Bobcat®

Service Manual

E27z

Compact Excavator

S/N B4R711001 & Above

7354905enUS (01-21) (B)

Printed in U.S.A.

SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

AVOID INJURY OR DEATH

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

W-2003-0807

IMPORTANT

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

I-2019-0284

DANGER

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

D-1002-1107

WARNING

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

W-2044-1107

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

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the machine is in safe operating condition.
- The Operation & Maintenance Manual delivered with the machine or attachment contains operating information as well as routine maintenance and service procedures. It is a part of the machine and can be stored in a container provided on the machine. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Machine signs (decals) instruct on the safe operation and care of your Bobcat machine or attachment. The signs and their locations are shown in the Operation & Maintenance Manual. Replacement signs are available from your Bobcat dealer.
- An Operator's Handbook fastened to the operator cab. It's brief instructions are convenient to the operator. The handbook is available from your dealer in an English edition or one of many other languages. See your Bobcat dealer for more information on translated versions.
- The Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.

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.

Avoid Silica Dust

Cutting or drilling concrete containing sand or rock containing quartz may result in exposure to silica dust. Use a respirator, water spray or other means to control dust.

SI EXC EMEA-1114 SM

LIFTING AND BLOCKING THE EXCAVATOR

Procedure

Always park the machine on a level surface.

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W-2003-0807

WARNING

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

W-2218-1195

Figure 10-10-1

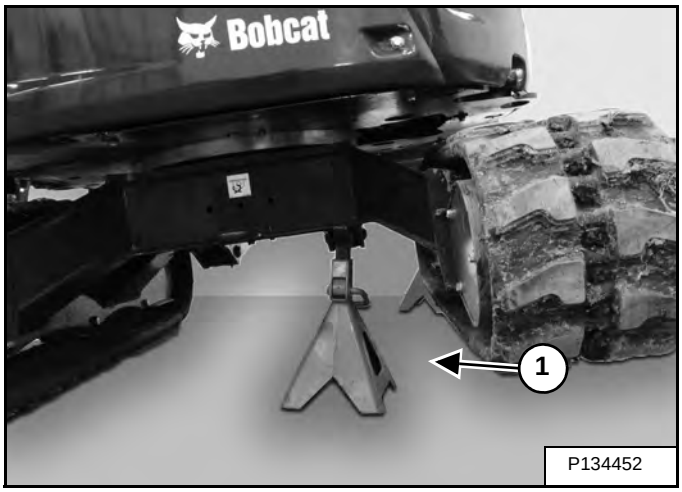
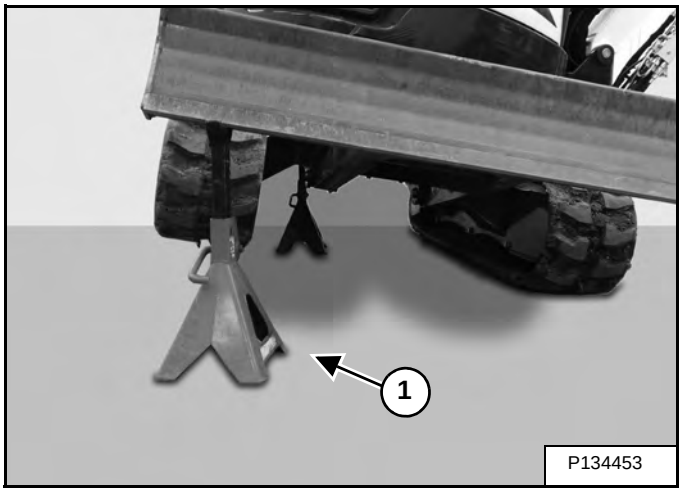


Figure 10-10-2



Raise one side of the machine (approximately 100 mm [4 in]) using the boom and arm **[Figure 10-10-1]** and **[Figure 10-10-2]**.

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

Repeat the procedure for the other side.

Stop the engine.

OPERATOR CANOPY (ROPS / TOPS / FOPS)

Description

The Bobcat excavator has an operator canopy (ROPS / TOPS / FOPS) as standard equipment to protect the operator if the excavator is tipped over or from falling objects. The seat belt must be worn for ROPS / TOPS / FOPS protection.

Check the ROPS / TOPS / FOPS canopy, mounting, and hardware for damage. Never modify the ROPS / TOPS / FOPS canopy. Replace the canopy and hardware if damaged. See your dealer for parts.

ROPS / TOPS - Roll-Over Protective Structure per ISO 12117-2, and Tip-Over Protective Structure per ISO 12117.

FOPS - Falling Objects Protective structure, Top Guard per ISO 10262 - Level 1.

⚠ WARNING

Never modify operator cab by welding, grinding, drilling holes or adding attachments unless instructed to do so by Bobcat Company. Changes to the cab can cause loss of operator protection from rollover and falling objects, and result in injury or death.

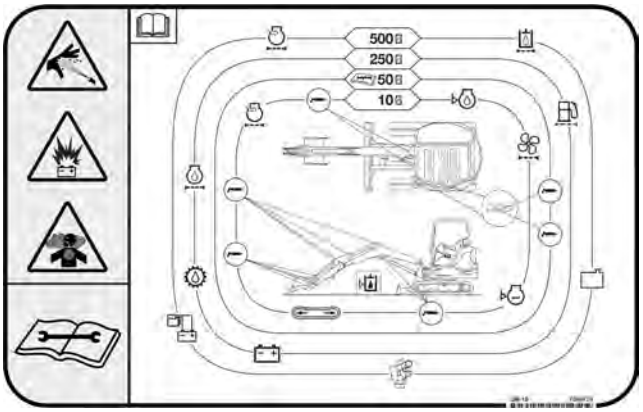
W-2069-0200

SERVICE SCHEDULE

Maintenance Intervals

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

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



See inside page of the back cover for symbols and identification.

WARNING

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W-2003-0807

Every 10 Hours (Before Starting The Excavator)

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

First 50 Hours

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

Every 50 Hours

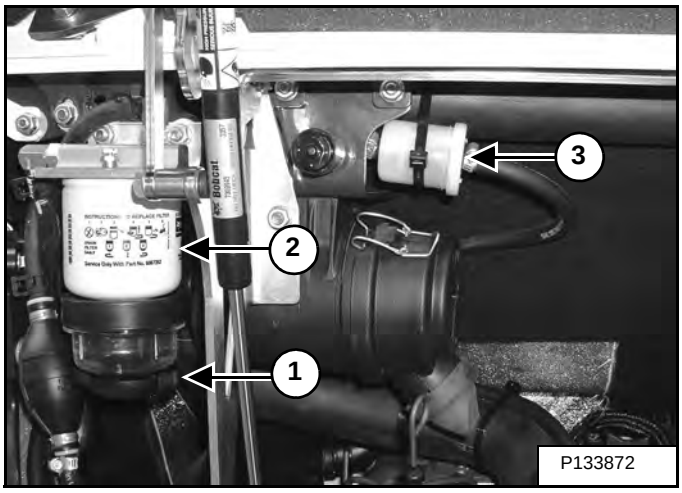
- **Swing Bearing** - Grease swing bearing and swing pinion. Service every 10 hours when operating in water.

Fuel Filter

Removing Water

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

Figure 10-100-2



Loosen the drain (Item 1) at the bottom of the filter (Item 2) **[Figure 10-100-2]** to drain water from the filter into a container.

Inspect the fuel pre-filter (Item 3) **[Figure 10-100-2]** daily for moisture and contamination. Replace as necessary.

Clean up any spilled fuel.

Replacing Elements

Remove and replace the fuel pre-filter (Item 3) **[Figure 10-100-2]**.

Remove the filter (Item 2) **[Figure 10-100-2]**.

Clean the area around the filter housing. Put clean oil on the seal of the new filter. Install the fuel filter and hand tighten.

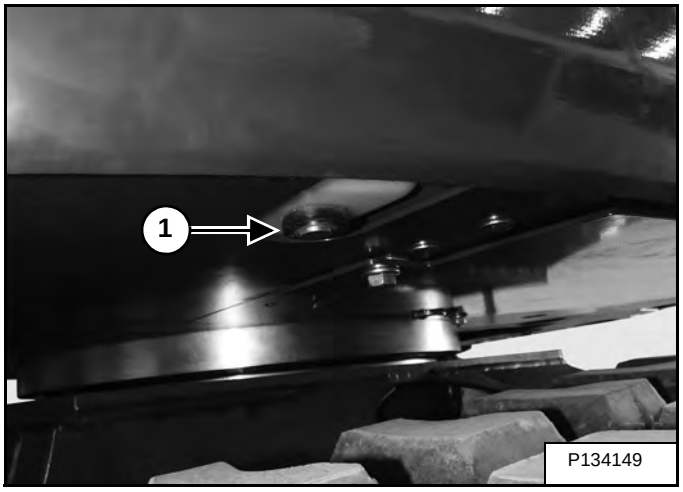
Remove the air from the fuel system. (See Removing Air From The Fuel System on Page 10-100-4.)

Close the tailgate.

Draining The Fuel Tank

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

Figure 10-100-3



Rotate the upperstructure so that the fuel drain plug (Item 1) **[Figure 10-100-3]** is located between the rear tracks.

Remove the drain plug (Item 1) **[Figure 10-100-3]**.

Drain the fuel into the container.

Reuse, recycle or dispose of fuel in an environmentally safe manner.

Reinstall the drain plug.

⚠ WARNING

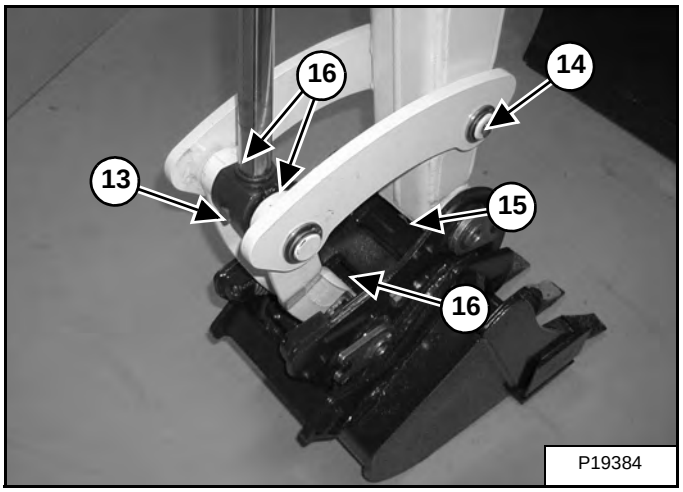
AVOID INJURY OR DEATH

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

W-2072-EN-0909

Lubrication Locations (Cont'd)

Figure 10-130-8



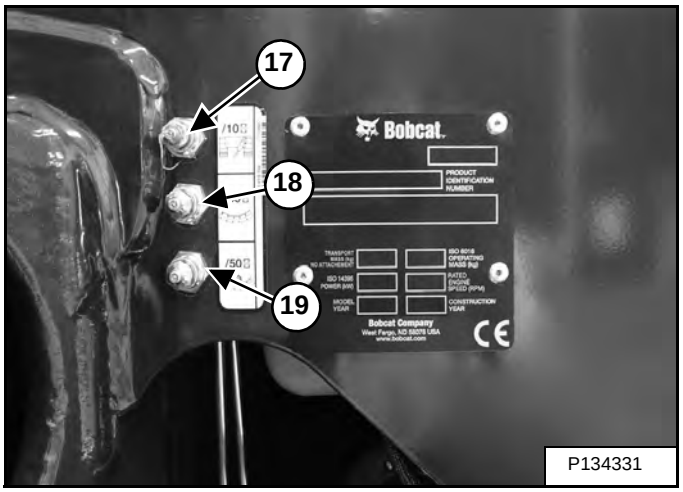
13. Bucket Cylinder Rod End (1) **[Figure 10-130-8]**.

14. Bucket Link Pin (1) **[Figure 10-130-8]**.

15. Bucket Pivot (1) **[Figure 10-130-8]**.

16. Bucket Link (3) **[Figure 10-130-8]**.

Figure 10-130-9



17. Boom Swing Cylinder Base (1) **[Figure 10-130-9]**.

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

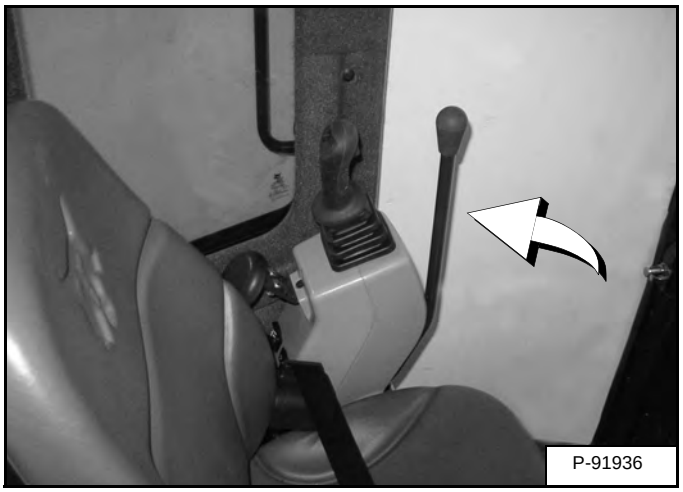
18. Slew Circle (1) **[Figure 10-130-9]**.

19. Slew Pinion (1) **[Figure 10-130-9]**. (Install three to four pumps of grease then rotate the upperstructure 90°. Install three to four pumps of grease and again rotate the upperstructure 90°. Repeat this until the slew pinion has been greased at four positions.)

CONTROL CONSOLE LOCKOUTS

Inspection And Maintenance

Figure 10-180-1



When the left console is raised **[Figure 10-180-1]**, the hydraulic control levers (joysticks) and traction system must not function.

Sit in the operator's seat, fasten the seat belt and start the engine.

Raise the left console **[Figure 10-180-1]**.

Move the joystick control levers. There should be no movement of the boom, arm, slew or bucket.

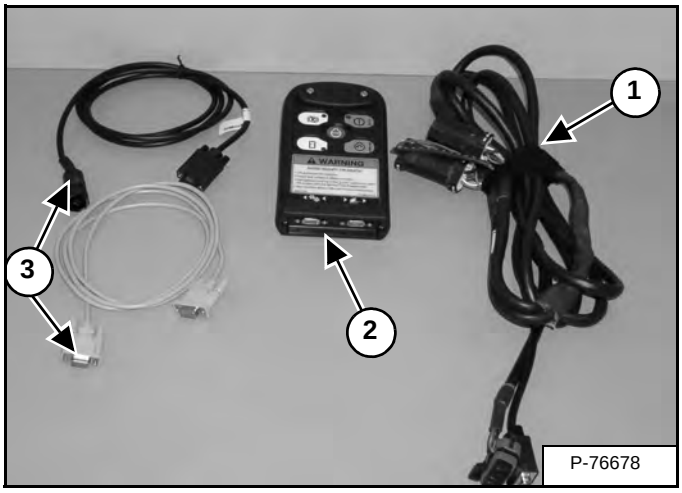
Move the steering control levers. There should be no movement of the excavator tracks.

Service the system if these controls do not deactivate when the left control console is raised.

REMOTE START TOOL (SERVICE TOOL) KIT - 7217666 (CONT'D)

Excavator Service Tool Harness - 6689747

Figure 10-201-3



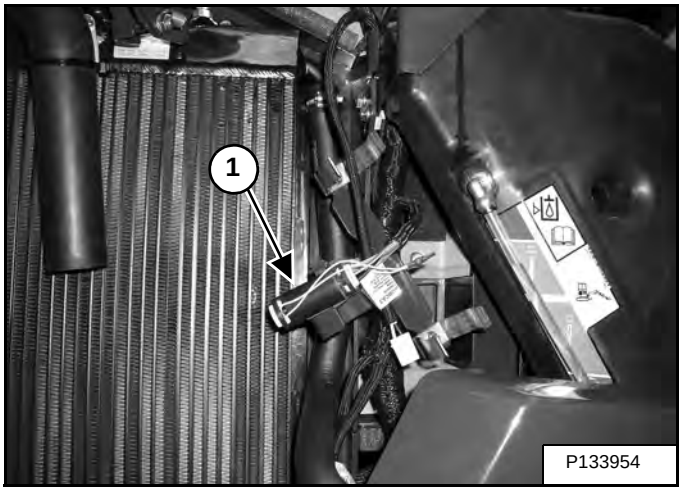
The service tool harness control (Item 1) **[Figure 10-201-3]** is used to connect the Remote Start Tool (Item 2) **[Figure 10-201-3]** to the electrical system on the excavator.

The service tool harness communicator (Item 3) **[Figure 10-201-3]** is used to connect the Remote Start Tool to the Service PC.

NOTE: Make all connections with the key or keyless panel in the OFF position.

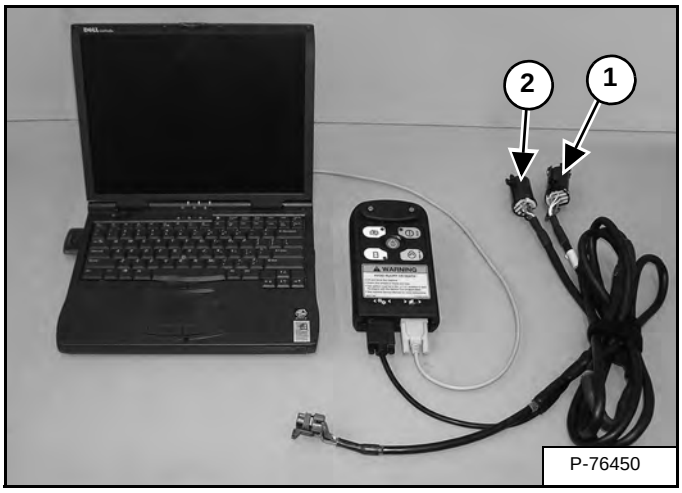
Open the right side cover.

Figure 10-201-4



Remove the plug (Item 1) **[Figure 10-201-4]** from the excavator harness connector.

Figure 10-201-5



NOTE: The Remote Start Tool (Service Tool) connection harness has two connectors (Item 1) and (Item 2). The main connector (Item 1) [Figure 10-201-5] is always used for connection to the excavator harness.

The second connector (Item 2) [Figure 10-201-5] is not used for E27z excavator applications. This connector has a cap attached to it to prevent damage or corrosion when not in use.

Connect the Remote Start Tool (Service Tool) connector (Item 1) **[Figure 10-201-5]** to the excavator harness connector.

NOTE: The Key Switch or Keyless Instrument Panel must be in the off position or the Remote Start Tool (Service Tool) will not operate.

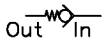
Glossary Of Hydraulic / Hydrostatic Symbols (Cont'd)

GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR EXCAVATORS

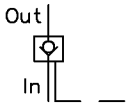
SYMBOL DESCRIPTION

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

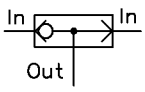
NON–RETURN VALVE (Check Valve) – Used as Replenishing Valve, Load Check Valve or Anticavitation Valve – Opens if the Inlet pressure is higher than the Outlet pressure. Often contains internal spring which has NO significant pressure value



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

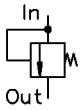


PILOT CONTROLLED NON–RETURN VALVE – It is possible to open the valve by pilot pressure

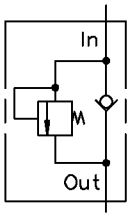


SHUTTLE VALVE – The Inlet port connected to the higher pressure is automatically connected to the Outlet port while the other Inlet port is closed

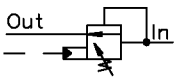
PRESSURE CONTROL VALVE: Valve ensuring the control of pressure



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



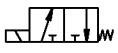
RELIEF/REPLENISHING VALVE or RELIEF/ANTICAVITATION VALVE – When the Inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port – Allows free flow in the opposite direction



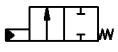
DUAL PRESSURE RELIEF VALVE – When the inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port. Pilot pressure provides a second pressure value.

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

TWO PORTS and CLOSED FLOW PATHS

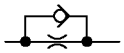


SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) – controlled by an electric solenoid (with return spring)

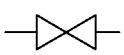


PILOT ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) – controlled by pressure (with return spring)

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



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

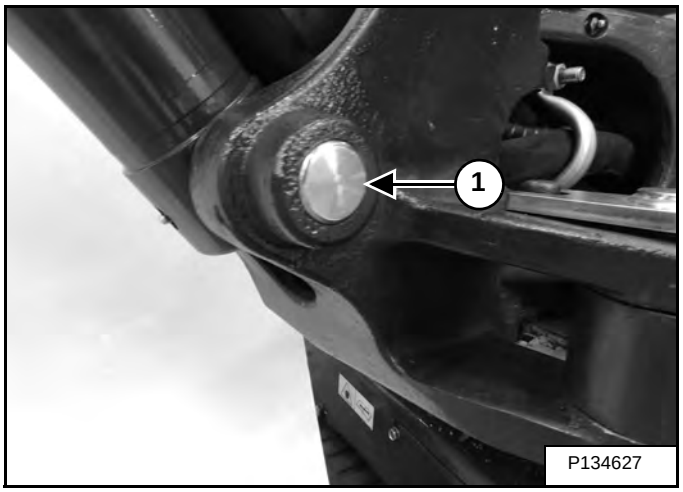


TOW VALVE – Normally in closed position

MS-1892-3

Removal And Installation (Cont'd)

Figure 20-20-15



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

Remove the cylinder.

Removal And Installation

IMPORTANT

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

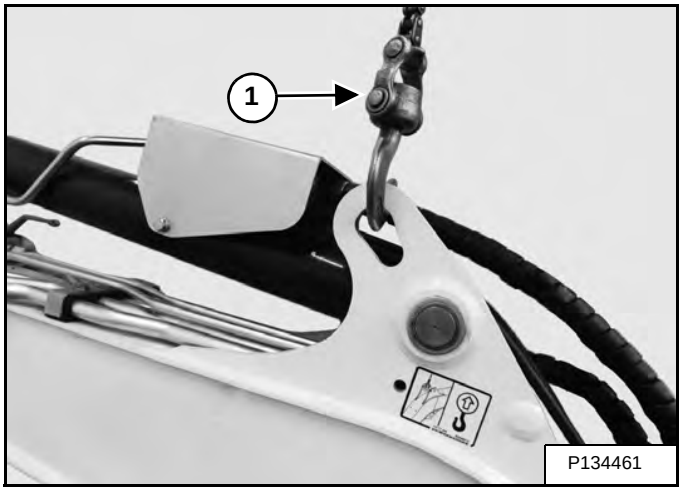
I-2003-0888

Lower the work group to the ground.

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

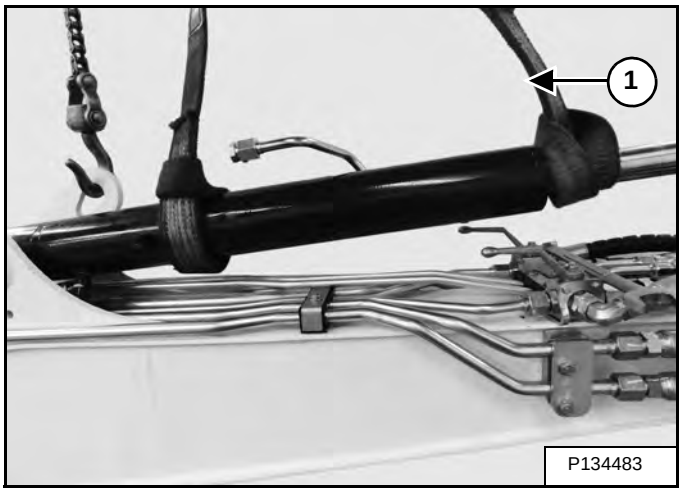
Remove the arm load holding valve. (See Removal And Installation on Page 20-201-1.)

Figure 20-21-6



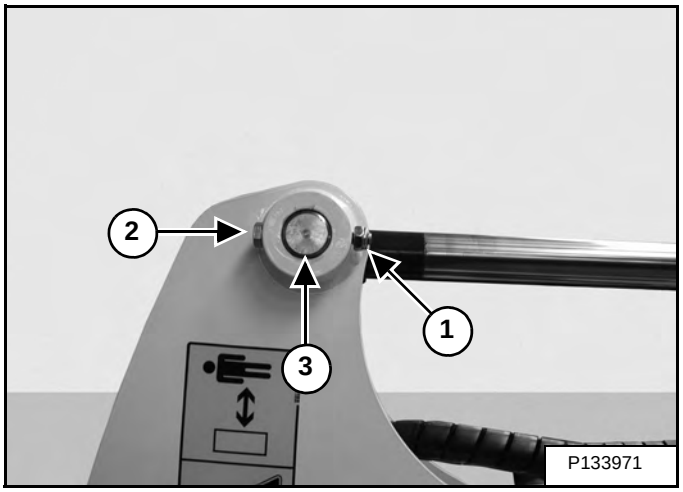
Support the boom with a chain hoist (Item 1) **[Figure 20-21-6]**.

Figure 20-21-7



Install a sling (Item 1) **[Figure 20-21-7]** on the cylinder. Use a lifting device to support the cylinder.

Figure 20-21-8



Remove the nut (Item 1) and bolt (Item 2) **[Figure 20-21-8]**.

Installation: After the nut (Item 1) and bolt (Item 2) **[Figure 20-21-8]** are tightened together, the bolt should be free to spin.

Remove the rod end pin (Item 3) **[Figure 20-21-8]**.

Removal And Installation

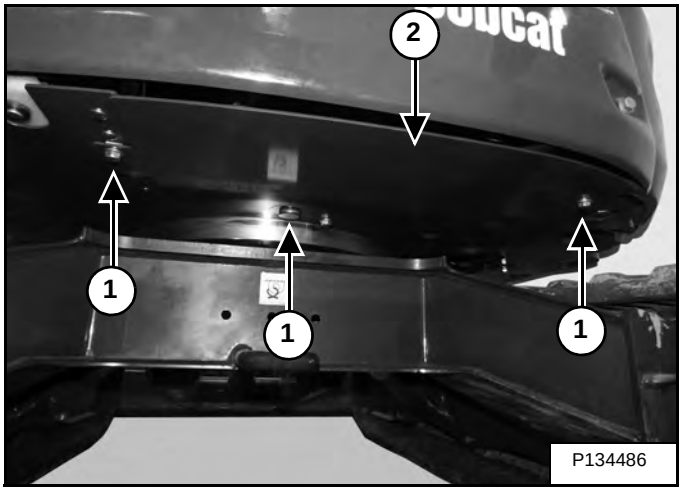
Turn the machine counterclockwise 90° for easier access.

Lower the work group to the ground.

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

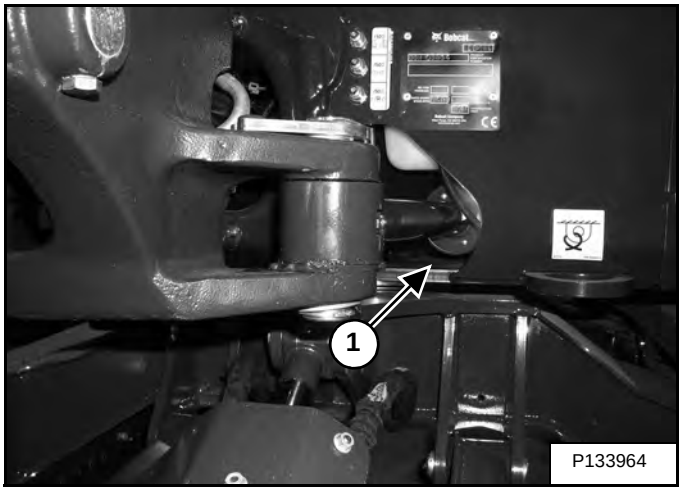
Remove the tool box cover. (See Removal And Installation on Page 40-220-1.)

Figure 20-22-5



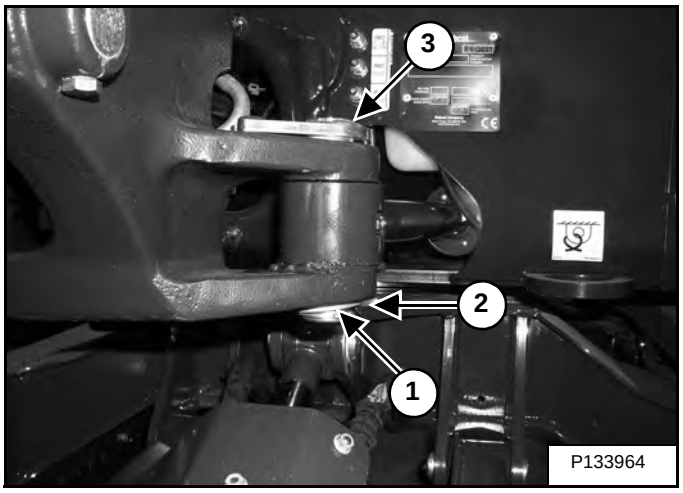
Remove the three bolts (Item 1) and access cover (Item 2) **[Figure 20-22-5]**.

Figure 20-22-6



Place a block (Item 1) **[Figure 20-22-6]** under the rod end of the boom swing cylinder.

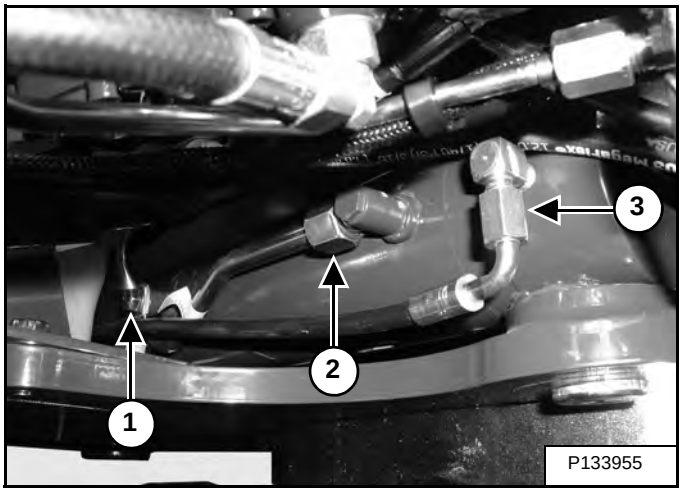
Figure 20-22-7



Remove the snap ring (Item 1) and washer (Item 2) **[Figure 20-22-7]** from the rod end pin of the cylinder.

Remove the pin (Item 3) **[Figure 20-22-7]**.

Figure 20-22-8



Remove the bolt (Item 1) **[Figure 20-22-8]** from the cylinder.

Remove the tubeline (Item 2) and hose (Item 3) **[Figure 20-22-8]** from the base end of the cylinder.

Disassembly (Later Models)

Clean the outside of the cylinder before disassembly.

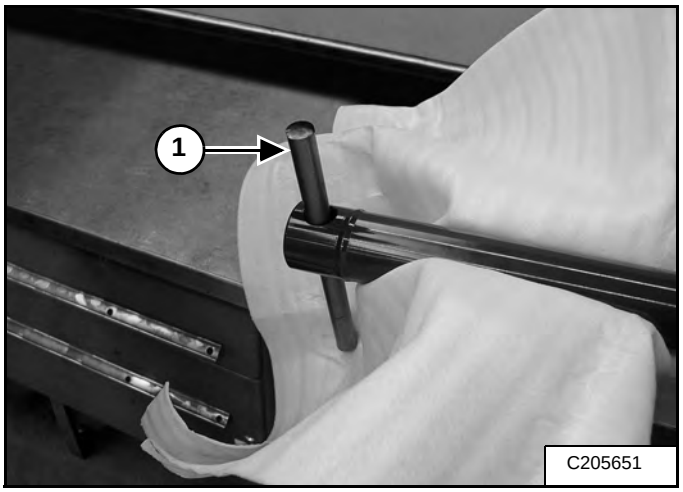
Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook

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

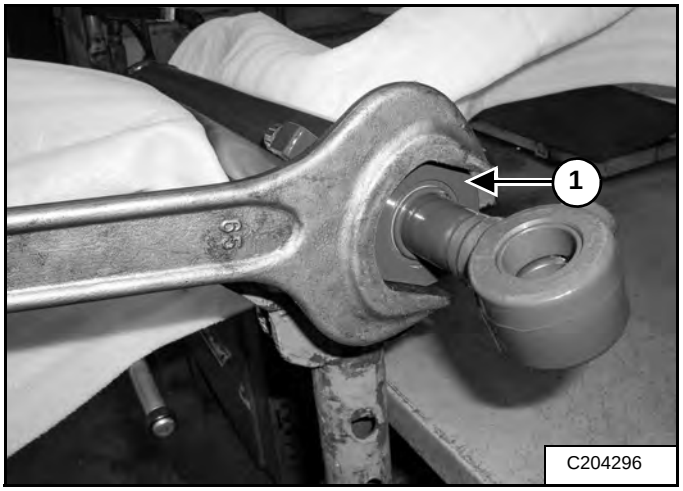
Put the cylinder in a vise.

Figure 20-22-33



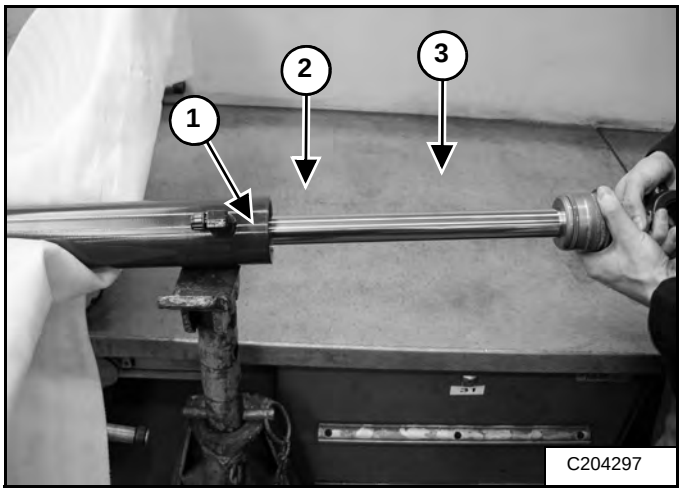
Avoid deformation of cylinder tube. Prevent tube rotation by inserting a bar (Item 1) **[Figure 20-22-33]** into the base side pin bore.

