure

Figure 10-10-1



Raise one side of the machine (approximately 101,6 mm [4 in]) using the boom and arm **[Figure 10-10-1]**.

Figure 10-10-2



Fully raise the blade and install jackstands (Item 1) **[Figure 10-10-2]** under the blade and track frame. Lower the boom until all machine weight is on the jackstands.

Stop the engine.

⚠ WARNING

AVOID INJURY

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

W-2142-0903

⚠ WARNING

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

W-2218-1195

TRANSPORTING THE EXCAVATOR ON A TRAILER

Loading And Unloading

When transporting the machine, observe the rules, motor vehicle laws, and vehicle limit ordinances. Use a transport and towing vehicle of adequate length and capacity.

Secure the parking brakes and block the wheels of the transport vehicle.

Align the ramps with the center of the transport vehicle. Secure the ramps to the truck bed and be sure ramp angle does not exceed 15 degrees.

Use metal loading ramps with a slip resistant surface.

Use ramps that are the correct length and width and can support the weight of the machine.

The rear of the trailer must be blocked or supported when loading or unloading the machine to prevent the front of the transport vehicle from raising.

Determine the direction of the track movement before moving the machine (blade forward).

Figure 10-40-1

NOTE: When loading or unloading the machine, disengage the auto idle feature and place the two speed travel in low range.

Move the machine forward onto the transport vehicle **[Figure 10-40-1]**.

Do not change direction of the machine while it is on the ramps.

Lower the boom, arm, bucket, and blade to the transport vehicle.

Stop the engine and remove the key.

Put blocks at the front and rear of the tracks.

Fastening

Figure 10-40-2

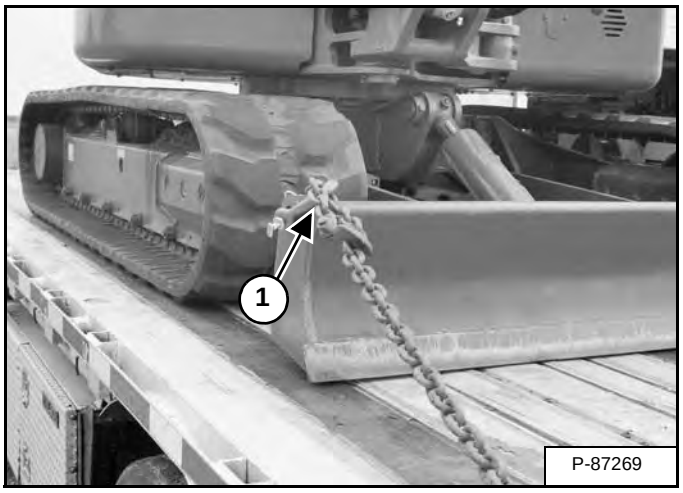
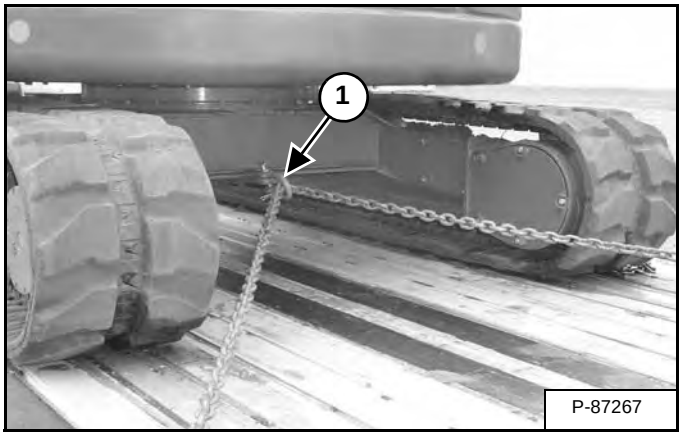


Figure 10-40-3



NOTE: A clevis may be used at the chain holes for the chains to be routed through for clearance.

Fasten chains to both corners of the blade (Item 1) **[Figure 10-40-2]** and to the tie down loop at the rear of the track frame (Item 1) **[Figure 10-40-3]** to prevent it from moving when going up or down slopes or during sudden stops.

Use chain binders to tighten the chains and then safely tie the chain binder levers to prevent loosening.

⚠ WARNING

AVOID SERIOUS INJURY OR DEATH

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

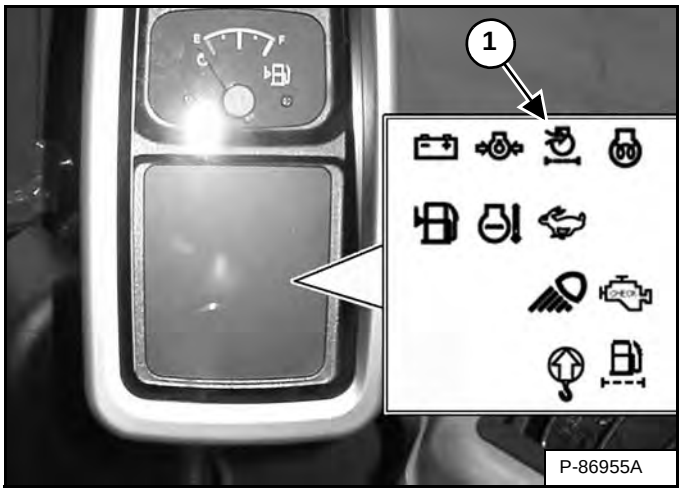
W-2058-0807

AIR CLEANER SERVICE

See the service schedule for the correct service interval. (See SERVICE SCHEDULE on Page 10-80-1.)

Daily Check

Figure 10-90-1

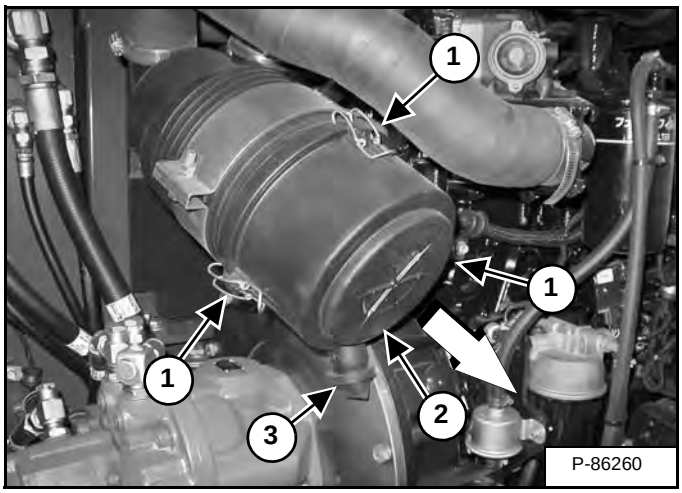


Check the air cleaner condition indicator icon (Item 1) **[Figure 10-90-1]** in the instrument panel. If the icon stays ON after the engine is started, the filter needs to be replaced.

Replacing The Filters

Open the right side cover to access the air cleaner for service. (See Opening And Closing on Page 10-50-1.)

Figure 10-90-2



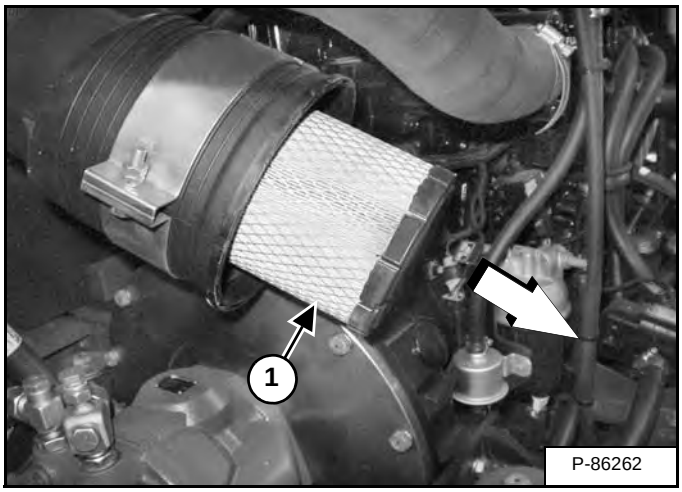
Replace the inner filter every third time the outer filter is replaced or as indicated.

Outer Filter

Pull out on the three fasteners (Item 1) and remove the cover **[Figure 10-90-2]**.

Clean the dust cup (Item 2) **[Figure 10-90-2]**.

Figure 10-90-3



Pull the outer filter (Item 1) **[Figure 10-90-3]** from the air cleaner housing.

Check the housing for damage.

Clean the housing and the seal surface. DO NOT use compressed air.

Install a new filter.

Install the cover and engage the three fasteners (Item 1) **[Figure 10-90-2]**.

Make sure the dust evacuator cup (Item 3) **[Figure 10-90-2]** is in the down position as shown.

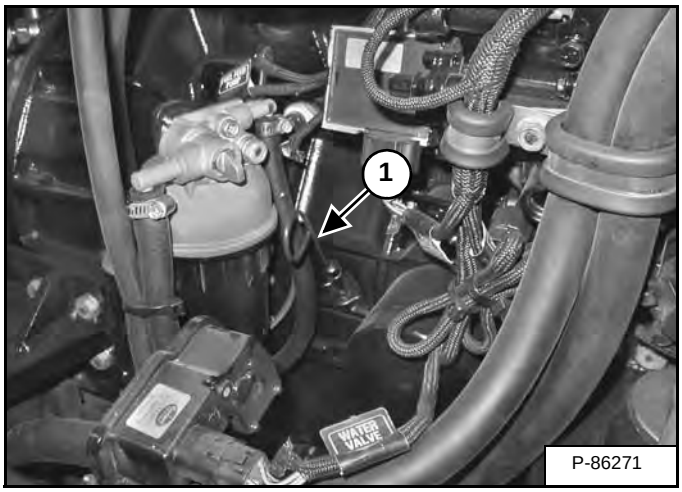
Check the air intake hose and the air cleaner housing for damage. Make sure all connections are tight.

ENGINE LUBRICATION SYSTEM

Checking And Adding Engine Oil

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

Figure 10-130-1



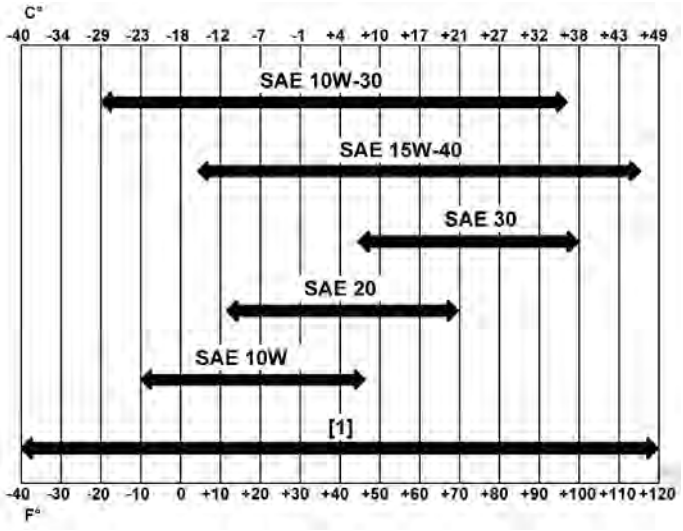
Open the right side cover and remove the dipstick (Item 1) **[Figure 10-130-1]**.

Keep the oil level between the marks on the dipstick.

Engine Oil Chart

ENGINE OIL
RECOMMENDED SAE VISCOSITY NUMBER
(LUBRICATION OILS FOR DIESEL ENGINE CRANKCASE)

Figure 10-130-2



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE (DIESEL ENGINES MUST USE API CLASSIFICATION CI-4 OR BETTER)

[1] Synthetic Oil - Use recommendation from Synthetic Oil Manufacturer.

Use good quality engine oil that meets API Service Classification of CI-4 or better **[Figure 10-130-2]**.

⚠ WARNING

AVOID INJURY OR DEATH

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

W-2103-0508

Install the dipstick and close the right side cover.

LUBRICATING THE EXCAVATOR

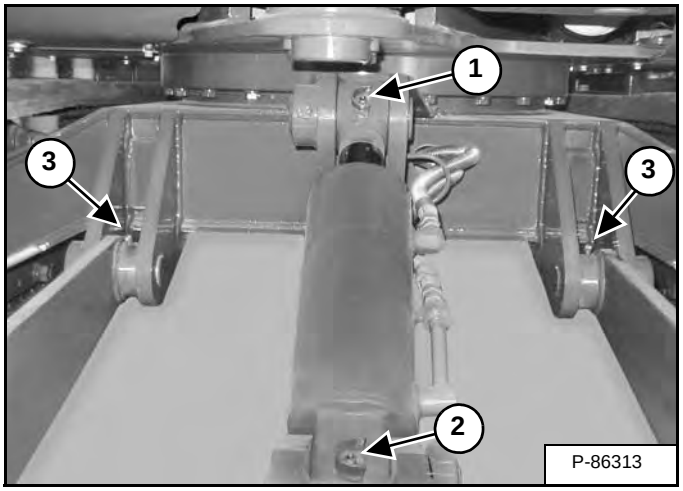
Lubrication Locations

Lubricate the excavator as specified in the Chart for the best performance of the machine. (See Chart on Page 10-80-1.)

Record the operating hours each time you lubricate the excavator.

Always use a good quality lithium based multipurpose grease when lubricating the machine. Apply the lubricant until extra grease shows.

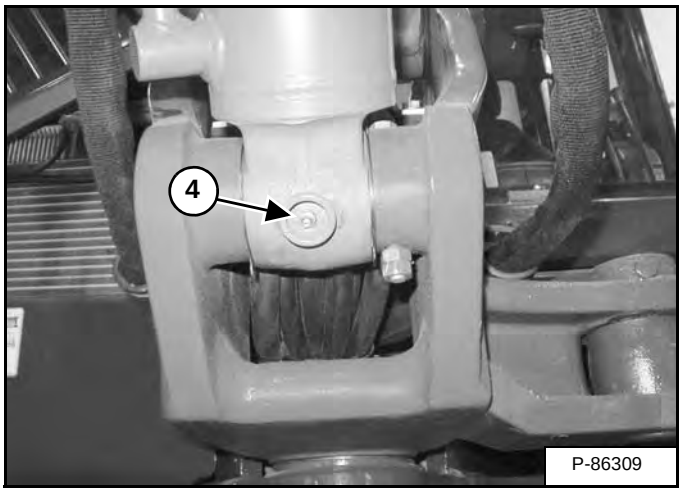
Figure 10-150-1



Ref Description (# of Fittings)

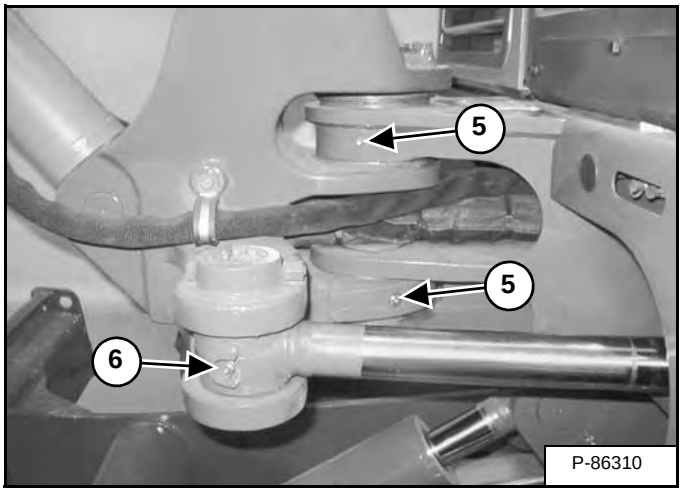
1. Blade Cylinder Rod End (1)
2. Blade Cylinder Base End (1)
3. Blade Pivots (2) **[Figure 10-150-1]**

Figure 10-150-2



4. Boom Cylinder Rod End (1) **[Figure 10-150-2]**

Figure 10-150-3



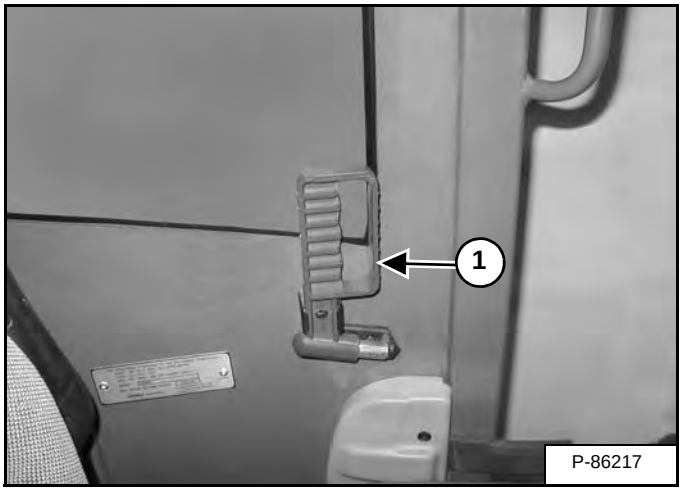
5. Boom Swing Pin (2)
6. Boom Swing Cylinder Base End (1) **[Figure 10-150-3]**

EMERGENCY EXIT

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

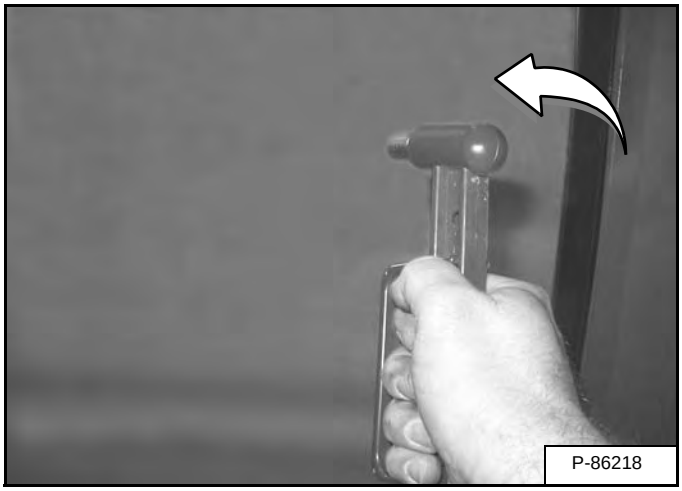
Right Rear Side Window

Figure 10-190-1



If emergency exit requires breaking a window, use the supplied hammer (Item 1) **[Figure 10-190-1]** located on the left side of the operator cab.

Figure 10-190-2



Remove the hammer from the storage position and strike the glass with the pointed end of the hammer **[Figure 10-190-2]**.

Use the hammer to remove broken glass from the edge of the window before exiting.

Figure 10-190-3

Exit through the right rear side window **[Figure 10-190-3]**.

Front Window

Figure 10-190-4

Open the front window and exit **[Figure 10-190-4]**.

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

HYDRAULIC SYSTEM

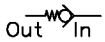
Glossary Of Hydraulic / Hydrostatic Symbols (Cont'd)

GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR EXCAVATORS

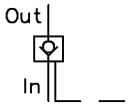
SYMBOL DESCRIPTION

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

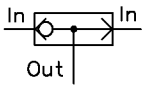
NON–RETURN VALVE (Check Valve) – Used as Replenishing Valve, Load Check Valve or Anticavitation Valve – Opens if the Inlet pressure is higher than the Outlet pressure. Often contains internal spring which has NO significant pressure value



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



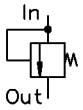
PILOT CONTROLLED NON–RETURN VALVE – It is possible to open the valve by pilot pressure



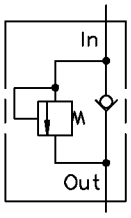
SHUTTLE VALVE – The Inlet port connected to the higher pressure is automatically connected to the Outlet port while the other Inlet port is closed

SYMBOL DESCRIPTION

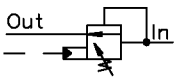
PRESSURE CONTROL VALVE: Valve ensuring the control of pressure



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



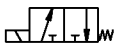
RELIEF/REPLENISHING VALVE or RELIEF/ANTICAVITATION VALVE – When the Inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port – Allows free flow in the opposite direction



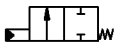
DUAL PRESSURE RELIEF VALVE – When the inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port. Pilot pressure provides a second pressure value.

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

TWO PORTS and CLOSED FLOW PATHS

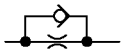


SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) – controlled by an electric solenoid (with return spring)

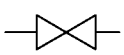


PILOT ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) – controlled by pressure (with return spring)

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



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

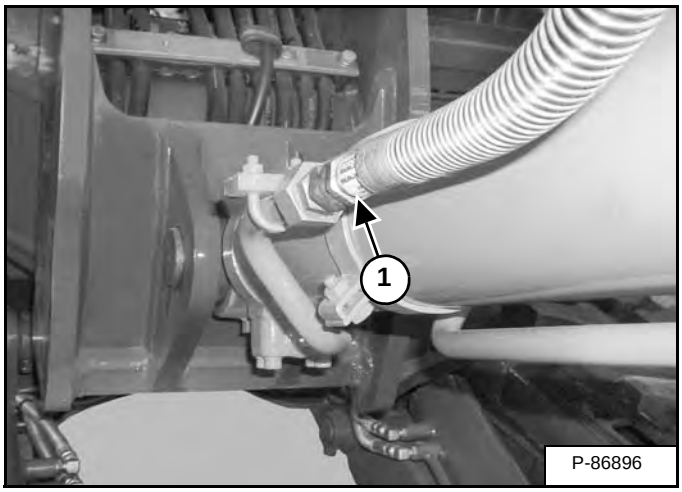


TOW VALVE – Normally in closed position

MS-1892-3

Testing (Cont'd)

Figure 20-20-8



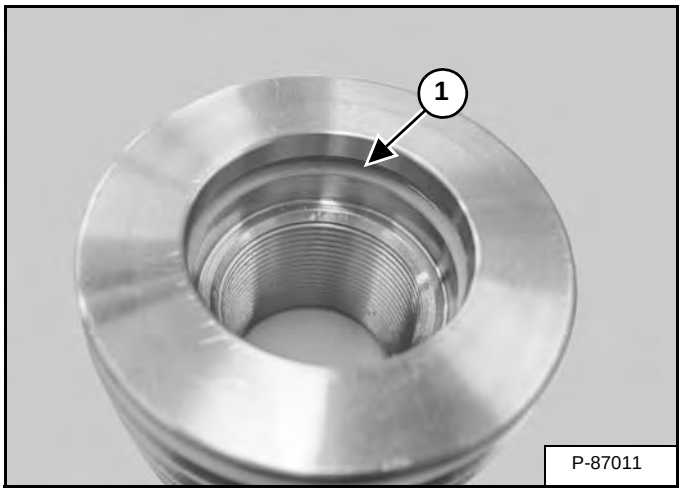
Remove the hose from the base end of the cylinder. Cap the hose (Item 1) **[Figure 20-20-8]**.

Start the engine and retract the boom cylinder.

If there is any oil leakage from the base end fitting (Item 1) **[Figure 20-20-8]**, remove the cylinder for repair or replacement.

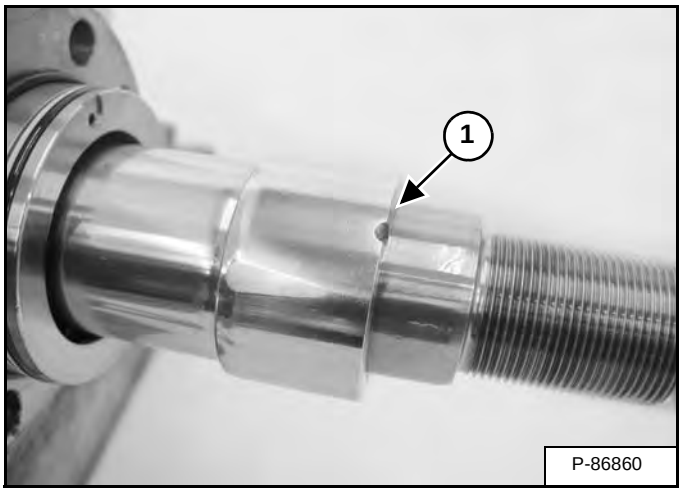
Disassembly (Cont'd)

Figure 20-20-41



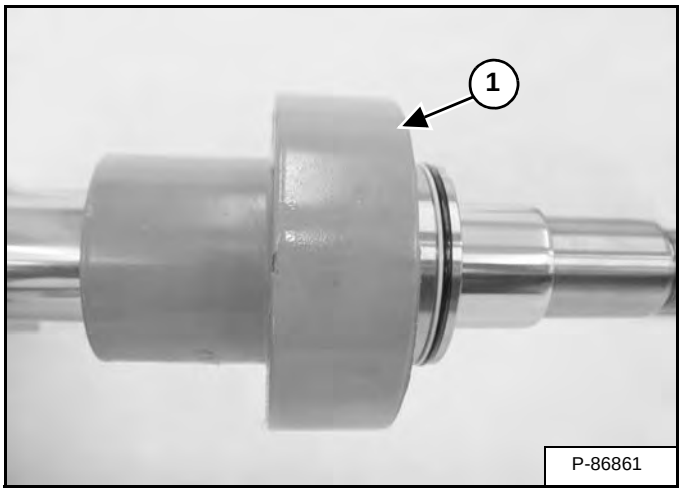
Remove the back-up ring (Item 1) **[Figure 20-20-41]** from the piston.

Figure 20-20-42



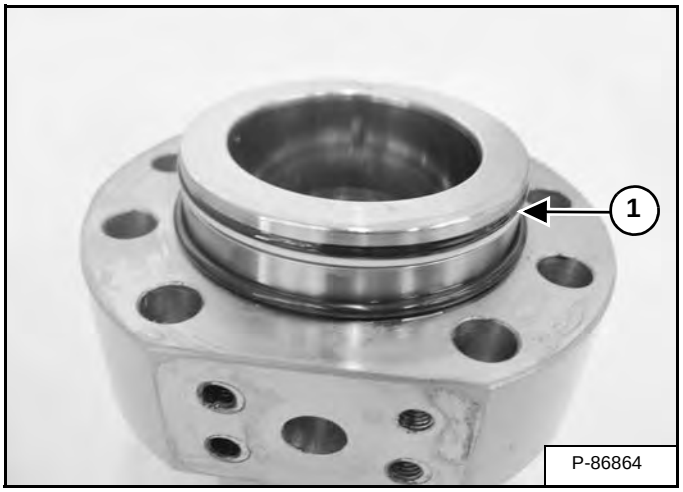
Remove the cushion ring (Item 1) **[Figure 20-20-42]** from the rod.

Figure 20-20-43



Remove the head (Item 1) **[Figure 20-20-43]** from the rod.

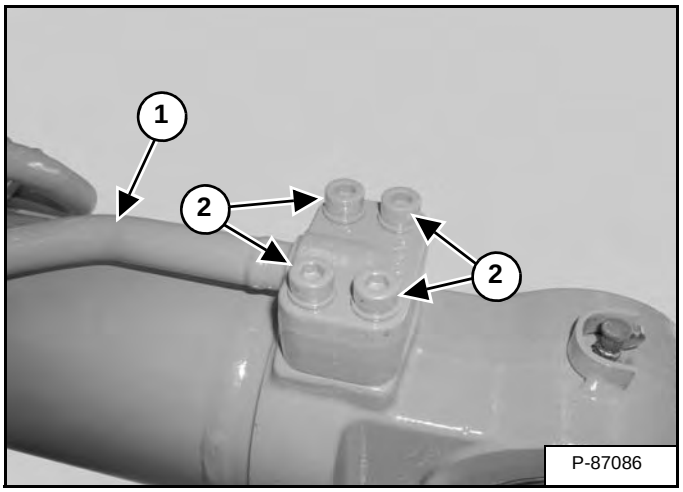
Figure 20-20-44



Remove the O-ring (Item 1) **[Figure 20-20-44]**.

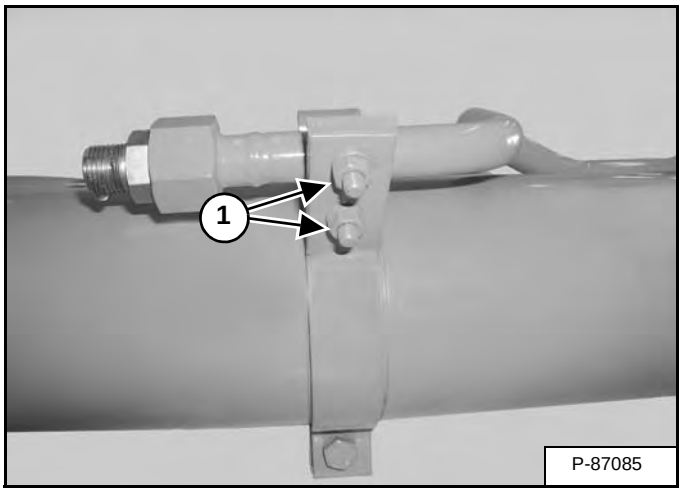
Assembly (Cont'd)

Figure 20-20-81



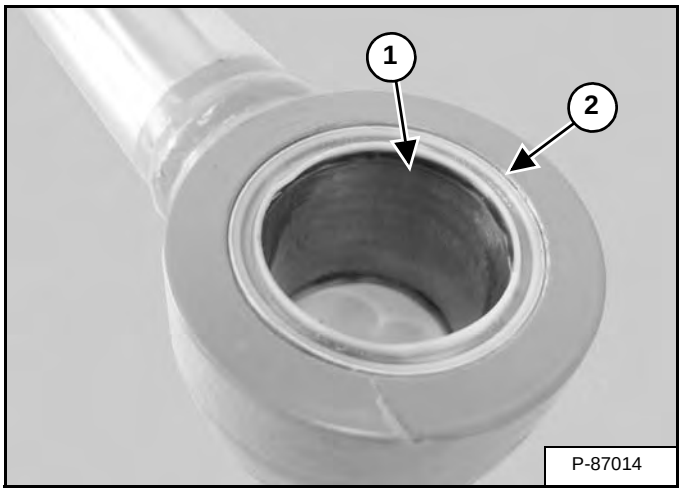
Install the tubeline (Item 1) using the four bolts (Item 2) **[Figure 20-20-81]** and lock washers.

Figure 20-20-82



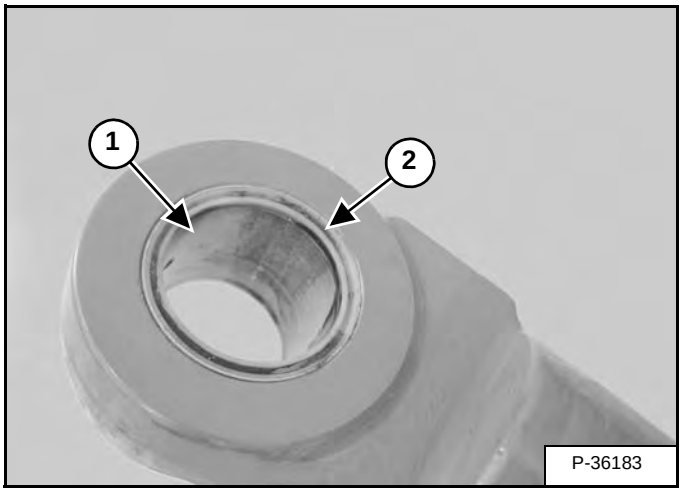
Install the U-bolt, washers and nuts (Item 1) **[Figure 20-20-82]**.

Figure 20-20-83



Install the bushing (Item 1) and seal (Item 2) **[Figure 20-20-83]** into both sides of the rod end of the cylinder.

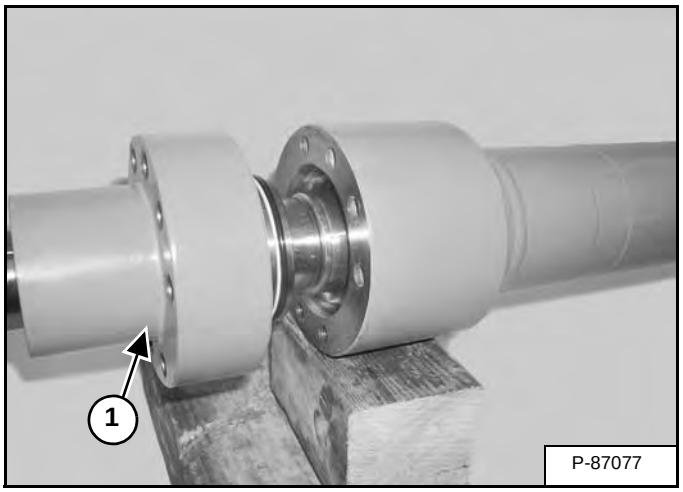
Figure 20-20-84



Install the bushing (Item 1) and seal (Item 2) **[Figure 20-20-84]** into both sides of the base end of the cylinder.

Disassembly (Cont'd)

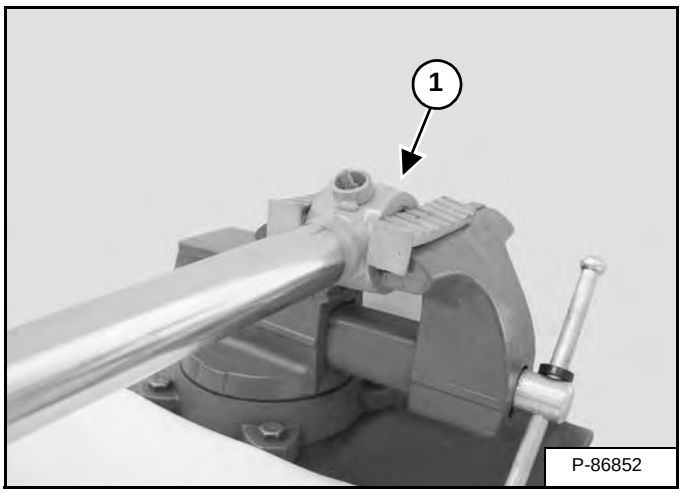
Figure 20-21-26



Remove the rod assembly (Item 1) **[Figure 20-21-26]** from the cylinder housing.

Remove the cylinder housing from the vise.

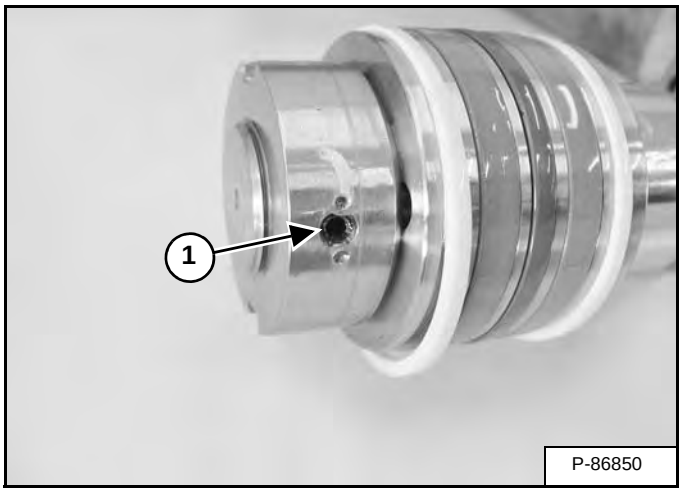
Figure 20-21-27



Clamp the rod end (Item 1) **[Figure 20-21-27]** in a vise.

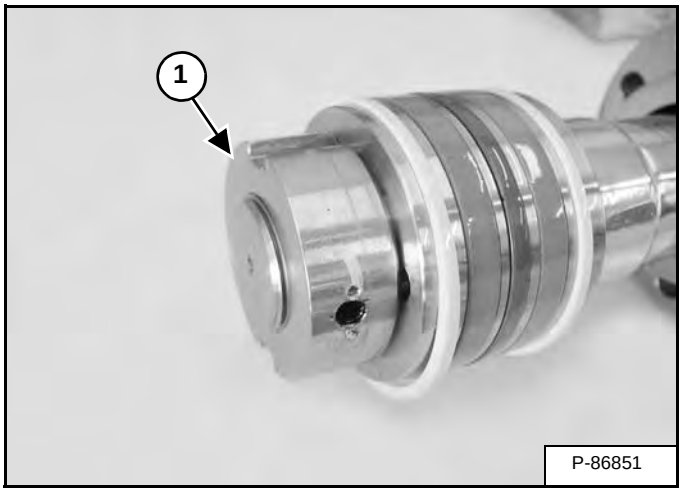
Support the end of the rod with a block.

Figure 20-21-28



Remove the set screw (Item 1) **[Figure 20-21-28]**.

Figure 20-21-29

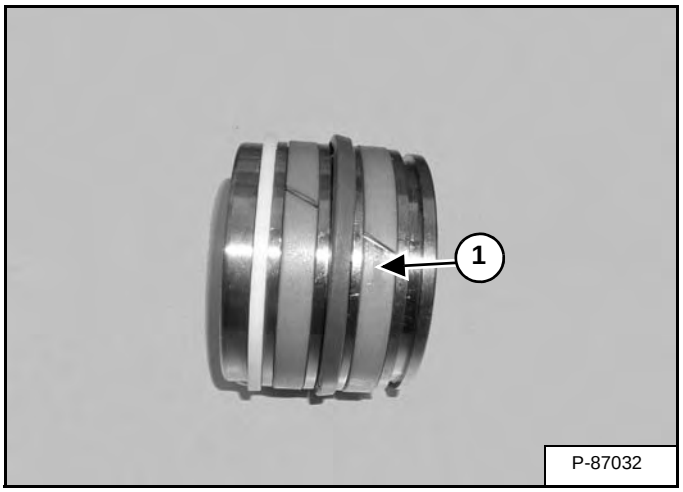


Apply moderate heat to the nut (Item 1) **[Figure 20-21-29]**.

Remove the nut.

