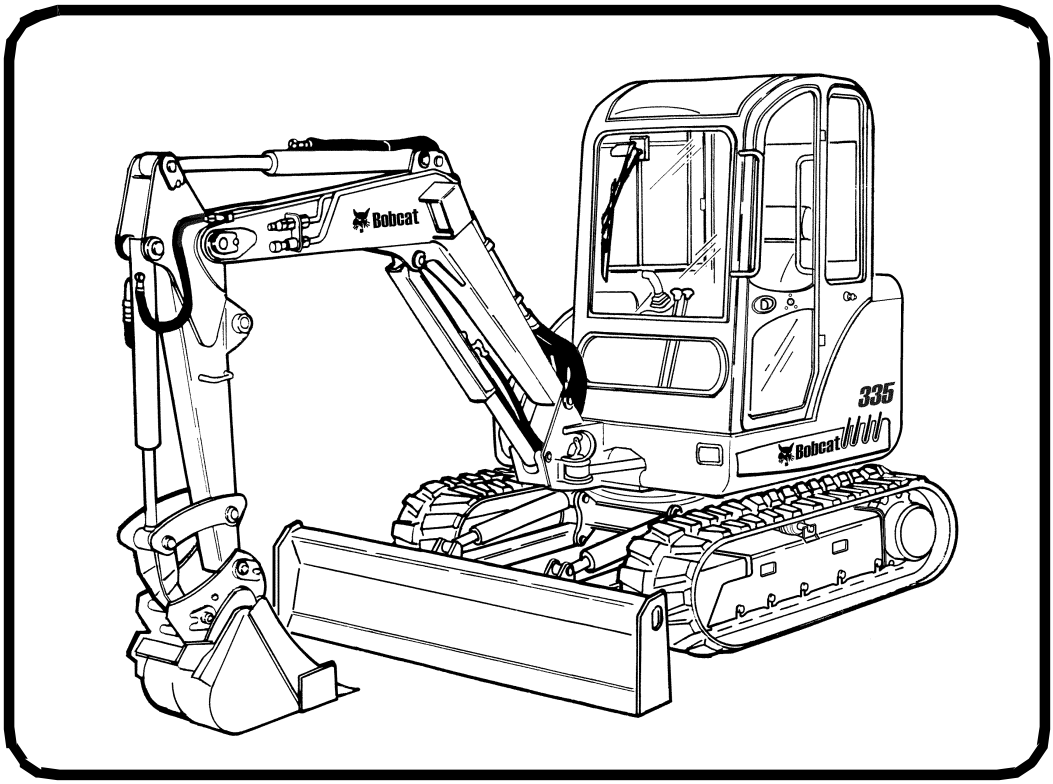
Bobcat®

Service Manual
335 Compact Excavator

S/N A16U11001 & Above



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Printed in U.S.A.

The dealer and owner / operator review the recommended uses of the product when delivered. If the owner / operator will be using the machine for a different application(s) he or she must ask the dealer for recommendations on the new use.

Call Before You Dig
Dial 811 (USA Only)
1-888-258-0808 (USA & Canada)

When you call, you will be directed to a location in your state / province, or city for information about buried lines (telephone, cable TV, water, sewer, gas, etc.).

Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Do not exceed Permissible Exposure Limits (PEL) to silica dust as determined by OSHA or other job site Rules and Regulations. Use a respirator, water spray or other means to control dust. Silica dust can cause lung disease and is known to the state of California to cause cancer.

LIFTING AND BLOCKING THE EXCAVATOR

Procedure

Always park the machine on a level surface.

⚠ WARNING

AVOID INJURY OR DEATH

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

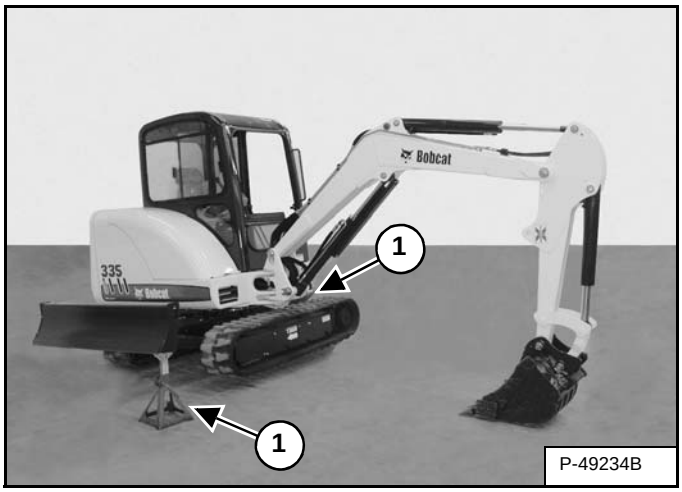
W-2003-0807

⚠ WARNING

Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0286

Figure 10-10-1



Raise one side of the machine (approximately four inches) using the boom and arm **[Figure 10-10-1]**.

Raise the blade fully and install jack stands under the blade and track frame (Item 1) **[Figure 10-10-1]**. Raise the boom until all machine weight is on the jack stands.

Repeat the procedure for the other side.

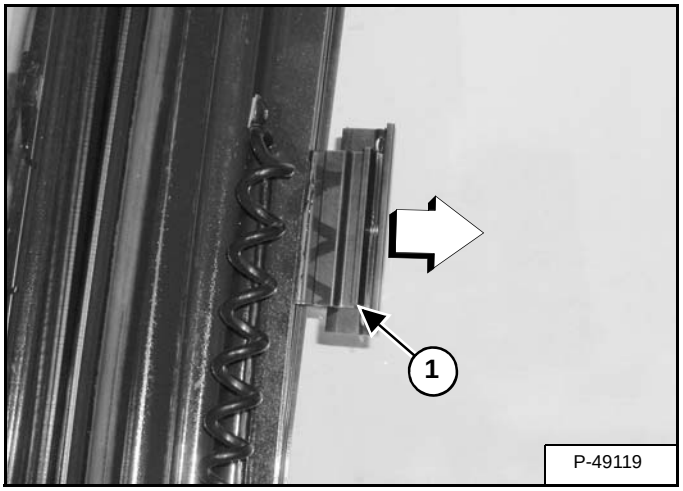
Stop the engine.

NOTE: For machines equipped with angle blade, make sure blade is in the straight position prior to lifting.

Right Side Window (Cont'd)

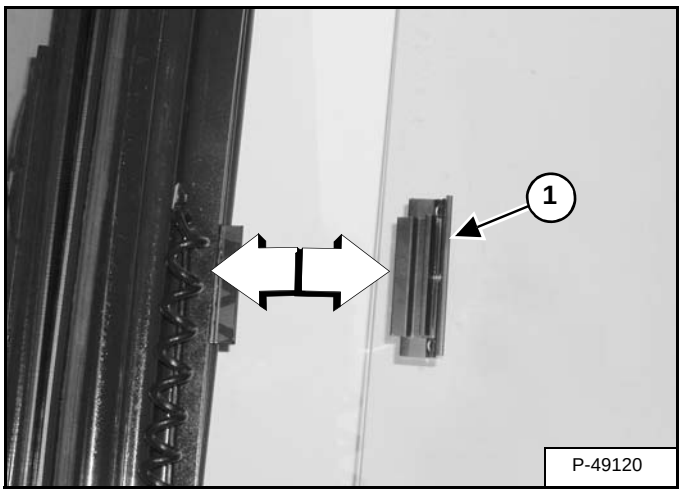
Opening The Right Front Window

Figure 10-20-15



Pull back on the latch / handle (Item 1) **[Figure 10-20-15]**.

Figure 10-20-16



Pull the latch / handle (Item 1) **[Figure 10-20-16]** back to open the window.

Closing The Right Front Window

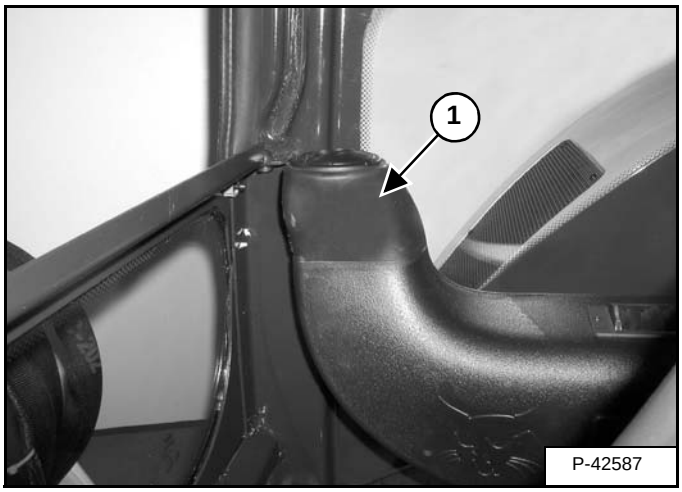
Push the handle forward to close the window.

Heating, Ventilation And Air Conditioning Duct

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

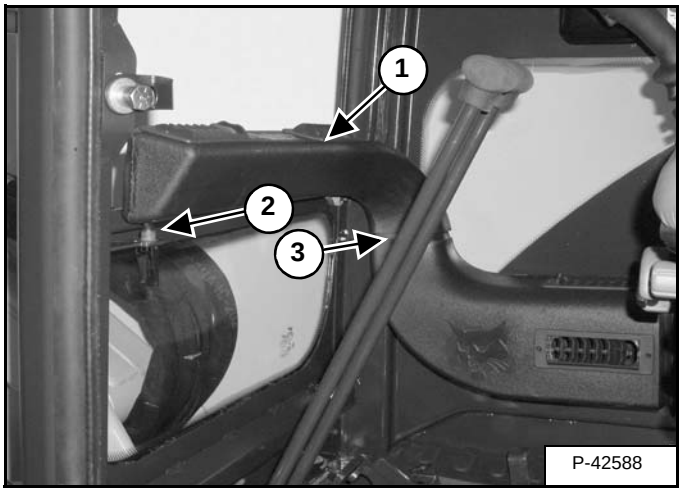
There are two air ducts that the operator can choose to install.

Figure 10-20-17



The small duct (Item 1) **[Figure 10-20-17]** is standard for heater use.

Figure 10-20-18



The large duct (Item 1) **[Figure 10-20-18]** is standard for models that have air conditioner available.

NOTE: This duct (Item 1) [Figure 10-20-18] can be removed for improved operator visibility.

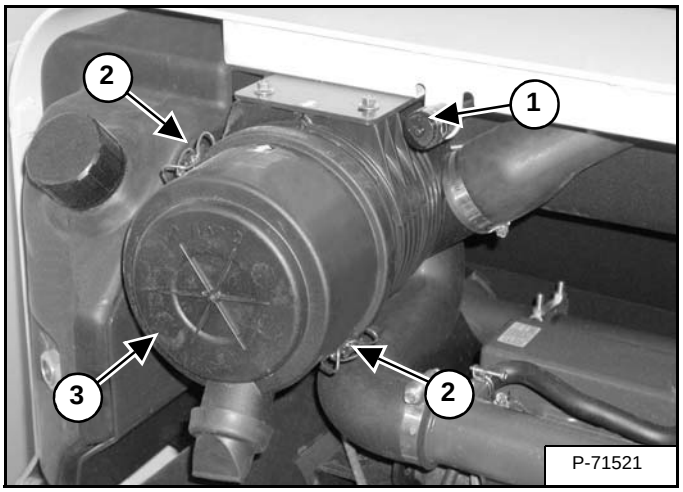
AIR CLEANER SERVICE

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 (See TAILGATE on Page 10-40-1.) to access the air cleaner for service.

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.

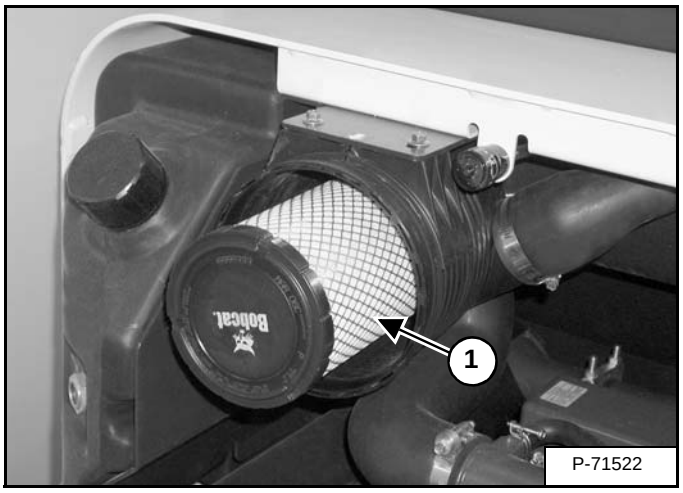
Replacing Filter Elements

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



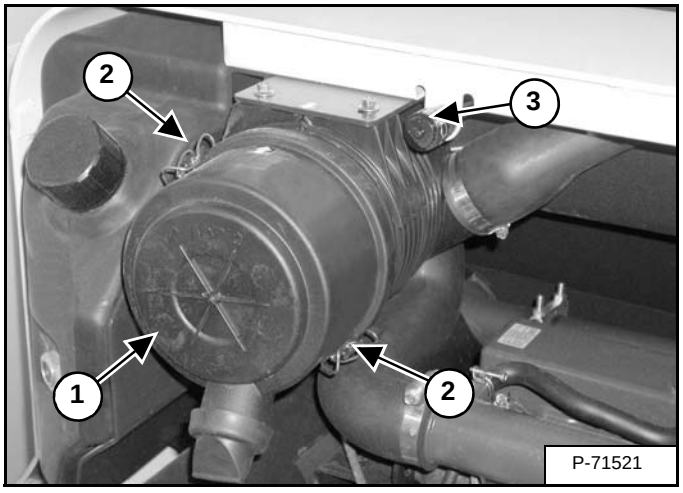
Pull the outer filter (Item 1) **[Figure 10-60-2]** from the air cleaner housing.

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.

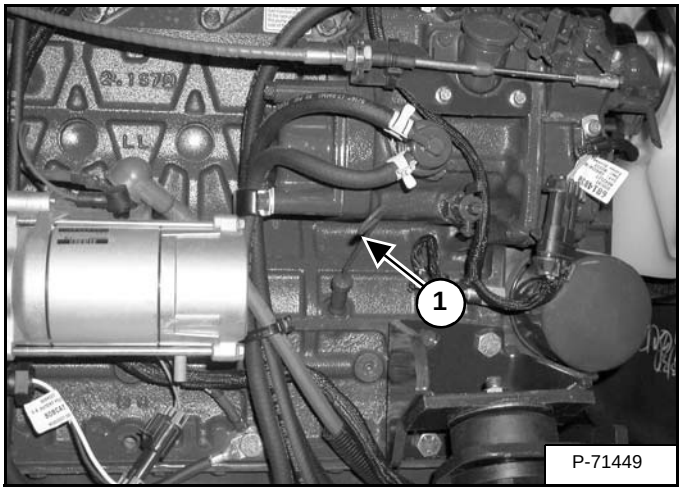
After the outer filter has been replaced, press the button (Item 3) **[Figure 10-60-3]** on the end of the condition indicator and start the engine. Run at full RPM, then reduce engine speed and stop the engine. If the red ring shows in the condition indicator, replace the inner filter.

ENGINE LUBRICATION SYSTEM

Checking And Adding Engine Oil

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

Figure 10-90-1



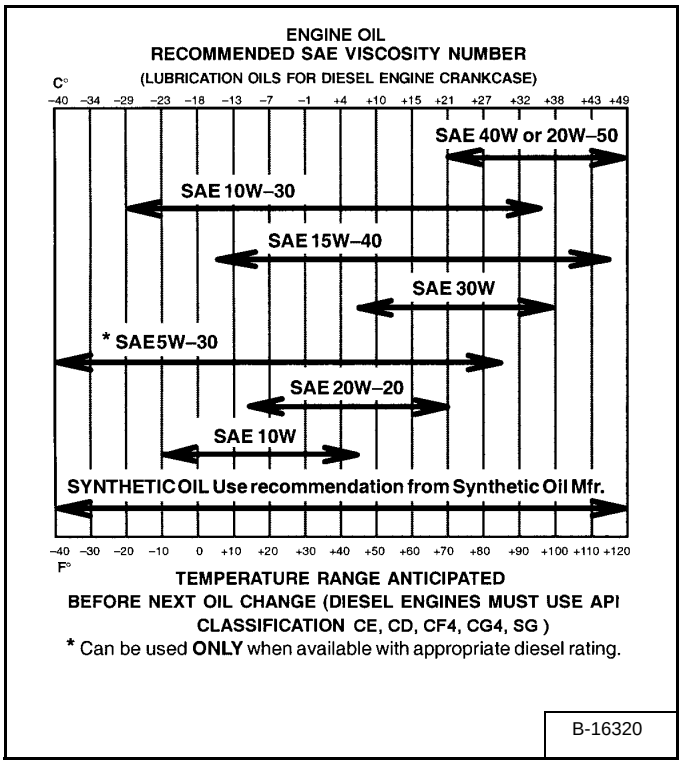
Open the tailgate and remove the dipstick (Item 1) **[Figure 10-90-1]**.

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



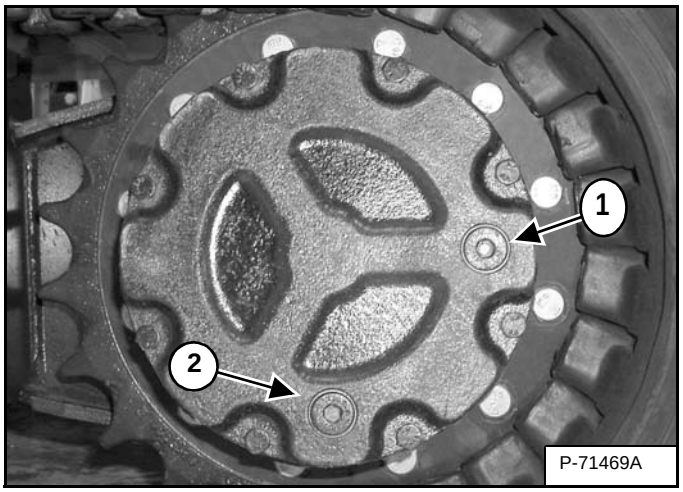
Use a good quality motor oil that meets the correct API Service Classification **[Figure 10-90-2]**.

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 (Item 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-10-5.)

Removing And Replacing Oil

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

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

⚠ WARNING

AVOID INJURY OR DEATH

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

W-2103-0508

Install the 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-10-5.)

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 extended 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.

335 HYDRAULIC/HYDROSTATIC SCHEMATIC
S/N A16U11001 – A16U11490

(PRINTED MARCH 2007)
V-0847legend

LEGEND

1. HYDRAULIC RESERVOIR: Pressurized with Fill Strainer
   Reservoir Capacity . .38.8 qt. (29.9 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. HYDRAULIC FILTER - with By-Pass
   Element - 40 Micron
   By-Pass - 40 PSI (2.76 bar)
6. SHUTTLE VALVE - 2 Speed (2)
7. VALVE - 2 -Speed (2)
8. SHUTTLE VALVE - 2 Speed (2)
9. RESTRICTOR
10. DRIVE MOTOR SHUTTLE - With restrictors (2)
11. SHUTTLE RELIEF:
    4060 PSI (280 bar) With restrictors
12. RESTRICTOR
13. HYDRAULIC PISTON PUMP . . . . . .
    Maximum Displacement:
    29.7 GPM (112.4 L/min.) at High Engine RPM
    Minimum Displacement:
    5.0 GPM (19 L/min.) at High Engine RPM
14. TORQUE LIMITER SUPPLY SPOOL -
    290 PSI (20 bar)
15. PUMP MARGIN SPOOL -
    220 PSI (15,2 bar)
16. TORQUE LIMITER
17. DESTROKE PISTON
18. DIAGNOSTIC PORT - Load Sense
19. BUILD-UP VALVE: 105 PSI (7,2 bar)
20. DIAGNOSTIC PORT
21. LOAD CHECK - (Two per Section - 14 Total - Only 7 Shown)
22. PRESSURE REDUCING VALVE
    435 PSI (30 bar)
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Work group 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 - "B" PORT - Travel Pilot Pressure
30. TEST PORT - "P1" PORT
31. LOAD SENSE RELIEF VALVE
    3625 PSI (250 bar)
32. LOAD SENSE BLEED CARTRIDGE:
    0.185 GPM (0,70 L/min)
33. FLUSHING VALVE: 360 PSI (24,8 bar)
34. COMPENSATOR (Slew, Travel, Blade, Bucket, Arm, Boom, Offset & Auxiliary)
35. PORT RELIEF VALVE - (Auxiliary Pressure Port: 3000 PSI (207 bar)
36. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Auxiliary Return Port: 3000 PSI (207 bar)
37. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Boom Cylinder) 4200 PSI (290 bar)
38. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (Boom Cylinder) 4200 PSI (290 bar)
39. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (ARM Cylinder) 4200 PSI (290 bar)
40. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (ARM Cylinder) 4200 PSI (290 bar)
41. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (BUCKET Cylinder) 4200 PSI (290 bar)
42. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (BUCKET Cylinder) 4200 PSI (290 bar)
43. PORT RELIEF VALVE (With Anti-Cavitation Valve) - (BLADE Cylinder) 3770 PSI (260 bar)
44. ANTI-CAVITATION VALVE (2)
45. CROSS PORT RELIEF VALVES - 2 STAGE (2): 2250 PSI (146 bar) at High Engine RPM
46. RELIEF VALVE - SECOND AUXILIARY (2) - (Optional): 1500 PSI (103 bar)
47. LOAD CHECK VALVE
48. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - Second Auxiliary
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Second Auxiliary
50. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - Second Auxiliary
51. RESTRICTOR - 0.108 inch (2,7 mm)
52. RESTRICTOR - 0.083 inch (2,1 mm)
53. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
54. CHECK VALVE 80 PSI (5,5 bar)
55. CHECK VALVE – Load Sense
56. ORIFICE - 0.025 inch (0,64 mm)
57. FILTER – Hydraulic X-Change Valve

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

Troubleshooting The Swing (Upperstructure Slew) Circuit

TROUBLESHOOTING THE SWING (UPPERSTRUCTURE SLEW) CIRCUIT		
PROBLEM	**CAUSE**	**CORRECTION**
Slew not operating	Control console raised Control console lock out switch incorrectly adjusted or defective	Lower control console. Readjust or replace
	Slew lock pin engaged	Disengage lock pin
	Joystick manifold pressure reducing valve defective	Repair or replace
	Slew motor gear defective	Repair or replace
	Joystick internal leakage excessive	Repair or replace
	Slew motor defective	Repair or replace
Slew force	Main relief valve set too low	Readjust or replace
	Slew motor relief valve pressure too low	Readjust or replace
Slew speed too low	Pump flow low	Check, repair or replace
	Blocked or restricted line to slew motor	Replace
	Joystick internal leakage excessive	Repair or replace
	Control valve internal leakage excessive	Repair or replace
	Slew motor internal leakage excessive	Repair or replace
Slew over run excessive	Control valve spool sticking	Repair or replace
	Joystick spool sticking	Repair or replace
	Slew motor relief valve set too low	Repair or replace
	Slew motor internal leakage excessive	Repair or replace
Slew motor seal leakage	Case drain line plugged	Replace

Assembly

Clean all parts in solvent and dry with compressed air.

Inspect the cylinder parts for wear or damage. Replace any worn or damaged parts.

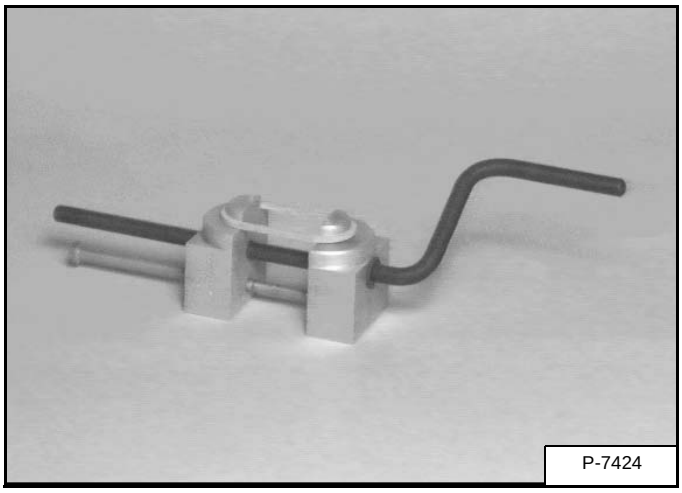
Always install new O-rings and seals.

Lubricate all O-rings and seals with hydraulic oil during installation.

Use the following tools to assemble the cylinder:

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

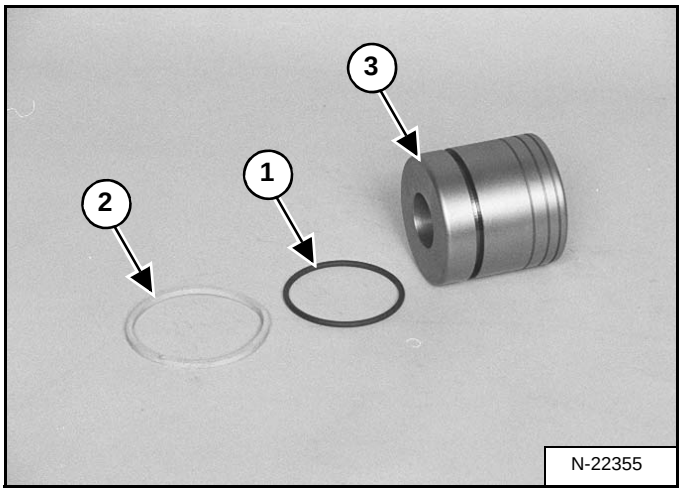
Figure 20-20-30



Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-20-30]**.

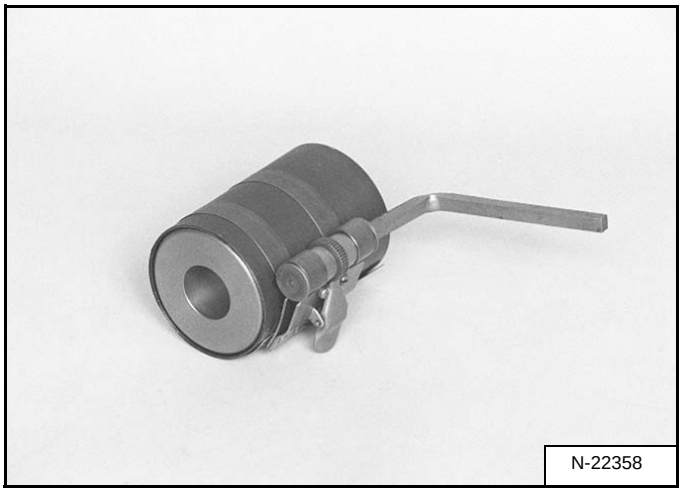
Allow the seal to stretch for 30 seconds before installing it on the piston.

Figure 20-20-31



Install the O-ring (Item 1) and seal (Item 2) on the piston (Item 3) **[Figure 20-20-31]**.

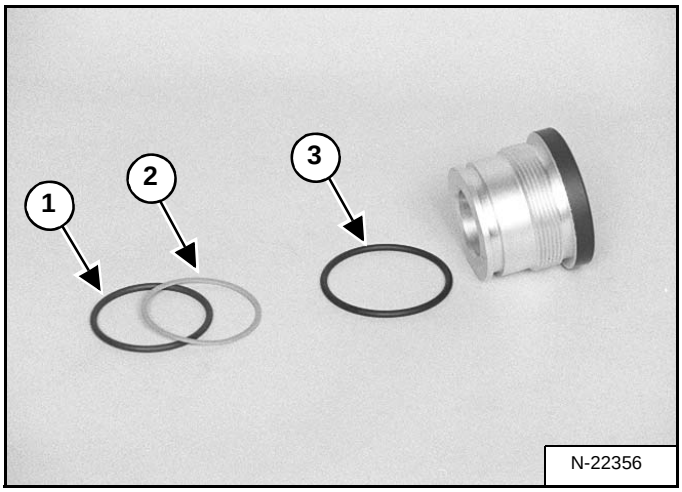
Figure 20-20-32



Use a ring compressor to compress the seal to the correct size. Leave the piston in the compressor for approximately three minutes **[Figure 20-20-32]**.

Disassembly (Cont'd)

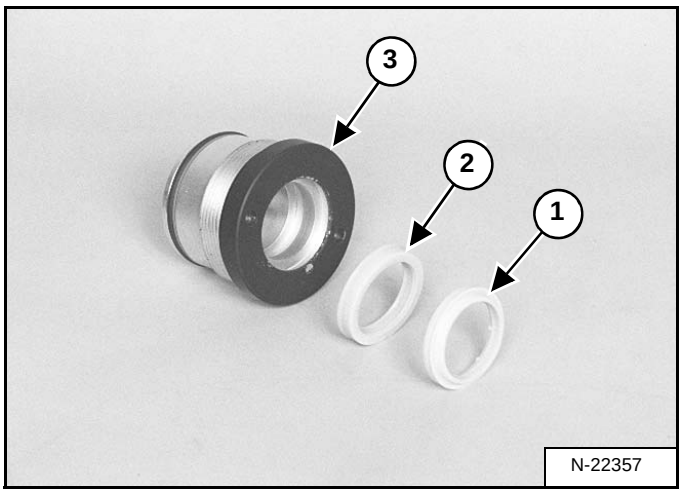
Figure 20-21-17



Remove the O-ring (Item 1) and the back-up ring (Item 2) **[Figure 20-21-17]**.

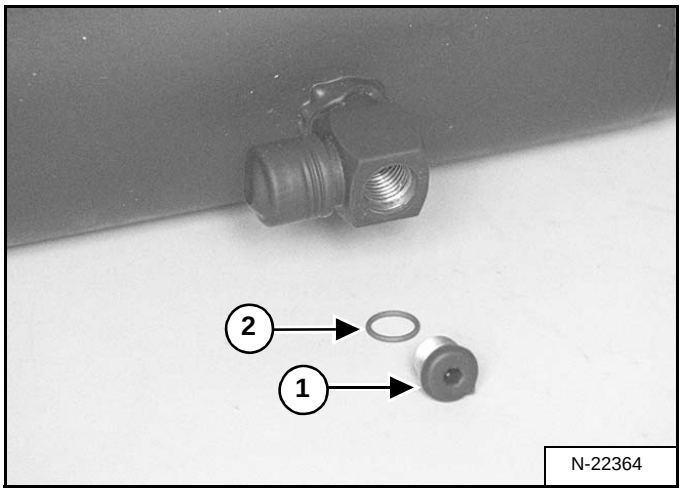
Remove the O-ring (Item 3) **[Figure 20-21-17]**.

Figure 20-21-18



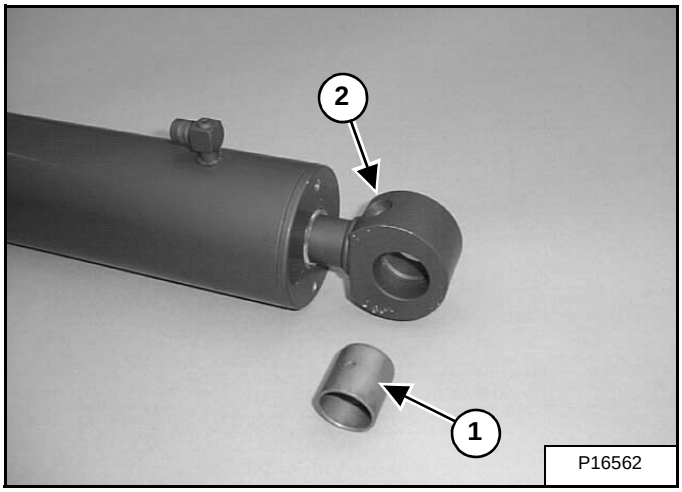
Remove the wiper seal (Item 1) and rod seal (Item 2) from the inside of the head (Item 3) **[Figure 20-21-18]**.

Figure 20-21-19



Remove plug (Item 1) and O-ring (Item 2) **[Figure 20-21-19]**.

Figure 20-21-20

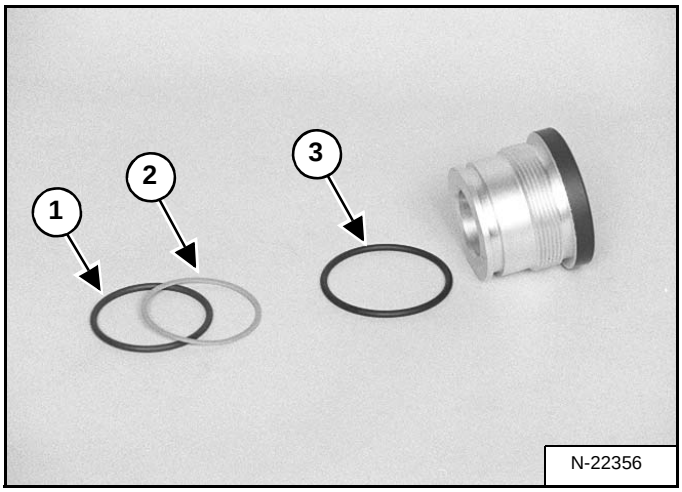


Remove the seals bushing (Item 1) **[Figure 20-21-20]**.

Replace the grease fitting (Item 2) **[Figure 20-21-20]** if damaged or missing.

Disassembly (Cont'd)

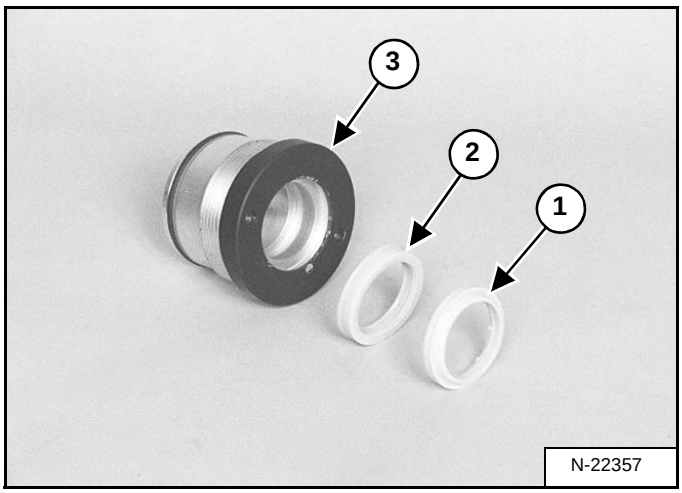
Figure 20-22-16



Remove the O-ring (Item 1) and the back-up ring (Item 2) **[Figure 20-22-16]** from the groove in the head.

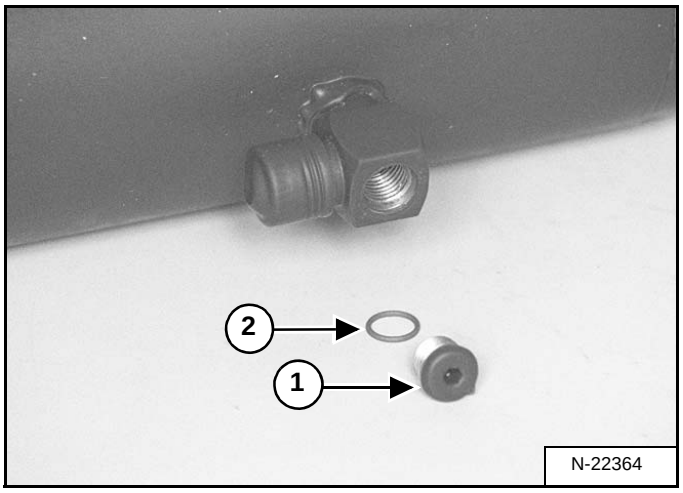
Remove the O-ring (Item 3) **[Figure 20-22-16]**.

Figure 20-22-17



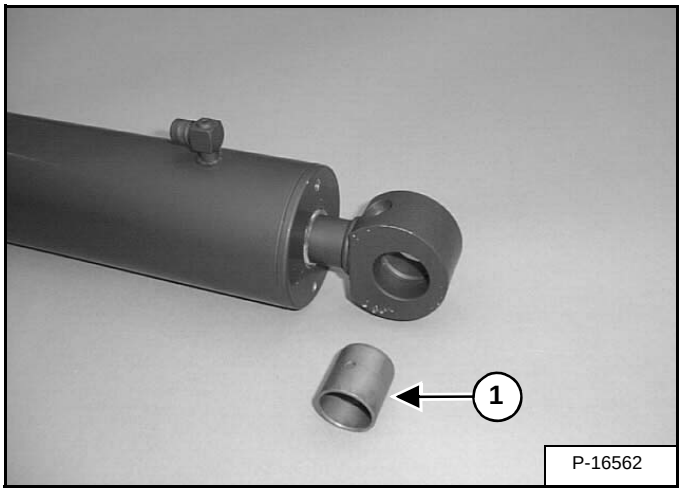
Remove the wiper seal (Item 1) and rod seal (Item 2) from the inside of the head (Item 3) **[Figure 20-22-17]**.

Figure 20-22-18



Remove plug (Item 1) and O-ring (Item 2) **[Figure 20-22-18]**.

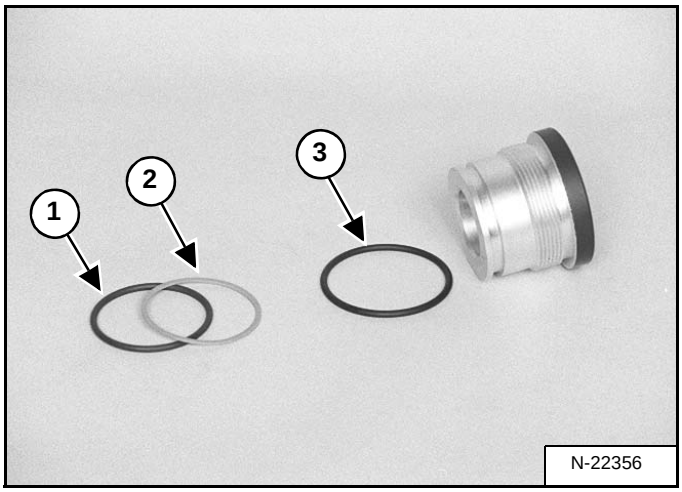
Figure 20-22-19



Remove the bushing (Item 1) **[Figure 20-22-19]**.

Disassembly (Cont'd)

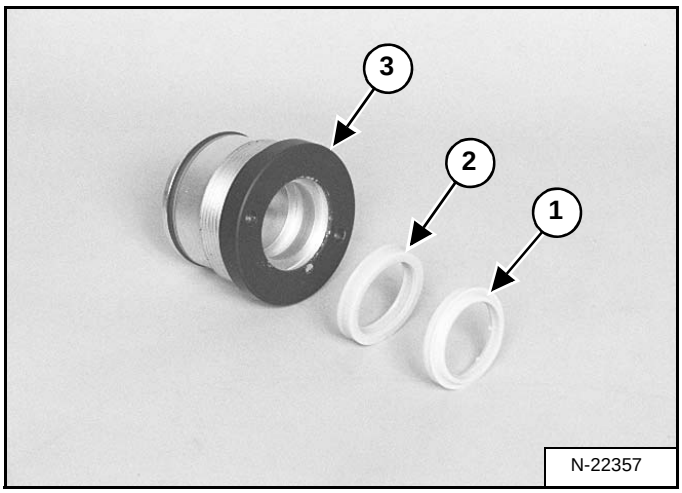
Figure 20-23-15



Remove the O-ring (Item 1) and the back-up ring (Item 2) **[Figure 20-23-15]** from the head.

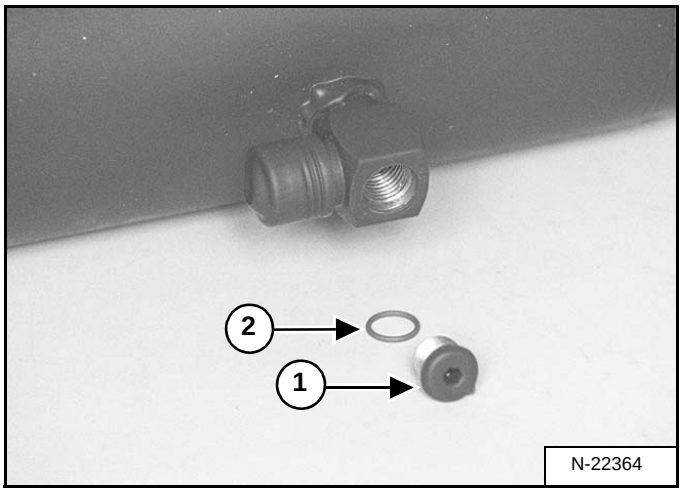
Remove the O-ring (Item 4) **[Figure 20-23-15]**.

Figure 20-23-16



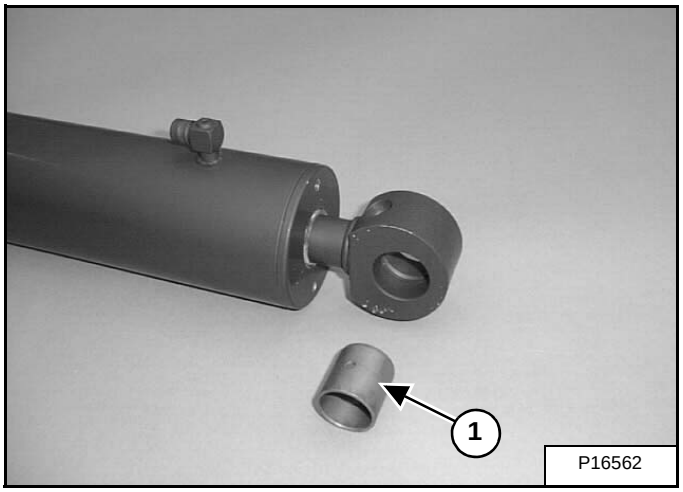
Remove the wiper seal (Item 1) and rod seal (Item 2) from the inside of the head (Item 3) **[Figure 20-23-16]**.

Figure 20-23-17



Remove plug (Item 1) and O-ring (Item 2) **[Figure 20-23-17]**.

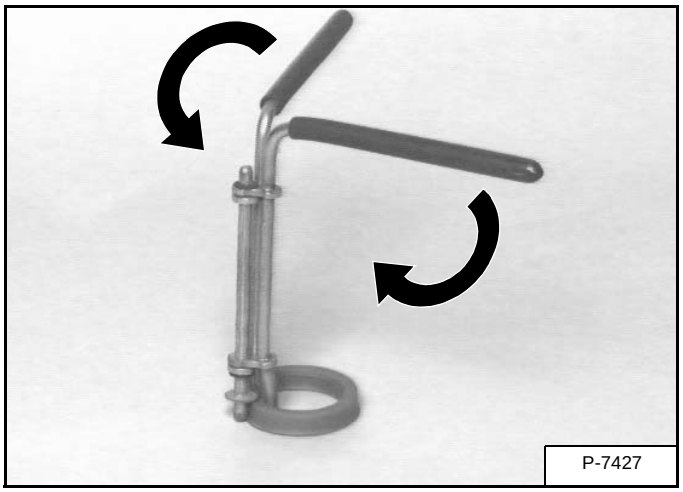
Figure 20-23-18



Remove the bushing (Item 1) **[Figure 20-23-18]**.

Assembly (Cont'd)

Figure 20-24-16

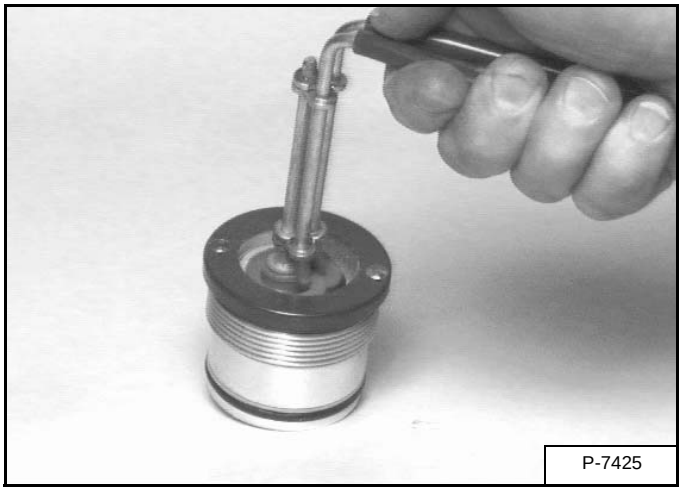


Install the rod seal on the rod seal tool **[Figure 20-24-16]**.

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

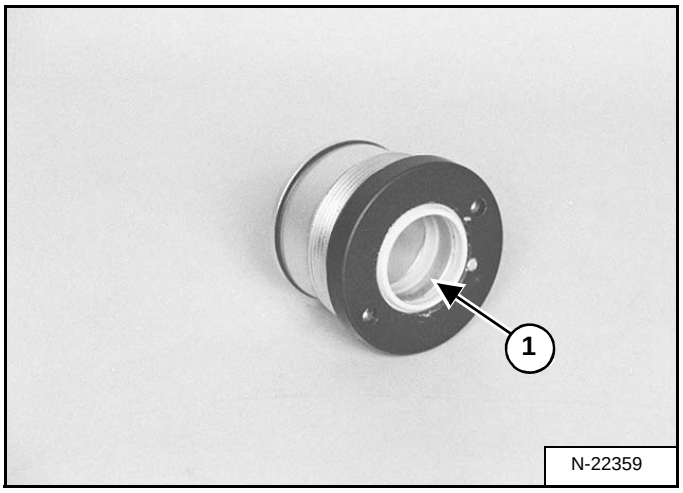
Rotate the handles to collapse the rod seal **[Figure 20-24-16]**.

Figure 20-24-17



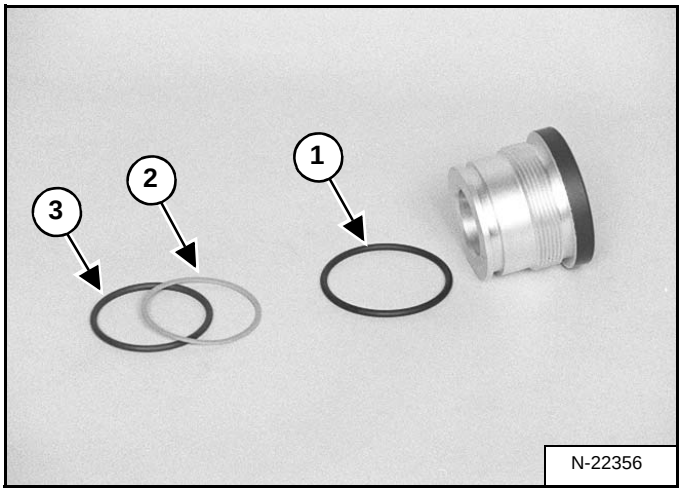
Install the rod seal in the head **[Figure 20-24-17]**.

Figure 20-24-18



Install the wiper seal with the wiper (Item 1) **[Figure 20-24-18]** toward the outside of the head.

Figure 20-24-19



Install the O-ring (Item 1) **[Figure 20-24-19]**.

Install the back-up washer (Item 2) and O-ring (Item 3) **[Figure 20-24-19]**.

Disassembly

Clean the outside of the angle blade cylinder before disassembly.

Use the following tools to disassemble the cylinder:

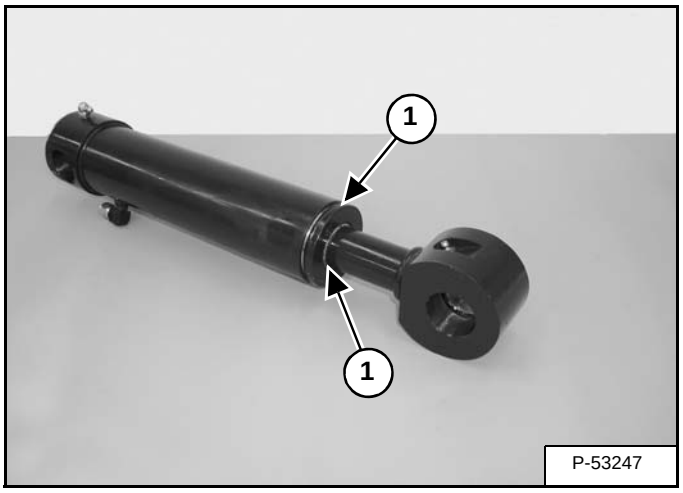
MEL1074 - O-ring Seal Hook
MEL1075 - Adjustable Gland Nut Wrench
MEL1075-2 - Special Offset Pins

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

Put the base end of the cylinder in a vise.

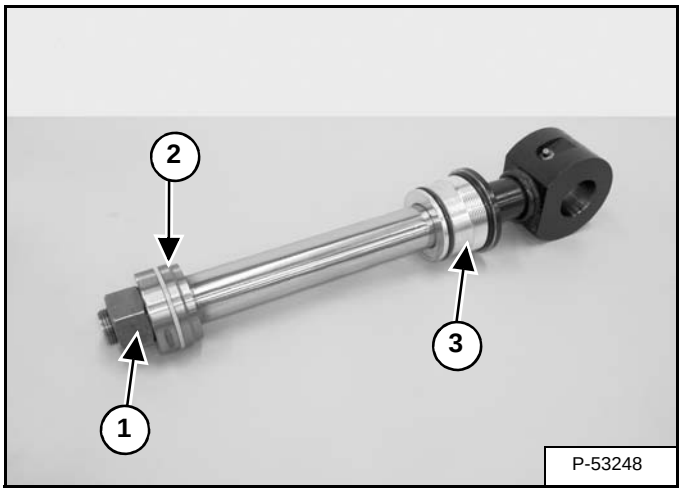
NOTE: Photo's may appear different, but the procedures are the same.