Figure 20-22-34



Use an open end wrench to loosen the head (Item 1) **[Figure 20-22-34]**.

Figure 20-22-35



Remove the head and the rod assembly (Item 1) **[Figure 20-22-35]** from the cylinder.

Put the rod end in a vise.

Disassembly

Clean the outside of the cylinder before disassembly.

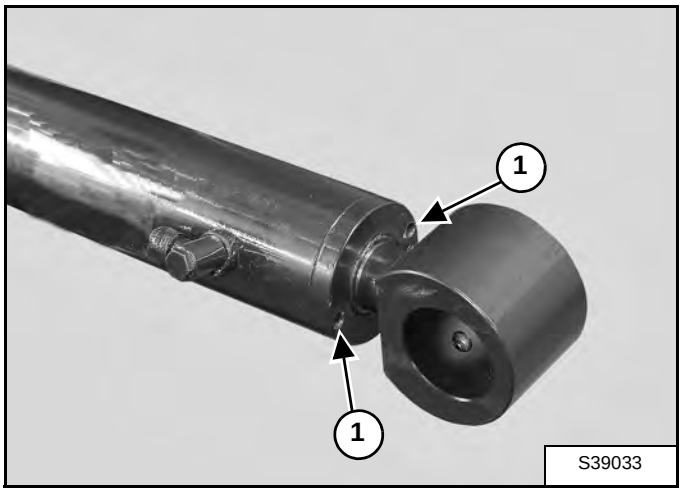
Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook
MEL1075 - Adjustable Gland Nut Wrench
MEL1075-2 - 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.

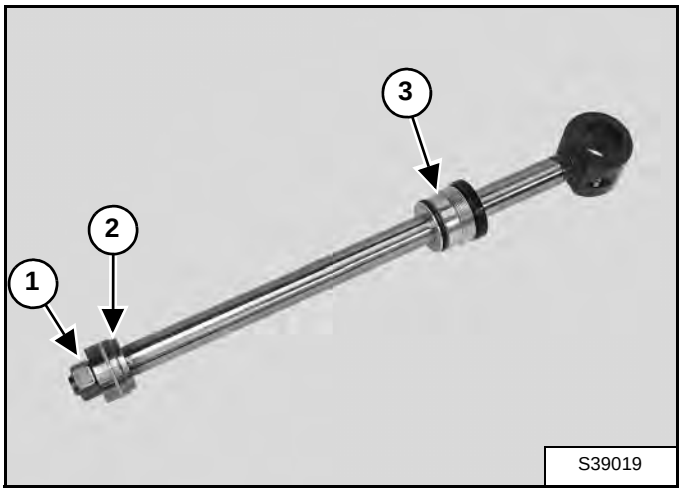
Put the base end of the cylinder in a vise.

Figure 20-23-9



Insert the Adjustable Gland Nut Wrench into the two holes (Item 1) **[Figure 20-23-9]** to loosen the head.

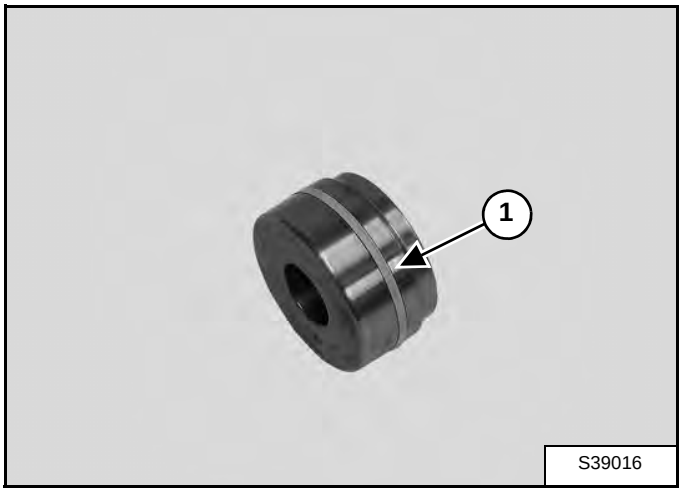
Figure 20-23-10



Remove the head and the rod assembly from the cylinder **[Figure 20-23-10]**. Put the rod end in a vise.

Remove the nut (Item 1), piston (Item 2) and head (Item 3) **[Figure 20-23-10]**.

Figure 20-23-11



Cut the old Teflon™ seal and remove the seal from the piston **[Figure 20-23-11]**.

Disassembly (Earlier Models)

Clean the outside of the cylinder before disassembly.

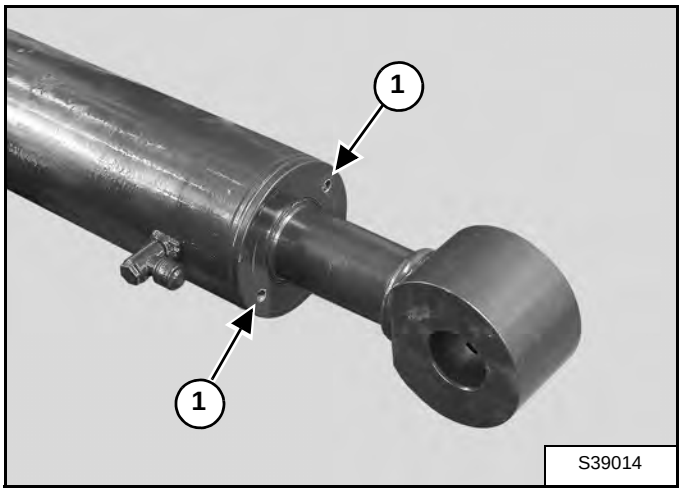
Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook
MEL1075 - Adjustable Gland Nut Wrench
MEL1075-2 - 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.

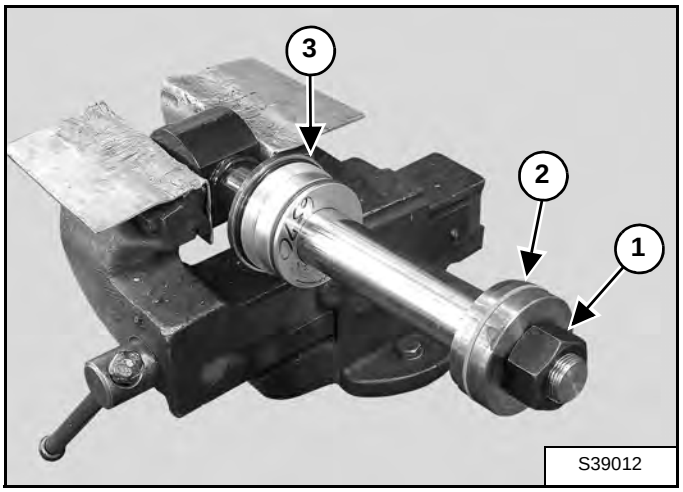
Put the base end of the cylinder in a vise.

Figure 20-24-10



Insert the adjustable gland nut wrench into the two holes (Item 1) **[Figure 20-24-10]** to loosen the head.

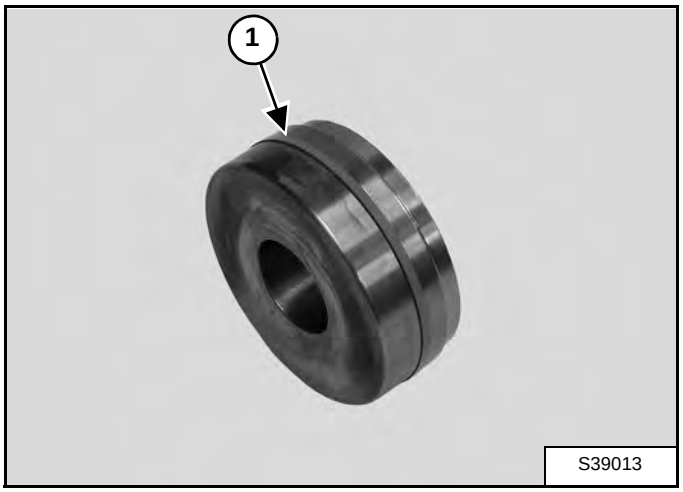
Figure 20-24-11



Remove the head and the rod assembly from the cylinder **[Figure 20-24-11]**. Put the rod end in a vise.

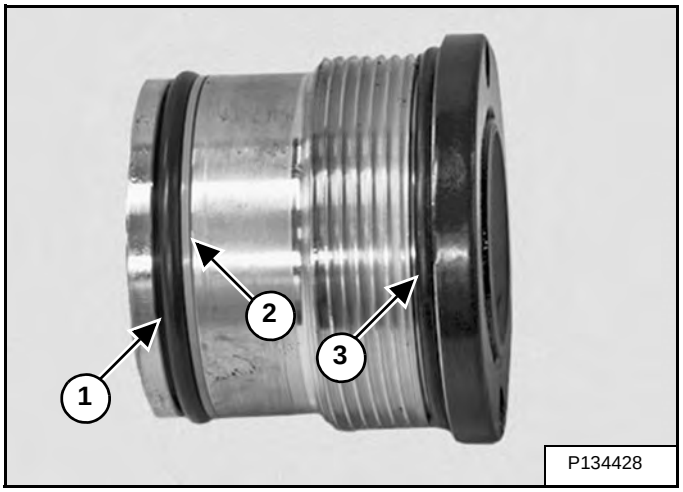
Remove the nut (Item 1), piston (Item 2) and head (Item 3) **[Figure 20-24-11]**.

Figure 20-24-12



Remove the seal (Item 1) **[Figure 20-24-12]** from the piston.

Figure 20-24-13

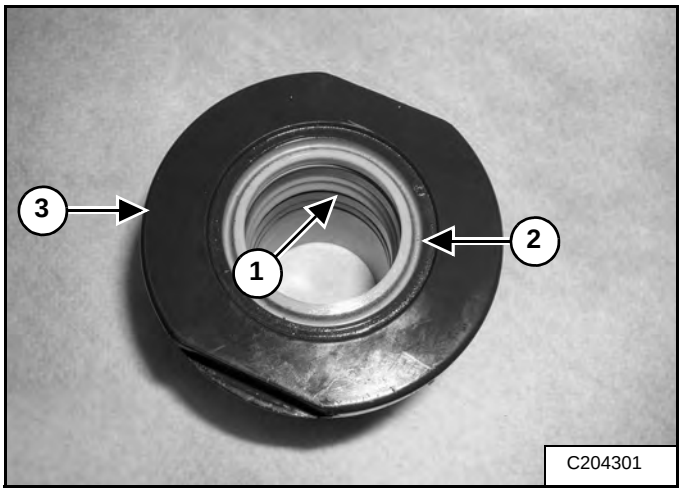


Remove the O-ring (Item 1) and the back-up ring (Item 2) **[Figure 20-24-13]**.

Remove the O-ring (Item 3) **[Figure 20-24-13]**.

Assembly (Later Models) (Cont'd)

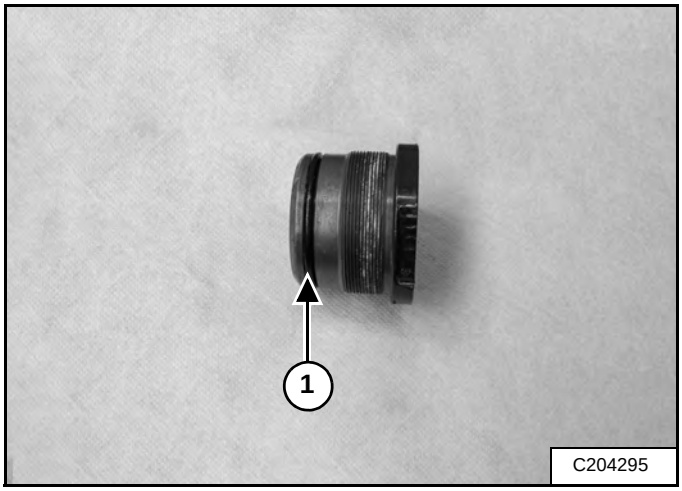
Figure 20-24-39



Install the rod seal (Item 1) and wiper seal (Item 2) in the head (Item 3) **[Figure 20-24-39]**.

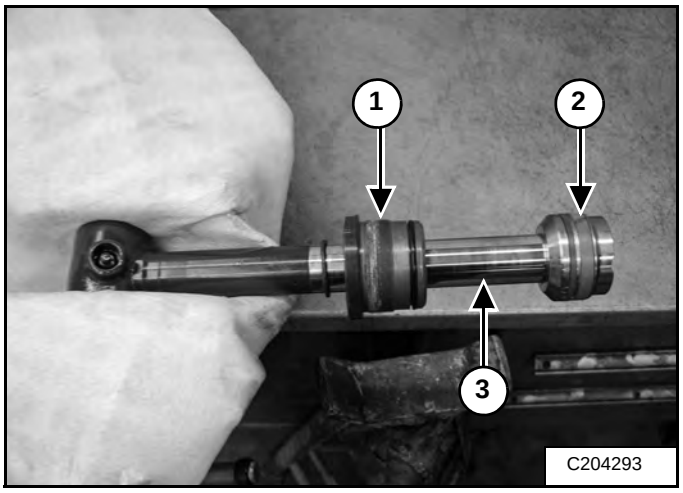
Install the wiper seal with the wiper (Item 2) **[Figure 20-24-39]** toward the outside of the head.

Figure 20-24-40



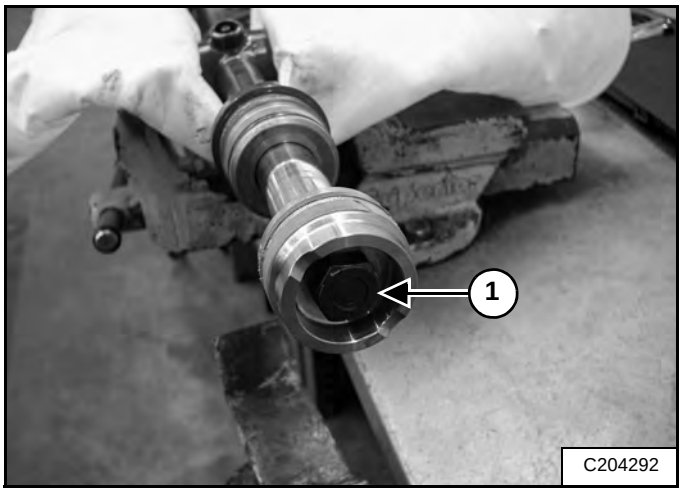
Install the O-ring (Item 1) **[Figure 20-24-40]** on the head.

Figure 20-24-41



Install the head (Item 1) and piston (Item 2) **[Figure 20-24-41]** on the cylinder rod.

Figure 20-24-42



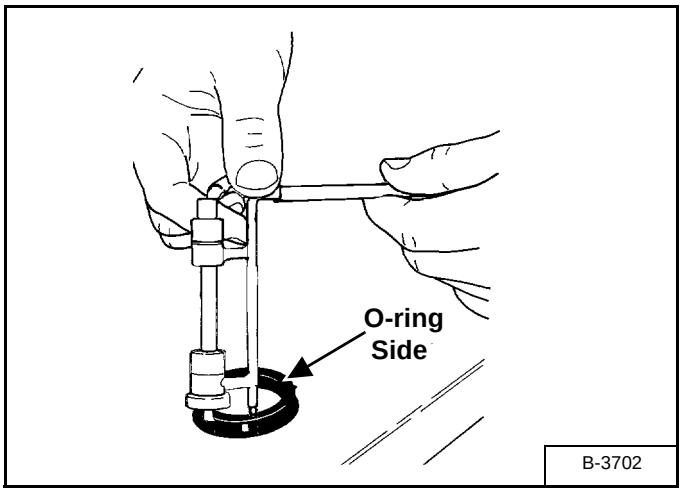
Install the head (Item 1) and piston (Item 2) **[Figure 20-24-42]** on the rod.

Tighten the bolt to 400 N•m (295 ft-lb) torque.

Put the hydraulic cylinder in a vise.

Assembly (Cont'd)

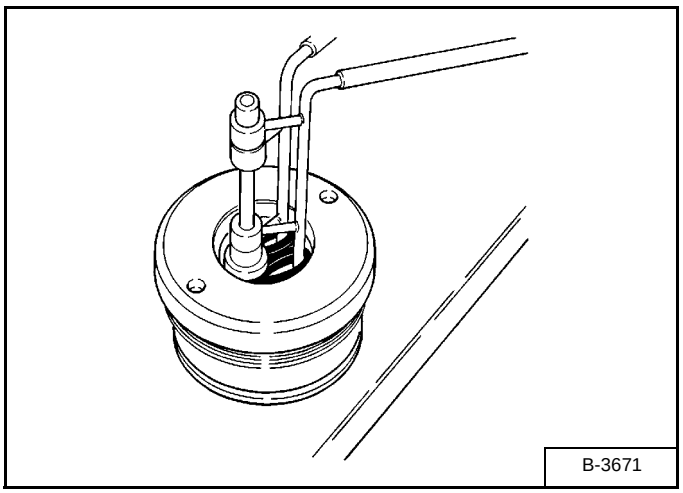
Figure 20-25-23



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

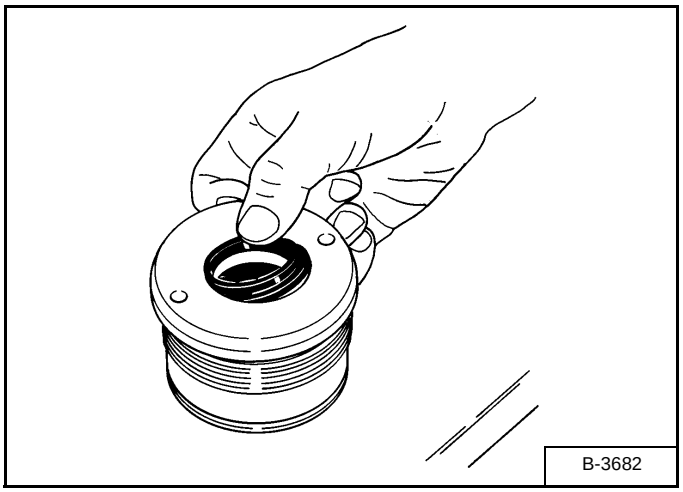
NOTE: The O-ring side of the oil seal goes toward the inside of the cylinder.

Figure 20-25-24



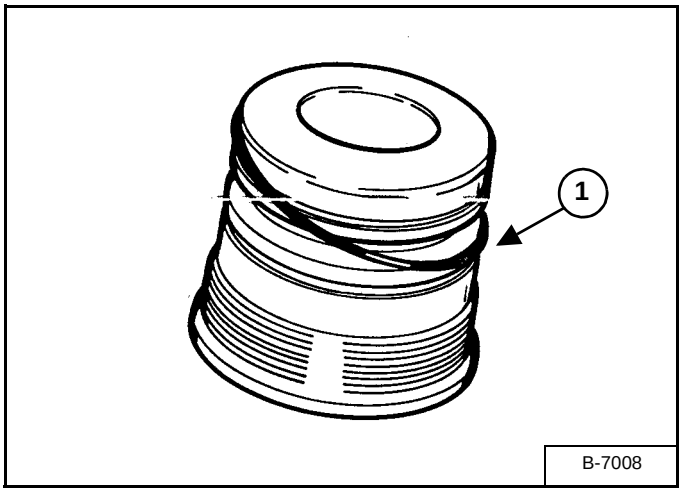
Install the oil seal in the head **[Figure 20-25-24]**.

Figure 20-25-25



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

Figure 20-25-26

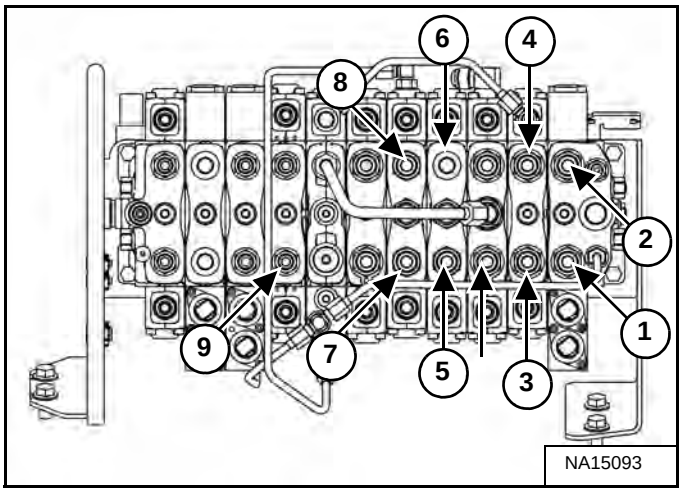


Install the O-ring (Item 1) **[Figure 20-25-26]** on the head.

VALVES (PORT RELIEF)

Testing And Adjusting

Figure 20-31-1



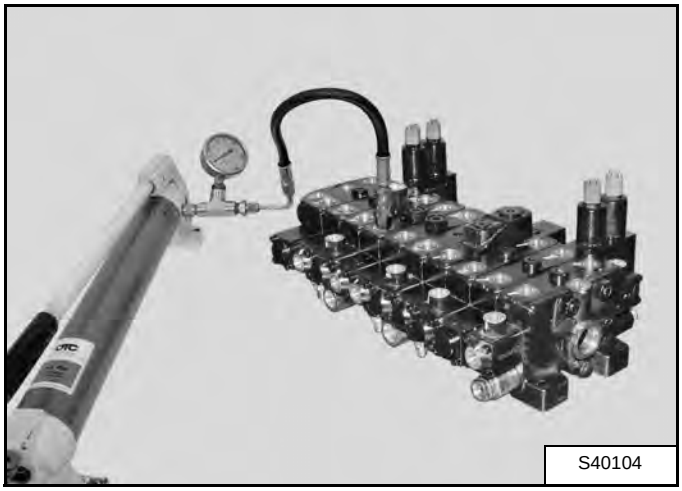
Port relief settings overview **[Figure 20-31-1]**:

REF	DESCRIPTION	TARGET PRESSURE MPa (bar) (psi)	ACCEPTABLE RANGE MPa (bar) (psi)
1	Aux Flow (Female Quick Coupler)	18 (180) (2610)	17,5 - 19,3 (175 - 193) (2537 - 2799)
2	Aux Flow (Male Quick Coupler)	18 (180) (2610)	17,5 - 19,3 (175 - 193) (2537 - 2799)
3	Arm (Rod End)	29 (290) (4205)	28,5 - 31,0 (285 - 310) (4132 - 4495)
4	Arm (Base End)	29 (290) (4205)	28,5 - 31,0 (285 - 310) (4132 - 4495)
5	Bucket (Rod End)	26 (260) (3770)	25,5 - 28,0 (255 - 280) (3697 - 4060)
6	Bucket (Base End)	26 (260) (3770)	25,5 - 28,0 (255 - 280) (3697 - 4060)
7	Boom (Rod End)	29 (290) (4205)	28,5 - 31,0 (285 - 310) (4132 - 4495)
8	Boom (Base End)	29 (290) (4205)	28,5 - 31,0 (285 - 310) (4132 - 4495)
9	Blade (Base End)	27 (270) (3915)	26,5 - 29,0 (265 - 290) (3842 - 4205)

NOTE: The reliefs are located below the spool covers on the valve sections.

A portable hydraulic hand pump will be used to test the port relief valves. The hand pump must have clean Bobcat hydraulic fluid.

Figure 20-31-2



Install the hand pump hose and a 34,5 MPa (345 bar) (5000 psi) pressure gauge into the valve section work port in which the port relief valve is located **[Figure 20-31-2]**. Slowly pressurize this section with the hand pump until the port relief valve opens and make a note of the pressure reading.

NOTE: Pumping the hand pump too fast will alter the pressure readings up to 340 kPa (3,4 bar) (50 psi).

WARNING

AVOID INJURY OR DEATH

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

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

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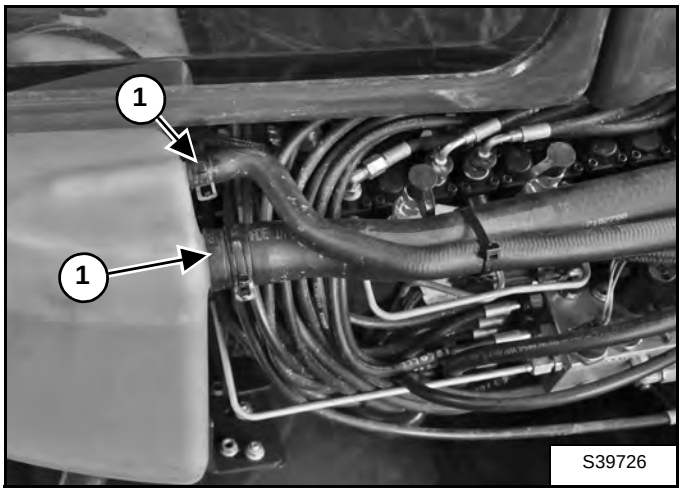
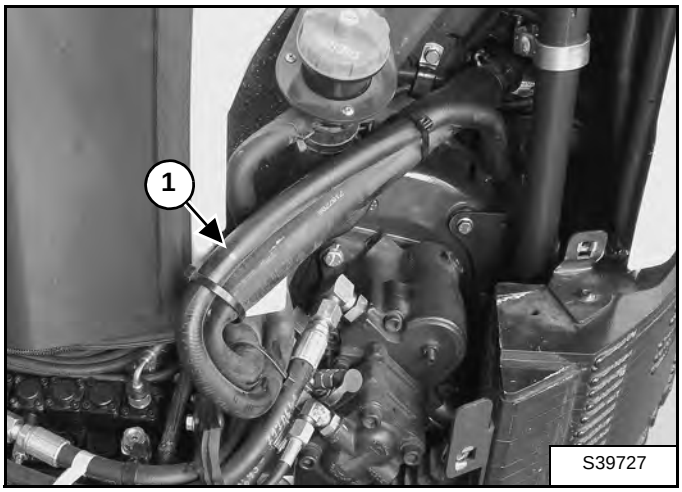
Removal And Installation (Cont'd)

Figure 20-40-8



Disconnect the two fuel lines (Item 1) **[Figure 20-40-8]**.

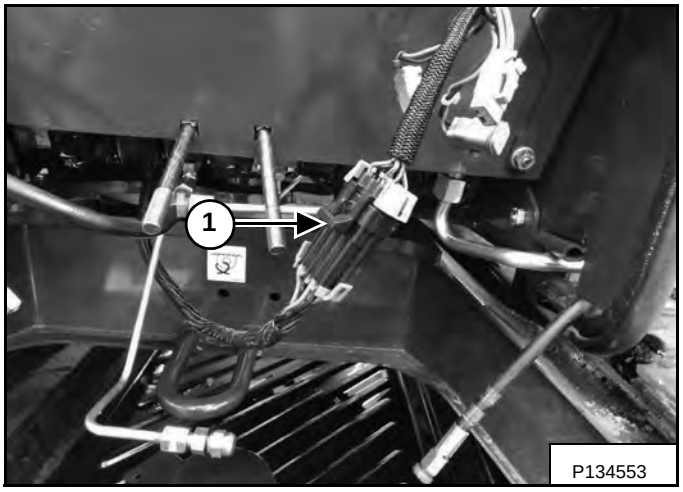
Figure 20-40-9



Pull back and secure both fuel lines (Item 1) **[Figure 20-40-9]** for better access.

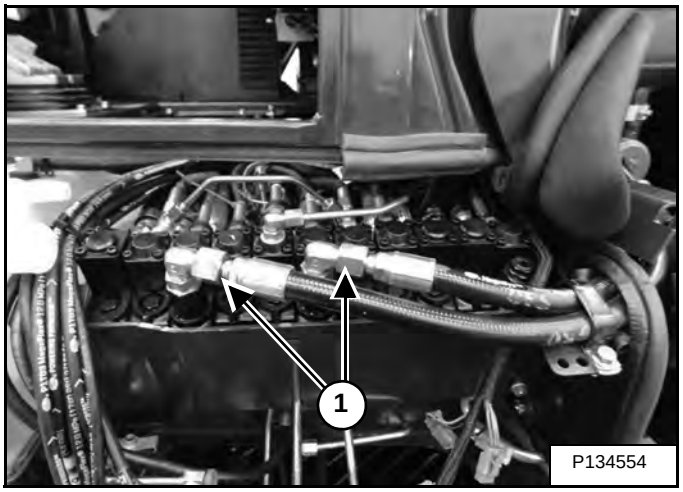
Remove the manifold. (See Removal And Installation on Page 20-60-1.)

Figure 20-40-10



Disconnect the connector (Item 1) **[Figure 20-40-10]**.

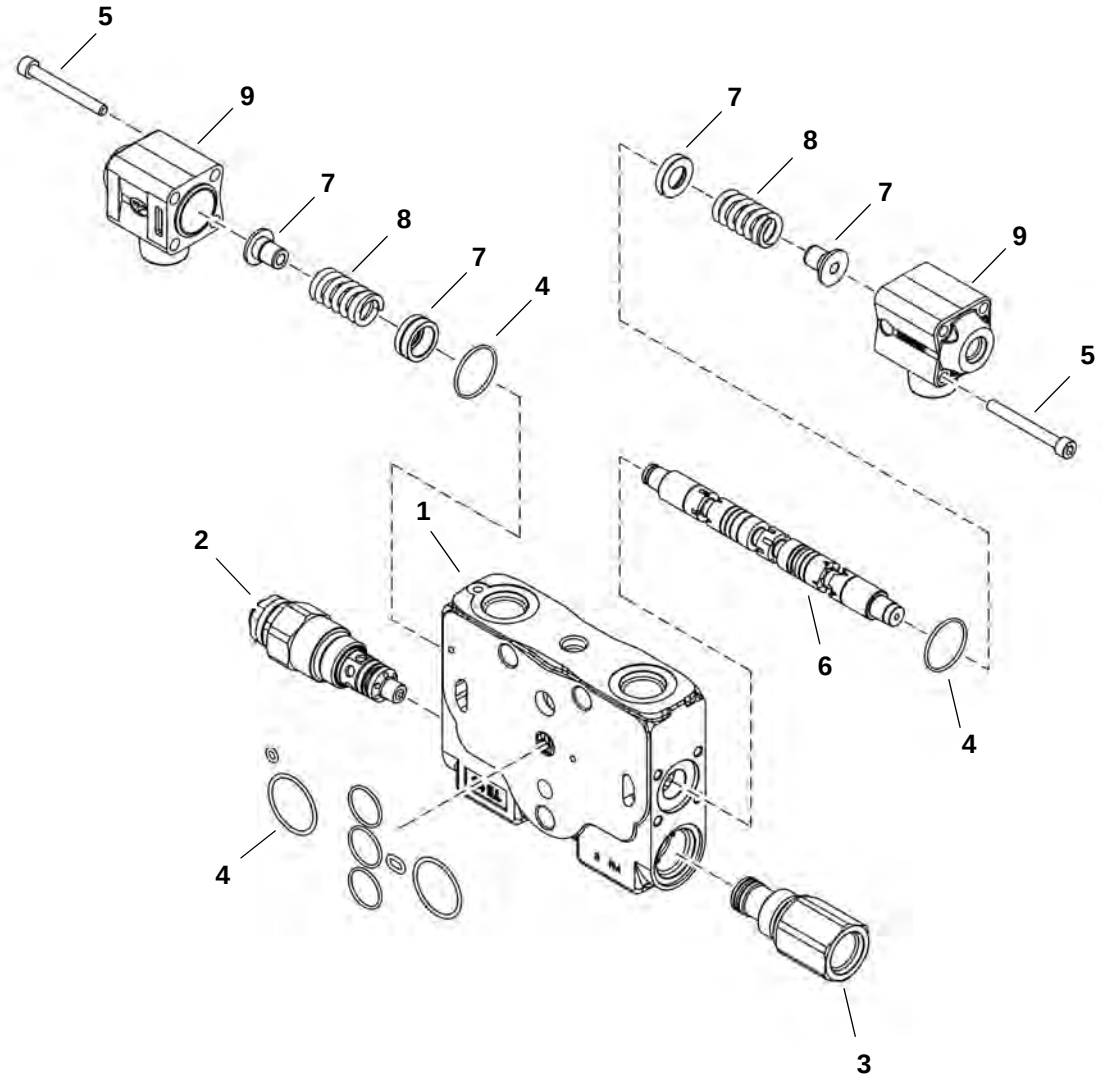
Figure 20-40-11



Mark and remove the two supply hoses (Item 1) **[Figure 20-40-11]**.