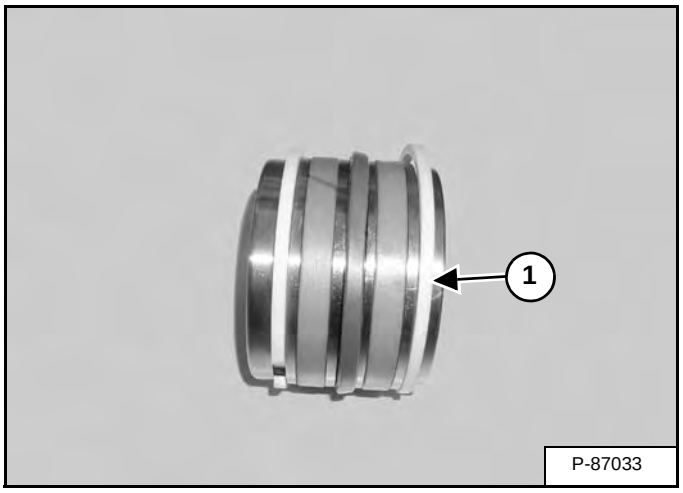
Assembly (Cont'd)

Figure 20-21-66



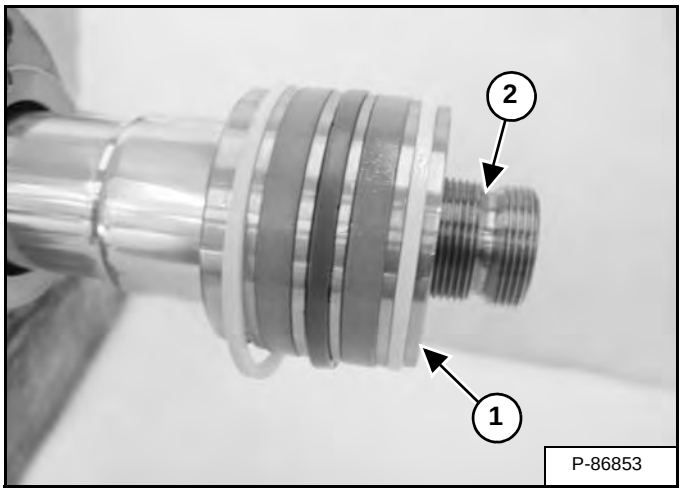
Install the wear ring (Item 1) **[Figure 20-21-66]** onto the piston.

Figure 20-21-67



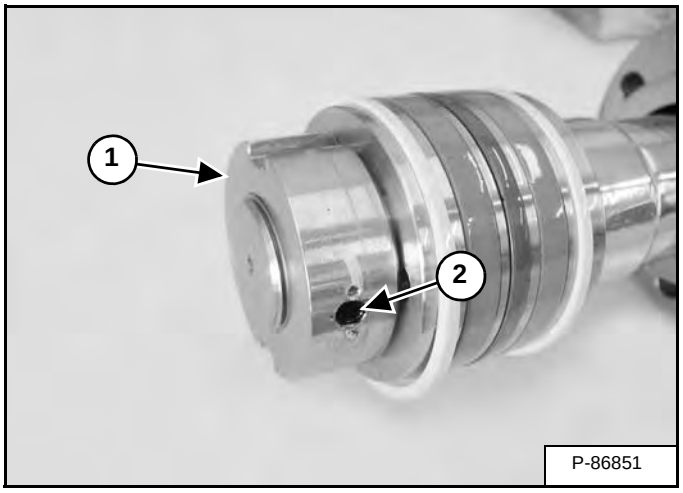
Install the seal (Item 1) **[Figure 20-21-67]** onto the piston.

Figure 20-21-68



Install the piston (Item 1) **[Figure 20-21-68]** onto the rod.

Figure 20-21-69

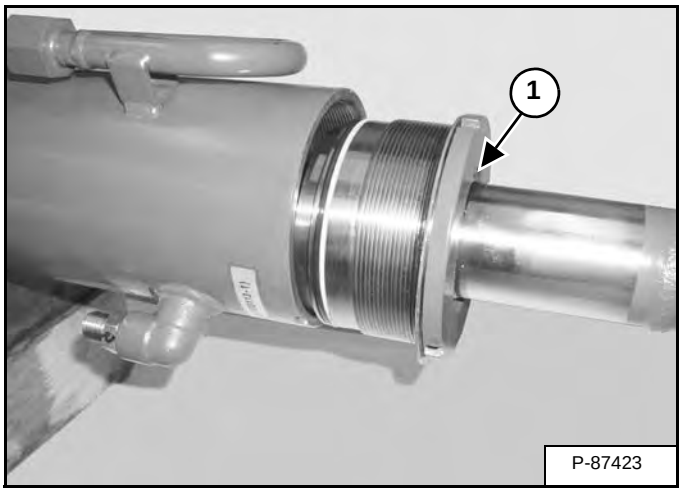


Install the nut (Item 1) **[Figure 20-21-69]**.

Tighten the nut until the bore (Item 2) **[Figure 20-21-69]** of the set screw is aligned with the groove (Item 2) **[Figure 20-21-68]** of the rod.

Disassembly (Cont'd)

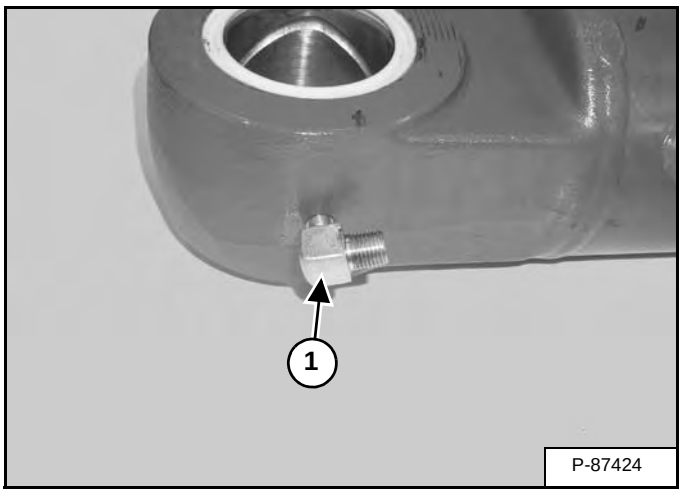
Figure 20-22-21



Remove the rod assembly (Item 1) **[Figure 20-22-21]** from the housing.

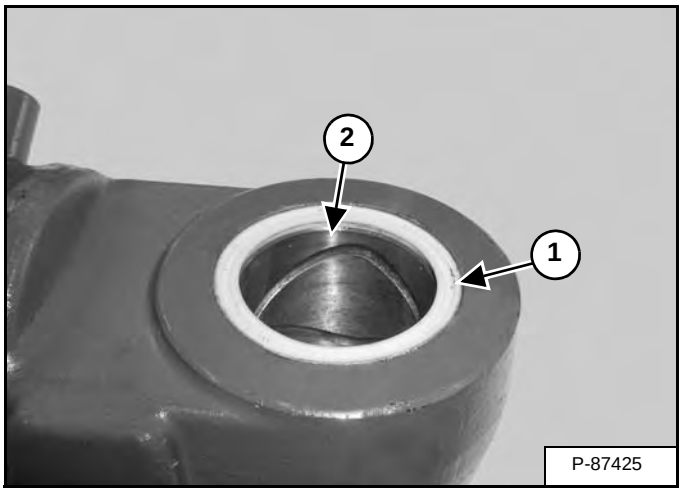
Remove the cylinder from the vise.

Figure 20-22-22



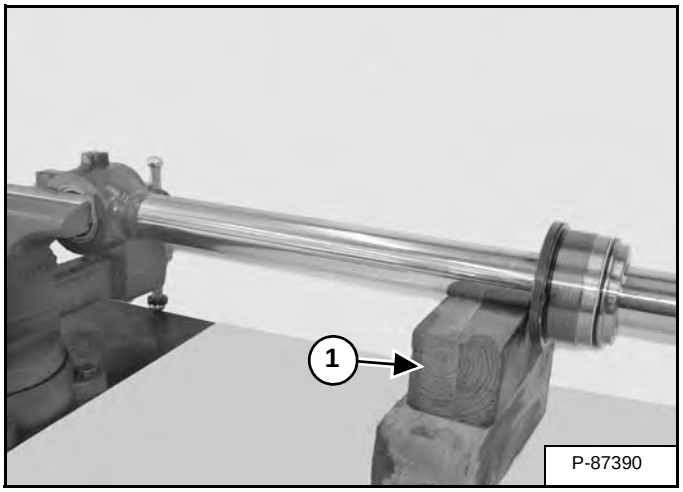
Remove the fitting (Item 1) **[Figure 20-22-22]**.

Figure 20-22-23



Remove the seal (Item 1) (both sides) and bushing (Item 2) **[Figure 20-22-23]**.

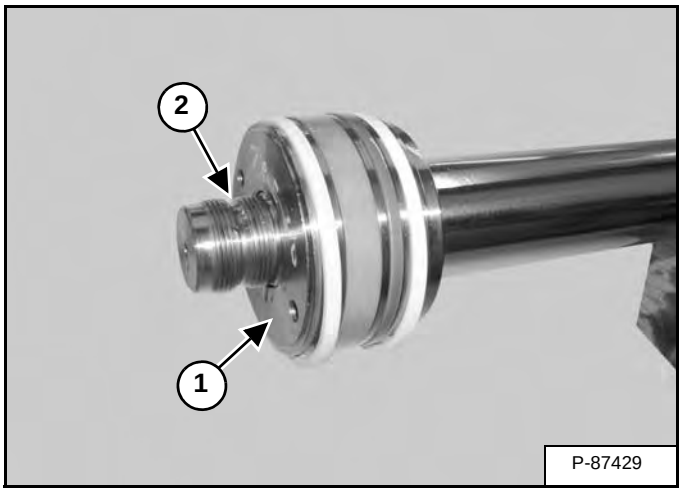
Figure 20-22-24



Clamp the rod end in a vise. Support the rod with a block (Item 1) **[Figure 20-22-24]**.

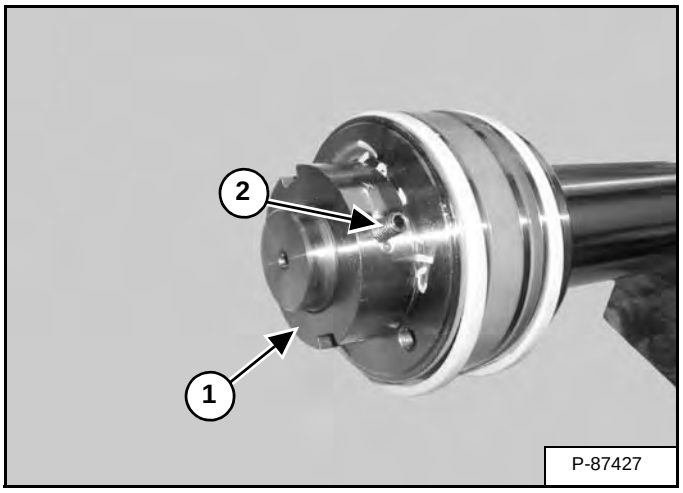
Assembly (Cont'd)

Figure 20-22-60



Install the piston (Item 1) **[Figure 20-22-60]**.

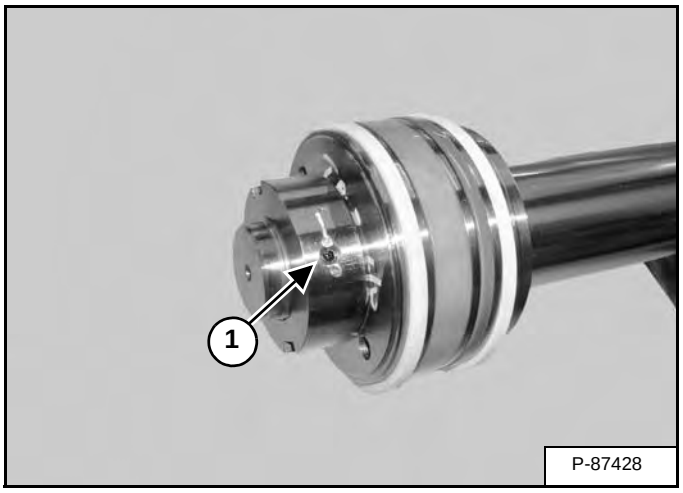
Figure 20-22-61



Install the nut (Item 1) **[Figure 20-22-61]**.

Tighten the nut until the bore (Item 2) **[Figure 20-22-61]** of the set screw is aligned with the groove (Item 2) **[Figure 20-22-60]** of the rod.

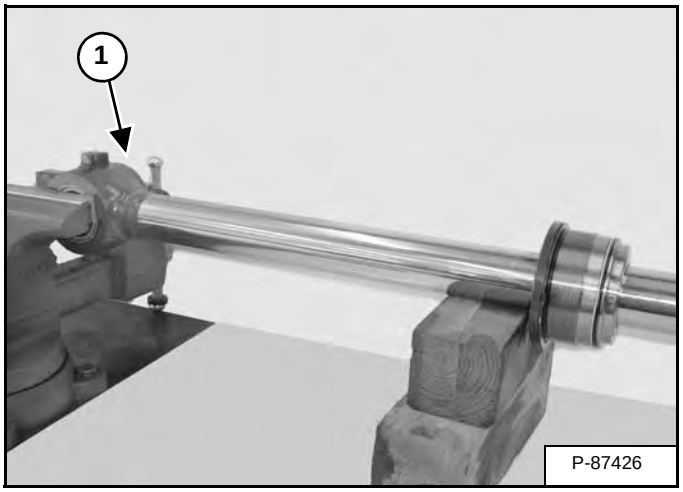
Figure 20-22-62



Install the set screw (Item 1) **[Figure 20-22-61]**.

Use a center punch to deform the threads of the set screw bore.

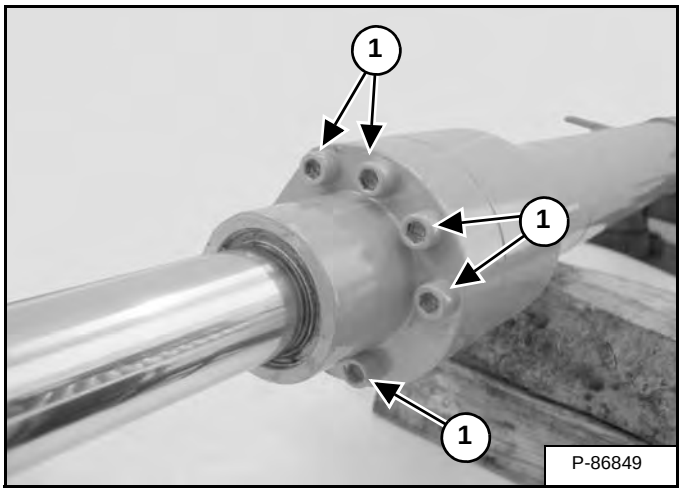
Figure 20-22-63



Remove the rod end (Item 1) **[Figure 20-22-63]** from the vise.

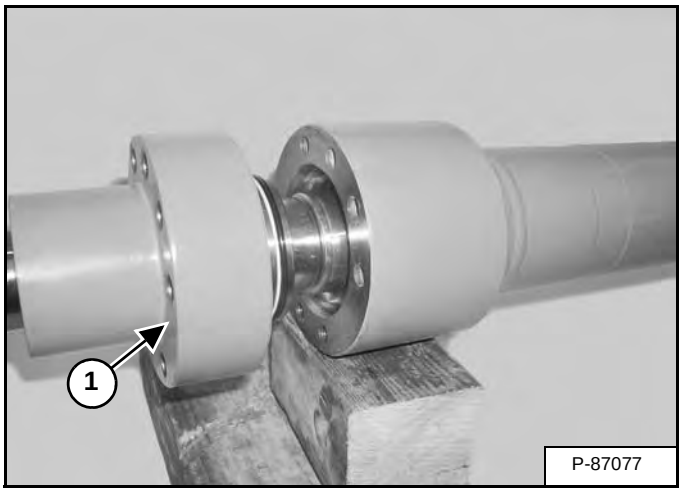
Disassembly (Cont'd)

Figure 20-23-20



Remove the eight bolts (Item 1) **[Figure 20-23-20]**.

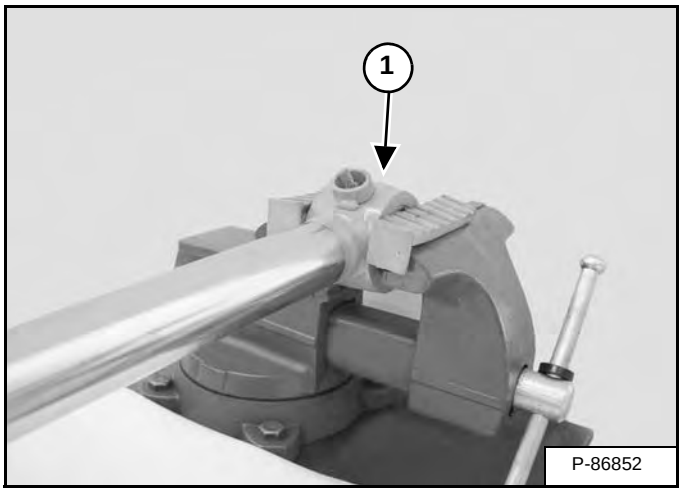
Figure 20-23-21



Remove the rod assembly (Item 1) **[Figure 20-23-21]** from the cylinder housing.

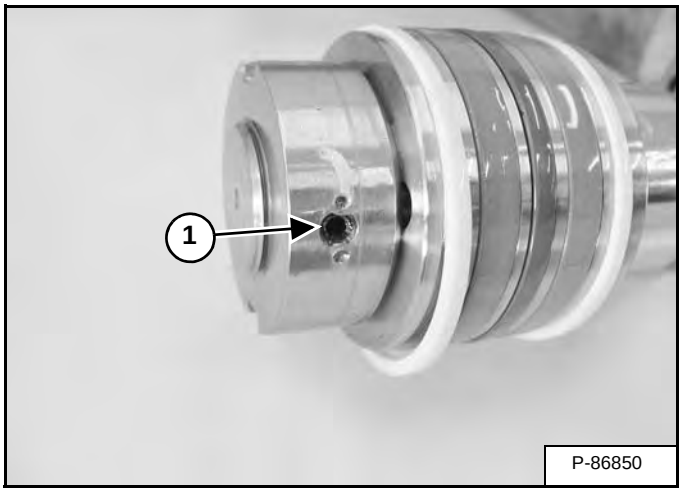
Remove the cylinder housing from the vise.

Figure 20-23-22



Clamp the rod end (Item 1)**[Figure 20-23-22]** in a vise. Support the end of the rod with a block.

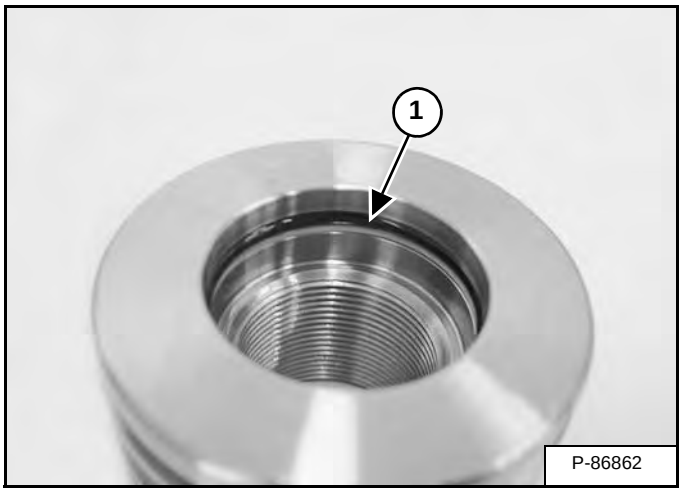
Figure 20-23-23



Remove the set screw (Item 1) **[Figure 20-23-23]**.

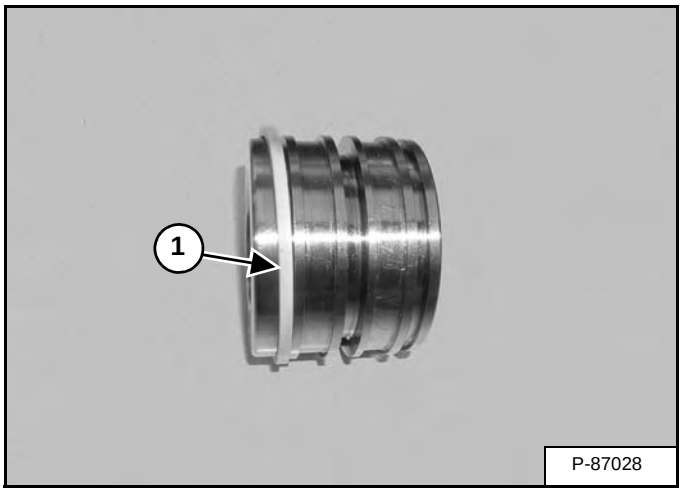
Assembly (Cont'd)

Figure 20-23-56



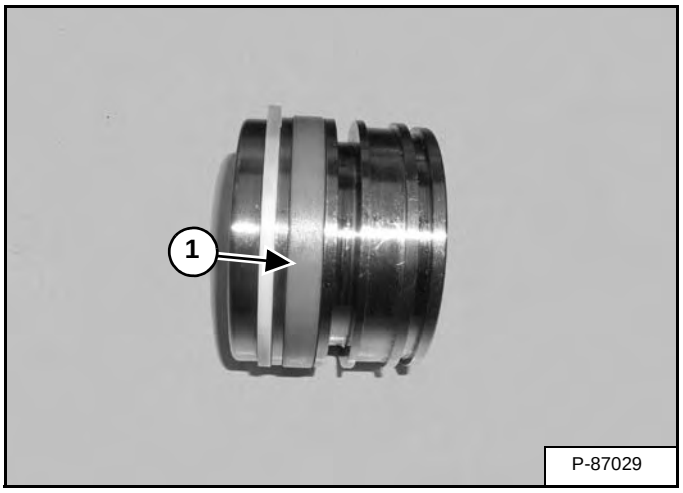
Install the O-ring (Item 1) **[Figure 20-23-56]** into the piston.

Figure 20-23-57



Install the seal (Item 1) **[Figure 20-23-57]** onto the piston.

Figure 20-23-58



Install the wear ring (Item 1) **[Figure 20-23-58]** onto the piston.

Figure 20-23-59

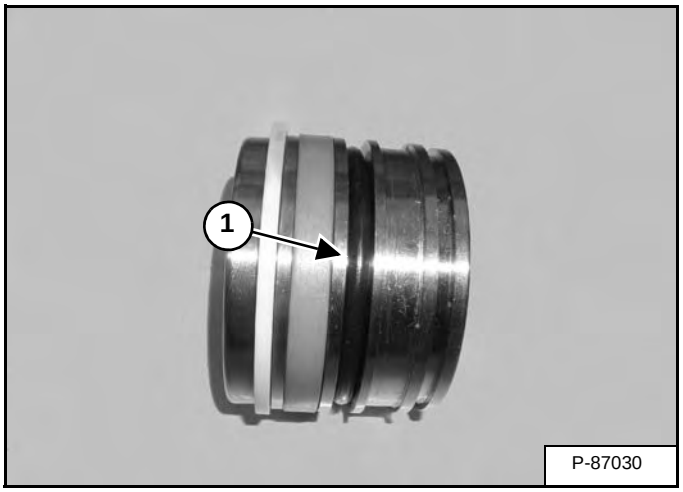
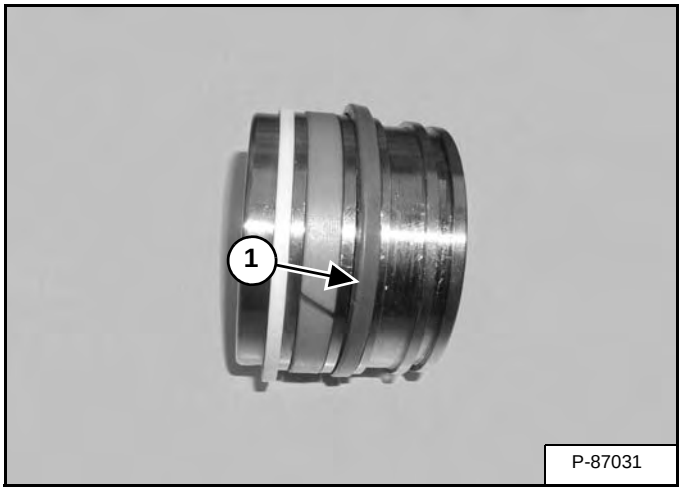


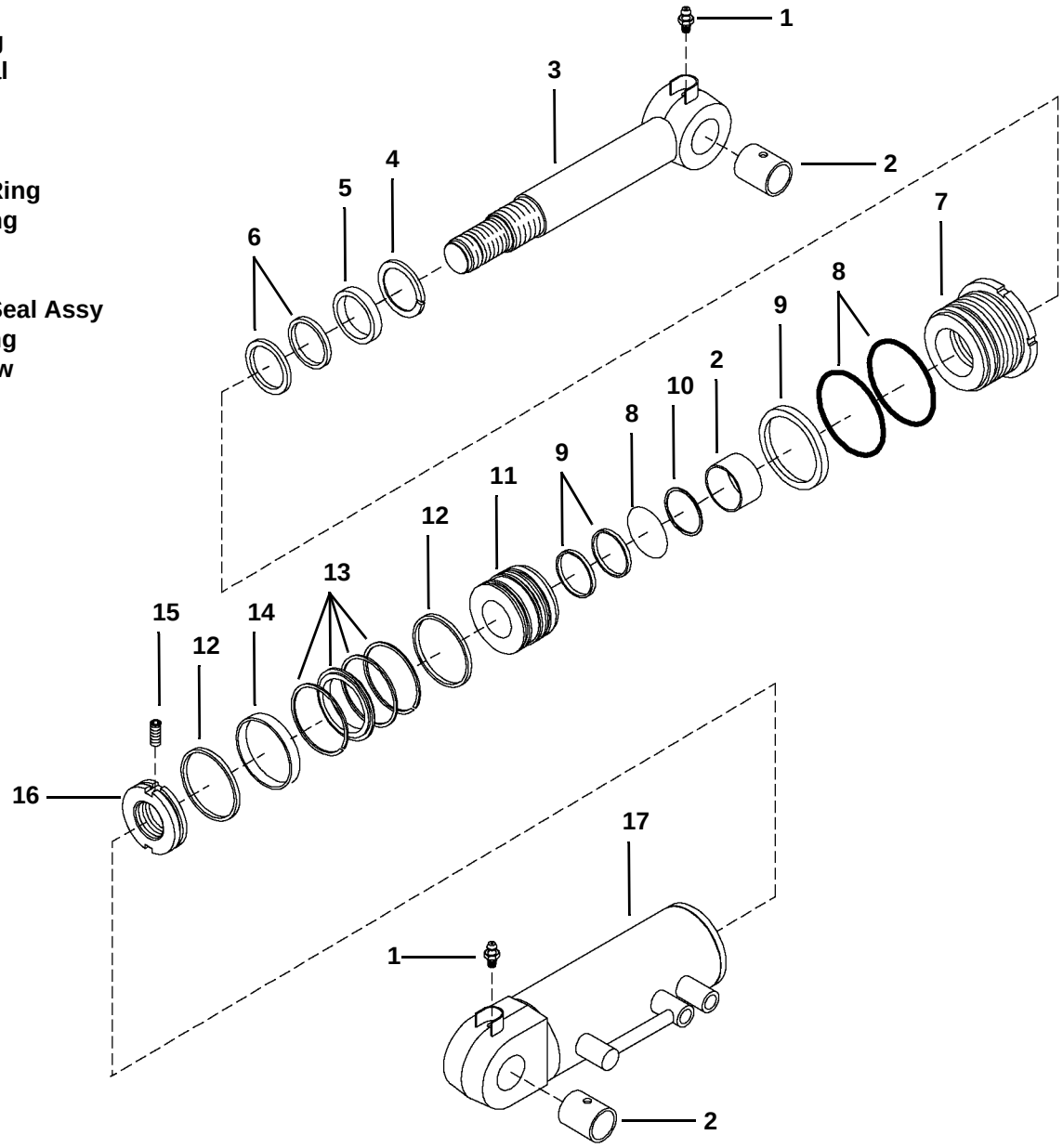
Figure 20-23-60



Install the O-ring (Item 1) **[Figure 20-23-59]** and seal (Item 1) **[Figure 20-23-60]** onto the piston.

Parts Identification

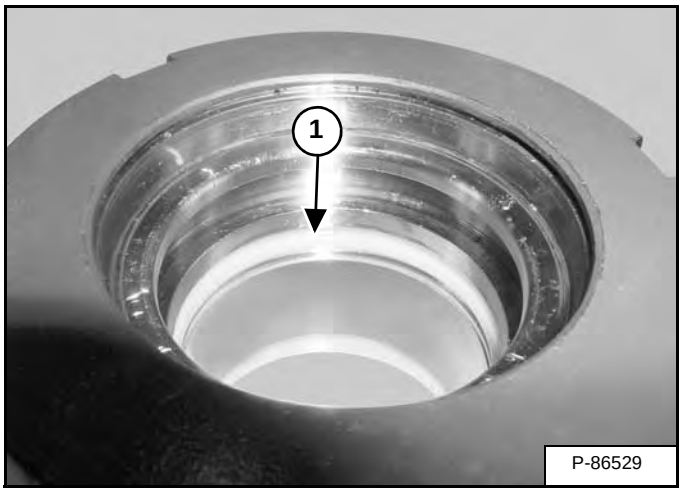
1. Grease Fitting
2. Bushing
3. Rod
4. Snap Ring
5. Wiper Seal
6. Seal
7. Head
8. O-ring
9. Back-up Ring
10. Snap Ring
11. Piston
12. Seal
13. Slipper Seal Assy
14. Wear Ring
15. Set Screw
16. Nut
17. Housing



MS-2796S

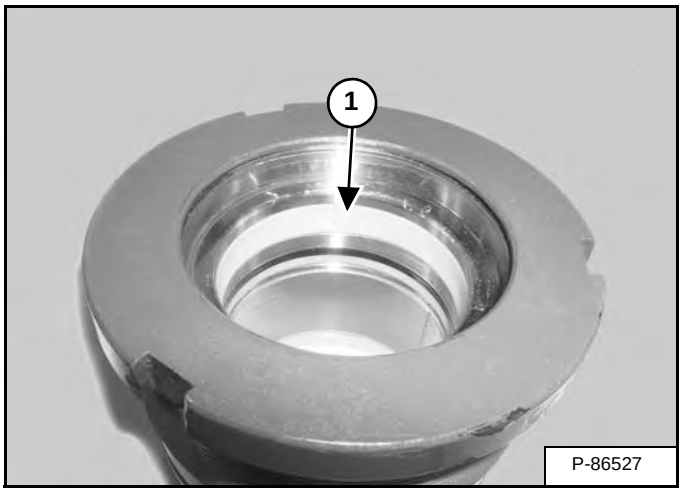
Assembly (Cont'd)

Figure 20-24-44



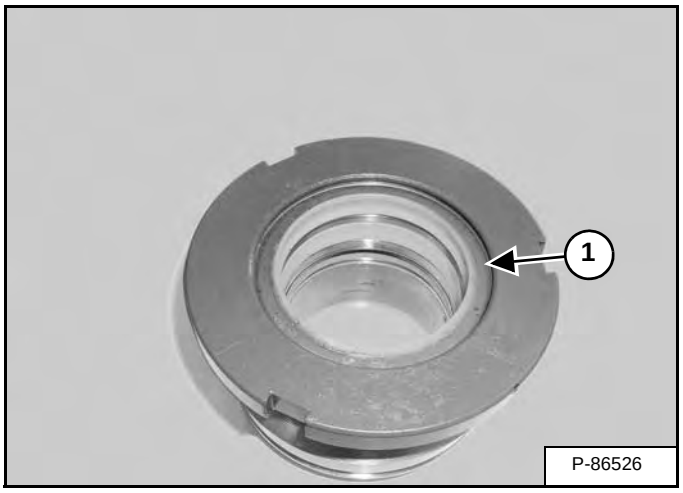
Install the seal (Item 1) **[Figure 20-24-44]**.

Figure 20-24-45



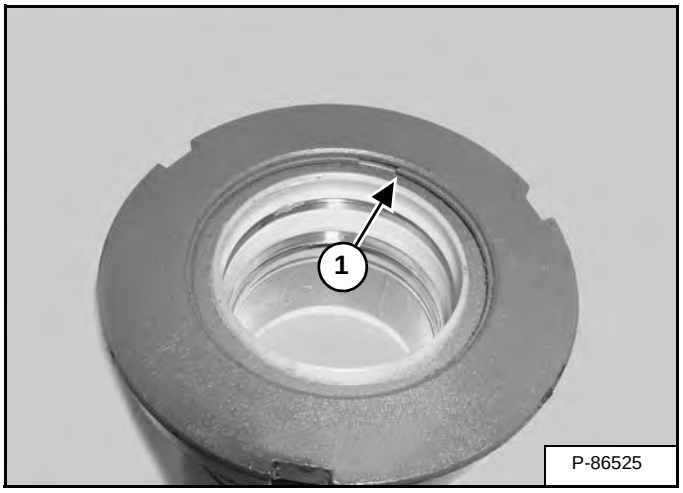
Install the seal (Item 1) **[Figure 20-24-45]**.

Figure 20-24-46



Install the wiper seal (Item 1) **[Figure 20-24-46]**.

Figure 20-24-47



Install the snap ring (Item 1) **[Figure 20-24-47]**.

CYLINDER (ARTICULATED BOOM) (OPTIONAL) (CONT'D)

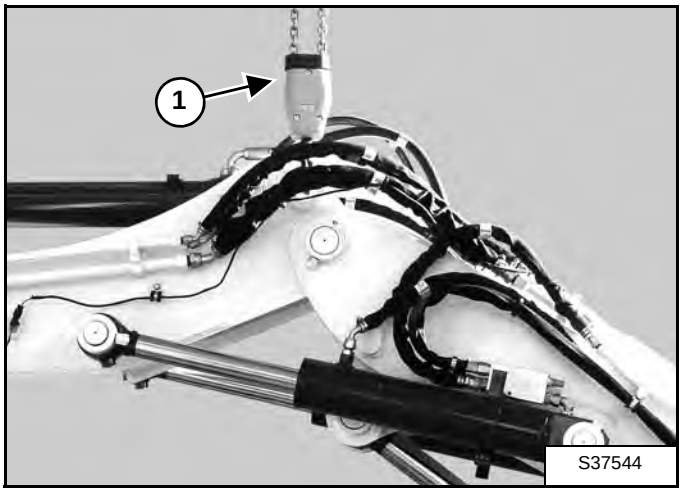
Removal And Installation

NOTE: The left cylinder is shown. The procedure is the same for the right cylinder.

Lower the boom / bucket and blade to the ground.

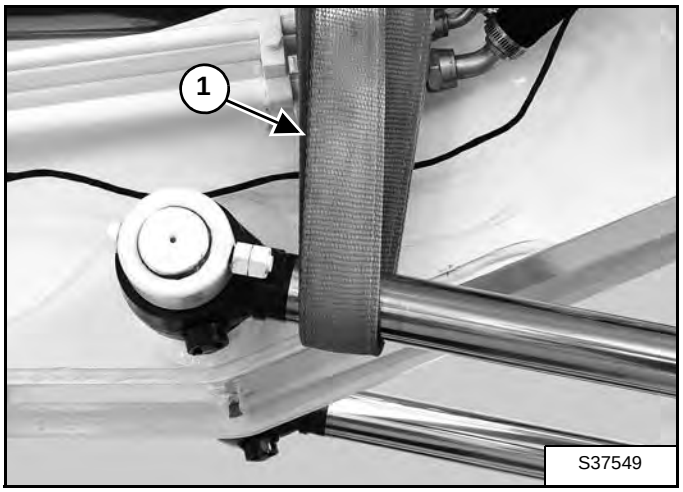
With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 20-25-6



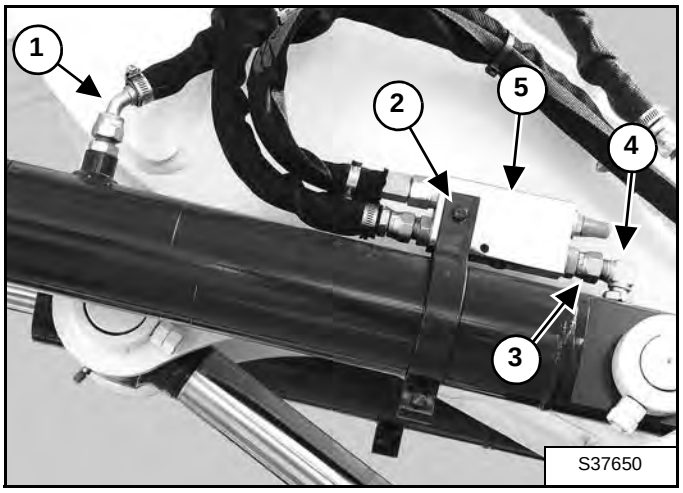
Support the boom with a chain hoist (Item 1) **[Figure 20-25-6]**.

Figure 20-25-7



Install a sling (Item 1) **[Figure 20-25-7]** and lifting device to the rod end of the cylinder.

Figure 20-25-8



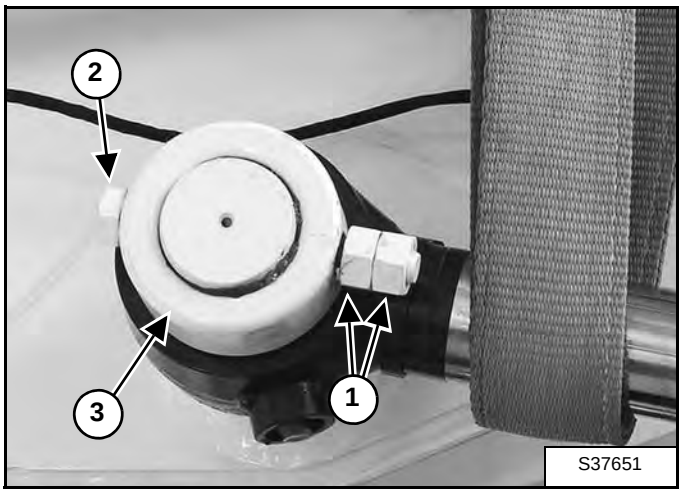
Remove the hose (Item 1) **[Figure 20-25-8]**.

Remove the bolt (Item 2) **[Figure 20-25-8]** and washer.

Remove the adapter (Item 3) from the fitting (Item 4) **[Figure 20-25-8]**.

Remove the valve (Item 5) **[Figure 20-25-8]** from the cylinder housing.

Figure 20-25-9

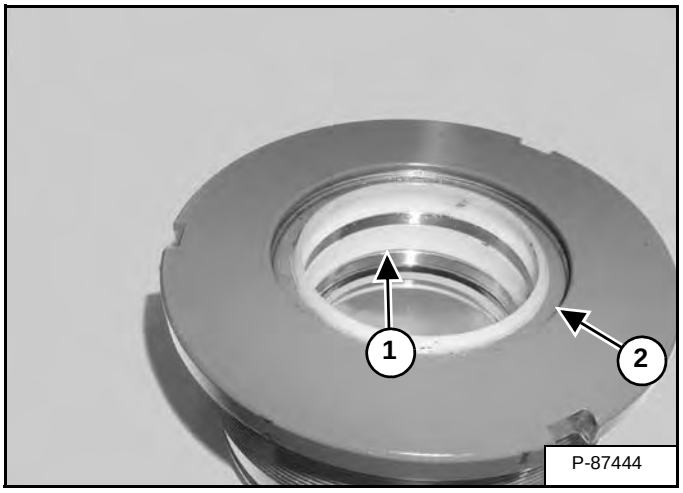


Remove the nuts (Item 1) and bolt (Item 2) **[Figure 20-25-9]**.

