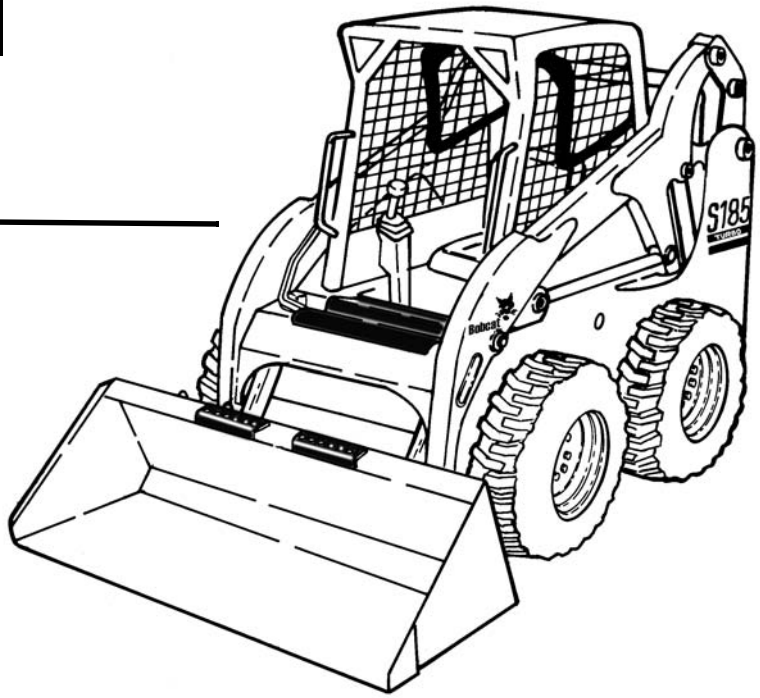
S175
S185
TURBO

INCLUDES HIGH FLOW

Bobcat®

Service Manual

S/N 525011001 & Above
S/N 525111001 & Above
S/N 525211001 & Above
S/N 525311001 & Above



EQUIPPED WITH BOBCAT INTERLOCK CONTROL SYSTEM (BICS™)

6902732 (2-06)

Ingersoll Rand
Compact Vehicle Technologies

Printed in U.S.A.

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MAINTENANCE SAFETY

WARNING

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

W-2003-0903

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

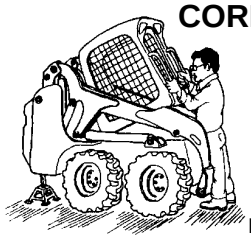
CORRECT



B-10731a

Never service the Bobcat Skid-Steer Loader without instructions.

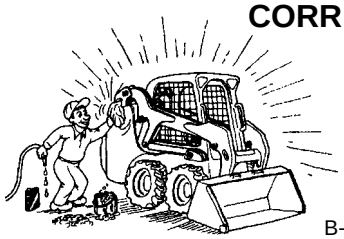
CORRECT



B-15535

Use the correct procedure to lift or lower operator cab.

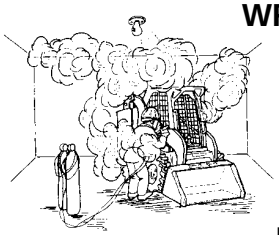
CORRECT



B-15524

Cleaning and maintenance are required daily.

WRONG



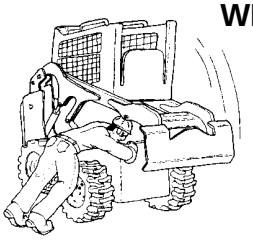
B-15734

Have good ventilation when welding or grinding painted parts.

Wear dust mask when grinding painted parts. Toxic dust and gas can be produced.

Avoid exhaust fume leaks which can kill without warning. Exhaust system must be tightly sealed.

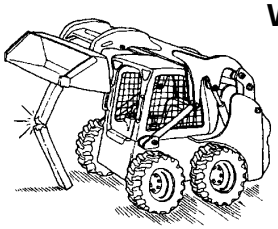
WRONG



B-15732

Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop. Do not go under lift arms when raised unless supported by an approved lift arm support device. Replace it if damaged.

WRONG

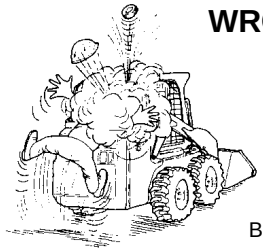


B-15525

Never work on loader with lift arms up unless lift arms are held by an approved lift arm support device. Replace if damaged.

Never modify equipment or add attachments not approved by Bobcat Company.

WRONG



B-15733

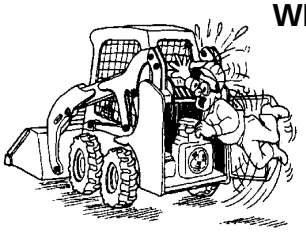
Stop, cool and clean engine of flammable materials before checking fluids.

Never service or adjust loader with the engine running unless instructed to do so in the manual.

Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes.

Never fill fuel tank with engine running, while smoking or when near open flame.

WRONG



B-15523

Keep body, jewelry and clothing away from moving parts, electrical contact, hot parts and exhaust.

Wear eye protection to guard from battery acid, compressed springs, fluids under pressure and flying debris when engines are running or tools are used. Use eye protection approved for type of welding.

Keep rear door closed except for service. Close and latch door before operating the loader.

WRONG



B-6589

Lead-acid batteries produce flammable and explosive gases.

Keep arcs, sparks, flames and lighted tobacco away from batteries.

Batteries contain acid which burns eyes or skin on contact. Wear protective clothing. If acid contacts body, flush well with water. For eye contact flush well and get immediate medical attention.

Maintenance procedures which are given in the Operation & Maintenance Manual can be performed by the owner/operator without any specific technical training. Maintenance procedures which are **not** in the Operation & Maintenance Manual must be performed **ONLY BY QUALIFIED BOBCAT SERVICE PERSONNEL. Always use genuine Bobcat replacement parts.** The Service Safety Training Course is available from your Bobcat dealer.

MSW07-0805

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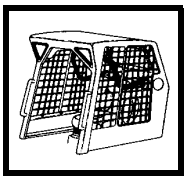
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FOREWORD

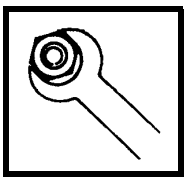
This manual is for the Bobcat loader mechanic. It provides necessary servicing and adjustment procedures for the Bobcat loader and its component parts and systems. Refer to the Operation & Maintenance Manual for operating instructions, Starting procedure, daily checks, etc.

A general inspection of the following items must be made after the loader has had service or repair:

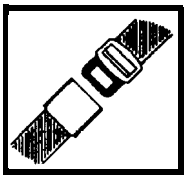
1. Check lift arm support device, replace if damaged. (Stored Position)



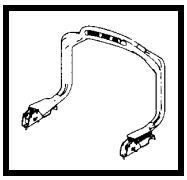
2. Check that ROPS mounting hardware is tightened and is Bobcat approved.



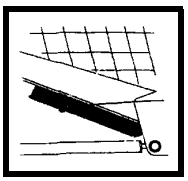
3. The seat belt must be correctly installed, functional and in good condition.



4. The seat bar must be correctly adjusted, clean and lubricated.



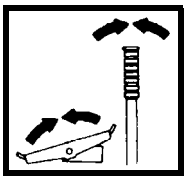
5. Check lift arm support device; replace if damaged.



6. Machine signs must be legible and in the correct location.



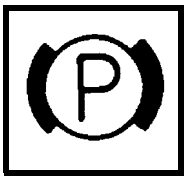
7. Steering levers and foot pedals must return to neutral.



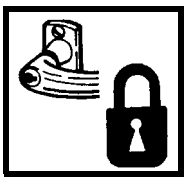
8. Check for correct function of the work lights



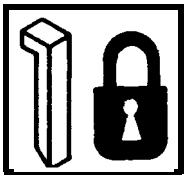
9. The parking brake must function correctly.



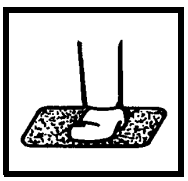
10. Enclosure door latches must open and close freely.



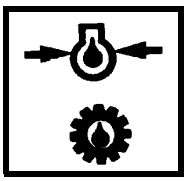
11. Bob-Tach wedges and linkages must function correctly and be in good condition.



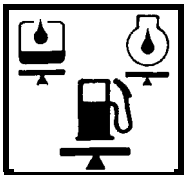
12. Safety treads must be in good condition.



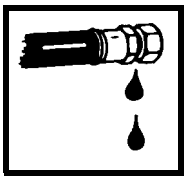
13. Check for correct function of indicator lamps (Optional on some models).



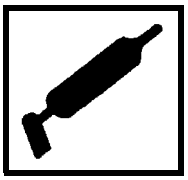
14. Check hydraulic fluid level, engine oil level and fuel supply.



15. Inspect for fuel, oil or hydraulic fluid leaks.

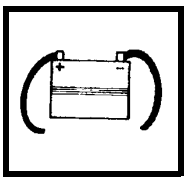


16. Lubricate the loader.

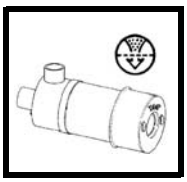


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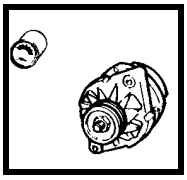
17. Check the condition of the battery and cables.



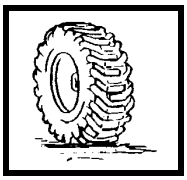
18. Inspect the air cleaner for damage or leaks. Check the condition of the element.



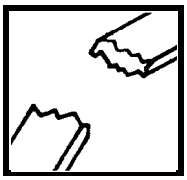
19. Check the electrical charging system.



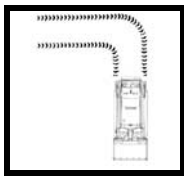
20. Check tires for wear and pressure.



21. Inspect for loose or broken parts or connections.



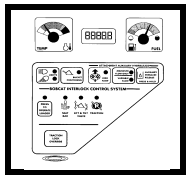
22. Operate the loader and check all functions.



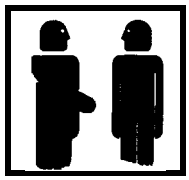
23. Check for any field modification not completed.



24. Check for correct function of the Bobcat Interlock Control System (BICS™) before the machine is returned to the customer.



Recommend to the owner that all necessary corrections be made before the machine is returned to service.



CALIFORNIA
PROPOSITION 65 WARNING

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects and other reproductive harm.

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SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

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

W-2003-0903

WARNING

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

W-2044-1285

IMPORTANT

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

I-2019-0284

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

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

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



Call Before You Dig

1-888-258-0808

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

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Fire Prevention

The machine and attachments have components that are at high temperature under normal operating conditions. The primary source of high temperatures is the engine and exhaust system. The electrical system, if damaged or incorrectly maintained, can be a source of arcs or sparks.

Flammable debris (leaves, straw, etc.) must be removed regularly. If flammable debris is allowed to accumulate, it will increase fire hazard. Clean often to avoid this accumulation. Flammable debris in the engine compartment is a potential hazard.

The spark arrestor muffler is designed to control the emission of hot particles from the engine and exhaust system, but the muffler and the exhaust gases are still hot.

- Do not use the machine where exhaust, arcs, sparks or hot components can contact flammable material, explosive dust or gases.

- The operator cab, engine compartment, and engine cooling system must be inspected every day and cleaned if necessary to prevent fire hazard and overheating.

- Check all electrical wiring and connections for damage. Keep the battery terminals clean and tight. Repair or replace any damaged part.

- Check fuel and hydraulic tubes, hoses and fittings for damage and leakage. Never use open flame or bare skin to check for leaks. Tighten or replace any parts that show leakage. Always clean fluid spills. Do not use gasoline or diesel fuel for cleaning parts. Use commercial nonflammable solvents.

- Do not use ether or starting fluids on any engine which has glow plugs. These starting aids can cause explosion and injure you or bystanders.

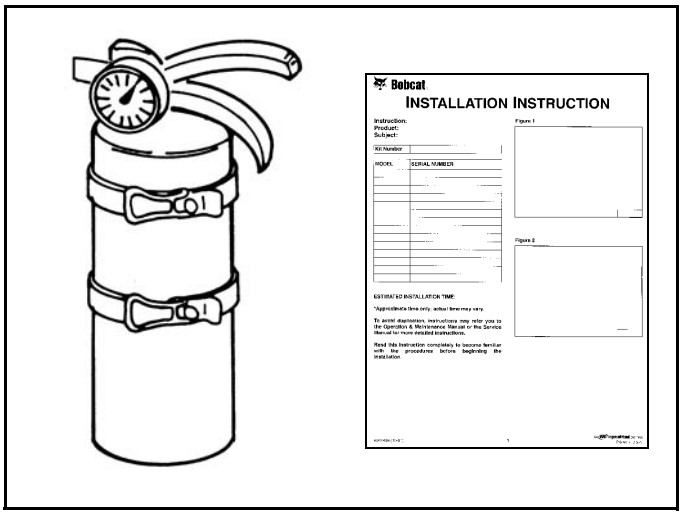
- Always clean the machine, disconnect the battery, and disconnect the wiring from the controllers before welding. Cover rubber hoses, battery and all other flammable parts. Keep a fire extinguisher near the machine when welding. Have good ventilation when grinding or welding painted parts. Wear a dust mask when grinding painted parts. Toxic dust or gas can be produced.

- Stop the engine and let it cool before adding fuel. NO SMOKING!

- Use the procedure in the Operation & Maintenance Manual for connecting the battery and for jump starting.

- Use the procedure in the Operation & Maintenance Manual for cleaning the spark arrestor muffler (if equipped).

Figure 1



- Know where fire extinguishers and first aid kits are located and how to use them. Fire extinguishers are available from your Bobcat dealer **[Figure 1]**.

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SERIAL NUMBER LOCATION

Always use the serial number of the loader when requesting service information or when ordering parts. Early or later models (identification made by serial number) may use different parts, or it may be necessary to use a different procedure in doing a specific service operation.

Loader Serial Number

Figure 2



The loader serial number plate is located on the outside of the loader frame **[Figure 2]**.

Explanation of loader Serial Number:

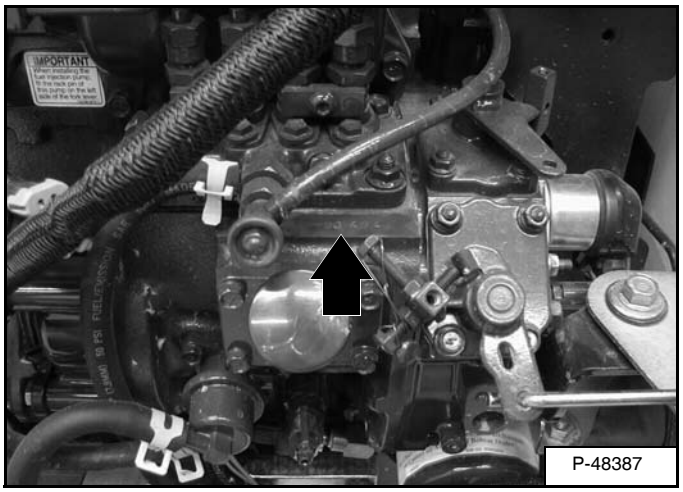
XXXX	XXXXX
Model 1.-Model/ Engine Combination	Model 2.-Production Sequence (Series)

1. The four digit Model/Engine Combination Module number identifies the model number and engine combination.

2. The five digit Production Sequence Number identifies the order which the loader is produced.

Engine Serial Number

Figure 3

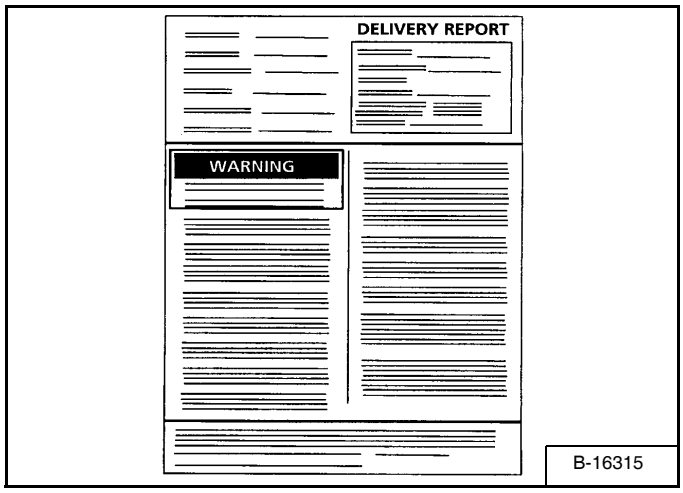


The engine serial number is in the location shown **[Figure 3]**.

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DELIVERY REPORT

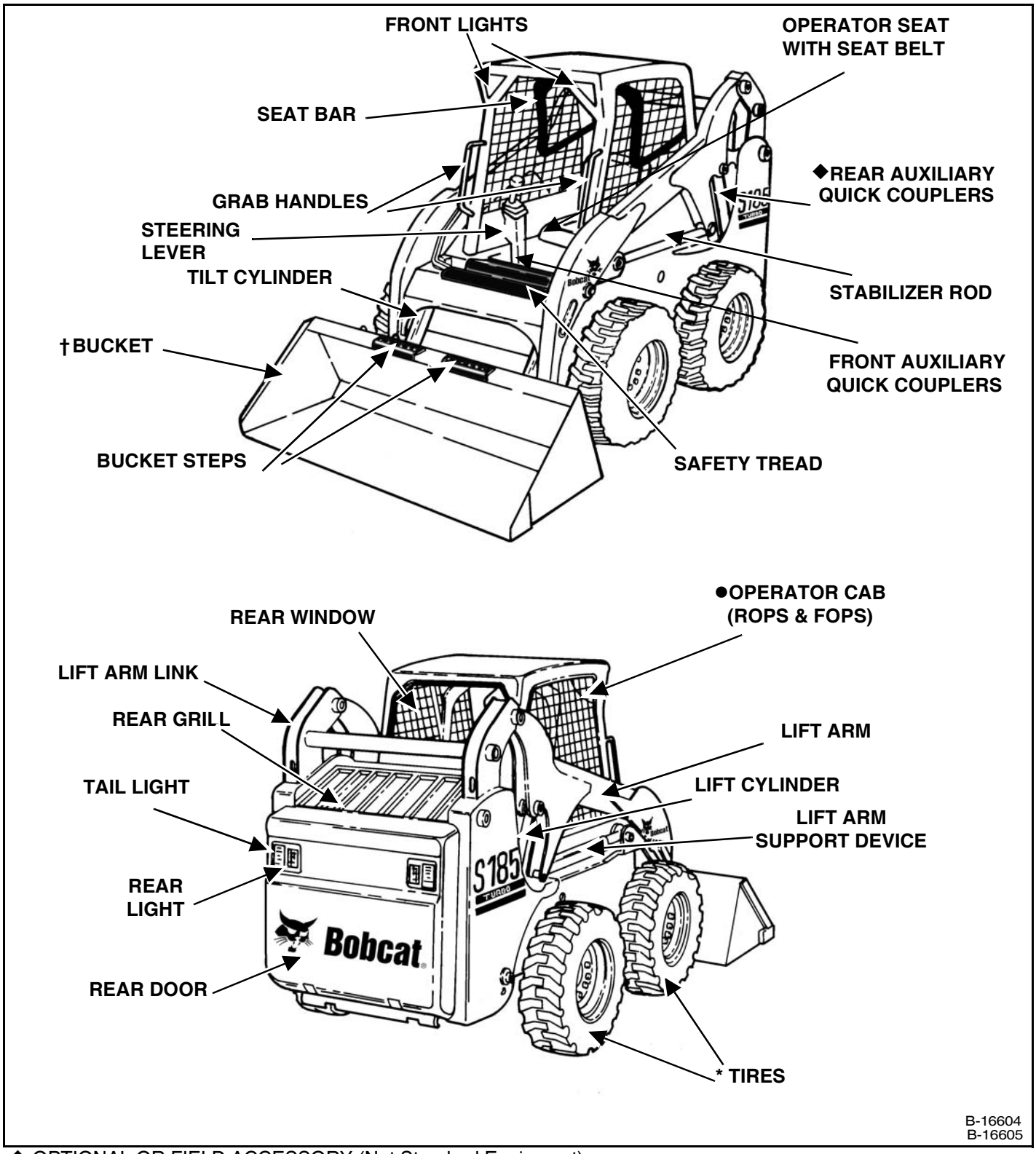
Figure 4



The Delivery Report must be filled out by the dealer and signed by the owner or operator when the Bobcat loader is delivered. An explanation of the form must be given to the owner. Make sure it is filled out completely **[Figure 4]**.

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BOBCAT LOADER IDENTIFICATION



◆ OPTIONAL OR FIELD ACCESSORY (Not Standard Equipment)

* TIRES - The Bobcat loader is factory equipped with heavy duty flotation tires. See Specifications Section and your Bobcat dealer for available tires.

† BUCKET - Several different buckets and other attachments are available for the Bobcat loader.

● ROPS, FOPS - Roll Over Protective Structure, per SAE J1040 and ISO 3471, and Falling Object Protective Structure per SAEJ1043 and ISO 3449, Level I. Level II is available. The Bobcat loader is base-equipped with a standard operator cab as shown. Extra insulated cab is available as an option (Reduced noise level).

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LIFTING AND BLOCKING THE LOADER

Figure 10-10-1



⚠ WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, 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-2003-0199

Procedure

Always park the loader on a level surface.

⚠ WARNING

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

W-2017-0286

Figure 10-10-2



Put the floor jack under the front of the loader **[Figure 10-10-2]**.

Lift the front of the loader and put jackstands under the axle tubes **[Figure 10-10-2]**.

NOTE: Make sure the jackstands do not touch the tires. Make sure tires clear floor or any obstacles.

Figure 10-10-3



Put the floor jack under the rear of the loader **[Figure 10-10-3]**.

Lift the rear of the loader and install jackstands **[Figure 10-10-3]**.

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LIFT ARM SUPPORT DEVICE

Installing Lift Arm Support Device

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

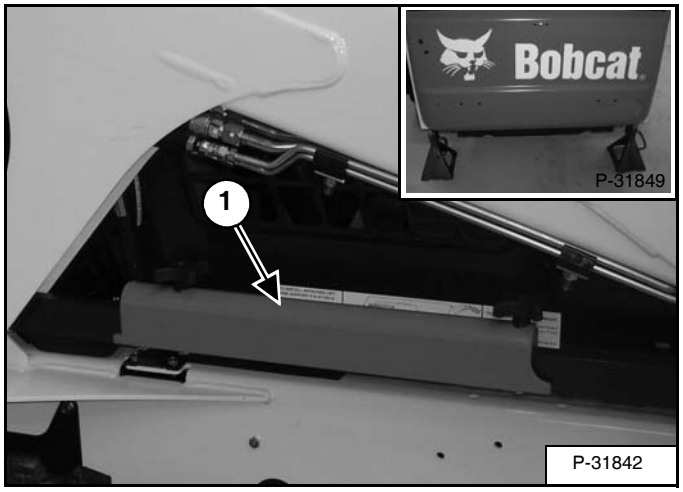
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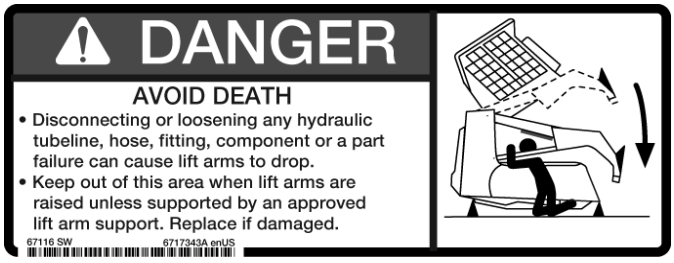
WARNING

Service lift arm support device if damaged or if parts are missing. Using a damaged lift arm support or with missing parts can cause lift arms to drop causing injury or death.

W-2271-1197

Figure 10-20-1

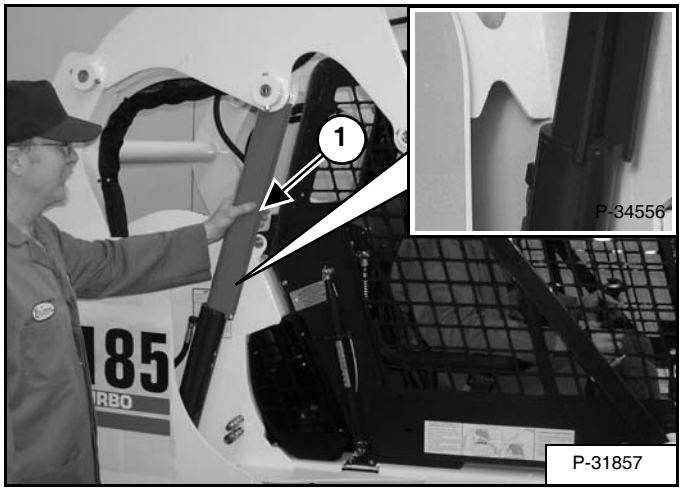




Put jackstands under the rear corners of the loader frame (Inset) **[Figure 10-20-1]**.

Remove the lift arm support device (Item 1) **[Figure 10-20-1]** from storage position.

Figure 10-20-2



The operator must be in the operator's seat, with the seat belt fastened and seat bar lowered, until the lift arm support device is installed.

Start the engine, and raise the lift arms all the way up.

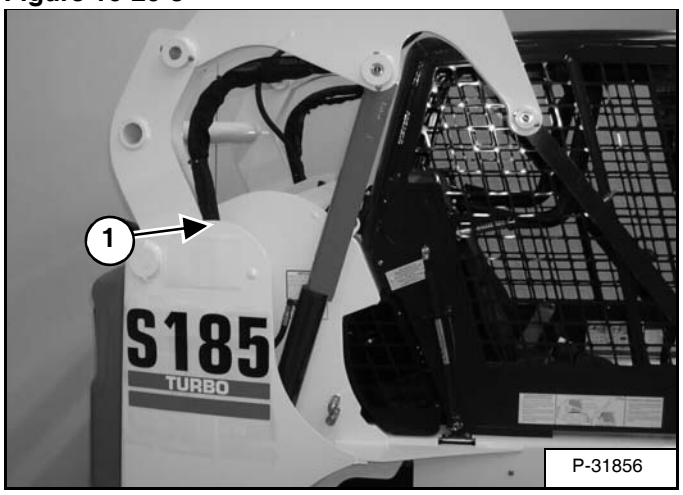
Have a second person install the lift arm support device (Item 1) **[Figure 10-20-2]** over the rod of one of the lift cylinders.

The lift arm support device must be tight against the cylinder rod. The tabs of the lift arm support device must be under the cylinder as shown (Inset) **[Figure 10-20-2]**.

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Installing Lift Arm Support Device (Cont'd)

Figure 10-20-3



Lower the lift arms slowly until the lift arm support device is held between the lift arms and lift cylinder **[Figure 10-20-3]**.

Removing Lift Arm Support Device

The operator must be in the operator's seat, with the seat belt fastened and seat bar lowered, until the lift arm support device is removed and the lift arms are lowered all the way.

Start the engine, raise the lift arms all the way up.

Have a second person remove the lift arm support device.

Lower the lift arms all the way and stop the engine.

Return the lift arm support device to storage position and secure with clamping knobs.

Remove the jackstands.

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OPERATOR CAB

Description

The Bobcat loader has an operator cab (ROPS and FOPS) as standard equipment to protect the operator from rollover and falling objects. Check with your dealer if the operator cab has been damaged. The seat belt must be worn for roll over protection.

ROPS/FOPS - Roll Over Protective Structure per SAE J1040 and ISO 3471, and Falling Object Protective Structure per SAE J1043 and ISO 3449, Level I. Level II is available.

Level I - Protection from falling bricks, small concrete blocks, and hand tools encountered in operations such as highway maintenance, landscaping, and other construction site services.

Level II - Protection from falling trees, rocks; for machines involved in site clearing, overhead demolition or forestry.

Raising The Operator Cab

Figure 10-30-1

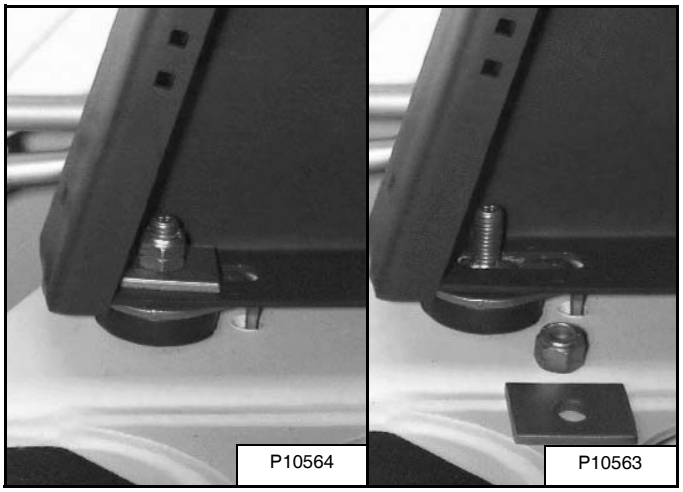


Always stop the engine before raising or lowering the cab.

Stop the loader on a level surface. Lower the lift arms. If the lift arms must be up while raising the operator cab, install the lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Install jackstands under the rear of the loader frame **[Figure 10-30-1]**.

Figure 10-30-2



Remove the nut and plate (both sides) at the front corners of the operator cab **[Figure 10-30-2]**.

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Raising The Operator Cab (Cont'd)

⚠ WARNING

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

W-2069-1299

Figure 10-30-3



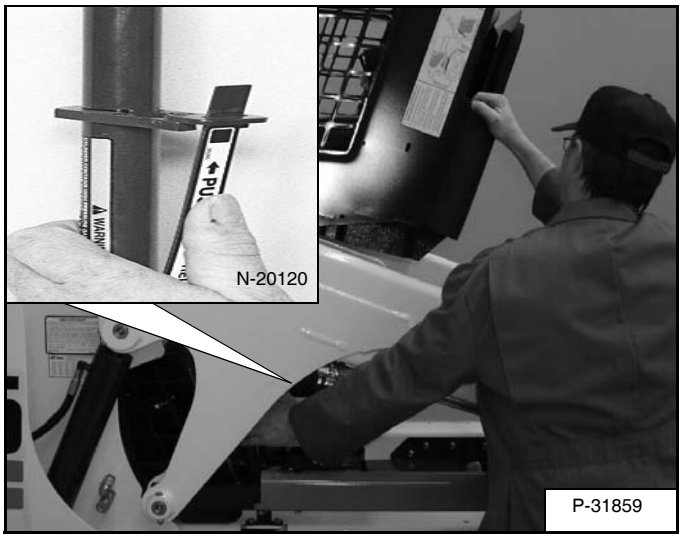
Lift on the grab handle and bottom of the operator cab slowly until the cab is all the way up and the latching mechanism engages **[Figure 10-30-3]**.

Advanced Hand Controls (AHC) and Advanced Control System (ACS)



Lowering The Operator Cab

Figure 10-30-4



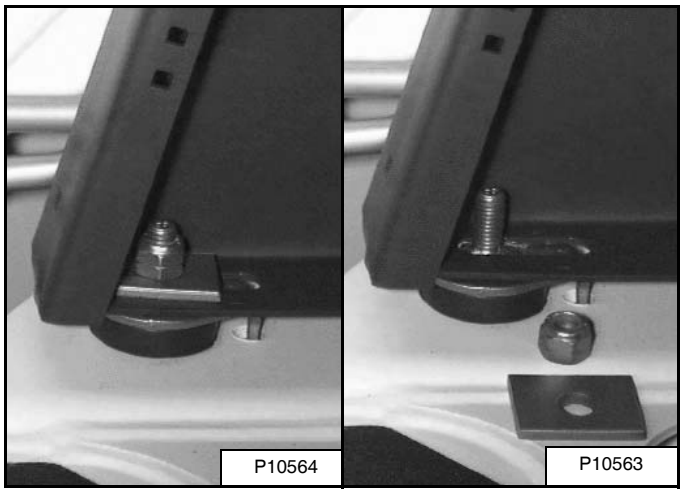
Always stop the engine before raising or lowering the cab.

NOTE: Make sure seat bar is fully raised or lowered when lowering the cab. Always use the grab handles to lower the cab.

Pull down on the bottom of the operator cab until it stops at the latching mechanism **[Figure 10-30-4]**.

Release the latching mechanism (Inset) **[Figure 10-30-4]** and pull the cab all the way down.

Figure 10-30-5



Install the plates and nuts **[Figure 10-30-5]** (both sides).

Tighten the nuts to 40-50 ft.-lb. (54-68 N•m) torque.

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Emergency Exit

Figure 10-30-6

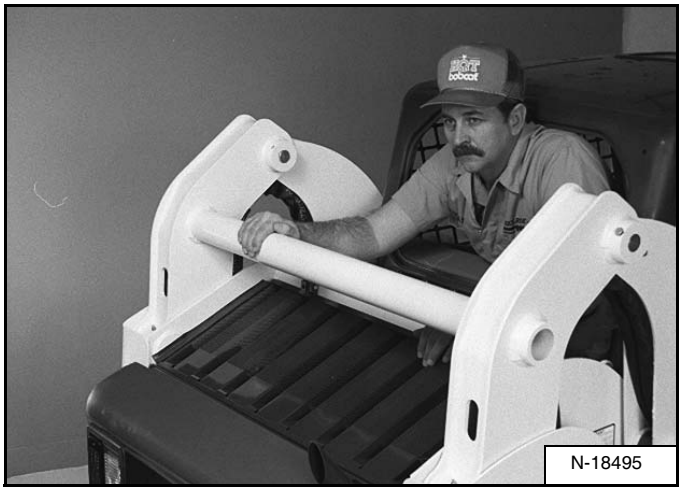


The front opening on the operator cab and rear window provide exits.

Rear Window (If Equipped)

Pull on the tag on the top of the rear window to remove the rubber cord **[Figure 10-30-6]**.

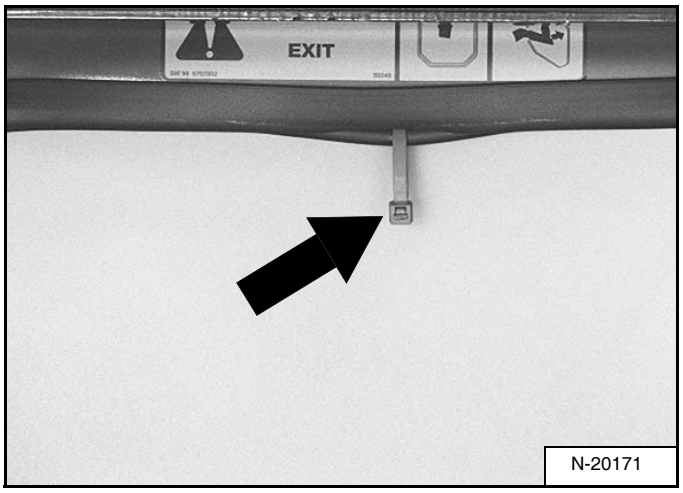
Figure 10-30-7



Push the rear window out of the rear of the operator cab.

Exit through the rear of the operator cab **[Figure 10-30-7]**.

Figure 10-30-8



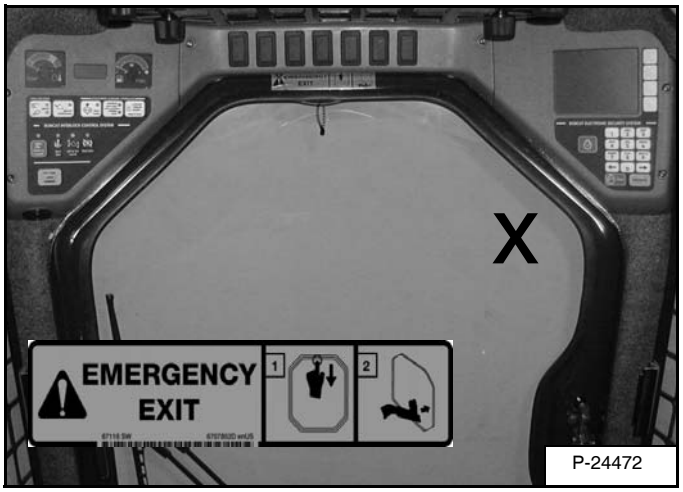
Front Door (If Equipped)

NOTE: When an Operator Cab Enclosure Kit is installed, the window of the front door can be used as an emergency exit. [Figure 10-30-8].

NOTE: If the loader has a Special Application Door Kit installed, the window of the front door is NOT an emergency exit.

Pull the plastic loop at the top of the window in the front door to remove the rubber cord **[Figure 10-30-8]**.

Figure 10-30-9



Push the window out with your foot **[Figure 10-30-9]** at any corner of the window.

Exit through the front door.

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TRANSPORTING THE BOBCAT LOADER

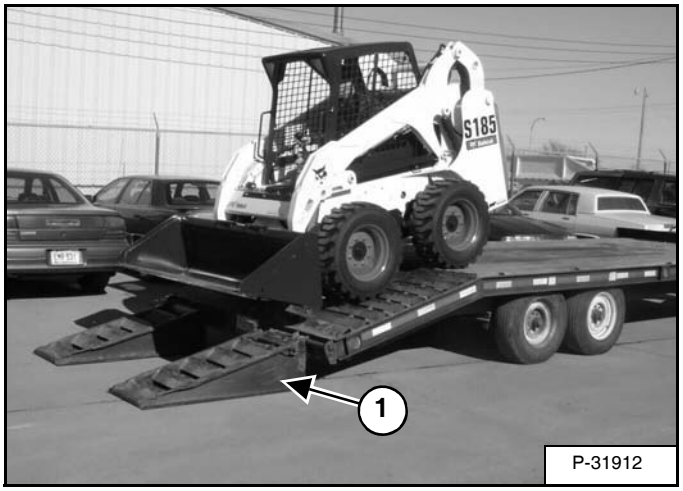
Procedure

⚠ WARNING

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

W-2058-0494

Figure 10-40-1

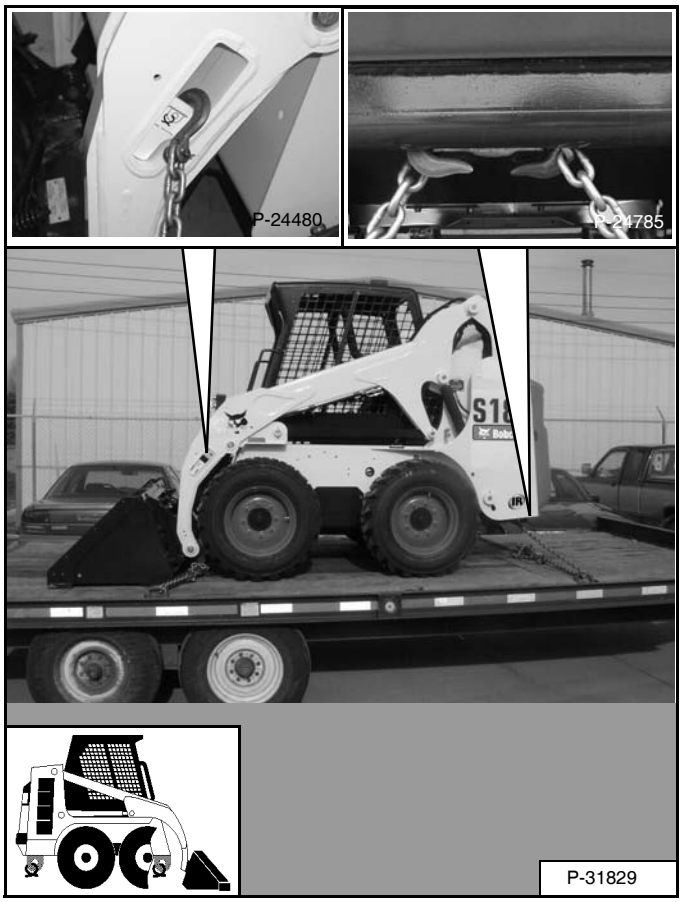


A loader with an empty bucket or no attachment must be loaded backward onto the transport vehicle **[Figure 10-40-1]**.

Be sure the transport and towing vehicles are of adequate size and capacity (See LOADER SPECIFICATIONS on Page SPEC-10-1.), for weight of loader.)

The rear of the trailer must be blocked or supported (Item 1)**[Figure 10-40-1]** when loading or unloading the loader to prevent the front end of the trailer from raising up.

Figure 10-40-2



Use the following procedure to fasten the Bobcat loader to the transport vehicle to prevent the loader from moving during sudden stops or when going up or down slopes **[Figure 10-40-2]**.

- Lower the bucket or attachment to the floor.
- Stop the engine.
- Engage the parking brake.
- Install chains at the front and rear loader tie down positions (Inset) **[Figure 10-40-2]**.
- Fasten each end of the chain to the transport vehicle.

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TOWING THE LOADER

Procedure

Because of the design of the loader, there is not a recommended towing procedure.

- The loader can be lifted onto a transport vehicle.

- The loader can be skidded a short distance to move for service (EXAMPLE: Move onto a transport vehicle.) without damage to the hydrostatic system. (The tires/tracks will not turn.) There might be slight wear to the tires/tracks when the loader is skidded.

  The towing chain (or cable) must be rated at 1 & 1/2 times the weight of the loader. (See LOADER SPECIFICATIONS on Page SPEC-10-1.)

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REMOTE START

Procedure

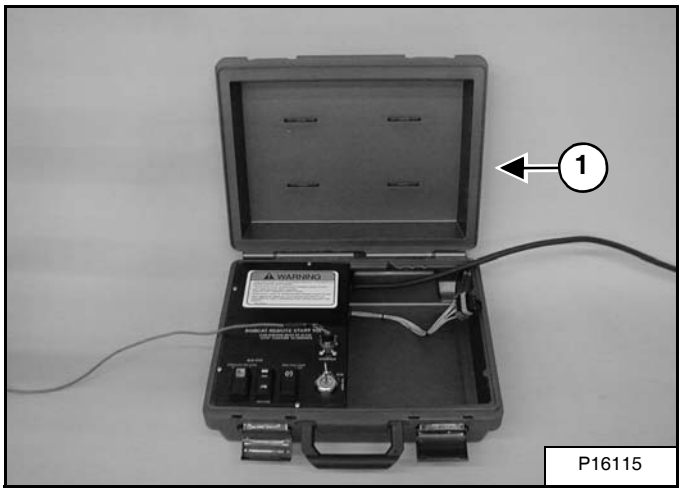
WARNING

AVOID INJURY OR DEATH

With the 7-pin connector plugged into the loader and Remote Start Key Switch in the OFF position, the loader can still be started from the operator panel inside the cab. Placing the key switch of the remote start tool in the run position disconnects the operator panel key switch from the start circuit. If the service technician will be working the engine area it is important to remove the operator panel keys.

W-2357-0899

Figure 10-60-1



The tool listed will be need to do the following procedure:

MEL1563 - Remote Start Tool Kit

The remote start (Item 1) **[Figure 10-60-1]** is required when the operator cab is in the raised position for service and the service technician needs to turn the key switch on or start the engine. Example: Control Handle: linkage neutral adjustment.

Figure 10-60-2

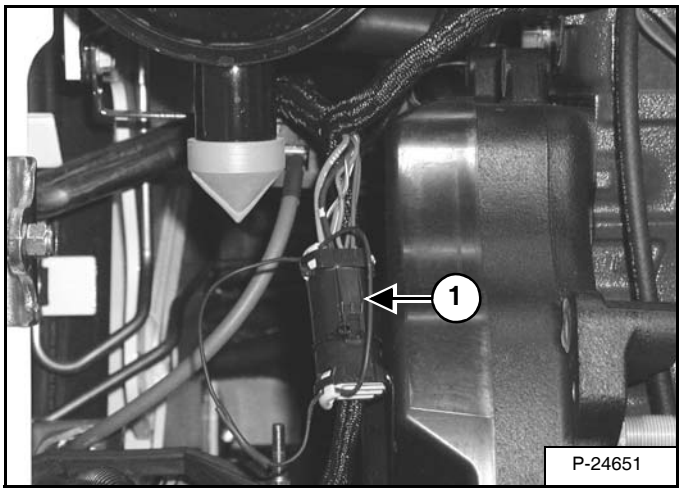
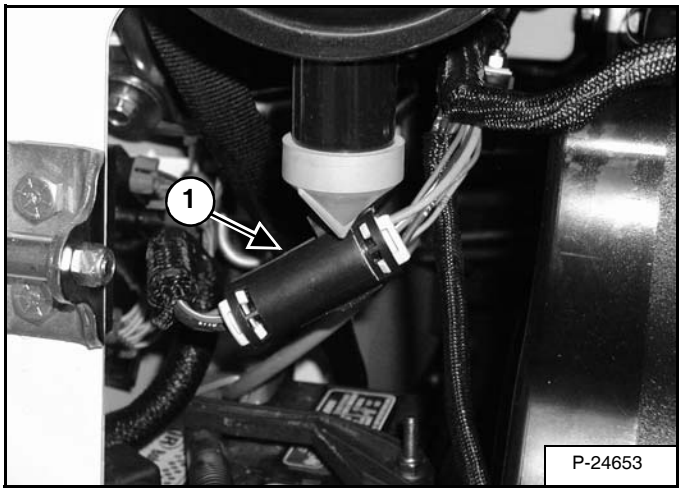


Figure 10-60-3



Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms (if required by the procedure) and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab (if required by the procedure). (See Raising The Operator Cab on Page 10-30-1.)

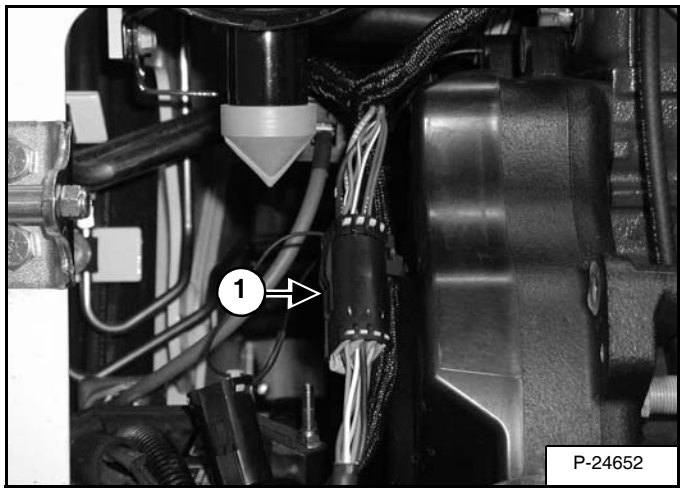
Open the rear door of the loader.

Remove the plug (Item 1) **[Figure 10-60-2]** or disconnect the attachment control harness (Item 1) **[Figure 10-60-3]** if connected.

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Procedure (Cont'd)

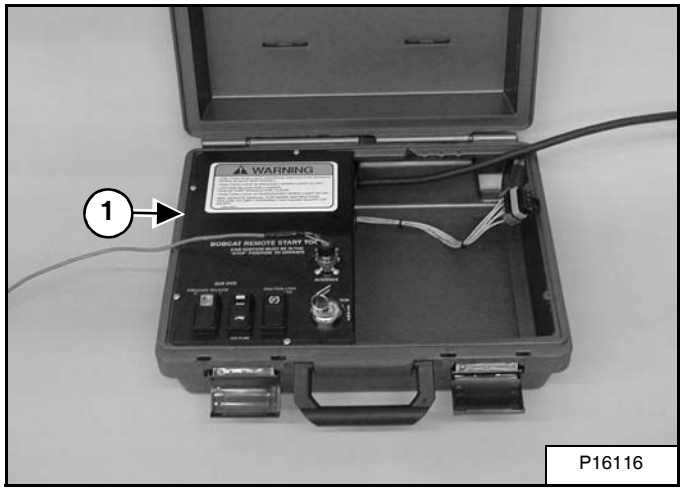
Figure 10-60-4



Connect the remote start tool to the engine harness connector (Item 1) **[Figure 10-60-4]**.

NOTE: The key switch on the right-hand side operator panel must be in the off position or the Remote Start Kit will not operate.

Figure 10-60-5



The remote start tool (Item 1) **[Figure 10-60-5]** has three rocker switches.

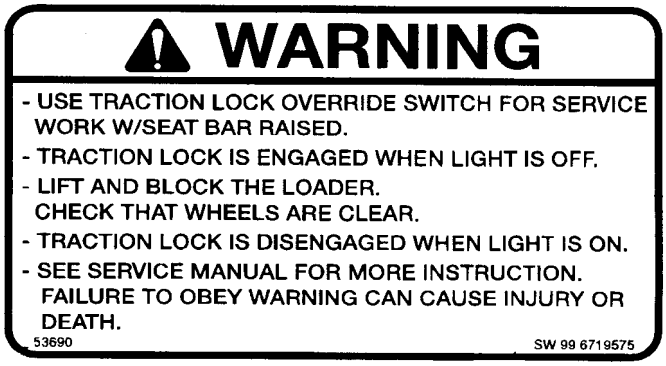
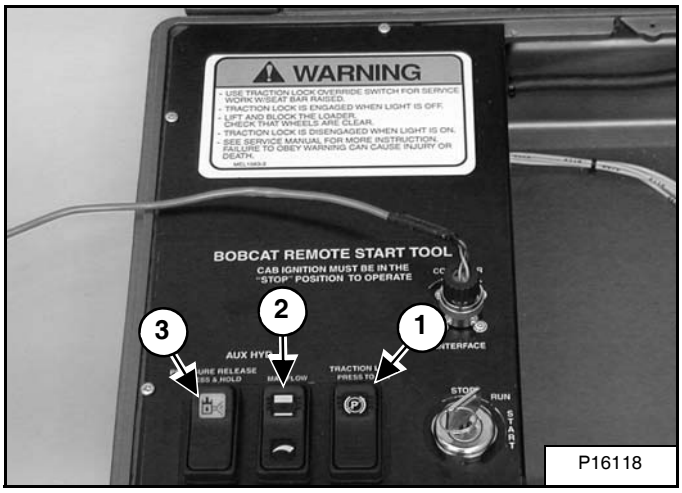


Figure 10-60-6



The traction lock switch (Item 1) **[Figure 10-60-6]** is used to turn traction lock on or off. Push the switch to the override position. The switch will illuminate to indicate traction lock OVERRIDE, in this position the wheels are able to turn.

The maximum flow/variable flow switch (Item 2) **[Figure 10-60-6]** is used to activate the auxiliary hydraulics. Pressing the switch once will activate variable flow. Pressing the switch again will activate maximum flow. The switch will illuminate to indicate which flow rate is active. Pressing the switch a third time will turn the flow OFF. The switch is used when checking pressures and flow rate.

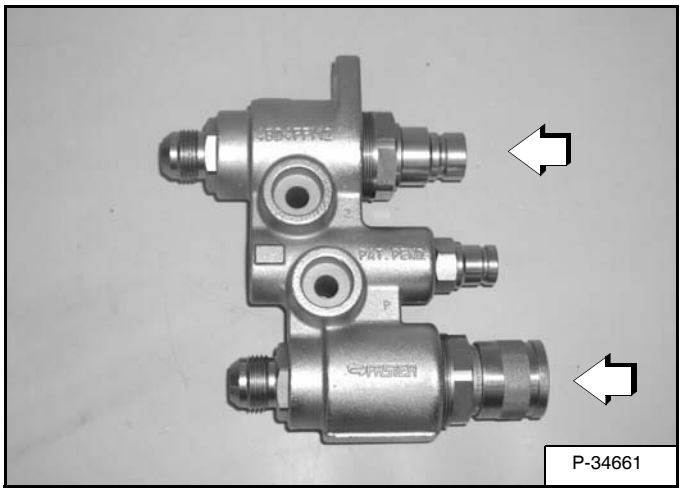
The auxiliary pressure release (Item 3) **[Figure 10-60-6]** is used to release hydraulic pressure to the right hand auxiliary and/or rear auxiliary couplers ONLY.

NOTE: With the engine running; pushing and holding the pressure release switch will cause the engine to stop in three seconds. To relieve the pressure; continue to press the switch after the engine has stopped.

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Procedure (Cont'd)

Figure 10-60-7



Push the couplers on the front auxiliary block toward the block and hold for five seconds to release the front auxiliary pressure **[Figure 10-60-7]**.

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SERVICE SCHEDULE

Chart

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 loader.

⚠ WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, Operator's Handbook and signs (decals) on machine. Follow warnings and instructions in the manuals when making repairs, adjustments or servicing. Check for correct function after adjustments, repairs or service. Untrained operators and failure to follow instructions can cause injury or death.
W-2003-0903

SERVICE SCHEDULE		HOURS					
ITEM	SERVICE REQUIRED	8-10	50	100	■ 250	■ 500	■ 1000
Engine Oil	Check the oil level and add oil as needed.						
Engine Air Filter and Air System	Check display panel. Service only when required. Check for leaks and damaged components.						
Engine Cooling System	Clean debris from oil cooler, radiator & grill. Check coolant level COLDand add premixed coolant as needed.						
Tires	Check for damaged tires and correct air pressure. Inflate to MAXIMUM pressure shown on sidewall of tire.						
Seat Belt, Seat Bar, Control Interlocks and Seat Belt Retractors	Check the condition of seat belt. Check the seat bar and control interlocks for correct operation. Clean dirt and debris from moving parts. Clean or replace seat belt retractors as needed.						
Safety Signs and Safety Treads	Check for damaged signs (decals) and safety treads. Replace any signs or safety treads that are damaged or worn.						
Indicators & Lights	Check for correct operation of all indicators and lights.						
Operator Cab	Check the fastening bolts, washers and nuts. Check the condition of the cab.						
Lift Arms, Cylinders, Bob-Tach Pivot Pins and Wedges	Lubricate with multi-purpose lithium based grease.						
Fuel Filter	Remove the trapped water.						
Heater Filters	Clean or replace filters as needed during heating/cooling season.						
Bobcat Interlock Control System (BICS™)	Check the four (4) BICS™ indicator lights and functions are activated. See details in this Manual.						
Hydraulic Fluid, Hoses and Tubelines	Check fluid level and add as needed. Check for damage and leaks. Repair or replace as needed.						
Final Drive Trans. (Chaincase),	Check oil level. Check for correct operation. Repair or adjust as needed.						
Foot Pedals or Hand Controls and Steering Levers	Check for correct operation. Repair or adjust as needed.						
Wheel Nuts	Check for loose wheel nuts and tighten to correct torque. (See TIRE MAINTENANCE on Page 10-170-1.)	❑					
Parking Brake	Check operation.						
Spark Arrestor Muffler	Clean the spark chamber.						
Battery	Check cables, connections and electrolyte level. Add distilled water as needed.						
Steering Lever Pivots	Grease two fittings.						
Engine/Hydrostatic Drive Belt	Check for wear or damage. Adjust as needed.		*				
Fan Drive Gearbox	Check gear lube level. Add as needed.						
Alternator Belt	Check belt tension and adjust as needed.						
Engine Oil and Filter	Replace oil and filter. Use CD or better grade oil and Bobcat filter.		^				
Fuel Filter	Replace the filter element.						
Bobcat Interlock Control System (BICS™)	Check the function of the lift arm by-pass control						
Hydraulic Reservoir Breather Cap	Replace the reservoir breather cap.						
Hyd./Hydro. Filter	Replace the filter element.		●				
Hydraulic Reservoir	Replace the fluid						
Final Drive Trans. (Chaincase)	Replace the fluid						
Case Drain Filters	Replace the filters						

❑ **Check wheel nut torque every 8 hours for the first 24 hours.**
* **Inspect the new belt after first 50 hours.**
● **Replace filter element after the first 50 hours and when the transmission warning light comes ON.**
^ **First oil and filter change must occur at 50 hours; 250 hours thereafter.**
■ **Or every 12 months.**

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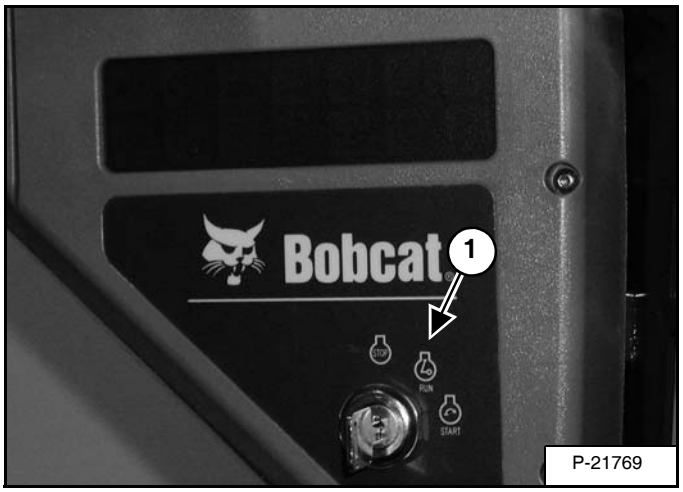


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AIR CLEANER SERVICE

Checking

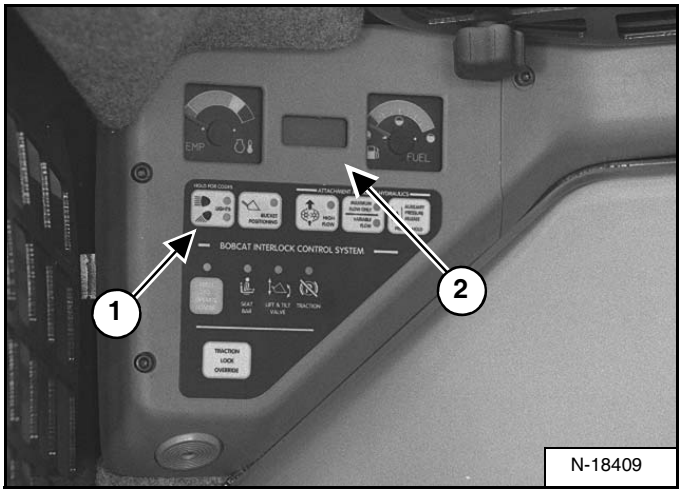
Figure 10-80-1



It is important to change the air filter element only when the Air Cleaner icon in the right panel is ON (Item 1) **[Figure 10-80-1]** and you hear three beeps from the alarm.

Replace the inner filter every third time the outer filter is replaced or as indicated on Contents Page 70-01.

Figure 10-80-2



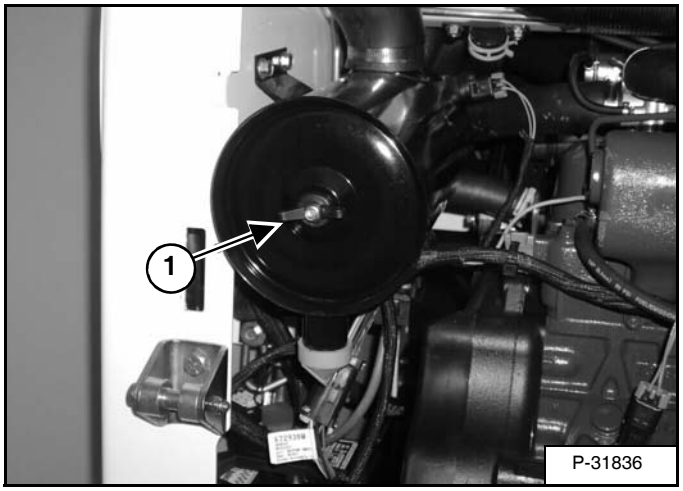
Press and hold the LIGHT Button (Item 1) **[Figure 10-80-2]** for two seconds.

If the filter element needs replacement, the CODE [01-17] **(Air Filter Plugged)** will show in the HOURMETER / CODE DISPLAY (Item 2) **[Figure 10-80-2]**.

Replacing Filter Element(s)

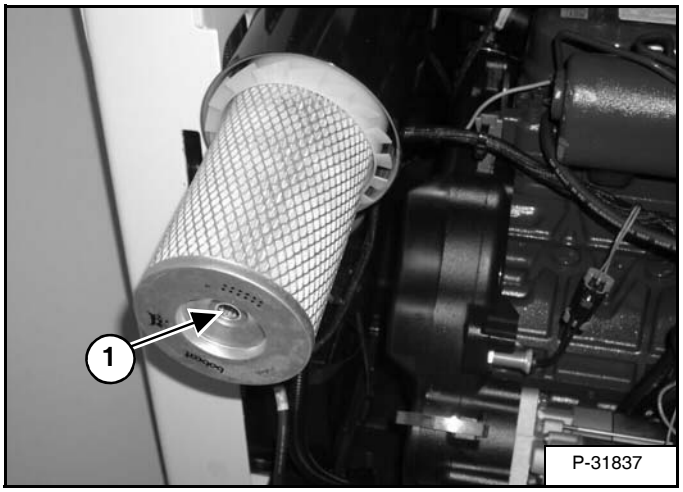
OUTER FILTER

Figure 10-80-3



Remove the wing nut (Item 1) **[Figure 10-80-3]** and remove the dust cover.

Figure 10-80-4

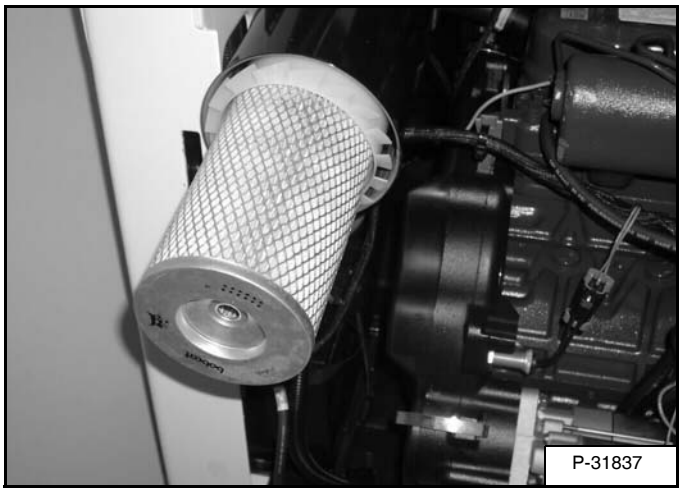


Remove the wing nut (Item 1) **[Figure 10-80-4]** from the outer filter element and the outer filter element.

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Replacing Filter Element(s) (Cont'd)

Figure 10-80-5



NOTE: Be sure all sealing surfaces are clean.

Install the new filter element and washer. Tighten the wing nut.

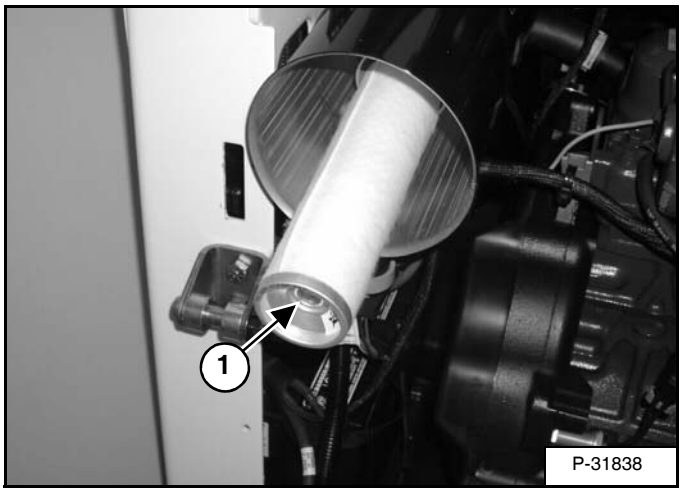
NOTE: Be sure sealing washer is in place on each wing nut [Figure 10-80-4].

Install the dust cover and tighten the wing nut.

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

INNER FILTER

Figure 10-80-6



Only replace the inner filter element under the following conditions:

- Replace the inner filter element every third time the outer filter is replaced.
- After the outer element has been replaced, start the engine and run at full RPM. If the HOURMETER / CODE DISPLAY shows [01-17] (Air Filter Plugged), replace the inner filter element.

Remove the inner filter wing nut **[Figure 10-80-6]**.

Remove the inner filter (Item 1) **[Figure 10-80-6]**.

Install a new filter and tighten the wing nut.

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Cleaning The Cooling System

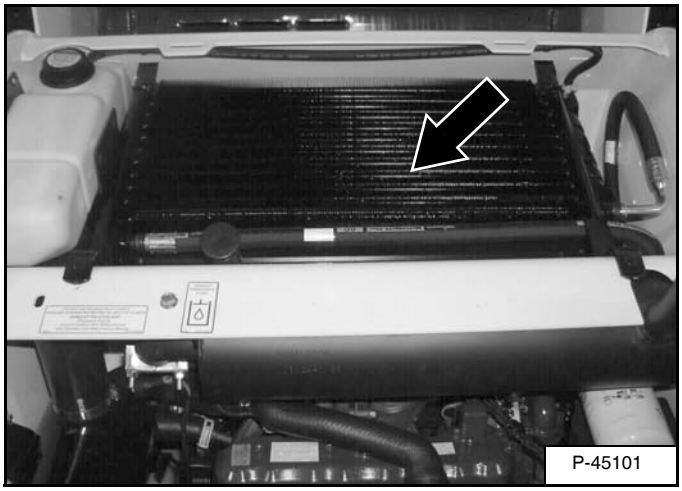
⚠ WARNING

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

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

W-2019-1285

Figure 10-90-1



Check the cooling system every day to prevent overheating, loss of performance or engine damage.

Open the rear door and remove the rear grill. (See Removal And Installation on Page 50-60-1.)

Use air pressure or water pressure to clean the top of the oil cooler **[Figure 10-90-1]**.

⚠ WARNING

Do not use your bare hands to remove debris from the oil cooler. Cooling fins are sharp and may cause injury.

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IMPORTANT

AVOID ENGINE DAMAGE

Always use the correct ratio of water to antifreeze.

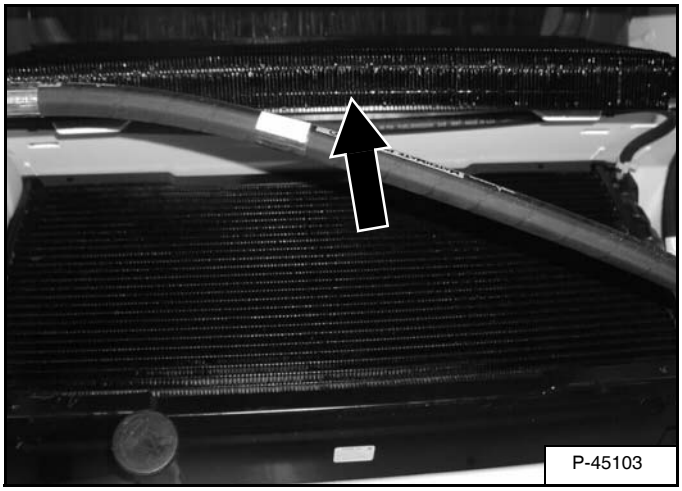
To much antifreeze reduces cooling system efficiency and may cause serious premature engine damage.

Too little antifreeze reduces the additives which protect the internal engine components; reduces the boiling point and freeze protection of the system.

Always add a premixed solution. Adding full strength concentrated coolant can cause serious premature engine damage.

I-2124-0497

Figure 10-90-2



Raise the air conditioning condenser (If equipped) and the oil cooler and clean the top of the radiator **[Figure 10-90-2]**.

Lower the oil cooler on the loader frame.

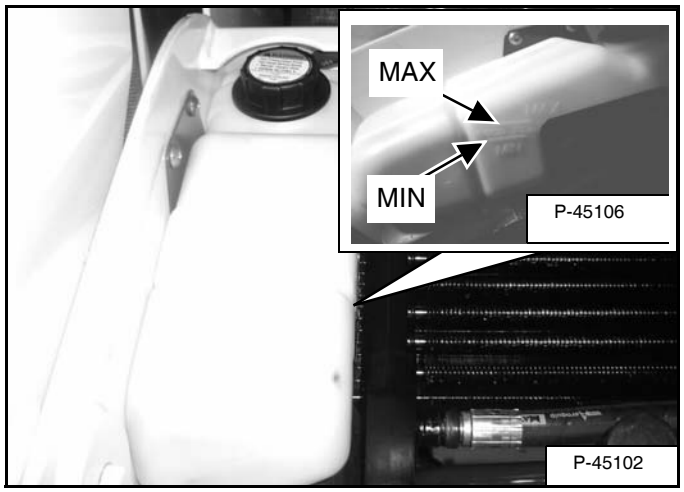
Check cooling system for leaks.

Lower the rear grill and close the rear door.

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Checking The Coolant Level

Figure 10-90-3



Open the rear door and raise the rear grill.

Check the coolant level **[Figure 10-90-3]**. The level markers are on the outside of the tank. Coolant must be between the bottom marker and the top marker when the engine is cold.

Close the rear door before operating the loader.

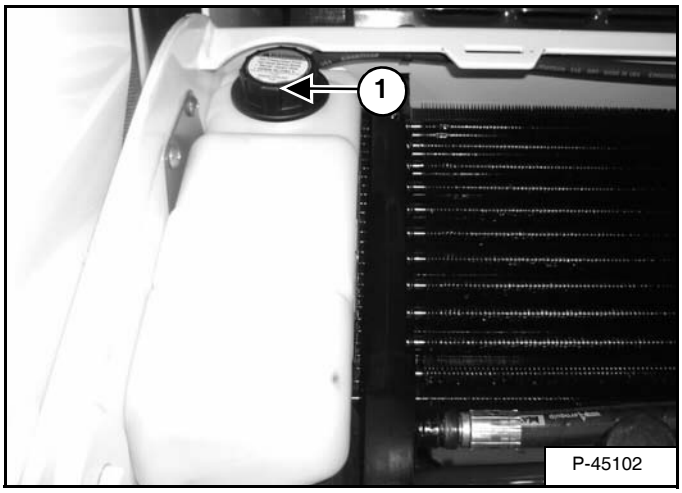
Replacing the Coolant

⚠ WARNING

Do not remove radiator cap when the engine is hot. You can be seriously burned.

W-2070-1285

Figure 10-90-4



Open the rear door and remove the rear grill.

Remove the radiator cap (Item 1) **[Figure 10-90-4]**.

IMPORTANT

AVOID ENGINE DAMAGE

Always use the correct ratio of water to antifreeze.

To much antifreeze reduces cooling system efficiency and may cause serious premature engine damage.

Too little antifreeze reduces the additives which protect the internal engine components; reduces the boiling point and freeze protection of the system.

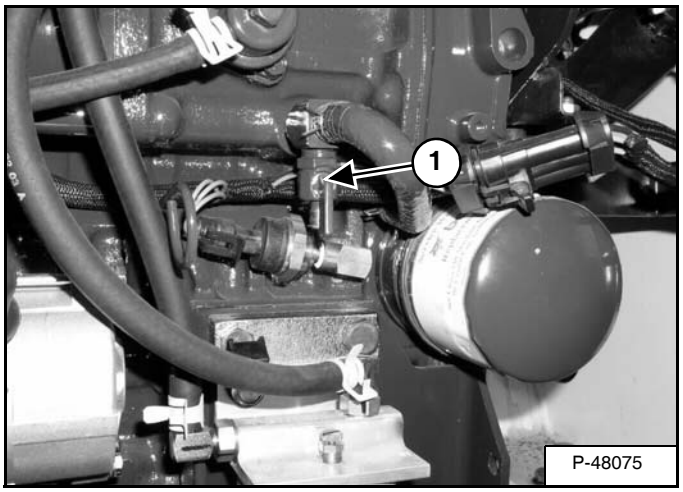
Always add a premixed solution. Adding full strength concentrated coolant can cause serious premature engine damage.

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Replacing the Coolant (Cont'd)

Figure 10-90-5



Turn the valve (Item 1) **[Figure 10-90-5]** 90 degrees and drain the coolant into a container.

Recycle or dispose of used coolant in an environmentally safe manner. Close the drain valve and remove the hose.

NOTE: The loader is factory filled with propylene glycol coolant (purple color). DO NOT mix propylene glycol with ethylene glycol.

Add premixed coolant, 47% water and 53% propylene glycol to the recovery tank if the coolant level is low.

One gallon and one pint (4,3 L) of propylene glycol mixed with one gallon (3,8 L) of water is the correct mixture of coolant to provide a -34°F (-37°C) freeze protection.

Use a refractometer to check the condition of propylene glycol in your cooling system.

Fill the radiator with the premixed coolant. Install the radiator cap.

Remove the cover from the coolant recovery tank. Fill the tank until it is at the lower marker (inside the tank).

Run the engine until it is at operating temperature.

Stop the engine.

Check the coolant level in the recovery tank when cool.

Add coolant as needed.

Lower the rear grill and close the rear door.

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FUEL SYSTEM

Fuel Specifications

Use only clean, high quality diesel fuel, Grade No. 2 or Grade No. 1.

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

TEMP. F° (C°)	NO. 2	NO. 1
+15° (9°)	100%	0%
Down to -20° (-29°)	50%	50%
Below -20° (29°)	0%	100%

Contact your fuel supplier for local recommendations.

Filling The Fuel Tank

⚠ WARNING

Stop and cool the engine before adding fuel. NO SMOKING! Failure to obey warnings can cause an explosion or fire.

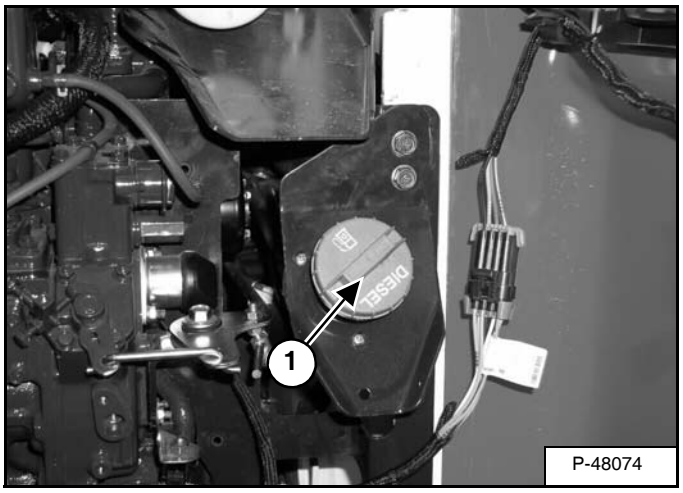
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⚠ WARNING

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

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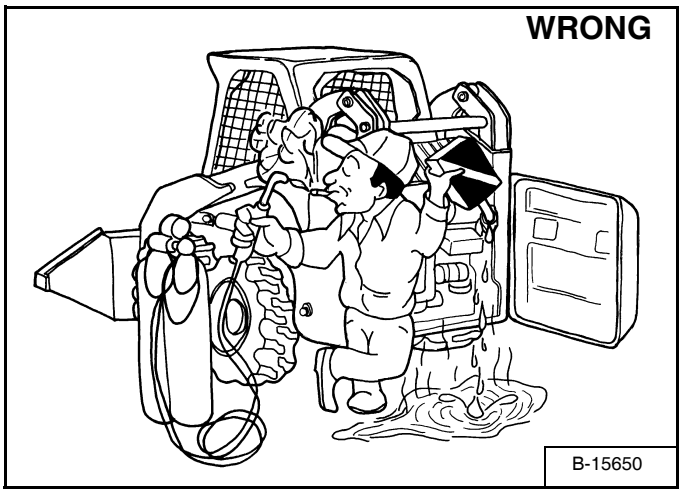
Figure 10-100-1



Open the rear door.

Remove the fuel fill cap (Item 1) **[Figure 10-100-1]**

Figure 10-100-2



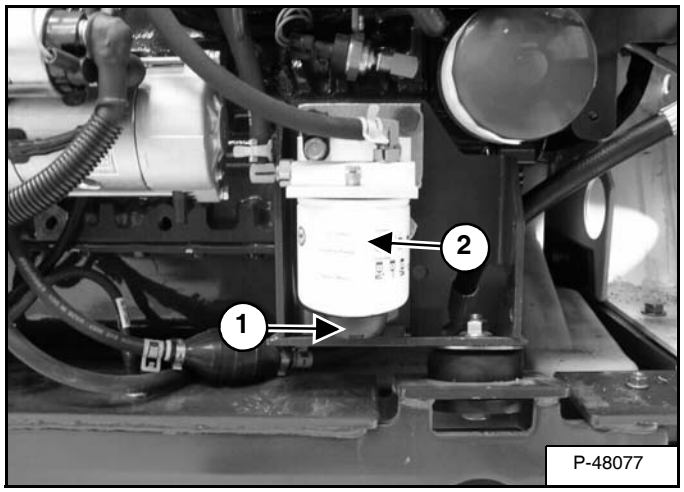
Use a clean, approved safety container to add fuel of the correct specifications. Add fuel only in an area that has free movement of air and no open flames or sparks. NO SMOKING! **[Figure 10-100-2]**.

Install and tighten the fuel fill cap (Item 1) **[Figure 10-100-1]**.

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Fuel Filter

Figure 10-100-3



(See SERVICE SCHEDULE on Page 10-70-1), for the service interval for removing water from, or replacing the fuel filter.

Removing Water

Loosen the drain (Item 1) **[Figure 10-100-3]** at the bottom of the filter element to remove water from the filter.

Replacing Element

Remove the filter element (Item 2) **[Figure 10-100-3]**.

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

Remove the air from the fuel system. (See Removing Air From The Fuel System on Page 10-100-2)

Removing Air From The Fuel System

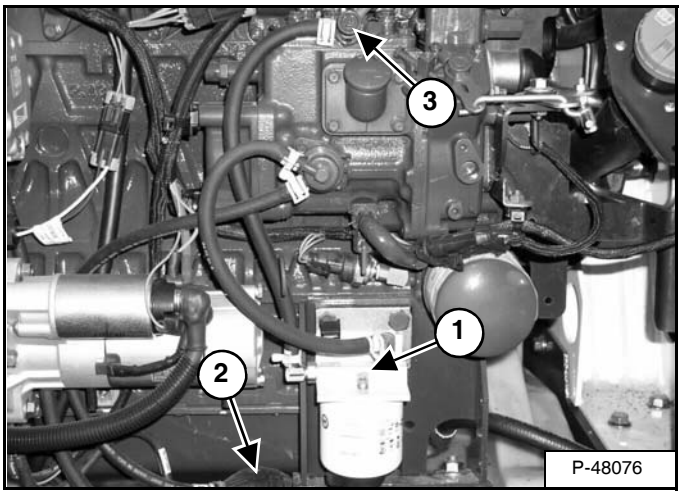
After replacing the filter element or when the fuel tank has run out of fuel, the air must be removed from the fuel system before starting the engine.

⚠ WARNING

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

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Figure 10-100-4



Open the vent (Item 1) **[Figure 10-100-1]** on the fuel filter housing.

Squeeze the hand pump (priming bulb) (Item 2) **[Figure 10-100-1]** until fuel flows from the vent with no air bubbles.

Close the vent (Item 1) **[Figure 10-100-1]** on the fuel filter housing.

Open the vent (Item 3) **[Figure 10-100-1]** on the fuel injection pump.

Squeeze the hand pump (priming bulb) (Item 2) **[Figure 10-100-1]** until the pump feels solid.

Tighten the vent plug (Item 3) **[Figure 10-100-1]**.

Start the engine.

It may be necessary to open the vent plug (Item 3) **[Figure 10-100-1]** briefly while the engine is running. Close the vent when the engine runs smoothly.

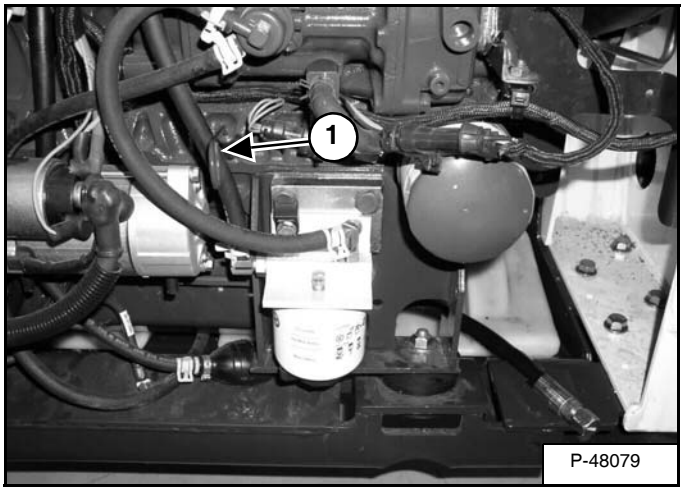
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ENGINE LUBRICATION SYSTEM

Checking Engine Oil

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

Figure 10-110-1



Park the loader on level ground.

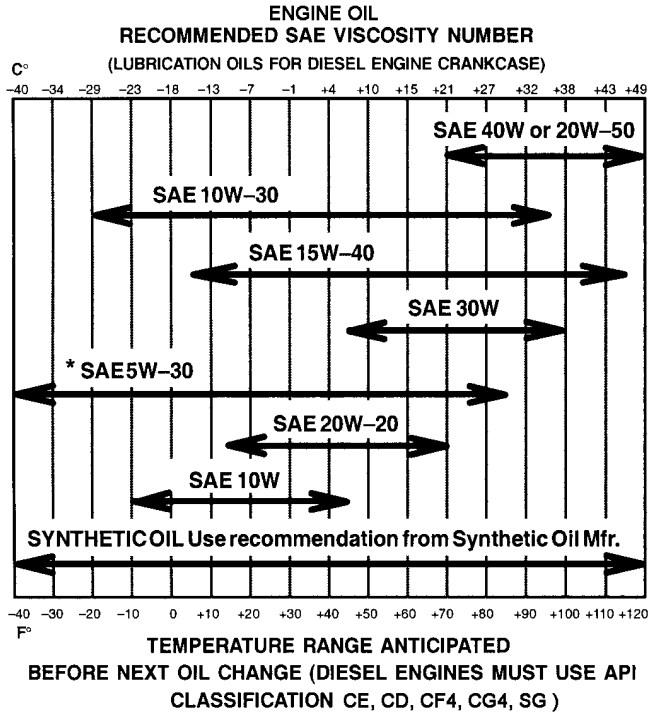
Open the rear door and remove the dipstick (Item 1) **[Figure 10-110-1]**.

Keep the oil level between the marks on the dipstick. **DO NOT OVERFILL.**

Use a good quality motor oil that meets API Service Classification of CD or better. (See Oil Chart.)

Install the dipstick and close the rear door.

Oil Chart



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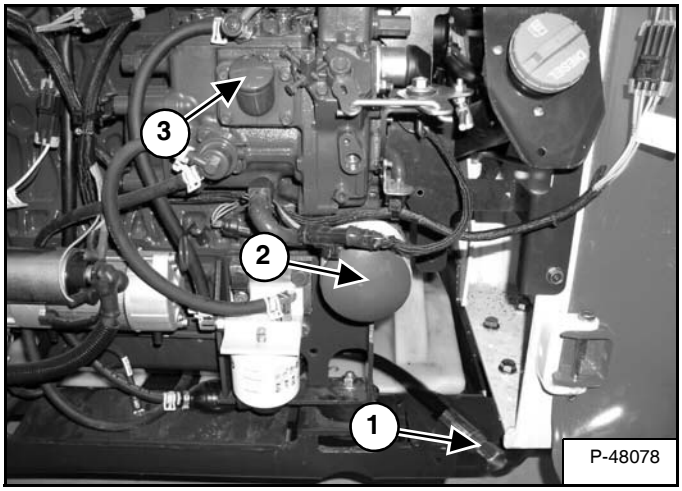
Replacing Oil And Filter

(See SERVICE SCHEDULE on Page 10-70-1), for the service interval for replacing the engine oil and filter.

Run the engine until it is at operating temperature. Park the loader on level ground and stop the engine.

Open the rear door.

Figure 10-110-2



Remove the drain plug (Item 1) **[Figure 10-110-2]**.

Drain the oil into a container and dispose of used oil in an environmentally safe manner.

Remove the oil filter (Item 2) **[Figure 10-110-2]**.

Clean the filter housing surface.

Put clean oil on the new oil filter gasket.

Install the filter and hand tighten.

Install and tighten the drain plug.

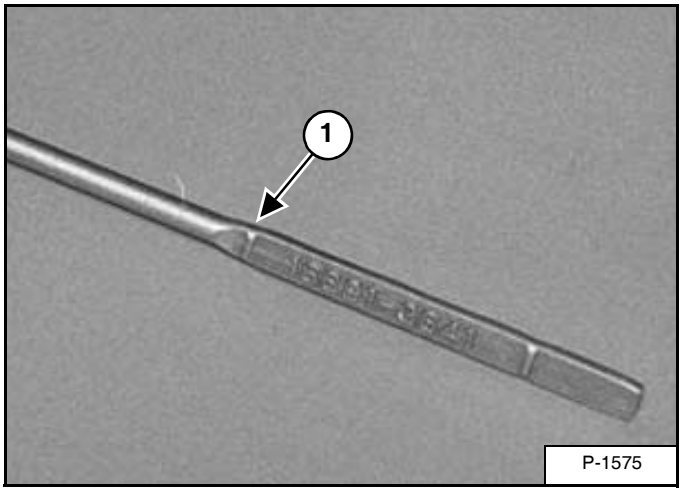
Remove the fill cap (Item 3) **[Figure 10-110-2]**.

⚠ WARNING

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

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Figure 10-110-3



Put oil in the engine. (See Capacities on Page SPEC-10-4.)**[Figure 10-110-3]** (See Oil Chart on Page 10-110-1.)

Start the engine and let it run for several minutes.

Stop the engine and check for leaks at the oil filter.

Remove the dipstick and check the oil level.

Add oil until it reaches the top mark (Item 1) **[Figure 10-110-3]** on the dipstick. **DO NOT OVERFILL.**

Install the dipstick and the fill plug.

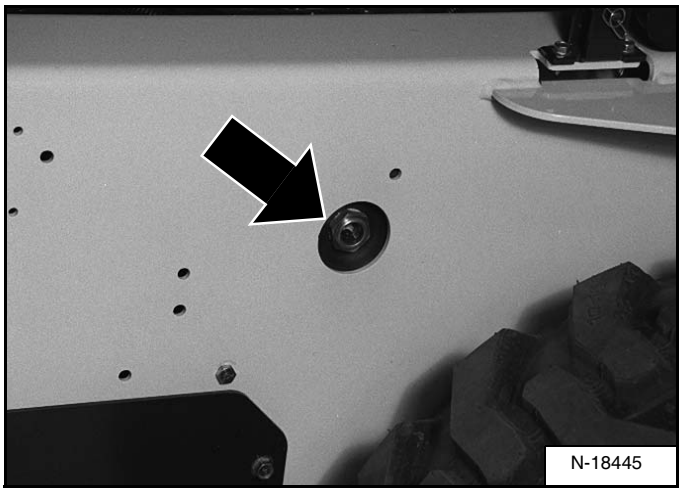
Close the rear door.

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HYDRAULIC/HYDROSTATIC SYSTEM

Checking And Adding Fluid

Figure 10-120-1



Use only recommended fluid in the hydraulic system. (See HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS on Page SPEC-50-1.)

Stop the loader on a level surface.

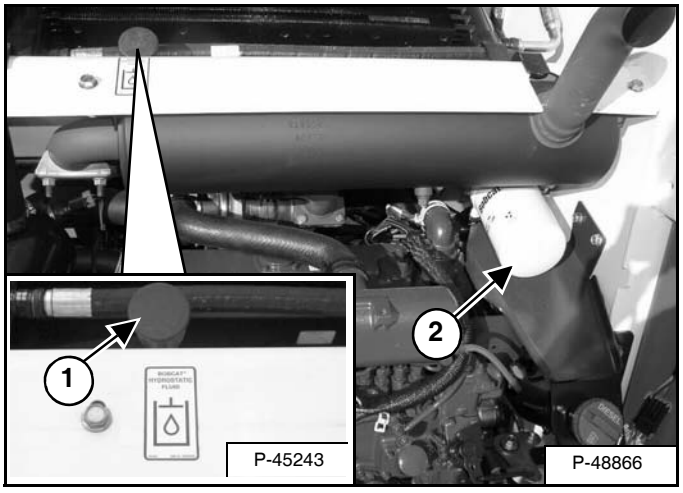
Lower the lift arms and tilt the Bob-Tach fully back.

Stop the engine.

Check fluid level in the sight gauge **[Figure 10-120-1]**.

Open the rear door and remove the rear grill.

Figure 10-120-2



Remove the fill cap (Item 1) **[Figure 10-120-2]**.

Add the fluid as needed to bring the level to the center of the sight gauge **[Figure 10-120-1]**.

Install the fill cap. Replace the rear grill and close the rear door.

Replacing Hydraulic/Hydrostatic Filter

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

Open the rear door.

Remove the filter element (Item 2) **[Figure 10-120-2]**.

Clean the surface of the filter housing where the seal contacts the housing.

Put clean oil on the seal of the new filter element.

Install and hand tighten the filter element.

Close the rear door before operating the loader.

Replacing Hydraulic Fluid

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

The fluid must be replaced if it becomes contaminated or after major repairs. If the fluid is replaced, the hydrostatic filter and both case drain filters must be replaced.

Use only recommended fluid in the hydraulic system. (See HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS on Page SPEC-50-1.)

Stop the loader on a level surface.

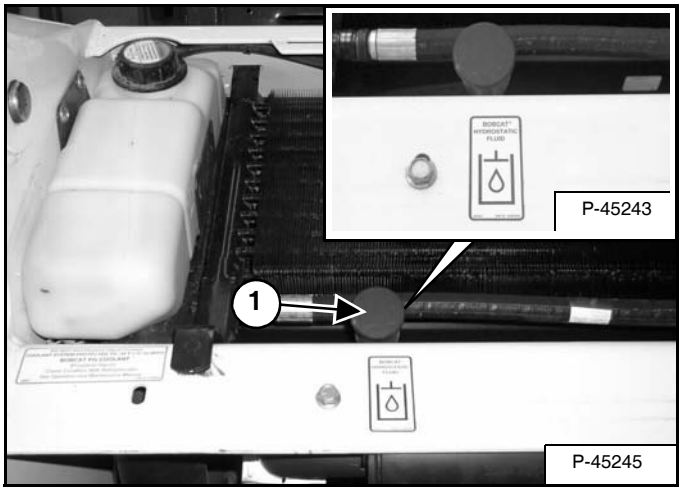
Lower the lift arms and tilt the Bob-Tach fully back.

Stop the engine.

Check fluid level in the sight gauge **[Figure 10-120-1]**.

Open the rear door and remove the rear grill.

Figure 10-120-3



Remove the reservoir fill cap (Item 1) **[Figure 10-120-3]**.

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Replacing Hydraulic Fluid (Cont'd)

⚠ WARNING

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

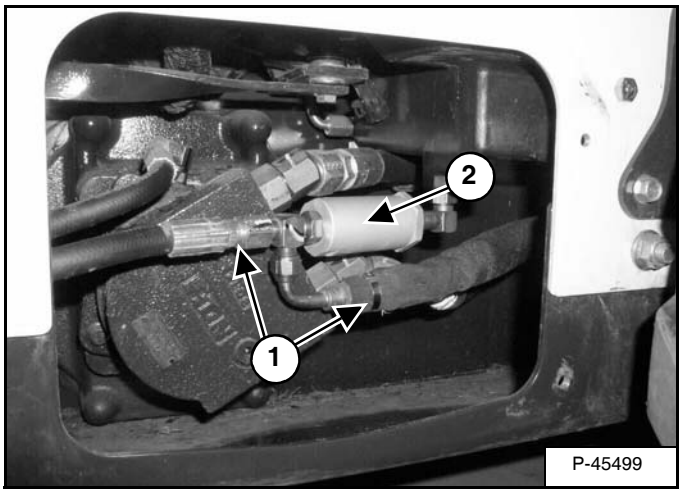
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⚠ WARNING

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

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Figure 10-120-4

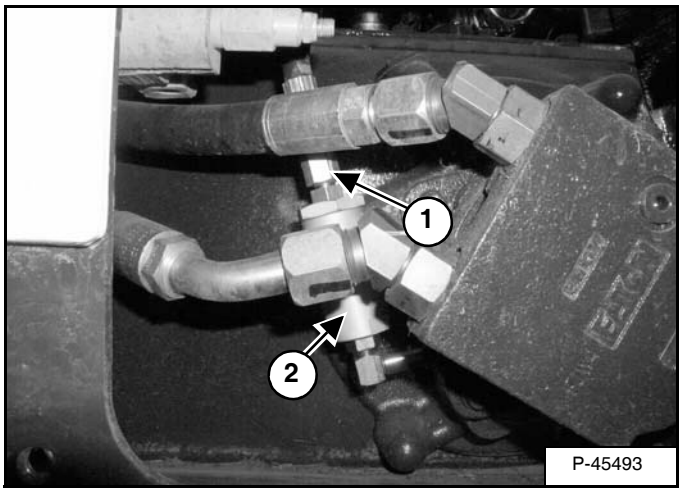


Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the hydraulic fluid reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Disconnect the hoses (Item 1) **[Figure 10-120-4]** from the case drain filter located on the reservoir. Use a plug and cap on the filter hose and case drain hose to prevent leakage.

Figure 10-120-5



Disconnect the hose (Item 1) **[Figure 10-120-5]** from the case drain filter located on the right drive motor. Use a plug and cap on the filter and case drain hose to prevent leakage.

Remove the case drain filters (Item 2) **[Figure 10-120-4]** & **[Figure 10-120-5]** and drain the fluid into a container.

Replace the hydraulic/hydrostatic filter element. (See Replacing Hydraulic/Hydrostatic Filter on Page 10-120-1.)

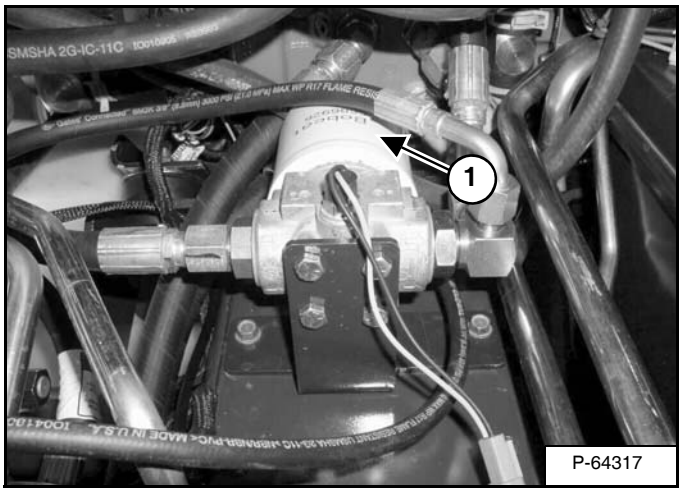
Replace both hydrostatic motor case drain filters (Item 2) **[Figure 10-120-4]** & **[Figure 10-120-5]**.

Connect the hoses to the case drain filters.

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Replacing Hydraulic Fluid (Cont'd)

Figure 10-120-6



On SJC equipped loaders, the hydrostatic charge pressure filter (Item 1) **[Figure 10-120-6]** is located on a bracket mounted to the transmission.

Remove and replace the hydrostatic charge pressure filter.

Add the correct fluid to the reservoir until the fluid level is at the center of the sight gauge (Do not overfill).

Lower the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

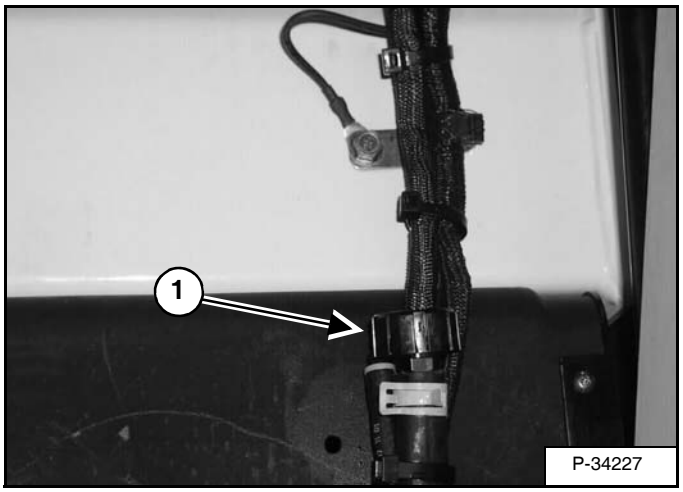
Start the engine and operate the loader hydraulic controls.

Stop the engine and check for leaks.

Check the fluid level in the reservoir and add as needed.

Breather Cap

Figure 10-120-7



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

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the breather cap (Item 1) **[Figure 10-120-7]** and discard.

Install new cap.

Lower the operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

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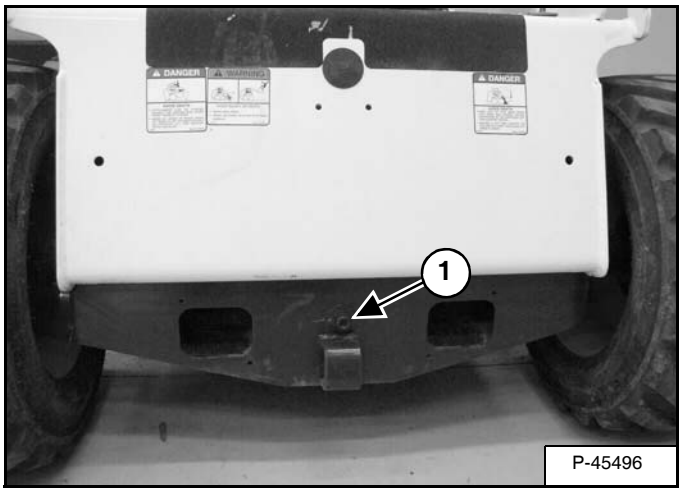


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FINAL DRIVE TRANSMISSION (CHAINCASE)

Checking And Adding Oil

Figure 10-130-1



The chaincase contains the final drive sprockets and chains and uses the same type of oil as the hydraulic/ hydrostatic system. (See LOADER SPECIFICATIONS on Page SPEC-10-1.)

To check the chaincase oil level, use the following procedure:

Stop the loader on a level surface.

Stop the engine.

Remove the plug (Item 1) **[Figure 10-130-1]** from the front of the chaincase housing.

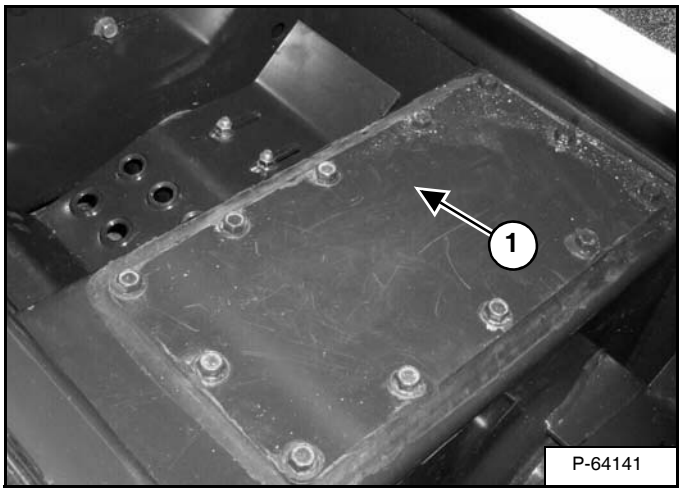
If oil can be reached with the tip of your finger through the hole, the oil level is correct.

If the level is low, add oil through the check plug hole until the oil flows from the hole.

Install and tighten the plug.

Removing Oil From The Chaincase

Figure 10-130-2



Remove the chaincase cover (Item 1) **[Figure 10-130-2]**(See CHAINCASE on Page 40-30-1.)

Use a vacuum pump to extract the fluid from the chain case.

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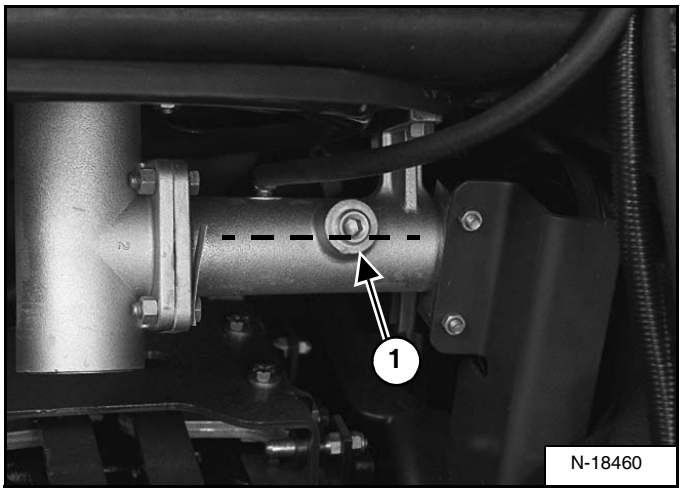


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FAN GEARBOX

Checking And Maintaining

Figure 10-140-1



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

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the plug (Item 1) **[Figure 10-140-1]** to check the lubricant level.

If the level is low, add SAE 90W gear lubricant through the check plug hole until lubricant flows from the hole.

Install and tighten the plug.

Lower the operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

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BOB-TACH

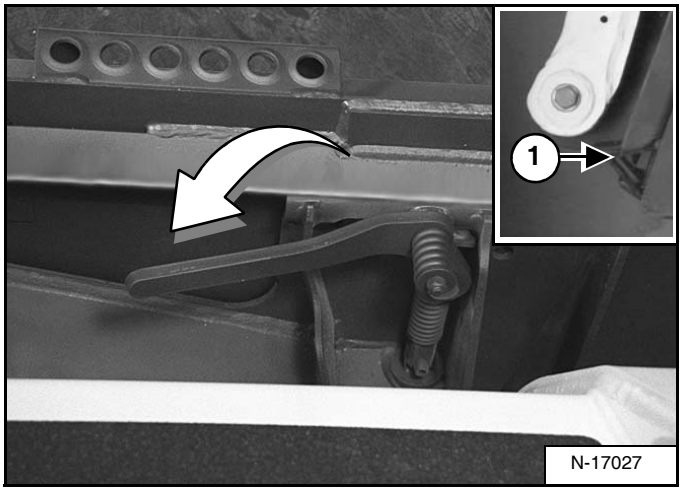
Inspection And Maintenance

WARNING

Bob-Tach wedges must extend through the holes in attachment. Levers must be fully down and locked. Failure to secure wedges can allow attachment to come off and cause injury or death.

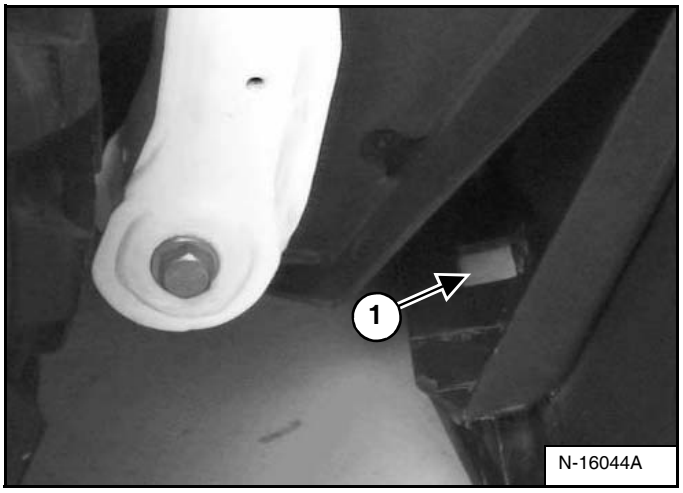
W-2102-0588

Figure 10-150-1



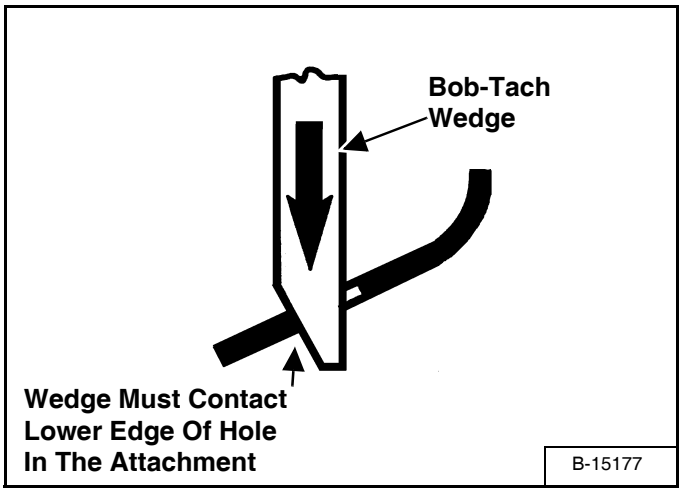
Move the Bob-Tach levers to engage the wedges **[Figure 10-150-1]**. The levers and wedges must move freely.

Figure 10-150-2



The wedges must extend through the holes in the attachment mounting frame (Item 1) **[Figure 10-150-2]**.

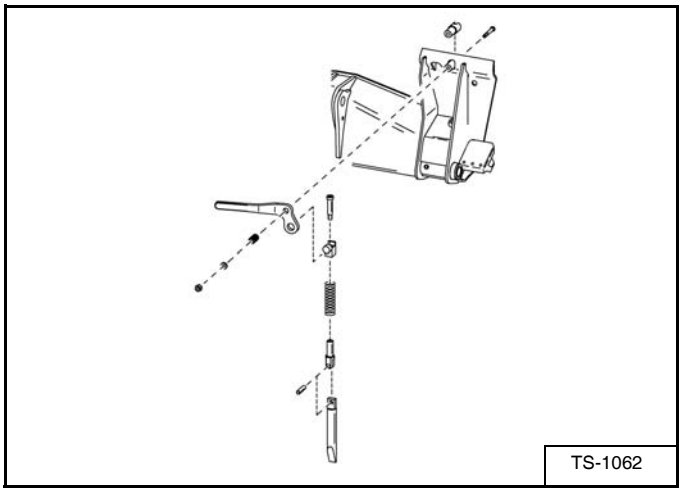
Figure 10-150-3



The spring-loaded wedge (Item 1) **[Figure 10-150-1]** must contact the lower edge of the hole in the attachment (Item 1) **[Figure 10-150-2]** and **[Figure 10-150-3]**.

If the wedge does not contact the lower edge of the hole **[Figure 10-150-2]** and **[Figure 10-150-3]**, the attachment will be loose and can come off the Bob-Tach.

Figure 10-150-4



Inspect the mounting frame on the attachment and the Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-150-4]**. Replace any parts that are damaged, bent, or missing. Keep all fasteners tight.

Look for cracked welds. Contact your Bobcat dealer for repair or replacement parts.

Lubricate the wedges. (See SERVICE SCHEDULE on Page 10-70-1) and (See LUBRICATION OF THE BOBCAT LOADER on Page 10-160-1.)

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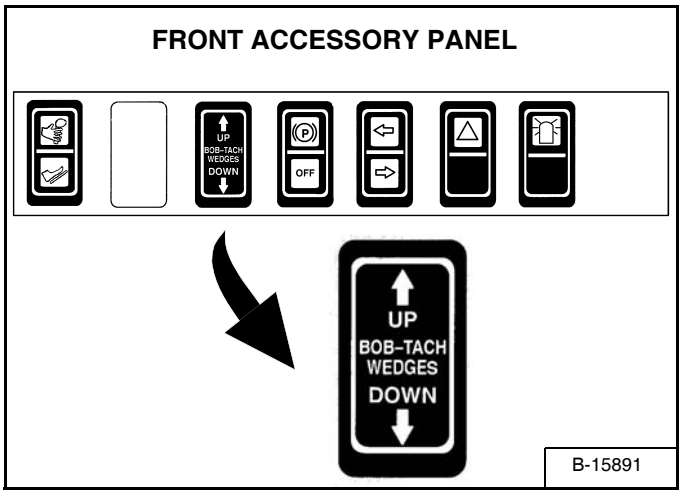


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POWER BOB-TACH (OPTION)

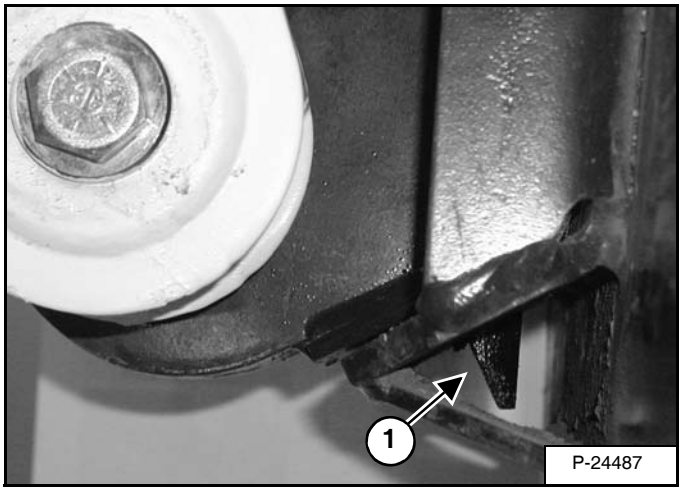
Inspection And Maintenance

Figure 10-151-1



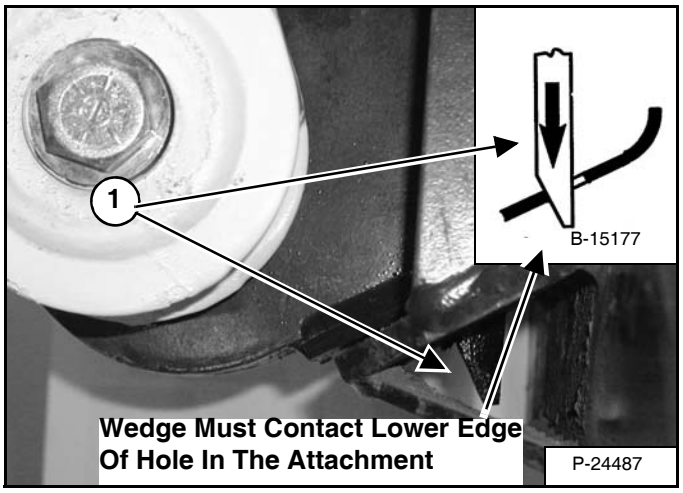
Push and hold the BOB-TACH "WEDGES UP" switch **[Figure 10-151-1]** until wedges are fully raised. Push and hold the BOB-TACH "WEDGES DOWN" switch **[Figure 10-151-1]** until the wedges are fully down. The wedges must move freely.

Figure 10-151-2



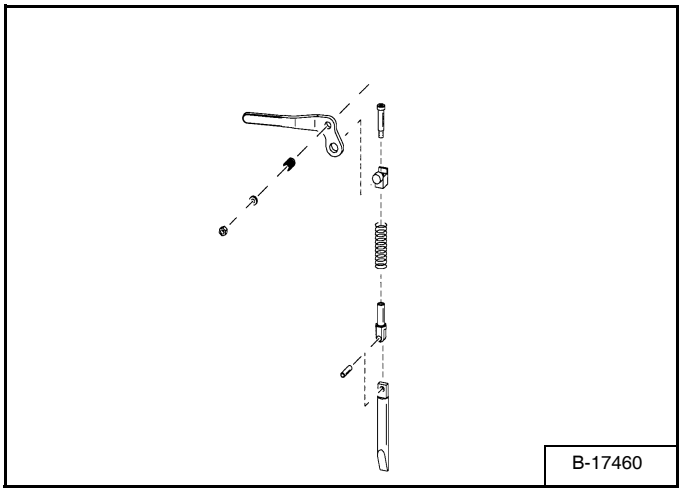
The wedges must extend through the holes in the attachment mounting frame (Item 1) **[Figure 10-151-2]** and must contact the lower edge of the hole in the attachment **[Figure 10-151-2]** and (Item 1) **[Figure 10-151-3]**.

Figure 10-151-3



If the wedge does not contact the lower edge of the hole **[Figure 10-151-3]**, the attachment will be loose and can come off the Bob-Tach.

Figure 10-151-4



Inspect the mounting frame on the attachment and the Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-151-4]**. Replace any parts including decals and lever that are damaged, bent, or missing. Keep all fasteners tight. Inspect the hoses and fittings for leaks.

Look for cracked welds.

Lubricate the wedges. (See SERVICE SCHEDULE on Page 10-70-1) and (See LUBRICATION OF THE BOBCAT LOADER on Page 10-160-1.)

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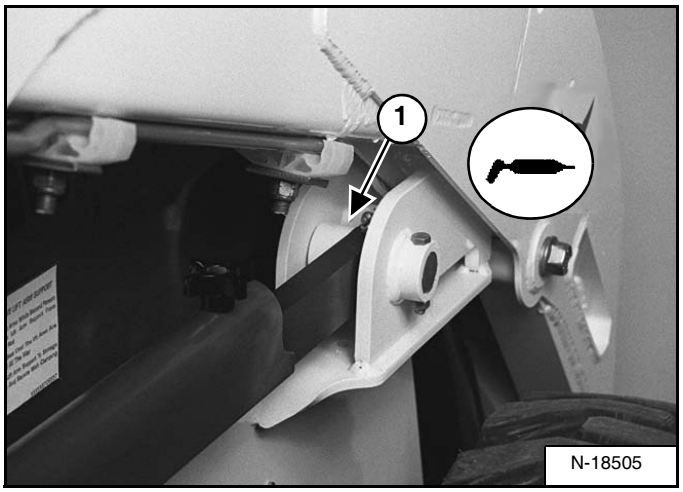


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LUBRICATION OF THE BOBCAT LOADER

Procedure

Figure 10-160-1



Lubricate the loader as specified in the *SERVICE SCHEDULE*, Contents Page 10-01, for the best performance of the loader.

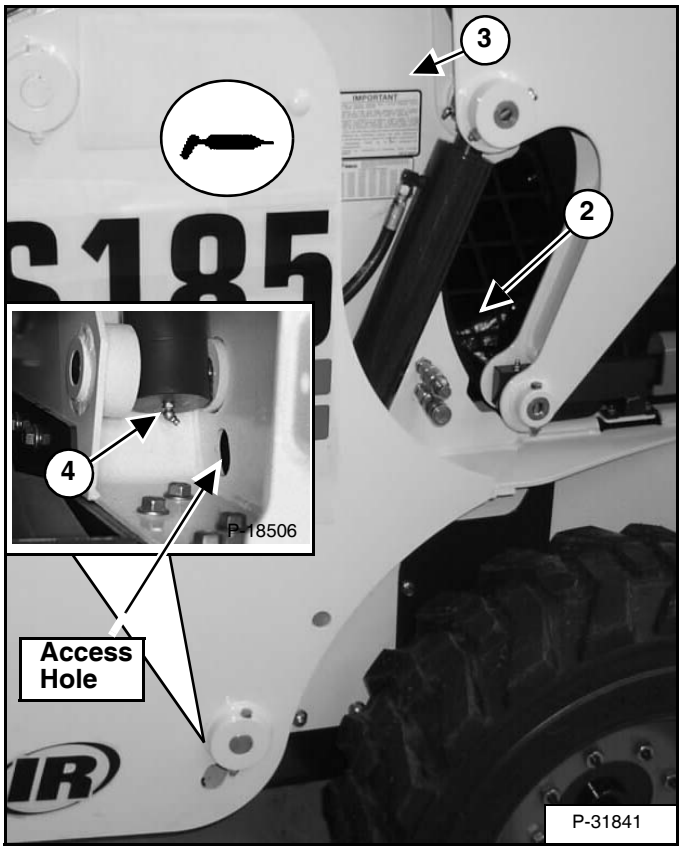
Record the operating hours each time you lubricate the Bobcat loader.

Always use a good quality lithium based multi-purpose grease when you lubricate the loader. Apply lubricant until extra grease shows.

Lubricate the following locations on the loader:

1. Stabilizer Rod - Front (Both Sides) **[Figure 10-160-1]**.

Figure 10-160-2

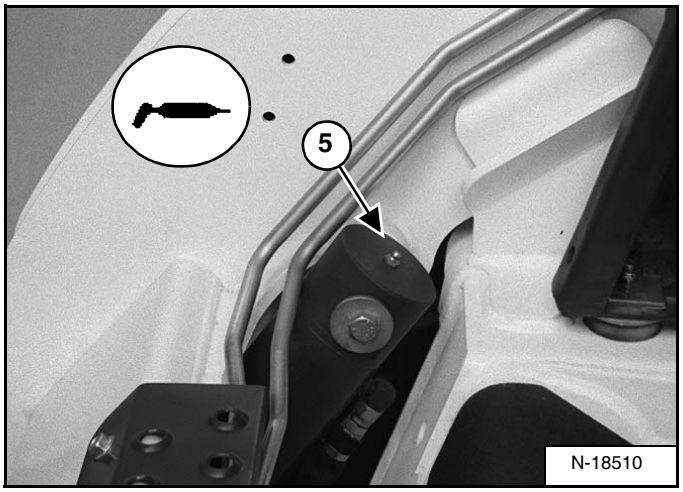


2. Stabilizer Rod - Rear (Both Sides) **[Figure 10-160-2]**

3. Lift Cylinder Rod End (Both Sides) **[Figure 10-160-2]**.

4. Lift Cylinder Base End (Both Sides) **[Figure 10-160-2]**.

Figure 10-160-3

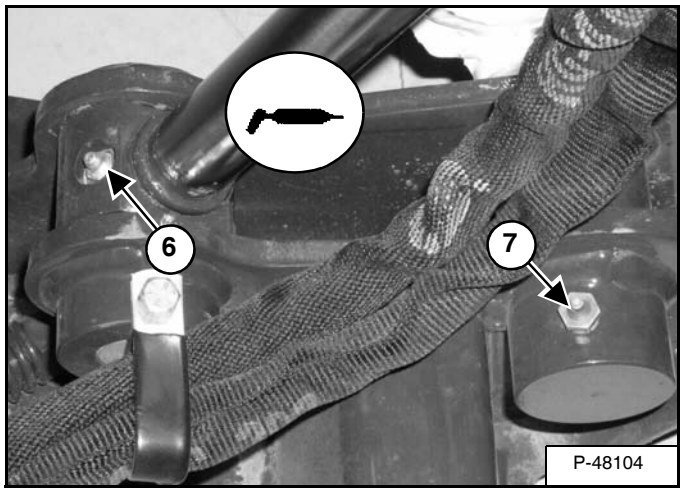


5. Tilt Cylinder Base End (Both Sides) **[Figure 10-160-3]**

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Procedure (Cont'd)

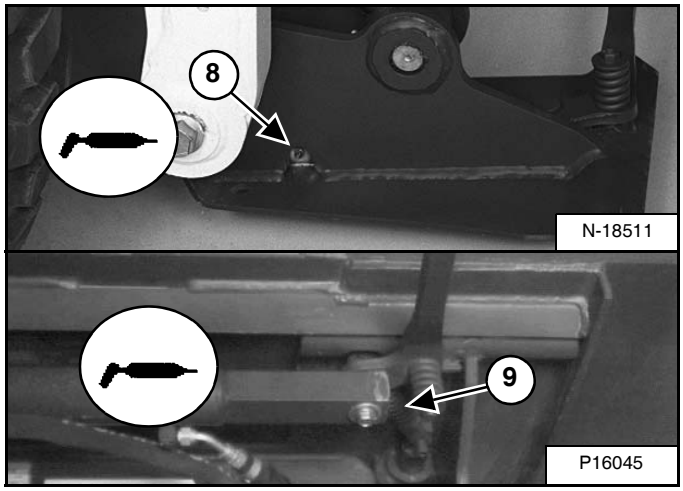
Figure 10-160-4



6. Tilt Cylinder Rod End. **[Figure 10-160-4]**.

7. Bob-Tach Pivot Pin (Both Sides) **[Figure 10-160-4]**.

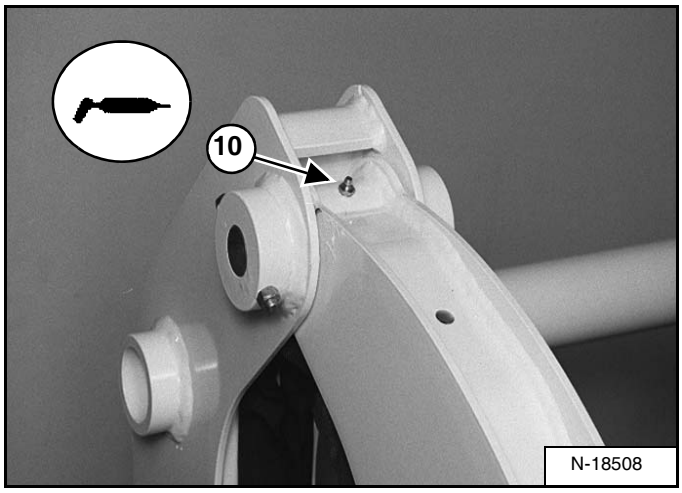
Figure 10-160-5



8. Bob-Tach Wedge (Both Sides) **[Figure 10-160-5]**.

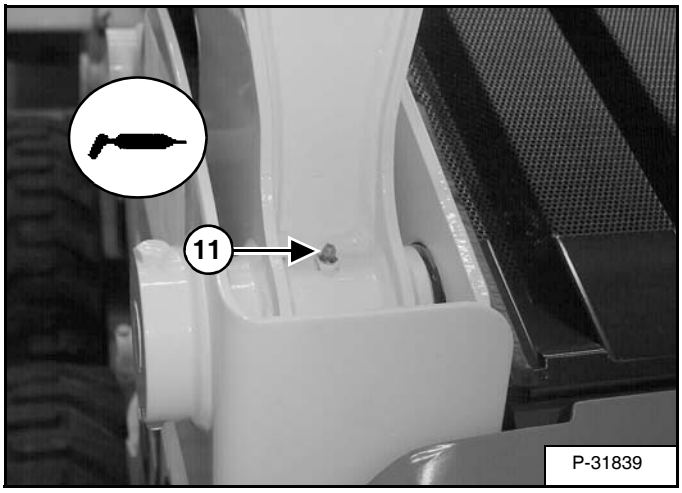
9. Power Bob-Tach Cylinder (Both Sides) **[Figure 10-160-5]**.

Figure 10-160-6



10. Lift Arm Pivot Pin (Both Sides) **[Figure 10-160-6]**.

Figure 10-160-7

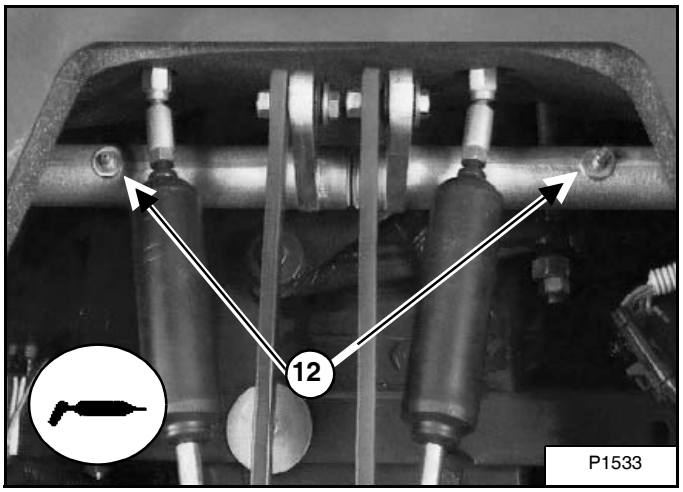


11. Lift Arm Link Pivot Pin (Both Sides) **[Figure 10-160-7]**.

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Procedure (Cont'd)

Figure 10-160-8



12. **250 Hours**: Steering Lever Shaft (2) **[Figure 10-160-8]**.

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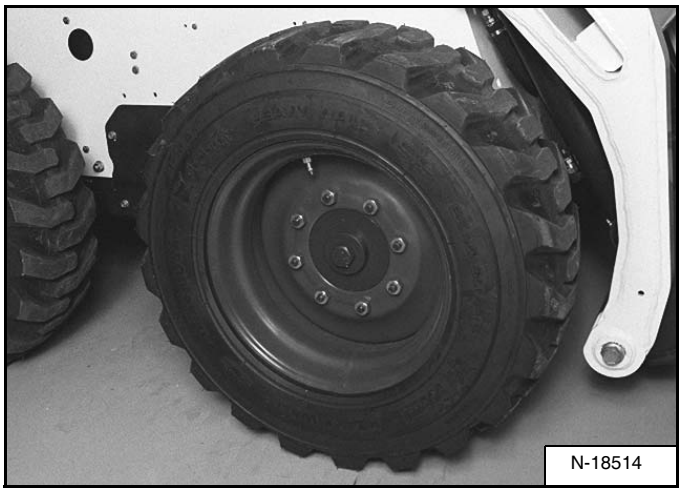


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TIRE MAINTENANCE

Wheel Nuts

Figure 10-170-1



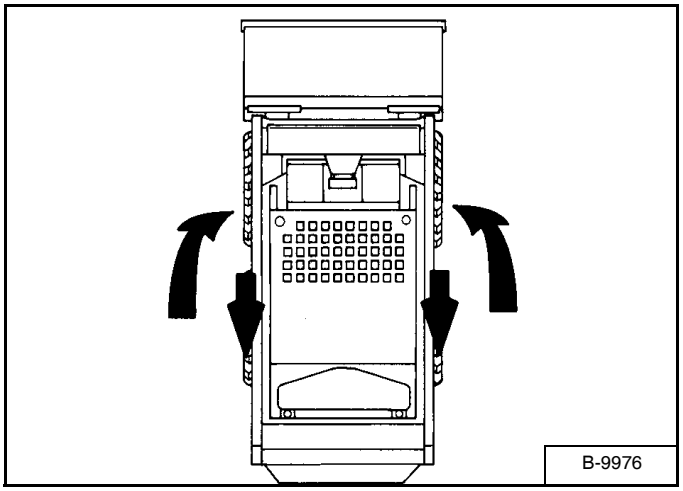
(See SERVICE SCHEDULE on Page 10-70-1), for the service interval to check the wheel nuts **[Figure 10-170-1]**.

When installing wheel nuts, tighten to 160 ft.-lb. (217 N•m) torque.

When checking wheel nut torque, set the torque wrench to 140 ft.-lb. (190 N•m) torque to prevent over-tightening.

Rotating

Figure 10-170-2



Check the tires regularly for wear, damage and pressure. (See Tires on Page SPEC-10-4), for the correct tire pressure.

Rear tires usually wear faster than front tires. To keep tire wear even, move the front tires to the rear and rear tires to the front **[Figure 10-170-2]**.

It is important to keep the same size tires on each side of the loader. If different sizes are used, each tire will be turning at a different rate and cause excessive wear. The tread bars of all the tires must face the same direction.

Recommended tire pressure must be maintained to avoid excessive tire wear and loss of stability and handling capability. Check for the correct pressure before operating the loader.

Mounting

Tires are to be repaired only by an authorized person using the proper procedures and safety equipment.

Tires and rims must always be checked for correct size before mounting. Check rim and tire bead for damage.

The rim flange must be cleaned and free of rust.

The tire bead and rim flange must be lubricated with a rubber lubricant before mounting the tire.

Avoid excessive pressure which can rupture the tire and cause serious injury or death.

During inflation of the tire, check the tire pressure frequently to avoid over inflation.

IMPORTANT

Inflate tires to the MAXIMUM pressure shown on the sidewall of the tire. DO NOT mix brands of tires used on the same loader.

I-2057-0794

⚠ WARNING

Do not inflate tires above specified pressure. Failure to use correct tire mounting procedure can cause an explosion which can result in injury or death.

W-2078-1285

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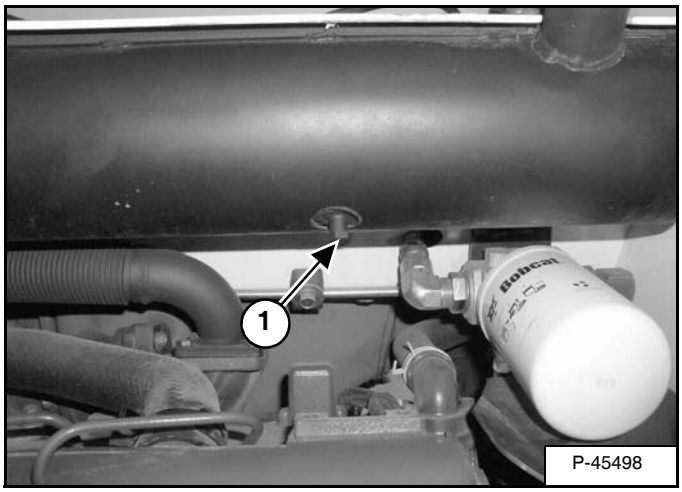


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SPARK ARRESTOR MUFFLER

Cleaning Procedure

Figure 10-180-1



(See SERVICE SCHEDULE on Page 10-70-1), for service interval for cleaning the spark arrestor muffler.

Do not operate the loader with a defective exhaust system.

IMPORTANT

This loader is factory equipped with a U.S.D.A. Forestry Service approved spark arrestor muffler. It is necessary to do maintenance on this spark arrestor muffler to keep it in working condition. The spark arrestor muffler must be serviced by dumping the spark chamber every 100 hours of operation.

If this machine is operated on flammable forest, brush or grass covered land, it must be equipped with a spark arrestor attached to the exhaust system and maintained in working order. Failure to do so will be in violation of California State Law, Section 4442 PRC.

Make reference to local laws and regulations for spark arrestor requirements.

I-2022-0595

Stop the engine. Open the rear door and rear grill.

Remove the plug (Item 1) **[Figure 10-180-1]** from the bottom of the muffler.

⚠ WARNING

When the engine is running during service, the steering levers must be in neutral and the parking brake engaged. Failure to do so can cause injury or death.

W-2006-0284

Start the engine and run for about ten seconds while a second person, wearing safety glasses, holds a piece of wood over the outlet of the muffler.

This will force contaminants out through the cleanout hole.

Stop the engine.

Install and tighten the plug.

Lower the rear grill and close the rear door.

⚠ WARNING

When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-1285

⚠ WARNING

Stop engine and allow the muffler to cool before cleaning the spark chamber. Wear safety goggles. Failure to obey can cause serious injury.

W-2011-1285

⚠ WARNING

Never use machine in atmosphere with explosive dust or gases or where exhaust can contact flammable material. Failure to obey warnings can cause injury or death.

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TIGHTEN ALL HARDWARE PER SIZE TO GRADE 5 TORQUE (SEE STANDARD TORQUE SPECIFICATIONS FOR BOLTS, SPEC SECTION) UNLESS OTHERWISE SPECIFIED.

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HYDRAULIC/HYDROSTATIC SCHEMATIC
S175 (S/N 525211001 - 525214999)
(S/N 525311001 - 525314999)
S185 (S/N 525011001 - 525014999)
(S/N 525111001 - 525114999)

(PRINTED APRIL 2005)
V-0444legend

LEGEND

1. RESERVOIR: Capacity . . . . . 19.2 Qts. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
3. DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (2,5-3,0 Bar) Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
6. RELIEF VALVE - CHARGE INLET: 220-270 PSI (15,1-18,6 Bar) at High Engine Idle With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type 16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN: 3250 - 3350 PSI (224-231 Bar) at Front Quick Couplers
10. RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (241,3 Bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (241,3 Bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 Bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. SHUTTLE RELIEF VALVE (Not Adjustable - Factory Set) 65 PSI (4,5 Bar)
38. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
39. CHECK VALVE - With 80 PSI (5,5 Bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. RELIEF VALVE - PORT: 3500 PSI (241,3 Bar)
43. RELIEF/ANTICAVITATION VALVE - PORT (TILT BASE END) 3500 PSI (241,3 Bar)
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 Bar)
48. RELIEF VALVE - 1200 PSI (83 Bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. CHECK VALVE - With 300 PSI (20,7 Bar) Spring And With 0.016 inch (0,40 mm) Orifice

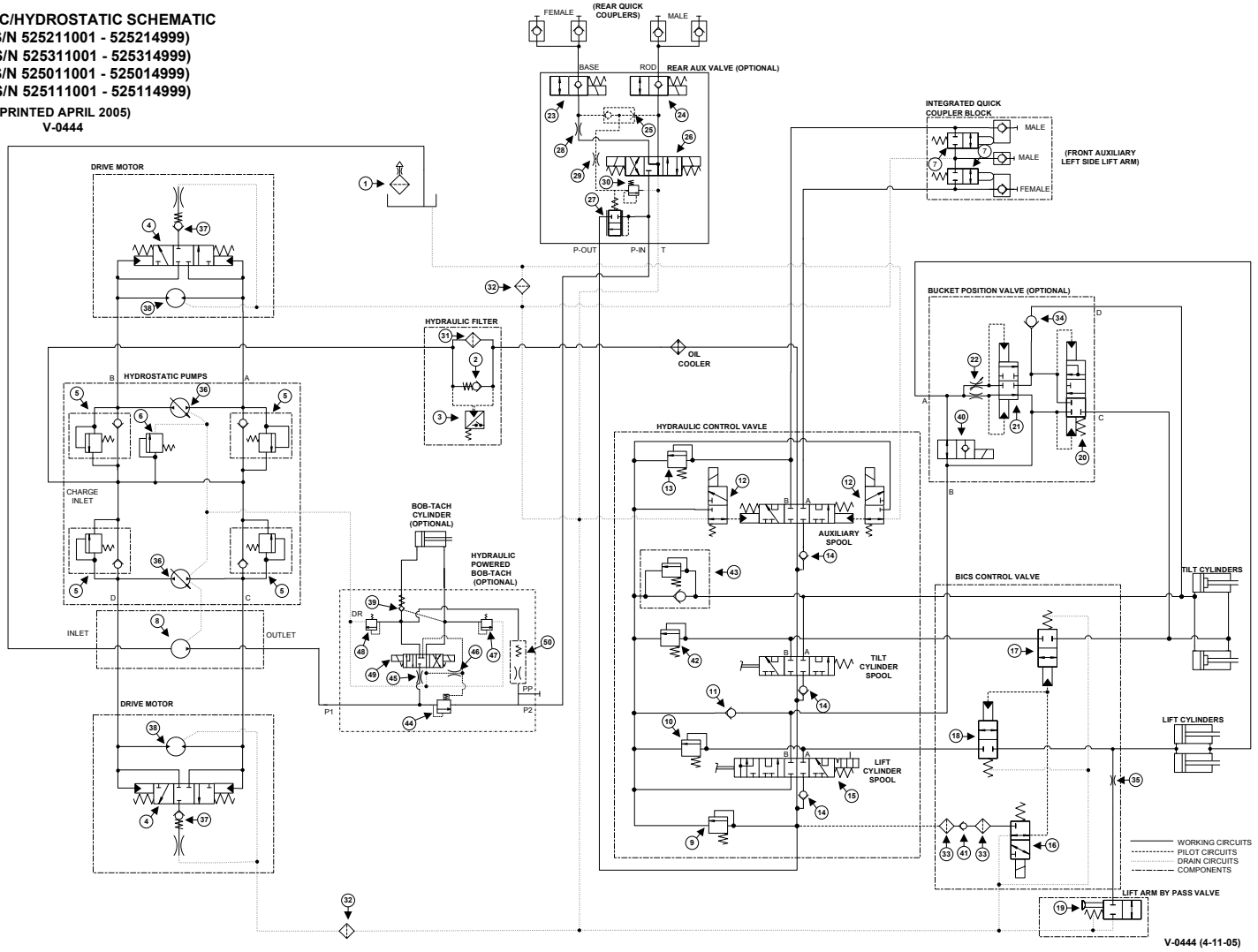
NOTE: Unless otherwise specified springs have NO significant pressure value.

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HYDRAULIC/HYDROSTATIC SCHEMATIC
S175 (S/N 525211001 - 525214999)
(S/N 525311001 - 525314999)
S185 (S/N 525011001 - 525014999)
(S/N 525111001 - 525114999)
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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW OPTION
S175 (S/N 525211001 AND ABOVE)
(S/N 525311001 AND ABOVE)
S185 (S/N 525011001 AND ABOVE)
(S/N 525111001 AND ABOVE)

(PRINTED APRIL 2005)

V-0445legend

LEGEND

1. RESERVOIR: Capacity . . . . . 19.2 Qts. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
3. DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (2,5-3,0 Bar) Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
6. RELIEF VALVE - CHARGE INLET: 220-270 PSI (15,1-18,6 Bar) at High Engine Idle With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type 16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN: 3250-3350 PSI (224-231 Bar) at Front Quick Couplers
10. RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (241,3 Bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (241,3 Bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 Bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. SHUTTLE RELIEF VALVE (Not Adjustable - Factory Set) 65 PSI (4,5 Bar)
38. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
39. CHECK VALVE - With 80 PSI (5,5 Bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. RELIEF VALVE - PORT: 3500 PSI (241,3 Bar)
43. RELIEF/ANTICAVITATION VALVE - PORT (TILT BASE END) 3500 PSI (241,3 Bar)
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 Bar)
48. RELIEF VALVE - 1200 PSI (83 Bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. RELIEF VALVE - 3300 PSI (228 Bar)
51. DUMP VALVE - (ON/OFF)
52. CHECK VALVE
53. AUXILIARY HYDRAULIC PUMP - 9.5 GPM (36 L/min) at High Engine Idle
54. CHECK VALVE - With 300 PSI (20,7 Bar) Spring And With 0.016 inch (0,40 mm) Orifice

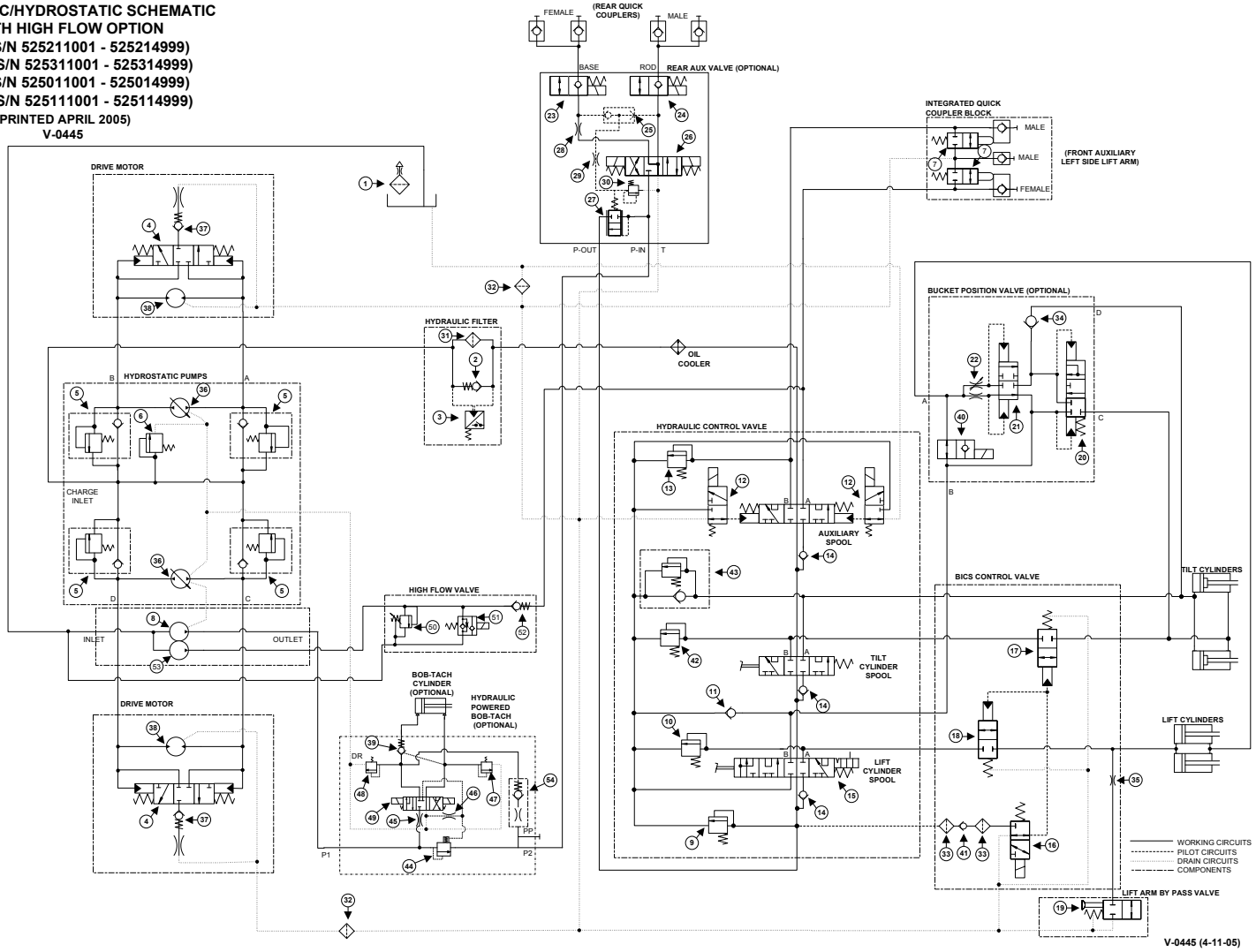
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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW OPTION
S175 (S/N 525211001 - 525214999)
(S/N 525311001 - 525314999)
S185 (S/N 525011001 - 525014999)
(S/N 525111001 - 525114999)
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HYDRAULIC/HYDROSTATIC SCHEMATIC
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)

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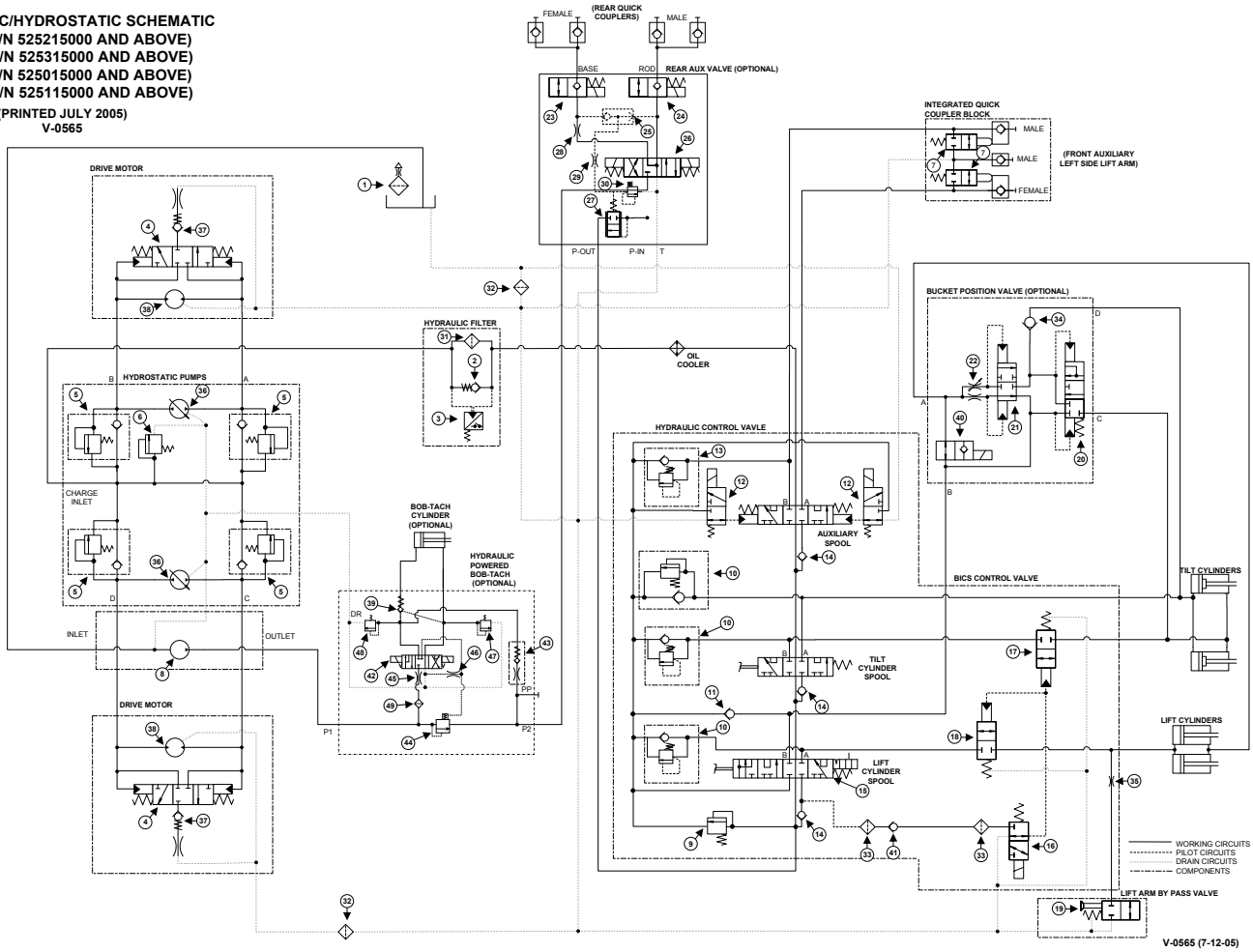
1. RESERVOIR:
   Capacity . . . . . 19.2 Qts. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
3. DIFFERENTIAL PRESSURE SWITCH:
   36-44 PSI (2,5-3,0 Bar)
   Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
6. RELIEF VALVE - CHARGE INLET:
   220-270 PSI (15,1-18,6 Bar)
   at High Engine Idle
   With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type
   16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN:
   3250 - 3350 PSI (224-231 Bar)
   at Front Quick Couplers
10. RELIEF/ANTICAVITATION VALVE - PORT 3500 PSI (241,3 Bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. RELIEF/ANTICAVITATION VALVE - PORT (OPTIONAL) 3500 PSI (241,3 Bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 Bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. SHUTTLE RELIEF VALVE
    (Not Adjustable - Factory Set)
    65 PSI (4,5 Bar)
38. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
39. CHECK VALVE - With 80 PSI (5,5 Bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
43. CHECK VALVE - With 300 PSI (20,7 Bar) Spring And With 0.016 inch (0,40 mm) Orifice
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 Bar)
48. RELIEF VALVE - 1200 PSI (83 Bar)
49. FILTER - BOB-TACH VALVE
    (S/N 525217391 & Above)
    (S/N 525315822 & Above)
    (S/N 525019833 & Above)
    (S/N 525115274 & Above)

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

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HYDRAULIC/HYDROSTATIC SCHEMATIC
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)
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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW OPTION
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)

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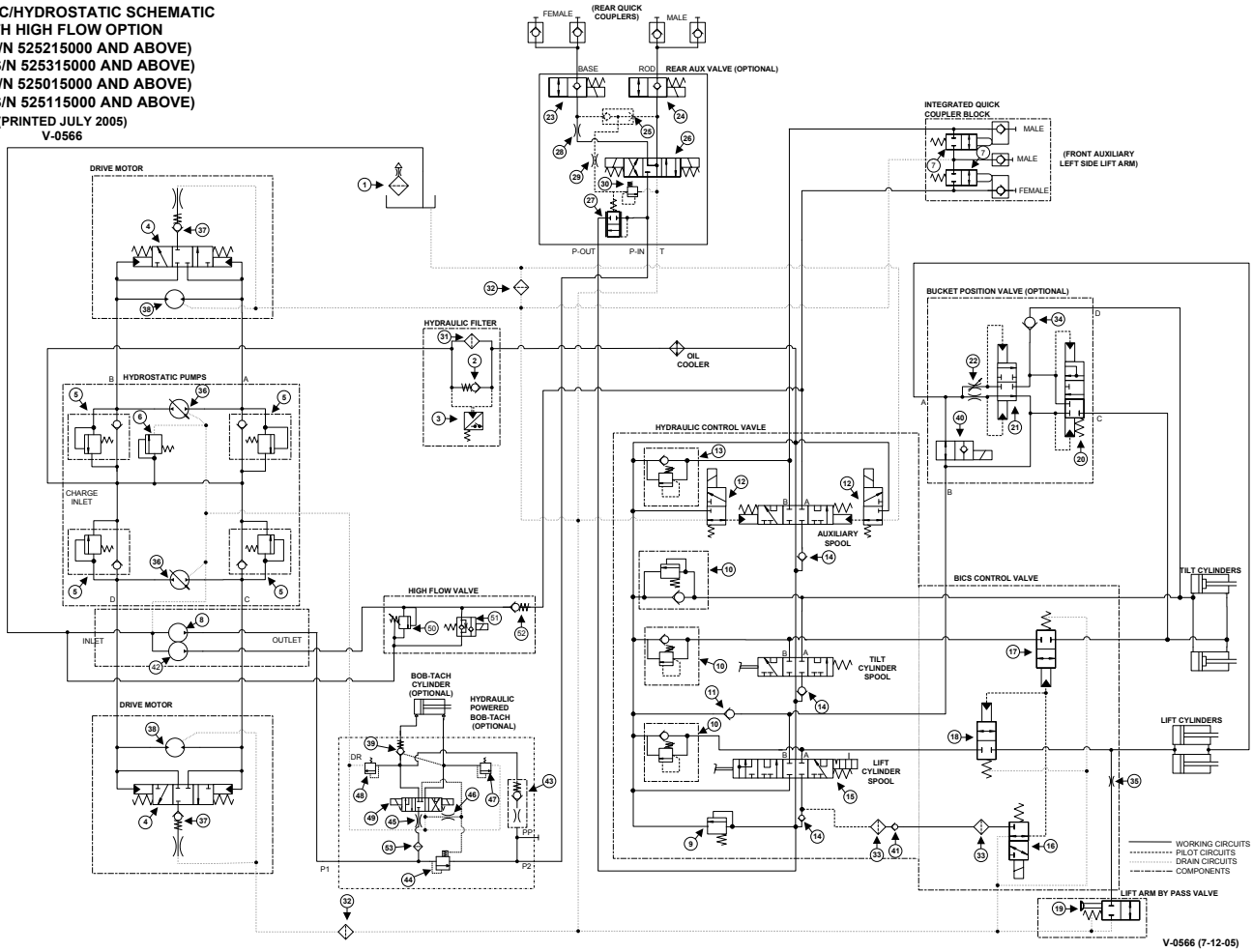
1. RESERVOIR:
   Capacity . . . . . 19.2 Qts. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 Bar)
3. DIFFERENTIAL PRESSURE SWITCH:
   36-44 PSI (2,5-3,0 Bar)
   Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 Bar)
6. RELIEF VALVE - CHARGE INLET:
   220-270 PSI (15,1-18,6 Bar)
   at High Engine Idle
   With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type
   16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN:
   3250-3350 PSI (224-231 Bar)
   at Front Quick Couplers
10. RELIEF/ANTICAVITATION VALVE - PORT 3500 PSI (241,3 Bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. RELIEF/ANTICAVITATION VALVE - PORT (OPTIONAL) 3500 PSI (241,3 Bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 Bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. SHUTTLE RELIEF VALVE
    (Not Adjustable - Factory Set)
    65 PSI (4,5 Bar)
38. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
39. CHECK VALVE - With 80 PSI (5,5 Bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. AUXILIARY HYDRAULIC PUMP - 9.5 GPM (36 L/min) at High Engine Idle
43. CHECK VALVE - With 300 PSI (20,7 Bar) Spring And With 0.016 inch (0,40 mm) Orifice
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 Bar)
48. RELIEF VALVE - 1200 PSI (83 Bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. RELIEF VALVE - 3300 PSI (228 Bar)
51. DUMP VALVE - (ON/OFF)
52. CHECK VALVE
53. FILTER - BOB-TACH VALVE
    (S/N 525217391 & Above)
    (S/N 525315822 & Above)
    (S/N 525019833 & Above)
    (S/N 525115274 & Above)

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

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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW OPTION
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)
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HYDRAULIC/HYDROSTATIC SCHEMATIC
With SJC Option
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)

(PRINTED JULY 2005)

V-0715legend

LEGEND

1. RESERVOIR: Capacity . . . . . 19.2 qt. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 bar)
3. DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (2,5-3,0 bar) Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5250 PSI (362 bar)
6. RELIEF VALVE - CHARGE INLET: 360 PSI (24,8 bar) at High Engine Idle With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type 16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN: 3250-3350 PSI (224-231 bar) at Front Quick Couplers
10. PORT RELIEF/ANTICAVITATION VALVE 3500 PSI (241,3 bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. PORT RELIEF/ANTICAVITATION VALVE: . . . . . (Optional) 3500 PSI (241,3 bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. SHUTTLE RELIEF VALVE (Not Adjustable - Factory Set) 65 PSI (4,5 bar)
38. FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR
39. CHECK VALVE - With 80 PSI (5,5 bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. RESTRICTION - 0.343 inch (8,7 mm)
43. FILTER - Bob-Tach Valve
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 bar)
48. RELIEF VALVE - 1200 PSI (83 bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. CHECK VALVE - With 300 PSI (20,7 bar) Spring with 0.016 inch (0,40 mm) orifice
51. CHARGE PRESSURE SENSOR
52. POSITION SENSOR - Swash Plate
53. SERVO PISTON - Swash Plate
54. SOLENOID ACTIVATED CONTROL VALVE - FORWARD/REVERSE
55. CHARGE PUMP . . . . . Gear Type 12.8 GPM (48,5 L/min.) at High Engine Idle

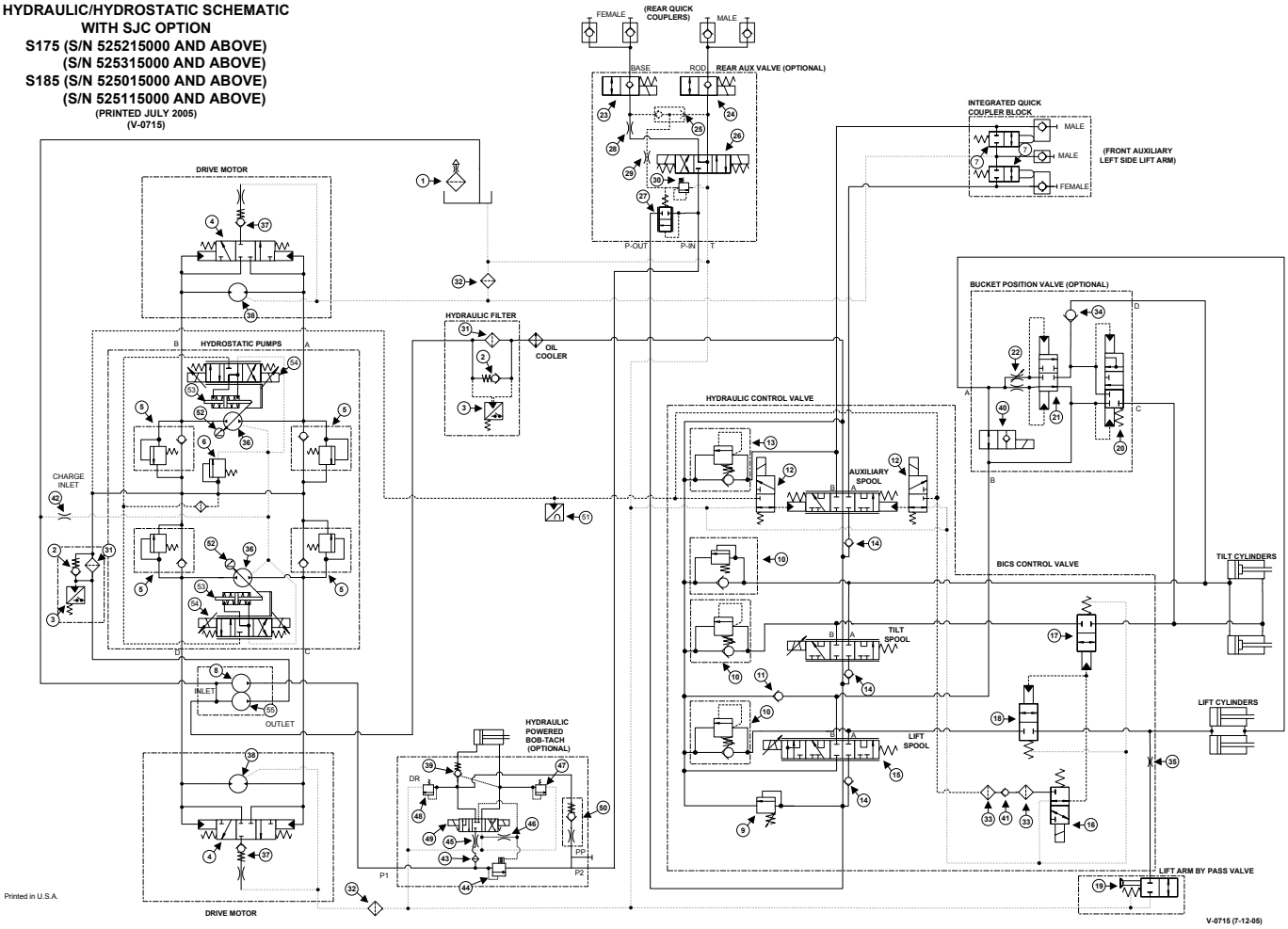
NOTE: Unless otherwise specified, springs have NO significant pressure value.

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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH SJC OPTION
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)
(PRINTED JULY 2005)
(V-0715)



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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH SJC AND HIGH FLOW OPTION
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)

(PRINTED JULY 2005)
V-0716legend

LEGEND

1. RESERVOIR: Capacity . . . . . 19.2 qt. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 bar)
3. DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (2,5-3,0 bar) Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5250 PSI (362 bar)
6. RELIEF VALVE - CHARGE INLET: 360 PSI (24,8 bar) at High Engine Idle With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type 16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN: 3250-3350 PSI (224-231 bar) at Front Quick Couplers
10. PORT RELIEF/ANTICAVITATION VALVE 3500 PSI (241,3 bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. PORT RELIEF/ANTICAVITATION VALVE: . . . . . (Optional) 3500 PSI (241,3 bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 inch (3,6 mm)
29. RESTRICTOR - 0.031 inch (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BI-DIRECTIONAL HYDROSTATIC PUMP
37. SHUTTLE RELIEF VALVE (Not Adjustable - Factory Set) 65 PSI (4,5 bar)
38. FIXED CAPACITY DISPLACEMENT BI-DIRECTIONAL HYDROSTATIC MOTOR
39. CHECK VALVE - With 80 PSI (5,5 bar) Spring
40. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)
41. CHECK VALVE - BICS CONTROL VALVE
42. RESTRICTION - 0.343 inch (8,7 mm)
43. FILTER - Bob-Tach Valve
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 inch (2,26 mm)
46. RESTRICTION - 0.025 inch (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 bar)
48. RELIEF VALVE - 1200 PSI (83 bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. RELIEF VALVE - 3300 PSI (228 bar)
51. DUMP VALVE - (ON/OFF)
52. CHECK VALVE
53. AUXILIARY HYDRAULIC PUMP - 9.5 GPM (36 L/min) at High Engine Idle
54. CHECK VALVE - With 300 PSI (20,7 bar) Spring with 0.016 inch (0,40 mm) orifice
55. SOLENOID ACTIVATED CONTROL VALVE - FORWARD/REVERSE
56. SERVO PISTON -Swash Plate
57. POSITION SENSOR -Swash Plate
58. CHARGE PRESSURE SENSOR
59. CHARGE PUMP - 12.8 GPM (48,5 L/min) at High Engine Idle

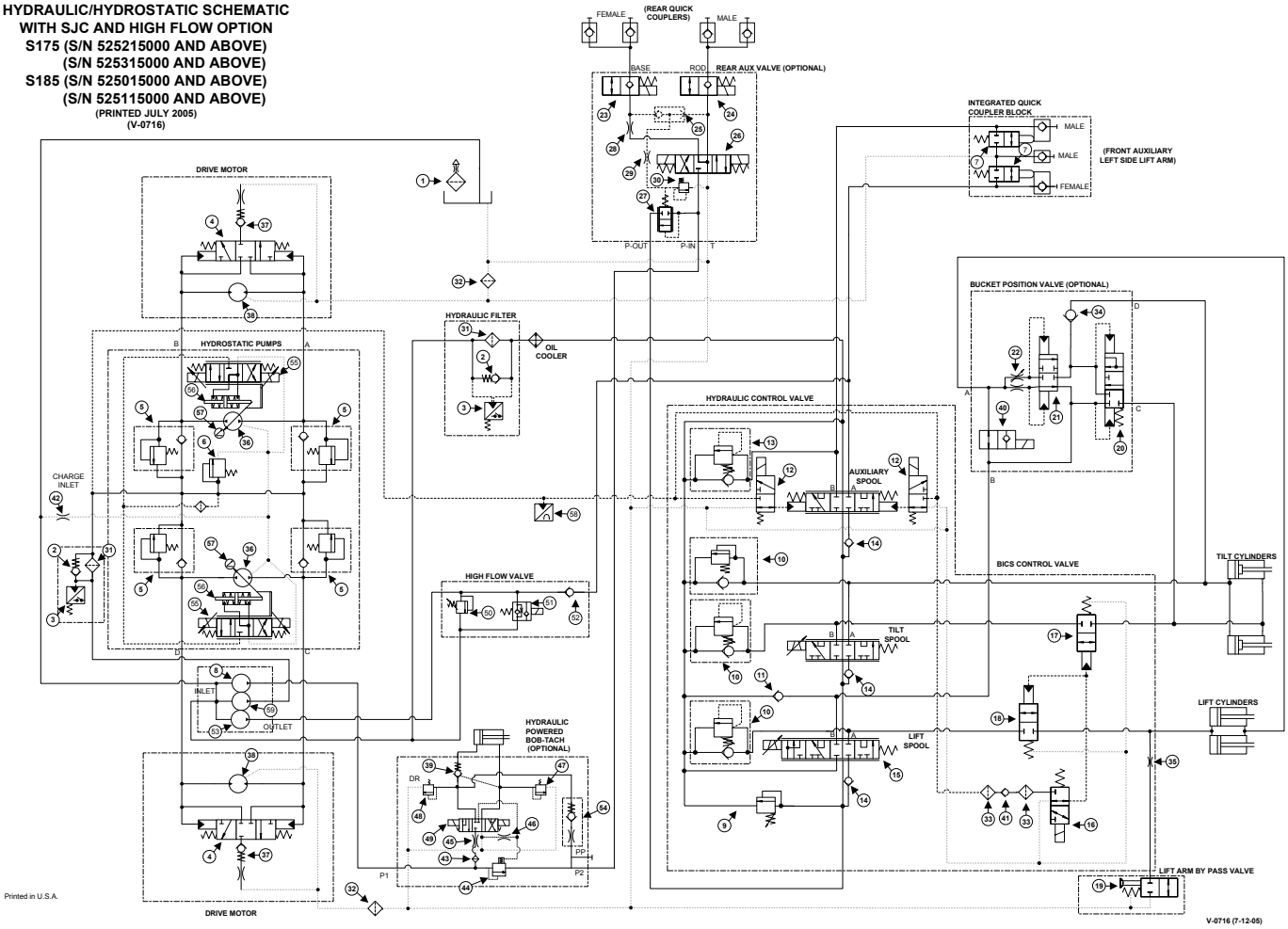
NOTE: Unless otherwise specified, springs have NO significant pressure value.

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HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH SJC AND HIGH FLOW OPTION
S175 (S/N 525215000 AND ABOVE)
(S/N 525315000 AND ABOVE)
S185 (S/N 525015000 AND ABOVE)
(S/N 525115000 AND ABOVE)
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GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR LOADERS

SYMBOL DESCRIPTION

FLOW LINES and CONNECTIONS

WORKING CIRCUITS - Continuous, Solid Line - Working (Main) Line, Return Line (line conducting fluid from working devices to the reservoir) and Feed Line (main line conductor)

PILOT PRESSURE - Dashed Line - Pilot Line (line which conducts control fluid)

DRAIN CIRCUITS - Dotted Line - Drain Line (drain or bleed line - line conducting fluid from a component housing to the reservoir)

COMPONENTS - Long Chain Line - Enclosure outline for several components assembled in one unit

MECHANICAL CONNECTIONS - Double Line (Shaft, Lever, Piston Rod)

CONNECTED JUNCTION OF OIL LINES (Flow Line Connection)

OIL LINES CROSSING (NOT Connected)

COUPLER - Quick-Acting Coupling (uncoupled, closed by non-return valve)

SYMBOL DESCRIPTION

BASIC and MISCELLANEOUS SYMBOLS

RESTRICTION - Line with Fixed Restriction - Affected by Viscosity (property of resistance to flowing fluid)

VARIABLE ADJUSTMENT RESTRICTION - Regulated or Variable Restriction

TEMPERATURE CONTROL - (indication of temperature)

TEMPERATURE INDICATOR - (temperature measurement - thermometer)

FILTER (strainer or screen) - For fluid conditioning

VENTED AND FILTERED RESERVOIR (reservoir open to atmosphere)

OIL COOLER (heat exchanger) - The arrows in the diamond indicate the extraction of heat (heat dissipation)

PRESSURE SENSOR - Varies electric signal with pressure

DIFFERENTIAL PRESSURE SWITCH - Switch activates when pressure difference reaches specified level

PRESSURE SWITCH - Switch activates when pressure reaches specified level

MUFFLER (silencer) - Reduces noise

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GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR LOADERS

SYMBOL DESCRIPTION

CYLINDER: Equipment to convert hydraulic energy into linear energy and in which the fluid pressure operates alternately in both directions (forward and backward strokes)



DOUBLE ACTING HYDRAULIC CYLINDER, UNEQUAL DISPLACEMENT - With single piston rod



DOUBLE ACTING HYDRAULIC CYLINDER, UNEQUAL DISPLACEMENT and CUSHION ON ONE END - With single piston rod

PUMP: To convert mechanical energy into hydraulic energy



FIXED CAPACITY DISPLACEMENT HYDRAULIC PUMP - With one direction of flow



VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDRAULIC PUMP - With two directions of flow (bidirectional)

MOTOR: To convert hydraulic energy into rotary mechanical energy



FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDRAULIC MOTOR - With two directions of flow (bidirectional)

SYMBOL DESCRIPTION

CONTROL MECHANISMS



CONTROL VALVE WITH DETENT (Holds Valve in Position) - device for maintaining a given position (mechanical)



CONTROL VALVE ACTIVATED BY A PULL BUTTON (manual)



CONTROL VALVE ACTIVATED BY A PUSH-PULL BUTTON (manual)



CONTROL VALVE ACTIVATED BY A LEVER (manual)



CONTROL VALVE ACTIVATED BY A PEDAL (manual)



CONTROL VALVE WITH SPRING RETURN (mechanical)



CONTROL VALVE ACTIVATED BY AN ELECTRIC SOLENOID (electrical)



CONTROL VALVE ACTIVATED BY PILOT PRESSURE (indirect control, pilot actuated by application of pressure)

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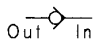
MC 2340-2 (6-2-98)

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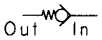
GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR LOADERS

SYMBOL DESCRIPTION

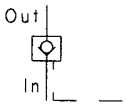
NON-RETURN VALVE, SHUTTLE VALVE: Valve which allows free flow in one direction only



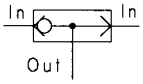
NON-RETURN VALVE (Check Valve) - Used as Replenishing Valve, Load Check Valve or Anticavitation Valve - Opens if the Inlet pressure is higher than the Outlet pressure. Often contains internal spring which has NO significant pressure value



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

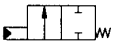
DIRECTIONAL CONTROL VALVE: Valve providing for the opening (fully or restricted) or the closing of one or more flow paths (represented by several squares)



TWO PORTS and CLOSED FLOW PATHS



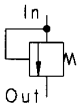
SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) - controlled by an electric solenoid (with return spring)



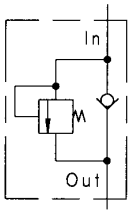
PILOT ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) - controlled by pressure (with return spring)

SYMBOL DESCRIPTION

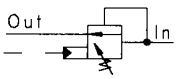
PRESSURE CONTROL VALVE: Valve ensuring the control of pressure



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

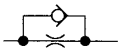


RELIEF/REPLENISHING VALVE or RELIEF/ANTICAVITATION VALVE - When the Inlet pressure overcomes the opposing force of the spring, the valve opens permitting flow from the Outlet port - Allows free flow in the opposite direction



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

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

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Troubleshooting Chart

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

WARNING

Check for correct function after adjustments, repairs or service. Failure to make correct repairs or adjustments can cause injury or death.

W-2004-1285

PROBLEM	CAUSE
The hydraulic system will not operate.	1, 2, 3, 5, 8
The transmission warning light come ON when hydraulics are operating.	1, 3
Slow hydraulic system action.	1, 3, 4, 6, 8
Hydraulic action is not smooth.	1, 4, 5, 6, 7
Lift arms go up slowly at full engine RPM	1, 3, 4, 5, 6, 7, 8, 9
The lift arms or Bob-Tach will move when the pedal is in neutral position	4
The lift arms come down with the pedal is in neutral position	4, 9, 10, 11
By-pass valve stuck	12
By-pass valve stem bent or broke	13

KEY TO CORRECT CAUSE

1. The fluid level is not correct.
2. The pedal linkage is disconnected.
3. The hydraulic pump has damage.
4. The pedal linkage is not adjusted correctly.
5. Relief valve is not at the correct pressure.
6. Suction leak on the inlet side of the hydraulic pump.
7. Fluid is cold. Wrong viscosity fluid. (See LOADER SPECIFICATIONS on Page SPEC-10-1.)
8. Using the loader for more than its rated capacity.
9. Internal leak in the lift cylinder(s).
10. External leak from the cylinder(s).
11. Damaged lift spool.
12. Rotate shaft.
13. Replace manual spool cartridge.

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CYLINDER (LIFT)

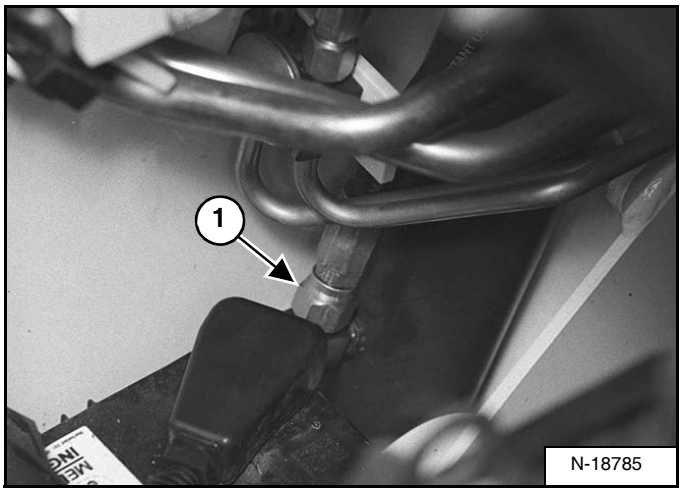
Checking

WARNING

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

W-2072-0496

Figure 20-20-1



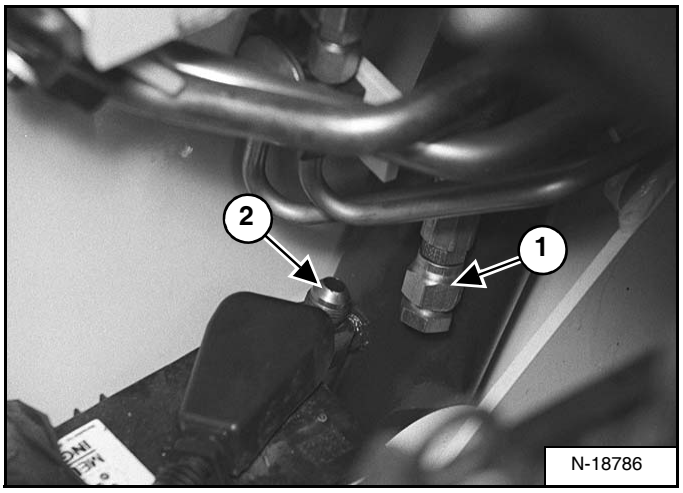
Lower the lift arms. Stop the engine. Pull up on the lift arm by-pass control and move the lift pedal to release the hydraulic pressure. Raise the seat bar.

Check only one cylinder at a time. Open the rear door.

Disconnect the negative ground cable to the battery.

Disconnect the hose (Item 1) **[Figure 20-20-1]** from the lift cylinder base end port.

Figure 20-20-2



Install a plug in the hose (Item 1) **[Figure 20-20-2]** and tighten.

Connect the negative ground cable to the battery.

Engage the parking brake. Lower the seat bar. Start the engine. Press the PRESS TO OPERATE BUTTON. Push the top (toe) of the lift pedal.

If there is any leakage from the base end cylinder port (Item 2) **[Figure 20-20-2]**, remove the lift cylinder for repair.

Repeat the procedure to check the other lift cylinder.

WARNING

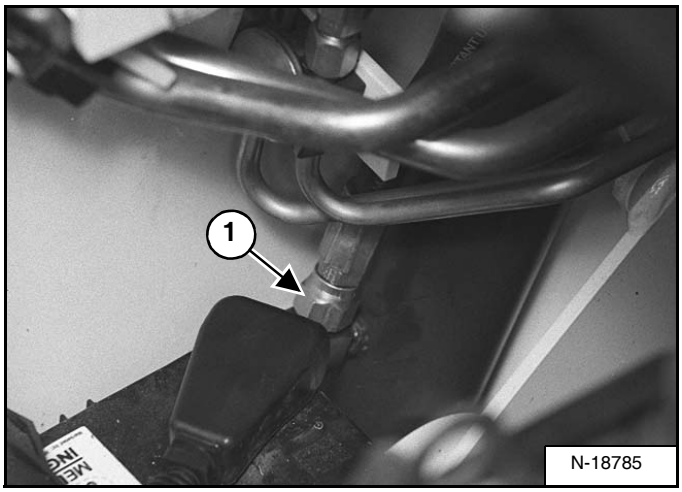
Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire which can result in injury or death.

W-2103-1285

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Removal And Installation

Figure 20-20-3



Stop the engine. Pull up on the lift arm by-pass control to release the hydraulic pressure.

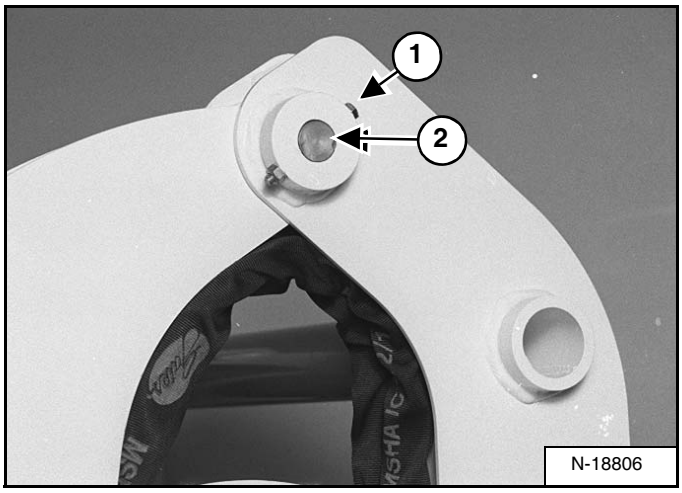
Open the rear door.

Disconnect the negative ground cable to the battery.

Disconnect the hose (Item 1) **[Figure 20-20-3]** from the lift cylinder base end port.

Install a plug in the hose and tighten.

Figure 20-20-4



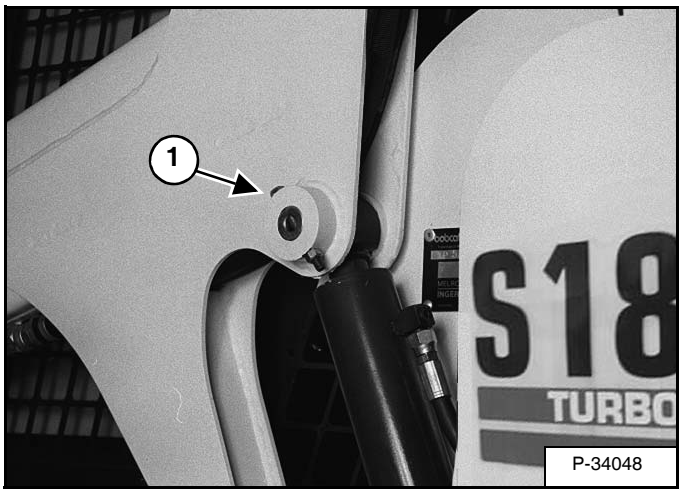
Remove the retainer bolt (Item 1) **[Figure 20-20-4]** and nut from the lift arm pin (both sides).

Installation: Tighten the bolt and nut to standard torque.

Use a drift pin and hammer, remove the lift arm pivot pin (Item 2) **[Figure 20-20-4]** (both sides).

Roll the lift arm link back.

Figure 20-20-5



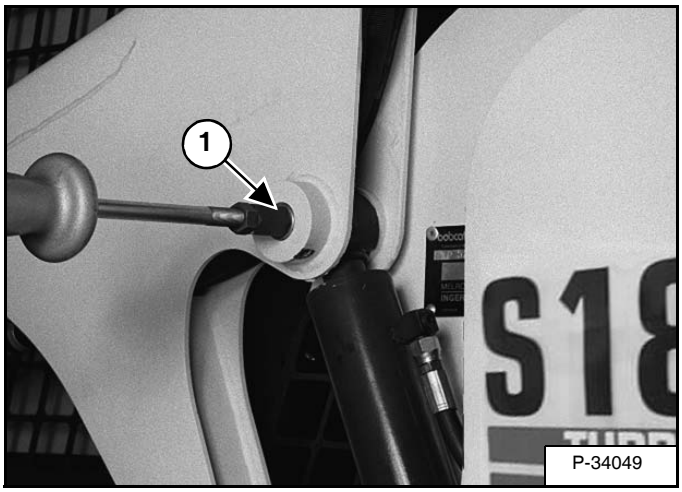
Remove the retainer bolt (Item 1) **[Figure 20-20-5]** and nut from the lift cylinder rod end pivot pin (both sides).

Installation: Tighten the bolt and nut to standard torque.

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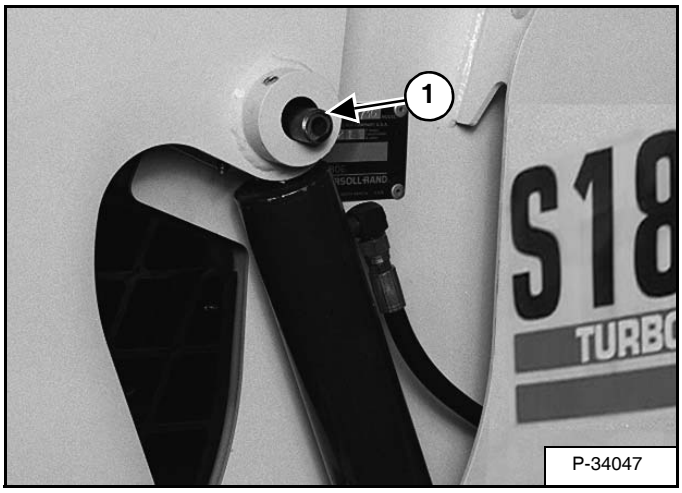
Removal And Installation (Cont'd)

Figure 20-20-6



Use a slide hammer, remove the lift cylinder rod end pivot pin (Item 1) **[Figure 20-20-6]**.

Figure 20-20-7

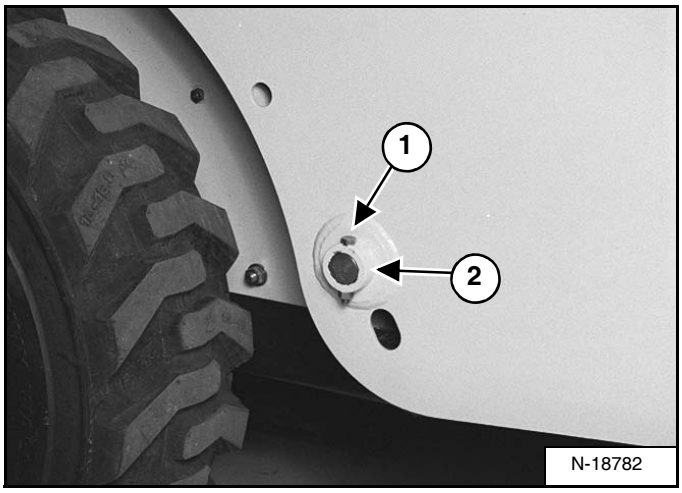


Install a smaller pin (Item 1) **[Figure 20-20-7]** to hold the cylinder in place.

Disconnect the hose (item 2) **[Figure 20-20-7]** from the lift cylinder rod end port.

Install a plug in the hose and tighten.

Figure 20-20-8



Remove the retainer bolt (Item 1) **[Figure 20-20-8]** and nut from the lift cylinder pivot pin.

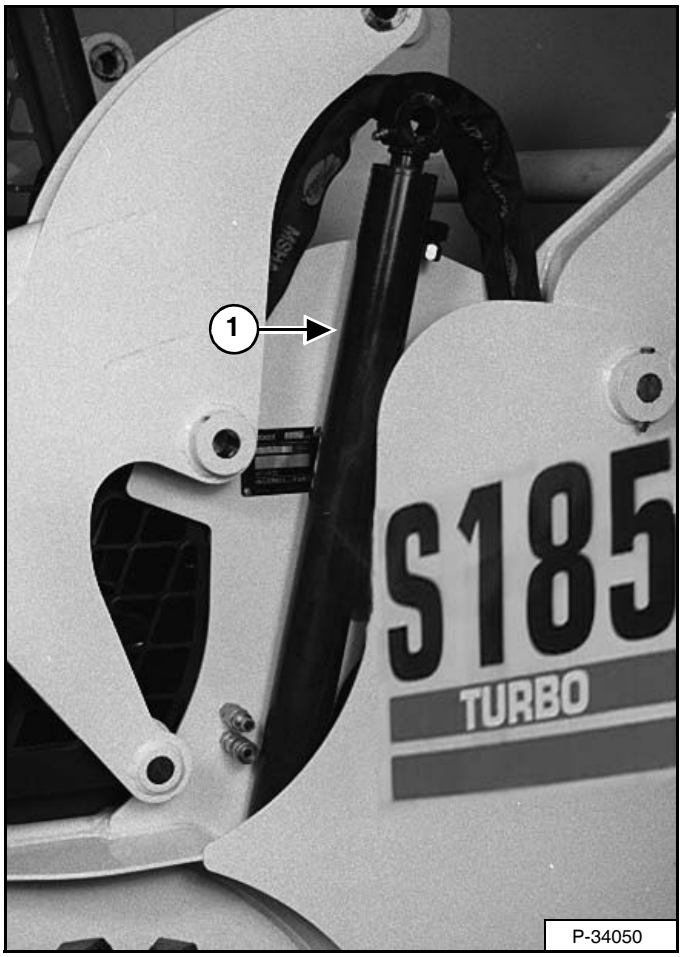
Installation: Tighten the bolt and nut to standard torque.

Use a drift pin and hammer, remove the lift arm pivot pin (Item 2) **[Figure 20-20-8]**.

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Removal And Installation (Cont'd)

Figure 20-20-9

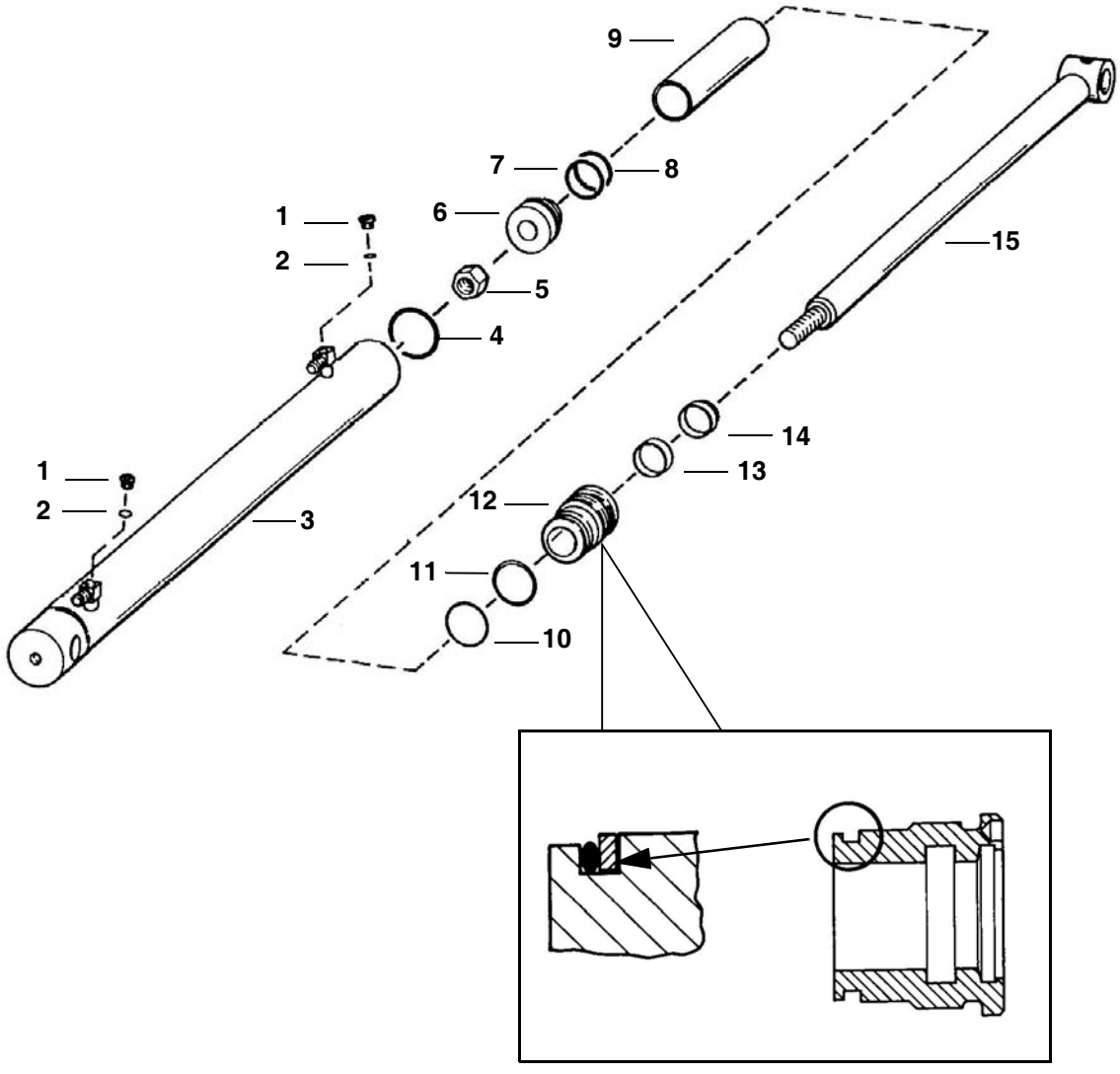


Remove the smaller pin (Item 1) **[Figure 20-20-7]** and lift the lift cylinder (Item 1) **[Figure 20-20-9]** out from the loader.

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Identification

1. Plug
2. O-ring
3. Cylinder
4. O-ring
5. Nut
6. Piston
7. Seal
8. O-ring
9. Spacer
10. Seal
11. O-ring
12. Head
13. Rod Seal
14. Wiper Seal
15. Rod



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Disassembly

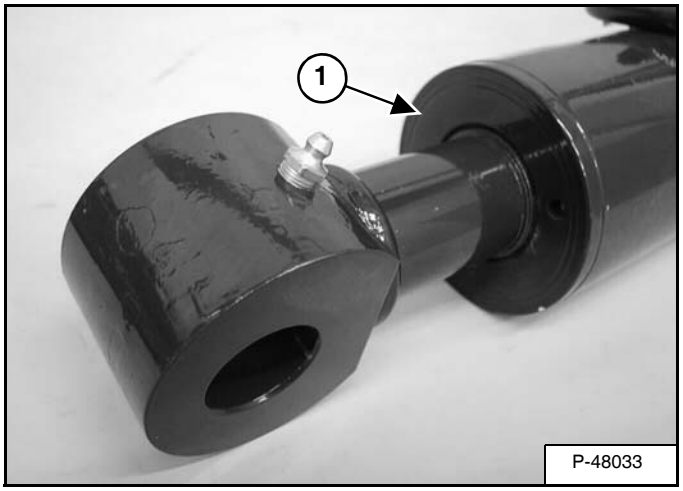
Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook
Spanner Wrench

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

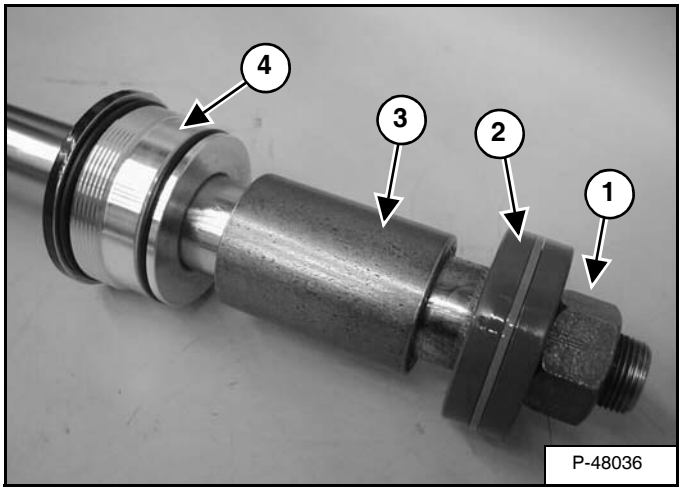
Put the base end of the cylinder in a vise.

Figure 20-20-10



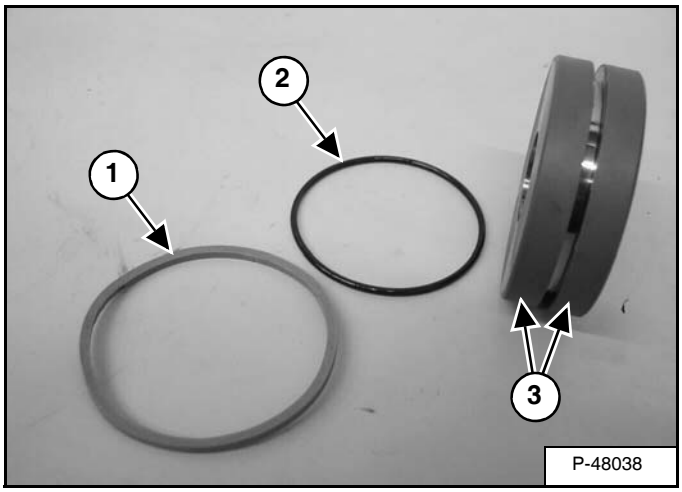
Use a spanner wrench to loosen the head (Item 1) **[Figure 20-20-10]** from the cylinder case.

Figure 20-20-11



Remove the nut (Item 1), piston (Item 2), spacer (Item 3) and head (Item 4) **[Figure 20-20-11]**.

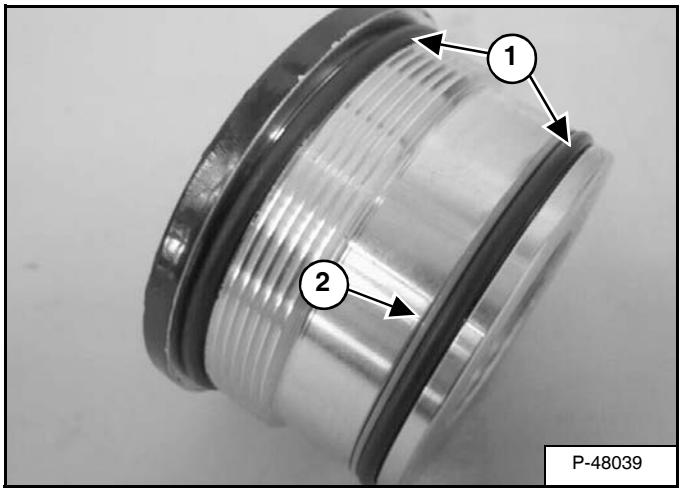
Figure 20-20-12



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

NOTE: If the fiber surface (Item 3) [Figure 20-20-12] on the piston head, becomes damaged, the complete piston head must be replaced.

Figure 20-20-13

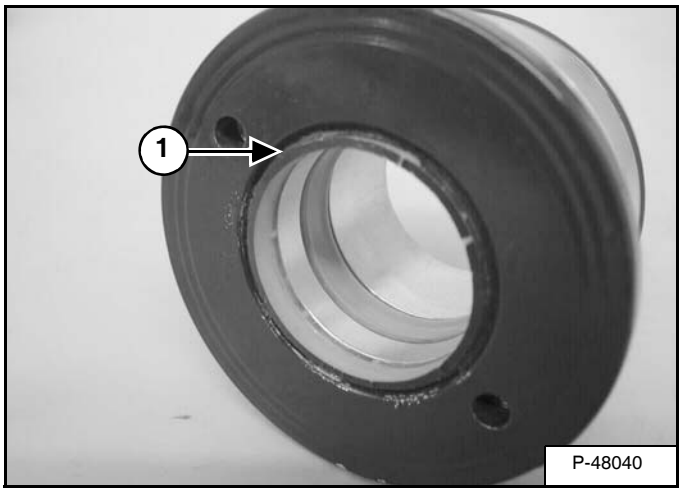


Remove the two O-rings (Item 1) and the back-up washer (Item 2) **[Figure 20-20-13]** from the cylinder head.

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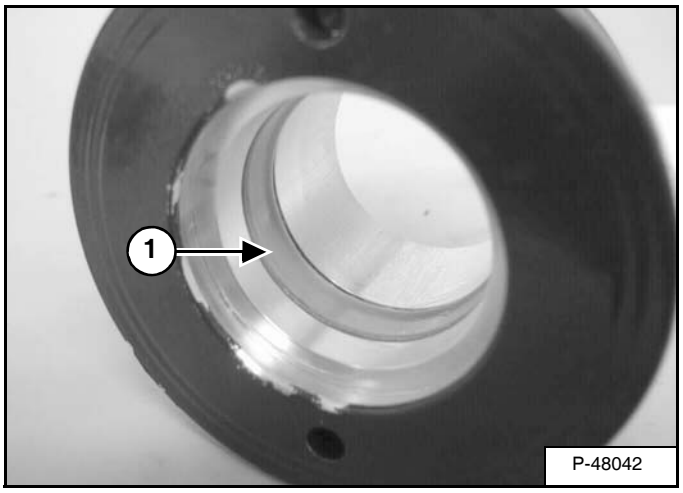
Disassembly (Cont'd)

Figure 20-20-14



Remove the wiper seal (Item 1) **[Figure 20-20-14]** from the cylinder head.

Figure 20-20-15



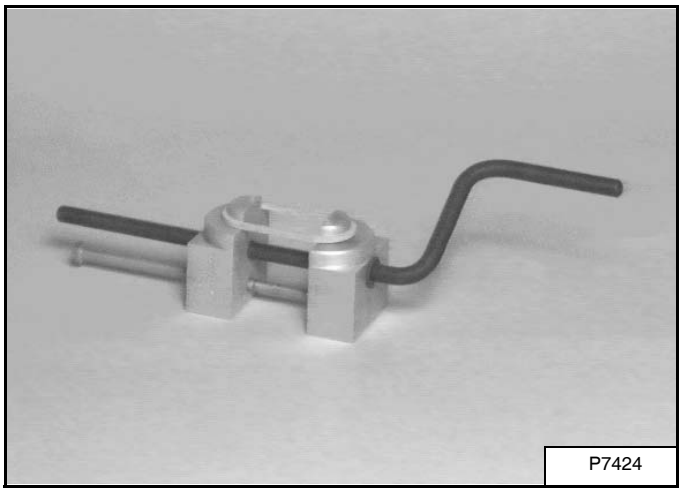
Remove the rod seal (Item 1) **[Figure 20-20-15]** from the cylinder head.

Assembly

Use the following tools to assemble the cylinder:

MEL1396 - Seal Installation Tool
MEL1033 - Rod Seal Installation Tool
Piston Ring Compressor
Spanner Wrench

Figure 20-20-16



Wash the cylinder parts in solvent and air dry them.

Inspect the cylinder parts for nicks, scratches or other damage. Replace any damaged parts.

Always install new O-rings and seals during assembly.

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

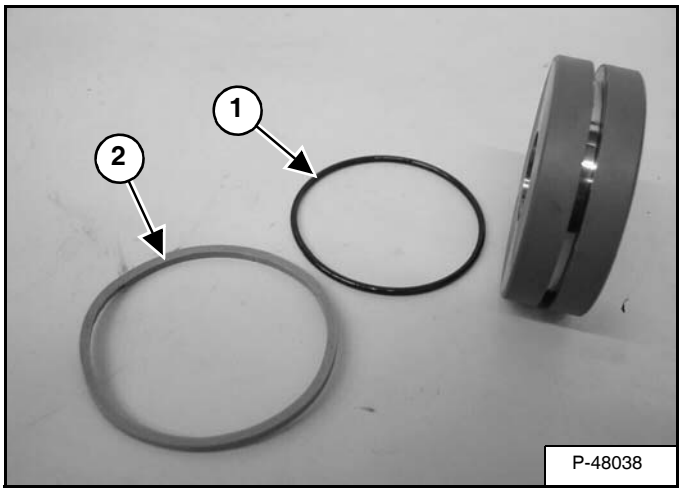
Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-20-16]**.

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

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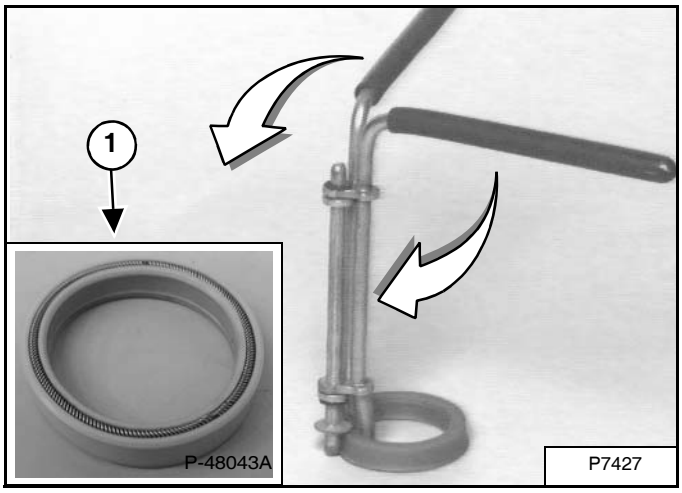
Assembly (Cont'd)

Figure 20-20-17



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

Figure 20-20-18

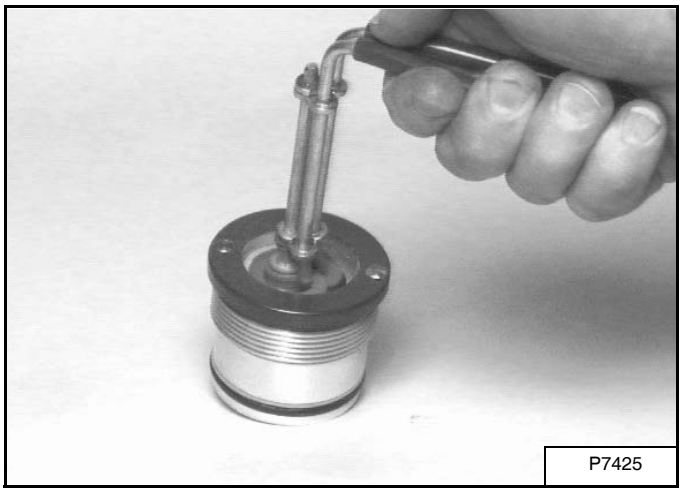


Install the rod seal on the rod seal tool **[Figure 20-20-18]**.

NOTE: During installation the spring side of the seal (Item 1) [Figure 20-20-18] must be installed toward the inside of the cylinder.

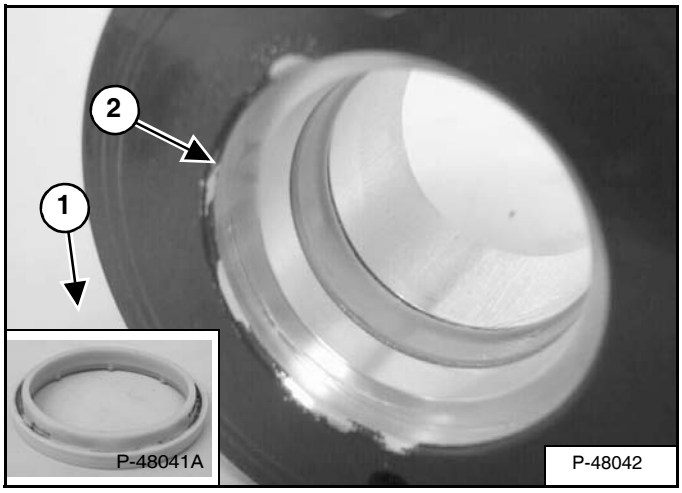
Rotate the handles to collapse the rod seal **[Figure 20-20-18]**.

Figure 20-20-19



Install the rod seal in the head **[Figure 20-20-19]**.

Figure 20-20-20

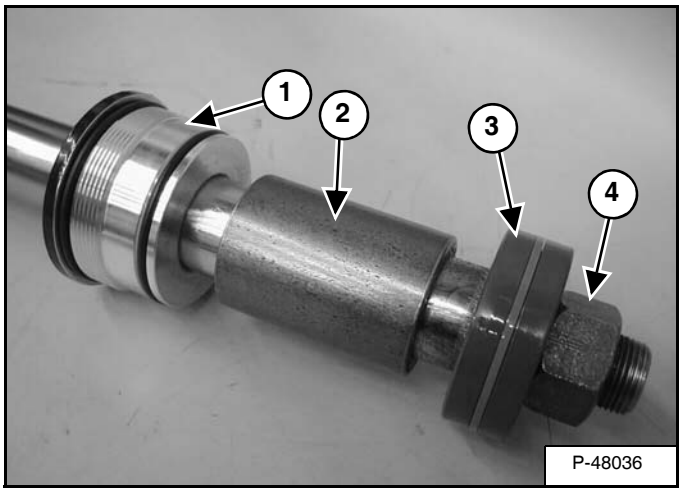


Install the wiper seal, with the wiper side of the seal (Item 1) toward the outside of the head (Item 2) **[Figure 20-20-20]**.

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Assembly (Cont'd)

Figure 20-20-21

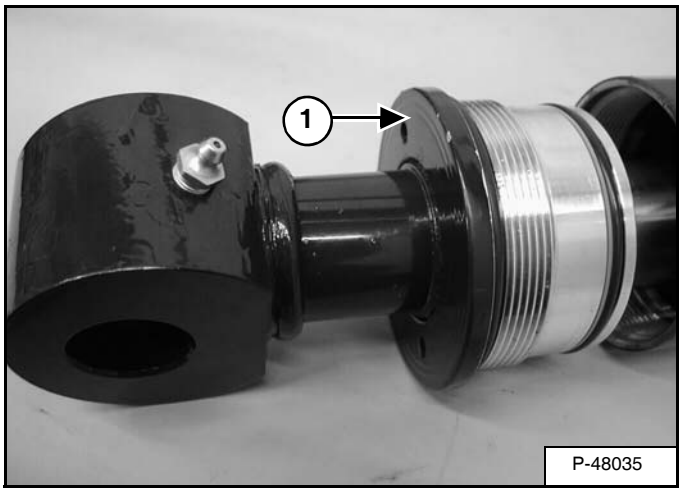


NOTE: Clean and dry the threads before installing the nut. Install the new nut from the kit.

Install the head (Item 1), spacer (Item 2) piston (Item 3), and nut (Item 4) **[Figure 20-20-21]**.

Tighten the nut (Item 4) **[Figure 20-20-21]** to 600 ft.-lb. (814 N•m) torque.

Figure 20-20-22



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

Tighten the head (Item 1) **[Figure 20-20-22]** using a spanner wrench.

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CYLINDER (TILT)

Checking

WARNING

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

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Figure 20-21-1

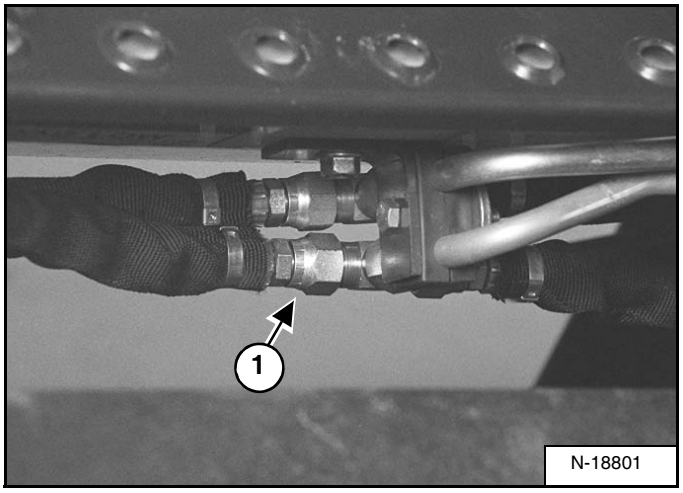
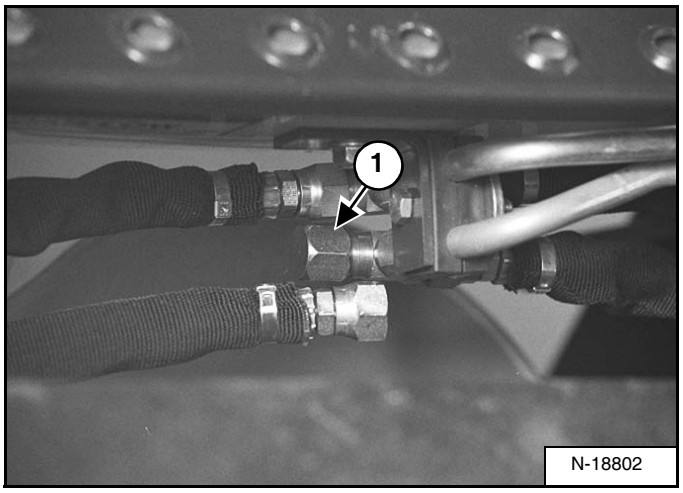


Figure 20-21-2



Remove the attachment. Roll the Bob-Tach fully back. Stop the engine. Raise the seat bar.

Disconnect the hose (Item 1) **[Figure 20-21-1]** which goes to the base end of the tilt cylinder.

Install a cap (Item 1) **[Figure 20-21-2]** on the fitting and tighten.

Engage the parking brake. Lower the seat bar.

Start the engine and push the Press to Operate button. Push the bottom (heel) of the tilt pedal.

If there is leakage from the open port, remove the tilt cylinder for repair.

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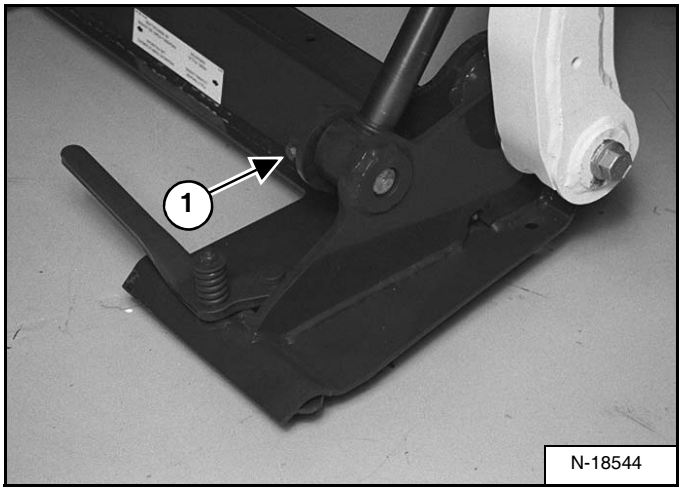
Removal And Installation

⚠ WARNING

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

W-2103-1285

Figure 20-21-3

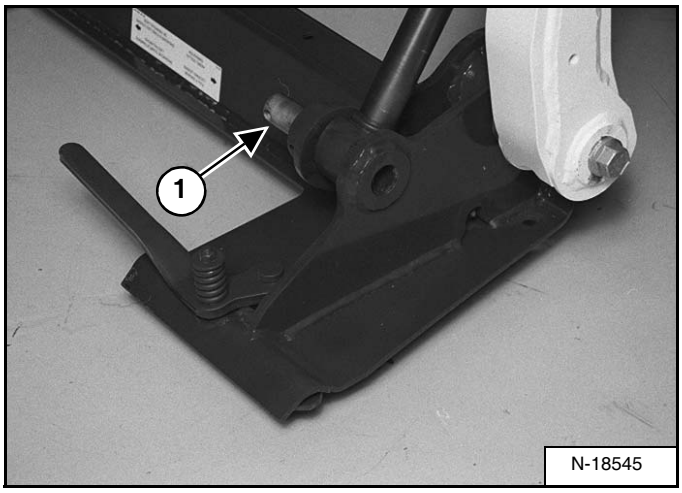


Remove the attachment. Roll the Bob-Tach forward. Stop the engine. Raise the seat bar.

Remove the retainer bolt (Item 1) **[Figure 20-21-3]** and nut from the rod end pin.

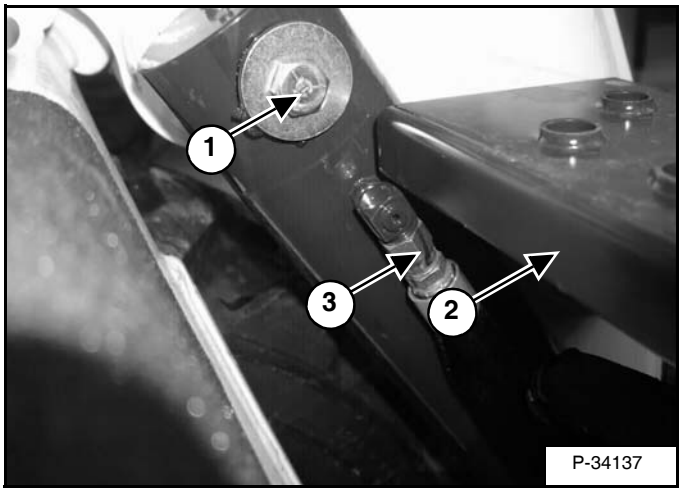
Installation: Tighten the bolt and nut to standard torque.

Figure 20-21-4



Use a drift pin and hammer, remove the rod end pivot pin (Item 1) **[Figure 20-21-4]**.

Figure 20-21-5



Remove the retainer bolt (Item 1) **[Figure 20-21-5]** from the tilt cylinder rod end pivot pin.

Installation: Tighten the bolt and nut to 125-140 ft.-lb. (170-190 N•m) torque.

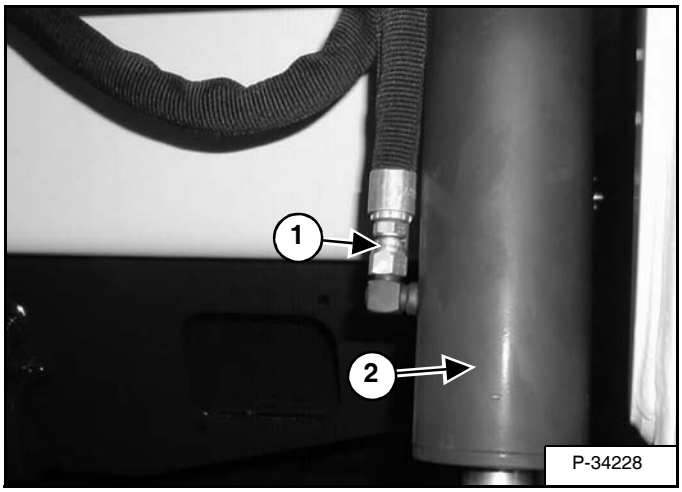
Remove the step (Item 2) **[Figure 20-21-5]**.

Disconnect the hose (Item 3) **[Figure 20-21-5]** from the cylinders.

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Removal And Installation (Cont'd)

Figure 20-21-6



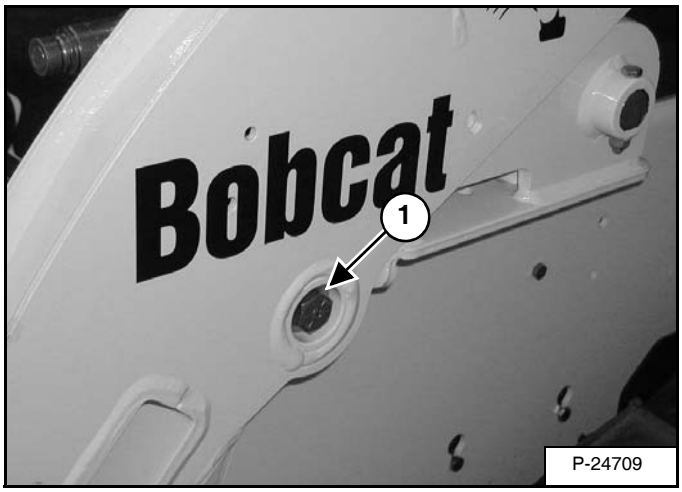
Disconnect the hose (Item 1) **[Figure 20-21-6]** from the cylinder.

Remove the cylinder (Item 2) **[Figure 20-21-6]** from the rod end pivot pin.

Remove the cylinder from the loader.

Base End Pivot Pin Replacement

Figure 20-21-7



Remove the tilt cylinder from the Bob-Tach. (See Removal And Installation, Page 20-21-2.)

Loosen the retainer bolt (Item 1) **[Figure 20-21-7]** from the tilt cylinder rod base end pin.

Installation: Tighten the retainer bolt to 175-190 ft.-lb. (240-260 N•m) torque.

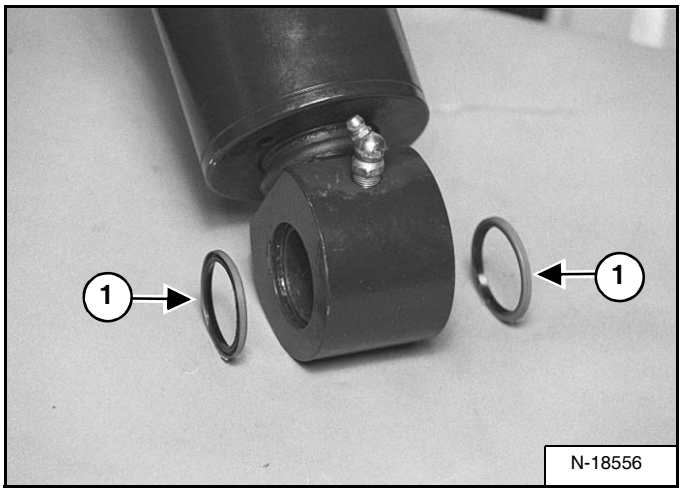
Strike the head of the bolt (Item 1) **[Figure 20-21-7]** to push the pivot pin out.

Reverse the removal procedure to install the pivot pin.

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Rod End Pivot Pin Bushing And Seal Replacement

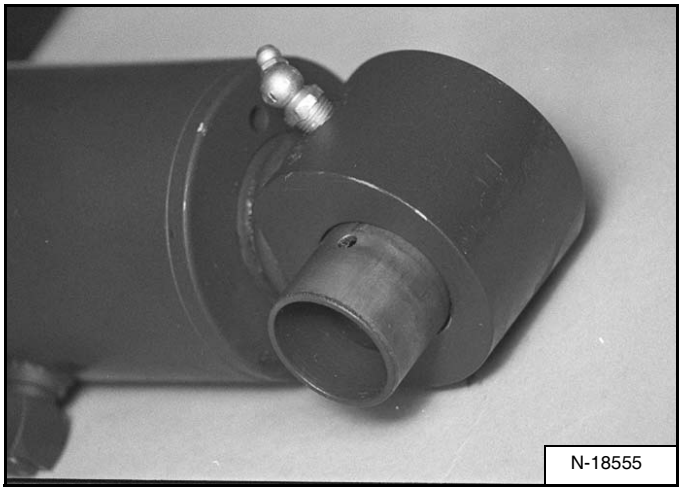
Figure 20-21-8



Remove the rod end of the tilt cylinder from the Bob-Tach. (See Rod End Pivot Pin Bushing And Seal Replacement, Page 20-21-4.)

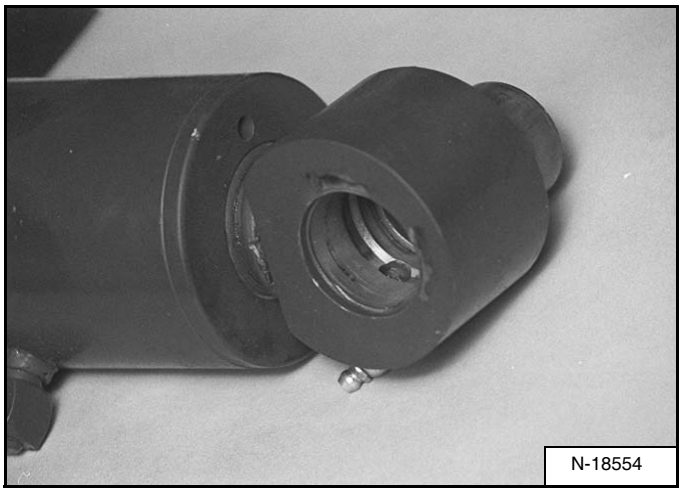
Use a seal pick to remove the seals (Item 1) **[Figure 20-21-8]** on both sides of the pivot bushing.

Figure 20-21-9



Remove and replace bushing with a driver tool and hammer **[Figure 20-21-9]**.

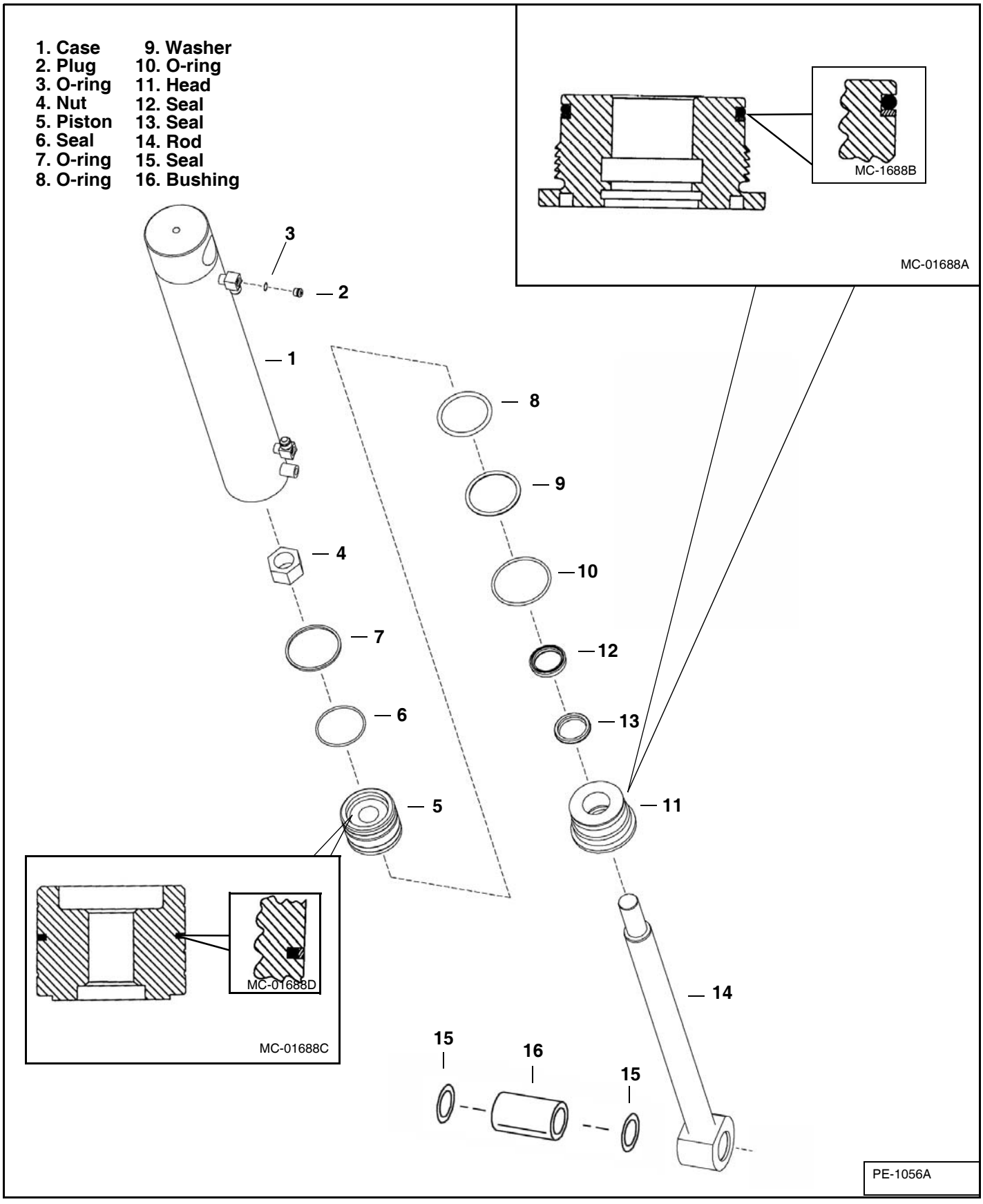
Figure 20-21-10



Reverse the removal procedure to install the pivot pin bushing and seal.

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Parts Identification



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Disassembly

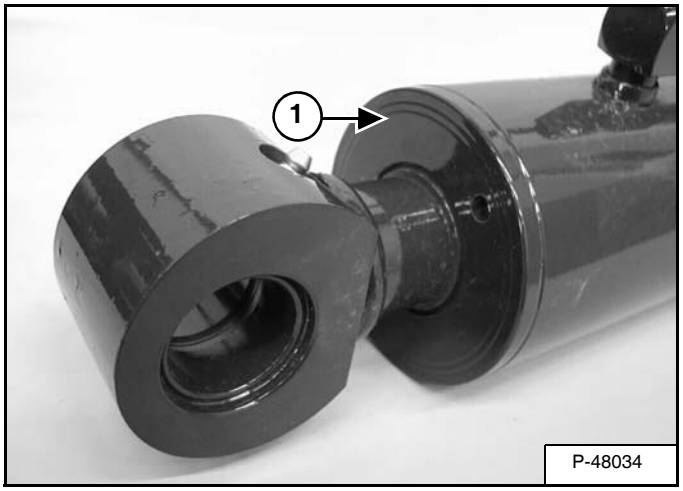
Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook
Spanner Wrench

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

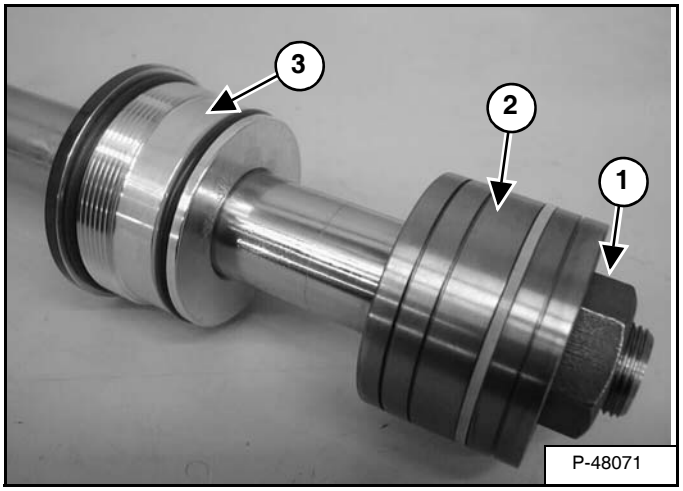
Put the base end of the cylinder in a vise.

Figure 20-21-11



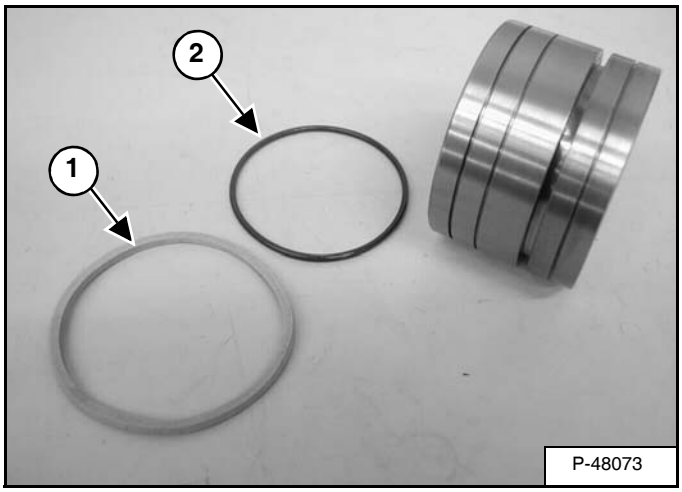
Use a spanner wrench to loosen the head (Item 1) **[Figure 20-21-11]** from the cylinder case.

Figure 20-21-12



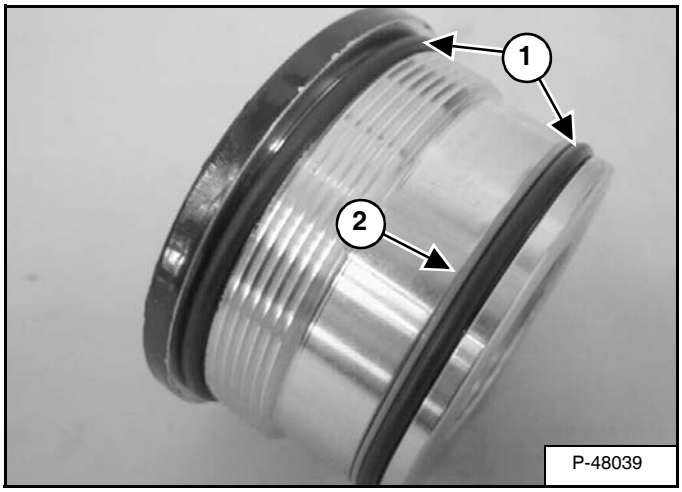
Remove the nut (Item 1), piston (Item 2) and head (Item 3) **[Figure 20-21-12]**.

Figure 20-21-13



Remove the seal (Item 1), and O-ring (Item 2) **[Figure 20-21-13]** from the piston.

Figure 20-21-14

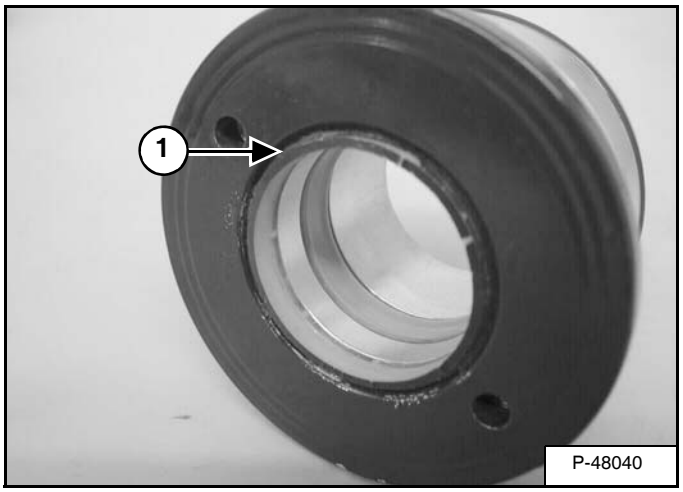


Remove the two O-rings (Item 1) and the back-up washer (Item 2) **[Figure 20-21-14]** from the cylinder head.

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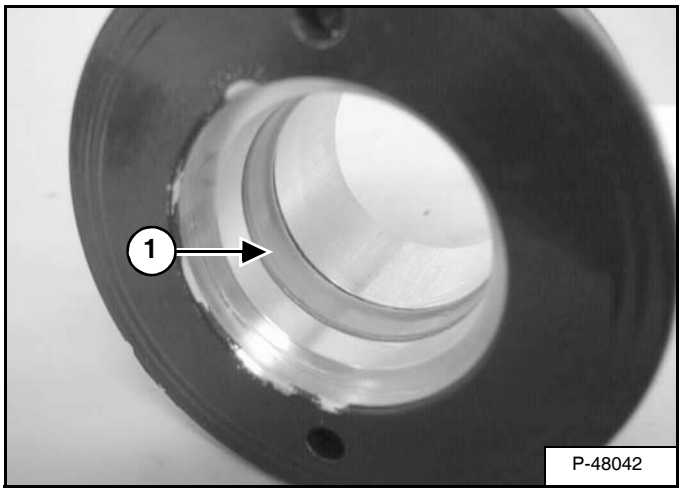
Disassembly (Cont'd)

Figure 20-21-15



Remove the wiper seal (Item 1) **[Figure 20-21-15]** from the cylinder head.

Figure 20-21-16



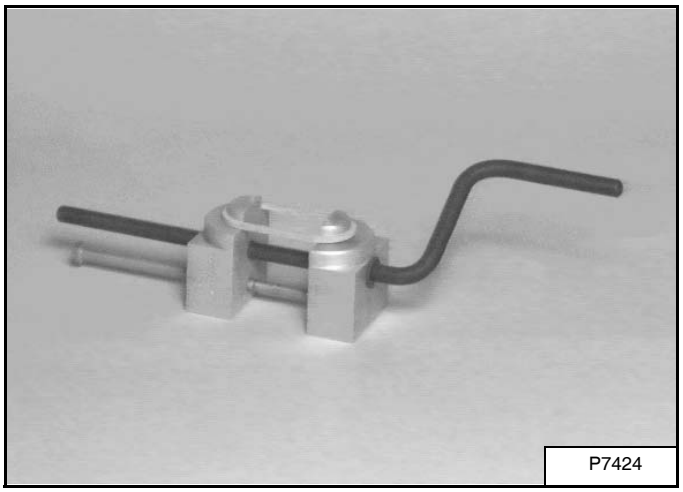
Remove the rod seal (Item 1) **[Figure 20-21-16]** from the cylinder head.

Assembly

Use the following tools to assemble the cylinder:

MEL1396 - Seal Installation Tool
MEL1033 - Rod Seal Installation Tool
Piston Ring Compressor
Spanner Wrench

Figure 20-21-17



Wash the cylinder parts in solvent and air dry them.

Inspect the cylinder parts for nicks, scratches or other damage. Replace any damaged parts.

Always install new O-rings and seals during assembly.

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

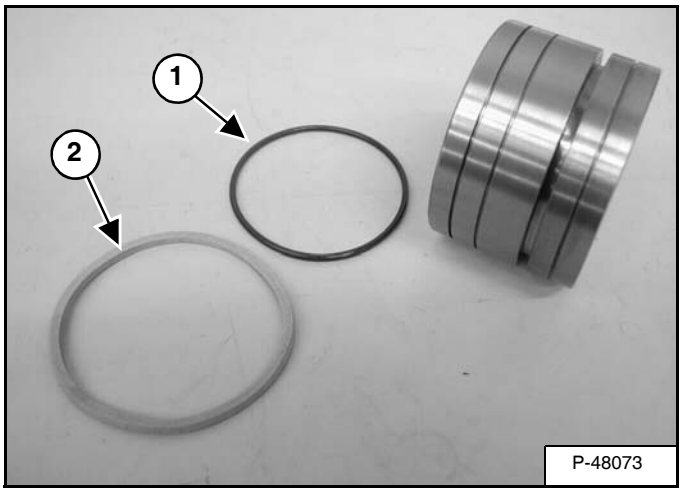
Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-21-17]**.

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

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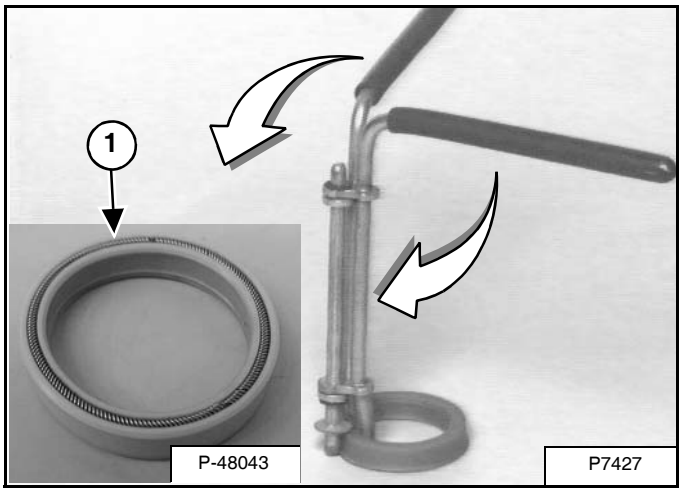
Assembly (Cont'd)

Figure 20-21-18



Install the O-ring (Item 1) and seal (Item 2) **[Figure 20-21-18]** on the cylinder piston.

Figure 20-21-19

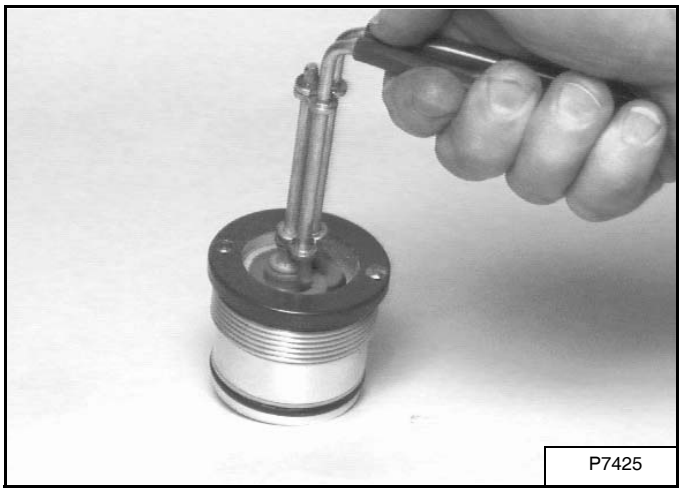


Install the rod seal on the rod seal tool **[Figure 20-21-19]**.

NOTE: During installation the spring side of the seal (Item 1) [Figure 20-21-19] must be installed toward the inside of the cylinder.

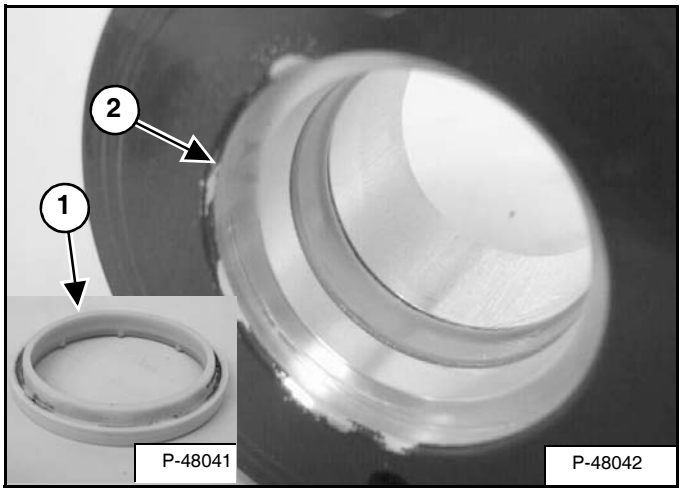
Rotate the handles to collapse the rod seal **[Figure 20-21-19]**.

Figure 20-21-20



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

Figure 20-21-21

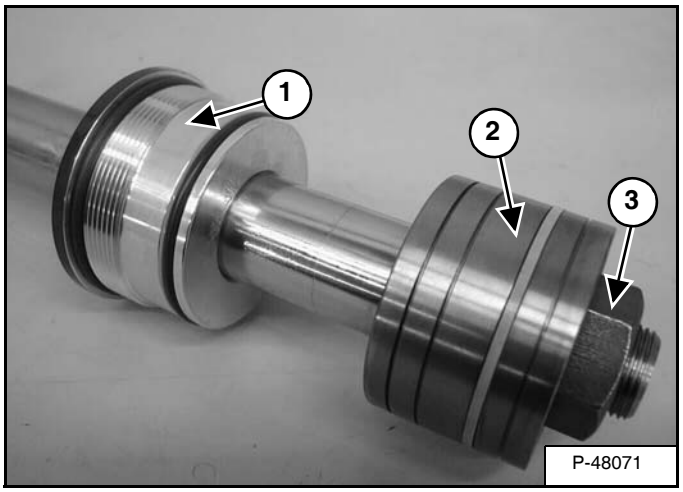


Install the wiper seal, with the wiper side of the seal (Item 1) toward the outside of the head (Item 2) **[Figure 20-21-21]**.

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Assembly (Cont'd)

Figure 20-21-22

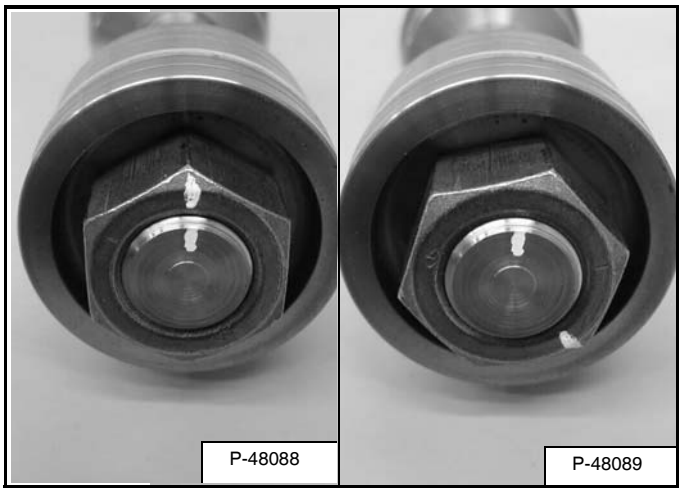


NOTE: Clean and dry the threads before installing the nut. Install the new nut from the kit.

Install the head (Item 1), piston (Item 2) and nut (Item 3) **[Figure 20-21-22]**.

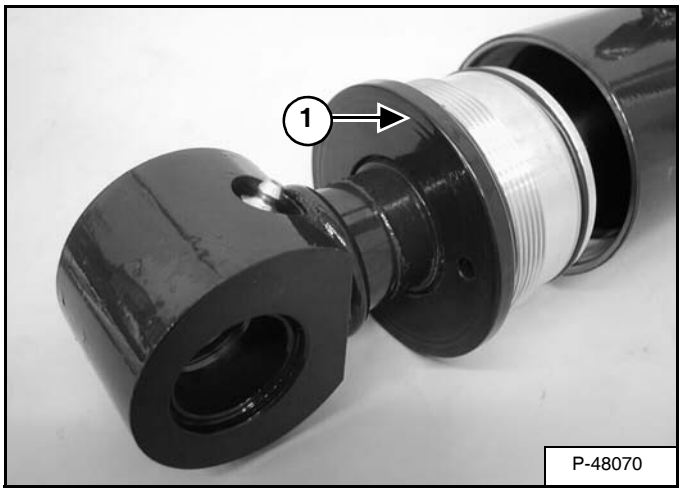
Tighten the nut (Item 3) **[Figure 20-21-22]** to 100 ft.-lb. (136 N•m) torque.

Figure 20-21-23



Mark the end of the shaft and nut. Tighten the nut an additional 135 degrees or 2-1/4 flats **[Figure 20-21-23]**.

Figure 20-21-24



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

Tighten the head (Item 1) **[Figure 20-21-24]** using a spanner wrench.

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CYLINDER (POWER BOB-TACH)

Checking

WARNING

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

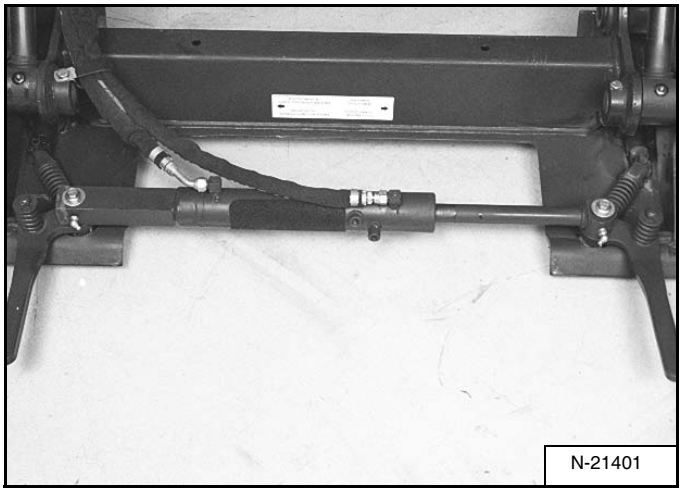
W-2103-1285

WARNING

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

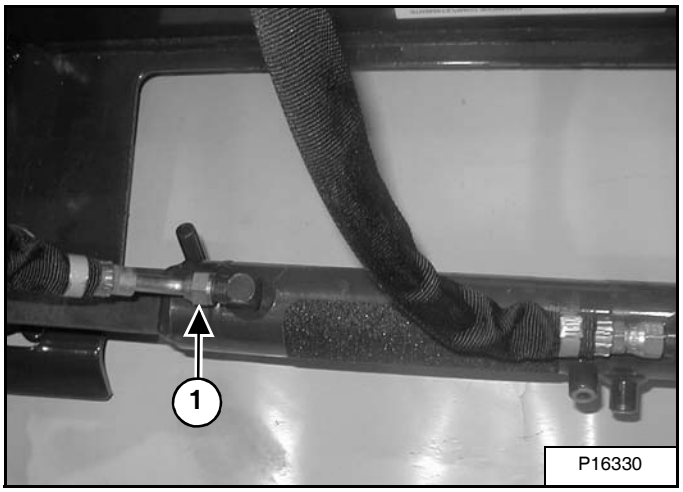
W-2072-0496

Figure 20-22-1



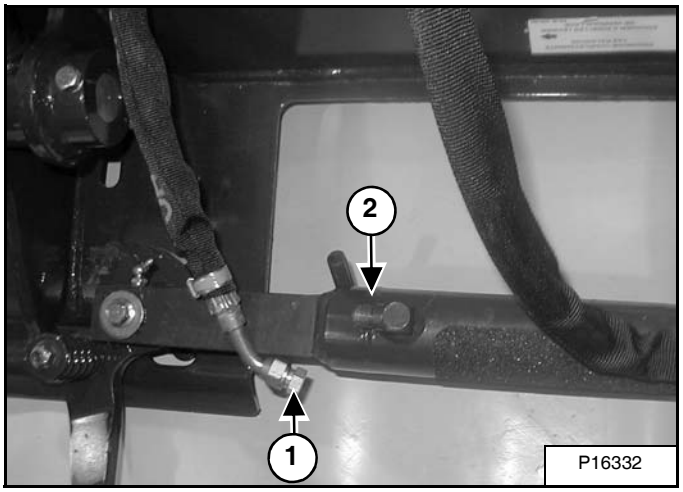
Tilt the Bob-Tach forward, so it is parallel to the floor **[Figure 20-22-1]**.

Figure 20-22-2



Disconnect the hose (Item 1) **[Figure 20-22-2]** from the power Bob-Tach cylinder base end port.

Figure 20-22-3



Install a plug in the hose (Item 1) **[Figure 20-22-3]** and tighten.

Engage the parking brake. Lower the seat bar. Start the engine.

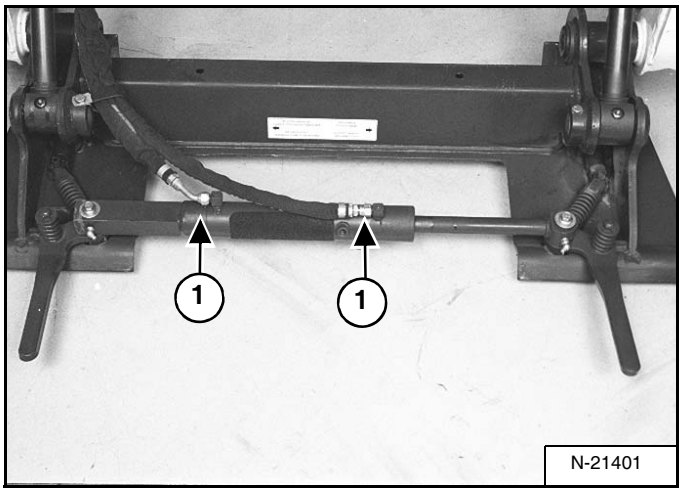
Push and hold the BOB-TACH "WEDGES UP" Switch (Front Accessory Panel).

If there is any leakage from the base end cylinder port (Item 2) **[Figure 20-22-3]**, remove the Power Bob-Tach cylinder for repair.

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Removal And Installation

Figure 20-22-4

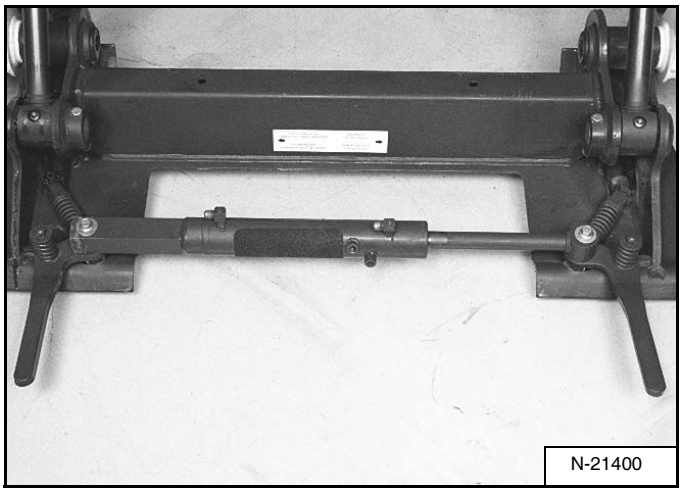


Disconnect the hoses from the cylinder fittings (Item 1 & 2) **[Figure 20-22-4]**.

Install plugs and cap on fittings.

NOTE: Connect the hose with the 45° end (Item 1) [Figure 20-22-4] to the base end fitting on the cylinder.

Figure 20-22-5



Remove the bolts (Item 1) **[Figure 20-22-5]**.

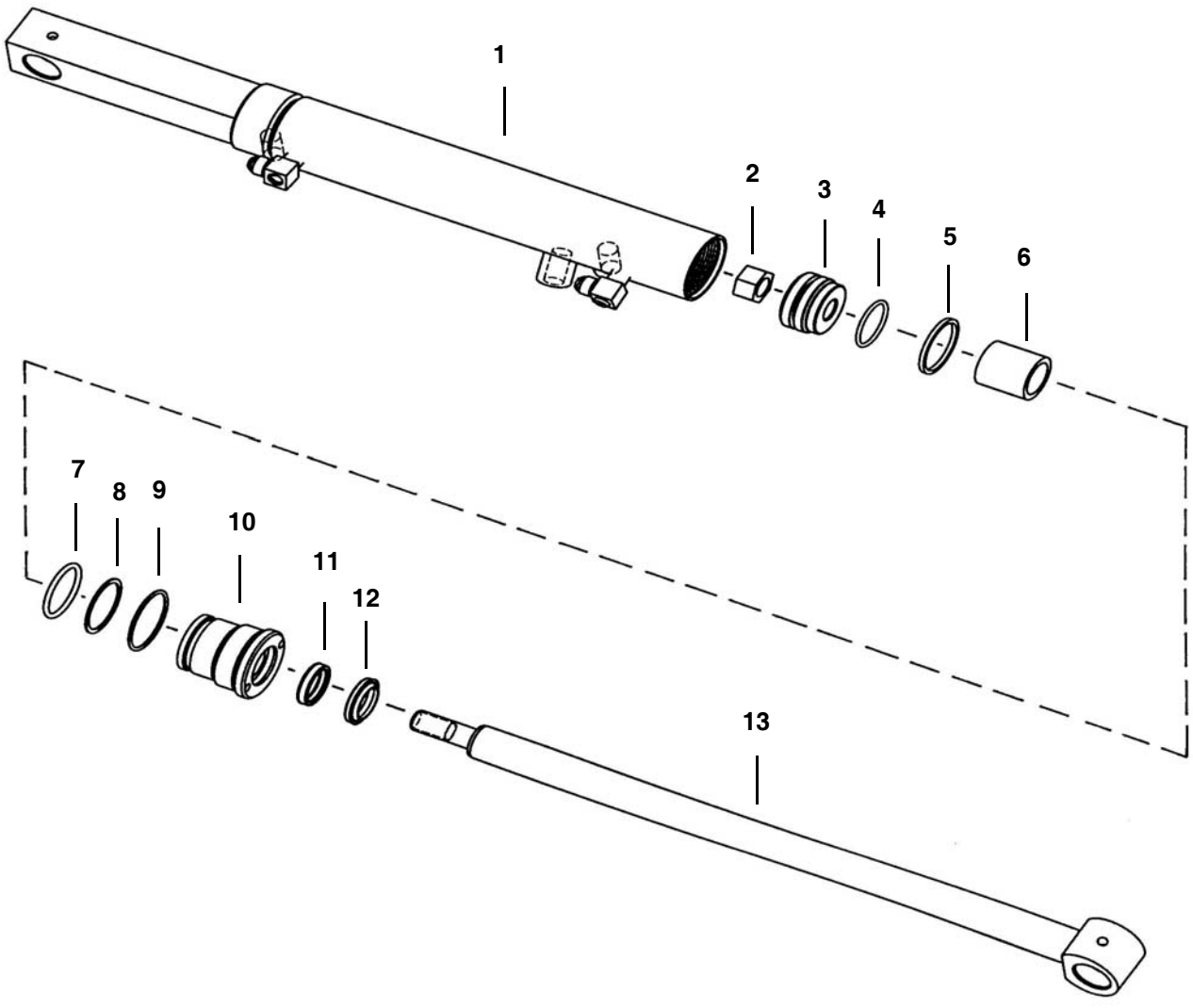
Installation: Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the washers and cylinder from the lever pivots.

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Identification

1. Cylinder
2. Nut
3. Piston
4. O-ring
5. Ring
6. Spacer
7. O-ring
8. Ring
9. O-ring
10. Head
11. Seal
12. Seal
13. Rod



B-16276

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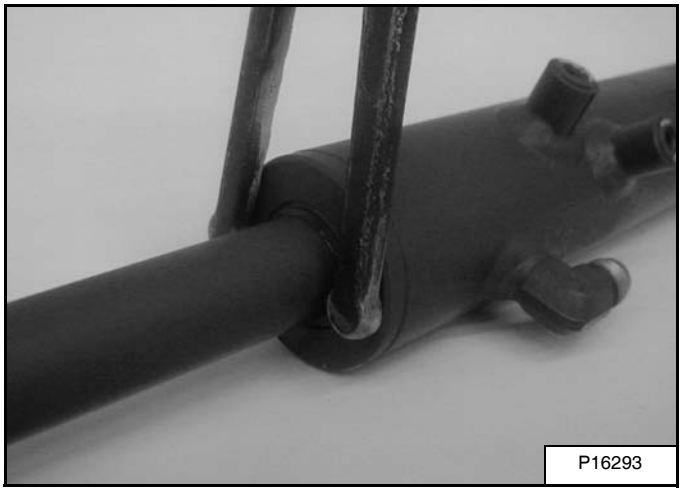
Disassembly

Use the following tools to disassemble the cylinder:

MEL1074 - O-ring Seal Hook
Spanner Wrench

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

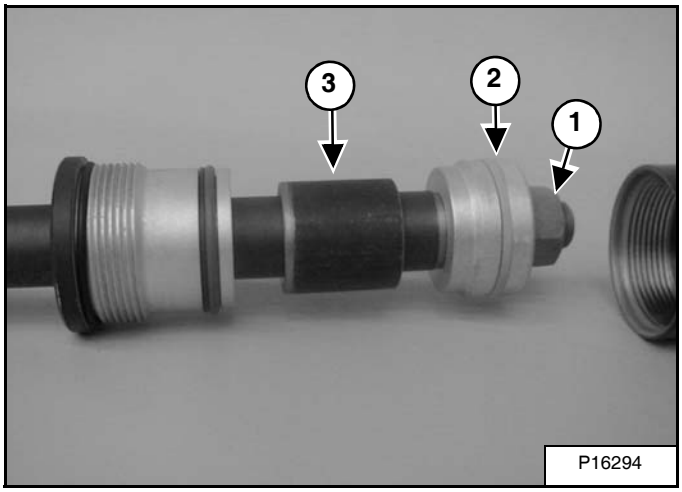
Figure 20-22-6



Put the base end of the cylinder in a vise.

Use a spanner wrench to loosen the head **[Figure 20-22-6]**.

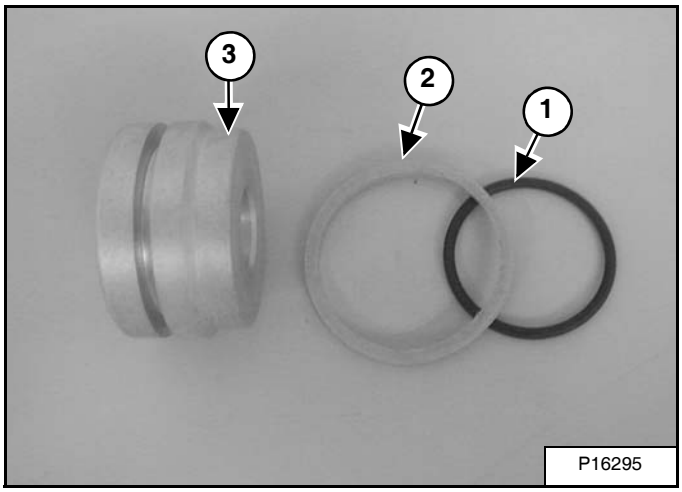
Figure 20-22-7



Remove the head and rod assembly from the cylinder **[Figure 20-22-7]**. Put the rod end in a vise.

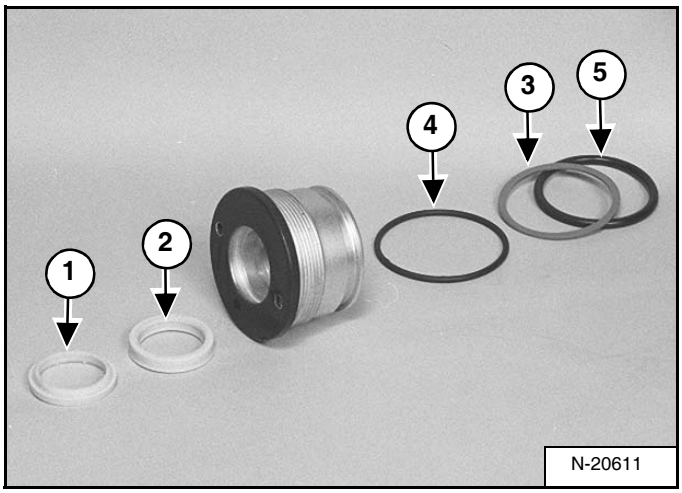
Remove the nut (Item 1) **[Figure 20-22-7]**, piston (Item 2) **[Figure 20-22-7]** and head (Item 3) **[Figure 20-22-7]** from the rod.

Figure 20-22-8



Piston: Remove the O-ring (Item 1) **[Figure 20-22-8]**, and seal (Item 2) **[Figure 20-22-8]** from the piston (Item 3) **[Figure 20-22-8]**.

Figure 20-22-9



Remove the wiper seal (Item 1) **[Figure 20-22-9]**, and rod seal (Item 2) **[Figure 20-22-9]**, the back up washer (Item 3) **[Figure 20-22-9]** the thin O-ring (Item 4) **[Figure 20-22-9]** and the thick O-ring (Item 5) **[Figure 20-22-9]** from the head.

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Assembly

Use the following tools to assembly the cylinder:

MEL1396 - Seal Installation Tool
MEL1033 - Rod Seal Installation Tool
Piston Ring Compressor
Spanner Wrench

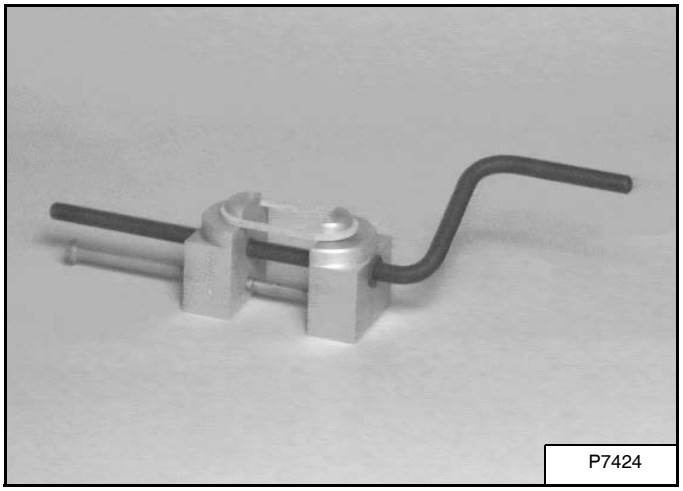
Wash the cylinder parts in solvent and air dry them.

Inspect the cylinder parts for nicks, scratches or other damage. Replace any damaged parts.

Always install new O-rings and seals during assembly.

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

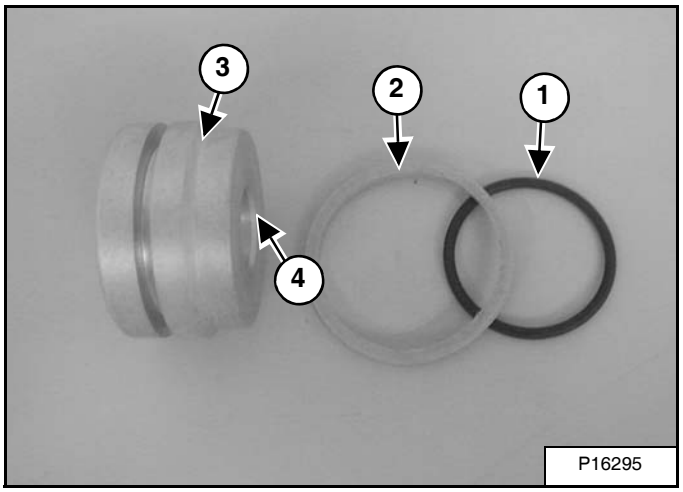
Figure 20-22-10



Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-22-10]**.

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

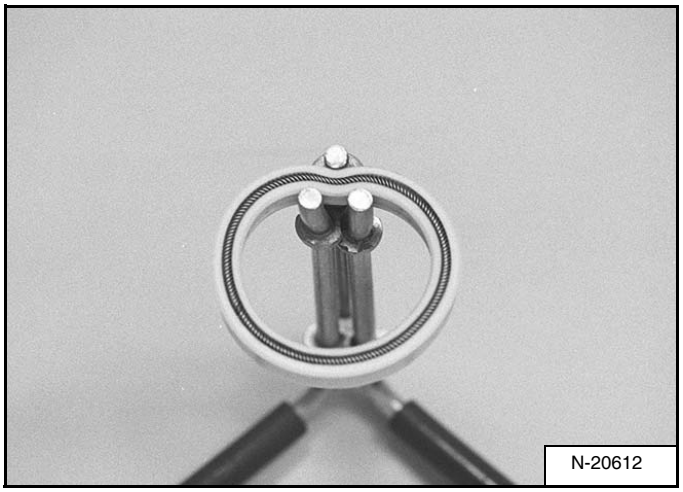
Figure 20-22-11



Piston: Install the O-ring (Item 1) **[Figure 20-22-11]** and seal (Item 2) **[Figure 20-22-11]** on the piston (Item 3) **[Figure 20-22-11]**.

NOTE: The piston center hole (Item 4) [Figure 20-22-11] has a bevel on one end. The bevel goes toward the rod.

Figure 20-22-12



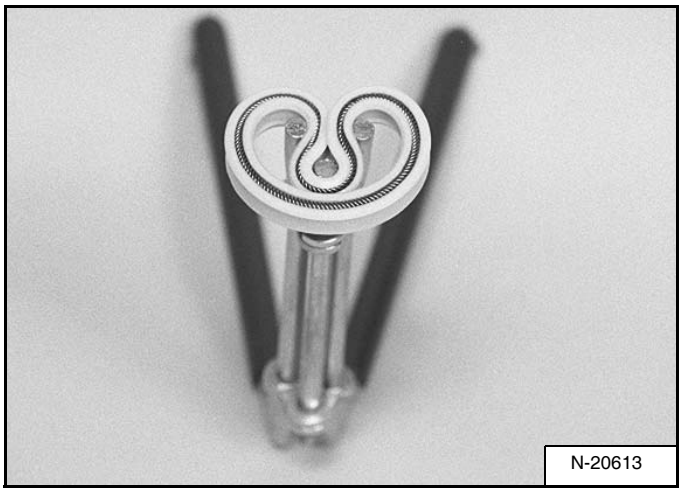
Install the rod seal on the rod seal tool **[Figure 20-22-12]**.

NOTE: During installation the O-ring side of the seal must be toward the inside of the cylinder.

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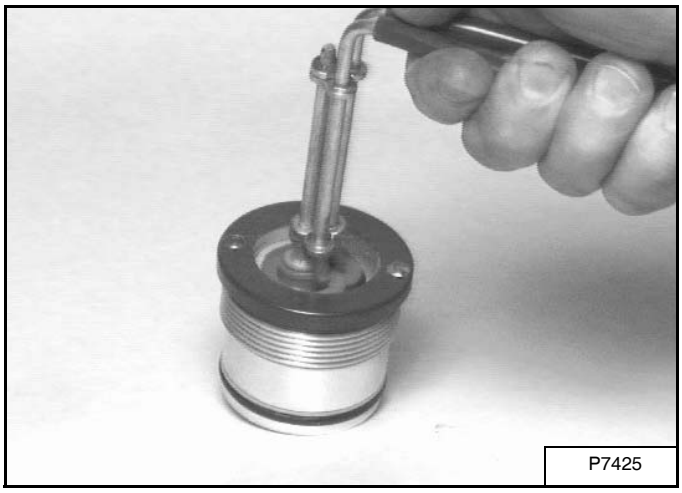
Assembly (Cont'd)

Figure 20-22-13



Rotate the handles to collapse the rod seal **[Figure 20-22-13]**.

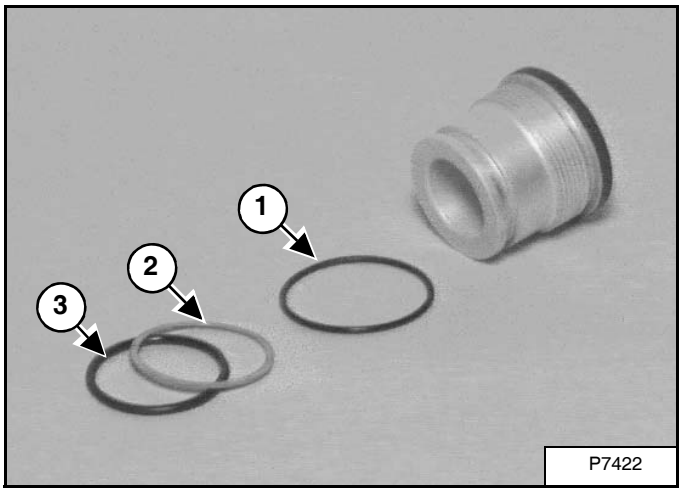
Figure 20-22-14



Install the rod seal in the head **[Figure 20-22-14]**.

Install the wiper seal with the wiper toward the outside of the head.

Figure 20-22-15

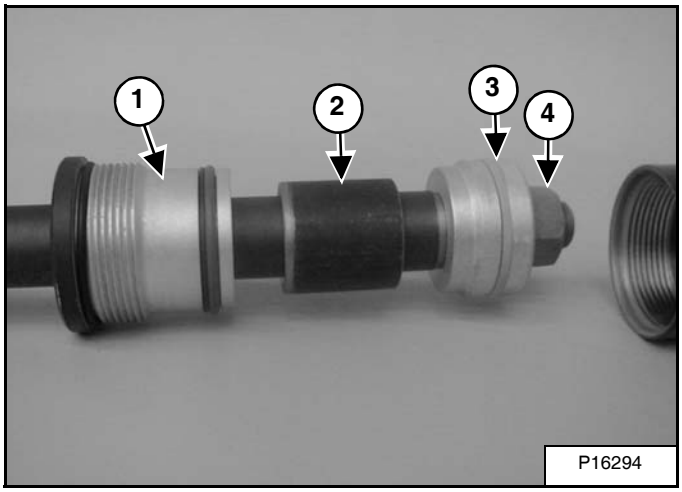


Install the thin O-ring (Item 1) **[Figure 20-22-15]**.

Install the back-up washer (Item 2) **[Figure 20-22-15]** and thick O-ring (Item 3) **[Figure 20-22-15]** into the groove on the head.

NOTE: Clean and dry the threads before installing the nut. Install the new nut from the seal kit.

Figure 20-22-16



Install the head (Item 1) **[Figure 20-22-16]**, and spacer (Item 2) **[Figure 20-22-16]**.

Install the piston (Item 3) **[Figure 20-22-16]**.

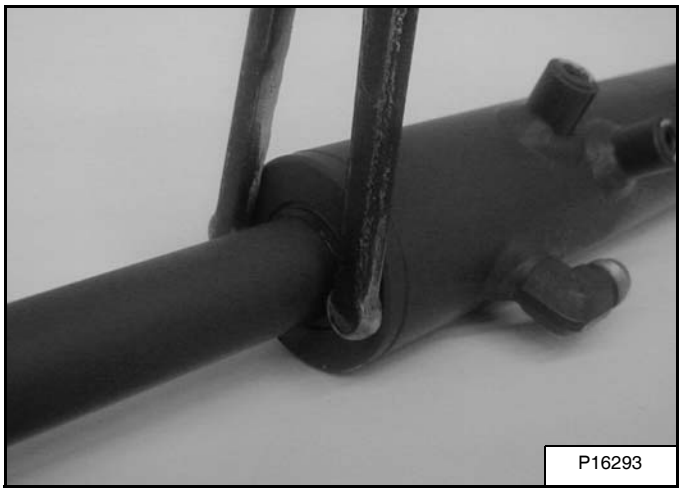
Grease the piston where the nut contacts the piston. do not get grease on the threads. Install the new nut (Item 4) **[Figure 20-22-16]**.

Tighten the nut to 90 ft.-lb. (122 N•m) torque.

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Assembly (Cont'd)

Figure 20-22-17



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

Tighten the head using a spanner wrench **[Figure 20-22-17]**.

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MAIN RELIEF VALVE

Checking

IMPORTANT

The hydraulic tester must be in the fully open position before you start the engine.

I-2024-0284

⚠ WARNING

When the engine is running during service, the steering levers must be in neutral and the parking brake engaged. Failure to do so can cause injury or death.

W-2006-0284

⚠ WARNING

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

W-2017-0286

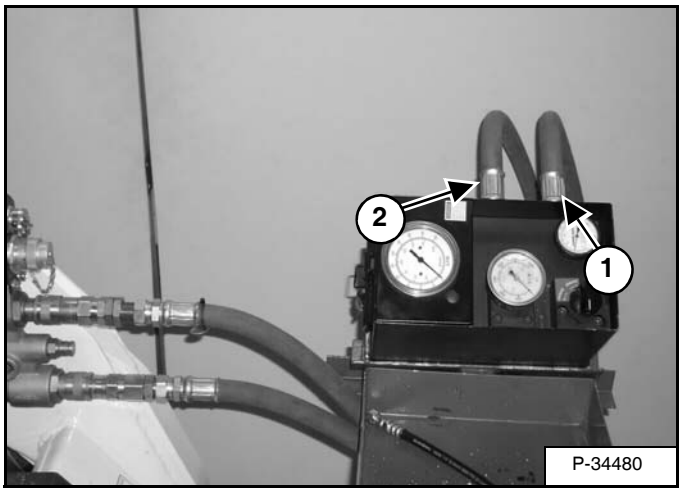
The tools listed will be needed to do the following procedure:

MEL10003 - Hydraulic Tester
MEL10006 - Hydraulic Test Kit

Turn the key switch to the OFF position. To release the hydraulic pressure at the front auxiliary quick couplers push the couplers into the coupler block and hold for three seconds.

Lift and block the loader. (See Procedure on Page 10-100-1.)

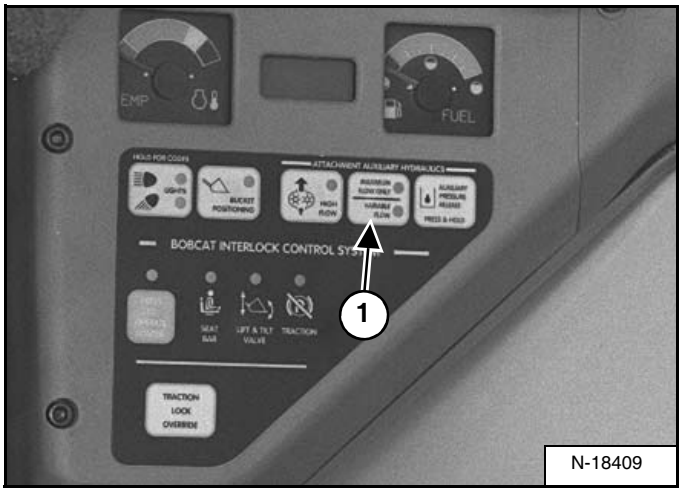
Figure 20-30-1



Connect the IN port (Item 1) **[Figure 20-30-1]** of the hydraulic tester to the bottom (female) quick coupler on the loader.

Connect the OUT port (Item 2) **[Figure 20-30-1]** of the hydraulic tester to the top (male) quick coupler on the loader.

Figure 20-30-2

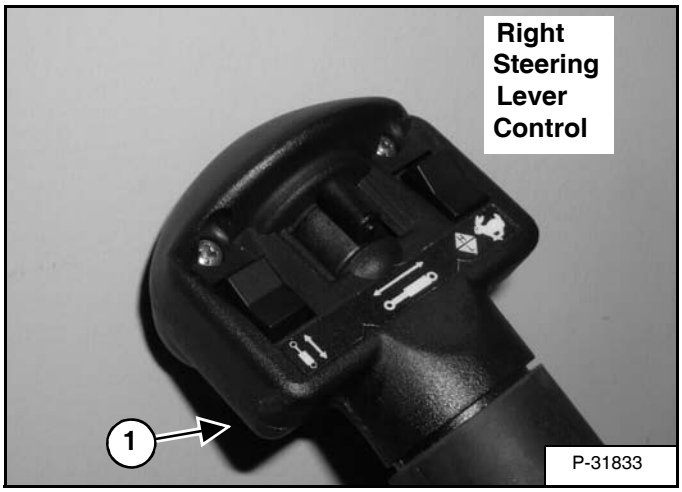


- Press the AUXILIARY HYDRAULICS Button (Item 1) **[Figure 20-30-2]** Maximum Flow.

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Checking (Cont'd)

Figure 20-30-3



- Push the front switch (Item 1) **[Figure 20-30-3]** to give the front quick couplers a constant flow of fluid.
- To release from continuous operation, press the front switch (Item 1) **[Figure 20-30-3]** a second time.

Watch the flow meter on the hydraulic tester to make sure the flow is correct. Increase the engine speed to full RPM.

Refer to **Specifications,** (Contents Page SPEC-01) for both flow and pressure specifications of the hydraulic system.

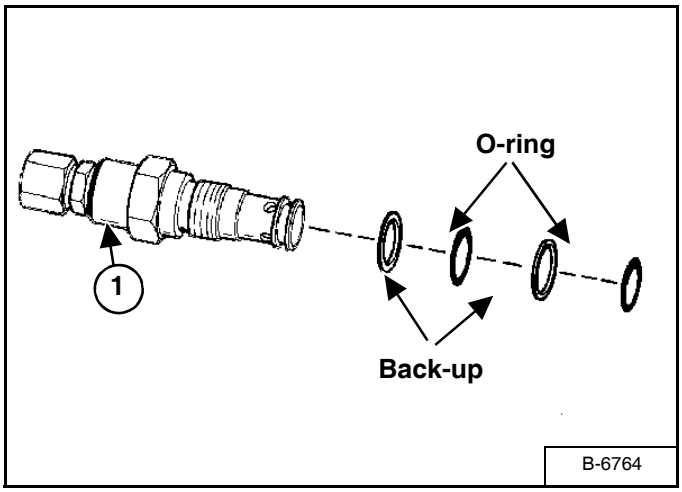
Check the free flow specification.

Turn the restrictor control, on the tester, until the main relief valve opens. Check the relief pressure.

If the relief pressure is not correct, stop the engine and adjust the main relief valve.

Adjustment

Figure 20-30-4



If the pressure is not correct, adjust the main relief valve. Remove the end cap (Item 1) **[Figure 20-30-4]**.

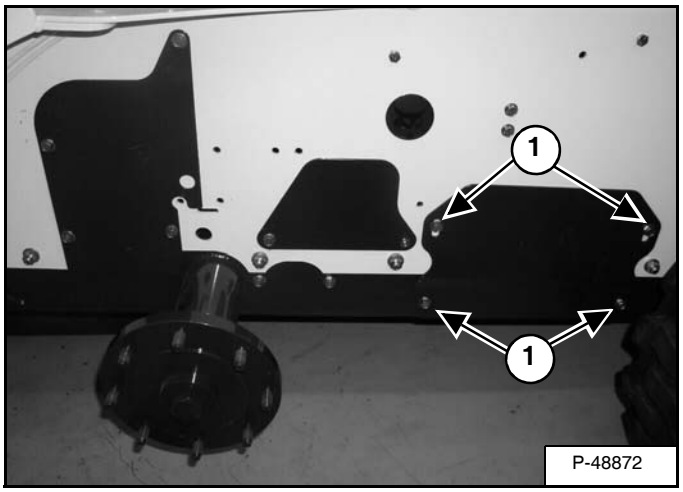
Turn the adjusting screw in or out until the pressure is correct.

NOTE: If the correct pressure can not be reached, replace the main relief valve. Check the pressure setting of the new relief valve.

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Removal and Installation

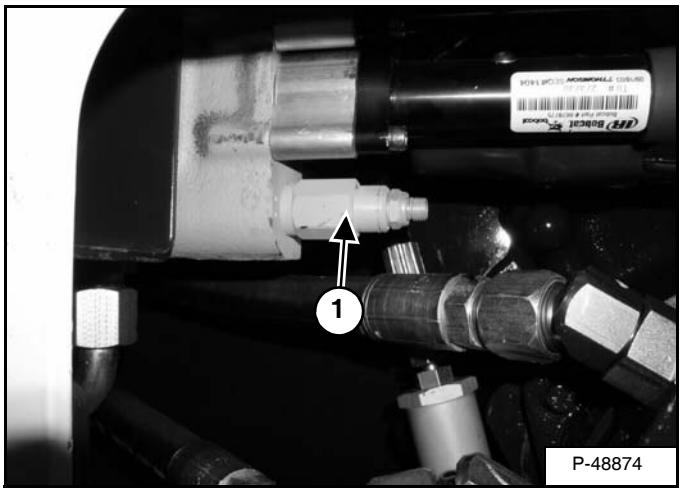
Figure 20-30-5



Remove the four motor cover mounting bolts (Item 1) **[Figure 20-30-5]**.

Installation: Tighten the mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 20-30-6



Clean the area around the control valve. Loosen and remove the main relief valve (Item 1) **[Figure 20-30-6]**.

Remove the O-rings and back-up washers **[Figure 20-30-4]**.

Clean the main relief valve in clean solvent. Use air pressure to dry the valve.

Install new O-rings and back-up washers. Install the main relief valve (Item 1) **[Figure 20-30-6]** and tighten. Check the pressure again. (See Checking on Page 20-30-1.)

Installation: Tighten the main relief valve to 35-40 ft.-lb. (47-54 N•m) torque.

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

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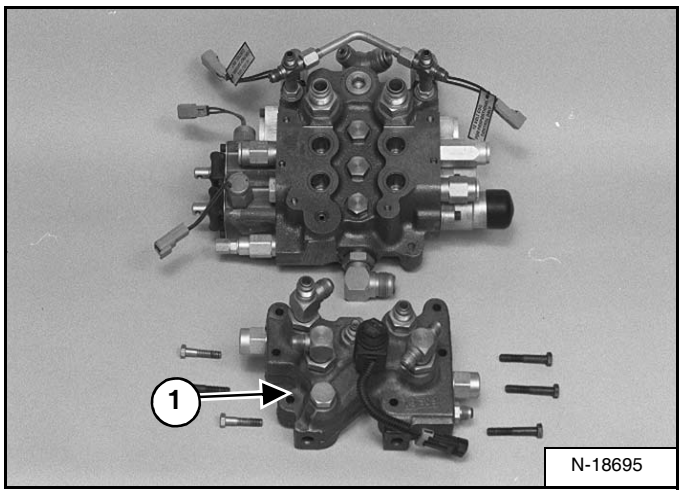


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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (FOOT CONTROL)

Identification

Figure 20-40-1



The hydraulic control valve (2 piece casting) (foot control) has a removable BICS™ section (Item 1) **[Figure 20-40-1]**.

The BICS™ section and main control valve are in two seperate castings.

For identification of the hydraulic control valve (1 piece casting) (foot control), (See Identification Chart on Page 20-42-6.).

Removal And Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

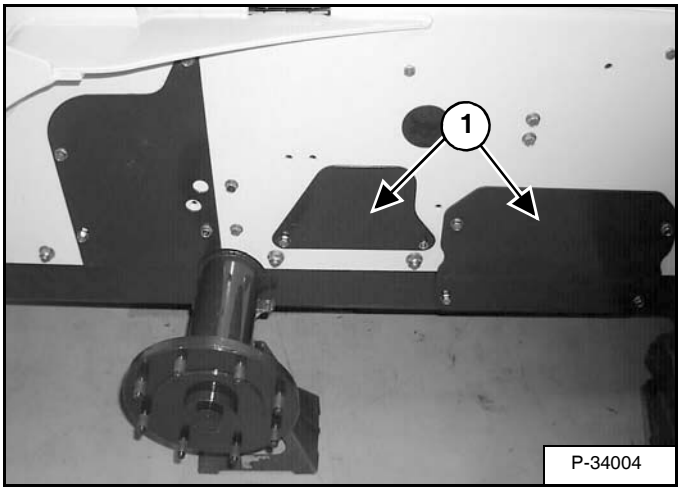
Clean the area around the control valve.

Drain the hydraulic reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Remove the control pedal crossbar linkage and tilt linkage. (See Crossbar Linkage Removal and Installation on Page 50-90-2.)

Figure 20-40-2



Remove the right rear tire.

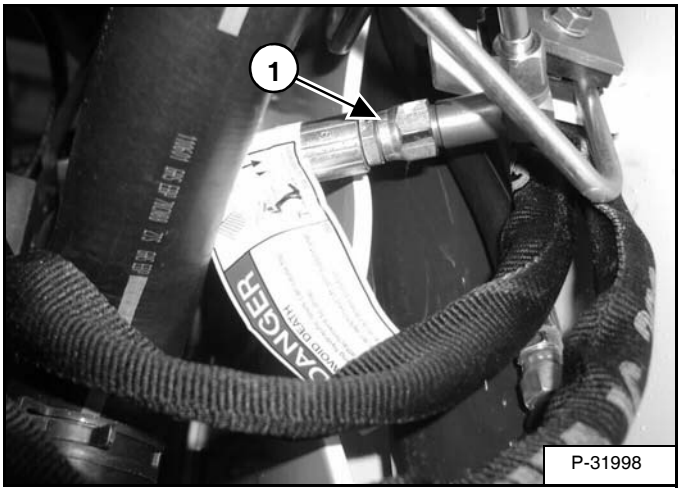
Locate and remove the access covers (Item 1) **[Figure 20-40-2]** on the right side of the machine.

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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (FOOT CONTROL) (CONT'D)

Removal and Installation (Cont'd)

Figure 20-40-3

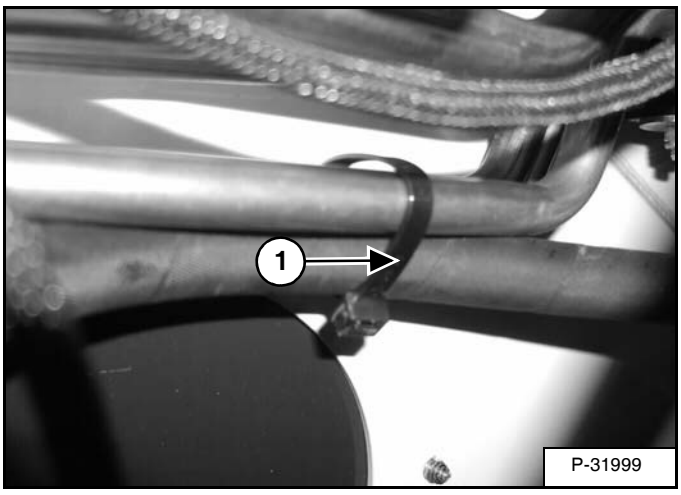


Mark all tubelines and hoses for correct installation.

The fixed end main valve hose assembly (Item 1) **[Figure 20-40-3]** is connected to a fixed end fitting on the control valve. The hose is routed to the back upright where the hose is connected to a tee fitting that feeds the base end of both lift cylinders. The hose must be removed at the back tee fitting, located in the right side upright.

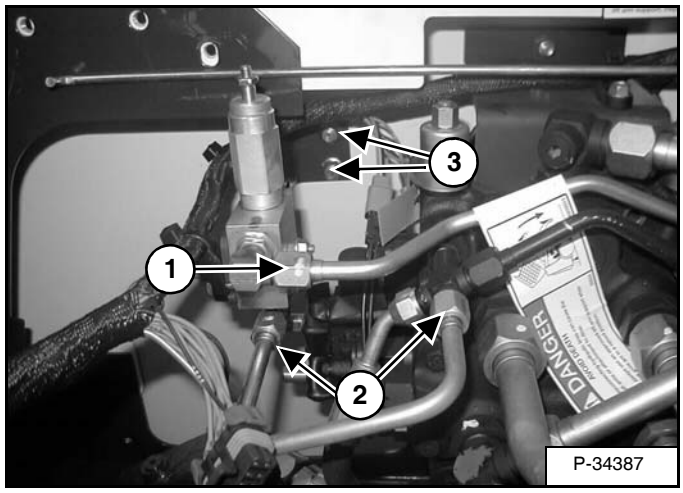
NOTE: Remember the hose routing for ease of control valve installation.

Figure 20-40-4



Remove the tie - strap (Item 1) **[Figure 20-40-4]** from the fixed end main valve hose.

Figure 20-40-5



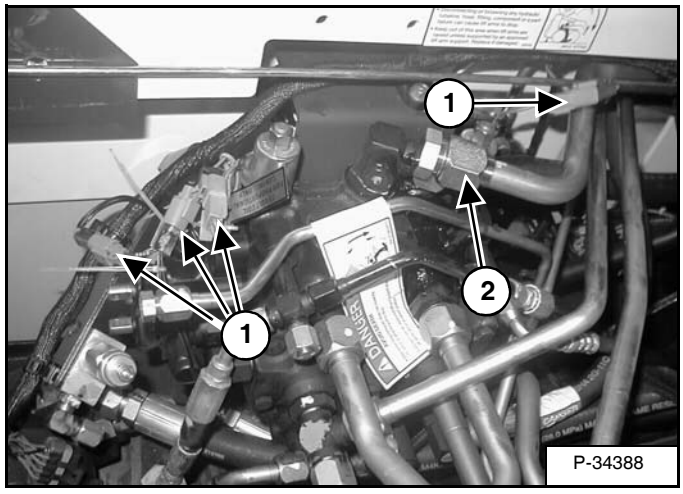
Disconnect the tubeline (Item 1) **[Figure 20-40-5]** from the lift arm by pass valve.

Remove the drain tubeline (Item 2) **[Figure 20-40-5]** from the lift arm by-pass valve and the control valve.

Remove the bolts (Item 3) **[Figure 20-40-5]** from the lift arm by-pass control valve.

Installation: Tighten the bolts to 180-200 in.-lb. (21-23 N•m) torque.

Figure 20-40-6



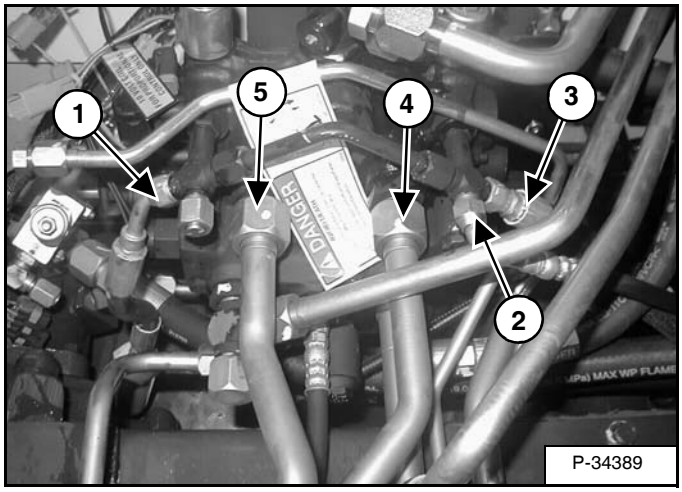
Label and disconnect the four electrical connectors (Item 1) **[Figure 20-40-6]**.

Disconnect the outlet tubeline (Item 2) **[Figure 20-40-6]** from the control valve.

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Removal and Installation (Cont'd)

Figure 20-40-7



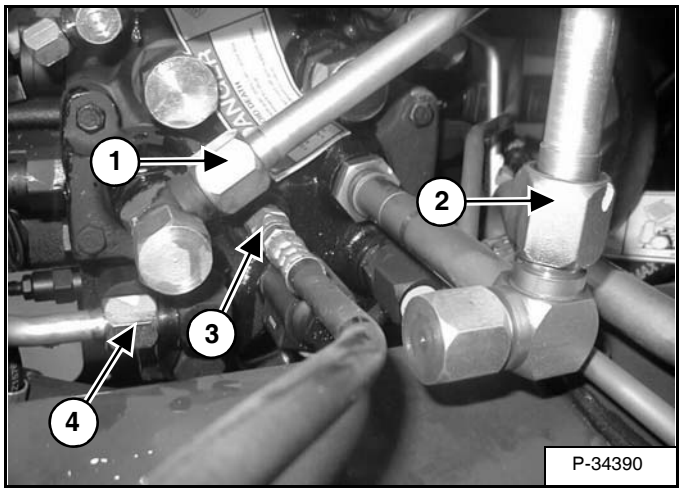
Disconnect the drive motor case drain hose (Item 1) **[Figure 20-40-7]**.

Disconnect the Power Bob-Tach drain hose (Item 2) **[Figure 20-40-7]** if so equipped.

Disconnect the drain to reservoir hose (Item 3) **[Figure 20-40-7]**.

Disconnect the auxiliary tubeline (Item 4) and (Item 5) **[Figure 20-40-7]**.

Figure 20-40-8



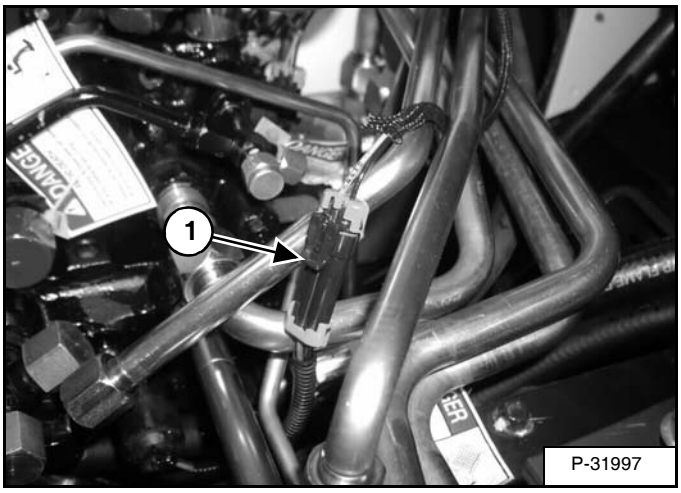
Disconnect the tilt tubeline (Item 1) **[Figure 20-40-8]**.

Disconnect the tilt tubeline (Item 2) **[Figure 20-40-8]**.

Disconnect the drain hose (Item 3) **[Figure 20-40-8]**.