Figure 20-26-10



Insert the adjustable gland nut wrench into the two holes (Item 1) **[Figure 20-26-10]** to loosen the head.

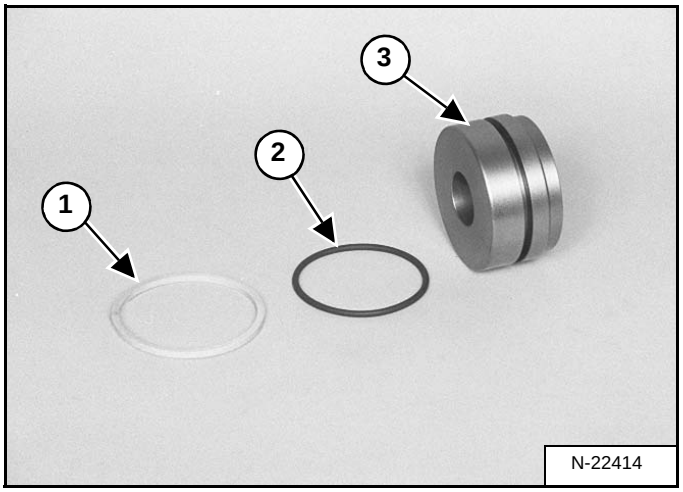
Figure 20-26-11



Remove the head and the rod assembly from the cylinder **[Figure 20-26-11]**. Put the rod end in a vise.

Remove the nut (Item 1), piston (Item 2) and head (Item 3) **[Figure 20-26-11]**.

Figure 20-26-12

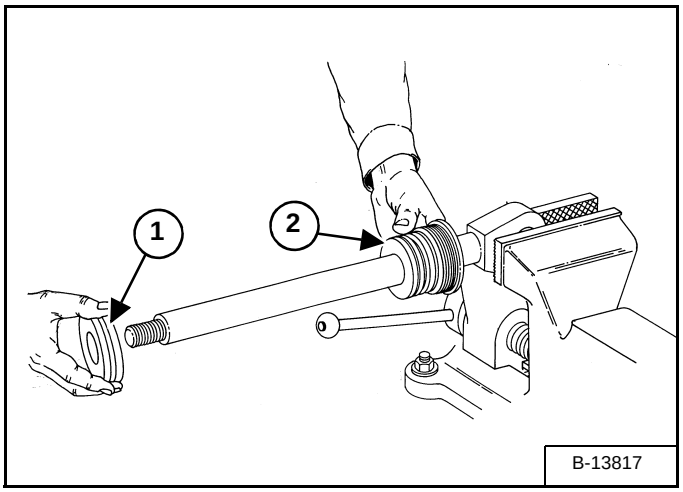


Remove the seal (Item 1) and O-ring (Item 2) from the piston (Item 3) **[Figure 20-26-12]**.

CLAMP CYLINDER (CONT'D)

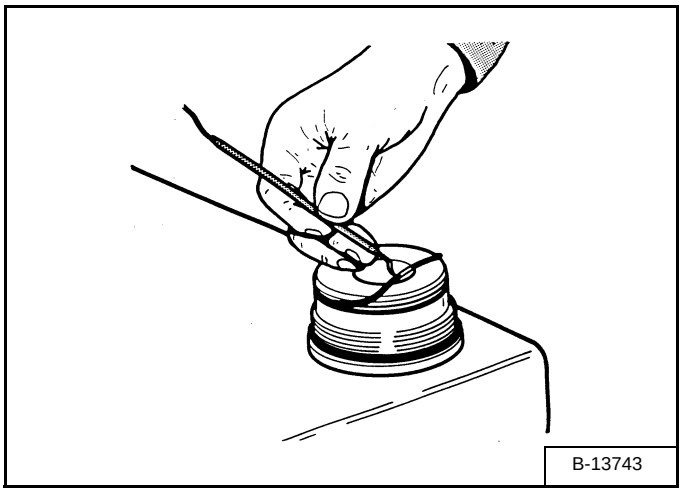
Disassembly (Cont'd)

Figure 20-27-34



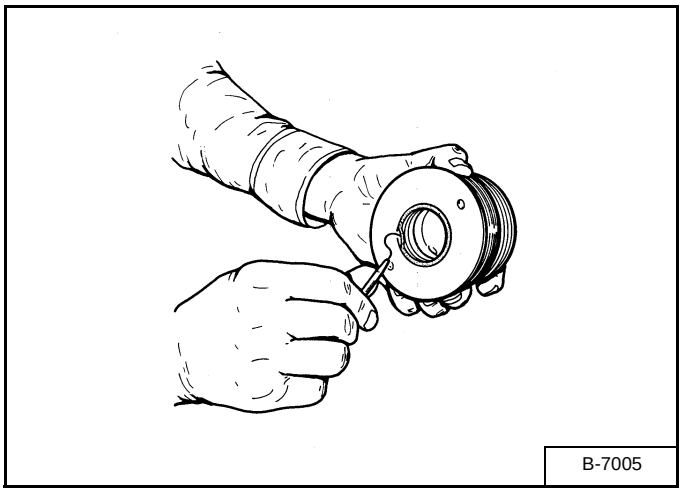
Remove the piston (Item 1) and head (Item 2) **[Figure 20-27-34]**.

Figure 20-27-35



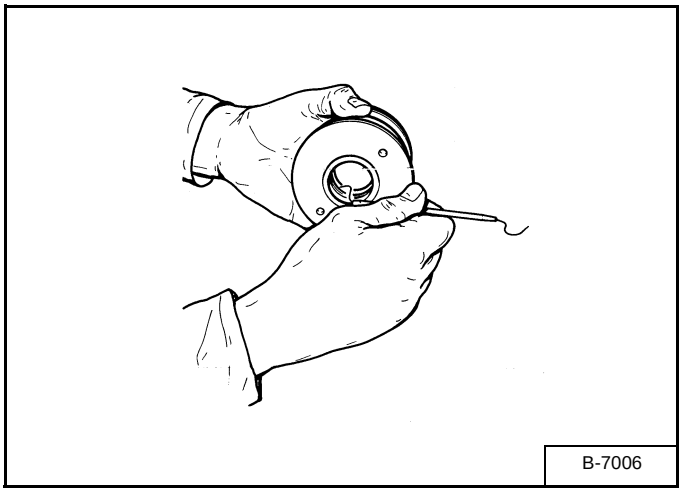
Remove the O-ring and back-up ring from the head with seal hook **[Figure 20-27-35]**.

Figure 20-27-36



Remove the wiper seal **[Figure 20-27-36]**.

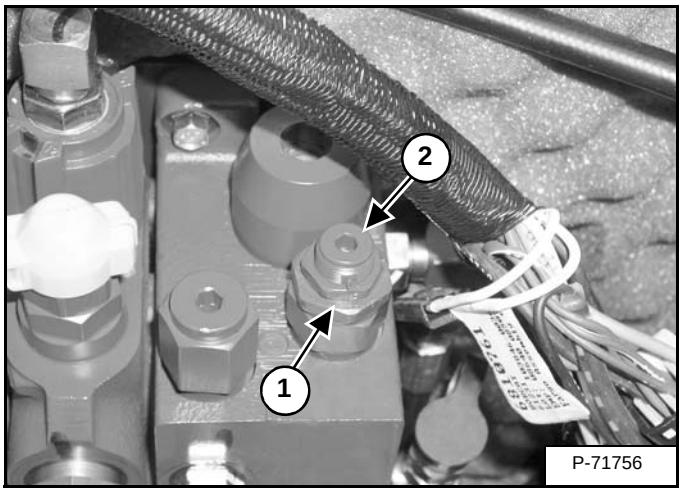
Figure 20-27-37



Remove the oil seal from the head **[Figure 20-27-37]**.

Testing And Adjusting The Main Relief Valve (Cont'd)

Figure 20-30-5



If adjustment is needed, remove the protective cap, loosen the nut (Item 1) **[Figure 20-30-5]**.

Turn the adjustment screw (Item 2) **[Figure 20-30-5]** clockwise to increase the pressure or counterclockwise to decrease the pressure.

NOTE: 1/2 turn is approximately 400 PSI (28 bar).

Tighten the nut (Item 1) **[Figure 20-30-5]**.

Retest the main relief valve after adjustment.

HYDRAULIC CONTROL VALVE

Description

The hydraulic control valve has two main relief valves. The front main relief valve operates at 2650 PSI (183 bar), the rear main relief valve operates at 2900 PSI (200 bar). The boom arm, bucket and blade sections have 2900 PSI 200 bar) and or 3335 PSI (230 bar) work port reliefs.

Removal And Installation

Lower the boom/bucket and blade to the ground.

Stop the engine.

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

IMPORTANT

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

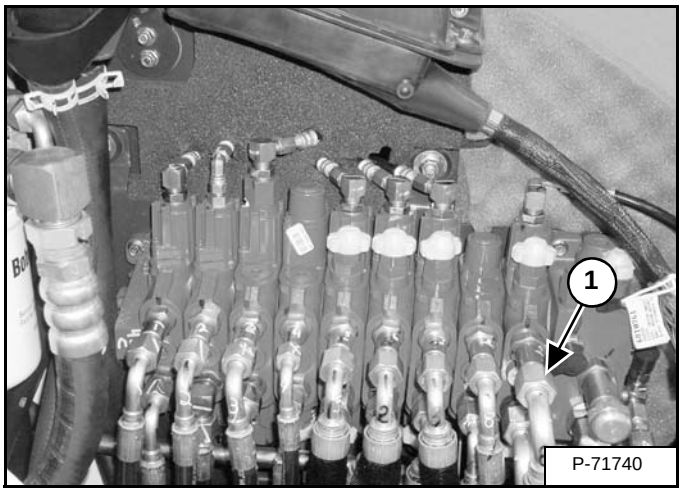
I-2003-0888

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

Open the right side cover.

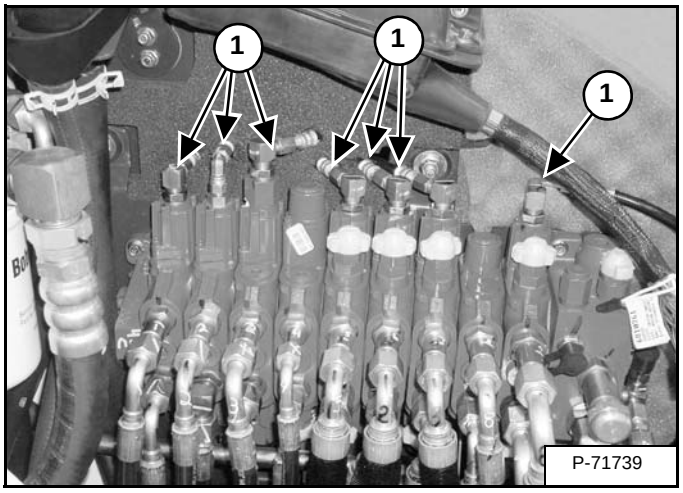
Mark all tubelines and hoses for proper installation.

Figure 20-40-1



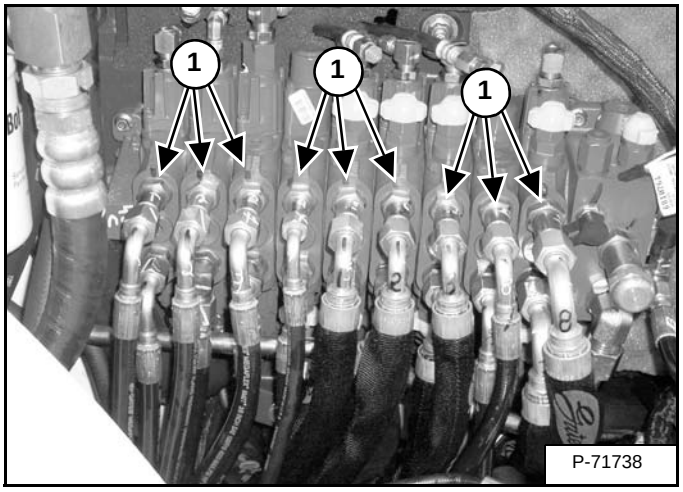
Remove the hose (Item 1) **[Figure 20-40-1]**.

Figure 20-40-2



Remove the hoses (Item 1) **[Figure 20-40-2]**.

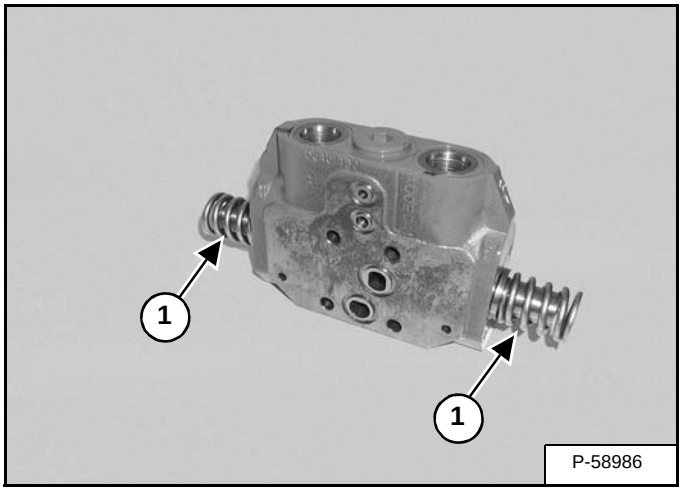
Figure 20-40-3



Remove the hoses (Item 1) **[Figure 20-40-3]**.

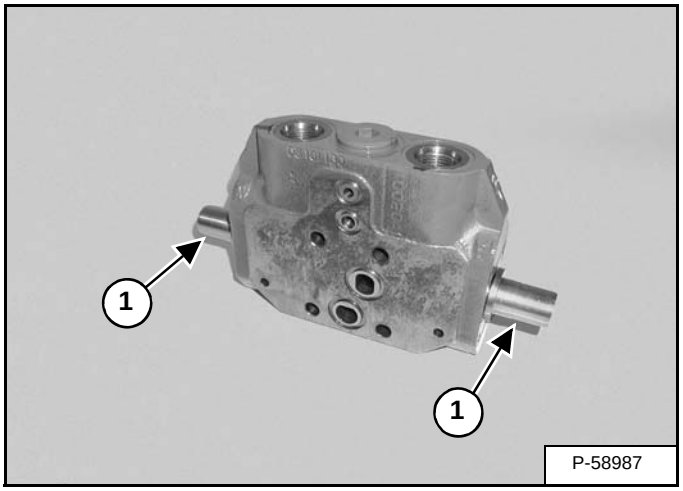
Left Travel Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-32



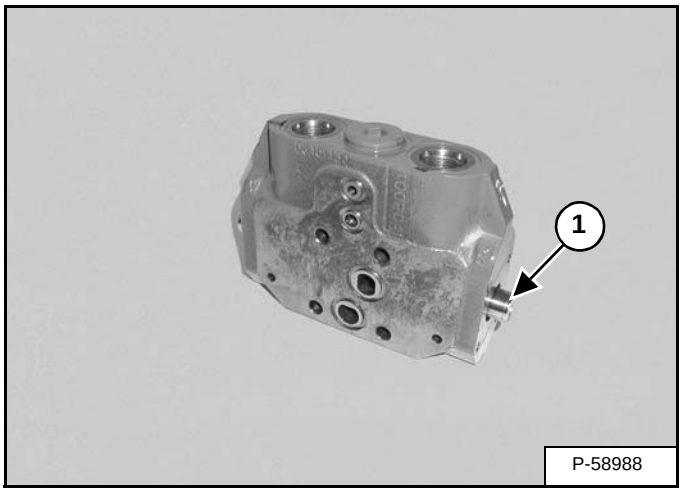
Remove the centering springs (Item 1) **[Figure 20-40-32]** from the spring guides.

Figure 20-40-33



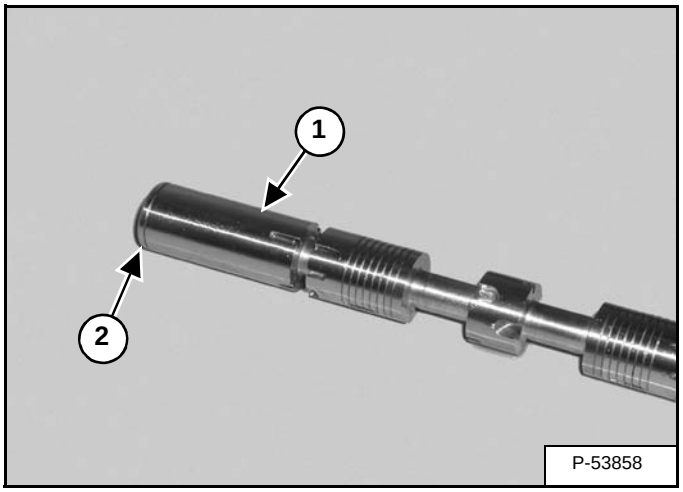
Remove the spring guides (Item 1) **[Figure 20-40-33]** from both ends of the valve spool.

Figure 20-40-34



Remove the spool (Item 1) **[Figure 20-40-34]** from the valve section.

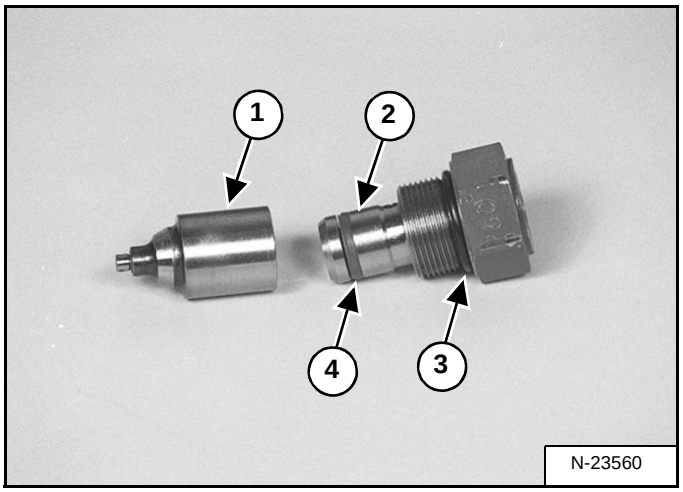
Figure 20-40-35



Assembly: The spool (Item 1) is symmetrical, and can be installed in the valve section with the spool groove (Item 2) **[Figure 20-40-35]** either toward the top, or the bottom of the valve section.

Blade Valve Section Disassembly And Assembly (Cont'd)

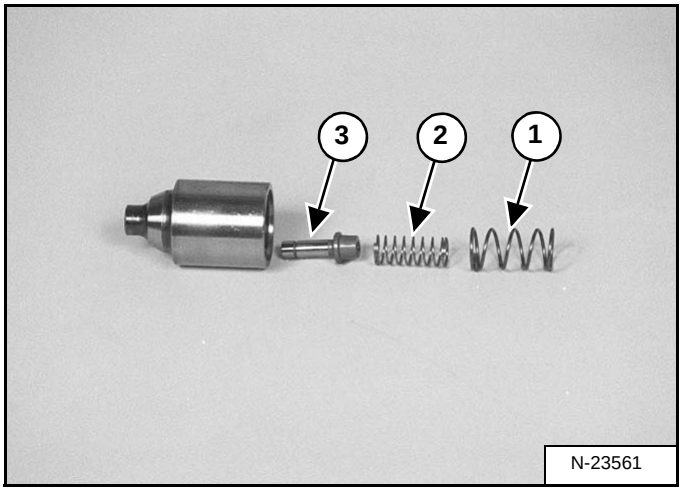
Figure 20-40-69



Remove the front section (Item 1) from the relief valve (Item 2) **[Figure 20-40-69]**.

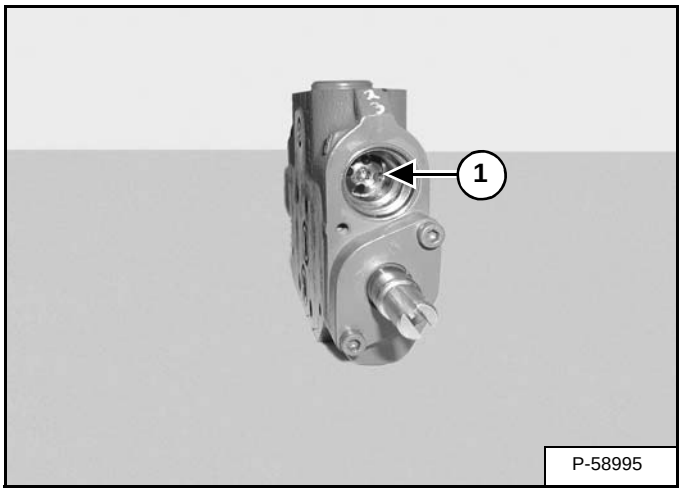
Remove the O-ring (Item 3) and seal (Item 4) **[Figure 20-40-69]**.

Figure 20-40-70



Remove the spring (Item 1), spring (Item 2) and poppet (Item 3) **[Figure 20-40-70]**.

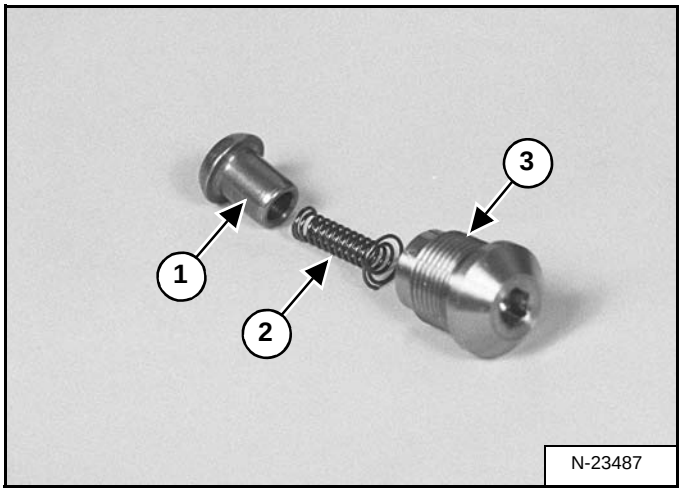
Figure 20-40-71



Remove the load check valve (Item 1) **[Figure 20-40-71]** from the valve section.

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

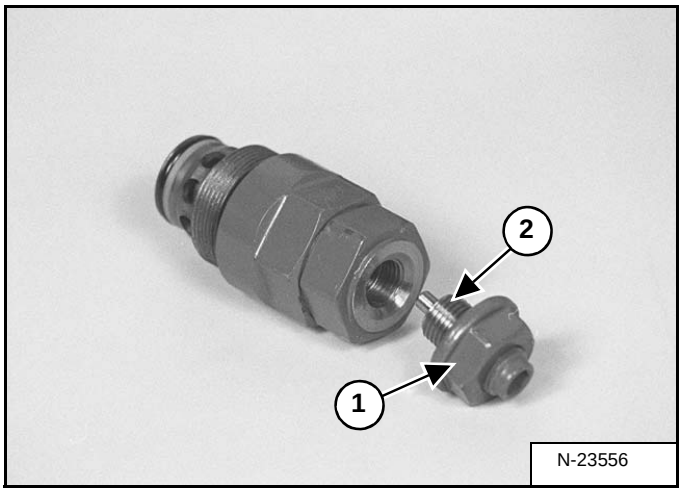
Figure 20-40-72



Remove the seat (Item 1) and spring (Item 2) from the load check valve (Item 3) **[Figure 20-40-72]**.

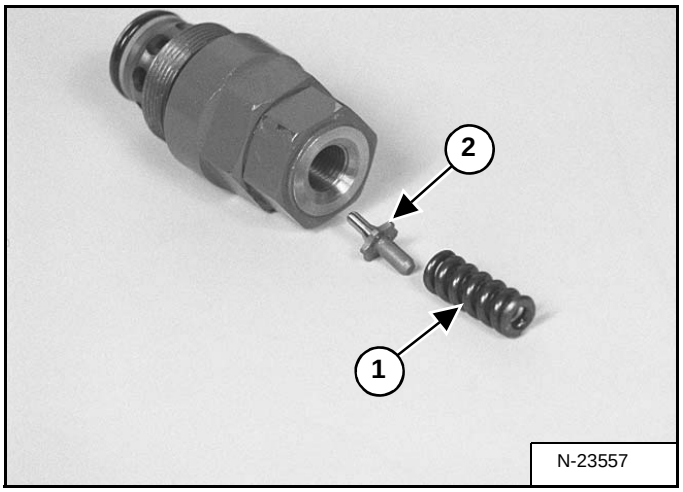
Bucket Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-106



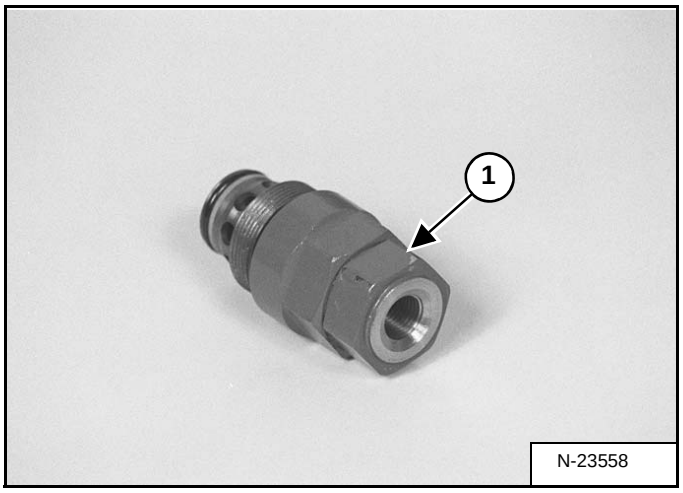
Remove the nut (Item 1) and adjustment screw (Item 2) **[Figure 20-40-106]** from the port relief/anti-cav valve.

Figure 20-40-107



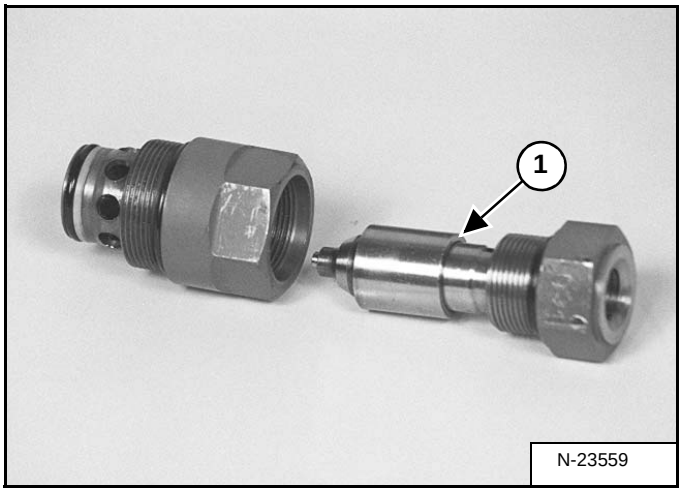
Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-40-107]** from the port relief/anti-cav body.

Figure 20-40-108



Remove the nut (Item 1) **[Figure 20-40-108]** from the port relief/anti-cav valve.

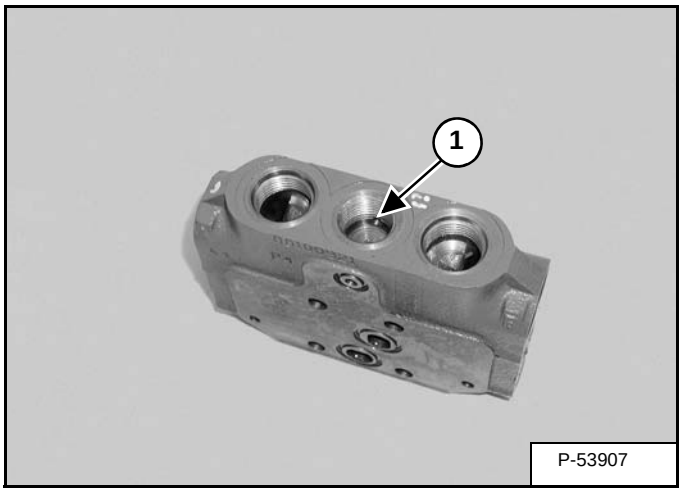
Figure 20-40-109



Remove the relief valve assembly (Item 1) **[Figure 20-40-109]** from the valve.

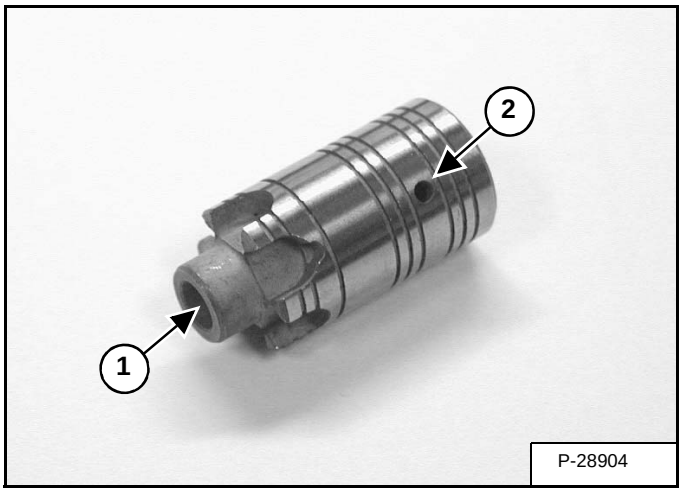
Arm Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-144



Remove the compensator (Item 1) **[Figure 20-40-144]** from the valve section.

Figure 20-40-145

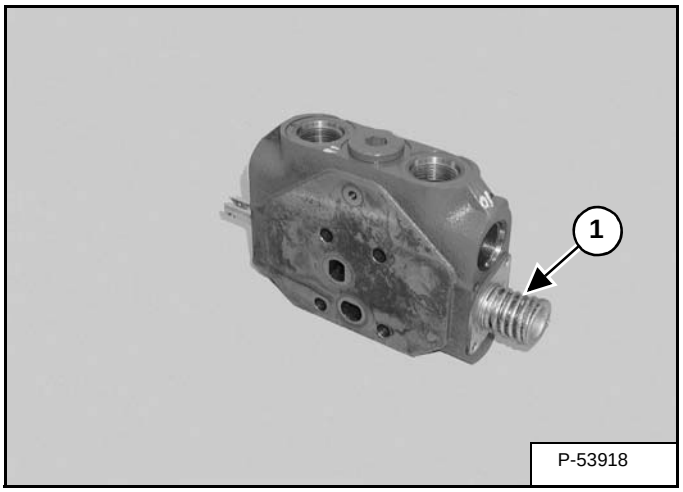


Check the orifice (Item 1) **[Figure 20-40-145]** in the compensator to be sure it is not plugged.

Check the crossport hole (Item 2) **[Figure 20-40-145]** to be sure it is not plugged.

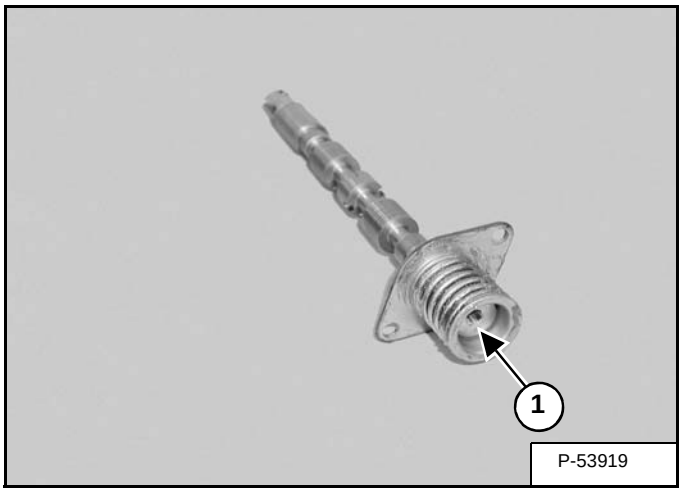
Boom Swing Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-180



Remove the spool assembly (Item 1) **[Figure 20-40-180]**.

Figure 20-40-181

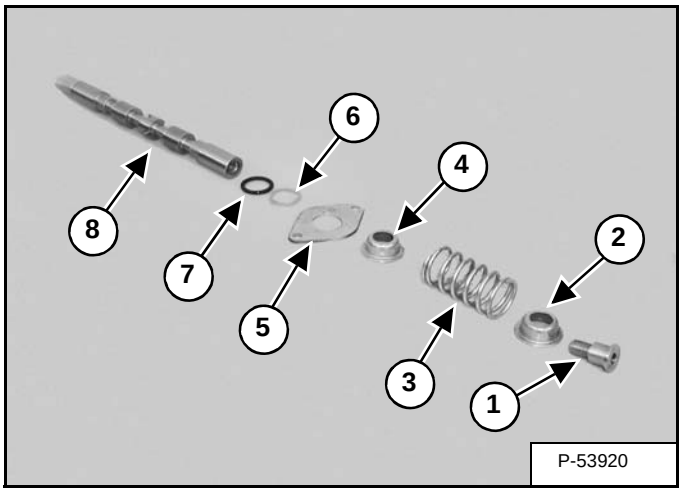


Loosen the bolt (Item 1) **[Figure 20-40-181]**.

Assembly: Tighten the bolt to 80 - 97 in.-lb. (9 - 1 N•m) torque.

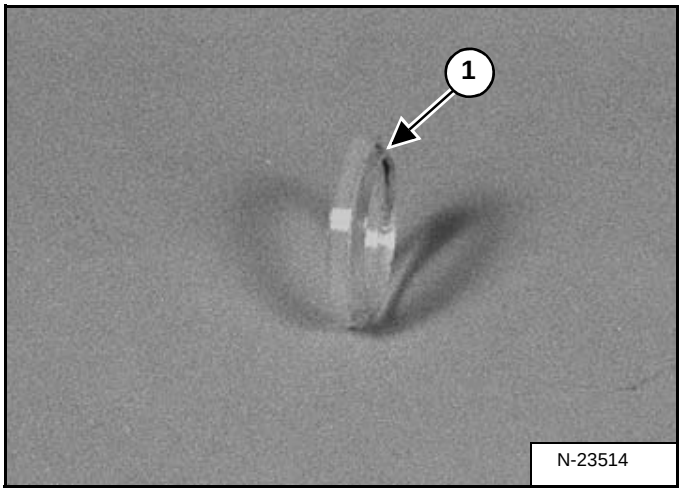
NOTE: To remove the bolt, the spool must be held on the linkage end, to keep the spool from rotating.

Figure 20-40-182



Remove the bolt (Item 1), spring retainer (Item 2), spring (Item 3), spring retainer (Item 4), retainer (Item 5), seal (Item 6) and O-ring (Item 7) from the spool (Item 8) **[Figure 20-40-182]**.

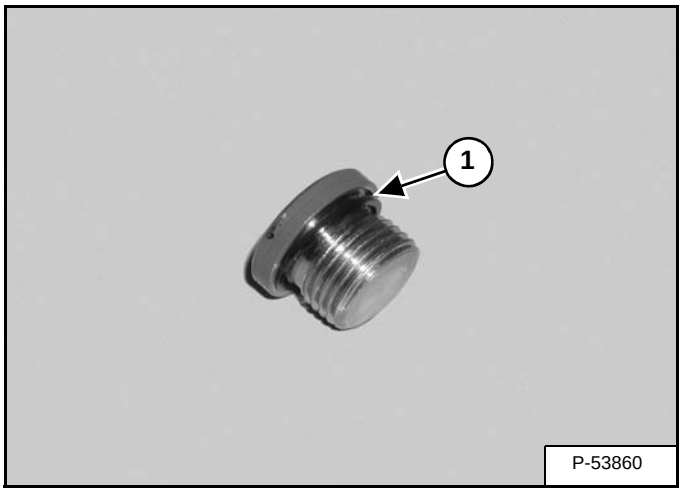
Figure 20-40-183



Assembly: Install the seal on the spool with the flange (Item 1) **[Figure 20-40-183]** toward the outside of the valve section.

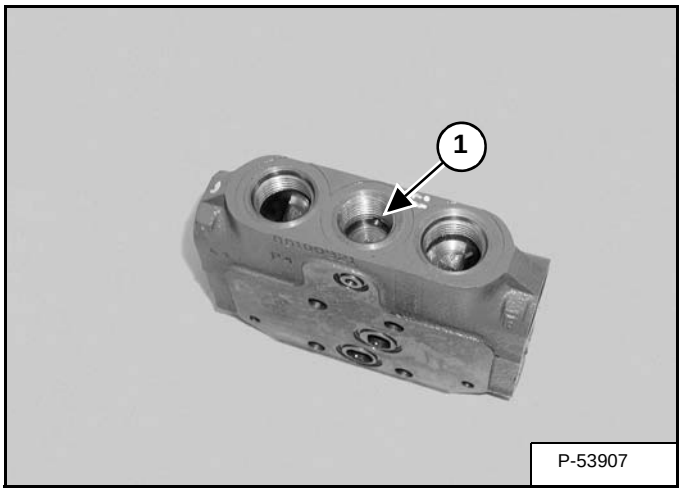
Auxiliary Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-214



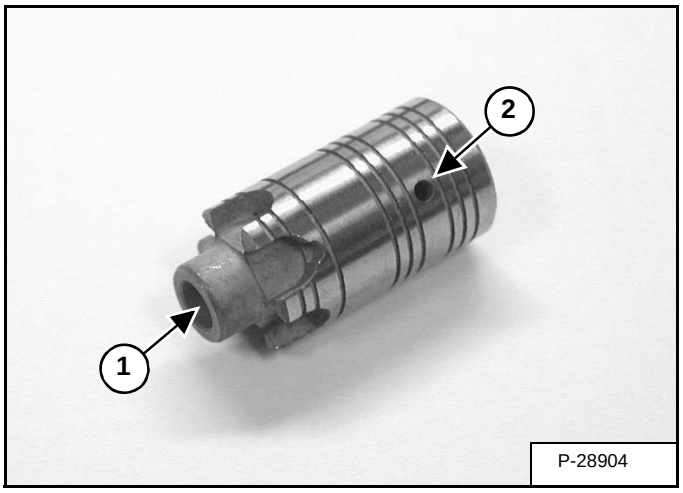
Remove the O-ring (Item 1) **[Figure 20-40-214]** from the plug.

Figure 20-40-215



Remove the compensator (Item 1) **[Figure 20-40-215]** from the valve section.

Figure 20-40-216

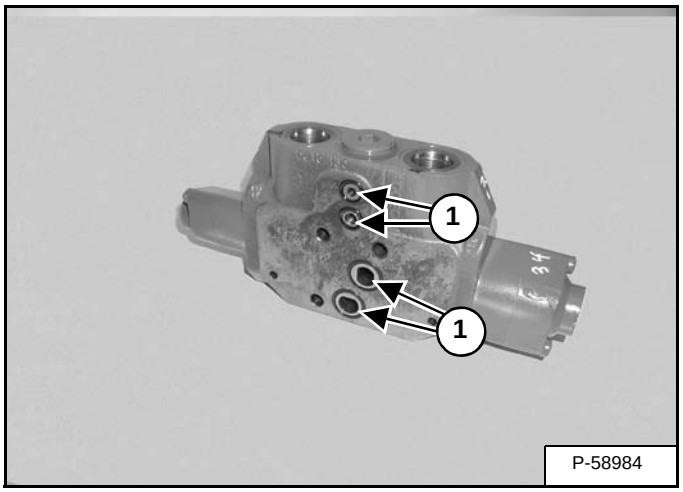


Check the orifice (Item 1) **[Figure 20-40-216]** in the compensator to be sure it is not plugged.

Check the crossport hole (Item 2) **[Figure 20-40-216]** to be sure it is not plugged.

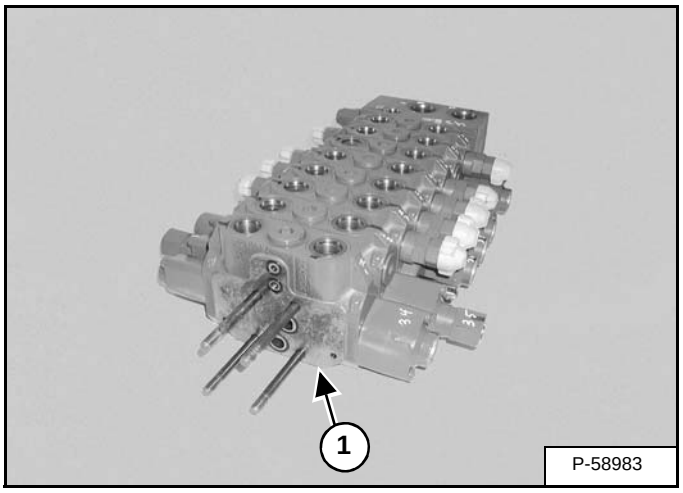
Assembly (Cont'd)

Figure 20-40-249



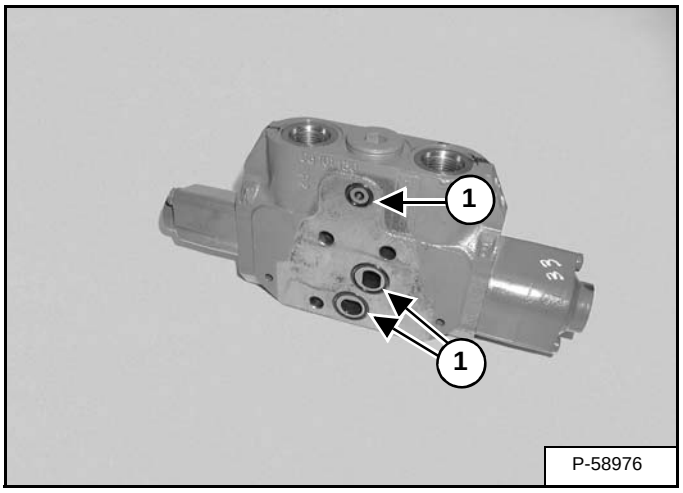
Install the O-rings (Item 1) **[Figure 20-40-249]** on the left travel valve section.

Figure 20-40-250



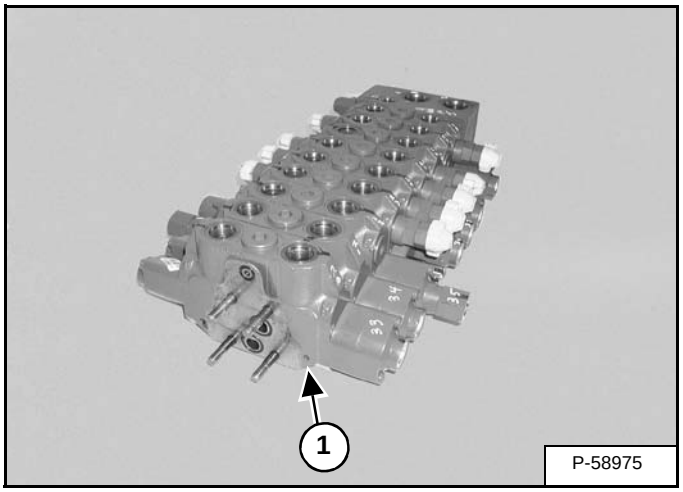
Install the left travel valve section (Item 1) **[Figure 20-40-250]** on the tie rods.

Figure 20-40-251



Install the O-rings (Item 1) **[Figure 20-40-251]** on the right travel valve section.

Figure 20-40-252

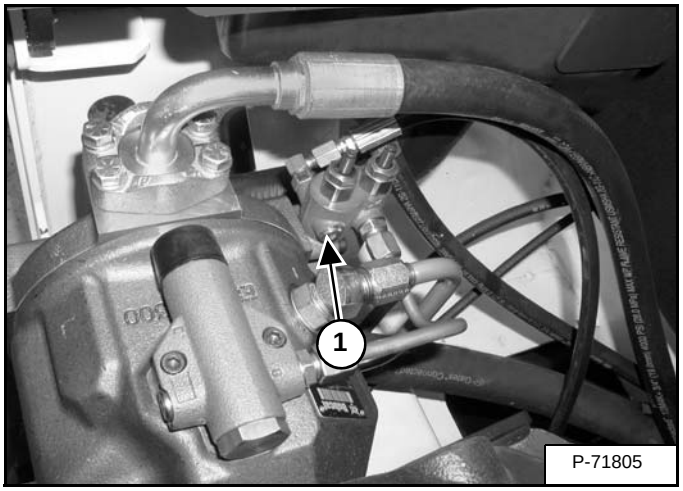


Install the right travel valve section (Item 1) **[Figure 20-40-252]** on the tie rods.

Testing The Piston Pump (Cont'd)

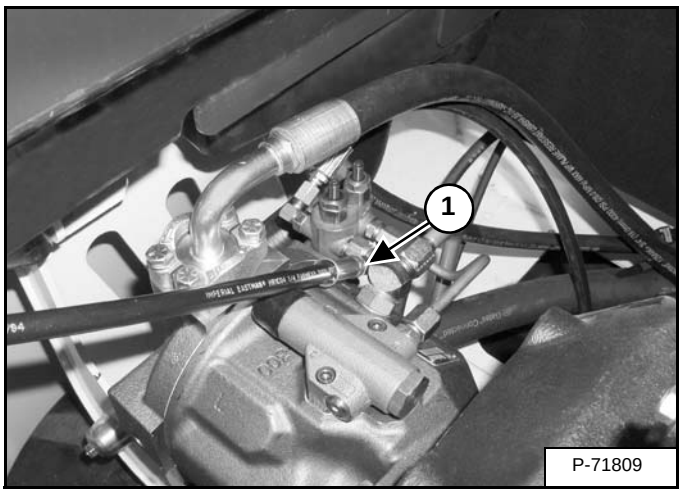
Pump Margin Pressure Adjustment

Figure 20-50-16



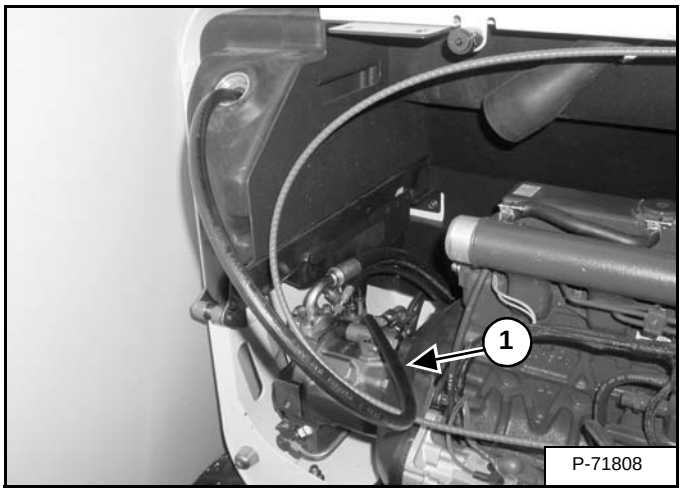
At the pump margin spool remove the front plug (Item 1) **[Figure 20-50-16]**.

Figure 20-50-17



Install a 15KN-3 fitting and 1/4 in. (6,35 mm) hydraulic hose with a 90 degree end (Item 1) **[Figure 20-50-17]** to the fitting.

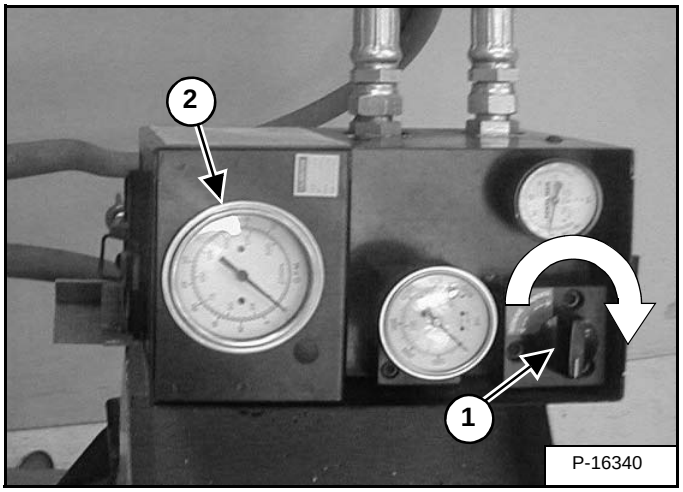
Figure 20-50-18



Route the hose (Item 1) **[Figure 20-50-18]** from the pump margin spool to the hydraulic reservoir.

Start the engine and allow the hydraulic fluid to warm to 140°F (60°C).

