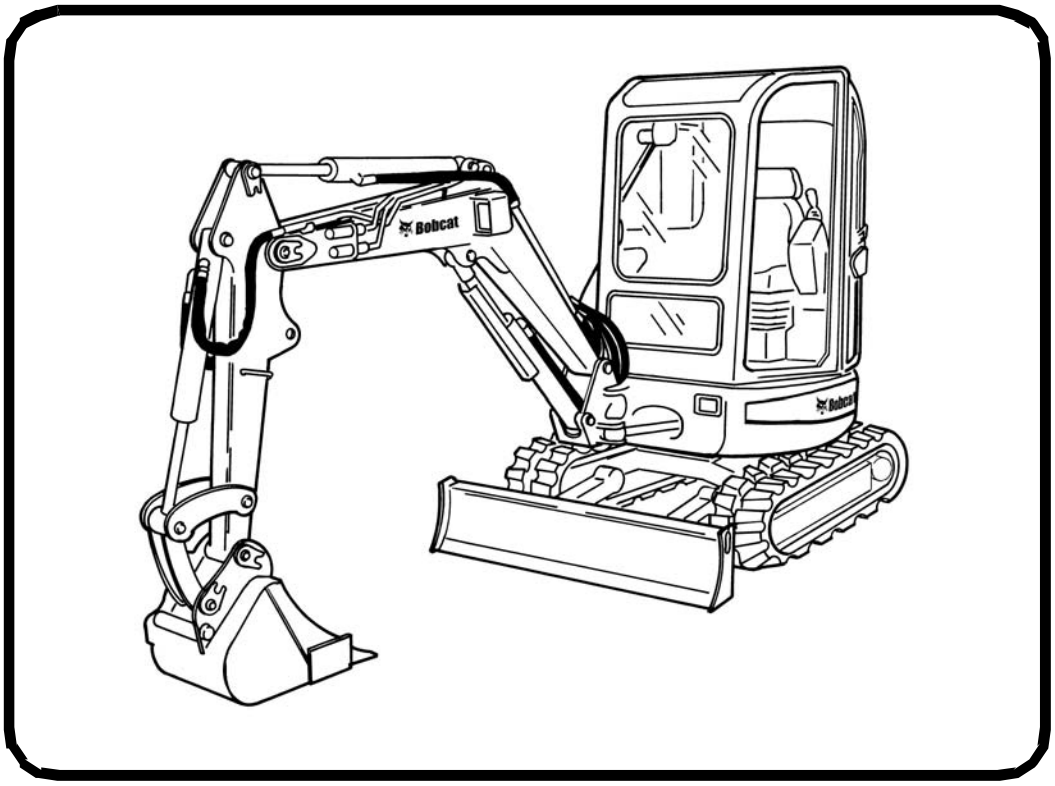
Bobcat®

Service Manual
425 Compact Excavator

S/N A1HW11001 & Above



Ingersoll Rand
Compact Vehicle Technologies

6904866 (7-07)

Printed in U.S.A.

SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

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

W-2003-0903

WARNING

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

W-2044-1285

IMPORTANT

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

I-2019-0284

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

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

SI EXC-0206 SM

LIFTING AND BLOCKING THE EXCAVATOR

Procedure

Always park the machine on a level surface.

Figure 10-10-1

Raise one side of the machine (approximately 4 in.) using the boom and arm as shown in **[Figure 10-10-1]**.

Raise the blade fully and install jackstands under the blade and the track frame. Lower the boom until all machine weight is on the jackstands.

Stop the engine.

⚠ 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

⚠ WARNING

AVOID INJURY

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

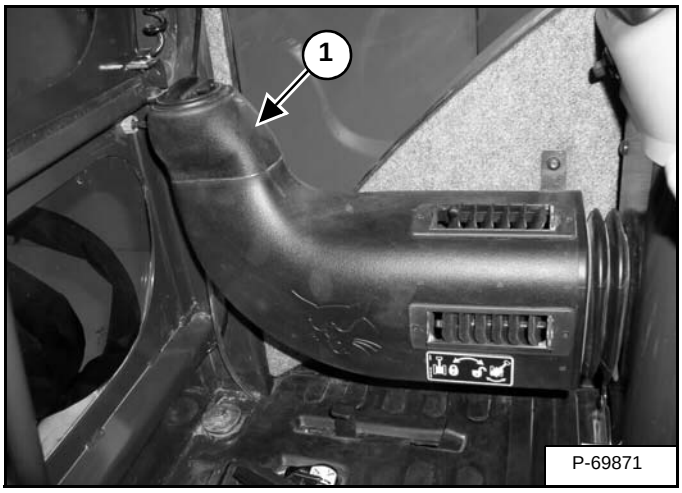
W-2142-0903

Heating, Ventilation, and Air Conditioning Duct

NOTE: The air conditioner duct can be ordered and used on heater models.

There are two HVAC ducts that the operator can choose to install.

Figure 10-20-13



The small duct (Item 1) **[Figure 10-20-13]** is standard for heater use.

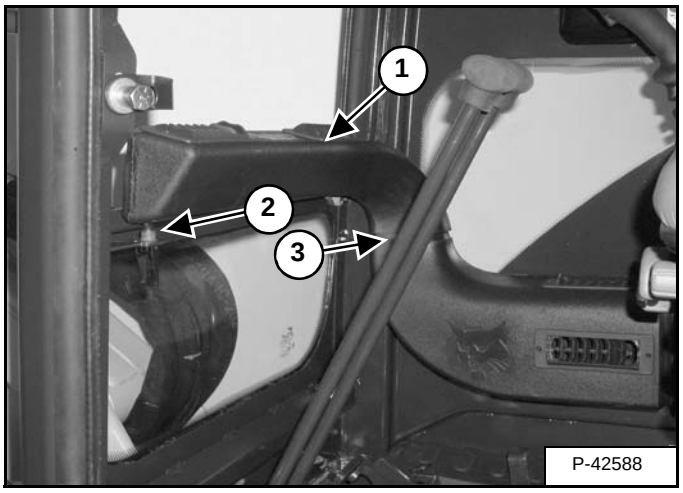
The large duct (Item 1) **[Figure 10-20-14]** is standard for models that have air conditioner available.

NOTE: This duct (Item 1) [Figure 10-20-14] can be removed for improved operator visibility.

Installation

Remove the screw and pull straight up to remove the duct (Item 1) **[Figure 10-20-13]**.

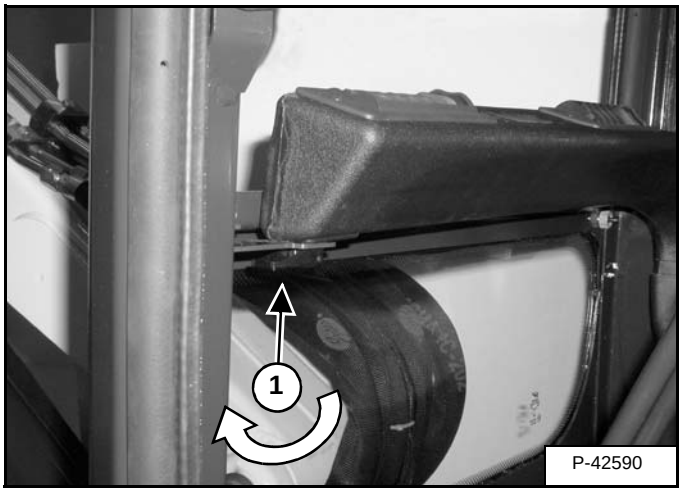
Figure 10-20-14



Place the air conditioning duct (Item 1) on the housing and over the locking stud (Item 2) **[Figure 10-20-14]**.

Reinstall the screw (Item 3) **[Figure 10-20-14]**.

Figure 10-20-15



Fully seat the duct and rotate the lock (Item 1) **[Figure 10-20-15]**.

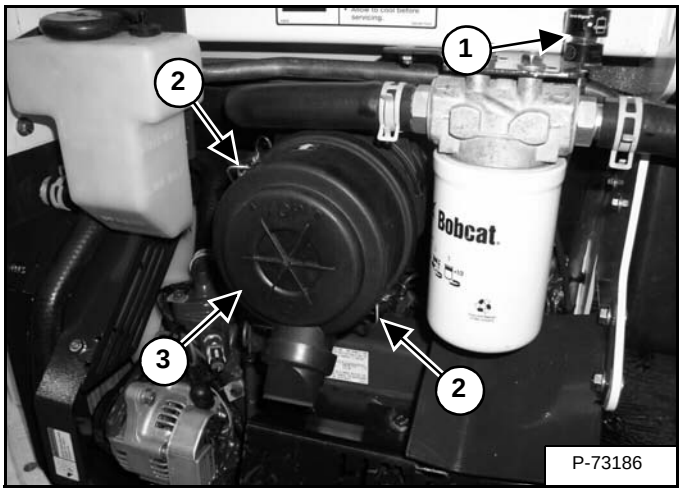
AIR CLEANER SERVICE

See the SERVICE SCHEDULE for the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.)

Daily Check

The air cleaner is located in the engine compartment. Open the tailgate to access the air cleaner for service. (See TAILGATE on Page 10-40-1.)

Figure 10-60-1



Check the condition indicator (Item 1) **[Figure 10-60-1]**. If the red ring shows in the condition indicator, the filter needs to be replaced.

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

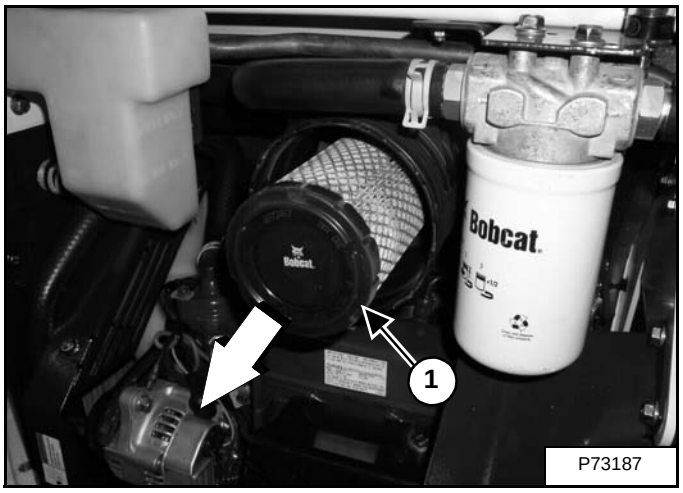
Replacing Filter Elements

Outer Filter

Release the two fasteners (Item 2) **[Figure 10-60-1]**.

Remove and clean the dust cup (Item 3) **[Figure 10-60-1]**.

Figure 10-60-2



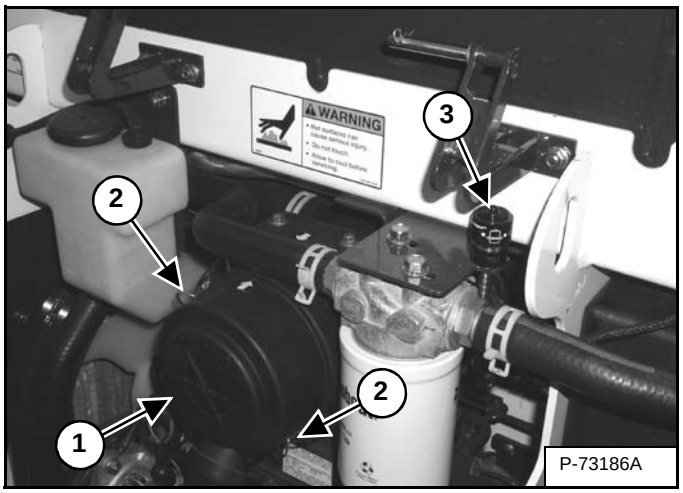
Pull the outer filter (Item 1) **[Figure 10-60-2]** from the air cleaner housing.

Check the housing for damage.

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

Install a new filter.

Figure 10-60-3



Install the dust cup (Item 1) and engage the fasteners (Item 2) **[Figure 10-60-3]**.

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

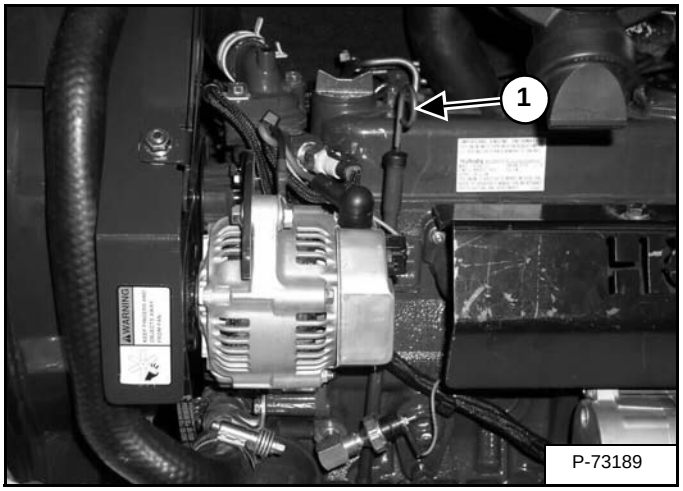
After the outer filter has been replaced, press the button (Item 3) **[Figure 10-60-3]** on the end of the condition indicator and start the engine. Run at full RPM, then reduce engine speed and stop the engine. If the red ring shows in the condition indicator, replace the inner filter.

ENGINE LUBRICATION SYSTEM

Checking And Adding Engine Oil

Check the engine oil after every 8-10 hours of operation and before starting the engine.

Figure 10-90-1



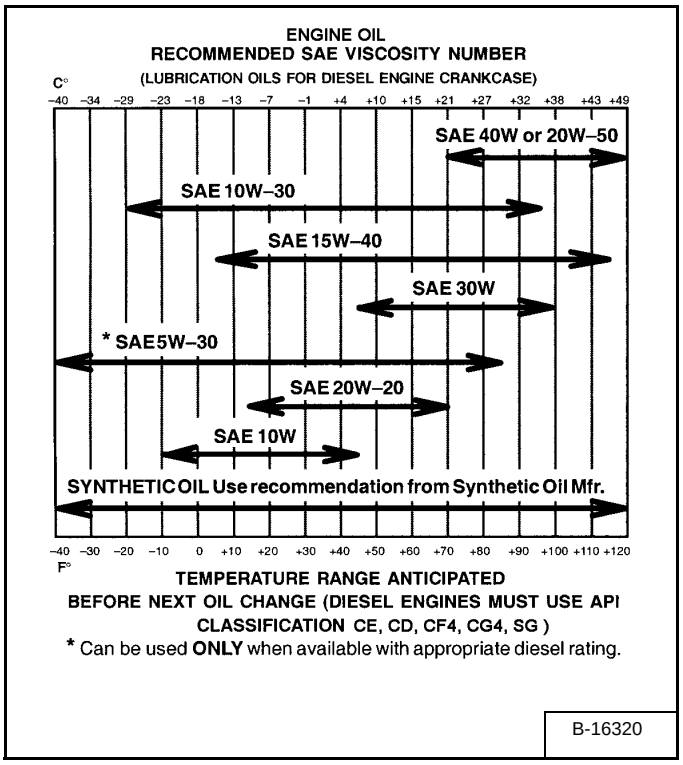
Open the tailgate and remove the dipstick (Item 1) **[Figure 10-90-1]**.

Keep the oil level between the marks on the dipstick.

Use a good quality motor oil that meets the correct API Service Classification.

Engine Oil Chart

Figure 10-90-2



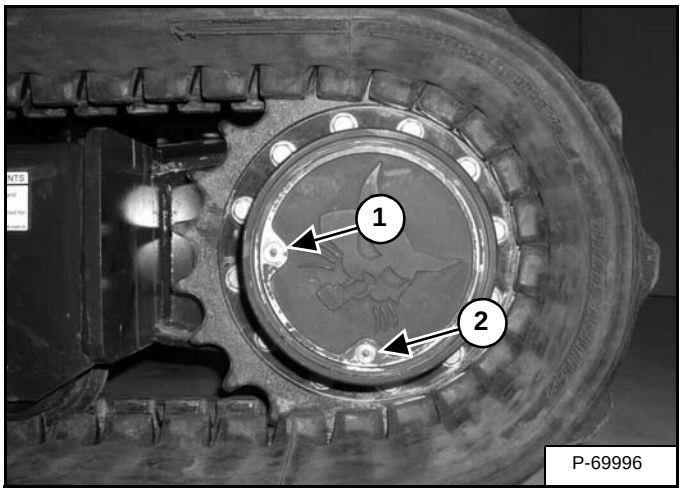
Use a good quality motor oil that meets the correct API Service Classification **[Figure 10-90-2]**.

Install the dipstick and close the tailgate.

TRAVEL MOTOR

Checking And Adding Oil

Figure 10-120-1



Park the excavator on a level surface with the plugs (Items 1 & 2) **[Figure 10-120-1]** in the position as shown.

Remove the plug (Item 1) **[Figure 10-120-1]**. The lube level must be at the bottom edge of the hole.

Add lubricant through the hole if the lube level is low. (See Capacities on Page SPEC-10-6.)

Removing And Replacing Oil

See the SERVICE SCHEDULE for the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.)

Park the excavator on a level surface with plugs (Items 1 & 2) **[Figure 10-120-1]** in the position shown. Remove both plugs and drain the lubricant into a container.

⚠ WARNING

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

W-2103-1285

Install the bottom plug (Item 2) **[Figure 10-120-1]**. Add lubricant through the top plug hole until the lube level is at the bottom edge of the hole. (See Capacities on Page SPEC-10-6.)

Install the plug (Item 1) **[Figure 10-120-1]**.

EXCAVATOR STORAGE AND RETURN TO SERVICE

Storage

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

- Thoroughly clean the excavator including the engine compartment.
- Lubricate the excavator.
- Replace worn or damaged parts.
- Drive the excavator onto planks in a dry protected shelter.
- Lower the boom fully with the bucket flat on the ground.
- Put grease on any exposed cylinder rods.
- Put fuel stabilizer in the fuel tank and run the engine a few minutes to circulate the stabilizer to the pump and fuel injectors.
- Drain and flush the cooling system. Refill with premixed coolant.
- Replace all fluids and filters (engine, hydraulic).
- Replace all filters (i.e.: air cleaner, heater, etc.).
- Put all controls in neutral position.
- Remove the battery. Be sure the electrolyte level is correct then charge the battery. Store it in a cool dry place above freezing temperatures and charge it periodically during storage.
- Cover the exhaust pipe opening.
- Tag the machine to indicate that it is in storage condition.

Return to Service

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

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

425 HYDRAULIC SCHEMATIC
S/N A1HW11001 AND ABOVE

(PRINTED JULY 2007)
V-0855legend

LEGEND

1. HYDRAULIC RESERVOIR: Pressurized with Fill Strainer
   Capacity (to center of sight glass): 2.4 Gal. (9.1 L)

   Hyd. System (W/Reservoir) Capacity: 5.5 Gal. (20.7 L)

2. PRESSURIZED BREATHER/FILL CAP with FILTER:
   5 PSI (3.4 Bar) - Outlet
   0.435 PSI (0.3 Bar) - Inlet

3. HYDRAULIC FILTER ELEMENT 15 Micron

4. FILTER BY-PASS 50 PSI (3.44 Bar)

5. CASE DRAIN FILTER

6. HYDRAULIC PUMP . . . . . Two Section - Variable Displacement Piston Pump
   Section P1 & P2:
   15.4 GPM (58,3 L/min.) at High Engine Idle

7. LOAD SENSE RELIEF VALVE (Main Relief):

   With Standard Arm: 2610 PSI (180 Bar)
   When tested at diagnostic port P1 (35)
   at High Engine Idle

   With Long Arm: 2900 PSI (200 Bar)
   When tested at diagnostic port P1 (35)
   at High Engine Idle

8. SHUTTLE ORIFICE - 0.022 inch (0,56 mm)

9. LOAD SENSE BLEED VALVE

10. FLUSHING VALVE: . . . 218 PSI (15 Bar)
    When tested at diagnostic port P1 (35)
    at Low Engine Idle

11. ACCUMULATOR – Non Pressurized

12. COMPENSATOR

13. LOAD CHECK (2 per Section, 14 Total)
    Only 7 Shown

14. RELIEF VALVE - PORT (4):
    3335 PSI (230 Bar)

15. RELIEF VALVE - PORT (2):
    3045 PSI (210 Bar)

16. RELIEF VALVE - PORT (2):
    2610 PSI (180 Bar)

17. RELIEF VALVE - PORT (1):
    3915 PSI (270 Bar)

18. SWING MOTOR CROSS PORT RELIEF VALVES (2):

    With Standard Arm: 2030 PSI (140 Bar)
    When tested at diagnostic port P1 (35)
    at High Engine Idle

    With Long Arm: 2175 PSI (150 Bar)
    When tested at diagnostic port P1 (35)
    at High Engine Idle

19. ORIFICE

20. RESTRICTOR - 0.108 inch (2,7 mm)

21. RESTRICTOR - 0.083 inch (2,1 mm)

22. PRESSURE REDUCING VALVE
    435 PSI (30 Bar)

23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Joystick Lockout

24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Two Speed

25. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Male Coupler

26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Female Coupler

27. ACCUMULATOR

28. TEST PORT - "G" PORT - Pressure Reducing Valve

29. TEST PORT - "B1" PORT - Joystick Pilot Pressure

30. ORIFICE - Straight Travel

31. TRAVEL MOTOR SPOOL

32. VALVE - 2 -Speed (2)

33. CROSSPORT RELIEF VALVE:
    3480 PSI (240 Bar)

34. ORIFICE – 2 Speed Shifting

35. TEST PORT - "P1" PORT - System Pressure

36. RESTRICTOR – One Way

37. CHECK VALVE

38. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)

39. CHECK VALVE 80 PSI (5,5 bar)

40. CHECK VALVE – Load Sense

41. ORIFICE - 0.025 inch (0,64 mm)

42. FILTER – Hydraulic X-Change Valve

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

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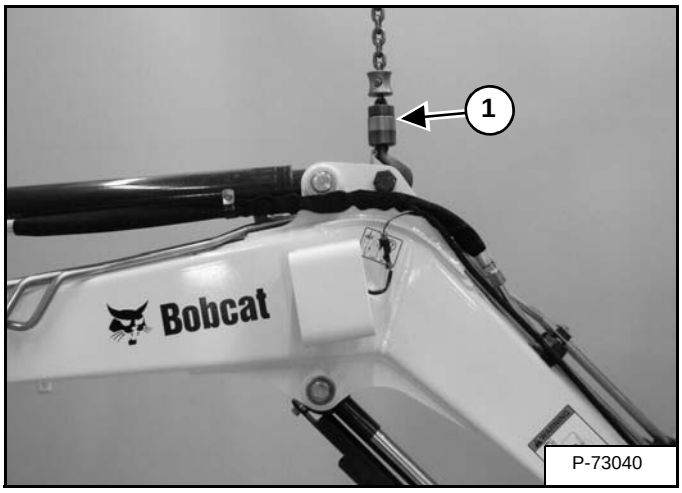
BOOM CYLINDER

Testing

Lower the boom/bucket and blade to the ground.

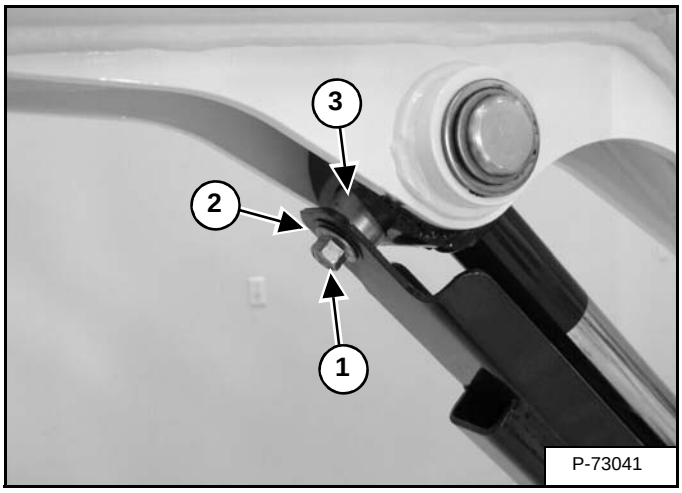
With the engine off, turn the key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 20-20-1



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

Figure 20-20-2



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

Figure 20-20-3

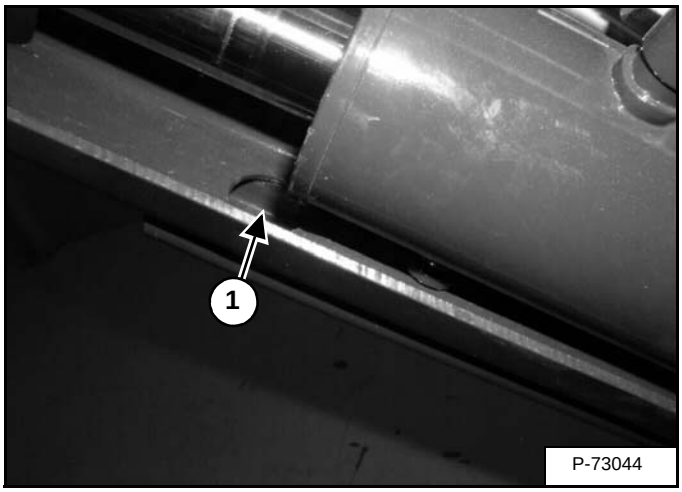
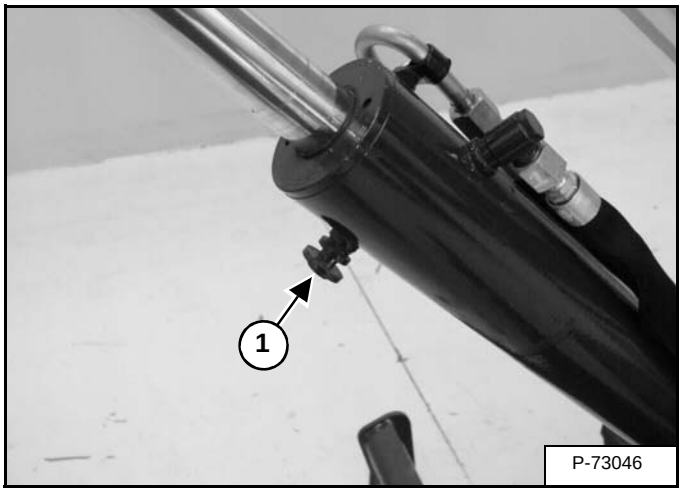


Figure 20-20-4

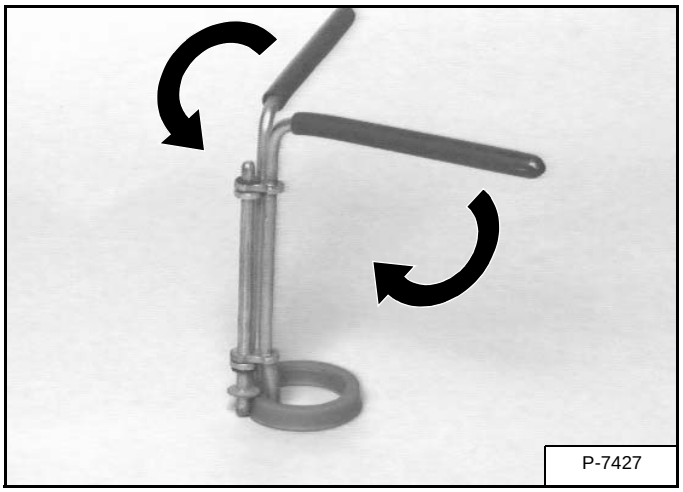


Slide the shield down until the keyhole (Item 1) **[Figure 20-20-3]** in the shield lines up with the mounting stud (Item 1) **[Figure 20-20-4]** on the cylinder.

Remove the shield.

Assembly (Cont'd)

Figure 20-20-28

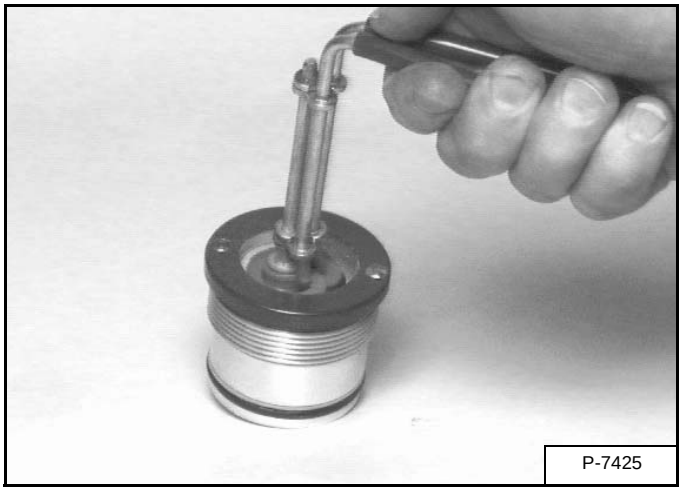


Install the rod seal on the rod seal tool **[Figure 20-20-28]**.

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

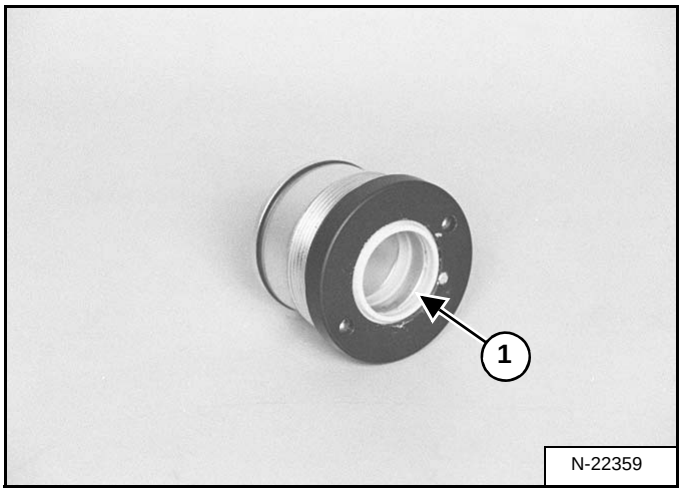
Rotate the handles to collapse the rod seal **[Figure 20-20-28]**.

Figure 20-20-29



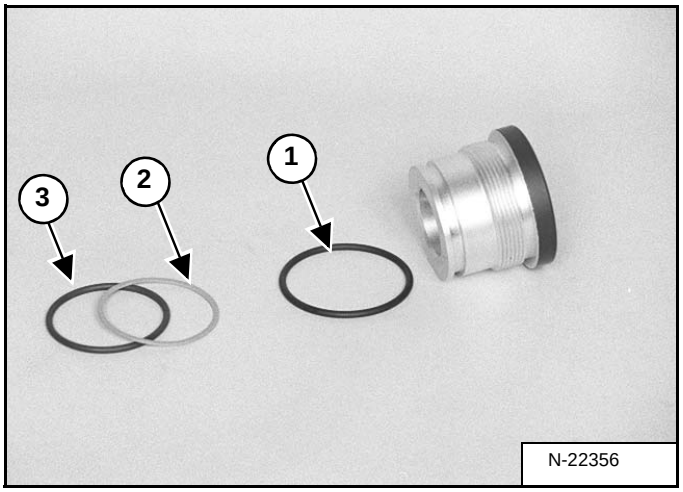
Install the rod seal in the head **[Figure 20-20-29]**.

Figure 20-20-30



Install the wiper seal with the wiper (Item 1) **[Figure 20-20-30]** toward the outside of the head.

Figure 20-20-31

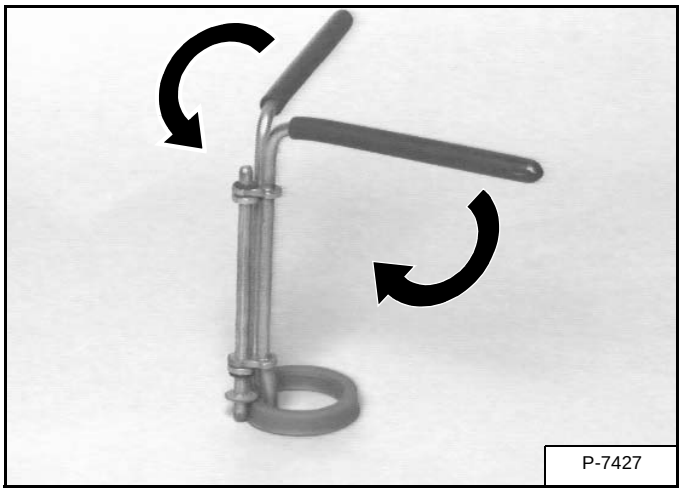


Install the O-ring (Item 1) **[Figure 20-20-31]**.