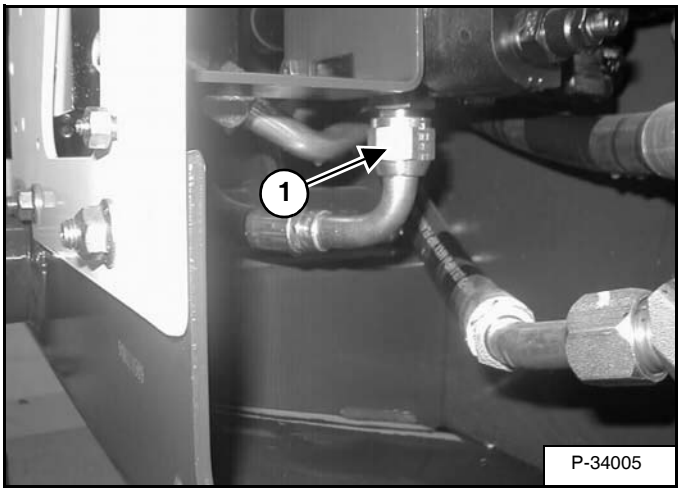
Disconnect the lift tubeline (Item 4) **[Figure 20-40-8]**.

Figure 20-40-9



Disconnect the BICS valve electrical connector (Item 1) **[Figure 20-40-9]**.

Figure 20-40-10



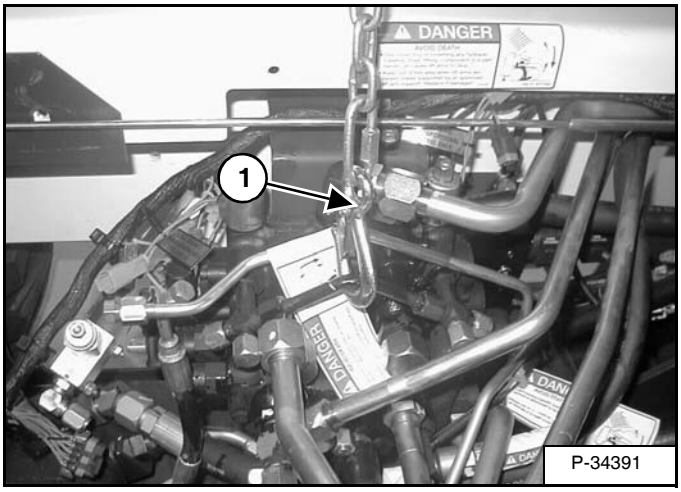
Disconnect the inlet hose (Item 1) **[Figure 20-40-10]** from the bottom of the control valve.

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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (FOOT CONTROL) (CONT'D)

Removal and Installation (Cont'd)

Figure 20-40-11



Connect a hoist (Item 1) **[Figure 20-40-11]** to the control valve.

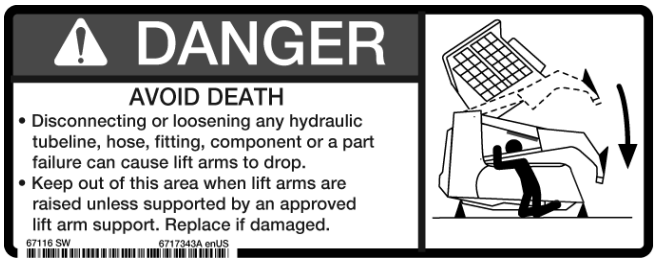
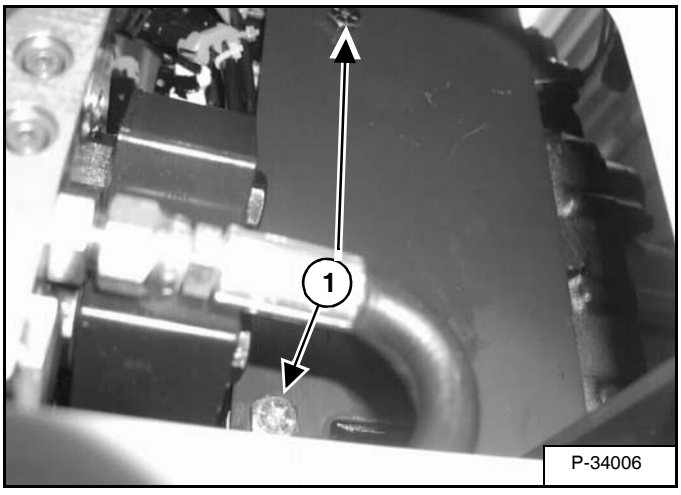


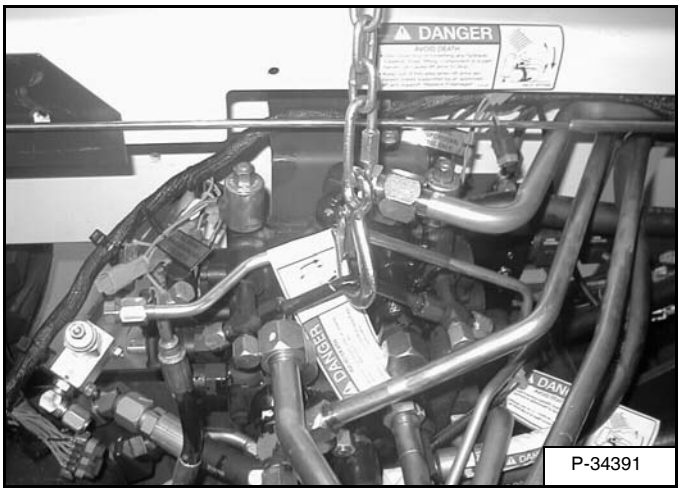
Figure 20-40-12



Locate and remove the two control valve mounting bolts (Item 1) **[Figure 20-40-12]** through the right side access panels.

Installation: Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 20-40-13

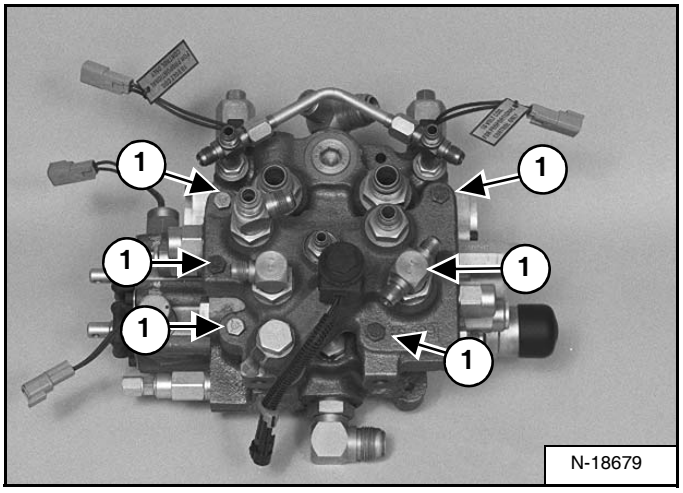


Remove the control valve from the loader **[Figure 20-40-13]**.

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BICS™ Valve Removal And Installation

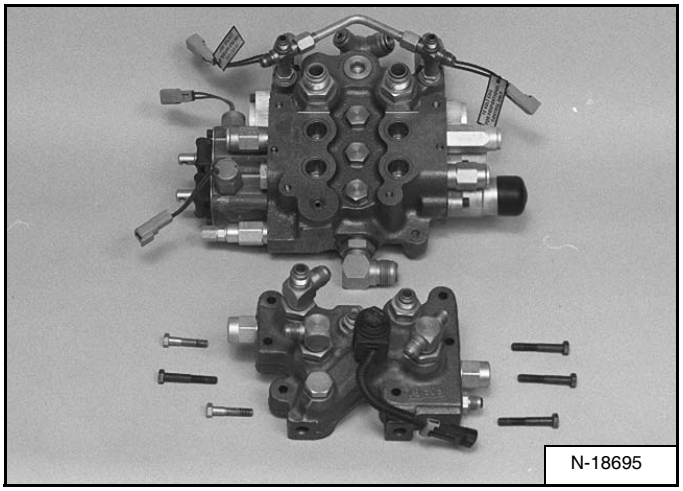
Figure 20-40-14



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

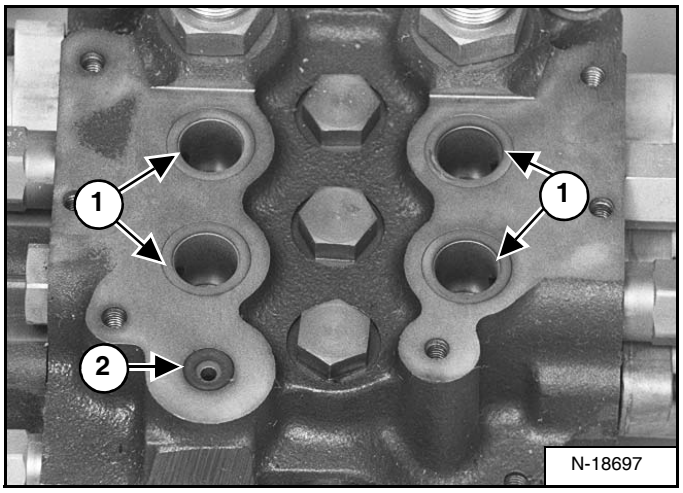
To remove the BICS™ from the control valve loosen and remove the six mounting bolts (Item 1) **[Figure 20-40-14]**.

Figure 20-40-15



Remove the BICS™ valve assembly from the top of the control valve **[Figure 20-40-15]**.

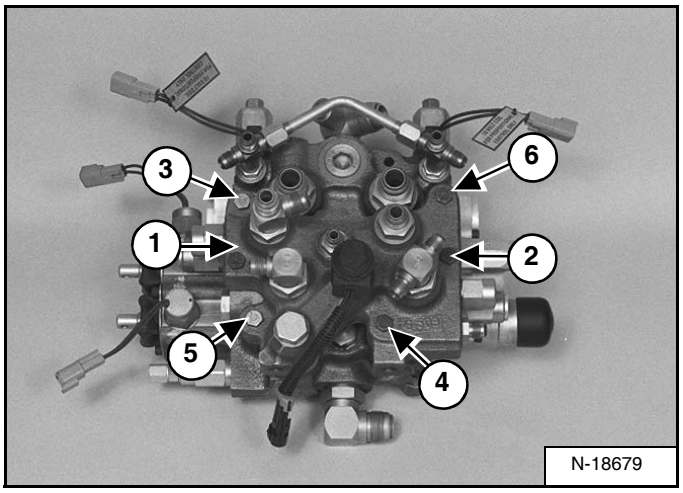
Figure 20-40-16



Remove the four large O-rings (Item 1) and the small O-ring (Item 2) **[Figure 20-40-16]** from the top of the control valve.

Installation: Install the four large O-rings (Item 1) and the small O-ring (Item 2) **[Figure 20-40-16]** on the top of the control valve.

Figure 20-40-17



Install the six mounting bolts **[Figure 20-40-17]**.

The chart below lists the correct torque specifications and tightening sequence when reinstalling the BICS™ valve assembly to the control valve. Thoroughly clean and dry bolts and threads in valve. Use liquid adhesive LOCTITE #242 or equivalent.

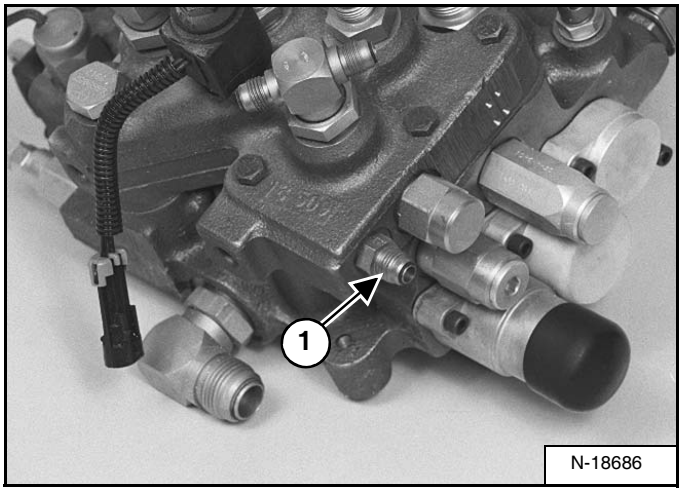
STEP	TORQUE	SEQUENCE
1	110-130 in.-lb. (12,5-23,7N•m)	1,2,3,4,5 & 6
2	190-210 in.-lb. (21,5-23,7N•m)	
3	190-210 in.-lb. (21,5-23,7 N•m)	

*Torque must be 190-210 in.-lb. (21,5-23,7 N•m) for every bolt or repeat step 3.

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BICS™ Valve, Lift Arm By-Pass Orifice Removal And Installation

Figure 20-40-18



Remove the fitting (Item 1) **[Figure 20-40-18]** from the valve.

Figure 20-40-19

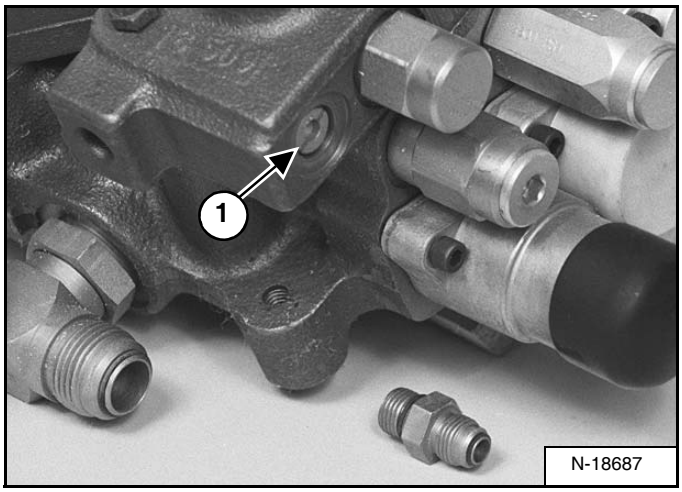
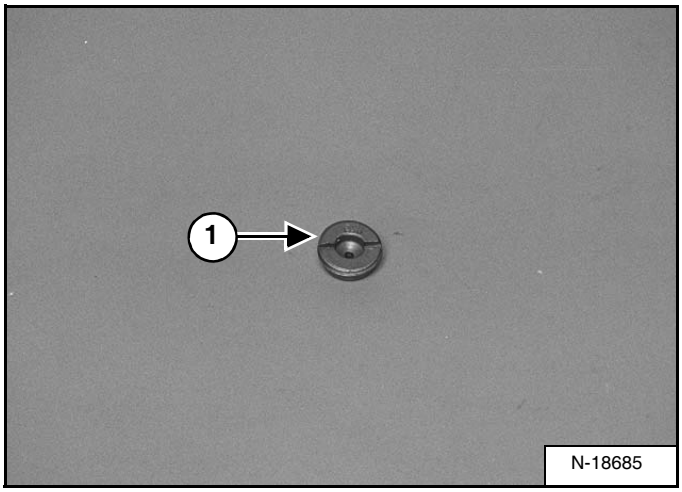


Figure 20-40-20



Using a flat blade screw driver, remove the lift arm by-pass orifice (Item 1) **[Figure 20-40-19]** & **[Figure 20-40-20]**.

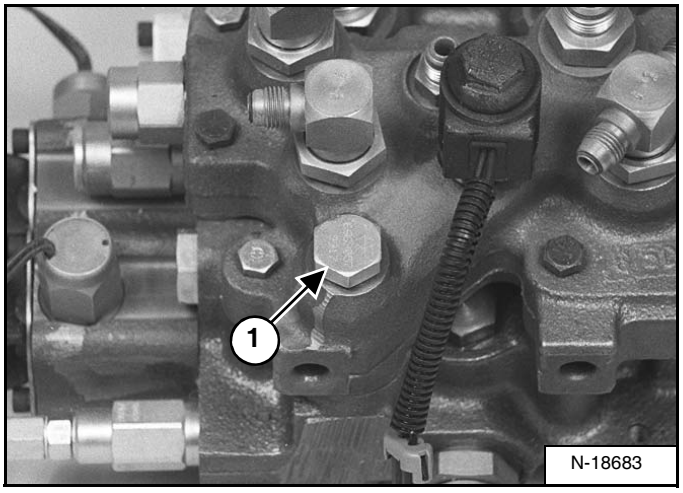
Orifice size is 0.078 inch.

Reverse the removal procedure to install the lift arm by-pass orifice.

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BICS™ Valve, Check Valve Removal And Installation

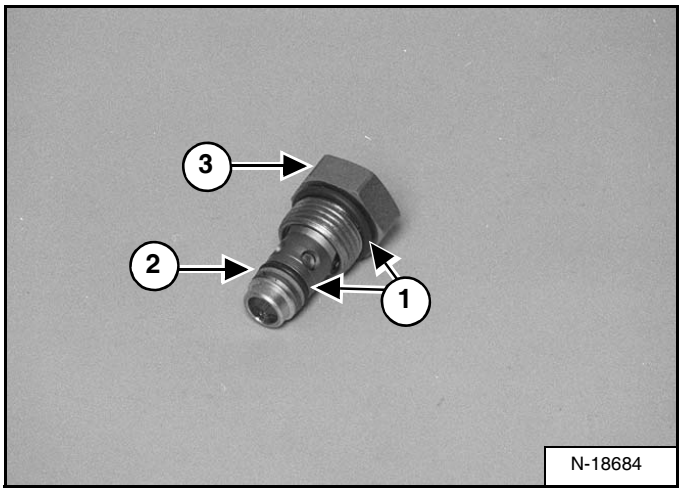
Figure 20-40-21



Remove the check valve (Item 1) **[Figure 20-40-21]**.

Installation: Tighten the valve to 20 ft.-lb. (27 N•m) torque.

Figure 20-40-22

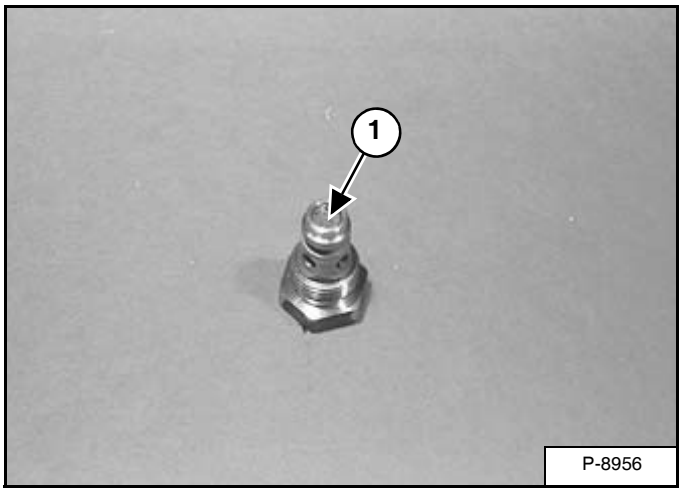


Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-22]**.

Install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-22]** on the check valve.

Check valve (Item 3) **[Figure 20-40-22]** has a rating of 5-10 PSI.

Figure 20-40-23



Clean and inspect the screen (Item 1) **[Figure 20-40-23]** on the end of the valve.

Reverse the removal procedure to install the BICS™ check valve.

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BICS™ Valve Lock Valve Removal And Installation

Figure 20-40-24

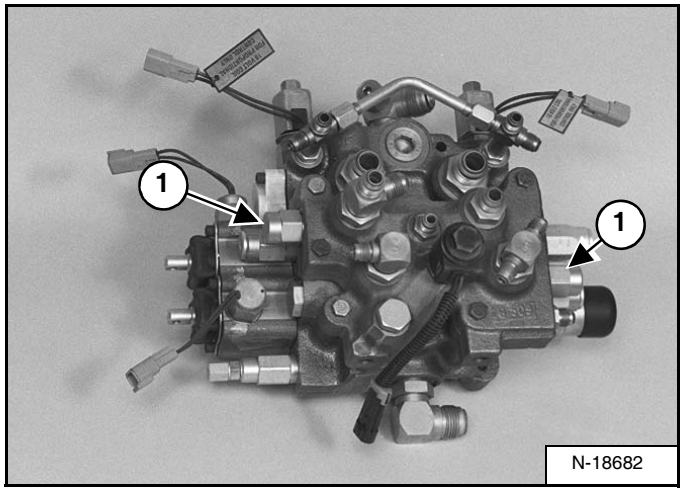


Figure 20-40-25

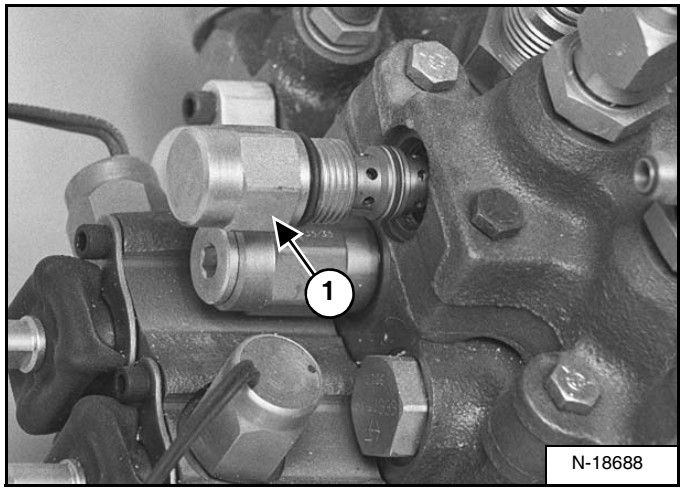
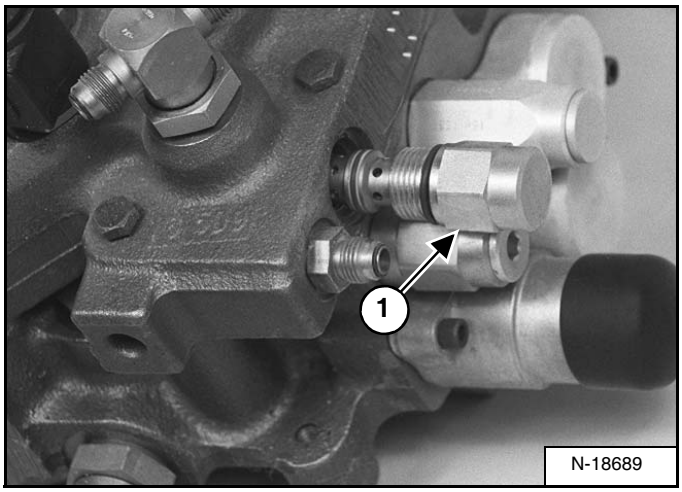


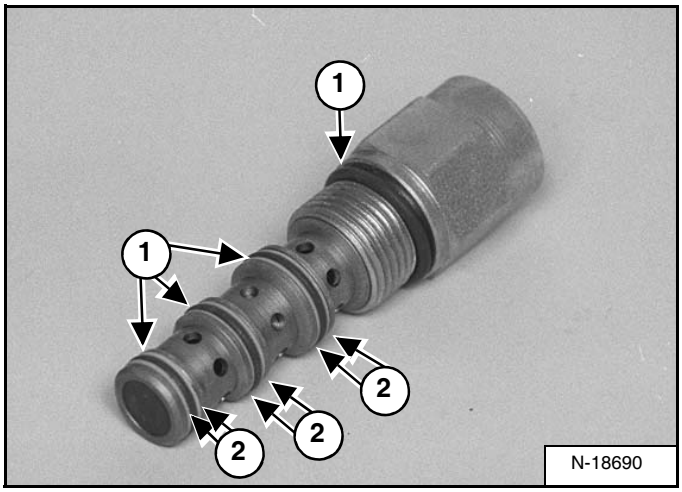
Figure 20-40-26



Remove the lock valves (Item 1) **[Figure 20-40-24]**, **[Figure 20-40-25]** & **[Figure 20-40-26]** from the BICS™ valve.

Installation: Tighten the lock valves to 25 ft.-lb. (34 N•m) torque.

Figure 20-40-27



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-40-27]** from both the tilt and lift lock valves.

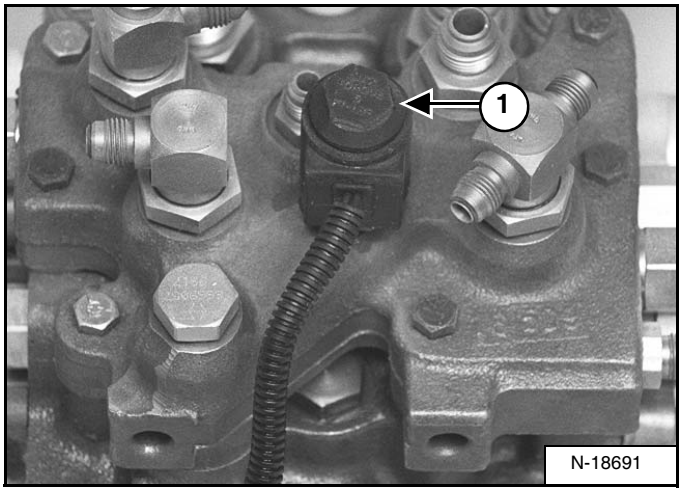
Install new O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-40-27]** on the tilt and lift lock valves.

Reverse the removal procedure to install the lock valve.

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BICS™ Valve Solenoid Removal And Installation

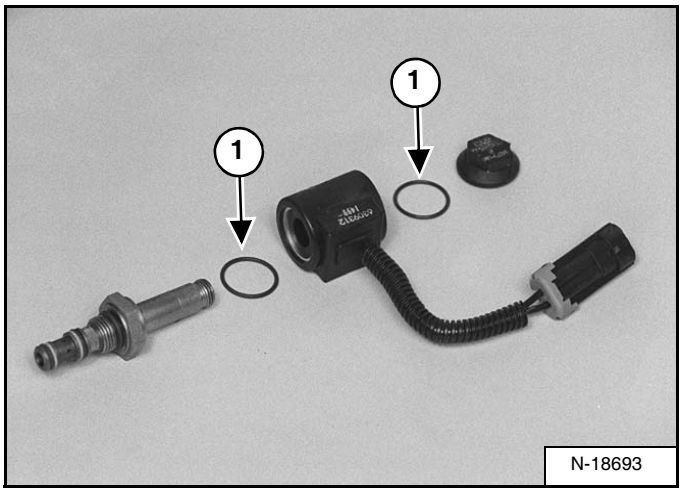
Figure 20-40-28



Remove the mounting nut (Item 1) **[Figure 20-40-28]** from the solenoid cartridge.

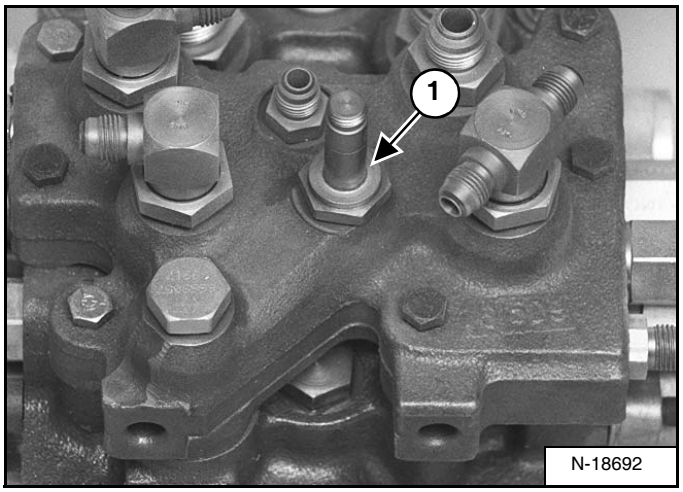
Installation: Tighten the mounting nut to 53 in.-lb. (6 N•m) torque.

Figure 20-40-29



Remove the O-rings (Item 1) **[Figure 20-40-29]** from both ends of the solenoid.

Figure 20-40-30



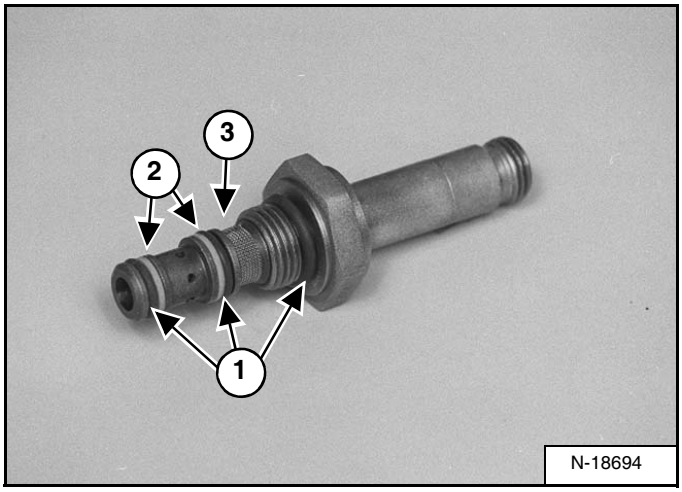
Remove the solenoid cartridge (Item 1) **[Figure 20-40-30]**.

Installation: Tighten the cartridge to 20 ft.-lb. (27 N•m) torque.

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BICS™ Valve Solenoid Removal And Installation (Cont'd)

Figure 20-40-31



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-40-31]** from the cartridge.

Clean all parts in solvent and dry with compressed air.

Inspect all parts for wear and replace any showing excessive wear.

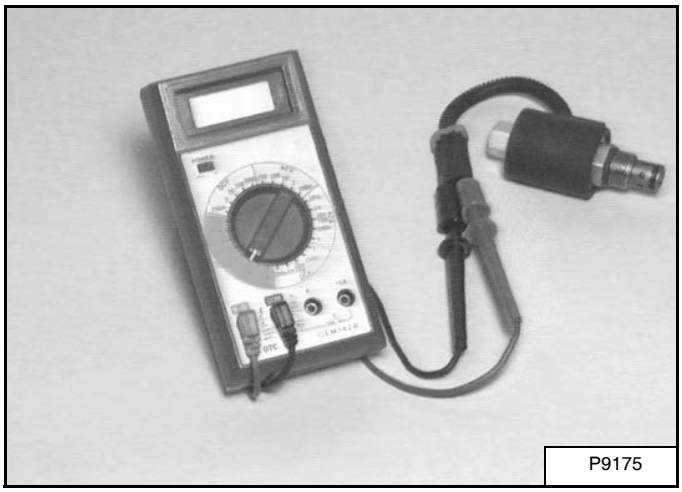
NOTE: The screen (Item 3) [Figure 20-40-31] may be cleaned with solvent. If it is torn or worn it needs to be replaced.

Use only new O-rings and apply oil to all O-rings and back-up rings before installation.

Install new O-rings (Item 1) **[Figure 20-40-29]** & **[Figure 20-40-31]** and new back-up rings (Item 2) **[Figure 20-40-31]** on the solenoid cartridge.

BICS™ Valve Solenoid Testing

Figure 20-40-32



Use an Ohm meter to measure coil resistance **[Figure 20-40-32]**.

Coil wires do not have polarity.

Correct resistance for the BICS™ is 9.7 ± 1 Ohm @ 20°C.

Correct resistance for the tilt and lift lock coils is 7.7 ± 1 Ohm @ 20°C.

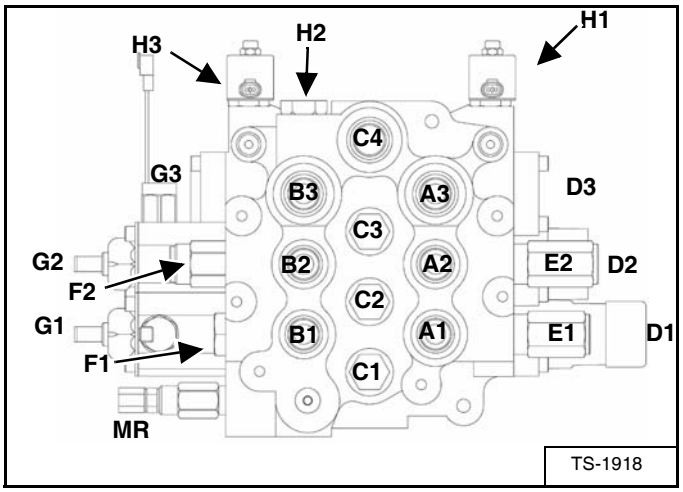
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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (FOOT CONTROL) (CONT'D)

Identification Chart

ITEM	S175, S185 LOADER
A1	Lift Cylinder Base End/Restrictor
A2	Tilt Cylinder Base End
A3	Auxiliary Hydraulics
B1	Lift Cylinder Rod End
B2	Tilt Cylinder Rod End
B3	Auxiliary Hydraulics
C1	Load Check Valve/Lift Function
C2	Load Check Valve/Tilt Function
C3	Orificed Load Check Valve Auxiliary Function
C4	Outlet Fluid Flow
D1	Lift Spool Centering Spring/Detent
D2	Tilt Spool Centering Spring
D3	Auxiliary Spool/Centering Springs
E1	Port Relief Valve-3500PSI
E2	Anti-Cavitation/Port Relief Valve-3500PSI
F1	Anti-Cavitation Valve
F2	Port Relief Valve-3500PSI
G1	Lift Spool End
G2	Tilt Spool End
G3	Auxiliary Spool/Centering Springs
H1	Auxiliary Electric Solenoid
H2	Plug/Port Relief (Optional)-3100PSI
H3	Auxiliary Electric Solenoid
MR	Main Relief Valve-3300PSI

Figure 20-40-33



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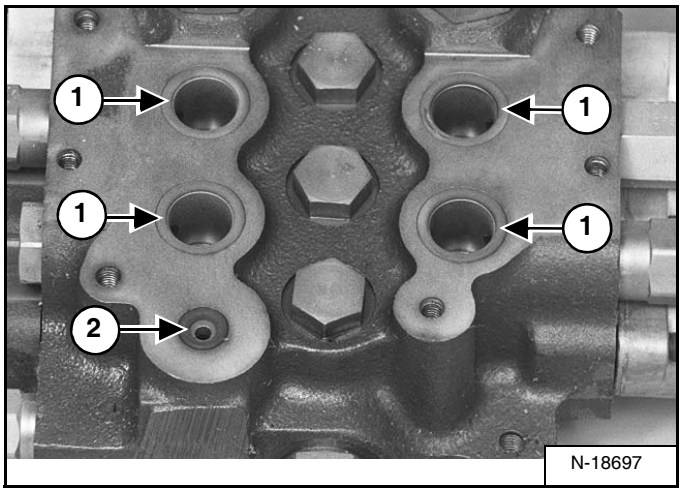
Load Check Valve

IMPORTANT

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

I-2003-0888

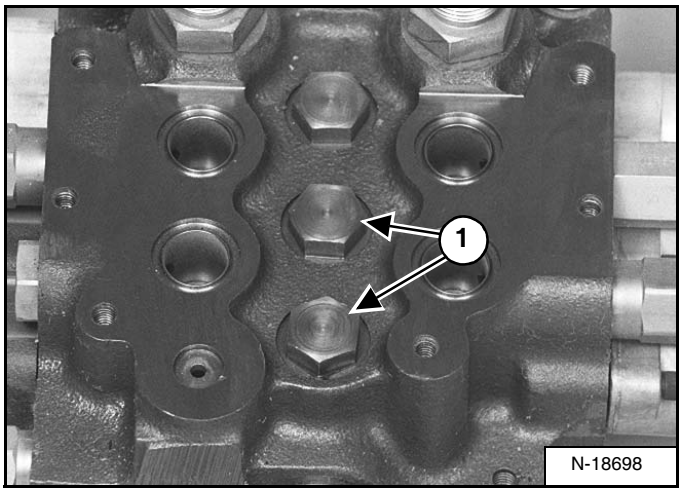
Figure 20-40-34



Remove the BICS™ valve assembly from the control valve. (See BICS™ Valve Removal And Installation on Page 20-40-5.)

Remove the four large O-rings (Item 1) and small O-ring (Item 2) **[Figure 20-40-34]**. Always replace these O-rings before installing the BICS™ valve assembly.

Figure 20-40-35



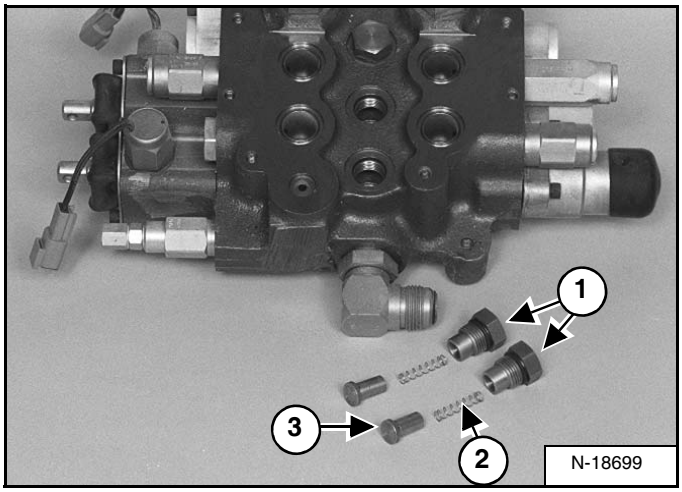
Mark each valve section, spool and related parts so that they will be returned to its original valve section during assembly.

Use bolts to fasten the control valve to a work bench for easier disassembly and assembly procedures.

Loosen the load check valve plugs (Item 1) **[Figure 20-40-35]**.

Installation: Always use new O-ring. tighten the plug to 35-40 ft.-lb. (47-54 N•m) torque.

Figure 20-40-36



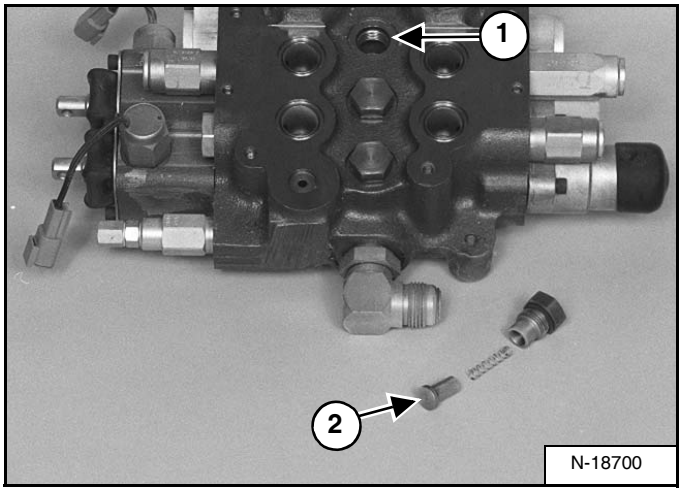
Remove the load check plugs (Item 1) **[Figure 20-40-36]**.

Remove the spring (Item 2) and poppet (Item 3) **[Figure 20-40-36]**.

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Load Check Valve (Cont'd)

Figure 20-40-37

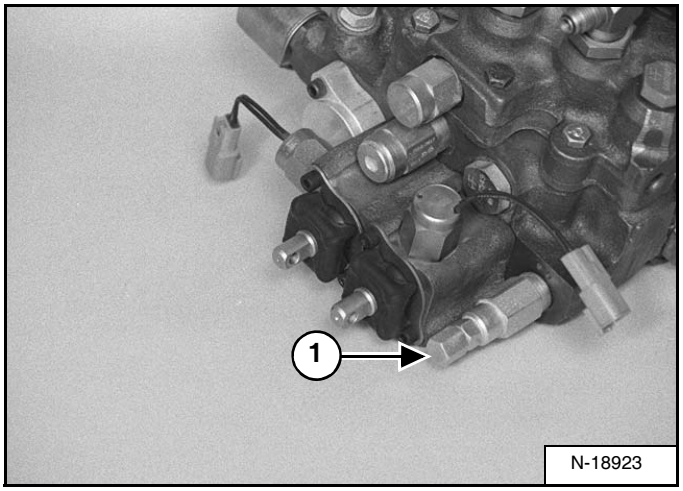


The auxiliary section (Item 1) uses an orifice load check poppet (Item 2) **[Figure 20-40-37]**.

NOTE: For correct port locations and valve component values (See Identification Chart on Page 20-40-11.)

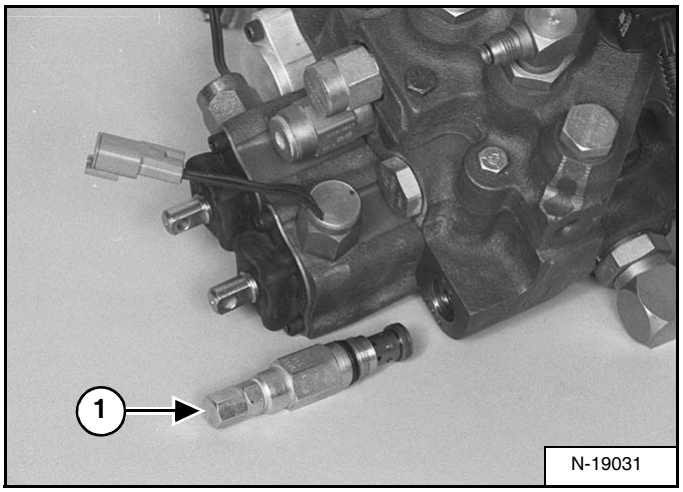
Main Relief Valve

Figure 20-40-38



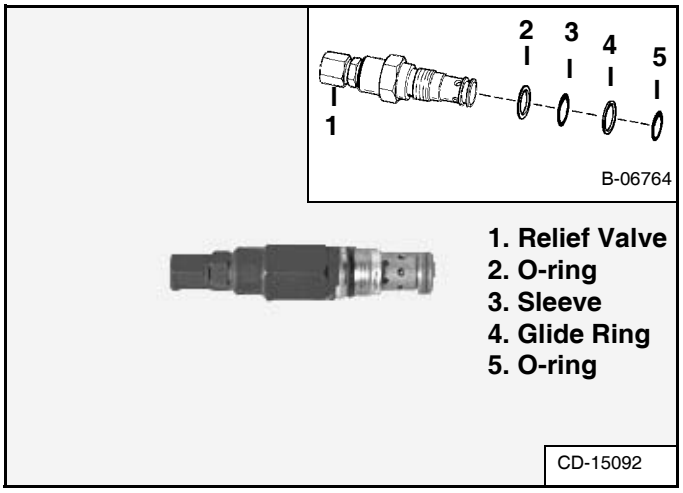
Loosen the main relief valve (Item 1) **[Figure 20-40-38]**.

Figure 20-40-39



Remove the main relief valve (Item 1) **[Figure 20-40-39]**.

Figure 20-40-40



Remove the O-rings, sleeve, and glide ring from the main relief valve **[Figure 20-40-40]**.

Installation: Always use new O-rings. sleeve, and glide ring. Tighten to 35-40 ft.-lb. (47-54 N•m) torque.

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Port Relief Valve

Figure 20-40-41

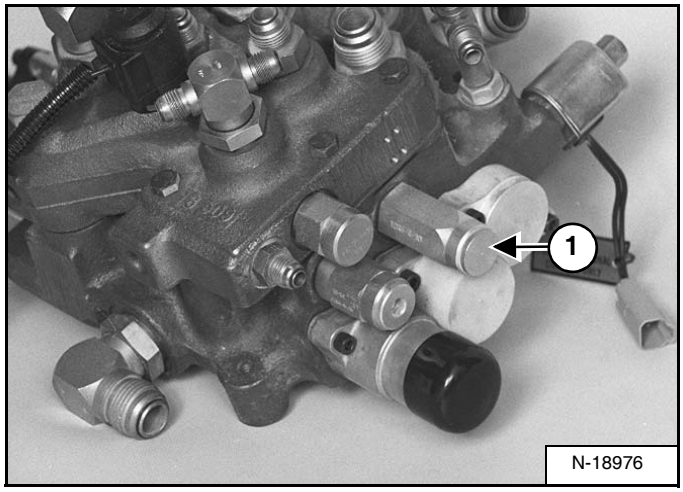
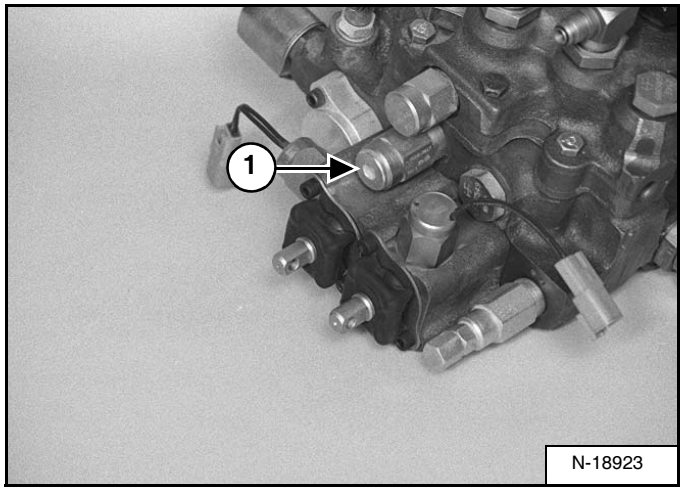


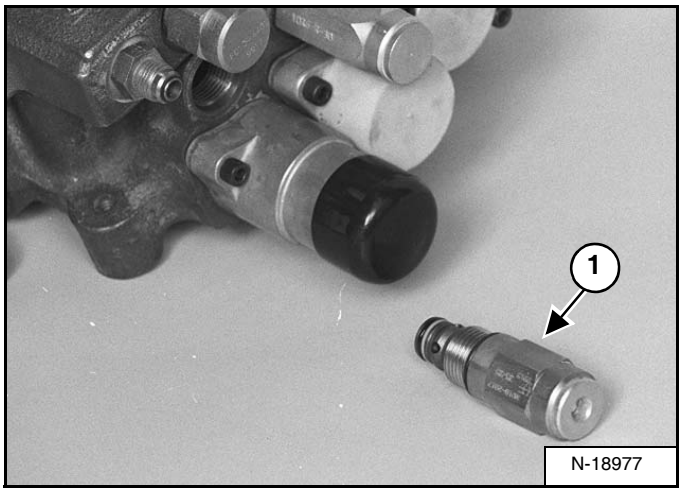
Figure 20-40-42



Loosen the port relief valve (Item 1) **[Figure 20-40-41]** & **[Figure 20-40-42]** (Port E1 or F2).

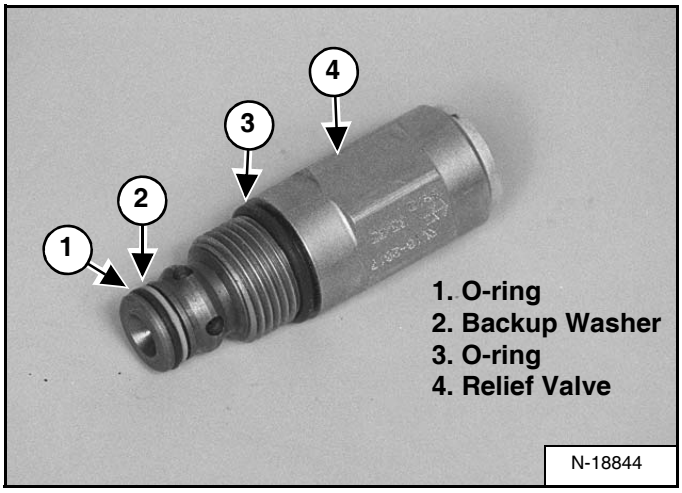
Installation: Always use new O-rings and back-up washers. Tighten to 35-40 ft.-lb. (47-54 N•m) torque.

Figure 20-40-43



Remove the port relief valve (Item 1) **[Figure 20-40-43]**.

Figure 20-40-44

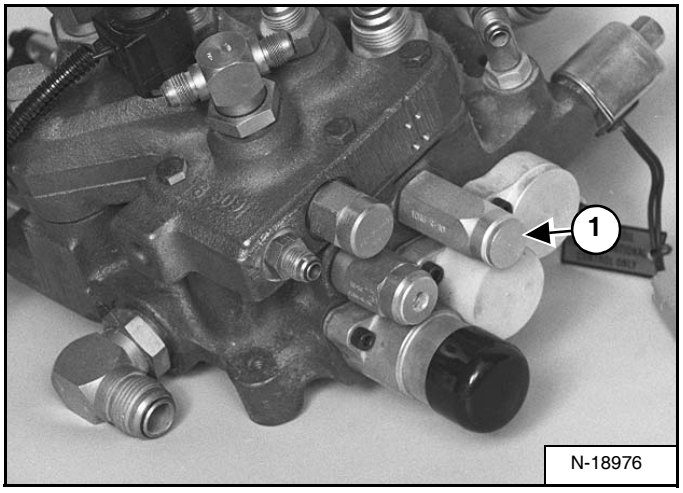


Remove the O-rings and back-up washer from the port relief valve **[Figure 20-40-44]**.

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Anti-Cavitation Valve/Port Relief Valve

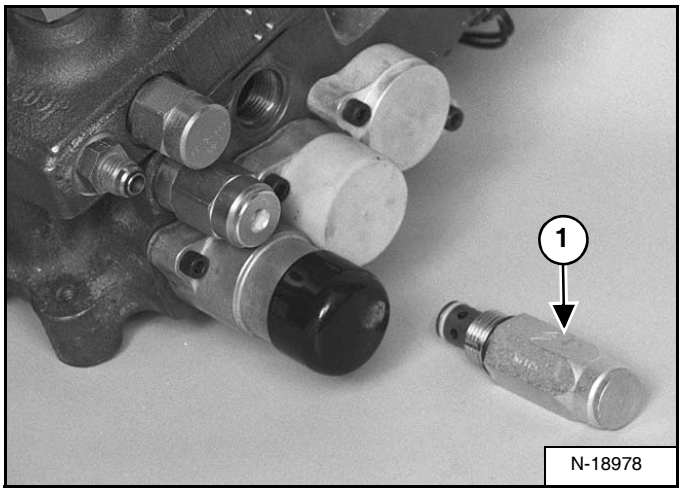
Figure 20-40-45



Loosen the anti-cavitation valve (Item 1) **[Figure 20-40-45]**.

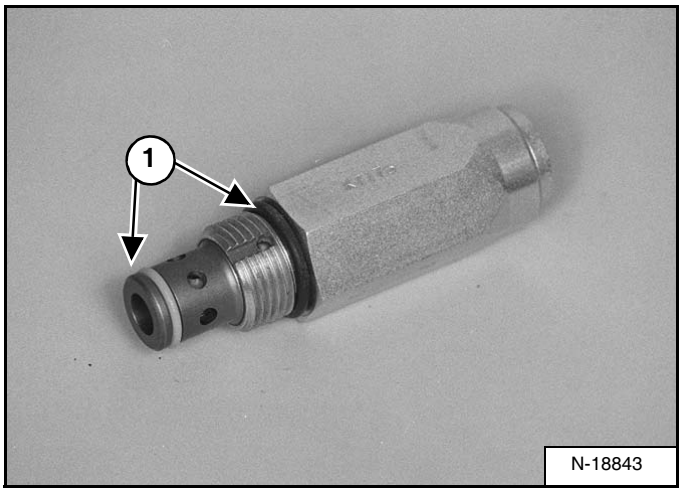
Installation: Always use new O-rings and back-up washers. Tighten to 35-40 ft.-lb. (47-54 N•m) torque.

Figure 20-40-46



Remove the anti-cavitation/port relief valve (Item 1) **[Figure 20-40-46]** from the control valve for the tilt section.

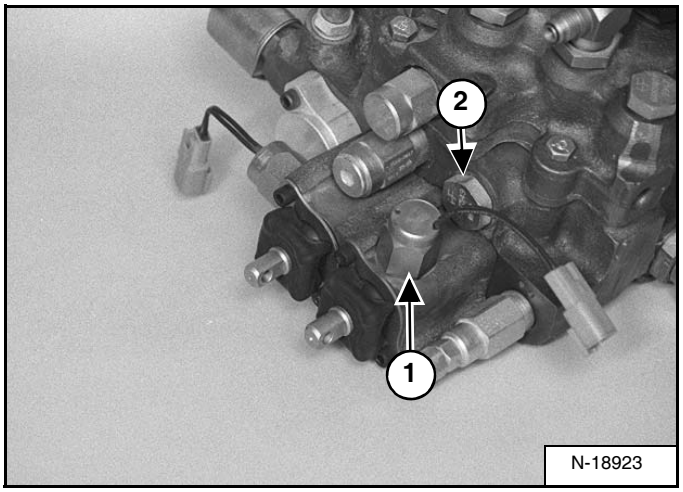
Figure 20-40-47



Remove the O-rings (Item 1) **[Figure 20-40-47]** from the anti-cavitation/port relief valve.

Anti-Cavitation Valve

Figure 20-40-48



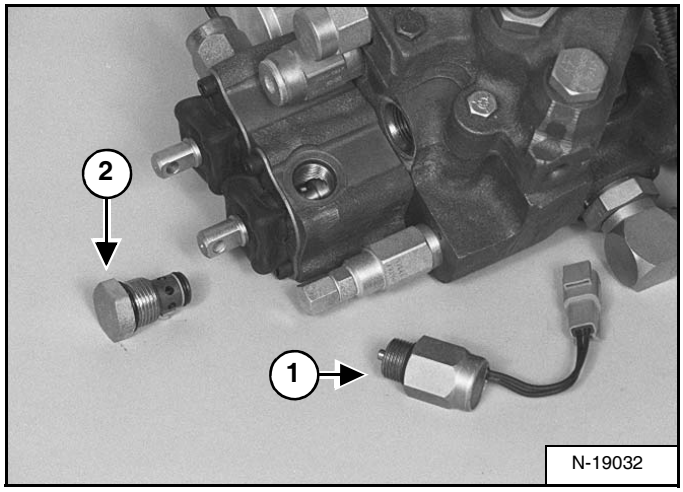
Remove the lift lock solenoid (Item 1) **[Figure 20-40-48]** & **[Figure 20-40-49]**.

Installation: Always use new O-rings and back-up washers. Tighten to 35-40 ft.-lb. (47-54 N•m) torque.

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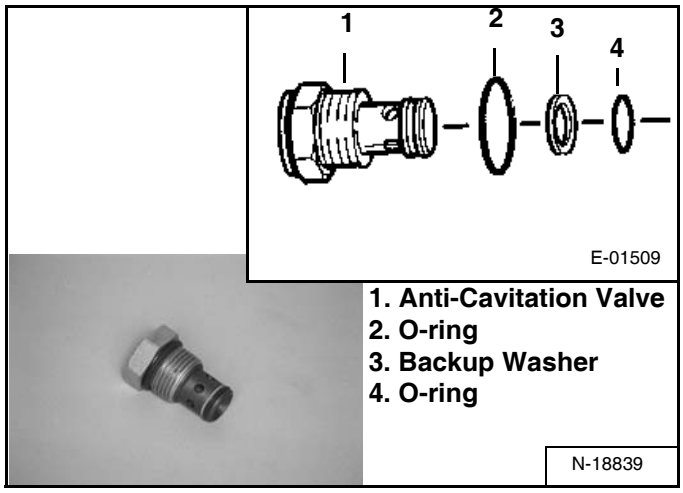
Anti-Cavitation Valve (Cont'd)

Figure 20-40-49



Remove the anti-cavitation valve (Item 2) **[Figure 20-40-48]** & **[Figure 20-40-49]** from the control valve for the lift section.

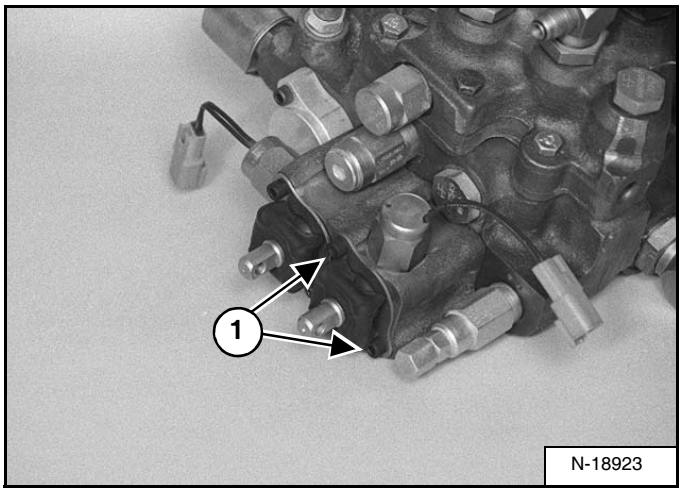
Figure 20-40-50



Remove the O-rings and back-up washer from the anti-cavitation valve **[Figure 20-40-50]**.

Rubber Boot

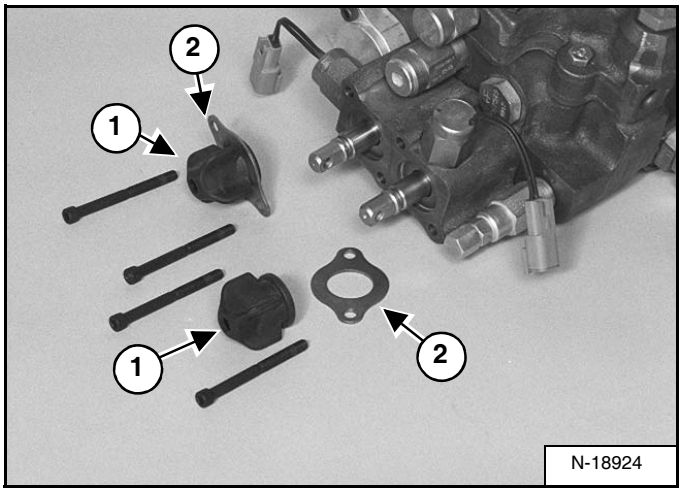
Figure 20-40-51



Remove the two screws (Item 1) **[Figure 20-40-51]** on the rubber boot retainer.

Installation: Tighten the screws to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Figure 20-40-52



Remove the rubber boot (Item 1) and retainer (Item 2) **[Figure 20-40-52]**.

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Lift And Tilt Lock Block Removal And Installation

Figure 20-40-53

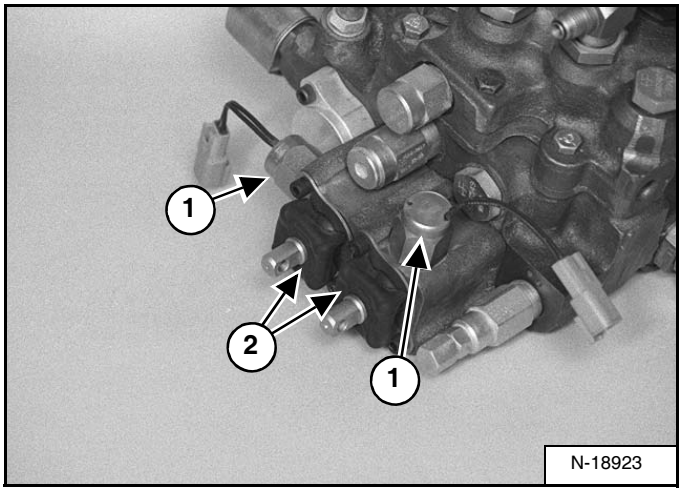
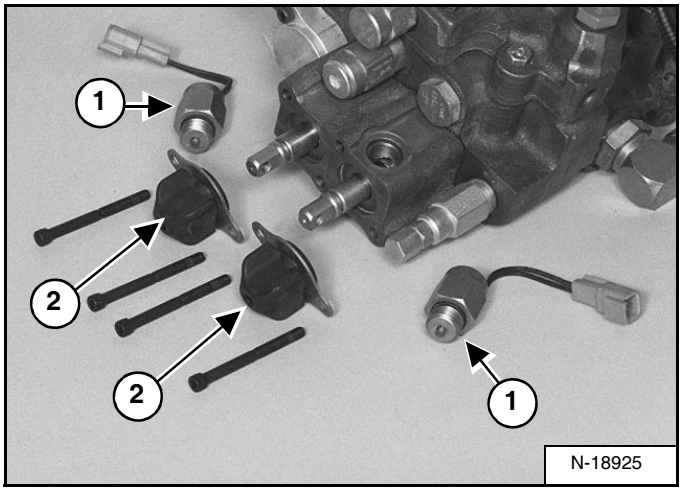


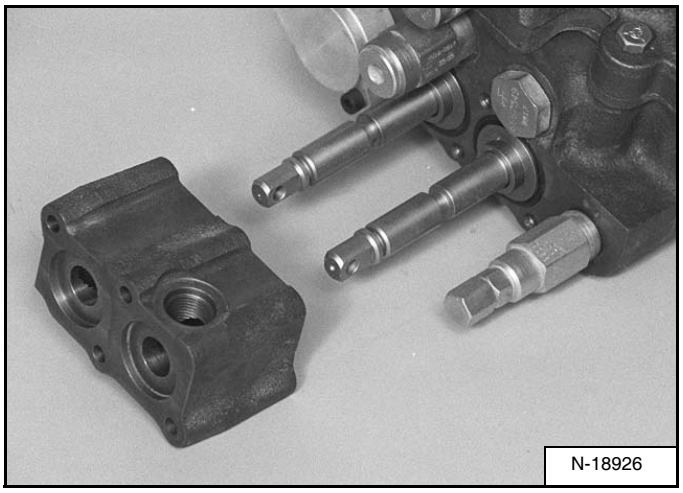
Figure 20-40-54



Remove the lock solenoids (Item 1) **[Figure 20-40-53]** & **[Figure 20-40-54]** from the lock block.

Remove the rubber boot (Item 2) **[Figure 20-40-53]** & **[Figure 20-40-54]**. (See Identification Chart on Page 20-40-11.)

Figure 20-40-55



Remove the block **[Figure 20-40-55]**.

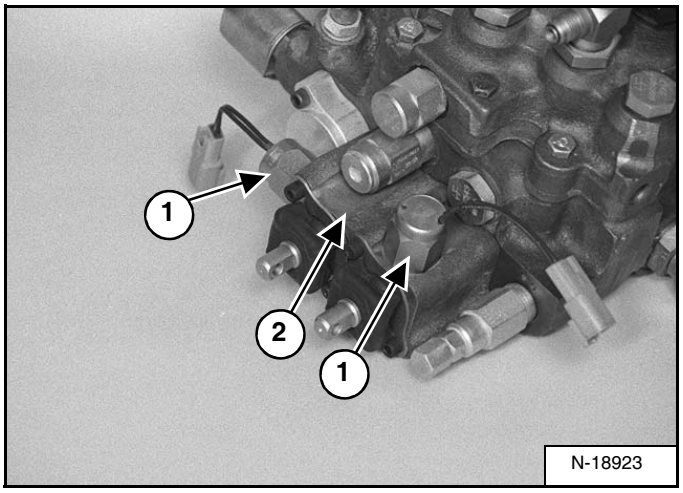
NOTE: The lock block must be clean and oil free. (Oil can cause the solenoids not to function properly.)

Lift Spool and Detent

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

MEL1278 - Detent Tool
MEL1285 - Detent Spring Tool

Figure 20-40-56



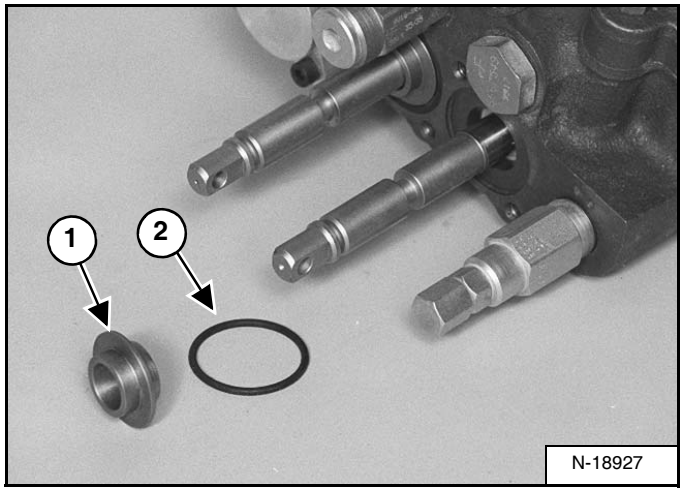
Remove the lift and tilt lock solenoids (Item 1) **[Figure 20-40-56]**.

Remove the lift and tilt lock block (Item 2) **[Figure 20-40-56]** from the control valve. (See Lift And Tilt Lock Block Removal And Installation on Page 20-40-17.)

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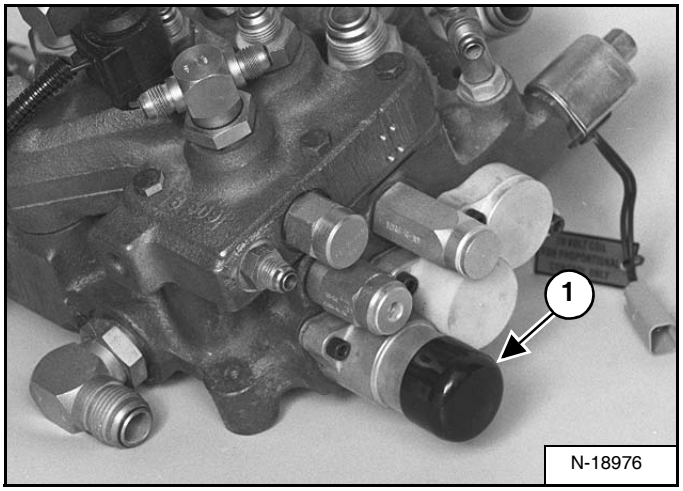
Lift Spool and Detent (Cont'd)

Figure 20-40-57



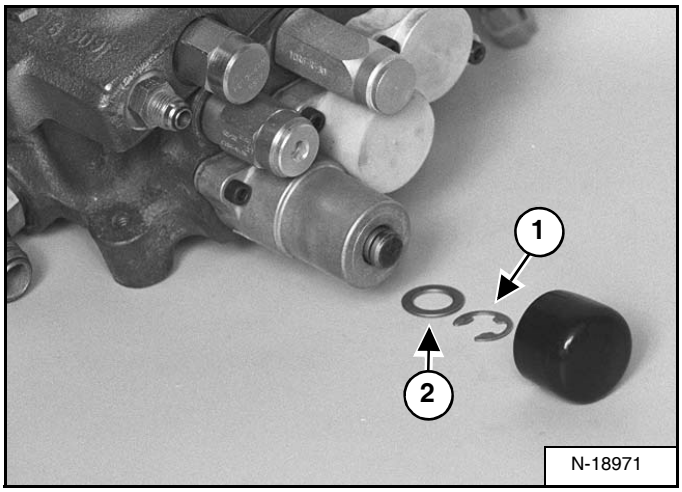
Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-40-57]** from the lift spool.

Figure 20-40-58



Remove the end cap (Item 1) **[Figure 20-40-58]**.

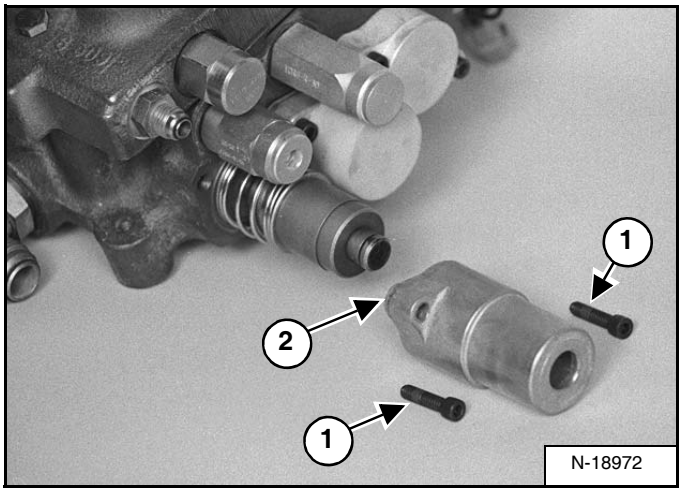
Figure 20-40-59



Use safety glasses and a screwdriver to remove the snap ring (Item 1) **[Figure 20-40-59]**.

Remove the washer (Item 2) **[Figure 20-40-59]**.

Figure 20-40-60



Remove the screws (Item 1) **[Figure 20-40-60]** from the detent bonnet.

Remove the detent bonnet (Item 2) **[Figure 20-40-60]**.

IMPORTANT

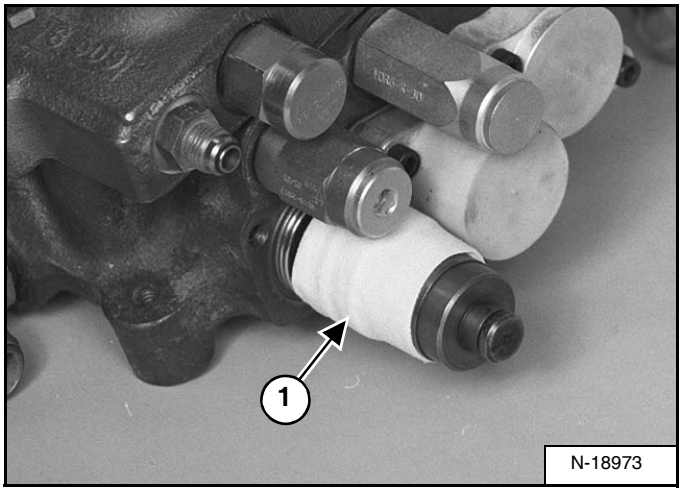
The detent assembly has small springs and balls. Do not lose these parts during disassembly and assembly.

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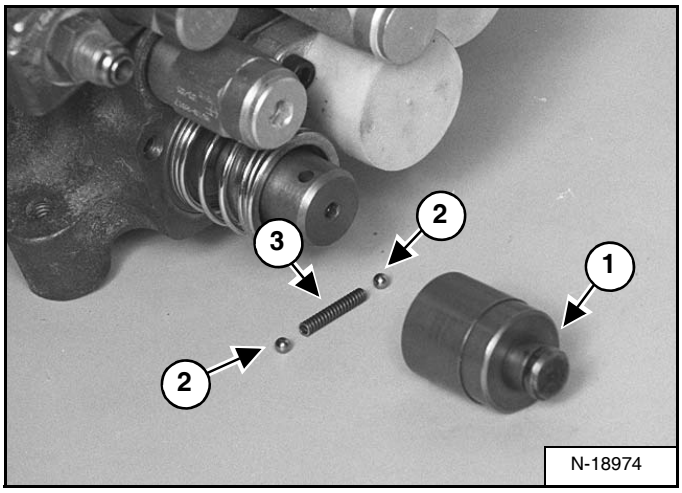
Lift Spool and Detent (Cont'd)

Figure 20-40-61



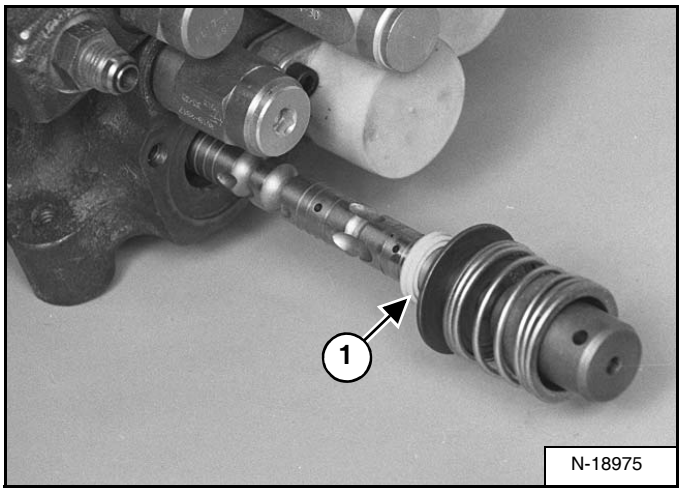
Put a rag around the detent assembly (Item 1) **[Figure 20-40-61]**. This will prevent the detent balls and spring from being lost when the detent sleeve is removed.

Figure 20-40-62



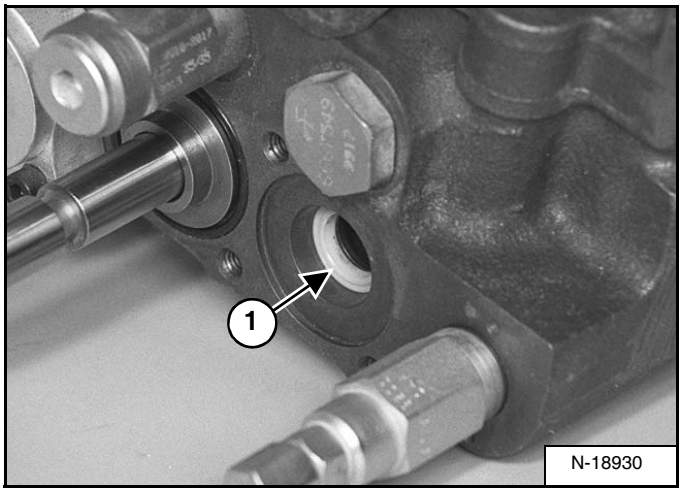
Remove the detent sleeve (Item 1), detent balls (Item 2) and spring (Item 3) **[Figure 20-40-62]**.

Figure 20-40-63



Remove the spool assembly and seal (Item 1) **[Figure 20-40-63]** from the control valve.

Figure 20-40-64

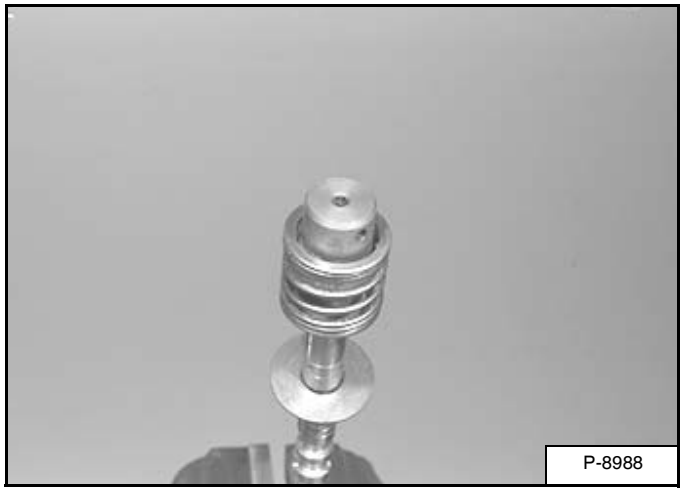


Remove the spool seal (Item 1) **[Figure 20-40-64]** from the linkage end of the valve.

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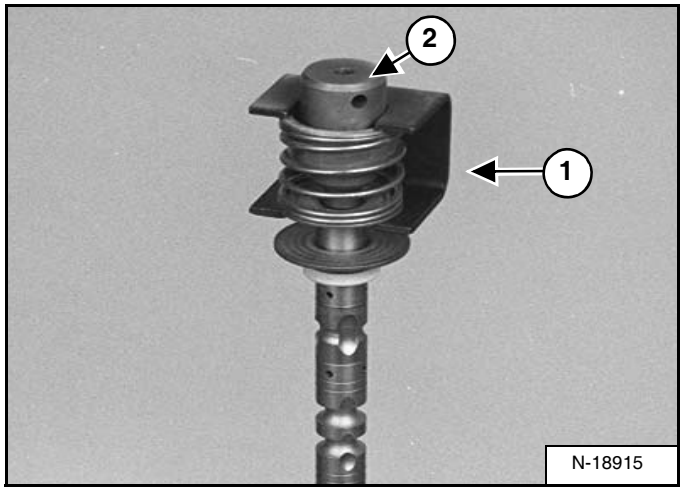
Lift Spool and Detent (Cont'd)

Figure 20-40-65



Clamp the linkage end of the spool in a vise **[Figure 20-40-65]**.

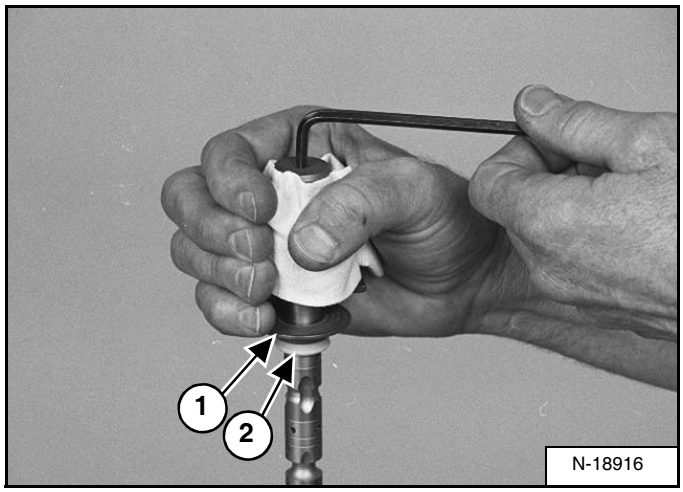
Figure 20-40-66



Install the spring tool (Item 1) **[Figure 20-40-66]** over the centering spring.

NOTE: Be careful when removing the detent adapter (Item 2) [Figure 20-40-66] from the centering spring, as it is under spring pressure.

Figure 20-40-67

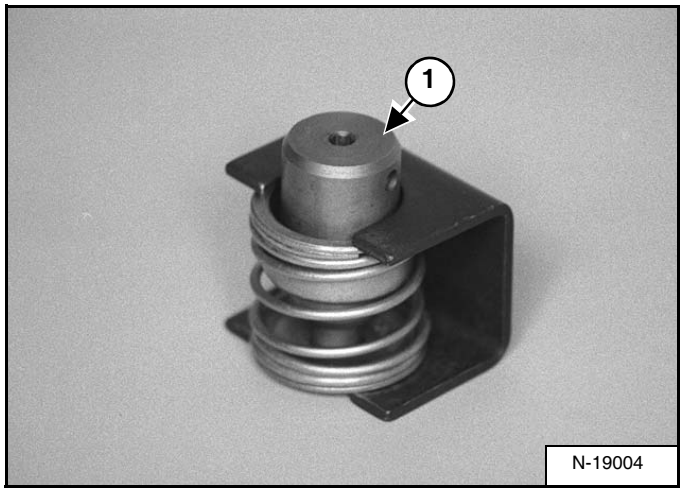


Put a rag around the detent assembly **[Figure 20-40-67]**. This will prevent the detent balls and spring from being lost when the detent adapter is removed.

Remove the detent adapter with an allen wrench.

Remove the back-up washer (Item 1) and spool seal (Item 2) **[Figure 20-40-67]**.

Figure 20-40-68

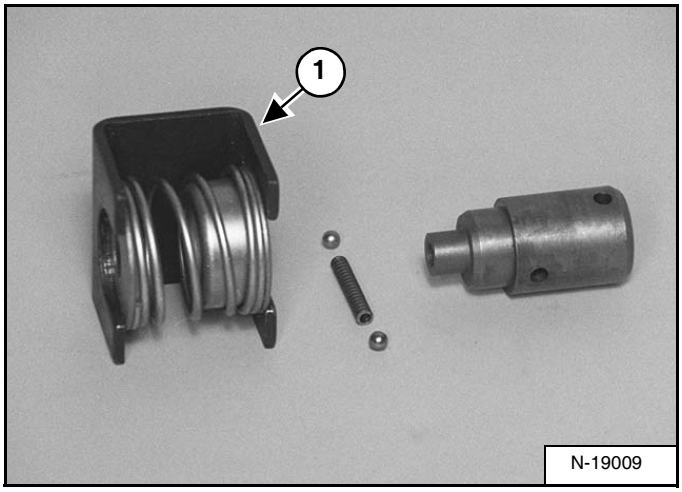


Remove the detent adapter (Item 1) **[Figure 20-40-68]** from the spring assembly.

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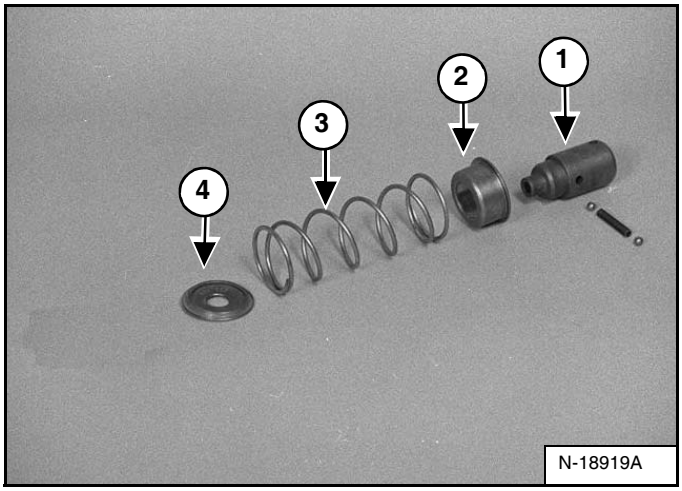
Lift Spool and Detent (Cont'd)

Figure 20-40-69



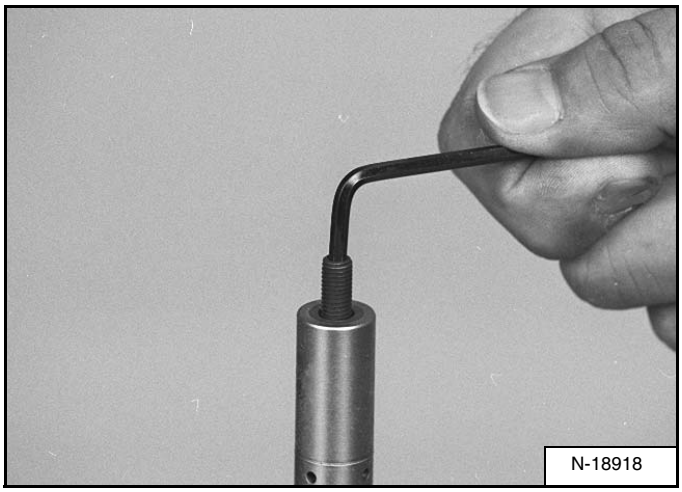
Remove spring tool (Item 1) **[Figure 20-40-69]** from the spring assembly.

Figure 20-40-70



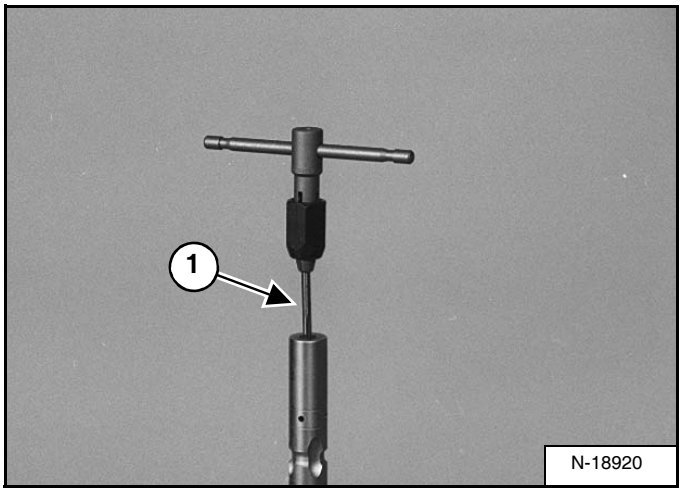
Inspect the adapter (Item 1), collar (Item 2), spring (Item 3), and washer (Item 4) **[Figure 20-40-70]**.

Figure 20-40-71



Remove the stud from the end of the spool **[Figure 20-40-71]**.

Figure 20-40-72



Removal of the plastic plug:

Make a center point in the plug using a 1/16 inch drill.

Drill a hole all the way through the plug using a 7/64 inch tap drill.

Turn a 6-32 tap (Item 1) **[Figure 20-40-72]** into the plug. Pull the tap and plug out of the spool. Be careful, do not break the tap.

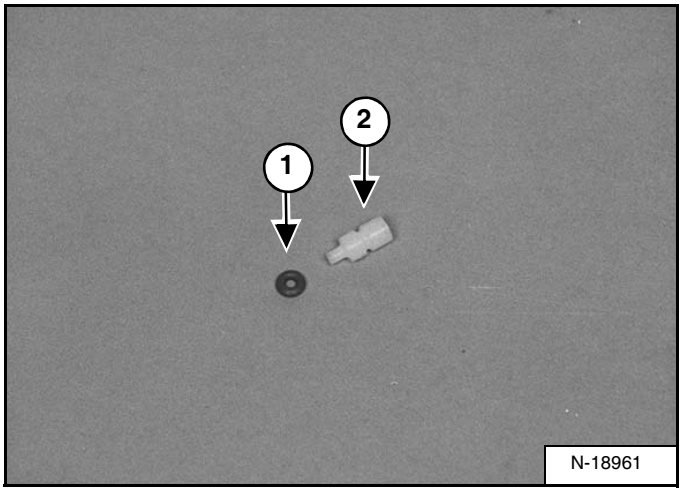
Clean all the debris from inside the spool bore.

NOTE: DO NOT USE LOCTITE ON THE STUD THREADS.

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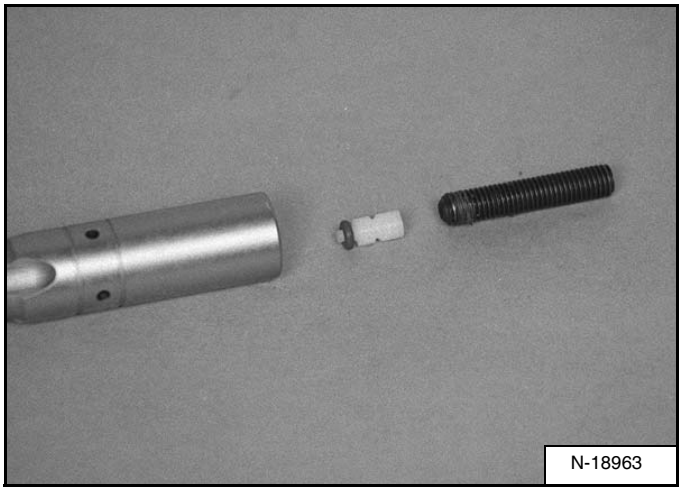
Lift Spool and Detent (Cont'd)

Figure 20-40-73



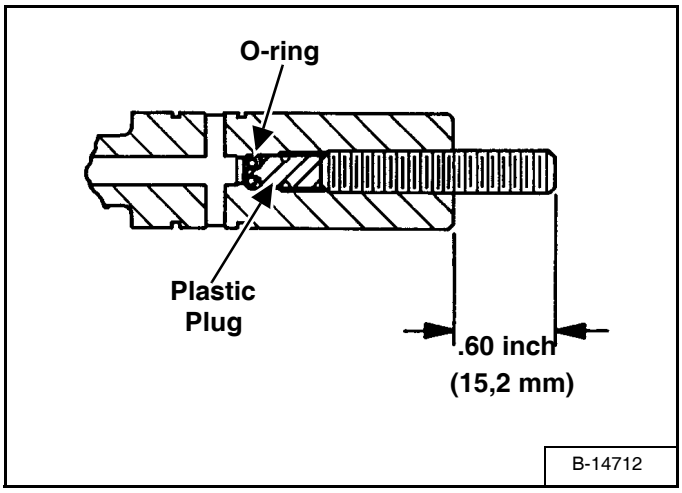
Install the O-ring (Item 1) over the nipple on the plastic plug (Item 2) **[Figure 20-40-73]**.

Figure 20-40-74



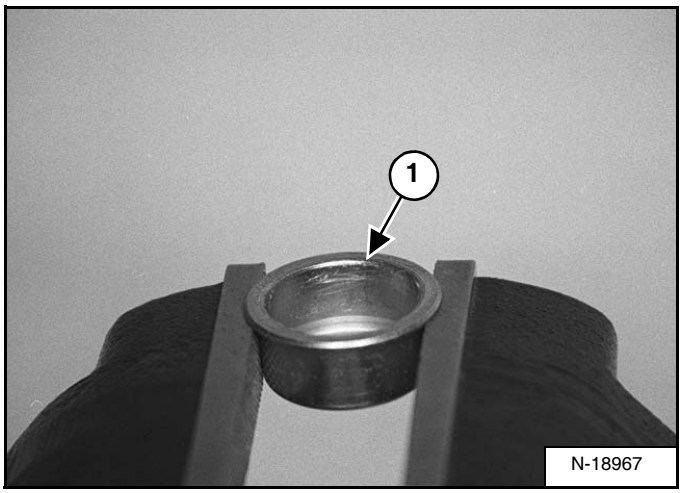
Install the plastic plug and O-ring in the spool **[Figure 20-40-74]**.

Figure 20-40-75



Install the stud and tighten until the other end of the stud is out about 0.60 inch (15,2 mm) from the spool **[Figure 20-40-75]**.

Figure 20-40-76

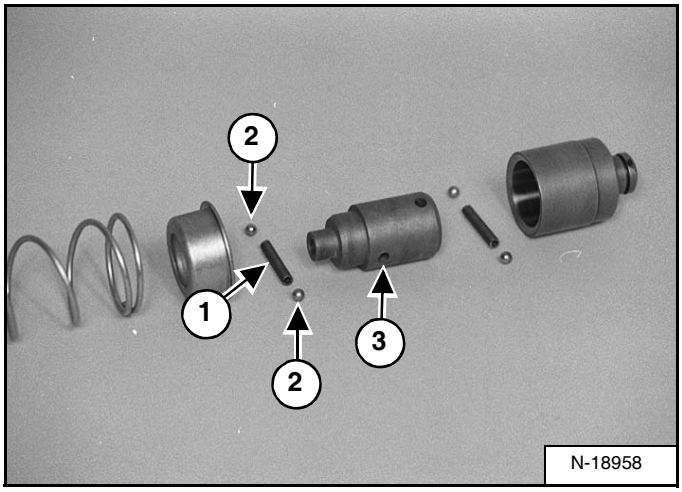


Clamp the collar (Item 1) **[Figure 20-40-76]** in a vice.

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Lift Spool and Detent (Cont'd)

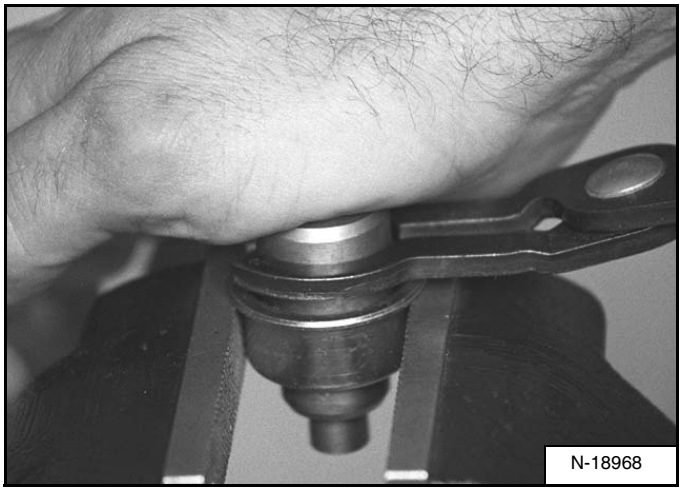
Figure 20-40-77



Apply grease on all the detent component surfaces before assembly **[Figure 20-40-77]**.

Install the spring (Item 1) and detent balls (Item 2) into the adapter (Item 3) **[Figure 20-40-77]** and compress with the detent pliers **[Figure 20-40-78]**.

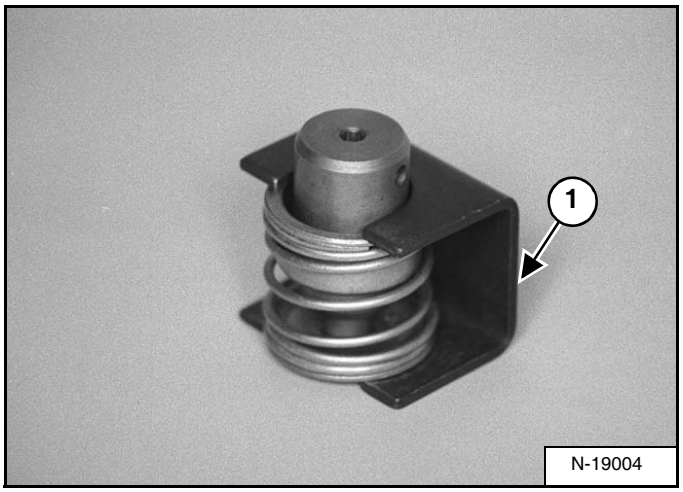
Figure 20-40-78



Install the detent adapter to the collar **[Figure 20-40-78]**.

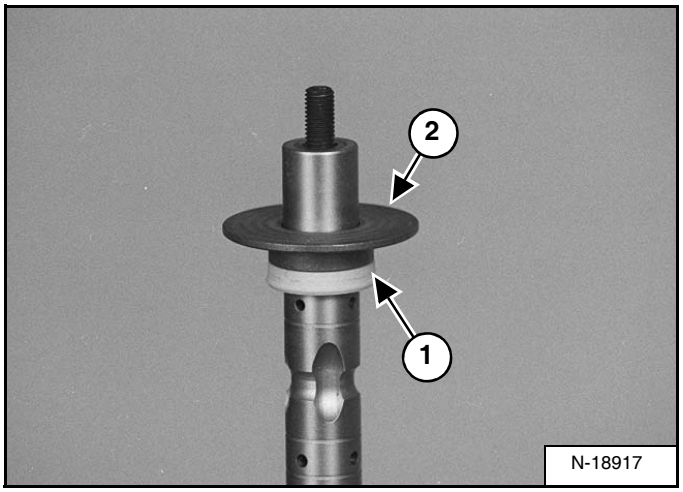
NOTE: The collar and the detent adapter are held together by spring pressure when assembled to the lift spool not the detent balls. Hold the detent adapter and collar together to prevent the detent balls and spring from falling out.

Figure 20-40-79



Install the spring tool (Item 1) **[Figure 20-40-79]** over the washer, spring, collar and detent adapter.

Figure 20-40-80

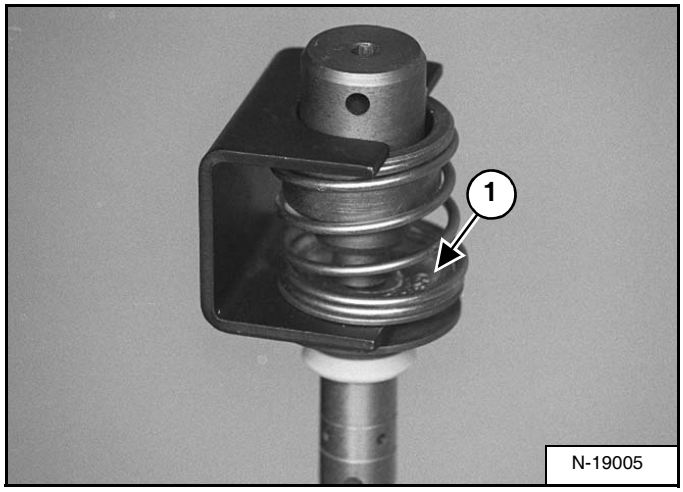


Install the spool seal (Item 1) and back-up washer (Item 2) **[Figure 20-40-80]**.

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Lift Spool and Detent (Cont'd)

Figure 20-40-81



Install the spring assembly to the lift spool hand tight **[Figure 20-40-81]**.

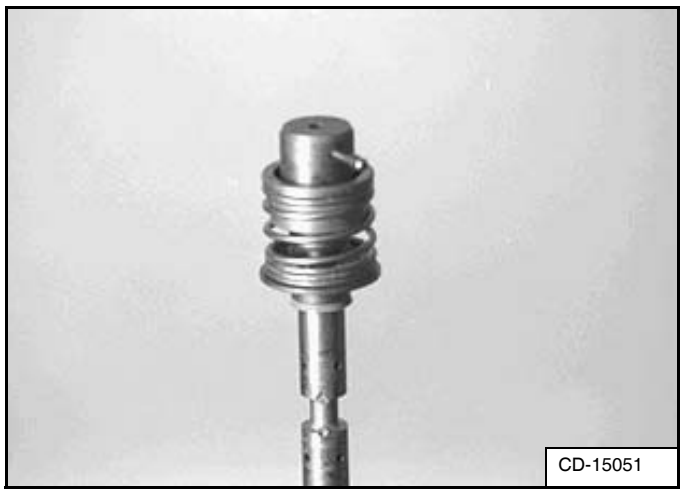
Remove the spring tool.

Check the alignment of the detent adapter and the washer.

Tighten the adapter to 90-100 in.-lb. (10,2-11,3 N•m).

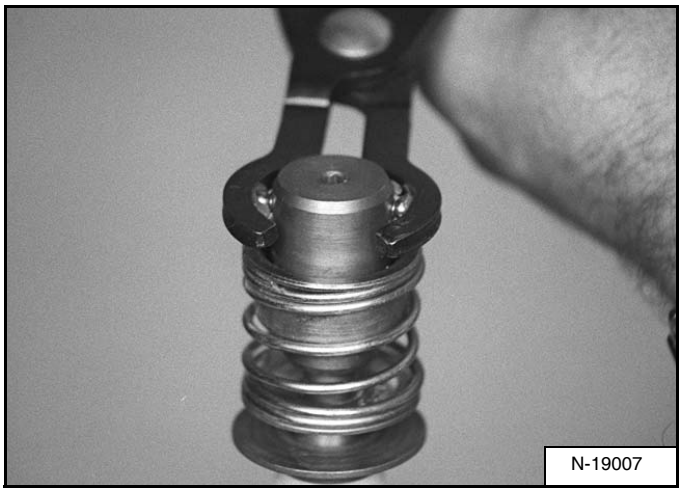
NOTE: The adapter must fit in the center of the washer (Item 1) [Figure 20-40-81].

Figure 20-40-82



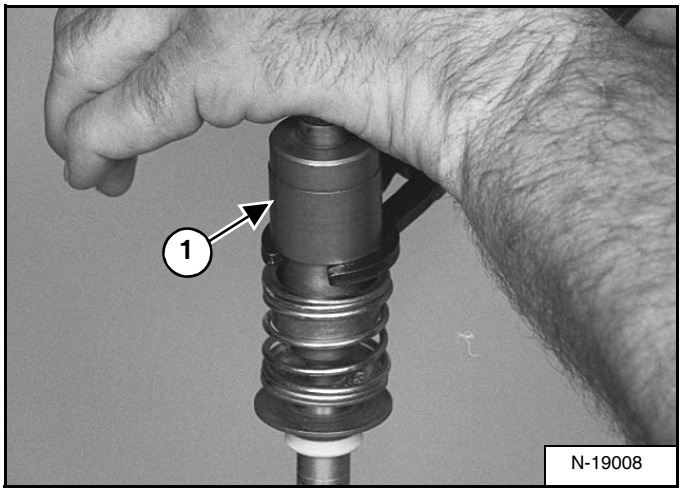
Install the detent balls and spring **[Figure 20-40-82]**.

Figure 20-40-83



Hold the detent balls in place with the detent pliers **[Figure 20-40-83]**.

Figure 20-40-84

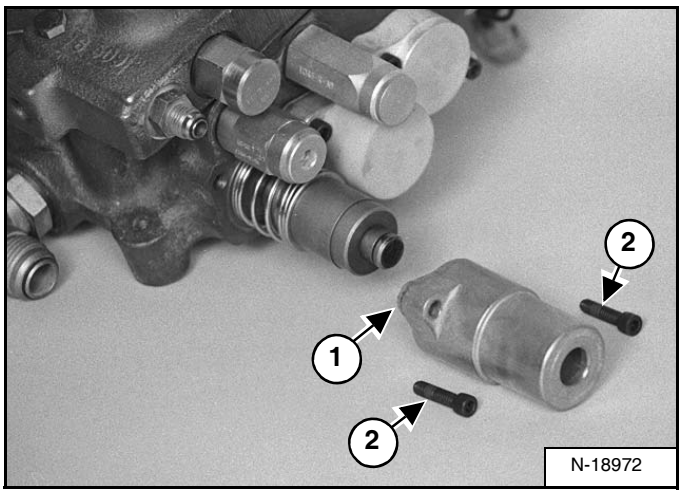


Install the detent sleeve (Item 1) **[Figure 20-40-84]** to the detent adapter.

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Lift Spool and Detent (Cont'd)

Figure 20-40-85



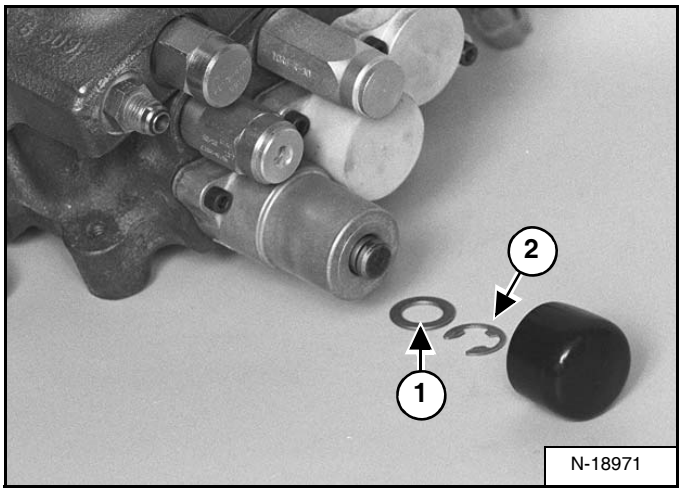
Install the lift spool assembly in the spool bore **[Figure 20-40-85]**.

Install the detent bonnet (Item 1) **[Figure 20-40-85]**.

Install the mounting screws (Item 2) **[Figure 20-40-85]**.

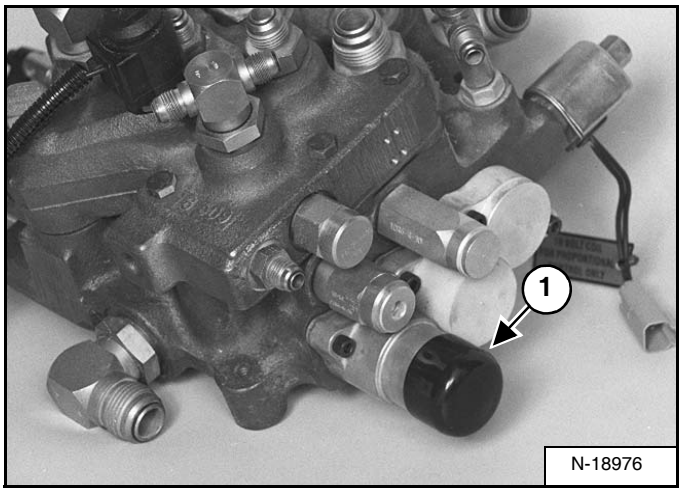
Installation: Tighten the screws to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Figure 20-40-86



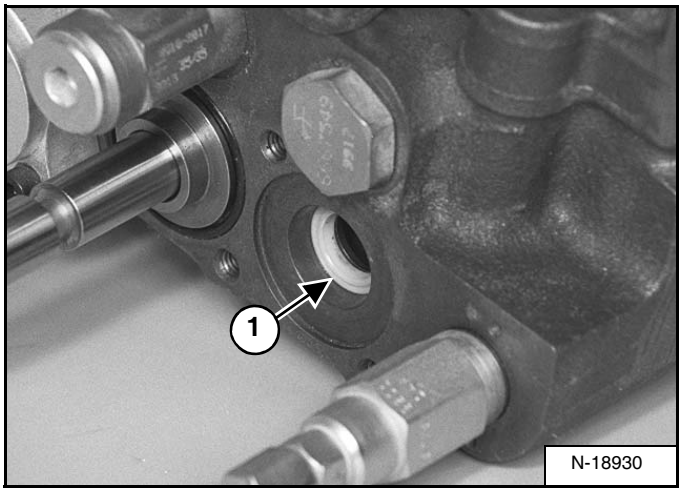
Install the washer (Item 1) and snap ring (Item 2) **[Figure 20-40-86]**.

Figure 20-40-87



Install the end cap (Item 1) **[Figure 20-40-87]**.

Figure 20-40-88

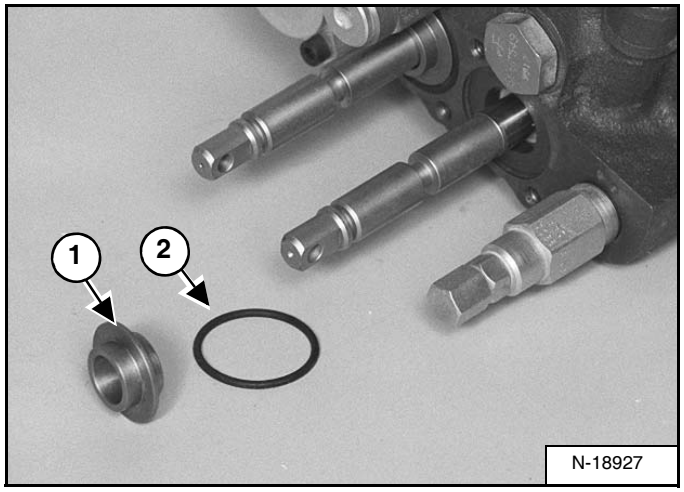


Install the spool seal (Item 1) **[Figure 20-40-88]** on the linkage end of the valve.

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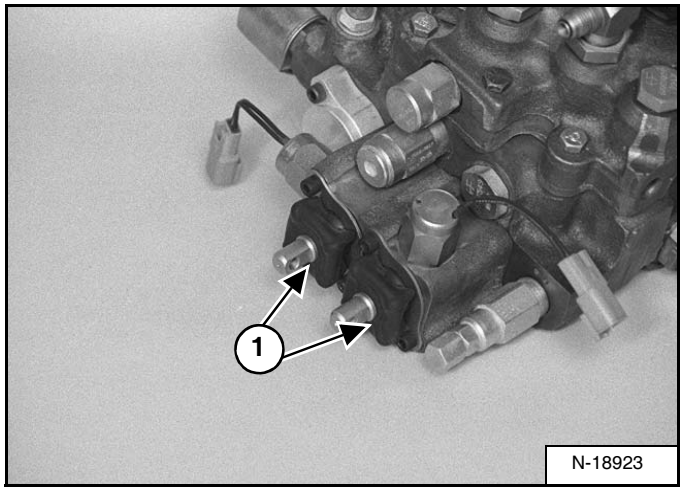
Lift Spool and Detent (Cont'd)

Figure 20-40-89



Install the spacer (Item 1) and O-ring (Item 2) **[Figure 20-40-89]** on the linkage end of the lift spool.

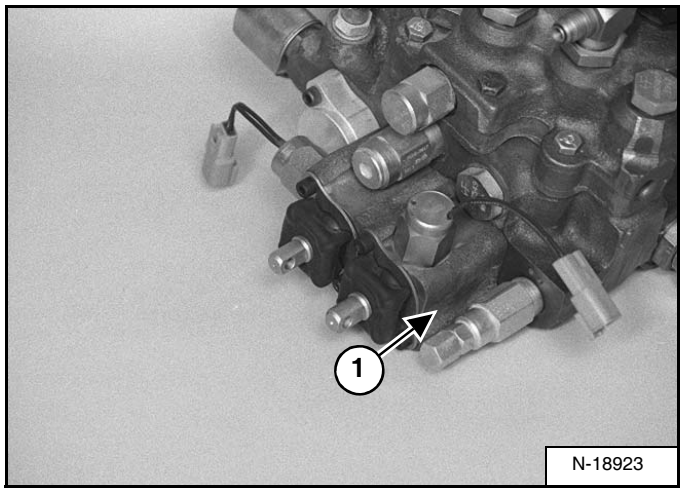
Figure 20-40-90



Install the lift and tilt lock block (Item 1) **[Figure 20-40-90]**. (See Lift And Tilt Lock Block Removal And Installation on Page 20-40-17.)

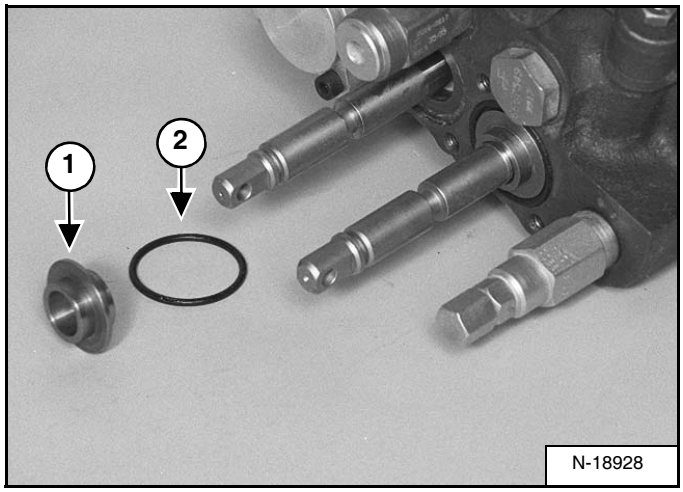
Tilt Spool Removal And Installation

Figure 20-40-91



Remove the lift and tilt lock block (Item 1) **[Figure 20-40-91]** from the control valve. (See Lift And Tilt Lock Block Removal And Installation on Page 20-40-17.)

Figure 20-40-92

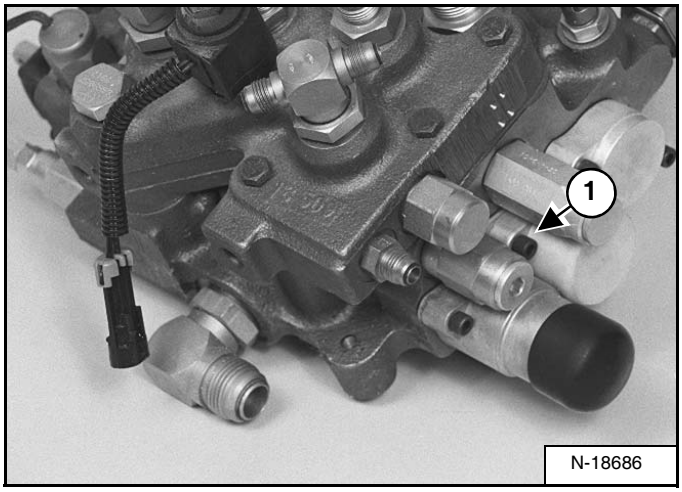


Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-40-92]** from the tilt spool.

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Tilt Spool Removal And Installation (Cont'd)

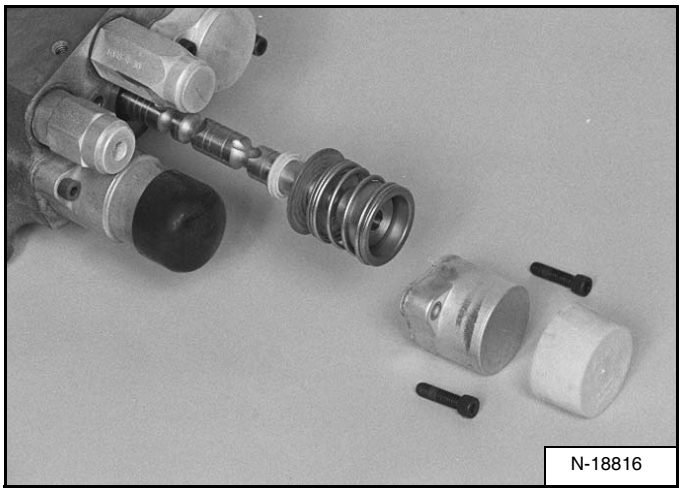
Figure 20-40-93



Remove the screws (Item 1) **[Figure 20-40-93]** from the end cap.

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

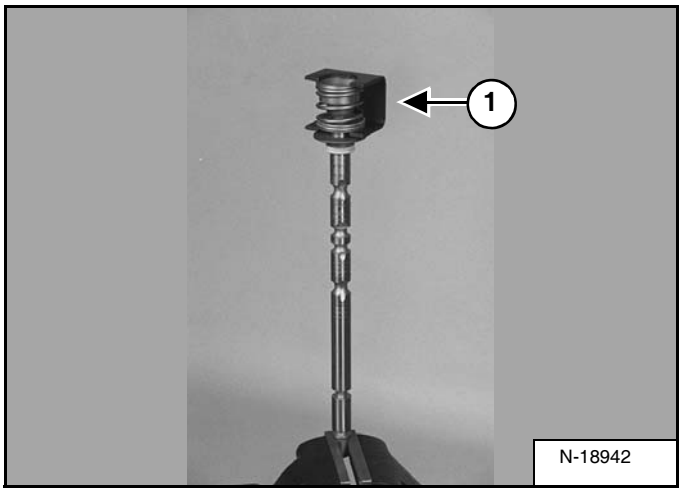
Figure 20-40-94



Remove the spool, centering spring, back-up washer and spool seal **[Figure 20-40-94]**.

Assembly: Always use a new spool seal.

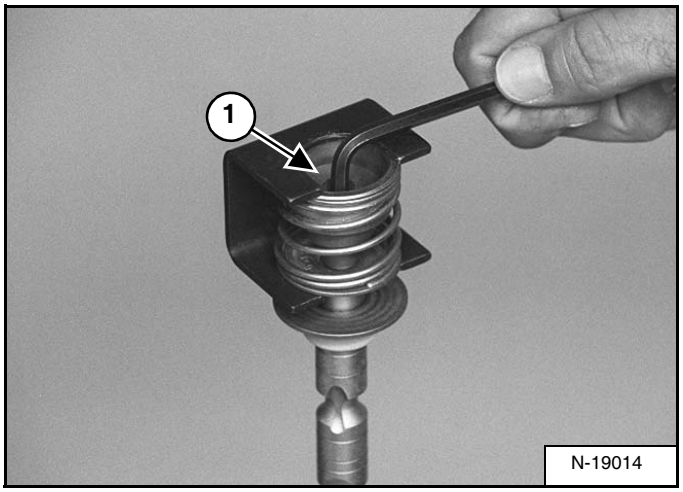
Figure 20-40-95



Put the linkage end of the spool in the vice **[Figure 20-40-95]**.

Install the spool tool (Item 1) **[Figure 20-40-95]** over the centering spring.

Figure 20-40-96



Remove the bolt (Item 1) **[Figure 20-40-96]** holding the centering spring to the spool.

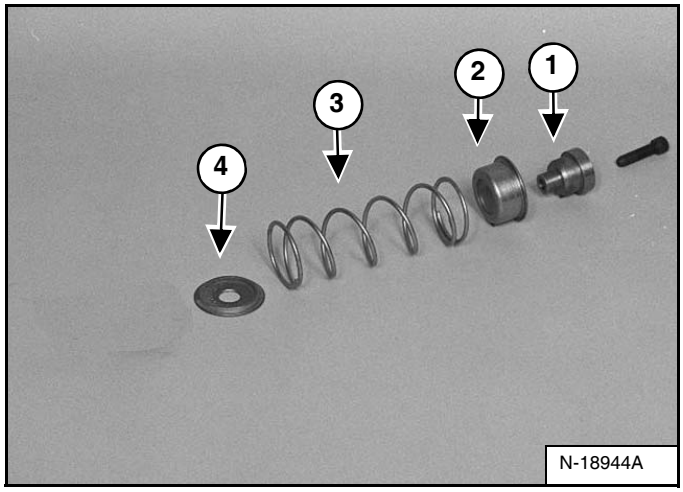
Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Remove spring tool from the spring assembly.

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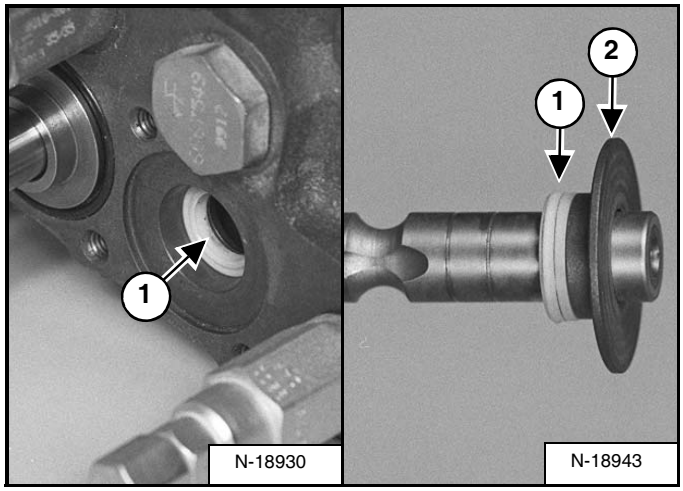
Tilt Spool Removal And Installation (Cont'd)

Figure 20-40-97



Inspect the adapter (Item 1), collar (Item 2), spring (Item 3), and washer (Item 4) **[Figure 20-40-97]**.

Figure 20-40-98

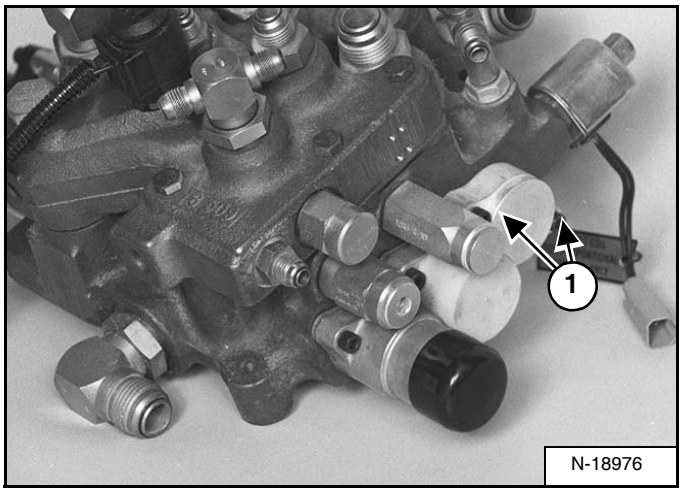


Remove the spool seal(s) (Item 1) and the back-up washer (Item 2) **[Figure 20-40-98]**.

Assembly: Always use a new spool seal.

Auxiliary Spool Removal And Installation

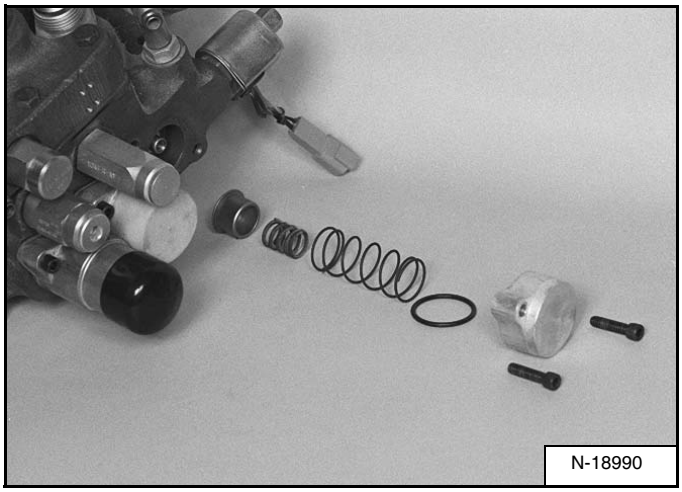
Figure 20-40-99



Remove the screws (Item 1) **[Figure 20-40-99]** from the end cap (both sides).

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Figure 20-40-100



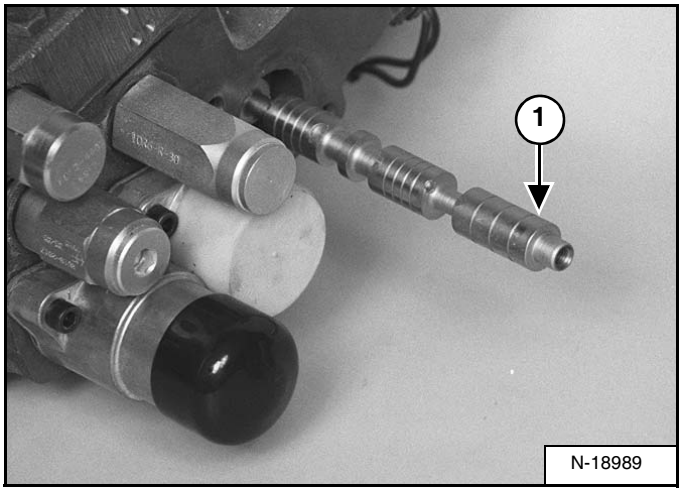
Remove the end cap, O-ring, springs and washer (both sides).

Assembly: Put grease on all the centering spring component parts.

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Auxiliary Spool Removal And Installation (Cont'd)

Figure 20-40-101

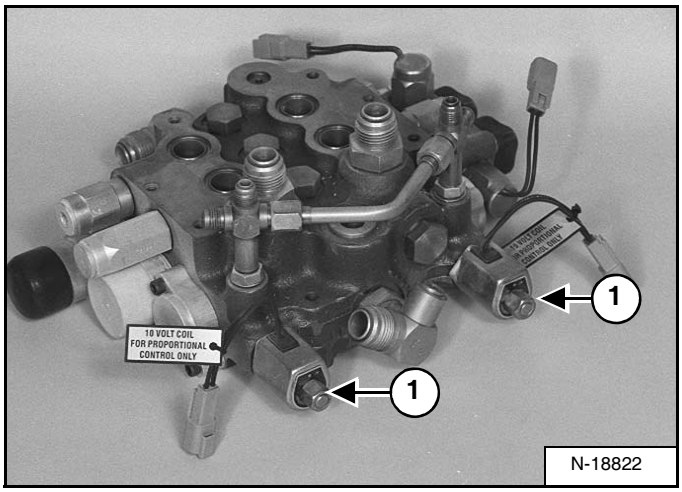


Remove the spool (Item 1) **[Figure 20-40-101]**.

Assembly: Always use a new spool seal.

Auxiliary Electric Solenoid

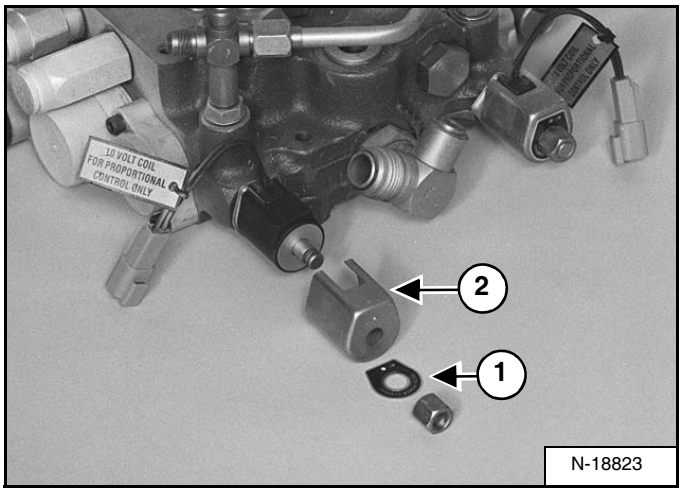
Figure 20-40-102



Remove the nut (Item 1) **[Figure 20-40-102]** from both solenoids.

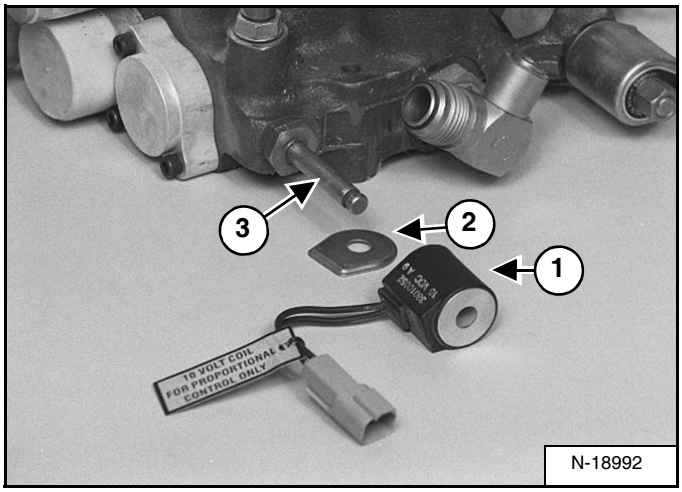
Installation: Tighten the nut to 96-144 in.-lb. (11-16 N•m) torque.

Figure 20-40-103



Remove the end plate (Item 1) and housing (Item 2) **[Figure 20-40-103]**.

Figure 20-40-104



Remove the coil (Item 1) and end plate (Item 2) **[Figure 20-40-104]**.

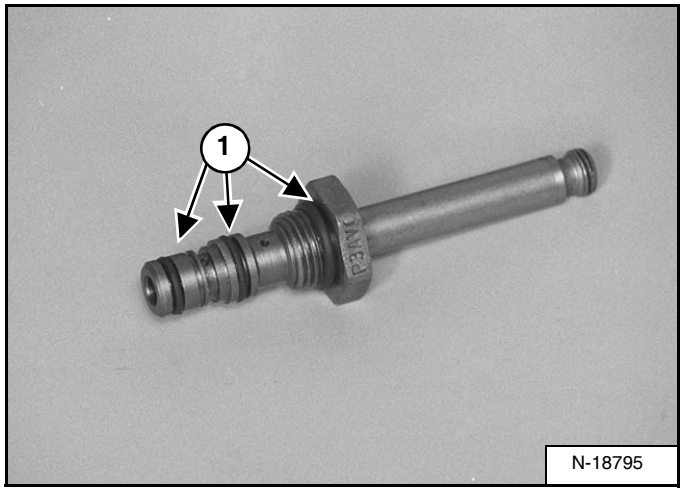
Remove the solenoid valve (Item 3) **[Figure 20-40-104]**.

Installation: Tighten valve to 96-144 in.-lb. (11-16 N•m) torque.

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Auxiliary Electric Solenoid (Cont'd)

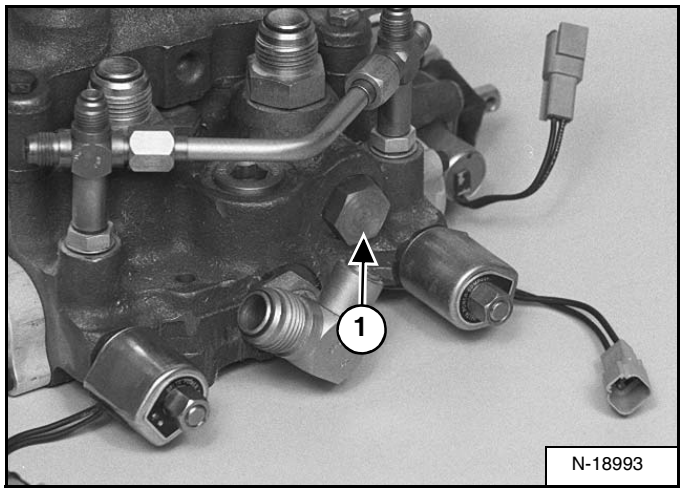
Figure 20-40-105



Remove the O-rings (Item 1) **[Figure 20-40-105]** from the solenoid valves.

Port-Auxiliary Section

Figure 20-40-106



Remove the plug (Item 1) **[Figure 20-40-106]** or optional port relief valve from the control valve.

Figure 20-40-107

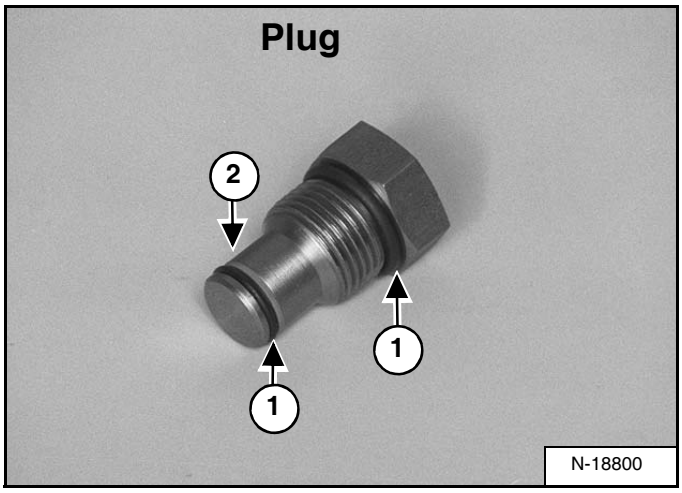
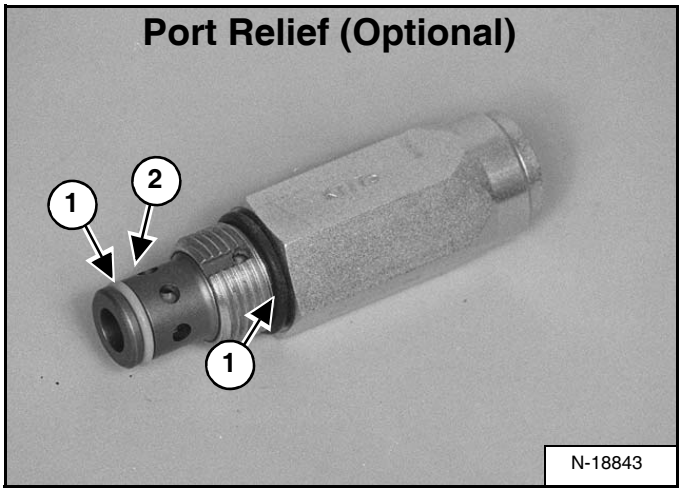


Figure 20-40-108



Remove the O-rings (Item 1) **[Figure 20-40-107]** & **[Figure 20-40-108]** and back-up ring (Item 2) **[Figure 20-40-107]** & **[Figure 20-40-108]** from the plug or port relief.

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Cleaning And Inspection

Clean all components with clean solvent and dry with compressed air.

Check the spools for wear or scratches.

Check that the spools are not loose in their bore.

Check that the centering springs are not broken.

Check that the load check valve seats are not worn.

Check the load check poppets for damage.

Check the rubber boots and retainers.

Replace the parts as needed.

Use new O-rings and back-up rings.

Apply oil to all new O-rings and back-up rings before installation.

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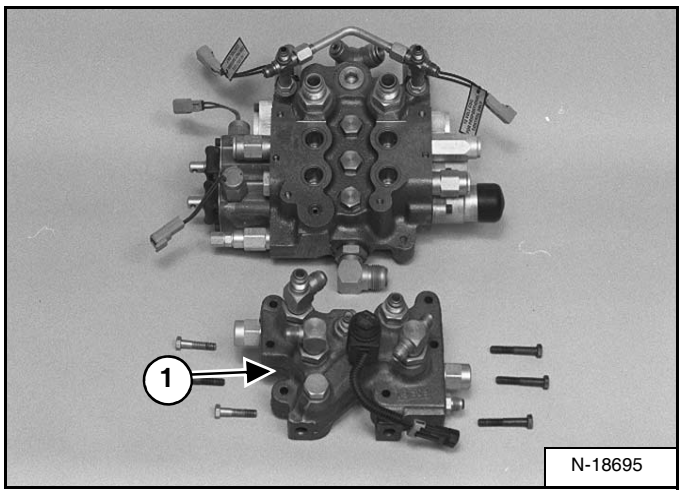


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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (ADVANCED CONTROL SYSTEM) (ACS)

Identification

Figure 20-41-1

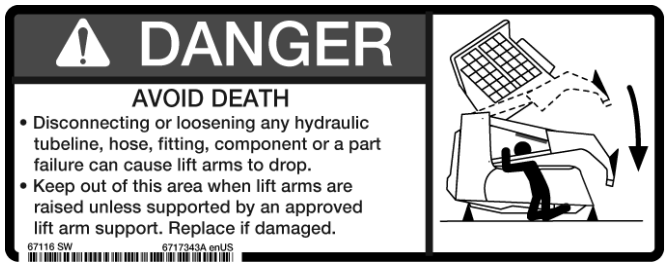


The hydraulic control valve (2 piece casting) (Advance Control System) (ACS) has a removable BICS™ section (Item 1) **[Figure 20-41-1]**.

The BICS™ section and main control valve are in two seperate castings.

For identification of the hydraulic control valve (1 piece casting) (Advanced Control System) (ACS), (See Identification Chart (ACS) Page 20-43-9.)

Removal and Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

Lift and block the loader. (See Procedure Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device (See Installing Lift Arm Support Device Page 10-20-1.)

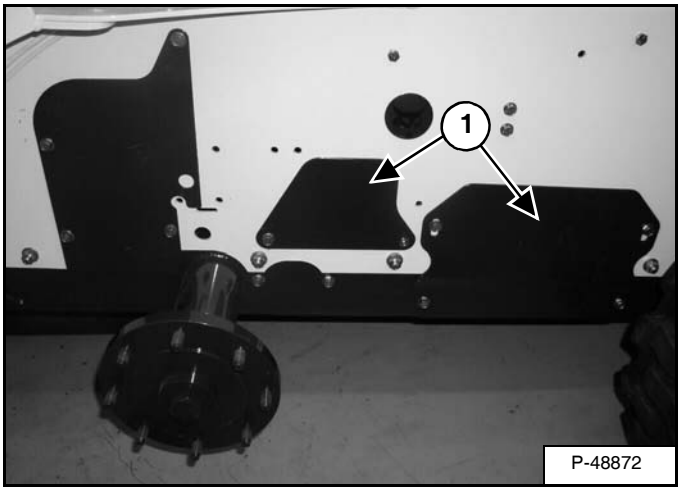
Raise the operator cab. ((See Raising The Operator Cab Page 10-30-1.)

Clean the area around the control valve.

Drain the hydraulic reservoir. (See Replacing Hydraulic Fluid Page 10-120-1.)

Remove the control panel. ((See Removal and Installation Page 50-100-1.)

Figure 20-41-2



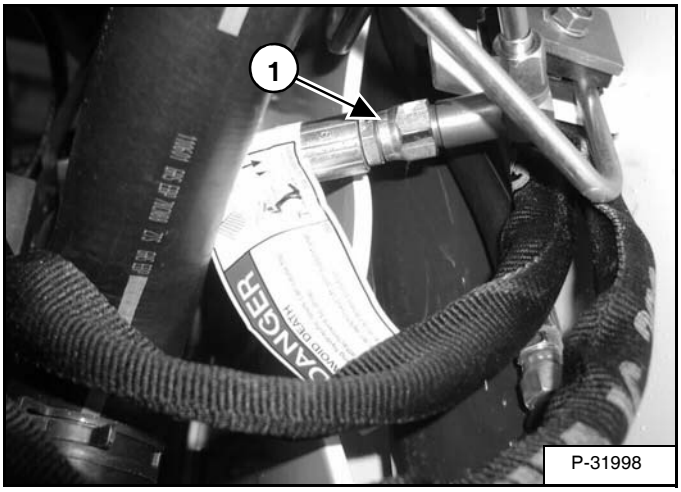
Remove the right rear tire.

Locate and remove the access covers (Item 1) **[Figure 20-41-2]** on the right side of the machine.

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Removal and Installation (Cont'd)

Figure 20-41-3

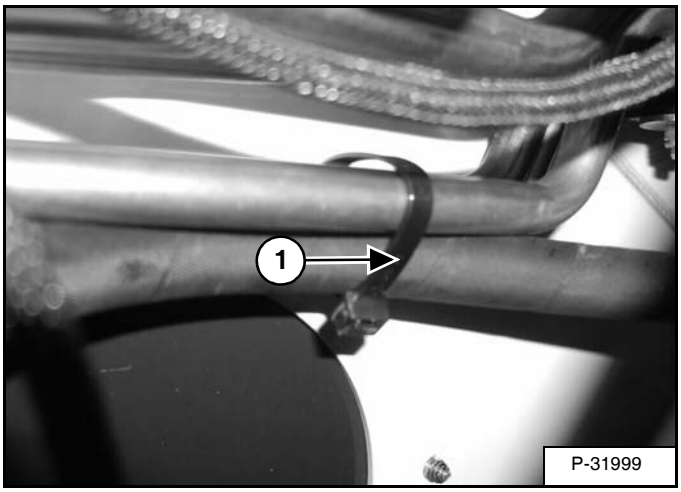


Mark all tubelines and hoses for correct installation.

The fixed end main valve hose assembly (Item 1) **[Figure 20-41-3]** is connected to a fixed end fitting on the control valve. The hose is routed to the back upright where the hose is connected to a tee fitting that feeds the base end of both lift cylinders. The hose must be removed at the back tee fitting, located in the right side upright.

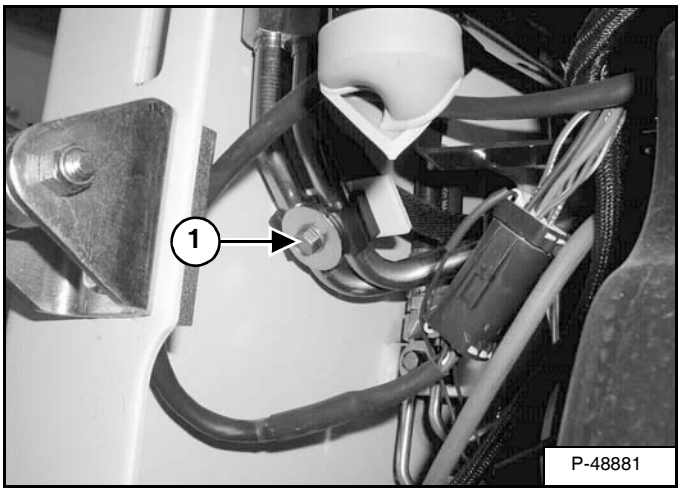
NOTE: Remember the hose routing for ease of control valve installation.

Figure 20-41-4



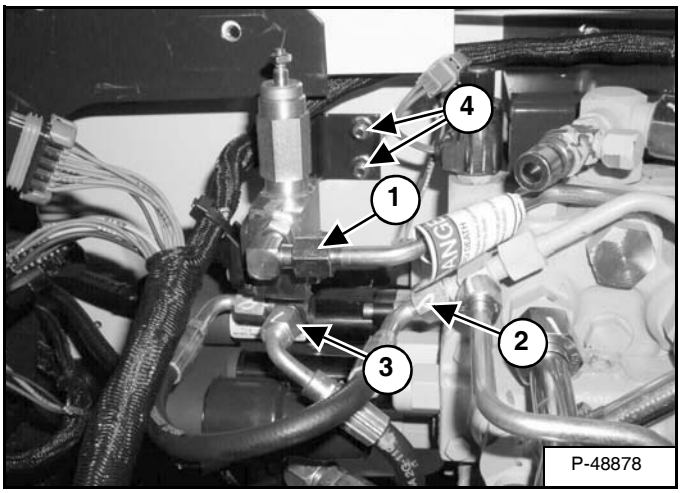
Remove the tie - strap (Item 1) **[Figure 20-41-4]** from the fixed end main valve hose.

Figure 20-41-5



Remove the tubeline clamp (Item 1) **[Figure 20-41-5]**. This will allow room to move the auxiliary tubelines away from the control valve.

Figure 20-41-6



Disconnect the tubeline (Item 1) **[Figure 20-41-6]** from the lift arm by-pass valve.

Disconnect the drain hose (Item 2) **[Figure 20-41-6]** from the control valve.

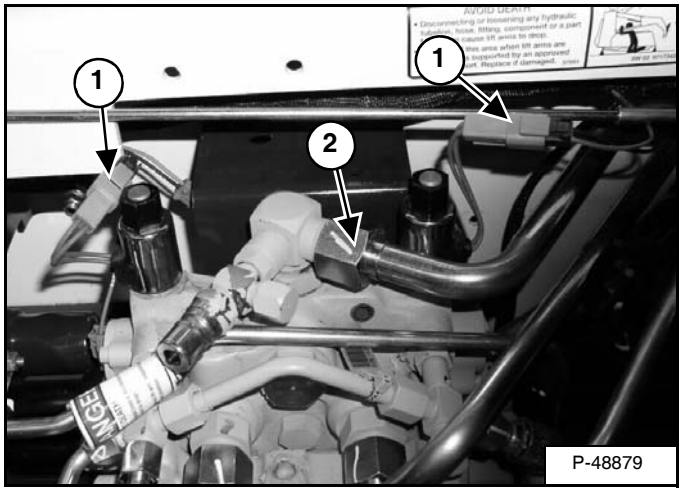
Disconnect the motor case drain hose (Item 3) **[Figure 20-41-6]** from the lift arm by-pass valve.

Remove the bolts (Item 4) **[Figure 20-41-6]** from the lift arm by-pass control valve. After removing the lift arm by-pass valve mounting bolts move the wire harness and by-pass valve towards the engine to give more room for control valve removal.

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Removal and Installation (Cont'd)

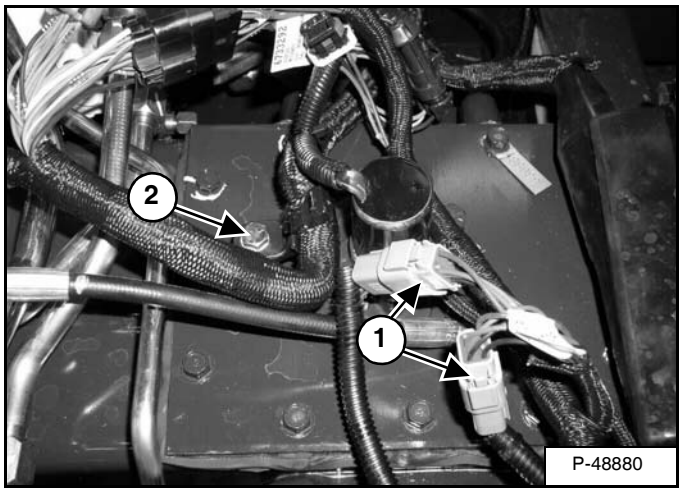
Figure 20-41-7



Label and disconnect the electrical connectors (Item 1) **[Figure 20-41-7]**.

Disconnect the outlet tubeline (Item 2) **[Figure 20-41-7]** from the control valve.

Figure 20-41-8

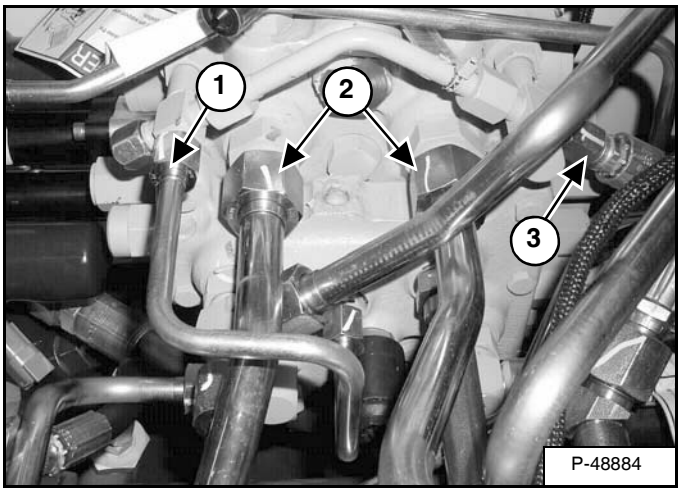


Label and disconnect the actuator electrical connectors (Item 1) **[Figure 20-41-8]**.

Remove the bolt (Item 2) **[Figure 20-41-8]** from the wire harness clamp.

Installation: Tighten the bolt to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 20-41-9

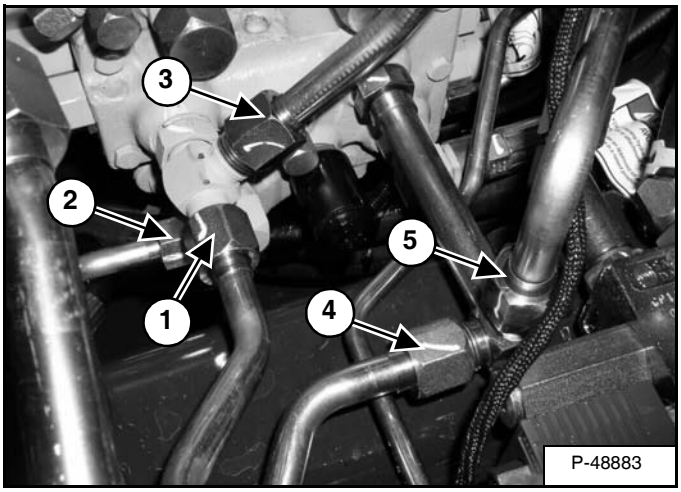


Remove the drain tubeline (Item 1) **[Figure 20-41-9]** from the control valve and BICS™ valve.

Disconnect the auxiliary tubelines (Item 2) **[Figure 20-41-9]**.

Disconnect the drain hose (Item 3) **[Figure 20-41-9]** from the control valve.

Figure 20-41-10



Remove the tilt tubeline (Item 1) **[Figure 20-41-10]** from the bucket positioning valve (if so equipped) and the control valve.

Disconnect the lift tubeline (Item 2) **[Figure 20-41-10]**.

Disconnect the tilt tubeline (Item 3) **[Figure 20-41-10]**.

Remove the tilt tubeline (Item 4) **[Figure 20-41-10]** from the bucket positioning valve and the control valve (if so equipped).

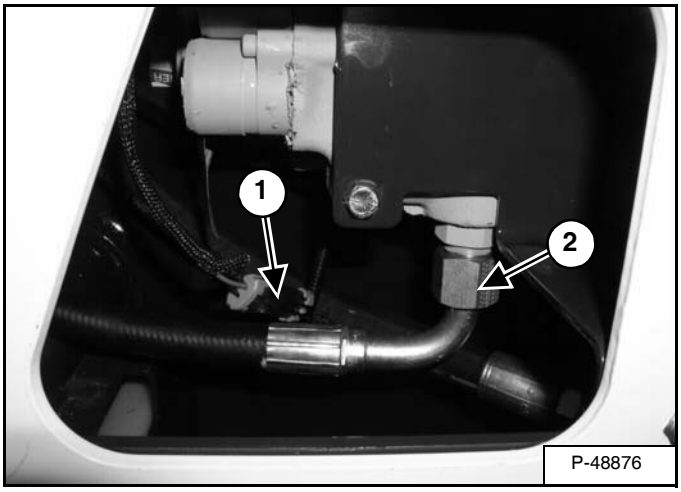
Disconnect the tilt tubeline (Item 5) **[Figure 20-41-10]**.

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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (ADVANCED CONTROL SYSTEM) (ACS) (CONT'D)

Removal and Installation (Cont'd)

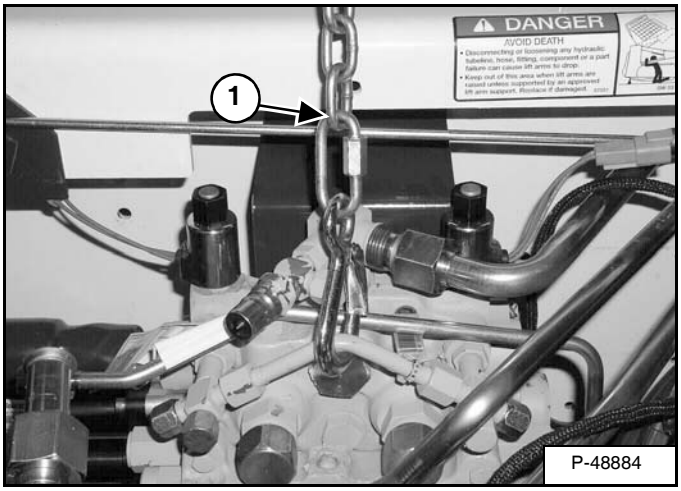
Figure 20-41-11



Disconnect the BICS valve electrical connector (Item 1) **[Figure 20-41-11]**.

Disconnect the inlet hose (Item 2) **[Figure 20-41-11]** from the bottom of the control valve.

Figure 20-41-12



Connect a hoist (Item 1) **[Figure 20-41-12]** to the control valve.

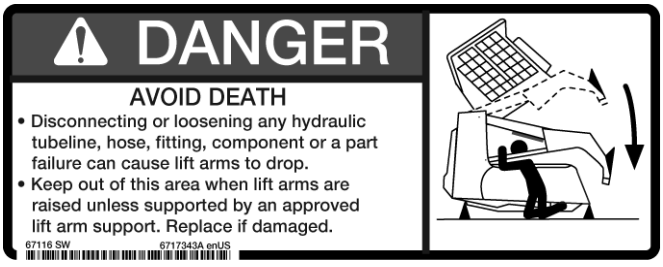
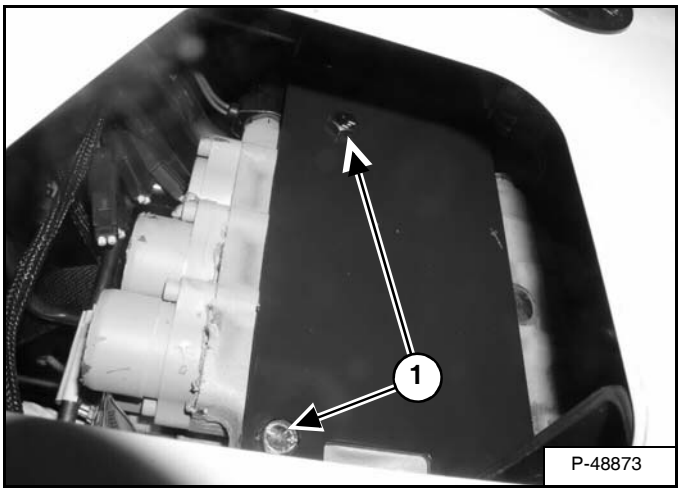


Figure 20-41-13



Locate and remove the two control valve mounting bolts (Item 1) **[Figure 20-41-13]** through the right side access panels.

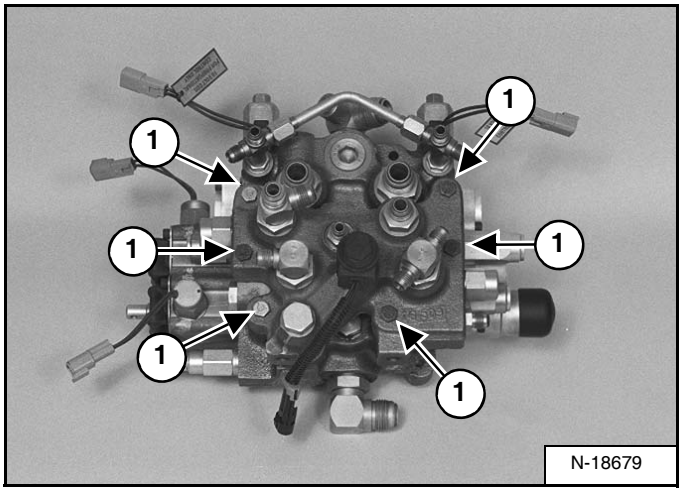
Installation: Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the control valve from the loader.

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BICS™ Valve Removal And Installation

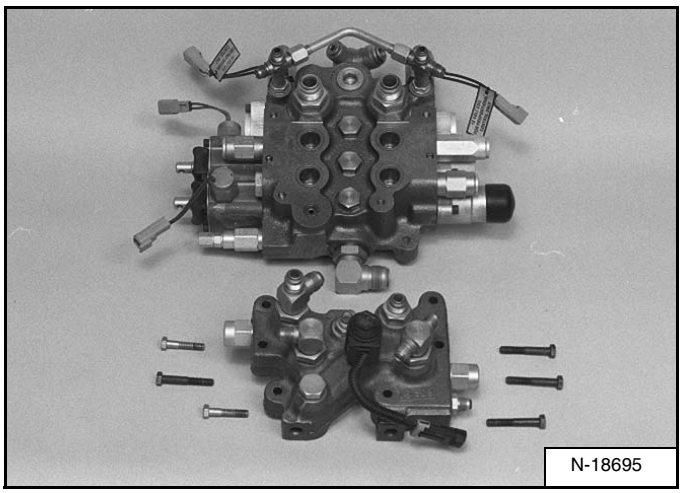
Figure 20-41-14



Remove the control valve. (See Removal and Installation Page 20-41-1.)

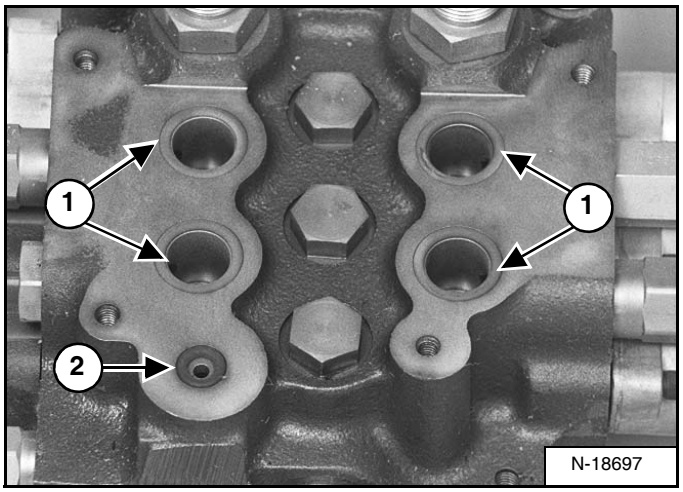
To remove the BICS™ from the control valve loosen and remove the six mounting bolts (Item 1) **[Figure 20-41-14]**.

Figure 20-41-15



Remove the BICS™ valve assembly from the top of the control valve **[Figure 20-41-15]**.

Figure 20-41-16



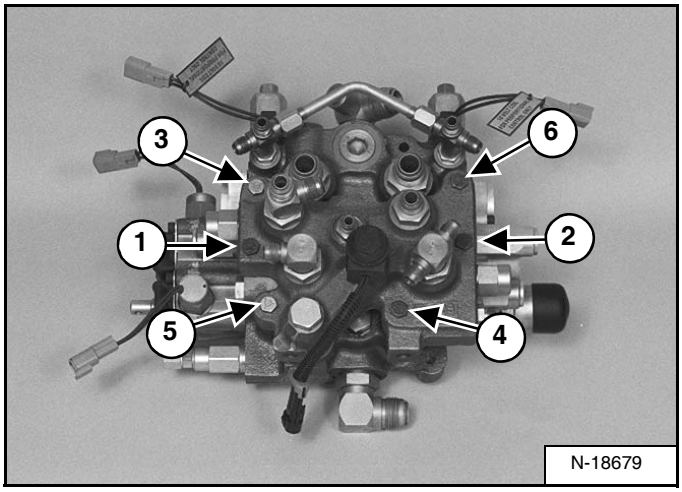
Remove the four large O-rings (Item 1) and the small O-ring (Item 2) **[Figure 20-41-16]** from the top of the control valve.

Install the four large O-rings (Item 1) and the small O-ring (Item 2) **[Figure 20-41-16]** on the top of the control valve.

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BICS Valve Removal And Installation (Cont'd)

Figure 20-41-17



Install the six mounting bolts **[Figure 20-41-17]**.

The chart below lists the correct torque specifications and tightening sequence when reinstalling the BICS valve assembly to the control valve. Thoroughly clean and dry bolts and threads in valve. Use liquid adhesive LOCTITE #242 or equivalent.

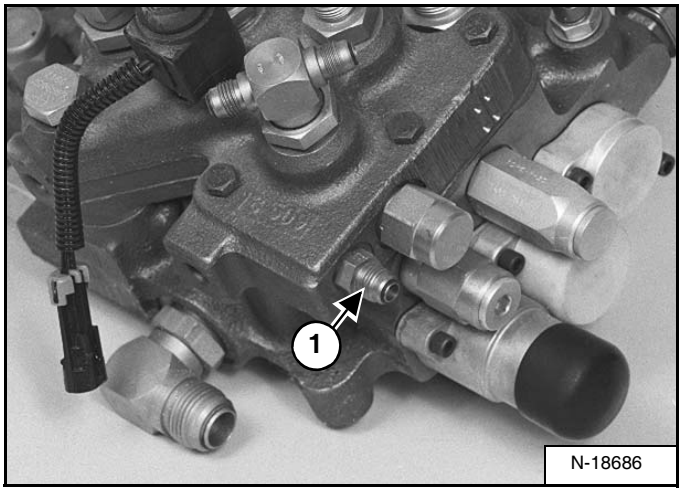
STEP	TORQUE	SEQUENCE
1	110-130 in.-lb. (12,4-14,7 N•m)	1,2,3,4,5 & 6
2	190-210 in.-lb. (21,5-23,7 N•m)	
3	190-210 in.-lb. (21,5-23,7 N•m)	

*Torque must be 190-210 in.-lb. (21,5-23,7 N•m) for every bolt or repeat step 3.

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BICS™ Valve, Lift Arm By-Pass Orifice Removal And Installation

Figure 20-41-18



Remove the fitting (Item 1) **[Figure 20-41-18]** from the valve.

Figure 20-41-19

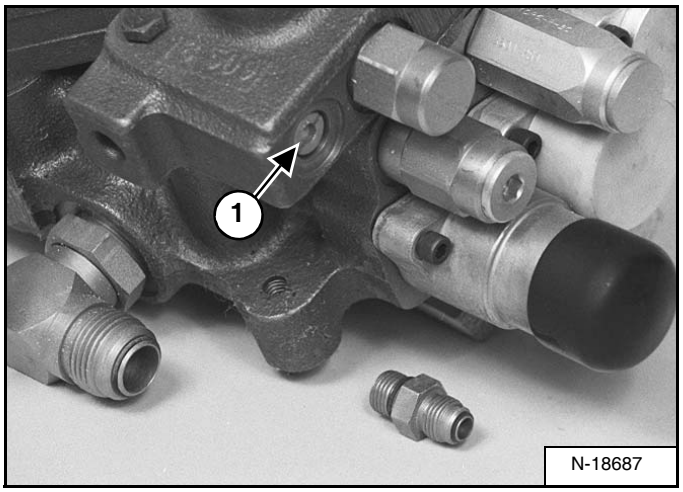
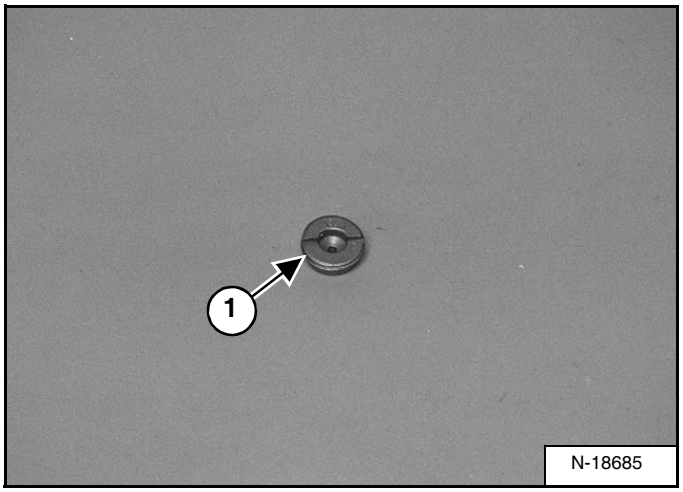


Figure 20-41-20



Using a flat blade screw driver, remove the lift arm by-pass orifice (Item 1) **[Figure 20-41-19]** & **[Figure 20-41-20]**.

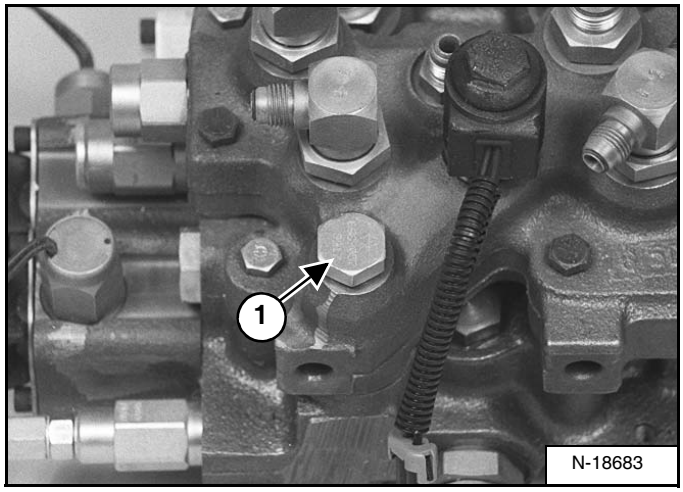
Orifice size is 0.078 inch.

Reverse the removal procedure to install the lift arm by-pass orifice.

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BICS™ Valve, Check Valve Removal And Installation

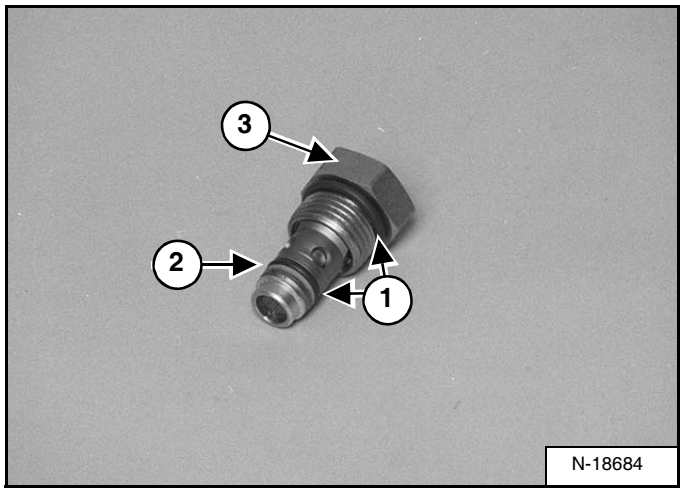
Figure 20-41-21



Remove the check valve (Item 1) **[Figure 20-41-21]**.

Installation: Tighten the valve to 20 ft.-lb. (27 N•m) torque.

Figure 20-41-22

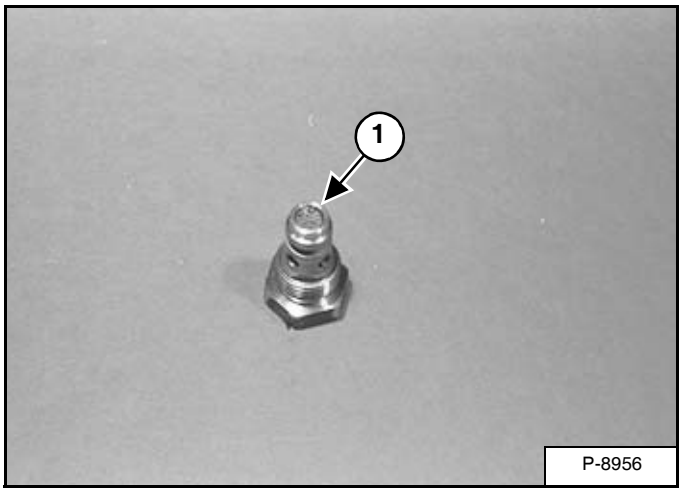


Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-41-22]**.

Install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-41-22]** on the check valve.

Check valve (Item 3) **[Figure 20-41-22]** has a rating of 5-10 PSI.

Figure 20-41-23



Clean and inspect the screen (Item 1) **[Figure 20-41-23]** on the end of the valve.

Reverse the removal procedure to install the BICS™ check valve.

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BICS™ Valve Lock Valve Removal And Installation

Figure 20-41-24

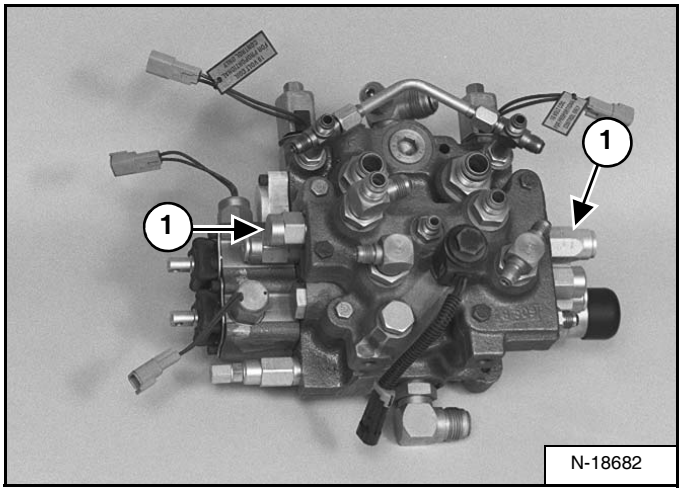


Figure 20-41-25

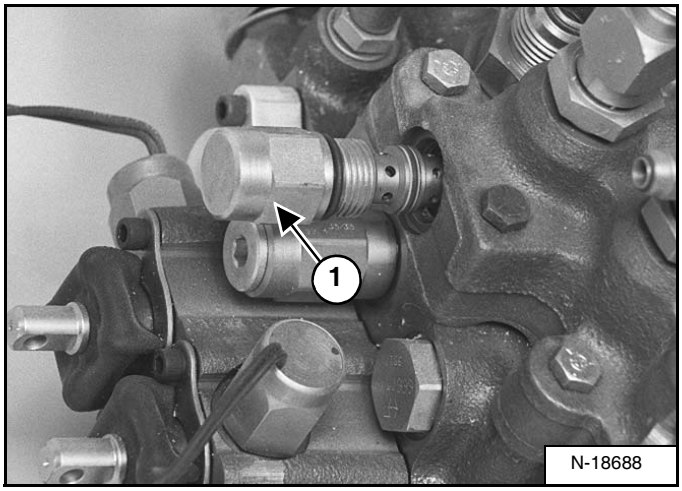
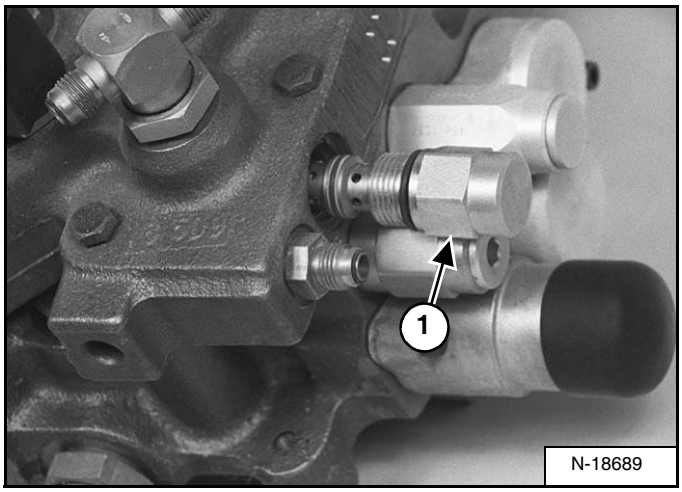


Figure 20-41-26



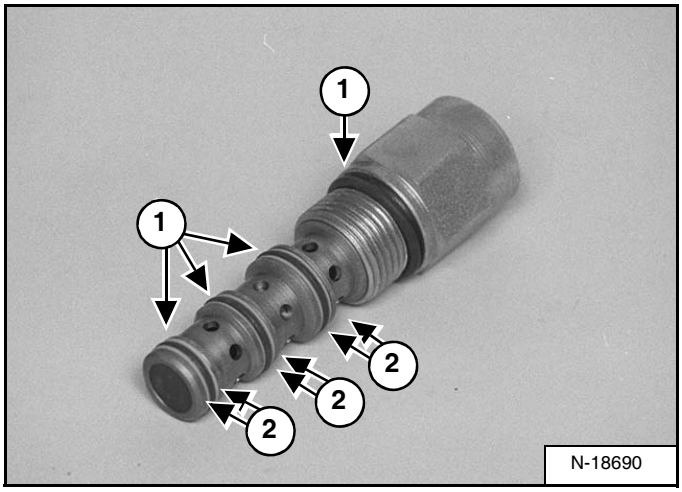
Remove the lock valves (Item 1) **[Figure 20-41-24]**, **[Figure 20-41-25]** & **[Figure 20-41-26]** from the BICS™ valve.

Installation: Tighten the lock valves to 25 ft.-lb. (34 N•m) torque.

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BICS Valve Lock Valve Removal And Installation (Cont'd)

Figure 20-41-27



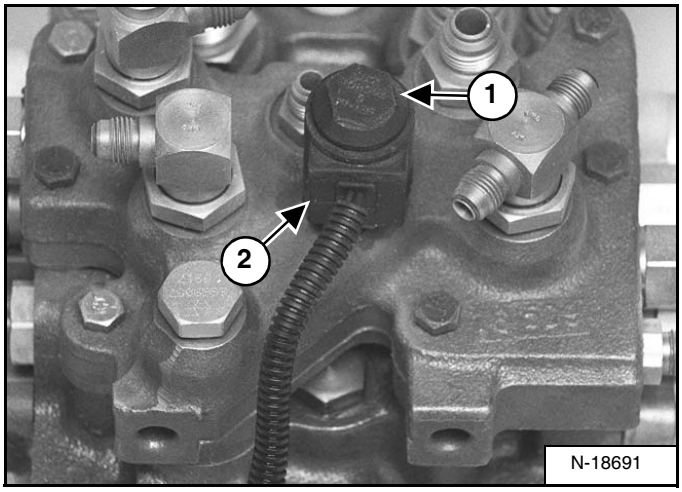
Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-41-27]** from both the tilt and lift lock valves.

Install new O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-41-27]** on the tilt and lift lock valves.

Reverse the removal procedure to install the lock valve.

BICS™ Valve Solenoid Removal And Installation

Figure 20-41-28

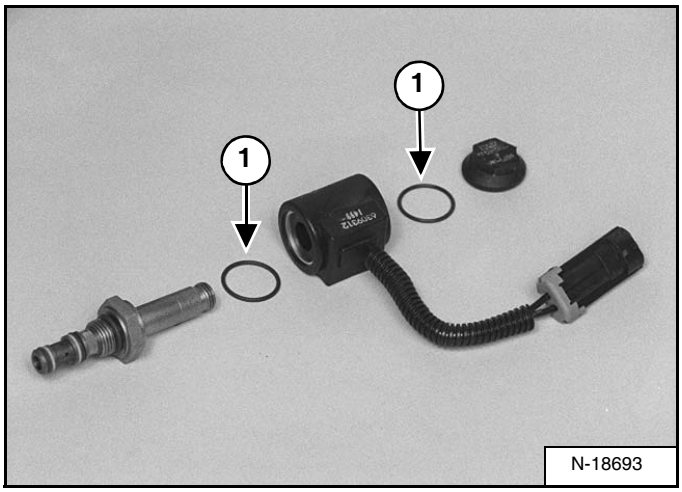


Remove the mounting nut (Item 1) **[Figure 20-41-28]** from the solenoid cartridge.

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

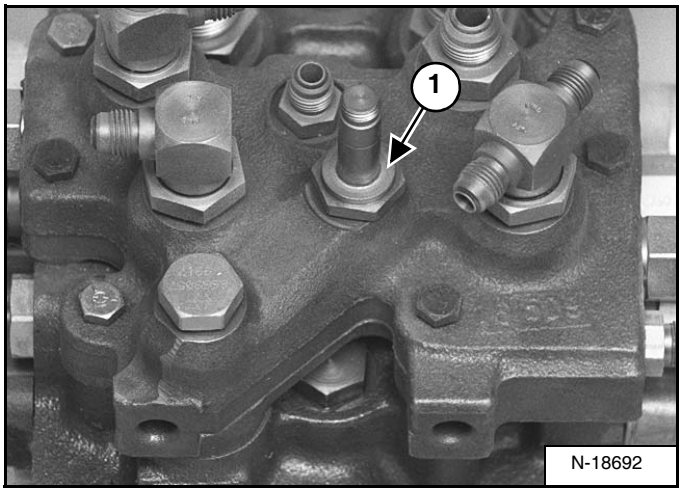
Remove the solenoid (Item 2) **[Figure 20-41-28]**.

Figure 20-41-29



Remove the O-rings (Item 1) **[Figure 20-41-29]** from both ends of the solenoid.

Figure 20-41-30



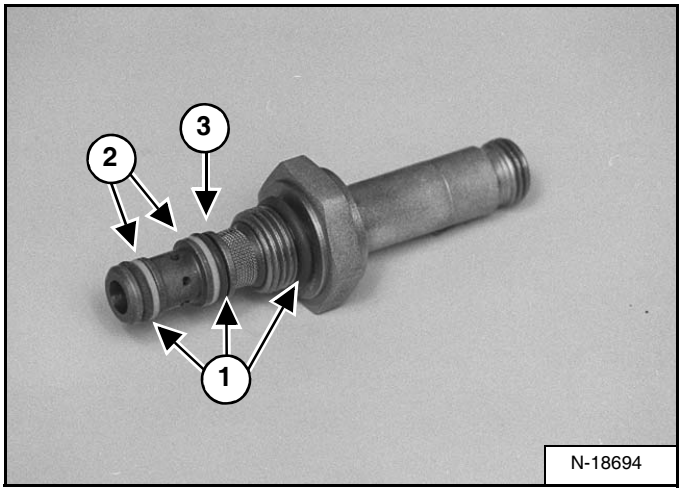
Remove the solenoid cartridge (Item 1) **[Figure 20-41-30]**.

Installation: Tighten the cartridge to 20 ft.-lb. (27 N•m) torque.

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BICS Valve Solenoid Removal And Installation (Cont'd)

Figure 20-41-31



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-41-31]** from the cartridge.

Clean all parts in solvent and dry with compressed air.

Inspect all parts for wear and replace any showing excessive wear.

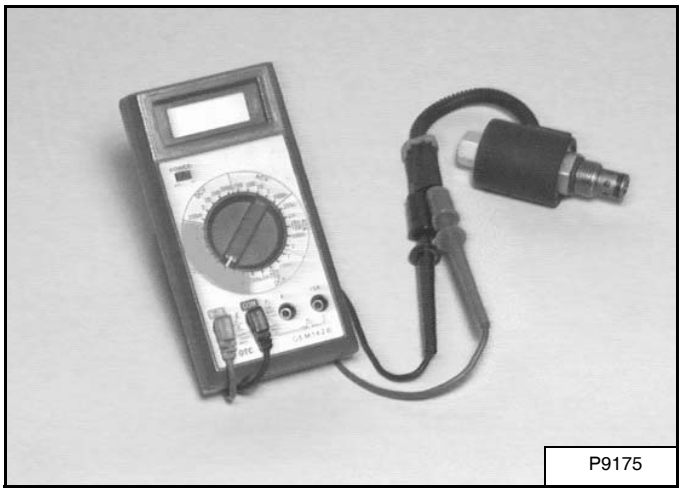
NOTE: The screen (Item 3) [Figure 20-41-31] may be cleaned with solvent. If it is torn or worn it needs to be replaced.

Use only new O-rings and apply oil to all O-rings and back-up rings before installation.

Install new O-rings (Item 1) **[Figure 20-41-29]** & **[Figure 20-41-31]** and new back-up rings (Item 2) **[Figure 20-41-31]** on the solenoid cartridge.

BICS™ Valve Solenoid Testing

Figure 20-41-32



Use an Ohm meter to measure coil resistance **[Figure 20-41-32]**.

Coil wires do not have polarity.

Correct resistance for the BICS™ is 9.7 ± 1 Ohm at 20°C.

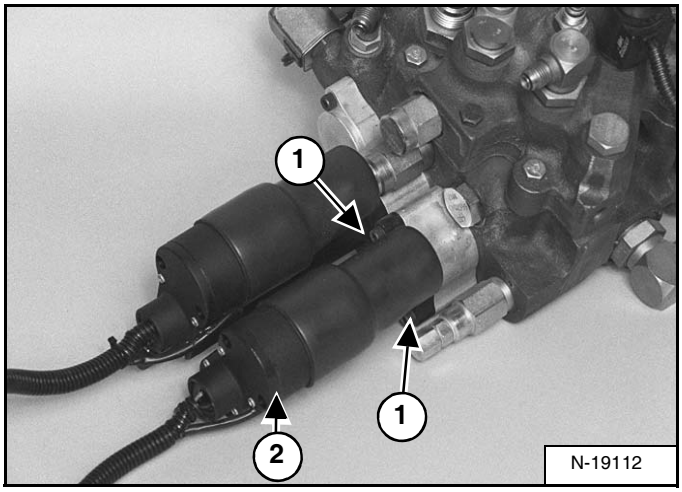
Correct resistance for the tilt and lift lock coils is 7.7 ± 1 Ohm at 20°C.

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Actuator Removal And Installation

NOTE: Actuators can be removed with the control valve in the loader. Remove the lift arm by-pass valve to allow room for actuator removal in the loader.

Figure 20-41-33

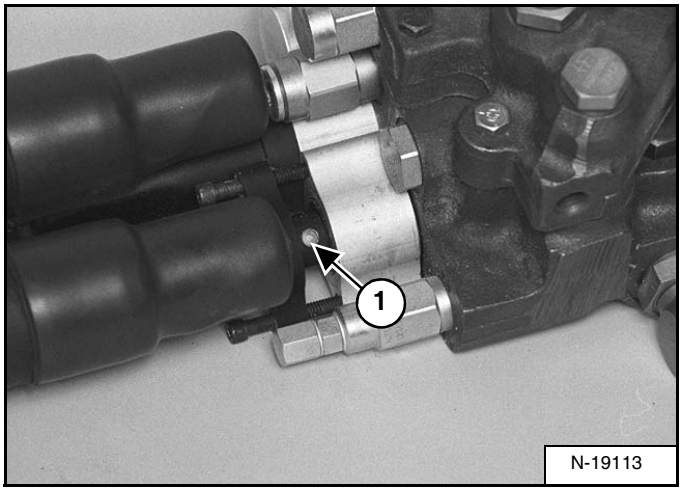


Remove the two screws (Item 1) **[Figure 20-41-33]** on the actuator retainer.

Installation: Tighten the bolt and nut to 90-100 in.-lb. (10,2-11,3 N•m) torque.

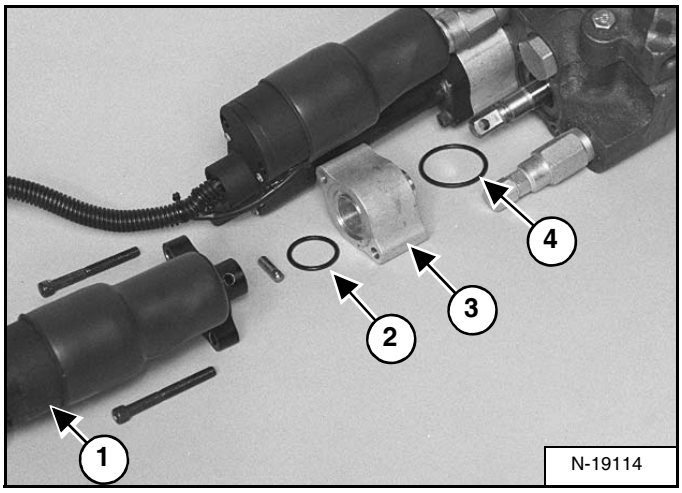
Pull the actuator (Item 2) **[Figure 20-41-33]** away from the control valve.

Figure 20-41-34



Use a drift pin and hammer to remove the actuator pin (Item 1) **[Figure 20-41-34]** from the actuator and the lift or tilt spool.

Figure 20-41-35



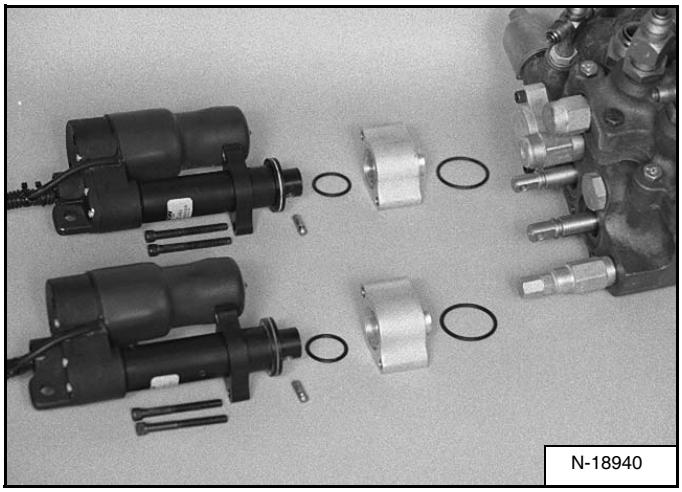
Remove the actuator (Item 1) **[Figure 20-41-35]**.

Remove the O-ring (Item 2) **[Figure 20-41-35]**.

Remove the spacer block (Item 3) **[Figure 20-41-35]**.

Remove the O-ring (Item 4) **[Figure 20-41-35]**.

Figure 20-41-36



Repeat removal for the other actuator **[Figure 20-41-36]**.

NOTE: The calibration procedure must be followed when replacing handle sensor, actuator or ACS controller. (See Calibration Procedure Page 60-120-16.)

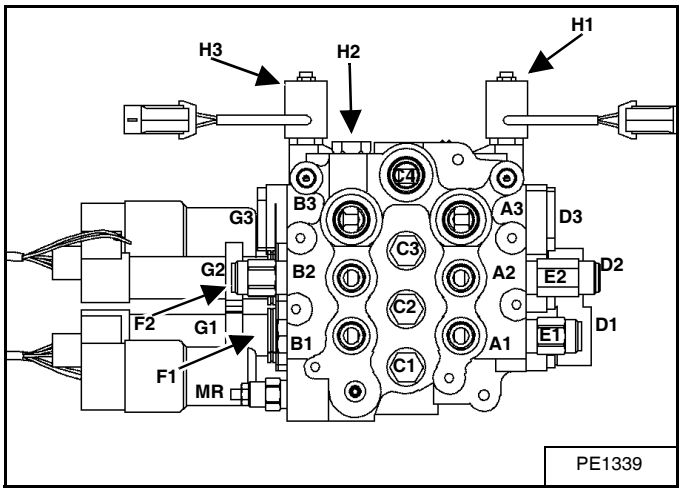
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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (ADVANCED CONTROL SYSTEM) (ACS) (CONT'D)

Identification Chart (ACS)

ITEM	S175, S185 ACS LOADER
A1	Lift Cylinder Base End/Restrictor
A2	Tilt Cylinder Base End
A3	Auxiliary Hydraulics
B1	Lift Cylinder Rod End
B2	Tilt Cylinder Rod End
B3	Auxiliary Hydraulics
C1	Load Check Valve/Lift Function
C2	Load Check Valve/Tilt Function
C3	Orificed Load Check Valve/Auxiliary Function
C4	Outlet Fluid Flow
D1	Lift Spool Centering Spring
D2	Tilt Spool Centering Spring
D3	Auxiliary Spool/Centering Springs
E1	Port Relief Valve-3500PSI
E2	Anti-Cavitation/Port Relief Valve-3500PSI
F1	Anti-Cavitation Valve
F2	Port Relief Valve-3500PSI
G1	Lift Spool End
G2	Tilt Spool End
G3	Auxiliary Spool/Centering Springs
H1	Auxiliary Electric Solenoid
H2	Plug/Port Relief (Optional)-3100PSI
H3	Auxiliary Electric Solenoid
MR	Main Relief Valve-3300PSI

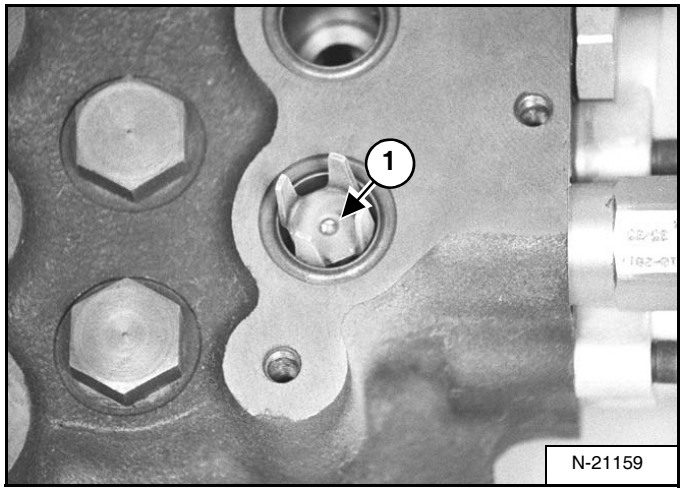
Figure 20-41-37



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Lift Base End Restrictor

Figure 20-41-38

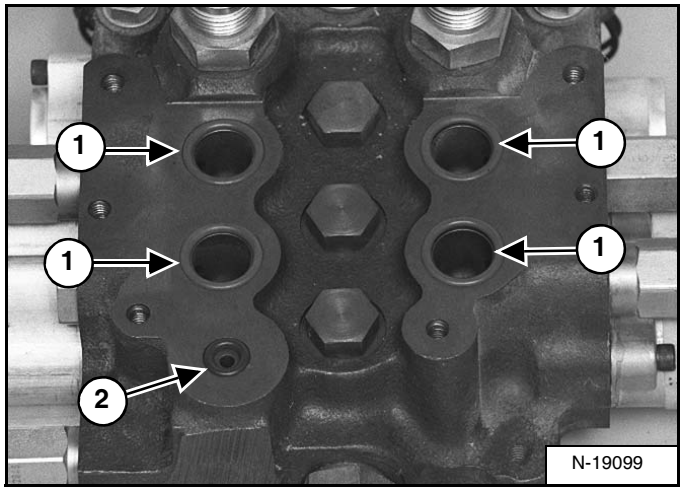


Remove the BICS™ valve assembly from the control valve. (See Removal and Installation Page 20-41-1.)

Remove the restrictor (Item 1) **[Figure 20-41-38]** from the lift section base end port.

Load Check Valve

Figure 20-41-39



Remove the BICS™ valve assembly from the control valve. (See Removal and Installation Page 20-41-1.)

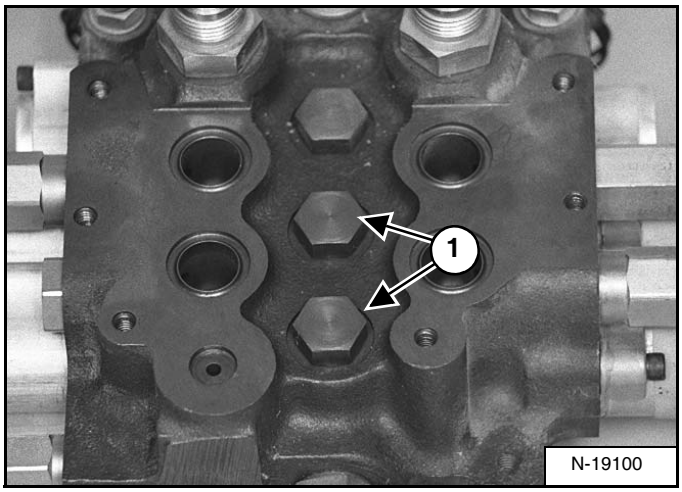
Remove the four large O-rings (Item 1) and small O-ring (Item 2) **[Figure 20-41-39]**. Always replace these O-rings before installing the BICS™ valve assembly

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.

I-2003-0888

Figure 20-41-40



Mark each valve section, spool and related parts so that they will be returned to their original valve section during assembly.

Use bolts to fasten the control valve to a work bench for easier disassembly and assembly procedures.

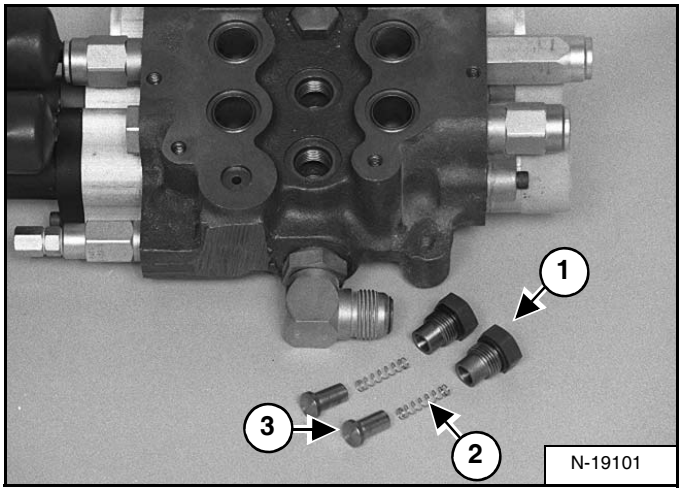
Loosen the load check valve plugs (Item 1) **[Figure 20-41-40]**.

Installation: Always use new O-ring. tighten the plug to 35-40 ft.-lb. (47-54 N•m) torque.

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Load Check Valve (Cont'd)

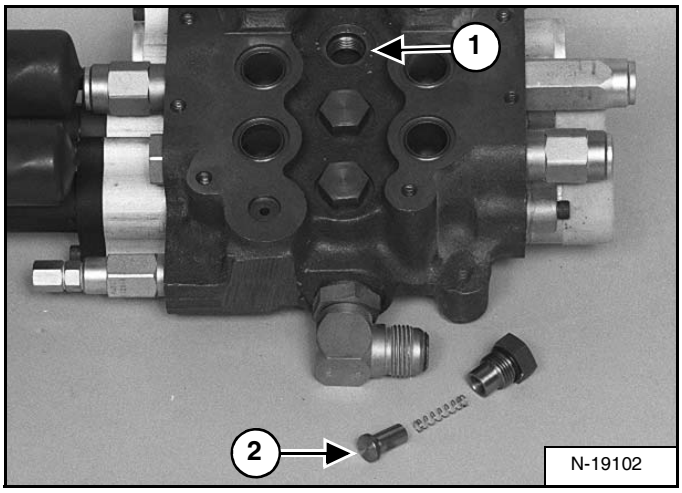
Figure 20-41-41



Remove the load check plugs (Item 1) **[Figure 20-41-41]**.

Remove the spring (Item 2) and poppet (Item 3) **[Figure 20-41-41]**.

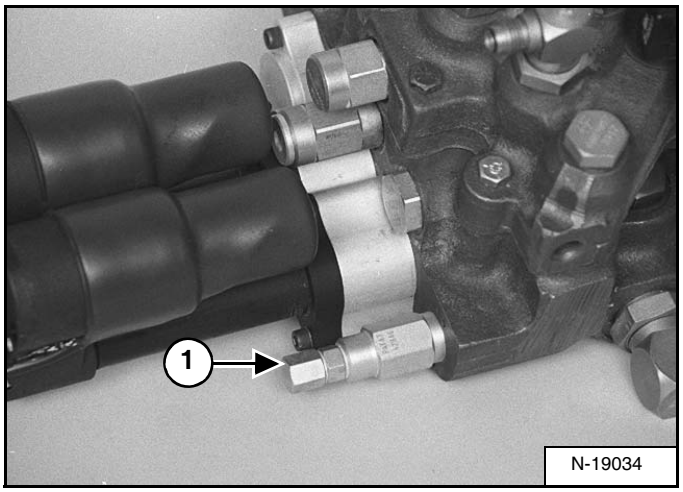
Figure 20-41-42



The auxiliary section (Item 1) uses an orifice load check poppet (Item 2) **[Figure 20-41-42]**.

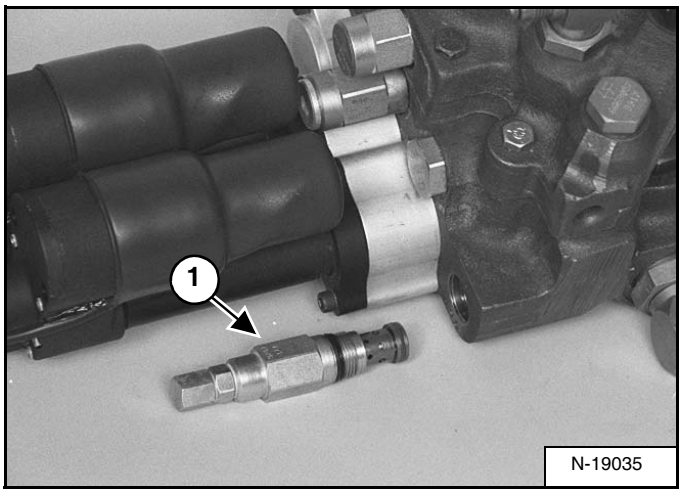
Main Relief Valve

Figure 20-41-43



Loosen the main relief valve (Item 1) **[Figure 20-41-43]**.

Figure 20-41-44



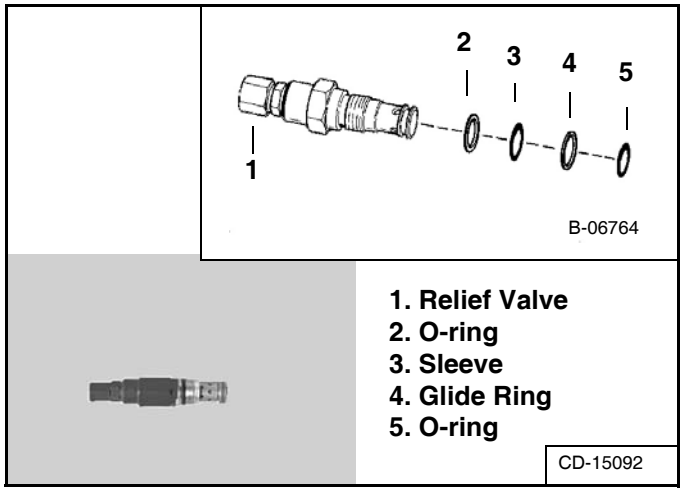
Remove the main relief valve (Item 1) **[Figure 20-41-44]**.

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HYDRAULIC CONTROL VALVE (2 PIECE CASTING) (ADVANCED CONTROL SYSTEM) (ACS) (CONT'D)

Main Relief Valve (Cont'd)

Figure 20-41-45



Remove the O-rings, sleeve, and glide ring from the main relief valve **[Figure 20-41-45]**.

Installation: Always use new O-rings, sleeve, and glide ring. TIghten to 35-40 ft.-lb. (47-54 N•m) torque.

Port Relief Valve

Figure 20-41-46

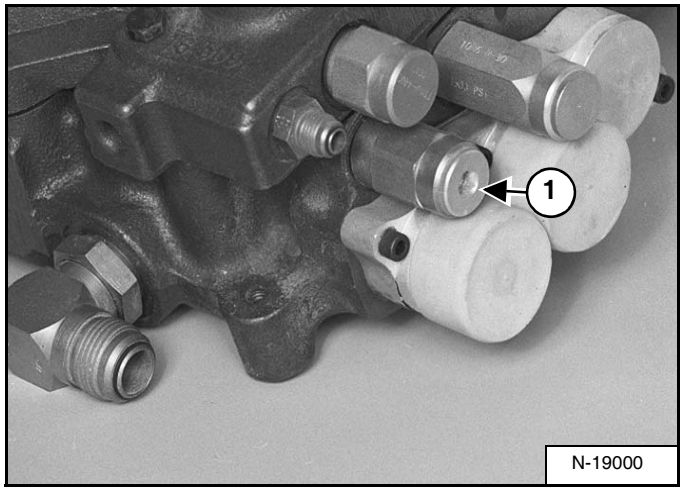
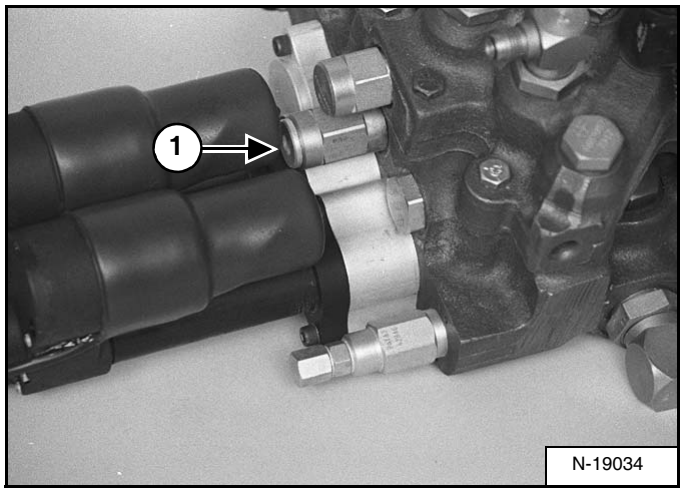


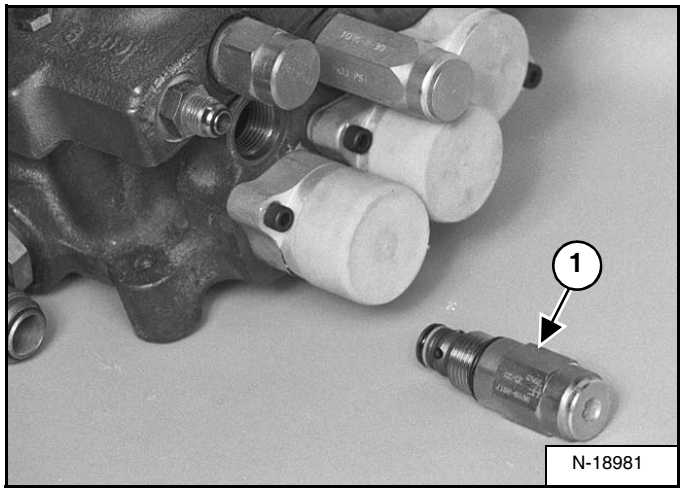
Figure 20-41-47



Loosen the port relief valve (Item 1) **[Figure 20-41-46]** & **[Figure 20-41-47]** (Port E1 or F2). (See Identification Chart (ACS) Page 20-41-13.)

Installation: Always use new O-rings and back-up washers. Tighten to 35-40 ft.-lb. (47-54 N•m) torque.

Figure 20-41-48

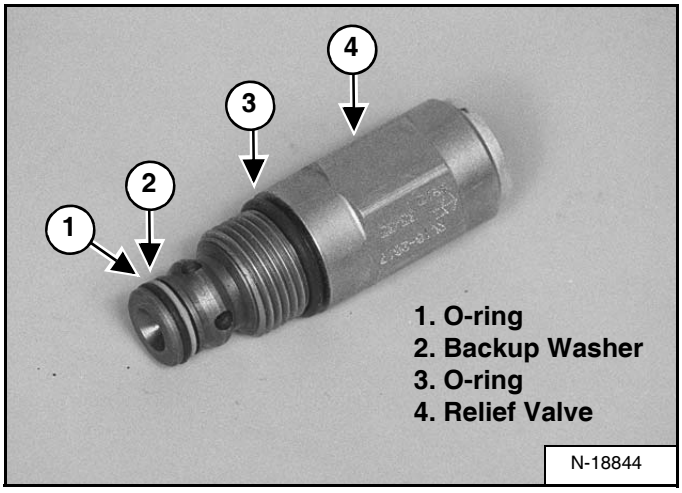


Remove the port relief valve (Item 1) **[Figure 20-41-48]**.

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Port Relief Valve (Cont'd)

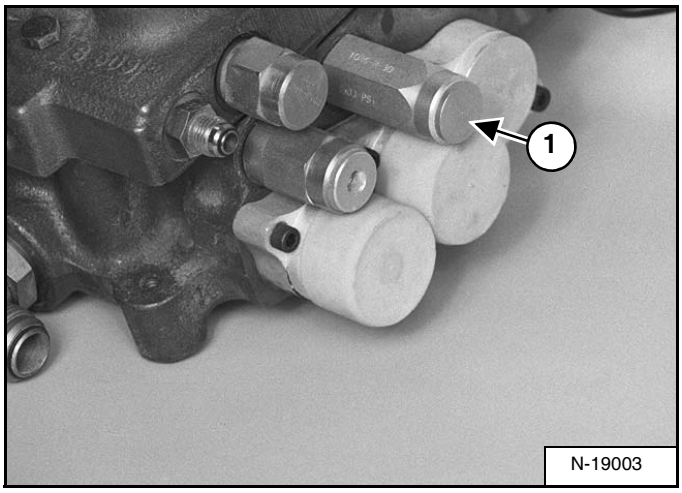
Figure 20-41-49



Remove the O-rings and back-up washer from the port relief valve **[Figure 20-41-49]**.

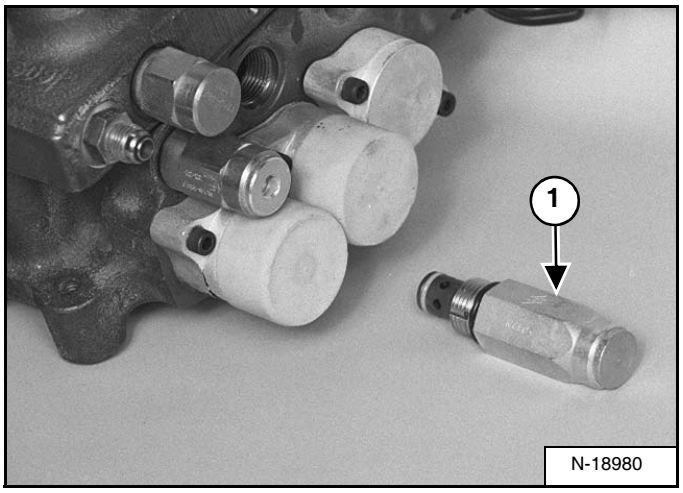
Anti-Cavitation Valve/Port Relief Valve

Figure 20-41-50



Loosen the anti-cavitation valve (Item 1) **[Figure 20-41-50]**.

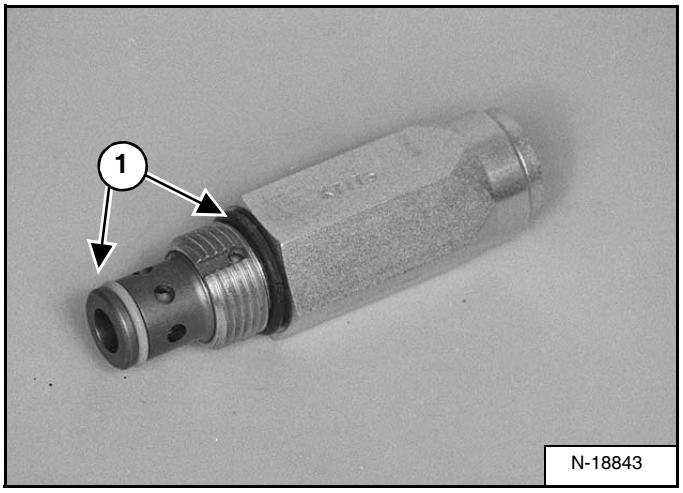
Figure 20-41-51



Remove the anti-cavitation/port relief valve (Item 1) from the control valve for the tilt section **[Figure 20-41-51]**.

Installation: Always use new O-rings and back-up washers. Tighten to 35-40 ft.-lb. (47-54 N•m) torque.

Figure 20-41-52



Remove the O-rings (Item 1) **[Figure 20-41-52]** from the anti-cavitation/port relief valve.

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Anti-Cavitation Valve

Figure 20-41-53

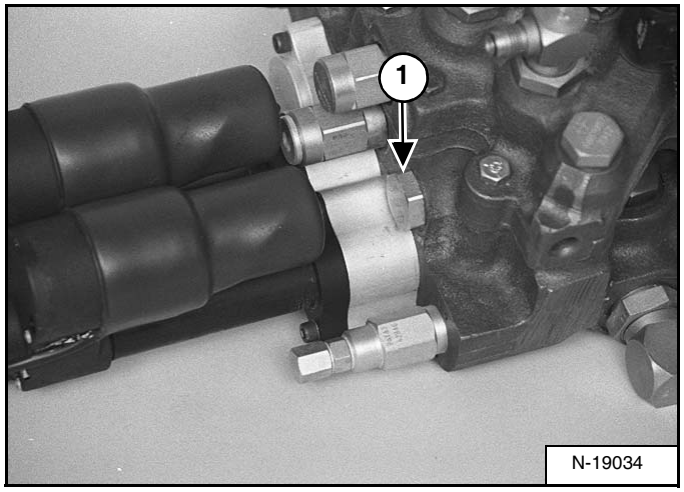
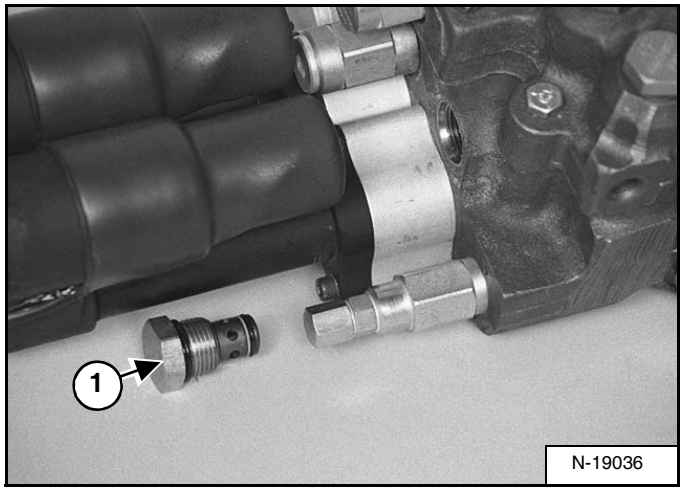
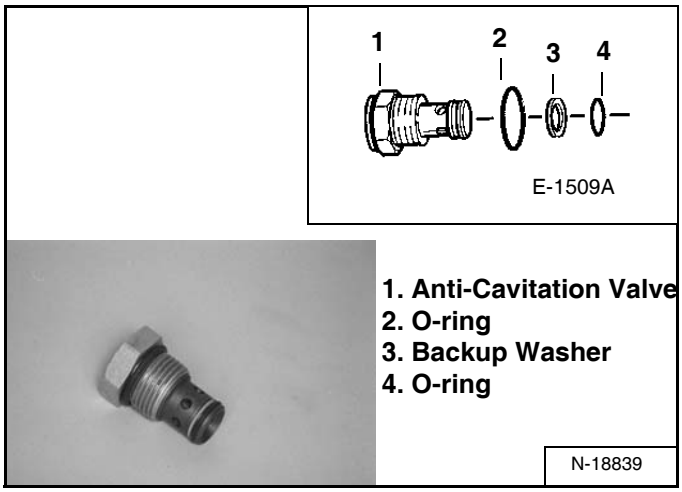


Figure 20-41-54



Remove the anti-cavitation valve (Item 1) **[Figure 20-41-53]** & **[Figure 20-41-54]** from the control valve.

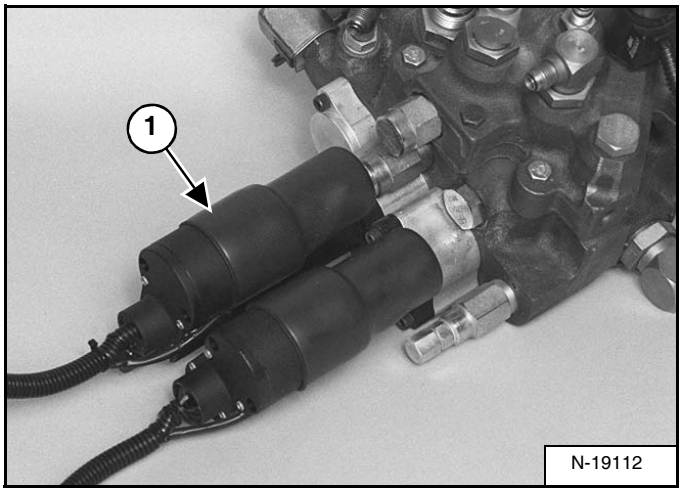
Figure 20-41-55



Remove the O-rings and back-up washer from the anti-cavitation valve **[Figure 20-41-55]**.

Tilt Spool Removal And Installation

Figure 20-41-56

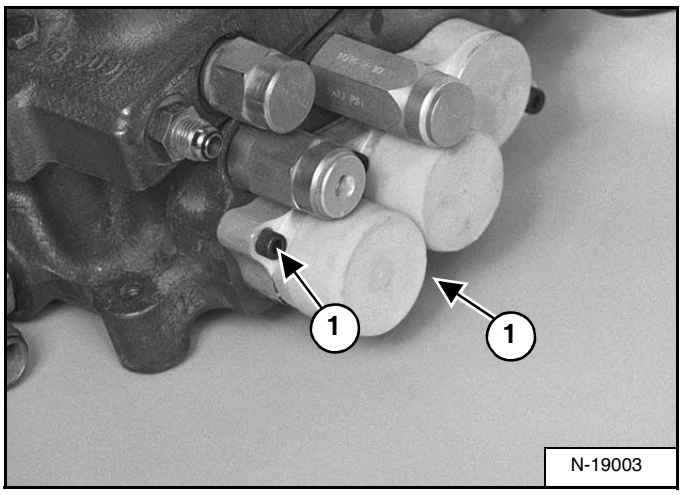


Remove the actuator (Item 1) **[Figure 20-41-56]** from the control valve. (See Actuator Removal And Installation Page 20-41-12.)

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Tilt Spool Removal And Installation (Cont'd)

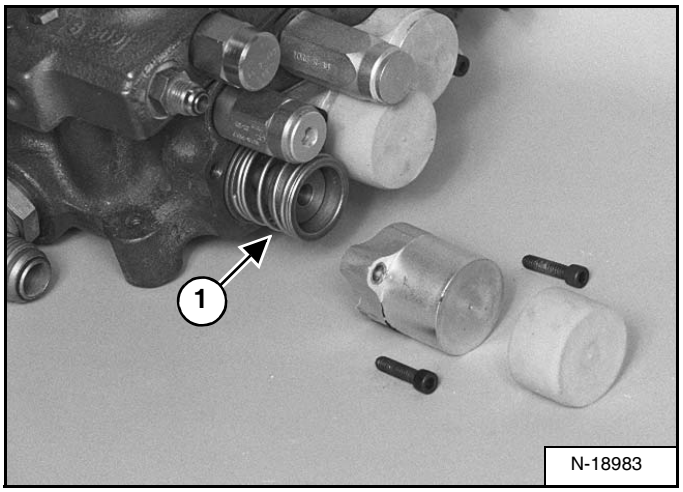
Figure 20-41-57



Remove the screws (Item 1) **[Figure 20-41-57]** from the cap.

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Figure 20-41-58

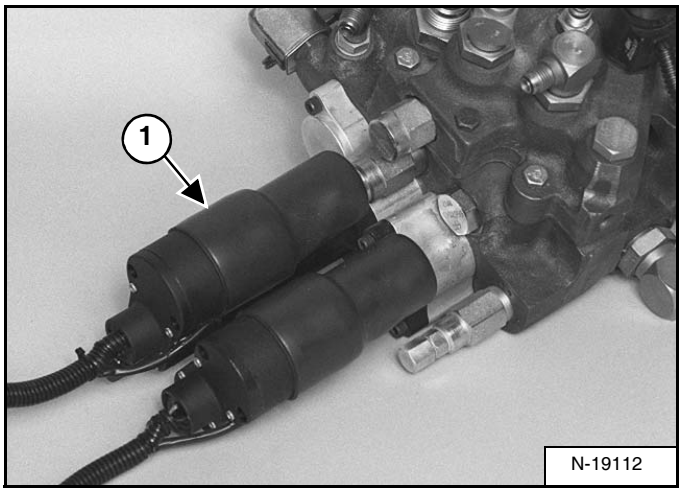


Remove the spool assembly (Item 1) **[Figure 20-41-58]** and seal from the control valve.

Assembly: Always use a new spool seal.

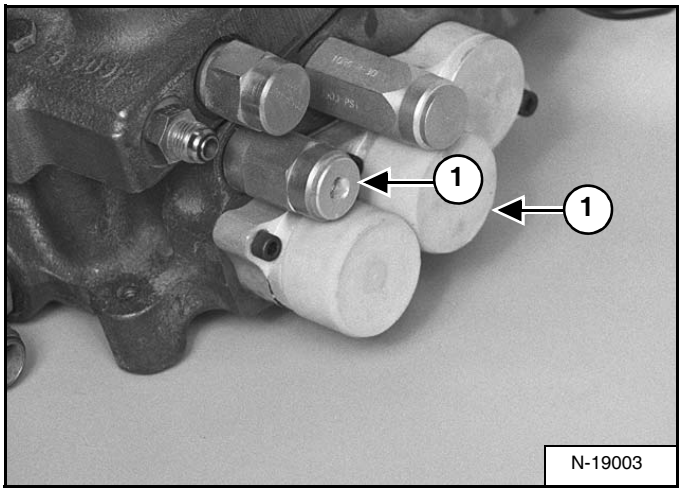
Lift Spool Removal And Installation

Figure 20-41-59



Remove the actuator (Item 1) **[Figure 20-41-59]** from the control valve. (See Actuator Removal And Installation Page 20-41-12.)

Figure 20-41-60



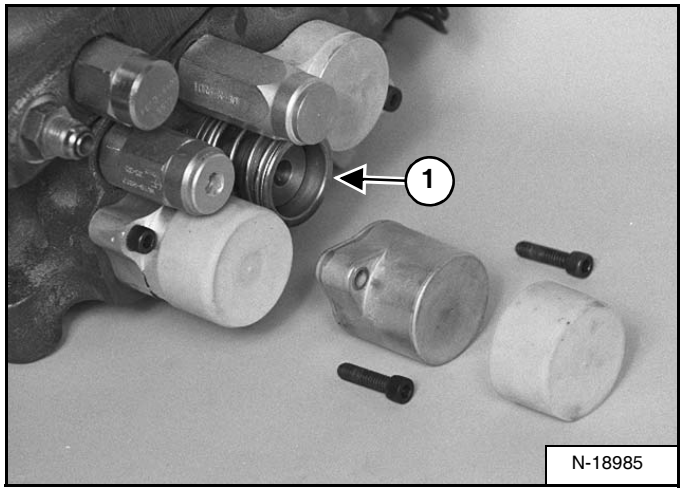
Remove the screws (Item 1) **[Figure 20-41-60]** from the end cap.

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

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Lift Spool Removal And Installation (Cont'd)

Figure 20-41-61

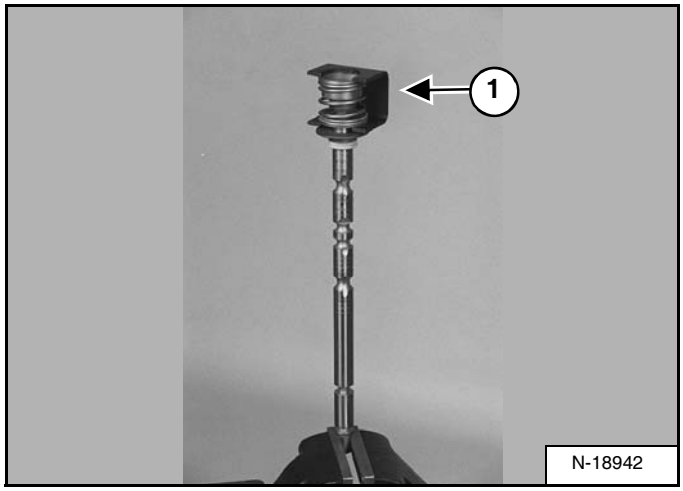


Remove the spool assembly (Item 1) **[Figure 20-41-61]** and seal from the control valve.

Assembly: Always use a new spool seal.

Lift and Tilt Spool Disassembly And Assembly

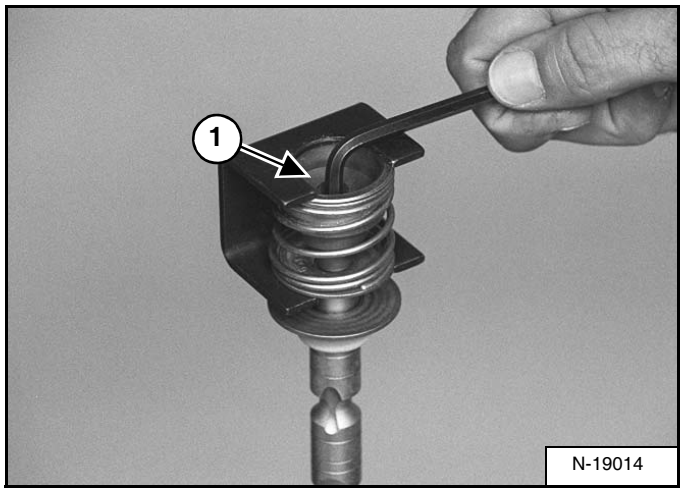
Figure 20-41-62



Put the linkage end of the spool in the vice **[Figure 20-41-62]**.

Install the spool tool (Item 1) **[Figure 20-41-62]** over the centering spring.

Figure 20-41-63

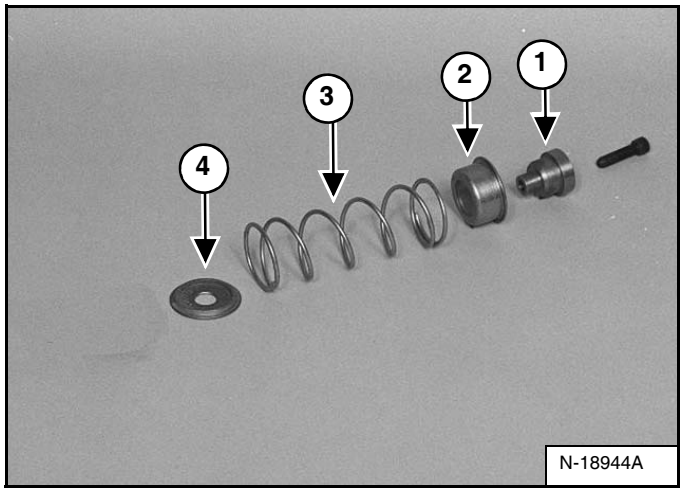


Remove the bolt (Item 1) **[Figure 20-41-63]** holding the centering spring to the spool.

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Remove spring tool from the spring assembly.

Figure 20-41-64

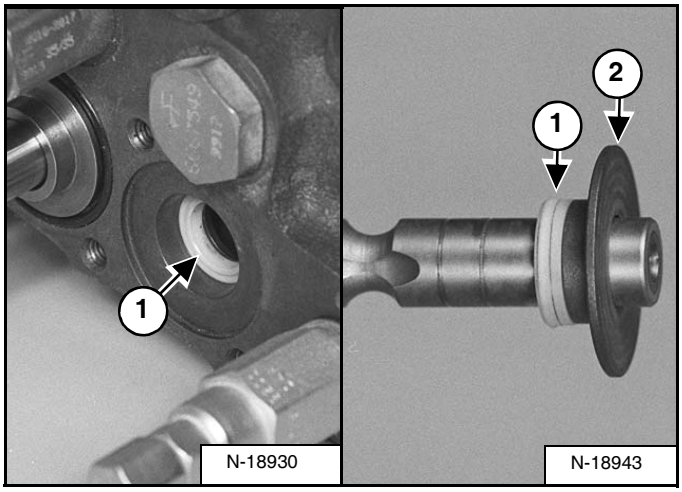


Inspect the adapter (Item 1), collar (Item 2), spring (Item 3), and washer (Item 4) **[Figure 20-41-64]**.

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Lift and Tilt Spool Disassembly And Assembly (Cont'd)

Figure 20-41-65

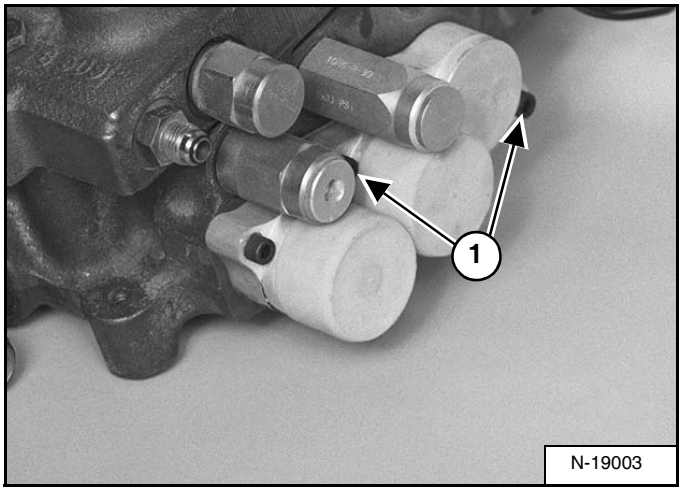


Remove the spool seal(s) (Item 1) and the back-up washer (Item 2) **[Figure 20-41-65]**.

Assembly: Always use a new spool seal.

Auxiliary Spool Removal And Installation

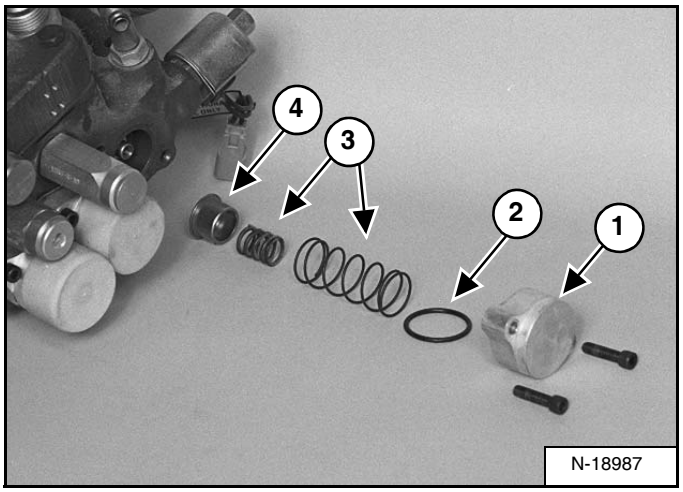
Figure 20-41-66



Remove the screws (Item 1) **[Figure 20-41-66]** from the end cap (both sides).

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

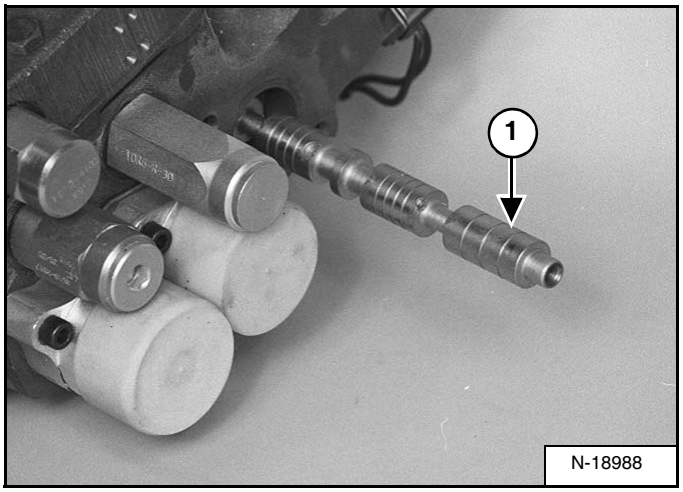
Figure 20-41-67



Remove the end cap (Item 1), O-ring (Item 2) springs (Item 3) and washer (Item 4) **[Figure 20-41-67]** (both sides).

Assembly: Always use a new spool seal.

Figure 20-41-68



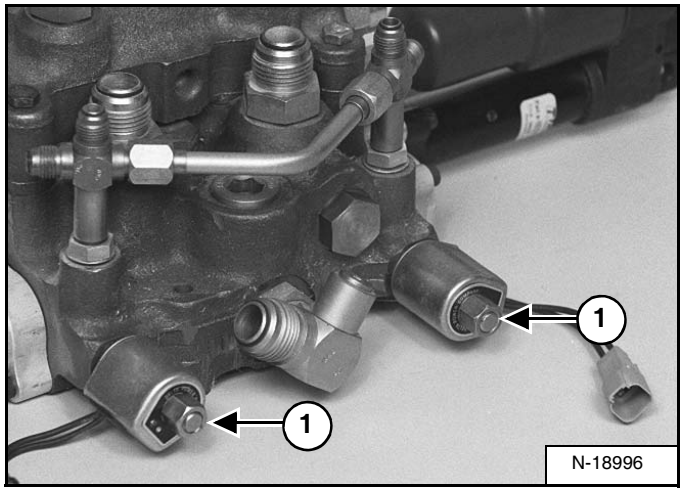
Remove the spool (Item 1) **[Figure 20-41-68]**.

Assembly: Put grease on all the centering spring component parts.

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Auxiliary Electric Solenoid

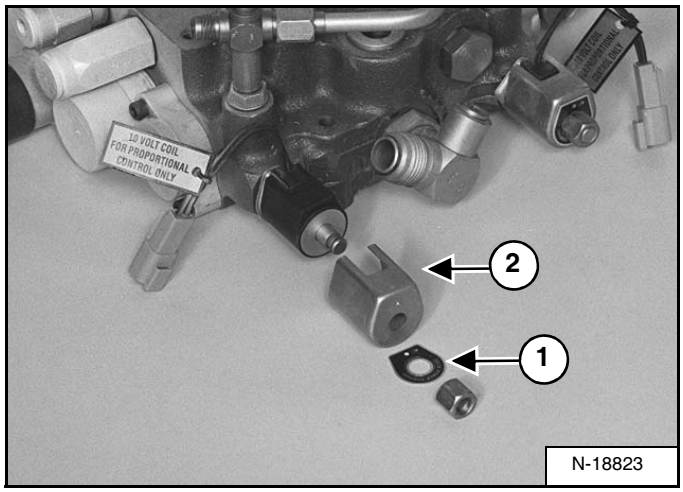
Figure 20-41-69



Remove the nut (Item 1) **[Figure 20-41-69]** from both solenoids.

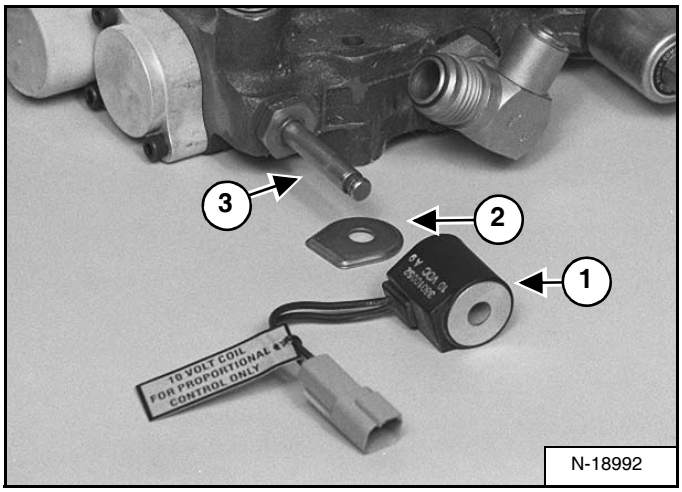
Installation: Tighten the nut to 96-144 in.-lb. (11-16 N•m) torque.4

Figure 20-41-70



Remove the end plate (Item 1) and housing (Item 2) **[Figure 20-41-70]**.

Figure 20-41-71

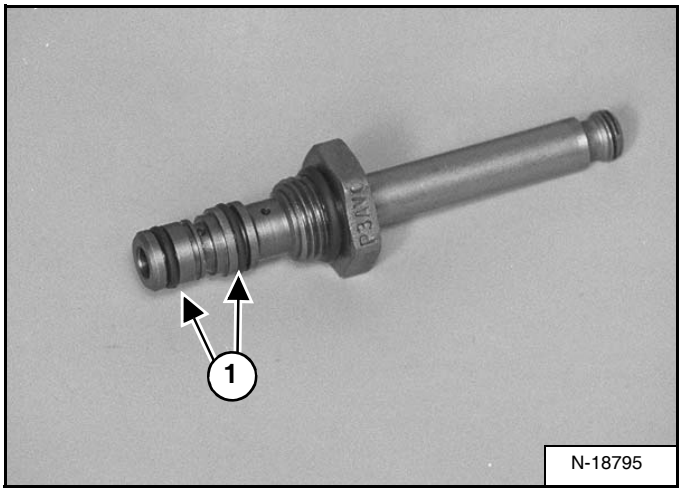


Remove the coil (Item 1) and end plate (Item 2) **[Figure 20-41-71]**.

Remove the solenoid valve (Item 3) **[Figure 20-41-71]**.

Installation: Tighten valve to 96-144 in.-lb. (11-16 N•m) torque.

Figure 20-41-72



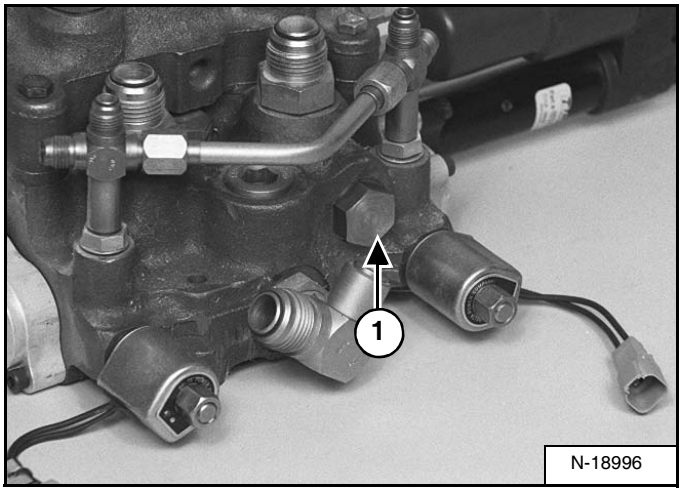
Remove the O-rings (Item 1) **[Figure 20-41-72]** from the solenoid valves.

Installation: Always use new O-rings and apply oil to the O-rings prior to installation.

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Port-Auxiliary Section

Figure 20-41-73



Remove the plug (Item 1) **[Figure 20-41-73]** or optional port relief valve from the control valve.

Figure 20-41-74

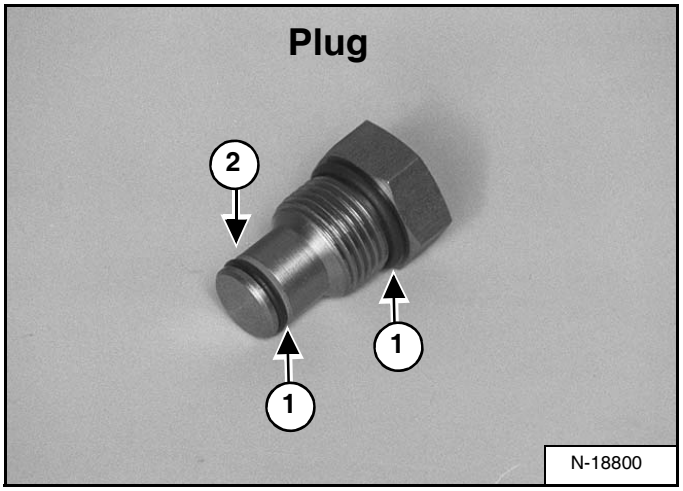
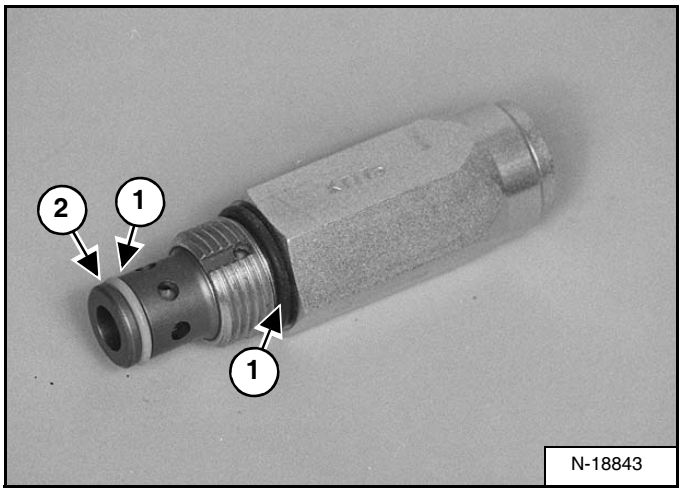


Figure 20-41-75



Remove the O-rings (Item 1) **[Figure 20-41-74]** & **[Figure 20-41-75]** and back-up ring (Item 2) **[Figure 20-41-74]** & **[Figure 20-41-75]** from the plug.

Cleaning And Inspection

Clean all components with clean solvent and dry with compressed air.

Check the spools for wear or scratches.

Check that the spools are not loose in their bore.

Check that the centering springs are not broken.

Check that the load check valve seats are not worn.

Check the load check poppets for damage.

Check the rubber boots and retainers.

Replace the parts as needed.

Use new O-rings and back-up rings.

Apply oil to all new O-rings and back-up rings before installation.

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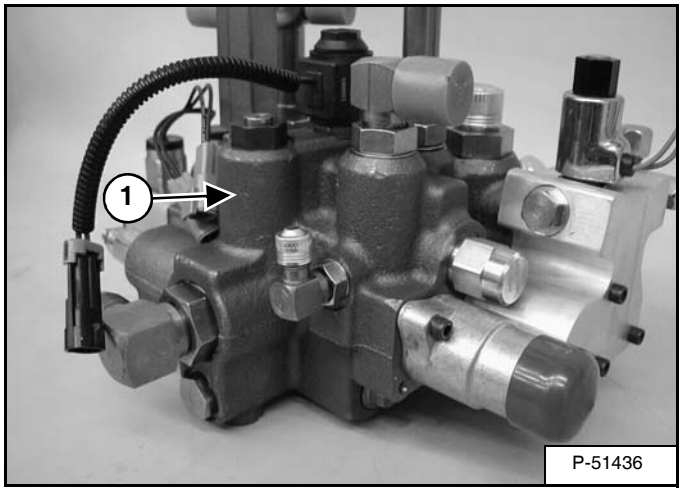


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HYDRAULIC CONTROL VALVE (1 PIECE CASTING) (FOOT CONTROL)

Identification

Figure 20-42-1



The hydraulic control valve (1 piece casting) (foot control) (Item 1) **[Figure 20-42-1]** does not have a removable BICS™ section.

The BICS™ section and main control valve are in one casting.

For identification of the hydraulic control valve (2 piece casting) (foot control), (See Identification on Page 20-40-1.)

Removal And Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

Lift and block the loader. ((See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device (See Installing Lift Arm Support Device on Page 10-20-1.)

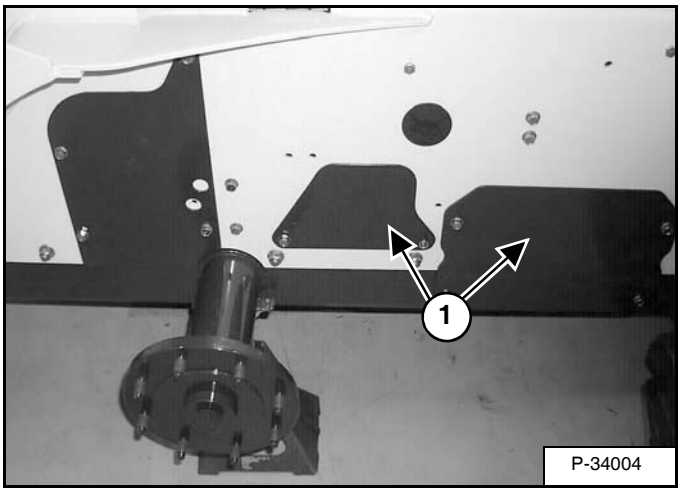
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Clean the area around the control valve.

Drain the hydraulic reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Figure 20-42-2



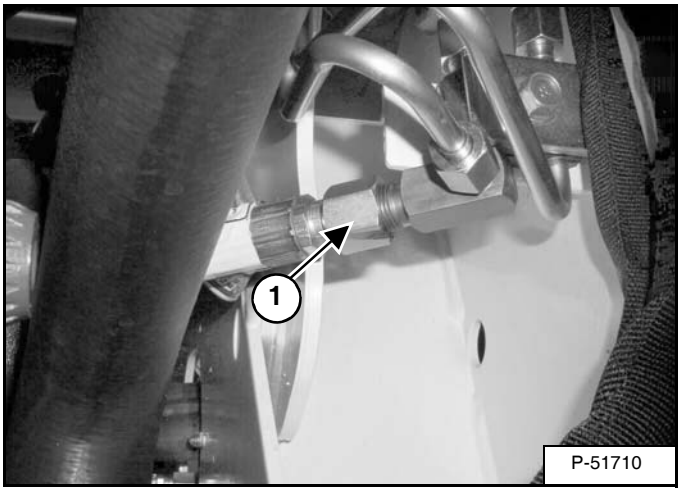
Remove the right rear tire.

Locate and remove the access covers (Item 1) **[Figure 20-42-2]** on the right side of the machine.

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Removal and Installation (Cont'd)

Figure 20-42-3

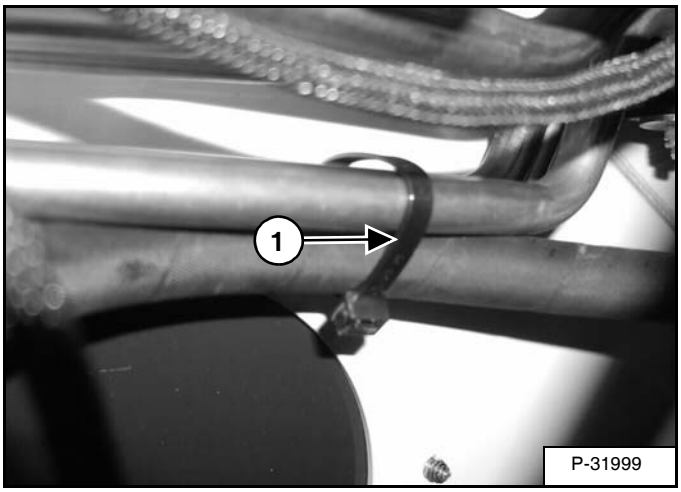


Mark all tubelines and hoses for correct installation.

The fixed end main valve hose (Item 1) **[Figure 20-42-3]** is connected to a fixed end fitting on the control valve. The hose is routed to the back upright where the hose is connected to a tee fitting that feeds the base end of both lift cylinders. The hose must be removed at the back tee fitting, located in the right side upright.

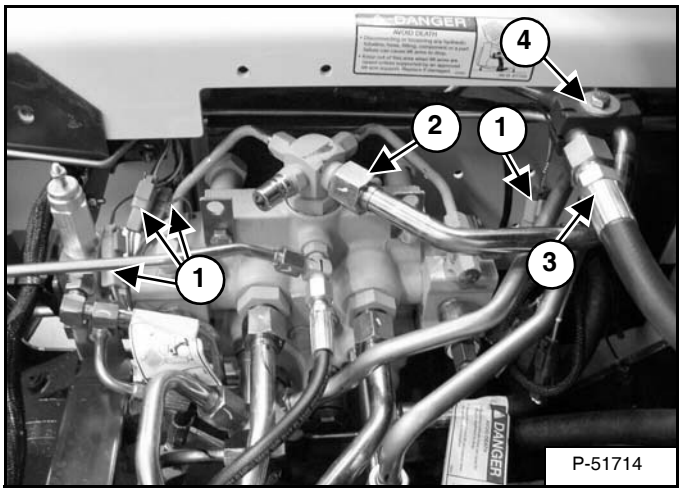
NOTE: Remember the hose routing for ease of control valve installation.

Figure 20-42-4



Remove the tie-strap (Item 1) **[Figure 20-42-4]** from the fixed end main valve hose.

Figure 20-42-5

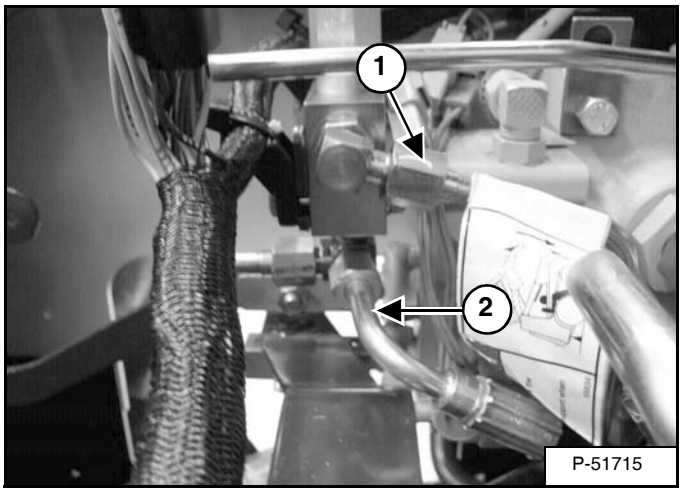


Mark and disconnect the four electric solenoid connectors for correct installation (Item 1) **[Figure 20-42-5]**.

Remove the outlet tubeline (Item 2) **[Figure 20-42-5]** from the control valve to the hydraulic oil cooler.

Disconnect and cap the supply hose (Item 3) and the supply hose clamp (Item 4) **[Figure 20-42-5]**.

Figure 20-42-6



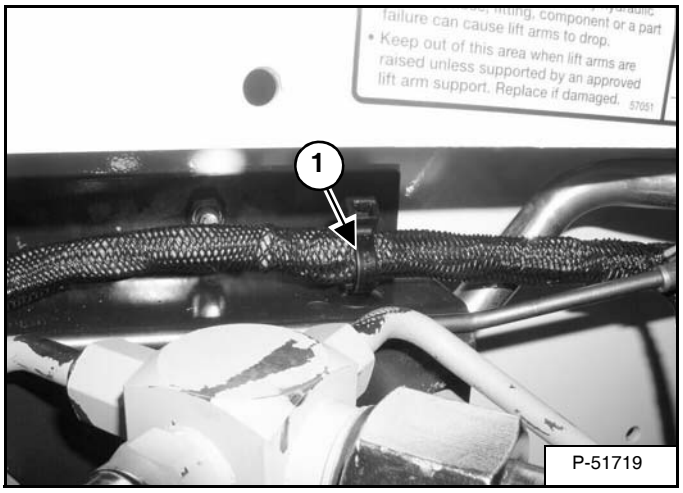
Disconnect and cap the tubeline (Item 1) **[Figure 20-42-6]** from the lift arm by-pass valve to the control valve.

Disconnect and cap the hose (Item 2) **[Figure 20-42-6]** from the lift arm by-pass valve to the drive motor case drain.

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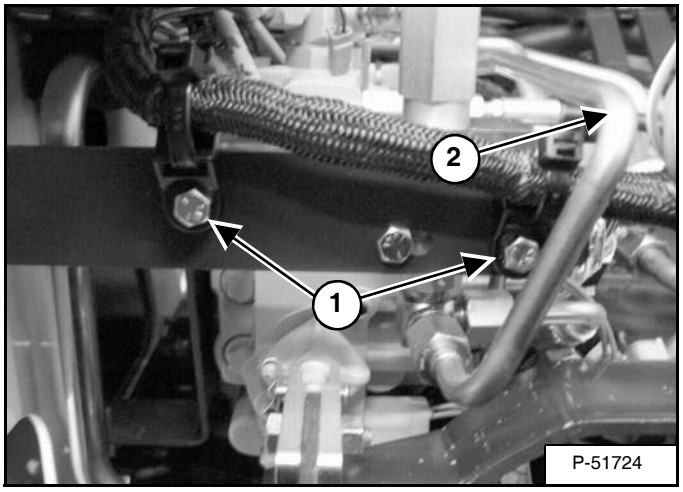
Removal And Installation (Cont'd)

Figure 20-42-7



Remove the tie-strap (Item 1) **[Figure 20-42-7]** from the main valve mounting bracket.

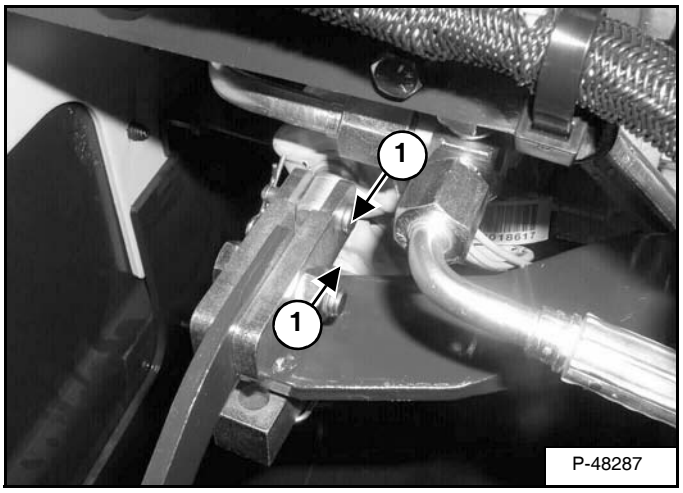
Figure 20-42-8



Disconnect the wire harness tie-strap mounts (Item 1) **[Figure 20-42-8]** from the lift arm by-pass bracket.

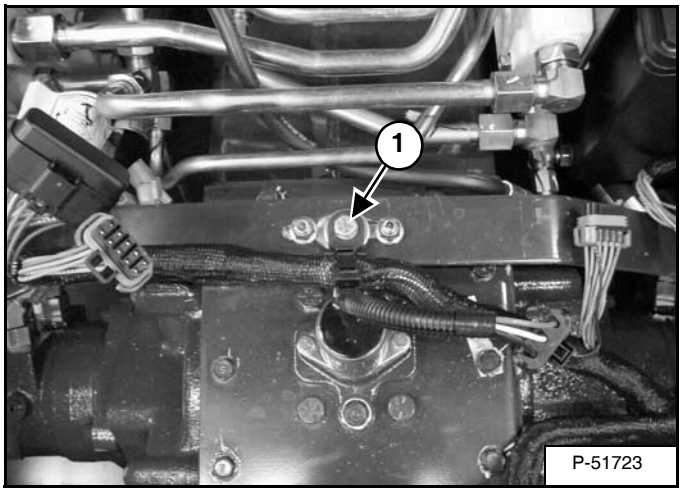
Remove the lift arm by-pass tubeline (Item 2) **[Figure 20-42-8]** from the control valve drain.

Figure 20-42-9



Remove the connector pins (Item 1) **[Figure 20-42-9]**.

Figure 20-42-10



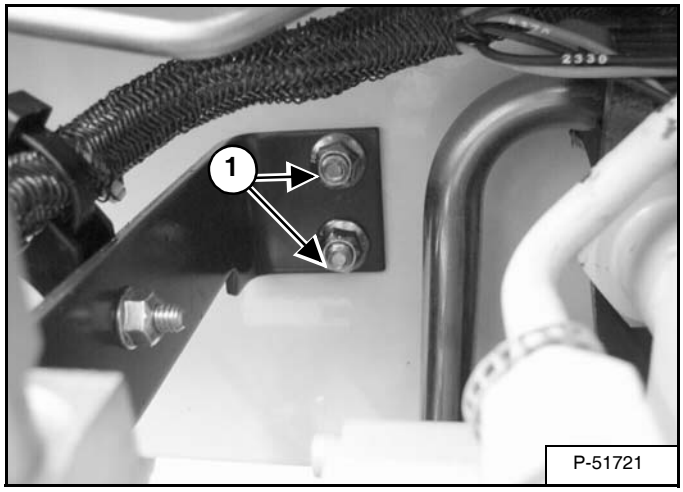
Remove the wire harness clamp bolt (Item 1) **[Figure 20-42-10]**.

Remove the control pedal crossbar linkage and tilt linkage. (See Crossbar Linkage Removal and Installation on Page 50-90-2.)

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Removal And Installation (Cont'd)

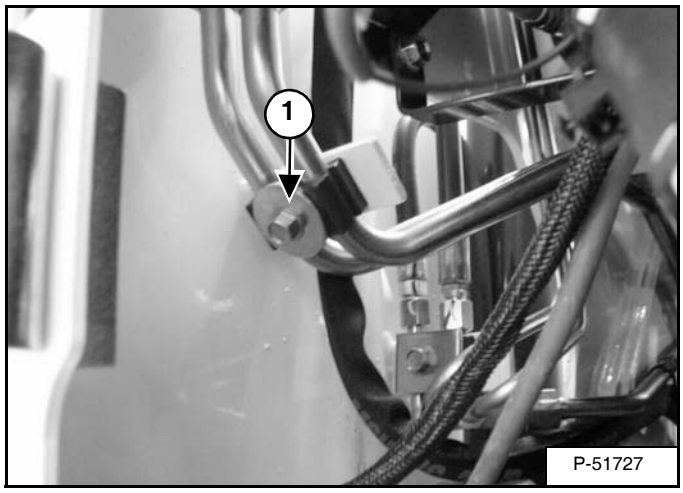
Figure 20-42-11



Remove the two lift arm by-pass valve mounting bolts (Item 1) **[Figure 20-42-11]**.

Remove the lift arm by-pass valve and mounting bracket.

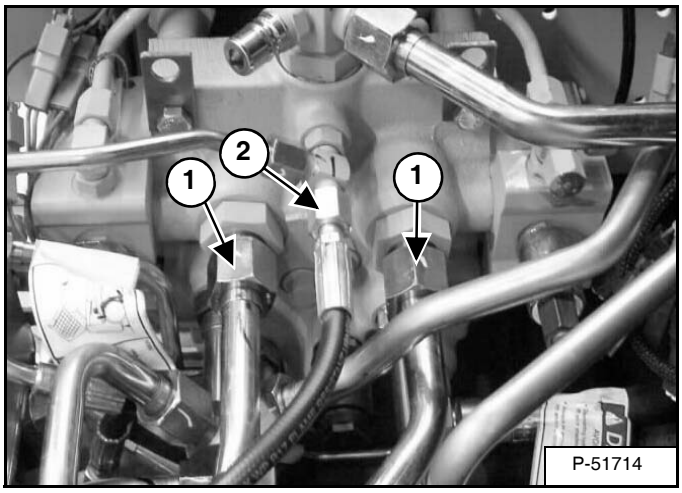
Figure 20-42-12



Remove tubeline clamp bolt (Item 1) **[Figure 20-42-12]** from the auxiliary tubelines in the left rear upright.

Installation: Tighten bolt to 15-20 ft.-lb. (20-27 N•m) torque.

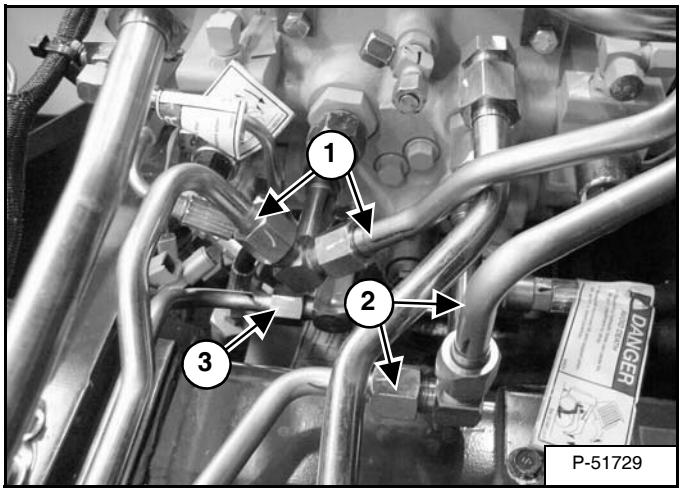
Figure 20-42-13



Remove and cap both tubelines (Item 1) **[Figure 20-42-13]** from the auxiliary section of the control valve.

Disconnect and cap the drain hose (Item 2) **[Figure 20-42-13]** from the control valve.

Figure 20-42-14



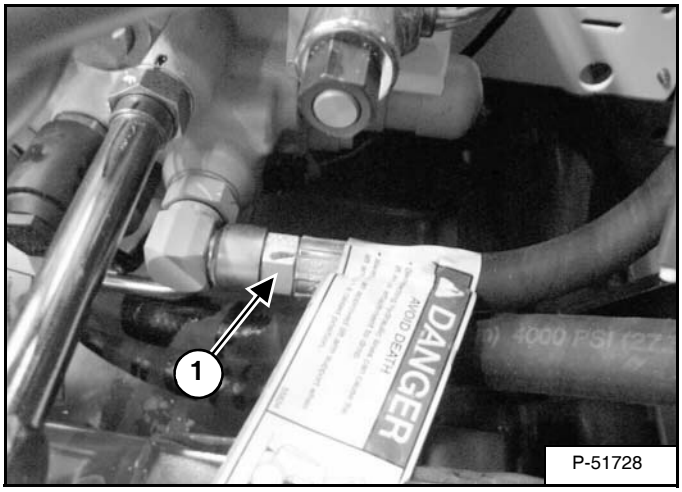
Disconnect and cap the tubelines (Item 1) and (Item 2) **[Figure 20-42-14]** from the tilt section of the control valve.

Disconnect and cap the tubeline (Item 3) **[Figure 20-42-14]** from the lift section of the control valve.

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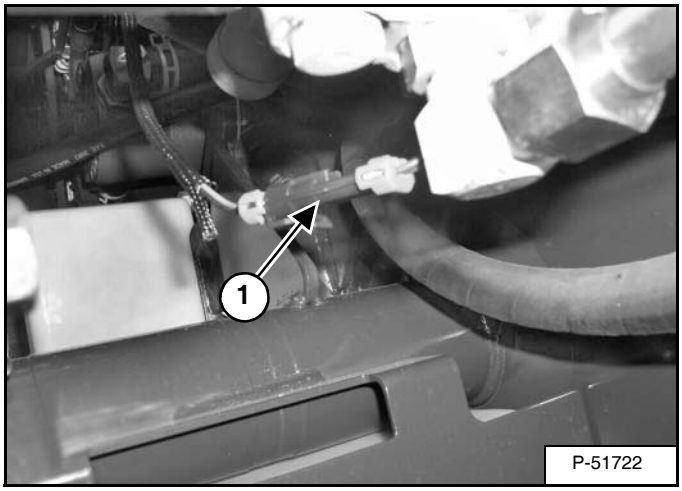
Removal And Installation (Cont'd)

Figure 20-42-15



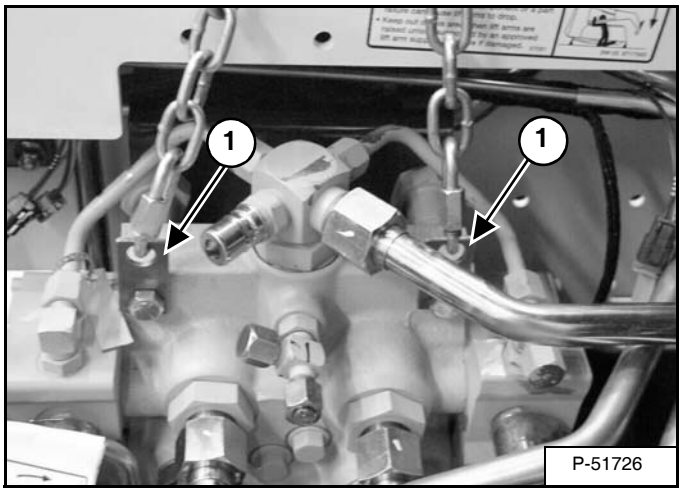
Remove the fixed-end main valve hose (Item 1) **[Figure 20-42-15]** from the main control valve fitting.

Figure 20-42-16



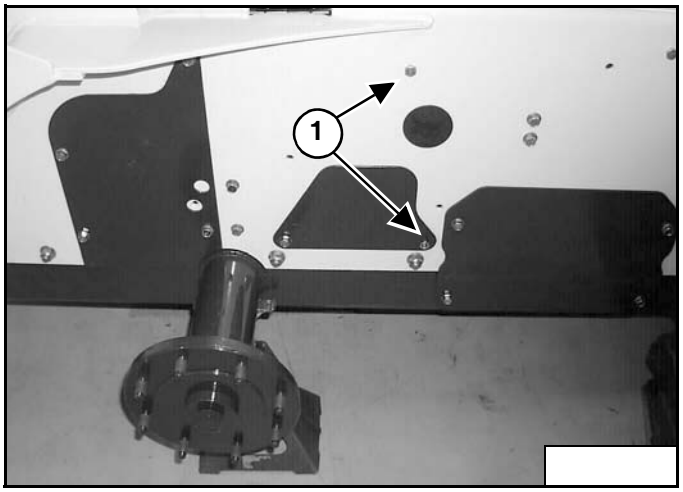
Mark and disconnect the BICS™ electric solenoid connector (Item 1) **[Figure 20-42-16]**.

Figure 20-42-17



Connect a hoist to the lifting brackets (Item 1) **[Figure 20-42-17]** on the control valve.

Figure 20-42-18



Remove the two mounting bolts (Item 1) **[Figure 20-42-18]** fastening the control valve and bracket to the side of the loader.

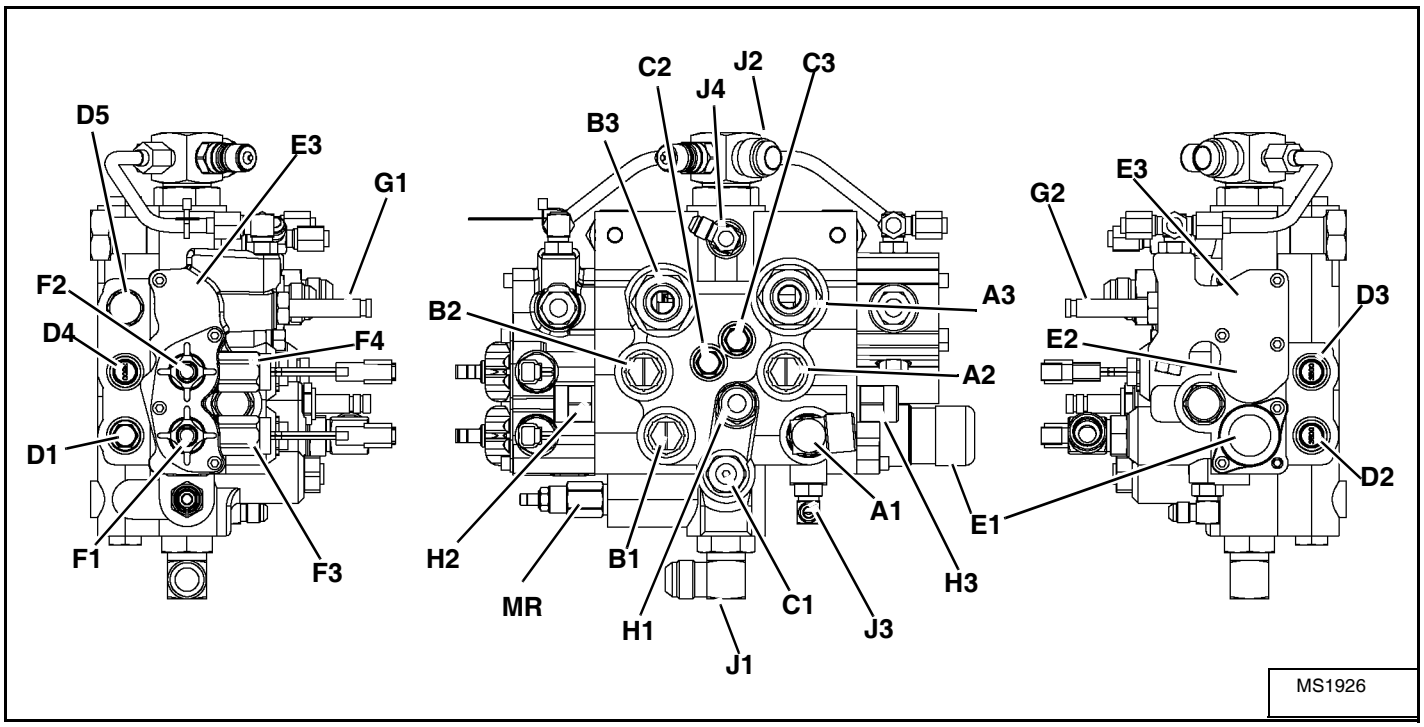
Remove the control valve from the loader.

Reverse procedure for installation.

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Identification Chart

Figure 20-42-19



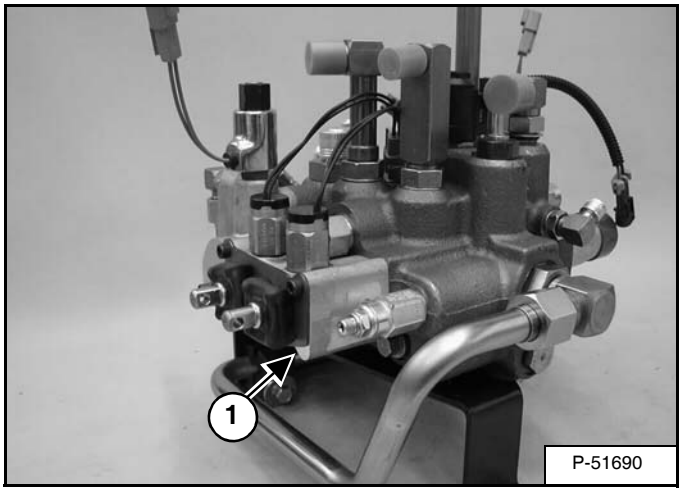
ITEM	S175/S185 LOADER
A1	Lift Cylinder Base End
A2	Tilt Cylinder Base End
A3	Auxiliary Hydraulic Rod End
B1	Lift Cylinder Rod End
B2	Tilt Cylinder Rod End
B3	Auxiliary Hydraulics Base End
C1	Load Check/BICS™ Valve Lift
C2	Load Check Valve Tilt Function
C3	Load Check Valve Auxiliary Function
D1	Anti-Cavitation Valve Lift (Rod End)
D2	Port Relief/Anti-Cavitation Valve – 3500 PSI Lift (Base End)
D3	Port Relief/Anti-Cavitation Valve – 3500 PSI Tilt (Base End)
D4	Port Relief/Anti-Cavitation Valve – 3500 PSI Tilt (Rod End)
D5	Port Relief/Anti-Cavitation Valve (Auxiliary) 3500 PSI (Optional)

ITEM	S175/S185 LOADER
E1	Lift Spool Detent
E2	Tilt Spool Centering Spring
E3	Auxiliary Spool/Centering Springs
F1	LIft Spool
F2	Tilt Spool
F3	Lift Spool Lock Solenoid
F4	Tilt Spool Lock Solenoid
G1	Auxiliary Solenoid Stem
G2	Auxiliary Solenoid Stem
H1	BICS™ Valve Solenoid
H2	BICS™ Lock Valve (Tilt)
H3	BICS™ Lock Valve (Lift)
J1	Inlet Fluid Flow (From Pump)
J2	Outlet Fluid Flow (Return to Tank)
J3	Lift Arm By-Pass Orifice
J4	Drain (Case)
MR	Main Relief Valve – 3300 PSI

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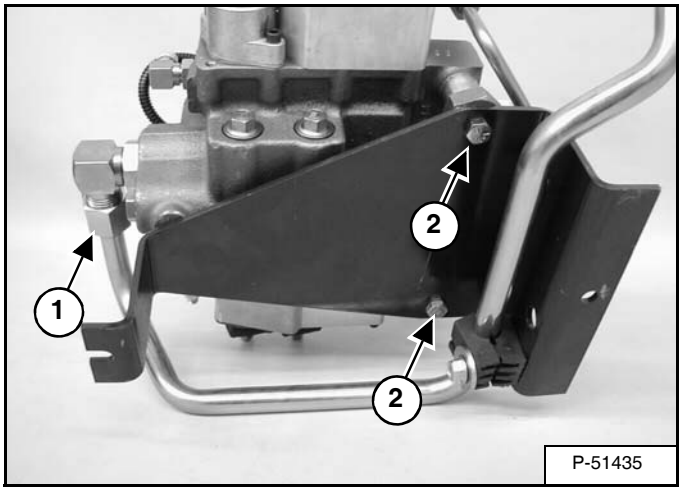
Mount Bracket Removal and Installation

Figure 20-42-20



Remove the control valve and mount bracket (Item 1) **[Figure 20-42-20]** from the loader.

Figure 20-42-21

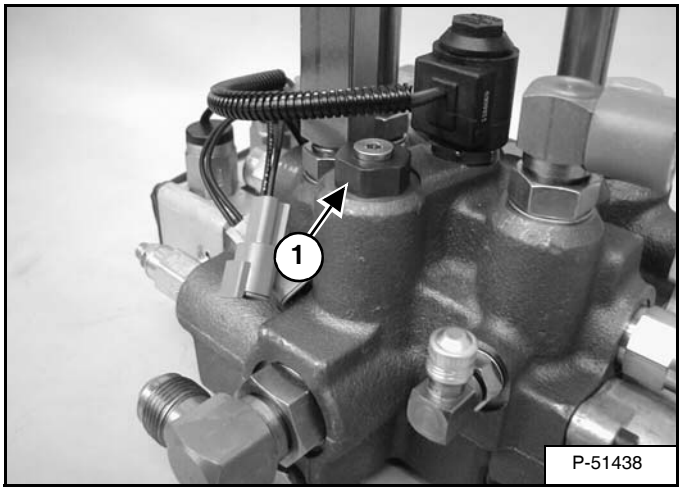


Disconnect the tubeline (Item 1) **[Figure 20-42-21]** from the inlet fitting on the control valve.

Remove the two mount bolts (Item 2) **[Figure 20-42-21]** from the control valve mount plate. Remove the mount plate and tubeline.

BICS™ Valve, Lift Load Check Valve Removal And Installation

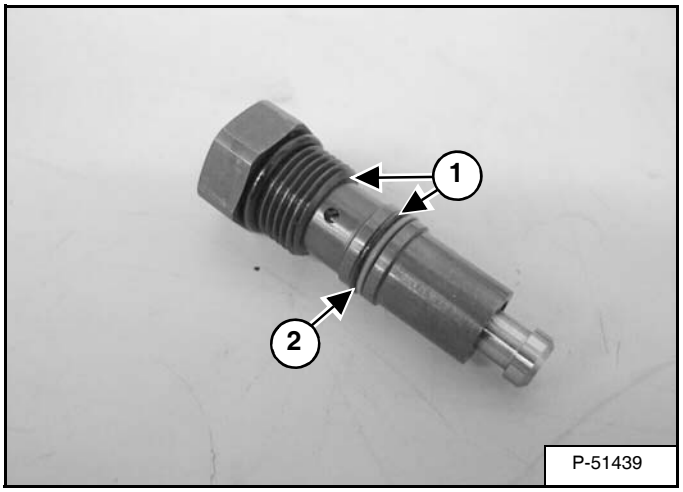
Figure 20-42-22



Remove the lift load check valve (Item 1) **[Figure 20-42-22]**.

Installation: Lubricate the o-ring and tighten the valve to 55-65 ft.-lb. (75-88 N•m) torque.

Figure 20-42-23

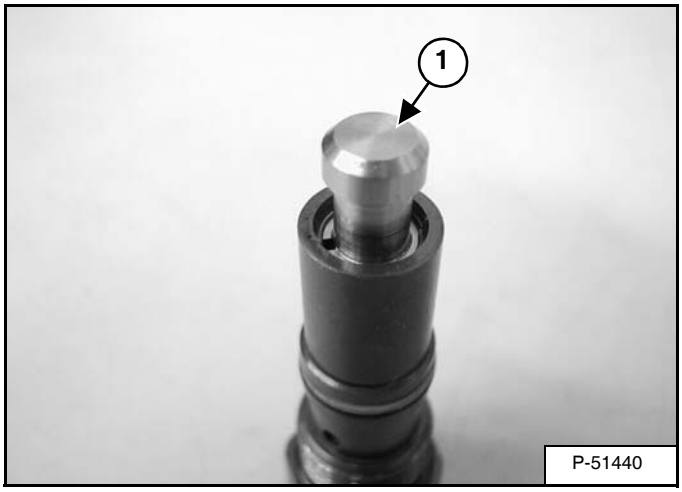


Remove and install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-42-23]**.

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BICS™ Valve, Lift Load Check Valve Removal And Installation (Cont'd)

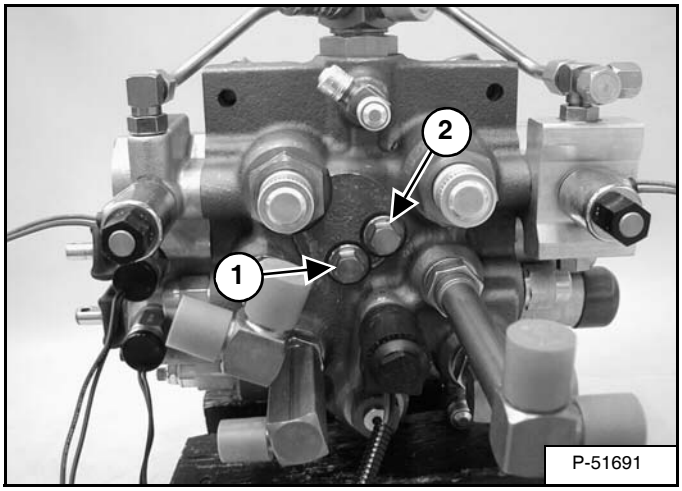
Figure 20-42-24



Check for free movement of the load check valve (Item 1) **[Figure 20-42-24]**.

Load Check Valve Removal And Installation (Tilt & Auxiliary)

Figure 20-42-25

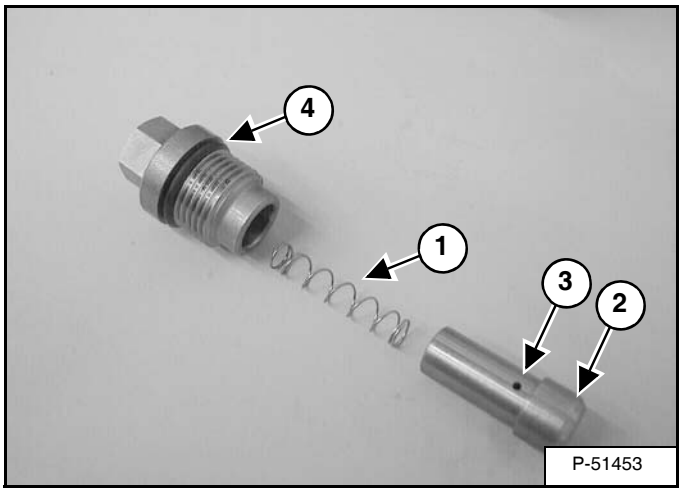


At the front side of the control valve locate the tilt section load check valve (Item 1) **[Figure 20-42-25]**.

At the front side of the control valve locate the auxiliary section load check valve (Item 2) **[Figure 20-42-25]**.

NOTE: The tilt and auxiliary load check valves are interchangeable.

Figure 20-42-26



Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-42-26]**.

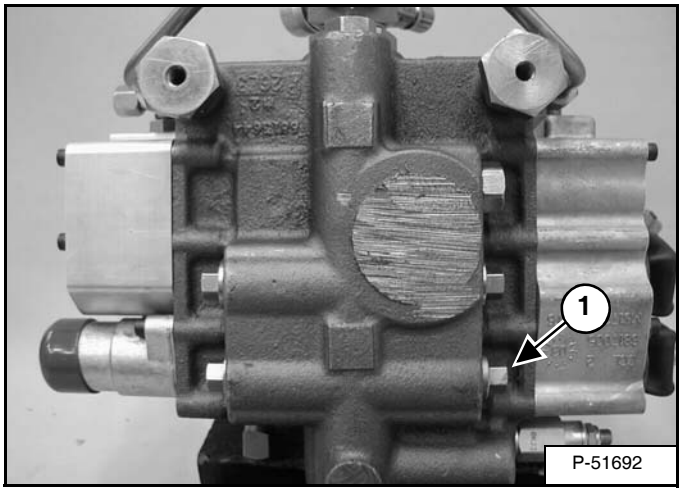
Check the orifice (Item 3) **[Figure 20-42-26]** in the poppet to be sure it is not plugged.

Installation: Install a new O-ring (Item 4) **[Figure 20-42-26]** on the plug and lightly lubricate with oil before installing. Tighten the plug to 38-45 ft.-lb. (52-61 N•m) torque.

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Anti-Cavitation Valve (Lift, Rod End)

Figure 20-42-27



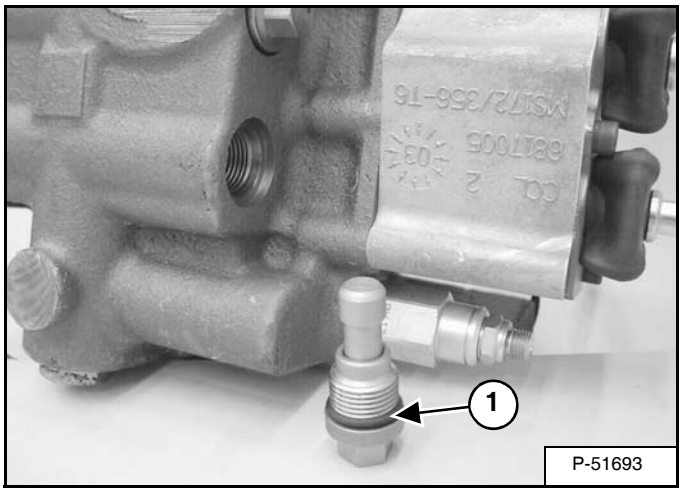
At the back side of the control valve, remove the lift section anti-cavitation valve (Item 1) **[Figure 20-42-27]**.

⚠ WARNING

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

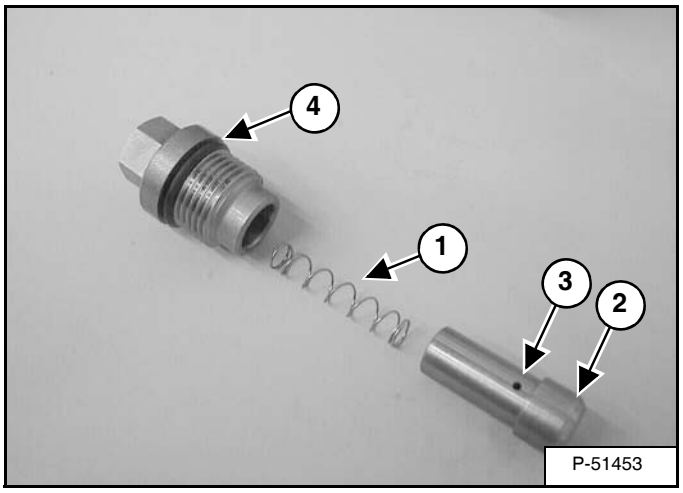
I-2003-0888

Figure 20-42-28



Installation: Always use new O-ring (Item 1) **[Figure 20-42-28]** on the anti-cavitation valve plug. Tighten the plug to 35-40 ft.-lb. (47-54 N•m) torque.

Figure 20-42-29



Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-42-29]**.

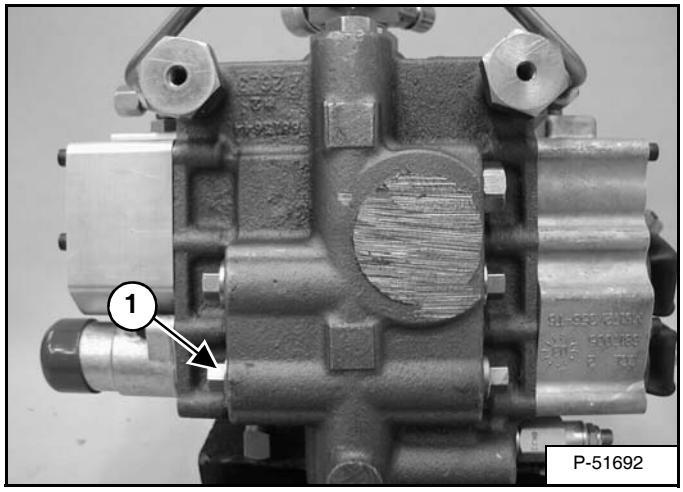
Check the orifice (Item 3) **[Figure 20-42-29]** in the poppet to be sure it is not plugged.

Installation: Install a new O-ring (Item 4) **[Figure 20-42-29]** on the plug and lightly lubricate with oil before installing. Tighten the plug to 38-45 ft.-lb. (52-61 N•m) torque.

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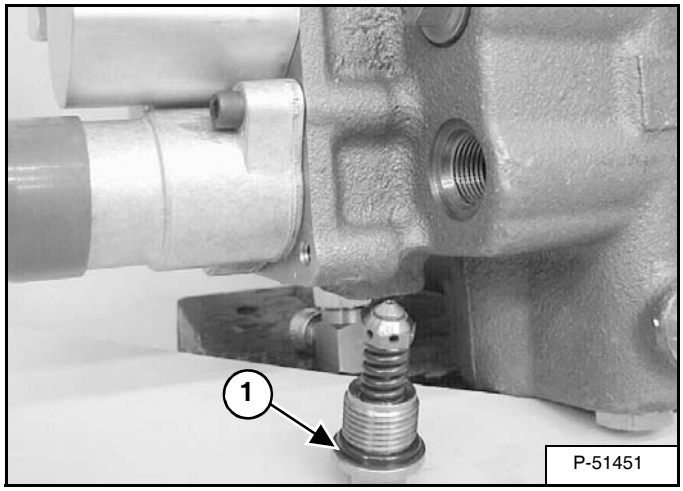
Port Relief/Anti-Cavitation Valve (Lift, Base End)

Figure 20-42-30



Loosen the lift circuit port relief/anti cavitation valve (Item 1) **[Figure 20-42-30]**.

Figure 20-42-31

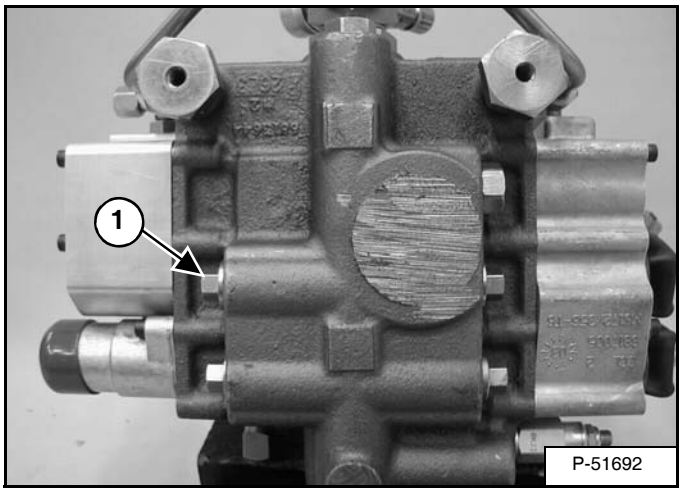


Replace the O-ring (Item 1) **[Figure 20-42-31]** before installation.

Installation: Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

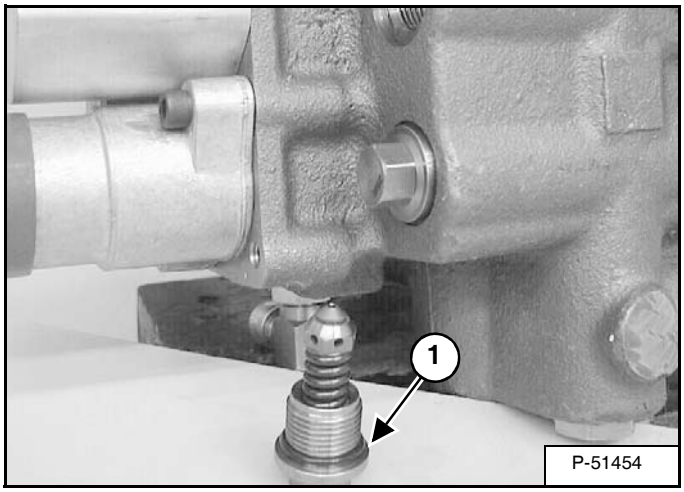
Port Relief/Anti-Cavitation Valve (Tilt, Base End)

Figure 20-42-32



Remove the tilt port relief/anti cavitation valve (Item 1) **[Figure 20-42-32]** from the base end of the tilt section.

Figure 20-42-33



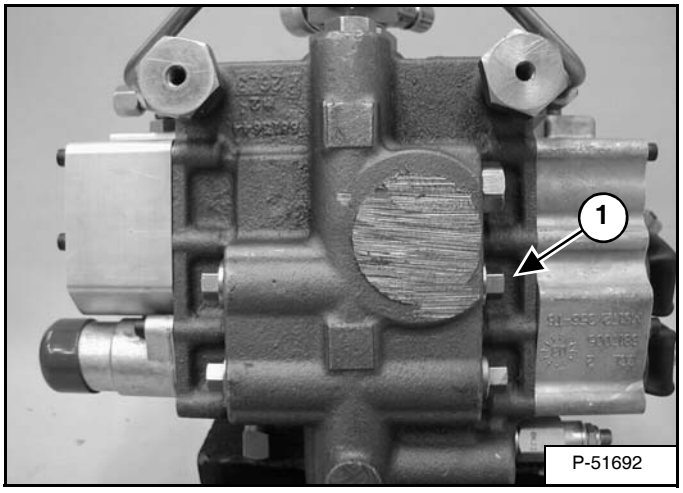
Replace the O-ring (Item 1) **[Figure 20-42-33]** before installation.

Installation: Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

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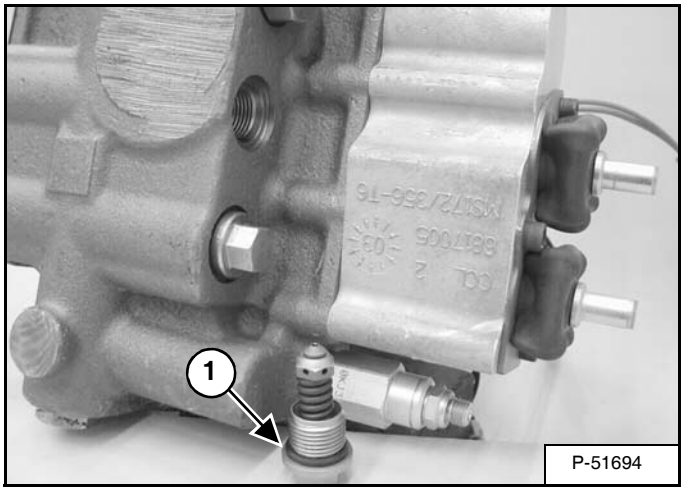
Port Relief/Anti-Cavitation Valve (Tilt, Rod End)

Figure 20-42-34



Remove the tilt port relief/anti cavitation valve (Item 1) **[Figure 20-42-34]** from the rod end of the tilt section.

Figure 20-42-35

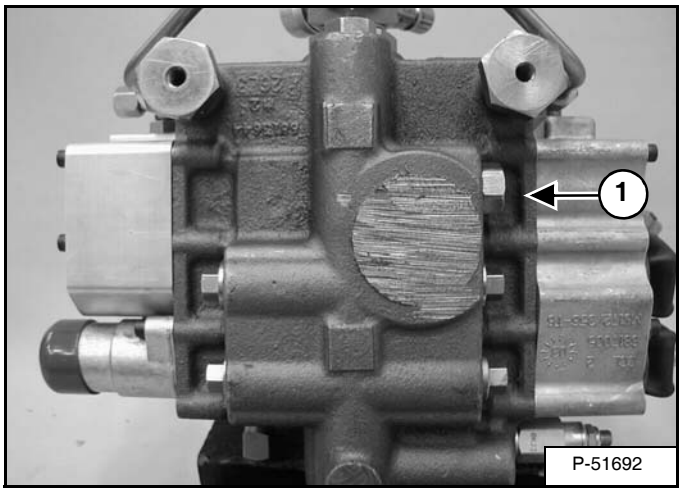


Replace the O-ring (Item 1) **[Figure 20-42-35]** before installation.

Installation: Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

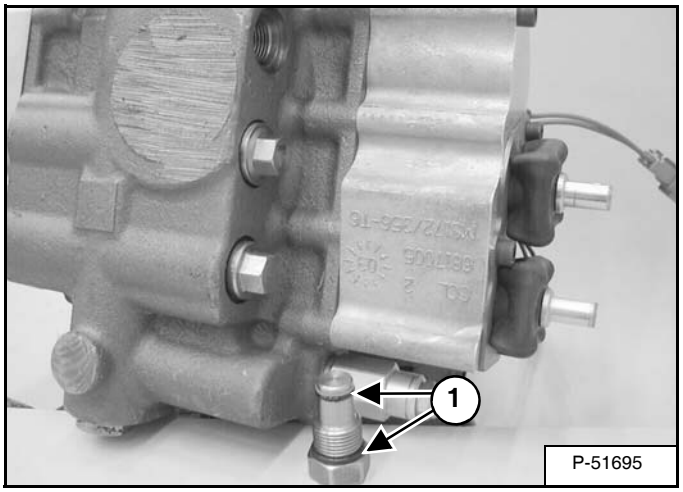
Port Relief Valve

Figure 20-42-36



Remove the port relief plug (Item 1) **[Figure 20-42-36]** from the auxiliary circuit of the control valve.

Figure 20-42-37

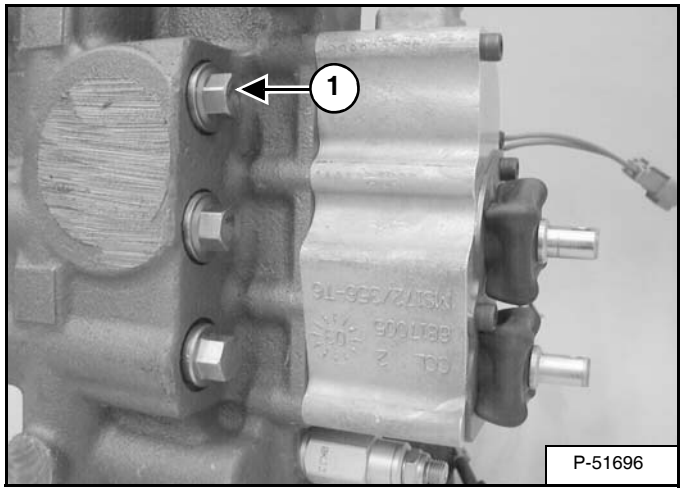


Installation: Always use new O-rings (Item 1) **[Figure 20-42-37]**. Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

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Port Relief Valve (Cont'd)

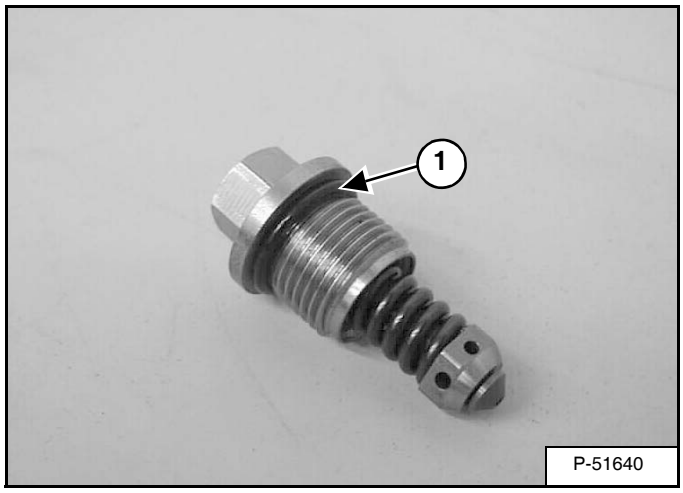
Figure 20-42-38



The control valve may be equipped with an optional auxiliary port relief valve (Item 1) **[Figure 20-42-38]**.

Remove the auxiliary port relief valve.

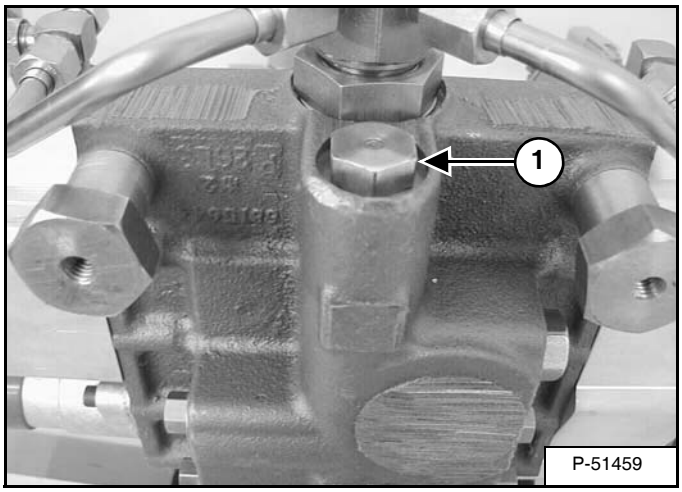
Figure 20-42-39



Installation: Always use new O-rings (Item 1) **[Figure 20-42-39]**. Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

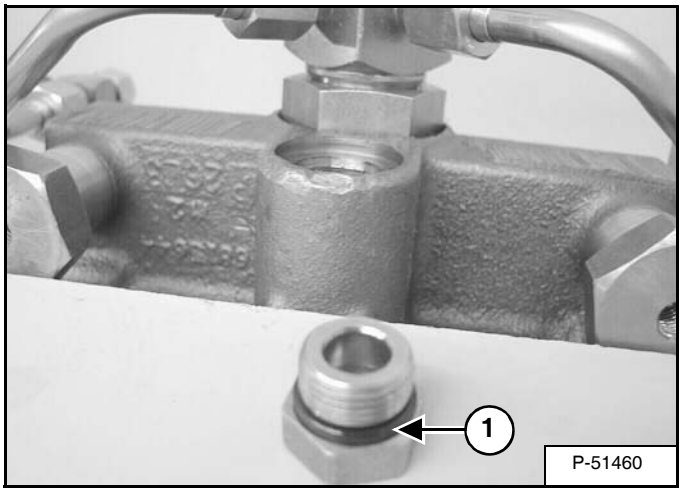
Plug Removal

Figure 20-42-40



At the top side of the control valve, remove the plug (Item 1) **[Figure 20-42-40]**.

Figure 20-42-41

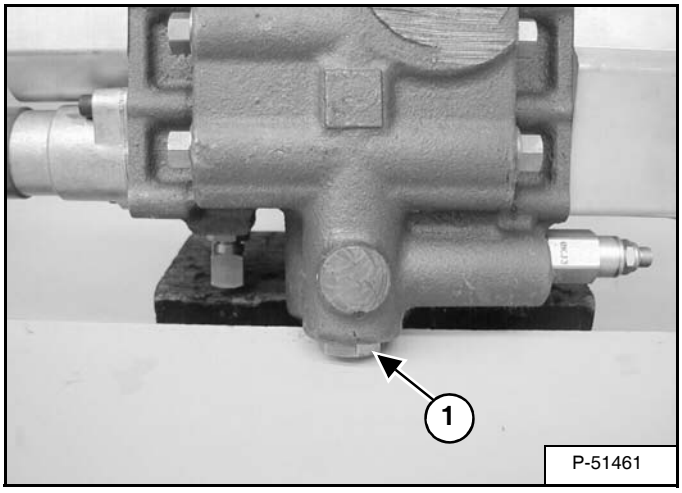


Installation: Always use new O-rings (Item 1) **[Figure 20-42-41]**. Tighten to 40 ft.-lb. (54 N•m) torque.