Parts Identification (Cont'd)

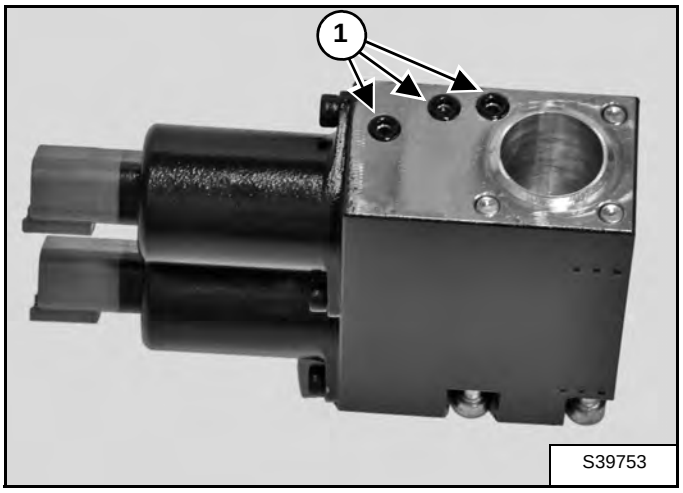
1. LH Travel Valve Housing
2. Port Relief / Anti-Cavitation Valve
3. Fitting
4. O-ring
5. Screw
6. Spool
7. Spring Retainer
8. Spring
9. Cover



NA5641S

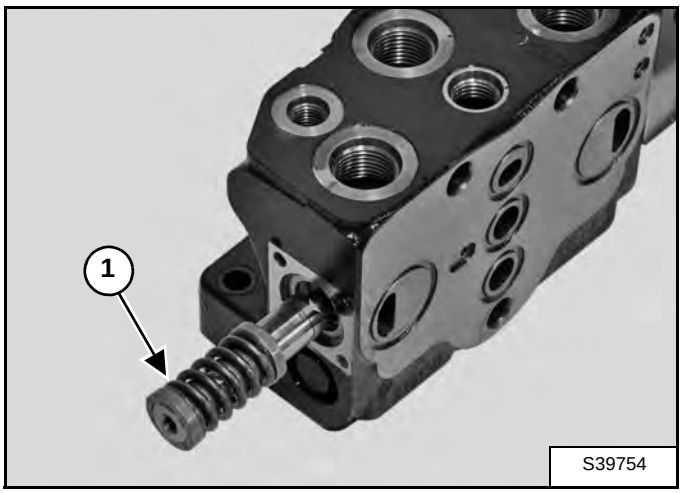
Auxiliary Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-38



Remove the three O-rings (Item 1) **[Figure 20-40-38]**.

Figure 20-40-39

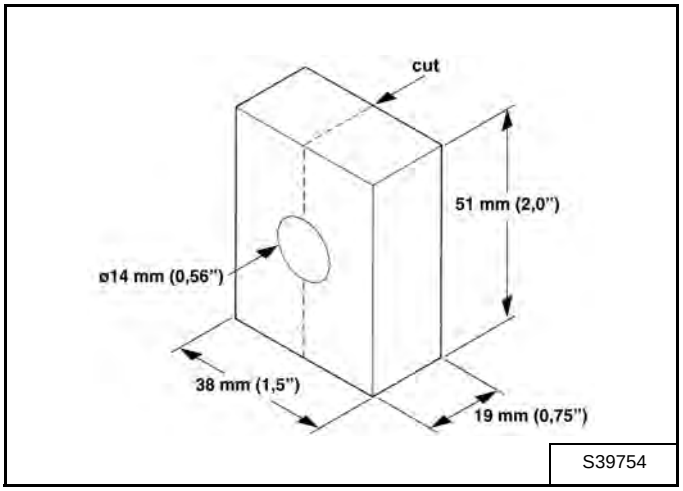


Gently pull the spool assembly (Item 1) **[Figure 20-40-39]** out of the valve.

The spool and valve block are not serviced separately.

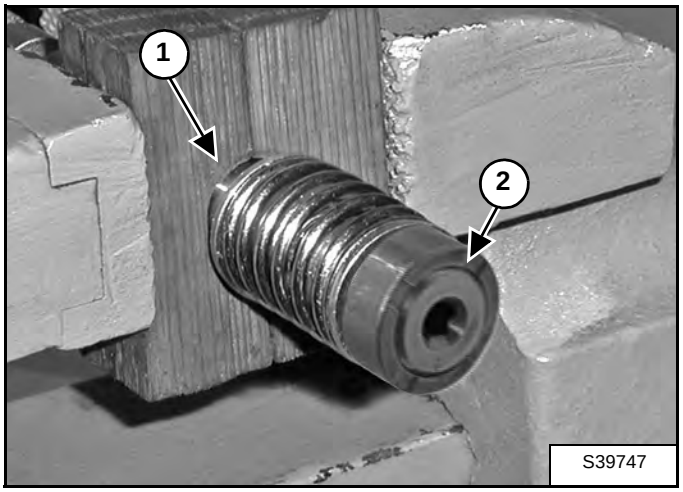
NOTE: When the spool is removed, use care not to scratch the spool surface. Do not interchange spools and valve blocks.

Figure 20-40-40



To remove the spring assembly from the spool, a holding fixture will have to be made from a 19 mm thick x 38 mm wide x 51 mm long (0.75 in x 1.500 in x 2.0 in) piece of hardwood. Drill a 14 mm hole (0.563 in) in the center of the hardwood block. Cut the block lengthwise **[Figure 20-40-40]**.

Figure 20-40-41

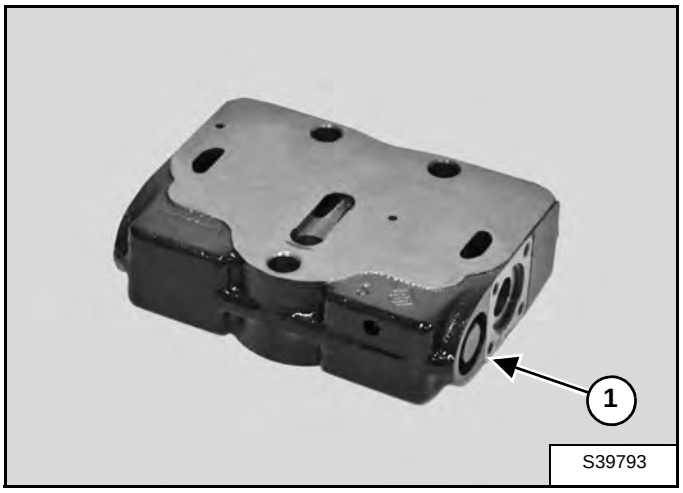


Using the wood block, clamp the spool (Item 1) in a vise and unscrew (Item 2) **[Figure 20-40-41]** the spring assembly.

NOTE: Use only hardwood blocks to grip the spool, or the spool will be damaged.

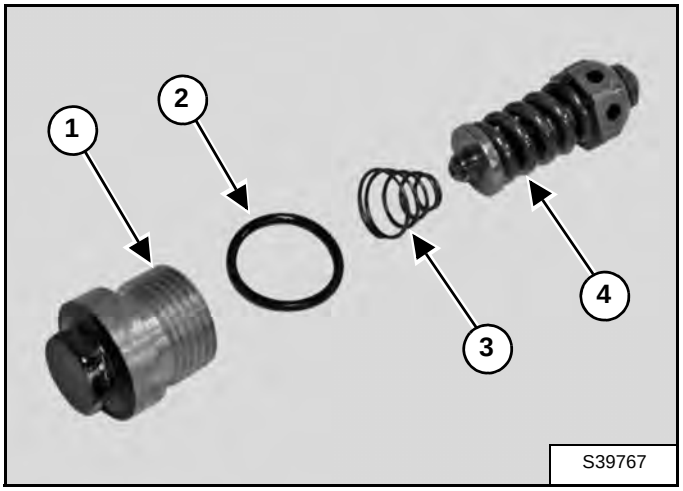
Bucket Valve Section Disassembly And Assembly (Cont'd)

Figure 20-40-72



Remove the plugs (Item 1) **[Figure 20-40-72]** on both sides of the valve.

Figure 20-40-73



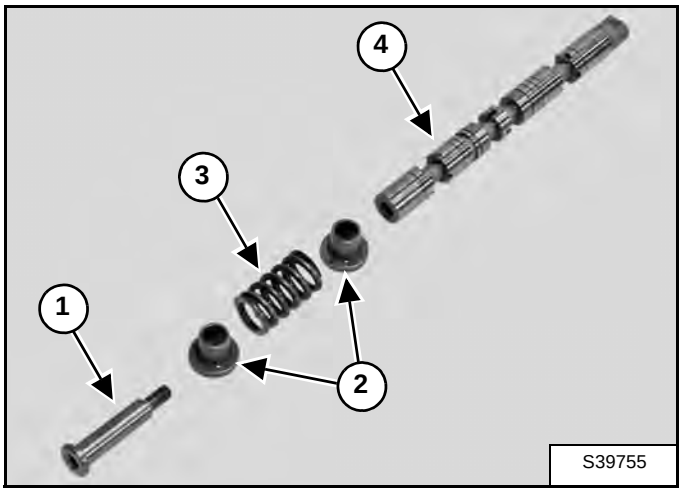
Remove the O-ring (Item 2) from the plug (Item 1), the spring (Item 3) and the spring kit (Item 4) **[Figure 20-40-73]**.

Installation: Tighten the plugs to 9,8 N•m (86.7 in-lb) torque.

NOTE: Both plugs are the same. Repeat the procedure for the other plug.

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

Figure 20-40-98



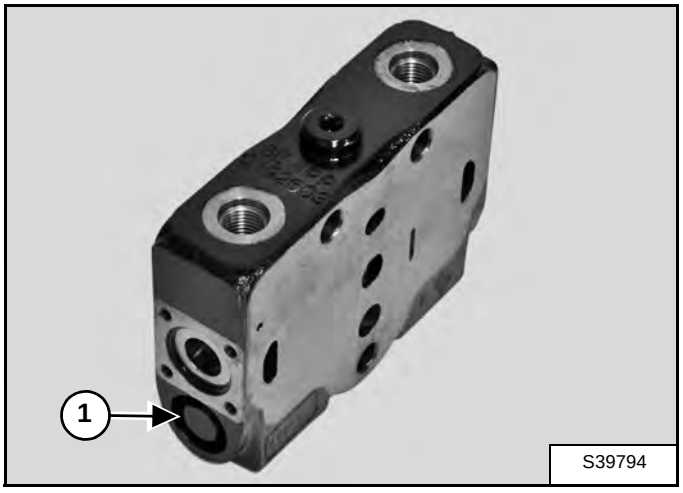
Remove the spring assembly spring screw (Item 1), spring seat (Item 2), spring (Item 3) and spool (Item 4) **[Figure 20-40-98]**.

Installation: Tighten the spring screw to 9,8 N•m (86.7 in-lb) torque.

Installation: Install the spool assembly and then both spool covers and tighten the cover screws to 6,6 N•m (58.4 in-lb).

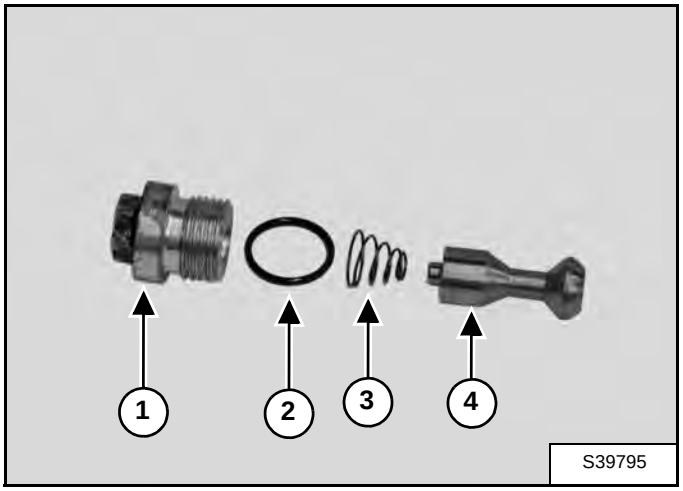
NOTE: Assemble the hydraulic spools positioning the code toward port B and the grooves toward port A.

Figure 20-40-99



Remove the plug (Item 1) **[Figure 20-40-99]** on both sides of the valve.

Figure 20-40-100



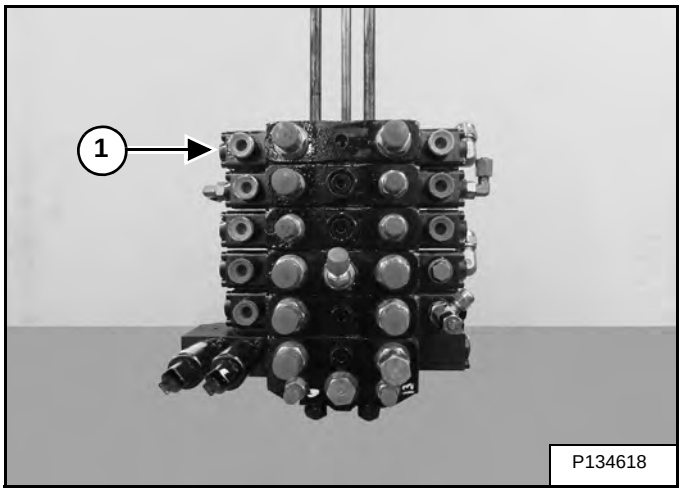
Remove the O-ring (Item 2) from the plug (Item 1), the spring (Item 3) and the shutter valve (Item 4) **[Figure 20-40-100]**.

Installation: Tighten the plugs to 9,8 N•m (86.7 in-lb) torque.

NOTE: Both plugs are the same. Repeat the procedure for the other plug.

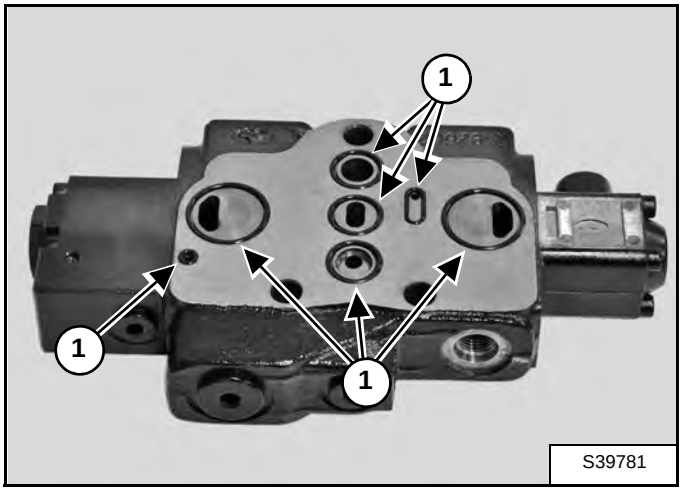
Assembly (Cont'd)

Figure 20-40-131



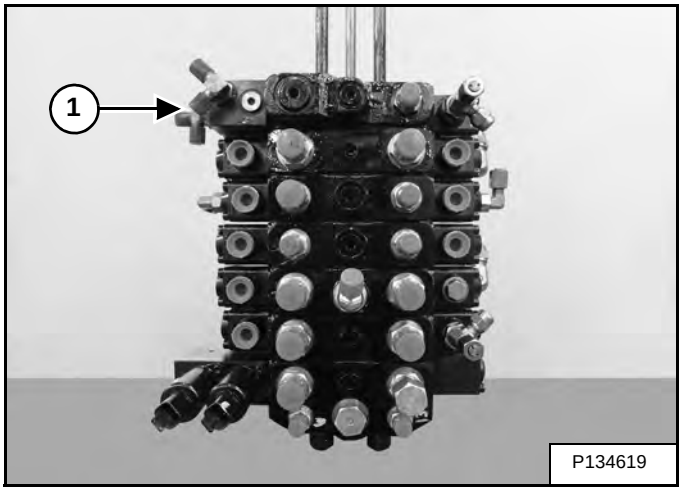
Install the LH travel valve section (Item 1) **[Figure 20-40-131]** on the tie rods.

Figure 20-40-132



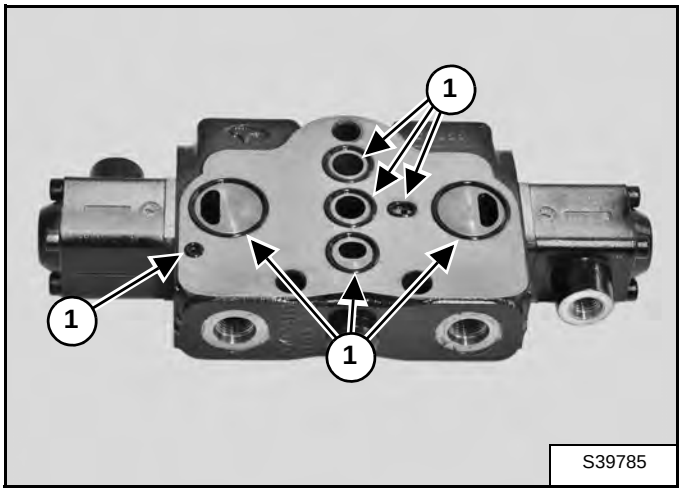
Install the O-rings (Item 1) **[Figure 20-40-132]** on the "Priority valve" valve section.

Figure 20-40-133



Install the "Priority valve" valve section (Item 1) **[Figure 20-40-133]** on the tie rods.

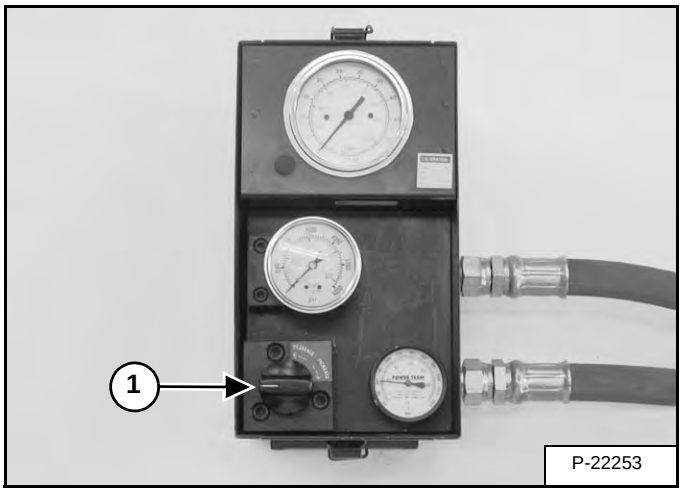
Figure 20-40-134



Install the O-rings (Item 1) **[Figure 20-40-134]** on the blade valve section.

Testing The Gear Pump P3 (Cont'd)

Figure 20-50-13



NOTE: Open the flow control knob (Item 1) [Figure 20-50-13] fully to prevent pump damage. This is a direct pump test. There is no relief valve in the system.

Start the engine and run at low rpm. Make sure the tester is connected correctly. If no flow is indicated at the tester, the hoses are connected wrong.

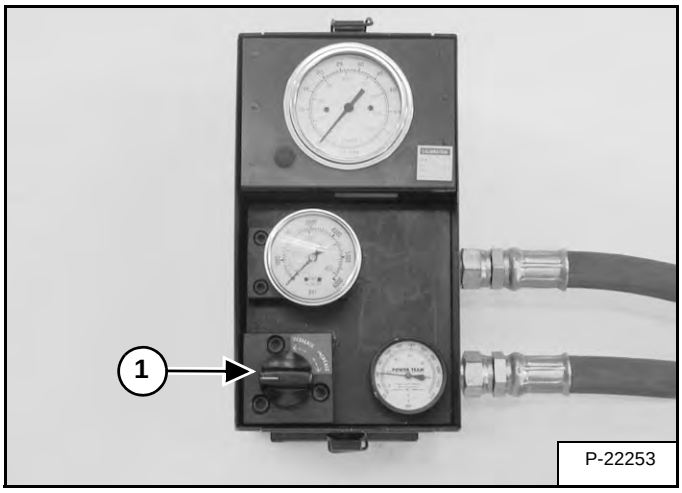
Increase the engine speed to full rpm. Warm the hydraulic fluid to 66°C (150°F) by turning the restrictor valve until the gauge reads about 6,9 MPa (69 bar) (1000 psi). Do not exceed system pressure.

After the temperature is correct, open the restrictor valve fully.

Record the pump free flow L/min (U.S. gpm).

Pump flow on a new gear pump is 20,0 L/min (5.3 U.S. gpm).

Figure 20-50-14



Close the flow control knob (Item 1) **[Figure 20-50-14]** slowly to 0.69 MPa (6,9 bar) (100 psi) below the relief valve setting (20,6 [206 bar] [2987 psi]).

Record the pump high pressure flow L/min (U.S. gpm).

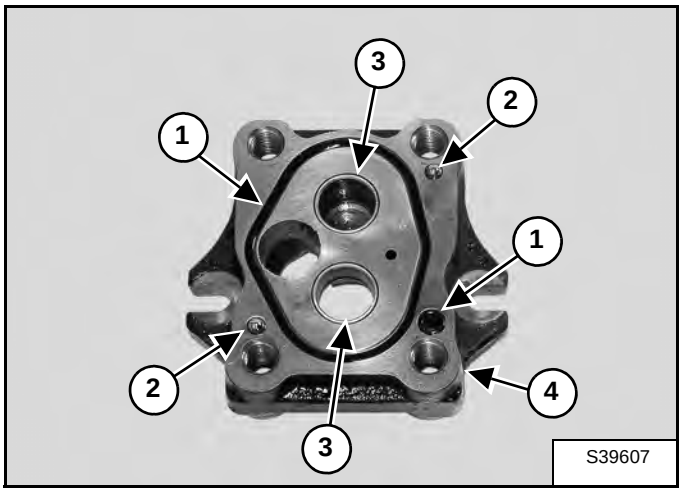
NOTE: The high pressure flow must be at least 80% of free flow.

$$\% = \frac{\text{HIGH PRESSURE FLOW (L/min)}}{\text{FREE FLOW (L/min)}} \text{ x100}$$

If the high pressure flow is less than 80% of free flow, remove the hydraulic pump for repair or replacement.

Gear Pump Disassembly And Assembly (Cont'd)

Figure 20-50-44



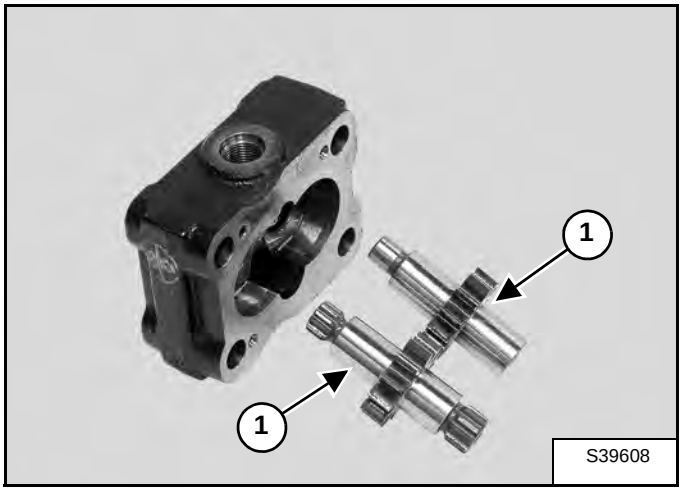
Remove the O-rings (Item 1) **[Figure 20-50-44]**.

Remove the two steel balls (Item 2) **[Figure 20-50-44]**.

Inspect the bushings (Item 3) **[Figure 20-50-44]** for wear or damage.

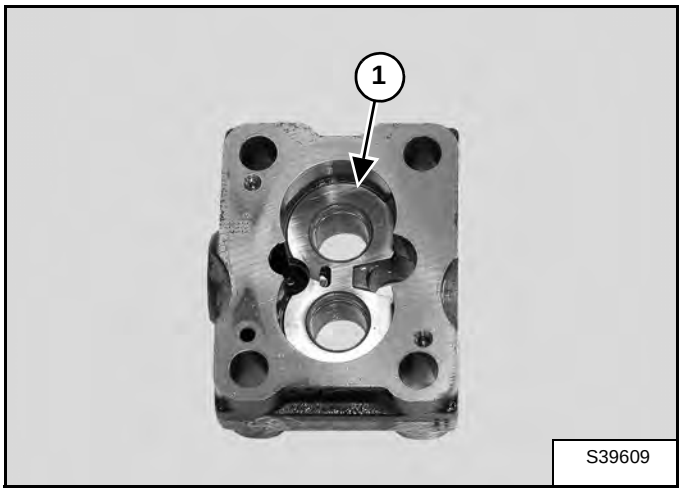
NOTE: The bushings are not serviceable. if the bushings are worn or damaged, replace the housing assembly (Item 4) [Figure 20-50-44].

Figure 20-50-45



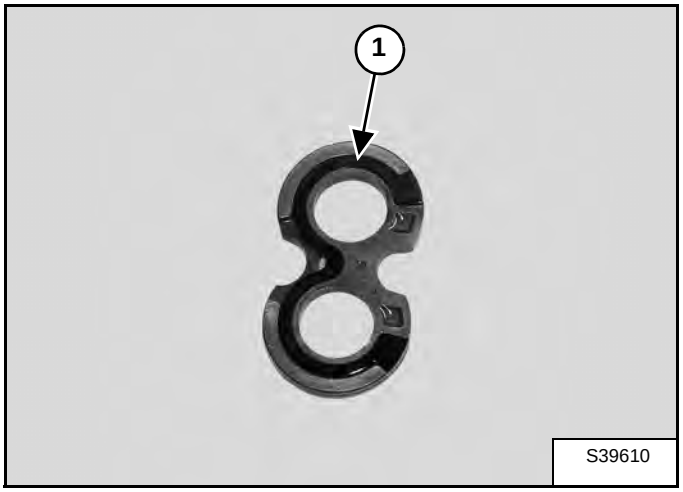
Remove the gears (Item 1) **[Figure 20-50-45]**.

Figure 20-50-46



Remove the wear plate (Item 1) **[Figure 20-50-46]**.

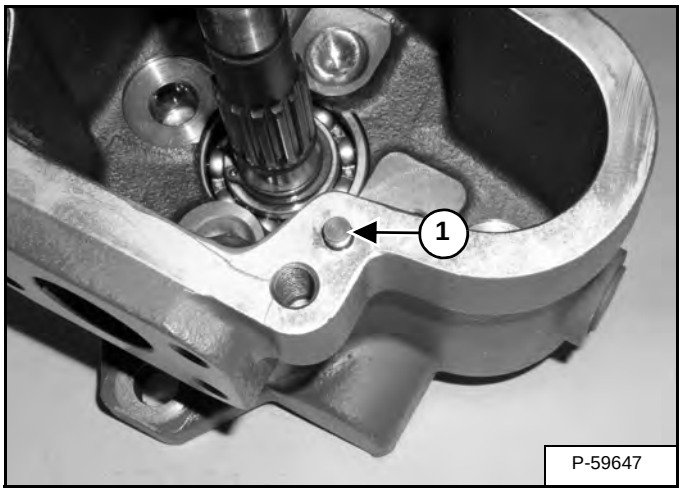
Figure 20-50-47



Remove the seal (Item 1) **[Figure 20-50-47]** from the wear plate.

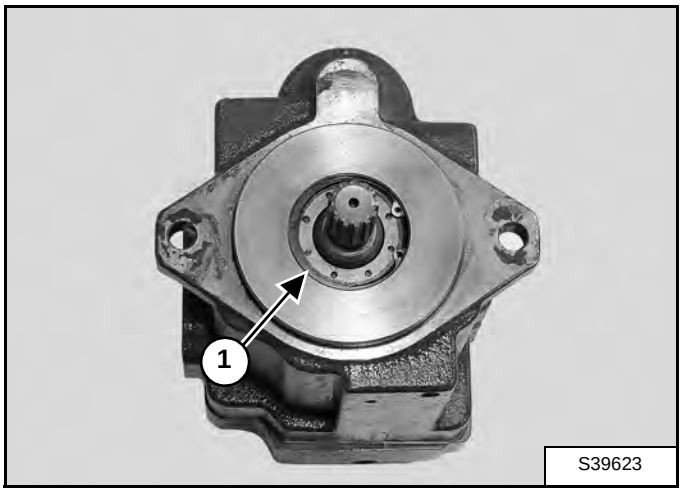
Piston Pump Disassembly And Assembly (Cont'd)

Figure 20-50-76



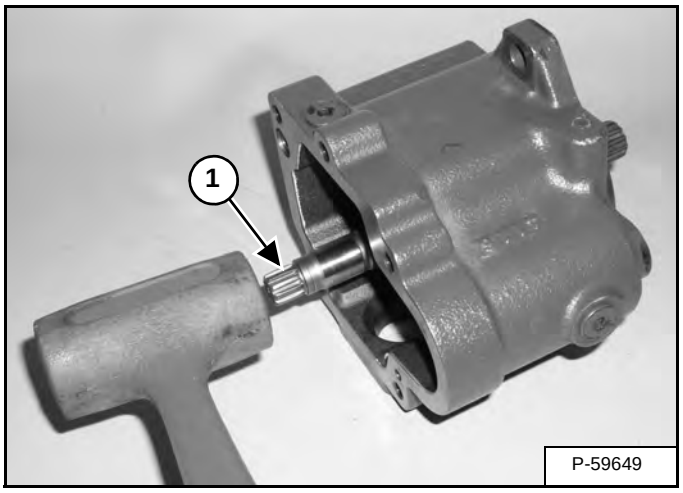
Remove the pin (Item 1) **[Figure 20-50-76]** from the pump housing.

Figure 20-50-77



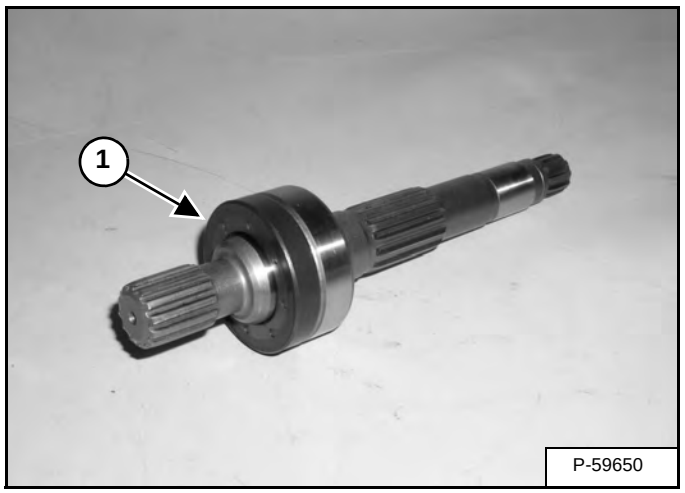
Remove the snap ring (Item 1) **[Figure 20-50-77]**.

Figure 20-50-78



Remove the shaft bearing assembly (Item 1) **[Figure 20-50-78]** from the pump housing by tapping the other end of the shaft.

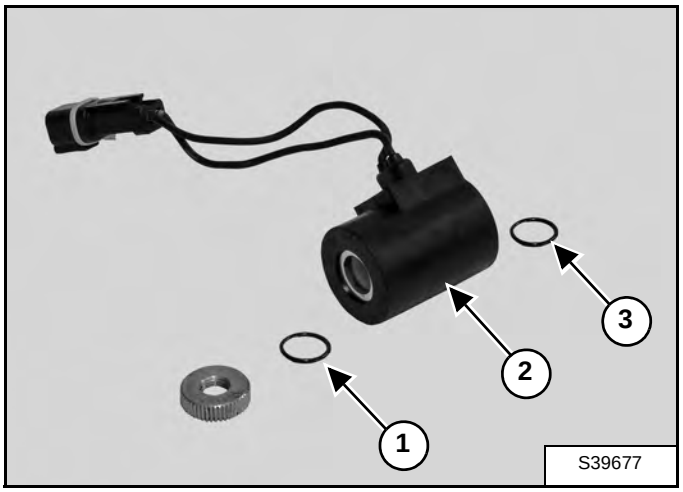
Figure 20-50-79



Remove the seal (Item 1) **[Figure 20-50-79]** from the shaft.

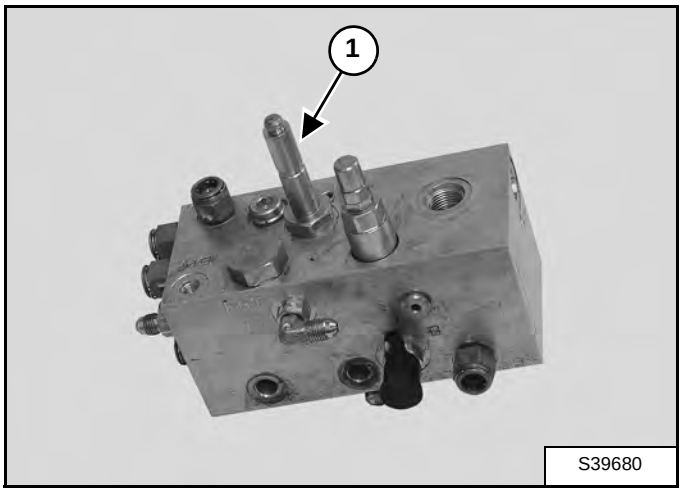
Disassembly And Assembly (Cont'd)

Figure 20-60-16



Remove the O-ring (Item 1), solenoid coil (Item 2) and O-ring (Item 3) **[Figure 20-60-16]**.

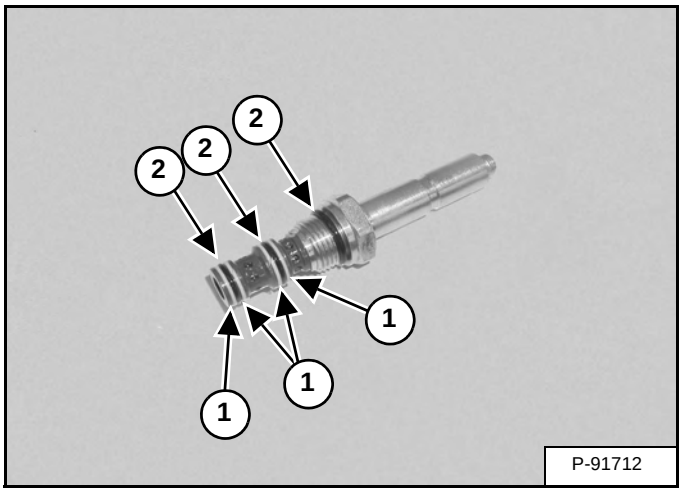
Figure 20-60-17



Remove the solenoid valve stem (Item 1) **[Figure 20-60-17]**.