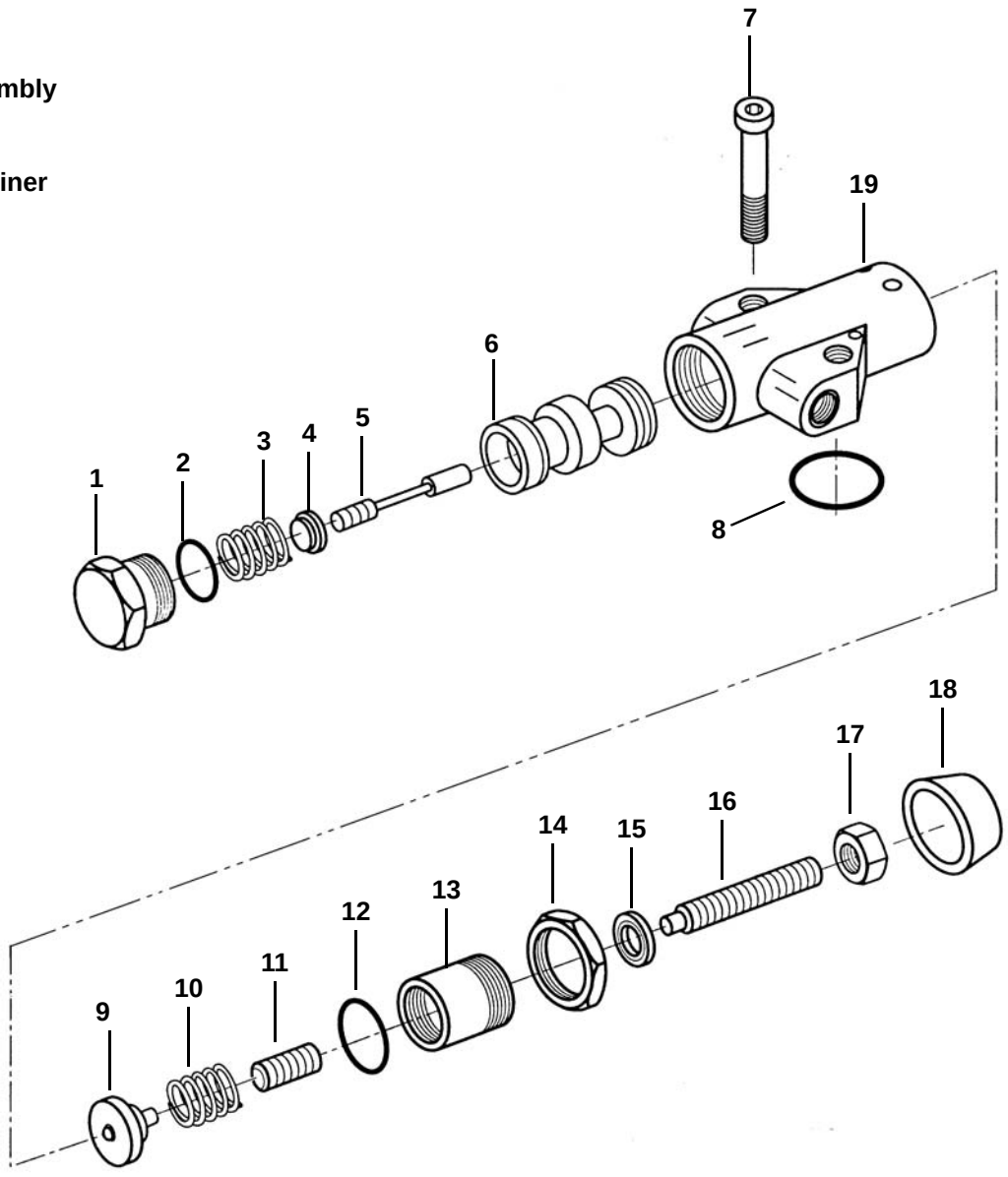
Figure 20-50-19



With the engine at high idle, turn the hydraulic tester flow control (Item 1) clockwise until **8 GPM (30 L/min.**) flow is shown at the hydraulic tester gauge (Item 2) **[Figure 20-50-19]**.

Parts Identification (Torque Limiter Valve)

1. Plug
2. O-Ring
3. Spring
4. Spring Seat
5. Spool
6. Spool Assembly
7. Bolt
8. O-Ring
9. Spring Retainer
10. Spring
11. Spring
12. O-Ring
13. Body
14. Locknut
15. Washer
16. Screw
17. Nut
18. Cap
19. Housing



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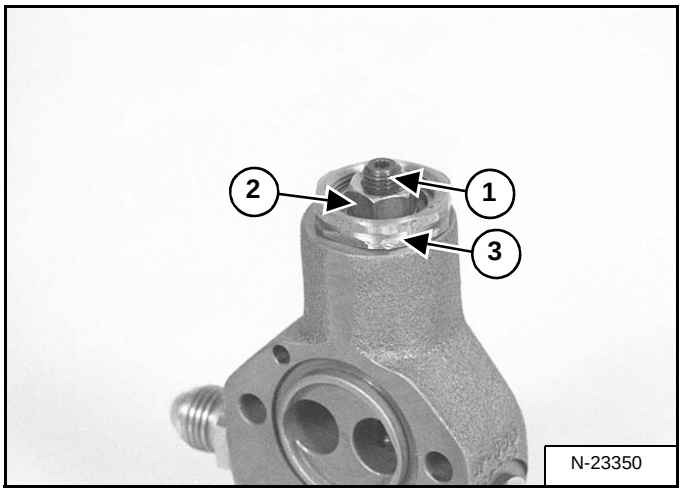
Initial Torque Limiter Valve Setting (Cont'd)

Figure 20-50-76

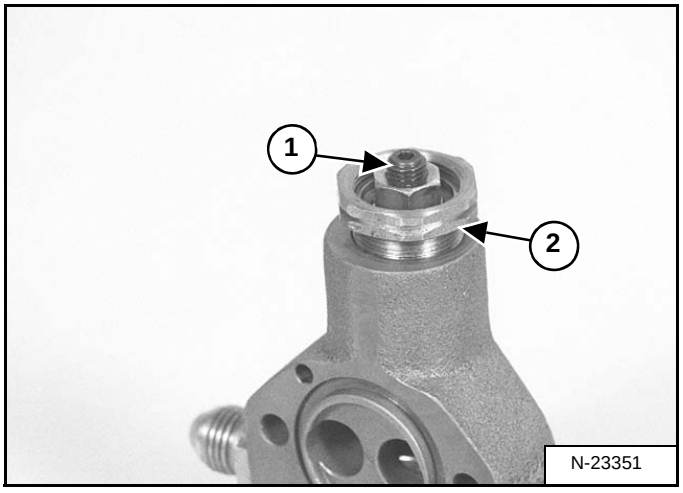


Back out the small adjustment screw (Item 1) **[Figure 20-50-76]** 10-1/4 turns.

Tighten the small nut (Item 2) **[Figure 20-50-76]**.

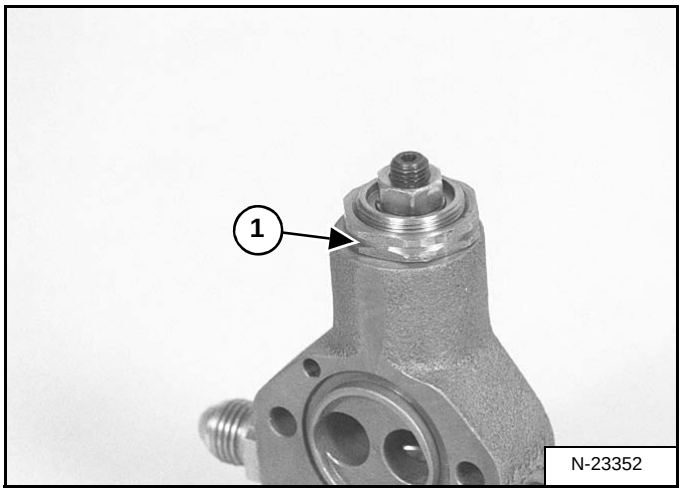
Loosen the large nut (Item 3) **[Figure 20-50-76]**.

Figure 20-50-77



With an Allen wrench in the small adjustment screw (Item 1) back out the large adjustment screw (Item 2) **[Figure 20-50-77]** 5-3/4 turns.

Figure 20-50-78



Tighten the large nut (Item 1) **[Figure 20-50-78]**.

This is the initial adjustment to the torque limiter valve.

Piston Pump Disassembly

IMPORTANT

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

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Remove the hydraulic pump from the machine. (See Removal And Installation on Page 20-50-16.)

Remove the coupler. (See Coupler Removal And Installation on Page 20-50-17.)

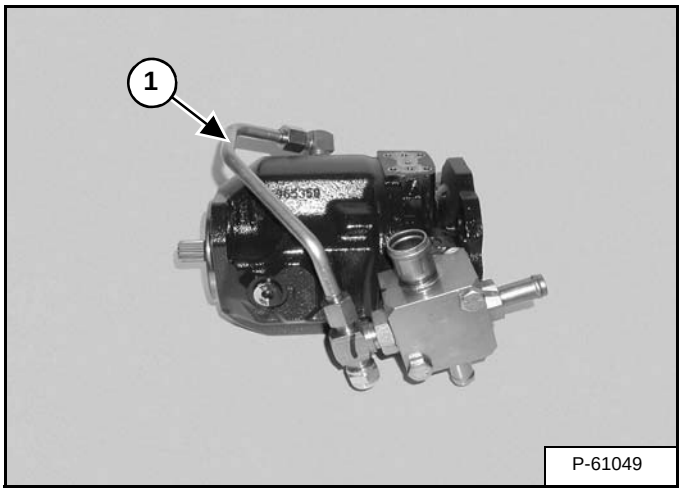
Remove the torque limiter valve. (See Torque Limiter Valve Removal on Page 20-50-20.)

Remove the pump control assembly. (See Pump Control Removal And Installation on Page 20-50-32.)

Clean the outside of the piston pump before disassembly.

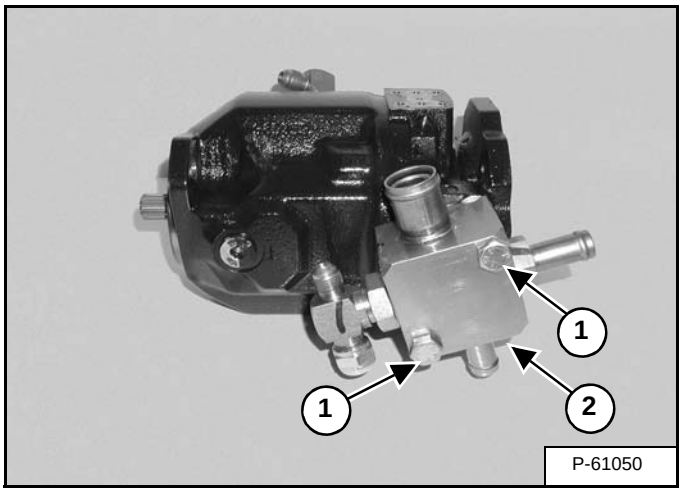
Mark the outside of the piston pump for ease of assembly.

Figure 20-50-103



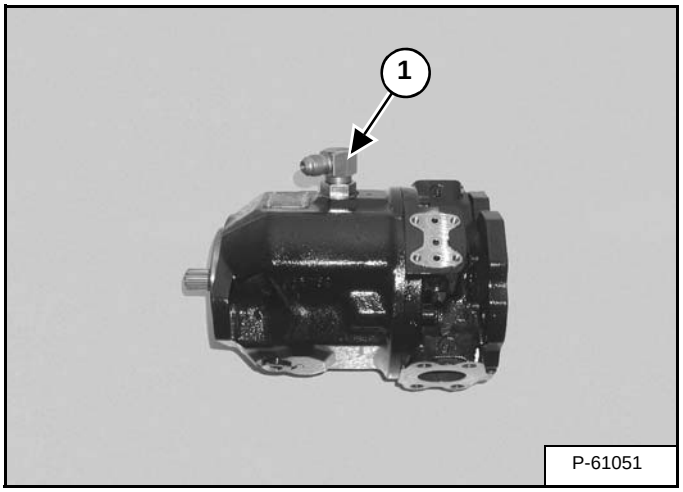
Remove the tubeline (Item 1) **[Figure 20-50-103]**.

Figure 20-50-104



Remove the bolts (Item 1) and block (Item 2) **[Figure 20-50-104]**.

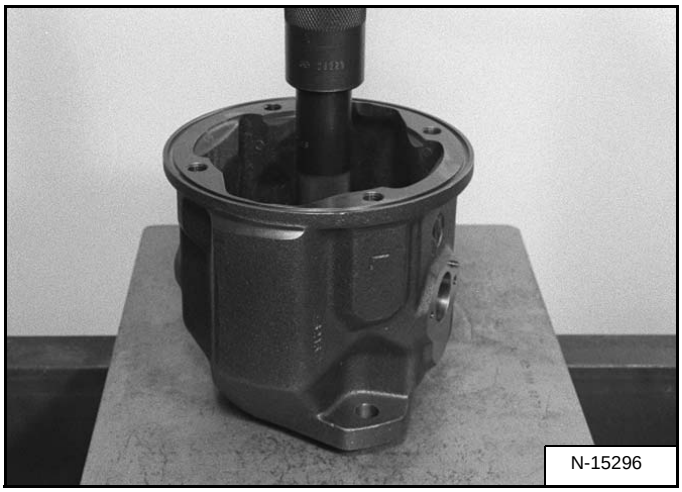
Figure 20-50-105



Remove the fitting (Item 1) **[Figure 20-50-105]**.

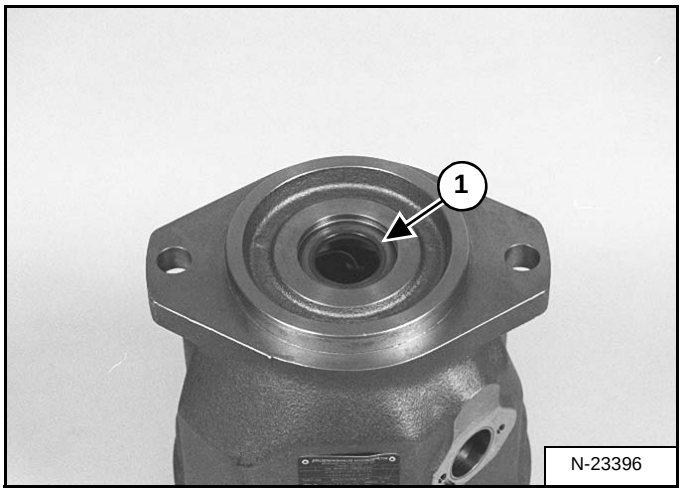
Piston Pump Assembly (Cont'd)

Figure 20-50-140



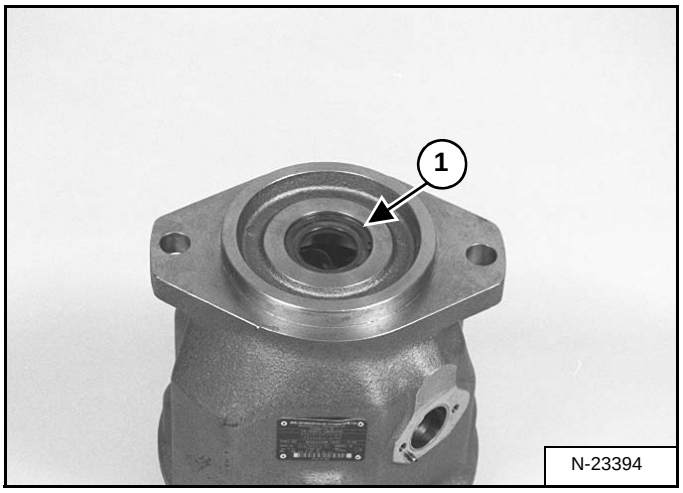
Press the race into the housing **[Figure 20-50-140]**.

Figure 20-50-141



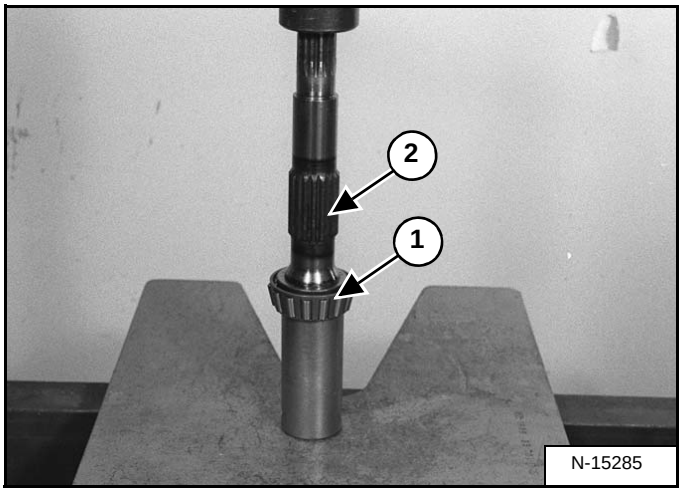
Install the shaft seal (Item 1) **[Figure 20-50-141]** in the housing.

Figure 20-50-142



Install the snap ring (Item 1) **[Figure 20-50-142]**.

Figure 20-50-143



Press the bearing (Item 1) onto the shaft (Item 2) **[Figure 20-50-143]**.

MANIFOLD ASSEMBLY/ ACCUMULATOR

Description

The manifold body contains a two speed solenoid valve, a pressure reducing valve, a system bypass valve and two auxiliary solenoid valves.

The body is connected to the accumulator.

The manifold supplies target pressure of 435 PSI (30 bar) with an acceptable range of 406 - 450 PSI (28 - 31 bar) to the joysticks to activate the control valve spools.

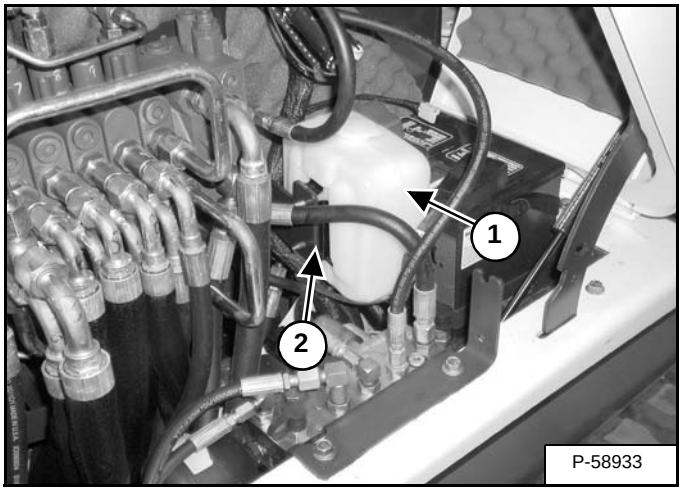
The accumulator provides short term reserve pressure for joystick function with the engine off and the key in the ON position.

Removal And Installation

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

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

Figure 20-60-1



For models equipped with a windshield washer, lift up on the windshield washer fluid reservoir (Item 1) and remove the reservoir from the bracket (Item 2) **[Figure 20-60-1]**. Reposition the reservoir away from the manifold assembly.

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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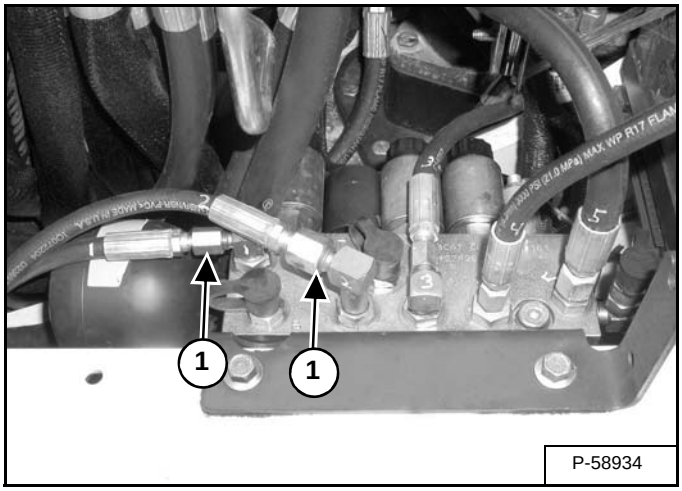
Mark the hoses for correct installation.

⚠ WARNING

Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possible death if proper medical treatment by a physician familiar with this injury is not received immediately.

W-2145-0290

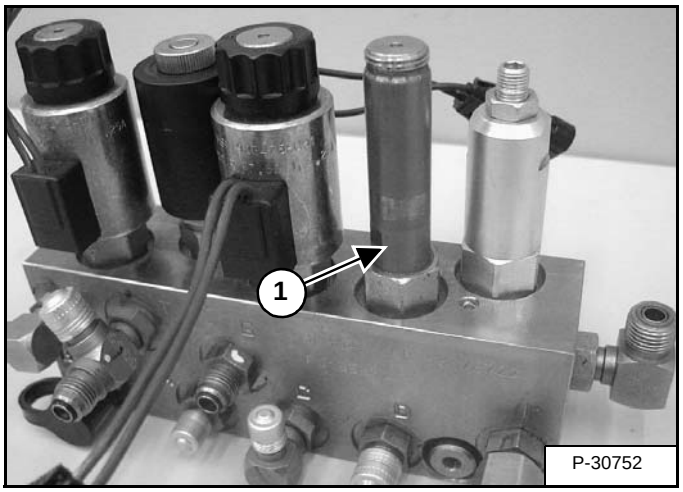
Figure 20-60-2



Remove the hoses (Item 1) **[Figure 20-60-2]**.

Disassembly And Assembly (Cont'd)

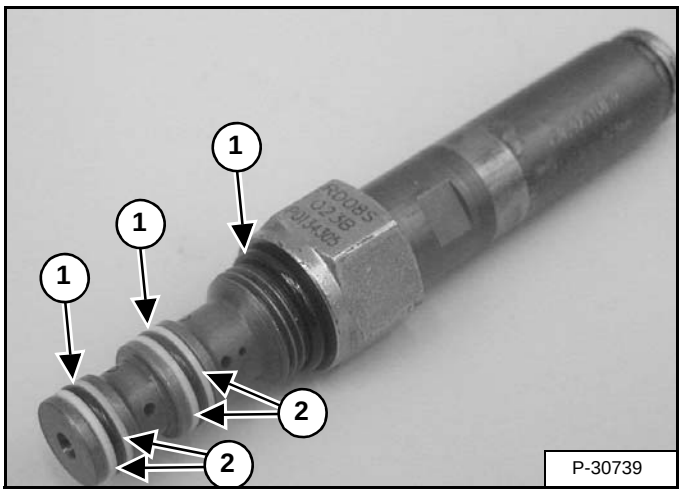
Figure 20-60-35



Remove the spool (Item 1) **[Figure 20-60-35]**.

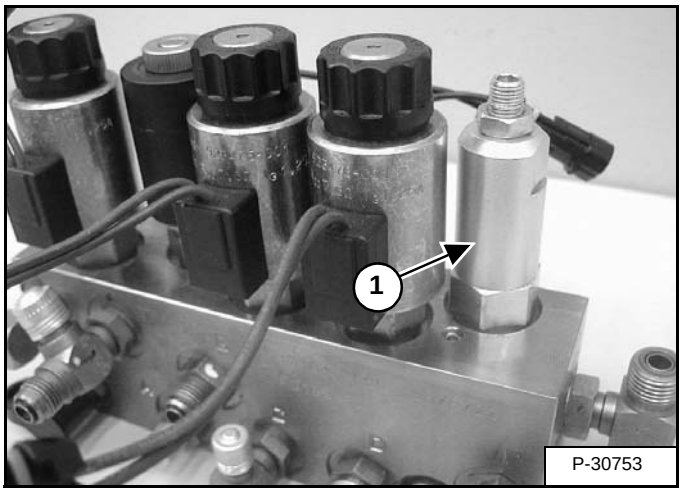
Installation: Tighten the spool to 22 ft.-lb. (30 N•m) torque.

Figure 20-60-36



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-60-36]**.

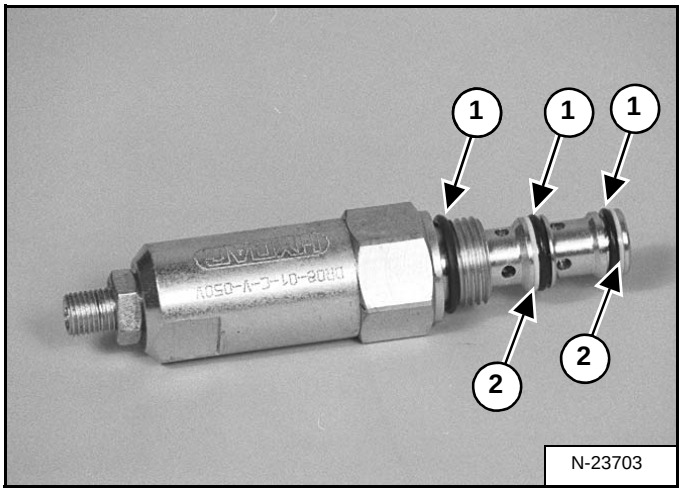
Figure 20-60-37



Remove the pressure reducing valve (Item 1) **[Figure 20-60-37]** from the manifold assembly.

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

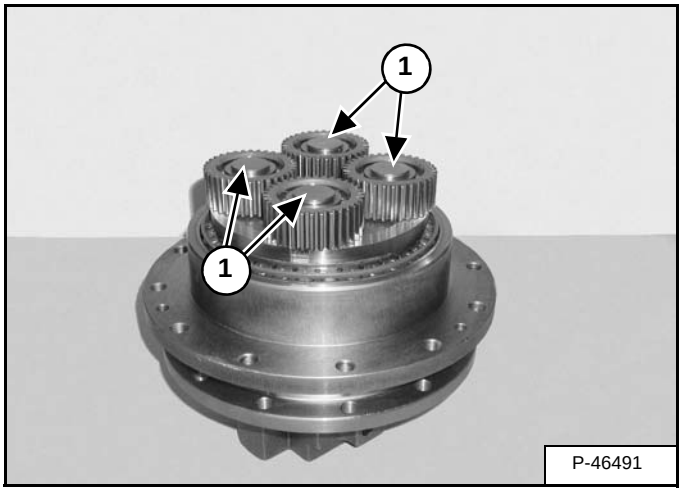
Figure 20-60-38



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-60-38]** from the pressure reducing valve.

Disassembly (Cont'd)

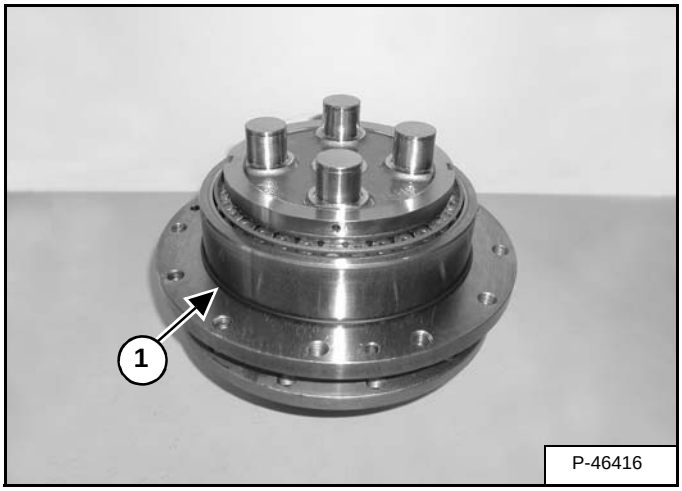
Figure 20-70-17



Pry the gear/bearing assembly (Item 1) **[Figure 20-70-17]** off of the hub. Record the orientation of the gear/bearing assembly.

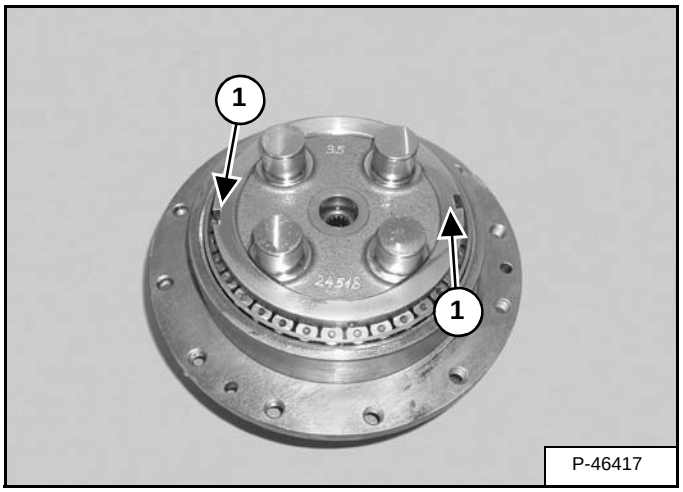
The gear/bearing assembly can only be installed in one direction.

Figure 20-70-18



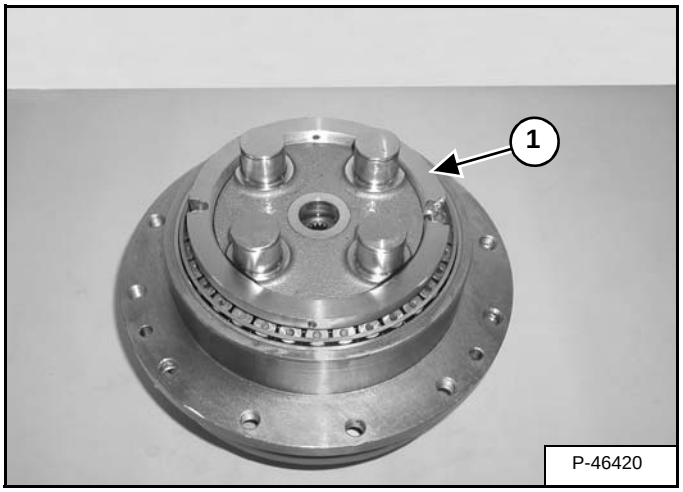
Remove the O-ring (Item 1) **[Figure 20-70-18]**.

Figure 20-70-19



Center punch and drill the nut where shown (Item 1) **[Figure 20-70-19]**.

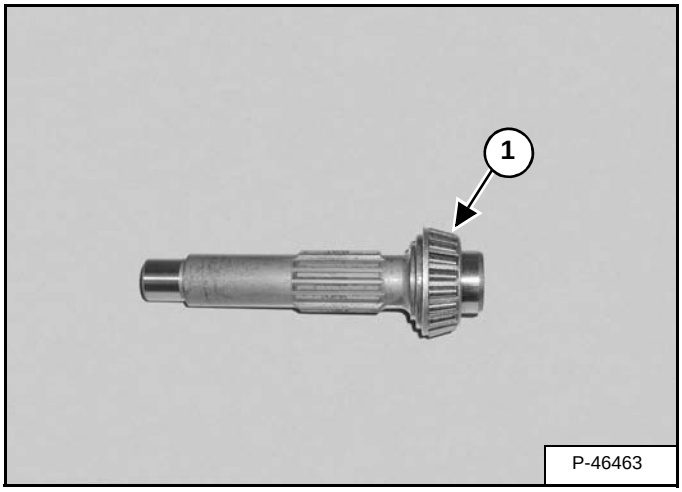
Figure 20-70-20



Split and remove the nut (Item 1) **[Figure 20-70-20]**.

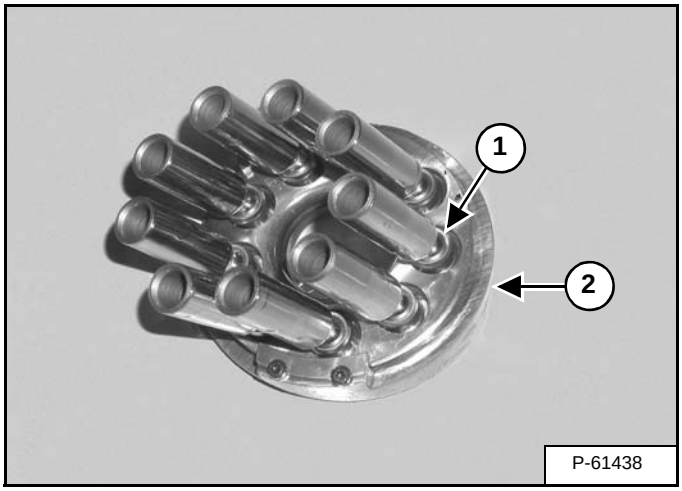
Disassembly (Cont'd)

Figure 20-70-57



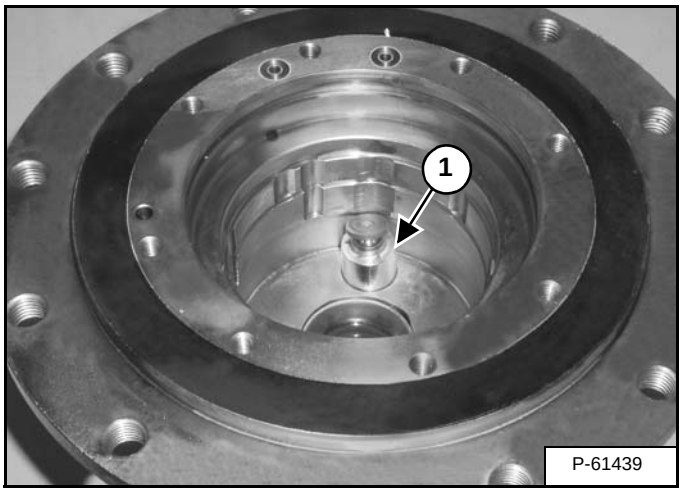
Remove the bearing (Item 1) **[Figure 20-70-57]** from the shaft.

Figure 20-70-58



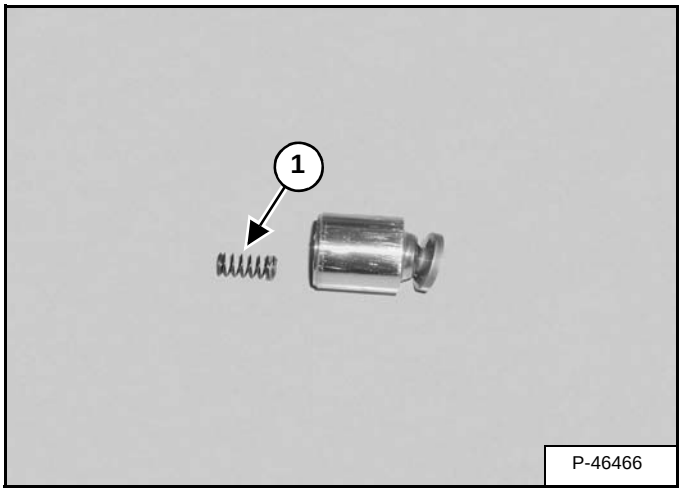
Remove the piston and retaining ring assembly (Item 1) from the swash plate (Item 2) **[Figure 20-70-58]**.

Figure 20-70-59



Remove the piston (Item 1) **[Figure 20-70-59]**.

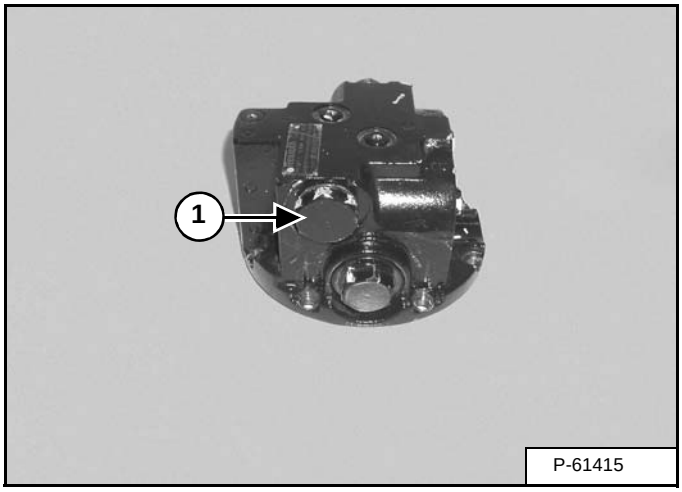
Figure 20-70-60



Remove the spring (Item 1) **[Figure 20-70-60]**.

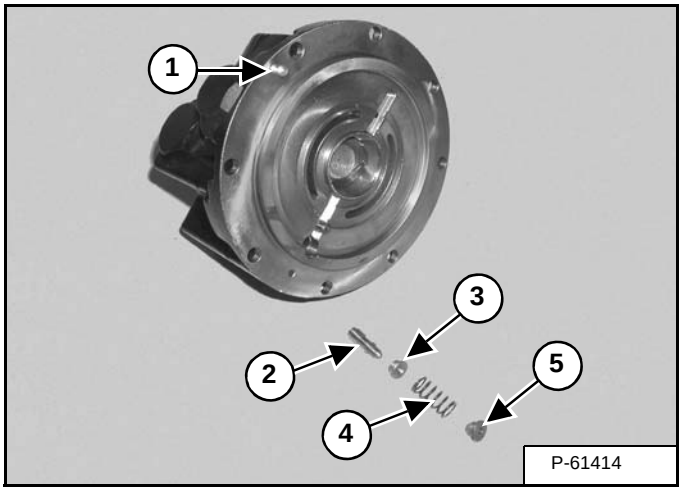
Assembly (Cont'd)

Figure 20-70-93



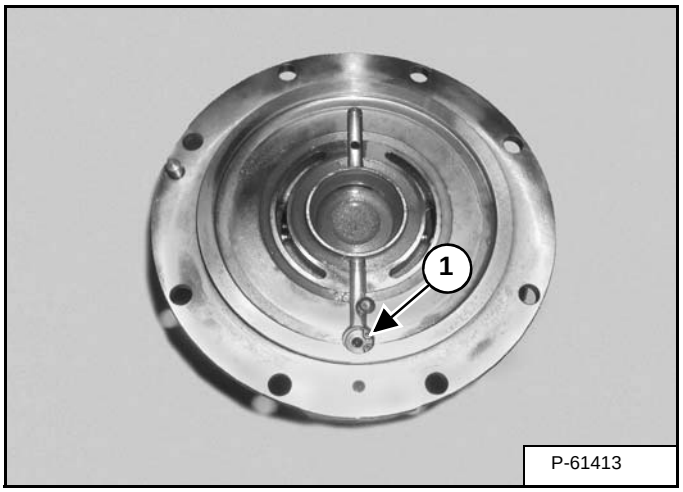
Install the plug (Item 1) **[Figure 20-70-93]**.

Figure 20-70-94



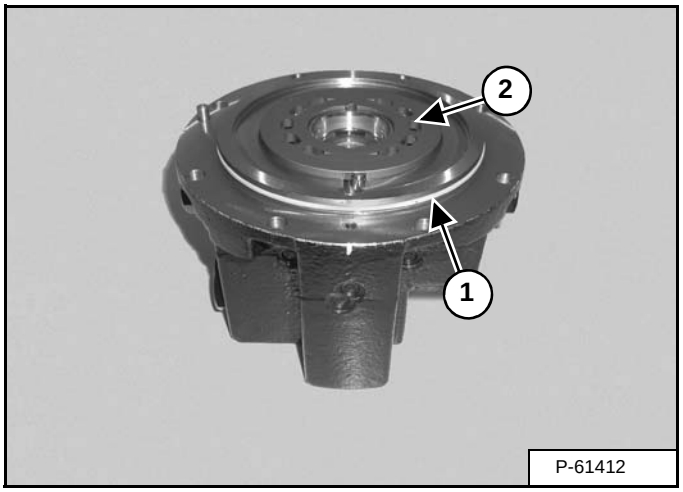
Tip the valve block on its side and install the alignment pin (Item 1), spool (Item 2), spring seat (Item 3), spring (Item 4) and spring seat (Item 5) **[Figure 20-70-94]**.

Figure 20-70-95



Stand the valve block up and install the snap ring (Item 1) **[Figure 20-70-95]**.

Figure 20-70-96



Install the O-ring (Item 1) and valve plate (Item 2) **[Figure 20-70-96]**.

Disassembly

Clean the outside of the travel motor before disassembly.

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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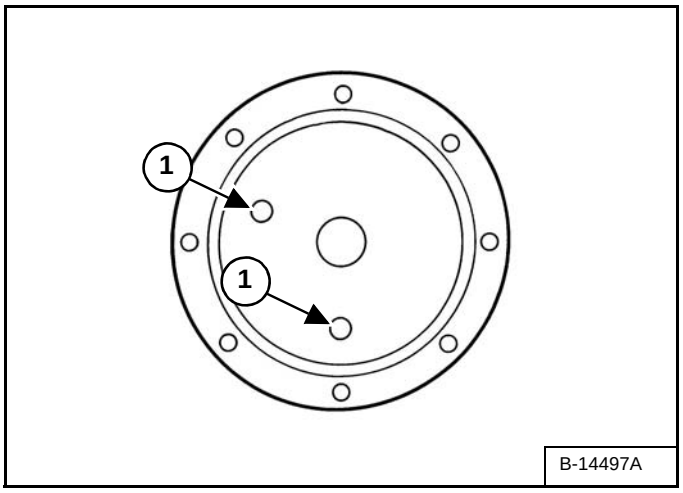
The tools listed will be needed to disassemble the travel motor:

MEL1553 Tool Kit
MEL1553-1 Motor Seal Installing Tool
MEL1553-2 Motor Seal Installing Tool
MEL1553-3 Motor Seal Installing Tool
MEL1553-4 Spanner Wrench

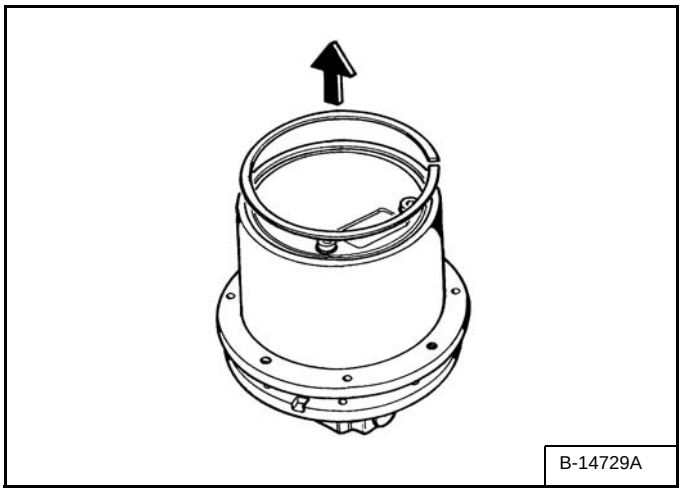
Figure 20-71-4



Remove the drain plugs (Item 1) **[Figure 20-71-4]** from the end cover.

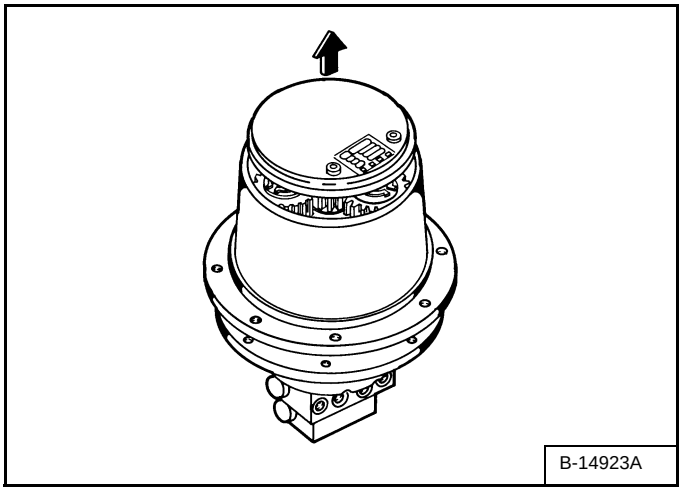
Drain the oil into a container.

Figure 20-71-5



Remove the internal snap ring from the travel motor housing **[Figure 20-71-5]**.

Figure 20-71-6



Use two screw drivers to pry the cover out of the housing **[Figure 20-71-6]**.

Air pressure may also be used to remove the cover.

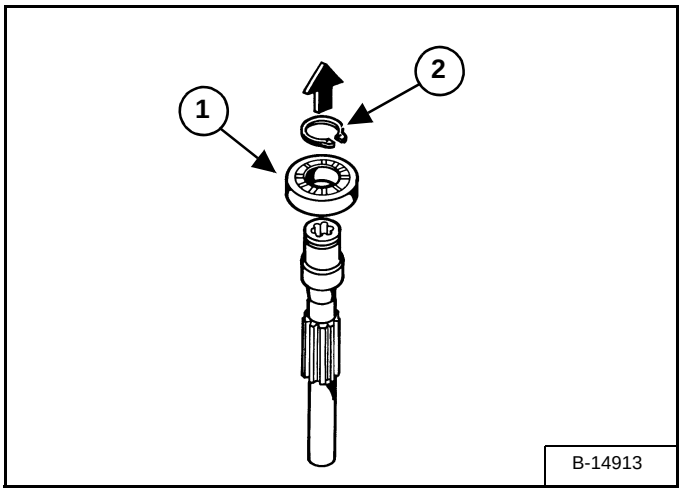
Assembly

The tools listed will be needed to assemble the travel motor:

MEL1553 - Tool Kit
MEL1553-1 Motor Seal Installing Tool
MEL1553-2 Motor Seal Installing Tool
MEL1553-3 Motor Seal Installing Tool
MEL1553-4 Spanner Wrench

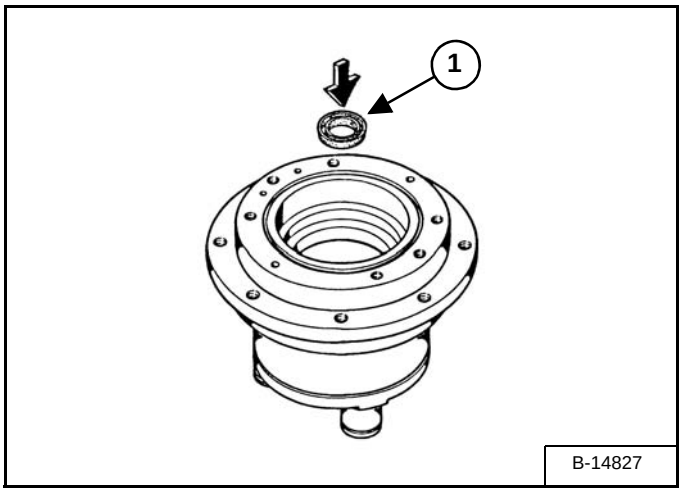
Clean all parts in solvent and dry with compressed air. Inspect all parts and replace any that are damaged. If any of the planetary gears are damaged, replace all the planetary gears and sun gear from the planetary assembly that is damaged. One damaged gear can cause a microscopic fatigue crack in mating teeth and cause premature failure after servicing. Apply oil to all O-rings (as noted) and light grease to the ball and roller bearings before installation.

Figure 20-71-40



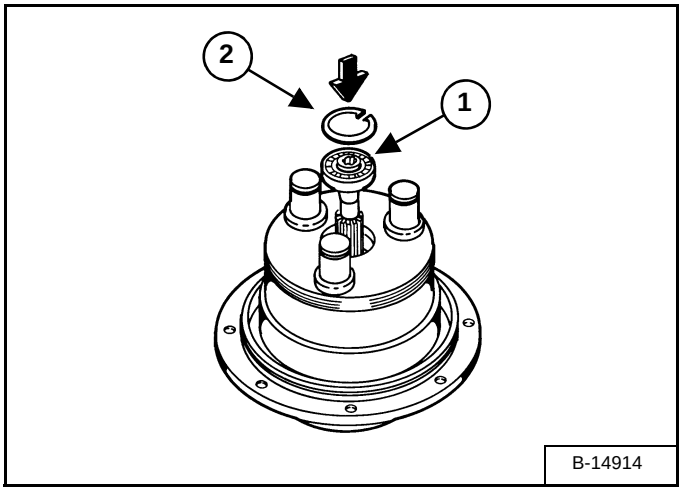
Install the bearing (Item 1) and snap ring (Item 2) **[Figure 20-71-40]** on the drive shaft.

Figure 20-71-41



Apply oil to the inside diameter of the oil seal and install the oil seal (Item 1) **[Figure 20-71-41]** in the hub.

Figure 20-71-42



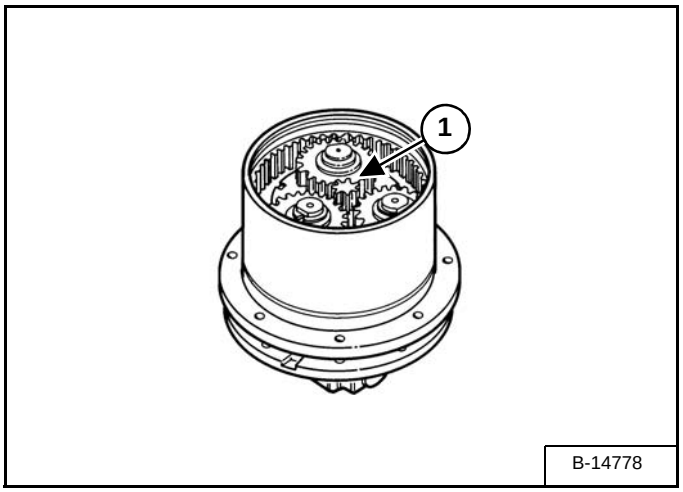
Install the drive shaft (Item 1) **[Figure 20-71-42]** in the hub.

NOTE: Make sure the bearing is seated in the hub.

Install the internal snap ring (Item 2) **[Figure 20-71-42]**.

Assembly (Cont'd)

Figure 20-71-78



Place a 0.500 in. (13 mm) long piece of 0.063 in. (1,5 mm) solder on the end of the sun gear (Item 1) **[Figure 20-71-78]**.

Seat the cover in the hub.

Remove the cover and measure the solder.

If the clearance between the sun gear and cover bushing does not meet specifications, order the bushing shim kit from Bobcat Parts.

P/N 6669597	0.020 in. (0,5 mm)
P/N 6669598	0.030 in. (0,76 mm)
P/N 6669599	0.060 in. (1,27 mm)

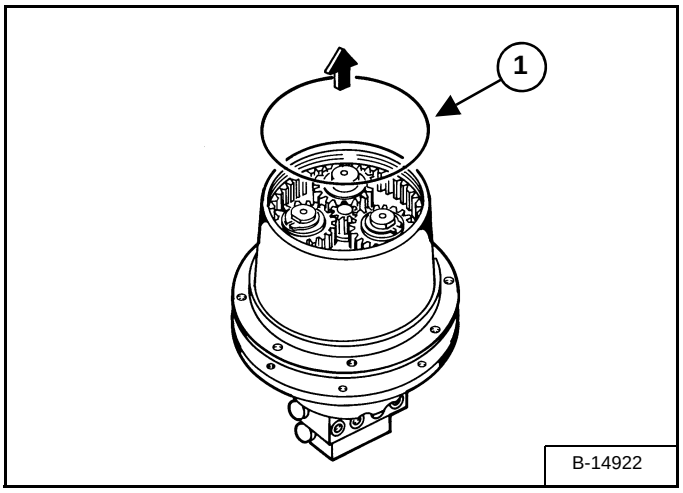
Remove the bushing.