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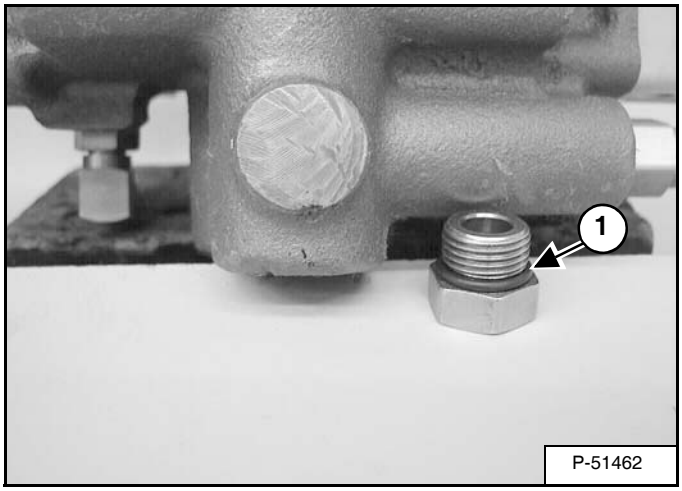
Plug Removal (Cont'd)

Figure 20-42-42



At the bottom side of the control valve remove the plug (Item 1) **[Figure 20-42-42]**.

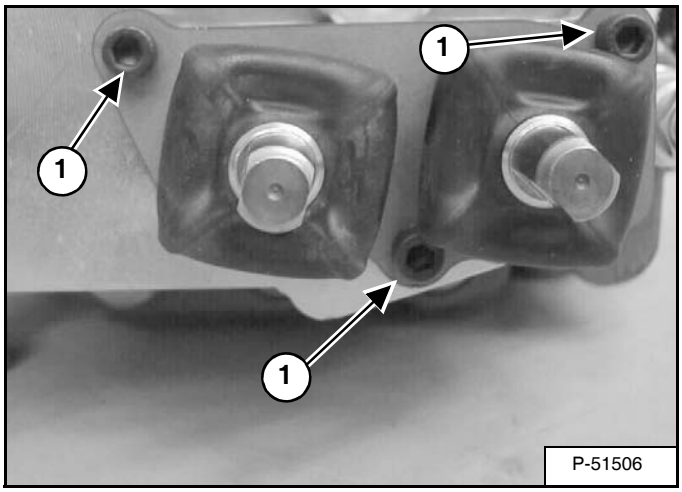
Figure 20-42-43



Installation: Always use new O-rings (Item 1) **[Figure 20-42-43]**. Tighten to 40 ft.-lb. (54 N•m) torque.

Rubber Boot Removal and Installation

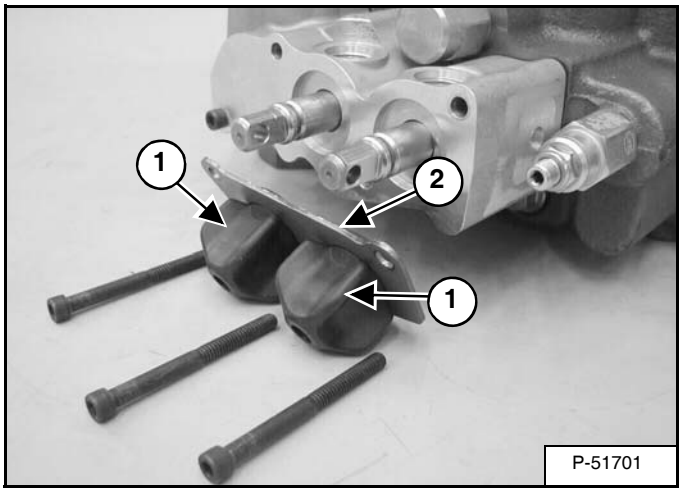
Figure 20-42-44



Remove the three screws (Item 1) **[Figure 20-42-44]** on the rubber boot retainer plate.

Installation: Tighten the screws to 90-100 in.-lb. (10, 11,3 N•m) torque.

Figure 20-42-45

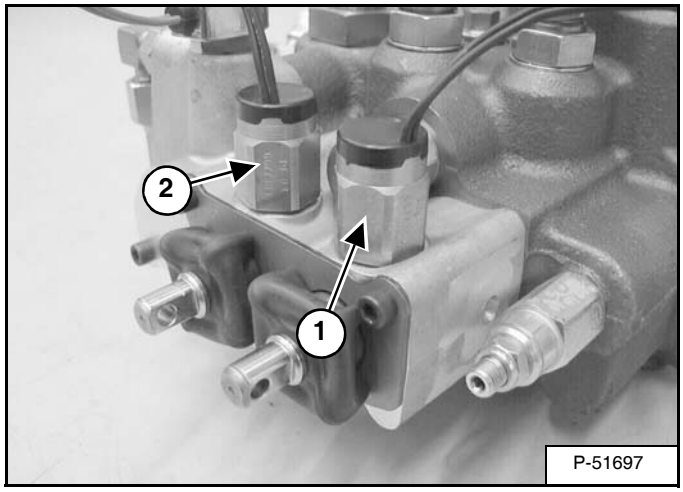


Remove the rubber boots (Item 1) from the retainer plate (Item 2) **[Figure 20-42-45]**.

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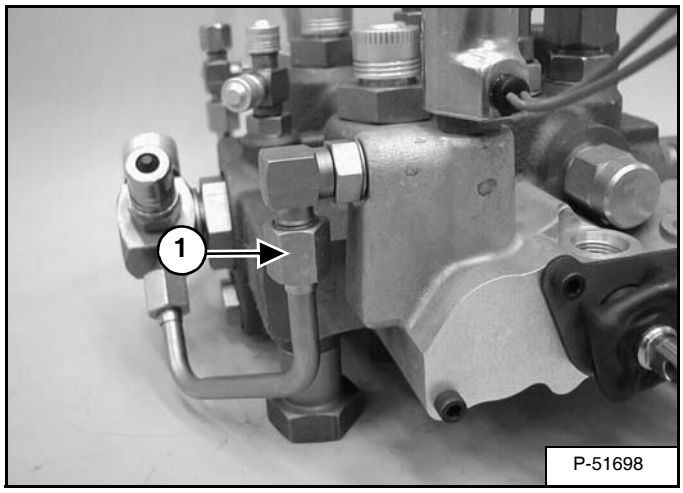
End Cap/Spool Lock Block Removal and Installation

Figure 20-42-46



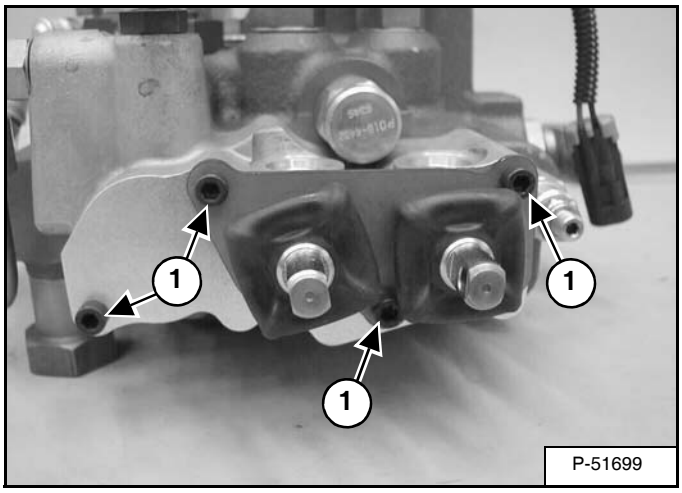
Remove the lift spool lock solenoid (Item 1) and the tilt spool lock solenoid (Item 2) **[Figure 20-42-46]** from the end cap/spool lock block.

Figure 20-42-47



Disconnect the tube line (Item 1) **[Figure 20-42-47]** from the end cap/spool lock block.

Figure 20-42-48

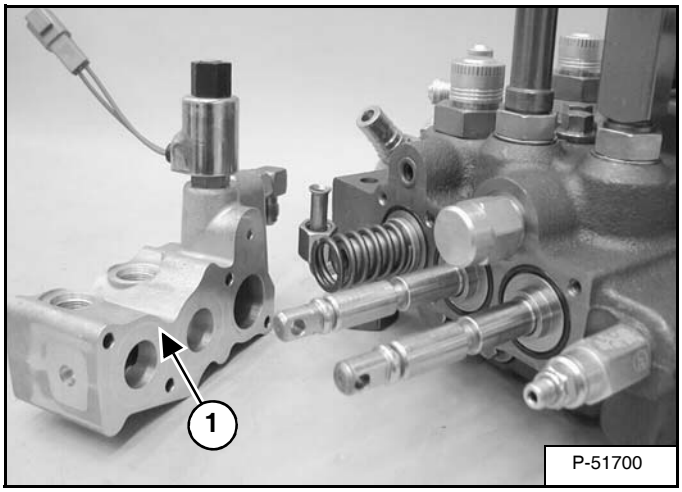


Remove the four end cap/spool lock block mount screws (Item 1) **[Figure 20-42-48]**.

Installation: Tighten the screws to 90 in.-lb. (10-11,3 N•m) torque.

Remove the rubber boots and retainer plate from the lift and tilt spools.

Figure 20-42-49



Remove the end cap/spool lock block (Item 1) **[Figure 20-42-49]** from the control valve.

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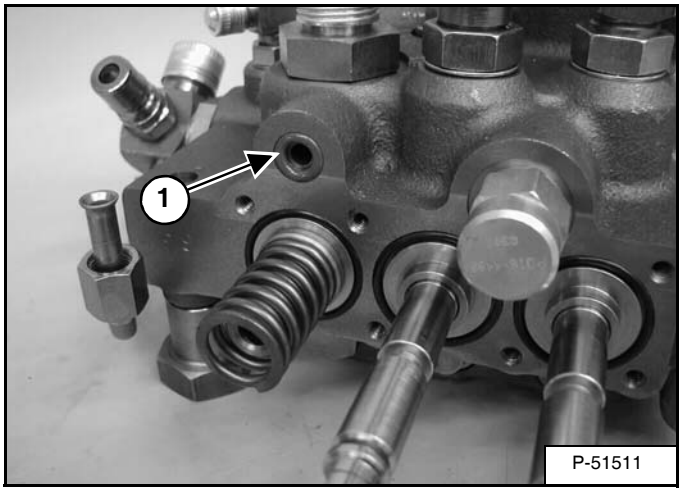
Lift Spool and Detent Removal and Installation

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

MEL1278 - Detent Tool
MEL1285 - Detent Spring Tool

Remove the end cap/spool lock block from the control valve.

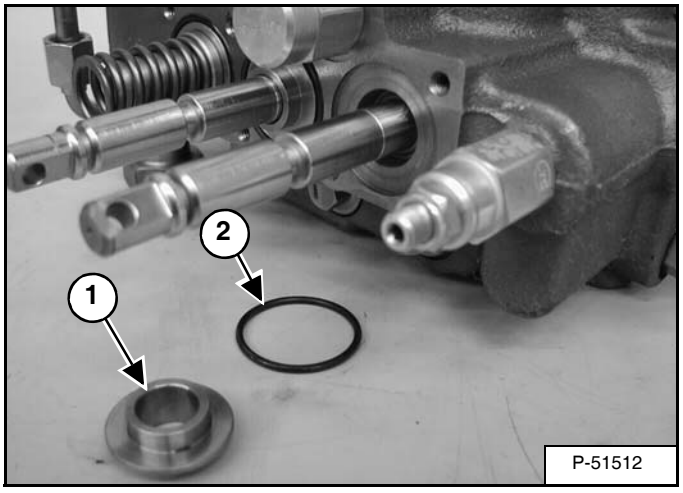
Figure 20-42-50



Remove the O-ring (Item 1) **[Figure 20-42-50]**.

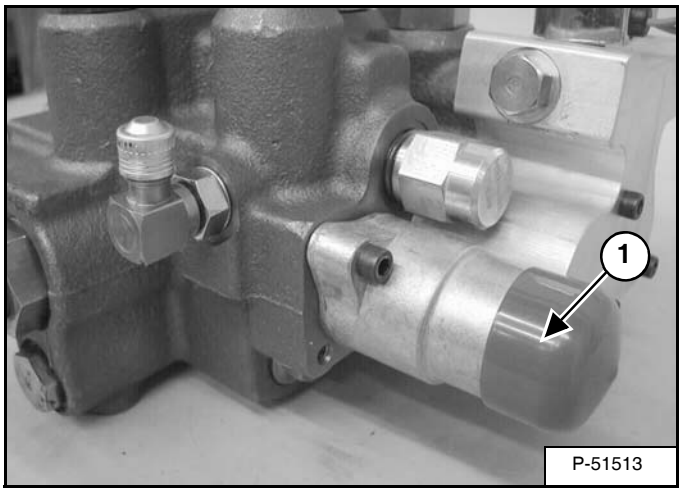
Installation: Replace the O-ring, and lubricate lightly with oil before installation of the end cap/spool lock block.

Figure 20-42-51



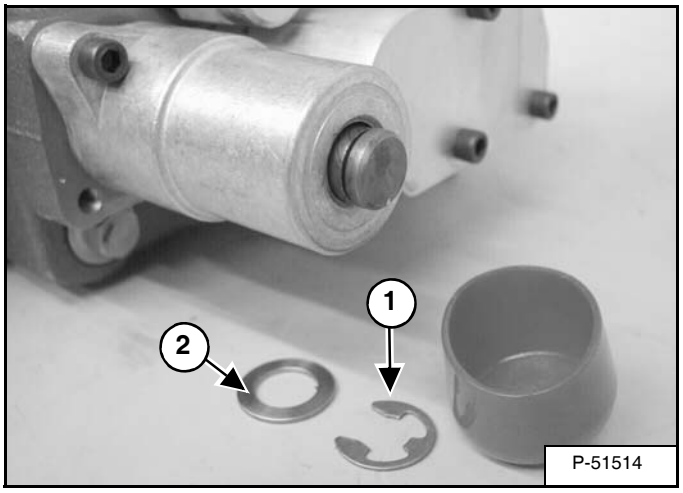
Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-42-51]** from the lift spool.

Figure 20-42-52



Remove the end cap (Item 1) **[Figure 20-42-52]**.

Figure 20-42-53



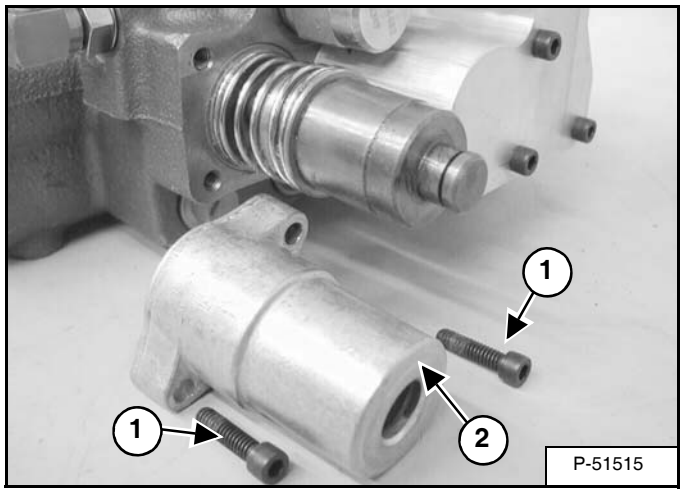
Use a screwdriver to remove the snap ring (Item 1) **[Figure 20-42-53]**.

Remove the washer (Item 2) **[Figure 20-42-53]**.

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Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-54



Remove the screws (Item 1) **[Figure 20-42-54]** from the detent bonnet.

Remove the detent bonnet (Item 2) **[Figure 20-42-54]**.

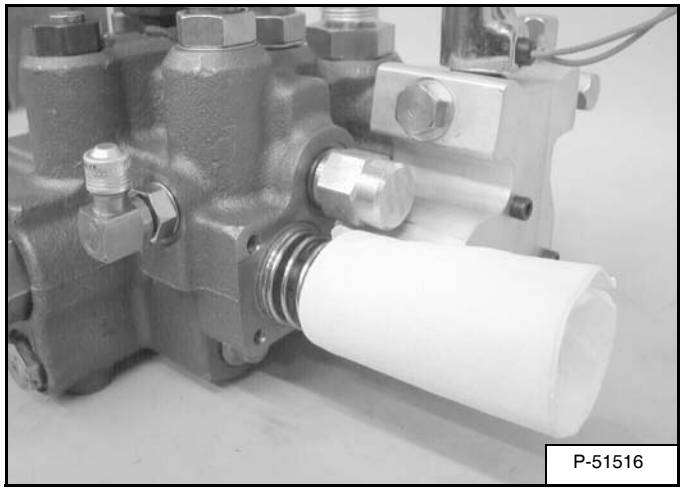
Installation: Lubricate the screws and tighten to 90-100 in.-lb. (10-11,3 N•m) torque.

IMPORTANT

The detent assembly has small springs and balls. Do not lose these parts during disassembly and assembly.

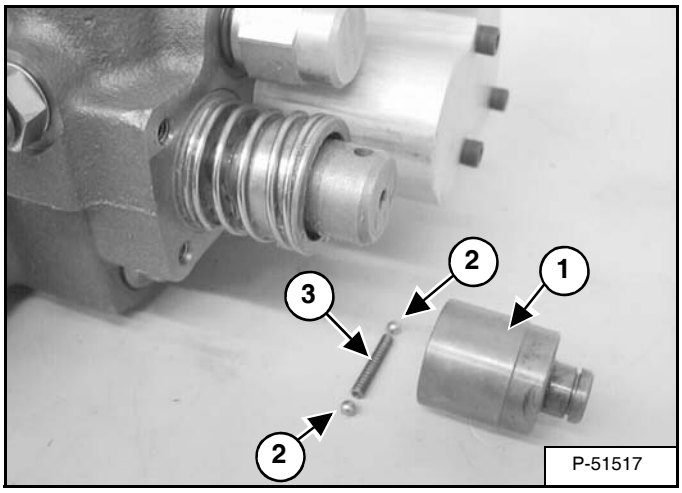
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Figure 20-42-55



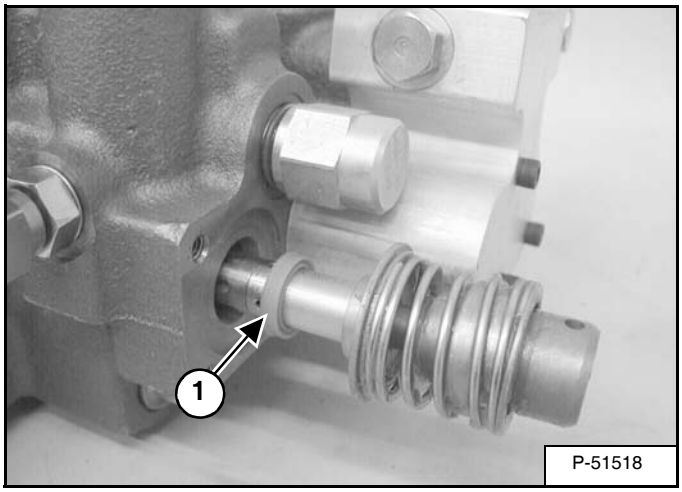
Put a rag around the detent assembly **[Figure 20-42-55]**. This will prevent the detent balls and spring from being lost when the detent sleeve is removed.

Figure 20-42-56



Remove the detent sleeve (Item 1), detent balls (Item 2) and spring (Item 3) **[Figure 20-42-56]**.

Figure 20-42-57

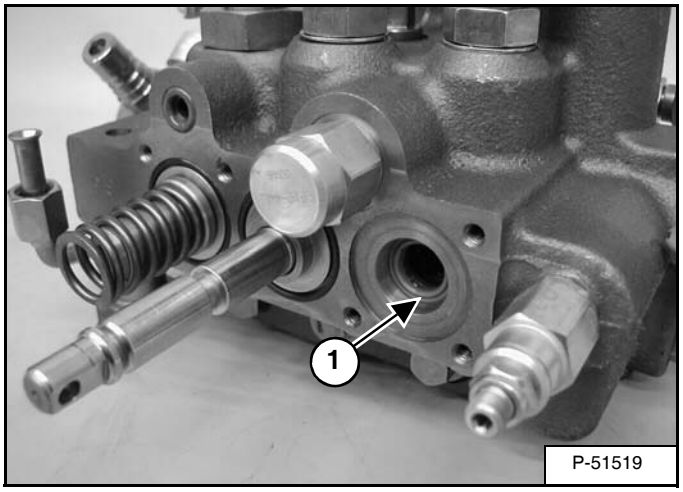


Remove the lift spool assembly and seal (Item 1) **[Figure 20-42-57]** from the control valve.

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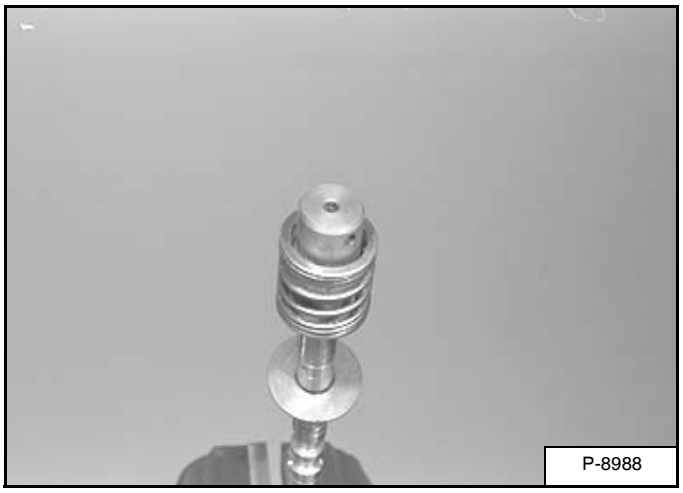
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-58



Remove the lift spool seal (Item 1) **[Figure 20-42-58]** from the linkage end of the valve.

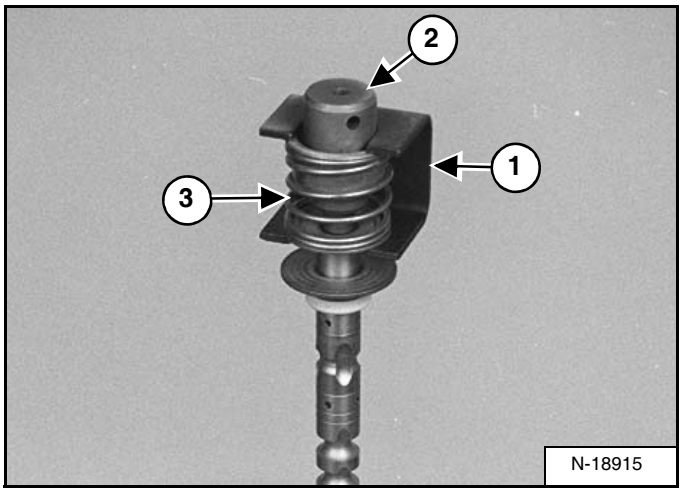
Figure 20-42-59



Clamp the linkage end of the spool in a vise **[Figure 20-42-59]**.

NOTE: Protect spool before clamping in vise.

Figure 20-42-60

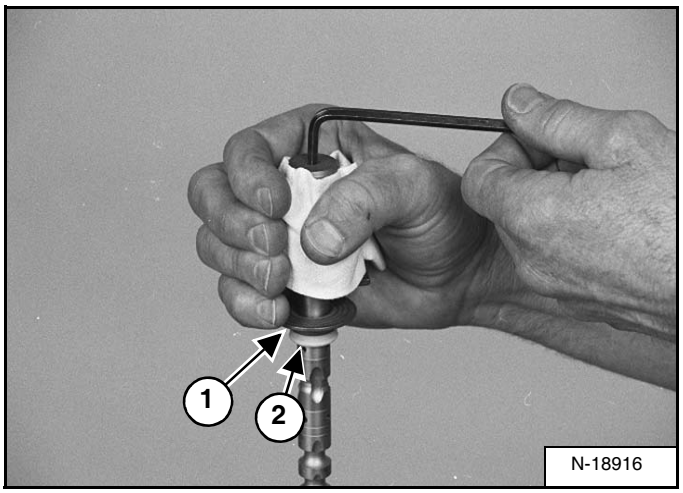


Install the spring tool (Item 1) **[Figure 20-42-60]** over the centering spring.

NOTE: Be careful when removing the detent adapter (Item 2) [Figure 20-42-60] from the centering spring, as it is under spring pressure.

NOTE: The centering spring (Item 3) [Figure 20-42-60] is white on all 700 series loaders.

Figure 20-42-61



Put a rag around the detent assembly **[Figure 20-42-61]**. This will prevent the detent balls and spring from being lost when the detent adapter is removed.

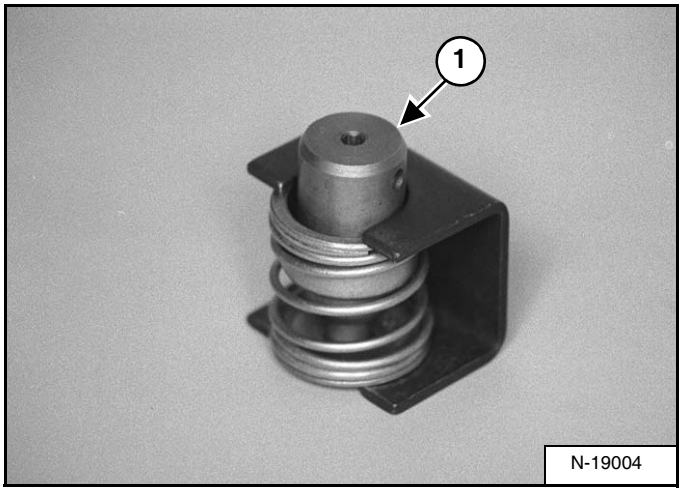
Remove the detent adapter with an Alan wrench.

Remove the back-up washer (Item 1) and spool seal (Item 2) **[Figure 20-42-61]**.

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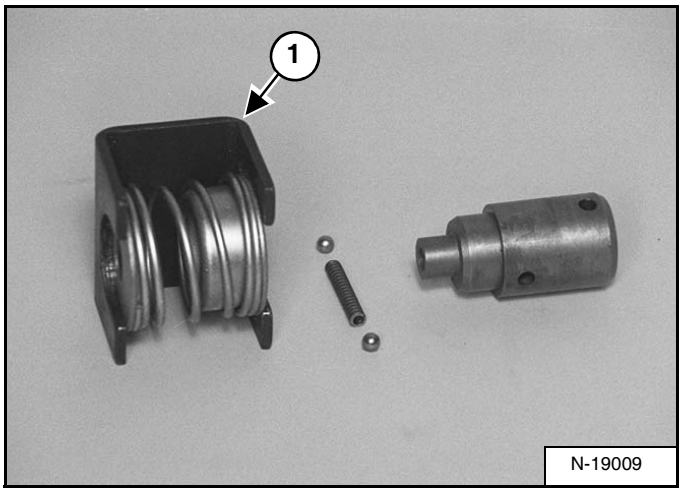
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-62



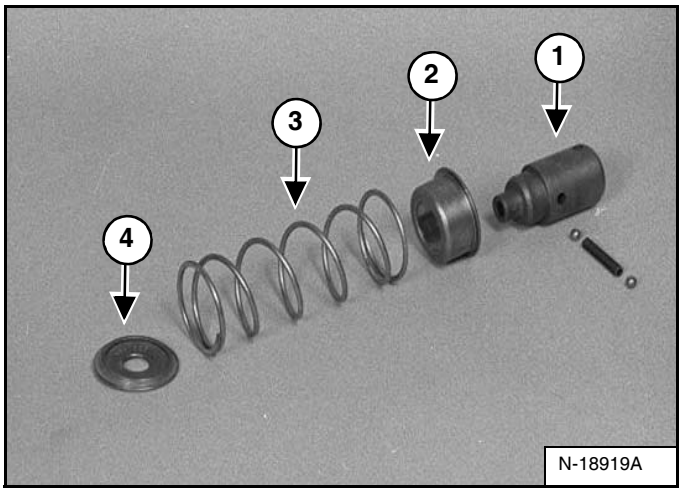
Remove the detent adapter (Item 1) **[Figure 20-42-62]** from the spring assembly.

Figure 20-42-63



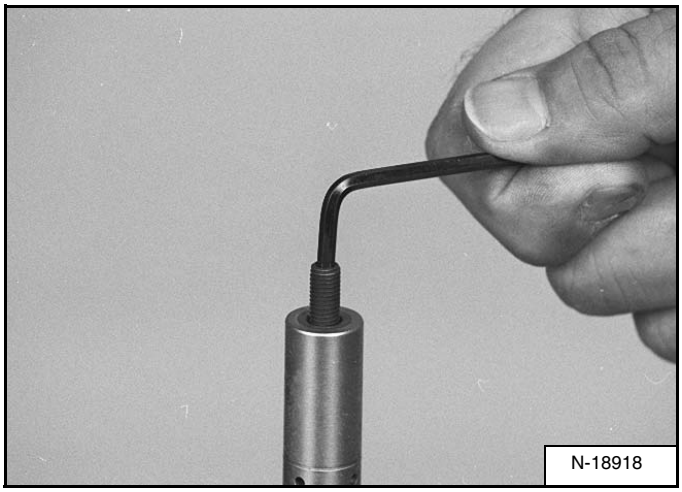
Remove spring tool (Item 1) **[Figure 20-42-63]** from the spring assembly.

Figure 20-42-64



Inspect the adapter (Item 1), collar (Item 2), spring (Item 3) and washer (Item 4) **[Figure 20-42-64]**.

Figure 20-42-65

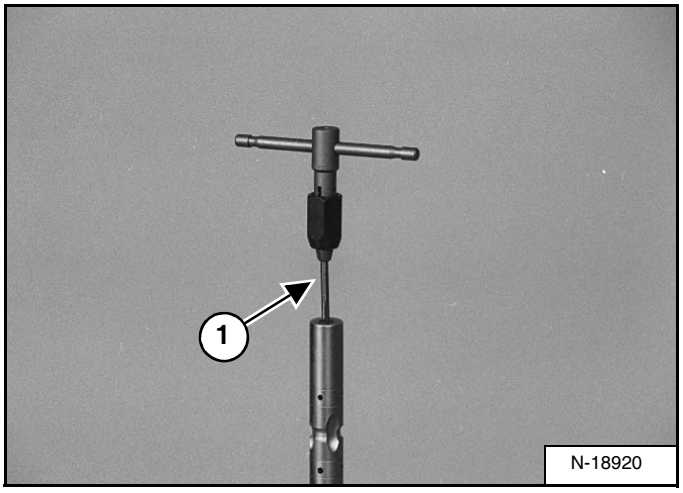


Remove the stud from the end of the spool **[Figure 20-42-65]**.

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Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-66



Removal of the plastic plug:

Make a center point in the plug using a 1/16 inch drill.

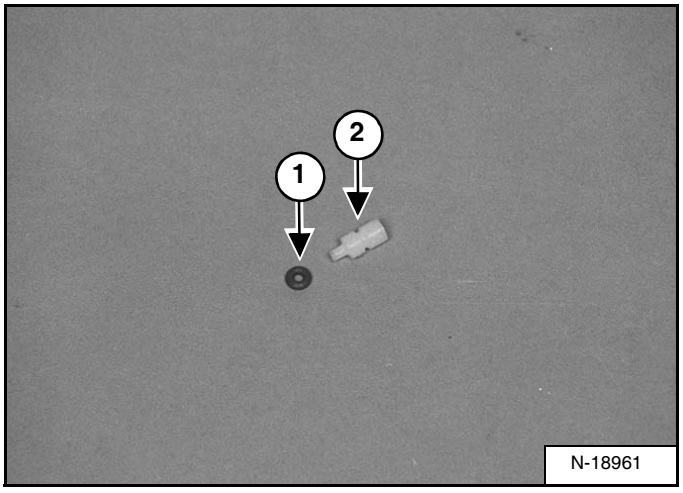
Drill a hole all the way through the plug using a 7/64 inch tap drill

Turn a 6-32 tap (Item 1) **[Figure 20-42-66]** into the plug. Pull the tap and plug out of the spool. Be careful, do not break the tap.

Clean all the debris from inside the spool bore.

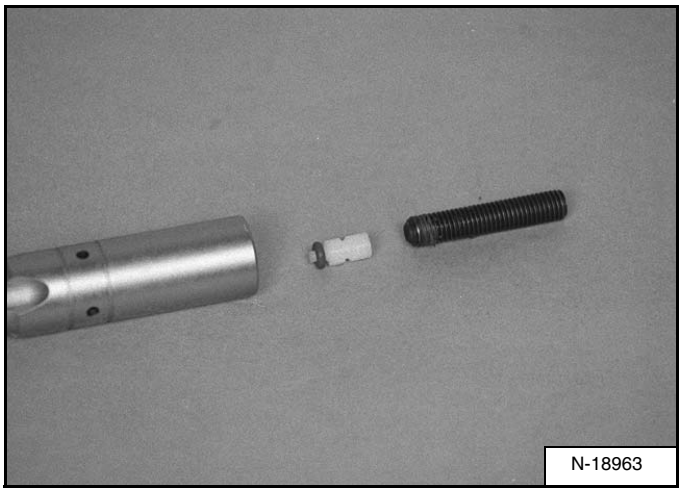
NOTE: DO NOT USE LOCTITE ON THE STUD THREADS.

Figure 20-42-67



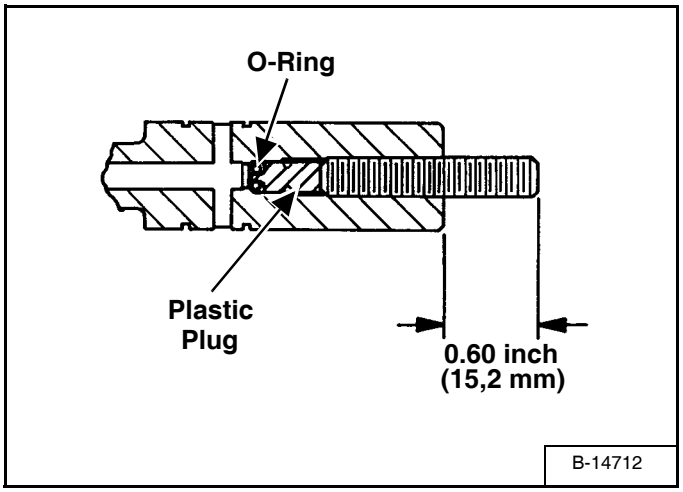
Install the O-ring (Item 1) over the nipple on the plastic plug (Item 2) **[Figure 20-42-67]**.

Figure 20-42-68



Install the plastic plug and O-ring in the spool **[Figure 20-42-68]**.

Figure 20-42-69

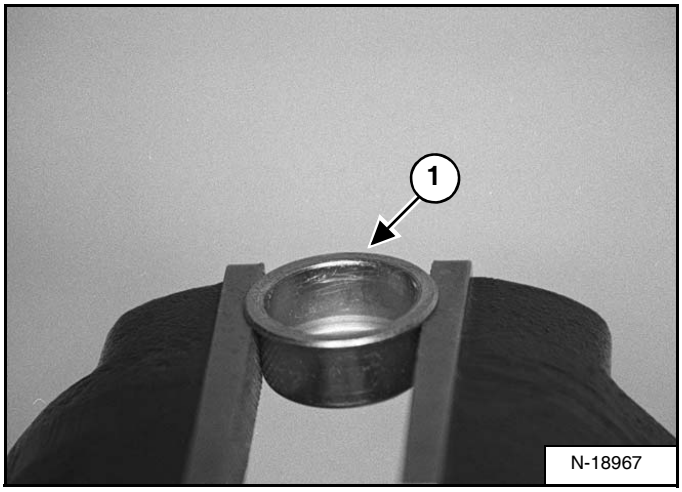


Install the stud and tighten until the other end of the stud is out about 0.600 inch (15,2 mm) from the spool **[Figure 20-42-69]**.

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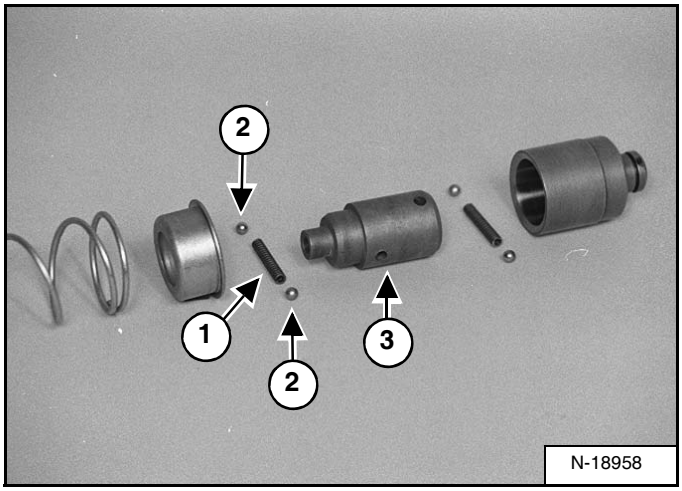
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-70



Clamp the collar (Item 1) **[Figure 20-42-70]** in a vice.

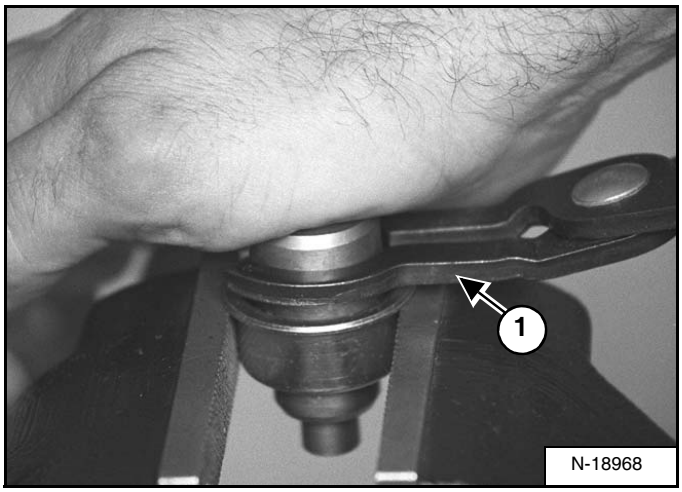
Figure 20-42-71



Apply grease on all the detent component surfaces before assembly **[Figure 20-42-71]**.

Install the spring (Item 1) and detent balls (Item 2) into the adapter (Item 3) **[Figure 20-42-71]** and compress with the detent pliers (Item 1) **[Figure 20-42-72]**.

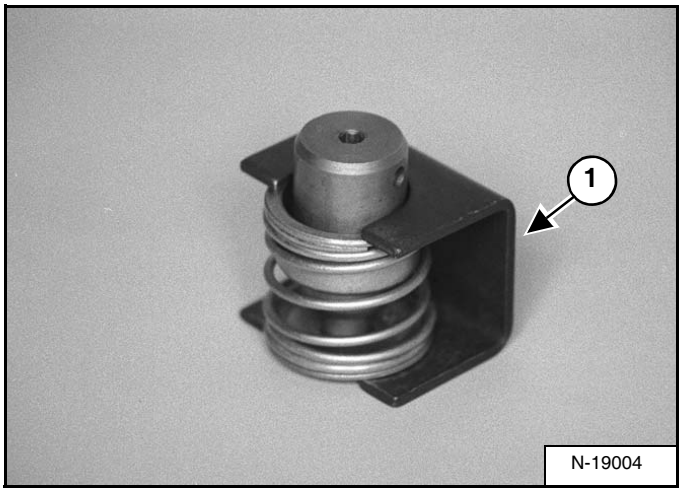
Figure 20-42-72



Install the detent adapter to the collar **[Figure 20-42-72]**.

NOTE: The collar and the detent adapter are held together by spring pressure when assembled to the lift spool not the detent balls. Hold the detent adapter and collar together to prevent the detent balls and spring from falling out.

Figure 20-42-73

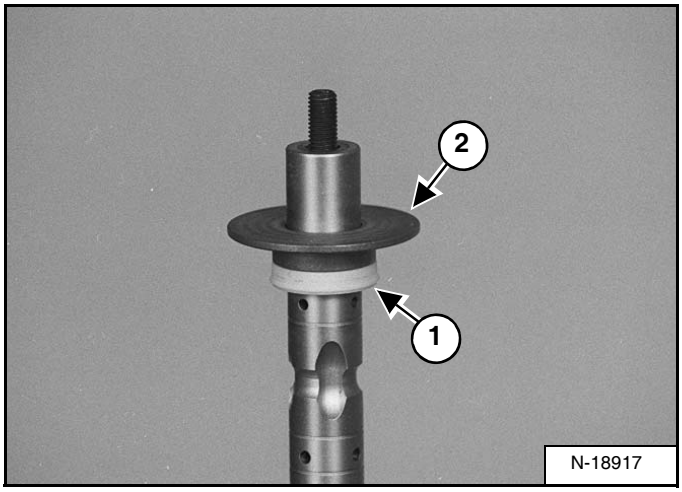


Install the spring tool (Item 1) **[Figure 20-42-73]** over the washer, spring, collar and detent adapter.

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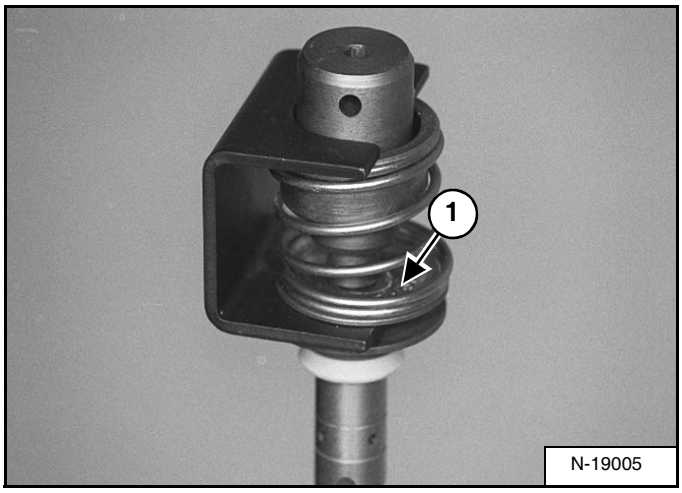
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-74



Install the spool seal (Item 1) and back-up washer (Item 2) **[Figure 20-42-74]**.

Figure 20-42-75



Install the spring assembly to the lift spool hand tight **[Figure 20-42-75]**.

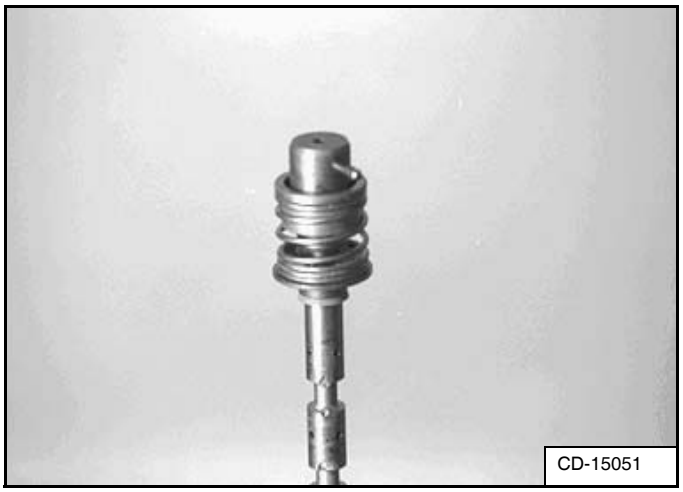
Remove the spring tool.

Check the alignment of the detent adapter and the washer.

Tighten the adapter to 90-100 in.-lb. (10,2-11,3 N•m).

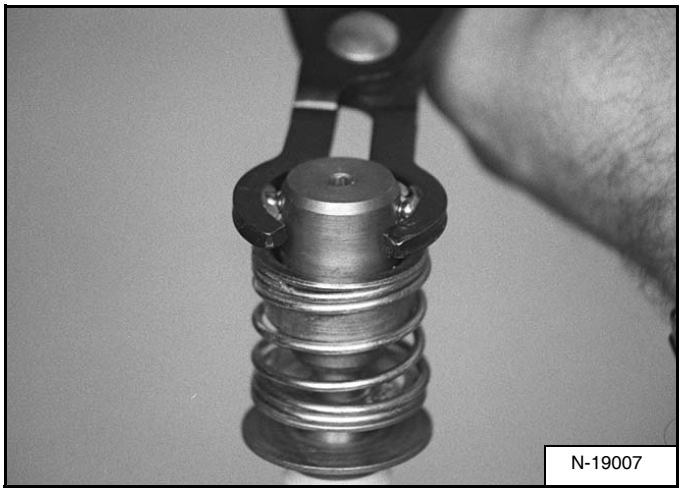
NOTE: The adapter must fit in the center of the washer (Item 1) [Figure 20-42-75].

Figure 20-42-76



Install the detent balls and spring **[Figure 20-42-76]**.

Figure 20-42-77

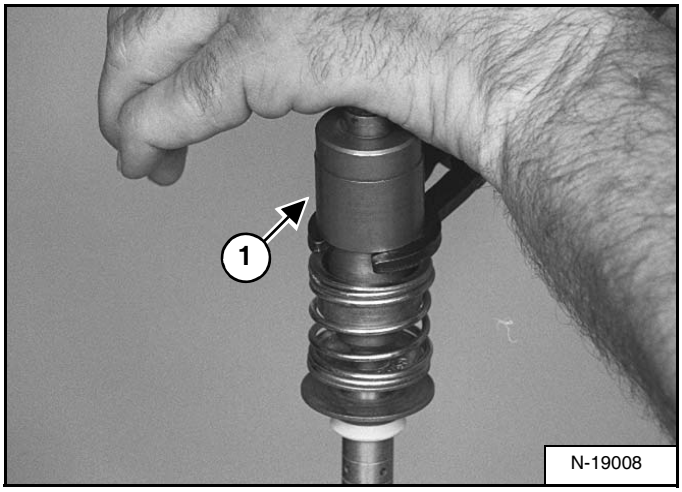


Hold the detent balls in place with the detent pliers **[Figure 20-42-77]**.

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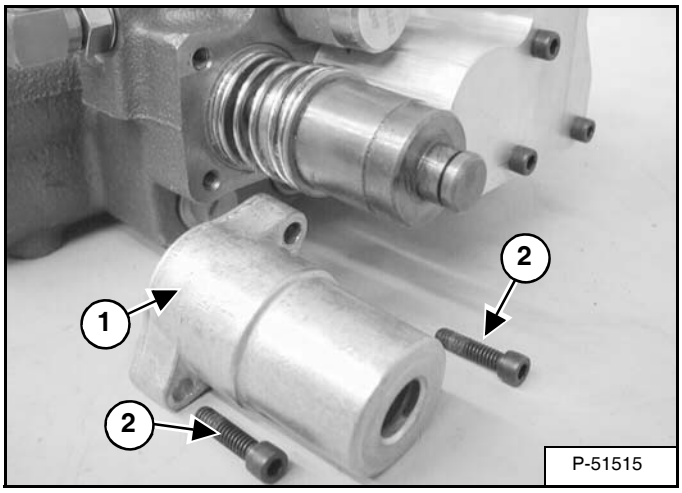
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-78



Install the detent sleeve (Item 1) **[Figure 20-42-78]** to the detent adapter.

Figure 20-42-79



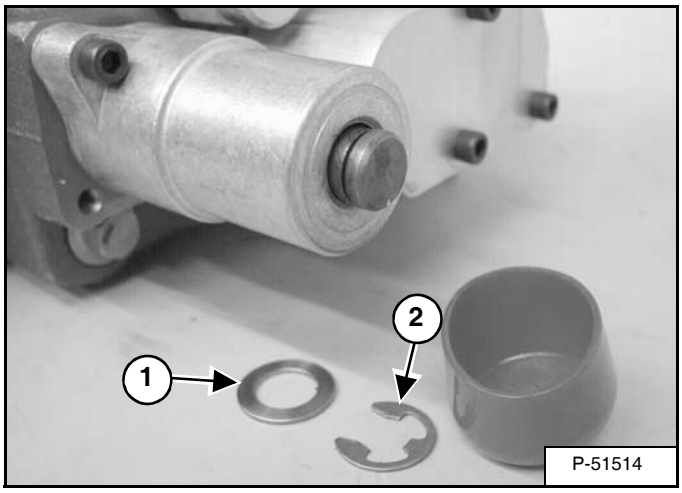
Install the lift spool assembly in the spool bore **[Figure 20-42-79]**.

Install the detent bonnet (Item 1) **[Figure 20-42-79]**.

Install the mounting screws (Item 2) **[Figure 20-42-79]**.

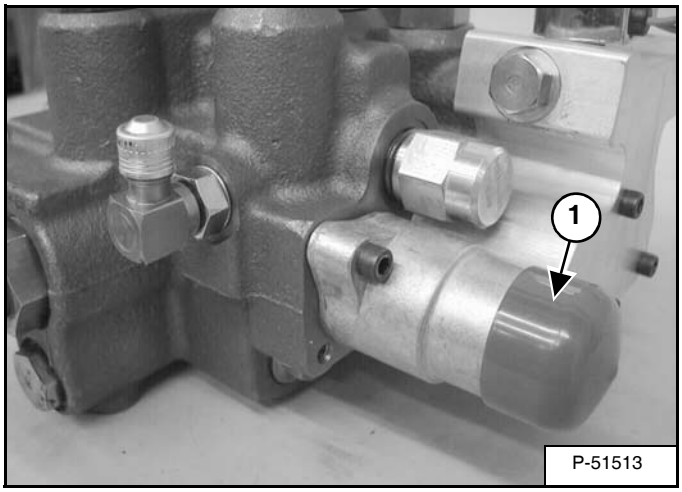
Installation: Lubricate the screws and tighten to 90-100 in.-lb. (10-11,3 N•m) torque.

Figure 20-42-80



Install the washer (Item 1) and snap ring (Item 2) **[Figure 20-42-80]**.

Figure 20-42-81

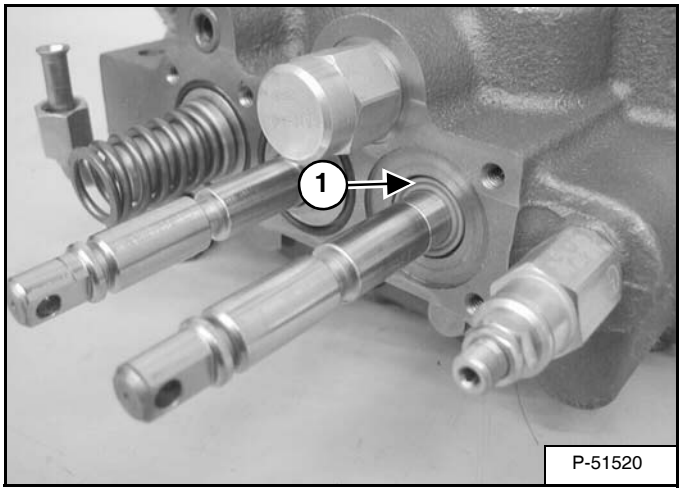


Install the end cap (Item 1) **[Figure 20-42-81]**.

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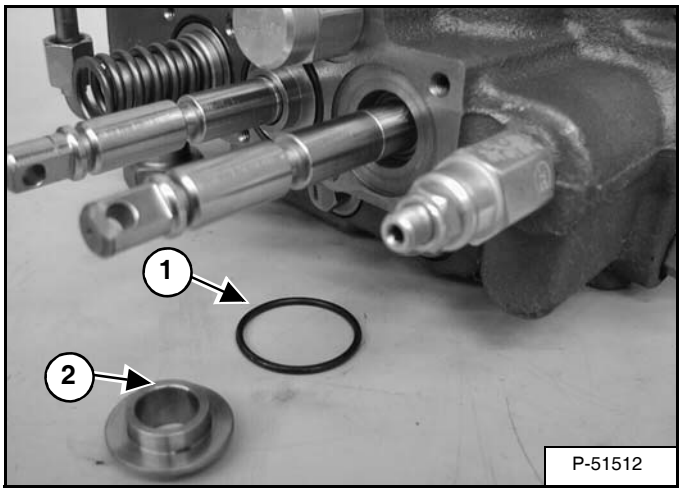
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-82



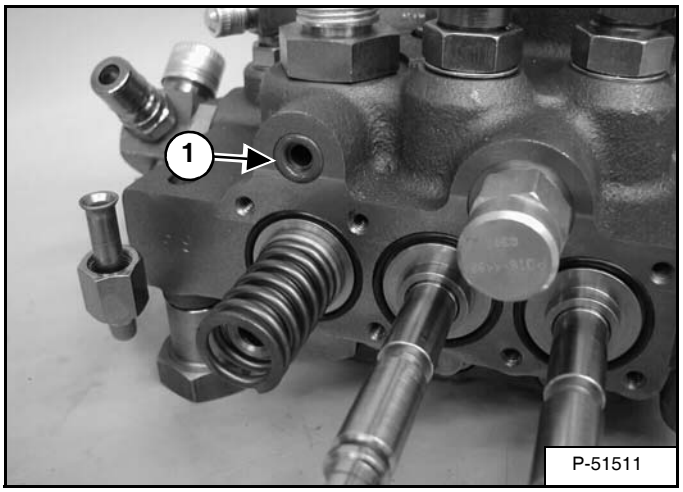
Install the spool seal (Item 1) **[Figure 20-42-82]** on the linkage end of the valve.

Figure 20-42-83



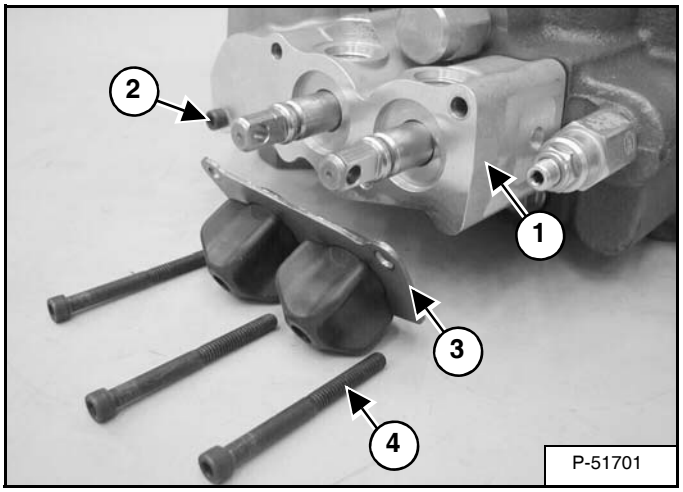
Install the O-ring (Item 1) and bushing (Item 2) **[Figure 20-42-83]** on the lift spool.

Figure 20-42-84



Install the O-ring (Item 1) **[Figure 20-42-84]** on the control valve.

Figure 20-42-85



Install the end cap/spool lock block (Item 1) and the mount bolt (Item 2) **[Figure 20-42-85]**.

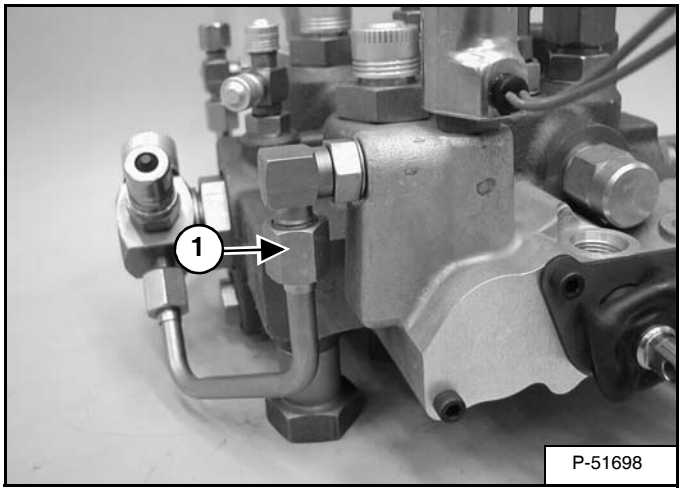
Install the lift and tilt spool rubber boots and mount plate (Item 3) and install the three mounting screws (Item 4) **[Figure 20-42-85]**.

Installation: Tighten the screws to 90-100 in.-lb. (10-11,3 N•m) torque.

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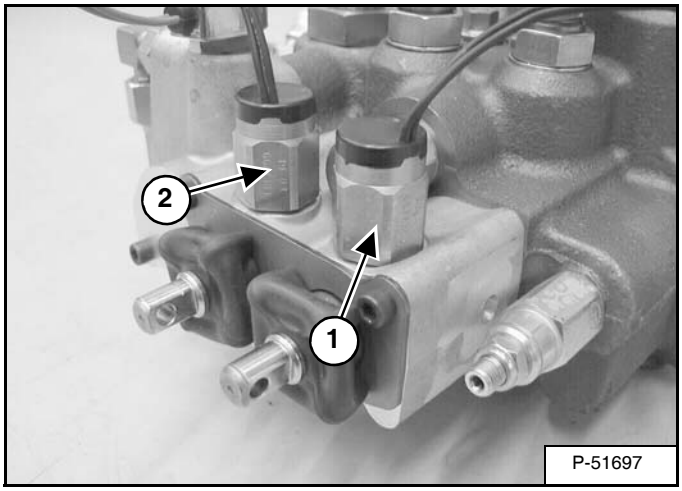
Lift Spool and Detent Removal and Installation (Cont'd)

Figure 20-42-86



Connect the tubeline (Item 1) **[Figure 20-42-86]**.

Figure 20-42-87



Use an Ohm meter to measure the lock solenoid coils resistance.

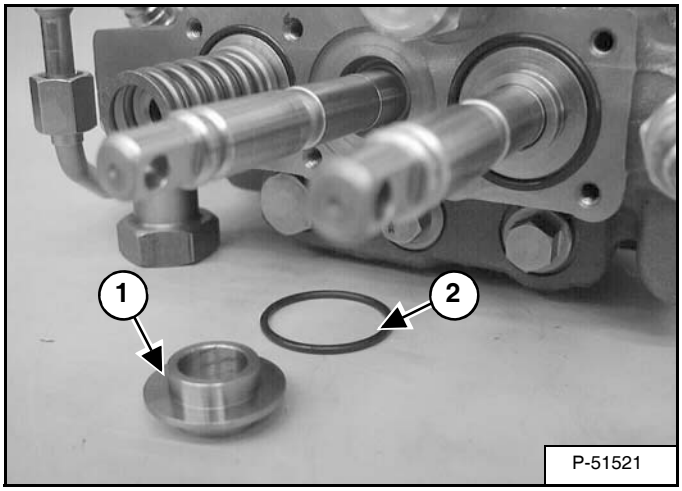
The correct resistance for the coil is **5.5 ± .28 Ohms**.

Installation: Install the lift spool (Item 1) and tilt spool (Item 2) **[Figure 20-42-87]** lock solenoids and tighten to 35-45 ft.-lb. (52-61 N•m) torque.

Tilt Spool Removal and Installation

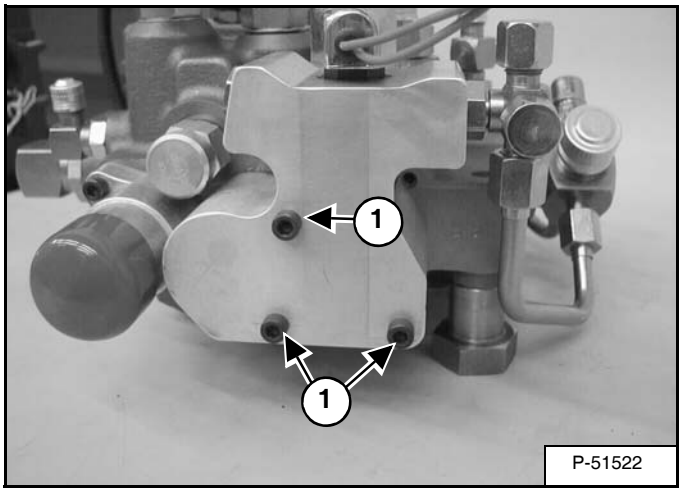
Remove the lift and tilt end cap/spool lock block. (See End Cap/Spool Lock Block Removal and Installation on Page 20-40-14.)

Figure 20-42-88



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-42-88]** from the tilt spool.

Figure 20-42-89



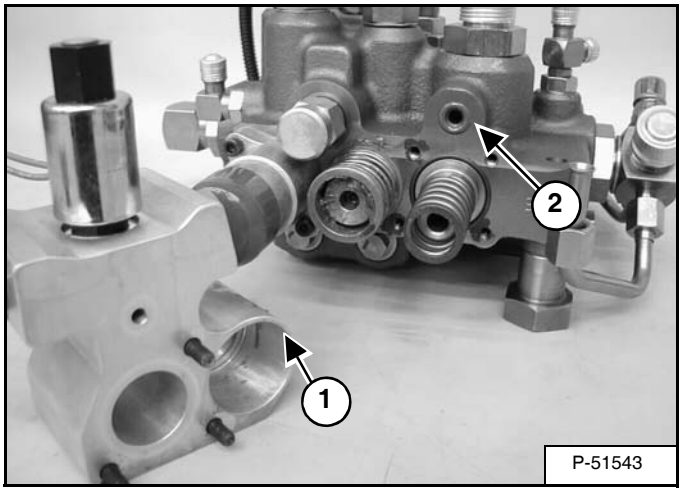
Remove the three screws (Item 1) **[Figure 20-42-89]** from the spool centering block.

Installation: Tighten the bolt to 90-100 in.-lb. (10-11,3 N•m) torque.

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Tilt Spool Removal And Installation (Cont'd)

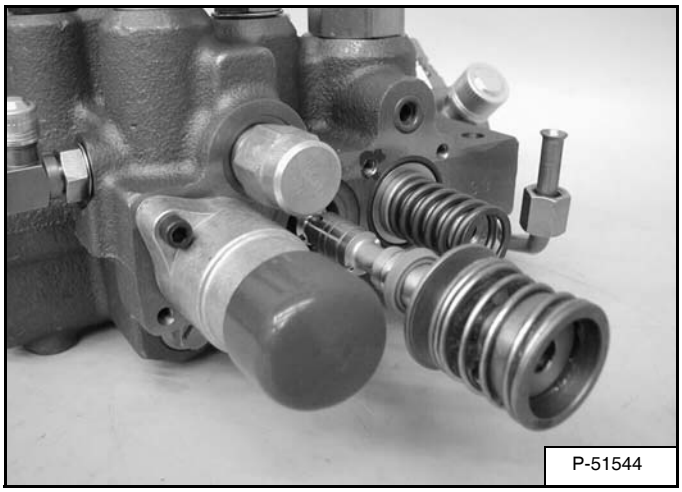
Figure 20-42-90



Remove the spool centering block (Item 1) **[Figure 20-42-90]** from the control valve.

Check and replace the O-ring (Item 2) **[Figure 20-42-90]** before replacing the spool centering block.

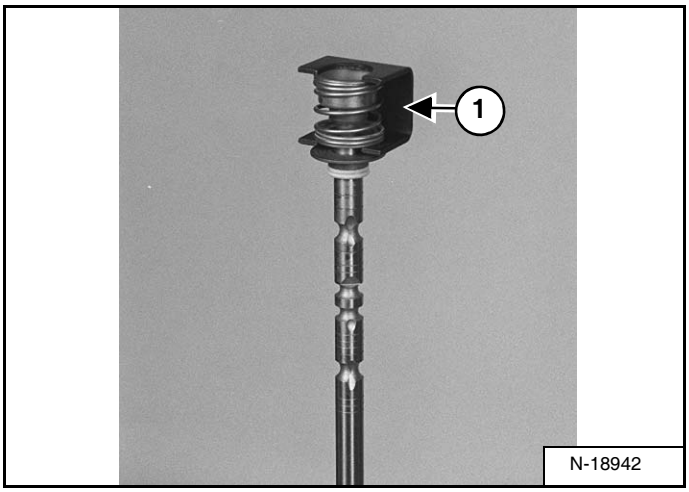
Figure 20-42-91



Remove the tilt spool, centering spring, back-up washer and spool seal **[Figure 20-42-91]**.

Assembly: Always use a new spool seal.

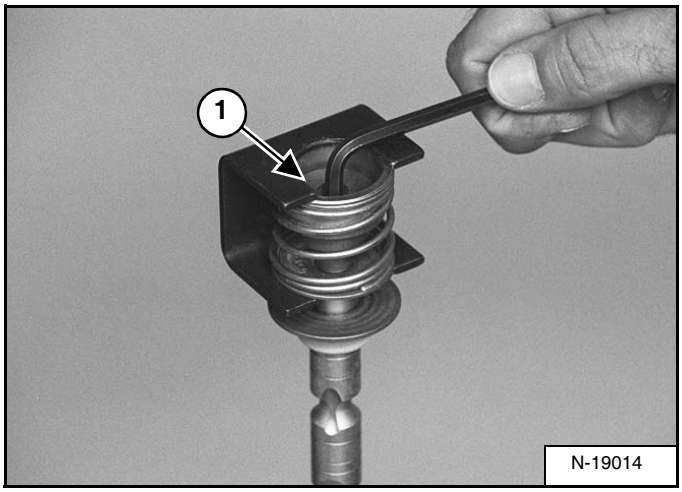
Figure 20-42-92



Put the linkage end of the spool in the vice **[Figure 20-42-92]**.

Install the spool tool (Item 1) **[Figure 20-42-92]** over the centering spring.

Figure 20-42-93



Remove the bolt (Item 1) **[Figure 20-42-93]** holding the centering spring to the spool.

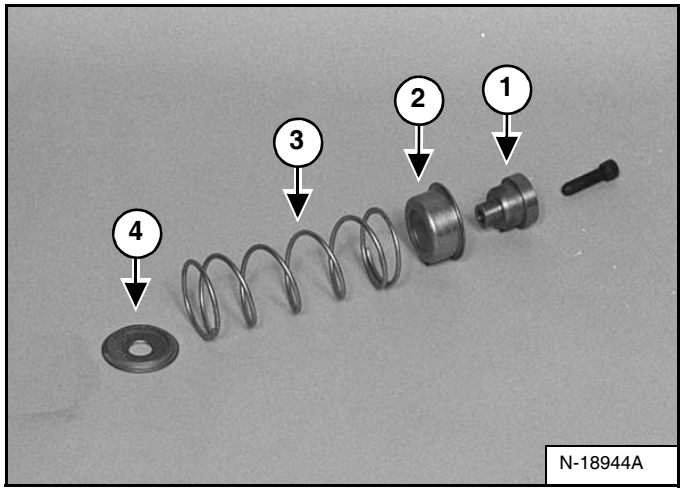
Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Remove spring tool from the spring assembly.

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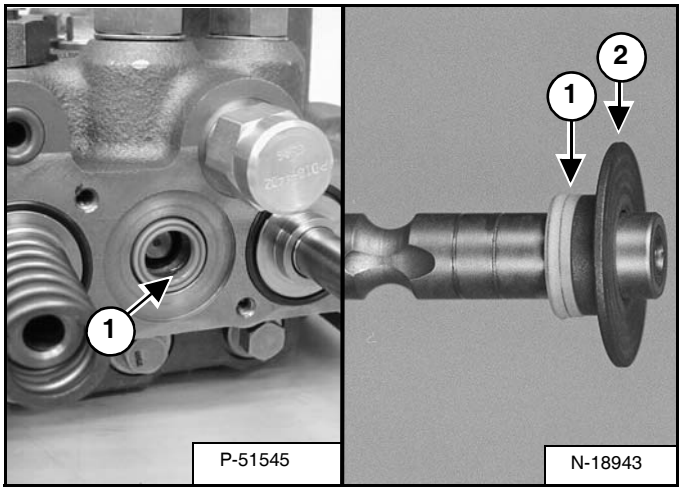
Tilt Spool Removal And Installation (Cont'd)

Figure 20-42-94



Inspect the adapter (Item 1), collar (Item 2), spring (Item 3) and washer (Item 4) **[Figure 20-42-94]**.

Figure 20-42-95

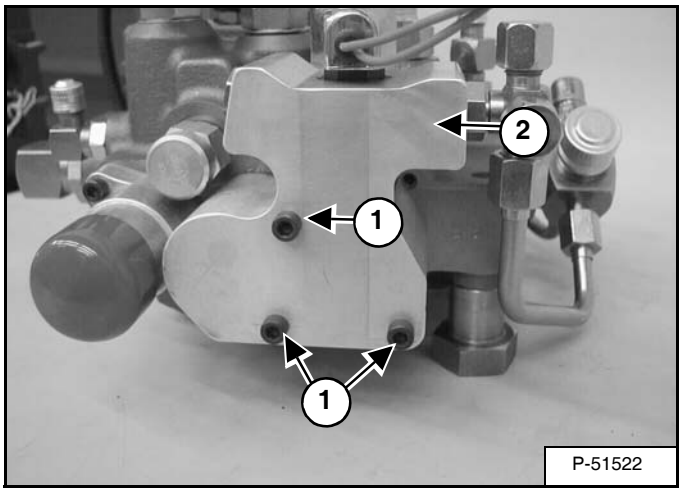


Remove the spool seal(s) (Item 1) **[Figure 20-42-95]** and the back-up washer (Item 2) **[Figure 20-42-95]**.

Assembly: Always use a new spool seal.

Auxiliary Spool Removal And Installation

Figure 20-42-96

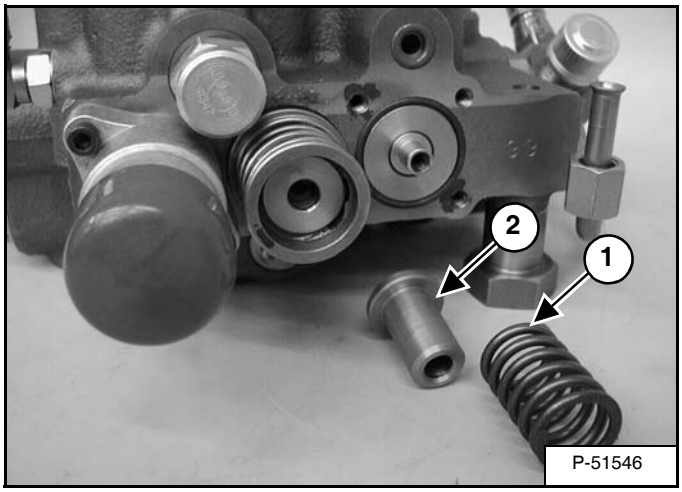


Remove the three screws (Item 1) **[Figure 20-42-96]** from the spool centering block.

Installation: Tighten the bolt to 90-100 in.-lb. (10-11,3 N•m) torque.

Remove the spool centering block (Item 2) **[Figure 20-42-96]** from the control valve.

Figure 20-42-97



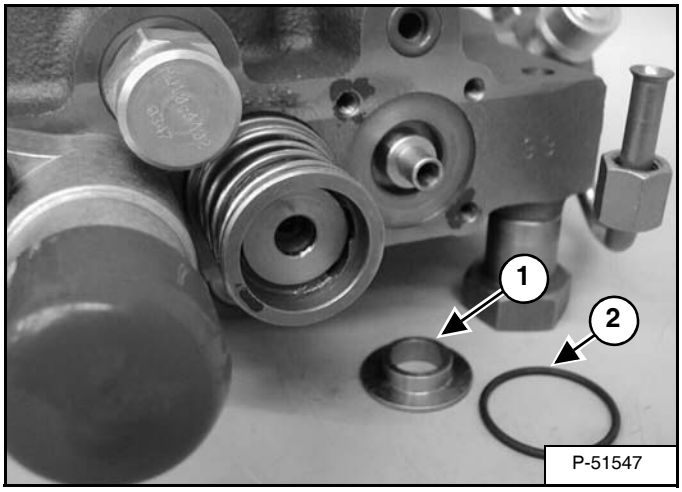
Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-42-97]** from the auxiliary spool.

Note: If the centering spring retainer (Item 2) [Figure 20-42-97] must be replaced, replace the retainer on the opposite end also.

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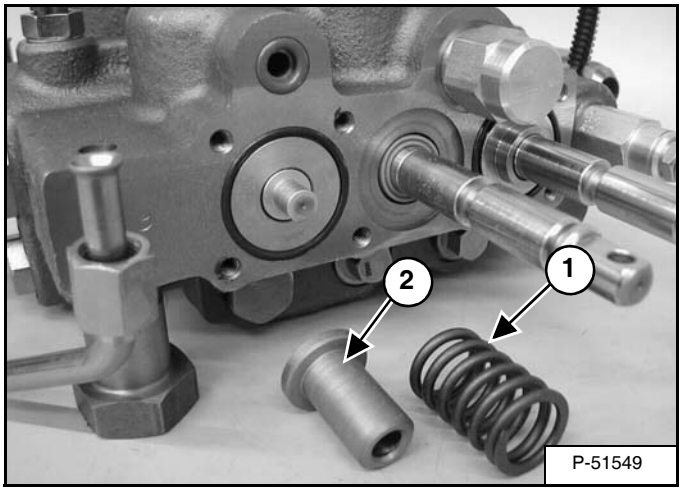
Auxiliary Spool Removal And Installation (Cont'd)

Figure 20-42-98



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-42-98]** from the auxiliary spool.

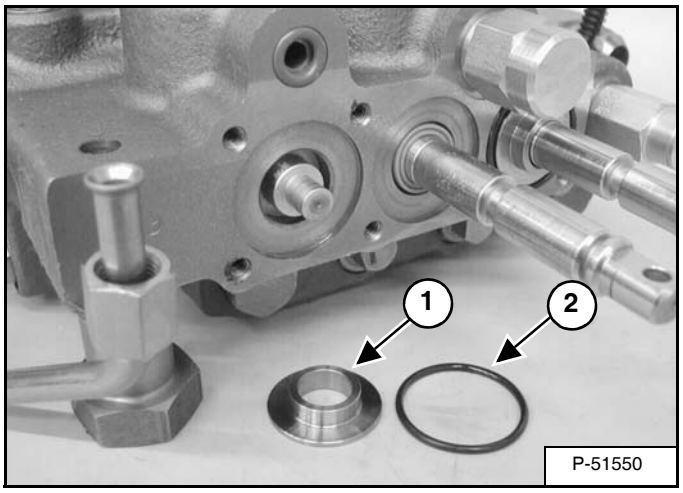
Figure 20-42-99



Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-42-99]** from the auxiliary spool.

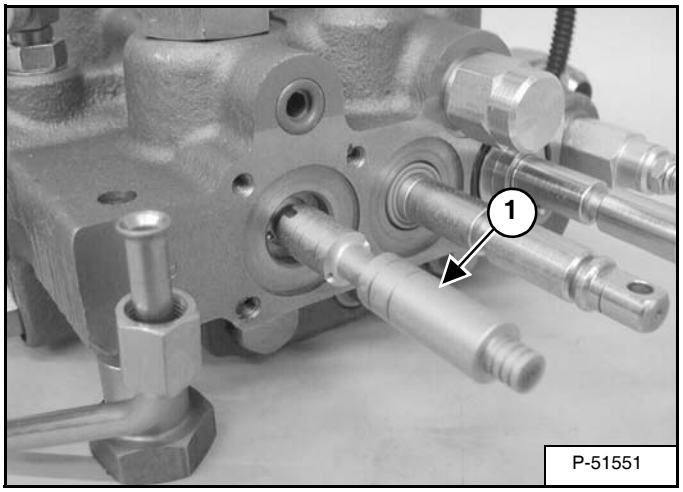
NOTE: If the centering spring retainer (Item 2) [Figure 20-42-99] must be replaced, replace the retainer on the opposite end also.

Figure 20-42-100



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-42-100]** from the auxiliary spool.

Figure 20-42-101

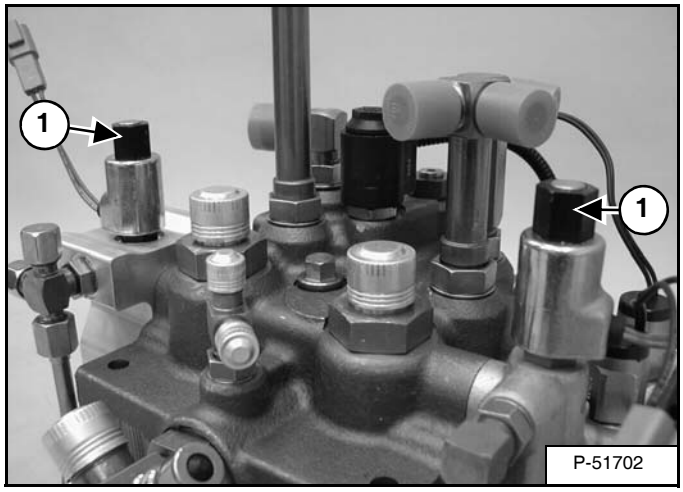


Remove the spool (Item 1) **[Figure 20-42-101]**.

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Auxiliary Solenoid Disassembly and Assembly

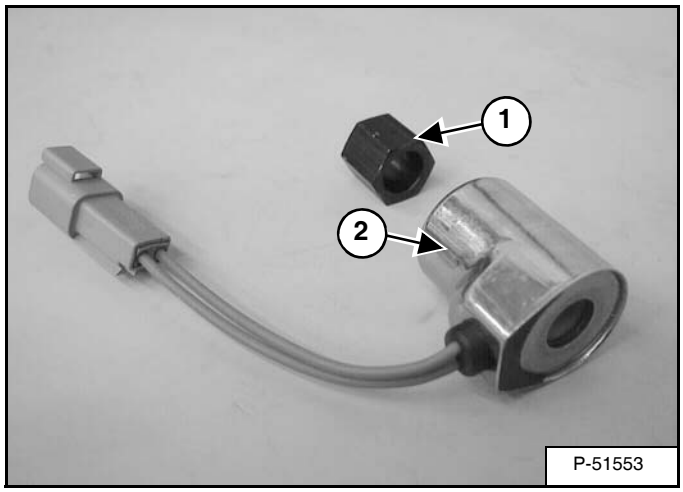
Figure 20-42-102



Remove the nut (Item 1) **[Figure 20-42-102]** from both solenoids.

Installation: Tighten the nut to 48-72 in.-lb. (5-8 N•m) torque.

Figure 20-42-103

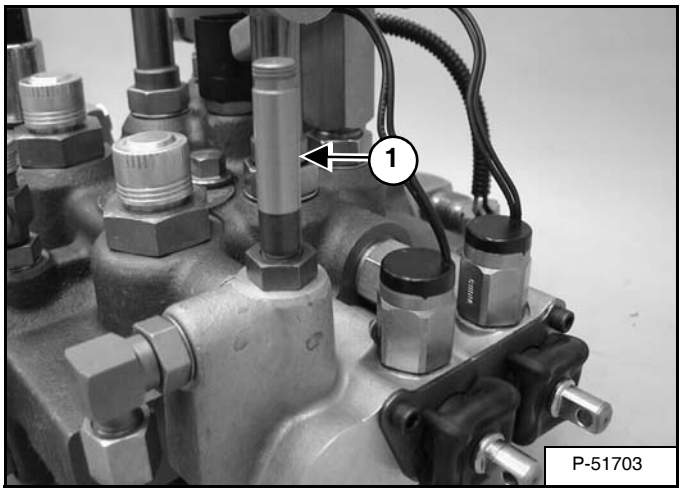


Remove the nut (Item 1) and solenoid coil (Item 2) **[Figure 20-42-103]**.

Use an Ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is **4.9 ± .25 Ohms**.

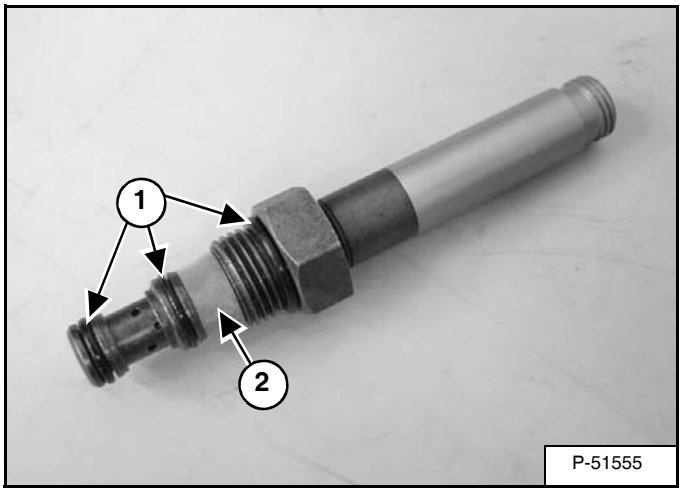
Figure 20-42-104



Remove the solenoid stem (Item 1) **[Figure 20-42-104]**.

Installation: Tighten the stem to 10-14 ft.-lb. (14-19 N•m) torque.

Figure 20-42-105



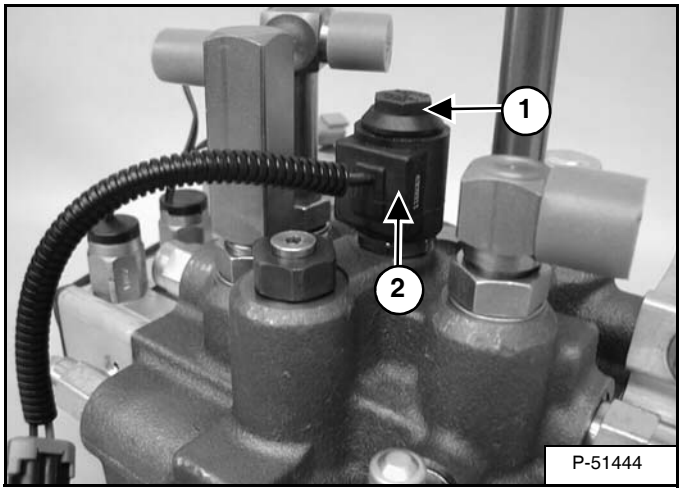
Remove the O-rings (Item 1) **[Figure 20-42-105]** from the solenoid stem.

Check and clean the screen (Item 2) **[Figure 20-42-105]**.

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BICS™ Valve Solenoid Disassembly And Assembly

Figure 20-42-106

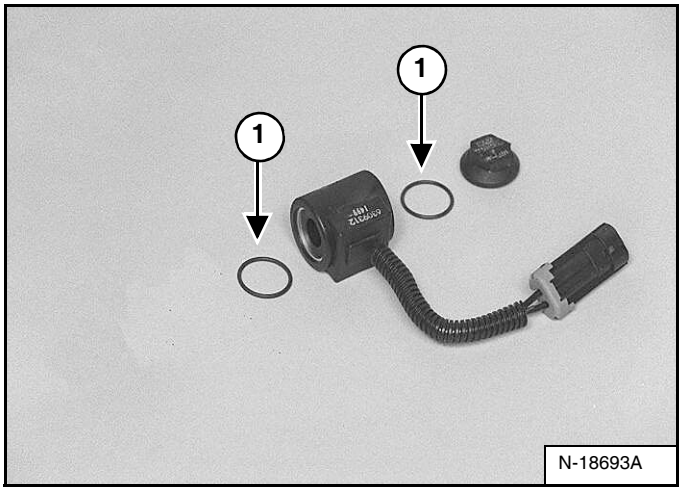


Remove the nut (Item 1) **[Figure 20-42-106]** from the solenoid stem.

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

Remove the solenoid coil (Item 2) **[Figure 20-42-106]**.

Figure 20-42-107

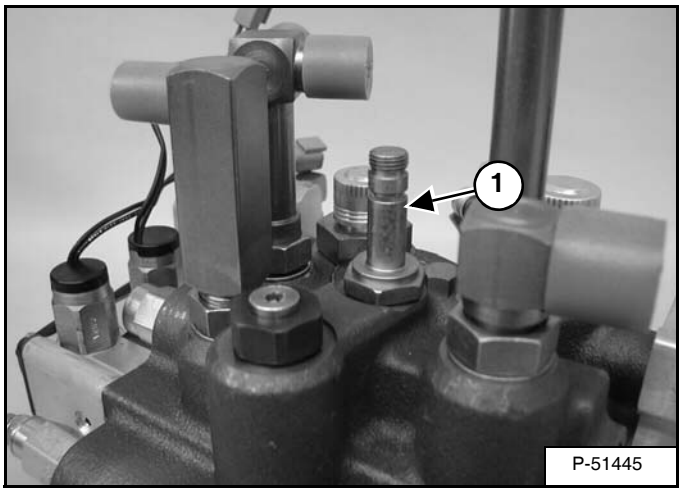


Remove the O-rings (Item 1) **[Figure 20-42-107]** from both ends of the solenoid coil.

Use an Ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is **9.79 ± .29 Ohms**.

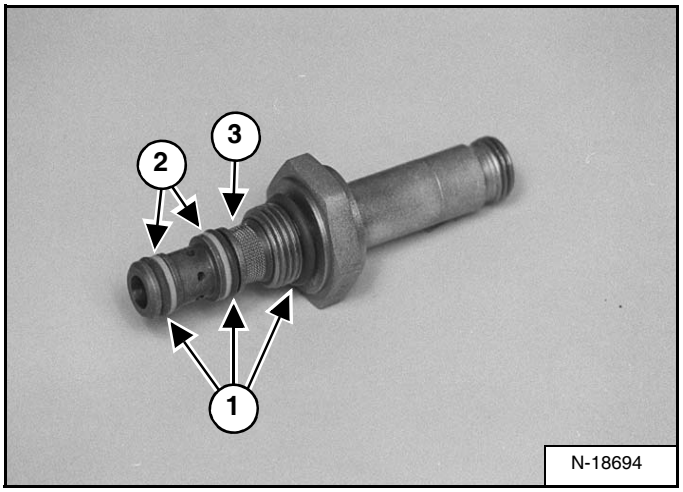
Figure 20-42-108



Remove the solenoid stem (Item 1) **[Figure 20-42-108]**.

Installation: Lubricate the O-rings and tighten the stem to 20-24 ft.-lb. (27-33 N•m) torque.

Figure 20-42-109



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-42-109]** from the cartridge.

Clean all parts in solvent and dry with compressed air.

Inspect all parts for wear and replace any showing excessive wear.

NOTE: The screen (Item 3) [Figure 20-42-109] may be cleaned with solvent. If it is torn or worn it needs to be replaced.

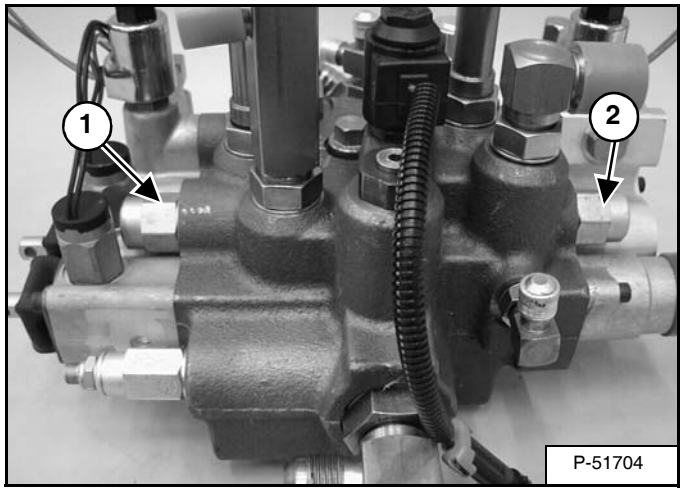
Use only new O-rings and apply oil to all O-rings and back-up rings before installation.

Install new O-rings (Item 1) **[Figure 20-42-107]** & **[Figure 20-42-109]** and new back-up rings (Item 2) **[Figure 20-42-109]** on the solenoid stem.

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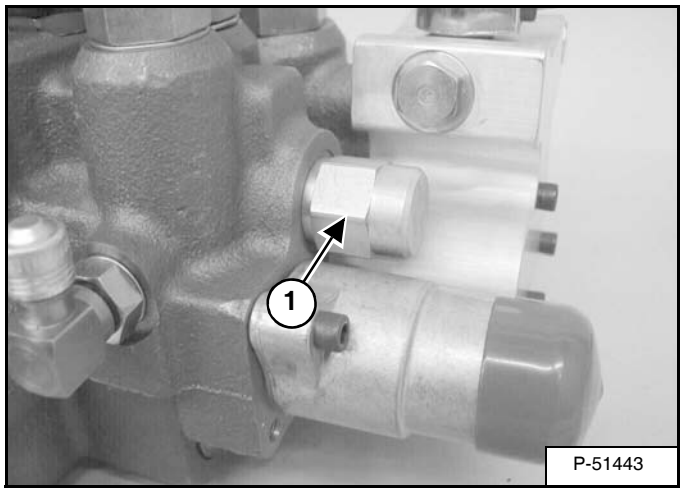
BICS™ Valve, Lock Valve Removal And Installation

Figure 20-42-110



Locate the two BICS™ lock valves, (Item 1) is for the tilt circuit and (Item 2) **[Figure 20-42-110]** is for the lift circuit.

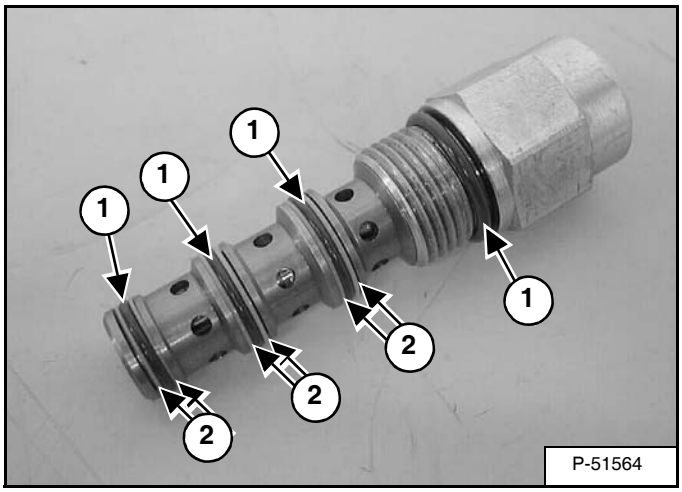
Figure 20-42-111



Remove the lift lock valve (Item 1) **[Figure 20-42-111]** from the back of the control valve.

Installation: Lightly lubricate the lock valve o-rings and tighten to 20-24 ft.-lb. (27-33 N•m) torque.

Figure 20-42-112

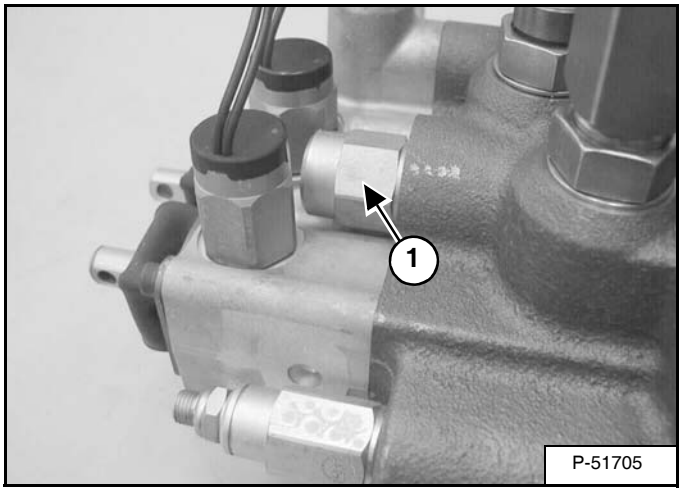


Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-42-112]** from the lift lock valve, and replace with new.

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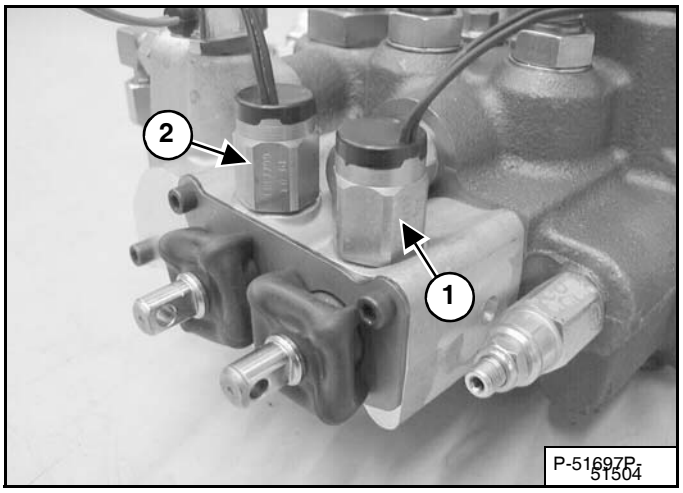
BICS™ Valve, Lock Valve Removal And Installation (Cont'd)

Figure 20-42-113



Locate the tilt circuit lock valve (Item 1) **[Figure 20-42-113]**.

Figure 20-42-114

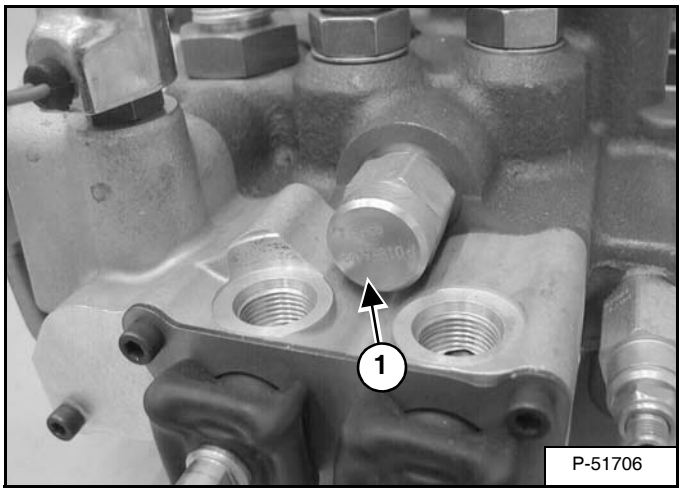


Remove the lift spool lock solenoid (Item 1) **[Figure 20-42-114]**.

Remove the tilt spool lock solenoid (Item 2) **[Figure 20-42-114]**.

Installation: Lubricate the O-rings and tighten the spool lock solenoids to 38-45 ft.-lb. (52-61 N•m) torque.

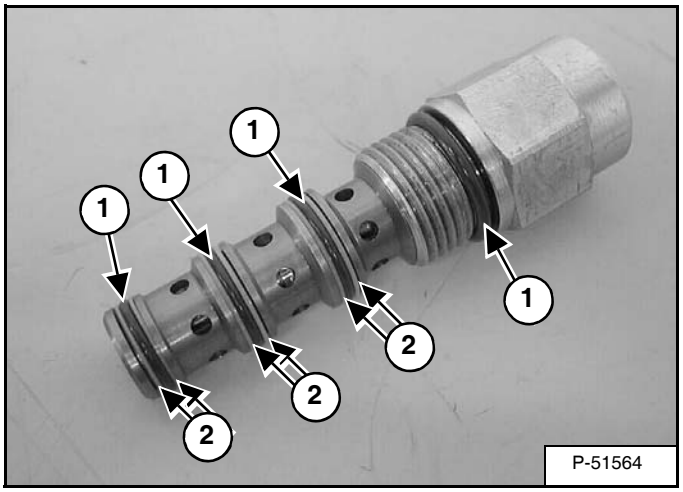
Figure 20-42-115



Remove the tilt lock valve (Item 1) **[Figure 20-42-115]** from the front of the control valve.

Installation: Lightly lubricate the lock valve o-rings and tighten to 20-24 ft.-lb. (27-33 N•m) torque.

Figure 20-42-116

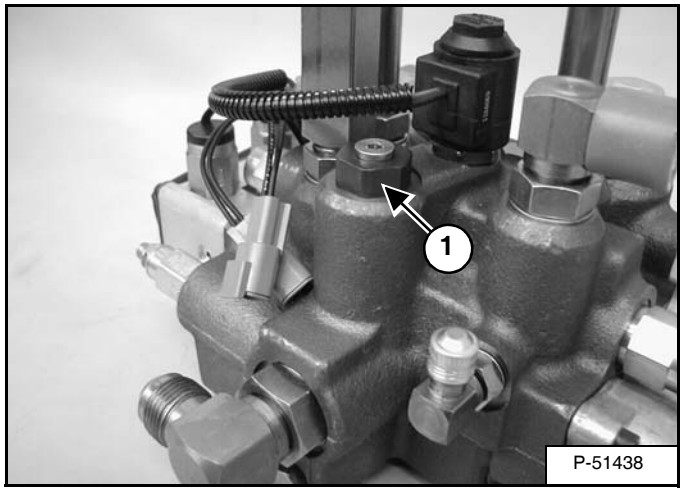


Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-42-116]** from the tilt lock valve, and replace with new.

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BICS™ Valve, Check Valve Removal And Installation

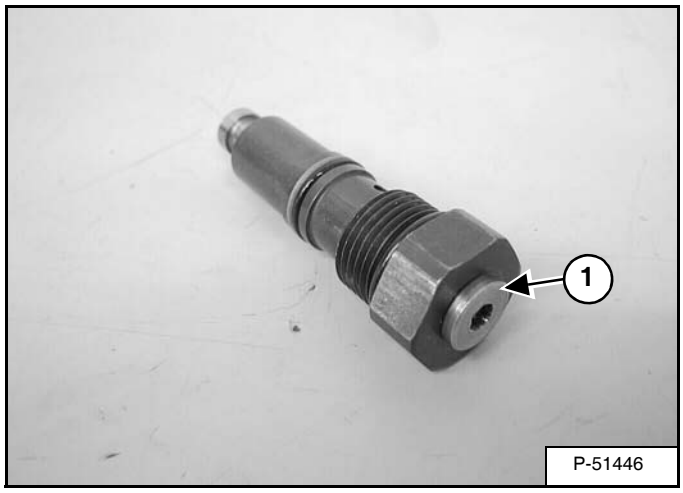
Figure 20-42-117



Remove the BICS™ valve (Item 1) **[Figure 20-42-117]**.

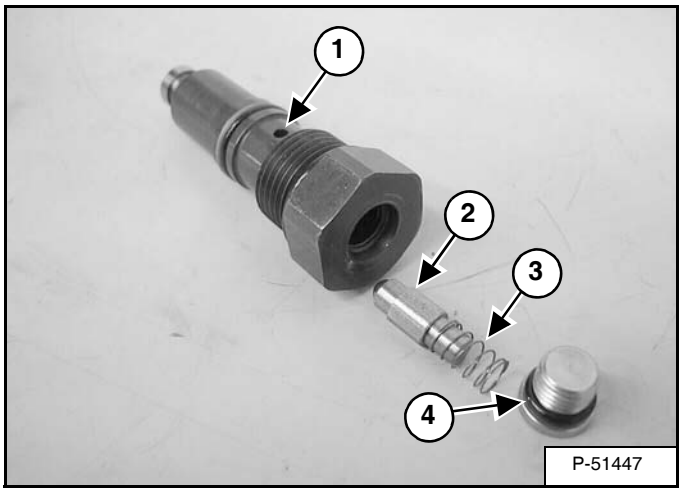
Installation: Lubricate the o-ring and tighten the valve to 55-65 ft.-lb. (75-88 N•m) torque.

Figure 20-42-118



Remove the plug (Item 1) **[Figure 20-42-118]** from the top of the BICS™ valve.

Figure 20-42-119



Check that there is no blockage in the orifice (Item 1) **[Figure 20-42-119]**.

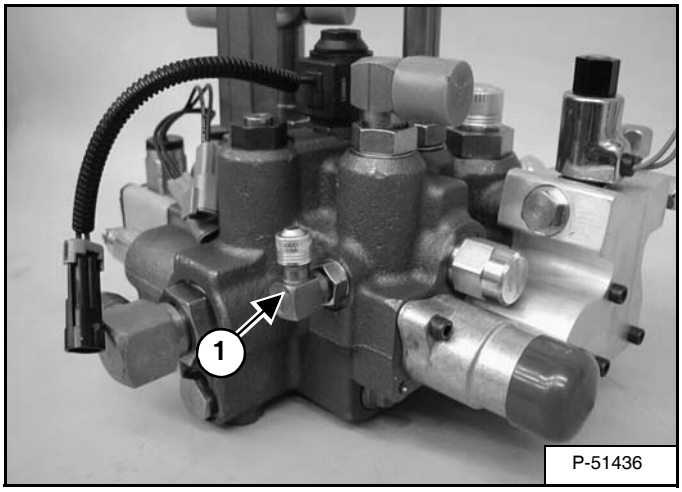
Inspect the check valve (Item 2) and spring (Item 3) **[Figure 20-42-119]**.

Replace the O-ring (Item 4) **[Figure 20-42-119]** on the plug before installation.

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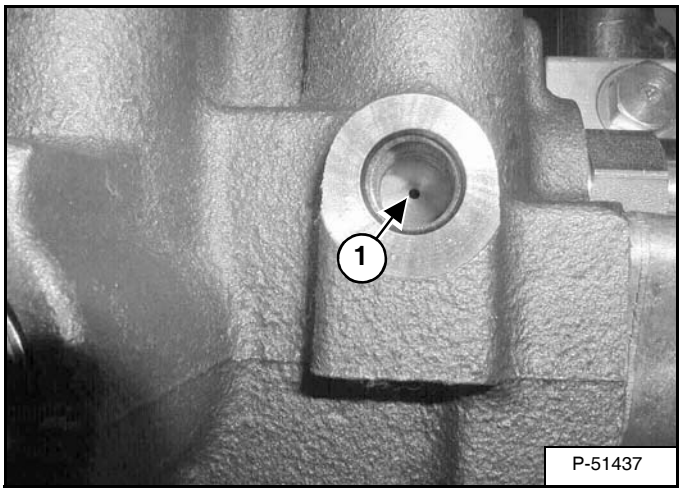
BICS™ Valve, Lift Arm By-Pass Orifice Disassembly And Assembly

Figure 20-42-120



Remove the fitting (Item 1) **[Figure 20-42-120]** from the valve.

Figure 20-42-121

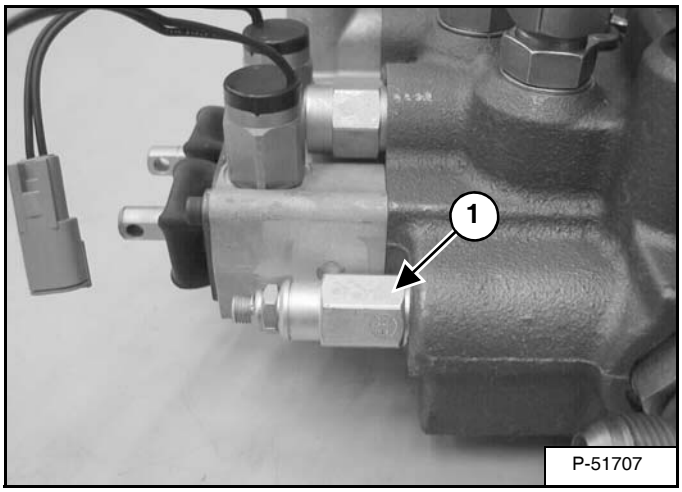


Check the lift arm by-pass orifice (Item 1) **[Figure 20-42-121]**.

NOTE: This orifice is not removable from the valve casting.

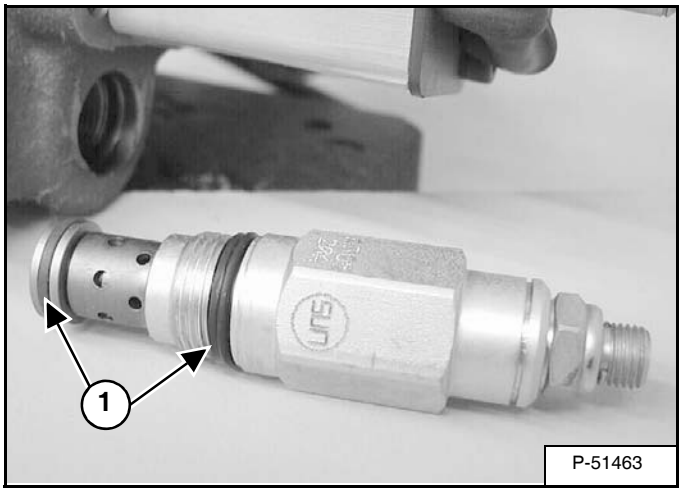
Main Relief Valve

Figure 20-42-122



Remove the main relief valve (Item 1) **[Figure 20-42-122]**.

Figure 20-42-123



Remove the O-rings from the main relief valve (Item 1) **[Figure 20-42-123]**.

Installation: Always use new O-rings. Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

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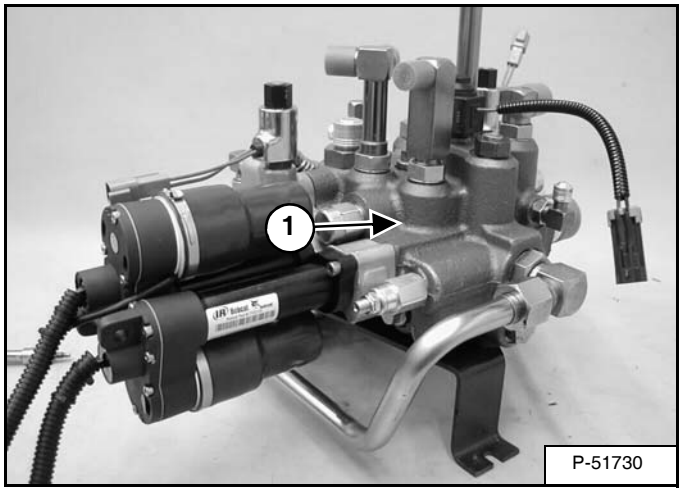


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HYDRAULIC CONTROL VALVE (1 PIECE CASTING) (ADVANCED CONTROL SYSTEM) (ACS)

Identification

Figure 20-43-1



The hydraulic control valve (1 piece casting) (ACS) (Item 1) **[Figure 20-43-1]** does not have a removable BICS™ section.

The BICS™ section and main control valve are in one casting.

For identification of the hydraulic control valve (2 piece casting) (ACS), (See Identification on Page 20-41-1.)

Removal And Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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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Lift and block the loader. ((See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device (See Installing Lift Arm Support Device on Page 10-20-1.)

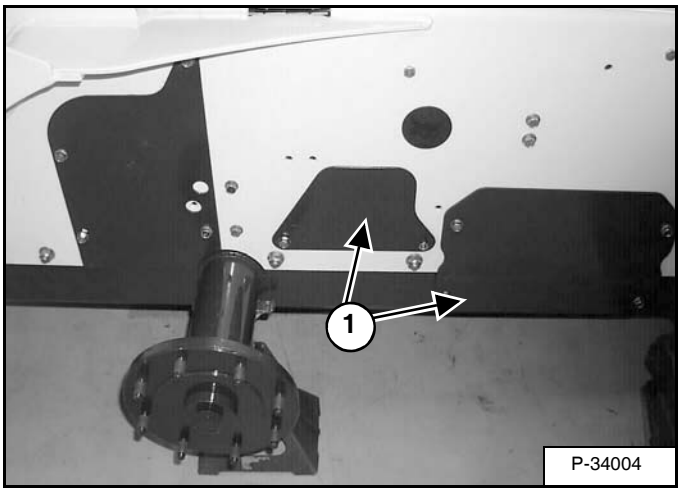
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Clean the area around the control valve.

Drain the hydraulic reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Figure 20-43-2



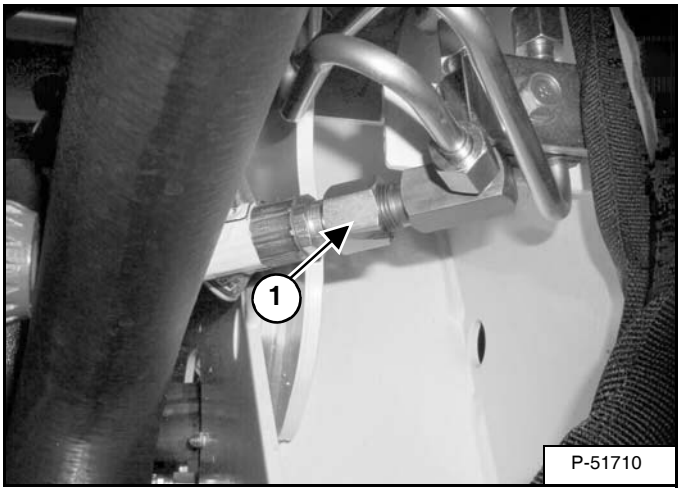
Remove the right rear tire.

Locate and remove the access covers (Item 1) **[Figure 20-43-2]** on the right side of the machine.

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Removal and Installation (Cont'd)

Figure 20-43-3

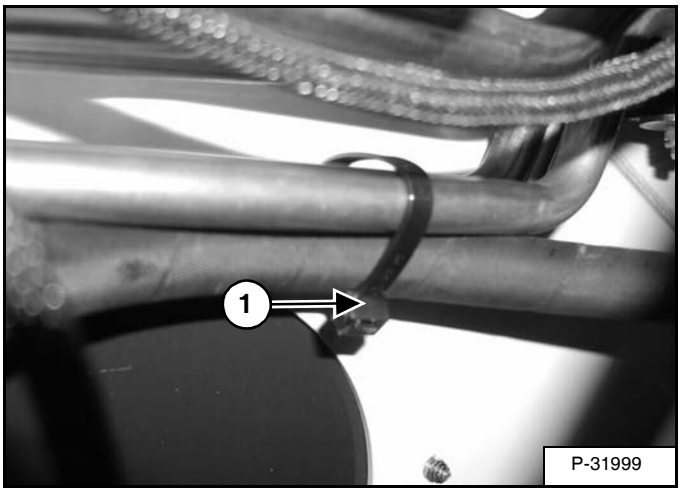


Mark all tubelines and hoses for correct installation.

The fixed end main valve hose (Item 1) **[Figure 20-43-3]** is connected to a fixed end fitting on the control valve. The hose is routed to the back upright where the hose is connected to a tee fitting that feeds the base end of both lift cylinders. The hose must be removed at the back tee fitting, located in the right side upright.

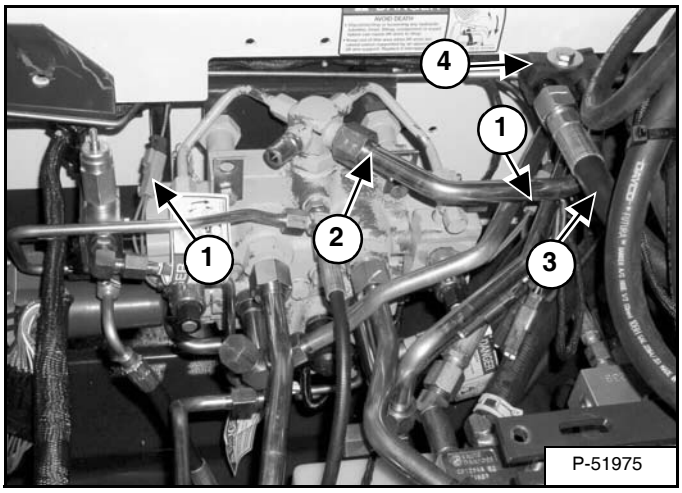
NOTE: Remember the hose routing for ease of control valve installation.

Figure 20-43-4



Remove the tie-strap (Item 1) **[Figure 20-43-4]** from the fixed end main valve hose.

Figure 20-43-5

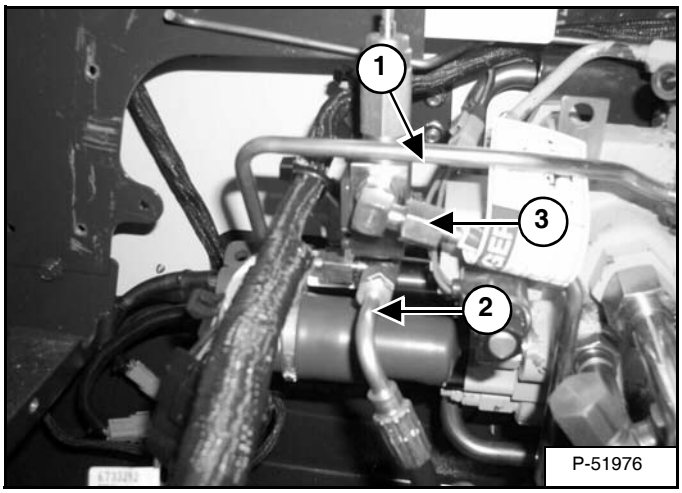


Mark and disconnect the two auxilliary electric solenoid connectors (Item 1) **[Figure 20-43-5]** for correct installation.

Remove the outlet tubeline (Item 2) **[Figure 20-43-5]** from the control valve to the hydraulic oil cooler.

Disconnect and cap the supply hose (Item 3) and the supply hose clamp (Item 4) **[Figure 20-43-5]**.

Figure 20-43-6



Disconnect and cap the tubeline (Item 1) **[Figure 20-43-6]** from the lift arm by-pass valve to the control valve.

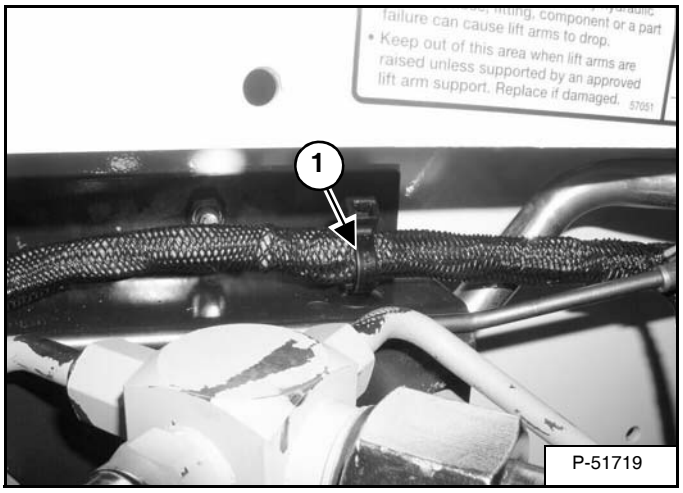
Disconnect and cap the hose (Item 2) **[Figure 20-43-6]** from the lift arm by-pass valve to the drive motor case drain.

Remove the lift arm by-pass tubeline (Item 3) **[Figure 20-43-6]** from the control valve drain.

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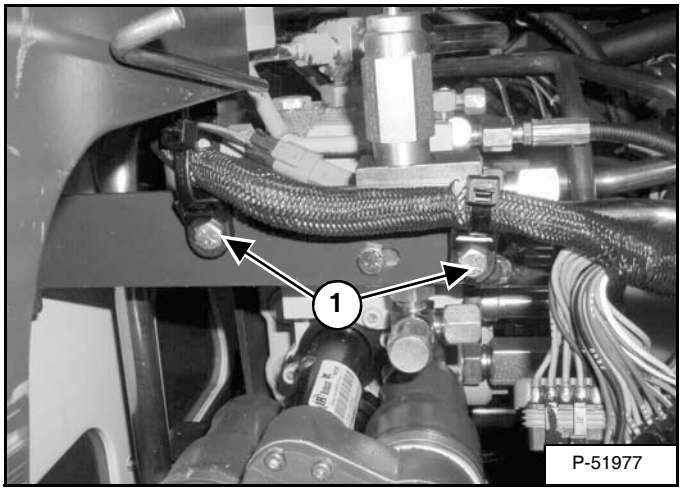
Removal And Installation (Cont'd)

Figure 20-43-7



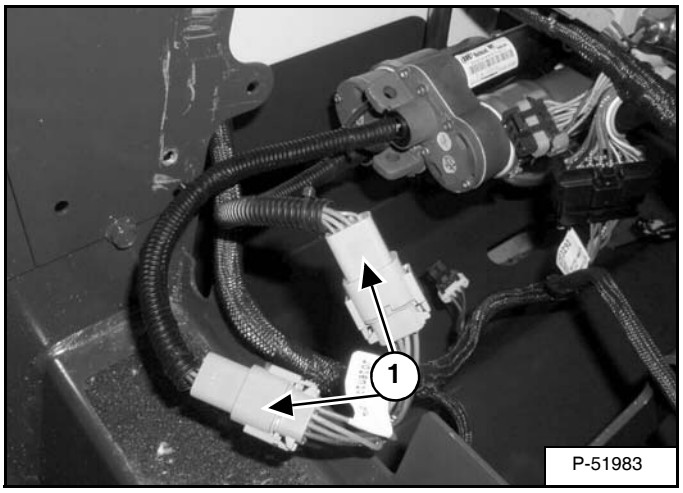
Remove the tie-strap (Item 1) **[Figure 20-43-7]** from the main valve mounting bracket.

Figure 20-43-8



Disconnect the wire harness tie-strap mounts (Item 1) **[Figure 20-43-8]** from the lift arm by-pass bracket.

Figure 20-43-9

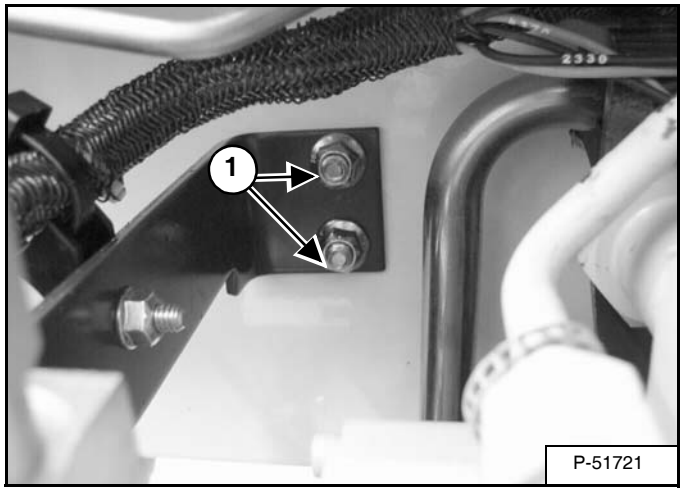


Disconnect the connectors (Item 1) **[Figure 20-43-9]** from the lift and tilt actuators.

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Removal And Installation (Cont'd)

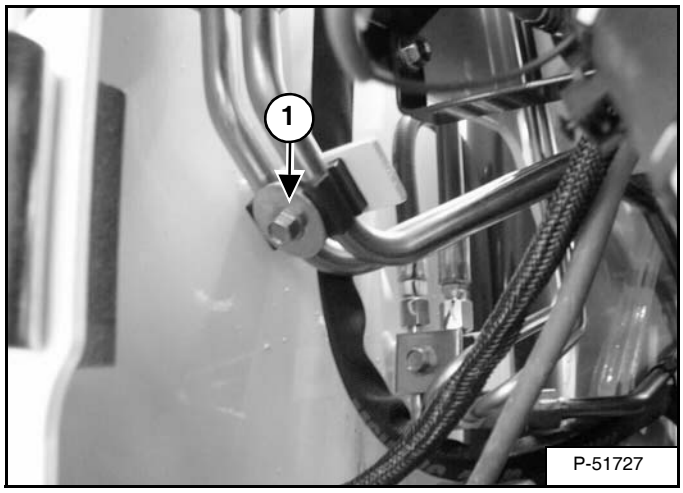
Figure 20-43-10



Remove the two lift arm by-pass valve mounting bolts (Item 1) **[Figure 20-43-10]**.

Remove the lift arm by-pass valve and mounting bracket.

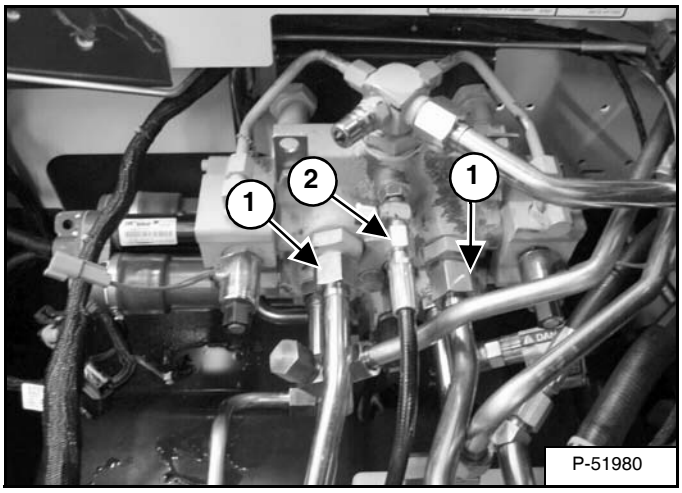
Figure 20-43-11



Remove tubeline clamp bolt (Item 1) **[Figure 20-43-11]** from the auxiliary tubelines in the left rear upright.

Installation: Tighten bolt to 15-20 ft.-lb. (20-27 N•m) torque.

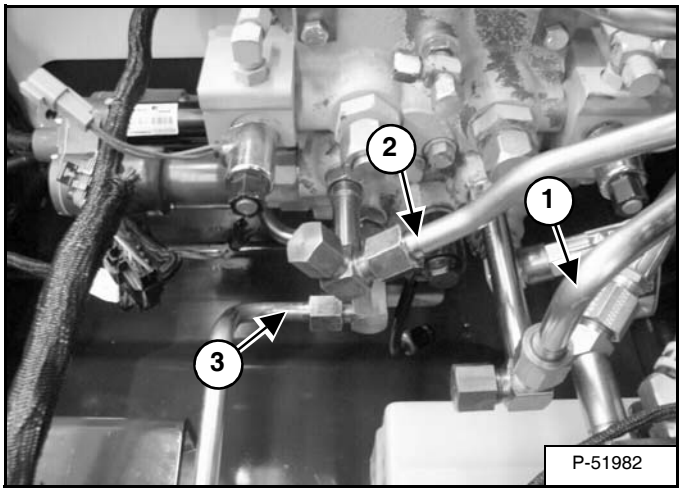
Figure 20-43-12



Remove and cap both tubelines (Item 1) **[Figure 20-43-12]** from the auxiliary section of the control valve.

Disconnect and cap the drain hose (Item 2) **[Figure 20-43-12]** from the control valve.

Figure 20-43-13



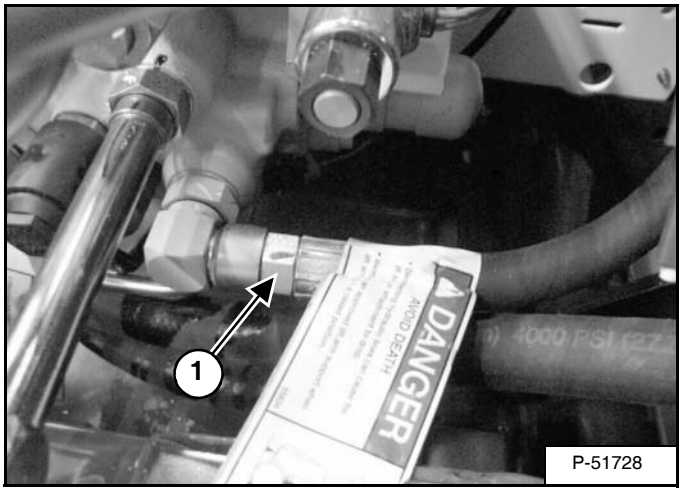
Disconnect and cap the tubelines (Item 1) and (Item 2) **[Figure 20-43-13]** from the tilt section of the control valve.

Disconnect and cap the tubeline (Item 3) **[Figure 20-43-13]** from the lift section of the control valve.

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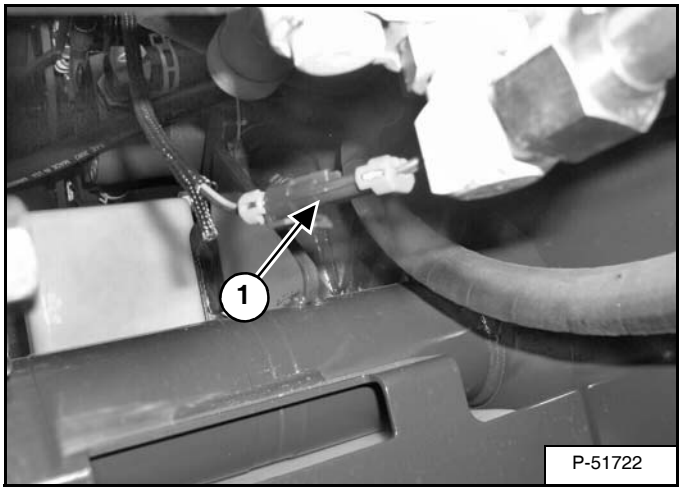
Removal And Installation (Cont'd)

Figure 20-43-14



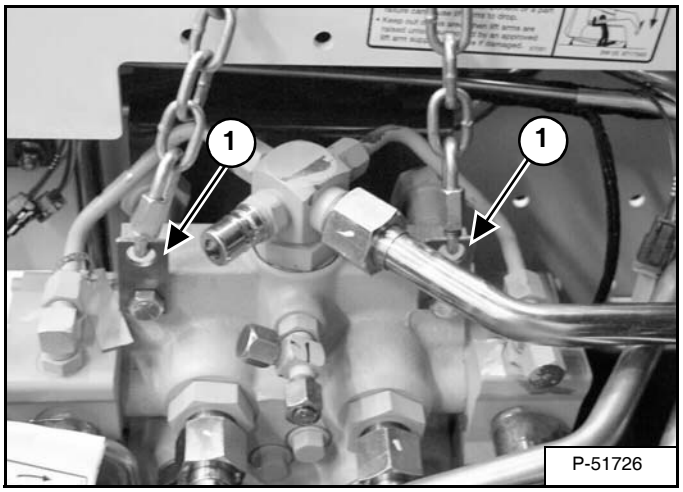
Remove the fixed-end main valve hose (Item 1) **[Figure 20-43-14]** from the main control valve fitting.

Figure 20-43-15



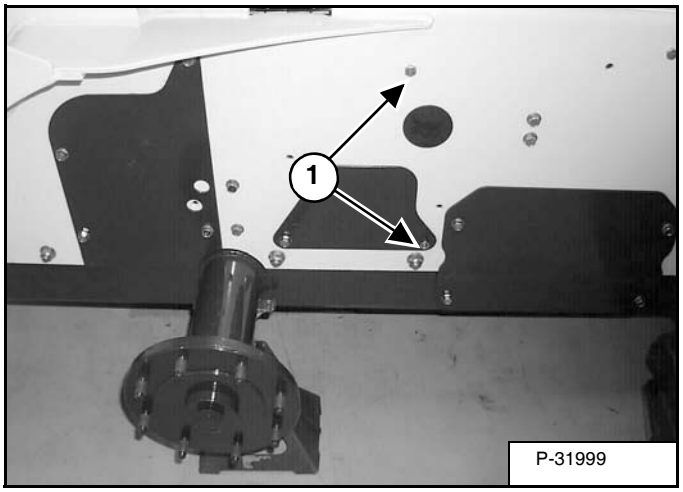
Mark and disconnect the BICS™ electric solenoid connector (Item 1) **[Figure 20-43-15]**.

Figure 20-43-16



Connect a hoist to the lifting brackets (Item 1) **[Figure 20-43-16]** on the control valve.

Figure 20-43-17



Remove the two mounting bolts (Item 1) **[Figure 20-43-17]** fastening the control valve and bracket to the side of the loader.

Remove the control valve from the loader.

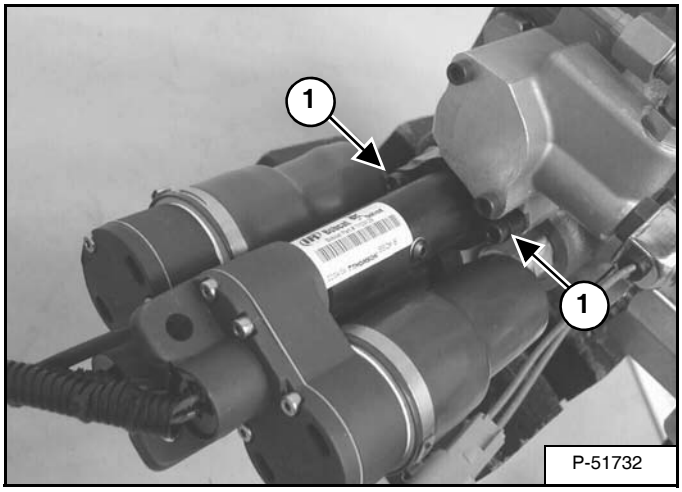
Reverse procedure for installation.

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Actuator Removal And Installation (Out of Loader)

Remove the control valve from the loader.

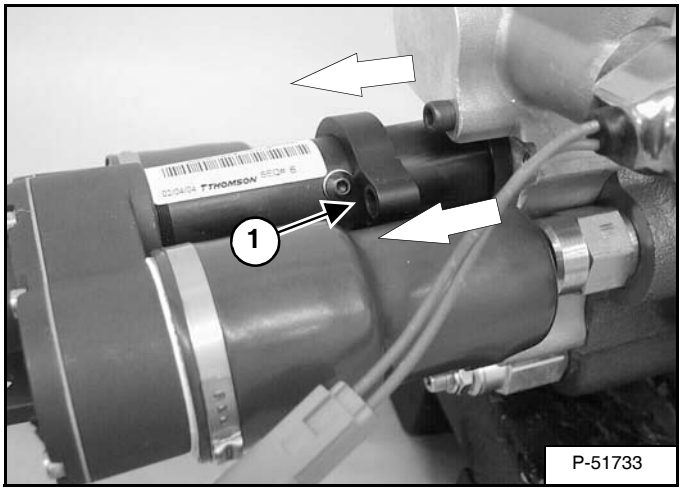
Figure 20-43-18



Remove the two mount bolts (Item 1) **[Figure 20-43-18]** from the tilt actuator.

Installation: Tighten the mounting bolts to 90-100 in.-lb. (10,2-11,3 N•m) torque.

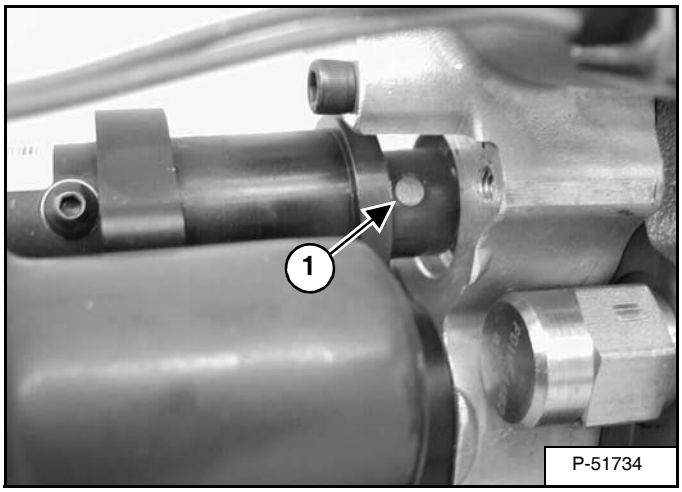
Figure 20-43-19



Slide the actuator mount bracket (Item 1) **[Figure 20-43-19]** away from the control valve.

Pull the actuator away from the control valve **[Figure 20-43-19]**.

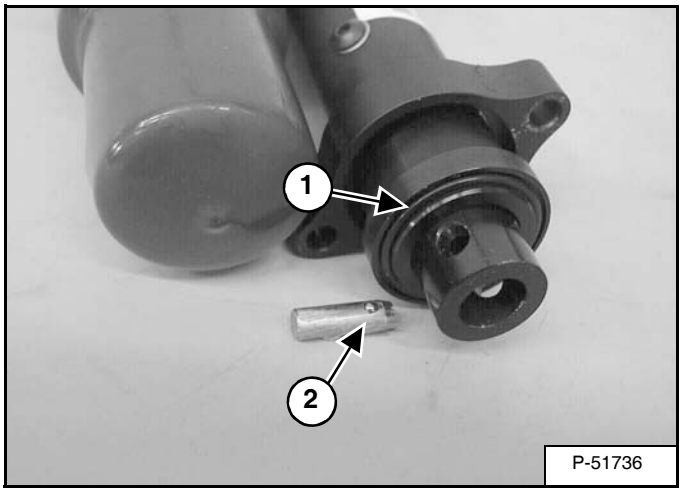
Figure 20-43-20



Using a drift pin and a hammer, remove the actuator linkage pin (Item 1) **[Figure 20-43-20]** from the actuator and the tilt spool.

Remove the actuator and linkage pin from the valve.

Figure 20-43-21



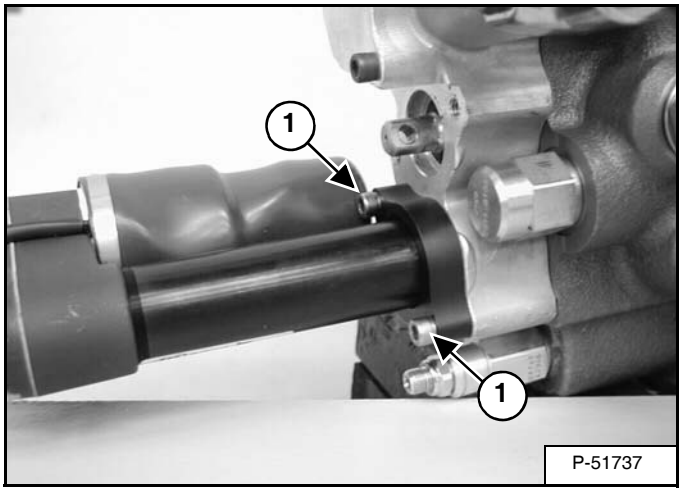
Inspect the O-ring (Item 1) **[Figure 20-43-21]** on the face of the actuator, and replace as needed.

Check the linkage pin (Item 2) **[Figure 20-43-21]** and replace as needed.

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Actuator Removal And Installation (Out of Loader) (Cont'd)

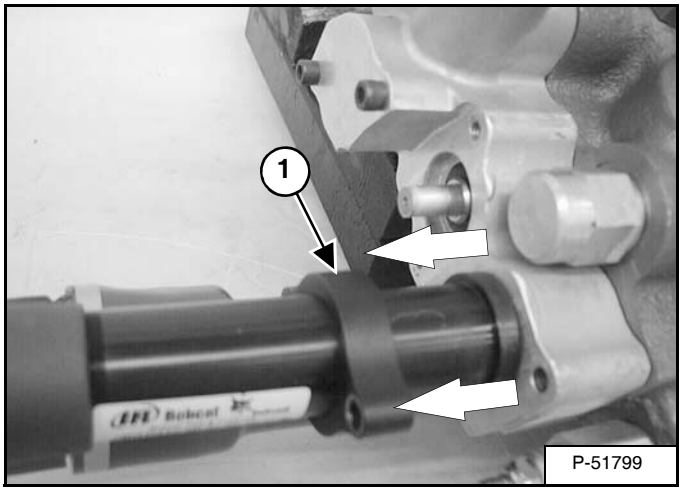
Figure 20-43-22



Remove the two mount bolts (Item 1) **[Figure 20-43-22]** from the lift actuator.

Installation: Tighten the mounting bolts to 90-100 in.-lb. (10,2-11,3 N•m) torque.

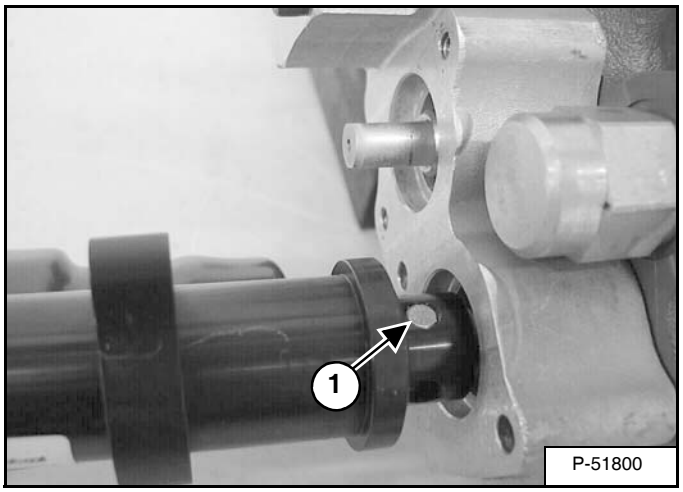
Figure 20-43-23



Slide the actuator mount bracket (Item 1) **[Figure 20-43-23]** away from the control valve.

Pull the actuator away from the control valve **[Figure 20-43-23]**.

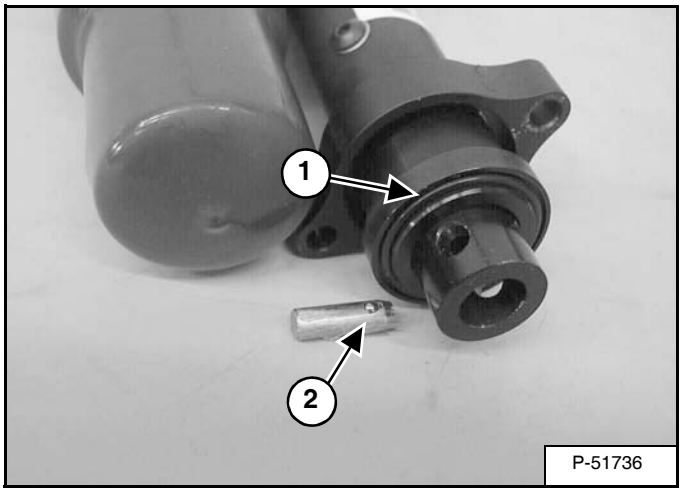
Figure 20-43-24



Using a drift pin and a hammer, remove the actuator linkage pin (Item 1) **[Figure 20-43-24]** from the actuator and the tilt spool.

Remove the actuator and linkage pin from the valve.

Figure 20-43-25



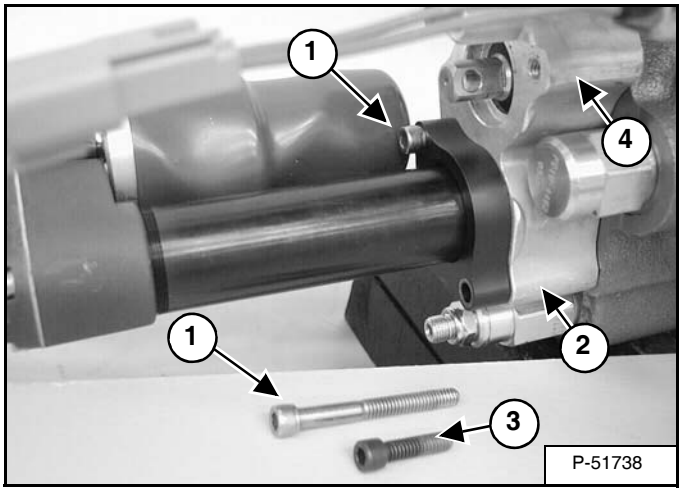
Inspect the O-ring (Item 1) **[Figure 20-43-25]** on the face of the actuator, and replace as needed.

Check the linkage pin (Item 2) **[Figure 20-43-25]** and replace as needed.

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Actuator Removal And Installation (Out of Loader) (Cont'd)

Figure 20-43-26



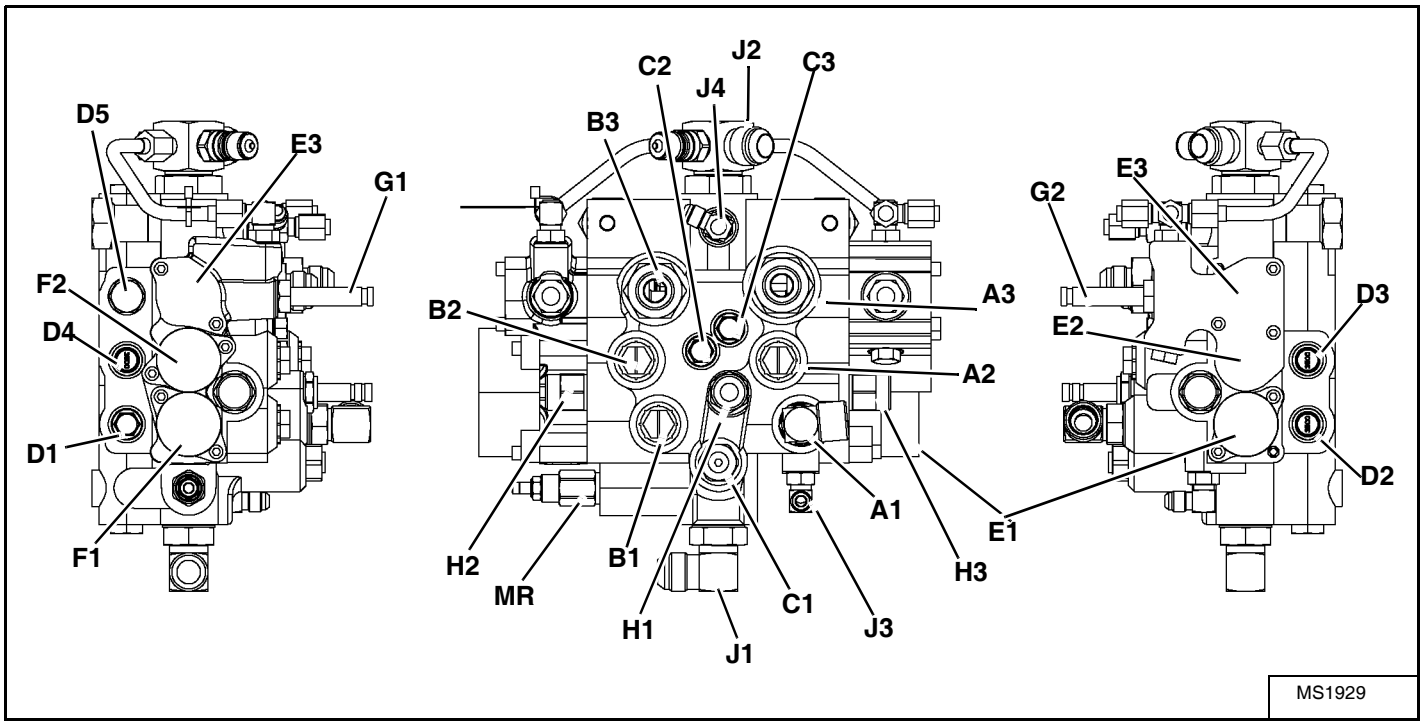
NOTE: The two longer bolts (Item 1) are used to mount the lift actuator and end cap (Item 2) [Figure 20-43-26] to the control valve.
The two shorter mount bolts (Item 3) are used to mount the tilt actuator to the end cap (Item 4) [Figure 20-43-26].

Installation: Tighten the mounting bolts to 90-100 in.-lb. (10,2-11,3 N•m) torque (Item 1) **[Figure 20-43-26]**

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Identification Chart (ACS)

Figure 20-43-27



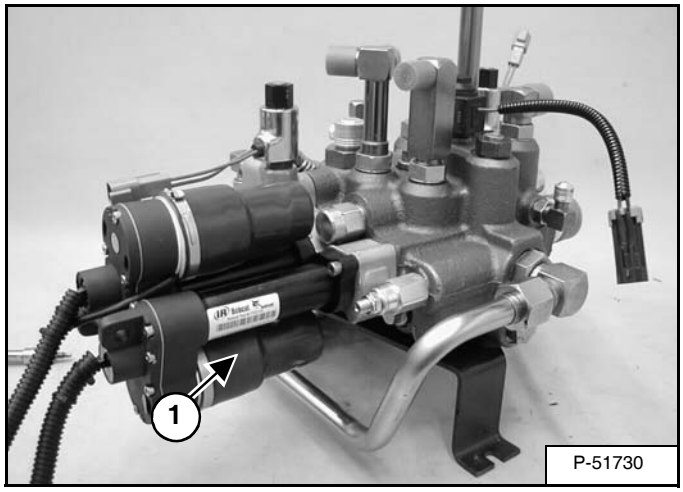
ITEM	S175/S185 LOADER
A1	Lift Cylinder Base End
A2	Tilt Cylinder Base End
A3	Auxiliary Hydraulic Rod End
B1	Lift Cylinder Rod End
B2	Tilt Cylinder Rod End
B3	Auxiliary Hydraulics Base End
C1	Load Check/BICS™ Valve Lift
C2	Load Check Valve Tilt Function
C3	Load Check Valve Auxiliary Function
D1	Anti-Cavitation Valve Lift (Rod End)
D2	Port Relief/Anti-Cavitation Valve – 3500 PSI Lift (Base End)
D3	Port Relief/Anti-Cavitation Valve – 3500 PSI Tilt (Base End)
D4	Port Relief/Anti-Cavitation Valve – 3500 PSI Tilt (Rod End)
D5	Port Relief/Anti-Cavitation Valve (Auxiliary) 3500 PSI (Optional)

ITEM	S175/S185 LOADER
E1	Lift Spool Centering Spring
E2	Tilt Spool Centering Spring
E3	Auxiliary Spool/Centering Springs
F1	LIft Spool
F2	Tilt Spool
G1	Auxiliary Solenoid Stem
G2	Auxiliary Solenoid Stem
H1	BICS™ Valve Solenoid
H2	BICS™ Lock Valve (Tilt)
H3	BICS™ Lock Valve (Lift)
J1	Inlet Fluid Flow (From Pump)
J2	Outlet Fluid Flow (Return to Tank)
J3	Lift Arm By-Pass Orifice
J4	Drain (Case)
MR	Main Relief Valve – 3300 PSI

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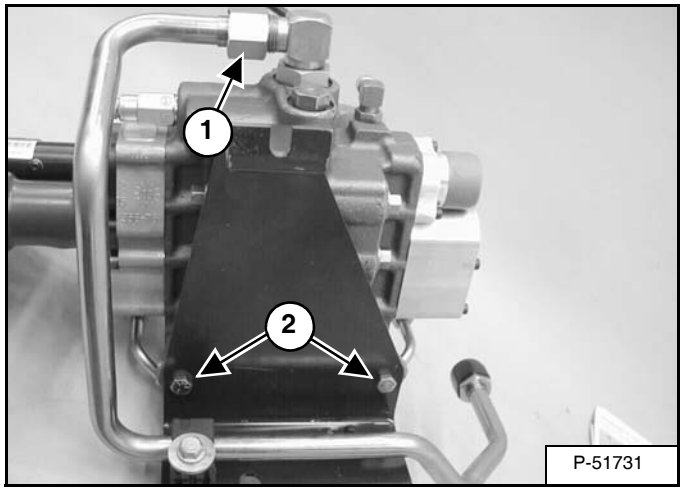
Mount Bracket Removal and Installation

Figure 20-43-28



Remove the control valve and mount bracket (Item 1) **[Figure 20-43-28]** from the loader.

Figure 20-43-29

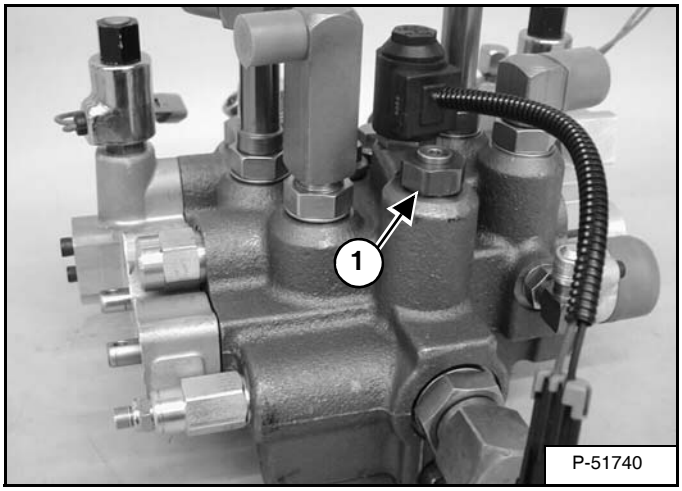


Disconnect the tubeline (Item 1) **[Figure 20-43-29]** from the inlet fitting on the control valve.

Remove the two mount bolts (Item 2) **[Figure 20-43-29]** from the control valve mount plate. Remove the mount plate and tubeline.

BICS™ Valve, Lift Load Check Valve Removal And Installation

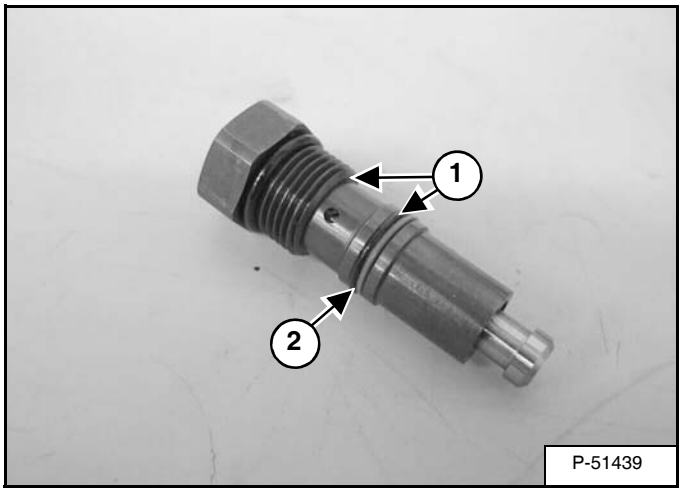
Figure 20-43-30



Remove the lift load check valve (Item 1) **[Figure 20-43-30]**.

Installation: Lubricate the O-ring and tighten the valve to 55-65 ft.-lb. (75-88 N•m) torque.

Figure 20-43-31

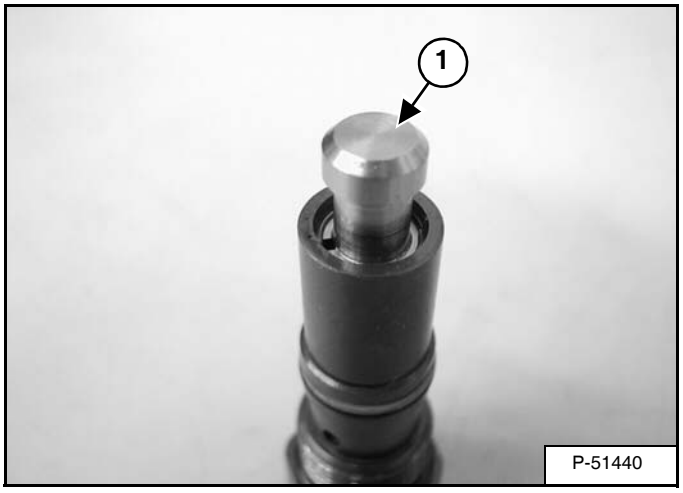


Remove and install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-43-31]**.

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BICS™ Valve, Lift Load Check Valve Removal And Installation (Cont'd)

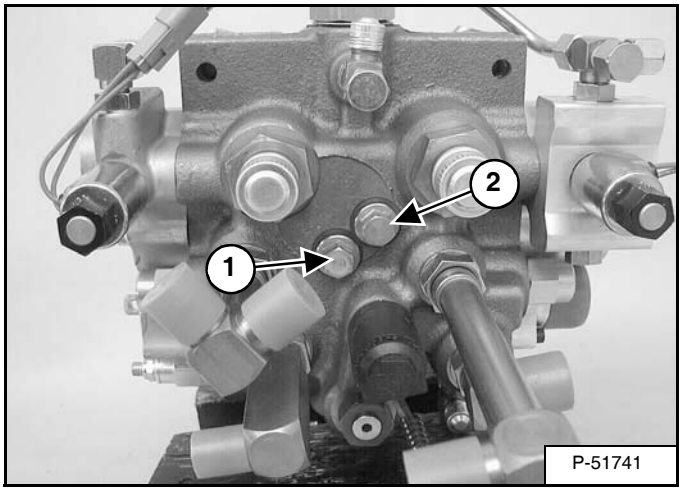
Figure 20-43-32



Check for free movement of the load check valve (Item 1) **[Figure 20-43-32]**.

Load Check Valve Removal And Installation (Tilt & Auxiliary)

Figure 20-43-33

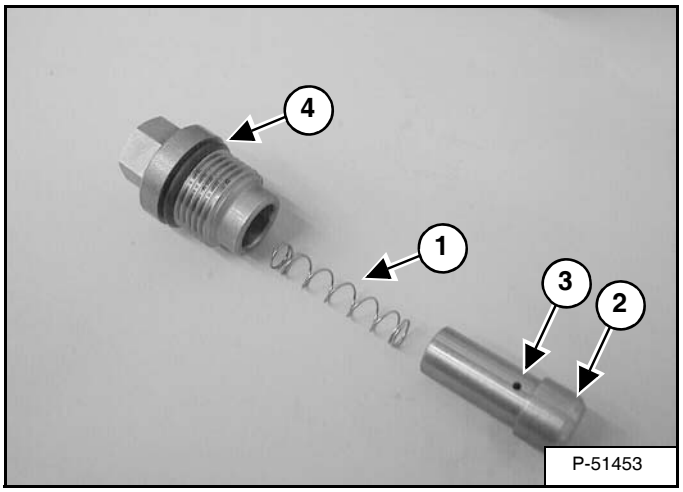


At the front side of the control valve locate the tilt section load check valve (Item 1) **[Figure 20-43-33]**.

At the front side of the control valve locate the auxiliary section load check valve (Item 2) **[Figure 20-43-33]**.

NOTE: The tilt and auxiliary load check valves are interchangeable.

Figure 20-43-34



Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-43-34]**.

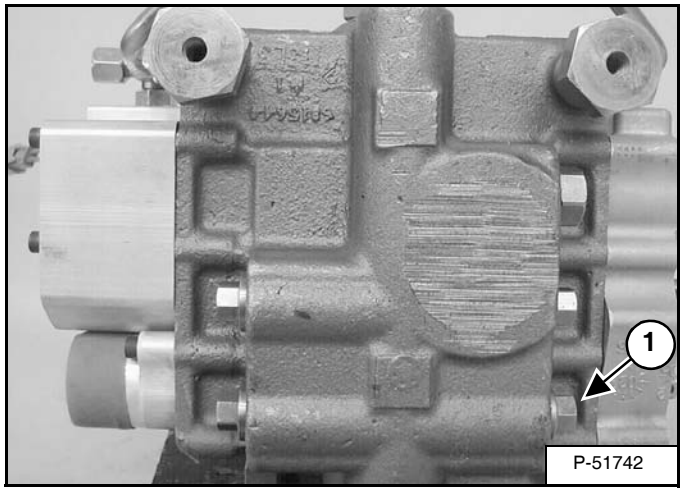
Check the orifice (Item 3) **[Figure 20-43-34]** in the poppet to be sure it is not plugged.

Installation: Install a new O-ring (Item 4) **[Figure 20-43-34]** on the plug and lightly lubricate with oil before installing. Tighten the plug to 38-45 ft.-lb. (52-61 N•m) torque.

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Anti-Cavitation Valve (Lift, Rod End)

Figure 20-43-35



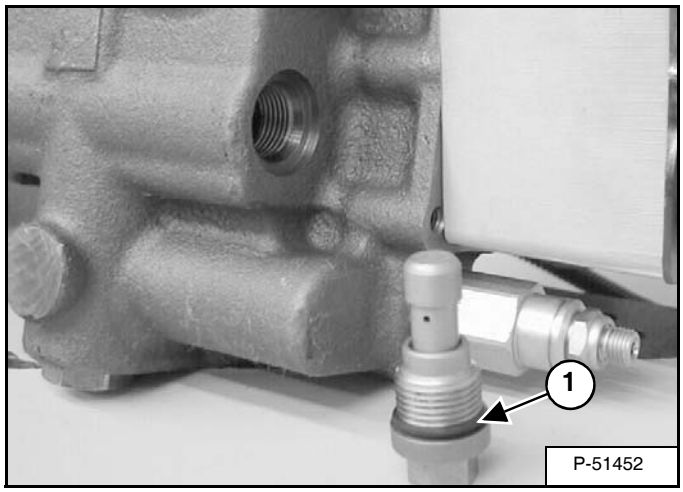
At the back side of the control valve, remove the lift section anti-cavitation valve (Item 1) **[Figure 20-43-35]**.

⚠ WARNING

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.

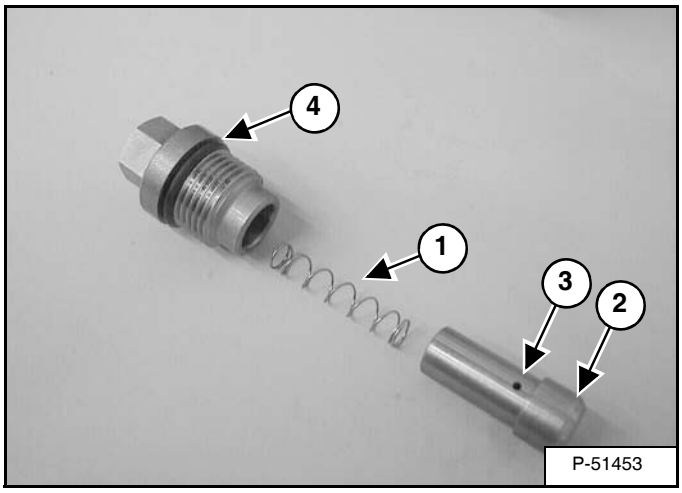
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Figure 20-43-36



Always use new O-ring (Item 1) **[Figure 20-43-36]** on the anti-cavitation valve plug.

Figure 20-43-37



Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-43-37]**.

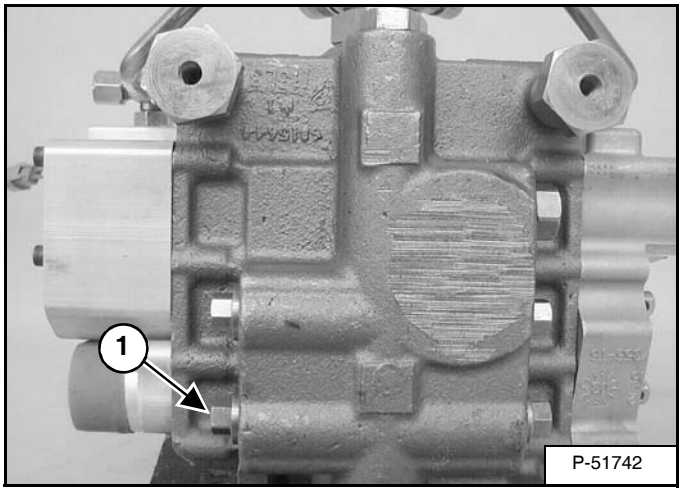
Check the orifice (Item 3) **[Figure 20-43-37]** in the poppet to be sure it is not plugged.

Installation: Install a new O-ring (Item 4) **[Figure 20-43-37]** on the plug and lightly lubricate with oil before installing. Tighten the plug to 38-45 ft.-lb. (52-61 N•m) torque.

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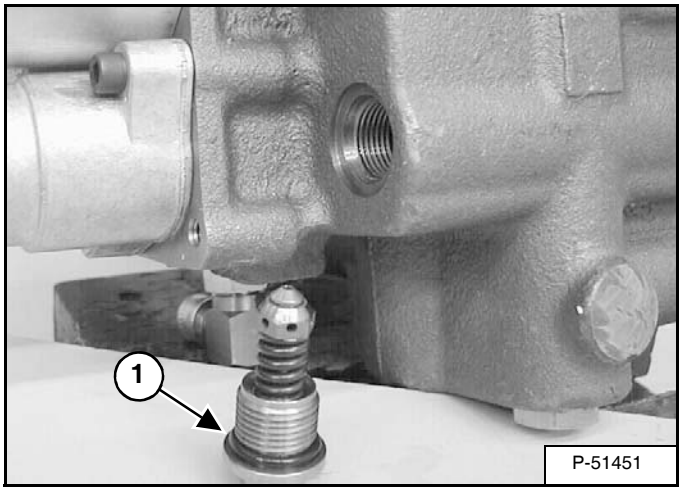
Port Relief/Anti-Cavitation Valve (Lift, Base End)

Figure 20-43-38



Loosen the lift circuit port relief/anti cavitation valve (Item 1) **[Figure 20-43-38]**.

Figure 20-43-39

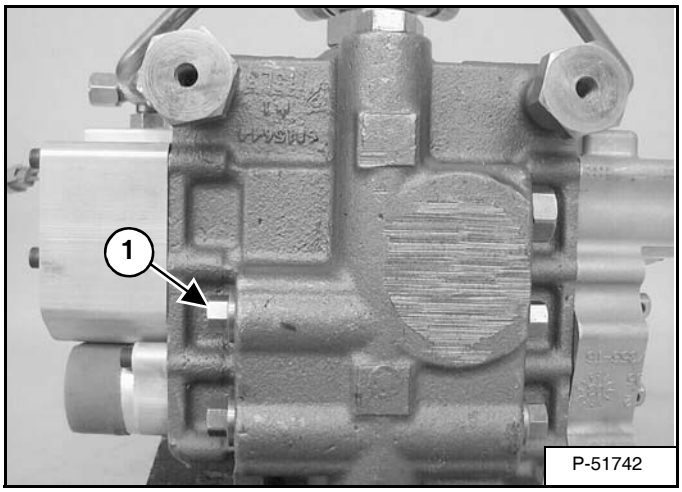


Replace the O-ring (Item 1) **[Figure 20-43-39]** before installation.

Installation: Lightly lubricate with oil and tighten to 38-45 ft.-lb. (52-61 N•m) torque.

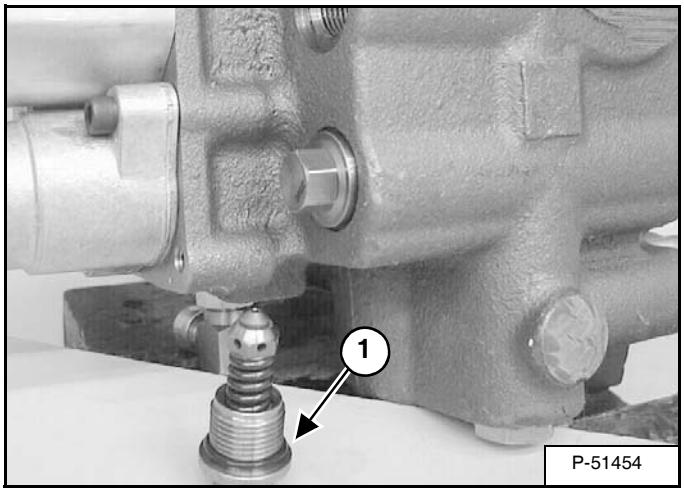
Port Relief/Anti-Cavitation Valve (Tilt, Base End)

Figure 20-43-40



Remove the tilt port relief/anti cavitation valve (Item 1) **[Figure 20-43-40]** from the base end of the tilt section.

Figure 20-43-41



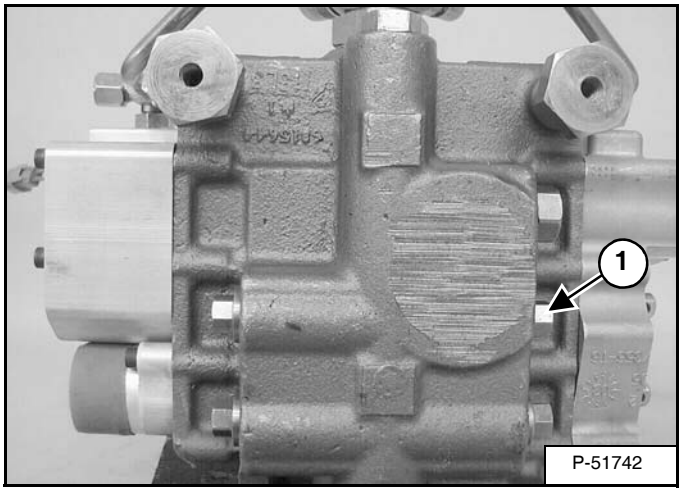
Replace the O-ring (Item 1) **[Figure 20-43-41]** before installation.

Installation: Lightly lubricate with oil and tighten to 38-45 ft.-lb. (52-61 N•m) torque.

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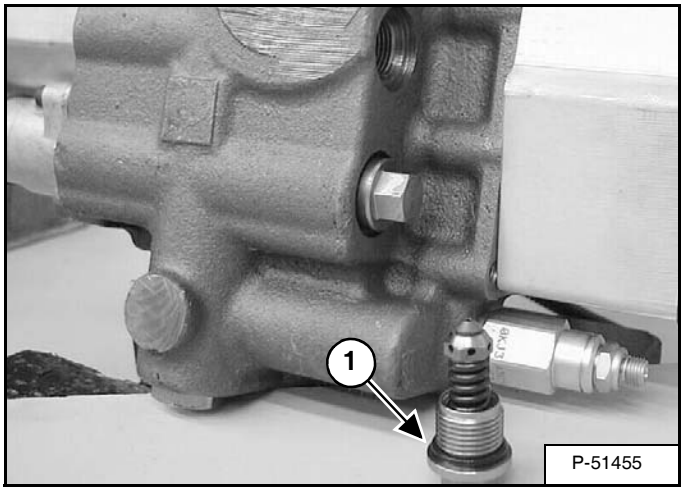
Port Relief/Anti-Cavitation Valve (Tilt, Rod End)

Figure 20-43-42



Remove the tilt port relief/anti cavitation valve (Item 1) **[Figure 20-43-42]** from the rod end of the tilt section.

Figure 20-43-43

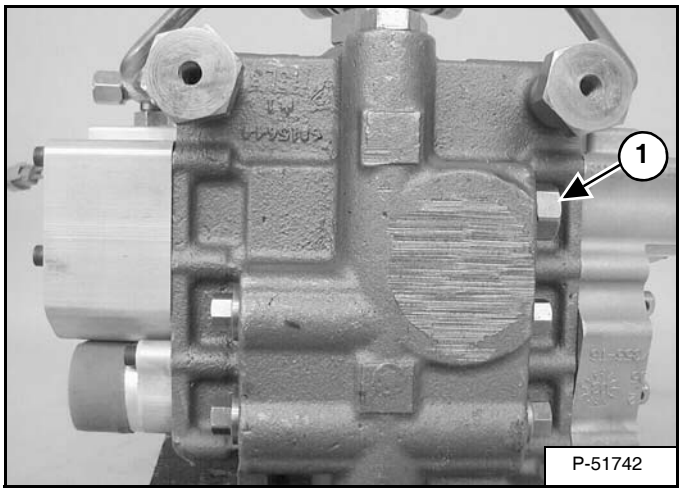


Replace the O-ring (Item 1) **[Figure 20-43-43]** before installation.

Installation: Lightly lubricate with oil and tighten to 38-45 ft.-lb. (52-61 N•m) torque.

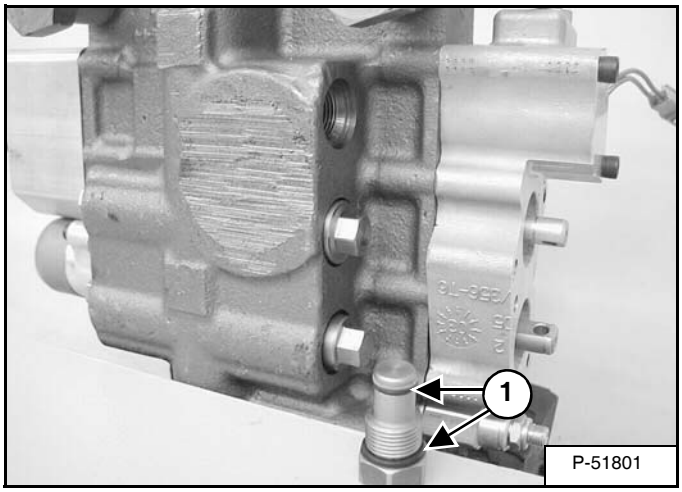
Port Relief Valve

Figure 20-43-44



Remove the port relief plug (Item 1) **[Figure 20-43-44]** from the auxiliary circuit of the control valve.

Figure 20-43-45

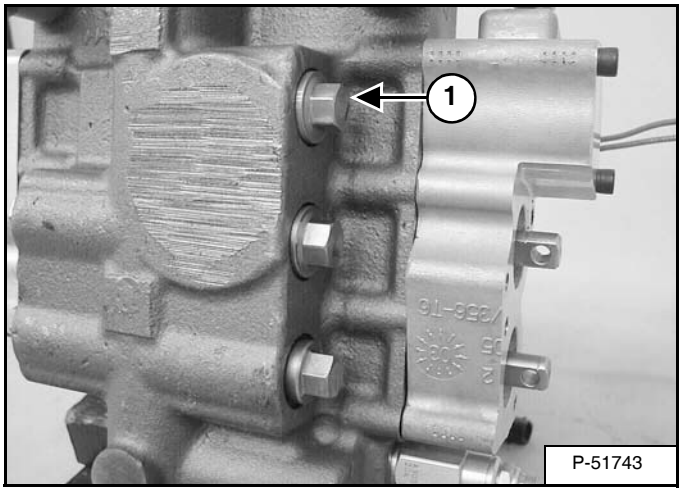


Installation: Always use new O-rings (Item 1) **[Figure 20-43-45]**. Lightly lubricate with oil and tighten to 38-45 ft.-lb. (52-61 N•m) torque.

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Port Relief Valve (Cont'd)

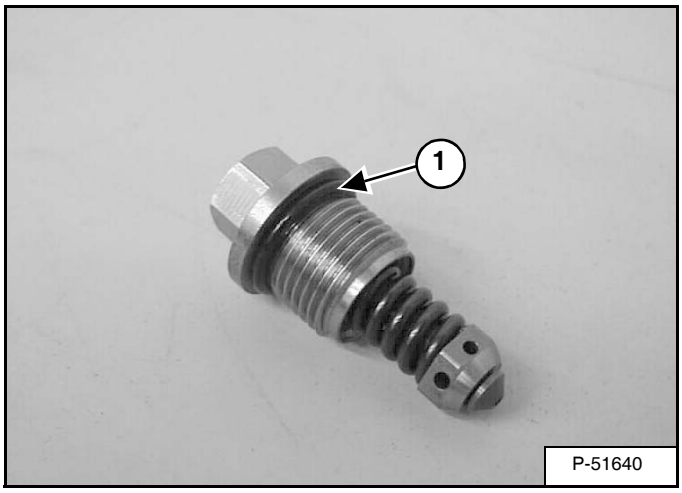
Figure 20-43-46



The control valve may be equipped with an optional auxiliary port relief valve (Item 1) **[Figure 20-43-46]**.

Remove the auxiliary port relief valve.

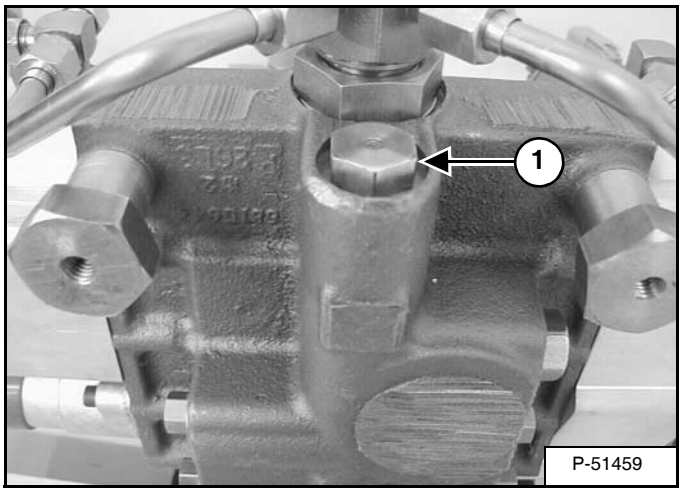
Figure 20-43-47



Installation: Always use new O-rings (Item 1) **[Figure 20-43-47]**. Lightly lubricate with oil and tighten to 38-45 ft.-lb. (52-61 N•m) torque.

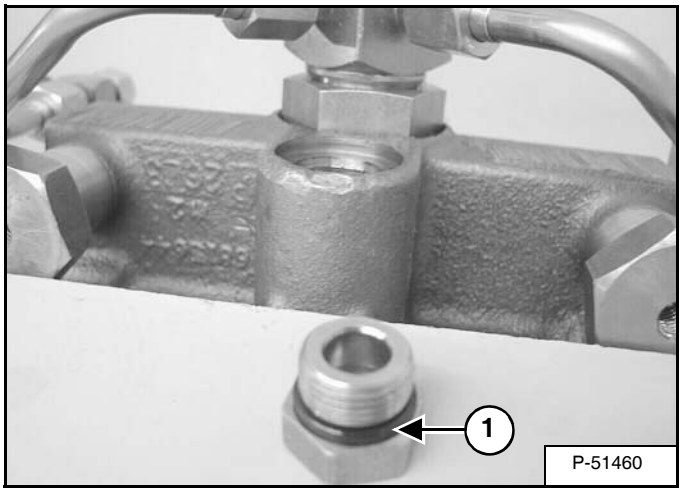
Plug Removal

Figure 20-43-48



At the top side of the control valve, remove the plug (Item 1) **[Figure 20-43-48]**.

Figure 20-43-49

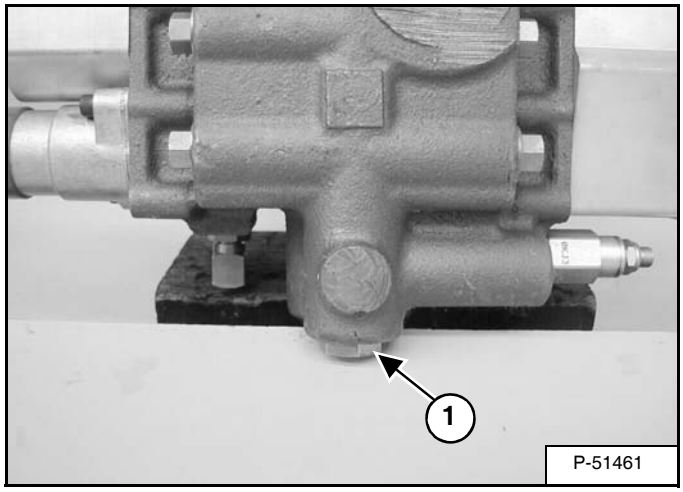


Installation: Always use new O-rings (Item 1) **[Figure 20-43-49]**. Tighten to 40 ft.-lb. (54 N•m) torque.

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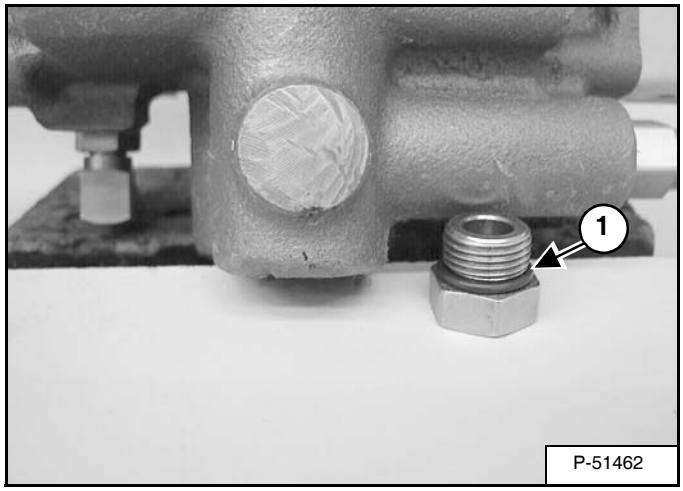
Plug Removal (Cont'd)

Figure 20-43-50



At the bottom side of the control valve remove the plug (Item 1) **[Figure 20-43-50]**.

Figure 20-43-51

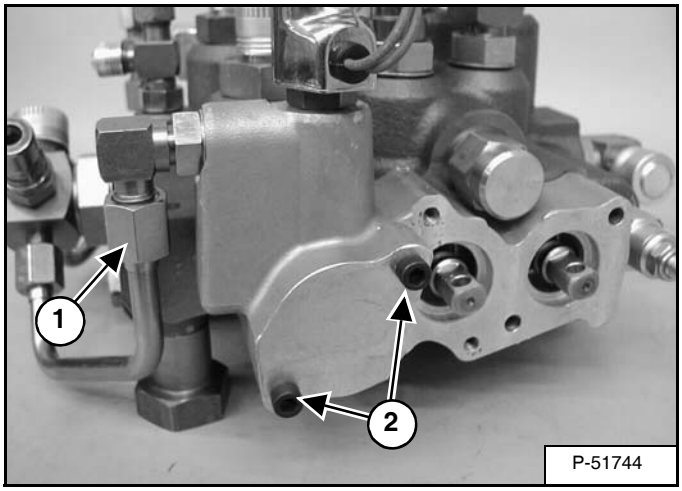


Installation: Always use new O-rings (Item 1) **[Figure 20-43-51]**. Tighten to 40 ft.-lb. (54 N•m) torque.

End Cap Block Removal and Installation

Remove the lift and tilt actuators from the control valve. (See Actuator Removal And Installation (Out of Loader) on Page 20-43-6.)

Figure 20-43-52

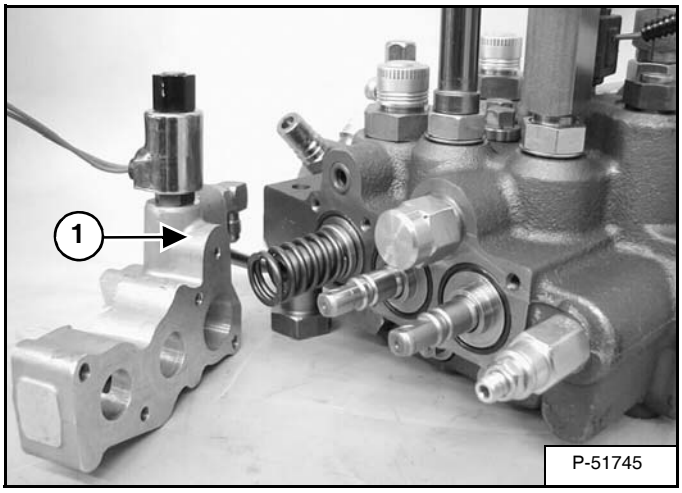


Disconnect the tube line (Item 1) **[Figure 20-43-52]** from the end cap block.

Remove the two end cap block mount screws (Item 2) **[Figure 20-43-52]**.

Installation: Tighten the screws to 90-100 in.-lb. (10-11,3 N•m) torque.

Figure 20-43-53



Remove the end cap block (Item 1) **[Figure 20-43-53]** from the control valve.

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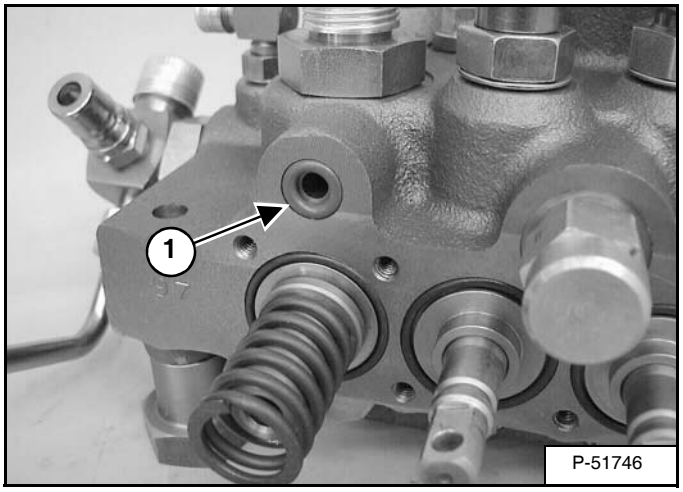
Lift Spool Removal and Installation

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

MEL 1285 - Spring Tool

Remove the end cap block from the control valve.

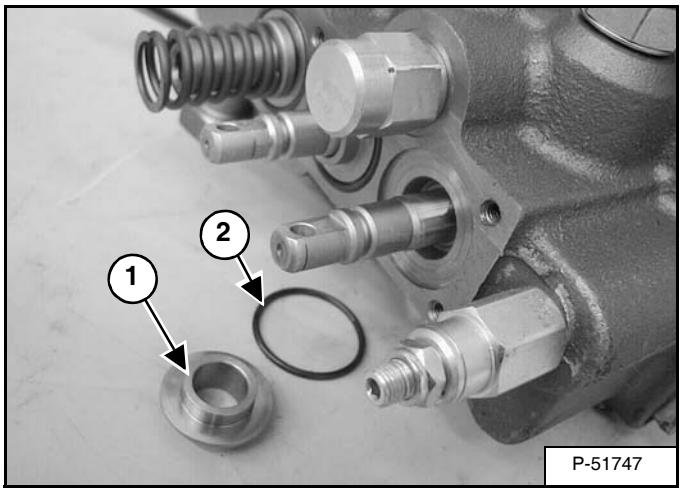
Figure 20-43-54



Remove the O-ring (Item 1) **[Figure 20-43-54]**.

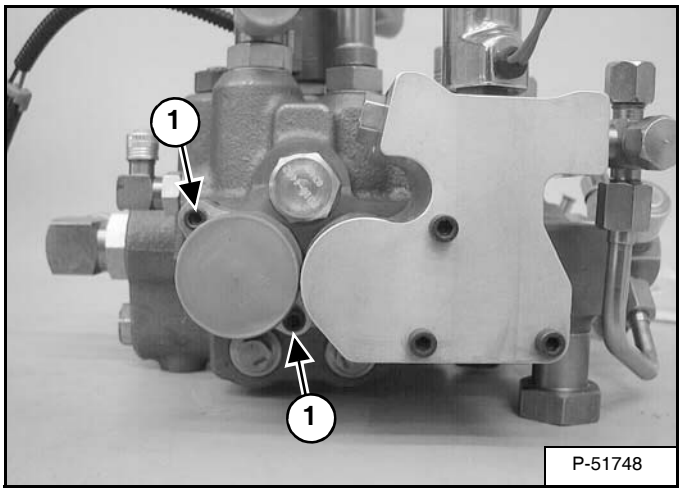
Installation: Replace the O-ring, and lubricate lightly with oil before installation of the end cap block.

Figure 20-43-55



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-43-55]** from the lift spool.

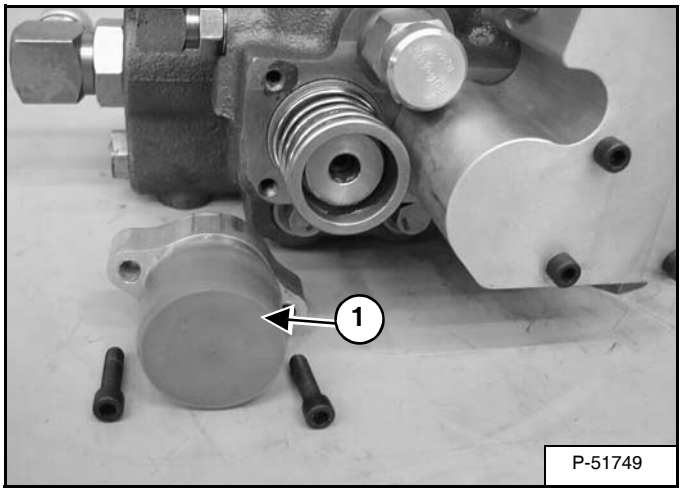
Figure 20-43-56



Remove the two screws (Item 1) **[Figure 20-43-56]** from the lift spool end cap.

Installation: Lubricate the screws and tighten to 90-100 in.-lb. (10-11,3 N•m) torque.

Figure 20-43-57

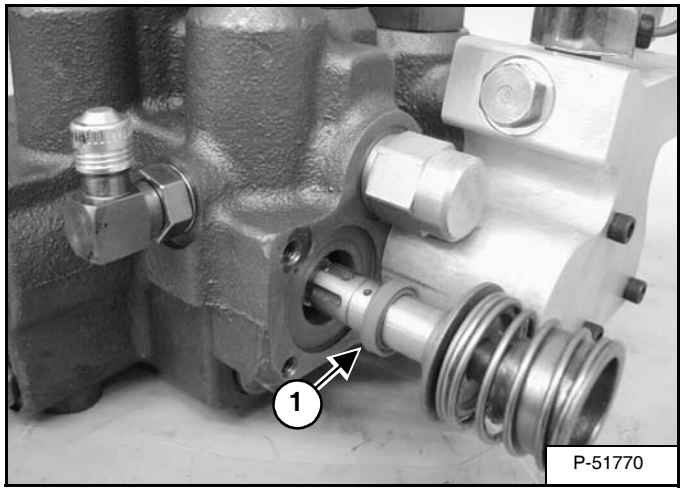


Remove the lift spool end cap (Item 1) **[Figure 20-43-57]** from the control valve.

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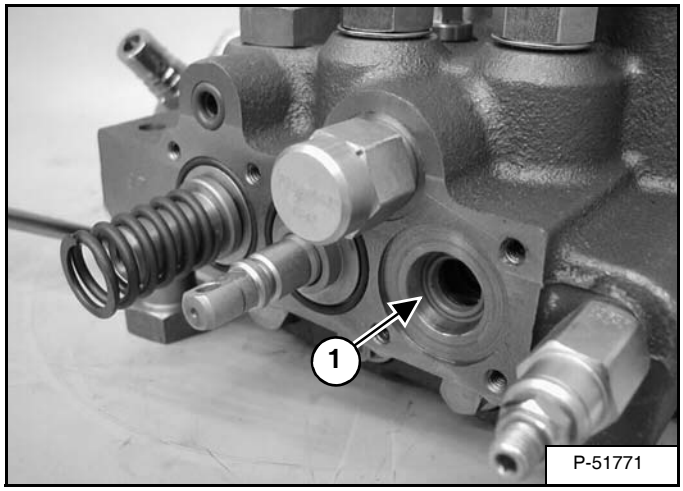
Lift Spool Removal and Installation (Cont'd)

Figure 20-43-58



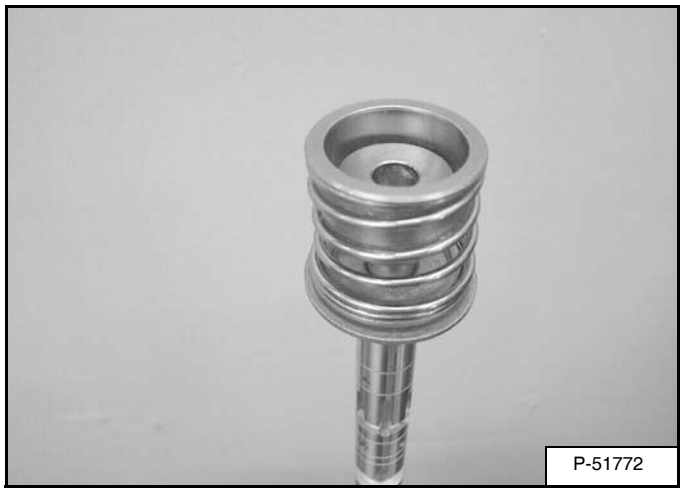
Remove the lift spool assembly and seal (Item 1) **[Figure 20-43-58]** from the control valve.

Figure 20-43-59



Remove the lift spool seal (Item 1) **[Figure 20-43-59]** from the linkage end of the valve.

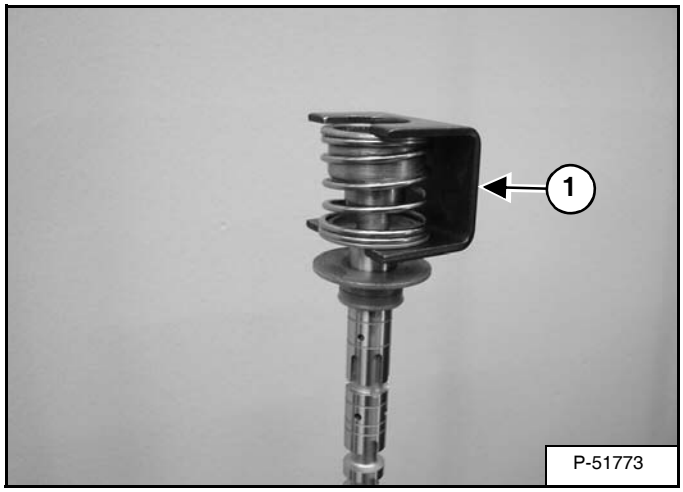
Figure 20-43-60



Clamp the linkage end of the spool in a vise **[Figure 20-43-60]**.

NOTE: Protect spool before clamping in vise.

Figure 20-43-61

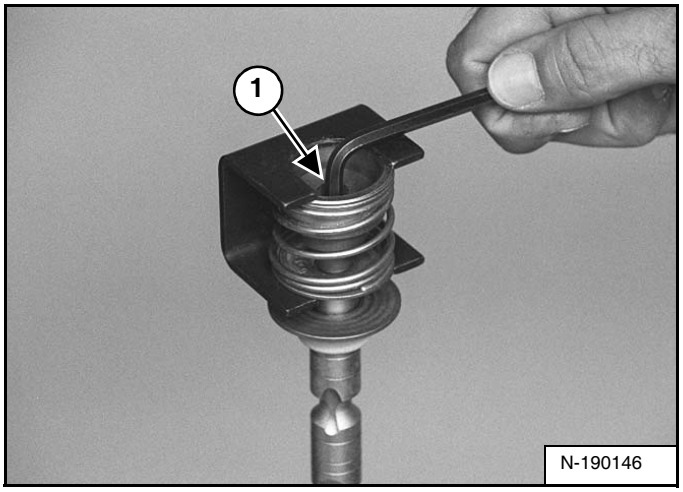


Install the spring tool (Item 1) **[Figure 20-43-61]** over the centering spring.

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Lift Spool Removal and Installation (Cont'd)

Figure 20-43-62

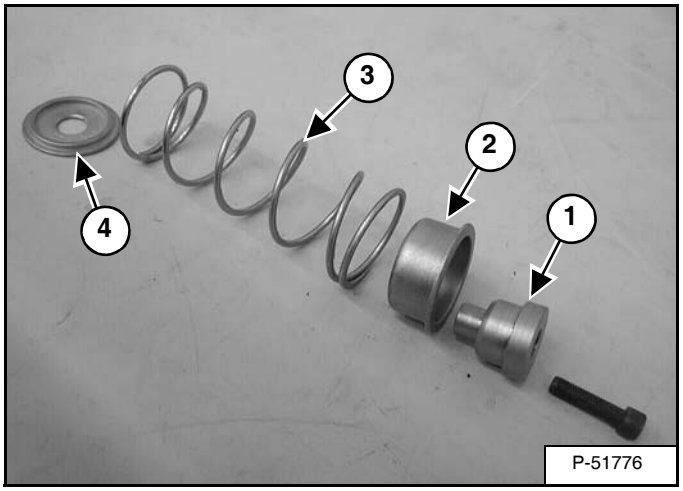


Remove the bolt (Item 1) **[Figure 20-43-62]** holding the centering spring to the spool.

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

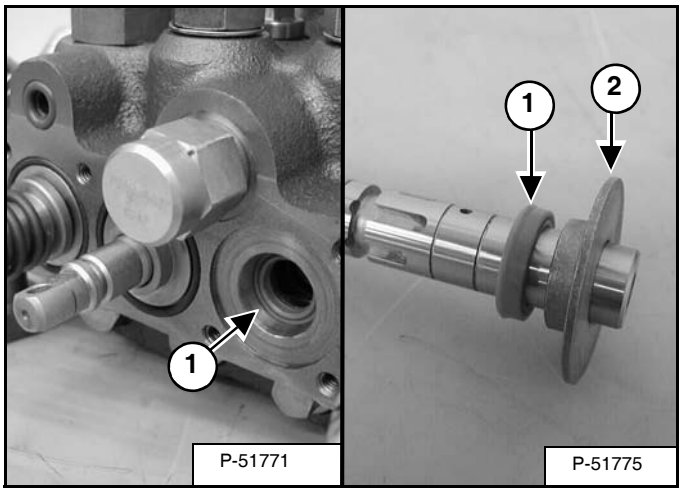
Remove spring tool from the spring assembly.

Figure 20-43-63



Inspect the adapter (Item 1), collar (Item 2), spring (Item 3) and washer (Item 4) **[Figure 20-43-63]**.

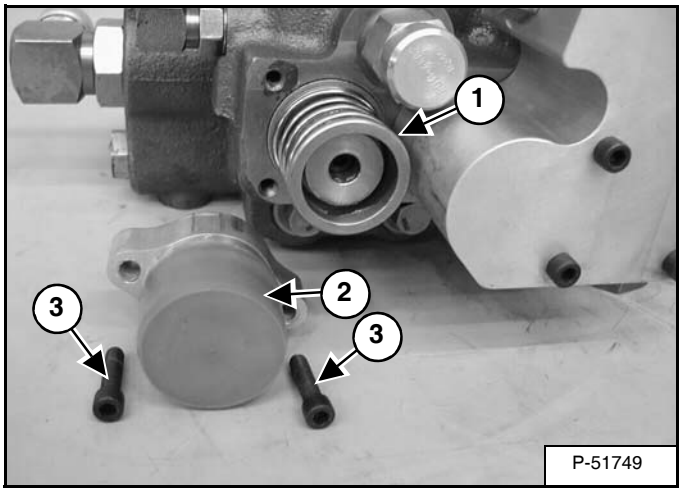
Figure 20-43-64



Remove the spool seal(s) (Item 1) and the back-up washer (Item 2) **[Figure 20-43-64]**.

Assembly: Always use a new spool seal.

Figure 20-43-65



Install the lift spool assembly (Item 1) **[Figure 20-43-65]** in the spool bore.

Install the end cap (Item 2) **[Figure 20-43-65]**.

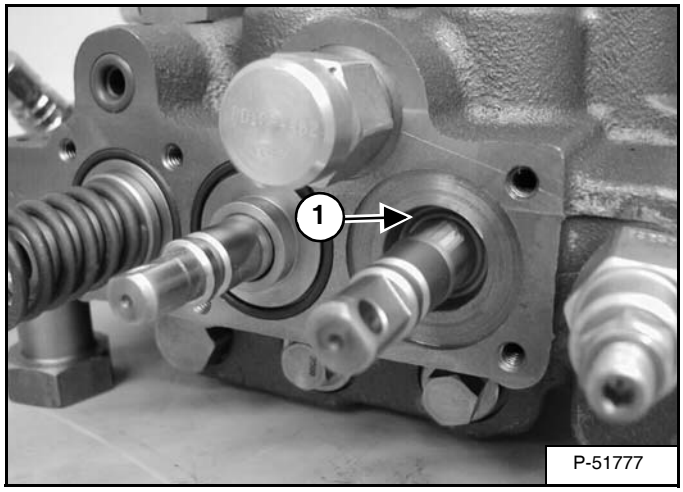
Install the mounting screws (Item 3) **[Figure 20-43-65]**.

Installation: Lubricate the screws and tighten to 90-100 in.-lb. (10-11,3 N•m) torque.

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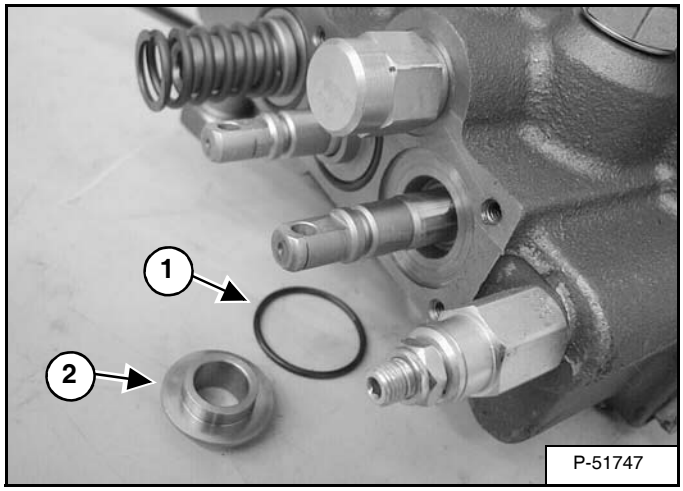
Lift Spool Removal and Installation (Cont'd)

Figure 20-43-66



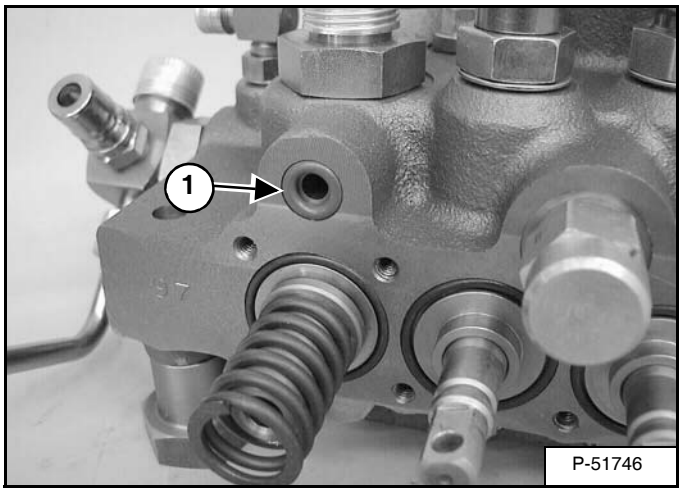
Install the spool seal (Item 1) **[Figure 20-43-66]** on the linkage end of the valve.

Figure 20-43-67



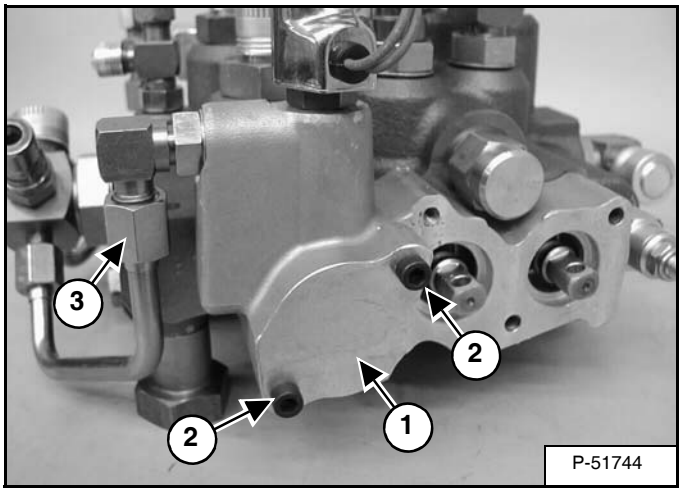
Install the O-ring (Item 1) and bushing (Item 2) **[Figure 20-43-67]** on the lift spool.

Figure 20-43-68



Install the O-ring (Item 1) **[Figure 20-43-68]** on the control valve.

Figure 20-43-69



Install the end cap block (Item 1) and the two mount bolts (Item 2) **[Figure 20-43-69]**.

Installation: Tighten the screws to 90-100 in.-lb. (10-11,3 N•m) torque.

Connect the tube line (Item 3) **[Figure 20-43-69]** to the end cap block.

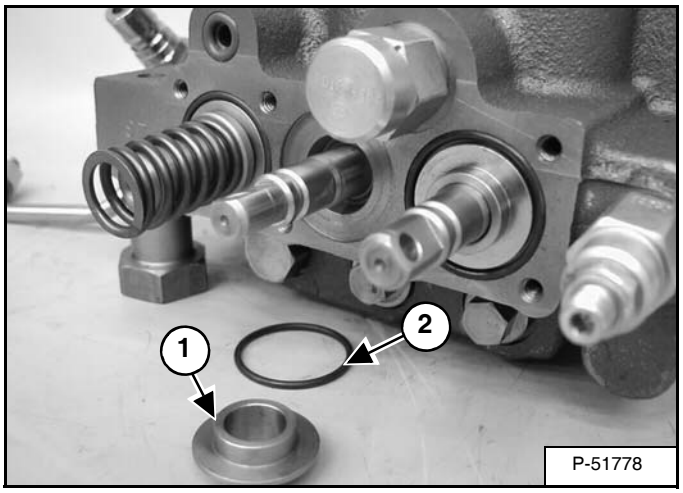
Install the lift and tilt actuators to the control valve.

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Tilt Spool Removal and Installation

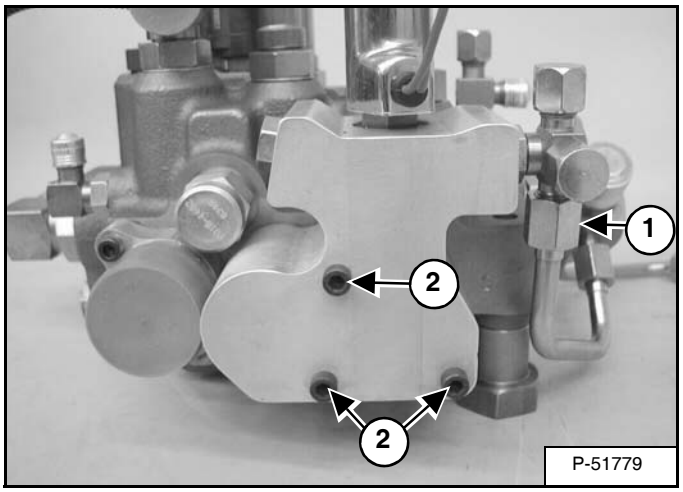
Remove the end cap block. (See End Cap Block Removal and Installation on Page 20-43-16.)

Figure 20-43-70



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-43-70]** from the tilt spool.

Figure 20-43-71

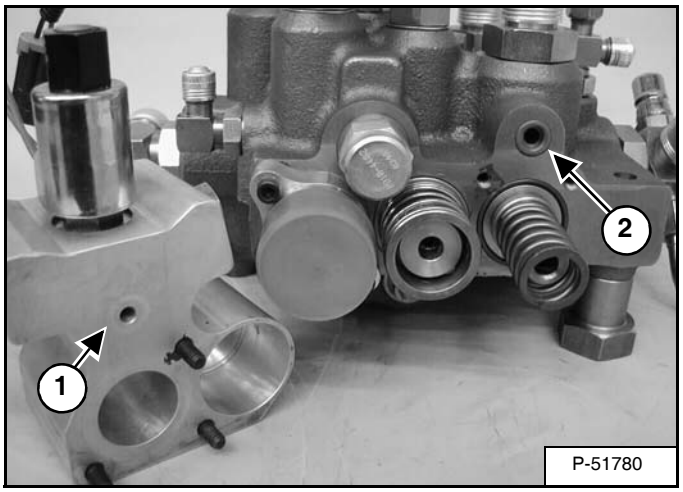


Disconnect the tubeline (Item 1) **[Figure 20-43-71]**.

Remove the three screws (Item 2) **[Figure 20-43-71]** from the spool centering block.

Installation: Tighten the bolt to 90-100 in.-lb. (10-11,3 N•m) torque.

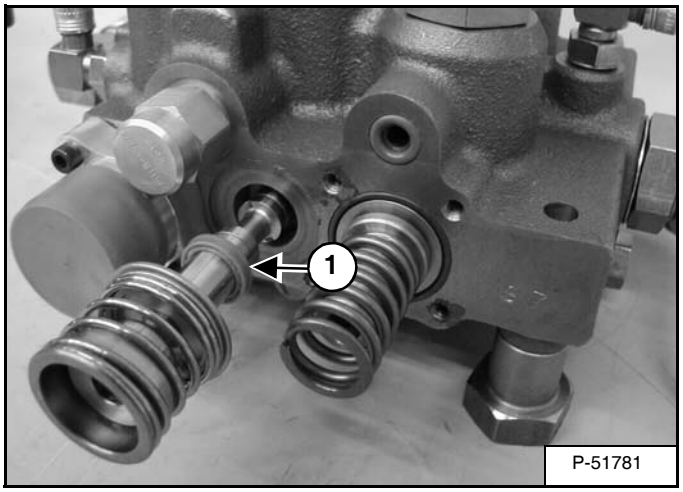
Figure 20-43-72



Remove the spool centering block (Item 1) **[Figure 20-43-72]** from the control valve.

Check and replace the O-ring (Item 2) **[Figure 20-43-72]** before replacing the spool centering block.

Figure 20-43-73



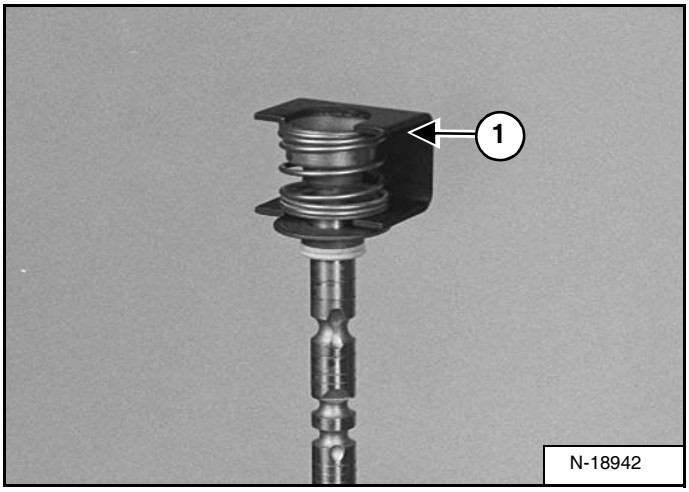
Remove the tilt spool, centering spring, back-up washer and spool seal (Item 1) **[Figure 20-43-73]**.

Assembly: Always use a new spool seal.

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Tilt Spool Removal And Installation (Cont'd)

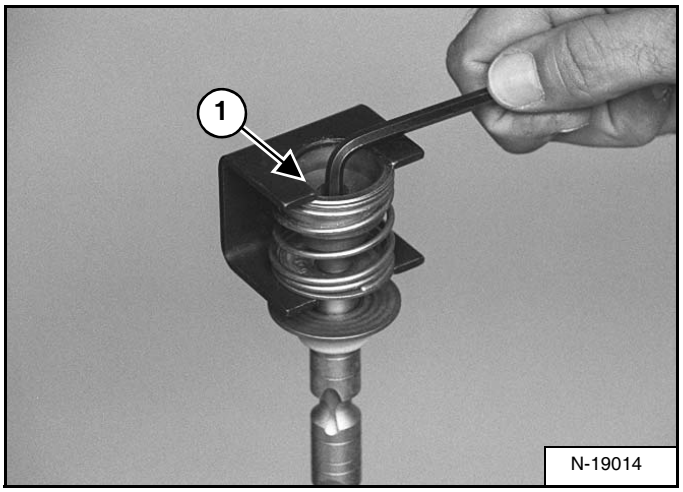
Figure 20-43-74



Put the linkage end of the spool in the vice **[Figure 20-43-74]**.

Install the spring tool (Item 1) **[Figure 20-43-74]** over the centering spring.

Figure 20-43-75

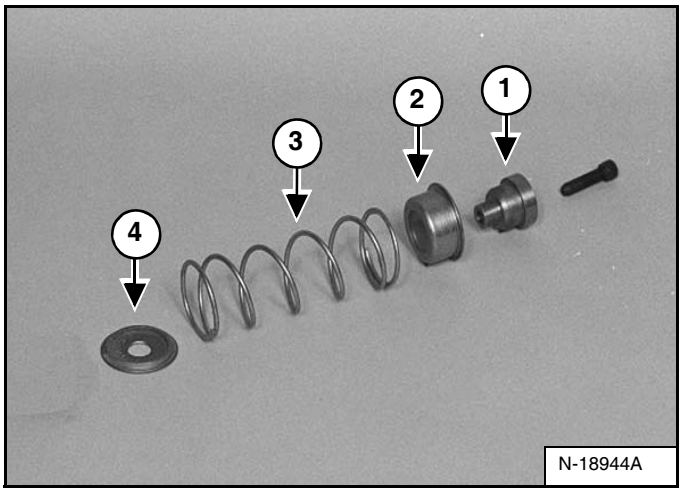


Remove the bolt (Item 1) **[Figure 20-43-75]** holding the centering spring to the spool.

Installation: Tighten the bolt to 90-100 in.-lb. (10,2-11,3 N•m) torque.

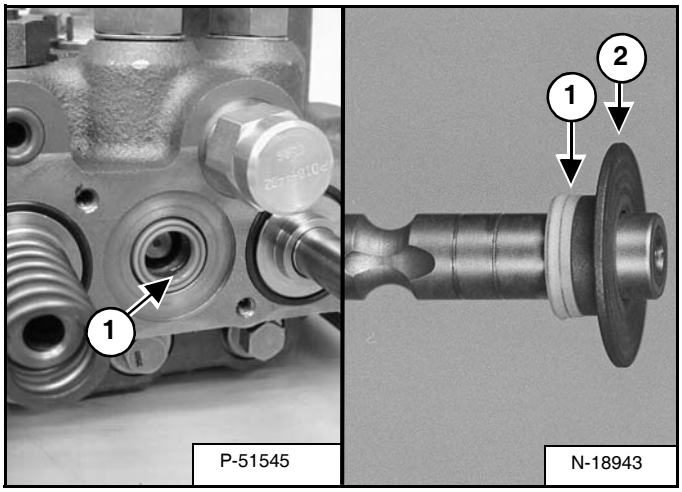
Remove spring tool from the spring assembly.

Figure 20-43-76



Inspect the adapter (Item 1), collar (Item 2), spring (Item 3) and washer (Item 4) **[Figure 20-43-76]**.

Figure 20-43-77



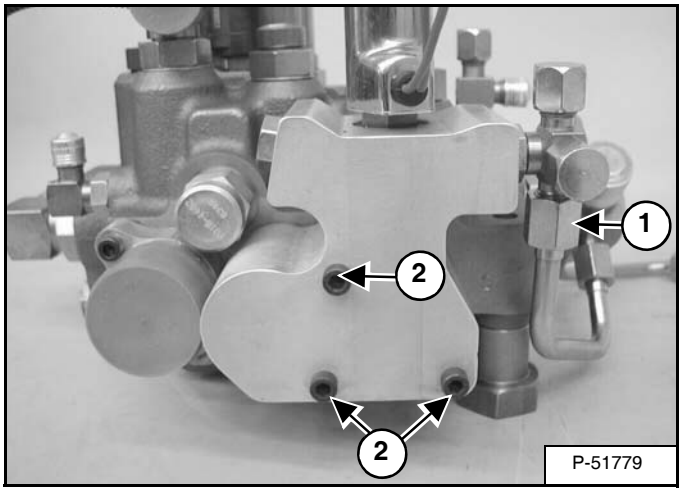
Remove the spool seal(s) (Item 1) and the back-up washer (Item 2) **[Figure 20-43-77]**.

Assembly: Always use a new spool seal.

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Auxiliary Spool Removal And Installation

Figure 20-43-78



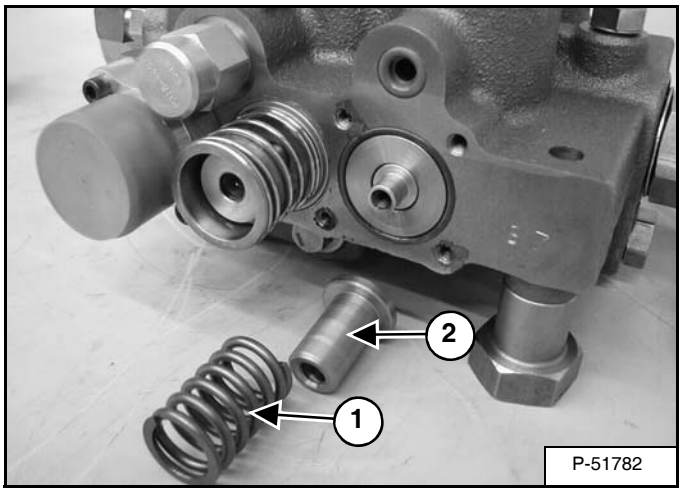
Disconnect the tubeline (Item 1) **[Figure 20-43-78]** from the spool centering block.

Remove the three screws (Item 2) **[Figure 20-43-78]** from the spool centering block.

Installation: Tighten the bolt to 90-100 in.-lb. (10-11,3 N•m) torque.

Remove the spool centering block from the control valve.

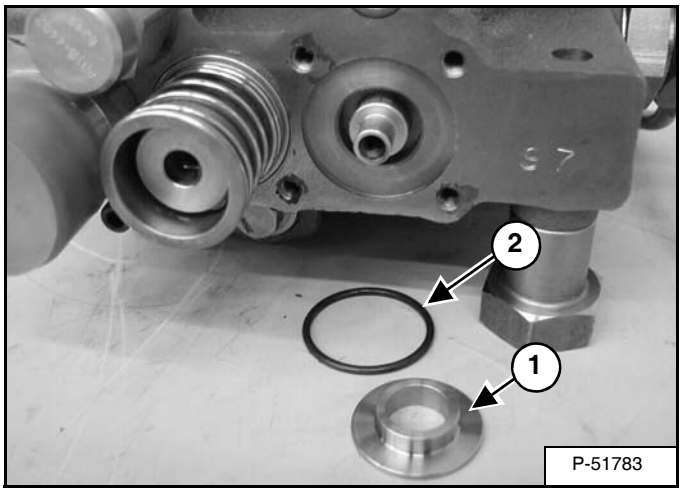
Figure 20-43-79



Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-43-79]** from the auxiliary spool.

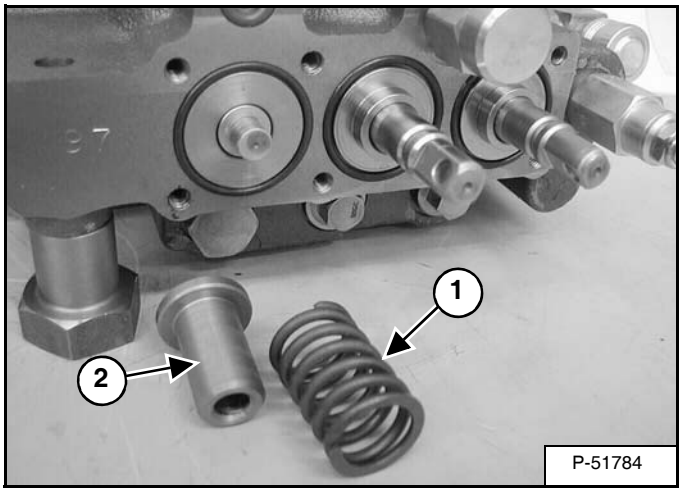
Note: If the centering spring retainer (Item 2) [Figure 20-43-79] must be replaced, replace the retainer on the opposite end also.

Figure 20-43-80



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-43-80]** from the auxiliary spool.

Figure 20-43-81



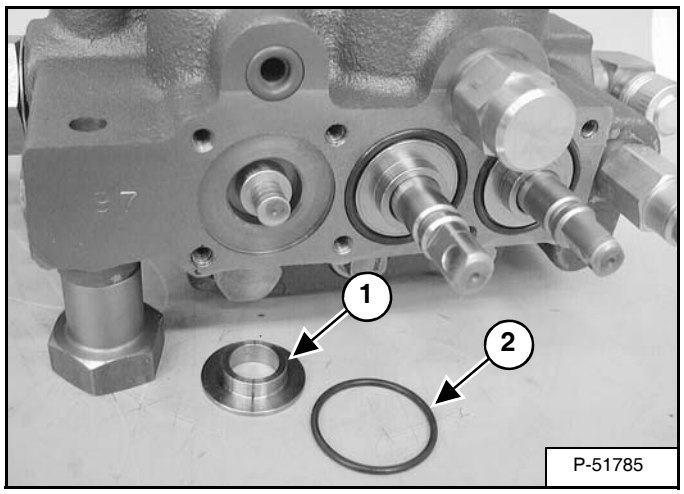
Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-43-81]** from the auxiliary spool.

NOTE: If the centering spring retainer (Item 2) [Figure 20-43-81] must be replaced, replace the retainer on the opposite end also.

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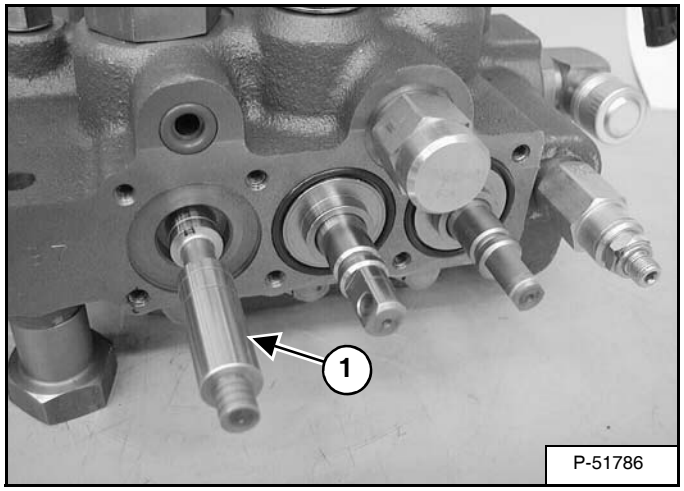
Auxiliary Spool Removal And Installation (Cont'd)

Figure 20-43-82



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-43-82]** from the auxiliary spool.

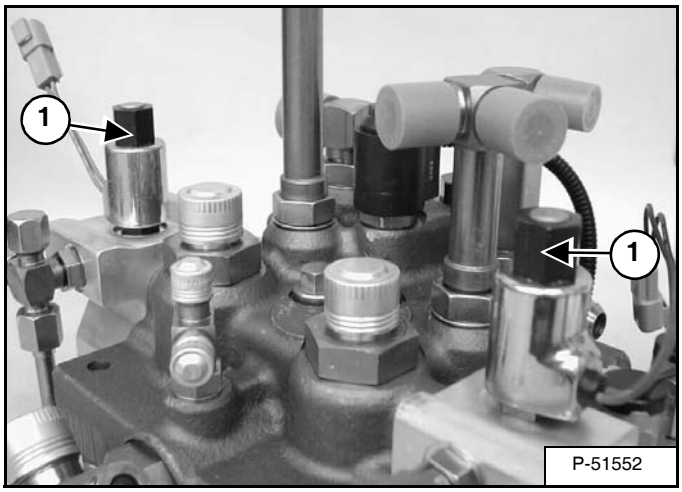
Figure 20-43-83



Remove the auxiliary spool (Item 1) **[Figure 20-43-83]**.

Auxiliary Solenoid Disassembly and Assembly

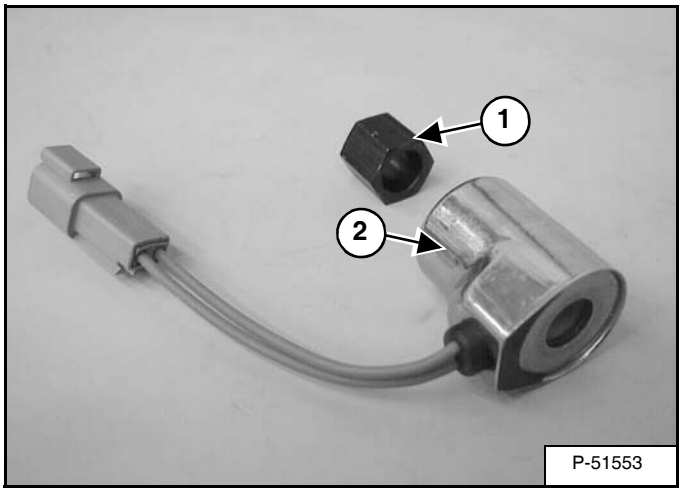
Figure 20-43-84



Remove the nut (Item 1) **[Figure 20-43-84]** from both solenoids.

Installation: Tighten the nut to 48-72 in.-lb. (5-8 N•m) torque.

Figure 20-43-85



Remove the nut (Item 1) and solenoid coil (Item 2) **[Figure 20-43-85]**.

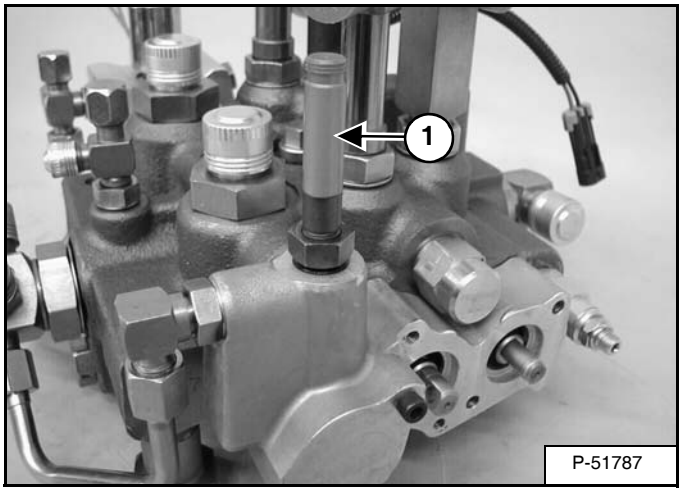
Use an Ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is **4.9 ± .25 Ohms**.

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Auxiliary Solenoid Disassembly and Assembly (Cont'd)

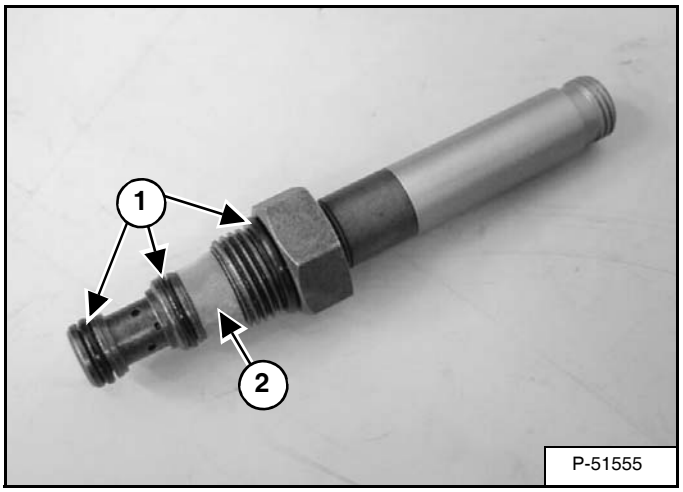
Figure 20-43-86



Remove the solenoid stem (Item 1) **[Figure 20-43-86]**.

Installation: Tighten the stem to 10-14 ft.-lb. (14-19 N•m) torque.

Figure 20-43-87

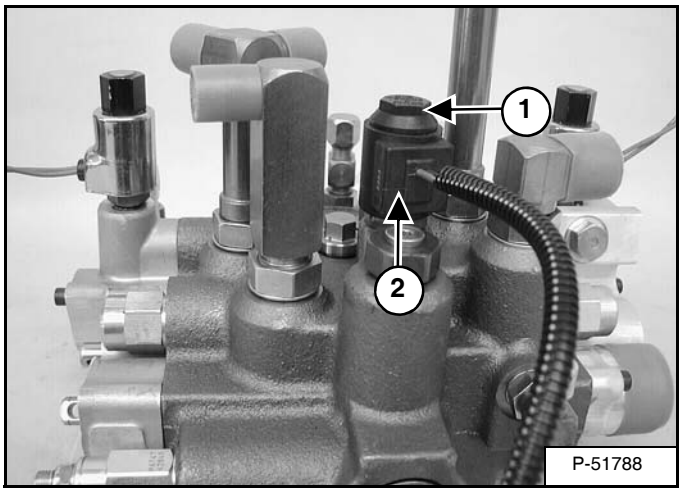


Remove the O-rings (Item 1) **[Figure 20-43-87]** from the solenoid stem.

Check and clean the screen (Item 2) **[Figure 20-43-87]**.

BICS™ Valve Solenoid Disassembly And Assembly

Figure 20-43-88

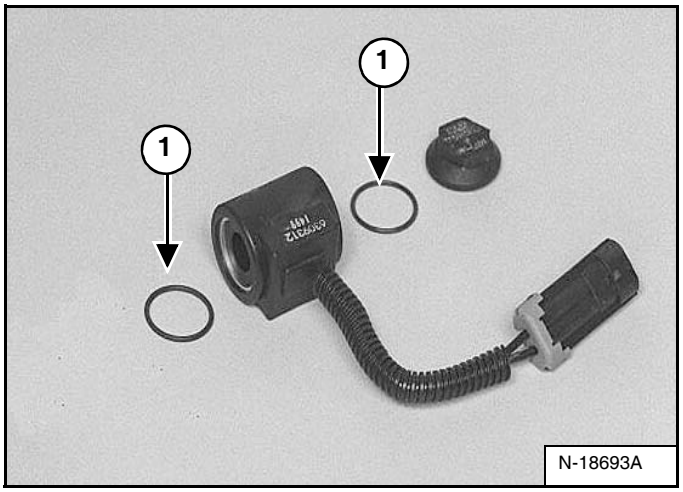


Remove the nut (Item 1) **[Figure 20-43-88]** from the solenoid stem.

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

Remove the solenoid coil (Item 2) **[Figure 20-43-88]**.

Figure 20-43-89



Remove the O-rings (Item 1) **[Figure 20-43-89]** from both ends of the solenoid coil.

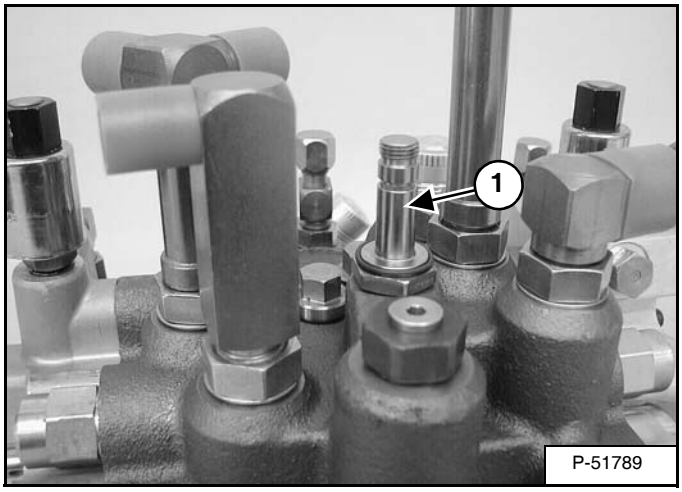
Use an Ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is **9.79 ± .29 Ohms**.

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BICS™ Valve Solenoid Disassembly And Assembly (Cont'd)

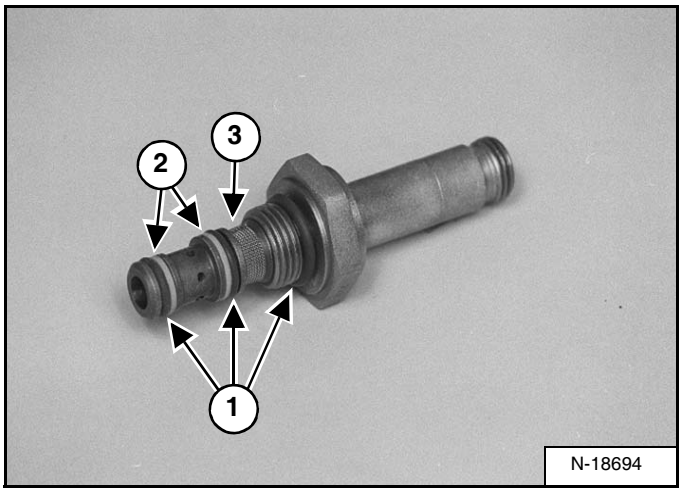
Figure 20-43-90



Remove the solenoid stem (Item 1) **[Figure 20-43-90]**.

Installation: Lubricate the O-rings and tighten the stem to 20-24 ft.-lb. (27-33 N•m) torque.

Figure 20-43-91



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-43-91]** from the stem.

Clean all parts in solvent and dry with compressed air.

Inspect all parts for wear and replace any showing excessive wear.

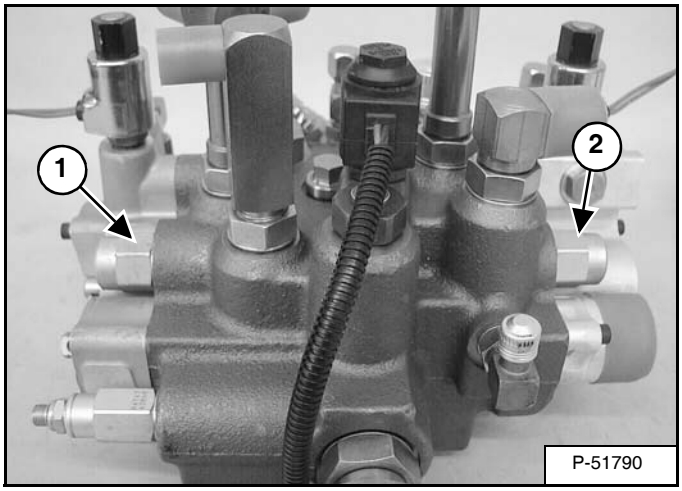
NOTE: The screen (Item 3) [Figure 20-43-91] may be cleaned with solvent. If it is torn or worn it needs to be replaced.

Use only new O-rings and apply oil to all O-rings and back-up rings before installation.

Install new O-rings (Item 1) **[Figure 20-43-89]** & **[Figure 20-43-91]** and new back-up rings (Item 2) **[Figure 20-43-91]** on the solenoid stem.

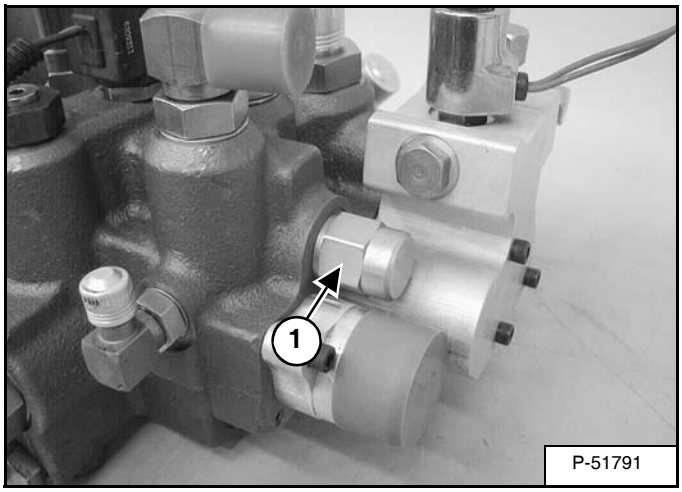
BICS™ Valve, Lock Valve Removal And Installation

Figure 20-43-92



Locate the two BICS™ lock valves, (Item 1) is for the tilt circuit and (Item 2) **[Figure 20-43-92]** is for the lift circuit.

Figure 20-43-93



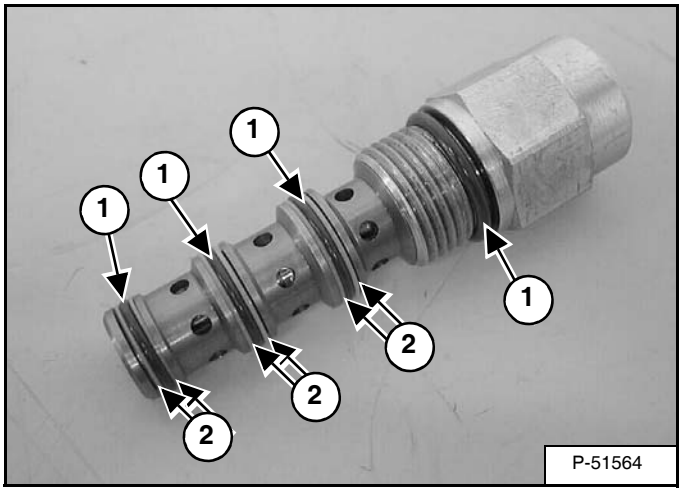
Remove the lift lock valve (Item 1) **[Figure 20-43-93]** from the back of the control valve.

Installation: Lightly lubricate the lock valve o-rings and tighten to 20-24 ft.-lb. (27-33 N•m) torque.

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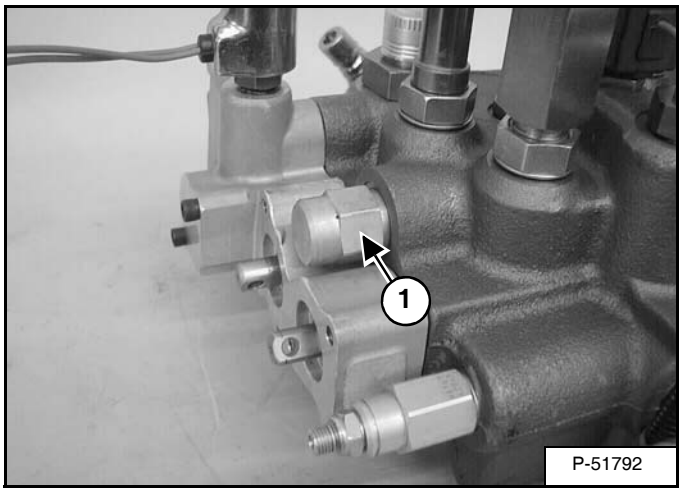
BICS™ Valve, Lock Valve Removal And Installation (Cont'd)

Figure 20-43-94



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-43-94]** from the lift lock valve, and replace with new.

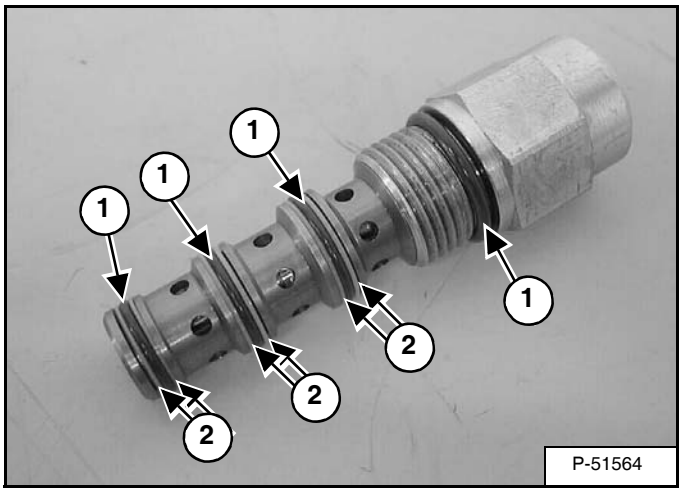
Figure 20-43-95



Remove the tilt lock valve (Item 1) **[Figure 20-43-95]** from the back of the control valve.

Installation: Lightly lubricate the lock valve o-rings and tighten to 20-24 ft.-lb. (27-33 N•m) torque.

Figure 20-43-96

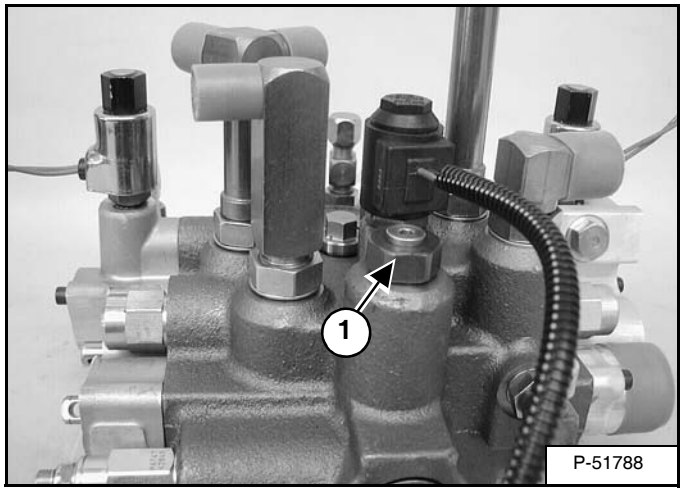


Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-43-96]** from the tilt lock valve, and replace with new.

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BICS™ Valve, Check Valve Removal And Installation

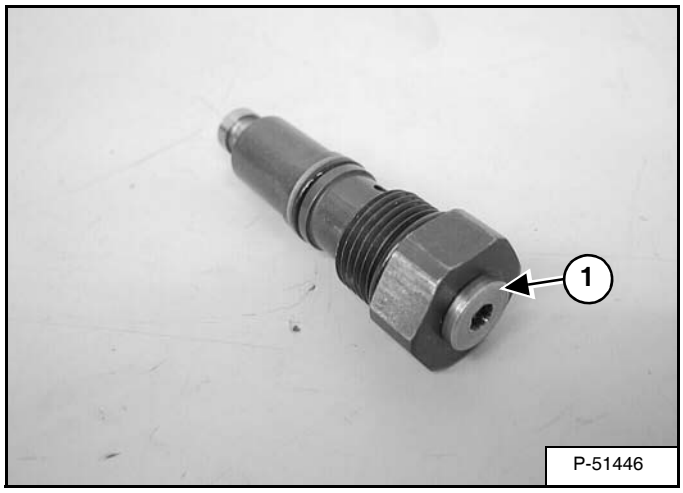
Figure 20-43-97



Remove the BICS™ valve (Item 1) **[Figure 20-43-97]**.

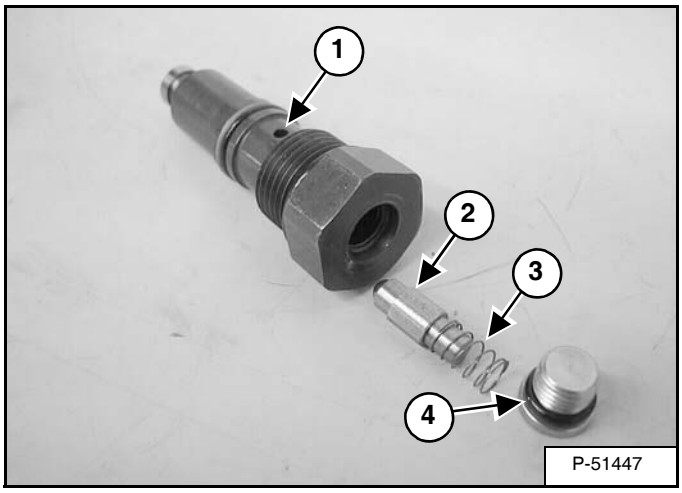
Installation: Lubricate the o-ring and tighten the valve to 55-65 ft.-lb. (75-88 N•m) torque.

Figure 20-43-98



Remove the plug (Item 1) **[Figure 20-43-98]** from the top of the BICS™ valve.

Figure 20-43-99



Check that there is no blockage in the orifice (Item 1) **[Figure 20-43-99]**.

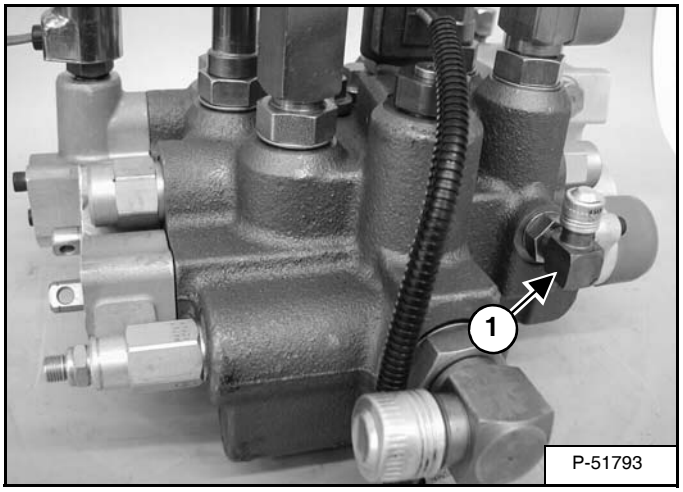
Inspect the check valve (Item 2) and spring (Item 3) **[Figure 20-43-99]**.

Replace the O-ring (Item 4) **[Figure 20-43-99]** on the plug before installation.

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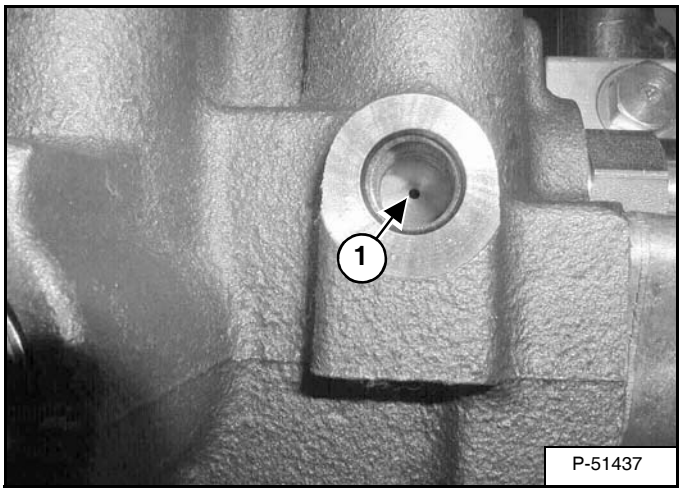
BICS™ Valve, Lift Arm By-Pass Orifice Disassembly And Assembly

Figure 20-43-100



Remove the fitting (Item 1) **[Figure 20-43-100]** from the valve.

Figure 20-43-101

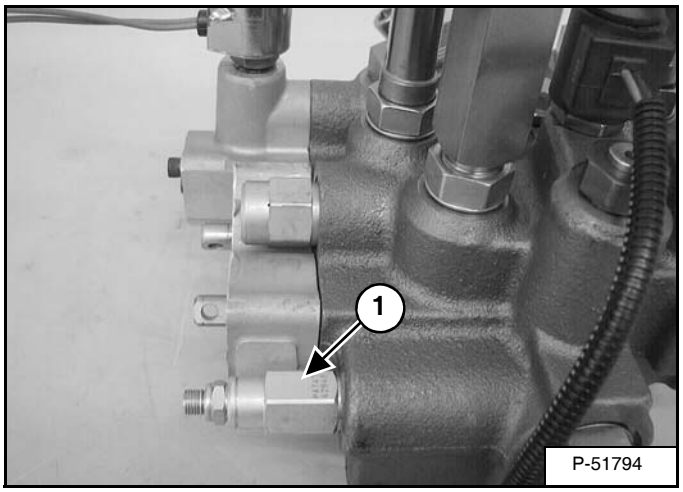


Check the lift arm by-pass orifice (Item 1) **[Figure 20-43-101]**.

NOTE: This orifice is not removable from the valve casting.

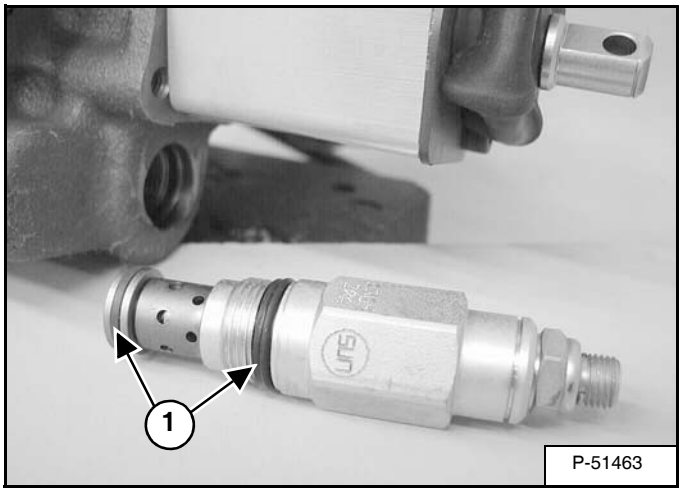
Main Relief Valve

Figure 20-43-102



Remove the main relief valve (Item 1) **[Figure 20-43-102]**.

Figure 20-43-103



Remove the O-rings from the main relief valve (Item 1) **[Figure 20-43-103]**.

Installation: Always use new O-rings. Tighten to 38-45 ft.-lb. (52-61 N•m) torque.

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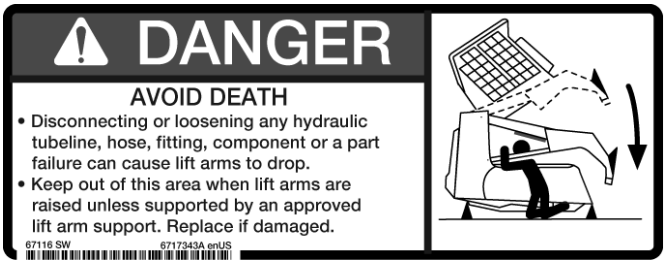


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LIFT ARM BY-PASS CONTROL VALVE

Raise the lift arms 6 feet (2 m) off the ground. Stop the engine. Turn the Lift Arm By-Pass Control Knob clockwise 1/4 turn. Then pull the Lift Arm By-Pass Control Knob until the lift arms slowly lower.

Removal and Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

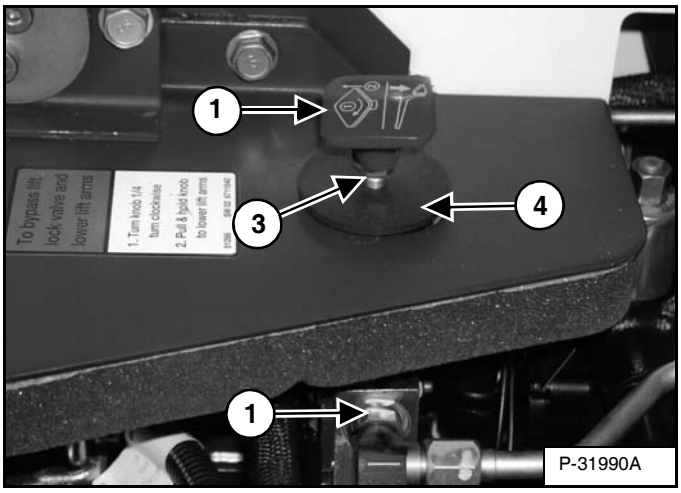
W-2059-0598

Install jack stands under the rear corners of the loader.

Start the engine. Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab.(See Raising The Operator Cab on Page 10-30-1.)

Figure 20-50-1



The Lift Arm By-Pass valve (Item 1) **[Figure 20-50-1]** is located under the right side of the control panel.

Hold the Lift Arm By-Pass Control knob (Item 2) and loosen the jam nut (Item 3) on the Lift Arm By-Pass valve shaft **[Figure 20-50-1]**.

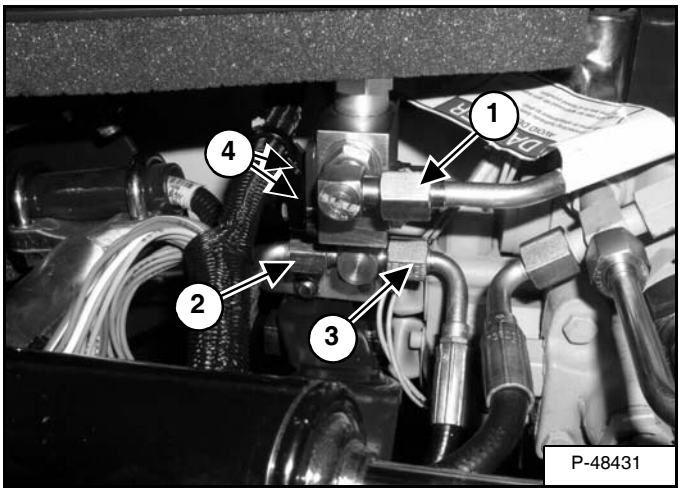
Remove the Lift Arm By-Pass Control knob (Item 2) and the jam nut (Item 3) from the Lift Arm By-Pass valve shaft **[Figure 20-50-1]**.

Remove the rubber washer (Item 4) **[Figure 20-50-1]**.

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Removal And Installation (Cont'd)

Figure 20-50-2



Disconnect the base end lift tubeline (Item 1) **[Figure 20-50-2]** from the Lift Arm By-Pass valve.

Disconnect the drain hose (Item 2) **[Figure 20-50-2]** from the Lift Arm By-Pass valve.

Disconnect the motor case drain hose (Item 3) **[Figure 20-50-2]**.

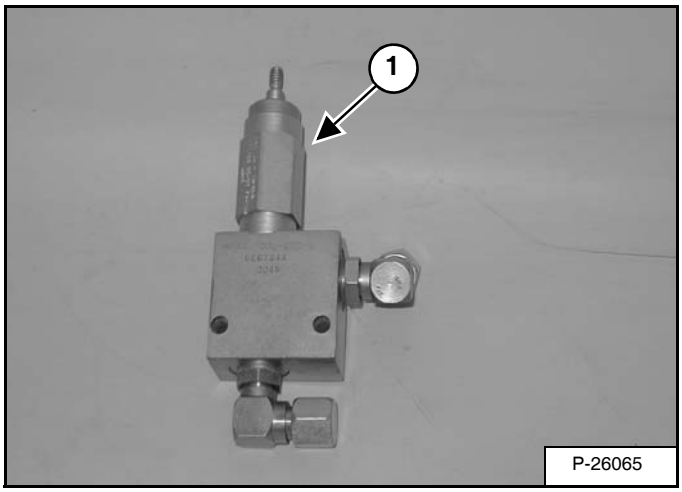
Remove the two mounting bolt/nuts (Item 4) **[Figure 20-50-2]**.

Installation: Tighten the mounting bolts to 180-200 in. lb. (21-23 N•m) torque.

Remove the lift arm by-pass control valve.

Disassembly And Assembly

Figure 20-50-3



Remove the by-pass valve (Item 1) **[Figure 20-50-3]** from the valve block. Inspect the by-pass valve for damage and replace if necessary.

Installation: Tighten the valve to 33-37 ft.-lb. (45-50 N•m) torque.

Inspect the hydraulic fittings on the valve block for damage and replace if necessary.

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HYDRAULIC PUMP

Check The Output Of The Hydraulic Pump Without Power Bob-Tach

WARNING

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

W-2017-0286

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

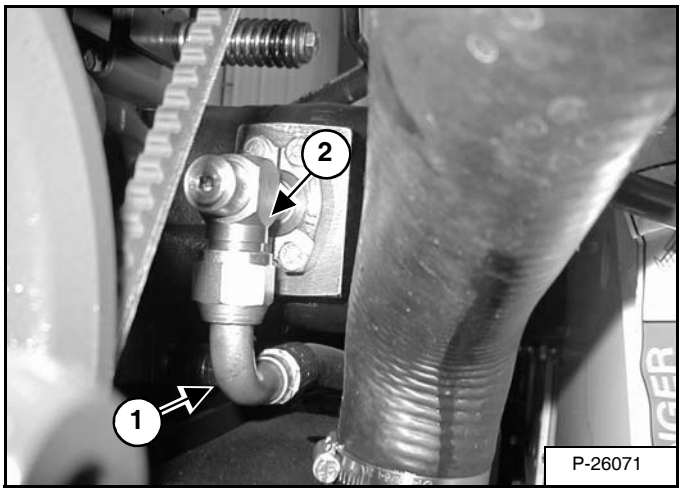
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

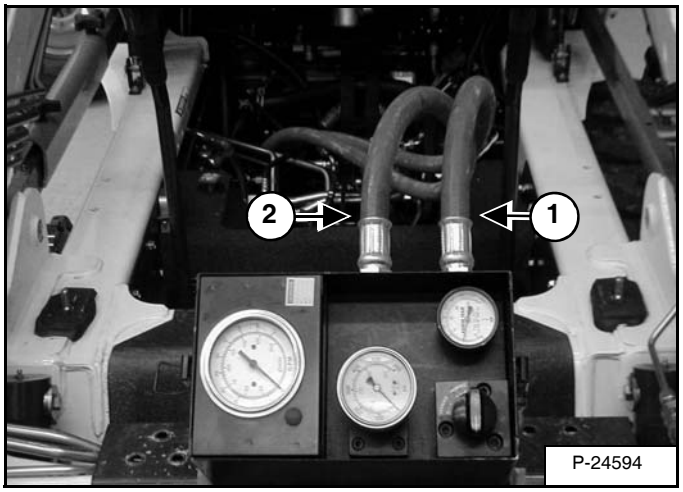
Connect the remote start tool. (See Procedure on Page 10-60-1.)

Figure 20-60-1



Disconnect the OUTLET hose (Item 1) **[Figure 20-60-1]** from the pump.

Figure 20-60-2



Connect the INLET hose (Item 1) **[Figure 20-60-2]** from the tester to the OUTLET fitting (Item 2) **[Figure 20-60-1]** of the pump. Connect the OUTLET hose (Item 2) **[Figure 20-60-2]** from the tester to the hose (Item 1) **[Figure 20-60-1]** which was disconnected from the pump.

IMPORTANT

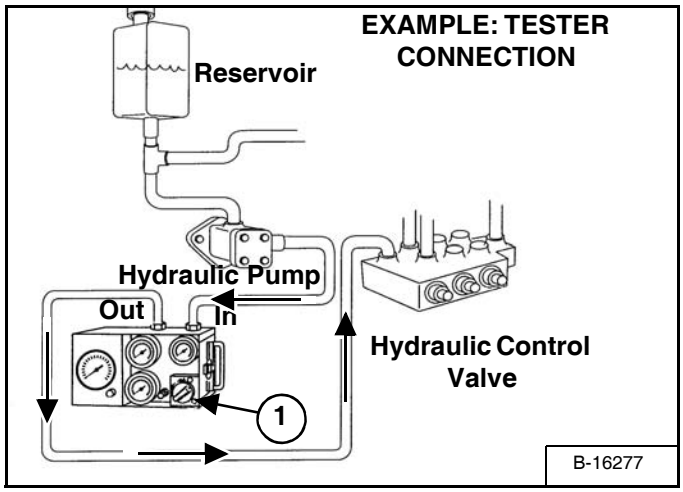
The hydraulic tester must be in the fully open position before you start the engine.

I-2024-0284

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Check The Output Of The Hydraulic Pump Without Power Bob-Tach (Cont'd)

Figure 20-60-3



Sample tester connection shown **[Figure 20-60-3]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-60-3]** on the tester to about 1000 PSI (6895 kPa). **DO NOT EXCEED SYSTEM RELIEF PRESSURE.** Open the restrictor control and record the free flow (GPM) at full RPM.

Push the maximum/variable flow switch (on the remote start tool) to engage the front auxiliary hydraulics. The light will come ON. Push the button (on the right control lever) for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *SPECIFICATIONS* Section SPEC-01 for system relief pressure and full RPM.

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Check The Output Of The Hydraulic Pump With Power Bob-Tach.

⚠ WARNING

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

W-2017-0286

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

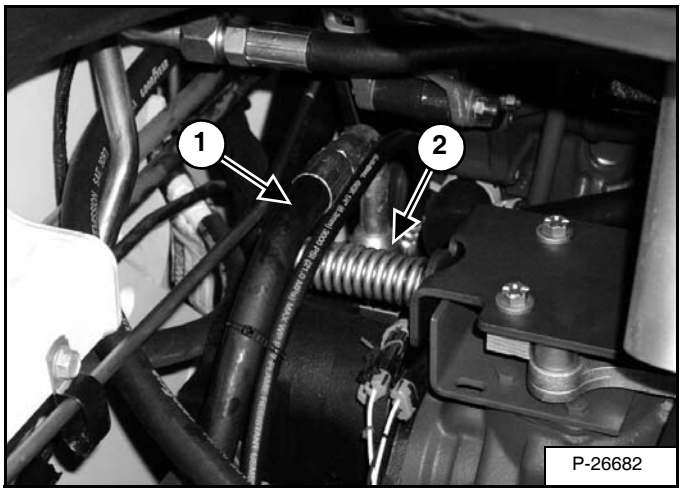
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

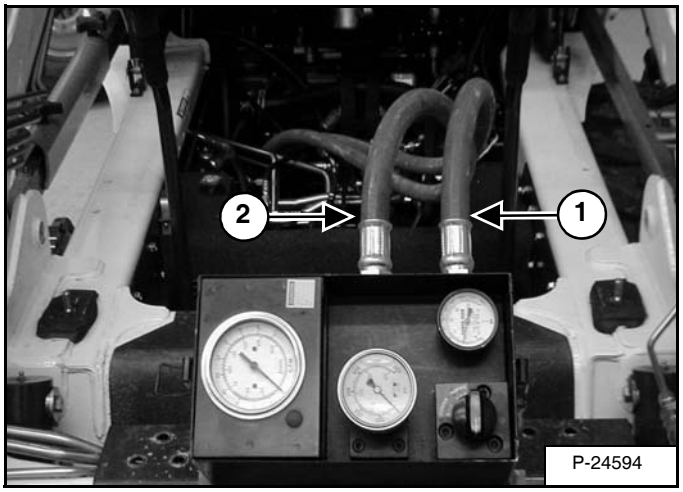
Connect the remote start tool. (See Procedure on Page 10-60-1.)

Figure 20-60-4



Disconnect the OUTLET hose (Item 1) **[Figure 20-60-4]** from the top of the Power Bob-Tach block.

Figure 20-60-5



Connect the INLET hose (Item 1) **[Figure 20-60-5]** from the tester to the OUTLET fitting (Item 2) **[Figure 20-60-4]** on the top of the Power Bob-Tach block. Connect the OUTLET hose (Item 2) **[Figure 20-60-5]** from the tester to the hose (Item 1) **[Figure 20-60-4]** which was disconnected from the Power Bob-Tach block.

IMPORTANT

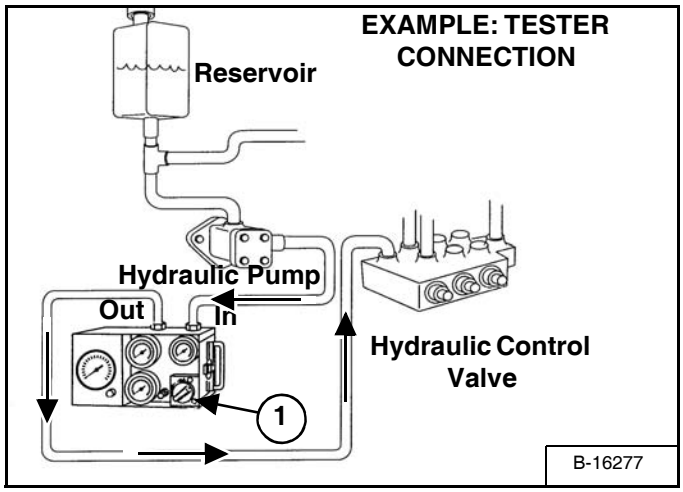
The hydraulic tester must be in the fully open position before you start the engine.

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Check The Output Of The Hydraulic Pump With Power Bob-Tach. (Cont'd)

Figure 20-60-6



Sample tester connection shown **[Figure 20-60-6]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-60-6]** on the tester to about 1000 PSI (6895 kPa). **DO NOT EXCEED SYSTEM RELIEF PRESSURE.** Open the restrictor control and record the free flow (GPM) at full RPM.

Push the maximum/variable flow switch (on the remote start tool) to engage the front auxiliary hydraulics. The light will come ON. Push the button (on the right control lever) for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

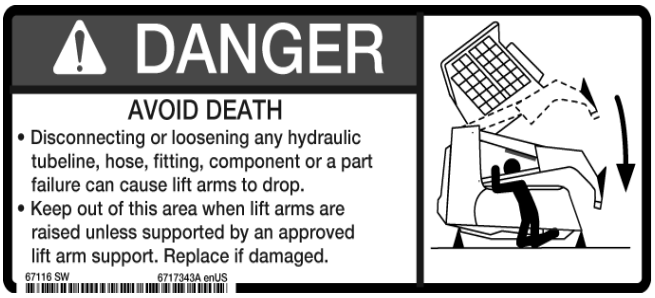
$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *SPECIFICATIONS* Section SPEC-01 for system relief pressure and full RPM.

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Removal And Installation

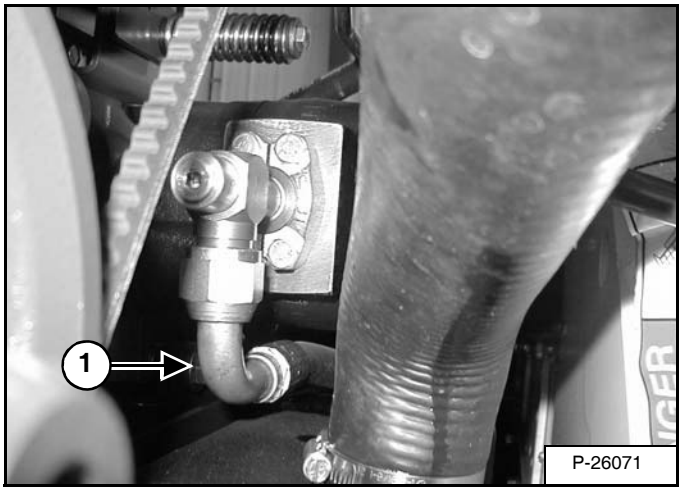


WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 20-60-7



Raise the lift arms and install an approved lift arm support device. (See Procedure on Page 10-10-1.)

Stop the engine. Raise the seat bar.

Lift and block the rear of the loader. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

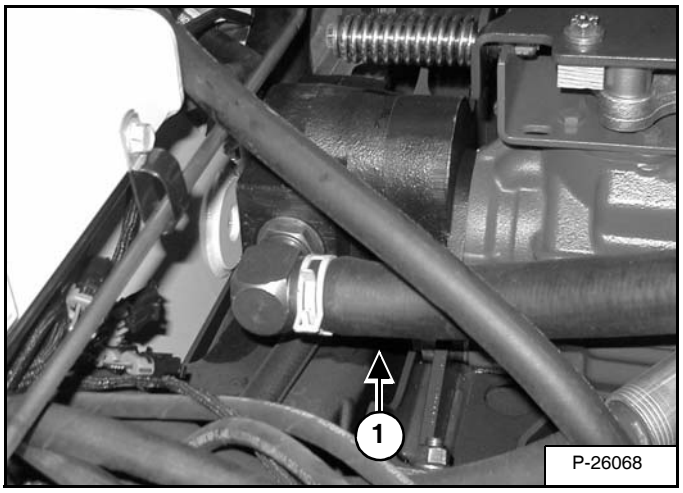
Drain the hydraulic fluid from the reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Open the rear door of the loader.

Remove the Power Bob-Tach block if equipped. (See Removal And Installation on Page 20-120-1.)

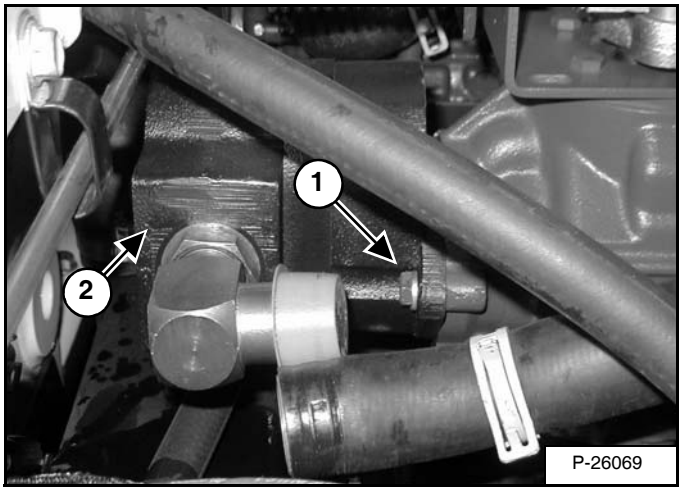
Disconnect and cap the outlet hose (Item 1) **[Figure 20-60-7]** from the back of the hydraulic pump.

Figure 20-60-8



Disconnect and cap the inlet hose (Item 1) **[Figure 20-60-8]** from the front of the hydraulic pump.

Figure 20-60-9



Remove the two mounting bolts (Item 1) **[Figure 20-60-9]** from the hydraulic pump.

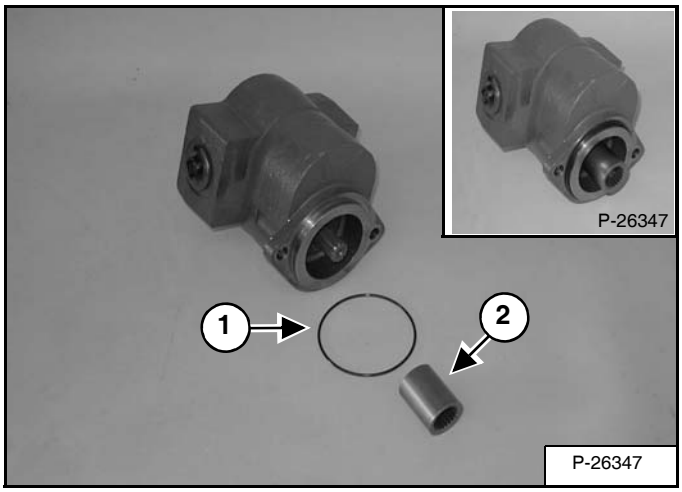
Installation: Tighten the mounting bolts to 27-37 in.-lb. (37-50 N•m) torque.

Remove the hydraulic pump (Item 2) **[Figure 20-60-9]** from the hydrostatic pump.

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Removal And Installation (Cont'd)

Figure 20-60-10



Remove the O-ring (Item 1) **[Figure 20-60-10]**.

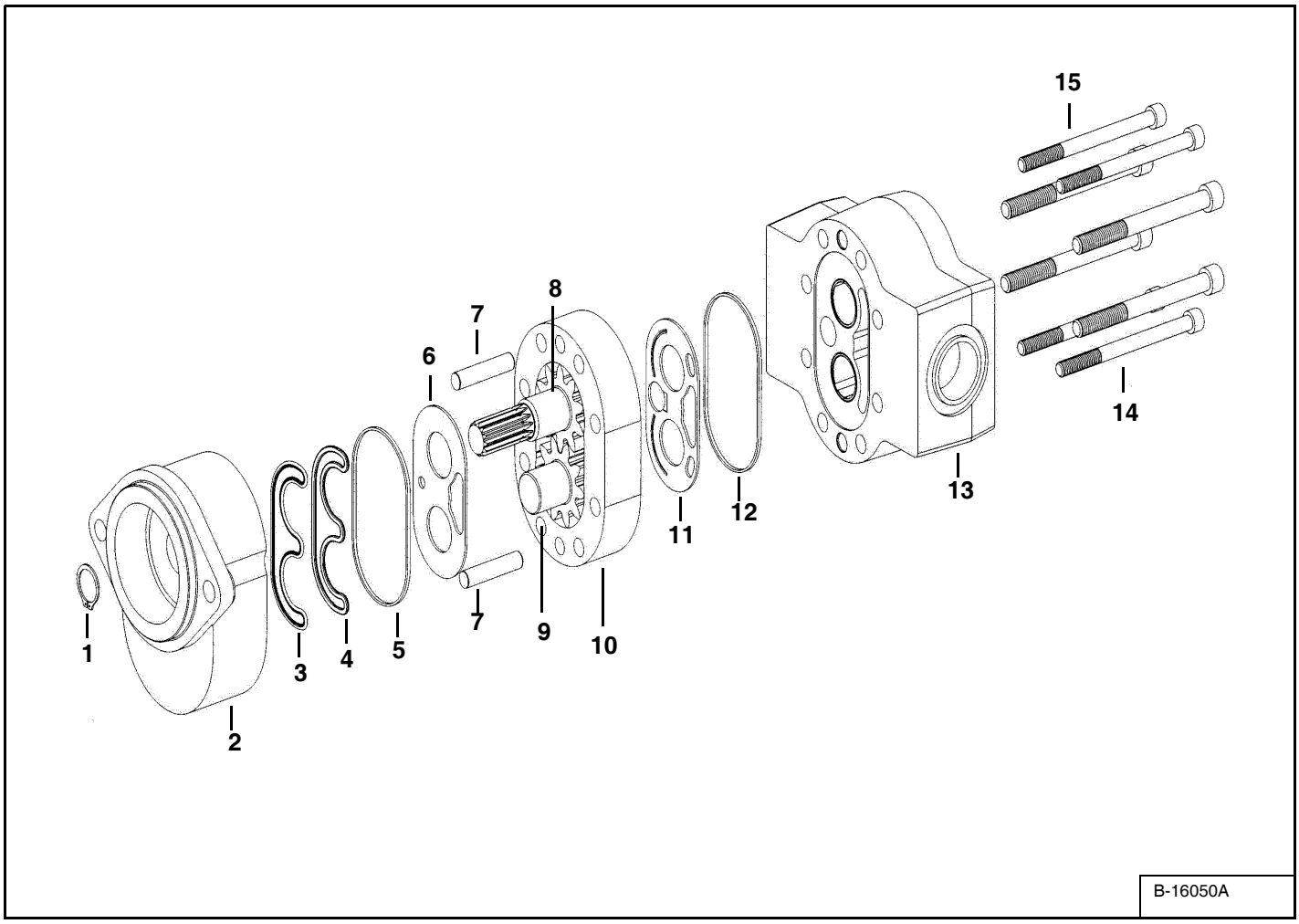
Remove the coupler (Item 2) **[Figure 20-60-10]** from the hydraulic pump shaft.

Reverse the removal procedure to install the hydraulic pump.

Installation: Use a new O-ring (Item 1) **[Figure 20-60-10]** when installing the hydraulic pump. (See Disassembly And Assembly on Page 20-60-8.)

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Identification

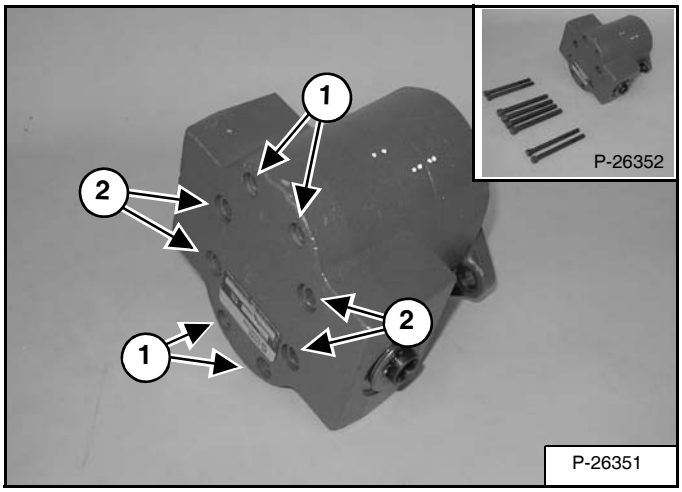


REF.	DESCRIPTION	REF.	DESCRIPTION
1	RETAINING RING	9	IDLER GEAR
2	PUMP END SECTION	10	PUMP CENTER SECTION
3	PRE-LOAD SEAL	11	WEAR PLATE
4	LOAD SEAL	12	SECTION SEAL
5	SECTION SEAL	13	PUMP END SECTION
6	WEAR PLATE	14	BOLTS (4)
7	PINS	15	BOLTS (4)
8	DRIVE GEAR		

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Disassembly And Assembly

Figure 20-60-11



Mark the pump sections for correct assembly **[Figure 20-60-11]**.

Remove the four smaller pump housing bolts (Item 1) **[Figure 20-60-11]**.

Remove the four larger pump housing bolts (Item 2) **[Figure 20-60-11]**.

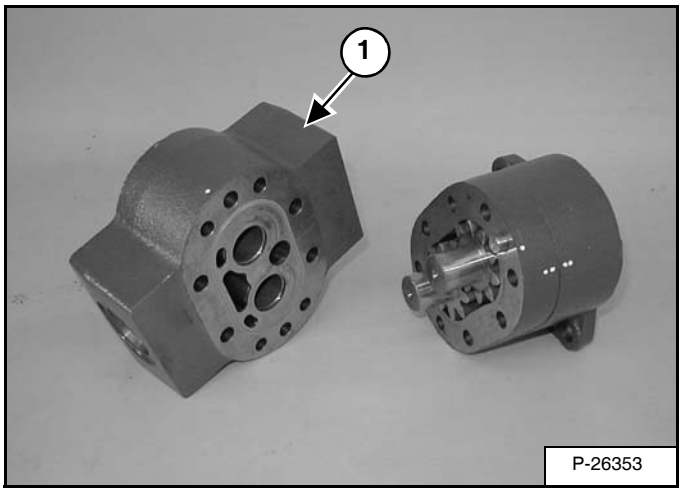
Installation: Tighten the four smaller bolts (Item 1) to 30 ft.-lb. (40,7 N•m) torque. Tighten the four larger bolts (Item 2) **[Figure 20-60-11]** to 54 ft.-lb. (73,2 N•m) torque.

IMPORTANT

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

I-2003-0888

Figure 20-60-12



Remove the pump end section (Item 1) **[Figure 20-60-12]**.

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Disassembly And Assembly (Cont'd)

Figure 20-60-13

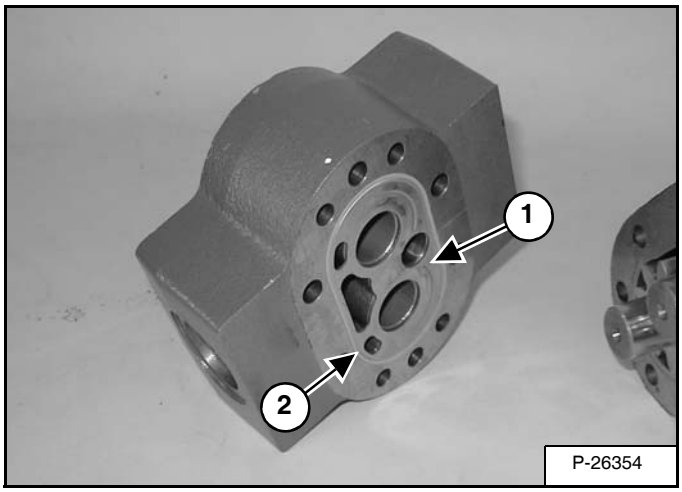
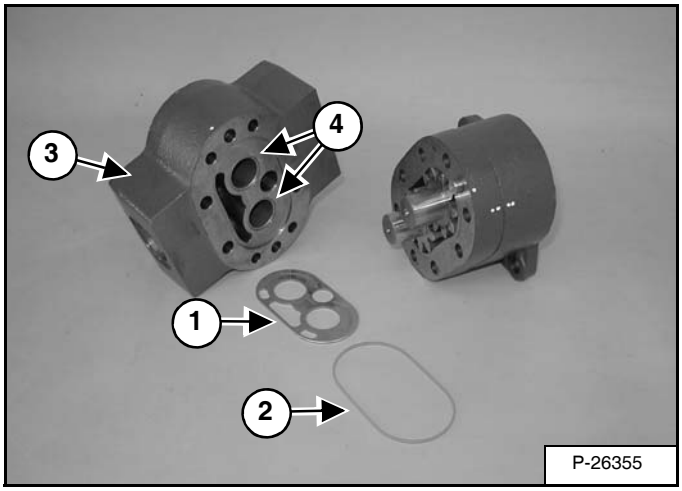


Figure 20-60-14



Remove the wear plate (Item 1) **[Figure 20-60-13]** & **[Figure 20-60-14]** and section seal (Item 2) **[Figure 20-60-13]** & **[Figure 20-60-14]** from the pump end section.

NOTE: Position wear plate (Item 1) [Figure 20-60-14] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the pump end section (Item 3) and bushings (Item 4) [Figure 20-60-14]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-60-15

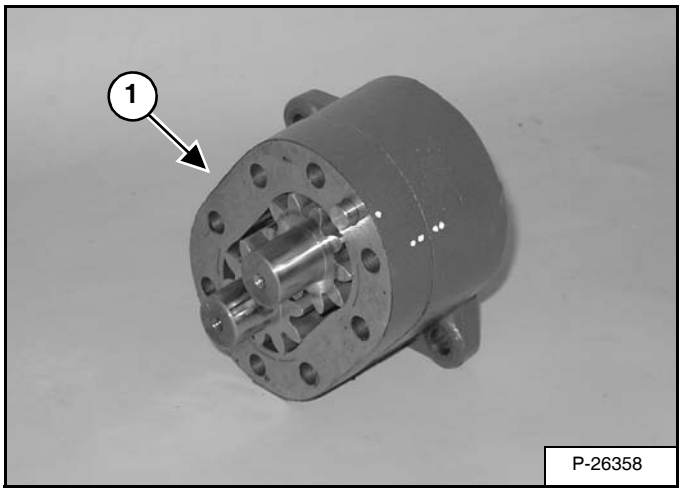
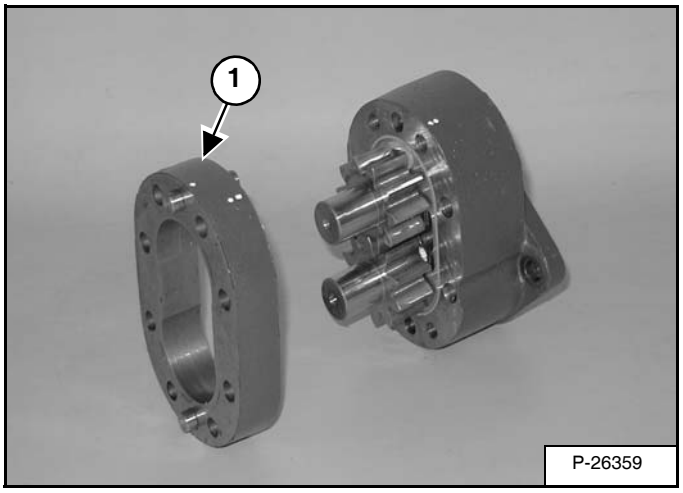


Figure 20-60-16



Remove the pump center section (Item 1) **[Figure 20-60-15]** & **[Figure 20-60-16]** from the pump end section.

NOTE: Inspect the pump center section (Item 1) [Figure 20-60-16]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-60-17

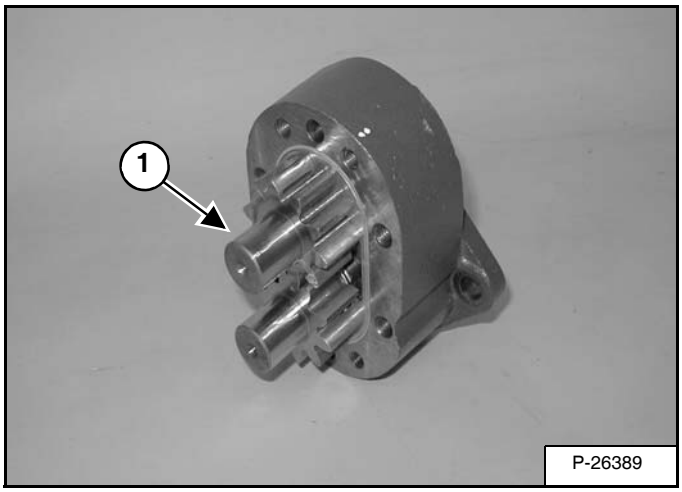
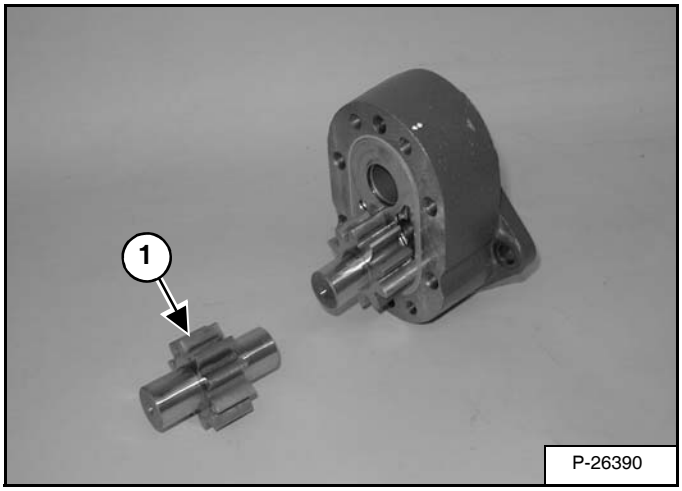


Figure 20-60-18



Remove the idler gear (Item 1) **[Figure 20-60-17]** & **[Figure 20-60-18]**.

NOTE: Inspect the idler gear (Item 1) [Figure 20-60-18]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-60-19

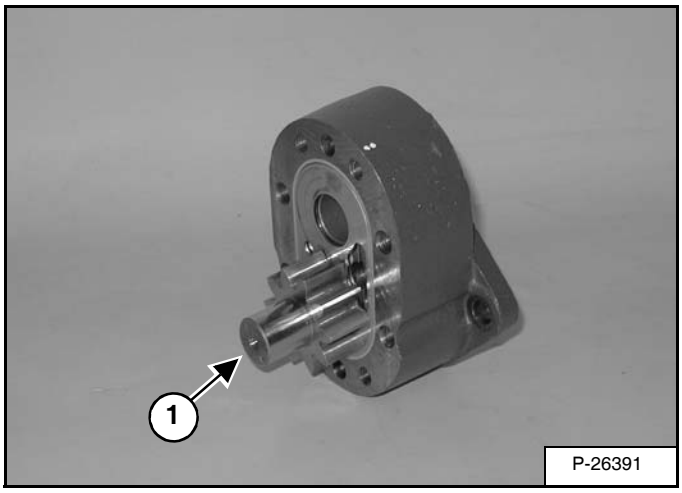
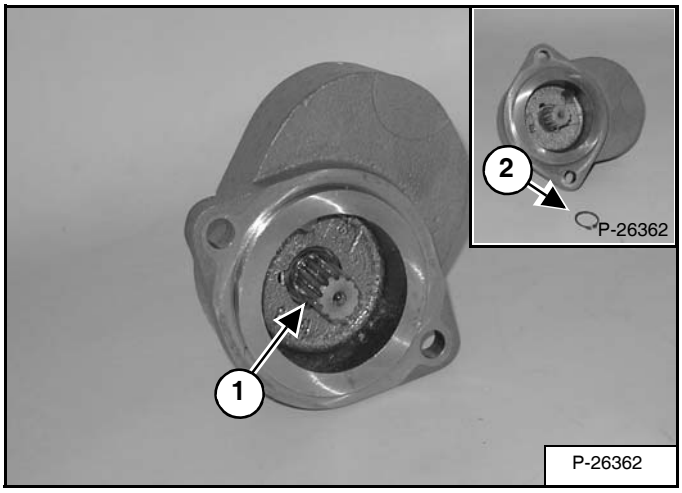


Figure 20-60-20

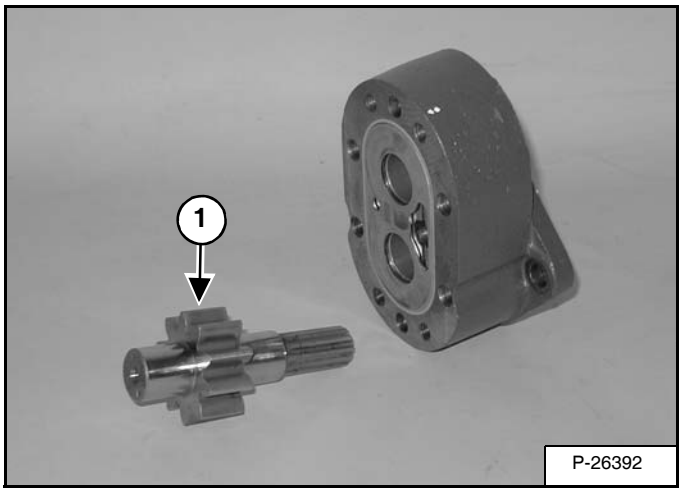


To remove the drive gear (Item 1) **[Figure 20-60-19]** from the pump end section, locate and remove the retaining ring (Item 2) (Inset) **[Figure 20-60-20]** from the spline end of the drive gear.

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Disassembly And Assembly (Cont'd)

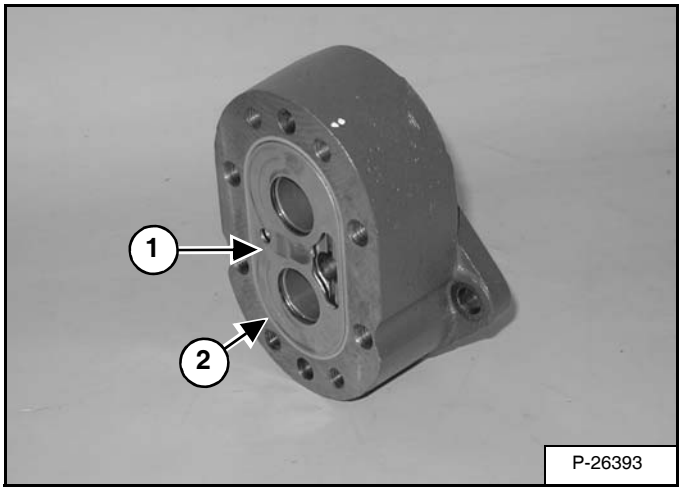
Figure 20-60-21



Remove the drive gear (Item 1) **[Figure 20-60-21]** from the pump end section.

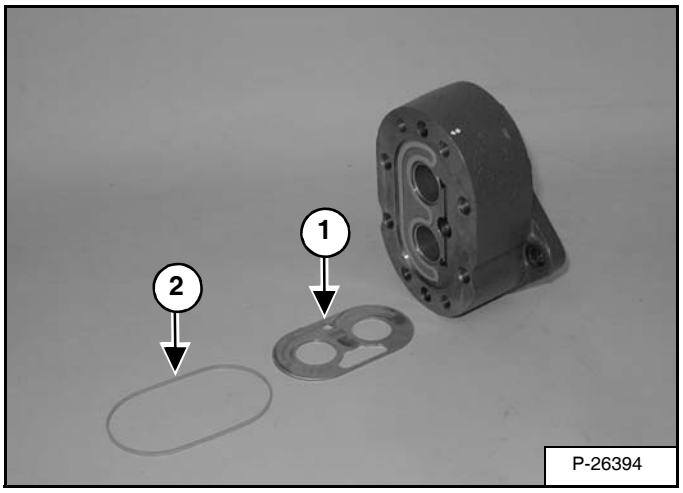
NOTE: Inspect the drive gear (Item 1) [Figure 20-60-21]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-60-22



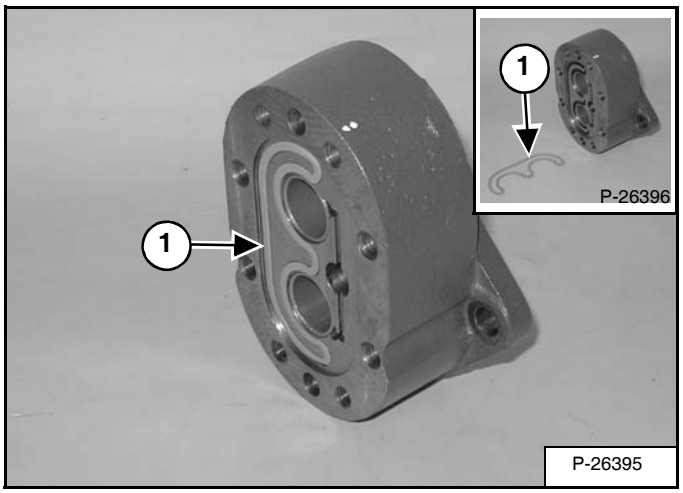
Remove the wear plate (Item 1) **[Figure 20-60-22]** & **[Figure 20-60-23]** and section seal (Item 2) **[Figure 20-60-22]** & **[Figure 20-60-23]** from the pump end section.

Figure 20-60-23



NOTE: Position wear plate (Item 1) [Figure 20-60-23] inlets and traps as shown with bronze side toward gears.

Figure 20-60-24

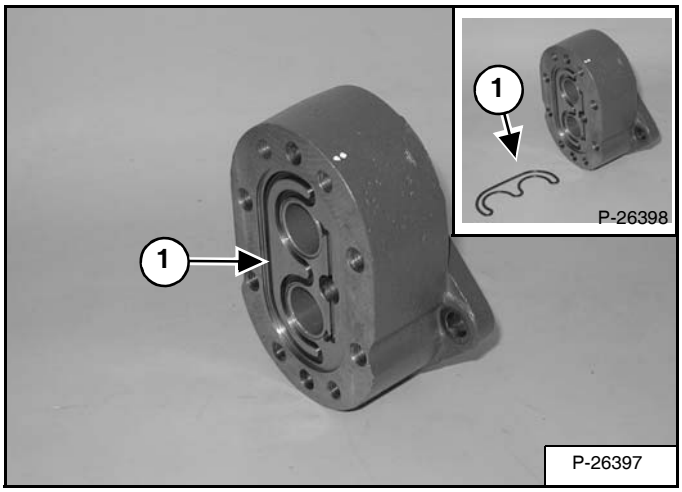


Remove the load seal (Item 1) **[Figure 20-60-24]**.

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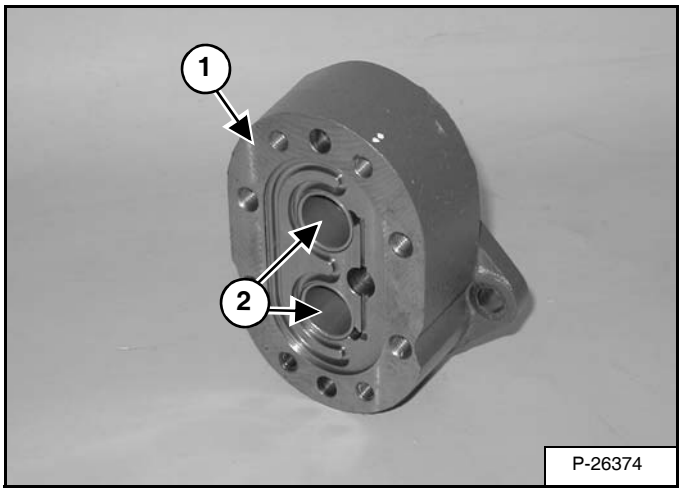
Disassembly And Assembly (Cont'd)

Figure 20-60-25



Remove the pre-load seal (Item 1) **[Figure 20-60-25]**.