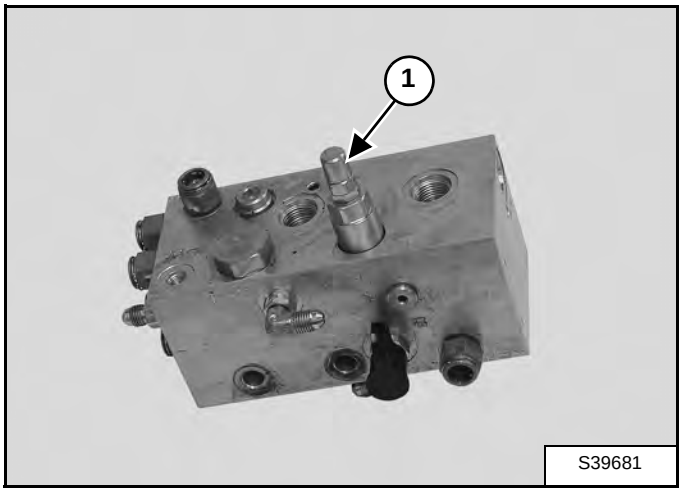
Installation: Tighten the stem to 27 - 33 N•m (19.9 - 24.3 ft-lb) torque.

Figure 20-60-18



Remove the back-up rings (Item 1) and O-rings (Item 2) **[Figure 20-60-18]** from both solenoid valve stems.

Figure 20-60-19

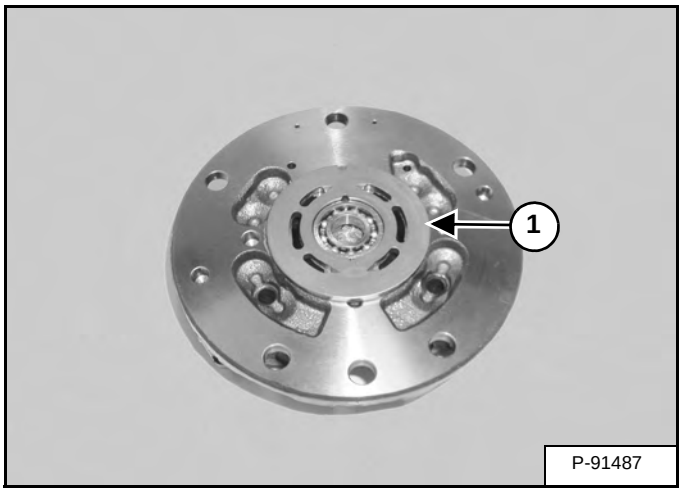


Remove the pilot relief valve (Item 1) **[Figure 20-60-19]**.

Installation: Tighten the pilot relief valve to 40,5 - 49,5 N•m (29.9 - 36.5 ft-lb) torque.

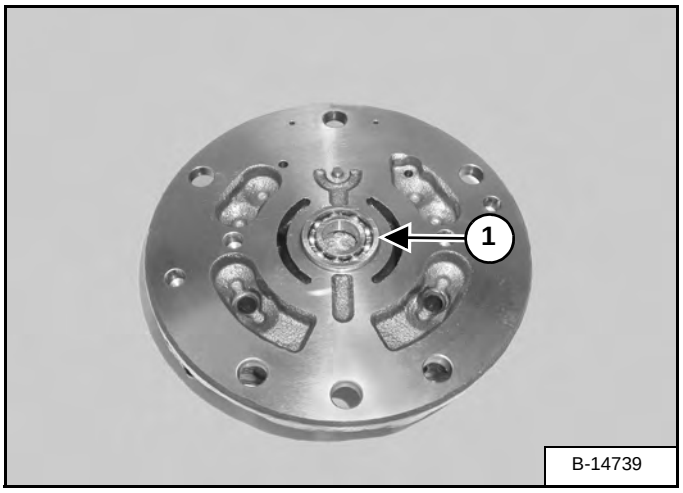
Disassembly (Cont'd)

Figure 20-70-16



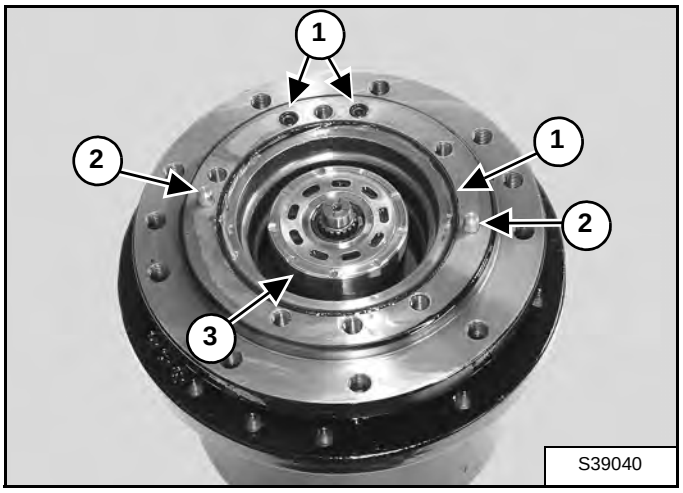
Remove the valve plate (Item 1) **[Figure 20-70-16]**.

Figure 20-70-17



Remove the bearing (Item 1) **[Figure 20-70-17]**.

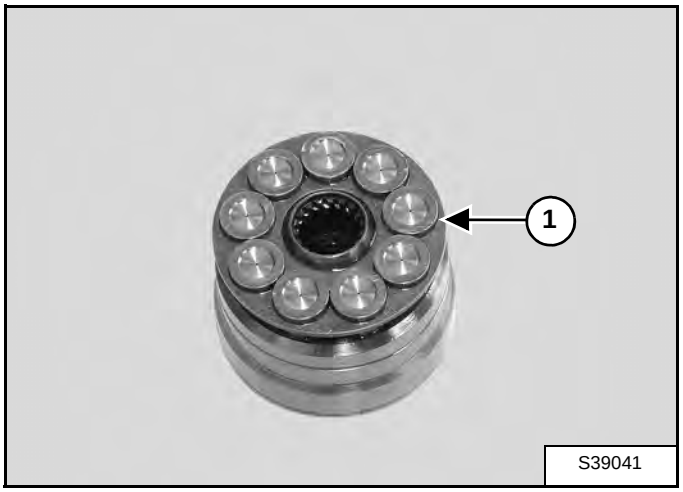
Figure 20-70-18



Remove the O-rings (Item 1). Remove the dowel pins (Item 2) **[Figure 20-70-18]**.

Remove the rotating group (Item 3) **[Figure 20-70-18]**.

Figure 20-70-19

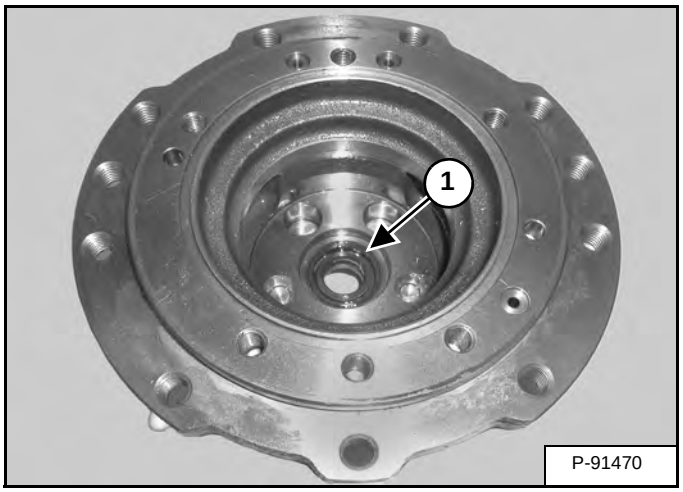


Remove the piston assemblies / retainer (Item 1) **[Figure 20-70-19]** from the cylinder block.

NOTE: It is not important that the pistons are installed in the original bores.

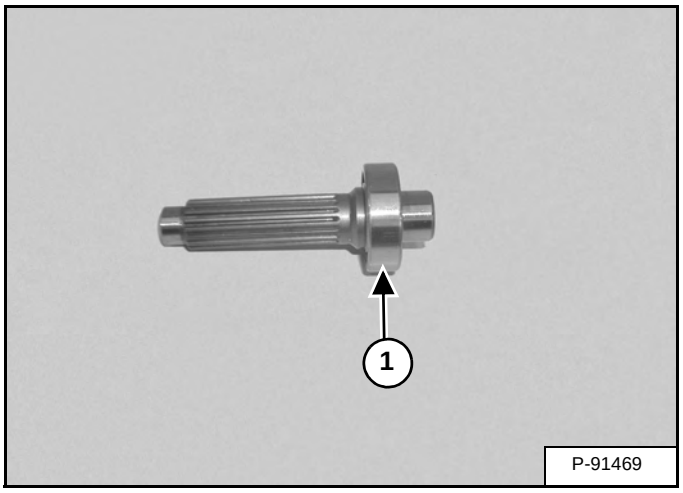
Assembly (Cont'd)

Figure 20-70-53



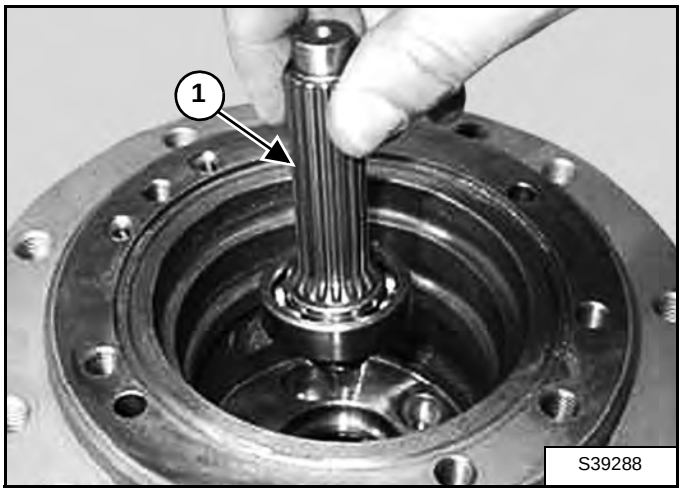
Install the oil seal (Item 1) **[Figure 20-70-53]**.

Figure 20-70-54



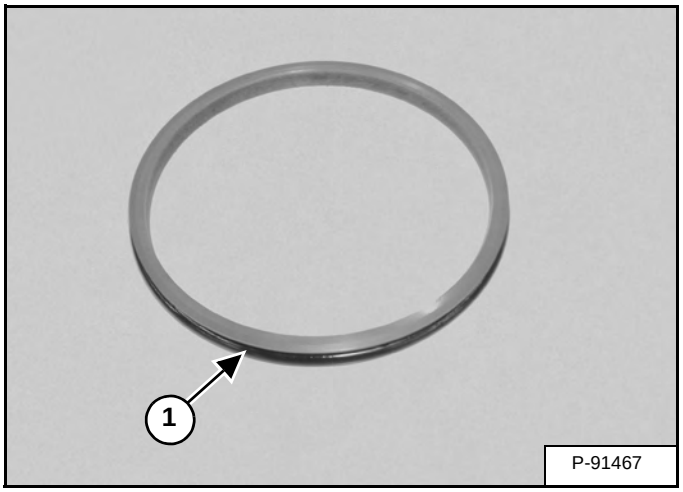
Install the bearing (Item 1) **[Figure 20-70-54]**.

Figure 20-70-55



Install the shaft / bearing assembly in the hub (Item 1) **[Figure 20-70-55]**.

Figure 20-70-56



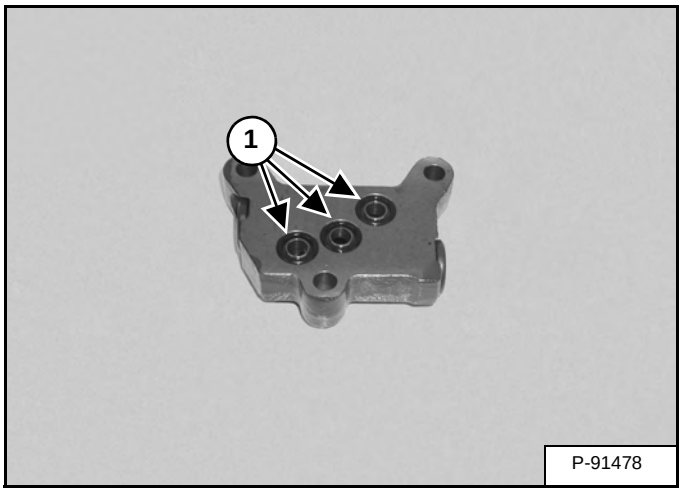
Install the O-ring (Item 1) **[Figure 20-70-56]** on the seal rings.

NOTE: Inspect the seal ring for burrs before installing the O-ring. Install the O-ring making sure it is not twisted. To remove any twists, gently pull a section of the O-ring and let it snap back.

The O-ring, seal rings, motor assembly and housing must be clean and free of any dust, oil film or foreign matter.

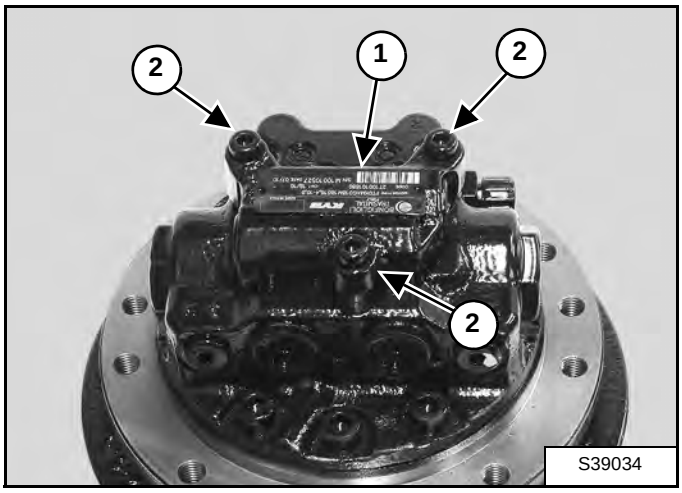
Assembly (Cont'd)

Figure 20-70-92



Install the O-rings (Item 1) **[Figure 20-70-92]**.

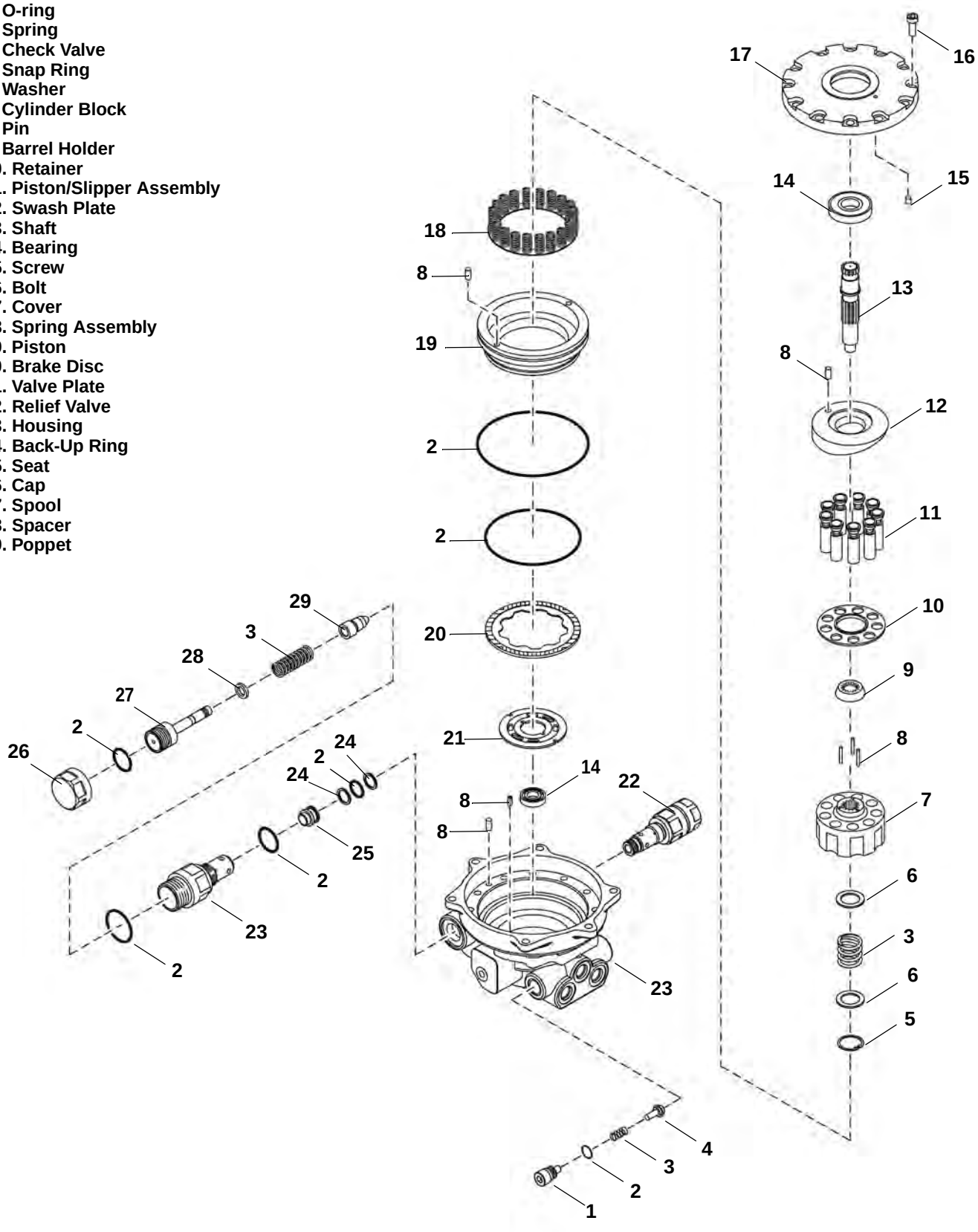
Figure 20-70-93



Install the valve (Item 1) on the motor. Install the bolts (Item 2) **[Figure 20-70-93]**. Tighten the bolts to 28 - 32 N•m (20.7 - 23.6 ft-lb) torque.

Parts Identification

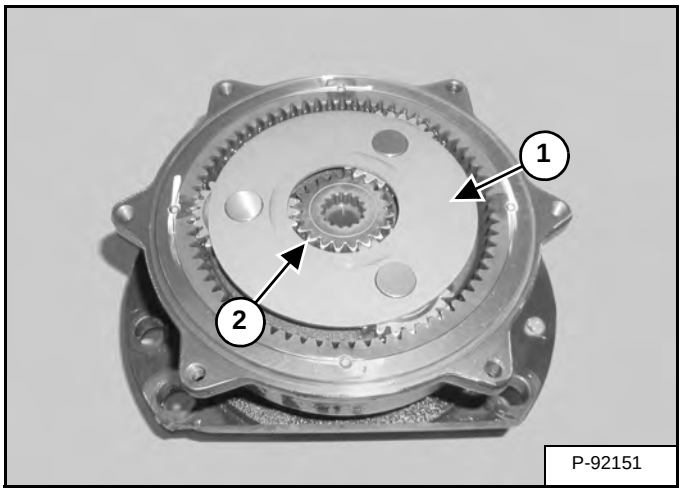
1. Plug
2. O-ring
3. Spring
4. Check Valve
5. Snap Ring
6. Washer
7. Cylinder Block
8. Pin
9. Barrel Holder
10. Retainer
11. Piston/Slipper Assembly
12. Swash Plate
13. Shaft
14. Bearing
15. Screw
16. Bolt
17. Cover
18. Spring Assembly
19. Piston
20. Brake Disc
21. Valve Plate
22. Relief Valve
23. Housing
24. Back-Up Ring
25. Seat
26. Cap
27. Spool
28. Spacer
29. Poppet



SWING MOTOR (DRIVE CARRIER) (CONT'D)

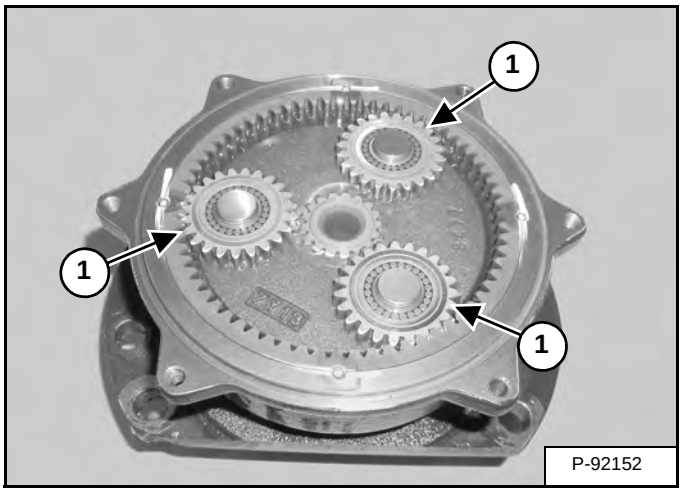
Disassembly And Assembly

Figure 20-91-2



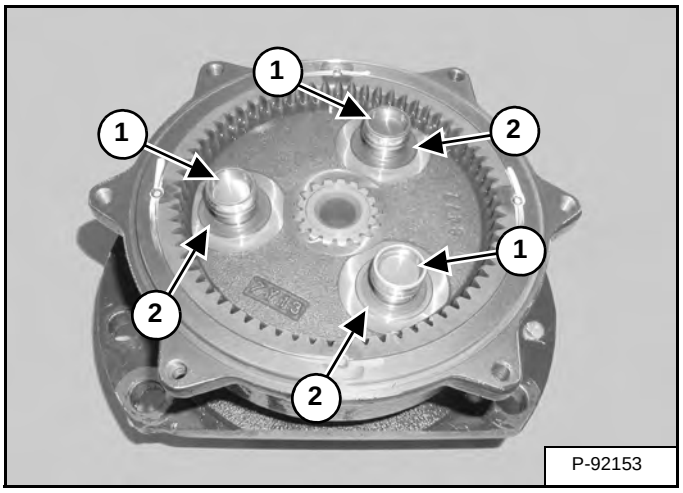
Remove the thrust plate (Item 1) and sun gear (Item 2) **[Figure 20-91-2]**.

Figure 20-91-3



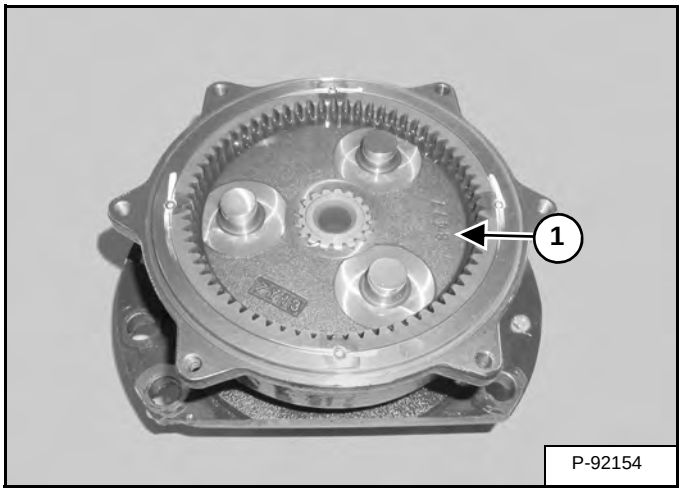
Remove the planetary gears (Item 1) **[Figure 20-91-3]** and roller bearings.

Figure 20-91-4



Remove the bearing races (Item 1) and thrust washers (Item 2) **[Figure 20-91-4]**.

Figure 20-91-5

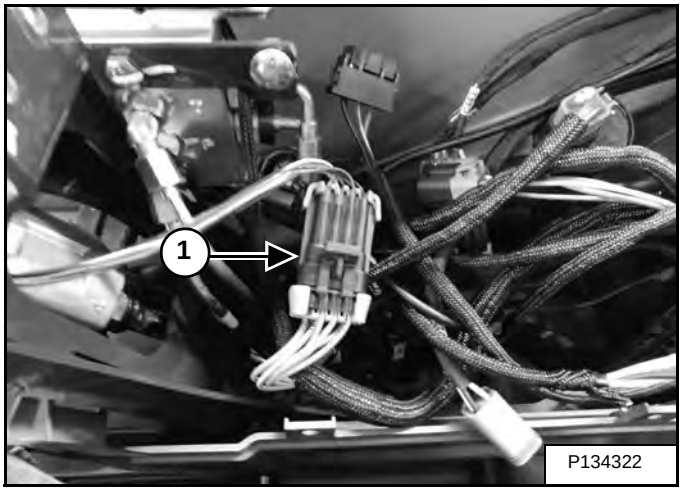


Remove the carrier (Item 1) **[Figure 20-91-5]**.

Joystick Assembly Removal And Installation

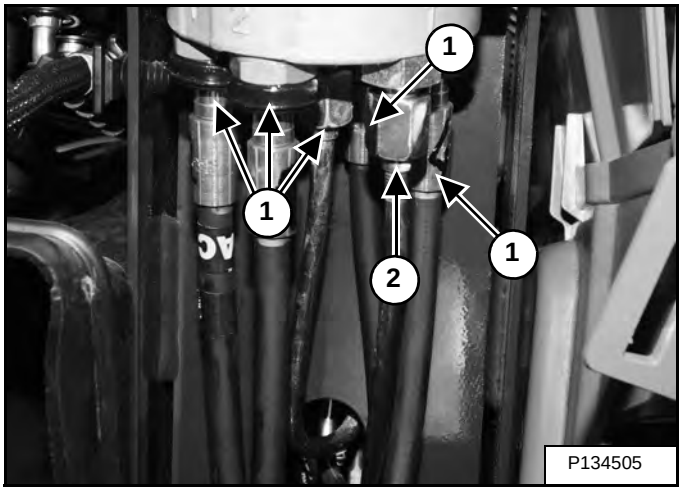
Remove the console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

Figure 20-100-13



Disconnect the wire harness (Item 1) **[Figure 20-100-13]**.

Figure 20-100-14



Mark and remove the hoses (Item 1) and tubeline (Item 2) **[Figure 20-100-14]** from the bottom of the joystick 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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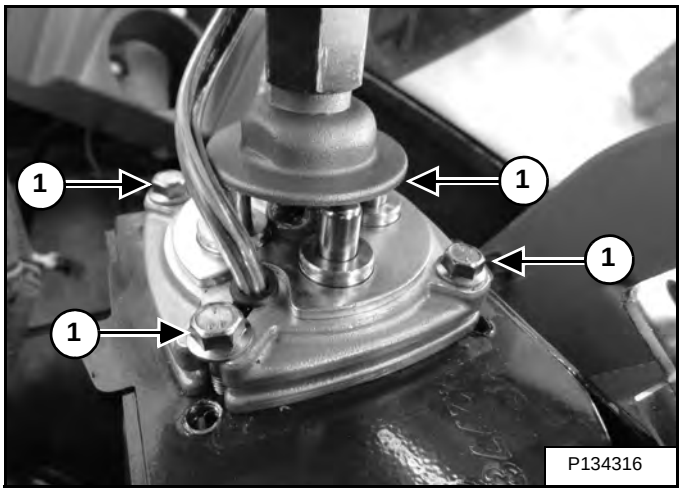
Figure 20-100-15



Pull the boot and remove the four bolts (Item 1) **[Figure 20-100-15]**.

Remove the joystick assembly.

LEFT CONTROL LEVER (CONT'D)

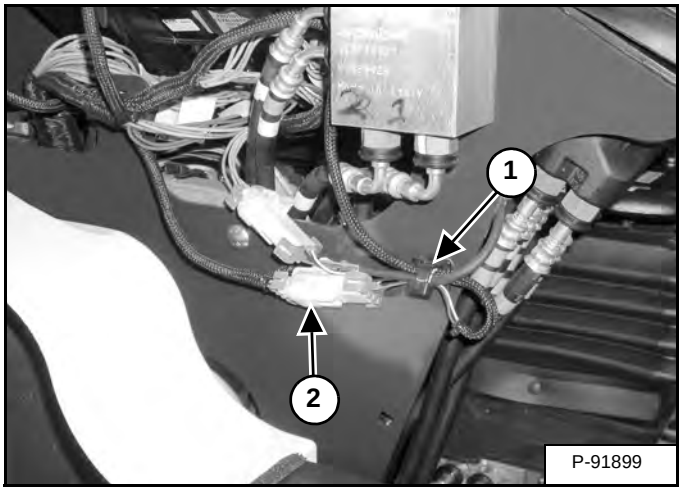
Disassembly And Assembly

The control lever (Joystick) is non serviceable and must be replaced as an assembly.

Removal And Installation

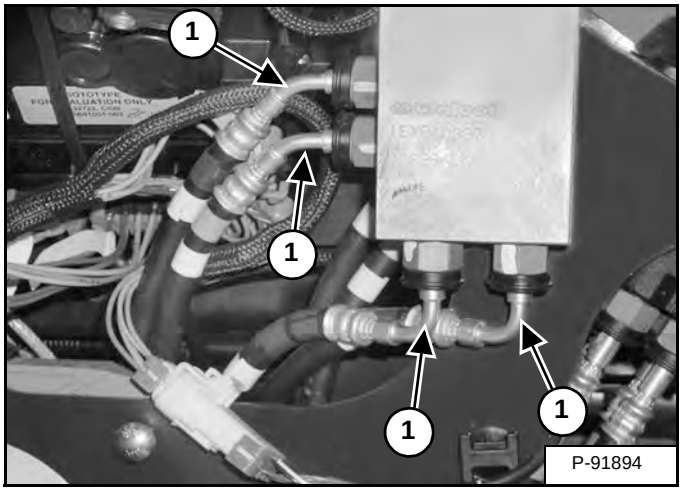
Remove the right console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

Figure 20-150-9



Cut and remove the cable tie (Item 1). Disconnect the wire harness (Item 2) **[Figure 20-150-9]**.

Figure 20-150-10



Mark and remove the four hoses (Item 1) **[Figure 20-150-10]**.

Figure 20-150-11

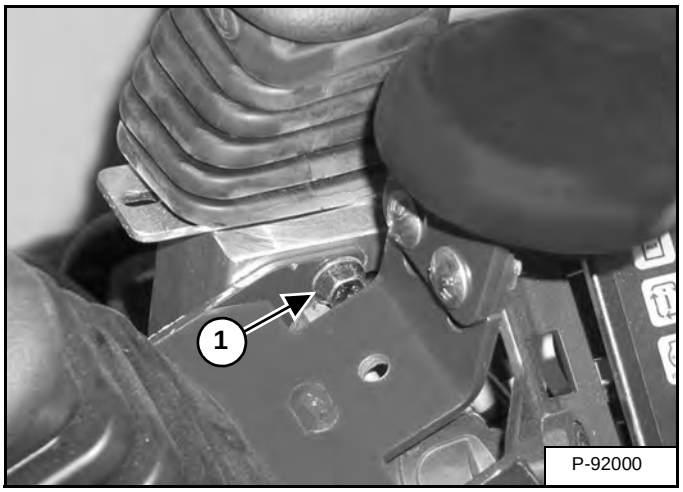
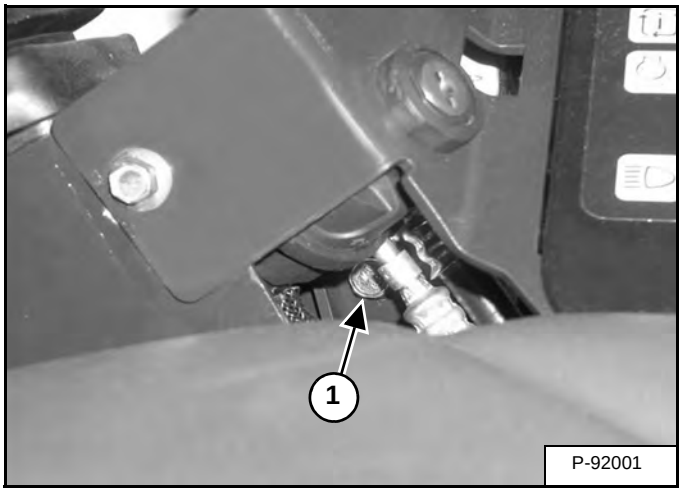


Figure 20-150-12



Remove the bolts (Item 1) **[Figure 20-150-11]** and **[Figure 20-150-12]**.

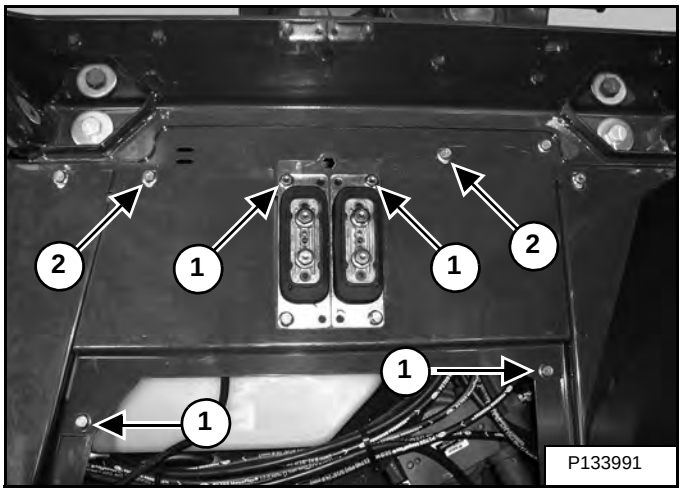
TRAVEL CONTROL VALVE

Removal And Installation

Remove the travel levers. (See Removal And Installation on Page 40-100-1.)