Install the correct shim under the bushing and install the bushing.

NOTE: Make sure there are no burrs on the bushing face from bushing removal.

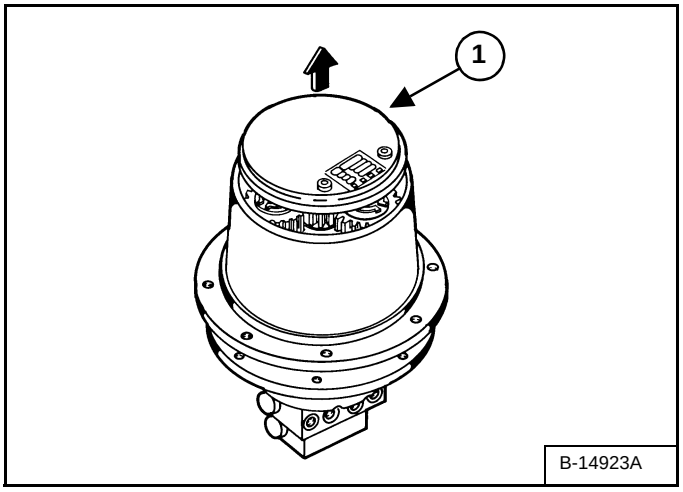
Repeat the procedure for checking clearance between the sun gear and cover bushing.

Figure 20-71-79



Apply oil to and install the O-ring (Item 1) **[Figure 20-71-79]** in the housing.

Figure 20-71-80



Install the cover (Item 1) **[Figure 20-71-80]** on the housing.

SWING MOTOR

Description

The swing motor is a hydraulic motor that receives hydraulic fluid from the piston pump through the control valve to swing the upperstructure left or right. The speed that the swing motor rotates is related to the amount of hydraulic fluid it receives.

Removal And Installation

Remove the floormat and floor panel. (See Removal And Installation (Cab Equipped) on Page 40-90-3.)

Remove the levers/pedals. (See Removal And Installation on Page 40-110-1.)

IMPORTANT

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

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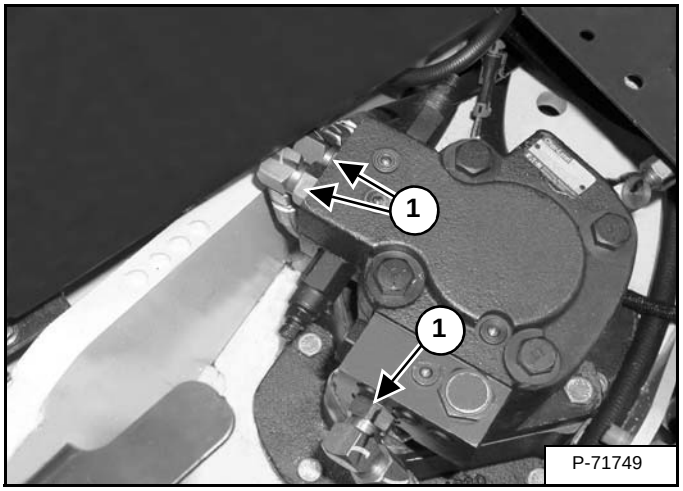
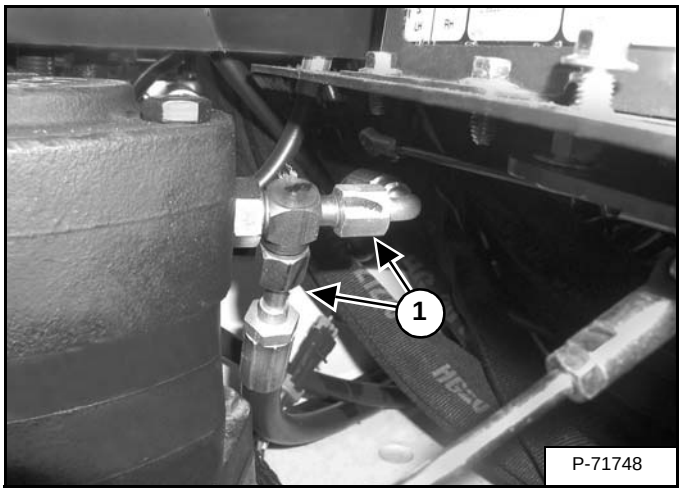
Figure 20-90-1



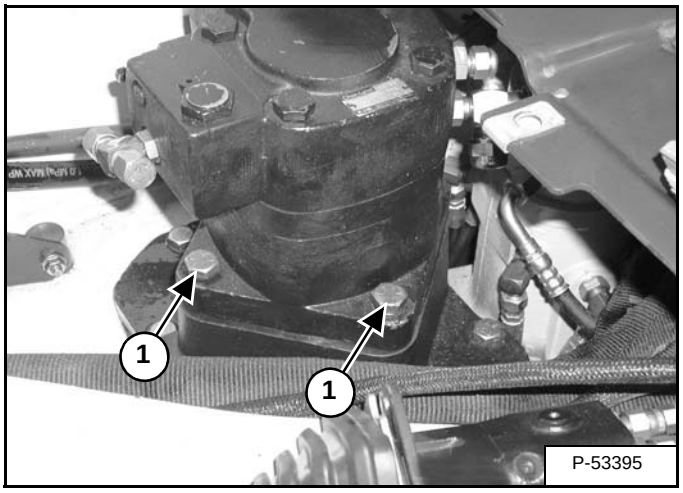
Remove the hoses (Item 1) **[Figure 20-90-1]**.

Figure 20-90-2



Remove the hoses (Item 1) **[Figure 20-90-2]**.

Figure 20-90-3

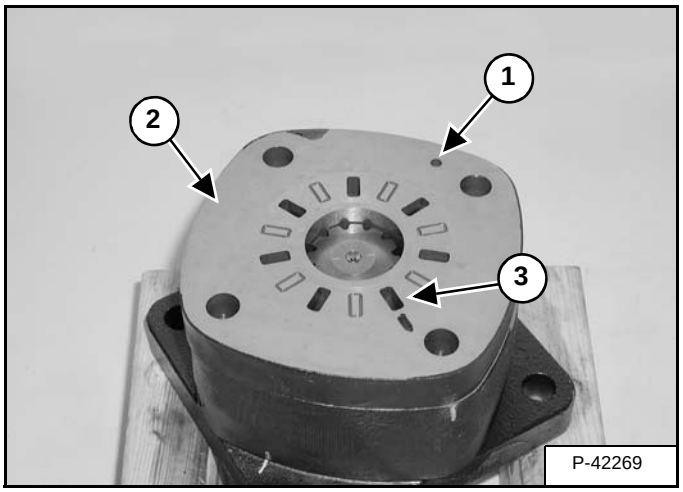


Remove the four bolts (Item 1) **[Figure 20-90-3]**.

Installation: Apply thread adhesive (Loctite® 242) to the bolt threads. Tighten the bolts to 90 - 100 ft.-lb. (125 - 135 N•m) torque.

Assembly (Cont'd)

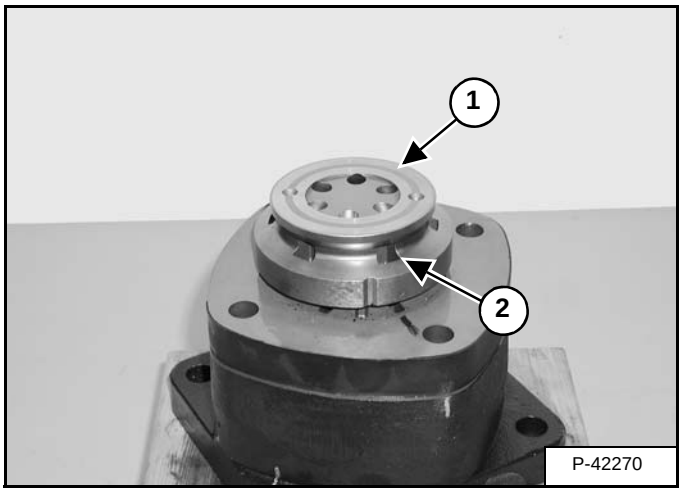
Figure 20-90-31



Align the case drain hole (Item 1) in the valve plate (Item 2) **[Figure 20-90-31]** with the case drain hole in the Geroler®. Install the valve plate (seal side toward Geroler®) on the Geroler®.

NOTE: Locate the slot opening (Item 3) [Figure 20-90-31] in the valve plate which is in line with the largest opening (marked earlier) in the Geroler®.

Figure 20-90-32



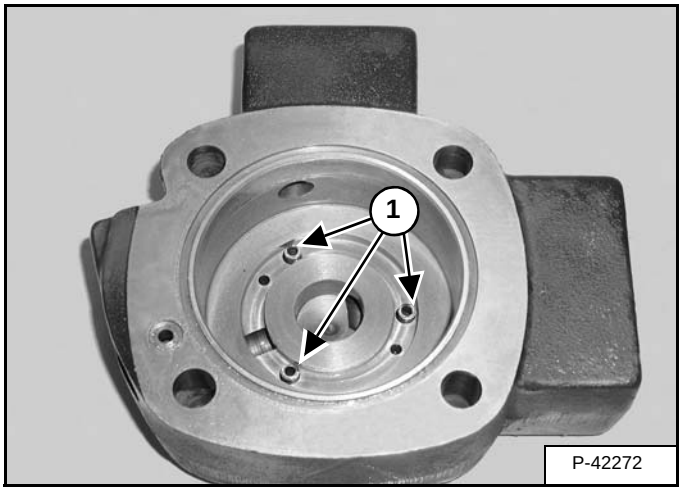
Install the valve (Item 1) **[Figure 20-90-32]**.

Locate any one of the side openings of the valve (Item 2) **[Figure 20-90-32]** that goes through to the face of the valve.

Line up this side opening with the open slot of the valve plate that is in line with the largest opening of the Geroler® (marked earlier).

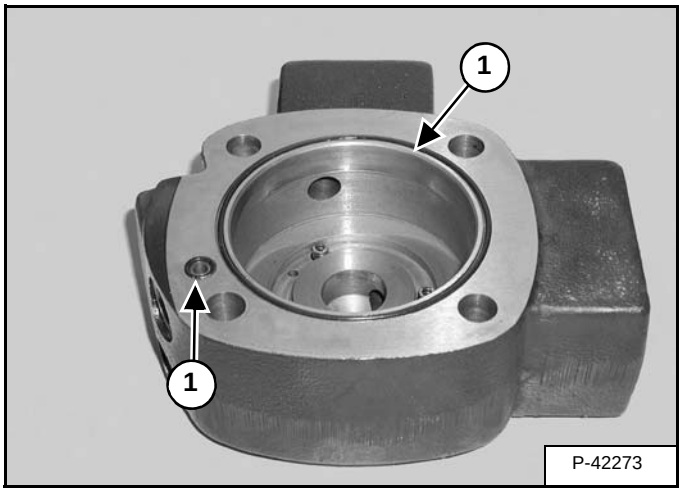
Rotate the valve clockwise until the spline teeth engage in the valve.

Figure 20-90-33



Apply clean grease on the three balance ring assembly springs (Item 1) **[Figure 20-90-33]** and install the springs in the holes located inside of the valve housing.

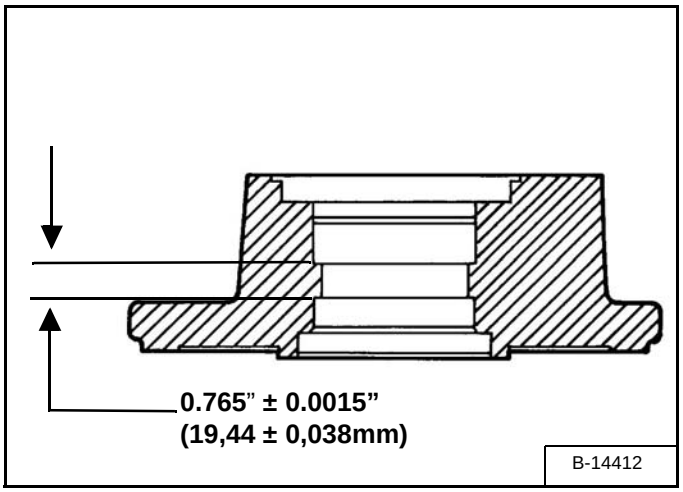
Figure 20-90-34



Install the O-rings (Item 1) **[Figure 20-90-34]** on the valve housing.

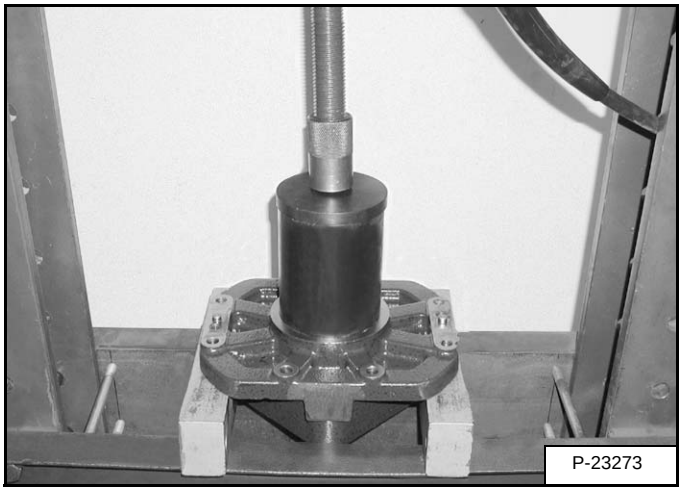
Assembly (Cont'd)

Figure 20-91-17



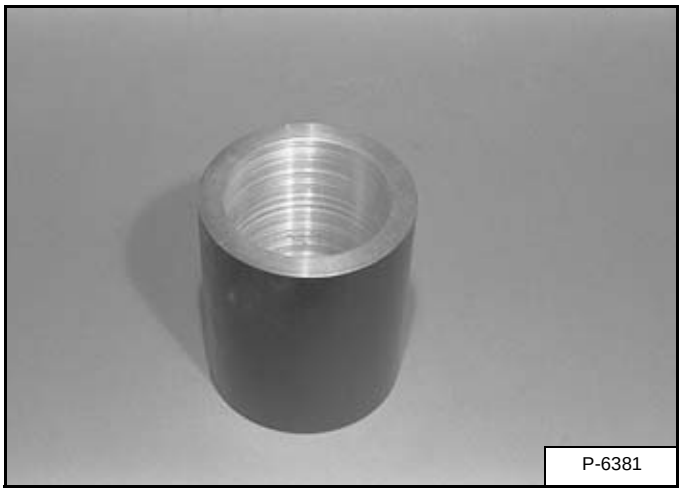
Housing top bearing cup seat to bottom bearing cup seat 0.765 in. ± 0,0015 in. (19.44 ± 0,038 mm) **[Figure 20-91-17]**.

Figure 20-91-18



Install the seal in the bottom of the carrier **[Figure 20-91-18]**.

Figure 20-91-19

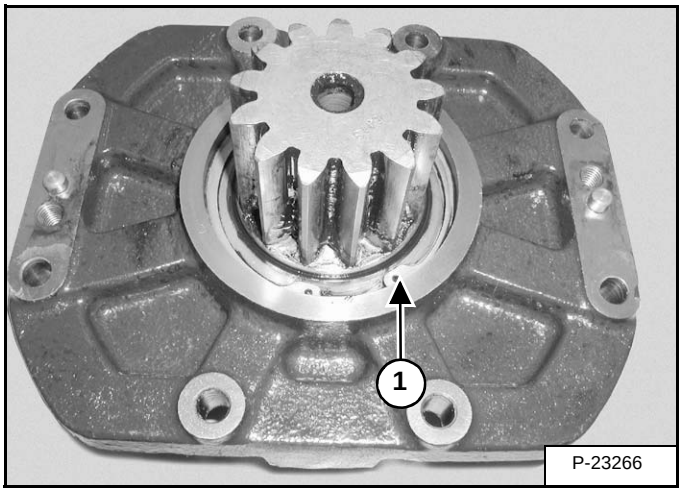


A seal installation tool can be made locally **[Figure 20-91-19]**.

Dimensions of the seal installation tool:

I.D.	3.250 in. (82,55 mm)
O.D.	4.0 in. (101,6 mm)
Height	5.0 in. (127 mm)

Figure 20-91-20

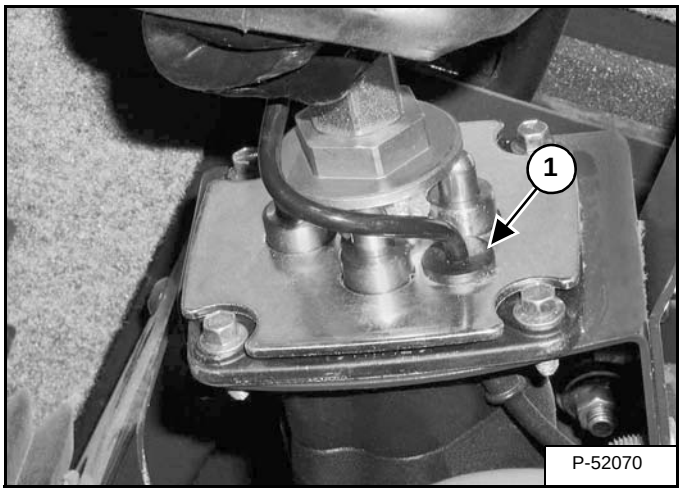


Install the bottom snapring (Item 1) **[Figure 20-91-20]**.

After the drive assembly has been installed in the excavator, fill the carrier with enough hydraulic fluid to cover the top bearing, before installing the swing motor.

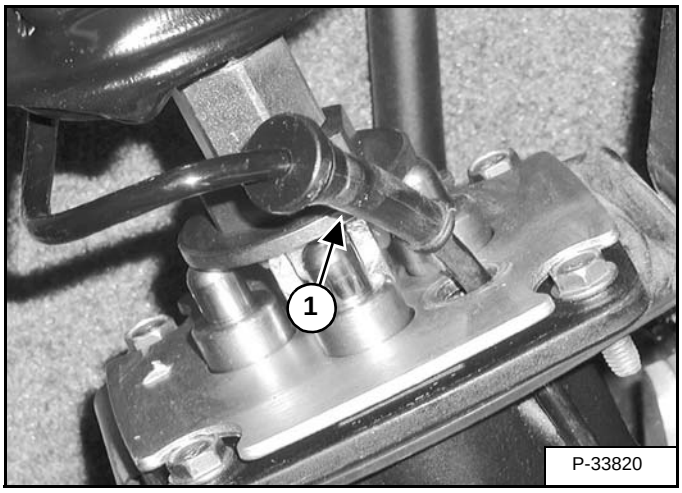
Handle Removal And Installation (Cont'd)

Figure 20-110-17



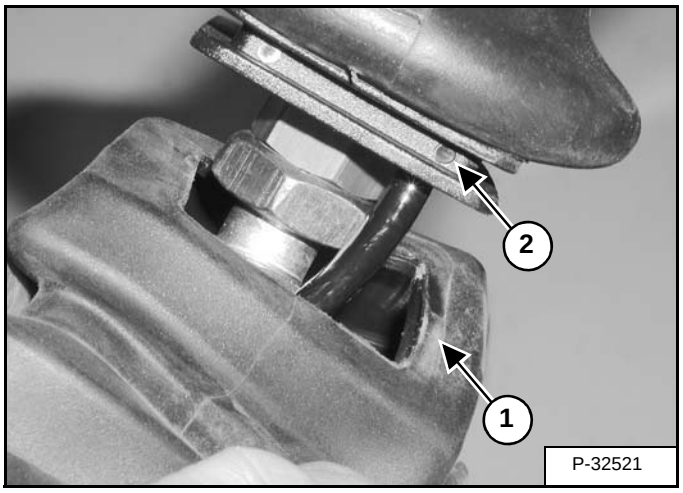
Lift the grommet (Item 1) **[Figure 20-110-17]** from the mount plate.

Figure 20-110-18



Remove the wire and grommet (Item 1) **[Figure 20-110-18]**.

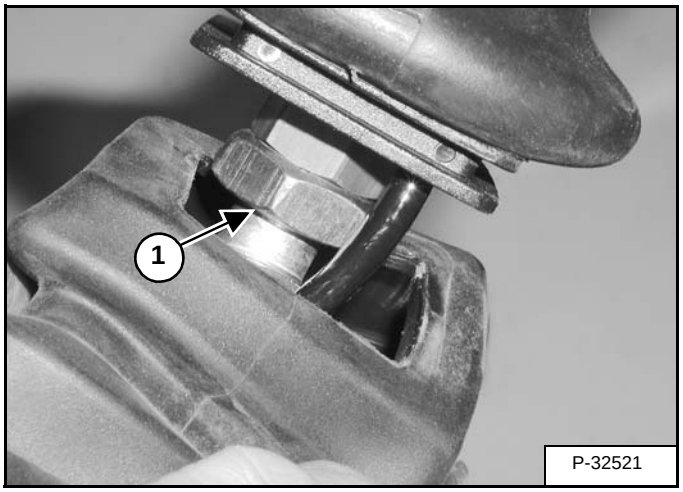
Figure 20-110-19



Pull the boot (Item 1) **[Figure 20-110-19]** down.

Installation: The top of the boot is molded to fit over the flange of the joystick. It has tabs that fit between the handle and joystick flange (Item 2) **[Figure 20-110-19]**. Install the boot properly before installing the console cover.

Figure 20-110-20



Loosen the nut (Item 1) **[Figure 20-110-20]**.

Remove the handle.

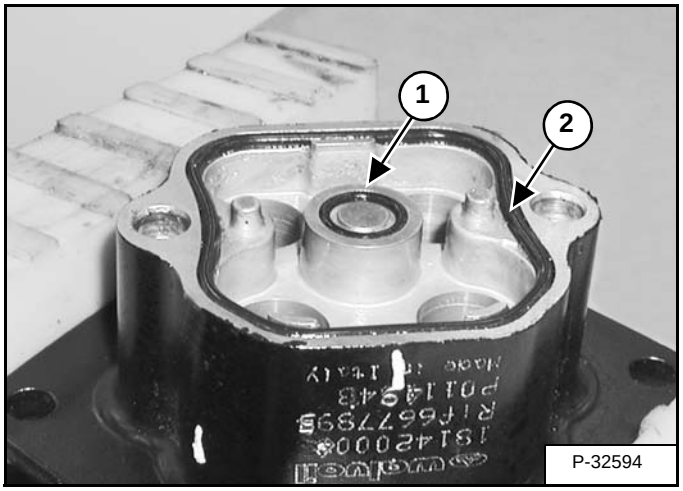
Assembly

Clean all parts in solvent and dry with compressed air.

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

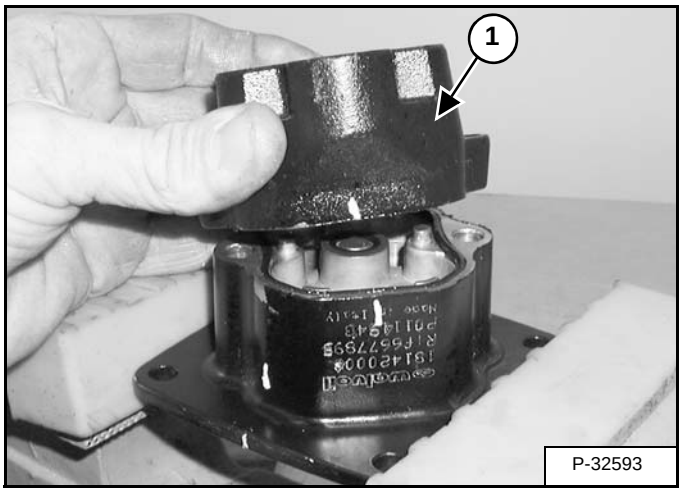
Always install new seals and O-rings. Lubricate all seals and O-rings with clean hydraulic fluid before installation.

Figure 20-110-48



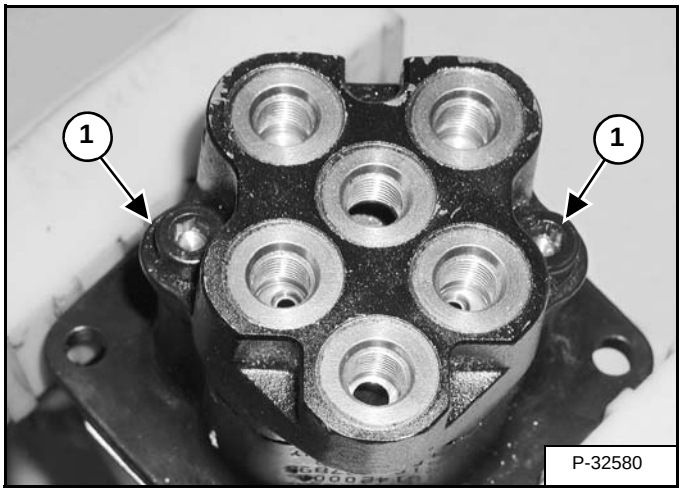
Clamp the housing in a vise equipped with padded jaws. Install the O-ring (Item 1) and seal (Item 2) **[Figure 20-110-48]**.

Figure 20-110-49



Install the end cap (Item 1) **[Figure 20-110-49]**.

Figure 20-110-50

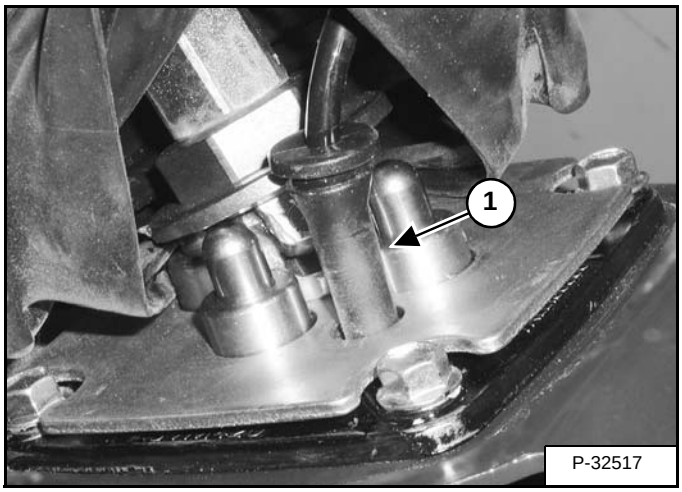


Install the two bolts (Item 1) **[Figure 20-110-50]**.

Turn the housing over.

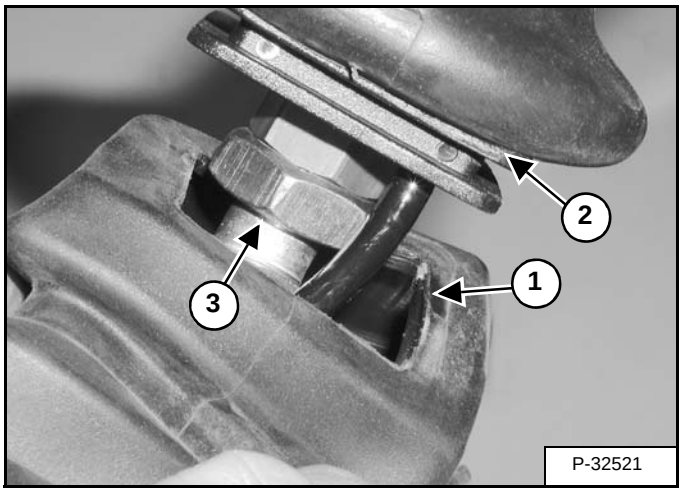
Handle Removal And Installation (Cont'd)

Figure 20-111-14



Remove the grommet and wire (Item 1) **[Figure 20-111-14]** from the mount plate.

Figure 20-111-15



Remove the boot (Item 1) **[Figure 20-111-15]** from the joystick handle.

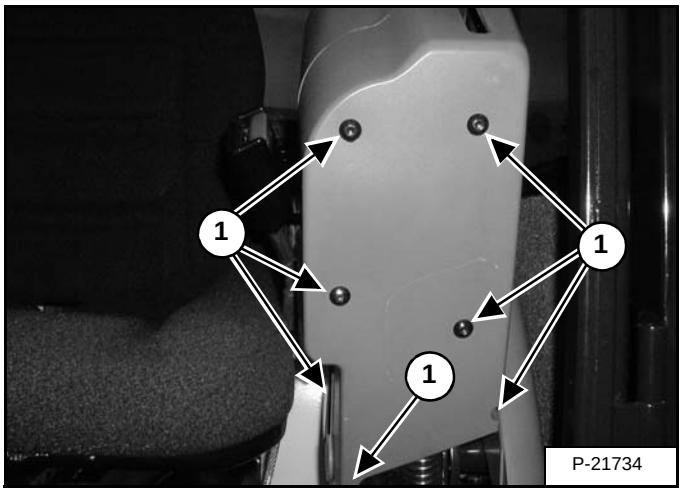
Installation: Align the top of the dust boot (Item 1) with the groove (Item 2) **[Figure 20-111-15]**.

Hold the boot down and loosen the nut (Item 3) **[Figure 20-111-15]**.

Remove the handle.

Removal And Installation

Figure 20-111-16

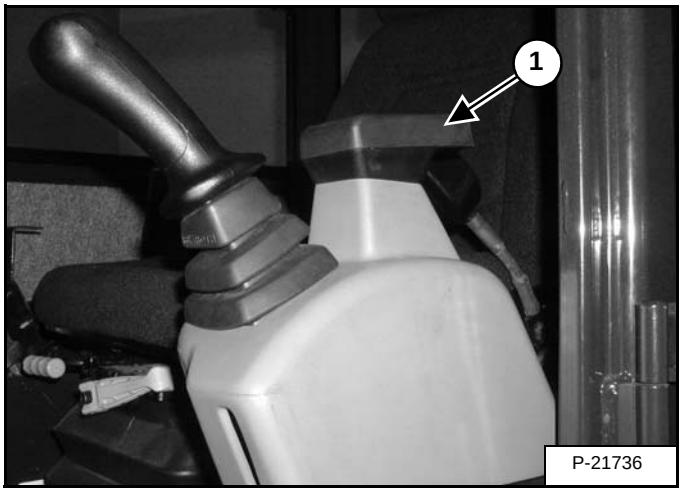


Remove the seven mounting bolts (Item 1) **[Figure 20-111-16]** from the bottom of the operator console.

Remove the bottom of the console cover.

Lower the console.

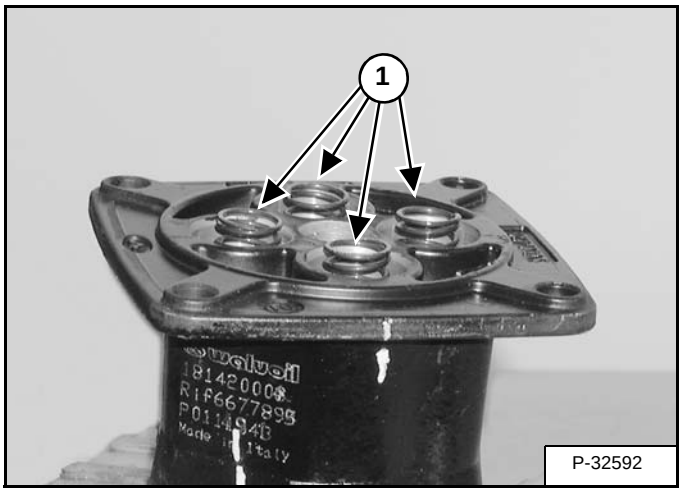
Figure 20-111-17



Remove the cover (Item 1) **[Figure 20-111-17]** from the arm rest.

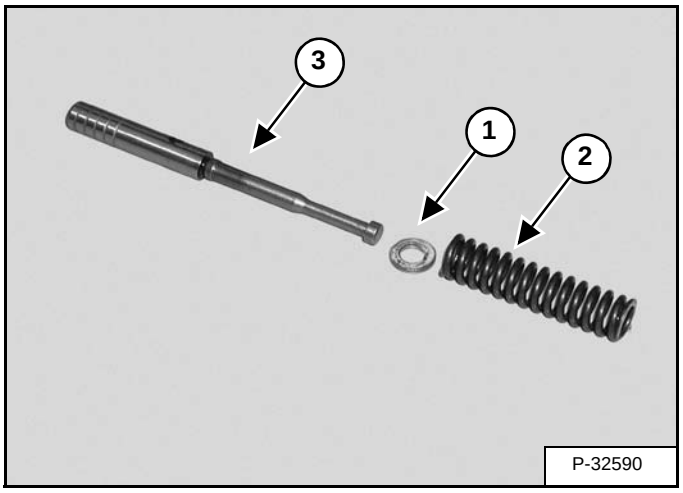
Assembly (Cont'd)

Figure 20-111-43



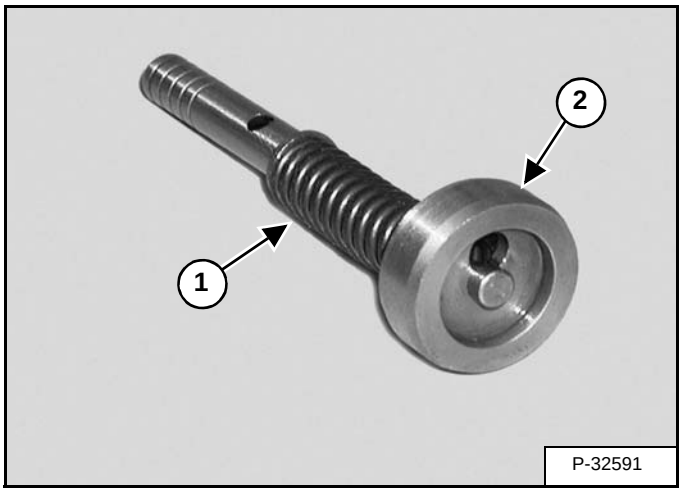
Install the springs (Item 1) **[Figure 20-111-43]**.

Figure 20-111-44



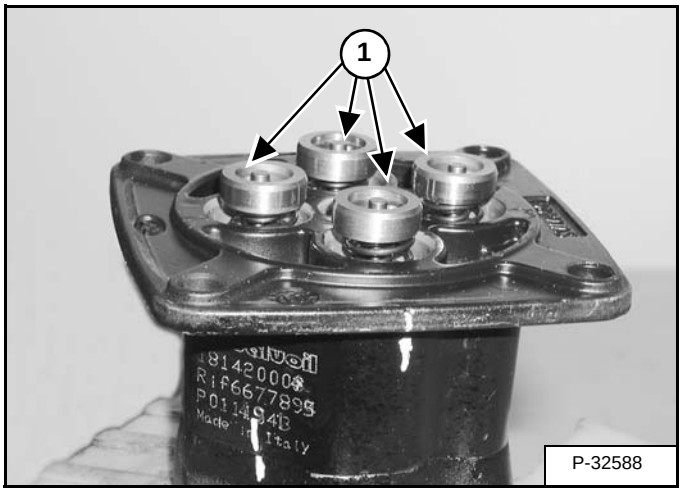
Install the shim (Item 1) and spring (Item 2) on the spool (Item 3) **[Figure 20-111-44]**.

Figure 20-111-45



Compress the spring (Item 1) and install the spring seat (Item 2) **[Figure 20-111-45]**.

Figure 20-111-46



Install the spool assemblies (Item 1) **[Figure 20-111-46]** into the housing.

OIL COOLER

Description

The oil cooler is used to cool the excavators hydraulic fluid. Oil passages are coiled into a heat exchanger. The air is forced around these passages cooling the oil.

Removal And Installation

IMPORTANT

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

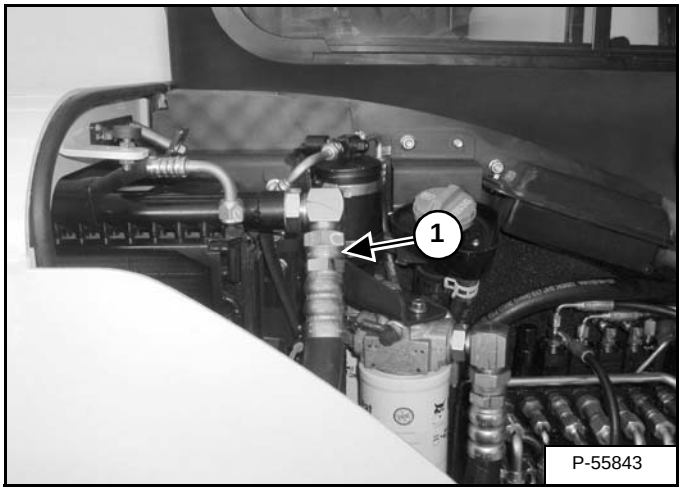
I-2003-0888

Open the right side cover.

Open the tailgate.

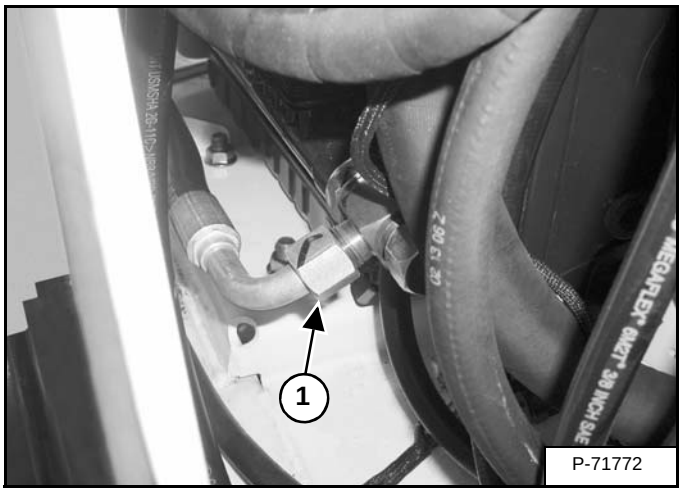
Drain the hydraulic reservoir.(See Checking And Adding Fluid on Page 10-100-1.)

Figure 20-140-1



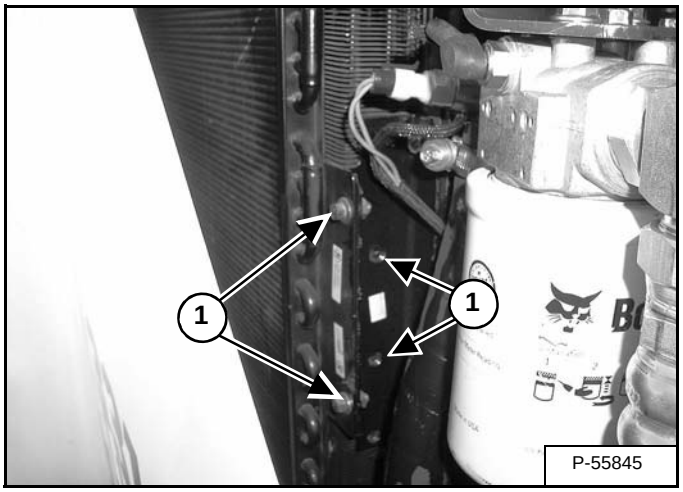
Remove the hose (Item 1) **[Figure 20-140-1]** that goes from the filter housing to the top of the oil cooler.

Figure 20-140-2



Remove the hose (Item 1) **[Figure 20-140-2]** from the bottom of the oil cooler.

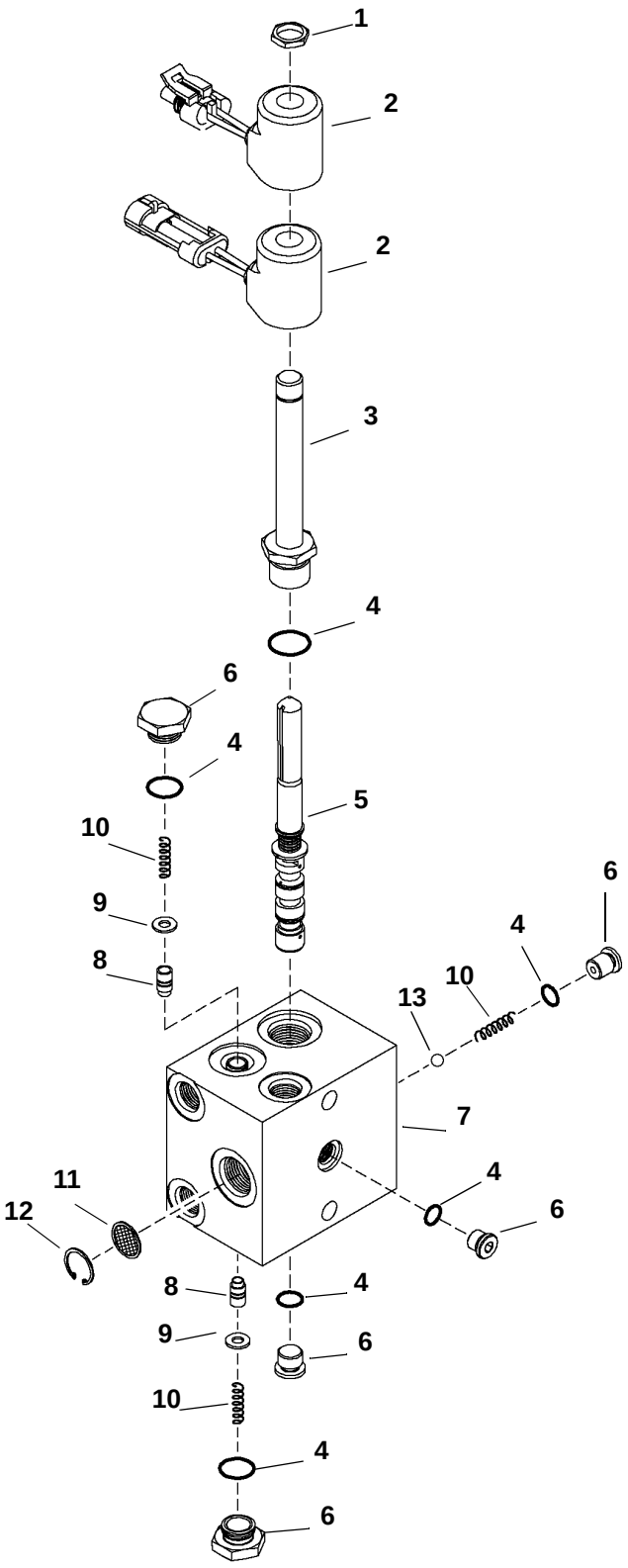
Figure 20-140-3



Remove the bolts (Item 1) **[Figure 20-140-3]** from the oil cooler.

Parts Identification

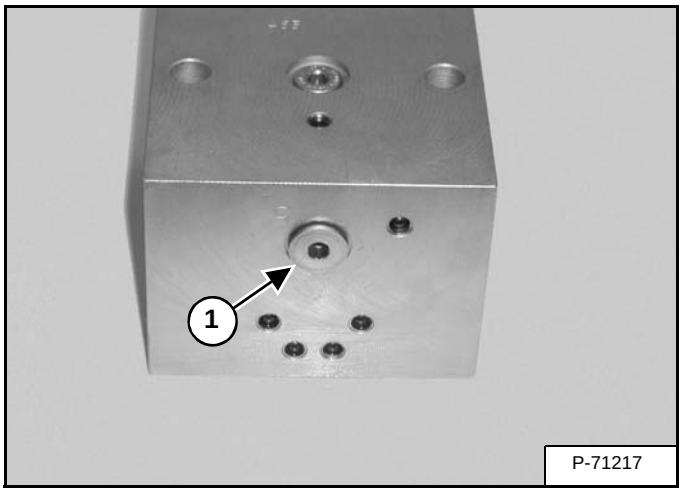
1. Nut
2. Solenoid
3. Spool
4. O-ring
5. Actuator Assembly
6. Plug
7. Valve
8. Poppet
9. Flat Washer
10. Spring
11. Screen
12. Snap Ring
13. Ball



MS-1461S

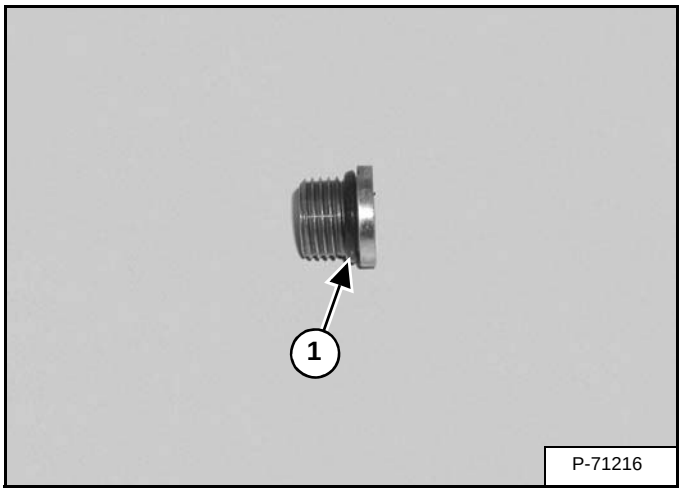
Assembly (Cont'd)

Figure 20-160-47



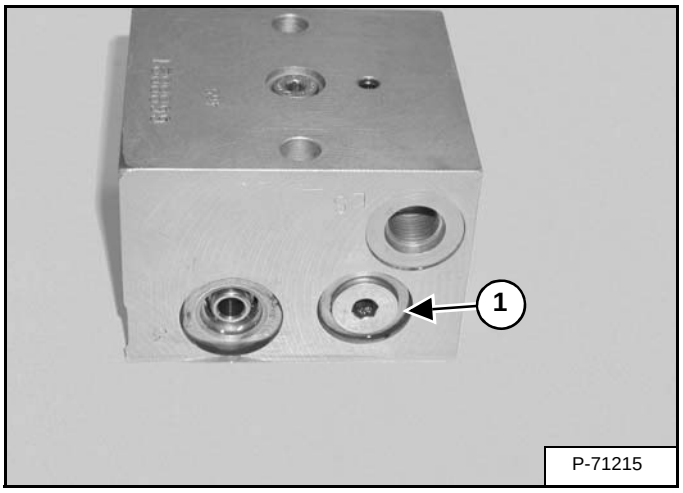
Install the plug (Item 1) **[Figure 20-160-47]**.

Figure 20-160-48



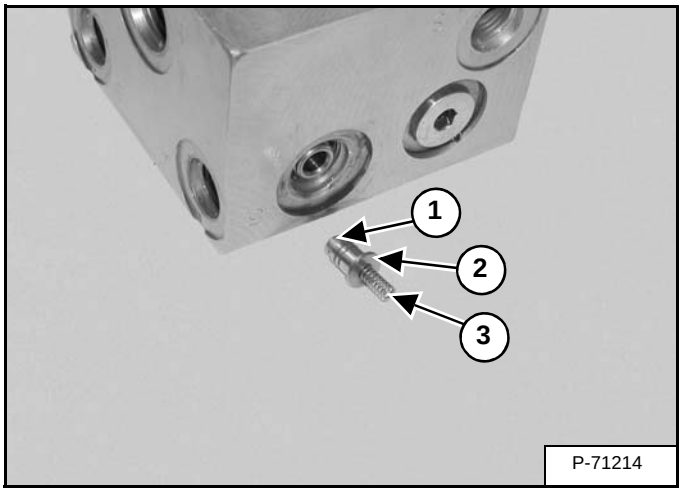
Install the O-ring (Item 1) **[Figure 20-160-48]** on the plug.

Figure 20-160-49



Install the plug (Item 1) **[Figure 20-160-49]**.

Figure 20-160-50

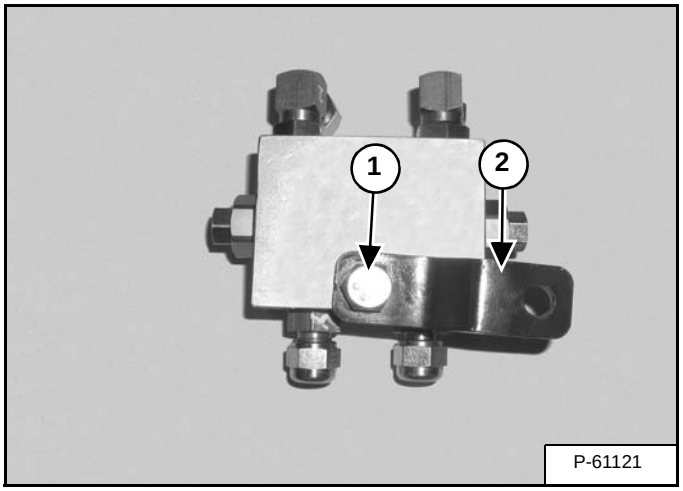


Install the poppet (Item 1), flat washer (Item 2) and spring (Item 3) **[Figure 20-160-50]**.

Disassembly

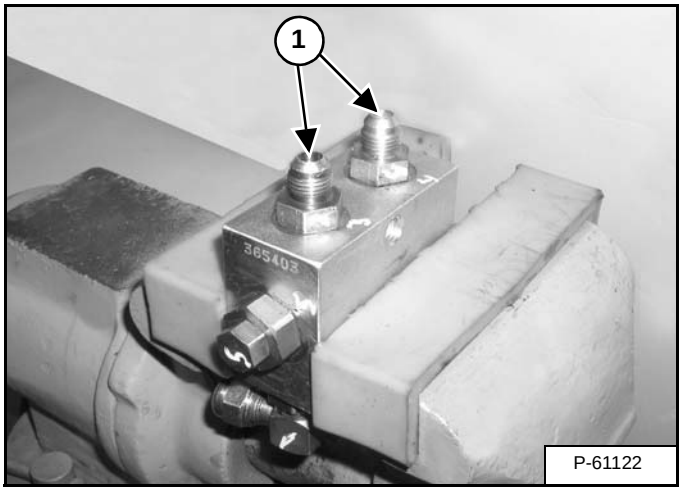
Clean the outside of the boom swing lock valve before disassembly.