Figure 20-60-26



NOTE: Inspect the pump end section (Item 1) and bushings (Item 2) [Figure 20-60-26]. If excessive wear or damage is visible, the pump must be replaced.

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HYDRAULIC PUMP (HIGH FLOW)

Check The Output Of The Hydraulic Pump Without Power Bob-Tach

WARNING

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

W-2017-0286

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

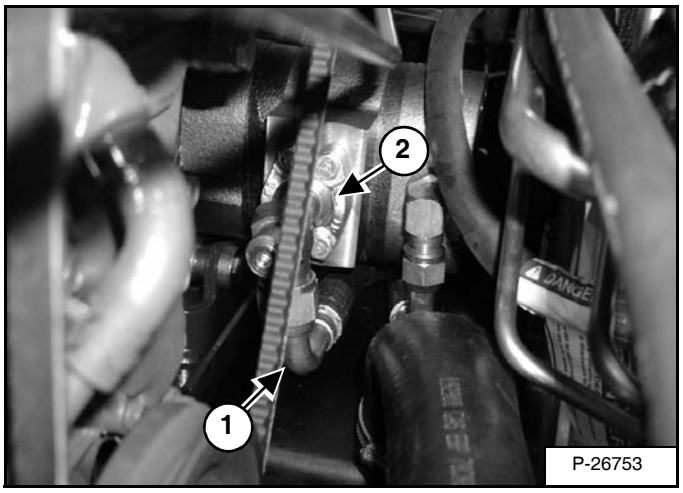
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

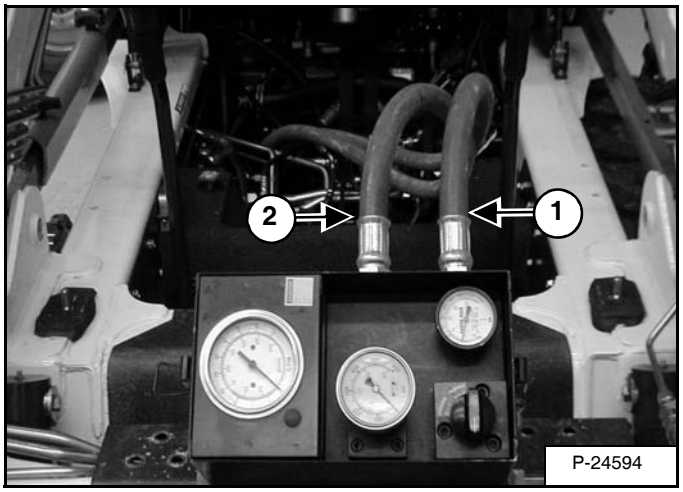
Connect the remote start tool. (See Procedure on Page 10-60-1.)

Figure 20-61-1



Disconnect the OUTLET hose (Item 1) **[Figure 20-61-1]** from the pump.

Figure 20-61-2



Connect the INLET hose (Item 1) **[Figure 20-61-2]** from the tester to the OUTLET fitting (Item 2) **[Figure 20-61-1]** of the pump. Connect the OUTLET hose (Item 2) **[Figure 20-61-2]** from the tester to the hose (Item 1) **[Figure 20-61-1]** which was disconnected from the pump.

IMPORTANT

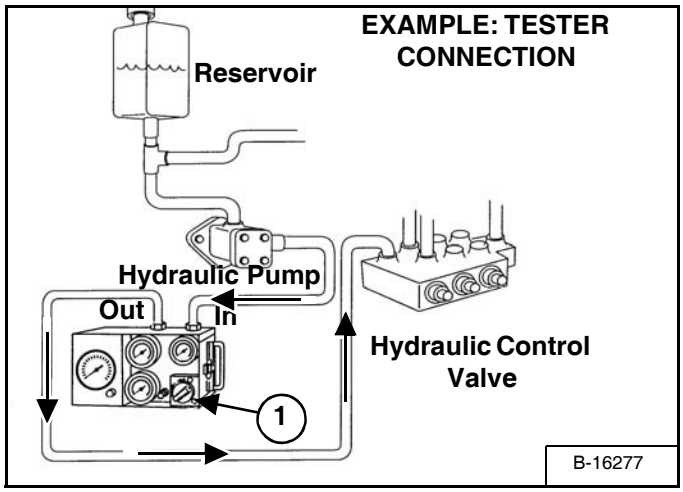
The hydraulic tester must be in the fully open position before you start the engine.

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Check The Output Of The Hydraulic Pump Without Power Bob-Tach (Cont'd)

Figure 20-61-3



Sample tester connection shown **[Figure 20-61-3]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-61-3]** on the tester to about 1000 PSI (6895 kPa). **DO NOT EXCEED SYSTEM RELIEF PRESSURE.** Open the restrictor control and record the free flow (GPM) at full RPM.

Push the maximum/variable flow switch (on the remote start tool) to engage the front auxiliary hydraulics, the light will come ON. Push the button (on the right control lever) for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *SPECIFICATIONS* Section SPEC-01 for system relief pressure and full RPM.

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Check The Output Of The Hydraulic Pump With Power Bob-Tach.

⚠ WARNING

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

W-2017-0286

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

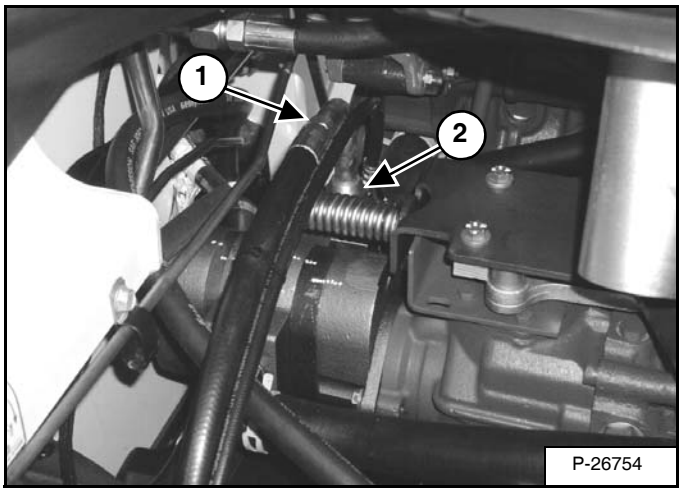
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

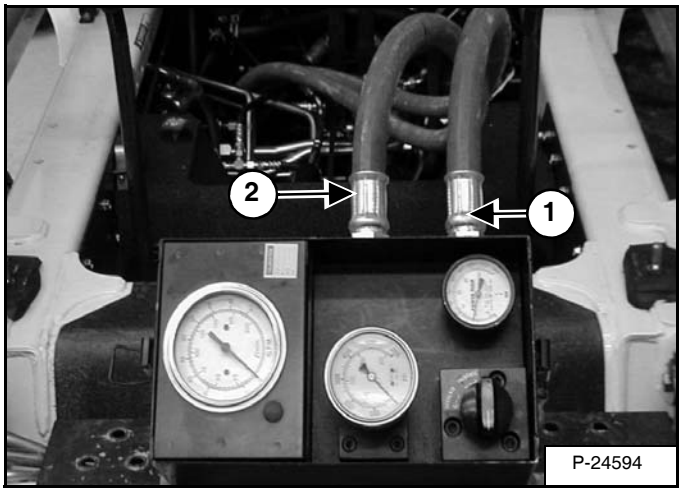
Connect the remote start tool. (See Procedure on Page 10-60-1.)

Figure 20-61-4



Disconnect the OUTLET hose (Item 1) **[Figure 20-61-4]** from the top of the Power Bob-Tach block.

Figure 20-61-5



Connect the INLET hose (Item 1) **[Figure 20-61-5]** from the tester to the OUTLET fitting (Item 2) **[Figure 20-61-4]** on the top of the Power Bob-Tach block. Connect the OUTLET hose (Item 2) **[Figure 20-61-5]** from the tester to the hose (Item 1) **[Figure 20-61-4]** which was disconnected from the Power Bob-Tach block.

IMPORTANT

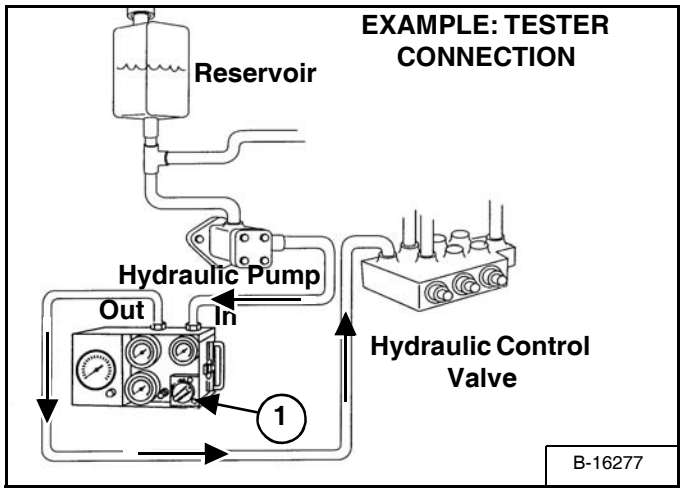
The hydraulic tester must be in the fully open position before you start the engine.

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Check The Output Of The Hydraulic Pump With Power Bob-Tach. (Cont'd)

Figure 20-61-6



Sample tester connection shown **[Figure 20-61-6]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-61-6]** on the tester to about 1000 PSI (6895 kPa). **DO NOT EXCEED SYSTEM RELIEF PRESSURE.** Open the restrictor control and record the free flow (GPM) at full RPM.

Push the maximum/variable flow switch (on the remote start tool) to engage the front auxiliary hydraulics, the light will come ON. Push the button (on the right control lever) for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *SPECIFICATIONS* Section SPEC-01 for system relief pressure and full RPM.

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Removal And Installation

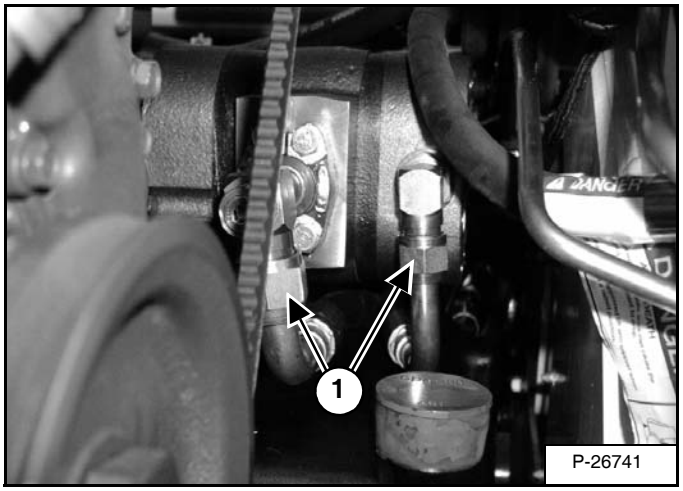


WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 20-61-7



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Stop the engine. Raise the seat bar.

Lift and block the rear of the loader. (See Procedure on Page 10-10-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

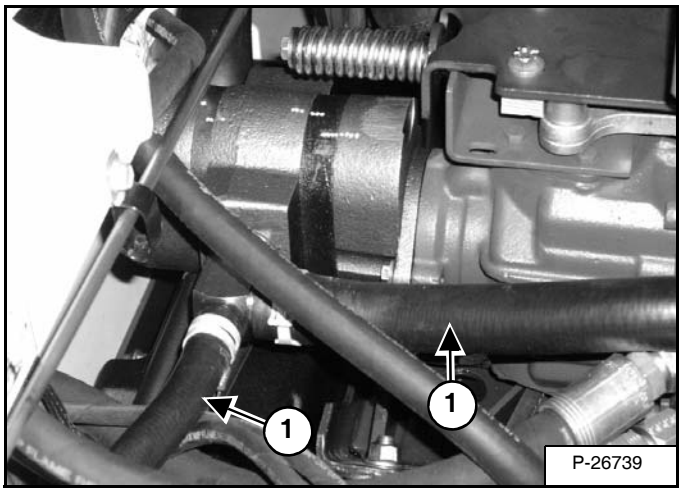
Drain the hydraulic fluid from the reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Open the rear door of the loader.

Remove the Power Bob-Tach block if equipped. (See Removal And Installation on Page 20-120-1.)

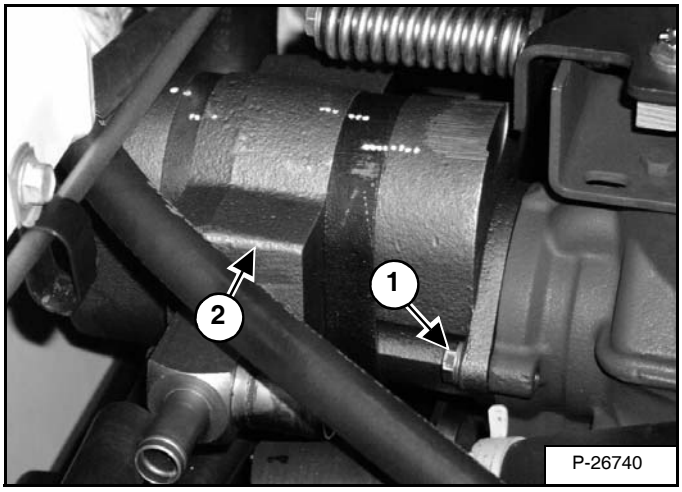
Disconnect and cap the outlet hoses (Item 1) **[Figure 20-61-7]** from the back of the hydraulic pump.

Figure 20-61-8



Disconnect and cap the inlet hoses (Item 1) **[Figure 20-61-8]** from the front of the hydraulic pump.

Figure 20-61-9



Remove the two mounting bolts (Item 1) **[Figure 20-61-9]** from the hydraulic pump.

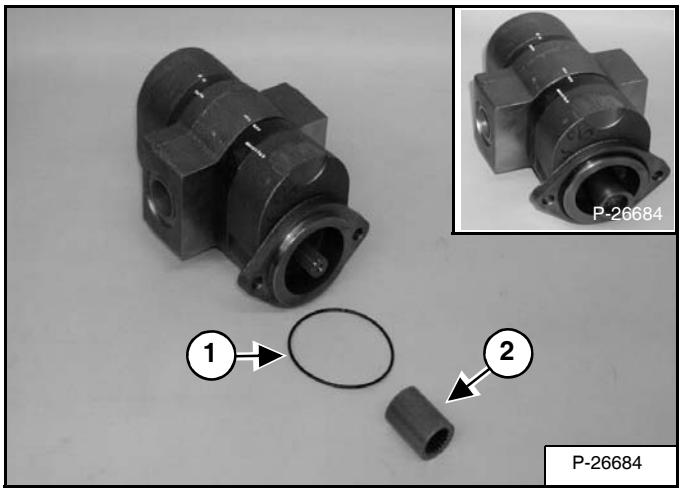
Installation: Tighten the mounting bolts to 27-37 ft.-lb. (37-50 N•m) torque.

Remove the hydraulic pump (Item 2) **[Figure 20-61-9]** from the hydrostatic pump.

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Removal And Installation (Cont'd)

Figure 20-61-10



Remove the O-ring (Item 1) **[Figure 20-61-10]**.

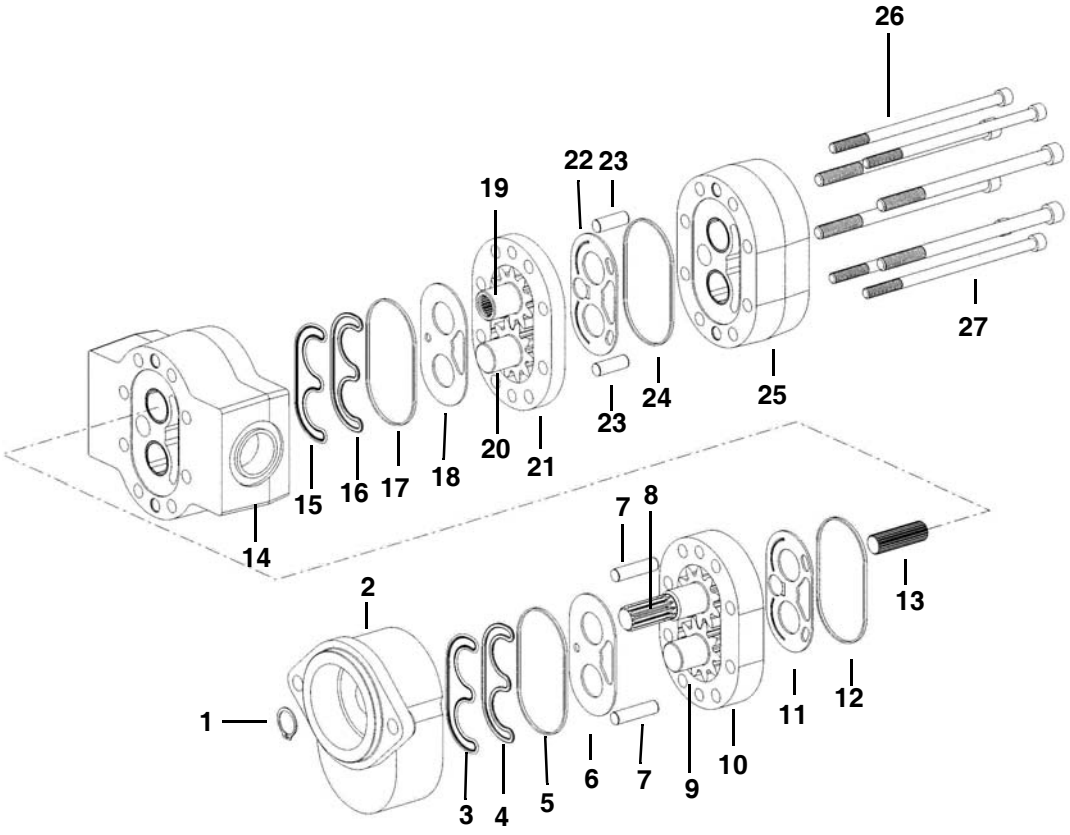
Remove the coupler (Item 2) **[Figure 20-61-10]** from the hydraulic pump shaft.

Reverse the removal procedure to install the hydraulic pump.

Installation: Use a new O-ring (Item 1) **[Figure 20-61-10]** when installing the hydraulic pump. (See Disassembly And Assembly on Page 20-61-8.)

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Identification



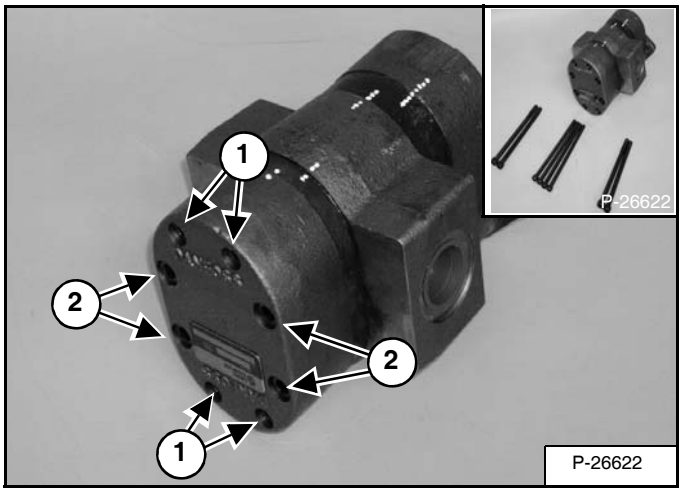
REF.	DESCRIPTION
1	RETAINING RING
2	PUMP END SECTION
3	PRE-LOAD SEAL
4	LOAD SEAL
5	SECTION SEAL
6	WEAR PLATE
7	PINS
8	DRIVE GEAR
9	IDLER GEAR
10	PUMP SECTION
11	WEAR PLATE
12	SECTION SEAL
13	SPLINE SHAFT

REF.	DESCRIPTION
14	PUMP CENTER SECTION
15	PRE-LOAD SEAL
16	LOAD SEAL
17	SECTION SEAL
18	WEAR PLATE
19	DRIVE GEAR
20	IDLER GEAR
21	PUMP SECTION
22	WEAR PLATE
23	PINS
24	SECTION SEAL
25	PUMP END SECTION
26	BOLT (4)
27	BOLT (4)

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Disassembly And Assembly

Figure 20-61-11



Mark the pump sections for correct assembly **[Figure 20-61-11]**.

Remove the four smaller pump housing bolts (Item 1) **[Figure 20-61-11]**.

Remove the four larger pump housing bolts (Item 2) **[Figure 20-61-11]**.

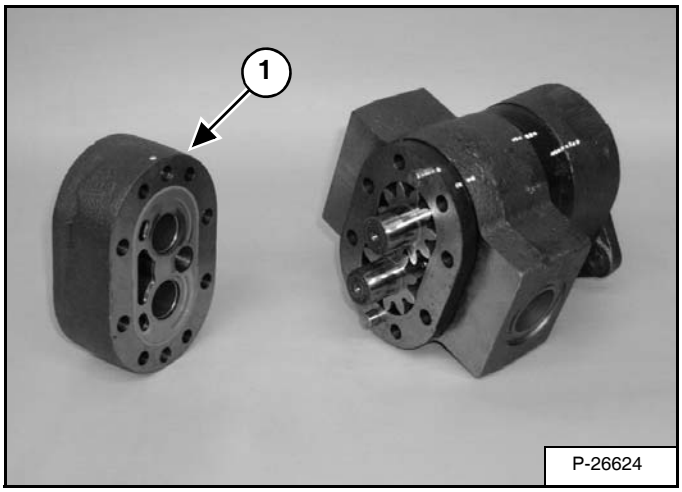
Installation: Tighten the four smaller bolts (Item 1) to 30 ft.-lb. (40,7 N•m) torque. Tighten the four larger bolts (Item 2) **[Figure 20-61-11]** to 54 ft.-lb. (73,2 N•m) torque.

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 20-61-12



Remove the pump end section (Item 1) **[Figure 20-61-12]**.

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Disassembly And Assembly (Cont'd)

Figure 20-61-13

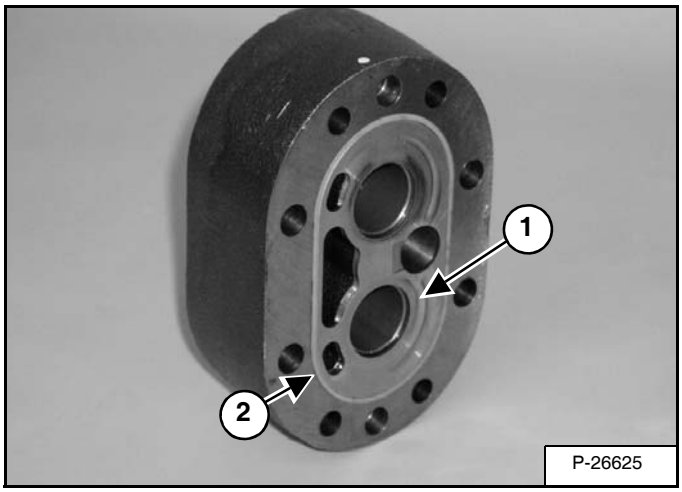
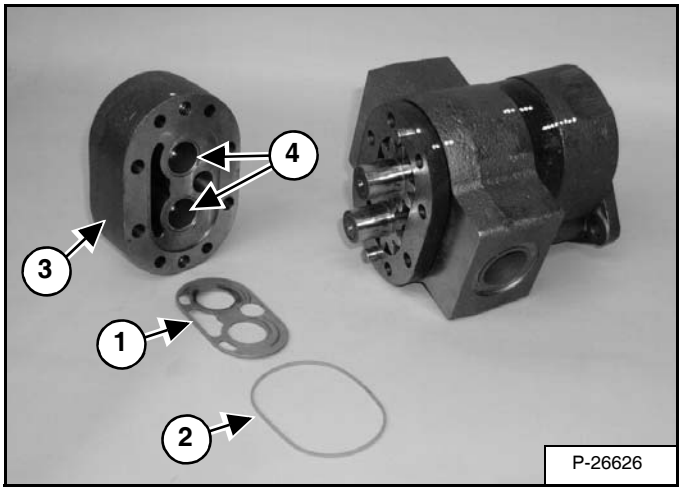


Figure 20-61-14



Remove the wear plate (Item 1) **[Figure 20-61-13]** & **[Figure 20-61-14]** and section seal (Item 2) **[Figure 20-61-13]** & **[Figure 20-61-14]** from the pump end section.

NOTE: Position wear plate (Item 1) [Figure 20-61-14] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the pump end section (Item 3) and bushings (Item 4) [Figure 20-61-14]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-61-15

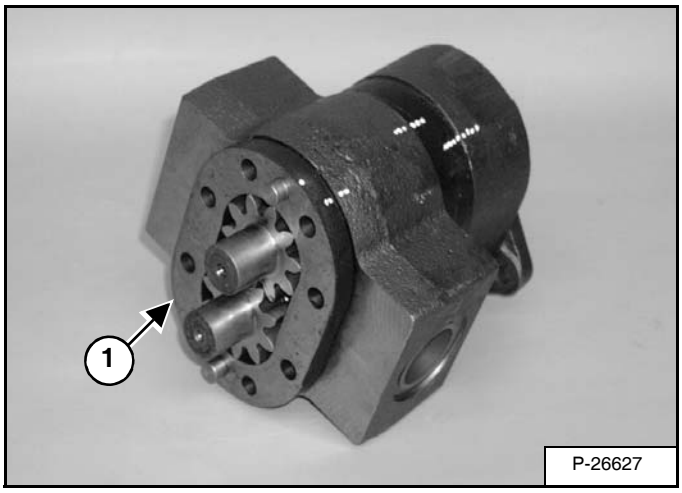
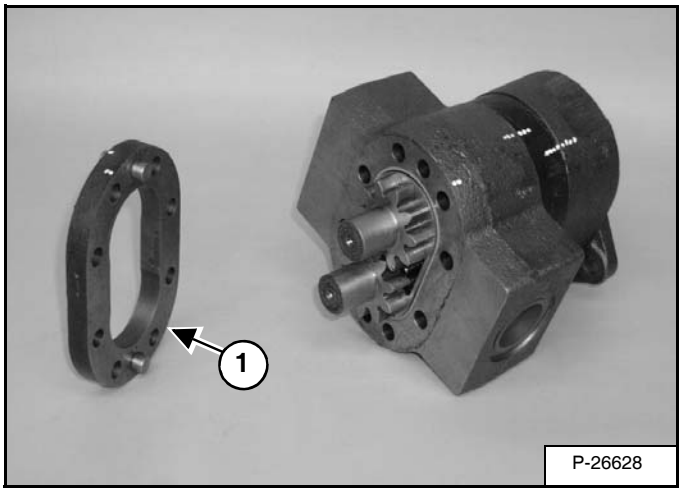


Figure 20-61-16



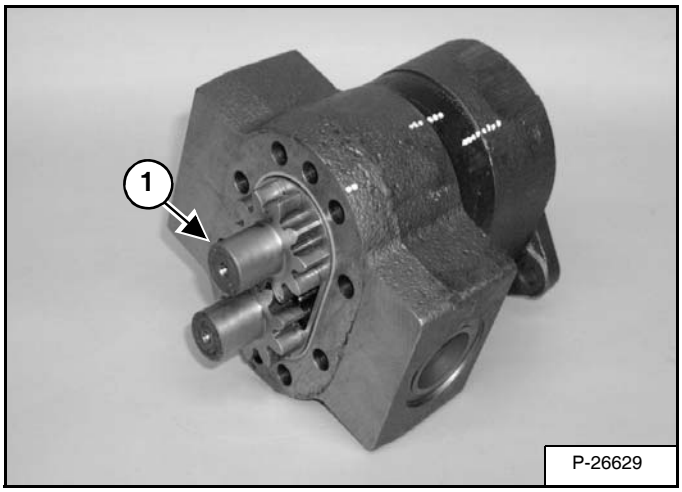
Remove the pump section (Item 1) **[Figure 20-61-15]** & **[Figure 20-61-16]** from the pump center section.

NOTE: Inspect the pumps center section (Item 1) [Figure 20-61-16]. If excessive wear or damage is visible, the pump must be replaced.

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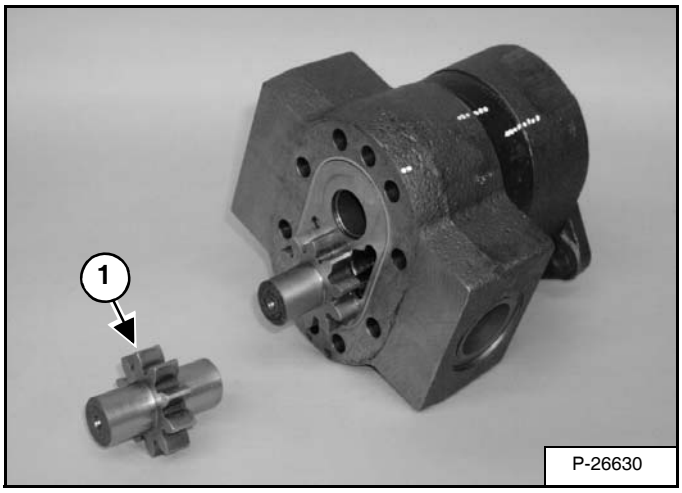
Disassembly And Assembly (Cont'd)

Figure 20-61-17



Remove the idler gear (Item 1) **[Figure 20-61-17]** & **[Figure 20-61-18]**.

Figure 20-61-18



NOTE: Inspect the idler gear (Item 1) [Figure 20-61-18]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-61-19

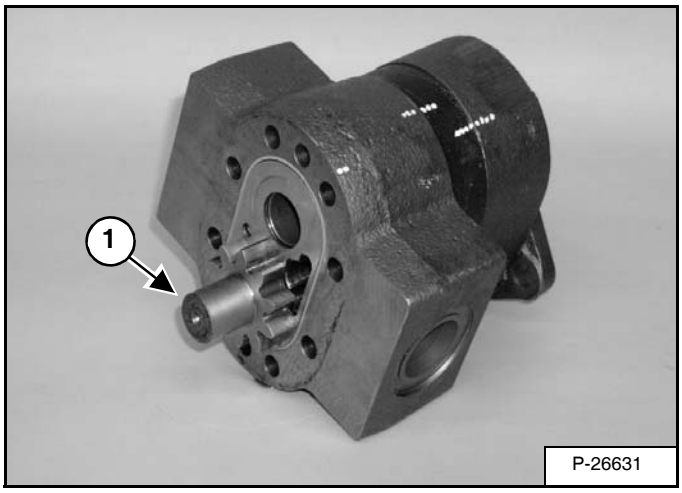
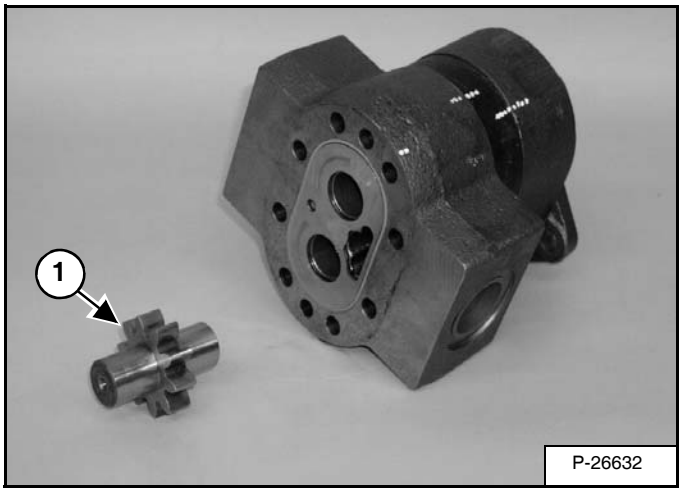


Figure 20-61-20



Remove the drive gear (Item 1) **[Figure 20-61-19]** & **[Figure 20-61-20]**.

NOTE: Inspect the drive gear (Item 1) [Figure 20-61-20]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-61-21

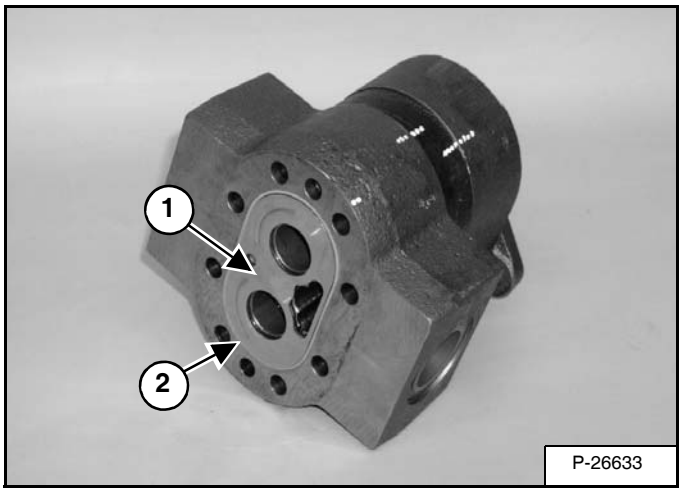
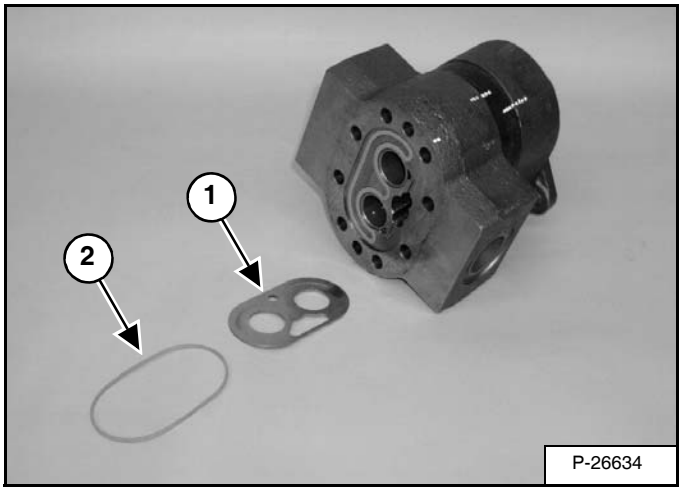


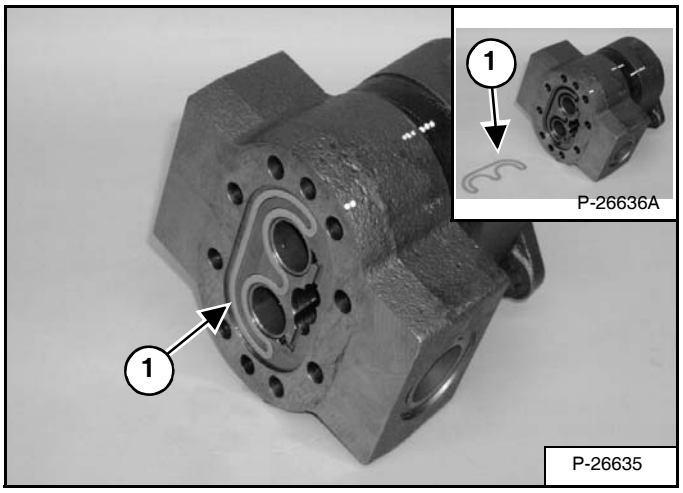
Figure 20-61-22



Remove the wear plate (Item 1) **[Figure 20-61-21]** & **[Figure 20-61-22]** and section seal (Item 2) **[Figure 20-61-21]** & **[Figure 20-61-22]** from the pump center section.

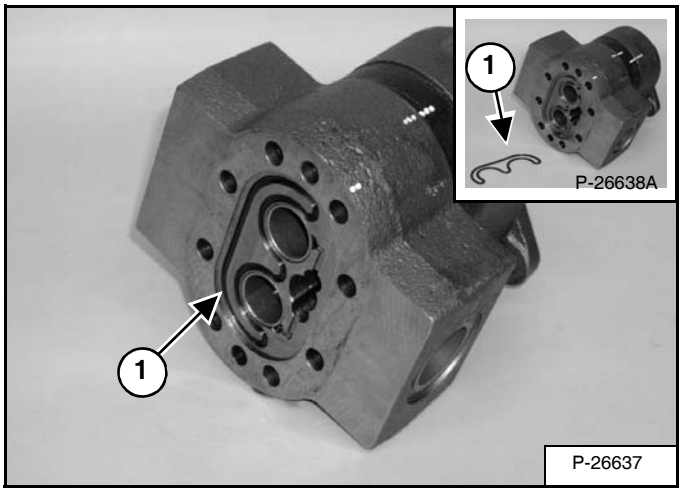
NOTE: Position wear plate (Item 1) [Figure 20-61-22] inlets and traps as shown with bronze side toward gears.

Figure 20-61-23



Remove the load seal (Item 1) **[Figure 20-61-23]**.

Figure 20-61-24

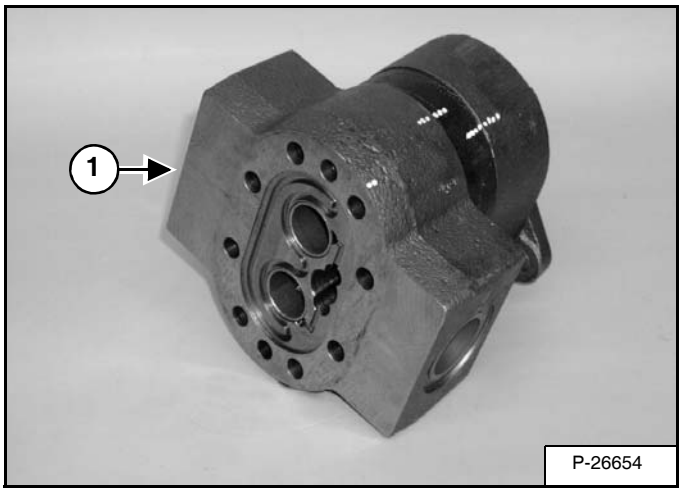


Remove the pre-load seal (Item 1) **[Figure 20-61-24]**.

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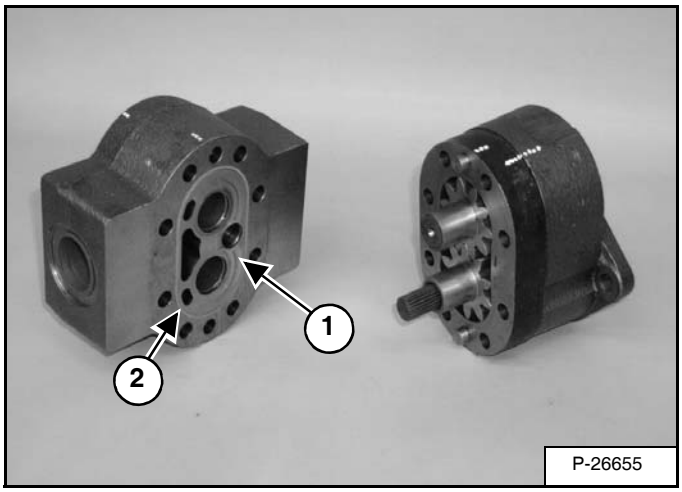
Disassembly And Assembly (Cont'd)

Figure 20-61-25



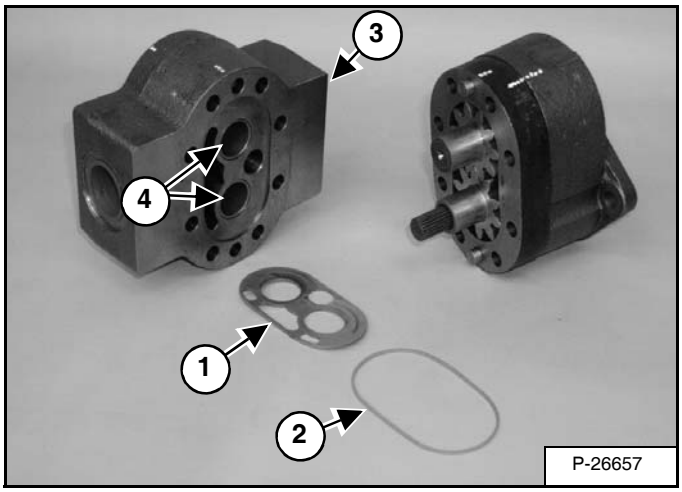
Remove the pump center section (Item 1) **[Figure 20-61-25]** from the pump sections.

Figure 20-61-26



Remove the wear plate (Item 1) **[Figure 20-61-26]** & **[Figure 20-61-27]** and section seal (Item 2) **[Figure 20-61-26]** & **[Figure 20-61-27]** from the pump section.

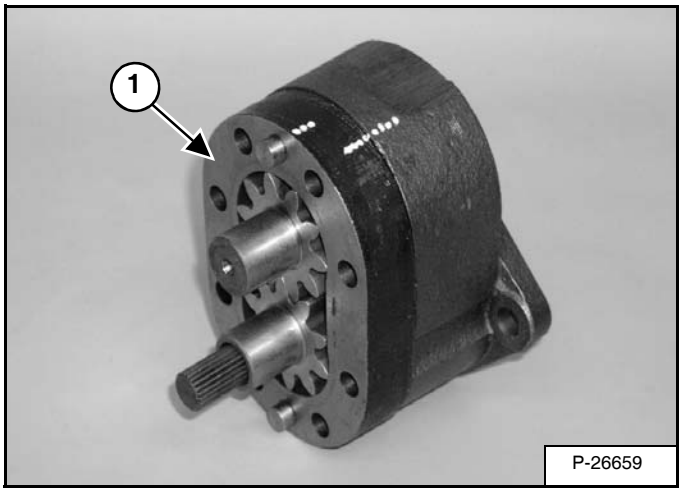
Figure 20-61-27



NOTE: Position wear plate (Item 1) [Figure 20-61-27] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the pump center section (Item 3) and bushings (Item 4) [Figure 20-61-27]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-61-28

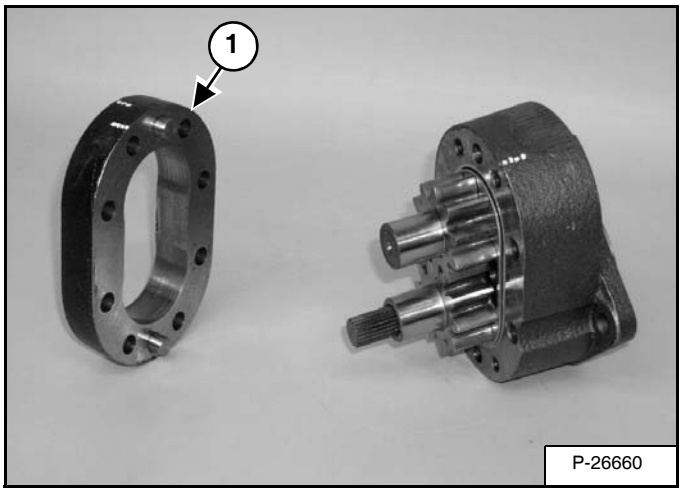


Remove the pump section (Item 1) **[Figure 20-61-28]** from the pump end section.

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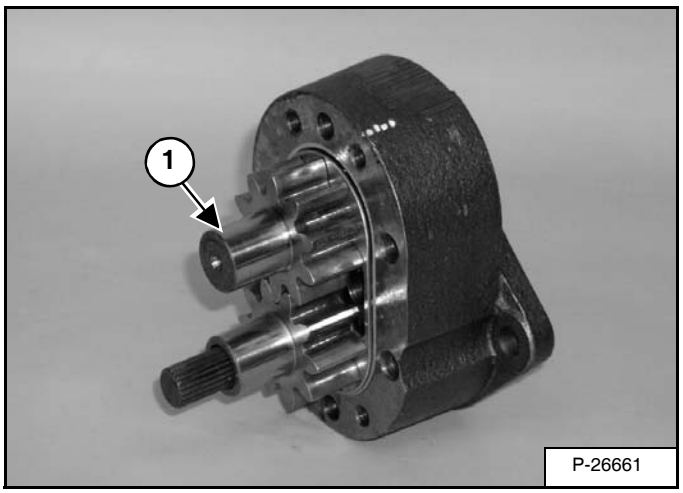
Disassembly And Assembly (Cont'd)

Figure 20-61-29



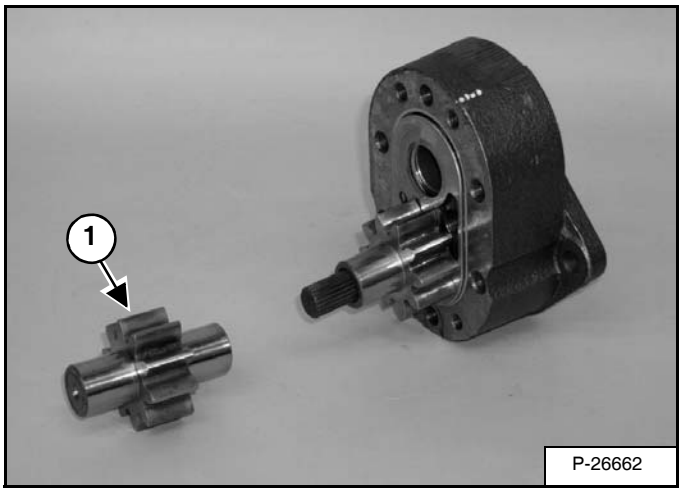
NOTE: Inspect the pump section (Item 1) [Figure 20-61-29]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-61-30



Remove the idler gear (Item 1) **[Figure 20-61-30]** & **[Figure 20-61-31]**.

Figure 20-61-31



NOTE: Inspect the idler gear (Item 1) [Figure 20-61-31]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-61-32

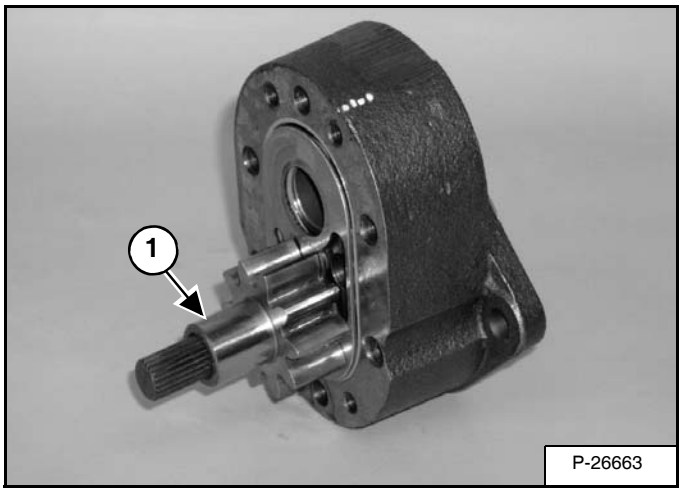
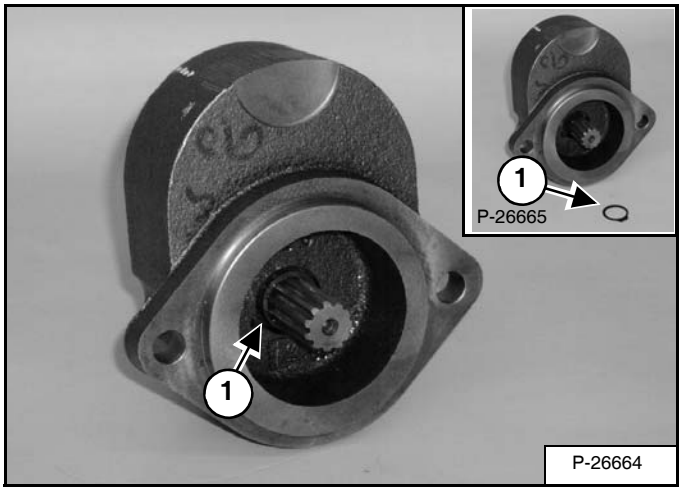
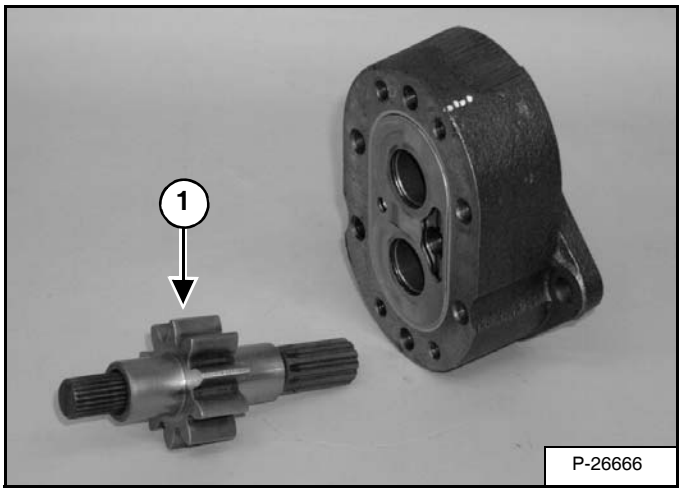


Figure 20-61-33



To remove the drive gear (Item 1) **[Figure 20-61-32]** from the pump end section, locate and remove the retaining ring (Item 1) **[Figure 20-61-33]** from the spline end of the drive gear.

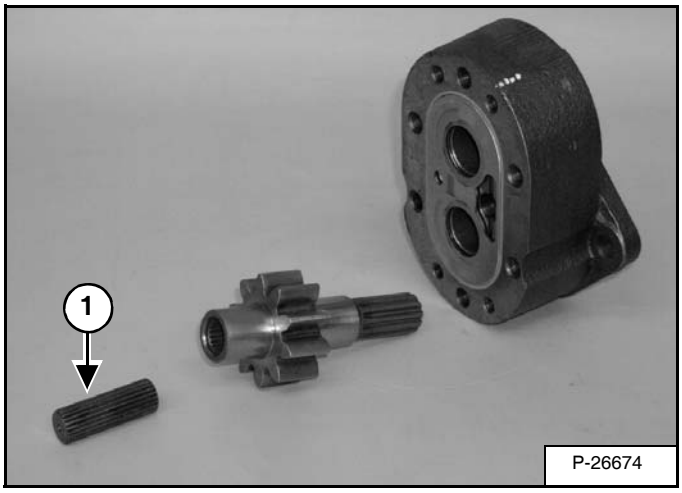
Figure 20-61-34



Remove the drive gear (Item 1) **[Figure 20-61-34]** from the pump end section.

NOTE: Inspect the drive gear (Item 1) [Figure 20-61-34]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-61-35



Remove the spline shaft (Item 1) **[Figure 20-61-35]** from the end of the drive gear.

NOTE: Inspect the spline shaft (Item 1) [Figure 20-61-35]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-61-36

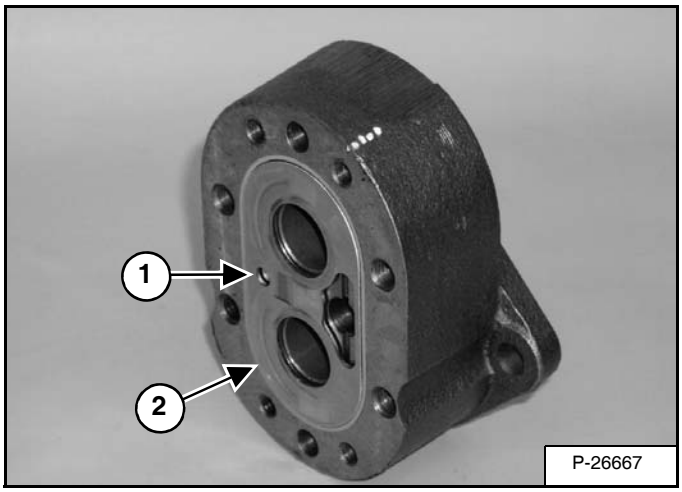
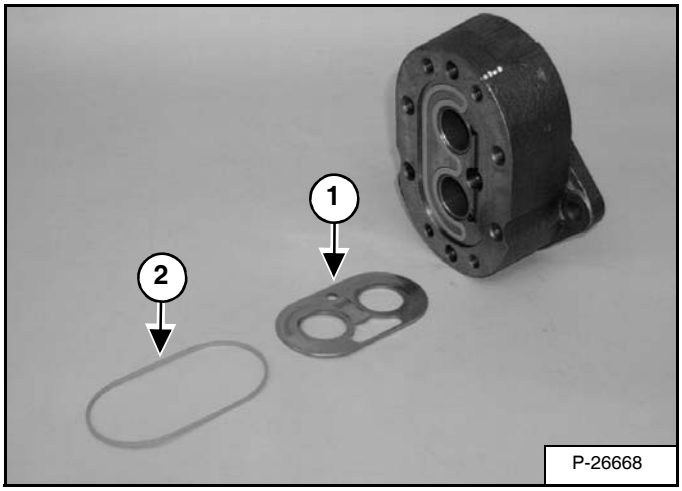


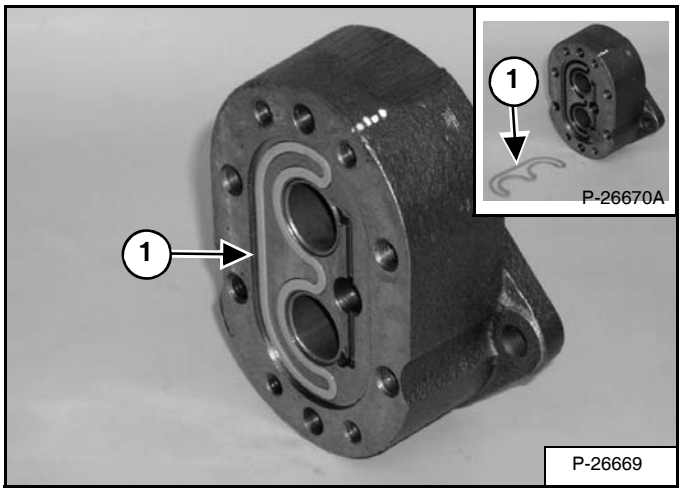
Figure 20-61-37



Remove the wear plate (Item 1) **[Figure 20-61-36]** & **[Figure 20-61-37]** and section seal (Item 2) **[Figure 20-61-36]** & **[Figure 20-61-37]** from the pump end section.

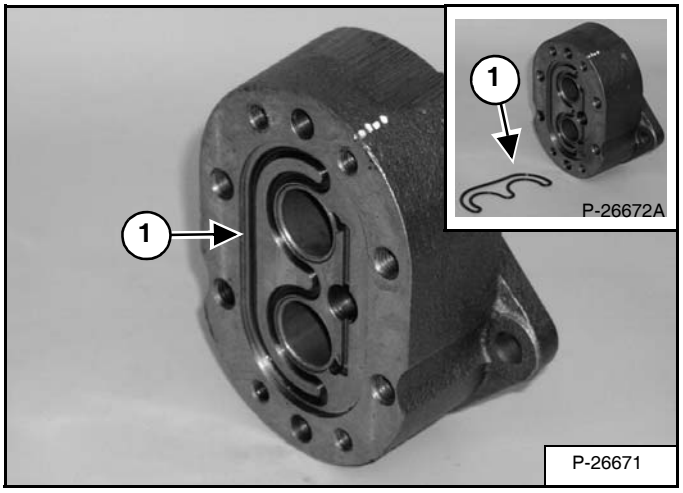
NOTE: Position wear plate (Item 1) [Figure 20-61-37] inlets and traps as shown with bronze side toward gears.

Figure 20-61-38



Remove the load seal (Item 1) **[Figure 20-61-38]**.

Figure 20-61-39

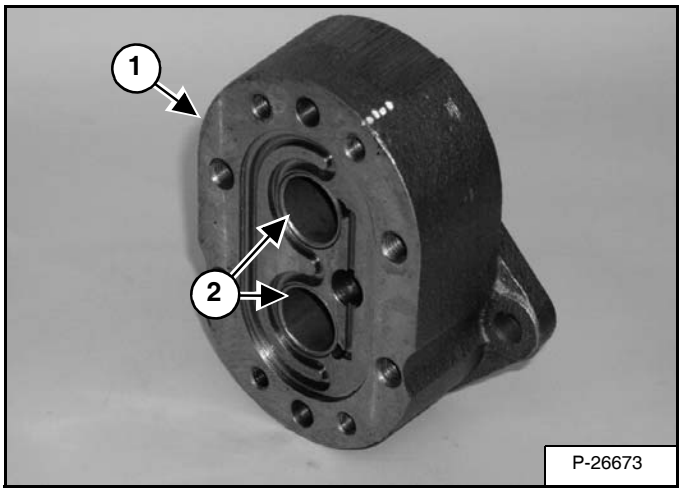


Remove the pre-load seal (Item 1) **[Figure 20-61-39]**.

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Disassembly And Assembly (Cont'd)

Figure 20-61-40



NOTE: Inspect the pump end section (Item 1) and bushings (Item 2) [Figure 20-61-40]. If excessive wear or damage is visible, the pump must be replaced.

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HYDRAULIC PUMP (SJC)

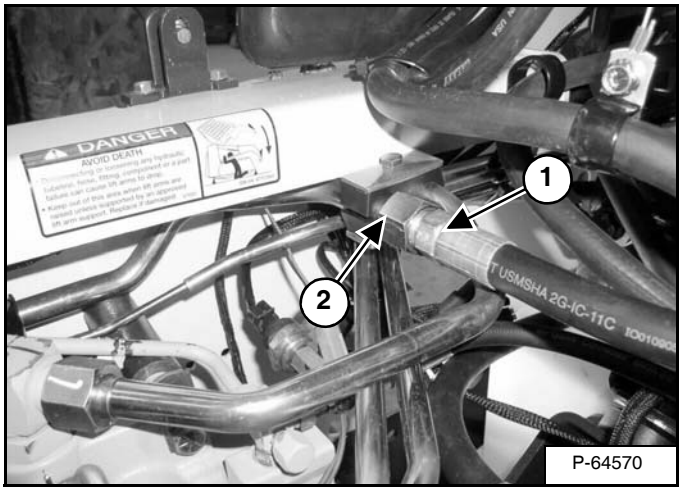
Test The Output Of The Hydraulic Auxiliary Pump

WARNING

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

W-2017-0286

Figure 20-62-1



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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

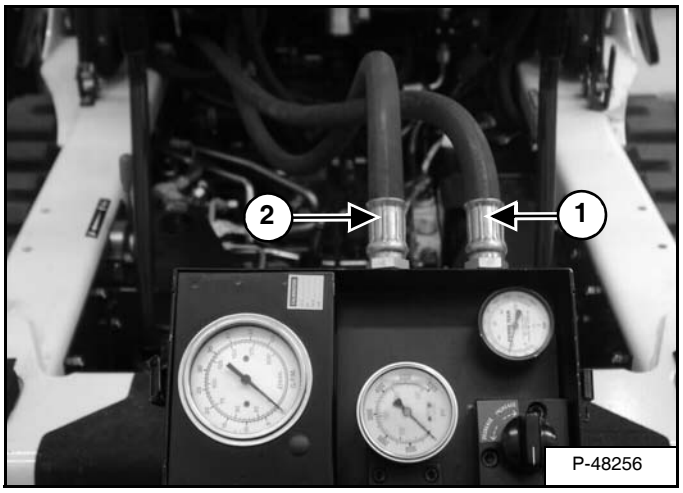
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

Connect the remote start tool. (See Procedure on Page 10-60-1.)

Disconnect the OUTLET hose (Item 1) **[Figure 20-62-1]**.

Figure 20-62-2



Connect the INLET hose (Item 1) **[Figure 20-62-2]** from the tester, to the OUTLET hose (Item 1) **[Figure 20-62-1]** coming from the gear pump. Connect the OUTLET hose (Item 2) **[Figure 20-62-2]** from the tester, to the INLET tubeline (Item 2) **[Figure 20-62-1]** leading to the control valve.

IMPORTANT

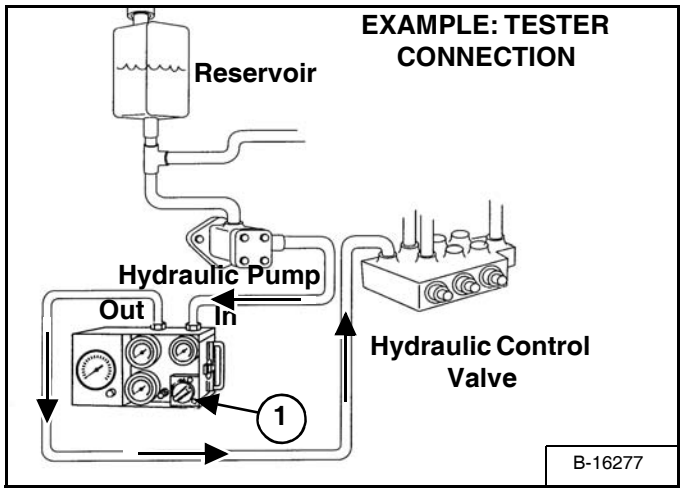
The hydraulic tester must be in the fully open position before you start the engine.

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Test The Output Of The Hydraulic Auxiliary Pump (Cont'd)

Figure 20-62-3



Sample tester connection shown **[Figure 20-62-3]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-62-3]** on the tester to about 1000 PSI (6895 kPa). **DO NOT exceed system relief pressure.** Open the restrictor control and record the free flow (GPM) at full RPM.

Push the maximum/variable flow switch (on the remote start tool) to engage the front auxiliary hydraulics. The light will come ON. Push the button (on the right control lever) for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *SPECIFICATIONS* Section, Contents Page SPEC-01 for system relief pressure and full RPM.

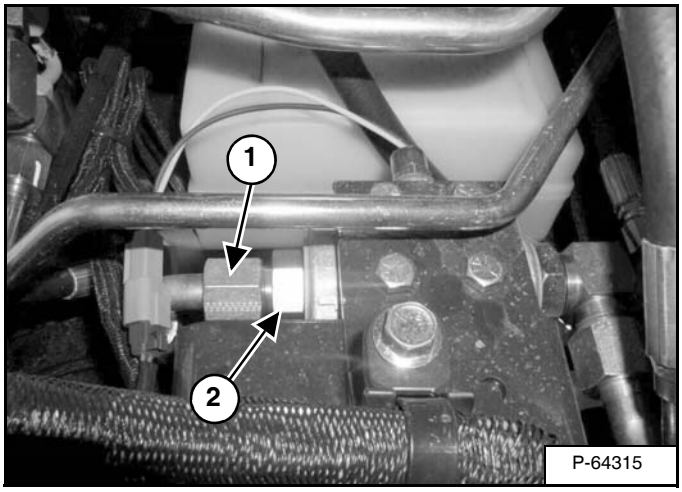
Test The Output Of The Hydraulic Charge Pump

⚠ WARNING

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

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Figure 20-62-4



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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

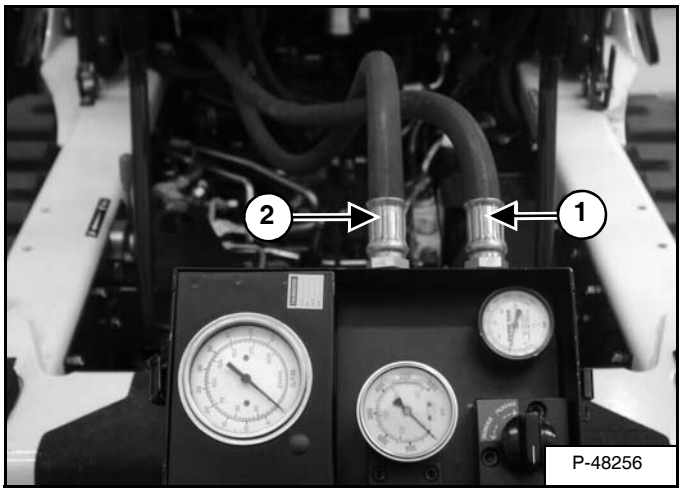
Connect the remote start tool. (See Procedure on Page 10-60-1.)

Disconnect the charge pump OUTLET hose (Item 1) from the INLET fitting (Item 2) **[Figure 20-62-4]** at the charge filter housing.

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Test The Output Of The Hydraulic Charge Pump (Cont'd)

Figure 20-62-5



Connect the INLET hose (Item 1) **[Figure 20-62-5]** from the tester, to the charge pump OUTLET hose (Item 1) **[Figure 20-62-4]** coming from the gear pump. Connect the OUTLET hose (Item 2) **[Figure 20-62-5]** from the tester, to the INLET fitting (Item 2) **[Figure 20-62-4]** at the charge filter housing.

IMPORTANT

The hydraulic tester must be in the fully open position before you start the engine.

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Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-62-3]** on the tester to about 1000 PSI (6895 kPa). **DO NOT exceed 2000 PSI**.

Open the restrictor control and record the free flow (GPM) at full RPM.

Turn the restrictor down to 2000 PSI. **DO NOT EXCEED 2000 PSI**. The high pressure flow must be at least 80% of free flow.

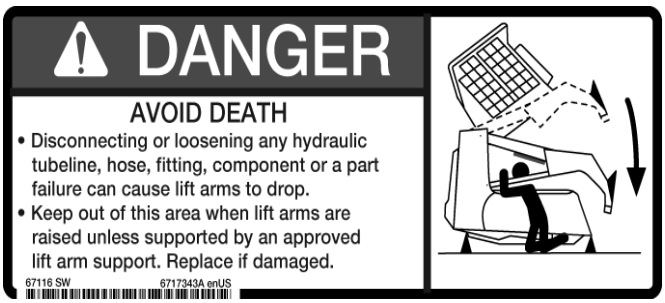
$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

**Refer to Hydraulic Schematics for pump flow and full RPM.*

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Removal And Installation

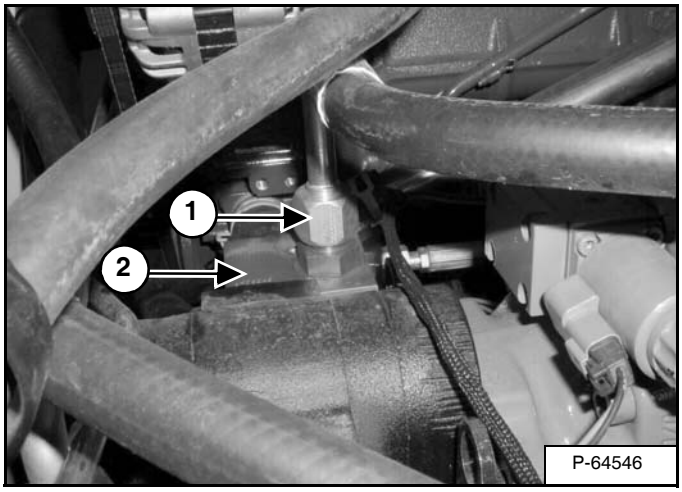


IMPORTANT

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.

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Figure 20-62-6



Lift and block the rear of the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the hydraulic fluid from the reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Open the rear door of the loader.

Disconnect and cap the outlet hose (Item 1) **[Figure 20-62-6]** from the back of the hydraulic pump.

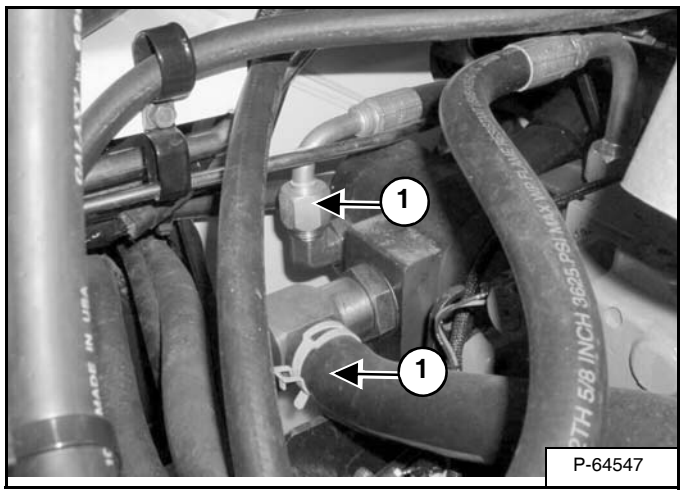
Remove the Power Bob-Tach block (Item 2) **[Figure 20-62-6]** if equipped. (See Removal And Installation on Page 20-120-1.)

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

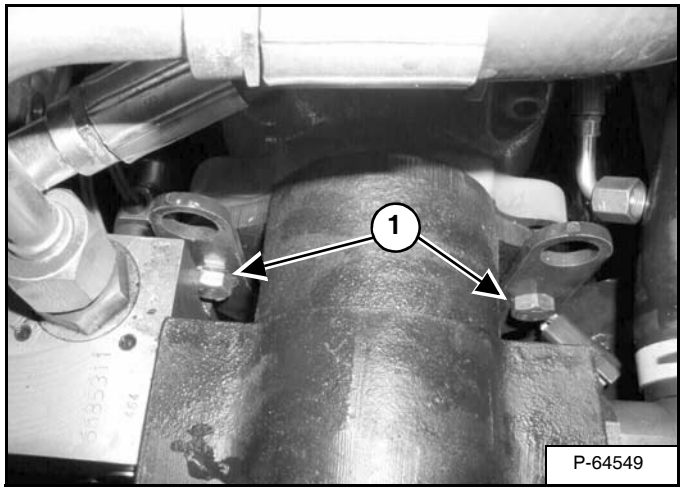
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Figure 20-62-7



Disconnect and cap the inlet hoses (Item 1) **[Figure 20-62-7]** from the front of the hydraulic pump.

Figure 20-62-8



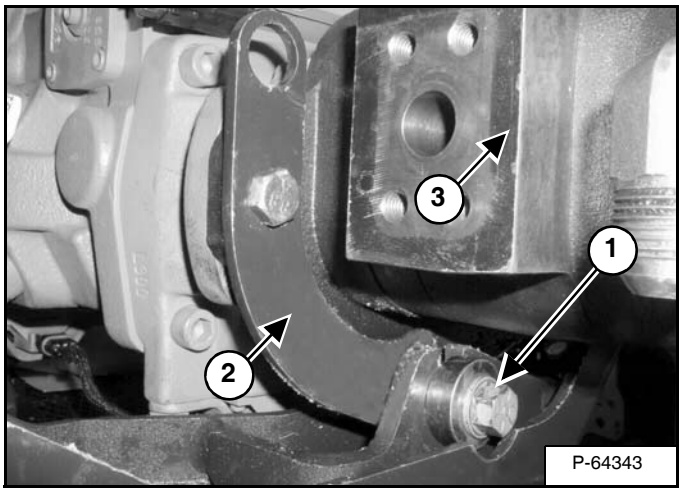
Remove the two mounting bolts (Item 1) **[Figure 20-62-8]** from the hydraulic pump.

Installation: Tighten the mounting bolts to 55-60 ft.-lb. (75-85 N•m) torque.

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Removal And Installation (Cont'd)

Figure 20-62-9



Remove the bracket mounting bolt (Item 1) from the pump mounting bracket (Item 2) **[Figure 20-62-9]**.

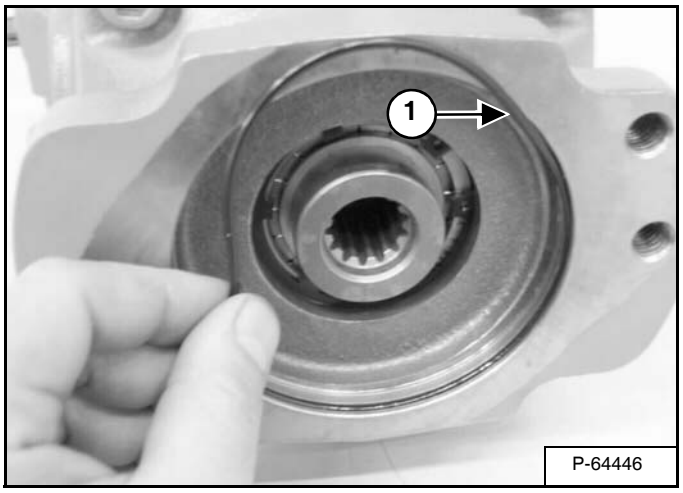
Note: The mounting bolt is a special purpose bolt. Only replace with original Bobcat Parts.

Installation: Apply a medium strength threadlocker to mounting bolt and tighten to 90-100 ft.-lb. (122-136 N•m) torque.

Remove the mounting bracket (Item 2) **[Figure 20-62-9]**.

Remove the hydraulic pump (Item 3) **[Figure 20-62-9]** from the hydrostatic pump.

Figure 20-62-10

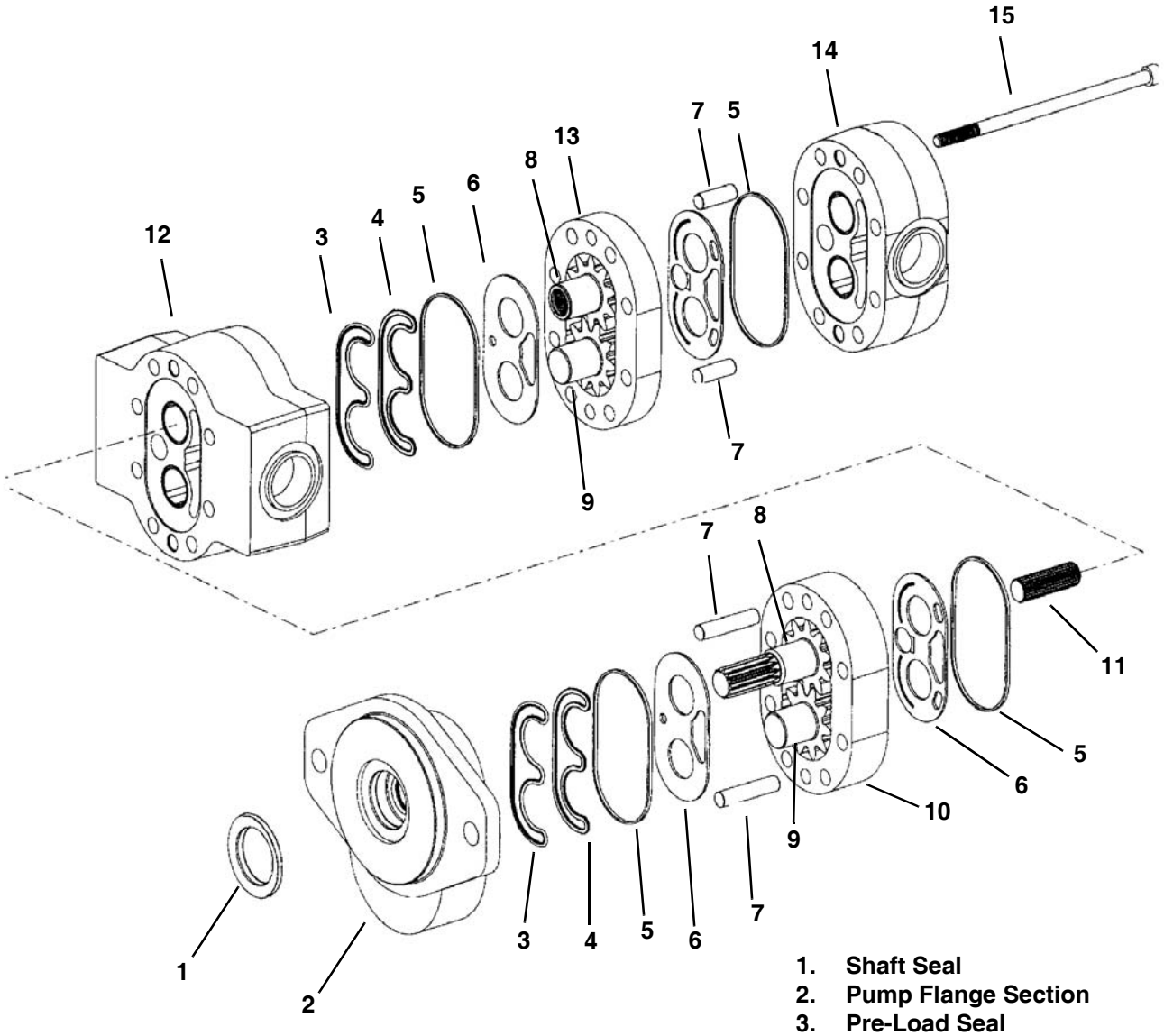


Replace the O-ring (Item 1) **[Figure 20-62-10]** in the hydrostatic pump.

Reverse the removal procedure to install the hydraulic pump.

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Identification



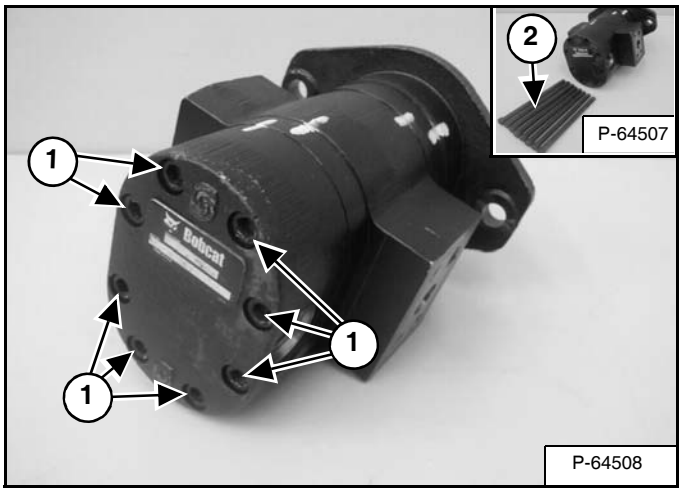
1. Shaft Seal
2. Pump Flange Section
3. Pre-Load Seal
4. Load Seal
5. O-ring
6. Wear Plate
7. Pins
8. Drive Gear
9. Idler Gear
10. Auxiliary Pump Section
11. Spline Shaft
12. Pump Center Section
13. Charge Pump Section
14. Pump End Section
15. Bolt (8)

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Disassembly And Assembly

Figure 20-62-11



Mark the pump sections for correct assembly **[Figure 20-62-11]**.

Remove the eight pump housing bolts (Item 1) **[Figure 20-62-11]**.

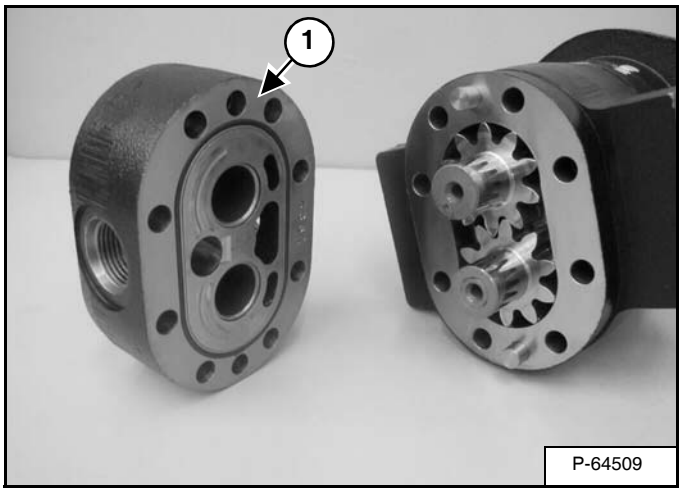
Installation: Tighten the bolts (Item 2) **[Figure 20-62-11]** to 54 ft.-lb. (73,2 N•m) torque.

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 20-62-12



Remove the pump end section (Item 1) **[Figure 20-62-12]**.

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Disassembly And Assembly (Cont'd)

Figure 20-62-13

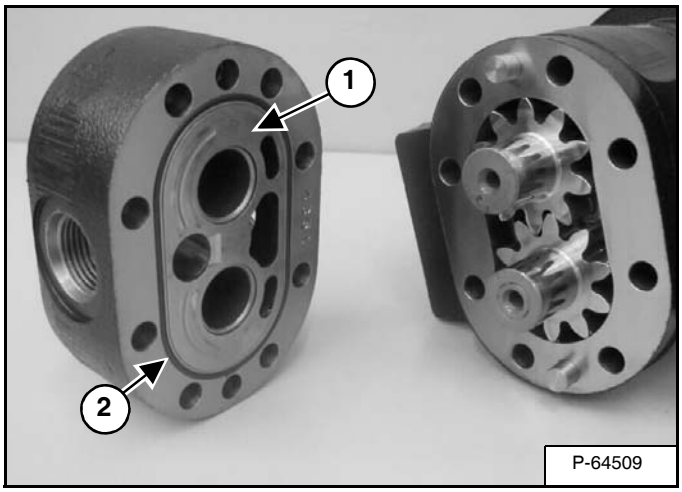
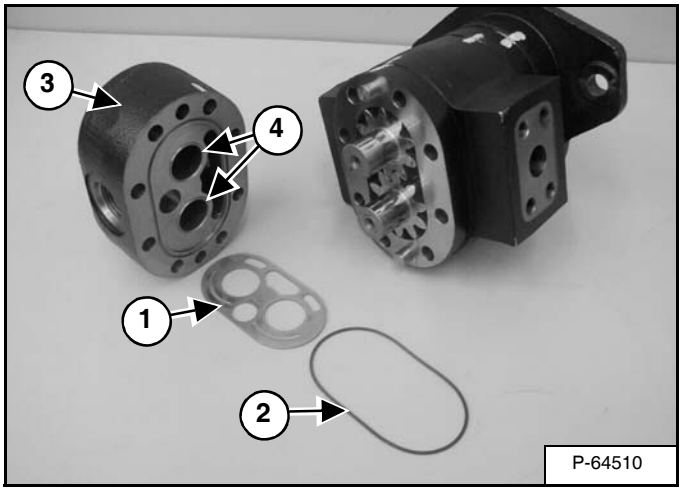


Figure 20-62-14



Remove the wear plate (Item 1) and section seal (Item 2) **[Figure 20-62-13]** & **[Figure 20-62-14]** from the pump end section.

NOTE: Position wear plate (Item 1) [Figure 20-62-14] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the pump end section (Item 3) [Figure 20-62-14] and bushings (Item 4) [Figure 20-62-14]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-62-15

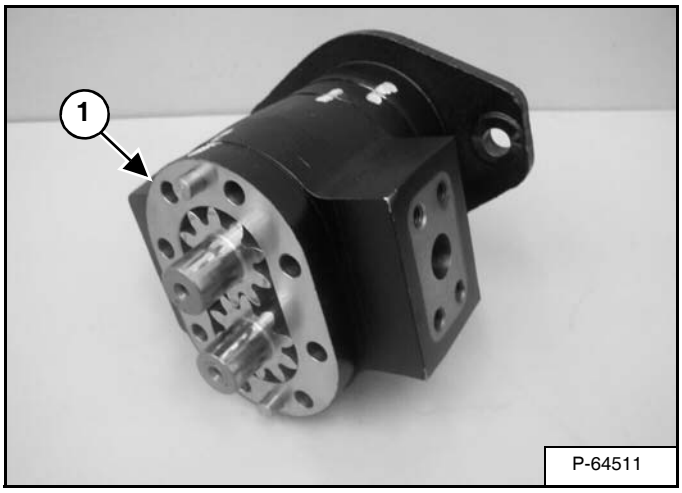
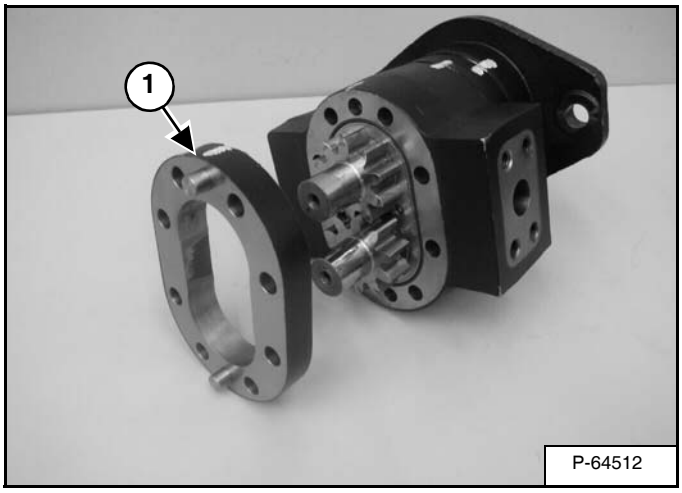


Figure 20-62-16



Remove the charge pump section (Item 1) **[Figure 20-62-15]** & **[Figure 20-62-16]** from the pump center section.

NOTE: Inspect the pump section (Item 1) [Figure 20-62-16]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-62-17

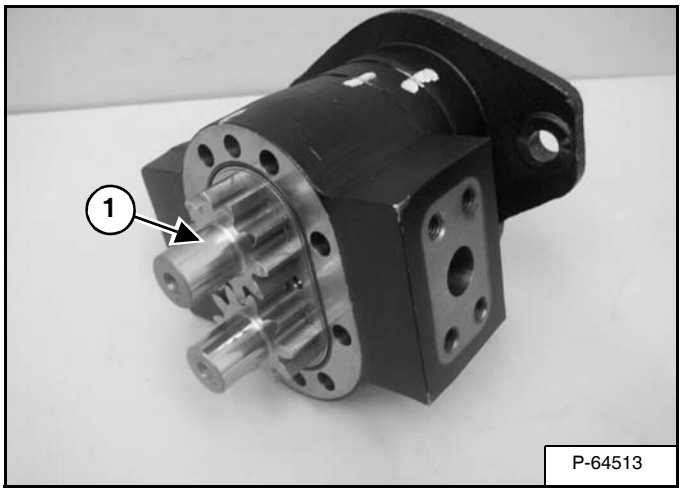
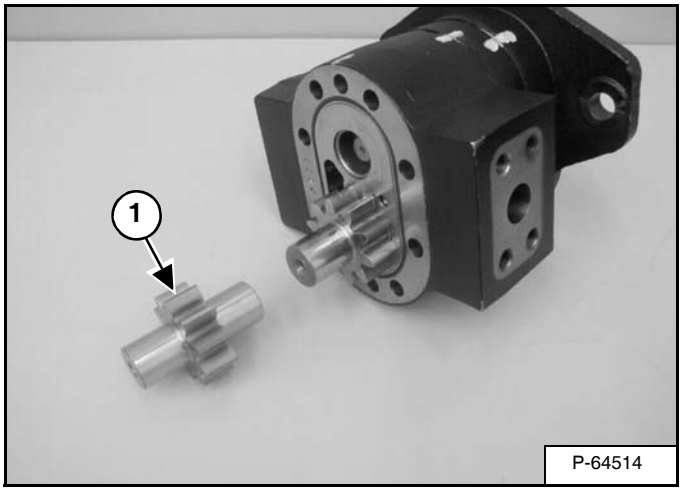


Figure 20-62-18



Remove the drive gear (Item 1) **[Figure 20-62-17]** & **[Figure 20-62-18]**.

NOTE: Inspect the drive gear (Item 1) [Figure 20-62-18]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-62-19

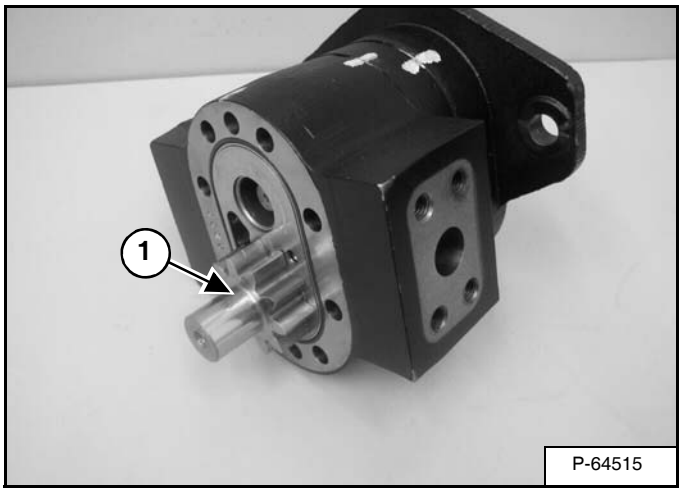
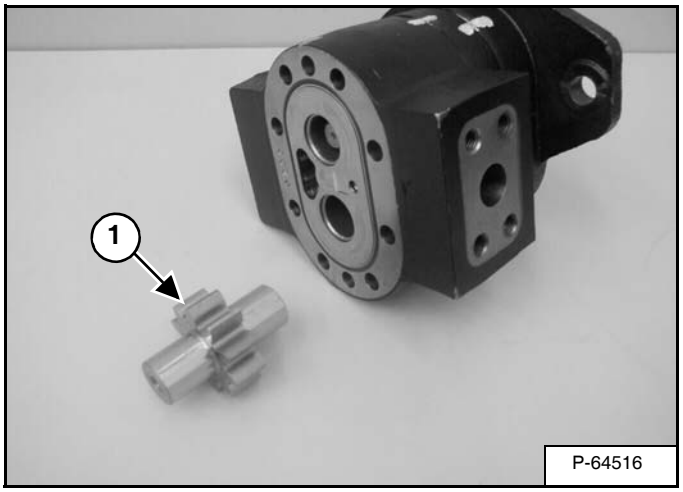


Figure 20-62-20



Remove the idler gear (Item 1) **[Figure 20-62-19]** & **[Figure 20-62-20]** from the pump center section.

NOTE: Inspect the idler gear (Item 1) [Figure 20-62-20]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-62-21

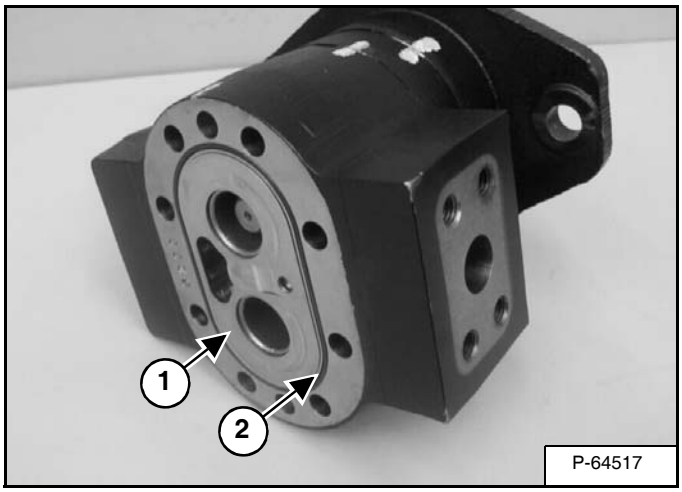
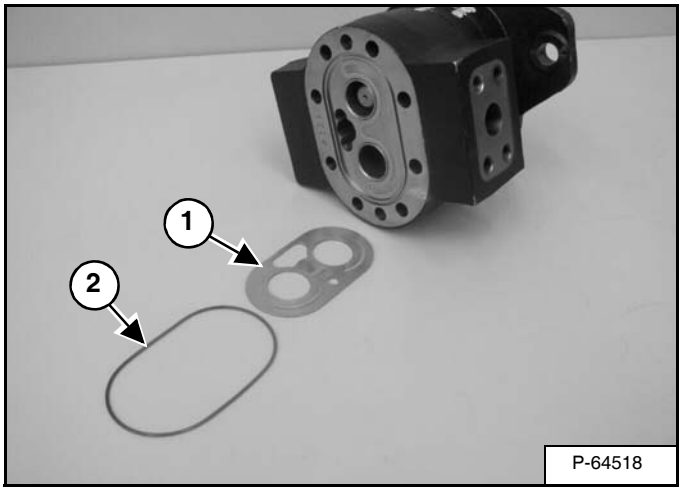


Figure 20-62-22



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-62-21]** & **[Figure 20-62-22]** from the pump center section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-62-22] inlets and traps as shown with bronze side toward gears.

Figure 20-62-23

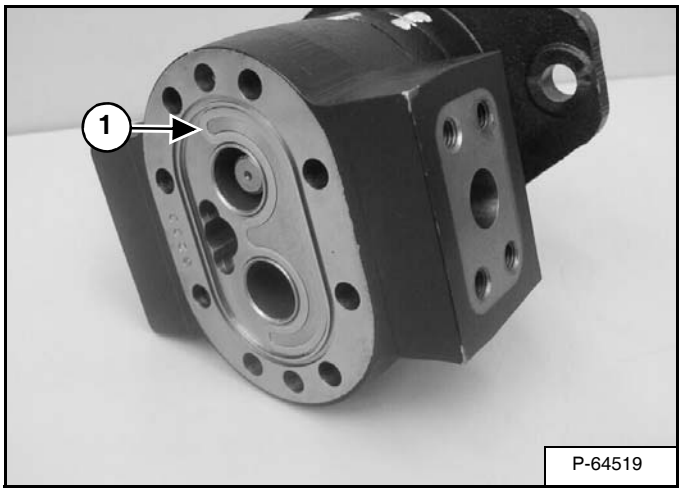
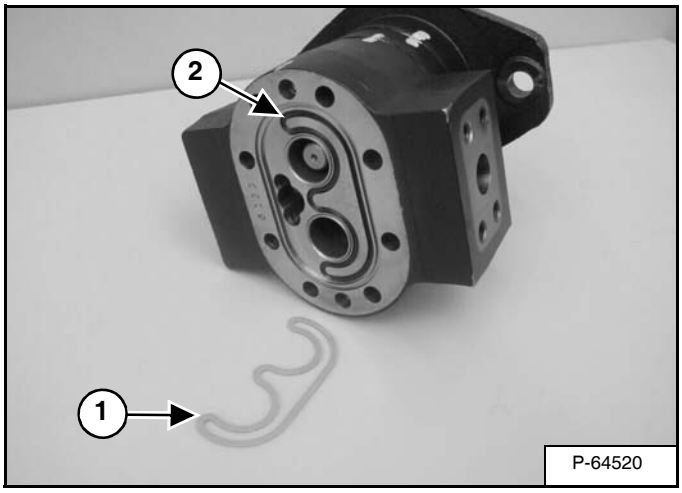


Figure 20-62-24



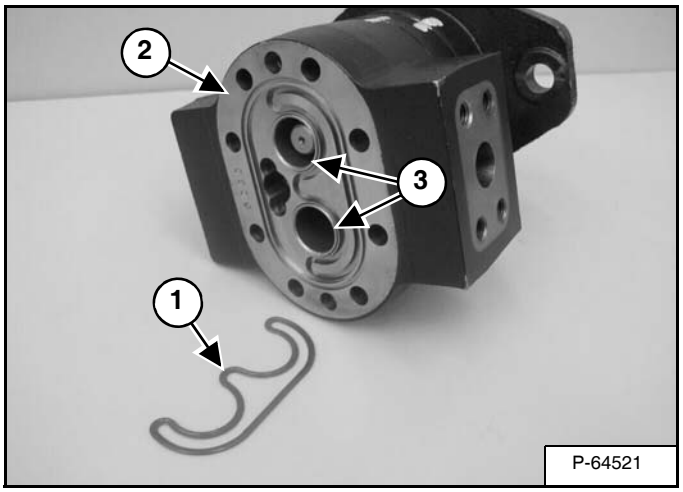
Remove the load seal (Item 1) **[Figure 20-62-23]** & **[Figure 20-62-24]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-62-24]**.

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Disassembly And Assembly (Cont'd)

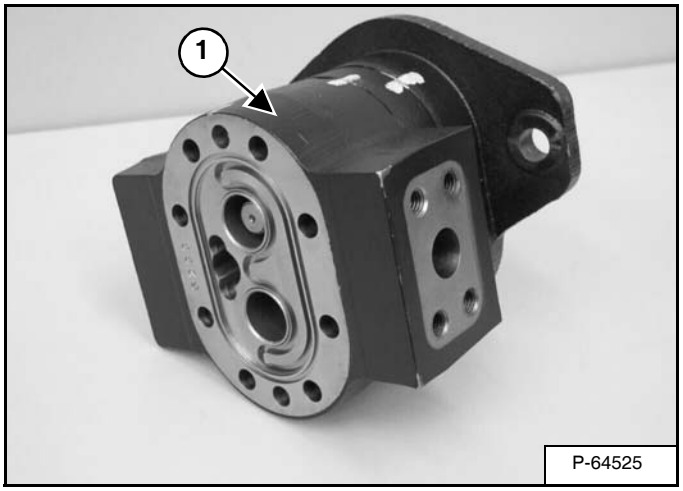
Figure 20-62-25



Inspect the pre-load seal (Item 1) **[Figure 20-62-25]** for damage and replace as needed.

NOTE: Inspect the pump center section (Item 2) and bushings (Item 3) [Figure 20-62-25]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-62-26



Remove the pump center section (Item 1) **[Figure 20-62-26]**.

Figure 20-62-27

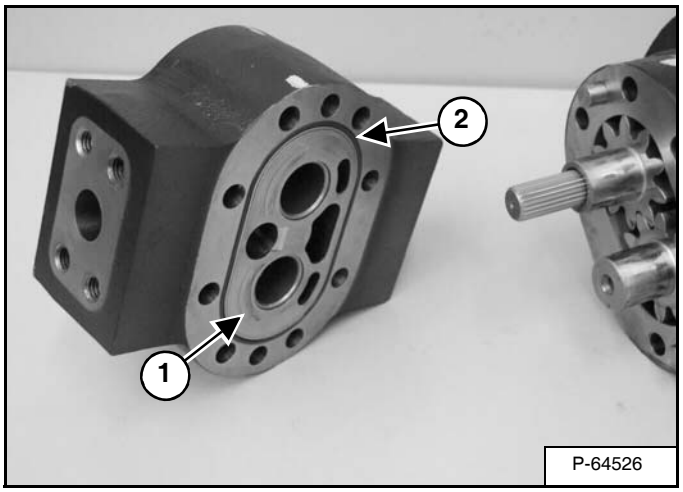
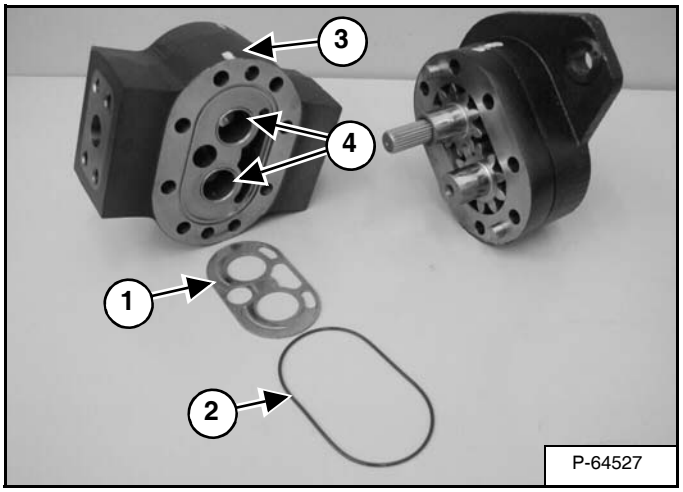


Figure 20-62-28



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-62-27]** & **[Figure 20-62-28]** from the pump center section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-62-28] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the pump center section (Item 3) and bushings (Item 4) [Figure 20-62-28]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-62-29

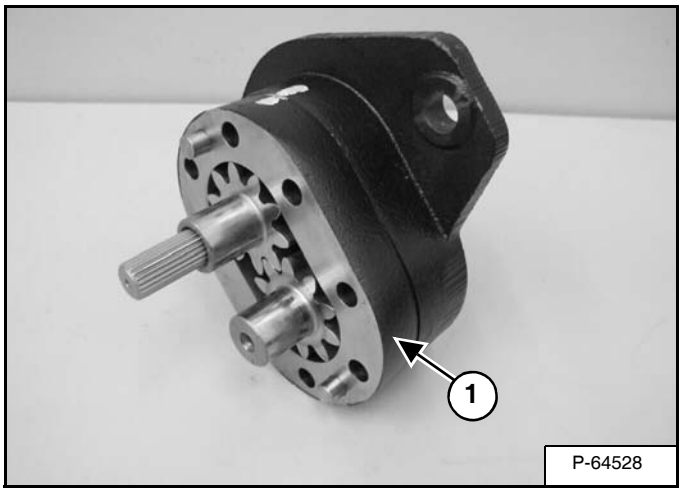
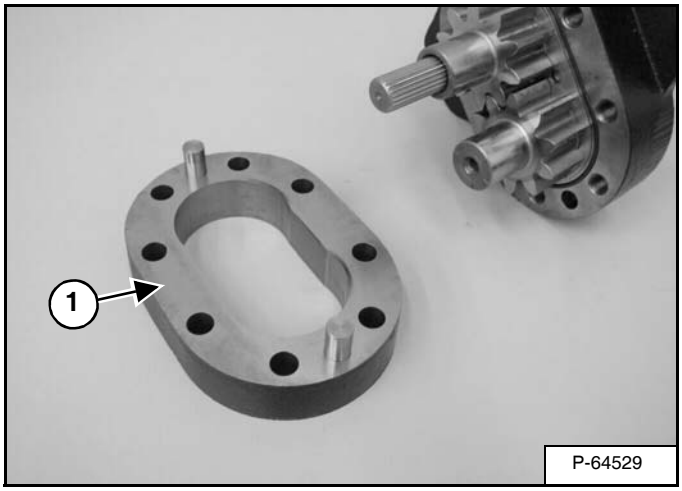


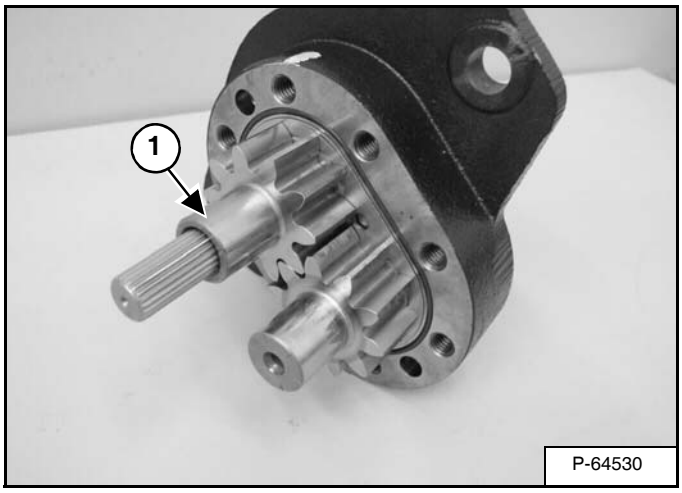
Figure 20-62-30



Remove the auxiliary pump section (Item 1) **[Figure 20-62-29]** & **[Figure 20-62-30]** from the pump flange section.

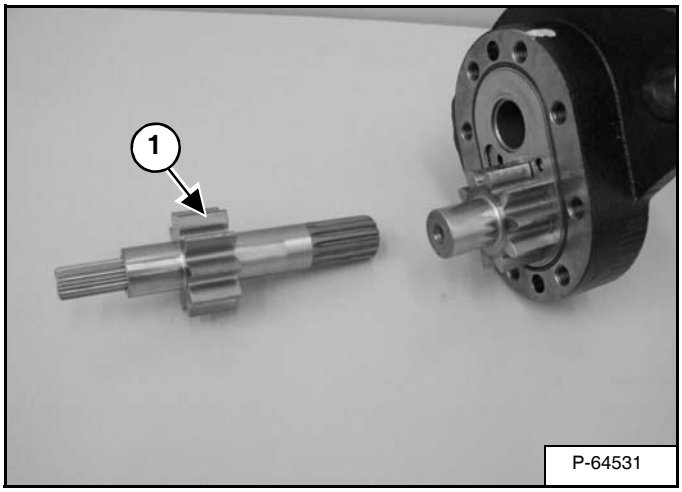
NOTE: Inspect the pump section (Item 1) [Figure 20-62-30]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-62-31



Remove the drive gear (Item 1) **[Figure 20-62-31]** from the pump flange section.

Figure 20-62-32

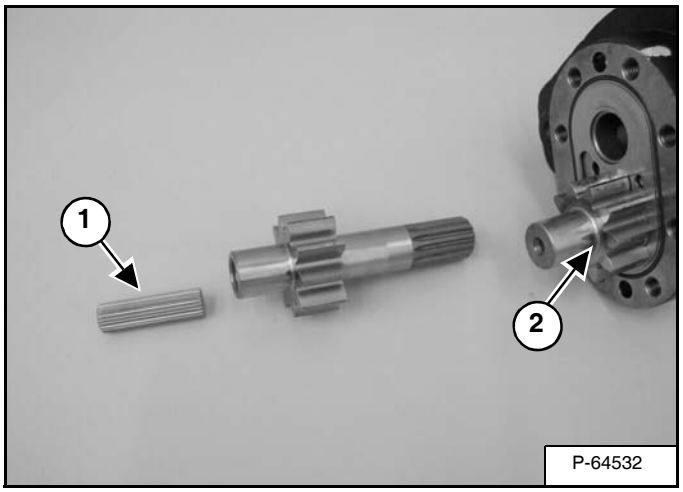


NOTE: Inspect the drive gear (Item 1) [Figure 20-62-32]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

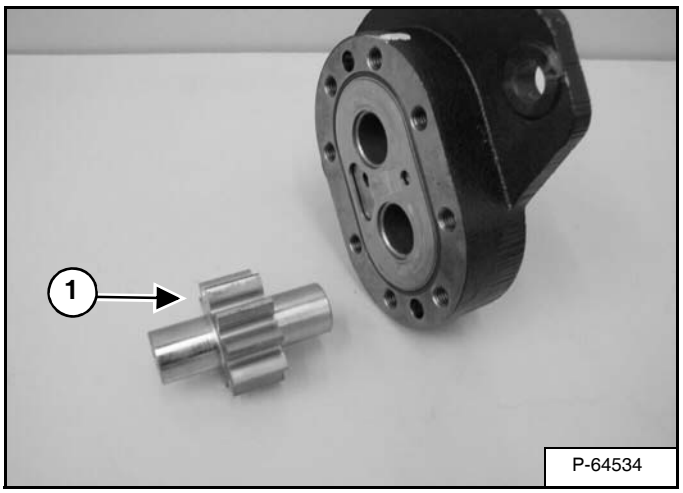
Figure 20-62-33



Remove the spline shaft (Item 1) **[Figure 20-62-33]** from the end of the drive gear.

Remove the idler gear (Item 2) **[Figure 20-62-33]**.

Figure 20-62-34



NOTE: Inspect the idler gear (Item 1) [Figure 20-62-34]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-62-35

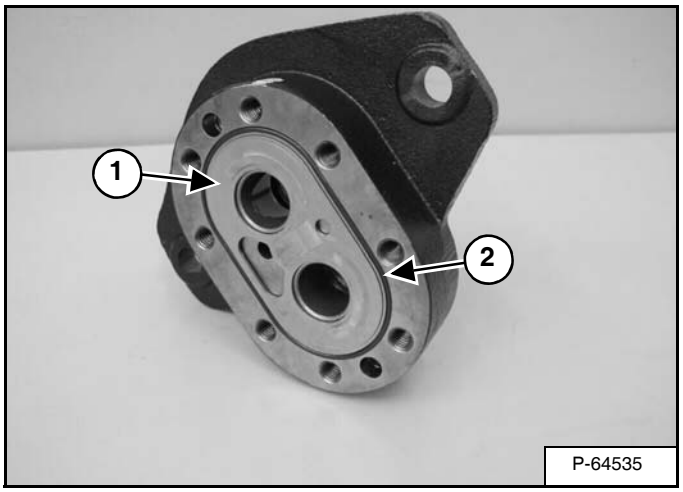
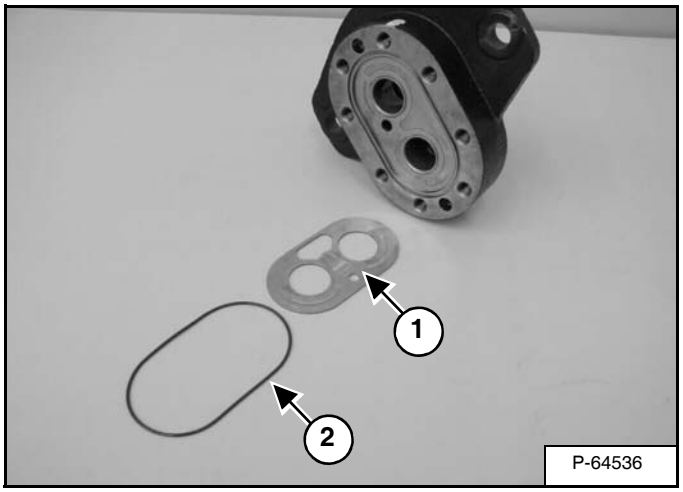


Figure 20-62-36



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-62-35]** & **[Figure 20-62-36]** from the pump flange section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-62-36] inlets and traps as shown with bronze side toward gears.

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Disassembly And Assembly (Cont'd)

Figure 20-62-37

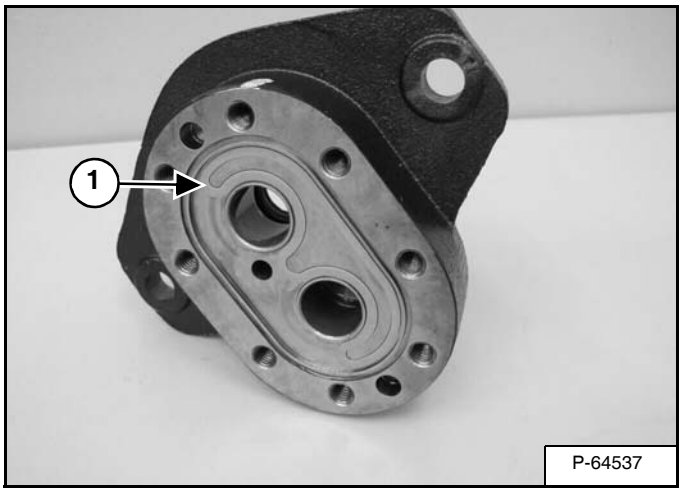
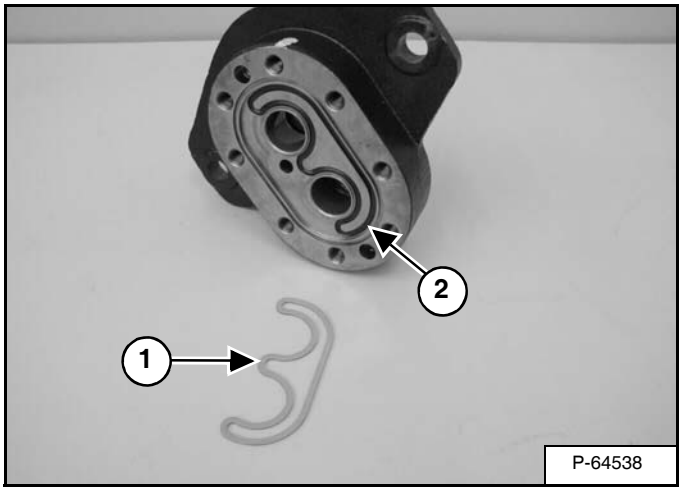


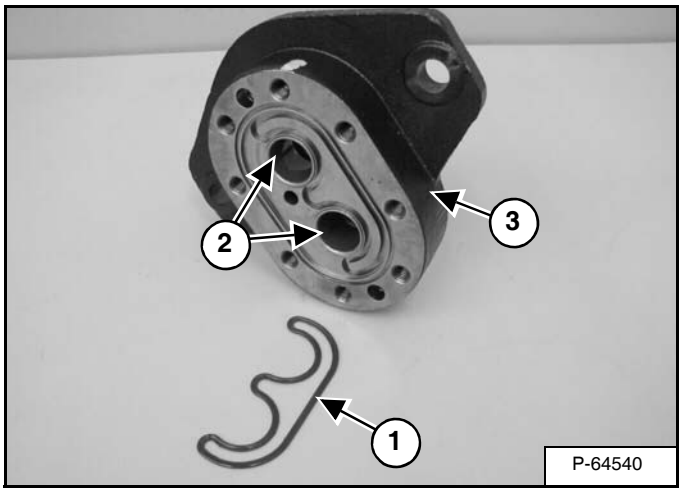
Figure 20-62-38



Remove the load seal (Item 1) **[Figure 20-62-37]** & **[Figure 20-62-38]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-62-38]**.

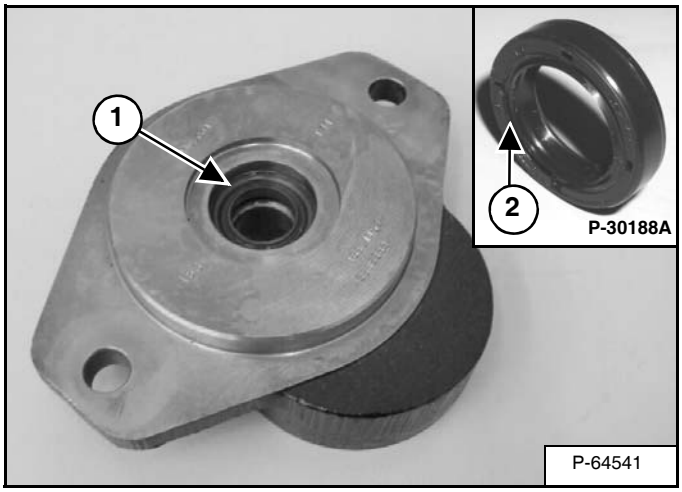
Figure 20-62-39



Inspect the pre-load seal (Item 1) **[Figure 20-62-39]** for damage and replace as needed.

NOTE: Inspect the pump flange section (Item 2) and bushings (Item 3) [Figure 20-62-39]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-62-40



Remove the shaft seal (Item 1) **[Figure 20-62-40]** from the pump flange section.

Installation: The shaft seal flush surface (Item 2) **[Figure 20-62-40]** must be facing out away from the pump.

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HYDRAULIC PUMP (HIGH FLOW) (SJC)

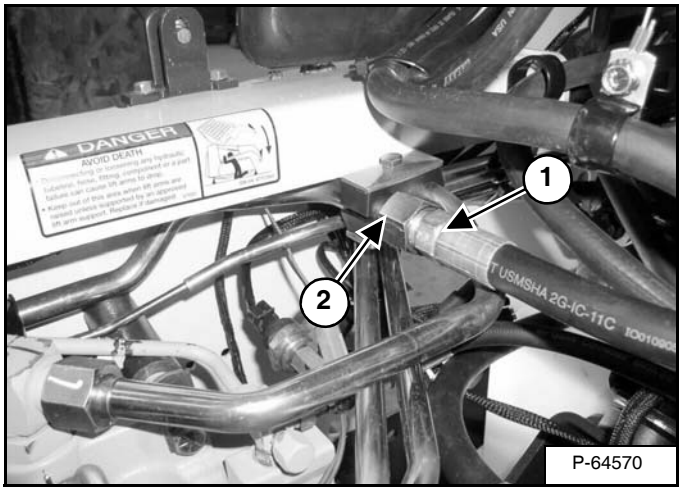
Test The Output Of The Hydraulic Auxiliary Pump

WARNING

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

W-2017-0286

Figure 20-63-1



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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

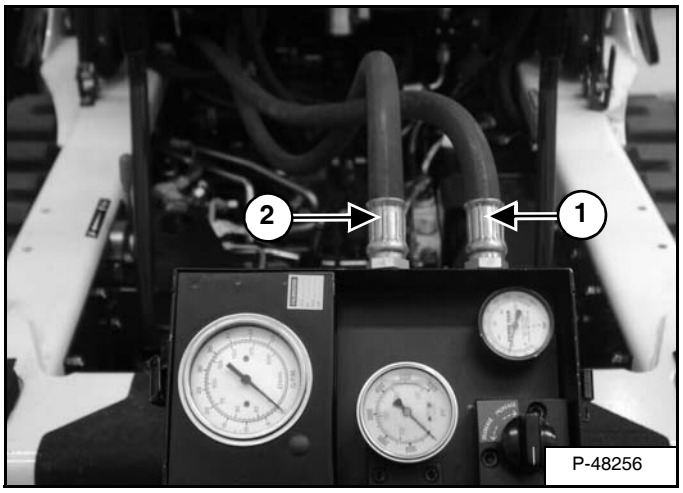
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

Connect the remote start tool. (See Procedure on Page 10-60-1.)

Disconnect the OUTLET hose (Item 1) **[Figure 20-63-1]**.

Figure 20-63-2



Connect the INLET hose (Item 1) **[Figure 20-63-2]** from the tester, to the OUTLET hose (Item 1) **[Figure 20-63-1]** coming from the gear pump. Connect the OUTLET hose (Item 2) **[Figure 20-63-2]** from the tester, to the INLET tubeline (Item 2) **[Figure 20-63-1]** leading to the hydraulic control valve.

IMPORTANT

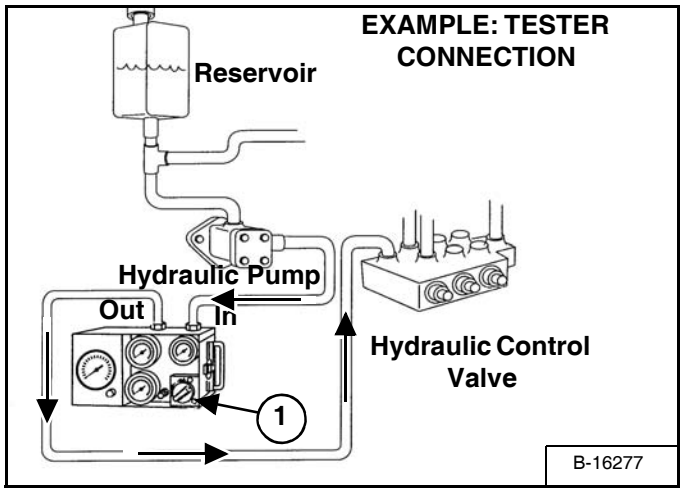
The hydraulic tester must be in the fully open position before you start the engine.

I-2024-0284

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Test The Output Of The Hydraulic Auxiliary Pump (Cont'd)

Figure 20-63-3



Sample tester connection shown **[Figure 20-63-3]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-63-3]** on the tester to about 1000 PSI (6895 kPa). **DO NOT exceed system relief pressure.** Open the restrictor control and record the free flow (GPM) at full RPM.

Push the maximum/variable flow switch (on the remote start tool) to engage the front auxiliary hydraulics. The light will come ON. Push the button (on the right control lever) for fluid flow to the quick coupler (fluid pressure will go over main relief). Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *SPECIFICATIONS* Section, Contents Page SPEC-01 for system relief pressure and full RPM.

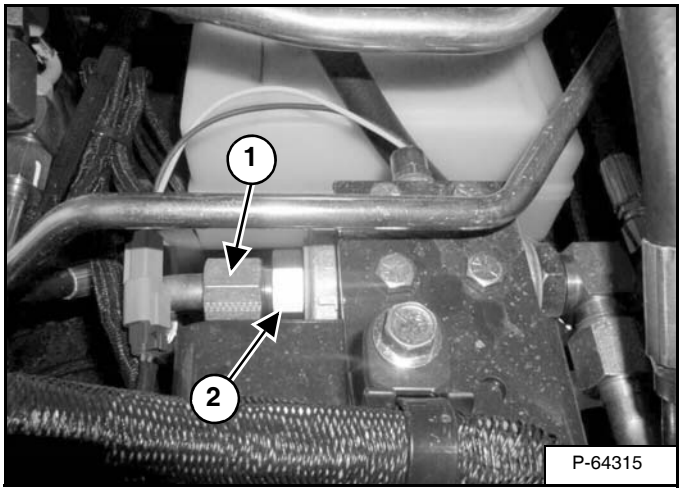
Test The Output Of The Hydraulic Charge Pump

⚠ WARNING

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

W-2017-0286

Figure 20-63-4



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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

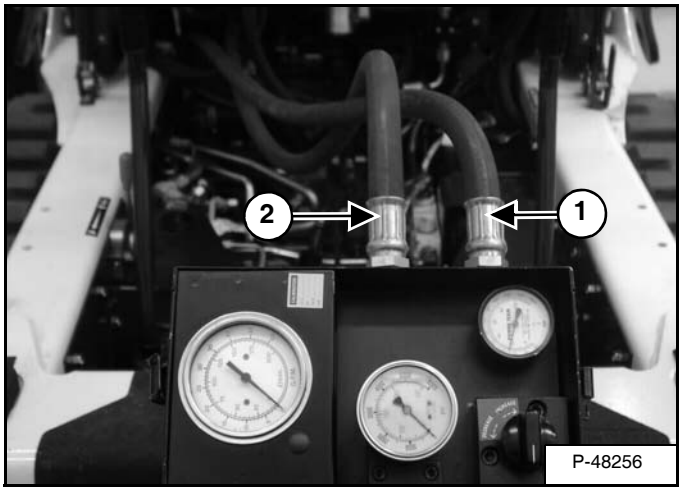
Connect the remote start tool. (See Procedure on Page 10-60-1.)

Disconnect the charge pump OUTLET hose (Item 1) from the INLET fitting (Item 2) **[Figure 20-63-4]** at the charge filter housing.

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Test The Output Of The Hydraulic Charge Pump (Cont'd)

Figure 20-63-5



Connect the INLET hose (Item 1) **[Figure 20-63-5]** from the tester, to the charge pump OUTLET hose (Item 1) **[Figure 20-63-4]** coming from the gear pump. Connect the OUTLET hose (Item 2) **[Figure 20-63-5]** from the tester, to the INLET fitting (Item 2) **[Figure 20-63-4]** at the charge filter housing.

IMPORTANT

The hydraulic tester must be in the fully open position before you start the engine.

I-2024-0284

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-63-3]** on the tester to about 1000 PSI (6895 kPa). **DO NOT exceed 2000 PSI**.

Open the restrictor control and record the free flow (GPM) at full RPM.

Turn the restrictor down to 2000 PSI. **DO NOT EXCEED 2000 PSI**. The high pressure flow must be at least 80% of free flow.

$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

**Refer to Hydraulic Schematics for pump flow and full RPM.*

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Test The Output Of The Hydraulic Pump (High Flow)

⚠ WARNING

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

W-2017-0286

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

IMPORTANT

The hydraulic tester must be in the fully open position before you start the engine.

I-2024-0284

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

MEL1563 - Remote Start Tool
MEL10103 - Hydraulic Tester
MEL10106 - Hydraulic Test Kit

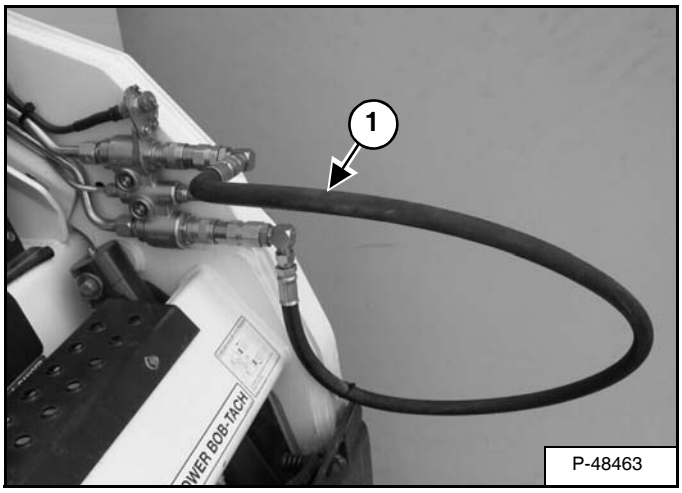
Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door of the loader.

Connect the remote start tool. (See Procedure on Page 10-60-1.)

Figure 20-63-6



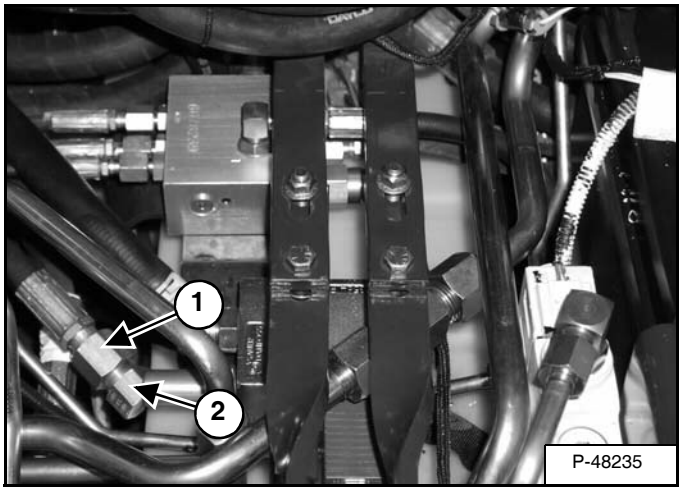
Install a jumper hose (Item 1) **[Figure 20-63-6]** onto the front auxiliary quick couplers.

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

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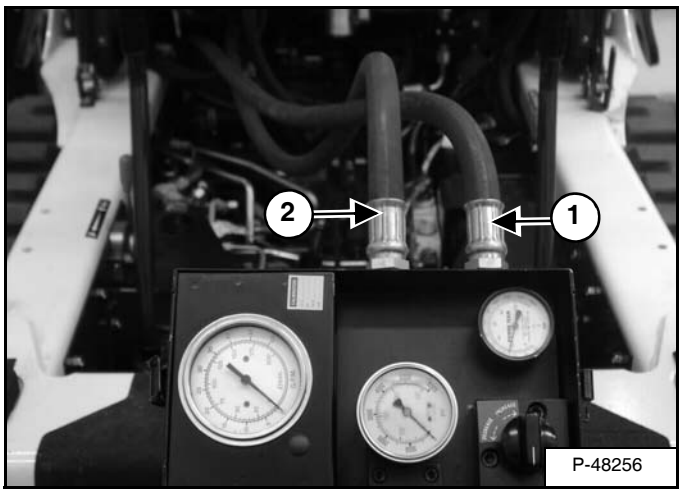
Test The Output Of The Hydraulic Pump (High Flow) (Cont'd)

Figure 20-63-7



Disconnect the high flow pump OUTLET hose (Item 1) from the high flow valve INLET fitting (Item 2) **[Figure 20-63-7]**.

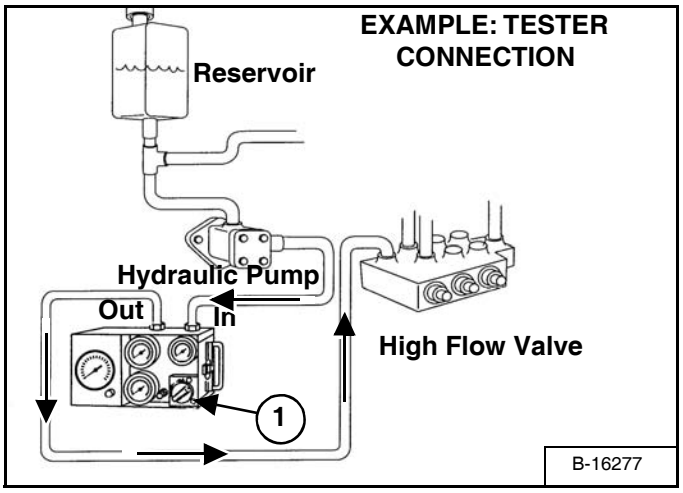
Figure 20-63-8



Connect the INLET hose (Item 1) **[Figure 20-63-8]** from the tester, to the high flow pump OUTLET hose (Item 1) **[Figure 20-63-7]**. Connect the OUTLET hose (Item 2) **[Figure 20-63-8]** from the tester, to the high flow valve INLET fitting (Item 2) **[Figure 20-63-7]** on the High Flow valve.

Lower the cab.

Figure 20-63-9



Sample tester connection shown **[Figure 20-63-9]**.

Start the engine and run at low idle RPM. Press the front auxiliary button. Press the High Flow button. Push the button (on the right control lever) for fluid flow to the quick coupler. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control (Item 1) **[Figure 20-63-9]** on the tester to about 1000 PSI (6895 kPa).

NOTE: DO NOT EXCEED 3300 PSI.

Open the restrictor control and record the free flow (GPM) at full RPM. Turn the restrictor control on the tester to 3300 PSI and the flow should go to zero GPM.

If pressure readings are not obtained go to the High Flow Valve, relief valve adjustment procedure.(See High Flow Relief Valve Adjustment Procedure on Page 20-100-3.)

Record the highest pressure (PSI) and flow (GPM). The high pressure flow must be at least 80% of free flow.

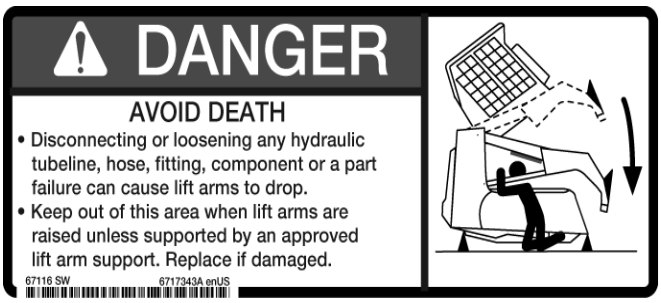
$$\%= \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \text{ X100}$$

A low percentage may indicate a failed pump.

*Refer to *Hydraulic Schematics* Legend for system relief pressure and full RPM.

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Removal And Installation



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Lift and block the rear of the loader. (See Procedure on Page 10-10-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the hydraulic fluid from the reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Open the rear door of the loader.

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 20-63-10

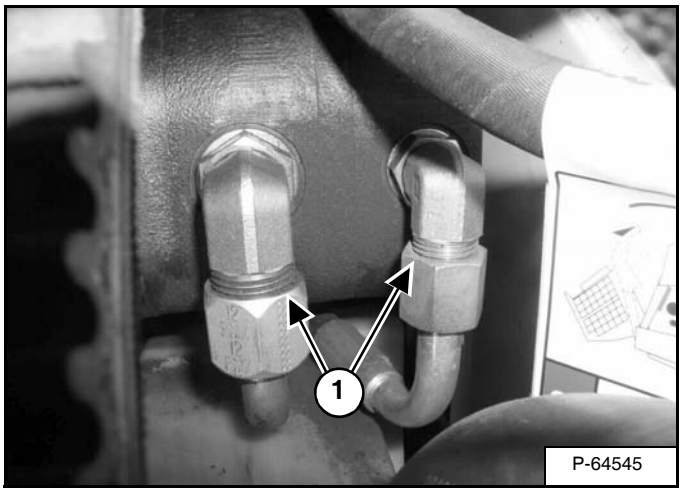
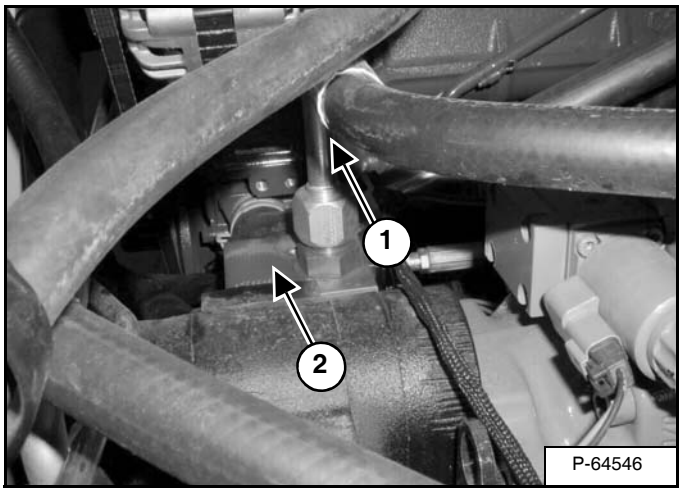


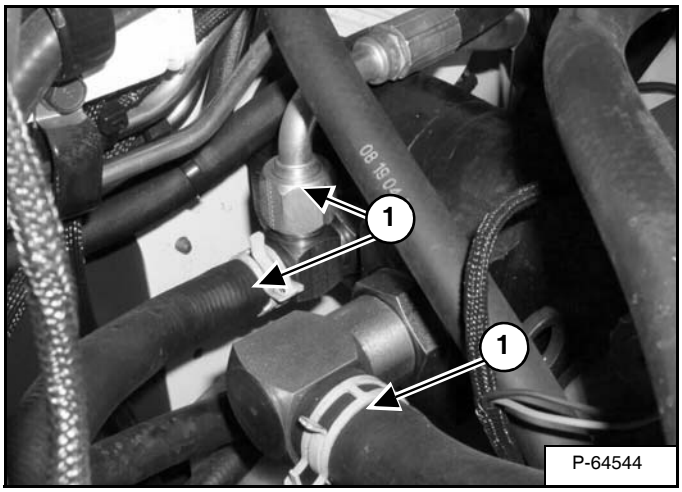
Figure 20-63-11



Disconnect and cap the outlet hoses (Item 1) **[Figure 20-63-10]** and **[Figure 20-63-11]** from the back of the hydraulic pump.

Remove the Power Bob-Tach block (Item 2) **[Figure 20-63-11]** if equipped. (See Removal And Installation on Page 20-120-1.)

Figure 20-63-12

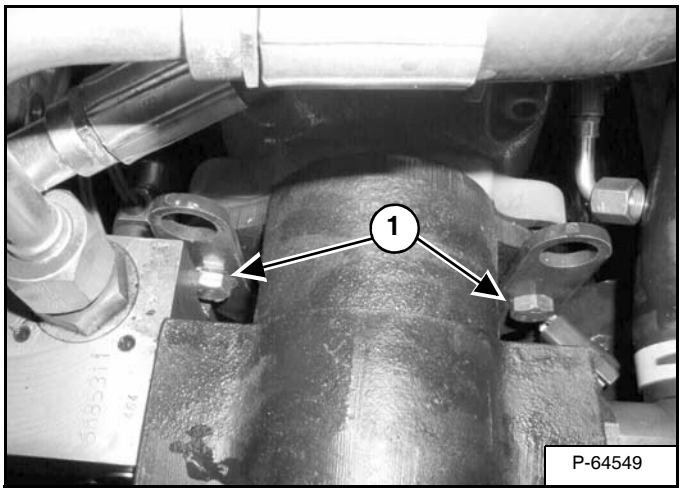


Disconnect and cap the inlet hoses (Item 1) **[Figure 20-63-12]** from the front of the hydraulic pump.

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Removal And Installation (Cont'd)

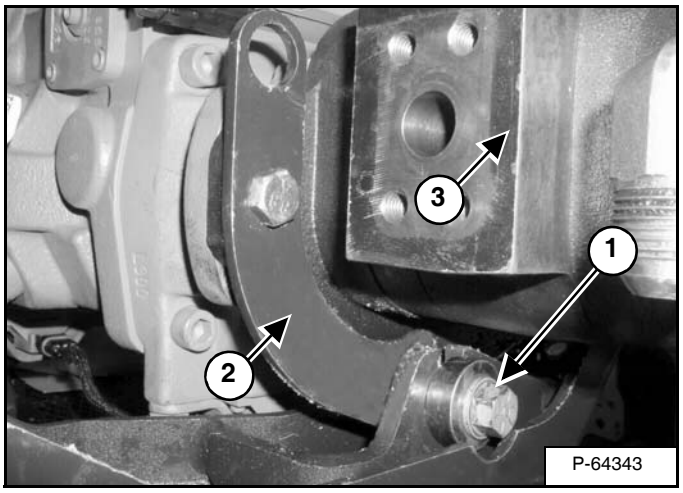
Figure 20-63-13



Remove the two mounting bolts (Item 1) **[Figure 20-63-13]** from the hydraulic pump.

Installation: Tighten the mounting bolts to 55-60 ft.-lb. (75-85 N•m) torque.

Figure 20-63-14



Remove the bracket mounting bolt (Item 1) from the pump mounting bracket (Item 2) **[Figure 20-63-14]**.

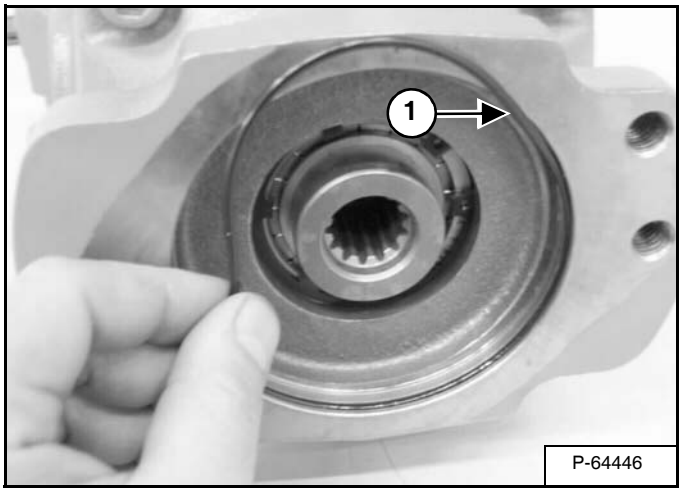
NOTE: The mounting bolt is a special purpose bolt. Only replace with original Bobcat Parts.

Installation: Apply a medium strength threadlocker to mounting bolt and tighten to 90-100 ft.-lb. (122-136 N•m) torque.

Remove the mounting bracket (Item 2) **[Figure 20-63-14]**.

Remove the hydraulic pump (Item 3) **[Figure 20-63-14]** from the hydrostatic pump.

Figure 20-62-15

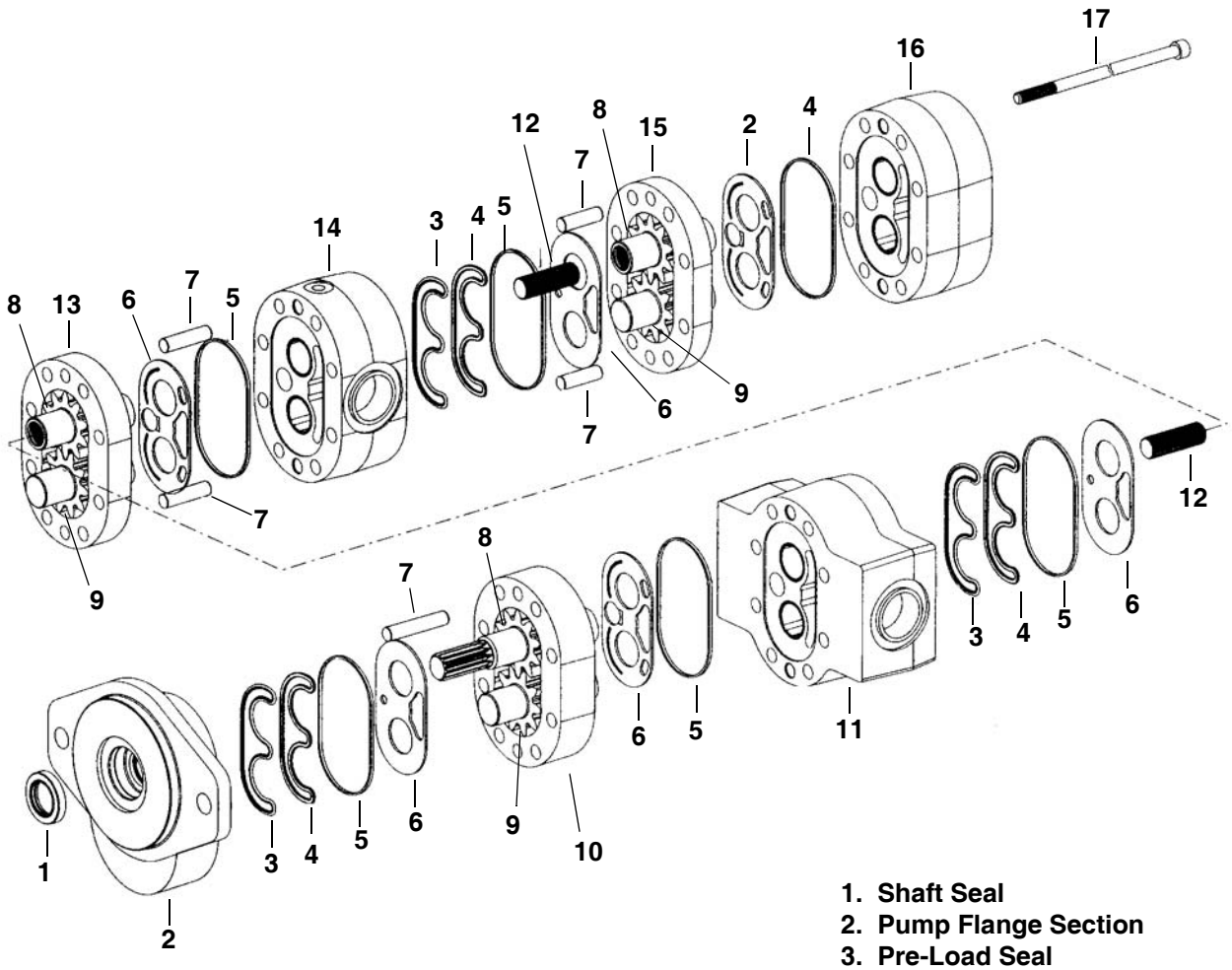


Replace the O-ring (Item 1) **[Figure 20-62-15]** in the hydrostatic pump.

Reverse the removal procedure to install the hydraulic pump.

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Identification



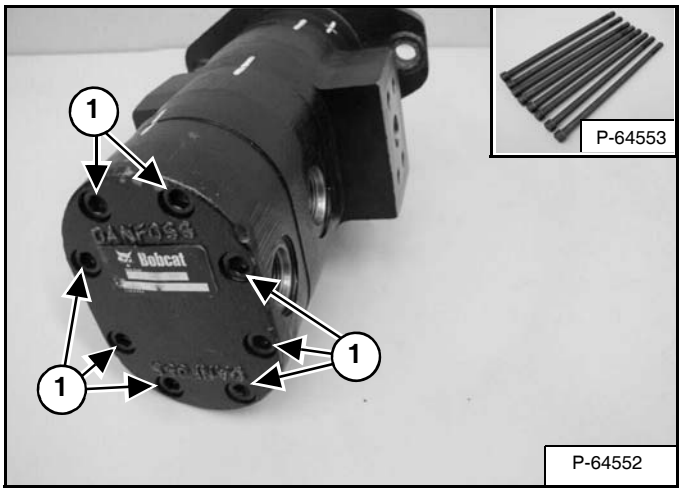
1. Shaft Seal
2. Pump Flange Section
3. Pre-Load Seal
4. Load Seal
5. O-Ring
6. Valve Plate
7. Pin
8. Drive Gear
9. Idler Gear
10. Auxiliary Pump Section
11. Auxiliary Center Section
12. Splined Shaft
13. Charge Pump Section
14. Charge Center Section
15. High Flow Pump Section
16. High Flow End Section
17. Bolt

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Disassembly And Assembly

Figure 20-63-16



Mark the pump sections for correct assembly **[Figure 20-63-16]**.

Remove the eight pump housing bolts (Item 1) **[Figure 20-63-16]**.

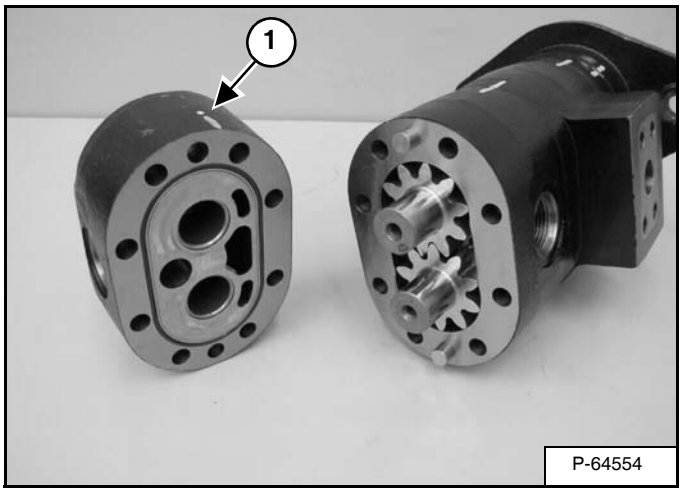
Installation: Tighten the bolts (Item 2) **[Figure 20-63-16]** to 54 ft.-lb. (73,2 N•m) torque.

IMPORTANT

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

I-2003-0888

Figure 20-63-17



Remove the high flow end section (Item 1) **[Figure 20-63-17]**.

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Disassembly And Assembly (Cont'd)

Figure 20-63-18

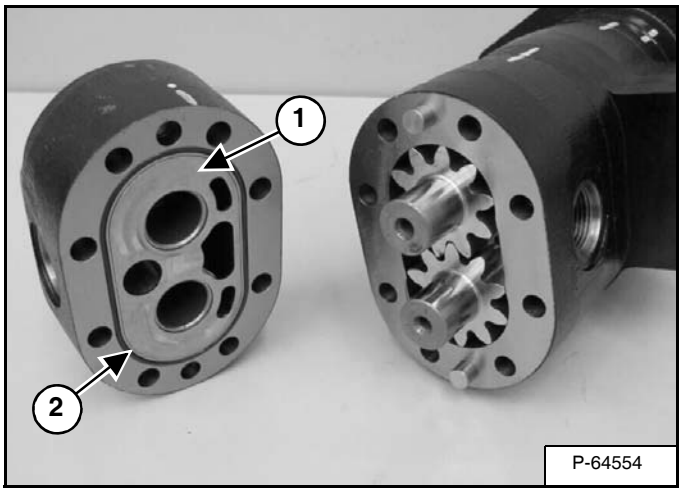
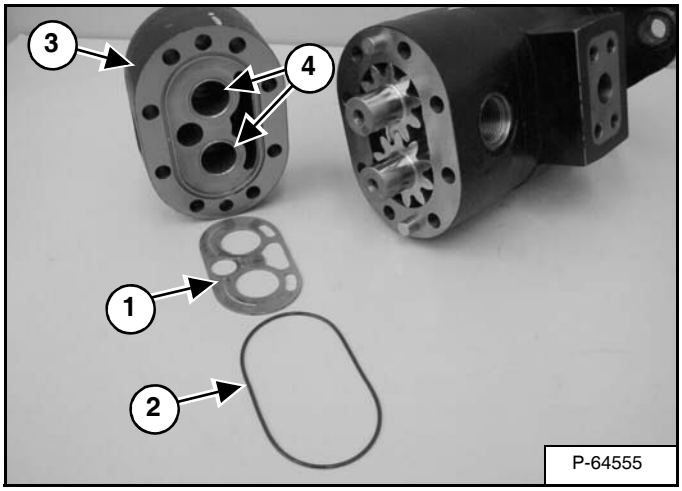


Figure 20-63-19



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-63-18]** & **[Figure 20-63-19]** from the high flow end section.

NOTE: Position wear plate (Item 1) [Figure 20-63-19] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the high flow end section (Item 3) and bushings (Item 4) [Figure 20-63-19]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-20

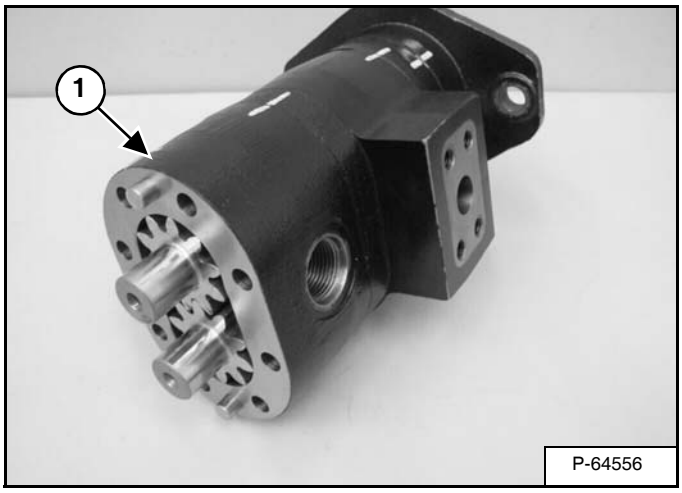
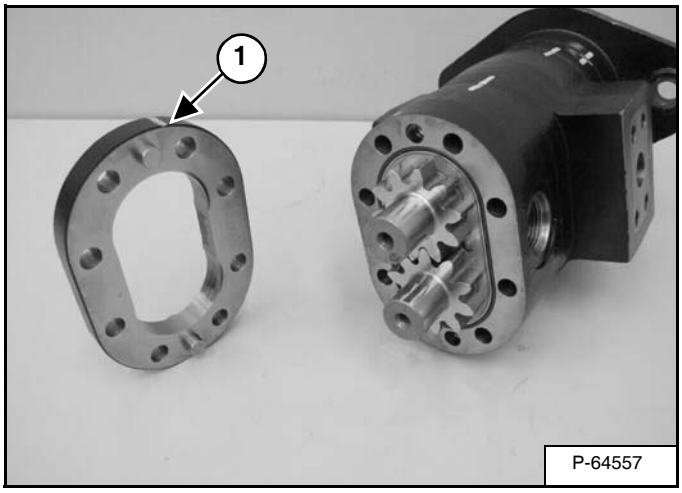


Figure 20-63-21



Remove the high flow pump section (Item 1) **[Figure 20-63-20]** & **[Figure 20-63-21]** from the charge center section.

NOTE: Inspect the high flow pump section (Item 1) [Figure 20-63-21]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-63-22

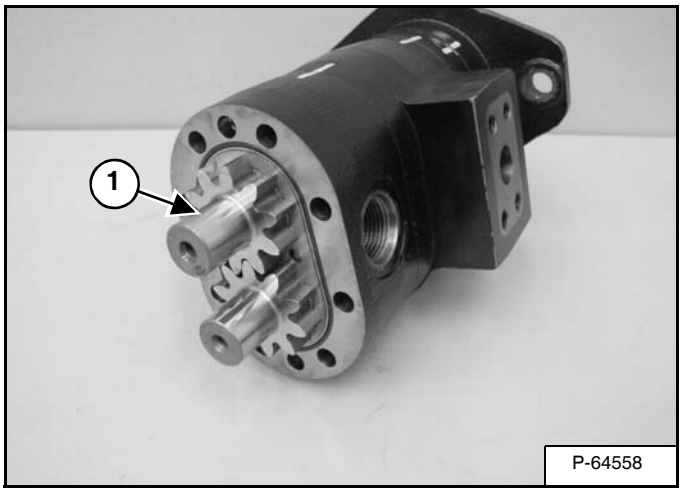
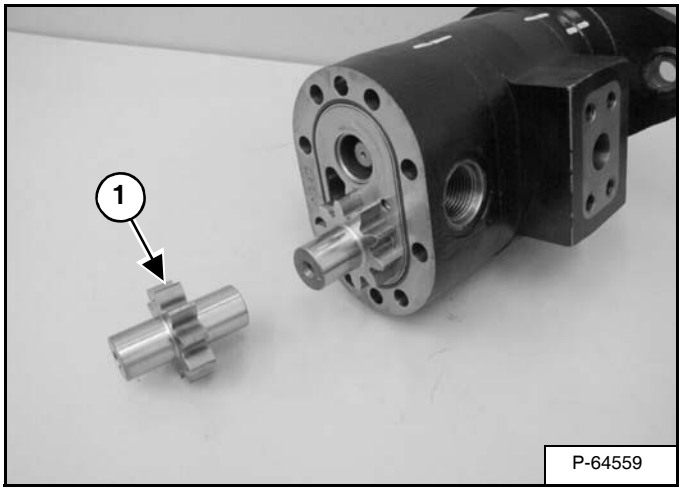


Figure 20-63-23



Remove the drive gear (Item 1) **[Figure 20-63-22]** & **[Figure 20-63-23]**.

NOTE: Inspect the drive gear (Item 1) [Figure 20-63-23]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-24

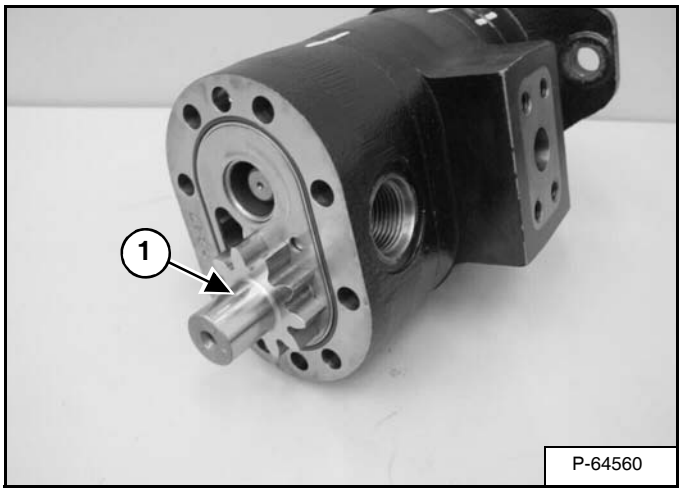
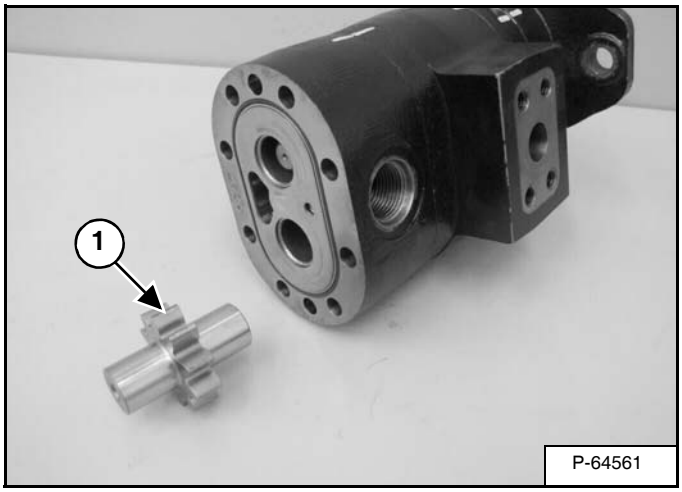


Figure 20-63-25



Remove the idler gear (Item 1) **[Figure 20-63-24]** & **[Figure 20-63-25]** from the charge center section.

NOTE: Inspect the idler gear (Item 1) [Figure 20-63-25]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-63-26

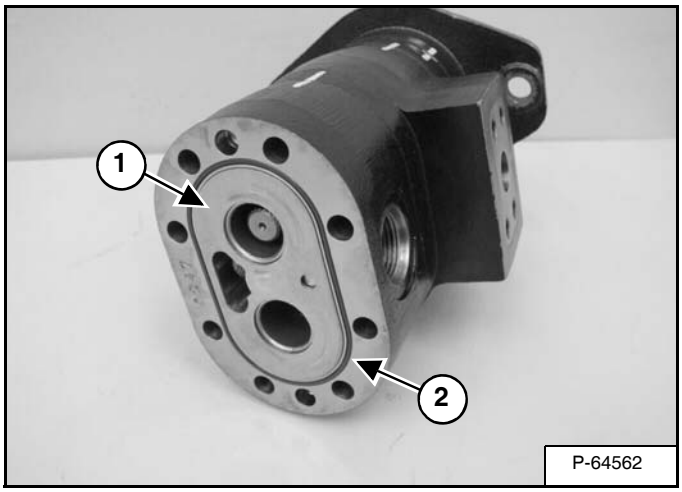
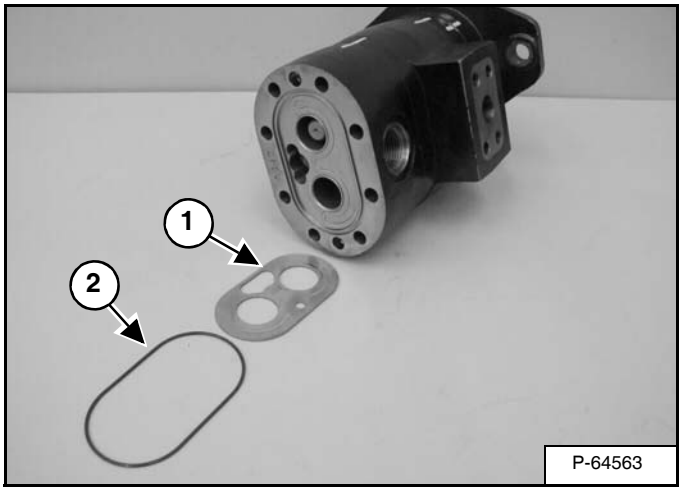


Figure 20-63-27



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-63-26]** & **[Figure 20-63-27]** from the charge center section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-63-27] inlets and traps as shown with bronze side toward gears.

Figure 20-63-28

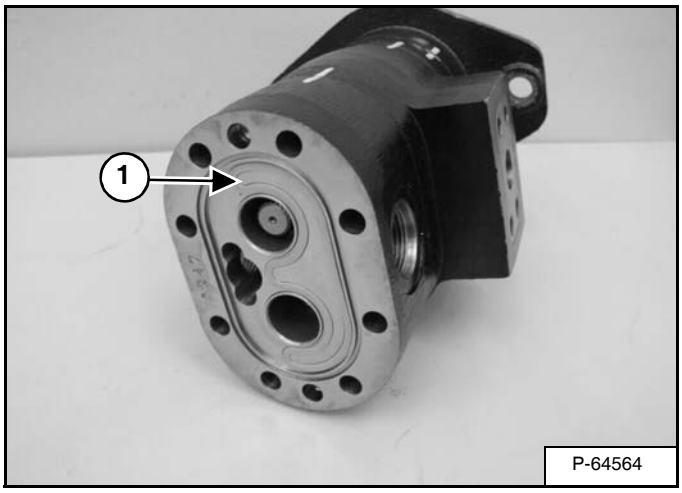
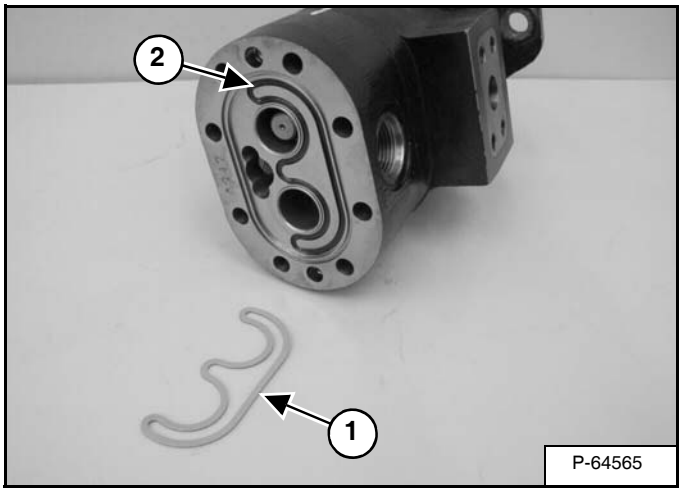


Figure 20-63-29



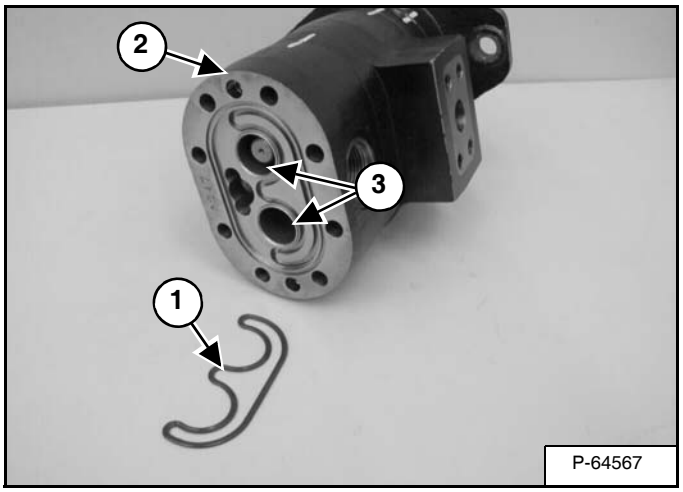
Remove the load seal (Item 1) **[Figure 20-63-28]** & **[Figure 20-63-29]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-63-29]**.

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Disassembly And Assembly (Cont'd)

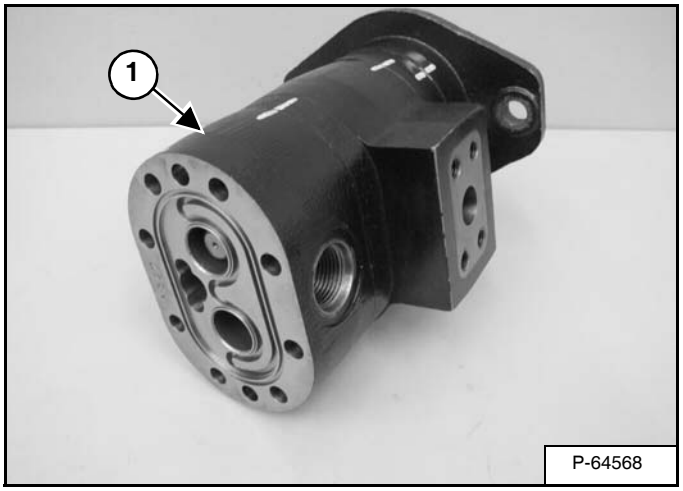
Figure 20-63-30



Inspect the pre-load seal (Item 1) **[Figure 20-63-30]** for damage and replace as needed.

NOTE: Inspect the charge center section (Item 2) and bushings (Item 3) [Figure 20-63-30]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-31



Remove the charge center section (Item 1) **[Figure 20-63-31]**.

Figure 20-63-32

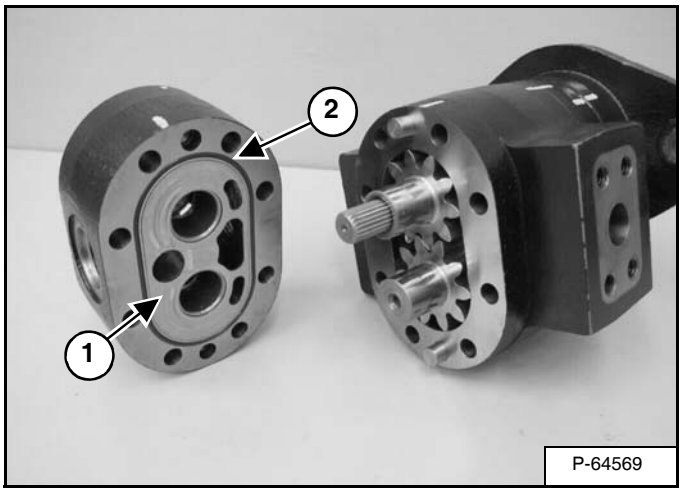
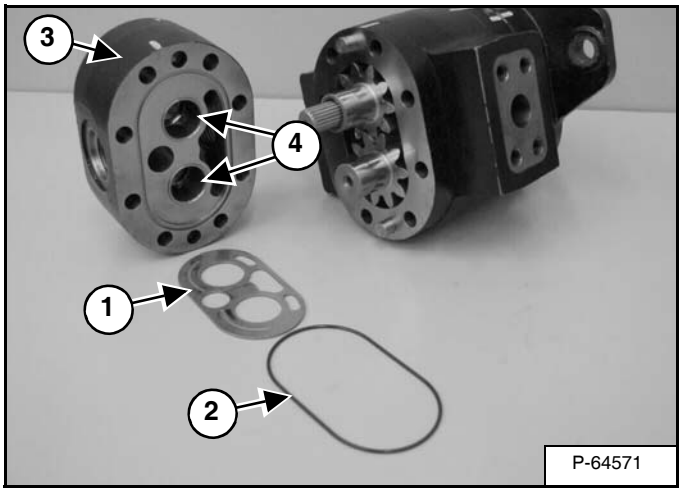


Figure 20-63-33



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-63-32]** & **[Figure 20-63-33]** from the charge center section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-63-33] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the charge center section (Item 3) and bushings (Item 4) [Figure 20-63-33]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-63-34

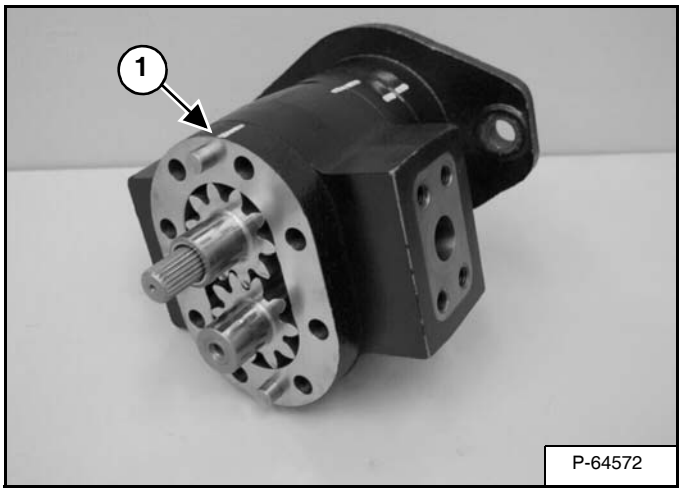
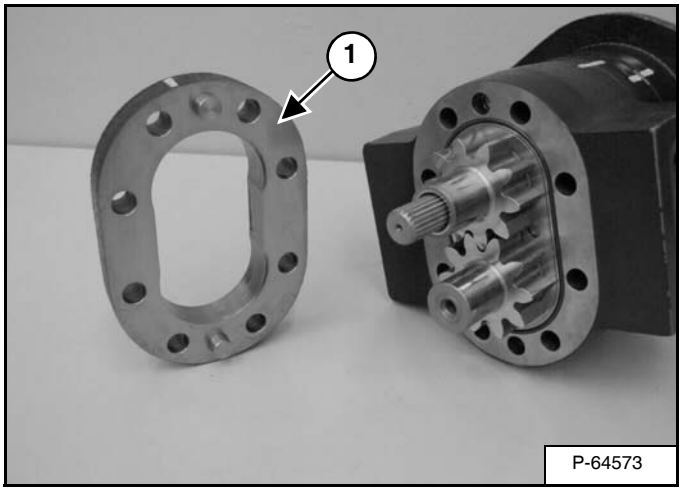


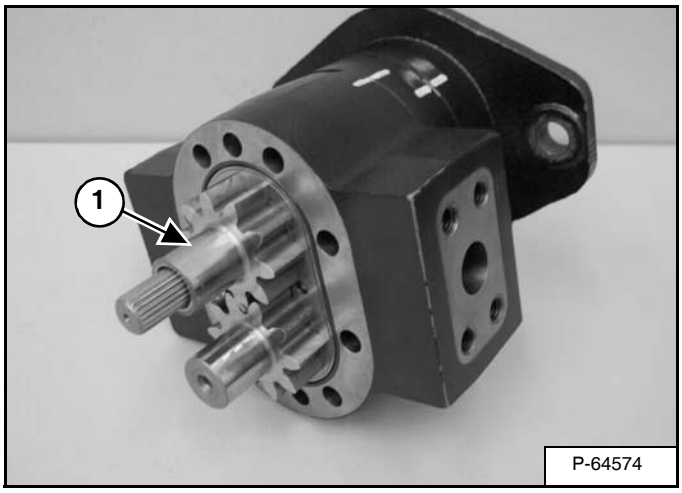
Figure 20-63-35



Remove the charge pump section (Item 1) **[Figure 20-63-34]** & **[Figure 20-63-35]** from the auxiliary pump center section.

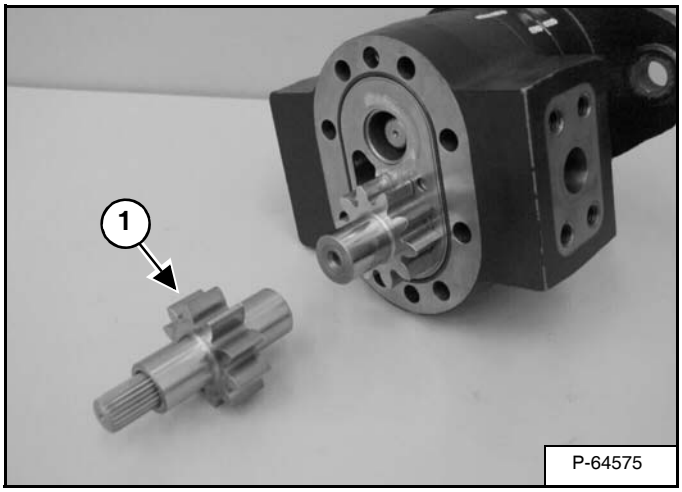
NOTE: Inspect the charge pump section (Item 1) [Figure 20-63-35]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-36



Remove the drive gear (Item 1) **[Figure 20-63-36]** from the auxiliary center section.

Figure 20-63-37

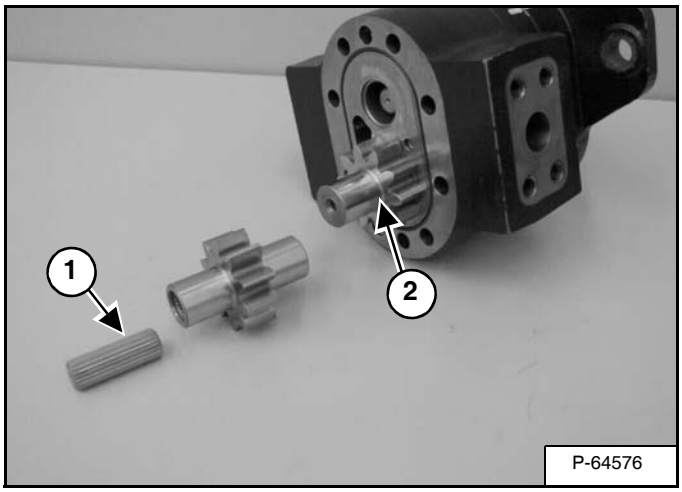


NOTE: Inspect the drive gear (Item 1) [Figure 20-63-37]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

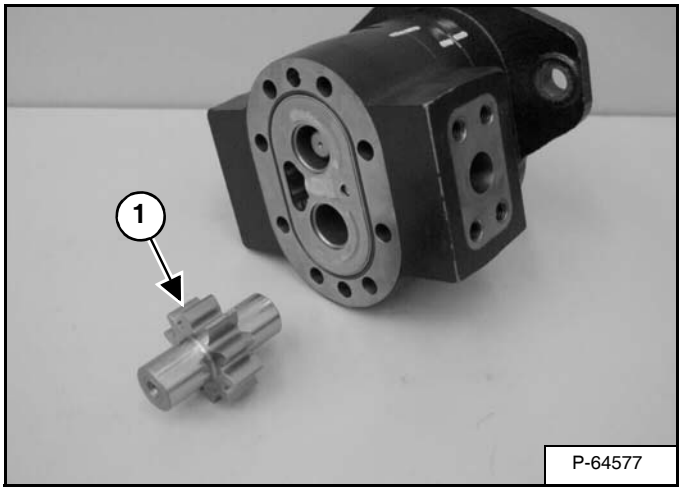
Figure 20-63-38



Remove the spline shaft (Item 1) **[Figure 20-63-38]** from the end of the drive gear. Inspect for damage and replace as needed.

Remove the idler gear (Item 2) **[Figure 20-63-38]**.

Figure 20-63-39



NOTE: Inspect the idler gear (Item 1) [Figure 20-63-39]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-40

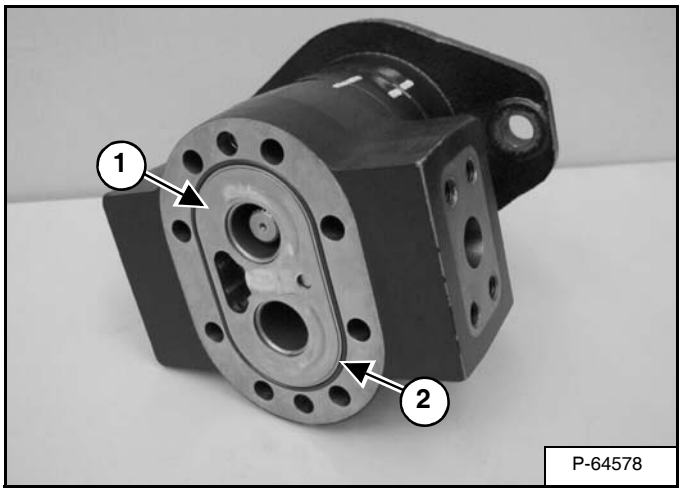
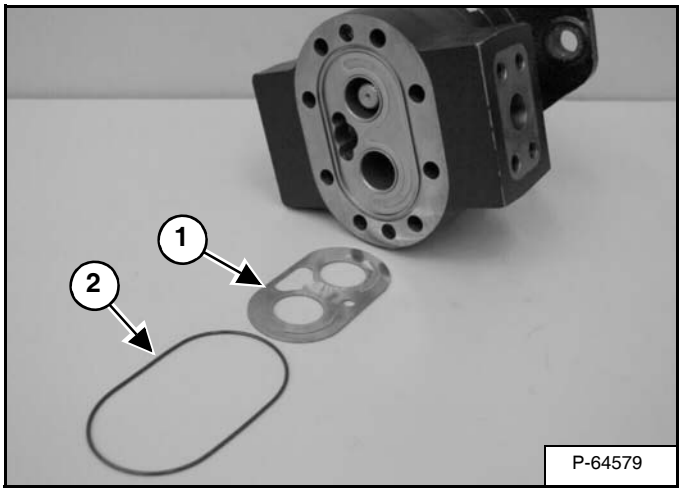


Figure 20-63-41



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-63-40]** & **[Figure 20-63-41]** from the auxiliary center section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-63-41] inlets and traps as shown with bronze side toward gears.

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Disassembly And Assembly (Cont'd)

Figure 20-63-42

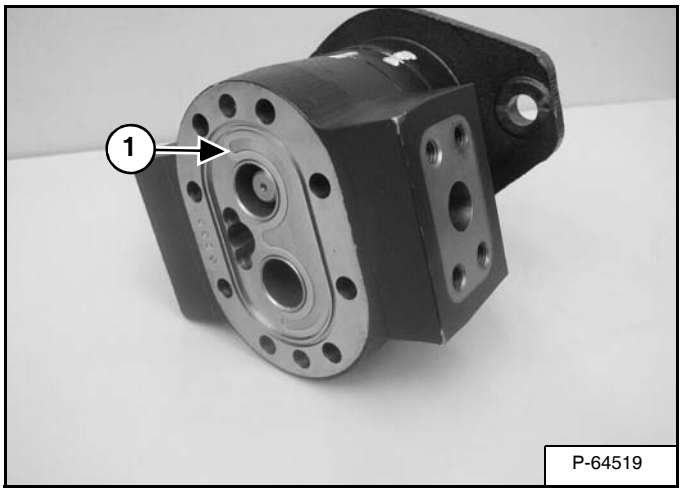
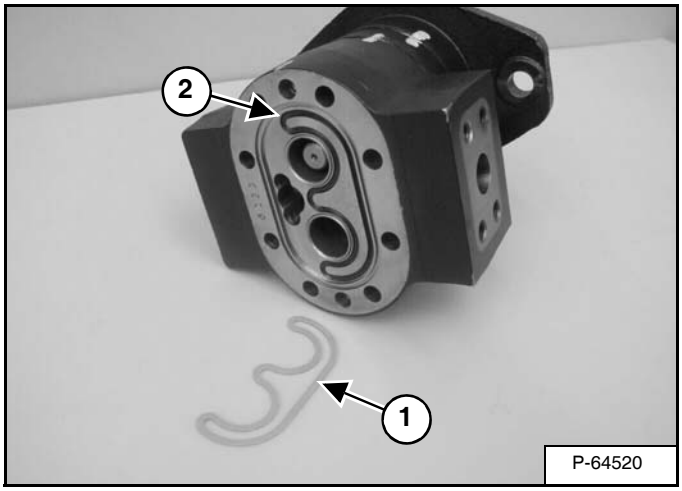


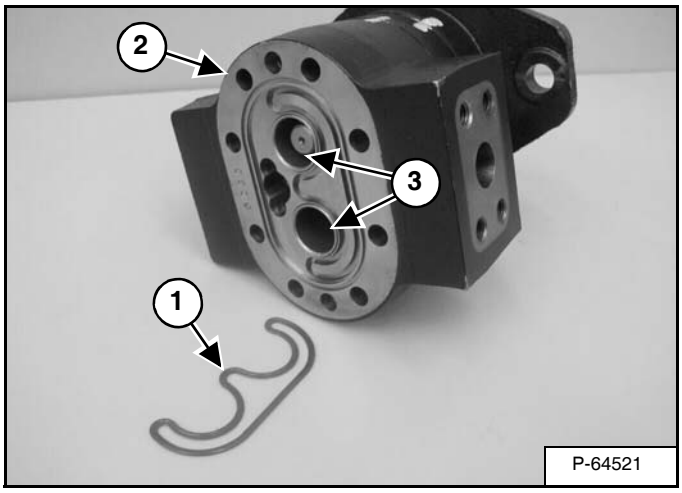
Figure 20-63-43



Remove the load seal (Item 1) **[Figure 20-63-42]** & **[Figure 20-63-43]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-63-43]**.

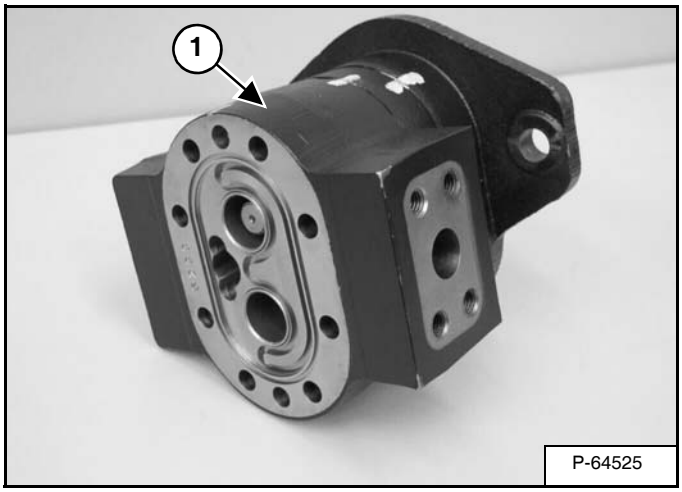
Figure 20-63-44



Inspect the pre-load seal (Item 1) **[Figure 20-63-44]** for damage and replace as needed.

NOTE: Inspect the auxiliary center section (Item 2) and bushings (Item 3) [Figure 20-63-44]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-45



Remove the auxiliary center section (Item 1) **[Figure 20-63-45]**.

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Disassembly And Assembly (Cont'd)

Figure 20-63-46

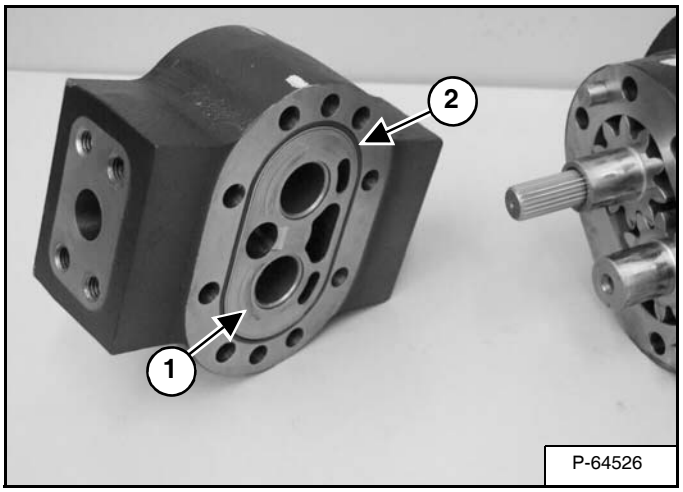
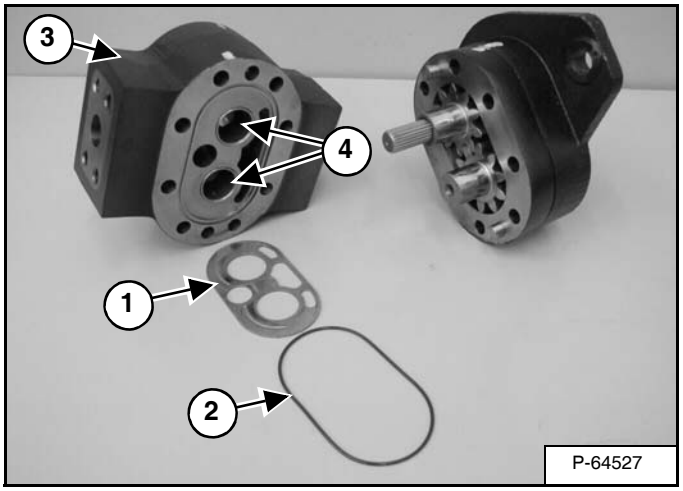


Figure 20-63-47



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-63-46]** & **[Figure 20-63-47]** from the auxiliary center section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-63-47] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the auxiliary center section (Item 3) and bushings (Item 4) [Figure 20-63-47]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-48

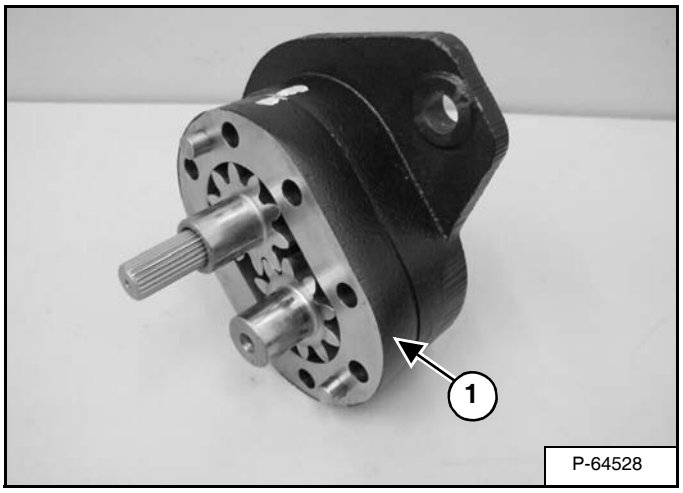
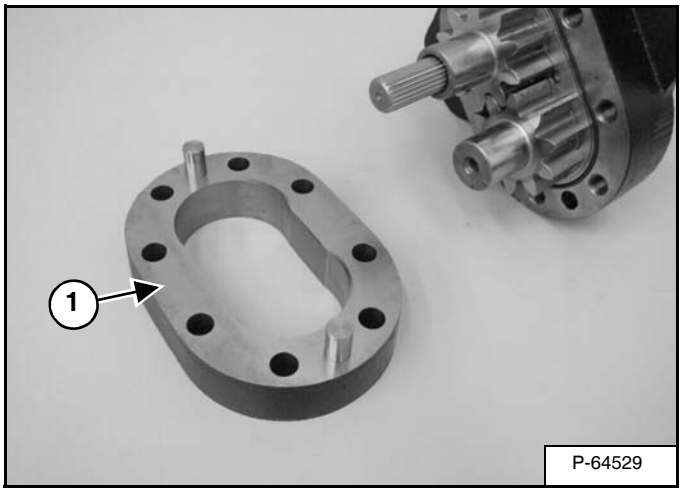


Figure 20-63-49



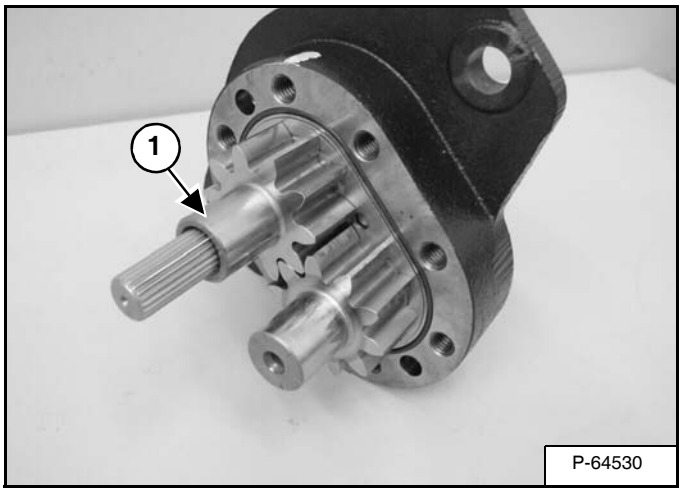
Remove the auxiliary pump section (Item 1) **[Figure 20-63-48]** & **[Figure 20-63-49]** from the pump flange section.

NOTE: Inspect the auxiliary pump section (Item 1) [Figure 20-63-49]. If excessive wear or damage is visible, the pump must be replaced.

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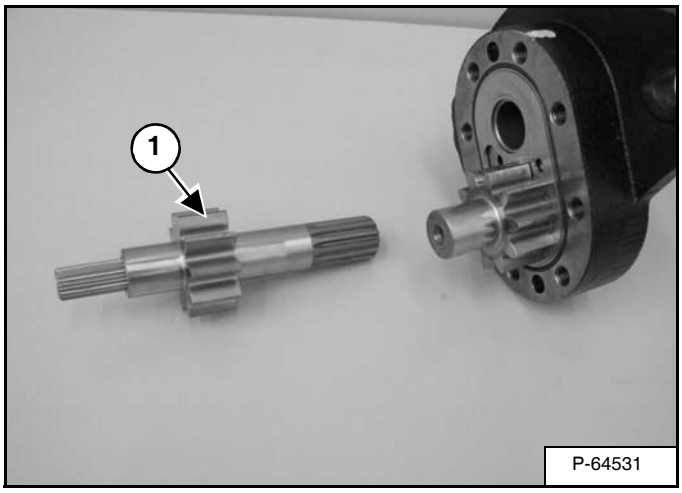
Disassembly And Assembly (Cont'd)

Figure 20-63-50



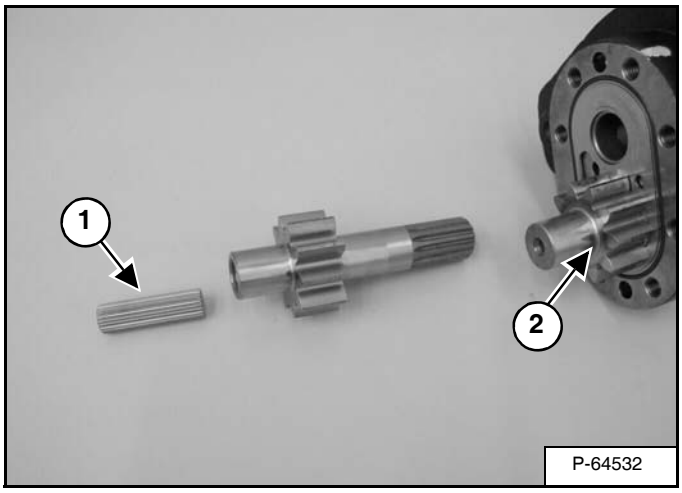
Remove the drive gear (Item 1) **[Figure 20-63-50]** from the pump flange section.

Figure 20-63-51



NOTE: Inspect the drive gear (Item 1) [Figure 20-63-51]. If excessive wear or damage is visible, the pump must be replaced.

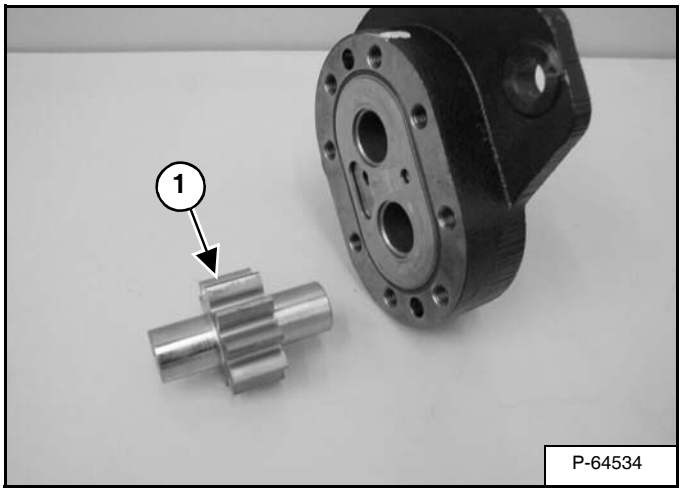
Figure 20-63-52



Remove the spline shaft (Item 1) **[Figure 20-63-52]** from the end of the drive gear.

Remove the idler gear (Item 2) **[Figure 20-63-52]**.

Figure 20-63-53



Remove the idler gear (Item 1) **[Figure 20-63-53]** from the pump flange section.

NOTE: Inspect the idler gear (Item 1) [Figure 20-63-53]. If excessive wear or damage is visible, the pump must be replaced.

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Disassembly And Assembly (Cont'd)

Figure 20-63-54

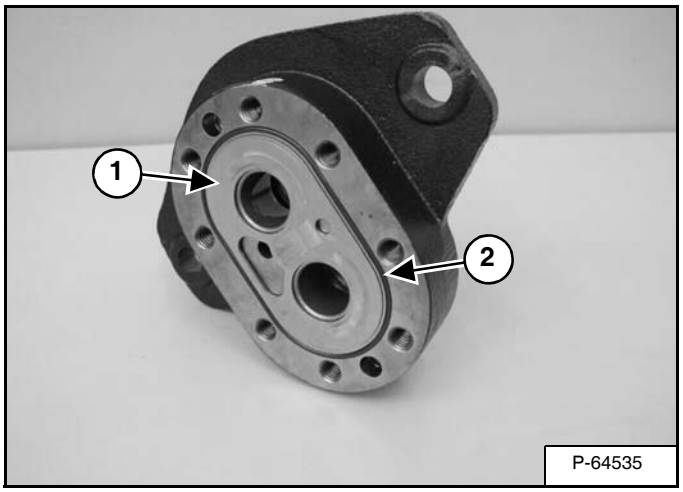
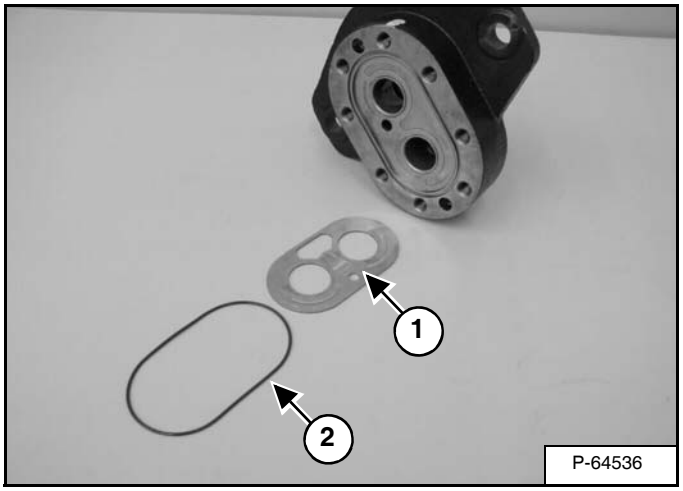


Figure 20-63-55



Remove the wear plate (Item 1) and section seal (Item 2) **[Figure 20-63-54]** & **[Figure 20-63-55]** from the pump flange section. Inspect for damage and replace as needed.

NOTE: Position wear plate (Item 1) [Figure 20-63-55] inlets and traps as shown with bronze side toward gears.

Figure 20-63-56

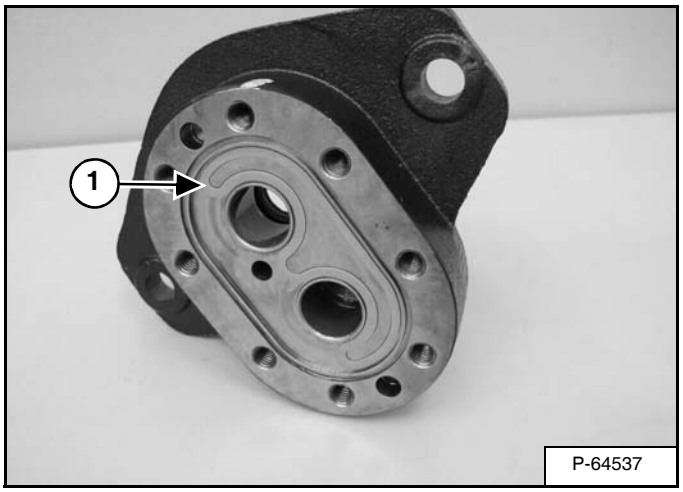
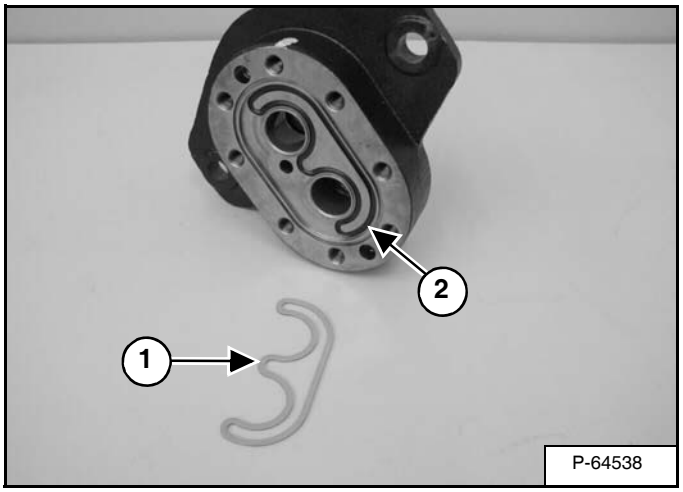


Figure 20-63-57



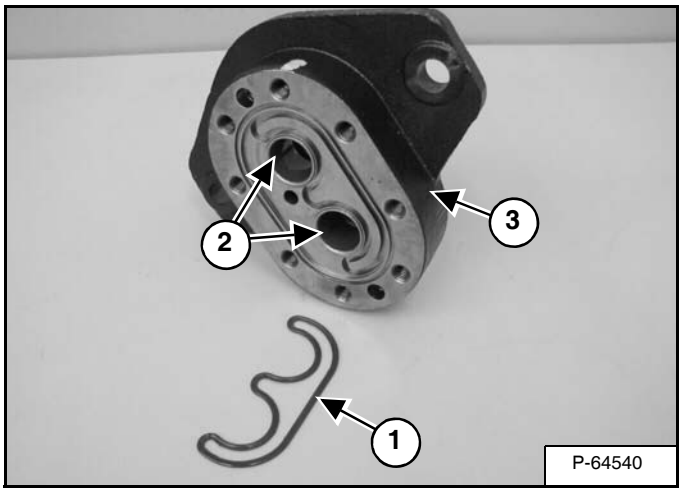
Remove the load seal (Item 1) **[Figure 20-63-56]** & **[Figure 20-63-57]**. Inspect for damage and replace as needed.

Remove the pre-load seal (Item 2) **[Figure 20-63-57]**.

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Disassembly And Assembly (Cont'd)

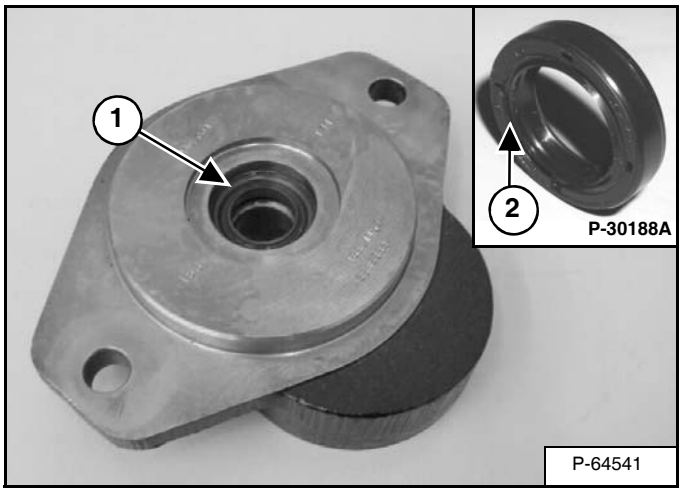
Figure 20-63-58



Inspect the pre-load seal (Item 1) **[Figure 20-63-58]** for damage and replace as needed.

NOTE: Inspect the pump flange section (Item 2) and bushings (Item 3) [Figure 20-63-58]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-63-59



Remove the shaft seal (Item 1) **[Figure 20-63-59]** from the pump flange section.

Installation: The shaft seal flush surface (Item 2) **[Figure 20-63-59]** must be facing out away from the pump.

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HYDRAULIC/HYDROSTATIC FILTER HOUSING

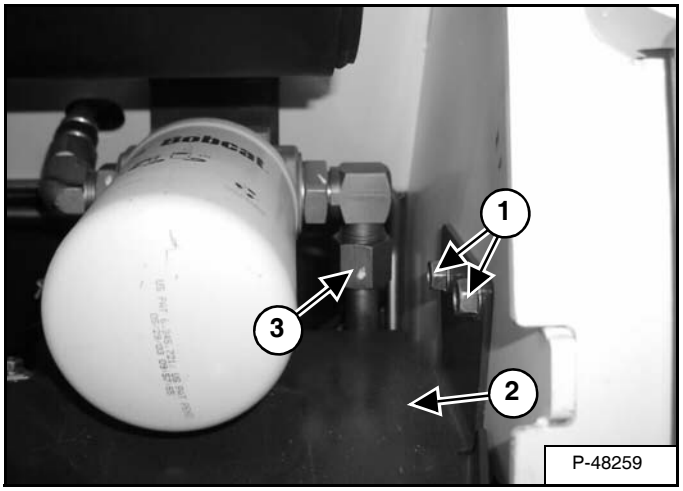
Removal And Installation

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.

Implement Filter Housing

Figure 20-70-1



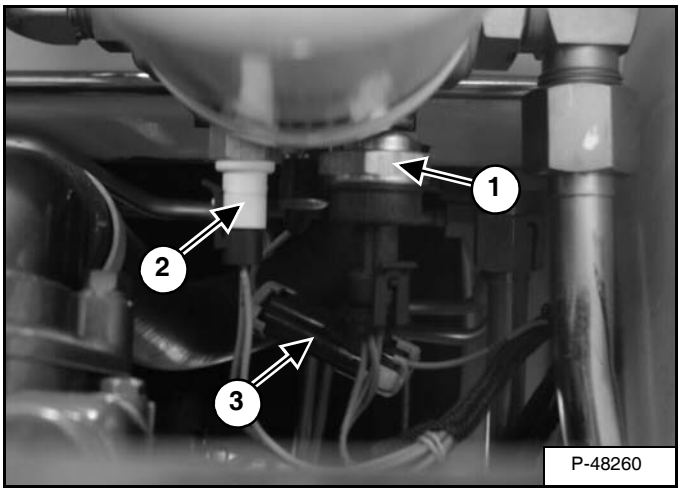
Stop the engine and open the rear door.

Drain the hydraulic fluid. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Remove the two mounting bolts (Item 1) and remove the hydraulic filter drip pan (Item 2) **[Figure 20-70-1]**.

Disconnect the tubeline (Item 3) **[Figure 20-70-1]** from the filter housing.

Figure 20-70-2

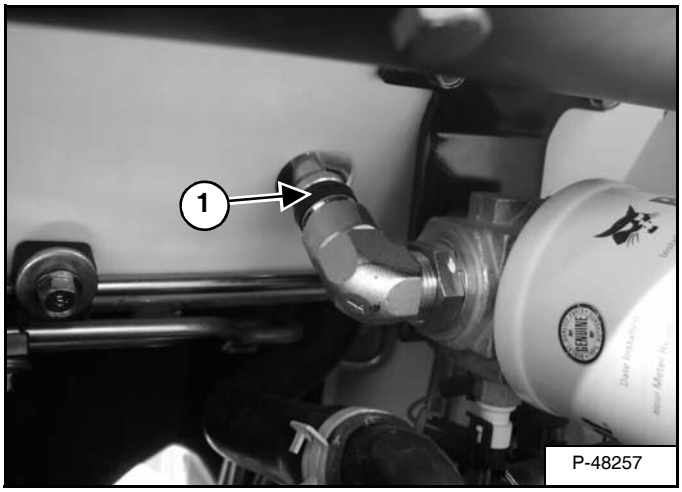


Disconnect the wires from the charge pressure sender (Item 1) **[Figure 20-70-2]** from the filter housing.

Disconnect the temperature sender connector (Item 2) **[Figure 20-70-2]** from the filter housing.

Disconnect the wire connector (Item 3) **[Figure 20-70-2]** from the differential pressure switch on the filter housing.

Figure 20-70-3

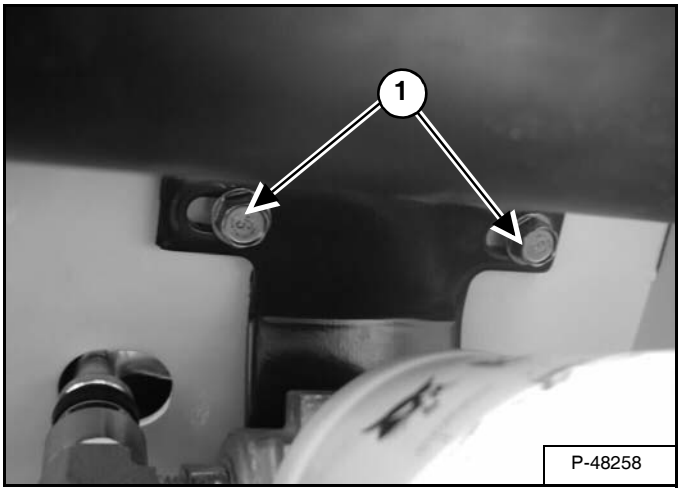


Using MEL 1558 tool disconnect the oil cooler tubeline (Item 1) **[Figure 20-70-3]** from the filter housing.

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Removal And Installation (Cont'd)

Figure 20-70-4



Remove the two mounting screws (Item 1) **[Figure 20-70-4]** from the filter housing mounting bracket.

Installation: Tighten the mounting screws to 15-20 ft.-lb. (20-27 N•m) torque.

Remove the hydraulic filter housing and filter.

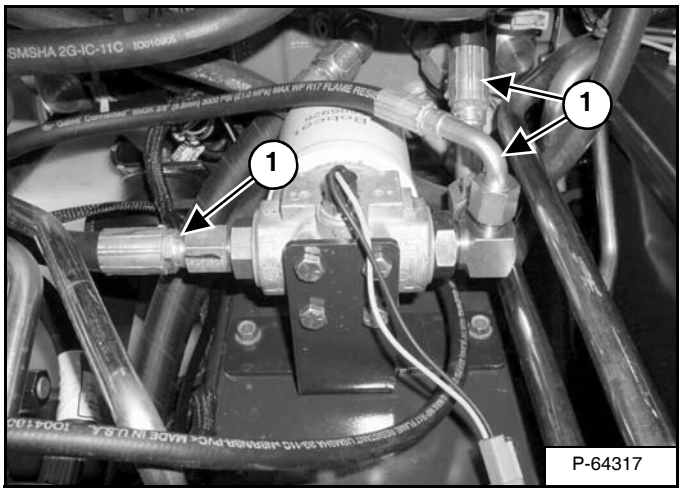
Reverse the removal procedure to install the filter housing and filter.

Charge Filter Housing

Stop the engine and open the rear door.

Drain the hydraulic fluid. (See Replacing Hydraulic Fluid on Page 10-120-1.)

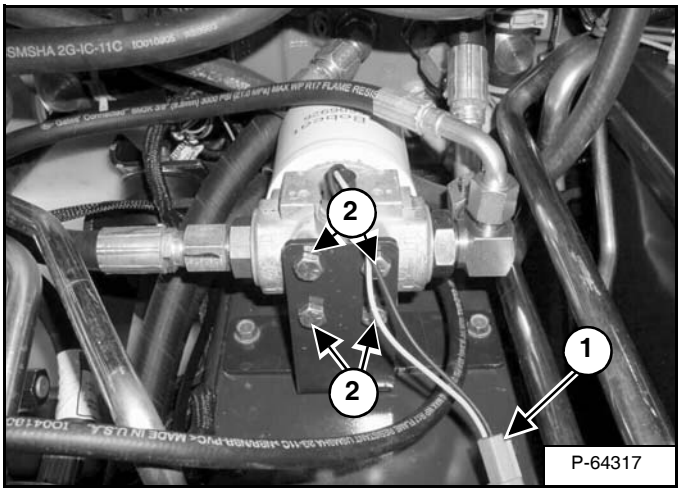
Figure 20-70-5



Disconnect the hoses (Item 1) **[Figure 20-70-5]** from the filter housing.

Disconnect the hose (Item 2) **[Figure 20-70-5]** from the filter housing.

Figure 20-70-6



Disconnect the wire connector (Item 1) **[Figure 20-70-6]** from the differential pressure switch on the filter housing.

Remove the four mounting bolts (Item 2) **[Figure 20-70-6]** from the filter housing.

Remove the hydraulic filter housing and filter.

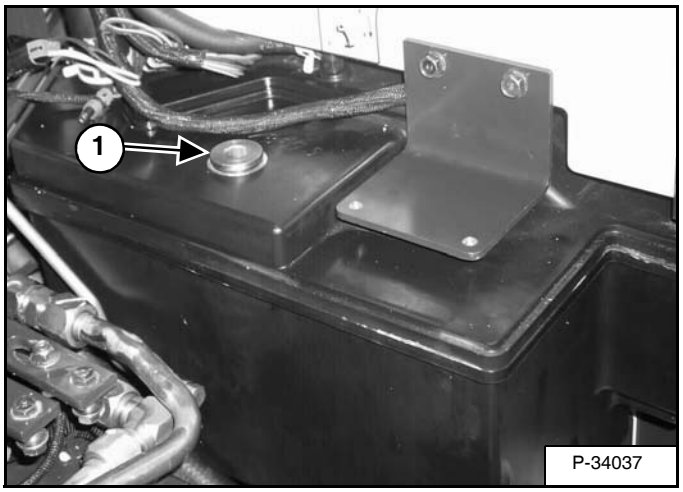
Reverse the removal procedure to install the filter housing and filter.

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HYDRAULIC FLUID RESERVOIR

Fluid Removal

Figure 20-80-1



Remove the plug (Item 1) **[Figure 20-80-1]** from the hydraulic reservoir.

Remove the fluid from the tank with pump.

Removal And Installation

Lift and block the loader. (See Procedure on Page 10-10-1.)

Start the engine. Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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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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Stop the engine.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

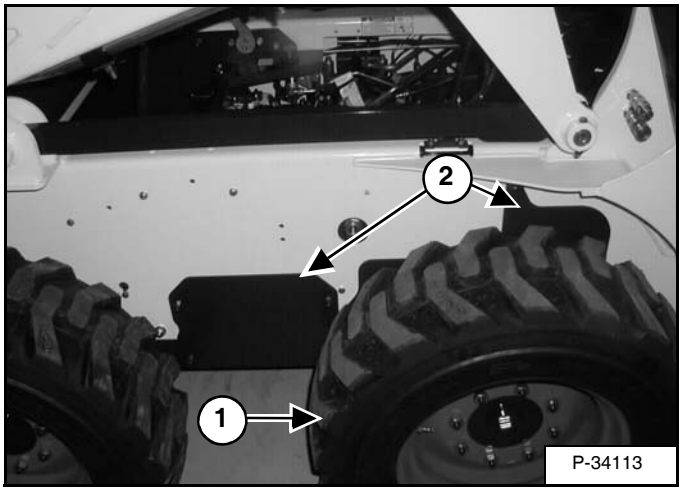
Remove the fluid from the hydraulic reservoir.

Remove the control panel.(See Removal and Installation on Page 50-100-1.)

Remove Bucket position valve if so equipped. (See Removal And Installation on Page 20-90-3.)

Remove the crossbar linkage. (See Crossbar Linkage Removal and Installation on Page 50-90-2.)

Figure 20-80-2



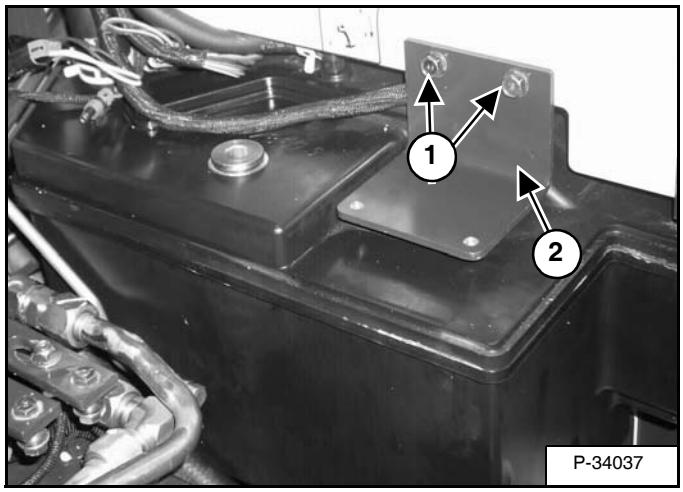
Remove the left rear tire assembly (Item 1) **[Figure 20-80-2]**.

Remove the two access panels (Item 2) **[Figure 20-80-2]**.

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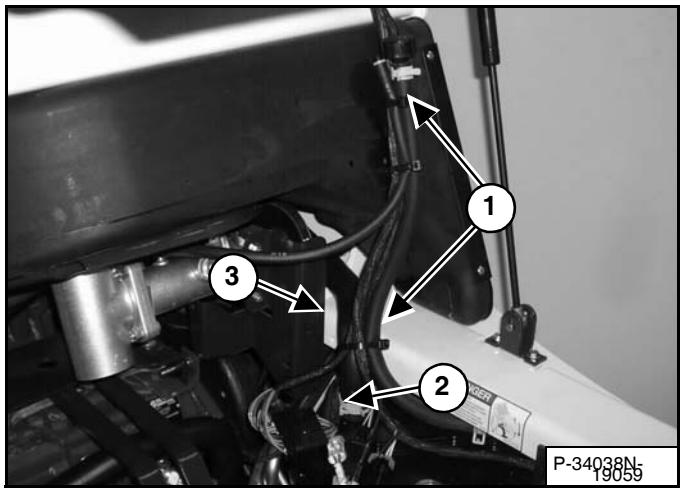
Removal And Installation (Cont'd)

Figure 20-80-3



Remove the two mounting bolts (Item 1) **[Figure 20-80-3]** and remove the plate (Item 2) **[Figure 20-80-3]** from the loader.

Figure 20-80-4

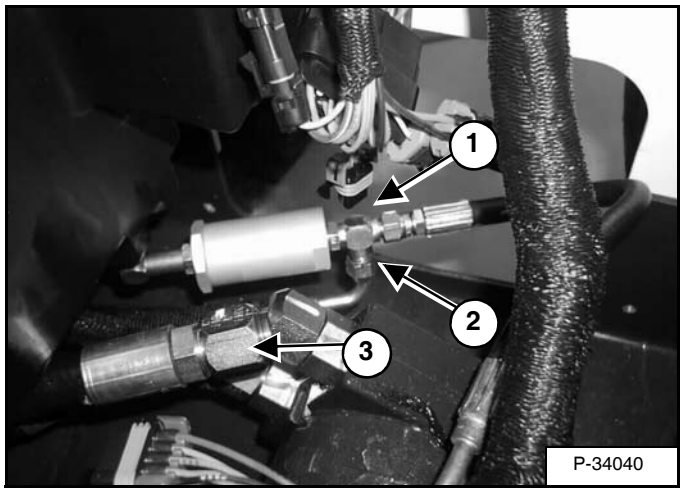


Remove the tie-straps (Item 1) **[Figure 20-80-4]** from the breather hose.

Remove the hose clamp (Item 2) **[Figure 20-80-4]**.

Remove the hydraulic fill hose (Item 3) **[Figure 20-80-4]** from the hydraulic reservoir.

Figure 20-80-5

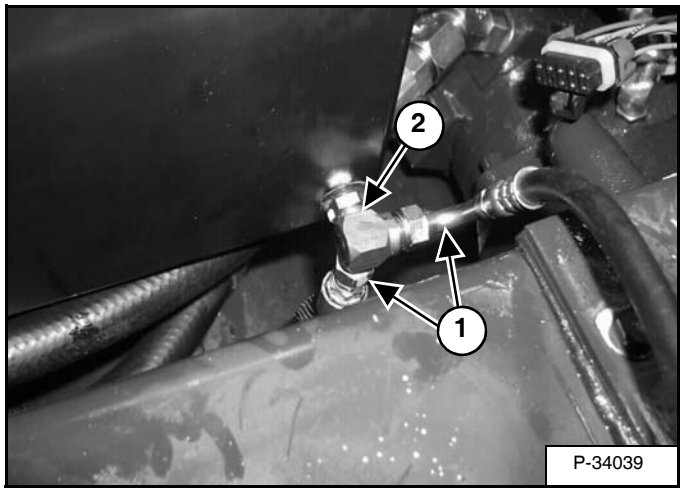


Remove the drive motor drain hose (Item 1) **[Figure 20-80-5]** at the drain filter

Remove the auxiliary pressure relief drain hose (Item 2) **[Figure 20-80-5]** at the drain filter.

Remove the drive motor supply hose (Item 3) **[Figure 20-80-5]**.

Figure 20-80-6



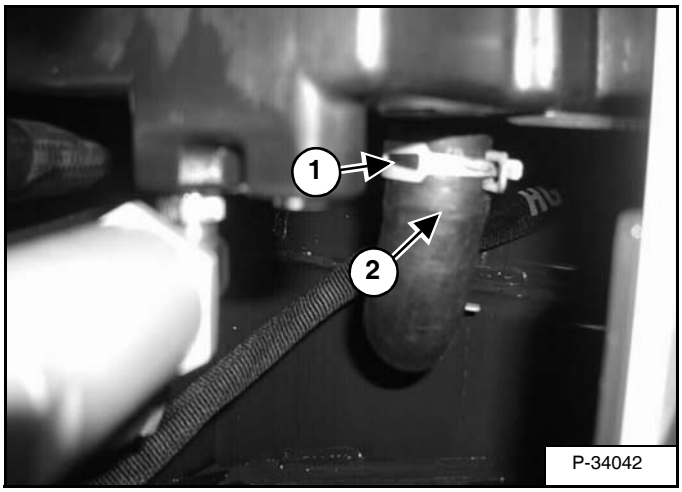
Remove the two control valve drain hoses (Item 1) **[Figure 20-80-6]**.

Remove the fitting (Item 2) **[Figure 20-80-6]** from the reservoir.

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Removal And Installation (Cont'd)

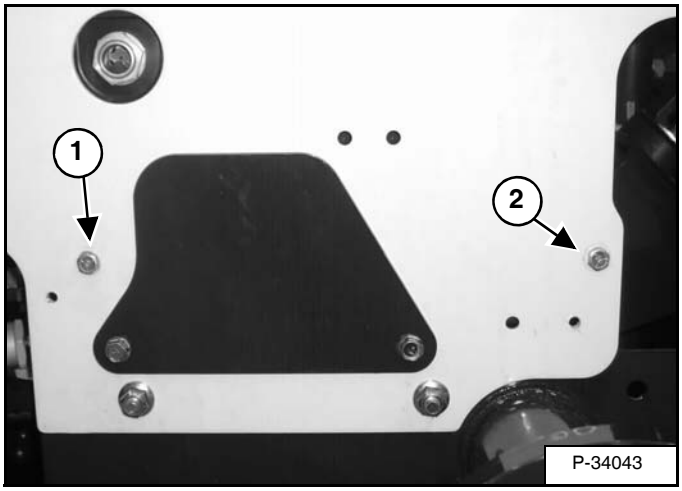
Figure 20-80-7



Remove the hose clamp (Item 1) **[Figure 20-80-7]** from the tank outlet.

Remove the hydrostatic supply hose (Item 2) **[Figure 20-80-7]** from the bottom of the reservoir.

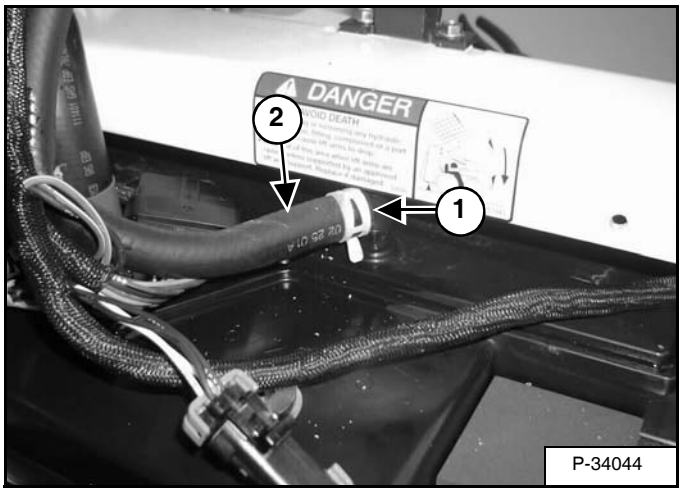
Figure 20-80-8



Remove the bolt and nut (Item 1) **[Figure 20-80-8]**.

Loosen the bolt and nut (Item 2) **[Figure 20-80-8]** to allow the hydraulic reservoir mount to drop down.

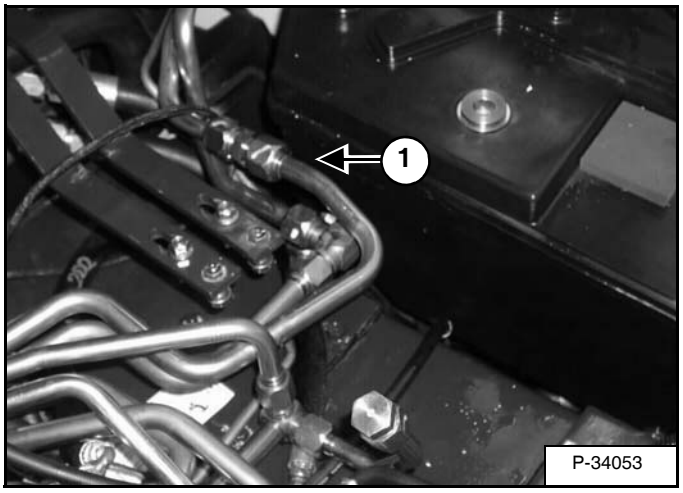
Figure 20-80-9



Remove the hose clamp (Item 1) **[Figure 20-80-9]** from the fitting.

Remove the breather hose (Item 2) **[Figure 20-80-9]** from the hydraulic reservoir.

Figure 20-80-10



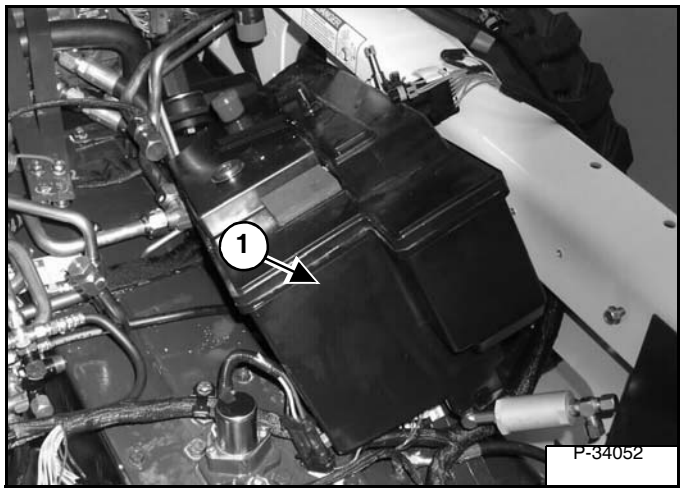
If the loader is equipped with rear auxiliaries remove the auxiliary tubeline (Item 1) **[Figure 20-80-10]** to allow the hydraulic reservoir to roll out from under the fender.

NOTE: Standard loaders without rear auxiliaries and all high flow loaders will have a one-piece auxiliary tubeline from the control valve to the rear upright hoses. Disconnect the tubeline (Item 1) [Figure 20-80-10] from the control valve and loosen the fitting in the left rear upright to allow movement of the tubeline for the hydraulic reservoir removal.

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Removal And Installation (Cont'd)

Figure 20-80-11



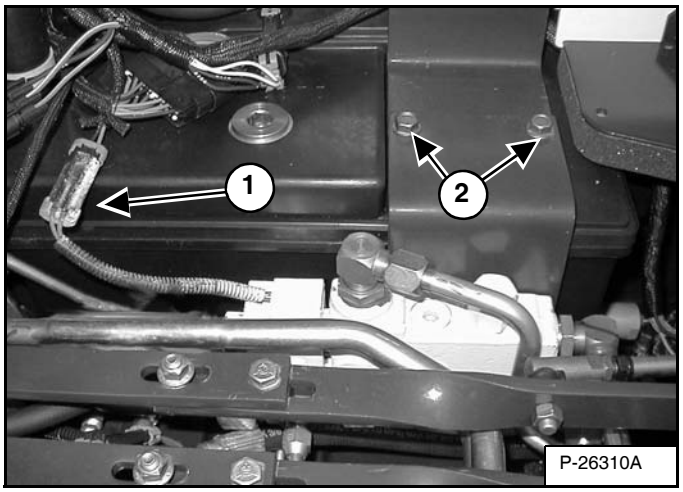
Remove the hydraulic reservoir (Item 1) **[Figure 20-80-11]** from the loader.

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BUCKET POSITION VALVE

Solenoid Removal And Installation

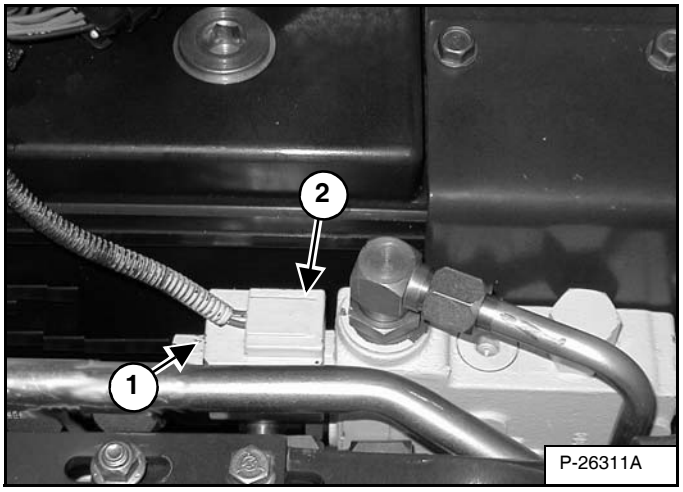
Figure 20-90-1



Disconnect the wire harness connector (Item 1) **[Figure 20-90-1]** from the bucket position shut-off solenoid.

NOTE: Loosening the two mounting bolts (Item 2) [Figure 20-90-1] on the Bucket Positioning Valve Bracket may aid in the solenoid removal.

Figure 20-90-2

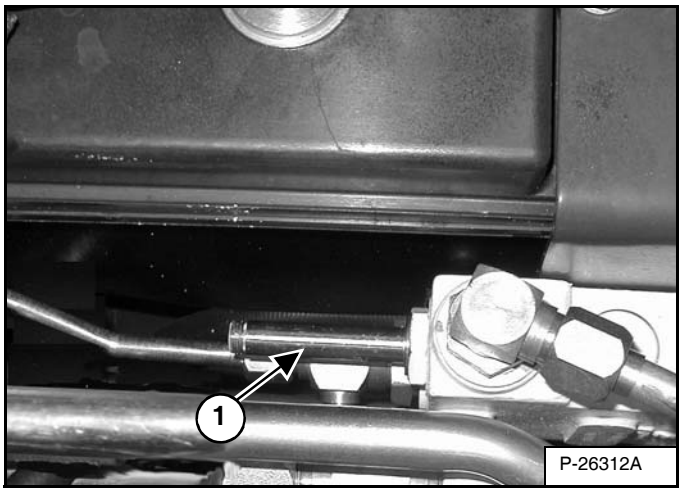


Remove the solenoid nut (Item 1) **[Figure 20-90-2]**.

Installation: Tighten the solenoid nut to 4-6 ft.-lb. max. (5-8 N•m max.) torque. Overtightening may cause valve failure.

Remove the solenoid coil (Item 2) **[Figure 20-90-2]**.

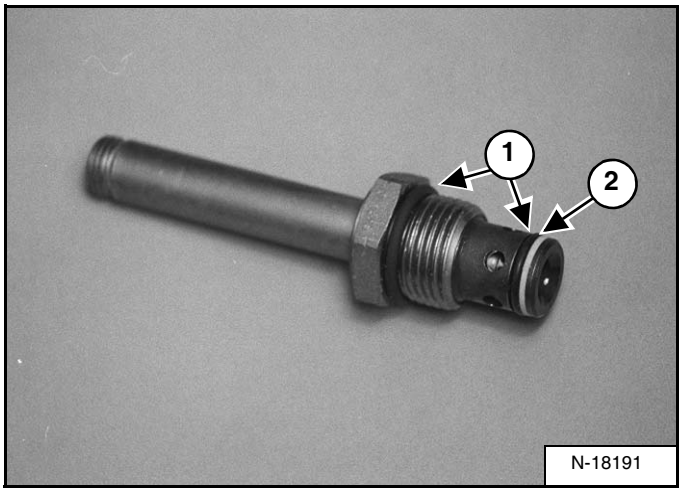
Figure 20-90-3



Remove the solenoid stem (Item 1) **[Figure 20-90-3]** from the bucket position valve.

Installation: Put oil on O-rings and back-up washers and tighten the solenoid stem to 30-35 ft.-lb. (40,8-47,6 N•m) torque.

Figure 20-90-4



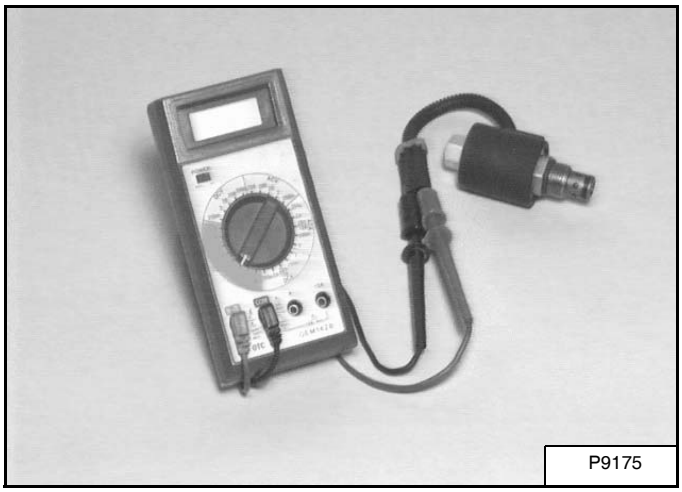
Inspect the solenoid stem and replace the O-rings (Item 1) **[Figure 20-90-4]** and the back-up washer (Item 2) **[Figure 20-90-4]**.

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BUCKET POSITION VALVE (CONT'D)

Solenoid Testing

Figure 20-90-5

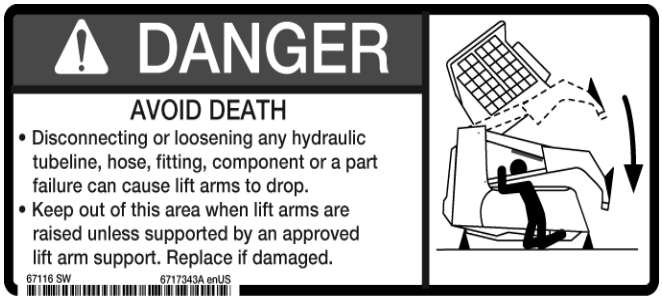


Use a test meter to measure coil resistance **[Figure 20-90-5]**. Coil wires do not have polarity. Correct resistance for the coil is 9.8 ohm.

Replace the test meter with 12 volt power. You can see and hear the spool shift.

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Removal And Installation

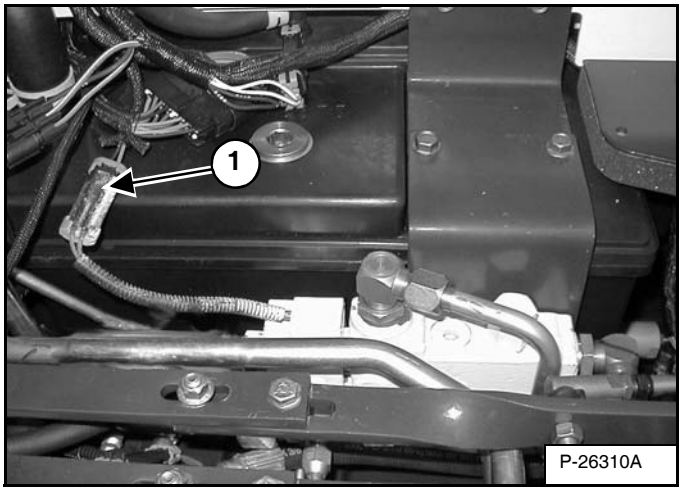


WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Figure 20-90-6



Start the engine. Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Stop the engine.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Disconnect the electric solenoid connector (Item 1) **[Figure 20-90-6]**.

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Removal And Installation (Cont'd)

Figure 20-90-7

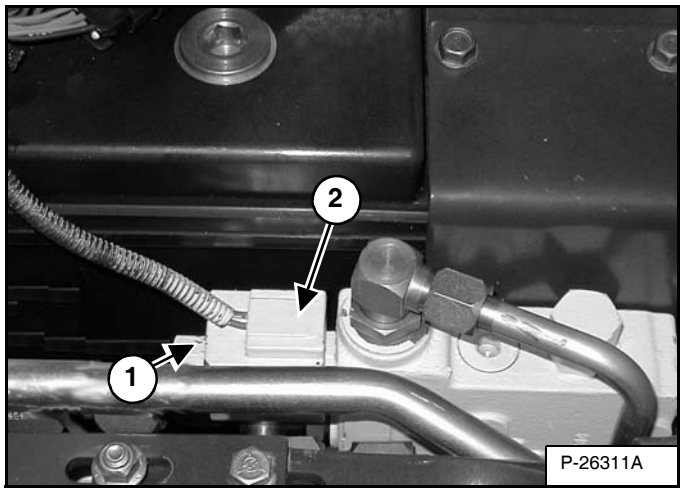
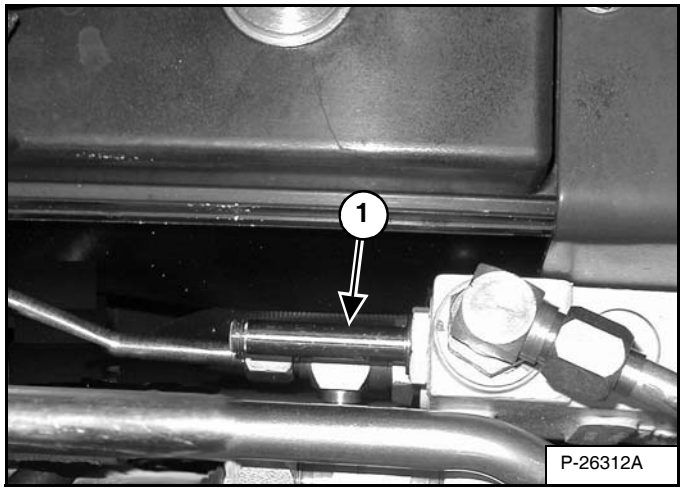


Figure 20-90-8



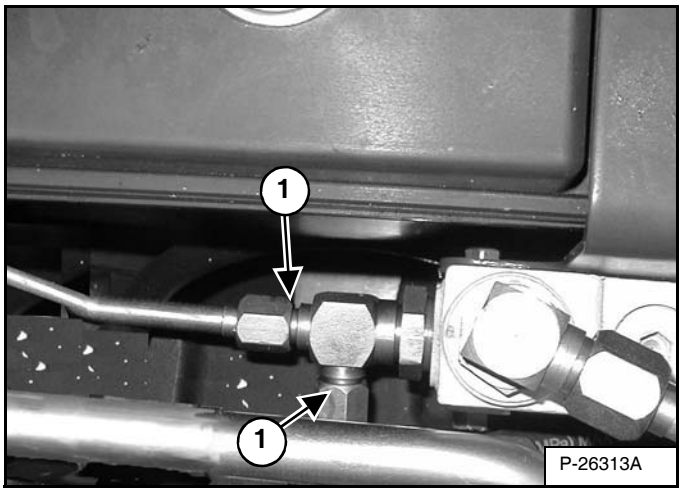
Remove the solenoid nut (Item 1) **[Figure 20-90-7]**.

Installation: Tighten the nut to 4-6 ft.-lb. max. (5-8 N•m max.) torque. Overtightening may cause valve failure.

Remove the solenoid (Item 2) **[Figure 20-90-7]** and the solenoid stem (Item 1) **[Figure 20-90-8]**.

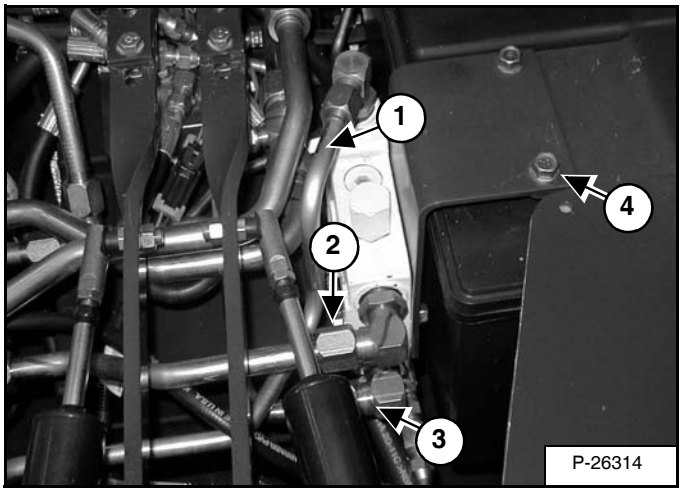
Installation: Put oil on the O-rings and back-up washers and tighten the solenoid stem to 30-35 ft.-lb. (40,8-47,6 N•m) torque.

Figure 20-90-9



Disconnect the two tubelines (Item 1) **[Figure 20-90-9]** from the tee fitting.

Figure 20-90-10



Remove the tubeline (Item 1) **[Figure 20-90-10]** from the B port to the control valve.

Disconnect the tubeline (Item 2) **[Figure 20-90-10]** from the C port (tilt rod end) on the BPV.

Disconnect the tubeline (Item 3) **[Figure 20-90-10]** from the D port (tilt base end) on the BPV.

Remove the mounting screws (Item 4) **[Figure 20-90-10]**.

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

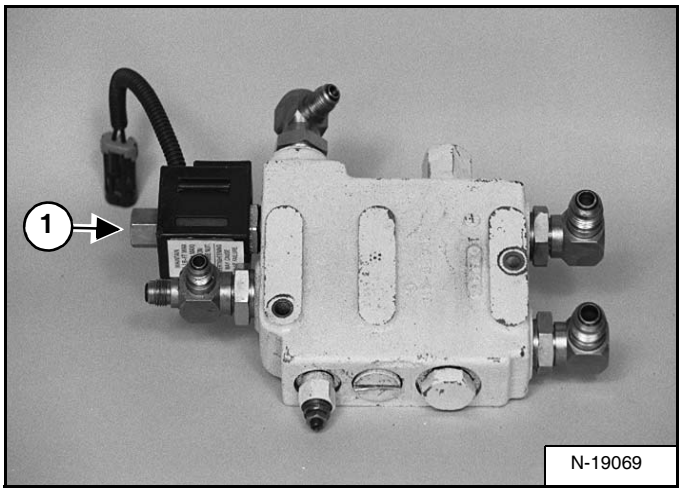
Remove the bucket position valve and bracket from the loader.

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BUCKET POSITION VALVE (CONT'D)

Disassembly And Assembly

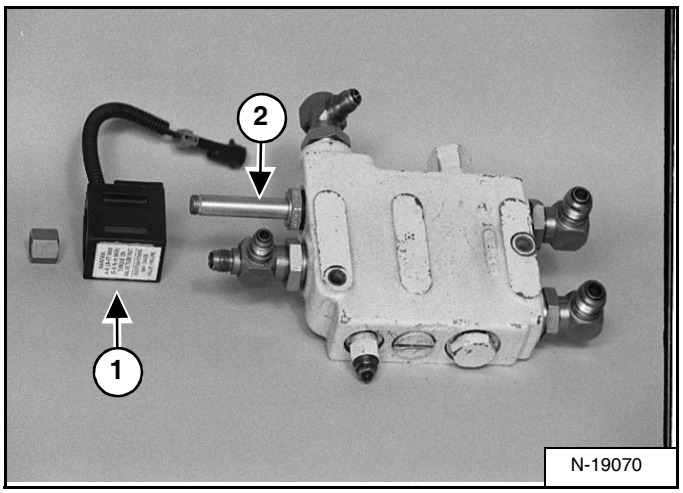
Figure 20-90-11



Remove the solenoid nut (Item 1) **[Figure 20-90-11]**.

Installation: Tighten the nut to 4-6 ft.-lb. max. (5-8 N•m max.) torque. Overtighten may cause valve failure.

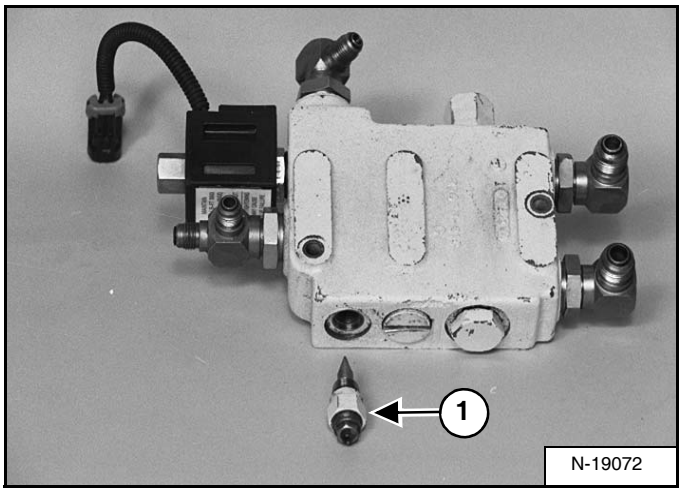
Figure 20-90-12



Remove the solenoid (Item 1) and the solenoid stem (Item 2) **[Figure 20-90-12]**.

Installation: Tighen the solenoid stem to 30-35 ft.-lb. (40,8-47,6 N•m) torque.

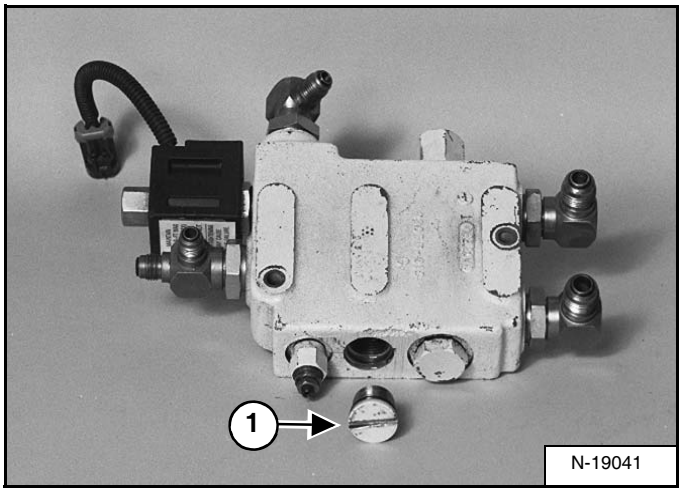
Figure 20-90-13



Remove the flow adjustment valve and O-ring (Item 1) **[Figure 20-90-13]**

NOTE: Always install new O-rings before any parts are installed into the valve. Check the parts for wear or damage and replace as needed.

Figure 20-90-14



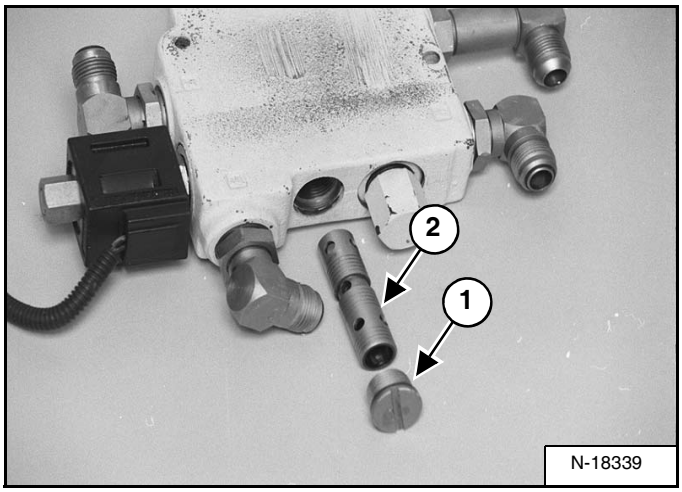
Remove the plug (Item 1) **[Figure 20-90-14]**.

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BUCKET POSITION VALVE (CONT'D)

Disassembly And Assembly (Cont'd)

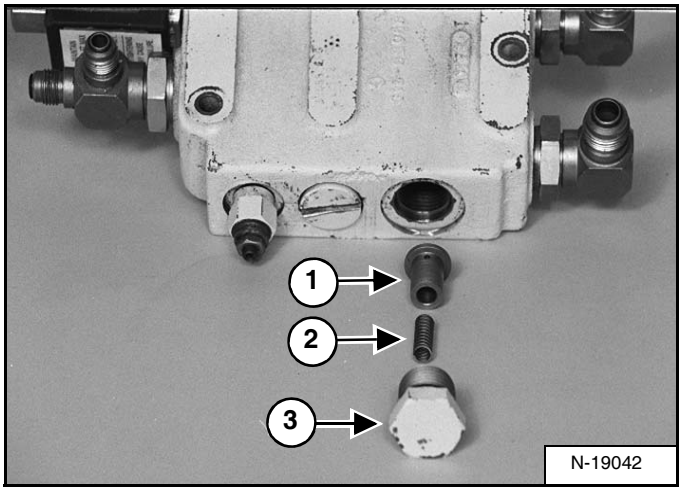
Figure 20-90-15



Remove the plug (Item 1), and flow control spool (Item 2) **[Figure 20-90-15]**.

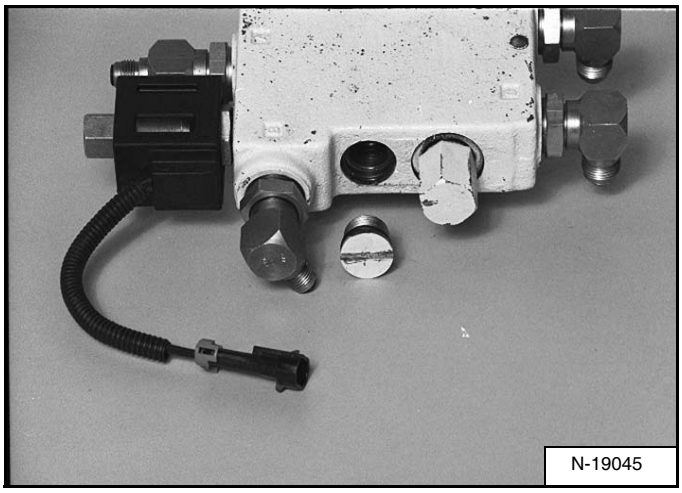
Check the flow control spool for wear, check the O-ring on the plug and replace as needed.

Figure 20-90-16



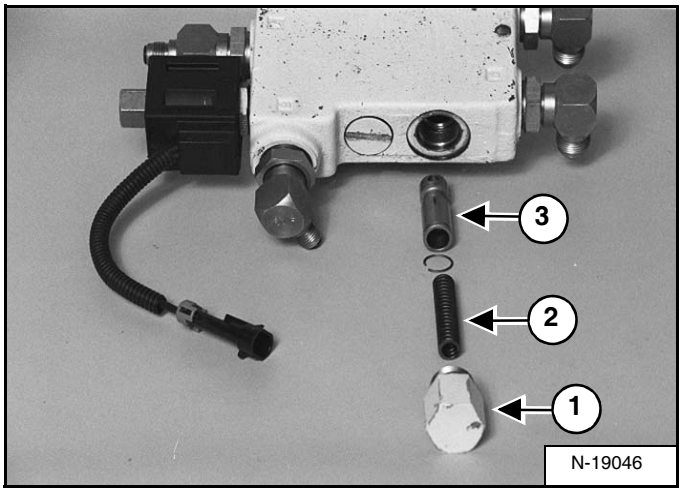
Remove the tilt cylinder check valve (item 1) spring (Item 2) and plug (Item 3) **[Figure 20-90-16]**. Check for wear, check the O-ring and replace as needed.

Figure 20-90-17



Remove the plug **[Figure 20-90-17]**.

Figure 20-90-18



Remove the plug (Item 1), spring (Item 2) and unloading spool (Item 3) **[Figure 20-90-18]**.

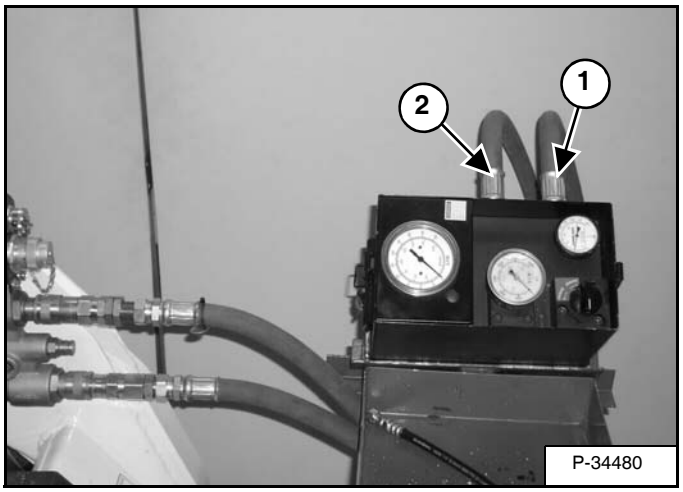
Check all parts and replace as needed. Install a new O-ring on the plug before installing.

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HIGH FLOW VALVE

Checking The High Flow Relief Valve

Figure 20-100-1



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

MEL10003 - Hydraulic Tester
MEL10006 - Hydraulic Test Kit

Lift and block the loader. (See Procedure on Page 10-10-1.)

NOTE: Check the Main Relief Valve (See Removal and Installation on Page 20-30-3.) for proper flow and pressure before checking the High Flow Relief Valve.

Connect the IN port of the hydraulic tester to the female quick coupler (Item 1) **[Figure 20-100-1]** on the loader.

Connect the OUT port of the hydraulic tester to the male quick coupler (Item 2) **[Figure 20-100-1]** on the loader.

IMPORTANT

The hydraulic tester must be in the fully open position before you start the engine.

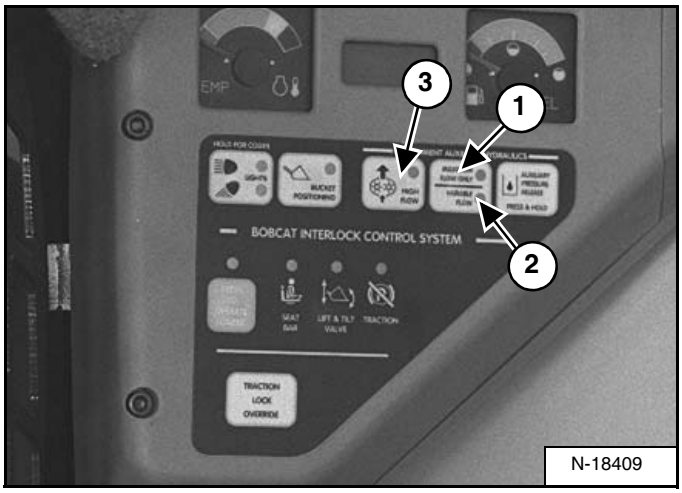
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WARNING

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

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Figure 20-100-2



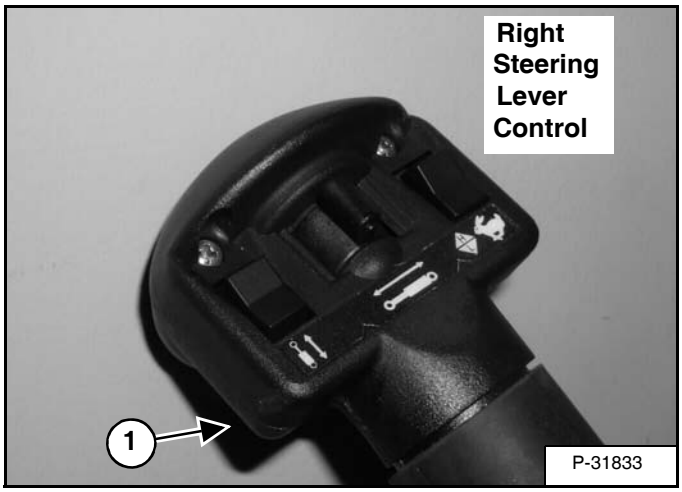
Start the engine and run at low idle RPM. Push the flow switch (Item 1) once (on the instrument panel) to engage the front auxiliary hydraulics variable flow, the light (Item 2) will come ON **[Figure 20-100-2]**.

Push the high flow switch (Item 3) **[Figure 20-100-2]** and the High Flow light will come ON.

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Checking The High Flow Relief Valve (Cont'd)

Figure 20-100-3



- Push the front switch (Item 1) **[Figure 20-100-3]** to give the **front** quick couplers a constant flow of fluid.

- To release from continuous operation, press the front switch (Item 1) **[Figure 20-100-3]** a second time.

Watch the flow meter on the hydraulic tester to make sure the flow is correct. Increase the engine speed to full RPM.

Warm the fluid to 140°F. (60°C.) by turning the restrictor control on the tester to about 1000 PSI (6895 kPa). DO NOT exceed system relief pressure.

NOTE: ***DO NOT EXCEED 3300 PSI.***

Turn the restrictor control on the tester counter clockwise, to obtain free flow, the flow should be at 27 GPM. Start turning the restrictor clockwise, causing more restriction on the flow. The GPM should drop off slightly until the pressure reaches approximately 3100 PSI. At approximately 3100 PSI the flow should start decreasing rapidly until the pressure reaches 3250-3350 PSI. At 3250-3350 PSI the flow should be at 0 GPM. Turn the restrictor control counter clockwise to free flow. Shut the front auxiliary hydraulics off.

If the specs from above are reached, the high flow relief valve is OK.

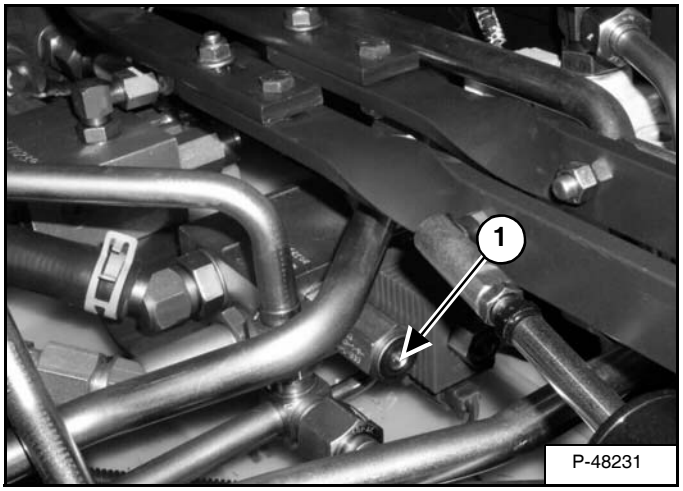
If the high flow relief pressure is not correct, stop the engine and adjust the high flow relief valve. (See High Flow Relief Valve Adjustment Procedure on Page 20-100-3.)

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High Flow Relief Valve Adjustment Procedure

NOTE: The high flow relief valve is located between the control valve and the hydraulic reservoir.

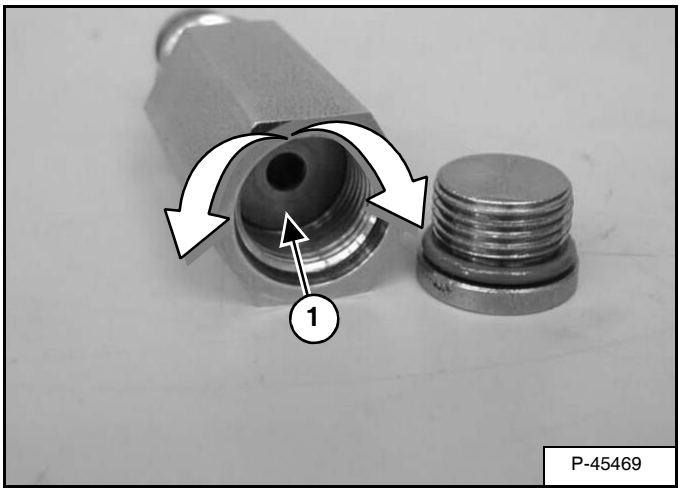
Figure 20-100-4



If the relief pressure is not correct, stop the engine and raise the operator cab.(See Raising The Operator Cab on Page 10-30-1.)

Remove the high flow relief valve adjustment plug (Item 1) **[Figure 20-100-4]**.

Figure 20-100-5



To increase the high flow relief valve PSI turn the screw (Item 1) **[Figure 20-100-5]** clockwise a 1/4 turn and recheck the high flow relief valve. (1/4 turn equals approximately 200 PSI.)

To decrease the high flow relief valve PSI turn the screw (Item 1) **[Figure 20-100-5]** counterclockwise a 1/4 turn and recheck the high flow relief valve. (1/4 turn equals approximately 200 PSI.)

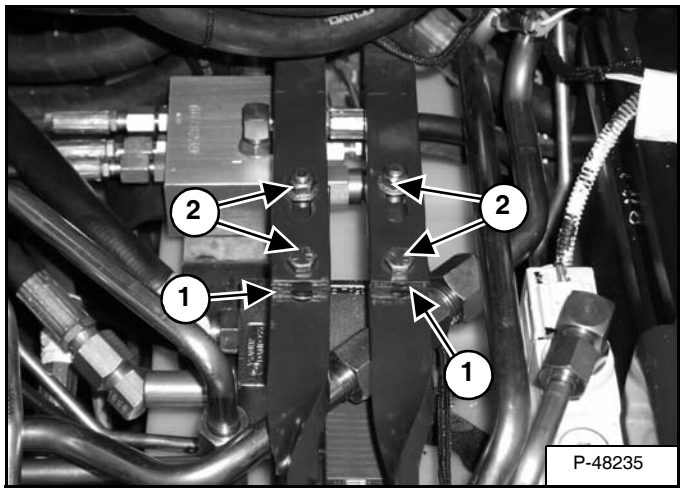
NOTE: If the relief screw (Item 1) [Figure 20-100-5] has been turned in 1/4 turn and the pressure remains the same, remove and inspect the high flow relief valve, replace as needed.

Install the plug into the high flow relief valve.

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Removal And Installation

Figure 20-100-6



Scribe a mark across the top of the steering linkage bars (Item 1) **[Figure 20-100-6]** which are connected to the steering shaft on the control panel.

Remove the four steering linkage mounting bolts (Item 2) **[Figure 20-100-6]**.

Installation: Align the marks on the steering linkage bars. Tighten the steering linkage mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

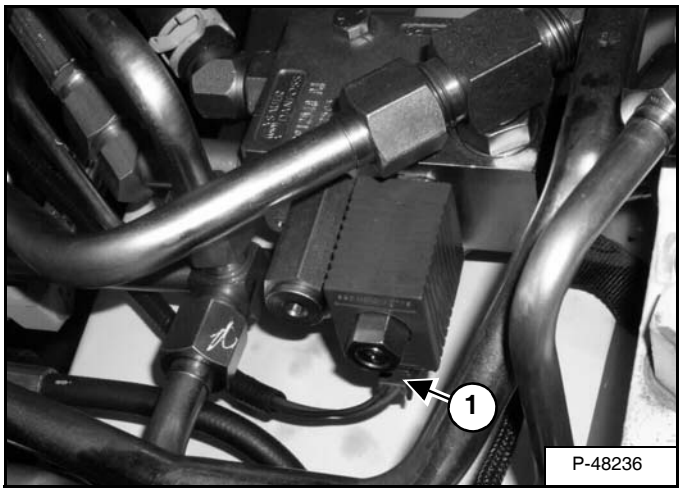
The high flow valve is located between the control valve and the hydraulic reservoir.

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.

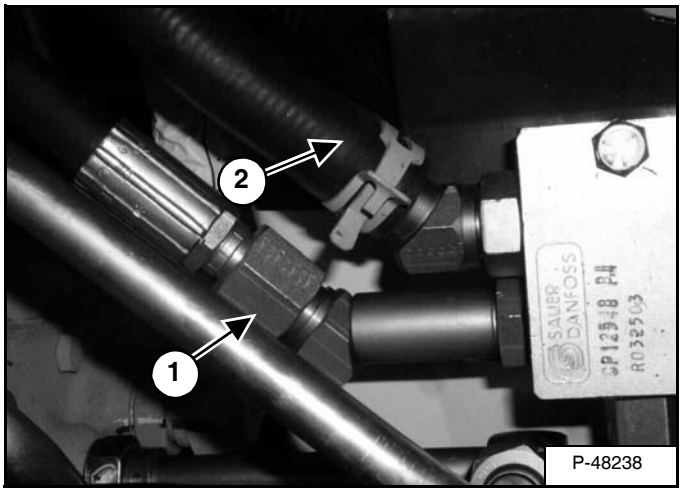
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Figure 20-100-7



Disconnect the electrical connector (Item 1) **[Figure 20-100-7]** from the solenoid.

Figure 20-100-8



Mark all tubelines and hoses for correct installation.

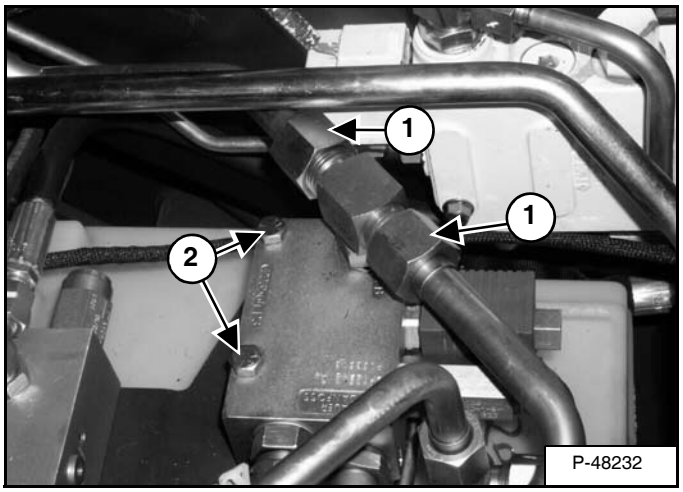
Disconnect and cap the hose (Item 1) **[Figure 20-100-8]** from the pump outlet to the high flow valve.

Disconnect and cap the hose (Item 2) **[Figure 20-100-8]** from the high flow valve to the pump inlet.

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Removal And Installation (Cont'd)

Figure 20-100-9



Disconnect and cap the tubelines (Item 1) **[Figure 20-100-9]** to the tilt cylinders.

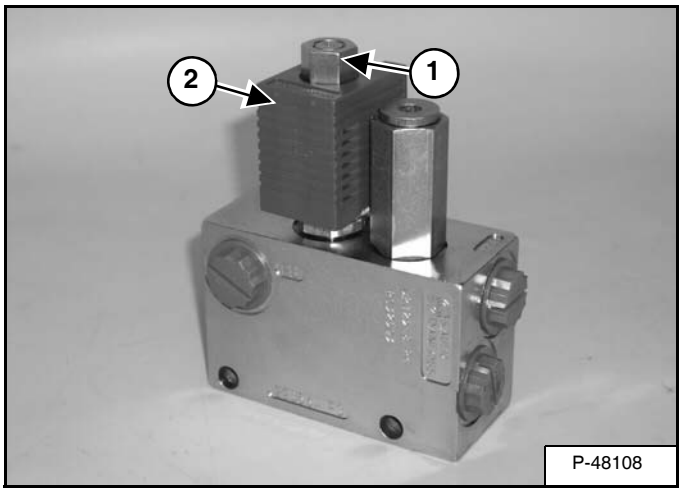
Remove the two mounting bolts (Item 2) **[Figure 20-100-9]**.

Installation: Tighten the mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

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Disassembly And Assembly

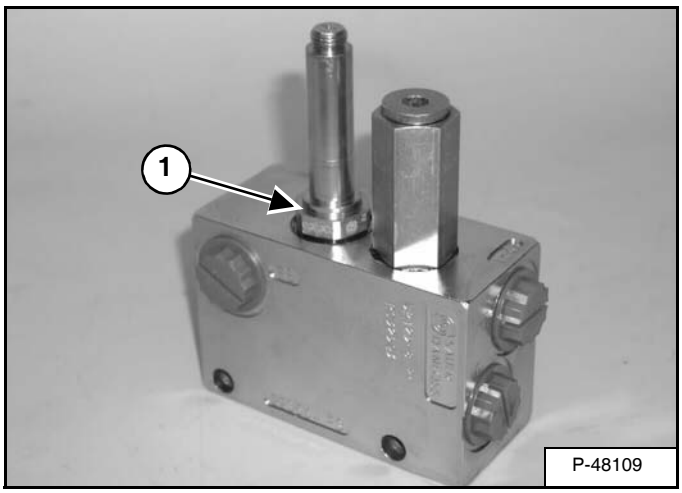
Figure 20-100-10



Remove the solenoid nut (Item 1) and solenoid (Item 2) from the solenoid valve **[Figure 20-100-10]**.

Installation: Tighten to 4-6 ft.-lb. (5-8 N•m) torque.

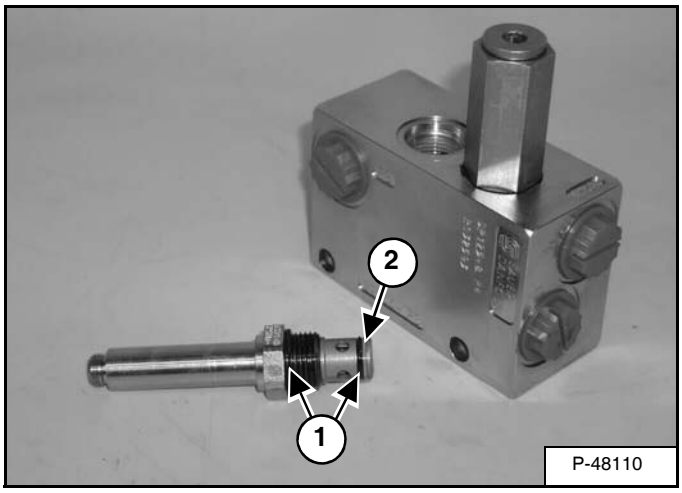
Figure 20-100-11



Remove the solenoid valve (Item 1) **[Figure 20-100-11]** from the valve.

Installation: Tighten to 30-35 ft.-lb. (41-47 N•m) torque.

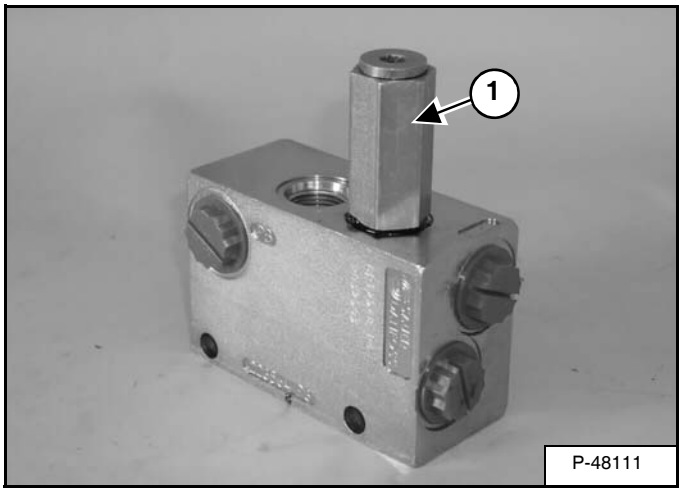
Figure 20-100-12



Inspect O-rings (Item 1) and back-up washer (Item 2) on the solenoid stem **[Figure 20-100-12]**.

Installation: Put oil on O-rings and back-up washer. Install and tighten to 25 ft.-lb. (39,9 N•m) torque.

Figure 20-100-13



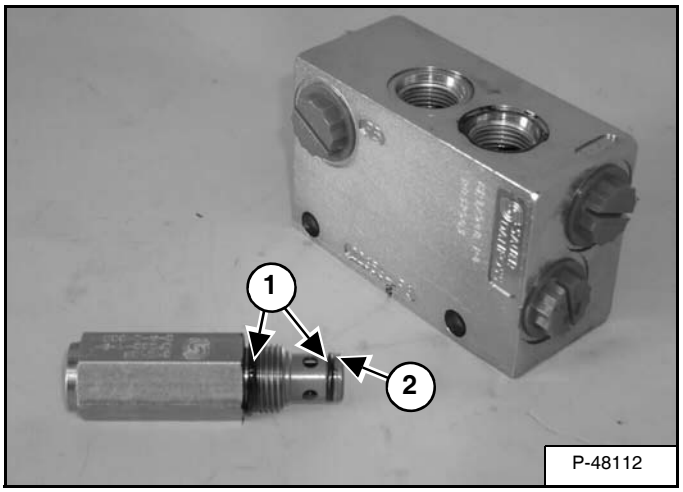
Remove the relief valve (Item 1) **[Figure 20-100-13]**.

Installation: Apply to oil to the O-rings and back-up washers. Tighten to 30-35 ft.-lb. (41-47 N•m) torque.

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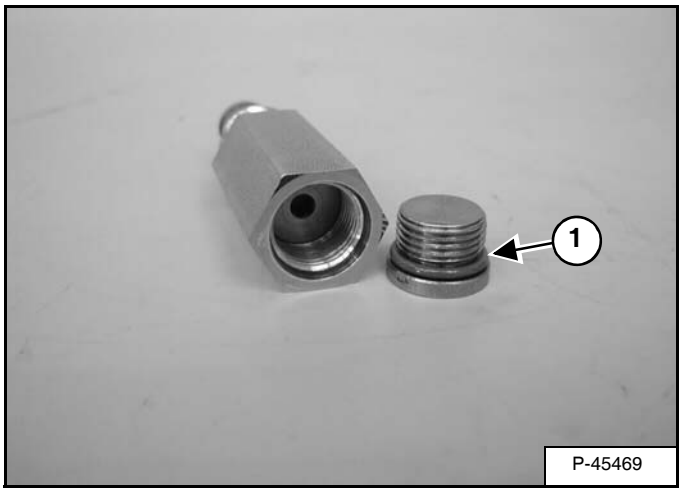
Disassembly And Assembly (Cont'd)

Figure 20-100-14



Inspect the relief valve and replace the two o-rings (Item 1) and washer (Item 2) **[Figure 20-100-14]**.

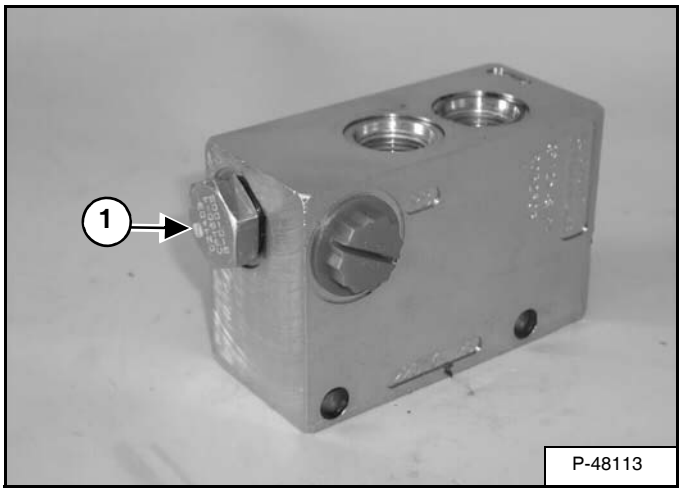
Figure 20-100-15



Inspect the O-ring (Item 1) **[Figure 20-100-15]** on the relief valve adjustment plug for damage and replace as needed.

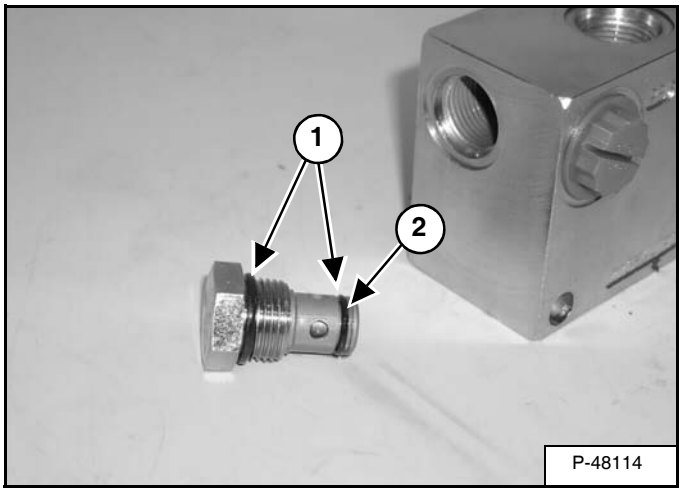
Installation: Tighten to 20 ft.-lb. (27,1 N•m) torque.

Figure 20-100-16



Remove the check valve (Item 1) **[Figure 20-100-16]** from the high flow valve.

Figure 20-100-17



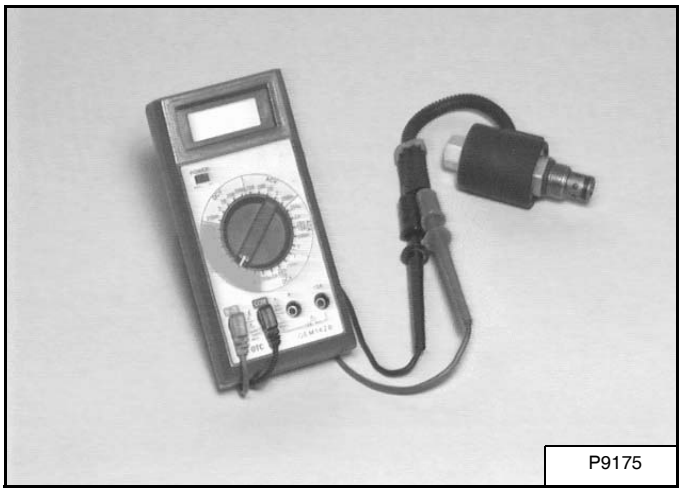
Inspect the check valve, O-rings & back-up washers for wear and replace as needed **[Figure 20-100-17]**.

Installation: Apply oil to the O-rings (Item 1) and back-up washers (Item 2) **[Figure 20-100-17]**. Tighten to 30-35 ft.-lb. (41-47 N•m) torque.

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Solenoid Testing

Figure 20-100-18



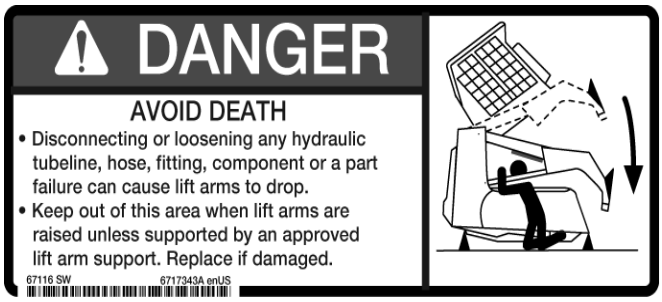
Use a test meter to measure coil resistance **[Figure 20-100-18]**. Coil terminals do not have polarity. Correct resistance for the pressure relief coil is 7.5 ohms.

Replace the test meter with 12 volt power. You can see and hear the spool shift.

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REAR AUXILIARY DIVERTER VALVE

Removal And Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

WARNING

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

W-2103-1285

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

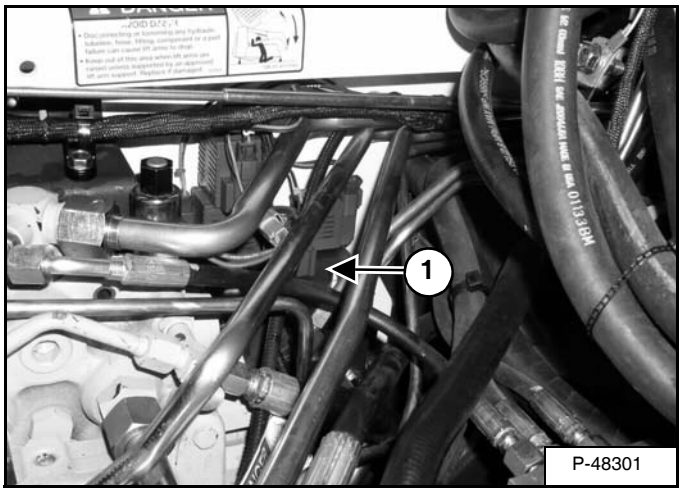
Disconnect the negative battery cable. (See Removal And Installation on Page 60-20-1.)

Remove the speed control lever. (See Control Lever Removal And Installation on Page 50-100-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Remove the right rear tire. (See TIRE MAINTENANCE on Page 10-170-1.)

Figure 20-110-1



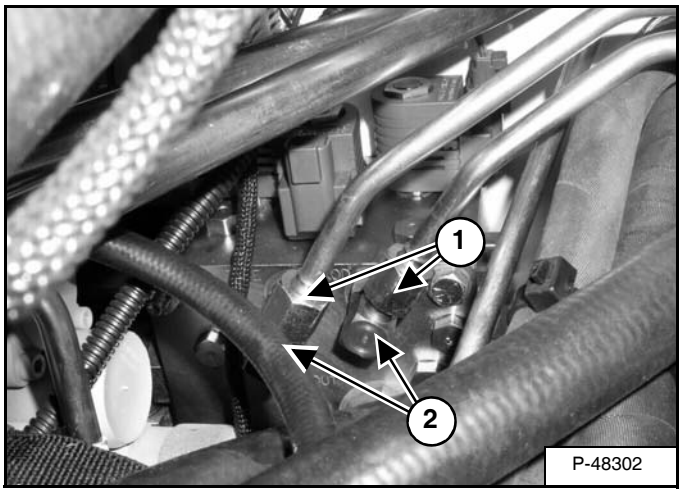
The rear auxiliary valve (Item 1) **[Figure 20-110-1]** is located between the control valve and the gear pump on the right side of the loader.

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 20-110-2



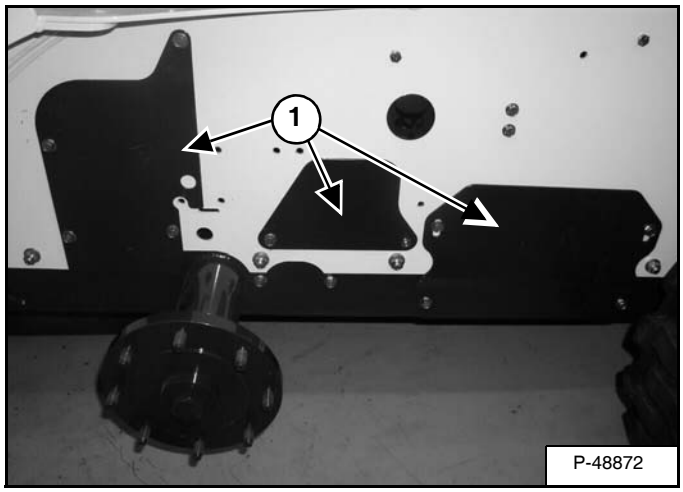
Disconnect the base and rod end tubelines (Item 1) **[Figure 20-110-2]**.

Remove the fittings (Item 2) **[Figure 20-110-2]** from the valve.

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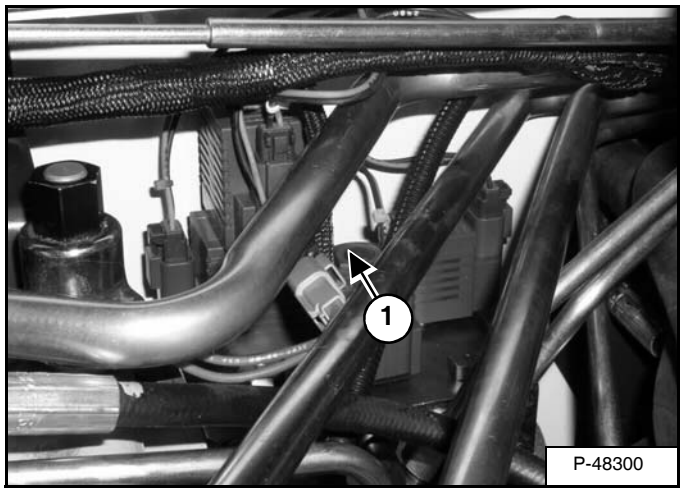
Removal And Installation (Cont'd)

Figure 20-110-3



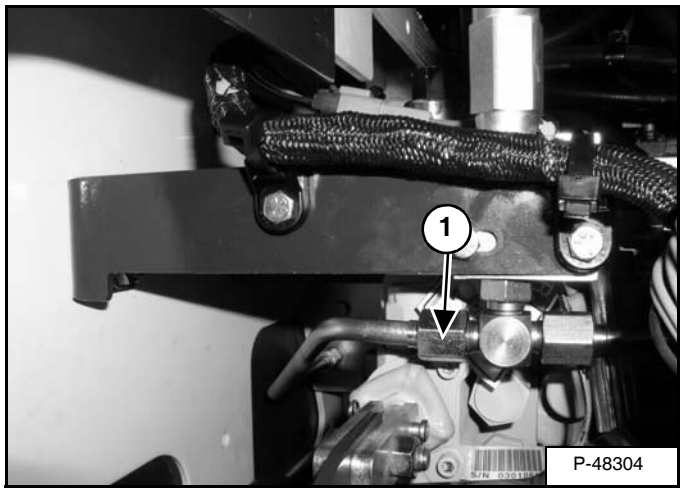
Remove the three access covers (Item 1) **[Figure 20-110-3]** on the right side of the machine.

Figure 20-110-4



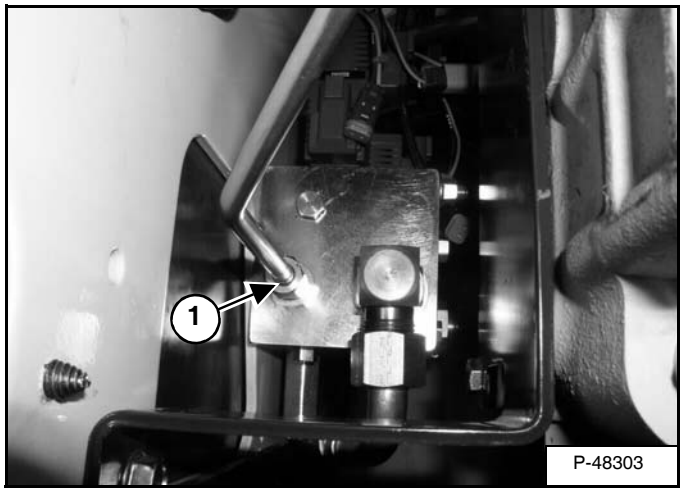
Disconnect the four solenoid connectors (Item 1) **[Figure 20-110-4]** from the rear auxiliary valve.

Figure 20-110-5



Disconnect the drain tubeline (Item 1) **[Figure 20-110-5]** from the lift arm by pass valve.

Figure 20-110-6

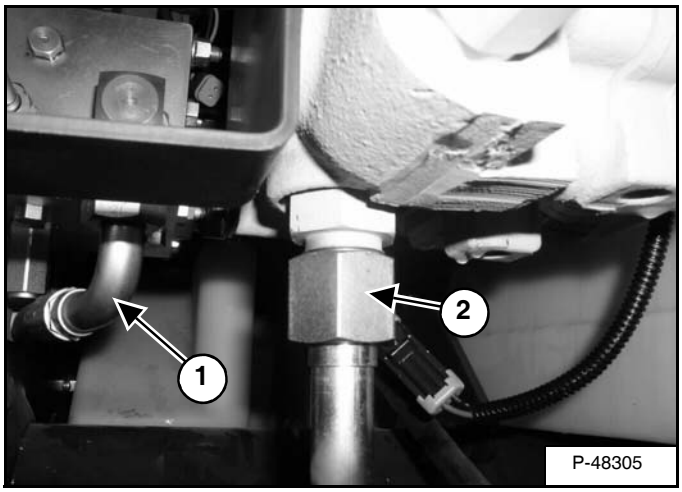


Disconnect and remove the drain tubeline (Item 1) **[Figure 20-110-6]** from the rear auxiliary valve.

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Removal And Installation (Cont'd)

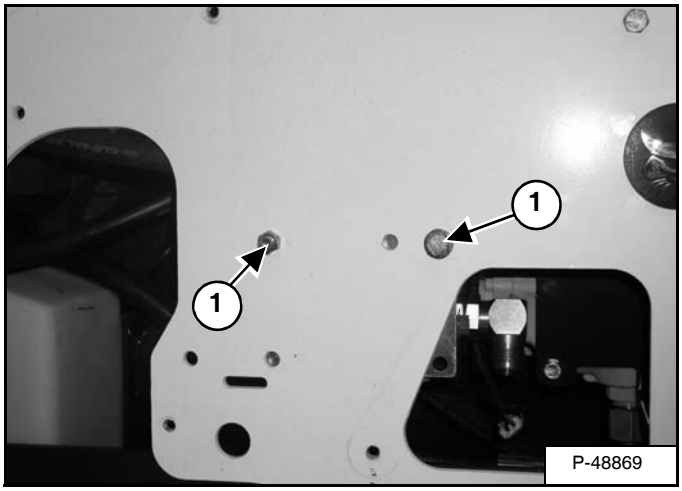
Figure 20-110-7



Disconnect the pump outlet hose (Item 1) **[Figure 20-110-7]** from the rear auxiliary valve.

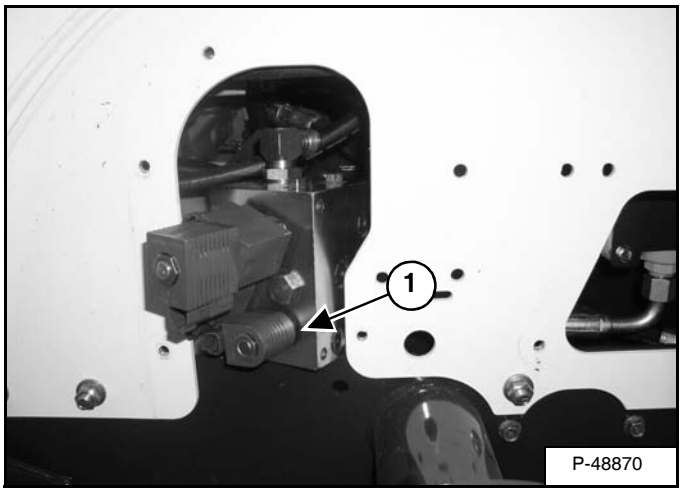
Disconnect the tubeline (Item 2) **[Figure 20-110-7]** from the bottom of the control valve and the rear auxiliary vavle.

Figure 20-110-8



Loosen and remove the two bolts and nuts (Item 1) **[Figure 20-110-8]** that hold the rear auxiliary valve.

Figure 20-110-9



Remove the rear auxiliary valve (Item 1) **[Figure 20-110-9]** by moving the valve to the rear access hole which allows enough room for the valve to be removed from the loader.

The valve needs to be tilted as shown in **[Figure 20-110-9]** for it to be removed through the hole.

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Disassembly And Assembly

Figure 20-110-10

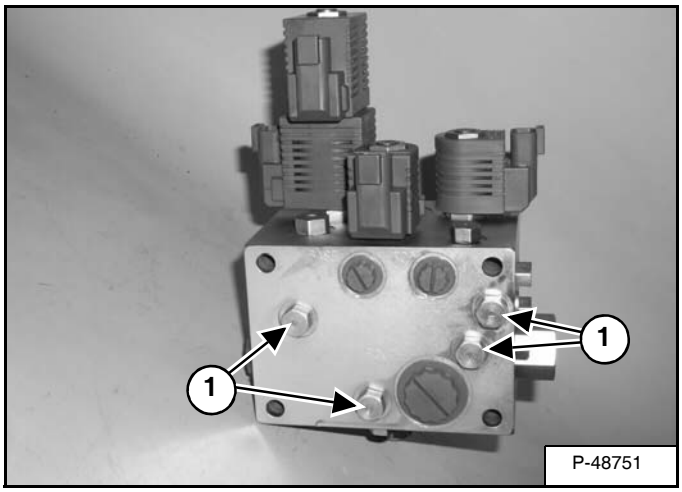
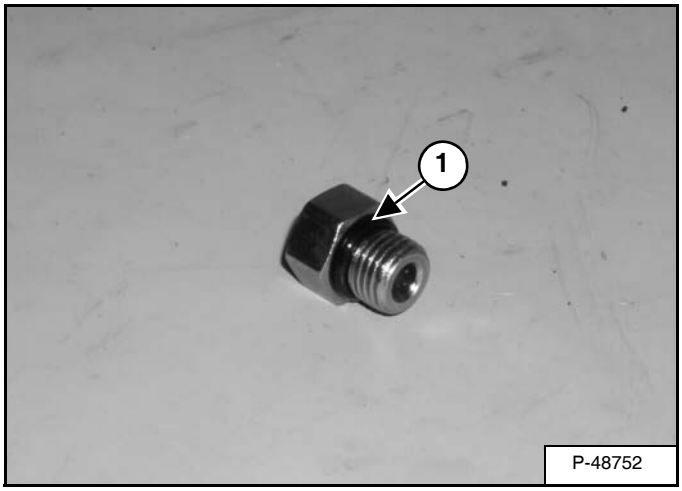


Figure 20-110-11



Clean the diverter valve to remove dirt before disassembly. Valve ports are labeled for correct assembly.

Several plugs (Item 1) **[Figure 20-110-10]** & **[Figure 20-110-11]** are located all over the diverter valve and can be removed for cleanout purposes.

Installation: Put oil on O-rings and back-up washers.Tighten to 10 ft.-lb. (13,6 N•m) torque.

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 20-110-12

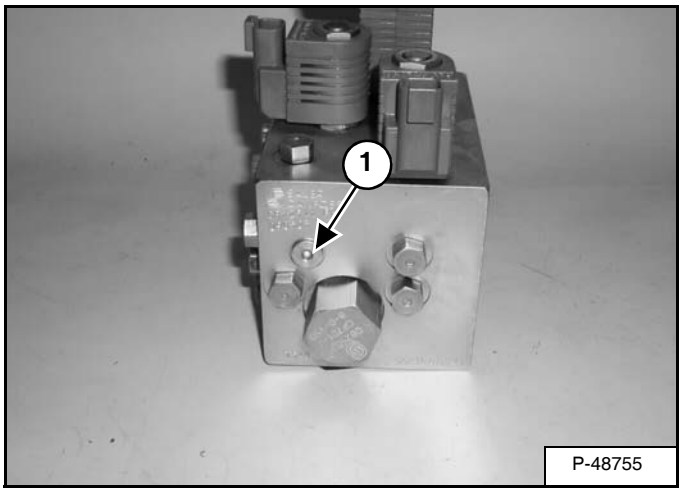
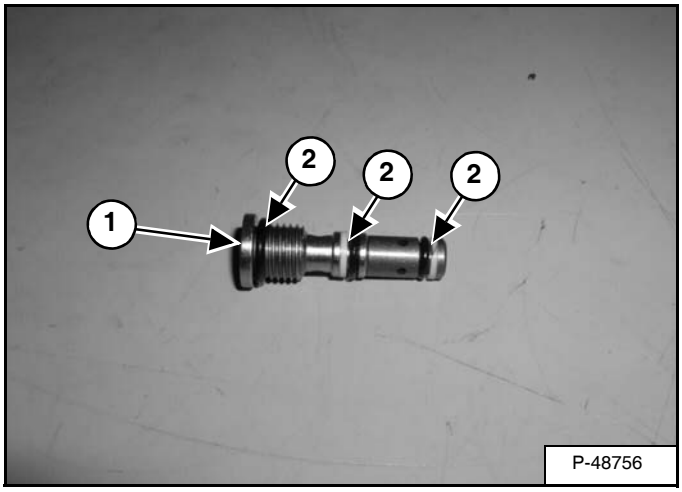


Figure 20-110-13



Remove the shuttle valve (Item 1) **[Figure 20-110-12]** & **[Figure 20-110-13]** from diverter valve and inspect the O-rings and back-up washers (Item 2) **[Figure 20-110-13]** for damage.

Installation: Put oil on the O-rings and back-up washers. Tighten to 10-12 ft.-lb. (14-16 N•m) torque.