Install the back-up ring (Item 2) and O-ring (Item 3) **[Figure 20-20-31]**.

Assembly (Cont'd)

Figure 20-21-23

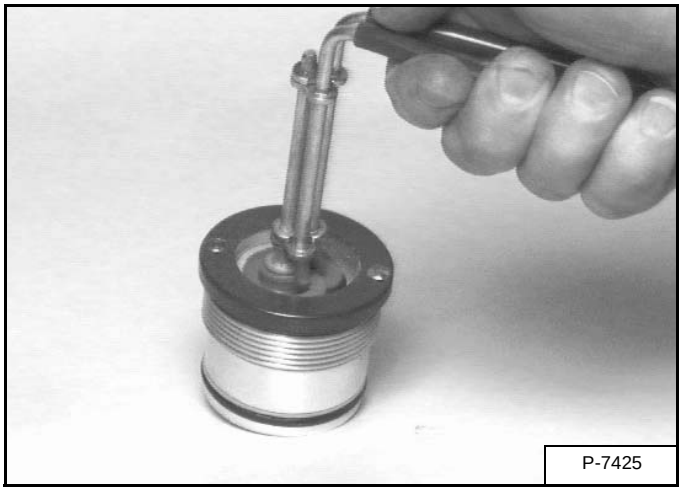


Install the rod seal on the rod seal tool **[Figure 20-21-23]**.

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

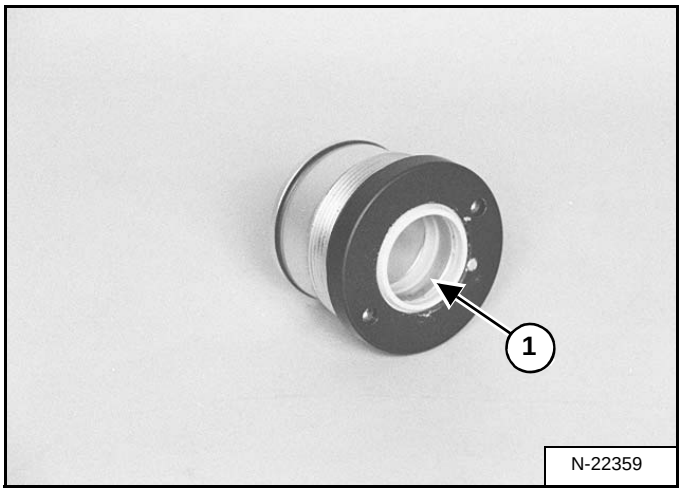
Rotate the handles to collapse the rod seal **[Figure 20-21-23]**.

Figure 20-21-24



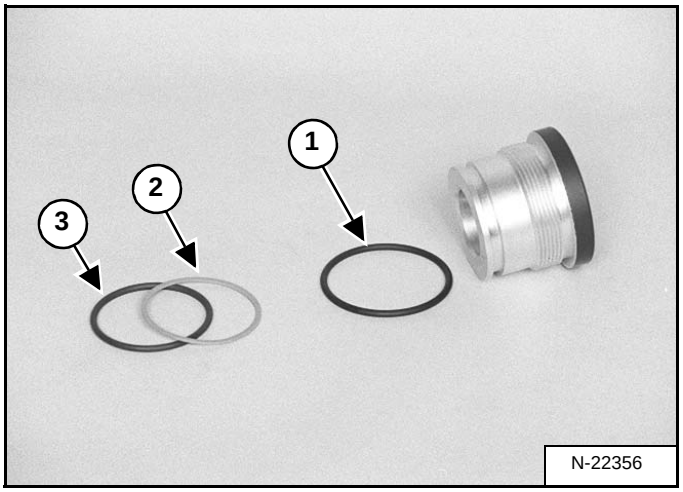
Install the rod seal in the head **[Figure 20-21-24]**.

Figure 20-21-25



Install the wiper seal with the wiper (Item 1) **[Figure 20-21-25]** toward the outside of the head.

Figure 20-21-26



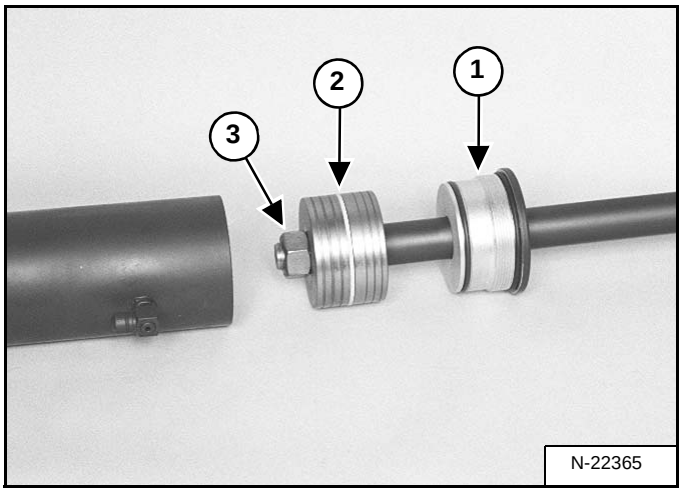
Install the O-ring (Item 1) **[Figure 20-21-26]**.

Install the back-up ring (Item 2) and O-ring (Item 3) **[Figure 20-21-26]**.

BOOM SWING CYLINDER (CONT'D)

Assembly (Cont'd)

Figure 20-22-23



Install the head (Item 1) and the piston (Item 2) **[Figure 20-22-23]** on the rod as shown.

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

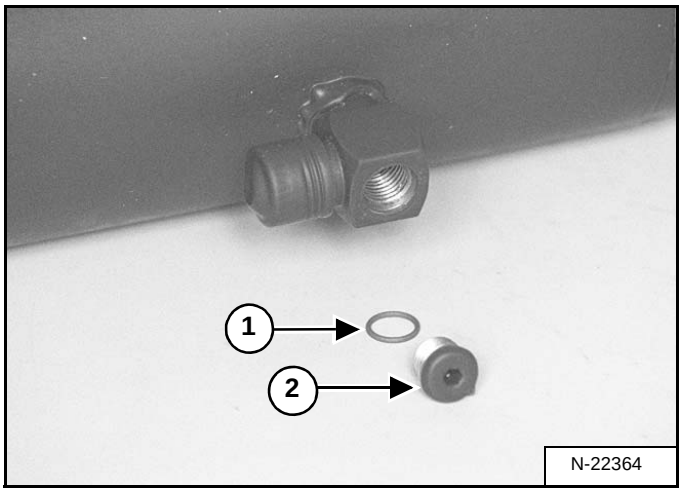
Provide an adequate support for the cylinder before tightening.

Install the nut (Item 3) **[Figure 20-22-23]**.

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

Tighten the nut to 600 ft.-lb. (814 N•m) torque.

Figure 20-22-24

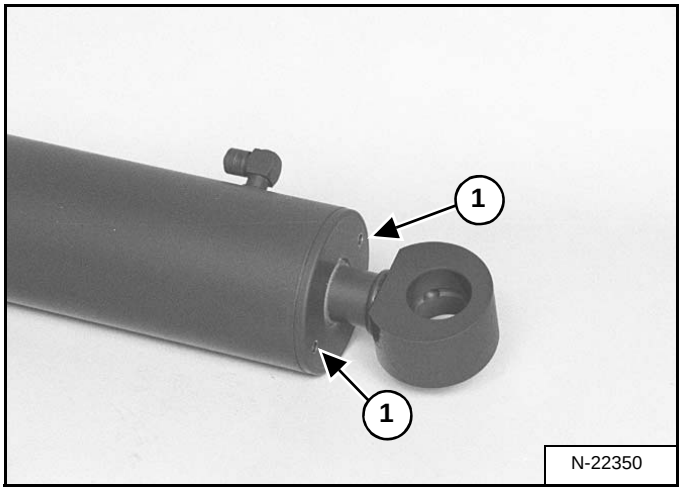


Install the O-ring (Item 1) and plug (Item 2) **[Figure 20-22-24]**.

Tighten the plug to 8 ft.-lb. (11 N•m) torque.

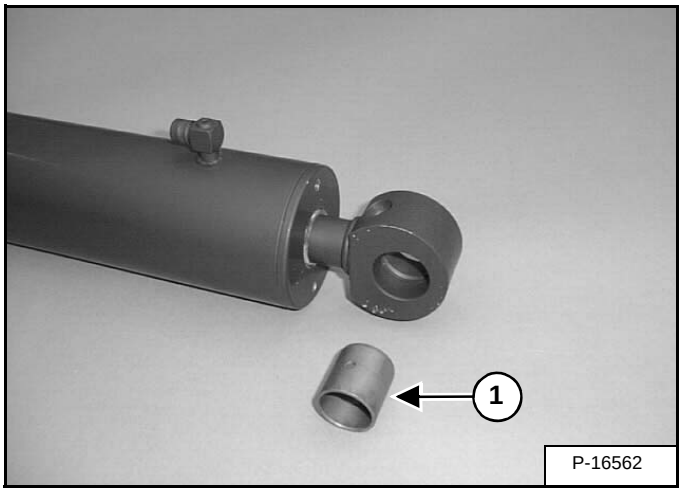
Put the base end of the cylinder in a vise.

Figure 20-22-25



Insert the adjustable gland nut wrench into the two holes (Item 1) **[Figure 20-22-25]** to tighten the head. Head to be torqued until flush with the end of the housing.

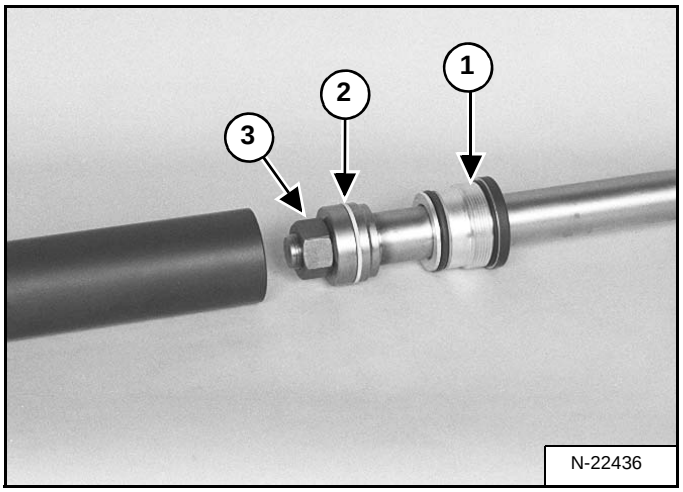
Figure 20-22-26



Install the bushing (Item 1) **[Figure 20-22-26]**. The bushing must be aligned with the grease channel in the rod end of the cylinder.

Assembly (Cont'd)

Figure 20-23-24



Install the head (Item 1) and the piston (Item 2) **[Figure 20-23-24]** on the rod as shown.

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

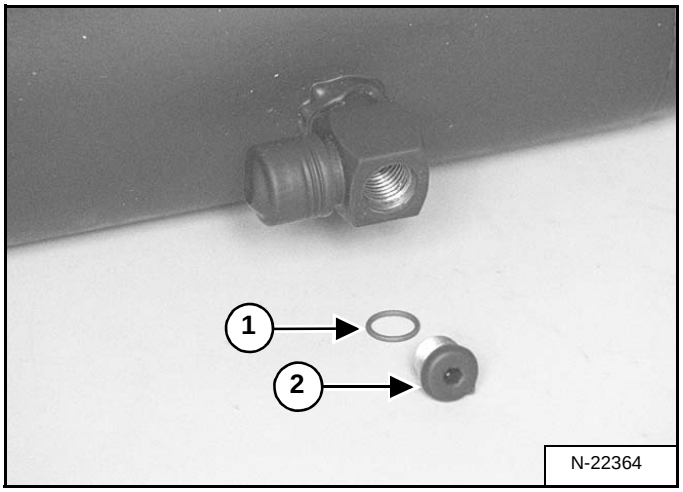
Provide an adequate support for the cylinder before tightening.

Install the nut (Item 3) **[Figure 20-23-24]**.

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

Tighten the nut to 600 ft.-lb. (814 N•m) torque.

Figure 20-23-25

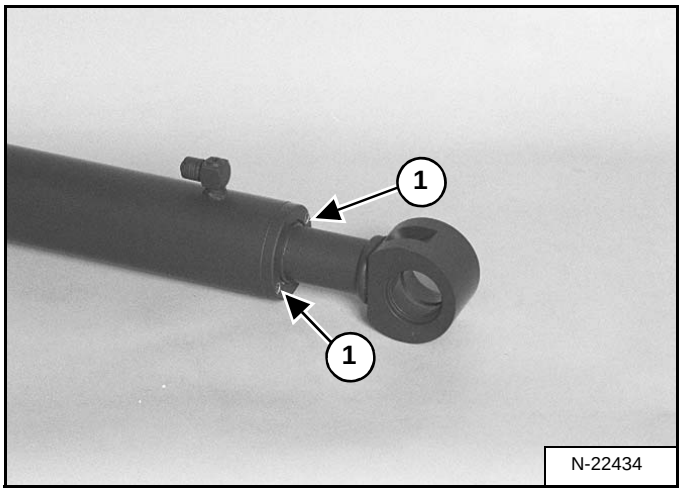


Install the O-ring (Item 1) and plug (Item 2) **[Figure 20-23-25]**.

Tighten the plug to 8 ft.-lb. (11 N•m) torque.

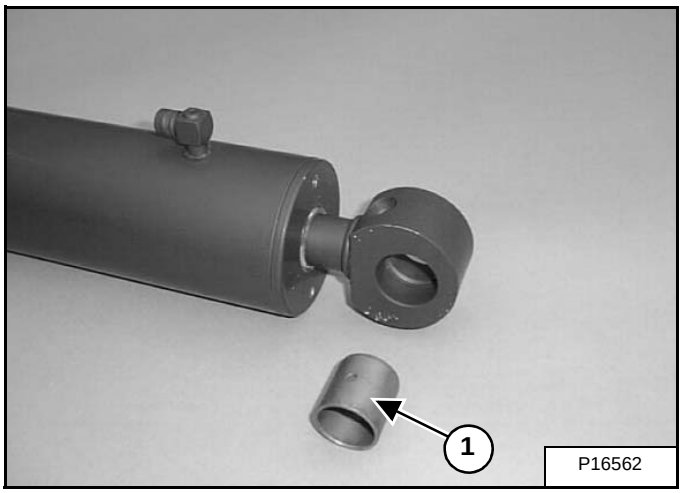
Put the base end of the cylinder in a vise.

Figure 20-23-26



Insert the adjustable gland nut wrench into the two holes (Item 1) **[Figure 20-23-26]** to tighten the head. Head to be torqued until flush with the end of the housing.

Figure 20-23-27

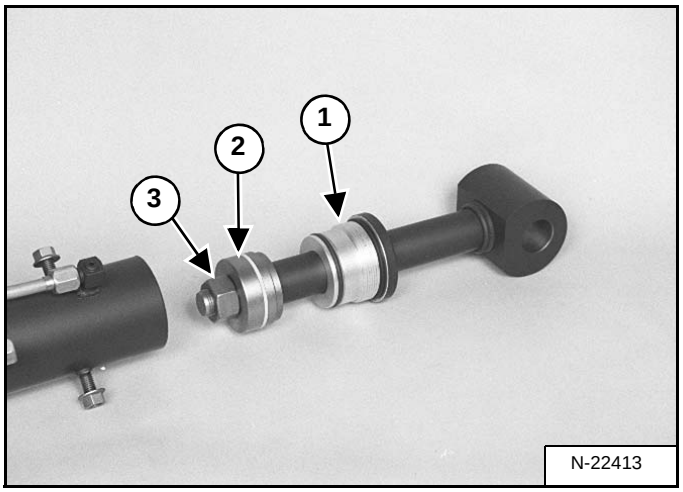


Install the bushing (Item 1) **[Figure 20-23-27]**. The bushing must be aligned with the grease channel in the rod end of the cylinder.

BLADE CYLINDER (CONT'D)

Assembly (Cont'd)

Figure 20-24-24



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

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

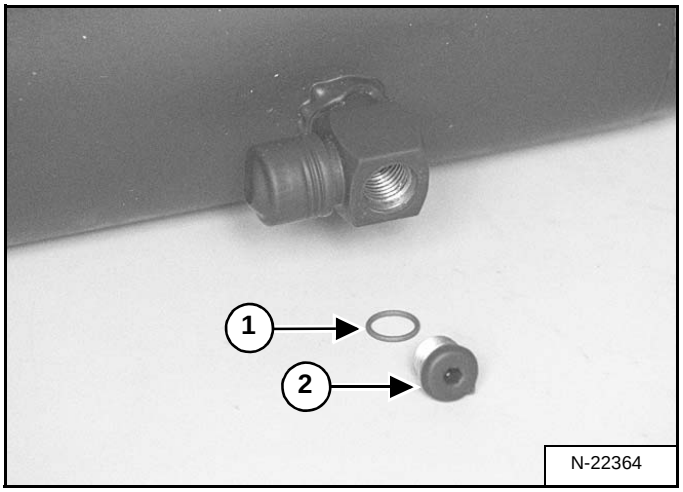
Provide an adequate support for the cylinder before tightening.

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

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

Tighten the nut to 600 ft.-lb. (814 N•m) torque.

Figure 20-24-25

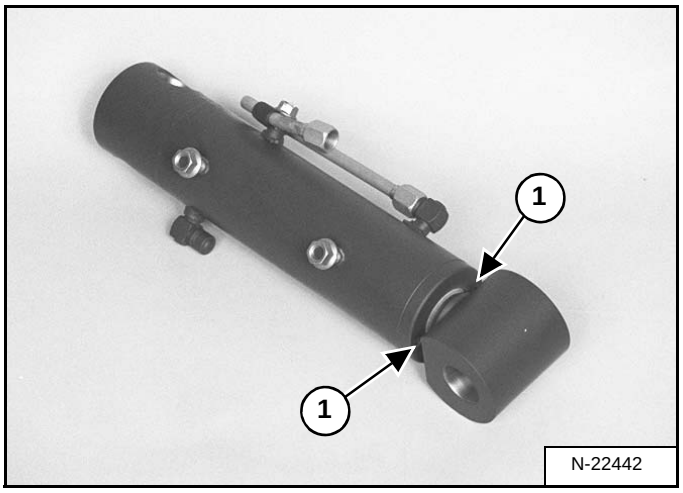


Install the O-ring (Item 1) and plug (Item 2) **[Figure 20-24-25]**.

Tighten the plug to 8 ft.-lb. (11 N•m) torque.

Put the base end of the cylinder in a vise.

Figure 20-24-26



Insert the adjustable gland nut wrench into the two holes (Item 1) **[Figure 20-24-26]** to tighten the head. Head to be torqued until flush with the end of the housing.

Testing And Adjusting The Crossport Relief Valves (Cont'd)

Figure 20-32-5

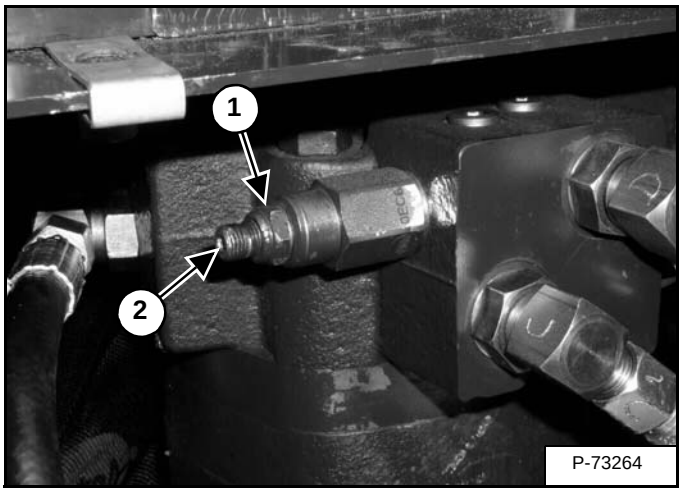
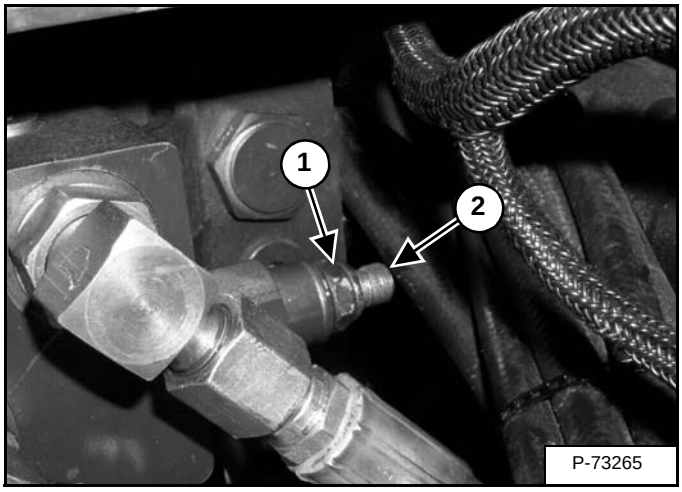


Figure 20-32-6



Loosen the nut (Item 1) **[Figure 20-32-5]** and **[Figure 20-32-6]**.

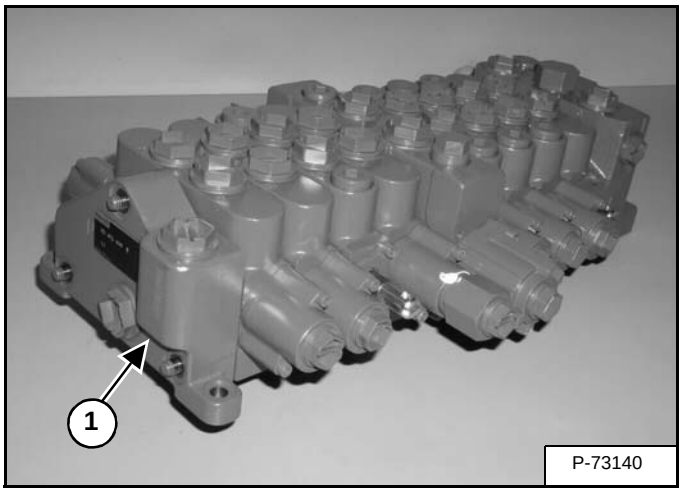
Turn the adjustment screw (Item 2) **[Figure 20-32-5]** and **[Figure 20-32-6]** clockwise to increase the pressure or counter clockwise to decrease pressure.

NOTE: 1/4 turn is 100 PSI (6,9 bar)

Tighten the nut (Item 1) **[Figure 20-32-5]**, reinstall the right floor panel and retest the crossport relief valves.

Disassembly (Cont'd)

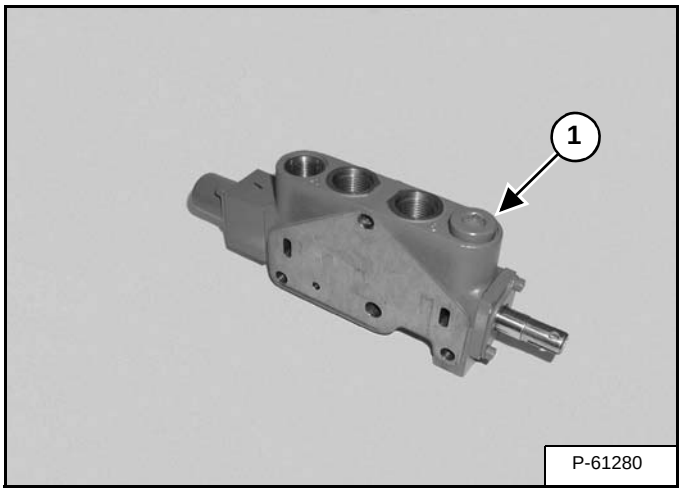
Figure 20-40-15



Remove the end cap (Item 1) **[Figure 20-40-15]** from the control valve.

Blade Valve Section Disassembly And Assembly (Cont'd)

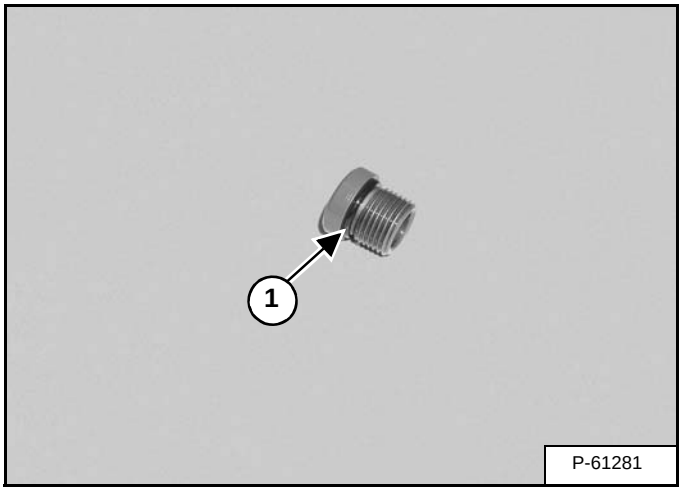
Figure 20-40-50



Remove the plug (Item 1) **[Figure 20-40-50]** from the port relief valve.

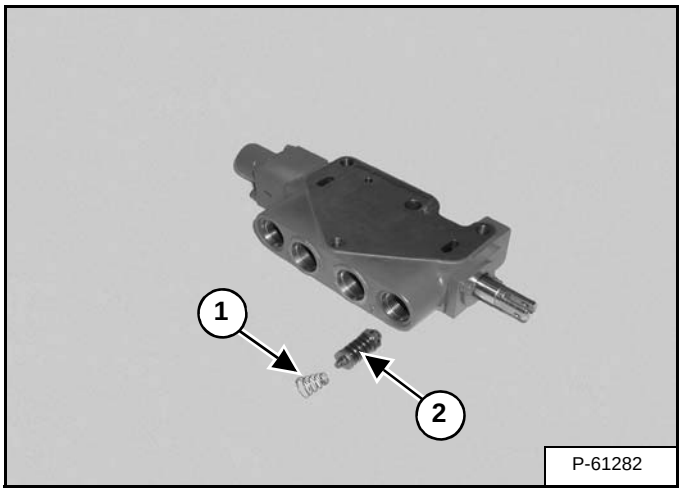
Installation: Tighten the plug to 22-26 ft.-lb. (30-35 N•m) torque.

Figure 20-40-51



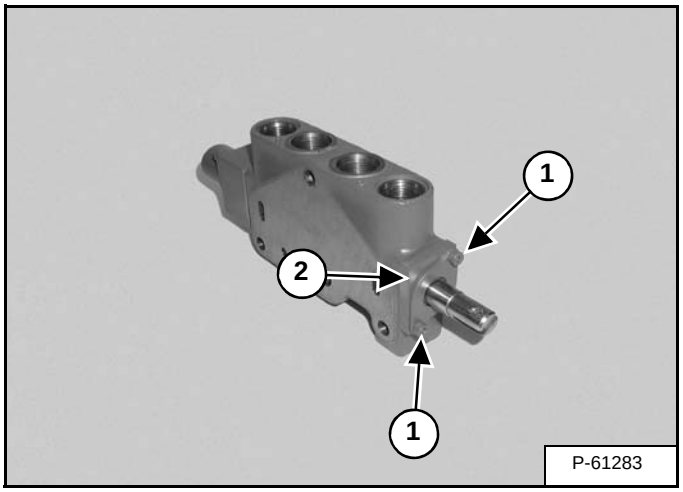
Remove the O-ring (Item 1) from the plug **[Figure 20-40-51]**.

Figure 20-40-52



Remove the spring (Item 1) and valve assembly (Item 2) **[Figure 20-40-52]**.

Figure 20-40-53



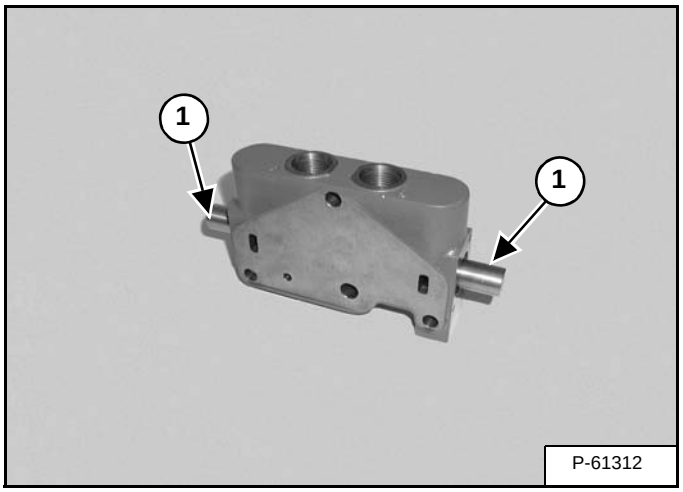
Remove the screws (Item 1) from the valve spool retainer (Item 2) **[Figure 20-40-53]**.

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

Remove the retainer.

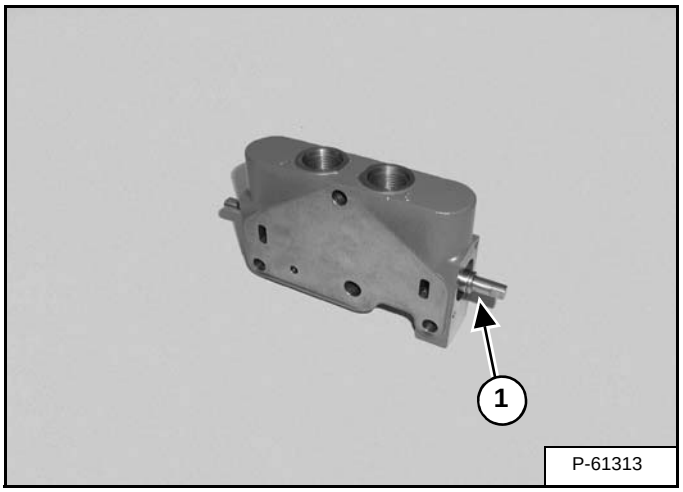
Slew Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-87



Remove the spring guides (Item 1) **[Figure 20-40-87]** from both ends of the valve spool.

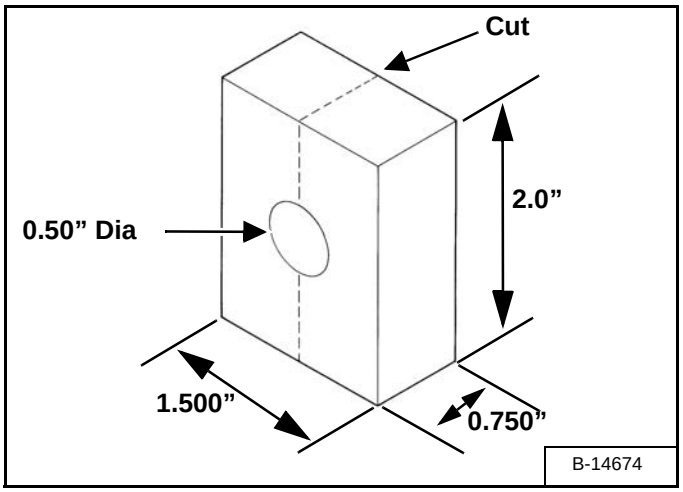
Figure 20-40-88



Record the orientation of the spool (Item 1) **[Figure 20-40-88]**. Remove the spool from the valve section.

NOTE: The spool is not symmetrical. Incorrect spool installation will cause poor hydraulic valve performance.