Figure 20-170-4



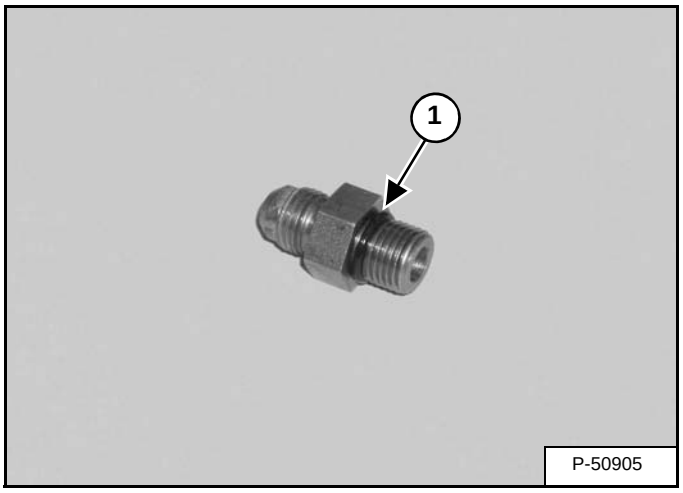
Remove the bolt (Item 1) and bracket (Item 2) **[Figure 20-170-4]**.

Figure 20-170-5



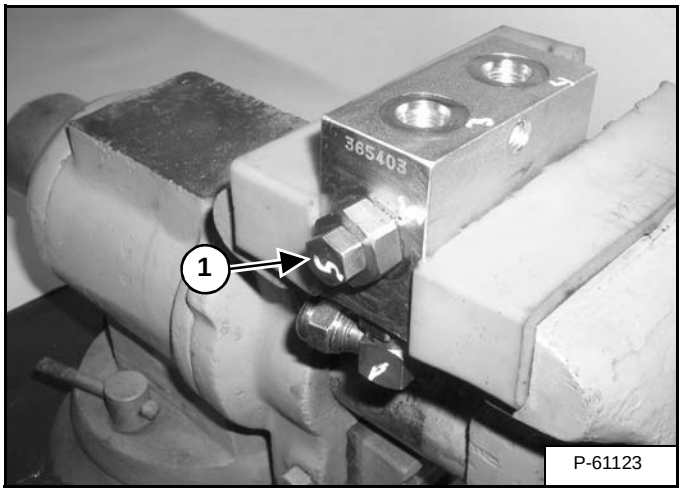
Remove the four fittings (Item 1) **[Figure 20-170-5]** (two per side) from the valve housing.

Figure 20-170-6



Remove the O-ring (Item 1) **[Figure 20-170-6]** from the fittings.

Figure 20-170-7



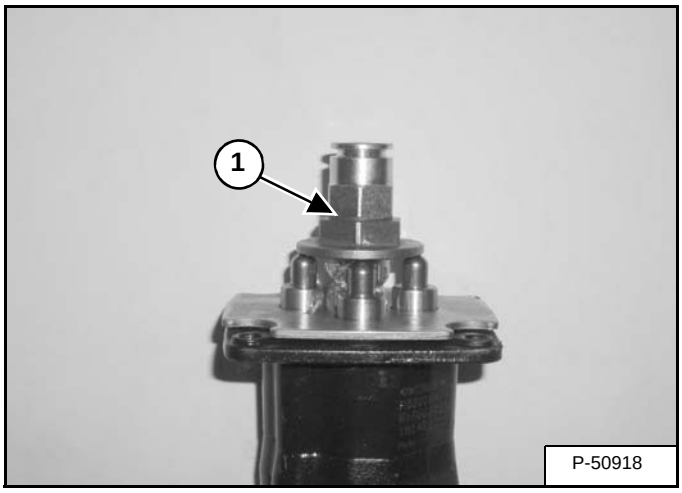
Remove the plug (Item 1) **[Figure 20-170-7]** from both ends of the valve body.

Disassembly And Assembly

Clean the outside of the travel control valve before disassembly.

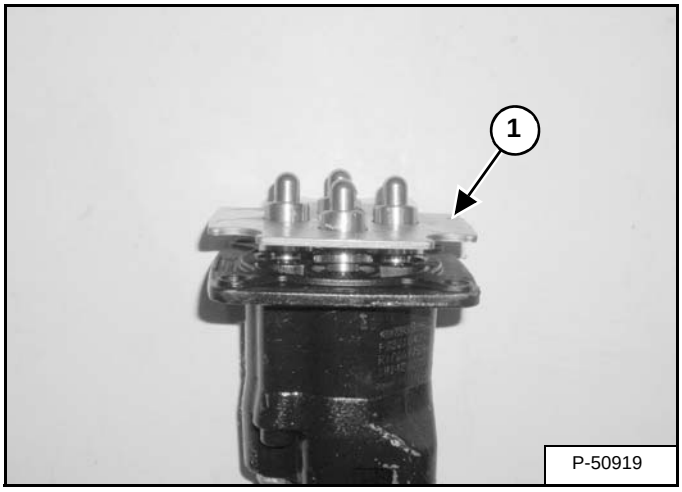
Mark the outside of the travel control valve for ease of assembly.

Figure 20-180-4



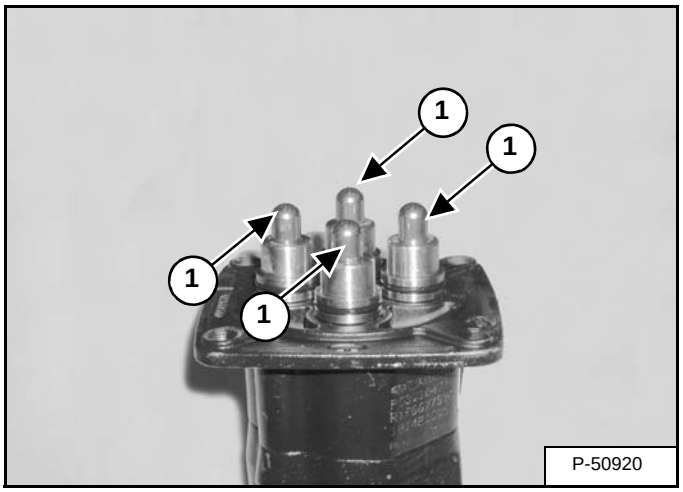
Remove the swivel joint (Item 1) **[Figure 20-180-4]**.

Figure 20-180-5



Remove the plate (Item 1) **[Figure 20-180-5]**.

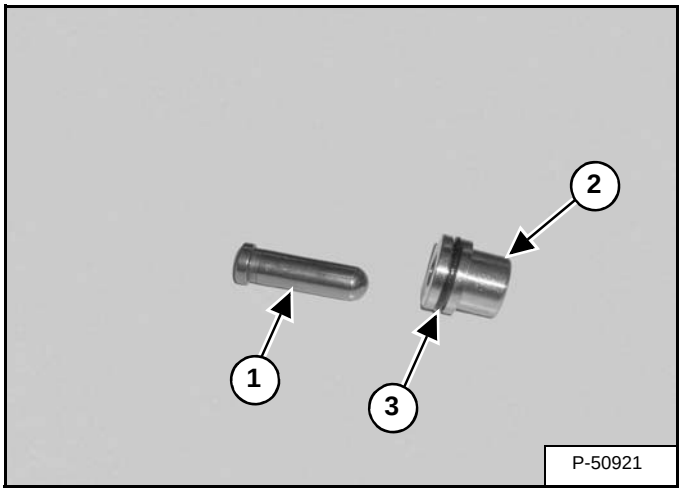
Figure 20-180-6



Remove the plunger assemblies (Item 1) **[Figure 20-180-6]** from the valve body.

NOTE: Install the plunger assemblies in the same bore from which they are removed.

Figure 20-180-7

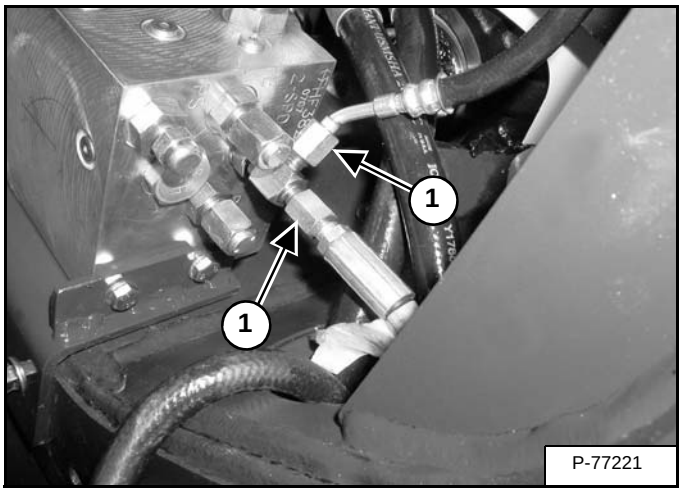


Remove the plunger (Item 1) from the plunger body (Item 2) **[Figure 20-180-7]**.

Remove the O-ring (Item 3) **[Figure 20-180-7]**.

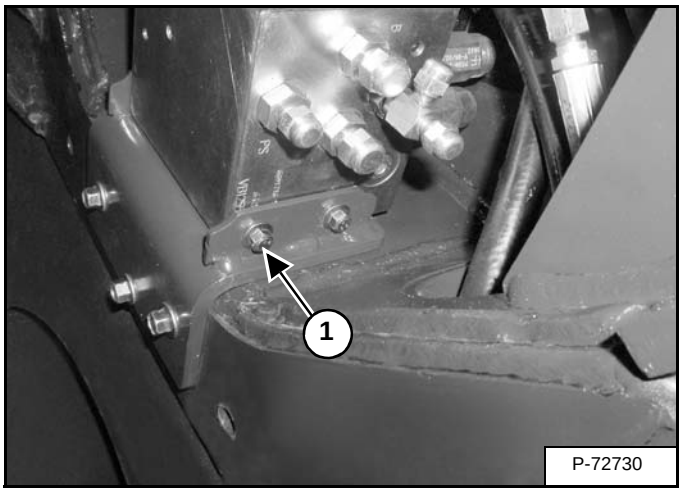
Removal And Installation (Cont'd)

Figure 20-190-16



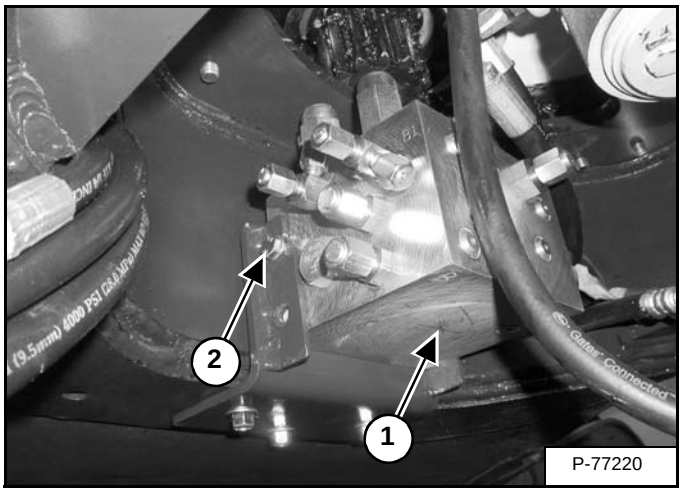
Remove the two hoses (Item 1) **[Figure 20-190-16]** from the T fitting in the 2 speed port.

Figure 20-190-17



Remove the bolt (Item 1) **[Figure 20-190-17]** (both sides.)

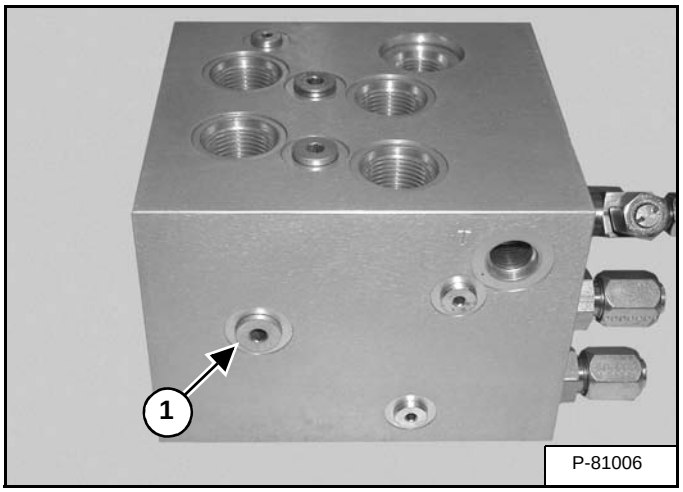
Figure 20-190-18



While supporting the diverter valve (Item 1) loosen the two remaining mounting bolts (Item 2) and remove the diverter valve (Item 1) **[Figure 20-190-18]**.

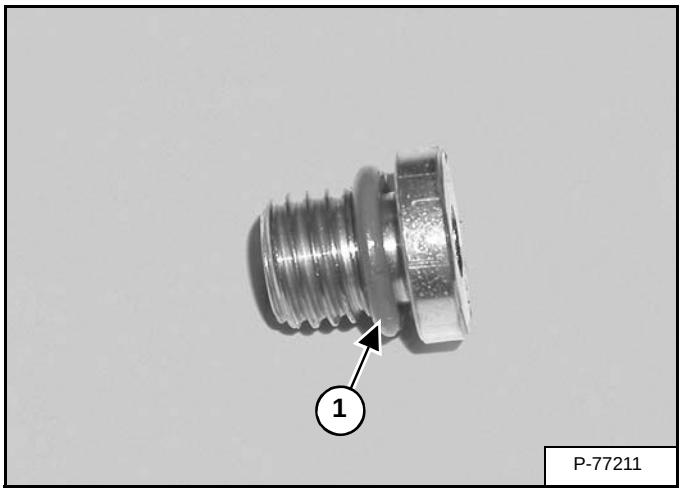
Disassembly (Cont'd)

Figure 20-190-51



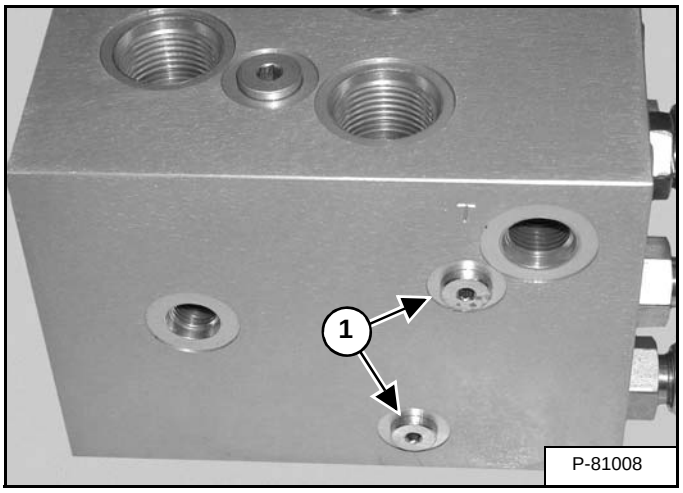
Remove the plug (Item 1) **[Figure 20-190-51]** from the angle blade valve.

Figure 20-190-52



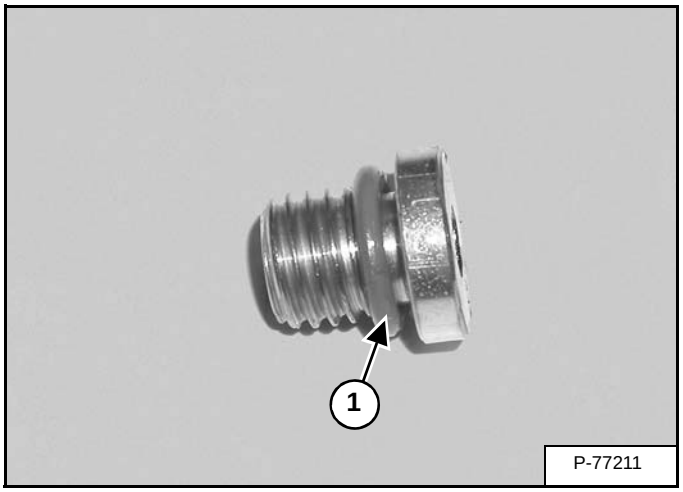
Remove the O-ring (Item 1) **[Figure 20-190-52]** from the plug and discard.

Figure 20-190-53



Remove the two plugs (Item 1) **[Figure 20-190-53]** from the angle blade valve.

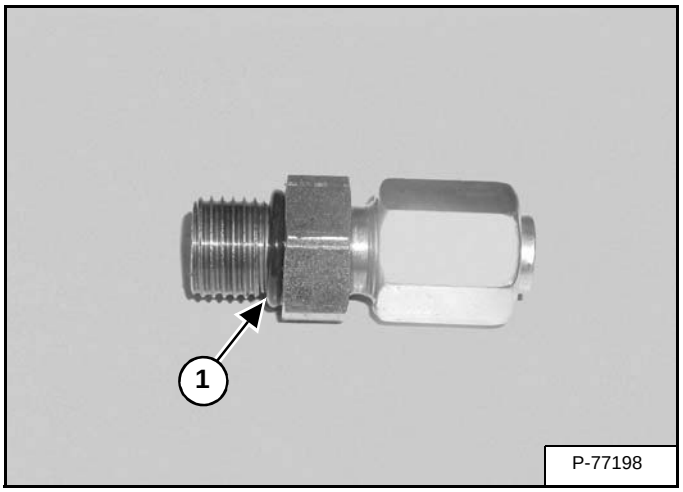
Figure 20-190-54



Remove the O-ring (Item 1) **[Figure 20-190-54]** from the plugs and discard.

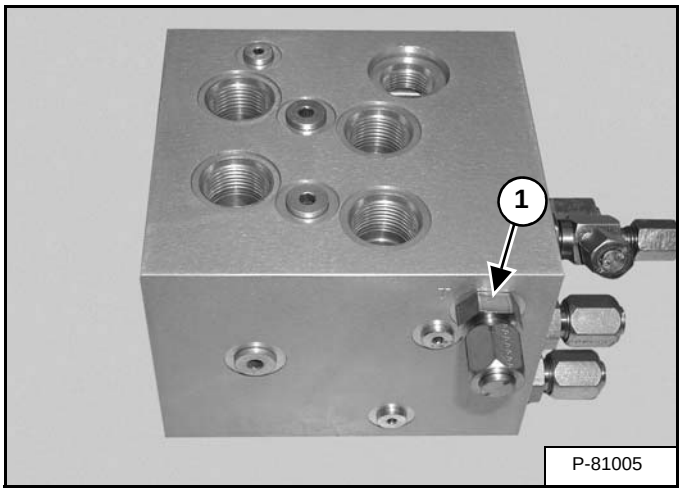
Assembly (Cont'd)

Figure 20-190-91



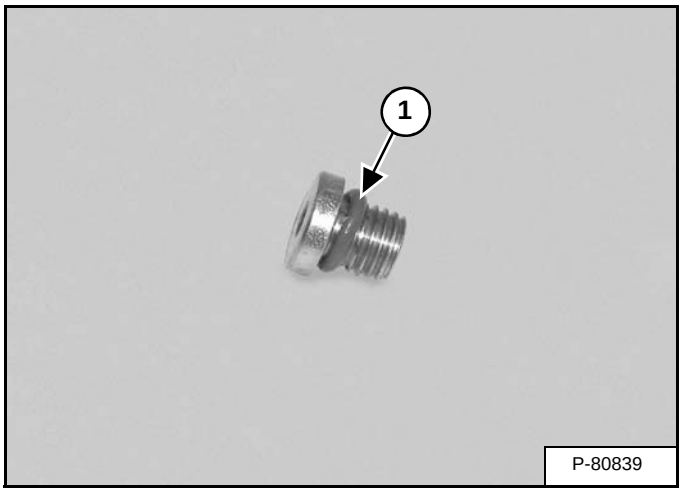
Install the O-ring (Item 1) **[Figure 20-190-91]** onto the fitting.

Figure 20-190-92



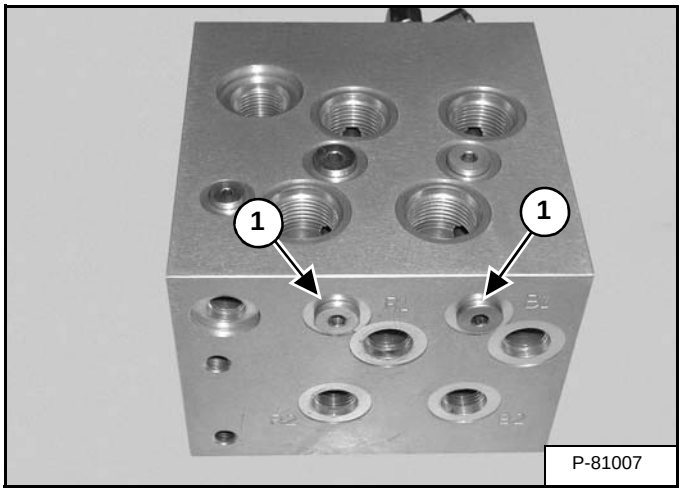
Install the fitting (Item 1) **[Figure 20-190-92]** into the T port of the angle blade valve.

Figure 20-190-93



Install the O-ring (Item 1) **[Figure 20-190-93]** onto the plug.

Figure 20-190-94



Install the plugs (Item 1) **[Figure 20-190-94]** into the angle blade valve.

BLADE

Description

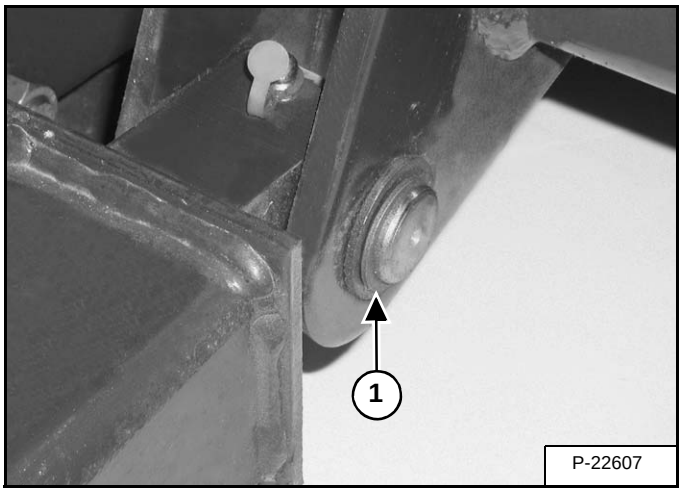
The blade is used for backfilling and stabilizing the excavator during excavating operation. The blade is hydraulically raised or lowered by use of two cylinders controlled by the blade lever in the cab or canopy.

Blade Removal And Installation

Lower the blade and bucket to the ground.

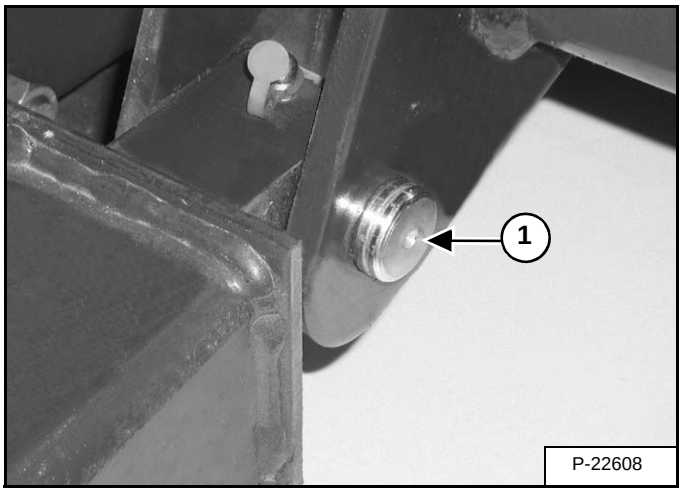
Remove the blade cylinder. (See Removal And Installation on Page 20-24-2.)

Figure 30-10-1



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

Figure 30-10-2



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

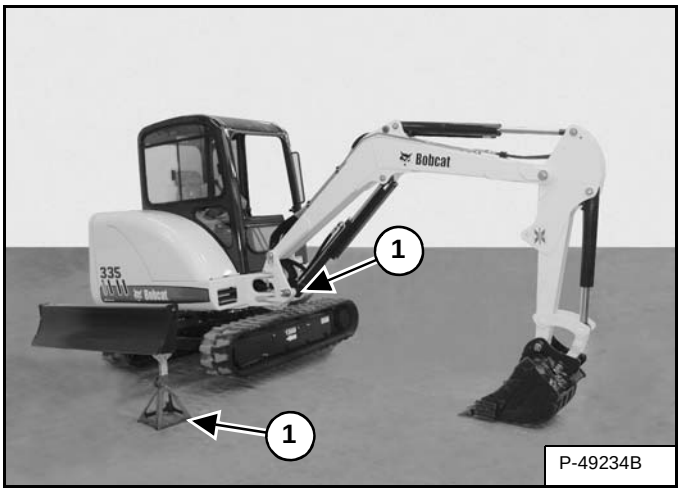
Remove the blade.

Checking Tension (Cont'd)

Steel Track

NOTE: The wear of undercarriage parts vary with working conditions and types of soil conditions. Maintain the correct track tension by inspecting regularly.

Figure 30-20-5



Raise one side of the machine (approximately 4 in.) using the boom and arm as shown in **[Figure 30-20-5]**.

Raise the blade fully and install jackstands under the blade and the track frame (Item 1) **[Figure 30-20-5]**. Lower the machine until all machine weight is on the jackstands.

Stop the engine.

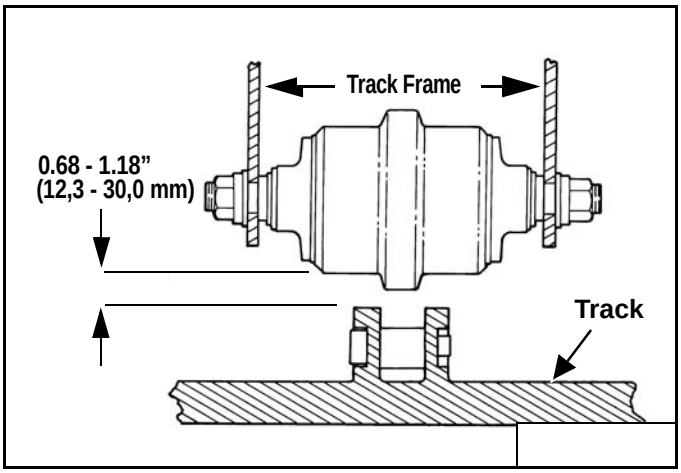
WARNING

AVOID INJURY

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

W-2142-0903

Figure 30-20-6



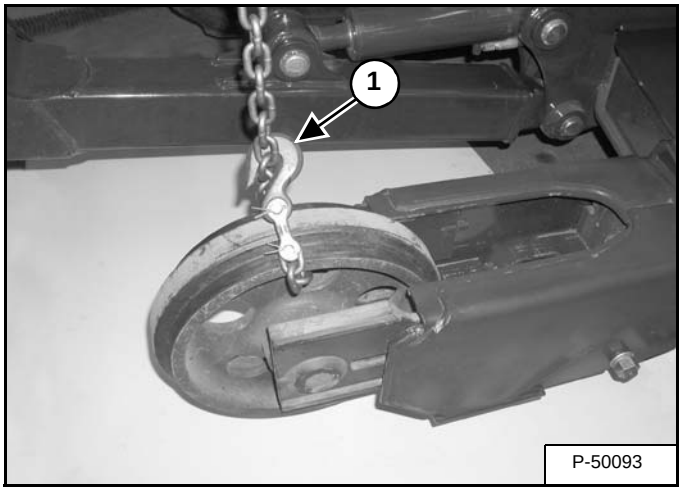
Measure the track clearance at the middle track roller. Do not get your fingers into pinch points between the track and the track roller. Use material of appropriate size to check the gap between the contact edge of the roller and top edge of the track guide **[Figure 30-20-6]**.

Steel Track Clearance 0.68 - 1.18" (17,3 - 30,0 mm).

Idler (Front) Removal And Installation

Remove the track. (See Rubber Track Removal And Installation on Page 30-20-5.) or (See Steel Track Removal And Installation on Page 30-20-8.).

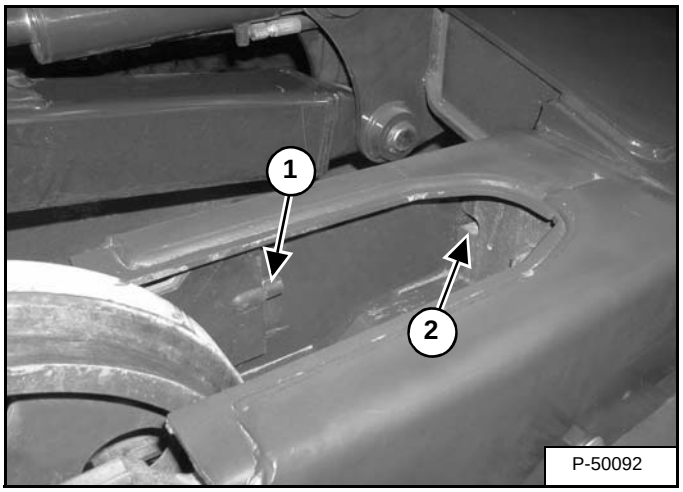
Figure 30-20-30



Install a chain hoist (Item 1) **[Figure 30-20-30]** on the front idler.

Remove the front idler.

Figure 30-20-31



Installation: The pin (Item 1) must engage the hole (Item 2) **[Figure 30-20-31]** in the recoil spring.

Recoil Spring Assembly And Cylinder Disassembly And Assembly (With Replaceable Shaft)

DO NOT DISASSEMBLE OR REPAIR THE COIL SPRING ASSEMBLY (Item 2) **[Figure 30-20-53]**.

⚠ WARNING

P-62574

AVOID INJURY OR DEATH

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

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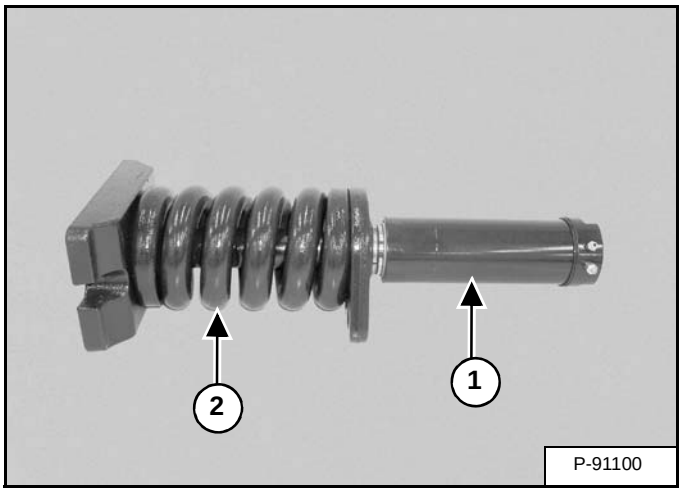
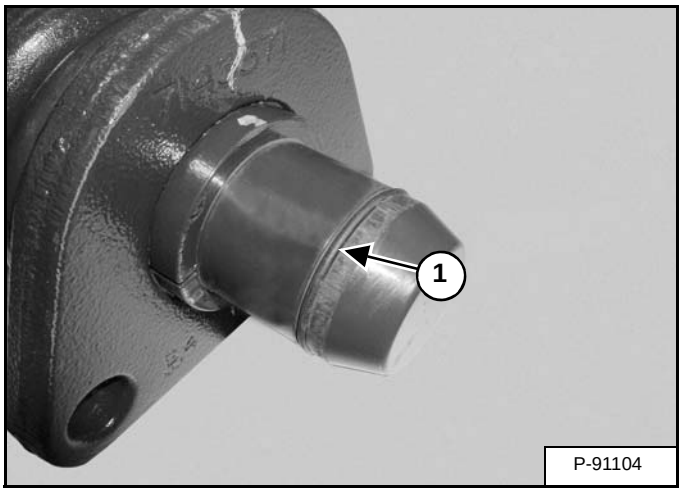
Figure 30-20-53



Remove the cylinder (Item 1) from the coil spring assembly (Item 2) **[Figure 30-20-53]**.

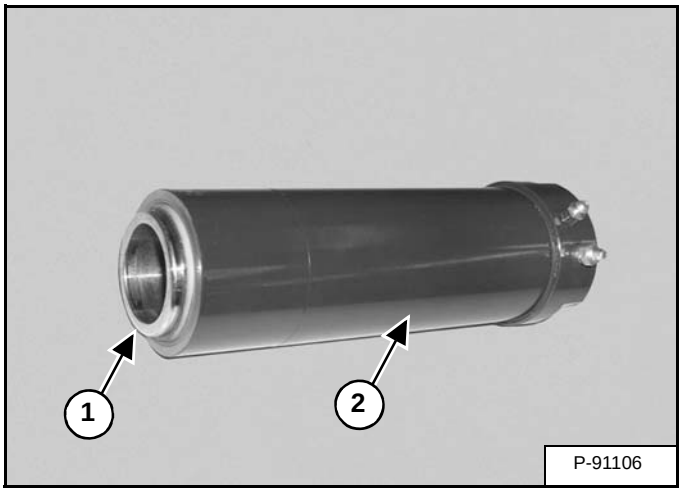
Figure 30-20-54



Remove the O-ring (Item 1) **[Figure 30-20-54]** from the cylinder.

Installation: Apply oil to the O-ring before installation.

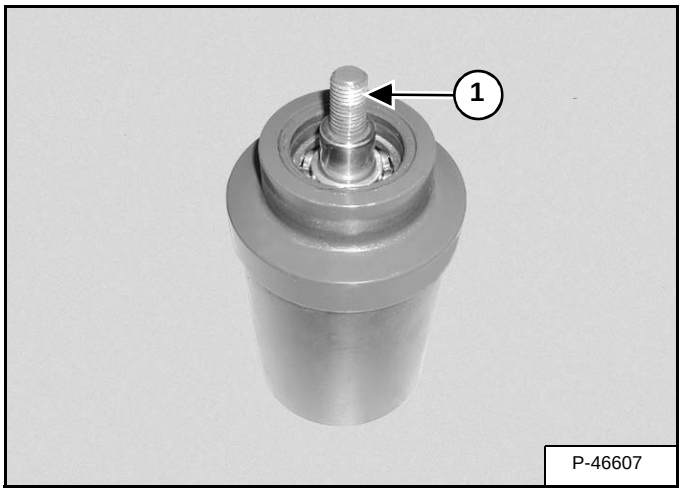
Figure 30-20-55



Remove the shaft (Item 1) from the tube (Item 2) **[Figure 30-20-55]**.

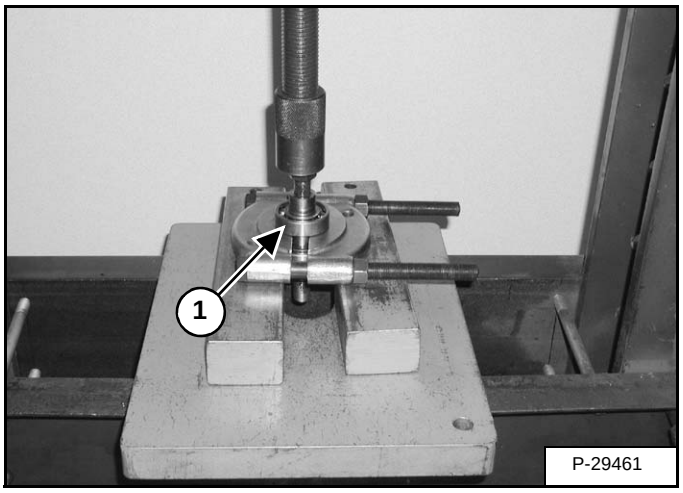
Lower Roller Disassembly (Cont'd)

Figure 30-20-75



Tap the shaft (Item 1) **[Figure 30-20-75]** and bearings out of the roller.

Figure 30-20-76

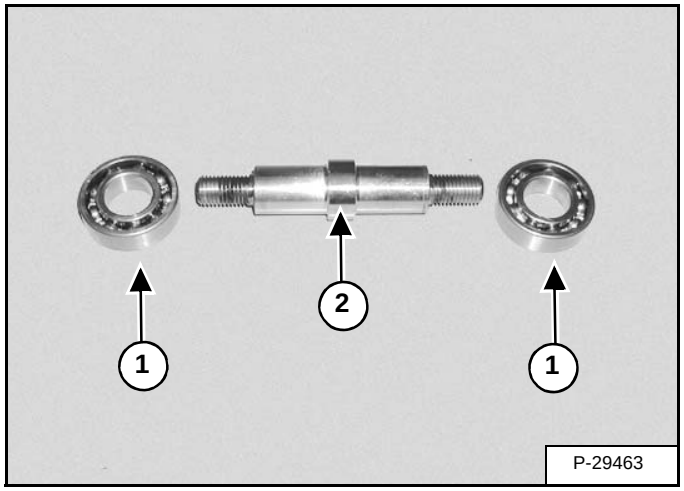


Press the bearings (Item 1) **[Figure 30-20-76]** off the shaft.

Lower Roller Assembly

Clean all parts in solvent and dry with compressed air.

Figure 30-20-77

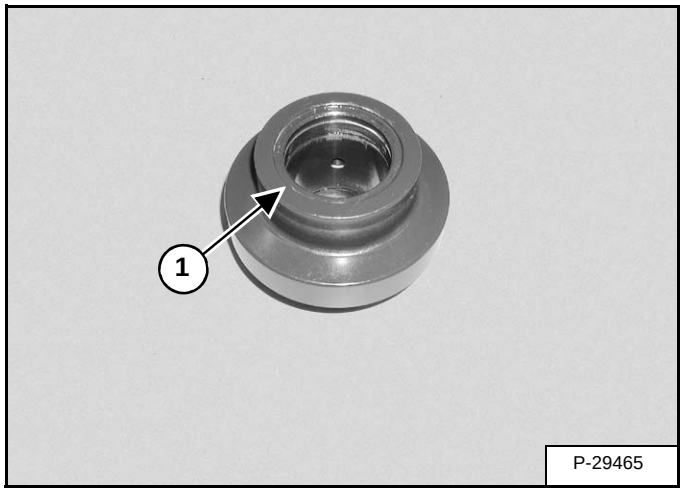


Inspect the bearings (Item 1) and shaft (Item 2) **[Figure 30-20-77]** for wear or damage.

The bearings are sealed. If the bearings do not roll smoothly or if the seals are damaged, replace the bearings.

Replace any worn or damaged parts.

Figure 30-20-78



Remove all paint and corrosion from the seal surface (Item 1) **[Figure 30-20-78]** on both sides of the roller.

Track Damage Identification (Cont'd)

Figure 30-20-101

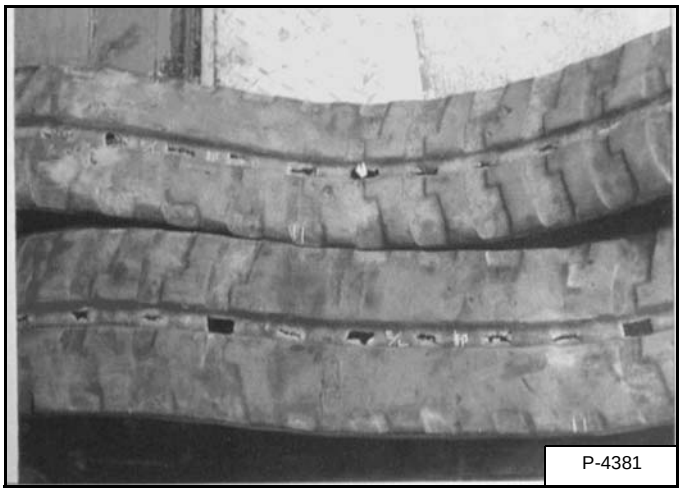
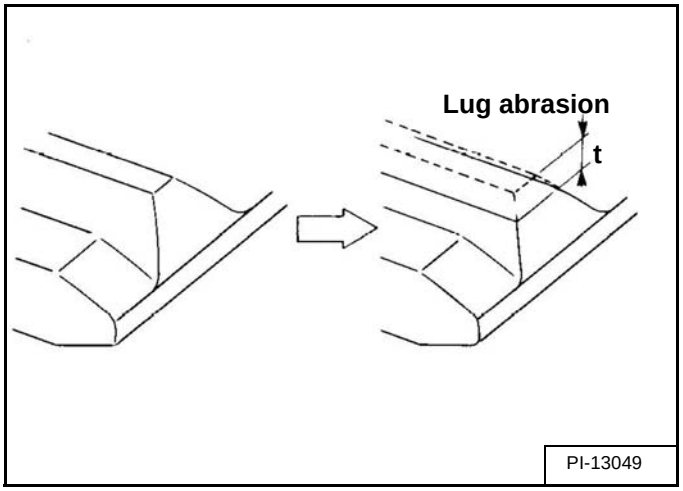


Figure 30-20-102



Lug Abrasion

Damage:

As its service time proceeds, the lug side inevitably undergoes abrasion **[Figure 30-20-101]** & **[Figure 30-20-102]**.

Replacement:

No replacement is required.

Causes of the damage:

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

Prevention:

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

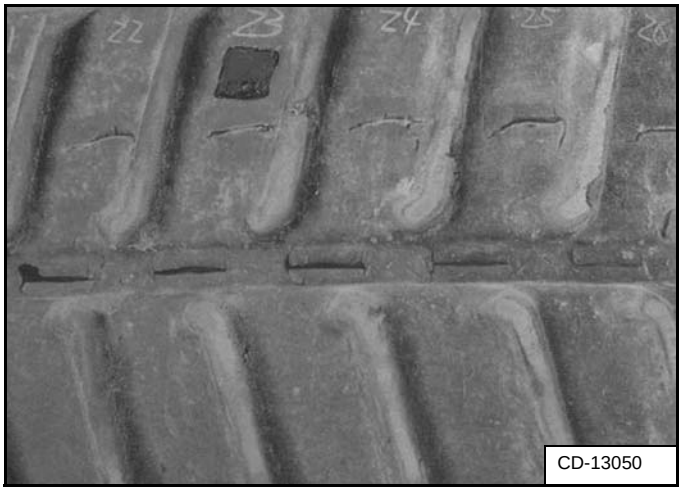
Making quick and repeated turns on concrete and asphalt roads

Driving up and down hilly paths with slippage.

Making frequent turns on paths covered with rocks and wood.

Cracks And Cuts On The Lug Side Rubber

Figure 30-20-103



Damage:

Sometimes cracks and cuts on the lug side rubber at the edges of the embedded metals can be observed **[Figure 30-20-103]**.

Replacement:

Basically, no replacement is required unless the cuts on the lug side rubber are discovered all around the edges of the embedded metals, as this will result in a complete cut off.

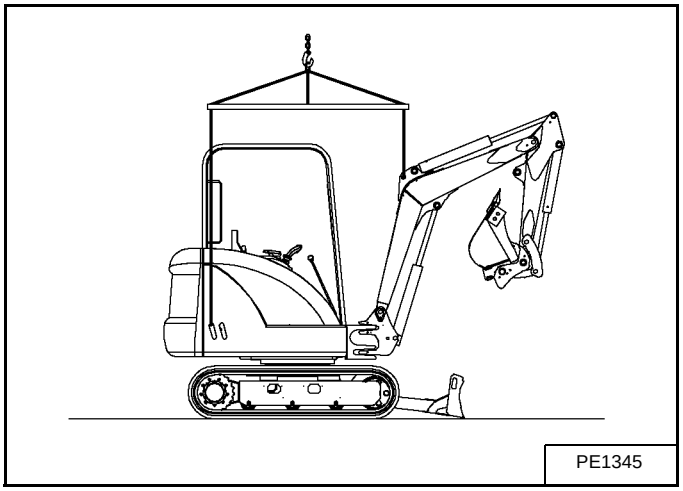
UPPERSTRUCTURE

Description

The upperstructure includes all the components in or attached to the frame and connects to the slew bearing. The slew bearing divides the upperstructure from the undercarriage, which includes the track frame components.

Removal

Figure 40-10-8



Fully extend the cylinders of the bucket, arm, and boom so that the excavator is in the position as shown **[Figure 40-10-8]**.

Lower the blade all the way.

Put all the control levers in neutral.

The boom must be in full raised position and centered to the front of the excavator **[Figure 40-10-8]**.

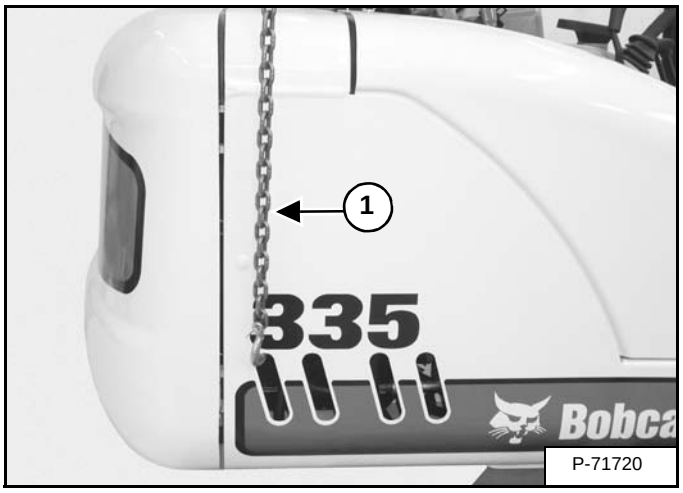
⚠ WARNING

AVOID INJURY OR DEATH

- **Use a lifting fixture with sufficient capacity for the weight of the excavator plus any added attachments.**
- **Maintain center of gravity and balance when lifting.**
- **Do not swing boom or upperstructure. Engage the upperstructure slew lock.**
- **Never lift with operator on machine.**

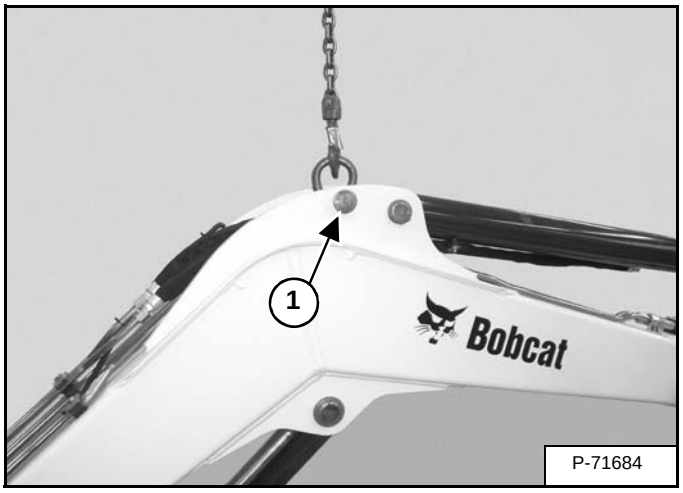
W-2202-0607

Figure 40-10-9



Fasten chains to the rear of the upperstructure on both sides (Item 1) **[Figure 40-10-9]** and up to a lifting fixture above the canopy/cab **[Figure 40-10-8]**. The lifting fixture must extend over the sides of the canopy/cab to prevent the chains from hitting the ROPS/TOPS.

Figure 40-10-10



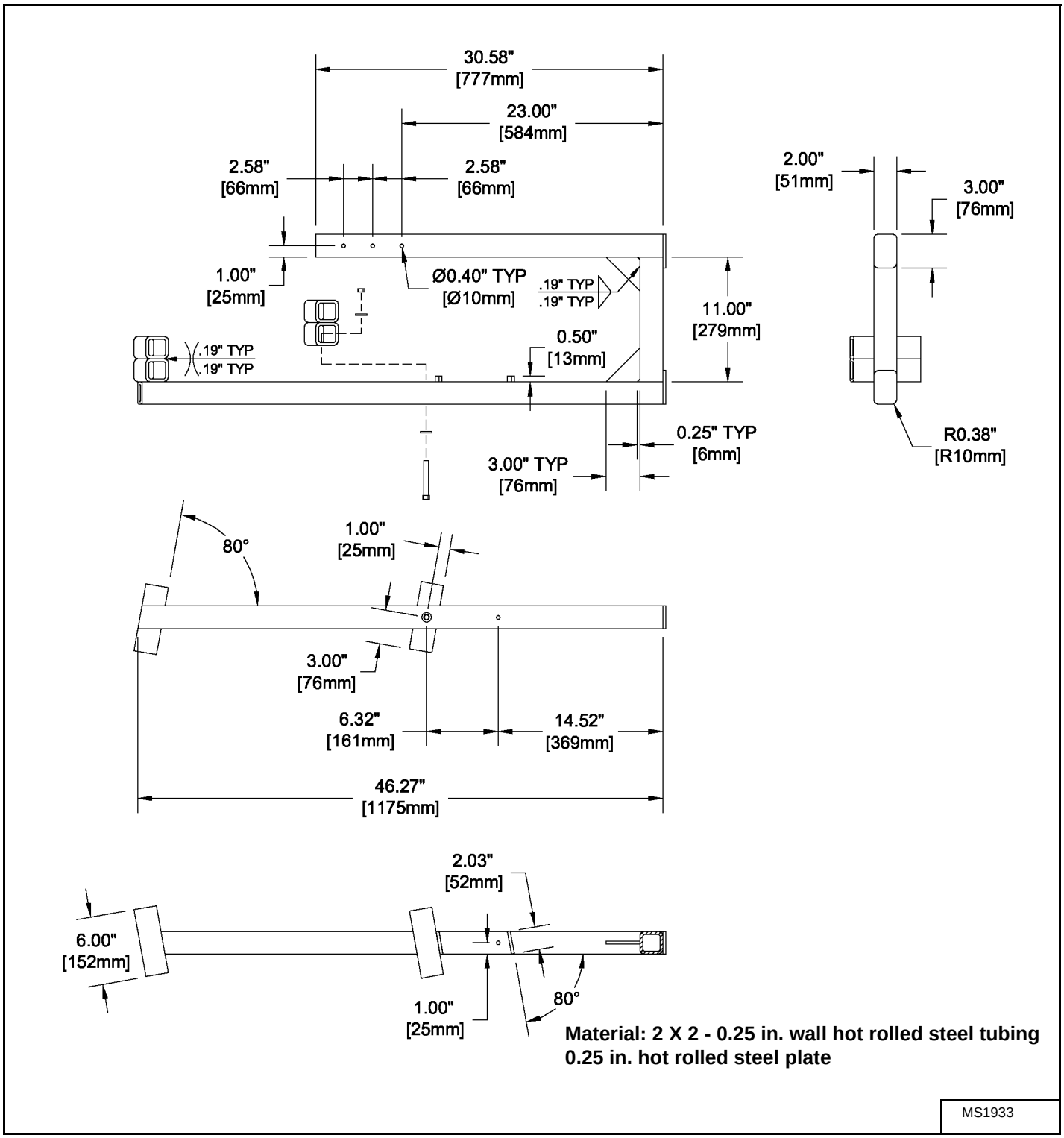
Install a one inch (25 mm) bolt and nut (Grade 5 or 8) through the hole at the boom (Item 1) **[Figure 40-10-10]**.