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Disassembly And Assembly (Cont'd)

Figure 20-110-14

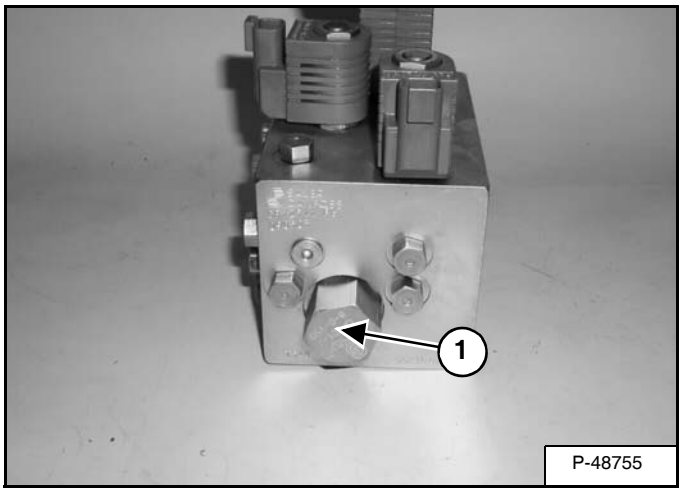
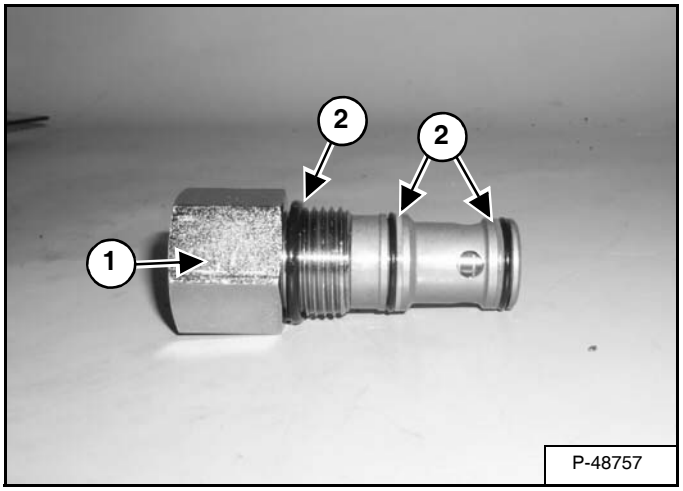


Figure 20-110-15



Remove the differential sensing valve (Item 1) **[Figure 20-110-14]** & **[Figure 20-110-15]** from diverter valve and inspect the O-rings and back-up washers (Item 2) **[Figure 20-110-15]** for damage.

Installation: Put oil on O-ring and back-up washers. Tighten to 50-55 ft.-lb. (68-75 N•m) torque.

Figure 20-110-16

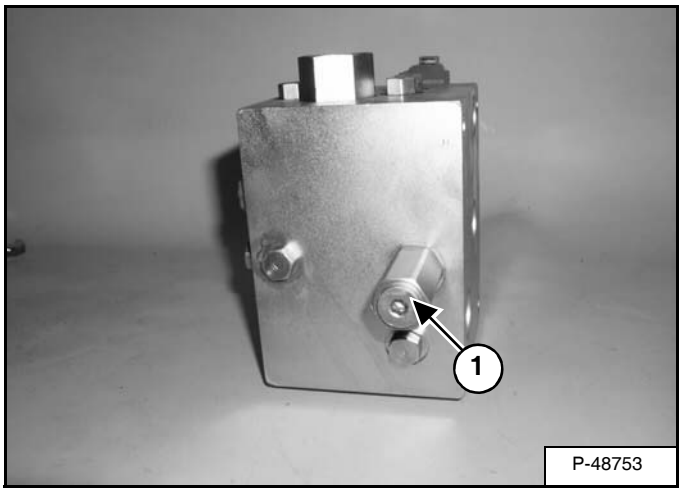
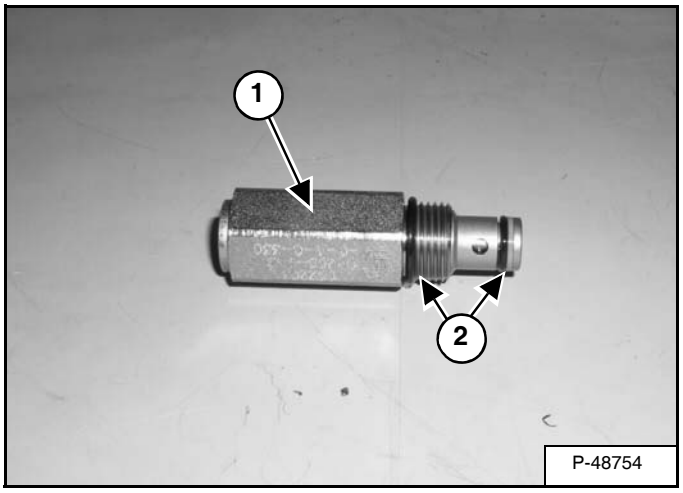


Figure 20-110-17



Remove the relief valve (Item 1) **[Figure 20-110-16]** & **[Figure 20-110-17]** from the diverter valve and inspect the O-rings and back-up washers (Item 2) **[Figure 20-110-17]** for damage.

Installation: Put oil on O-ring and back-up washers. Tighten to 20-25 ft.-lb. (27-34 N•m) torque.

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Disassembly And Assembly (Cont'd)

Figure 20-110-18

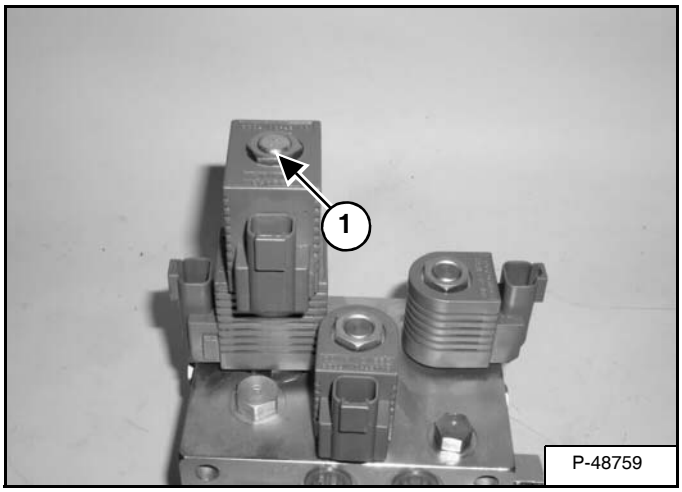
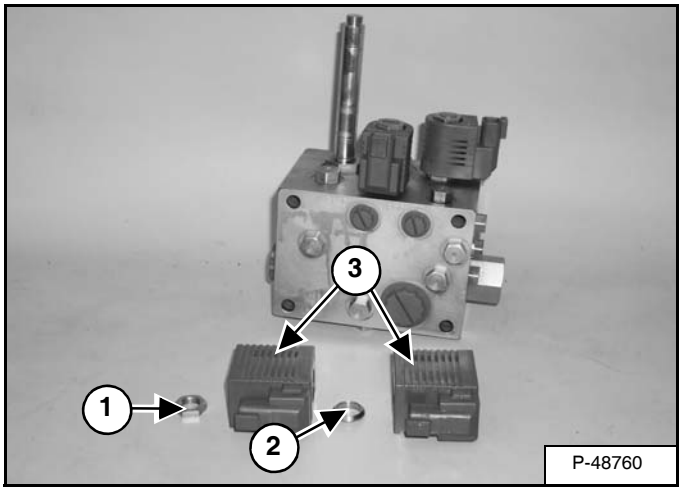


Figure 20-110-19



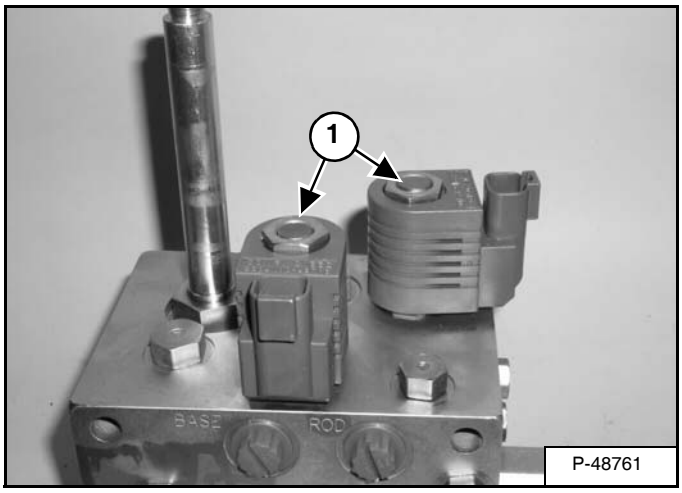
NOTE: Before removing the solenoid coils mark the coils for proper alignment.

Remove the nut (Item 1) **[Figure 20-110-18]** & **[Figure 20-110-19]** from the solenoid valve stem.

Installation: Tighten the nut to 4-6 ft.-lb. (5-8 N•m) torque.

Remove the spacer (Item 2) and solenoid valve coils (Item 3) **[Figure 20-110-19]**.

Figure 20-110-20



NOTE: Before removing the solenoid coils mark the coils for proper alignment.

Remove the nuts (Item 1) **[Figure 20-110-20]** from the solenoid valve stems.

Installation: Tighten the nut to 4-6 ft.-lb. (5-8 N•m) torque.

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Disassembly And Assembly (Cont'd)

Figure 20-110-21

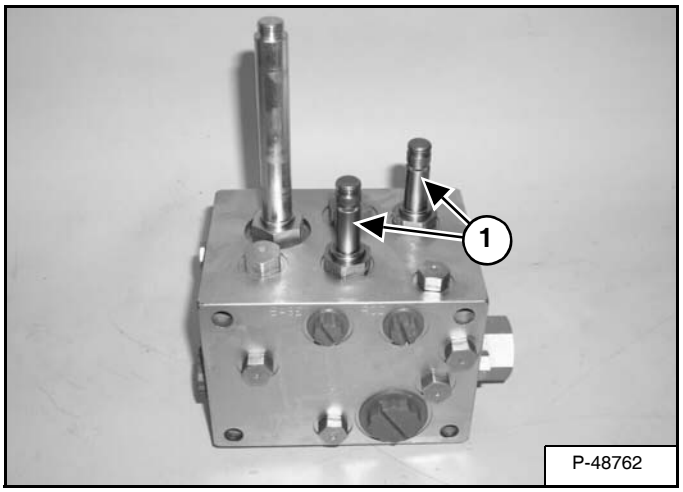
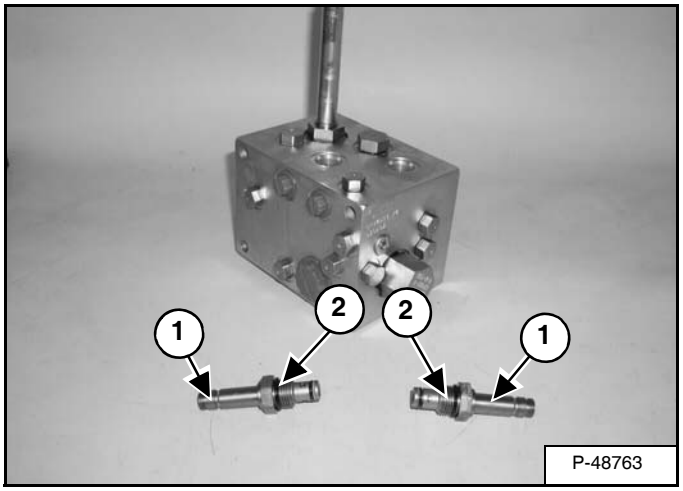


Figure 20-110-22



Remove the solenoid valve stems (Item 1) **[Figure 20-110-21]** & **[Figure 20-110-22]** and inspect the O-rings and back-up washers (Item 2) **[Figure 20-110-22]** for damage.

Installation: Put oil on O-rings and back-up washers. Tighten to 20-25 ft.-lb. (27-34 N•m) torque.

Figure 20-110-23

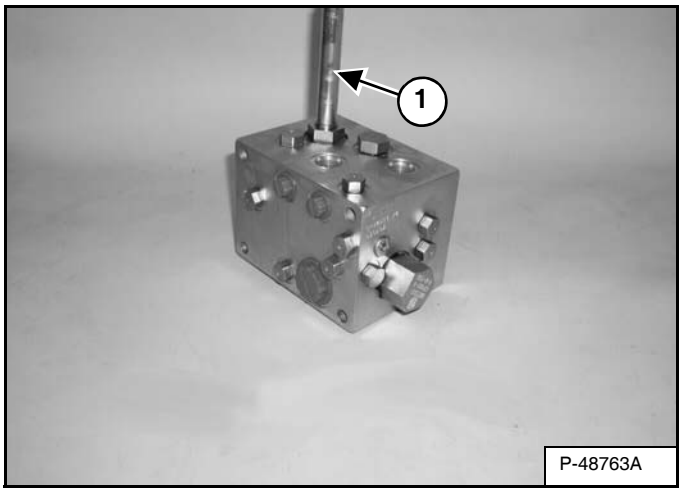
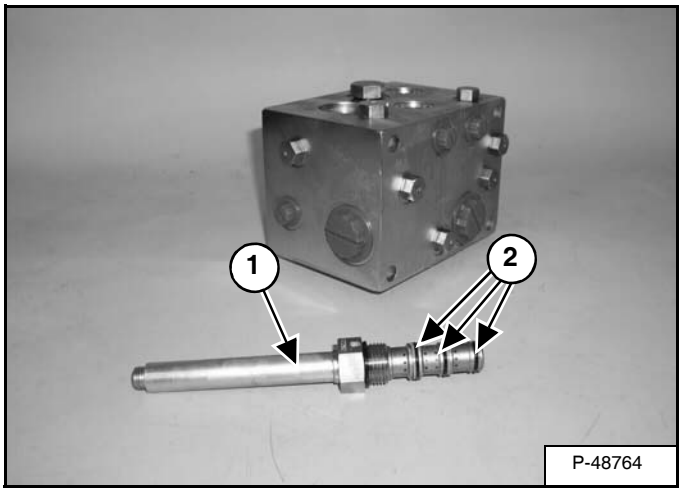


Figure 20-110-24



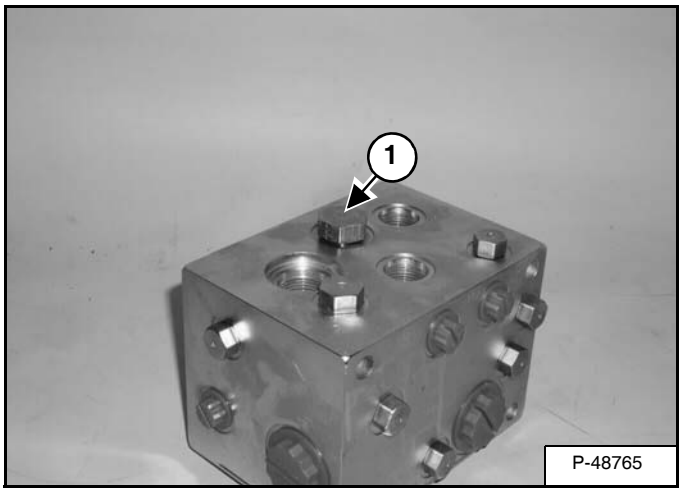
Remove the solenoid valve stem (Item 1) **[Figure 20-110-23]** & **[Figure 20-110-24]** and inspect the O-rings and back-up washers (Item 2) **[Figure 20-110-24]** for damage.

Installation: Put oil on O-rings and back-up washers. Tighten to 30-35 ft.-lb. (41-47 N•m) torque.

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Disassembly And Assembly (Cont'd)

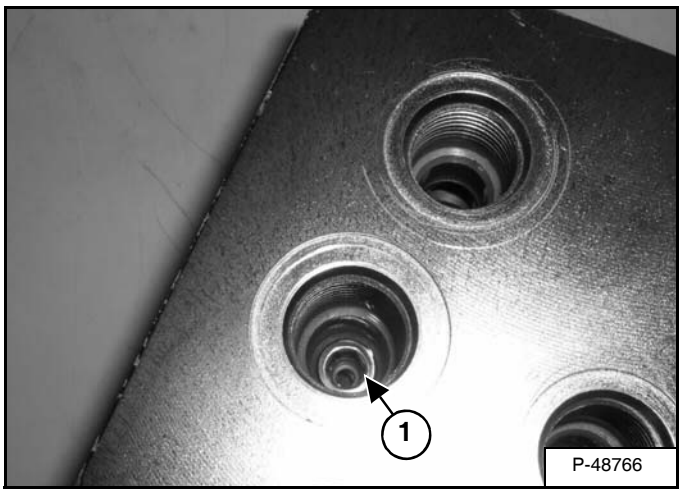
Figure 20-110-25



Remove the plug (Item 1) **[Figure 20-110-25]**.

Installation: Tighten the plug to 38 ft.-lb. (51,5 N•m) torque.

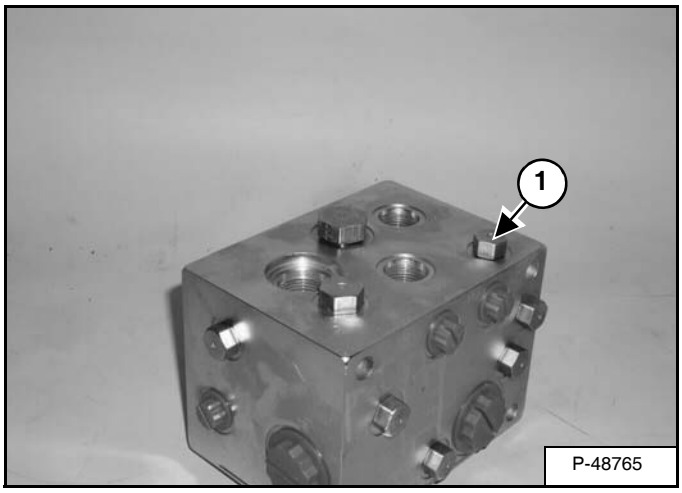
Figure 20-110-26



Remove and inspect the orifice (Item 1) **[Figure 20-110-26]** for dirt and debris.

Installation: Tighten the orifice to 22 ft.-lb. (29,8 N•m) torque.

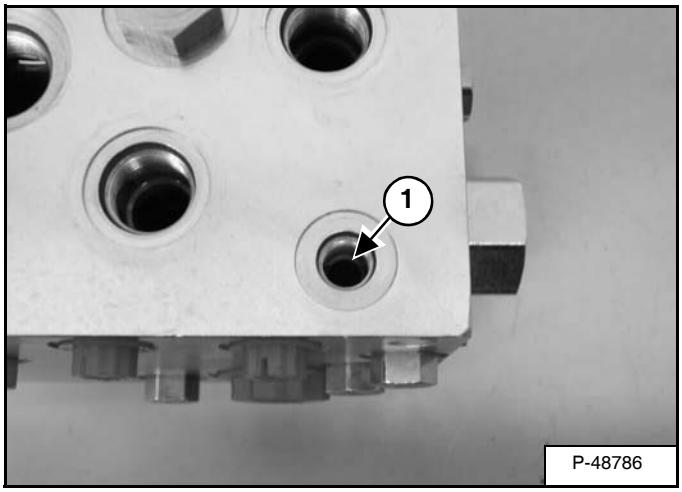
Figure 20-110-27



Remove the plug (Item 1) **[Figure 20-110-27]**.

Installation: Tighten the plug to 10 ft.-lb. (13,6 N•m) torque.

Figure 20-110-28



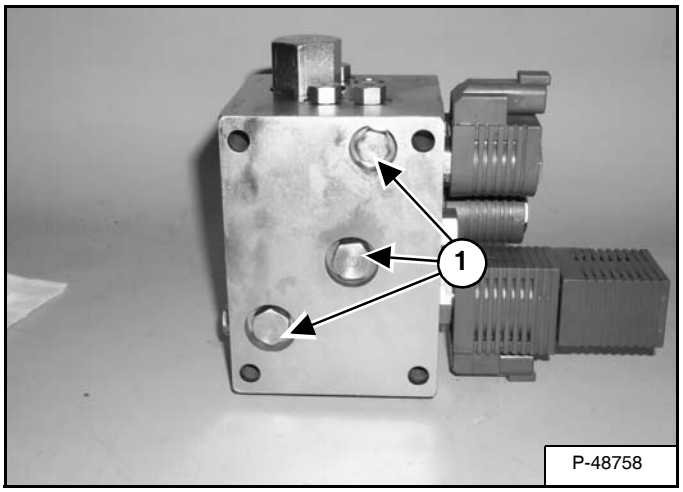
Remove the orifice (Item 1) **[Figure 20-110-28]**.

Installation: Tighten the orifice to 3.3 ft.-lb. (4,5 N•m) torque.

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Disassembly And Assembly (Cont'd)

Figure 20-110-29

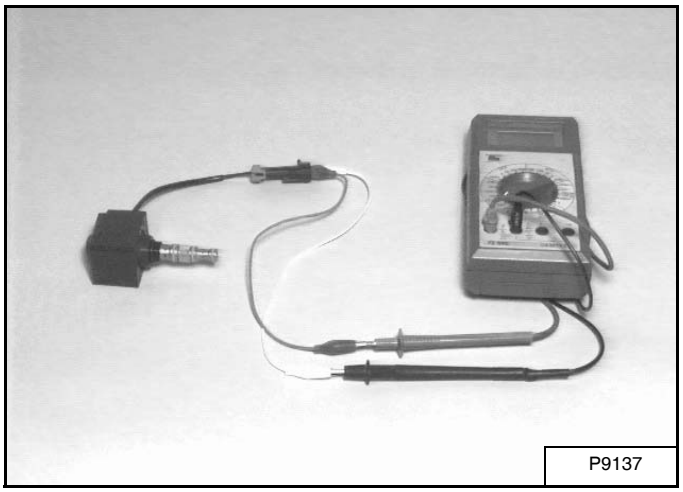


Remove the plugs (Item 1) **[Figure 20-110-29]**.

Installation: Tighten the plug to 14 ft.-lb. (19 N•m) torque.

Solenoid Testing

Figure 20-110-30



Use a test meter to measure coil resistance **[Figure 20-110-30]**. Coil wires do not have polarity. Correct resistance is 8.6-9.5 ohms @ 68 degrees Fahrenheit.

Replace the test meter with 12 volt power. You can see and hear the spool shift.

Inspection

Inspect cartridges, check valves, solenoid valves and sealing washers for contamination or damage. Wash all parts in clean solvent. Use air pressure for drying them. Install new O-rings and back-up washers.

Inspect diverter valve cavities for contamination. Wash valve in clean solvent. Use air pressure to dry.

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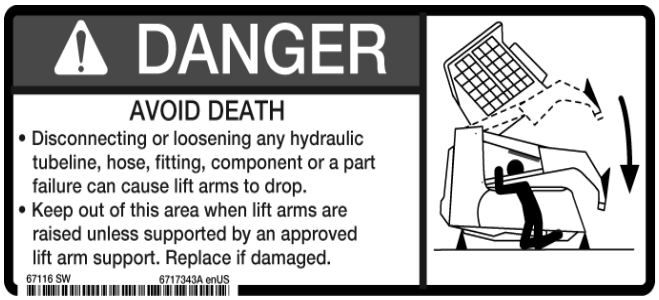
POWER BOB-TACH BLOCK

Removal And Installation

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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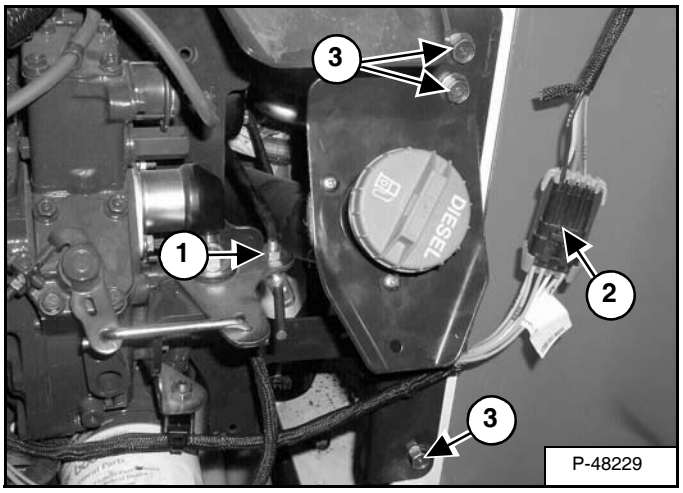


IMPORTANT

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 20-120-1



Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Open the rear door.

Drain the hydraulic reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

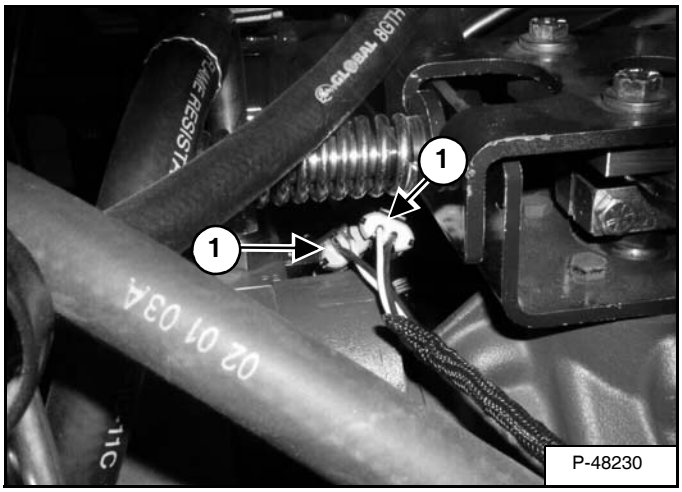
Remove the nut from the speed control linkage (Item 1) and unplug the rear lights electrical connector (Item 2) **[Figure 20-120-1]**.

Remove the fuel fill bracket mounting bolts (Item 3) **[Figure 20-120-1]**.

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Removal And Installation (Cont'd)

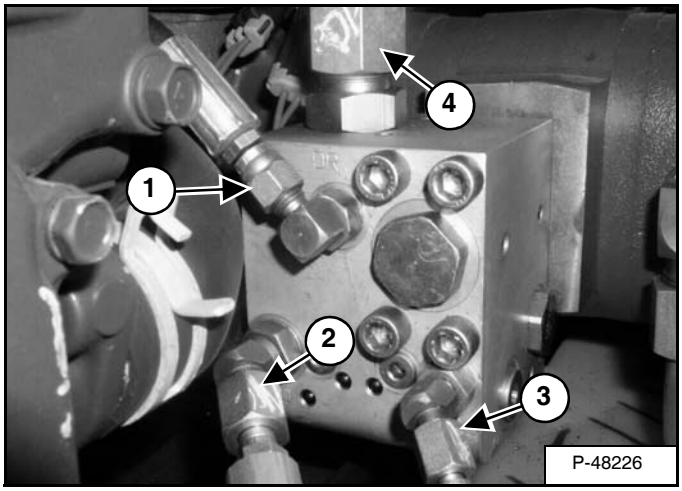
Figure 20-120-2



Installation: The harness connectors are marked with Red or Black tie straps. Be sure the connectors with the same color are connected.

Disconnect the power Bob-Tach harness from the solenoid connectors (Item 1) **[Figure 20-120-2]** by the hydraulic pump.

Figure 20-120-3



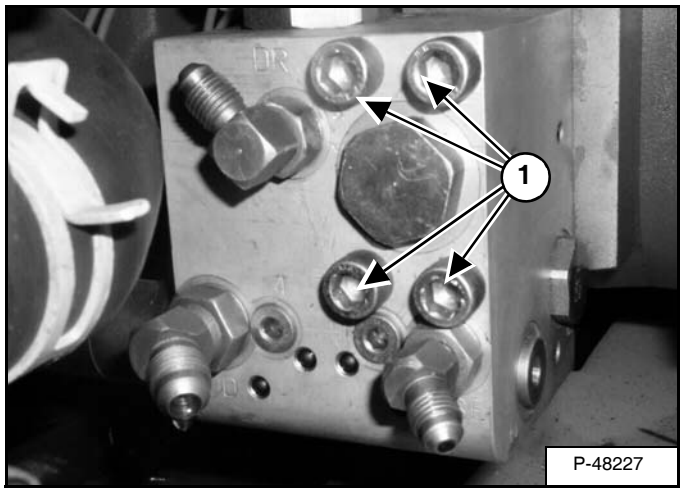
Disconnect the hose (Item 1) **[Figure 20-120-3]** from the "DR" port fitting on the block.

Disconnect the hose (Item 2) **[Figure 20-120-3]** from the power Bob-Tach cylinder rod end fitting on the block.

Disconnect the hose (Item 3) **[Figure 20-120-3]** from the power Bob-Tach cylinder base end fitting on the block.

Disconnect the outlet hose (Item 4) **[Figure 20-120-3]** from the fitting on top of the block.

Figure 20-120-4



Remove the four mounting bolts (Item 1) **[Figure 20-120-4]**.

Installation: Tighten the mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

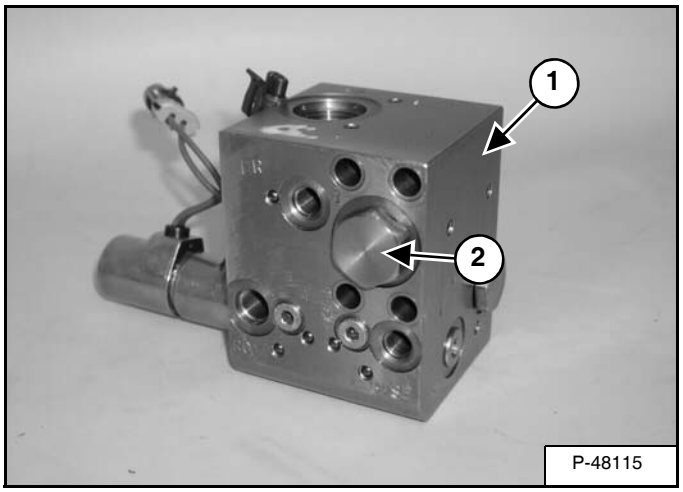
Remove the power Bob-Tach block.

NOTE: There is an O-ring in-between the power Bob-Tach block and the hydraulic pump. Inspect and replace as needed.

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Disassembly And Assembly

Figure 20-120-5



Clean the block (Item 1) **[Figure 20-120-5]** to remove dirt before disassembly. Block ports are labeled for correct assembly.

Remove the plug (Item 2) **[Figure 20-120-5]**.

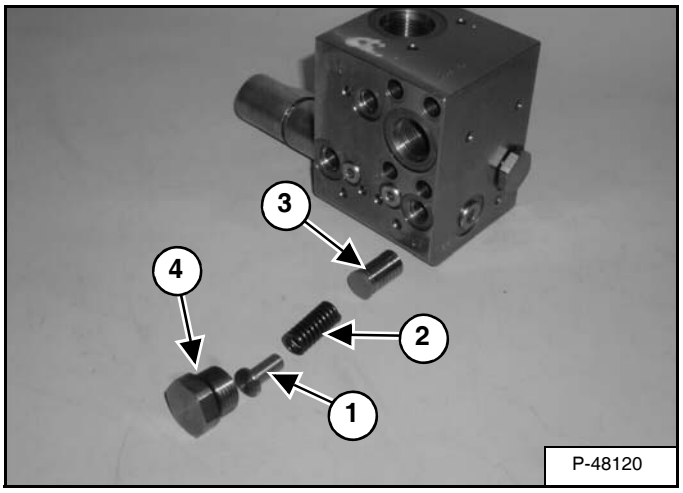
Installation: Tighten the plug to 25-30 ft.-lb. (34-40,6 N•m) torque.

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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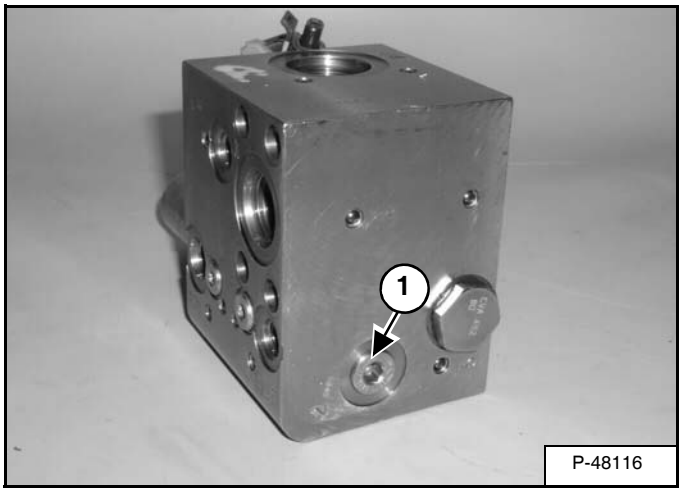
Figure 20-120-6



Remove the spring guide (Item 1), spring (Item 2) and the spool (Item 3) **[Figure 20-120-6]**.

Check the O-ring (Item 4) **[Figure 20-120-6]** on the plug and replace as needed.

Figure 20-120-7



NOTE: This plug is a zero leak plug and should not be removed. If removed damage may occur and the plug and O-ring must be replaced.

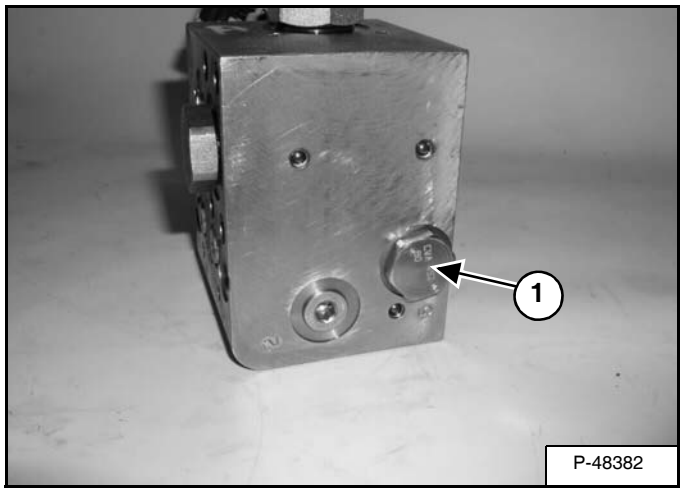
Do not remove the plug (Item 1) **[Figure 20-120-7]**.

Installation: Tighten the plug to 12-14 ft.-lb. (16,3-19 N•m) torque.

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Disassembly And Assembly (Cont'd)

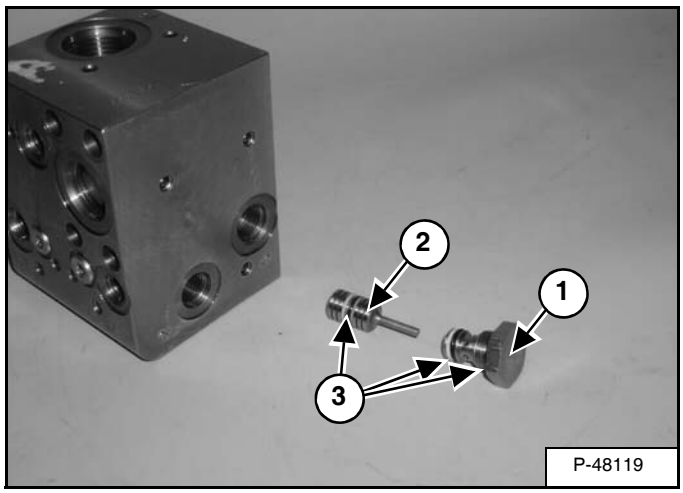
Figure 20-120-8



Remove the check valve (Item 1) **[Figure 20-120-8]**.

Installation: Oil the check valve and O-rings and tighten the check valve to to 20-25 ft.-lb. (27,1-34 N•m) torque.

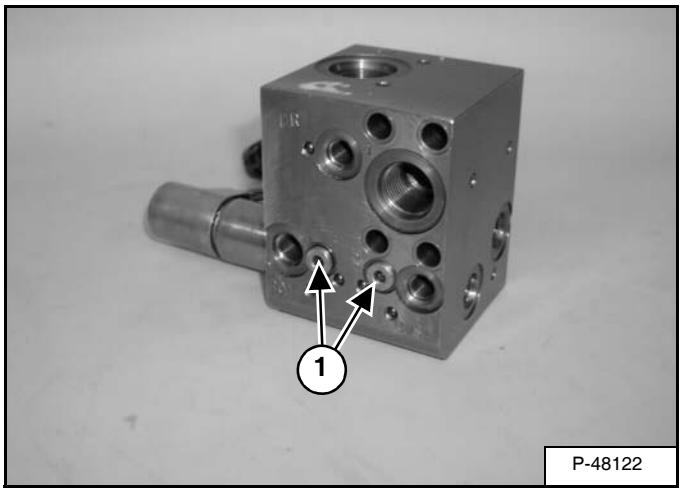
Figure 20-120-9



Inspect the check valve (Item 1) and piston assembly (Item 2) **[Figure 20-120-9]**.

Check the O-rings and back up washers (Item 3) **[Figure 20-120-9]** on the check valve and piston assembly and replace as needed.

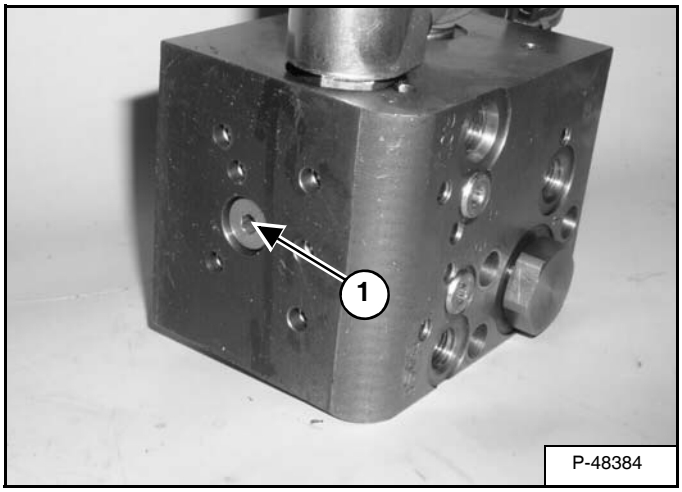
Figure 20-120-10



Do not remove the plugs (Item 1) **[Figure 20-120-10]**.

NOTE: Do not remove plugs. If the plugs are removed the internal pressure relieving spring setting will be altered.

Figure 20-120-11



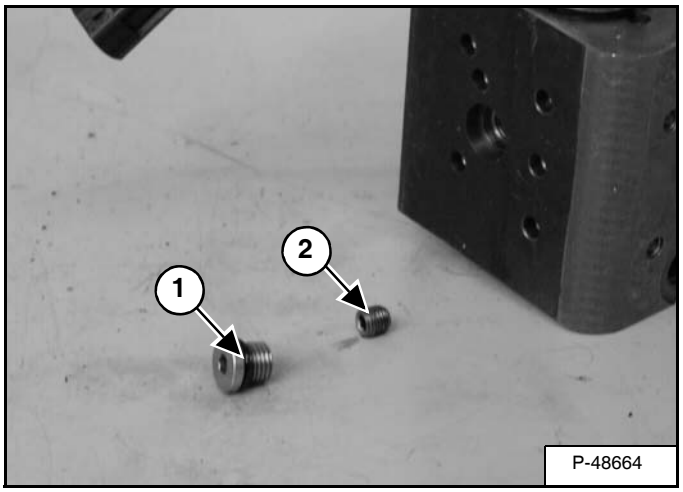
Remove the plug (Item 1) **[Figure 20-120-11]**, inspect the O-ring and replace as needed.

Installation: Tighten the plug (Item 1) **[Figure 20-120-11]** to 12-14 ft.-lb. (16,3-19 N•m) torque.

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Disassembly And Assembly (Cont'd)

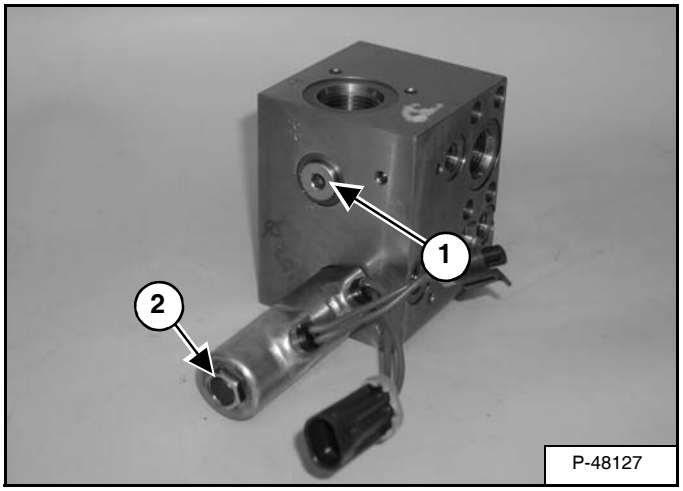
Figure 20-120-12



Remove the orifice screw (Item 2) located behind the plug (Item 1) **[Figure 20-120-11]**.

Installation: Tighten the orifice screw (Item 2) **[Figure 20-120-11]** to 6-8 ft.-lb. (8,1-10,8 N•m) torque.

Figure 20-120-13



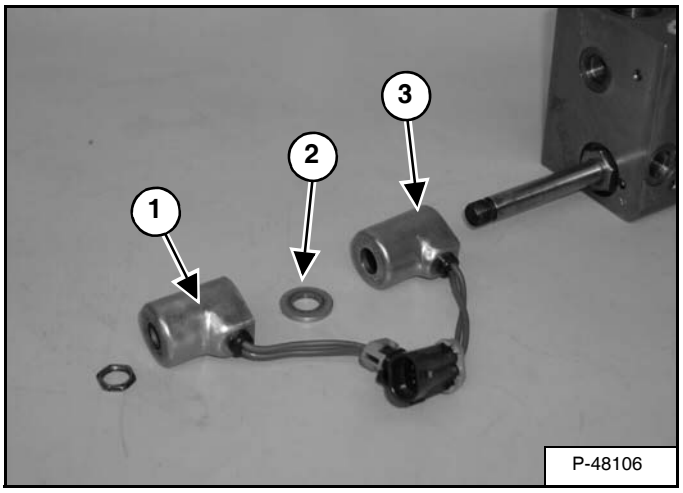
NOTE: This plug is a zero leak plug and should not be removed. If removed damage may occur and the plug and O-ring must be replaced.

Do not remove the plug (Item 1) **[Figure 20-120-13]**.

Remove the solenoid nut (Item 2) **[Figure 20-120-13]**.

Installation: Tighten the solenoid valve stem nut to 15-45 in.-lb. (1,7-5,1 N•m) torque.

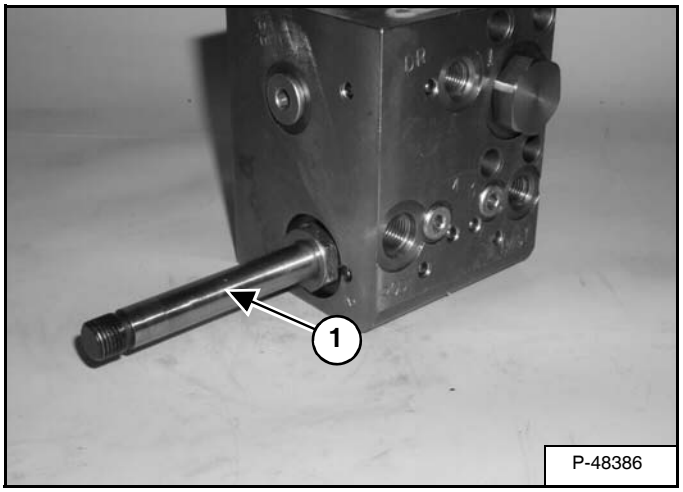
Figure 20-120-14



Remove the first solenoid coil (Item 1), spacer (Item 2) and the second solenoid coil (Item 3) **[Figure 20-120-14]**.

NOTE: Remember the solenoid coil orientation for ease of installation.

Figure 20-120-15



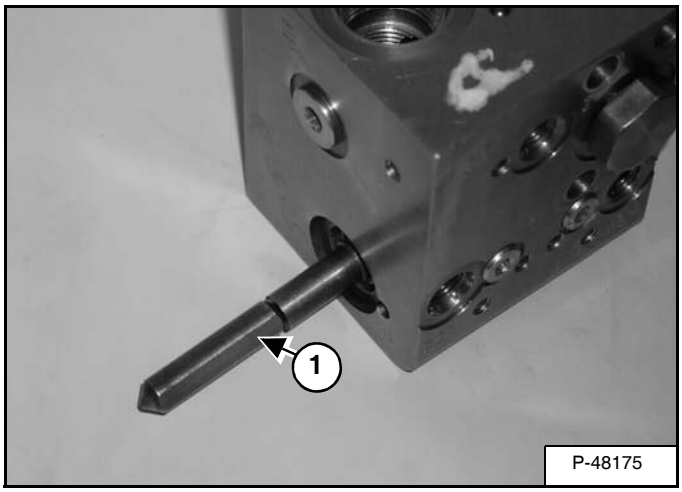
Remove the the solenoid stem (Item 1) **[Figure 20-120-15]**.

Installation: Tighten the solenoid stem to to 20-25 ft.-lb. (27,1-34 N•m) torque.

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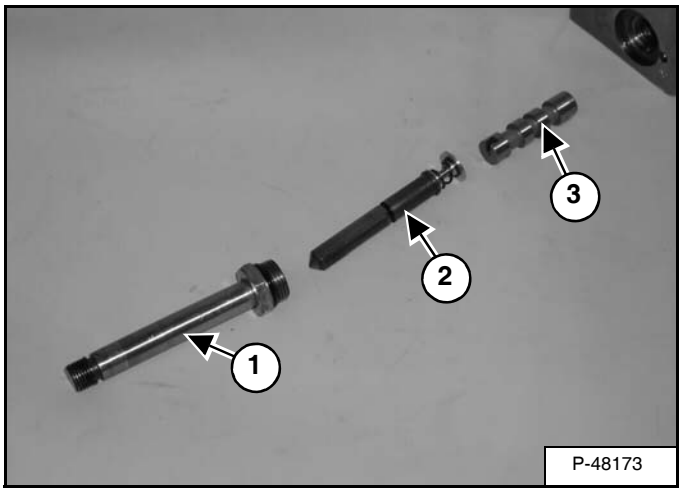
Disassembly And Assembly (Cont'd)

Figure 20-120-16



Remove the armature rod assembly (Item 1) **[Figure 20-120-16]**.

Figure 20-120-17

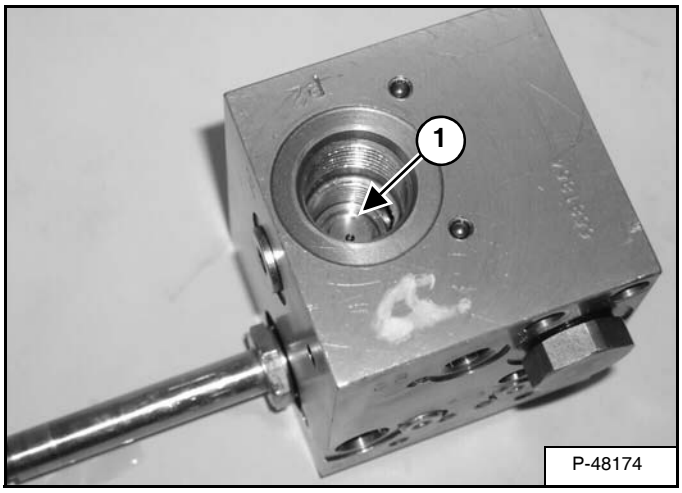


Inspect the solenoid stem (Item 1), armature assembly (Item 2) and the spool (Item 3) for damage **[Figure 20-120-17]**.

NOTE: If the solenoid stem is damaged (Item 1) check the armature assembly (Item 2) for damage.

The armature assembly (Item 2) and spool (Item 3) are non-serviceable parts. If they are damaged, order a new power Bob-Tach block assembly from Bobcat parts [Figure 20-120-17].

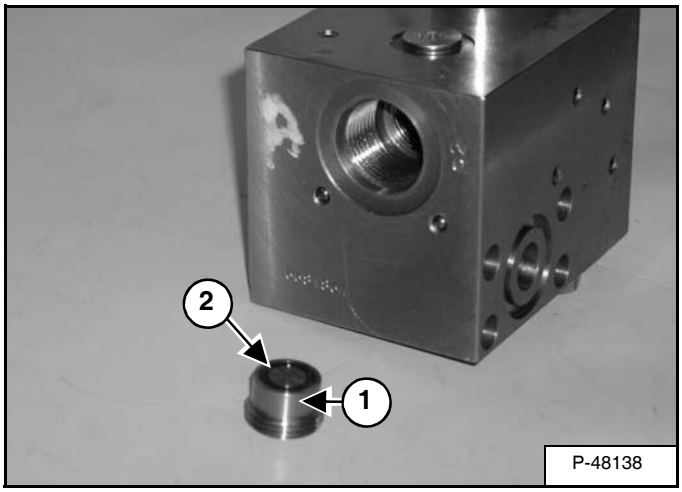
Figure 20-120-18



Remove the screened orifice plug (Item 1) **[Figure 20-120-18]**.

Installation: Tighten the screened orifice plug to to 11-12 ft.-lb. (14,9-16,3 N•m) torque.

Figure 20-120-19



Inspect the screened orifice plug (Item 1) **[Figure 20-120-19]** for damage replace as needed. If the screened orifice plug is blocked replace with a new plug.

Check the O-ring (Item 2) **[Figure 20-120-19]** and replace as needed.

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FRONT AUXILIARY HYDRAULIC COUPLER BLOCK

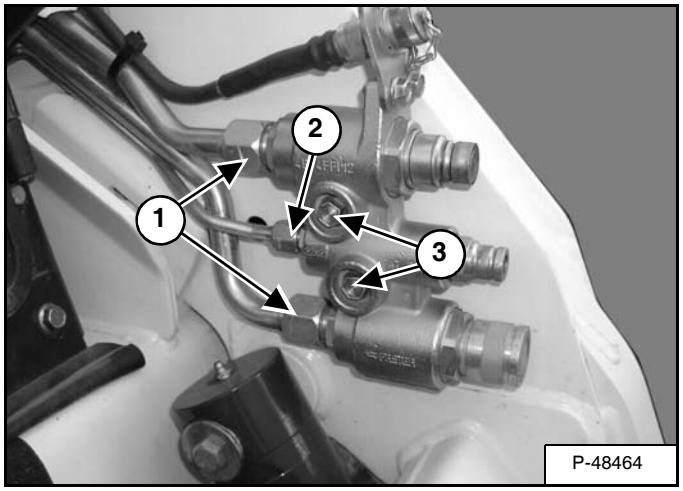
Removal and Installation

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.

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Figure 20-130-1



Disconnect the auxiliary tubelines (Item 1) and drain tubeline (Item 2) from the coupler block **[Figure 20-130-1]**.

Remove the two mounting bolts (Item 3) **[Figure 20-130-1]**.

Disassembly And Assembly

Figure 20-130-2

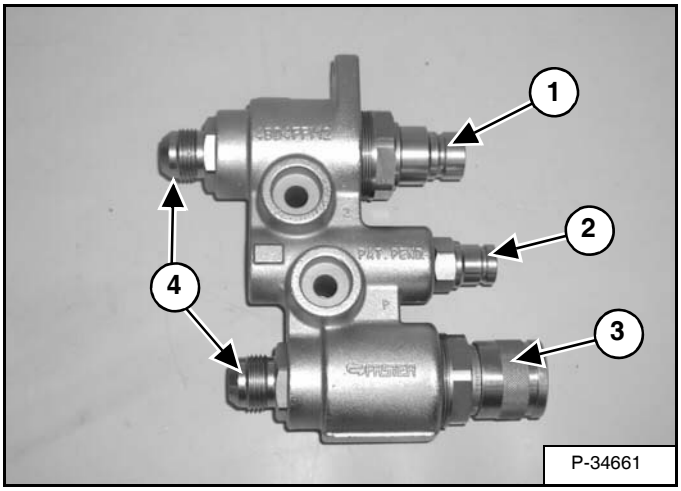
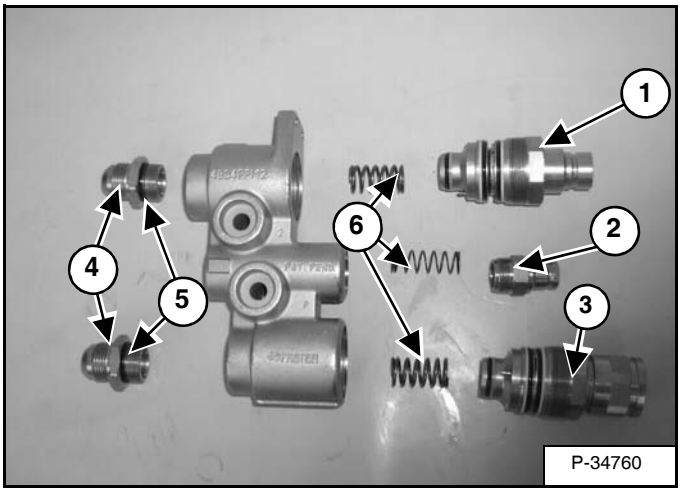


Figure 20-130-3



Remove the male coupler (Item 1) **[Figure 20-130-2]** & **[Figure 20-130-3].**

Installation: Tighten the male coupler (Item 1) **[Figure 20-130-2]** & **[Figure 20-130-3]** to 59 ft.lb. (80 N•m)

Remove the drain coupler (Item 2) **[Figure 20-130-2]** & **[Figure 20-130-3].**

Installation: Tighten the drain coupler (Item 2) **[Figure 20-130-2]** & **[Figure 20-130-3]** to 37 ft.lb. (50 N•m)

Remove the female coupler (Item 3) **[Figure 20-130-2]** & **[Figure 20-130-3].**

Installation: Tighten the female coupler (Item 3) **[Figure 20-130-2]** & **[Figure 20-130-3]** to 59 ft.lb. (80 N•m)

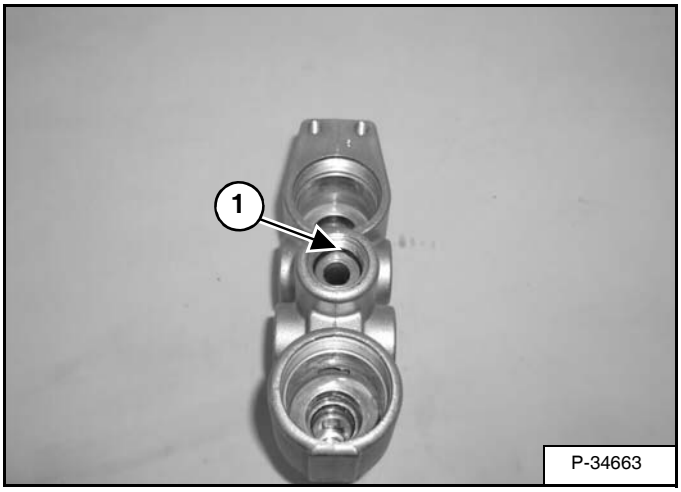
Remove the fittings (Item 4) **[Figure 20-130-2]** & **[Figure 20-130-3]** check the O-rings (Item 5) **[Figure 20-130-3]** and replace as needed.

Remove the springs (Item 6) **[Figure 20-130-3].**

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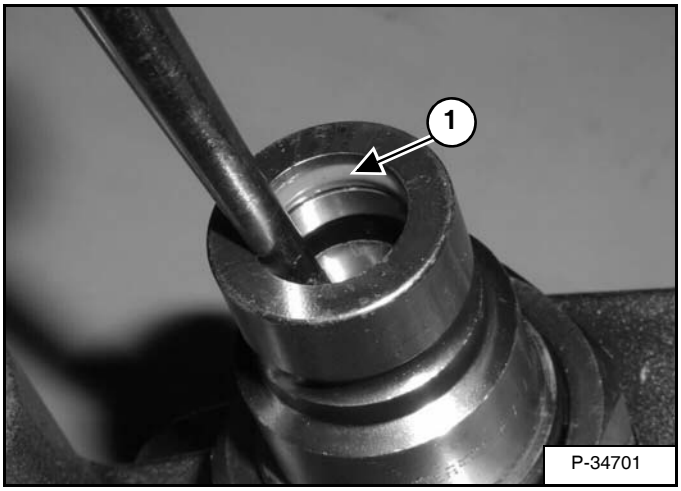
Disassembly And Assembly (Cont'd)

Figure 20-130-4



Check the O-ring (Item 1) **[Figure 20-130-4]** for damage and replace as needed.

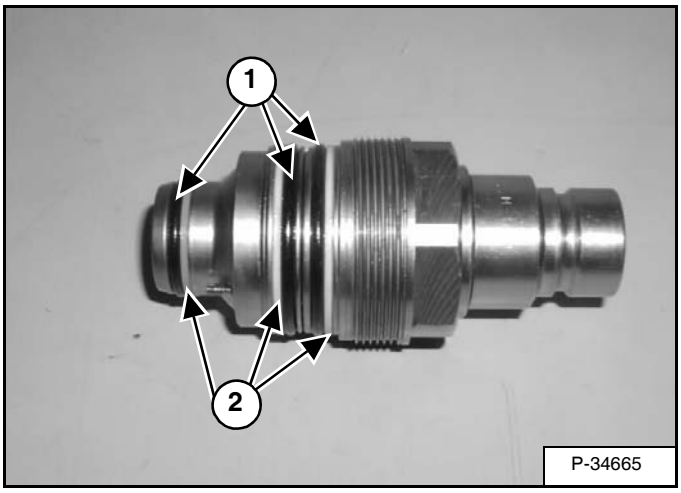
Figure 20-130-5



Press center of male couplers down and check the O-ring (Item 1) **[Figure 20-130-5]** for damage and replace as needed.

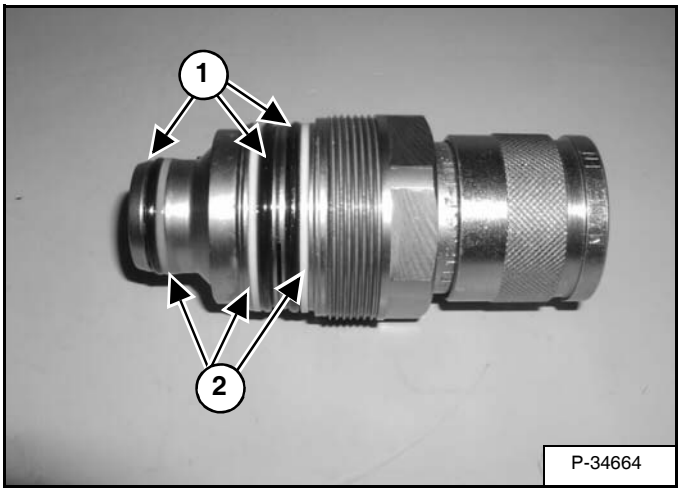
.

Figure 20-130-6



Check the O-rings (Item 1) backup O-rings (Item 2) for damage and replace as needed **[Figure 20-130-6]**.

Figure 20-130-7



Check the O-rings (Item 1) backup O-rings (Item 2) for damage and replace as needed **[Figure 20-130-7]**.

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HYDROSTATIC SYSTEM

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HYDROSTATIC SYSTEM INFORMATION

Troubleshooting Chart

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

⚠ WARNING

Check for correct function after adjustments, repairs or service. Failure to make correct repairs or adjustments can cause injury or death.

W-2004-1285

PROBLEM	CAUSE
No drive on one side, in one direction.	1, 2
No drive on one side in both directions.	2, 3, 4, 5
The loader does not move in a straight line.	2, 3, 5, 6, 7
The hydrostatic system is overheating.	8, 9

KEY TO CORRECT THE CAUSE
1. The hydrostatic pump replenishing valves not seating.
2. The steering linkage needs adjustment.
3. The hydrostatic pump has damage.
4. The final drive chains are broken.
5. The hydrostatic motor has damage.
6. The tires do not have the correct tire pressure.
7. The tires are not the same size.
8. The hydrostatic fluid is not at the correct level.
9. The oil cooler has a restriction.

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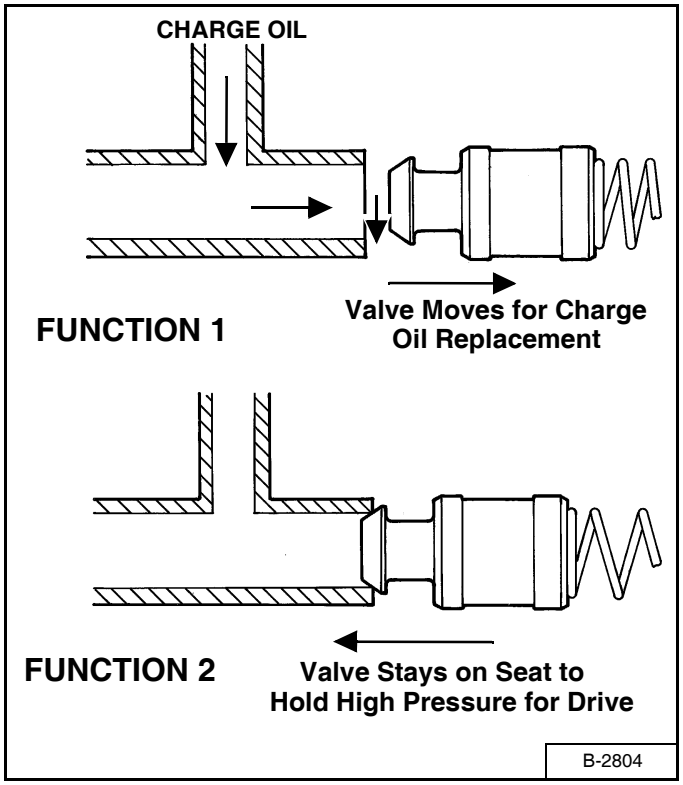
IMPORTANT

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

Replenishing Valve Function

Figure 30-10-1



The functions of the replenishing valves are:

1. To give replacement fluid to the low pressure side of the hydrostatic circuit. Replacement fluid is needed because of normal internal leakage and the controlled flow to the oil cooler for cooling; Function 1 **[Figure 30-10-1]**.

2. To keep high pressure fluid out of the low pressure side of the hydrostatic circuitry; Function 2 **[Figure 30-10-1]**.

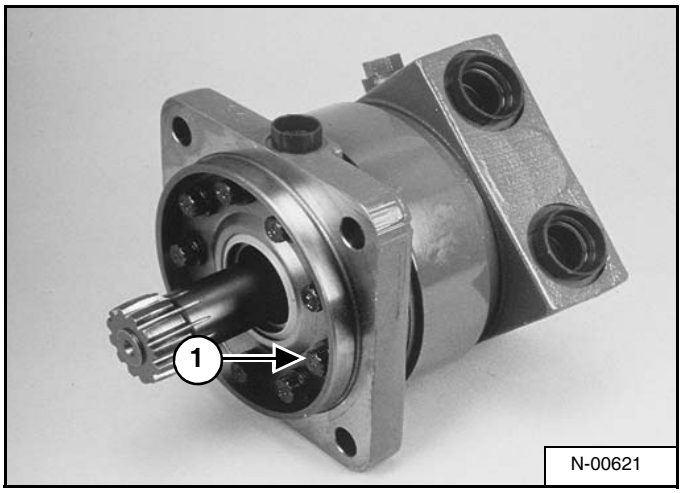
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HYDROSTATIC MOTOR

Description

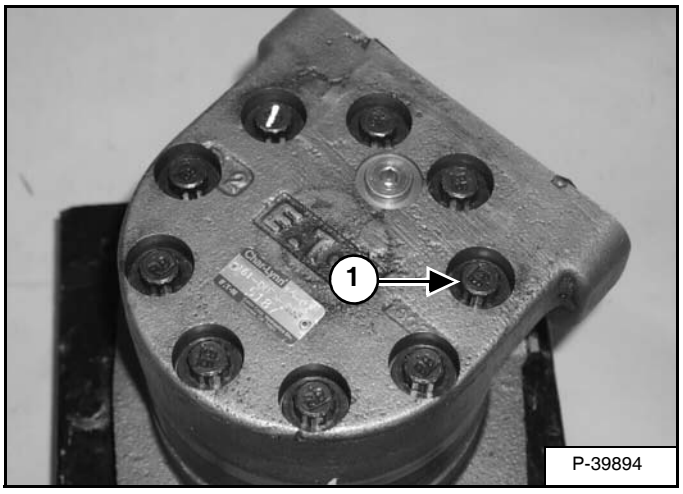
Two types of hydrostatic drive motors have been used on this model loader. Both designs remove and install the same.

Figure 30-20-1



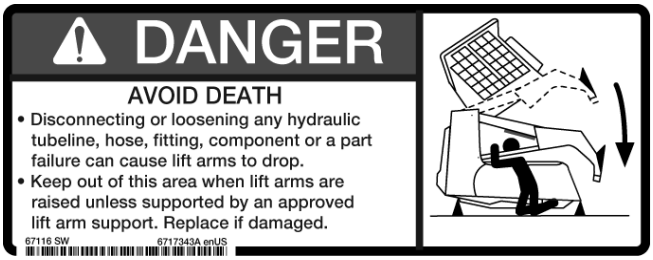
The early design is identified by the tie bolts (Item 1) **[Figure 30-20-1]** mounting from the inside of the hydrostatic drive motor with the heads of the tie bolts immersed in the hydraulic oil. The tie bolts are not visible when the hydrostatic drive motor is installed on the loader. This type is called the **"wet bolt"** design.

Figure 30-20-2



The later design has the tie bolts (Item 1) **[Figure 30-20-2]** mounting from the outside of the hydrostatic drive motor. The tie bolt heads are not immersed in hydraulic oil and are visible when the hydrostatic drive motor is installed on the loader. This type is called the **"dry bolt"** design.

Removal And Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

WARNING

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

W-2103-1285

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the front and rear wheel/tire assemblies. (See TIRE MAINTENANCE on Page 10-170-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

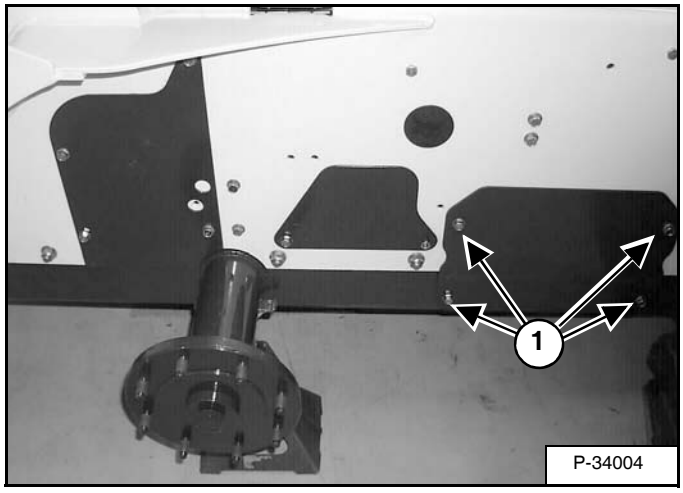
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

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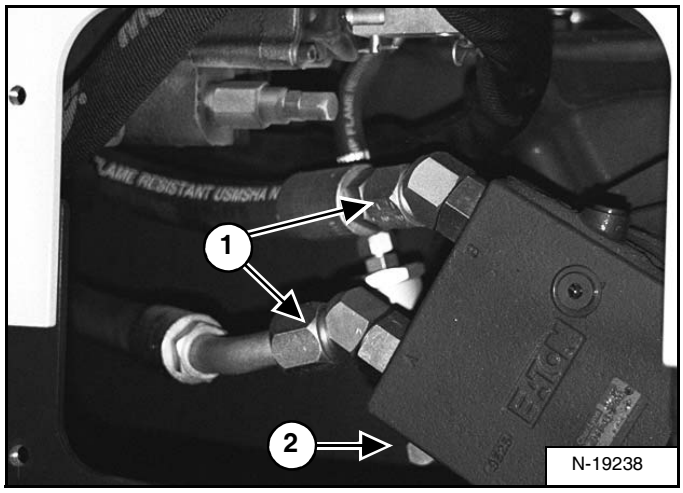
Removal And Installation (Cont'd)

Figure 30-20-3



Remove the four motor cover mounting bolts (Item 1) **[Figure 30-20-3]** .

Figure 30-20-4

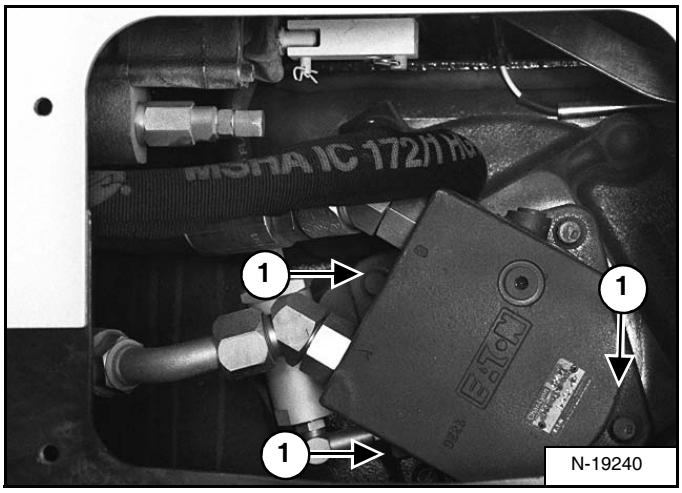


Mark the two hoses (Item 1) **[Figure 30-20-4]** before disconnecting them from the HYDROSTATIC MOTOR for correct installation.

Remove the two hoses (Item 1) **[Figure 30-20-4]** from the drive motor.

Remove the drain hose (Item 2) **[Figure 30-20-4]** from the drive motor.

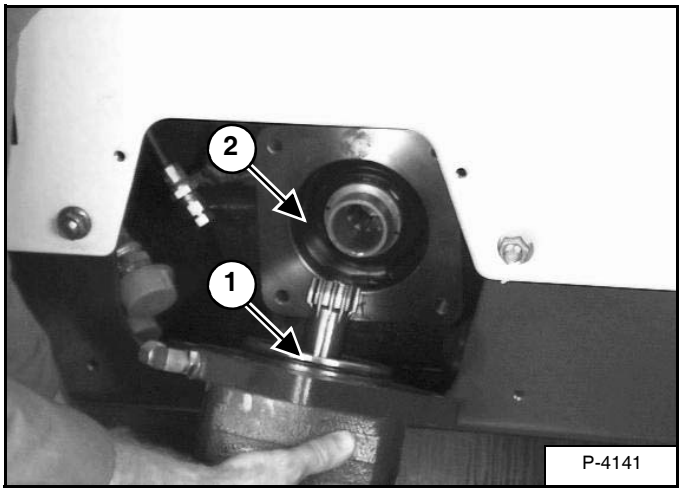
Figure 30-20-5



Remove the four drive motor mounting bolts (Item 1) **[Figure 30-20-5]**.

Installation: Tighten the drive motor mounting bolts to 90-100 ft.-lb. (122-136 N•m) torque.

Figure 30-20-6



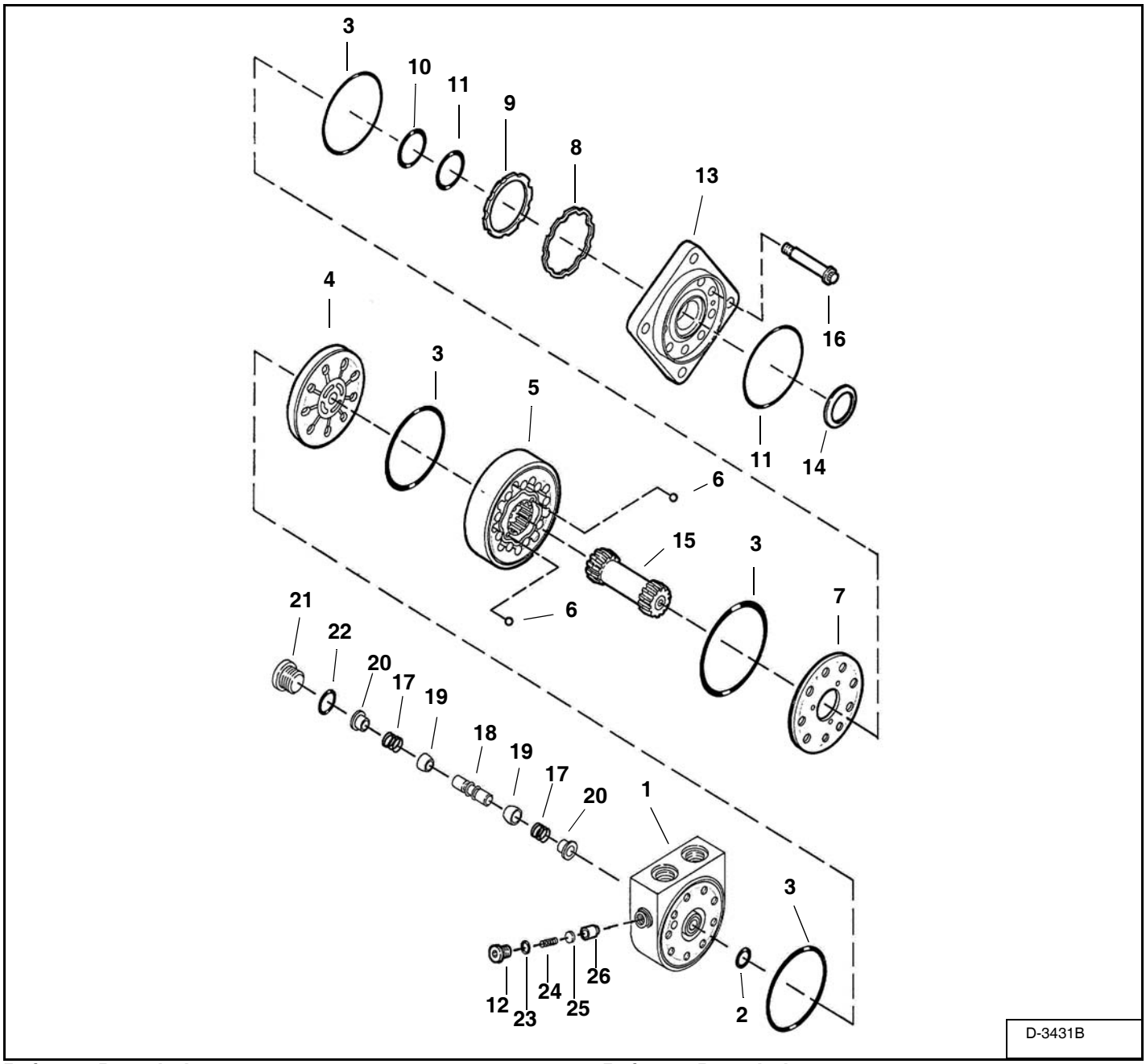
Remove the drive motor from the access hole in the loader frame **[Figure 30-20-6]**.

Inspect drive motor o-ring (Item 1) and carrier shaft seal (Item 2) **[Figure 30-20-6]**.

Reverse the removal procedure to install the HYDROSTATIC MOTOR.

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Parts Identification (Wet Bolt)



Ref.	Description	Ref.	Description
1.	HOUSING	15.	SHAFT, drive
2.	O-RING	16.	BOLT
3.	SEAL, square	17.	SPRING
4.	VALVE, plate	18.	PISTON
5.	GEROLER	19.	POPPET
6.	BALL	20.	SLEEVE
7.	PLATE, balance	21.	PLUG
8.	RING, back-up	22.	O-RING
9.	SEAL	23.	O-RING
10.	RING, back-up	24.	SPRING
11.	O-RING	25.	SHIM
12.	PLUG	26.	POPPET
13.	FLANGE, mounting		
14.	SEAL, face		

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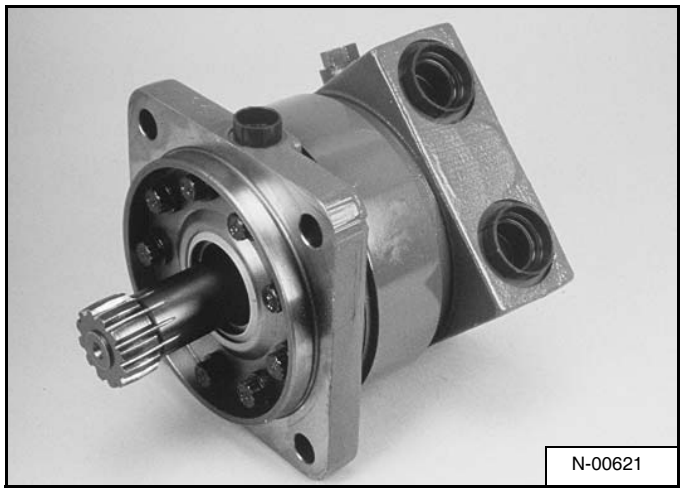
Disassembly (Wet Bolt)

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 30-20-7

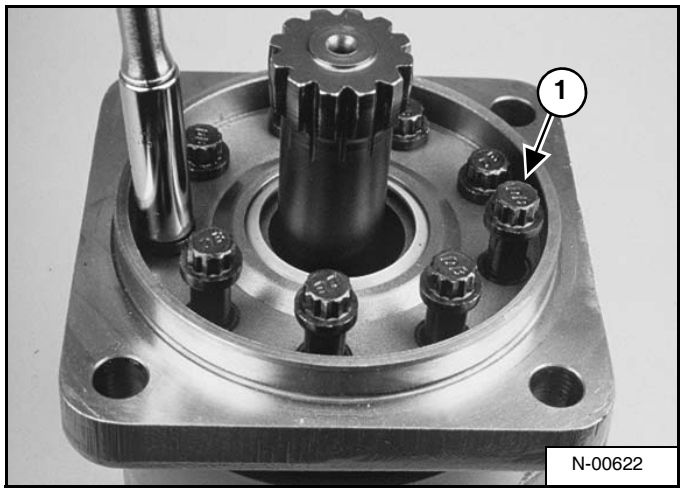


Drain the oil from the motor.

Seal all open ports and clean the motor with solvent.

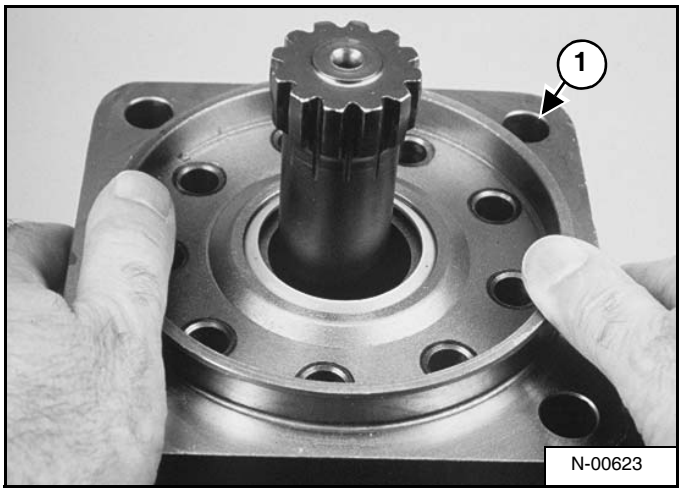
Put a mark across the sections of the motor for correct assembly **[Figure 30-20-7]**.

Figure 30-20-8



Remove the nine bolts (Item 1) **[Figure 30-20-8]** from the motor.

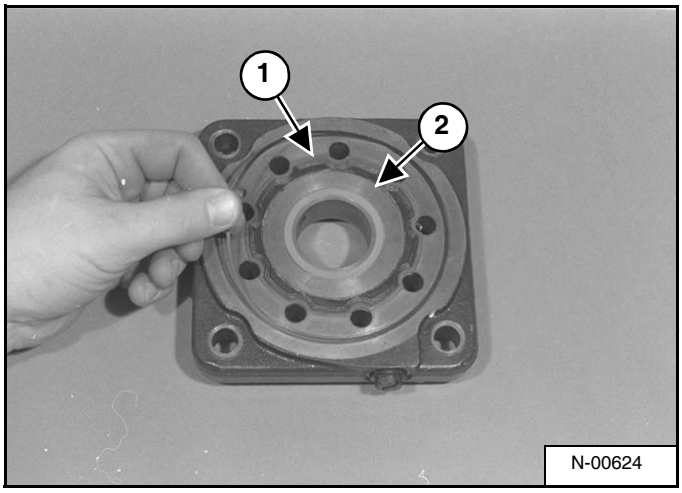
Figure 30-20-9



Lift and remove the mounting flange (Item 1) **[Figure 30-20-9]** from the motor.

NOTE: Do not scratch or damage the surfaces of the motor sections. Always put them on a soft surface.

Figure 30-20-10

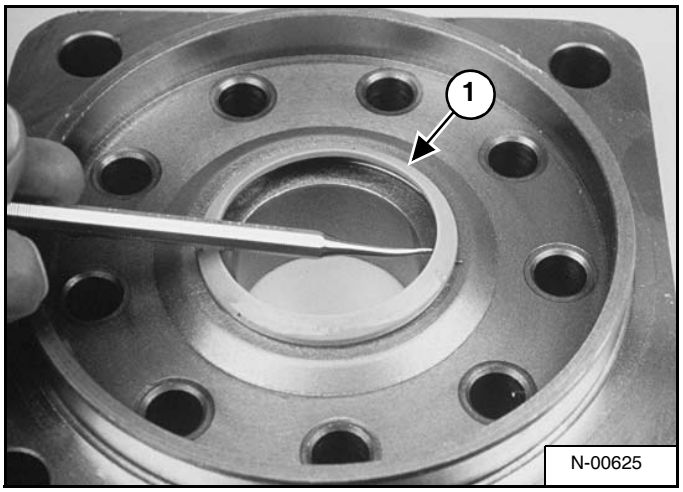


Turn the mounting flange over and remove the O-ring (Item 1) and back-up ring (Item 2) **[Figure 30-20-10]**.

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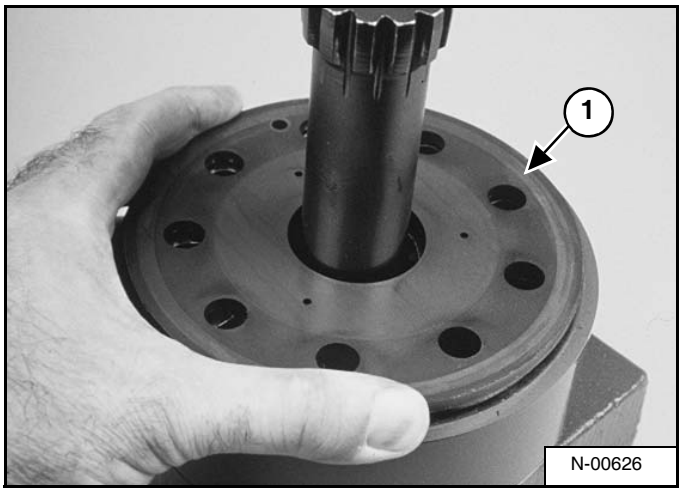
Disassembly (Wet Bolt) (Cont'd)

Figure 30-20-11



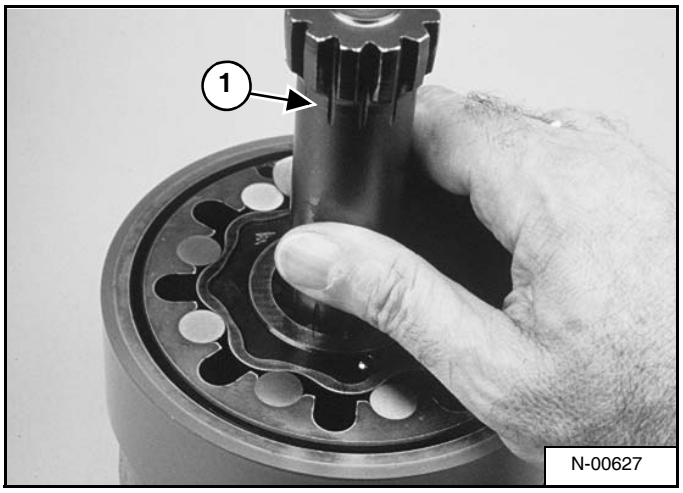
Turn the mounting flange backover and remove the seal (Item 1) **[Figure 30-20-11]** from the mounting flange.

Figure 30-20-12



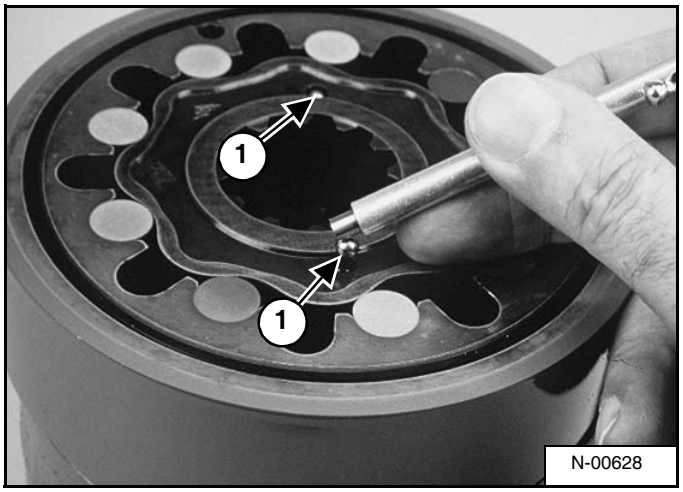
Remove the balance plate (Item 1) **[Figure 30-20-12]** from the gerolor assembly.

Figure 30-20-13



Remove the main drive (Item 1) **[Figure 30-20-13]** from the gerolor assembly.

Figure 30-20-14

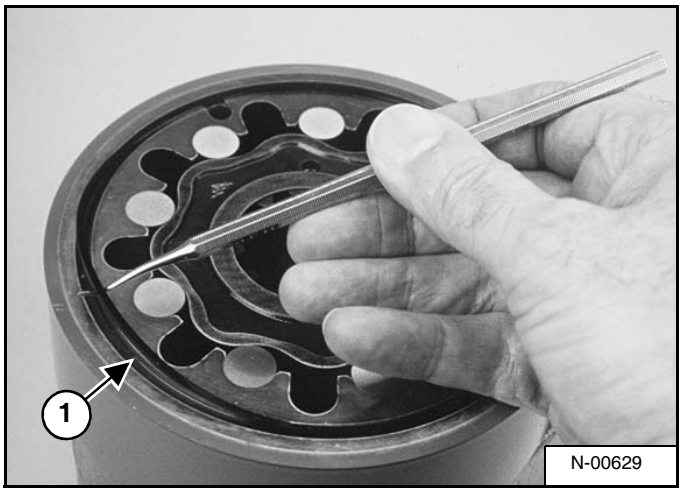


Remove the two check balls (Item 1) **[Figure 30-20-14]** from the gerolor.

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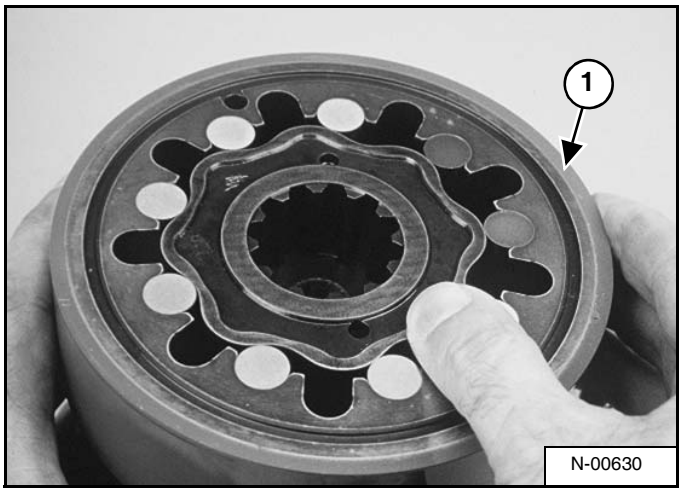
Disassembly (Wet Bolt) (Cont'd)

Figure 30-20-15



Remove the square cut seal (Item 1) **[Figure 30-20-15]** from the gerolor.

Figure 30-20-16

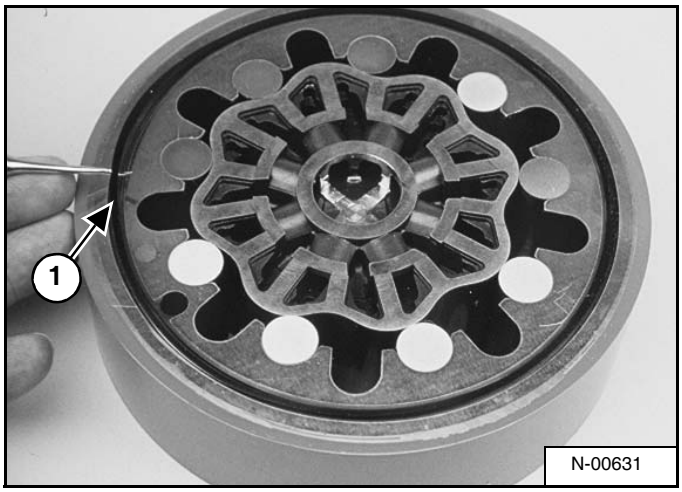


Remove the gerolor assembly (Item 1) **[Figure 30-20-16]**.

NOTE: Care should be taken to keep the gerolor assembly together.

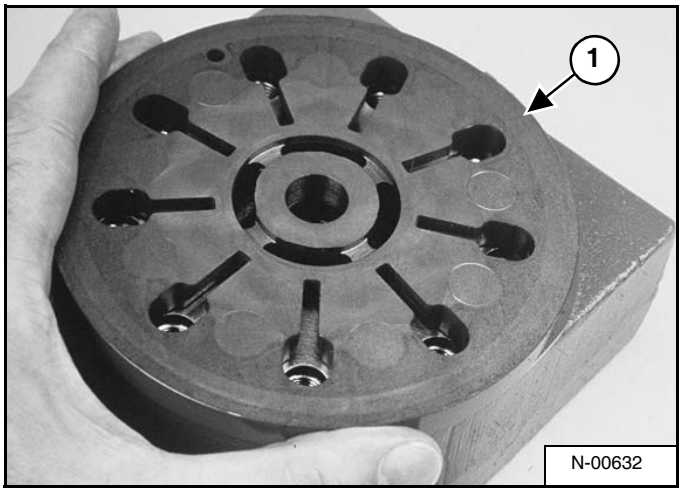
NOTE: If rollers are removed, put them back in their original bore.

Figure 30-20-17



Carefully turn the gerolor assembly over and remove the square cut seal (Item 1) **[Figure 30-20-17]**.

Figure 30-20-18

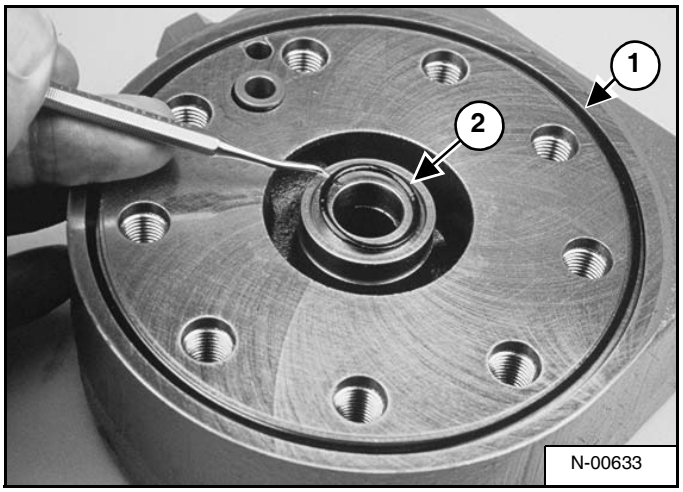


Remove the valve plate (Item 1) **[Figure 30-20-18]** from the end cap.

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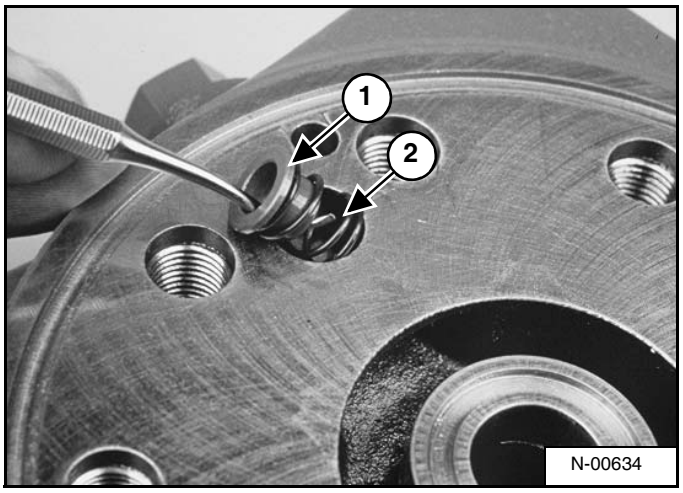
Disassembly (Wet Bolt) (Cont'd)

Figure 30-20-19



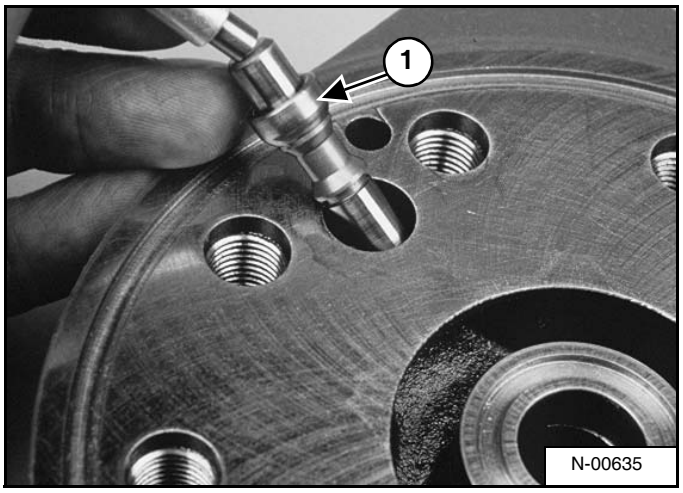
Remove the square cut seal (Item 1) and small O-ring (Item 2) **[Figure 30-20-19]** from the end cap.

Figure 30-20-20



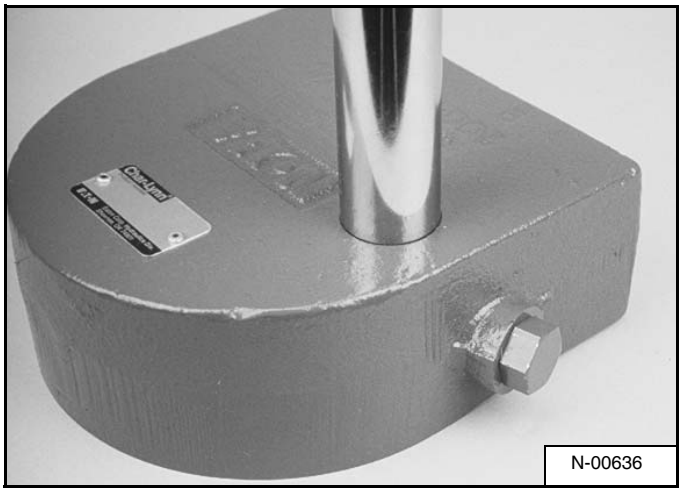
Remove the spring seat (Item 1) and spring (Item 2) **[Figure 30-20-20]**.

Figure 30-20-21



Remove the poppet and shuttle valve (Item 1) **[Figure 30-20-21]**.

Figure 30-20-22

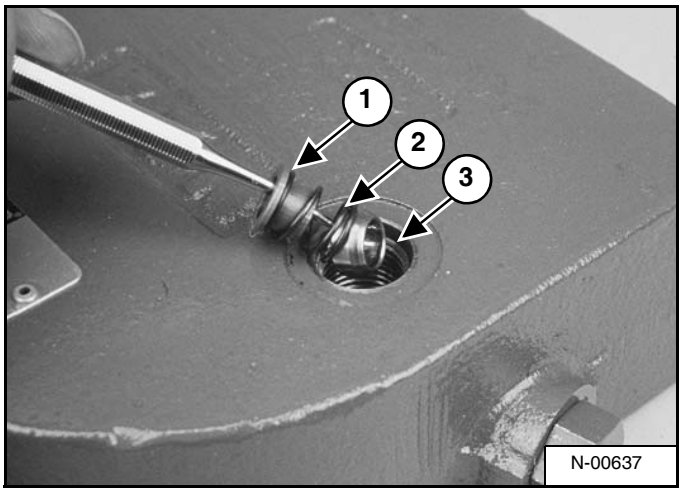


Turn the end cover over and remove the shuttle valve plug from the end cover **[Figure 30-20-22]**.

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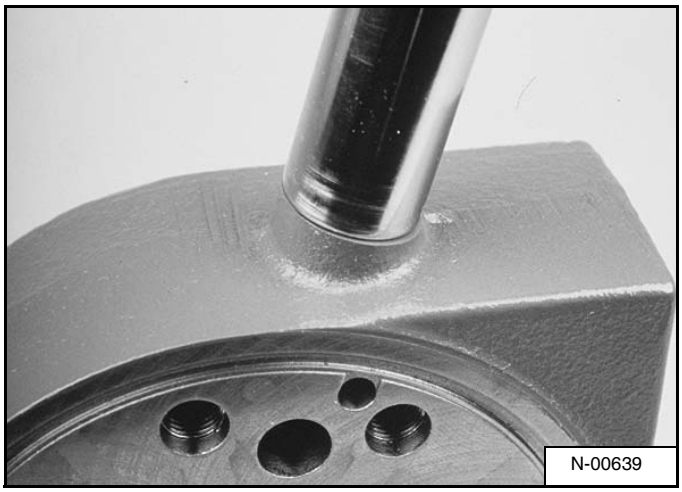
Disassembly (Wet Bolt) (Cont'd)

Figure 30-20-23



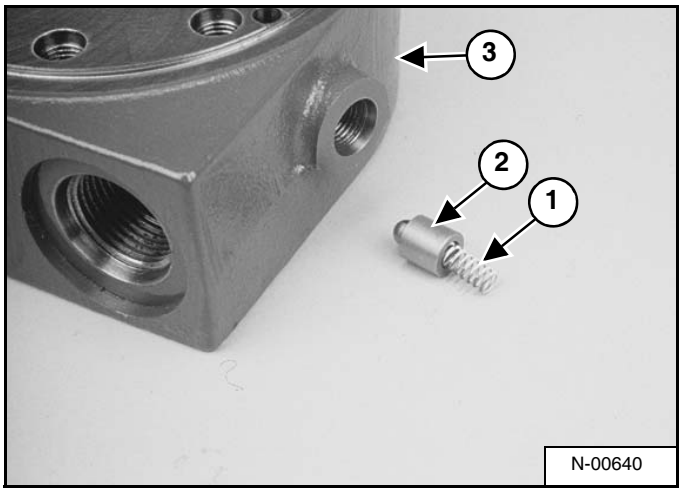
Remove the spring seat (Item 1), spring (Item 2) and poppet (Item 3) **[Figure 30-20-23]**.

Figure 30-20-24



Remove the low pressure relief valve plug from the side of the end cover **[Figure 30-20-24]**.

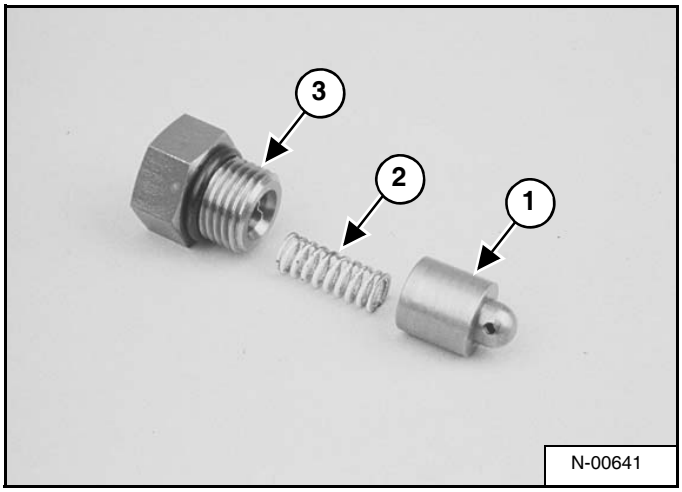
Figure 30-20-25



Remove the spring (Item 1) and poppet (Item 2) from the end cover (Item 3) **[Figure 30-20-25]**.

NOTE: The relief pressure is factory set and must not be changed. Shims may or may not have been used at the factory for setting the pressure. If shims are present, make sure they are reinstalled during assembly.

Figure 30-20-26



The low pressure relief valve is made up of the poppet (Item 1), the spring (Item 2) and the plug assembly (Item 3) **[Figure 30-20-26]**.

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Assembly (Wet Bolt)

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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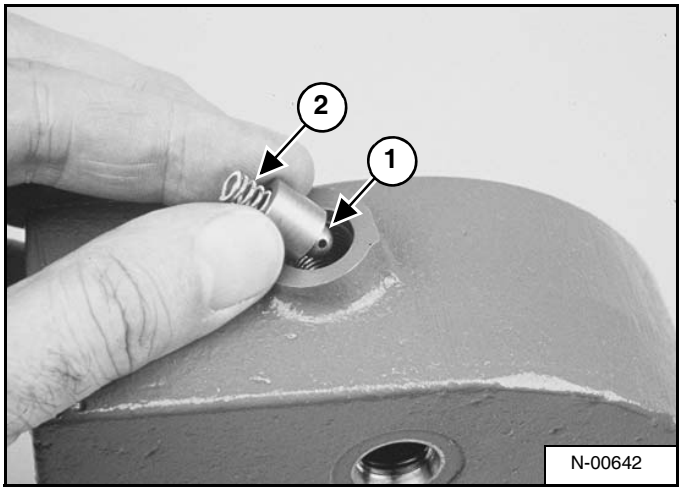
Prior to assembly:

Clean all parts with solvent and dry with compressed air.

Put grease on O-rings.

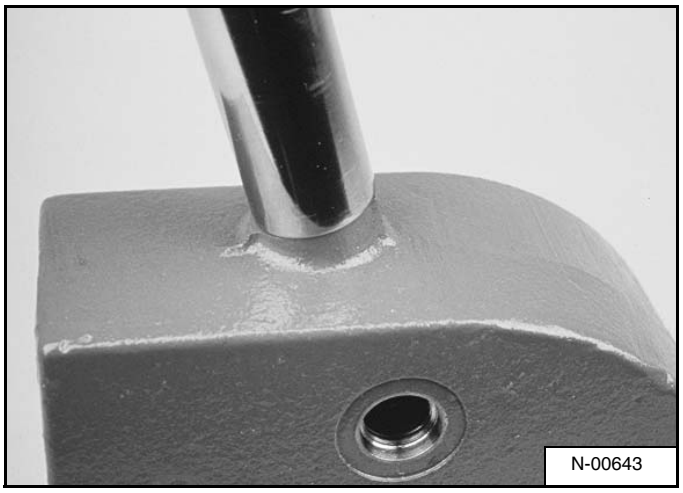
Lubricate parts with oil.

Figure 30-20-27



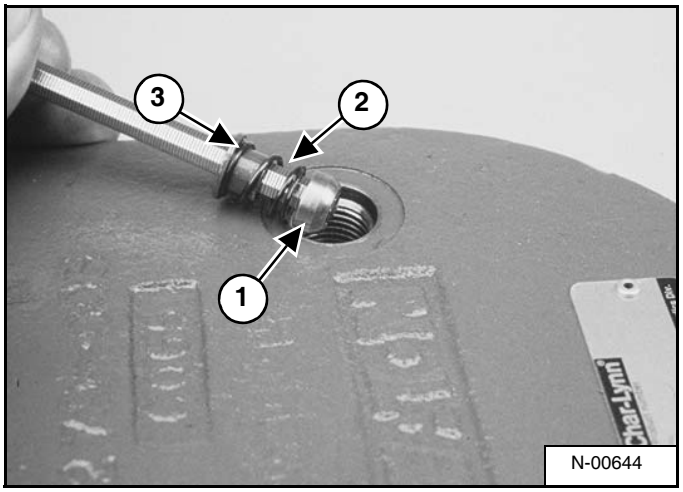
Install the poppet (Item 1) and spring (Item 2) **[Figure 30-20-27]** in the low pressure relief port in the end cover.

Figure 30-20-28



Install the new O-ring on the plug and tighten to 300 in.-lb. (34 N•m) torque **[Figure 30-20-28]**.

Figure 30-20-29



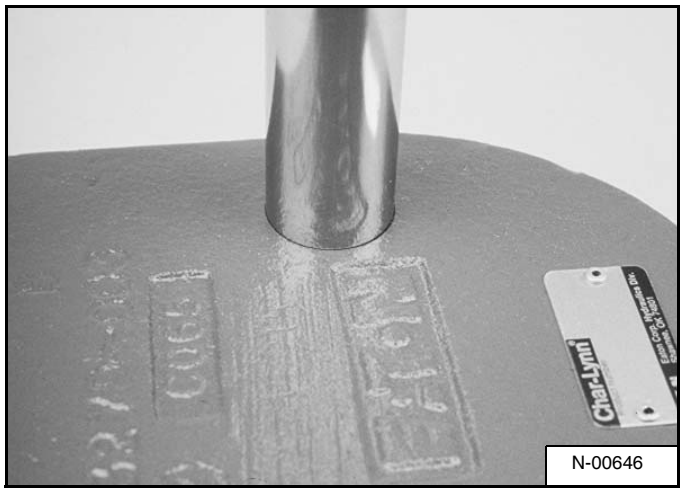
Install the poppet (Item 1), the spring (Item 2) and the spring seat (Item 3) **[Figure 30-20-29]** in the end cover.

NOTE: The tapered end of the poppet must face towards the shuttle valve.

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Assembly (Wet Bolt) (Cont'd)

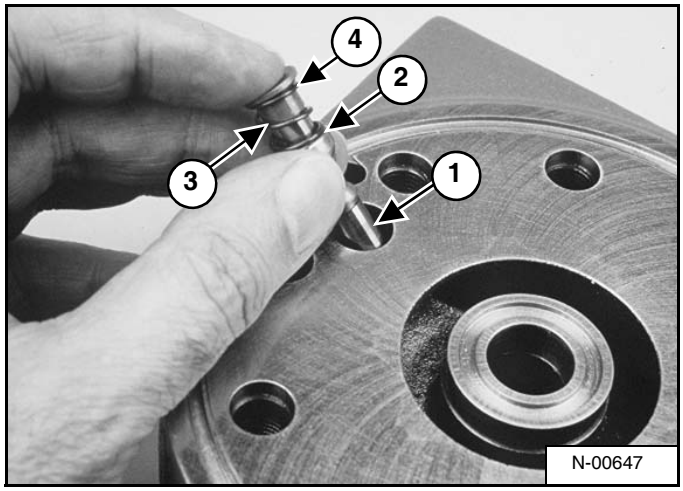
Figure 30-20-30



Install a new O-ring on the plug **[Figure 30-20-30]** and tighten to 260 in.-lb. (41 N•m) torque.

NOTE: Always use new O-rings and seals when assembling the motor. Put a small amount of grease on all the O-rings and seals for easier installation.

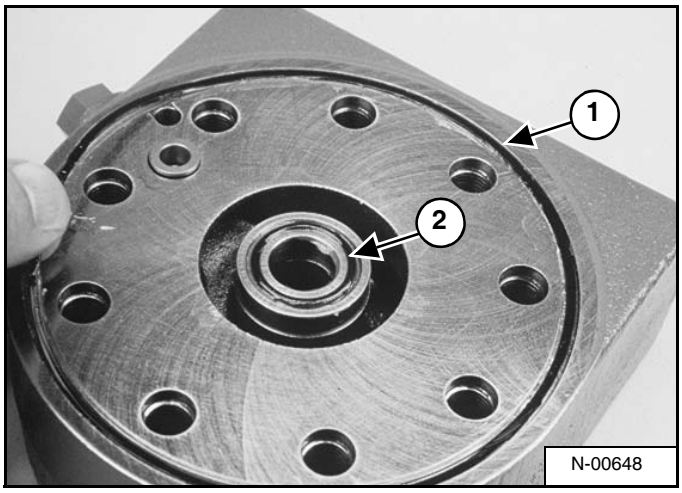
Figure 30-20-31



Install the shuttle valve (Item 1), poppet (Item 2), spring (Item 3) and spring seat (Item 4) **[Figure 30-20-31]** in the port hole in the end cap.

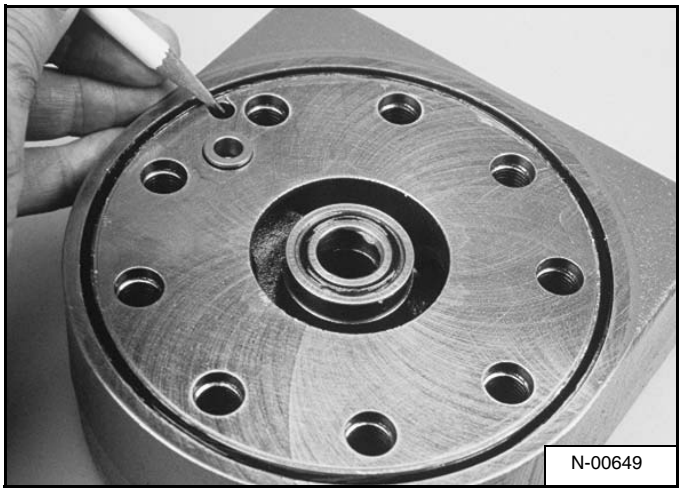
NOTE: The tapered end of the poppet must face towards the shuttle valve.

Figure 30-20-32



Install the square cut seal (Item 1) and small O-ring (Item 2) **[Figure 30-20-32]** in the end cover.

Figure 30-20-33

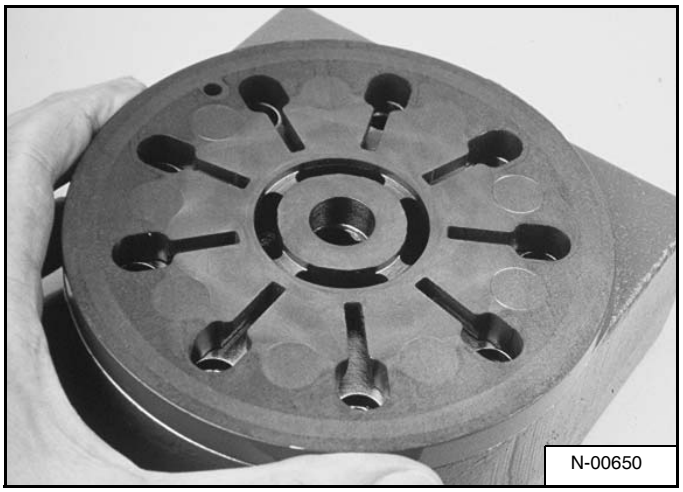


Mark the case drain port location on the outside of the end cover for ease of assembly **[Figure 30-20-33]**.

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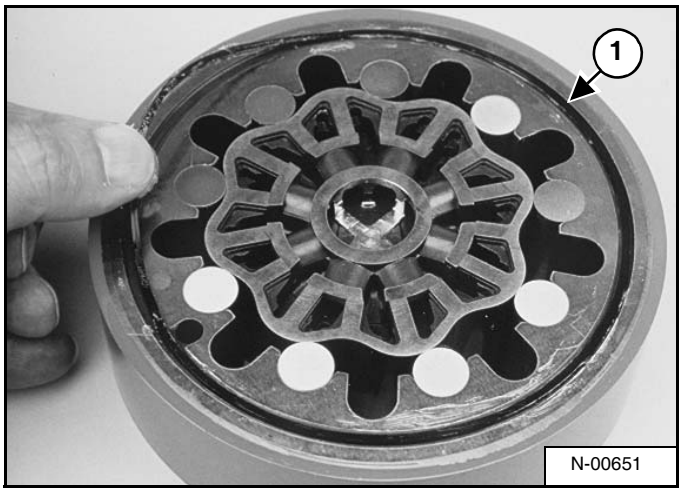
Assembly (Wet Bolt) (Cont'd)

Figure 30-20-34



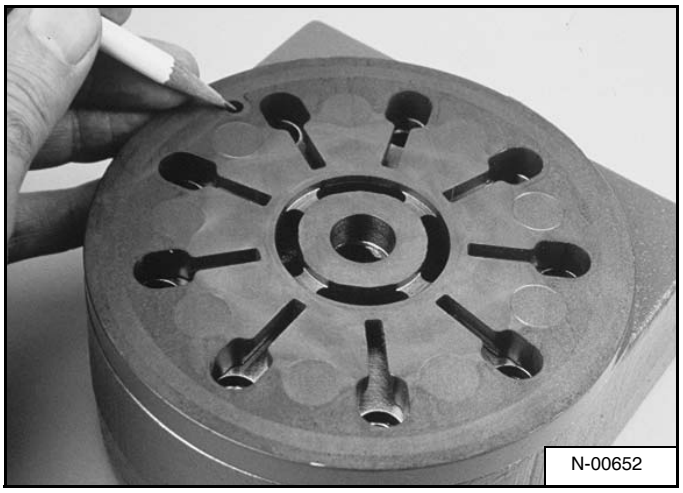
Align the case drain ports in the valve plate with the case drain port in the end cover **[Figure 30-20-34]**.

Figure 30-20-35



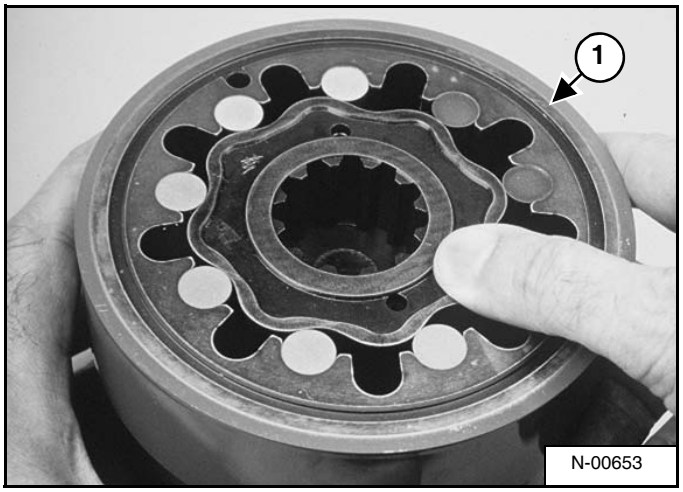
Install the large square cut seal (Item 1) **[Figure 30-20-35]** in gerolor assembly.

Figure 30-20-36



Mark the case drain port location on the outside edge of the valve plate as shown **[Figure 30-20-36]**.

Figure 30-20-37

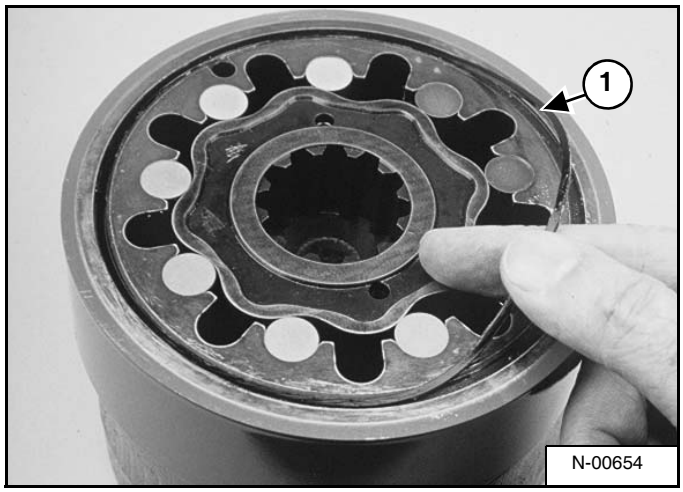


Install the gerolor assembly (Item 1) **[Figure 30-20-37]** by aligning the case drain hole with the case drain hole in the valve plate.

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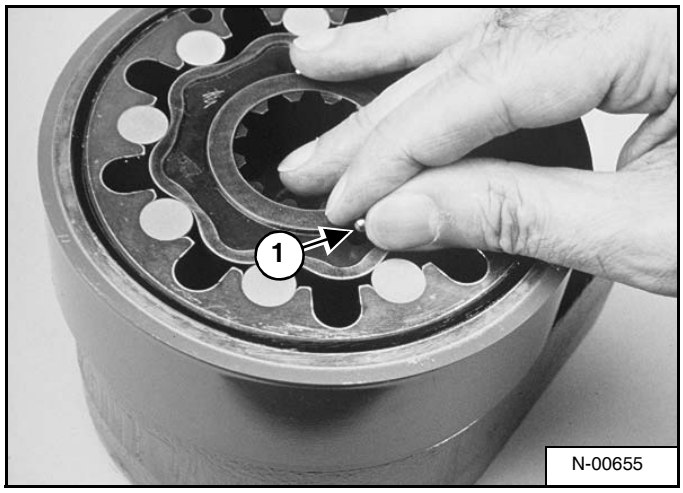
Assembly (Wet Bolt) (Cont'd)

Figure 30-20-38



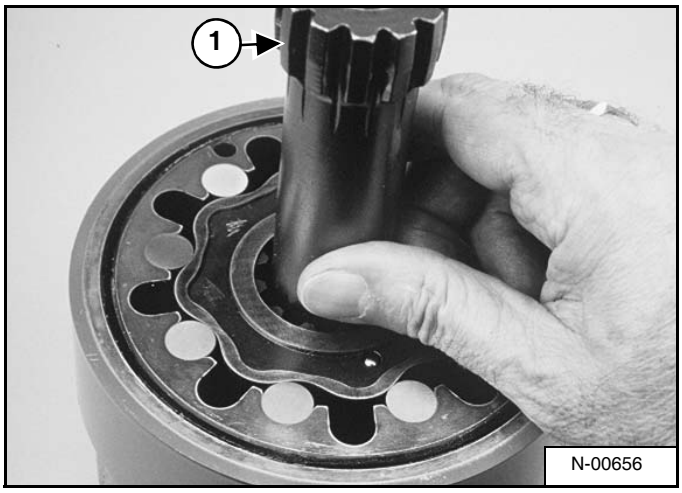
Install the square cut seal (Item 1) **[Figure 30-20-38]** in the gerolor outer ring.

Figure 30-20-39



Install the two check balls (Item 1) **[Figure 30-20-39]** in their bores in the gerolor.

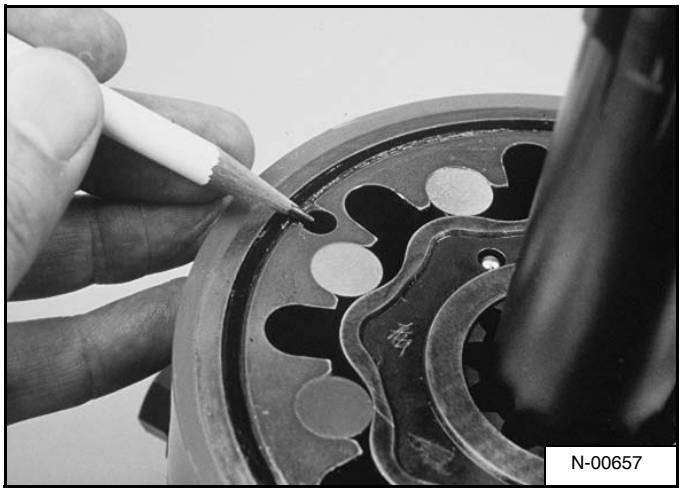
Figure 30-20-40



Install the main drive (Item 1) **[Figure 30-20-40]** in the gerolor (as shown).

NOTE: Whenever the main drive is not symmetrical, the smallest end of the main drive must be installed into the gerolors.

Figure 30-20-41

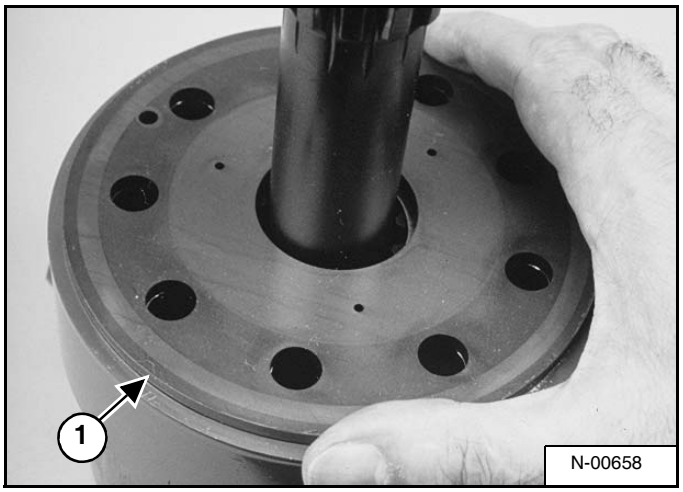


Mark the case drain hole on the outer ring of the gerolor (as shown) **[Figure 30-20-41]**.

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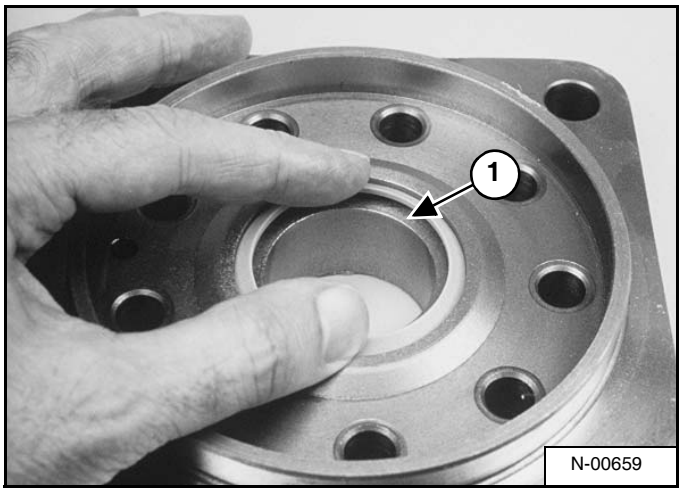
Assembly (Wet Bolt) (Cont'd)

Figure 30-20-42



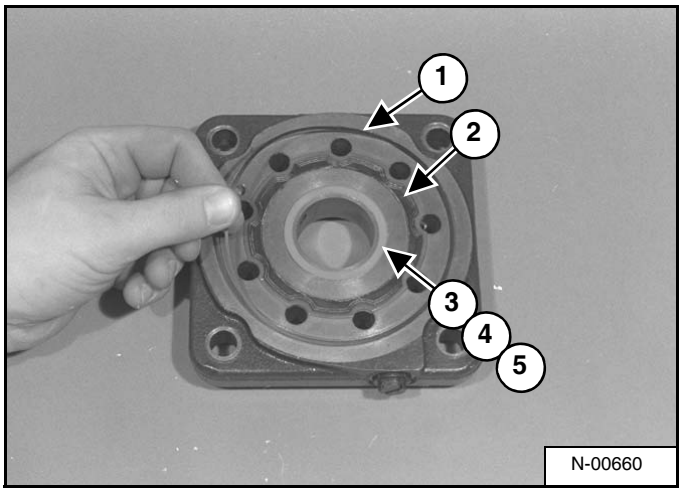
Align the case drain holes and install the balance plate (Item 1) **[Figure 30-20-42]** on the gerolor assembly.

Figure 30-20-43



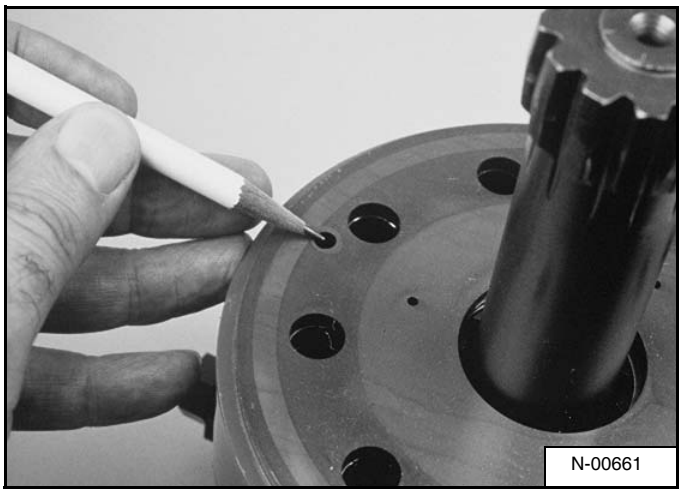
Install the seal (Item 1) **[Figure 30-20-43]** (as shown).

Figure 30-20-44



Install the square cut seal (Item 1), seal (Item 2), back-up seal (Item 3), seal (Item 4) and back-up ring (Item 5) **[Figure 30-20-44]** in the mounting flange.

Figure 30-20-45

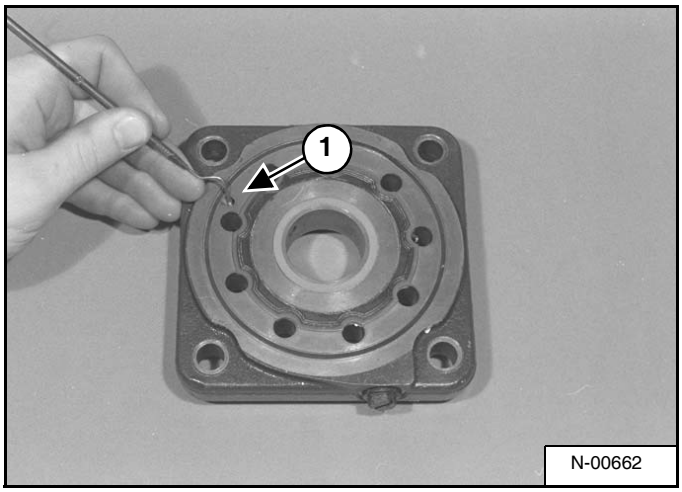


Mark the case drain holes on the side of the balance plate **[Figure 30-20-45]**.

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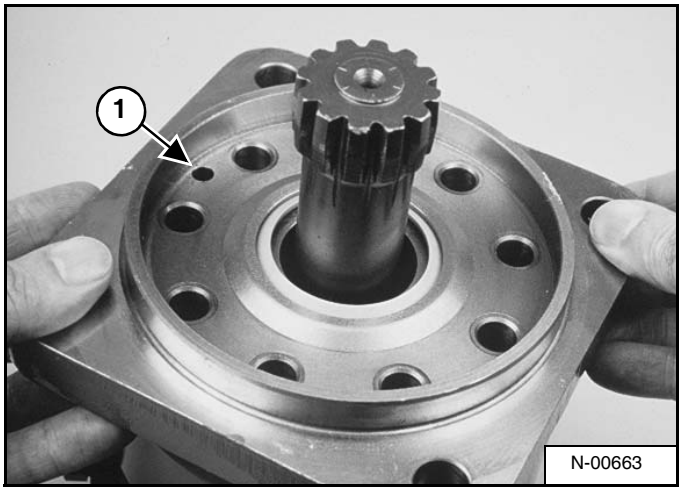
Assembly (Wet Bolt) (Cont'd)

Figure 30-20-46



Align the case drain port (Item 1) **[Figure 30-20-46]** in the mounting flange with the case drain port in the balance plate (as shown).

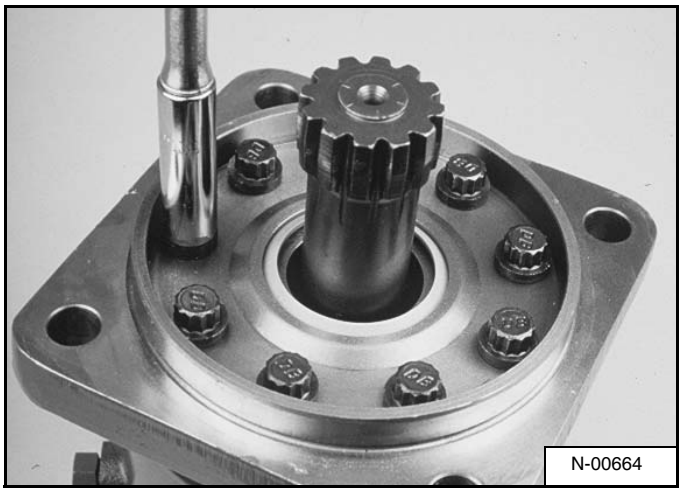
Figure 30-20-47



Align the two case drain port (Item 1) **[Figure 30-20-47]** and install the mounting flange on the balance plate.

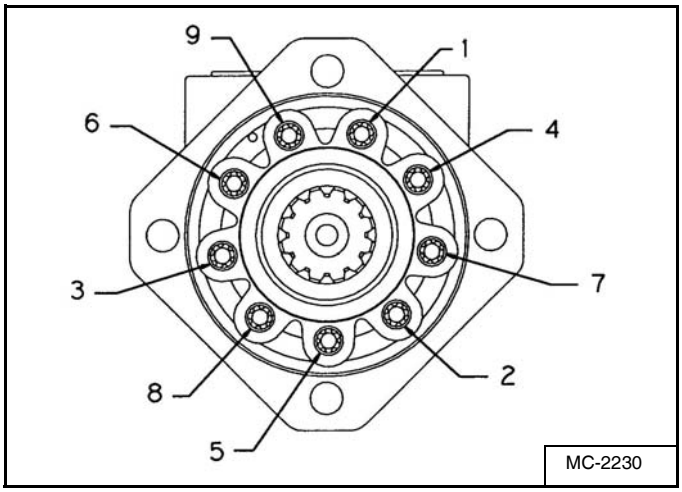
Be careful not to displace the seals and back-up rings.

Figure 30-20-48



Install the nine bolts into the motor. Make sure all the parts are in correct alignment **[Figure 30-20-48]**.

Figure 30-20-49



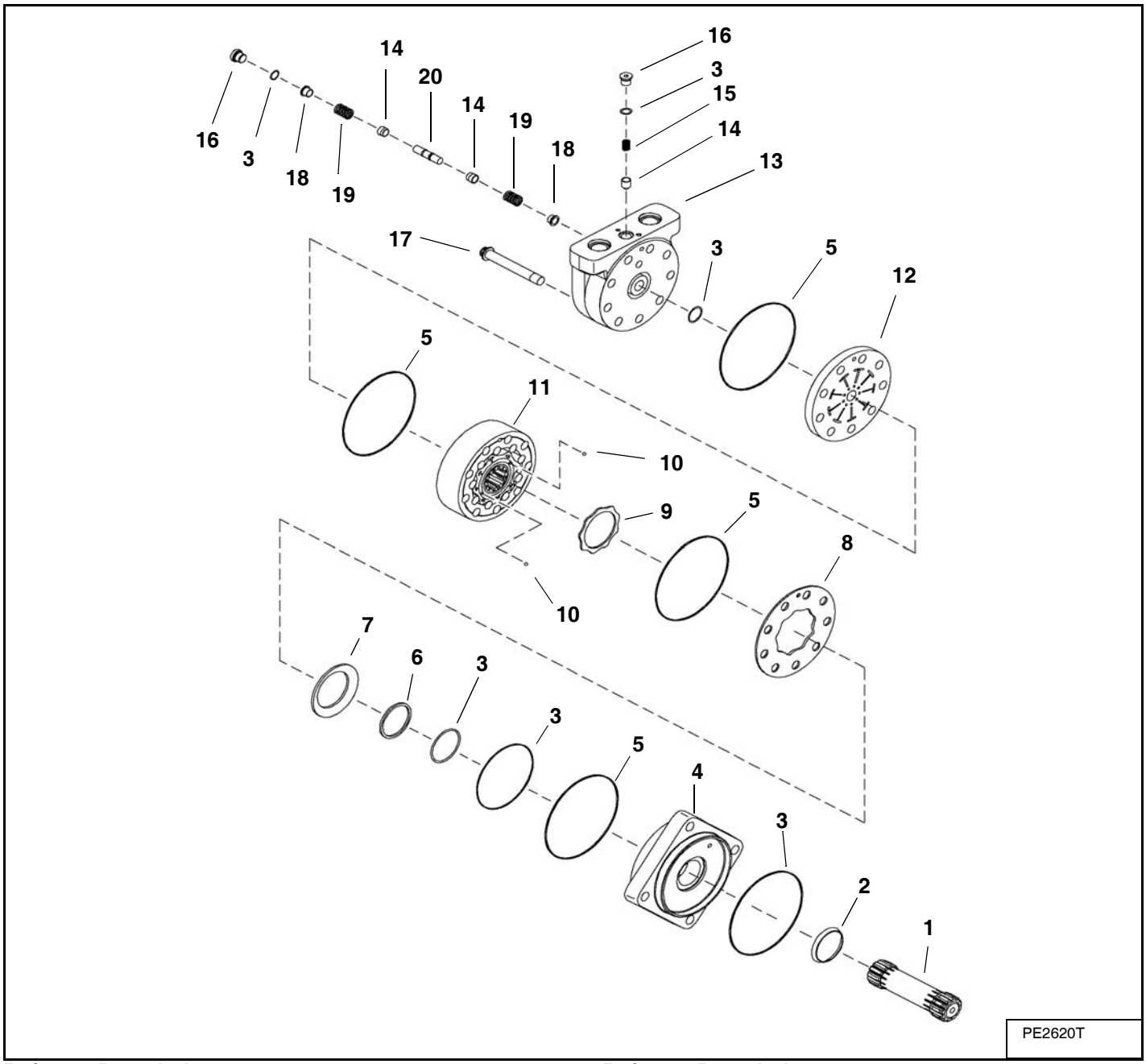
1. Tighten the bolts to 45-55 ft.-lb. (61-75 N•m) torque as shown in figure **[Figure 30-20-49]**.

2. Tighten the bolts to 55-65 ft.-lb. (75 -88 N•m) torque as shown in figure **[Figure 30-20-49]**.

NOTE: To prevent damage to the balance plate, never lift or support the motor by the center shaft.

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Parts Identification (Dry Bolt)



Ref.	Description
1.	SHAFT, drive
2.	SEAL, face
3.	O-RING
4.	FLANGE, mounting
5.	SEAL, square cut
6.	RING, back-up
7.	SPRING, belleville
8.	PLATE, outer balance
9.	PLATE, inner balance
10.	BALL
11.	GEROLER
12.	PLATE, valve
13.	END CAP
14.	POPPET
15.	SPRING
16.	PLUG
17.	BOLT
18.	SLEEVE
19.	SPRING
20.	VALVE, shuttle

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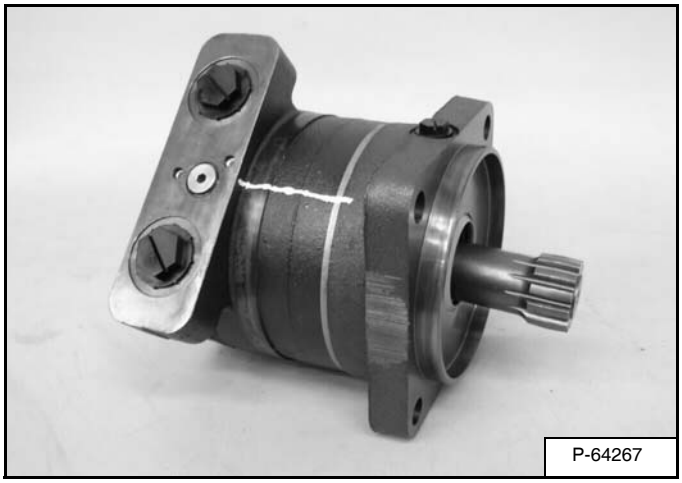
Disassembly and Assembly (Dry Bolt)

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 30-20-50

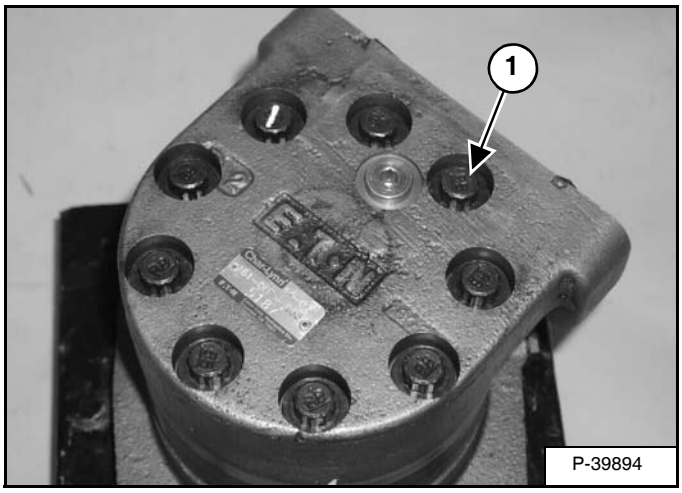


Drain the oil from the motor.

Seal all open ports and clean the motor with solvent.

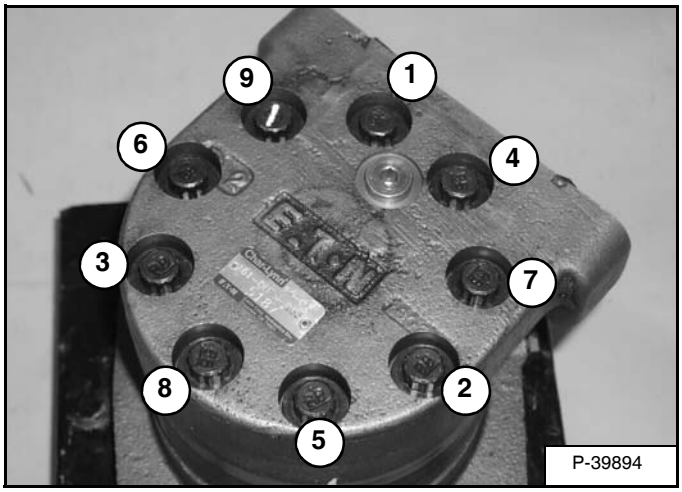
Put a mark across the sections of the motor for correct assembly **[Figure 30-20-50]**.

Figure 30-20-51



Remove the nine tie bolts (Item 1) **[Figure 30-20-51]** from the motor.

Figure 30-20-52



Assembly:

1. Tighten the bolts to 45-55 ft.-lb. (61-75 N•m) torque in the order shown in figure **[Figure 30-20-52]**.

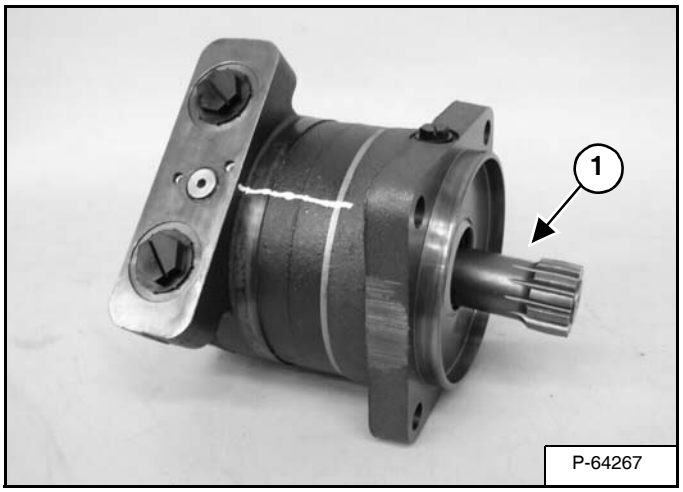
2. Tighten the bolts to 55-65 ft.-lb. (75 -88 N•m) torque in the order shown in figure **[Figure 30-20-52]**.

NOTE: To prevent damage to the balance plate, never lift or support the motor by the drive shaft.

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Disassembly and Assembly (Dry Bolt) (Cont'd)

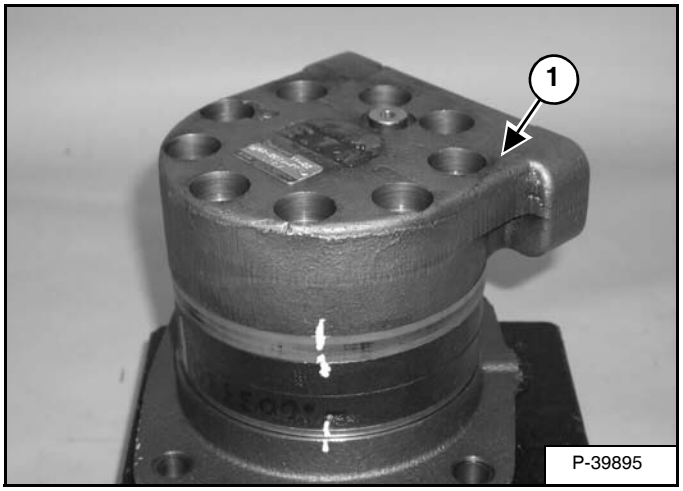
Figure 30-20-53



Once the tie bolts have been removed and the motor begins to separate, the drive shaft can be removed. (Item 1) **[Figure 30-20-53]**.

Assembly: Install drive shaft before tightening tie bolts.

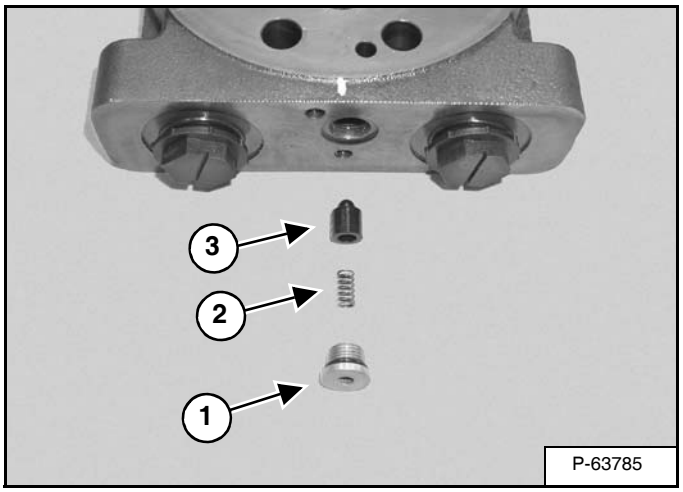
Figure 30-20-54



Lift and remove the end cap (Item 1) **[Figure 30-20-54]** from the motor.

NOTE: Do not scratch or damage the surfaces of the motor sections. Always put them on a soft surface.

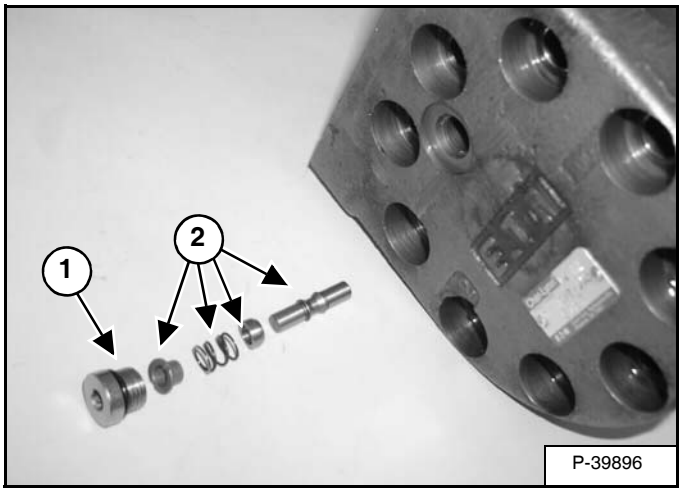
Figure 30-20-55



Remove the plug (Item 1) spring (Item 2) and poppet (Item 3) **[Figure 30-20-55]** that make up the relief valve assembly. Inspect for scoring on poppet. Ensure it can operate freely in the bore. Inspect o-ring on plug.

Installation: Lubricate relief valve assembly with hydraulic oil and tighten plug to 260 in.-lb. (41 N•m) torque.

Figure 30-20-56



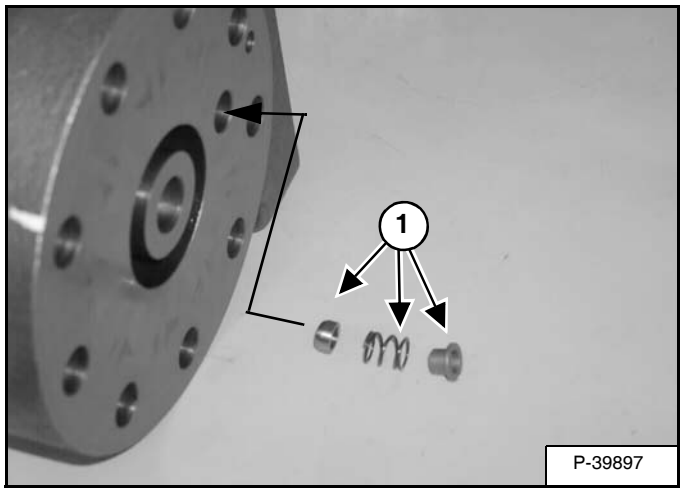
Remove the plug (Item 1) and shuttle valve assembly (Item 2) **[Figure 30-20-56]**. Inspect for scoring on shuttle valve. Ensure it can operate freely in the bore.

Installation: Lubricate shuttle valve assembly with hydraulic oil and tighten plug to 260 in.-lb. (41 N•m) torque.

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Disassembly and Assembly (Dry Bolt) (Cont'd)

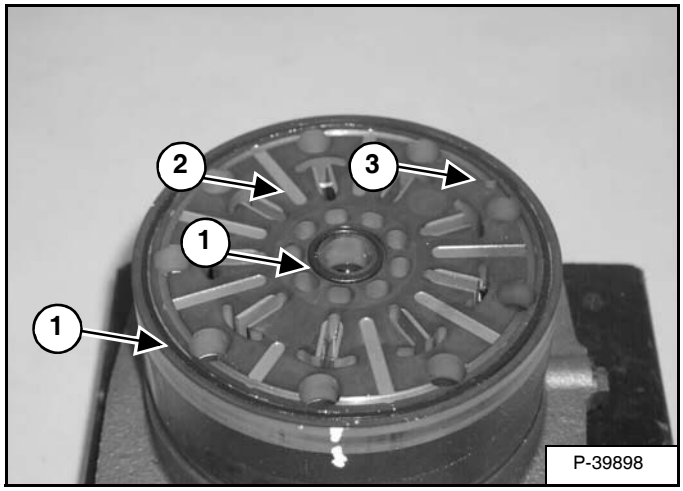
Figure 30-20-57



Remove the remaining pieces to the shuttle valve assembly (Item 1) **[Figure 30-20-57]** from the inside of the end cap. Inspect for broken or damaged parts. Parts should move freely in bore.

Assembly: Apply grease to shuttle valve parts to help hold in place during assembly.

Figure 30-20-58

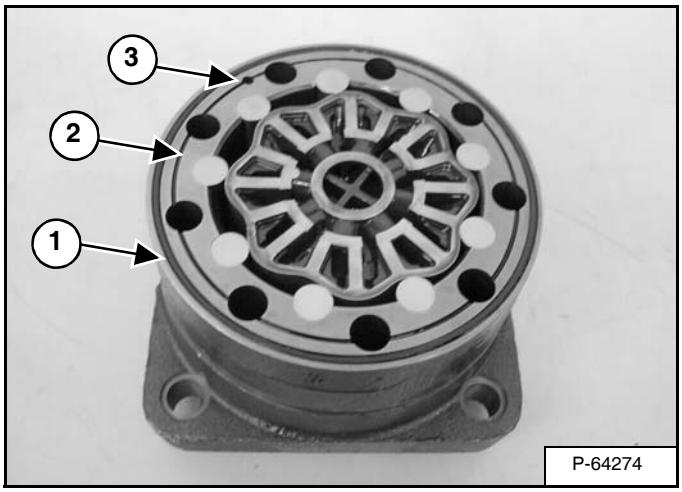


Remove and inspect/replace seals (Item 1) **[Figure 30-20-58]**.

Remove the valve plate (Item 2) **[Figure 30-20-58]**.

Assembly: Apply grease to seals. Note location of case drain hole (Item 3) **[Figure 30-20-58]**. Align hole with other sections on drive motor.

Figure 30-20-59



Remove and inspect/replace seal (Item 1) **[Figure 30-20-59]**.

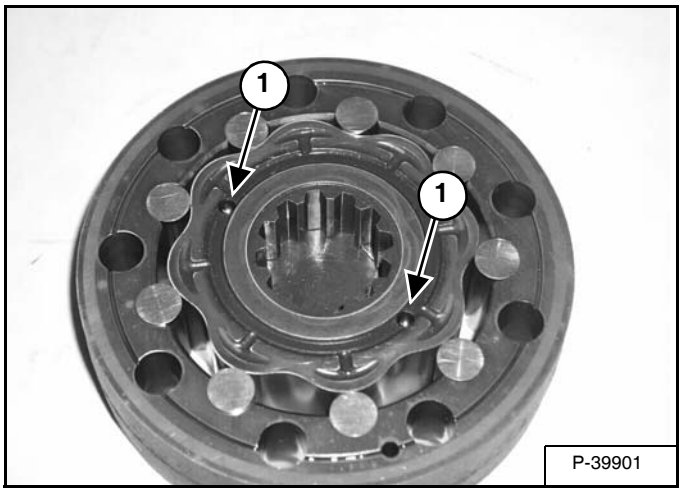
Remove the gerolor section as an assembly (Item 2) **[Figure 30-20-59]**.

NOTE: There are two check balls on the backside of the gerolor section. Be carefull not to lose these check balls. See [Figure 30-20-60]. Note location of case drain hole (Item 3) [Figure 30-20-59]. Align hole with other sections on drive motor.

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Disassembly and Assembly (Dry Bolt) (Cont'd)

Figure 30-20-60



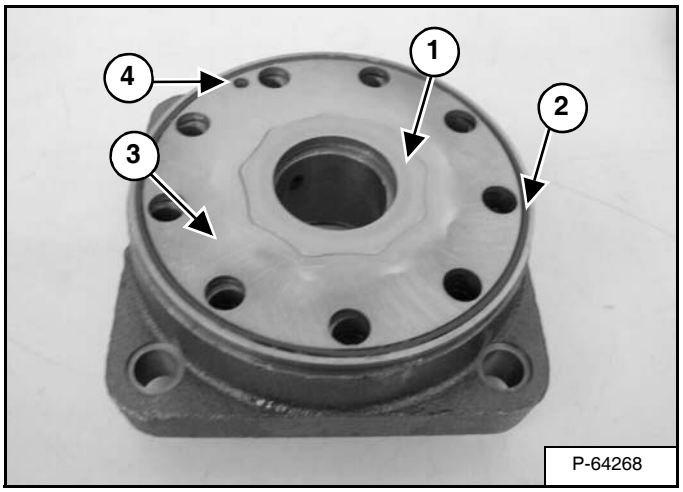
Remove the two check balls (Item 1) **[Figure 30-20-60]** from the gerolor.

Assembly: Check for scoring and wear on the gerolor assembly. Apply grease to check balls to keep them from falling out of there seats when assembling.

NOTE: Care should be taken to keep the gerolor assembly together.

NOTE: If rollers are removed, put them back in their original bore.

Figure 30-20-61



Remove the center piece of the balance plate (Item 1) **[Figure 30-20-61]**.

Remove and inspect/replace the seal (Item 2) **[Figure 30-20-61]**.

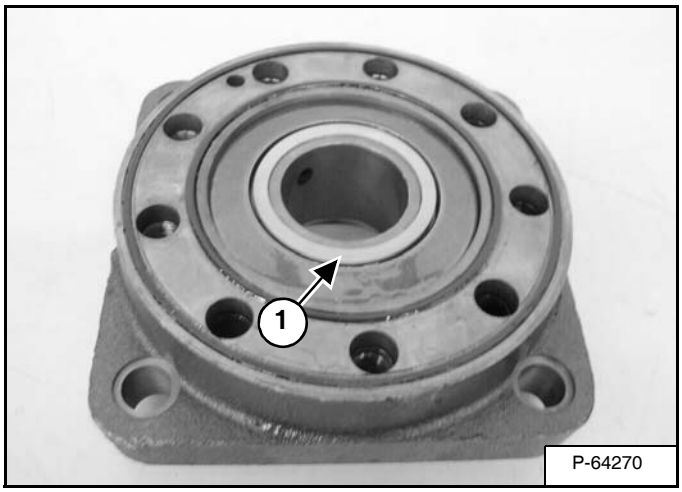
Remove the balance plate (Item 3) **[Figure 30-20-61]**.

Assembly: Apply grease to seals. Note location of case drain hole (Item 4) **[Figure 30-20-61]**. Align hole with other sections on drive motor.

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Disassembly and Assembly (Dry Bolt) (Cont'd)

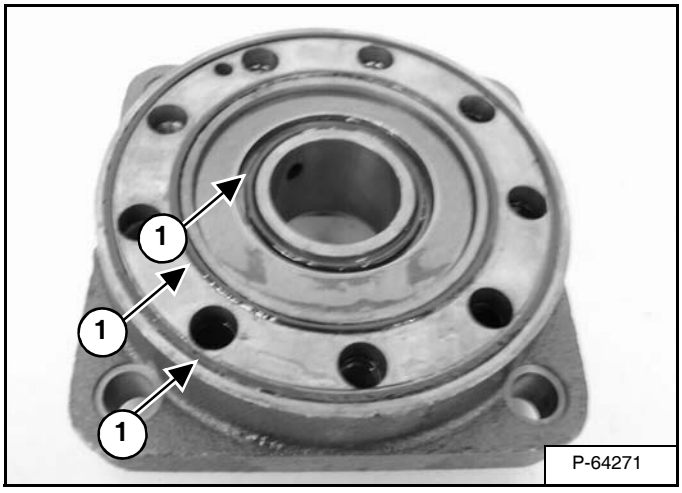
Figure 30-20-62



Remove the back up ring (Item 1) **[Figure 30-20-62]**.

Assembly: Apply grease to back up ring. One side of the back up ring is grooved to fit against the o-ring underneath.

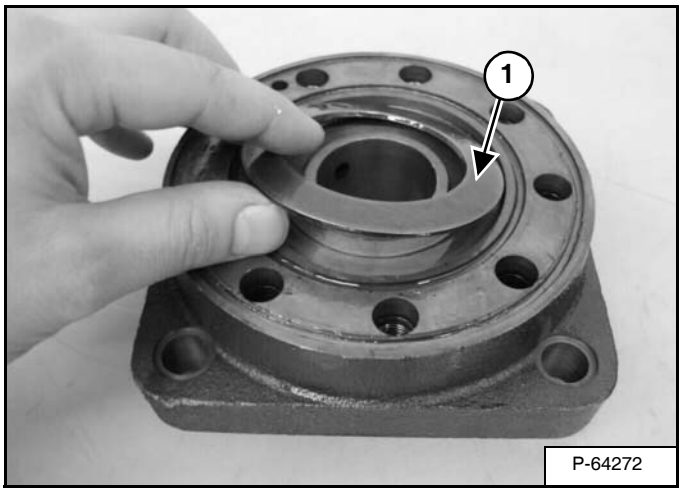
Figure 30-20-63



Remove and inspect/replace the seals (Item 1) **[Figure 30-20-63]** from the gerolor.

Assembly: Apply grease to seals.

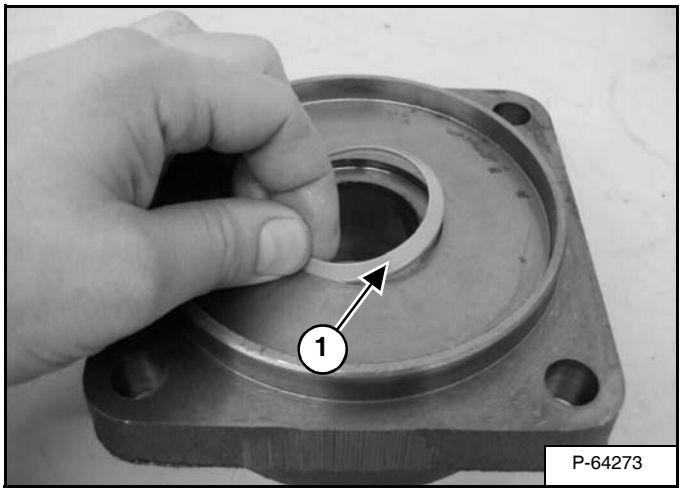
Figure 30-20-64



Remove the belleville spring. (Item 1) **[Figure 30-20-64]**.

Assembly: If the belleville spring is no longer cone shaped, replace with new.

Figure 30-20-65



Carefully turn the mounting flange over and remove the seal (Item 1) **[Figure 30-20-65]**.

Assembly: Replace the seal.

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HYDROSTATIC MOTOR CARRIER

Shaft Seal Replacement

The tool listed is necessary for the following procedure:

MEL1420 - Carrier Seal Tool

Remove the hydrostatic motor. (See Removal And Installation on Page 30-21-3.)

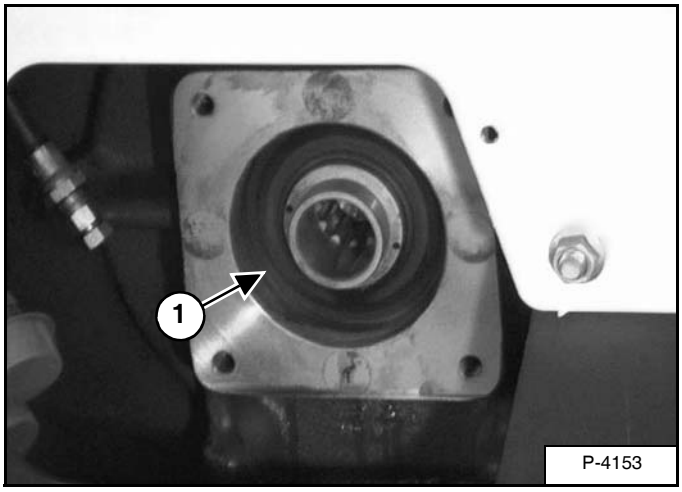
⚠ WARNING

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.**

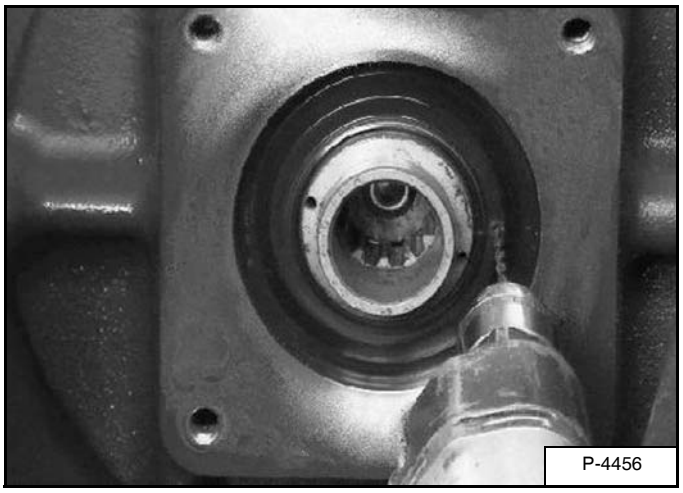
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Figure 30-21-1



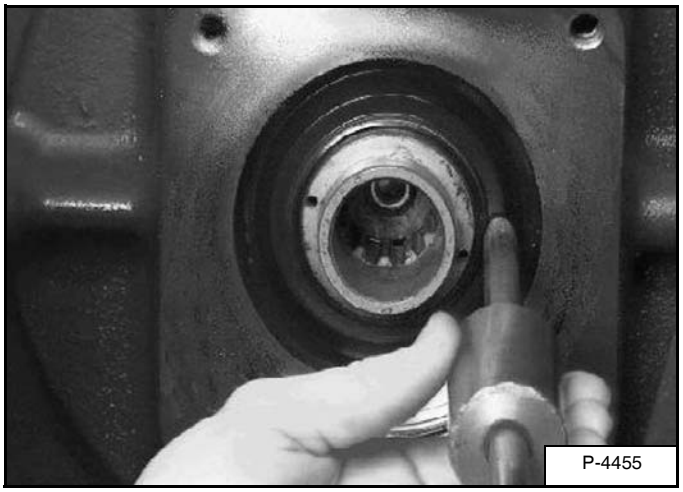
The motor carrier seal (Item 1) **[Figure 30-21-1]** is located on the outside of the motor carrier shaft.

Figure 30-21-2



Drill a .125 inch (3 mm) hole in the motor carrier seal **[Figure 30-21-2]**.

Figure 30-21-3

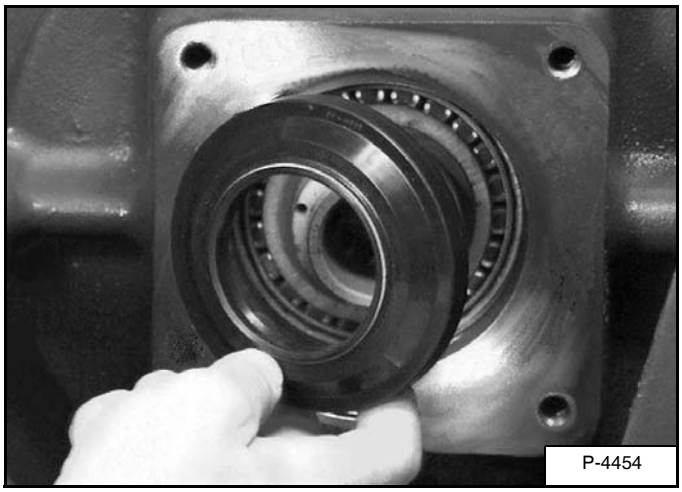


Use a slide hammer to remove the seal from the motor carrier shaft **[Figure 30-21-3]**.

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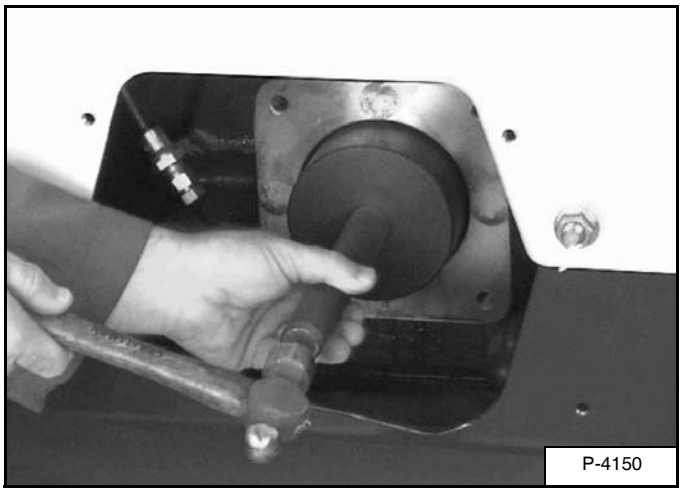
Shaft Seal Replacement (Cont'd)

Figure 30-21-4



Installation: Install a new seal over the motor carrier shaft **[Figure 30-21-4]**.

Figure 30-21-5



Installation: Install MEL1420 Carrier Seal Tool over the carrier seal **[Figure 30-21-5]**.

Hit the tool with a hammer until the seal is fully seated on the carrier shaft **[Figure 30-21-5]**.

Figure 30-21-6

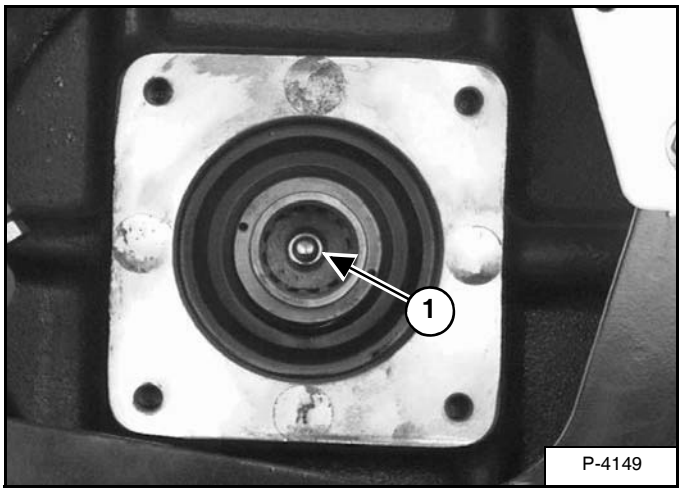


Photo **[Figure 30-21-6]** shows the motor carrier seal correctly installed.

NOTE: Before reinstalling the hydrostatic motor, check the plug (Item 1) [Figure 30-21-6] located in the center of the carrier shaft for tightness. If the plug becomes loosened, case drain lubrication oil from the hydrostatic motor can leak into the chaincase.

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Removal And Installation

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the fluid from the chaincase. (See Removing The Oil on Page 40-30-1.)

Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Remove the lift arm by-pass control valve. (See Removal and Installation on Page 20-50-1.)

Remove the traction lock assembly. (See TRACTION LOCK on Page 60-110-1.)

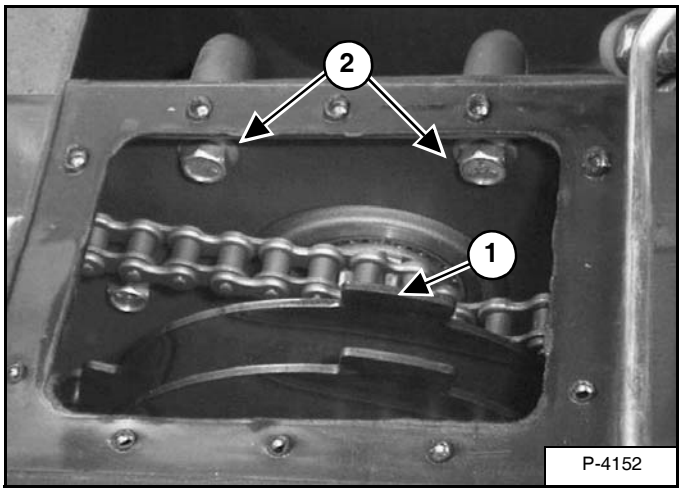
Remove the center chaincase cover. (See Center Cover Removal And Installation on Page 40-30-3.)

Remove the front chaincase cover. (See Front Cover Removal And Installation on Page 40-30-2.)

Remove the front axle and sprocket. (See Axle Sprocket And Bearings Removal And Installation on Page 40-20-3.)

Remove the hydrostatic motor. (See Removal And Installation on Page 30-21-3)

Figure 30-21-7

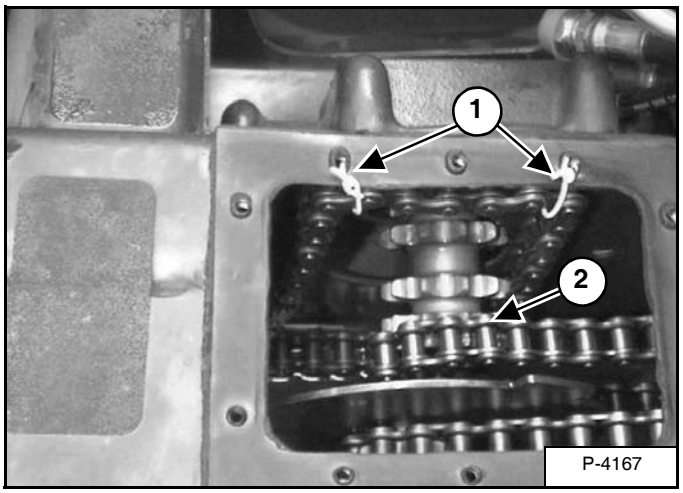


Remove the parking brake disc (Item 1) **[Figure 30-21-7]**. (See Disk Removal And Installation on Page 40-10-1.)

Remove the six motor carrier mounting bolts (Item 2) **[Figure 30-21-7]** from the inside of the chaincase.

Installation: Tighten the motor carrier mounting bolts to 125-140 ft.-lb. (170-190 N•m) torque.

Figure 30-21-8



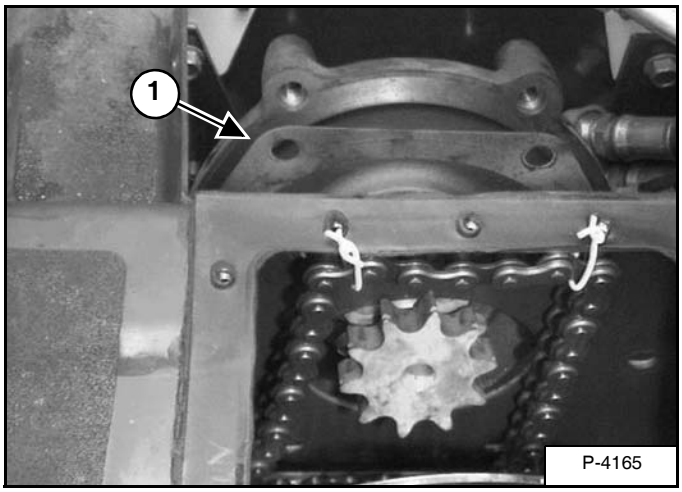
For ease of removal, fasten the front drive chain (previously removed) to the chaincase as shown (Item 1) **[Figure 30-21-8]**.

Tip the end of the sprocket toward the rear of the loader and remove the rear drive chain (Item 2) **[Figure 30-21-8]** from the sprocket.

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Removal And Installation (Cont'd)

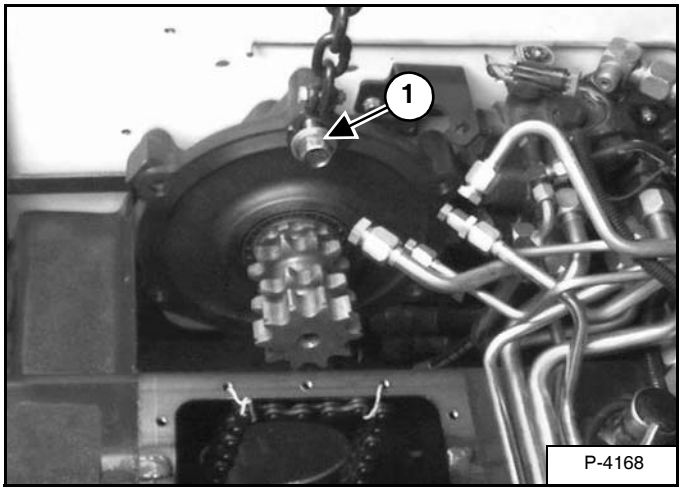
Figure 30-21-9



Slide the motor carrier out of the chaincase **[Figure 30-21-9]**.

Installation: Check the motor carrier gasket (Item 1) **[Figure 30-21-9]** for wear or damage and replace if necessary.

Figure 30-21-10



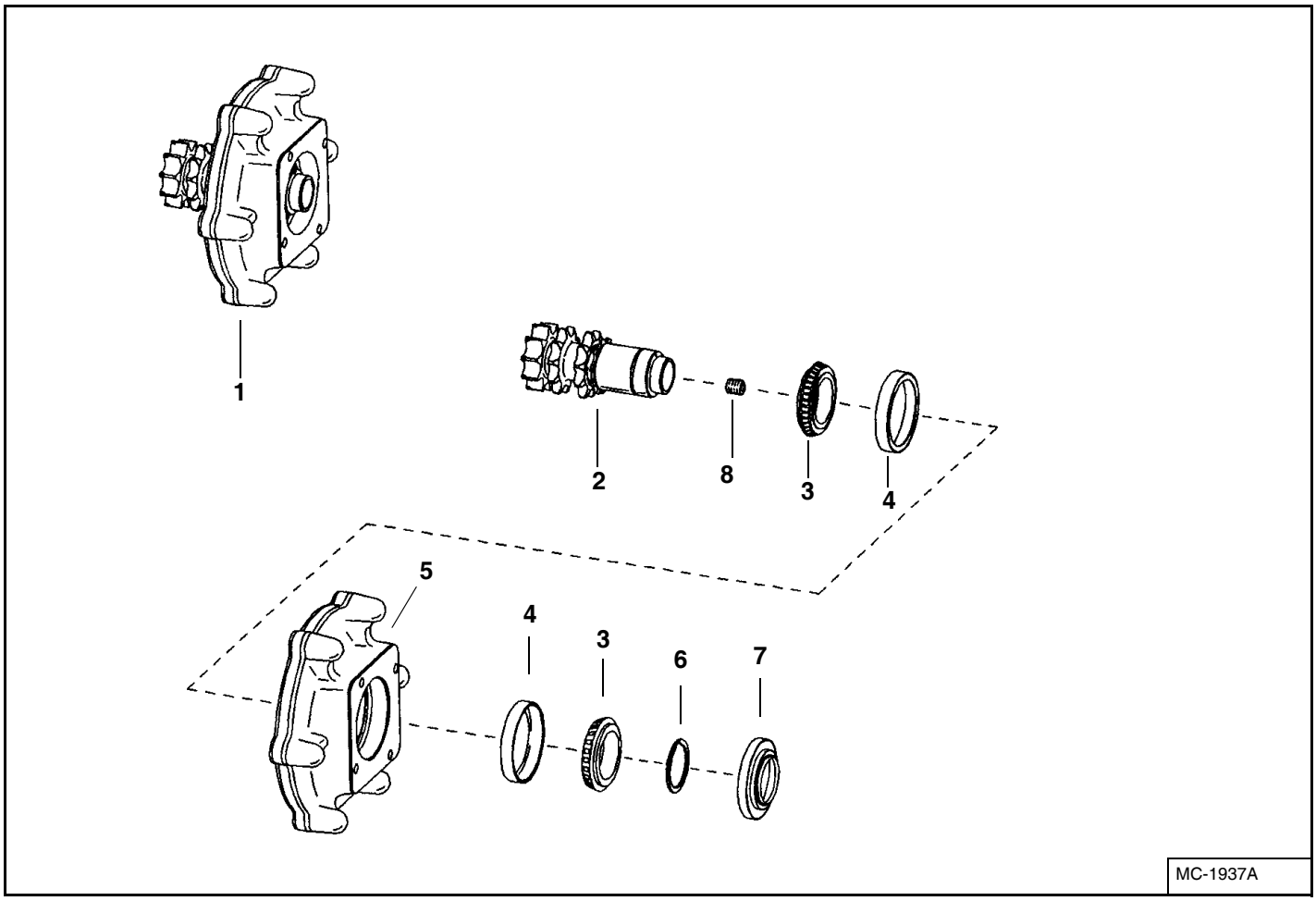
Use one of the motor carrier mounting bolts (Item 1) **[Figure 30-21-10]** and install partially into one mounting hole on the carrier.

Fasten a chain hoist to the bolt on the motor carrier and remove the carrier from the loader.

Reverse the removal procedure to install the motor carrier.

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Parts Identification

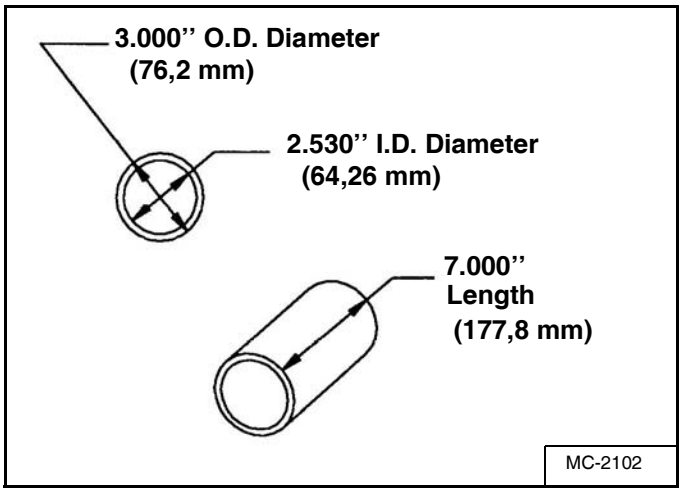


Ref.	Description	Ref.	Description
1.	MOUNT ASSY.	5.	HOUSING
2.	SHAFT	6.	SNAP RING
3.	BEARING	7.	SEAL
4.	RACE	8.	PLUG

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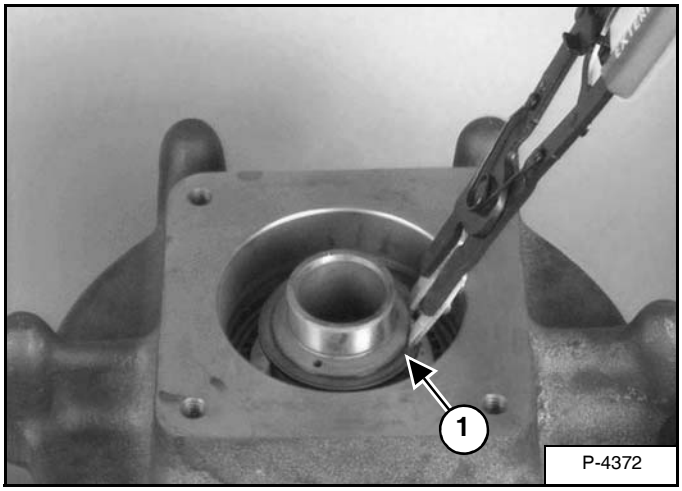
Disassembly and Assembly

Figure 30-21-11



It is necessary to locate or fabricate a press tool for this procedure. Refer to photo **[Figure 30-21-11]** for the correct dimensions of the tool needed.

Figure 30-21-12

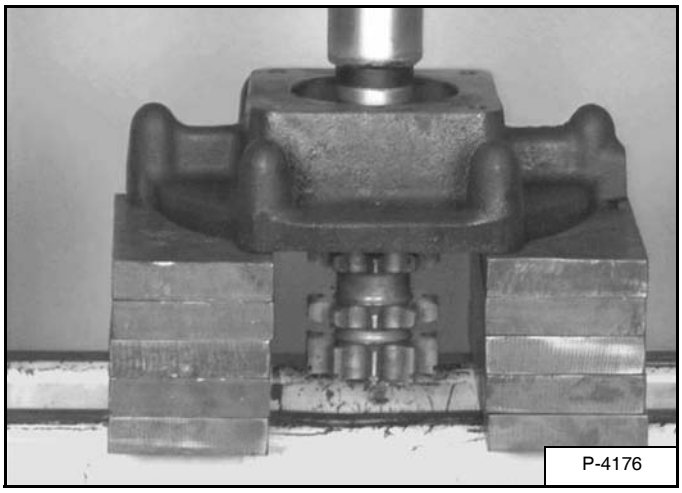


A hydraulic press, slide hammer with puller end and snap ring pliers are also recommended for this procedure.

Remove the motor carrier shaft seal. (See Disassembly and Assembly on Page 30-21-6).

Remove the snap ring (Item 1) **[Figure 30-21-12]** from the motor carrier shaft using the snap ring pliers.

Figure 30-21-13

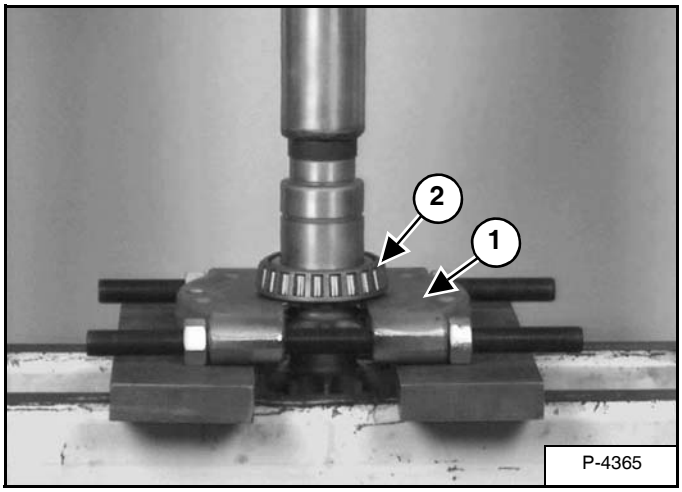


Put the motor carrier in the hydraulic press as shown **[Figure 30-21-13]**.

Use 2-1/4 inch driver tool and press the sprocket shaft out of the motor carrier housing **[Figure 30-21-13]**.

NOTE: The outer bearing will now be free from the sprocket shaft.

Figure 30-21-14



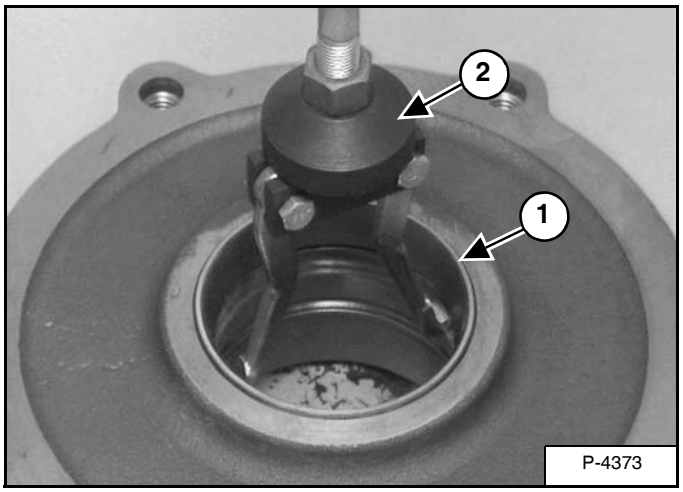
Remove the housing from the press and install a bearing puller (Item 1) **[Figure 30-21-14]** on the sprocket shaft.

Put the assembly in the hydraulic press. Use the same tool driver and remove the bearing (Item 2) **[Figure 30-21-14]** from the shaft.

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Disassembly and Assembly (Cont'd)

Figure 30-21-15

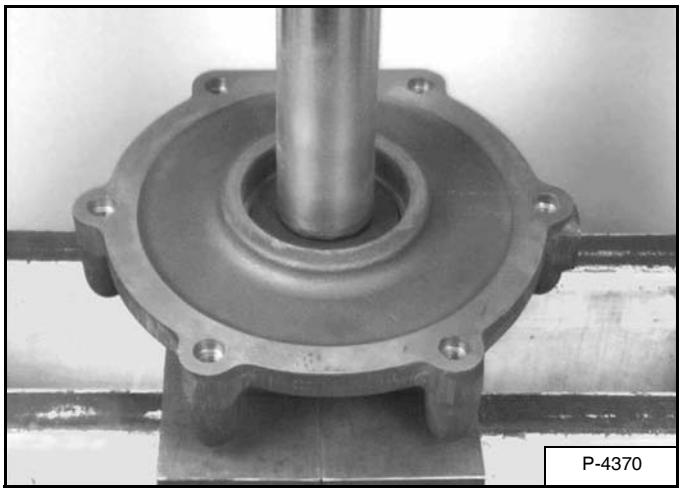


Fasten the carrier motor housing to the work surface securely with the inner bearing race (Item 1) **[Figure 30-21-15]** facing up.

Install the slide hammer with puller end (Item 2) **[Figure 30-21-15]** on the bottom side of the bearing race.

Remove the bearing race from the carrier housing **[Figure 30-21-15]**.

Figure 30-21-16

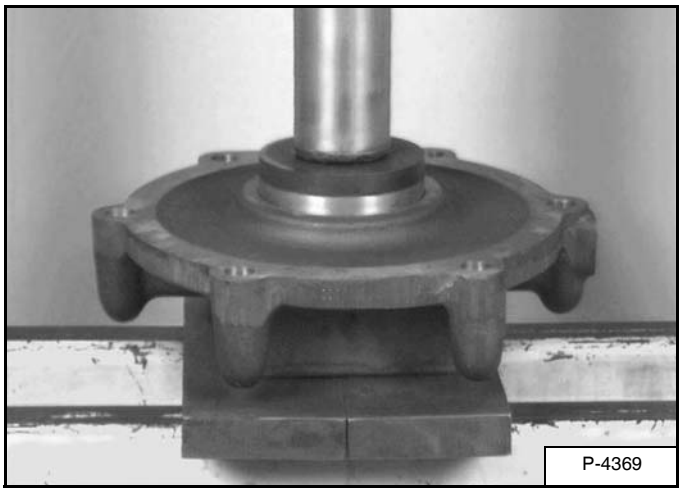


Put the motor carrier housing in the hydraulic press as shown **[Figure 30-21-16]**.

Use a 3-7/8 inch driver tool and press the outer bearing race from the housing.

Check all parts for wear and damage. Replace the bearing race when new bearings are to be installed.

Figure 30-21-17

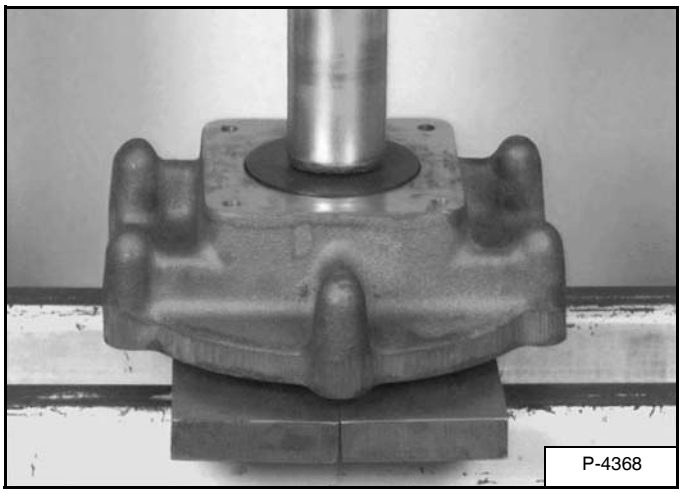


Put the motor carrier housing in the press as shown **[Figure 30-21-17]**.

Use 4-5/16 inch driver tool and press the new inner bearing race into the motor carrier housing **[Figure 30-21-17]**.

Press the bearing race in until it is fully seated in the carrier housing.

Figure 30-21-18



Turn the motor carrier housing over as shown **[Figure 30-21-18]**.

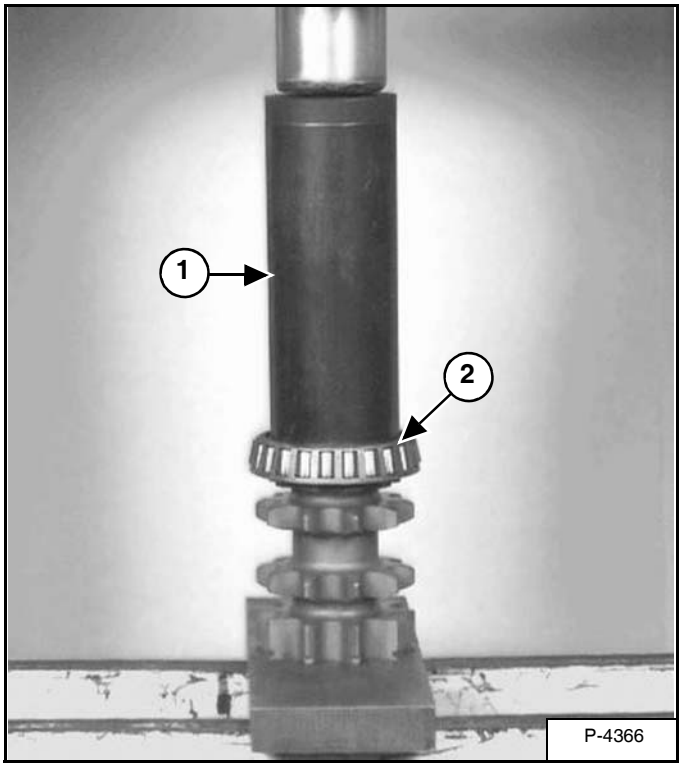
Use 4-5/16 inch driver tool and press the new outer bearing race into the motor carrier housing **[Figure 30-21-18]**.

Press the bearing race in until it is fully seated in the carrier housing.

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Disassembly and Assembly (Cont'd)

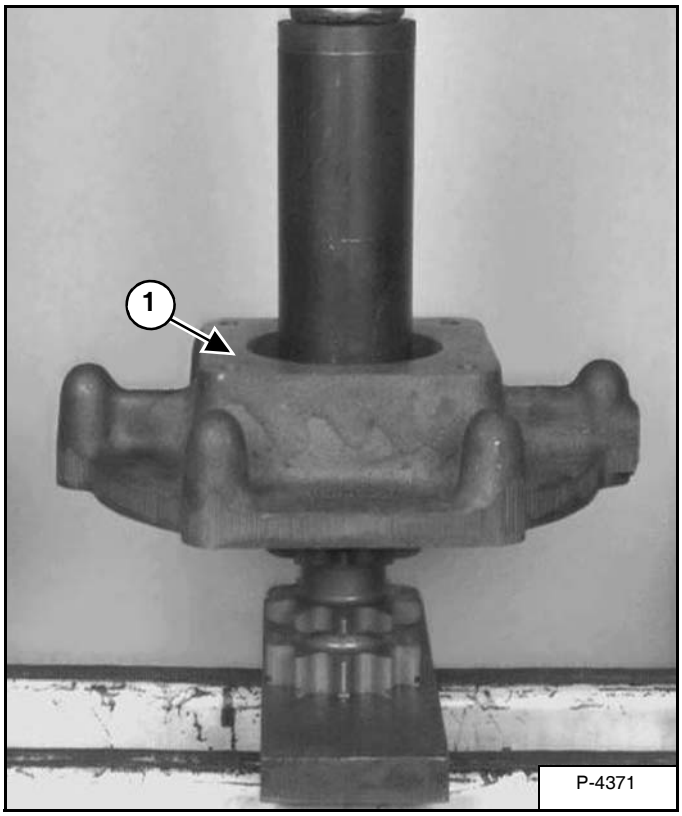
Figure 30-21-19



Use the fabricated press tool (Item 1) and 3.0 inch driver tool, install the new inner bearing (Item 2) **[Figure 30-21-19]** on the sprocket shaft as shown.

Remove the press and drive tools from the sprocket shaft.

Figure 30-21-20



Put the motor carrier housing (Item 1) **[Figure 30-21-20]** over the sprocket shaft as shown.

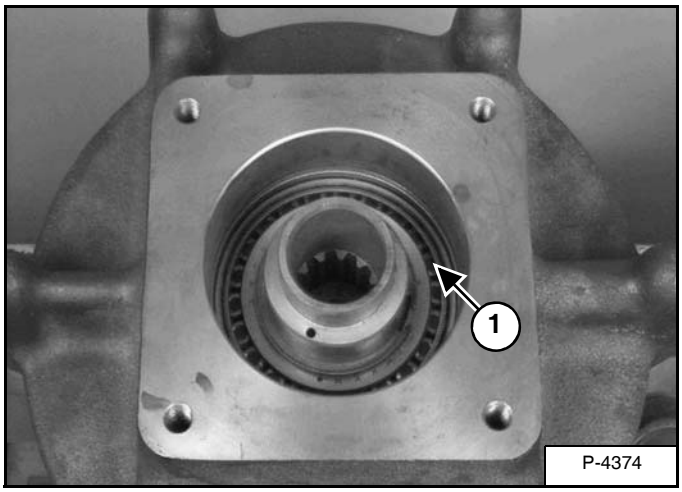
Put the outer bearing over the end of the sprocket shaft and press the bearing on with the press tool and driver tool **[Figure 30-21-20]**.

Remove the press and driver tools from the sprocket shaft.

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Disassembly and Assembly (Cont'd)

Figure 30-21-21



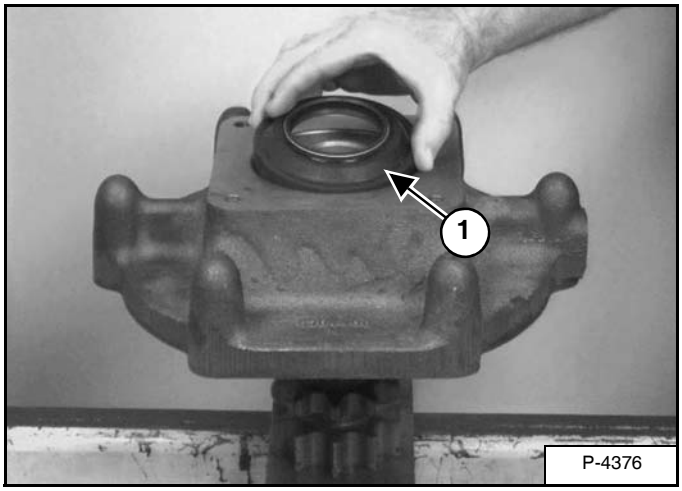
Put the snap ring (Item 1) **[Figure 30-21-21]** over the end of the sprocket shaft.

NOTE: Use the snap ring pliers to spread the snap ring so it will fit over the sprocket shaft.

Using the press and driver tools, press the snap ring (Item 1) **[Figure 30-21-21]** over the sprocket.

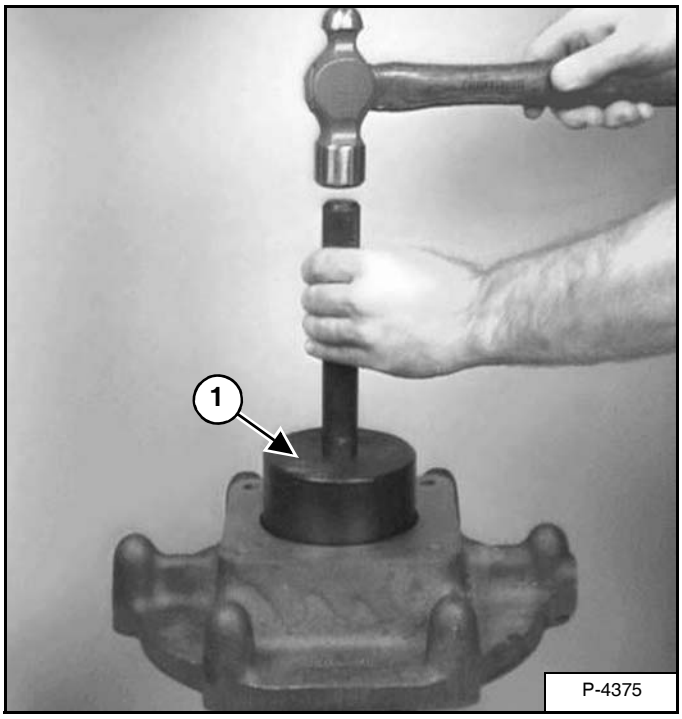
Press the snap ring on until it snaps into the groove on the shaft.

Figure 30-21-22



Put a new shaft seal (Item 1) **[Figure 30-21-22]** on the sprocket shaft.

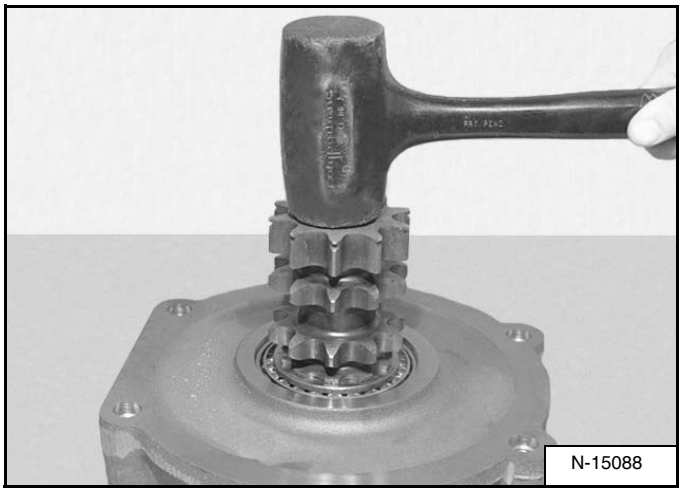
Figure 30-21-23



Use MEL1420 Carrier Seal Tool (Item 1) **[Figure 30-21-23]** and install the shaft seal.

Hit the tool with a hammer until the seal is fully seated on the carrier shaft **[Figure 30-21-23]**.

Figure 30-21-24



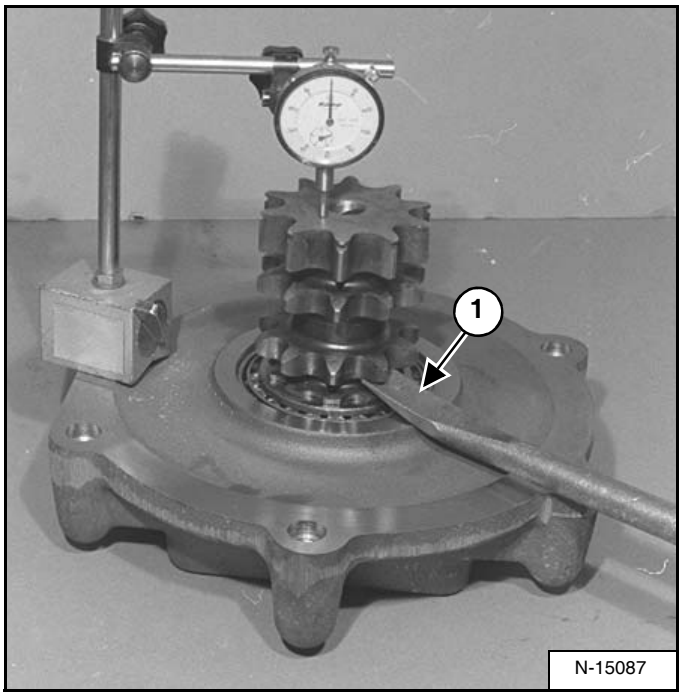
Check the end play of the motor carrier as follows:

Use a rubber mallet **[Figure 30-21-24]**, tap down on the cluster shaft.

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Disassembly and Assembly (Cont'd)

Figure 30-21-25



Install a dial indicator as shown in Photo **[Figure 30-21-25]**.

Use a pry bar (Item 1) **[Figure 30-21-25]** to lift the carrier shaft and read the end play on the dial indicator.

The carrier shaft must turn freely with end play not to exceed 0.007 inch (0,17 mm).

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HYDROSTATIC MOTOR CARRIER (SJC)

Shaft Seal Replacement

The tool listed is necessary for the following procedure:

MEL1420 - Carrier Seal Tool

Remove the hydrostatic motor. ((See Removal And Installation on Page 30-20-1.)

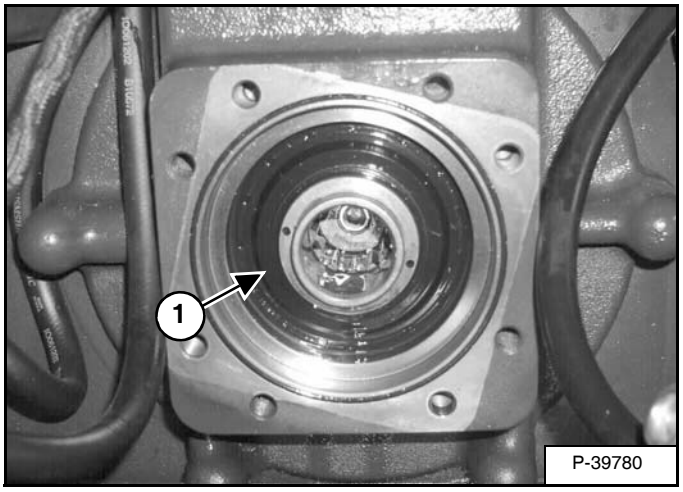
⚠ WARNING

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.**

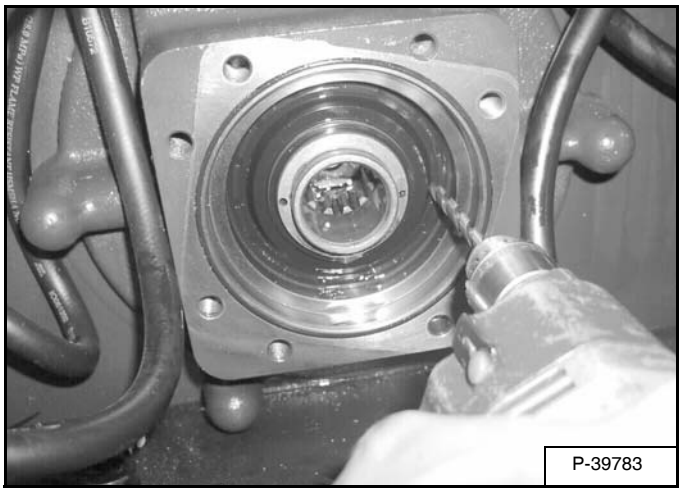
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Figure 30-22-1



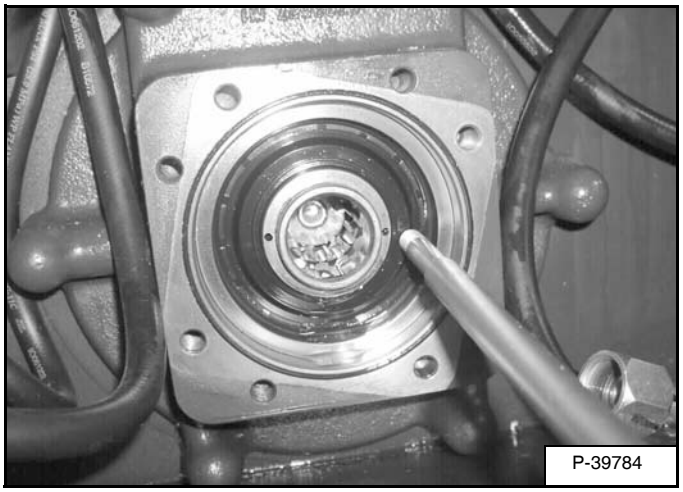
The motor carrier seal (Item 1) **[Figure 30-22-1]** is located on the outside of the motor carrier shaft.

Figure 30-22-2



Drill a .125 inch (3 mm) hole in the motor carrier seal **[Figure 30-22-2]**.

Figure 30-22-3

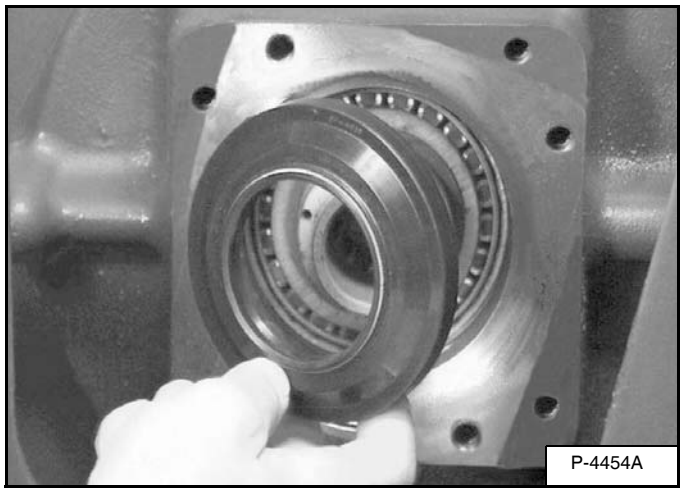


Use a slide hammer to remove the seal from the motor carrier shaft **[Figure 30-22-3]**.

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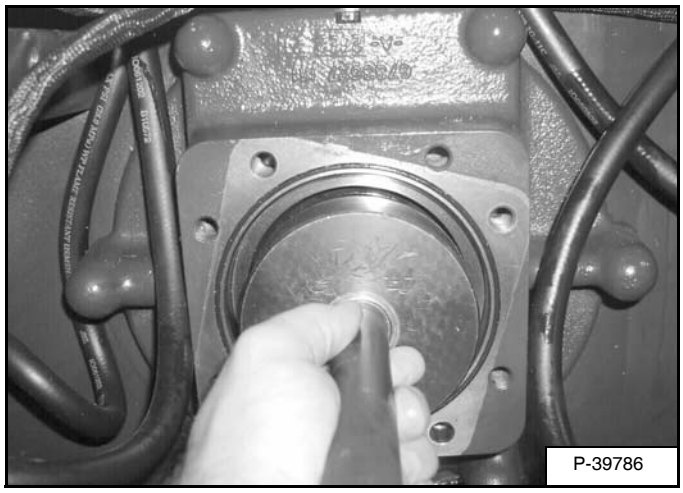
Shaft Seal Replacement (Cont'd)

Figure 30-22-4



Installation: Install a new seal over the motor carrier shaft **[Figure 30-22-4]**.

Figure 30-22-5



Installation: Install MEL1420 Carrier Seal Tool over the carrier seal **[Figure 30-22-5]**.

Hit the tool with a hammer until the seal is fully seated on the carrier shaft **[Figure 30-22-5]**.

Figure 30-22-6

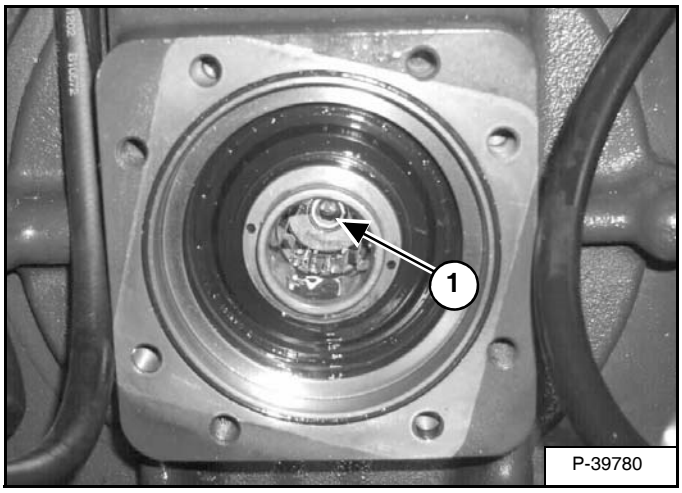


Photo **[Figure 30-22-6]** shows the motor carrier seal correctly installed.

NOTE: Before reinstalling the hydrostatic motor, check the plug (Item 1) [Figure 30-22-6] located in the center of the carrier shaft for tightness. If the plug becomes loosened, case drain lubrication oil from the hydrostatic motor can leak into the chaincase.

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Removal And Installation

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the fluid from the chaincase. (See Removing The Oil on Page 40-30-1.)

Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Remove the lift arm by-pass control valve. (See Removal and Installation on Page 20-50-1.)

Remove the traction lock assembly. (See TRACTION LOCK on Page 60-110-1.)

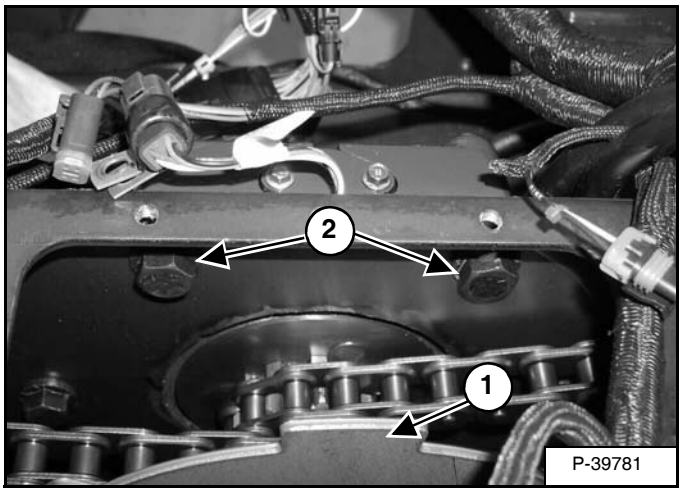
Remove the center chaincase cover. (See Center Cover Removal And Installation on Page 40-30-3.)

Remove the front chaincase cover. (See Front Cover Removal And Installation on Page 40-30-2.)

Remove the front axle and sprocket. (See Axle Sprocket And Bearings Removal And Installation on Page 40-20-3.)

Remove the hydrostatic motor. (See Removal And Installation on Page 30-20-1.)

Figure 30-22-7

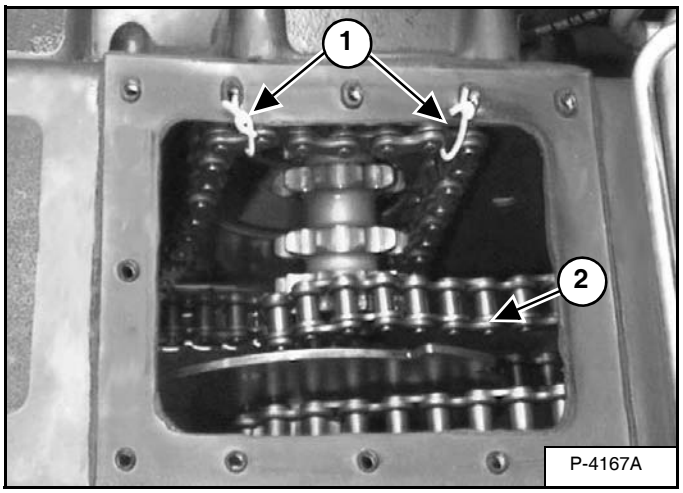


Remove the parking brake disc (Item 1) **[Figure 30-22-7]**. (See Disk Removal And Installation on Page 40-10-1.)

Remove the six motor carrier mounting bolts (Item 2) **[Figure 30-22-7]** from the inside of the chaincase.

Installation: Tighten the motor carrier mounting bolts to 125-140 ft.-lb. (170-190 N•m) torque.

Figure 30-22-8



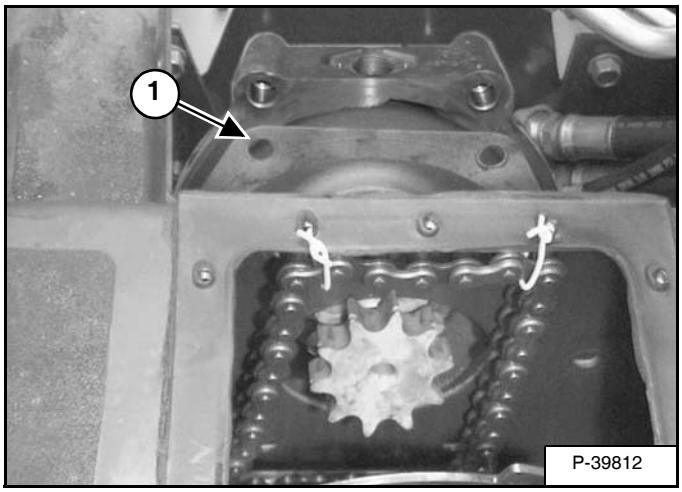
For ease of removal, fasten the front drive chain (previously removed) to the chaincase as shown (Item 1) **[Figure 30-22-8]**.

Tip the end of the sprocket toward the rear of the loader and remove the rear drive chain (Item 2) **[Figure 30-22-8]** from the sprocket.

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Removal And Installation (Cont'd)

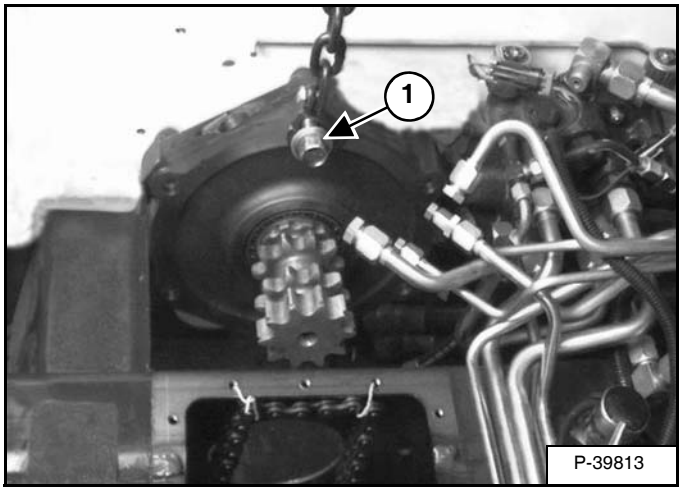
Figure 30-22-9



Slide the motor carrier out of the chaincase **[Figure 30-22-9]**.

Installation: Check the motor carrier gasket (Item 1) **[Figure 30-22-9]** for wear or damage and replace if necessary.

Figure 30-22-10



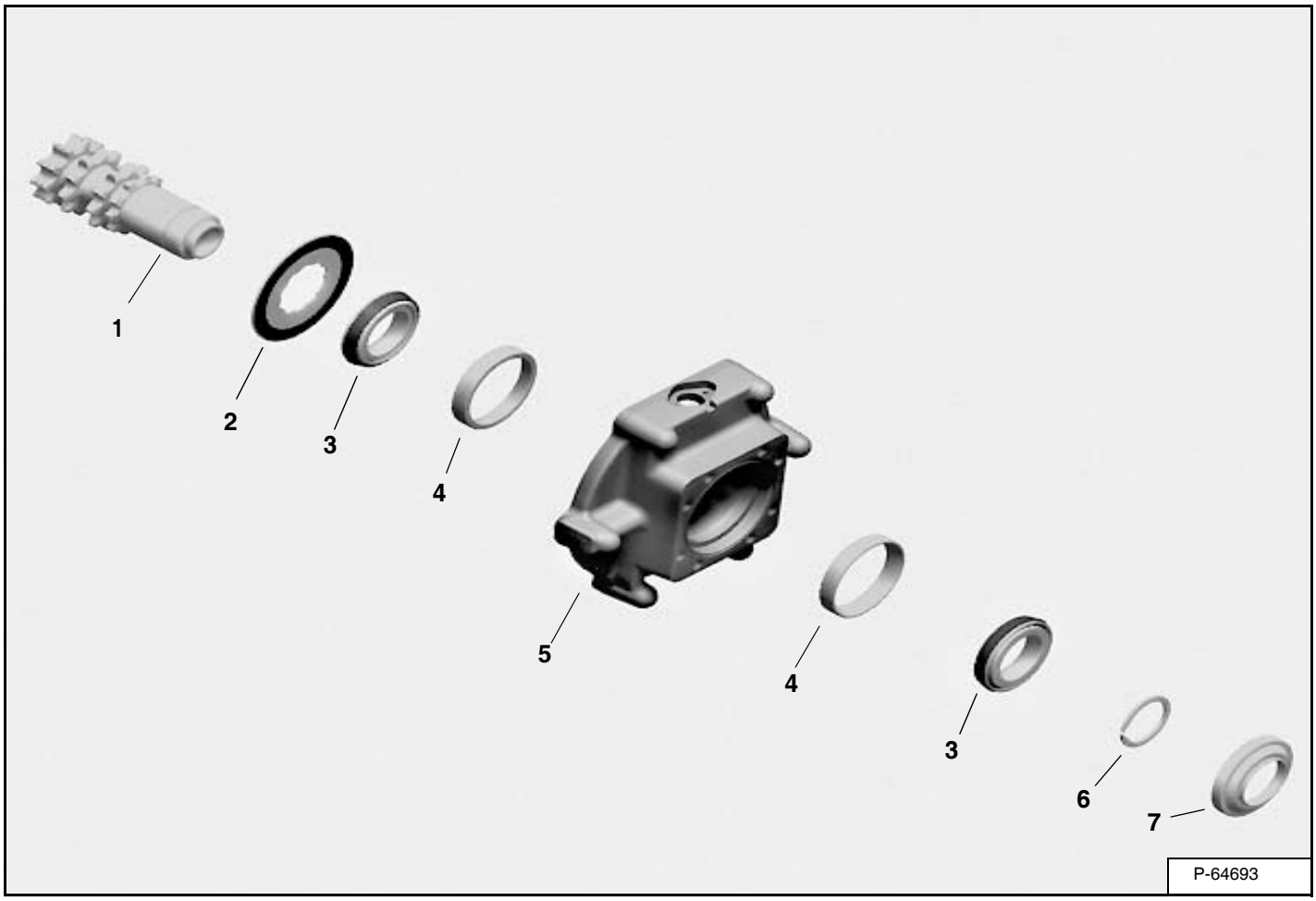
Use one of the motor carrier mounting bolts (Item 1) **[Figure 30-22-10]** and install partially into one mounting hole on the carrier.

Fasten a chain hoist to the bolt on the motor carrier and remove the carrier from the loader.

Reverse the removal procedure to install the motor carrier.

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Parts Identification

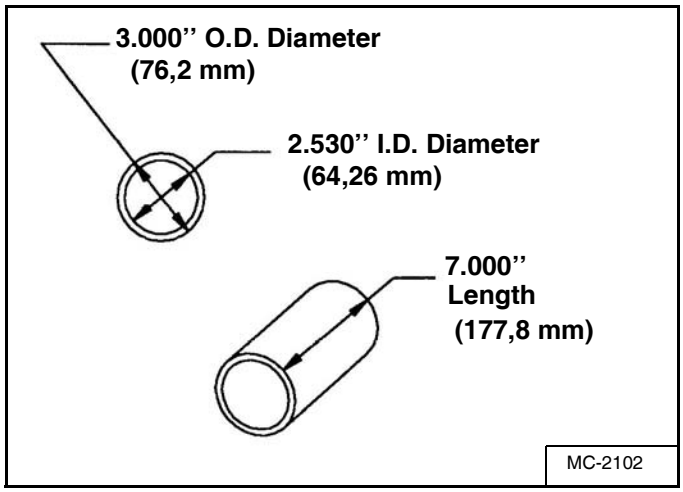


Ref.	Description	Ref.	Description
1.	SHAFT	5.	HOUSING
2.	SENSOR DISC	6.	SNAP RING
3.	BEARING	7.	SEAL
4.	RACE		

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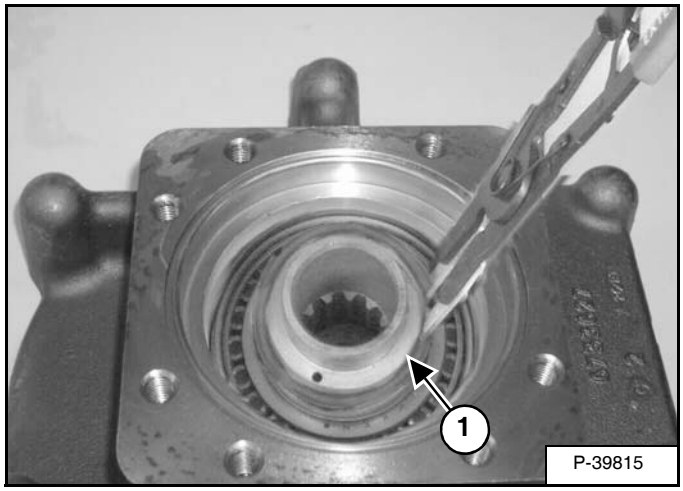
Disassembly and Assembly

Figure 30-22-11



It is necessary to locate or fabricate a press tool for this procedure. Refer to photo **[Figure 30-22-11]** for the correct dimensions of the tool needed.

Figure 30-22-12

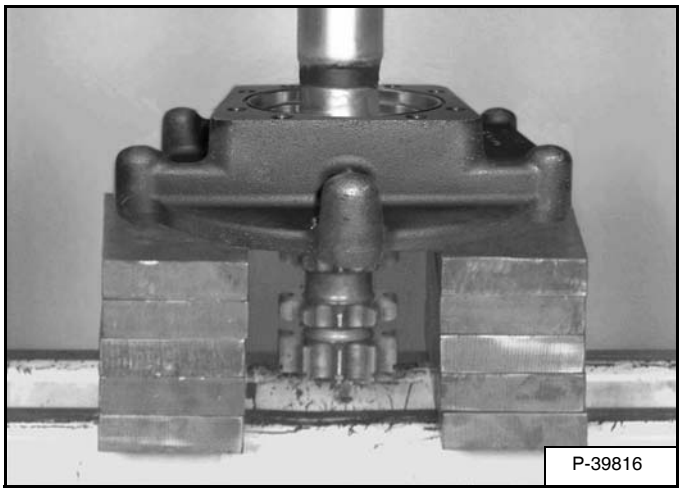


A hydraulic press, slide hammer with puller end and snap ring pliers are also recommended for this procedure.

Remove the motor carrier shaft seal. (See Shaft Seal Replacement on Page 30-22-1.)

Remove the snap ring (Item 1) **[Figure 30-22-12]** from the motor carrier shaft using the snap ring pliers.

Figure 30-22-13

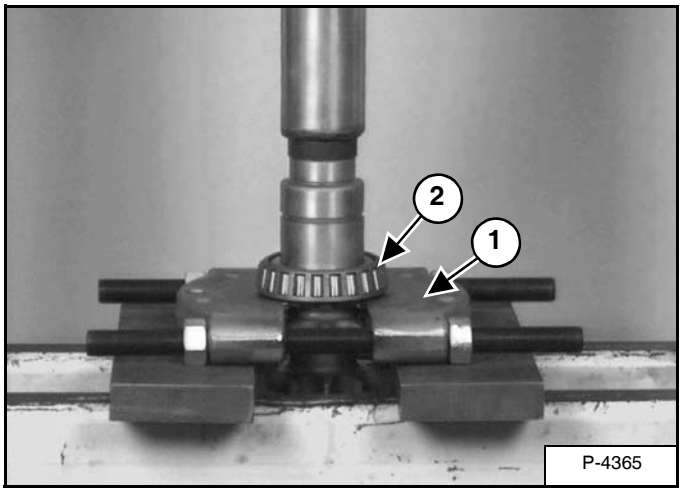


Put the motor carrier in the hydraulic press as shown **[Figure 30-22-13]**.

Use 2-1/4 inch driver tool and press the sprocket shaft out of the motor carrier housing **[Figure 30-22-13]**.

NOTE: The outer bearing will now be free from the sprocket shaft.

Figure 30-22-14



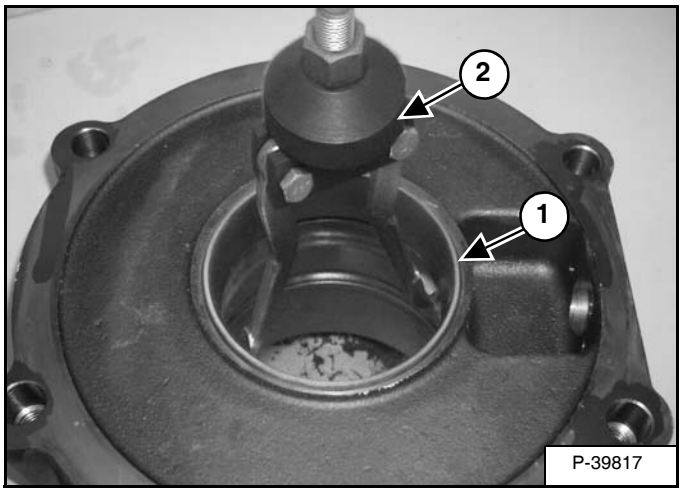
Remove the housing from the press and install a bearing puller (Item 1) **[Figure 30-22-14]** on the sprocket shaft.

Put the assembly in the hydraulic press. Use the same tool driver and remove the bearing (Item 2) **[Figure 30-22-14]** from the shaft.

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Disassembly and Assembly (Cont'd)

Figure 30-22-15

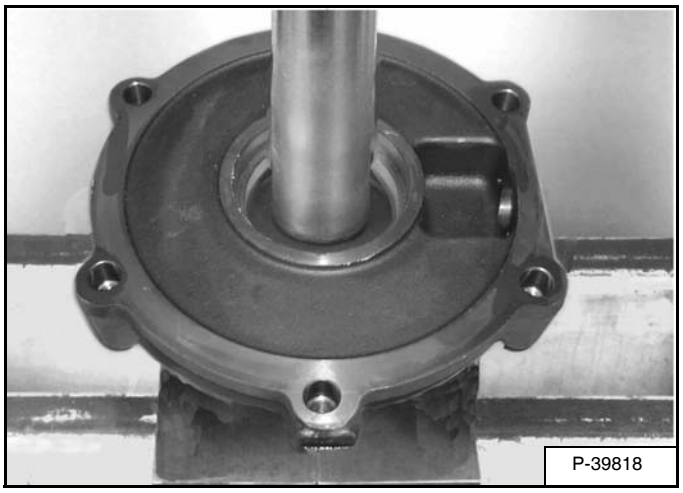


Fasten the carrier motor housing to the work surface securely with the inner bearing race (Item 1) **[Figure 30-22-15]** facing up.

Install the slide hammer with puller end (Item 2) **[Figure 30-22-15]** on the bottom side of the bearing race.

Remove the bearing race from the carrier housing **[Figure 30-22-15]**.

Figure 30-22-16

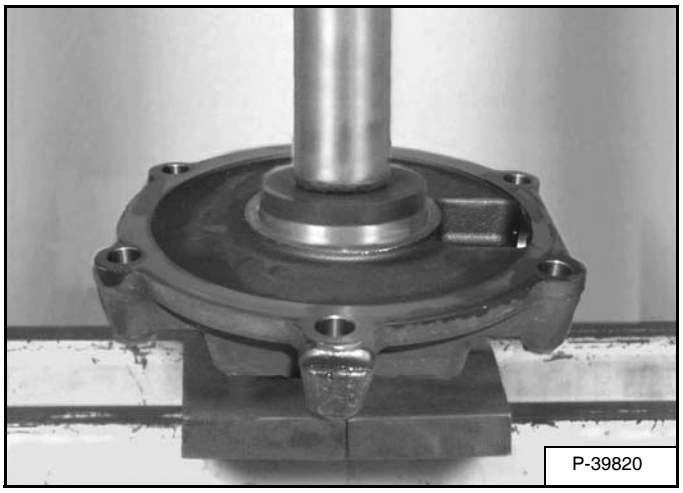


Put the motor carrier housing in the hydraulic press as shown **[Figure 30-22-16]**.

Use a 3-7/8 inch driver tool and press the outer bearing race from the housing.

Check all parts for wear and damage. Replace the bearing race when new bearings are to be installed.

Figure 30-22-17

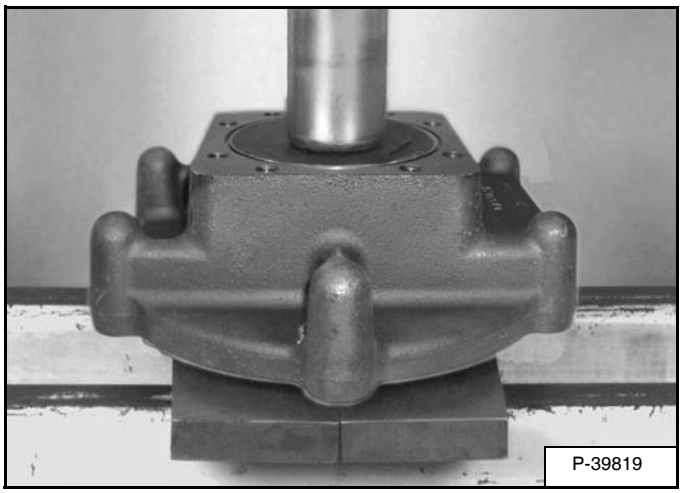


Put the motor carrier housing in the press as shown **[Figure 30-22-17]**.

Use a 4-5/16 inch driver tool and press the new inner bearing race into the motor carrier housing **[Figure 30-22-17]**.

Press the bearing race in until it is fully seated in the carrier housing.

Figure 30-22-18



Turn the motor carrier housing over as shown **[Figure 30-22-18]**.

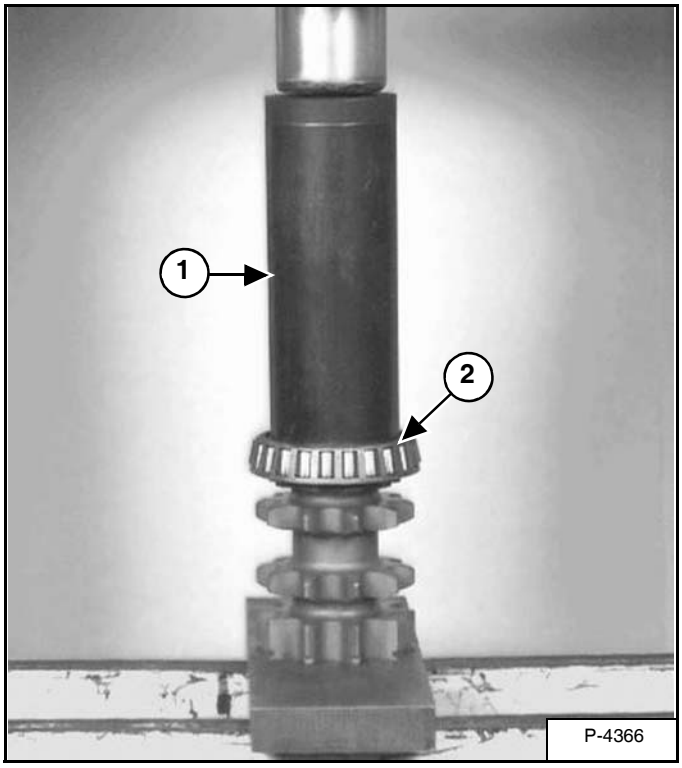
Use 4-5/16 inch driver tool and press the new outer bearing race into the motor carrier housing **[Figure 30-22-18]**.

Press the bearing race in until it is fully seated in the carrier housing.

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Disassembly and Assembly (Cont'd)

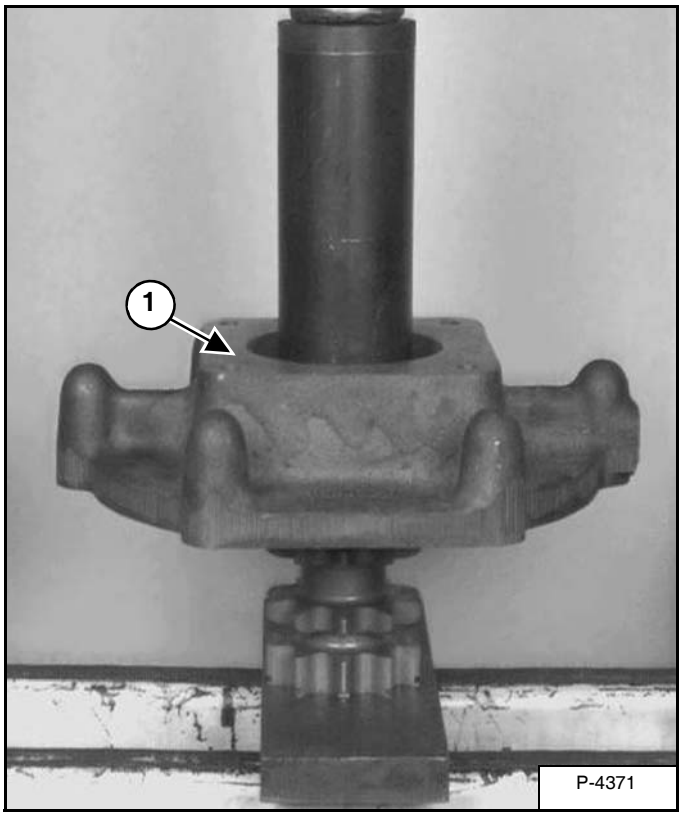
Figure 30-22-19



Use the fabricated press tool (Item 1) and 3.0 inch driver tool, install the new inner bearing (Item 2) **[Figure 30-22-19]** on the sprocket shaft as shown.

Remove the press and drive tools from the sprocket shaft.

Figure 30-22-20



Put the motor carrier housing (Item 1) **[Figure 30-22-20]** over the sprocket shaft as shown.

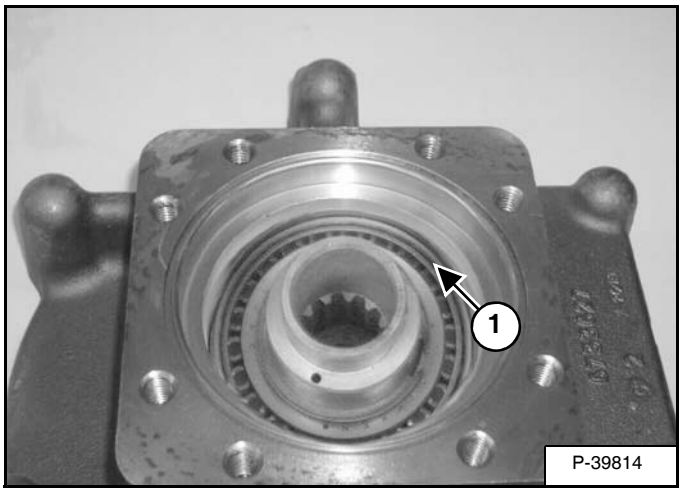
Put the outer bearing over the end of the sprocket shaft and press the bearing on with the press tool and driver tool **[Figure 30-22-20]**.

Remove the press and driver tools from the sprocket shaft.

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Disassembly and Assembly (Cont'd)

Figure 30-22-21



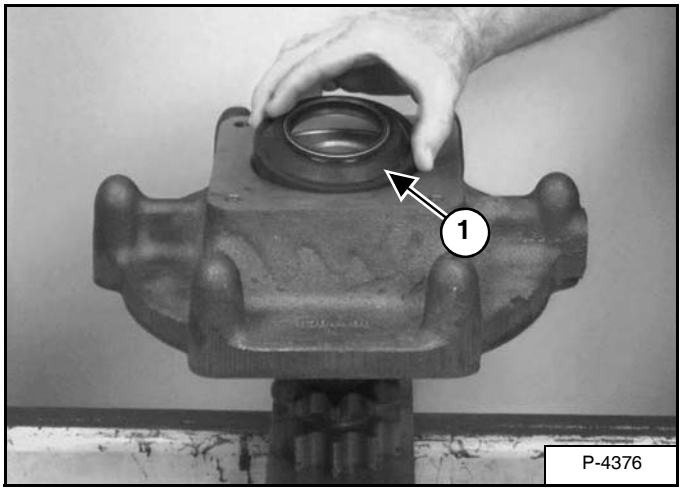
Put the snap ring (Item 1) **[Figure 30-22-21]** over the end of the sprocket shaft.

NOTE: Use the snap ring pliers to spread the snap ring so it will fit over the sprocket shaft.

Using the press and driver tools, press the snap ring (Item 1) **[Figure 30-22-21]** over the sprocket.

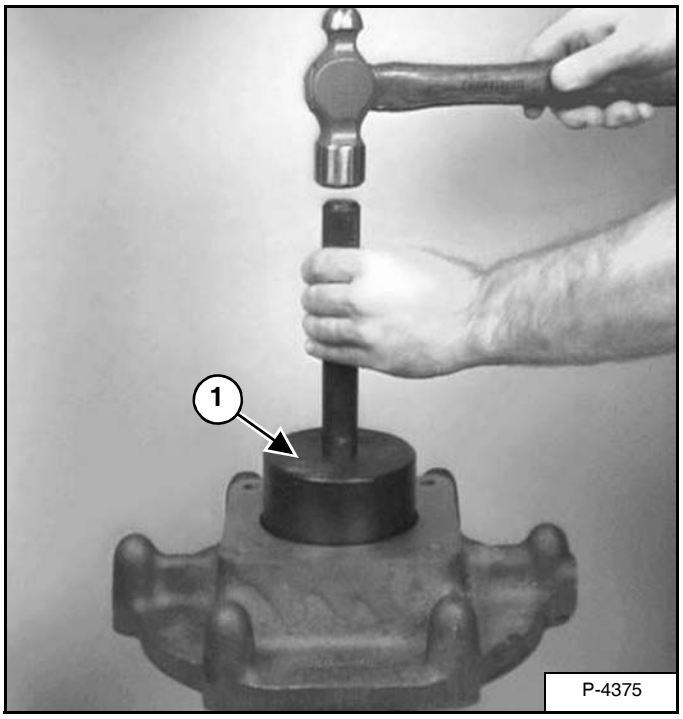
Press the snap ring on until it snaps into the groove on the shaft.

Figure 30-22-22



Put a new shaft seal (Item 1) **[Figure 30-22-22]** on the sprocket shaft.

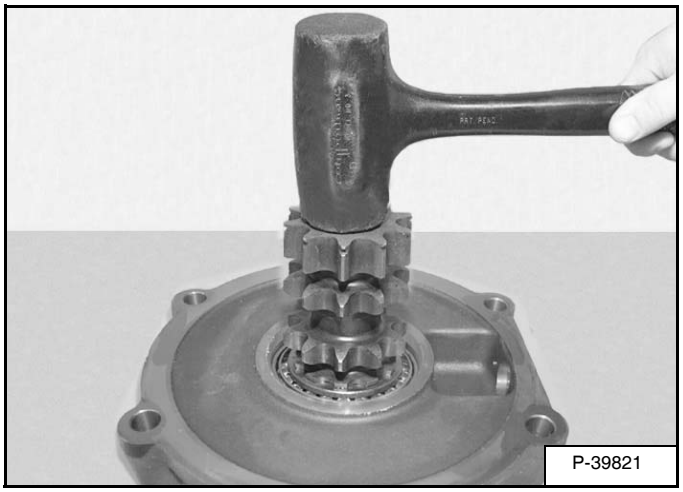
Figure 30-22-23



Use MEL1420 Carrier Seal Tool (Item 1) **[Figure 30-22-23]** and install the shaft seal.

Hit the tool with a hammer until the seal is fully seated on the carrier shaft **[Figure 30-22-23]**.

Figure 30-22-24



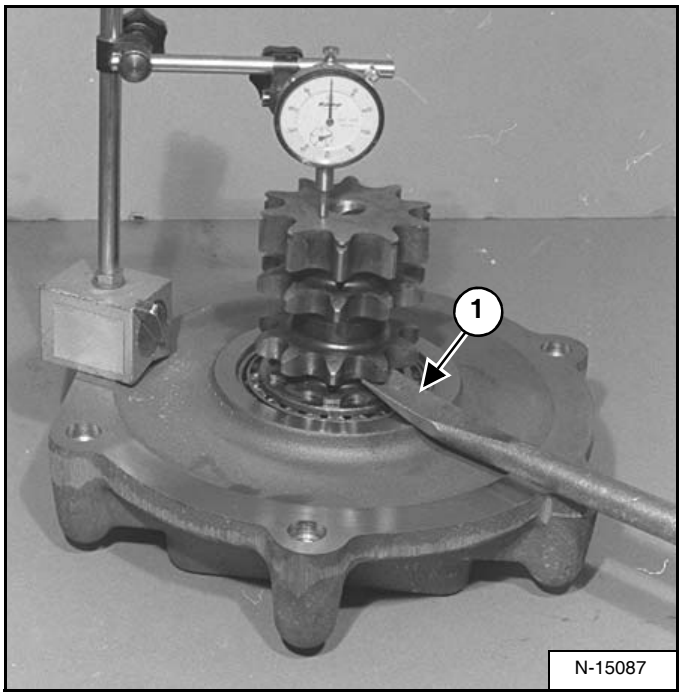
Check the end play of the motor carrier as follows:

Use a rubber mallet **[Figure 30-22-24]**, tap down on the cluster shaft.

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Disassembly and Assembly (Cont'd)

Figure 30-22-25



Install a dial indicator as shown in Photo **[Figure 30-22-25]**.

Use a pry bar (Item 1) **[Figure 30-22-25]** to lift the carrier shaft and read the end play on the dial indicator.

The carrier shaft must turn freely with end play not to exceed 0.007 inch (0,17 mm).

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CHARGE PRESSURE

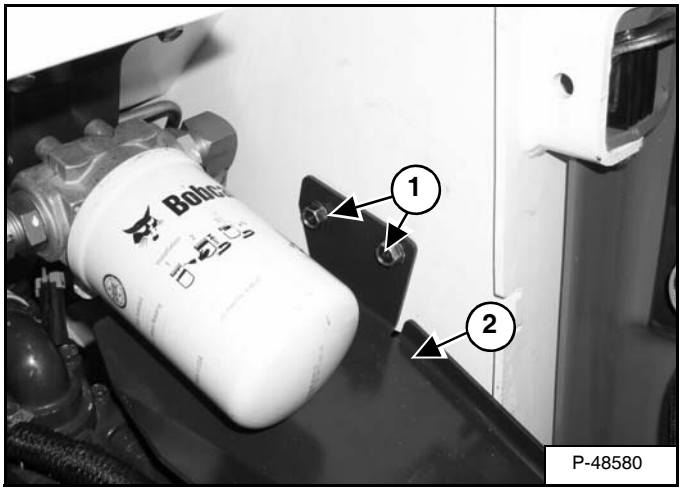
Sender Removal And Installation (Non SJC Machines)

WARNING

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

W-2017-0286

Figure 30-30-1

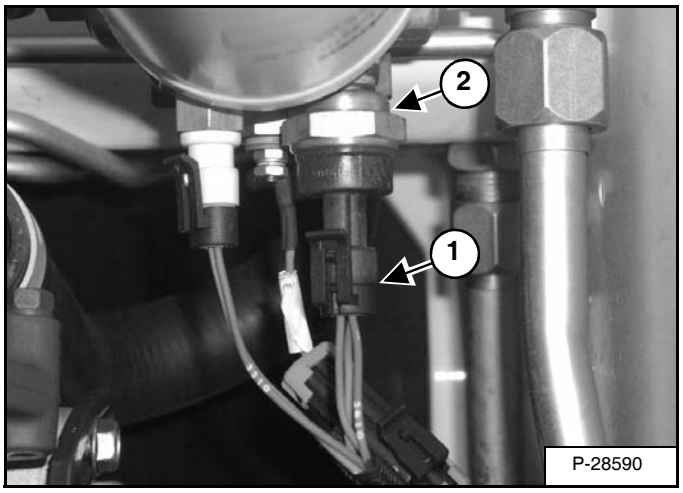


Open the rear door.

Remove the two mounting bolts (Item 1) to remove the oil filter drip shield (Item 2) **[Figure 30-30-1]**.

Installation: Tighten the mounting bolts and nuts to 15 ft.-lb. (20 N•m) torque.

Figure 30-30-2



Disconnect the wires (Item 1) **[Figure 30-30-2]** from the charge pressure sender.

Remove the charge pressure sender (Item 2) **[Figure 30-30-2]** from the fitting.

Installation: Tighten the sender to 7.4-8.1 ft.-lb. (10-11 N•m) torque.

Testing (Non SJC Machines)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Remove the two mounting bolts (Item 1) to remove the oil filter drip shield (Item 2) **[Figure 30-30-1]**.

Disconnect the wires (Item 1) **[Figure 30-30-2]** from the charge pressure sender.

Remove the charge pressure sender (Item 2) **[Figure 30-30-2]** from the fitting.

Installation: Tighten the sender to 7.4-8.1 ft.-lb. (10-11 N•m) torque.

Install a tee fitting into the charge pressure sender fitting.

Install a hose with a pressure gauge of at least 500 PSI on one end of the tee fitting and the charge pressure sender into the other end.

Reconnect the wires to the charge pressure sender.

Start the engine.

The gauge must read as follows:

220-270 PSI (15,1-18,6 bar) with approximately 140°F (60°C) fluid @ High Idle.

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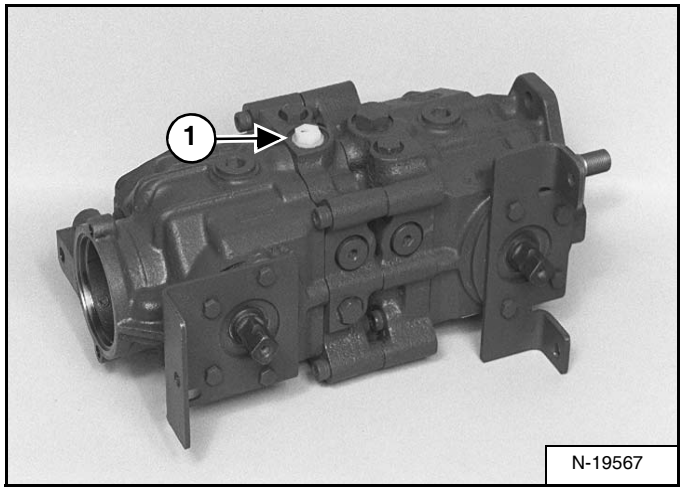
Adjusting (Non SJC Machines)

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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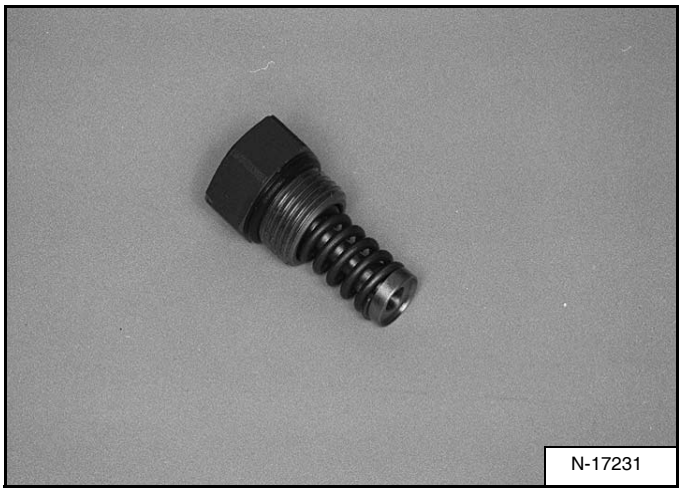
Figure 30-30-3



If the charge pressure is not correct loosen the charge relief valve plug (Item 1) **[Figure 30-30-3]**.

Assemble: Always use a new O-ring. Tighten the plug to 30-50 ft.-lb. (41-68 N•m) torque.

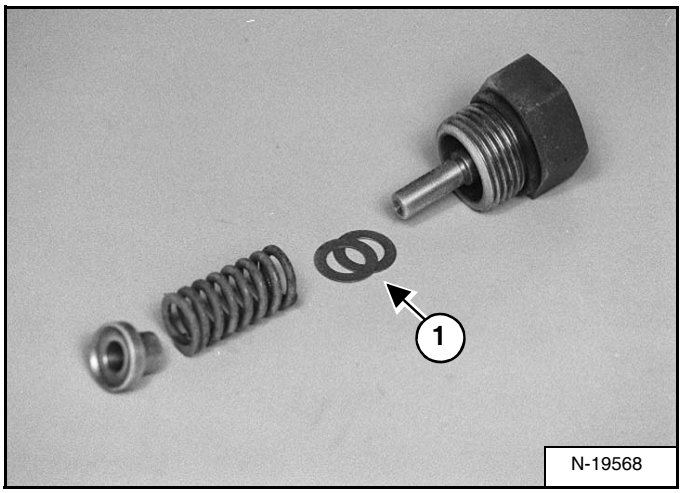
Figure 30-30-4



Remove the plug, spring and poppet **[Figure 30-30-4]**.

Check the poppet and spring for wear or damage.

Figure 30-30-5



There are several different thickness of the shims (Item 1) **[Figure 30-30-5]** and are used to adjust the charge pressure.

NOTE: 0.010 inch (0,254 mm) is 8 PSI (55.16 kPa) increase in pressure.

The charge pressure should be set at 220-270 PSI (15,1-18,6 bar).

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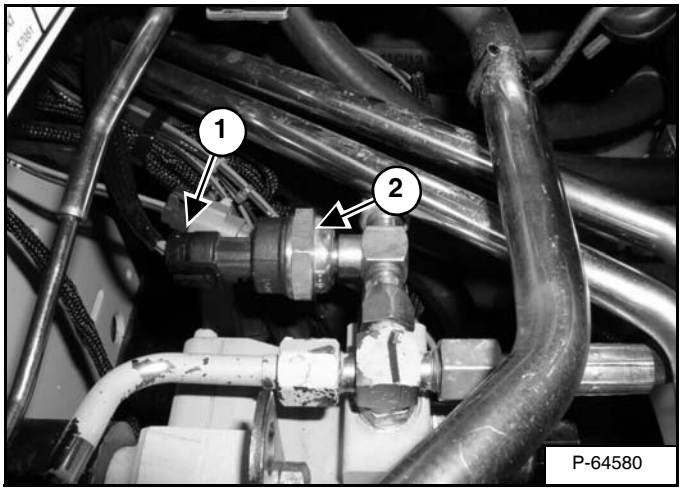
Sender Removal And Installation (SJC Machines)

⚠ WARNING

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

W-2017-0286

Figure 30-30-6



Raise the lift arms and install an approved lift arm support device (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Disconnect the wires (Item 1) **[Figure 30-30-6]** from the charge pressure sender.

Remove the charge pressure sender (Item 2) **[Figure 30-30-6]** from the fitting.

Installation: Tighten the sender to 7.4-8.1 ft.-lb. (10-11 N•m) torque.

Testing (SJC Machines)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the lift arms and install an approved lift arm support device (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Disconnect the wires (Item 1) **[Figure 30-30-6]** from the charge pressure sender.

Remove the charge pressure sender (Item 2) **[Figure 30-30-6]** from the fitting.

Installation: Tighten the sender to 7.4-8.1 ft.-lb. (10-11 N•m) torque.

Install a tee fitting into the charge pressure sender fitting.

Install a hose with a pressure gauge of at least 500 PSI on one end of the tee fitting and the charge pressure sender into the other end.

Reconnect the wires to the charge pressure sender.

Start the engine.

The gauge must read as follows:

360 PSI (24,8 bar) with approximately 140°F (60°C) fluid @ High Idle.

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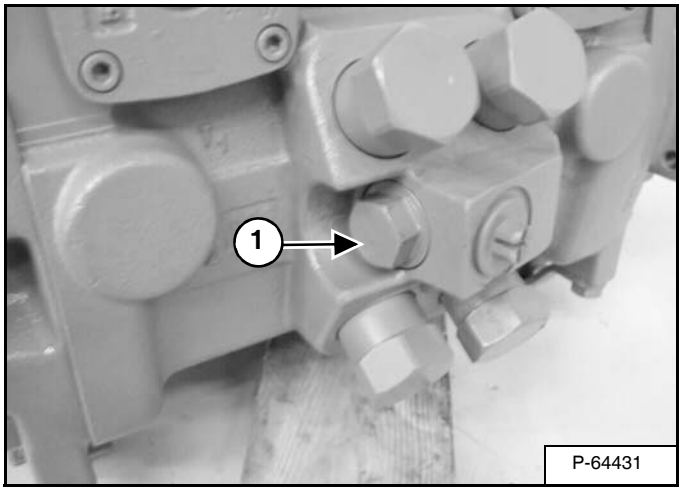
Adjusting (SJC Machines)

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 30-30-7

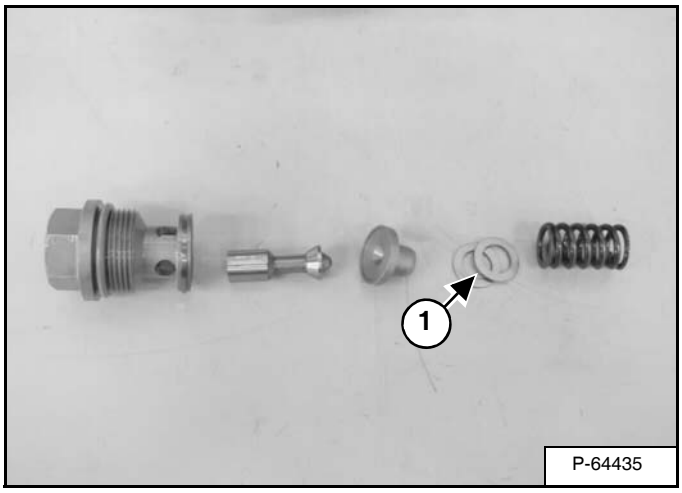


If the charge pressure is not correct remove the charge relief valve (Item 1) **[Figure 30-30-7]**.

NOTE: The pump has been removed for photo clarity. The charge pressure relief valve is located on the engine side of the hydrostatic pump when installed in the loader.

Assemble: Always use a new O-ring. Tighten the plug to 30-50 ft.-lb. (41-68 N•m) torque.

Figure 30-30-8



Check the poppet and spring for wear or damage.

There are several different thickness of shims (Item 1) **[Figure 30-30-8]** used to adjust the charge pressure.

NOTE: 1.0 mm shim (Item 1) [Figure 30-30-8] = 43.5 PSI (3 bar) in pressure change. Adding shims increses charge pressure. Removing shims decreases charge pressure.

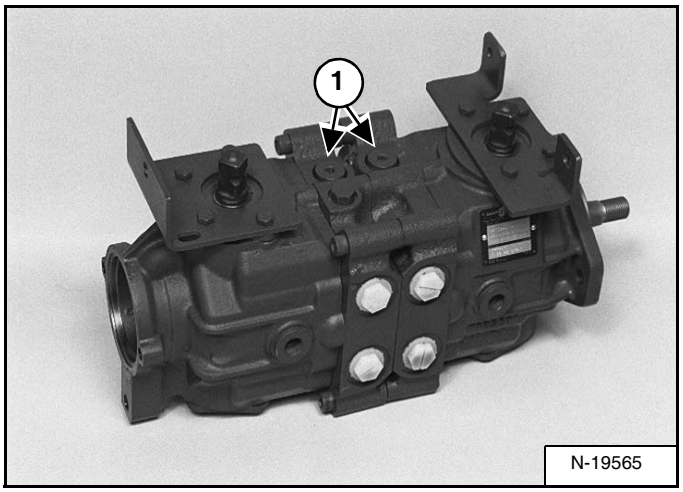
The charge pressure should be set at 360 PSI (24,8 bar).

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HYDROSTATIC PUMP

Replenishing/High Pressure Relief Valve

Figure 30-40-1

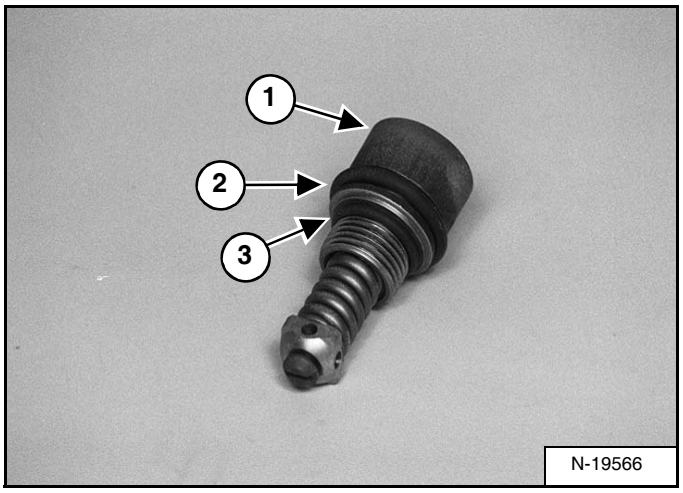


There are four replenishing/high pressure relief valves (Item 1) **[Figure 30-40-1]** in the hydrostatic pump assembly. Two are located at the top of the pumps and two at the bottom of the pumps.

(See Replenishing Valve Function on Page 30-10-2.), for valve function.

NOTE: The two top valves are for the reverse drive loop and the two bottom valves are for the forward drive loop.

Figure 30-40-2



Remove the high pressure relief valve (Items 1) **[Figure 30-40-2]** from the pump.

Assemble: Tighten the plug to 30-50 ft.-lb. (41-68 N•m) torque.

Check for damage and replace as needed.

Check the O-rings (Items 2 & 3) **[Figure 30-40-2]** for damage and replace as needed.

If the high pressure relief valve must be replaced, it must be replaced as a complete unit.

The pressure setting for a new high pressure relief valve is 5000 PSI (34475 kPa).

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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.

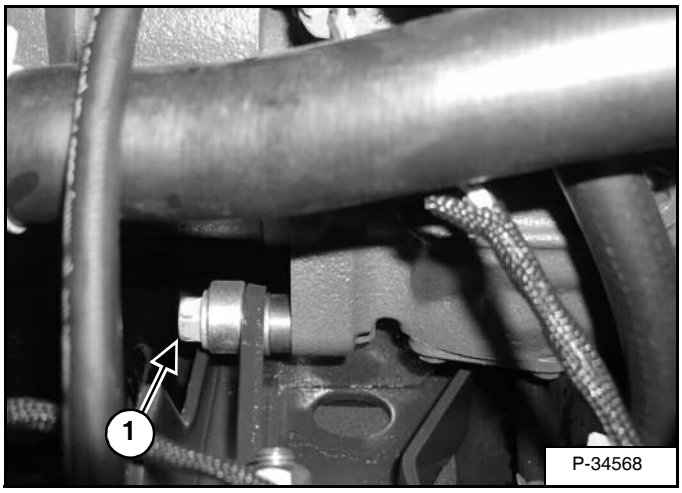
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Remove the engine/hydrostatic pump assembly from the loader. (See Removal And Installation on Page 70-80-1.)

Remove the control handle linkage from the hydrostatic pump. (See Control Lever Removal And Installation on Page 50-110-1.)

Remove the hydraulic pump from the hydrostatic pump. (See Removal And Installation on Page 20-60-5.)

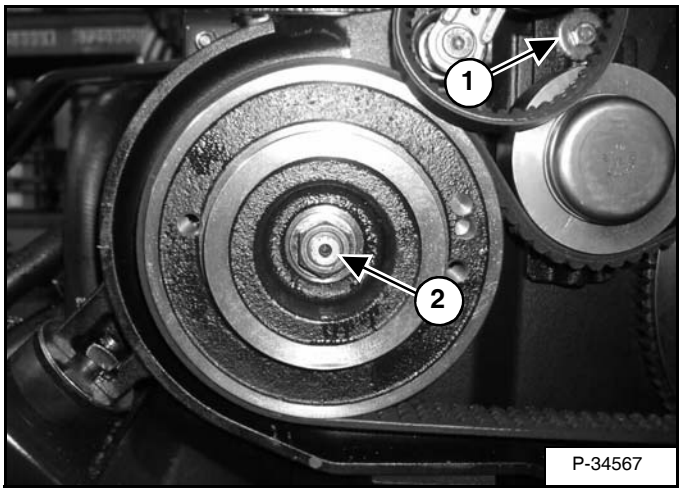
Figure 30-40-3



Remove the hydrostatic pump mounting bolt (Item 1) **[Figure 30-40-3]** and washer(s).

Installation: Tighten the mounting bolt to 65-70 ft.-lb. (88-95 N•m) torque.

Figure 30-40-4

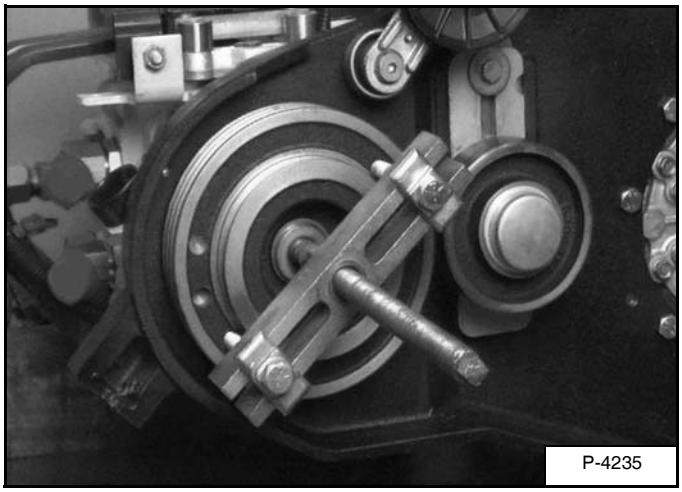


Loosen the drive belt tensioner (Item 1) **[Figure 30-40-4]** and remove the drive belt.

Remove the hydrostatic pump drive pulley mounting nut (Item 2) **[Figure 30-40-4]** and washer.

Installation: Tighten the pump pulley mounting nut to 175-200 ft.-lb. (237-271 N•m) torque.

Figure 30-40-5

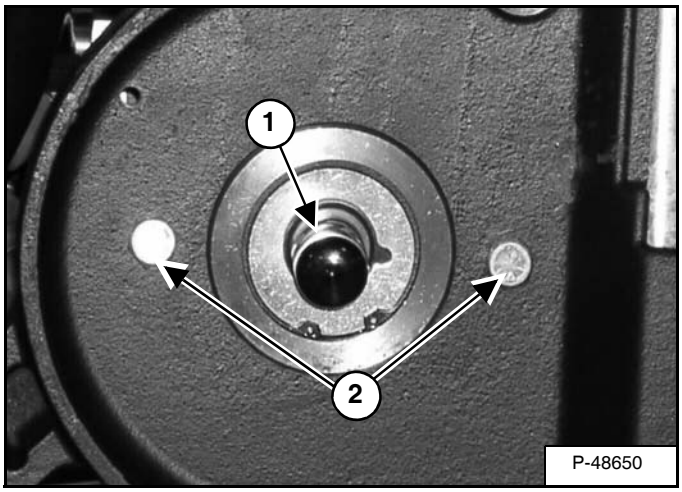


Install a puller on the hydrostatic pump drive pulley and remove the pulley from the pump shaft **[Figure 30-40-5]**.

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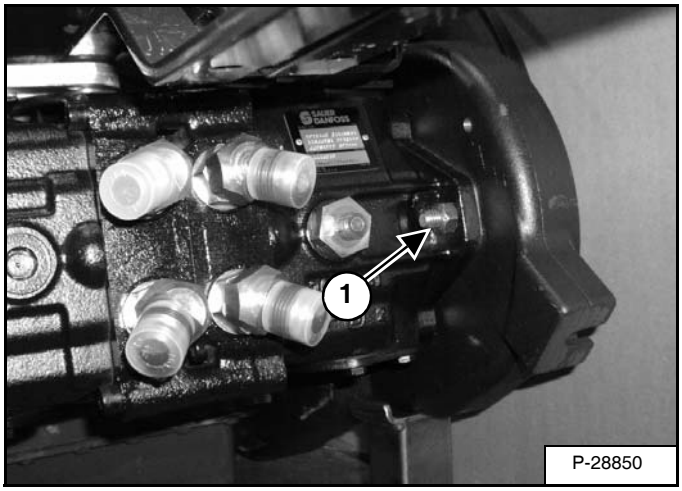
Removal And Installation (Cont'd)

Figure 30-40-6



Installation: Install the key in the hydrostatic pump shaft (Item 1) **[Figure 30-40-6]** before installing the pump drive pulley.

Figure 30-40-7



Hold the nut (Item 1) **[Figure 30-40-7]** on the two hydrostatic pump mounting bolts (Item 2) **[Figure 30-40-6]**.

Remove the two hydrostatic pump mounting bolts from the pump and drive belt housing.

Installation: Tighten the pump mounting bolts to 65-70 ft.-lb. (88-95 N•m) torque.

⚠ WARNING

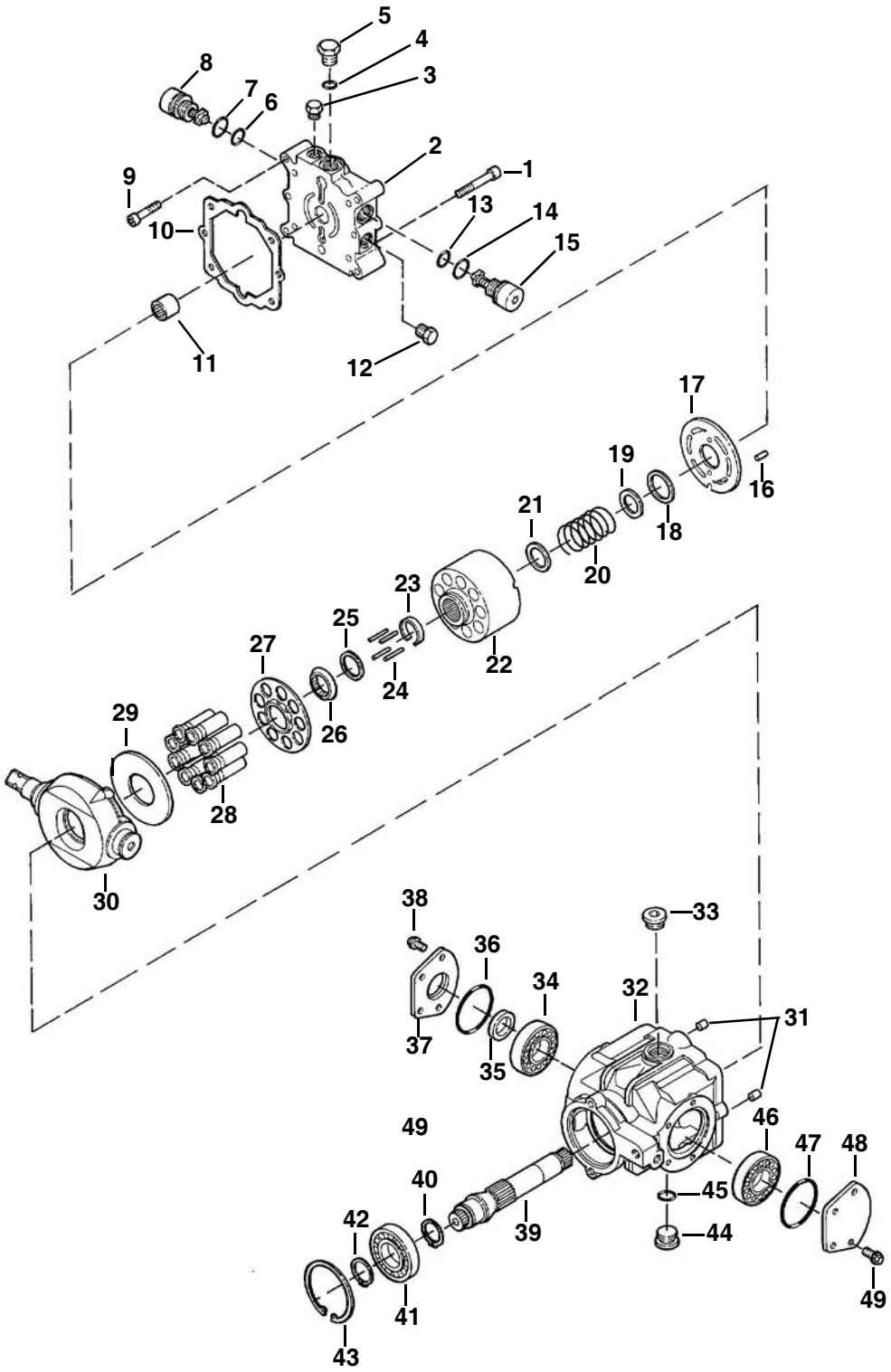
Always clean up spilled fuel or oil. Keep heat, flames, sparks or lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire which can result in injury or death.

W-2103-1285

Reverse the removal procedure to install the hydrostatic pump assembly.

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Parts Identification (Right Half)



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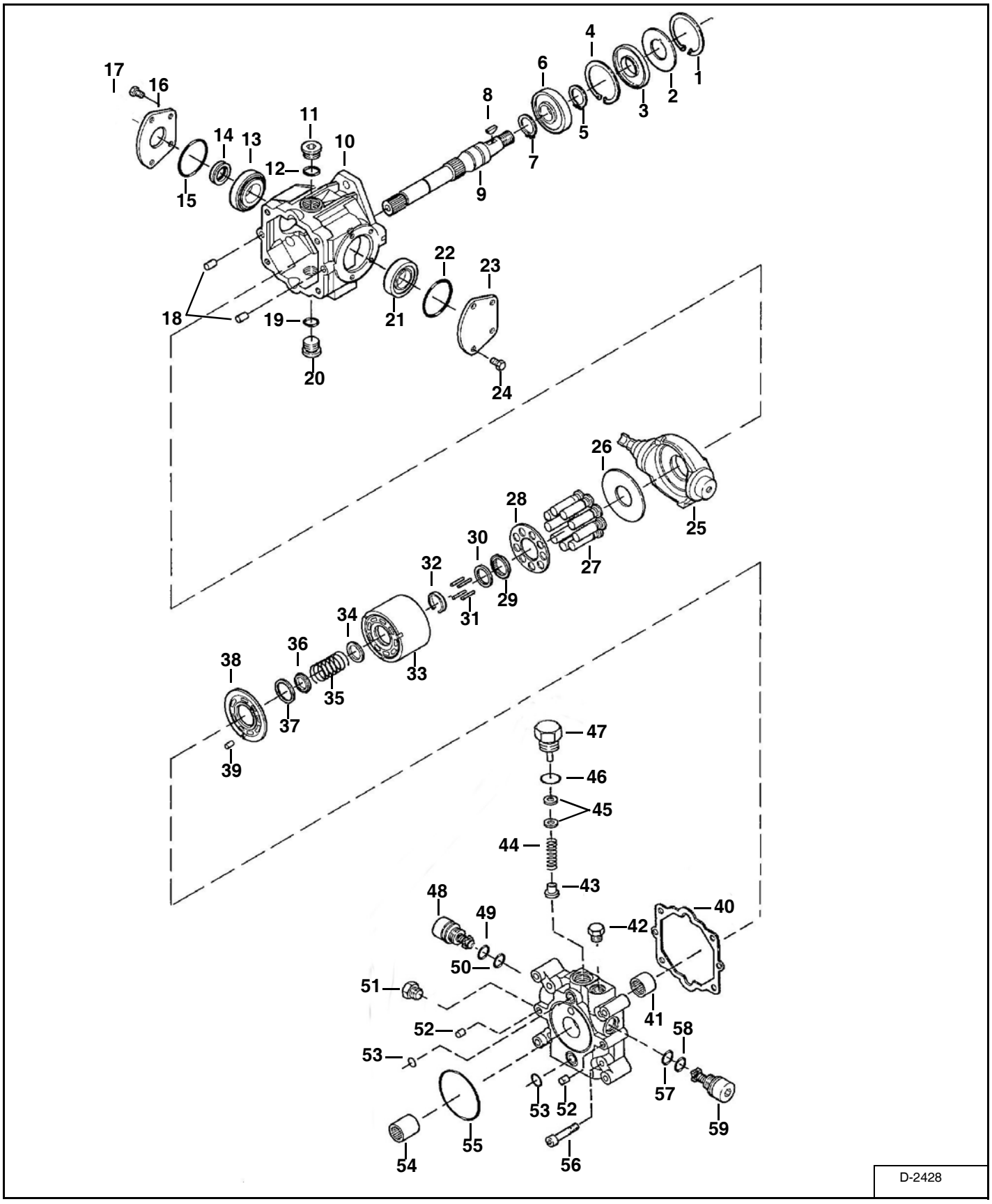
Parts Identification (Right Half) (Cont'd)

Ref.	Description
1.	Bolt
2.	End Cap
3.	Plug
4.	O-ring
5.	Plug
6.	O-ring
7.	O-ring
8.	Relief Valve
9.	Bolt
10.	Gasket
11.	Bearing
12.	Plug
13.	O-ring
14.	O-ring
15.	Relief Valve
16.	Pin
17.	Valve Plate
18.	Retainer
19.	Washer
20.	Spring
21.	Washer
22.	Block
23.	Retainer
24.	Pin
25.	Washer
26.	Retainer
27.	Retainer
28.	Piston Assembly
29.	Plate
30.	Swashplate
31.	Pin
32.	Housing
33.	Plug
34.	Bearing
35.	Seal
36.	O-ring
37.	Cover
38.	Boltg
39.	Shaft
40.	Snap Ring
41.	Bearing
42.	Snap Ring
43.	Snap Ring
44.	Plug
45.	O-ring
46.	Bearing
47.	O-ring
48.	Plate
49.	Bolt

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HYDROSTATIC PUMP (CONT'D)

Parts Identification (Left Half)



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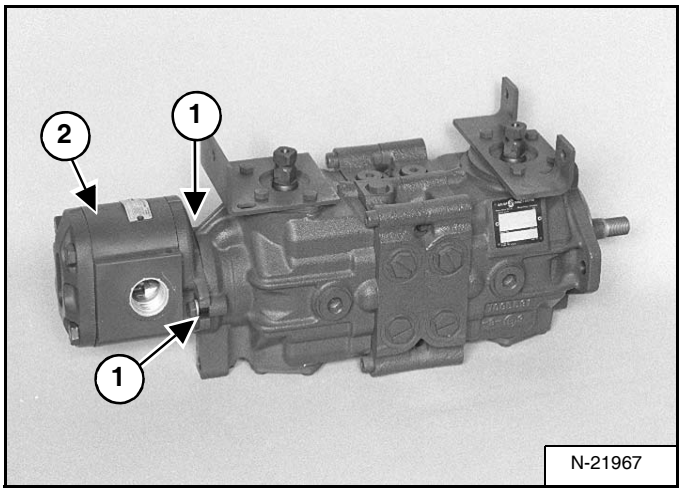
Parts Identification (Left Half) (Cont'd)

Ref.	Description
1.	Snap Ring
2.	Washer
3.	Seal
4.	Snap Ring
5.	Snap Ring
6.	Bearing
7.	Snap Ring
8.	Key
9.	Shaft
10.	Housing
11.	Plug
12.	O-ring
13.	Bearing
14.	Seal
15.	O-ring
16.	Cover
17.	Bolt
18.	Pin
19.	O-ring
20.	Plug
21.	Bearing
22.	O-ring
23.	Plate
24.	Bolt
25.	Swash Plate
26.	Wear Plate
27.	Piston Assembly
28.	Piston Retainer
29.	Retainer
30.	Washer
31.	Pin
32.	Retainer
33.	Block
34.	Washer
35.	Spring
36.	Washer
37.	Washer
38.	Valve Plate
39.	Pin
40.	Gasket
41.	Bearing
42.	Plug
43.	Poppet
44.	Spring
45.	Shim
46.	O-ring
47.	Plug
48.	Relief Valve
49.	O-ring
50.	O-ring
51.	Plug
52.	Pin
53.	O-ring
54.	Coupler
55.	O-ring
56.	Bolt
57.	O-ring
58.	O-ring
59.	Relief Valve

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Hydraulic Pump Removal And Installation

Figure 30-40-8

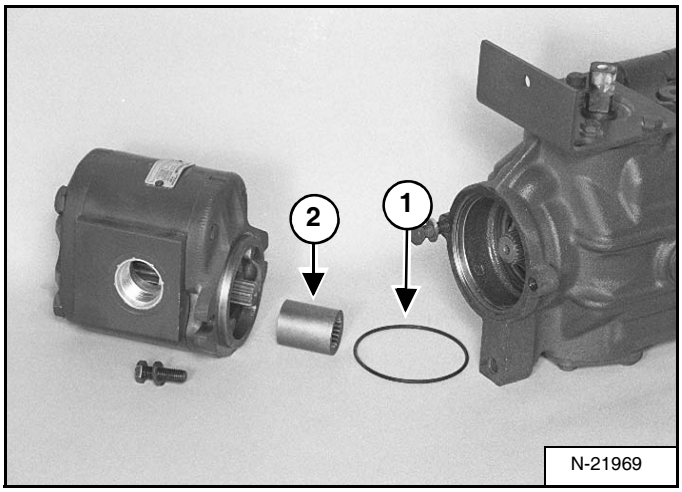


Remove the pump mounting bolts (Item 1) **[Figure 30-40-8]** (both sides).

Installation: Tighten the mounting bolts to 25-27 ft.-lb. (34-37 N•m) torque.

Remove the hydraulic pump (Item 2) **[Figure 30-40-8]** from the hydrostatic pumps.

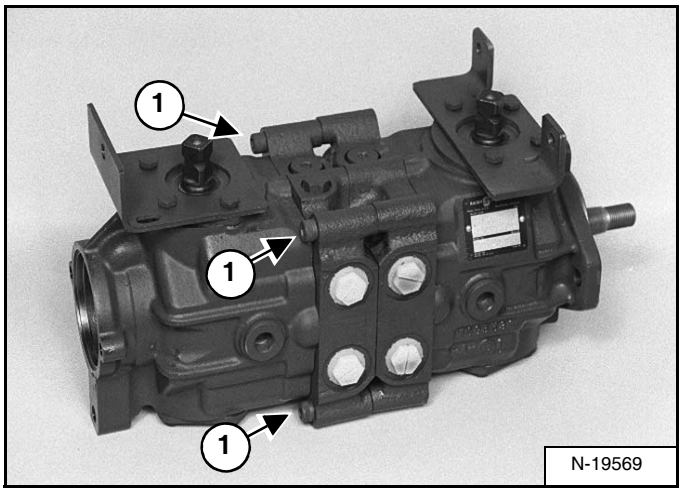
Figure 30-40-9



Remove the O-ring (Item 1) **[Figure 30-40-9]** and coupler (Item 2) **[Figure 30-40-9]** with the hydraulic pump.

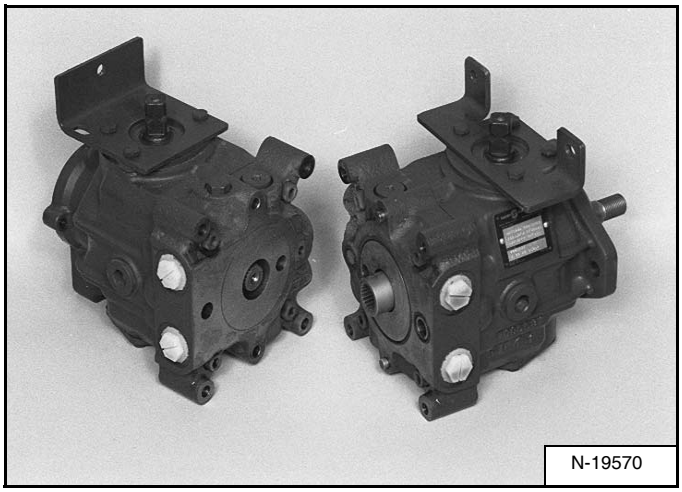
Pump Separation

Figure 30-40-10



Remove the four mounting bolts (Item 1) **[Figure 30-40-10]**.

Figure 30-40-11

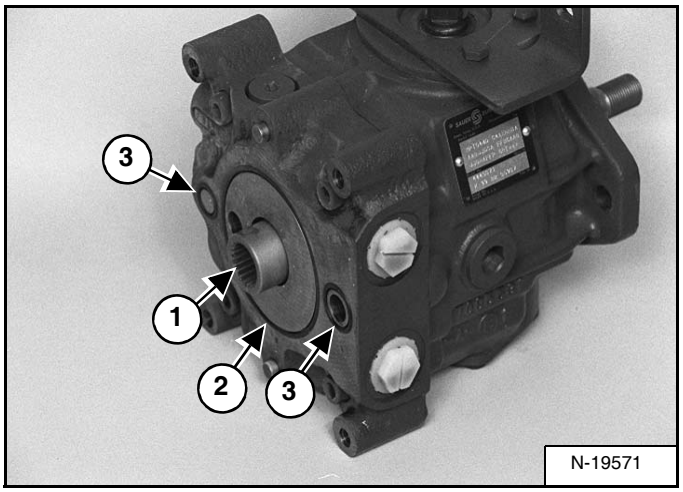


Separate the two hydrostatic pumps **[Figure 30-40-11]**.

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Pump Separation (Cont'd)

Figure 30-40-12



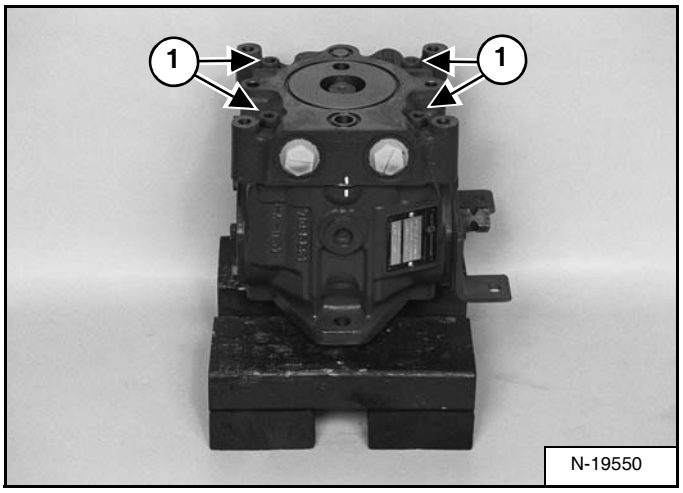
Remove the pump coupler (Item 1) **[Figure 30-40-12]**.

Remove the large O-ring (Item 2) **[Figure 30-40-12]**.

Remove the two small O-rings (Item 3) **[Figure 30-40-12]**.

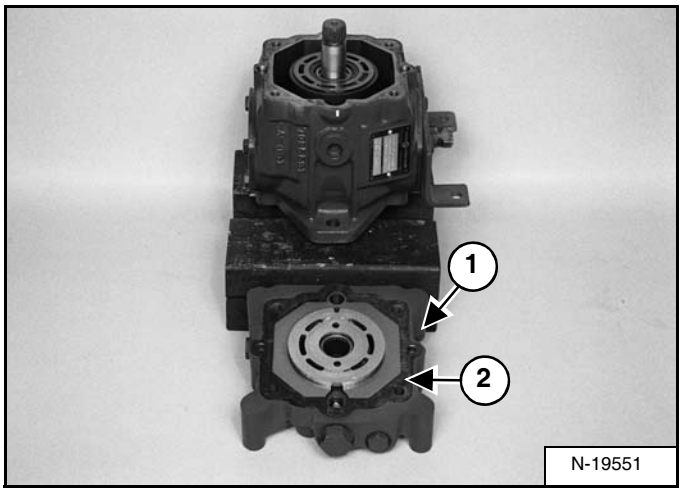
Disassembly

Figure 30-40-13



Remove the four bolts (Item 1) **[Figure 30-40-13]** from the pump housing end cap.

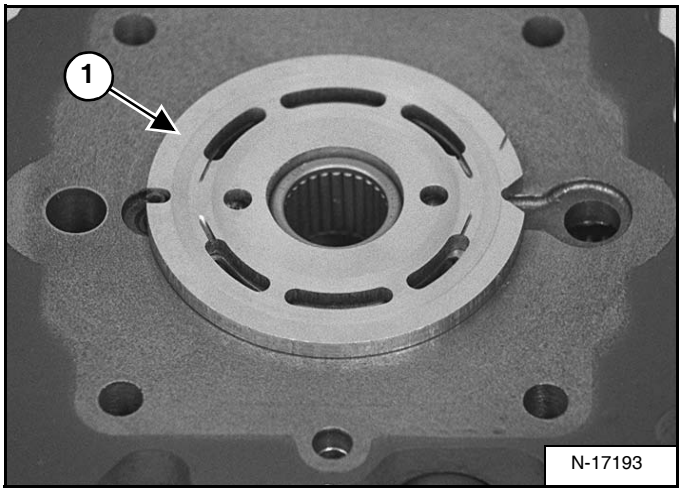
Figure 30-40-14



Remove the pump housing end cap (Item 1) **[Figure 30-40-14]**.

Remove the gasket (Item 2) **[Figure 30-40-14]**.

Figure 30-40-15



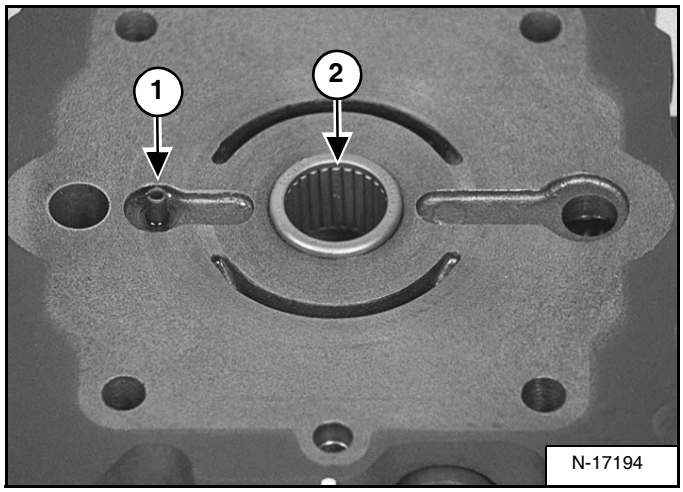
Remove the valve plate (Item 1) **[Figure 30-40-15]**.

Check the valve plate for wear. (Both Sides.)

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Disassembly (Cont'd)

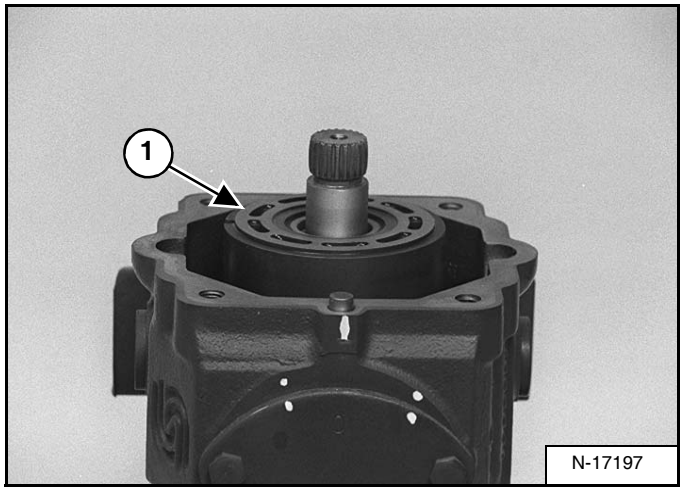
Figure 30-40-16



Check the valve plate locating pin (Item 1) **[Figure 30-40-16]** for wear and replace if needed.

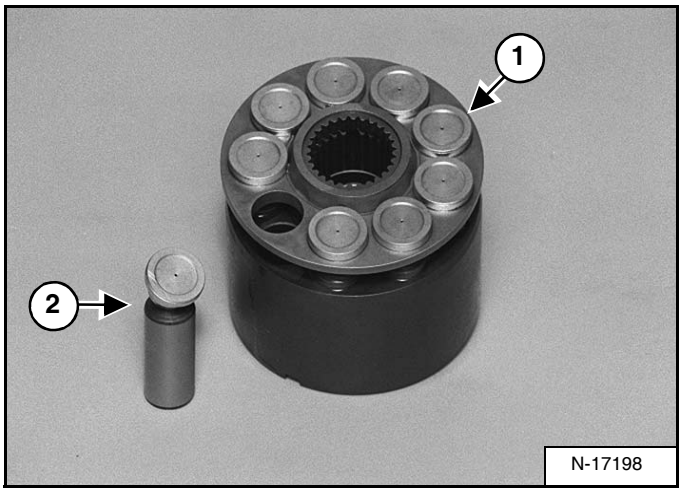
Check the needle bearing (Item 2) **[Figure 30-40-16]** for wear and replace if needed.

Figure 30-40-17



Remove the rotating group (Item 1) **[Figure 30-40-17]** from the pump.

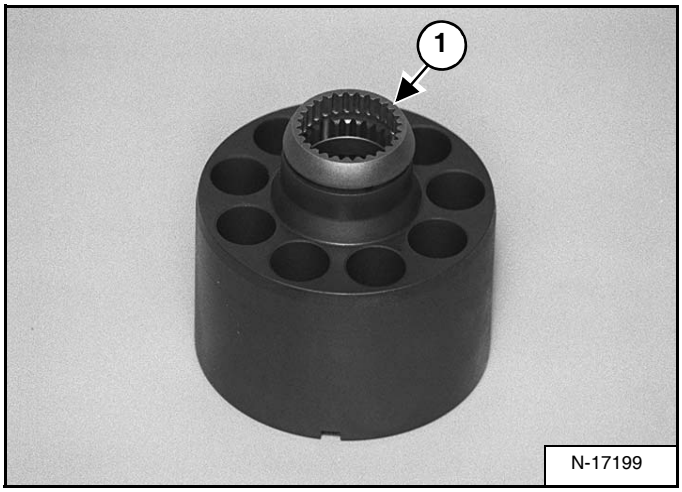
Figure 30-40-18



Remove the slipper guide and pistons (Item 1) **[Figure 30-40-18]** from the cylinder block.

Check all the pistons (Item 2) **[Figure 30-40-18]** for wear and replace the rotating group as needed.

Figure 30-40-19

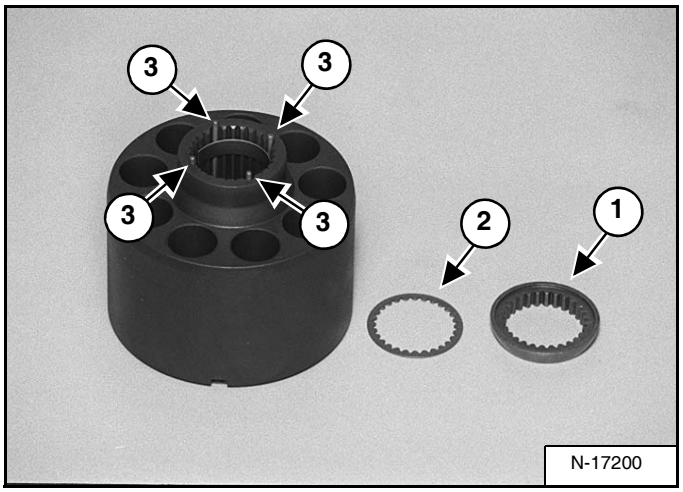


Remove the ball guide retainer (Item 1) **[Figure 30-40-19]** from the cylinder block.

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Disassembly (Cont'd)

Figure 30-40-20



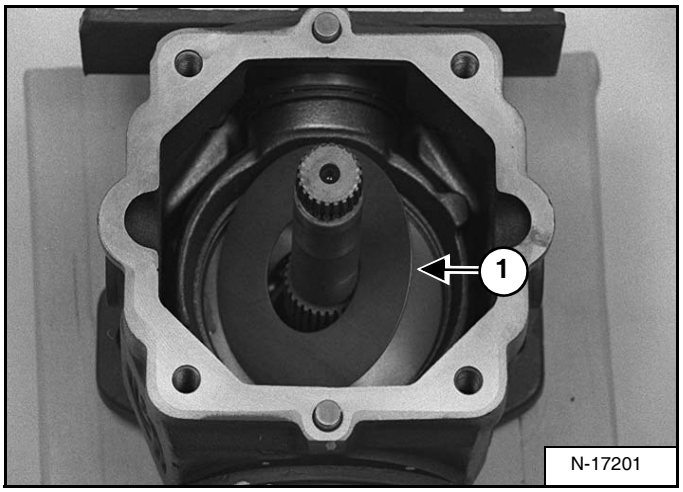
Check the ball guide retainer (Item 1) and washer (Item 2) for wear and replace as needed **[Figure 30-40-20]**.