Remove the stopper (Item 3) and shims. **[Figure 20-25-9]**.

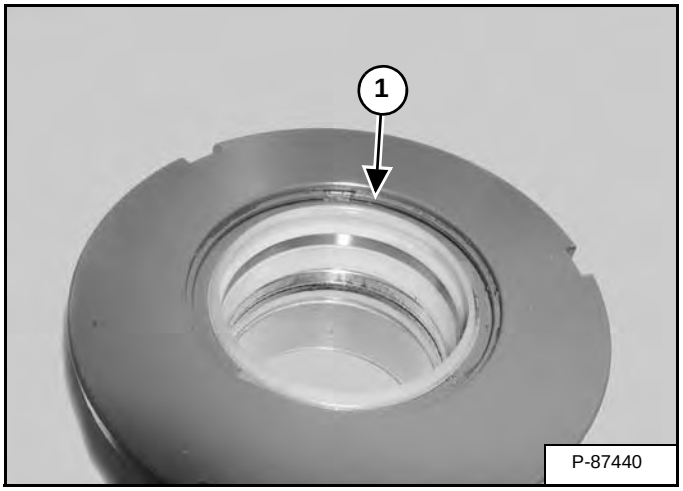
Assembly (Cont'd)

Figure 20-25-38



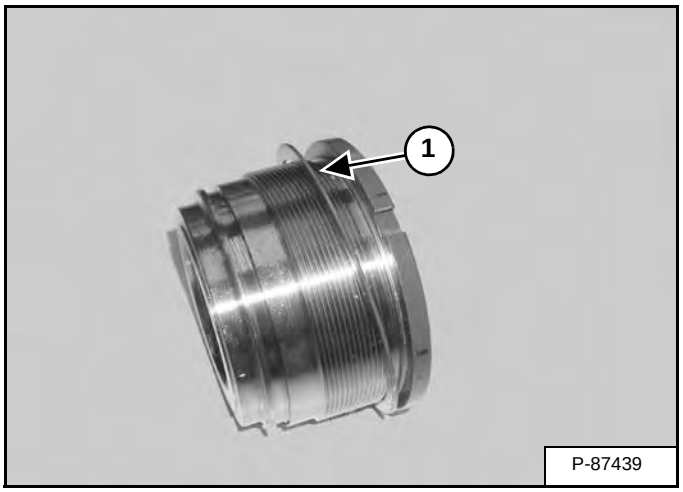
Install the inner seal (Item 1) and wiper seal (Item 2) **[Figure 20-25-38]**.

Figure 20-25-39



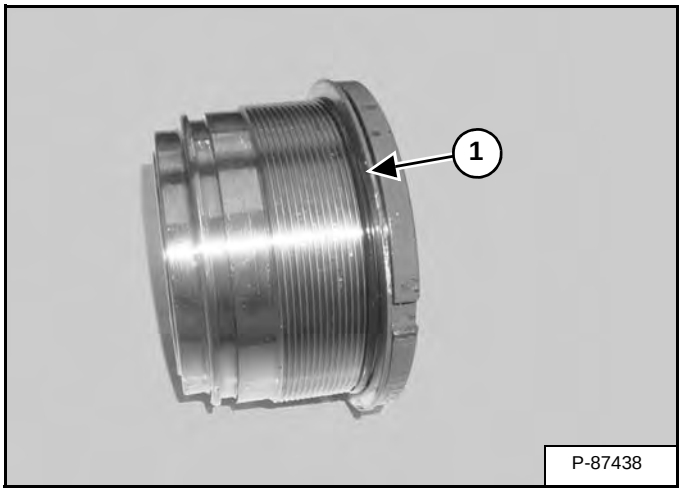
Install the snap ring (Item 1) **[Figure 20-25-39]**.

Figure 20-25-40



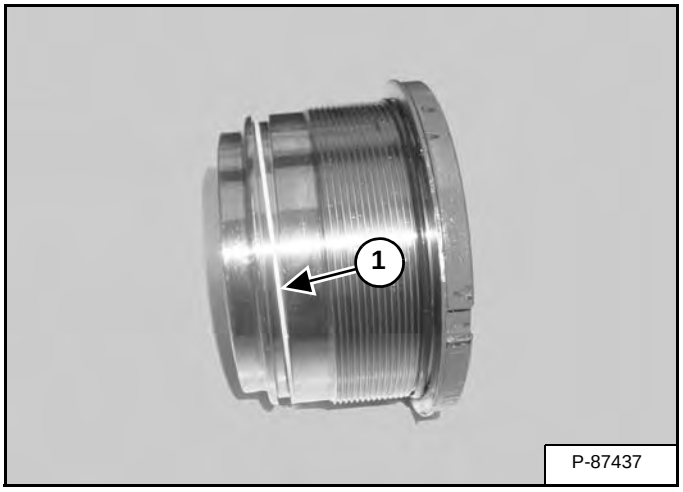
Install the lock ring (Item 1) **[Figure 20-25-40]**.

Figure 20-25-41



Install the O-ring (Item 1) **[Figure 20-25-41]**.

Figure 20-25-42



Install the back-up ring (Item 1) **[Figure 20-25-42]**.

VALVE (PILOT PRESSURE RELIEF)

Testing And Adjusting The Pressure Reducing Valve

The pressure reducing valve supplies lower hydraulic pressure to joysticks.

With the engine off, and the key in the run position, lower the left console and move both joysticks to relieve hydraulic pressure.

Tilt the cab. (See Tilting The Cab on Page 10-210-1.)

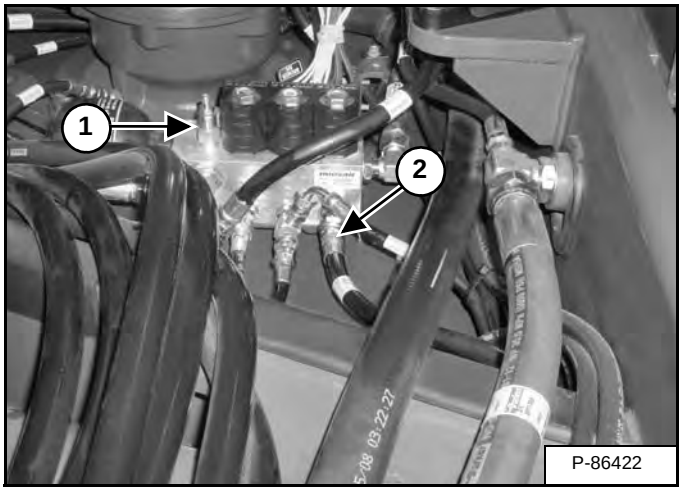
⚠ WARNING

AVOID INJURY OR DEATH

Never work under the excavator cab without installing an approved cab support device.

W-2435-0502

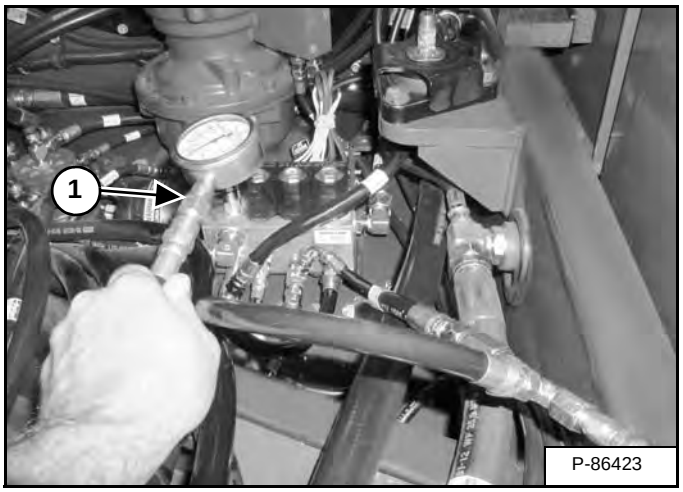
Figure 10-141-1



The pressure reducing valve (Item 1) **[Figure 10-141-1]** is located on the end of the manifold.

Remove the hose (Item 2) **[Figure 10-141-1]** from the A-1 port.

Figure 20-32-1



Install the test fittings and 6900 kPa (69 bar) (1000 psi) gauge (Item 1) **[Figure 20-32-1]** in between the A-1 port fitting and existing hose. Route the gauge to the outside of the excavator.

Lower the cab. (See Tilting The Cab on Page 10-210-1.)

Enter the cab, start the engine and warm up the hydraulic fluid to operating temperature.

With the hydraulic fluid at operating temperature, run the engine at full rpm.

The pressure at the gauge should be 3200 kPa (32 bar) (464 psi).

Move the engine speed control to low idle speed.

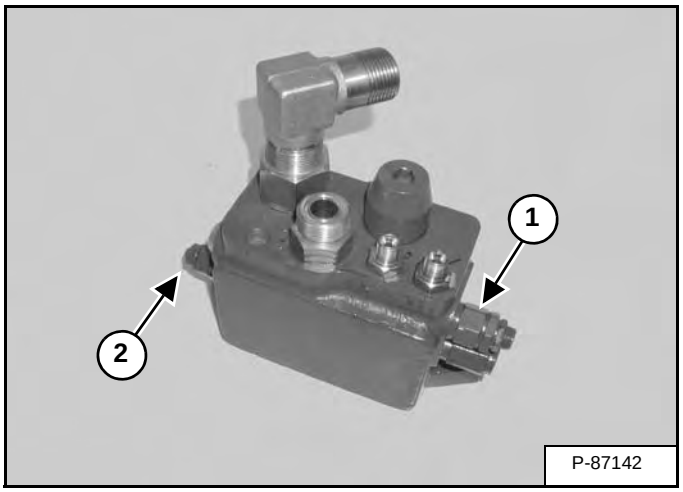
Stop the engine.

With the engine off, and the key in the run position, lower the left console and move both joysticks to relieve hydraulic pressure.

If adjustment is needed, remove the center cover. (See Removal And Installation on Page 40-70-1.)

Inlet Valve Section Disassembly And Assembly

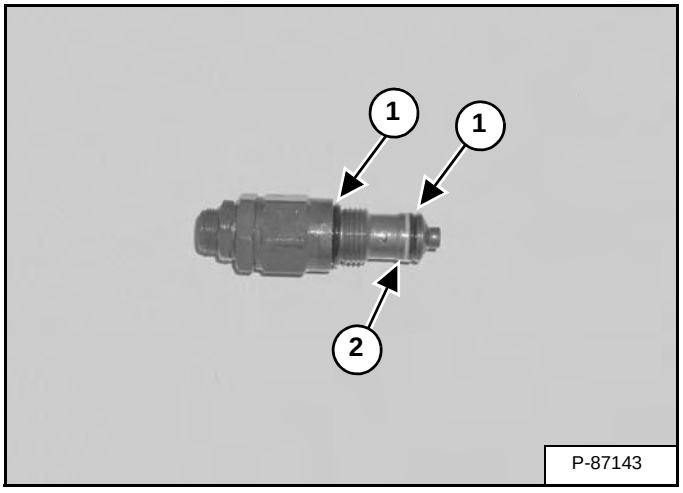
Figure 20-40-25



Remove the load sense relief valve (Item 1) and back-up relief valve (Item 2) **[Figure 20-40-25]**.

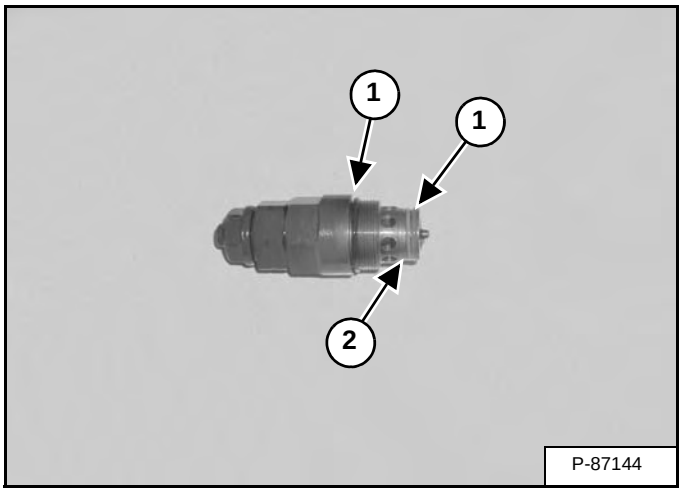
Installation: Tighten the relief valves to 41 - 49 N•m (30 - 60 ft-lb) torque.

Figure 20-40-26



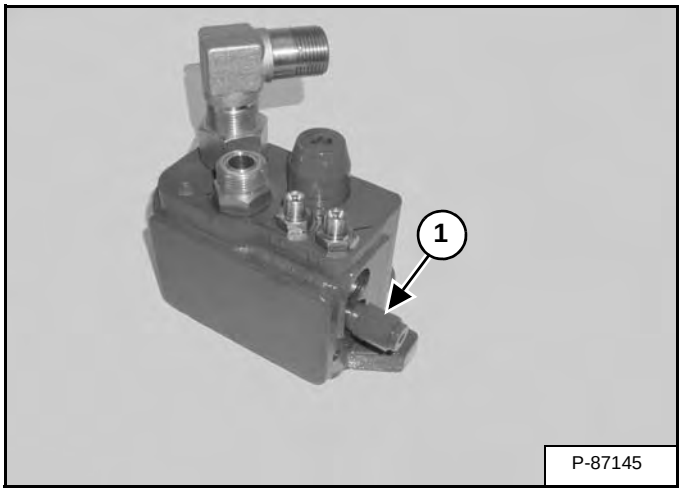
Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-26]** from the load sense relief valve.

Figure 20-40-27



Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-27]** from the back-up relief valve.

Figure 20-40-28

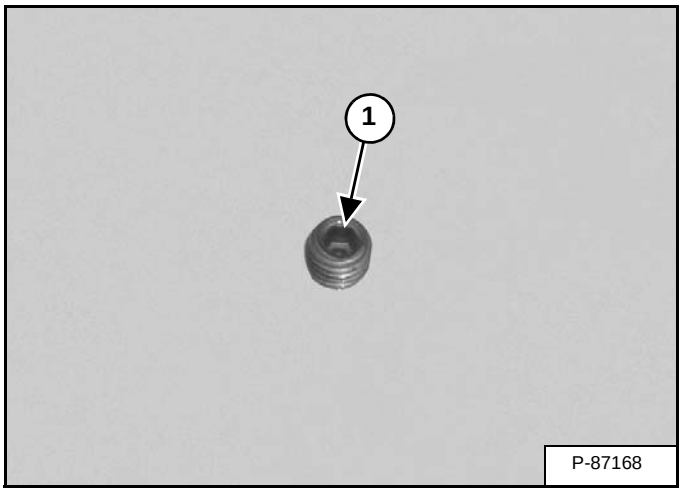


Remove the load sense bleed cartridge (Item 1) **[Figure 20-40-28]**.

Installation: Tighten the cartridge to 18 - 22 N•m (13 - 17 ft-lb) torque.

Left Travel, Right Travel And Blade Valve Section Disassembly And Assembly (Cont'd)

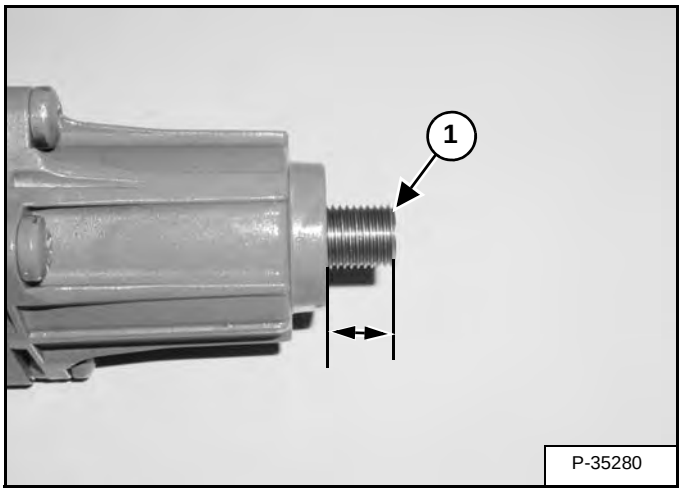
Figure 20-40-62



Inspect the orifice (Item 1) **[Figure 20-40-62]** for damage and plugging.

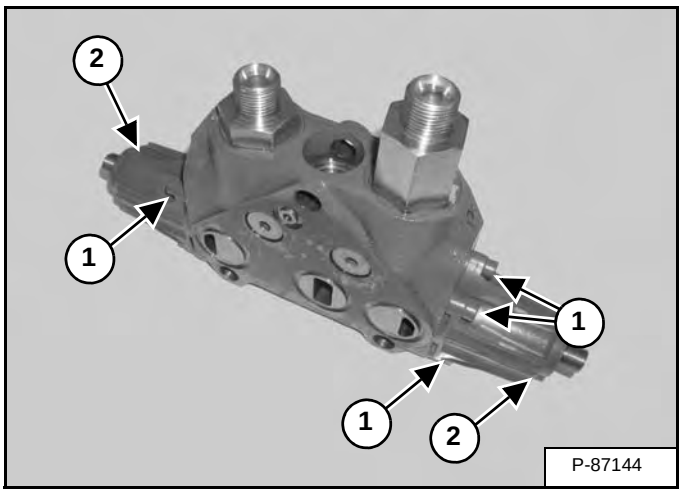
Articulated Boom Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-98



Record the distance of the spool stroke limitation adjustment screw (Item 1) **[Figure 20-40-98]** for correct installation.

Figure 20-40-99

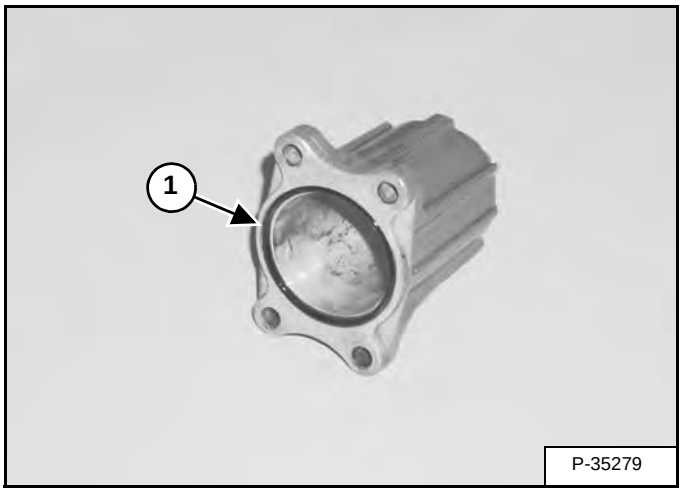


Remove the four screws (Item 1) **[Figure 20-40-99]** from both ends of the valve.

Installation: Tighten the screws to 25 N•m (18 ft-lb) torque.

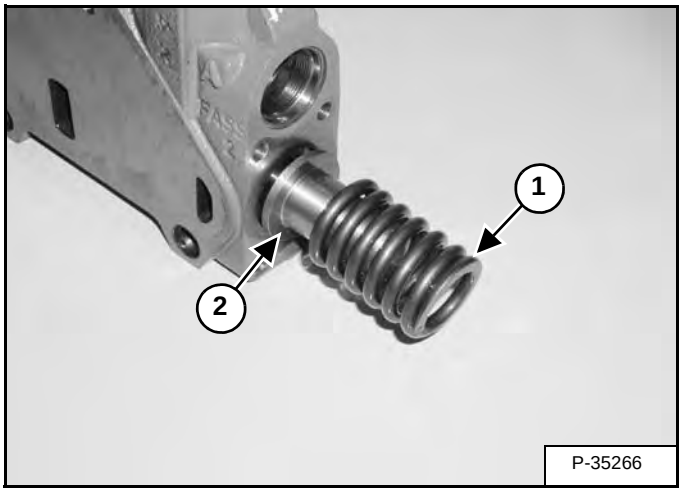
Remove both covers (Item 2) **[Figure 20-40-99]**

Figure 20-40-100



Remove the O-ring (Item 1) **[Figure 20-40-100]**.

Figure 20-40-101



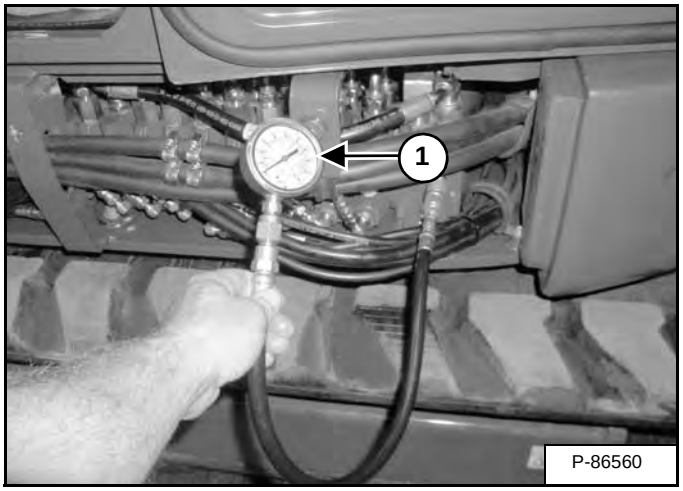
Remove the centering spring (Item 1) **[Figure 20-40-101]**.

Remove the spring seat (Item 2) **[Figure 20-40-101]** from both ends.

Pump Testing (Cont'd)

Load Sense Relief Valve Adjustment

Figure 20-50-13



Install a 69000 kPa (690 bar) (10000 psi) pressure gauge on the test coupler (Item 1) **[Figure 20-50-13]**.

Move the engine speed control to the high idle position.

Raise the blade until the blade cylinders are fully retracted and the relief valve opens.

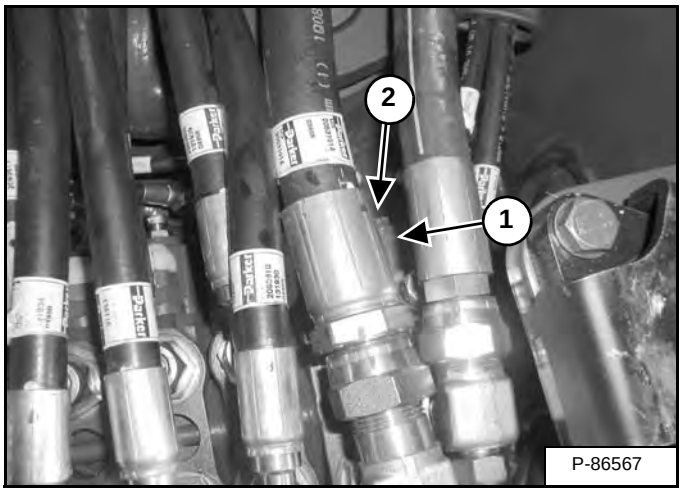
Record the pressure.

The pressure at the gauge (Item 2) **[Figure 20-50-13]** should be 28000 (280 bar) (4060 psi).

Stop the engine.

Tilt the cab. (See Tilting The Cab on Page 10-210-1.)

Figure 20-50-14



Loosen the lock nut (Item 1) **[Figure 20-50-14]**.

Turn the adjustment screw (Item 2) **[Figure 20-50-14]** inwards to increase pressure and outwards to decrease pressure.

NOTE: One quarter turn is approximately 1380 kPa (13,8 bar) (200 psi).

Tighten the lock nut and lower the cab.

⚠ WARNING

AVOID INJURY OR DEATH

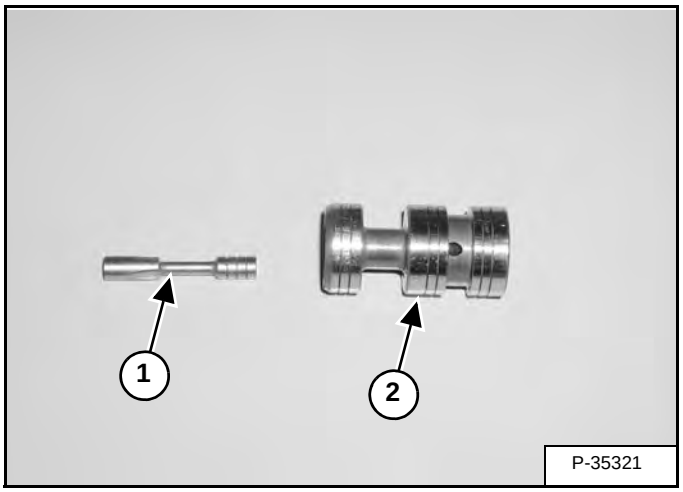
Never work under the excavator cab without installing an approved cab support device.

W-2435-0502

Retest the load sense relief valve.

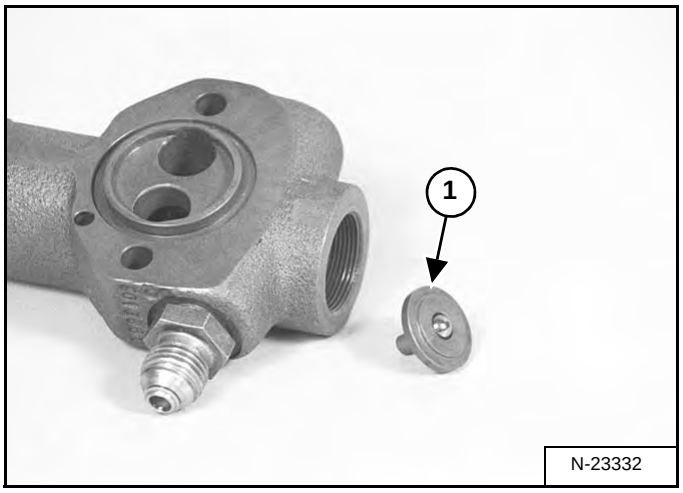
Torque Limiter Valve Disassembly (Cont'd)

Figure 20-50-42



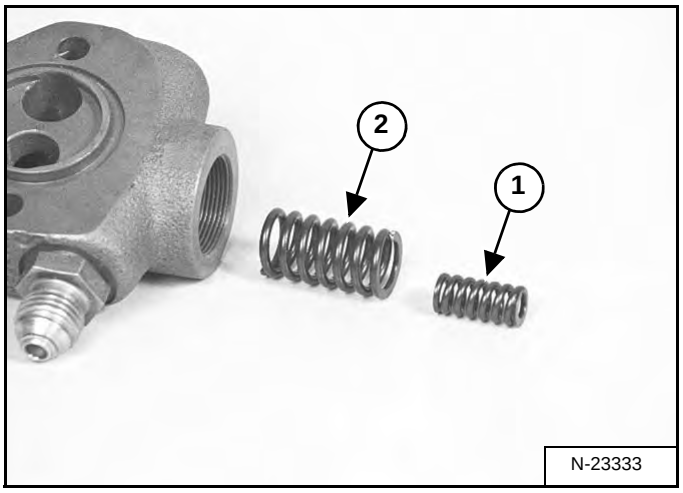
Remove the metering spool (Item 1) from the control spool (Item 2) **[Figure 20-50-42]**.

Figure 20-50-43



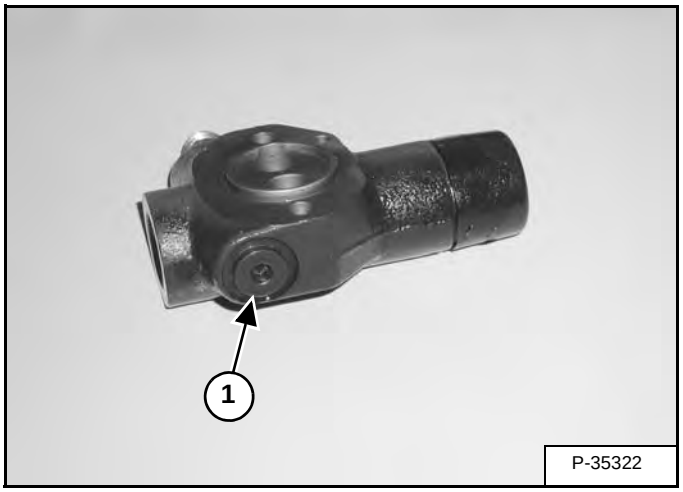
Remove the spring retainer (Item 1) **[Figure 20-50-43]** from the torque limiter valve.

Figure 20-50-44



Remove the two springs (Items 1 and 2) **[Figure 20-50-44]**.

Figure 20-50-45

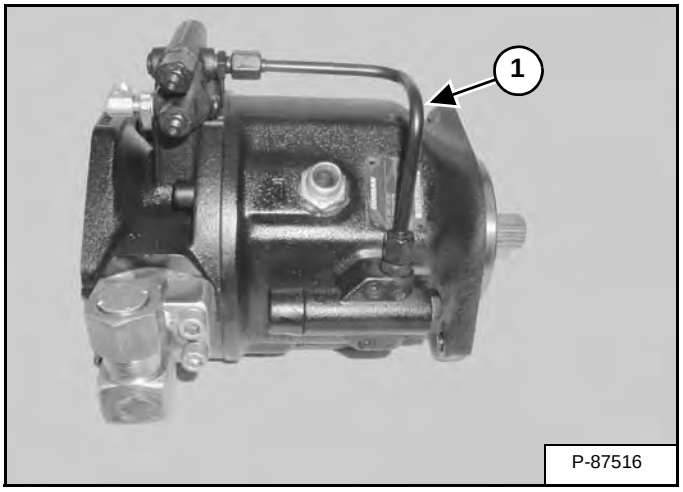


Remove the plug (Item 1) **[Figure 20-50-45]**.

Pump Control Removal And Installation

Clean the outside of the pump with clean solvent and dry it with compressed air before removing any components from the pump.

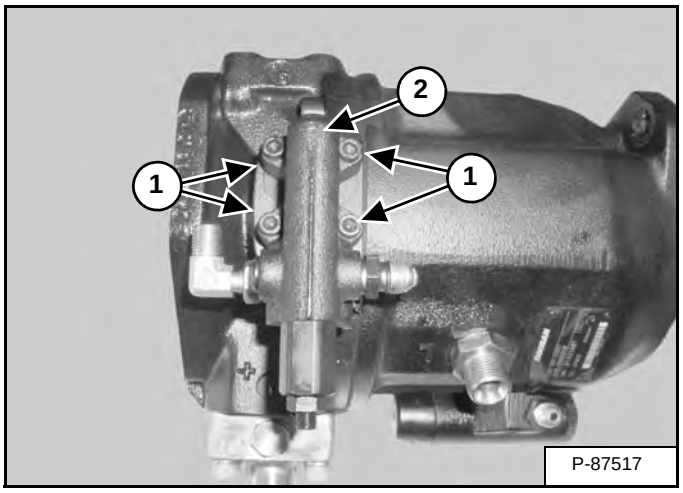
Figure 20-50-70



Mark the tubeline (Item 1) **[Figure 20-50-70]** for correct assembly.

Remove the tubeline (Item 1) **[Figure 20-50-70]** from the pump control and torque limiter valve.

Figure 20-50-71

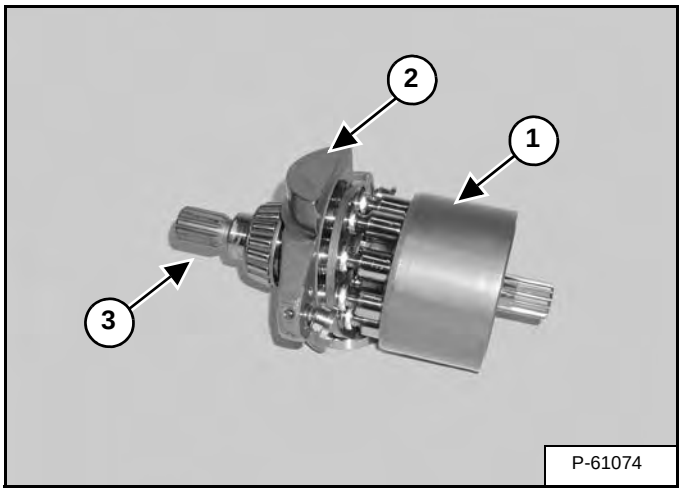


Remove the four bolts (Item 1) and remove the pump control (Item 2) **[Figure 20-50-71]** from the hydraulic piston pump.

Installation: Tighten the bolts to 13 N•m (10 ft-lb) torque.

Disassembly (Cont'd)

Figure 20-50-101

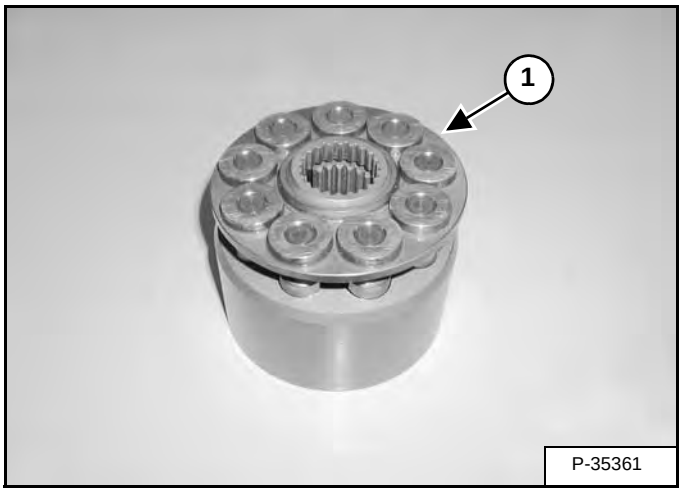


Slide the rotary group (Item 1) and swash plate (Item 2) from the shaft assembly (Item 3) **[Figure 20-50-101]**.

NOTE: It is NOT important that the pistons are installed in their original positions.

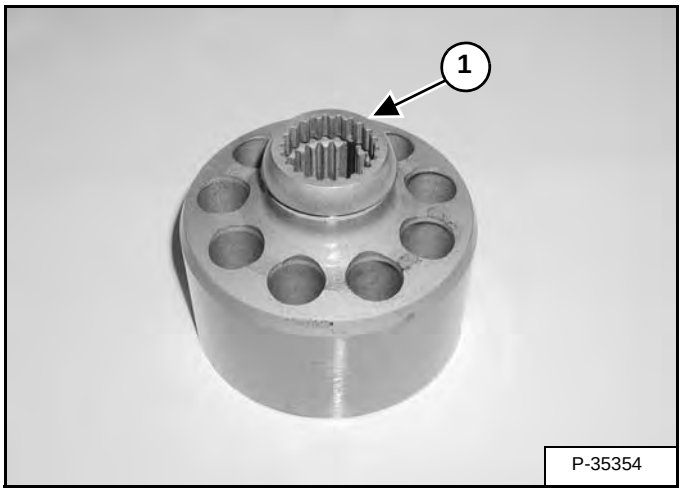
NOTE: Check that there are no scratches or metal deposits on the sliding surface. (Pistons must be replaced in sets.)

Figure 20-50-102



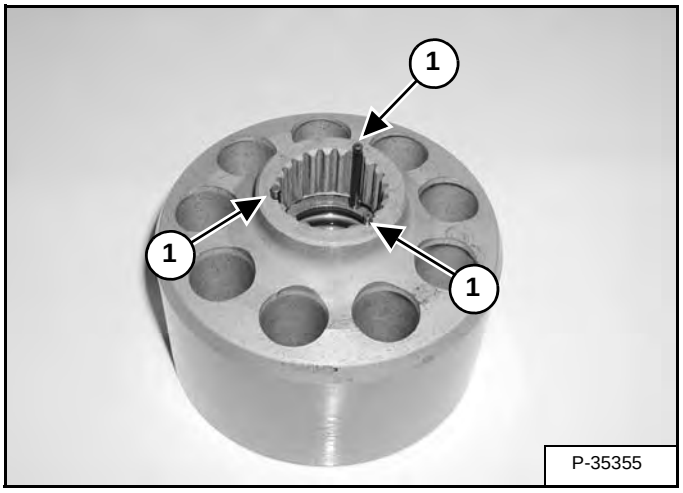
Remove the retainer plate and pistons (Item 1) **[Figure 20-50-102].**

Figure 20-50-103



Remove the retaining ball (Item 1) **[Figure 20-50-103]**.

Figure 20-50-104

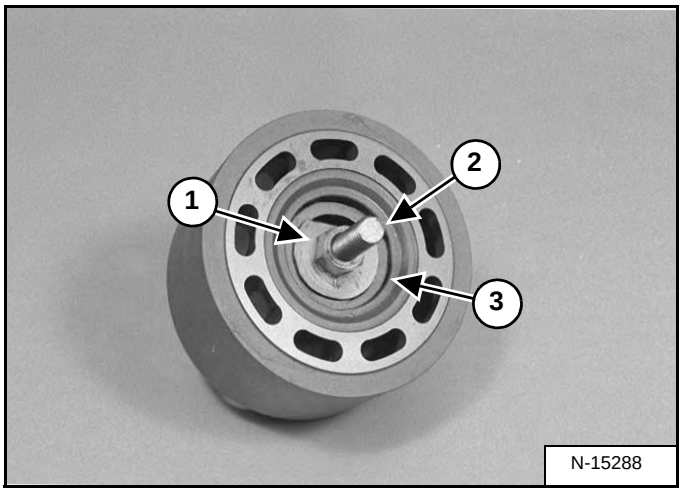


Inspect the three pins (Item 1) **[Figure 20-50-104]** for wear and/or damage.

NOTE: The following procedure is only to disassemble the rotating group for inspection. The rotating group parts can not be ordered separately and must be ordered as an assembly.

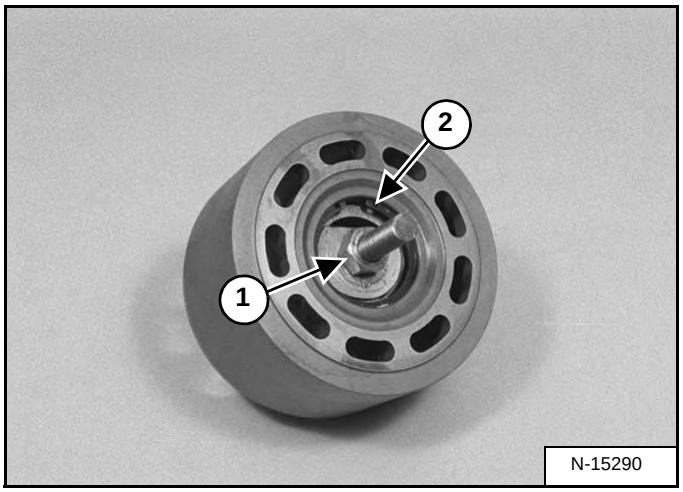
Assembly (Cont'd)

Figure 20-50-138



NOTE: The modified washer (Item 1) must fit over the spring (Item 2), but must also fit inside the snap ring (Item 3) [Figure 20-50-138].