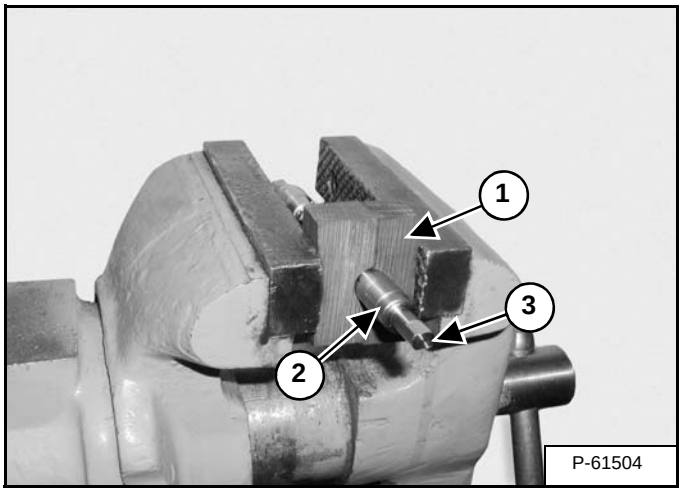
Figure 20-40-89



To remove the plugs from the spool, a holding fixture will have to be made from a 0.750 inch thick x 1.500 inch wide x 2.0 inch long (19 mm thick x 38 mm wide x 50 mm long) piece of hardwood. Drill a 0.50 inch (13 mm) hole in the center of the hardwood block. Cut the block lengthwise **[Figure 20-40-89]**.

NOTE: Do not use anything other than hardwood blocks to grip the spool, or the spool will be damaged.

Figure 20-40-90

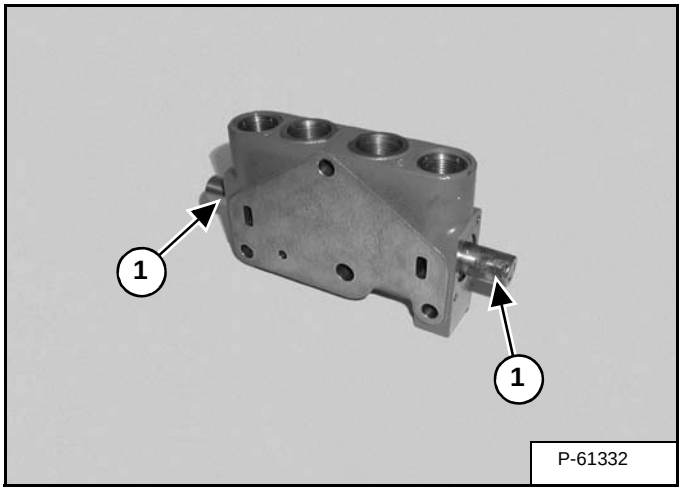


Using the wood blocks (Item 1) clamp the spool assembly (Item 2) in a vise and loosen the plugs (Item 3) **[Figure 20-40-90]**. (Both ends)

Installation: Apply thread lock adhesive (Loctite® 262) or equivalent to the threads. Tighten the plugs to 44 in.-lb. (5 N•m) torque.

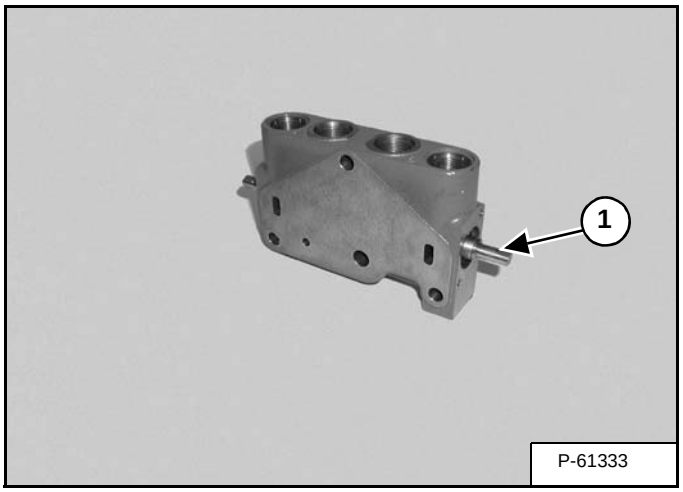
Bucket Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-123



Remove the spring guides (Item 1) **[Figure 20-40-123]** from both ends of the valve spool.

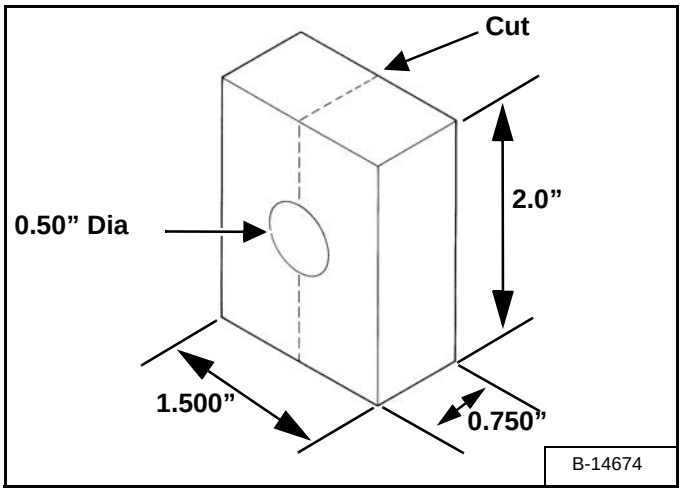
Figure 20-40-124



Record the orientation of the spool (Item 1) **[Figure 20-40-124]**. Remove the spool from the valve section.

NOTE: The spool is not symmetrical. Incorrect spool installation will cause poor hydraulic valve performance.

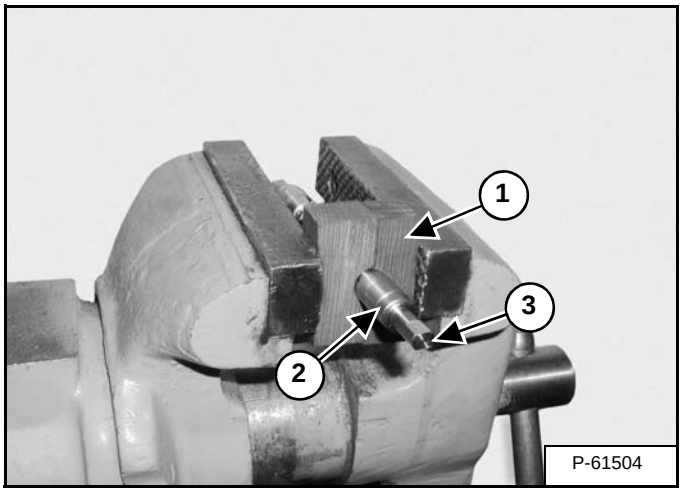
Figure 20-40-125



To remove the plugs from the spool, a holding fixture will have to be made from a 0.750 inch thick x 1.500 inch wide x 2.0 inch long (19 mm thick x 38 mm wide x 50 mm long) piece of hardwood. Drill a 0.50 inch (13 mm) hole in the center of the hardwood block. Cut the block lengthwise **[Figure 20-40-125]**.

NOTE: Do not use anything other than hardwood blocks to grip the spool, or the spool will be damaged.

Figure 20-40-126

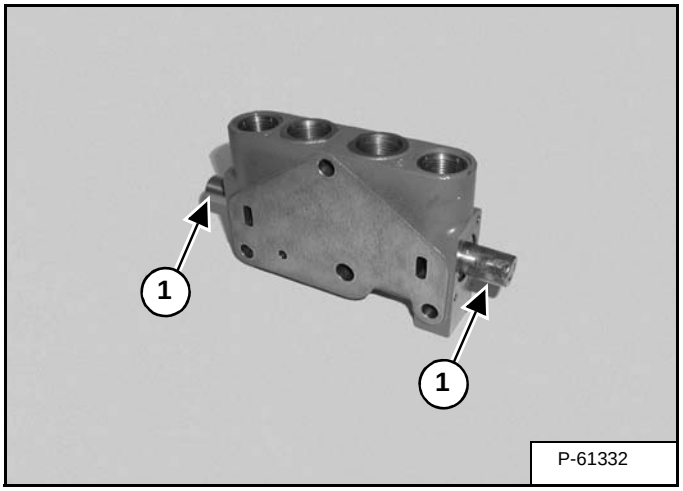


Using the wood blocks (Item 1) clamp the spool assembly (Item 2) in a vise and loosen the plugs (Item 3) **[Figure 20-40-126]**. (Both ends).

Installation: Apply thread lock adhesive (Loctite® 262) or equivalent to the threads. Tighten the plugs to 44 in.-lb. (5 N•m) torque.

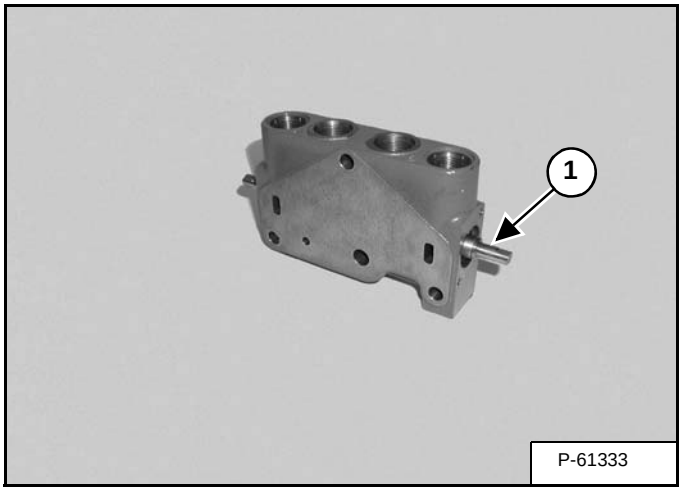
Boom Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-159



Remove the spring guides (Item 1) **[Figure 20-40-159]** from both ends of the valve spool.

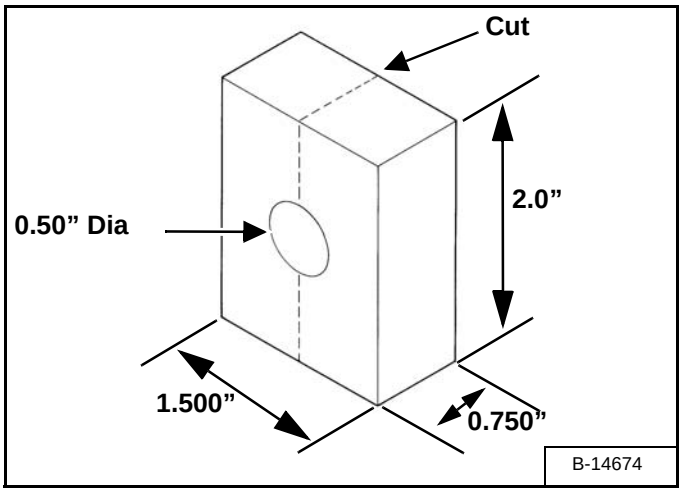
Figure 20-40-160



Record the orientation of the spool (Item 1) **[Figure 20-40-160]**. Remove the spool from the valve section.

NOTE: The spool is not symmetrical. Incorrect spool installation will cause poor hydraulic valve performance.

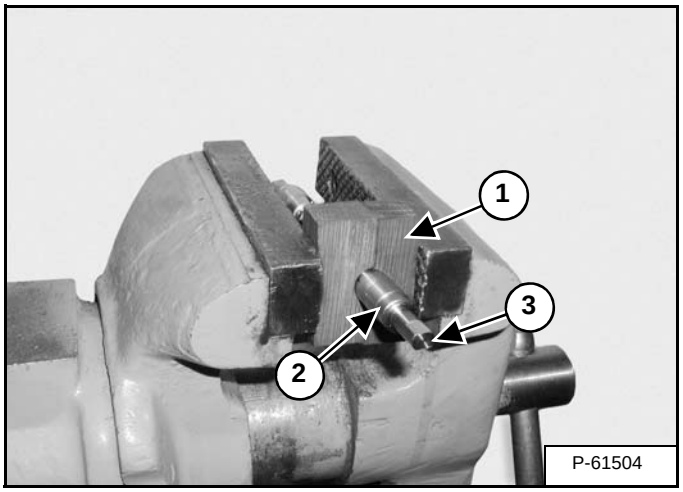
Figure 20-40-161



To remove the plugs from the spool, a holding fixture will have to be made from a 0.750 inch thick x 1.500 inch wide x 2.0 inch long (19 mm thick x 38 mm wide x 50 mm long) piece of hardwood. Drill a 0.50 inch (13 mm) hole in the center of the hardwood block. Cut the block lengthwise **[Figure 20-40-161]**.

NOTE: Do not use anything other than hardwood blocks to grip the spool, or the spool will be damaged.

Figure 20-40-162

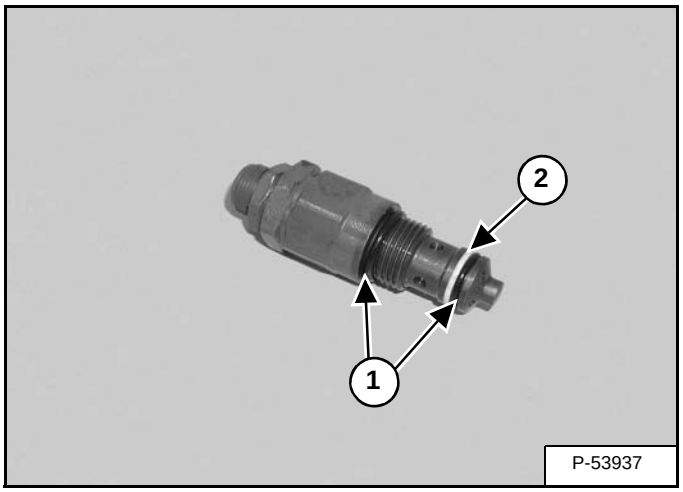


Using the wood blocks (Item 1) clamp the spool assembly (Item 2) in a vise and loosen the plugs (Item 3) **[Figure 20-40-162]**. (Both ends)

Installation: Apply thread lock adhesive (Loctite® 262) or equivalent to the threads. Tighten the plugs to 44 in.-lb. (5 N•m) torque.

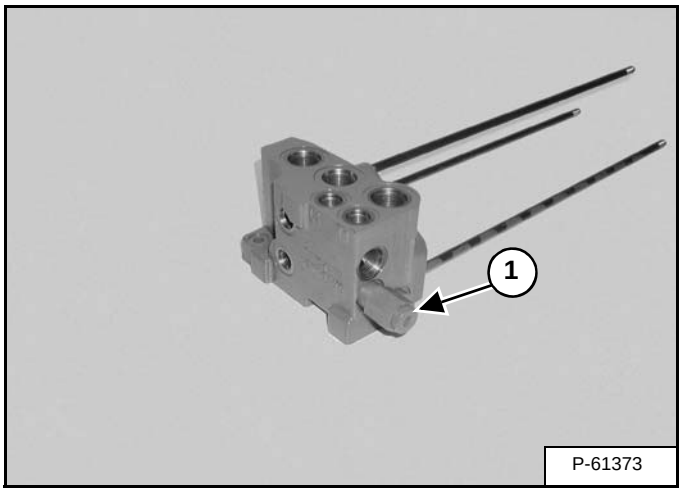
Inlet Section Disassembly And Assembly (Cont'd)

Figure 20-40-197



Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-197]** from the relief valve.

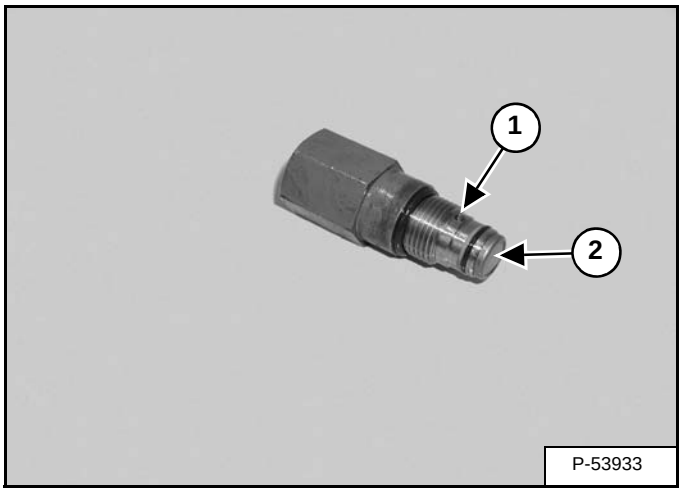
Figure 20-40-198



Remove the load sense bleed valve (Item 1) **[Figure 20-40-198]** from the inlet section.

Installation: Tighten the load sense bleed valve to 15 ft.-lb. (20 N•m) torque.

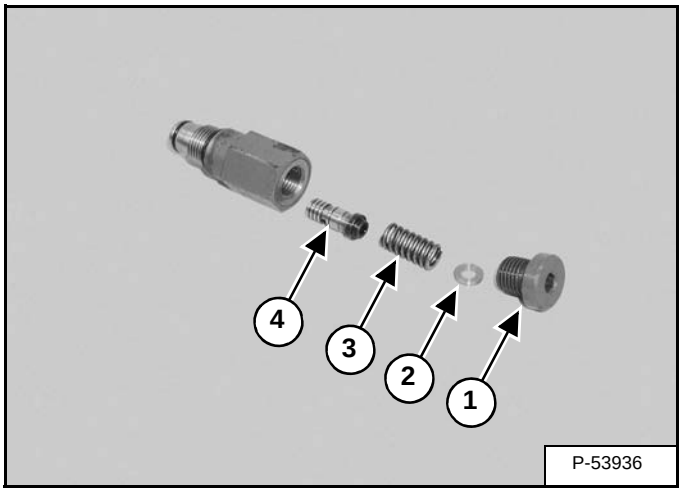
Figure 20-40-199



Check the port (Item 1) **[Figure 20-40-199]** in the load sense bleed valve to be sure it is not plugged.

Remove the filter (Item 2) **[Figure 20-40-199]** from the end of the load sense bleed valve.

Figure 20-40-200



Remove the plug (Item 1), shims (Item 2), spring (Item 3) and spool (Item 4) **[Figure 20-40-200]** from the load sense bleed valve.

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

HYDRAULIC PUMP

Description

IMPORTANT

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

I-2003-0888

Figure 20-50-1

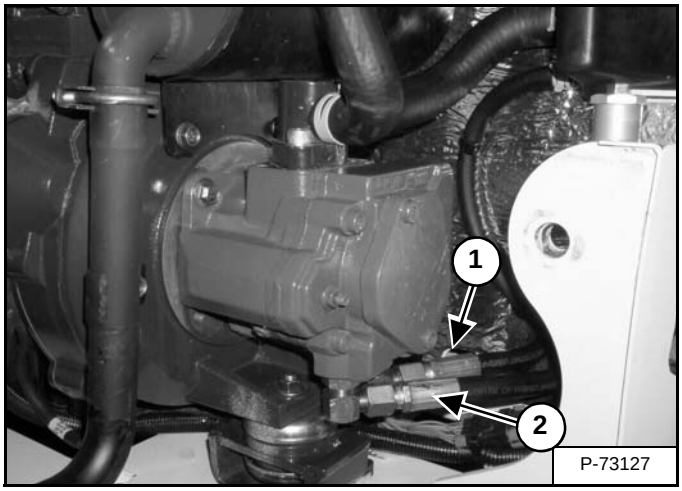
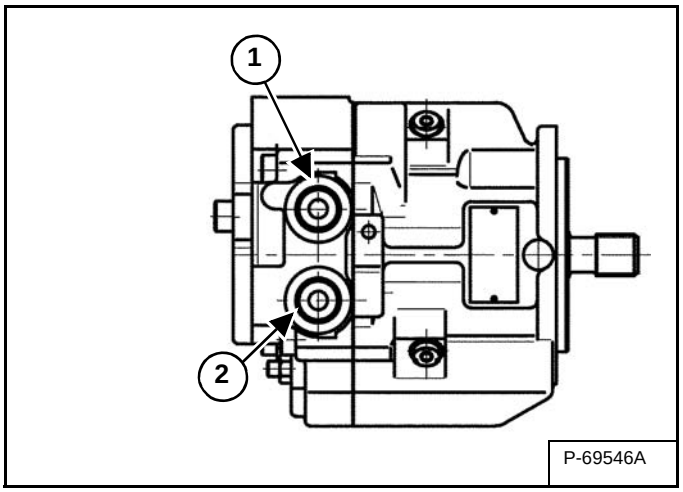


Figure 20-50-2



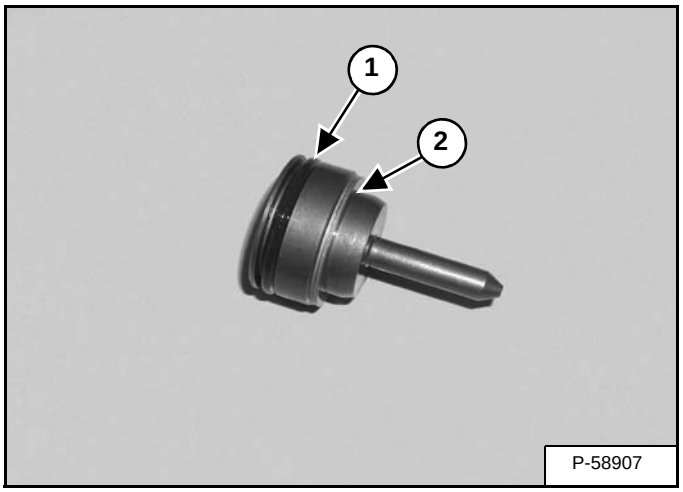
Pump outlet 1 (Item 1) **[Figure 20-50-1]** & **[Figure 20-50-2]** provides hydraulic fluid to the right hand travel, boom swing and boom valve sections.

Pump outlet 2 (Item 2) **[Figure 20-50-1]** & **[Figure 20-50-2]** provides hydraulic fluid flow to the left hand travel, arm and bucket valve sections.

Hydraulic flow from pump outlet 2 (Item 2) **[Figure 20-50-1]** & **[Figure 20-50-2]**.

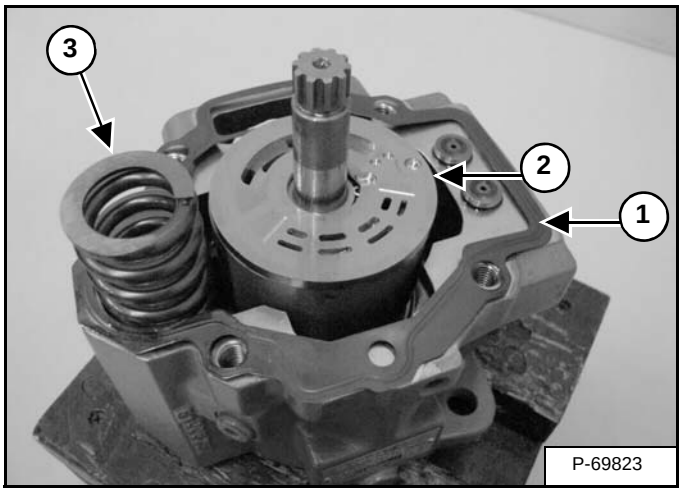
Piston Pump Disassembly (Cont'd)

Figure 20-50-25



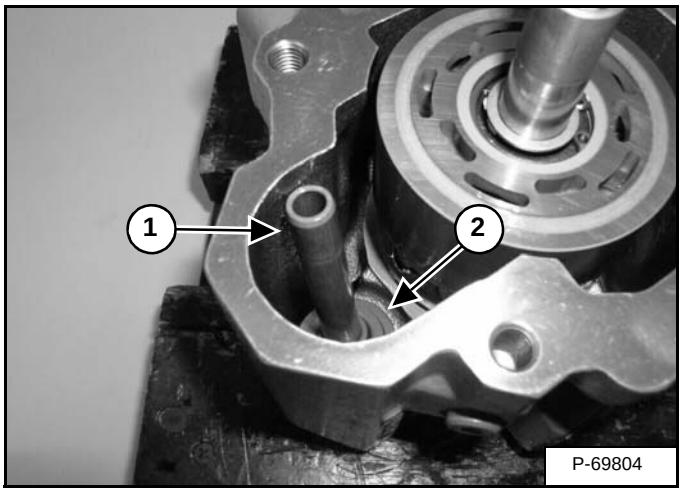
Remove the O-ring (Item 1) and two shims (Item 2) **[Figure 20-50-25]** from the piston.

Figure 20-50-26



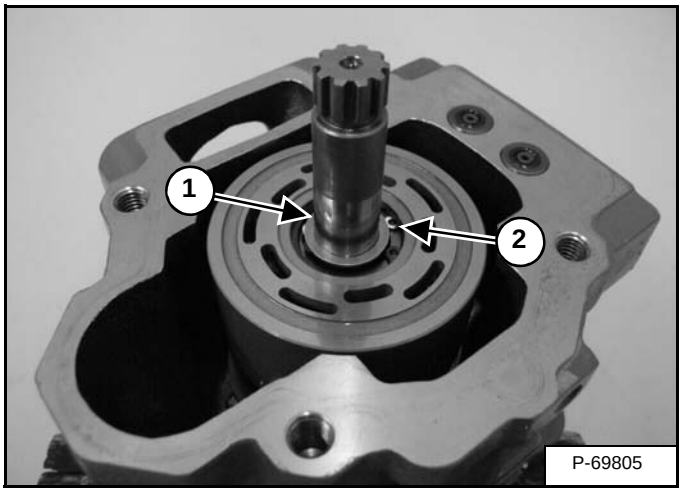
Remove the gasket (Item 1), control plate (Item 2), and spring (Item 3) **[Figure 20-50-26]**.

Figure 20-50-27



Remove the spring guide (Item 1) and spring seat (Item 2) **[Figure 20-50-27]**.

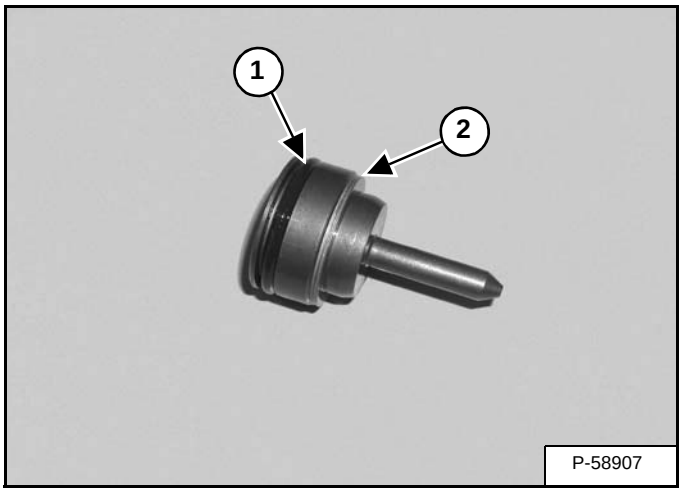
Figure 20-50-28



Remove the washer (Item 1) and snap ring (Item 2) **[Figure 20-50-28]**.

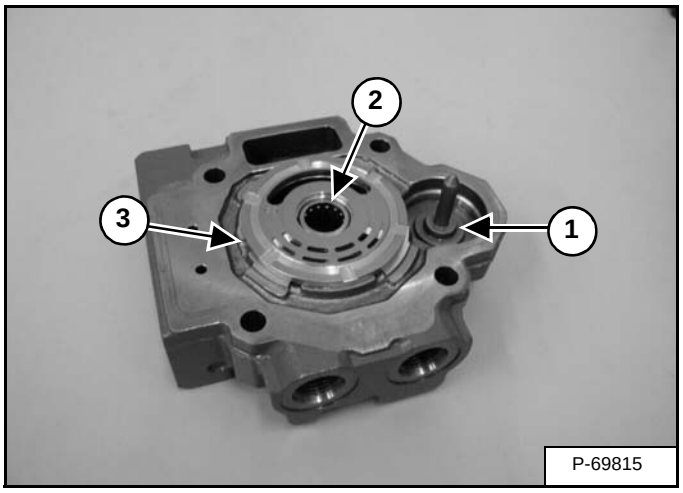
Piston Pump Assembly (Cont'd)

Figure 20-50-64



Install the O-ring (Item 1) and two shims (Item 2) **[Figure 20-50-64]** on the piston.

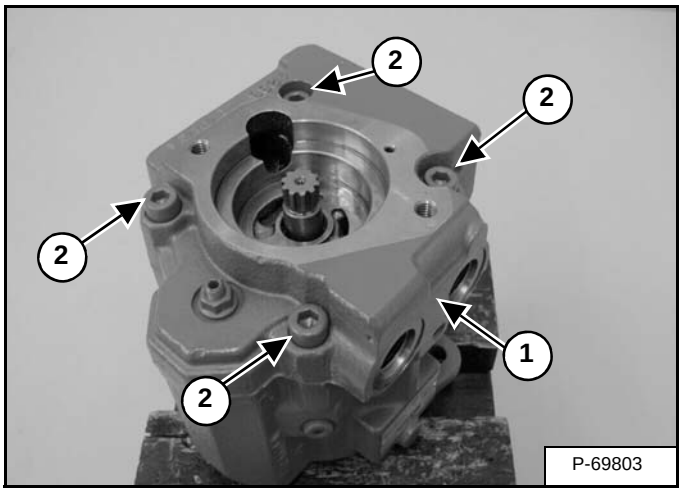
Figure 20-50-65



Install the piston (Item 1) and bearing (Item 2) **[Figure 20-50-65]**.

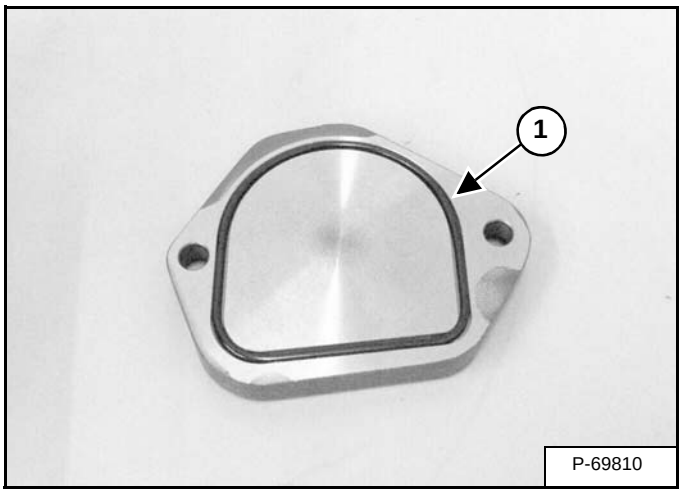
Apply assembly grease on the control plate (Item 3) **[Figure 20-50-65]** and align on pin.

Figure 20-50-66



Install the port plate (Item 1) and four bolts (Item 2) **[Figure 20-50-66]** and tighten the bolts to xx-xx ft.-lb. (xx-xx N•m) torque.

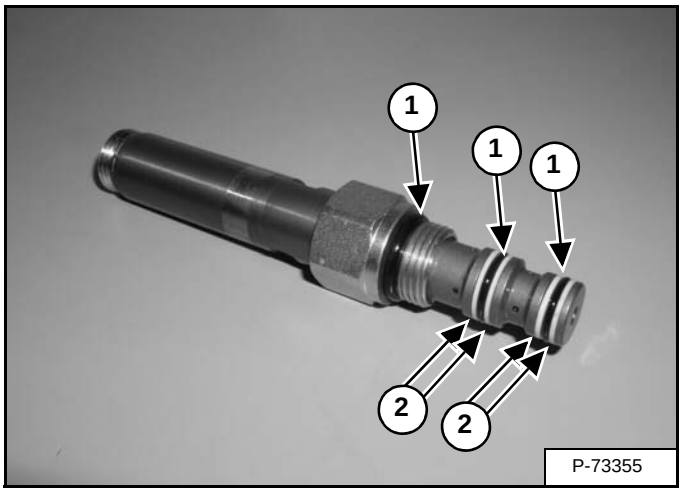
Figure 20-50-67



Install the O-ring (Item 1) **[Figure 20-50-67]** on the end plate.