Remove the four pins (Item 3) **[Figure 30-40-20]** from the cylinder block.

Check the cylinder block for wear and replace as needed.

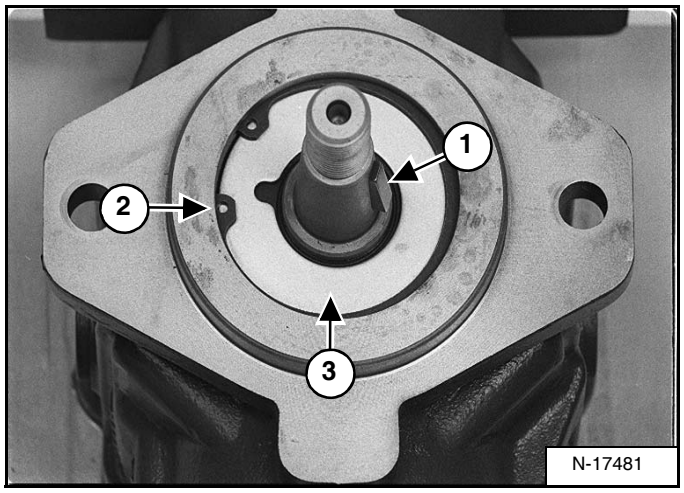
Check pins (Item 3) **[Figure 30-40-20]** to see if they are all the same length.

Figure 30-40-21



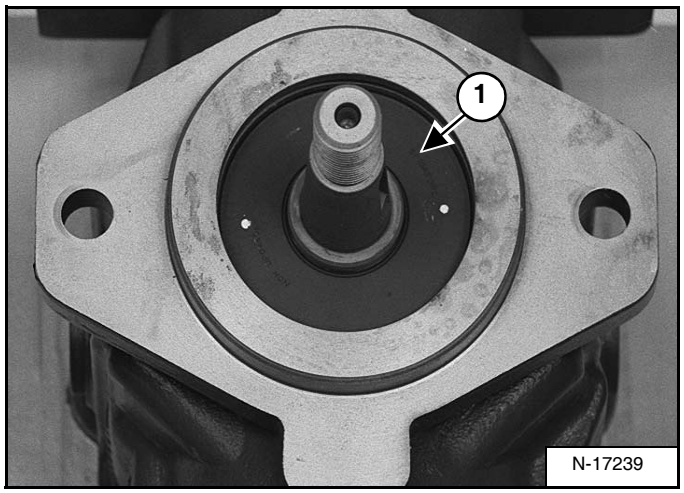
Remove the thrust plate (Item 1) **[Figure 30-40-21]** from the pump housing.

Figure 30-40-22



Remove the driveshaft key (Item 1) the snap ring (Item 2) and the support washer (Item 3) from the drive shaft end of the pump **[Figure 30-40-22]**.

Figure 30-40-23

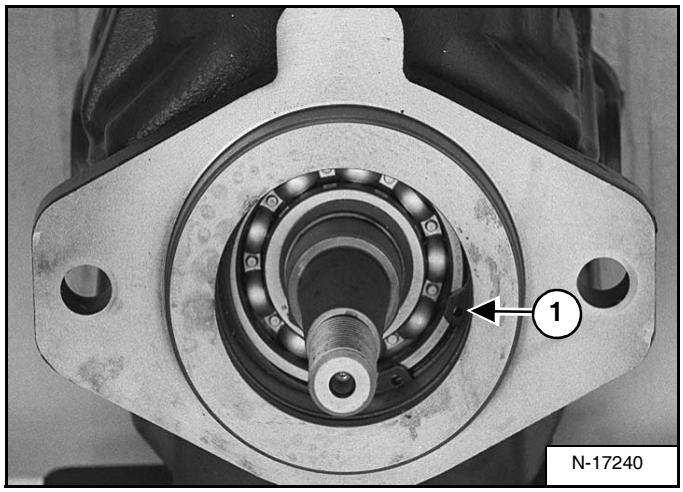


Use a seal puller and remove the seal (Item 1) **[Figure 30-40-23]** from the pump housing.

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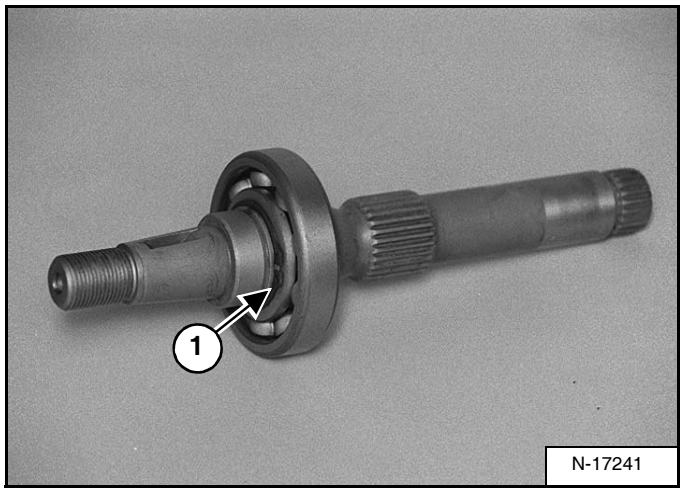
Disassembly (Cont'd)

Figure 30-40-24



Remove the snap ring (Item 1) **[Figure 30-40-24]** from the pump housing and remove the driveshaft and bearing from the housing.

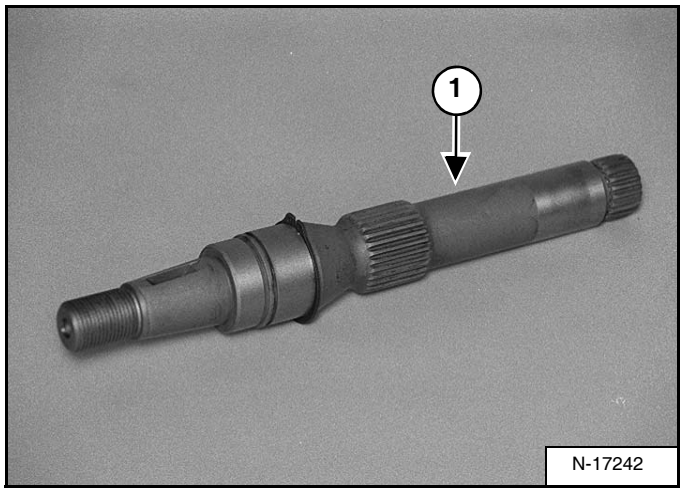
Figure 30-40-25



Remove the snap ring (Item 1) **[Figure 30-40-25]** from the driveshaft and remove the bearing.

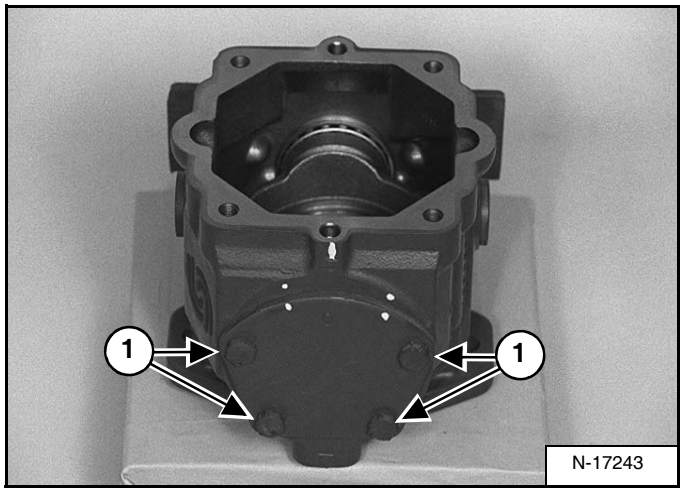
Check the bearing for wear and replace if worn.

Figure 30-40-26



Check the pump shaft (Item 1) **[Figure 30-40-26]** for wear and replace if needed.

Figure 30-40-27

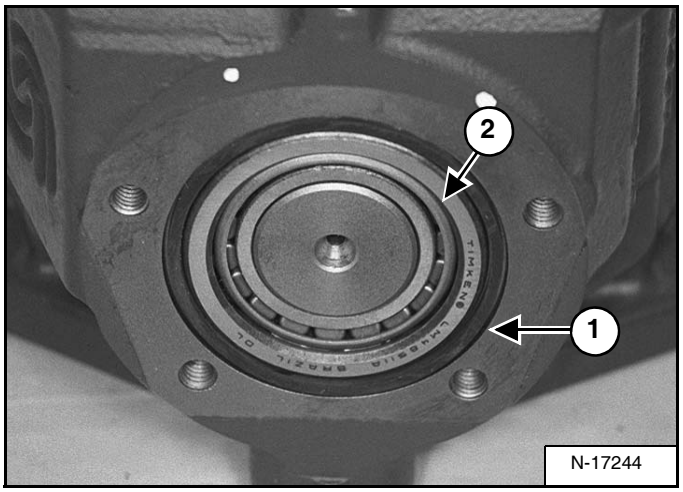


Remove the four mount bolts (Item 1) **[Figure 30-40-27]** from the lower trunnion cover. Remove the cover.

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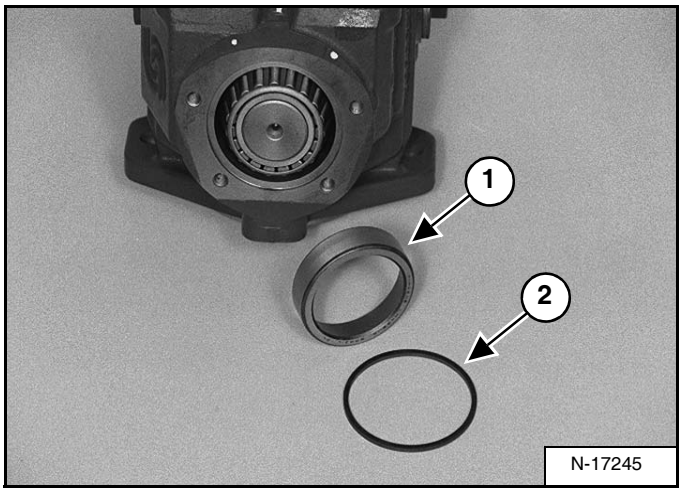
Disassembly (Cont'd)

Figure 30-40-28



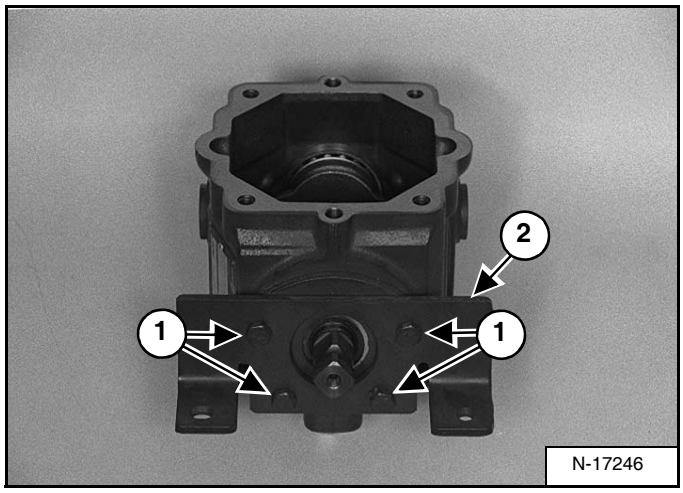
Remove the O-ring (Item 1) and bearing race (Item 2) from the pump housing **[Figure 30-40-28]**.

Figure 30-40-29



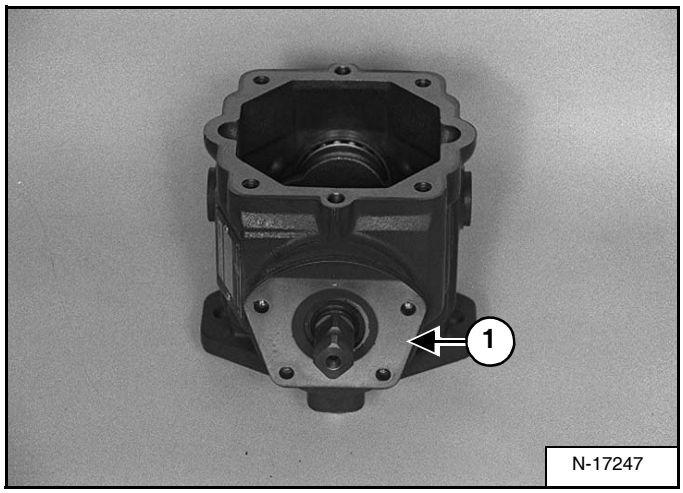
Check the bearing race (Item 1) and O-ring (Item 2) for wear and replace as needed **[Figure 30-40-29]**.

Figure 30-40-30



Remove the four mount bolts (Item 1) from the pump housing and remove the linkage bracket (Item 2) **[Figure 30-40-30]**.

Figure 30-40-31

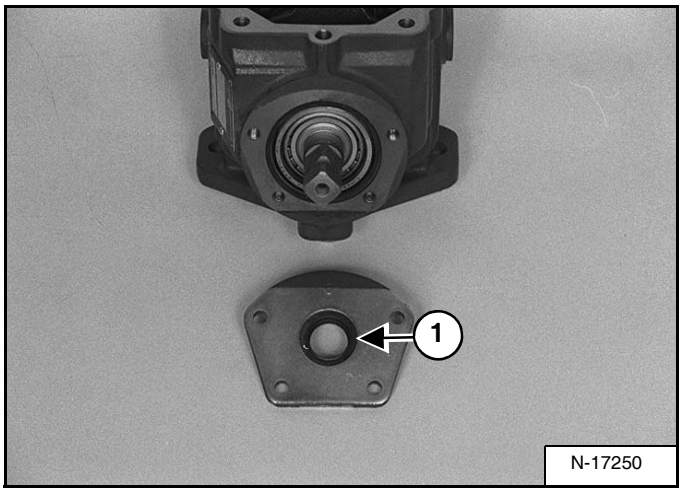


Remove the upper trunnion cover (Item 1) **[Figure 30-40-31]**.

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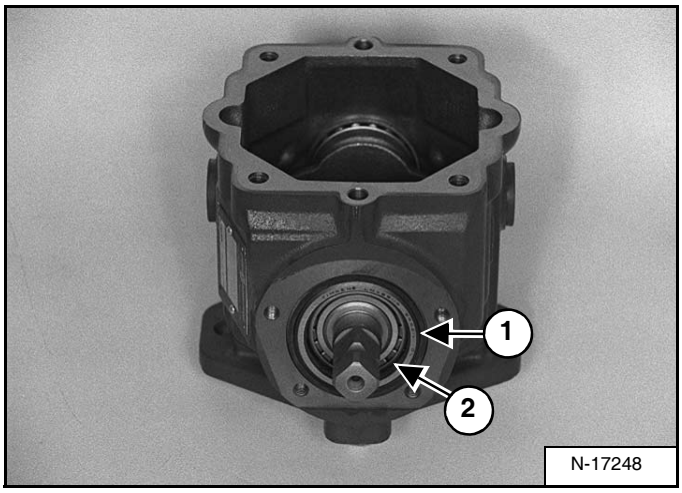
Disassembly (Cont'd)

Figure 30-40-32



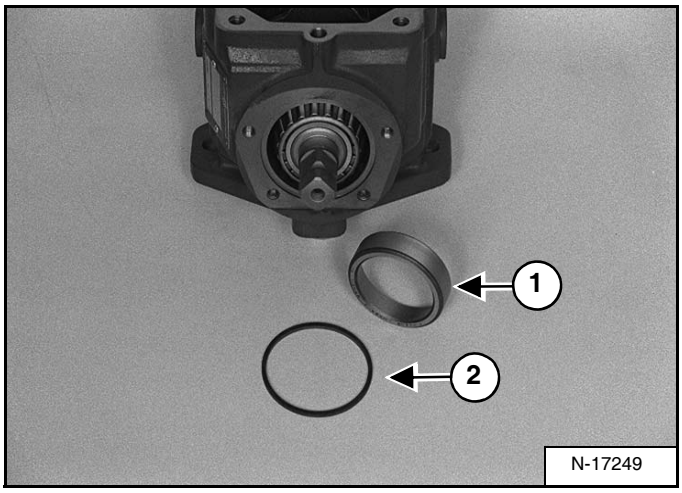
Inspect the seal (Item 1) **[Figure 30-40-32]** in the upper trunnion cover and replace if needed.

Figure 30-40-33



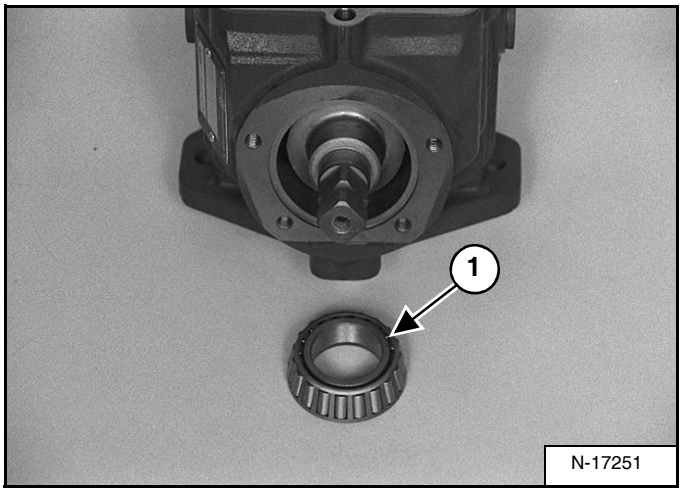
Remove the O-ring (Item 1) **[Figure 30-40-33]** and bearing race (Item 2) **[Figure 30-40-33]** from the pump housing.

Figure 30-40-34



Inspect the bearing race (Item 1) and O-ring (Item 2) **[Figure 30-40-34]** and replace as needed.

Figure 30-40-35

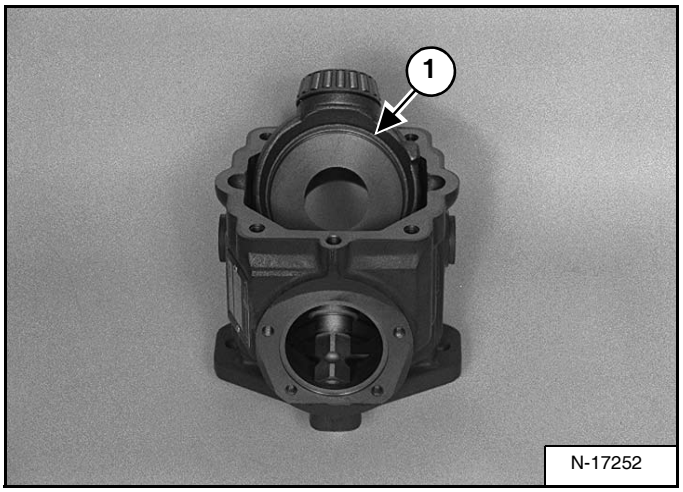


Slide the swashplate from side to side and remove the tapered roller bearing (Item 1) **[Figure 30-40-35]** from the swashplate shaft.

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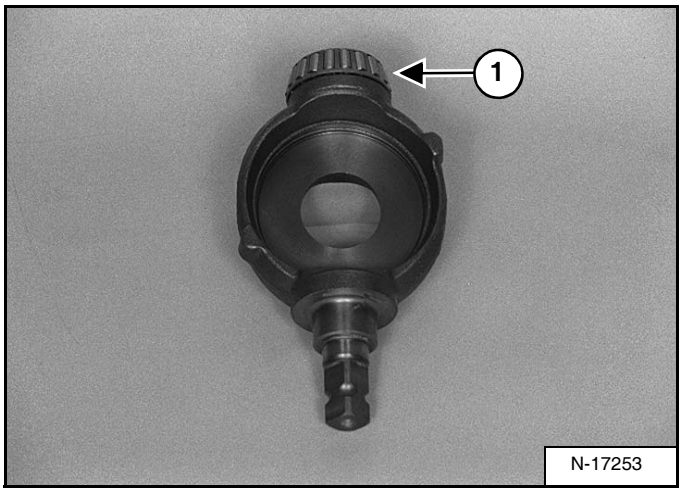
Assembly

Figure 30-40-36



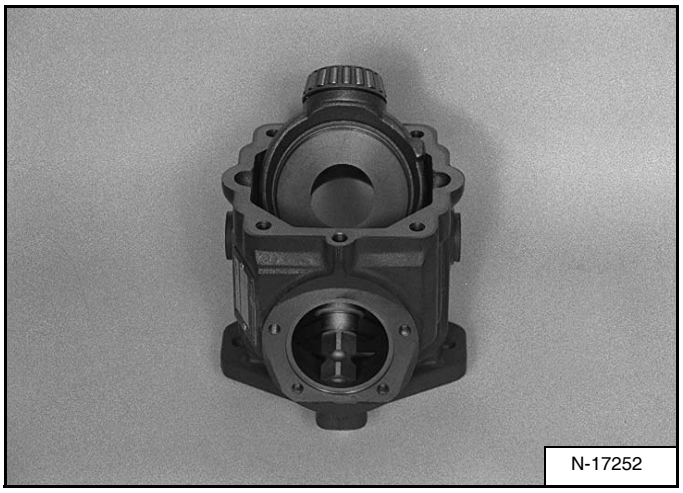
Tilt the swashplate (Item 1) **[Figure 30-40-36]** and remove the swashplate and lower bearing from the pump housing.

Figure 30-40-37



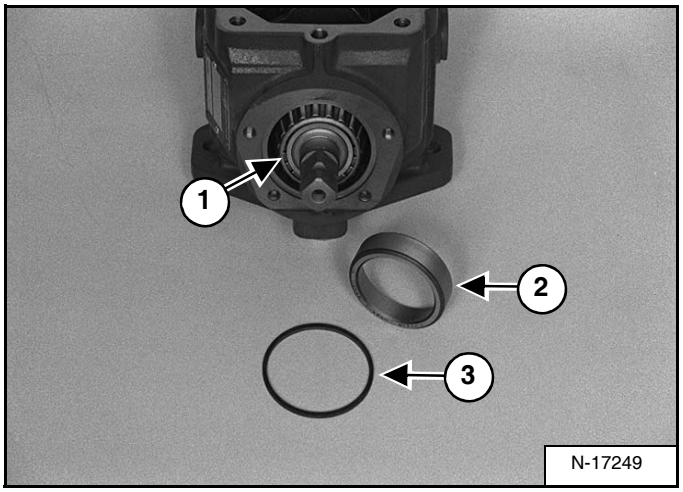
Install the lower bearing (Item 1) **[Figure 30-40-37]** on the swashplate.

Figure 30-40-38



Install the swashplate and bearing into the pump housing **[Figure 30-40-38]**.

Figure 30-40-39

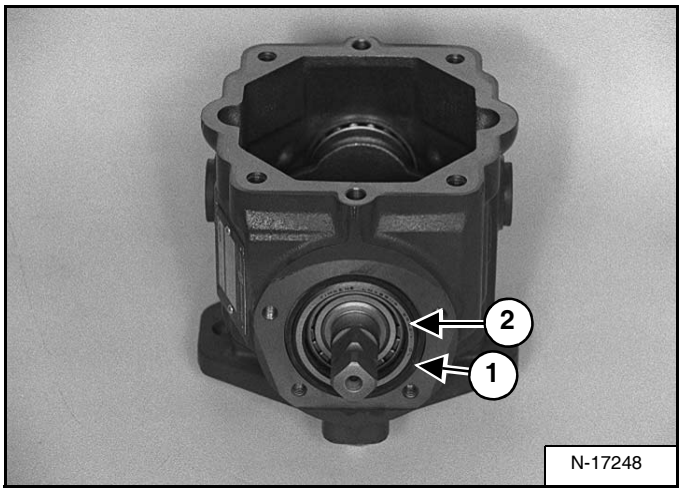


Install the tapered bearing (Item 1) **[Figure 30-40-39]** on the swashplate shaft.

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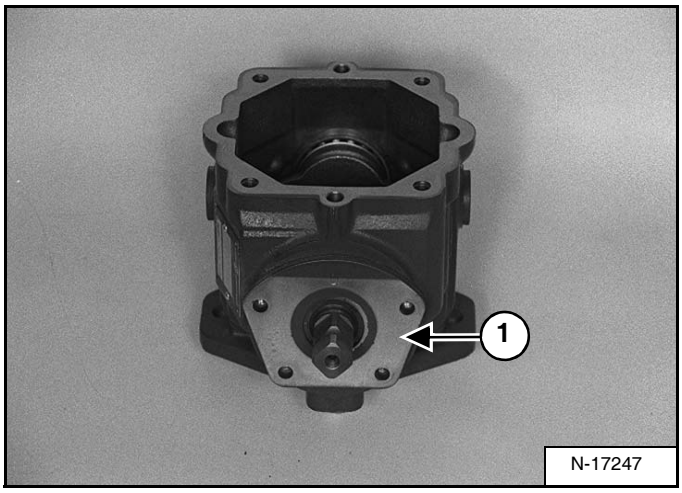
Assembly (Cont'd)

Figure 30-40-40



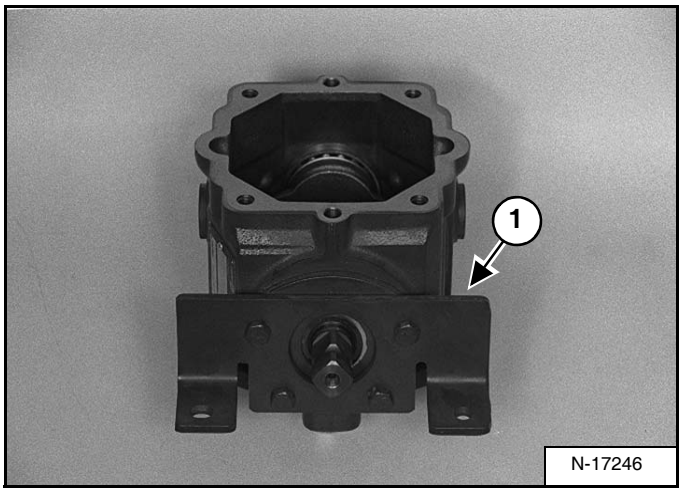
Install the bearing race (Item 1) and O-ring (Item 2) as shown in **[Figure 30-40-40]**.

Figure 30-40-41



Install the upper trunnion seal (Item 1) **[Figure 30-40-41]** and cover.

Figure 30-40-42



Install the linkage bracket (Item 1) **[Figure 30-40-42]** and the four mounting bolts and tighten to 18-22 ft.-lb. (24-30 N•m) torque.

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Assembly (Cont'd)

Figure 30-40-43

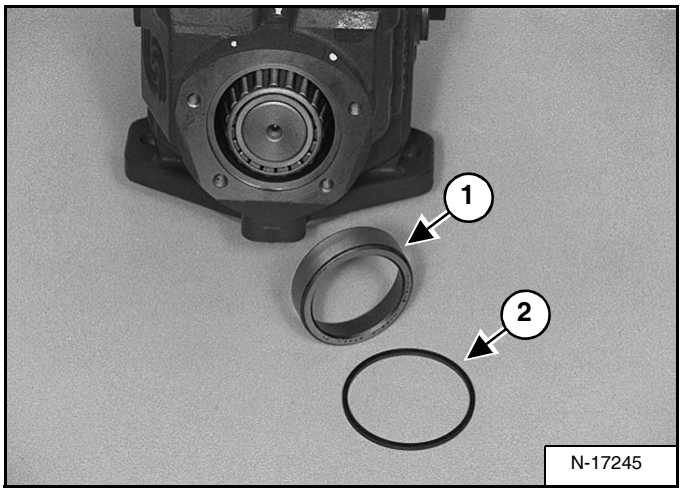
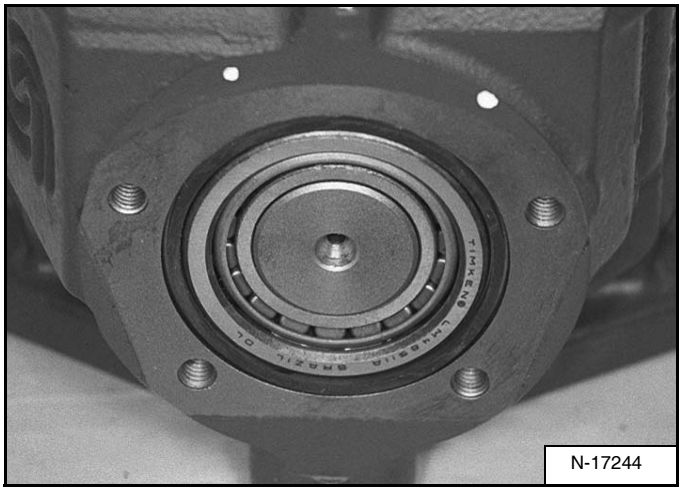
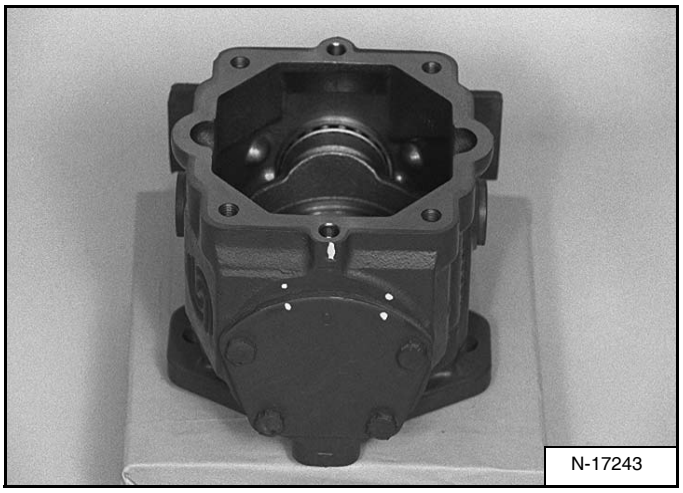


Figure 30-40-44



Install the bearing race (Item 1) and O-ring (Item 2) at the lower trunnion as shown in **[Figure 30-40-44]**.

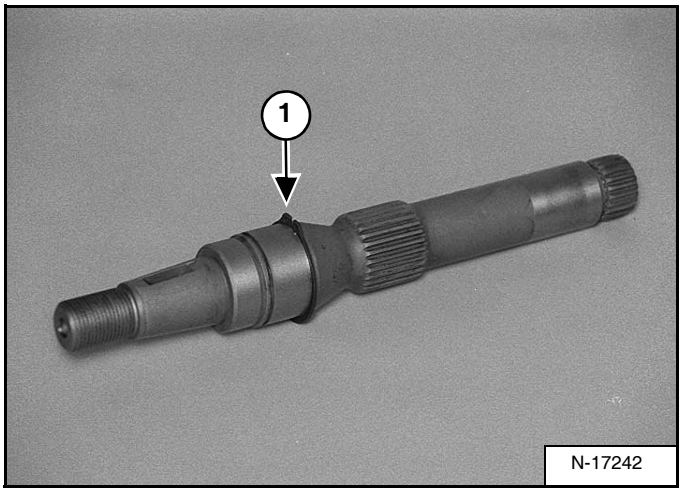
Figure 30-40-45



Align the marks on the lower trunnion cover and pump housing as shown in **[Figure 30-40-45]**.

Install the four mounting bolts and tighten to 18-22 ft.-lb. (24-30 N•m) torque.

Figure 30-40-46

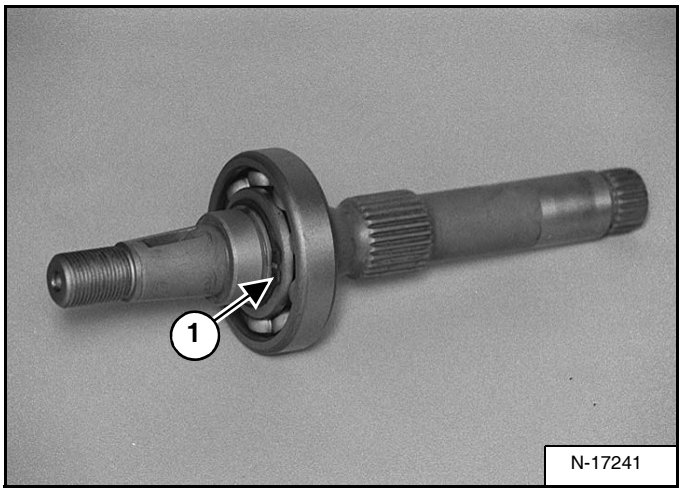


Install the snap ring (Item 1) **[Figure 30-40-46]** on the pump shaft.

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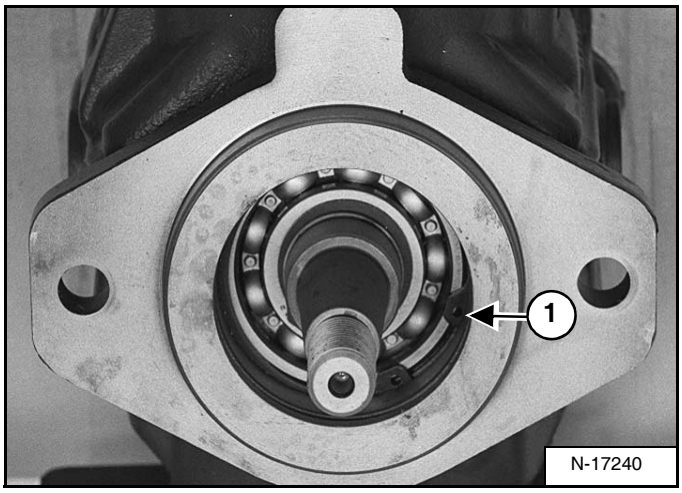
Assembly (Cont'd)

Figure 30-40-47



Install the bearing and snap ring (Item 1) **[Figure 30-40-47]** on the pump shaft.

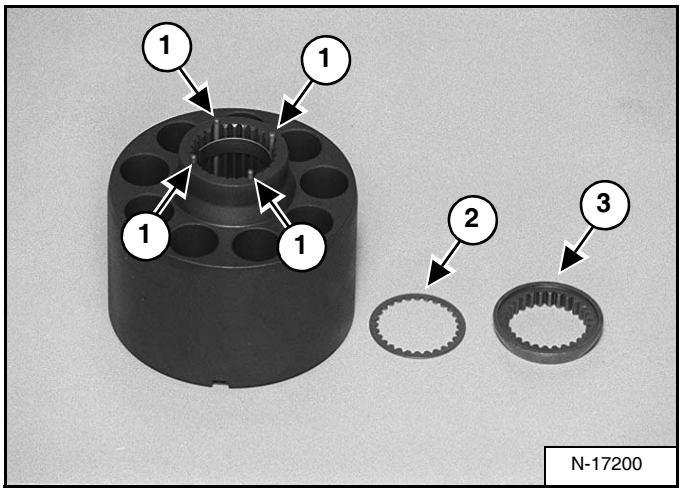
Figure 30-40-48



Install the pump shaft into the pump housing **[Figure 30-40-48]**.

Install the snap ring (Item 1) **[Figure 30-40-48]**.

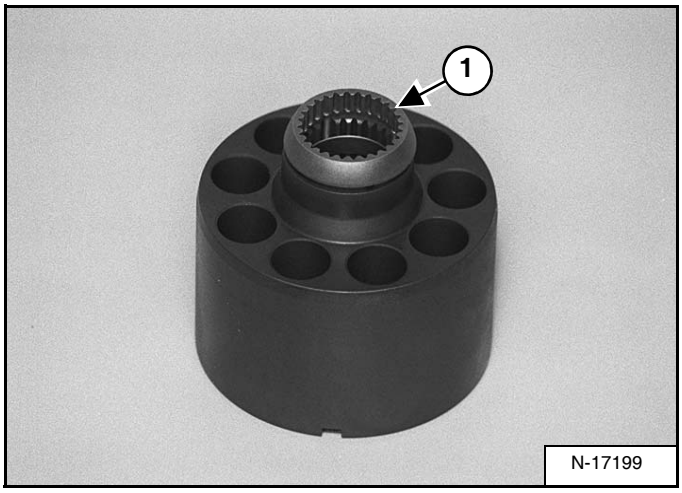
Figure 30-40-49



Install the four slipper pins (Item 1) **[Figure 30-40-49]** into the cylinder block.

Apply a small amount of grease to the washer (Item 2) and install into the ball guide retainer (Item 3) **[Figure 30-40-49]**.

Figure 30-40-50

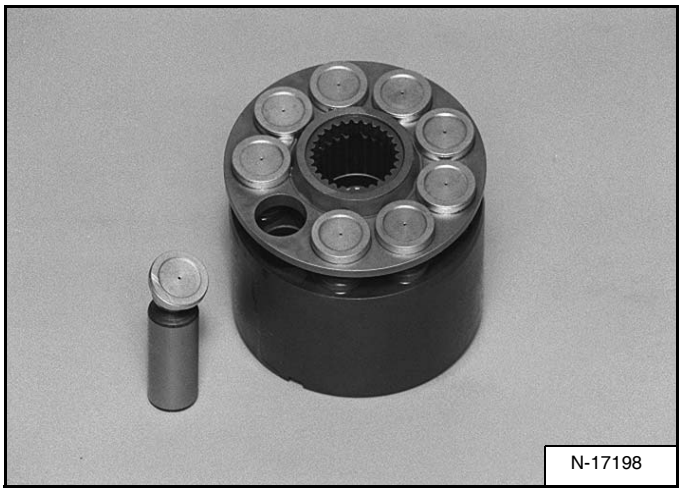


Install the ball guide retainer and washer (Item 1) **[Figure 30-40-50]** onto the slipper holddown pins.

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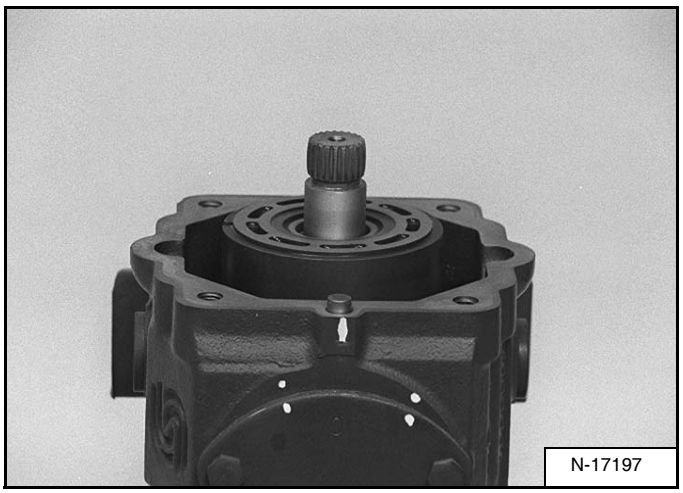
Assembly (Cont'd)

Figure 30-40-51



Assemble the piston assemblies into the slipper guide. Lubricate the pistons and cylinder block bores and insert the piston assemblies into the cylinder bores **[Figure 30-40-51]**.

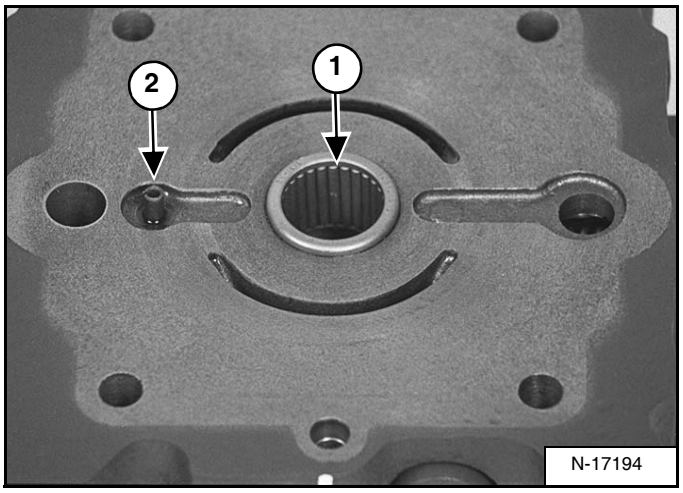
Figure 30-40-52



Lay the pump housing on its side and install the cylinder block, piston assembly into the housing.

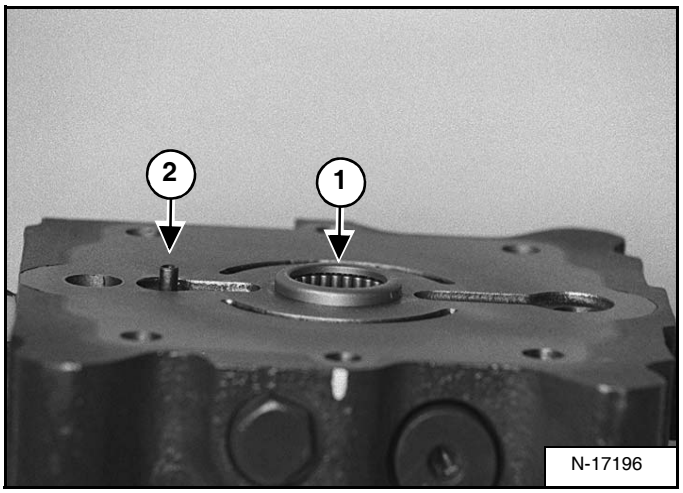
Place the pump on a work surface with the end cap opening up **[Figure 30-40-52]**.

Figure 30-40-53



Replace the needle bearing (Item 1) and valve plate locating pin (Item 2) in the charge pump **[Figure 30-40-53]**.

Figure 30-40-54



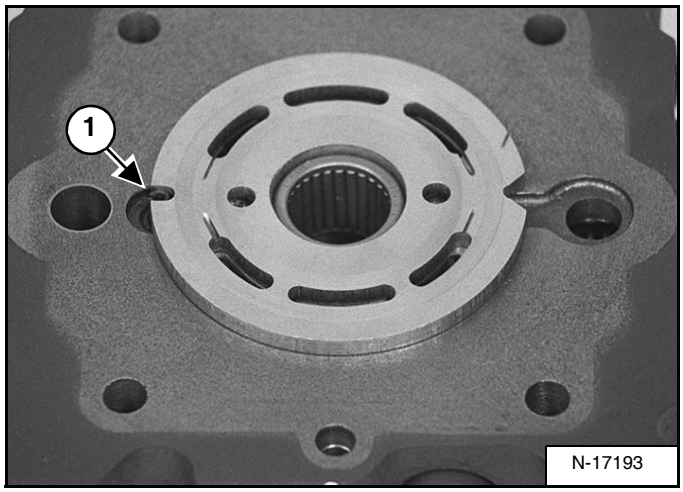
The bearing cage (Item 1) **[Figure 30-40-54]** will protrude from 0.08-0.10 inch (2,0-2,5 mm) from the surface of the charge pump.

The valve plate locating spring pin (Item 2) **[Figure 30-40-54]** will protrude from 1.65-0.185 inch (4,19-4,70 mm) from the surface of the charge pump.

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Assembly (Cont'd)

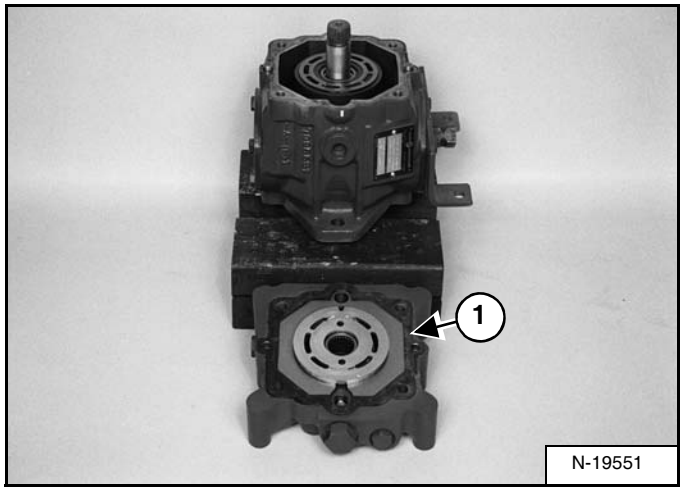
Figure 30-40-55



Coat the backside of the valve plate with petroleum jelly to hold it in position and install the valve plate onto the charge pump, bronze face up **[Figure 30-40-55]**.

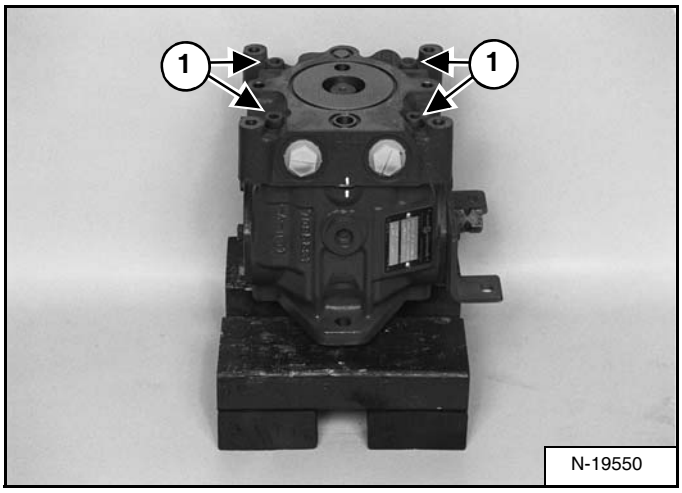
The notch (Item 1) **[Figure 30-40-55]** on the valve plate must engage the locating pin.

Figure 30-40-56



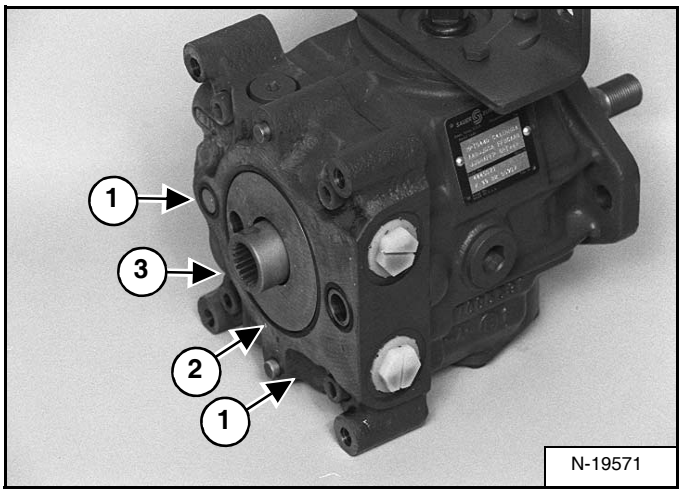
Coat a new end cap gasket (Item 1) **[Figure 30-40-56]** with petroleum jelly and install onto the end cap.

Figure 30-40-57



Install the valve plate and end cap on the pump housing. Tighten the bolts (Item 1) **[Figure 30-40-57]** to 35-45 ft.-lb. (47-61 N•m) torque.

Figure 30-40-58



Install the two small O-rings (Item 1) **[Figure 30-40-58]**.

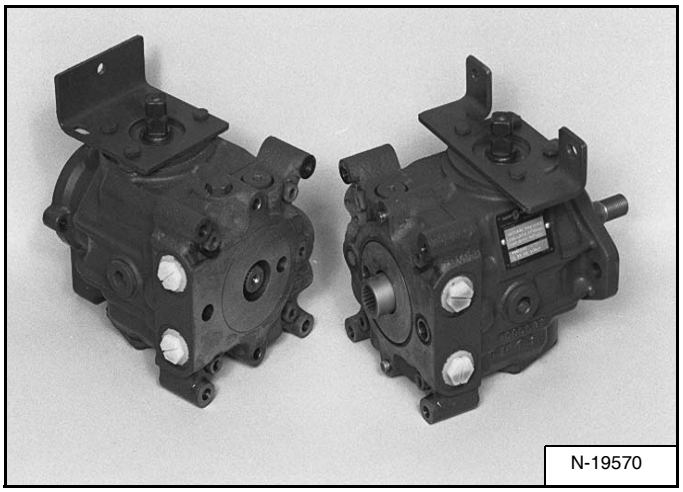
Install the large new O-ring (Item 2) **[Figure 30-40-58]**.

Install the pump coupler (Item 3) **[Figure 30-40-58]**.

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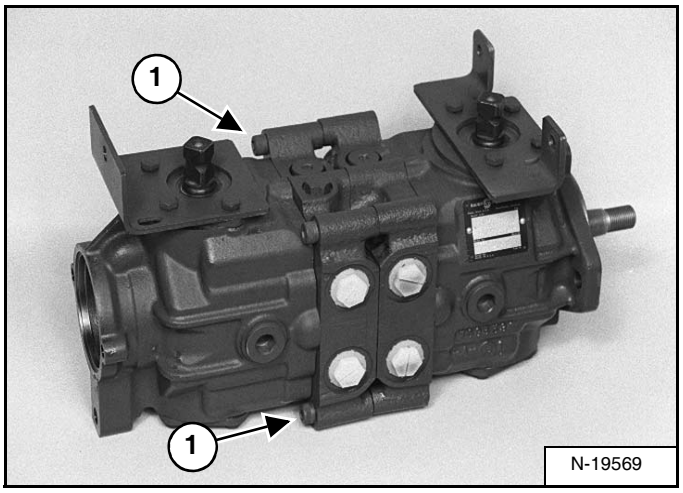
Assembly (Cont'd)

Figure 30-40-59



Install the two pumps together **[Figure 30-40-59]**.

Figure 30-40-60



Tighten the four bolts (Item 1) **[Figure 30-40-60]** to 35-45 ft.-lb. (47-61 N•m) torque.

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HYDROSTATIC PUMP (SJC)

Description

The SJC hydrostatic pump is a fully proportional dual piston pump in one pump casing. The endcaps are removable to gain access to the rotating assemblies.

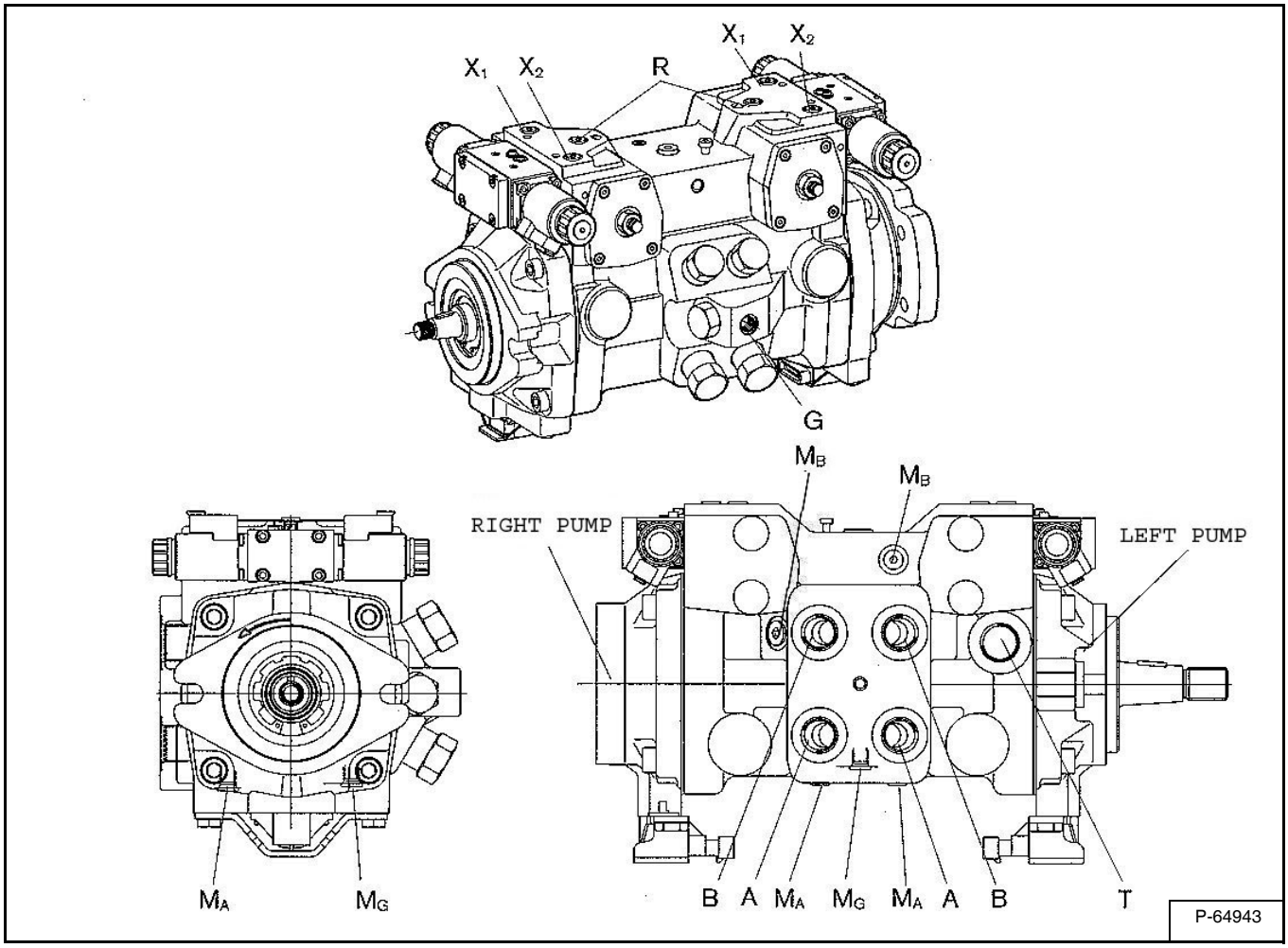
The hydraulic controllers are fed charge pressure from an external charge pump. 12 volt electrical solenoids shift a spool in the hydraulic controller that directs flow to a servo piston.

The servo piston strokes the swash plate in the rotating group. The rotating group generates flow to the A or B ports on the hydrostatic pump. The flow from the A and B ports is sent to the hydrostatic drive motors where forward or reverse drive motor rotation is obtained.

There are swash plate angle sensors on the bottom of the pump that monitor swash plate movement.

Ports are labeled on the hydrostatic pump casting.

Figure 30-41-1



A,B Service Line Ports (High Pressure Outlet Ports to Drive Motors)

T_1 Case Drain Port

M_A Operating Pressure of "A" Port

M_B Operating Pressure of "B" Port

R Air Bleed Port

X_1,X_2 Control Pressure Gauge Port

G Charge Pressure Inlet Port

M_G Gauge Port For Charge Pressure

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Hydraulic Controller Removal And Installation

The loader's right hand side hydraulic controller can be removed with the hydrostatic pump still in the loader. The loader's left hand side hydraulic controller can only be removed when the hydrostatic pump is separated from the engine/hydrostatic pump cast mount.

Controller solenoids can be bled of trapped air in the controller. This should be performed when hydraulic controllers are replaced, removed or uncommanded oscillations in the controls are present.

Raise the lift arms and install and approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Place the loader on jack stands. ((See Procedure on Page 10-10-1.)

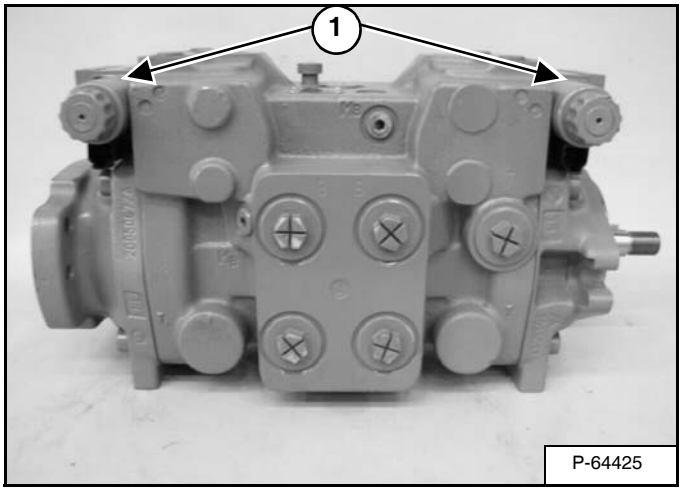
⚠ WARNING

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

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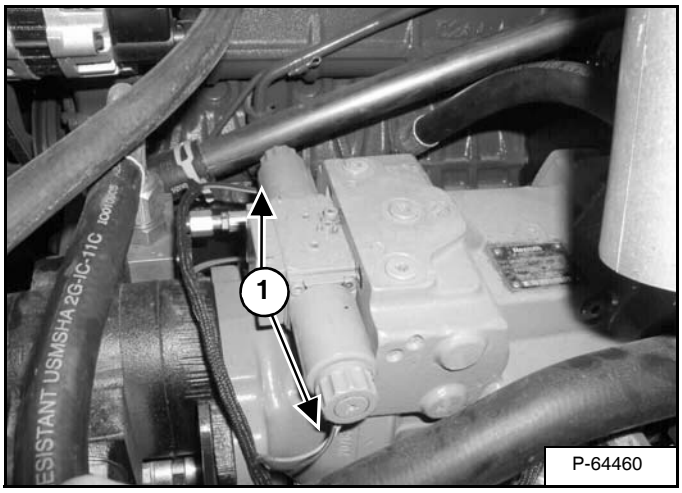
Raise the operator cab. ((See Raising The Operator Cab on Page 10-30-1.)

Figure 30-41-2



Locate the two hydraulic controllers (Item 1) **[Figure 30-41-2]** on the hydrostatic pumps.

Figure 30-41-3



Disconnect all of the electrical harness connectors (Item 1) **[Figure 30-41-3]** from the loader harness.

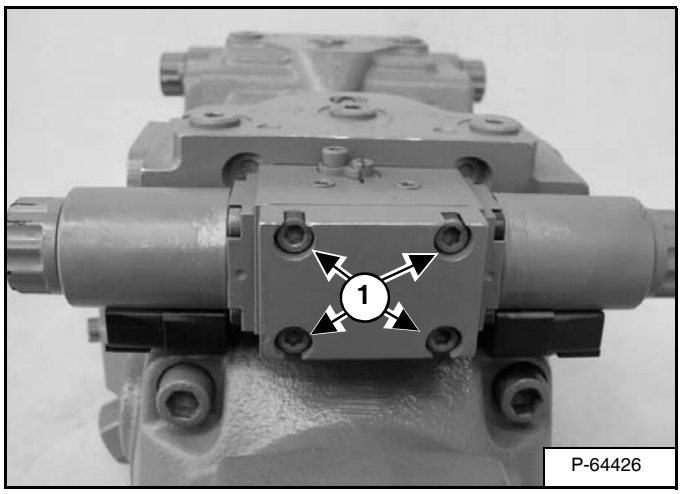
Removal:

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 30-41-4

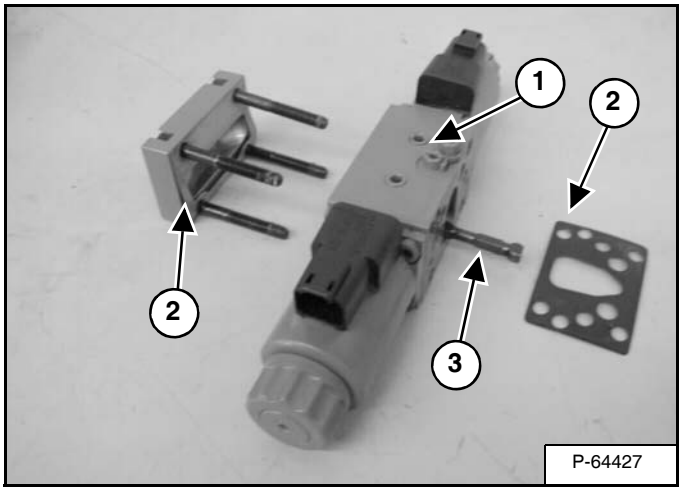


Remove the four mount bolts (Item 1) **[Figure 30-41-4]** from the hydraulic controller.

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Hydraulic Controller Removal And Installation (Cont'd)

Figure 30-41-5

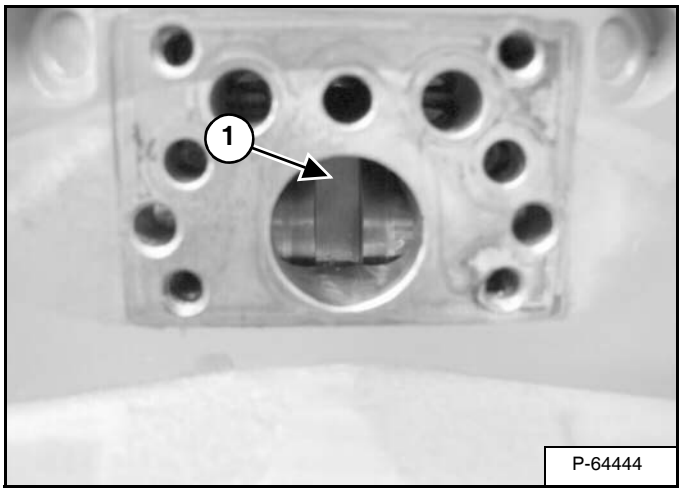


Remove the controller (Item 1) **[Figure 30-41-5]** from the pump.

Remove the controller gaskets (Item 2) **[Figure 30-41-5]** from the pump.

Installation:

Figure 30-41-6

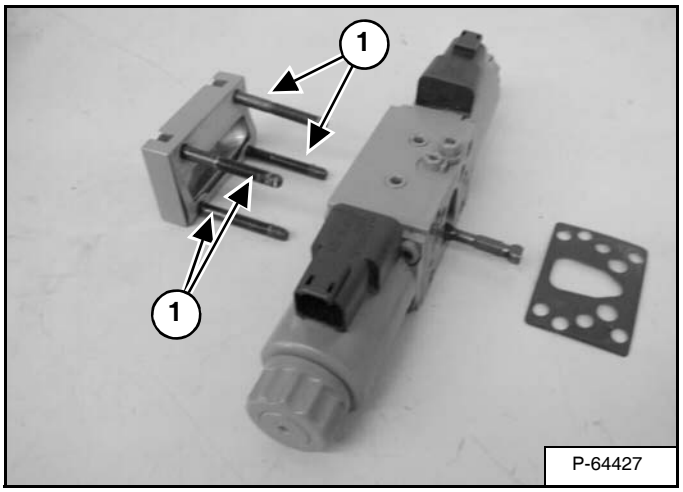


Be sure the feedback lever (Item 3) **[Figure 30-41-5]** is in the center of the servo piston groove (Item 1) **[Figure 30-41-6]**.

Use a small amount of grease on a new gasket and install the gasket on the hydraulic controller (Item 1) **[Figure 30-41-5]**.

Be sure the pump surface is clean.

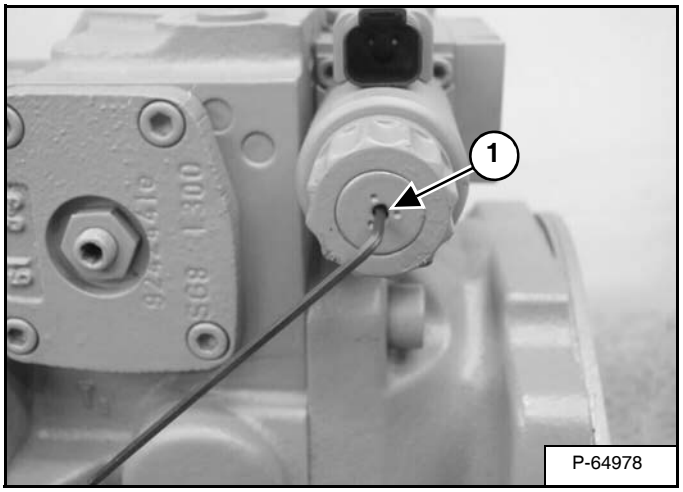
Figure 30-41-7



Alternately tighten bolts (Item 1) **[Figure 30-41-7]** to 7.7 ft.-lb. (10,4 N•m) torque. Ensure bolts are tight to specifications.

NOTE: When a hydraulic controller is replaced, the hydrostatic pumps must be calibrated. (See Hydraulic Controller Neutral Adjustment on Page 30-41-28.)

Figure 30-41-8



With the engine running and the loader on jack stands: Bleed the trapped air in the controller by loosening the small set screw (Item 1) **[Figure 30-41-8]** a maximum of 2 turns. Leave the screw loose until oil comes dripping out of the set screw. Tighten set screw to 18 in.-lb. (2 N•m) torque.

Repeat the bleeding procedure for all of the solenoids.

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Removal And Installation

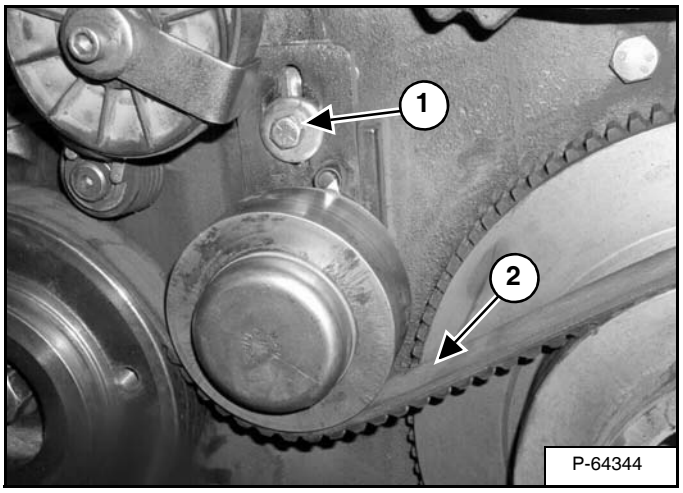
Remove the hydrostatic pump/engine assembly from the loader. ((See Removal And Installation on Page 70-80-1.)

IMPORTANT

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

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Figure 30-41-9

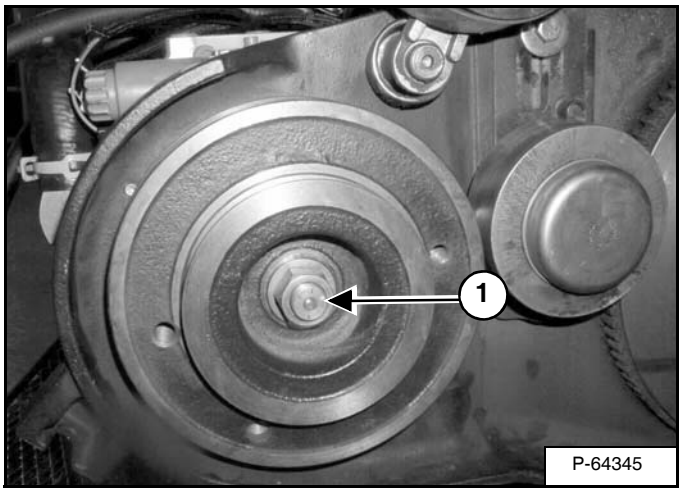


Loosen the tensioner mount bolt (Item 1) **[Figure 30-41-9]**.

Remove the drive belt (Item 2) **[Figure 30-41-9]**.

Installation: (See Drive Belt Replacement on Page 30-50-3.)

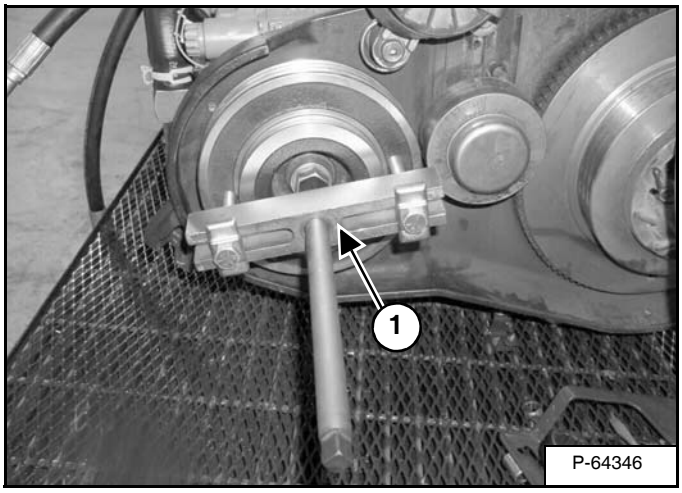
Figure 30-41-10



Loosen the washer and nut (Item 1) **[Figure 30-41-10]** on the hydrostatic pump drive shaft.

Installation: Tighten the nut to 175-200 ft.-lb. (237-271 N•m) torque

Figure 30-41-11



Use a puller (Item 1) **[Figure 30-41-11]** to loosen the pulley from the pump drive shaft.

NOTE: DO NOT strike puller or pump shaft with a hammer. Internal pump damage may result.

Remove the nut and washer from the pump drive shaft.

Remove the pump pulley from the pump drive shaft.

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Removal And Installation (Cont'd)

Figure 30-41-12

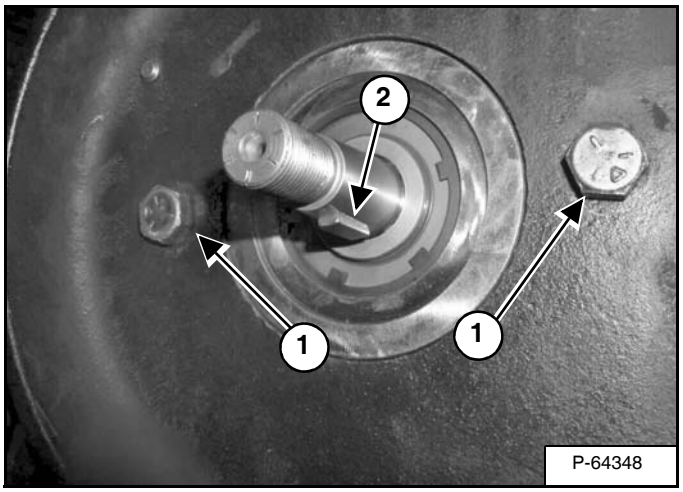
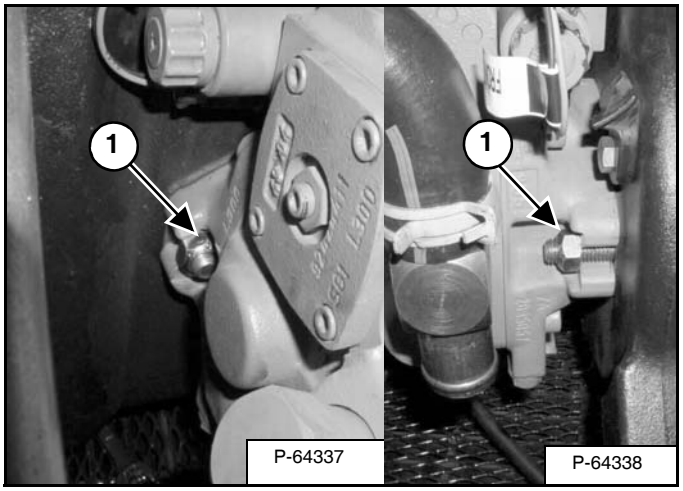


Figure 30-41-13

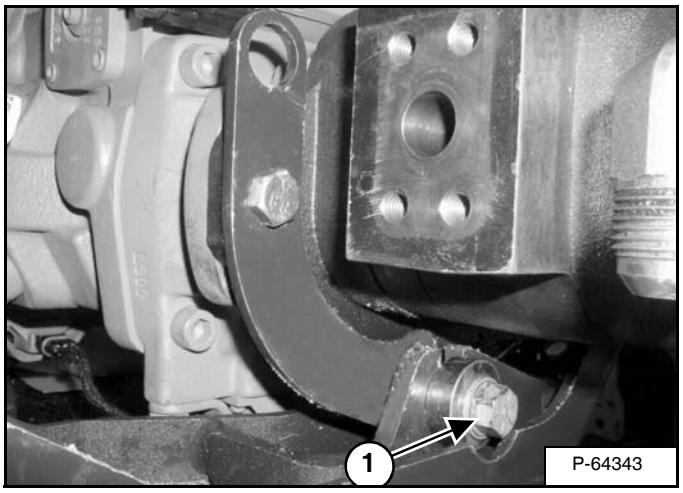


Remove the two mounting bolts (Item 1) **[Figure 30-41-12]** and nuts (Item 1) **[Figure 30-41-13]**.

Installation: Tighten the mounting bolts and nuts to 65-70 ft.-lb. (88-95 N•m) torque.

Make sure the key (Item 2) **[Figure 30-41-12]** is installed.

Figure 30-41-14

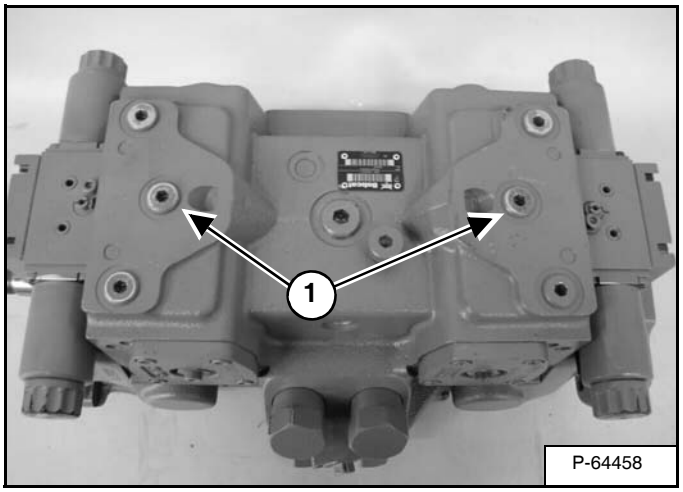


Remove the mounting bolt (Item 1) **[Figure 30-41-14]** at the hydraulic pump mounting bracket.

Remove the hydrostatic pump from the mounting bracket and drive belt housing.

NOTE: The mounting bolt is a special purpose bolt. Only replace with original Bobcat Parts.

Figure 30-41-15



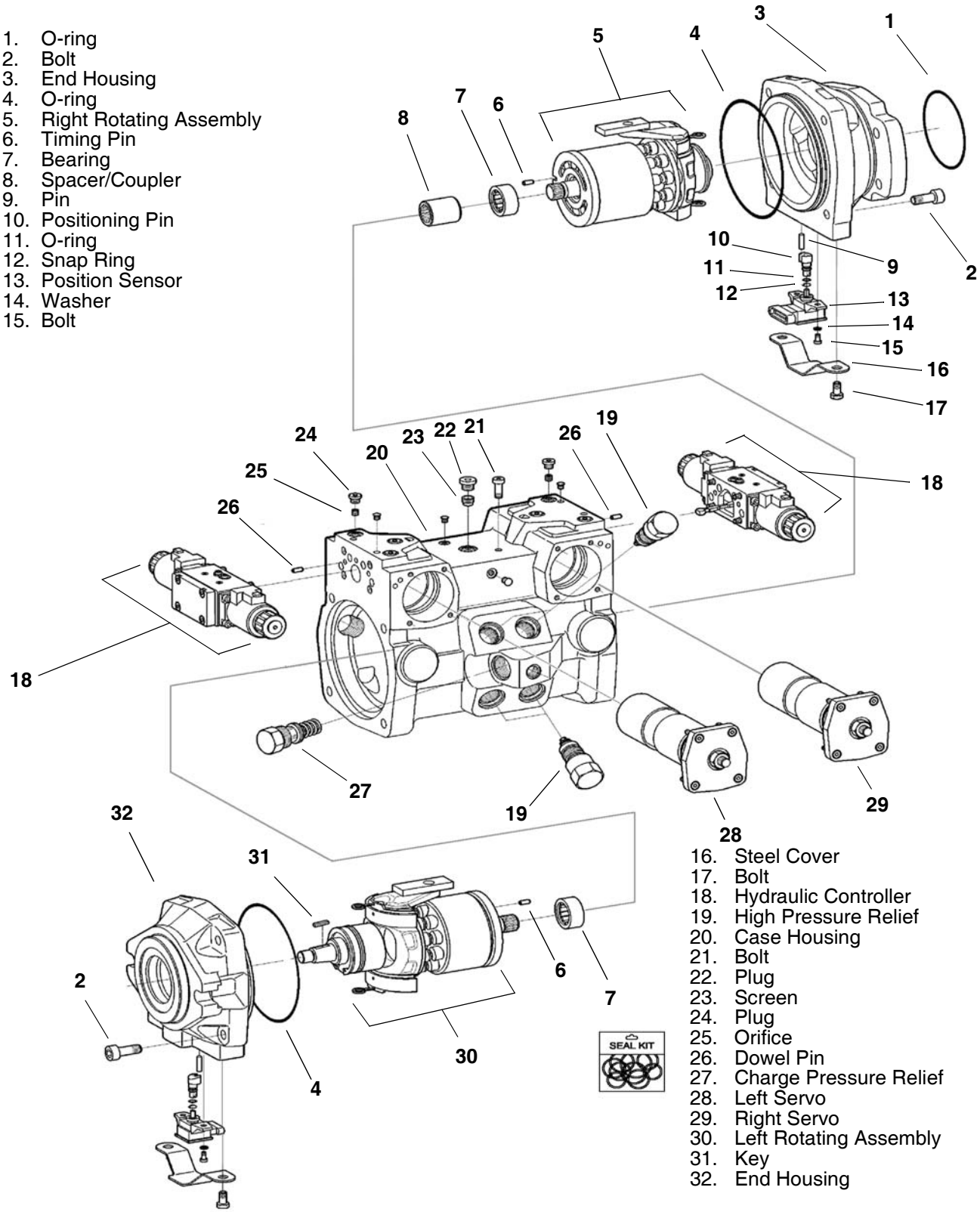
Remove the air bleed plugs (Item 1) **[Figure 30-41-15]**.

BEFORE START UP: Fill one of the air bleed ports with new hydraulic oil until the hydraulic oil flows out of the other air bleed port. This will remove trapped air in the hydrostatic pumps before start up.

Assembly: Tighten plugs to 18 ft.-lb. (25 N•m) torque.

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Parts Identification



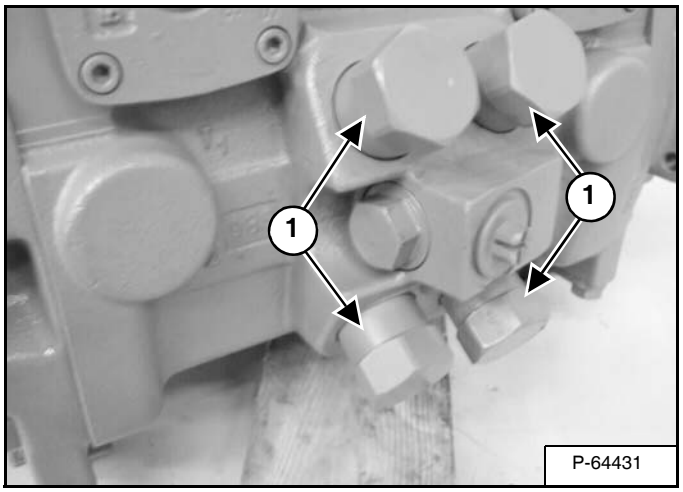
1. O-ring
2. Bolt
3. End Housing
4. O-ring
5. Right Rotating Assembly
6. Timing Pin
7. Bearing
8. Spacer/Coupler
9. Pin
10. Positioning Pin
11. O-ring
12. Snap Ring
13. Position Sensor
14. Washer
15. Bolt
16. Steel Cover
17. Bolt
18. Hydraulic Controller
19. High Pressure Relief
20. Case Housing
21. Bolt
22. Plug
23. Screen
24. Plug
25. Orifice
26. Dowel Pin
27. Charge Pressure Relief
28. Left Servo
29. Right Servo
30. Left Rotating Assembly
31. Key
32. End Housing

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High Pressure Relief and By-Pass Valve

Figure 30-41-16

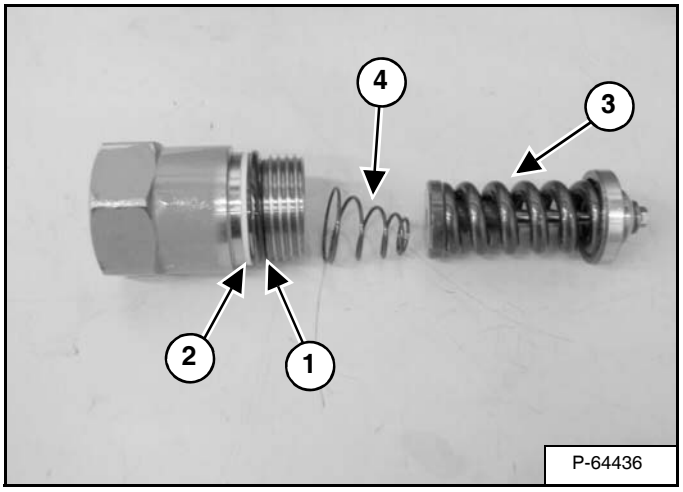


There are four system check relief valves (Item 1) **[Figure 30-41-16]** in the back of the hydrostatic pump.

Remove the relief valve cap (Item 1) **[Figure 30-41-16]**.

Assembly: Tighten cap to 111-125 ft.-lb. (150-170 N•m) torque.

Figure 30-41-17

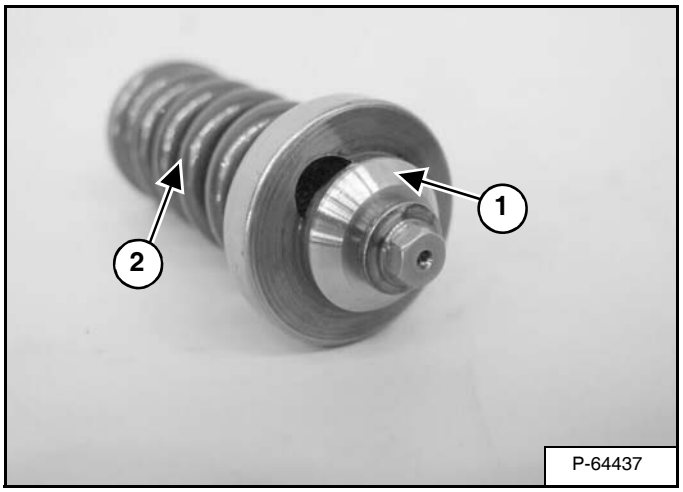


Check the valve cap O-ring (Item 1) and back-up ring (Item 2) **[Figure 30-41-17]**, replace as needed.

Remove relief valve assembly (Item 3) **[Figure 30-41-17]** from the valve cap.

Check the conical spring (Item 4) **[Figure 30-41-17]** to ensure it is not broken or flattened.

Figure 30-41-18



Check the valve seat surface (Item 1) **[Figure 30-41-18]** for scratches and replace as needed.

Inspect the spring (Item 2) **[Figure 30-41-18]** for breakage.

Inspect seats inside case housing.

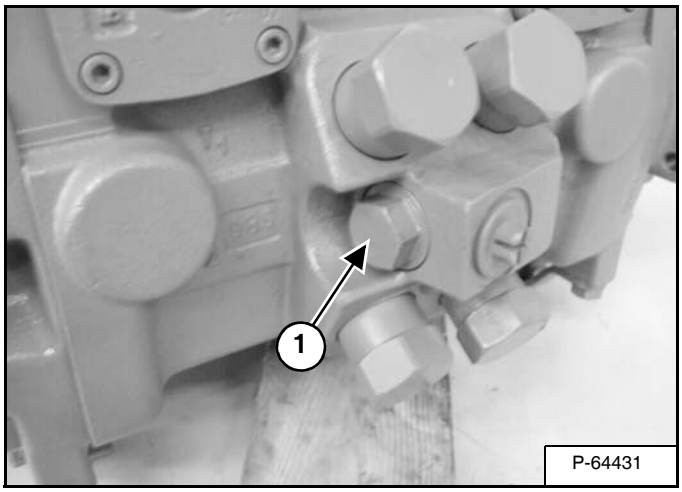
Do not disassemble the relief valve assembly. If replacement is required, replace as an assembly .

Factory setting on the relief valve is 5250 PSI (362 bar).

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Charge Relief Valve

Figure 30-41-19

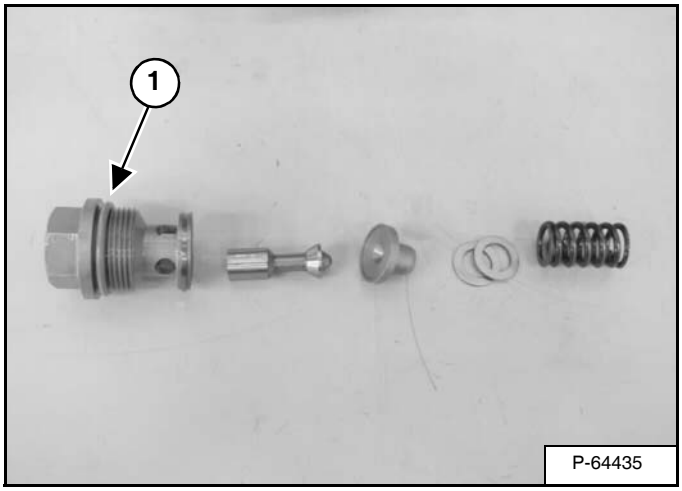


The charge relief valve (Item 1) **[Figure 30-41-19]** is located on the back of the hydrostatic pump.

Remove the charge relief valve.

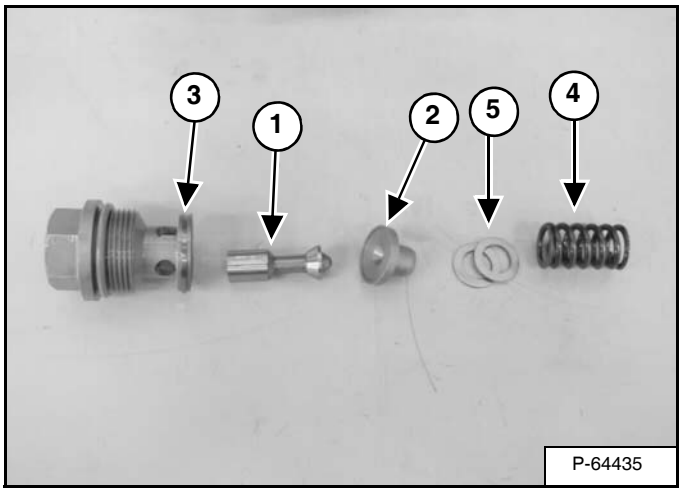
Assembly: Tighten charge relief valve to 52 ft.-lb. (70 N•m) torque.

Figure 30-41-20



Check and replace the O-ring (Item 1) **[Figure 30-41-20]**.

Figure 30-41-21



Inspect the poppet (Item 1) and the mating seat (Item 2) **[Figure 30-41-21]** for damage or foreign material. Ensure the poppet moves freely in it's bore.

Inspect the sealing ring (Item 3) **[Figure 30-41-21]** and the mating seat in the pump housing for damage or foreign material.

Inspect the spring (Item 4) and the charge relief valve shims (Item 5) **[Figure 30-41-21]**.

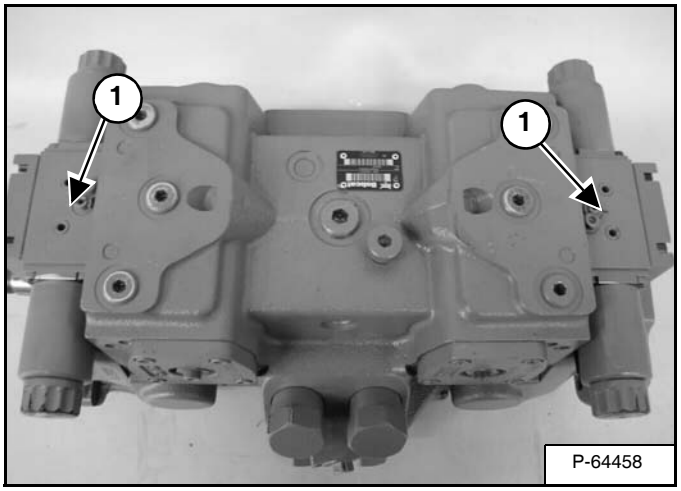
NOTE: 1.0 mm shim (Item 5) [Figure 30-41-21] = 43.5 PSI (3 bar) in pressure change. Adding shims increases charge pressure. Removing shims decreases charge pressure.

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Disassembly and Assembly

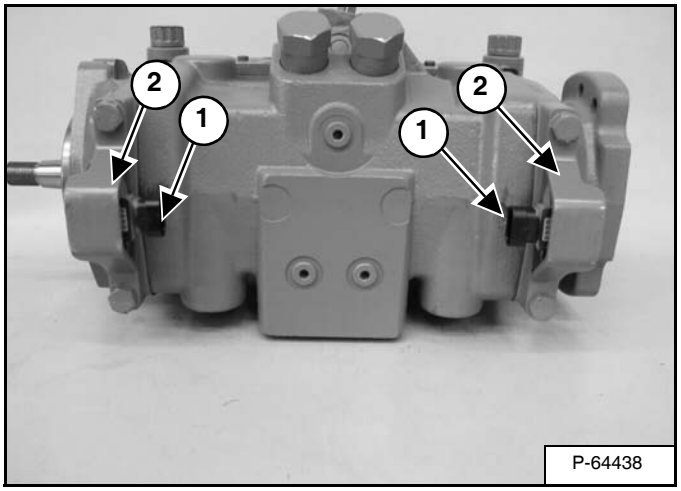
Remove the hydrostatic pump/engine assembly from the loader. ((See Removal And Installation on Page 70-80-1.)

Figure 30-41-22



Remove the hydraulic controllers (Item 1) **[Figure 30-41-22]**. (See Hydraulic Controller Removal And Installation on Page 30-41-2.)

Figure 30-41-23

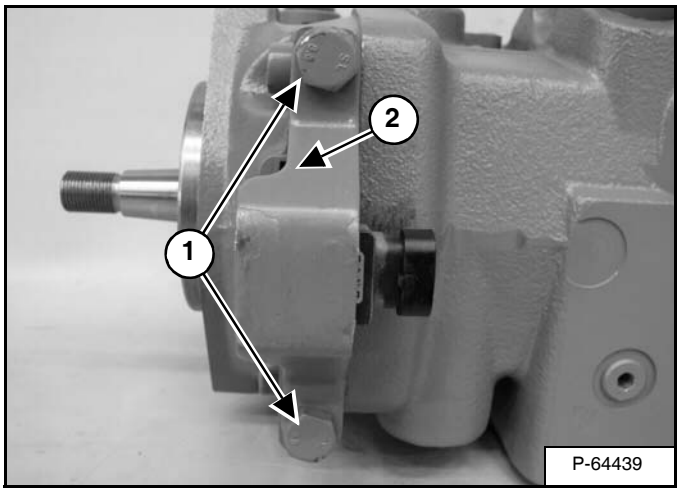


Swashplate angle sensors (Item 1) are mounted on the bottom of the hydrostatic pump. They are protected by steel covers (Item 2) **[Figure 30-41-23]**.

Note the connectors facing each other.

Note the steel covers facing direction.

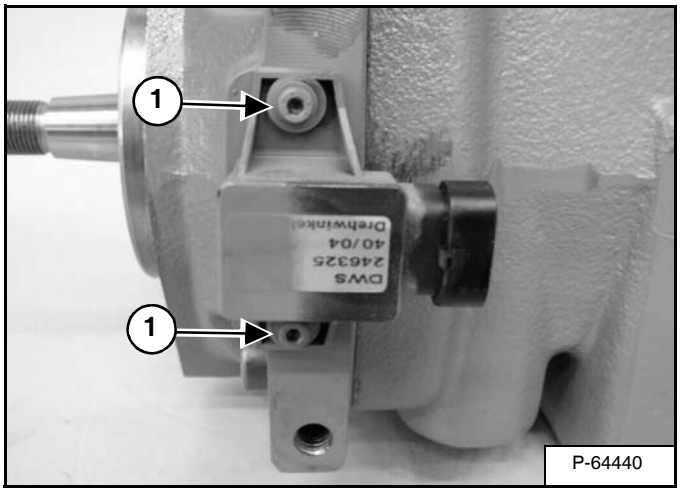
Figure 30-41-24



Remove the bolts (Item 1) mounting the steel covers (Item 2) **[Figure 30-41-24]**.

Assembly: Tighten bolts to 38 ft.-lb. (51 N•m) torque.

Figure 30-41-25



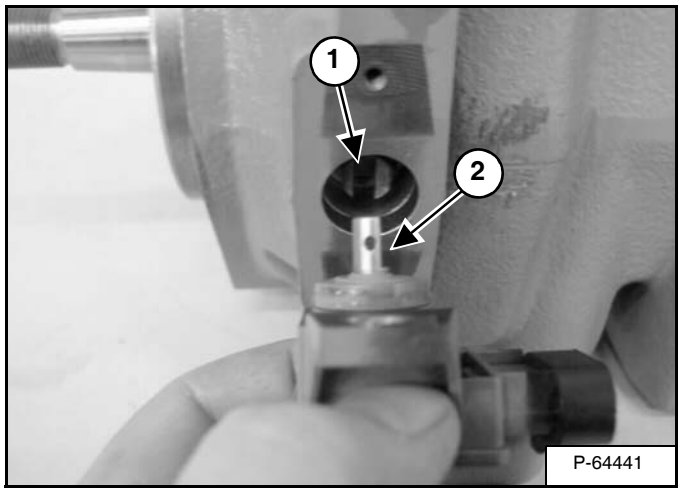
Remove the mounting bolts and washers for the swashplate angle sensor (Item 1) **[Figure 30-41-25]**.

Assembly: Tighten bolts to 27.4 in.-lb. (3,1 N•m) torque.

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Disassembly and Assembly (Cont'd)

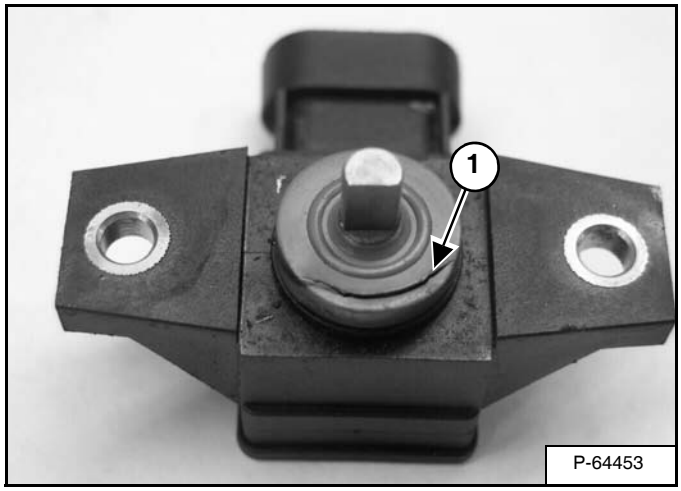
Figure 30-41-26



Assembly: Note the slotted portion (Item 1) of the positioning pin tightly fits the machined section on the swashplate angle sensor shaft (Item 2) **[Figure 30-41-26]**

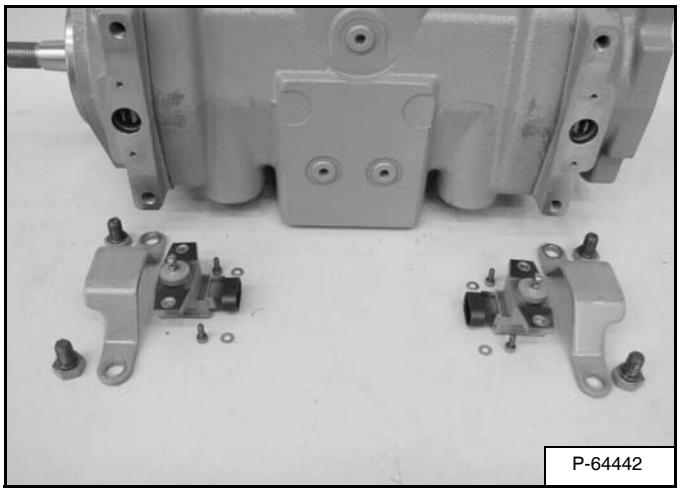
Note the machined section of the swashplate angle sensor shaft faces the center of the hydrostatic pump.

Figure 30-41-27



NOTE: Improperly installing the swashplate angle sensor, with the shaft facing toward the outside of the hydrostatic pump, will make it hard to install the sensor mounting bolts and also destroy the seal (Item 1) [Figure 30-41-27].

Figure 30-41-28



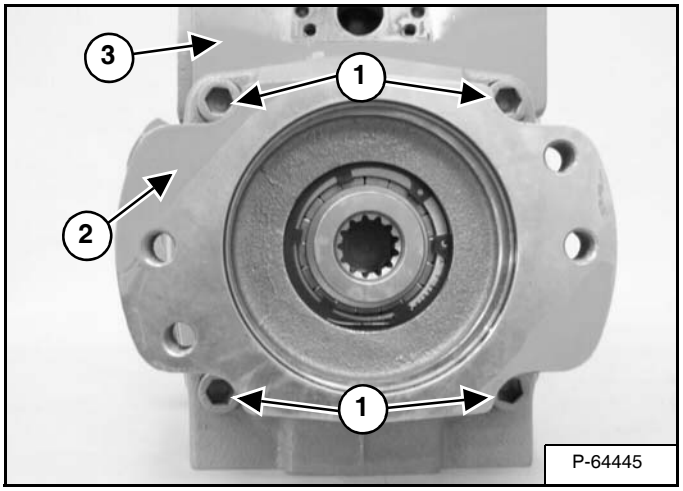
Both swashplate angle sensors and associated hardware removed from the hydrostatic pump. **[Figure 30-41-28]**

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Disassembly and Assembly (Cont'd)

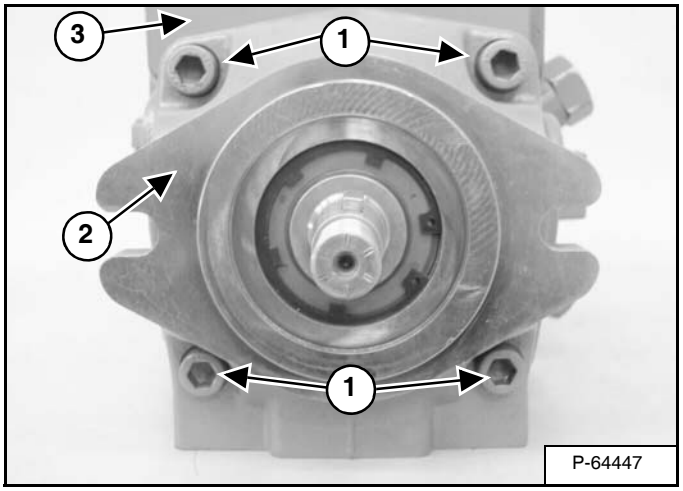
Right End Housing

Figure 30-41-29



Left End Housing

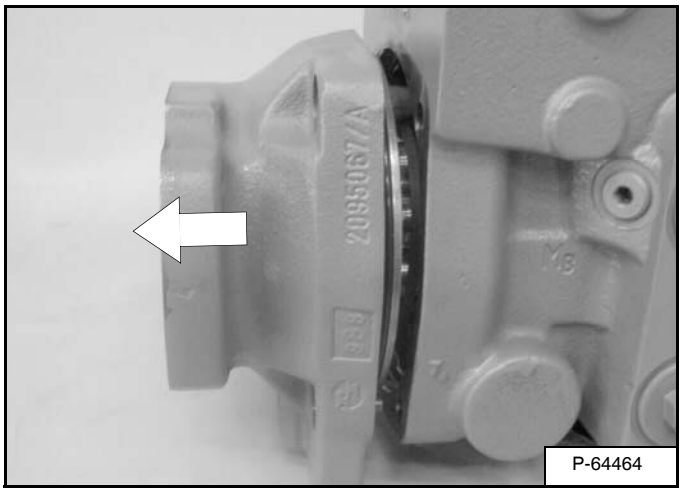
Figure 30-41-30



Remove the four mount bolts (Item 1) securing the end housing (Item 2) to the main case housing (Item 3) **[Figure 30-41-29]** and **[Figure 30-41-30]**

Assembly: Alternately, tighten mount bolts to 96 ft.-lb. (130 N•m) torque.

Figure 30-41-31

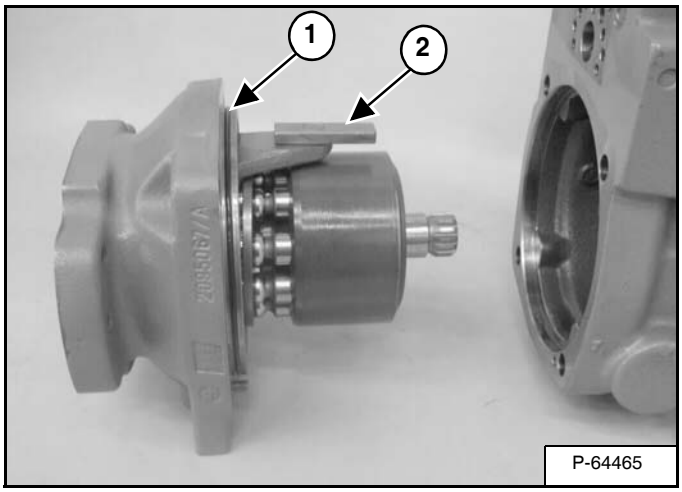


Pull the end housings from the case housing **[Figure 30-41-31]**.

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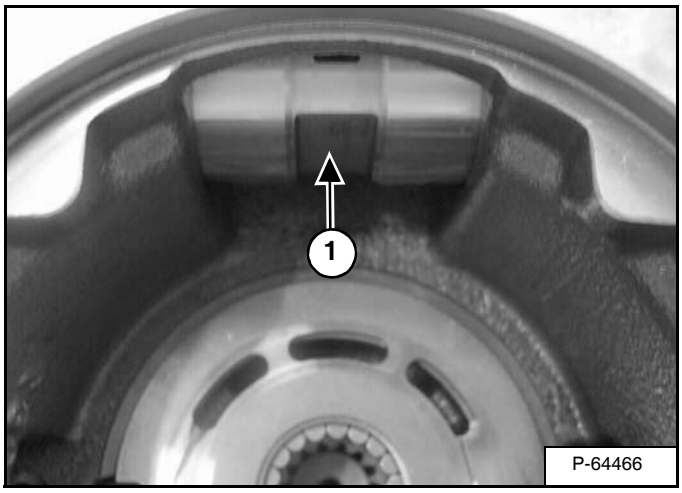
Disassembly and Assembly (Cont'd)

Figure 30-41-32



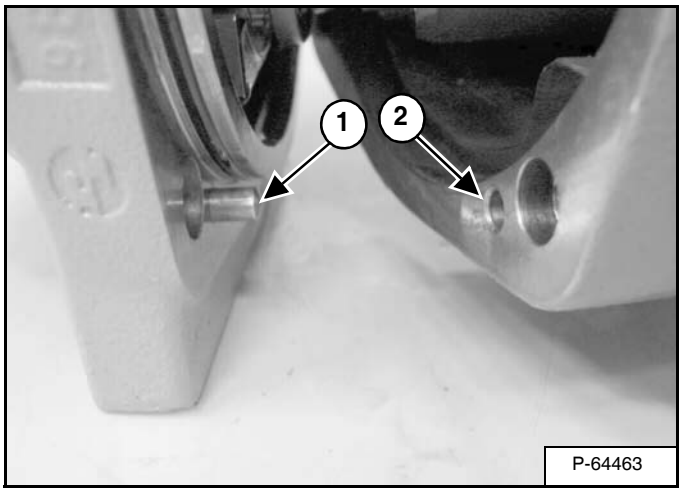
Replace O-ring (Item 1) **[Figure 30-41-32]**.

Figure 30-41-33



Ensure servo follower (Item 2) **[Figure 30-41-32]** is swung out for proper engagement with the notch in the servo piston (Item 1) **[Figure 30-41-33]**.

Figure 30-41-34



Assembly: Ensure dowel pin (Item 1) is aligned with hole in case housing (Item 2) **[Figure 30-41-34]** before tightening screws.

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Disassembly and Assembly (Cont'd)

Figure 30-41-35

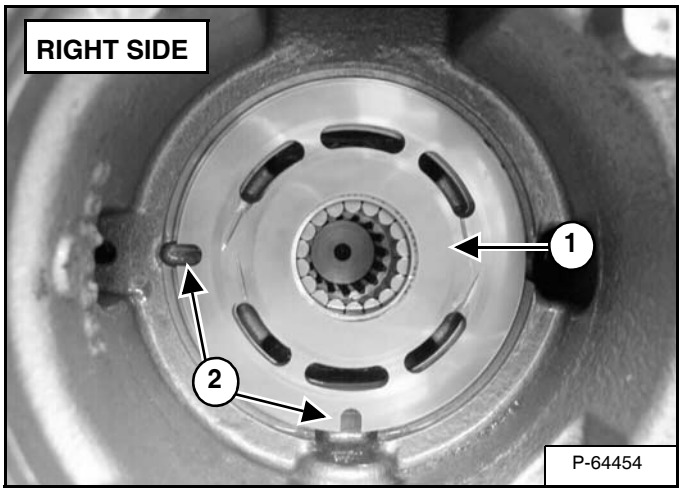
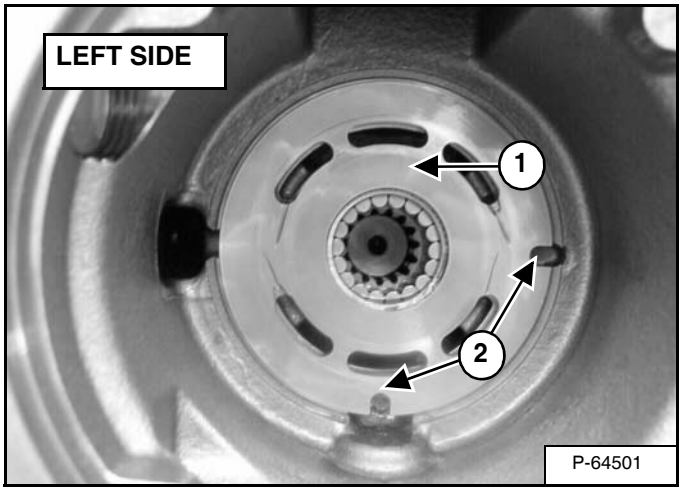


Figure 30-41-36



Remove valve plate (Item 1) **[Figure 30-41-35]** and **[Figure 30-41-36]** from the case housing.

Inspect valve plate for scratches or scoring. Replace a valve plate if the scratches are deep enough to catch with a fingernail.

NOTE: Pay attention to the notches (Item 2) [Figure 30-41-35] and [Figure 30-41-36] in the valve plate for assembly reasons. There are different valve plates for the left and right side. The valve plates are NOT interchangeable.

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Disassembly and Assembly (Cont'd)

Figure 30-41-37

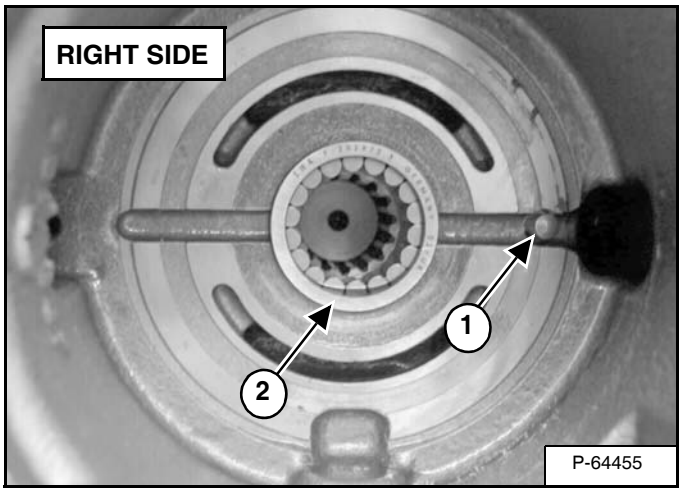


Figure 30-41-38

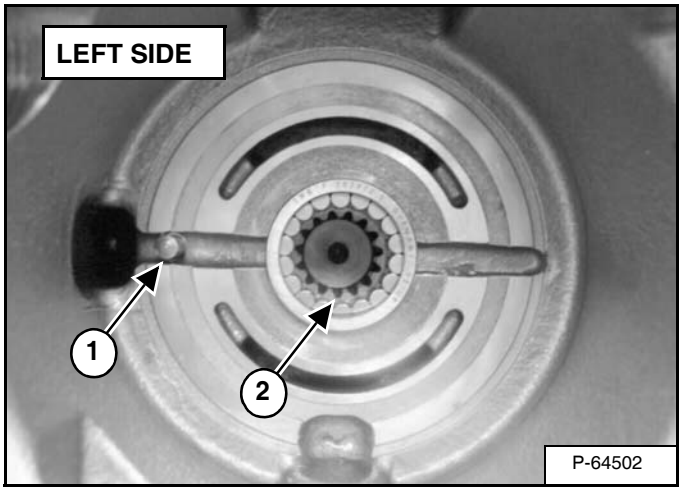


Figure 30-41-39

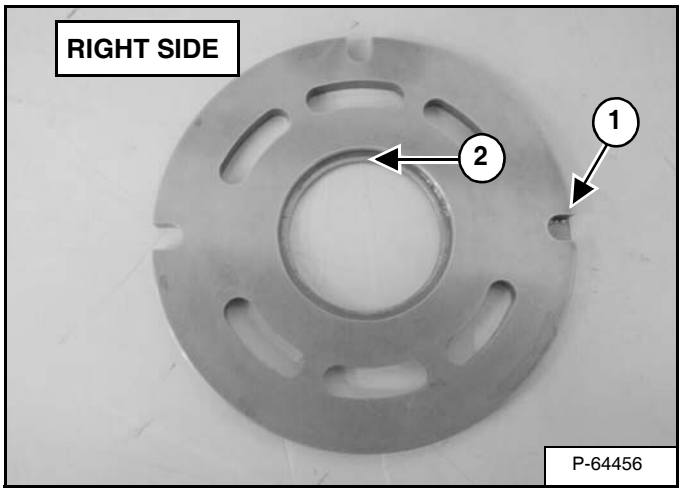
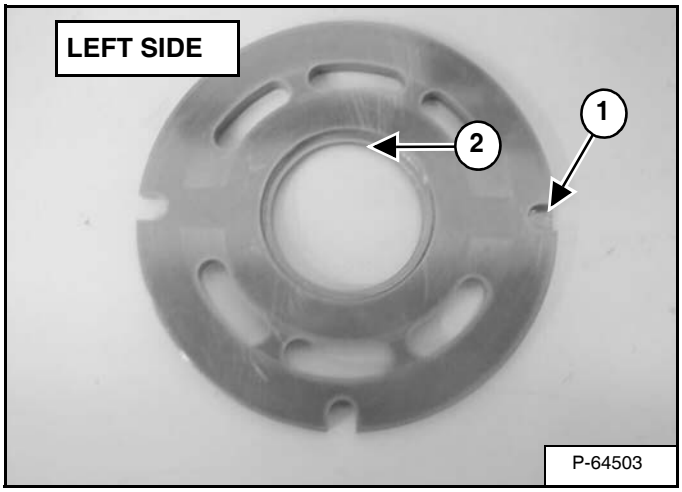


Figure 30-41-40



Assembly: Align the timing pin (Item 1) **[Figure 30-41-37]** and **[Figure 30-41-38]** in the case housing with the notch (Item 1) **[Figure 30-41-39]** and **[Figure 30-41-40]** that does not go through the valve plate.

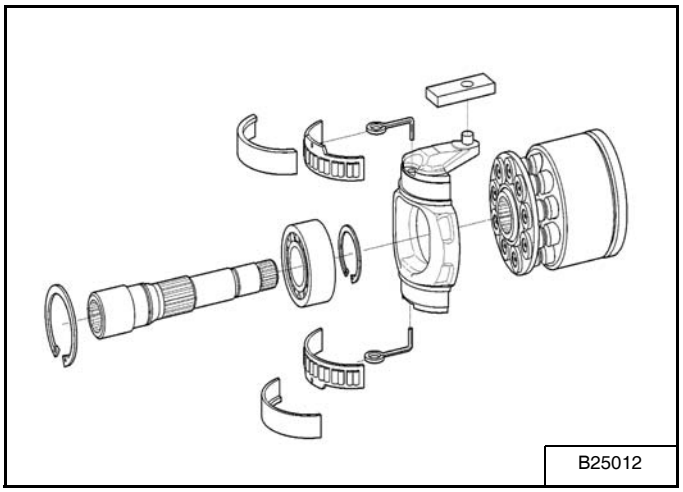
Align the shoulder of the roller bearing (Item 2) **[Figure 30-41-37]** and **[Figure 30-41-38]** with the beveled edge on the valve plate (Item 2) **[Figure 30-41-39]** and **[Figure 30-41-40]**.

NOTE: Valve plate should sit FLUSH with the case housing when properly installed.

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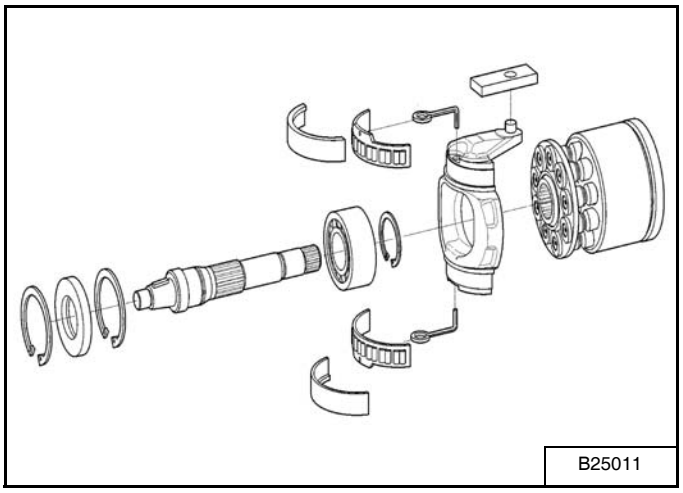
Disassembly and Assembly (Cont'd)

Figure 30-41-41



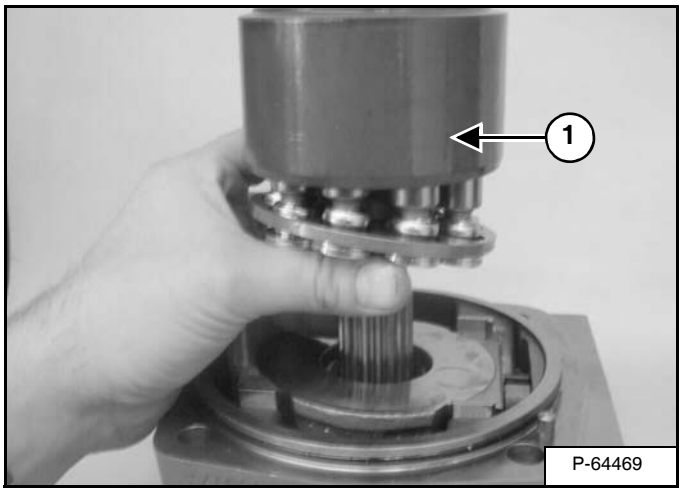
Right Side Rotating Group **[Figure 30-41-41]**.

Figure 30-41-42



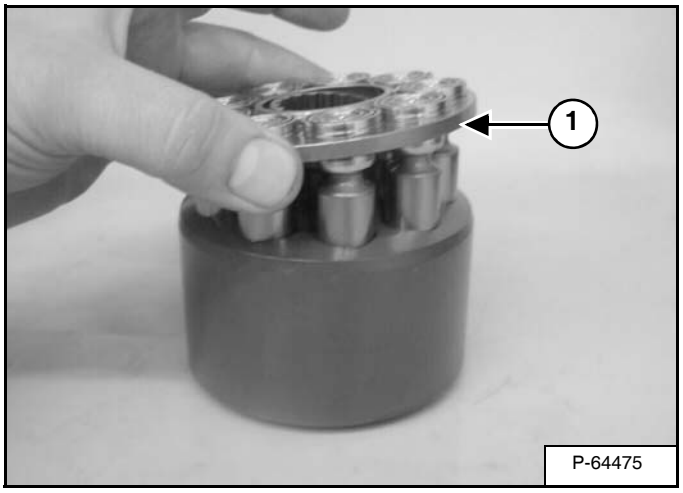
Left Side Rotating Group **[Figure 30-41-42]**.

Figure 30-41-43



Remove the piston assembly (Item 1) **[Figure 30-41-43]**.

Figure 30-41-44

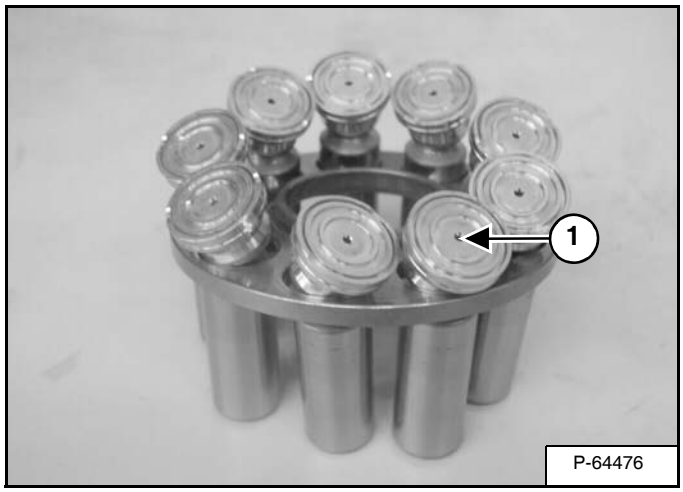


Remove the pistons (Item 1) **[Figure 30-41-44]** from the rotating block.

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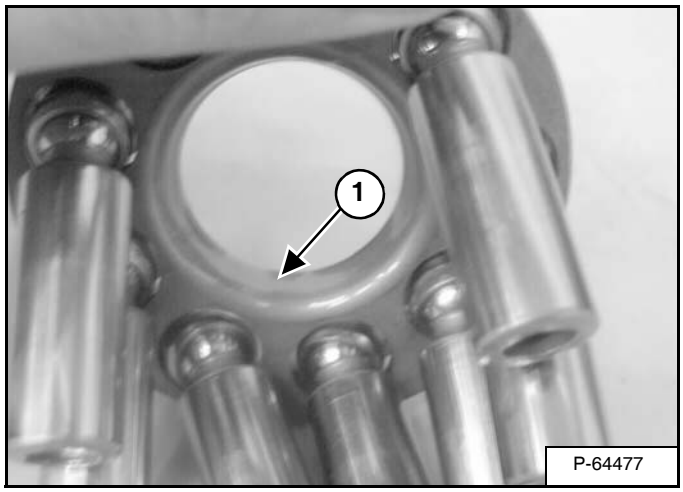
Disassembly and Assembly (Cont'd)

Figure 30-41-45



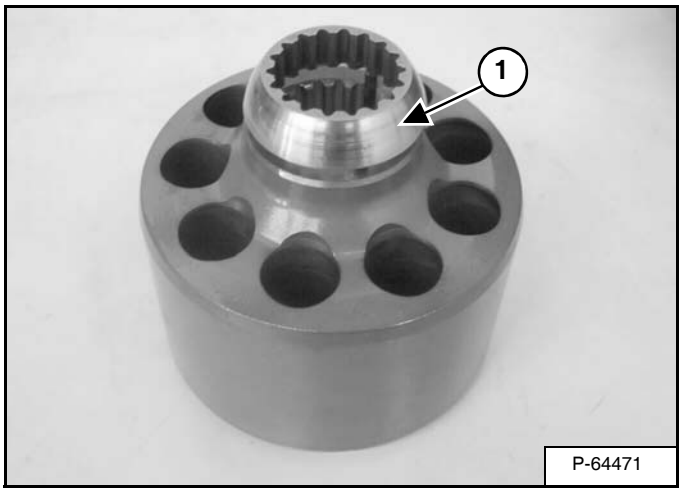
Inspect the pistons, look for scoring and scratches. Ensure the holes (Item 1) **[Figure 30-41-45]** in the slippers, are not plugged.

Figure 30-41-46



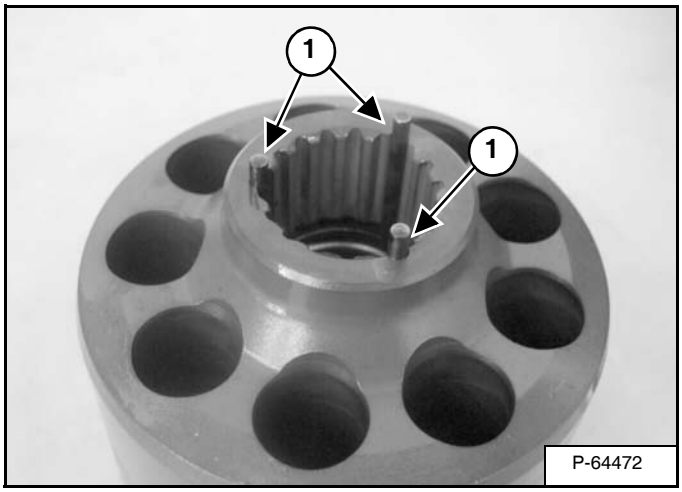
Inspect the mating surface of the spherical washer for scoring or scratches (Item 1) **[Figure 30-41-46]**.

Figure 30-41-47



Remove the spherical washer (Item 1) **[Figure 30-41-47]**.

Figure 30-41-48

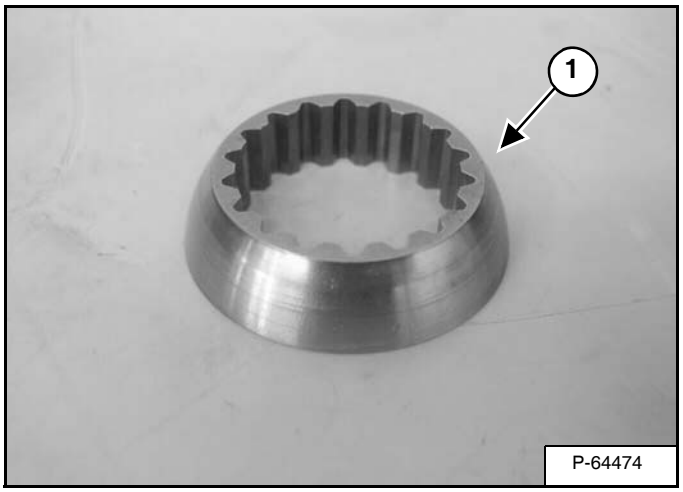


Inspect the pins (Item 1) **[Figure 30-41-48]**. They should be all the same length. Do not remove.

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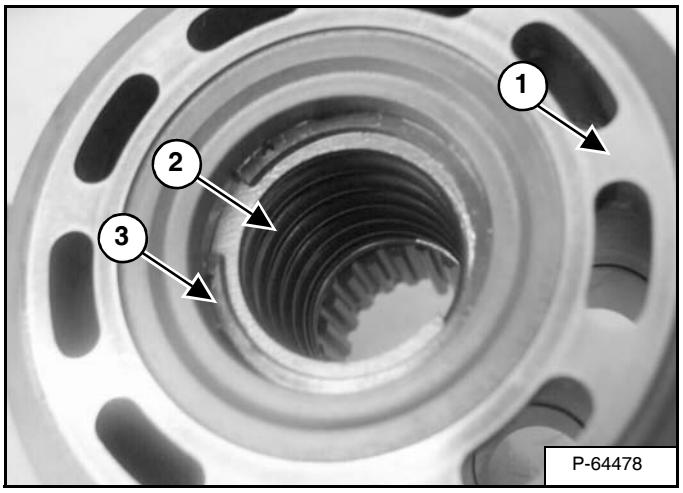
Disassembly and Assembly (Cont'd)

Figure 30-41-49



Inspect the sperical washer for scoring and wear (Item 1) **[Figure 30-41-49]**.

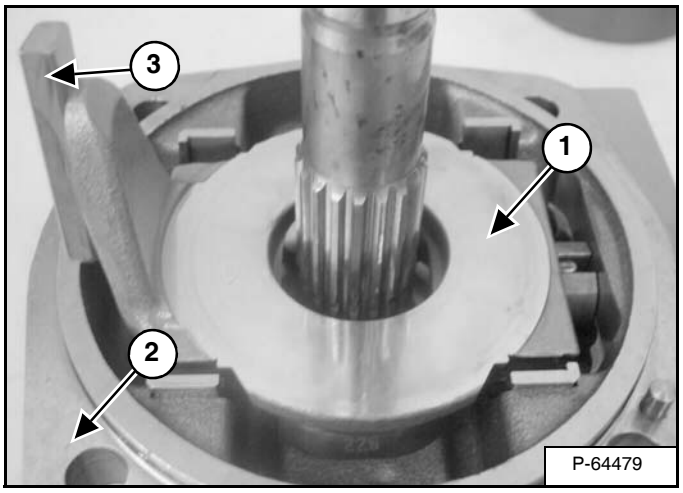
Figure 30-41-50



Inspect the back surface of the rotating block (Item 1) **[Figure 30-41-50]** where the valve plate seals. Ensure there is no scratches or scoring.

Visually ensure spring (Item 2) and c-clip (Item 3) **[Figure 30-41-50]** are not bent or damaged.

Figure 30-41-51

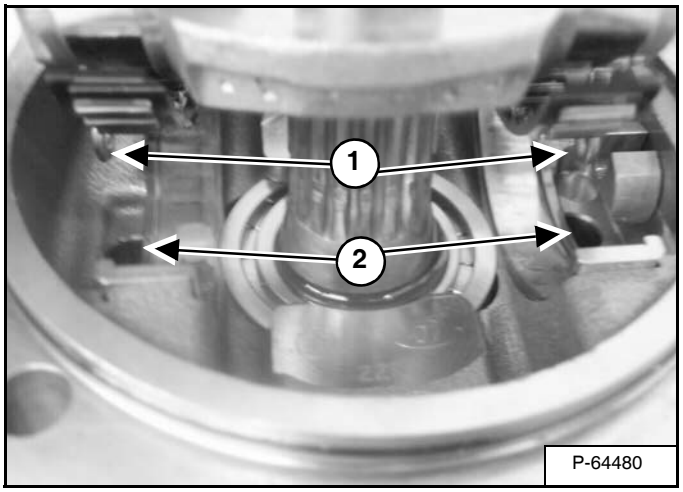


Inspect mating surface for the slippers on the swashplate (Item 1) **[Figure 30-41-51]**.

Remove the swashplate from the endcap housing (Item 2) **[Figure 30-41-51]**.

Remove the slide ring (Item 3) **[Figure 30-41-51]**, ensure it pivots freely.

Figure 30-41-52

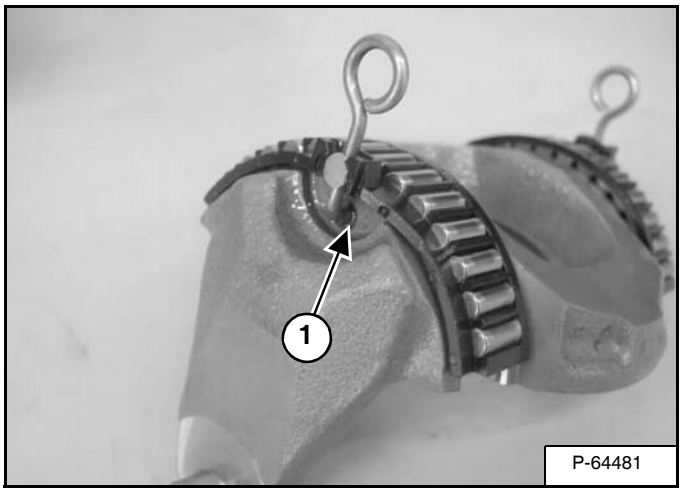


Assembly: Carefully align bearing pin eyelets (Item 1) into holes in endcap housing (Item 2) **[Figure 30-41-52]**.

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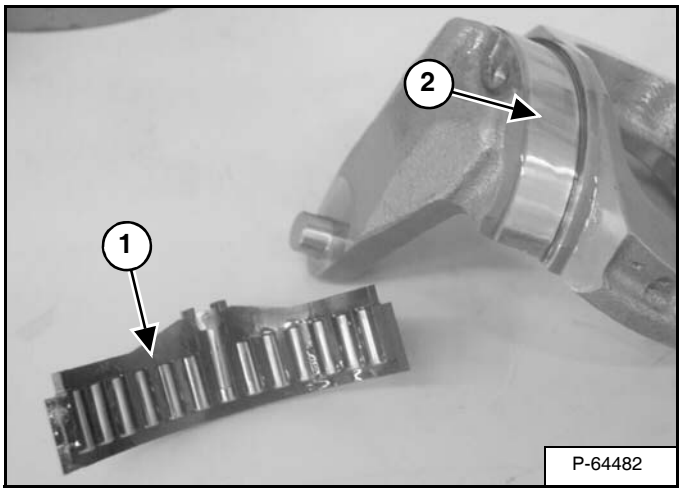
Disassembly and Assembly (Cont'd)

Figure 30-41-53



Assembly: Ensure bearing pins are in the holes of the swashplate (Item 1) **[Figure 30-41-53]**.

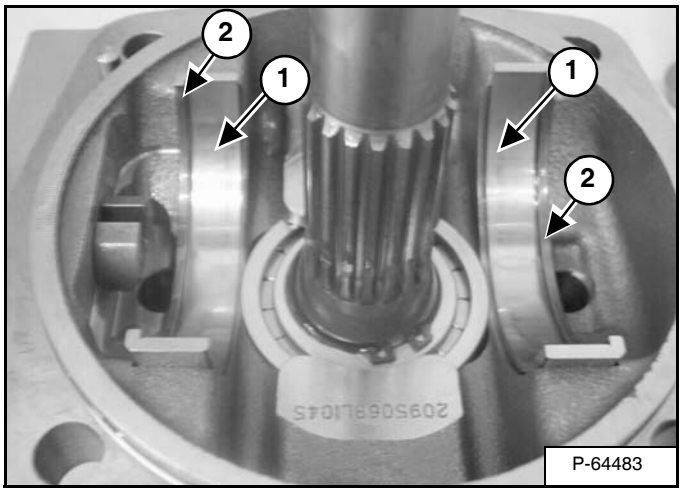
Figure 30-41-54



Remove the shell bearing (Item 1) **[Figure 30-41-54]**.

Inspect individual roller bearings and machined surfaces (Item 2) **[Figure 30-41-54]** on swashplate.

Figure 30-41-55



Remove the shell bearing races (Item 1) **[Figure 30-41-55]**.

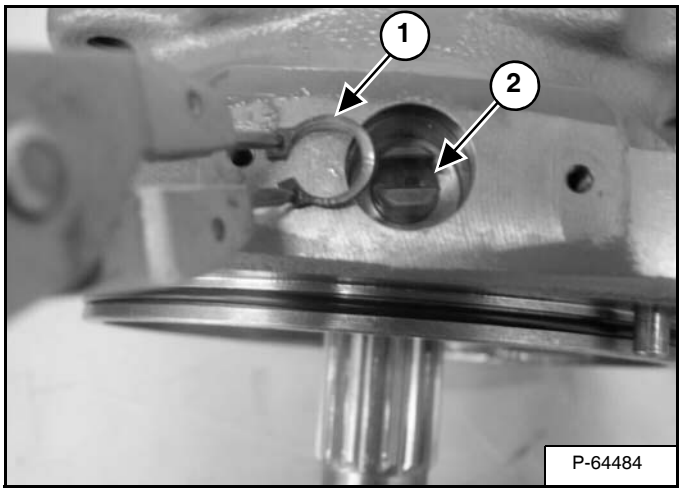
Assembly: Note shell bearing races have an edge (Item 2) **[Figure 30-41-55]** on them. The edges face towards the outside of the endcap housing

Inspect bearing surfaces for scratches or scoring.

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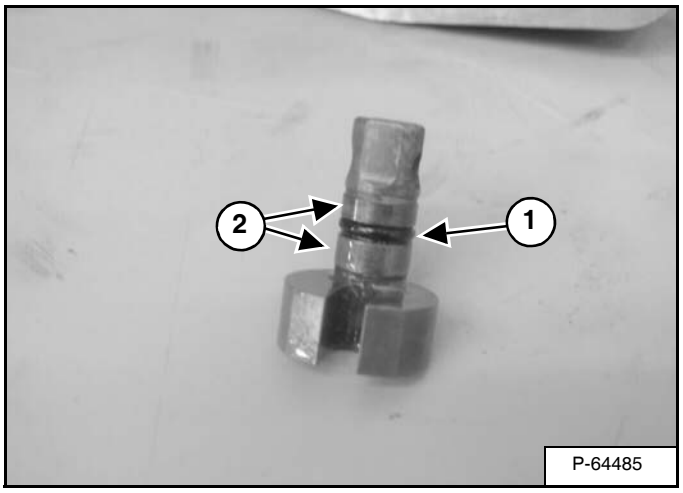
Disassembly and Assembly (Cont'd)

Figure 30-41-56



Remove the snap ring (Item 1) from the positioning pin (Item 2) **[Figure 30-41-56]**.

Figure 30-41-57



Pull the positioning pin from the end housing.

Replace O-ring (Item 1) **[Figure 30-41-57]**.

Inspect wear surfaces (Item 2) **[Figure 30-41-57]** for scratches or scoring. Ensure positioning pin can rotate smoothly in the end housing without excessive play.

Figure 30-41-58

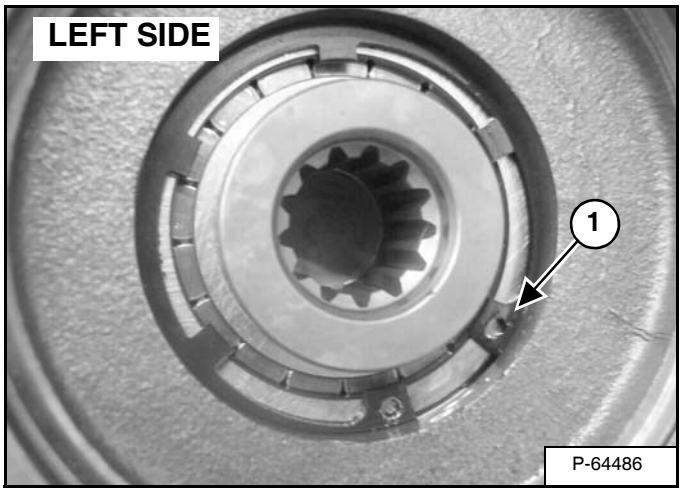
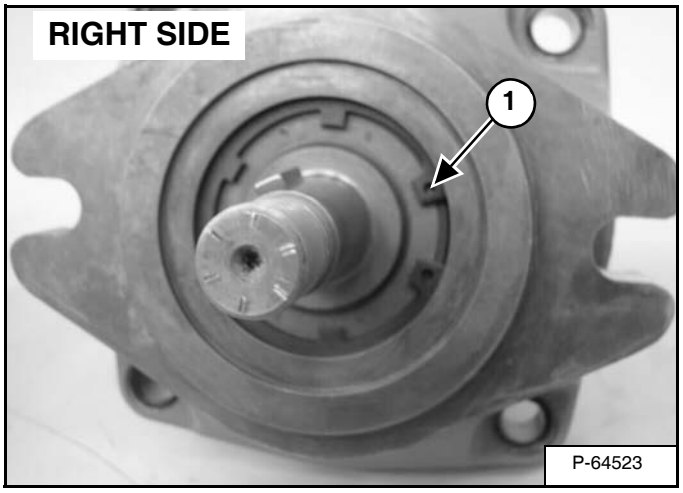
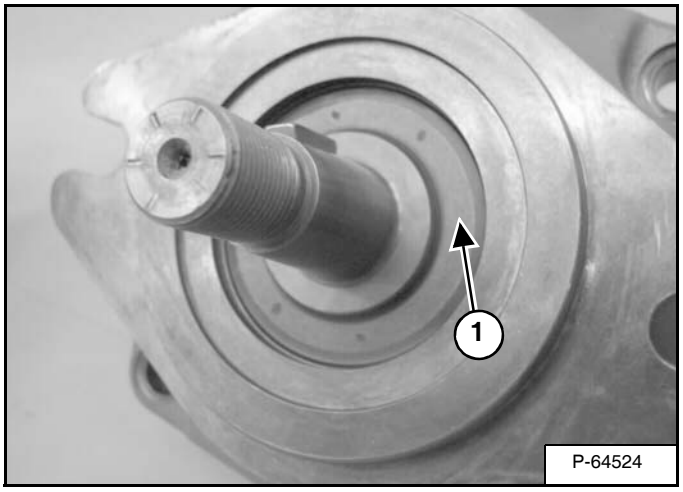


Figure 30-41-59



Remove the snap ring (Item 1) **[Figure 30-41-58]** and **[Figure 30-41-59]** from the end housing.

Figure 30-41-60

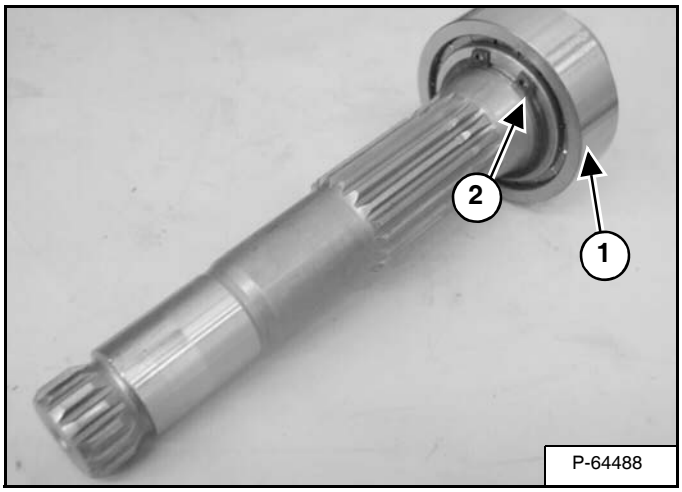


The pump seal (Item 1) **[Figure 30-41-60]** is removed by inserting a screw into the seal and prying out.

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Disassembly and Assembly (Cont'd)

Figure 30-41-61



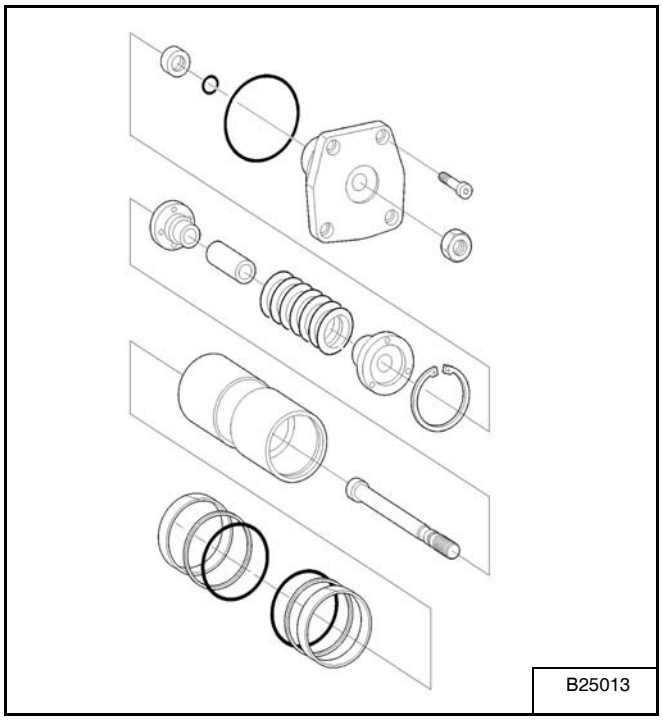
The drive shaft can be tapped out of the end housing with a rubber mallet.

Inspect wear surfaces for scratches, and inspect splines for excessive wear.

Inspect bearing (Item 1); if bearing needs replacement, remove snap ring (Item 2) **[Figure 30-41-61]** and remove bearing.

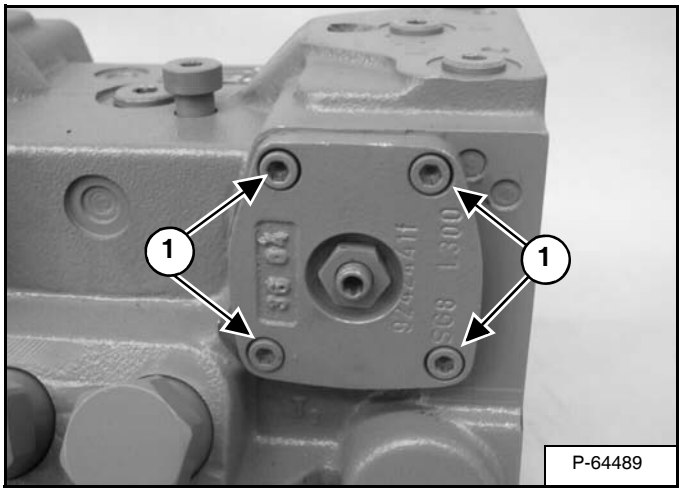
The Servo Piston Assembly **[Figure 30-41-62]** cannot be removed unless the hydraulic controller and rotating group is removed first.

Figure 30-41-62



Servo Piston Assembly **[Figure 30-41-62]**.

Figure 30-41-63



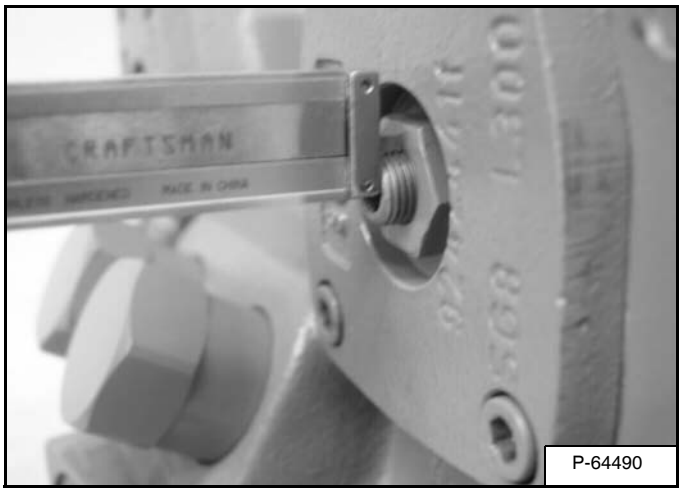
Remove servo piston mounting bolts (Item 1) **[Figure 30-41-63]**.

Installation: Tighten bolts to 7.7 ft.-lb. (10,4 N•m) torque.

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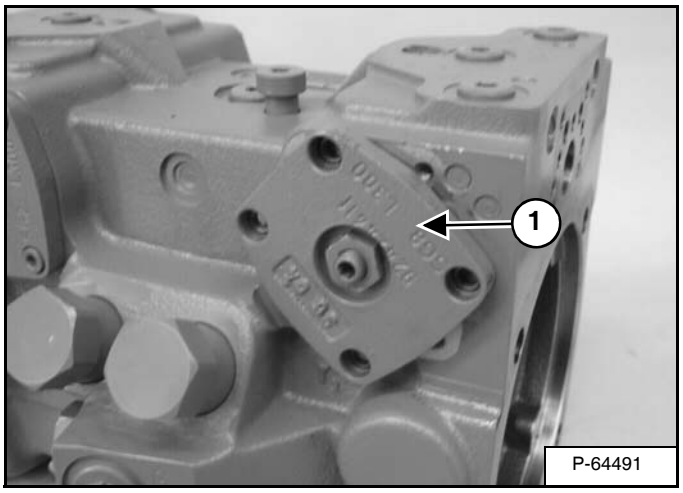
Disassembly and Assembly (Cont'd)

Figure 30-41-64



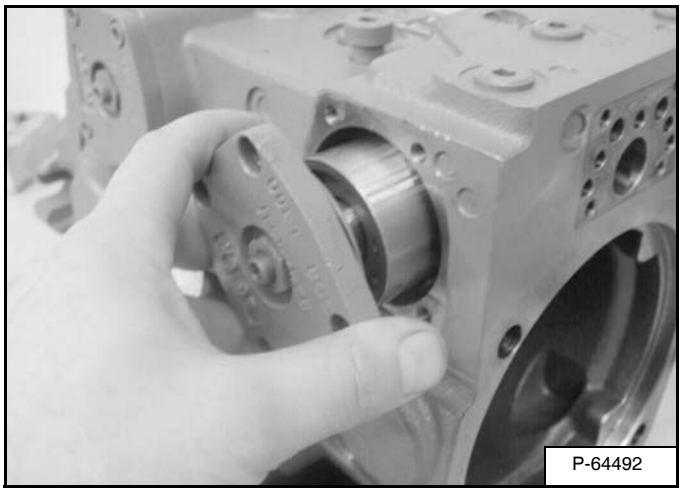
Measure and record servo piston depth at the adjustment screw **[Figure 30-41-64]**.

Figure 30-41-65



Use a rubber mallet to rotate servo piston cover (Item 1) **[Figure 30-41-65]**.

Figure 30-41-66



Slide the servo piston assembly out of the bore. **[Figure 30-41-66]**.

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Disassembly and Assembly (Cont'd)

Figure 30-41-67

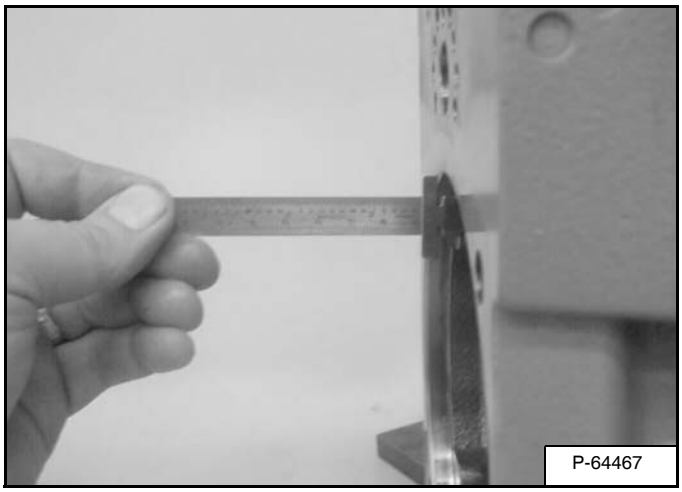
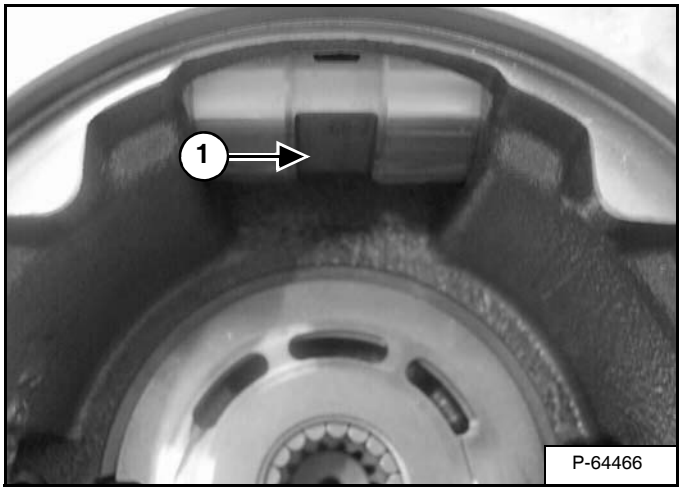
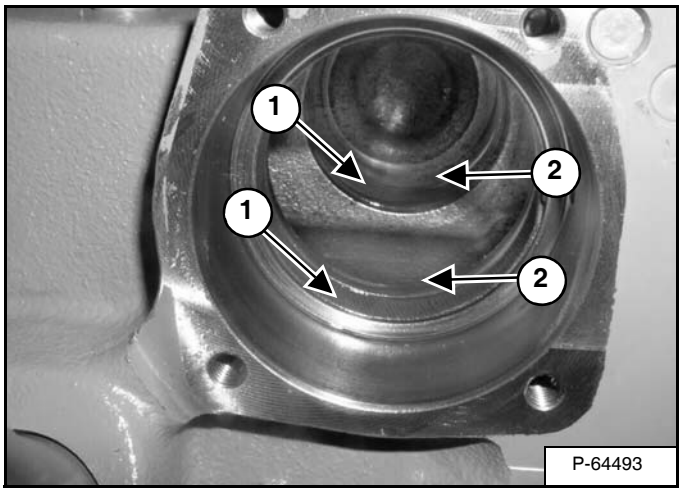


Figure 30-41-68



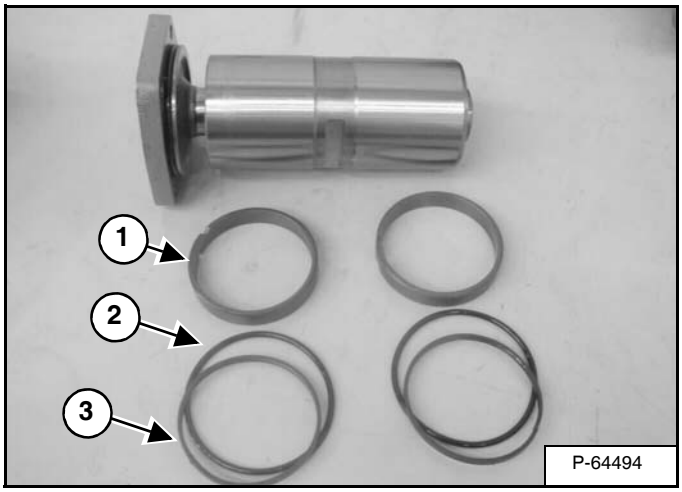
Assembly: Align the servo piston so the guide slot (Item 1) **[Figure 30-41-68]** is parallel to the driveshaft centerline. Measure with a straight-edge **[Figure 30-41-67]**.

Figure 30-41-69



Remove the bushings (Item 1), seals and O-rings (Item 2) **[Figure 30-41-69]** from the pump housing.

Figure 30-41-70

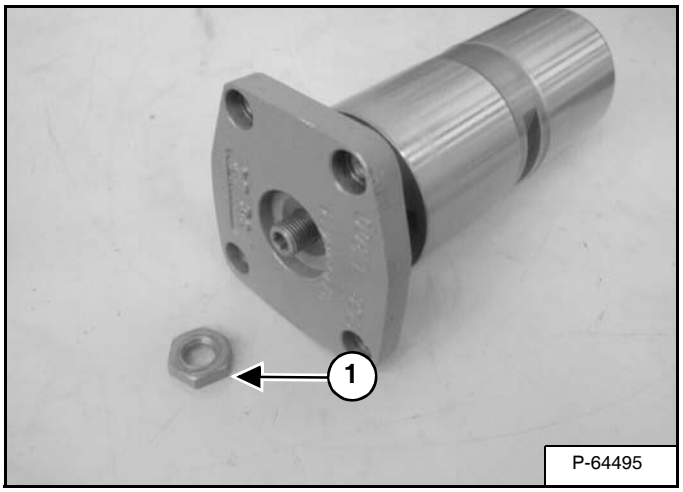


Each servo has a pair of bushings (Item 1), O-rings (Item 2) and square-cut seals (Item 3) **[Figure 30-41-70]**.

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Disassembly and Assembly (Cont'd)

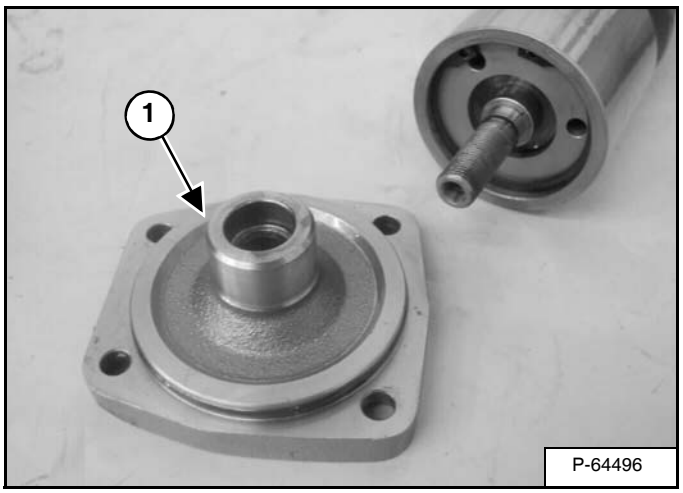
Figure 30-41-71



Remove the lock nut (Item 1) **[Figure 30-41-71]** from the servo piston.

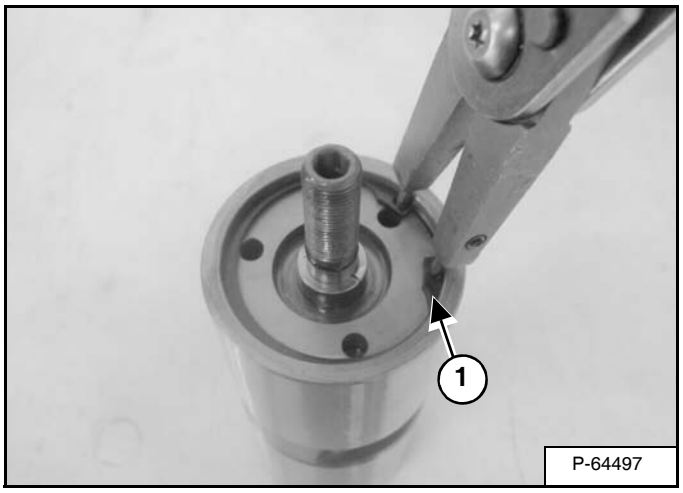
Assembly: Tighten lock nut to 22 ft.-lb. (30 N•m) torque.

Figure 30-41-72



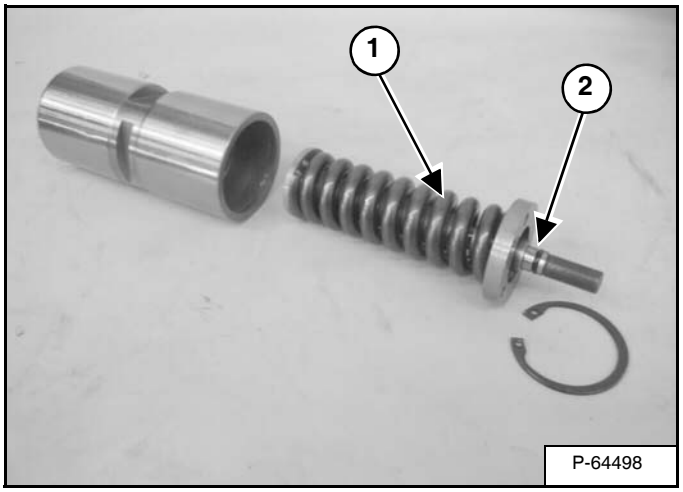
Remove the servo cover (Item 1) **[Figure 30-41-72]** from the servo piston.

Figure 30-41-73



Remove snap ring (Item 1) **[Figure 30-41-73]** from the servo piston.

Figure 30-41-74



Remove the piston stop adjustment mechanism (Item 1) **[Figure 30-41-74]** from the servo piston.

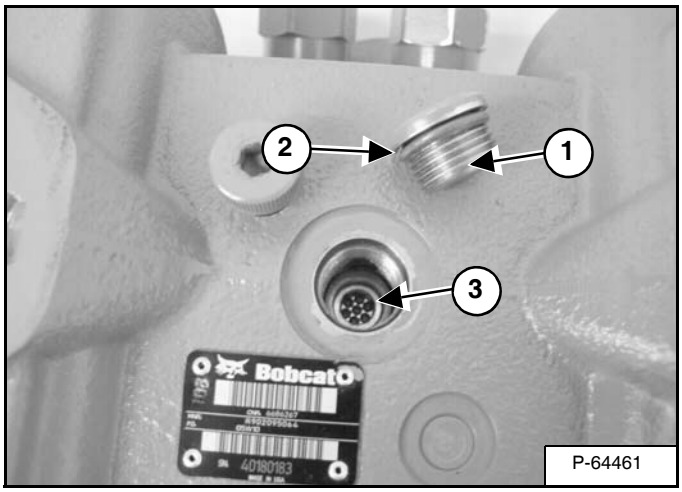
Inspect mechanism for broken parts.

Replace O-ring (Item 2) **[Figure 30-41-74]**

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Disassembly and Assembly (Cont'd)

Figure 30-41-75



Remove the plug (Item 1) from the top center of the case housing. Replace O-ring (Item 2) **[Figure 30-41-75]**.

Assembly: Tighten plug to 45 ft.-lb. (10 N•m) torque.

Remove internal screen (Item 3) **[Figure 30-41-75]**.

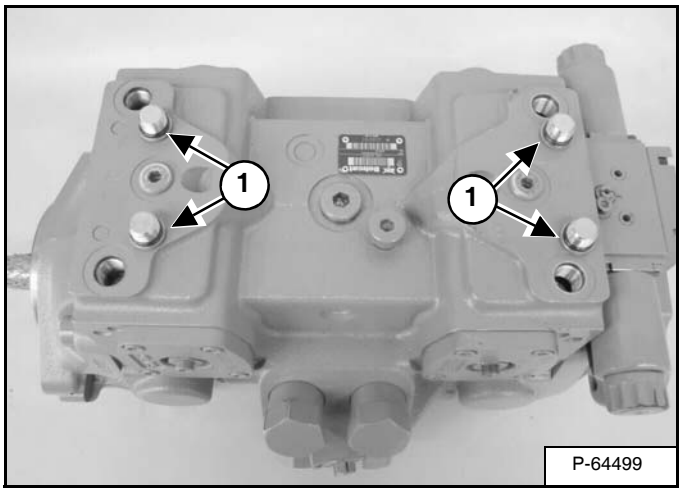
Assembly: Tighten internal screen to 7.4 ft.-lb. (62 N•m) torque.

Figure 30-41-76



Ensure screen is clean **[Figure 30-41-76]**.

Figure 30-41-77

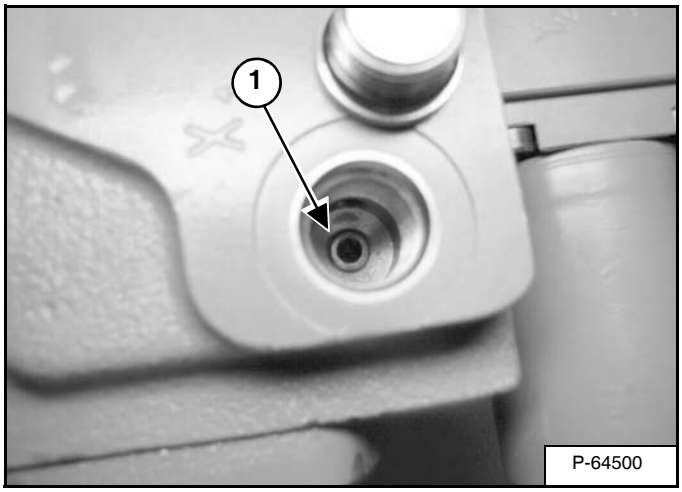


Remove the four control pressure plugs (Item 1) **[Figure 30-41-77]** at the top of the case housing to gain access to the four orifices (Item 1) **[Figure 30-41-78]**.

Replace O-rings on plugs.

Assembly: Tighten plugs to 18 ft.-lb. (25 N•m) torque.

Figure 30-41-78

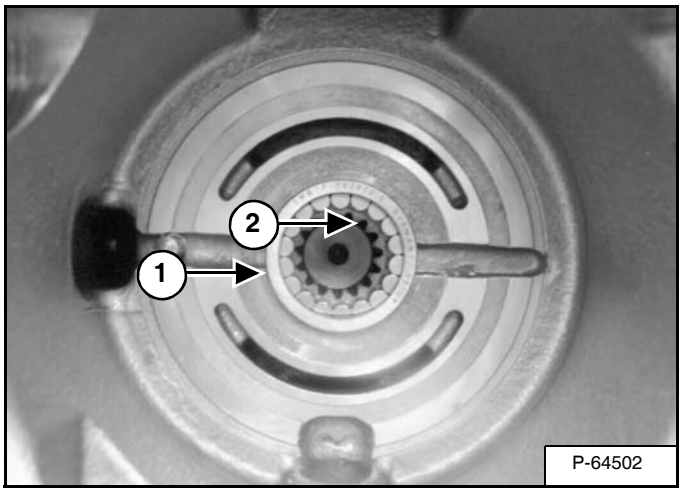


Ensure the four orifices (Item 1) **[Figure 30-41-78]** in case housing are clean and not plugged.

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Disassembly and Assembly (Cont'd)

Figure 30-41-79



Bearings (Item 1) **[Figure 30-41-79]** in case housing are replaced by using a press and bearing driver.

Inspect center coupler (Item 2) **[Figure 30-41-79]**.

Mechanical Neutral Adjustment

The pump mechanical neutral adjustment sets the position of the servo piston and pump swashplate relative to the hydraulic controller. This procedure should be followed if the hydrostatic pump has been disassembled for servicing the servo piston and the setting has been disrupted.

Place the loader on jackstands. (See Procedure on Page 10-10-1.)

⚠ WARNING

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

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Raise the lift arms, and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Connect the remote start tool. (See Procedure on Page 10-60-1.)

Disconnect the swashplate angle sensors in the electrical harness. This prevents unwanted swashplate movement error codes from occurring during adjustments. Disconnecting the sensors does not have to be done directly at the sensor, follow the harness back to find an accessible connector to disconnect.

Disconnect the speed sensors located on the top of the motor carriers. This prevents uncommanded wheel movement error codes from occurring during adjustments.

⚠ WARNING

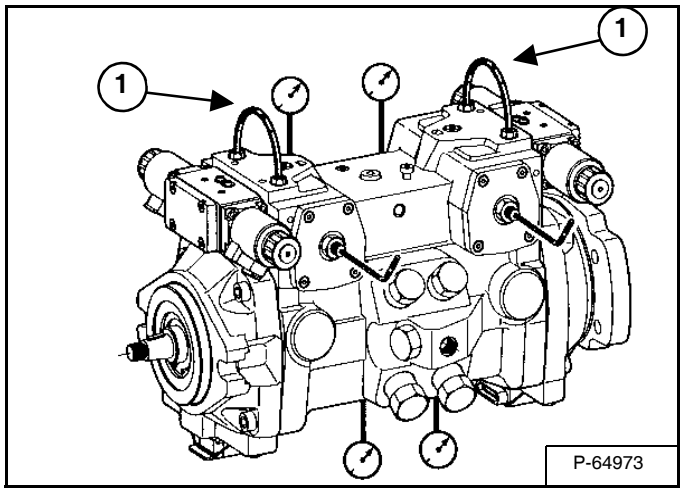
Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possibly death if proper medical treatment by a physician familiar with this injury is not received immediately.

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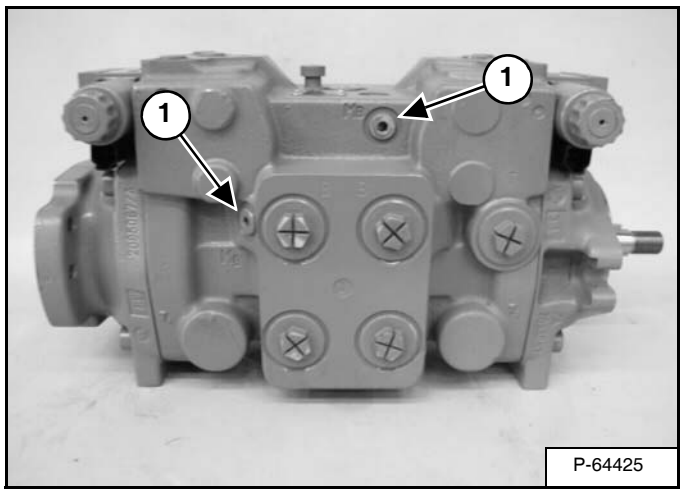
Mechanical Neutral Adjustment (Cont'd)

Figure 30-41-80



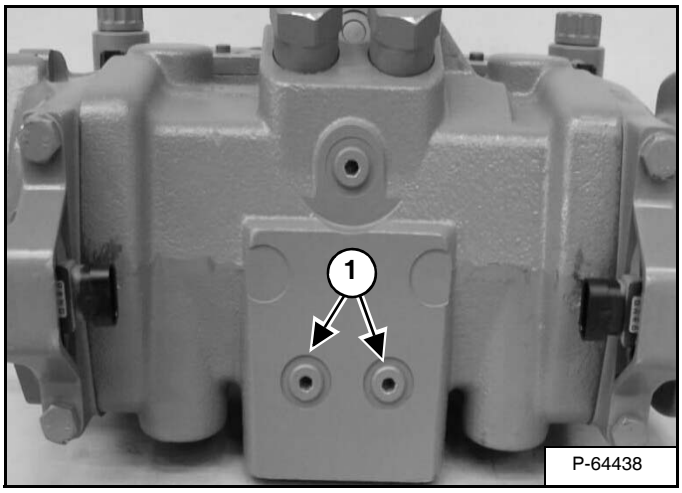
Connect a hydraulic hose (Item 1) **[Figure 30-41-80]** between port X1 and port X2 on each side of the hydrostatic pump, to equalize the pressures on both ends of the servo pistons.

Figure 30-41-81



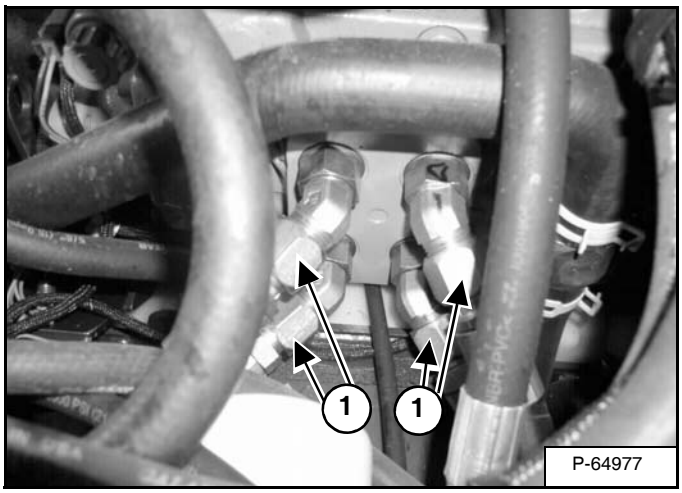
Remove the plugs (Item 1) **[Figure 30-41-81]** from the MB ports on the front side of the pump, and install 7500 PSI (241 bar) pressure gauges.

Figure 30-41-82



Remove the plugs (Item 1) **[Figure 30-41-82]** from the MA ports on the bottom of the pump, and install 7500 PSI pressure gauges.

Figure 30-41-83

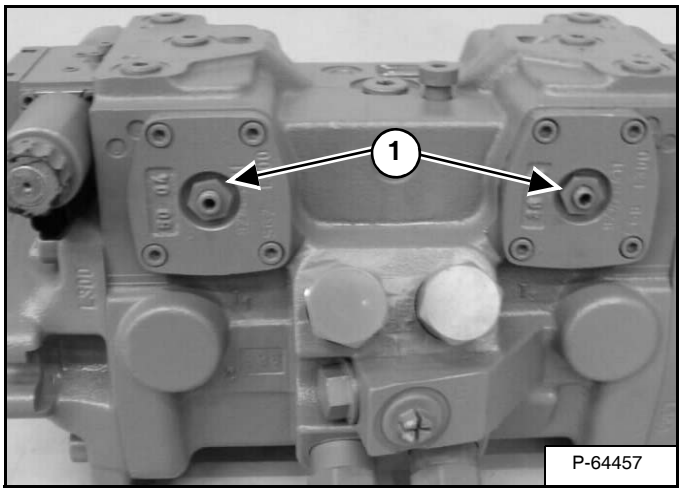


Remove drive hoses from the A and B ports (Item 1) **[Figure 30-41-83]**. Plug the ports with metal caps. The caps must be able to handle at least 7500 PSI. Plugging the A and B ports eliminates leakage at the drive motors from causing errors in the pump mechanical neutral setting.

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Mechanical Neutral Adjustment (Cont'd)

Figure 30-41-84



Loosen the pump neutral adjustment lock nut (Item 1) **[Figure 30-41-84]**.

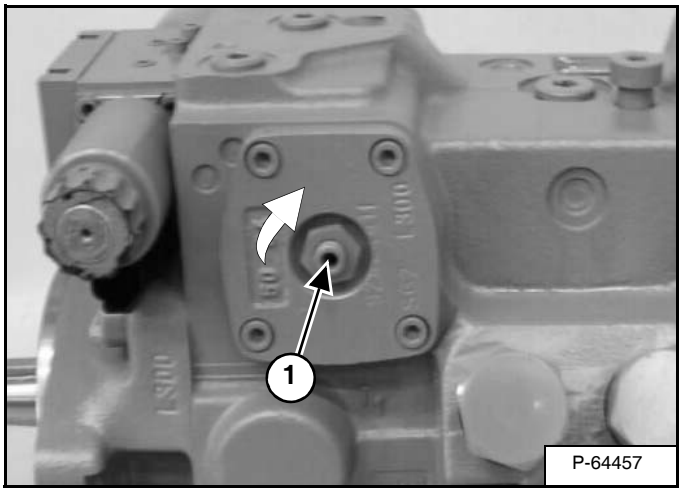
Start the loader using the remote start tool and run at an idle.

⚠ WARNING

Stay clear of the loader wheels. They will turn whenever the pump is not centered.

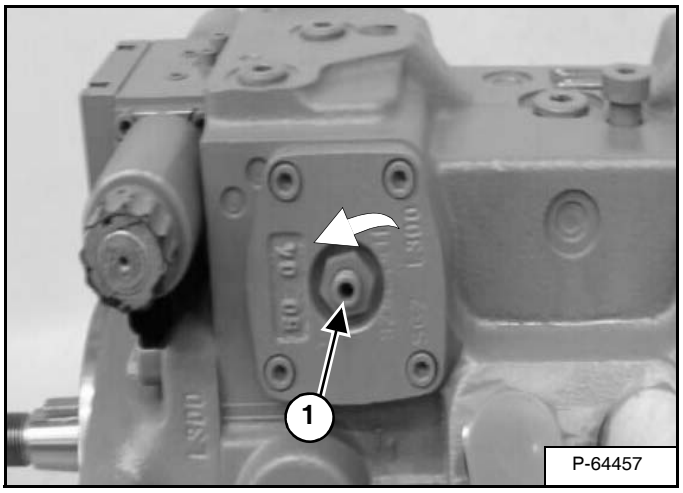
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Figure 30-41-85



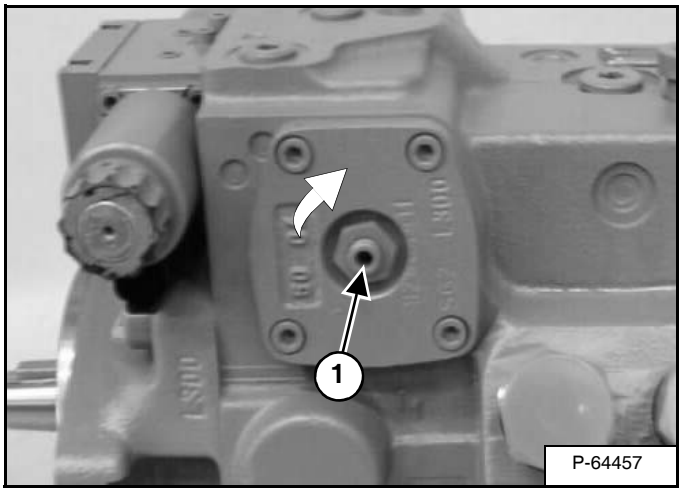
Turn the adjustment screw (Item 1) **[Figure 30-41-85]** clockwise, until one of the gauges registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-41-86



Turn the adjustment screw (Item 1) **[Figure 30-41-86]** counterclockwise, until the other gauge registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-41-87

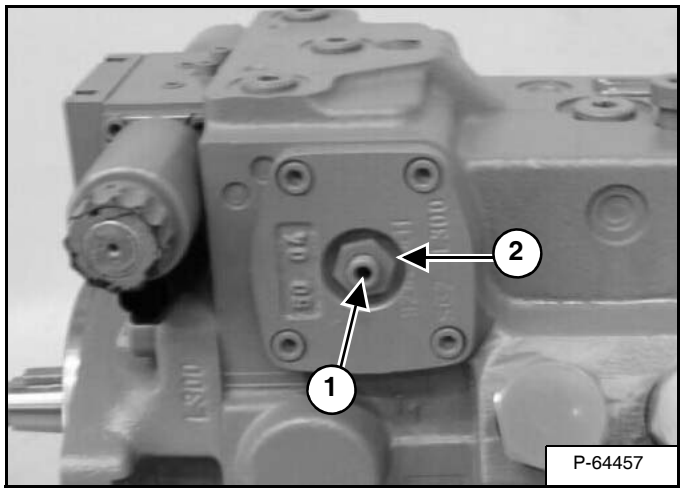


Turn the adjustment screw (Item 1) **[Figure 30-41-87]** clockwise, to a position halfway between the recorded positions. The pressure gauges should read equal pressures.

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Mechanical Neutral Adjustment (Cont'd)

Figure 30-41-88



While holding the adjustment screw (Item 1) in position, tighten the lock nut (Item 2) **[Figure 30-41-88]** to 22 ft.-lb. (30 N•m) torque.

Shut loader OFF.

Remove the hydraulic hose from the X1 and X2 ports on the pump. Install the plugs and tighten to 18 ft.-lb. (25 N•m) torque.

Remove the pressure gauges from the MA and MB ports on the pump. Install the plugs and tighten to 18 ft.-lb. (25 N•m) torque.

NOTE: The Hydraulic Controller Neutral Adjustment must be performed whenever the Mechanical Neutral Adjustment is done. (See Hydraulic Controller Neutral Adjustment on Page 30-41-28.)

Hydraulic Controller Neutral Adjustment

The hydraulic controller neutral adjustment, aligns the pump swash plate and the control spool so that a zero angle control setting provides a zero degree swash plate setting. This adjustment should be performed whenever any part of the control or swash plate mechanisms are adjusted or removed or after the pump mechanical neutral setting is adjusted. Ensure the pump mechanical neutral setting is correct before performing hydraulic controller neutral adjustments.

NOTE: Procedure is shown for the left side hydraulic controller. Procedure is the same for the right side hydraulic controller, except you disconnect the electrical connectors for the right side hydraulic controller and connect pressure gauges in the X1 and X2 ports on the right side of the pump.

Place the loader on jack stands. (See Procedure on Page 10-10-1.)

⚠ WARNING

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

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Raise the lift arms, and install an approved lift arm support device. ((See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Connect the remote start tool. (See Procedure on Page 10-60-1.)

⚠ WARNING

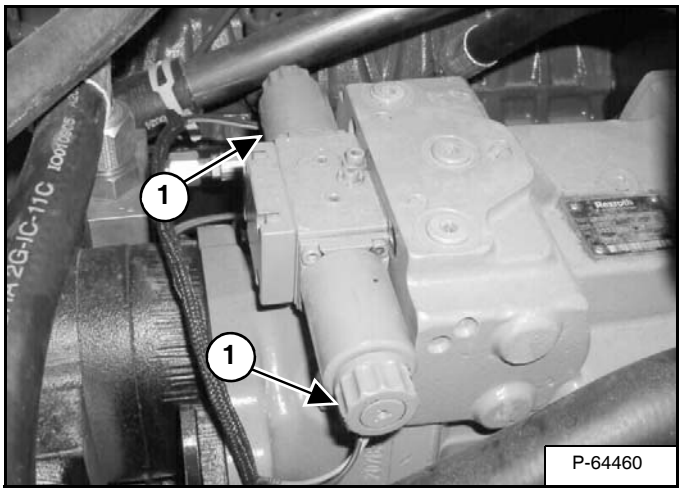
Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possibly death if proper medical treatment by a physician familiar with this injury is not received immediately.

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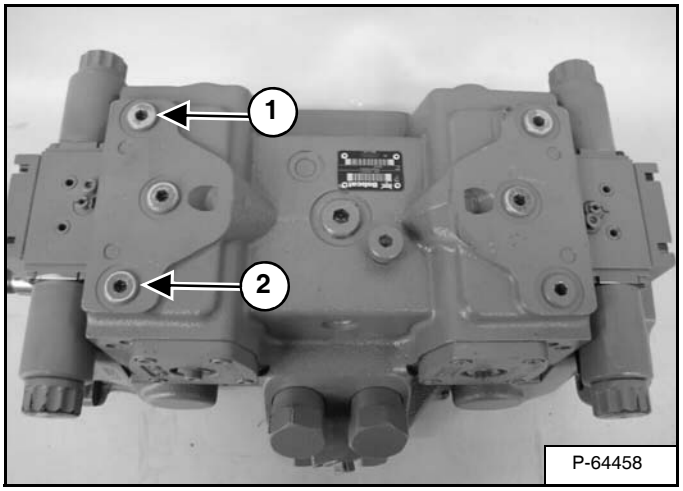
Hydraulic Controller Neutral Adjustment (Cont'd)

Figure 30-41-89



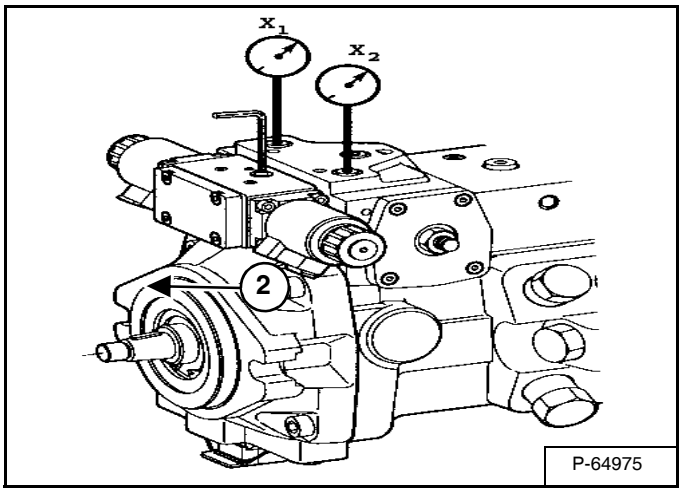
Disconnect the hydraulic controller connectors (Item 1) **[Figure 30-41-89]** from the loader wiring harness for the hydraulic controller you are adjusting.

Figure 30-41-90



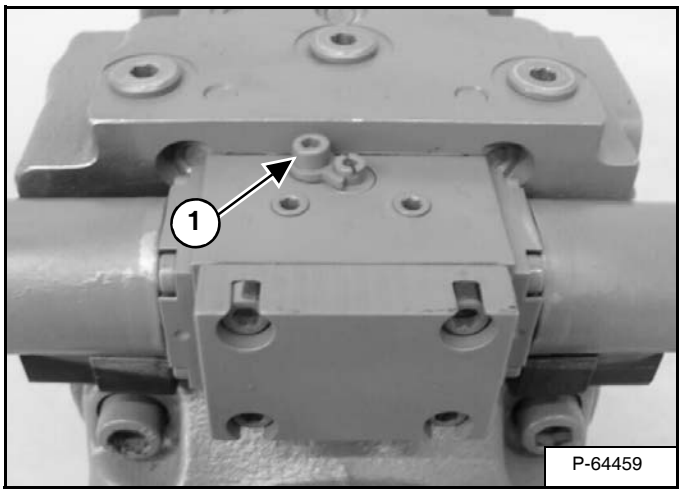
Remove the X1 plug (Item 1) and X2 plug (Item 2) **[Figure 30-41-90]** pertaining to the side of the hydrostatic pump you are adjusting.

Figure 30-41-91



Install 500 PSI pressure gauges in the X1 and X2 ports pertaining to the side of the hydrostatic pump you are adjusting.

Figure 30-41-92



Loosen the locking screw (Item 1) **[Figure 30-41-92]**.

Start the loader using the remote start tool and run at an idle.

⚠ WARNING

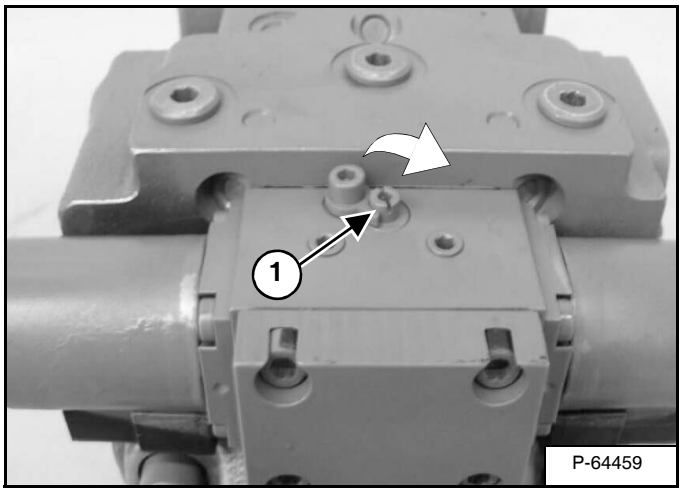
Stay clear of the loader wheels. They will turn whenever the pump is not centered.

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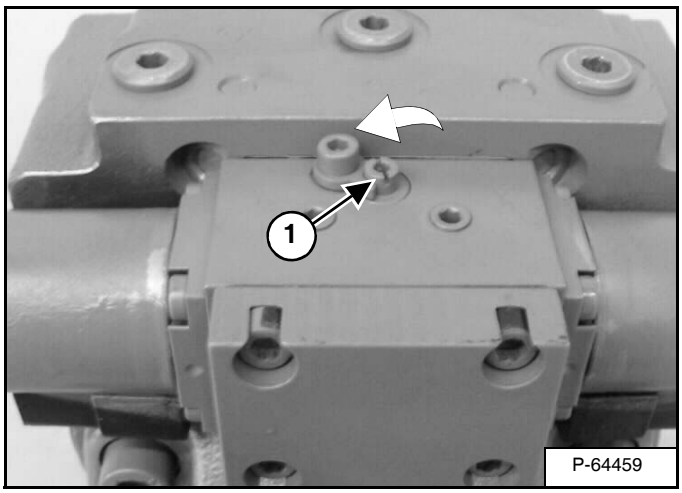
Hydraulic Controller Neutral Adjustment (Cont'd)

Figure 30-41-93



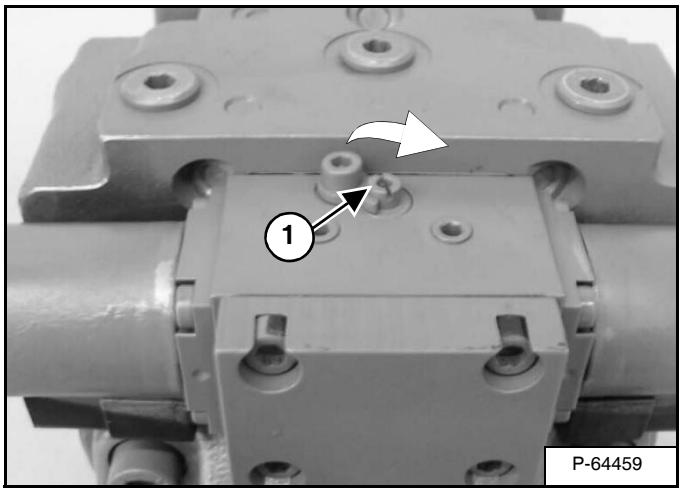
Turn the adjustment screw (Item 1) **[Figure 30-41-93]** clockwise, until one of the gauges registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-41-94



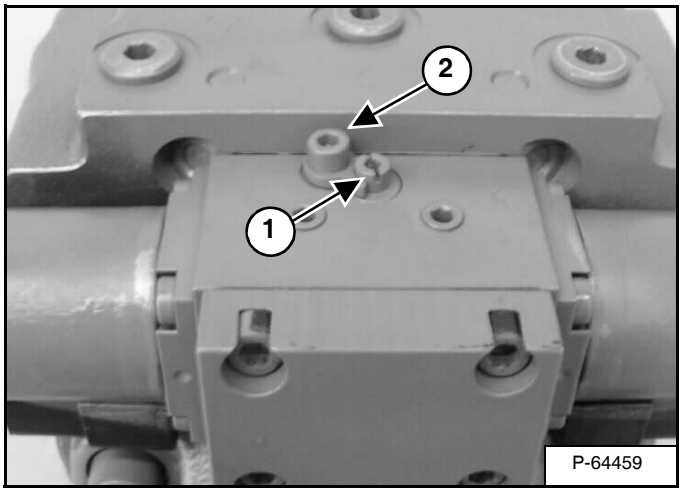
Turn the adjustment screw (Item 1) **[Figure 30-41-94]** counterclockwise, until the other gauge registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-41-95



Turn the adjustment screw (Item 1) **[Figure 30-41-95]** clockwise, to a position halfway between the recorded positions. The pressure gauges should read equal pressures.

Figure 30-41-96



While holding the adjustment screw (Item 1) in position, tighten the locking screw (Item 2) **[Figure 30-41-96]** to 4.5 ft.-lb. (6,1 N•m) torque.

Shut loader OFF.

Remove the pressure gauges from the X1 and X2 ports on the pump. Install the plugs and tighten to 18 ft.-lb. (25 N•m) torque.

Connect the hydraulic controller wire connectors to the loader wiring harness.

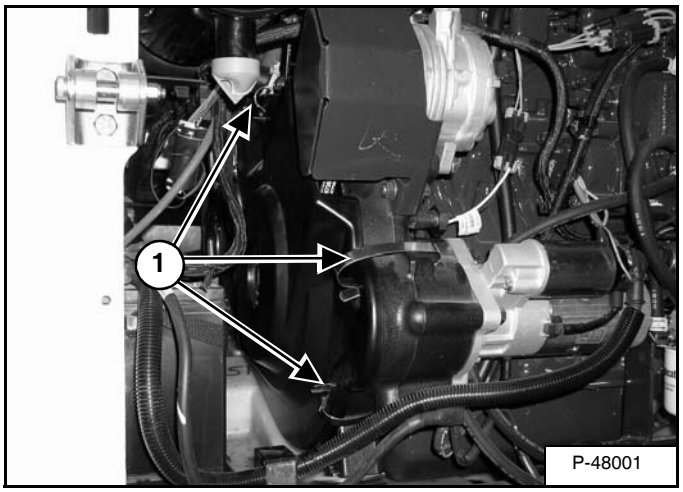
Perform a controller calibration procedure. (See Calibration Procedure (ACS) on Page 60-160-11.)

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DRIVE BELT

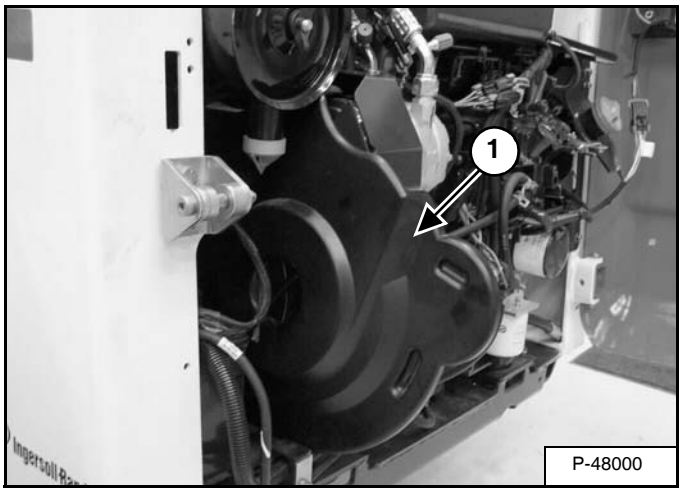
Shield Removal And Installation

Figure 30-50-1



Remove the three drive belt shield mounting clips (Item 1) **[Figure 30-50-1]** .

Figure 30-50-2



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

Adjusting

To adjust the drive belt between the flywheel and the hydrostatic pump pulley, use the following procedure:

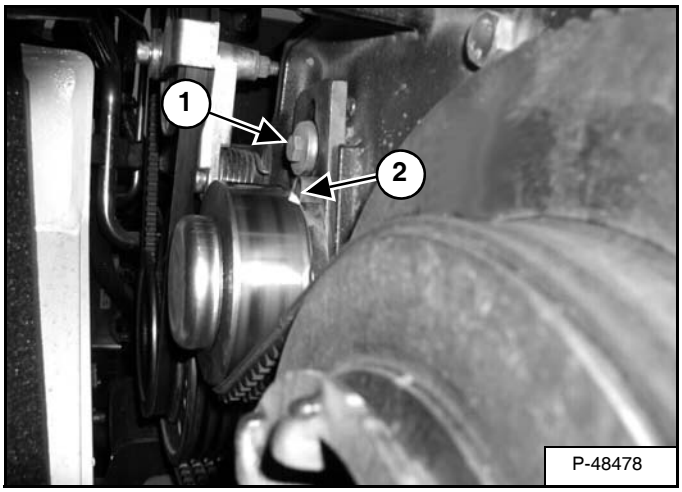
Stop the engine. Open the rear door.

Disconnect the negative (-) battery cable.

Remove the belt shield. (See Shield Removal And Installation, Page 30-50-1.)

The pulley tensioner is located between the flywheel and pump pulley.

Figure 30-50-3



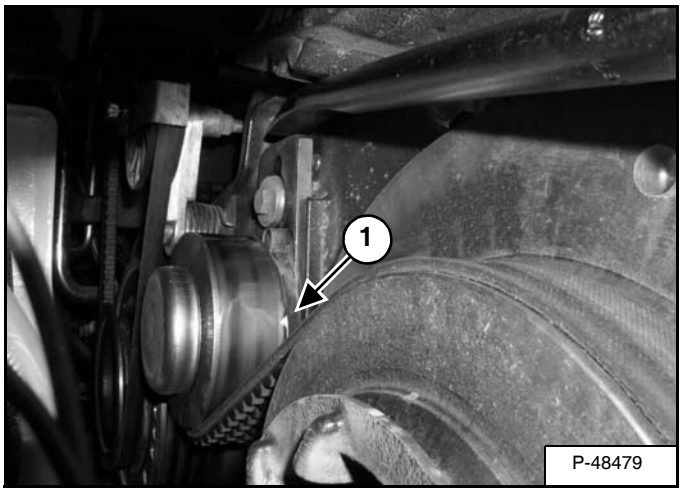
Loosen the bolt (Item 1) **[Figure 30-50-3]** on the spring loaded drive idler.

NOTE: The pointer (Item 2) [Figure 30-50-3] will be at the 1 o'clock position when the idler is not under spring tension.

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Adjusting (Cont'd)

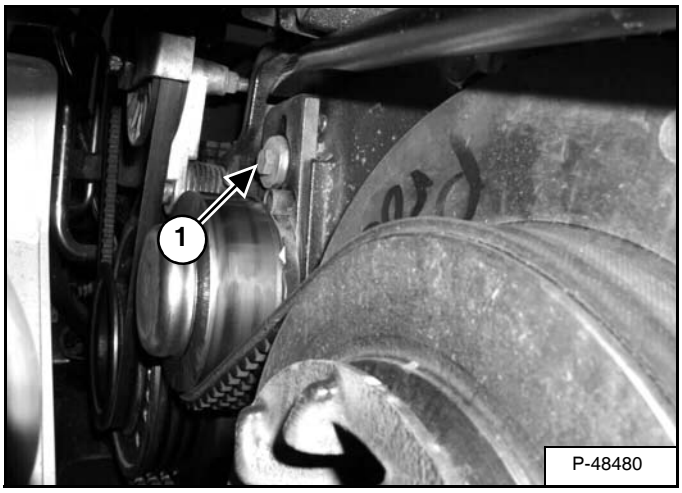
Figure 30-50-4



Using the Belt Tensioner Bar (MEL1405) or a pry bar push the idler assembly against the belt, the pointer (Item 1) **[Figure 30-50-4]** will be at the 3 o'clock position when the idler stop is bottomed out. *Do not pry directly on the pulley, pry on the tensioner bracket the pulley is mounted on.*

Note: If the pointer does not move when prying on the tensioner mounting bracket, manually move the arrow towards the 3 o'clock position with a screwdriver while putting tension on the bracket to help get it started.

Figure 30-50-5



Raise the idler assembly slightly so that the pulley is operating on spring tension and not against the stop.

Tighten the mounting bolt (Item 1) **[Figure 30-50-5]** to 25-28 ft.-lb. (34-38 N•m) torque.

NOTE: Do not set the idler against the travel stop in the 3 o'clock position.

Run the engine for a few minutes.

Stop the engine and recheck the pointer position.

Readjust if necessary.

After the idler has been in service, readjust when the pointer reaches the 1 o'clock position.

Install the belt shield using the fasteners.

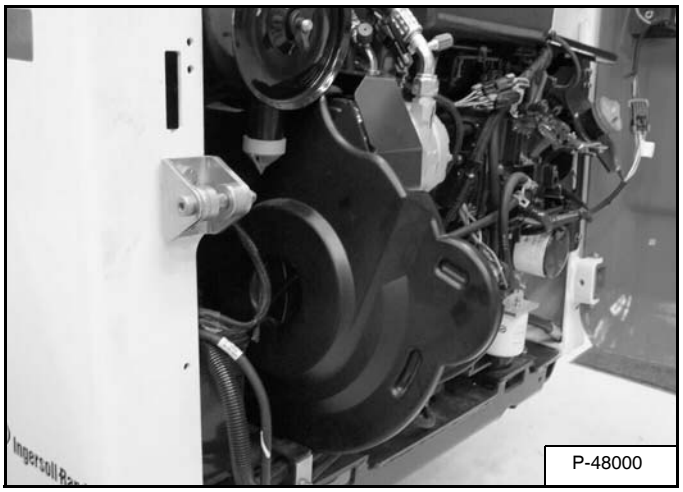
Reconnect the negative (-) battery cable.

Close the rear door.

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Drive Belt Replacement

Figure 30-50-6



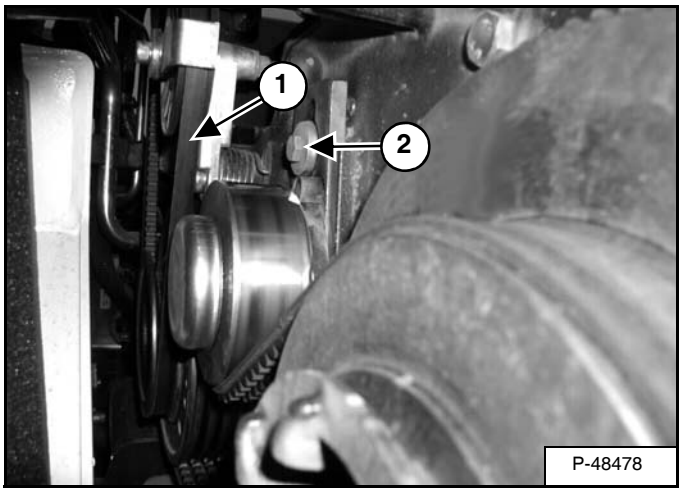
Stop the engine. Open the rear door.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the negative (-) cable from the battery. The battery may be removed for additional working clearance. (See Removal And Installation on Page 60-20-1.)

Remove the belt shield **[Figure 30-50-6]**. (See Shield Removal And Installation, Page 30-50-1.)

Figure 30-50-7



Remove the fan drive belt (Item 1) **[Figure 30-50-7]**.

Remove the air conditioner belt if so equipped.

The belt tensioner is located between the flywheel and pump pulley. Loosen and remove the bolt (Item 2) **[Figure 30-50-7]** from the belt tensioner.

Remove the belt tensioner assembly.

Figure 30-50-8



Remove the drive belt from the pump pulley and flywheel. Remove the drive belt from the loader **[Figure 30-50-8]**.

Install the new drive belt. Install the belt tensioner assembly.

Install the fan drive belt.

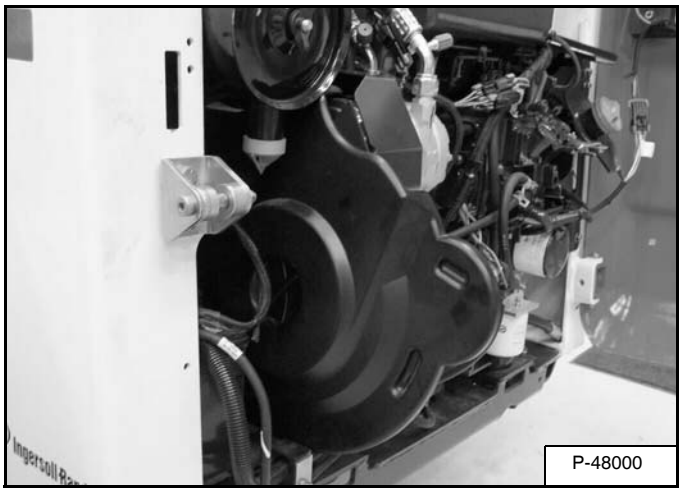
Adjust the drive belt. (See Adjusting, Page 30-50-1.)

Reinstall belt shield and connect the negative (-) cable to the battery.

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Tensioner Pulley Removal And Installation

Figure 30-50-9

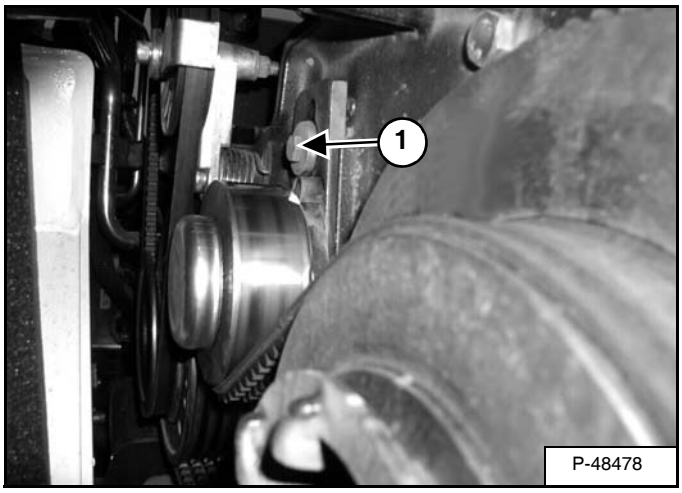


Stop the engine. Open rear door.

Remove the negative (-) cable from the battery. the battery may be removed for additional working clearance. (See Removal And Installation on Page 60-20-1.)

Remove the belt shield **[Figure 30-50-9]**. (See Shield Removal And Installation, Page 30-50-1.)

Figure 30-50-10



Loosen and remove the tensioner pulley mounting bolt (Item 1) **[Figure 30-50-10]**.

Installation: Tighten the bolt to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the belt tensioner pulley from the housing.

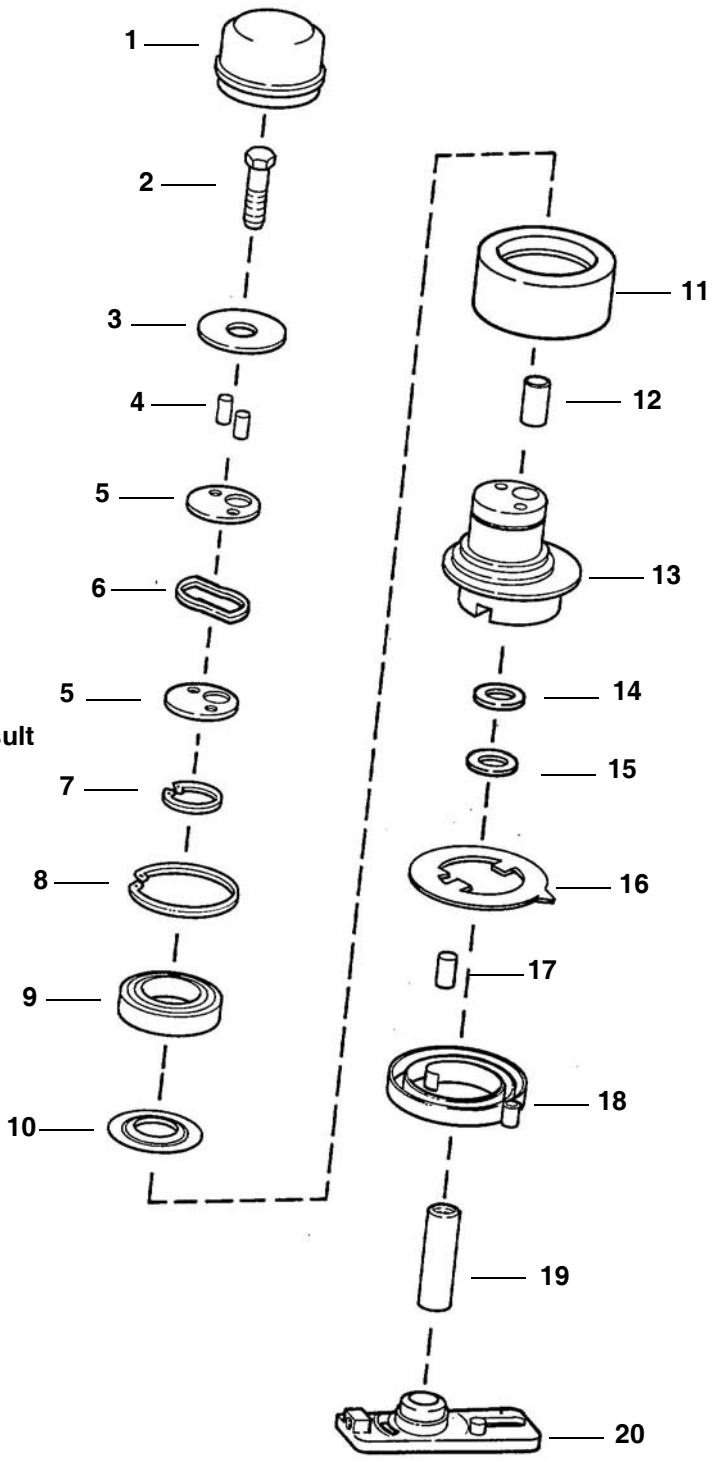
Reverse the removal procedure to install the drive belt tensioner.

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Tensioner Pulley Parts Identification

1. Cover
2. Bolt
3. Washer
4. Pins
5. Washer
6. Spring
7. Snap Ring
8. Snap Ring
9. Bearing
10. Dust Shield
11. Pulley
12. Bushing
13. Hub
14. Washer
15. Seal
16. Arrow Indicator Plate
17. Locating Pin
18. Spring
19. Shaft
20. Bracket

NOTE: Drive idler parts are not available individually. Consult parts catalog for available sub-assemblies.

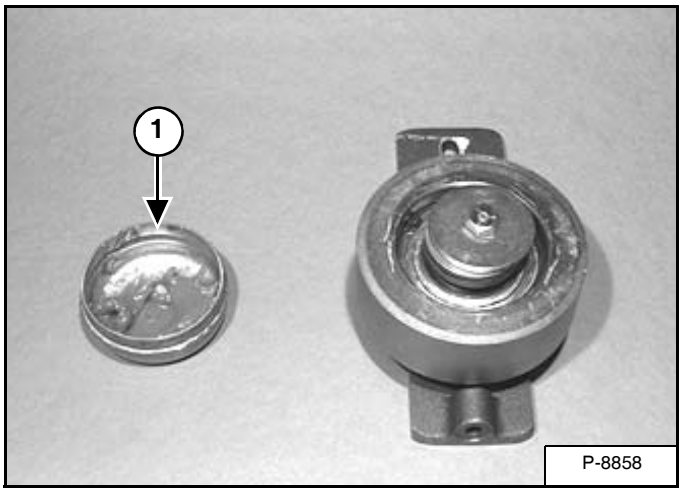


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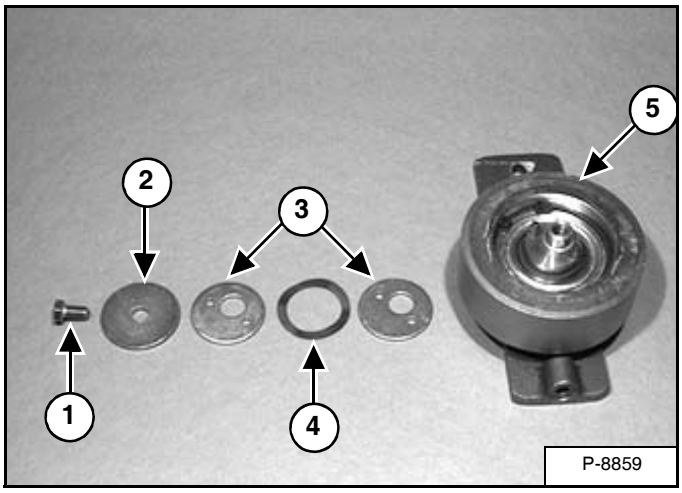
Tensioner Pulley Disassembly

Figure 30-50-11



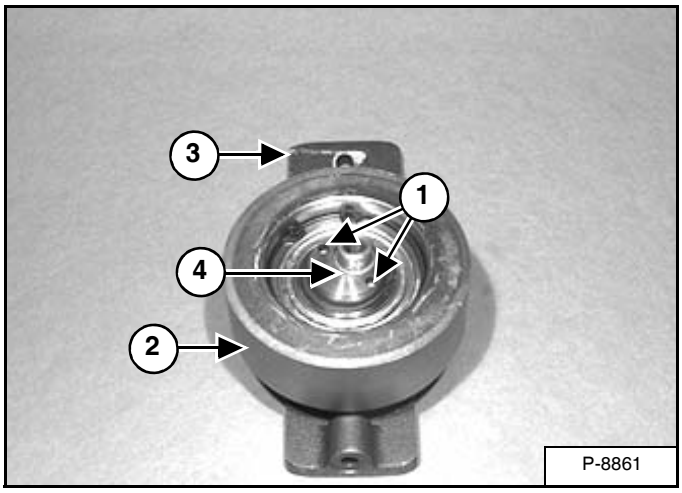
Remove the grease cover (Item 1) **[Figure 30-50-11]**.

Figure 30-50-12



Remove the bolt (Item 1), the flat washer (Item 2), the retainer washer (Item 3), the spring washer (Item 4) and the second retainer washer (Item 3) from the pulley assembly (Item 5) **[Figure 30-50-12]**.

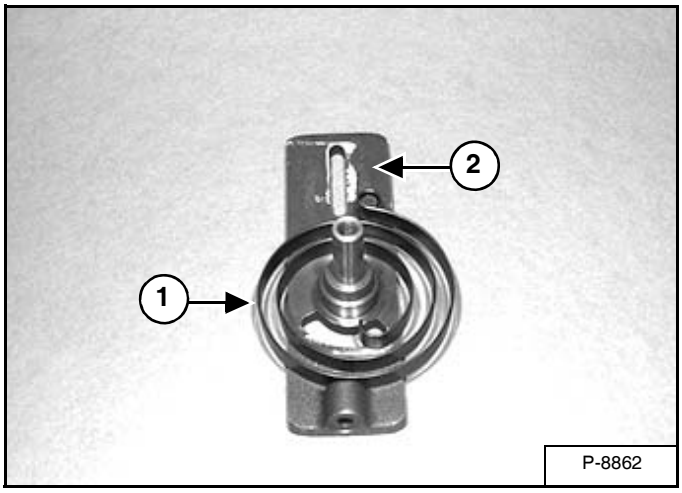
Figure 30-50-13



Remove the two pins (Item 1) from the hub assembly (Item 2) **[Figure 30-50-13]** only if they have been damaged.

Remove the bracket assembly (Item 3) by tapping on the shaft (Item 4) **[Figure 30-50-13]** with a plastic hammer.

Figure 30-50-14

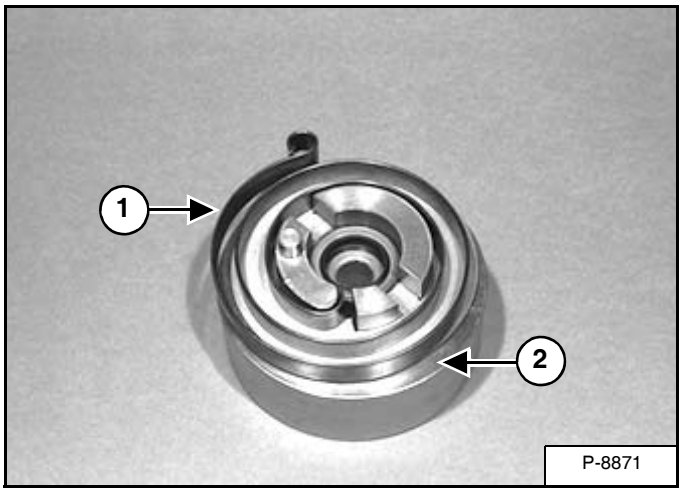


Remove the spring (Item 1) from the bracket (Item 2) **[Figure 30-50-14]**.

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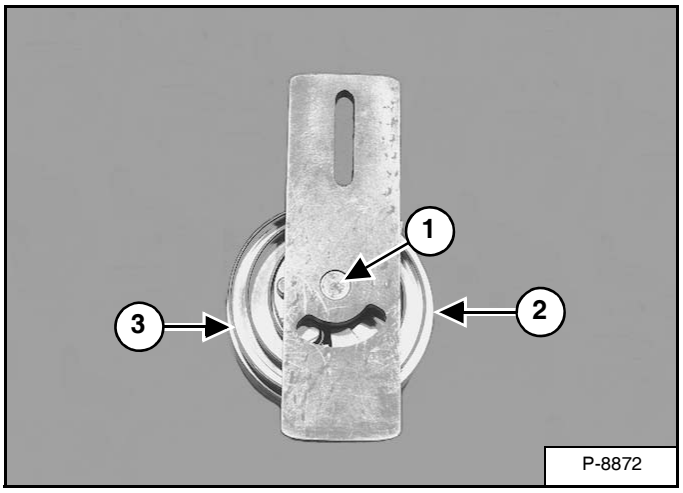
Tensioner Pulley Assembly

Figure 30-50-15



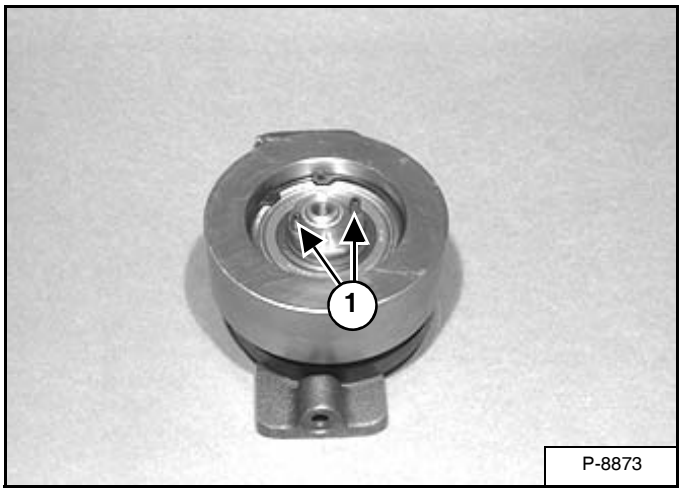
Install the spring (Item 1) on the pulley (Item 2) **[Figure 30-50-15]** as shown.

Figure 30-50-16



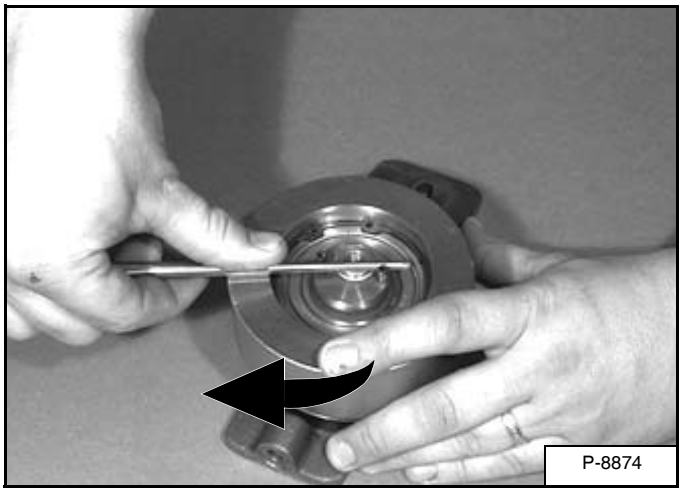
Install the shaft from the bracket assembly (Item 1) into the pulley assembly (Item 2) and align the spring (Item 3) **[Figure 30-50-16]** over the alignment pin on the bracket.

Figure 30-50-17



Turn the pulley assembly over and install the two pins (Item 1) **[Figure 30-50-17]** into the hub.

Figure 30-50-18



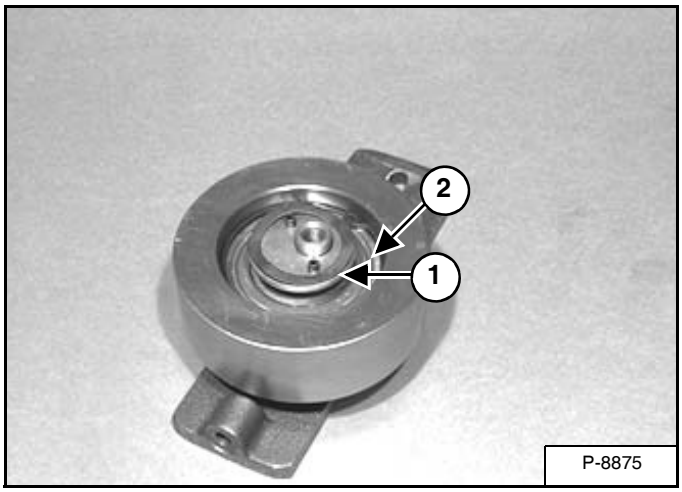
Install a punch as shown and turn clockwise while applying down pressure on the pulley.

Turn until the pulley snaps down into place; this procedure winds the spring and retains the end of the spring in proper location **[Figure 30-50-18]**.

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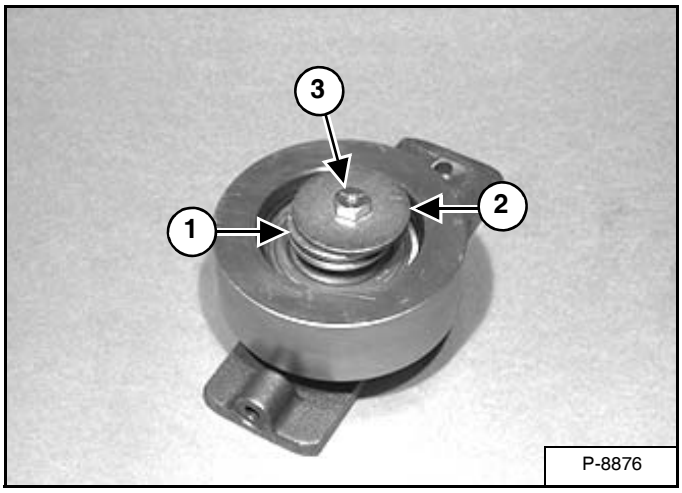
Tensioner Pulley Assembly (Cont'd)

Figure 30-50-19



Install the first retainer washer (Item 1) and spring washer (Item 2) **[Figure 30-50-19]** over the roll pins.

Figure 30-50-20

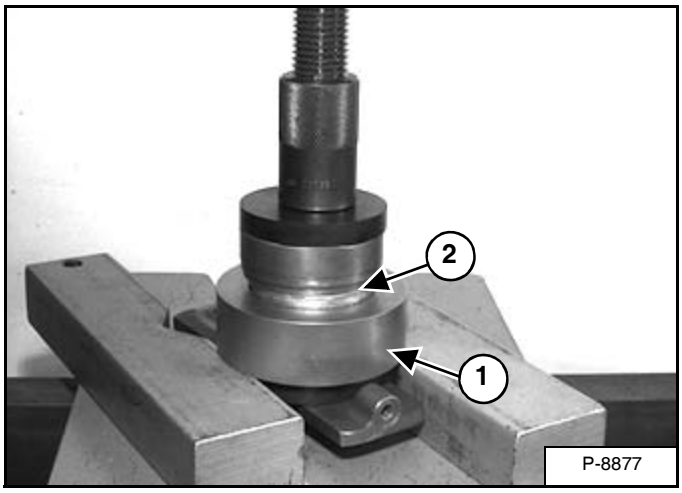


Install the second retainer washer (Item 1), the washer (Item 2) and the bolt (Item 3) **[Figure 30-50-20]**.

Tighten the bolt to 28-32 ft.-lb. (38-45 N•m) torque.

Fill the grease cap 1/4 full (approximately 1/2-3/4 oz.) of grease.

Figure 30-50-21



Press the grease cap (Item 1) onto the pulley assembly (Item 2) **[Figure 30-50-21]**. Press on the outer formed edge of the grease cap.

NOTE: When pressing the grease cap onto the pulley assembly, do not press down on the arrow indicator plate. Support the hub assembly so that it contacts only the hub and not the arrow indicator plate.

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OIL COOLER

Removal and Installation

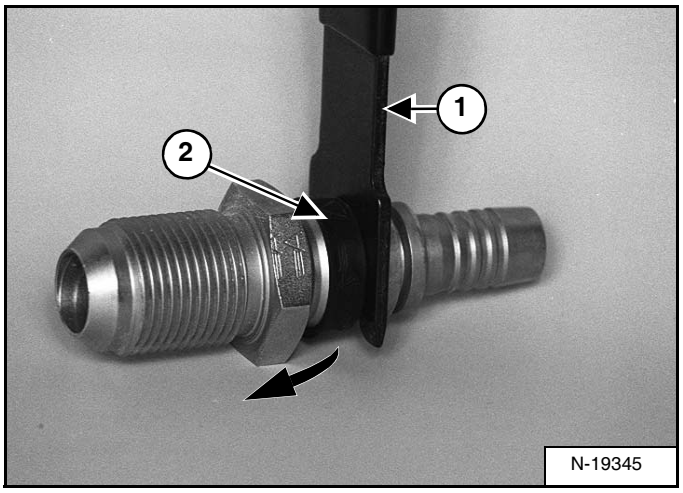
WARNING

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

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Remove the rear grill from the loader. (See Removal And Installation on Page 50-60-1.)

Figure 30-60-1



Install tool MEL 1558 (Item 1) to outside of rubber sleeve (Item 2) **[Figure 30-60-1]**.

Figure 30-60-2

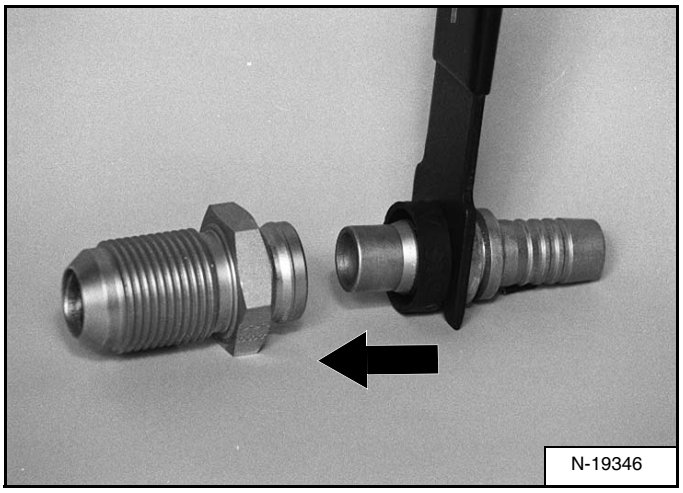
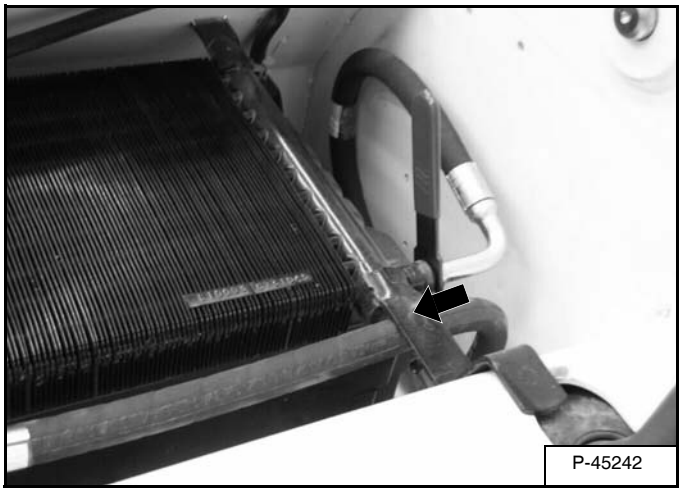


Figure 30-60-3

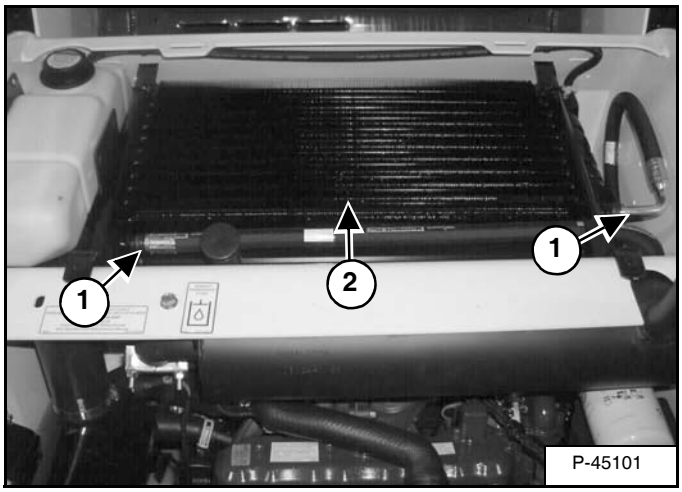


Slide the rubber sleeve in toward the radiator. The connector will release **[Figure 30-60-2]** & **[Figure 30-60-3]**.

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Removal and Installation (Cont'd)

Figure 30-60-4



Disconnect the inlet and outlet hoses (Item 1) **[Figure 30-60-4]** from the oil cooler (Item 2) **[Figure 30-60-4]**.

NOTE: When installing the cooler hoses, the fittings should make a clicking sound when pushed together.

Lift up the oil cooler and remove the cooler from the loader.

Reverse the removal procedure to install the oil cooler.

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DRIVE SYSTEM

BRAKE 40-10-1
Disk Removal And Installation 40-10-1
Switch Operated Parking Brake 40-10-2

CHAINCASE 40-30-1
Center Cover Removal And Installation 40-30-3
Checking And Adding Oil 40-30-1
Front Cover Removal And Installation 40-30-2
General Information 40-30-2
Rear Cover Removal And Installation 40-30-4
Removing The Oil 40-30-1

DRIVE COMPONENTS 40-20-1
Axle Seal Removal And Installation 40-20-1
Axle Sprocket And Bearings Removal And Installation . . . 40-20-3
Chain Removal And Installation 40-20-8

TIGHTEN ALL HARDWARE PER SIZE TO GRADE 5 TORQUE (SEE STANDARD TORQUE SPECIFICATIONS FOR BOLTS, SPEC SECTION) UNLESS OTHERWISE SPECIFIED.

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BRAKE

Disk Removal And Installation

Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)

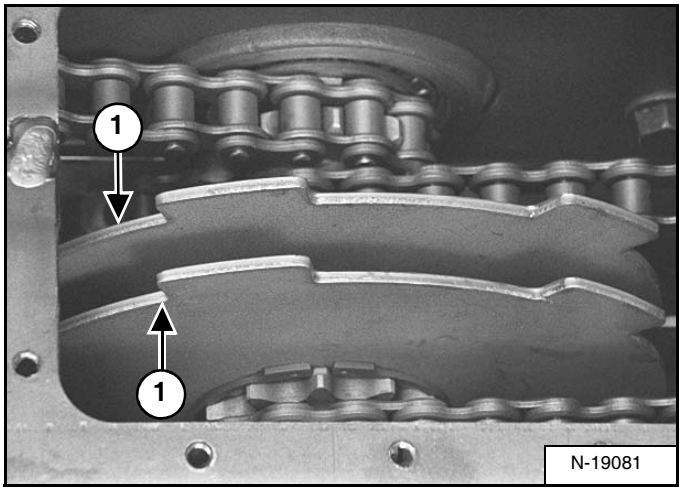
Disconnect and remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Remove the control panel from the loader. (See Removal and Installation on Page 50-100-1.)

Remove the center chaincase cover. (See Center Cover Removal And Installation on Page 40-30-3.)

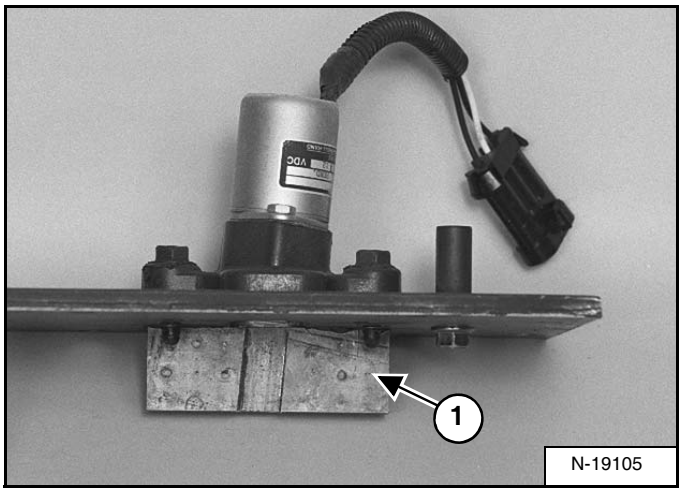
Remove the traction lock assembly. (See TRACTION LOCK on Page 60-110-1.)

Figure 40-10-1



The parking brake discs (Item 1) **[Figure 40-10-1]** are located beneath the center chaincase cover.

Figure 40-10-2



Inspect the traction lock guides (Item 1) **[Figure 40-10-2]** and the brake disc for damage or wear and replace as necessary.

(See Inspecting on Page 60-110-3.)

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Disk Removal And Installation (Cont'd)

Figure 40-10-3

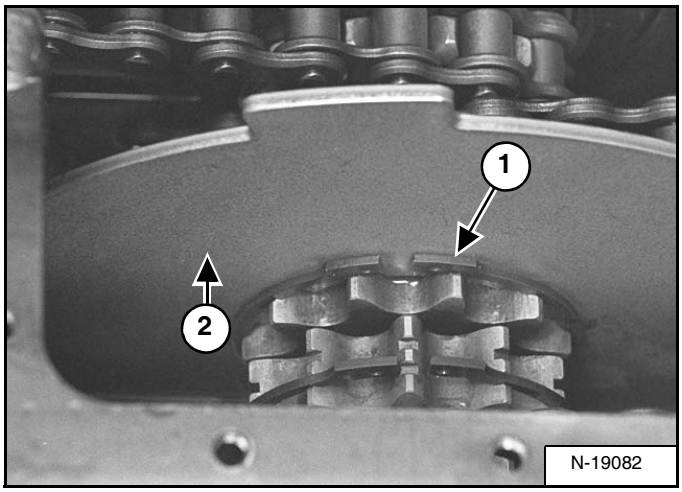
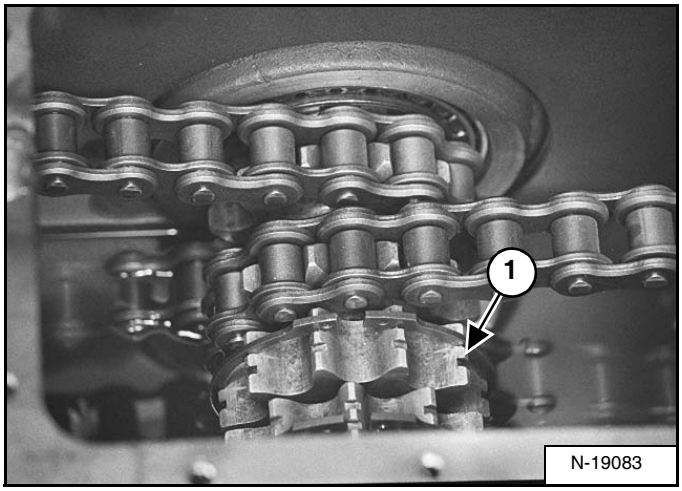


Figure 40-10-4



A snap ring pliers with 90° tips are necessary for removing the parking brake disc.

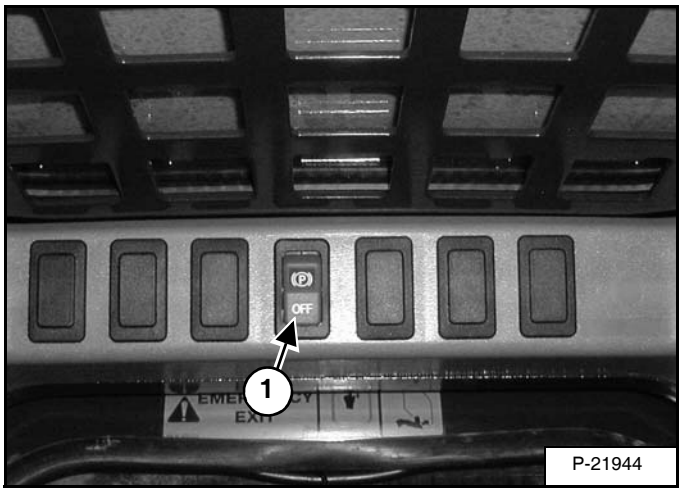
Remove the snap ring (Item 1) **[Figure 40-10-3]** from the end of the sprocket on the hydrostatic motor carrier.

Slide the disc (Item 2) **[Figure 40-10-3]** off the sprocket (Item 1) **[Figure 40-10-4]** and remove the disc through the front chaincase cover.

Reverse the removal procedure to install the disc in the loader.

Switch Operated Parking Brake

Figure 40-10-5



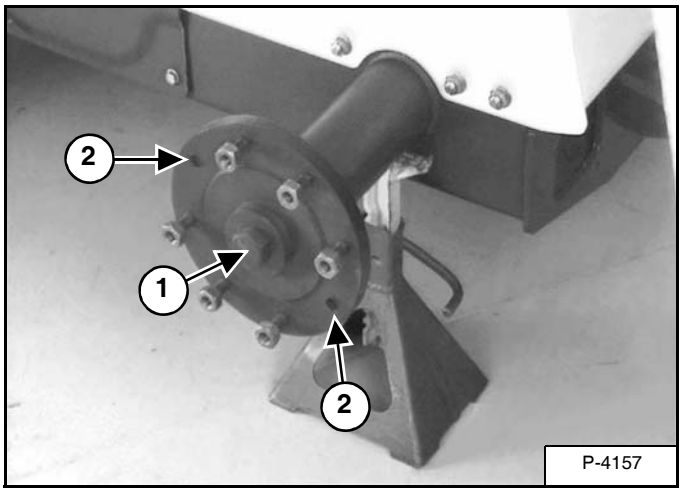
The parking brake switch in the front panel (Item 1) **[Figure 40-10-5]** replaced the pedal parking brake. (See INSTRUMENT PANEL on Page 60-50-1.)

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DRIVE COMPONENTS

Axle Seal Removal And Installation

Figure 40-20-1



The tools listed are needed for the following procedure:

Axle Hub Puller Tool
MEL1399 - Seal Driver Tool
MEL1242 - Power Ram (may be used if desired)

To loosen the axle hub mounting bolt (Item 1) **[Figure 40-20-1]**, use the following procedure:

Before lifting and blocking the loader, loosen the hub mounting bolt (Item 1) **[Figure 40-20-1]**.

NOTE: If the axle and bearings are being replaced, also loosen the sprocket mounting bolt inside the chaincase before lifting and blocking the loader. (See Axle Sprocket And Bearings Removal And Installation on Page 40-20- 3.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Remove the front tire/wheel assembly.

Installation: Tighten the wheel mounting nuts to 105-115 ft.-lb. (142-156 N•m) torque.

Remove the hub mounting bolt (Item 1) **[Figure 40-20-1]** and washer from the axle.

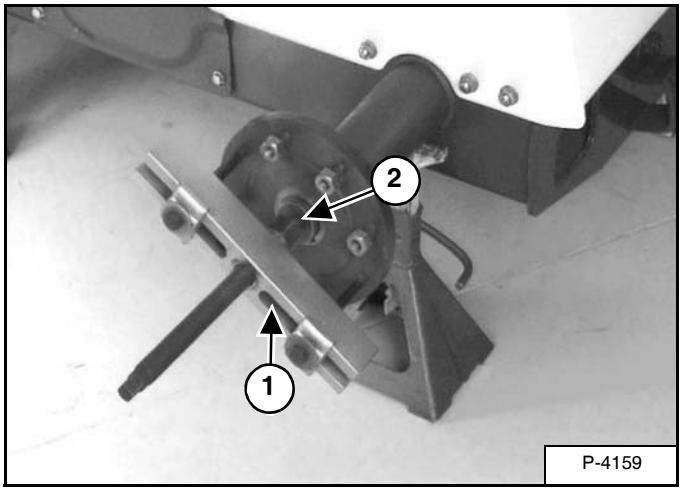
Installation: Tighten the hub mounting bolt to 725-800 ft.-lb. (983-1085 N•m) torque.

Remove two of the wheel mounting studs (Item 2) **[Figure 40-20-1]**.

Use a wheel mounting nut on each stud and remove the two studs with a hammer.

Installation: Support the flange of the axle hub and install the two studs with a hammer. A hydraulic press can also be used to install the studs.

Figure 40-20-2



Install the puller tool (Item 1) **[Figure 40-20-2]** on the axle hub.

A driver tool (Item 2) **[Figure 40-20-2]** can be used for centering the threaded rod of the puller.

⚠ WARNING

NEVER STAND IN-LINE OF THE HUB WHEN REMOVING A HUB FROM AN AXLE. The hub has a tapered fit on the axle end and can come off the axle with great force and cause serious injury.

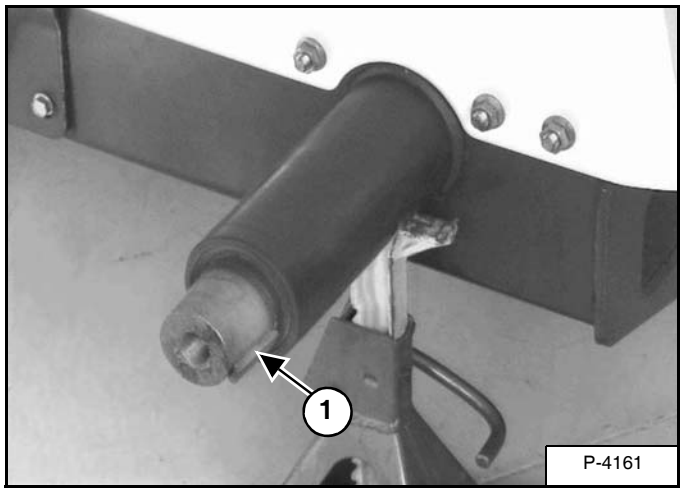
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Use a wrench with the puller and remove the axle hub from the axle tube. A spacer and a power ram can be used between the axle and the tool if available, instead of the wrench, threaded rod and driver tool.

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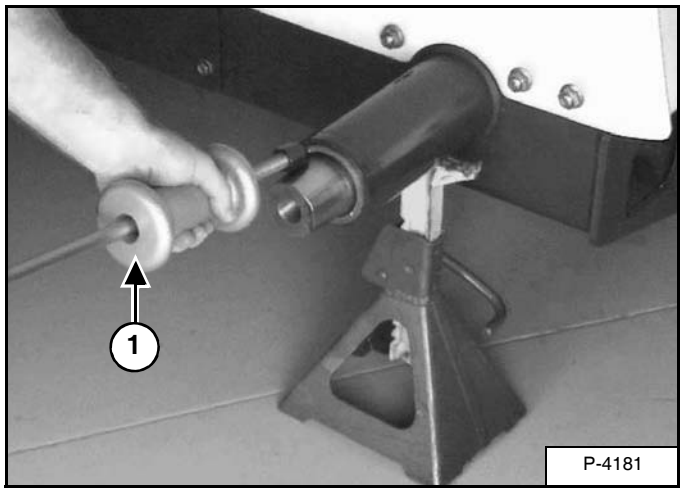
Axle Seal Removal And Installation (Cont'd)

Figure 40-20-3



Remove the key (Item 1) **[Figure 40-20-3]** from the axle.

Figure 40-20-4

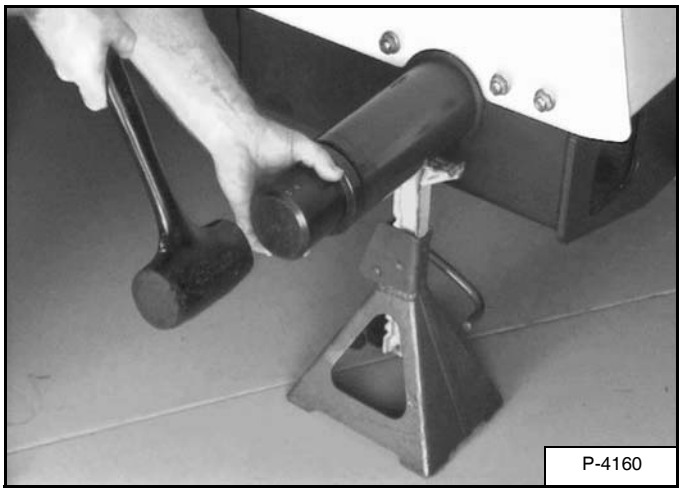


Drill a small hole in the axle seal.

Install a slide hammer (Item 1) **[Figure 40-20-4]** with a screw tip end in the axle seal.

Remove the axle seal.

Figure 40-20-5



Installation: MEL1399 seal driver tool is necessary for the following procedure:

Clean the seal area and inspect the shaft for wear.

NOTE: If the shaft is damaged or worn, an axle repair sleeve kit is available from Bobcat Parts.

Place the new axle seal over the axle and into the axle tube.

Install MEL1399 seal driver tool over the axle and put against the axle seal **[Figure 40-20-5]**.

Hit the seal driver tool with a hammer until the tool is flush with the edge of the axle tube **[Figure 40-20-5]**.

Reverse removal procedure to install the axle hub and wheel assembly.

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Axle Sprocket And Bearings Removal And Installation

The tools listed are needed for the following procedure:

MEL1242 - Power Ram
MEL1202B - Axle Bearing Service Set

NOTE: The procedure shown is for removing the front axle, bearings and sprocket. This procedure can also be used for the rear axle, bearings and sprocket. (See Rear Cover Removal And Installation on Page 40-30-4.)

Use jackstands to support the rear of the loader. (The loader wheels should remain on the ground.)

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

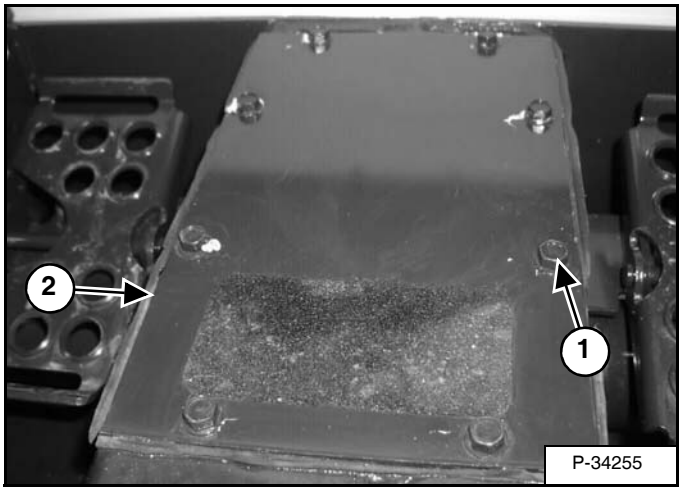
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Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

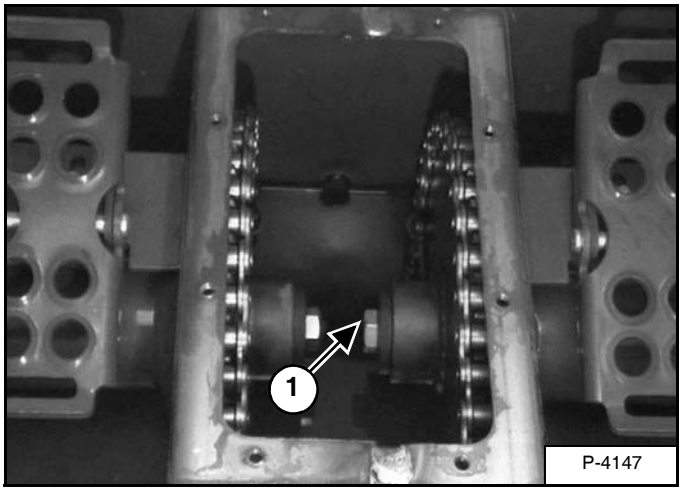
Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Figure 40-20-6



Remove the eight front cover mounting bolts (Item 1) and the front cover (Item 2) from the chaincase **[Figure 40-20-6]**.

Figure 40-20-7



Loosen the axle sprocket mounting bolt (Item 1) **[Figure 40-20-7]**.

Lift and block the loader. (See Procedure on Page 10-10-1.)

Remove the fluid from the chaincase. (See Removing The Oil on Page 40-30-1.)

Remove the axle hub. (See Axle Seal Removal And Installation on Page 40-20-1.)

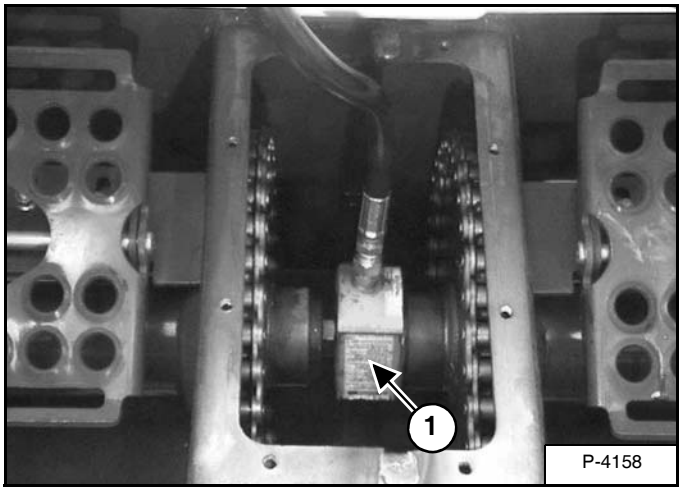
Remove the sprocket mounting bolt (Item 1) **[Figure 40-20-7]**.

Installation: Tighten the sprocket mounting bolt to 300-330 ft.-lb. (407-447 N•m) torque.

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Axle Sprocket And Bearings Removal And Installation (Cont'd)

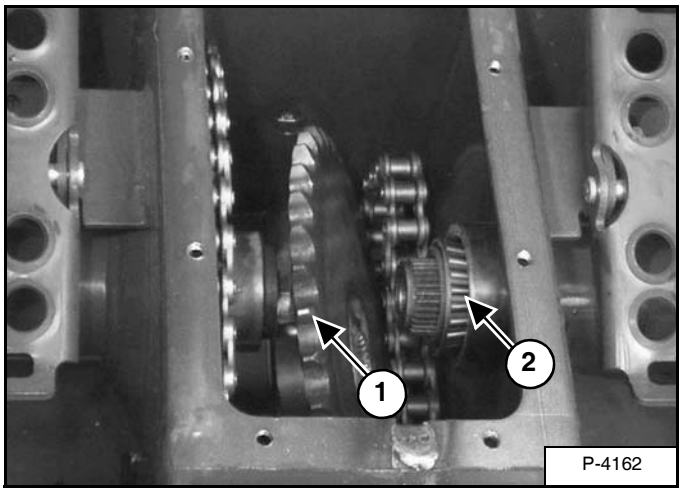
Figure 40-20-8



Install the MEL1242 power ram (Item 1) **[Figure 40-20-8]** between the two sprockets.

Put a spacer between the power ram and axle. Push the axle out to the end of the power ram stroke. Add another spacer and push the axle again. Repeat this procedure until the axle is free from the sprocket and inner bearing.

Figure 40-20-9

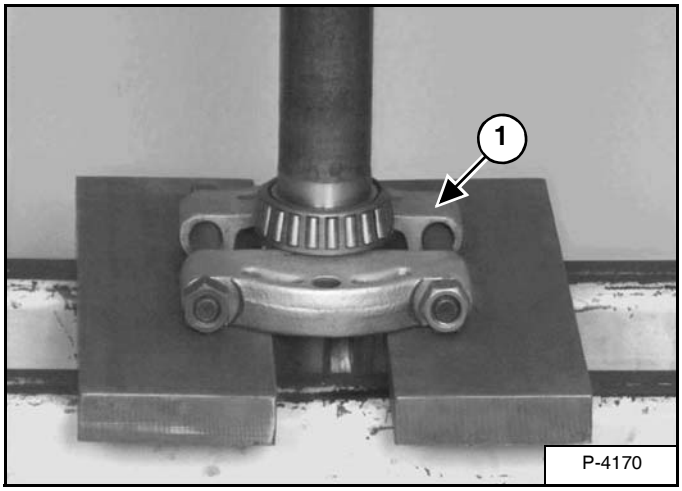


Remove the drive chain from the sprocket (Item 1) **[Figure 40-20-9]** and remove the sprocket from the chaincase.

Remove the inner bearing (Item 2) **[Figure 40-20-9]** and remove the axle from the axle tube. (See Axle Sprocket And Bearings Removal And Installation on Page 40-20-3.)

Installation: Pack both axle bearings with grease before installing them.

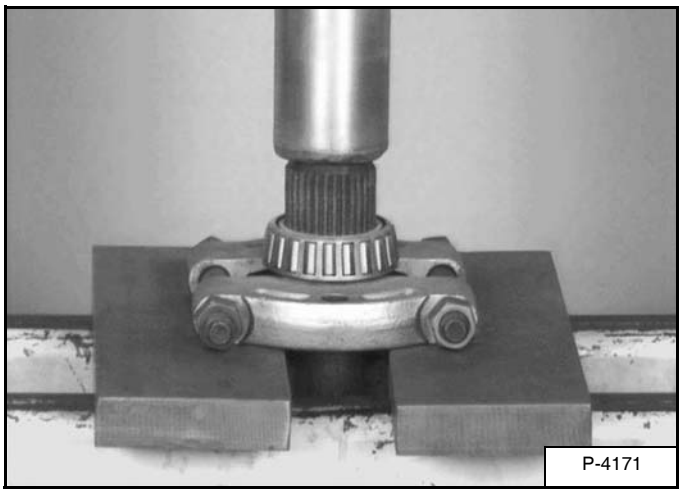
Figure 40-20-10



A bearing puller (Item 1) **[Figure 40-20-10]** is needed for the following procedure:

Put the axle/outer bearing assembly in the bearing puller as shown and put in the hydraulic press **[Figure 40-20-10]**.

Figure 40-20-11



Be sure the bearing puller makes good contact with the inner race of the bearing and press the bearing off the mounting surface of the axle.

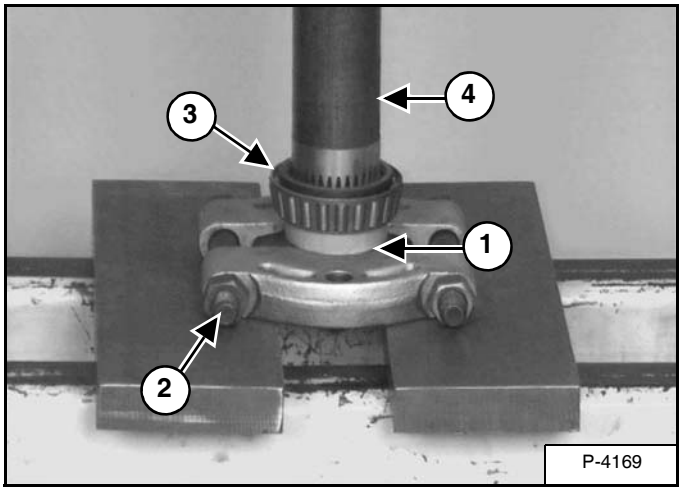
Be sure to hold onto the axle during removal as it will slide freely along the axle shaft after removal from the bearing mounting surface and until the bearing contacts the spline on the shaft.

Press the splined end of the axle free from the bearing **[Figure 40-20-11]**.

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Axle Sprocket And Bearings Removal And Installation (Cont'd)

Figure 40-20-12



Installation: A piece of round tubing (Item 1) **[Figure 40-20-12]** is needed to install the bearing on the axle shaft. The tubing needs to measure approximately 0.500 inch (12,7 mm) to 1.0 inch (25,4 mm) in length. The inside diameter of the tubing should not be under 2.100 inches (53,3 mm) and the outside diameter should not be over 2.400 inches (60 mm),

A bearing puller (Item 2) **[Figure 40-20-12]** is also needed to install the bearing on the axle.

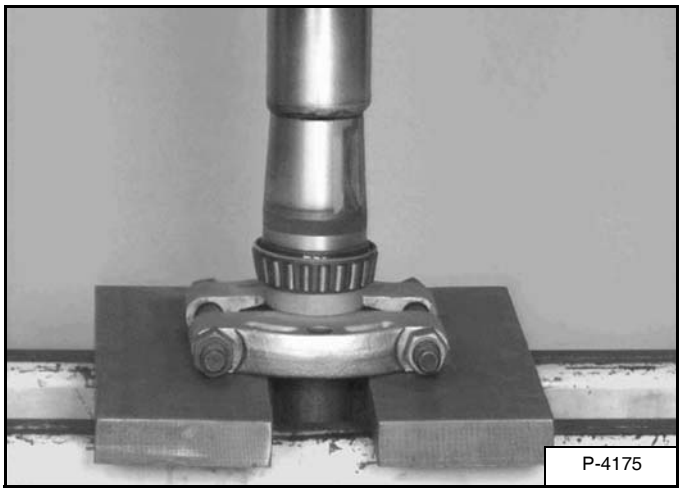
Put the tubing (Item 1) **[Figure 40-20-12]** on the bearing puller (Item 2) **[Figure 40-20-12]**.

Put the bearing (Item 3) **[Figure 40-20-12]** on the tube as shown.

Put the spline end of the axle shaft (Item 4) **[Figure 40-20-12]** in the bearing and press the bearing onto the axle.

Be sure to hold onto the axle during installation, as it will slide freely along the axle shaft after the spline end has passed through the bearing and until it reaches the bearing mounting surface on the axle.

Figure 40-20-13

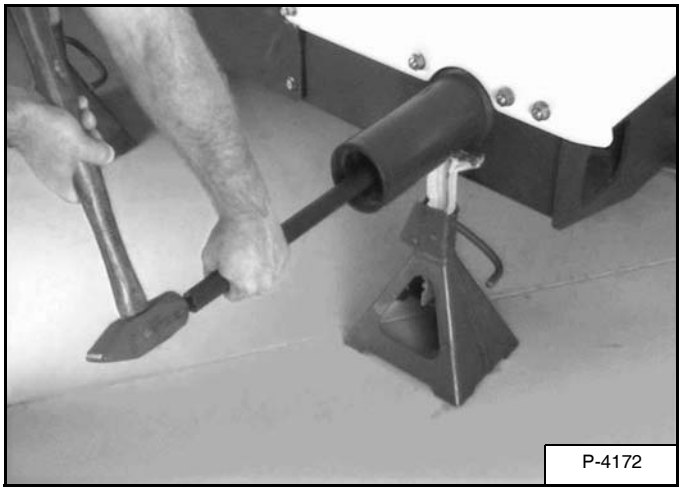


When the bearing reaches the bearing mounting surface, continue the installation until the bearing is fully seated **[Figure 40-20-13]**.

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Axle Sprocket And Bearings Removal And Installation (Cont'd)

Figure 40-20-14

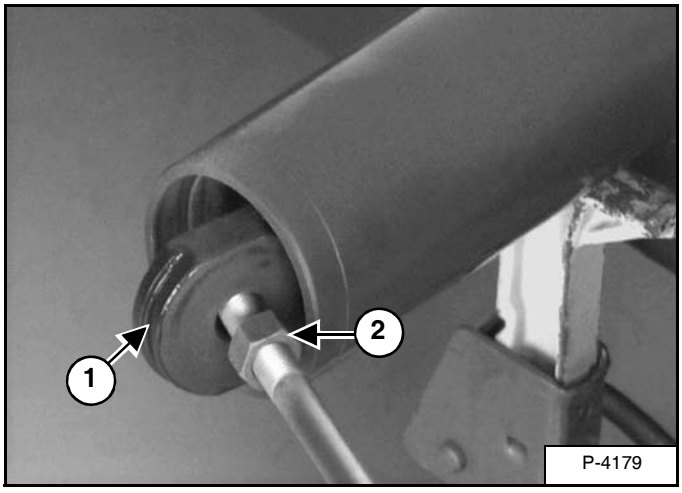


Use the tools provided in the MEL1202B Axle Bearing Service Set for bearing cup removal and installation. A slide hammer is also necessary for this procedure.

Use the long rod and bearing cup tool to remove the inner bearing cup **[Figure 40-20-14]**.

Hit the long rod with a hammer to remove the bearing cup from the axle tube **[Figure 40-20-14]**.

Figure 40-20-15

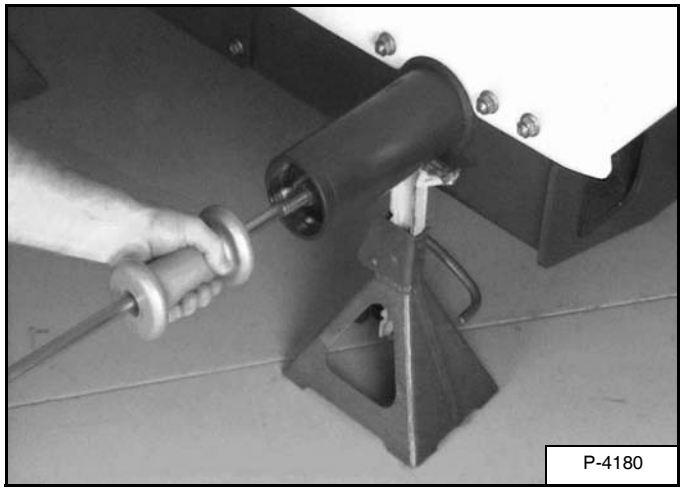


To remove the outer bearing cup, place the bearing cup tool (Item 1) **[Figure 40-20-15]** on the slide hammer.

Leave the bearing cup tool loose until the tool is installed inside the tube **[Figure 40-20-15]**.

After the bearing cup tool is inside the axle tube, pull the tool against the bearing cup and tighten the nut (Item 2) **[Figure 40-20-15]** on the tool.

Figure 40-20-16



Use the slide hammer and remove the bearing cup from the axle tube **[Figure 40-20-16]**.

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Axle Sprocket And Bearings Removal And Installation (Cont'd)

Figure 40-20-17

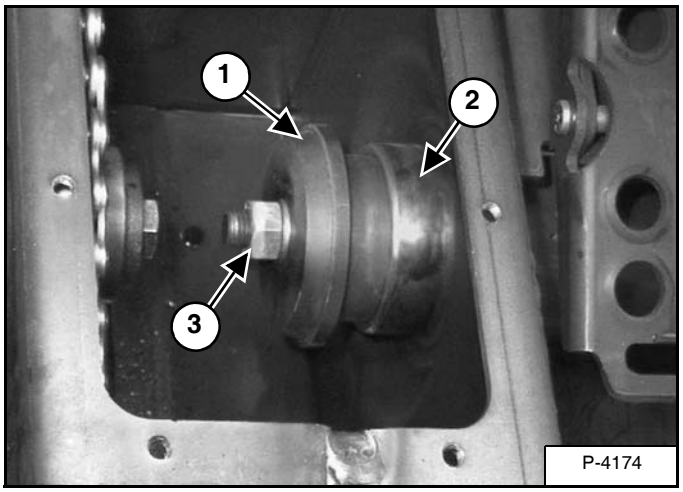
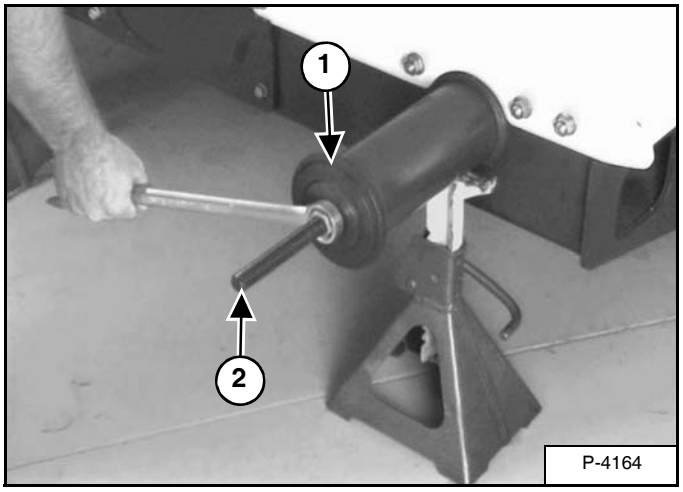


Figure 40-20-18



Use the bearing cup installation tools (Item 1) **[Figure 40-20-17]** and (Item 1) **[Figure 40-20-18]** and the long threaded rod (Item 2) **[Figure 40-20-18]** from the service set to install the inner and outer bearing cups.

Put the inner bearing cup in the axle tube (Item 2) **[Figure 40-20-17]**.

Put the installation tool (Item 1) **[Figure 40-20-17]** in the axle tube.

Install the long threaded rod (Item 2) **[Figure 40-20-18]** into the axle tube and through the installation tool (Item 1) **[Figure 40-20-17]**.

Secure the tool to the threaded rod with a nut (Item 3) **[Figure 40-20-17]**.

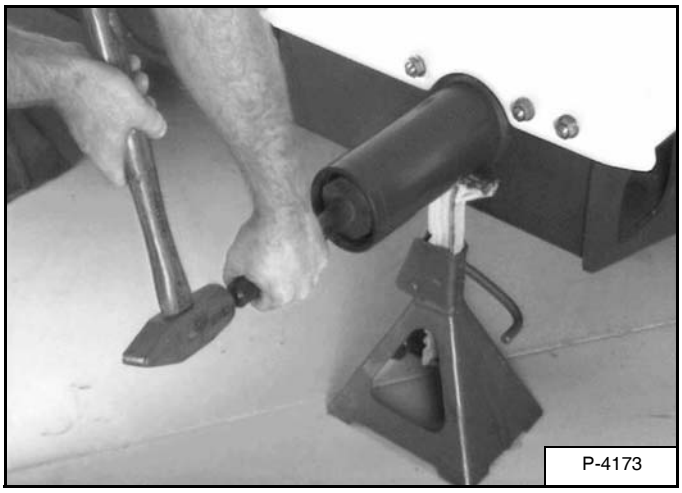
Put the installation tool (Item 1) **[Figure 40-20-18]** in the axle tube with the threaded rod through the hole in the tool.

Secure the tool to the threaded rod with a nut **[Figure 40-20-18]**.

Hold the inside nut (Item 3) **[Figure 40-20-17]** with a wrench and tighten the outside nut as shown in photo **[Figure 40-20-18]**.

Tighten the nut until the bearing cup is seated.

Figure 40-20-19



To install the outer bearing cup, use the short rod and the bearing cup tool used for removing the bearing cups.

Put the bearing cup tool on the short rod.

Put the bearing cup in the axle tube and put the tool into the tube over the bearing cup **[Figure 40-20-19]**.

Hit the short rod with a hammer until the bearing cup is seated inside the axle tube.

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Chain Removal And Installation

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the loader lift arms and install an approved lift arm support device.(See Installing Lift Arm Support Device on Page 10-20-1.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the fluid from the chaincase. (See Removing The Oil on Page 40-30-1.)

Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Remove the control panel. (See Removal and Installation on Page 50-100-1.)

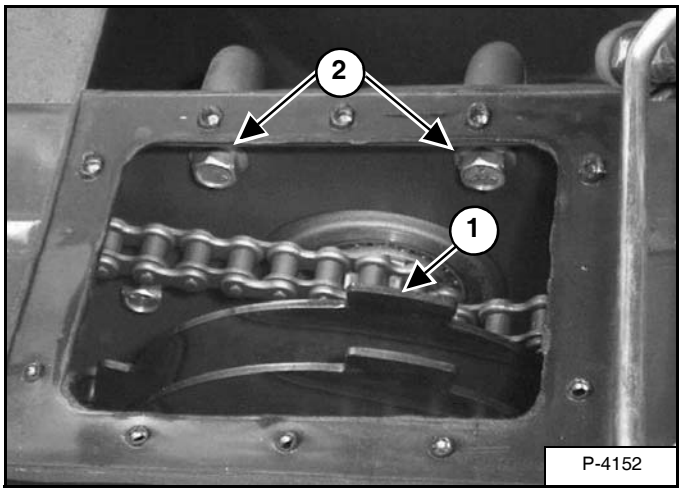
Remove the traction lock assembly. (See TRACTION LOCK on Page 60-110-1.)

Remove the center chaincase cover. (See Center Cover Removal And Installation on Page 40-30-3.)

Remove the front (or rear) chaincase cover. (See Front Cover Removal And Installation on Page 40-30-2.)

Remove the front (or rear) axle and sprocket. (See Axle Sprocket And Bearings Removal And Installation on Page 40-20-3.)

Figure 40-20-20

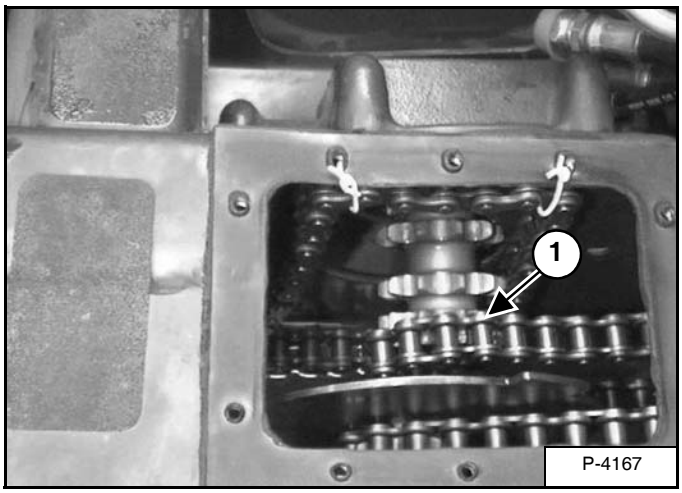


Remove the parking brake disc (Item 1) **[Figure 40-20-20]**. (See Disk Removal And Installation on Page 40-10-1.)

Remove the six carrier mounting bolts (Item 2) **[Figure 40-20-20]** from inside the chaincase.

Installation: Tighten the motor carrier mounting bolts to 125-140 ft.-lb. (170-190 N•m) torque.

Figure 40-20-21



Tip the end of the sprocket on the motor carrier toward the rear of the loader and remove the rear drive chain from the sprocket.

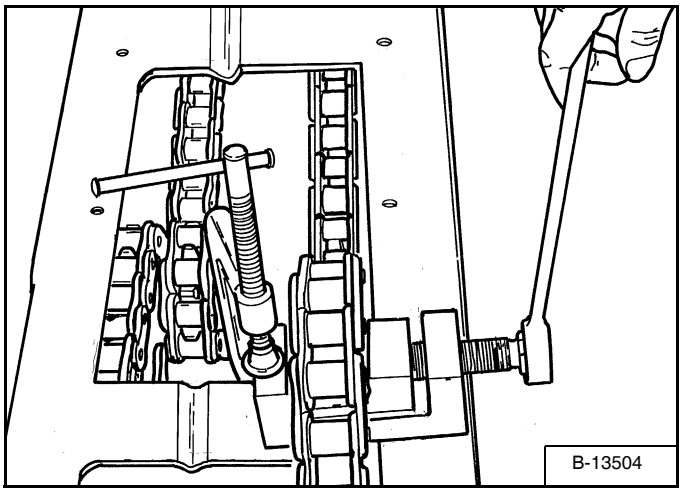
NOTE: It may be necessary to tie the front drive chain up as shown in photo [Figure 40-20-21], so the carrier/motor assembly can be moved enough to free the rear drive chain (Item 1) [Figure 40-20-21] from the sprocket.

Remove the front drive chain from the chaincase.

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Chain Removal And Installation (Cont'd)

Figure 40-20-22



The tool listed is needed for the following procedure:

MEL1037 - Chain Link Tool

Installation: If a new chain is installed, a connector link must be used to connect the chain together.

Use MEL1037 Chain Link Tool and #80 chain adapter.

Secure the tool and place the connector link in the tool as shown **[Figure 40-20-22]**.

Turn the threaded rod of the tool and press the connector link together on the chain **[Figure 40-20-22]**. Tighten the threaded rod of the chain link tool to 130 ft.-lb. (176 N•m) torque.

⚠ WARNING

DO NOT exceed the recommended torque of 130 ft.-lb. (176 N•m). The tool may fail under too much torque. Put cloth around the tool to protect yourself from flying debris.

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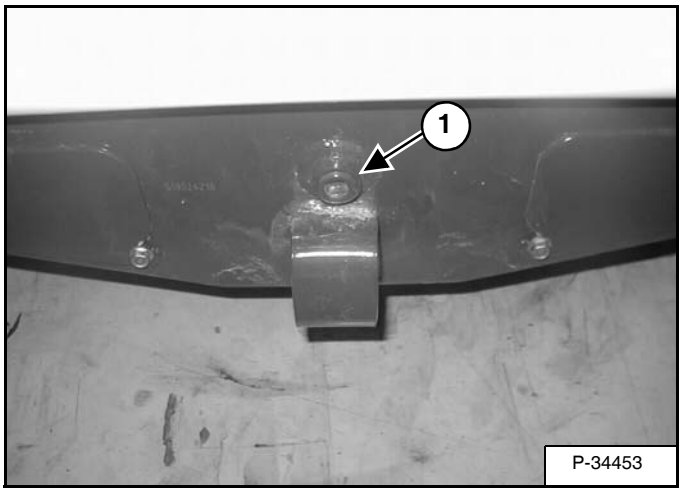


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CHAINCASE

Checking And Adding Oil

Figure 40-30-1



The chaincase contains the final drive sprockets and chains and uses the same type of oil as the hydraulic/ hydrostatic system. (See HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS on Page SPEC-50-1.)

To check the chaincase oil level, use the following procedure:

Drive the loader on a level surface. Stop the engine.

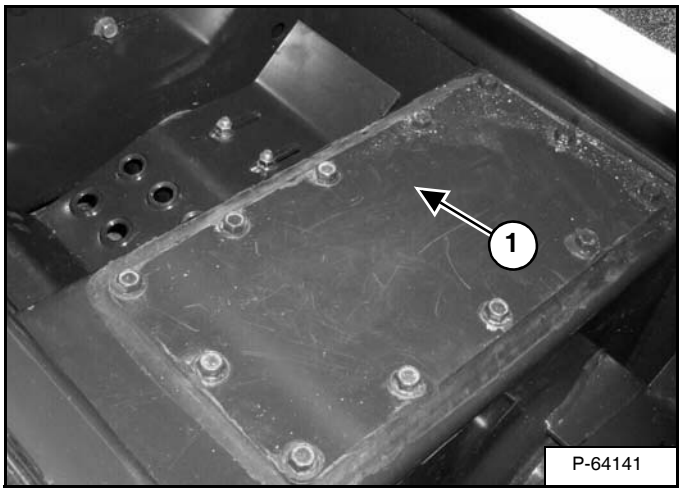
Remove the plug (Item 1) **[Figure 40-30-1]** from the front of the chaincase housing.

If oil can be reached with the tip of the your finger through the hole the oil level is correct.

If the level is low, add oil through the check plug hole until the oil flows from the hole. Install and tighten the plug.

Removing The Oil

Figure 40-30-2



Remove the chaincase cover (Item 1) **[Figure 40-30-2]**(See Front Cover Removal And Installation on Page 40-30-2.)

Use a vacuum pump to extract the fluid from the chain case.

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General Information

Early chaincase designs were assembled with gaskets and polyurethane sealant between the chaincase covers and chaincase housing. This was due to a weld that ran down the middle of the top of the chaincase.The gasket helps seal around the welded area. The polyurethane sealant should be used with the gasket to ensure a good seal.

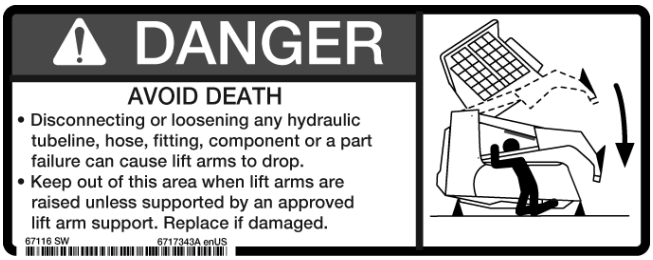
Later chaincase designs do not use a gasket because the weld was moved to the top edge of the chaincase. This creates a "flat top", on the chaincase, for the cover to seal against. Polyurethane sealant is all that is needed to seal the covers.

Note: Both the later "flat top" and early chaincase designs should use polyurethane sealer on the screw threads, to ensure a good seal.

Front Cover Removal And Installation

Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)

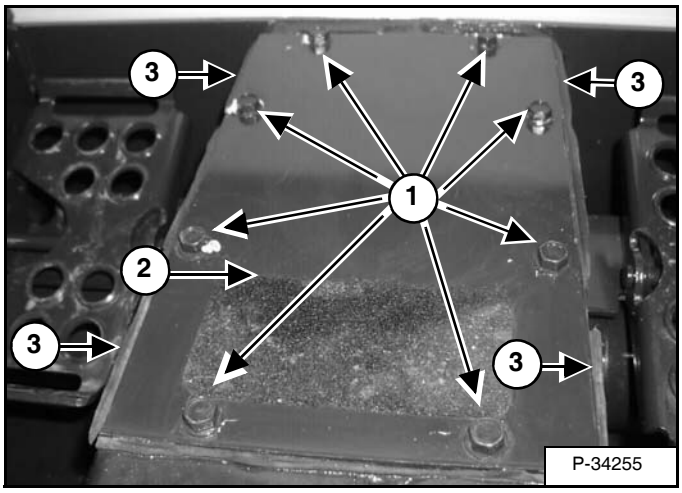


WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Figure 40-30-3



Remove the front chaincase cover mounting screws (Item 1) **[Figure 40-30-3]**.

Remove the front chaincase cover (Item 2) **[Figure 40-30-3]** from the loader.

Note: On later "flat top" chaincases there are machined recesses (Item 3) [Figure 40-30-3] on the bottom side of the cover to help pry the covers off.

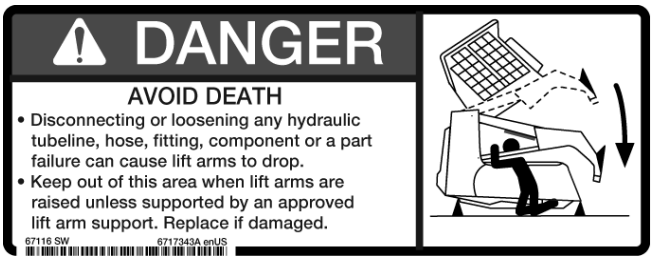
Installation: Install a new gasket (if equipped). When installing a cover on "flat top" chaincases, apply polyurethane sealer to mating surfaces. Polyurethane sealant should be applied to the screw threads and gasket (if equipped) to stop oil leakage. Tighten the mounting screws to 15-20 ft.-lb. (20-27 N•m) torque.

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Center Cover Removal And Installation

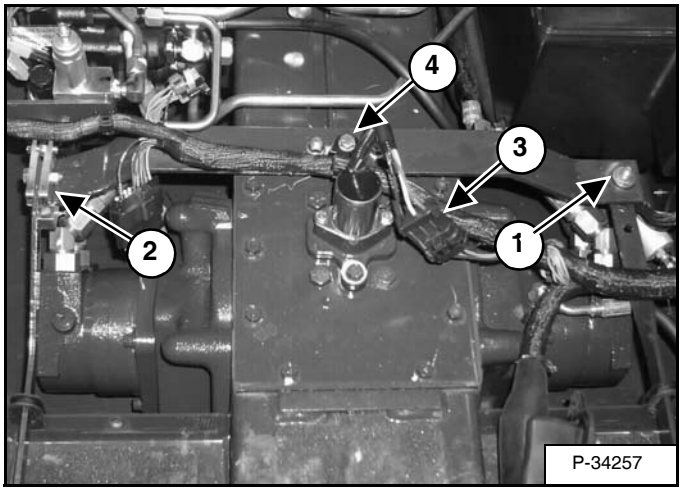
Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)



Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Figure 40-30-4



Disconnect the lift control cross bar (Item 1) **[Figure 40-30-4]** from the lift pedal linkage.

Disconnect the lift control cross bar (Item 2) **[Figure 40-30-4]** from the lift spool on the main control valve.

Disconnect the electrical connector (Item 3) **[Figure 40-30-4]** from the traction lock solenoid.

Remove the crossbar mounting bolt (Item 4) **[Figure 40-30-4]**.

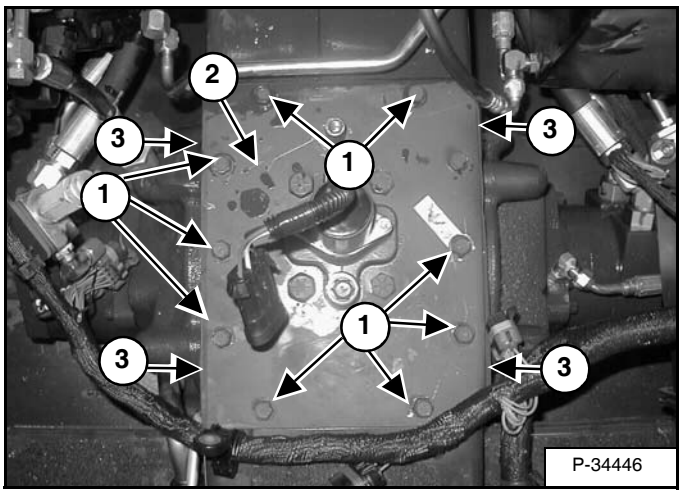
Remove the crossbar and wire harness from the center chaincase cover.

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 40-30-5



Remove the chaincase cover mounting screws (Item 1) **[Figure 40-30-5]**.

Remove the center chaincase cover (Item 2) **[Figure 40-30-5]** from the loader.

Note: On later "flat top" chaincases there are machined recesses (Item 3) [Figure 40-30-5] on the bottom side of the cover to help pry the covers off.

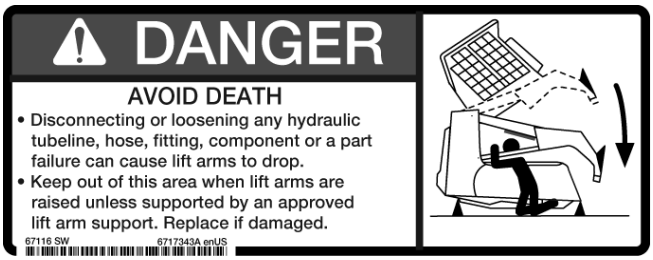
Installation: Install a new gasket (if equipped). When installing a cover on "flat top" chaincases, apply polyurethane sealer to mating surfaces. Polyurethane sealant should be applied to the screw threads and gasket (if equipped) to stop oil leakage. Tighten the mounting screws to 15-20 ft.-lb. (20-27 N•m) torque.

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Rear Cover Removal And Installation

Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)



WARNING

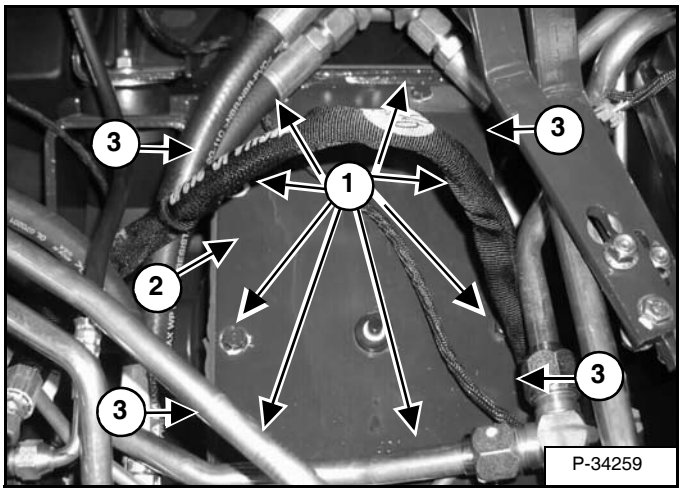
Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Disconnect the front steering linkage bars from the rear linkage bars. (See Removal and Installation on Page 50-100-1.)

Move the linkage bars to allow adequate space to remove the rear chaincase cover.

Figure 40-30-6



Remove the rear chaincase cover mounting screws (Item 1) **[Figure 40-30-6]**.

Remove the rear chaincase cover (Item 2) **[Figure 40-30-6]**.

Note: On later "flat top" chaincases there are machined recesses (Item 3) [Figure 40-30-6] on the bottom side of the cover to help pry the covers off.

Installation: Install a new gasket (if equipped). When installing a cover on "flat top" chaincases, apply polyurethane sealer to mating surfaces. Polyurethane sealant should be applied to the screw threads and gasket (if equipped) to stop oil leakage. Tighten the mounting screws to 15-20 ft.-lb. (20-27 N•m) torque.

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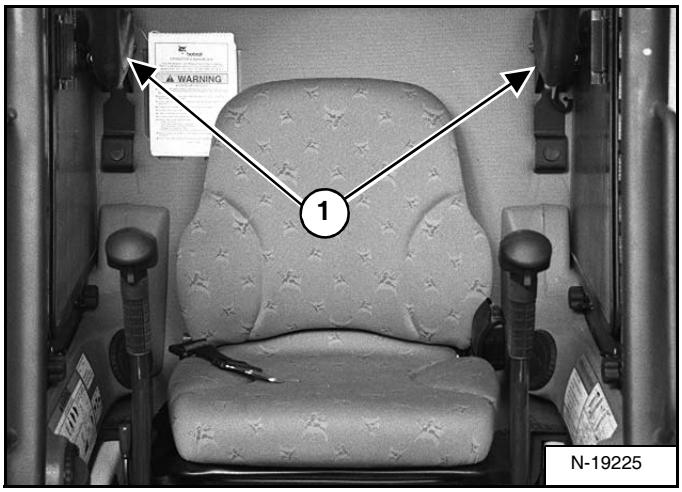
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SEAT BAR

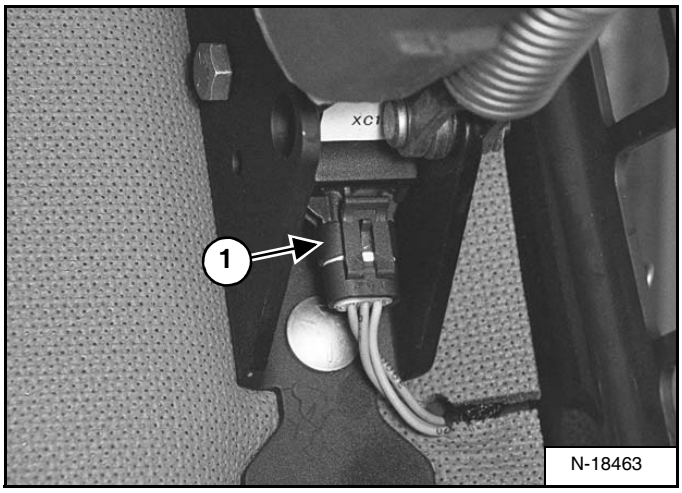
Removal And Installation

Figure 50-10-1



Raise the seat bar (Item 1) **[Figure 50-10-1]**.

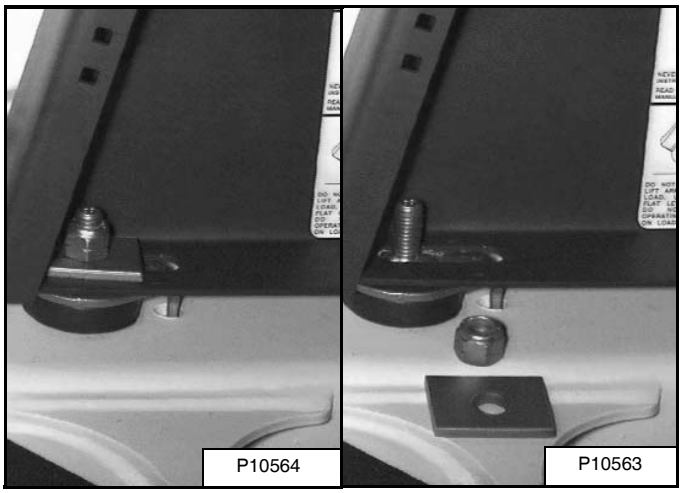
Figure 50-10-2



Disconnect the seat bar sensor (Item 1) **[Figure 50-10-2]** from the cab harness.

Lower the seat bar.

Figure 50-10-3



Loosen the nut (both sides) at the front corners of the operator cab **[Figure 50-10-3]**.

Remove the nuts and plates (both sides) **[Figure 50-10-3]**.

Installation: Tighten the nuts to 40-50 ft.-lb. (54-68 N•m) torque.

Figure 50-10-4

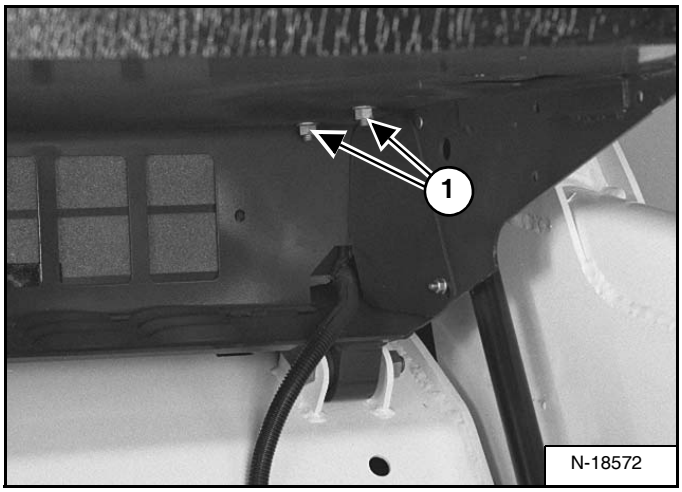


Lift on the grab handle and bottom of the operator cab slowly until the cab is all the way up and the latching mechanism engages **[Figure 50-10-4]**.

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Removal And Installation (Cont'd)

Figure 50-10-5

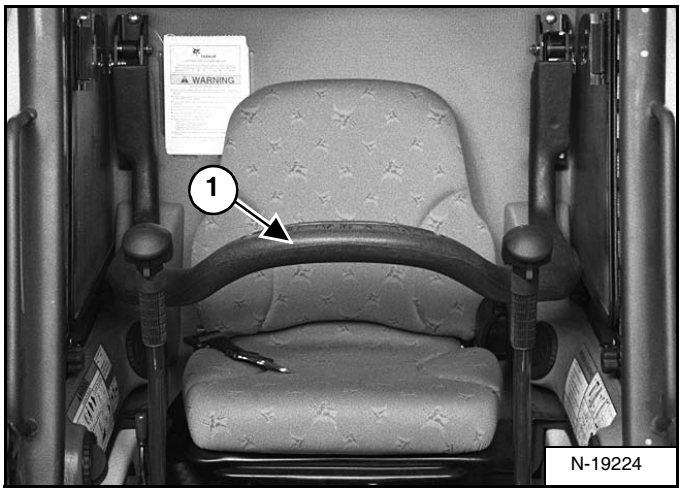


Remove the seat bar mounting nuts (Item 1) **[Figure 50-10-5]** (both sides).

Installation: Tighten the nuts to 28 ft.-lb. (38 N•m) torque.

Lower the operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

Figure 50-10-6



Remove the seat bar (Item 1) **[Figure 50-10-6]** from the operator cab.

Reverse the above procedure to install the seat bar into the operator cab.

Assembling Components

Figure 50-10-7

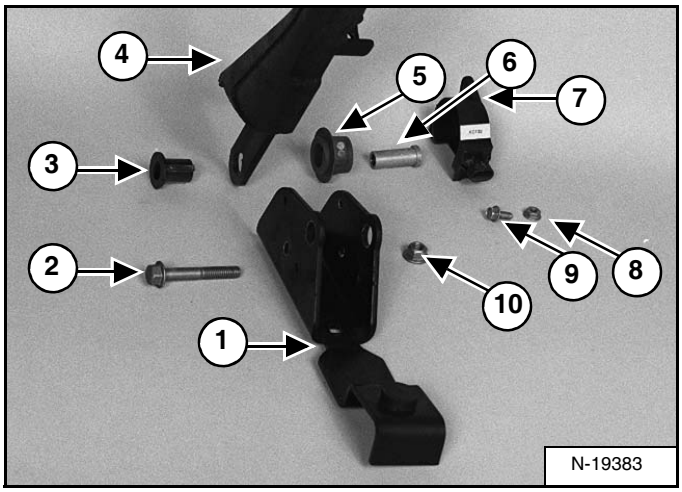
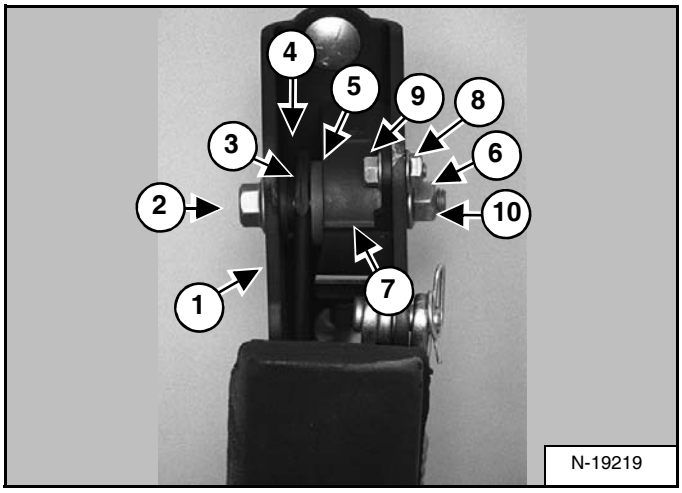


Figure 50-10-8



Assemble the parts as shown for the left side of the seat bar pivot assembly **[Figure 50-10-7]** & **[Figure 50-10-8]**.

Seat Bar Mount (Item 1)
Mounting Bolt (Item 2)
Keyed Plastic Bushing (Item 3)
Seat Bar (Item 4)
Magnetic Bushing Assembly (Item 5)
Pivot Bushing (Item 6)
Sensor Bracket (Item 7)
Sensor Mounting Nut (Item 8)
Sensor Mounting Bolt (Item 9)
Mounting Nut (Item 10)

Installation: Tighten the mounting bolt (Item 2) **[Figure 50-10-7]** & **[Figure 50-10-8]** to 50-70 in.-lb. (5,6-7,9 N•m) torque.

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Assembling Components (Cont'd)

Figure 50-10-9

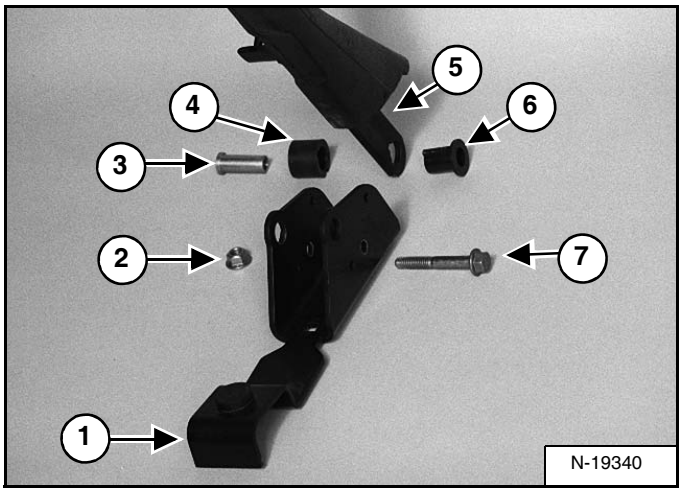
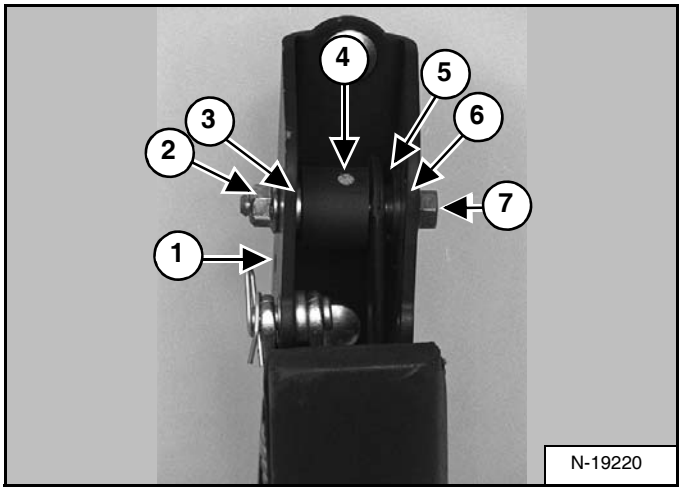


Figure 50-10-10



Assemble the parts as shown for the right side of the seat bar pivot assembly **[Figure 50-10-9]** & **[Figure 50-10-10]**.