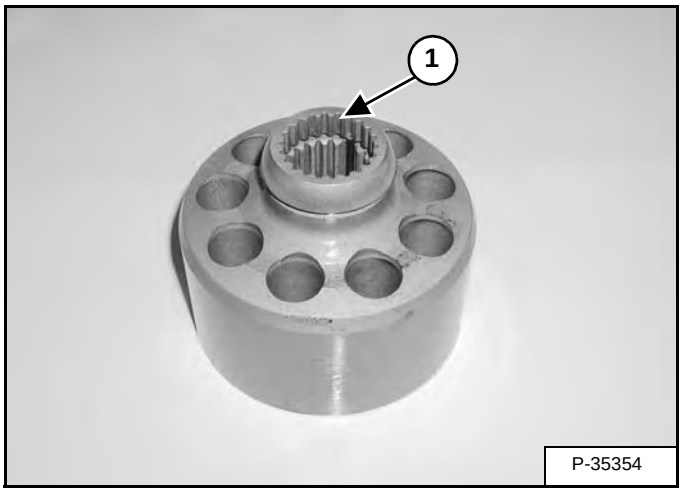
Figure 20-50-139



Tighten the nut (Item 1) until the spring is compressed enough to install the snap ring (Item 2) **[Figure 20-50-139]**.

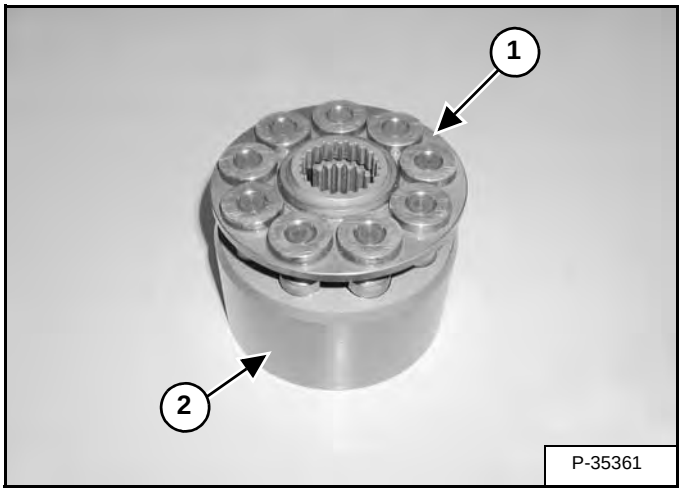
Remove the threaded rod / washer assembly.

Figure 20-50-140



Install the retaining ball (Item 1) **[Figure 20-50-140]** on the three pins.

Figure 20-50-141

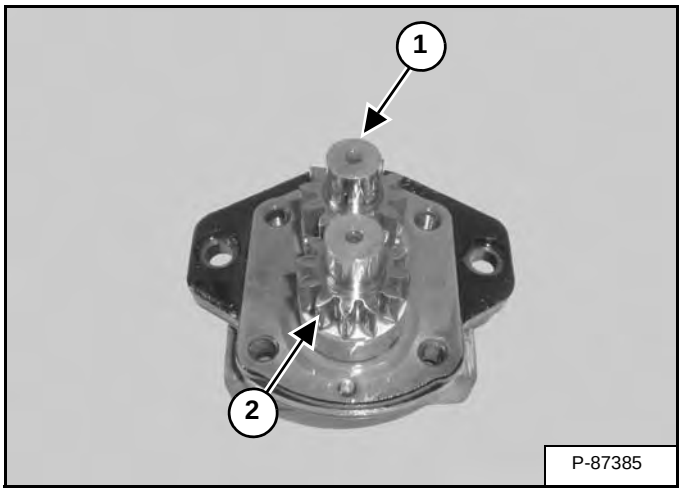


Install the retainer and piston assembly (Item 1) in the cylinder block (Item 2) **[Figure 20-50-141]**.

NOTE: It is NOT important that the pistons are installed in their original positions.

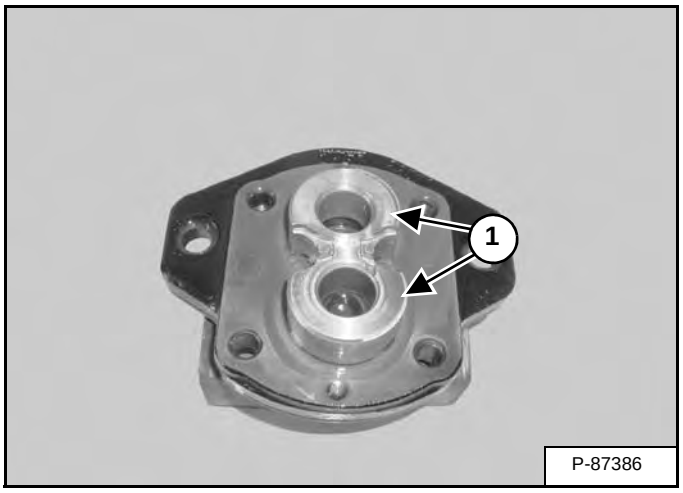
Disassembly And Assembly (Cont'd)

Figure 20-51-19



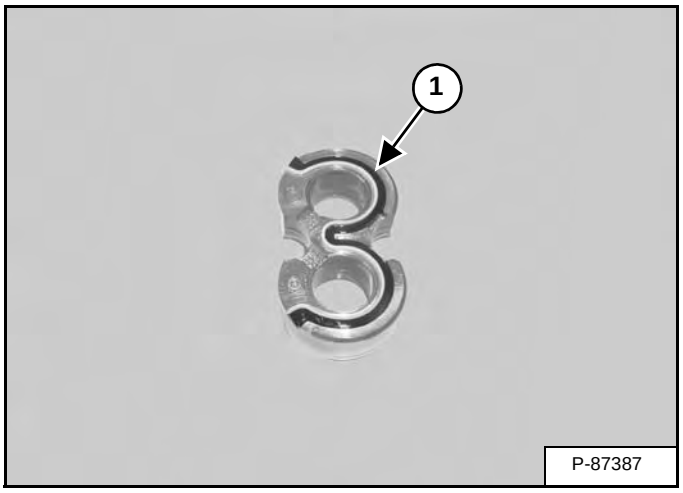
Remove the drive gear (Item 1). Remove the idler gear (Item 2) **[Figure 20-51-19]**.

Figure 20-51-20



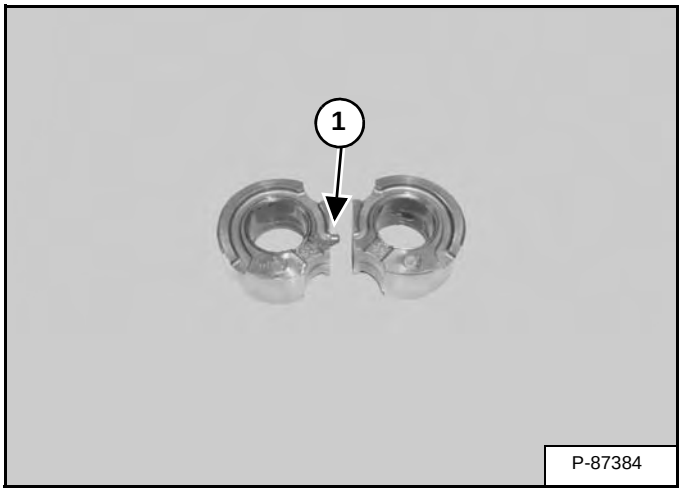
Remove the bearings (Item 1) **[Figure 20-51-20]**.

Figure 20-51-21



Remove the seal and back-up ring (Item 1) **[Figure 20-51-21]**.

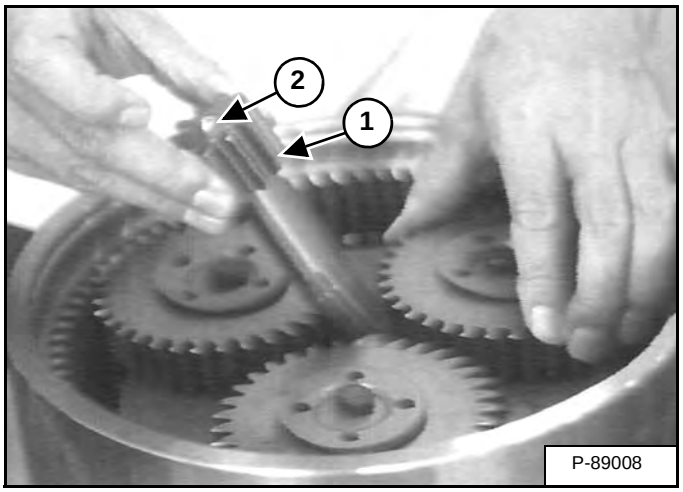
Figure 20-51-22



Separate the bearings and remove the dowel pin (Item 1) **[Figure 20-51-22]**.

Disassembly (Cont'd)

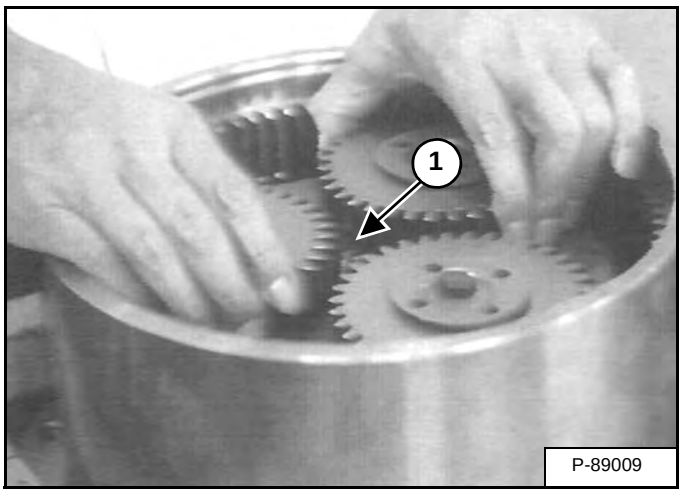
Figure 20-70-8



Remove the sun gear (Item 1) **[Figure 20-70-8]**.

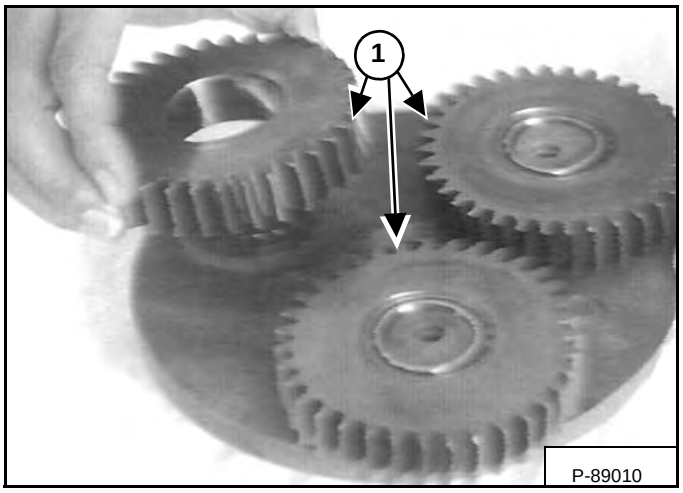
Remove the steel ball (Item 2) **[Figure 20-70-8]** from the sun gear.

Figure 20-70-9



Remove the carrier assembly (Item 1) **[Figure 20-70-9]** from the hub.

Figure 20-70-10

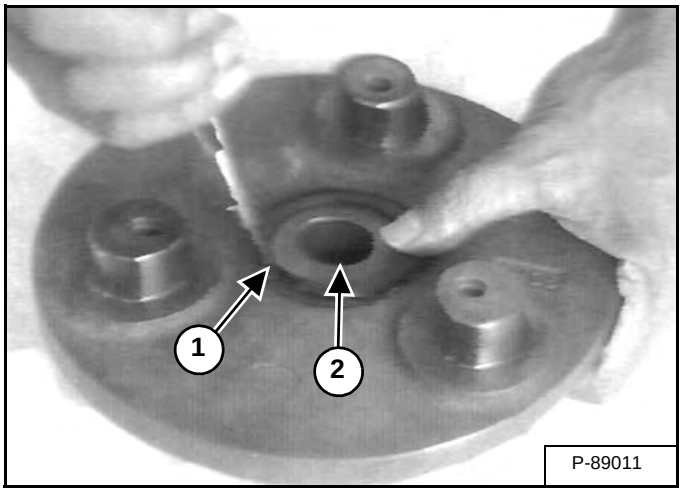


Remove the bolts, thrust washers, and planetary gears (Item 1) **[Figure 20-70-10]**.

Remove the roller bearing and inner ring from the carrier.

NOTE: Do not reuse the bolts holding the planetary gears to the carrier.

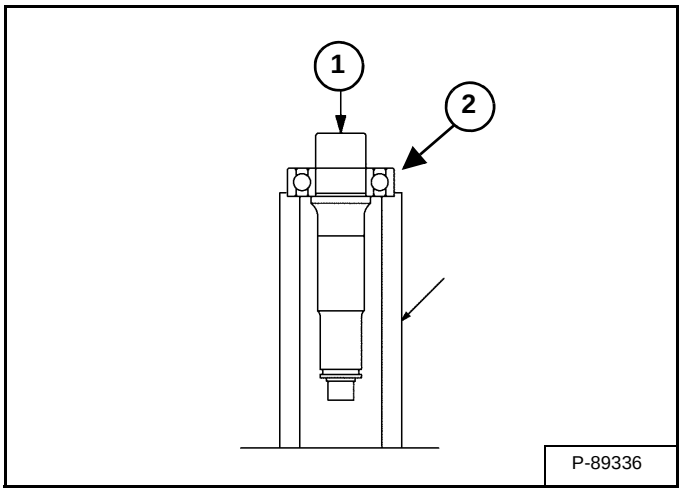
Figure 20-70-11



Remove the snap ring (Item 1) and sun gear (Item 2) **[Figure 20-70-11]** from the carrier.

Disassembly (Cont'd)

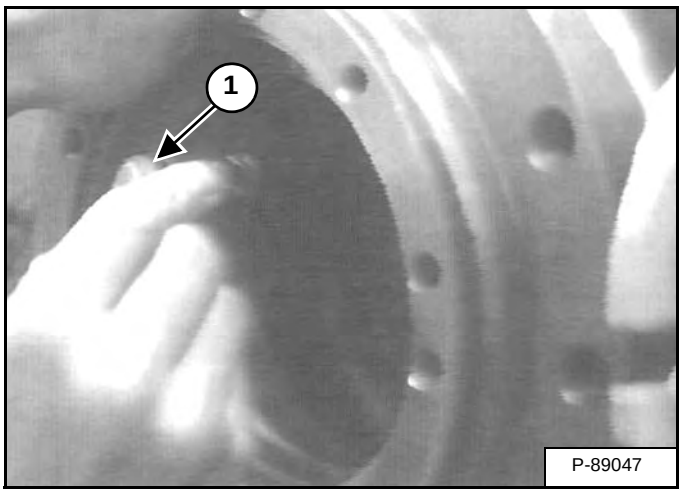
Figure 20-70-47



Place the shaft (Item 1) in a press and remove the bearing (Item 2) **[Figure 20-70-47]**.

Do not reuse the bearing.

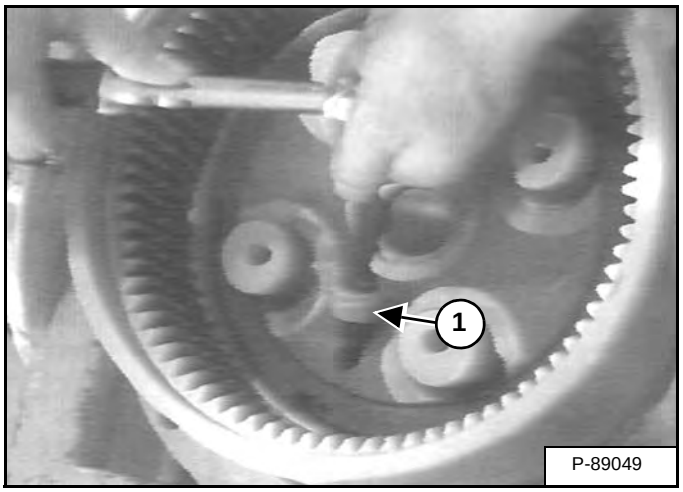
Figure 20-70-48



Remove the pivots and parallel pins (Item 1) **[Figure 20-70-48]**.

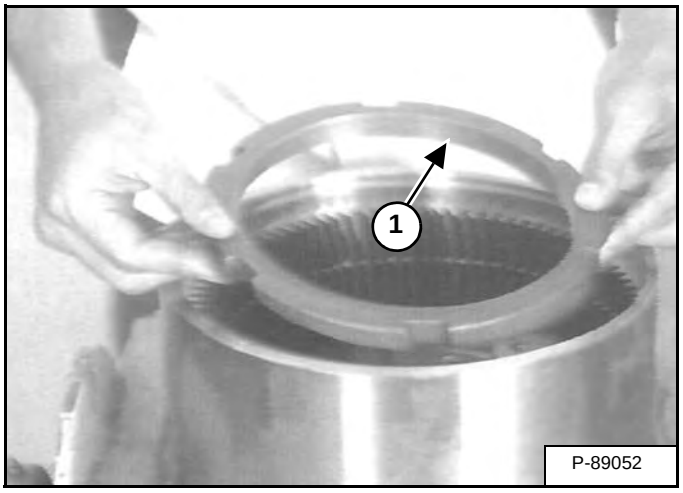
Remove the 2-speed pistons and springs by applying low air pressure to the oil passages.

Figure 20-70-49



Remove the set screws (Item 1) **[Figure 20-70-49]**.

Figure 20-70-50

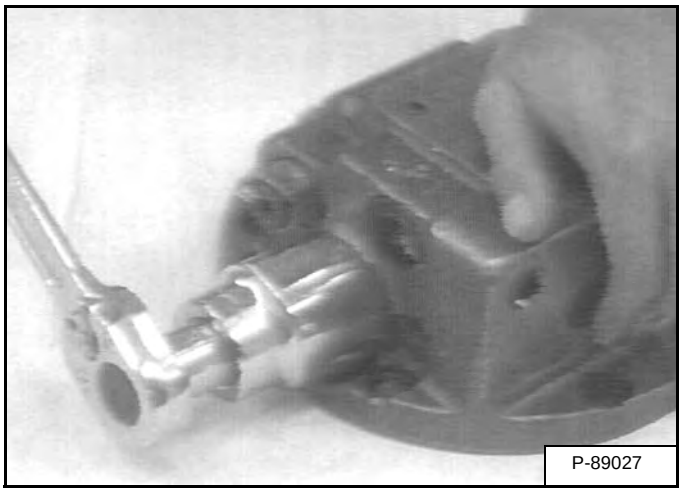


Remove the nut (Item 1) **[Figure 20-70-50]**.

Do not reuse the nut.

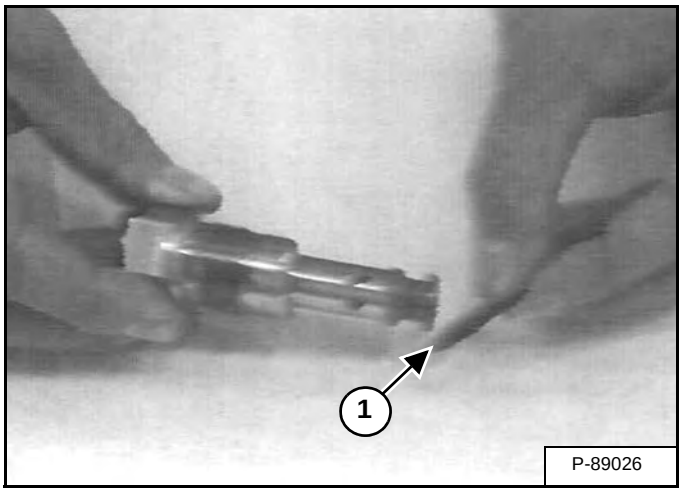
Assembly (Cont'd)

Figure 20-70-83



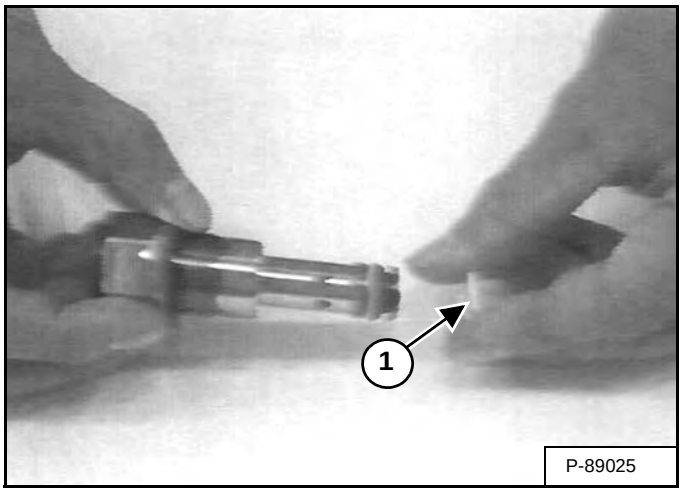
Install the spring retainer, spring and plug (both ends of the spool) **[Figure 20-70-83]**.

Figure 20-70-84



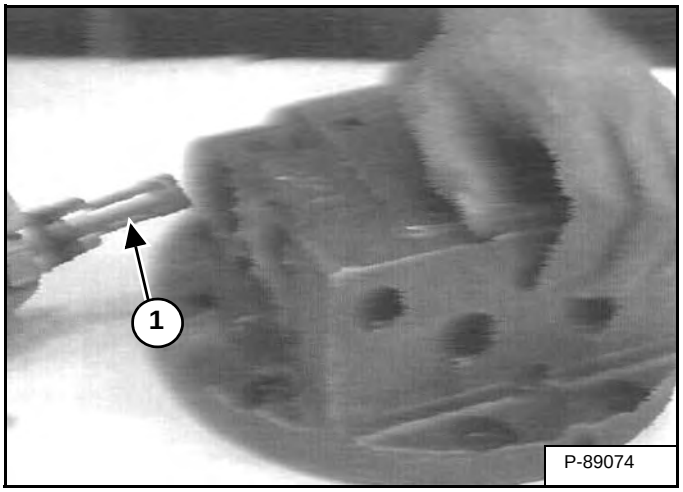
Install the O-ring (Item 1) **[Figure 20-70-84]** onto the valve.

Figure 20-70-85



Install the O-ring and back-up ring (Item 1) **[Figure 20-70-85]**.

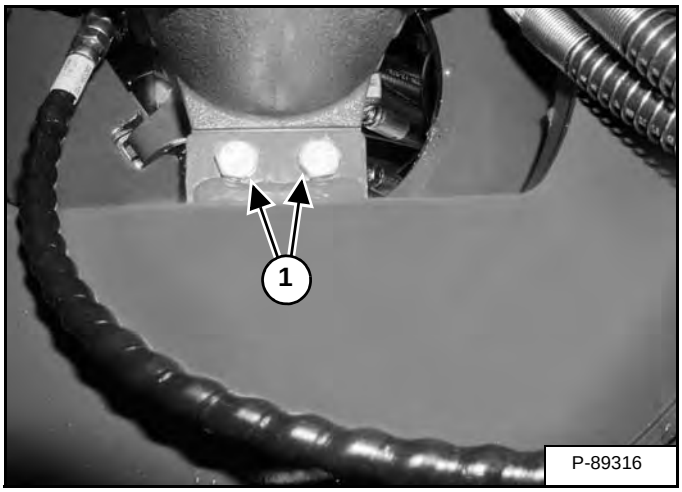
Figure 20-70-86



Install the valve (Item 1) **[Figure 20-70-86]**.

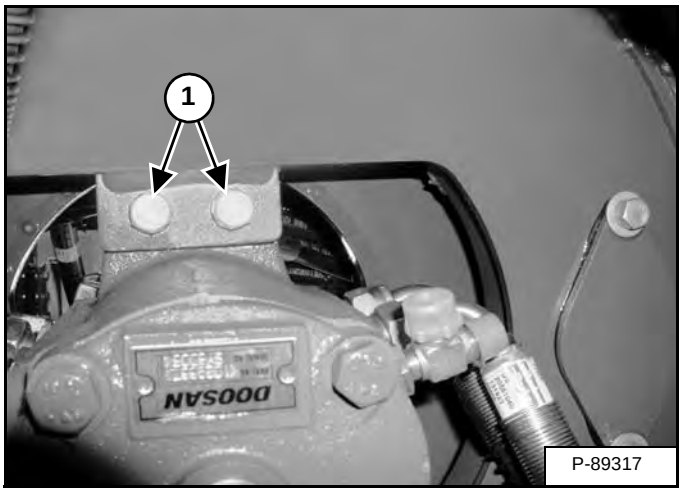
Removal And Installation (Cont'd)

Figure 20-80-8



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

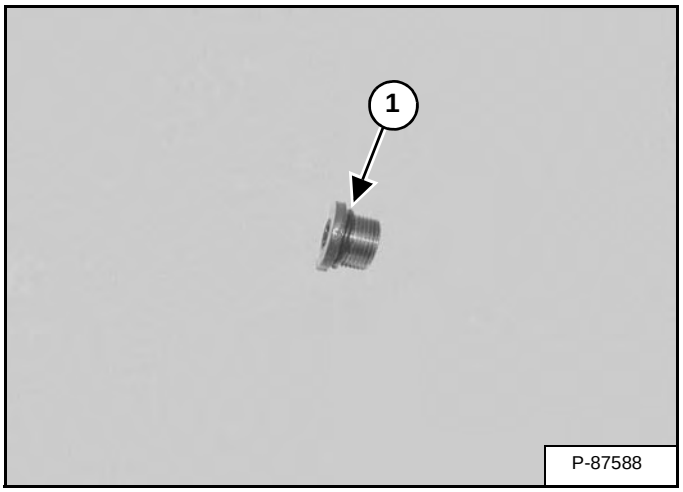
Figure 20-80-9



Remove the bolts (Item 1) **[Figure 20-80-9]**.

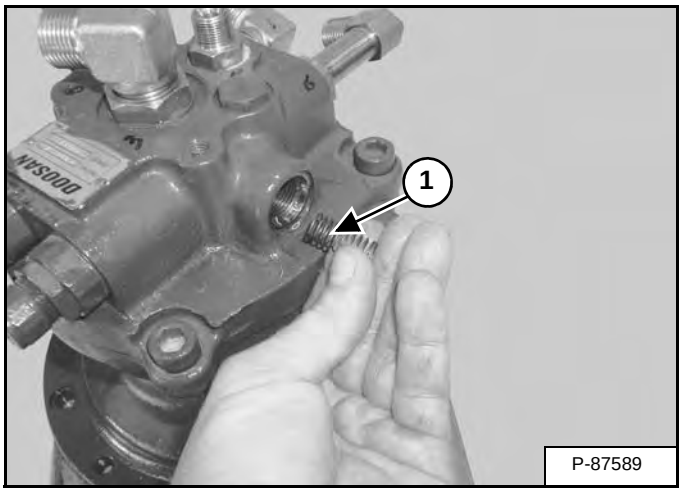
Disassembly And Assembly (Cont'd)

Figure 20-90-12



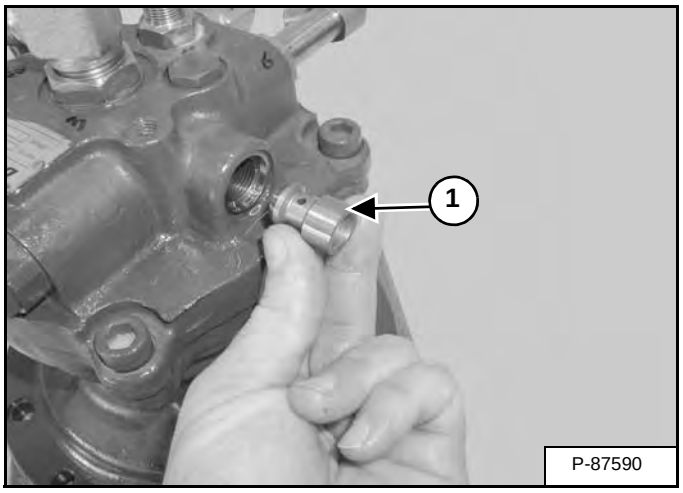
Remove the O-ring (Item 1) **[Figure 20-90-12]** from both plugs.

Figure 20-90-13



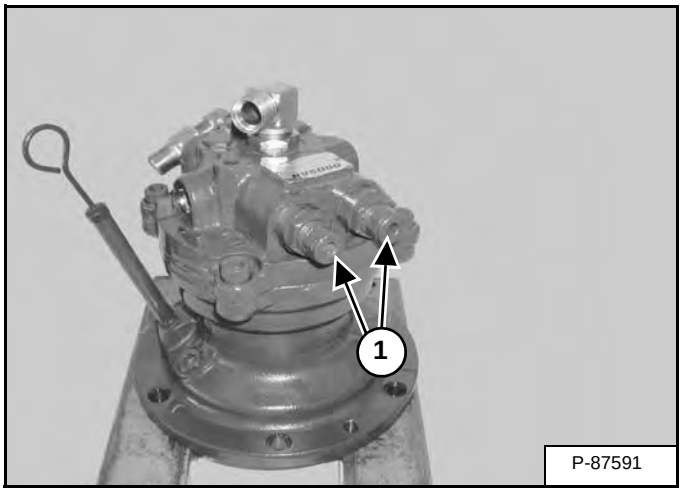
Remove the spring (Item 1) **[Figure 20-90-13]** from both sides of the end cap.

Figure 20-90-14



Remove the spool (Item 1) **[Figure 20-90-14]** from both sides of the end cap.

Figure 20-90-15

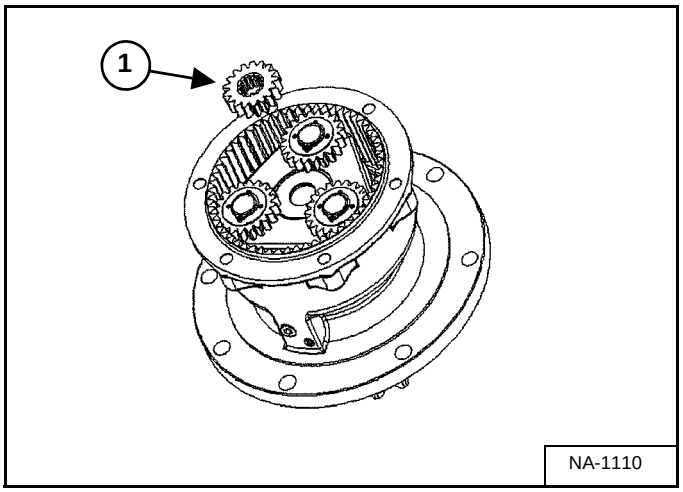


Remove the relief valves (Item 1) **[Figure 20-90-15]**.

Installation: Tighten the relief valves to 148 - 167 N•m (109 - 123 ft-lb) torque.

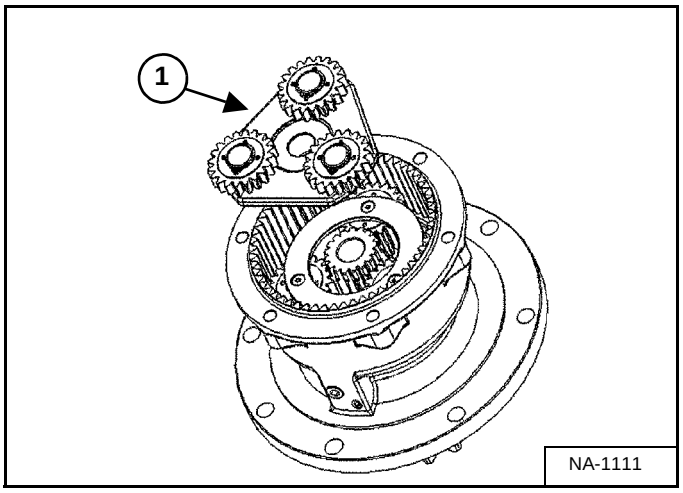
Disassembly And Assembly

Figure 20-91-5



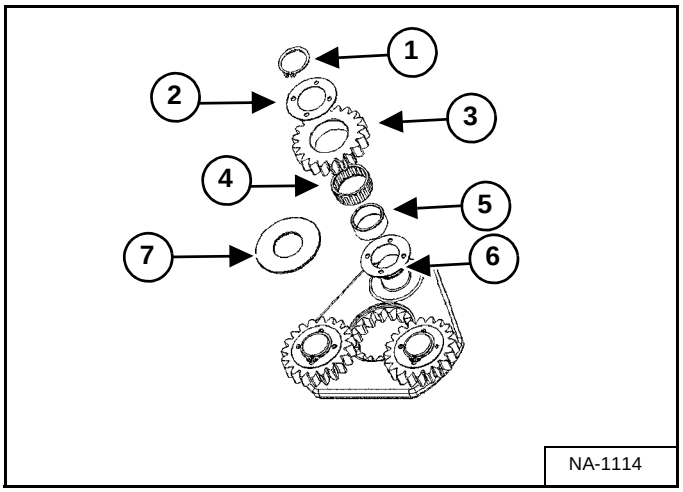
Remove the sun gear (Item 1) **[Figure 20-91-5]**.

Figure 20-91-6



Remove the carrier assembly (Item 1) **[Figure 20-91-6]**.

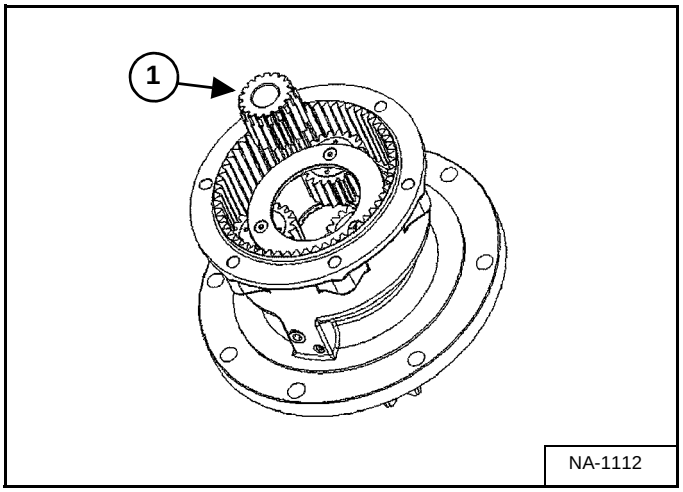
Figure 20-91-7



Remove the snap ring (Item 1), thrust washer (Item 2), planetary gear (Item 3), bearing (Item 4) bearing race (Item 5) and thrust washer (Item 6) **[Figure 20-91-7]**.

Remove the sun gear thrust washer (Item 7) **[Figure 20-91-7]**.

Figure 20-91-8



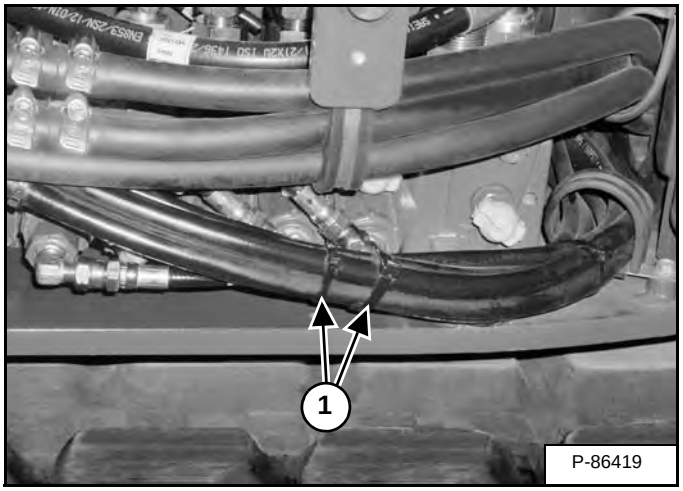
Remove the sun gear (Item 1) **[Figure 20-91-8]**.

RIGHT CONTROL LEVER (JOYSTICK)

Testing

Remove the left upperstructure cover. (See Removal And Installation on Page 40-20-1.)

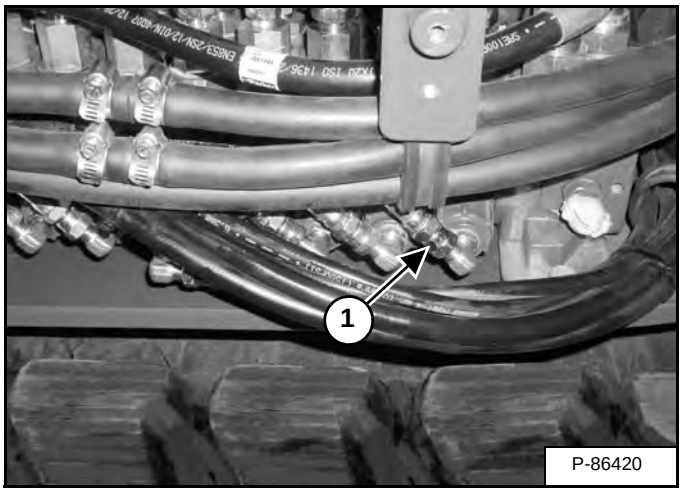
Figure 20-110-1



Cut and remove the cable ties (Item 1) **[Figure 20-110-1]**.

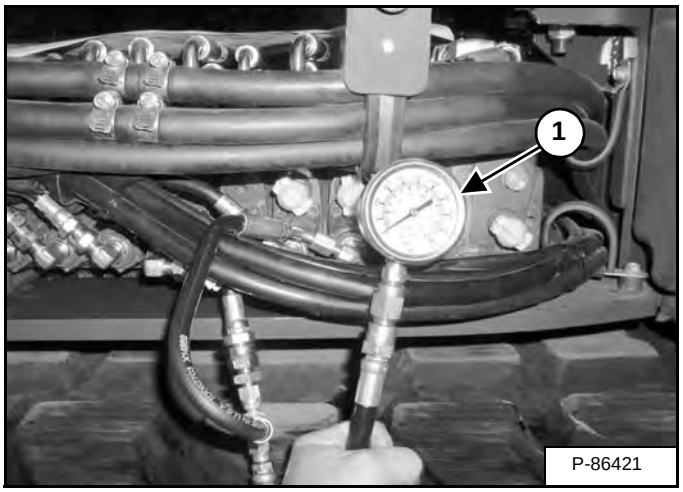
Find the pilot line of the control lever that is to be checked at the control valve assembly.

Figure 20-110-2



Disconnect the hydraulic hose (Item 1) **[Figure 20-110-2]** from the control valve.

Figure 20-110-3



Install a 6900 kPa (69 bar) (1000 psi) gauge (Item 1) **[Figure 20-110-3]** on the pilot line. Start the excavator and warm up the hydraulic oil to operating temperature.

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

The operating pressure should be approximately 2800 kPa (28 bar) (415 psi).