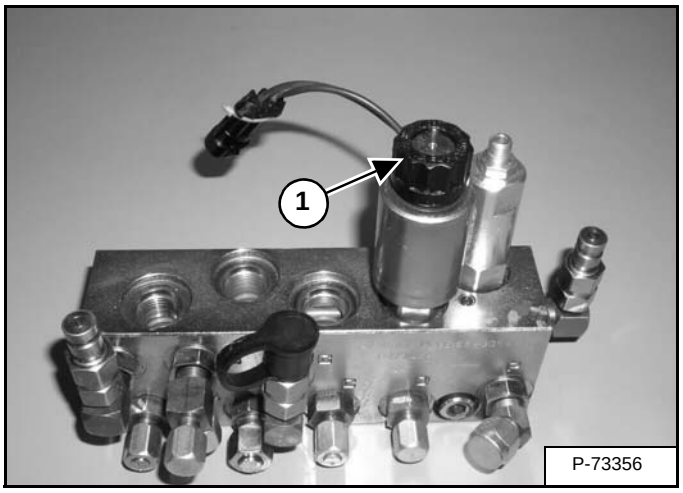
Disassembly And Assembly (Cont'd)

Figure 20-60-26



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-60-26]**.

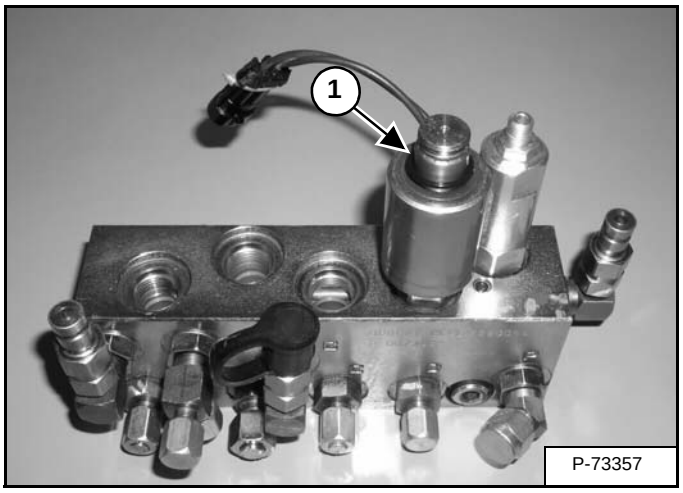
Figure 20-60-27



Remove the nut (Item 1) **[Figure 20-60-27]** from the blue tie strap solenoid.

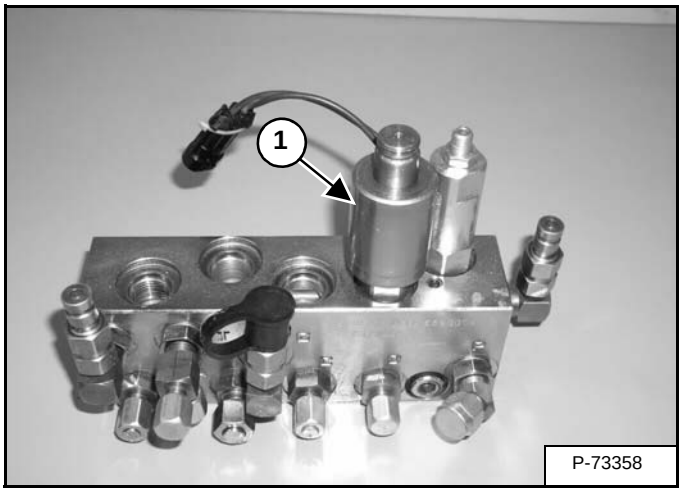
Installation: Tighten the nut to 53 in.-lb. (6 N•m) torque.

Figure 20-60-28



Remove the O-ring (Item 1) **[Figure 20-60-28]** from the solenoid.

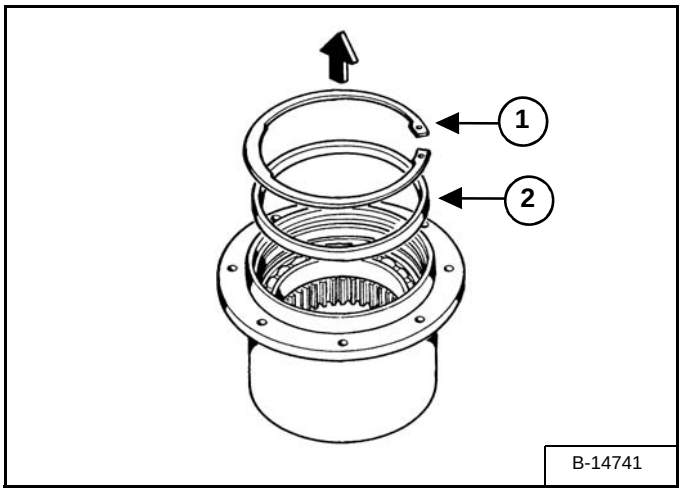
Figure 20-60-29



Remove the coil with the blue tie strap (Item 1) **[Figure 20-60-29]** from the solenoid stem.

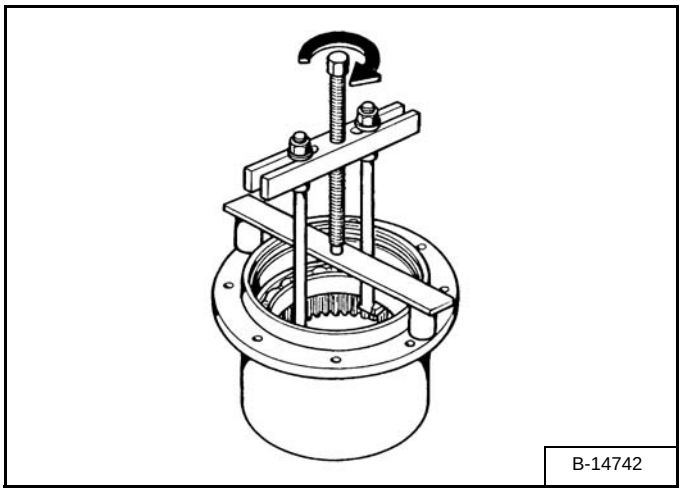
Disassembly (Cont'd)

Figure 20-70-19



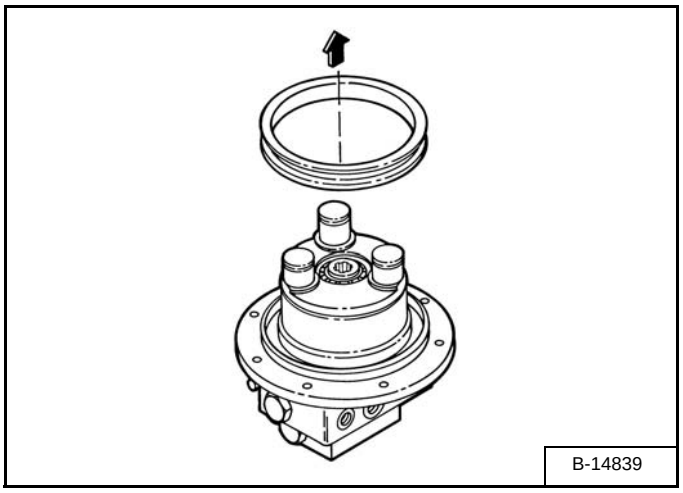
Remove the internal snap ring (Item 1) and spacer (Item 2) **[Figure 20-70-19]**.

Figure 20-70-20



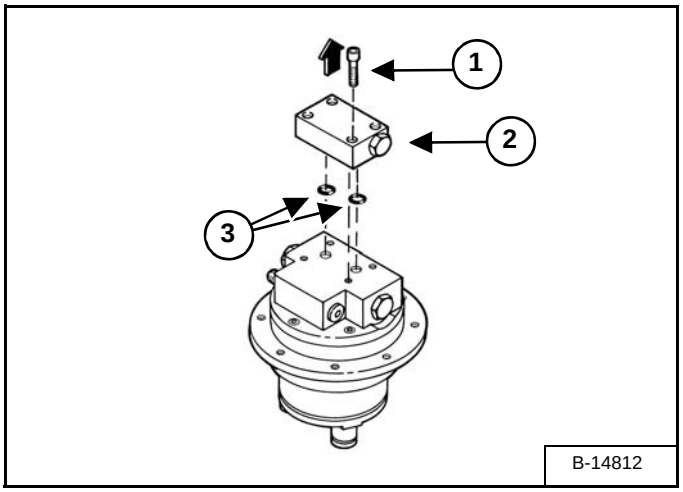
Remove the second bearing from the ring gear **[Figure 20-70-20]**.

Figure 20-70-21



Remove the front seal ring from the motor hub **[Figure 20-70-21]**.

Figure 20-70-22



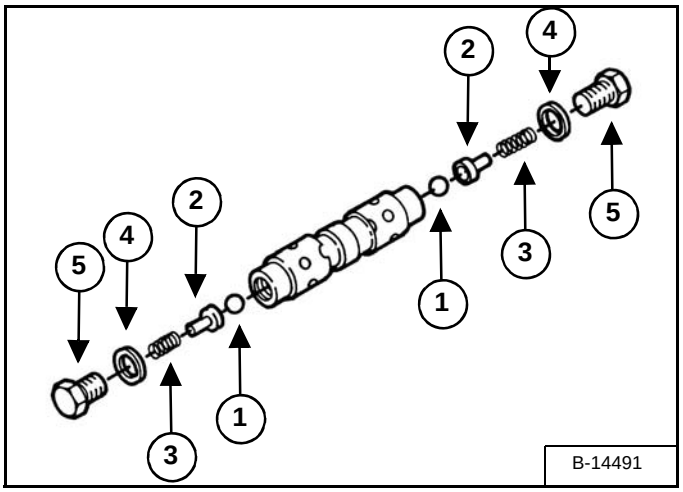
Remove the four bolts (Item 1) from the relief valve block (Item 2) **[Figure 20-70-22]**.

Remove the two O-rings (Item 3) **[Figure 20-70-22]**.

NOTE: The relief valve block assembly (Item 2) [Figure 20-70-22] and the relief valves are not serviceable. If any of these parts are damaged, order a new relief valve block assembly.

Assembly (Cont'd)

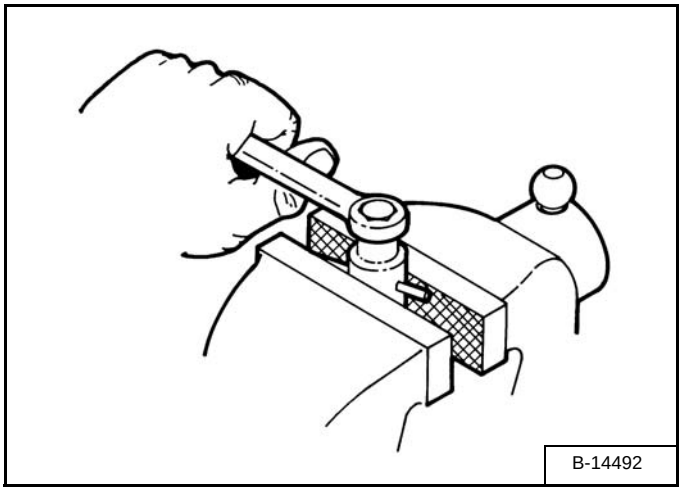
Figure 20-70-55



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

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

Figure 20-70-56



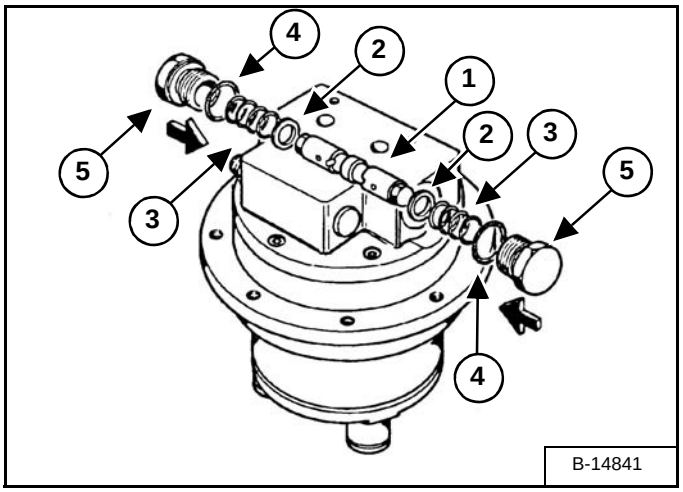
To assemble the spool, insert a hardened pin through the hole in the spool and use a vise with protective jaws to hold the spool **[Figure 20-70-56]**.

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

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

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

Figure 20-70-57



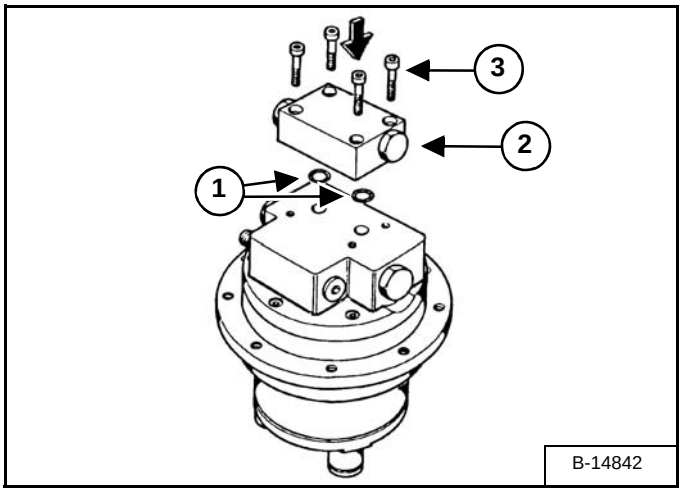
Apply oil to and install the spool (Item 1) **[Figure 20-70-57]** in the motor cover.

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

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

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

Figure 20-70-58

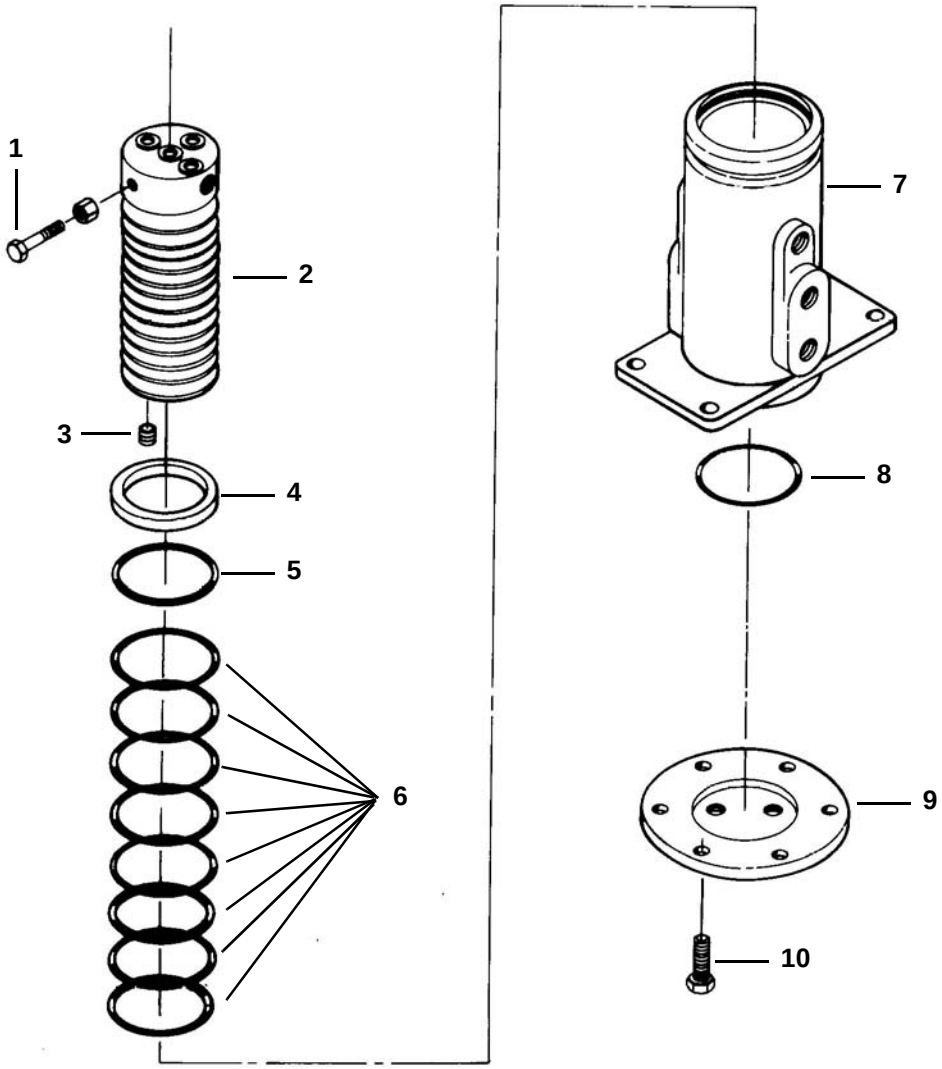


Apply oil to and install the two O-rings (Item 1) **[Figure 20-70-58]**.

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

Parts Identification

1. Bolt
2. Rotor
3. Plug
4. Seal
5. Seal
6. Seal
7. Body
8. O-Ring
9. Cover
10. Bolt



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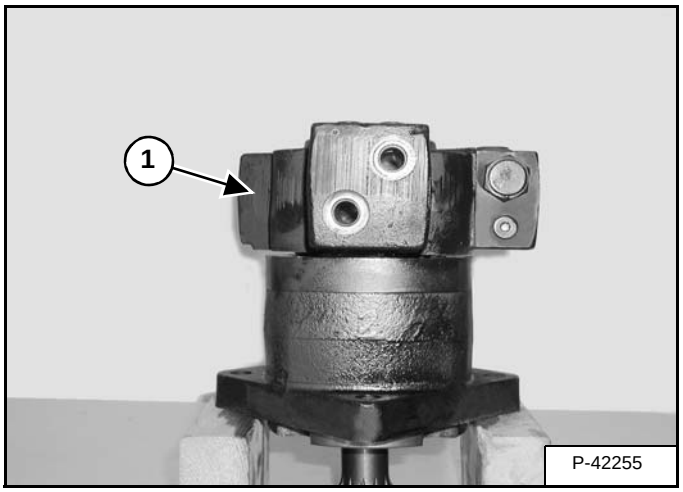
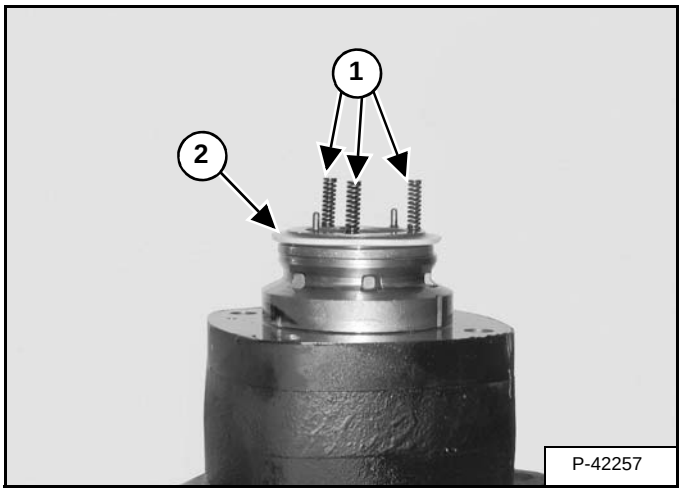
Disassembly (Cont'd)

Figure 20-90-10



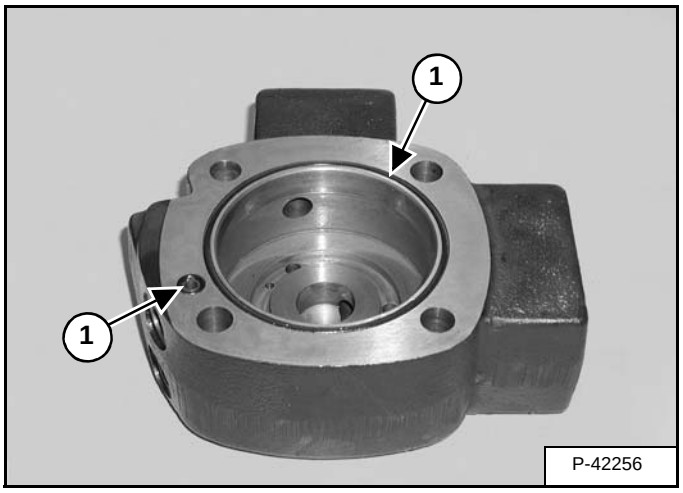
Remove the valve housing (Item 1) **[Figure 20-90-10]**.

Figure 20-90-11



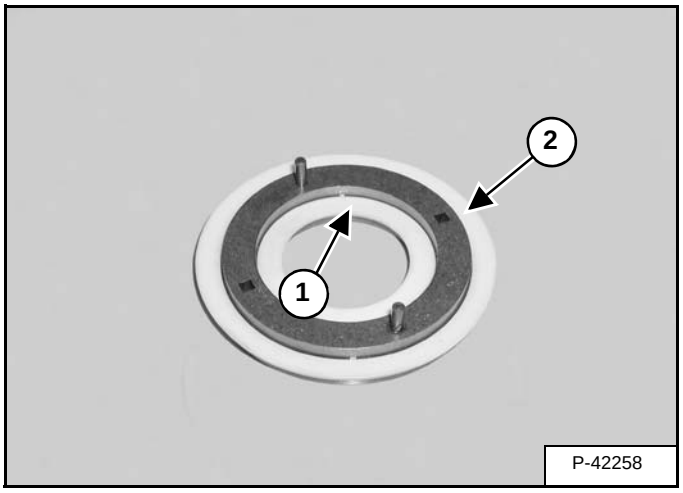
Lift the housing straight up. If done carefully the springs (Item 1) and balance ring sub-assembly (Item 2) **[Figure 20-90-11]** will remain on the valve for easy removal. Remove the springs and balance ring.

Figure 20-90-12



Remove the O-rings (Item 1) **[Figure 20-90-12]**.

Figure 20-90-13



Remove the inner seal (Item 1) and outer seal (Item 2) **[Figure 20-90-13]**.

SWING MOTOR DRIVE CARRIER

Description

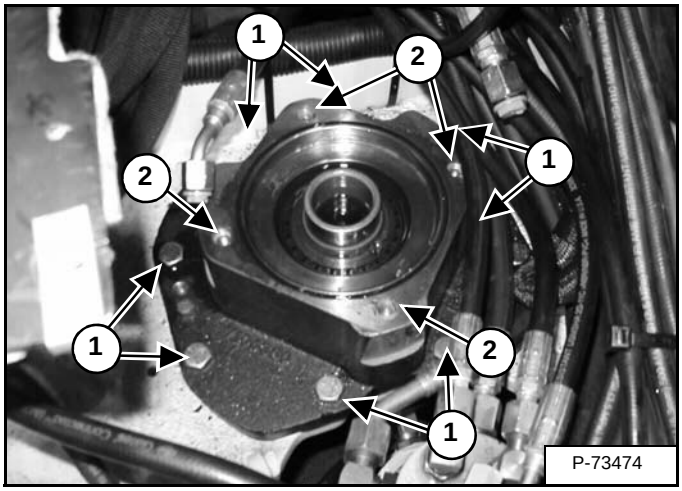
The swing motor drive carrier is the mating connection from the swing motor to the swing circle gear.

The swing motor drive carrier contains a shaft that rotates on two tapered roller bearings. The shaft has a gear that turns the upperstructure on the swing circle gear. Damaged or severely worn bearings can destroy a swing motor drive carrier and swing motor.

Removal And Installation

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

Figure 20-91-1



Mark and remove the eight bolts (Item 1) **[Figure 20-91-1]**.

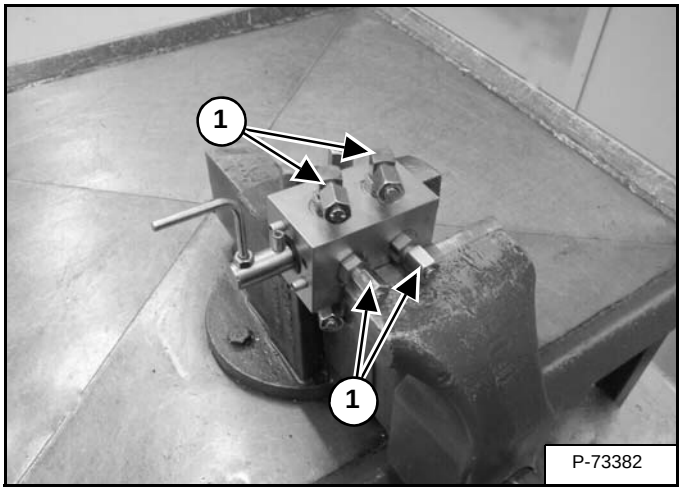
NOTE: It is necessary to mark the bolts as the bolts are two different lengths. The bolts must be installed in the original positions.

Installation: Apply Loctite® 242 to the bolt threads and tighten the bolts to 78-85 ft.-lb. (105-115 N•m) torque.

Disassembly and Assembly

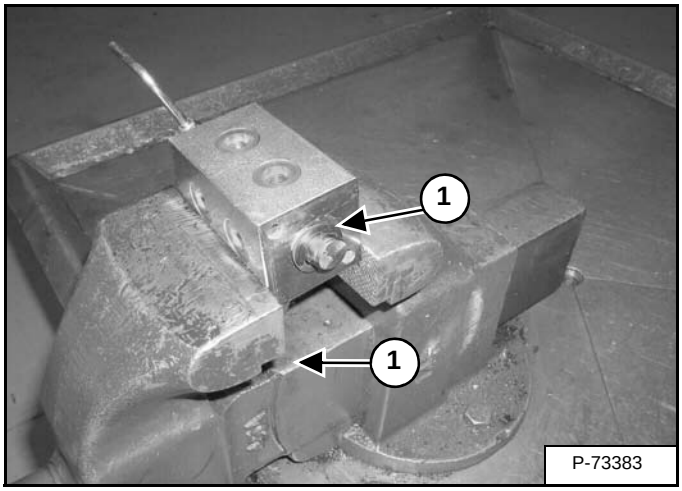
Clean the outside of the valve before disassembly.

Figure 20-100-2



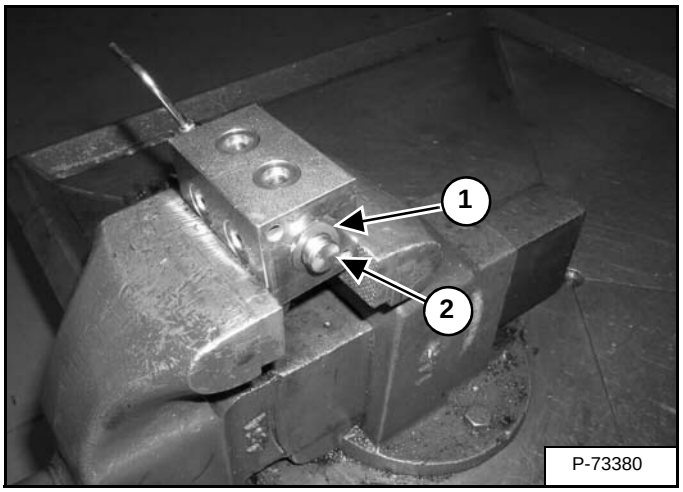
Remove all the fittings (Item 1) **[Figure 20-100-2]**.

Figure 20-100-3



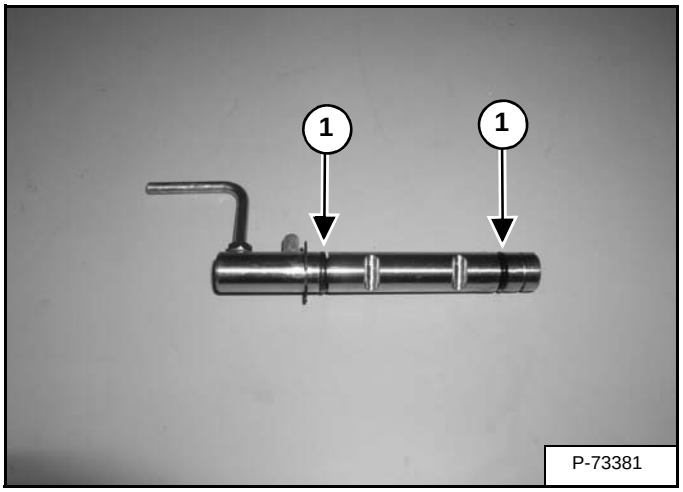
Remove the snap ring (Item 1) **[Figure 20-100-3]**.

Figure 20-100-4



Remove the wave washer (Item 1) and the spool (Item 2) **[Figure 20-100-4]**.

Figure 20-100-5

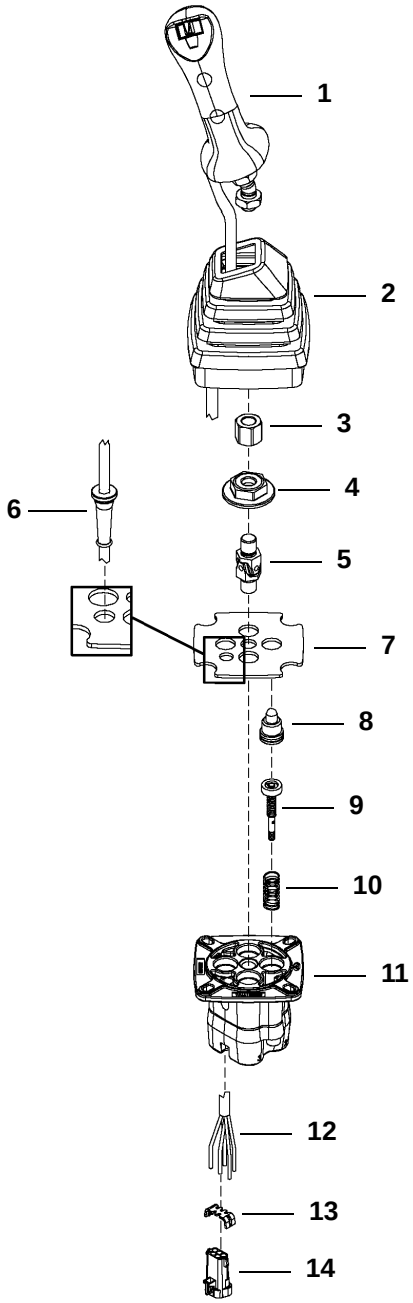


Remove the O-rings (Item 1) **[Figure 20-100-5]** from the spool.

Installation: Clean all parts in solvent and dry with compressed air. Inspect all parts for wear or damage. Replace any worn or damaged parts. Always install new seals and O-rings. Lubricate all seals and O-rings with clean hydraulic fluid before installation.

Parts Identification

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



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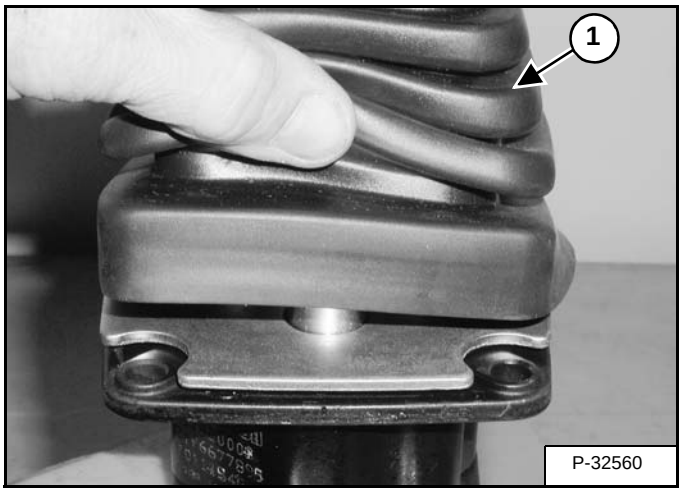
Assembly (Cont'd)

Figure 20-110-63

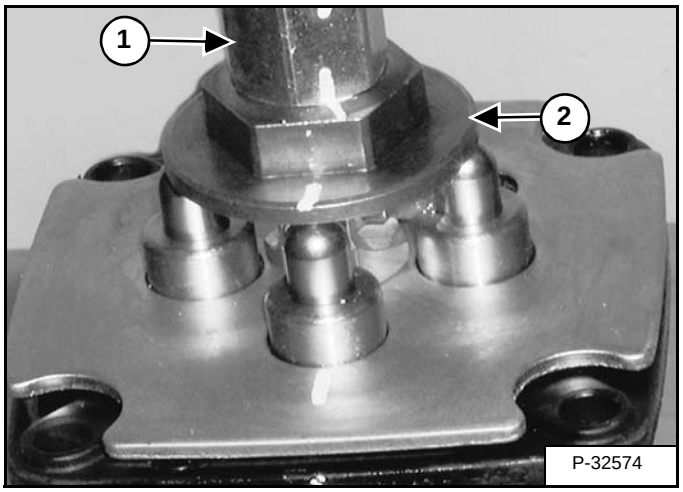


Install the tabs of the boot in between the joystick flange and mounting plate (Item 1) **[Figure 20-110-63]**.