Seat Bar Mount (Item 1)
Mounting Nut (Item 2)
Pivot Bushing (Item 3)
Spacer Bushing (Item 4)
Seat Bar (Item 5)
Keyed Plastic Bushing (Item 6)
Mounting Bolt (Item 7)

Installation: Tighten the mounting bolt (Item 7) **[Figure 50-10-9]** & **[Figure 50-10-10]** to 50-70 in.-lb. (5,6-7,9 N•m) torque.

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Compression Spring Disassembly And Assembly

Figure 50-10-11

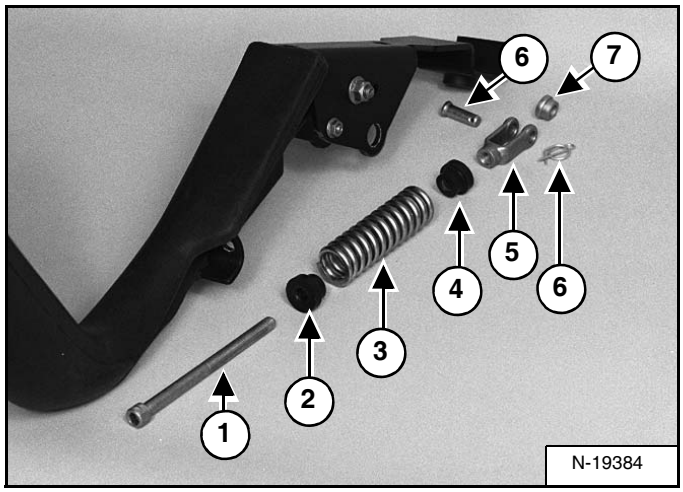
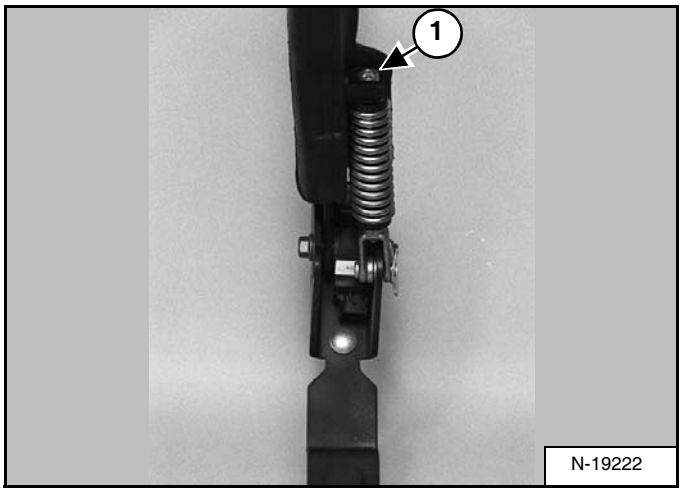


Figure 50-10-12



Turn the bolt (Item 1) **[Figure 50-10-12]** & **[Figure 50-10-11]** out of the clevis.

Assembly: Apply LOCTITE #518 adhesive to the bolt threads. Adjust the compression spring by turning the bolt in past the end of the clevis three turns.

NOTE: For procedures requiring the use of LOCTITE #518 adhesive, thoroughly clean and dry affected parts before the application of LOCTITE #518.

Disassemble and assemble the seat bar compression spring and parts as shown in Fig. **[Figure 50-10-11]**.

Bolt (Item 1)
Bushing (Item 2)
Spring (Item 3)
Clevis (Item 4)
Retaining Pin (Item 5)
Pin (Item 6)
Bushing (Item 7)

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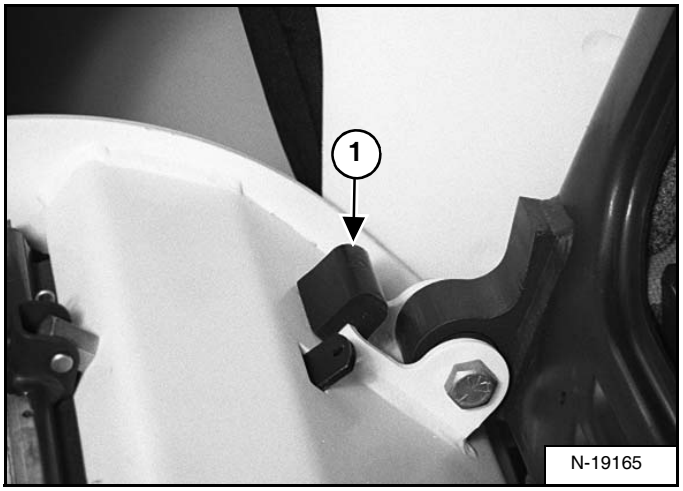
Gas Cylinder Removal And Installation

WARNING

Cylinder contains high pressure gas. Do not open. Opening cylinder can release rod and cause injury or death.

W-2113-0288

Figure 50-20-1



Remove the operator cab stop (Item 1) (both sides) **[Figure 50-20-1]**.

Start the engine.

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

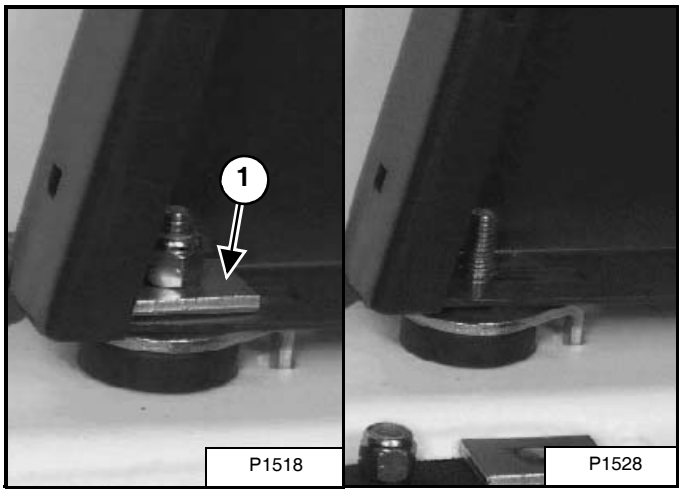
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Raise the lift arms. (See Installing Lift Arm Support Device on Page 10-20-1.)

Install an approved lift arm support device.

Stop the engine.

Figure 50-20-2



Remove the cab nut and holddown plate (Item 1) **[Figure 50-20-2]** (both sides).

Installation: Tighten the nut to 40-50 ft.-lb. (54-68 N•m) torque.

Figure 50-20-3



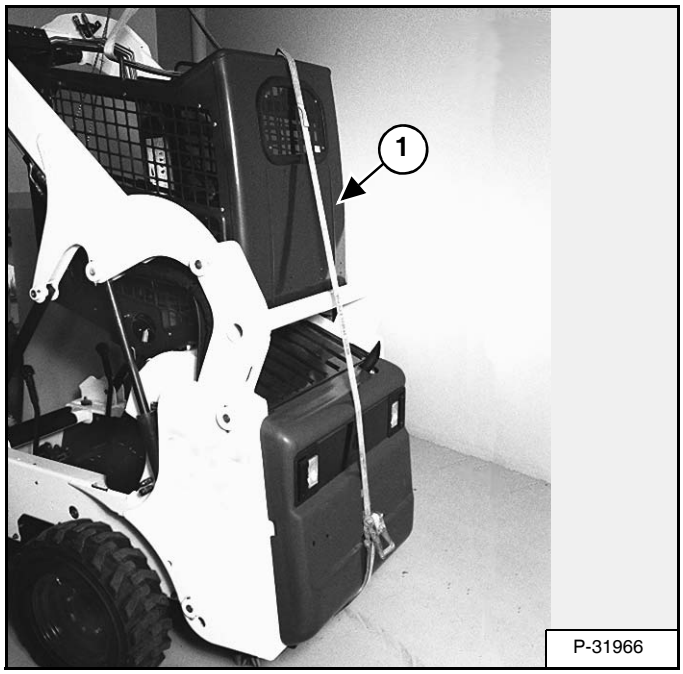
Install a strap (Item 1) **[Figure 50-20-3]** to the cab handles to prevent the cab from falling forward.

Raise the operator cab (See Raising The Operator Cab on Page 10-30-1), to release the tension on the gas cylinder.

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Gas Cylinder Removal And Installation (Cont'd)

Figure 50-20-4



Install a strap (Item 1) **[Figure 50-20-4]** from the operator cab to the loader main frame to prevent the cab from tipping forward when the gas cylinder(s) are removed.

Figure 50-20-5

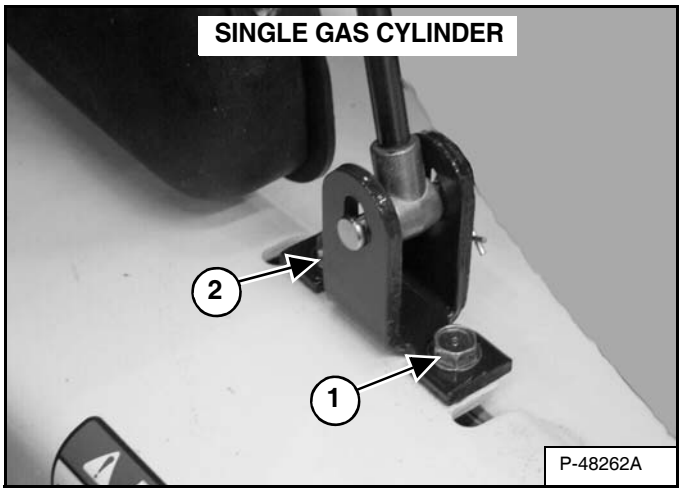
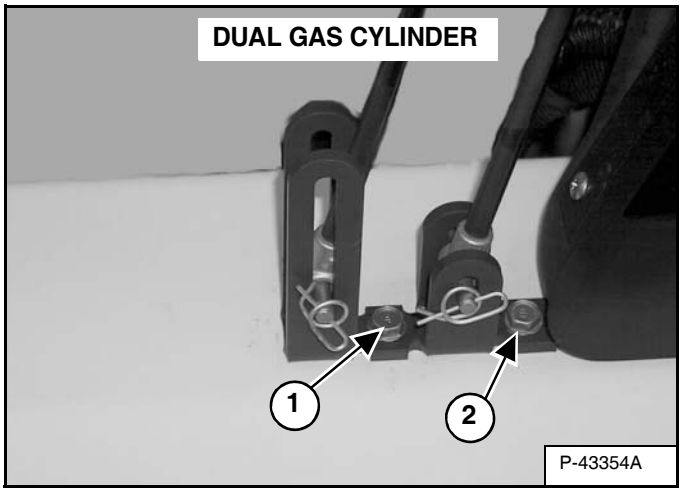


Figure 50-20-6

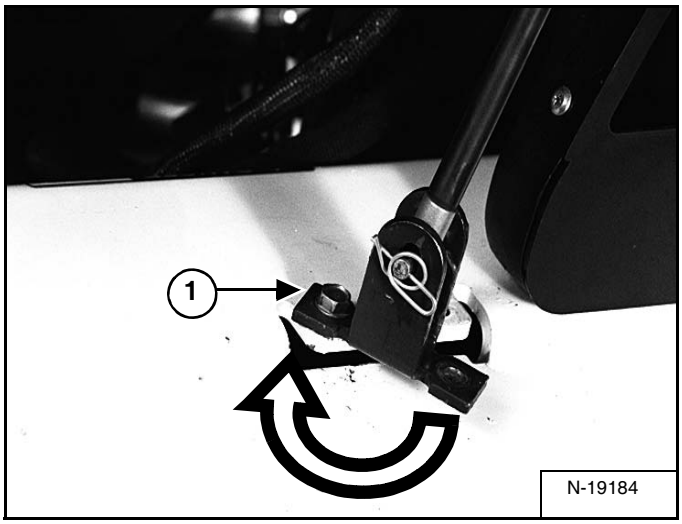


Loosen the front bolt (Item 1) and remove the rear bolt (Item 2) **[Figure 50-20-5]** and **[Figure 50-20-6]** from the gas cylinder mounting bracket.

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Gas Cylinder Removal And Installation (Cont'd)

Figure 50-20-7



Rotate the mounting bracket forward to relieve any remaining tension on the gas cylinder(s) **[Figure 50-20-7]**.

Remove the front bolt (Item 1) **[Figure 50-20-7]** from the gas cylinder mounting bracket.

Installation: Tighten the bolts to 100-130 in.-lb. (11,3-14,7 N•m) torque.

Figure 50-20-8

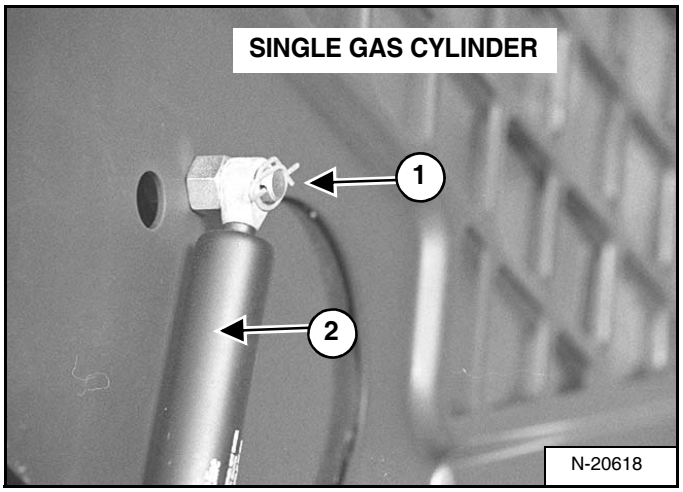
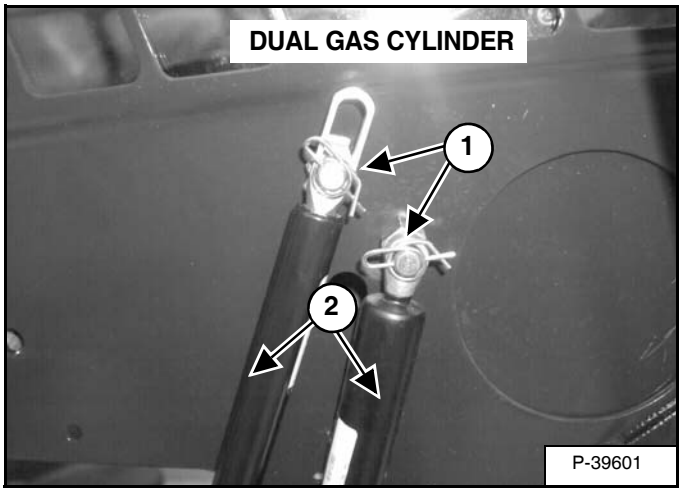


Figure 50-20-9



Remove the retaining pin(s) (Item 1) **[Figure 50-20-8]** and **[Figure 50-20-9]** from the top pivot pin(s).

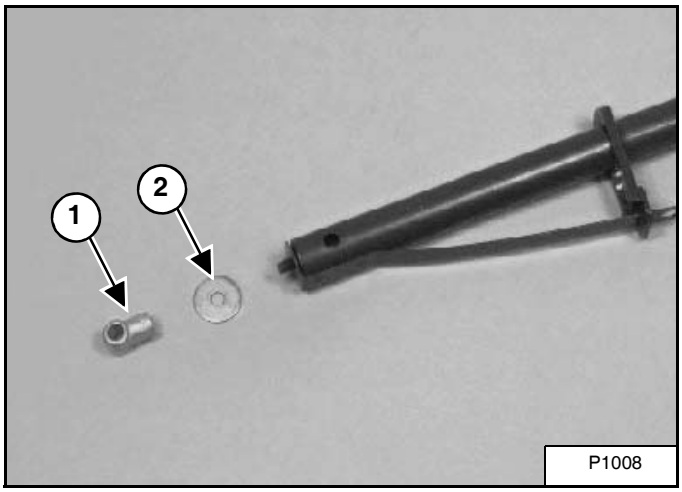
Remove the gas cylinder(s) (Item 2) **[Figure 50-20-8]** and **[Figure 50-20-9]** from the operator cab.

Reverse the above procedure to install the gas cylinders onto the operator cab.

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Gas Cylinder Disassembly

Figure 50-20-10

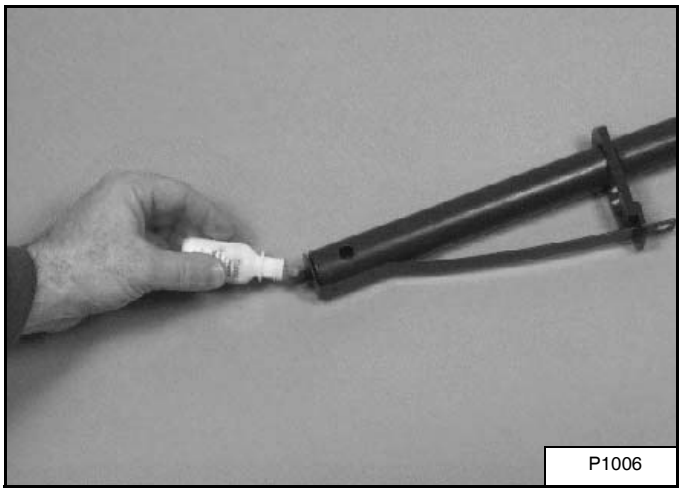


Remove the clevis (Item 1) **[Figure 50-20-10]** and washer (Item 2) **[Figure 50-20-10]** from the end of the gas cylinder.

Remove the gas cylinder from the outer housing.

Assembly: Install a replacement cylinder inside the cylinder housing.

Figure 50-20-11

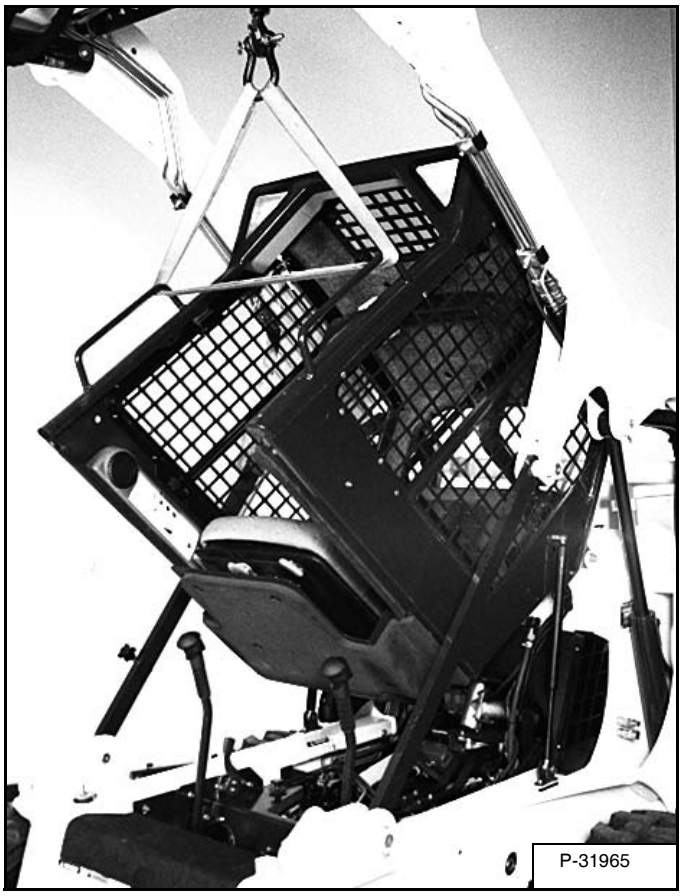


Apply a small amount of LOCTITE on the threads of the cylinder rod **[Figure 50-20-11]**.

Reinstall the washer and clevis on the cylinder rod.

Removal And Installation

Figure 50-20-12



Remove the operator cab gas cylinder(s). (See Gas Cylinder Removal And Installation on page 50-20- 1.)

⚠ WARNING

AVOID INJURY OR DEATH

Attach a chain hoist to the grab handles of the operator cab before removing the operator cab gas cylinders. If the operator cab is tilted forward without the gas cylinders operational, the cab will fall and could cause injury or death.

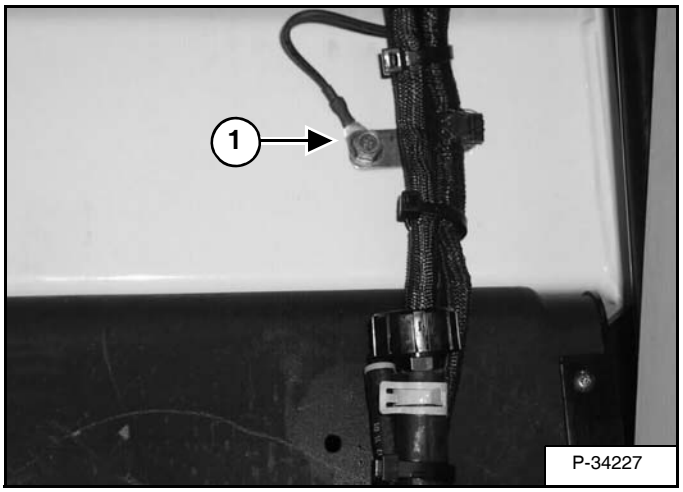
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Use the hoist connected to the operator cab grab handles to lower or (raise) the operator cab when the gas cylinders are disconnected **[Figure 50-20-12]**.

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Removal And Installation (Cont'd)

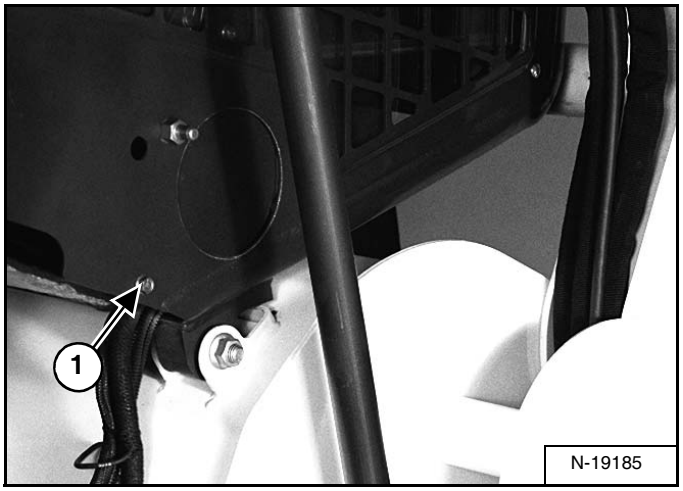
Figure 50-20-13



Remove bolt (Item 1) **[Figure 50-20-13]** from the cab ground.

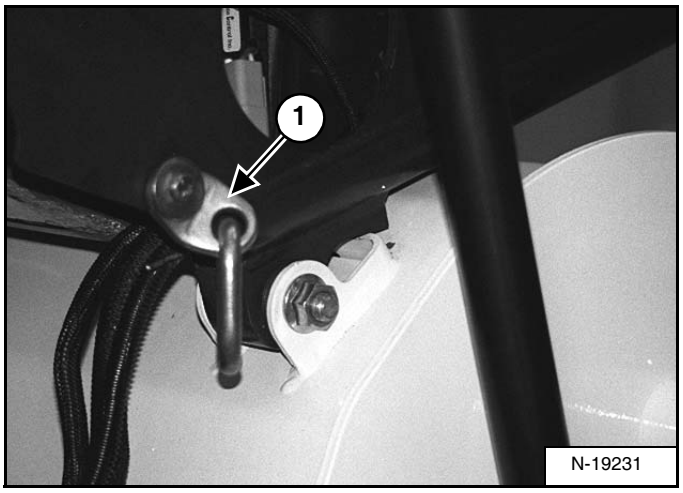
Remove any tie-straps connected to the harness **[Figure 50-20-13]**.

Figure 50-20-14



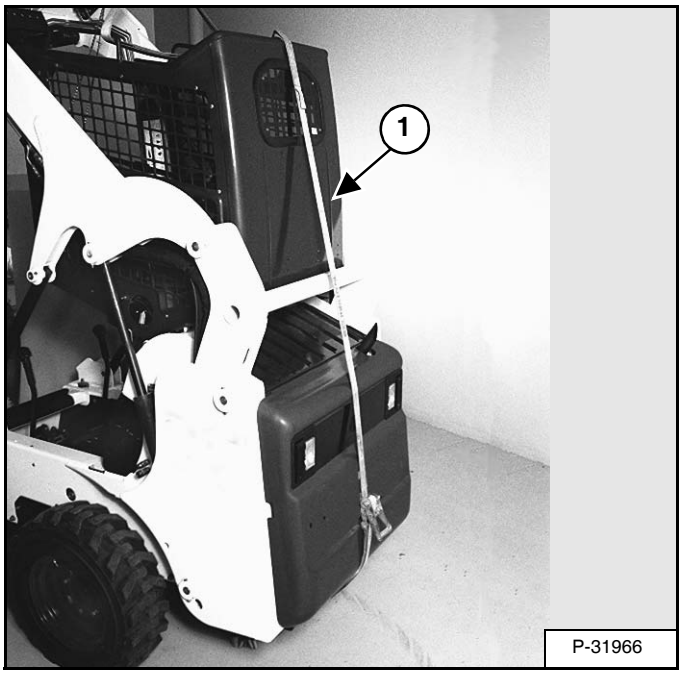
Remove the mounting bolt (Item 1) **[Figure 50-20-14]** (both sides) to the cab access hole covers.

Figure 50-20-15



Install lift eye (Item 1) **[Figure 50-20-15]** (both sides) to the cab.

Figure 50-20-16



Remove the strap (Item 1) **[Figure 50-20-16]** preventing the cab from tipping forward.

Lower the cab.

Start the engine.

Remove the lift arm support device. (See Removing Lift Arm Support Device on Page 10-20-2.)

Stop the engine.

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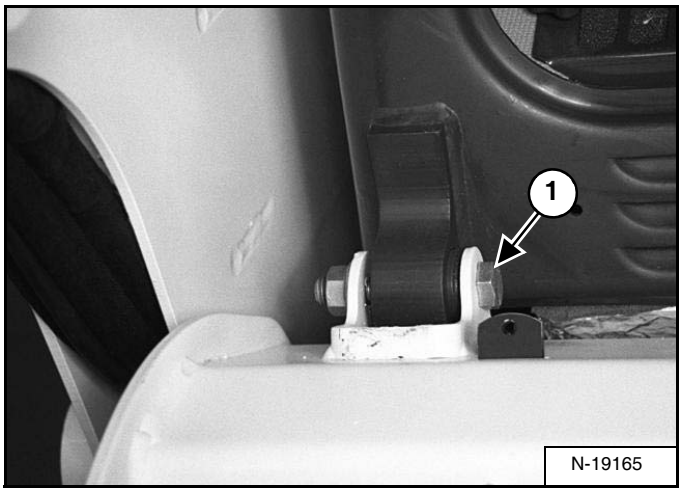
Removal And Installation (Cont'd)

Figure 50-20-17



Connect the slings (Items 1 & 2) **[Figure 50-20-17]** to a chain hoist.

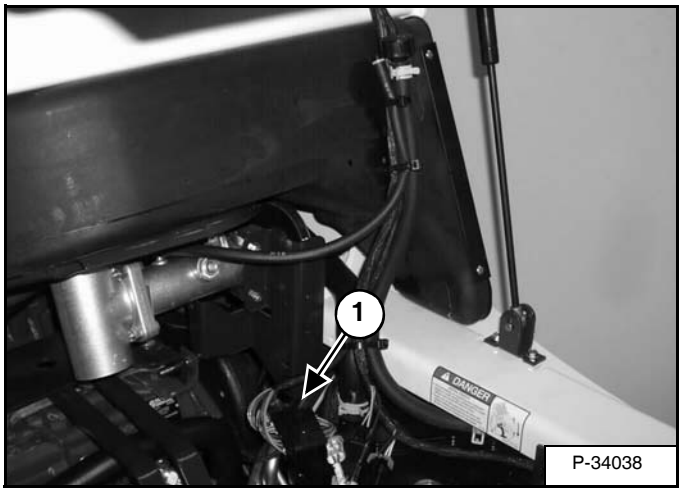
Figure 50-20-18



Remove the rear mounting bolt (Item 1) **[Figure 50-20-18]** (both sides) and nut from the operator cab.

Installation: Tighten the bolt and nut to 25-35 ft.-lb. (34-47 N•m) torque.

Figure 50-20-19



Lift the operator cab up and forward.

Disconnect the cab harness connector (Item 1) **[Figure 50-20-19]**.

Remove the operator cab from the loader.

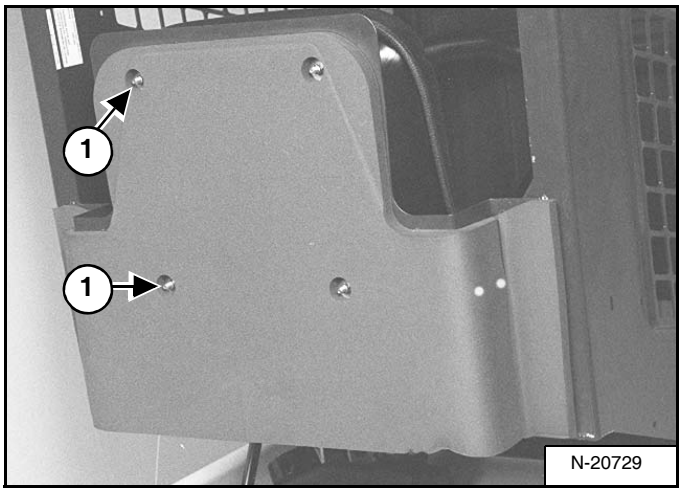
Reverse the above procedure to install the operator cab.

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OPERATOR SEAT

Removal And Installation

Figure 50-30-1



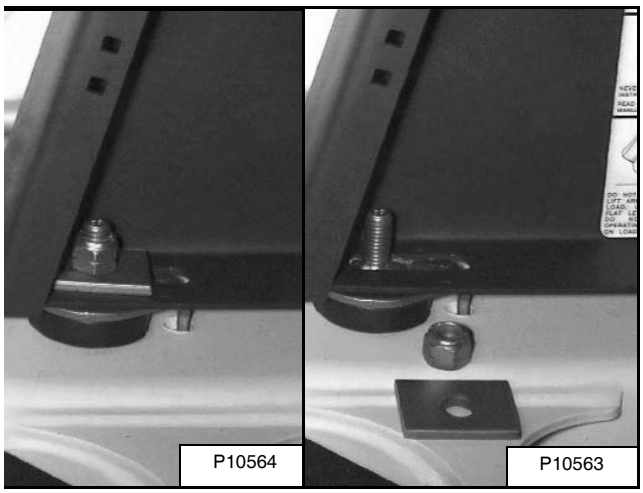
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the four seat mounting nuts (Item 1) **[Figure 50-30-1]** and washers from the operator seat mounting studs.

Installation: Tighten the mounting nuts to 20 ft.-lb. (27 N•m) torque.

NOTE: Ensure the washers are installed.

Figure 50-30-2



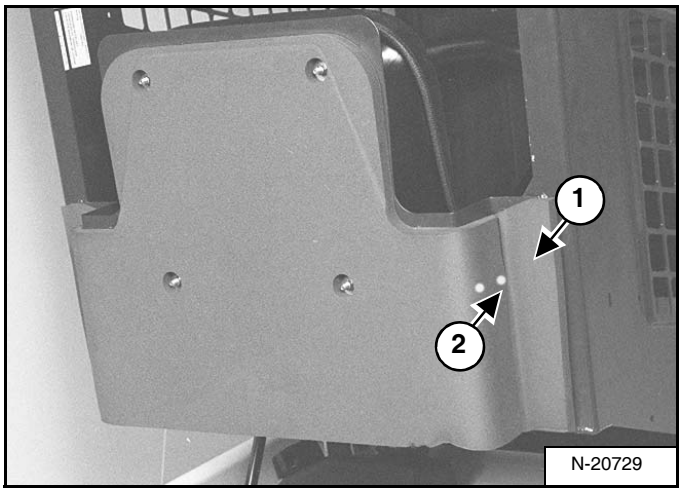
Lower the cab and install one of the mounting washers and a nut **[Figure 50-30-2]**.

NOTE: With the seat removed the cab will raise.

Reverse the removal procedure to install the operator seat.

Seat Belt Removal And Installation

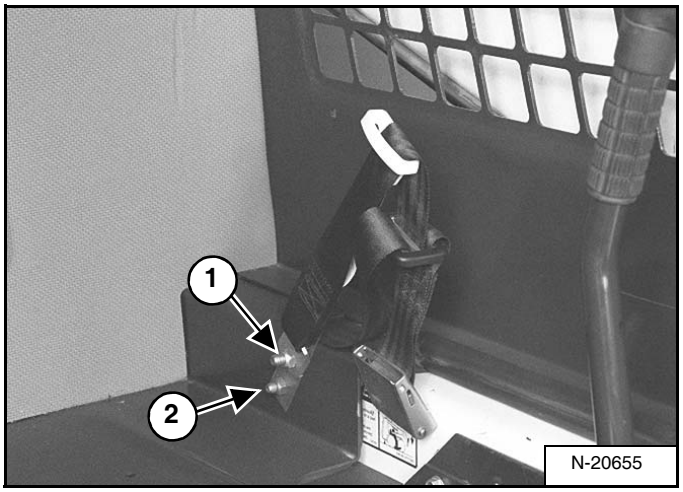
Figure 50-30-3



Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Locate the seat belt bolts under seat pan insulation (Item 1 & 2) **[Figure 50-30-3]** and peel back or cut insulation to gain access to the head.

Figure 50-30-4



Remove the two nuts (Item 1 & 2) **[Figure 50-30-4]**.

Installation: Tighten nut (Item 1) **[Figure 50-30-4]** to 54 ft.-lb. (73 N•m) torque. Tighten nut (Item 2) **[Figure 50-30-4]** to 34 ft.-lb. (46 N•m) torque.

Repeat for other half of seat belt and guide

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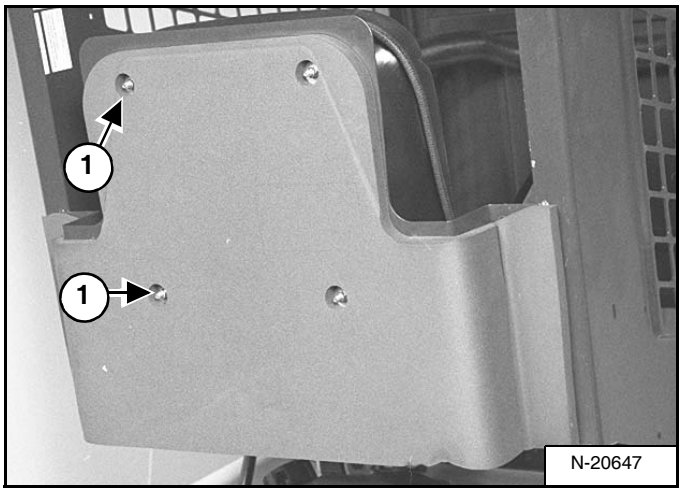


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OPERATOR SEAT (SUSPENSION)

Removal And Installation

Figure 50-31-1

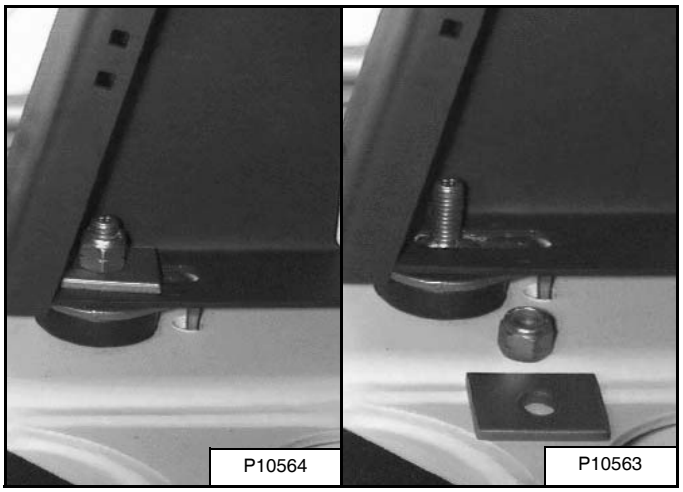


Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the four seat mounting nuts (Item 1) **[Figure 50-31-1]** and washers from the operator seat mounting studs.

Installation: Tighten the mounting nuts to 20 ft.-lb. (27 N•m) torque.

Figure 50-31-2

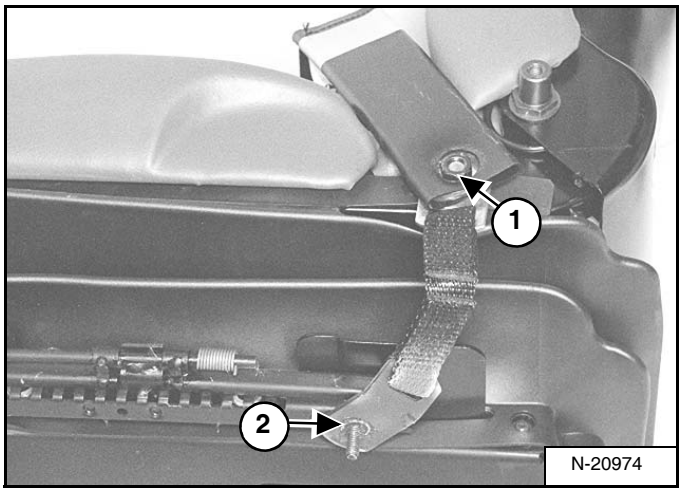


Lower the cab and install one of the mounting washers and a nut **[Figure 50-31-2]**.

NOTE: With the seat removed, the cab will raise.

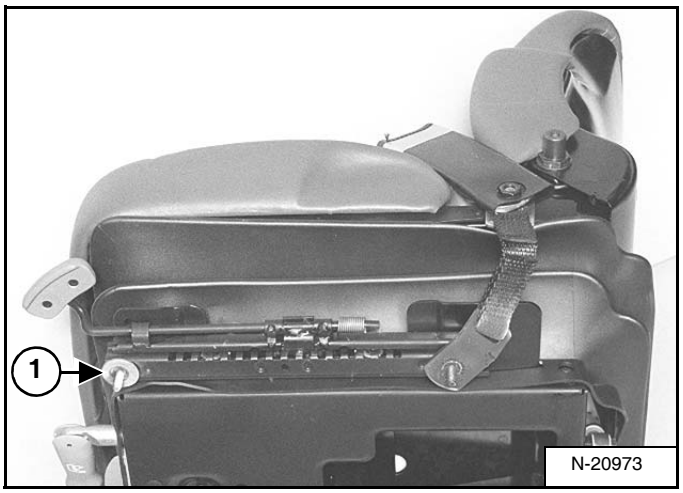
Reverse the removal procedure to install the operator seat.

Figure 50-31-3



NOTE: Assure seat tethers are securely fastened to seatbelt studs (Item 1) and seat rail studs (Item 2) [Figure 50-31-3].

Figure 50-31-4

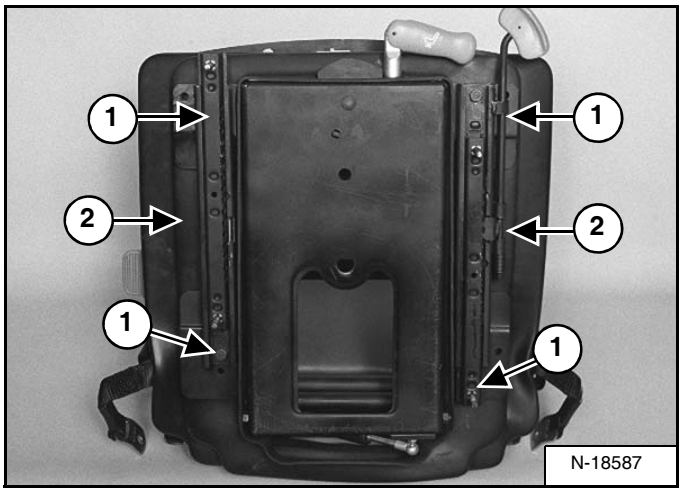


NOTE: Verify the front two seat rail studs have washers attached (Item 1) [Figure 50-31-4].

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Slide Rail Removal And Installation

Figure 50-31-5



Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the operator seat. (See Removal And Installation on Page 50-31-1.)

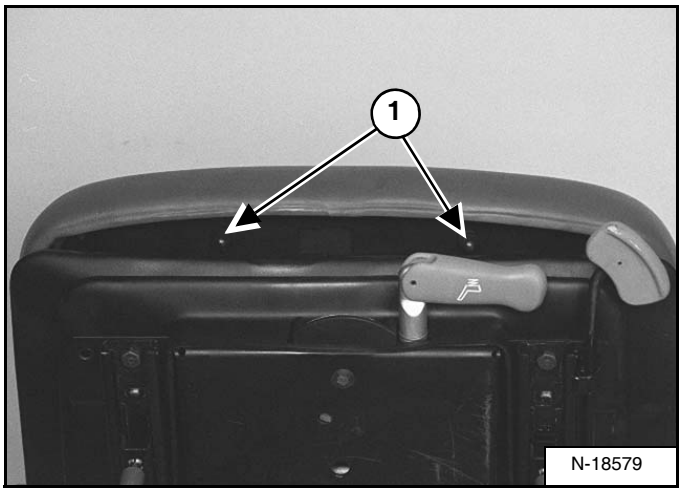
Remove the two slide rail mounting bolts (Item 1) **[Figure 50-31-5]**.

Remove the slide rail (Item 2) **[Figure 50-31-5]** from the bottom of the seat frame.

Reverse the removal procedure to install the operator seat slide rail.

Cushion Removal And Installation

Figure 50-31-6



Press the two buttons (Item 1) **[Figure 50-31-6]** & **[Figure 50-31-7]** and lift the seat cushion.

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Cushion Removal And Installation (Cont'd)

Figure 50-31-7

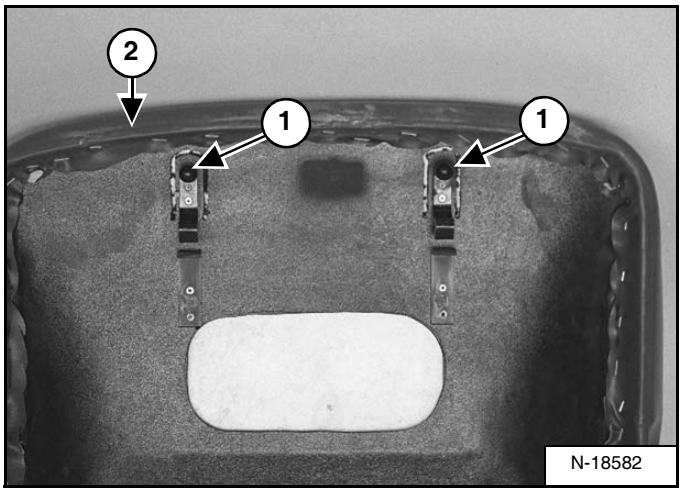
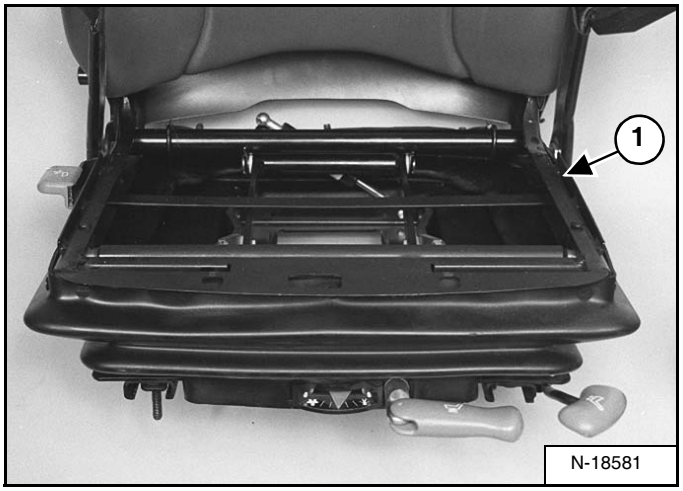
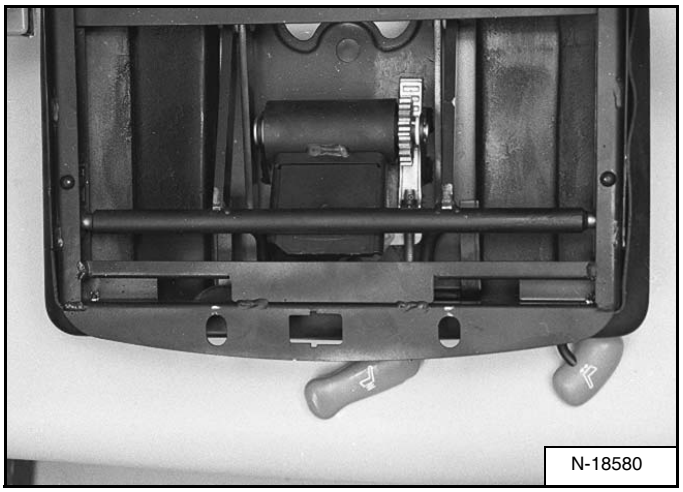


Figure 50-31-8



Remove the cushion (Item 2) **[Figure 50-31-7]** from the seat frame (Item 1) **[Figure 50-31-8]**.

Figure 50-31-9



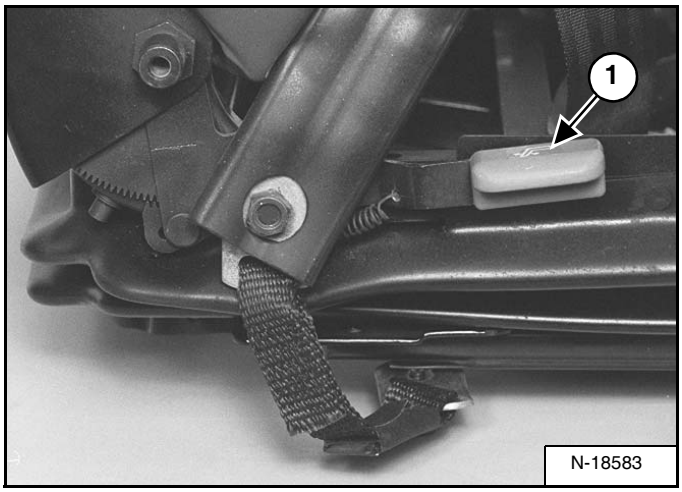
Inspect the seat ride adjustment **[Figure 50-31-9]**.

Reverse the removal procedure to install the operator seat back.

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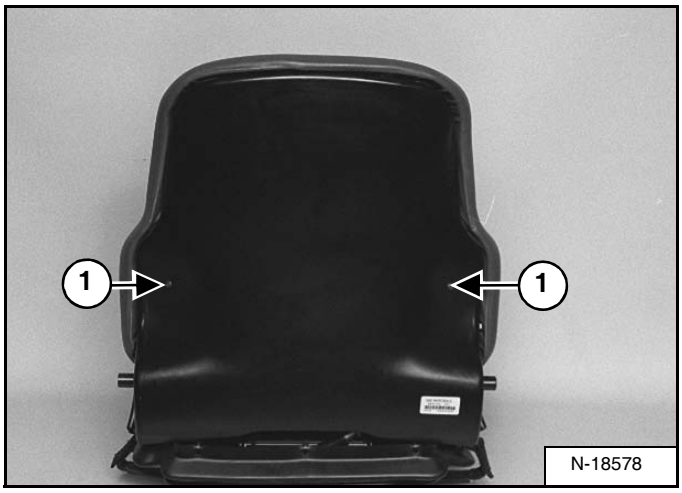
Back Removal And Installation

Figure 50-31-10



Pull the seat back adjustment lever (Item 1) **[Figure 50-31-10]** and tilt the seat back all the way forward.

Figure 50-31-11

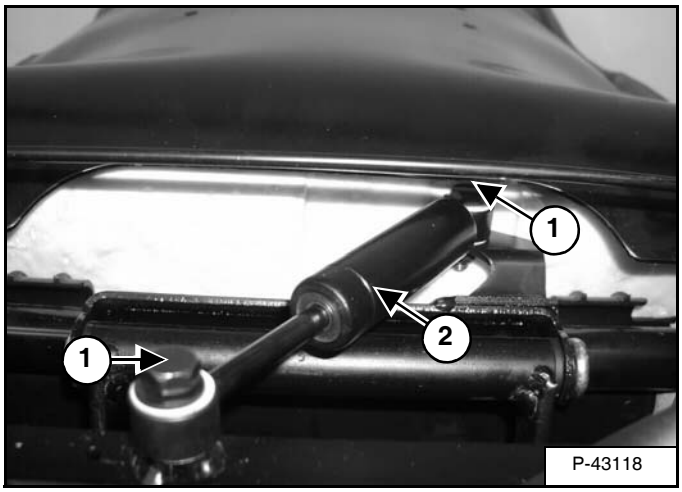


Remove the two mounting screws (Item 1) **[Figure 50-31-11]** from the seat back and remove the back.

Reverse the removal procedure to install the operator seat back.

Shock Removal And Installation

Figure 50-31-12



Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the operator seat. (See Removal And Installation on Page 50-31-1.)

Remove the seat shock mounting bolts (Item 1) **[Figure 50-31-12]** (Both ends.)

Remove the seat shock (Item 2) **[Figure 50-31-12]**.

Reverse the removal procedure to install the operator seat shock.

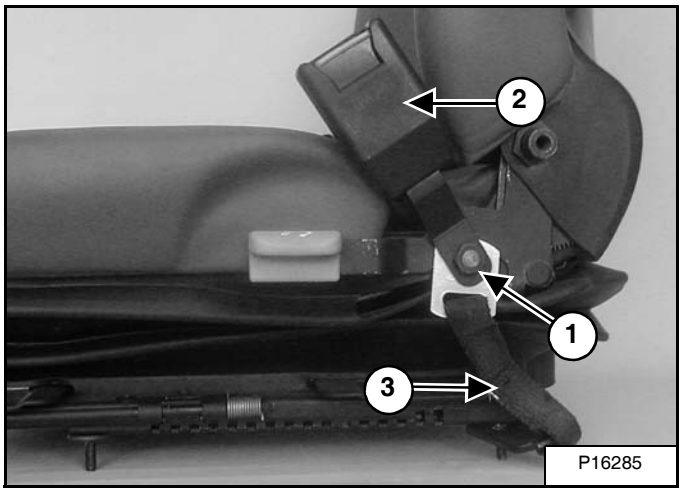
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3-Point Seat Belt Removal And Installation

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the operator seat. (See Removal And Installation on Page 50-31-1.)

Figure 50-31-13

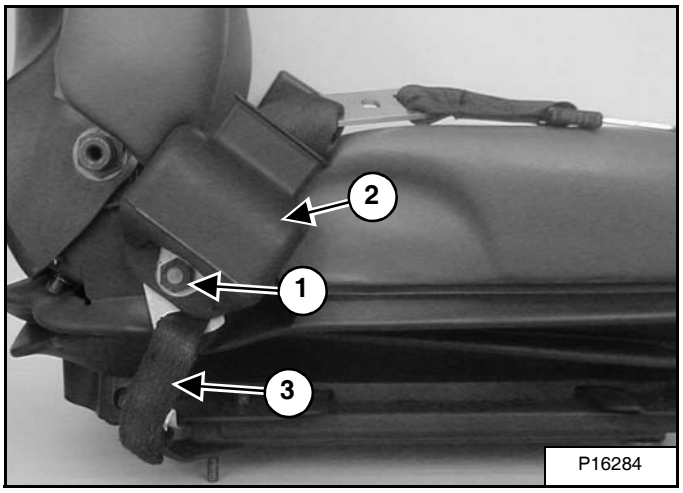


Remove the mounting nut (Item 1) **[Figure 50-31-13]**

Remove the end release buckle (Item 2) **[Figure 50-31-13]**

Installation: Be sure tether strap (Item 3) **[Figure 50-31-13]** is on the seat belt stud behind the end release buckle.

Figure 50-31-14



Remove the mounting nut (Item 1) **[Figure 50-31-14]**

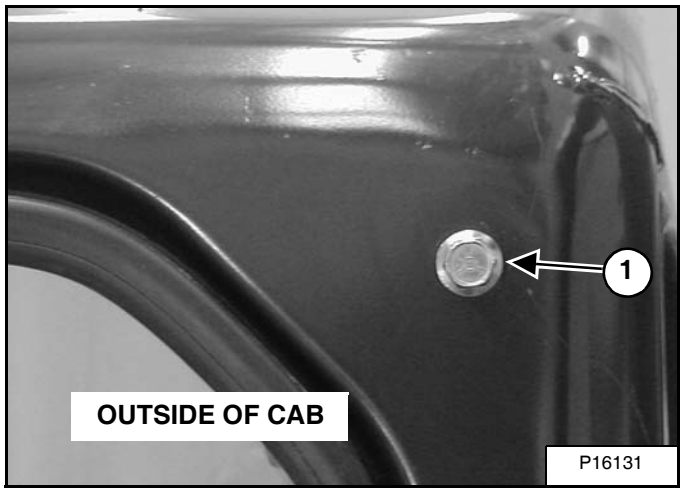
Remove the seat belt retractor (Item 2) **[Figure 50-31-14]**

Installation: Be sure tether strap (Item 3) **[Figure 50-31-14]** is on the seat belt stud behind the seat belt retractor.

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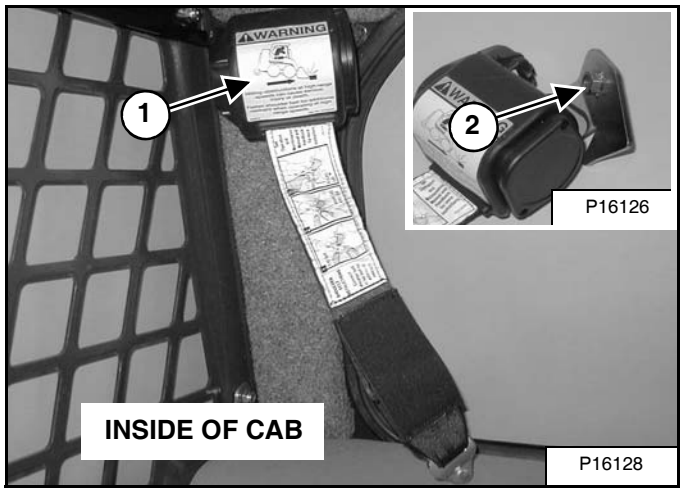
3-Point Seat Belt Removal And Installation (Cont'd)

Figure 50-31-15



Remove the mounting bolt (Item 1) **[Figure 50-31-15]**

Figure 50-31-16



Remove the shoulder harness retractor (Item 1) **[Figure 50-31-16]**

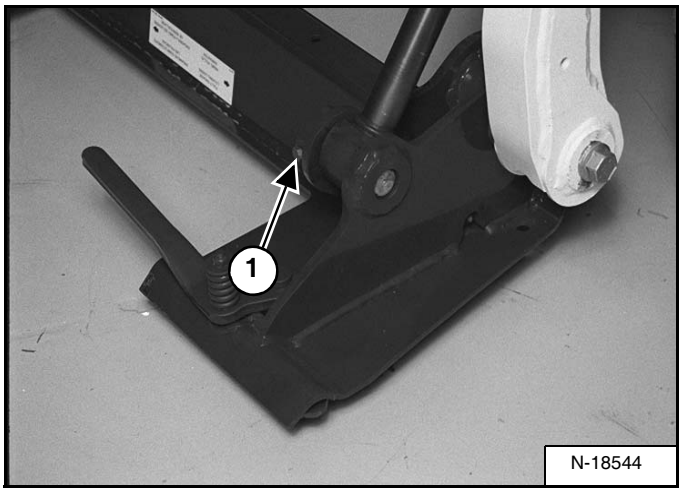
Installation: Line up the bolt (Item 1) **[Figure 50-31-15]** with the mounting bracket (Item 2) **[Figure 50-31-16]** on the inside of the cab.

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BOB-TACH

Removal And Installation

Figure 50-40-1



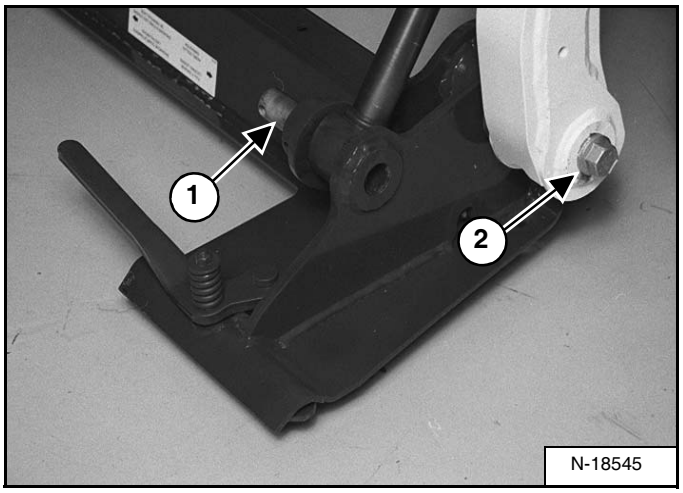
Tilt the Bob-Tach forward, so it is parallel to the floor. Put blocks (approximately 3 inches) under each side of the Bob-Tach **[Figure 50-40-1]**.

Lower the Bob-Tach onto the blocks.

Remove the retainer bolt (Item 1) **[Figure 50-40-1]** and nut from the tilt cylinder rod end pin (both sides).

Installation: Tighten the retainer bolt and nut to 25-30 ft.-lb. (34-38 N•m) torque.

Figure 50-40-2



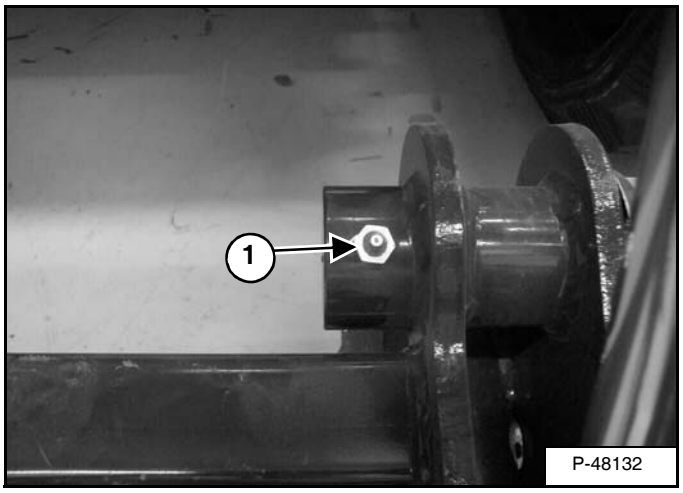
Remove the pivot pin (Item 1) **[Figure 50-40-2]** from the tilt cylinder rod end (both sides).

Remove the tilt cylinder rod end from the Bob-Tach (both sides).

Loosen the bolt (Item 2) **[Figure 50-40-2]** at the Bob-Tach pivot pin.

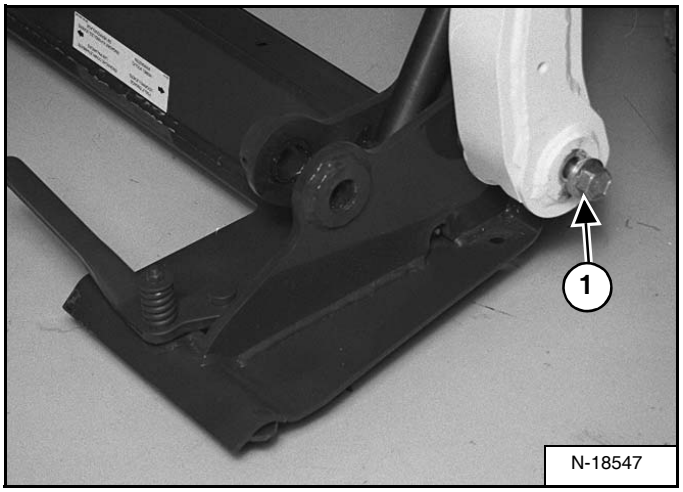
Installation: Tighten the bolt to 175-190 ft.-lb. (240-260 N•m) torque.

Figure 50-40-3



Remove the grease zerk (Item 1) (both sides) **[Figure 50-40-3]** out of the Bob-Tach frame. This allows grease to escape when driving the pivot pins into the Bob-Tach frame.

Figure 50-40-4



Strike the head of the bolt (Item 1) **[Figure 50-40-4]** to push the pivot pin into the Bob-Tach frame.

Remove the bolt.

Use a long punch to push the pivot pin all the way into the Bob-Tach.

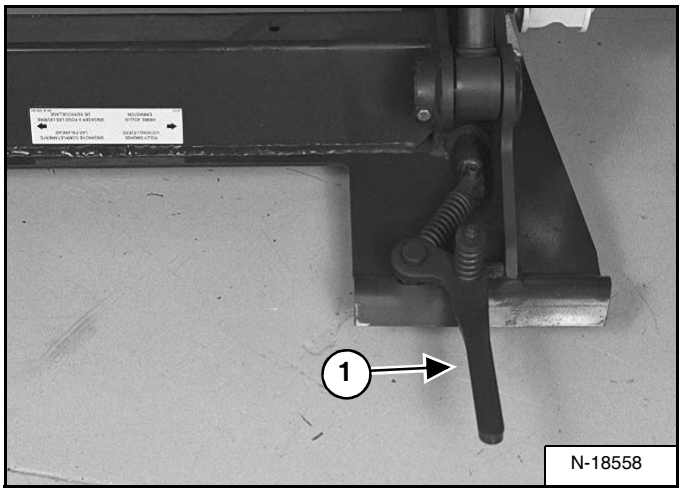
Remove the Bob-Tach from the lift arms.

Remove the Bob-Tach pivot pin (both sides).

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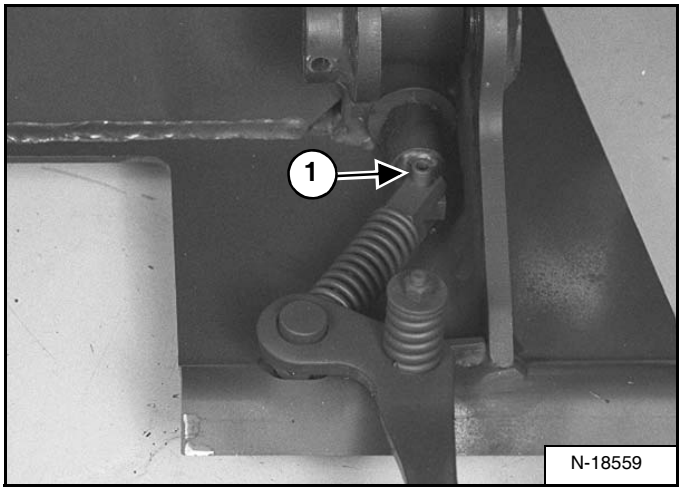
Bob-Tach Lever And Wedge

Figure 50-40-5



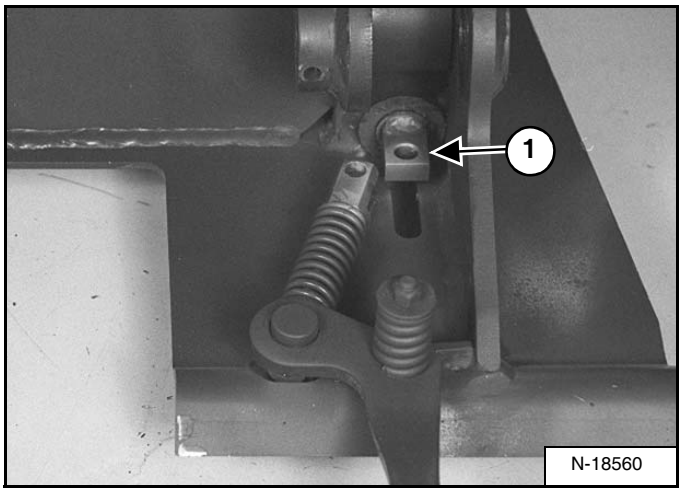
Use the following procedure to remove and install the Bob-Tach lever (Item 1) **[Figure 50-40-5]**, spring and wedge.

Figure 50-40-6



Use a punch and hammer, remove the roll pin (Item 1) **[Figure 50-40-6]** from the Bob-Tach Wedge and spring clevis.

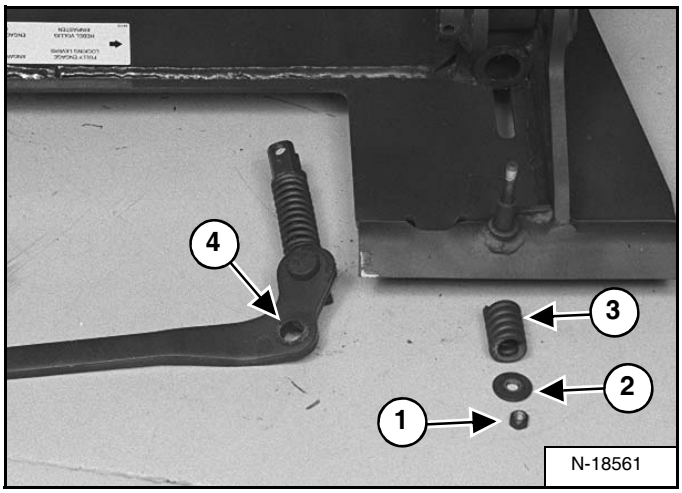
Figure 50-40-7



Remove the Wedge (Item 1) **[Figure 50-40-7]**.

Always replace bent or broken wedges.

Figure 50-40-8



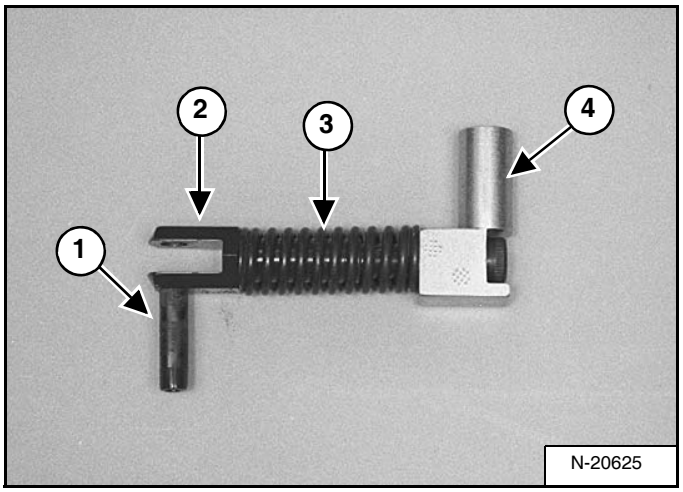
Remove the lever mounting nut (Item 1), washer (Item 2), spring (Item 3) and lever (Item 4) **[Figure 50-40-8]**.

Installation: Tighten the nut to 25-28 ft.-lb. (34-38 N•m) torque.

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Bob-Tach Lever And Wedge (Cont'd)

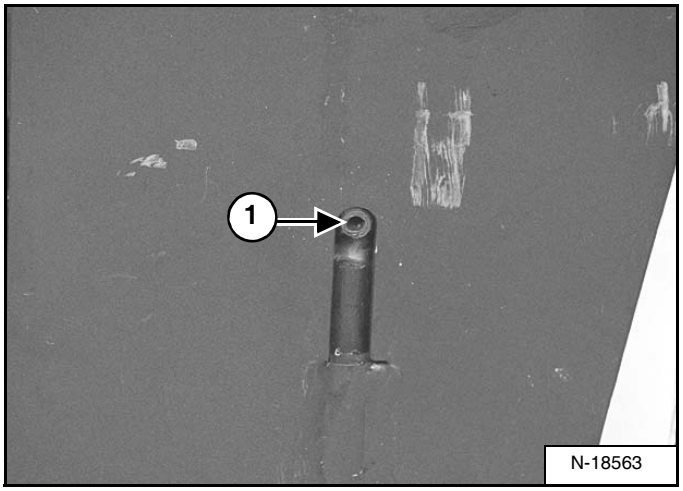
Figure 50-40-9



If the bolt (Item 1), handle pivot (Item 2), spring (Item 3), or clevis (Item 4) **[Figure 50-40-9]** are damaged, put the assembly in a vise.

Remove the bolt and replace the damaged parts as needed.

Figure 50-40-10



Use a punch and hammer to drive the roll pin (Item 1) **[Figure 50-40-10]** flush with the face of the Bob-Tach.

Reverse the removal procedure to install the Bob-Tach lever and wedge **[Figure 50-40-10]**.

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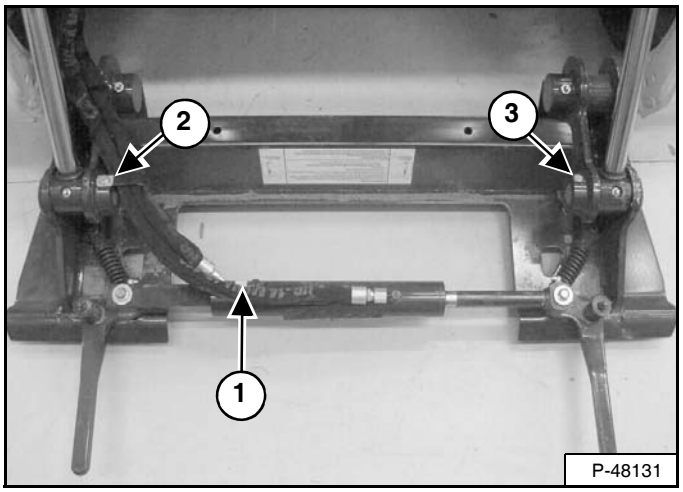


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POWER BOB-TACH

Removal And Installation

Figure 50-41-1



Tilt the Bob-Tach forward, so it is parallel to the floor. Put blocks (approximately 3 inches) under each side of the Bob-Tach **[Figure 50-41-1]**.

Lower the Bob-Tach onto the blocks.

Remove the hoses to the cylinder fittings **[Figure 50-41-1]**.

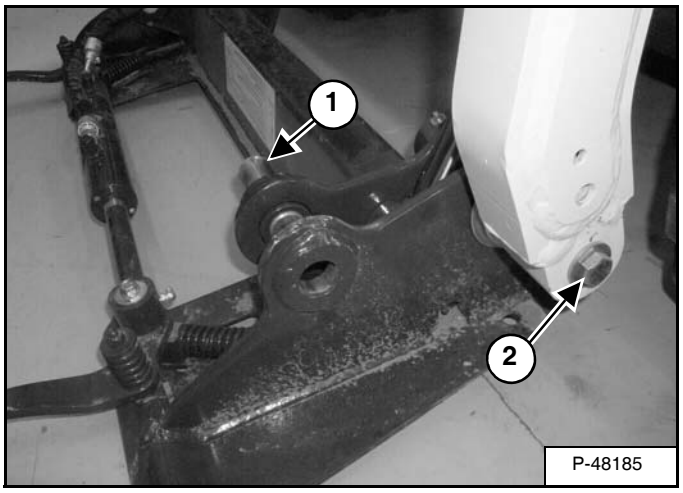
NOTE: The hose with the 45° end (Item 1) [Figure 50-41-1] is connected to the base end fitting on the cylinder.

Remove the hose clamp on the hoses and use the bolt (Item 2) **[Figure 50-41-1]** on the tilt cylinder pivot pin to secure the clamp.

Remove the retainer bolt (Item 3) **[Figure 50-41-1]** and nut from the tilt cylinder rod end pin (both sides).

Installation: Tighten the retainer bolt and nut to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 50-41-2



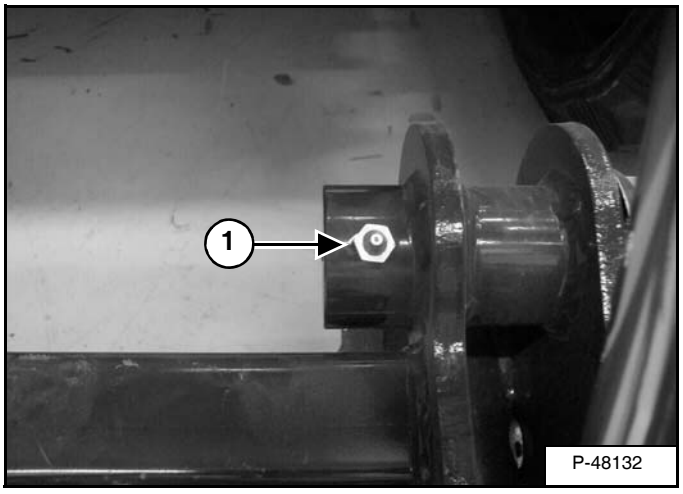
Remove the pivot pin (Item 1) **[Figure 50-41-2]** from the tilt cylinder rod end (both sides).

Remove the tilt cylinder rod end from the Bob-Tach (both sides).

Loosen the bolt (Item 2) **[Figure 50-41-2]** at the Bob-Tach pivot pin.

Installation: Tighten the bolt to 175-190 ft.-lb. (240-260 N•m) torque.

Figure 50-41-3

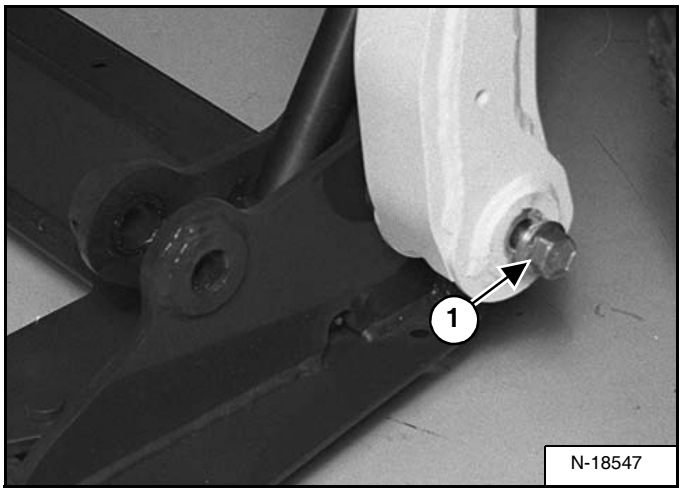


Remove the grease zerk (Item 1) (both sides) **[Figure 50-41-3]** out of the Bob-Tach frame. This allows the grease to escape when driving the pivot pins in to the Bob-Tach frame.

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Removal And Installation (Cont'd)

Figure 50-41-4



Strike the head of the bolt (Item 1) **[Figure 50-41-4]** to push the pivot pin into the Bob-Tach frame.

Remove the bolt.

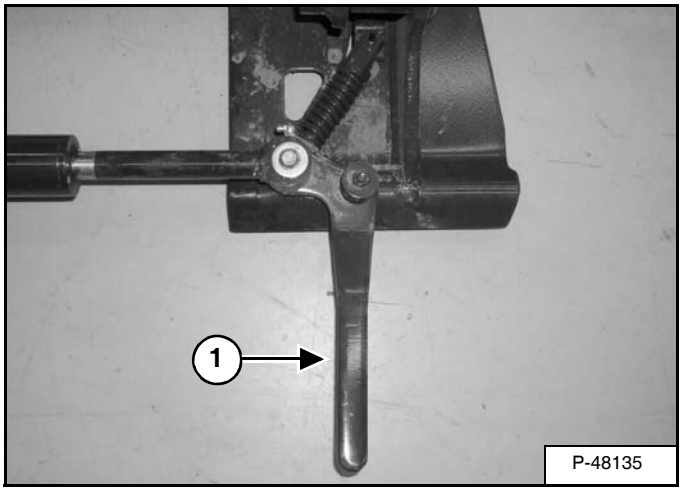
Use a long punch to push the pivot pins all the way into the Bob-Tach frame.

Remove the Bob-Tach from the lift arms.

Remove the Bob-Tach pivot pin (both sides).

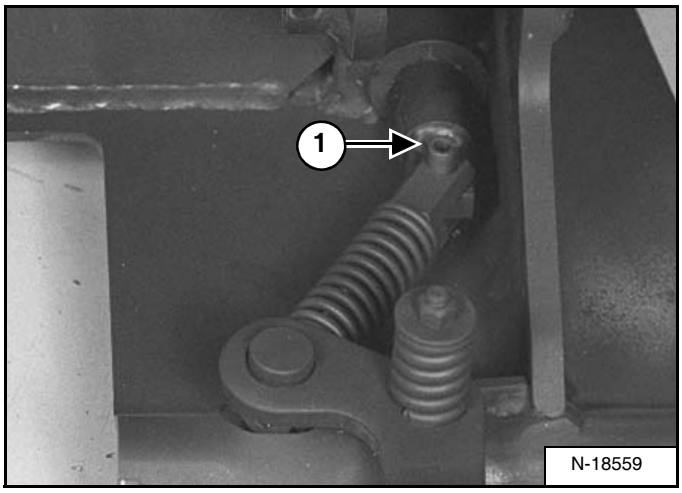
Power Bob-Tach Lever And Wedge

Figure 50-41-5



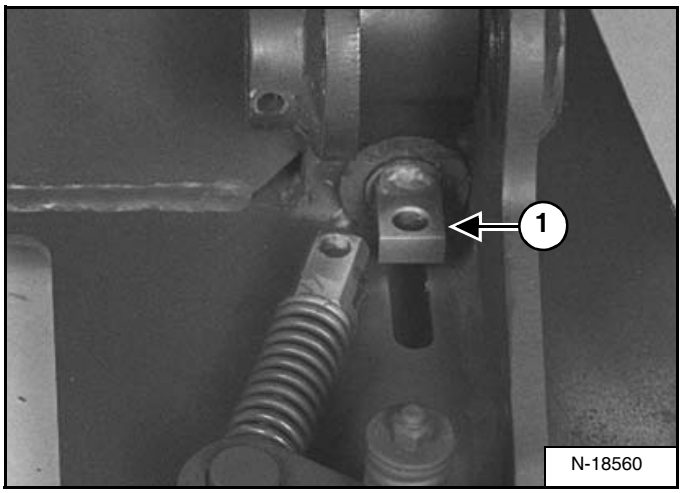
Use the following procedure to remove and install the Bob-Tach lever (Item 1) **[Figure 50-41-5]**, spring and wedge.

Figure 50-41-6



Use a punch and hammer, remove the roll pin (Item 1) **[Figure 50-41-6]** from the Bob-Tach Wedge and spring clevis.

Figure 50-41-7



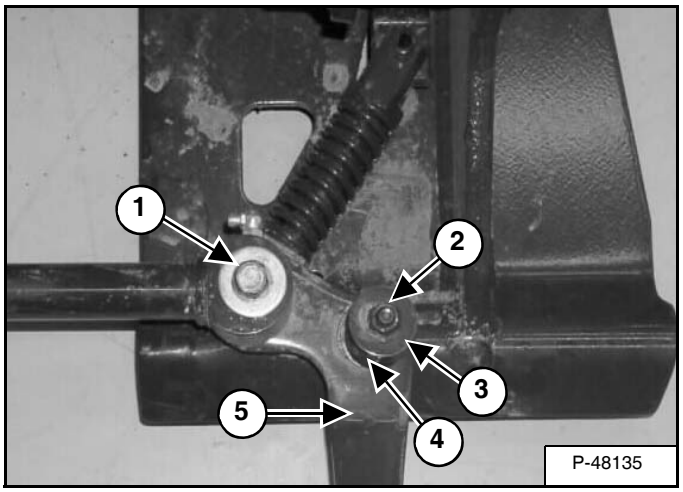
Remove the Wedge (Item 1) **[Figure 50-41-7]**.

Always replace bent or broken wedges.

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Power Bob-Tach Lever And Wedge (Cont'd)

Figure 50-41-8



Remove the washers and bolts (Item 1) **[Figure 50-41-8]**.

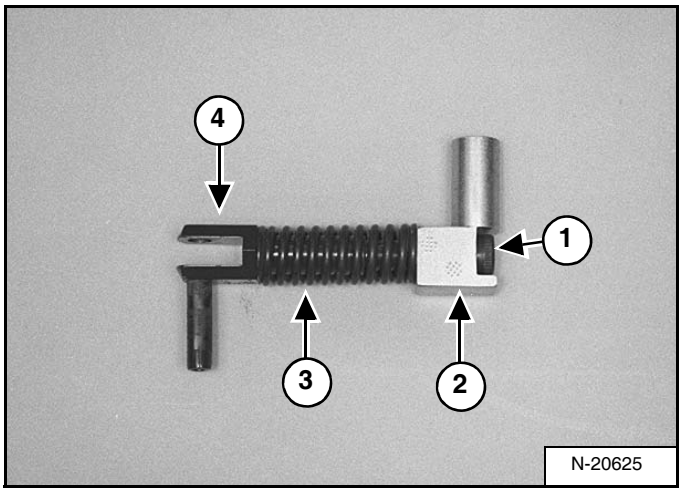
Installation: Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the cylinder off the lever pivots. Position the rod end to the left with the grease fitting holes to the top **[Figure 50-41-8]**.

Remove the lever mounting nut (Item 2), washer (Item 3), spring (Item 4) and lever (Item 5) **[Figure 50-41-8]**.

Installation: Tighten the nut to 25-28 ft.-lb. (34-38 N•m) torque.

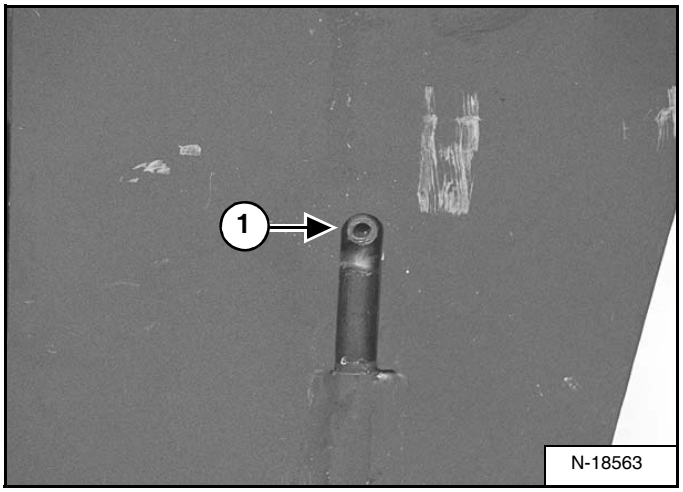
Figure 50-41-9



If the bolt (Item 1), handle pivot (Item 2), spring (Item 3), or clevis (Item 4) **[Figure 50-41-9]** are damaged, put the assembly in a vise.

Remove the bolt and replace the damaged parts as needed.

Figure 50-41-10



Use a punch and hammer to drive the roll pin (Item 1) **[Figure 50-41-10]** flush with the face of the Bob-Tach.

Reverse the removal procedure to install the Power Bob-Tach lever and wedge **[Figure 50-41-10]**.

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LIFT ARM

Removal And Installation

Figure 50-50-1

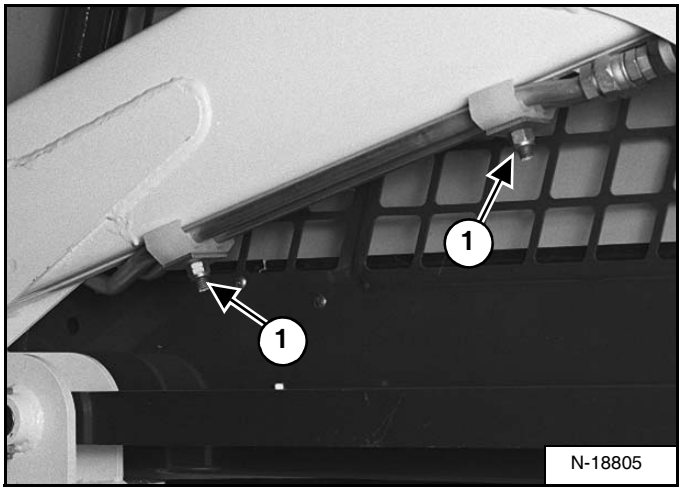


Roll the Bob-Tach fully forward. Stop the engine.

Remove the Bob-Tach frame from the lift arms. (See Removal And Installation on Page 50-40-1.)

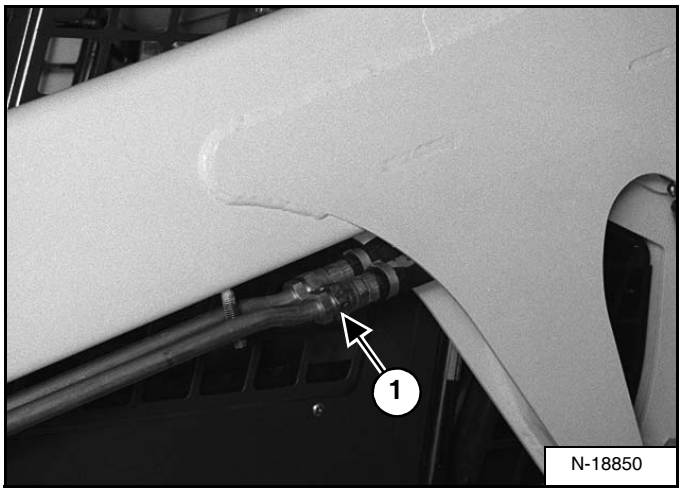
Install jackstands under the rear of the loader **[Figure 50-50-1]**.

Figure 50-50-2



Remove the tubeline clamps (Item 1) **[Figure 50-50-2]** under the lift arms (both sides).

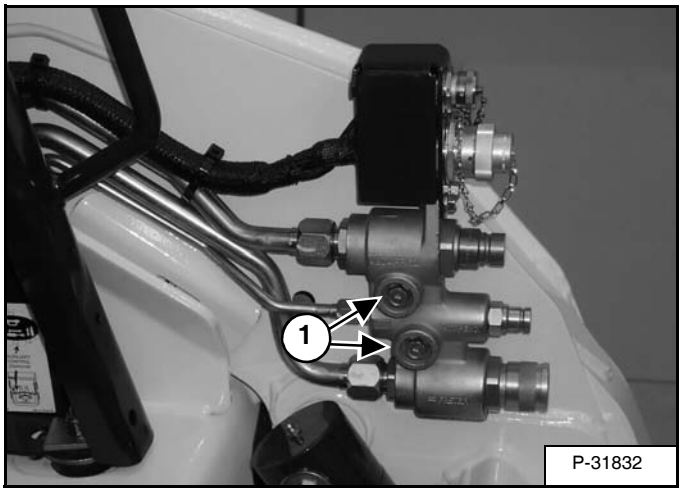
Figure 50-50-3



Mark the tubelines for correct installation (both sides). Pull the tubelines down, disconnect the hoses (Item 1) **[Figure 50-50-3]** (both sides).

Install plugs into the hose and tubeline ends.

Figure 50-50-4



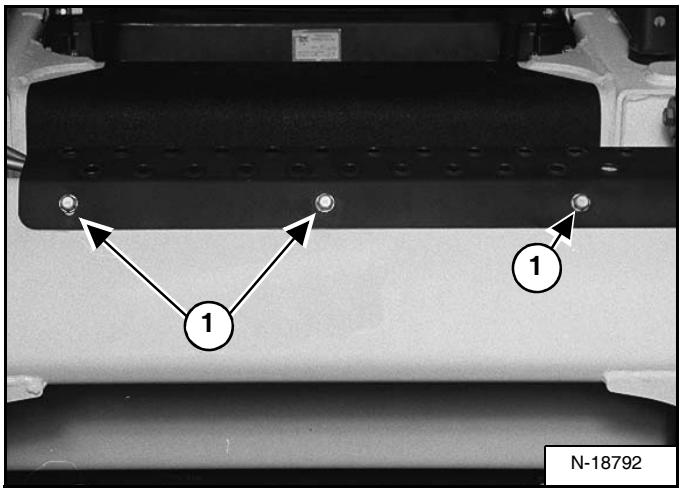
Remove the front auxiliary mount mounting bolts (Item 1) **[Figure 50-50-4]**.

Remove the front auxiliary tubelines from the lift arms.

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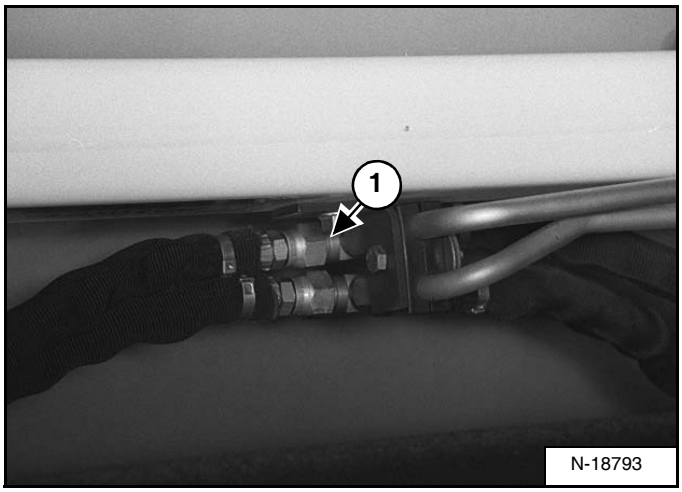
Removal And Installation (Cont'd)

Figure 50-50-5



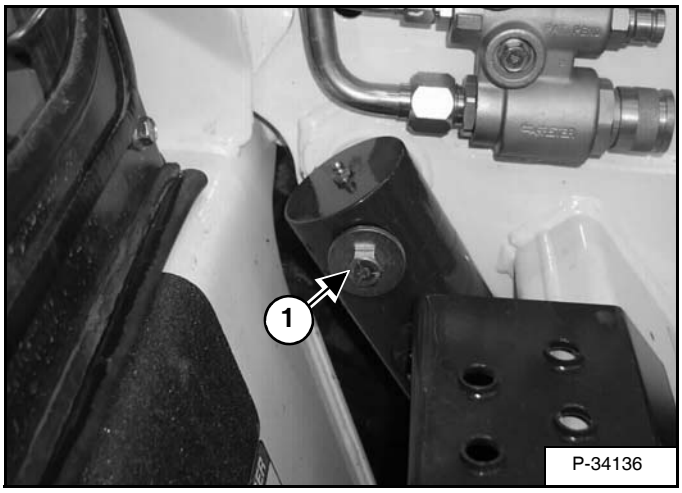
Remove the three front step mounting bolts (Item 1) **[Figure 50-50-5]**.

Figure 50-50-6



Remove the tilt port block mounting bolt (Item 1) **[Figure 50-50-6]** under the step.

Figure 50-50-7

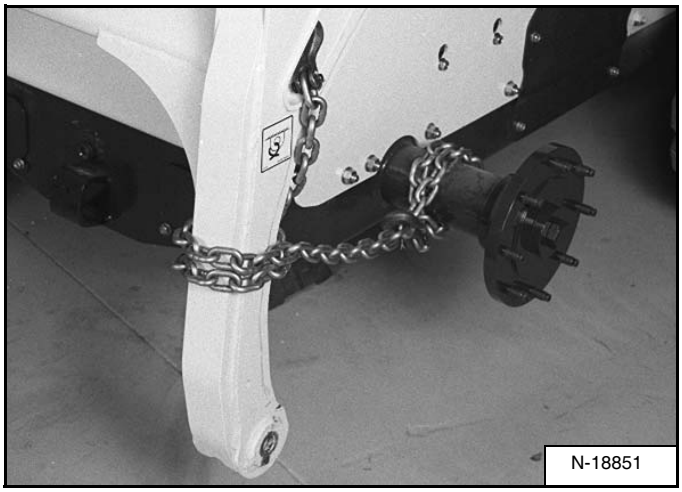


Remove the tilt cylinder mounting bolt base end (Item 1) **[Figure 50-50-7]**.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the tilt cylinders and tilt tubelines from the loader.

Figure 50-50-8

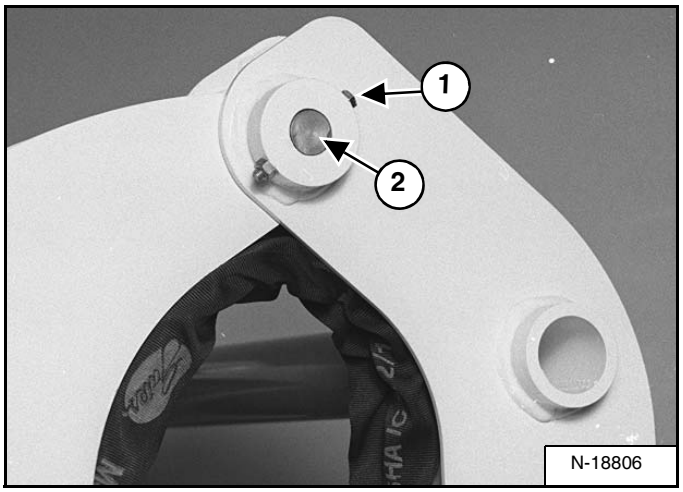


Connect a chain to the front of the lift arm and around the axle **[Figure 50-50-8]**.

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Removal And Installation (Cont'd)

Figure 50-50-9

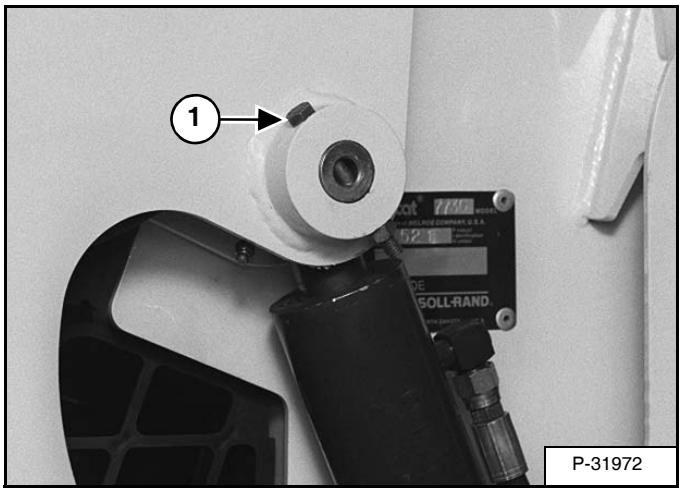


Remove the retainer bolt (Item 1) **[Figure 50-50-9]** and nut from the lift arm pin (both sides).

Installation: Tighten the bolt and nut to 18-20 ft.-lb. (24-27 N•m) torque.

Use a drift pin and hammer remove the lift arm pivot pin (Item 2) **[Figure 50-50-9]** (both sides).

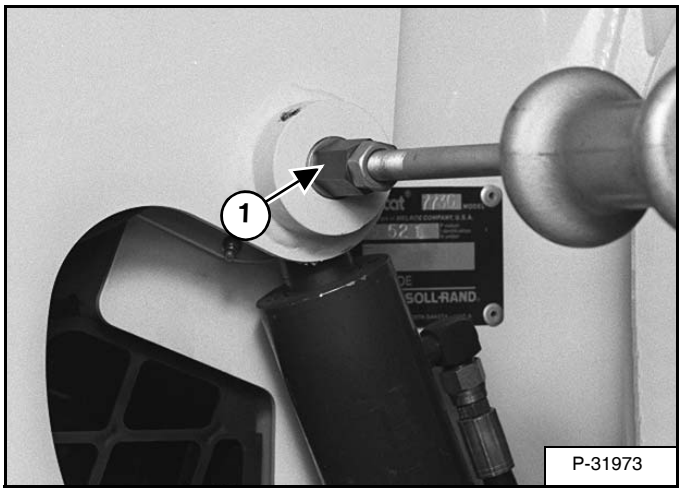
Figure 50-50-10



Remove the retainer bolt (Item 1) **[Figure 50-50-10]** and nut from the lift cylinder rod end pivot pin (both sides).

Installation: Tighten the bolt and nut to 18-20 ft.-lb. (24-27 N•m) torque.

Figure 50-50-11



Use a slide hammer remove the lift cylinder rod end pivot pin (Item 1) **[Figure 50-50-11]** (both sides).

Strap the lift cylinders to rear of the uprights.

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Removal And Installation (Cont'd)

Figure 50-50-12

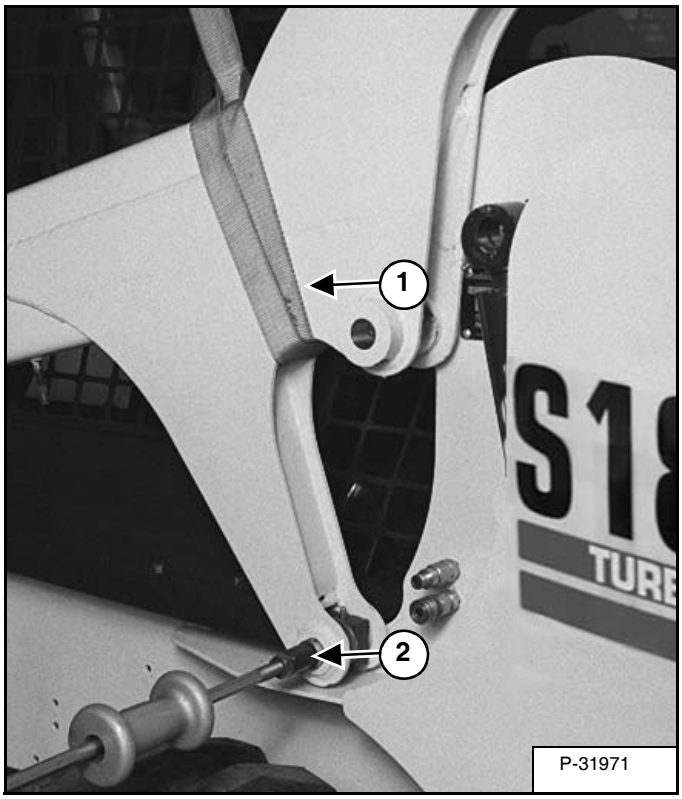


Figure 50-50-13



Connect a nylon lift strap, chain and chain hoist to the lift arms (Item 1) **[Figure 50-50-12]** & **[Figure 50-50-13]**.

Remove the retainer bolt (Item 2) **[Figure 50-50-12]** from the stabilizer pivot pin.

Installation: Tighten to 18-20 ft.-lb. (24-27 N•m) torque.

Use a slide hammer, remove the stabilizer pivot pin (Item 2) **[Figure 50-50-12]** (both sides).

Remove the chain from the front axle.

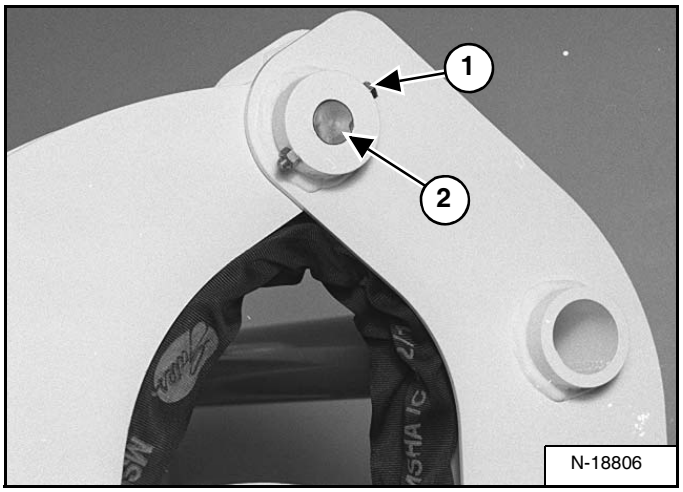
Remove the lift arms from the loader.

Reverse the removal procedure to install the lift arm.

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Link Removal And Installation

Figure 50-50-14



Lower the lift arms. Stop the engine.

Remove the retainer bolt (Item 1) **[Figure 50-50-14]** and nut from the lift arm pivot pin.

Installation: Tighten to 18-20 ft.-lb. (24-27 N•m) torque.

Use a drift pin and hammer, remove the lift arm pivot pin (Item 2) **[Figure 50-50-14]** (both sides).

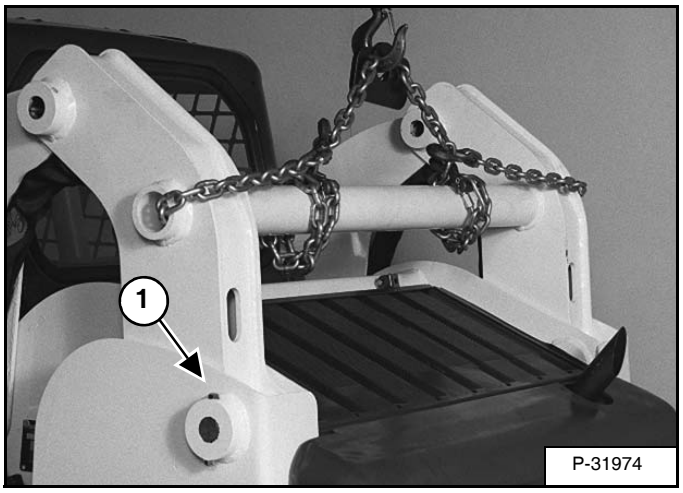
⚠ WARNING

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

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

W-2019-1285

Figure 50-50-15

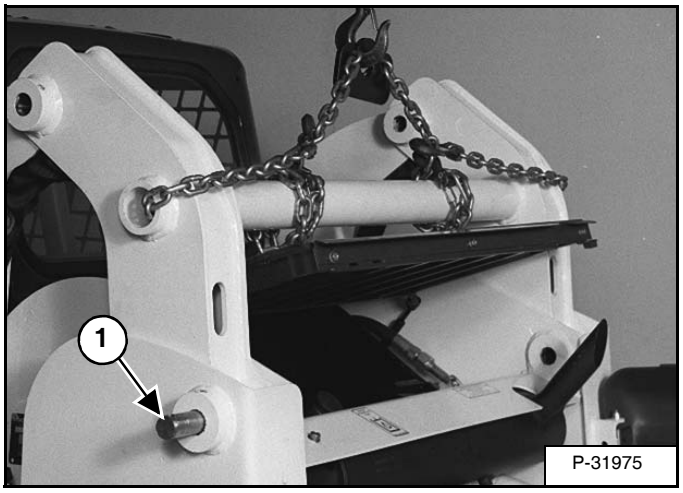


Connect a chain and chain hoist on the lift arm link **[Figure 50-50-15]**.

Remove the retainer bolt (Item 1) **[Figure 50-50-15]** and nut from the lift arm link pivot pin.

Installation: Tighten to 18-20 ft.-lb. (24-27 N•m) torque.

Figure 50-50-16



Open the rear door.

Raise the radiator cover part way to gain access to the pivot pin.

Use a drift pin and hammer, remove the lift arm pivot pin (Item 1) **[Figure 50-50-16]** (both sides).

Lower the rear grill. Close the rear door.

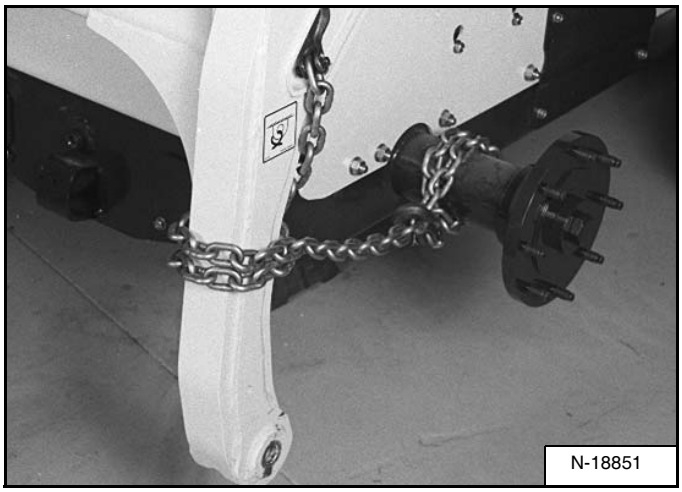
Raise the lift arm link with the chain hoist and remove it from the loader frame.

Reverse the removal procedure to install the lift arm link on the loader.

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Stabilizer Bar Removal And Installation

Figure 50-50-17



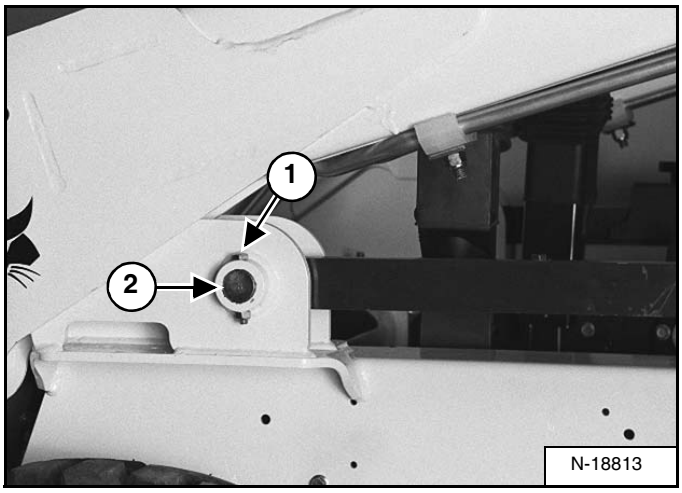
Lower the lift arms.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Connect a chain to the front of the lift arm and around the axle **[Figure 50-50-17]**.

NOTE: The Bob-Tach and front wheel are removed in photo [Figure 50-50-17] for clarity purpose only. The Bob-Tach and front wheel do not need to be removed to remove the stabilizer link.

Figure 50-50-18

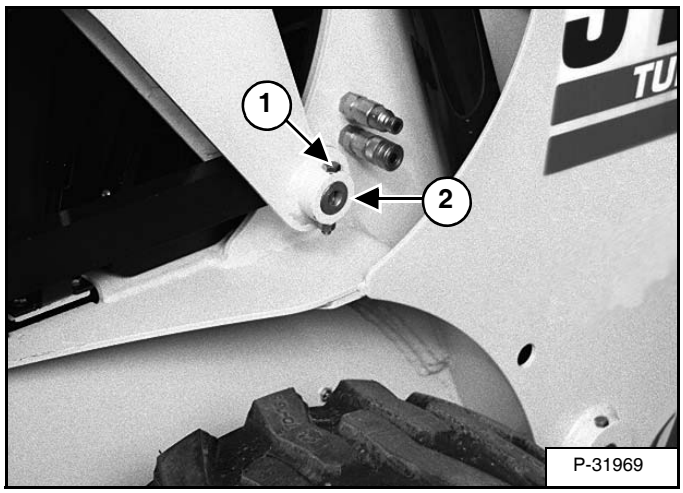


Remove the retainer bolt (Item 1) **[Figure 50-50-18]** from the stabilizer link pivot pin.

Installation: tighten to 18-20 ft.-lb. (24-27 N•m) torque.

Remove the stabilizer link pivot pin (Item 2) **[Figure 50-50-18]**.

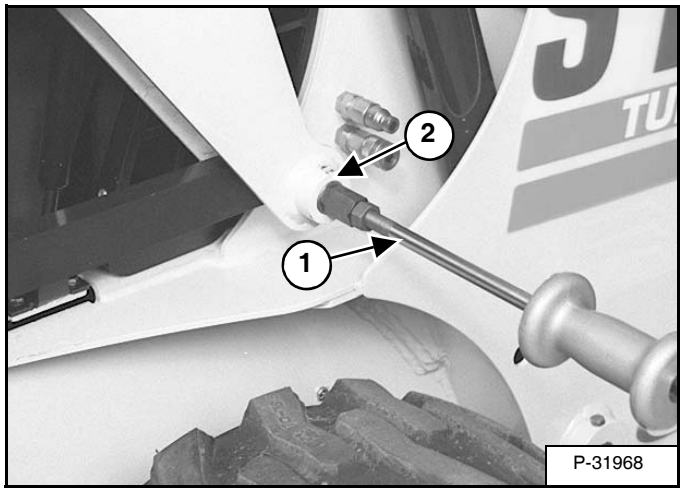
Figure 50-50-19



Remove the retainer bolt (Item 1) **[Figure 50-50-19]** from the stabilizer link pivot pin.

Installation: Tighten to 18-20 ft.-lb. (24-27 N•m) torque.

Figure 50-50-20



Use a slide hammer (Item 1), remove the stabilizer link pivot pin (Item 2) **[Figure 50-50-20]**.

Remove the stabilizer link (Item 2) **[Figure 50-50-20]** from the lift arm.

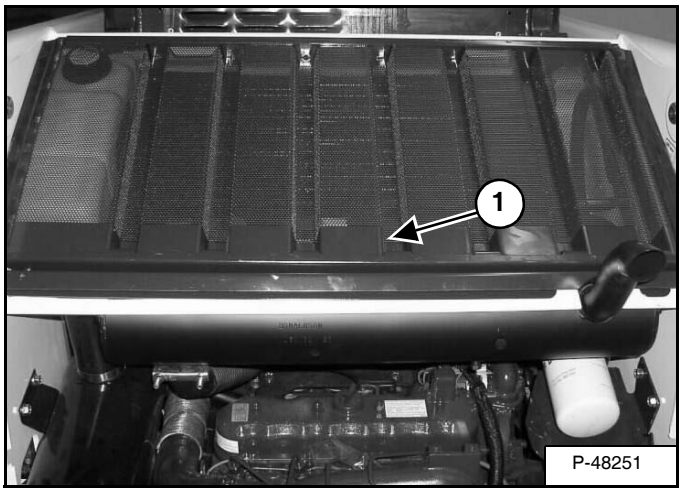
Reverse the above procedure to install the stabilizer link.

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REAR GRILL

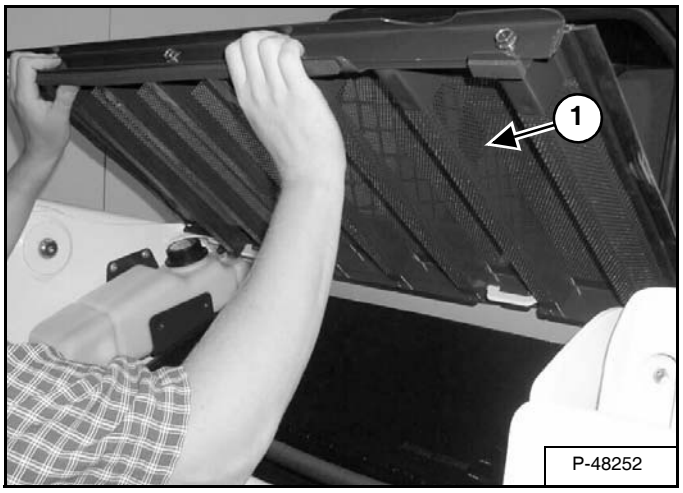
Removal And Installation

Figure 50-60-1



Open the rear door.

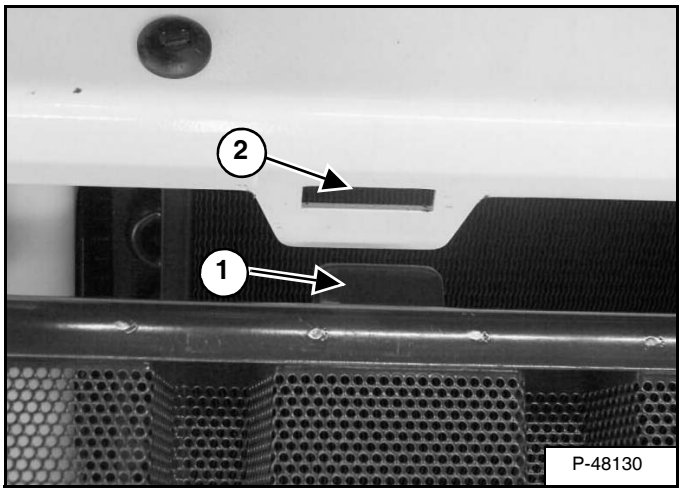
Figure 50-60-2



Lift up on the rear grill (Item 1) **[Figure 50-60-1]** and **[Figure 50-60-2]**.

Lift the grill away from the loader.

Figure 50-60-3



Installation: Line up the tab (Item 1) on the grill with the slot (Item 2) **[Figure 50-60-3]** on the loader mainframe. Insert the tab fully and then push down.

Reverse the removal procedure to install the grill.

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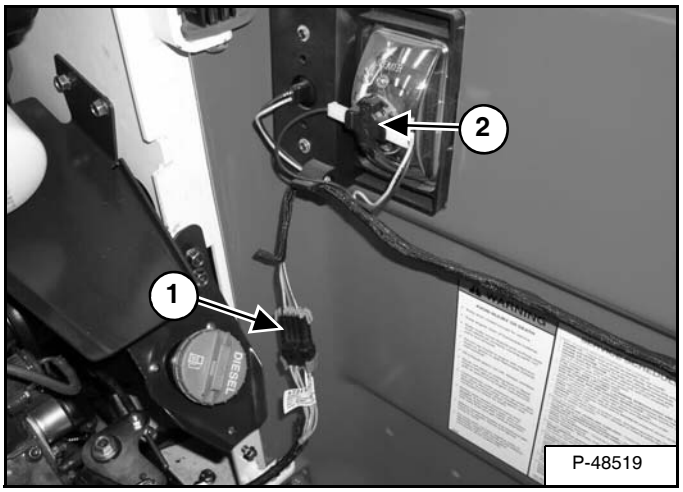


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REAR DOOR

Removal And Installation

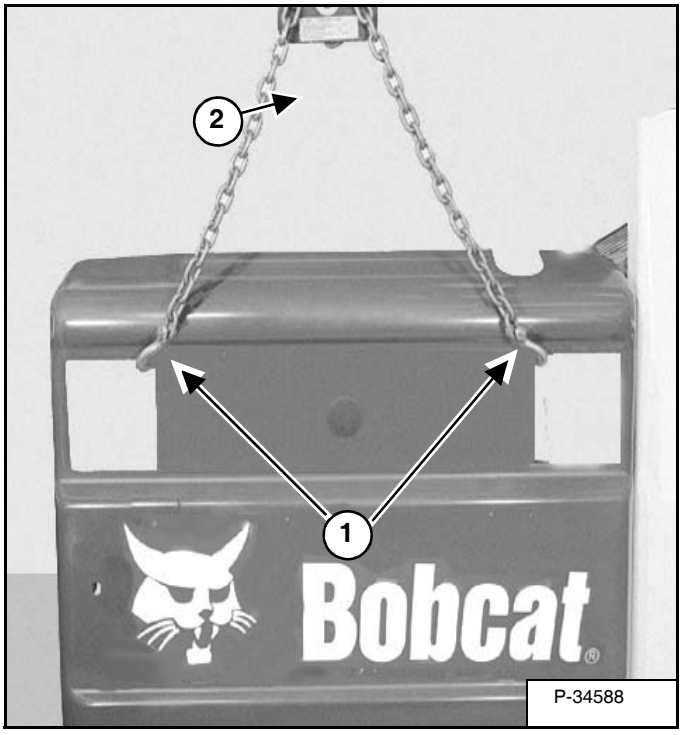
Figure 50-70-1



Disconnect the light harness connector **(Item 1) [Figure 50-70-1]** from the engine harness.

Remove both rear lights (Item 2) **[Figure 50-70-1]** from the door. (See Rear Removal And Installation on Page 60-60-2.)

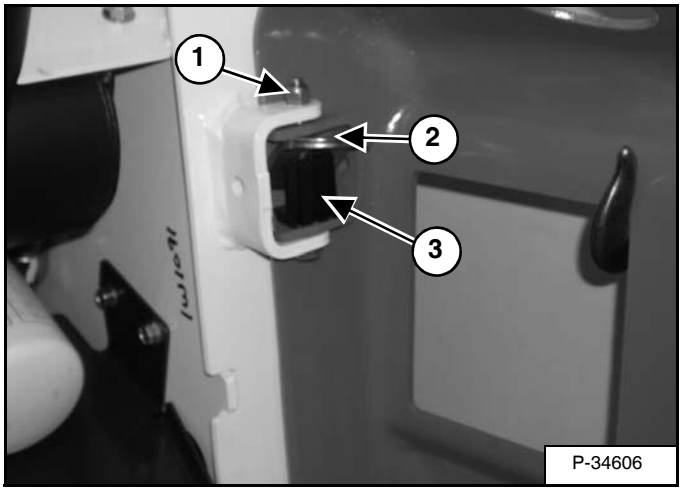
Figure 50-70-2



Secure the chain hooks (Item 1) **[Figure 50-70-2]** to the door as shown.

Connect a chain hoist (Item 2) **[Figure 50-70-2]** to the lifting chain.

Figure 50-70-3



Remove the top and bottom door hinge mounting bolts (Item 1) **[Figure 50-70-3]** and nuts.

NOTE: Install the door stop (Item 2) and the door stop retainer (Item 3) in the top hinge as shown [Figure 50-70-3].

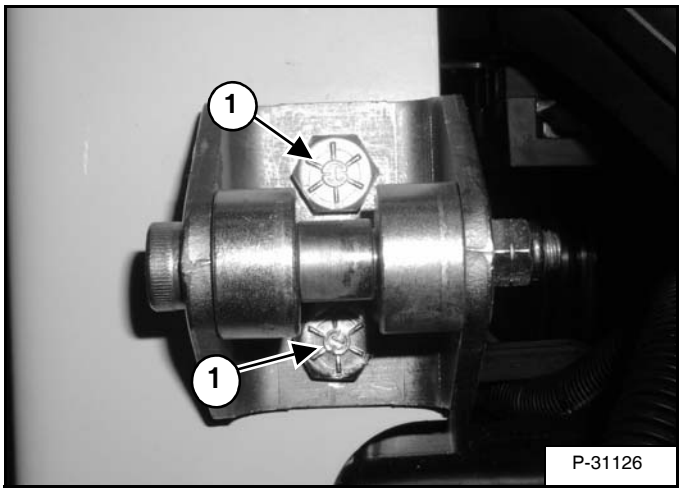
Installation: Tighten the mounting bolts and nuts to 25-28 ft.-lb. (34-38 N•m) torque.

Lift the door away from the loader frame and put the door flat on the floor.

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Striker Removal and Installation

Figure 50-70-4

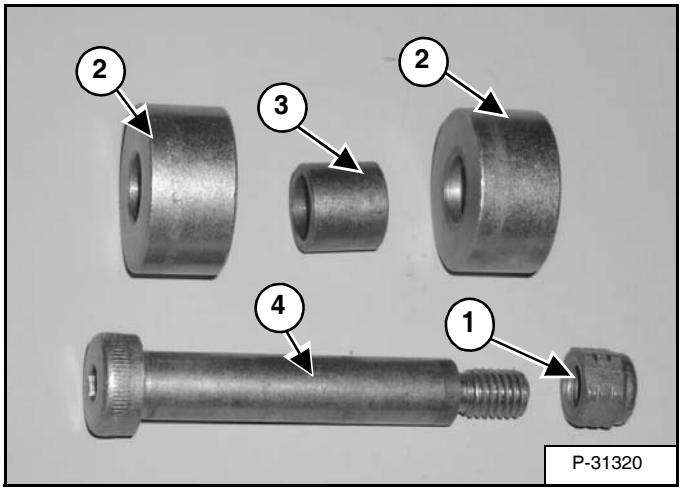


Remove the two striker mount bolts (Item 1) **[Figure 50-70-4]**.

Remove the striker assembly from the loader.

Striker Disassembly and Assembly

Figure 50-70-5



Remove the lock nut (Item 1) **[Figure 50-70-5]**.

Remove the rollers (Item 2) and the spacer (Item 3) from the bolt (Item 4) **[Figure 50-70-5]**.

Check the parts for wear and replace as needed.

Adjusting The Striker

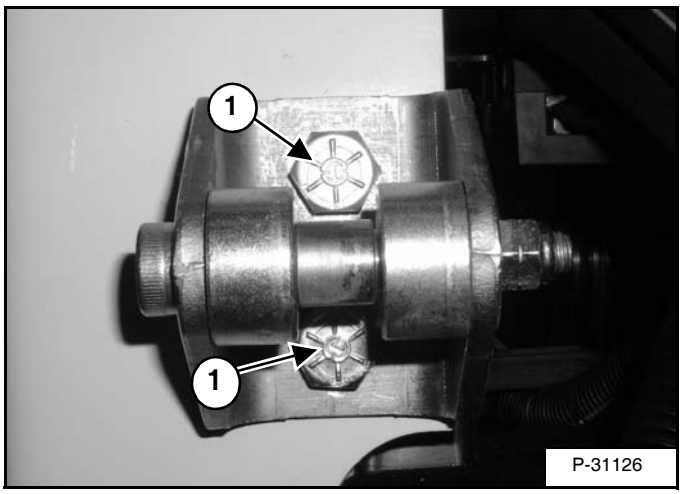
⚠ WARNING

AVOID INJURY OR DEATH

Never service or adjust the machine when the engine is running unless instructed to do so in the manual.

W-2012-0497

Figure 50-70-6



Loosen the striker assembly mount bolts (Item 1) **[Figure 50-70-6]**.

Align the striker assembly in the center of the mounting holes.

NOTE: Tighten the striker assembly, top mount bolt only, until it will hold the striker assembly in the center of the mounting slots.

Close the rear door. (This will align the striker assembly to the correct position.)

Open the door.

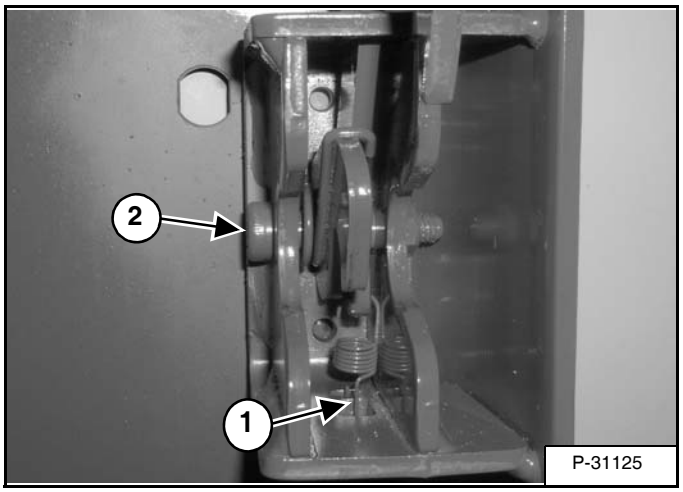
Tighten both striker mount bolts (Item 1) **[Figure 50-70-6]**.

Close the rear door.

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Latch Removal and Installation

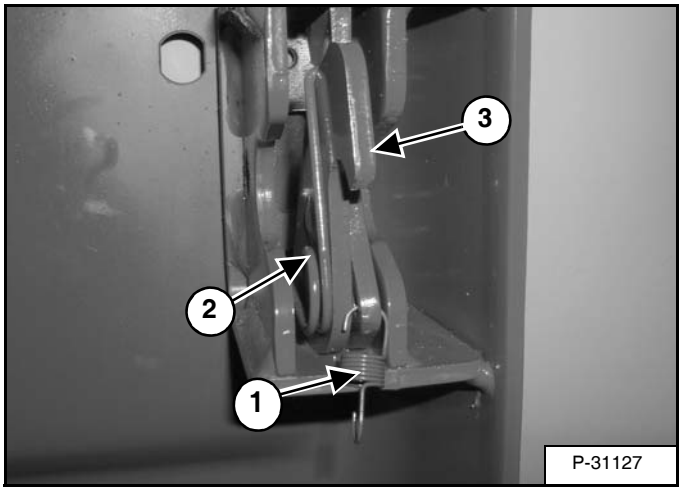
Figure 50-70-7



Disconnect the spring (Item 1) **[Figure 50-70-7]** from the rear door.

Remove the bolt and nut (Item 2) **[Figure 50-70-7]** from the latch.

Figure 50-70-8

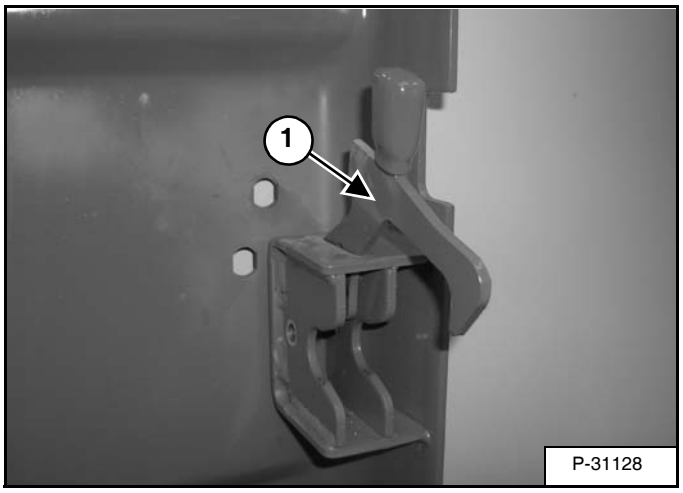


Remove the spring (Item 1) **[Figure 50-70-8]** from the door handle.

Remove the spring (Item 2) **[Figure 50-70-8]** from the door latch.

Remove the door latch (Item 3) **[Figure 50-70-8]** from the door handle.

Figure 50-70-9



Remove the door handle (Item 1) **[Figure 50-70-9]** from the rear door.

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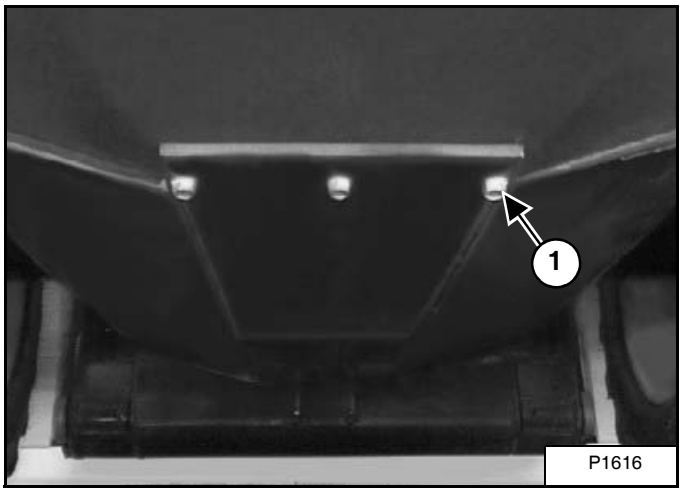


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FUEL TANK

Removal And Installation

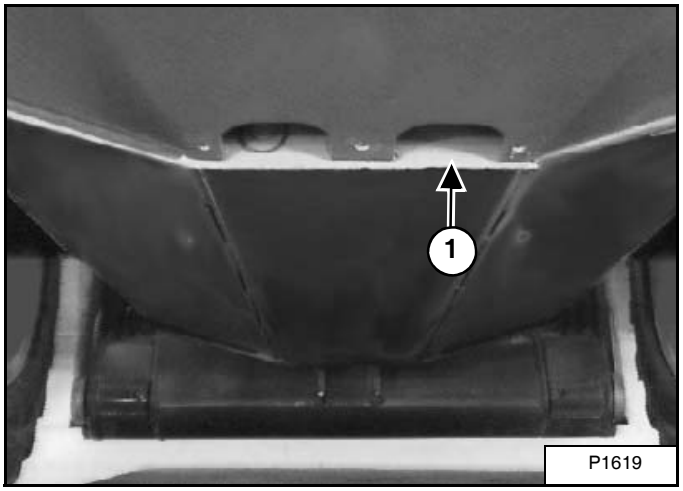
Figure 50-80-1



Remove the cover (Item 1) **[Figure 50-80-1]** which is installed over the fuel drain near the rear of the chaincase.

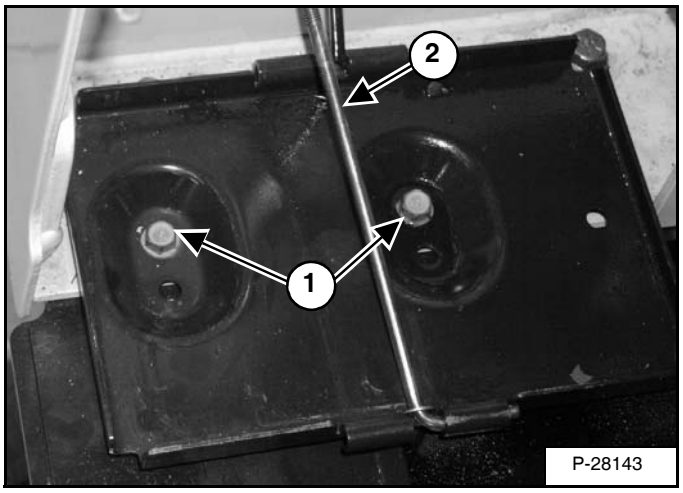
Installation: Tighten the cover mounting bolts to 190-240 in.-lb. (21,5-27 N•m) torque.

Figure 50-80-2



Drain the fuel from the tank through the fuel drain (Item 1) **[Figure 50-80-2]**.

Figure 50-80-3



Open the rear door of the loader.

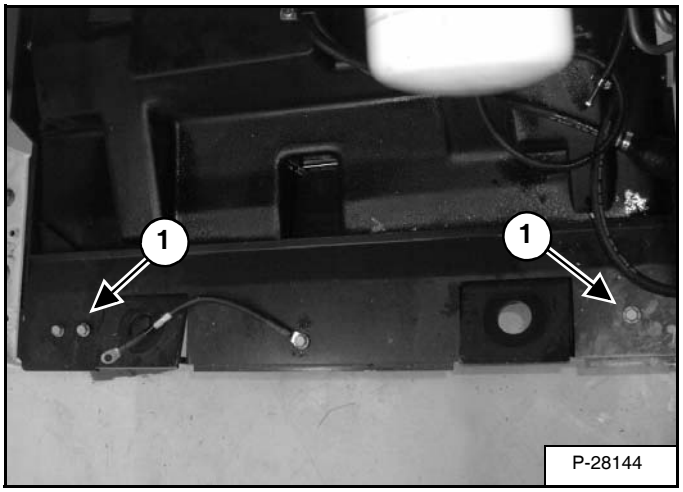
Remove the engine/hydrostatic pump assembly from the loader. (See Removal And Installation on Page 70-80-1.)

Remove the two mounting bolts (Item 1) **[Figure 50-80-3]** from the battery holder.

Installation: Tighten the battery holder mounting bolts to 190-240 in.-lb. (21,5-27 N•m) torque.

Remove the battery holder (Item 2) **[Figure 50-80-3]** from the loader.

Figure 50-80-4



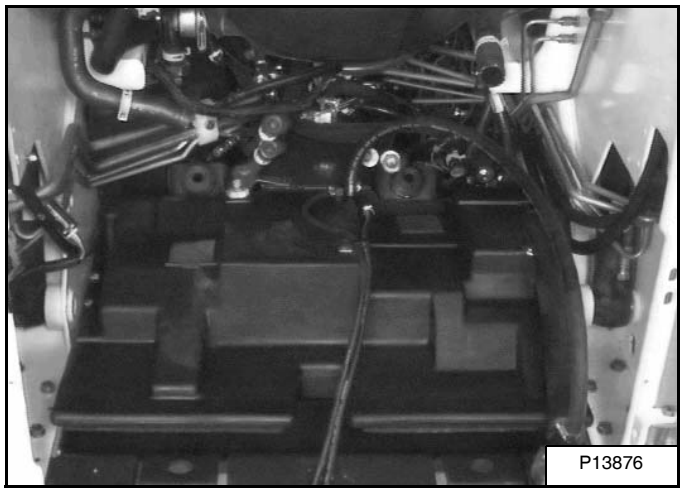
Remove the mounting bolts (Item 1) **[Figure 50-80-4]** from the fuel tank retainer bracket.

Installation: Tighten the mounting bolts to 190-240 in.-lb. (21,5-27 N•m) torque.

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Removal And Installation (Cont'd)

Figure 50-80-5



Disconnect fuel sender.

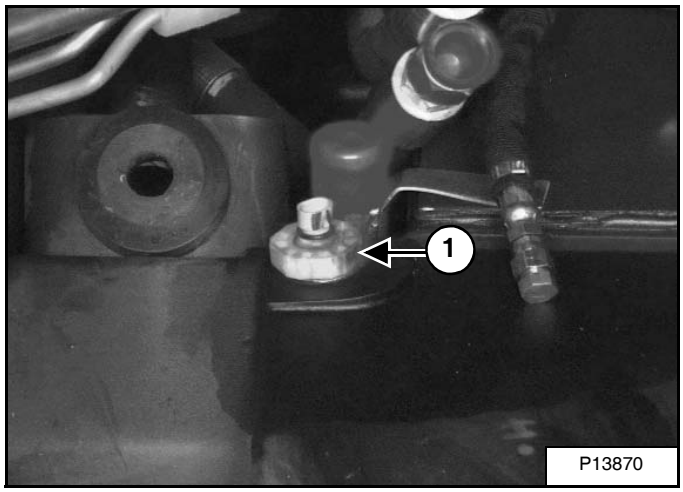
Disconnect fuel venthose.

Disconnect fuel fillhose.

Lift the fuel tank up and remove the tank from the loader **[Figure 50-80-5]**.

Fuel Level Sender

Figure 50-80-6



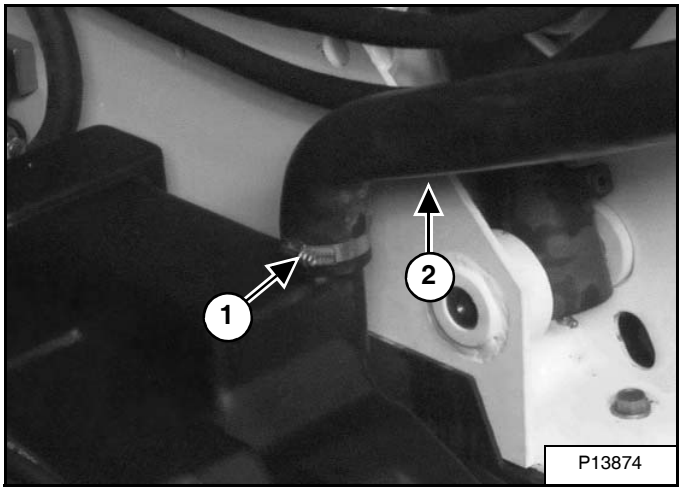
Loosen the fuel level sender (Item 1) **[Figure 50-80-6]** with a wrench.

Turn the fuel level sender out and remove it from the fuel tank. Check the fuel level sender for damage and replace if necessary.

Installation: tighten the fuel level sender to 50-60 in.-lb. (5,7-6,8 N•m) torque.

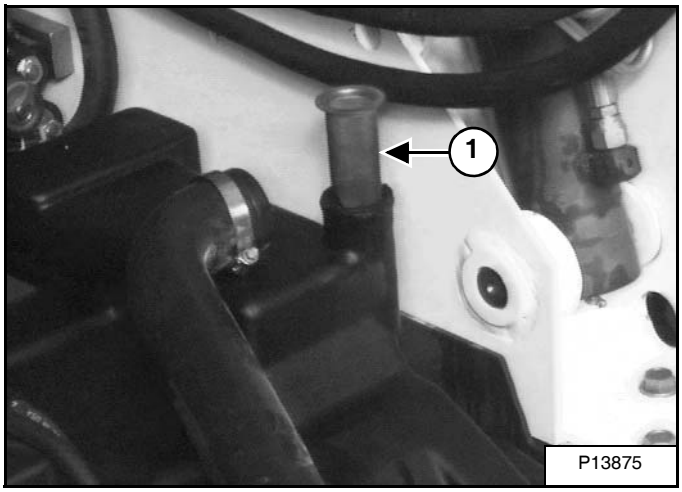
Fuel Fill Screen

Figure 50-80-7



Remove the clamp (Item 1) **[Figure 50-80-7]** and remove the fuel fill hose (Item 2) **[Figure 50-80-7]** from the tank.

Figure 50-80-8

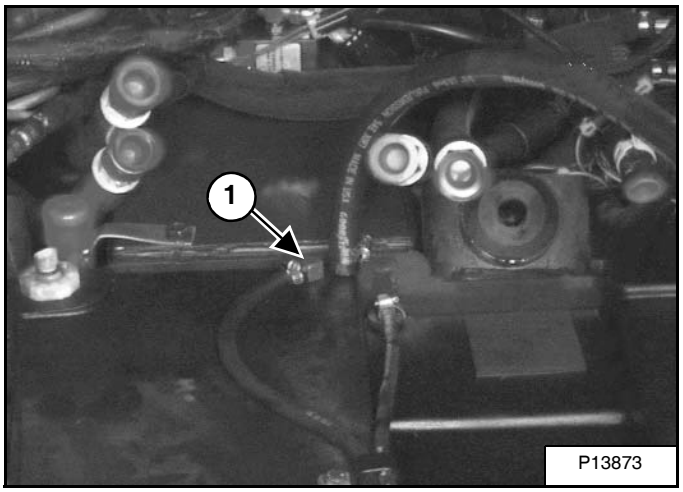


Remove the fuel fill screen (Item 1) **[Figure 50-80-8]** from the tank. Check the screen for damage and replace if necessary.

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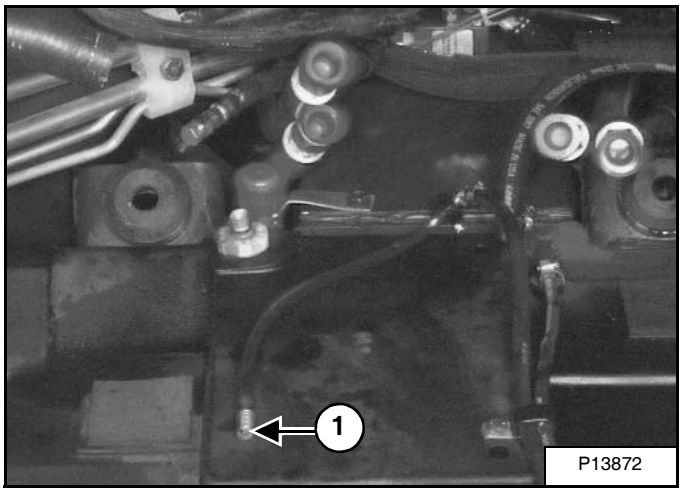
Fuel Fill Screen (Cont'd)

Figure 50-80-9



Remove the fitting (Item 1) **[Figure 50-80-9]** and grommet from the tank.

Figure 50-80-10



Remove the fuel supply screen (Item 1) **[Figure 50-80-10]** from the hose. Check the screen for damage and replace if necessary.

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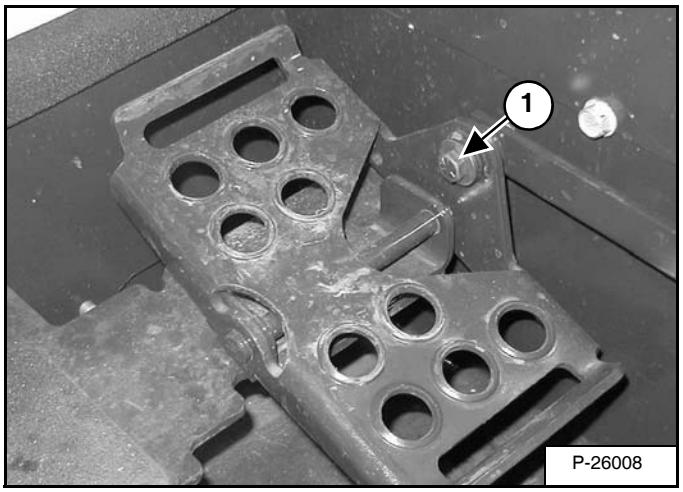


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CONTROL PEDALS

Removal And Installation

Figure 50-90-1

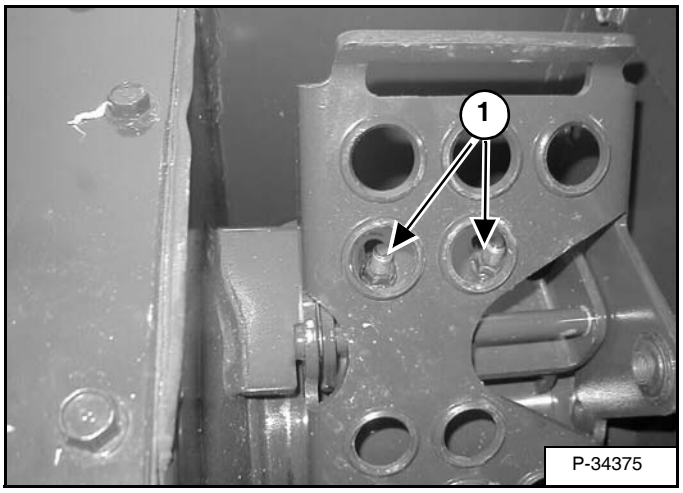


Remove the bolt (Item 1) **[Figure 50-90-1]** and nut from the pedal linkage.

Installation: Tighten the bolt and nut to 21-25 ft.-lb. (28-34 N•m) torque.

Check the rubber bushing in the pedal for wear and replace as needed.

Figure 50-90-2



Remove the two mounting bolts (Item 1) **[Figure 50-90-2]** from the pedal mounting bracket.

Remove the pedal assembly from the loader.

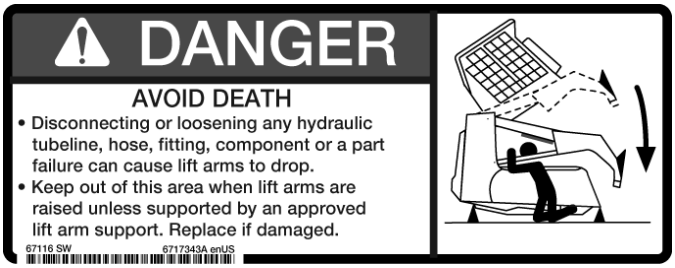
Remove the pedal assembly from the loader.

Pedal Adjustment

After installing the pedal, adjust the pedal so that there is clearance under the rear of the pedal. The valve spool must travel full stroke without the pedal hitting the floor panel.

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Crossbar Linkage Removal and Installation



WARNING

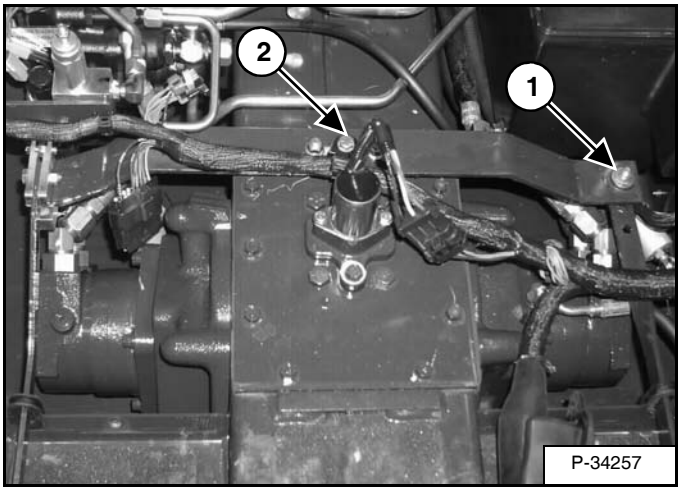
Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the lift arms and install an approved lift arm support device.(See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab.(See Raising The Operator Cab on Page 10-30-1.)

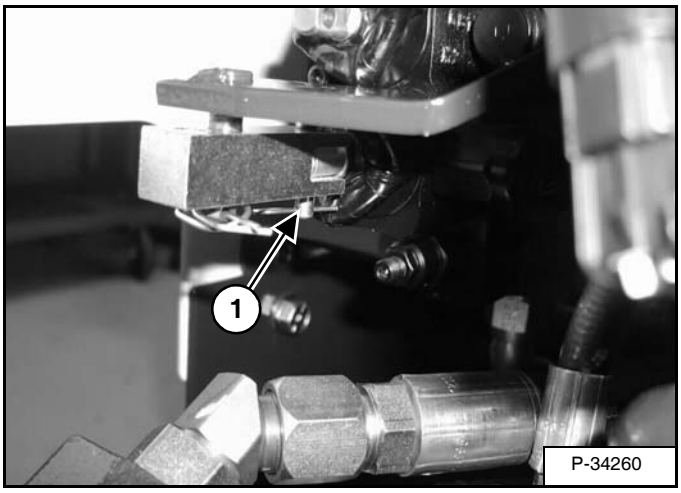
Figure 50-90-3



Remove the bolt and nut (Item 1) **[Figure 50-90-3]** to disconnect the lift pedal linkage from the crossbar.

Remove the crossbar pivot bolt (Item 2) **[Figure 50-90-3]**.

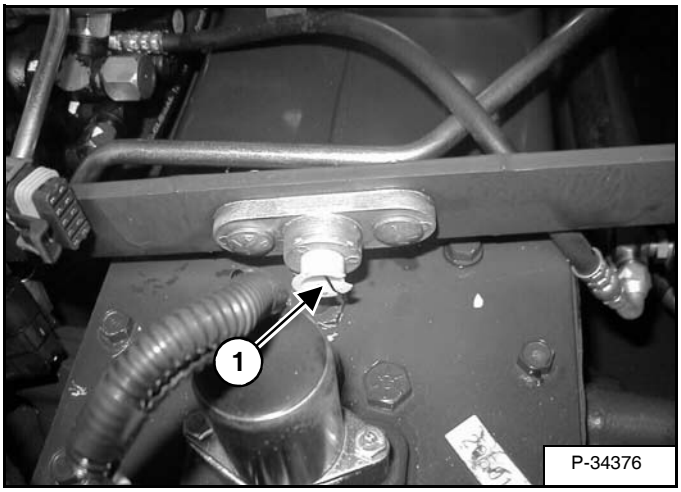
Figure 50-90-4



Remove the hairpin clip and cross-pin (Item 1) **[Figure 50-90-4]** from the control valve lift spool.

Disconnect the crossbar from the control valve.

Figure 50-90-5



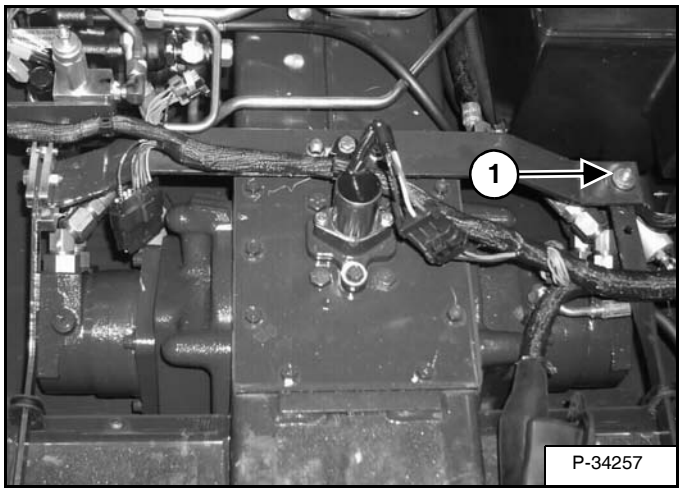
Remove the crossbar from the pivot **[Figure 50-90-5]**.

Installation: Check the nylon bushing (Item 1) **[Figure 50-90-5]** for wear and replace as needed.

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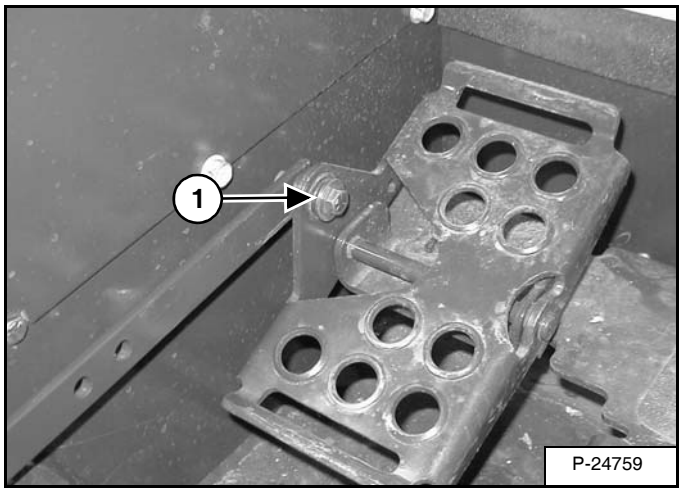
Lift Foot Pedal Linkage Removal and Installation

Figure 50-90-6



Remove the bolt and nut (Item 1) **[Figure 50-90-6]** to disconnect the lift foot pedal linkage from the crossbar linkage.

Figure 50-90-7

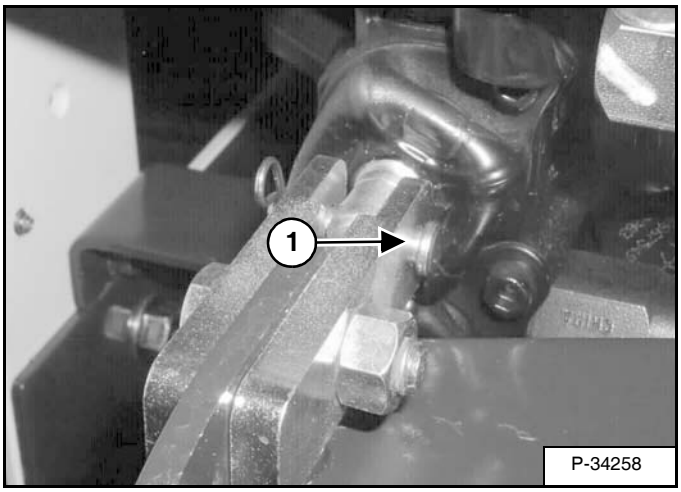


Remove the bolt and nut (Item 1) **[Figure 50-90-7]** to disconnect the lift foot pedal.

Installation: Tighten the bolt and nut to 21-25 ft.-lb. (28-34 N•m) torque.

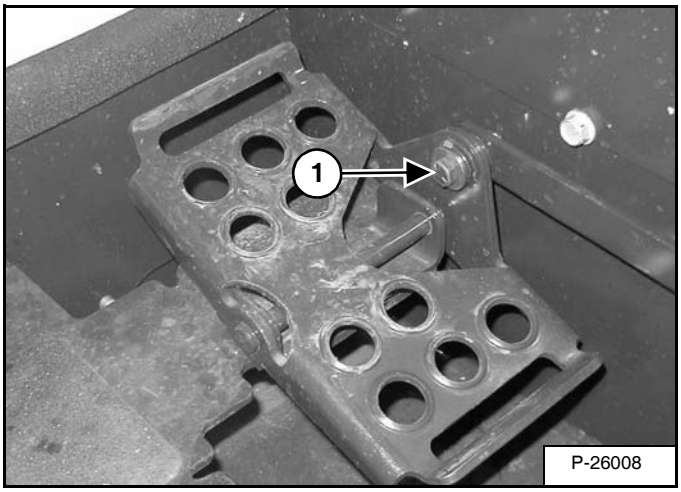
Tilt Foot Pedal Linkage Removal and Installation

Figure 50-90-8



Remove the hairpin clip and cross-pin (Item 1) **[Figure 50-90-8]** from the control valve tilt spool.

Figure 50-90-9



Remove the bolt and nut (Item 1) **[Figure 50-90-9]** to disconnect the lift foot pedal.

Installation: Tighten the bolt and nut to 21-25 ft.-lb. (28-34 N•m) torque.

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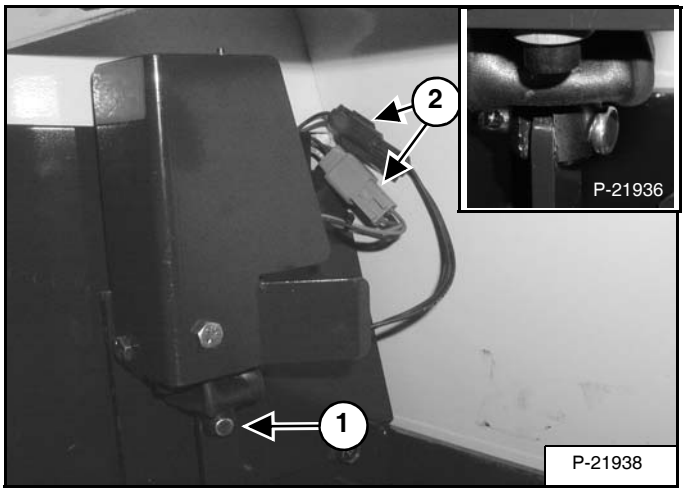


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CONTROL PEDALS (ACS)

Foot Sensor Removal And Installation

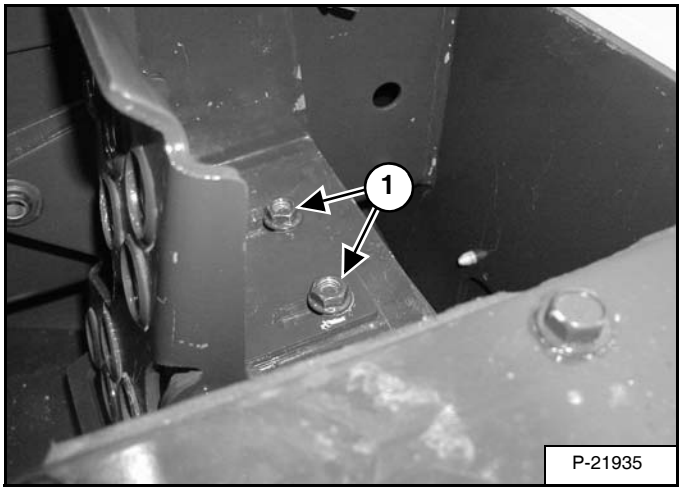
Figure 50-91-1



Pull the pin (Item 1) **[Figure 50-91-1]** holding the foot pedal linkage to the sensor.

Disconnect the two connectors (Item 2) **[Figure 50-91-1]** from the sensor and lock solenoid.

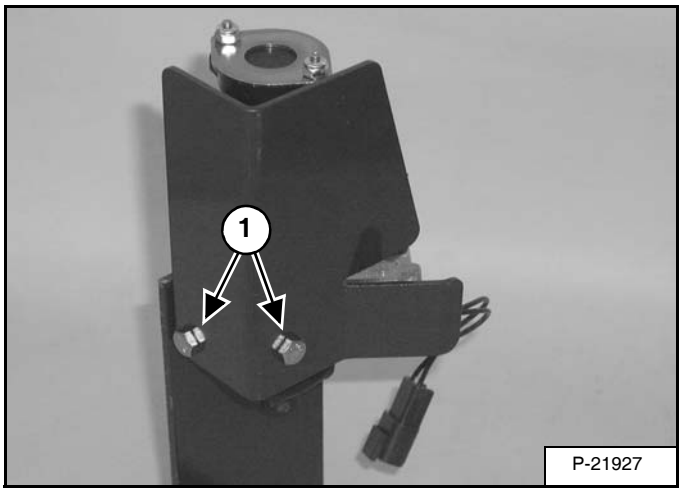
Figure 50-91-2



Tilt the foot pedal up and remove the two nuts (Item 1) **[Figure 50-91-2]**.

Remove the foot pedal and sensor assembly from the loader.

Figure 50-91-3



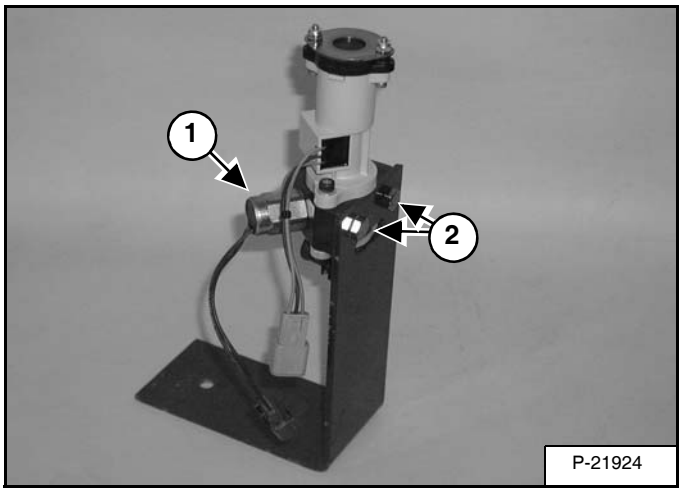
Remove the two bolts (Item 1) **[Figure 50-91-3]** from the foot sensor shield.

Installation: Tighten the bolts to 80-90 in.-lb. (9,0-10,2 N•m) torque.

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Foot Sensor Removal And Installation (Cont'd)

Figure 50-91-4



Remove foot lock solenoid (Item 1) **[Figure 50-91-4]**.

Installation: Apply a drop of oil to the solenoid threads and tighten the solenoid to 35-40 ft.-lb. (47-54 N•m) lubed torque.

Remove the two bolts (Item 2) **[Figure 50-91-4]** from the bracket and sensor assembly.

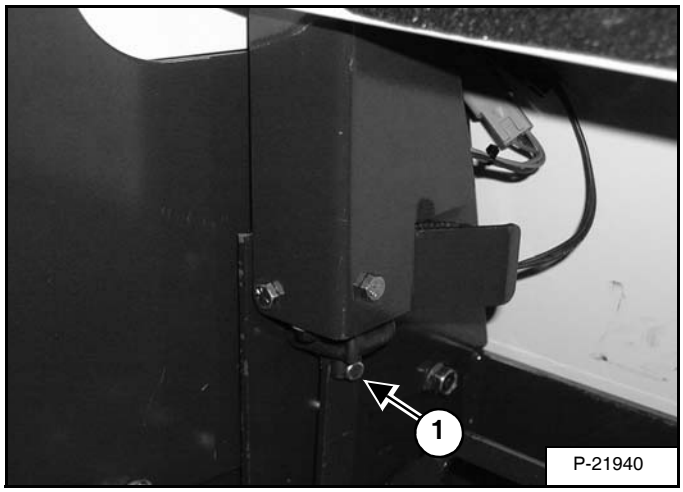
Installation: Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the sensor assembly.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure (ACS) on Page 60-160-11.)

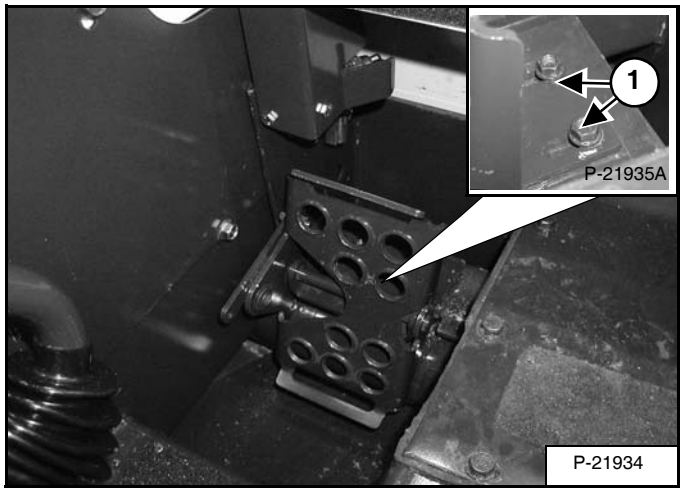
Foot Pedal Removal And Installation

Figure 50-91-5



Remove the pin (Item 1) **[Figure 50-91-5]** holding the linkage to the sensor.

Figure 50-91-6



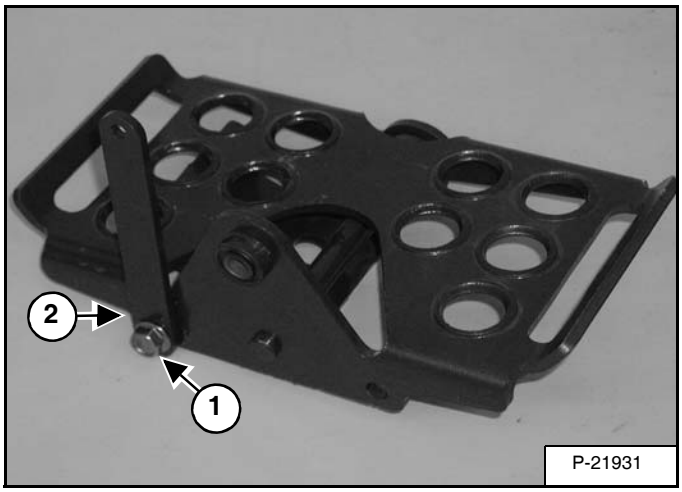
Tip the foot pedal up and remove the two nuts (Item 1) **[Figure 50-91-6]**.

Remove the foot pedal assembly.

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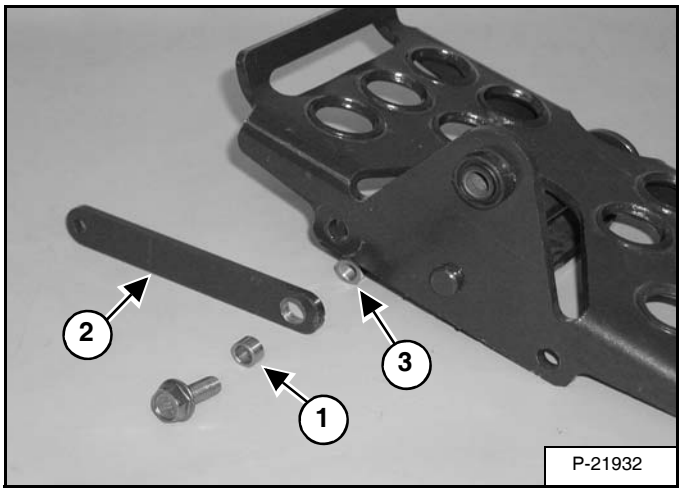
Foot Pedal Linkage Disassembly And Assembly

Figure 50-91-7



Remove the bolt (Item 1) holding the linkage (Item 2) to the side of the foot pedal **[Figure 50-91-7]**.

Figure 50-91-8



Remove the spacer (Item 1), linkage (Item 2), and nut (Item 3) from the foot pedal **[Figure 50-91-8]**.

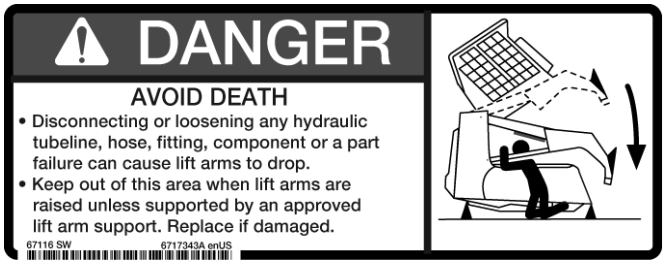
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CONTROL PANEL (NON-ADJUSTABLE PINTLES)

Removal and Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

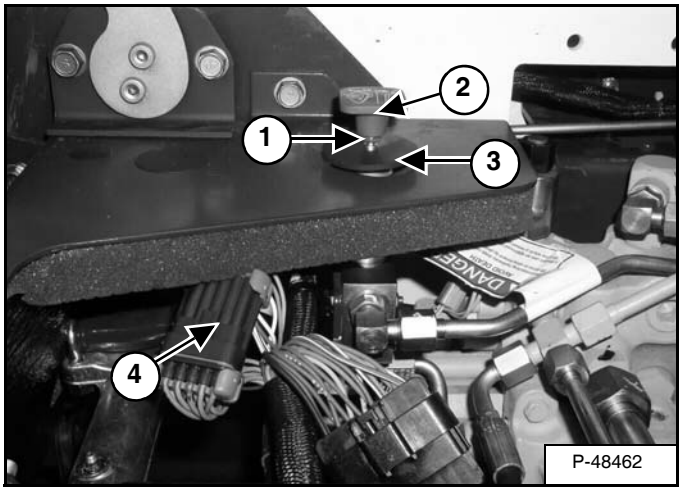
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Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Figure 50-100-1



Loosen the jam nut (Item 1) from the by-pass control knob (Item 2) **[Figure 50-100-1]**.

Remove the control knob (Item 2), jam nut (Item 1) and rubber washer (Item 3) **[Figure 50-100-1]**.

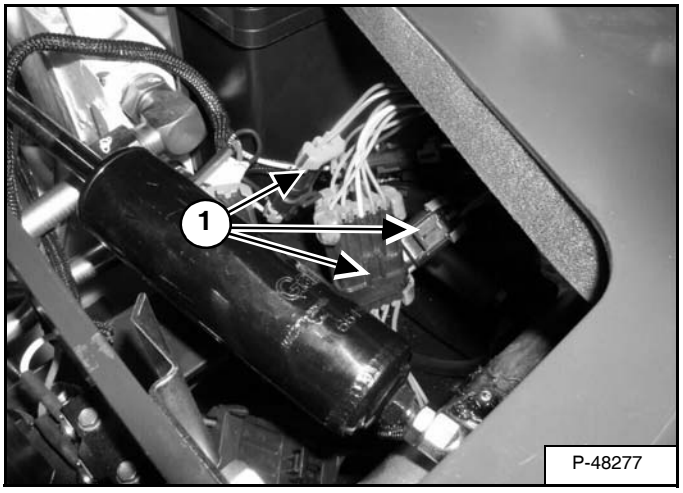
Disconnect the control harness connectors (Item 4) **[Figure 50-100-1]** from right control levers.

WARNING

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

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Figure 50-100-2

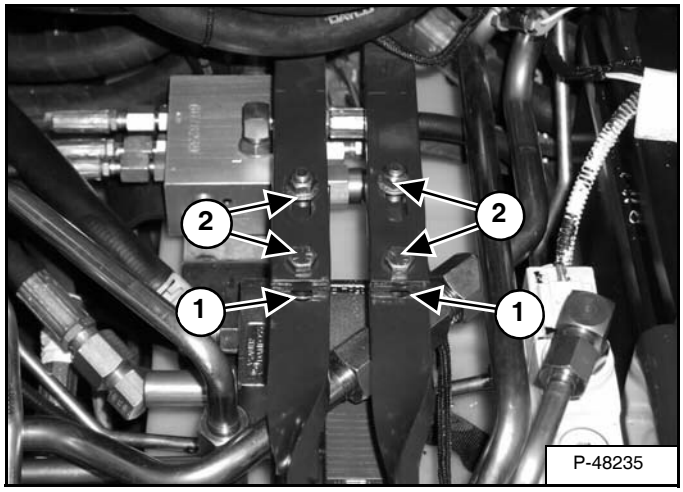


Disconnect the control harness connectors (Item 1) **[Figure 50-100-2]** from left control levers.

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Removal And Installation (Cont'd)

Figure 50-100-3

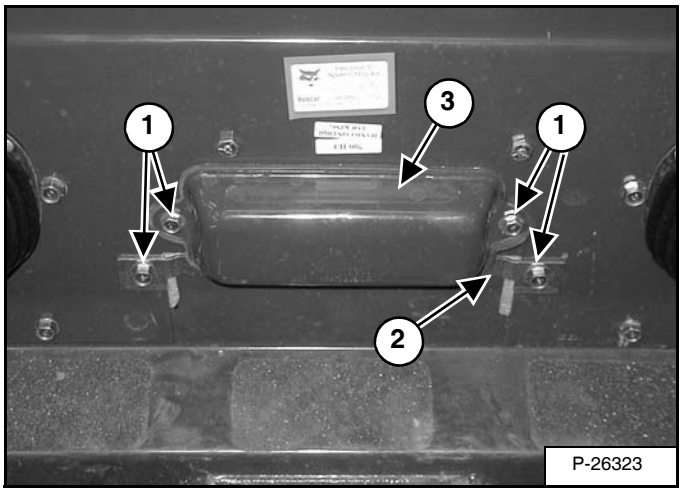


Scribe a mark across the top of the steering linkage bars (Item 1) **[Figure 50-100-3]** which are connected to the steering shaft on the control panel.

Remove the four steering linkage mounting bolts (Item 2) **[Figure 50-100-3]**.

Installation: Align the marks on the steering linkage bars. Tighten the steering linkage mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 50-100-4

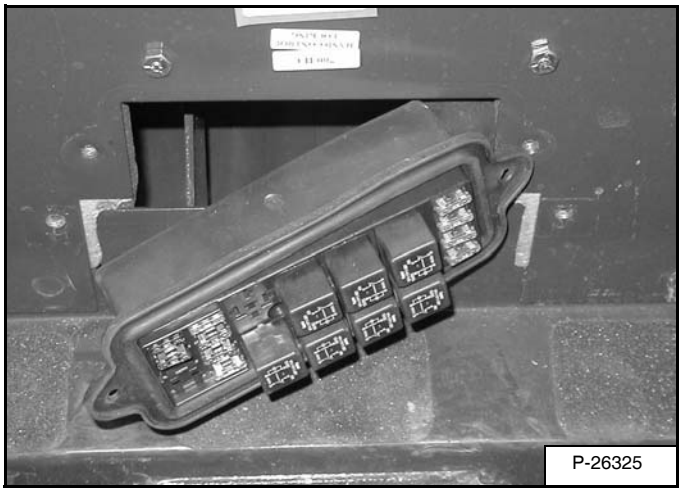


Remove the fuse/relay mounting bolts (Item 1) **[Figure 50-100-4]**.

Remove the fuse/relay shield (Item 2) **[Figure 50-100-4]**.

Remove the fuse/relay cover (Item 3) **[Figure 50-100-4]**.

Figure 50-100-5



Remove the fuse/relay block **[Figure 50-100-5]**.

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Removal And Installation (Cont'd)

Figure 50-100-6

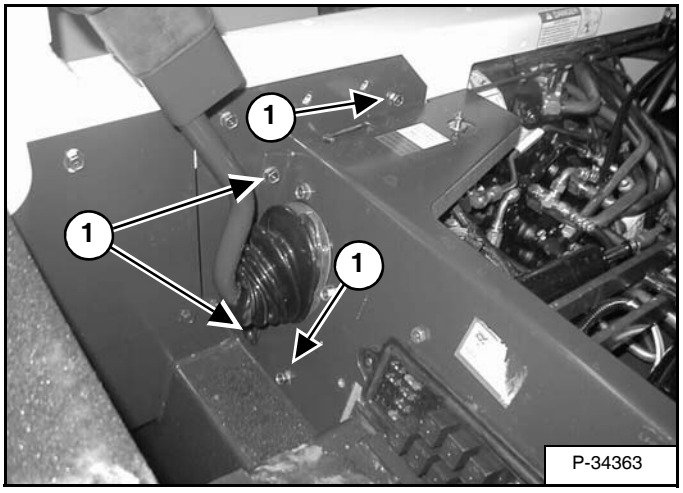


Figure 50-100-7

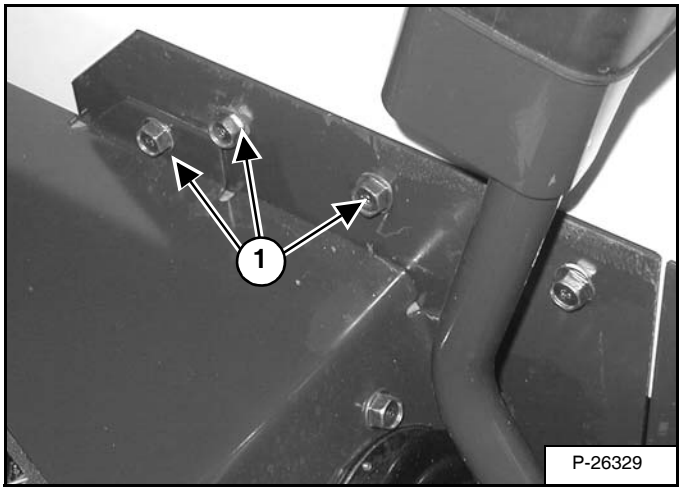
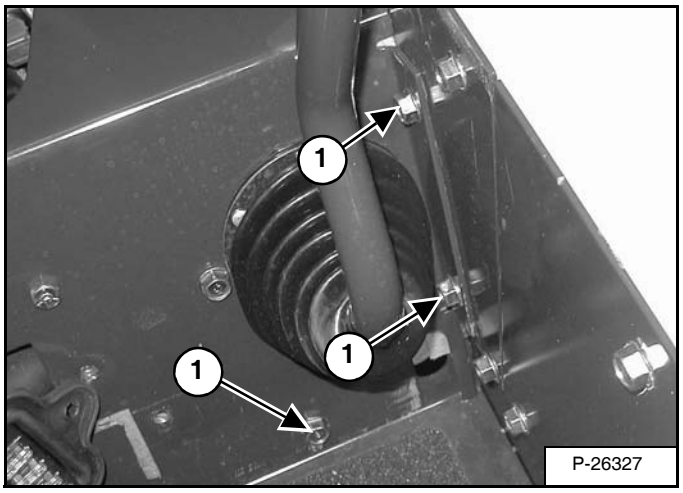


Figure 50-100-8



Remove the control panel mounting bolts (Item 1) **[Figure 50-100-6]**, **[Figure 50-100-7]** & **[Figure 50-100-8]** from both sides of the control panel.

Installation: Tighten the control panel mounting bolts to 15-20 ft.-lb. (20-27 N•m) torque.

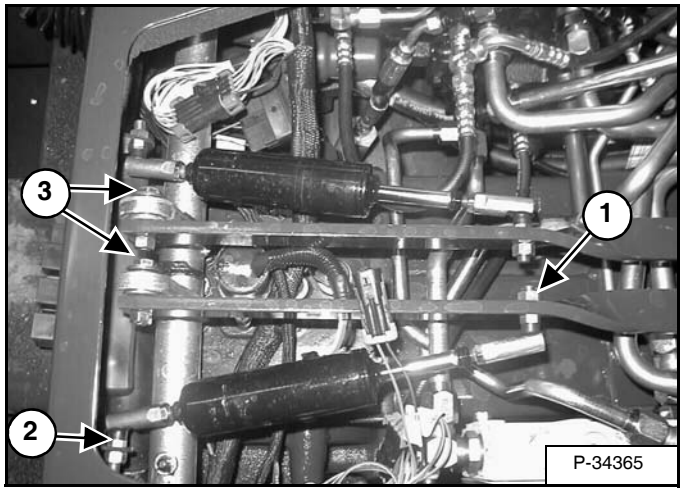
Remove the control panel from the loader.

Reverse the removal procedure to install the control panel.

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Shock Removal And Installation

Figure 50-100-9



Remove the mounting nut (Item 1) **[Figure 50-100-9]** from the end of the shock connected to the steering linkage.

Remove the mounting nut (Item 2) **[Figure 50-100-9]** from the other end of the shock connected to the bracket on the control panel.

Installation: Tighten the mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

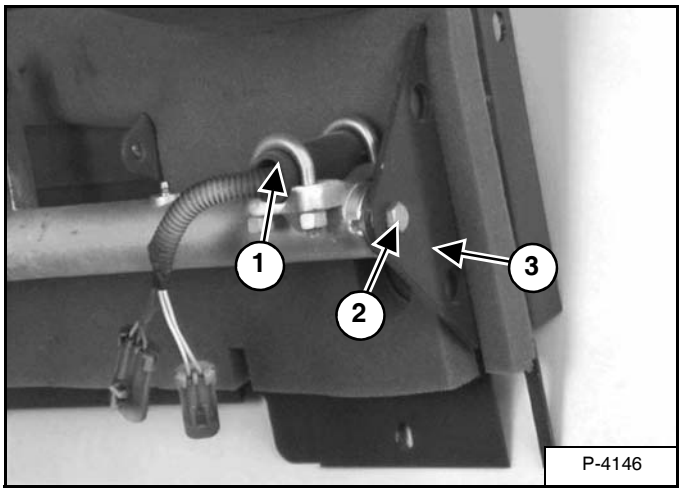
Shaft Removal And Installation

NOTE: The steering shaft can be removed without removing the control panel from the loader. Photo [Figure 50-100-10] shows the control panel removed for clarity purpose only.

Remove the steering linkage mounting bolts (Item 3) **[Figure 50-100-9]**.

Remove the steering shock mounting nuts (Item 2) **[Figure 50-100-9]**.

Figure 50-100-10



Remove Control Handle Lever (Item 1) **[Figure 50-100-10]**. (See Control Lever Removal And Installation on Page 50-110-1.)

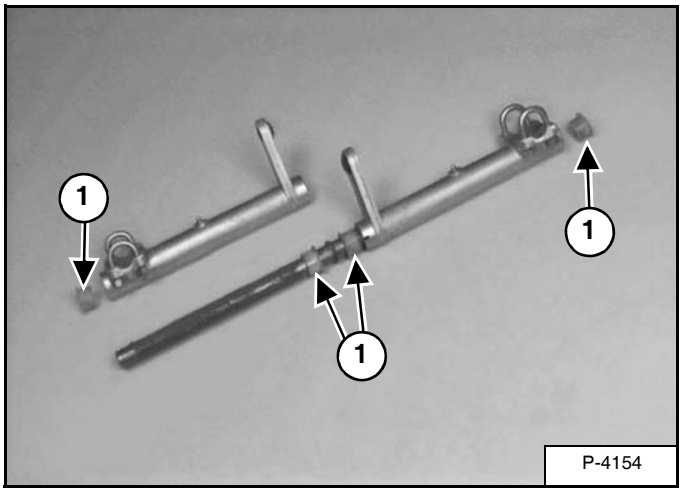
Remove the steering shaft pivot bolt (Item 2) **[Figure 50-100-10]** from both sides of the control panel.

Installation: Tighten the pivot bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the steering shaft from the control panel.

Shaft Disassembly And Assembly

Figure 50-100-11



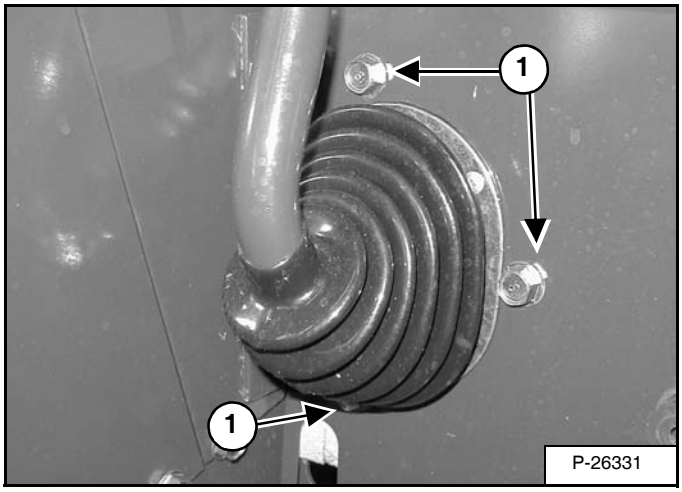
Disassemble the right and left steering shafts from the cross shaft assembly **[Figure 50-100-11]**.

Assembly: Install new nylon bushings (Item 1) **[Figure 50-100-11]** as needed when assembling the steering shaft. Be sure to apply grease on the cross shaft before installing the right and left steering shaft.

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Shaft Disassembly And Assembly (Cont'd)

Figure 50-100-12



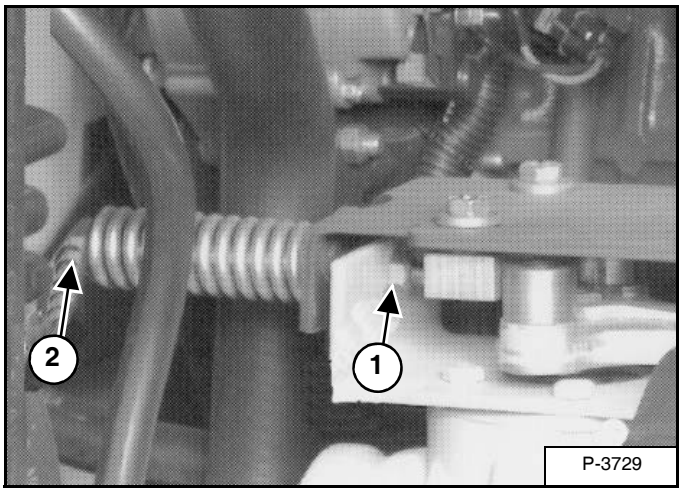
To remove the steering shaft mounting bracket (Item 3) **[Figure 50-100-10]**, remove the three mounting bolts (Item 1) **[Figure 50-100-12]** from the front of the control panel.

Remove the steering shaft mounting bracket from each side of the control panel.

Installation: Tighten the mounting bolts to 15-20 ft.-lb. (20-27 N•m) torque.

Linkage Removal And Installation

Figure 50-100-13

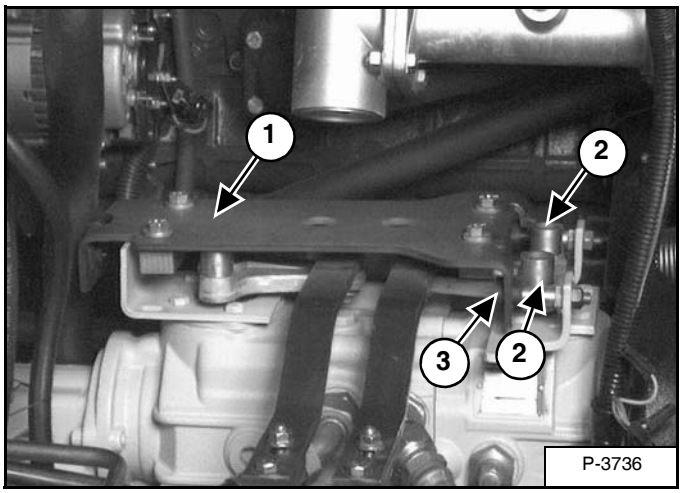


Remove the nut (Item 1) from the end of the centering spring shoulder bolt (Item 2) **[Figure 50-100-13]**.

Remove the shoulder bolt/spring assembly.

Installation: Tighten the centering spring shoulder bolt and a NEW lock nut to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 50-100-14



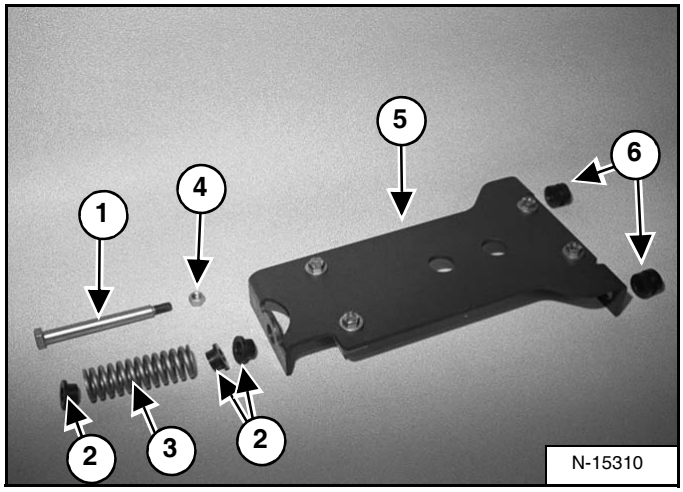
Slide the plate (Item 1) to the right and remove it from the two guide pins (Item 2) **[Figure 50-100-14]**.

NOTE: The two guide bushings (Item 3) will be loose and can fall out of the plate (Item 1) as soon as it is removed from the guide pins (Item 2) [Figure 50-100-14].

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Linkage Removal And Installation (Cont'd)

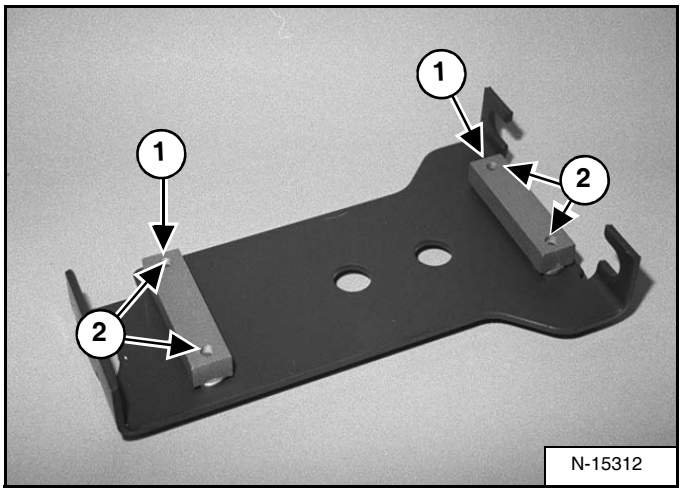
Figure 50-100-15



The centering plate/centering spring assembly consists of the following parts;

ITEM	DESCRIPTION
1	Shoulder Bolt
2	Bushings
3	Spring
4	Lock Nut
5	Centering Plate
6	Guide Bushings

Figure 50-100-16

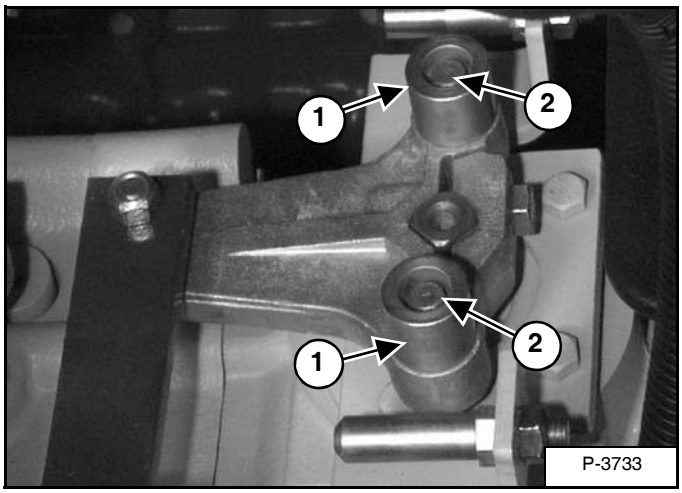


Check the wear on the centering blocks (Item 1) **[Figure 50-100-16]**.

If the centering blocks need replacement, remove the bolts (Item 2) **[Figure 50-100-16]**. Remove the centering blocks.

Installation: Tighten the centering block bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Figure 50-100-17



If the surface of any of the four pintle cams (Item 1) are worn, loosen the bolt (Item 2) **[Figure 50-100-17]** and rotate the cams 1/4 turn.

Tighten the bolts to 45-50 ft.-lb. (62-68 N•m) torque.

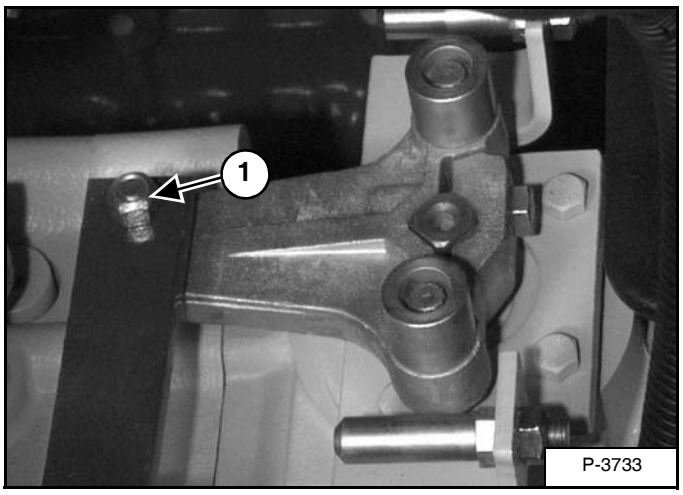
When replacing the old style pintle levers, wear cams and cam bolts, install the latest style parts.

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CONTROL PANEL (NON-ADJUSTABLE PINTLES) (CONT'D)

Linkage Removal And Installation (Cont'd)

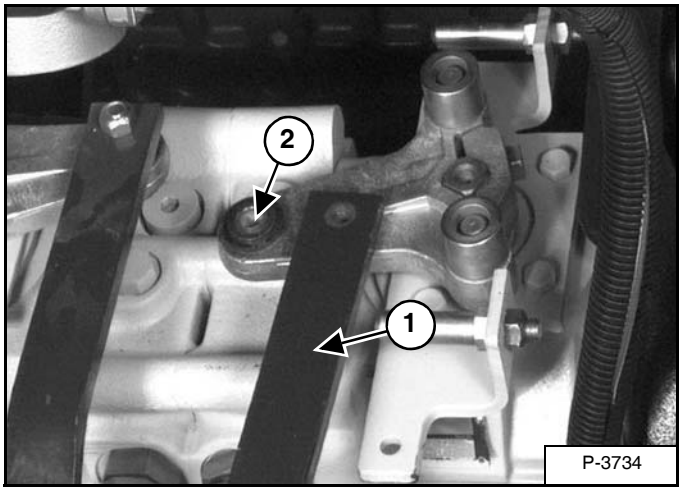
Figure 50-100-18



Remove the nut (Item 1) **[Figure 50-100-18]** from the torsion bushing/linkage bar. The bolt is threaded into the linkage bar, remove the bolt from underneath the pintle lever.

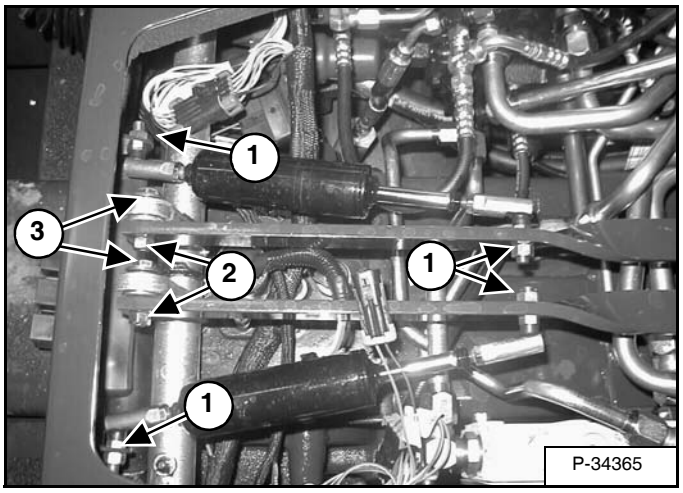
Installation: Tighten the bolt to 11-13 ft.-lb. (21-25 N•m) torque, then tighten the nut to 21-25 ft.-lb. (28-33 N•m) torque.

Figure 50-100-19



Remove the linkage bar (Item 1) and remove the torsion bushing (Item 2) **[Figure 50-100-19]**.

Figure 50-100-20



Remove the nuts (Item 1) **[Figure 50-100-20]** from both shock absorber ball joint ends.

Remove the shock absorbers.

Installation: Tighten the nuts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the nuts (Item 2) from the linkage bar mounting bolt. The bolts (Item 3) are threaded into the linkage bars, remove the bolts (Item 3) **[Figure 50-100-20]**.

The torsion bushings can now be removed from the steering bell cranks.

Installation: Tighten the bolts to 11-13 ft.-lb. (21-25 N•m) torque, then tighten the nuts to 21-25 ft.-lb. (28-33 N•m) torque.

The linkage and the centering plate must be readjusted for neutral after the components have been reassembled. (See Page 50-100-12 for the neutral adjustment procedure.)

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Linkage Adjustment

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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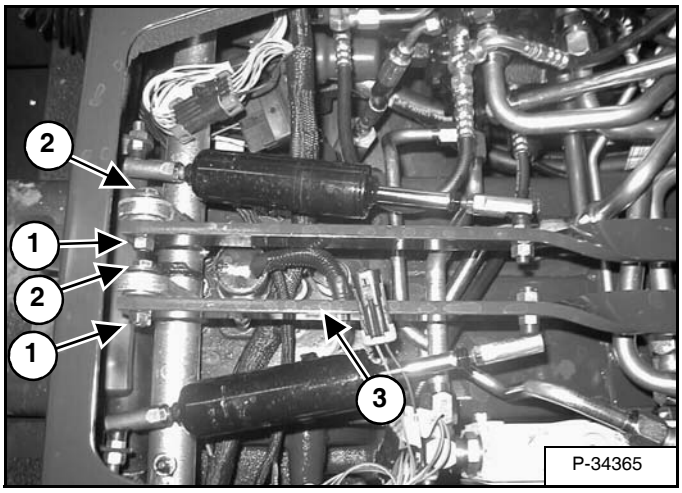
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

⚠ WARNING

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

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Figure 50-100-21



Lift and block the loader. (See Procedure on Page 10-10-1.)

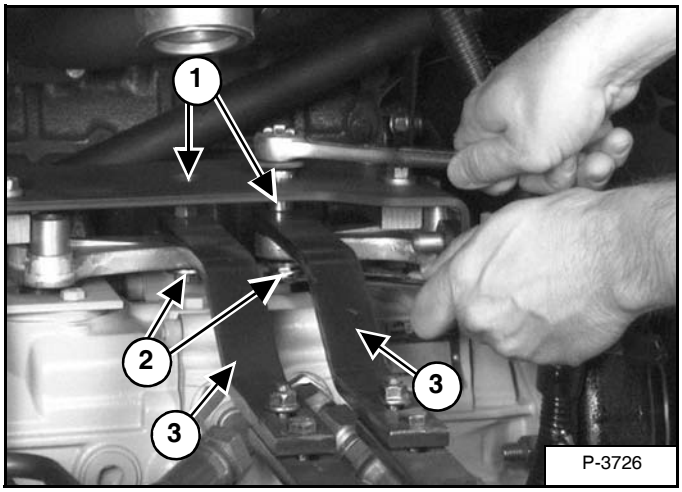
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Connect the remote start tool (MEL1429). (See Procedure on Page 10-60-1.)

Pre-load tension in the torsion bushings must be removed before adjusting the steering linkage.

Loosen the nut (Item 1) 3 to 4 turns, then loosen the bolt (Item 2). The bolt (Item 2) is threaded into the linkage bar (Item 3). The bolt (Item 2) **[Figure 50-100-21]** must be loosened enough to allow the torsion bushing to turn freely between the steering bellcrank and the linkage bar.

Figure 50-100-22



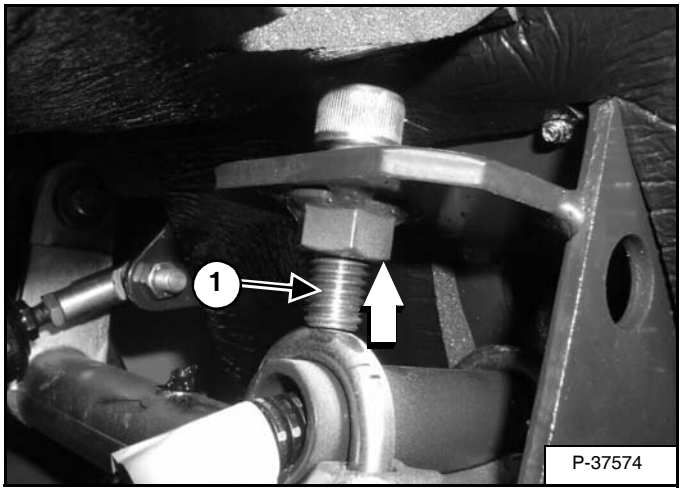
Loosen the nut (Item 1) 3 to 4 turns, then loosen the bolt (Item 2). The bolt (Item 2) is threaded into the linkage bar (Item 3). The bolt (Item 2) **[Figure 50-100-22]** must be loosened enough to allow the torsion bushing to turn freely between the pintle arm and the linkage bar.

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CONTROL PANEL (NON-ADJUSTABLE PINTLES) (CONT'D)

Linkage Adjustment (Cont'd)

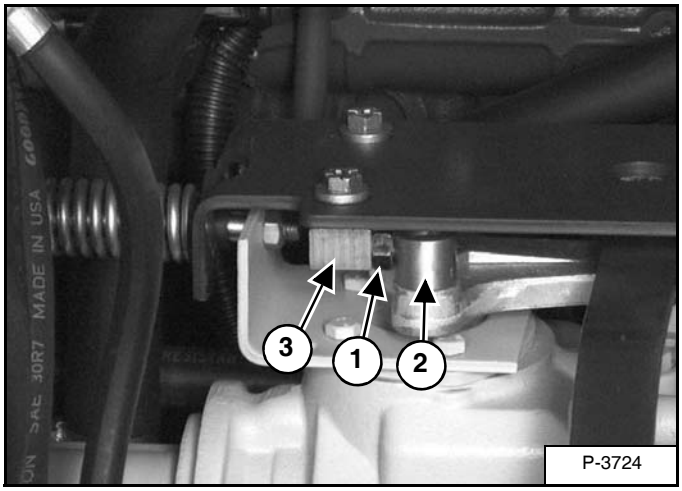
Figure 50-100-23



Remove access plug from the top of the control valve.

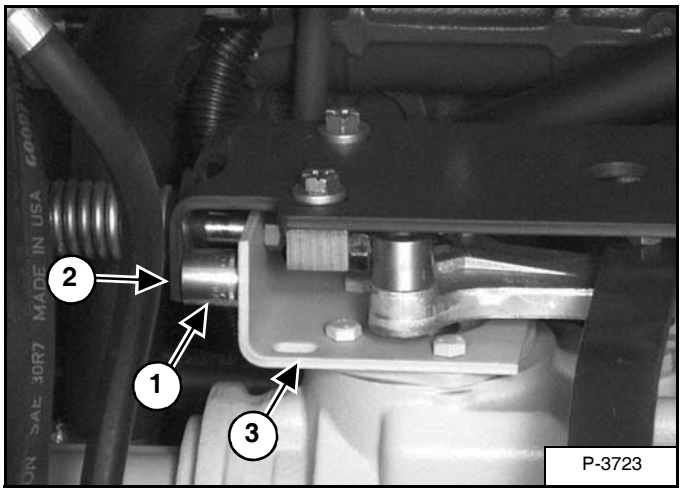
Turn the control lever drift adjustment bolts (Item 1) **[Figure 50-100-23]** (one on each control lever) out until it is flush with the bottom of the nut.

Figure 50-100-24



Move the right side steering lever to the rear and install a 3/8 inch (10 mm) thick spacer (Item 1) between the pintle arm cam (Item 2) and the centering block (Item 3) **[Figure 50-100-24]**.

Figure 50-100-25

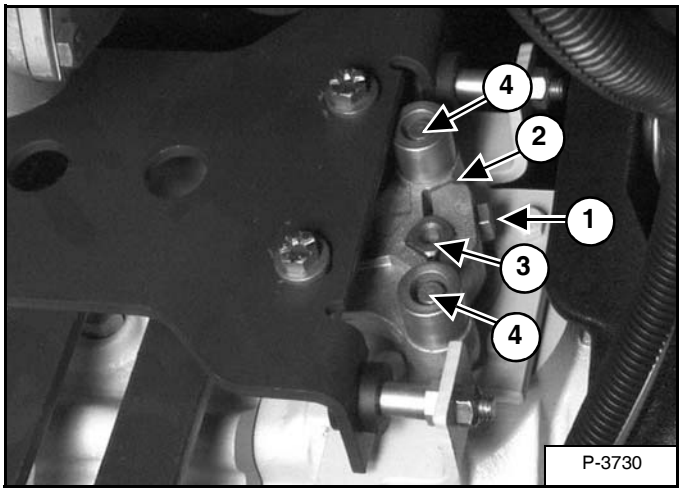


Move the right side steering lever forward and install a 15/16 inch (24 mm) thick spacer (Item 1) between the center plate (Item 2) and the mounting plate (Item 3) **[Figure 50-100-25]**.

This will allow the pintle arms to move freely while adjusting the steering linkage for full forward travel speed.

Remove the 3/8 inch (10 mm) thick spacer (Item 1) **[Figure 50-100-25]**.

Figure 50-100-26

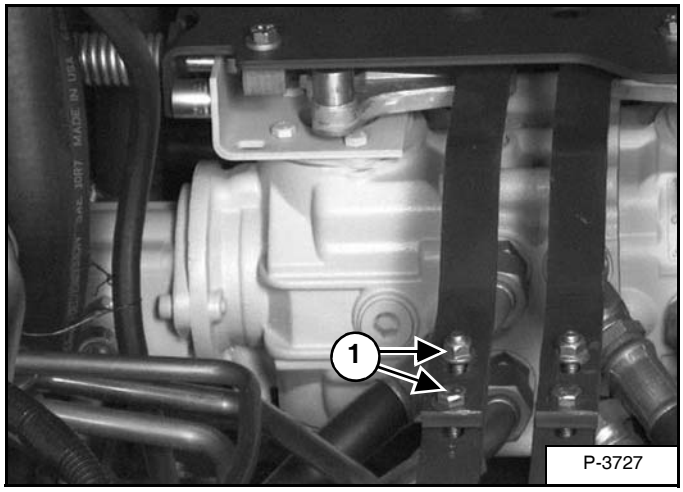


Before adjusting the linkage, check that the pintle arm mounting bolt (Item 1) is tight, 25-28 ft.-lb. (34-38 N•m) torque and that there is no play between the pintle arm (Item 2) and the square pump shaft (Item 3). Also check that the cam mounting bolts (Item 4) **[Figure 50-100-26]** are tight, 45-50 ft.-lb. (62-68 N•m) torque.

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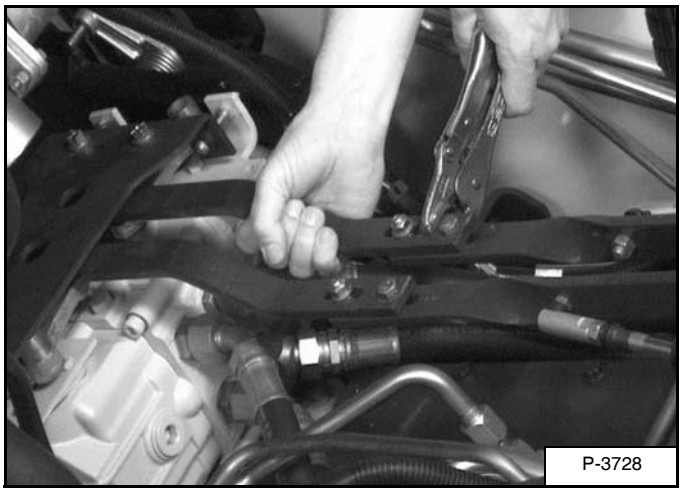
Linkage Adjustment (Cont'd)

Figure 50-100-27



Loosen the two bolts and nuts (Item 1) **[Figure 50-100-27]** on each steering linkage bar.

Figure 50-100-28



Move the left control lever to the full forward position, then pull forward on the left rear linkage bar until the pintle arm is rotated to the front as far as possible **[Figure 50-100-28]**. Use a locking plier and clamp the two linkage bars together.

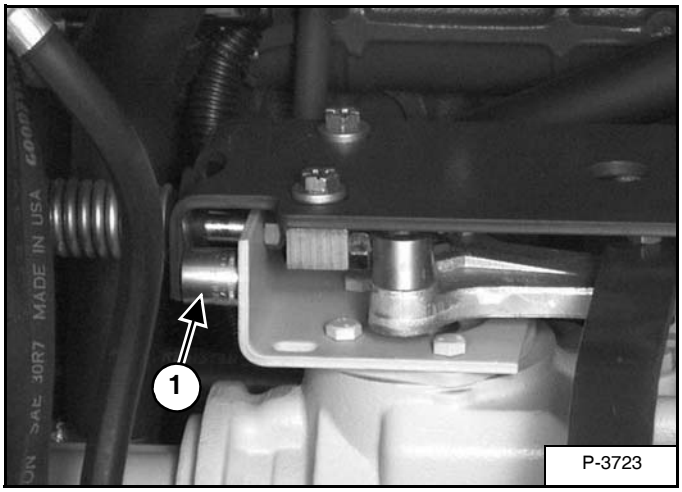
Installation: Tighten the nuts and bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Check the lever movement to make sure that the pintle arm and the control lever are both at full stroke at the same time. This will allow for maximum forward speed.

Repeat the procedure for the right side linkage.

After both sides of the linkage have been adjusted, the feel of both levers at full stroke should be the same. Readjust the linkage if necessary.

Figure 50-100-29



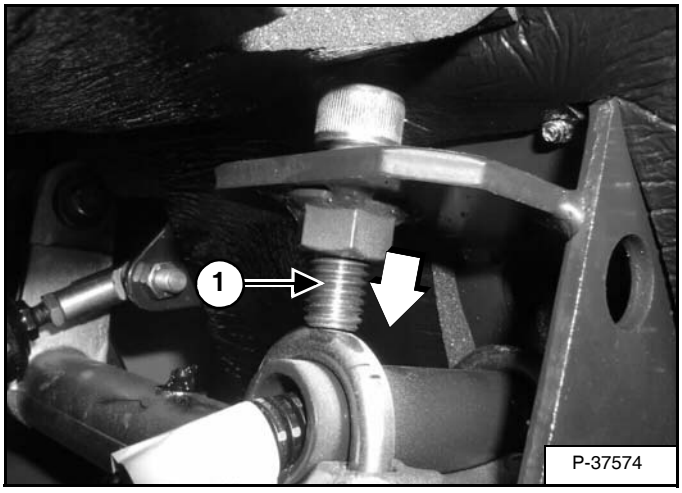
Remove the spacer (Item 1) **[Figure 50-100-29]**.

Disconnect the remote start tool.

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Linkage Adjustment (Cont'd)

Figure 50-100-30



Push the control lever to full stroke and turn drift adjustment bolt (Item 1) **[Figure 50-100-30]** in until it touches the U-bolt holding the control lever.

Repeat steps on the other control lever.

Drive the loader forward and check for drift.

The traditional benchmark for drift is less than 10 ft. of “drift” in 100 ft. of travel distance.

If the drift is excessive to the left, turn the right adjustment bolt (Item 1) **[Figure 50-100-30]** in.

If the drift is excessive to the right, turn the left adjustment bolt in.

NOTE: When using the drift adjustment bolts, only adjust one bolt for each test drive.

In addition only move each bolt a maximum of one turn for each test drive. This will help prevent over correction and excess reduction in travel speed.

Drift adjustment is for forward travel only.

Adjust the drift to an acceptable level.

Re-install the plug in the drift bolt access hole after adjustment.

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CONTROL PANEL (NON-ADJUSTABLE PINTLES) (CONT'D)

Linkage Neutral Adjustment

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

MEL1563 - Remote Start Tool Kit

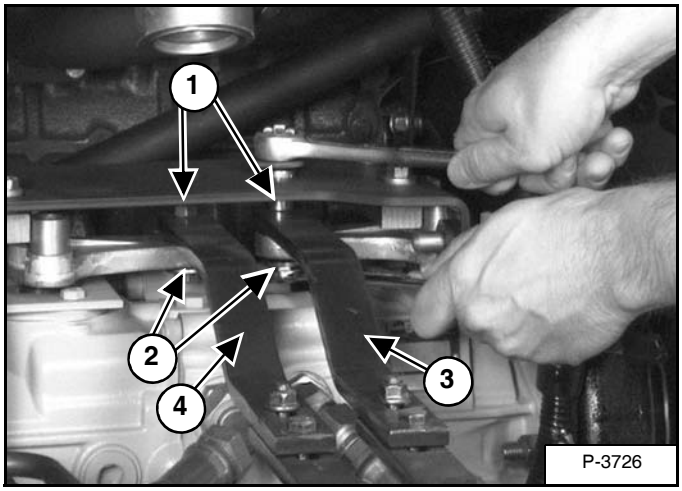
Connect the remote start tool to the engine harness. (See Procedure on Page 10-60-1.)

⚠ WARNING

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

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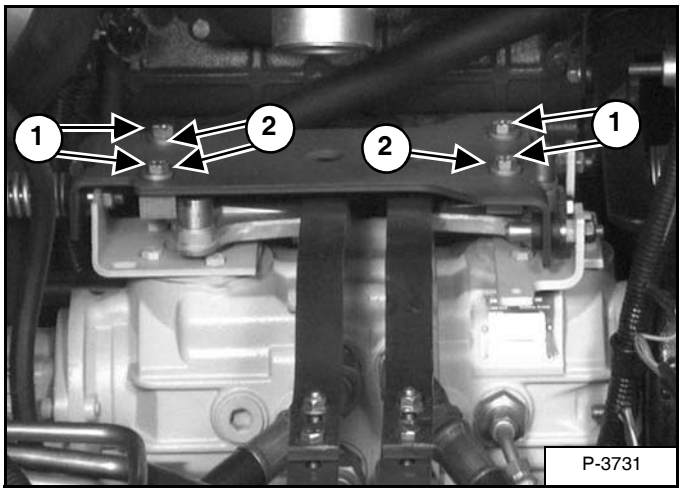
Figure 50-100-31



Loosen the nut (Item 1) a couple of turns, then loosen the bolt (Item 2). The bolt (Item 2) is threaded into the linkage bars (Items 3 & 4) **[Figure 50-100-31]**.

The bolt (Item 2) **[Figure 50-100-31]** must be loose enough to allow the torsion bushing to turn freely between the pintle arm and the linkage bar.

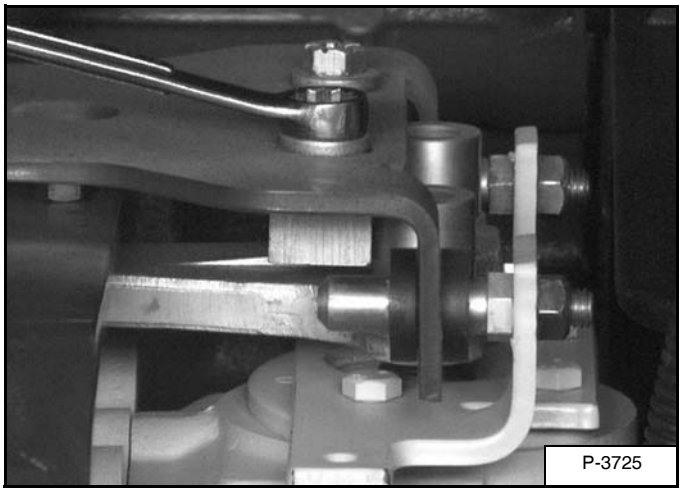
Figure 50-100-32



Loosen the four bolts (Item 1) **[Figure 50-100-32]** holding the two centering blocks. Move the right hand centering block to the right as far as possible.

NOTE: Bolt holes (Item 2) [Figure 50-100-32] are slotted for pintle arm centering adjustment.

Figure 50-100-33



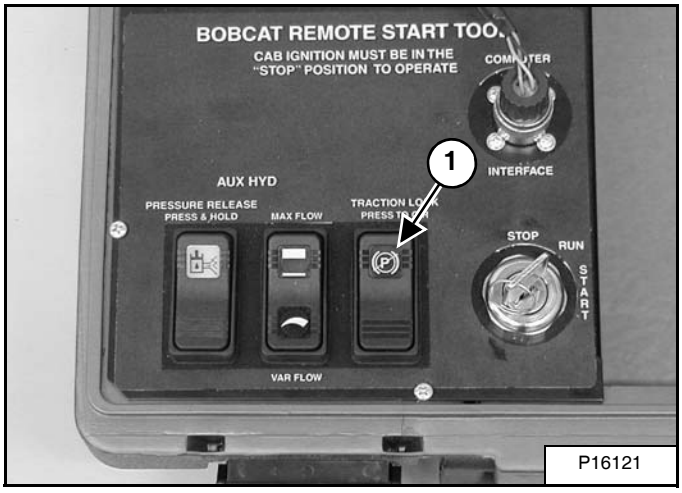
Adjust the left centering block first **[Figure 50-100-33]**.

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CONTROL PANEL (NON-ADJUSTABLE PINTLES) (CONT'D)

Linkage Neutral Adjustment (Cont'd)

Figure 50-100-34



Start the engine and run at high RPM.

Move the traction lock override switch (Item 1) **[Figure 50-100-34]** to the OFF position so the traction function is unlocked. The wheels are now able to turn.

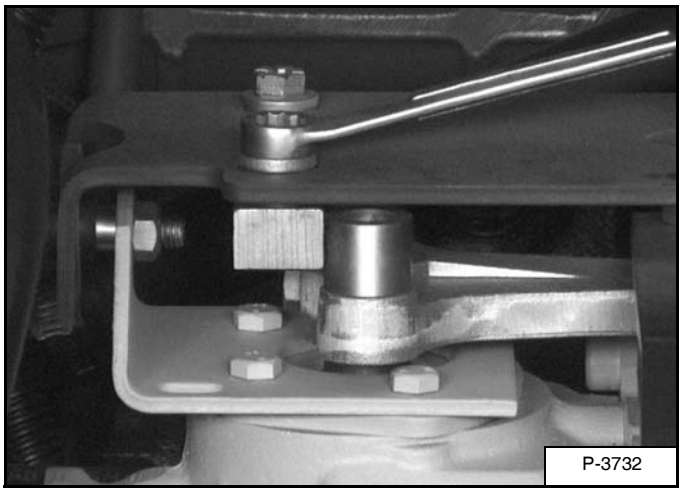
Move the left control lever until the tires do not turn (neutral position).

Move the left centering block to the left until it contacts both pintle cams and the control lever is still in the neutral position **[Figure 50-100-33]**.

Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

NOTE: If the centering blocks are worn, they can be removed and rotated 180 degrees and reinstalled. If the cams are worn, they can be loosened and rotated 90 degrees and reinstalled.

Figure 50-100-35



Adjust the right centering block **[Figure 50-100-35]**.

Move the right control lever until the tires do not turn (neutral position).

Move the right centering block to the left until it contacts both pintle cams and the control lever is still in the neutral position **[Figure 50-100-35]**.

Tighten the bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Test both levers by moving them backward and forward and letting them return to neutral by the return spring force.

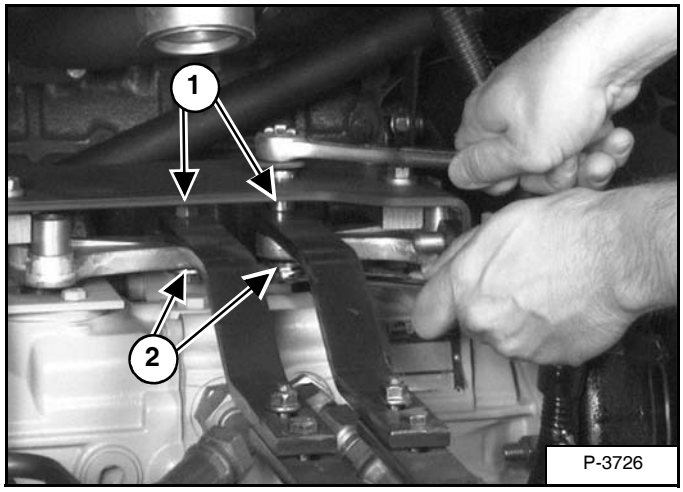
If the levers do not return to neutral and the tires do not come to a complete stop, repeat the adjustment procedure again.

Stop the engine.

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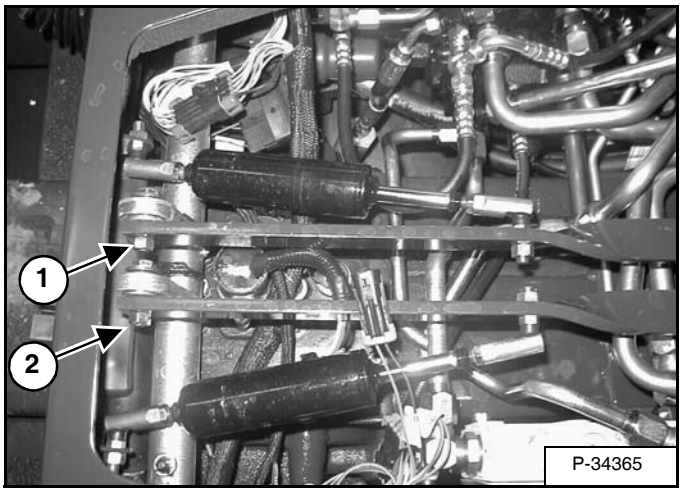
Linkage Neutral Adjustment (Cont'd)

Figure 50-100-36



Tighten the two bolts (Item 1) to 11-13 ft.-lb. (15-17 N•m) torque, then tighten the two nuts (Item 2) **[Figure 50-100-36]** to 21-25 ft.-lb. (28-33 N•m) torque.

Figure 50-100-37



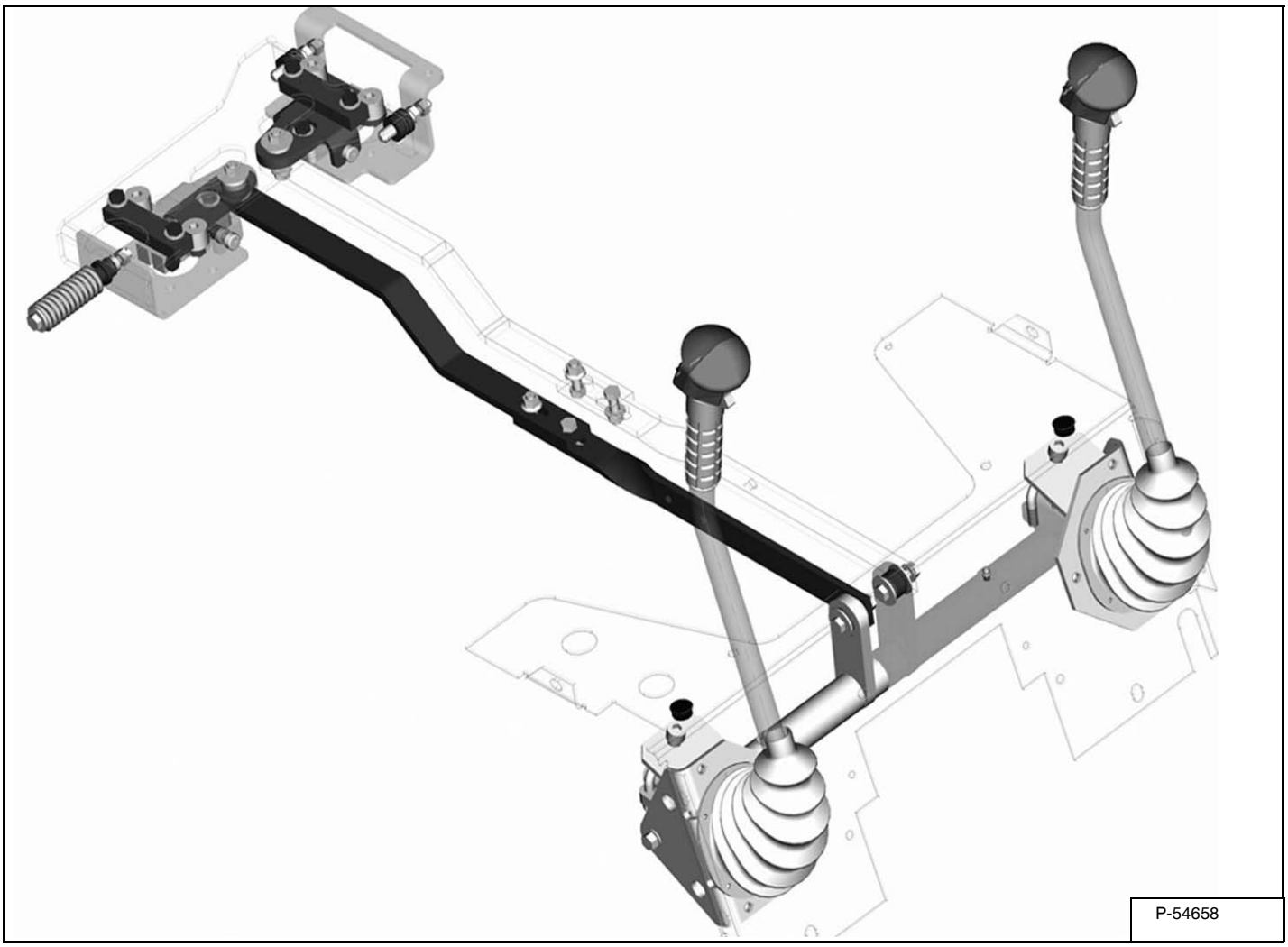
Tighten the two bolts to 11-13 ft.-lb. (15-17 N•m) torque, then tighten the two nuts to 21-25 ft.-lb. (28-33 N•m) torque at the steering cross shaft (Items 1 & 2) **[Figure 50-100-37]**.

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CONTROL PANEL (ADJUSTABLE PINTLES)

Description

Figure 50-100-1



The steering system **[Figure 50-101-1]** consists of independent steering levers the operator uses to provide steering input to the loader.

The steering levers are attached to pivoting bellcranks that pivot on a steering shaft and plastic bushings. The bellcranks have grease fittings.

The forward travel is adjusted by drift adjustment bolts.

The bellcranks are attached to steering linkage bars with rubber torsion bushings pressed into the bellcranks. Bellcranks mount to the control panel.

Steering linkage bars are a two-piece design. Steering linkage bars are adjustable in length for “full travel adjustment”.

Steering linkage bars attach to the pintle arms where a rubber torsion bushing is pressed into the pintle arms.

Pintle arms are of a two-piece design that allow easy adjustment of the neutral or “creep”. Earlier designs use a “spring return” adjustment, later designs use a “thread return” adjustment.

The steering system returns the levers to their starting position by means of the centering spring and the returning force of the torsion bushings.

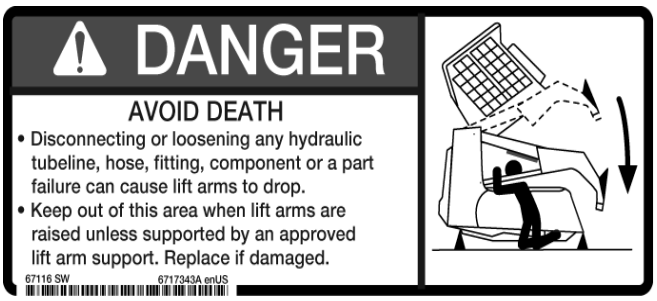
NOTE: Torsion bushings need to be replaced if torn or rotating in the housing. Loosen torsion bushing bolts slightly before adjustments are made. Do not fully tighten torsion bushing bolts again until all steering adjustments have been made first.

Sequence of steering adjustments:

1. Set neutral of pintle arms, “creep”
2. Set full travel at steering linkage bars
3. Set drift at drift adjustment bolts

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Removal and Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

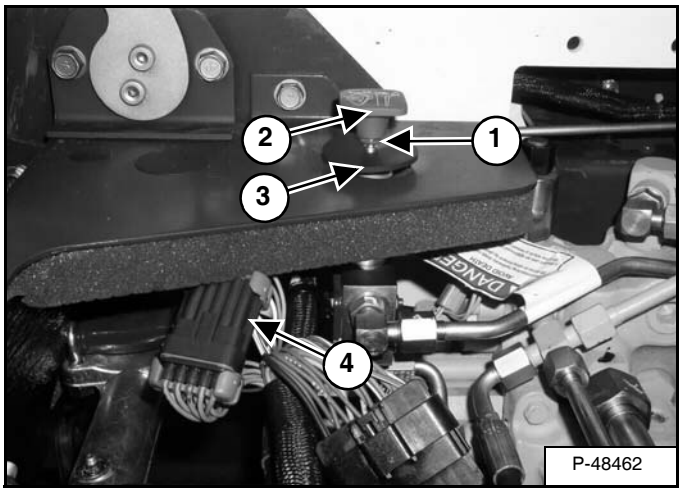
W-2059-0598

WARNING

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

W-2017-0286

Figure 50-101-2



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

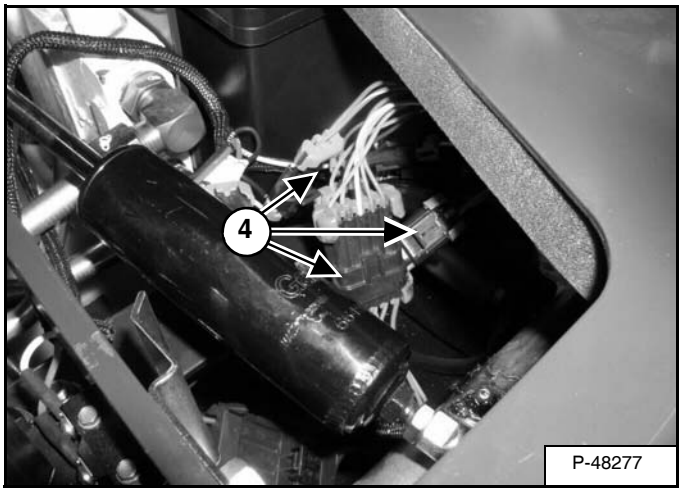
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Loosen the jam nut (Item 1) from the by-pass control knob (Item 2) **[Figure 50-101-2]**.

Remove the control knob (Item 2), jam nut (Item 1) and rubber washer (Item 3) **[Figure 50-101-2]**.

Figure 50-101-3

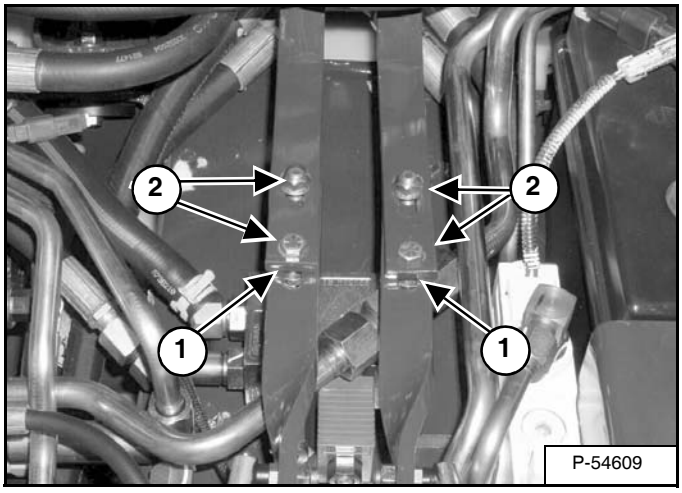


Disconnect the control harness connectors (Item 4) **[Figure 50-101-2]** & **[Figure 50-101-3]** from the control levers.

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Removal and Installation (Cont'd)

Figure 50-101-4

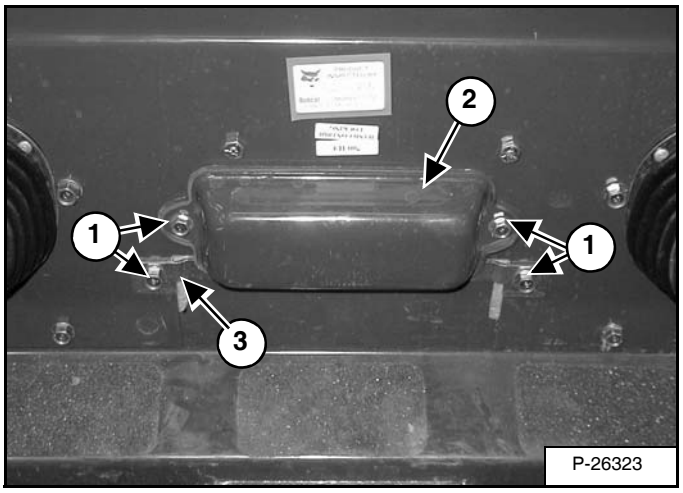


Scribe a mark across the top of the steering linkage bars (Item 1) **[Figure 50-101-4]** which are connected to the steering shaft on the control panel.

Remove the four steering linkage mounting bolts (Item 2) **[Figure 50-101-4]**.

Installation: Align the marks on the steering linkage bars. Tighten the steering linkage mounting bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

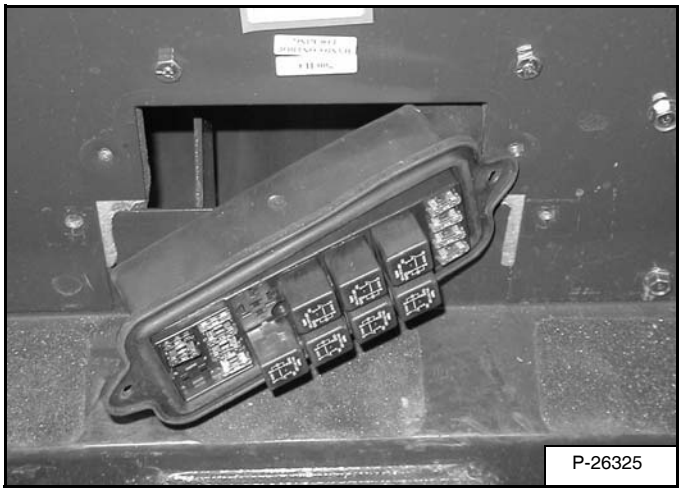
Figure 50-101-5



Remove the fuse/relay mounting bolts (Item 1) **[Figure 50-101-5]**.

Remove the fuse/relay cover (Item 2) and fuse/relay block retaining bracket (Item 3) **[Figure 50-101-5]**.

Figure 50-101-6



Remove the fuse/relay block **[Figure 50-101-6]**.

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Removal and Installation (Cont'd)

Figure 50-101-7

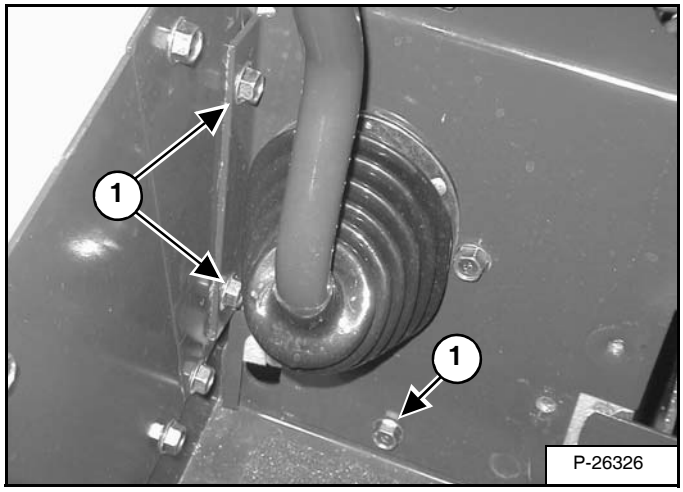


Figure 50-101-8

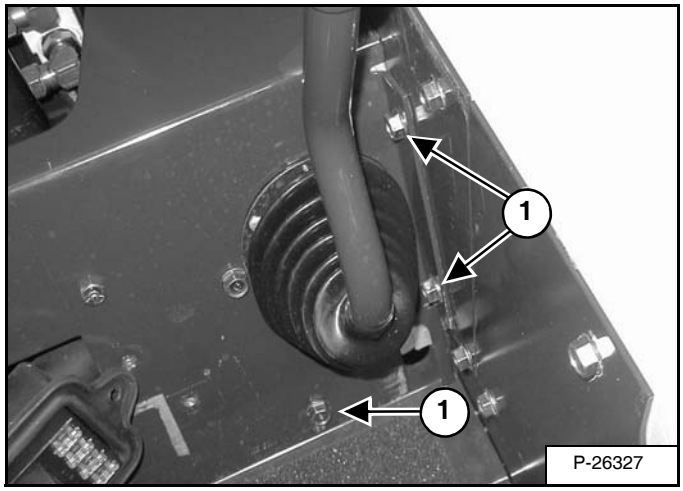
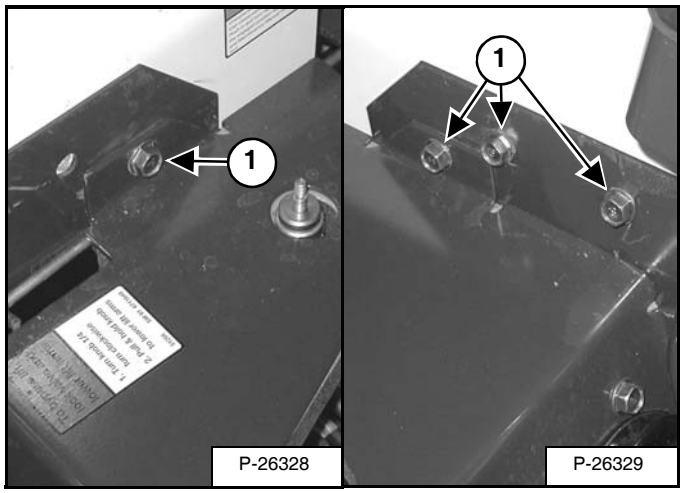


Figure 50-101-9



Remove the control panel mounting bolts (Item 1) **[Figure 50-101-7]**, **[Figure 50-101-8]** & **[Figure 50-101-9]** from both sides of the control panel.

Installation: Tighten the control panel mounting bolts to 15-20 ft.-lb. (20-27 N•m) torque.

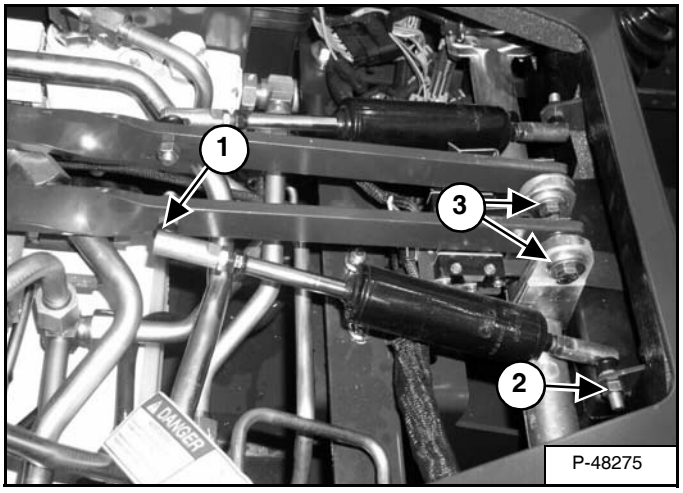
Remove the control panel from the loader.

Reverse the removal procedure to install the control panel.

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Shock Removal And Installation

Figure 50-101-10



Remove the mounting nut (Item 1) **[Figure 50-101-10]** from the end of the shock connected to the steering linkage.

Remove the mounting nut (Item 2) **[Figure 50-101-10]** from the other end of the shock connected to the bracket on the control panel.

Installation: Tighten the mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

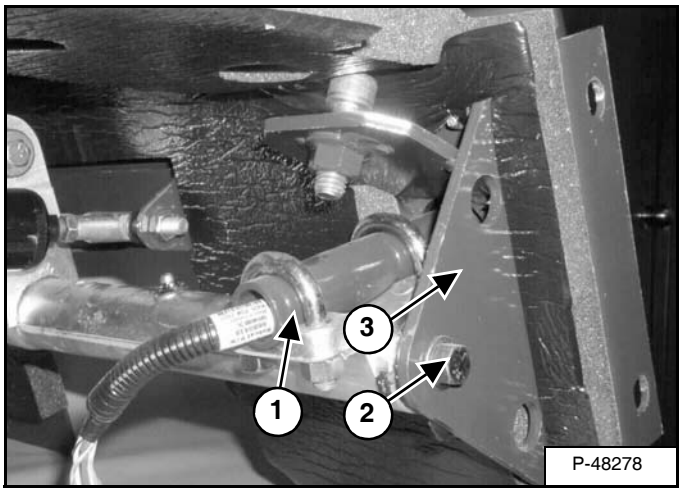
Shaft Removal And Installation

NOTE: The steering shaft can be removed without removing the control panel from the loader. Photo [Figure 50-101-11] shows the control panel removed for clarity purpose only.

Remove the steering linkage mounting bolts (Item 3) **[Figure 50-101-10]**.

Remove the steering shock mounting nuts (Item 2) **[Figure 50-101-10]**.

Figure 50-101-11



Remove Control Handle Lever (Item 1) **[Figure 50-101-11]**. (See Control Lever Removal And Installation on Page 50-110-1.)

Remove the steering shaft pivot bolt (Item 2) **[Figure 50-101-11]** from both sides of the control panel.

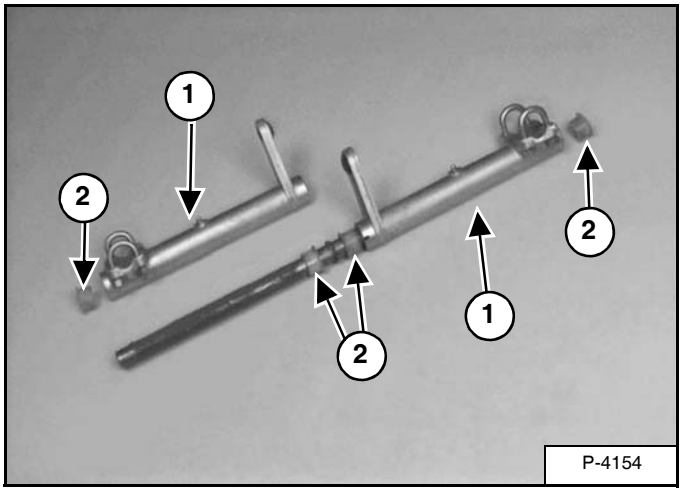
Installation: Tighten the pivot bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the steering shaft from the control panel.

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Shaft Disassembly And Assembly

Figure 50-101-12

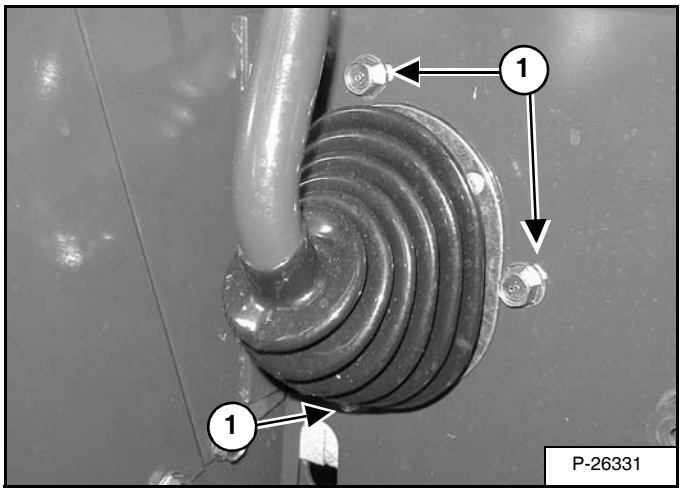


Disassemble the right and left steering bellcranks (Item 1) from the cross shaft assembly **[Figure 50-101-12]**.

Assembly: Install new nylon bushings (Item 2) **[Figure 50-101-12]** as needed when assembling the steering shaft. Be sure to apply grease on the cross shaft before installing the right and left bellcranks.

NOTE: The bellcranks should pivot freely on the cross shaft when assembled correctly.

Figure 50-101-13



To remove the steering shaft mounting bracket (Item 3) **[Figure 50-101-11]**, remove the three mounting bolts (Item 1) **[Figure 50-101-13]** from the front of the control panel.

Remove the steering shaft mounting bracket.

Installation: Tighten the mounting bolts to 15-20 ft.-lb. (20-27 N•m) torque.

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Linkage Removal And Installation

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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⚠ WARNING

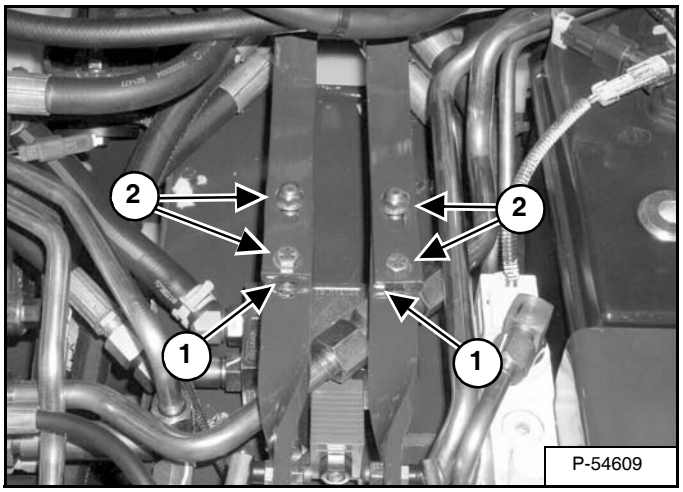
Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0286

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Figure 50-101-14



Scribe a mark across the top of the steering linkage bars (Item 1) **[Figure 50-101-14]** which are connected to the steering shaft on the control panel.

Remove the four steering linkage mounting bolts (Item 2) **[Figure 50-101-14]**.

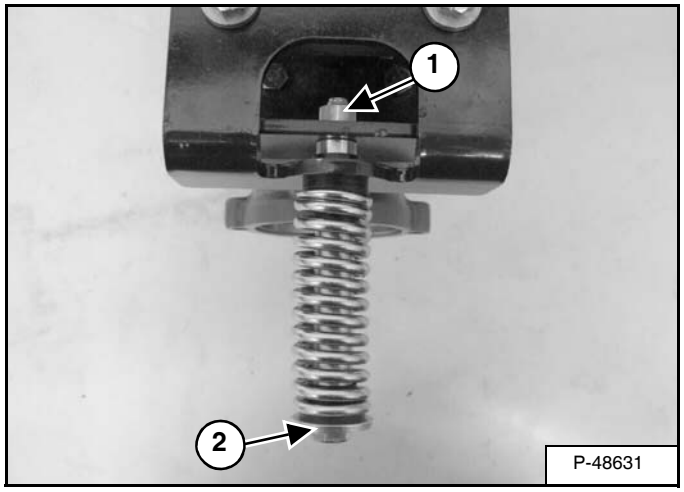
Installation: Align the marks on the steering linkage bars. Tighten the steering linkage mounting bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

NOTE: After removal and installation of the linkage, the linkage neutral adjustment procedure must be performed. See Page 50-101-13 for Linkage Neutral Adjustment procedure.

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Linkage Removal And Installation (Cont'd)

Figure 50-101-15

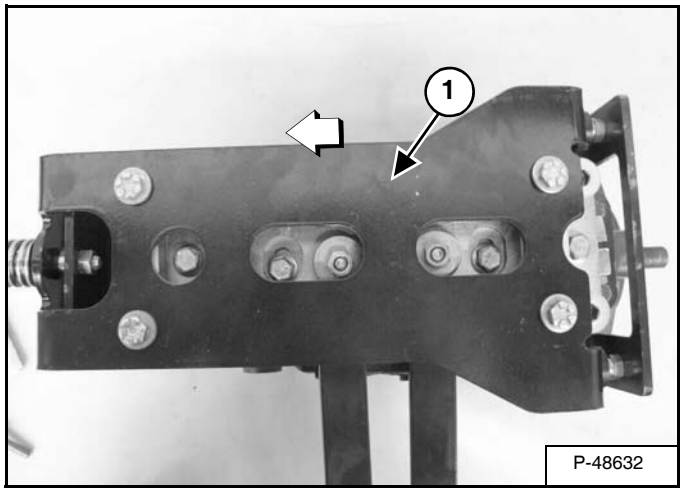


Remove the nut (Item 1) from the end of the centering spring shoulder bolt (Item 2) **[Figure 50-101-15]**.

Remove the bolt/spring assembly.

Installation: Tighten the centering spring bolt and a **NEW** lock nut to 25-28 ft.-lb. (34-38 N•m) torque.

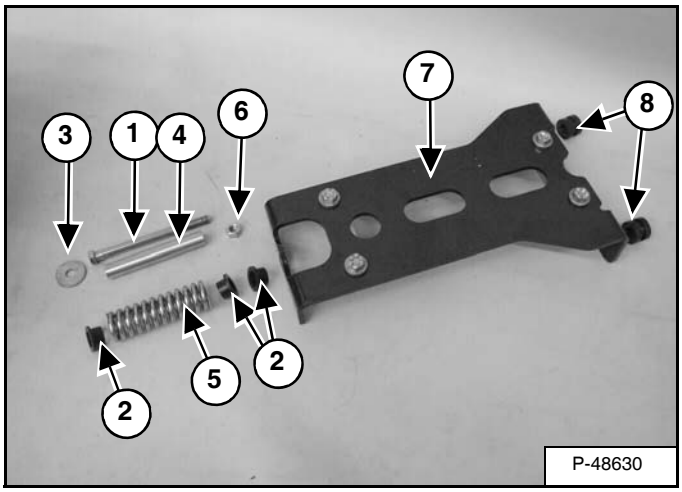
Figure 50-101-16



Slide the centering plate (Item 1) **[Figure 50-101-16]** to the right to remove it from the hydrostatic pumps.

NOTE: Directions are shown and stated as if you were sitting in the operators seat.

Figure 50-101-17



The centering plate/centering spring assembly consists of the following parts:

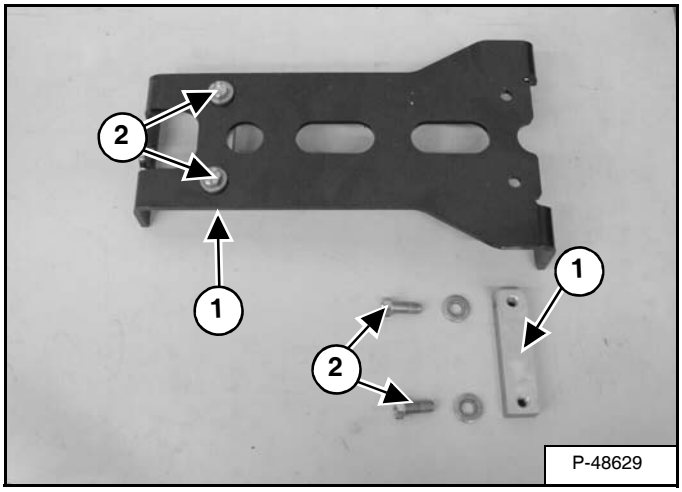
ITEM	DESCRIPTION
1	Bolt
2	Bushings
3	Washer
4	Bushing Spacer
5	Spring
6	Lock Nut
7	Centering Plate
8	Guide Bushings

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CONTROL PANEL (ADJUSTABLE PINTLES) (CONT'D)

Linkage Removal And Installation (Cont'd)

Figure 50-101-18



Check the wear on the centering blocks (Item 1) **[Figure 50-101-18]**.

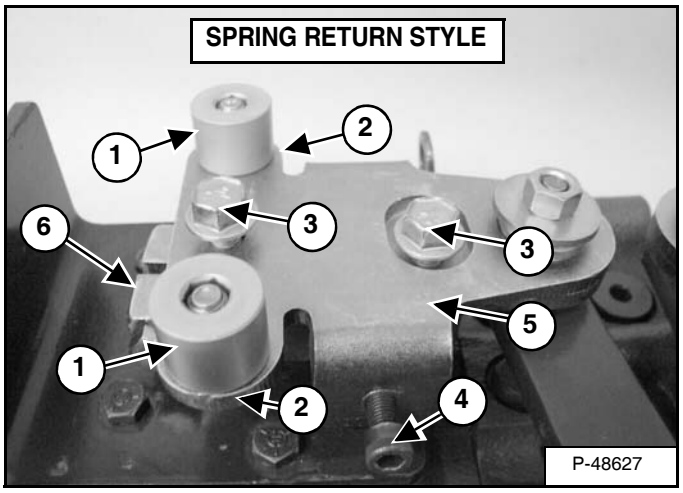
If the centering blocks need replacement, remove the bolts (Item 2) **[Figure 50-101-18]**. Remove the centering blocks.

Installation: Tighten the centering block bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

NOTE: The washers go between the bolts and the centering plate.

NOTE: If the centering blocks are worn, they can be removed and rotated 180 degrees and reinstalled. If the solid cams are worn, they can be loosened and rotated 90 degrees and reinstalled.

Figure 50-101-19



If the surface of any of the four solid pintle cams (Item 1) are worn, loosen the bolt (Item 2) and rotate the cams 1/4 turn **[Figure 50-101-19]**.

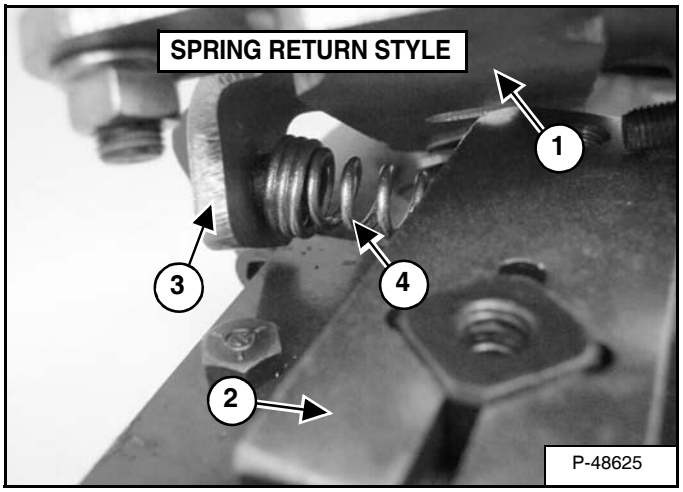
Remove the bolts and washers (Item 3) **[Figure 50-101-19]** from the pintle.

Installation: Tighten the bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

Loosen the creep adjustment bolt (Item 4) **[Figure 50-101-19]**.

Remove the pintle arm (Item 5) from the pintle base. (Item 6) **[Figure 50-101-19]**.

Figure 50-101-20

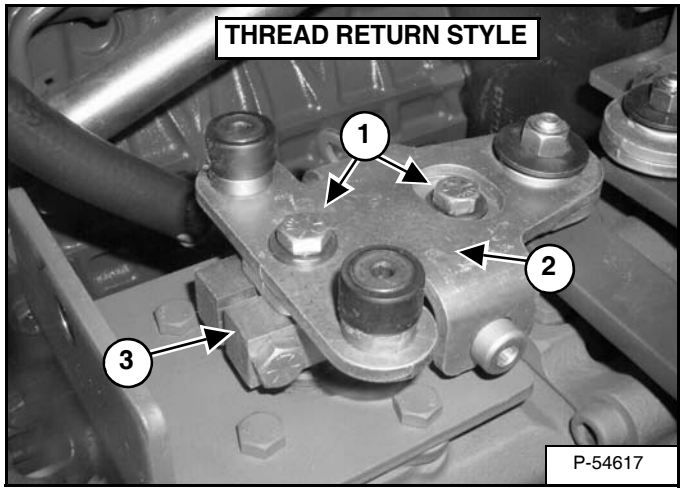


NOTE: When installing the pintle arm (Item 1) onto the pintle base (Item 2) align the rear of pintle arm (engine side) (Item 3) into the spring (Item 4) [Figure 50-101-20]. (Spring Return Style Only)

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Linkage Removal And Installation (Cont'd)

Figure 50-101-21

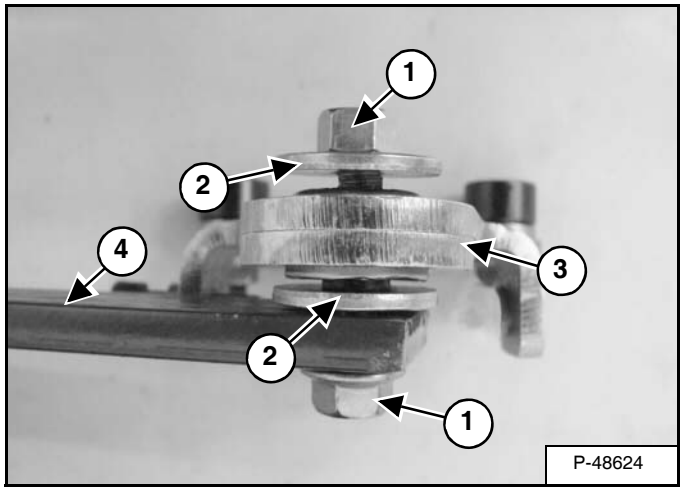


Remove the bolts and washers (Item 1) **[Figure 50-101-21]** from the pintle.

Installation: Tighten the bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

Remove the pintle arm (Item 2) from the pintle base (Item 3) **[Figure 50-101-21]**.

Figure 50-101-22

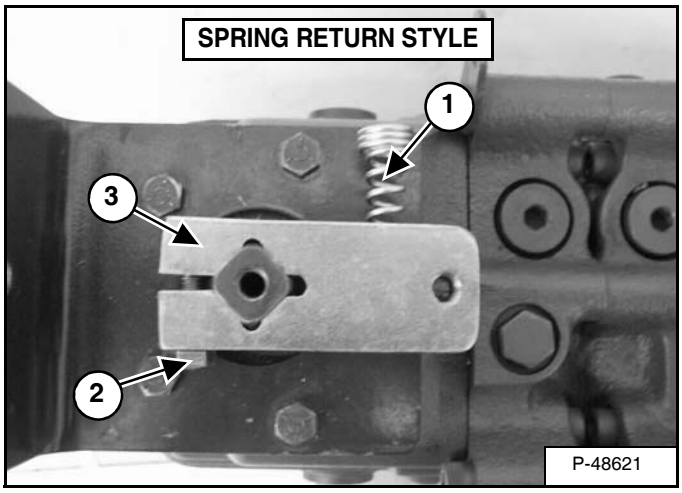


Remove the bolt and nut (Item 1) **[Figure 50-101-22]**.

Inspect the washers (Item 2), pintle arm (Item 3) and the steering control link (Item 4) for damage and replace as needed **[Figure 50-101-22]**.

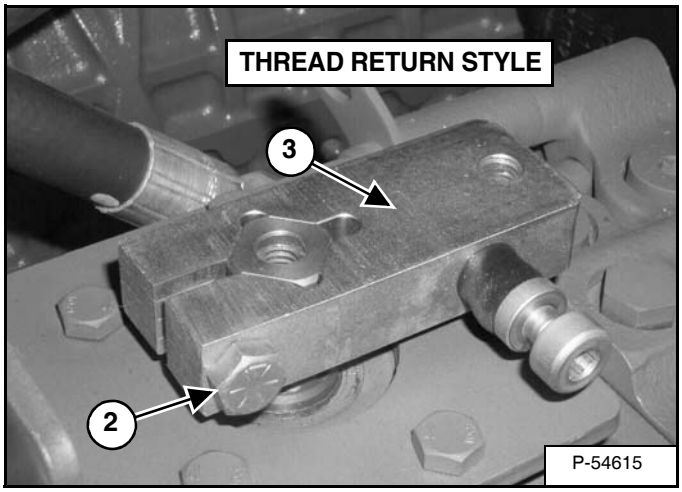
NOTE: The washers (Item 2) [Figure 50-101-22] are hardened, and should only be replaced through Bobcat Parts.

Figure 50-101-23



Remove and inspect the spring (Item 1) **[Figure 50-101-23]**. **Spring return style only.**

Figure 50-101-24

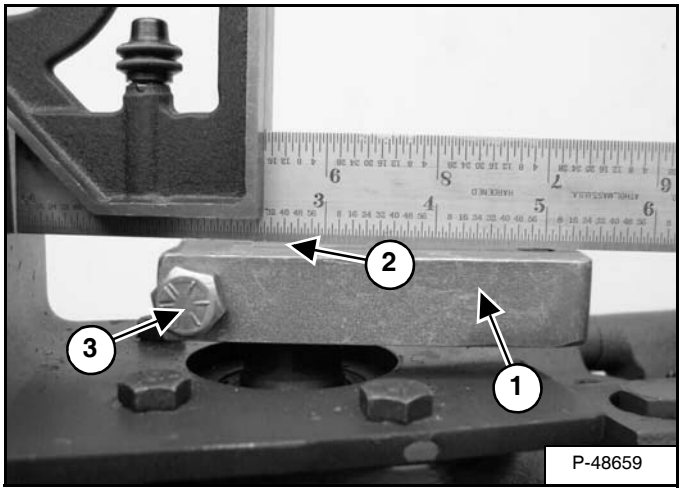


Loosen the bolt (Item 2) and remove the pintle base (Item 3) **[Figure 50-101-23]** and **[Figure 50-101-24]**.

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Linkage Removal And Installation (Cont'd)

Figure 50-101-25



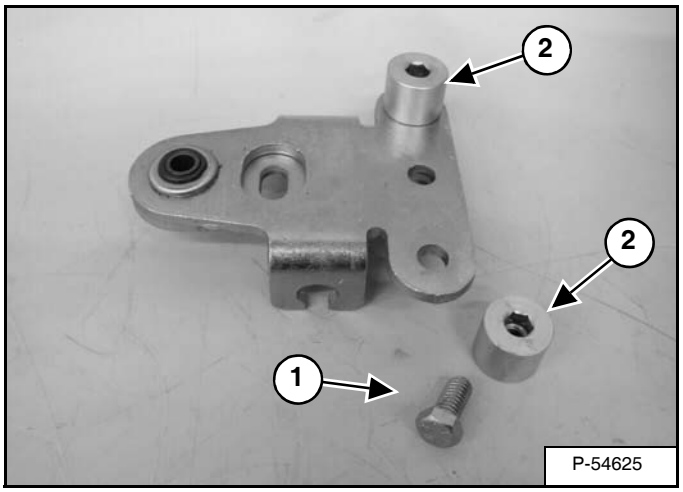
NOTE: When installing the pintle base (Item 1) onto the pump shaft, the cutouts on the pump shaft will not line up with the bolt (Item 3) [Figure 50-101-25].

Installation: Install the pintle base (Item 1) onto the pump shaft (Item 2) **[Figure 50-101-25]**. The top of the pintle base should be level with the top of the pump shaft. Tighten the bolt to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

NOTE: After installing the linkage onto the hydrostatic pumps the linkage neutral adjustment procedure must be performed. See Page 50-101-13 for Linkage Neutral Adjustment procedure.

Pintle Arm Disassembly and Assembly

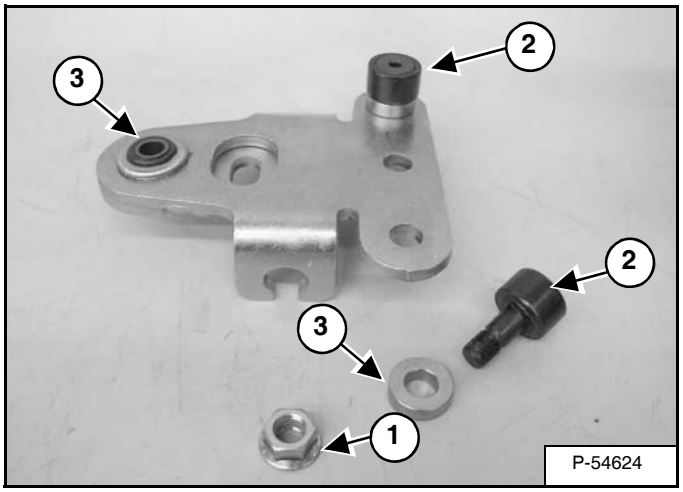
Figure 50-101-26



Remove the bolt (Item 1) from the pintle solid cams (Item 2)_**[Figure 50-101-26]** and inspect the pintle solid cams for damage or excessive wear.

Installation: Tighten the bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

Figure 50-101-27



NOTE: The pintle roller cams (Item 2) [Figure 50-101-27] are used on ACS loaders only.

Remove the nut (Item 1) from the pintle roller cams (Item 2) and inspect the pintle roller cams and washers (Item 3) for damage **[Figure 50-101-27]**.

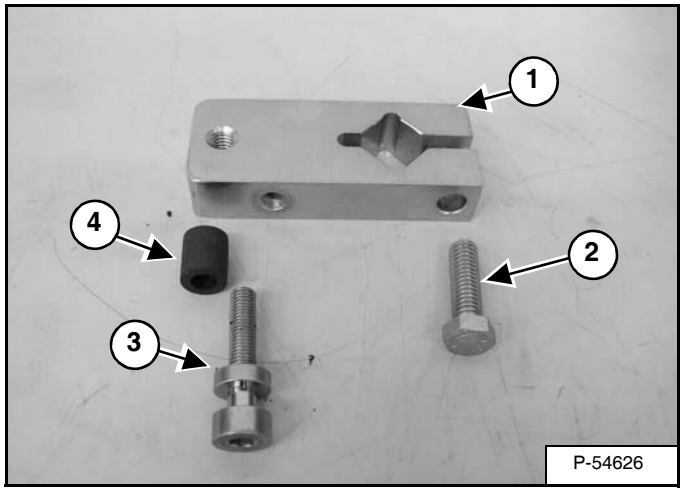
Inspect the torsion bushing (Item 3) **[Figure 50-101-27]** for damage and replace as needed.

Installation: Tighten the nuts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

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Pintle Arm Disassembly and Assembly (Cont'd)

Figure 50-101-28



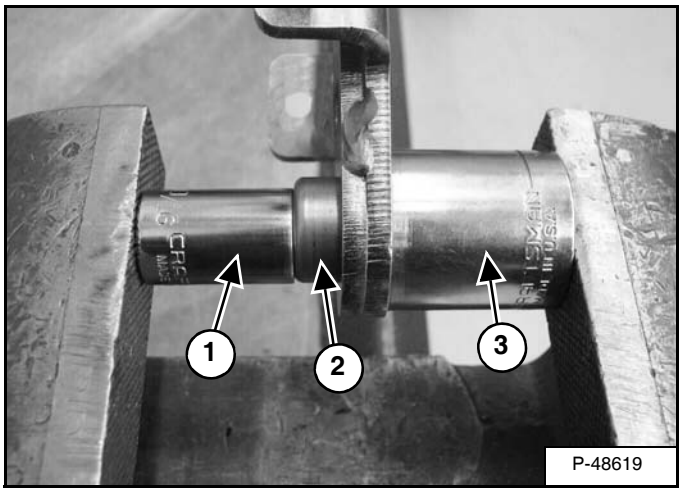
Remove the base pintle (Item 1) **[Figure 50-101-28]** from the pump shaft.

Remove the retaining bolt (Item 2), adjusting screw (Item 3) and neoprene dampener (Item 4) **[Figure 50-101-28]** from the base pintle.

Inspect parts for wear and damage, replace as needed **[Figure 50-101-28]**.

NOTE: Anti-sieze should be used on the adjusting screw to prevent corrosion and allow free movement while adjusting.

Figure 50-101-29



Using a bushing driver (Item 1) remove the torsion bushing (Item 2) by pressing the bushing through the pintle arm into an oversized socket (Item 3) to catch the torsion bushing **[Figure 50-101-29]**.

Installation: Install the torsion bushing (Item 2) **[Figure 50-101-29]** into the pintle arm using the same procedure as the removal.

NOTE: When the torsion bushing is installed, the amount of bushing on each side of the pintle arm should be the same.

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CONTROL PANEL (ADJUSTABLE PINTLES) (CONT'D)

Linkage Neutral Adjustment

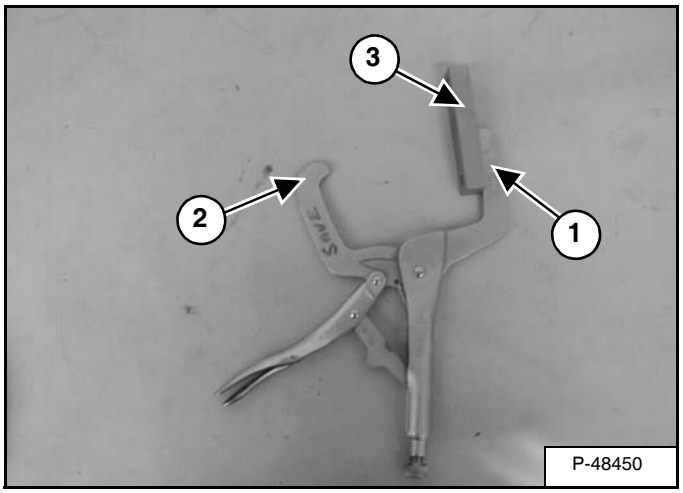
The following tool listed will be needed to do the following procedure:

MEL1563 - Remote Start Tool Kit

Connect the remote start tool to the engine harness. (See Procedure on Page 10-60-1.)

Lift and block the loader. (See Procedure on Page 10-10-1.)

Figure 50-101-30



Tool that may assist in the neutral adjustment **[Figure 50-101-30]**.

To make this tool use a locking grip C-Clamp and grind one edge flat (Item 1) and grind the other edge (Item 2) **[Figure 50-101-30]** to a small rounded edge.

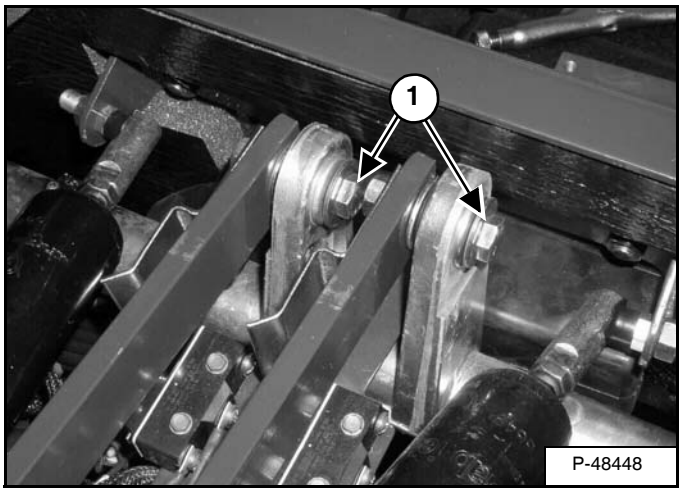
A steering centering block (Item 3) **[Figure 50-101-30]** is also needed. The centering block can be placed as shown and welded to the C-clamp if desired.

⚠ WARNING

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

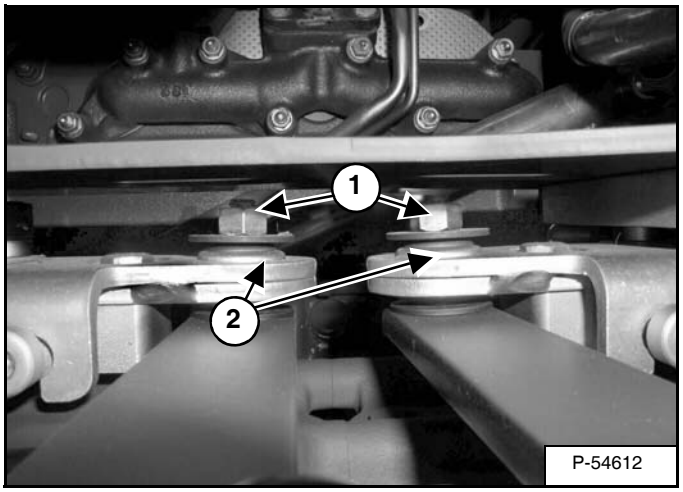
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Figure 50-101-31



Loosen the bolt/nut (Item 1) **[Figure 50-101-31]** only until the tension is released from the torsion bushing.

Figure 50-101-32



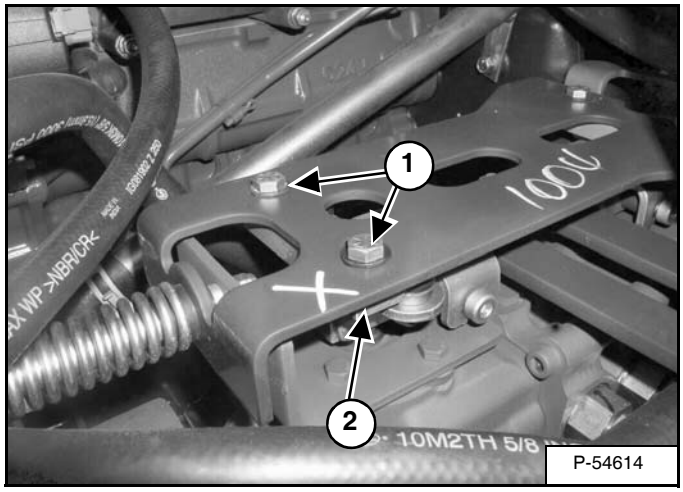
Loosen the nut (Item 1) only until the tension is released from the torsion bushing (Item 2) **[Figure 50-101-32]**.

NOTE: The bolt must be loose enough to allow the torsion bushing (Item 2) [Figure 50-101-32] to turn freely between the torsion bushing and the steering linkage bar.

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Linkage Neutral Adjustment (Cont'd)

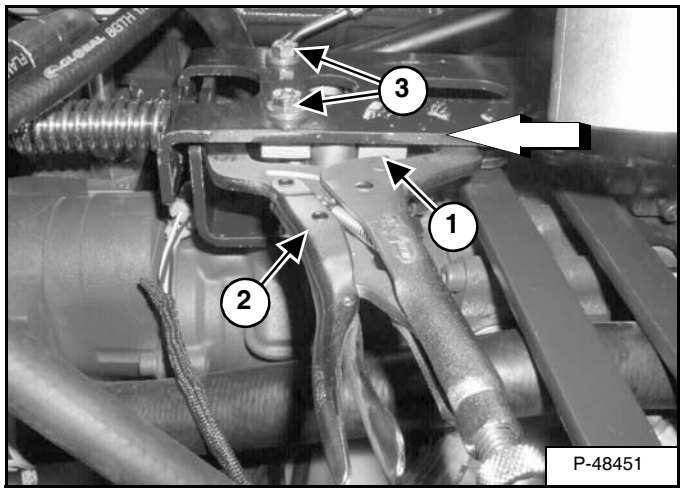
Figure 50-101-33



Loosen the two bolts (Item 1) holding the right centering block. Move the right hand centering block (Item 2) **[Figure 50-101-33]** until both pintle cams contact the centering block.

NOTE: The left centering block is not adjustable. By adjusting the right centering block the left centering block will also become aligned properly.

Figure 50-101-34

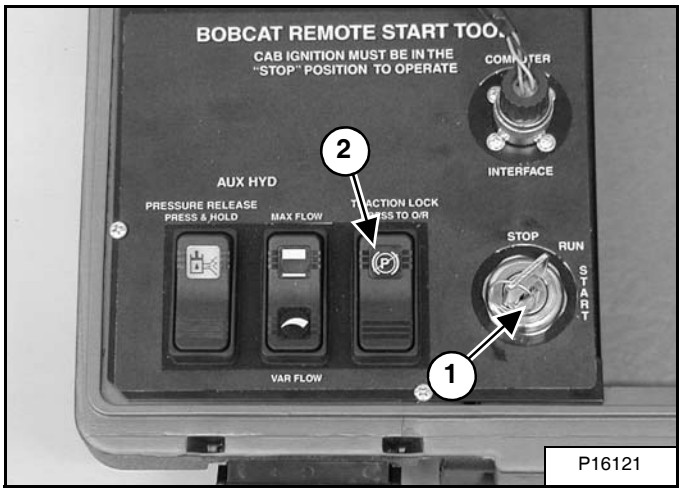


A modified locking grip C-Clamp and steering block shown in **[Figure 50-101-30]** may be used to help in aligning the centering blocks.

Install the centering block (Item 1) on the inside of the pintle cams and the C-Clamp (Item 2) **[Figure 50-101-34]** around both centering blocks.

Lock the C-Clamp in place.

Figure 50-101-35



Using the remote start tool, turn the key (Item 1) **[Figure 50-101-35]** to the run position.

Move the traction lock override switch (Item 2) **[Figure 50-101-35]** so the traction function is unlocked. (The traction lock override switch light will be ON.) On a standard loader the wedge brake will unlock.

NOTE: When the engine is started, the wheels/tracks may begin to move.

NOTE: In loaders equipped with manual steering and hydraulic brake, the steering levers may have to be moved during engine start-up to reduce the amount of creep. This reduction in creep will allow time for the engine to run and build up hydraulic charge pressure, which will release the hydraulic brake.

Using the remote start tool, turn the key (Item 1) **[Figure 50-101-35]** and start the engine and run at low idle.

Tighten bolts (Item 3) **[Figure 50-101-34]** to 35-40 ft.-lb. (47,5-54,2 N•m).

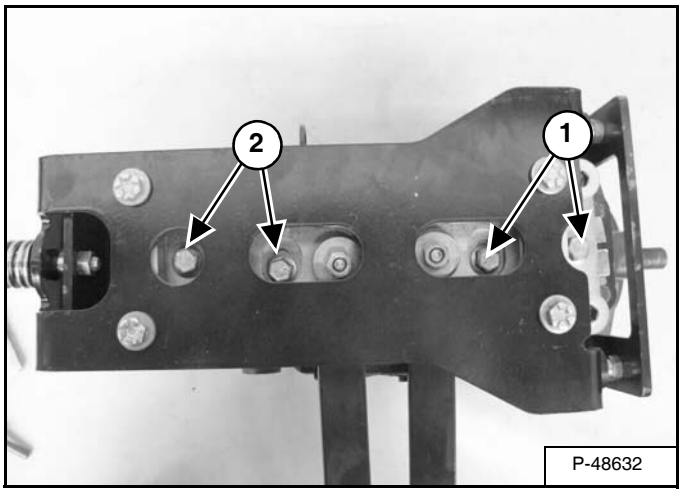
NOTE: Check for slack between centering blocks and pintle cams. If there is excessive slack repeat above steps [Figure 50-101-33] & [Figure 50-101-34].

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Linkage Neutral Adjustment (Cont'd)

Start the neutral adjustment procedure with the left pump first and complete the neutral adjustment for the left pump before adjusting the right pump.

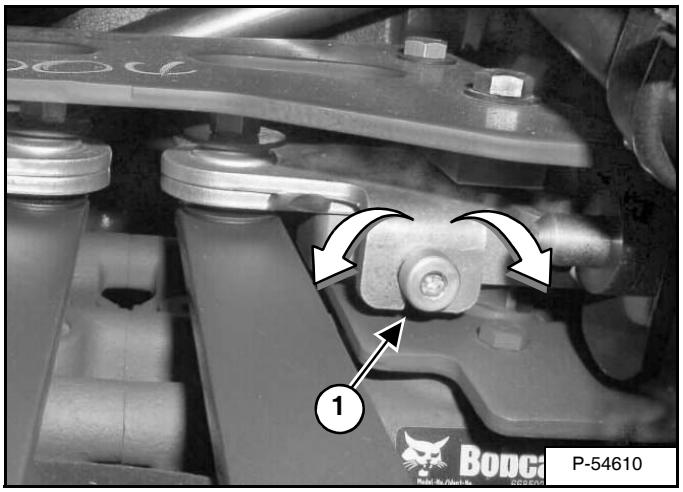
Figure 50-101-36



Loosen the left pump pintle adjustment lock bolts (Item 1). (The right pump pintle adjustment lock bolts are (Item 2) **[Figure 50-101-36]**.) Loosen the bolts enough to allow free movement between the pintle arm and the pintle base.

NOTE: If the bolts are too loose or too tight, the neutral adjustment may be affected.

Figure 50-101-37



Move the engine speed control to high idle.

NOTE: The neutral range (dead-band) will vary between the hydrostatic pumps.

NOTE: This procedure is shown for neutral adjustment on the left side of the loader. The procedure is the same for the right side neutral adjustment.

Turn the adjustment screw (Item 1) **[Figure 50-101-37]** counterclockwise until forward creep is seen.

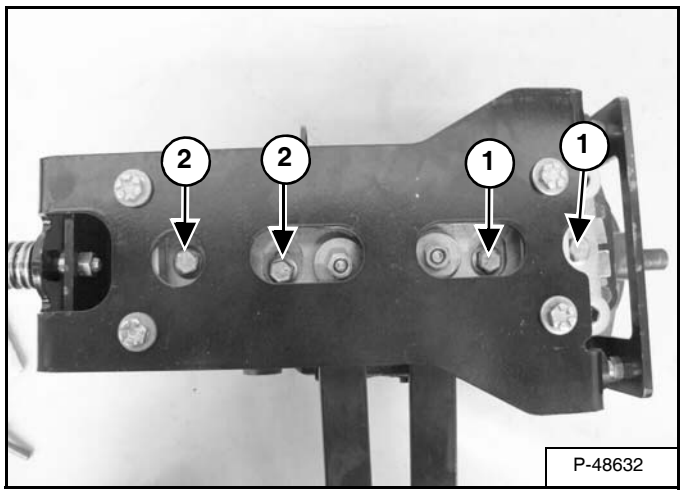
Turn the adjustment screw (Item 1) **[Figure 50-101-37]** counterclockwise to a point between forward and reverse where there is **zero** creep.

Stroke the left steering lever to forward and allow the lever to return to neutral. Stroke the left steering lever to reverse and allow the lever to return to neutral. Check that there is zero creep when the lever returns from either direction, on the left side. Turn the adjustment screw (if necessary) until zero creep is obtained.

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Linkage Neutral Adjustment (Cont'd)

Figure 50-101-38



Torque the left pump pintle adjustment lock bolts (Item 1) **[Figure 50-101-38]** to 35-40 ft.-lb. (47,5-54,2 N•m).

Repeat the adjustment procedure for the right pump.

Torque the right pump pintle adjustment lock bolts (Item 2) **[Figure 50-101-38]** to 35-40 ft.-lb. (47,5-54,2 N•m).

Test both levers by moving them backward and forward and letting them return to neutral by the return spring force.

If the levers do not return to neutral and the wheels/ tracks do not come to a complete stop, repeat the adjustment procedure again.

Stop the engine.

Remove one pintle adjustment bolt (Item 1) **[Figure 50-101-38]** at a time and apply loctite 242 or equivalent thread locker to the bolt and re-install the bolt. Torque the bolt to 35-40 ft.-lb. (47,5-54,2 N•m). Repeat for the three remaining pintle adjustment lock bolts.

NOTE: To maintain proper adjustment setting, remove and reinstall only one bolt at a time. New bolts can be installed with pre applied loctite.

Remove the loader remote start tool.

NOTE: After the neutral adjustment is completed on both pumps, the linkage travel adjustment MUST be completed. (See Page 50-101-17.)

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CONTROL PANEL (ADJUSTABLE PINTLES) (CONT'D)

Linkage Travel Adjustment

NOTE: When the linkage travel adjustment procedure is being done as part of the loader neutral adjustment procedure, check the torsion bushings at the pump and at the bell cranks to be sure they are not binding or too loose, which will affect the procedure.

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

⚠ WARNING

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

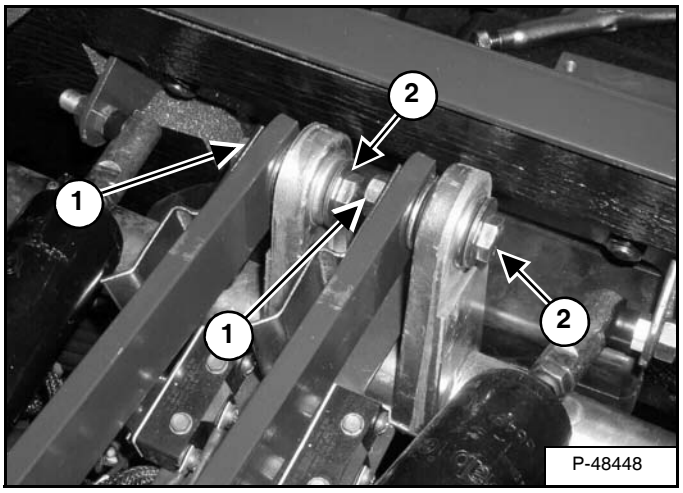
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Lift and block the loader. (See Procedure on Page 10-10-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

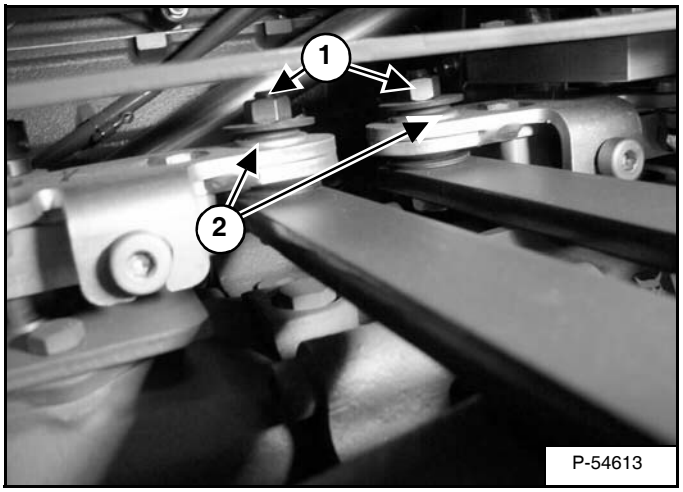
Pre-load tension in the torsion bushings must be removed before adjusting the steering linkage.

Figure 50-101-39



Loosen the nut (Item 1) 3 to 4 turns, then loosen the bolt (Item 2). The bolt (Item 2) **[Figure 50-101-39]** must be loosened enough to allow the torsion bushing to turn freely between the steering bellcrank and the linkage bar.

Figure 50-101-40



Loosen the nut (Item 1) only until the tension is released from the torsion bushing (Item 2) **[Figure 50-101-40]**.

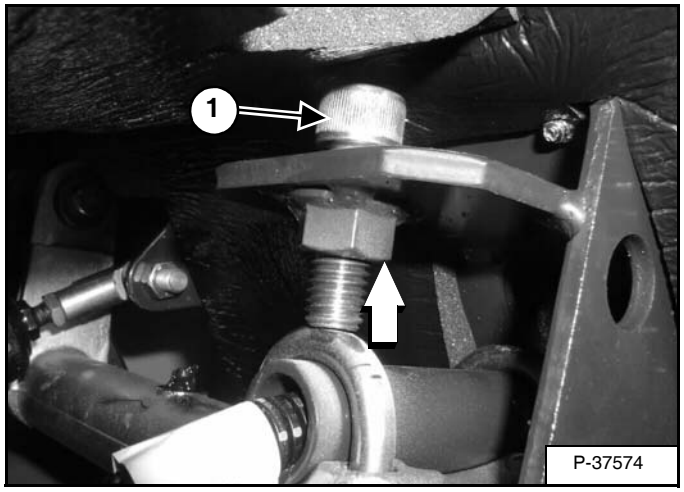
The bolt must be loose enough to allow the torsion bushing (Item 2) **[Figure 50-101-40]** to turn freely between the torsion bushing and the linkage bar.

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CONTROL PANEL (ADJUSTABLE PINTLES) (CONT'D)

Linkage Travel Adjustment (Cont'd)

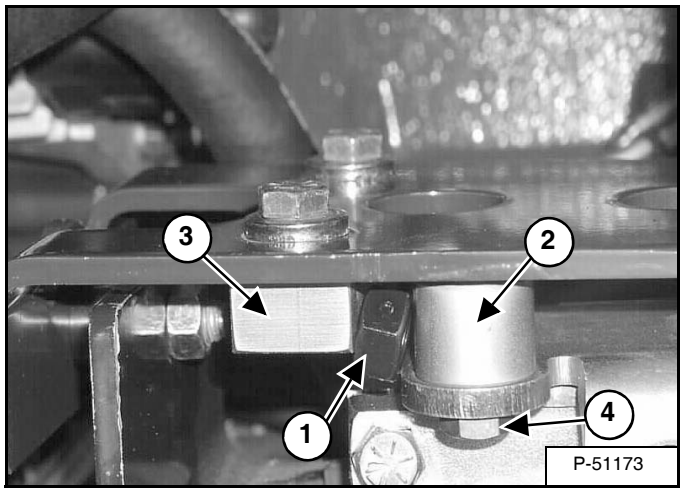
Figure 50-101-41



Remove access plug from the top of the control panel.

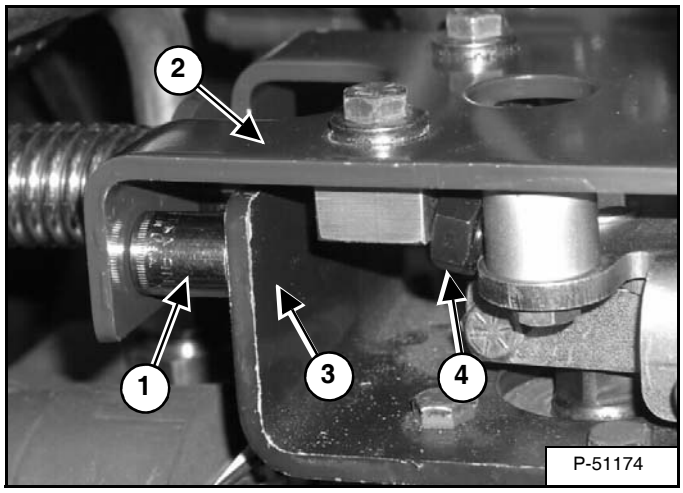
Turn the control lever drift adjustment bolts (Item 1) **[Figure 50-101-41]** (one on each control lever) out until it is flush with the bottom of the nut.

Figure 50-101-42



Move the right side steering lever to the rear and install a 3/8 inch (10 mm) thick spacer (Item 1) between the pintle arm cam (Item 2) and the centering block (Item 3) **[Figure 50-101-42]**.

Figure 50-101-43

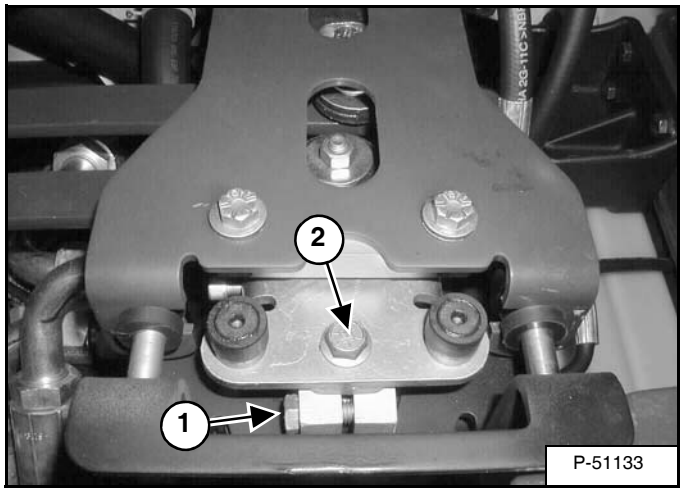


Move the right side steering lever forward and install a 15/16 inch (24 mm) thick spacer (Item 1) between the center plate (Item 2) and the mounting plate (Item 3) **[Figure 50-101-43]**.

This will allow the pintle arms to move freely while adjusting the steering linkage for full forward travel speed.

Remove the 3/8 inch (10 mm) thick spacer (Item 4) **[Figure 50-101-43]**.

Figure 50-101-44



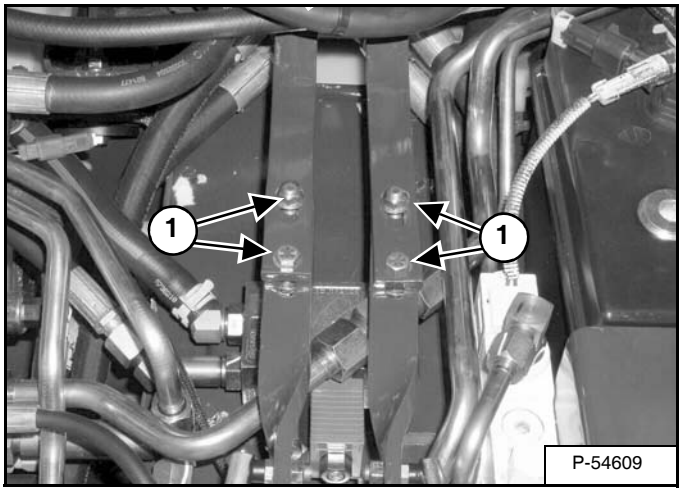
Before adjusting the linkage, check that the base pintle arm mounting bolt (Item 1) and both of the upper pintle mount bolts (Item 2) **[Figure 50-101-44]** and tighten to 35-40 ft.-lb. (48-54 N•m) torque. There should be no play between the pintle arm and the square pump shaft.

Also check that the cam mounting nuts or bolts (Item 4) **[Figure 50-101-42]** are tight, 35-40 ft.-lb. (48-54 N•m) torque .

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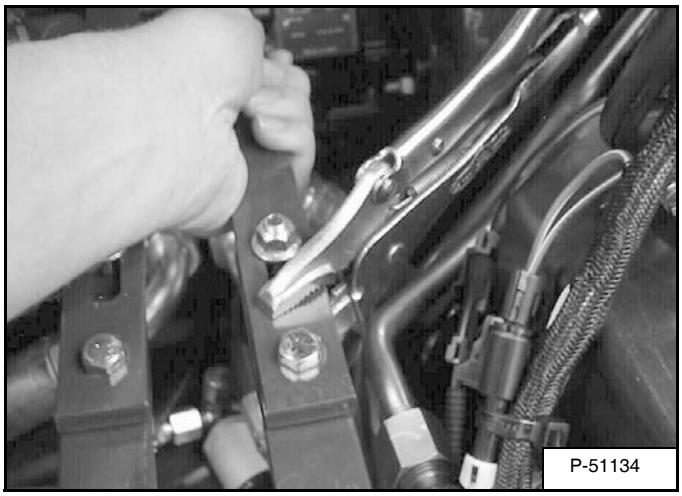
Linkage Travel Adjustment (Cont'd)

Figure 50-101-45



Loosen the two bolts and nuts (Item 1) **[Figure 50-101-45]** on each steering linkage bar.