Fasten a chain from the bolt to the lift fixture **[Figure 40-10-8]**.

Removal And Installation

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

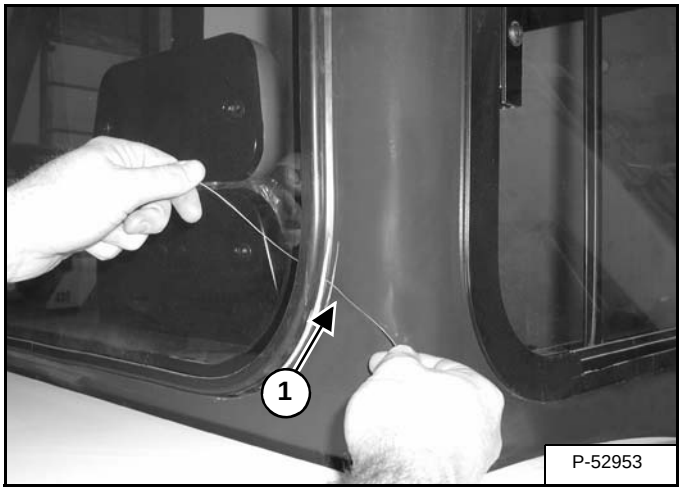
Figure 40-30-1



Glass Removal

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

Figure 40-30-32



Push a small diameter wire (Item 1) **[Figure 40-30-32]** through the adhesive. Pull the wire around the perimeter of the glass to cut the adhesive.

Remove the glass.

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

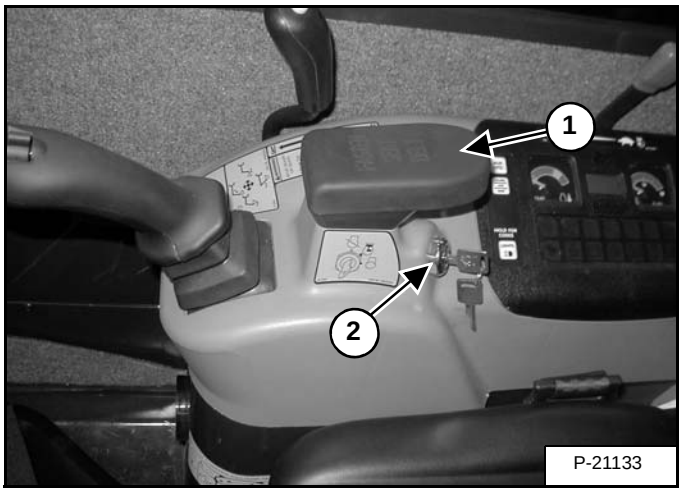
RIGHT CONSOLE

Description

The right console contains a moveable joystick, throttle lever, controller, ignition switch, blade control and cup holder.

Console Cover Removal And Installation

Figure 40-50-1



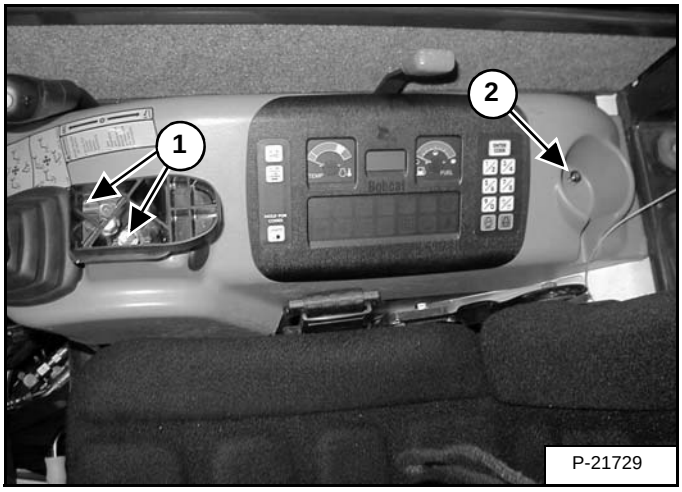
Remove the cover (Item 1) **[Figure 40-50-1]** from the arm rest.

Lift up on the rear of the cover and slide the cover ahead to remove it.

Remove the key and nut from the key switch (Item 2) **[Figure 40-50-1]** (if equipped). Allow the switch to drop inside the console.

NOTE: The key switch must be removed to remove and install the console cover. It interferes with the arm rest bracket.

Figure 40-50-2



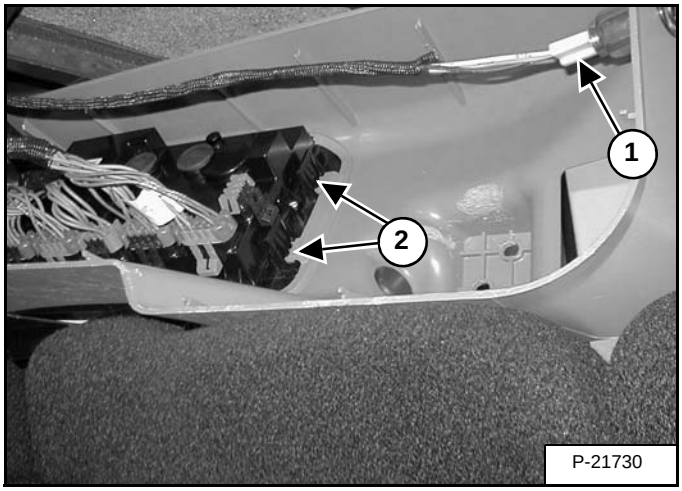
Remove the two bolts (Item 1) **[Figure 40-50-2]** from the arm rest.

Remove the arm rest.

Remove the screw (Item 2) **[Figure 40-50-2]** from the cup holder.

Lift the console cover up and over the joystick lever.

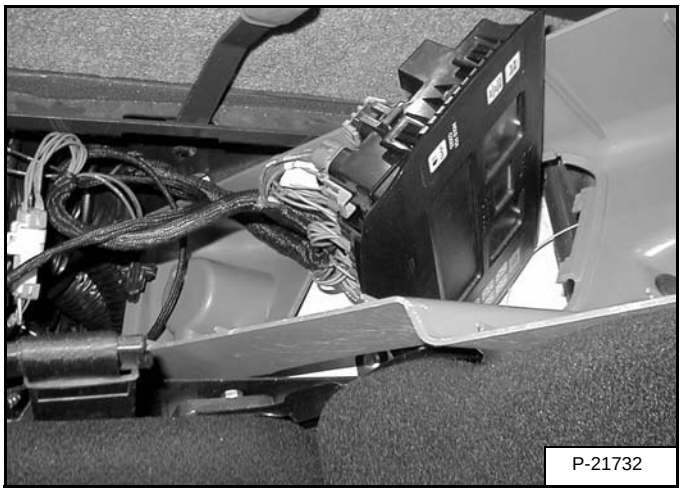
Figure 40-50-3



Disconnect the accessory outlet electrical connector (Item 1) **[Figure 40-50-3]**.

Remove the controller from the console cover by pressing the four mounting tabs (Item 2) **[Figure 40-50-3]**.

Figure 40-50-4



Turn the controller to allow it to pass through the console cover **[Figure 40-50-4]**.

Remove the console cover.

Lever Removal And Installation

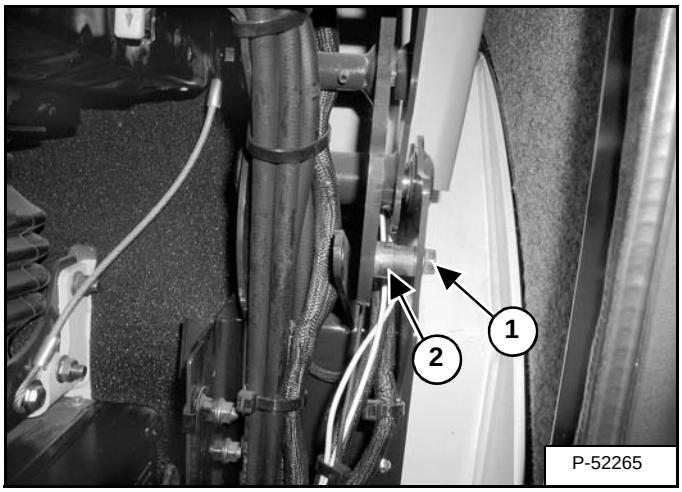
Remove the top console cover. (See Joystick Console Cover (Top) Removal And Installation on Page 40-60-1.)

Remove the bottom console cover. (See Joystick Console Frame Removal And Installation on Page 40-60-9.)

Remove the console frame. (See Joystick Console Frame Removal And Installation on Page 40-60-9.)

Remove the compression spring assembly from the console. (See Compression Spring Removal And Installation on Page 40-60-4.)

Figure 40-60-15

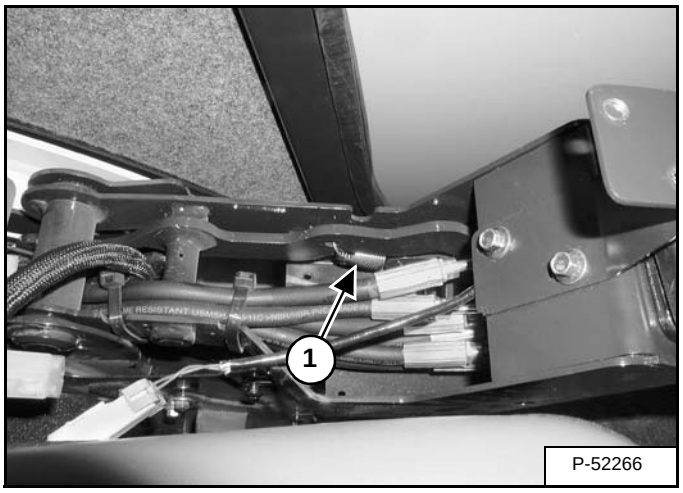


Remove the bolt (Item 1) from the lever bearing (Item 2) **[Figure 40-60-15]**.

Remove the bearing.

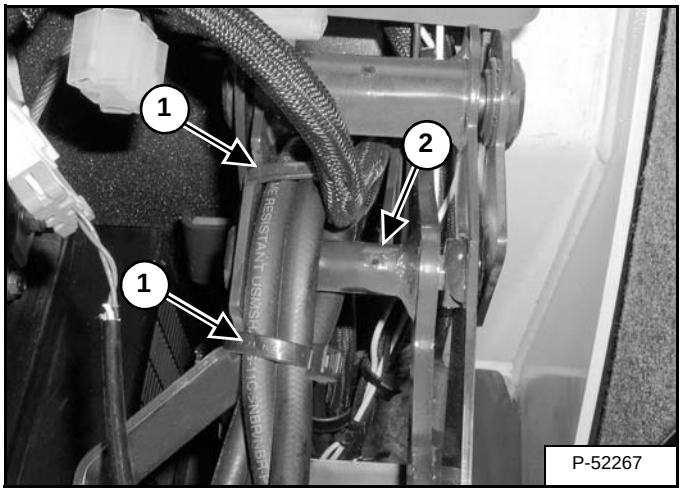
Lower the console.

Figure 40-60-16



Remove the spring (Item 1) **[Figure 40-60-16]**.

Figure 40-60-17



Remove the tie straps (Item 1) **[Figure 40-60-17]**.

Remove the roll pin (Item 2) **[Figure 40-60-17]** from the lever pivot pin.

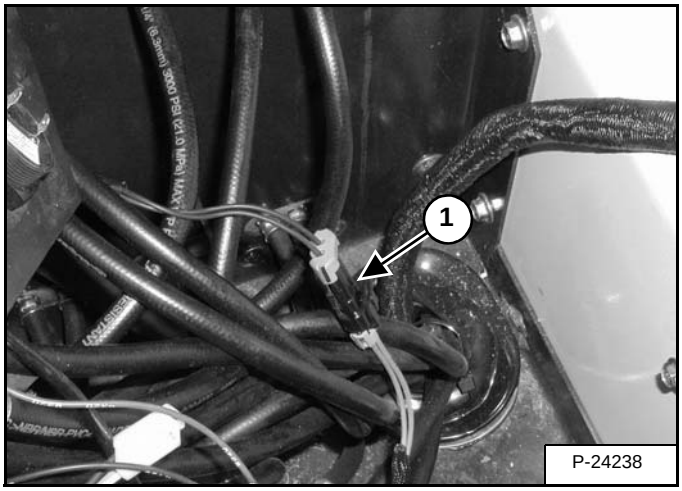
Raise and support the console.

BLADE CONTROL

Removal And Installation

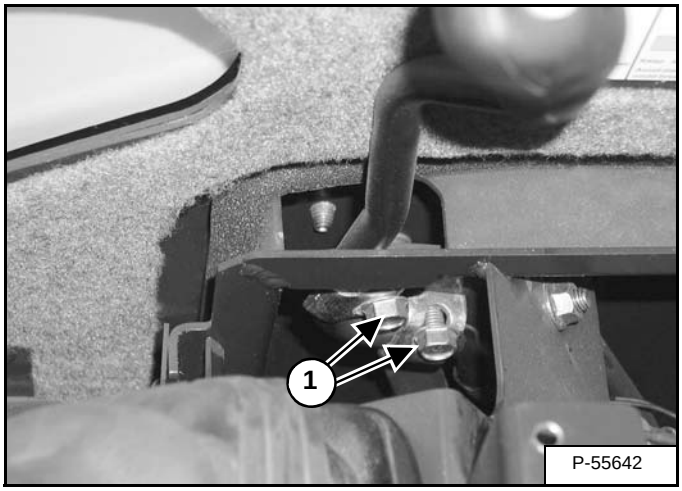
Remove the right console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

Figure 40-70-1



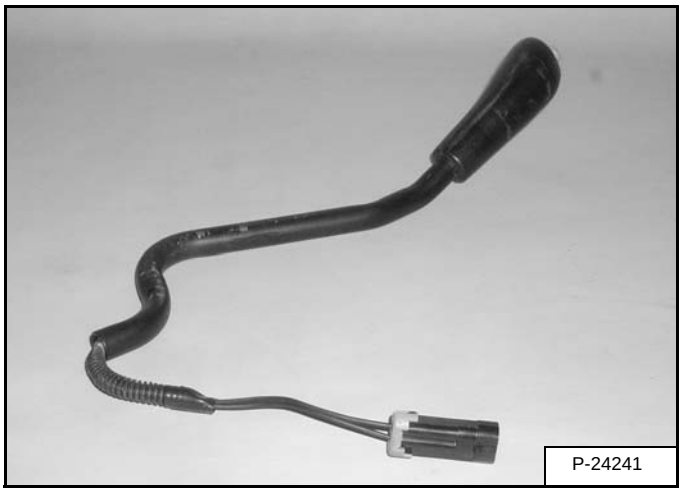
Disconnect the two speed wire harness (Item 1) **[Figure 40-70-1]**.

Figure 40-70-2



Loosen the bolts (Item 1) **[Figure 40-70-2]**.

Figure 40-70-3



Remove the blade control lever from the excavator **[Figure 40-70-3]**.

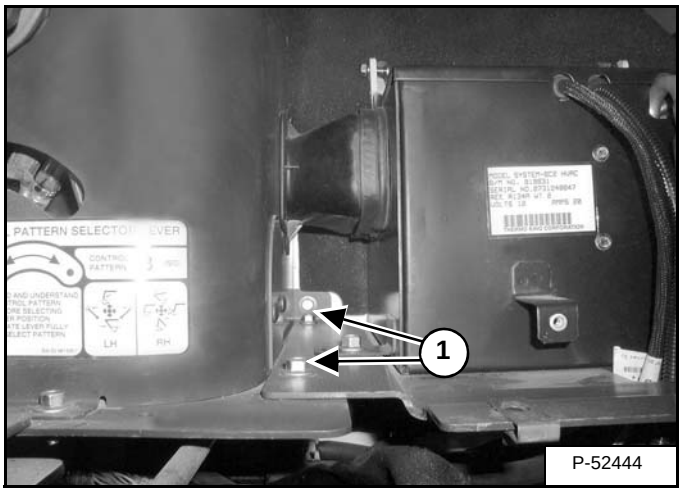
NOTE: If the two-speed switch needs to be replaced, the complete blade control lever must be replaced.

Removal And Installation (Cab Equipped) (Cont'd)

Rear Panel

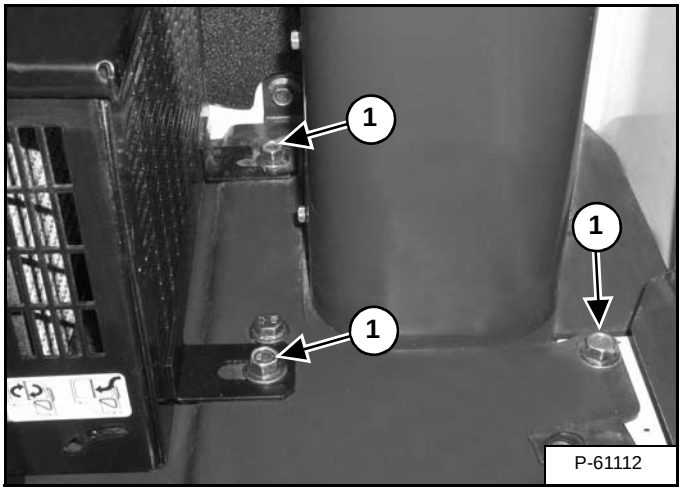
Remove the front panel. (See Removal And Installation (Cab Equipped) on Page 40-90-3.)

Figure 40-90-16



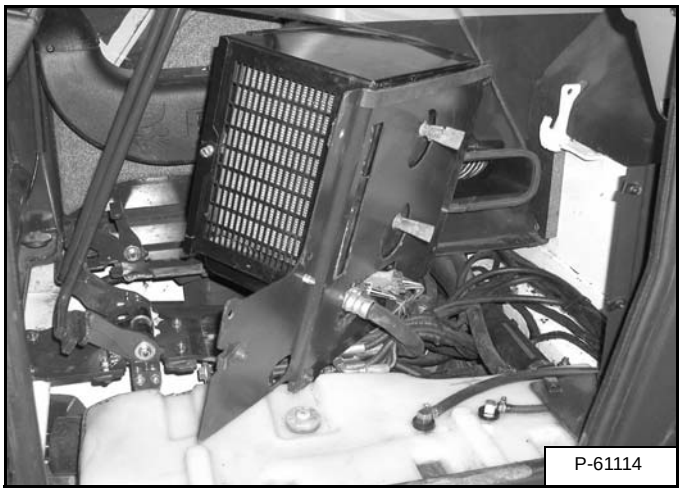
Remove the bolts (Item 1) **[Figure 40-90-16]** from the right side of the evaporator/heater unit.

Figure 40-90-17



Remove the bolts (Item 1) **[Figure 40-90-17]** on the left side of the evaporator/heater unit.

Figure 40-90-18

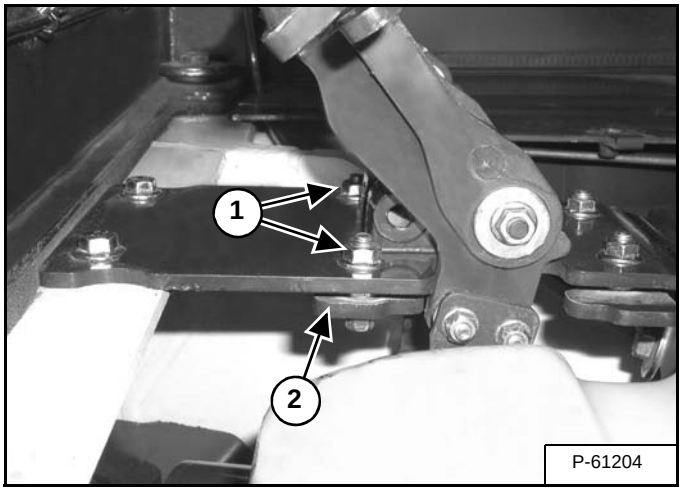


Position the evaporator/heater unit rear floor panel as shown **[Figure 40-90-18]**.

Adjustment (Cont'd)

Reverse Lever Stop:

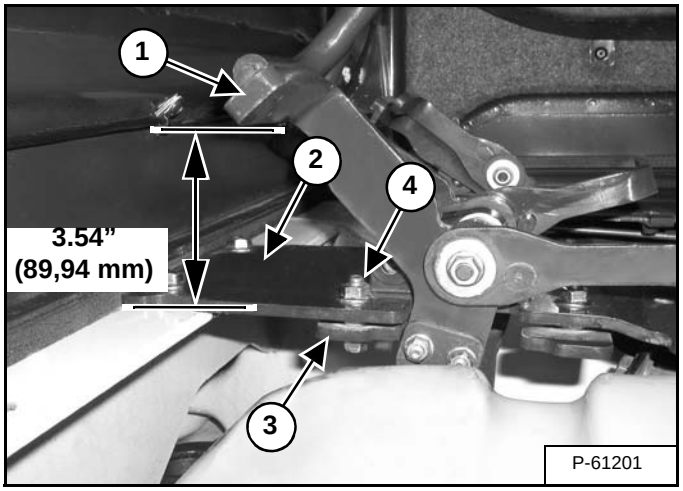
Figure 40-110-14



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

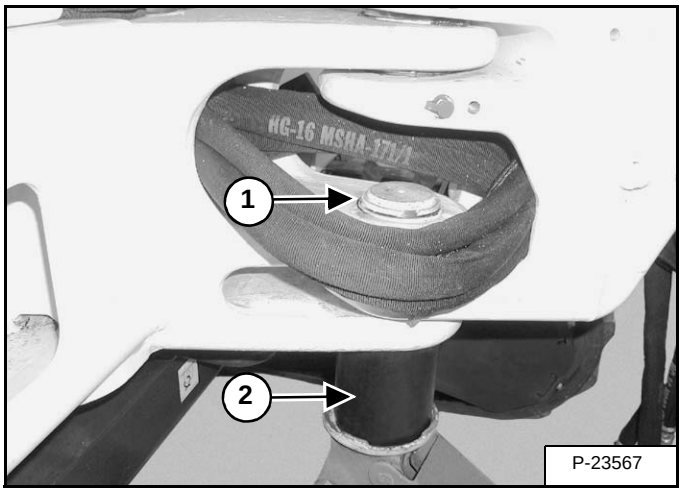


Reverse position is 3.54 in. (89,9 mm) from the travel lever (Item 1) to the top of the pedal mount plate (Item 2) **[Figure 40-110-15]**.

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)

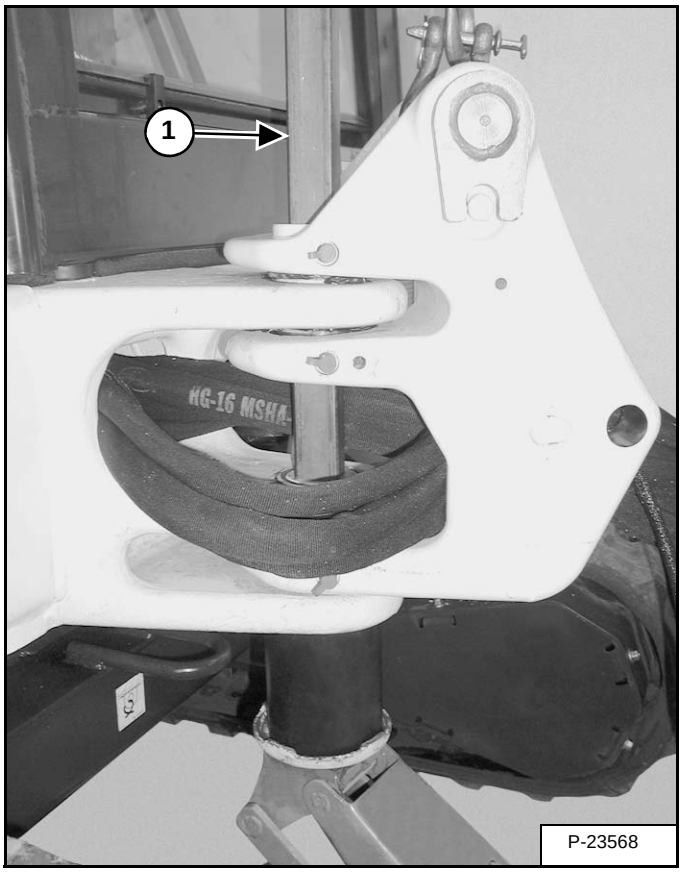
Figure 40-140-7



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

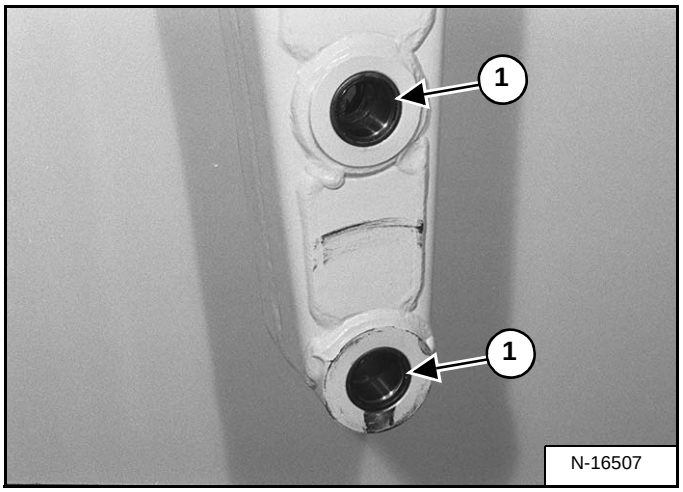


Use a large punch (Item 1) **[Figure 40-140-8]** and drive the bottom swing frame pin out.

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.

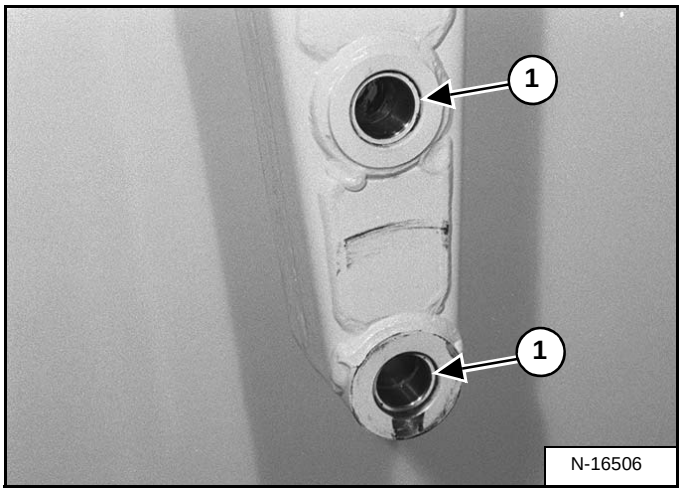
Arm To Bucket & Bucket Link Bushing Removal And Installation

Figure 40-160-7



Remove the seals (Item 1) **[Figure 40-160-7]** from both sides of the arm.

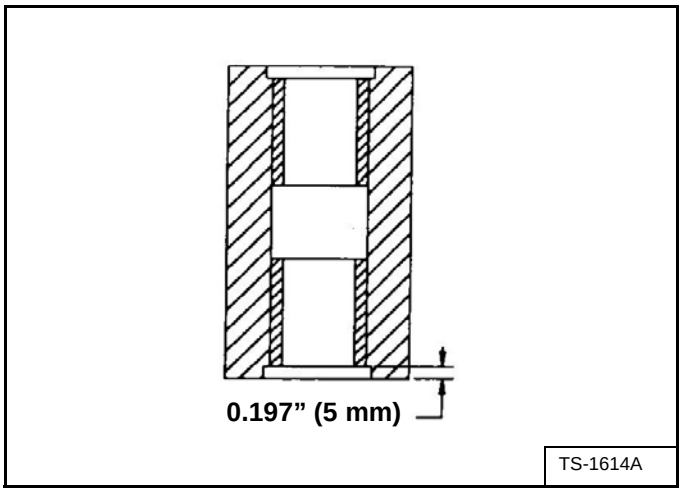
Figure 40-160-8



Remove the bushings (Item 1) **[Figure 40-160-8]** from both sides of the arm.

Install the new bushings in the arm.

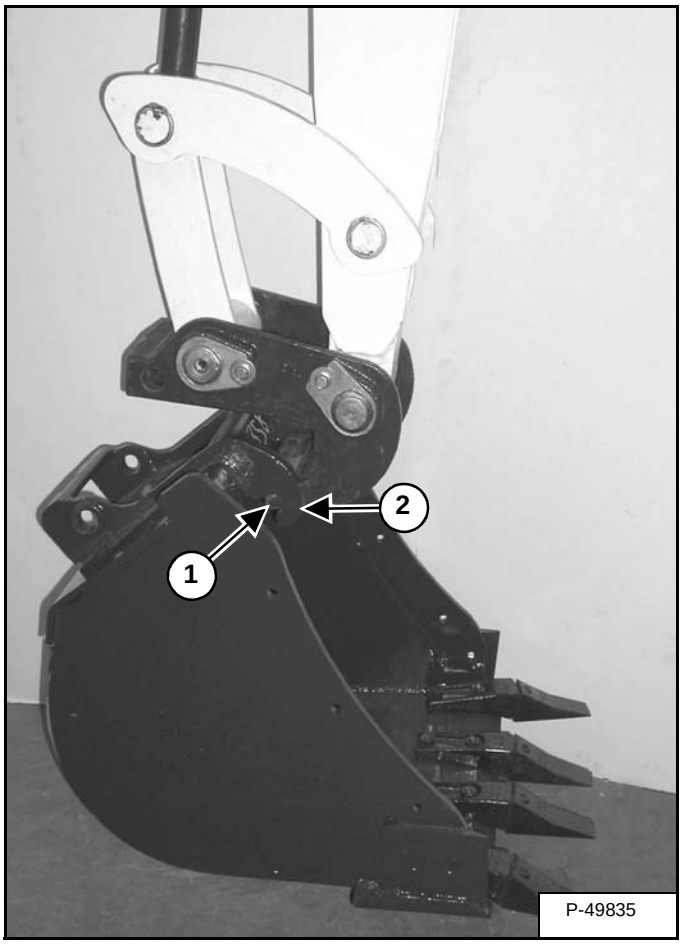
Figure 40-160-9



Install the bushings until they are seated 0.197 in. (5 mm) in the pin boss **[Figure 40-160-9]** (both sides).

Install new seals on both sides of the arm.

Figure 40-170-17



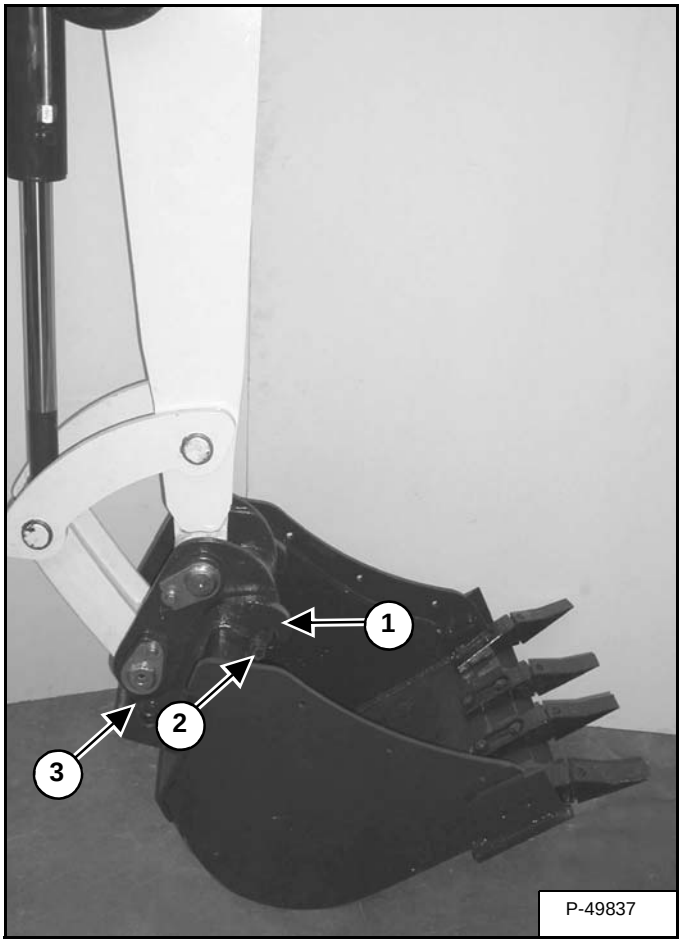
Start the engine and move the arm toward the bucket. Raise the boom until the pins (Item 1) engage the hooks (Item 2) **[Figure 40-170-17]** on the bucket.

BUCKET (CONT'D)

Removal And Installation (Bolt-On X-Change) (Cont'd)

Installation (Cont'd)

Figure 40-170-18



Raise the boom, and extend the bucket cylinder until the bucket is in the position shown **[Figure 40-170-18]**.

With the arm vertical, lower the boom until the hooks (Item 1) of the bucket disengage the pins (Item 2) of the X-Change and plate (Item 3) **[Figure 40-170-18]** engages in the bucket crossmember.

Bucket Teeth Removal And Installation

⚠ WARNING

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

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

W-2505-0604

Position the bucket so the bucket teeth are at a 30 degree angle up from the ground for accessibility to the teeth.

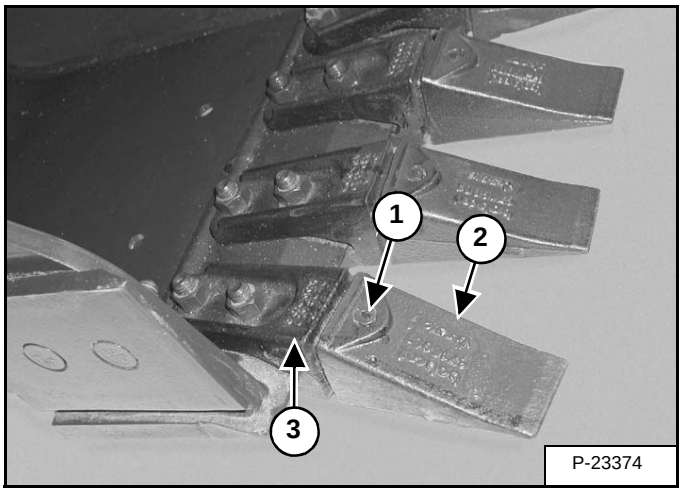
Lower the boom until the bucket is fully on the ground.

Stop the engine and exit the excavator.

NOTE: Early and later style tooth points and retaining pins are not interchangeable.

Early Style bucket Teeth

Figure 40-170-38

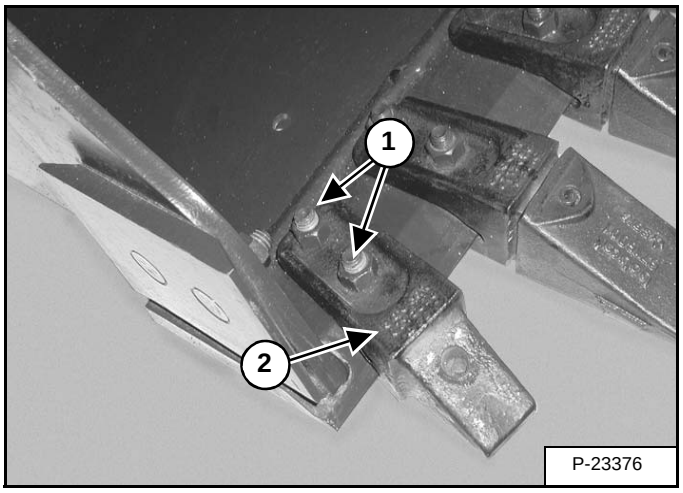


Remove the retaining pin (Item 1) from the tooth point (Item 2) **[Figure 40-170-38]**.

Remove the tooth point (Item 2) from the shank (Item 3) **[Figure 40-170-38]**.

Installation: Position the new tooth point on the shank and install a new retaining pin. Install the retaining pin until it is flush with the top of the point.

Figure 40-170-39

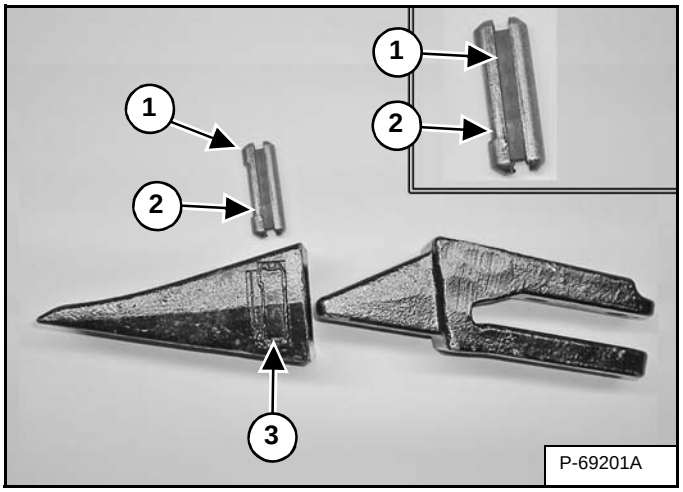


Remove the two nuts (Item 1) and bolts from the tooth shank (Item 2) **[Figure 40-170-39]**. Remove the tooth shank.

Installation: Tighten the nuts to 90 - 100 ft.-lb. (125 - 135 N•m) torque.

Later Style Bucket Teeth

Figure 40-170-40



The removal and installation procedure for the later style tooth point and tooth assembly is the same as the early. style.

The later style tooth has a unique retaining pin (Item 1). The retaining pin must be installed as shown [notch (Item 2) to the front] for proper fit and tooth retention. The side of the tooth point (Item 3) **[Figure 40-170-40]** also shows the correct orientation of the retaining pin.

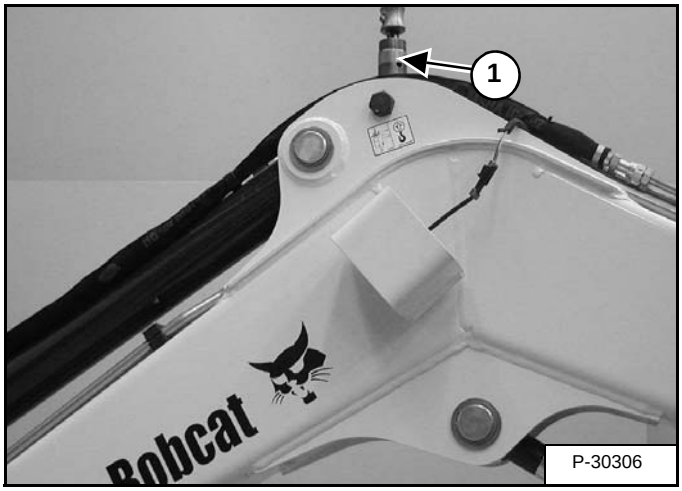
Installation: Position the new tooth point on the shank and install a new retaining pin. Install the retaining pin until it is flush with the top of the point.

X-CHANGE (HYDRAULIC)

Removal And Installation

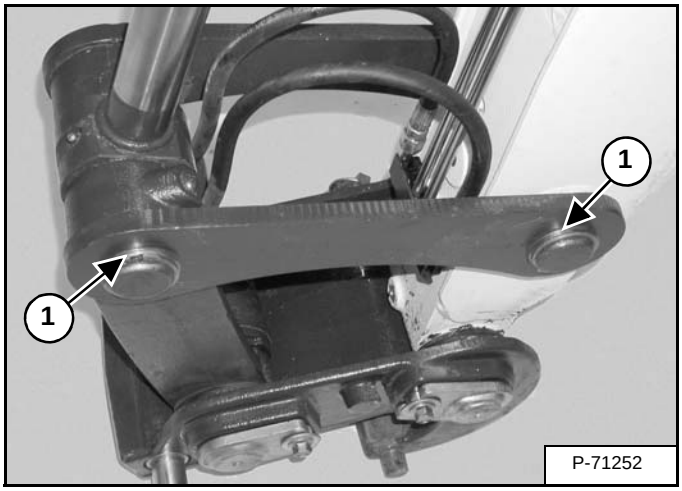
Remove the bucket. (See Removal And Installation (Hydraulic X-Change) on Page 40-170-13.)

Figure 40-191-1



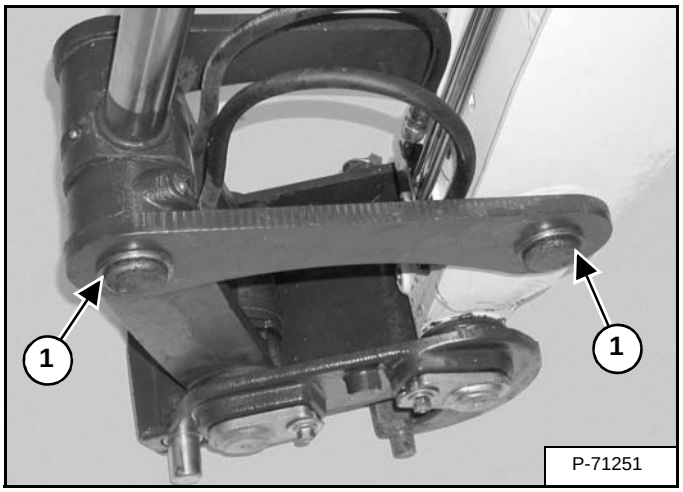
Support the boom with a hoist (Item 1) **[Figure 40-191-1]** and release the pressure on the boom cylinder.

Figure 40-191-2



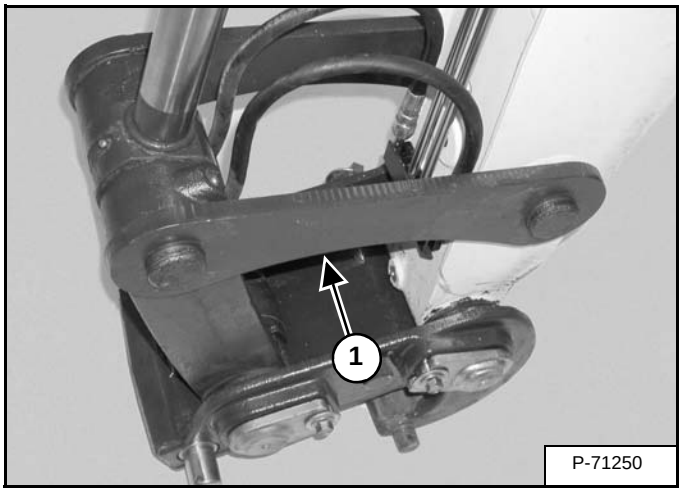
Remove the snap rings (Item 1) **[Figure 40-191-2]**.

Figure 40-191-3



Remove the washers (Item 1) **[Figure 40-191-3]**.

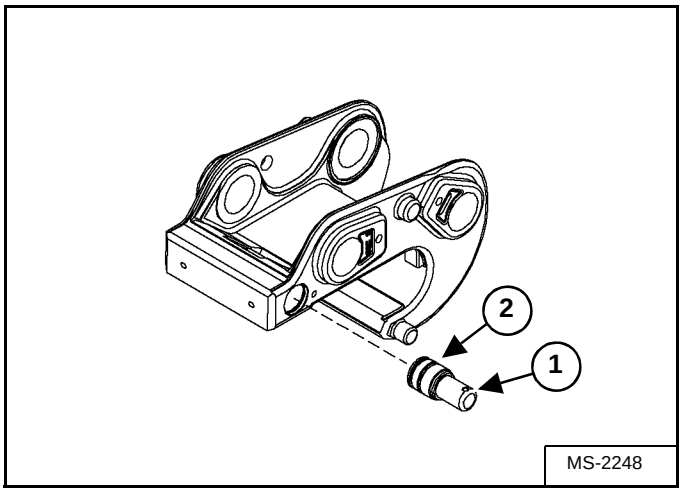
Figure 40-191-4



Remove the plate (Item 1) **[Figure 40-191-4]**.

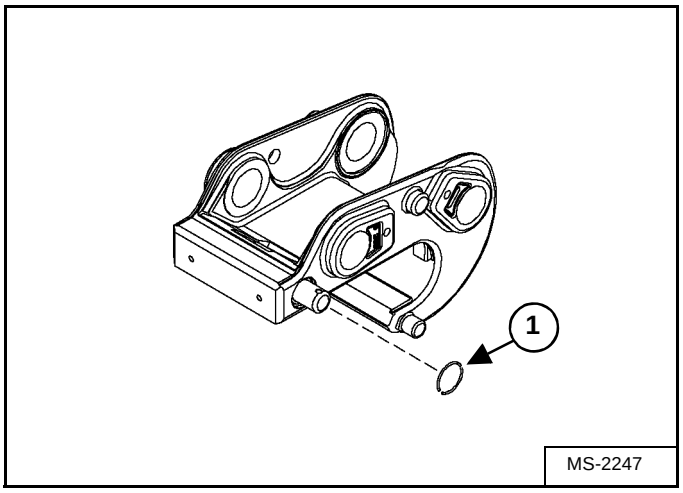
Assembly (Cont'd)

Figure 40-191-34



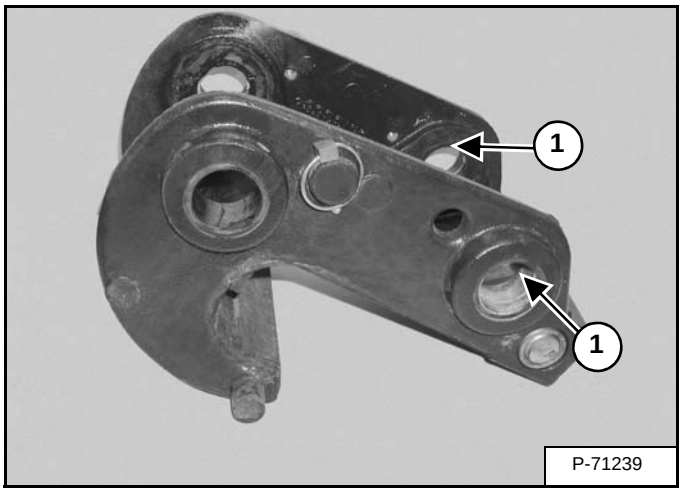
Install the piston (Item 1) and the piston head (Item 2) **[Figure 40-191-34]**.

Figure 40-191-35



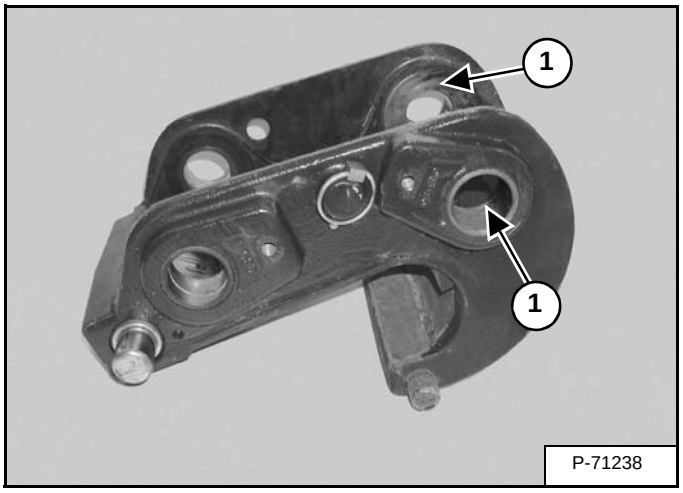
Apply inward pressure on the piston and install the retaining ring (Item 1) **[Figure 40-191-35]**.

Figure 40-191-36



Install the bushings (Item 1) **[Figure 40-191-36]**.

Figure 40-191-37



Install the bushings (Item 1) **[Figure 40-191-37]**.

ELECTRICAL SYSTEM AND ANALYSIS

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- Charging System Inspection 50-30-2
- High Voltage Testing 50-30-4
- Low Voltage Testing 50-30-3
- Parts Identification 50-30-7
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- Upperstructure Light Removal And Installation 50-50-1

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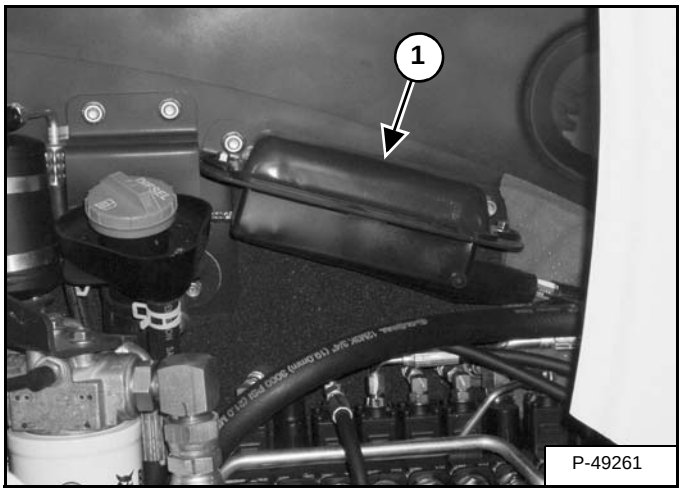
Description

Figure 50-10-8



The excavator has a 12 volt, negative ground electrical system. The electrical system is protected by fuses located under the right side cover of the excavator (Item 1) **[Figure 50-10-8]**. The fuses will protect the electrical system when there is an electrical overload. The reason for the overload must be found before starting the engine again.