Install the handle. (See Handle Removal And Installation on Page 20-110-2.)

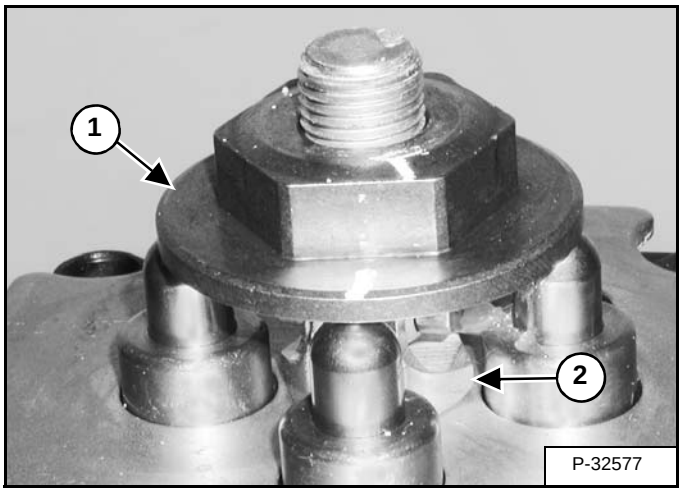
Disassembly (Cont'd)

Figure 20-111-27



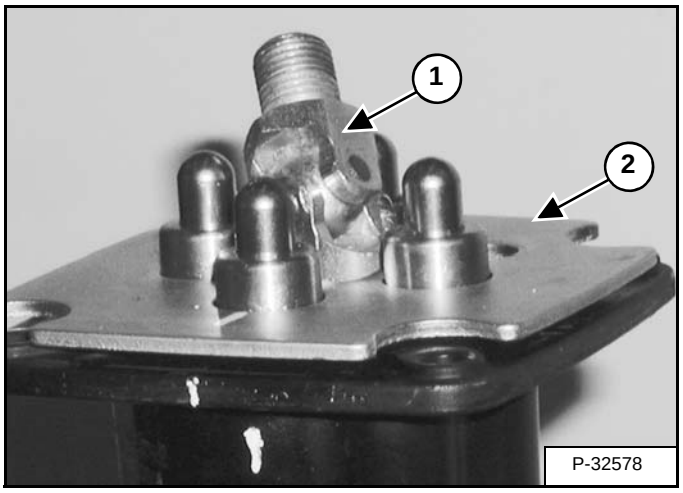
Remove the coupler (Item 1) from the control plate (Item 2) **[Figure 20-111-27]**.

Figure 20-111-28



Remove the control plate (Item 1) from the U-joint (Item 2) **[Figure 20-111-28]**.

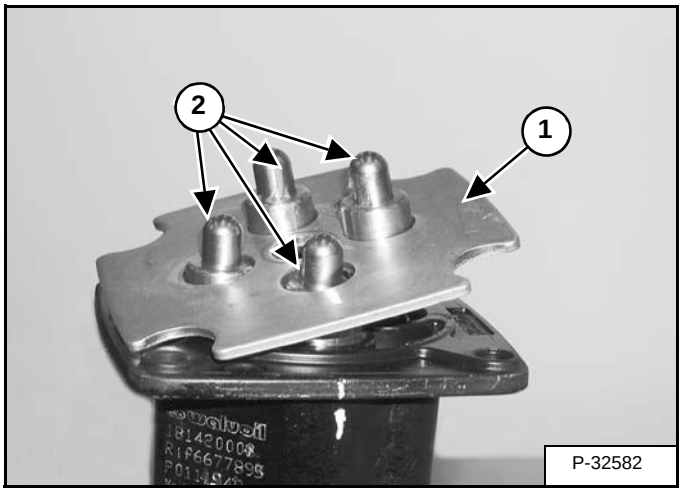
Figure 20-111-29



Mark the plate and housing for correct installation. Remove the U-joint (Item 1) **[Figure 20-111-29]**.

NOTE: The plate (Item 2) [Figure 20-111-29] is spring loaded and will come up as the U-joint is removed.

Figure 20-111-30



Remove the plate (Item 1) **[Figure 20-111-30]**.

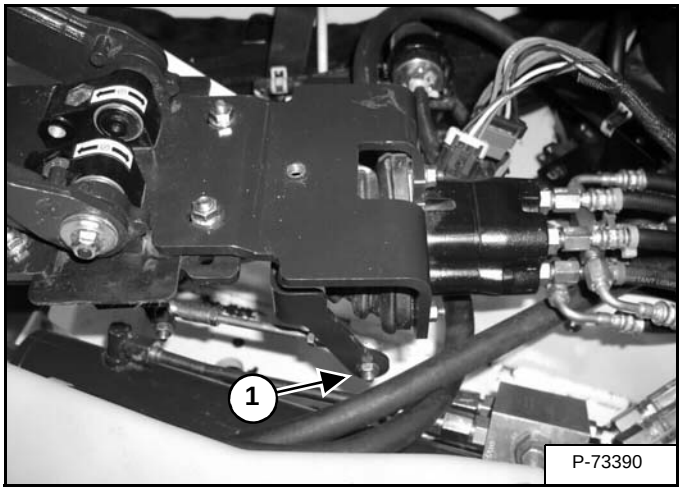
NOTE: Use care while removing the plate. The plungers (Item 2) [Figure 20-111-30] are spring loaded.

TRAVEL CONTROL VALVE

Removal and Installation

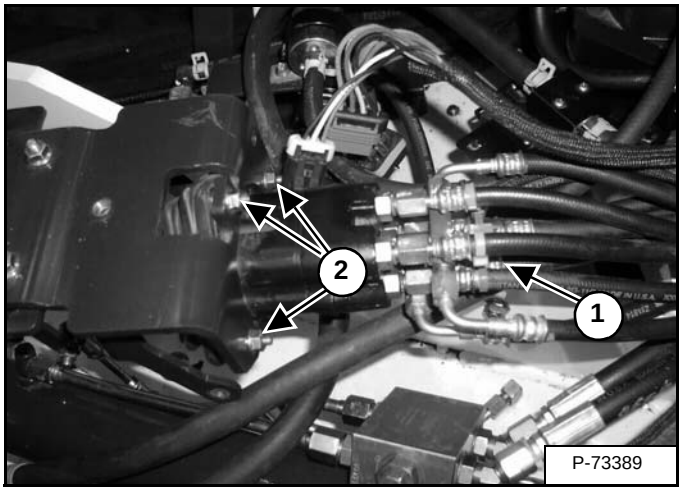
Remove the floor mat and floor plates. (See Removal And Installation on Page 40-90-1.)

Figure 20-112-1



Remove the linkage nuts (Item 1) **[Figure 20-112-1]**. (Both sides)

Figure 20-112-2



Mark the hydraulic hoses for proper installation.

Remove the ten hydraulic hoses (Item 1) **[Figure 20-112-2]** from the travel control valve.

Remove the three bolts and nuts (Item 2) **[Figure 20-112-2]** from the travel control valve.

Lower 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.

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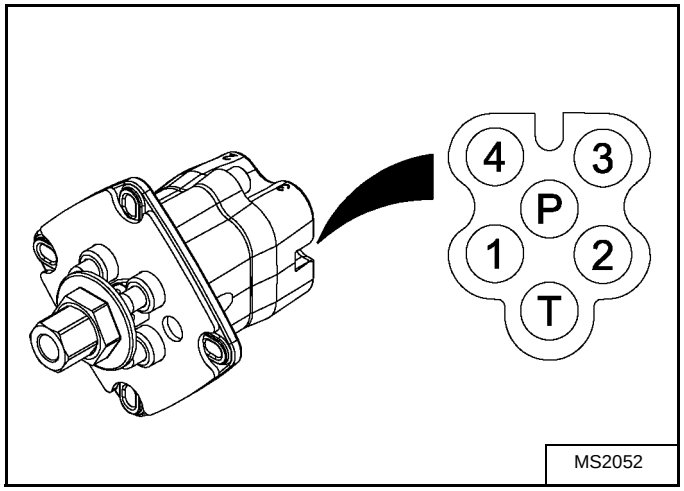
Figure 20-112-3



Installation: Install the hoses on the correct port **[Figure 20-112-3]**.

Remove the travel control valve from the excavator.

HYDRAULIC RESERVOIR

Description

The hydraulic reservoir is a storage container for the excavators hydraulic fluid. The reservoir contains a vented fill cap with a fluid screen to prevent contaminants from entering the reservoir while adding fluid.

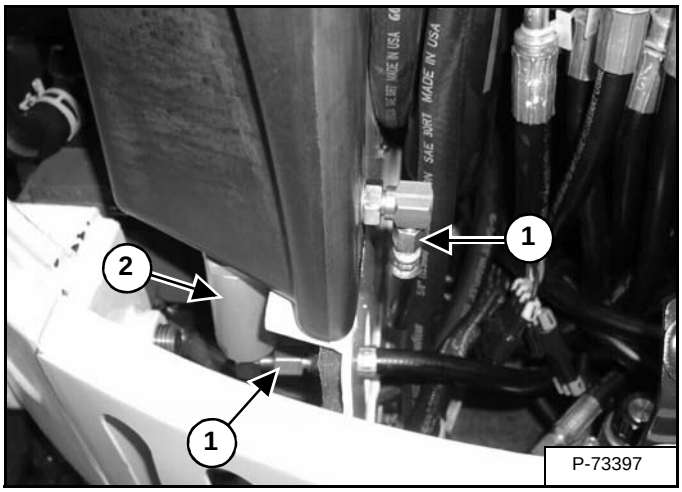
The hydraulic reservoir is located behind the tailgate on the left side of the excavator.

Removal And Installation

Drain the reservoir. (See Removing And Replacing The Hydraulic Fluid on Page 10-100-3.)

Open the right side cover and tailgate.

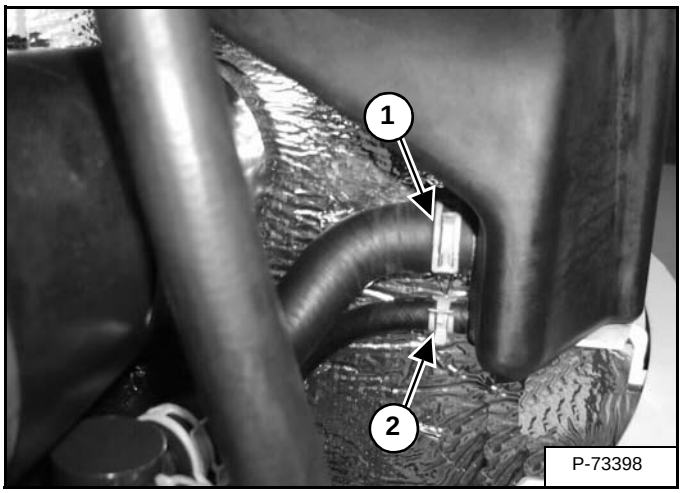
Figure 20-130-1



Remove and cap the hoses (Item 1) **[Figure 20-130-1]**.

Remove the case drain filter (Item 2) **[Figure 20-130-1]**.

Figure 20-130-2



Remove the suction hose (Item 1) **[Figure 20-130-2]**.

Remove the drain hose (Item 2) **[Figure 20-130-2]**.

HYDRAULIC X-CHANGE VALVE

Removal And Installation

Open the right side cover.

IMPORTANT

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

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Lower the boom and blade to the ground.

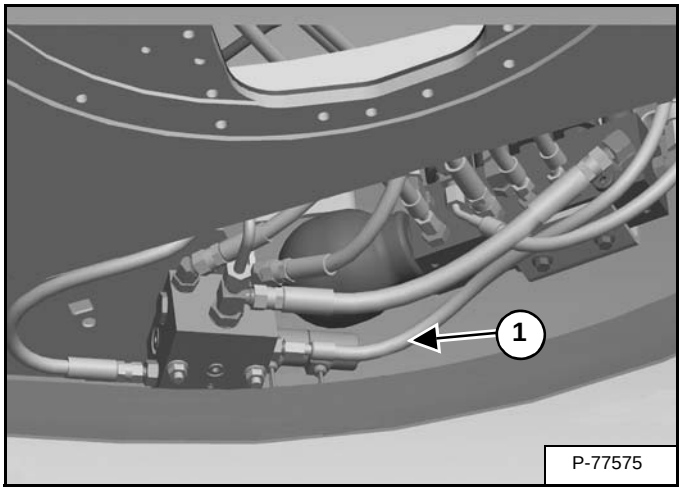
With the engine off, turn the key to the ON position and move both control levers to relieve hydraulic pressure.

Open the right side cover.

Remove the battery. (See Removal And Installation on Page 50-20-1.)

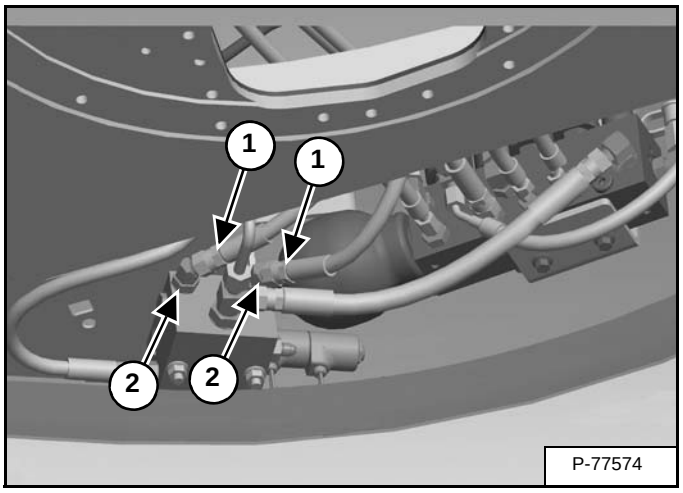
Mark all hoses for proper installation.

Figure 20-150-1



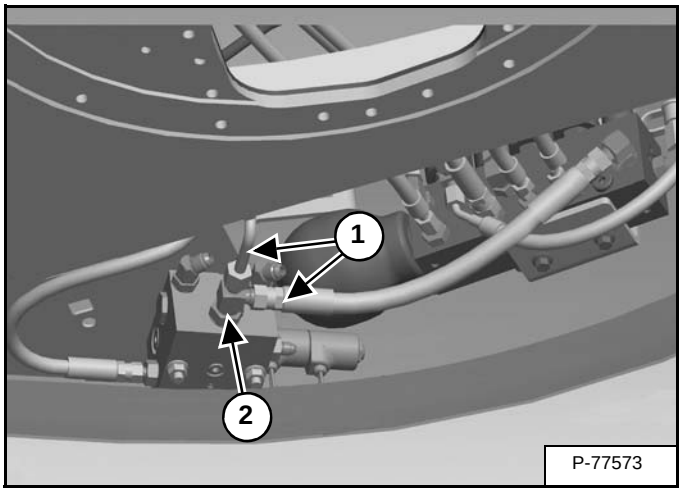
Remove the hose (Item 1) from the T port (Item 2) **[Figure 20-150-1]** of the X-change valve.

Figure 20-150-2



Remove the hoses (Item 1) from the A & B ports (Item 2) **[Figure 20-150-2]** of the X-change valve.

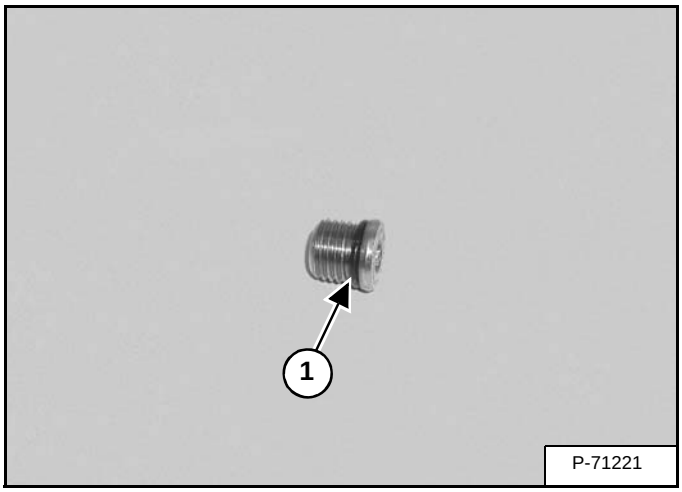
Figure 20-150-3



Remove the hoses (Item 1) from the P port (Item 2) **[Figure 20-150-3]** of the X-change valve.

Disassembly (Cont'd)

Figure 20-150-35



Remove the O-ring (Item 1) **[Figure 20-150-35]** from the plug.

UNDERCARRIAGE

Rubber Track Removal And Installation (Cont'd)

Figure 30-20-16

Insert a pry bar between the track and the idler wheel and pry out on the track until the track slides off the idler wheel **[Figure 30-20-16]**.

Remove the track.

To install the rubber track:

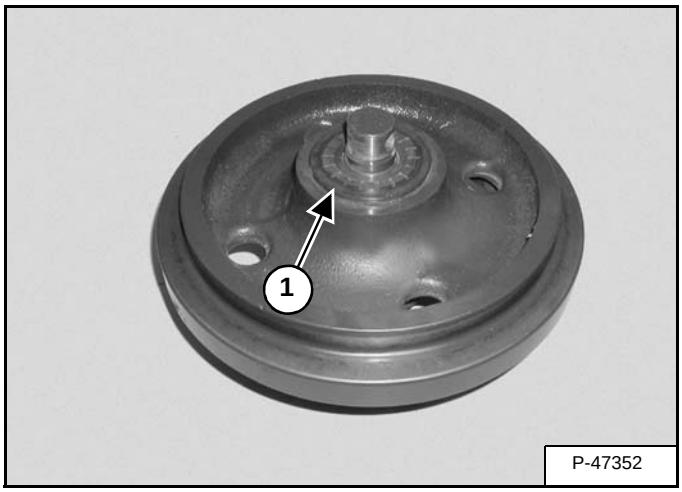
Put the track over the rear drive sprocket lugs.

Put the front of the track onto the front idler wheel.

See Adjustment for adding grease to the grease spring and for checking track tension. (See Checking Tension on Page 30-20-2.)

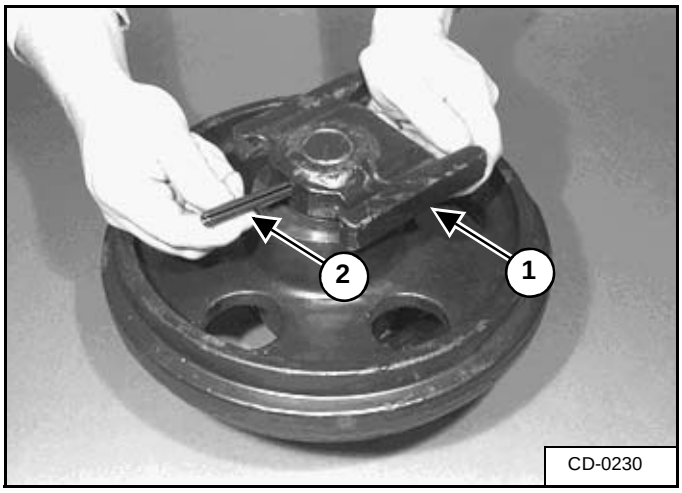
Idler (Front) Assembly (Cont'd)

Figure 30-20-41



Using the driving tool, install the seal (Item 1) **[Figure 30-20-41]** on both sides of the idler.

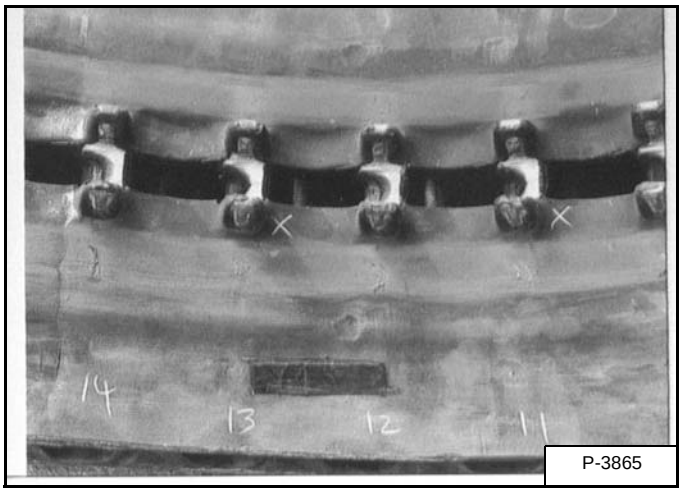
Figure 30-20-42



Install the block (Item 1) and roll pin (Item 2) **[Figure 30-20-42]** on both sides of the shaft.

Track Damage Identification (Cont'd)

Figure 30-20-64

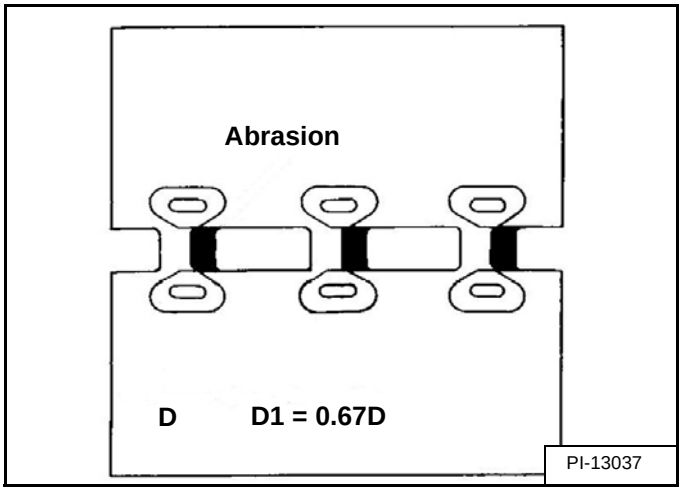


Abrasion Of Embedded Metals

Damage:

In proportion to the service time, embedded metals will gradually wear away by friction **[Figure 30-20-64]**.

Figure 30-20-65



Replacement:

Replacement is required when the width of the embedded metals (D1) becomes 67% of their original width (D) **[Figure 30-20-65]**.

Causes of the damage:

When the track rollers, sprockets and idler gears roll over the embedded metals, abrasion of embedded metals is inevitable. The following cases sometimes accelerate their abrasion:

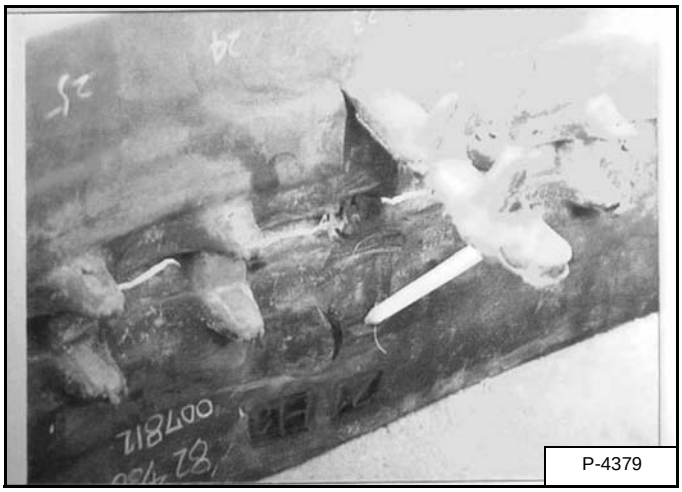
Rubber tracks are driven with an extraordinary heavy load on them.

Rubber tracks are used on sandy fields.

Prevention:

As long as rubber tracks are used under normal operating conditions, abnormal abrasion is unlikely to occur. The level of abrasion should be carefully checked when the machines are used for dozing which generate a heavy load for rubber tracks, and when they are operated under a sandy field condition for a long time.

Figure 30-20-66



Separation Of Embedded Metals

Damage:

Extraordinary outer forces applied to embedded metals cause their separation from the rubber track's body **[Figure 30-20-66]**.

Replacement:

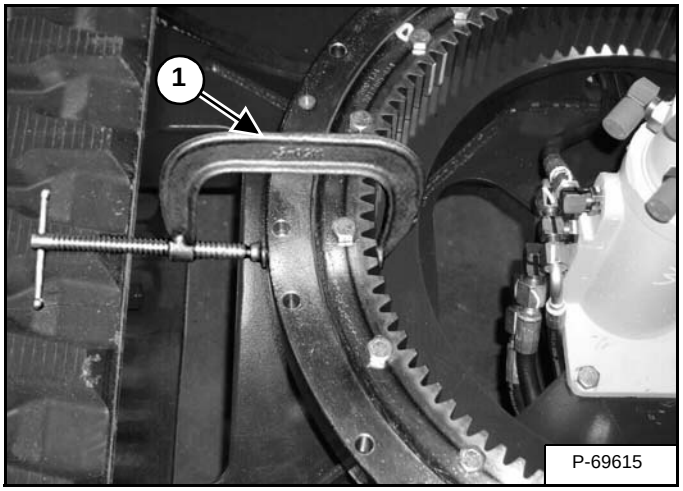
Even a partial separation of embedded metals requires replacement of the track.

SWING CIRCLE GEAR

Removal And Installation

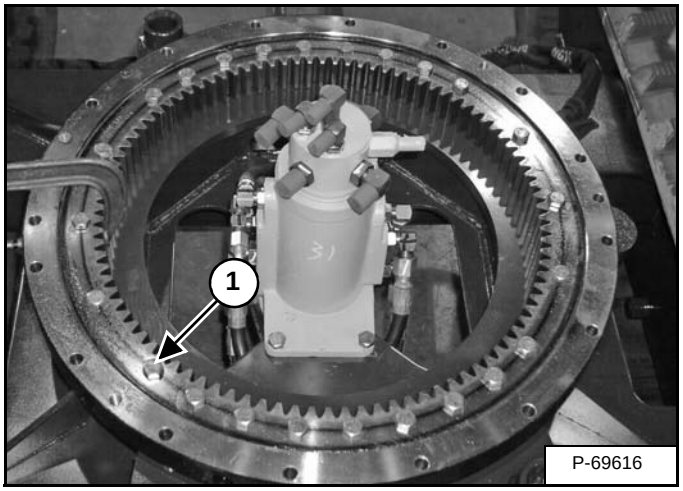
Remove the upperstructure. (See Removal on Page 40-10-1.)

Figure 30-30-1



Install a C-clamp (Item 1) **[Figure 30-30-1]** to prevent the swing bearing from turning while being removed.

Figure 30-30-2



Remove the 24 bolts and nuts that hold the swing bearing to the track frame (Item 1) **[Figure 30-30-2]**.

Remove the swing bearing.

Figure 30-30-3

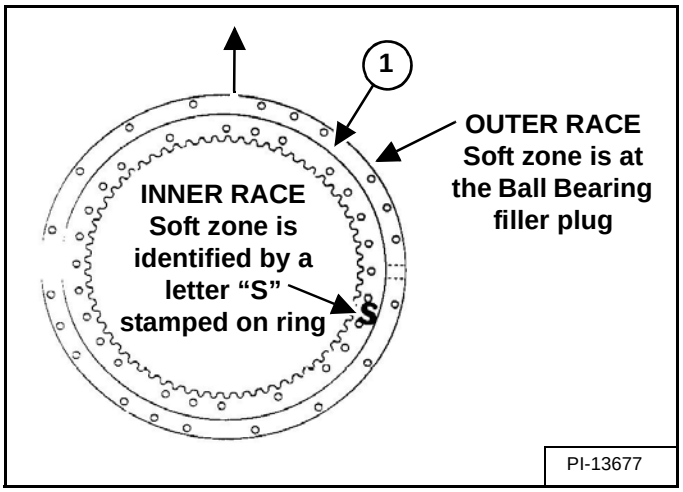
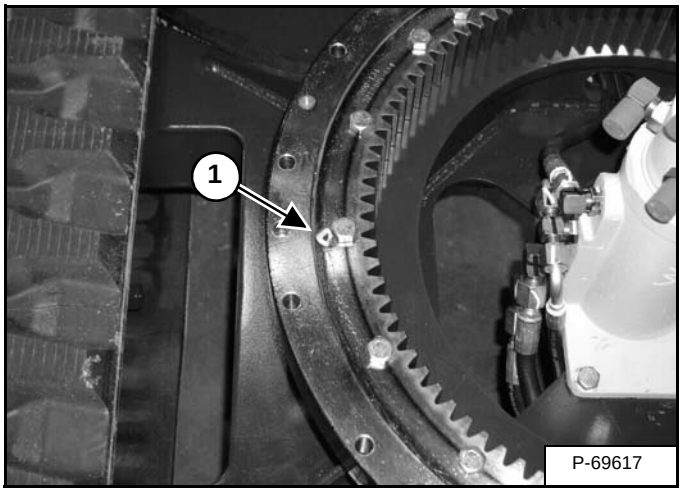


Figure 30-30-4



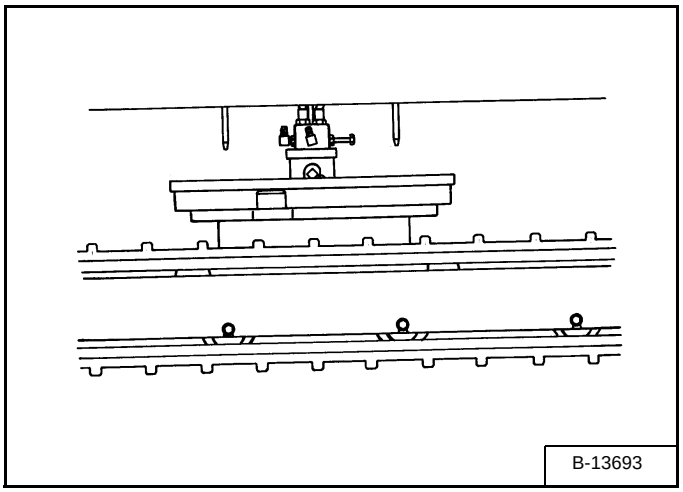
If reusing the existing swing bearing, use top, side and edge aligning marks to put the swing bearing in the correct location. If installing a new swing bearing find the soft zone area (Item 1) **[Figure 30-30-3]** & **[Figure 30-30-4]**.

Install the swing bearing so the inside soft zone (Item 1) **[Figure 30-30-3]** & **[Figure 30-30-4]** is at the right hand side of the excavator.

NOTE: Do not put the soft zone to the front or rear of the excavator.

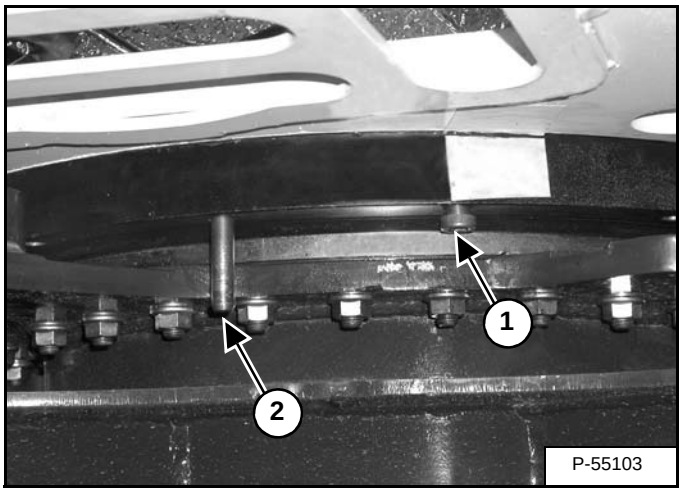
Installation (Cont'd)

Figure 40-10-12



Make sure the swivel joint is centered into the upperstructure access hole **[Figure 40-10-12]**.