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

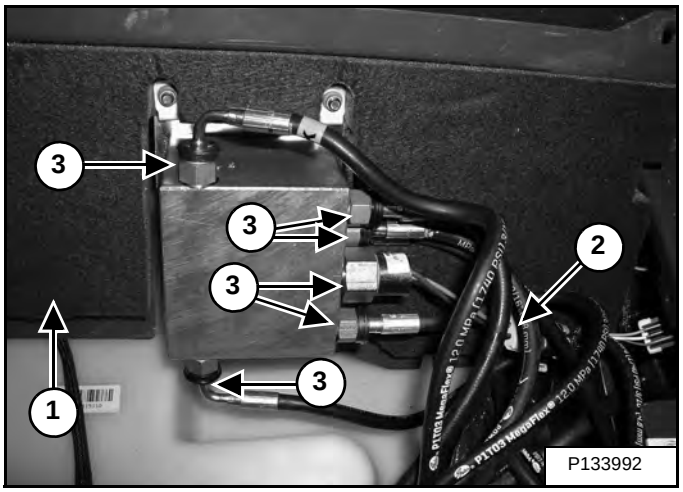
Figure 20-170-1



Remove the four bolts (Item 1) **[Figure 20-170-1]**.

Remove the two nuts (Item 2) **[Figure 20-170-1]** from the front floorplate.

Figure 20-170-2



Tip the plate (Item 1) **[Figure 20-170-2]** towards the front window.

Disconnect the electrical connector (Item 2) **[Figure 20-170-2]**.

Mark and remove the six hoses from the travel control valve (Item 3) **[Figure 20-170-2]**.

IMPORTANT

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

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SECONDARY AUXILIARY VALVE

Removal And Installation

Lower the work group to the ground.

Stop the engine.

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

IMPORTANT

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

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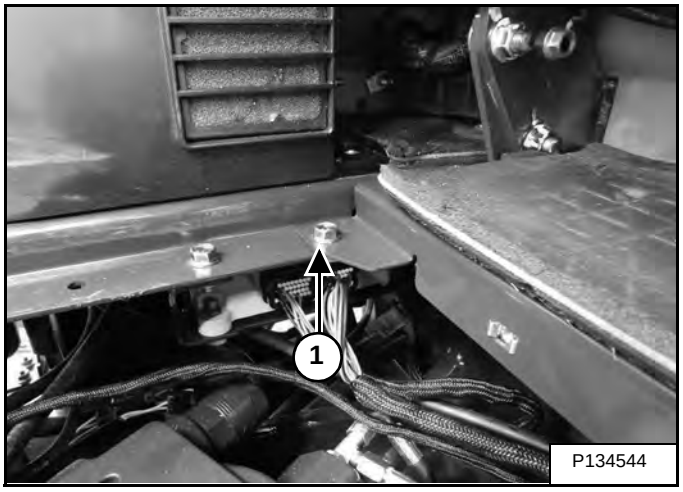
Drain the hydraulic reservoir. (See Removal And Installation on Page 20-130-1.)

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

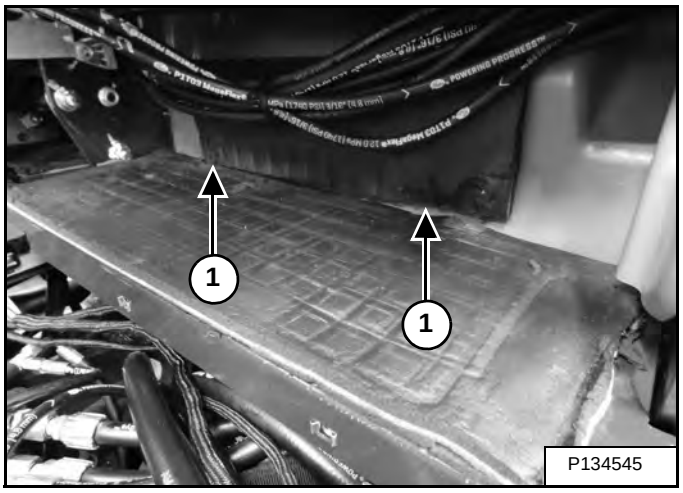
Remove the tool box. (See Removal And Installation on Page 40-220-1.)

Figure 20-190-1



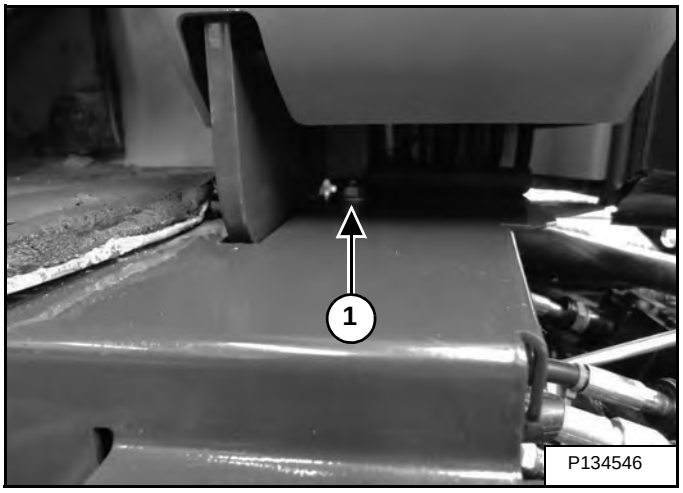
Remove the bolt (Item 1) **[Figure 20-190-1]**.

Figure 20-190-2



Remove the two nuts (Item 1) **[Figure 20-190-2]**.

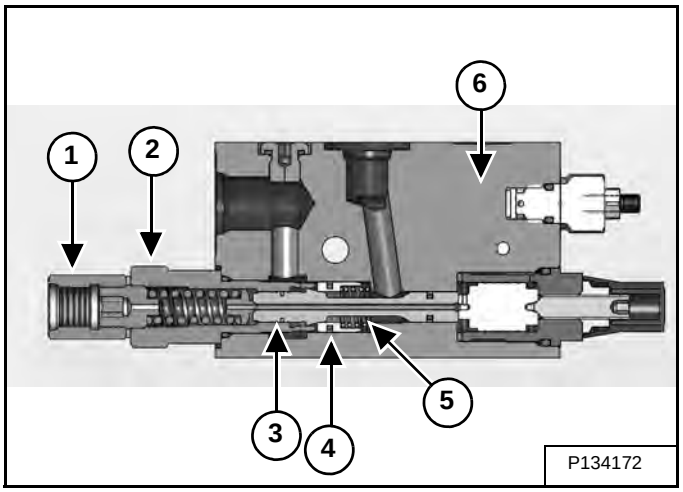
Figure 20-190-3



Remove the nut (Item 1) **[Figure 20-190-3]** and remove the rear plate.

Inspection

Figure 20-200-7



NOTE: Do not remove nut (Item 1) [Figure 20-200-7].

Remove the nut (Item 2) **[Figure 20-200-7]**.

Installation: Tighten the nut (Item 2) **[Figure 20-200-7]** to 42 N•m (31 ft-lb) torque.

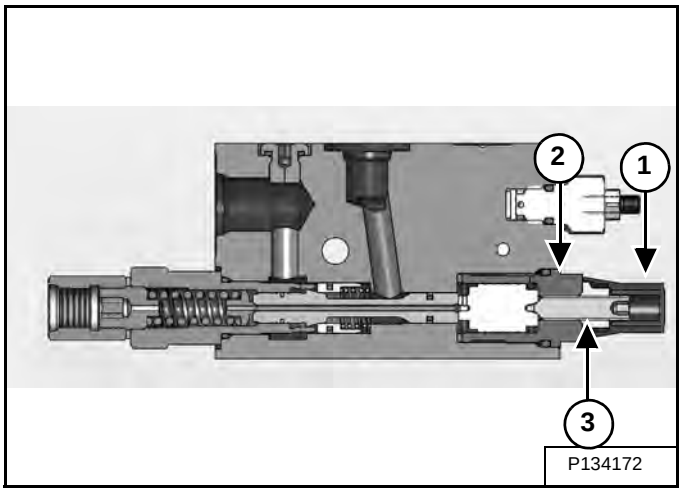
Remove the pin (Item 3), ring (Item 4) and the spring (Item 5) **[Figure 20-200-7]** in order.

Installation: Reverse the order paying special attention to the O-ring.

When not sure if the boom load holding valve (Item 6) **[Figure 20-200-7]** settings have been tampered with, the complete valve assembly must be replaced.

Override Function - Emergency Lowering

Figure 20-200-8



Remove the cap (Item 1) **[Figure 20-200-8]**.

Loosen the bolt (Item 2) **[Figure 20-200-8]**.

Turn the screw (Item 3) **[Figure 20-200-8]** clockwise until the boom starts lowering.

Once the boom is lowered safely, tighten the screw (Item 3) **[Figure 20-200-8]** by turning it counterclockwise.

Tighten the bolt (Item 2) **[Figure 20-200-8]**.

Install the cap (Item 1 **[Figure 20-200-8]**.

TRACK UNDERCARRIAGE COMPONENTS (RUBBER TRACK)

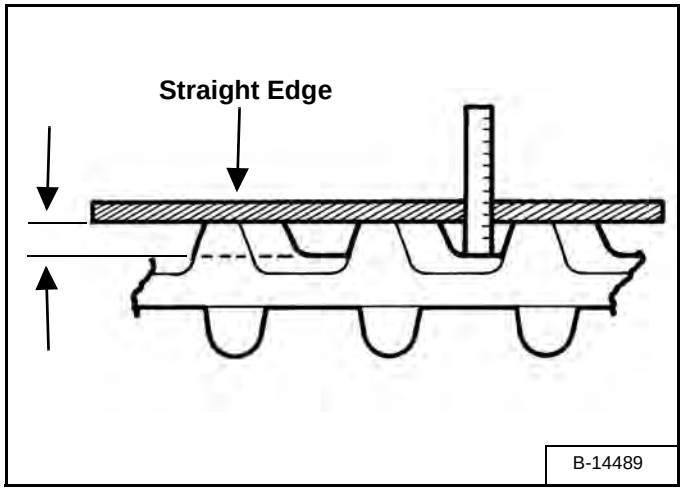
Description

The track undercarriage components consist of the front idler, top roller, bottom rollers, drive motor and track frame.

Track Lug Height

The lug height of a new rubber track is 25 mm (0.984 in).

Figure 30-20-1



To find the percentage of wear on a excavator track, measure the height of the lug by placing a straight edge across the top of three lugs and measure the distance from the base of the track to the bottom of the straight edge **[Figure 30-20-1]**.

Divide this measurement by the new track height and multiply by 100. This will give the percentage of track lug left.

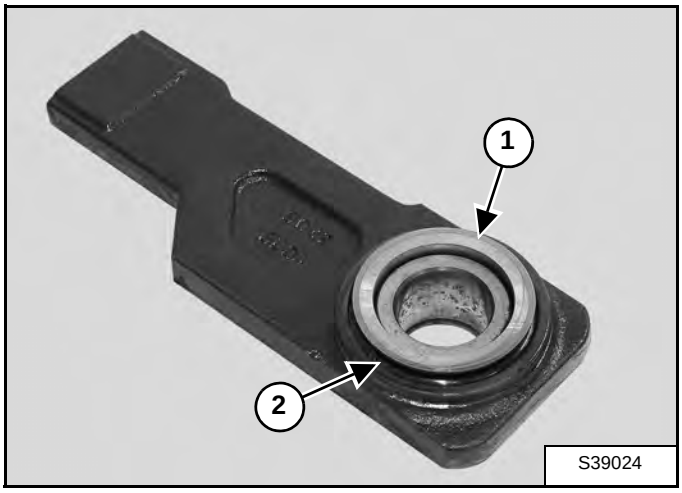
Example: lug height 20 mm (0.787 in)

$$\frac{0.7}{0.9} \times 100 = 78$$

78% of the track lug is remaining with 22% wear on the track lugs.

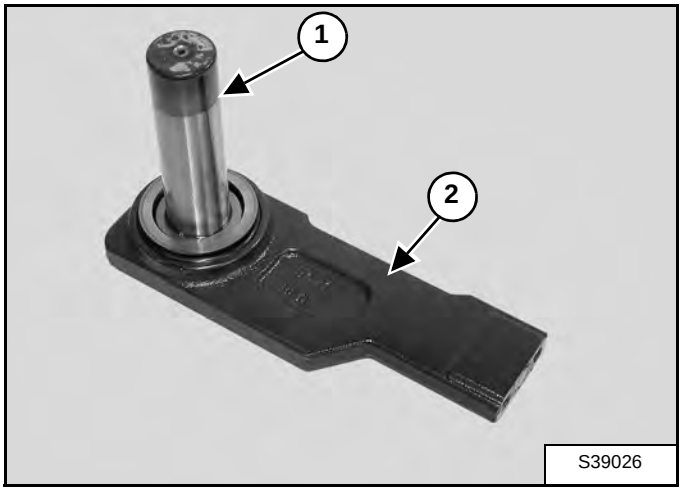
Idler Assembly (Cont'd)

Figure 30-20-23



Install the spacer (Item 1) and new O-ring (Item 2) **[Figure 30-20-23]** on both blocks.

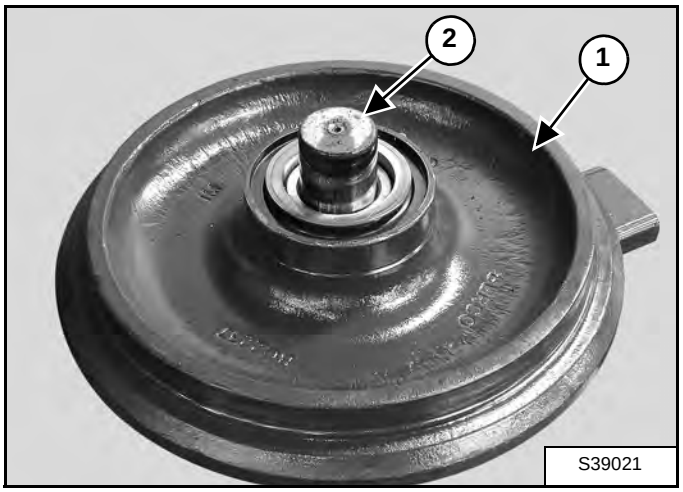
Figure 30-20-24



Install the shaft (Item 1) on one of the blocks (Item 2) **[Figure 30-20-24]** using a press.

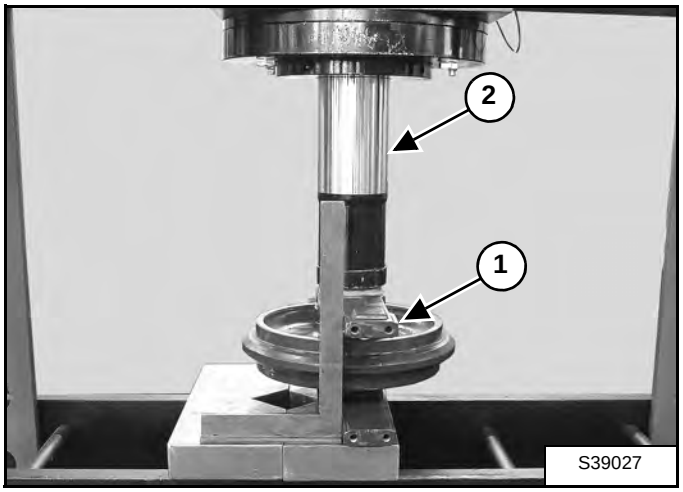
NOTE: Apply Loctite® 601 to the shaft hole in the block before installation. Remove all residues after installation.

Figure 30-20-25



Install the idler (Item 1) over the shaft (Item 2) **[Figure 30-20-25]**.

Figure 30-20-26

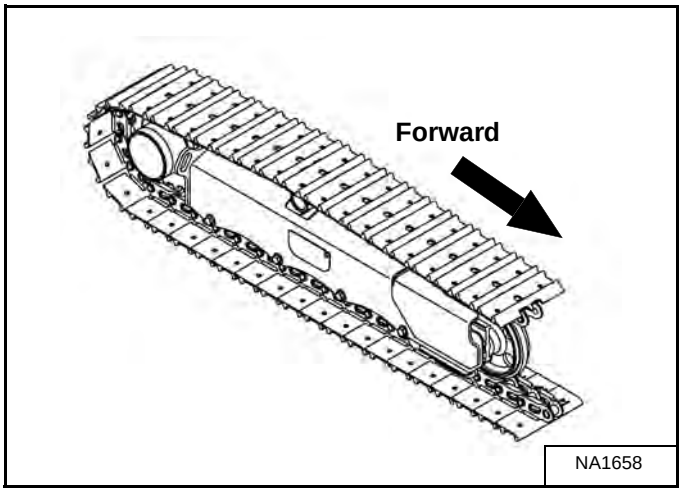


Apply Loctite® 601 to the shaft hole in the block.

Align the blocks and install the block (Item 1) on the shaft using a press (Item 2) **[Figure 30-20-26]**.

Track Removal And Installation (Cont'd)

Figure 30-21-11



With the help of a second person, start the excavator. Use the travel lever (on which side the track is being installed) to slowly turn the drive motor in the forward direction. Hold the end of the track upwards as the drive motor slowly moves the track forward. Guide the end of the track over the top of the roller and up to the front idler wheel **[Figure 30-21-11]**.

Stop the engine.

⚠ WARNING

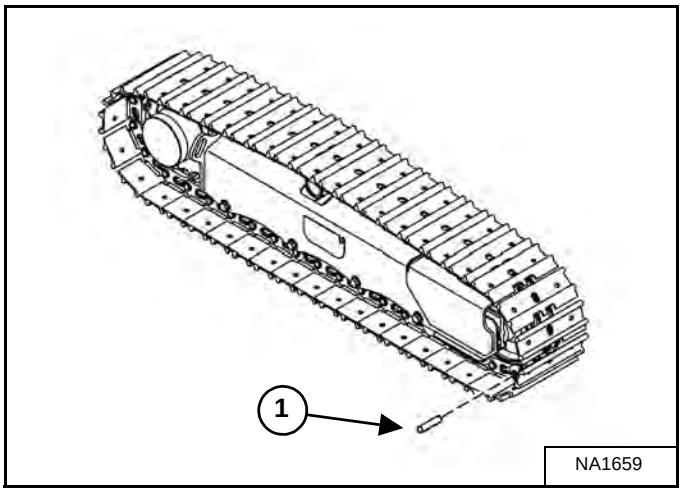
AVOID INJURY OR DEATH

Drive motor must be operated slowly to avoid any sudden movements that could cause injury or death.

W-2174-0195

Position the two ends of the track together and use a drift pin to hold the links together.

Figure 30-21-12



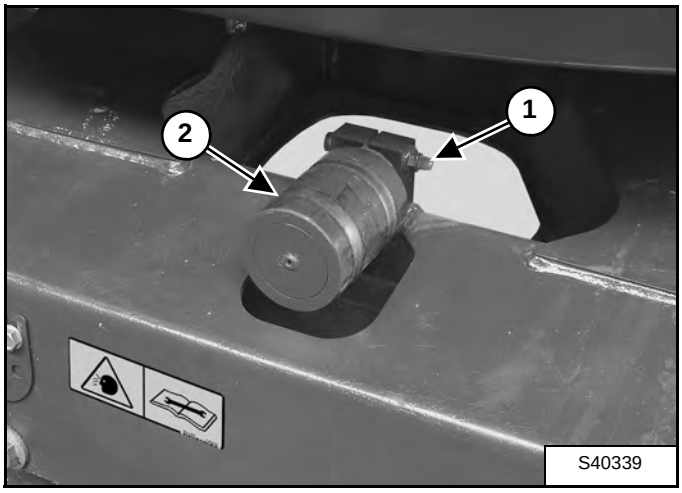
Insert the connecting link pin (Item 1) **[Figure 30-21-12]** into the track link hole. Tap the end of the pin until the press fit diameter contacts the connecting link hole.

Hold a heavy steel block on the back side of the track connecting link and use a hammer to drive the connecting link pin into the track link until the head of the pin is flush with the track link.

See Adjustment for adding grease to the grease spring and for checking track clearance. (See Adjusting Tension on Page 30-21-2.)

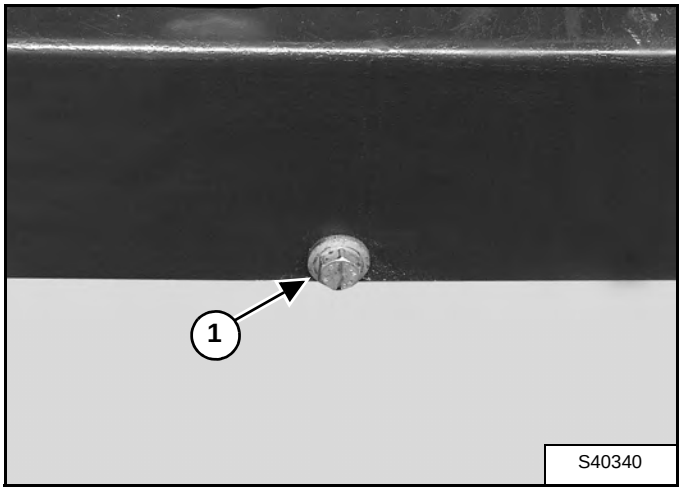
Roller Removal And Installation

Figure 30-21-34



Loosen the bolt (Item 1) and nut. Remove the top roller (Item 2) **[Figure 30-21-34]**.

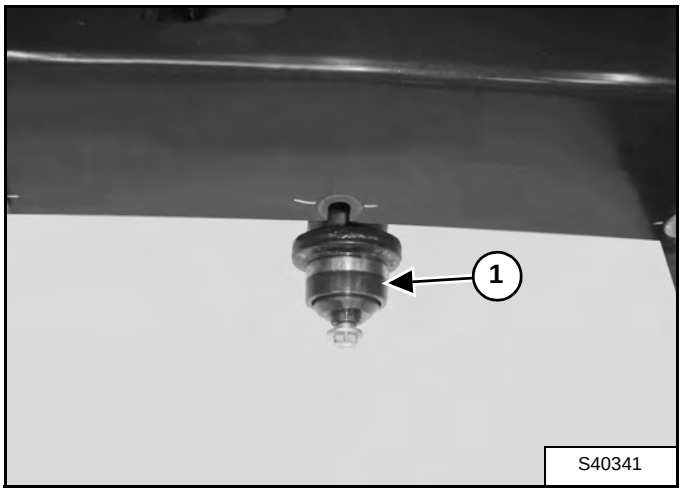
Figure 30-21-35



Loosen the bolts (Item 1) **[Figure 30-21-35]** on the track roller on both sides of the track frame.

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

Figure 30-21-36



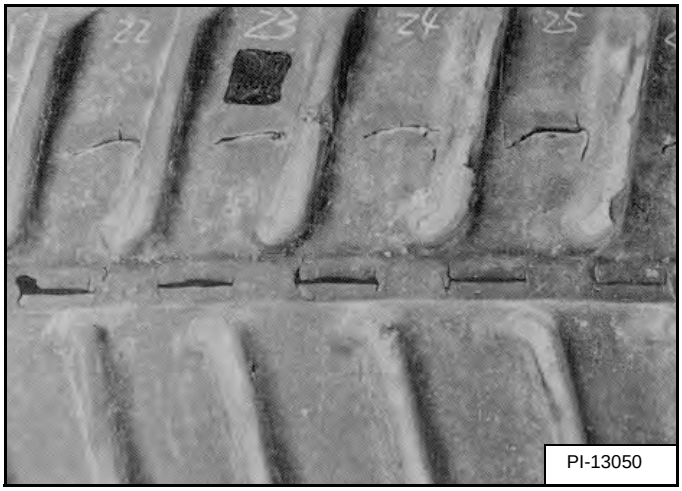
Remove the bottom roller (Item 1) **[Figure 30-21-36]**.

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

Track Damage Identification (Cont'd)

Cracks And Cuts On The Lug Side Rubber

Figure 30-30-18



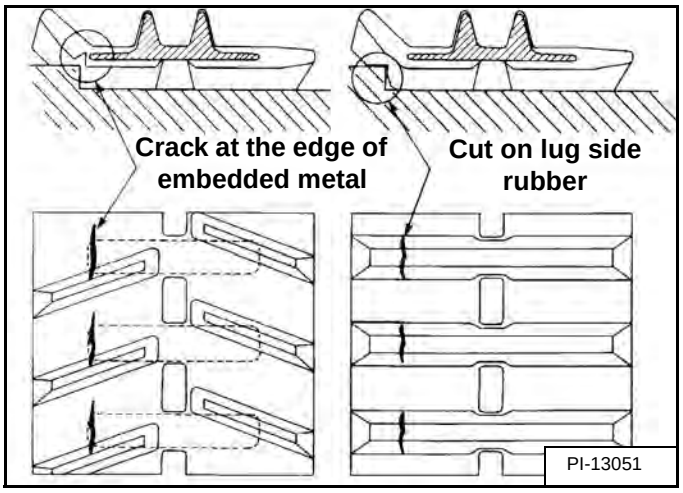
Damage:

Sometimes cracks and cuts on the lug side rubber at the edges of the embedded metals can be observed **[Figure 30-30-18]**.

Replacement:

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.

Figure 30-30-19



Causes of the damage:

When rubber tracks drive over sharp projections, intensive stress is applied to the lug side rubber surface, especially at the edges of embedded metals, causing cracks and cuts in the area around the embedded metals **[Figure 30-30-19]**.

Prevention:

To avoid extensive stress applied to the lug root where metals are embedded, machine operators are requested to avoid driving over stumps and ridges.

UPPERSTRUCTURE

Removal

Lower the blade all the way.

Put all the control levers in NEUTRAL.

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

Remove the right side cover.

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

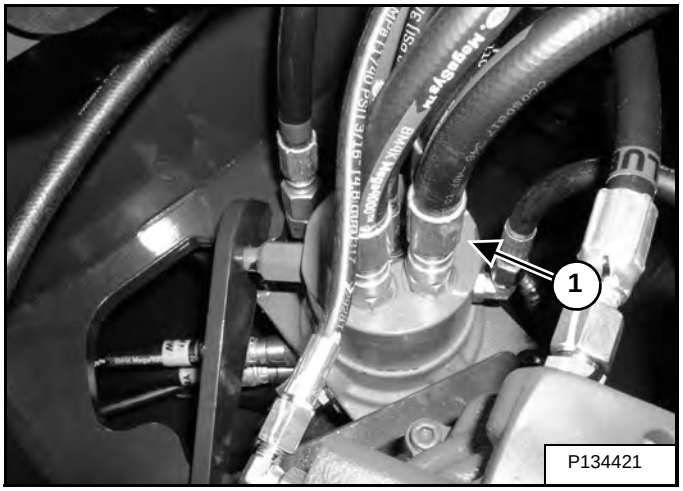
Remove the travel control valve. (See Removal And Installation on Page 20-170-1.)

Remove the hydraulic control valve. (See Removal And Installation on Page 20-40-1.)

Remove the fuel tank. (See Removal And Installation on Page 40-120-1.)

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

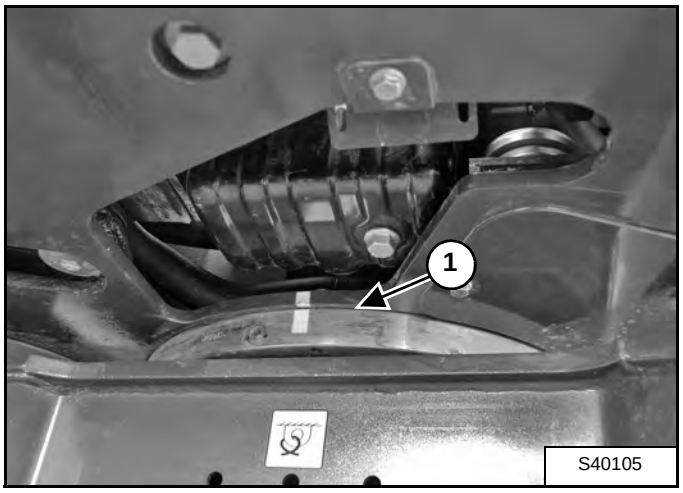
Figure 40-10-1



Remove the hoses from the top of the swivel joint (Item 1) **[Figure 40-10-1]**.

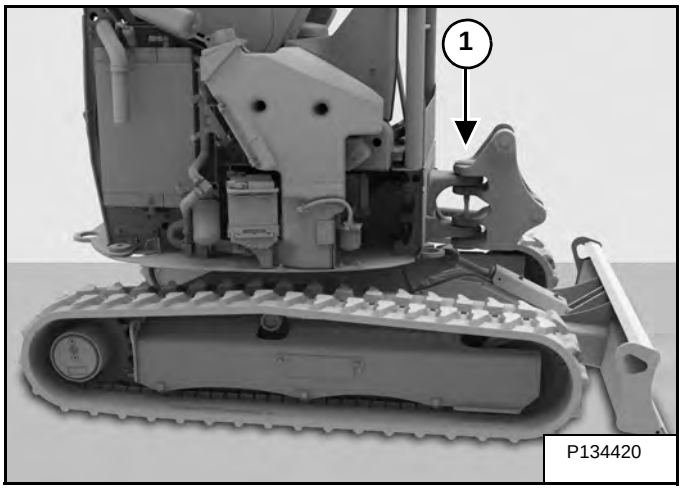
Remove the swing motor drive carrier. (See Removal And Installation on Page 20-91-1.)

Figure 40-10-2



Mark the upperstructure to swing bearing to the track frame for assembly (Item 1) **[Figure 40-10-2]**.

Figure 40-10-3



Fasten a chain through the front of the excavator frame (Item 1) **[Figure 40-10-3]**.

Removal And Installation (Cont'd)

⚠ WARNING

Never use the cab / canopy service lifting bracket to lift the excavator. The bracket is not strong enough and can fail causing serious injury or death.

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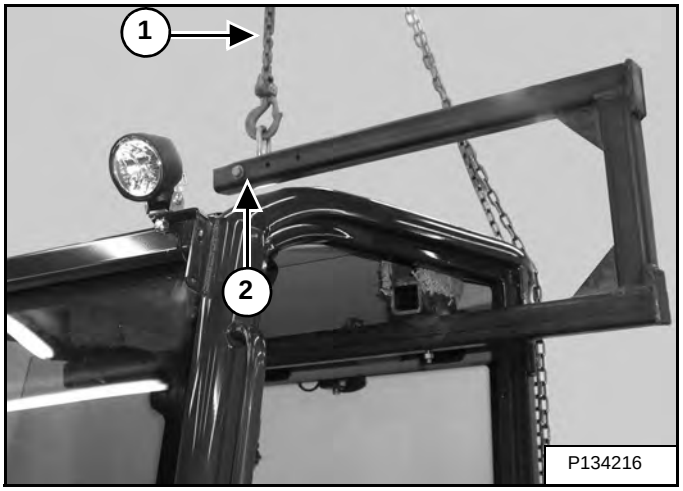
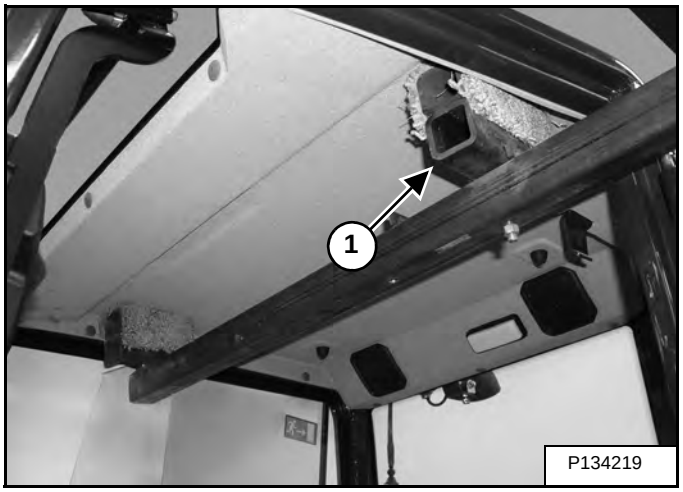
Figure 40-30-5



Install the chain hoist (Item 1) in the end hole of the lifting bracket (Item 2) **[Figure 40-30-5]**.

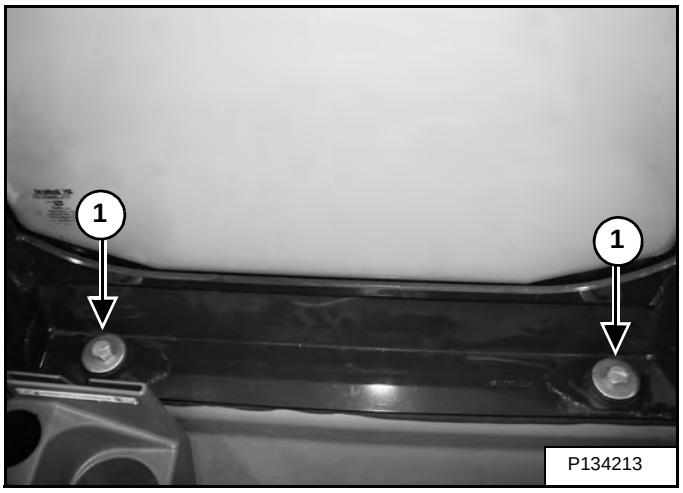
Install the cab / canopy service lifting bracket on the cab **[Figure 40-30-5]**

Figure 40-30-6



Adjust the lifting bracket to the proper width by moving the bracket (Item 1) **[Figure 40-30-6]**.