If the operating pressure is correct, check the valve section spool for proper operation. If the operating pressure is incorrect, test the pressure reducing valve. (See Testing And Adjusting The Pressure Reducing Valve on Page 20-32-1.)

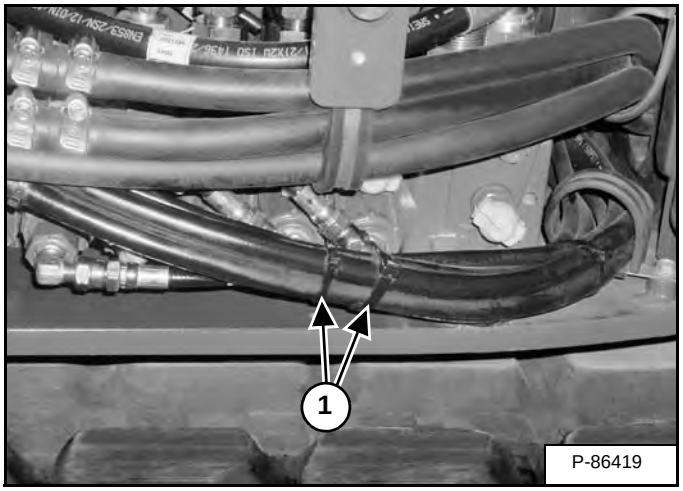
If the pressure reducing valve is incorrect, adjust the pressure reducing valve. (See Testing And Adjusting The Pressure Reducing Valve on Page 20-32-1.) Retest the right control lever.

LEFT CONTROL LEVER (JOYSTICK)

Testing

Remove the left upperstructure cover. (See Removal And Installation on Page 40-20-1.)

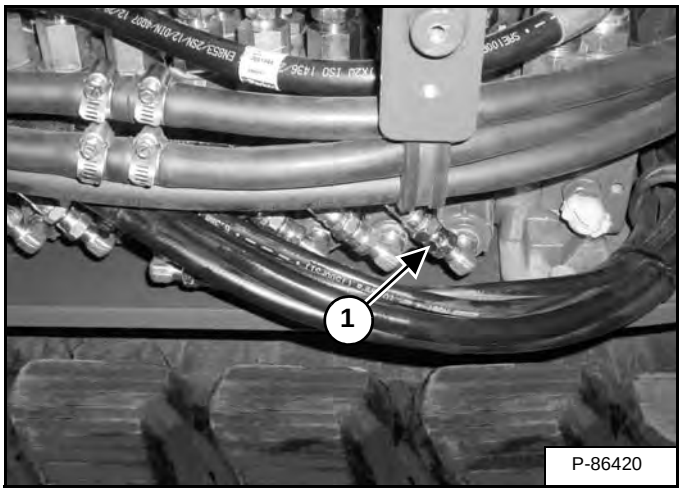
Figure 20-120-1



Cut and remove the cable ties (Item 1) **[Figure 20-120-1]**.

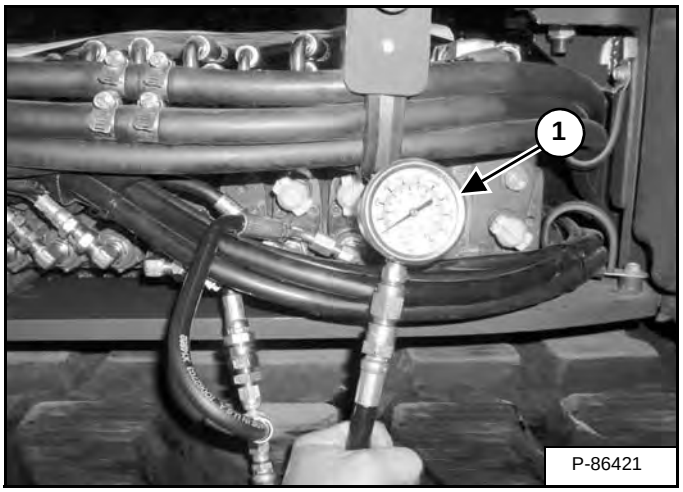
Find the pilot line of the control lever that is to be checked at the control valve assembly.

Figure 20-120-2



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

Figure 20-120-3



Install a 6900 kPa (69 bar) (1000 psi) gauge (Item 1) **[Figure 20-120-3]** on the pilot line. Start the excavator and warm up the hydraulic oil to operating temperature.

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

The operating pressure should be approximately 2800 kPa (28 bar) (415 psi).

If the operating pressure is correct, check the valve section spool for proper operation. If the operating pressure is incorrect, test the pressure reducing valve. (See Testing And Adjusting The Pressure Reducing Valve on Page 20-32-1.)

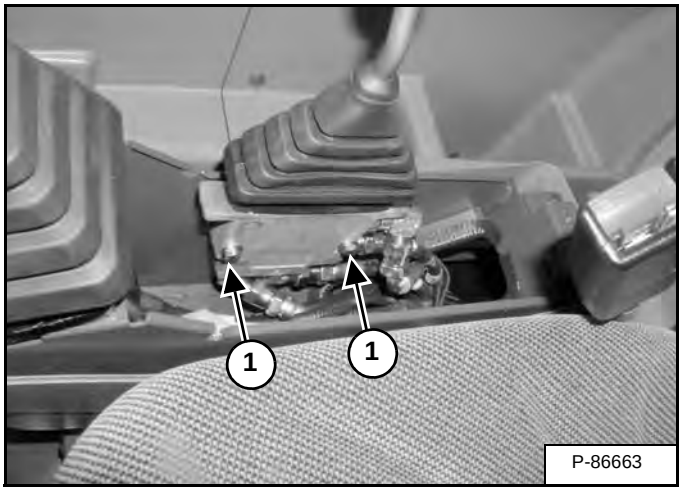
If the pressure reducing valve is incorrect, adjust the pressure reducing valve. (See Testing And Adjusting The Pressure Reducing Valve on Page 20-32-1.) Retest the right control lever.

BLADE CONTROL VALVE

Removal And Installation

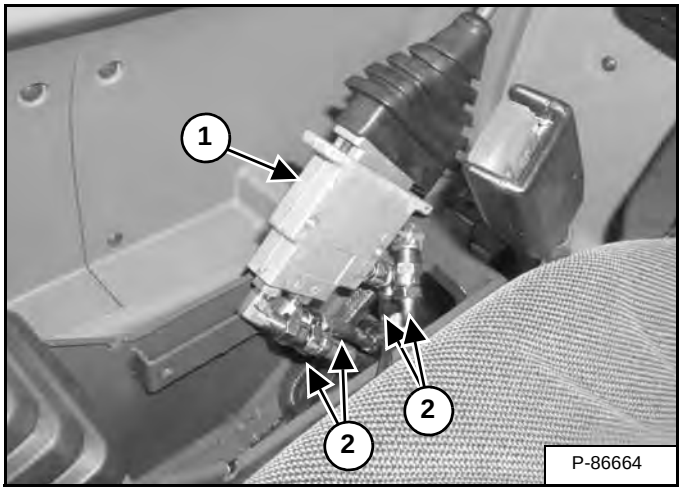
Remove the right console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

Figure 20-130-1



Remove the bolts (Item 1) **[Figure 20-130-1]** and washers.

Figure 20-130-2



Tilt the valve (Item 1) towards the rear of the cab. Mark and remove the four hoses (Item 2) **[Figure 20-130-2]**.

Remove the valve.

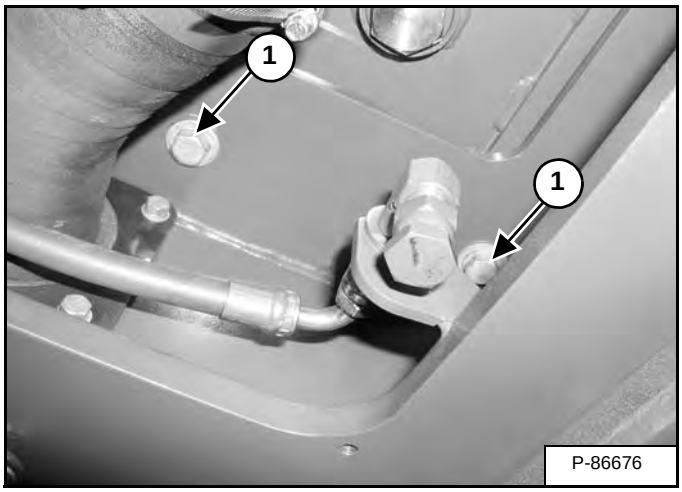
IMPORTANT

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

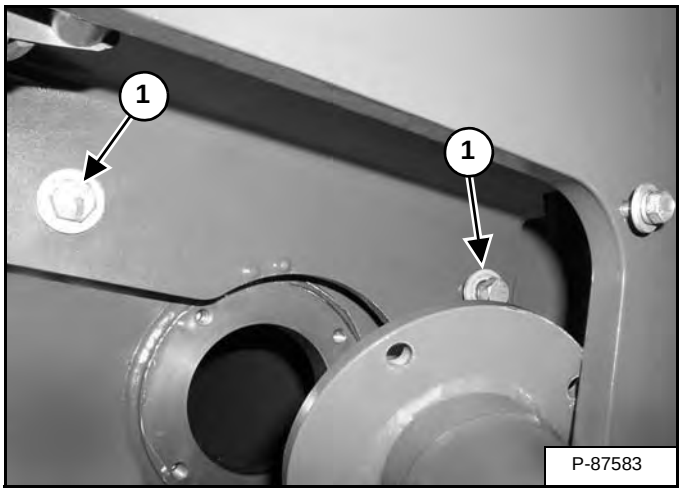
Removal And Installation (Cont'd)

Figure 20-140-16



Remove the bolts (Item 1) **[Figure 20-140-16]** and washers.

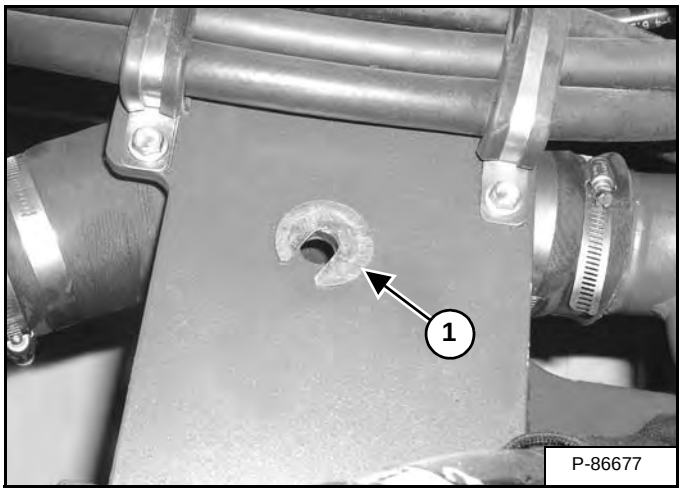
Figure 20-140-17



Remove the bolts (Item 1) **[Figure 20-140-17]** and washers.

Remove the hydraulic reservoir.

Figure 20-140-18



Inspect the mounting plate for shims (Item 1) **[Figure 20-140-18]**. Record the number and the locations of the shims for ease of installation.

BOOM SWING VALVE

Removal And Installation

Remove the floor mat. (See Removal And Installation on Page 40-100-1.)

Tilt the cab. (See Tilting The Cab on Page 10-210-1.)

WARNING

AVOID INJURY OR DEATH

Never work under the excavator cab without installing an approved cab support device.

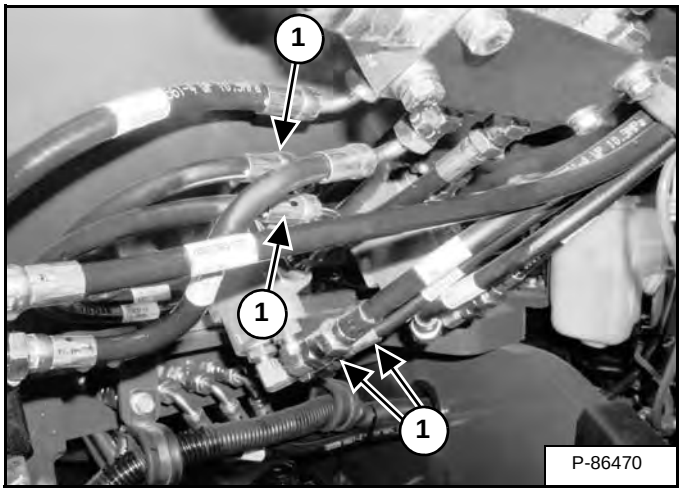
W-2435-0502

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.

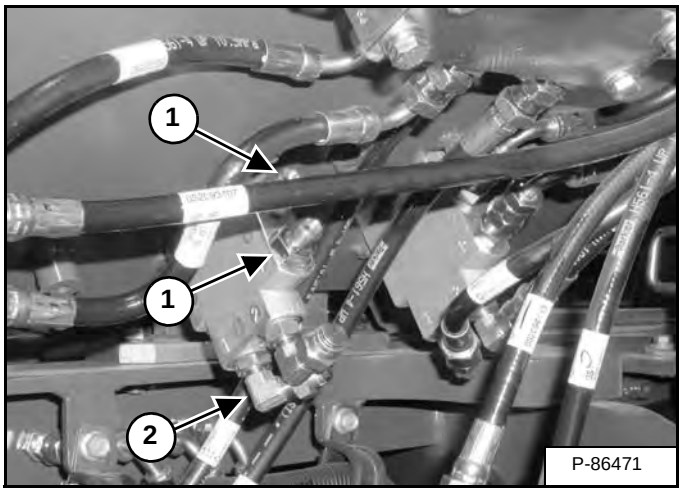
I-2003-0888

Figure 10-141-1



Mark and remove the four hoses (Item 1) **[Figure 10-141-1]**.

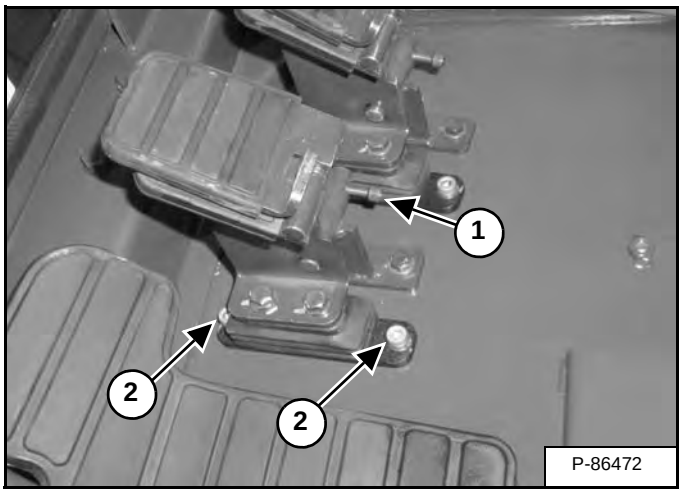
Figure 20-180-1



Remove the two fittings (Item 1) **[Figure 20-180-1]**.

Loosen the bottom fitting (Item 2) **[Figure 20-180-1]**.

Figure 20-180-2

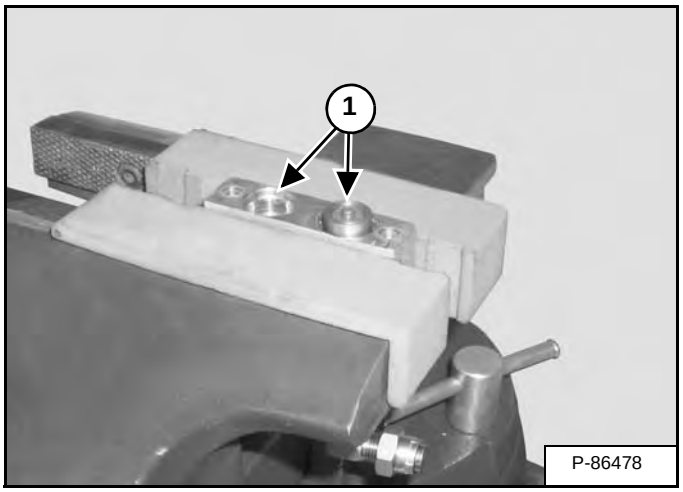


Disengage the pedal lock (Item 1) and remove the two bolts (Item 2) **[Figure 20-180-2]**.

Remove the valve.

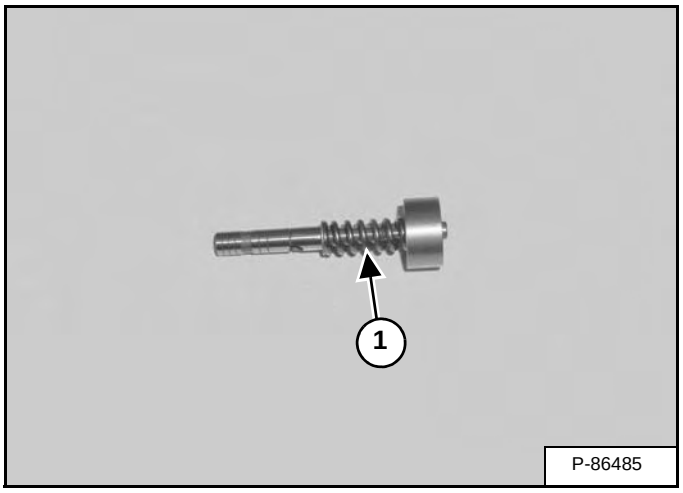
Disassembly And Assembly (Cont'd)

Figure 20-190-11



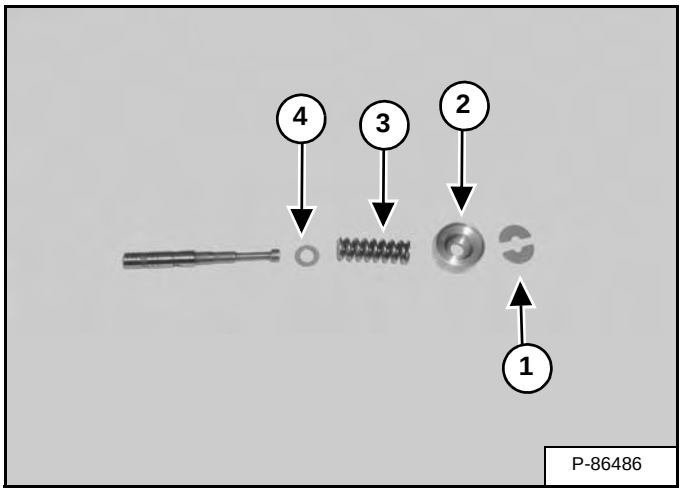
Remove the spool assemblies (Item 1) **[Figure 20-190-11]**.

Figure 20-190-12



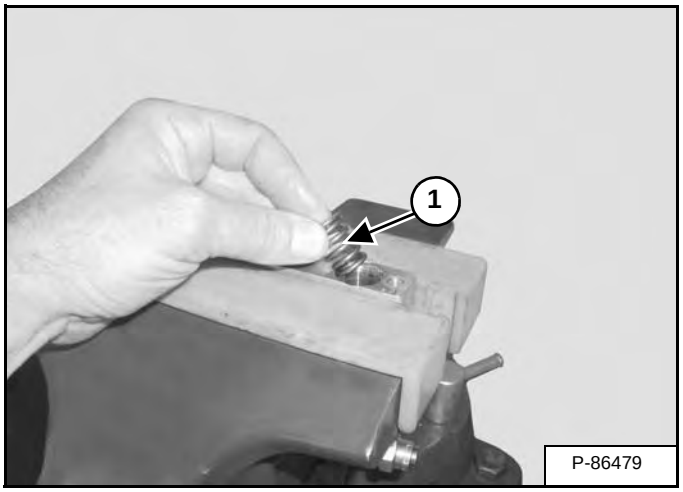
Compress the spring (Item 1) **[Figure 20-190-12]** and remove the spring keepers (Item 1) **[Figure 20-190-13]**.

Figure 20-190-13



Remove the spring seat (Item 2), spring (Item 3), and washer (Item 4) **[Figure 20-190-13]** from the spool.

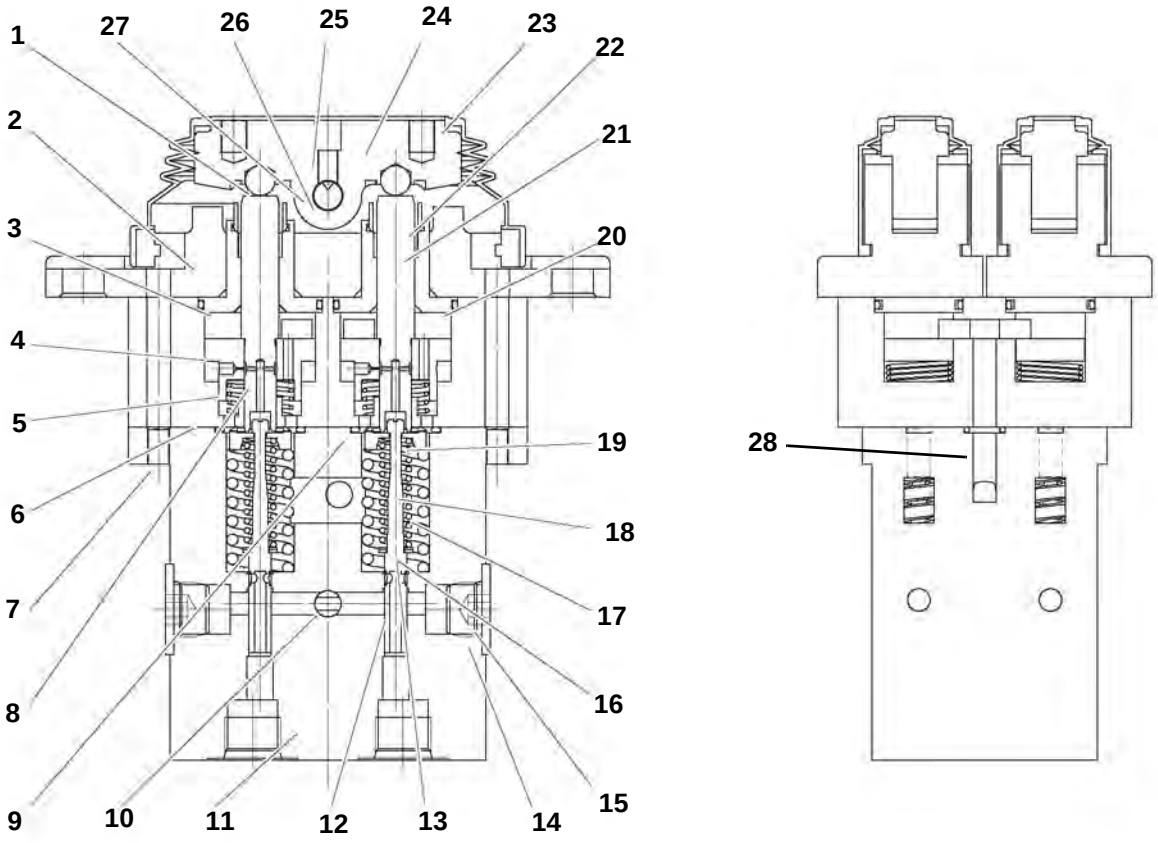
Figure 20-190-14



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

Parts Identification

1. Ball
2. Cover
3. Plug
4. Piston
5. Spring
6. Cover
7. Bolt
8. Push Rod
9. O-ring
10. Plug
11. Housing (Bottom)
12 Spool
13. Washer
14. O-ring
15. Plug
16. Washer
17. Spring
18. Spring
19. Spring Seat
20. Piston
21. Dust Seal
22. Grease Cap
23. Dust Boot
24. Cam
25. Screw
26. Pin
27. Bushing
28. O-ring

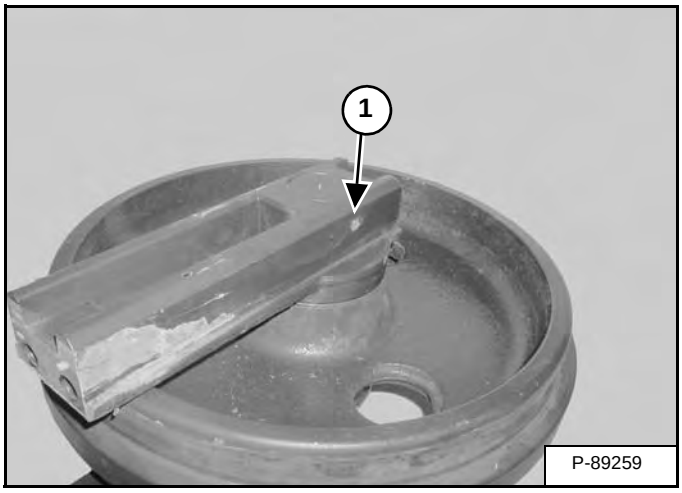


B-23944

UNDERCARRIAGE

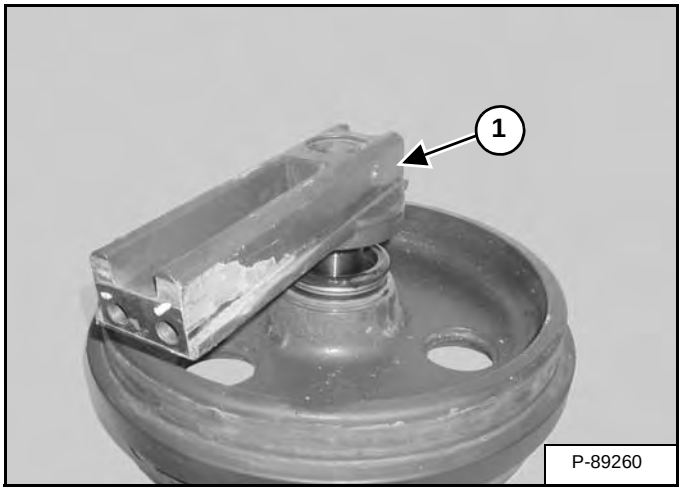
Idler Disassembly

Figure 30-20-14



Remove the roll pin (Item 1) **[Figure 30-20-14]**.

Figure 30-20-15



Pull up on and remove the support (Item 1) **[Figure 30-20-15]**.

Figure 30-20-16

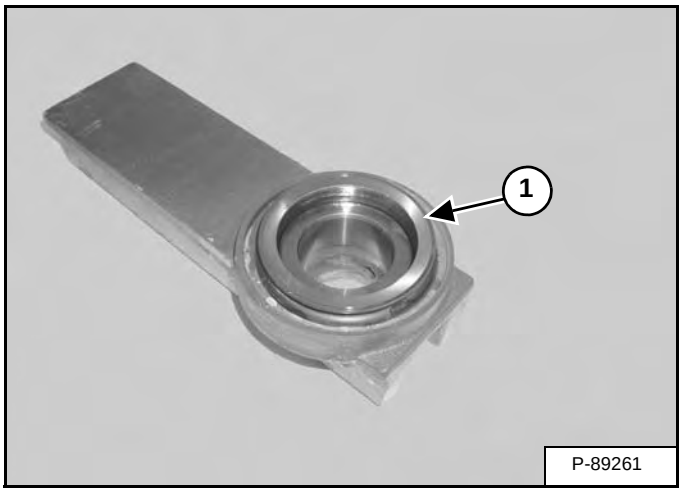
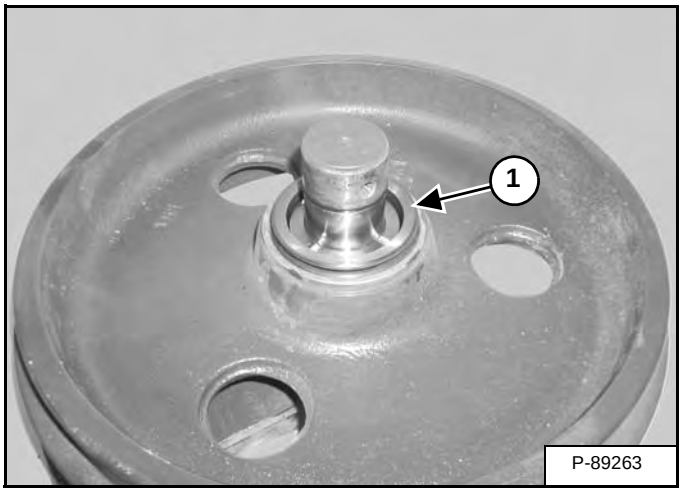


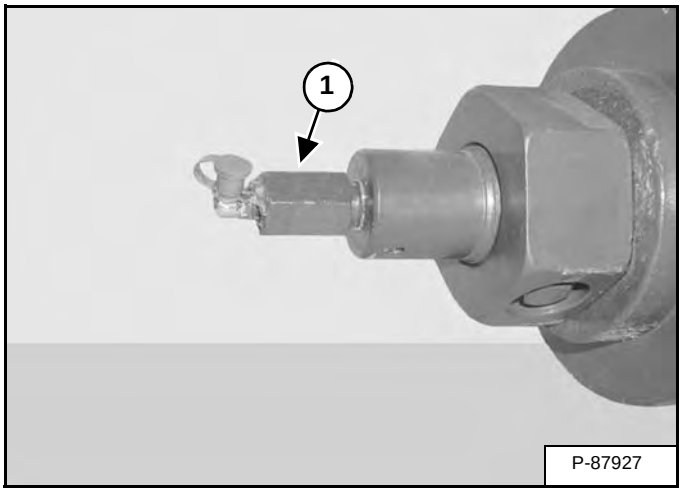
Figure 30-20-17



Remove the floating seal (Item 1) **[Figure 30-20-16]** and **[Figure 30-20-17]** from the support and idler.

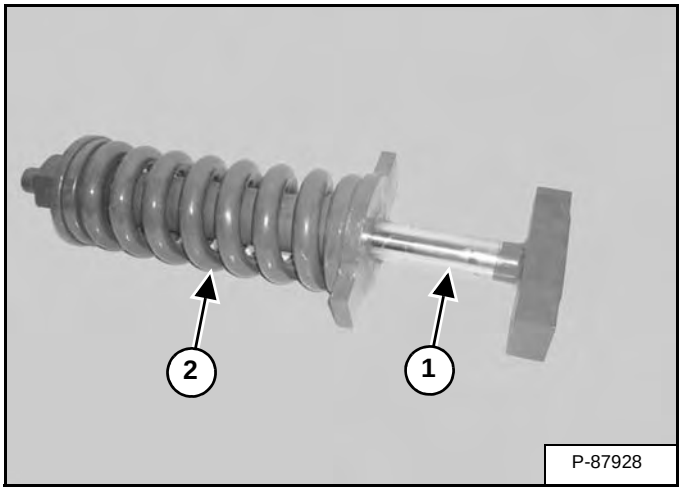
Track Tensioner Disassembly And Assembly

Figure 30-20-48



Remove the grease fitting and adapter (Item 1) **[Figure 30-20-48]**.

Figure 30-20-49



Remove the piston rod (Item 1) **[Figure 30-20-49]** from the cylinder.

DO NOT DISASSEMBLE OR REPAIR THE COIL SPRING ASSEMBLY (Item 2) **[Figure 30-20-49]**

⚠ WARNING

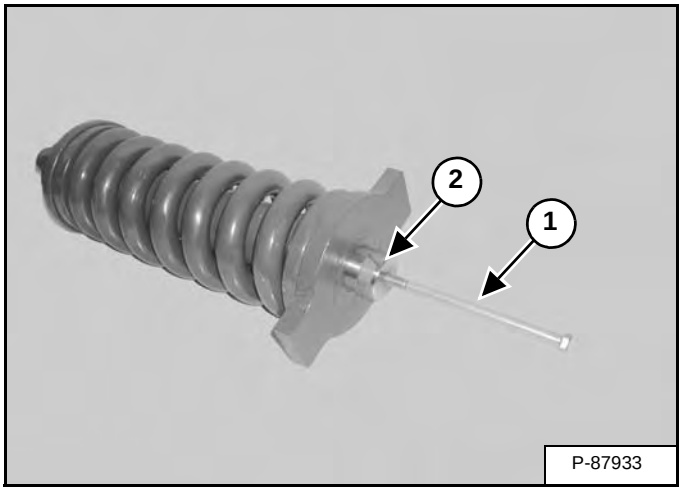
P-62574

AVOID INJURY OR DEATH

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

W-2617-1004

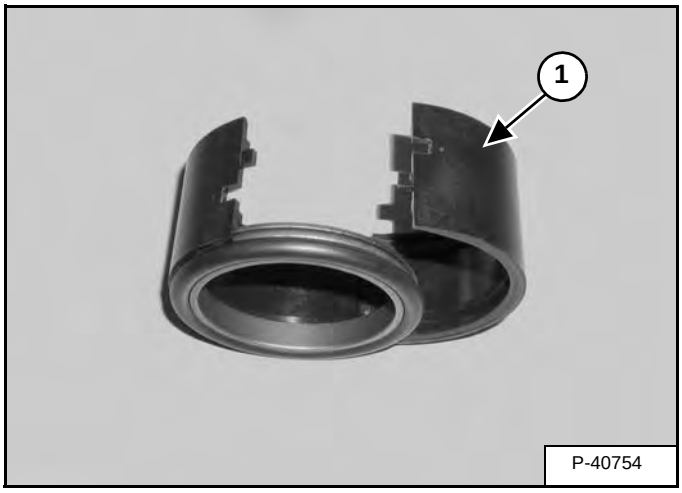
Figure 30-20-50



Use a 12 mm x 1,75 x 203 mm long bolt to thread the bolt (Item 1) into the piston (Item 2) **[Figure 30-20-50]**. Pull the piston out of the cylinder.

Lower Roller Assembly (Cont'd)

Figure 30-20-80

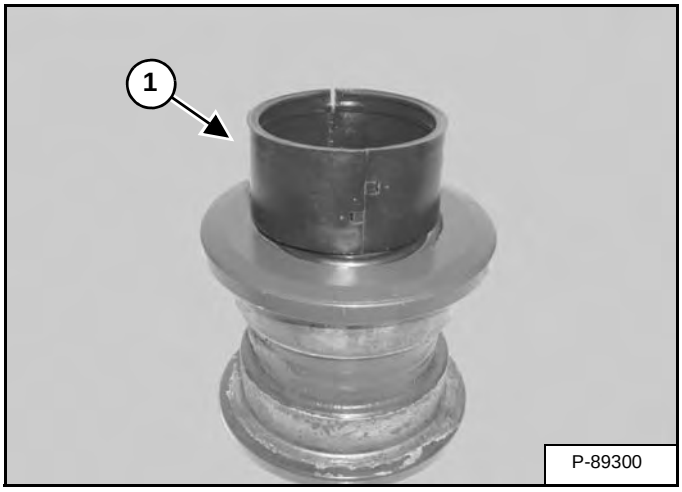


Place the seal assembly (Item 1) **[Figure 30-20-80]** in the installation tool.

The O-ring and seal ring assembly have to be lubricated with alcohol, so that the O-ring will slip past the housing retaining ring and seal uniformly in the housing radius.

Dip the O-ring and seal assembly in a pan of alcohol.

Figure 30-20-81

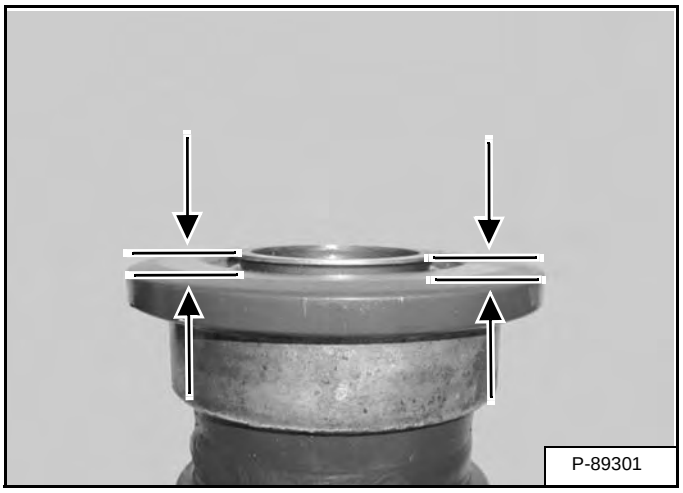


Shake off the excess alcohol and install the seal assembly (Item 1) **[Figure 30-20-81]** in the roller.

Use firm, even pressure on the installation tool to *pop* the O-ring in to the collar.

Remove the installation tool.

Figure 30-20-82

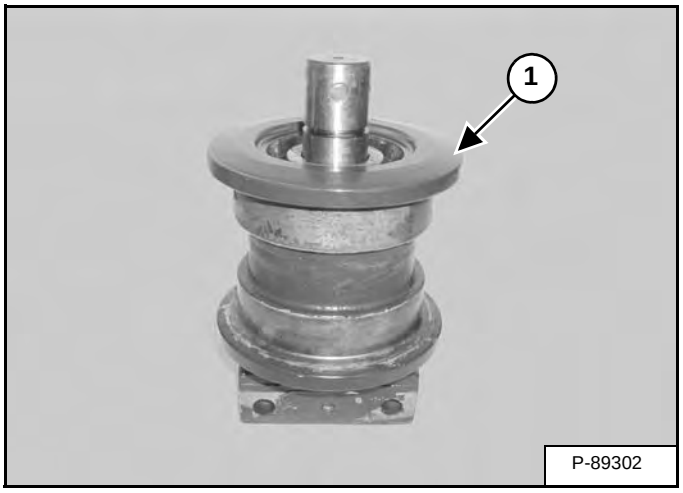


The seal assembly stand off height must be equal and the O-ring must not be twisted **[Figure 30-20-82]**.

Apply a light film of oil to both metal seal rings.

NOTE: Do not get any oil on the rubber O-rings.

Figure 30-20-83



Install the roller (Item 1) **[Figure 30-20-83]** on the shaft.

TRACK UNDERCARRIAGE COMPONENTS (STEEL TRACK)

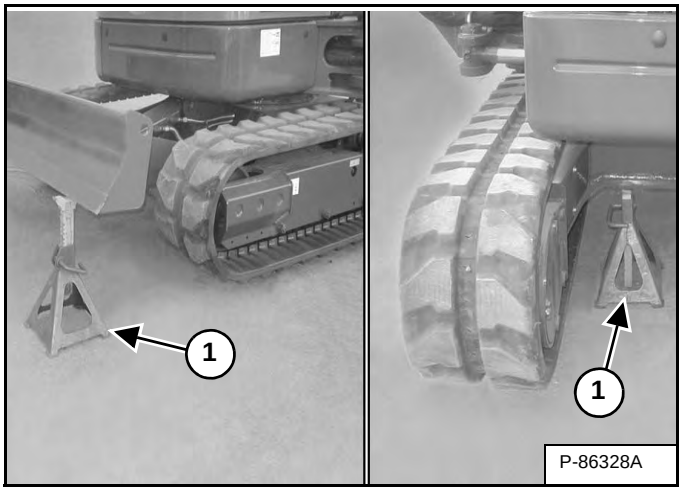
Checking Tension

NOTE: The wear of the pins and bushings on the undercarriage varies with the working conditions and the types of soil. It is necessary to inspect track tension to maintain the correct tension. See Service Schedule for the correct service interval. (See Chart on Page 10-80-1.)