Figure 40-10-13



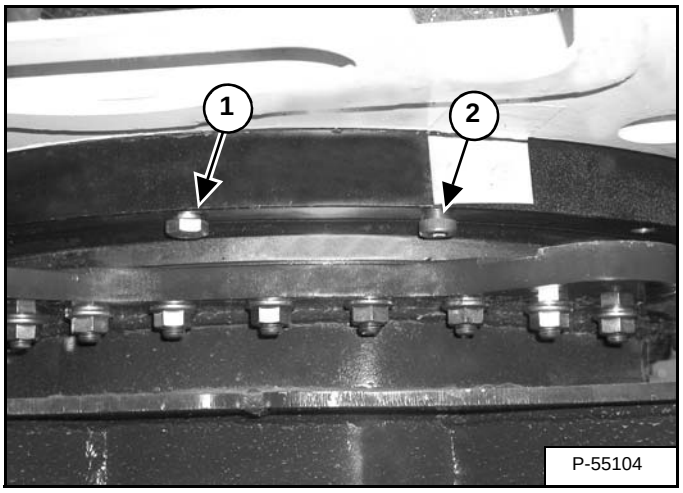
Install the three tapered head alignment bolts (Item 1) **[Figure 40-10-13]** through the swing bearing and into the upperstructure. These bolts should be spaced at approximately 120°.

This procedure will correctly align the upperstructure for correct swing motor gear to swing bearing ring gear clearance.

Tighten these three tapered bolts to 60 ft.-lb. (81 N•m) torque.

Remove the three alignment pins (Item 2) **[Figure 40-10-13]** from the upperstructure.

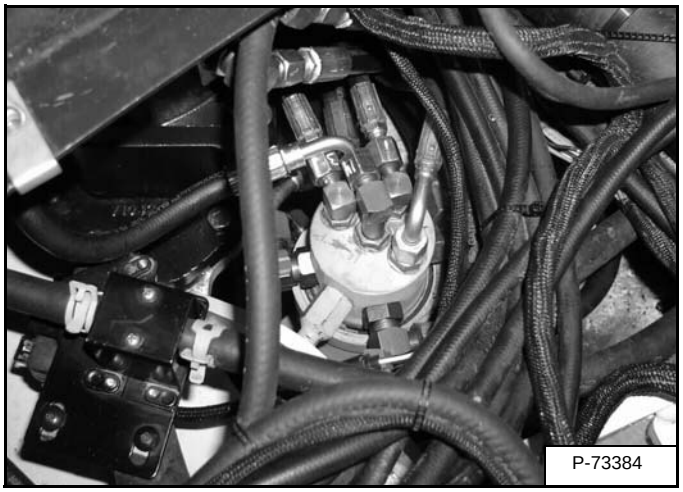
Figure 40-10-14



Apply thread adhesive (LOCTITE® #242) to the threads of the bolts. Install the bolts into all holes (except the three with the alignment bolts installed). Tighten these bolts to 78-85 ft.-lb. (106-115 N•m) torque.

Remove the three alignment bolts. Install the three remaining bolts. Tight these bolts to 78-85 ft.-lb. (106-115 N•m) torque.

Figure 40-10-15



Install the hoses **[Figure 40-10-15]** on the swivel joint.

Remove the chains and lifting fixture.

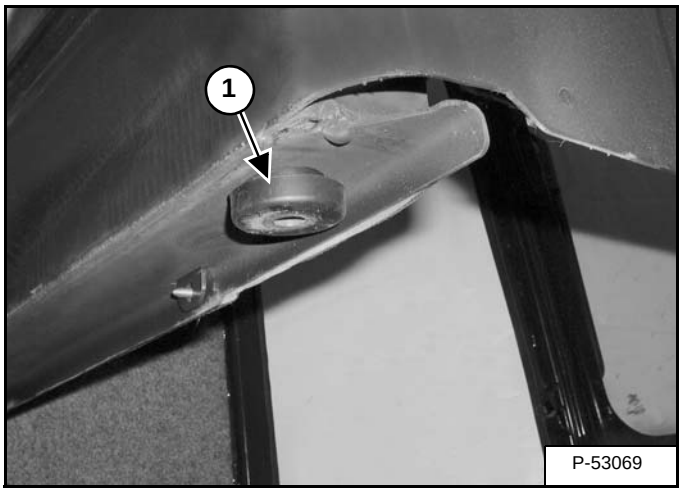
Install the swing motor drive carrier. (See Removal And Installation on Page 20-91-1.)

Check the backlash between the gears by moving the frame back and forth at several points throughout 360° of frame rotation. There must be some backlash present.

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

Removal And Installation (Cont'd)

Figure 40-30-13



Installation: Install the cab mounts (Item 1) **[Figure 40-30-13]** on the four corners of the cab.

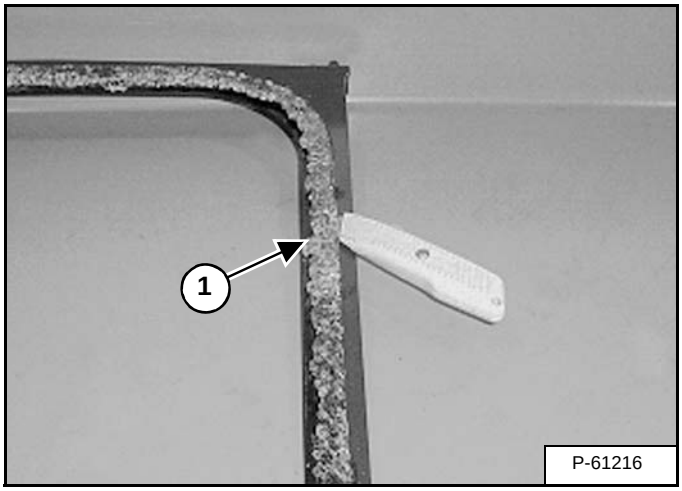
Glass Installation (Cont'd)

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 bumpers for correctly installing the new glass.

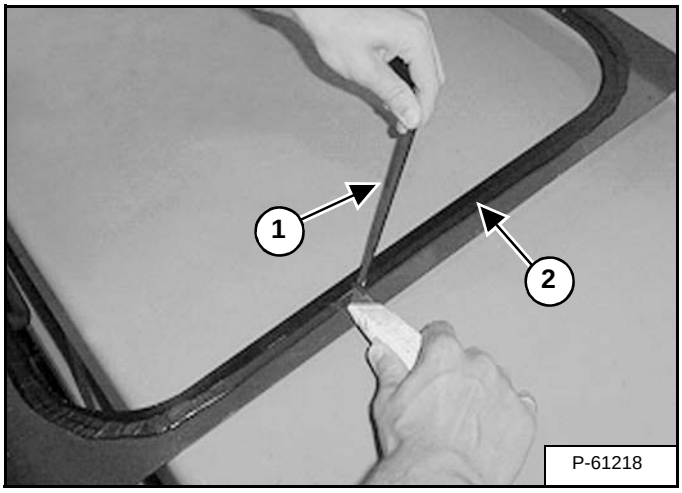
Remove the front window or door that is to be repaired from the excavator.

Figure 40-30-42



Remove the broken glass (Item 1) **[Figure 40-30-42]**.

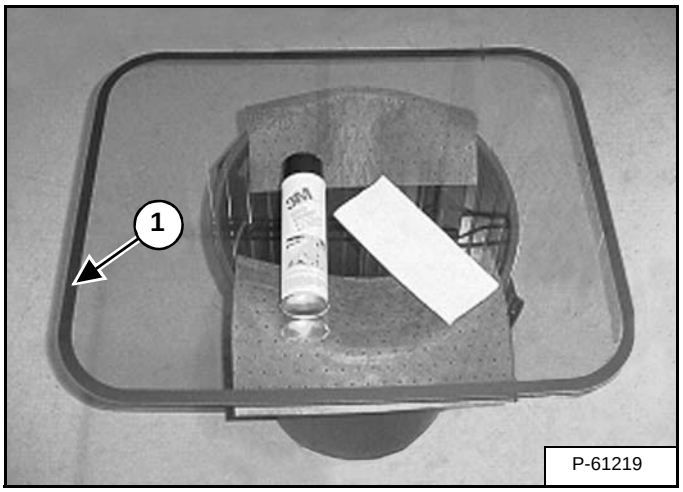
Figure 40-30-43



Cut and remove the old urethane adhesive (Item 1) leaving less than a 0.03 in. (0.79 mm) thick layer (Item 2) **[Figure 40-30-43]** for the new adhesive to bond to.

NOTE: Use care not to scratch the paint on the frame.

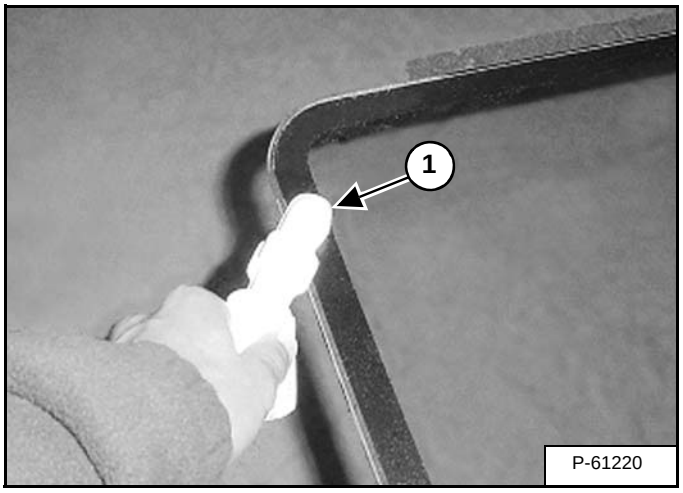
Figure 40-30-44



Place the glass on a flat surface with the painted side of the glass (Item 1) **[Figure 40-30-44]** facing up.

Thoroughly clean the entire glass with glass cleaner.

Figure 40-30-45



Apply one coat of combo primer (Item 1) **[Figure 40-30-45]** on the painted edge of the glass.

Apply the combo primer to any scratches on the door/ front window frame in the area where the glass is installed.

Allow the primer to dry for a minimum of 15 minutes.

Excess primer may be removed from the glass using a razor blade.

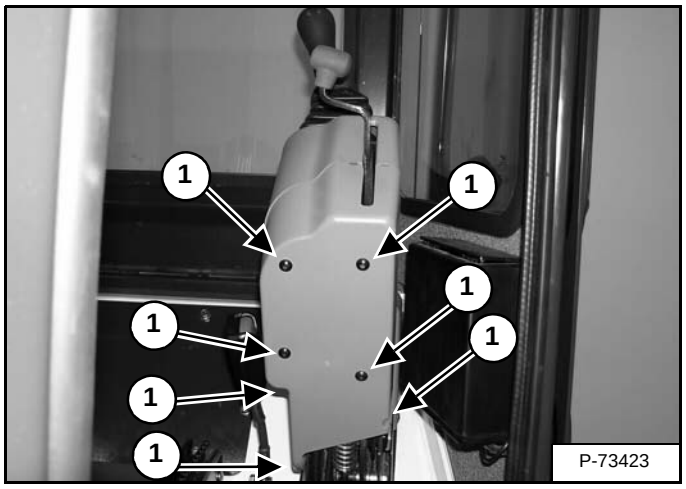
LEFT CONSOLE

Description

An excavator equipped with a canopy or cab, the left console contains a moveable joystick console and a rear console in a cab contains the blower fan and temperature control for the heater.

Joystick Console Cover (Bottom) Removal And Installation

Figure 40-60-1



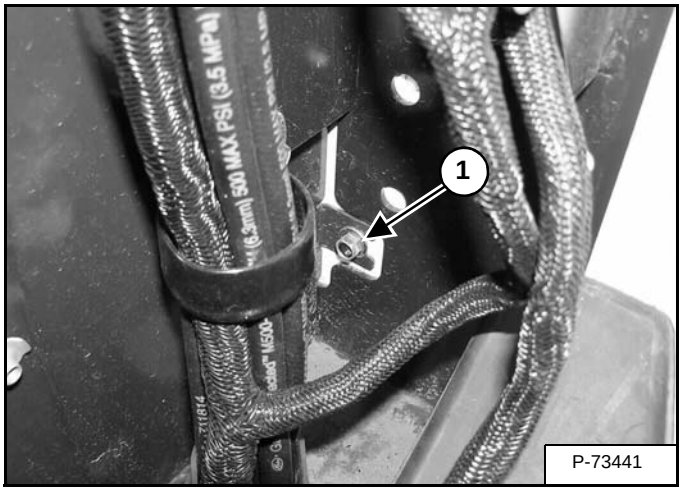
Remove the screws (Item 1) **[Figure 40-60-1]** from the bottom of the console cover.

Remove the bottom of the console cover.

Lower the console.

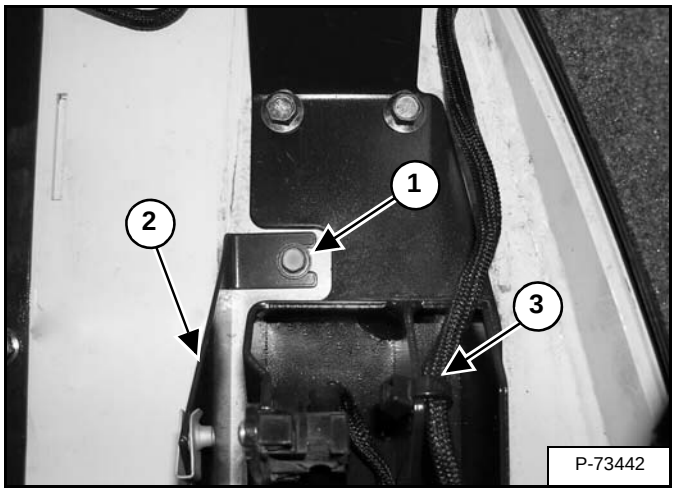
Left Rear Console Frame Removal And Installation (Cont'd)

Figure 40-60-28



Remove the bolt (Item 1) **[Figure 40-60-28]**.

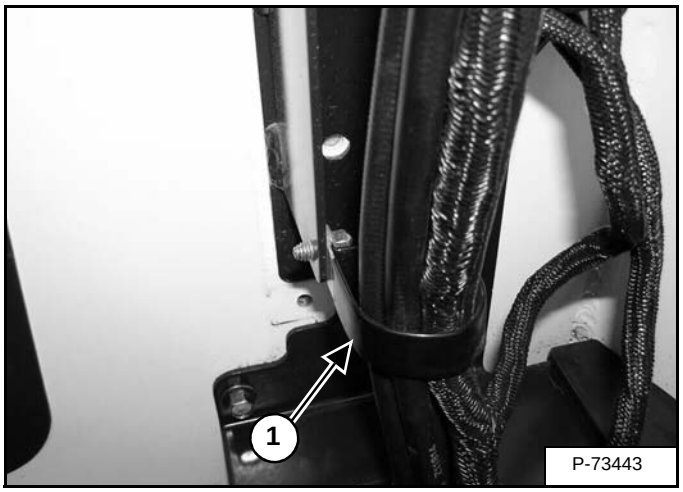
Figure 40-60-29



Remove the bolt (Item 1) the console base cover (Item 2) **[Figure 40-60-29]**.

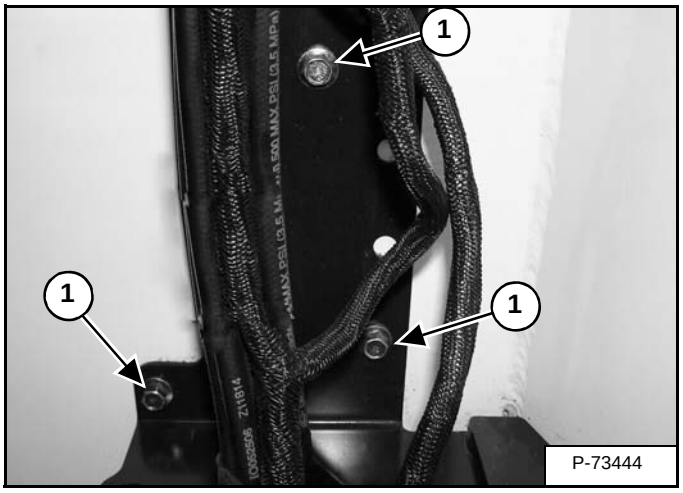
Remove the tie strap (Item 3) **[Figure 40-60-29]**.

Figure 40-60-30



Remove the hose clamp (Item 1) **[Figure 40-60-30]**.

Figure 40-60-31

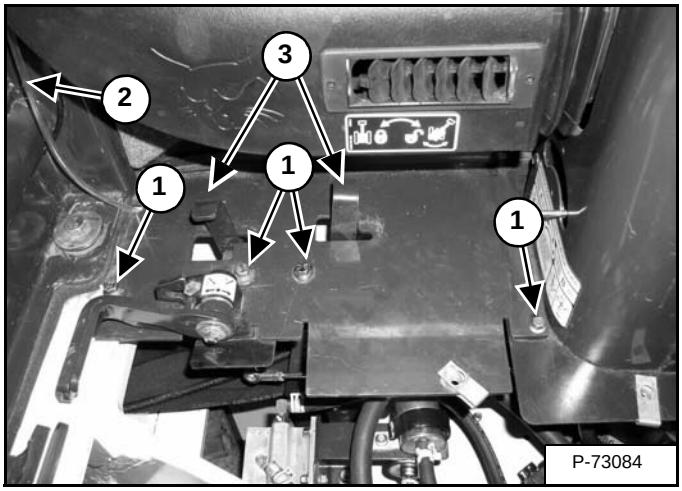


Remove the bolts (Item 1) **[Figure 40-60-31]**.

Removal And Installation (Cont'd)

Right Floor Panel (Cont'd)

Figure 40-90-7

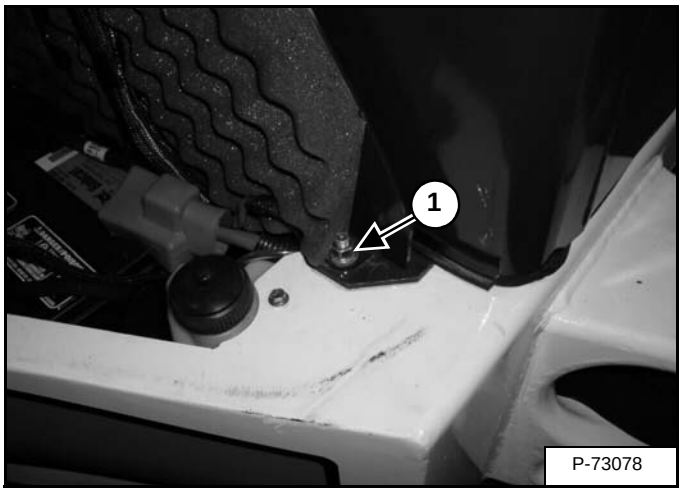


Remove the four mount bolts (Item 1) **[Figure 40-90-7]** from the right floor panel.

Remove the washer hose (Item 2) **[Figure 40-90-7]** from the nozzle and slide down through the floor panel.

Slide the upperstructure slew (Item 3) **[Figure 40-90-7]** lockdown through the floor panel.

Figure 40-90-8



Open the right side cover.

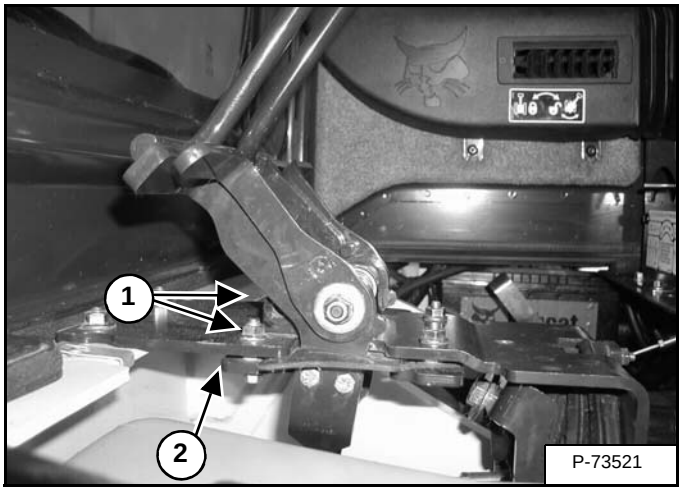
Remove the mount bolt (Item 1) **[Figure 40-90-8]** from the right floor panel.

Remove the right floor panel.

Adjustment (Cont'd)

Reverse Lever Stop:

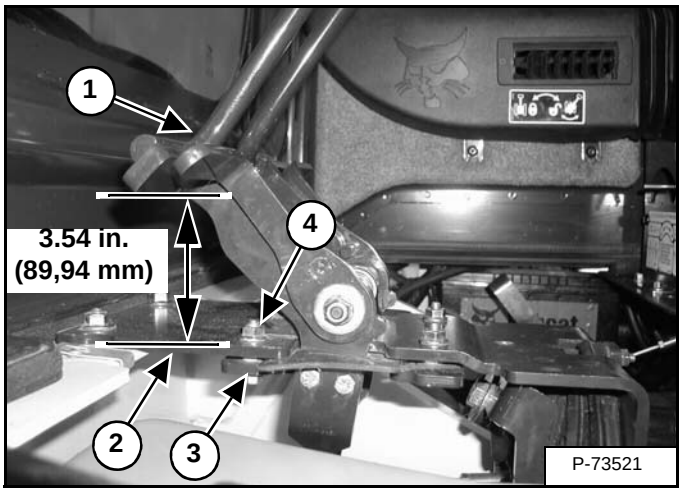
Figure 40-110-14



Loosen the bolts (Item 1) on the front pedal stop (Item 2) **[Figure 40-110-14]**.

Hold both travel levers in the reverse position.

Figure 40-110-15

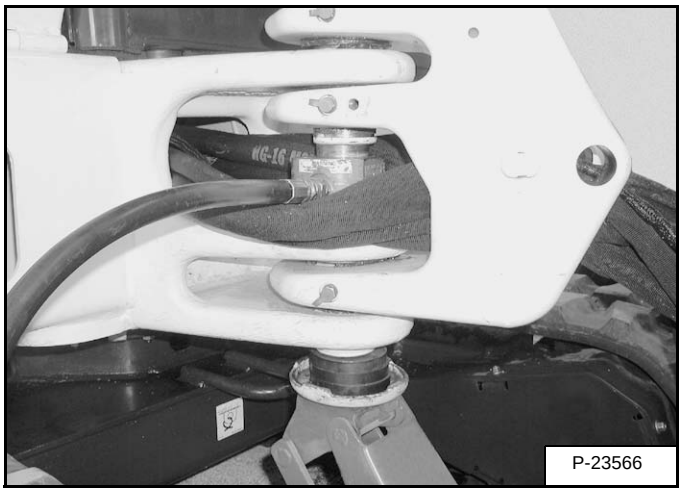


Reverse position is 3.54 in. (89,9 mm) from the travel lever (Item 1) to the top of the pedal mount plate (Item 2) **[Figure 40-110-15]**.

Slide the front pedal stop (Item 3) rearward until it contacts both travel levers. Tighten the bolts (Item 4) **[Figure 40-110-15]**.

Removal And Installation (Cont'd)

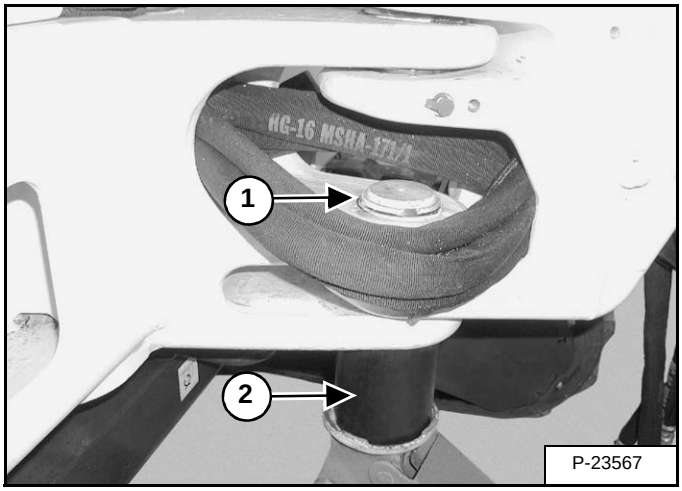
Figure 40-140-6



Support the bottom pin with a jack.

Install a porta-power between the top and bottom pins and press the top pin out **[Figure 40-140-6]**.

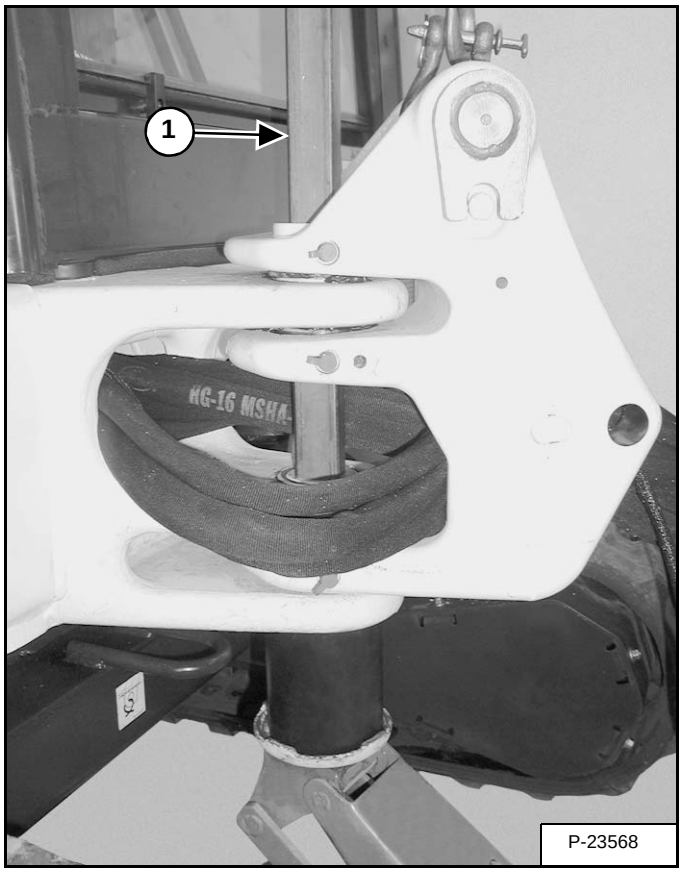
Figure 40-140-7



Remove the snap ring (Item 1) **[Figure 40-140-7]** and washer from the pin.

Install a spacer tube (Item 2) **[Figure 40-140-7]** and jack under the swing frame to support the casting. The spacer tube must be large enough to allow the pin to be driven in the center of the spacer for pin removal.

Figure 40-140-8



Use a large punch (Item 1) **[Figure 40-140-8]** and drive the bottom swing frame pin out.

NOTE: Do not use a porta-power to press out the bottom pin because the top casting cannot be supported and possible damage to the casting could occur.

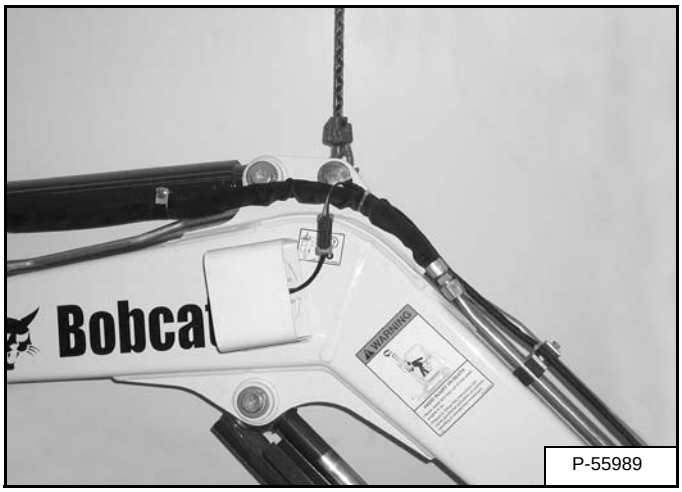
ARM

Description

The arm is the section that is connected to the end of the boom section and the bucket/bucket link.

Removal And Installation

Figure 40-160-1

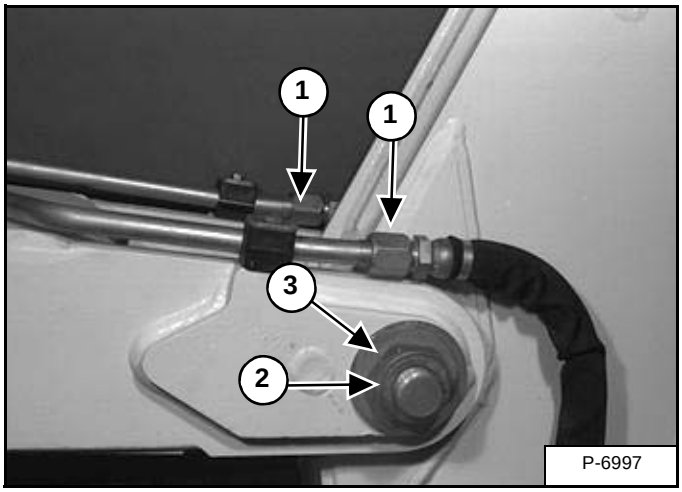


Support the boom **[Figure 40-160-1]**.

Remove the arm cylinder. (See Removal And Installation on Page 20-21-3.)

Support the arm with a chain hoist.

Figure 40-160-2



Disconnect the bucket cylinder hoses (Item 1) **[Figure 40-160-2]**.

Remove the nut (Item 2) **[Figure 40-160-2]** and the washer (Item 3) **[Figure 40-160-2]** from the boom mounting pin.

Installation: Tighten the lock nut until it is seated firmly against the boom. Do not over tighten and deflect the boom mounting plates. The arm must pivot freely.

Remove the arm.

BUCKET (CONT'D)

Removal And Installation (Bolt-On X-Change)

Installation

Use the bolt on X-Change components when installing older attachments that do not have the pin retention provision. Bolt on components are supplied with the excavator and are stored under the right side cover.

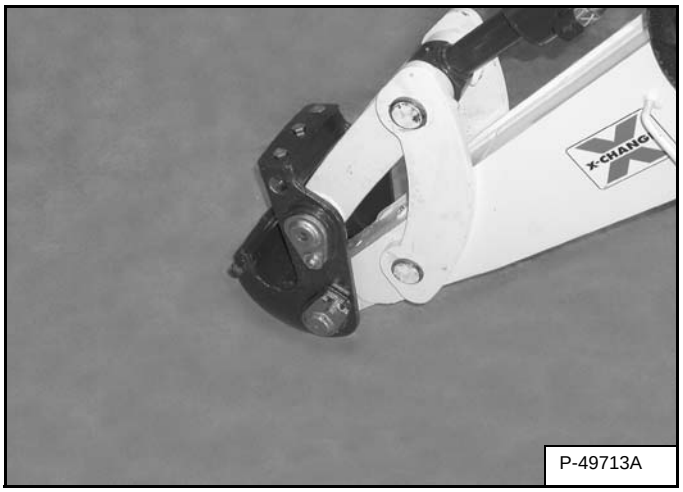
NOTE: Removal and installation of the bucket is shown. The procedure is the same for other attachments. Disconnect any hydraulic lines that are operated by hydraulic power before removing any attachments (breaker, auger, etc.).

⚠ WARNING

Never use attachments or buckets which are not approved by Bobcat Company. Buckets and attachments for safe loads of specified densities are approved for each model. Unapproved attachments can cause injury or death.

W-2052-0500

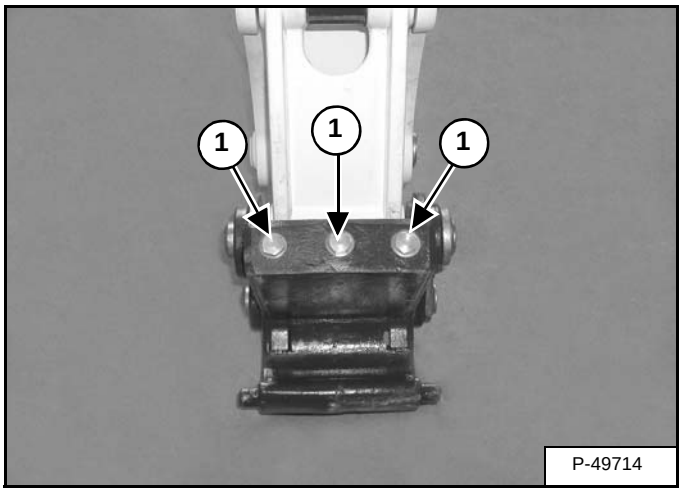
Figure 40-170-12



Fully retract the bucket cylinder and lower the arm to the ground **[Figure 40-170-12]**.