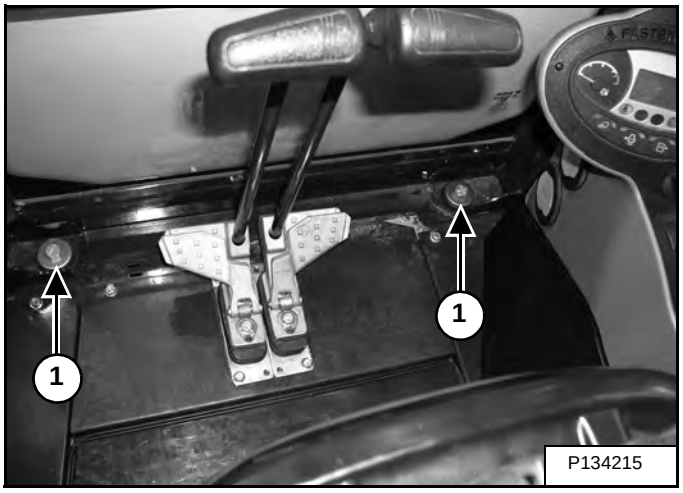
Figure 40-30-7



Remove the bolts and washers (Item 1) **[Figure 40-30-7]** from the rear of the cab.

Installation: Tighten the bolts to 160 - 180 N•m (118 - 133 ft-lb) torque.

Figure 40-30-8



Remove the bolts and washers (Item 1) **[Figure 40-30-8]** from the front of the cab.

Installation: Tighten the bolts to 160 - 180 N•m (118 - 133 ft-lb) torque.

Glass Installation (Cont'd)

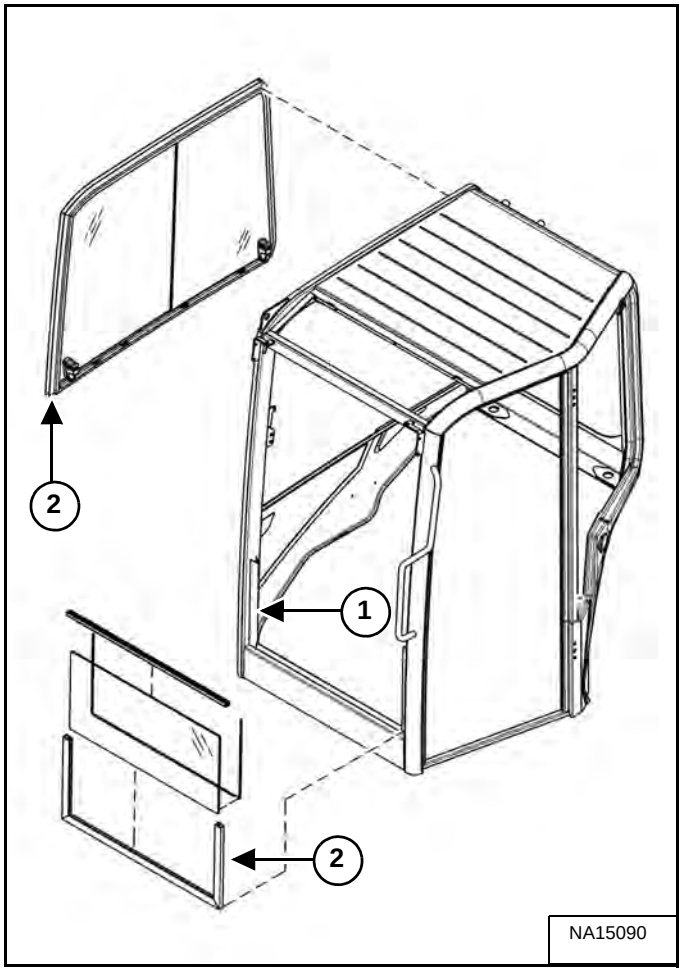
Right And Lower Front Glass

Remove the majority of the old urethane adhesive from the perimeter of the cab.

Prime and paint any bare metal or scratches.

Clean the metal surfaces with general purpose adhesive cleaner. Clean the glass surface with glass cleaner.

Figure 40-30-34



Apply the combo primer to the perimeter of the cab opening (Item 1) and window frame (Item 2) **[Figure 40-30-34]**.

Allow the combo primer to dry for at least 15 minutes. Excess primer can be removed from the glass using a razor blade.

IMPORTANT

If the glass has direct contact with the metal frame, the glass may break due to machine vibration.

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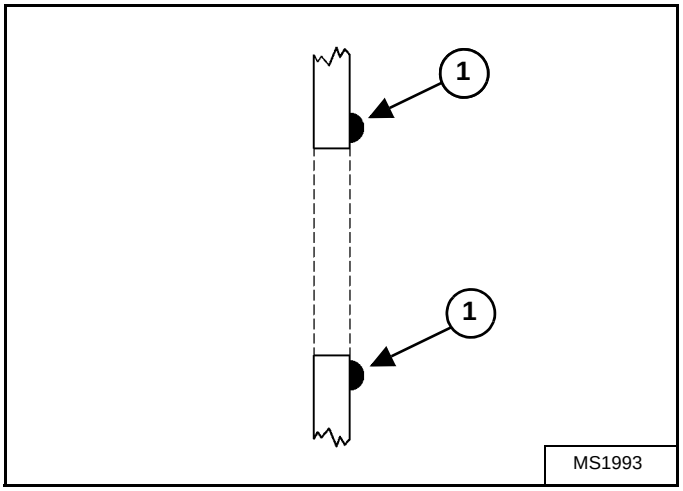
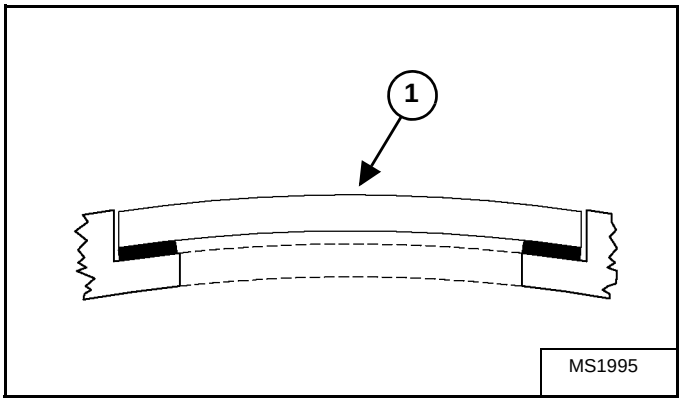
Cut the tip of the adhesive tube to the desired shape and size to provide a bead height sufficient to give good contact with the glass around the entire perimeter.

Figure 40-30-35



Apply a 6,4 X 9,5 mm (0.25 X 0.375 in) bead of urethane adhesive (Item 1) **[Figure 40-30-35]** to the perimeter of the cab.

Figure 40-30-36



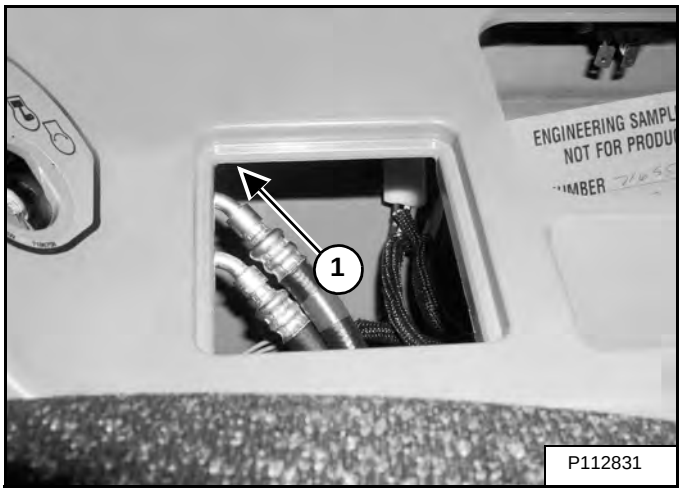
Install the glass (Item 1) **[Figure 40-30-36]**. Press the glass into the cab to make complete contact with the adhesive. Tape the glass in place.

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

Remove the tape after the adhesive is cured.

Console Cover Removal And Installation (Cont'd)

Figure 40-50-15

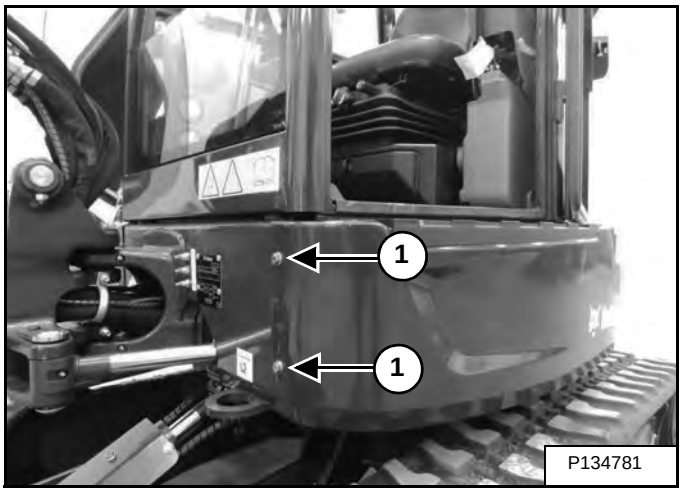


Loosen the nut (Item 1) **[Figure 40-50-15]** and bolt located under the console cover. Remove the cover.

LEFT UPPERSTRUCTURE COVER

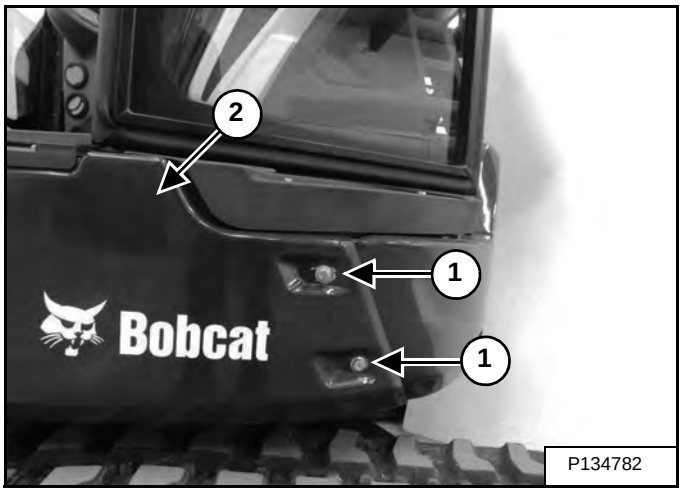
Removal And Installation

Figure 40-70-1



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

Figure 40-70-2

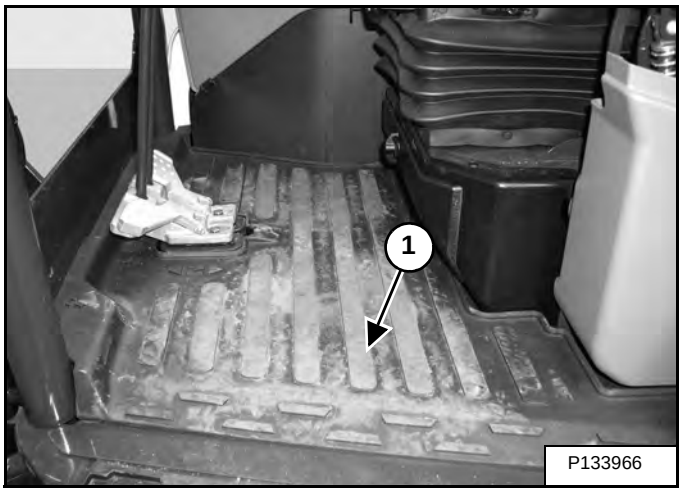


Remove the two bolts (Item 1) and remove the cover (Item 2) **[Figure 40-70-2]**.

FLOOR MAT

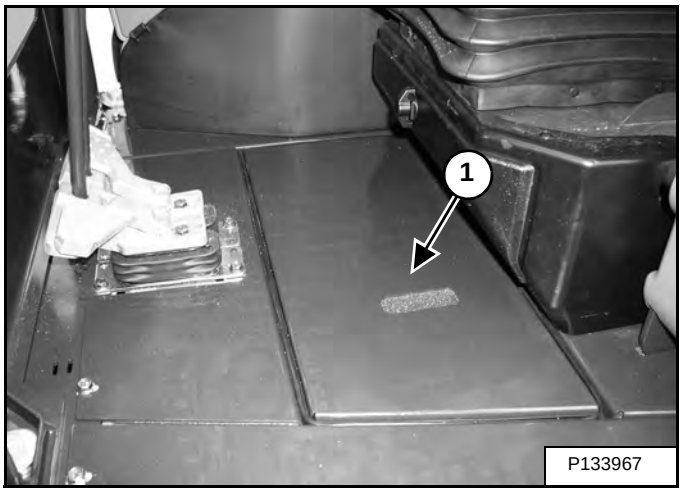
Removal And Installation

Figure 40-110-1



Lift up and remove the floor mat (Item 1) **[Figure 40-110-1]**.

Figure 40-110-2



Lift up and remove the floor panel (Item 1) **[Figure 40-110-2]**.

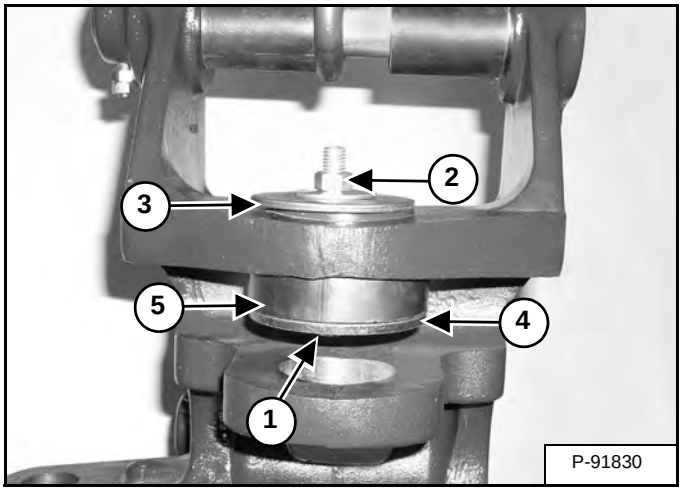
Bushing Installation

Apply a film of grease to the outer diameter of the bushing and to the inner diameter of the casting.

Center the bushing on the casting hole.

NOTE: Make sure that the bushing is centered into the casting hole and that it starts in the hole evenly and square.

Figure 40-140-13



Put the washer (Item 3) **[Figure 40-140-13]** over the flanged end of the bushing.

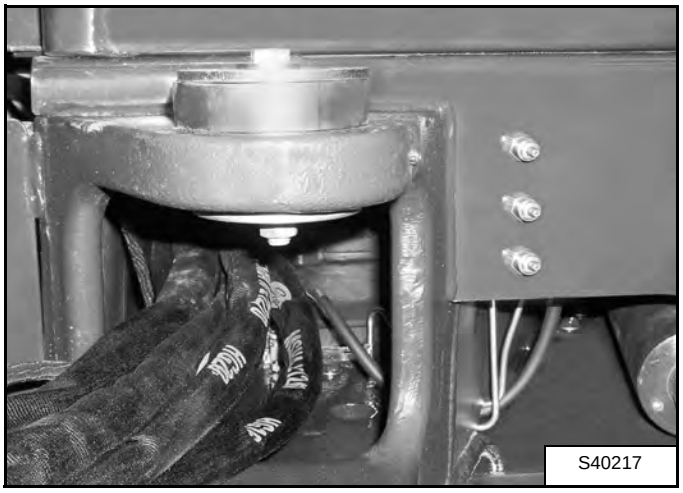
Put the spacer (Item 5) and the washer (Item 4) **[Figure 40-140-13]** over the bushing hole casting. Center the spacer and the washer over the bushing hole.

Install the bolt (Item 1) through the washers, the spacer and the bushing. Install the nut (Item 2) **[Figure 40-140-13]**.

Tighten the bolt and nut until the bushing is seated in the casting.

Figure 40-140-14

Figure 40-140-15



The same procedure is used to remove and install the bushings in the frame castings **[Figure 40-140-14]** and **[Figure 40-140-15]**.

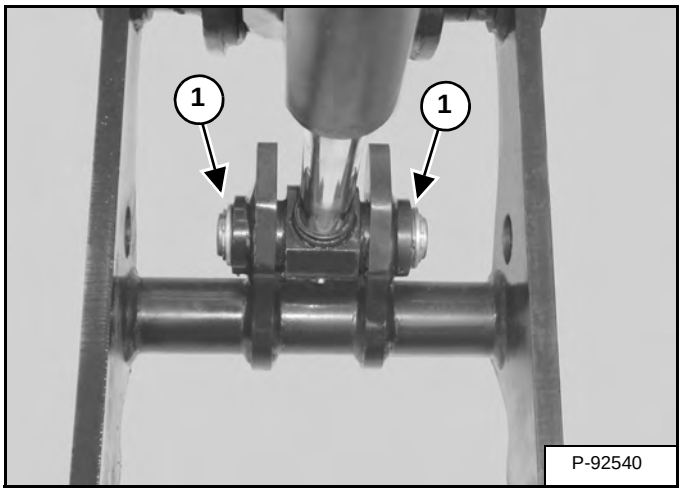
CLAMP

Removal And Installation

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

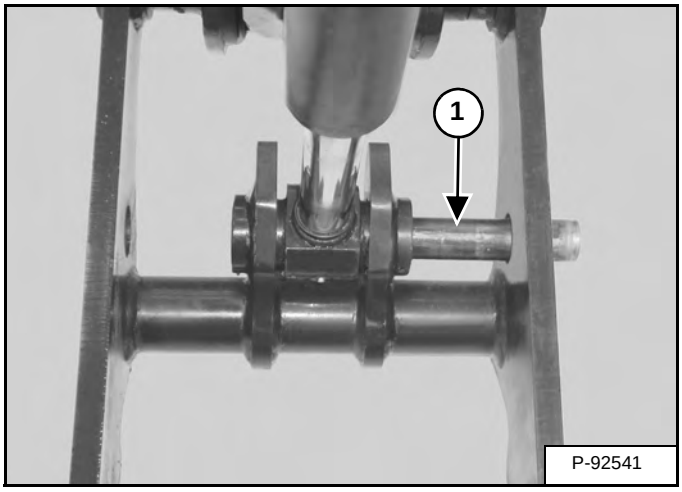
Lower the clamp to the ground.

Figure 40-180-1



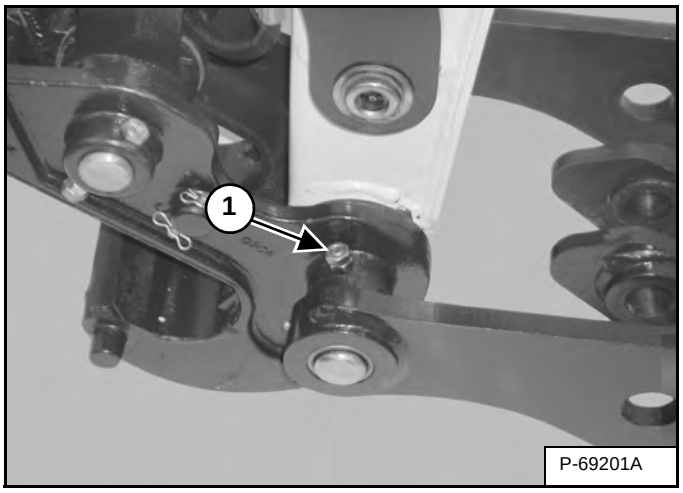
Remove the snap ring (Item 1) **[Figure 40-180-1]** and washers from the rod end of the clamp cylinder.

Figure 40-180-2



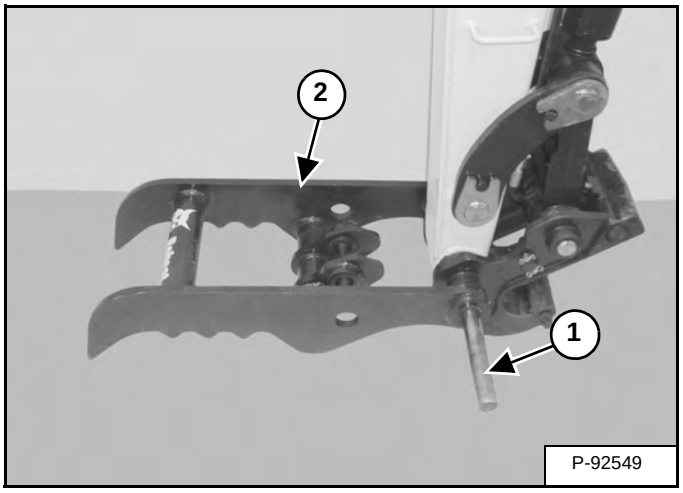
Remove the pin (Item 1) **[Figure 40-180-2]**.

Figure 40-180-3



Remove the nut and bolt (Item 1) **[Figure 40-180-3]**.

Figure 40-180-4



Remove the pin (Item 1) and clamp (Item 2) **[Figure 40-180-4]**.

Installation (Cont'd)

⚠ WARNING

AVOID INJURY

Keep fingers and hands out of pinch points when latching and unlatching the attachment quick coupler.

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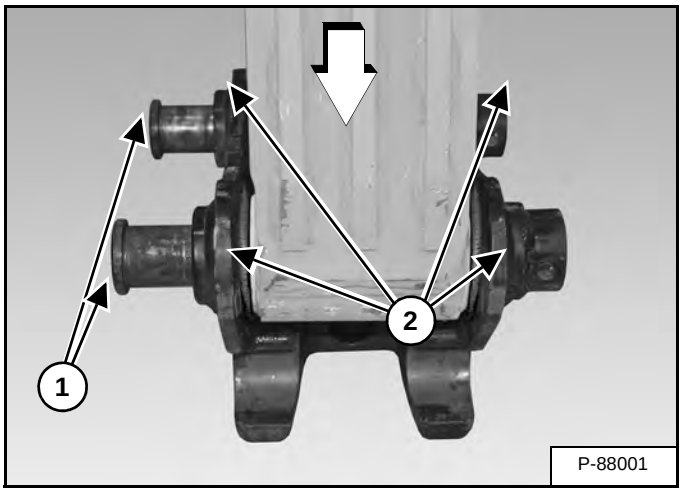
Figure 40-201-7

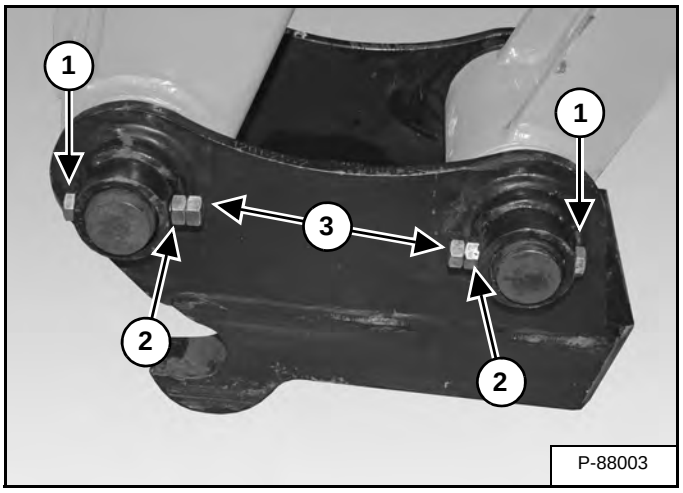


Align and install the two connecting pins (Item 1) **[Figure 40-201-7]** through the coupler, arm and bucket link.

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

Slide O-rings (Item 2) **[Figure 40-201-7]** into position between the coupler pivot point for the arm and bucket link.

Figure 40-201-8



Align the holes of the connecting pins with the holes in the coupler.

Install the two retaining bolts (Item 1) **[Figure 40-201-8]**.

Install nuts (Item 2) **[Figure 40-201-8]** just until they make contact with the coupler.

NOTE: DO NOT tighten nuts (Item 2) [Figure 40-201-8] against the coupler. The retaining bolt should move freely.

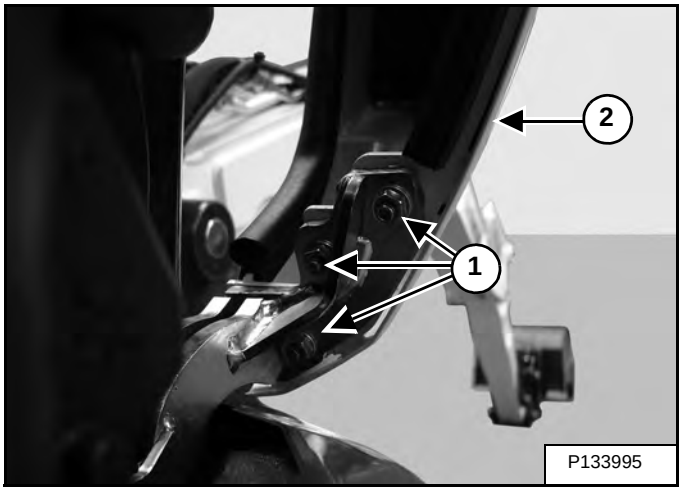
Install and tighten nuts (Item 3) securely against the two nuts (Item 2) **[Figure 40-201-8]**. Check to make sure the retaining bolts move freely.

RIGHT SIDE COVER

Removal And Installation

Open the right side cover.

Figure 40-210-1



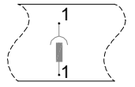
Remove the three nuts (Item 1) and the right side cover (Item 2) **[Figure 40-210-1]**.

Installation: Tighten the nuts to 41 N•m (30 ft-lb) torque.

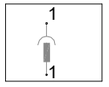
WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	**GROUP NUMBER RANGE**	**WIRE COLOR**	**COLOR CODE**
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK	BLK
CONTROLLER GROUND	2000 THROUGH 2999	BROWN	BRN
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
CONTROLLER SUPLY (5V, 8V)	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
OTHER FUNCTIONS	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION CAN LO	90XX, 92XX, 94XX, 96XX, 98XX	PURPLE	PUR
COMMUNICATION CAN HI	91XX, 93XX, 95XX, 97XX, 99XX	PURPLE/WHITE	PUR/WHT

LEGEND

PARTIAL CONNECTOR

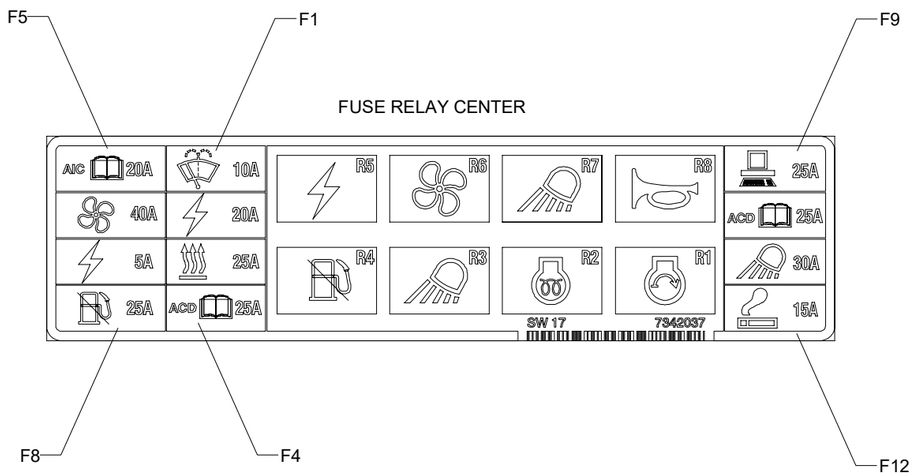


CONNECTOR



WIRE BREAK
(TWO WIRE BREAKS JOIN ONE WIRE)

SHEET #



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E27Z (S/N B4R711001 AND ABOVE)
Sheet 3 of 16

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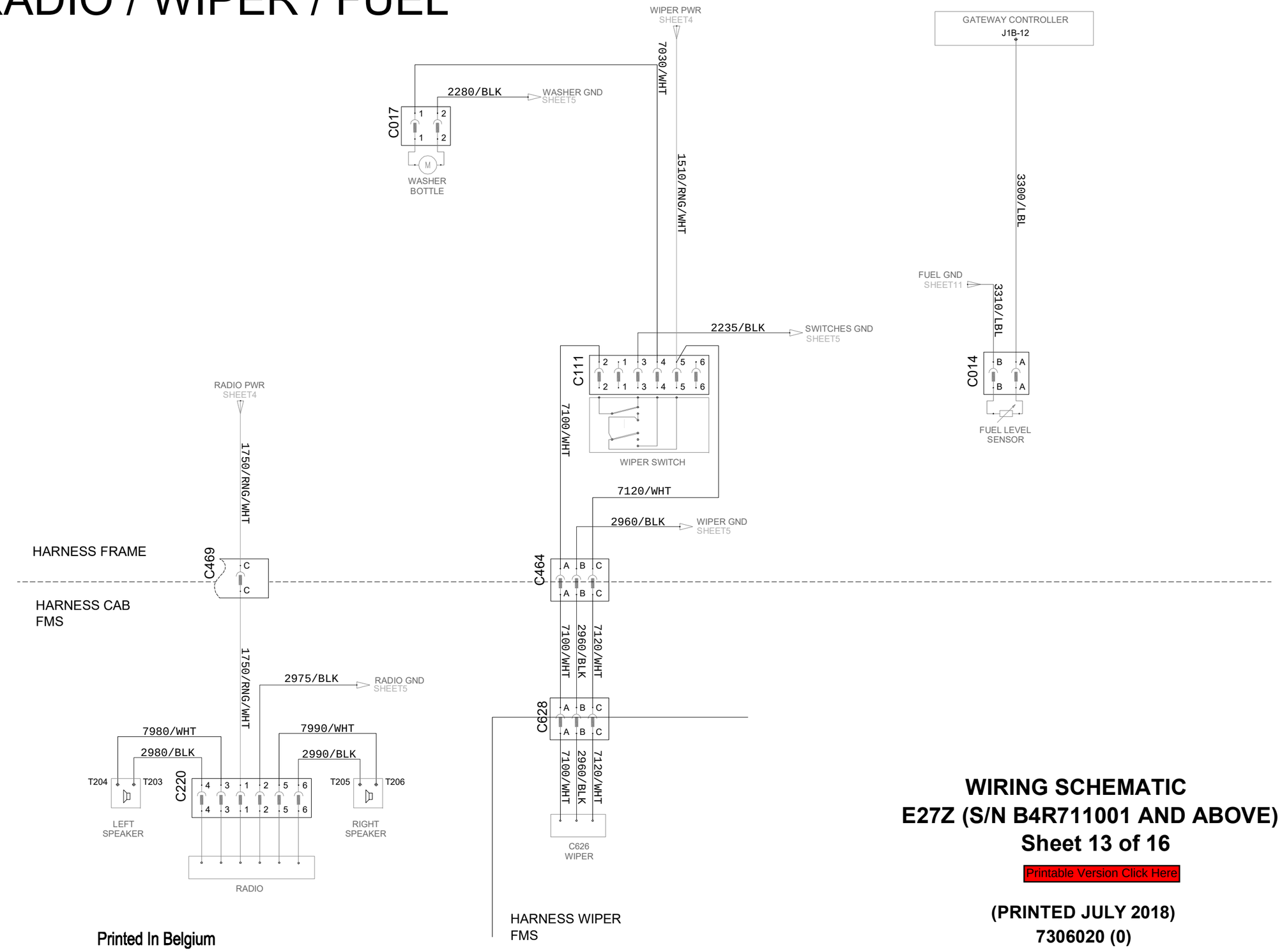
RADIO / WIPER / FUEL



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WIRING SCHEMATIC
E27Z (S/N B4R711001 AND ABOVE)
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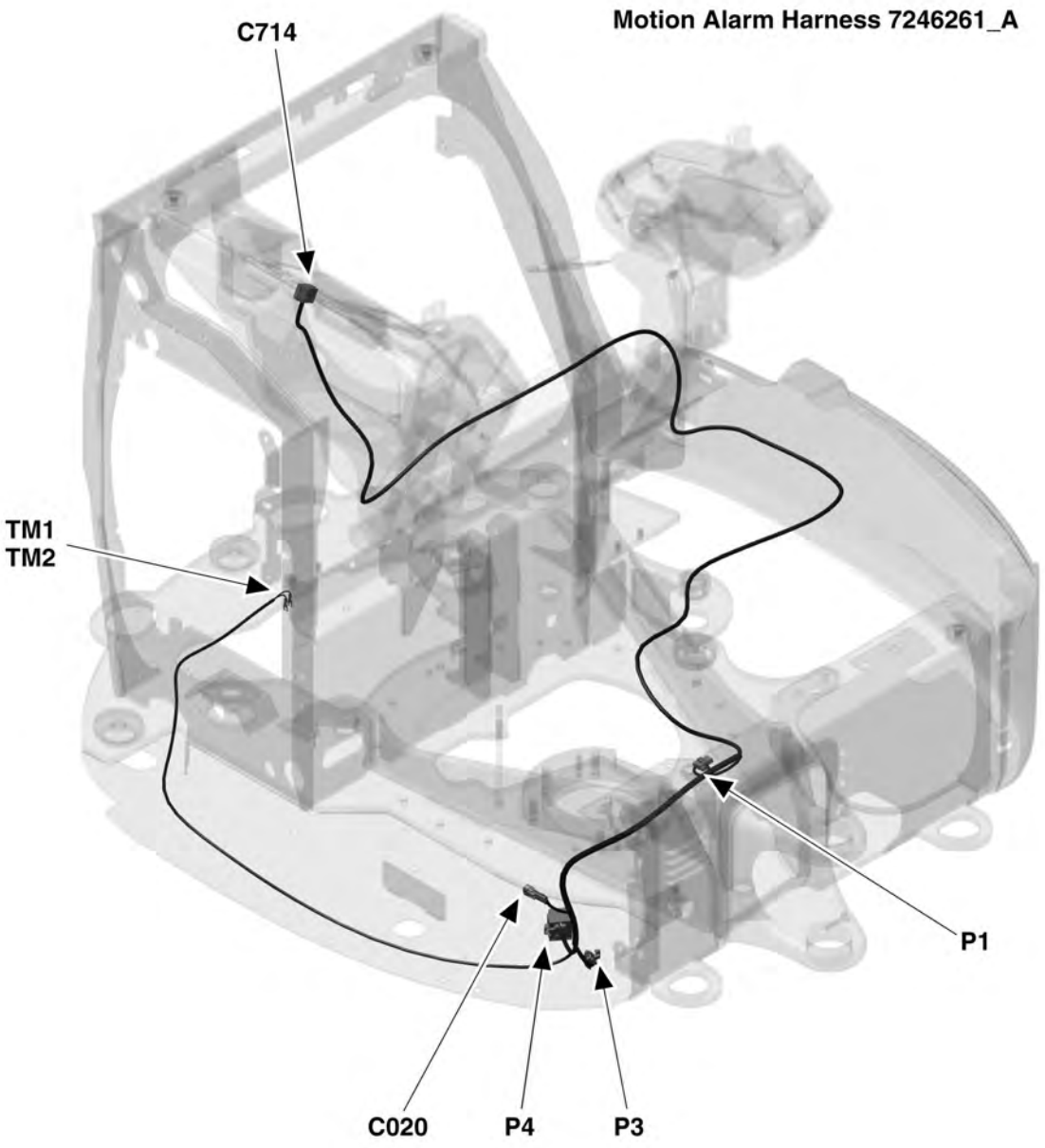
Motion Alarm Harness



NA15054

ALTERNATOR

Belt Adjustment

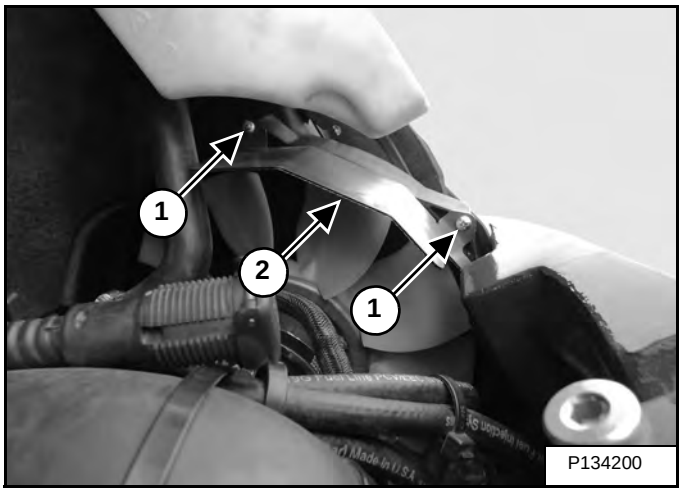
The alternator and fan belt is a special maintenance free type that is pretensioned over the pulleys. This belt eliminates the need for a tensioning device and does not require periodic adjustment.