Figure 30-21-1

Raise the side of the machine (approximately 102 mm [4 in]) using the boom and arm **[Figure 30-21-1]**.

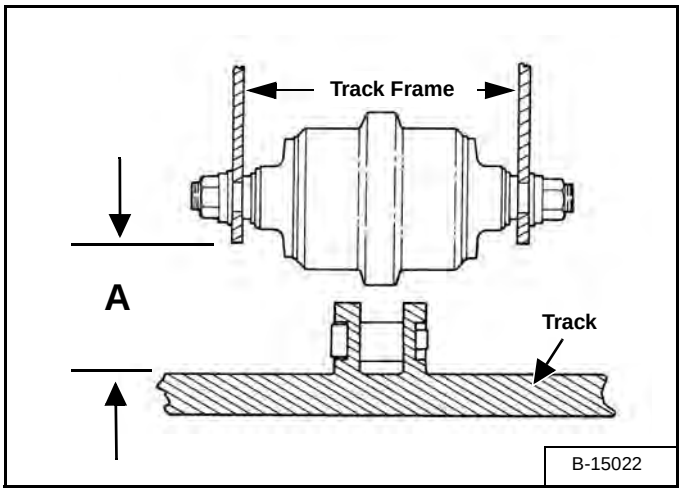
Figure 30-21-2



Fully raise the blade and install jackstands (Item 1) **[Figure 30-21-2]** under the blade and track frame. Raise the boom until all machine weight is on the jackstands.

Stop the engine.

Figure 30-21-3

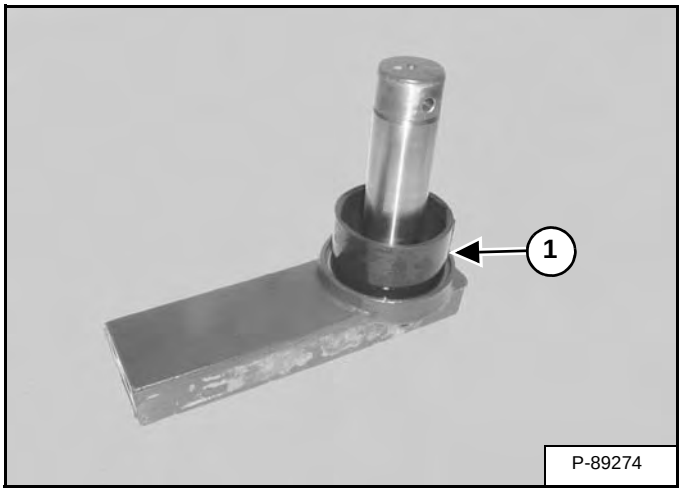


Measure the track clearance “A” at the middle track roller. Do not get your fingers into the pinch points between the track and the track roller. Check the gap between the bottom edge of the track frame and the top surface of the track **[Figure 30-21-3]**.

TERRAIN TYPE	DIMENSION “A”
Soil	140 -150 mm (5.51 - 5.91 in)
Gravel, Sand, Soft Soil	150 -160 mm (5.91 - 6.30 in)
Rock Bed	120 -130 mm (4.72 - 5.12 in)

Idler Assembly (Cont'd)

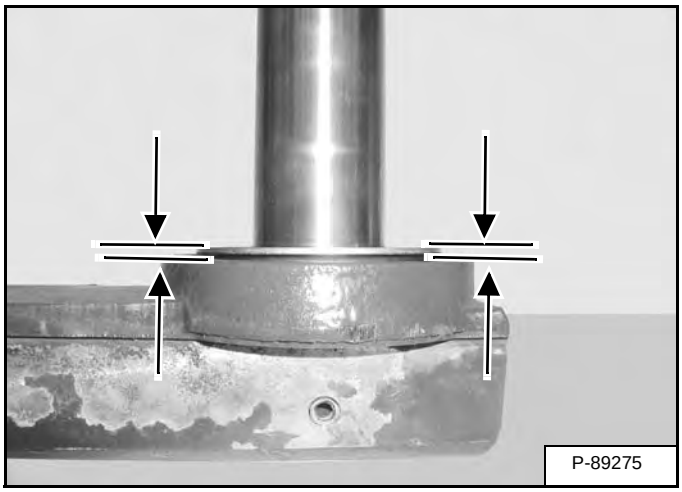
Figure 30-21-34



Shake off the excess alcohol and install the seal assembly (Item 1) **[Figure 30-21-34]** in the support.

Use firm, even pressure on the installation tool to *pop* the O-ring into the housing.

Figure 30-21-35

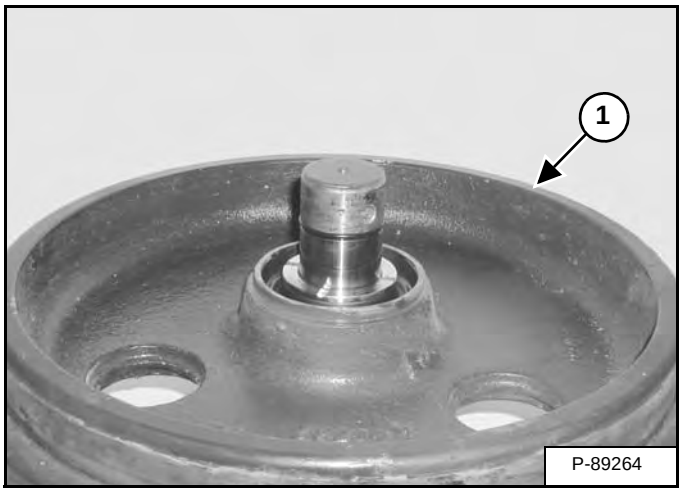


The seal assembly stand off height must be equal and the O-ring must not be twisted **[Figure 30-21-35]**.

Apply a light film of oil to both metal seal rings.

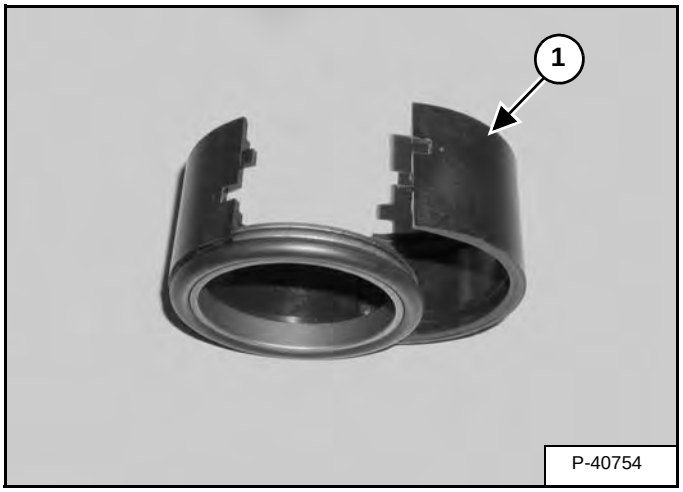
NOTE: Do not get any oil on the rubber O-rings.

Figure 30-21-36



Install the idler (Item 1) **[Figure 30-21-36]** on the shaft / support assembly.

Figure 30-21-37



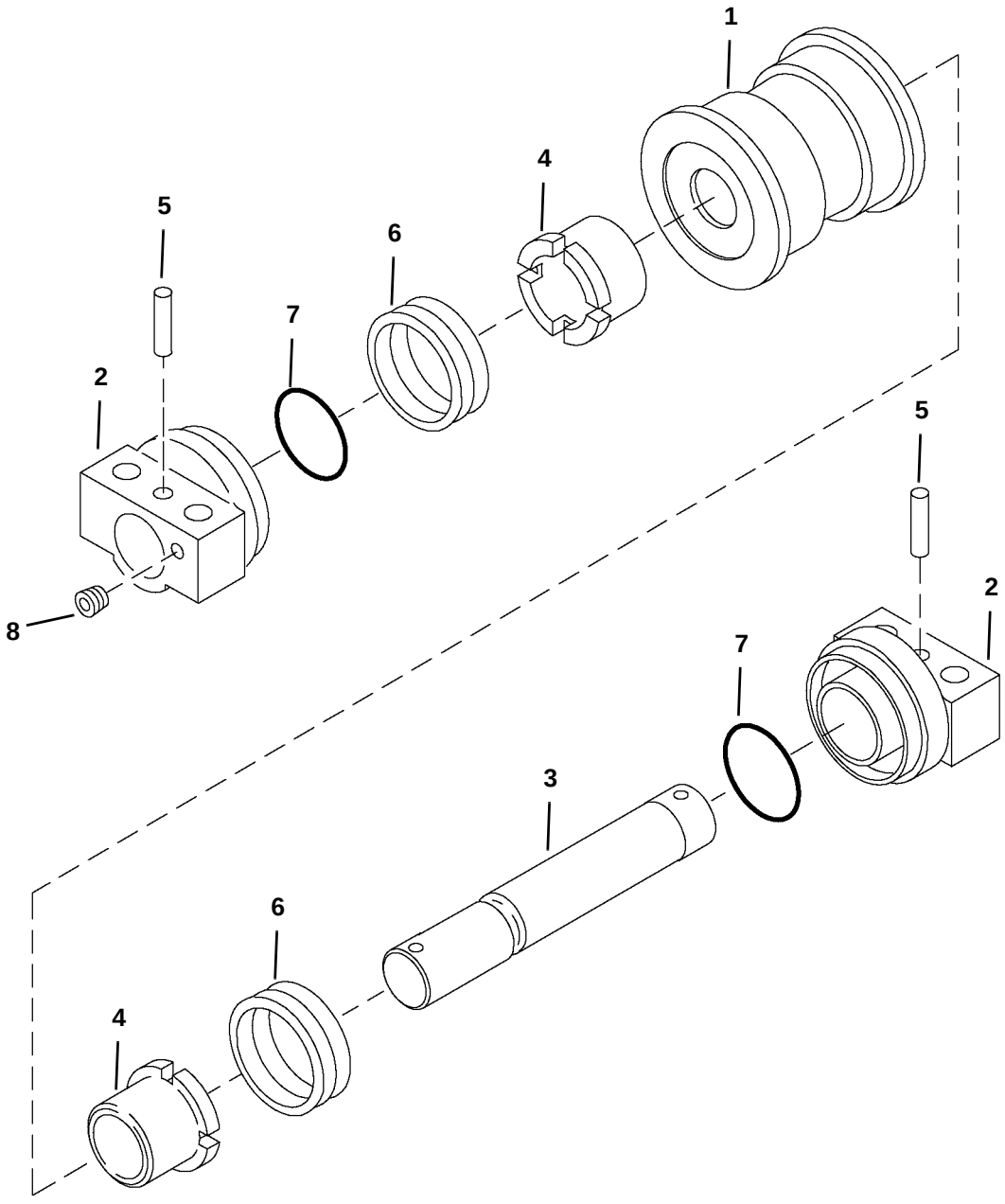
Place the seal assembly (Item 1) **[Figure 30-21-37]** in the installation tool.

The O-ring and seal ring assembly have to be lubricated with alcohol, so that the O-ring will slip past the housing retaining ring and seal uniformly in the housing radius.

Dip the seal assembly in a pan of alcohol.

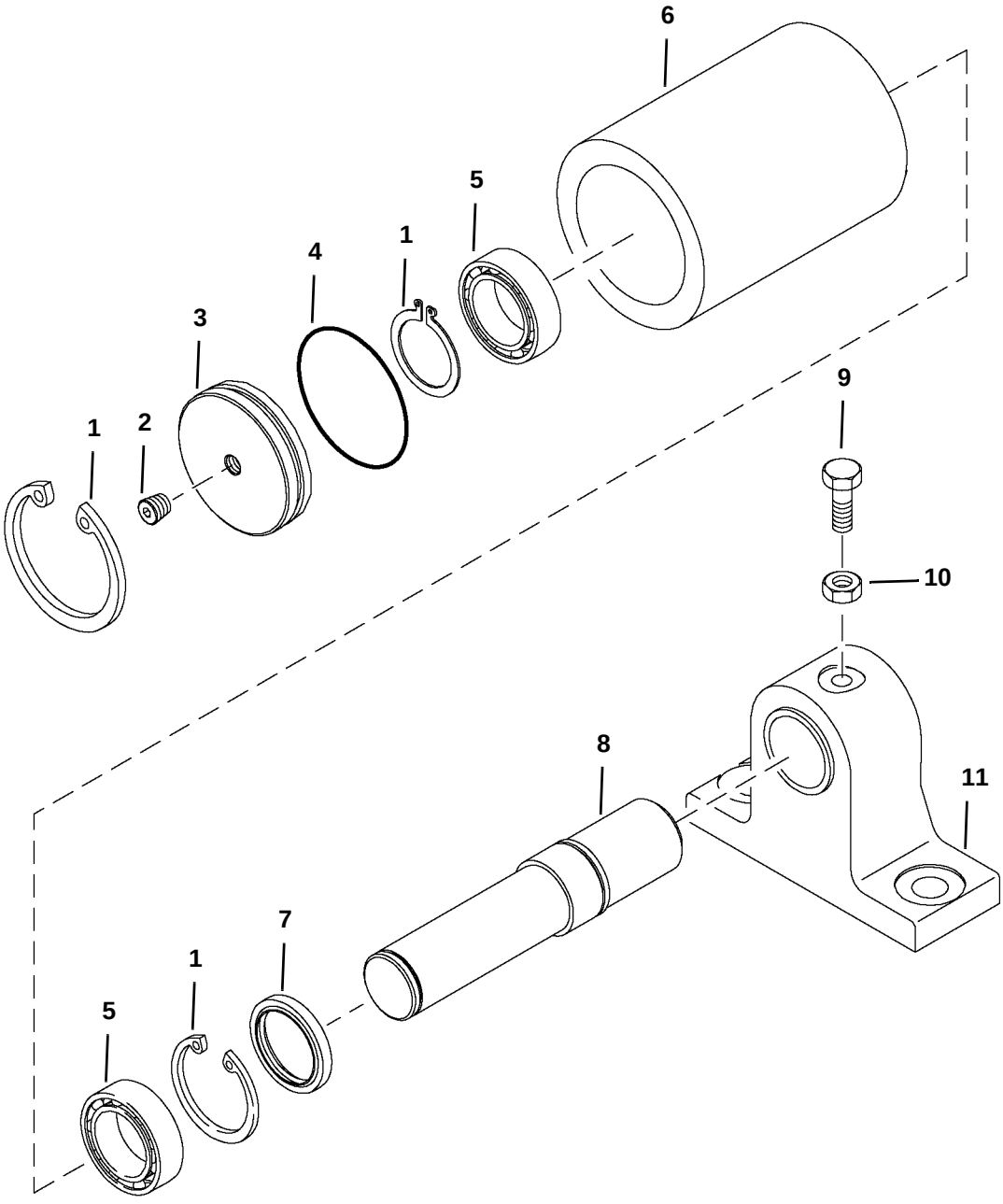
Lower Roller Parts Identification

1. Roller
2. Collar
3. Shaft
4. Bushing
5. Pin
6. Seal
7. O-Ring
8. Plug



Upper Roller Parts Identification

1. Snap Ring
2. Pipe Plug
3. Cover
4. O-Ring
5. Bearing
6. Roller
7. Seal
8. Shaft
9. Bolt
10. Nut
11. Mount

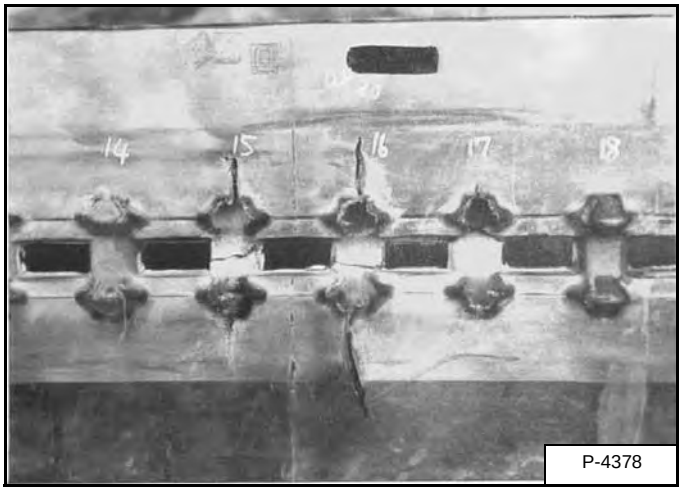


E80-2140S

Track Damage Identification (Cont'd)

Separation Of Embedded Metals Due To Corrosion

Figure 30-30-10



Damage:

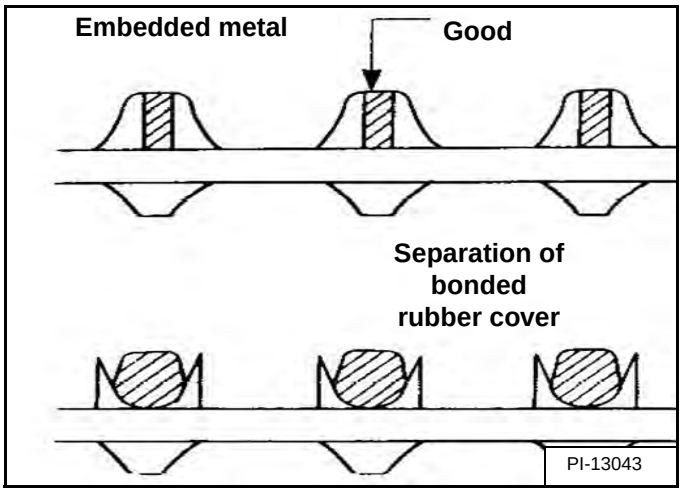
Due to corrosion of embedded metals, the adhesion to the rubber body deteriorates, resulting in complete separation **[Figure 30-30-10]**.

Replacement:

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

Causes of the damage:

Figure 30-30-11



Embedded metals are bonded to the rubber body. The following operating conditions cause embedded metals to corrode, causing deterioration of the bonding, and finally resulting in separation of the embedded metals from the rubber body **[Figure 30-30-11]**:

Excessively salty fields, like the sea shore

Strong acidic or alkali soil conditions

Compost spread grounds.

On tracks that are out of adjustment, the track rollers, idlers and sprockets will gradually wear the rubber surface at the side of the track roller, causing exposure of the embedded metals. Consequently the embedded metals will corrode resulting in their separation from the rubber body.

Prevention:

If rubber tracks are used under such field conditions as described under (Causes of the damage). The tracks should be washed with plenty of water. After being completely dried, they should be stored correctly.

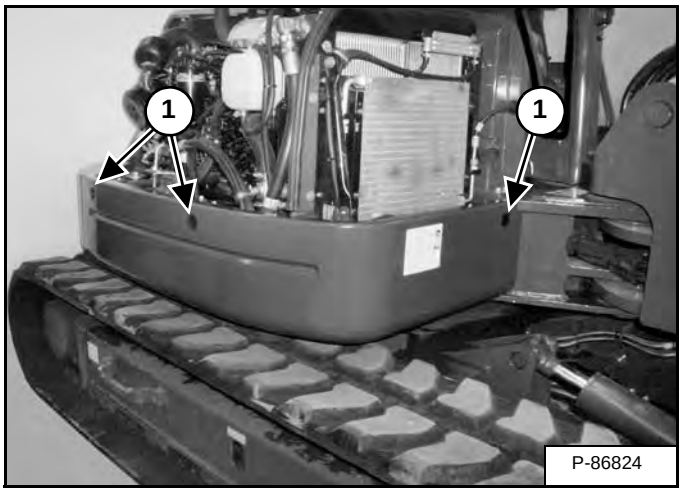
When the bonded rubber cover is separated from the embedded metal projections and the metals in the rubber body become loose, it is time to consider replacing the rubber track.

UPPERSTRUCTURE & SWING SECTION

UPPERSTRUCTURE SIDE COVER (RIGHT)

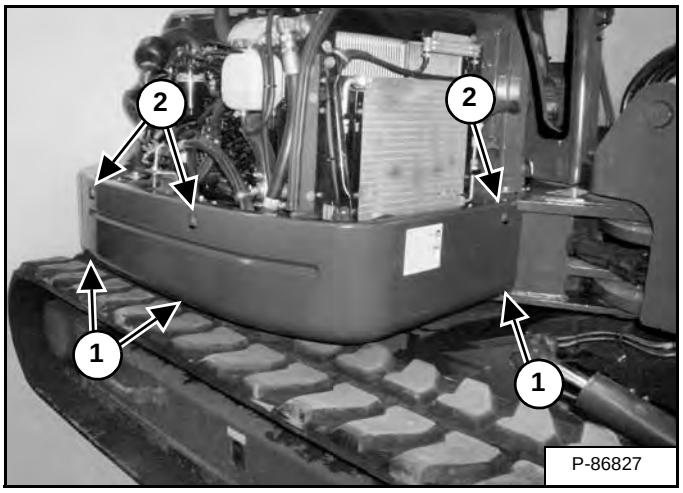
Removal And Installation

Figure 40-21-1



Remove the three rubber plugs (Item 1) **[Figure 40-21-1]**.

Figure 40-21-2



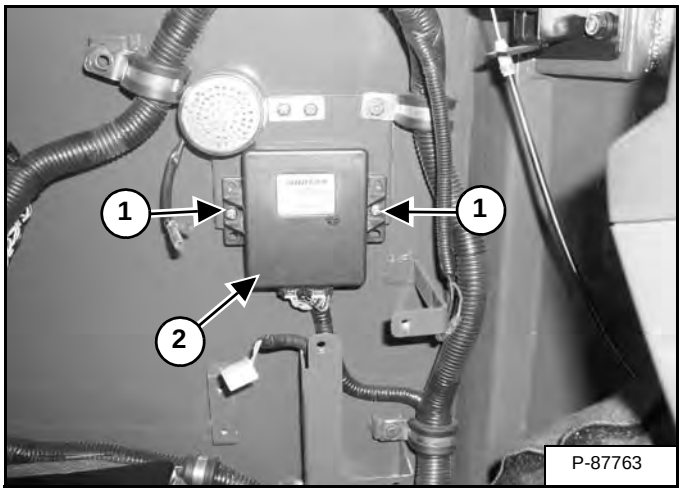
Remove the three bottom bolts (Item 1), flat washers and lock washers. Remove the three top bolts (Item 2) **[Figure 40-21-2]**, flat washers and lock washers.

Remove the cover.

Note the number and position of the shims located between the cover and upperstructure. Place the shims in the correct position for installation.

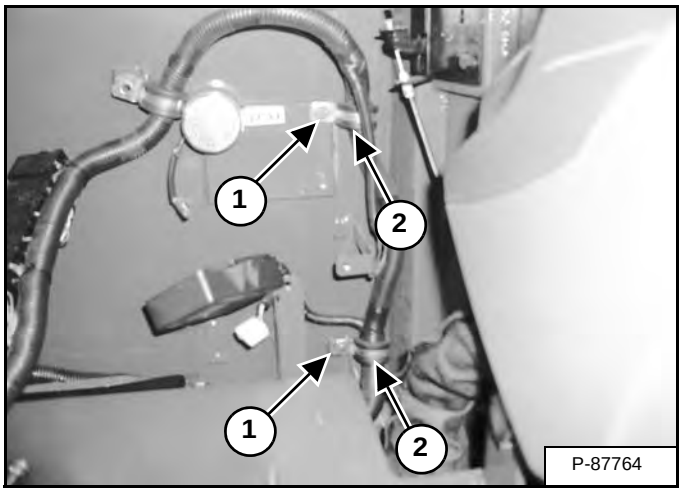
Removal And Installation (Cont'd)

Figure 40-30-35



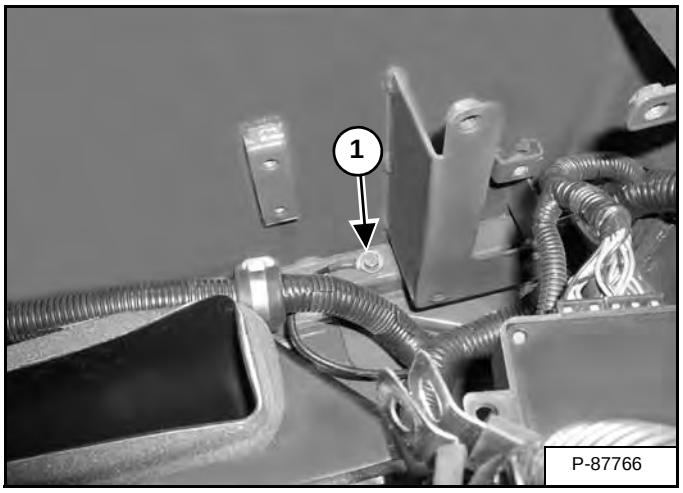
Remove the screws (Item 1) and controller (Item 2) **[Figure 40-30-35]**.

Figure 40-30-36



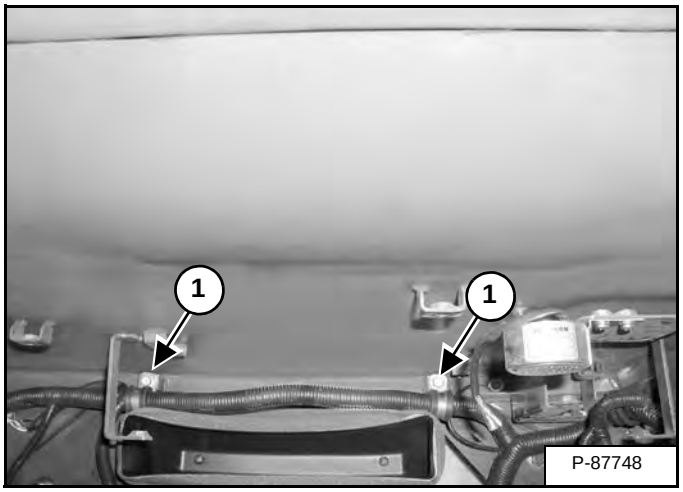
Remove the bolts (Item 1) from the P-clamps (Item 2) **[Figure 40-30-36]**.

Figure 40-30-37



Remove the bolt (Item 1) **[Figure 40-30-37]** from the ground wire.

Figure 40-30-38

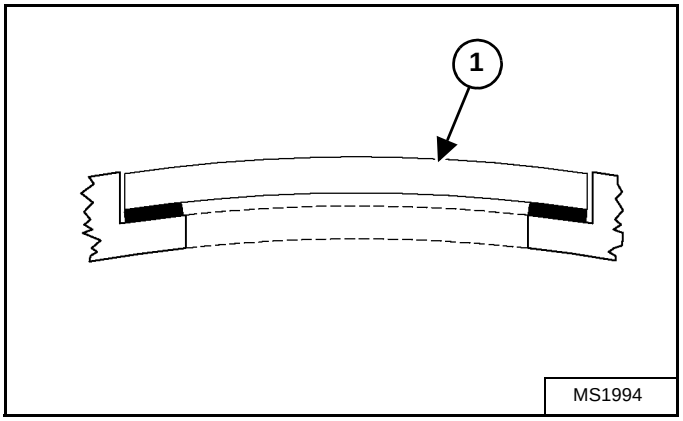


Remove the bolts (Item 1) **[Figure 40-30-38]** from the P-clamps.

Glass Installation (Cont'd)

Top, Right Side, Left Side And Rear Glass (Cont'd)

Figure 40-30-67



Install the glass and damper assembly (Item 1) **[Figure 40-30-67]**. Press the glass into the cab to make complete contact with the adhesive. Tape the glass in place.

Allow the adhesive to cure for a minimum of twelve hours at 70° F and 20% relative humidity.

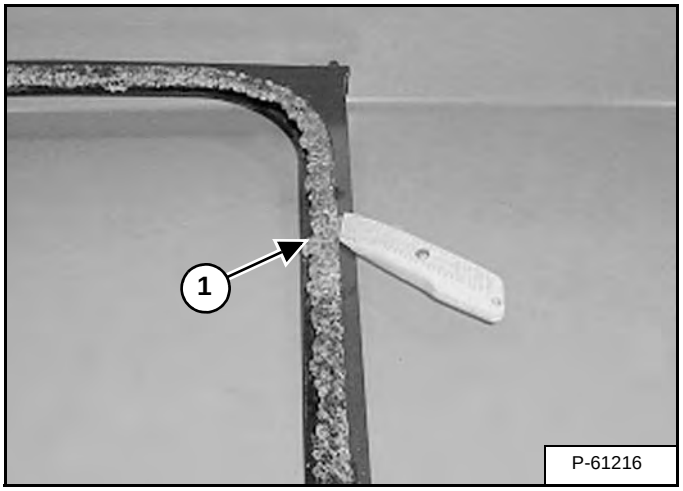
Remove the tape after the adhesive is cured.

Door And Front Window Glass

NOTE: The door and front windows are supplied as kits that include the glass, urethane adhesive, combo primer, glass cleaner and damper for correctly installing the new glass.

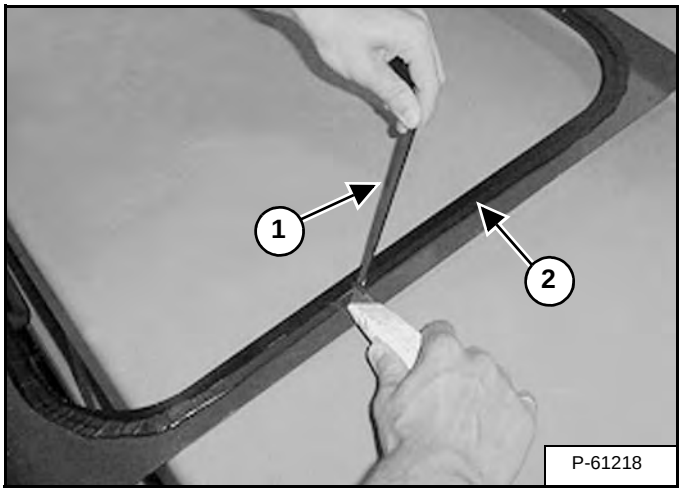
Remove the front window or door that is to be repaired from the excavator.

Figure 40-30-68



Remove the broken glass (Item 1) **[Figure 40-30-68]**.

Figure 40-30-69

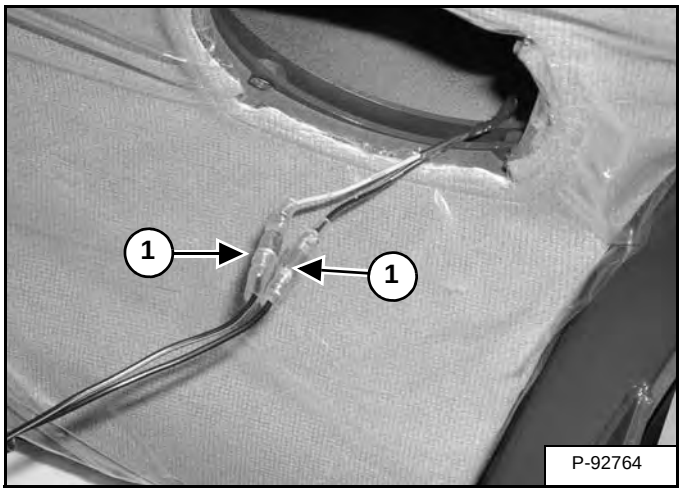


Cut and remove the old urethane adhesive (Item 1) leaving less than a 0,79 mm (0.03 in) thick layer (Item 2) **[Figure 40-30-69]** for the new adhesive to bond to.

NOTE: Be careful not to scratch the paint on the frame.

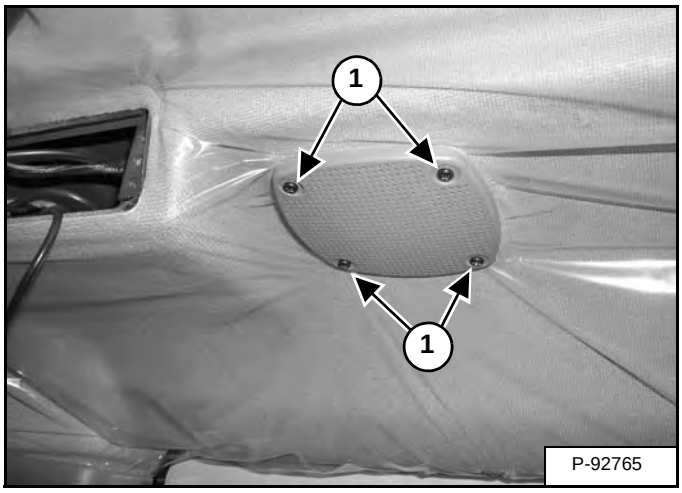
Headliner Removal And Installation (Cont'd)

Figure 40-30-92



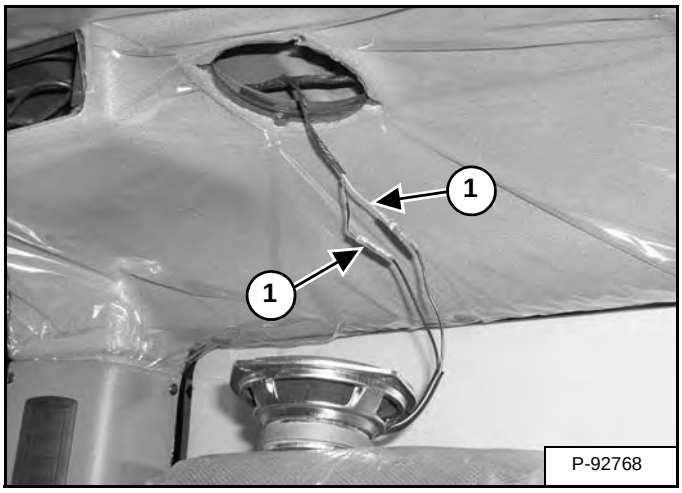
Remove the speaker from the headliner and disconnect the wires (Item 1) **[Figure 40-30-92]**.

Figure 40-30-93



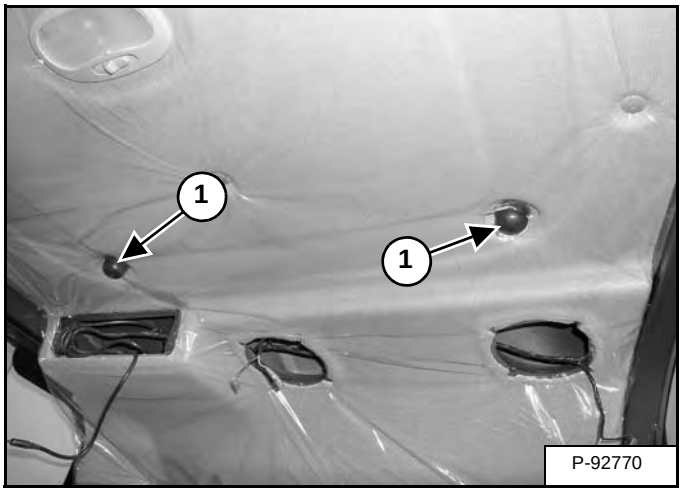
Remove the screws (Item 1) **[Figure 40-30-93]**.

Figure 40-30-94



Remove the speaker from the headliner and disconnect the wires (Item 1) **[Figure 40-30-94]**.

Figure 40-30-95



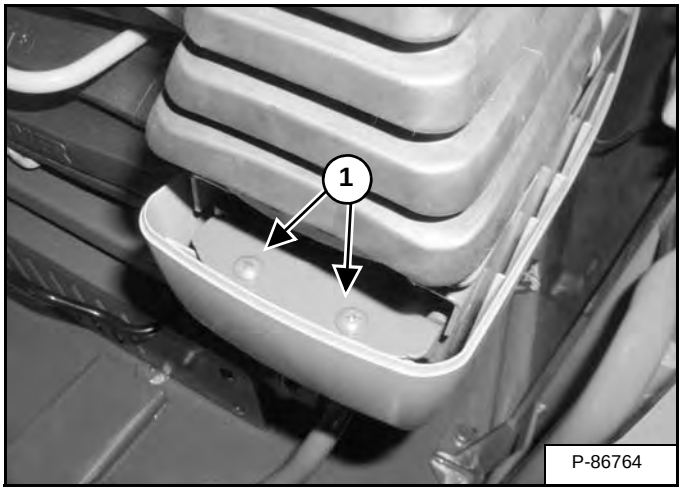
Remove the front window bumpers (Item 1) **[Figure 40-30-95]**.

LEFT CONSOLE

Lower Console Cover Removal And Installation

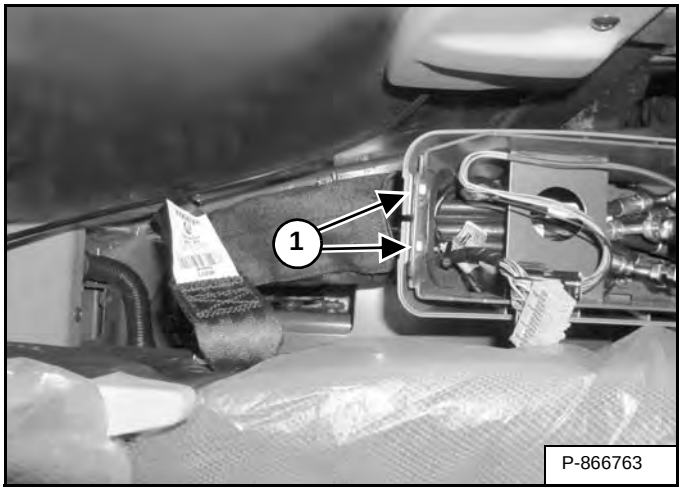
Remove the upper console cover. (See Upper Console Cover Removal And Installation on Page 40-60-2.)

Figure 40-60-1



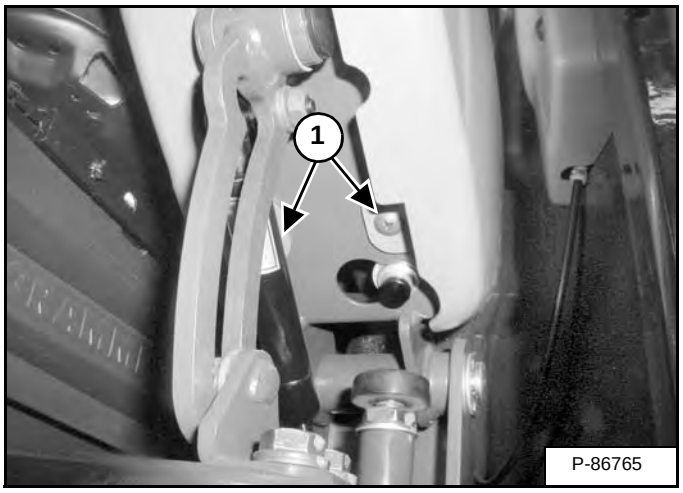
Remove the two screws (Item 1) **[Figure 40-60-1]** from the front of the cover.