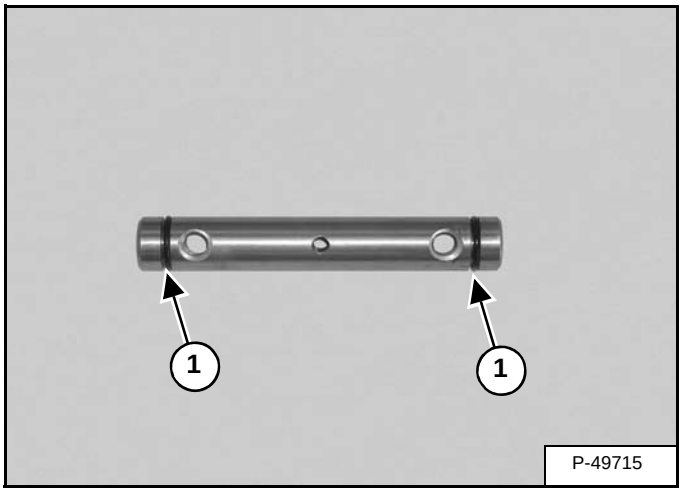
With the engine off, turn the start key to the ON position and move both hydraulic control levers to relieve hydraulic pressure.

Figure 40-170-13



Remove the three plugs (Item 1) **[Figure 40-170-13]**.

Figure 40-170-14



Apply grease to the O-rings (Item 1) **[Figure 40-170-14]**.

TAILGATE

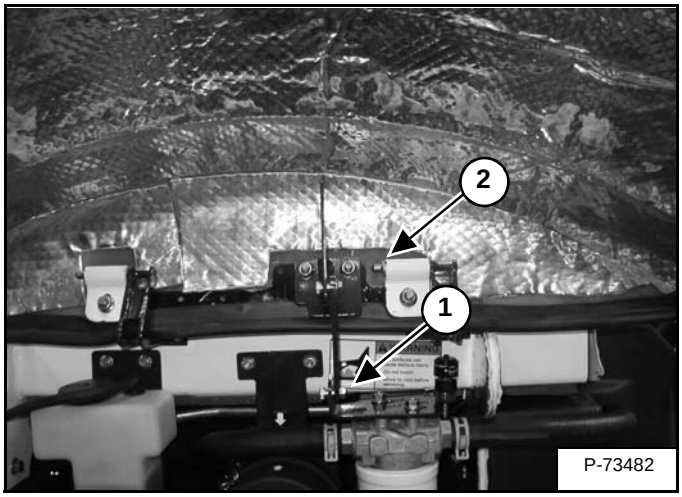
Removal And Installation

Open the tailgate.

Figure 40-180-1

Open the tailgate (Item 1) **[Figure 40-180-1]**.

Figure 40-180-2



Support the tailgate.

Remove the bolt and nut (Item 1) **[Figure 40-180-2]**.

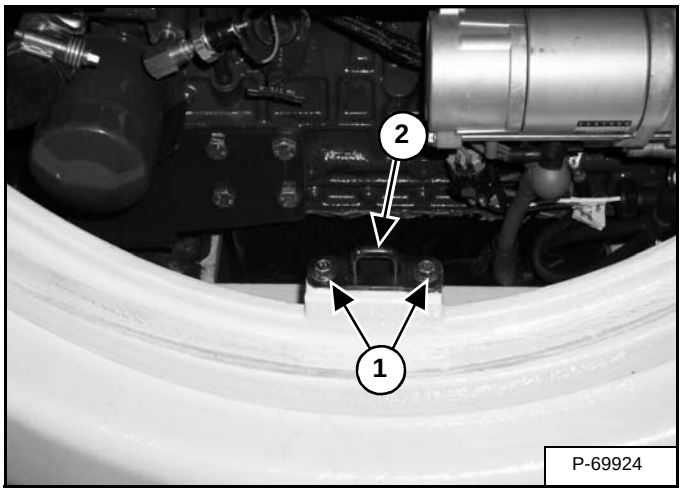
Remove the cotter pin and washer (Item 2) **[Figure 40-180-2]**.

Remove the Tailgate.

Installation: Tighten the nuts (Item 2) to 28 - 30 ft.-lb. (35 - 40 N•m **[Figure 40-180-2]**.

Latch Removal And Installation

Figure 40-180-3

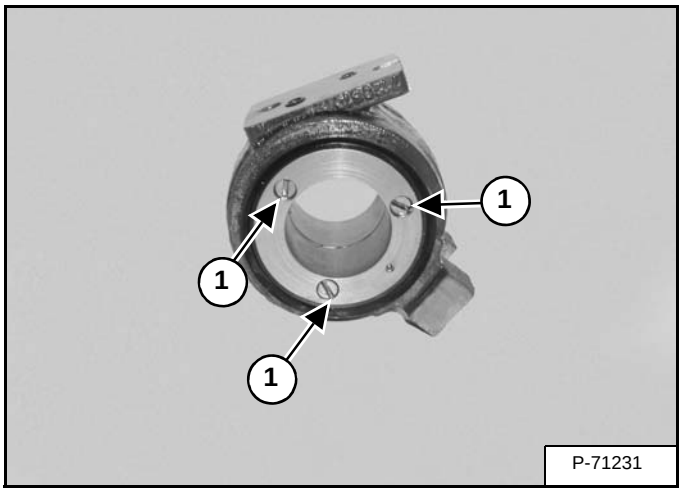


Raise and support the right side cover.

Remove the two bolts (Item 1) and the latch **[Figure 40-180-3]**.

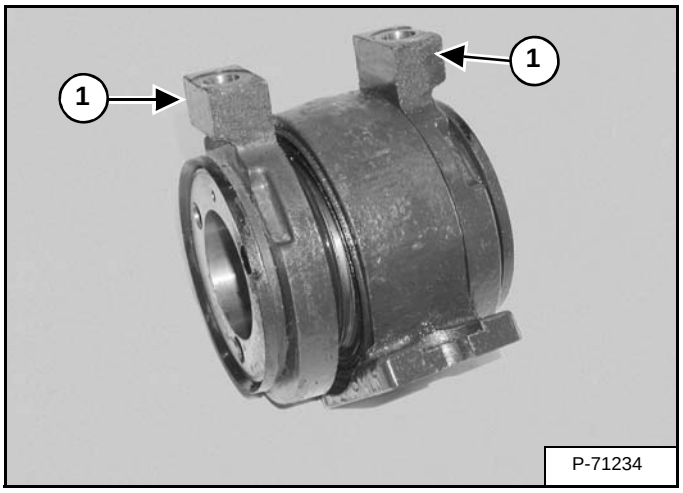
Disassembly (Cont'd)

Figure 40-191-18



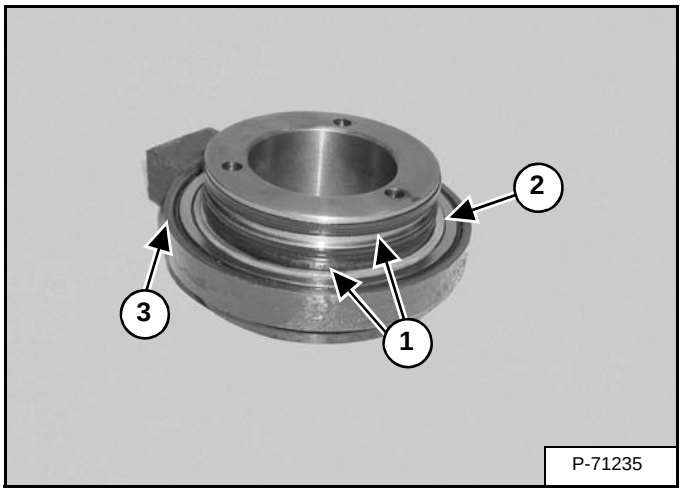
Remove the screws (Item 1) **[Figure 40-191-18]** and nuts from the swivel assembly.

Figure 40-191-19



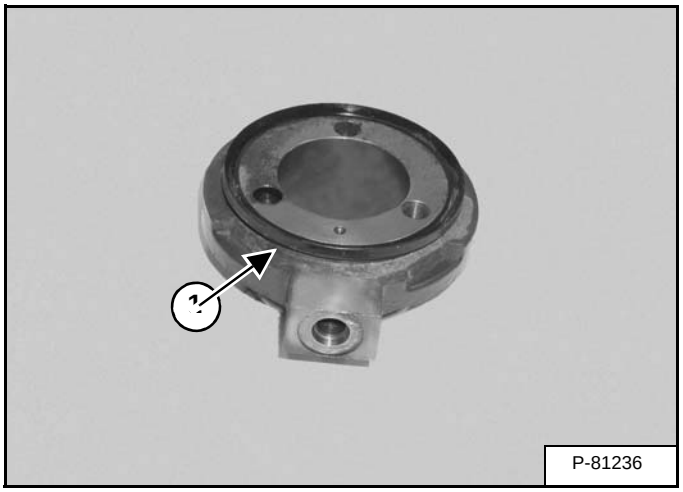
Remove the two swivel ends (Item 1) **[Figure 40-191-19]**.

Figure 40-191-20



Remove the seals (Item 1), wear ring (Item 2) and the O-ring (Item 3) **[Figure 40-191-20]** from the swivel end.

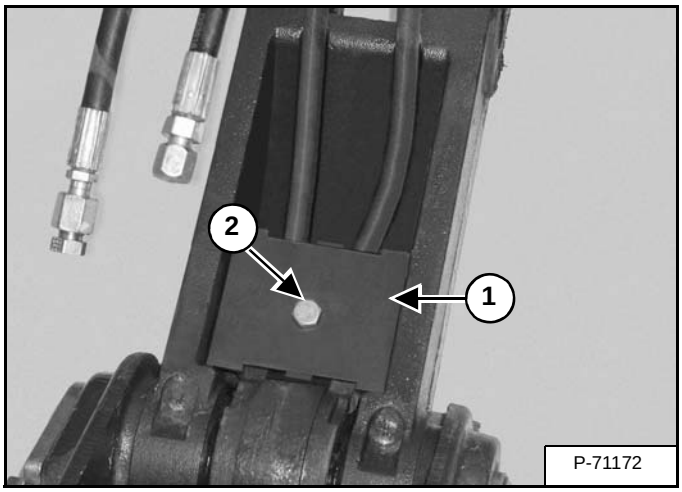
Figure 40-191-21



Remove the dust seal (Item 1) **[Figure 40-191-21]**. (Both swivel ends)

Assembly (Cont'd)

Figure 40-191-58



Install the foam block and cover (Item 1) using the bolt (Item 2) **[Figure 40-191-58]** and nut.

WIRING SCHEMATIC
425 (S/N A1HW11001 AND ABOVE)

(PRINTED NOVEMBER 2006)
V-0853

WIRES CONNECT BY LETTER ACROSS CONNECTORS

SOME CONNECTOR BODIES NOT SHOWN FOR DRAWING CLARITY

BATTERY FEED 1000-1999 RED, RED/WHT, RNG
GROUND 2000-2999 BLK
MONITORING 3000-3999 LBL
HYDRAULIC 4000-4999 LGN
ATTACHMENT CONTROLS 5000-5999 YEL
LIGHTS 6000-6999 PNK
ACCESSORIES 7000-7999 WHT
ENGINE 8000-8999 TAN
COMMUNICATION 9000-9999 PUR

RED = RED
RNG = ORANGE
BLK = BLACK
LBL = LIGHT BLUE
DBL = DARK BLUE
LGN = LIGHT GREEN
DGN = DARK GREEN
YEL = YELLOW
PNK = PINK
WHT = WHITE
BRN = BROWN
TAN = TAN
PUR = PURPLE
GRY = GRAY

CONTROL MODULE CONNECTORS J1-J5

J3: F LFT BOOM, G SENSOR POWER (+8V), D CONSOLE, C HYD TEMP, H SENSOR GROUND, A FUEL SENDER, B HYD FILTER, E SPARE ANG #1
J4: F HYD OIL FILTER, K ENGINE SPEED VR, G ENG OIL PRESS, H, D STARTER STATUS, A ENGINE SPEED HALL, B GLOW PLUG STATUS, J CRANK, C FUEL PULL STATUS, E KEY
J1: K SWITCHED POWER RELAY, G POWER, J FUEL PULL, B FUEL HOLD, C LIGHT, D GROUND, A STARTER, E BATTERY, F BATTERY, H GLOW PLUG
J5: J L SKI UP, H L SKI DOWN, K L SKI SPEED, A CAN LOW, B CAN HIGH, F R POT SIGNAL, E 2 SPEED, G DETENT, D R SKI DOWN, C R SKI UP
J2: K LOAD MOMENT, J PIEZO OUT, G HYD X-CHANGE, E 2 SPEED PWM, C PWM WORKGROUP D37, H WORKGROUP D252 AND D31, D SPARE, A FUEL GAUGE, B FUEL GAUGE, F SPARE 4DEVICES 3DL

LH CONSOLE HARNESS 7130797

FUEL SENDER 20-270 ohm
HORN
CONSOLE SENSOR
LOAD MOMENT (OPTIONAL)
FRAME LIGHT
BEACON SWITCH (OPTIONAL)
WIPER SWITCH (OPTIONAL)
FUEL PUMP
C457, C458, C461, C463, C469, C464, C470, C100

CAB HARNESS 7102833 (IF EQUIPPED)

DOME LIGHT
RADIO CONNECTOR
LEFT SPEAKER
RIGHT SPEAKER
BEACON
WORK LIGHT HARNESS
LEFT WORK LIGHT (OPT)
RIGHT WORK LIGHT (OPT)
WIPER HARNESS 7100772
C624, C625, C626, C627

ENGINE HARNESS 7130796

FUEL SHUT OFF
WHT TO BLK = 0.26 ohm
RED TO BLK = 10.9 ohm
(EARLY MODEL FUEL SHUTOFF ONLY)
FUEL SOLENOID HARNESS 6814830
(LATER MODEL FUEL SHUTOFF)
0.33 OHM
24.5 OHM
GLOW PLUGS 0.4 ohm
SPEED SENSOR (VR)
ENGINE OIL PRESSURE SWITCH
ENGINE COOLANT SENDER 500-3000 ± 30 ohm
STARTER
ALTERNATOR
GROUNDS
C101, C160, C159, C450, C451

TRAVEL ALARM (OPTIONAL)
HYD TEMP SENDER 538-1824 ±30 ohm
HYD FILTER SWITCH
AUX SOCKET
WASHER BOTTLE
BOOM LIGHT HARNESS 6808415
BOOM LIGHT
HEATER
C458, C465, C462, C460, C161

BATTERY

ACD POWER FUSE 4 25A 1320
WIPER POWER FUSE 1 5A 1460
ALT / HEATER FUSE 3 25A 1480
SWITCH POWER FUSE 2 20A 7200
RELAY GROUNDS 2000-2050 ARE CONNECTED IN SERIES
SWITCHED POWER
STARTER
FUEL SHUTOFF
LIGHT RELAY
GLOW PLUG
RADIO MEMORY
RADIO CONN

RIGHT HAND CONSOLE HARNESS 7130798

RIGHT HANDLE
DETENT
PWM
TWO-SPEED (BLADE LEVER)
C456

HYDRAULIC X-CHANGE OPTION CONNECTOR
TWO-SPEED
8 ohm nominal at 12VDC
YELLOW TIE STRAP
BUZZER
C413, C414

WORK GROUP LOCKOUT
8 ohm nominal at 12 VDC
GREEN TIE STRAP
FRONT ROD
6 ohm nominal at 12 VDC
BLUE TIE STRAP
FRONT BASE
6 ohm nominal at 12 VDC
RED TIE STRAP
C415, C419, C418

C455
WHT, DGN, RED
START, RUN, OFF
IGNITION SWITCH

120 ohm
ACD & REMOTE START CONNECTOR
C453

POWER LEADS
GROUNDS
2000, 2330, 2340, 2450, 2480, 2500, 2650, 2710, 2820, 2830, 2940
2100, 2110, 2610, 2740, 2790, 2840, 2930, 2700

15A FUSE 12	STARTER	GLOW PLUGS	LIGHTS	FUEL PULL	25A FUSE 4	25A FUSE 8
20A IGNITION FUSE 11					25A IGN/ACCESS FUSE 3	5A IGN FUSE 7
25A FUSE 10				SWITCH POWER	20A BATTERY FUSE 2	25A BACKUP FUSE 6
25A CONTROLLER FUSE 9					5A SPARE FUSE 1	FUSE 5

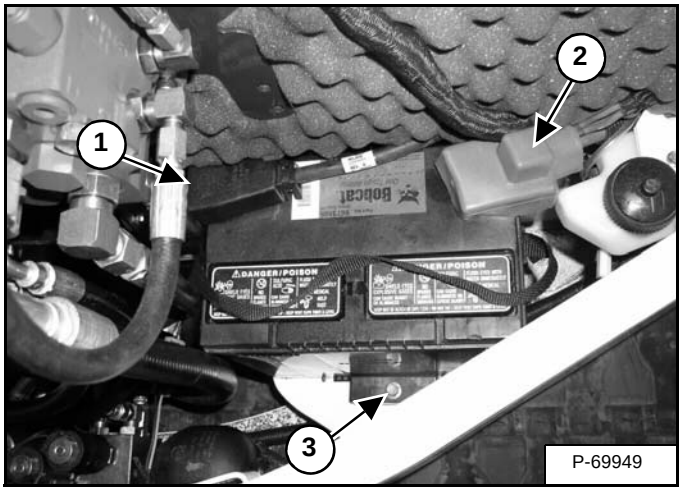
V-0853 (10-23-06)

BATTERY

Removal And Installation

Open the right side cover.

Figure 50-20-1



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

Disconnect the positive (+) cable (Item 2) **[Figure 50-20-1]**.

Remove the bolt (Item 3) **[Figure 50-20-1]** and remove the hold down clamp.

Remove the battery.

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

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

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

⚠ WARNING

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

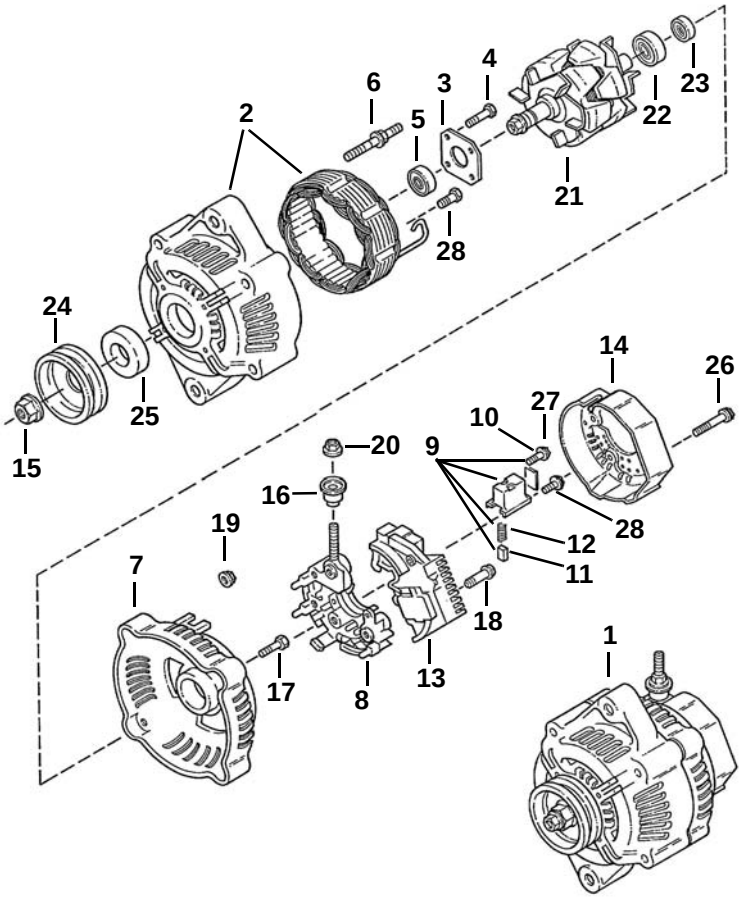
In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

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

W-2065-1296

Parts Identification

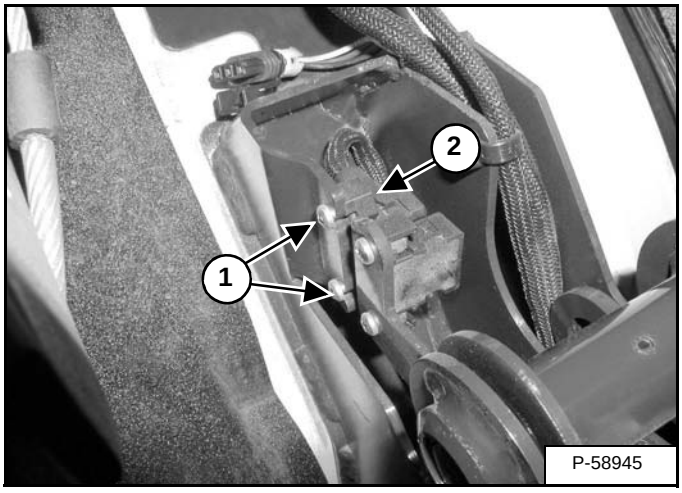
1. Alternator
2. Frame Assy.
3. Plate
4. Screw
5. Bearing
6. Stud
7. Frame End
8. Holder
9. Holder
10. Seal
11. Brush
12. Spring
13. Regulator
14. Cover
15. Nut
16. Insulator
17. Bolt
18. Screw
19. Nut
20. Nut
21. Rotor Assy.
22. Bearing
23. Cover
24. Pulley
25. Spacer
26. Bolt
27. Screw
28. Screw



C-3456

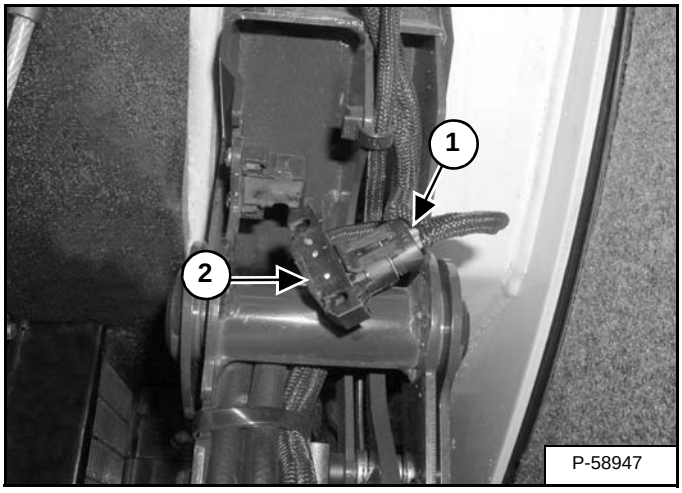
Left Console Magnetic Lockout Sensor Removal And Installation (Cont'd)

Figure 50-60-8



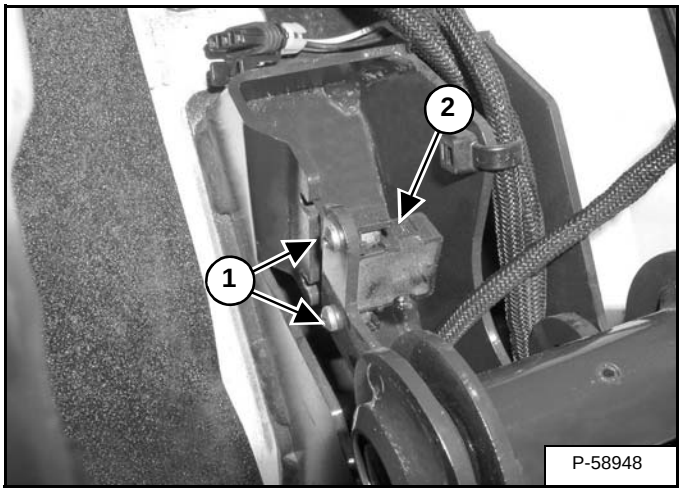
Loosen the screws (Item 1), raise the console, and remove the magnetic lockout sensor (Item 2) **[Figure 50-60-8]** from the frame.

Figure 50-60-9



Disconnect the wire harness (Item 1) from the magnetic lockout sensor (Item 2) **[Figure 50-60-9]**.

Figure 50-60-10



Remove the screws (Item 1) and nuts. Remove the magnet (Item 2) **[Figure 50-60-10]**.

NOTE: When removing the screws from the magnet, the two nuts can fall out of the case.

Specifications (Cont'd)

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.

Valve Springs

Free Length	1.457 - 1.476 in (37 - 37,5 mm)
Allowable Limit	1.437 in (36,5 mm)
Fitted Length	1.220 in (31 mm)
Compress to Fitted Length	26.4 lb. (117,4 N)
Allowable Limit	22.5 lb. (100 N)
Inclination Allowable Limit	0.039 in (1 mm)

Valve Timing

Intake Valve (Open)	14 degrees B.T.D.C.
(Close)	36 degrees A.B.D.C.
Exhaust Valve (Open)	45 degrees B.B.D.C.
(Close)	17 degrees A.T.D.C.

Rocker Arms

O.D. of Rocker Arm Shaft	0.4714 - 0.4718 in (11,973 - 11.984 mm)
I.D. of Rocker Arm	0.4724 - 0.4731 in (12 - 12,018 mm)
Clearance Between Rocker Arm & Shaft	0.0006 - 0.0018 in (0,02 - 0,05 mm)
Allowable Limit	0.0039 in (0,1 mm)

Camshaft

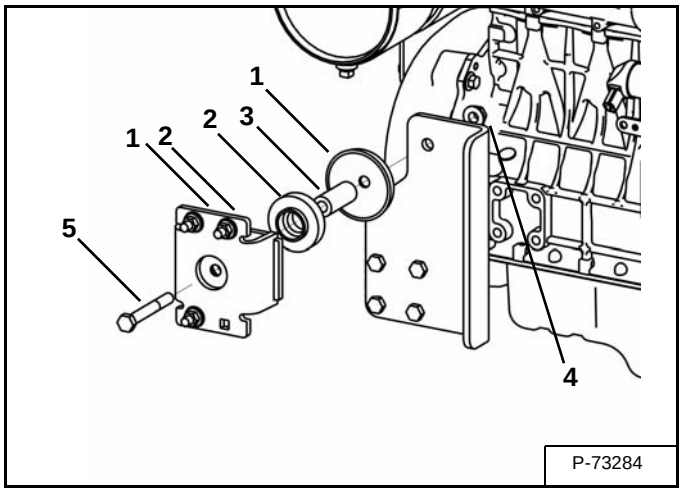
Journal O.D.	1.4147 - 1.4153 in (35,934 - 35,950 mm)
Cylinder Block Bore I.D.	1.4173 - 1.4183 in (36 - 36,025 mm)
Oil Clearance	0.00197 - 0.00358 in (0,05 - 0,091 mm)
Allowable Limit	0.006 in (0,15 mm)
Alignment Allowable Limit	0.0004 in (0,01 mm)
Cam Lobe Height (IN.)	1.1339 in (28,8 mm)
Allowable Limit (IN.)	1.1319 (28,75 mm)
Cam Lobe Height (EX.)	1.1417 in (29 mm)
Allowable Limit (EX.)	1.1398 in (28,95 mm)
End Clearance	0.0028-0.0087 in (0,07-0,22 mm)
Allowable Limit	0.012 in (0,3 mm)

Tappet

Clearance Between Tappet & Guide	0.0008 - 0.0024 in (0,02 - 0,062 mm)
Allowable Limit	0.0028 in (0,07 mm)
Tappet O.D.	0.7858 - 0.7866 in (19,959 - 19,980 mm)
Tappet Guide I.D.	0.7874 - 0.7882 in (20 - 20,021 mm)

Engine Mount Replacement (Cont'd)

Figure 60-10-19



Right front engine mount.

Use the parts shown to install the new engine mount **[Figure 60-10-19]**.

Item 1 - Cup Snubber
Item 2 - Molded Engine Mount
Item 3 - Tube Spacer
Item 4 - Nut
Item 5 - Bolt

Compression - Checking

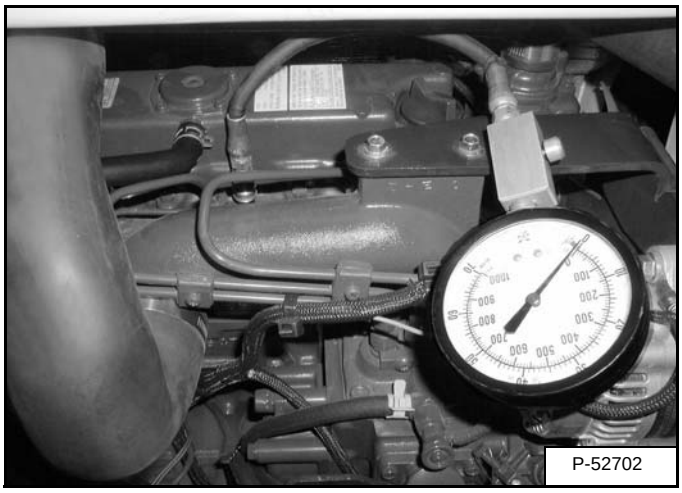
The tools listed will be needed to do the following procedure:

MEL10630 - Engine Compression Kit
MEL 1352 - Compression Adapter

The engine must be at operating temperature.

Remove the glow plugs. (See Glow Plug Removal And Installation on Page 60-80-2.)

Figure 60-10-20



Install the correct compression adapter into the cylinder head **[Figure 60-10-20]**.

Connect the compression gauge **[Figure 60-10-20]**.

Make sure the speed control lever is at low engine idle.

Disconnect the fuel stop solenoid.

Crank the engine with the starter at 200-300 RPM.

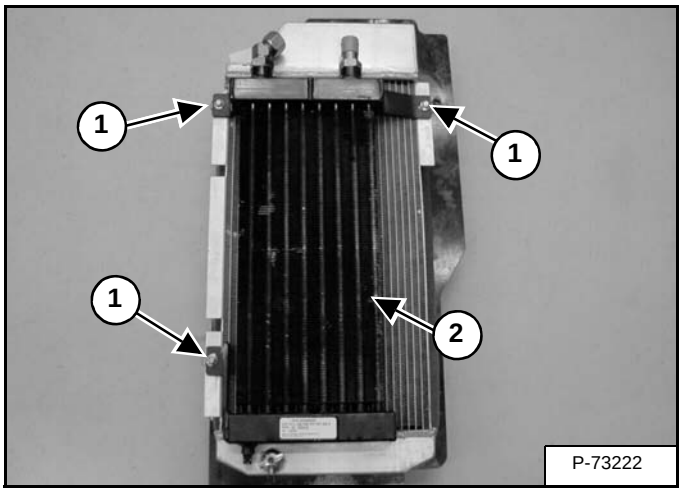
Compression Pressure	412 - 469 PSI (28,4 - 32,3 bar)
Allowable Limit (minimum)	327 PSI (22,5 bar)

The compression must be no lower than the allowable limit, with no more than 10% variance among cylinders.

Connect the fuel stop solenoid.