Belt Replacement

Removal

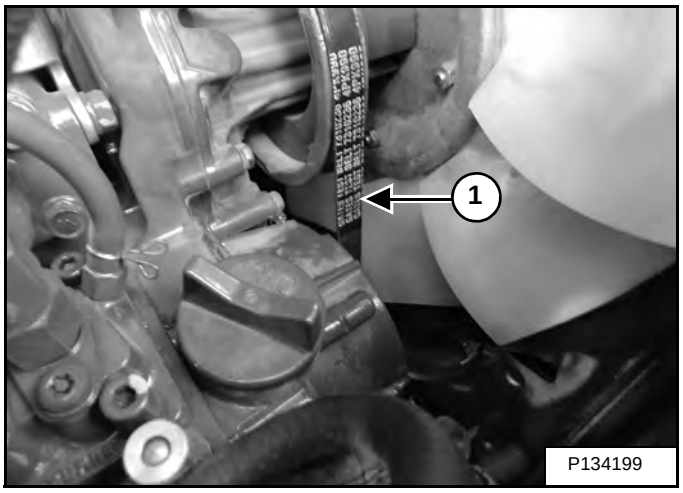
Stop the engine and open the tailgate. (See Opening And Closing on Page 10-50-1.)

Figure 50-30-1



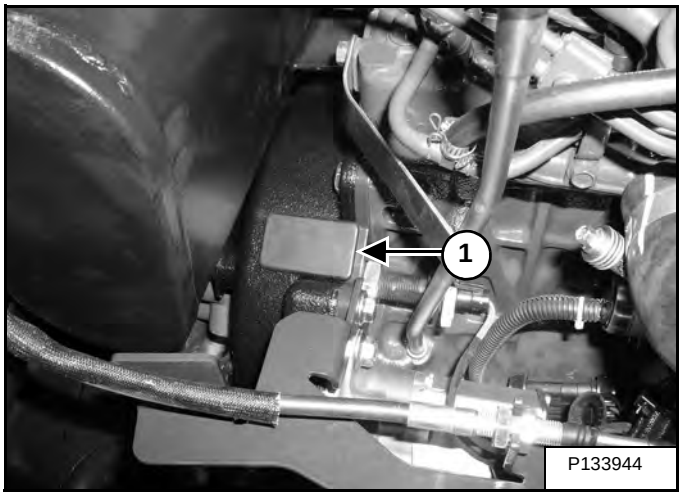
Remove the belt shield mounting screws (Item 1) and remove the belt shield (Item 2) **[Figure 50-30-1]**.

Figure 50-30-2



Cut the old belt (Item 1) **[Figure 50-30-2]** and remove the belt from the pulleys. Inspect the pulleys for wear.

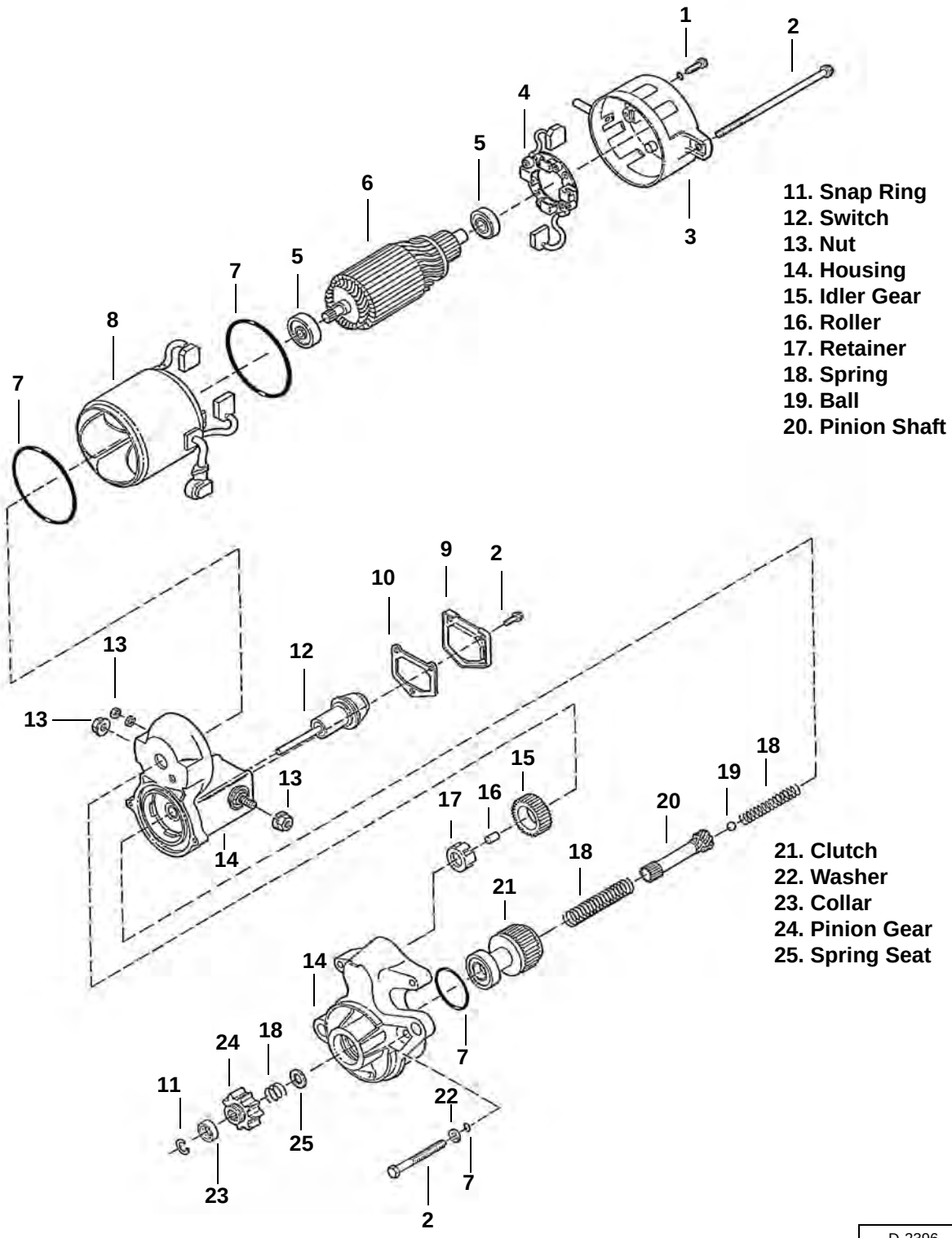
Figure 50-30-3



The flywheel will need to be rotated by hand to install the new belt. To access the flywheel, remove the plug (Item 1) **[Figure 50-30-3]** from the flywheel housing.

Parts Identification

1. Screw
2. Bolt
3. Brush Cover
4. Brush Holder
5. Bearing
6. Armature
7. O-ring
8. Frame
9. Cover
10. Gasket
11. Snap Ring
12. Switch
13. Nut
14. Housing
15. Idler Gear
16. Roller
17. Retainer
18. Spring
19. Ball
20. Pinion Shaft
21. Clutch
22. Washer
23. Collar
24. Pinion Gear
25. Spring Seat



D-2396

DIAGNOSTIC SERVICE CODES (CONT'D)

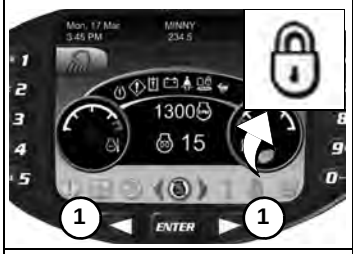
Service Codes List (Cont'd)

CODE		CODE	
M0909	Fuel Level Low	M2721	Throttle Sensor Out of Range High
M0921	Fuel Level Out of Range High	M2722	Throttle Sensor Out of Range Low
M0922	Fuel Level Out of Range Low		
		M3128	Interrupted Power Failure
M1121	Console Sensor Out of Range High		
M1122	Console Sensor Out of Range Low	M3204	Throttle Controller No Communication
M1128	Console Sensor Failure		
		M3304	Deluxe Panel No Communication
M1305	Fuel Hold Solenoid Short to Battery		
M1306	Fuel Hold Solenoid Short to Ground	M3404	RFID Key Controller No Communication
M1307	Fuel Hold Solenoid Open Circuit		
		M3702	Hyd Exchange Output Error On
M1402	Fuel Pull Output Error On	M3703	Hyd Exchange Output Error Off
M1403	Fuel Pull Output Error Off		
M1407	Fuel Pull Output Open Circuit		
M1428	Fuel Pull Output Failure		
		M4109	Alternator Low
M1705	Hydraulics Enable Solenoid Short to Battery	M4110	Alternator High
M1706	Hydraulics Enable Solenoid Short to Ground		
M1707	Hydraulics Enable Solenoid Open Circuit	M4304	Keyless Start Panel No Communication
M1732	Hydraulics Enable Solenoid Overcurrent		
		M4404	Secondary Controller No Communication
M2005	Two Speed Solenoid Short to Battery		
M2006	Two Speed Solenoid Short to Ground	M4621	5V Sensor Supply Out of Range High
M2007	Two Speed Solenoid Open Circuit	M4622	5V Sensor Supply Out of Range Low
M2102	Glow Plug Output Error On	M4721	8V Sensor Supply Out of Range High
M2103	Glow Plug Output Error Off	M4722	8V Sensor Supply Out of Range Low
M2107	Glow Plug Output Open Circuit		
M2128	Glow Plug Output Failure	M5002	Light Output Error On
		M5003	Light Output Error Off
M2202	Starter Output Error On		
M2203	Starter Output Error Off	M5205	Offset Base Solenoid Short to Battery
M2207	Starter Output Open Circuit	M5206	Offset Base Solenoid Short to Ground
M2228	Starter Output Failure	M5207	Offset Base Solenoid Open Circuit
		M5232	Offset Base Solenoid Overcurrent
M2302	Starter Relay Error On		
M2303	Starter Relay Error Off	M5305	Offset Rod Solenoid Error On
		M5306	Offset Rod Solenoid Short to Ground
M2402	Fuel Pull Relay Error On	M5307	Offset Rod Solenoid Open Circuit
M2403	Fuel Pull Relay Error Off	M5332	Offset Rod Solenoid Overcurrent
M2521	Load Sense Sensor Out of Range High	M5421	Offset Control Switch Out of Range High
M2522	Load Sense Sensor Out of Range Low	M5422	Offset Control Switch Out of Range Low
		M5424	Offset Control Switch Out of Neutral
M2602	Glow Plug Relay Error On		
M2603	Glow Plug Relay Error Off		

CONTROL PANEL SETUP (CONT'D)

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

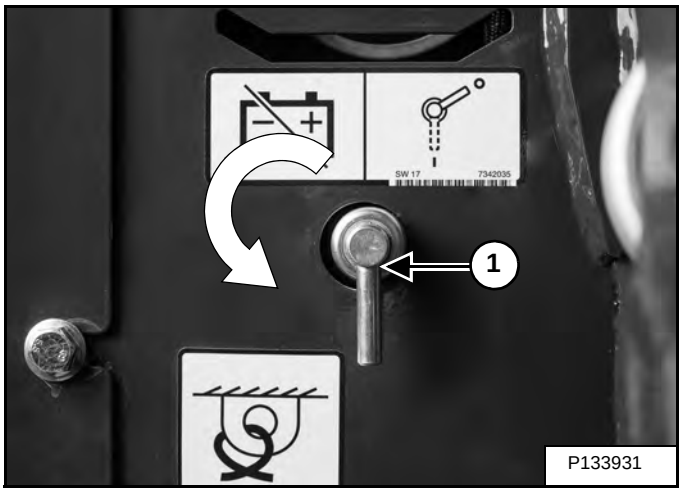
Changing The User Password

	Press a scroll button (Item 1) repeatedly until the Security screen icon (Inset) is highlighted.
	Select **[1. PASSWORDS / LOCKOUTS]**.
	Enter owner password and press **[ENTER]**.
	Select **[1. USER SETTINGS]**.
	Select user.
	Select **[2. CHANGE PASSWORD]**.
	Enter new user password and press **[ENTER]**.

WIPER MOTOR

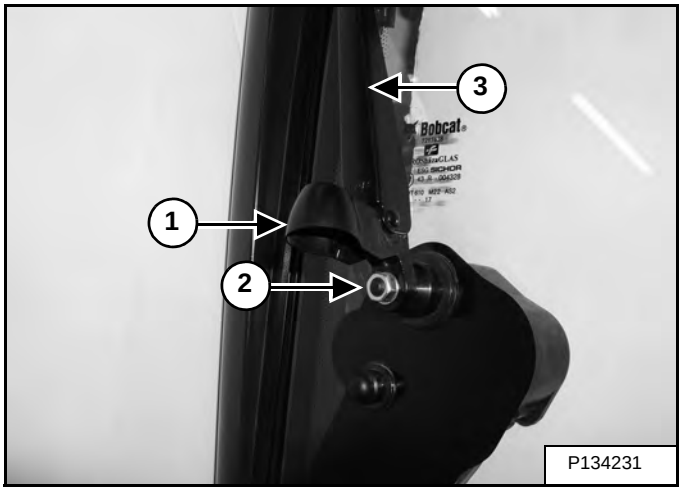
Removal And Installation

Figure 50-120-1



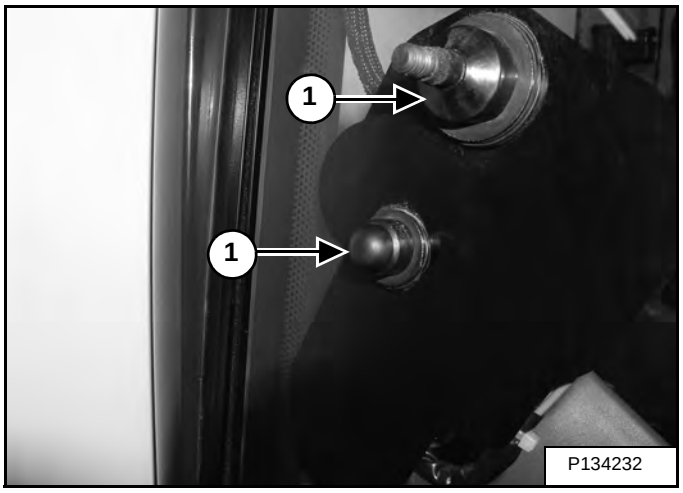
Rotate the battery disconnect switch (Item 1) **[Figure 50-120-1]** counterclockwise to disconnect the ground terminal from the battery.

Figure 50-120-2



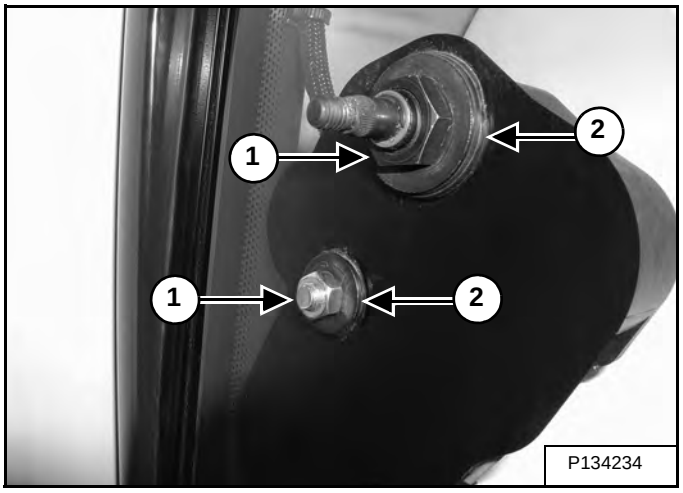
Raise the cover (Item 1) and remove the nut (Item 2) and wiper arm (Item 3) **[Figure 50-120-2]**.

Figure 50-120-3



Remove the caps (Item 1) **[Figure 50-120-3]**.

Figure 50-120-4



Remove the nuts (Item 1) and washers (Item 2) **[Figure 50-120-4]**.

ENGINE INFORMATION

Description

The E27z has a Kubota® D1105-E2B indirect injection diesel engine with a displacement of 1,123 L (68.53 in^3). The engine is rated at an SAE Gross 19,4 kW (26 hp) and has a closed breather system.

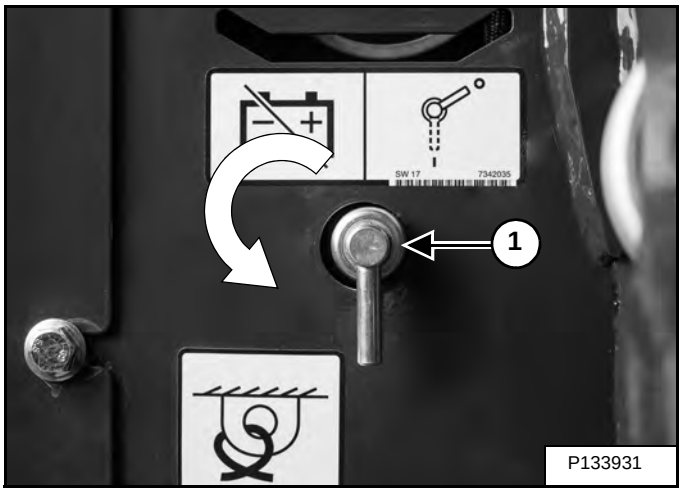
The engine has three cylinders and the rotation is counterclockwise (viewed from the flywheel side). It is equipped with glow plugs for assisting in cold start. Engine block heaters are also available from Bobcat Parts.

The engine serial number is stamped below the exhaust manifold, and also shown on labels fitted to the valve cover. Use these numbers to obtain the correct service parts.

The engine is liquid cooled with a propylene glycol / water mixture in a radiator. Coolant flow is controlled by a thermostat. The cooling fan is belt driven.

Engine Removal And Installation

Figure 60-10-2



Rotate the battery disconnect switch (Item 1) **[Figure 60-10-2]** counterclockwise to disconnect the ground terminal from the battery.

Drain the hydraulic reservoir. (See Removing And Replacing Hydraulic Fluid on Page 10-120-3.)

Drain the radiator. (See Removing And Replacing Coolant on Page 10-90-3.)

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

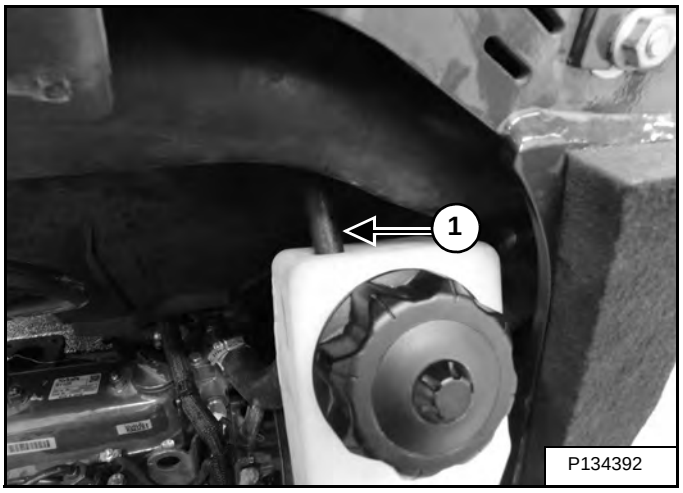
Remove the counterweight. (See Removal And Installation (Standard And Long Arm) on Page 40-90-1.)

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

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

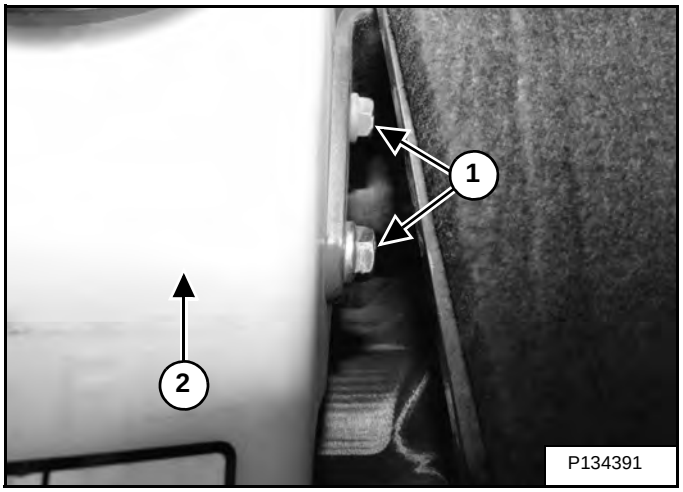
Remove the hydraulic pump. (See Removal And Installation on Page 20-50-11.)

Figure 60-10-3



Remove the radiator overflow hose (Item 1) **[Figure 60-10-3]**.

Figure 60-10-4



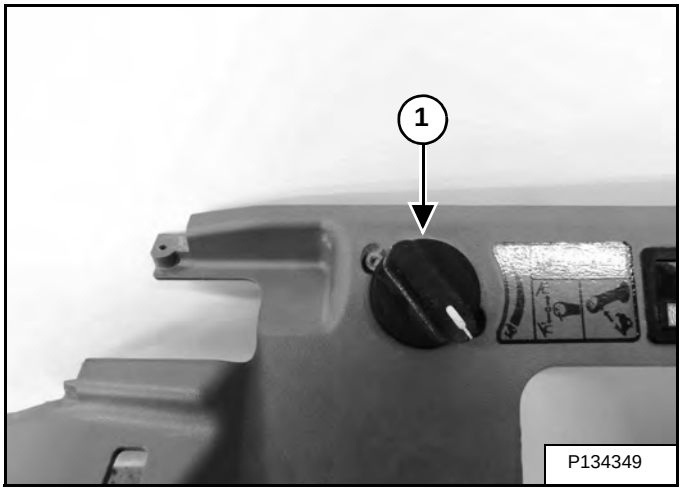
Remove the two bolts (Item 1) and the coolant reservoir (Item 2) **[Figure 60-10-4]**.

ENGINE SPEED CONTROL (DIAL GAUGE)

Removal And Installation

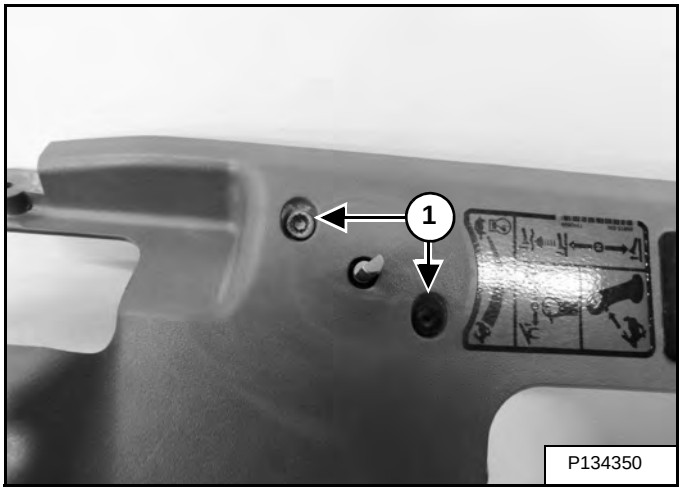
Remove the console cover. (See Console Cover Removal And Installation on Page 40-50-1.)

Figure 60-20-1



Pull up on and remove the engine speed control knob (Item 1) **[Figure 60-20-1]**.

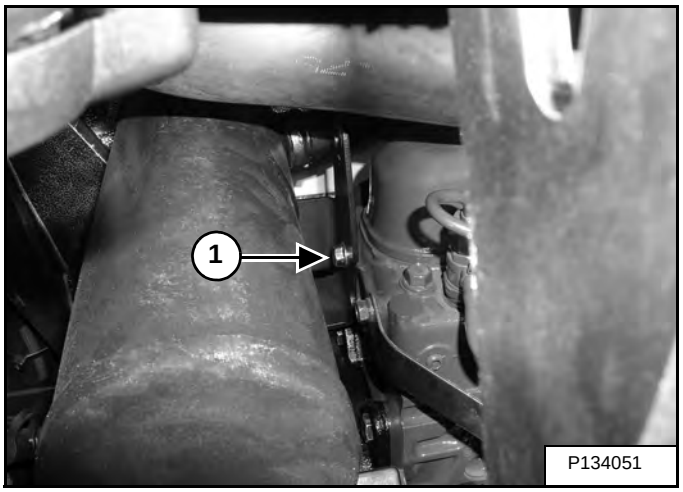
Figure 60-20-2



Remove the screws (Item 1) **[Figure 60-20-2]** and remove the speed control switch.

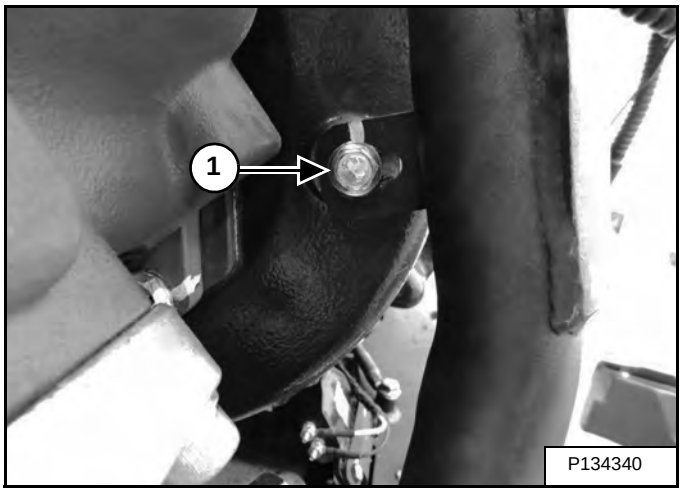
Installation (Cont'd)

Figure 60-30-8



Install the two bolts (Item 1) **[Figure 60-30-8]**, washers and nuts. Do not yet tighten the bolts.

Figure 60-30-9



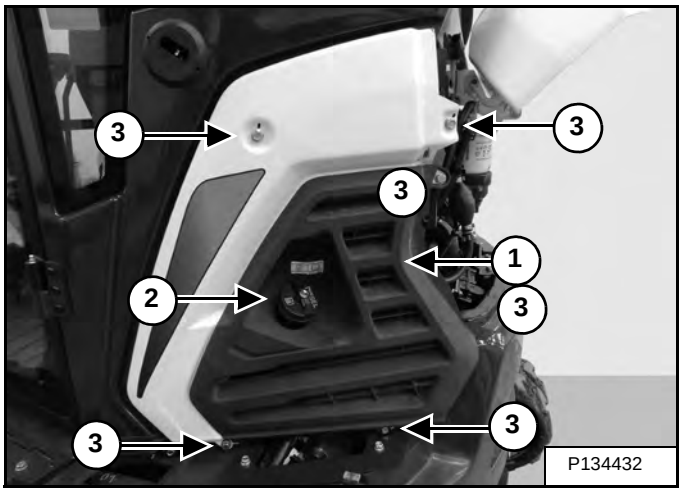
Install the bolt (Item 1) **[Figure 60-30-9]**.

Tighten the four bolts (Item 1) **[Figure 60-30-7]** to 24 - 26 N•m (18 - 19 ft-lb) torque.

Tighten the bolts (Item 1) **[Figure 60-30-6]** and **[Figure 60-30-8]** to 24 - 26 N•m (18 - 19 ft-lb) torque.

Tighten the bolts (Item 1) **[Figure 60-30-9]** to 24 - 26 N•m (18 - 19 ft-lb) torque.

Figure 60-30-10



Remove the fuel cap which has been temporarily installed to prevent contamination.

Install the side cover (Item 1), fuel cap (Item 2) and four bolts (Item 3) **[Figure 60-30-10]**.

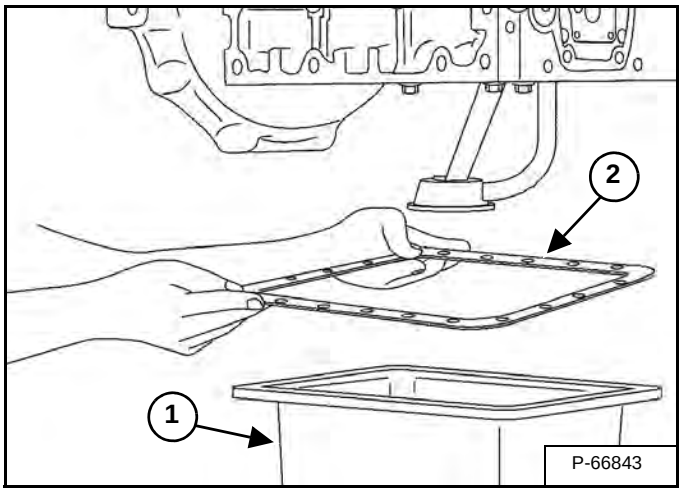
LUBRICATION SYSTEM

Oil Pan Removal And Installation

Remove the engine assembly from the excavator. (See Engine Removal And Installation on Page 60-10-11.)

The engine will have to be on an engine stand or suspended in the air safely to remove the oil pan.

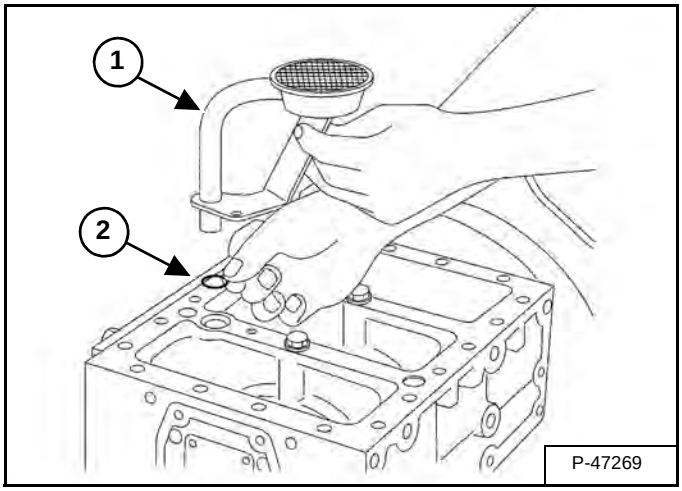
Figure 60-60-1



Remove the oil bolts securing the oil pan (Item 1) **[Figure 60-60-1]**. Slightly tapping on the oil pan with a soft mallet will break loose the oil pan from the engine block.

Installation: Use a liquid gasket adhesive to the oil side of the oil pan gasket (Item 2) **[Figure 60-60-1]**. Tighten the oil pan bolts to 39 - 75 N•m (29 - 33 ft-lb) torque.