Figure 40-60-2



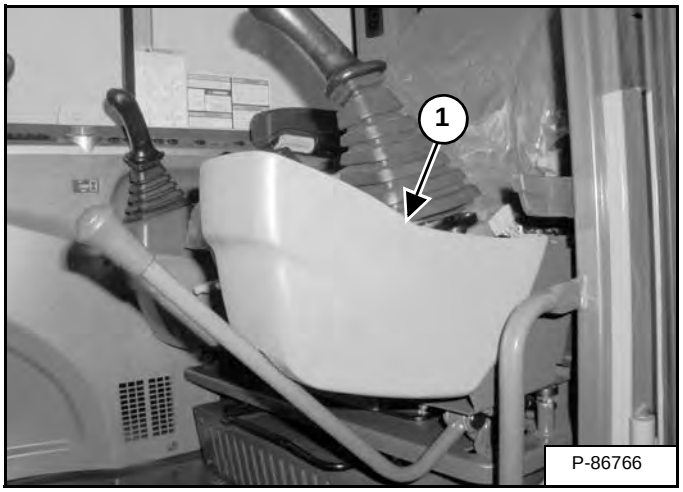
Remove the two screws (Item 1) **[Figure 40-60-2]** from the rear of the cover.

Figure 40-60-3



Raise the console and remove the two screws (Item 1) **[Figure 40-60-3]** from the bottom of the cover.

Figure 40-60-4



Lower the console and remove the cover (Item 1) **[Figure 40-60-4]**.

COUNTERWEIGHT

Removal And Installation

Tilt the cab. (See Tilting The Cab on Page 10-210-1.)

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

Figure 40-90-1

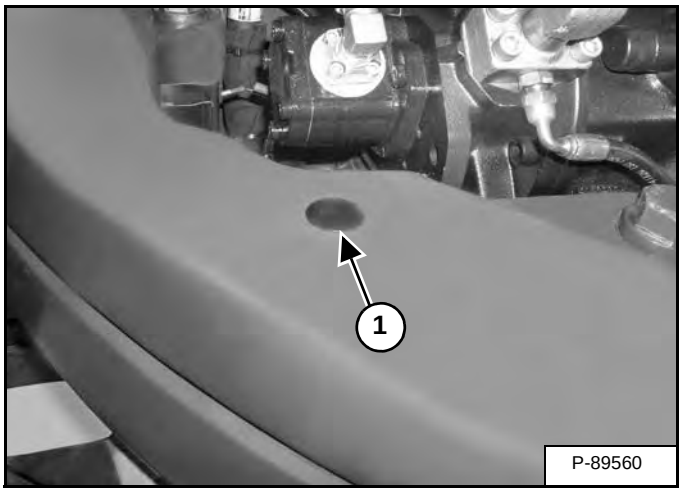
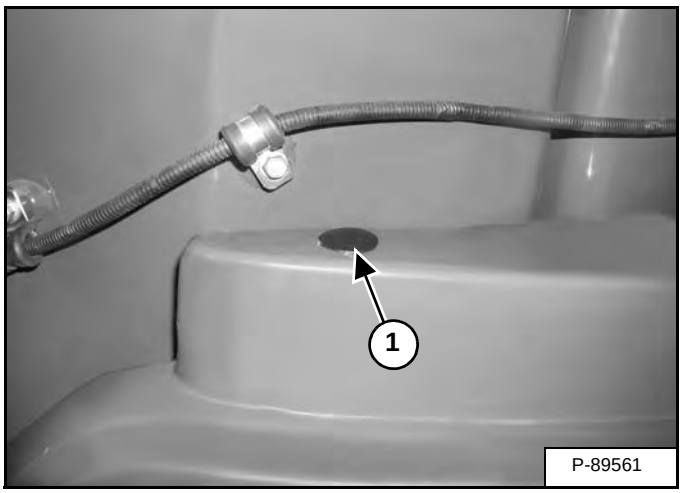
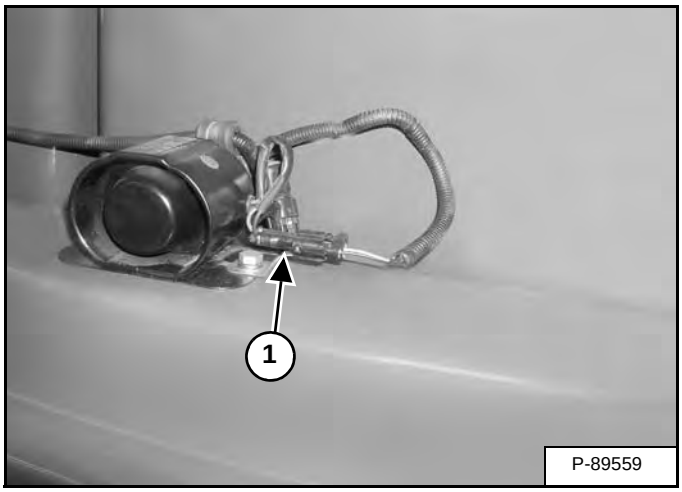


Figure 40-90-2



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

Figure 40-90-3



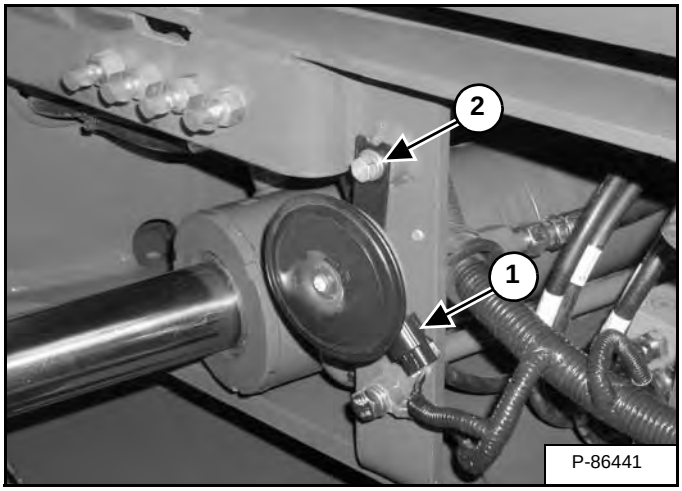
Disconnect the harness (Item 1) **[Figure 40-90-3]** from the motion alarm.

HORN

Removal And Installation

Remove the left upperstructure side cover. (See Removal And Installation on Page 40-20-1.)

Figure 40-120-1



Disconnect the wire harness (Item 1). Remove the bolt (Item 2) **[Figure 40-120-1]** and washer.

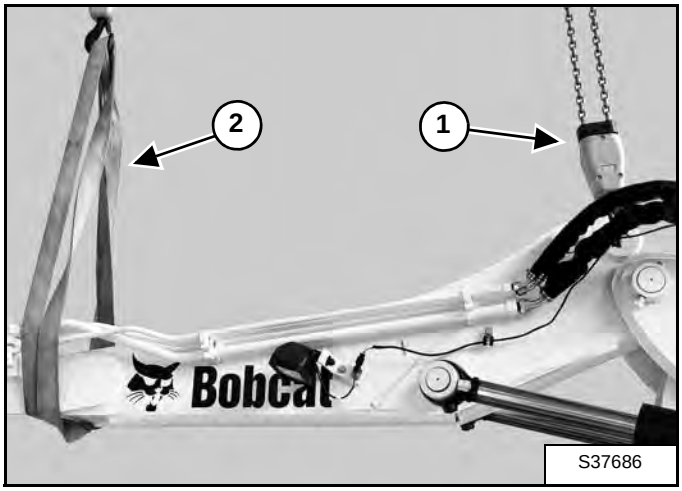
Remove the horn.

BOOM (ARTICULATED) (OPTIONAL)

Removal And Installation

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

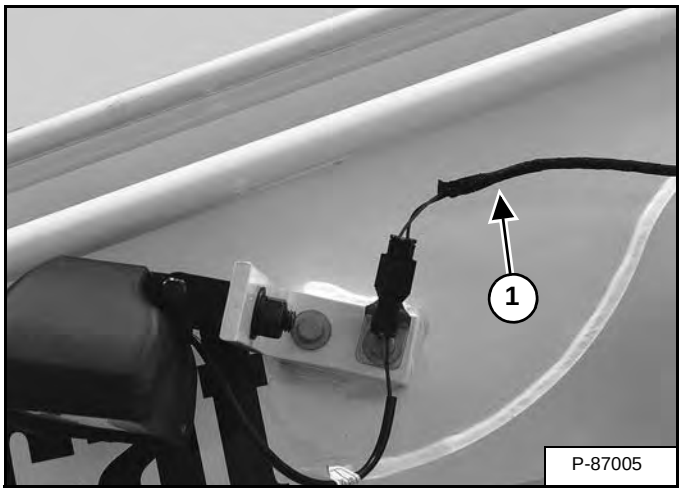
Figure 40-141-1



Support the articulated boom with a chain hoist (Item 1) in the articulated boom lifting point, and with a hoist at the front of the articulated boom (Item 2) **[Figure 40-141-1]**.

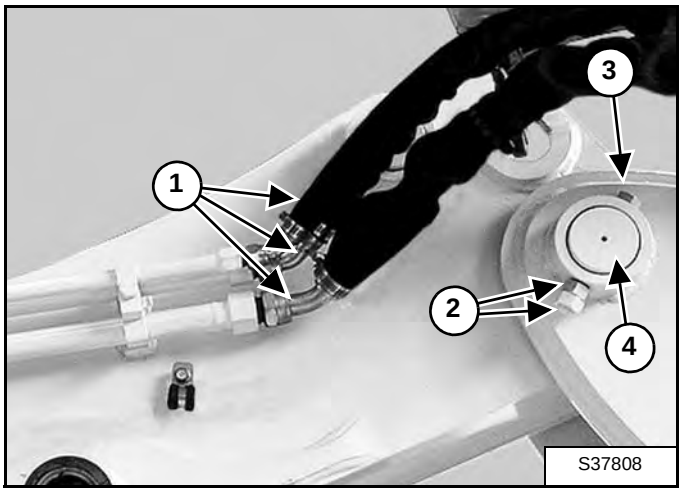
Remove the articulated boom cylinders. (See Removal And Installation on Page 20-25-3.)

Figure 40-141-2



Disconnect the wire harness (Item 1) **[Figure 40-141-2]** from the boom light (Both sides).

Figure 40-141-3



Mark and remove the hoses (Item 1) **[Figure 40-141-3]** (Both sides).

Remove the nuts (Item 2) and bolt (Item 3) **[Figure 40-141-3]** (Both sides).

Remove the pivot pin (Item 4) **[Figure 40-141-3]**.

Remove the articulated boom.

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

Disassembly

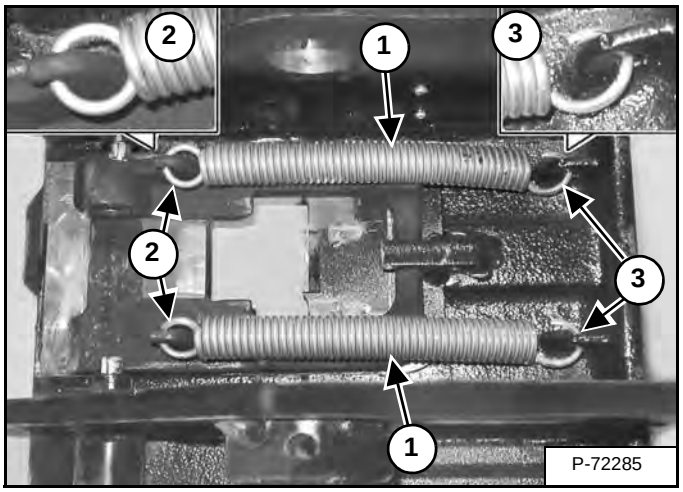
WARNING

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

- **Pressurized fluids and springs or other stored energy components.**
- **Flying debris or loose material is present.**
- **Engine is running.**
- **Tools are being used.**

W-2505-0604

Figure 40-160-7



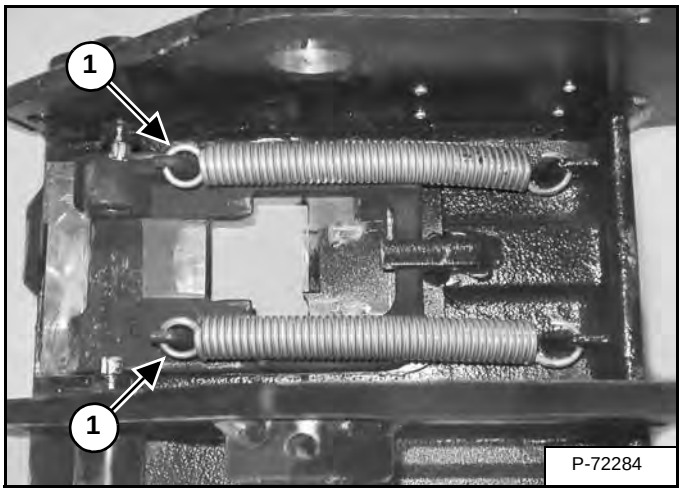
The two springs (Item 1) **[Figure 40-160-7]** have different style of end hooks.

The spring hook (Item 2) **[Figure 40-160-7]** are full circle hooks.

The spring hook (Item 3) **[Figure 40-160-7]** are partial circle hooks.

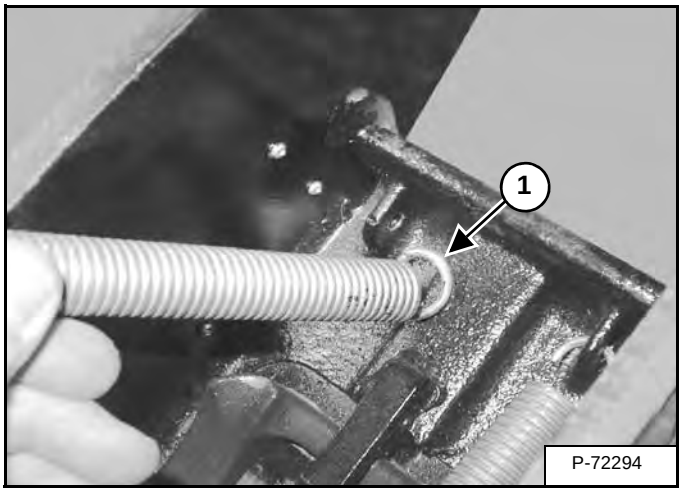
The spring ends must be positioned as shown when assembled.

Figure 40-160-8



Remove the spring end hook (Item 1) **[Figure 40-160-8]** from the quick coupler.

Figure 40-160-9



Remove the opposite end of the two springs (Item 1) **[Figure 40-160-9]**.

Disassembly (MS08)

⚠ WARNING

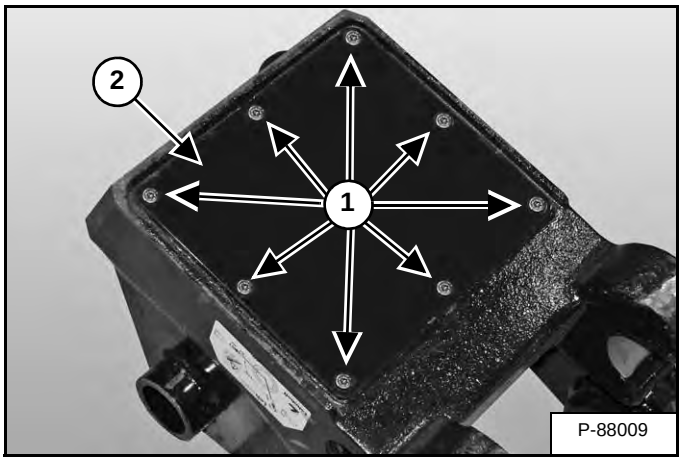
AVOID INJURY OR DEATH

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

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

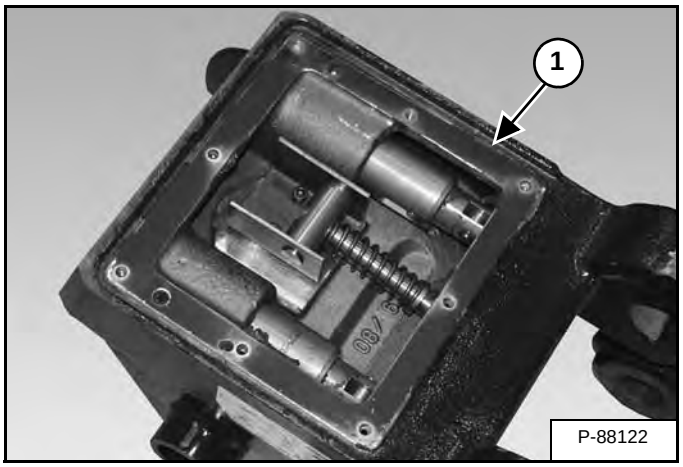
W-2019-0907

Figure 40-161-10



Remove the eight bolts (Item 1) and cover (Item 2) **[Figure 40-161-10]**.

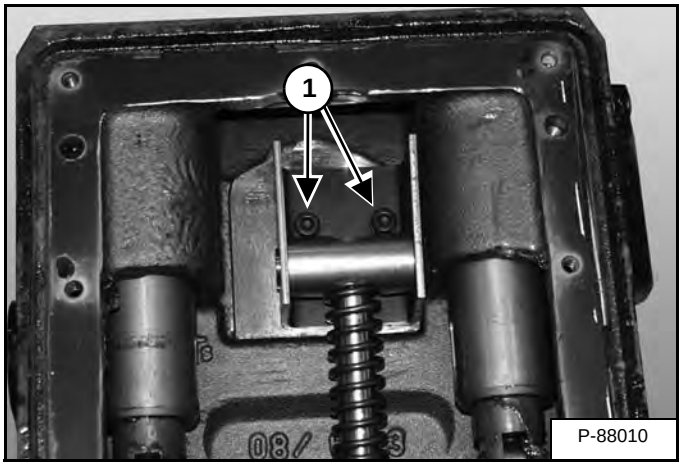
Figure 40-161-11



Remove all sealant (Item 1) **[Figure 40-161-11]** from the housing and cover.

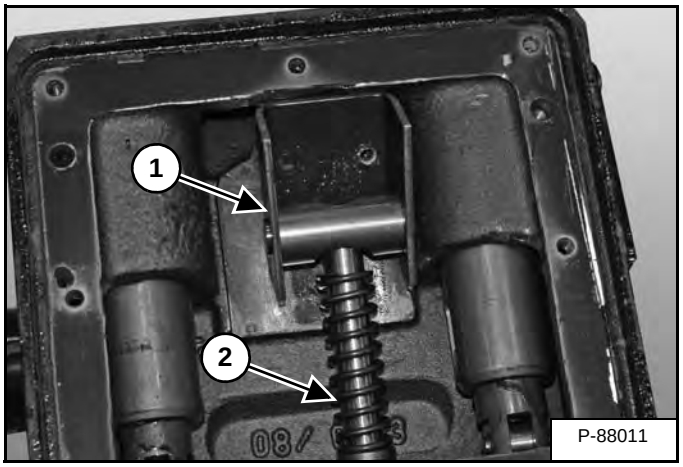
NOTE: Do not scratch the mounting surface while removing sealant.

Figure 40-161-12



Remove the two bolts (Item 1) **[Figure 40-161-12]**.

Figure 40-161-13



Tilt the bearing block and pivoting journal (Item 1) up and remove from the spring guide (Item 2) **[Figure 40-161-13]**.

RIGHT SIDE COVER

Removal And Installation

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

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

Open the right side cover. (See Opening And Closing on Page 10-50-1.)

Figure 40-180-1

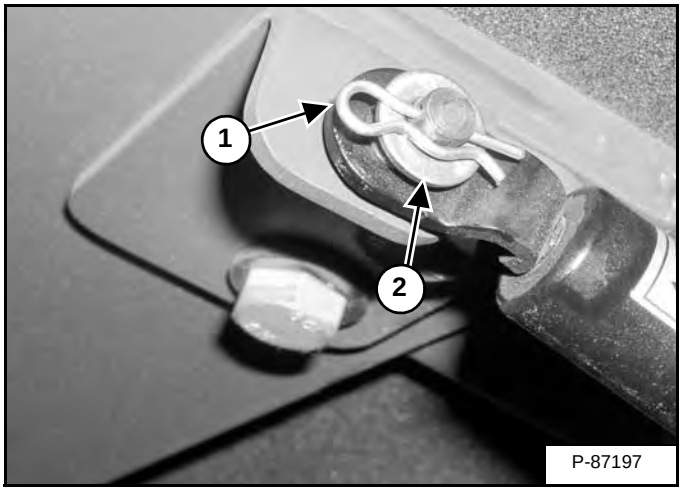
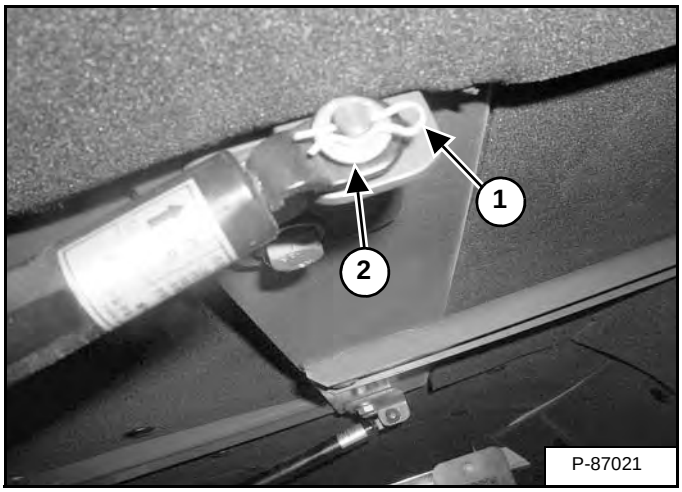


Figure 40-180-2



Remove the clip (Item 1) and washer (Item 2) **[Figure 40-180-1]** and **[Figure 40-180-2]** from the top of the gas strut.

Figure 40-180-3

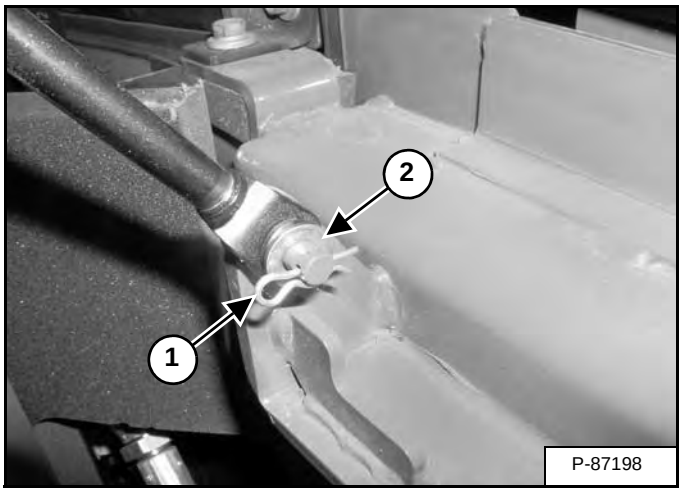
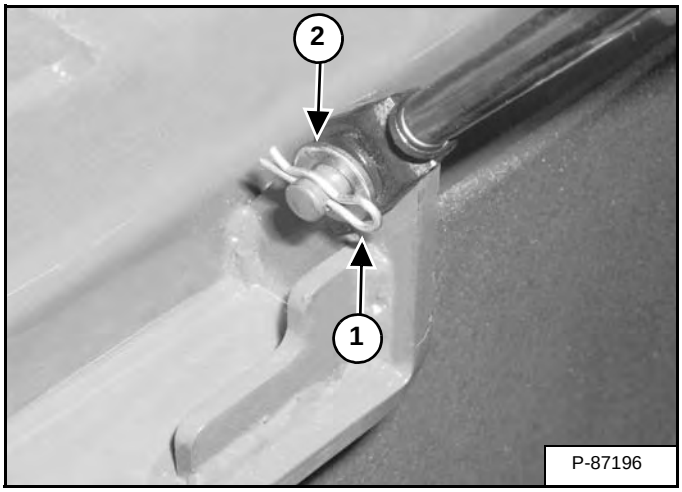


Figure 40-180-4



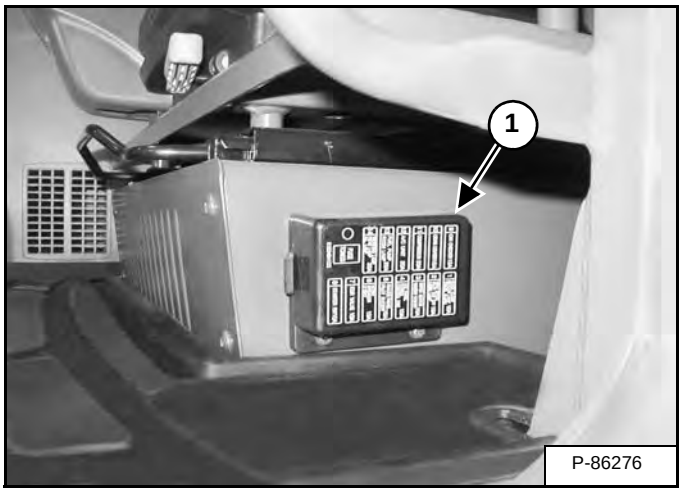
Remove the clip (Item 1) and washers (Item 2) **[Figure 40-180-3]** and **[Figure 40-180-4]** from the bottom of the gas strut.

Support the cover and remove the gas strut.

Close the right side cover.

Description

Figure 50-10-1



The excavator has a 12 volt, negative ground electrical system. The electrical system is protected by fuses located below the operator's seat (Item 1) **[Figure 50-10-1]**.

The fuses will protect the electrical system when there is an electrical overload. The reason for the overload must be found before starting the engine again.

The battery cables must be clean and tight. Check the electrolyte level in the battery. Add distilled water as needed. Remove acid or corrosion from the battery and cables with a sodium bicarbonate and water solution.

Put Battery Saver P/N 6664458 or grease on the battery terminals and cable ends to prevent corrosion.

⚠ 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.

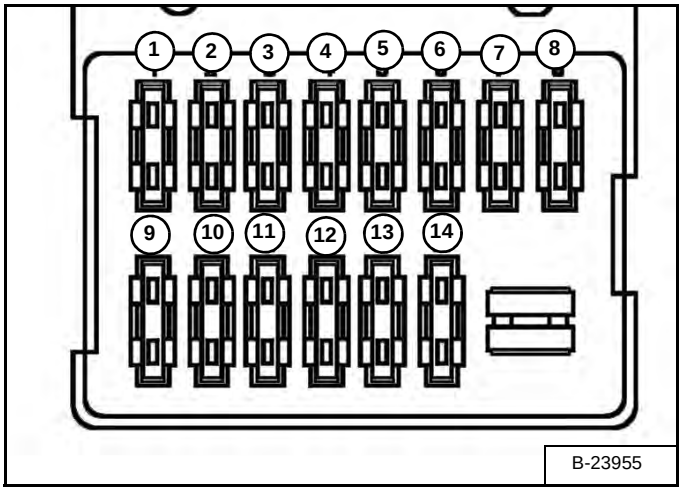
W-2065-0807

Fuse And Relay Location / Identification

A decal is on the cover to show location and amp ratings.

Remove the cover to check or replace the fuses.

Figure 50-10-2

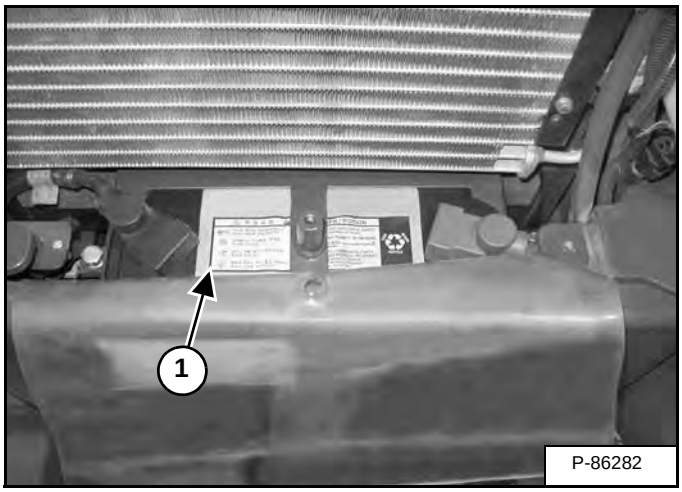


The fuse locations and sizes are shown below and in **[Figure 50-10-2]**.

REF	DESCRIPTION	AMP
1	**Warning Light, Motion Alarm**	10
2	Two Speed, Console Lock, Cab Light	10
3	Wiper, Washer	10
4	Stereo, ECU, Air Conditioning Control Panel	10
5	Instrument Panel	10
6	Horn, Breaker Switch, Beacon / Strobe Light	10
7	EGR Valve	10
8	Starter	10
9	Can Checker	15
10	Power Plug	15
11	Condenser Fan, Compressor Clutch	20
12	Air Conditioner / Heater	20
13	Fuel Pump, Hour Meter	20
14	Work Light, Boom Light	30

Charging System Inspection (Cont'd)

Figure 50-30-9



If the icon is illuminated, measure the voltage at the battery (Item 1) **[Figure 50-30-9]**.

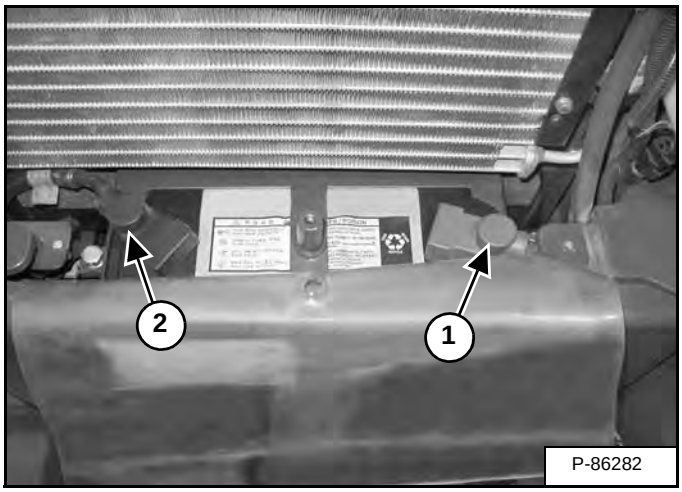
Battery voltage should be between 13 and 15 volts.

If the voltage is over 15.5 volts, replace the regulator.

If the voltage is less than 13 volts, inspect the auxiliary diode.

Alternator Voltage Testing

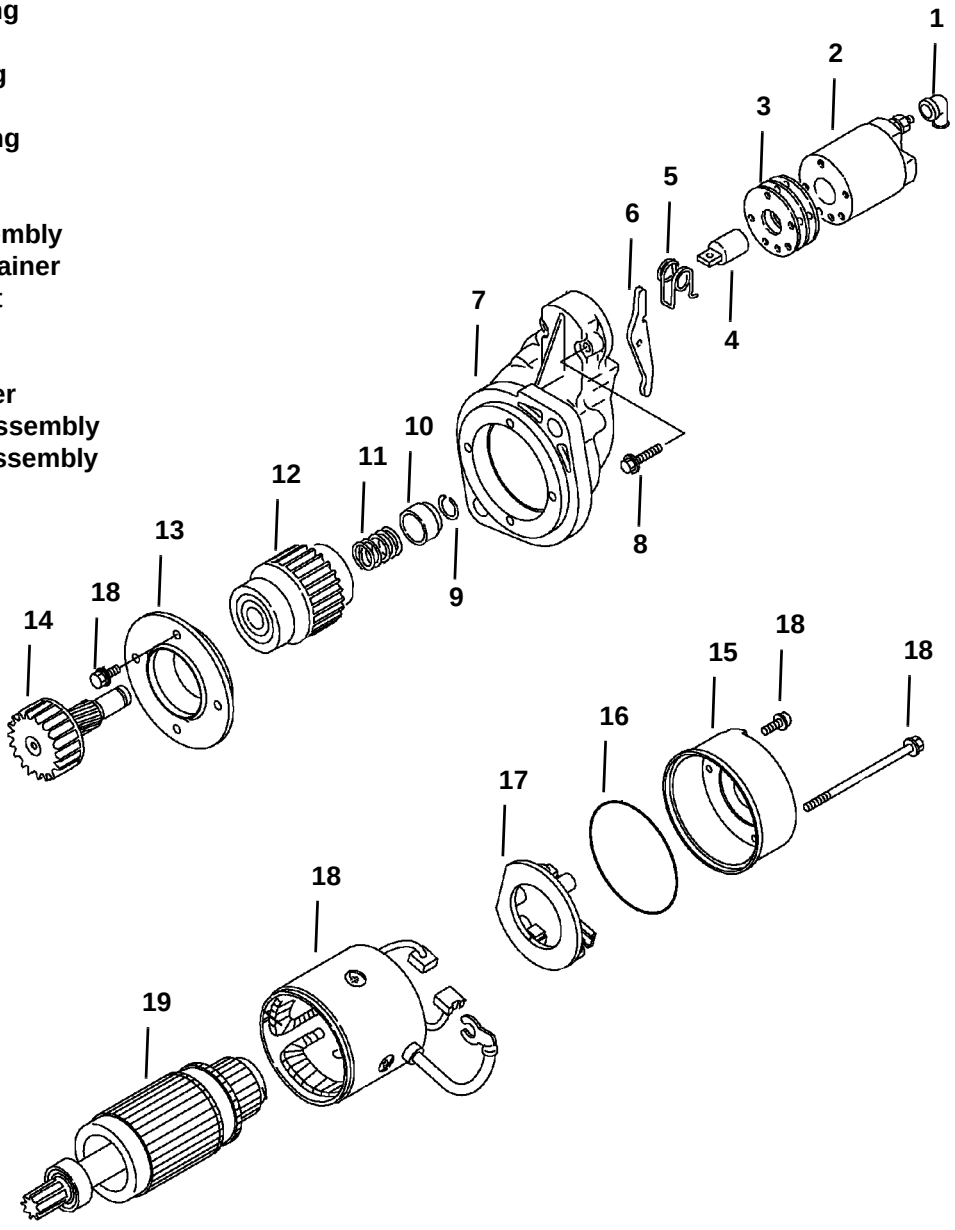
Figure 50-30-10



Run the engine at rated speed. Check to make sure that all accessories are turned OFF. Connect the positive lead of the voltmeter to the positive terminal (Item 1) of the battery. Connect the negative lead of the volt meter to the negative terminal (Item 2) **[Figure 50-30-10]**. If the reading on the voltmeter is under 13 volts or more than 15.5 volts, disassemble the alternator and check the components.

Parts Identification

1. Rubber cover
2. Solenoid
3. Shims
4. Plunger
5. Torsion Spring
6. Shift Lever
7. Gear Housing
8. Bolt
9. Retaining Ring
10. Pinion Stop
11. Spring
12. Clutch Assembly
13. Bearing Retainer
14. Pinion Shaft
15. Rear Cover
16. O-ring
17. Brush Holder
18. Field Coil Assembly
19. Armature Assembly



E80025S

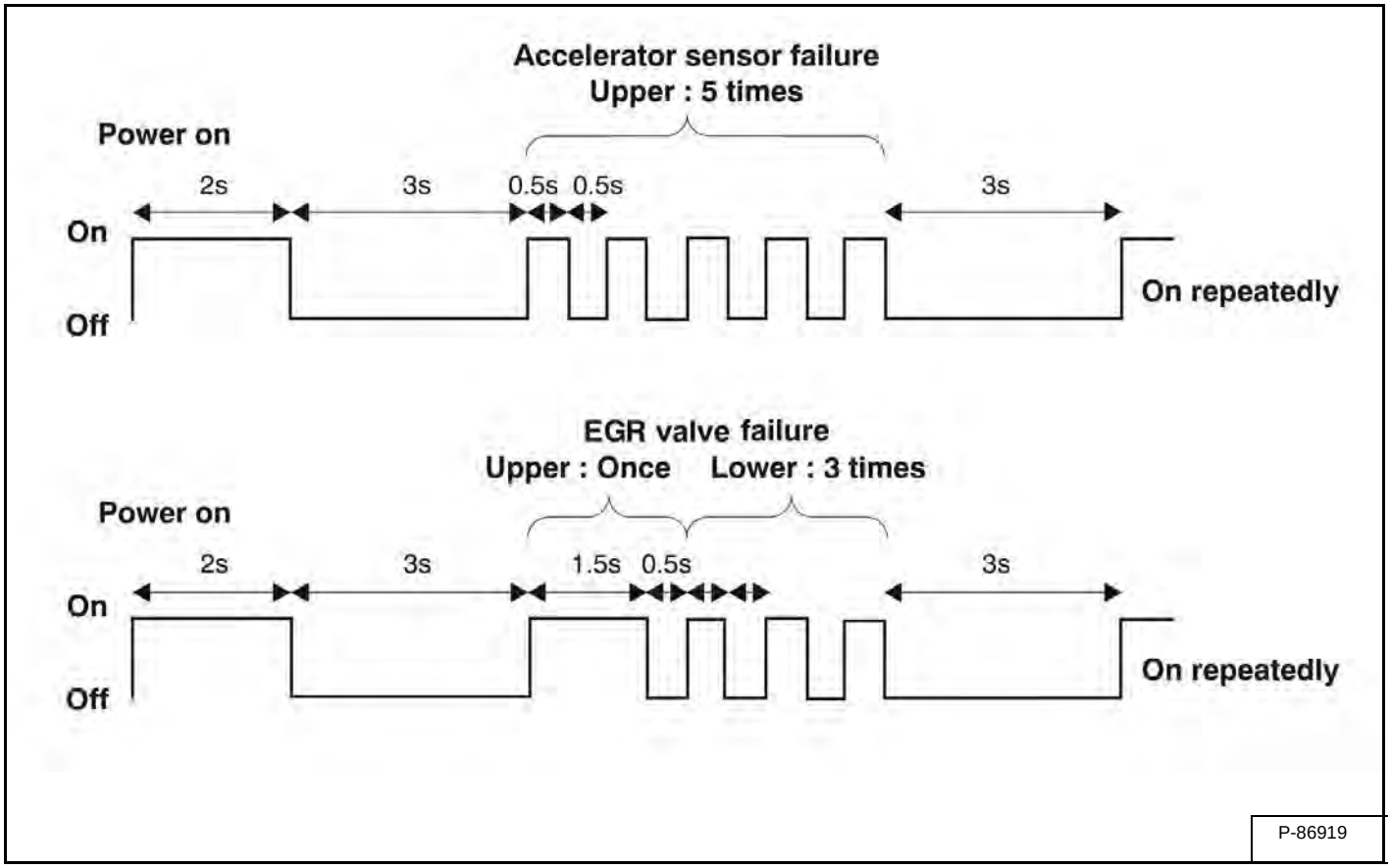
DIAGNOSTIC SERVICE CODE (CONT'D)

Flashing Patterns Of Engine Check Lamp

When detecting these failures, the E-ECU (Engine control unit) flashes the engine check lamp to alert the operator to the occurrence of failure conditions. The engine check lamp will illuminate for two sec. when the E-ECU is power on. This allows checking if the E-ECU is supplied with power normally.