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

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

⚠ WARNING

AVOID INJURY OR DEATH

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

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

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

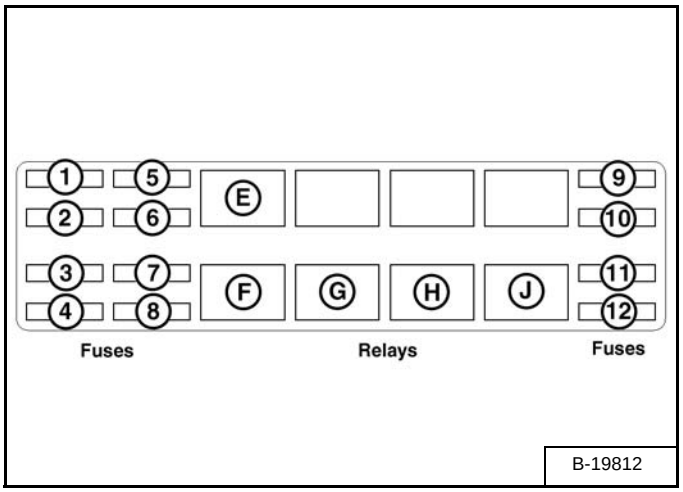
W-2065-0807

Fuse And Relay Locations/Identification

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

Remove the cover to check or replace the fuses and relays.

Figure 50-10-9



The location and sizes are shown below and **[Figure 50-10-9]**.

REF	DESCRIPTION	AMP	REF	DESCRIPTION	AMP
1	***Not Used***	- -	11	Lights	20
2	Heater	25	12	ACC Plug	15
3	Ignition	5			
4	Fuel Solenoid	25			
5	Wiper	5			
6	Switch Power	20			
7	Alternator/ Heater	25			
8	ACD	25			
9	Controller	25			
10	ACD	25			

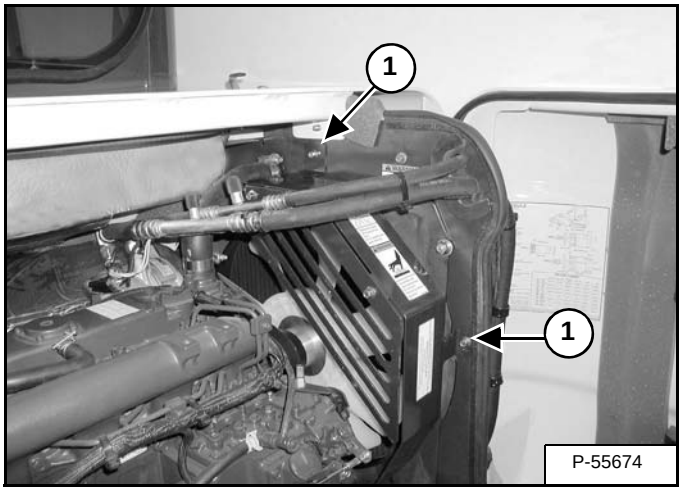
Always replace fuses using the same type and capacity.

REF	DESCRIPTION
E	Switch Power
F	Fuel Solenoid
G	Lights
H	Glow Plug
J	Starter

Removal And Installation

Open the tailgate.

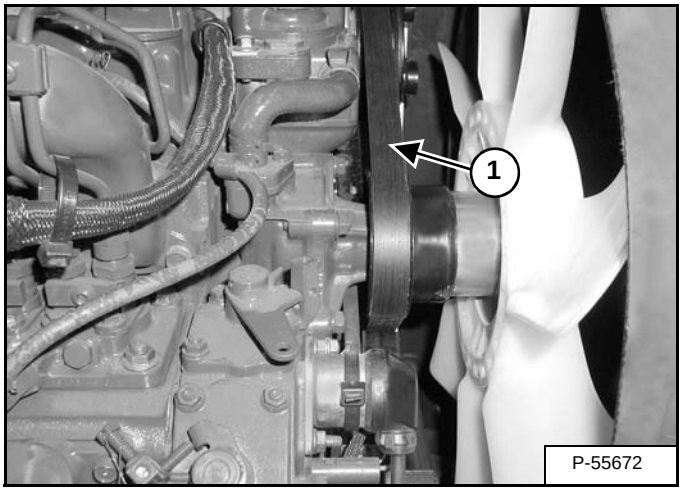
Figure 50-30-9



Remove the two bolts (Item 1) **[Figure 50-30-9]** from the fan shield.

Remove the fan shield from the engine.

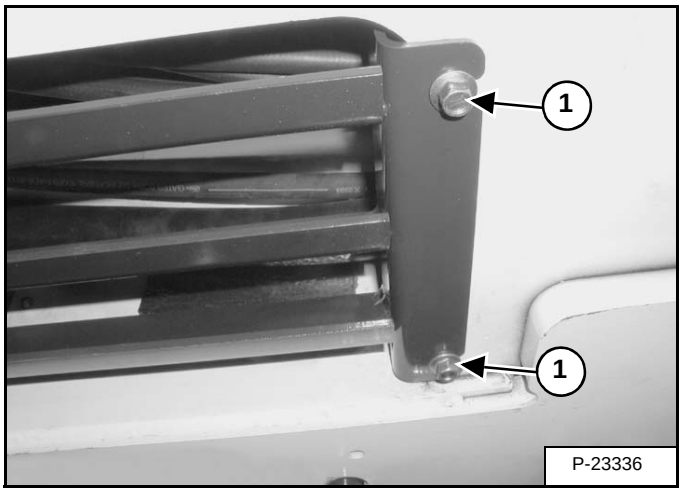
Figure 50-30-10



Remove the engine accessory drive belt (Item 1) **[Figure 50-30-10]** from the engine. (See Belt Replacement on Page 10-140-1.)

Installation: Adjust the engine accessory drive belt after installation. (See Belt Adjustment on Page 10-140-1.)

Figure 50-30-11

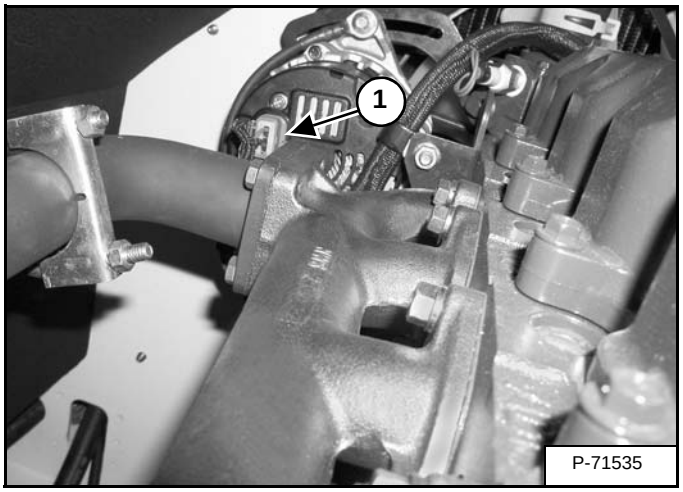


On the bottom of the excavator, loosen the two bolts on the left side. Remove the two bolts (Item 1) **[Figure 50-30-11]** on the right side.

Remove the louver from the bottom of the excavator.

NOTE: Access to the alternator is obtained from underneath the excavator.

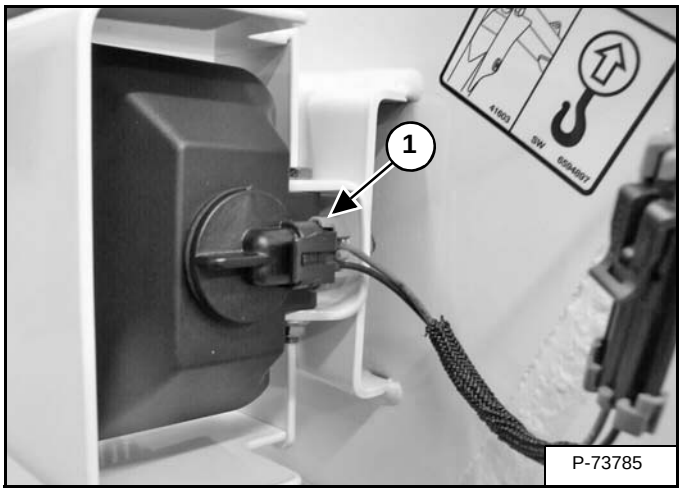
Figure 50-30-12



Disconnect the wire harness (Item 1) **[Figure 50-30-12]** from the alternator.

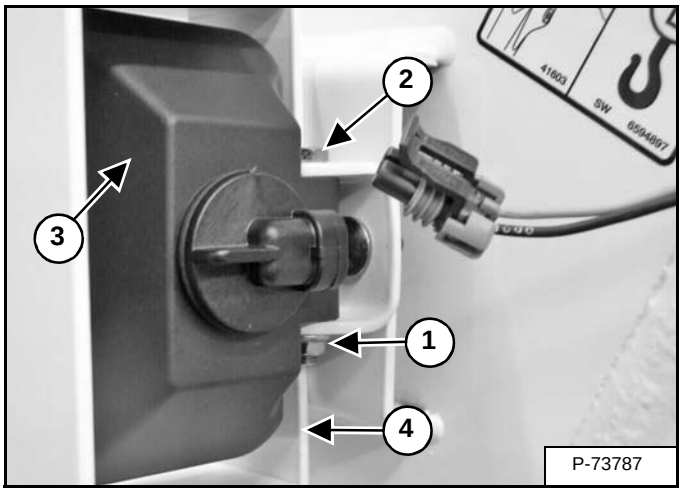
Boom Light Removal And Installation (Later Models)

Figure 50-50-7



Disconnect the wire harness (Item 1) **[Figure 50-50-7]**.

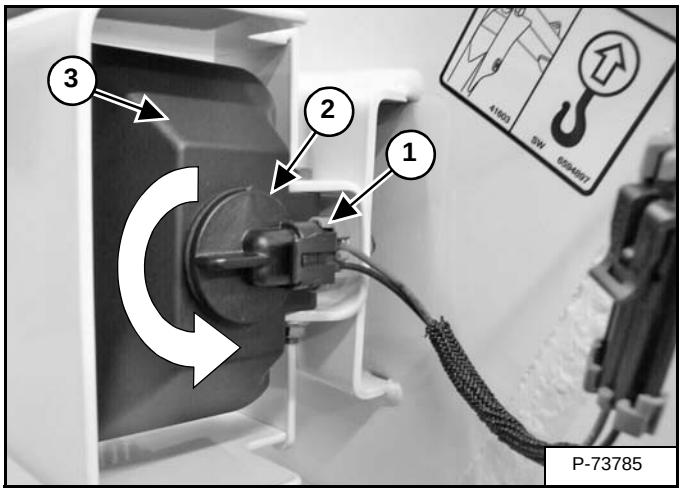
Figure 50-50-8



Remove the nut (Item 1) and bolt (Item 2). Remove the boom light (Item 3) from the boom light guard (Item 4) **[Figure 50-50-8]**.

Boom Light Bulb Replacement (Later Models)

Figure 50-50-9



Disconnect the wire harness (Item 1) **[Figure 50-50-9]**.

Figure 50-50-10

NOTE: Do not touch glass of halogen bulb with your fingers or allow bulb to come in contact with oils. If contaminated, the bulb should be cleaned with mild alcohol and clean cloth [Figure 50-50-10].

DELUXE INSTRUMENT PANEL SETUP

Passwords

All new machines with Deluxe Instrumentation arrive at Bobcat Dealerships with the panel in locked mode. This means that a password must be used to start the engine.

For security purposes, your dealer may change the password and also set it in the locked mode. Your dealer will provide you with the password.

Master Password:
A permanent, randomly selected password is set at the factory which cannot be changed. This password is used for service by the Bobcat dealer if the Owner Password is not known; or to change the Owner Password.

Owner Password:
There is only one Owner Password (**CodE 0**). It must be used to change the owner or operator passwords. See below for changing the Owner Password.

Operator Password:
There can be up to three operator Passwords (**CodE 1, CodE 2, CodE 3**). See below for changing the Operator Password.

Password Entry (For Starting and Operating the Machine)

Press ENTER CODE button (Item 1). The panel will become lighted and there will be two short beeps. **CodE** will appear on the LCD (Item 2) **[Figure 50-90-1]**.

NOTE: After you press ENTER CODE you have 40 seconds to use the keypad (Item 3) [Figure 50-90-1] to enter the password. (If more than 40 seconds is used, the process will abort and you will need to start over.

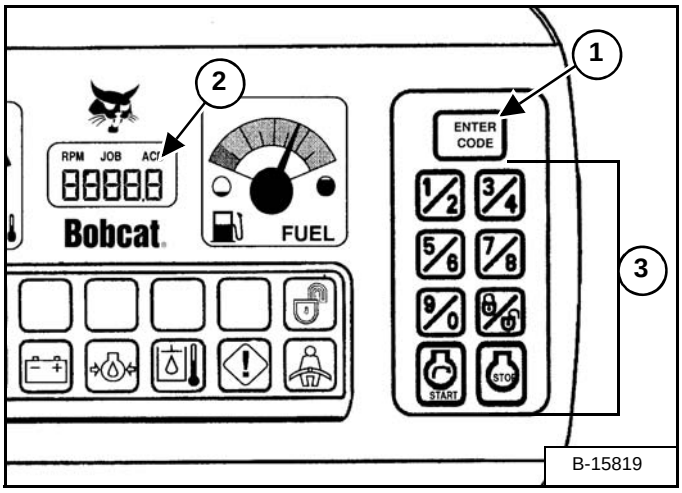
Enter the password. For each digit that you enter, a dash will appear on the LCD. If the password was entered correctly, there will be one long beep.

NOTE: If the password was incorrect there will be three short beeps and *Error* **will appear on the LCD. Press the ENTER CODE button again and start over. After three failed attempts, you must wait three minutes to try again.**

You are now ready to start and operate the machine.

If you will be changing passwords, do not start the engine. (See Changing The Password at right.)

Figure 50-90-1



Changing The Owner Or Operator Password

Perform Password Entry at left, but do not start the engine.

Press and hold the ENTER CODE button (Item 1) for three seconds. CodE 1 will appear on the LCD (Item 2) **[Figure 50-90-1]**.

Press the ENTER CODE button until the desired Code (**CodE 0, CodE 1, CodE 2, CodE 3**) appears. CodE 0 is Owner Password. The other codes are Operator passwords. You now have 40 seconds to use the keypad (Item 3) **[Figure 50-90-1]** to enter each digit of a new four digit password.

Enter the new four digit password. After the fourth digit is entered, there will be two short beeps and **rPEAt** will appear.

Re-enter the new four digit password to verify. If the new passwords match, there will be two short beeps, **Code** will appear for 1 second and then the LCD will return to HOURMETER function.

NOTE: If the new passwords do not match, there will be one long beep and Error will appear for 1 second and then the LCD will return to HOURMETER function.

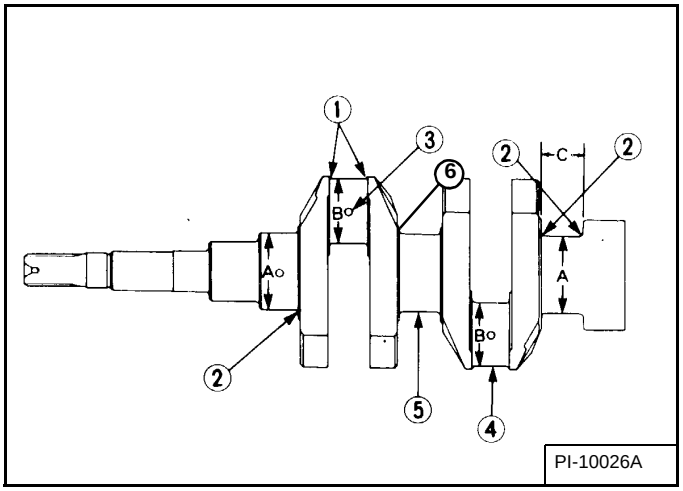
Specifications (Cont'd)

Crankshaft Re-Grind Data

If the standard size bearing cannot be used due to excessive wear of the crankpin and crank journal use undersize or oversize bearings.

For undersize or oversize bearing use, follow the precautions noted below.

Figure 60-10-2



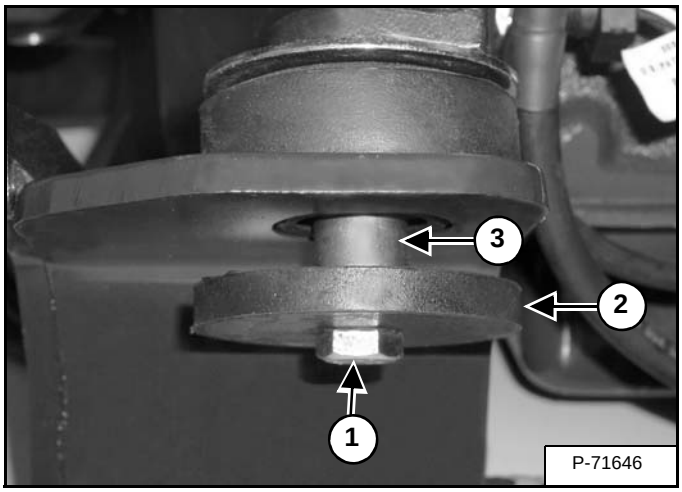
Grind the crankpin and journal with a wheel which has specified round corner and width without shoulder **[Figure 60-10-2]**.

1. 0.1299 - 0.1457" (3,3 - 3,7 mm) radius.
2. 0.1102 - 0.1260" (2,8 - 3,2 mm) radius.
3. Chamfer the oil hole circumference to 0.04 - 0.06" (1,0 - 1,5 mm) radius with an oil stone.
4. The crankpin must be fine finished to higher than (0,8S).
5. The crank journal must be fine-finished to higher than (0,8S).
6. The crank journal side surface must be fine-finished to higher than (0,8S).

SIZE	CODE NO.	NAME OF BEARING	BEARING MARK	CRANKSHAFT PROCESSING DIM.	
-0.008" (0,2 mm)	17311-23910	Crankshaft Bearing 1 0.008" minus (0,2 minus)	020 US	A	2.0363 - 2.037" (51,721 - 51,74 mm)
-0.008" (0,2 mm)	17311-23930	Crankshaft Bearing 2 0.008" minus (0,2 minus)	020 US		
-0.016" (0,4 mm)	17311-23920	Crankshaft Bearing 1 0.016" minus (0,4 minus)	040 US	A	2.0284 - 2.0291" (51,521 - 51.54 mm)
-0.016" (0,4 mm)	17311-23940	Crankshaft Bearing 2 0.016" minus (0,4 minus)	040 US		
-0.008" (0,2 mm)	17331-22970	Crank Pin Bearing 0.008" minus (0,2 minus)	020 US	B	1.8409 - 1.8415" (46,759 - 46,775 mm)
-0.016" (0,4 mm)	17331-22980	Crank Pin Bearing 0.016" minus (0,4 minus)	040 US	B	1.8330 - 1.8337" (46,559 - 46,575 mm)
+0.008" (+0,2 mm)	15521-23950	Thrust Bearing 1 - 0.008" plus (0,2 mm plus)	020 OS	C	1.0315 - 1.0335" (26,20 - 26,25 mm)
	19202-23970	Thrust Bearing 2 - 0.008" plus (0,2 mm plus)			
+0.016" (+0,4 mm)	15521-23960	Thrust Bearing 1 - 0.016" plus (0,4 mm plus)	040 OS	C	1.0394 - 1.0413" (26,4 - 26,45 mm)
	19202-23980	Thrust Bearing 2 - 0.016" plus (0,4 mm plus)			

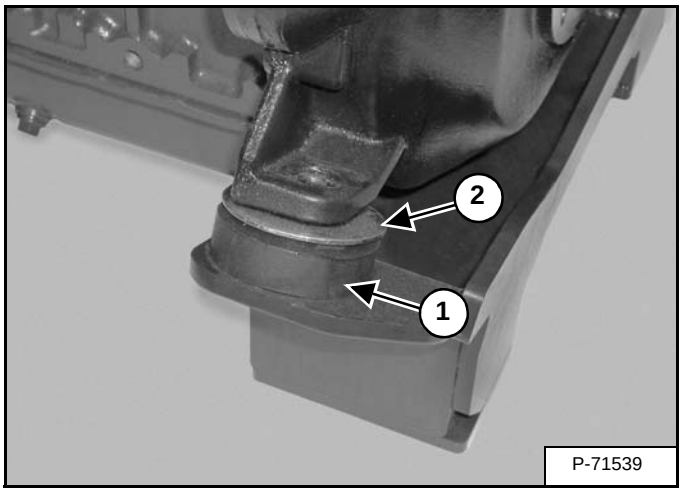
Engine Mount Replacement (Cont'd)

Figure 60-10-29



Remove the bolt (Item 1), washer (Item 2) and spacer (Item 3) **[Figure 60-10-29]**.

Figure 60-10-30

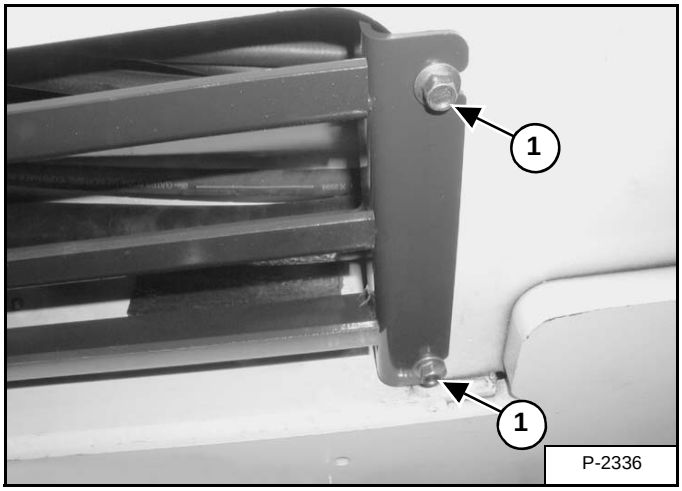


Remove the engine mount (Item 1) and washer (Item 2) **[Figure 60-10-30]**.

Engine Installed

For Front Mounts Only

Figure 60-10-31

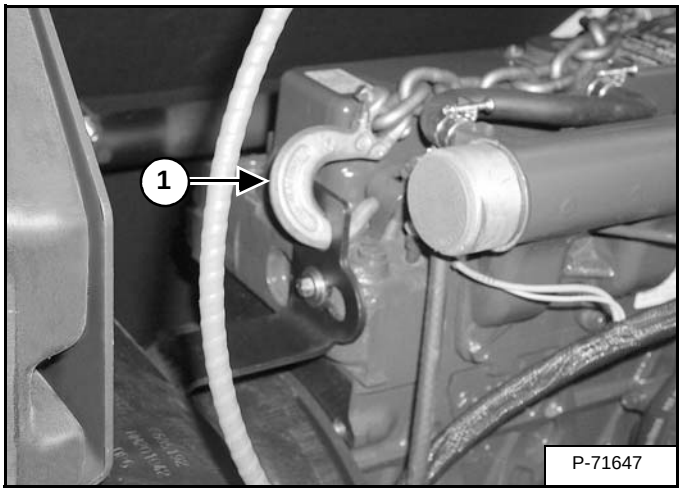


On the bottom of the excavator, loosen the two bolts on the left side. Remove the two bolts (Item 1) **[Figure 60-10-31]** on the right side.

Remove the louver from the bottom of the excavator.

For Front and rear mounts, remove the air cleaner. (See Removal and Installation on Page 60-40-1.)

Figure 60-10-32



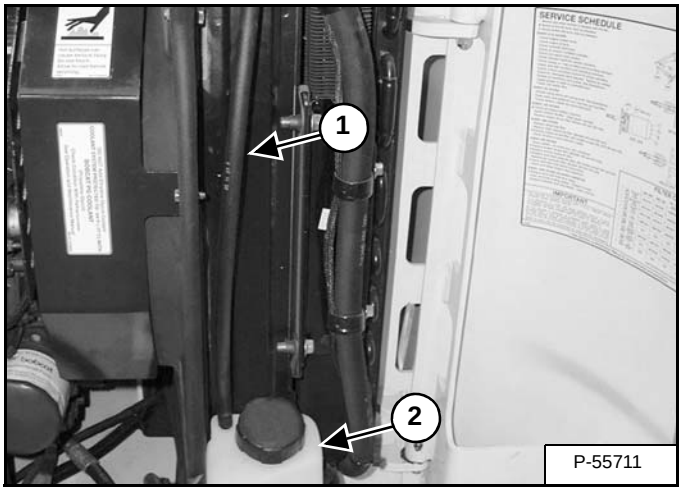
Attach a chain (Item 1) **[Figure 60-10-32]** to the lifting bracket on the pump end of the engine.

ENGINE COOLING SYSTEM

Radiator Removal And Installation

Open the tailgate.

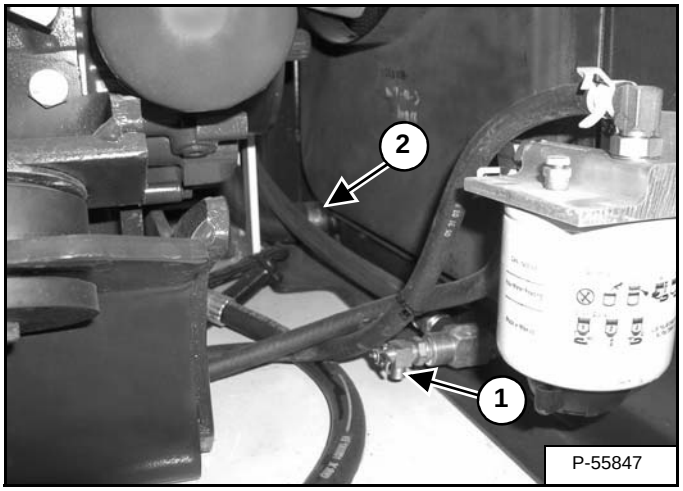
Figure 60-50-1



Remove the radiator over flow hose (Item 1) **[Figure 60-50-1]** from the radiator.

Remove the hose and overflow bottle (Item 2) **[Figure 60-50-1]**.

Figure 60-50-2

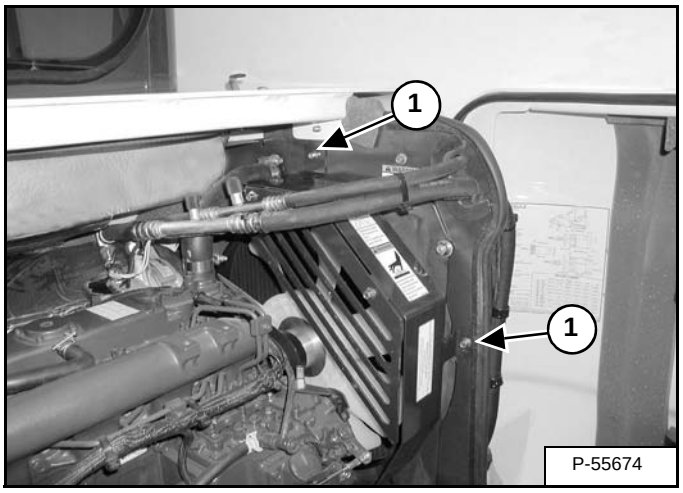


Install a rubber hose on the radiator drain (Item 1) **[Figure 60-50-2]** and drain the coolant from the radiator.

Remove the lower radiator hose clamp (Item 2) **[Figure 60-50-2]**.

Remove the lower radiator hose from the radiator.

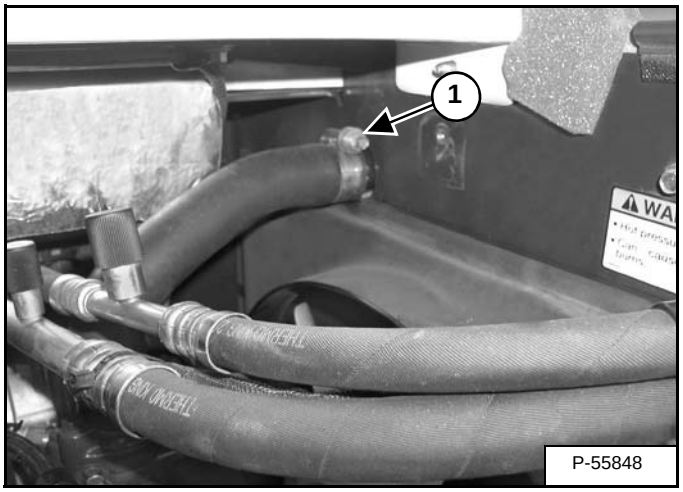
Figure 60-50-3



Remove the bolts (Item 1) **[Figure 60-50-3]** from the fan guard.

Remove the fan guard from the excavator.

Figure 60-50-4



Remove the top radiator hose clamp (Item 1) **[Figure 60-50-4]**.

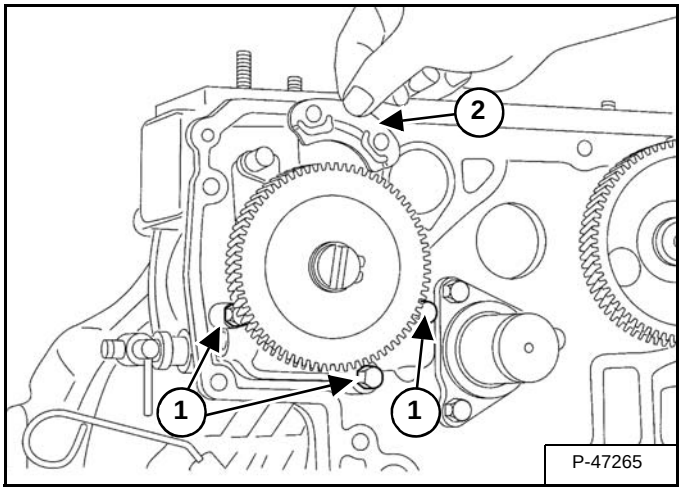
Remove the top radiator hose from the radiator.

Fuel Camshaft Removal And Installation

Remove the timing gearcase cover.(See Timing Gearcase Cover Removal And Installation on Page 60-100-1.)

Remove the idler gear. (See Idler Gear And Shaft Removal And Installation on Page 60-100-4.)

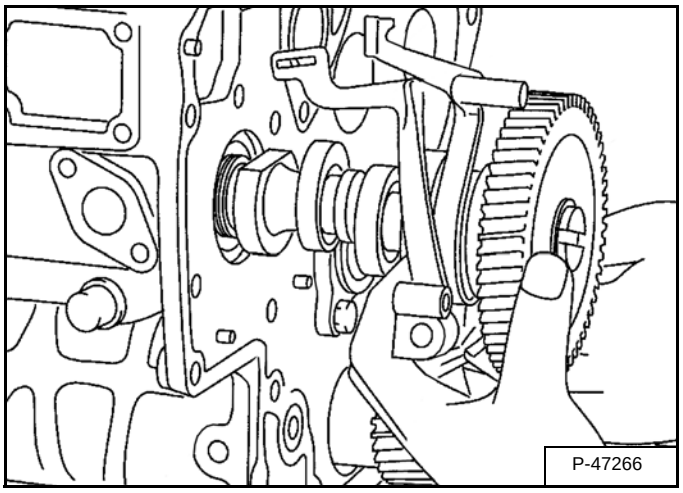
Figure 60-70-1



Remove the three bolts (Item 1) **[Figure 60-70-1]**.

Remove the two bolts and fuel camshaft retainer plate (Item 2) **[Figure 60-70-1]**.

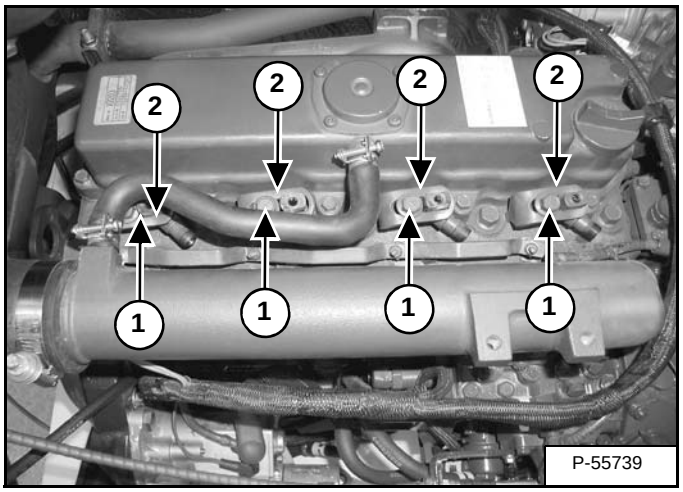
Figure 60-70-2



Remove the fuel camshaft and fork lever assembly at the same time **[Figure 60-70-2]**.

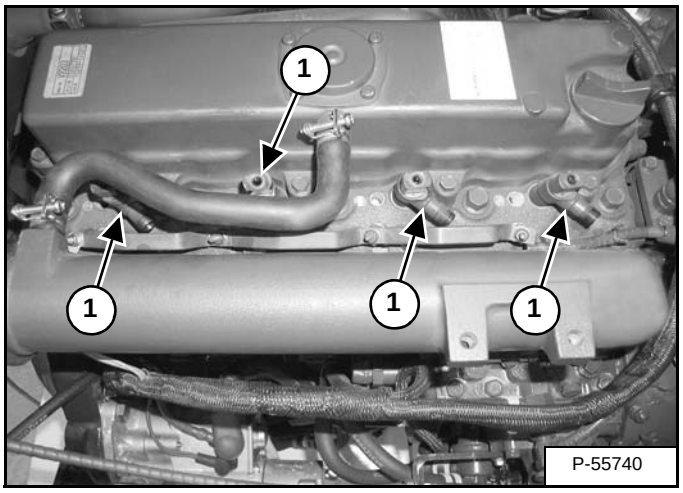
Fuel Injector Removal And Installation (Cont'd)

Figure 60-70-25



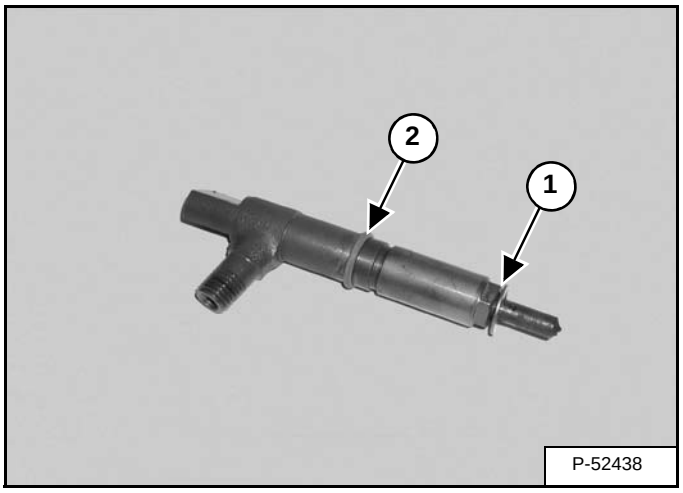
Remove the bolts (Item 1) and clamps (Item 2) **[Figure 60-70-25]**.

Figure 60-70-26



Remove the injector nozzles (Item 1) **[Figure 60-70-26]**.

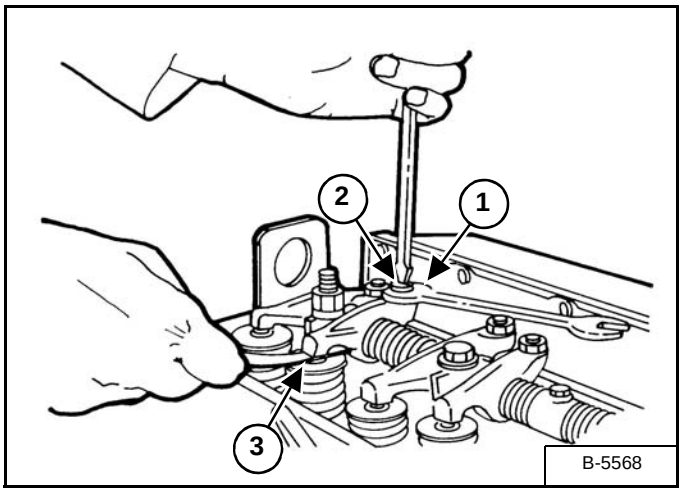
Figure 60-70-27



NOTE: Replace the copper washer (Item 1) and O-ring (Item 2) [Figure 60-70-27] anytime new or used fuel injectors are installed.

Valve Clearance Adjustment

Figure 60-80-5



Adjust the valve clearance as follows:

Loosen the lock nut (Item 1) **[Figure 60-80-5]**.

Turn the adjustment screw (Item 2) **[Figure 60-80-5]** until the correct clearance is obtained.

NOTE: The clearance is measured between the rocker arm and valve stem tip (Item 3) [Figure 60-80-5].

Figure 60-80-6

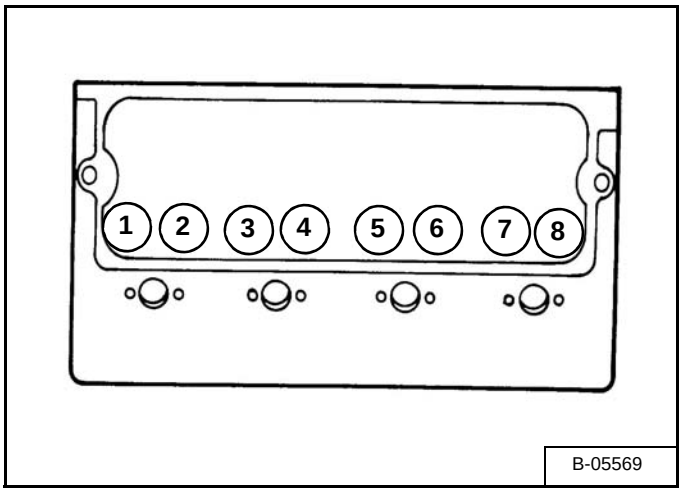


Figure 60-80-7

Cylinder Number	1		2		3		4	
Valve Number	1	2	3	4	5	6	7	8
Valve I=Intake E=Exhaust	I	E	I	E	I	E	I	E

Adjust the valve clearance as follows:

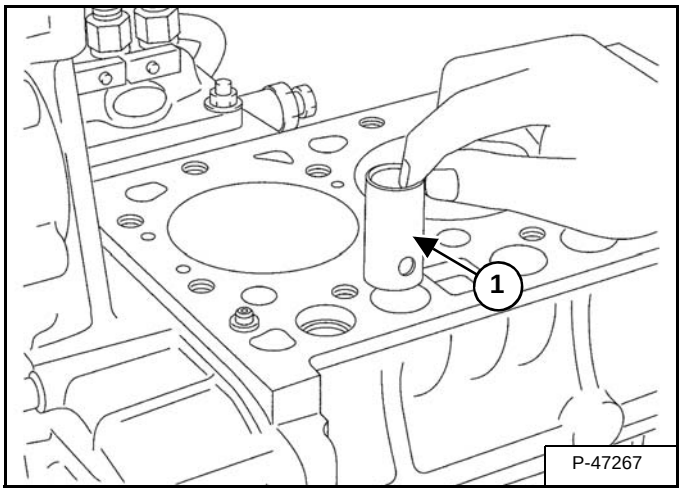
0.0071 - 0.0087 in. (0,18 - 0,22 mm) Intake & Exhaust

Use the following sequence to set the valves **[Figure 60-80-6]** & **[Figure 60-80-7]**:

1. With the rocker arm rocking (valves 7 & 8) on No. 4 cylinder set clearance at No. 1 cylinder (valves 1 & 2).
2. With the rocker arm rocking (valves 3 & 4) on No. 2 cylinder set clearance at No. 3 cylinder (valves 5 & 6).
3. With the rocker arm rocking (valves 1 & 2) on No. 1 cylinder set clearance at No. 4 cylinder (valves 7 & 8).
4. With the rocker arm rocking (valves 5 & 6) on No. 3 cylinder set clearance at No. 2 cylinder (valves 3 & 4).

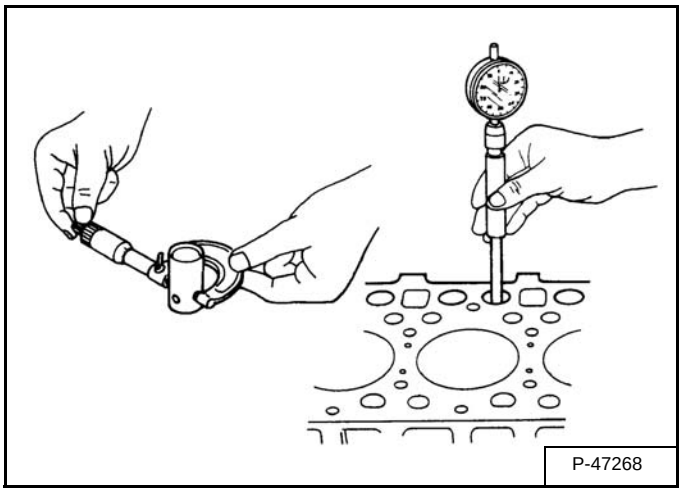
Valve Tappets

Figure 60-80-35



Remove the valve tappets (Item 1) **[Figure 60-80-35]**.

Figure 60-80-36



Measure the O.D. of the tappet **[Figure 60-80-36]**.

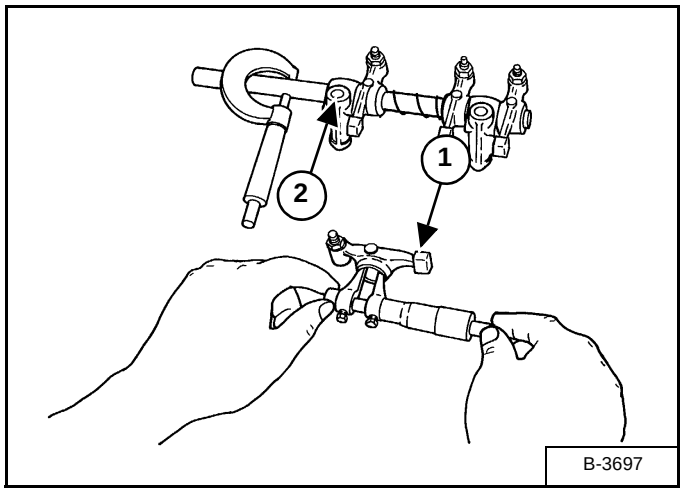
Measure the ID of the tappet bore **[Figure 60-80-36]**.

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

Tappet OD	0.9433 - 0.9441 in. (23,96 - 23,98mm)
Tappet Bore ID	0.9449 - 0.9457 in. (24 - 24,02 mm)
Clearance Between Tappet and Tappet Bore	0.0008 - 0.0024 in. (0,02 - 0,06 mm)
Allowable limit	0.0028 in. (0,07 mm)

Rocker Arm And Shaft - Checking

Figure 60-80-37



Measure the rocker arm I.D. (Item 1) **[Figure 60-80-37]** with an inside micrometer.

Measure the rocker arm shaft O.D. (Item 2) **[Figure 60-80-37]** 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.

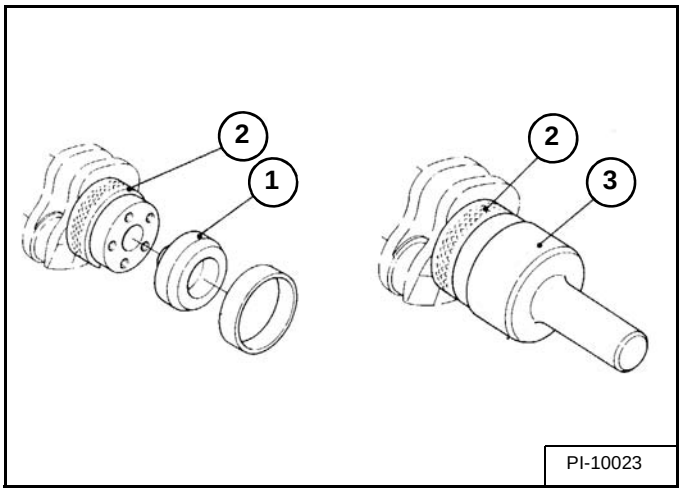
Oil Clearance Between Rocker Arm & Shaft	0.0006 - 0.0018 in. (0,02 - 0,05 mm)
Allowable Limit	0.004 in. (0,1 mm)
Rocker Arm Shaft O.D.	0.5501 - 0.5506 in. (13,97 - 13,98 mm)
Rocker Arm I.D.	0.5512 - 0.5519 in. (14,0 - 14,02 mm)

Crankshaft And Bearings - Servicing (Cont'd)

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

Remove the sleeve.

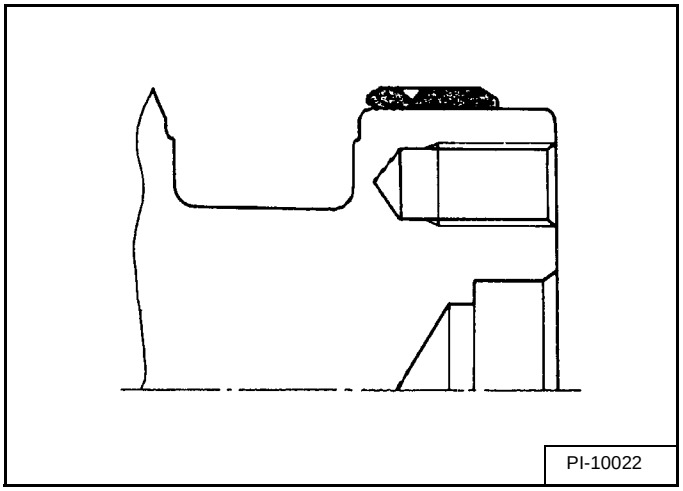
Figure 60-90-28



Install the sleeve guide (Item 1) and stop (Item 2) **[Figure 60-90-28]**.

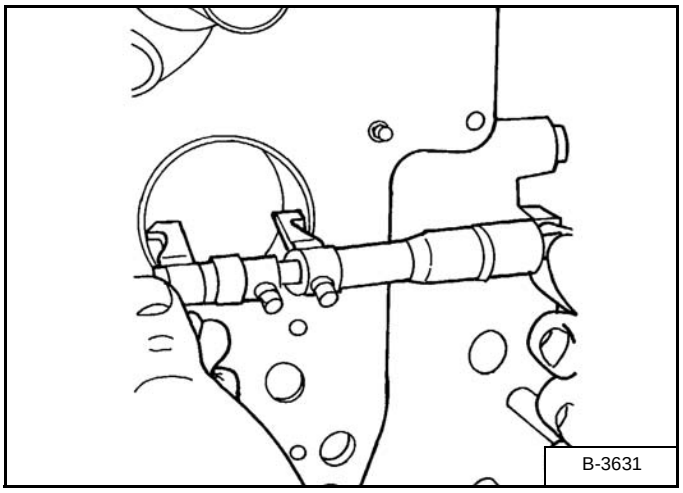
Heat the sleeve to approximately 302 - 392°F (150 - 200°C). Install the sleeve on the crankshaft using the special driver tool (Item 3) **[Figure 60-90-28]**.

Figure 60-90-29



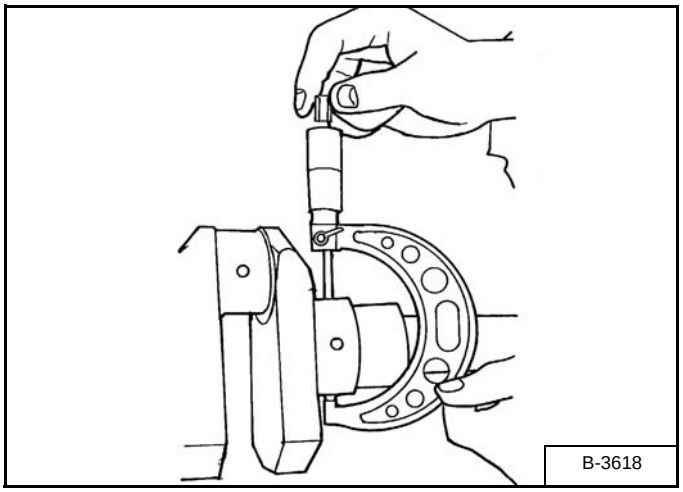
NOTE: The sleeve is installed with the larger chamfered surface to the front of the crankshaft (Item 1) [Figure 60-90-29].

Figure 60-90-30



Measure the I.D. of the No. 1 crankshaft bearing **[Figure 60-90-30]**.

Figure 60-90-31



Measure the O.D. of the crankshaft journal **[Figure 60-90-31]**.

Calculate the oil clearance.

FLYWHEEL AND HOUSING

Flywheel Housing Removal And Installation

Open the tailgate.

Remove the air cleaner. (See Removal And Installation on Page 60-40-1.)