Figure 60-60-2

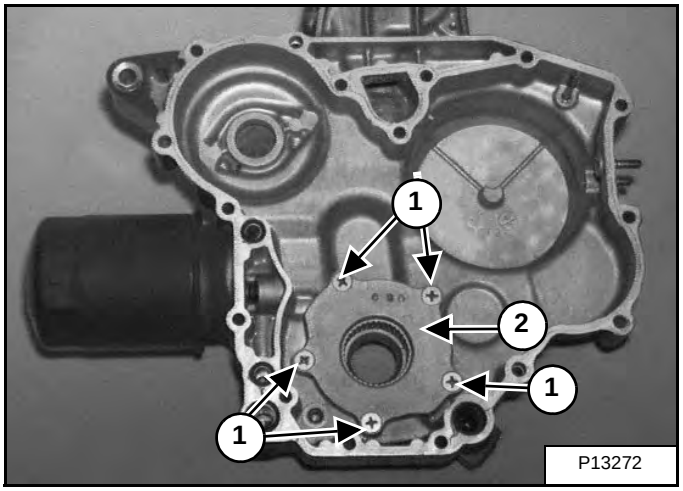


Remove the oil pump strainer (Item 1) and O-ring (Item 2) **[Figure 60-60-2]** by tapping the edge of the strainer with a soft faced hammer.

Oil Pump Removal And Installation

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

Figure 60-60-3



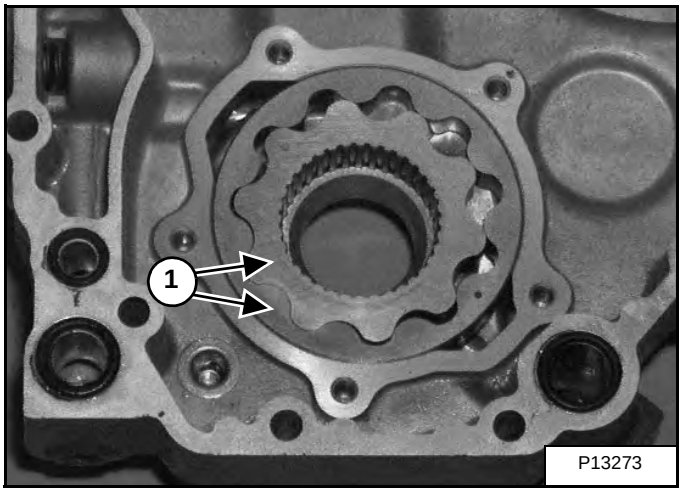
Remove the timing gearcase cover. See **[Figure 60-60-3]**.

Remove the mounting screws (Item 1) **[Figure 60-60-3]**.

Installation: Tighten the mounting screws to 7,9 - 12,8 N•m (70 - 113 in-lb) torque.

Remove the rear cover (Item 2) **[Figure 60-60-3]**.

Figure 60-60-4



Remove the oil pump rotor assembly (Item 1) **[Figure 60-60-4]** and check for wear.

Fuel Injection Pump - Timing

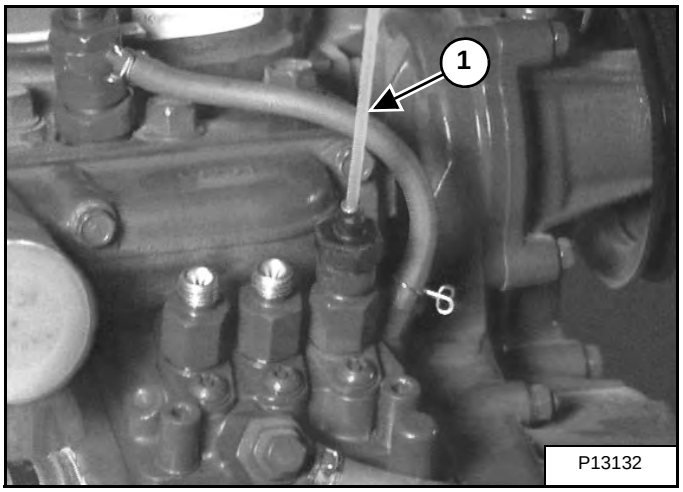
Timing the injection pump is done by changing the number of shims between the injection pump and engine block.

Disconnect the high pressure fuel lines from the injection pump and the injectors. (See Fuel Injection Pump Removal And Installation on Page 60-70-4.)

Remove the fuel injectors. (See Fuel Injector Removal And Installation on Page 60-70-10.)

Remove the fuel shut-off solenoid. (See Fuel Shutoff Solenoid Removal And Installation on Page 60-70-2.)

Figure 60-70-15



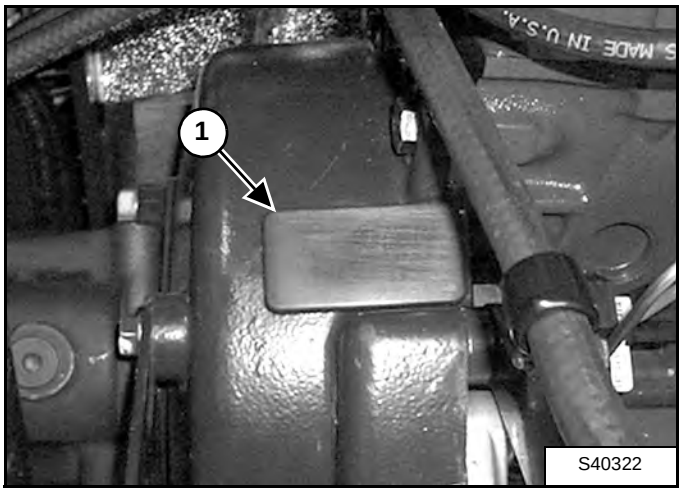
Turn the fuel supply lever to the ON position. Install a short plastic tube (Item 1) **[Figure 60-70-15]** in the fitting of the number one cylinder port. Point the tube up (vertical).

Turn the engine counterclockwise until fuel flows out of the injection pumps number 1 cylinder nozzle and into the plastic tube. (Install a tool on the crankshaft at the front of the engine to turn the engine.)

NOTE: The fuel must flow out of the nozzle for one firing cycle before timing can be attempted.

Pull the stop lever (Item 2) **[Figure 60-70-15]** 5,9 - 7,7 mm (0.232 - 0.302 in) from the free position toward the stop position.

Figure 60-70-16

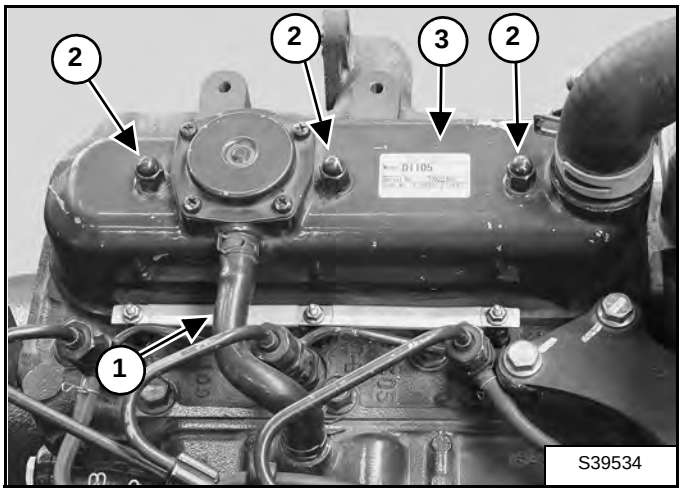


Remove the rubber plug (Item 1) **[Figure 60-70-16]**.

CYLINDER HEAD (CONT'D)

Cylinder Head Removal And Installation

Figure 60-80-7

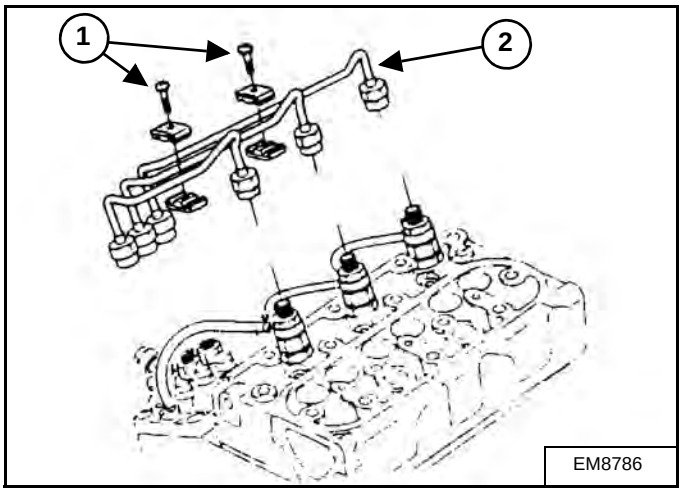


Remove the breather hose (Item 1) and valve cover bolts (Item 2) **[Figure 60-80-7]**.

Remove the valve cover (Item 3) **[Figure 60-80-7]** and gasket.

Installation: Tighten the valve cover bolts to 7 - 8 N•m (62 - 70.8 in-lb).

Figure 60-80-8



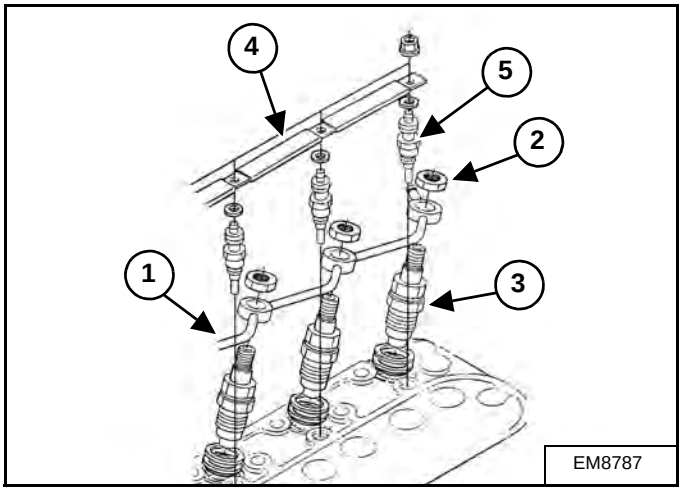
Remove the clamp screws (Item 1) **[Figure 60-80-8]** and clamps.

Remove the high pressure fuel lines (Item 2) **[Figure 60-80-8]** from the fuel injectors.

NOTE: Hold the banjo fitting nuts (Item 2) [Figure 60-80-8] when removing or tightening the high pressure fuel lines.

Installation: Tighten the high pressure fuel line nuts to 24 - 33 N•m (18 - 25 ft-lb).

Figure 60-80-9



Remove the overflow pipe (Item 1) **[Figure 60-80-9]**.

Installation: Tighten the overflow pipe nuts (Item 2) **[Figure 60-80-9]** to 20 - 24 N•m (15 - 18 ft-lb) torque.

Remove the three nozzle holder assemblies (Item 3) **[Figure 60-80-9]**.

Installation: Tighten the nozzle holder assemblies to 49 - 68 N•m (37 - 50 ft-lb) torque.

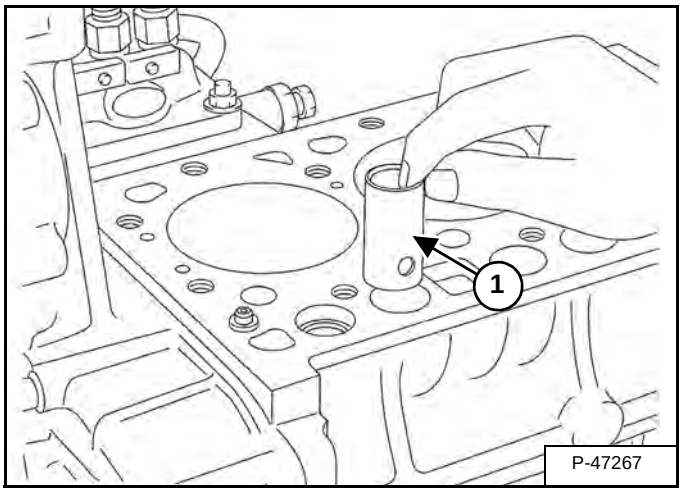
Remove the lead (Item 4) from the glow plugs (Item 5) **[Figure 60-80-9]**.

Remove the three glow plugs (Item 5) **[Figure 60-80-9]**.

Installation: Tighten the glow plugs to 7,9 - 14 N•m (5.8 - 10 ft-lb) torque.

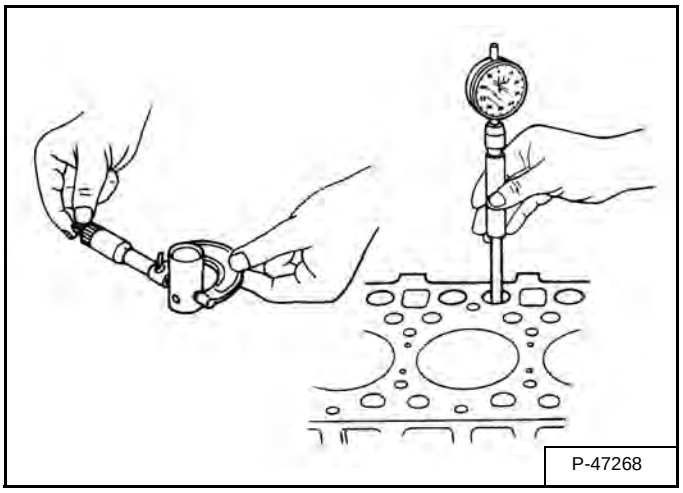
Valve Tappets

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]**.

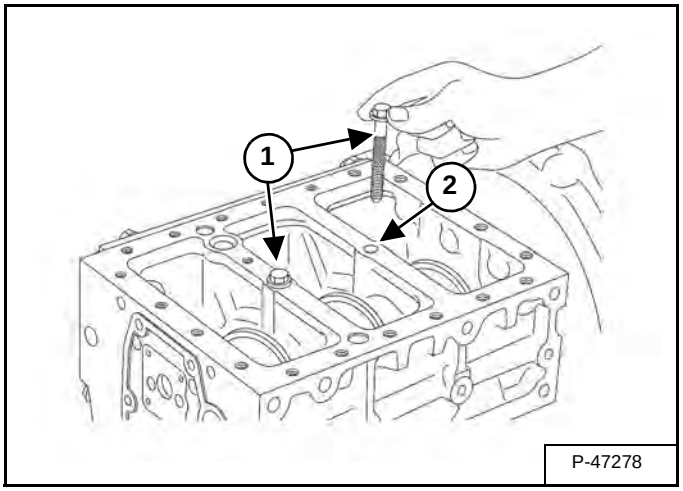
Measure the I.D. of the tappet guide **[Figure 60-80-36]**.

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

Tappet O.D.	19,959 - 19,980 mm (0.78579 - 0.78661 in)
Tappet Guide I.D.	20,000 - 20,021 mm (0.78740 - 0.78822 in)
Clearance Between Tappet and Tappet Guide	0,020 - 0,062 mm (0.00079 - 0.0024 in)
Allowable Limit	0,07 mm (0.003 in)

Crankshaft And Bearings Removal And Installation (Cont'd)

Figure 60-90-20

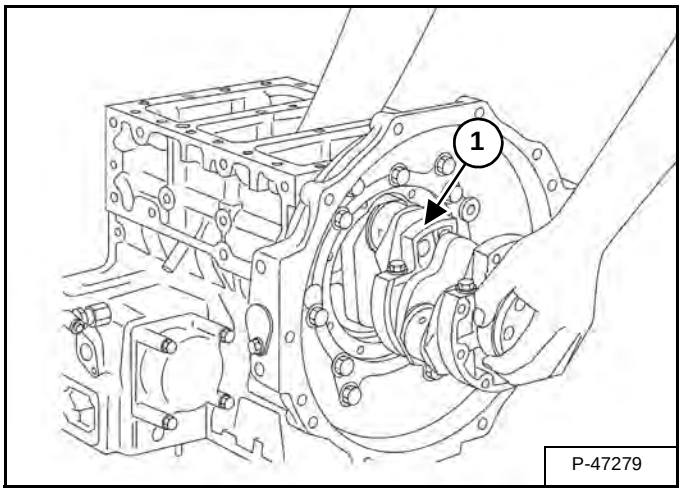


Remove the main bearing bolt (Item 1) **[Figure 60-90-20]**.

Turn the crankshaft so the crank pin of the #3 cylinder is at BDC. Start to remove the crankshaft until the crankpin of the #2 cylinder is in the #3 cylinder bore. Rotate the crankshaft 120° counterclockwise so the #2 crank pin is at BDC. Repeat the above procedure when the #1 crank pin is in the #3 cylinder.

Installation: Align the bearing case hole with the hole in the block (Item 2) **[Figure 60-90-20]**. Put oil on the bolt threads and tighten to 69 - 74 N•m (51 - 54 ft-lb) torque.

Figure 60-90-21

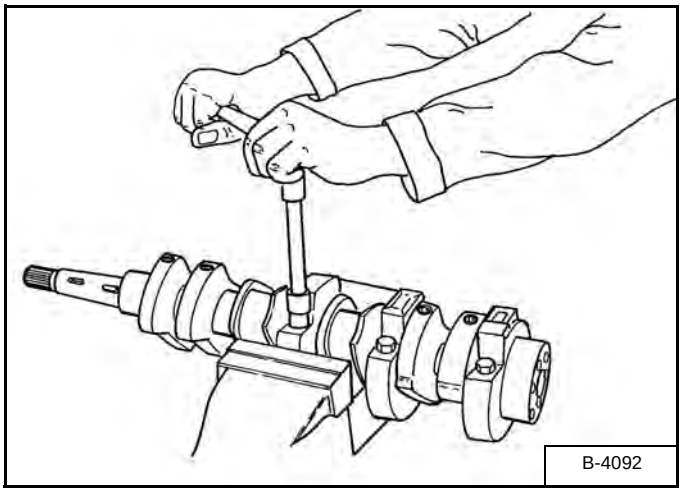


Remove the crankshaft / main bearing assembly from the engine block **[Figure 60-90-21]**.

NOTE: Turn the crankshaft as needed to allow the crank pin journals to pass through the cut out (Item 1) [Figure 60-90-21] of the engine block.

Mark the bearing case halves for correct installation.

Figure 60-90-22



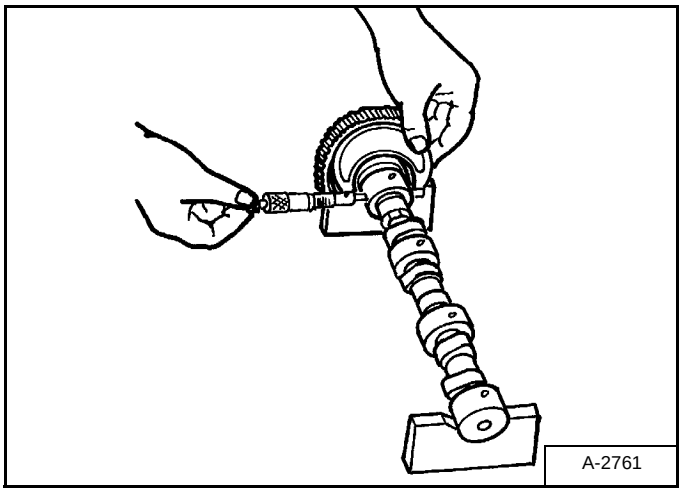
Remove the two bearing case bolts **[Figure 60-90-22]**.

Remove the bearing case and bearing.

Installation: Tighten the bearing case bolts to 46 - 51 N•m (34 - 38 ft-lb) torque.

Camshaft - Servicing (Cont'd)

Figure 60-100-15

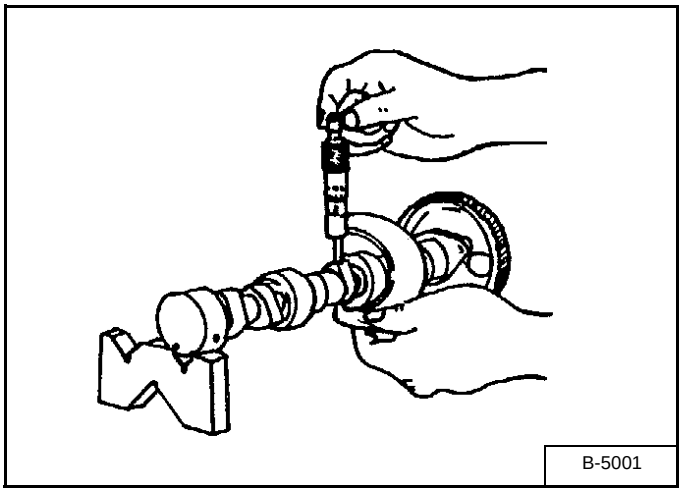


Measure the camshaft journal **[Figure 60-100-15]**.

Calculate the oil clearance. If the clearance exceeds the allowable limit, replace the camshaft.

Cylinder Block Bore I.D.	36,000 - 36,025 mm (1.4173 - 1.4183 in)
Journal O.D.	35,934 - 35,950 mm (1.4147 - 1.4153 in)
Oil Clearance of Cam-shaft Journal	0,050 - 0,091 mm (0.0020 - 0.0035 in)
Allowable Limit	0,15 mm (0.0059 in)

Figure 60-100-16

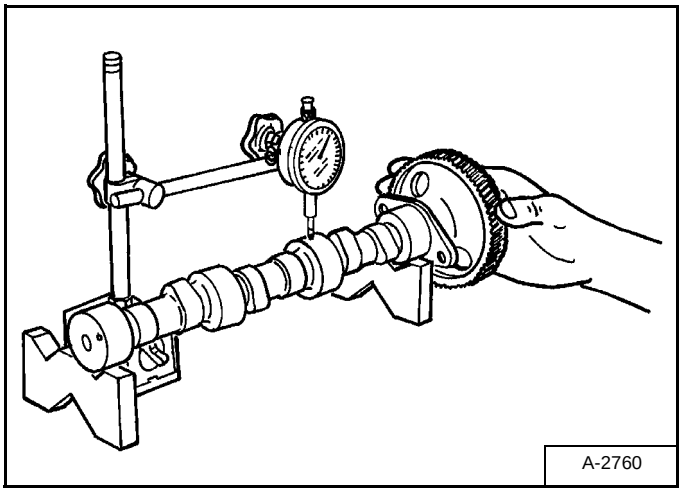


Measure the cam lobes at their highest point **[Figure 60-100-16]**.

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

Cam Height of Intake	28,80 mm (1.134 in)
Allowable Limit	28,75 mm (1.132 in)
Cam Height of Exhaust	29,00 mm (1.142 in)
Allowable Limit	28,95 mm (1.140 in)

Figure 60-100-17



Put the camshaft in V-blocks. Install a dial indicator **[Figure 60-100-17]**.

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

Camshaft Alignment Allowable Limit	0,01 mm (0.0004 in)

TROUBLESHOOTING

Blower Motor Does Not Operate

POSSIBLE CAUSE	INSPECTION	SOLUTION
1. Blown Fuse	Inspect the fuse / wiring	Replace fuse / repair wiring
2. Broken wiring or bad connection	Check the fan motor ground and connectors	Repair the wiring or connector
3. Fan Motor Malfunction	Check the lead wires 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

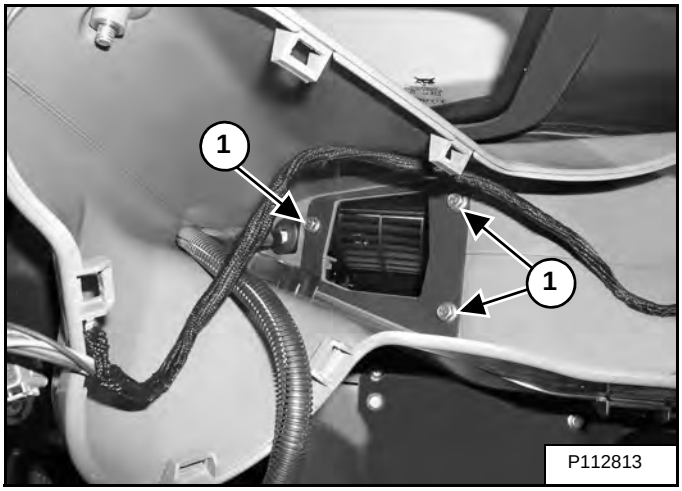
POSSIBLE CAUSE	INSPECTION	SOLUTION
1. Evaporator inlet obstruction	Check evaporator for plugging	Remove the obstruction and clean evaporator fins with air or water
2. Air leak	Check to make sure air hoses are properly hooked to Louvers and air ducts	Repair or adjust
3. Defective thermo switch (frozen evaporator)	Check thermostat using a circuit tester	Replace thermostat
4. Plugged cab filters	Check cab recirculation and fresh air filters	Clean or replace filters

HEATING / VENTILATION DUCT

Removal And Installation

Remove the instrument panel. (See Removal And Installation on Page 70-70-1.)

Figure 70-70-1

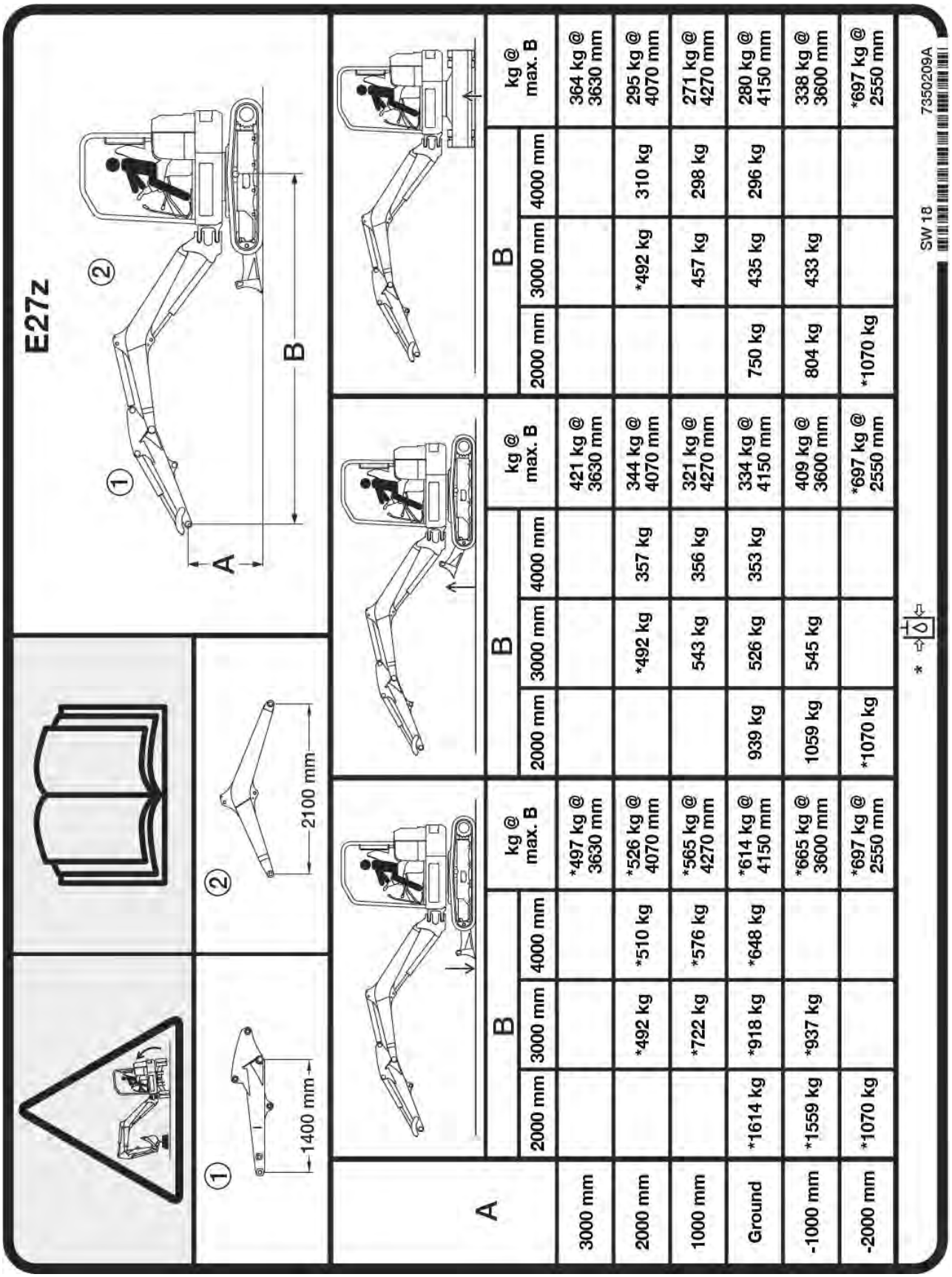


Remove the bolts (Item 1) **[Figure 70-70-1]**. Remove the plate and duct.

EXCAVATOR SPECIFICATIONS (CONT'D)

Rated Lift Capacity - Canopy With Long Arm And Heavy Counterweight

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



A	B				B				B			
	2000 mm	3000 mm	4000 mm	kg @ max. B	2000 mm	3000 mm	4000 mm	kg @ max. B	2000 mm	3000 mm	4000 mm	kg @ max. B
3000 mm				*497 kg @ 3630 mm				421 kg @ 3630 mm				364 kg @ 3630 mm
2000 mm		*492 kg	*510 kg	*526 kg @ 4070 mm		*492 kg	357 kg	344 kg @ 4070 mm		*492 kg	310 kg	295 kg @ 4070 mm
1000 mm		*722 kg	*576 kg	*565 kg @ 4270 mm		543 kg	356 kg	321 kg @ 4270 mm		457 kg	298 kg	271 kg @ 4270 mm
Ground	*1614 kg	*918 kg	*648 kg	*614 kg @ 4150 mm	939 kg	526 kg	353 kg	334 kg @ 4150 mm	750 kg	435 kg	296 kg	280 kg @ 4150 mm
-1000 mm	*1559 kg	*937 kg		*665 kg @ 3600 mm	1059 kg	545 kg		409 kg @ 3600 mm	804 kg	433 kg		338 kg @ 3600 mm
-2000 mm	*1070 kg			*697 kg @ 2550 mm	*1070 kg			*697 kg @ 2550 mm	*1070 kg			*697 kg @ 2550 mm

TECHNICAL SERVICE GUIDE SPECIFICATIONS

Engine

Engine Oil Pressure at Low Idle	50 kPa (0,50 bar) (7 psi)
Engine Oil Pressure at High Idle	193 - 441 kPa (1,9 - 4,4 bar) (28 - 64 psi)
Firing Order	1-2-3
Location of Number 1 Cylinder	Closest to water pump
Injection Timing	18° BTDC
Crankshaft Rotation (Facing Crankshaft Pulley)	Clockwise
Compression at Cranking Speed	10% variance between pistons. 3716 - 4109 kPa (37 - 41 bar) (539 - 596 psi)
Valve Clearance (Cold) Intake	0,145 - 0,185 mm (0.00571 - 0.00728 in)
Valve Clearance (Cold) Exhaust	0,145 - 0,185 mm (0.00571 - 0.00728 in)

Engine Torques

Engine Oil Drain Cap	33 - 37 N•m (24 - 27 ft-lb)
Fuel Injection Tubeline Nuts	25 - 34 N•m (18 - 25 ft-lb)
Glow Plugs	14,6 N•m (10.8 ft-lb)
Injection Pump Mounting Bolts/Nuts	22 - 27 N•m (16 - 20 ft-lb)
Valve Cover Bolts	6,9 - 8,8 N•m (5.1 - 6.5 ft-lb)
Head Bolts	63,7 - 68,6 N•m (47 - 50.6 ft-lb)

Excavator Torques

Drive Motor To Frame Bolt	105 - 115 N•m (78 - 85 ft-lb)
Sprocket To Drive Motor	108 N•m (80 ft-lb)
Swing Bearing To Frame Bolt	105 - 115 N•m (78 - 85 ft-lb)
Swing Bearing To Upperstructure Bolt	105 - 155 N•m (78 - 85 ft-lb)
Swing Motor Drive Carrier	270 - 300 N•m (199 - 221 ft-lb)
Swing Motor Mounting Bolts	35 - 39 N•m (25.5 - 28.5 ft-lb)
Swivel Joint Mounting Bolts	94 - 118 N•m (69 - 87 ft-lb)

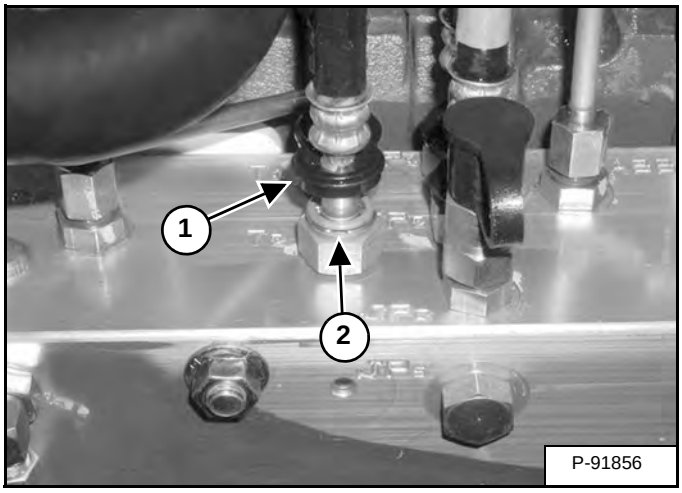
NOTE: Additional excavator torques can be found in the relevant section of this manual.

Cooling System

Coolant Type and Mix	47% Water and 53% Propylene Glycol
Radiator Cap Pressure	89,6 kPa (0,9 bar) (13 psi)
Thermostat	Fully Open at 85°C (185°F)

Push To Connect Fittings (Cont'd)

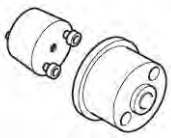
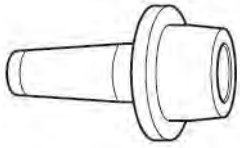
Figure SPEC-40-14



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

SERVICE TOOLS REQUIRED (CONT'D)

Engine Tools

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

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

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