Radiator Disassembly and Assembly

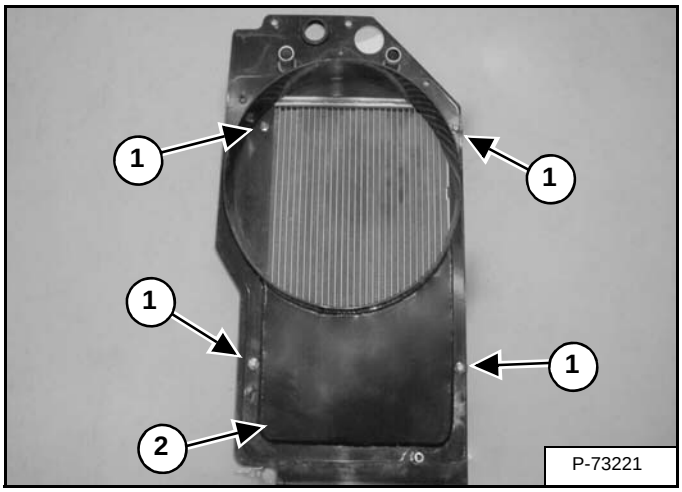
Figure 60-50-8



Remove the three bolts (Item 1) **[Figure 60-50-8]**.

Remove the oil cooler (Item 2) **[Figure 60-50-8]**.

Figure 60-50-9



Remove the four bolts (Item 1) **[Figure 60-50-9]**.

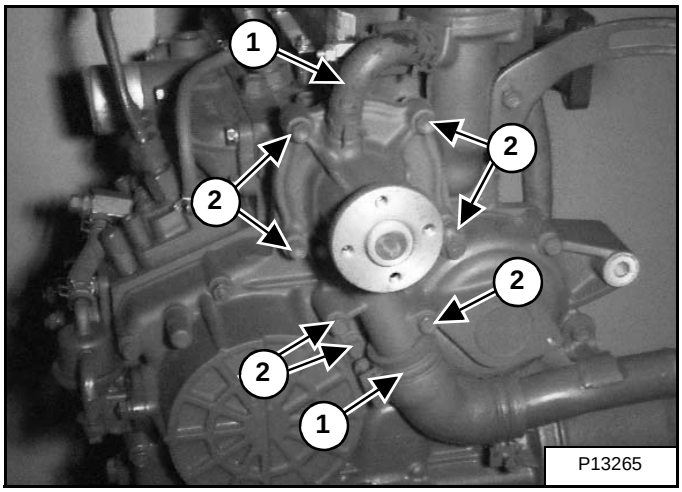
Remove the fan shield (Item 2) **[Figure 60-50-9]** from the radiator.

Water Pump Removal And Installation

Drain the radiator. (See Removing And Replacing Coolant on Page 10-70-3.)

Remove the alternator. (See Removal And Installation on Page 50-30-6.)

Figure 60-50-10



Loosen the clamps and disconnect the hoses (Item 1) **[Figure 60-50-10]** from the water pump.

Remove the seven mounting bolts (Item 2) **[Figure 60-50-10]** from the water pump.

NOTE: The bolts may vary in length. Keep the bolts in their original location.

Remove the water pump from the engine.

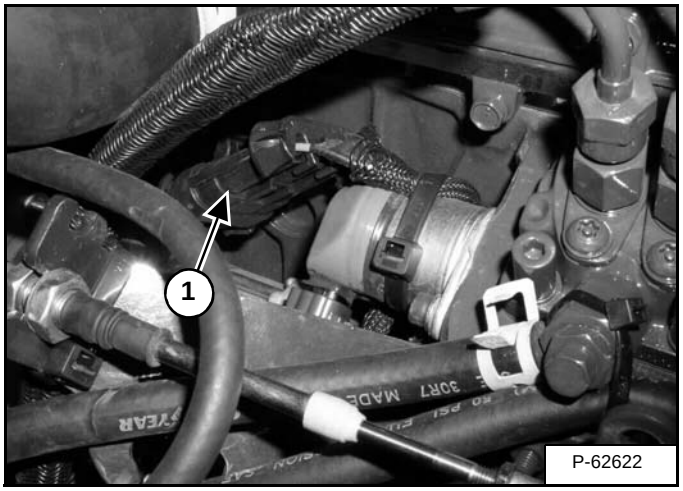
Installation: Always use a new gasket when installing the water pump.

Fuel Shutoff Solenoid Removal And Installation

Remove the rear access panel behind the seat.

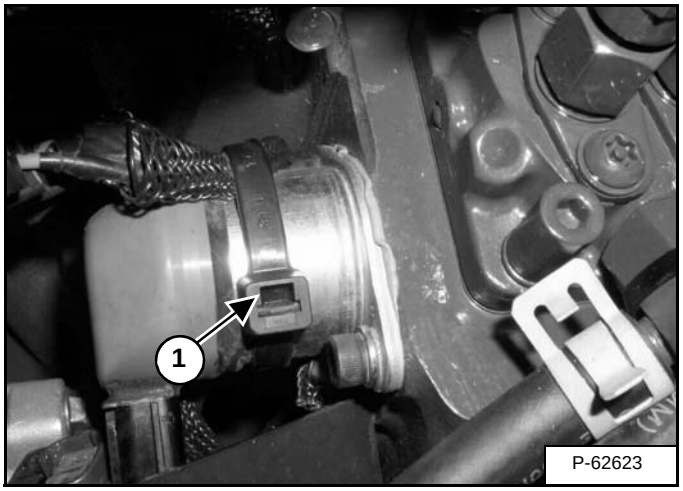
Disconnect the negative (-) cable from the battery.

Figure 60-70-7



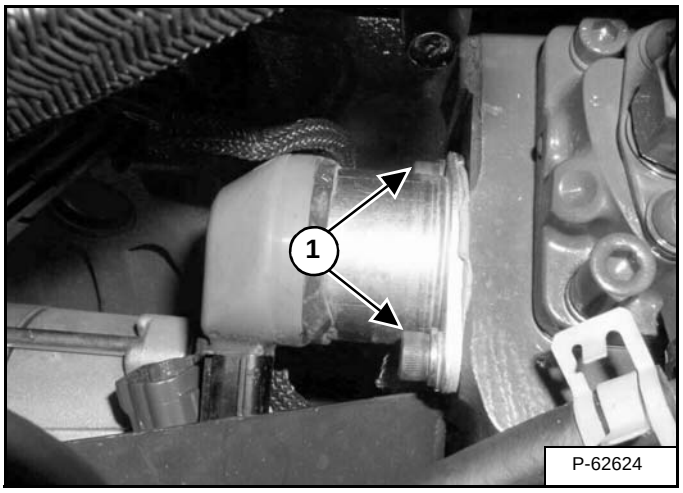
Disconnect the electrical connector (Item 1) **[Figure 60-70-7]** from the fuel shutoff solenoid.

Figure 60-70-8



Remove the tie strap (Item 1) **[Figure 60-70-8]**.

Figure 60-70-9



Remove the two mounting bolts (Item 1) **[Figure 60-70-9]** from the fuel shutoff solenoid.

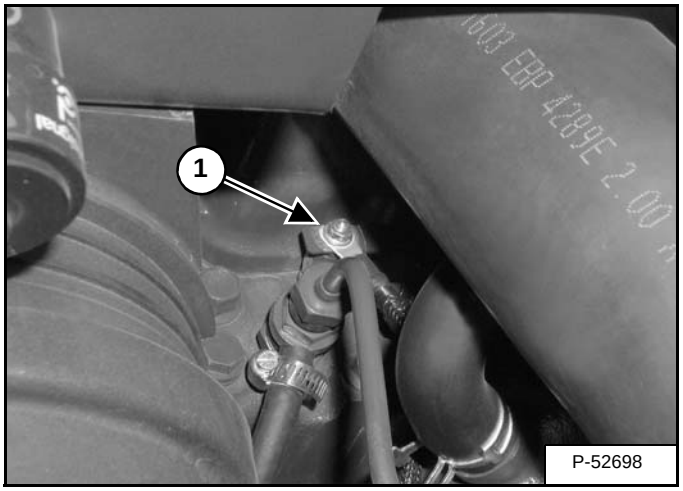
Remove the fuel shutoff solenoid.

CYLINDER HEAD

Glow Plug - Testing

Disconnect the negative (-) cable from the battery.

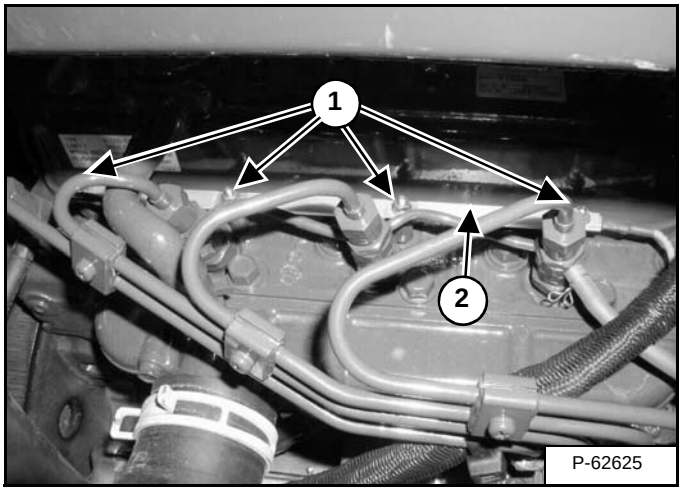
Figure 60-80-1



Disconnect the glow plug cables and leads.

Remove the nut and wire harness (Item 1) **[Figure 60-80-1]**.

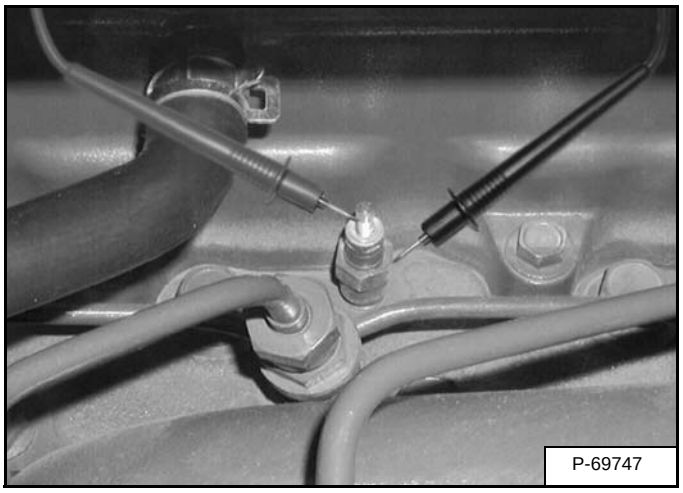
Figure 60-80-2



Remove the nuts (Item 1) **[Figure 60-80-2]** from the top of the glow plugs.

Remove the glow plug connecting strap (Item 2) **[Figure 60-80-2]**.

Figure 60-80-3



Use an ohmmeter to check the glow plugs **[Figure 60-80-3]**.

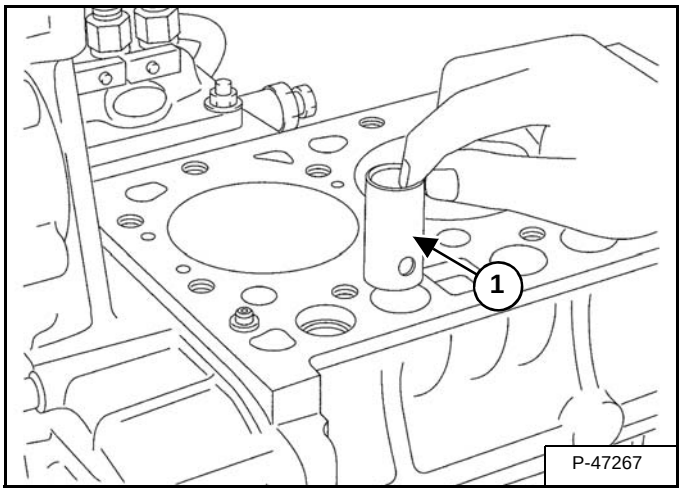
Touch one probe to the end of the glow plug and the other probe to the body of the glow plug.

The reading should be approximately 0.9 ohms. If the resistance is infinite, the coil of the glow plug is broken. If the resistance is 0 the glow plug is short circuited.

Repeat the procedure for each glow plug.

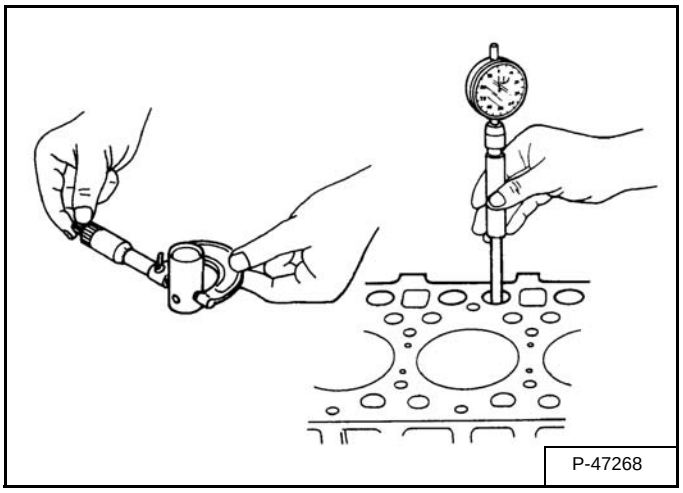
Valve Tappets

Figure 60-80-33



Remove the valve tappets (Item 1) **[Figure 60-80-33]**.

Figure 60-80-34



Measure the O.D. of the tappet **[Figure 60-80-34]**.

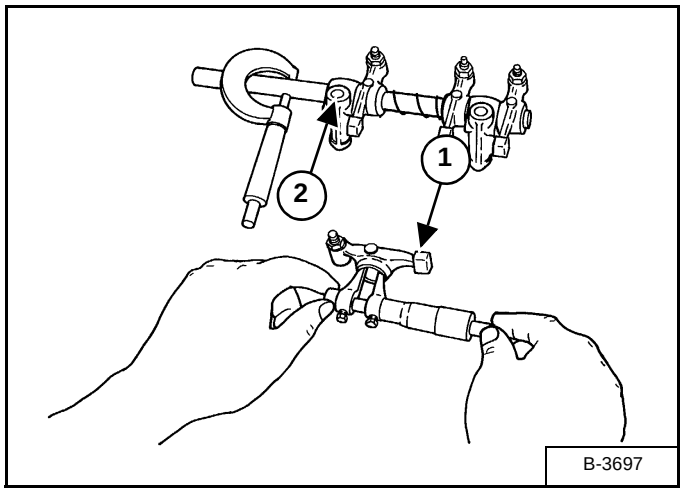
Measure the ID of the tappet bore **[Figure 60-80-34]**.

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

Tappet OD	0.7858 - 0.7866 in. (19,959 - 19,980 mm)
Tappet Bore ID	0.7874 - 0.7882 in. (20 - 20,021 mm)
Clearance Between Tappet and Tappet Bore	0.0008-0.0024 inch (0,02-0,06 mm)
Allowable limit	0.0028 inch (0,07 mm)

Rocker Arm And Shaft - Checking

Figure 60-80-35



Measure the rocker arm I.D. (Item 1) **[Figure 60-80-35]** with an inside micrometer.

Measure the rocker arm shaft O.D. (Item 2) **[Figure 60-80-35]** with an outside micrometer.

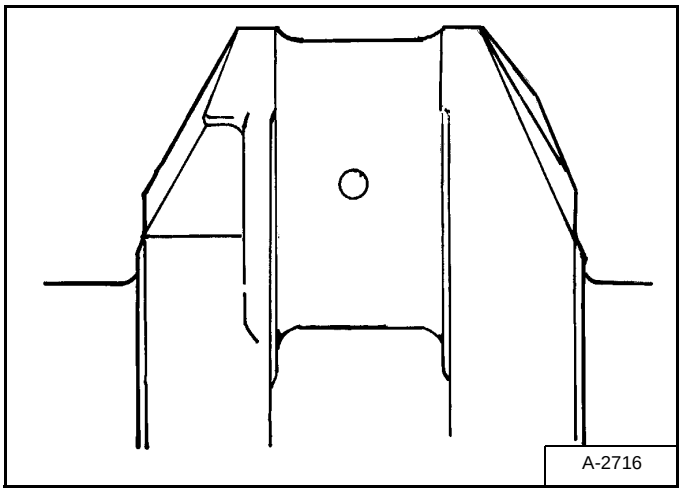
If the clearance exceeds the allowable limit, replace the bushing.

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

Oil Clearance Between Rocker Arm & Shaft	0.0006 - 0.0018 in. (0,016 -0,045 mm)
Allowable Limit	0.004 in. (0,10 mm)
Rocker Arm Shaft O.D.	0.4714 - 0.4718 in. (11,973 - 11,984 mm)
Rocker Arm I.D.	0.4724 - 0.4731 in. (12 - 12,018 mm)

Crankshaft And Bearings - Servicing (Cont'd)

Figure 60-90-25

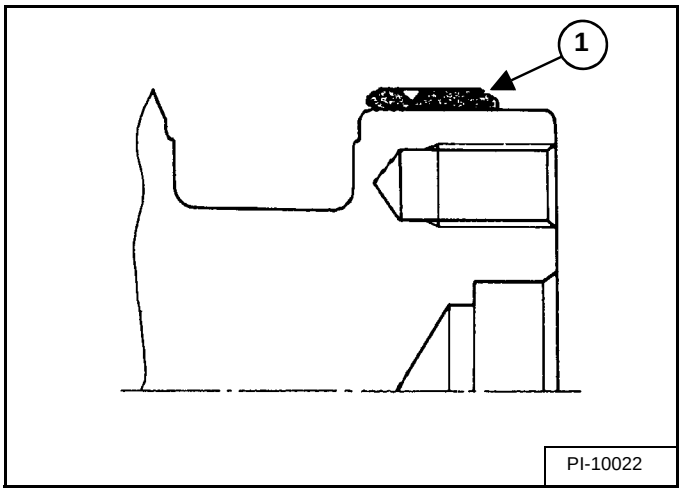


Measure the crankpin O.D. **[Figure 60-90-25]**.

Calculate the oil clearance.

Crankpin Bearing I.D.	1.5750 - 1.5768 in. (40,004 - 40,050 mm)
Crankpin O.D.	1.5732 - 1.5738 in. (39,959 - 39,975 mm)
Oil Clearance	0.0011 - 0.0036 in. (0,029 - 0,091 mm)
Allowable limit	0.0079 in. (0,2 mm)

Figure 60-90-26



Check the wear on the crankshaft sleeve (Item 1) **[Figure 60-90-26]**.

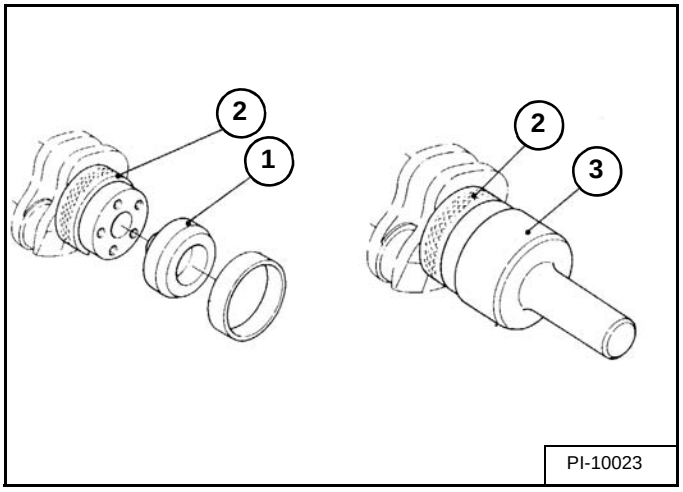
If the wear exceeds the allowable limit or the seal leaks oil, replace the sleeve.

Wear of Sleeve	0.0004 in. (0,1 mm)

The special tool set will be needed to replace the crankshaft sleeve.

Remove the sleeve.

Figure 60-90-27



Install the sleeve guide (Item 1) and stop (Item 2) **[Figure 60-90-27]**.

Heat the sleeve to approximately 300° F (150° C). Install the sleeve on the crankshaft using the special driver tool (Item 3) **[Figure 60-90-27]**.

NOTE: The sleeve is installed with the larger chamfered surface to the front of the crankshaft (Item 1) [Figure 60-90-26 on Page 9].

FLYWHEEL AND HOUSING

Flywheel Housing Removal And Installation

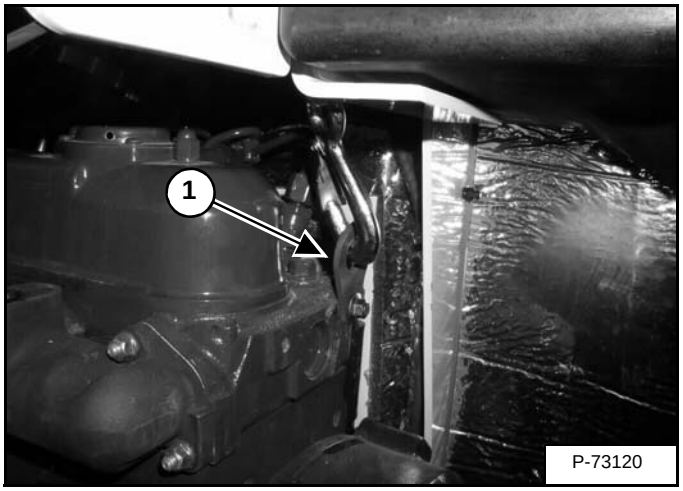
Open the tailgate.

Remove the starter. (See Removal And Installation on Page 50-40-2.)

Remove the hydraulic pump. (See Removal on Page 20-50-5.)

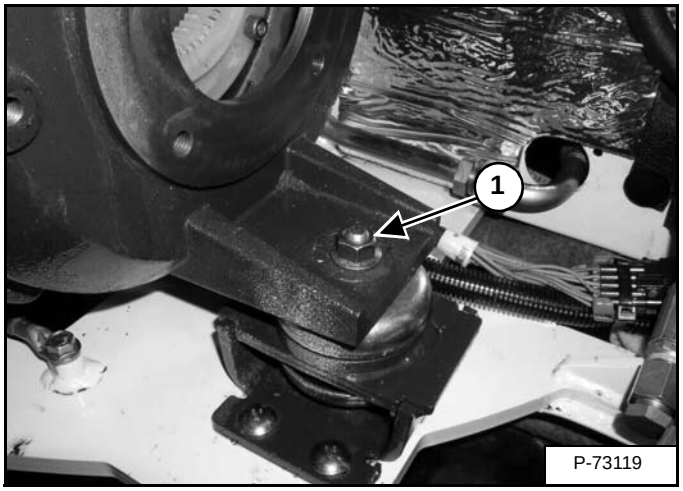
Remove the muffler. (See Removal And Installation on Page 60-30-1.)

Figure 60-110-1



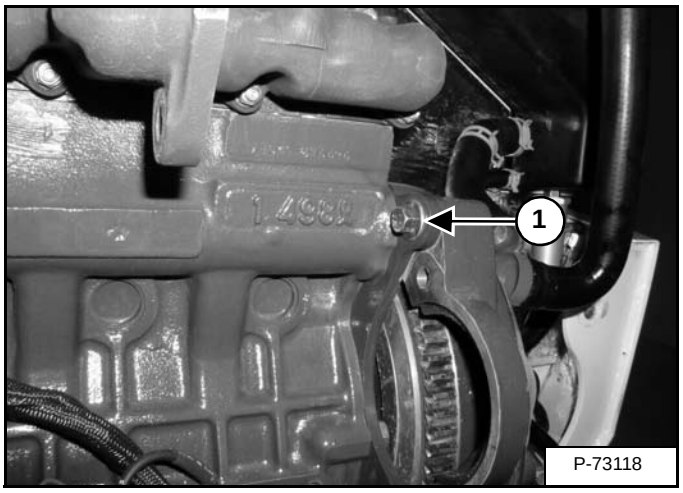
Install a lifting eye (Item 1) **[Figure 60-110-1]** and hoist on the end of the engine.

Figure 60-110-2



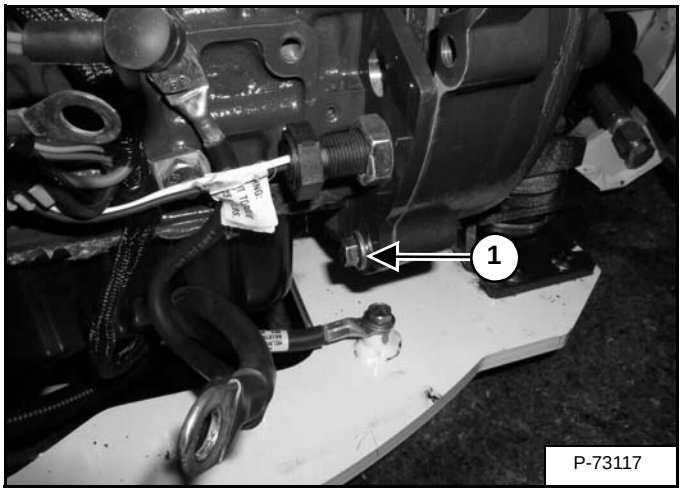
Remove the right side engine mount bolt (Item 1) **[Figure 60-110-2]**.

Figure 60-110-3



Remove the top housing bolts (Item 1) **[Figure 60-110-3]** from both sides of the engine.

Figure 60-110-4



Remove the bottom housing bolts (Item 1) **[Figure 60-110-4]** from both sides of the engine.

TROUBLESHOOTING

Blower Motor Does Not Operate

Possible Cause	Inspection	Solution
1. Blown fuse.	Inspect the fuse/wiring.	Replace fuse/repair wiring.
2. Broken wiring or bad connection.	Check the fan motor ground and connectors.	Repair the wiring or connector.
3. Fan motor malfunction.	Check the lead wires form the motor with a circuit tester.	Replace Motor.
4. Resistor malfunction.	Check resistor using a circuit tester.	Replace Resistor.
5. Fan motor switch malfunction.	Check power into and out of the fan switch.	Replace Fan Switch.

Blower Motor Operates Normally, But Air Flow Is Insufficient

Possible Cause	Inspection	Solution
1. Evaporator inlet obstruction.	Check evaporator for plugging.	Remove obstruction and clean evaporator fins with air or water.
2. Air leak.	Check to make sure air hoses are properly hooked to Louvers, and air ducts.	Repair of adjust.
3. Plugged cab filters	Check cab filter condition.	Clean or replace filters.

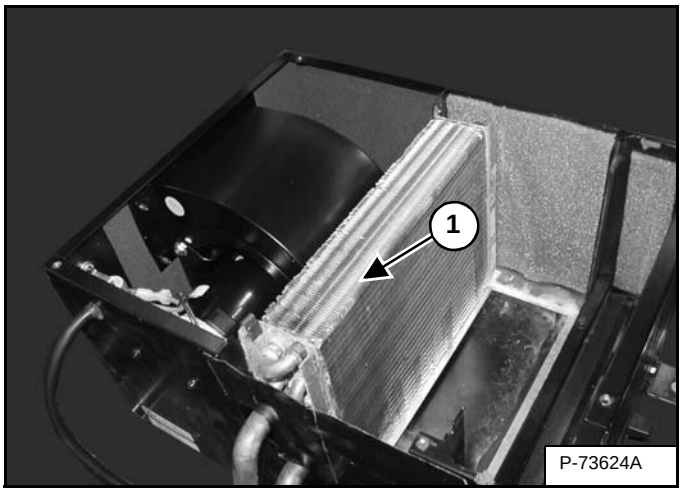
BLOWER FAN

Removal And Installation

Remove the operator seat and seat mount. (See SEAT AND SEAT MOUNT on Page 40-40-1.)

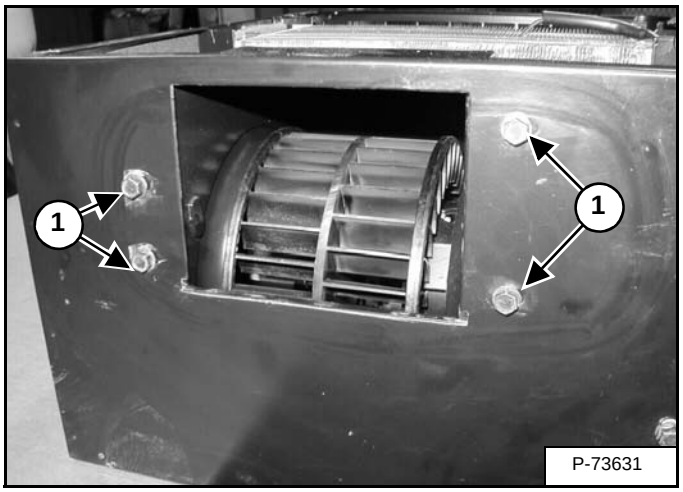
Remove the heater unit. (See Removal And Installation on Page 70-40-1.)

Figure 70-60-1



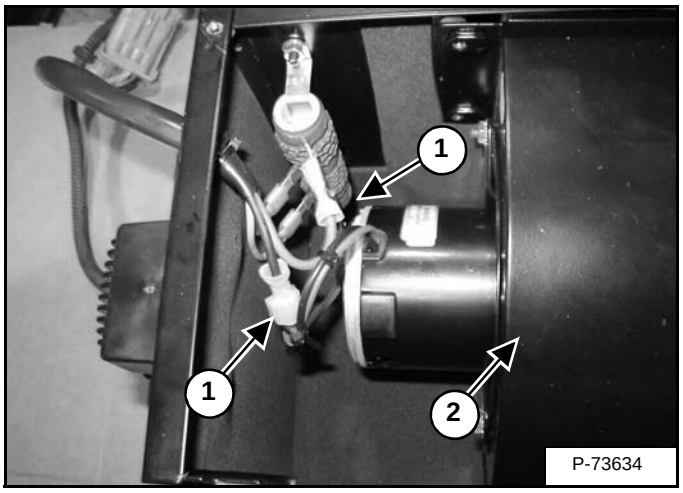
Lift the heater coil (Item 1) **[Figure 70-60-1]** straight up from the heater unit.

Figure 70-60-2



Remove the four bolts (Item 1) **[Figure 70-60-2]** from the blower fan housing.

Figure 70-60-3



Disconnect the wire connectors (Item 1) **[Figure 70-60-3]**.

Remove the blower fan (Item 2) **[Figure 70-60-3]**.

EXCAVATOR SPECIFICATIONS (CONT'D)

Performance

	425	425 With Long Arm Option
Operating weight (Canopy w/ 20 inch Bucket & Rubber Tracks)	5849 lb. (2653 kg)	6257 lb. (2838 kg)
Operating weight (Cab w/ Heater, 20 inch Bucket & Rubber Tracks)	6154 lb. (2791 kg)	6562 lb. (2972 kg)
With Steel Tracks Add	158 lb. (72 kg)	
Travel Speed - 2 Speed	Low - 1.3 mph (2,1 km/hr.) High 2.3 mph (3,7 km/hr.)	Low - 1.3 mph (2,1 km/hr.) High 2.3 mph (3,7 km/hr.)
Digging Force (per ISO 6015) Arm Bucket	 3282 lbf. (14600 N) 5058 lbf. (22500 N)	 2743 lbf. (12200 N) 5530 lbf. (24600 N)
Boom Swing (Offset)	Left 90° - Right 50°	Left 90° - Right 50°

Controls

Steering	Two hand levers or foot pedals
Hydraulics	Two hand operated levers (joysticks) control boom, bucket, arm and upperstructure slew
Auxiliary Hydraulics	Electric switch in right joystick
Auxiliary Pressure Release	Electric switch in right joystick
Engine	Hand lever engine speed, key type start switch
Starting Aid	Glow Plugs - activated by key switch
Brakes Travel Service & Parking Swing Service Holding	 Hydraulic lock in motor circuit Hydraulic lock on motor Locking Pin

Engine

Make/Model	Kubota V1505-IDI-NA
Fuel/Cooling	Diesel / Liquid (Antifreeze mixture)
Horsepower (SAE Net)	26.4 HP (19,7 kW)
Torque @ 1600 RPM (SAE Net)	70.4 ft.lb. (95,5 N•m)
Number Of Cylinders	Four
Displacement	91.4 cu.in. (1,5 L)
Bore / Stroke	3.04 x 3.07 in. (78,0 x 78,4 mm)
Lubrication	Pressure System with Filter
Crankcase Ventilation	Closed Breather
Air Cleaner	Dual dry replaceable paper cartridges
Ignition	Diesel Compression
Low Idle	1350 RPM
High Idle	2520 RPM
Engine Coolant	Propylene Glycol / water mixture (53% PG / 47% water)