Flashing patterns of the engine check lamp are shown in **[Figure 50-80-2]**. When accelerator sensor failure (flashing five times) and EGR valve failure (flashing 1-3 times) occur, the engine check lamp flashes as shown in **[Figure 50-80-2]**. When two or more failures have occurred simultaneously, the engine check lamp scrolls through all the failure modes, then repeats.

Figure 50-80-2

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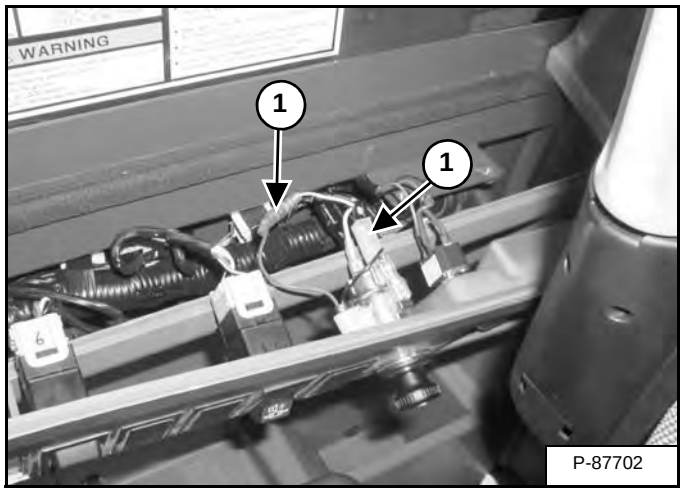
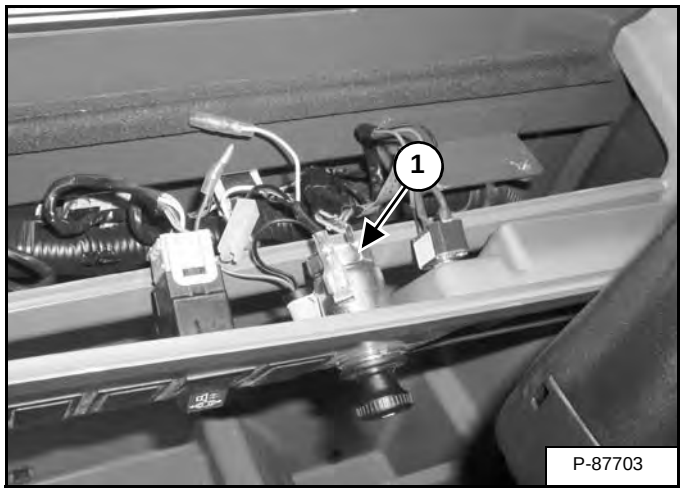
Auxiliary Power Outlet Removal And Installation

Figure 50-120-12



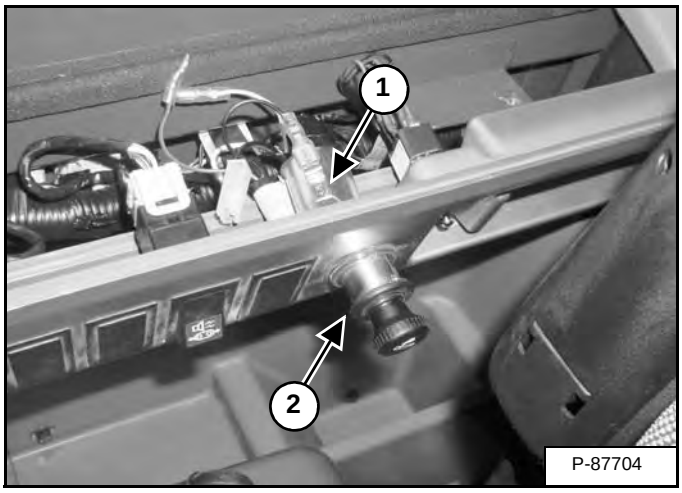
Disconnect the wire harness (Item 1) **[Figure 50-120-12]**.

Figure 50-120-13



Remove the nut (Item 1) **[Figure 50-120-13]**.

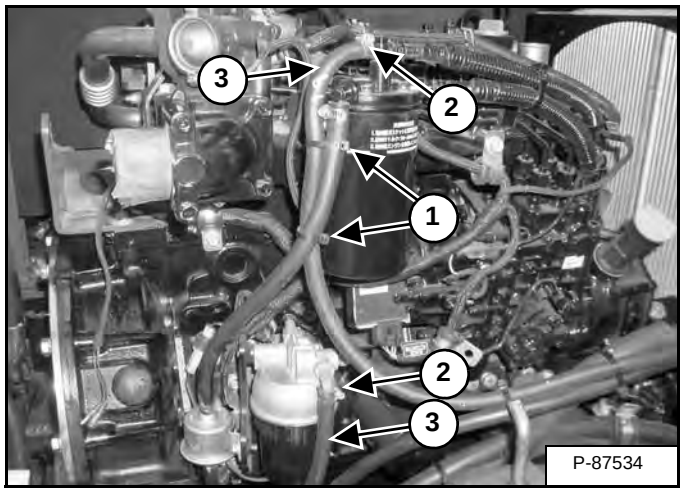
Figure 50-120-14



Remove the collar (Item 1) and slide the housing (Item 2) **[Figure 50-120-14]** out of the cover.

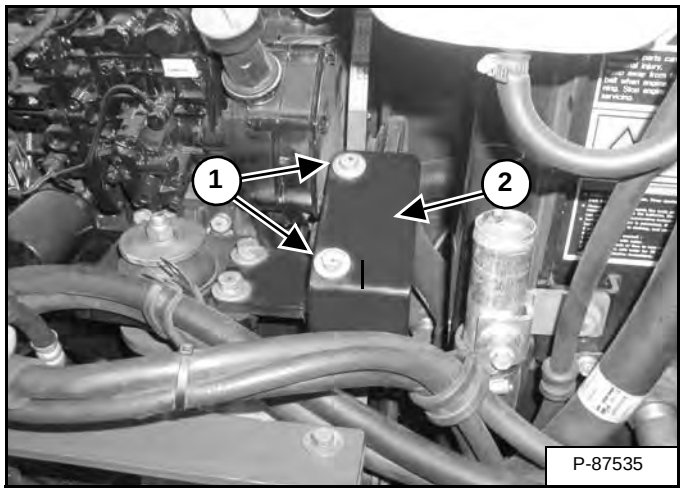
Engine Removal And Installation (Cont'd)

Figure 60-10-5



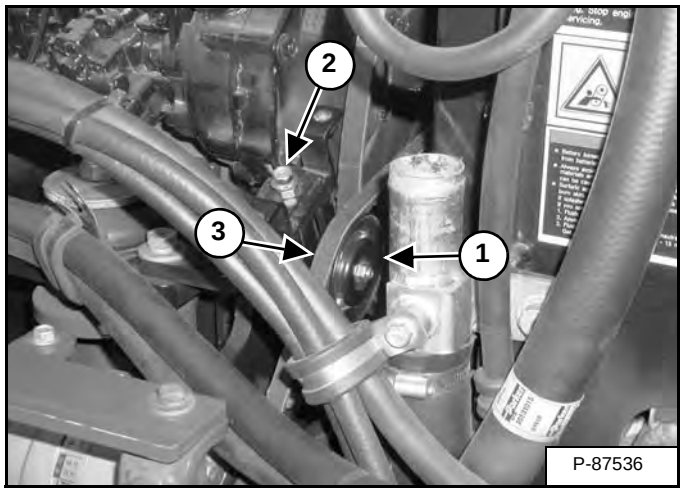
Cut and remove the cable ties (Item 1). Loosen the hose clamps (Item 2) and remove the fuel lines (Item 3) **[Figure 60-10-5]**.

Figure 60-10-6



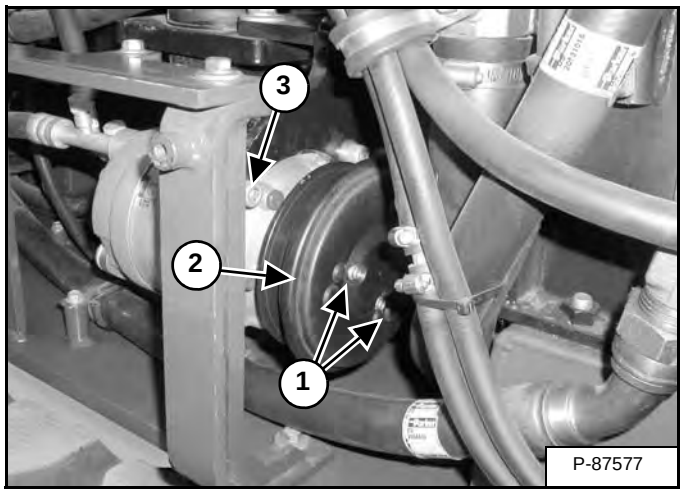
Remove the two bolts (Item 1) and washers. Remove the belt shield (Item 2) **[Figure 60-10-6]**.

Figure 60-10-7



Loosen the nut (Item 1). Loosen the adjustment bolt (Item 2) and remove the belt (Item 3) **[Figure 60-10-7]** from the A/C compressor pulley.

Figure 60-10-8

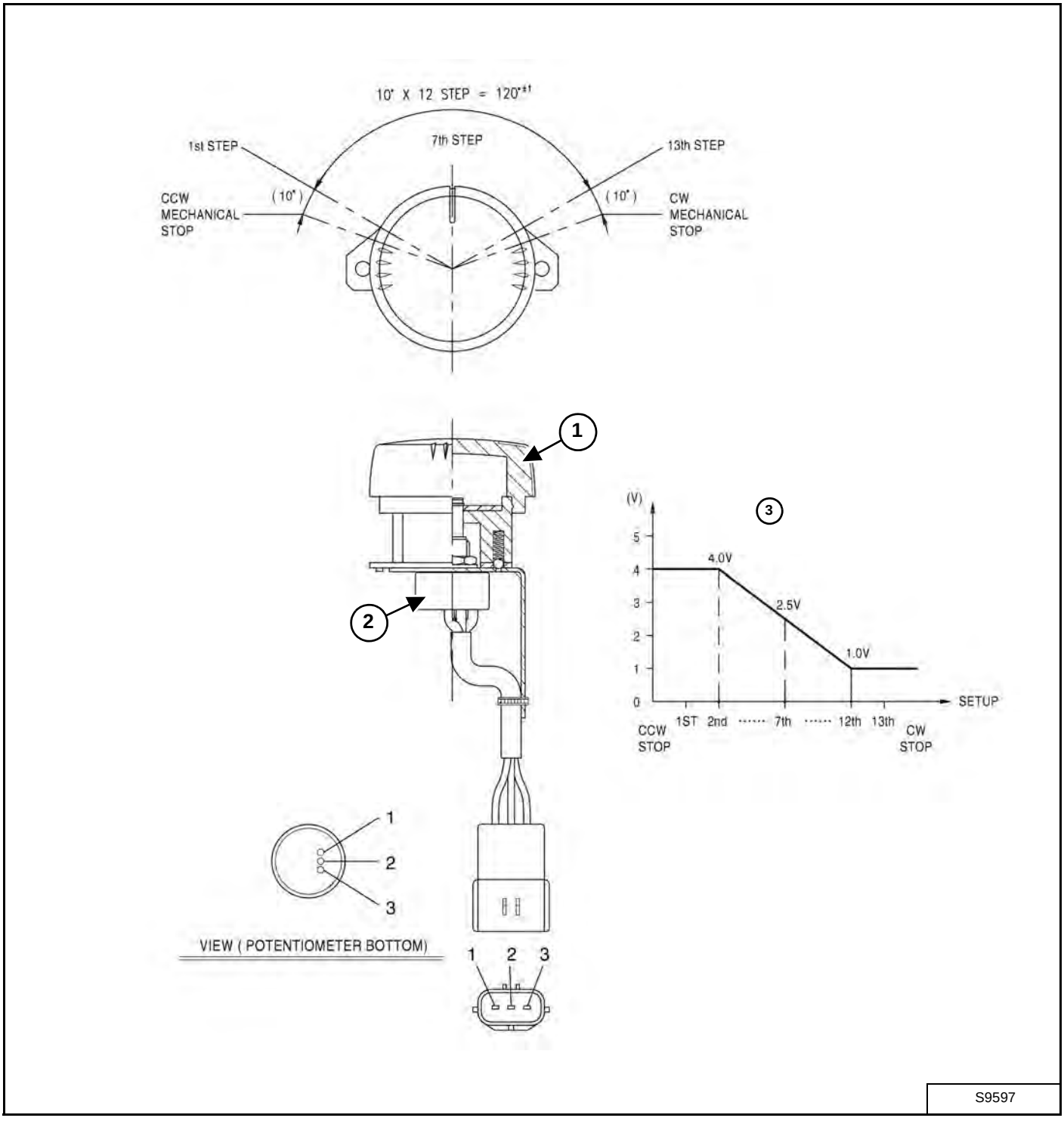


Remove the three screws (Item 1) and remove the dust shield (Item 2). Remove the three bolts (Item 3) **[Figure 60-10-8]**.

ENGINE SPEED CONTROL (CONT'D)

Adjustment (Cont'd)

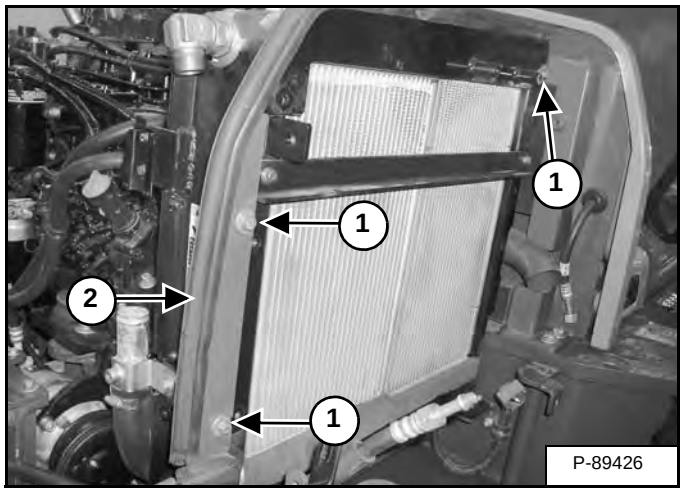
Figure 60-20-2



The engine control dial has a built-in potentiometer (Item 1). When the control knob (Item 2) is moved, the output voltage (through 2 and 3 terminals) will vary from the 5V supplied from the engine throttle controller, as shown in the graph (Item 3) **[Figure 60-20-2]**.

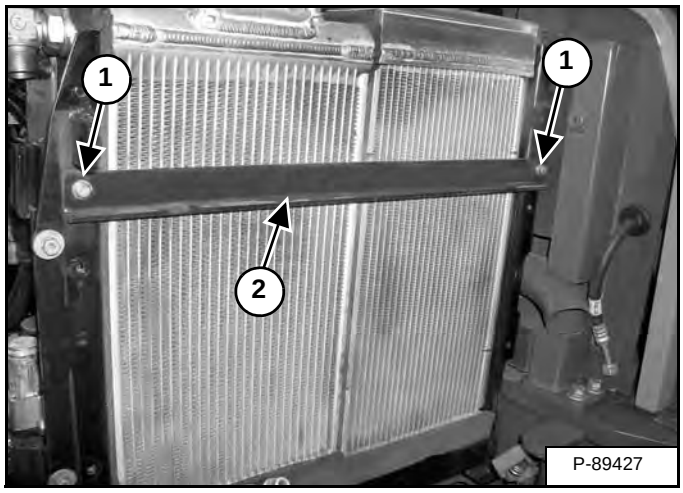
Radiator Removal And Installation (Cont'd)

Figure 60-50-20



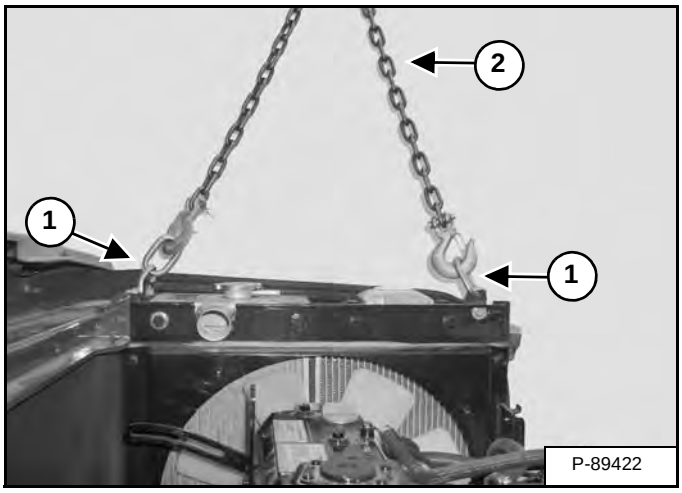
Remove the bolts (Item 1) and seal strip (Item 2) **[Figure 60-50-20]**.

Figure 60-50-21



Remove the bolts (Item 1) and brace (Item 2) **[Figure 60-50-21]**.

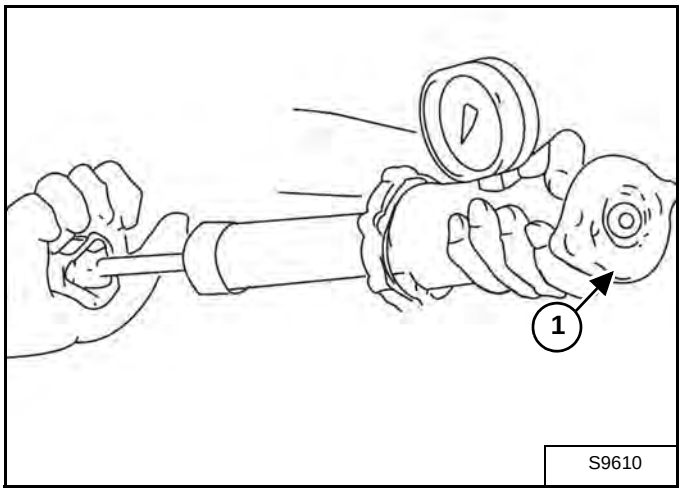
Figure 60-50-22



Install lifting brackets (Item 1) and a chain (Item 2) **[Figure 60-50-22]**.

Thermostat Testing (Cont'd)

Figure 60-50-41

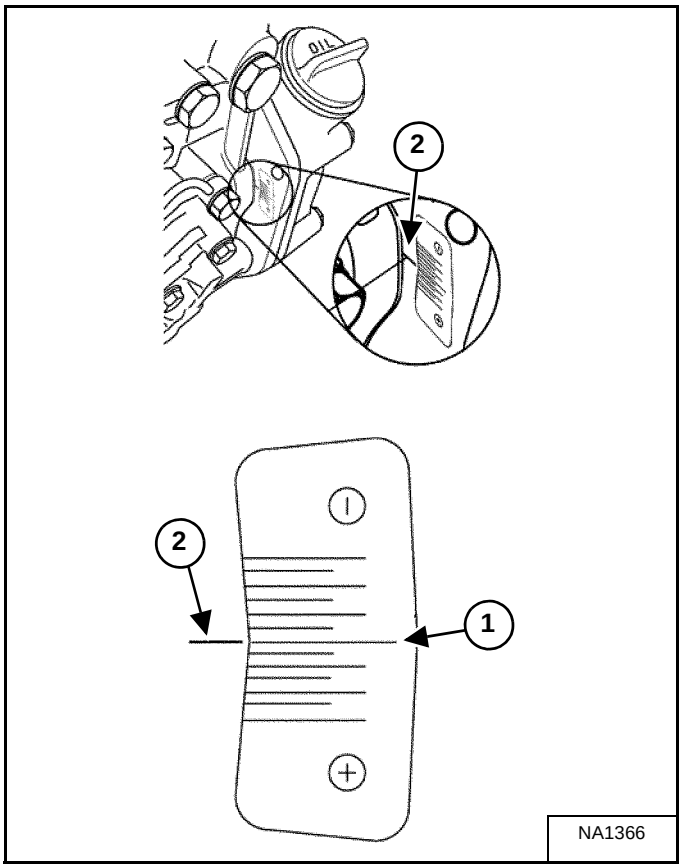


Install the radiator cap (Item 1) **[Figure 60-50-41]** on a cooling system tester.

Apply 75 - 105 kPa (0,75 - 1,05 bar) (10,8 - 14,8 psi) to the radiator cap. The radiator cap relief valve must open within the specified range.

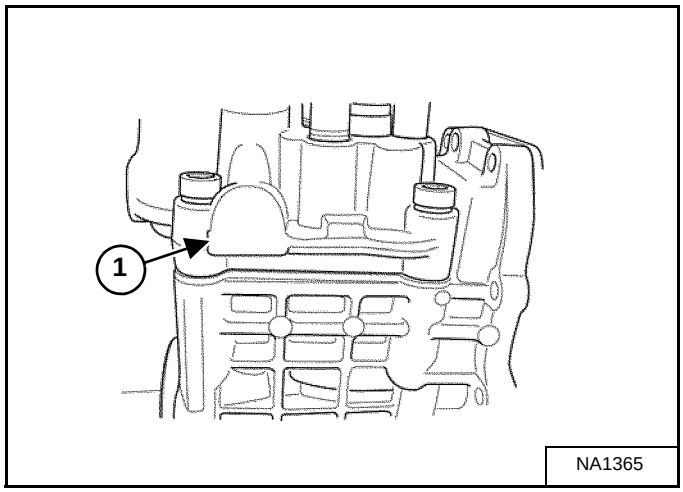
Fuel Injection Pump Removal And Installation (Cont'd)

Figure 60-70-11



If installing a new fuel injection pump, clean the timing case cover and install the timing grid sticker (provided with the new fuel injection pump), aligning the standard mark (Item 1) with the reference mark (Item 2) **[Figure 60-70-11]** made earlier.

Figure 60-70-12

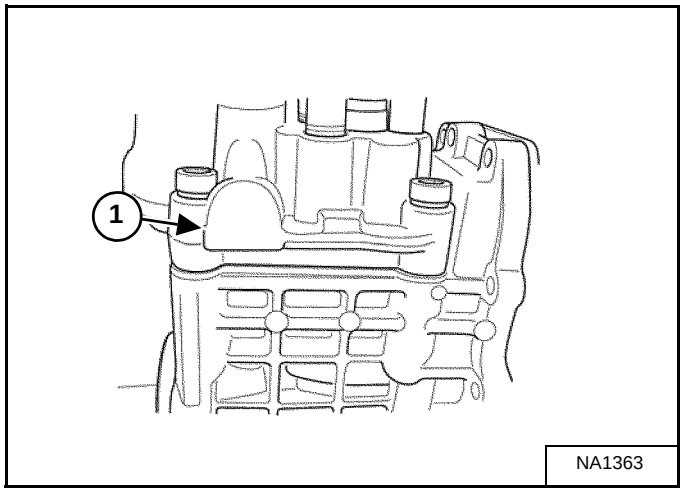


Locate the timing index number (Item 1) **[Figure 60-70-12]** located on the engine side of the fuel injection pump.

Calculate the difference between the pump timing index numbers from the new fuel injection pump and the original fuel injection pump.

NOTE: The number is stamped as a two digit number. Treat the number as if it has a decimal point between the two digits. (Example 68 = 6.8)

Figure 60-70-13



Example: The replacement injection pump is 7.3 (Item 1) **[Figure 60-70-13]** and the original injection pump is 6.8. The difference is +0.5.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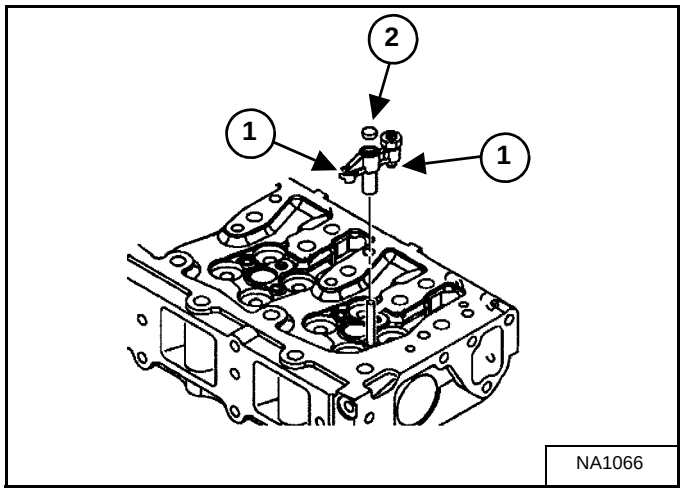
Valve Bridge - Inspection

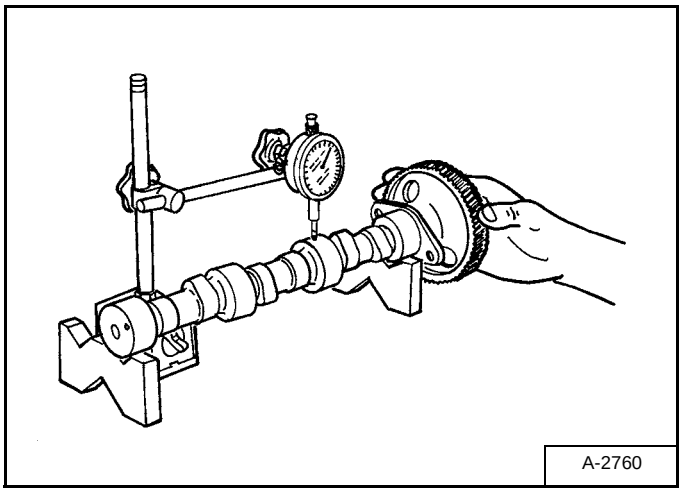
Figure 60-80-29



Visually inspect the contact surface (Item 1) at both ends of the valve bridge for wear and mushrooming. Remove and inspect the seat (Item 2) **[Figure 60-80-29]**.

Camshaft - Servicing

Figure 60-100-7

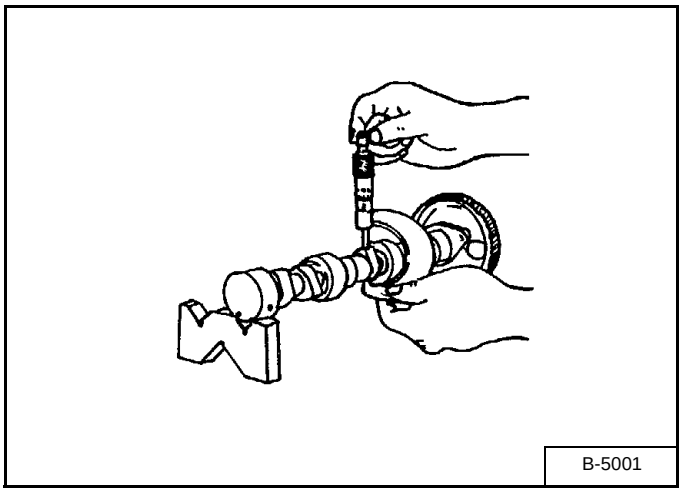


Put the camshaft in V-blocks. Install a dial indicator **[Figure 60-100-7]**.

Turn the camshaft at a slow rate. If the misalignment exceeds the allowable limit, replace the camshaft.

Camshaft Alignment Allowable Limit	0,02 mm (0.0008 in)

Figure 60-100-8



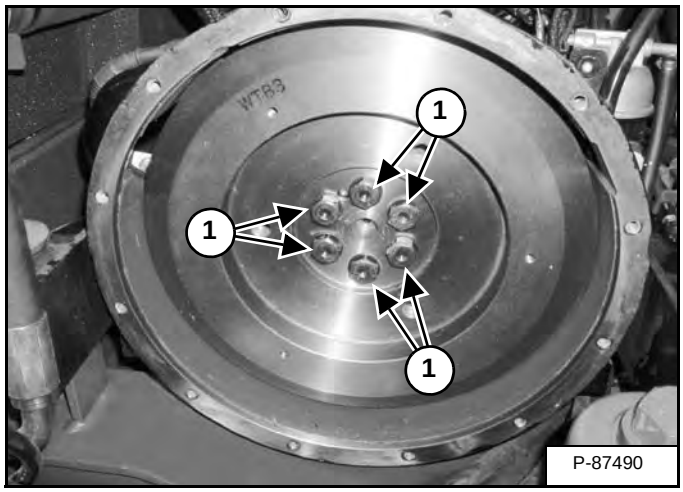
Measure the cam lobes at their highest point **[Figure 60-100-8]**.

If the measurement is less than the allowable limit, replace the camshaft.

Cam Lobe Height	43,4 - 43,6 mm (1.7087 - 1.7165 in)
Allowable Limit	43,15 mm (1.6988 in)

Flywheel Removal And Installation

Figure 60-140-5



Remove the six bolts (Item 1) **[Figure 60-140-5]** from the flywheel.

Installation: Tighten the bolts 186 - 206 N•m (137 - 152 ft-lb) torque.

Remove the flywheel.

Flywheel Ring Gear Removal And Installation

WARNING

AVOID INJURY OR DEATH

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

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

W-2019-0907

The ring gear on the flywheel is an interference fit. Heat the ring gear enough to expand it and hit it with a hammer evenly to remove it.

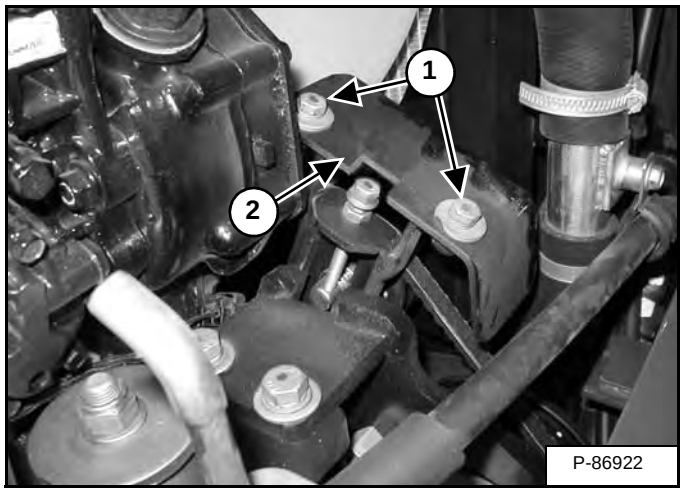
Clean the outer surface of the flywheel to give a smooth fit.

Clean the new ring gear and heat it to a temperature of 232 - 260°C (450 - 500°F)

Fit the ring gear over the flywheel. Make sure the gear is seated correctly.

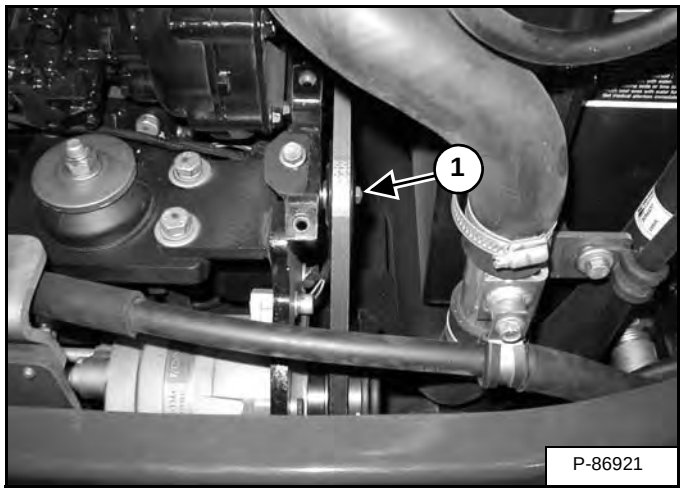
Belt Replacement

Figure 70-20-4



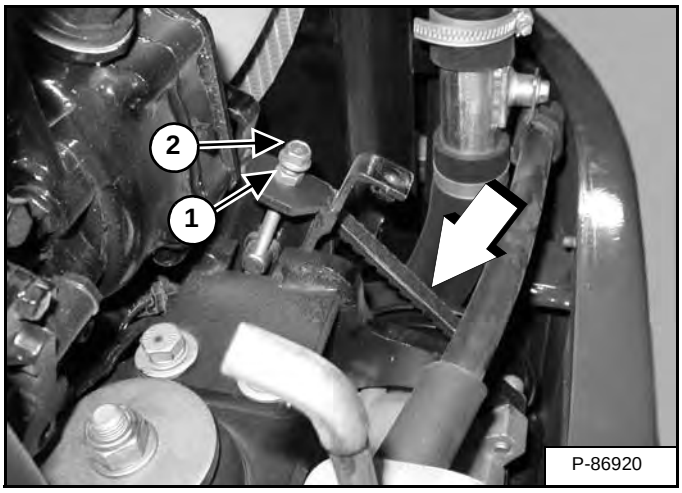
Remove the two bolts and washers (Item 1) and remove the shield (Item 2) **[Figure 70-20-4]**.

Figure 70-20-5



Loosen the belt idler mounting bolt (Item 1) **[Figure 70-20-5]**.

Figure 70-20-6



Loosen the lock nut (Item 1) and the bolt (Item 2) **[Figure 70-20-6]** until the belt can be removed.

Install a new belt.

Adjust the bolt (Item 2) until the belt tension is correct. Tighten the lock nut (Item 1) **[Figure 70-20-6]**.

Tighten the belt idler mounting bolt (Item 1) **[Figure 70-20-5]**.

Reinstall the shield (Item 2) and the two bolts and washers (Item 1) **[Figure 70-20-4]**.

⚠ WARNING

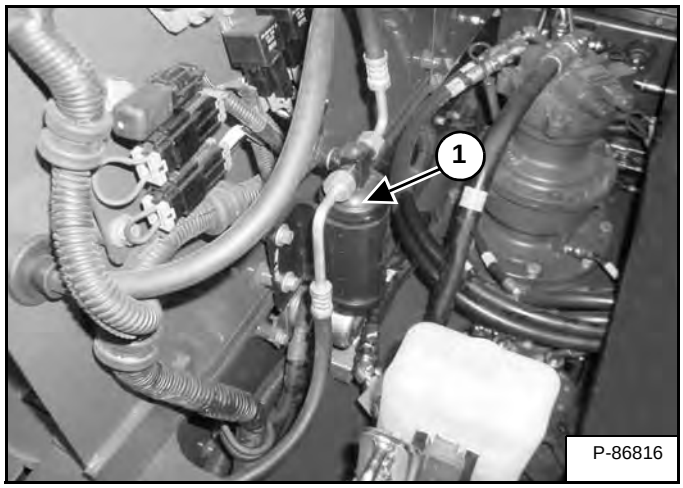
AVOID INJURY OR DEATH

- **Do Not Operate with damaged or missing screens, shields or rubber deflectors.**
- **Stop engine before cleaning or servicing.**
- **Contact with moving parts or flying objects can cause injury or death.**

W-2528-0406

HVAC Repair And Leaks

Figure 70-30-6



Whenever the A/C system is opened to the atmosphere or there has been a leak in the system, the receiver/drier (Item 1) **[Figure 70-30-6]** must be changed.

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

COMPRESSOR (CONT'D)

Oil Check

The compressor oil should be checked as follows when oil is being added to an in service excavator.

There is a close affinity between oil and refrigerant. During normal operation, part of the oil circulates with the refrigerant in the system. When checking the amount of oil in the system or replacing any system component, the compressor must be run in advance to insure return of oil to the compressor.

If the amount of refrigerant in the system has decreased, charge the system. (See SYSTEM CHARGING AND RECLAMATION on Page 70-40-1.)

Open the cab door and windows.

Run the blower at maximum speed.

Run the compressor for at least 20 minutes at 800 - 1200 rpm.

Remove the compressor from the excavator. (See Removal And Installation on Page 70-50-1.)

Figure 70-50-12

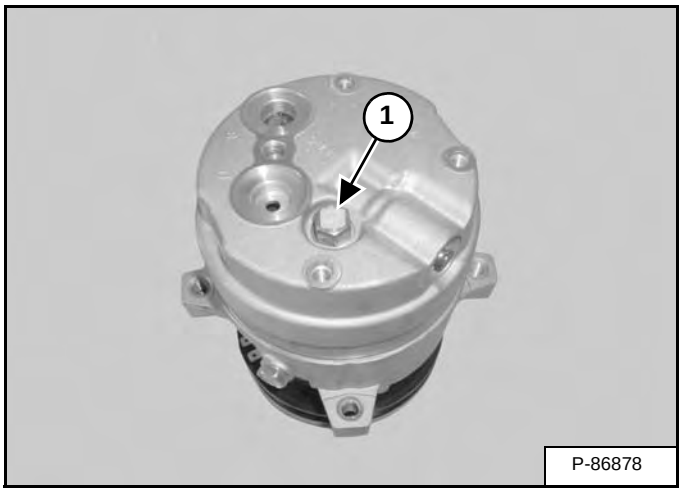
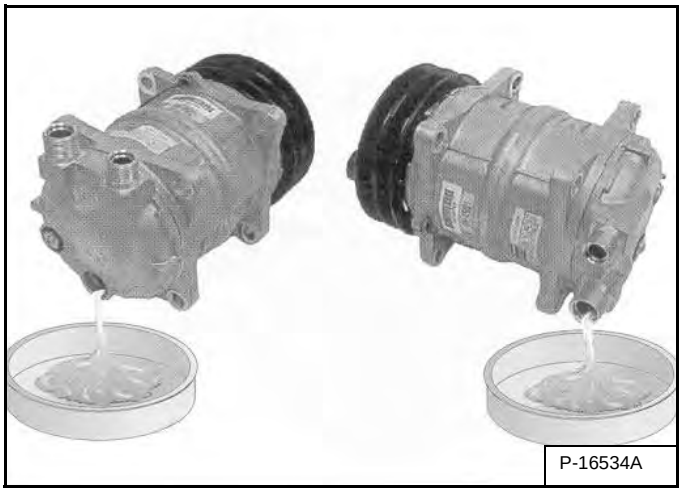


Figure 70-50-13



Remove the oil drain plug (Item 1) **[Figure 70-50-12]** and drain the oil through the connectors and the oil drain hole **[Figure 70-50-13]**.

Installation: Tighten the oil drain plug to 13 - 15 N•m (9.4 - 10.8 ft-lb) torque.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