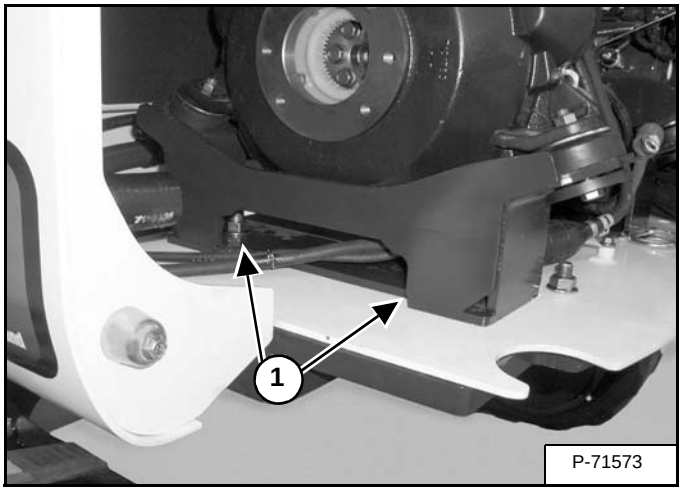
Drain the hydraulic reservoir. (See Removing And Replacing Hydraulic Fluid. on Page 10-100-3.)

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

Remove the hydraulic pump. (See Removal And Installation on Page 20-50-16.)

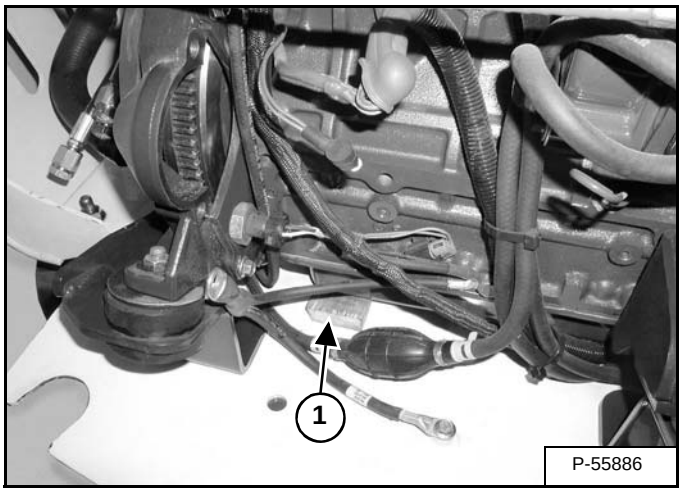
Remove the starter. (See Removal And Installation on Page 50-40-2.)

Figure 60-110-1



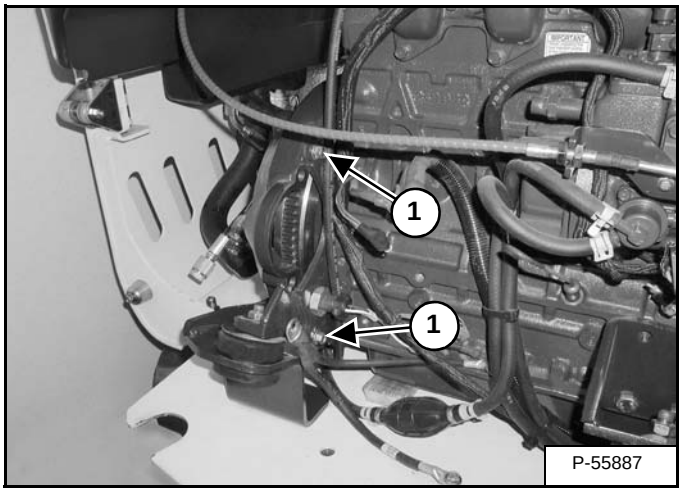
Remove the bolts (Item 1) **[Figure 60-110-1]** from the engine mounts.

Figure 60-110-2



Slightly raise the flywheel end of the engine, and place a support (Item 1) **[Figure 60-110-2]** under the oil pan.

Figure 60-110-3



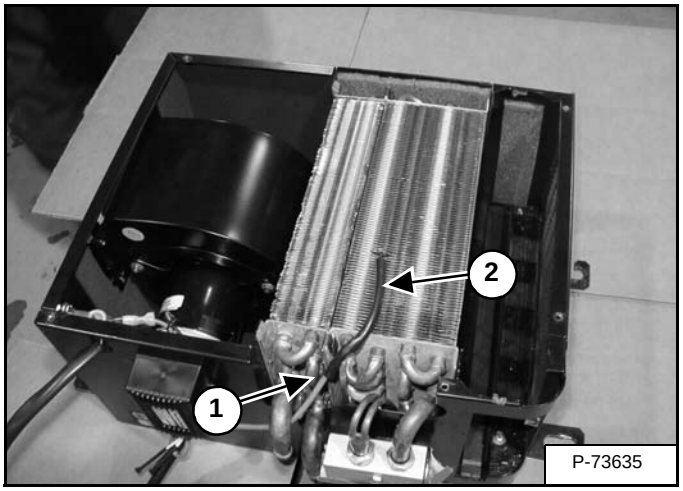
Remove the flywheel cover bolts (Item 1) **[Figure 60-110-3]**.

HEATER COIL (LATER MODELS)

Removal And Installation With A/C

Remove the evaporator/heater unit from the excavator. (See Removal And Installation on Page 70-191-1.)

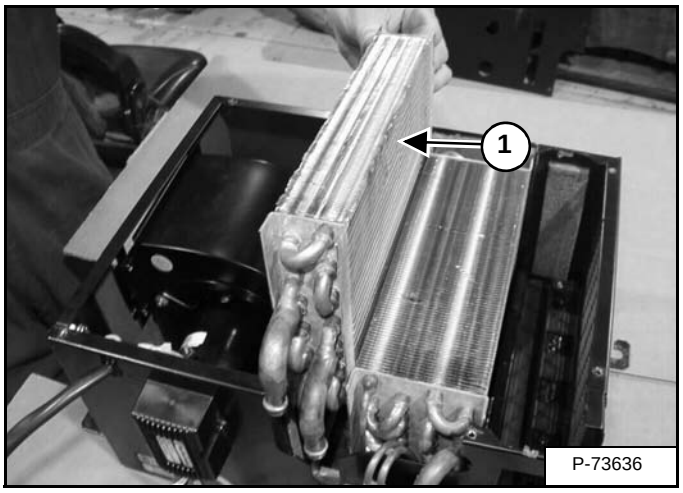
Figure 70-11-1



Remove the tie strap (Item 1) **[Figure 70-11-1]**.

Remove the thermostat probe (Item 2) **[Figure 70-11-1]** from the evaporator. Move the probe to allow clearance for the heater coil removal.

Figure 70-11-2

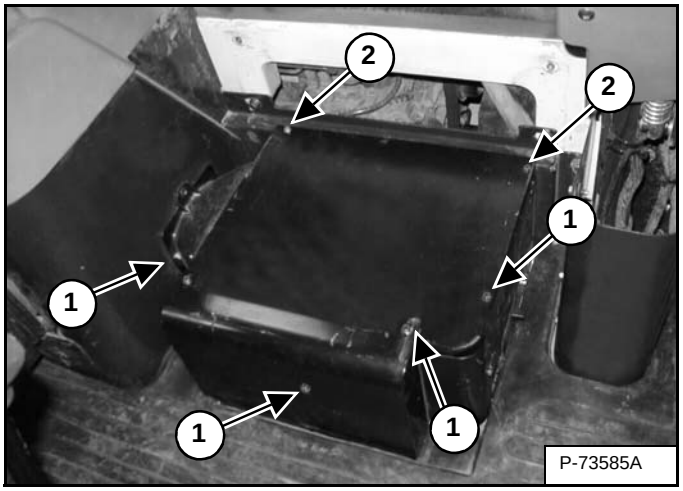


Lift the heater coil (Item 1) **[Figure 70-11-2]** straight up and remove it from the evaporator/heater unit.

Removal And Installation Without A/C

Remove the operator seat and seat mount. (See Removal And Installation on Page 50-40-2.)

Figure 70-11-3

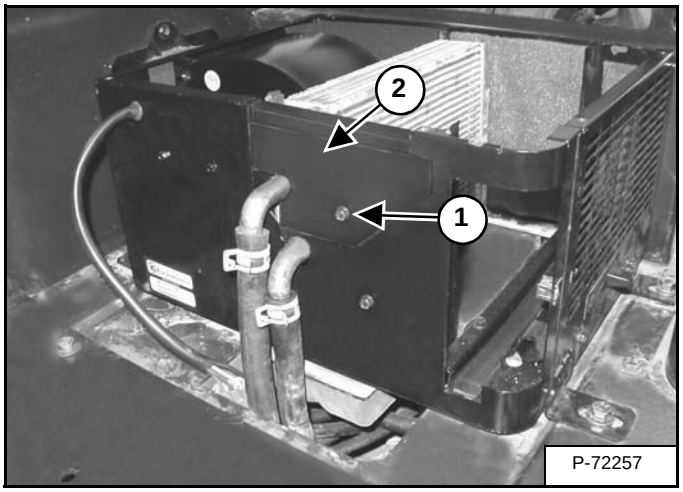


Remove the bolts (Item 1) **[Figure 70-11-3]** from the heater unit front cover.

Remove the front cover from the unit.

Remove the bolts (Item 2) **[Figure 70-11-3]** from the heater cover and remove cover.

Figure 70-11-4



Remove the bolt (Item 1) and cover (Item 2) **[Figure 70-11-4]** from the unit.

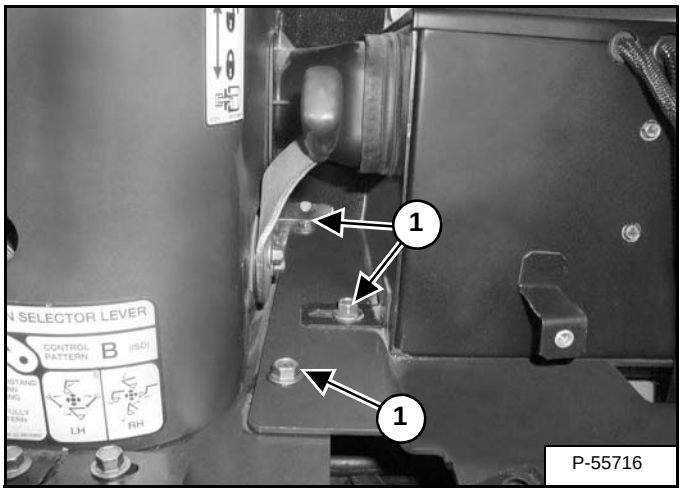
HEATER VALVE

Removal And Installation

Remove the seat and seat mount. (See Seat Mount Removal And Installation on Page 40-40-1.)

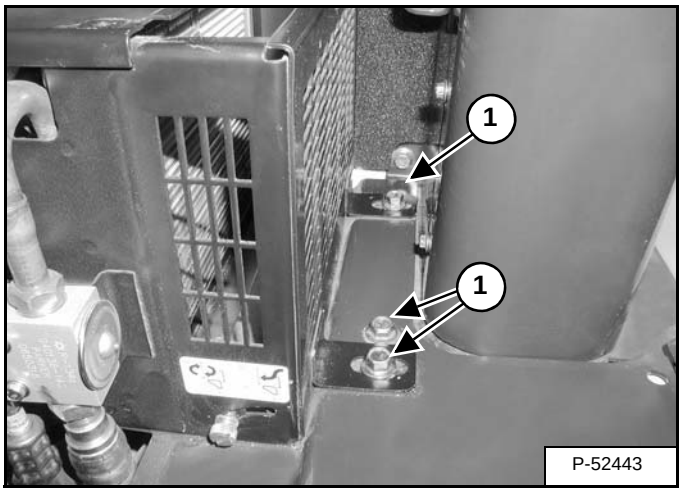
Remove the floor mat and floor plate. (See Removal And Installation (Cab Equipped) on Page 40-90-3.)

Figure 70-30-1



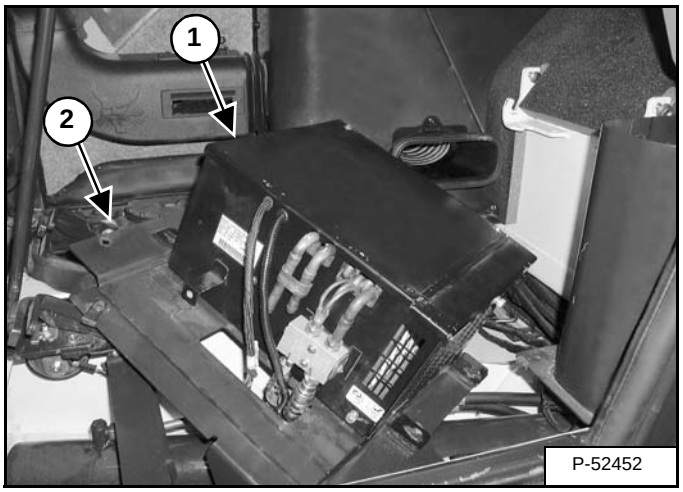
Remove the bolts (Item 1) **[Figure 70-30-1]** from the right side of the evaporator/heater unit.

Figure 70-30-2



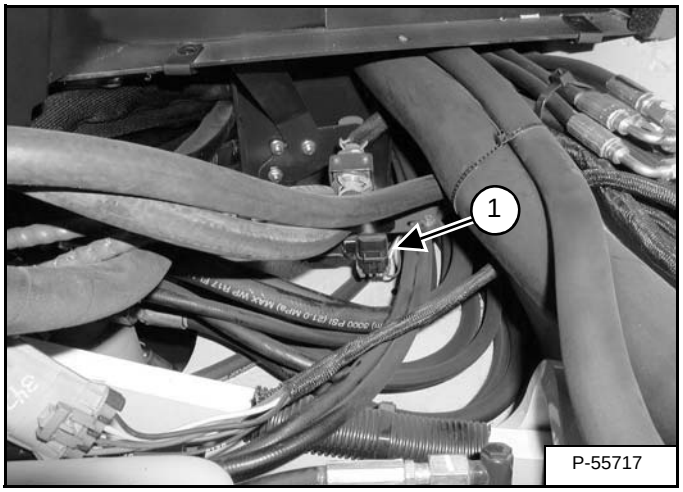
Remove the bolts (Item 1) **[Figure 70-30-2]** from the left side of the evaporator/heater unit.

Figure 70-30-3



Position the evaporator/heater unit (Item 1) and rear floor plate (Item 2) **[Figure 70-30-3]** as shown.

Figure 70-30-4



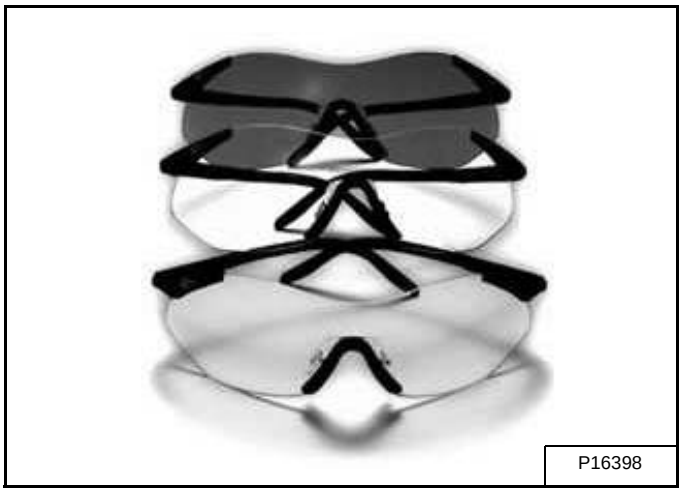
Disconnect the wire harness (Item 1) **[Figure 70-30-4]** from the heater valve.

SAFETY

Safety Equipment

In servicing A/C and heater systems you will be exposed to high pressures, temperatures and several chemical hazards. Moving belts and pulleys are normal shop hazards.

Figure 70-60-11



In addition to exercising caution in your work, DO WEAR SAFETY GLASSES OR A FACE SHIELD **[Figure 70-60-11]** when you are using R-134a, a leak detector, adjusting service valves or the manifold gage set connectors. Safety glasses or a transparent face shield are practical safety items and one or the other is absolutely required.

⚠ WARNING

In the event of a leak, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R134a refrigerant gives a toxic gas.

W-2371-0500

Figure 70-60-12

R-134a inside a canister or in an A/C system is a liquid under pressure. When it escapes or releases into the air, **ITS TEMPERATURE DROPS TO 21.6 F DEGREES "INSTANTLY"**. If it spills on your skin or in your eyes you should flood the area with cool water and **SEEK MEDICAL ATTENTION FAST!** It is a good idea to wear gloves **[Figure 70-60-12]** to prevent frost bite if you should get refrigerant on your hands.

⚠ WARNING

HFC 134A refrigerant can be dangerous if not properly handled. Liquid 134A may cause blindness if it contacts the eyes and may cause serious frostbite if it contacts the skin.

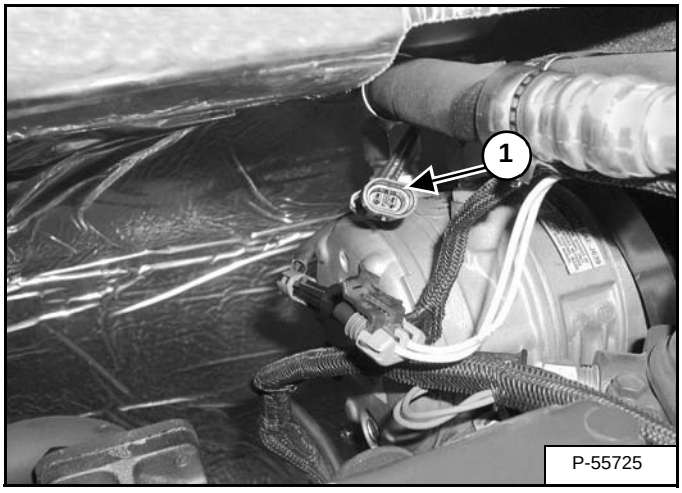
- **Gaseous 134A becomes lethal (phosgene) gas when it contacts open flame or very hot substances.**
- **NEVER SMOKE when there is the possibility of even small amounts of 134A in the air.**

Any servicing work that involves release or addition of 134A to the system must be done by a competent refrigeration dealer who has the proper equipment, knowledge, and experience to service refrigeration equipment.

W-2373-0500

Checking The Electrical System (Cont'd)

Figure 70-80-20



If there is voltage at the harness, check the resistance at the pressure switch (Item 1) **[Figure 70-80-20]**.

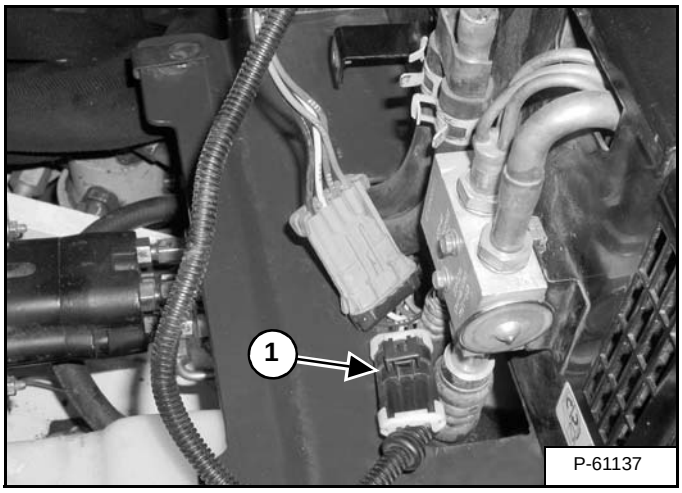
If there is no resistance value, check for low or high refrigerant levels in the system. (See Chart on Page 70-40-3.)

If a resistance value is observed, the pressure switch is good.

If there is no voltage at the wiring harness check the harness for broken wires. If there are no broken wires, reconnect the wire harness to the pressure switch.

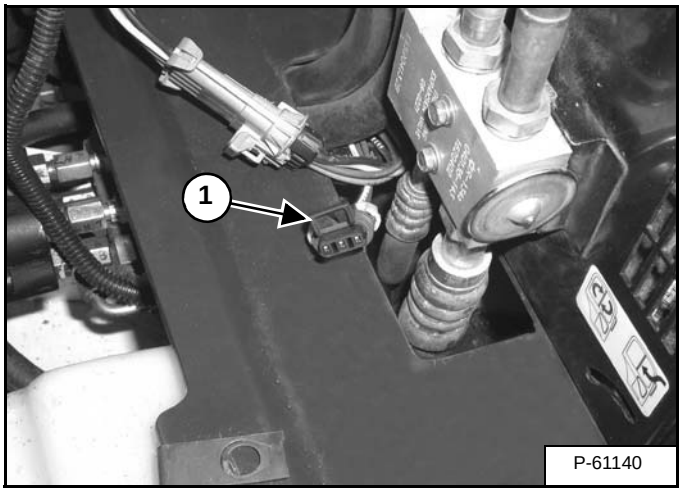
Remove the floor mat and floor panel. (See Removal And Installation (Cab Equipped) on Page 40-90-3.)

Figure 70-80-21



Disconnect the thermostat/blower fan wire harness (Item 1) **[Figure 70-80-21]**.

Figure 70-80-22



Check the wire harness (Item 1) **[Figure 70-80-22]** for voltage. The voltage should be approximately 12 volts, from Pin A (Blue wire # 3100) to ground.

If there is no voltage at the wiring harness, check the harness for broken wires.

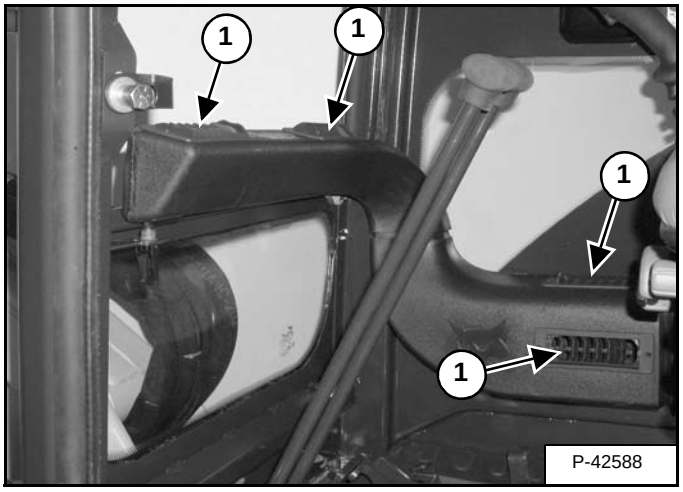
If there is voltage at the wiring harness, check the thermostat for resistance.

BASIC TROUBLESHOOTING (LATER MODELS)

Poor A/C Performance

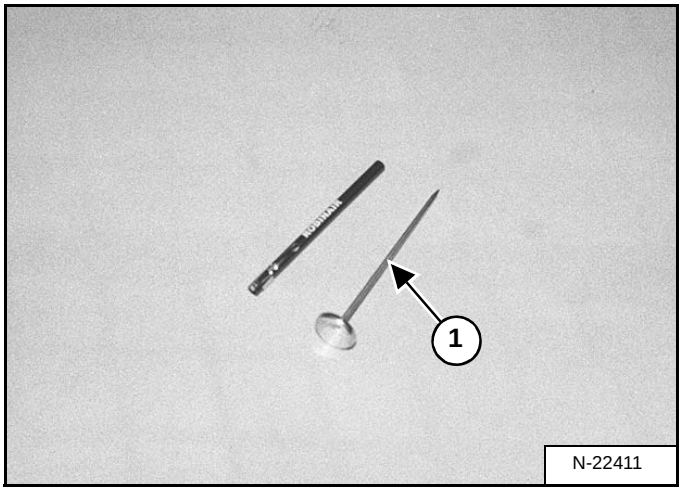
Start the excavator. Engage the A/C system with the blower fan on high. Run the excavator at full RPM for approximately 15 minutes, with the cab door closed.

Figure 70-81-1



Close the louvers at the front window duct and on the top of the lower duct (Item 1) **[Figure 70-81-1]**.

Figure 70-81-2



Check the temperature at the louvers (Item 1) **[Figure 70-81-2]** with a thermometer.

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

If louver temperature is too high. (See SYSTEM TROUBLESHOOTING CHART on Page 70-100-1.)

Check the blower fan for proper operation or noise, and replace if necessary. (See Removal And Installation on Page 70-20-1.)

Check the accessory drive belt tension. (See Belt Adjustment on Page 10-140-1.)

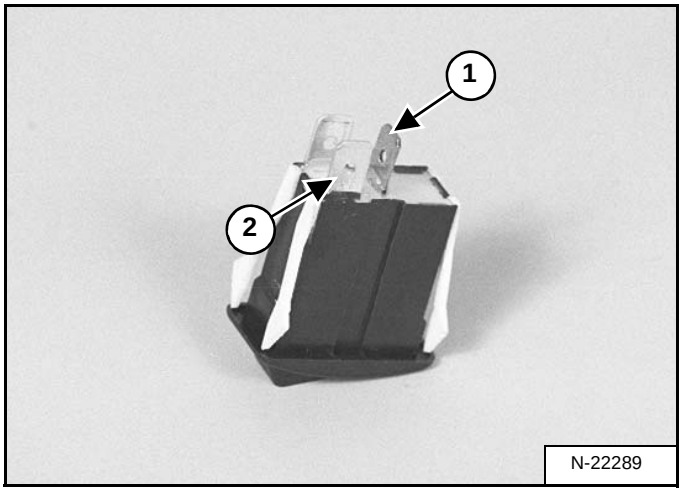
Check the A/C evaporator coil for dirt or mud, and clean if necessary. (See Removing And Replacing Coolant on Page -2.)

Inspect the sight glass located on the receiver/drier for air bubbles. (See Receiver/Drier Removal And Installation on Page 70-160-1.)

Check the engine coolant to see if it is bypassing the heater valve. (See Removal And Installation on Page 70-30-1.)

Electrical System (Cont'd)

Figure 70-81-31



If there is voltage at the wiring harness, check the A/C switch **[Figure 70-81-31]** for resistance.

With the switch in the OFF position there should be no resistance between any of the three terminals on the A/C switch.

With the switch in the ON position there should be resistance between terminal (Item 1) and terminal (Item 2) **[Figure 70-81-31]**.

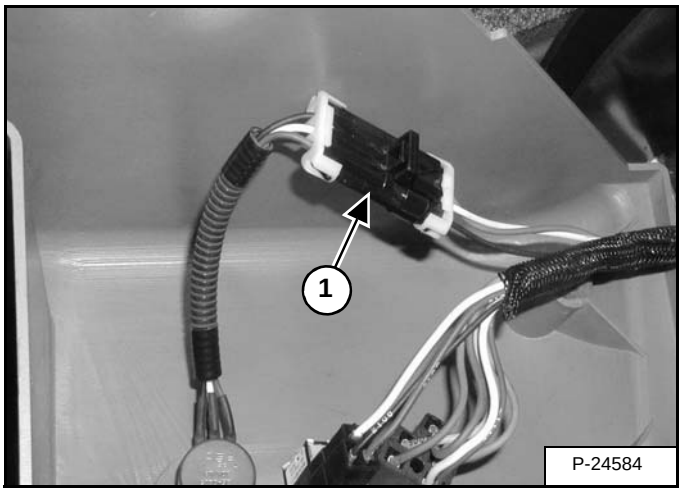
If no resistance value is found, replace the A/C switch.

If a resistance value is found, check the potentiometer.

The potentiometer will effect the A/C system and also effect the operation of the heater.

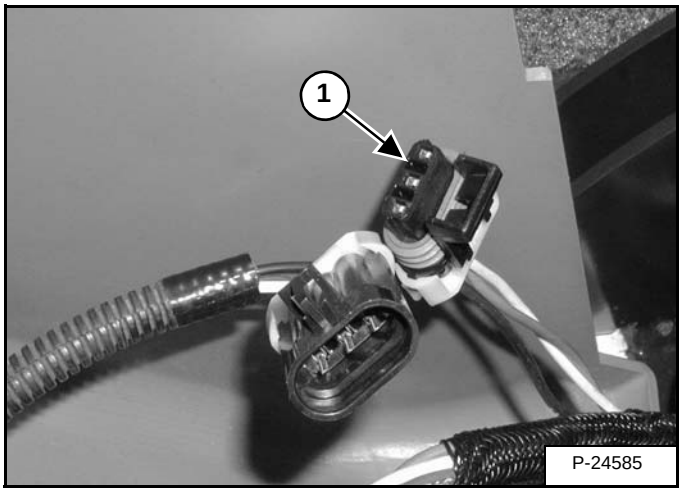
If the heater valve does not open, or close, or the A/C does not work, check the potentiometer.

Figure 70-81-32



Disconnect the wire harness (Item 1) **[Figure 70-81-32]** from the potentiometer.

Figure 70-81-33



Check the wire harness (Item 1) **[Figure 70-81-33]** for voltage. Between pins **A** and **C** the voltage should be approximately 12 volts.

If there is no voltage at the wiring harness, check the harness for broken wires.

SYSTEM TROUBLESHOOTING CHART

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 from 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.	Defective thermo. switch (frozen evaporator).	Check thermostat using a circuit tester.	Replace thermostat.

Insufficient cooling although air flow and compressor operation are normal

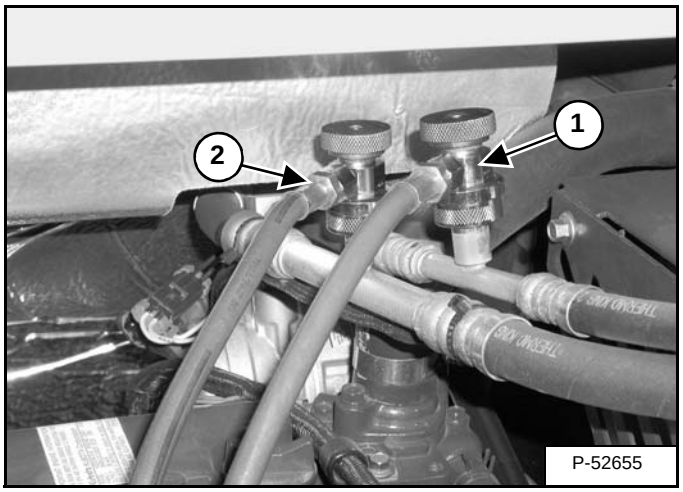
	POSSIBLE CAUSE	INSPECTION	SOLUTION
1.	System low on refrigerant.	The high side pressure will be low and bubbles may be present in sight glass on receive drier.	Repair any leaks and recharge the refrigerant to the correct level.
2.	Excessive refrigerant.	The high pressure side pressure will be high.	Use refrigerant recovery equipment to capture excess refrigerant. Charge to the correct refrigerant level.

The compressor does not operate at all, or operates improperly

	POSSIBLE CAUSE	INSPECTION	SOLUTION
1.	Loose drive belt.	The belt is vibrating or oscillating.	Adjust tension.
2.	Internal compressor malfunction.	The compressor is locked up and the belt slips.	Replace compressor.
		Magnetic clutch related	
3.	Low battery voltage.	Clutch slips.	Recharge the battery.
4.	Faulty coil.	Clutch slips.	Replace the magnetic clutch.
5.	Oil on the clutch surface.	Clutch slips.	Replace or clean the clutch surface.
6.	Open oil.	Clutch does not engage and there is not reading when a circuit tester is connected between the coil and terminals.	Replace clutch.
7.	Broken wiring or poor ground.	Clutch will not engage. Inspect the ground and connections.	Repair.
8.	Wiring harness components.	Test the conductance of the pressure switch, thermostat, Relay, etc.	Check operation.

Reclamation Procedure (Cont'd)

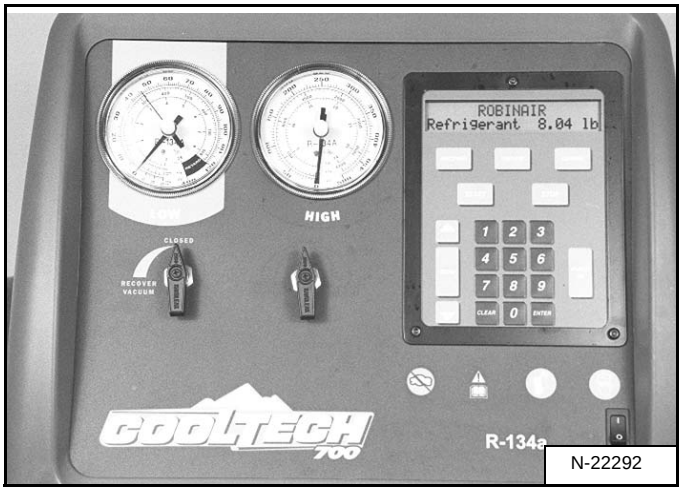
Figure 70-130-5



Connect the Red hose (Item 1) **[Figure 70-130-5]** to the high pressure port and open the valve.

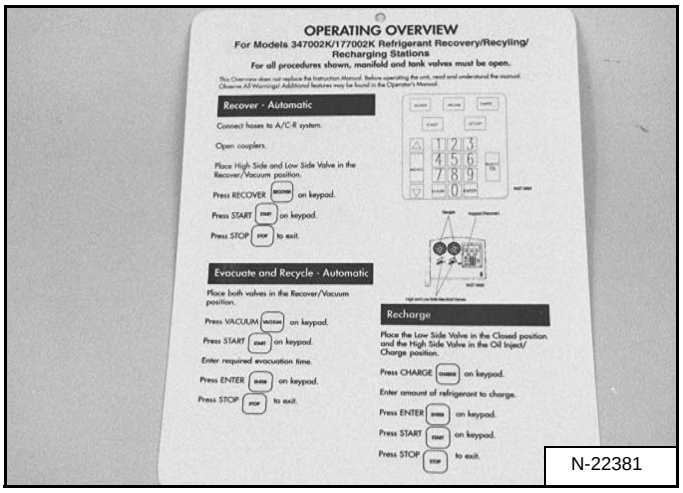
Connect the Blue hose (Item 1) **[Figure 70-130-5]** to the low pressure port and open the valve.

Figure 70-130-6



Turn the reclaimer unit to the ON position and follow the on screen instructions **[Figure 70-130-6]**.

Figure 70-130-7



NOTE: The reclaimer unit has a complete step by step set of instructions [Figure 70-130-7] to follow for reclamation and recharging of the A/C system. A trained technician should follow these instructions as they may very slightly depending on the model and brand of reclaimer used.

CONDENSER

Removal And Installation

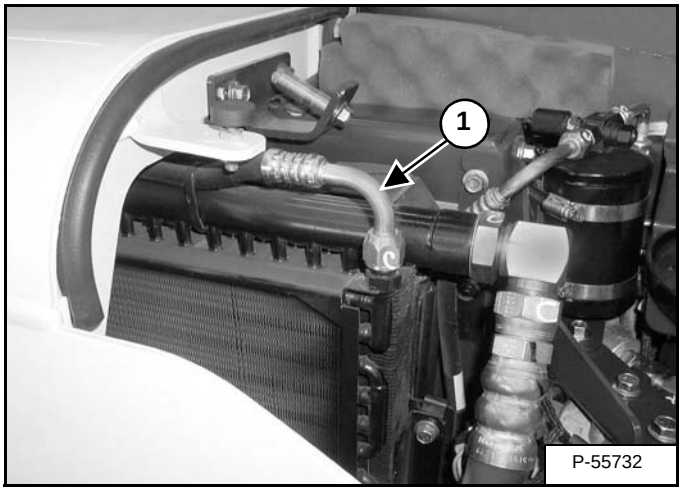
Open the tailgate.

Evacuate the A/C system. (See Charging With A Manifold Gauge Set on Page 70-130-4.)

Open the right side cover.

Mark the A/C hoses for proper installation.

Figure 70-150-1



Remove the top hose (Item 1) **[Figure 70-150-1]** from the condenser.

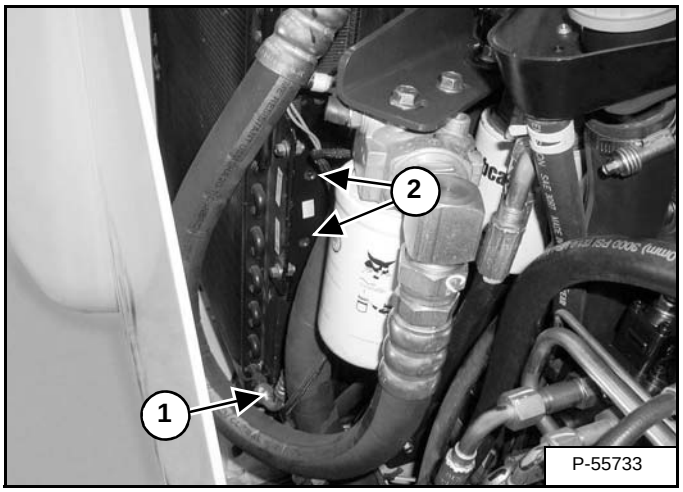
Cap the hose and plug the fitting on the condenser.

WARNING

In the event of a leak, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R134a refrigerant gives a toxic gas.

W-2371-0500

Figure 70-150-2

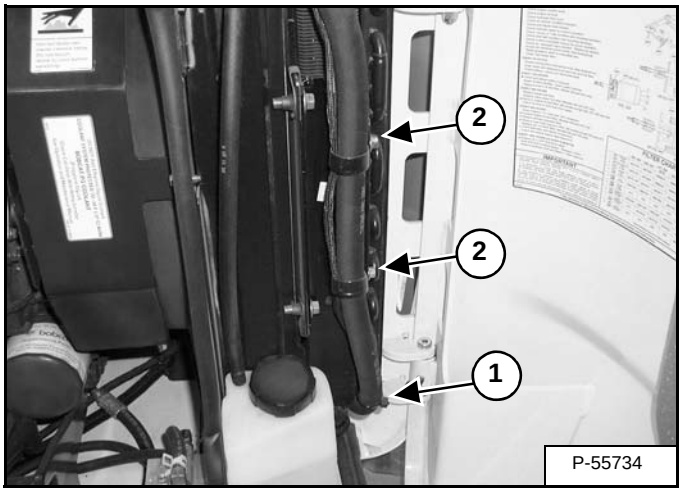


Remove the lower hose (Item 1) **[Figure 70-150-2]** from the condenser.

Cap the hose and plug the fitting on the condenser.

Remove the bolts (Item 2) **[Figure 70-150-2]**.

Figure 70-150-3



Remove the tie-strap (Item 1) **[Figure 70-150-3]**.

Remove the bolts (Item 2) **[Figure 70-150-3]**.

Move the hose to the side for condenser removal.

Remove the condenser from the excavator.

EVAPORATOR/HEATER UNIT (LATER MODELS)

Removal And Installation

Remove the operator seat and seat mount. (See Removal And Installation on Page 50-40-2.)

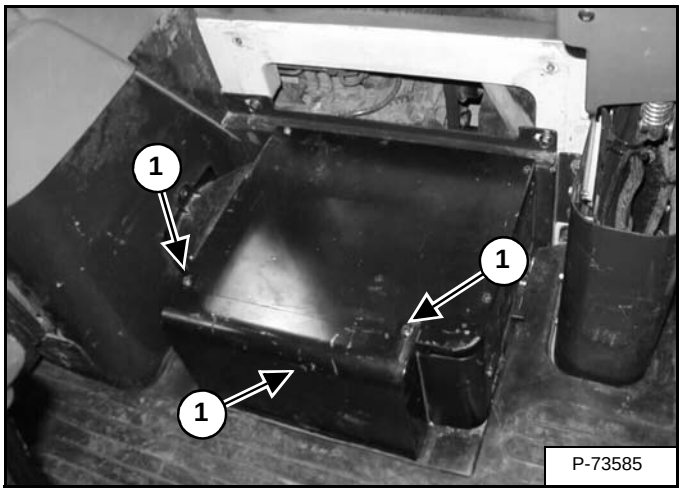
Evacuate the A/C system. (See Charging With A Manifold Gauge Set on Page 70-130-4.)

⚠ WARNING

In the event of a leak, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R134a refrigerant gives a toxic gas.

W-2371-0500

Figure 70-191-9

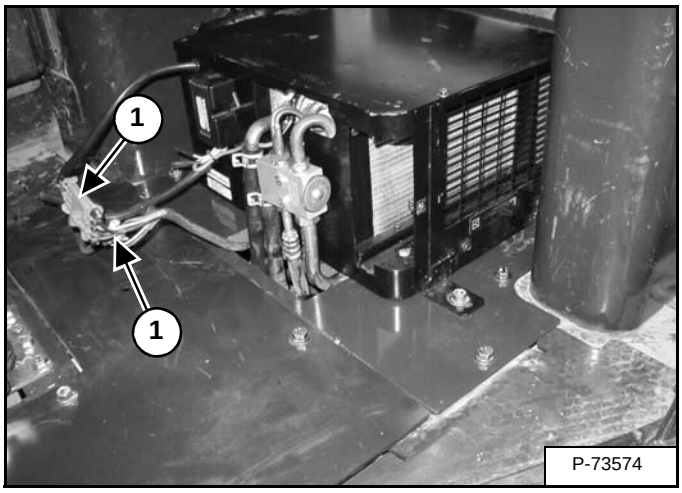


Remove the bolts (Item 1) **[Figure 70-191-9]** from the evaporator/heater unit front cover.

Remove the front cover from the unit.

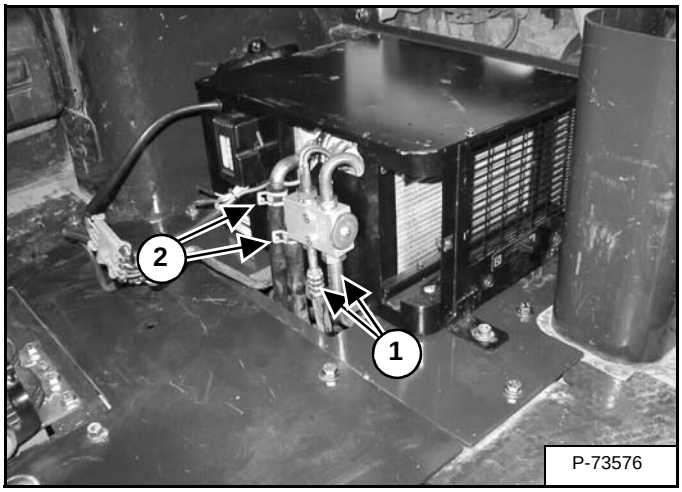
Remove the floormat and floor plate. (See Removal And Installation (Cab Equipped) on Page 40-90-3)

Figure 70-191-10



Disconnect the wire connectors (Item 1) **[Figure 70-191-10]**.

Figure 70-191-11



Remove the A/C hoses (Item 1) **[Figure 70-191-11]** from the expansion valve.

Installation: Tighten the A/C hoses to 22 ft.-lb. (29,8 N•m) torque.

Cap and plug the hoses and the expansion valve fittings with the proper A/C caps and plugs.

Remove the clamps (Item 2) **[Figure 70-191-11]** from the heater hoses.

Remove the heater hoses from the heater coil.

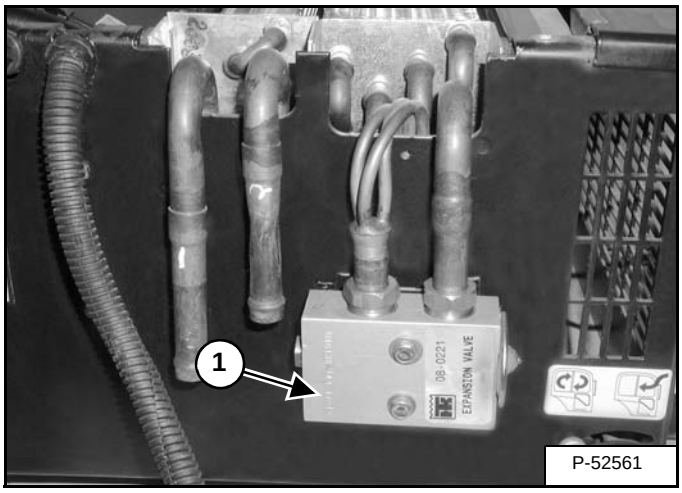
EVAPORATOR COIL (EARLY MODELS)

Removal And Installation

Evacuate the A/C system. (See Charging With A Manifold Gauge Set on Page 70-130-4.)

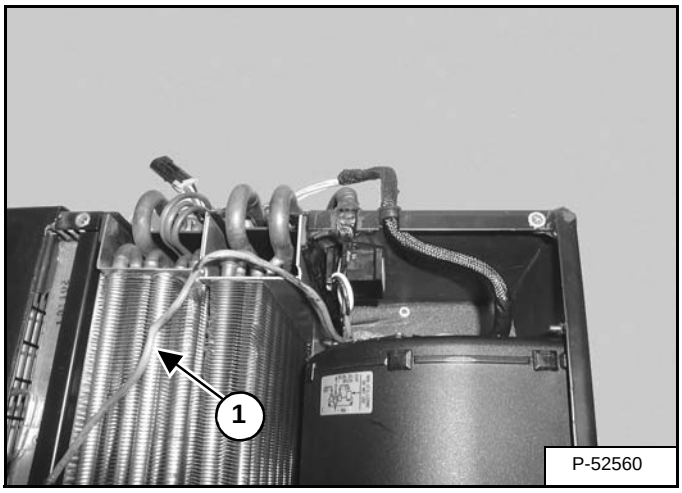
Remove the evaporator/heater unit from the excavator. (See Removal And Installation on Page 70-190-1.)

Figure 70-220-1



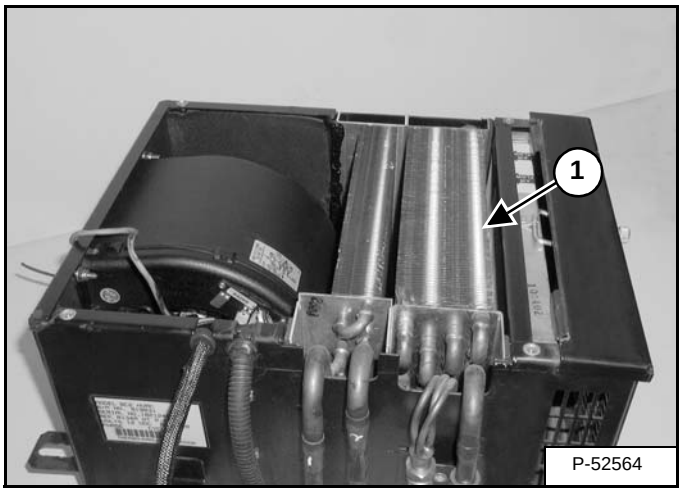
Remove the expansion valve (Item 1) **[Figure 70-220-1]** from the unit. (See Removal And Installation on Page 70-211-1.)

Figure 70-220-2



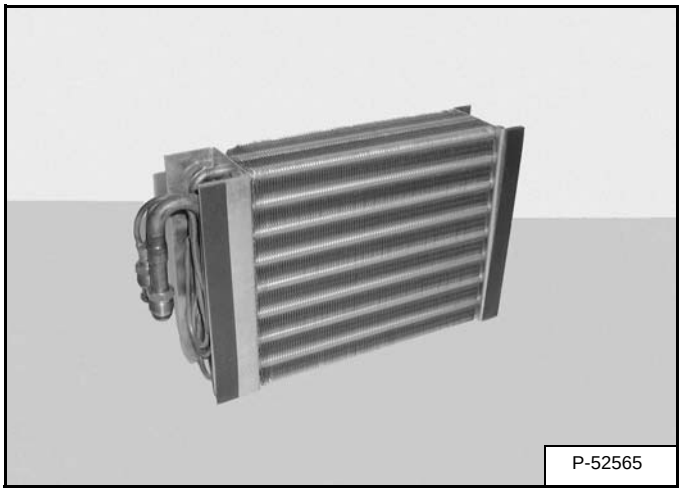
Remove the thermostat probe (Item 1) **[Figure 70-220-2]** from the evaporator.

Figure 70-220-3



Lift the evaporator (Item 1) **[Figure 70-220-3]** straight up from the evaporator/heater unit.

Figure 70-220-4



Inspect the evaporator coil **[Figure 70-220-4]** for leaks, and replace as needed.

Clean with low water or air pressure.

EXCAVATOR SPECIFICATIONS (CONT'D)
Electrical

Starting Aid	Glow Plugs
Alternator	12 volts, 90 Amp open frame w/ internal regulator
Battery	12 volts - 530 CCA @ 0°F (-18°C)
Starter	12 volts; gear reduction 2.7 Hp (2.0 kw)
Instrumentation	Fuel gauge, audible alarm, visual warning for engine functions and hourmeter

Drive System

Final Drive	Each track is independently driven by an Axial Piston Motor
Type of Reduction	Two-stage planetary gear reduction

Slew System

Slew Motor	Orbit Motor
Slew Circle	Single row shear type ball bearing with internal gear
Slew Speed	9.0 RPM

Undercarriage

Crawler Track Design	Sealed track rollers with boxed section track, Roller frame, Grease type track adjuster
Width of crawler	70.1 in. (1780 mm)

Capacities

Fuel Tank	12.3 Gal. (46,6 L)
Hydraulic Reservoir	Tank Cap. 7.8 Gal. (29,5 L)
Cooling System	4.5 Gal. (17.0 L)
Engine Oil and Filter	7.5 qt. (7,1 L)
Final Drive (each) S/N A16U11001 Through A16U11490	0.55 qt. (0,5 L)
Final Drive (each) S/N A16U11491 & Above	1.2 qt. (1,1L)

Tracks

Type	Rubber	Steel
Width	12.6 in. (320 mm)	12.6 in. (320 mm)
Number Of Shoes	Single Assembly	47
Number of Track Rollers (per side)	5	5

Ground Pressure

Ground Pressure Rubber Track Steel Track	 4.80 PSI (0.331 bar) 4.85 PSI (0.334 bar)