Figure 50-101-46



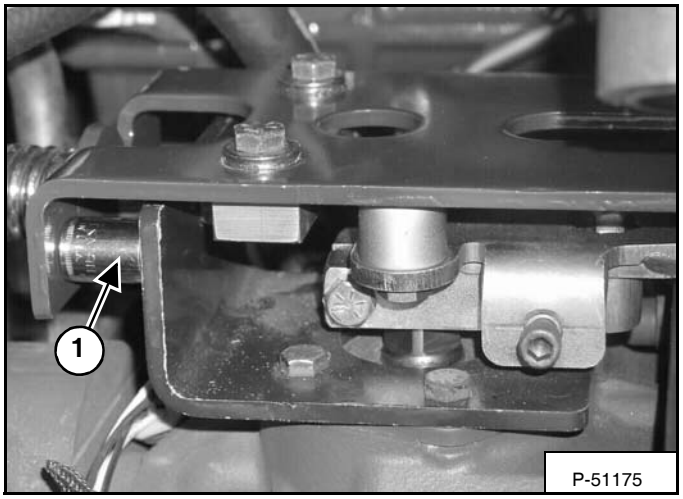
Move the left control lever to the full forward position, then pull forward on the left rear linkage bar until the pintle arm is rotated to the front as far as possible **[Figure 50-101-46]**. Use a locking plier, clamp the two linkage bars together.

Installation: Tighten the nuts and bolts to 35-40 ft.-lb. (47,5-54,2 N•m) torque.

Check the lever movement to make sure that the pintle arm and the control lever are both at full stroke at the same time. This will allow for maximum forward speed.

Repeat the linkage travel adjustment procedure for the right side linkage.

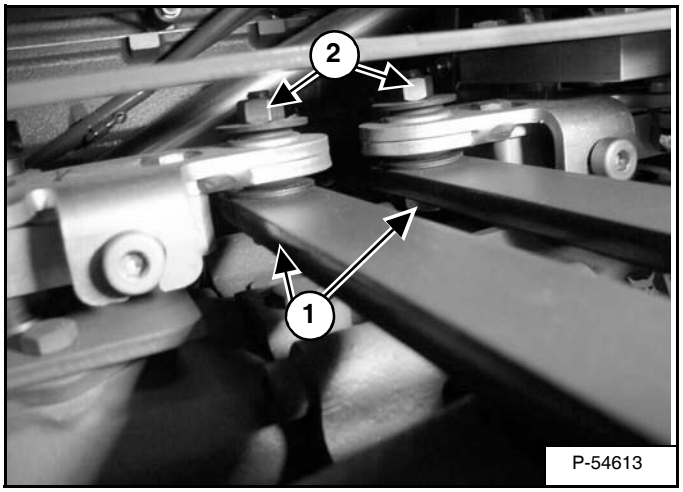
Figure 50-101-47



Remove the spacer (Item 1) **[Figure 50-101-47]**.

Disconnect the remote start tool. (See Procedure on Page 10-60-1.)

Figure 50-101-48

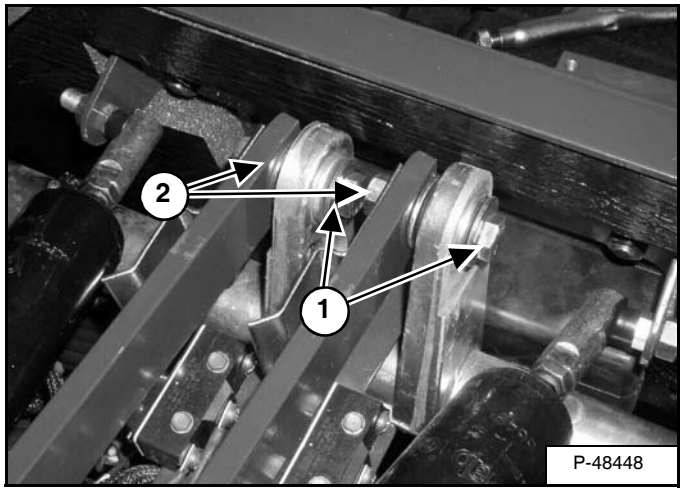


Tighten the two bolts (Item 1) and nuts (Item 2) to 35-40 ft.-lb. (47,5-54,2 N•m) **[Figure 50-101-48]**.

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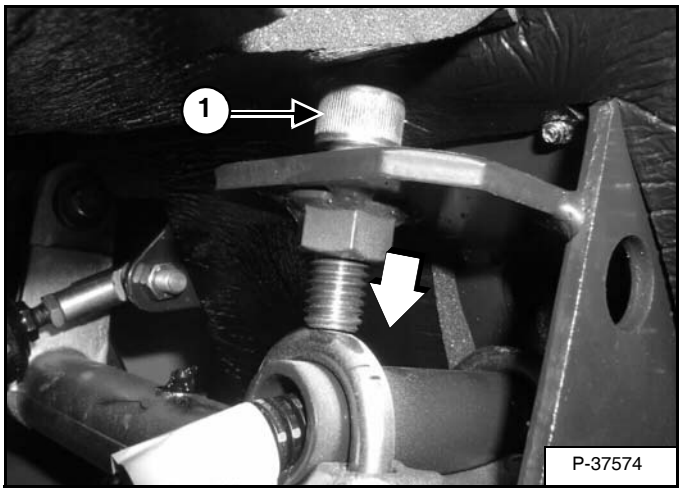
Linkage Travel Adjustment (Cont'd)

Figure 50-101-49



Tighten the two bolts and nuts (Items 1 & 2) **[Figure 50-101-49]** to 35-40 ft.-lb. (47,5-54,2 N•m) torque at the steering bell cranks.

Figure 50-101-50



Push the control lever to full stroke and turn drift adjustment bolt (Item 1) **[Figure 50-101-50]** in until it touches the U-bolt holding the control lever.

Repeat steps on the other control lever.

Drive the loader forward and check for drift.

The traditional benchmark for drift is less than 10 ft. of “drift” in 100 ft. of travel distance.

If the drift is excessive to the left, turn the right adjustment bolt (Item 1) **[Figure 50-101-50]** in.

If the drift is excessive to the right, turn the left adjustment bolt in.

NOTE: When using the drift adjustment bolts, only adjust one bolt for each test drive.

In addition, only move each bolt a maximum of one turn for each test drive. This will help prevent over-correction and excessive reduction in travel speed.

Drift adjustment is for forward travel only.

Adjust the drift to an acceptable level.

Re-install the plug in the drift bolt access hole after adjustment.

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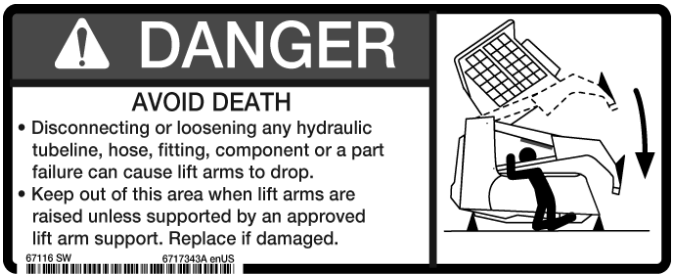
CONTROL PANEL (SJC)

Removal And Installation

⚠ WARNING

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

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⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

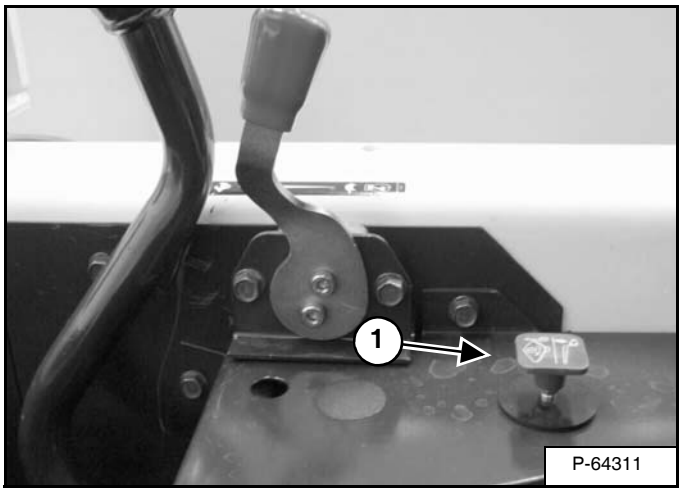
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Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

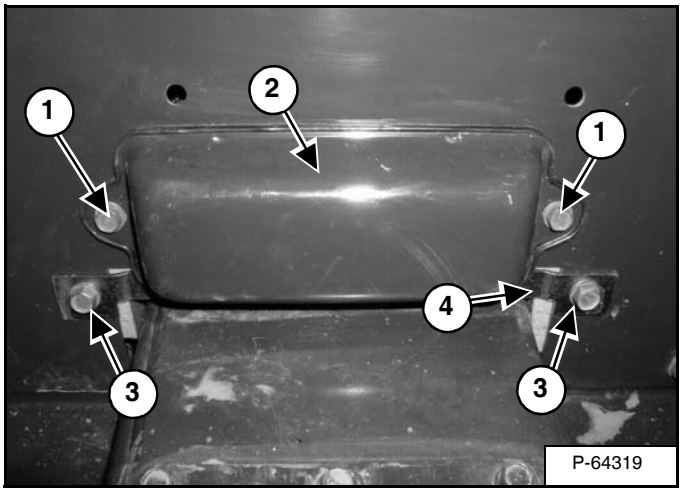
Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Figure 50-102-1



Remove the lift arm by-pass control knob and rubber washer (Item 1) **[Figure 50-102-1]**.

Figure 50-102-2



Remove the fuse cover mount screws (Item 1) **[Figure 50-102-2]**.

Installation: Tighten screws to 8-11 ft.-lb. (11-15 N•m) torque.

Remove the fuse/relay cover (Item 2) **[Figure 50-102-2]**.

Remove the fuse/relay shield mounting screws (Item 3) **[Figure 50-102-2]**.

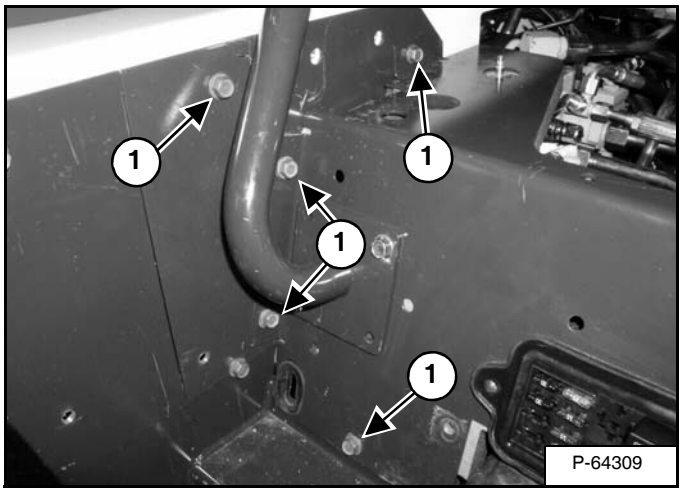
Installation: Tighten screws to 15-20 ft.-lb. (20-27 N•m) torque.

Remove the fuse/relay shield (Item 4) **[Figure 50-102-2]**

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Removal And Installation (Cont'd)

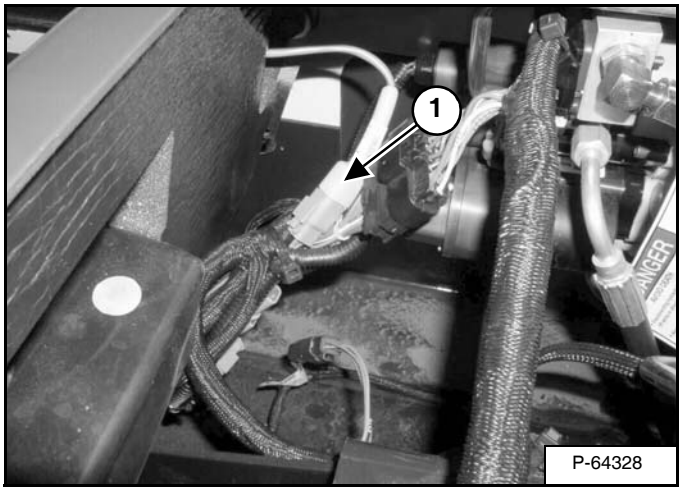
Figure 50-102-3



Remove the control panel mount screws (Item 1) **[Figure 50-102-3]** from the both sides of the control panel.

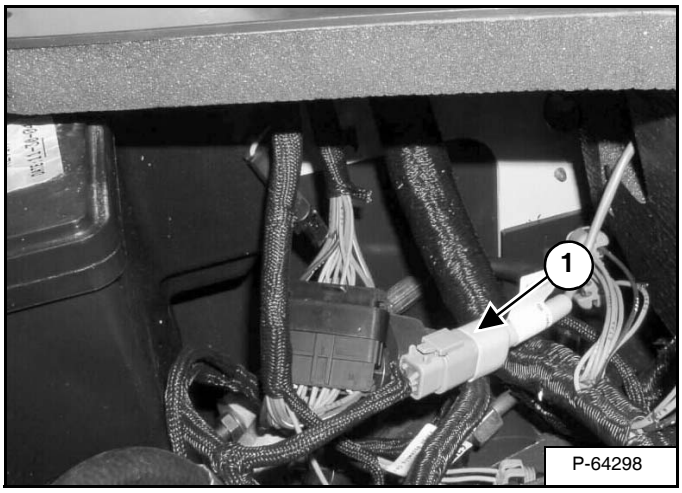
Installation: Tighten the control panel mounting screws to 15-20 ft.-lb. (20-27 N•m) torque.

Figure 50-102-4



Disconnect the right joystick wire harness connector (Item 1) **[Figure 50-102-4]**.

Figure 50-102-5



Disconnect the left joystick wire harness connector (Item 1) **[Figure 50-102-5]**.

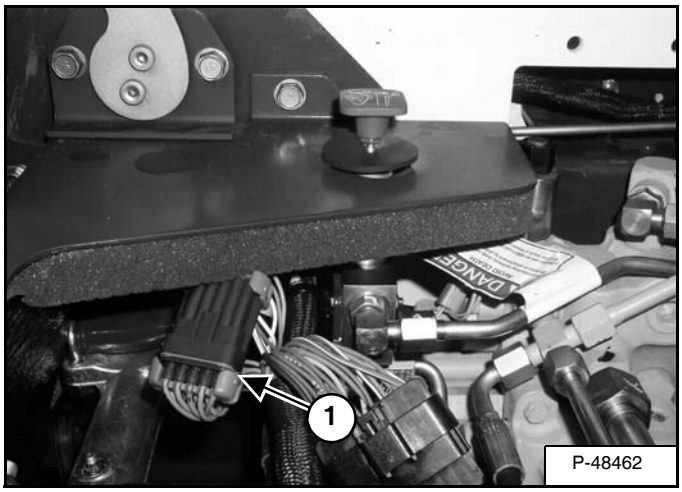
Remove the control panel from the loader.

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CONTROL HANDLE

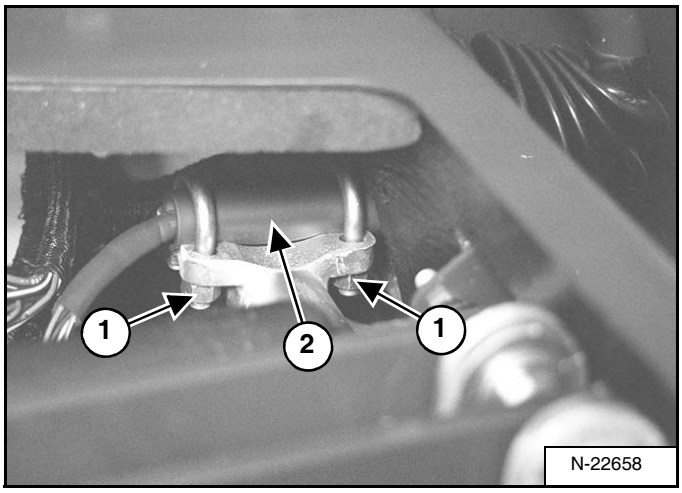
Control Lever Removal And Installation

Figure 50-110-1



Disconnect the electrical connectors from the control lever **[Figure 50-110-1]**.

Figure 50-110-2



Remove the nuts from the two U-bolts (Item 1) **[Figure 50-110-2]** used to mount the control lever.

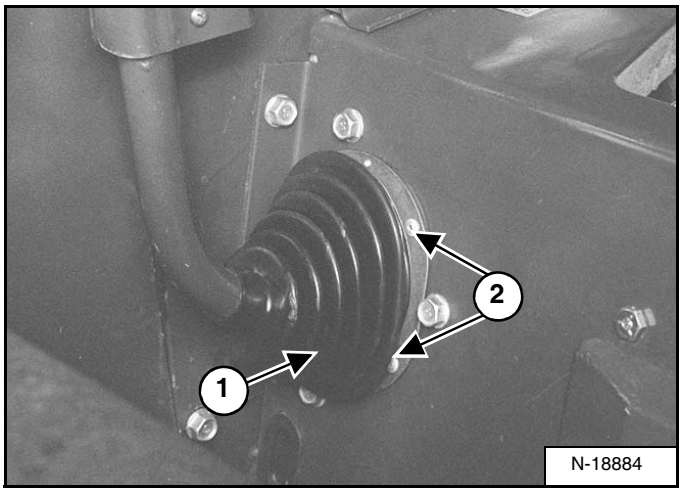
Remove the U-bolts from the control lever mount.

Remove the control lever (Item 2) **[Figure 50-110-2]** by sliding the lever through the rubber boot (Item 1) **[Figure 50-110-3]** on the front of the control panel.

Installation: Tighten the U-bolts so the lever can not be moved either right or left when seated in the operator seat. Be sure the control lever does not interfere with the operator cab when lowering or raising the cab.

Control Lever Boot

Figure 50-110-3



To replace the rubber boot (Item 1) **[Figure 50-110-3]** on the control panel, remove the control lever (See above procedure).

Drill out the four rivets (Item 2) **[Figure 50-110-3]** located on the flange of the rubber boot and remove the old boot.

Install the new boot and reinstall the control lever.

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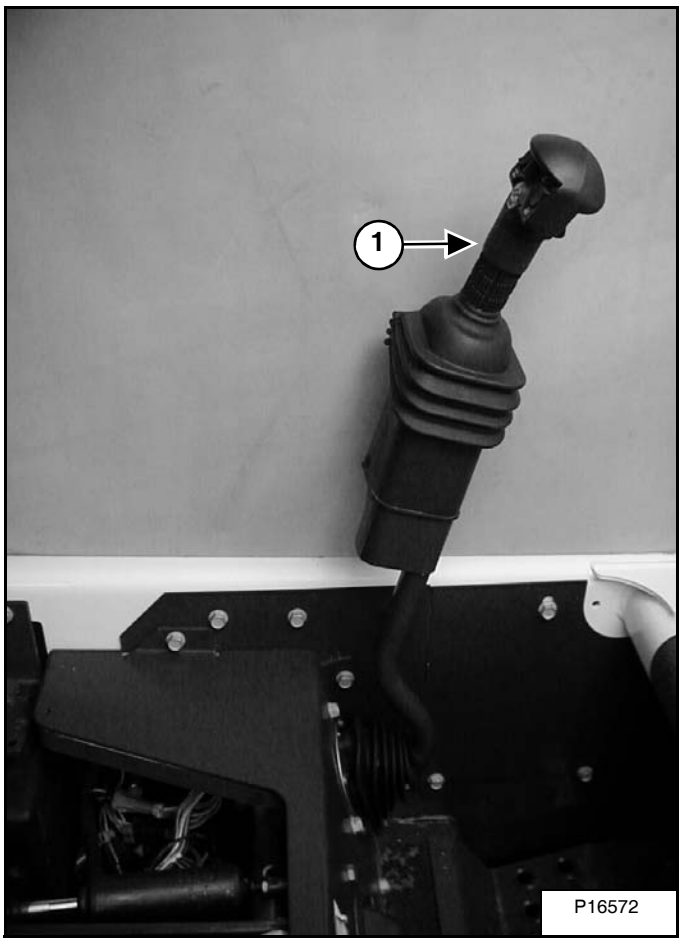


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CONTROL HANDLE (ADVANCED CONTROL SYSTEM) (ACS)

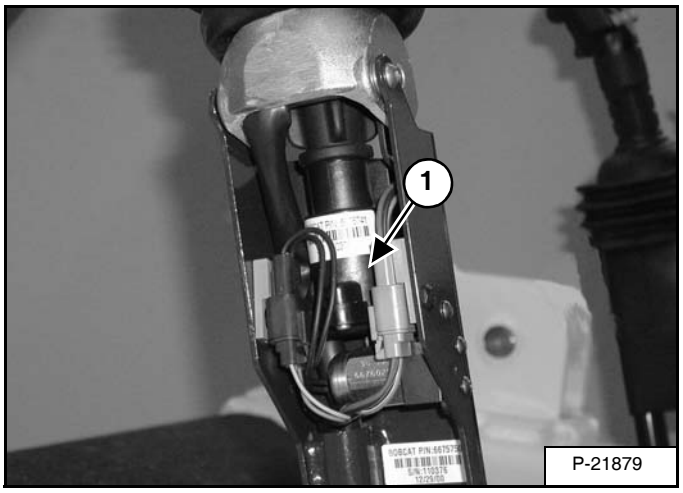
Components Identification

Figure 50-111-1



Control Handle (Item 1) **[Figure 50-111-1]**.

Figure 50-111-2



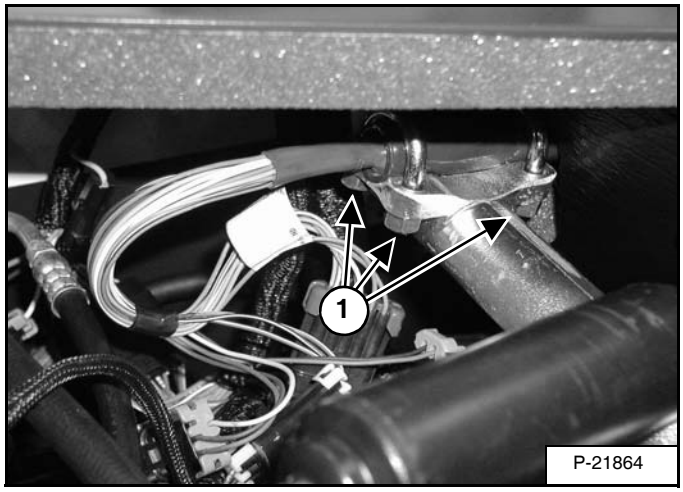
Handle Sensor (Item 1) **[Figure 50-111-2]**.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure (ACS) on Page 60-160-11.)

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Handle Sensor Removal And Installation

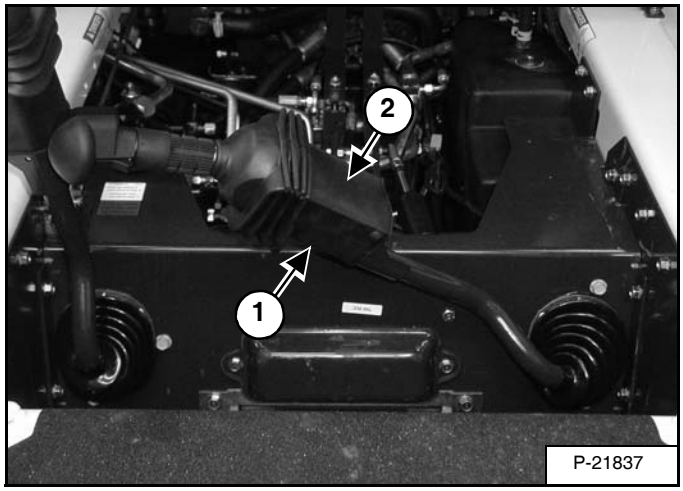
Figure 50-111-3



Loosen the nuts (Item 1) **[Figure 50-111-3]**.

Installation: Tighten the u-bolts so the lever can not be moved either right or left when seated in the operator seat. Be sure the control lever does not interfere with the operator cab when lowering or raising the cab.

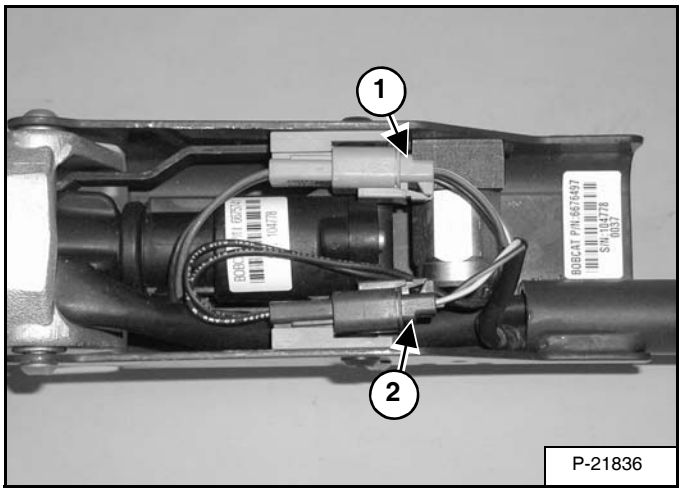
Figure 50-111-4



Tilt the control handle (Item 1) **[Figure 50-111-4]** to the center of the loader.

Lift the boot cover (Item 2) **[Figure 50-111-4]**.

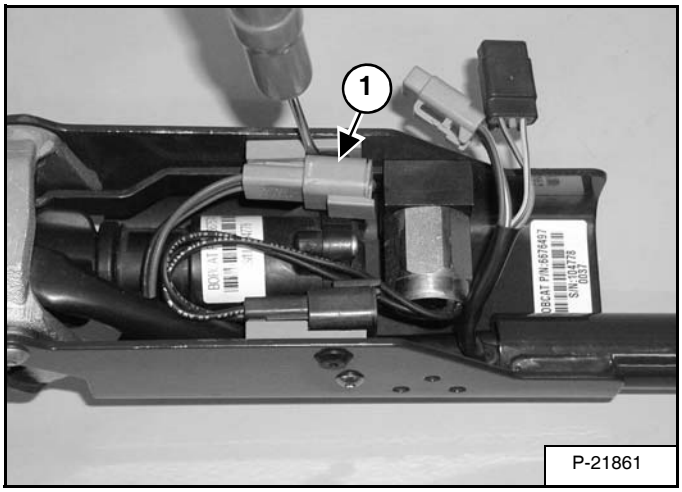
Figure 50-111-5



Disconnect the harness connector (Item 1) **[Figure 50-111-5]** from the handle sensor connector.

Disconnect the harness connector (Item 2) **[Figure 50-111-5]** from the handle lock solenoid connector.

Figure 50-111-6



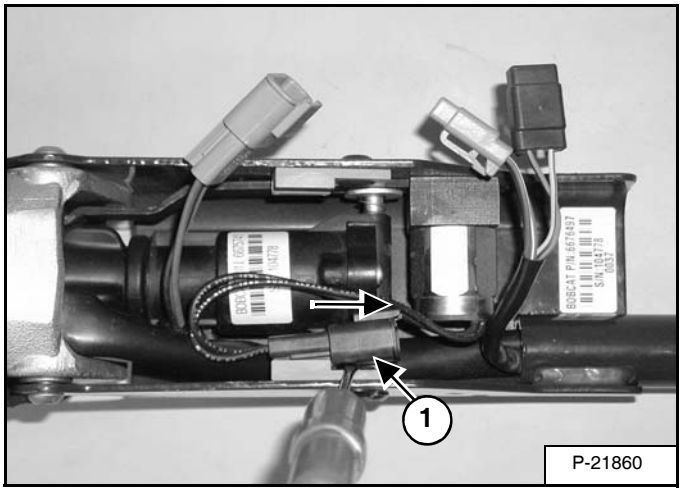
Remove the handle sensor connector (Item 1) **[Figure 50-111-6]** from the clip.

NOTE: Pry out with a small screw driver and push the connector down.

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Handle Sensor Removal And Installation (Cont'd)

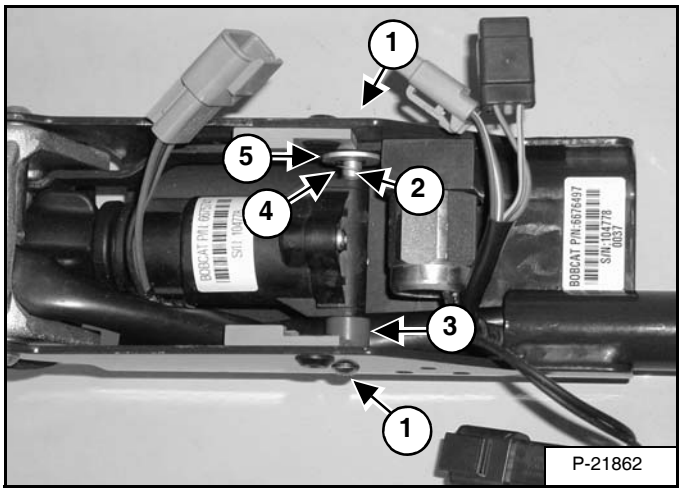
Figure 50-111-7



Remove the handle lock solenoid connector (Item1) **[Figure 50-111-7]** from the clip.

NOTE: Pry out with a small screw driver and push the connector down.

Figure 50-111-8

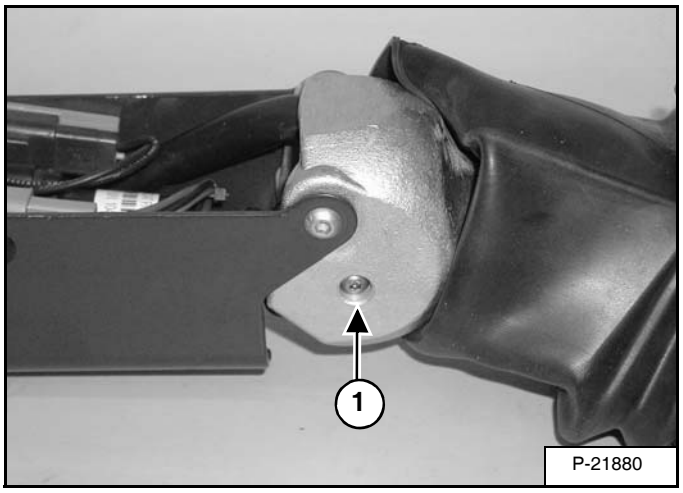


Remove one of the two mounting screws (Item 1) **[Figure 50-111-8]** from the handle sensor.

Installation: Tighten screws to 32-38 in.-lb. (3,6-4,3 N•m) torque.

While removing the mounting pin (Item 2) from the handle sensor, remove the one plastic spacer (Item 3), the spring (Item 4) and washer (Item 5) **[Figure 50-111-8]**.

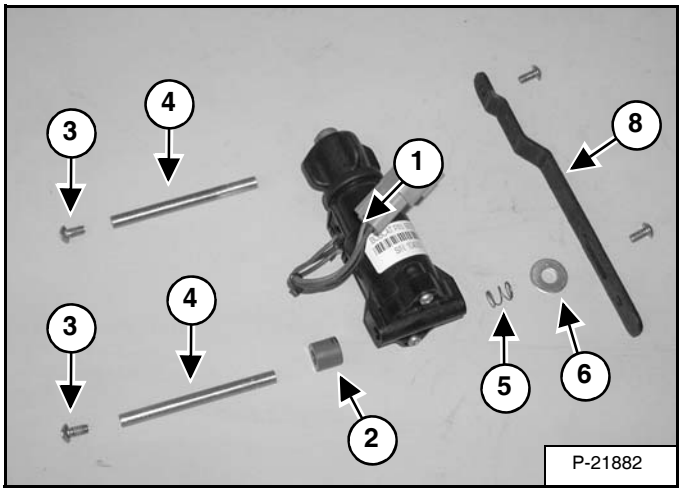
Figure 50-111-9



Remove one of the two mounting screws (Item 1) **[Figure 50-111-9]** from the handle sensor.

Installation: Tighten bolt to 32-38 in.-lb. (3,6-4,3 N•m) torque.

Figure 50-111-10



Remove the handle sensor (Item 1) **[Figure 50-111-10]** from the handle assembly.

NOTE: The handle sensor (Item 1) [Figure 50-111-10] can only be replaced as a complete assembly.

Check the spacer (Item 2) and screws (Item 3), mounting pin (Item 4), spring (Item 5), washer (Item 6), bolt/nut (Item 7), stop strap (Item 8) and replace as needed **[Figure 50-111-10]**.

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Handle Sensor Removal And Installation (Cont'd)

Figure 50-111-11

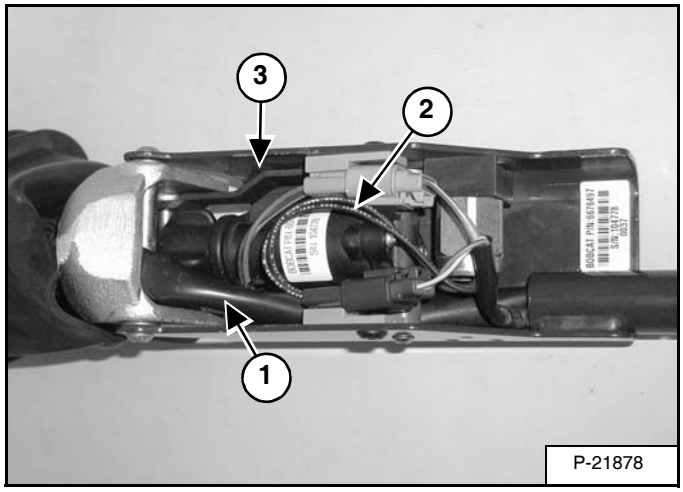
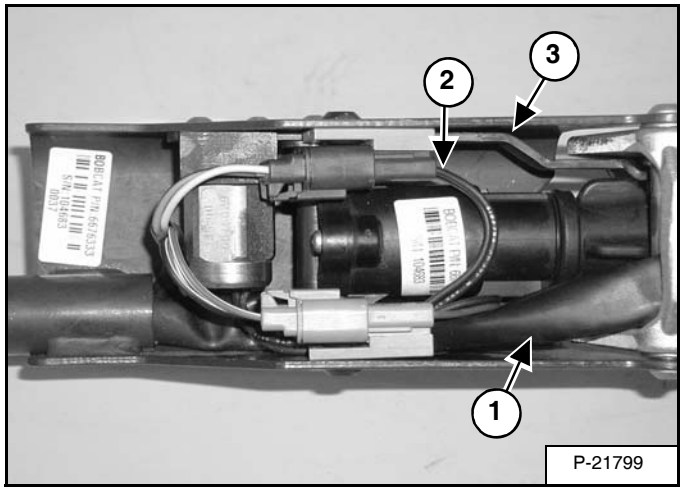


Figure 50-111-12



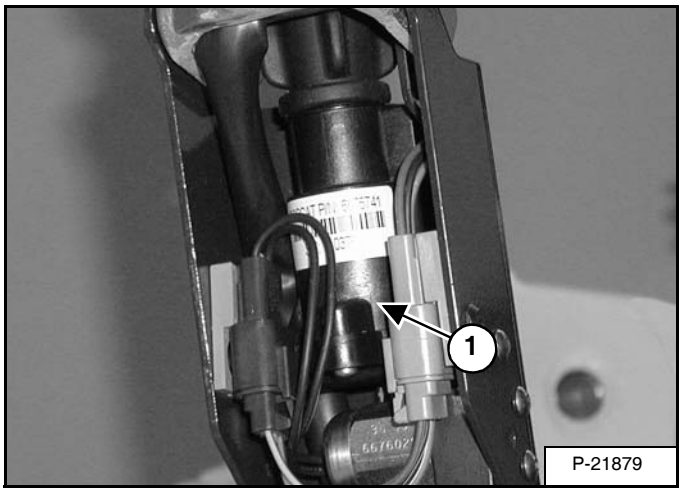
Installation: When installing the handle sensor into the control handle, check the routing of the switch handle wire harness (Item 1) **[Figure 50-111-11]** & **[Figure 50-111-12]** to assure proper return of the control handle to neutral and minimize harness movement.

NOTE: Route wires (Item 2) [Figure 50-111-11] & [Figure 50-111-12] as shown away from stop strap (Item 3) [Figure 50-111-11] & [Figure 50-111-12] to avoid wire damage.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure (ACS) on Page 60-160-11.)

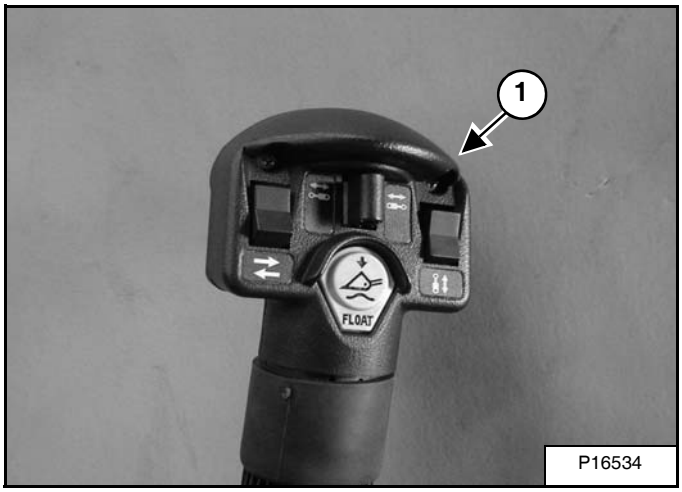
Control Handle Removal and Installation

Figure 50-111-13



Remove the handle sensor (Item 1) **[Figure 50-111-13]**. (See Handle Sensor Removal And Installation on Page 50-111-2.)

Figure 50-111-14

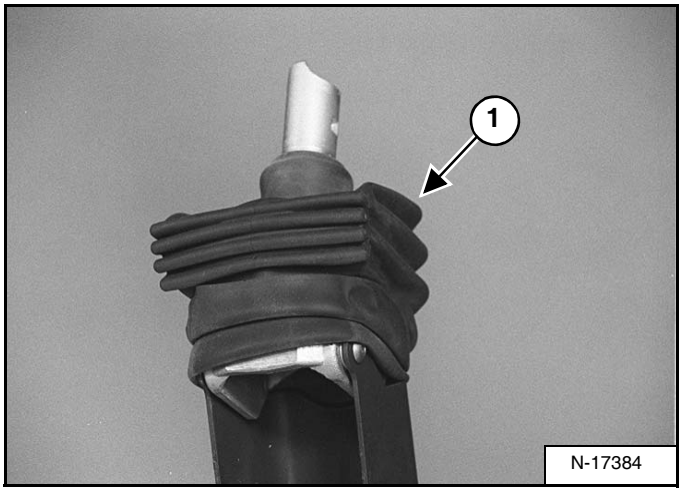


Remove the switch handle (Item 1) **[Figure 50-111-14]**. (See Switch Handle Removal on Page 60-120-7.)

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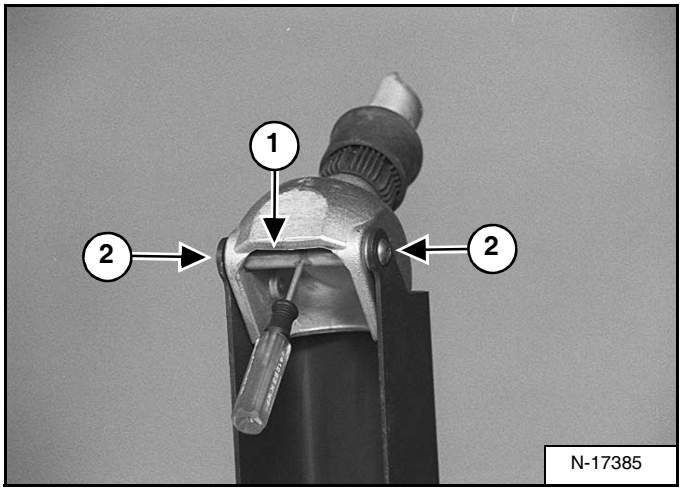
Control Handle Removal And Installation (Cont'd)

Figure 50-111-15



Remove the rubber handle cover (Item 1) **[Figure 50-111-15]** from the handle.

Figure 50-111-16

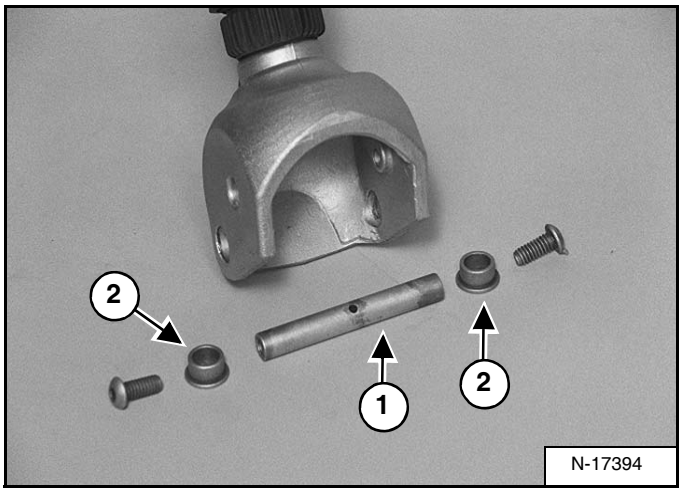


Using a small screwdriver, hold the handle spacer (Item 1) and remove the allen head screws (Item 2) **[Figure 50-111-16]** from the handle assembly.

Installation: Tighten the allen head screws to 35 in.-lb. (4 N•m) torque.

Control Handle Disassembly and Assembly

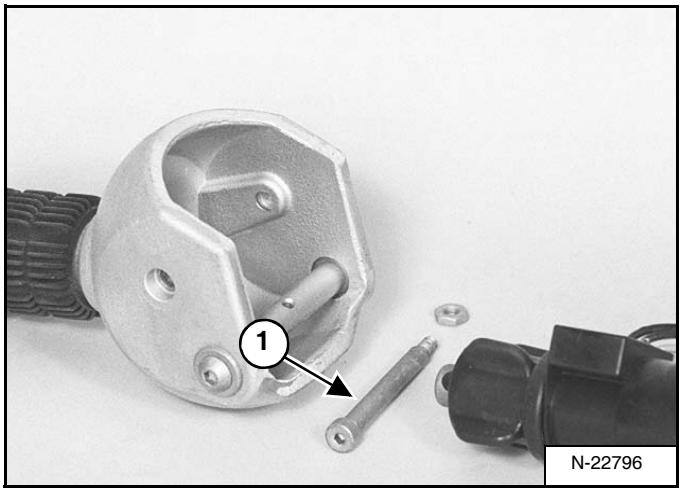
Figure 50-111-17



Remove the handle sleeve (Item 1) and bushings (Item 2) from the handle **[Figure 50-111-17]**.

Check all parts for wear and replace as needed.

Figure 50-111-18

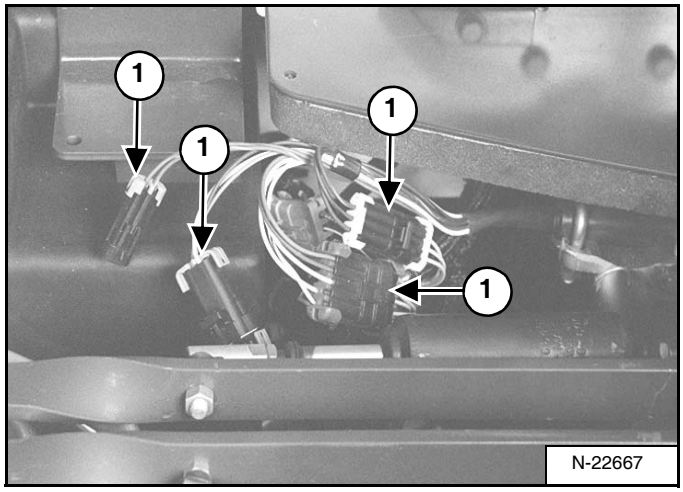


Check the mounting bolt (Item 1) **[Figure 50-111-18]** that connects the handle to the handle sensor for wear, replace as needed.

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Control Lever Removal and Installation

Figure 50-111-19



Disconnect the electrical connectors (Item 1) **[Figure 50-111-19]** from the control lever switch handle.

Remove the electrical connectors from the control lever switch handle. (See ADVANCED CONTROL SYSTEM (ACS) on Page 60-120-1.)

Figure 50-111-20

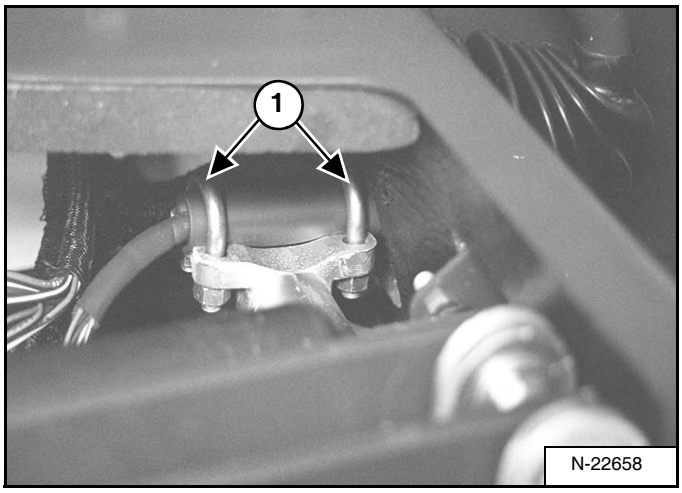
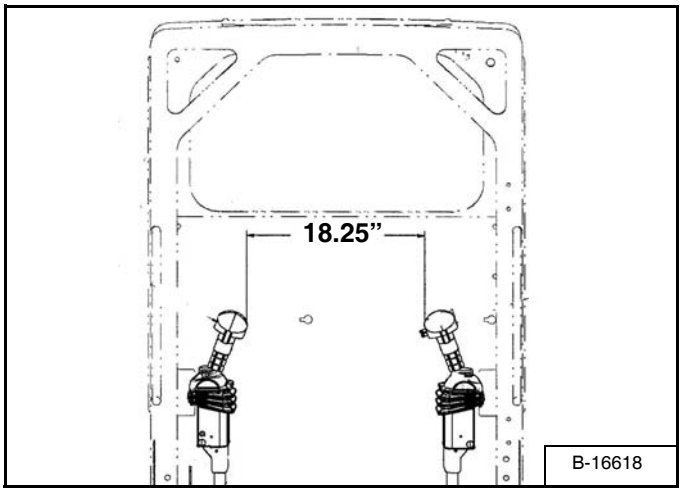


Figure 50-111-21



Loosen the two u-clamps (Item 1) **[Figure 50-111-20]** nuts.

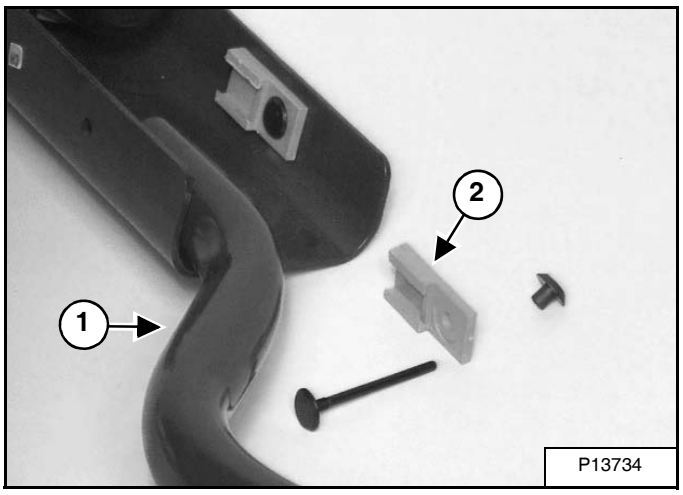
Installation: Tighten the u-bolts so the lever can not be moved either right or left when seated in the operator seat. Control lever end (Item 2) **[Figure 50-111-20]** should be flush with bellcrank. Be sure the control lever does not interfere with the operator cab when lowering or raising the cab. The distance between handles should be 18.25 inches **[Figure 50-111-21]**.

Remove the control lever from the cross shaft and control panel.

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Control Lever Removal And Installation (Cont'd)

Figure 50-111-22

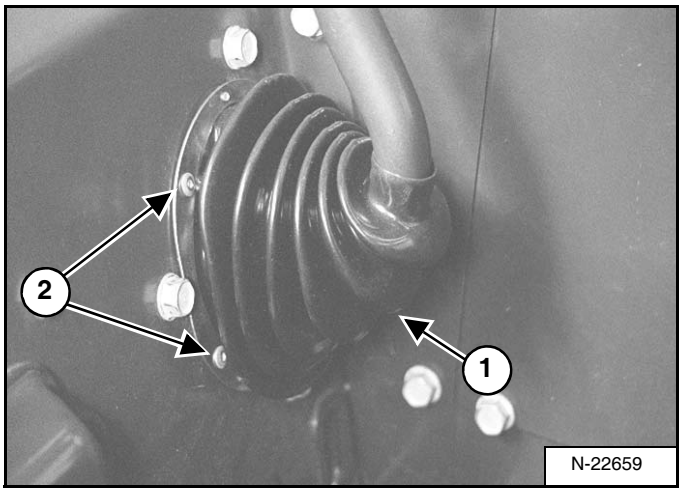


The control lever (Item 1) **[Figure 50-111-22]** must be replaced as a complete unit.

The connector clip (Item 2) **[Figure 50-111-22]** can be replaced separately from the control lever.

Control Lever Boot

Figure 50-111-23



To replace the rubber boot (Item 1) **[Figure 50-111-23]** on the control panel, remove the control lever. (See Control Lever Removal And Installation on Page 50-110-1.)

Drill out the four rivets (Item 2) **[Figure 50-111-23]** located on the flange of the rubber boot and remove the old boot.

Install the new boot and reinstall the control lever. (See Control Lever Removal And Installation on Page 50-110-1.)

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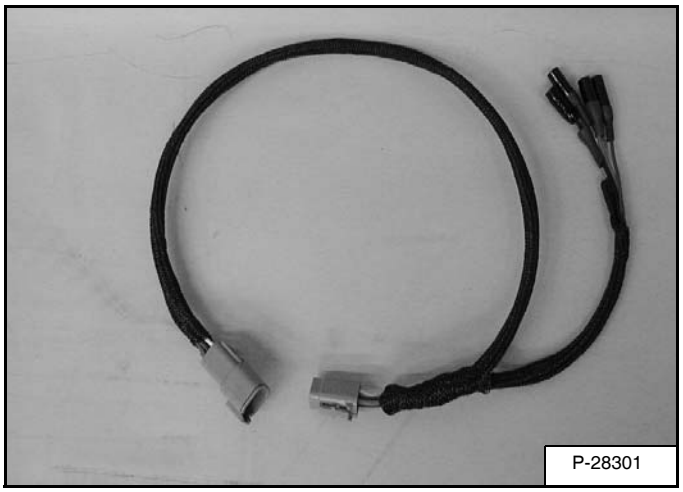


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CONTROL HANDLE (SJC)

Joystick Testing (Right & Left)

Figure 50-112-1



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

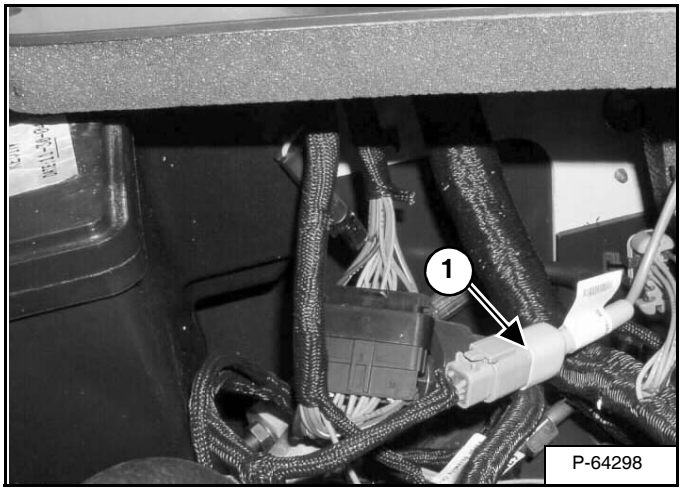
MEL1608-Joystick Test Harness **[Figure 50-112-1]**
MEL1563-Remote Start Tool
Multimeter

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

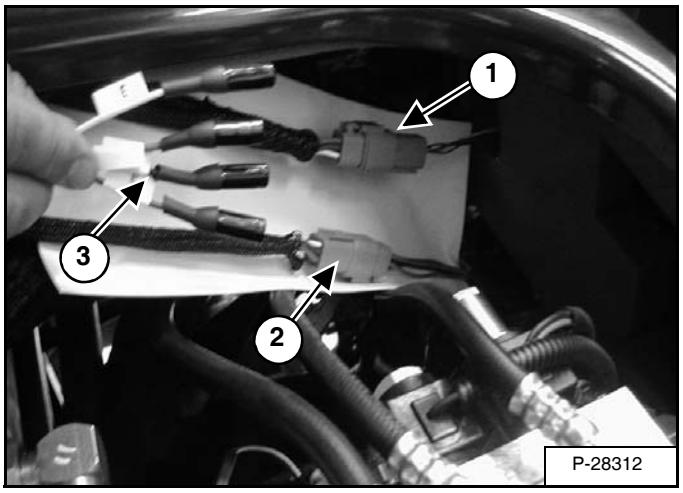
Connect the remote start tool to the loader. (See Procedure on Page 10-60-1.)

Figure 50-112-2



At the back side of the control panel, locate the left joystick wire connector (Item 1) **[Figure 50-112-2]**.

Figure 50-112-3



Disconnect the joystick harness connector (Item 1) from the loader wiring harness (Item 2) **[Figure 50-112-3]**.

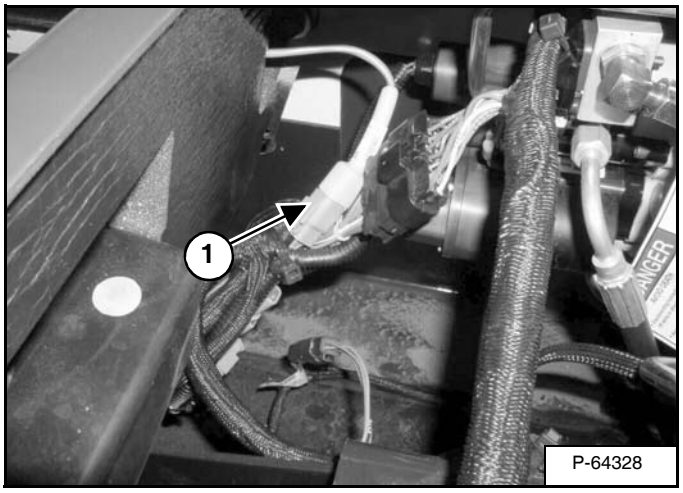
Install the test harness (Item 3) **[Figure 50-112-3]** between the two connectors.

Turn the remote start key to ON position without starting the loader.

Check the voltage between pin 3 and pin 5 on the joystick test harness (Item 3) **[Figure 50-112-3]**.

The voltage should be between 2.45 and 2.55 volts.

Figure 50-112-4



Repeat the procedure at the right joystick wiring harness connector (Item 1) **[Figure 50-112-4]**. (If needed.)

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CONTROL HANDLE (SJC) (CONT'D)

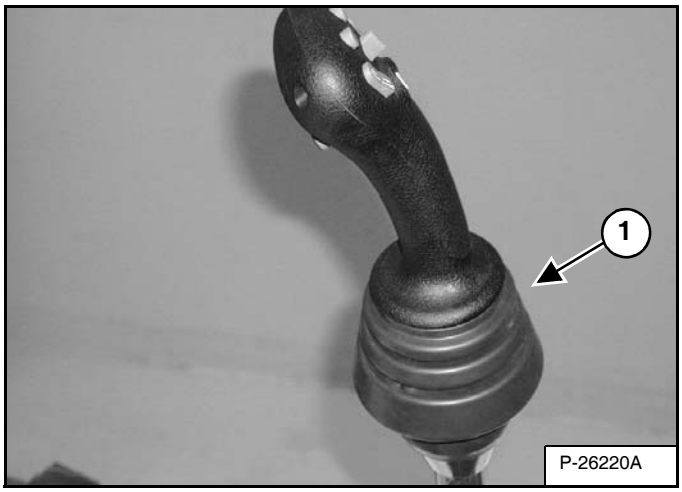
Joystick Removal (Right & Left)

When replacing joystick assemblys, they are available as a complete assembly with the boot and lever already attached. This procedure is shown so the electrical connections can be checked at the bottom of the joystick, if suspected to be loose or disconnected.

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

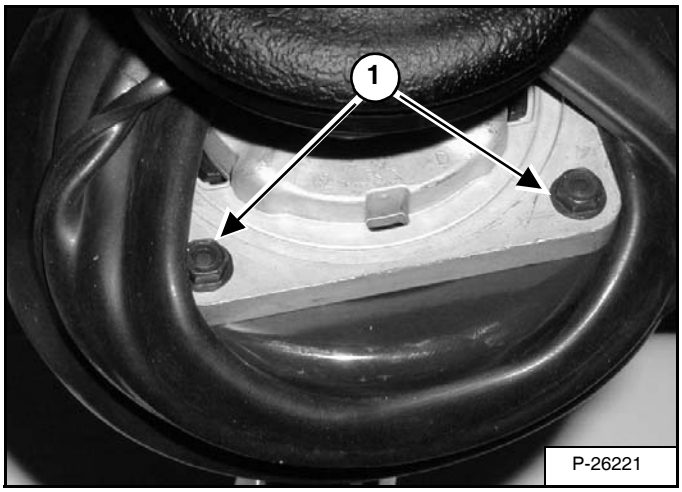
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Figure 50-112-5



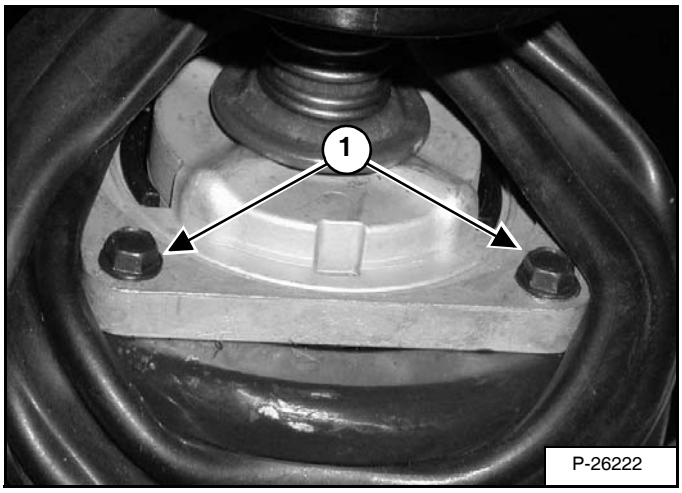
Roll the joystick rubber boot (Item 1) **[Figure 50-112-5]** down from the joystick handle.

Figure 50-112-6



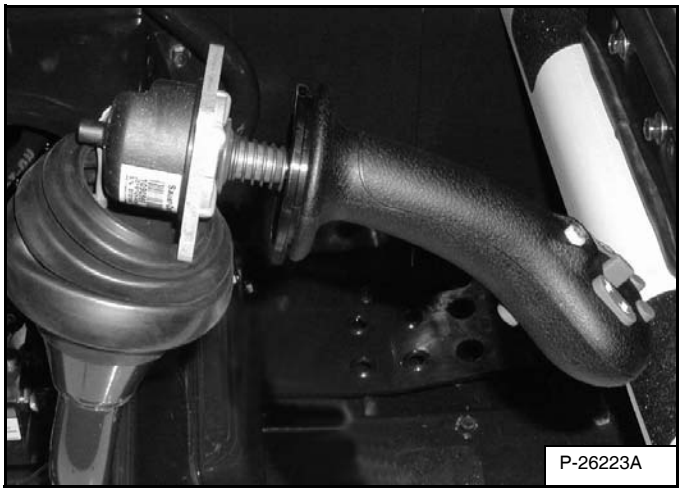
Remove the two inside joystick mount bolts (Item 1) **[Figure 50-112-6]**.

Figure 50-112-7



Remove the two outside joystick mount screws (Item 1) **[Figure 50-112-7]**.

Figure 50-112-8

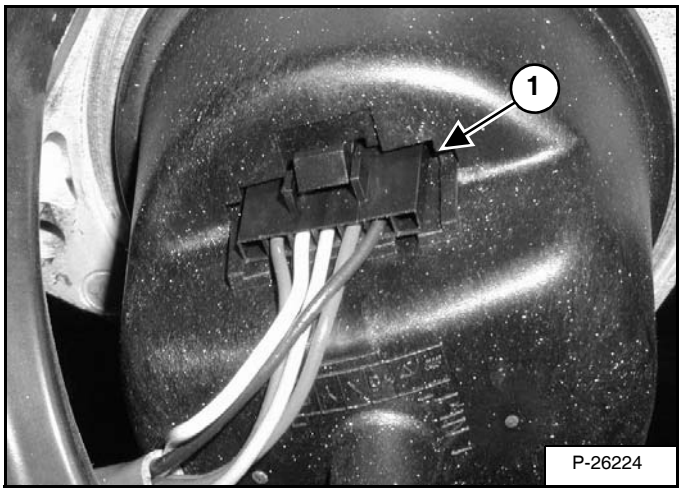


Remove the joystick from the rubber boot **[Figure 50-112-8]**.

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Joystick Removal (Right & Left) (Cont'd)

Figure 50-112-9



Disconnect the electrical harness (Item 1) **[Figure 50-112-9]** from the joystick.

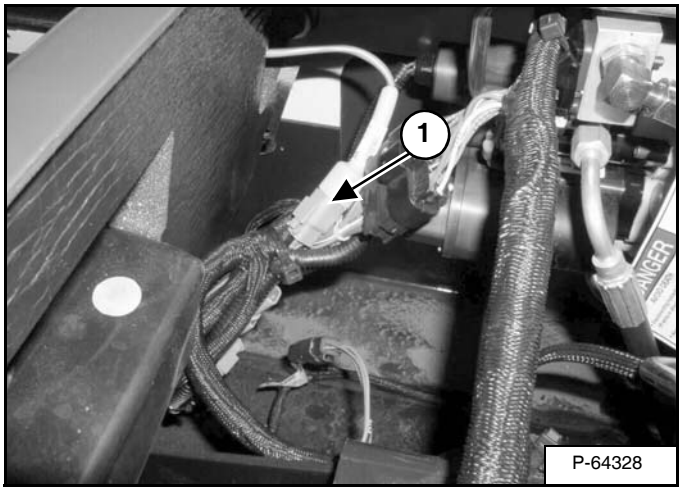
Remove the joystick from the loader.

Lever Assembly Removal (Right & Left)

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Figure 50-112-10

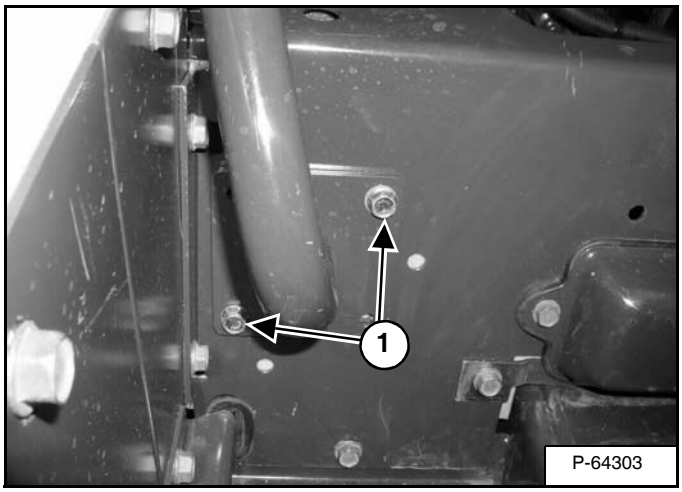


Disconnect the joystick wiring harness connectors (Item 1) on both the right and left hand joysticks **[Figure 50-112-10]**.

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Lever Assembly Removal (Right & Left) (Cont'd)

Figure 50-112-11



Remove the two control lever mounting bolts (Item 1) **[Figure 50-112-11]**.

The mounting bolts are secured with lock-nuts on the back of the control panel. Once removed, they need to be replaced with new.

Figure 50-112-12



Remove the control lever from the loader **[Figure 50-112-12]**.

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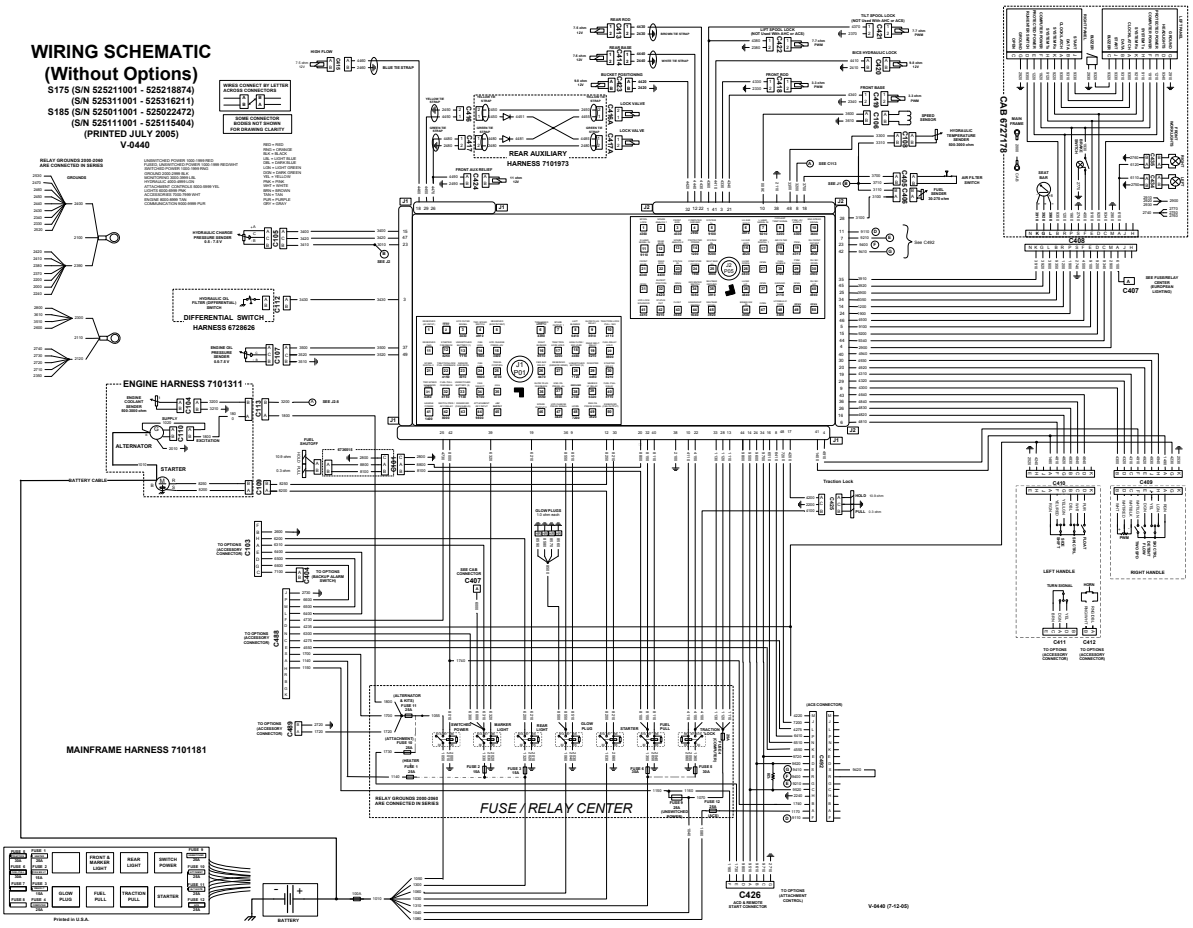
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- Guide Removal 60-110-5
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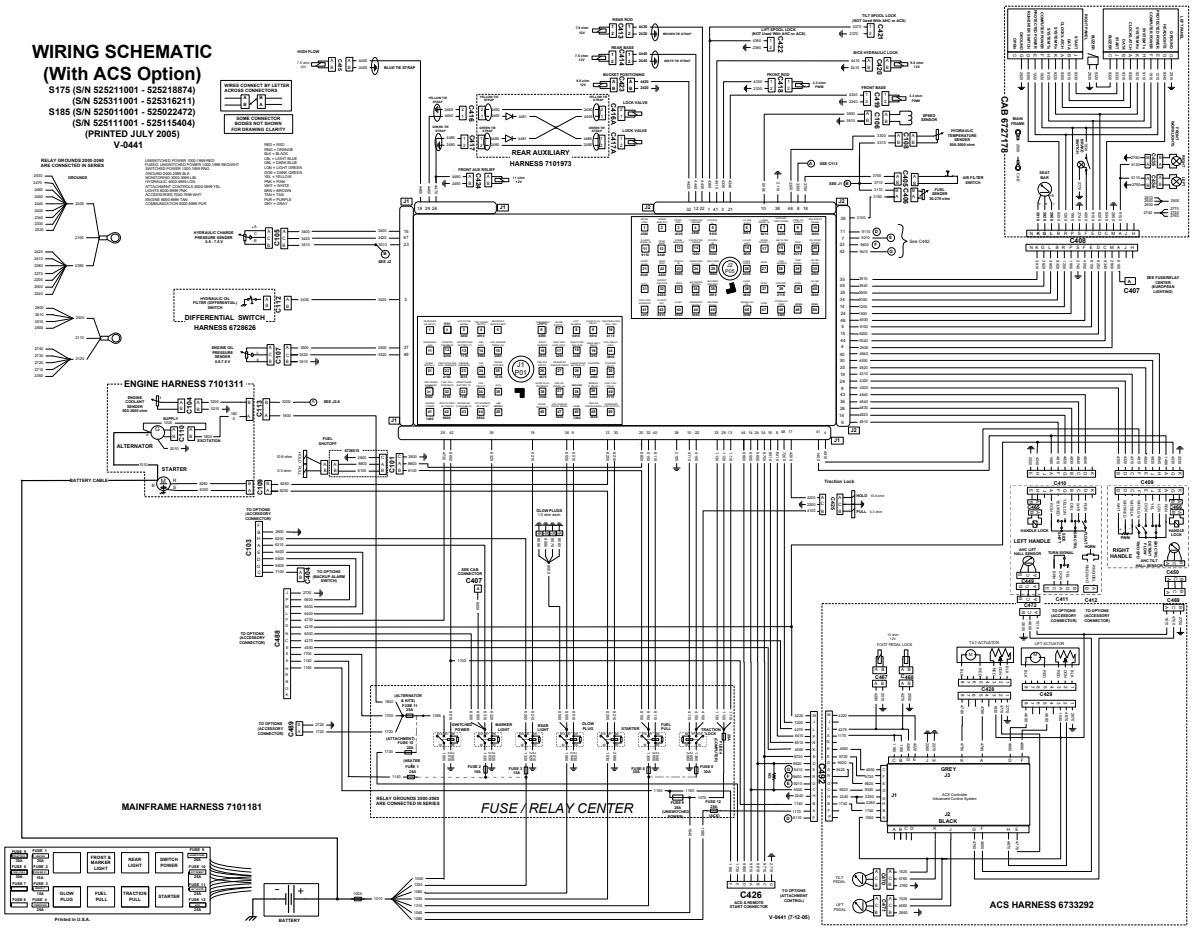
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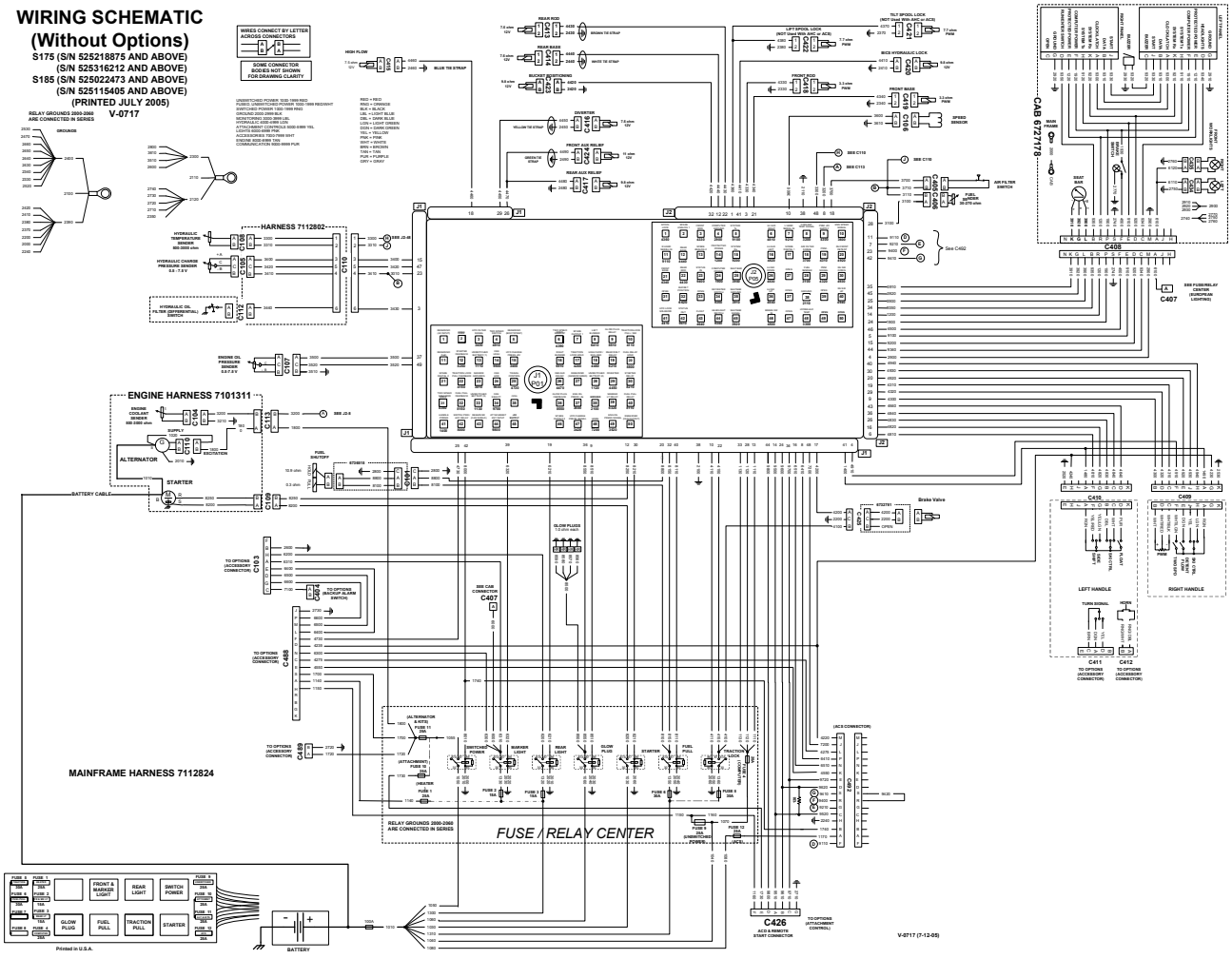


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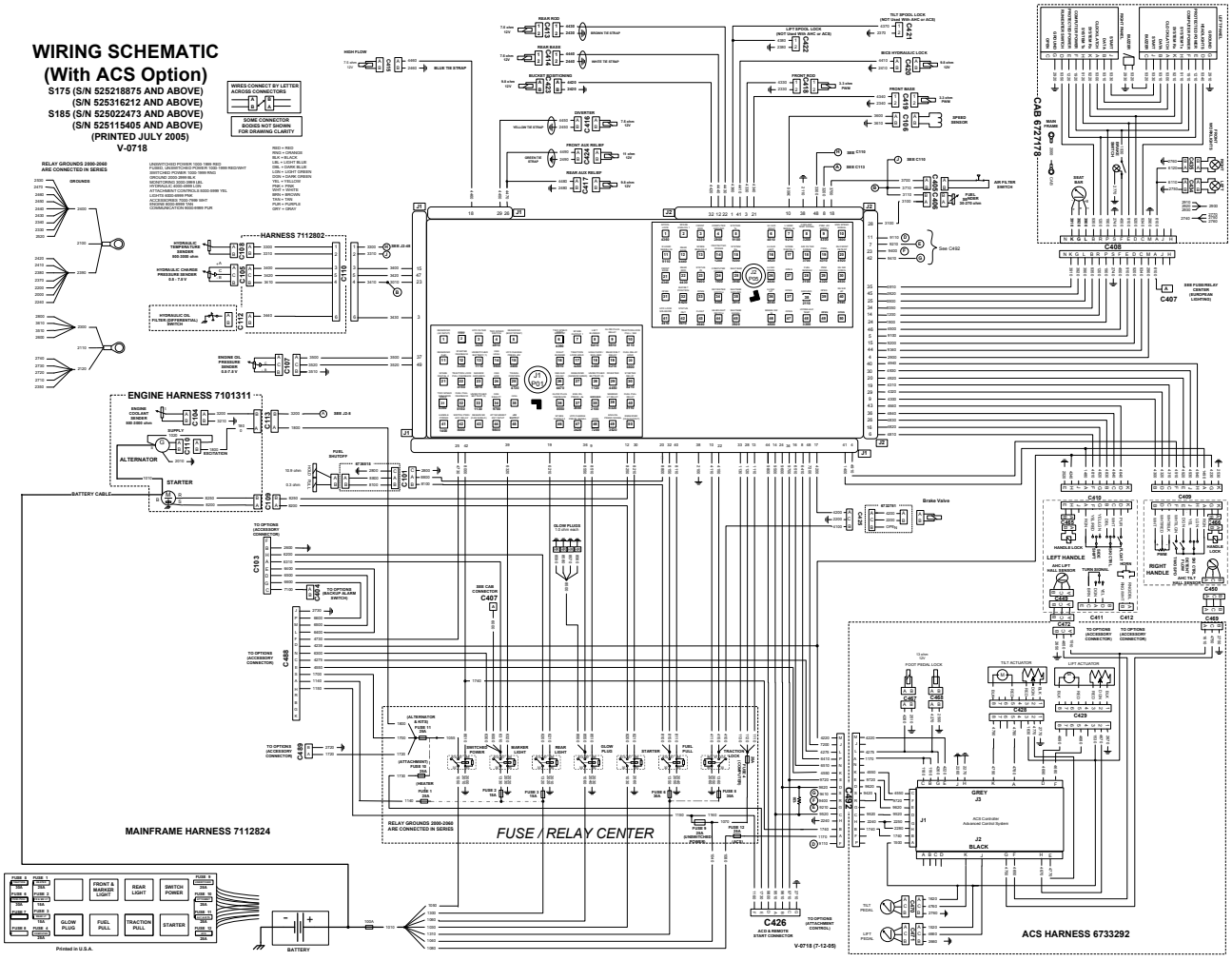
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(Without Options)

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(S/N 525316212 AND ABOVE)
S185 (S/N 525022473 AND ABOVE)
(S/N 525115405 AND ABOVE)
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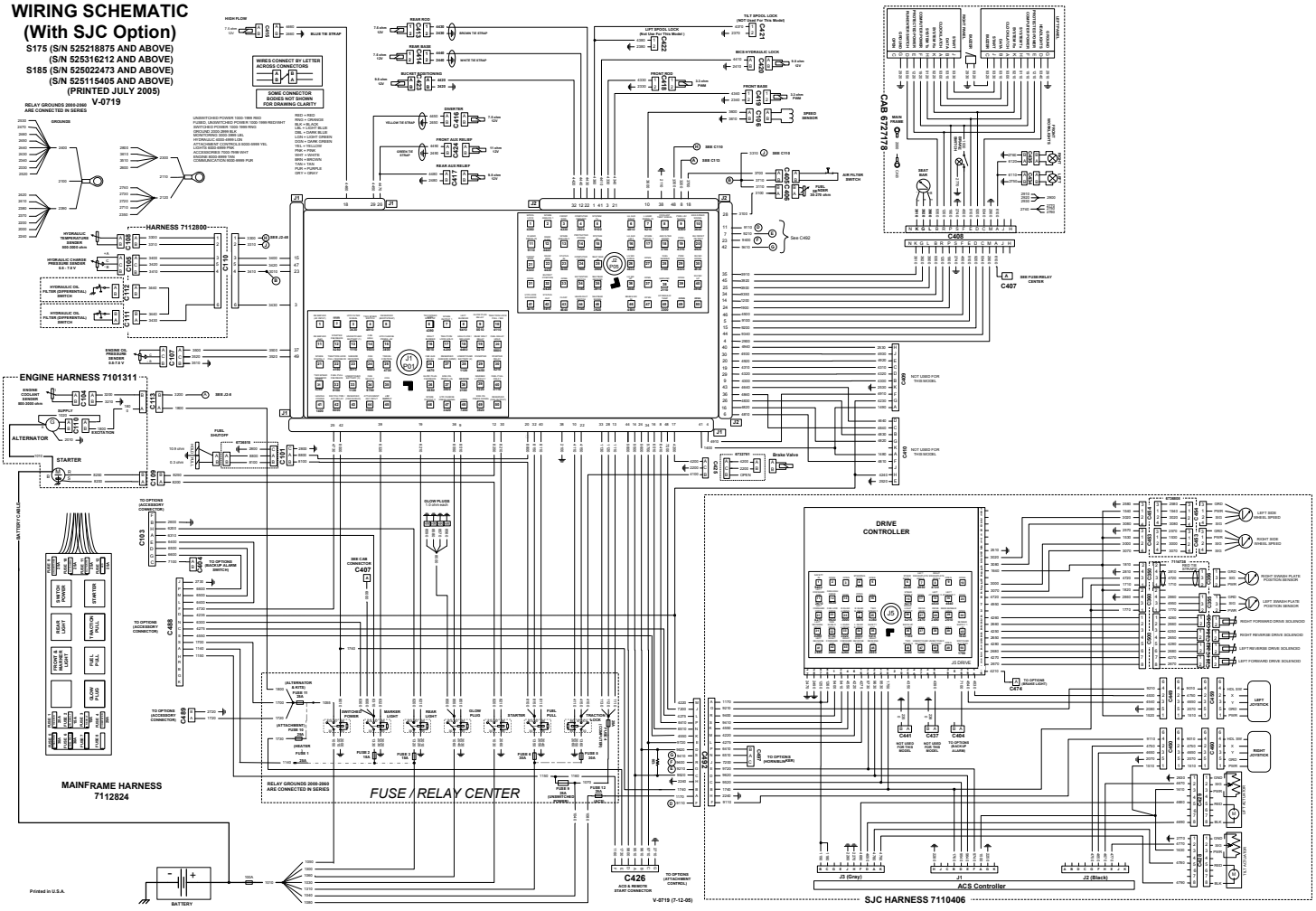
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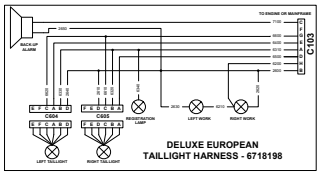
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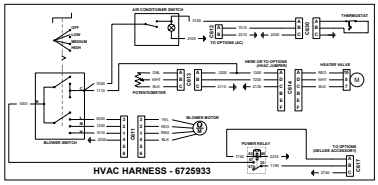


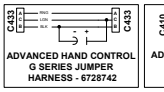
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WIRING SCHEMATIC

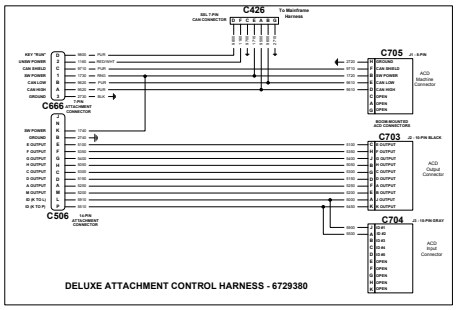
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S185 (S/N 525011001 AND ABOVE)
(S/N 525111001 AND ABOVE)
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V-0442

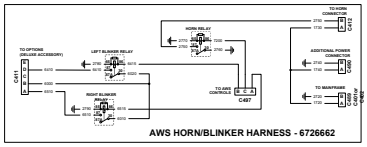


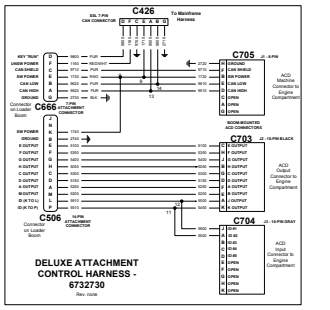




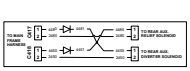


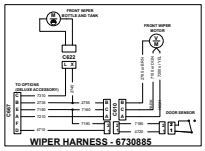


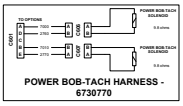


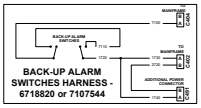


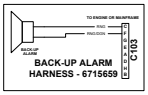


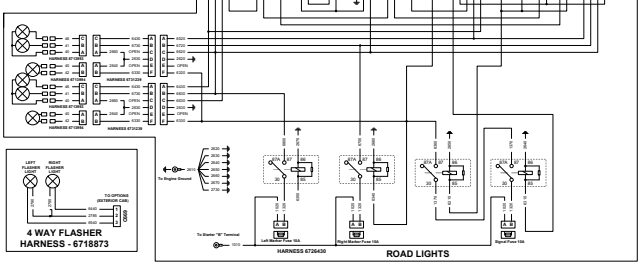


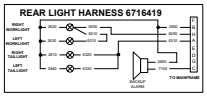


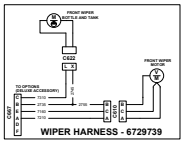


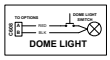


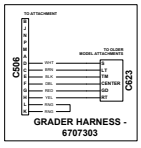


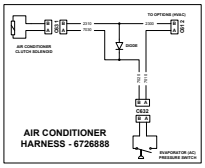


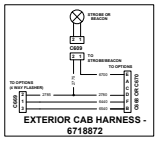


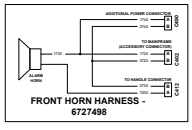


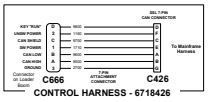


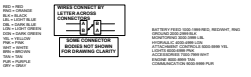












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WIRING SCHEMATIC

OPTIONS

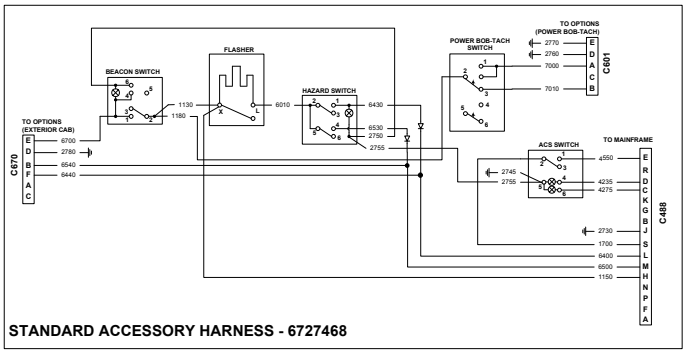
S175 (S/N 525211001 AND ABOVE)
(S/N 525311001 AND ABOVE)
S185 (S/N 525011001 AND ABOVE)
(S/N 525111001 AND ABOVE)
(PRINTED JULY 2005)
V-0443

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

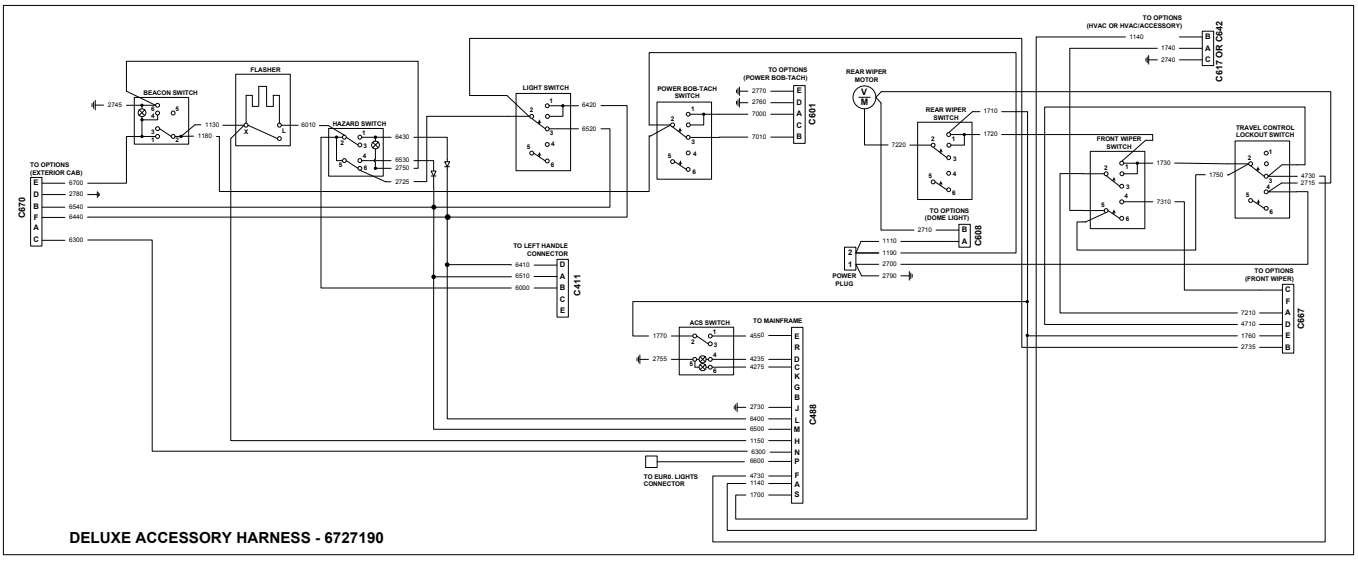
WIRES CONNECT BY LETTER ACROSS CONNECTORS

SOME CONNECTOR BODIES NOT SHOWN FOR DRAWING CLARITY

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



STANDARD ACCESSORY HARNESS - 6727468



DELUXE ACCESSORY HARNESS - 6727190

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S175 WIRING SCHEMATIC

(WITHOUT ACS OPTION)

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S/N 525311001 AND ABOVE
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V-0440

S185 WIRING SCHEMATIC

(WITHOUT ACS OPTION)

S/N 525011001 AND ABOVE
S/N 525111001 AND ABOVE
(PRINTED NOVEMBER 2003)
V-0440

S175 WIRING SCHEMATIC

(WITH ACS OPTION)

S/N 525211001 AND ABOVE
S/N 525311001 AND ABOVE
(PRINTED NOVEMBER 2003)
V-0441

S185 WIRING SCHEMATIC

(WITH ACS OPTION)

S/N 525011001 AND ABOVE
S/N 525111001 AND ABOVE
(PRINTED NOVEMBER 2003)
V-0441

S175 WIRING SCHEMATIC

OPTIONS

S/N 525211001 AND ABOVE
S/N 525311001 AND ABOVE
(PRINTED MAY 2004)
V-0442

S185 WIRING SCHEMATIC

OPTIONS

S/N 525011001 AND ABOVE
S/N 525111001 AND ABOVE
(PRINTED MAY 2004)
V-0442

S175 WIRING SCHEMATIC

OPTIONS

S/N 525211001 AND ABOVE
S/N 525311001 AND ABOVE
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V-0443

S185 WIRING SCHEMATIC

OPTIONS

S/N 525011001 AND ABOVE
S/N 525111001 AND ABOVE
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Troubleshooting Chart

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

WARNING

Instructions are necessary before operating or servicing machine. Read and understand the Operation & Maintenance Manual, 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-2003-0199

PROBLEM	CAUSE
Battery will not take a charge.	1, 2, 3, 4, 5
Alternator will not charge.	1, 2, 5
Starter will not turn the engine.	2, 3, 4, 6, 7, 8, 9

KEY TO CORRECT THE CAUSE
1. Alternator belt is loose or damaged.
2. Battery connections are dirty or loose.
3. Battery is damaged.
4. The ground connection is not making a good contact.
5. The alternator is damaged.
6. The engine is locked.
7. The starter is damaged.
8. The wiring or solenoid is damaged.
9. Check the fuses.

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Description

Figure 60-10-1

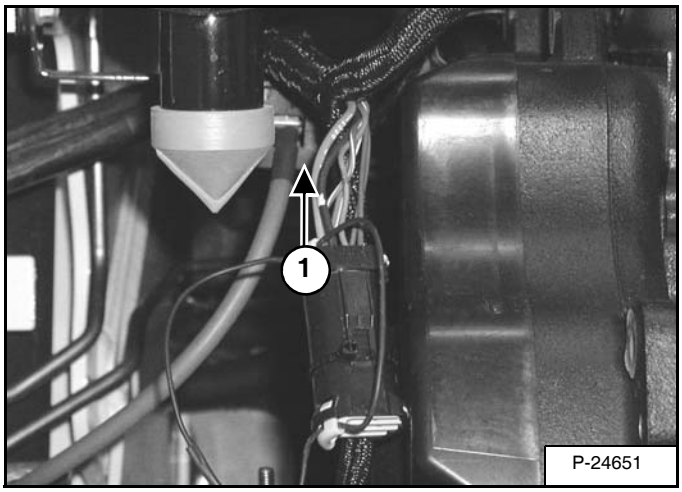
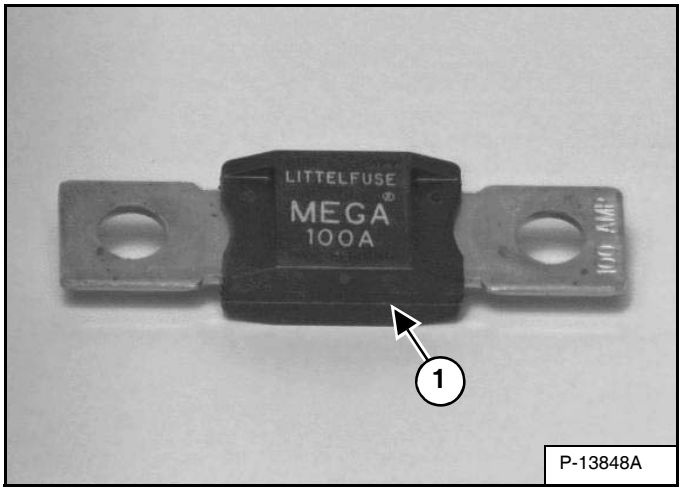
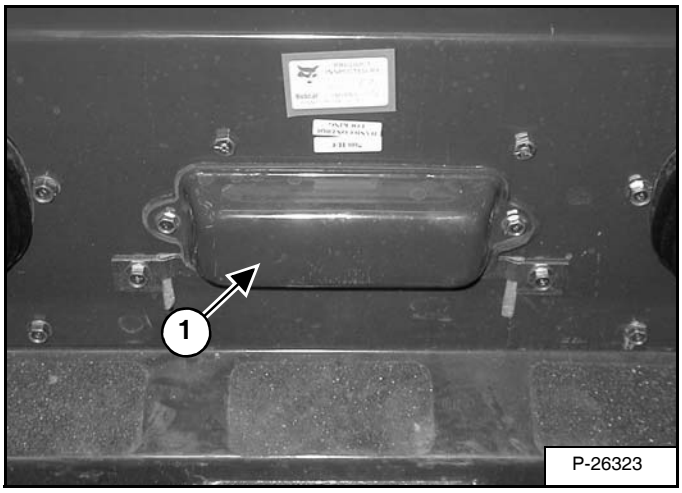


Figure 60-10-2



The loader has a 12 volt, negative ground alternator charging system. The electrical system is protected by a 100 amp master fuse (Item 1) **[Figure 60-10-1]** & **[Figure 60-10-2]** to protect against serious system overloads that could lead to burned up harness or loader damage. This fuse is located in the left-hand side engine compartment, just forward of the engine harness connector.

Figure 60-10-3



The electrical system is also protected by fuses and relays under the fuse panel cover (Item 1) **[Figure 60-10-3]** located in the cab on the control panel.

The fuse panel cover (Item 1) **[Figure 60-10-3]** & **[Figure 60-10-5]** has a decal inside to show the location and amp ratings.

IMPORTANT

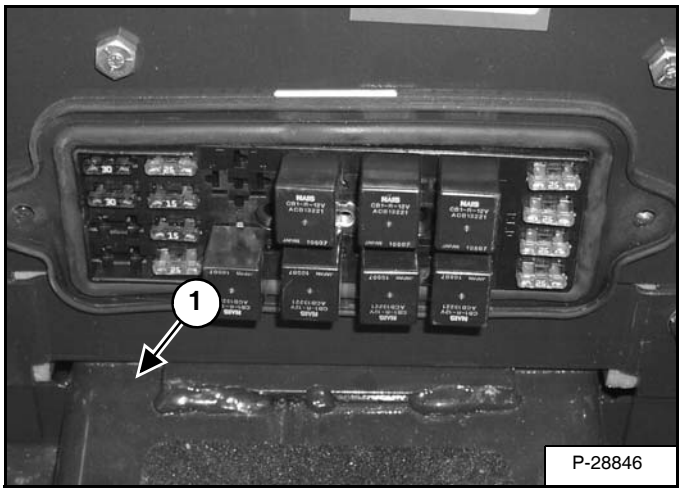
Do Not use silicone base sprays and/or sealants on harness connectors or components.

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Fuse Location

Figure 60-10-4



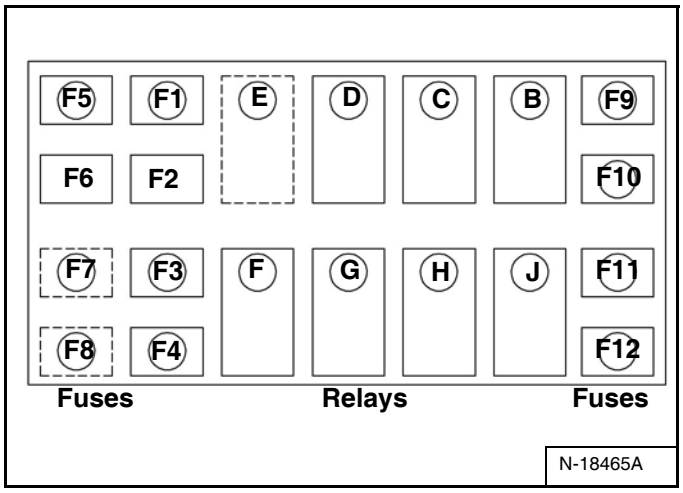
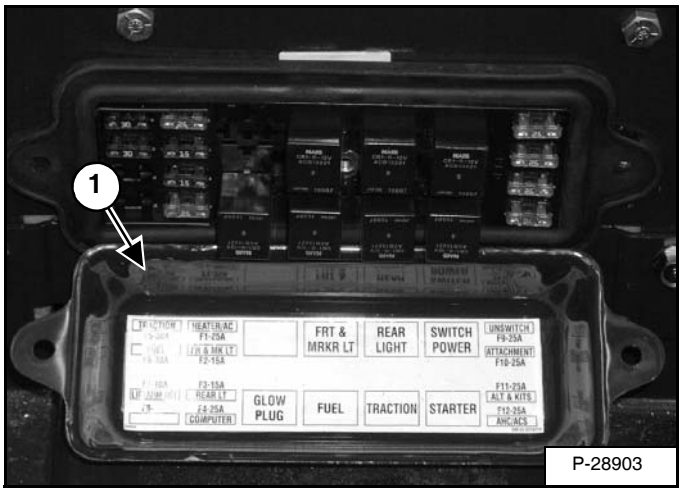


Figure 60-10-5



Remove the cover to check or replace the fuses (Item 1) **[Figure 60-10-5]**.

The location and sizes are shown in **[Figure 60-10-4]** & **[Figure 60-10-5]**.

REF	Description	Amp.
F1	Heater	25
F2	Front & Marker Lights	15
F3	Rear Lights	15
F4	Bobcat Controller	25
F5	Traction	30
F6	Fuel Shutoff	30
F7	*Not Used*	--
F8	*Not Used*	--
F9	Unswitched Attach.	25
F10	Switched Attach.	25
F11	Alternator & Kits	25
F12	ACS Power	25

Relay Switch Location

Remove the cover to check or replace the relays.

The location is shown in **[Figure 60-10-4]** & **[Figure 60-10-5]**.

REF	Description
B	Switch Power
C	Rear Lights
D	Front & Marker Lights
E	*Not Used*
F	Glow Plugs
G	Fuel Shutoff
H	Traction
J	Starter

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BATTERY

Removal And Installation

WARNING

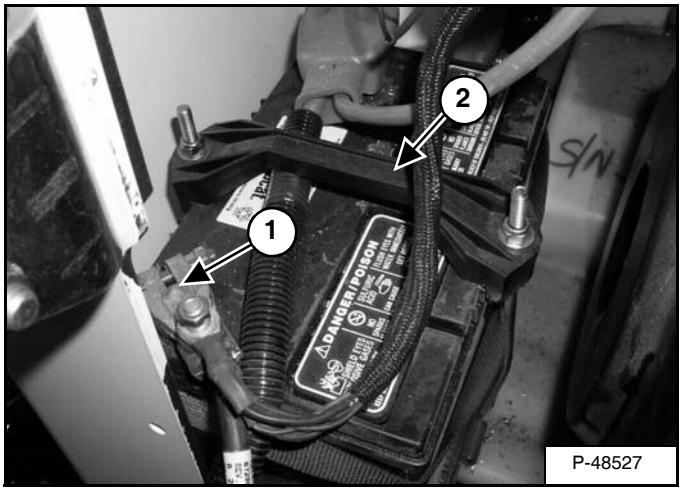
Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

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

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

W-2065-1296

Figure 60-20-1

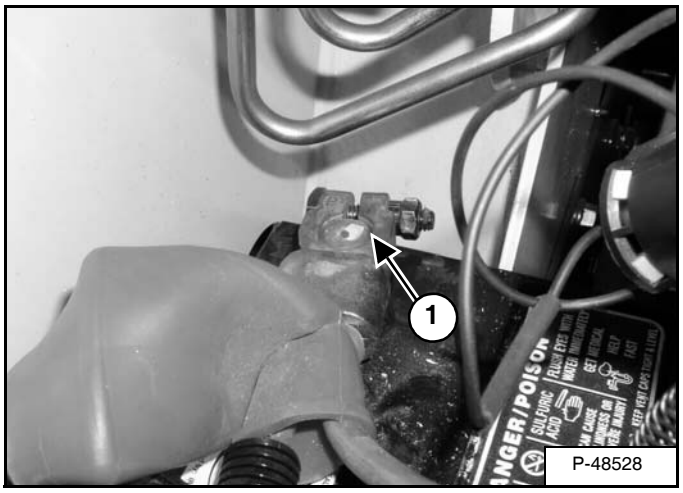


Open the rear door.

Disconnect the negative (-) battery cable (Item 1) **[Figure 60-20-1]**.

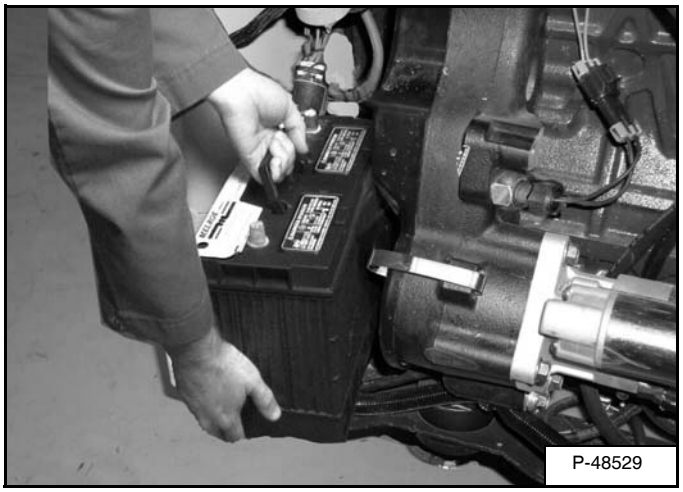
Remove the battery hold down clamp (Item 2) **[Figure 60-20-1]**.

Figure 60-20-2



Disconnect the positive (+) battery cable (Item 1) **[Figure 60-20-2]**.

Figure 60-20-3



Remove the battery from the loader **[Figure 60-20-3]**.

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Removal And Installation (Cont'd)

Installation

Figure 60-20-4

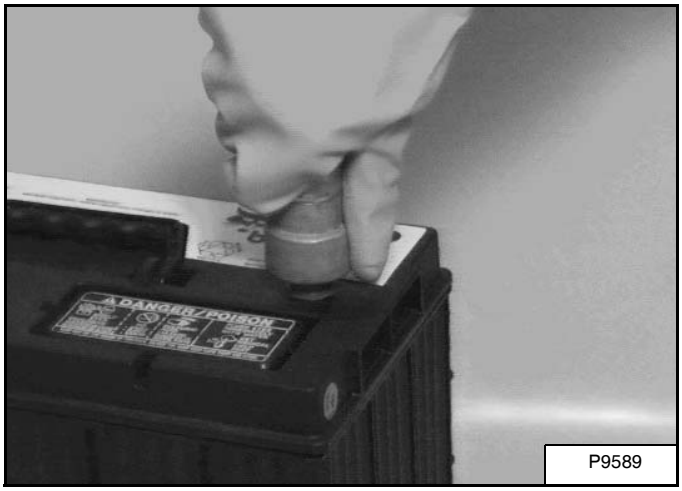
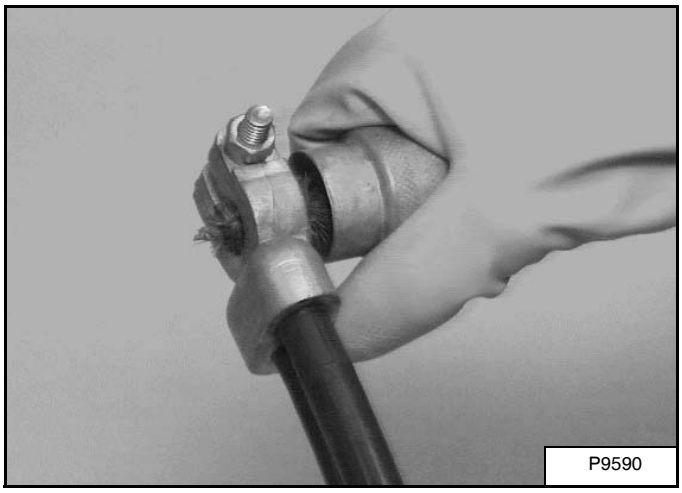


Figure 60-20-5



Always clean the terminals and cable ends when installing a new battery **[Figure 60-20-4]** & **[Figure 60-20-5]**.

When installing the battery in the loader, do not touch any metal parts with the battery terminal posts.

Connect and tighten the battery cables. Connect the negative (-) cable last to prevent sparks.

Install the battery holddown clamp.

Servicing

⚠ WARNING

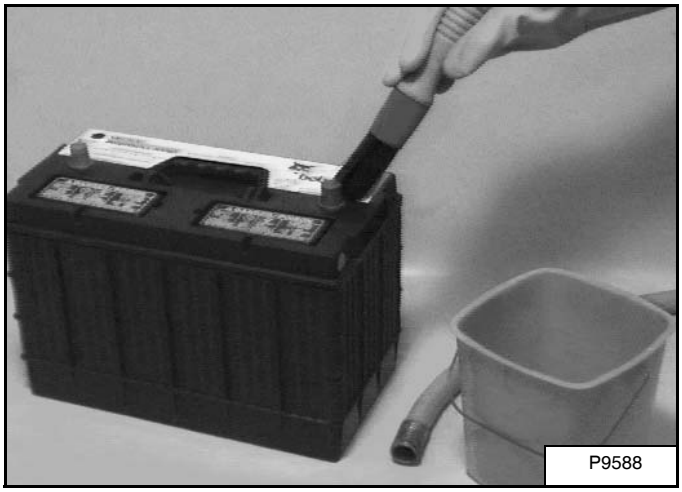
Batteries contain acid which burns eyes and skin on contact. Wear goggles, protective clothing and rubber gloves to keep acid off body.

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

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

W-2065-1296

Figure 60-20-6



The battery cables must be clean and the connections tight. Remove acid or corrosion from the battery and cables with a sodium bicarbonate (baking soda) and water solution **[Figure 60-20-6]**.

Clean the terminals and cable ends as shown in figure **[Figure 60-20-4]** and **[Figure 60-20-5]**.

Check the electrolyte level in the battery. Add distilled water as needed.

Put battery saver or grease on the battery terminals and cable ends to prevent corrosion.

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Using A Booster Battery (Jump Starting)

If it is necessary to use a booster battery to start the engine, BE CAREFUL! There must be one person in the operator's seat and one person to connect and disconnect the battery cables.

The key switch must be OFF (*Standard Panel*) OR the STOP Button must be pressed (*Deluxe Panel*). The booster battery must be 12 volt.

⚠ WARNING

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

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

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

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⚠ WARNING

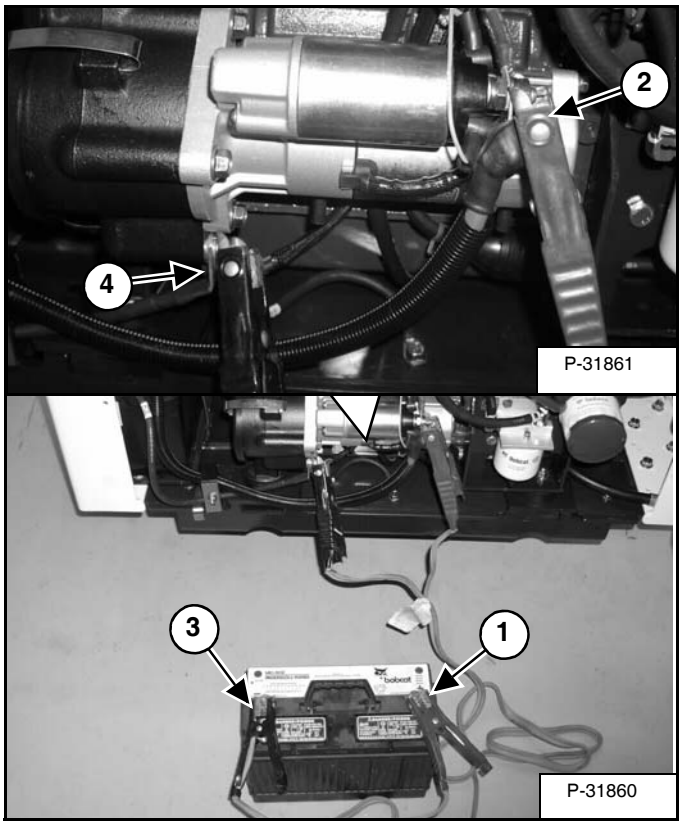
Keep arcs, sparks flames and lighted tobacco away from batteries. When *jumping* from booster battery make final connection (negative) at engine frame.

Do not jump start or charge a frozen or damaged battery. Warm battery to 60°F (16°C) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

Battery gas can explode and cause serious injury.

W-2066-1296

Figure 60-20-7



Connect the end of the first cable (Item 1) to the positive (+) terminal of the booster battery. Connect the other end of the same cable (Item 2) **[Figure 60-20-7]** to the positive terminal on the loader starter.

Connect the end of the second cable (Item 3) to the negative (-) terminal of the booster battery. Connect the other end of the same cable (Item 4) **[Figure 60-20-7]** to the engine.

Keep cables away from moving parts. Start the engine. (See REMOTE START on Page 10-60-1.)

After the engine has started, remove the ground (-) cable (Item 4) **[Figure 60-20-7]** first.

Remove the cable from the positive terminal (Item 2) **[Figure 60-20-7]**.

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Using A Booster Battery (Jump Starting) (Cont'd)

IMPORTANT

Damage to the alternator can occur if:

- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the loader. (Remove both cables from the battery.)**
- **Extra battery cables (booster cables) are connected wrong.**

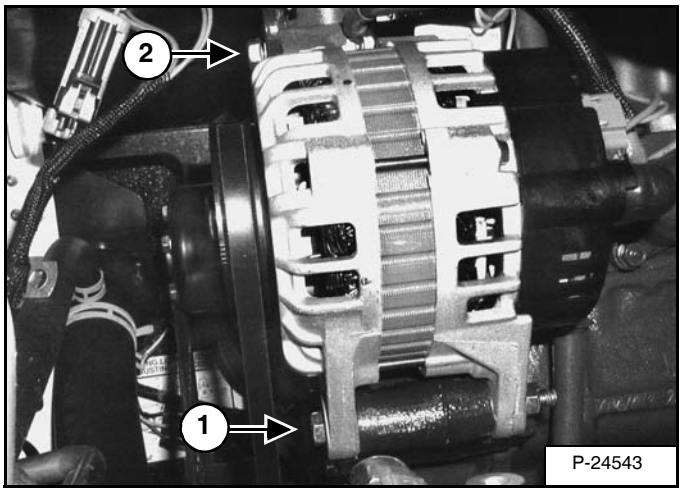
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ALTERNATOR

Adjusting The Alternator Belt

Figure 60-30-1



Stop the engine.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Loosen the alternator mounting bolt (Item 1) **[Figure 60-30-1]**.

Loosen the adjustment bolt (Item 2) **[Figure 60-30-1]**

Move the alternator until the belt has 5/16 inch (8,0 mm) movement at the middle of the belt span with 15 lb. (66 N•m) of force.

Tighten the adjustment bolt and mounting bolt.

Lower the operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

Alternator Identification

Figure 60-30-2

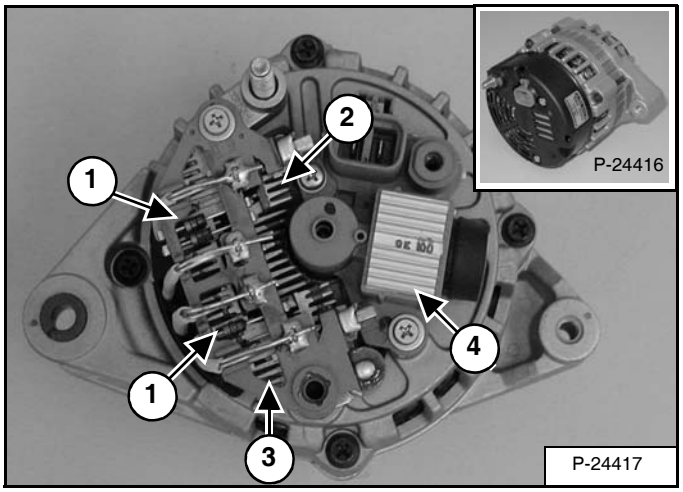
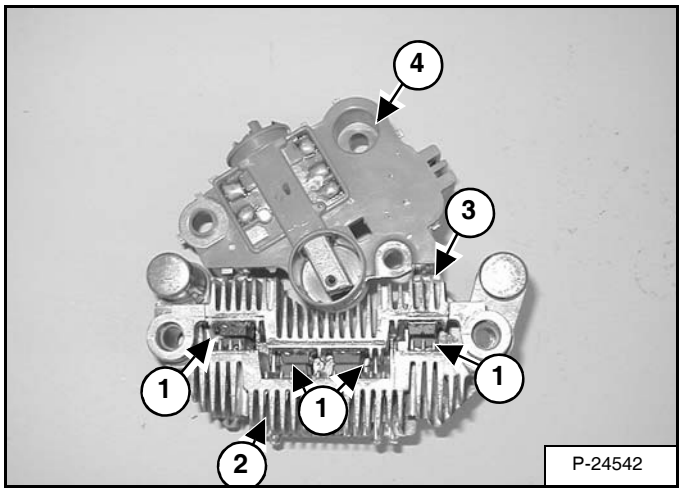


Figure 60-30-3



The black cover has been removed to show alternator rectifier/regulator assembly. The alternator contains field coil diodes (low current) (Item 1) **[Figure 60-30-2]**, grounded heat sink (Item 2) **[Figure 60-30-2]** & **[Figure 60-30-3]**, B+ power heat sink (Item 3) **[Figure 60-30-2]** & **[Figure 60-30-3]**, regulator (Item 4) **[Figure 60-30-2]** & **[Figure 60-30-3]**, and four pair of large power diodes (Item 1) **[Figure 60-30-3]** on the underside of the rectifier.

NOTE: The rectifier/regulator assembly has been removed from the alternator and flipped over for component identification [Figure 60-30-3].

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Charging System Check

WARNING

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

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

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

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WARNING

Keep arcs, sparks flames and lighted tobacco away from batteries. When *jumping* from booster battery make final connection (negative) at engine frame.

Do not jump start or charge a frozen or damaged battery. Warm battery to 60°F (16°C) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

Battery gas can explode and cause serious injury.

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IMPORTANT

Damage to the alternator can occur if:

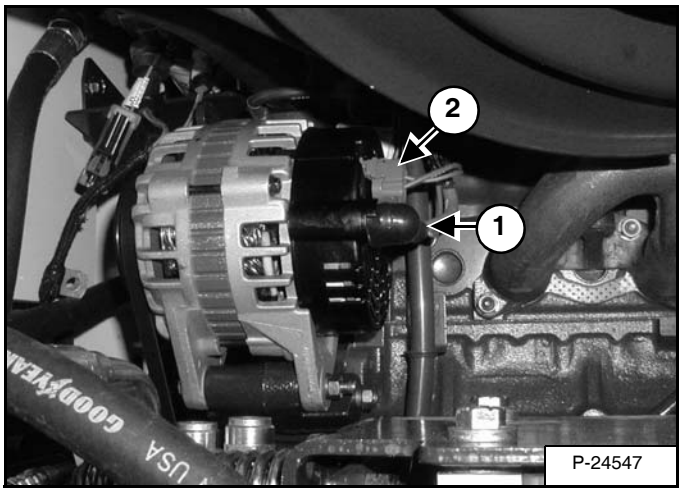
- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the loader. (Remove both cables from the battery.)**
- **Extra battery cables (booster cables) are connected wrong.**

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Charging System Check (Cont'd)

Figure 60-30-4



If the charging system malfunctions check the following:

Check the condition and tension of the alternator belt. (See Adjusting The Alternator Belt on Page 60-30-1.) If belt is worn or deteriorated replace.

Inspect the alternator wiring harness and connectors at alternator. Harness and connectors must be clean and tight.

Check the fuse for the alternator in the fuse panel. If fuse is burned, find the cause and repair/replace. If fuse is in doubt, remove it and check for continuity.

Check the electrolyte level in the battery. Add distilled water as needed. (Does not apply to maintenance free batteries.)

Verify the charge of the battery. Make sure battery is fully charged.

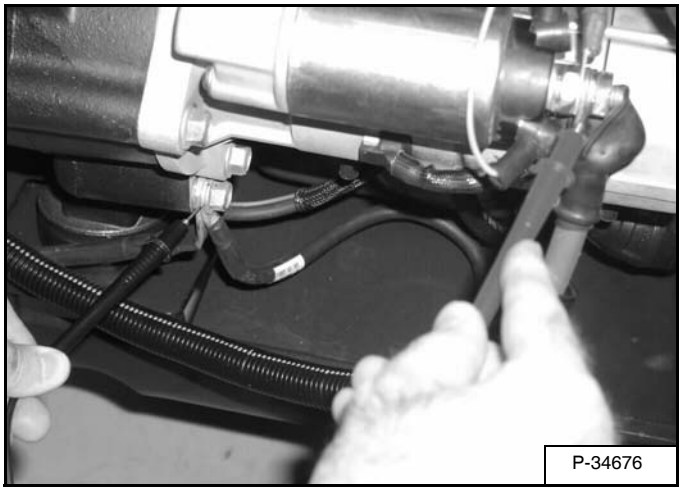
Disconnect the battery cables (negative first, then positive). Inspect the cable clamps and battery posts for corrosion. Remove acid or corrosion from the battery and cables with a sodium bicarbonate and water solution. Put grease on the cable ends and battery terminals to prevent corrosion. Reconnect the cable to the positive terminal.

With the key off, connect a test light between the negative battery post and the disconnected negative cable clamp.

1. If the test light does not light up, reattach the clamp and proceed to alternator voltage test. (See Below.)
2. If the test light lights up, there is a short (drain) in the electrical system of the loader. The short must be repaired before the charging system can be checked.
3. Disconnect the alternator B+ terminal (Item 1) and L & S terminal connector (Item 2) **[Figure 60-30-4]** and if the test light goes out, the alternator is faulty. If the test light stays on, find the short in the system and repair it.

Alternator Voltage Test

Figure 60-30-5



Open the rear door.

Connect the remote start tool to the loader. (See Procedure on Page 10-60-1.)

Turn the engine on with the remote start tool and run at idle. With a voltmeter, check the voltage between the B+ terminal and ground at the starter **[Figure 60-30-5]**.

The voltage must be higher than 13.5 volts but lower than 14.7 volts at 70°F (Alternator Temperature).

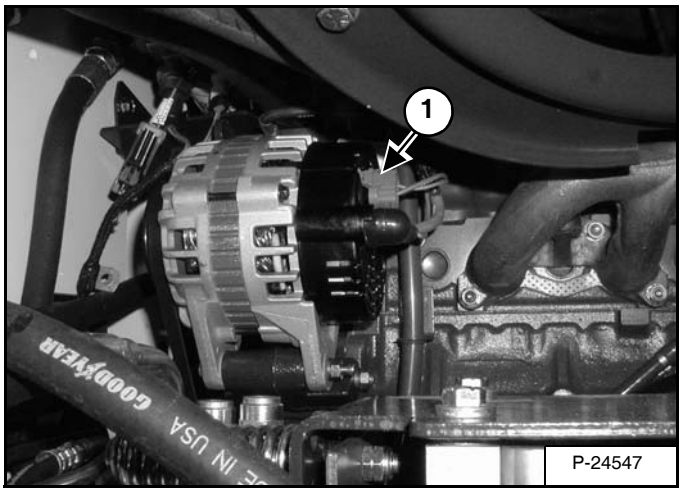
If the voltage is higher that 14.7 volts, proceed to the following high voltage test.

If the voltage is lower than 13.5 volts, run the engine at high idle and recheck voltage. If voltage is still below 13.5 volts, proceed with the following low voltage test.

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Low Voltage Test

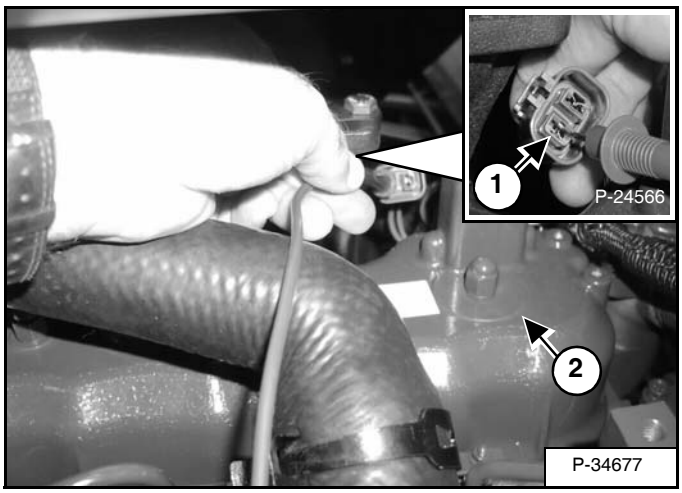
Figure 60-30-6



Turn engine OFF and remove the L & S terminal connector (Item 1) **[Figure 60-30-6]** off the alternator.

Turn the remote start tool key to the ON position.

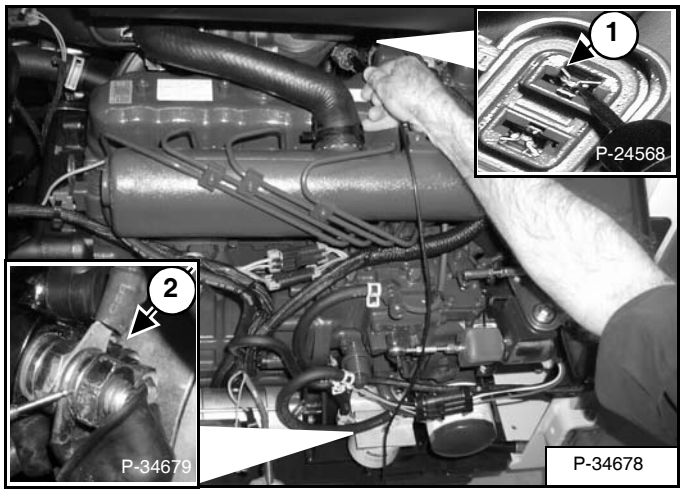
Figure 60-30-7



Check the voltage across the "L" terminal (Item 1) and ground (Item 2) **[Figure 60-30-7]**. The voltage should be what the battery voltage is. If not, check wire harness, relay and fuses. If the wire harness, relay and fuses are ok then remove alternator for replacement or repair. To repair, (See Rectifier Continuity (Diode) Test on Page 60-30-5.) for further component testing.

High Voltage Test

Figure 60-30-8



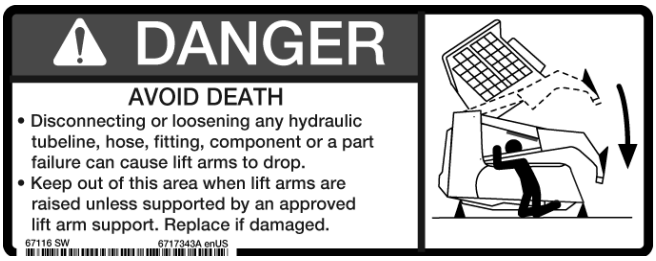
Turn engine OFF and remove the L & S Terminal connector (Item 1) **[Figure 60-30-6]** off the alternator.

Check the continuity between the "S" terminal (Item 1) [Figure 60-30-8] and the positive (+) terminal on the battery or starter terminal (Item 2) [Figure 60-30-8]. There should be continuity. If no continuity, replace wire harness.

If voltage is still above 14.7 volts at 70°F (Alternator Temperature), then remove alternator for replacement or repair. To repair, (See Rectifier Continuity (Diode) Test on Page 60-30-5.) for further component testing.

Removal And Installation

Place jackstands under the rear corners of the loader.



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Removal And Installation (Cont'd)

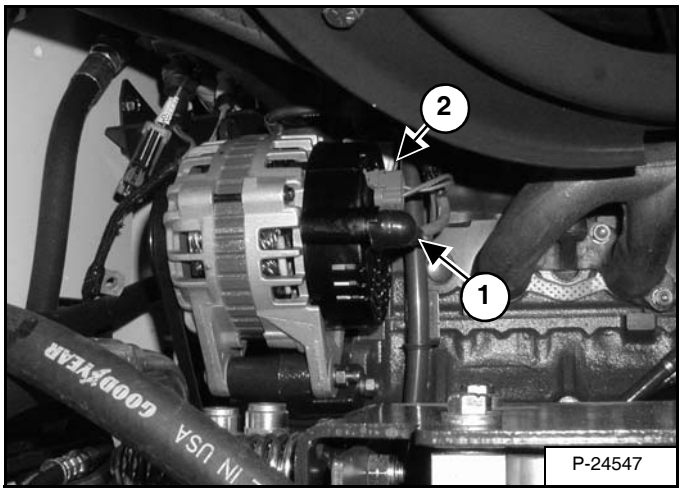
IMPORTANT

Damage to the alternator can occur if:

- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the loader. (Remove both cables from the battery.)**
- **Extra battery cables (booster cables) are connected wrong.**

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Figure 60-30-9



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

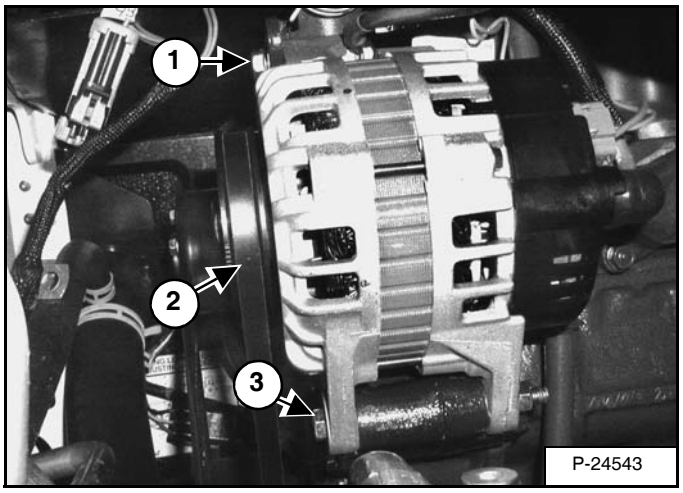
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Disconnect the negative (-) cable from the battery.

Disconnect the red wire (Item 1) **[Figure 60-30-9]** from the alternator which comes from the battery.

Disconnect the wiring harness connector (Item 2) **[Figure 60-30-9]** from the alternator.

Figure 60-30-10



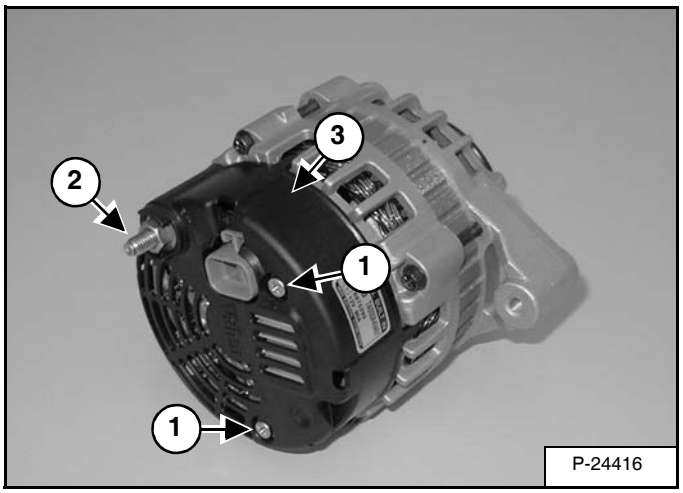
Remove the adjustment bolt (Item 1) **[Figure 60-30-10]** from the mounting bracket.

Remove the alternator belt (Item 2) **[Figure 60-30-10]** from the alternator pulley.

Remove the mounting bolt (Item 3) **[Figure 60-30-10]**.

Rectifier Continuity (Diode) Test

Figure 60-30-11



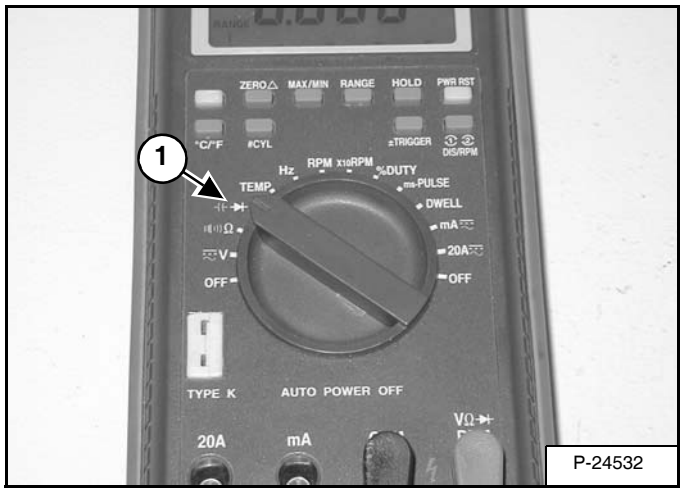
Remove the two screws (Item 1), nut/washer (Item 2) and the plastic cover (Item 3) **[Figure 60-30-11]** from the alternator.

NOTE: In the diode tests there should be continuity in one direction only. Meter readings should be different when probes are reversed. If the diode being tested shows no continuity or continuity in both directions, replace the rectifier assembly.

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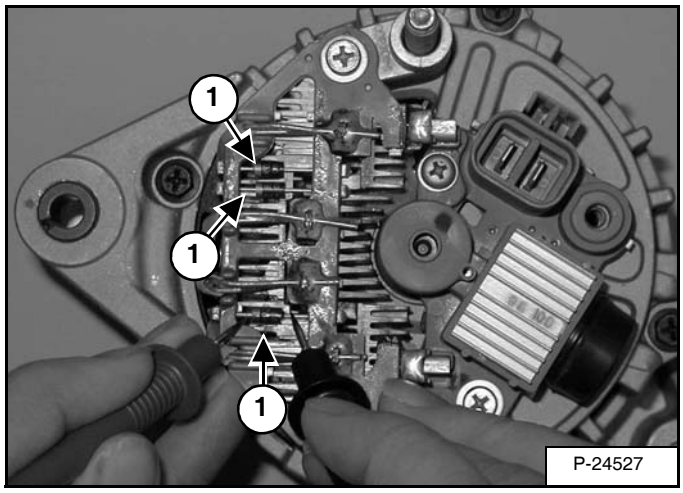
Rectifier Continuity (Diode) Test (Cont'd)

Figure 60-30-12



NOTE: Use the diode function (Item 1) [Figure 60-30-12] on the multimeter.

Figure 60-30-13

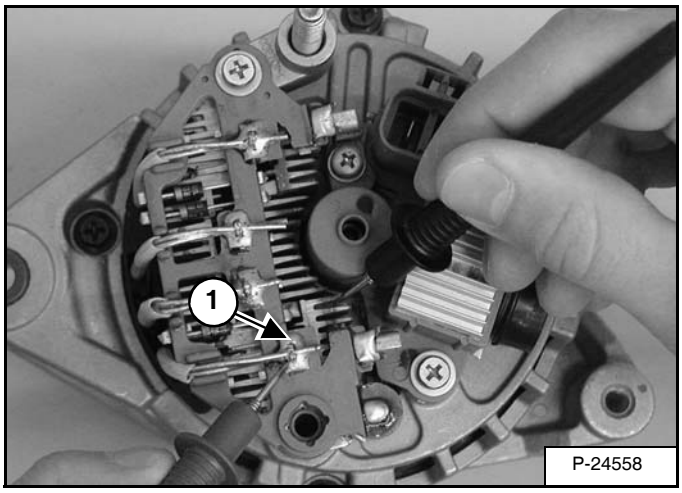


Touch the probes to the terminals (Item 1) **[Figure 60-30-13]** of each diode and read the meter.

Reverse the probes to check the diode in the other direction.

Meter readings should be different when probes are reversed.

Figure 60-30-14



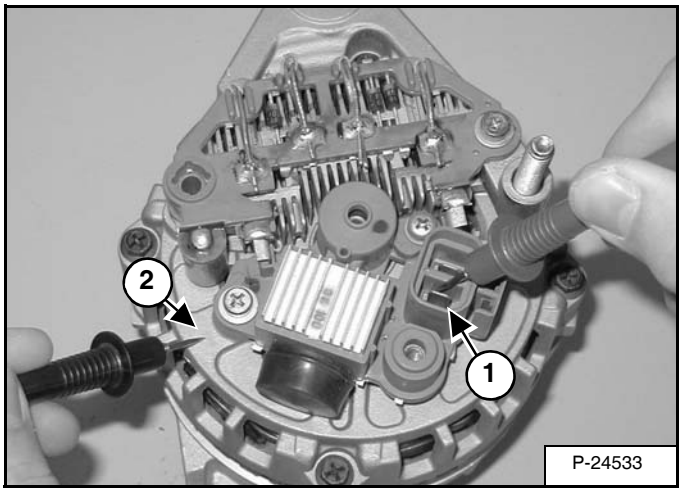
Touch one probe to the diode (Item 1) **[Figure 60-30-14]** and the other probe to each heat sink and read the meter.

Reverse the probes to check the diode in the other direction.

Meter readings should be different when probes are reversed.

Alternator Regulator Test

Figure 60-30-15

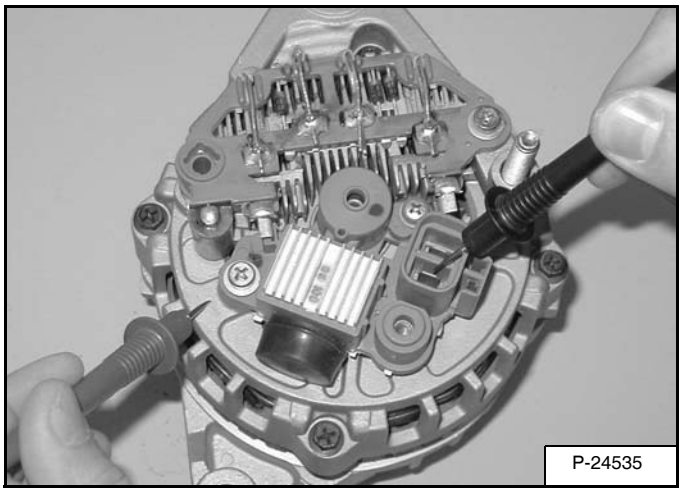


Touch one probe to the "L" terminal (Item 1) and the other probe to the ground (Item 2) **[Figure 60-30-15]**.

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Alternator Regulator Test (Cont'd)

Figure 60-30-16

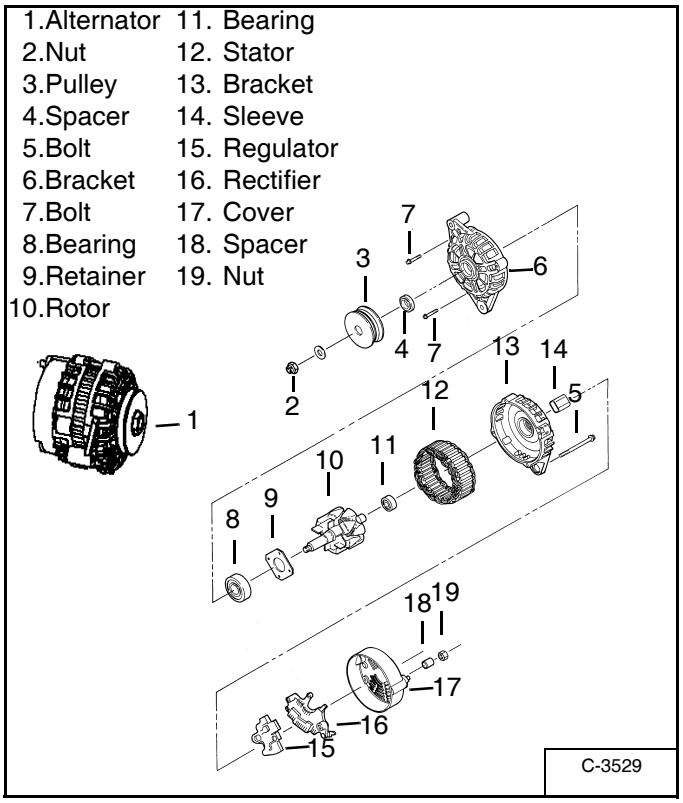


Reverse the probes to check in the other direction **[Figure 60-30-16]**.

There should be continuity in one direction only. Meter readings should be different when probes are reversed. If there is no continuity or continuity in both directions, replace regulator.

Disassembly

Figure 60-30-17



Disassemble the alternator. (See Parts Identification Figure **[Figure 60-30-17]**.)

Remove the regulator cover.

Remove the four bolts holding halves together.

Pry the halves apart (use a press if needed).

Use a soft jaw vise to hold rotor while removing pulley nut.

Remove front case half from the rotor using a plastic hammer or press.

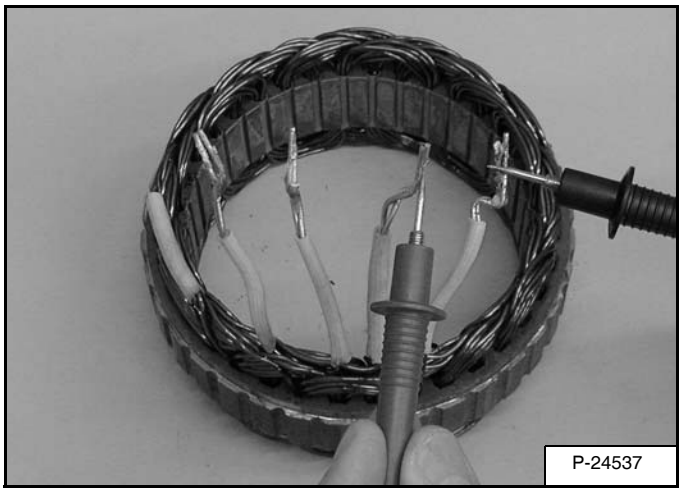
Unsolder the stator leads from the rectifier. Remove the stator.

Unsolder the two leads between the rectifier and regulator. Remove the regulator from rectifier.

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Stator Continuity Test

Figure 60-30-18



Use an ohmmeter to test the stator.

Touch the probes to two of the bare stator wires **[Figure 60-30-18]**.

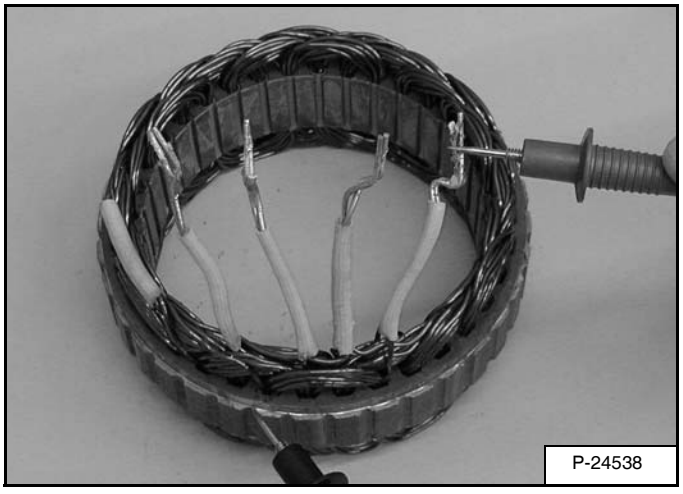
Move one of the probes to the third wire.

The readings should be the same.

If there is no continuity, replace the stator.

Stator Ground Test

Figure 60-30-19



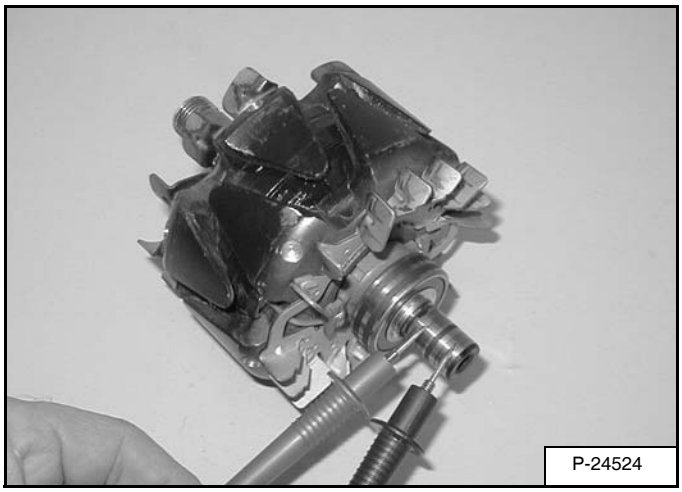
Touch one probe to a bare stator lead and the other probe to the bare metal surface of the stator **[Figure 60-30-19]**.

There should be no continuity.

Replace the stator if there is continuity.

Rotor Continuity Test

Figure 60-30-20



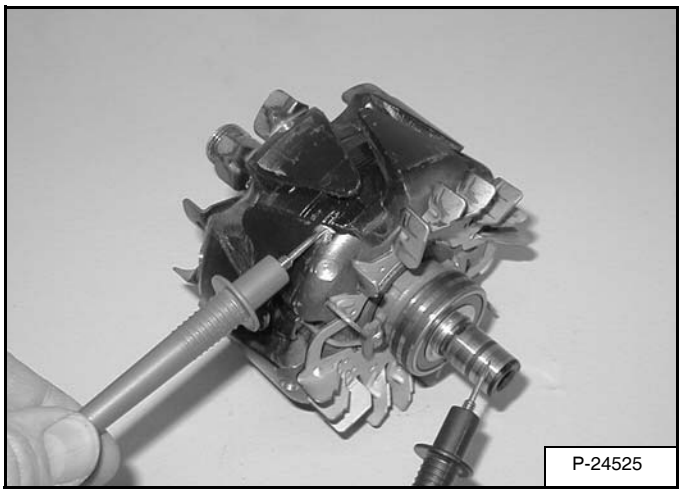
Touch the probes to the slip rings **[Figure 60-30-20]**.

The ohmmeter should read between 3.0-4.0 ohms.

If there is no continuity, replace the rotor.

Rotor Ground Test

Figure 60-30-21



Touch one probe to one of the slip rings and the other probe to the rotor shaft **[Figure 60-30-21]**.

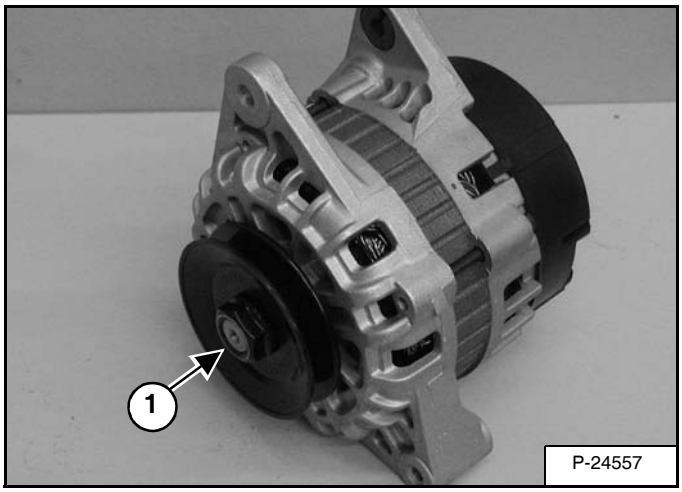
There should be no continuity.

Replace the rotor if there is continuity.

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Assembly

Figure 60-30-22



Reverse the order of disassembly.

Do not assemble the rear case half.

Place the rotor in soft jaws when tightening the shaft nut (Item 1) **[Figure 60-30-22]**. Tighten to 72 + 14.5 ft.-lb. (98 + 20 N•m) torque.

Install the rear case half and the remaining parts.

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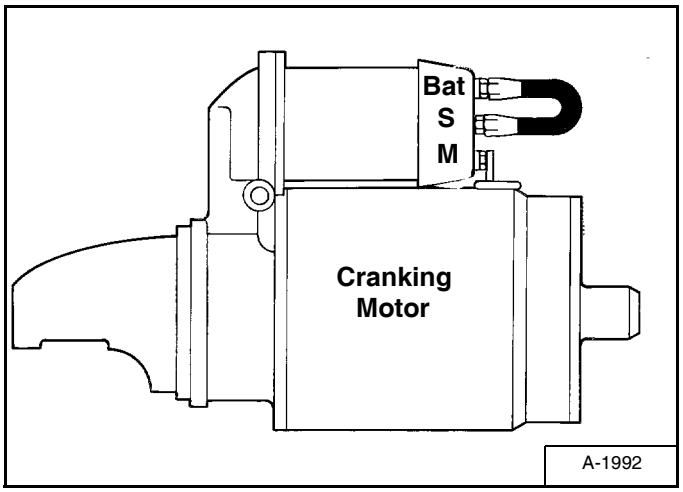


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STARTER

Checking

Figure 60-40-1



The key switch must be in the OFF position.

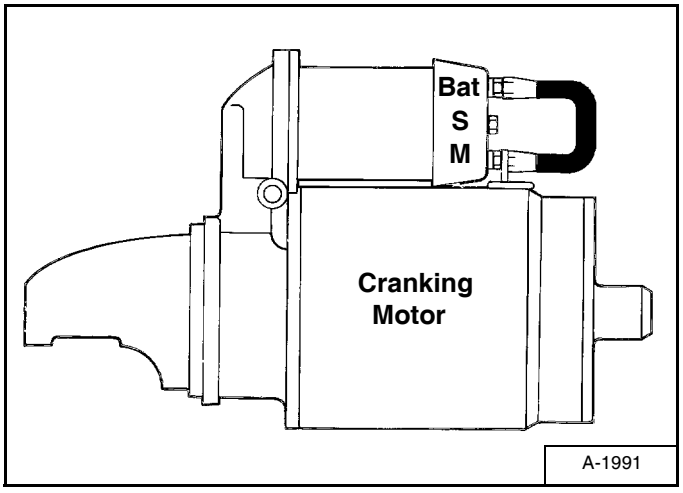
The battery must be at full charge.

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

Connect a jumper wire between S terminal and BAT terminal **[Figure 60-40-1]**.

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

Figure 60-40-2

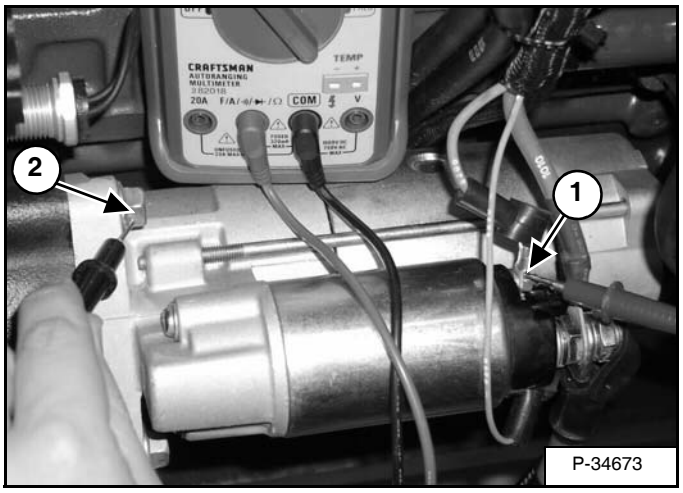


Connect a jumper wire **(of at least 4 gauge in size)** between the M terminal and the BAT terminal **[Figure 60-40-2]**.

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

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

Figure 60-40-3

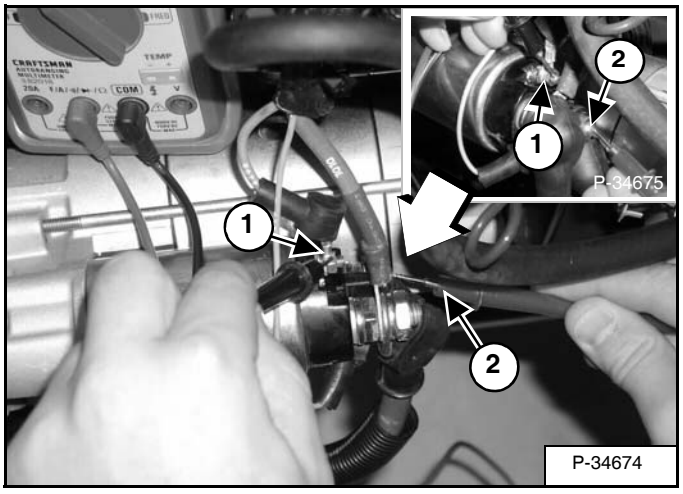


Disconnect the negative cable from the battery. (See Removal And Installation on Page 60-20-1.)

Disconnect the S terminal on the starter (Item 1) **[Figure 60-40-3]**.

Hold-In Test: Use circuit tester, touch one probe to the S terminal (Item 1) and one probe to the mounting bolt (Item 2) **[Figure 60-40-3]** on the magnetic switch (solenoid). If there is no continuity replace the magnetic switch (solenoid).

Figure 60-40-4



Disconnect the negative cable from the battery. (See Removal And Installation on Page 60-20-1.)

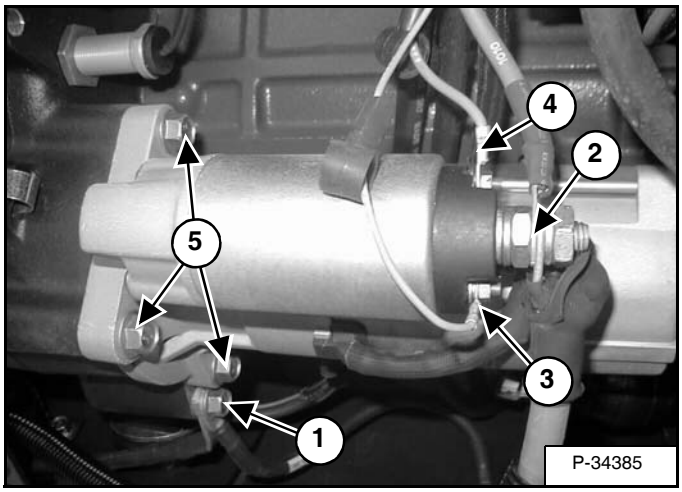
Disconnect the S terminal on the starter (Item 1) **[Figure 60-40-4]**.

Pull-In Test: Use circuit tester, touch one probe to the S terminal (Item 1) and one probe to the starter motor terminal (Item 2) **[Figure 60-40-4]**. If there is no continuity replace the magnetic switch (solenoid).

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Removal And Installation

Figure 60-40-5



Stop the engine and open the rear door.

Remove the negative (-) and positive (+) cables from the battery.

Disconnect the ground wire (Item 1) **[Figure 60-40-5]** from the starter.

Disconnect the engine harness power wire and positive (+) battery cable from the starter solenoid terminal (Item 2) **[Figure 60-40-5]**.

Installation: Tighten the nut to 10.8-12.3 ft. lb. (14,7-16,7 N•m) torque.

Disconnect the tan wire (Item 3) **[Figure 60-40-5]** from the R terminal on the starter solenoid.

Disconnect the brown wire (Item 4) **[Figure 60-40-5]** from the S terminal on the starter solenoid.

Remove the mounting bolts (Item 5) **[Figure 60-40-5]** from the starter.

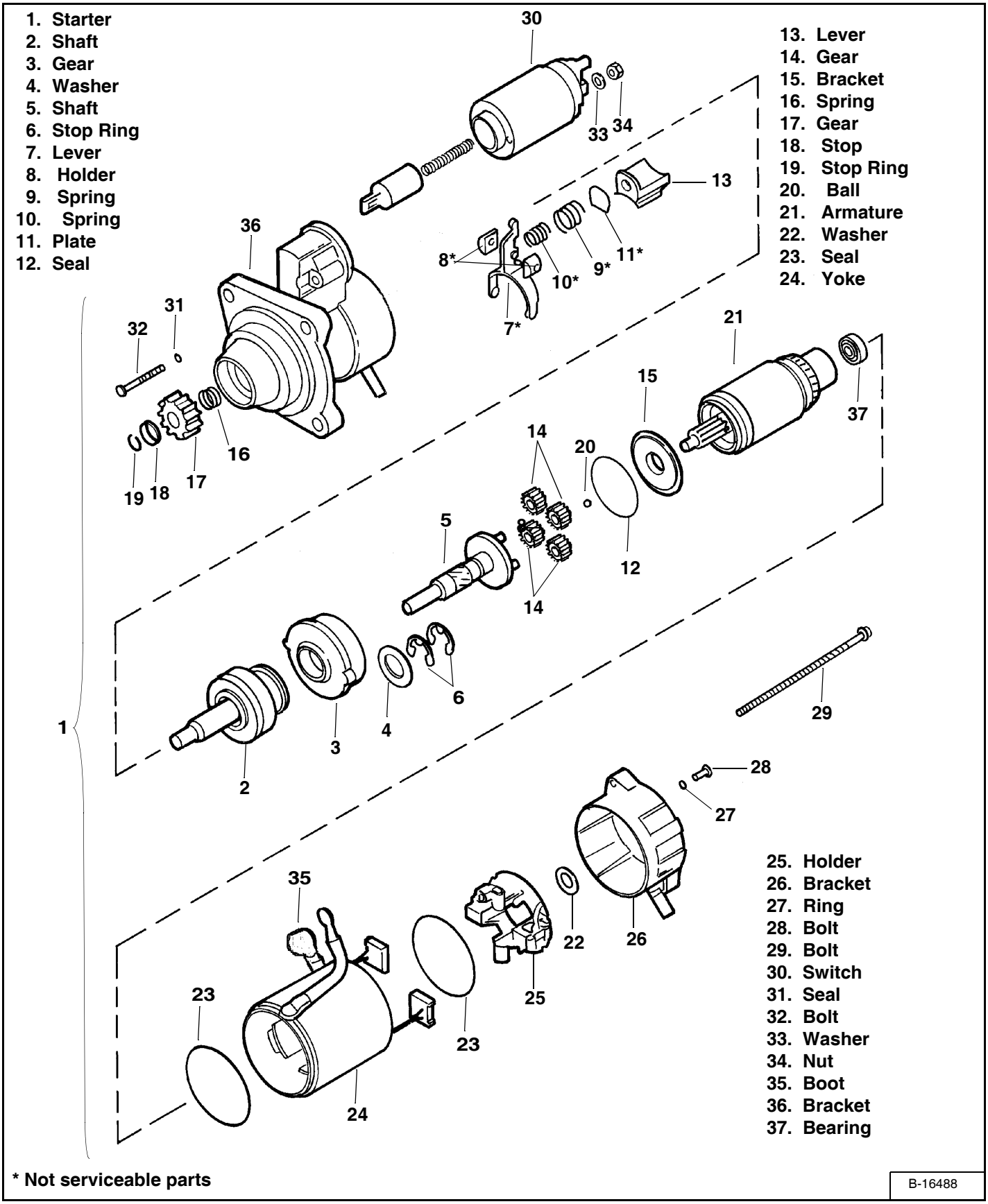
Remove the starter from the engine.

Installation: Tighten the three mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Reverse the removal procedure to install the starter.

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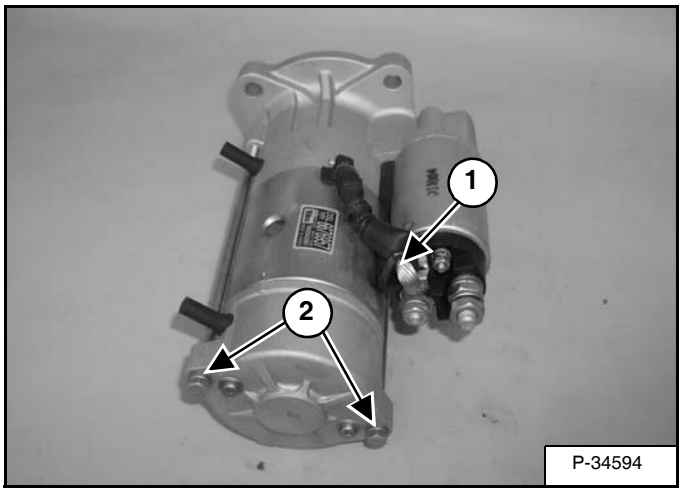
Parts Identification



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Disassembly and Assembly

Figure 60-40-6

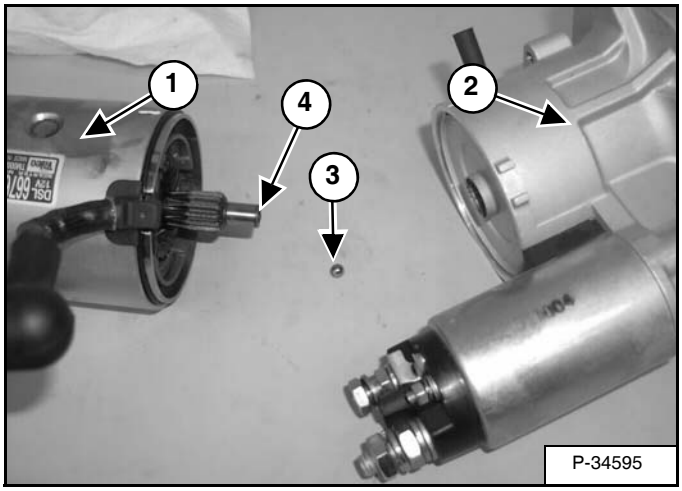


Remove the cable (Item 1) **[Figure 60-40-6]** from the magnetic switch.

Remove the bolts (Item 2) **[Figure 60-40-6]**.

Installation: Tighten the bolts to 63-129 in.-lb. (7,1-14,6 N•m) torque.

Figure 60-40-7

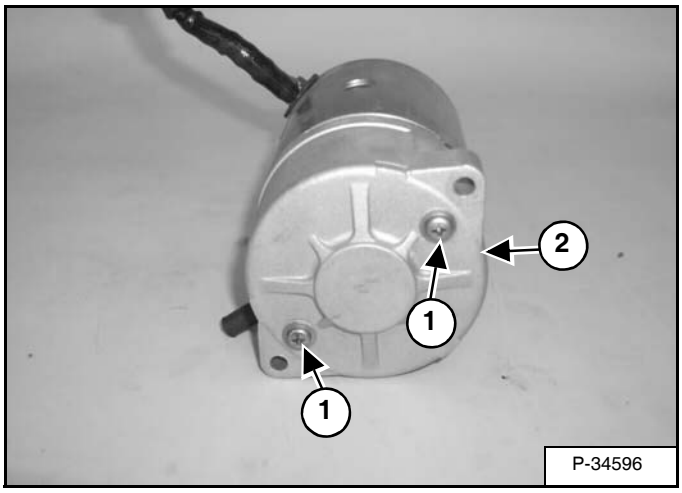


Remove the armature, yoke, brush holder and rear bracket assemblies (Item 1) from the front assembly (Item 2) **[Figure 60-40-7]**.

NOTE: When separating the parts there will be a steel ball (Item 3) located at the end of the armature shaft (Item 4) [Figure 60-40-7].

Installation: Apply grease to the steel ball (Item 3) and install into the end of the armature shaft (Item 4) **[Figure 60-40-7]** .

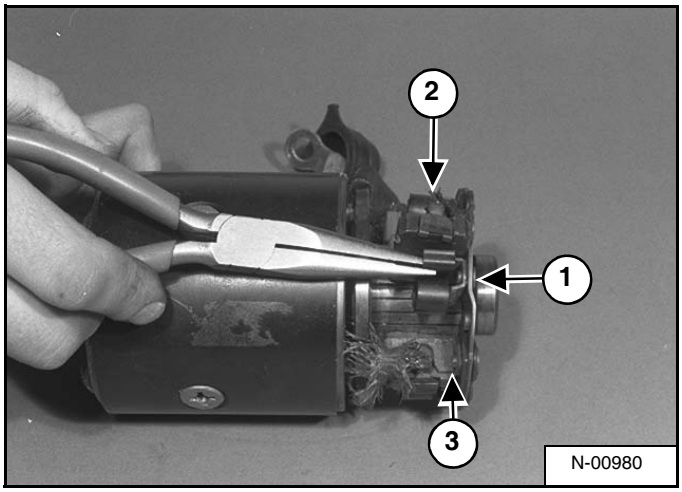
Figure 60-40-8



Remove the bolts (Item 1) from the brush cover (Item 2) **[Figure 60-40-8]**.

Remove the cover (Item 2) **[Figure 60-40-8]**.

Figure 60-40-9



Using a needle nose pliers, pull the brush springs (Item 1) back and remove the brushes (Item 2) **[Figure 60-40-9]**.

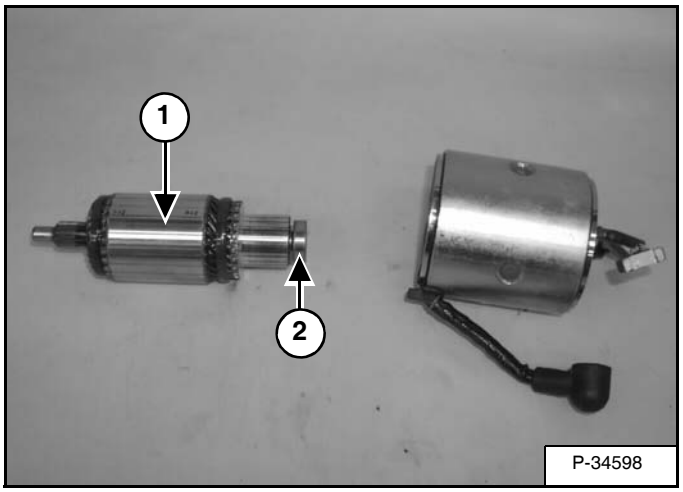
NOTE: The brushes are non-replaceable. If the brushes are worn order a new brush holder (for the negative brushes) and yolk (for the positive brushes).

Remove the brush holder (Item 3) **[Figure 60-40-9]** from the end of the armature.

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Disassembly and Assembly (Cont'd)

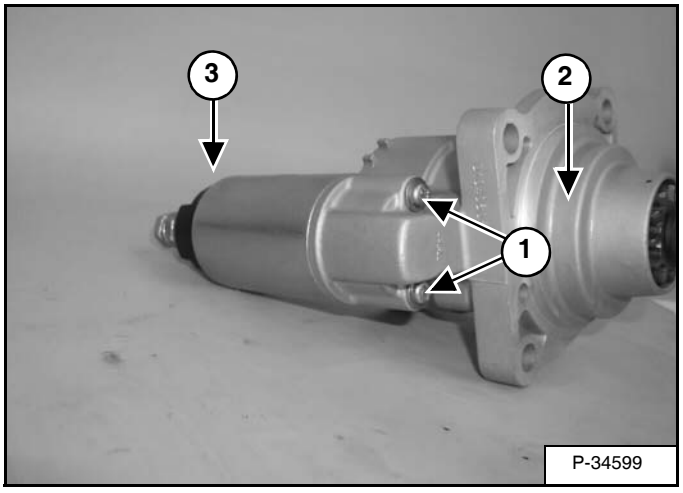
Figure 60-40-10



Remove the armature (Item 1) **[Figure 60-40-10]** from the frame.

Remove the bearing (Item 2) **[Figure 60-40-10]** from the end of the armature.

Figure 60-40-11

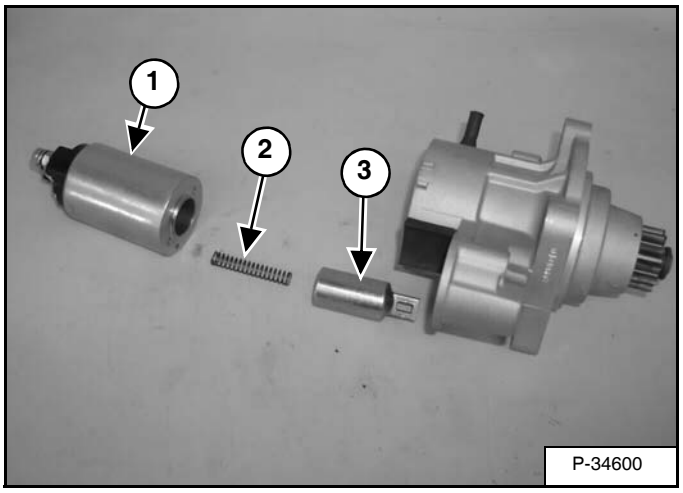


Remove the bolts (Item 1) **[Figure 60-40-11]** from the magnetic switch.

Installation: Tighten bolts to 34-69 in.-lb. (3,8-7,8 N•m) torque.

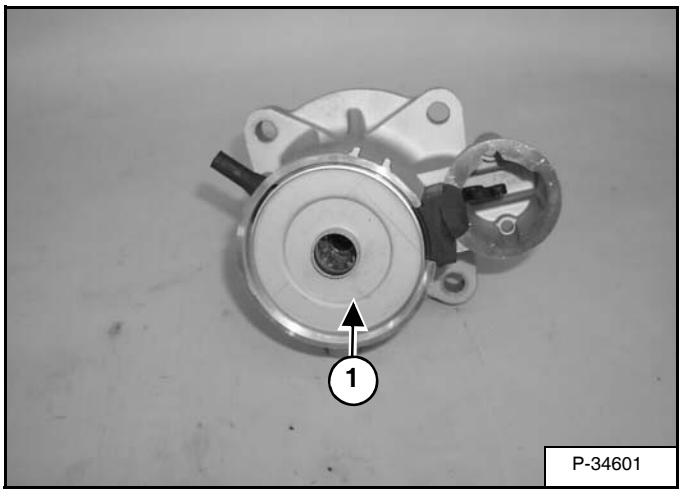
Remove the front assembly (Item 2) from the magnetic switch (Item 3) **[Figure 60-40-11]**.

Figure 60-40-12



Inspect the magnetic switch (Item 1), the spring (Item 2),and the plunger (Item 3) **[Figure 60-40-12]** for wear and replace as needed.

Figure 60-40-13

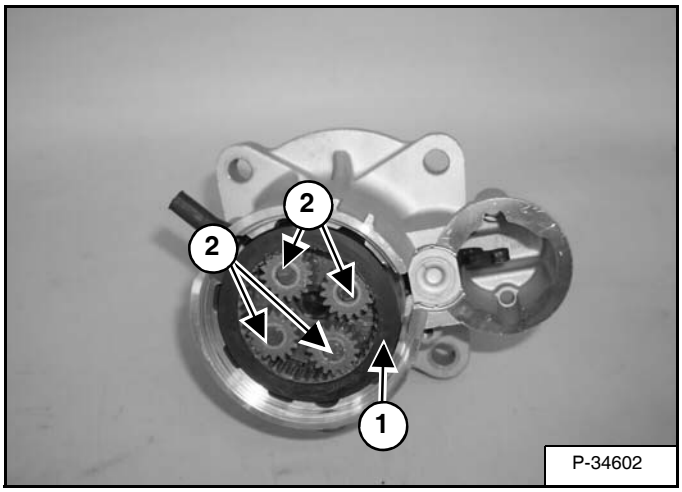


Remove the center bracket (Item 1) **[Figure 60-40-13]**

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Disassembly and Assembly (Cont'd)

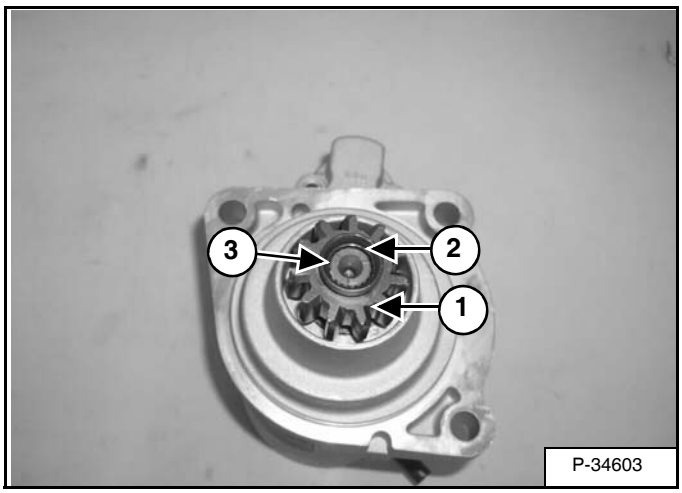
Figure 60-40-14



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

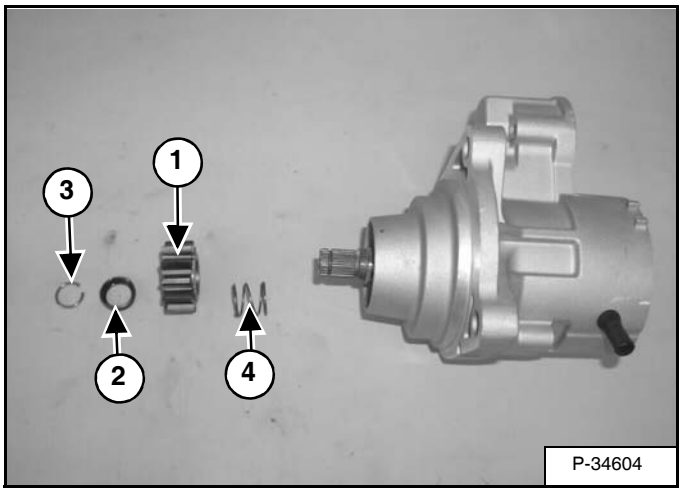
Remove the planetary gears (Item 2) **[Figure 60-40-14]** and inspect for damage.

Figure 60-40-15



Press down on the pinion (Item 1) **[Figure 60-40-15]** & **[Figure 60-40-16]** and retainer (Item 2) **[Figure 60-40-15]** & **[Figure 60-40-16]**.

Figure 60-40-16



Remove the snap ring (Item 3) **[Figure 60-40-15]** & **[Figure 60-40-16]**

Remove the retainer (Item 2) **[Figure 60-40-15]** & **[Figure 60-40-16]** and pinion (Item 1) **[Figure 60-40-15]** & **[Figure 60-40-16]**.

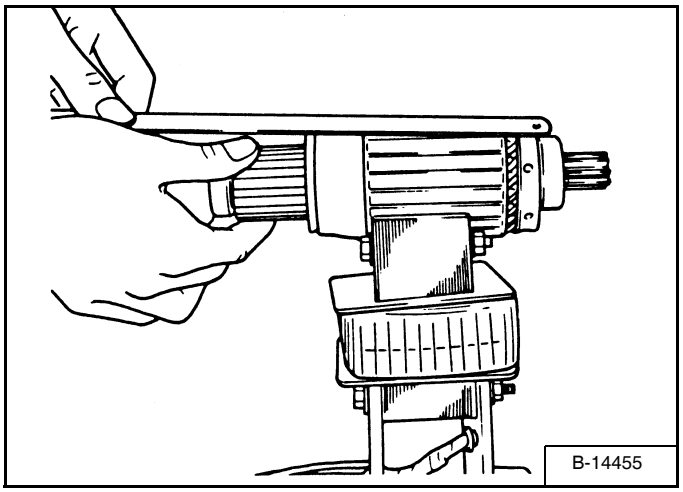
Remove the spring (Item 4) **[Figure 60-40-16]**.

Installation: Inspect all parts for wear and replace as needed.

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Inspection And Repair

Figure 60-40-17

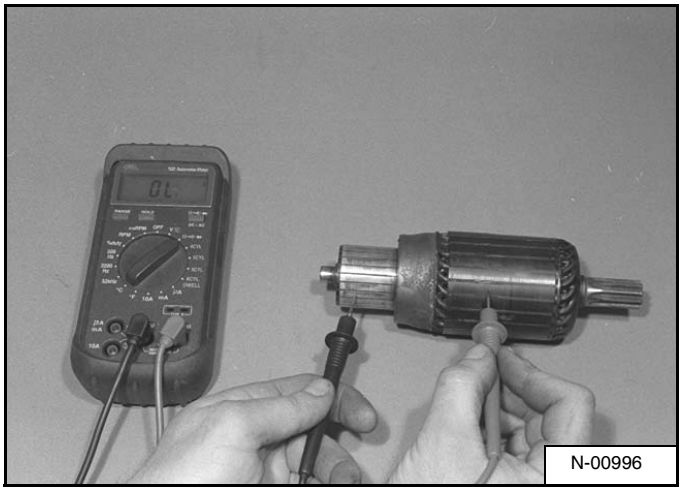


Inspect the brush cover for discoloration, indication the starter has been overheated.

Inspect the pinion teeth for wear and damage.

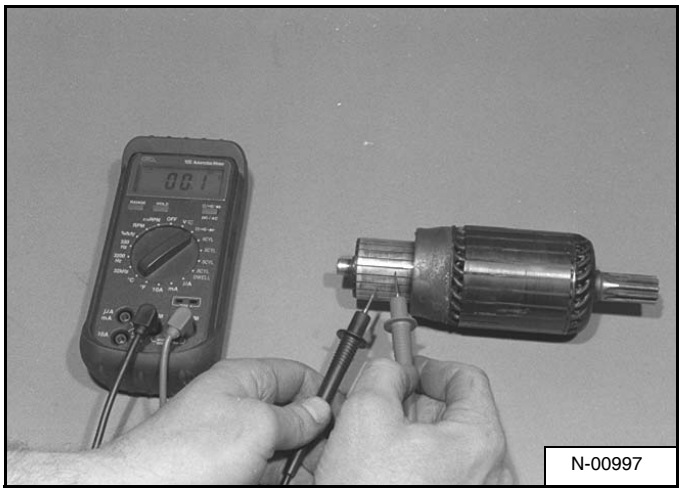
Armature Short-Circuit Test: Use a growler tester, put the armature on the growler and hold a hack saw blade against the armature core while slowly rotating the armature **[Figure 60-40-17]**. A short circuited armature causes the blade to vibrate and be attracted to the core. An armature which is short-circuited must be replaced.

Figure 60-40-18



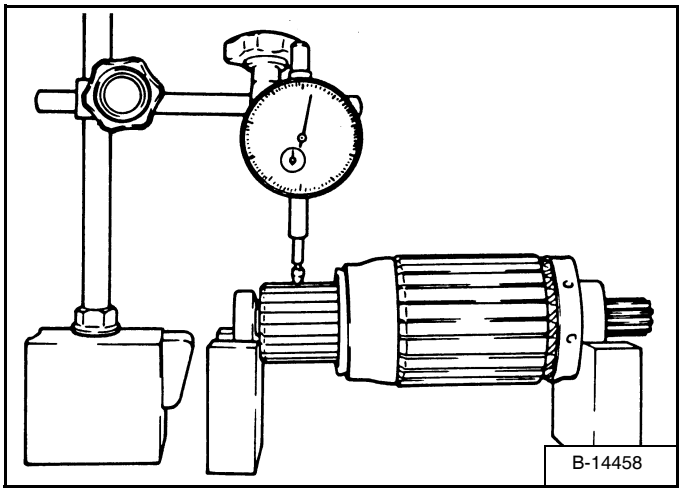
Armature Winding Ground Test: Use a circuit tester, touch one probe to a commutator segment and the other probe to the armature core **[Figure 60-40-18]**. There should be no continuity. If there is continuity, the armature is grounded and must be replaced.

Figure 60-40-19



Armature Winding Continuity Test: Use a circuit tester, touch the probes to two commutator segments **[Figure 60-40-19]**. There should be continuity at any point. If there is no continuity, the winding is open-circuited, replace the armature.

Figure 60-40-20



Commutator Run-Out Test: check the commutator run-out as shown in **[Figure 60-40-20]**.

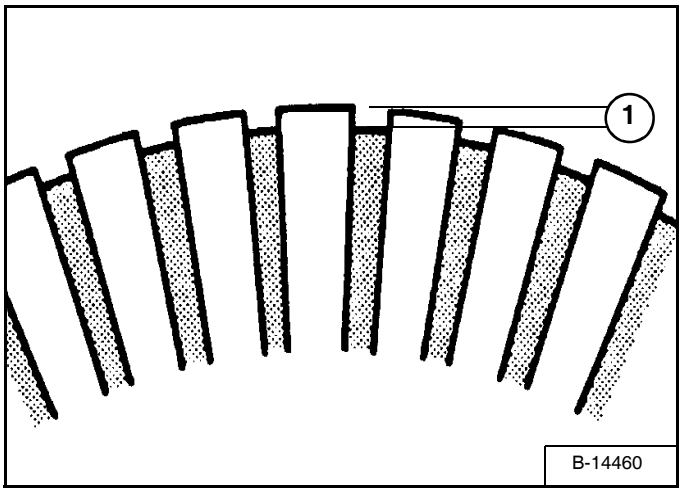
Service Limit - 0.003 inch (0,07 mm)

If the commutator exceeds the service limit, repair as needed.

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Inspection And Repair (Cont'd)

Figure 60-40-21



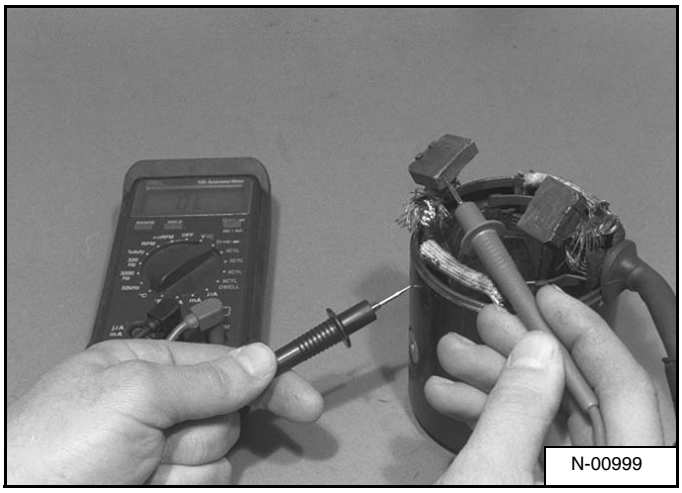
Measure the segment mica depth (Item 1) **[Figure 60-40-21]**.

Service Limit - 0.012 inch (0,3 mm)

If it is worn, replace the armature.

Check the commutator surface for burned spots which usually indicates an open-circuit, and correct it using #400 sand paper.

Figure 60-40-22



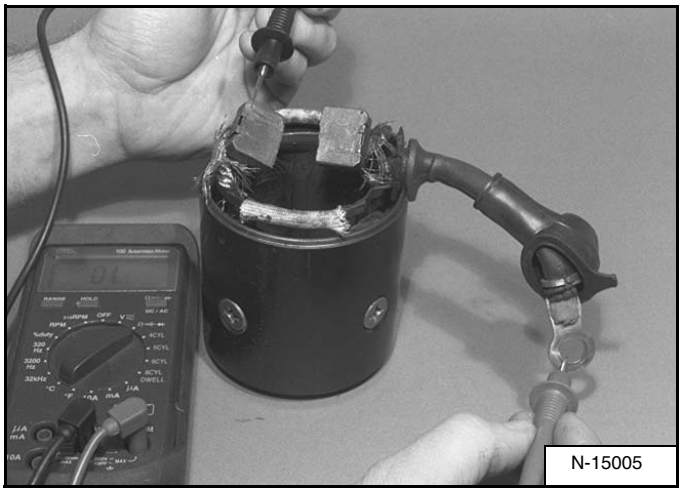
Check the field windings for wear and damage.

Check all the connections for clean and tight solder joints.

Field Winding Ground Test: Use a circuit tester, touch one probe to the field winding end of the brush and the other probe to the surface of the frame **[Figure 60-40-22]**. There should be no continuity. If there is continuity, the field windings are grounded.

Replace the frame.

Figure 60-40-23



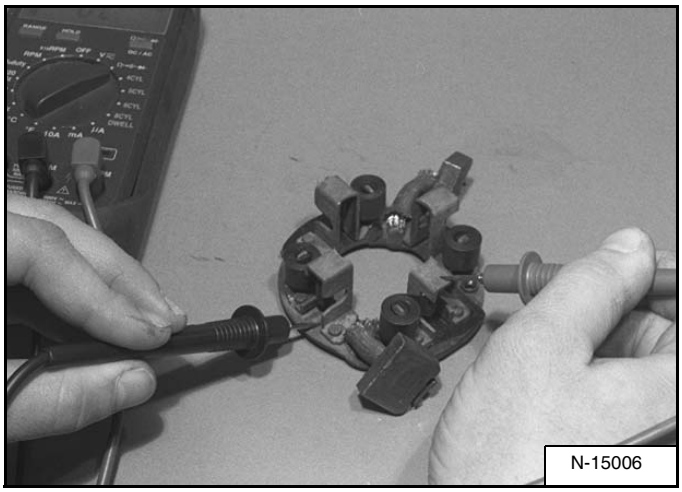
Field Windings Continuity Test: Use a circuit tester, touch one probe to the wire and the other probe to the brush **[Figure 60-40-23]**. There should be continuity. If there is no continuity, the field windings are open-circuited.

Replace the frame.

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Inspection and Repair (Cont'd)

Figure 60-40-24



Inspect the brushes for wear and damage.

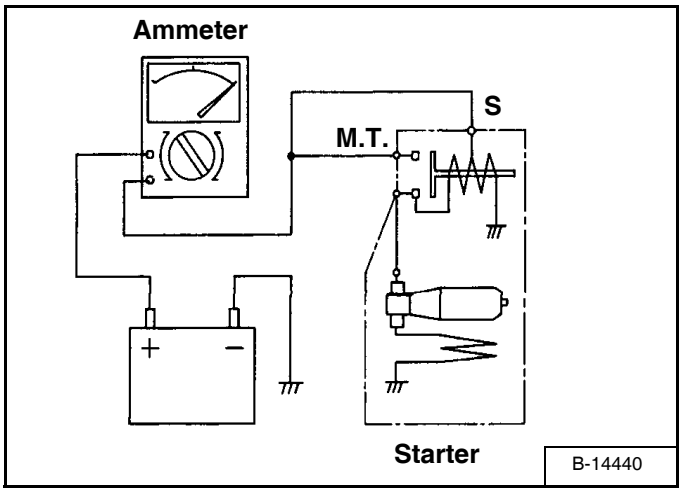
Replace the brush holder and yoke if the brushes need replacement.

Check brush spring, for damage or rust. Replace as needed.

Brush Holder Insulation Test: Use a circuit tester, touch one probe to the positive brush holder plate and the other probe to the holder plate **[Figure 60-40-24]**. There should be no continuity. If there is continuity, replace or repair.

No Load Test

Figure 60-40-25



The following test should be done after reassembling the starter:

Clamp the starter in a vise. Using a 12 volt battery and ammeter, connect the positive wire of the battery, and the ammeter to the terminal **[Figure 60-40-25]**. Connect the negative wire to the starter body. Using a jumper wire, connect the S terminal to the main terminal.

The starter should show smooth and steady rotation immediately after the pinion is engaged, it should draw less than the specified current.

Service Limit - 1150 Amp. Maximum @ Stall Condition

Clean all parts and apply high temperature grease to the armature bearing, return spring, steel ball, over running clutch, and idler gear rollers.

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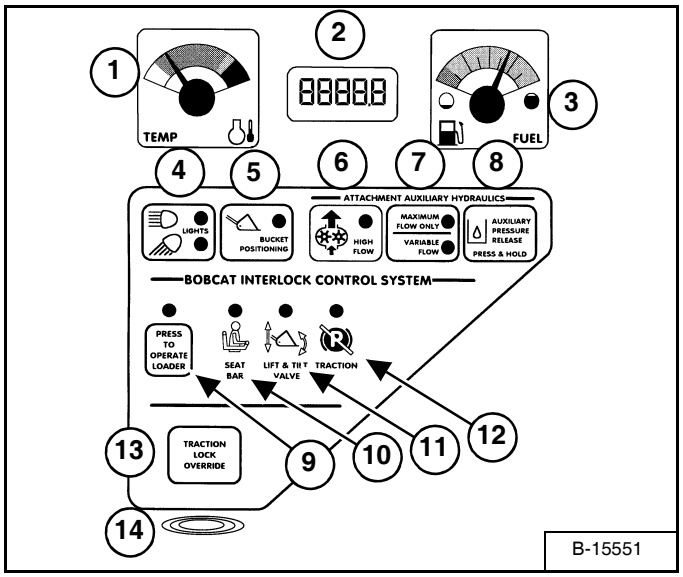


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INSTRUMENT PANEL

Left Panel

Figure 60-50-1



The left instrument panel is the same for both the Standard and Deluxe Instrument Panels **[Figure 60-50-1]**.

The table below shows the DESCRIPTION and FUNCTION/OPERATION for each of the components of the left panel.

Press and hold LIGHTS button (Item 4) **[Figure 60-50-1]** for two seconds to view SERVICE CODES in the HOURMETER/CODE DISPLAY (Item 2) **[Figure 60-50-1]**. If more than one SERVICE CODE is present, the codes will scroll on the HOURMETER/CODE DISPLAY.

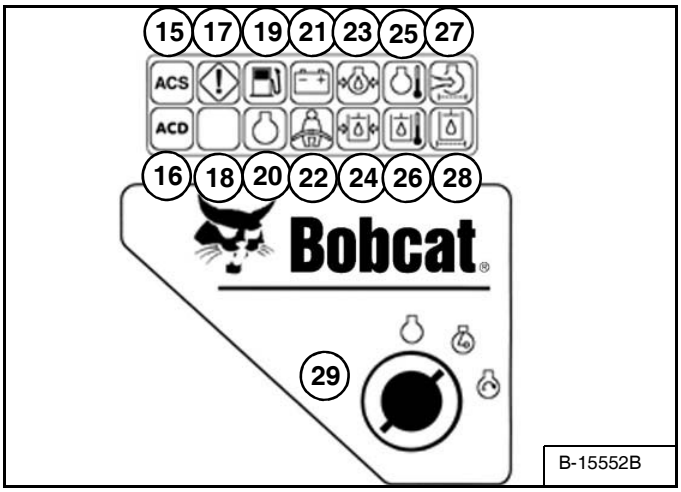
REF. NO	DESCRIPTION	FUNCTION / OPERATION
1	TEMPERATURE GAUGE	Shows the engine coolant temperature.
2	HOURMETER / CODE DISPLAY / GLOW PLUG COUNTDOWN	HOURMETER - Records operating hours of loader. CODE DISPLAY - Display numeric SERVICE CODES* relating to the loader monitoring system. COUTNTDOWN - Glow Plug time remaning
3	FUEL GAUGE	Shows the amount of fuel in the tank.
4	LIGHTS / HOLD FOR CODES	LIGHTS - Press once for FRONT LIGHTS. Press a second time for FRONT AND REAR lights. Press a third time to turn all lights off. HOLD FOR CODES - Press and hold two seonds for display of SERVICE CODES (Item 2). (CODES* show only when there is an error found by loader monitoring system.)
5	BUCKET POSITIONING (Option)	Press to engage the BUCKET POSITIONING function. Press again to disengage. Press and hold 2 seconds to view BASE or SHTDN (◆ SHUTDOWN) feature in HOURMETER/CODE DISPLAY.
	ATTACHMENT AUXILIARY HYDRAULICS	
6	HIGH FLOW (Option)	Press to engage the HIGH FLOW auxiliary hydraulics. Press again to disengage.
7	MAXIMUM FLOW / VARIABLE FLOW	Press once to engage the VARIABLE FLOW auxiliary hydraulics. Press a second time to engage MAXIMUM FLOW. Press a third time to disengage all auxiliary hydraulics. [VARIABLE FLOW allows for slow-to-fast movement of auxiliary functions (The farther you move the switch, the faster the movement of auxiliary functions.) MAXIMUM FLOW allows for only fast movement.]
8	AUXILIARY PRESSURE RELEASE	Press and hold for two seconds. The engine wil stop. Hydraulic pressure will be released in the rear auxiliary (If so equipped) or right side front auxiliary circuit (If so equipped).
	BOBCAT INTERBLOCK CONTROL SYSTEM (BICS™) **(SEE TROUBLESHOOTING GUIDE ON PAGE 60-90-4.)**	
9	PRESS TO OPERATE LOADER	Press to activate BICS™ System when the Seat Bar is down and operator is seated in operating position.
10	SEAT BAR	The light comes *ON* when the seat bar is down.
11	LIFT & TILT VALVE	The light comes *ON* when the seat bar is down and the PRESS TO OPERATE Button is pressed. The lift and tilt functions can be operated when the light is *ON*.
12	TRACTION	The light comes *ON* when the seat bar is down, engine is running, and parking brake is released. The loader can be moved forward or backward when the light is *ON*.
13	TRACTION LOCK OVERRIDE	(Function Only When Seat Bar Is Raised And The Engine Is Running) Press to unlock the brakes. Allows you to use the steering levers to move the loader forward or backward when using the backhoe attachment or for loader service. (See TRACTION LOCK on Page 60-110-1.) Press a second time to lock the brakes.
14	ALARM	The ALARM beeps when there is an Error, WARNING or ◆SHUTDOWN condition.

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INSTRUMENT PANEL (CONT'D)

Right Panel (Standard) (With Key Switch)

Figure 60-50-2



The right instrument panel shown **[Figure 60-50-2]** is the Standard Panel.

The table below shows the Icons and other components of the Right Standard Panel

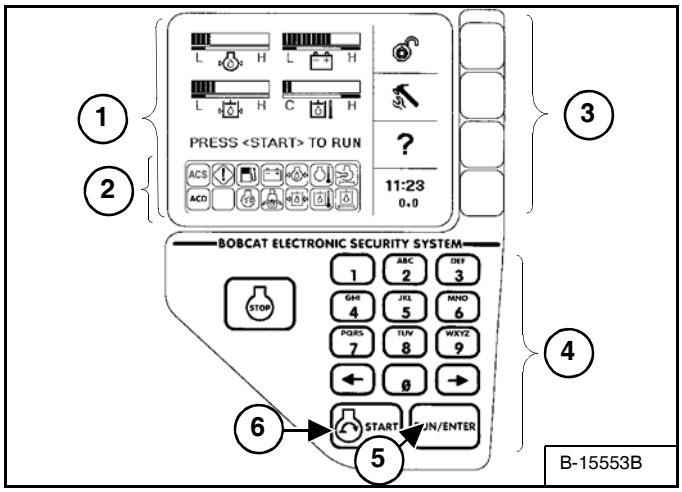
* These functions are monitored and have SERVICE CODES associated with them. (See DIAGNOSTICS SERVICE CODES on Page 60-80-1.)

REF.	FUNCTION	ICON/ LIGHT	ALARM	CODE	CONDITION	DESCRIPTION
ACS 15	Advanced Control System (ACS)	ON	3 Beeps	*	Error	Error with Advanced Control System (ACS)
ACD 16	Attachment Control Device (ACD)	FLASHING	3 Beeps	*	Error	Error with Attachment Control Device (ACD)
17	General Warning	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING SHUTDOWN	Error with one or more engine or hydraulic functions. Engine speed high or in shutdown. Engine speed very high. Engine will stop in 10 seconds.
18	NOT USED					
19	Fuel Level	ON FLASHING	3 Beeps 3 Beeps	* *	Error WARNING	Fuel level sender system fault. Fuel level low.
20	Glow Plugs	ON FLAHSING	--- 3 Beeps	- *	--- Error	Glow plugs are energized. Error with glow plugs
21	System Voltage	ON	3 Beeps	*	WARNING	Voltage low, high or very high.
22	Seat Belt	ON	---	-	---	Light stays on for 45 seconds to remind operator to fasten seat belt.
23	Engine Oil Pressure	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING SHUTDOWN	Engine Oil Pressure sender out of range. Engine oil level low. Engine oil pressure very low. Engine will shutdown in 10 seconds.
24	Hydrostatic Charge Pressure	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING SHUTDOWN	Hydraulic oil pressure sender out of range. Hydraulic oil pressure low. Hydraulic charge pressure very low. Engine will stop in 10 seconds.
25	Engine Coolant Temperature	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING SHUTDOWN	Engine coolant sender out of range Engine coolant temperature high. Engine coolant temperature very high. Engine will stop in 10 seconds.
26	Hydraulic Oil Temperature	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING SHUTDOWN	Hydraulic oil temperature out of range. Hydraulic oil temperature high. Hydraulic oil temperature very high. Engine will stop in 10 seconds.
27	Engine Air Filter	ON FLASHING	3 Beeps 3 Beeps	* *	Error WARNING	Air filter with high restriction. Air filter switch not connected.
28	Hydraulic Filter	ON FLASHING	3 Beeps 3 Beeps	* *	Error WARNING	Hydraulic filter with high restriction. Hydraulic filter switch not connected.
29	Key Switch	-	-	-	-	Used to start and stop the engine.

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Right Panel (Deluxe) (With Keyless Start)

Figure 60-50-3



The right instrument panel shown **[Figure 60-50-3]** is the Deluxe Panel.

1. Display Panel: The Display Panel is where all system setup, monitoring, troubleshooting, and error conditions are displayed.

2. Function Icons: The lower left area of the Deluxe Panel has the same Icons as the Standard Panel (See Right Panel (Standard) (With Key Switch) on Page 60-50-2.) These Icons are only visible when the monitoring system has detected an error.

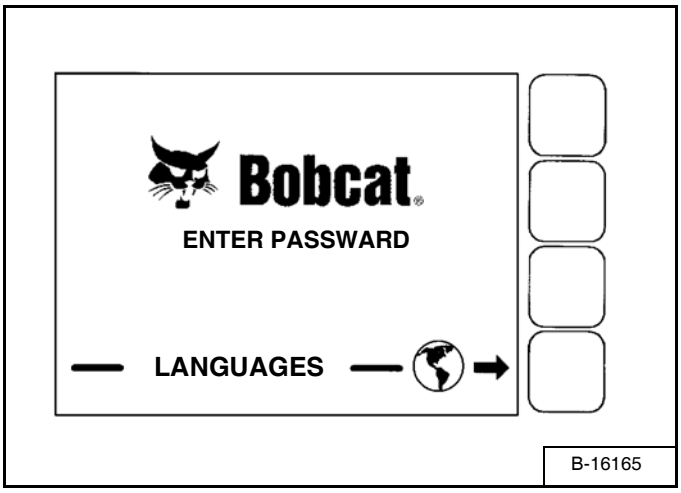
3. Selection Buttons: The four Selection Buttons allow you to select items from the Display Panel and scroll through screens.

4. Keypad: The numeric keypad (Item 4) **[Figure 60-50-3]** has two functions:

   (a) To enter a number code (password) to allow starting the engine (Keyless Start).

   (b) To enter a number as directed for further use of the Display Panel.

Figure 60-50-4



The first screen you will see on your new loader will be as shown in **[Figure 60-50-4]**.

When this screen is on the display you can enter the password and start the engine or change the Display Panel setup features.

NOTE: Your new loader (with Deluxe Instrument Panel) will have a Owner Password. Your dealer will provide you with this password. Change the password to one that you will easily remember to prevent unauthorized use of your loader. (See ELECTRICAL SYSTEM SERVICE MANUAL.) Keep your password in a safe place for future needs.

Start Engine: Use the Keypad to enter the numbers (letters) of your password and press the RUN / ENTER key (Item 5) **[Figure 60-50-3]**.

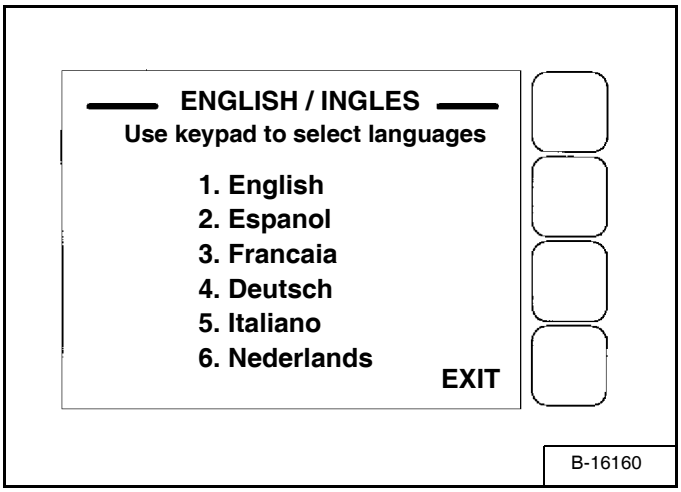
Press and hold the START Button (Item 6) **[Figure 60-50-3]** until the engine starts.

Change Language: Press the Selection Button at the end of the arrow **[Figure 60-50-4]** to go to the next screen.

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Right Panel (Deluxe) (With Keyless Start) (Cont'd)

Figure 60-50-5



Use the Keypad to select the number of the language **[Figure 60-50-5]**

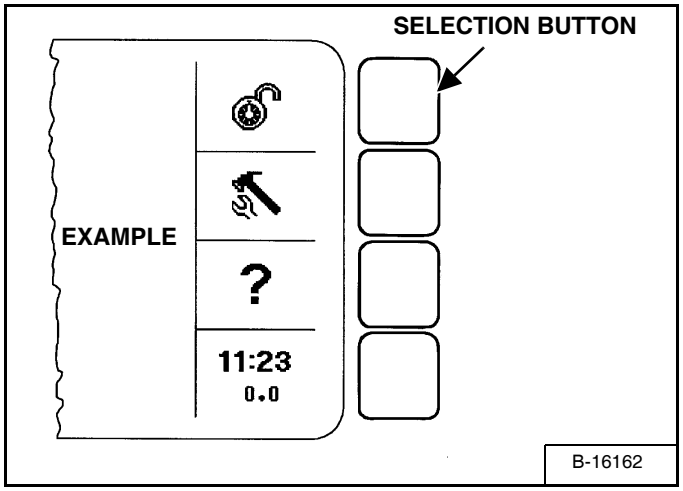
Press EXIT. The screen will return to **[Figure 60-50-4]**. You can then enter the password and start the engine.

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Right Panel Setup Display Options (Deluxe)

Icon Identification

Figure 60-50-6



Make selection by pressing SELECTION BUTTON opposite the Icon **[Figure 60-50-6]**.

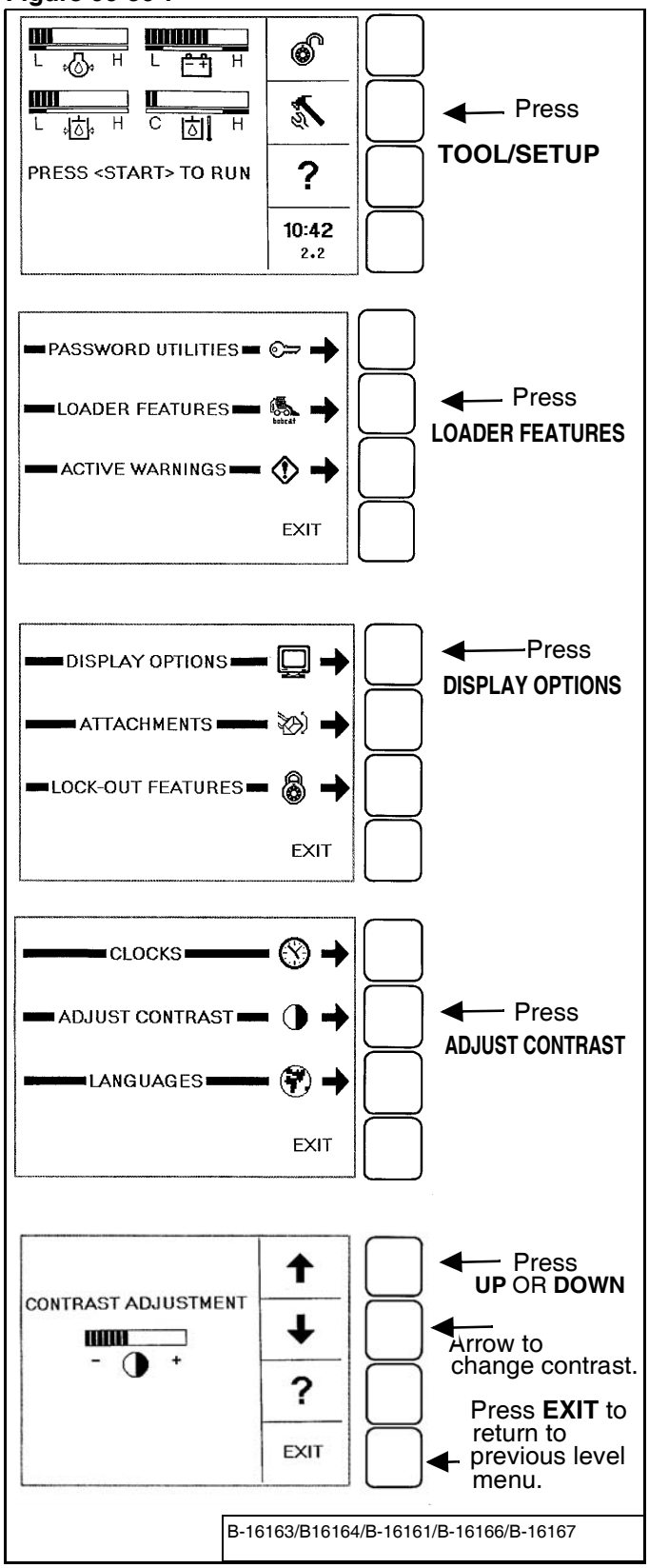
ICON	DESCRIPTION
	LOCK/UNLOCK: Allows machine to be locked/unlocked. You must lock machine to activate security system. When system is unlocked, the user can press RUN/ENTER then press START to begin operation. A valid password will need to be entered at startup to run a locked machine.
	TOOL/SETUP: Access system options. Use to set clock, check system warnings, select language, set passwords, etc.
?	**HELP:** Access help on current menu item.
EXIT	**EXIT** returns you to previous level menu.
11:23 0.0	**CLOCK/JOB CLOCK:** Press to clear or lock job clock; TOOL/SETUP to set time.
	UP ARROW: Goes backward one screen. **DOWN ARROW:** Goes forward one screen.
	OUTLINE ARROWS: No screen available (backward/forward).
	SELECTION ARROW: Use to select menu item.
NEXT	Goes to the NEXT screen in series. EXAMPLE: the next Active Warning screen.
INFO	Goes to more information about an attachment.
YES/NO	Answer yes/no to current setup question.
CLEAR	Removes previously installed password.
SET	Set accepts current installed password.

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Deluxe Panel Setup

Display Options

Figure 60-50-7



B-16163/B16164/B-16161/B-16166/B-16167

All new machines with Deluxe Instrumentation arrive at Bobcat Dealerships with the panel in locked mode. This means that a password must be used to start the engine **[Figure 60-50-7]**.

Passwords (Deluxe)

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

Owner Password:
Allows for full use of the loader and to setup the Deluxe Panel. Owner can select a password to allow starting & operating the loader and modify the setup of the Deluxe Panel. Owner should change the password as soon as possible for security of the loader.

User Password:
Allows starting and operating the loader; cannot change password or any of the other setup features.

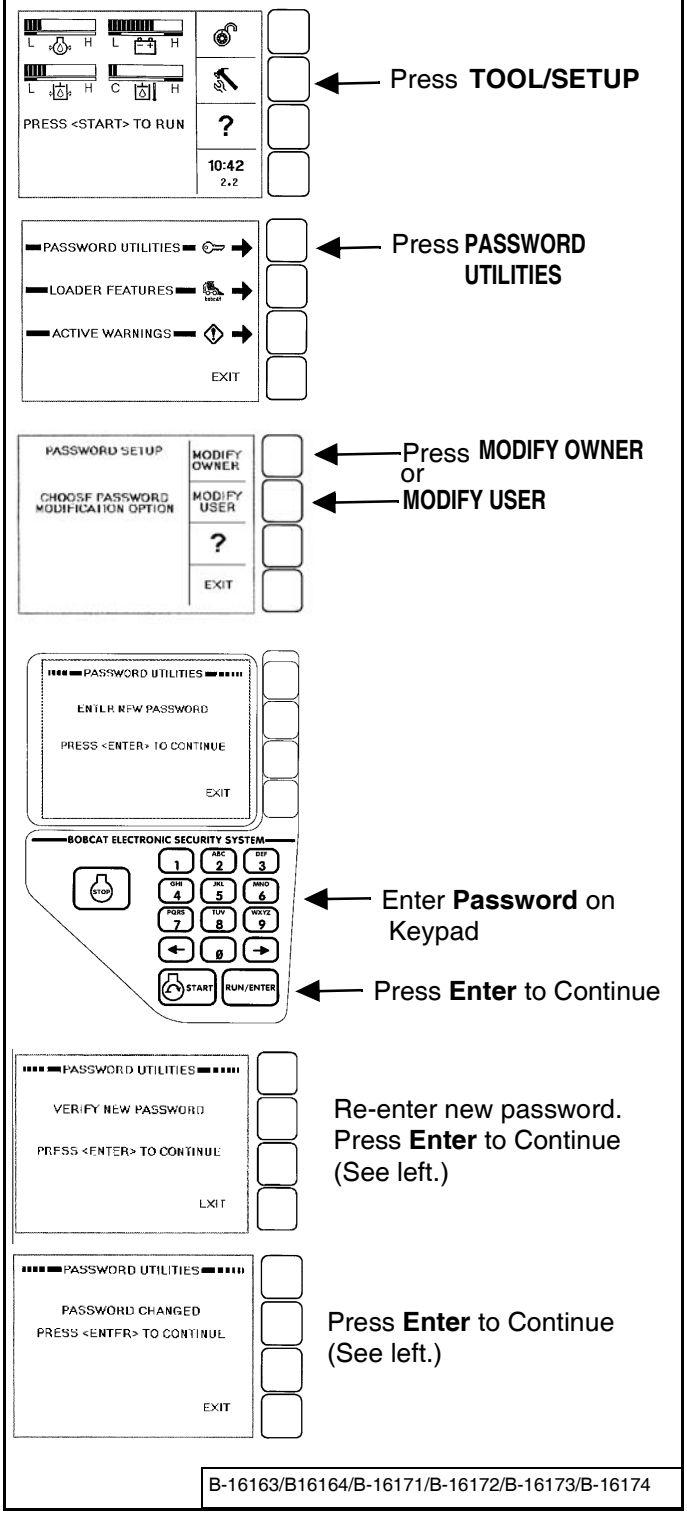
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INSTRUMENTATION PANEL (CONT'D)

Passwords (Deluxe) (Cont'd)

Figure 60-50-8

Changing the Password **Right Instrument Panel Display Screen**



B-16163/B16164/B-16171/B-16172/B-16173/B-16174

More EXAMPLES:

Clocks

TOOL/SETUP [Figure 60-50-8]

LOADER FEATURES.
DISPLAY OPTIONS
CLOCKS
SET CLOCK
Use the keypad to set time.
Press **RUN/ENTER** to set clock.
Press **EXIT** to return to previous level menu.

RESET JOB CLOCK (Password required)
Press **CLEAR** to reset job clock to zero.
Press **LOCK/UNLOCK** to unlock.
Enter Password and press **RUN/ENTER**.

Languages

TOOL/SETUP
LOADER FEATURES.
DISPLAY OPTIONS
LANGUAGES
Select the language, press **RUN/ENTER**.
Press **EXIT** to return to previous level menu.

Vitals (Monitor engine, hydraulic/hydrostatic, electrical functions when engine is running.)

TOOL/SETUP
LOADER FEATURES.
VITALS
Press **SELECTION ARROW** to select METRIC or ENGLISH **(M/E)** readouts

You can monitor real-tim readouts of:
Engine Oil Pressure
Engine Coolant Temperature
Hydraulic Charge Pressure
Hydraulic Ouil Temperature
System Voltage
Engine Speed

The Display Panel is easy to use. Continue to set your own preferences for running/monitoring your Bobcat loader.

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Option And Field Accessory Panels (If Equipped)

Figure 60-50-9

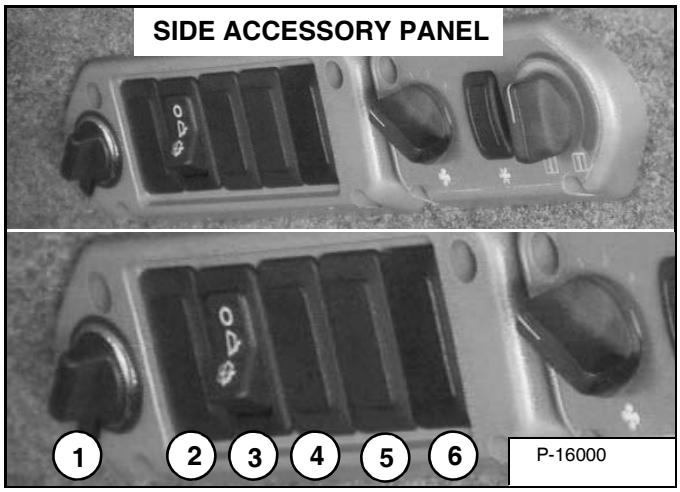


Figure 60-50-10

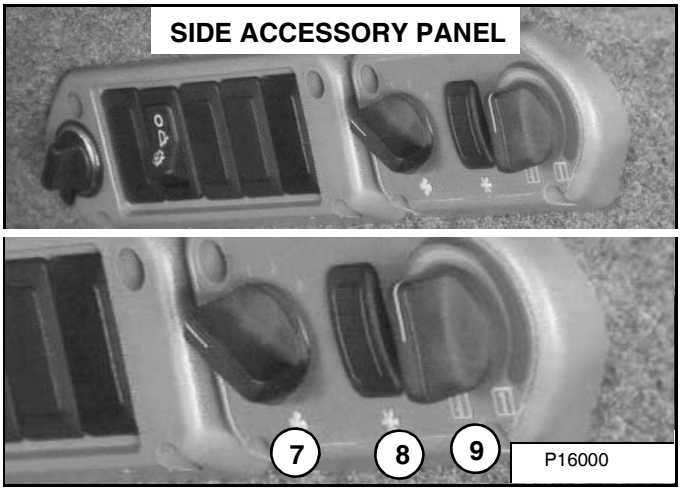
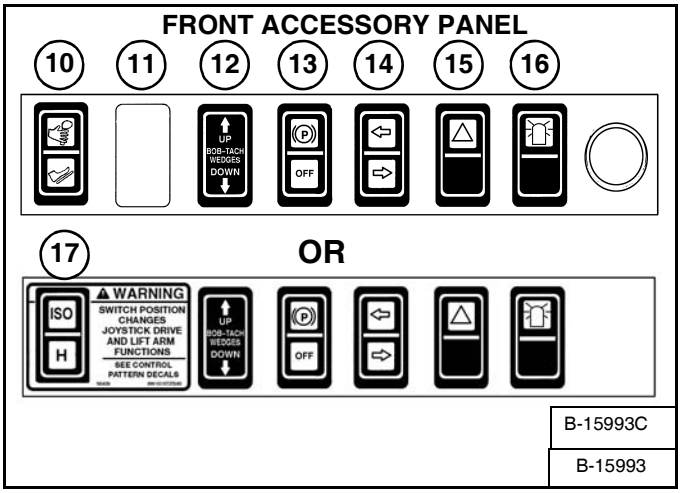


Figure 60-50-11



Side Accessory Panel **[Figure 60-50-9]** and **[Figure 60-50-10]**.

REF. NO.	DESC.	FUNCTION/OPERATION
1.	POWER PLUG	Provides a 12V receptacle for accessories.
2.	NOT USED	---
3.	FRONT WIPER	Press the top of the switch to start the front wiper (press and hold for washer fluid). Press the bottom of the switch to stop the wiper.
4.	REAR WIPER	Press the bottom of the switch to start the rear wiper. Press the top of the switch to provide washer fluid to clean the rear window.
5.	NOT USED	---
6.	NOT USED	---
7.	FAN MOTOR	Turn clockwise to increase fan speed; counterclockwise to decrease. There are four positions; OFF-1-2-3.
8.	AIR COND. SWITCH	Press top of switch to start; bottom to stop. Fan Motor (Item 7) must be ON for A/C to operate.
9.	TEMP. CONTROL	Turn clockwise to increase the temperature; counterclockwise to decrease.

Front Accessory Panel **[Figure 60-50-11]**

REF. NO.	DESC.	FUNCTION/OPERATION
10.	ADVANCED CONTROL SYSTEM (ACS)	Press the top to select Hand Controls; bottom to select Foot Controls.
11.	NOT USED	---
12.	POWER BOB-TACH (If Equipped)	Press and hold the up arrow to disengage the the Bob-Tach wedges. Press and hold the down arrow to engage the wedges into the mounting frame holes.
13.	PARKING BRAKE	Press the top to engage the PARKING BRAKE; bottom to disengage.
14.	TURN SIGNAL INDICATORS	Indicates left or right TURN SIGNALS are ON.
15.	HAZARD LIGHTS	Press the left side (or top) to turn the HAZARD LIGHTS ON; right side (or bottom) to turn OFF.
16.	ROTATING BEACON	Press the left side (or top) to turn the ROTATING BEACON ON; right side (or bottom) to turn OFF.
17.	SELECTABLE JOYSTICK CONTROL (SJC)	Press the top to select 'ISO' Control Pattern; bottom to select 'H' Control Pattern.

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Standard Panel Removal And Installation (Right Side)

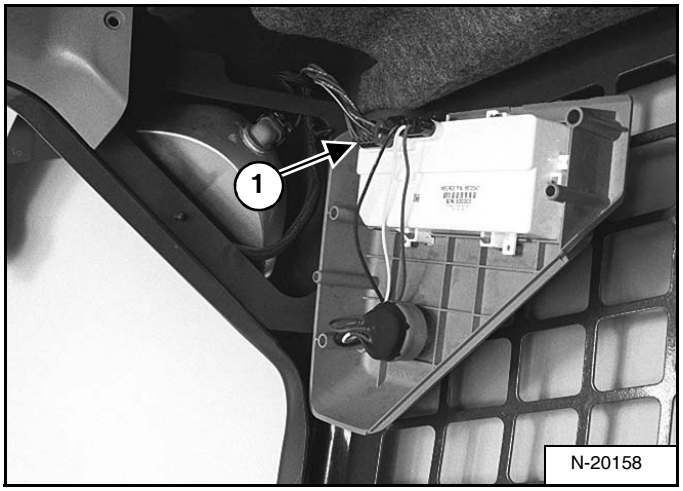
Figure 60-50-12



Remove the three mounting bolts (Item 1) **[Figure 60-50-12]**.

Installation: Be careful to not overtighten the instrument panel mounting bolts to prevent stripping of the threaded holes in the panels.

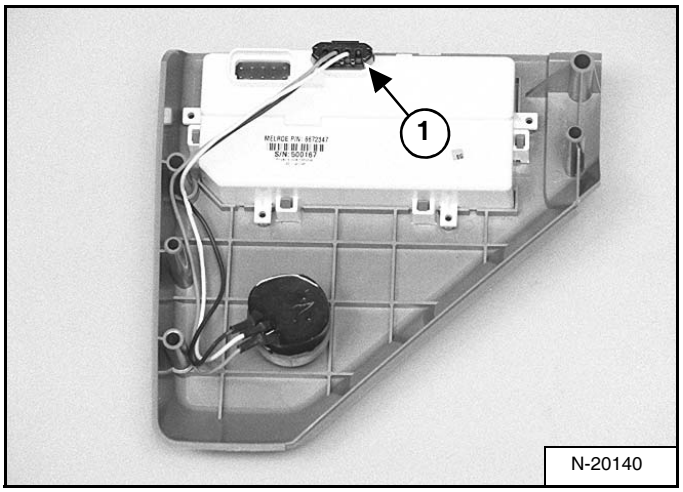
Figure 60-50-13



Pull the right instrument panel down and disconnect the wire harness connector (Item 1) **[Figure 60-50-13]** from the panel.

Remove the panel from the loader cab.

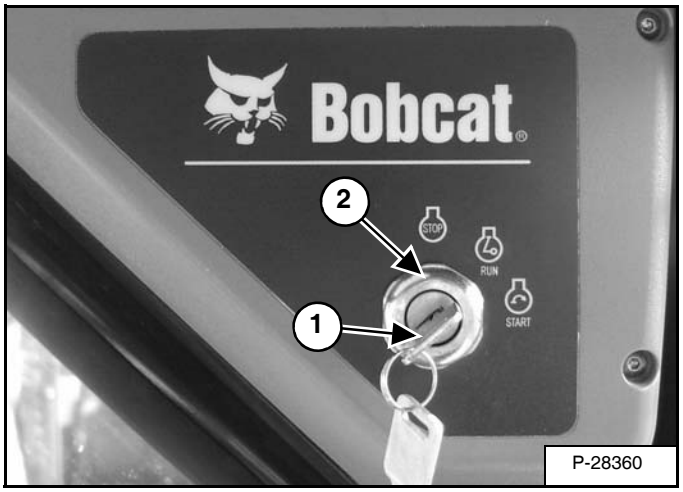
Figure 60-50-14



Ignition Switch Removal and Installation (Standard Panel)

Disconnect the key switch wiring harness (Item 1) **[Figure 60-50-14]** from the back of the control panel.

Figure 60-50-15



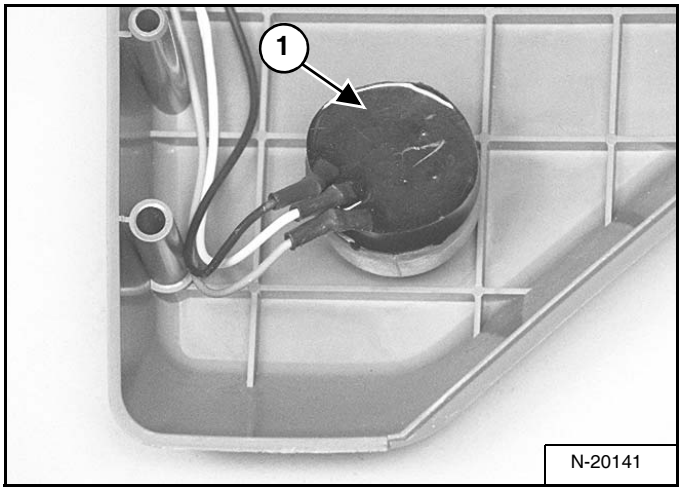
Remove the ignition key (Item 1) from the switch. Remove the ignition switch retaining nut (Item 2) **[Figure 60-50-15]** from the switch.

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Standard Panel Removal And Installation (Right Side) (Cont'd)

Ignition Switch Removal And Installation Standard Panel (Cont'd)

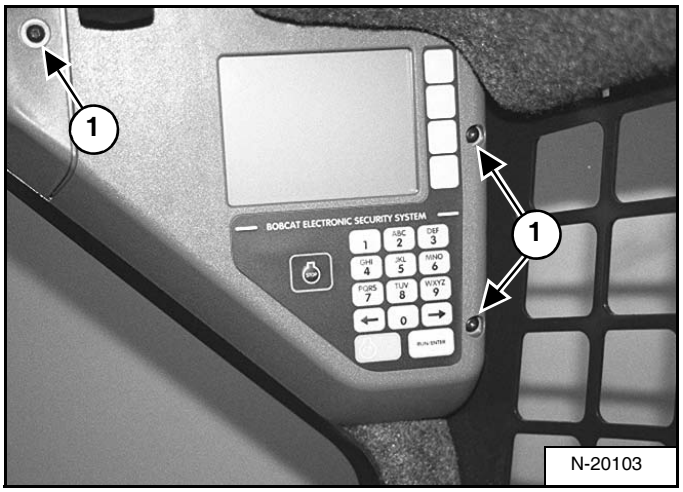
Figure 60-50-16



Remove the ignition switch (Item 1) **[Figure 60-50-16]** from the control panel.

Deluxe Panel Removal And Installation (Right Side)

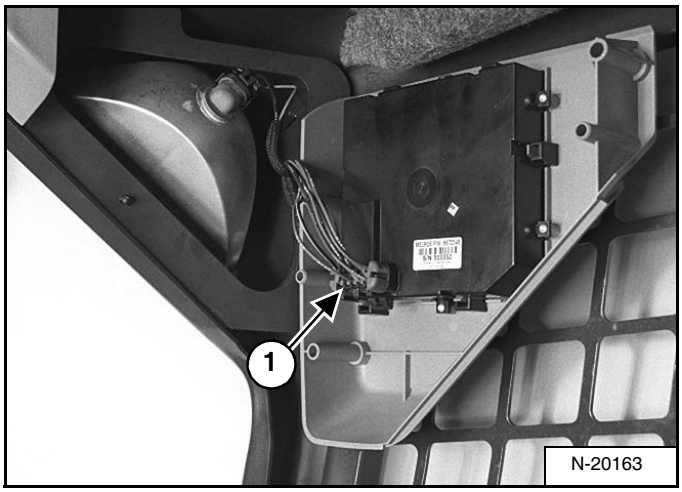
Figure 60-50-17



Remove the three mounting bolts (Item 1) **[Figure 60-50-17]**.

Installation: Be careful to not overtighten the instrument panel mounting bolts to prevent stripping of the threaded holes in the panels.

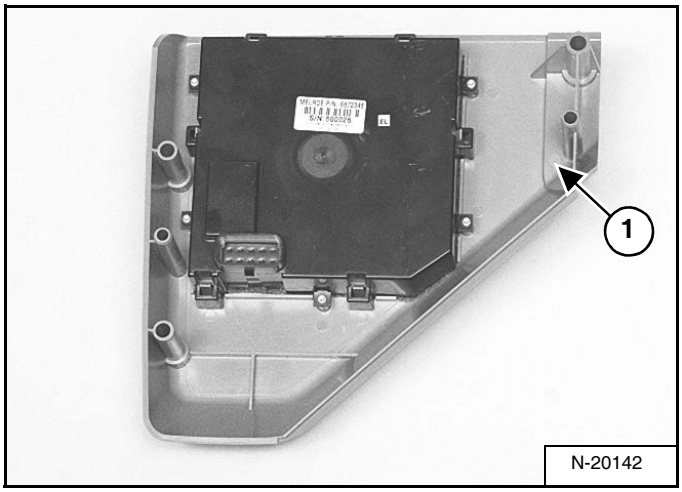
Figure 60-50-18



Pull the right instrument panel down and disconnect the wire harness connector (Item 1) **[Figure 60-50-18]** from the panel.

Remove the panel from the loader cab.

Figure 60-50-19

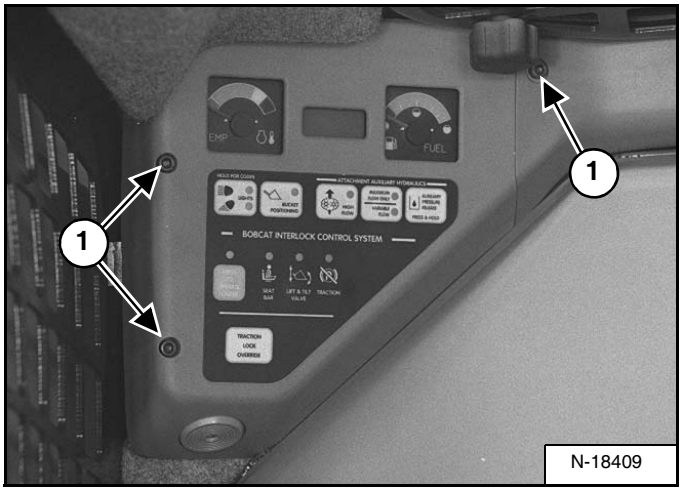


NOTE: The instrument panel (Item 1) [Figure 60-50-19] must be replaced as a complete unit.

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Standard & Deluxe Panel Removal And Installation (Left Side)

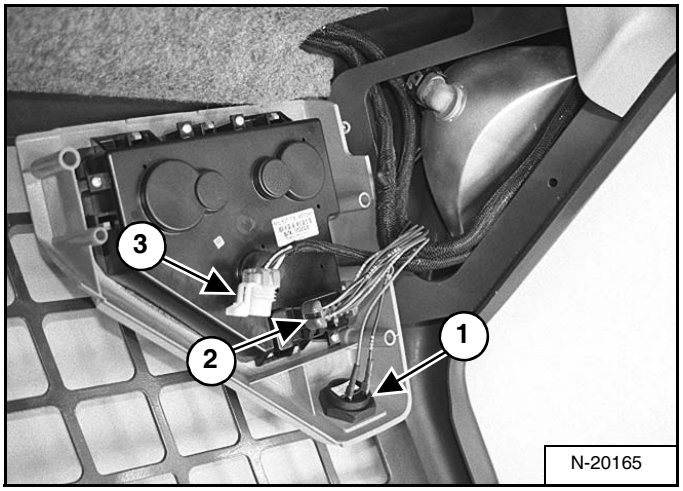
Figure 60-50-20



Remove the three mounting bolts (Item 1) **[Figure 60-50-20]**.

Installation: Be careful to not overtighten the instrument panel mounting bolts to prevent stripping of the threaded holes in the panels.

Figure 60-50-21



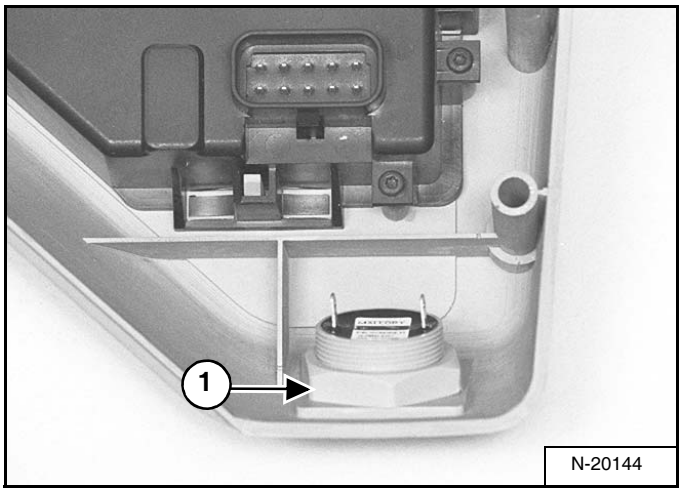
Pull the left instrument panel down and disconnect the wire harness connector (Item 1) **[Figure 60-50-21]** from the loader alarm.

Disconnect the wire harness connector (Item 2) **[Figure 60-50-21]** from the loader instrument panel.

NOTE: The wiring harness (Item 3) [Figure 60-50-21] is an optional accessory harness.

Remove the instrument panel from the loader.

Figure 60-50-22



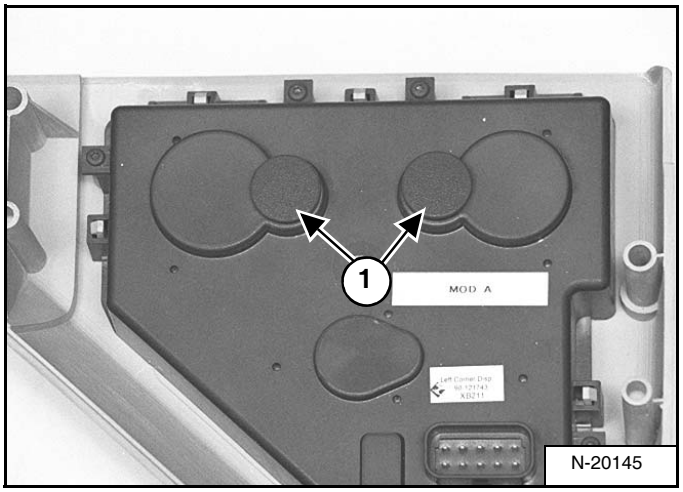
Alarm Removal and Installation

Remove the left side instrument panel.

Remove the retaining nut (Item 1) **[Figure 60-50-22]** from the loader alarm.

Remove the alarm from the loader instrument panel.

Figure 60-50-23



Bulb Removal And Installation

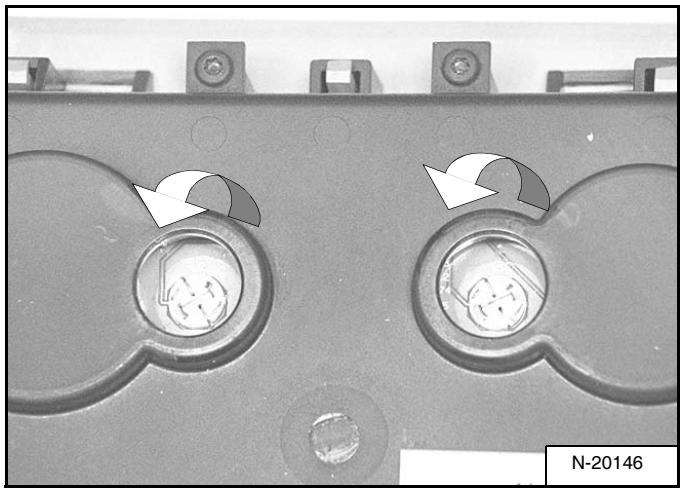
Remove the left side instrument panel.

Remove the two light bulb covers (Item 1) **[Figure 60-50-23]** from the back of the instrument panel.

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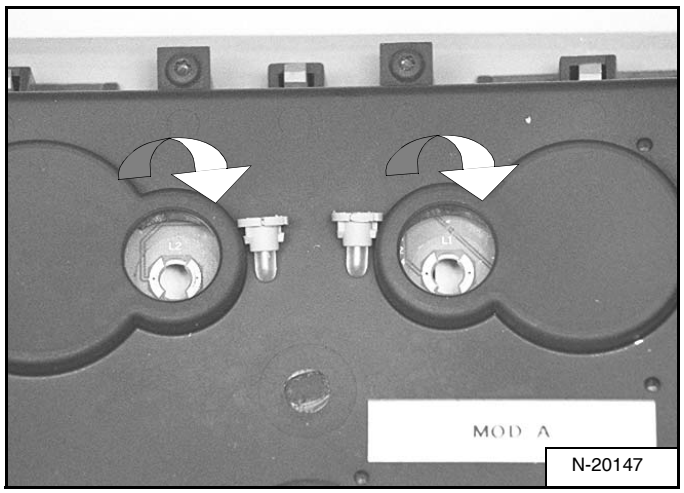
Standard & Deluxe Panel Removal And Installation (Left Side) (Cont'd)

Figure 60-50-24



With a flat blade screw driver, turn the light bulb counterclockwise **[Figure 60-50-24]** and remove from the panel.

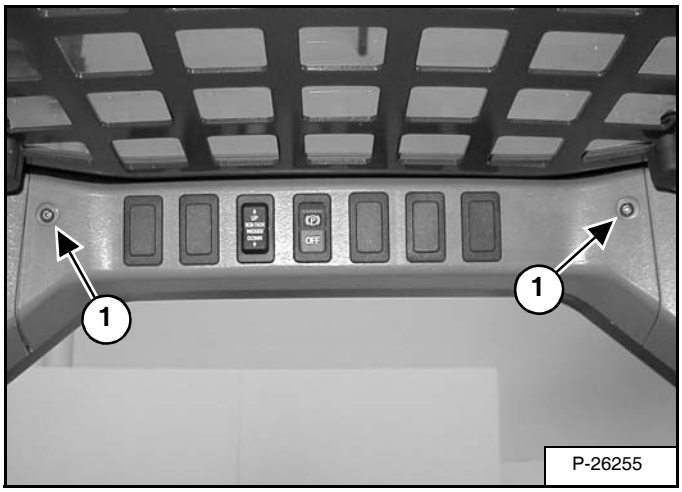
Figure 60-50-25



To install the bulbs, place them in the sockets and turn clockwise **[Figure 60-50-25]**.

Front Accessory Panel Removal And Installation

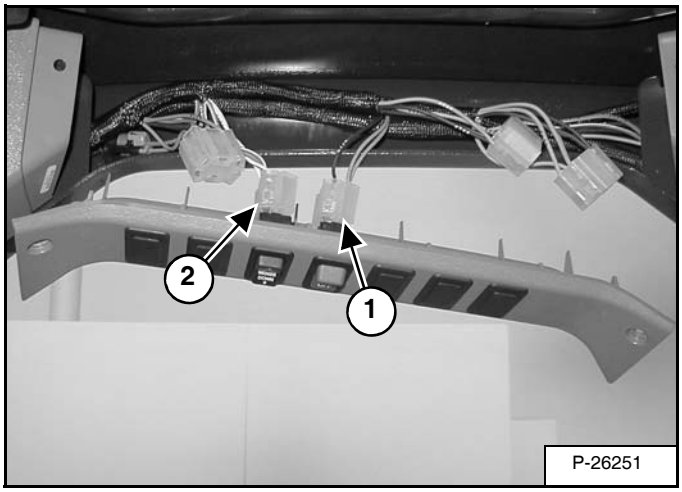
Figure 60-50-26



Remove the two mounting bolts (Item 1) **[Figure 60-50-26]**.

Installation: Be careful to not overtighten the front accessory panel mounting bolts to prevent damage to the plastic panel.

Figure 60-50-27



Pull the front accessory panel down and disconnect the wire harness connector(s) (Items 1 & 2) **[Figure 60-50-27]** from the switches.

Remove the panel.

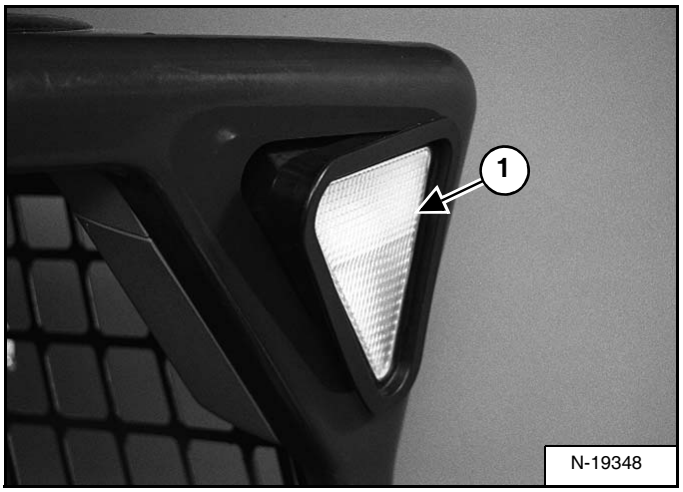
Reverse the procedure to install the front accessory panel.

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LIGHTS

Front Removal And Installation

Figure 60-60-1

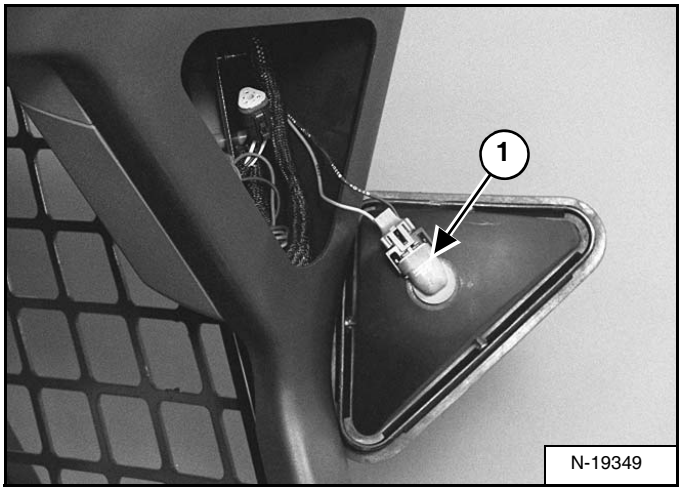


Open the rear door.

Disconnect the negative(-) cable from the battery. (See Removal And Installation on Page 60-20-1.).

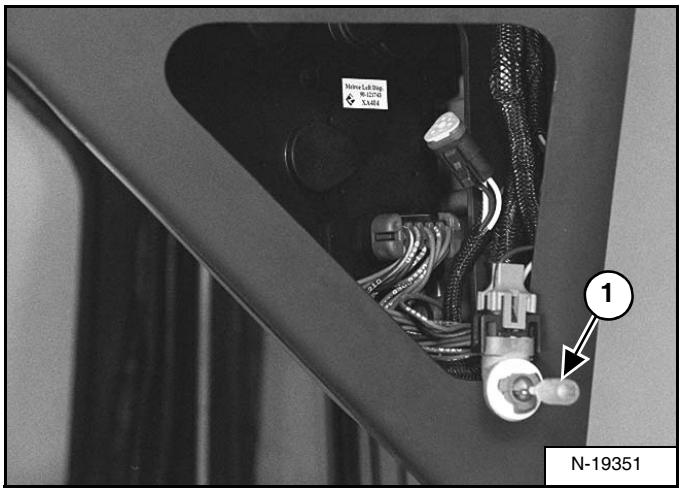
Remove the light housing (Item 1) **[Figure 60-60-1]** from the operator cab.

Figure 60-60-2



Remove the bulb assembly (Item 1) **[Figure 60-60-2]** from the light housing by turning bulb assembly a 1/4 turn.

Figure 60-60-3



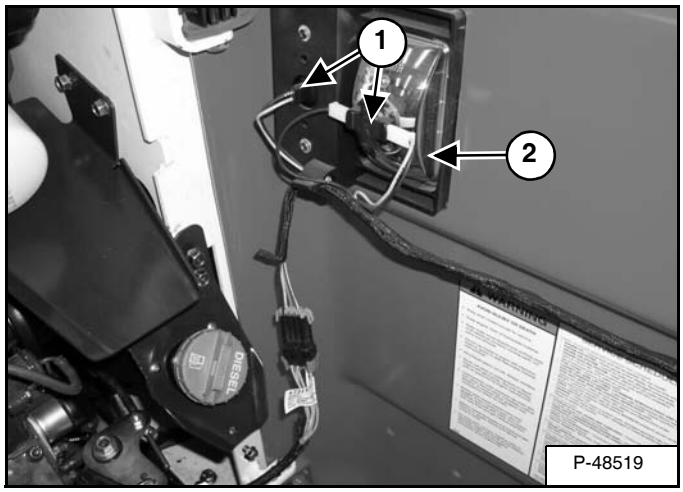
Remove the bulb (Item 1) **[Figure 60-60-3]** from the socket.

Reverse the above procedure to install the bulb.

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Rear Removal And Installation

Figure 60-60-4



Remove the bulb assembly (Items 1 & 2) from the light housing (Item 3) **[Figure 60-60-4]** by turning bulb assembly a 1/4 turn.

Figure 60-60-5



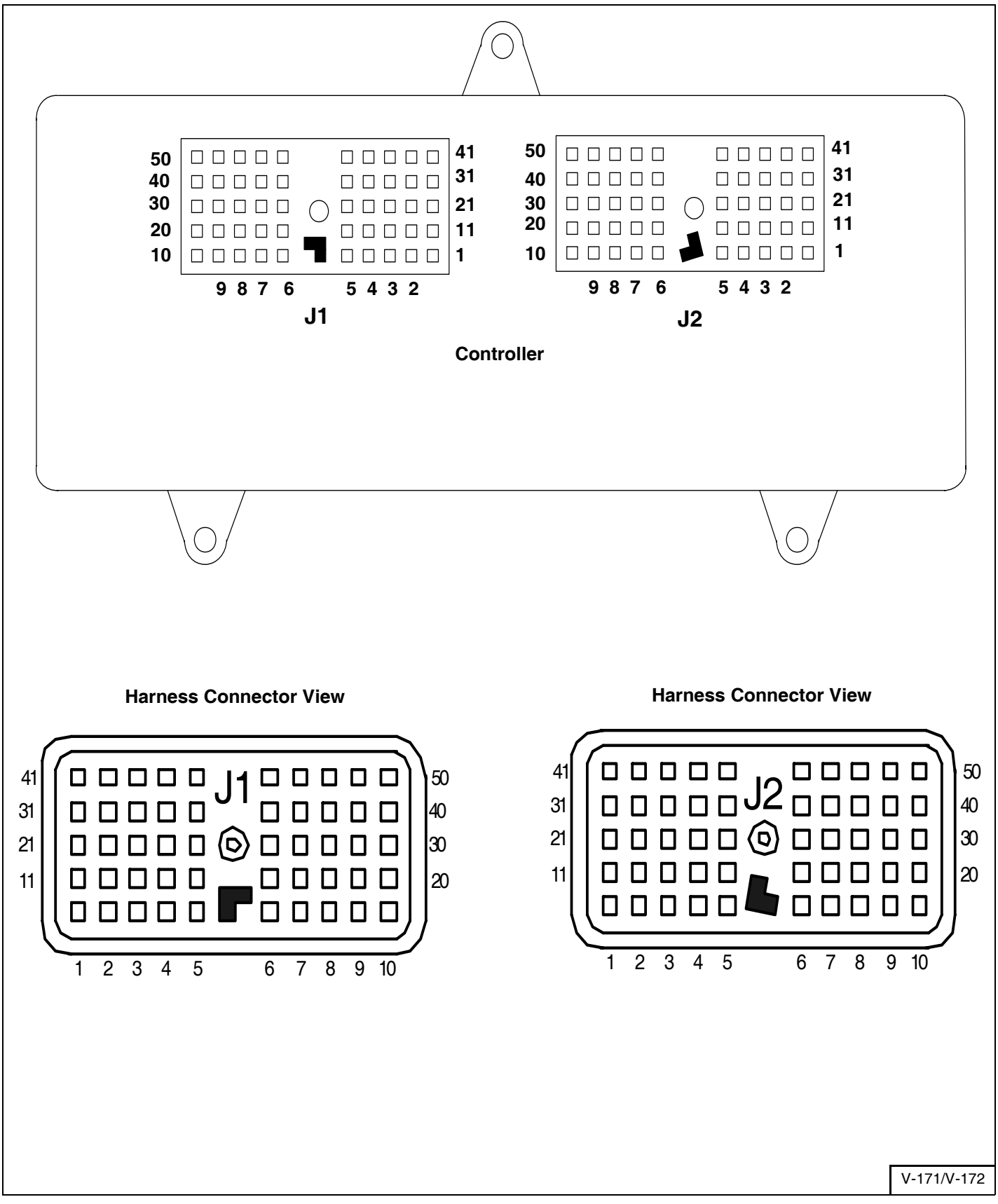
Using care press the rear light and housing from the door **[Figure 60-60-5]**.

Reverse this procedure for installation.

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BOBCAT CONTROLLER

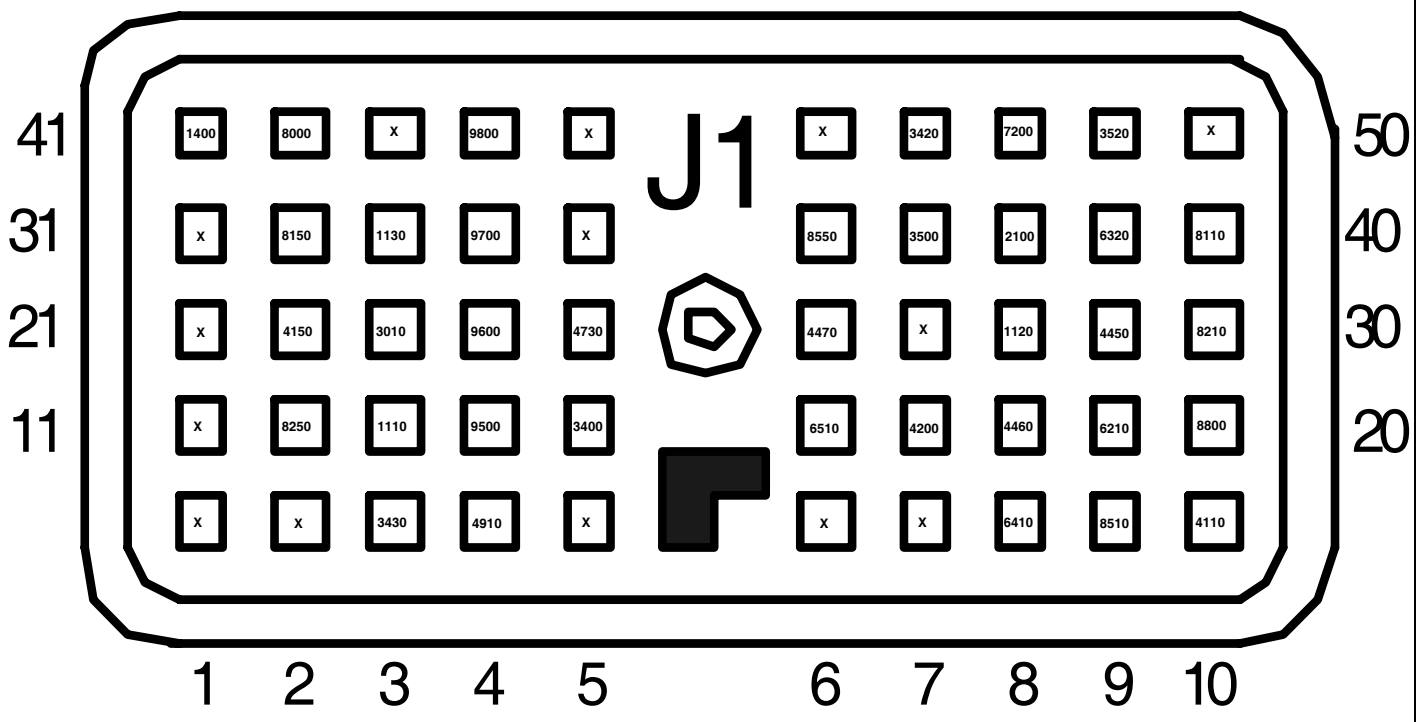
Identification Chart



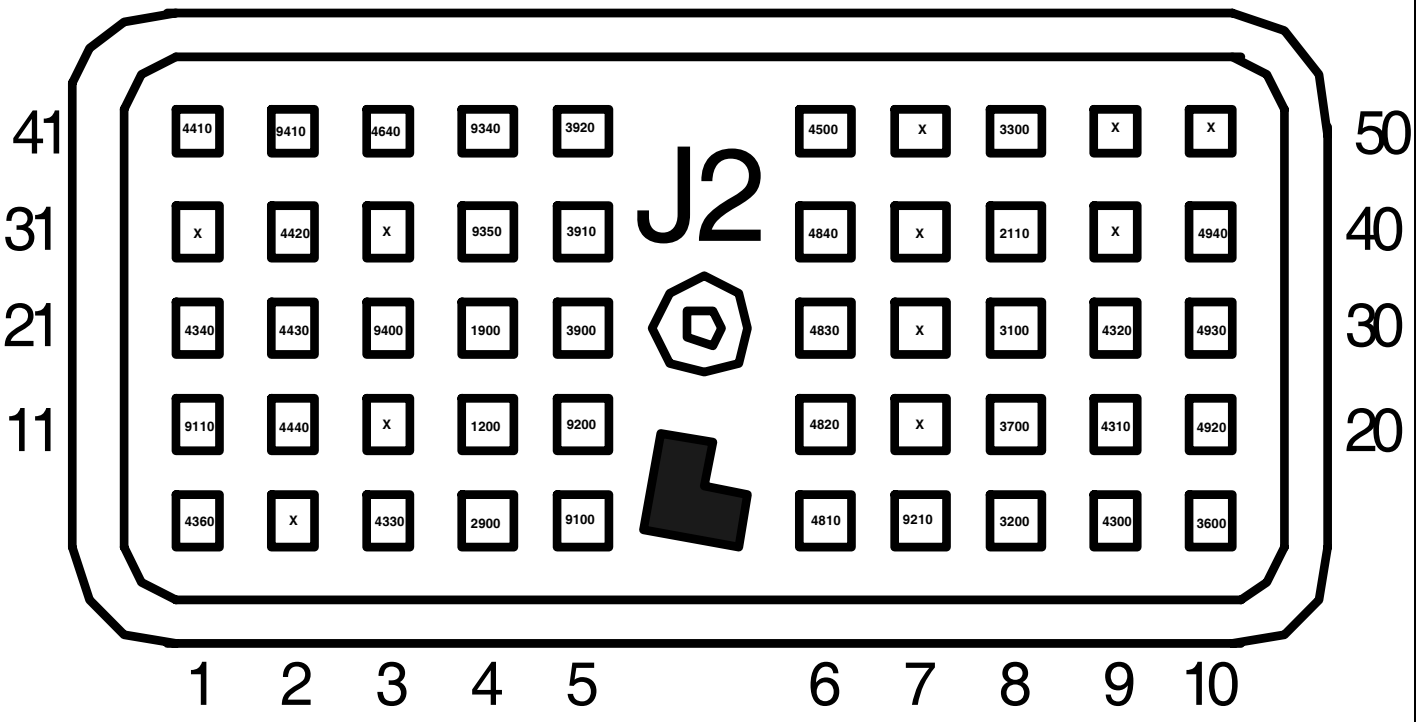
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Identification Chart (Cont'd)

Harness Connector View



Harness Connector View



V-172

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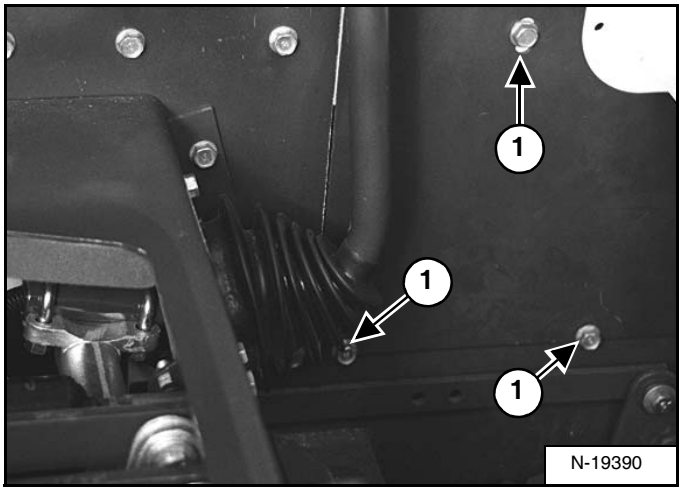
Removal And Installation

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 60-70-1



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

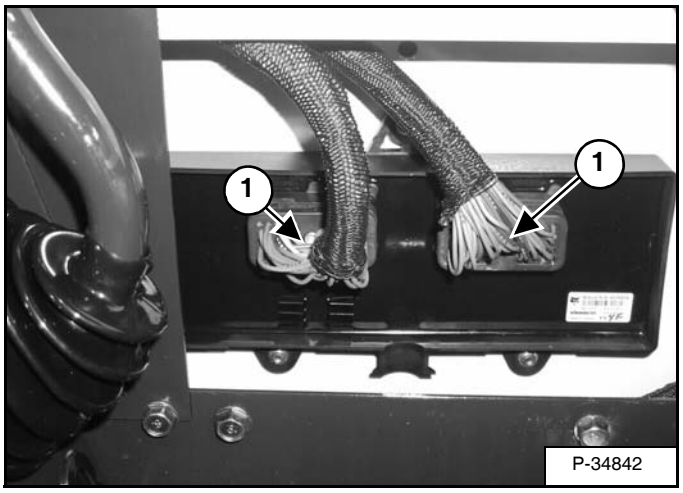
Stop the engine. Raise the seat bar.

Lift and block the rear of the loader. (See Procedure on Page 10-10-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the left front side panel (Item 1) **[Figure 60-70-1]**.

Figure 60-70-2

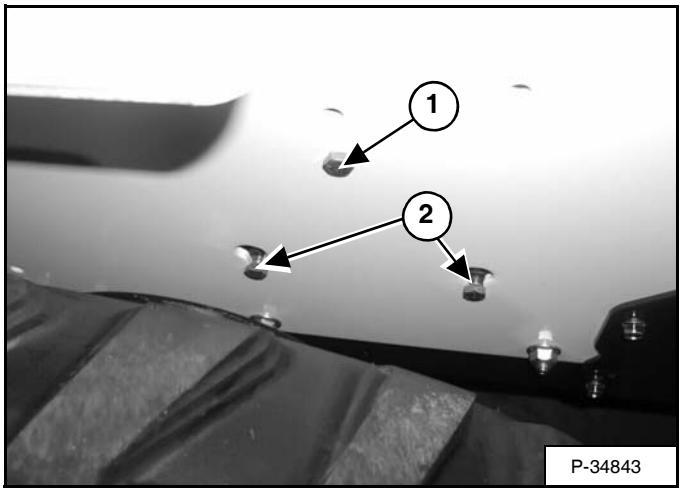


Loosen the harness connectors mounting bolts (Item 1) **[Figure 60-70-2]** from the Bobcat controller.

Remove the connectors.

NOTE: The connectors are keyed and will only plug in one way.

Figure 60-70-3



Remove the top mounting bolt (Item 1) **[Figure 60-70-3]**.

Loosen the two mounting bolts (Item 2) **[Figure 60-70-3]** of the system controller.

Installation: Tighten the nuts to 12-14 ft.-lb. (16,3-19 N•m) torque.

Remove the system controller.

Reverse the above procedure to install the system controller.

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CONTROLLER (SELECTABLE JOYSTICK CONTROL) (SJC)

Removal and Installation

⚠ WARNING

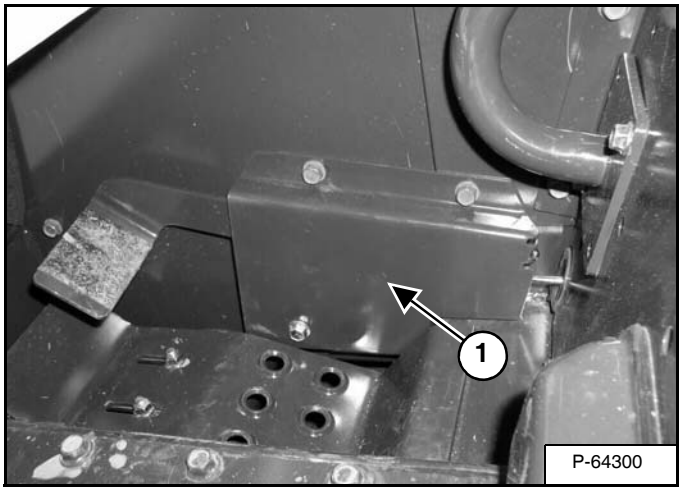
Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

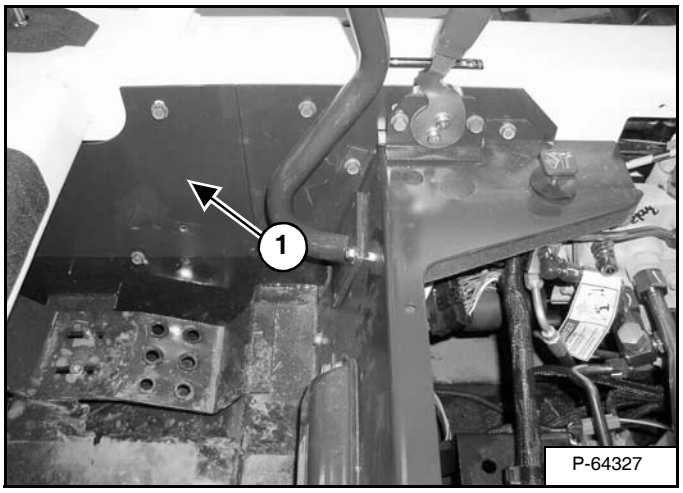
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Figure 60-71-1



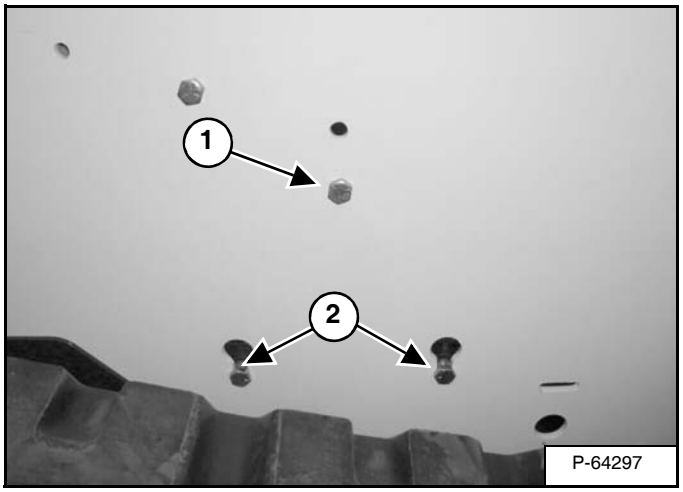
Remove the foot portion of the engine speed control (Item 1) **[Figure 60-71-1]**. (See Removal And Installation on Page 70-20-1.)

Figure 60-71-2



Remove the inside access panel (right side) (Item 1) **[Figure 60-71-2]**.

Figure 60-71-3



Remove the top controller mounting bolt (Item 1). Loosen the two bottom controller mounting bolts (Item 2) **[Figure 60-71-3]** from the right side fender.

Lift and remove the controller from the fender.

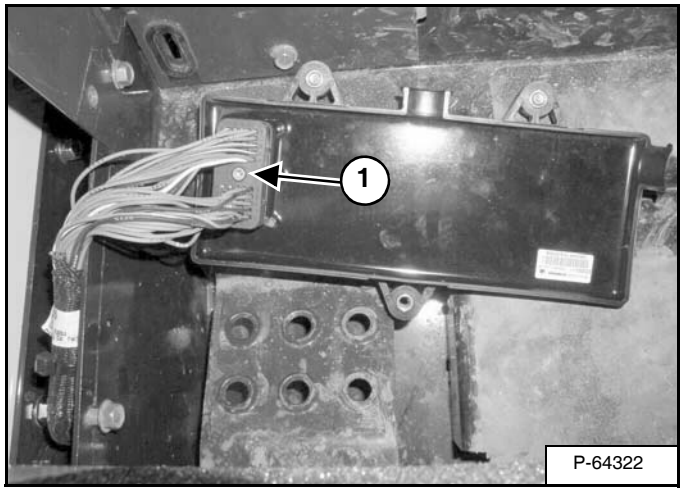
Installation: Tighten the mounting bolts to 12-14 ft.-lbs (16-19 N•m) torque.

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CONTROLLER (SELECTABLE JOYSTICK CONTROL) (SJC) (CONT'D)

Removal and Installation (Cont'd)

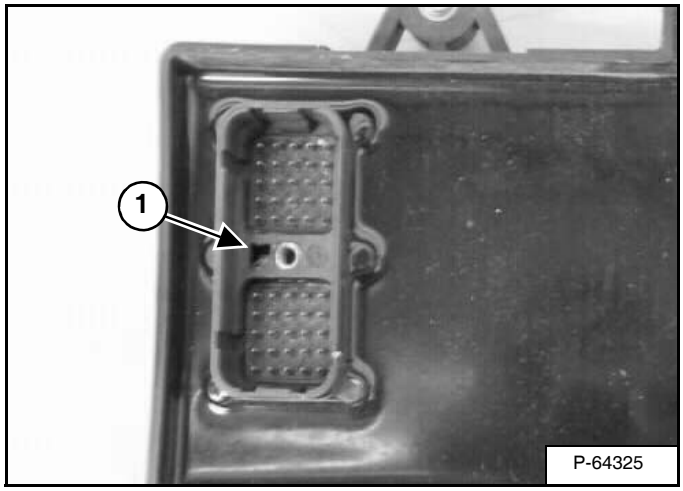
Figure 60-71-4



Pull the controller out from the fender and loosen the connector screw (Item 1) **[Figure 60-71-4]** to release the connector.

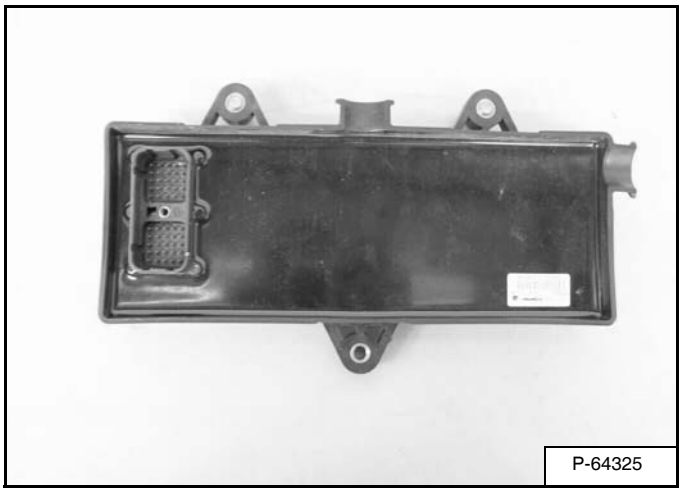
Installation: Tighten the connector screw to 30-35 in.-lb. (3,39-3,96 N•m) torque. DO NOT OVERTIGHTEN!

Figure 60-71-5



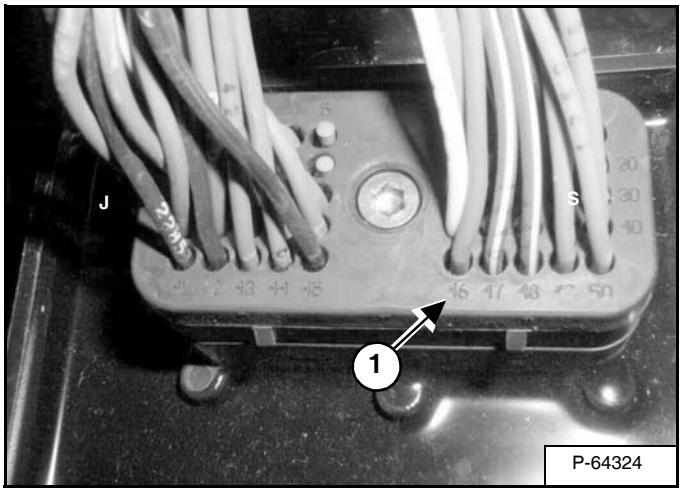
Installation: Note the keyed hole in the controller socket. (Item 1) **[Figure 60-71-5]**. The keyed hole matches a tab on the connector on the wire harness.

Figure 60-71-6



Remove the SJC controller **[Figure 60-71-6]**.

Figure 60-71-7



The wire location (Item 1) **[Figure 60-71-7]** is printed on the connector, in the locations shown.

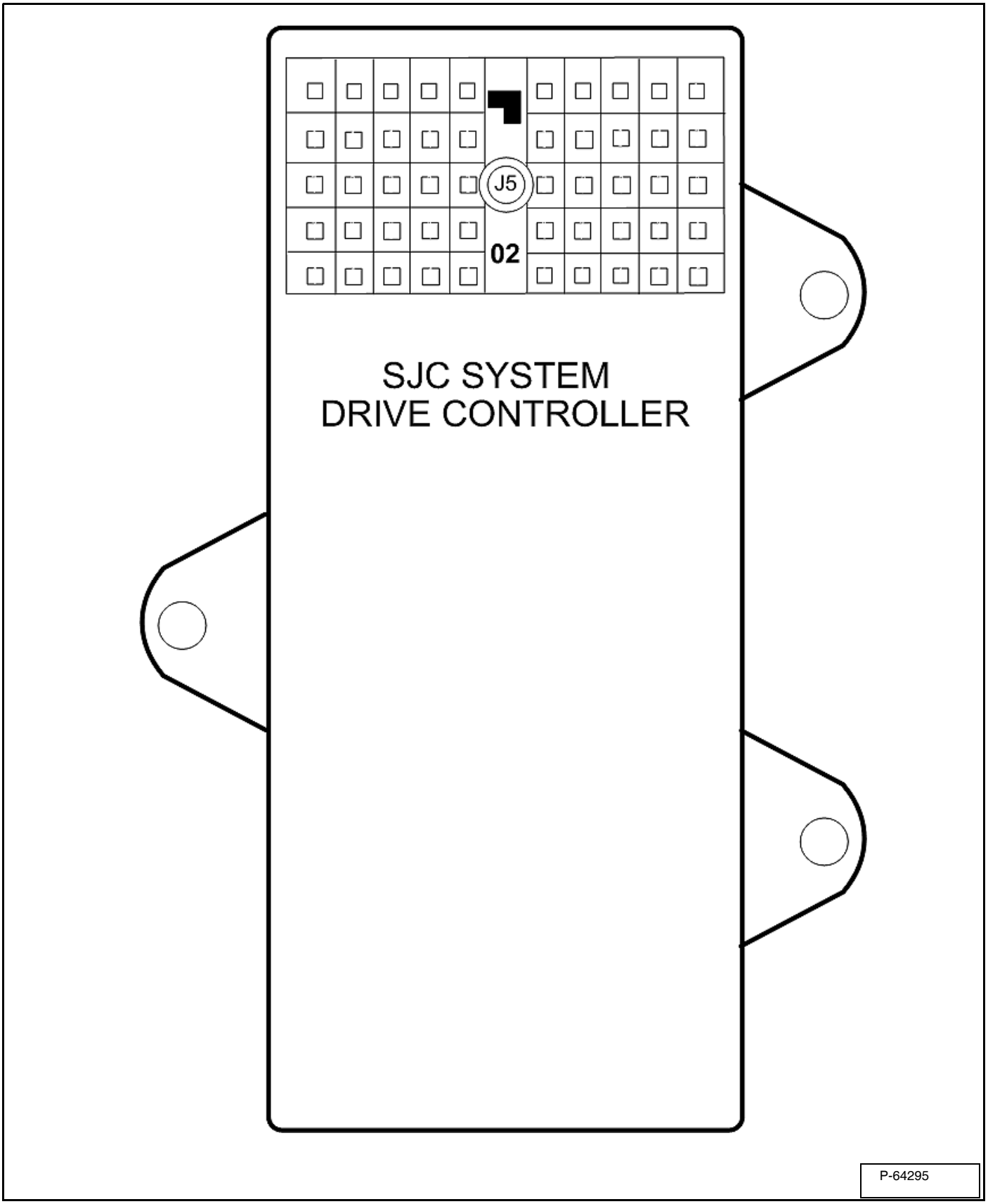
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Bobcat®

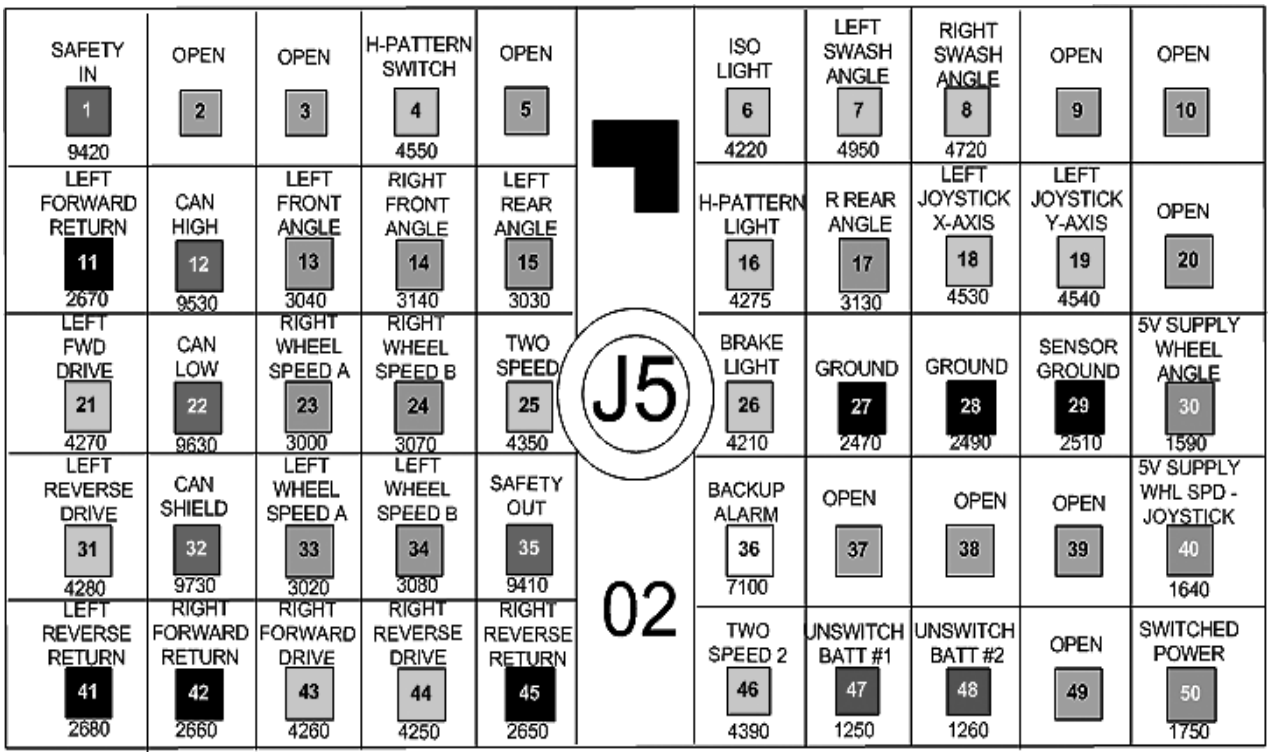
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Identification Chart



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Identification Chart (Cont'd)



P-64296

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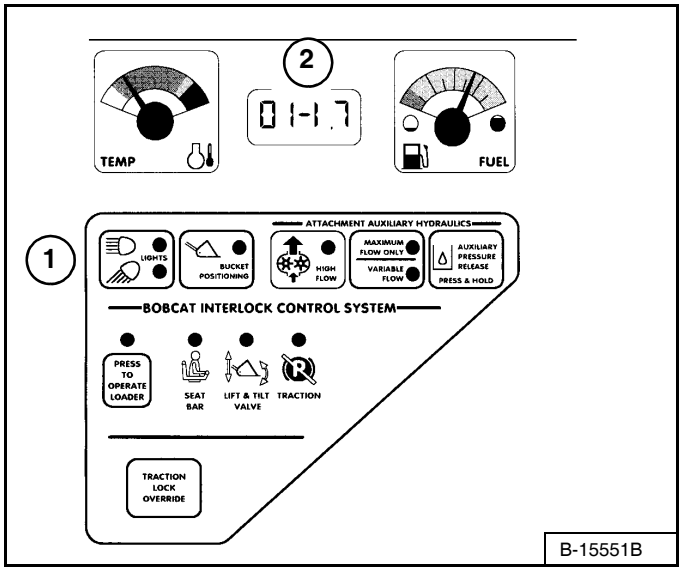


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DIAGNOSTICS SERVICE CODES

Display

Figure 60-80-1



The left instrument panel is the same for both the Standard and Deluxe Instrumentation **[Figure 60-80-1]**.

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

Press and hold LIGHTS Button (Item 1) **[Figure 60-80-1]** for two seconds to view SERVICE CODES in the HOURMETER/CODE DISPLAY (Item 2) **[Figure 60-80-1]**. If more than one SERVICE CODE is present, the codes will scroll on the HOURMETER/CODE DISPLAY.

The following word errors may be displayed.

REPLY One or both instrument panel(s) not communicating with the controller.

INPUT The controller not communicating with the left instrument panel.

CODE The controller is asking for a password. (Deluxe instrument panel only.)

ERROR The wrong password was entered. (Deluxe instrument panel only.)

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DIAGNOSTICS SERVICE CODES (CONT'D)

Number Codes List

CODE		CODE	
01-16	Air filter not connected	10-16	Hydraulic Charge filter not connected
01-17	Air filter plugged	10-17	Hydraulic Charge filter plugged
02-16	Hydraulic implement filter not connected	11-05	Seat bar sensor short to battery
02-17	Hydraulic implement filter plugged	11-06	Seat bar sensor short to ground
03-09	Battery voltage low	12-21	Front auxiliary PWM switch out of range high
03-10	Battery voltage high	12-22	Front auxiliary PWM switch out of range low
03-11	Battery voltage extremely high	12-23	Front auxiliary PWM switch not in neutral
03-14	Battery voltage extremely low		
03-22	Battery voltage out of range low	13-05	Fuel shut-off hold solenoid short to battery
		13-06	Fuel shot-off hold solenoid short to ground
04-09	Engine oil pressure low	13-07	Fuel shut-off solenoid open circuit
04-14	Engine oil pressure extremely low		
04-15	Engine oil pressure shutdown level	14-02	Fuel shut-off pull solenoid error ON
04-21	Engine oil pressure out of range high	14-03	Fuel shut-off pull solenoid error OFF
04-22	Engine oil pressure out of range low		
		15-02	Traction lock pull solenoid error ON
05-09	Hydraulic charge pressure low	15-03	Traction lock pull solenoid error OFF
05-10	Hydraulic charge pressure high		
05-11	Hydraulic charge pressure extremely high	16-05	Traction lock hold solenoid short to battery
05-14	Hydraulic charge pressure extremely low	16-06	Traction lock hold solenoid short to ground
05-15	Hydraulic charge pressure shutdown level	16-07	Traction lock hold solenoid open circuit
05-21	Hydraulic charge pressure out of range high		
05-22	Hydraulic charge pressure of range low	17-05	Hydraulic lock valve solenoid short to battery
06-10	Engine speed high	17-06	Hydraulic lock valve solenoid short to ground
06-11	Engine speed extremely high	17-07	Hydraulic lock valve solenoid open circuit
06-13	Engine speed no signal		
06-15	Engine speed shutdown level	18-05	Spool Lock Solenoid short to battery
06-18	Engine speed out of range	18-06	Spool Lock Solenoid short to ground
07-10	Hydraulic oil temperature high	18-07	Spool Lock Solenoid open circuit
07-11	Hydraulic oil temperature extremely high		
07-15	Hydraulic oil temperature shutdown level	19-02	Bucket position solenoid error ON
07-21	Hydraulic oil temperature out of range high	19-03	Bucket position solenoid error OFF
07-22	Hydraulic oil temperature out of range low		
		20-02	Two-speed solenoid error ON
08-10	Engine coolant temperature high	20-03	Two-speed solenoid error OFF
08-11	Engine coolant temperature extremely high		
08-15	Engine coolant temperature shutdown level	21-02	Glow plug error ON
08-21	Engine coolant temperature out of range high	21-03	Glow plug error OFF
08-22	Engine coolant temperature out of range low		
		22-02	Starter error ON
09-09	Fuel level low	22-03	Starter error OFF
09-21	Fuel level out of range high		
09-22	Fuel level out of range low	23-02	Rear base solenoid error ON
		23-03	Rear base solenoid error OFF

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Number Codes List (Cont'd)

CODE		CODE	
		32-57	Lift actuator reduced performance
24-02	Rear rod solenoid error ON	32-58	Tilt actuator reduced performance
24-03	Rear rod solenoid error OFF	32-59	Lift actuator wrong direction
		32-60	Tilt actuator wrong direction
25-02	Rear auxiliary relief solenoid error ON	32-61	Handle lock short to ground
25-03	Rear auxiliary relief solenoid error Off	32-62	Handle lock short to battery
		32-63	Pedal lock short to ground
26-02	Front base solenoid error ON	32-64	Pedal lock short to battery
26-03	Front base solenoid error OFF	32-65	Sensor supply voltage out of range
		32-66	Battery voltage out of range
27-02	Front rod solenoid error ON	32-67	Switch flipped while operating
27-03	Front rod solenoid error OFF	32-68	Lift handle information error
		32-69	Control pattern switch flipped while operating
28-02	Diverter solenoid error ON	32-70	Right drive handle short to ground
28-03	Diverter solenoid error OFF	32-71	Right drive handle short to battery
		32-75	Interrupted unswitched power
29-02	High flow solenoid error ON		
29-03	High flow solenoid error OFF	33-23	Main Controller (Bobcat Controller) not programmed
30-28	Controller Memory failure	34-04	Deluxe panel no communication to Bobcat controller
31-28	Interrupted power failure	35-02	Hydraulic fan error ON
		35-03	Hydraulic fan error OFF
32-04	ACS not communicating with Bobcat Controller		
32-23	ACS Not calibrated	36-48	ACD multiple controllers present
32-31	Tilt actuator fault		
32-32	Tilt actuator wiring fault	37-02	Two-speed secondary error ON
32-33	Tilt handle wiring fault	37-03	Two-speed secondary error OFF
32-34	Tilt actuator not in neutral		
32-35	Tilt handle/pedal not in neutral		
32-36	Lift actuator fault		
32-37	Lift actuator wiring fault		
32-38	Lift handle wiring fault		
32-39	Lift actuator not in neutral		
32-40	Lift handle/pedal not in neutral		
32-41	No communication		
32-49	Lift actuator short to ground		
32-50	Tilt actuator short to ground		
32-51	Lift actuator short to battery		
32-52	Tilt actuator short to battery		
32-53	Lift handle/pedal short to ground		
32-54	Tilt handle/pedal short to ground		
32-55	Lift handle/pedal short to battery		
32-56	Tilt handle/pedal short to battery		

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Number Codes List (Cont'd)

CODE		CODE	
38-04	No communication from joystick controller	38-53	Left forward drive solenoid error OFF
38-05	Left joystick X axis not in neutral	38-54	Left reverse drive solenoid error OFF
38-06	Right joystick X axis not in neutral	38-55	Right forward drive solenoid error OFF
38-07	Left joystick Y as not in neutral	38-56	Right reverse drive solenoid error OFF
38-08	Right joystick Y axis not in neutral	38-57	Front right extend steering solenoid error OFF
38-09	Control pattern switch - Short to Battery or Ground	38-58	Front right retract steering solenoid error OFF
38-11	Lift actuator not in neutral	38-59	Front left extend steering solenoid error OFF
38-12	Tilt actuator not in neutral	38-60	Front left retract steering solenoid error OFF
38-13	Lift actuator fault	38-61	Rear right extend steering solenoid error OFF
38-14	Tilt actuator fault	38-62	Rear right retract steering solenoid error OFF
38-15	Right wheel speed fault	38-63	Rear left extend steering solenoid error OFF
38-16	Left wheel speed fault	38-64	Rear left retract steering solenoid error OFF
38-17	Tilt actuator reduced performance	38-65	Steering pressure solenoid error OFF
38-18	Lift actuator reduced performance	38-66	Back-up alarm error OFF
38-19	Left joystick X axis out of range high	38-67	No communication from Bobcat controller
38-20	Right joystick X axis out of range low	38-68	Wheel angles (alignment) not calibrated
38-21	Left joystick Y axis out of range high	38-69	Lift & tilt actuators not calibrated
38-22	Right joystick Y axis out of range high	38-70	Interrupted power
38-23	Front right steering sensor out of range high	38-71	Battery out of range
38-24	Front left steering sensor out of range high	38-72	Drive pump not calibrated
38-25	Rear right steering sensor out of range high	38-73	Steering mode / drive mode switch flipped while operating
38-26	Rear left steering sensor out of range high	38-74	Uncommanded right wheel speed error ON
38-27	Lift actuator out of range high	38-75	Uncommanded left wheel speed error ON
38-28	Tilt actuator out of range high	38-76	Undercurrent steer pressure solenoid
38-29	Left joystick X axis out of range low	38-77	Undercurrent front right extend steer solenoid
38-30	Right joystick X axis out of range low	38-78	Undercurrent front right retract steer solenoid
38-31	Left joystick Y axis out of range low	38-79	Undercurrent front left extend steer solenoid
38-32	Right joystick Y axis out of range low	38-80	Undercurrent front left retract steer solenoid
38-33	Front right steering sensor out of range low	38-81	Undercurrent rear right extend steer solenoid
38-34	Front left steering sensor out of range low	38-82	Undercurrent rear right retract steer solenoid
38-35	Rear right steering sensor out of range low	38-83	Undercurrent rear left extend steer solenoid
38-36	Rear left steering sensor out of range low	38-84	Undercurrent rear left retract steer solenoid
38-37	5 volt sensor supply 1 out of range low	38-85	5 Volt sensor supply 1 out of range high
38-38	5 volt sensor supply 2 out of range low	38-86	5 Volt sensor supply 2 out of range high
38-39	Lift actuator short to ground / out of range low	38-87	Front right wheel blocked (steering mechanical failure)
38-40	Tilt actuator short to ground / out of range low	38-88	Front left wheel blocked (steering mechanical failure)
38-41	Tilt actuator wrong direction	38-89	Rear right wheel blocked (steering mechanical failure)
38-42	Lift actuator wrong direction	38-90	Rear left steering error
38-43	Left forward drive solenoid error ON	38-91	Right speed sensor missing pulses
38-44	Left reverse drive solenoid error ON	38-92	Left speed sensor missing pulses
38-45	Right forward drive solenoid error ON	38-93	Unresponsive right speed sensor
38-46	Right reverse drive solenoid error ON	38-94	Unresponsive left speed sensor
38-47	Front right steering solenoid error ON	38-95	Left speed sensor reverse direction
38-48	Front left steering solenoid error ON	38-96	Right speed sensor reverse direction
38-49	Rear right steering solenoid error ON	38-98	Controller in drive calibration mode
38-50	Rear left steering solenoid error ON	38-99	Controller in wheel position calibration mode.
38-51	Steering pressure solenoid error ON		
38-52	Back-up alarm error ON		

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DIAGNOSTICS SERVICE CODES (CONT'D)

Number Codes List (Cont'd)

CODE		CODE	
39-04	Left joystick no communication to Bobcat controller	50-38	Front reverse error OFF
		50-39	Rear PWM error on
40-04	Right joystick no communication to Bobcat controller	50-41	Rear PWM no signal
		50-42	Rear PWM not calibrate
44-02	Horn error ON	50-43	Rear forward error ON
44-03	Horn error OFF	50-44	Rear forward error OFF
		50-45	Rear reverse error ON
45-02	Right blinker error ON	50-46	Rear reverse error OFF
45-03	Right blinker error OFF	50-47	Two speed error OFF
		50-48	Two speed error ON
46-02	Left blinker error ON	50-49	Brake solenoid error ON
46-03	Left blinker error OFF	50-50	Brake solenoid error OFF
		50-51	Brake solenoid no signal
47-21	8 volt sensor supply out of range high	50-52	Brake light relay error ON
47-22	8 volt sensor supply out of range low	50-53	Brake light relay error OFF
		50-54	Differential lock error ON
48-02	Front light relay error ON	50-55	Differential lock error OFF
48-03	Front light relay error OFF	50-56	CAN communications fault
		50-57	Drive controller not calibrated
49-02	Rear light relay error ON		
49-03	Rear light relay error OFF	50-59	Front speed sensor missing pulses
		50-60	Rear speed sensor missing pulses
50-01	Travel pedal out of range high		
50-02	Travel pedal out of range low		
50-03	Travel pedal not calibrated	50-63	Front angle sensor not calibrated
50-04	Brake Pedal out of range high		
50-05	Brake Pedal out of range low		
50-06	Brake Pedal not calibrated	50-66	Rear angle sensor not calibrated
50-07	Drive selector switch no signal	50-67	Front forward no signal
50-08	Drive selector switch multiple inputs	50-68	Front reverse no signal
50-09	Front wheel speed sensor out of range high	50-69	Rear forward no signal
50-10	Front wheel speed sensor out of range low	50-70	Rear reverse no signal
50-11	Rear wheel speed sensor out of range high	50-99	In calibration mode
50-12	Rear wheel speed sensor out of range low		
50-13	Front wheel speed sensor no signal	60-21	Rear auxiliary control out of range high
50-14	Rear wheel speed sensor no signal	60-22	Rear auxiliary control out of range low
50-15	Dual wheel speed sensor fault	60-23	Rear auxiliary control not returning to neutral
50-24	Battery voltage over voltage		
50-27	5V sensor #1 over voltage	62-04	Load moment monitoring in error
50-28	5V sensor #1 under voltage		
50-29	5V sensor #2 over voltage	63-05	Short to battery
50-30	5V sensor #2 under voltage	63-06	Short to ground
50-31	Front PWM error on		
50-33	Front PWM no signal	64-02	Switched power relay error ON
50-34	Front PWM not calibrate	64-03	Switched power relay error OFF
50-35	Front forward error ON		
50-36	Front forward error OFF		
50-37	Front reverse error ON		

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Number Codes List (Cont'd)

CODE		CODE	
65-02	Workgroup lockout error on	75-74	Left wheel speed uncommanded motion
65-03	Workgroup lockout error off	75-75	Right wheel speed uncommanded motion
65-05	Workgroup lockout short to battery	75-76	No communication from ACS Controller
65-06	Workgroup lockout short to ground	75-77	Left speed sensor out of range high
65-07	Workgroup lockout open circuit	75-78	Right speed sensor out of range high
		75-79	Left speed sensor out of range low
66-05	Pilot pressure short to battery	75-80	Right speed sensor out of range low
66-06	Pilot pressure short to ground	75-85	5 volt sensor supply 1 out of range high
		75-91	Left swash plate sensor reversed
74-72	Bobcat controller in boot code	75-92	Right swash plate sensor reversed
74-73	Left hand panel system RX error	75-93	Unresponsive right speed sensor
		75-94	Unresponsive left speed sensor
75-04	No communication from Drive Controller	75-95	Left speed sensor reversed direction
75-05	Left joystick X-Axis not in neutral	75-96	Left speed sensor reversed direction
75-07	Left joystick Y-Axis not in neutral	75-98	Controller in Calibration Mode
75-08	Right joystick Y-Axis not in neutral		
75-09	ISO/H pattern switch short to ground or battery	76-73	Left display panel RX error
75-17	Left swash plate not in neutral		
75-18	Right swash plate not in neutral	77-48	Key Switch - Multiple
75-19	Left joystick X-Axis out of range high		
75-21	Left joystick Y-Axis out of range high	78-74	Door/Transport Lock - Open/Active
75-22	Right joystick Y-Axis out of range high		
75-27	Left swash plate out of position		
75-28	Right swash plate out of position		
75-29	Left joystick X-Axis out of range low		
75-31	Left joystick Y-Axis out of range low		
75-32	Right joystick Y-Axis out of range low		
75-37	5 volt sensor supply 1 out of range low		
75-39	Left swash plate sensor out of range high		
75-40	Left swash plate sensor out of range low		
75-41	Right swash plate sensor out of range high		
75-42	Right swash plate sensor out of range low		
75-43	Left forward drive solenoid error ON		
75-44	Left reverse drive solenoid error ON		
75-45	Right forward drive solenoid error ON		
75-46	Right reverse drive solenoid error ON		
75-52	Backup alarm error ON		
75-53	Left forward drive solenoid error OFF		
75-54	Left reverse drive solenoid error OFF		
75-55	Right forward drive solenoid error OFF		
75-56	Right reverse drive solenoid error OFF		
75-66	Backup alarm error OFF		
75-67	No communication from Bobcat Controller		
75-69	Battery voltage out of range high		
75-70	Interrupted power (also occurs after software update)		
75-71	Battery voltage out of range low		
75-72	Drive pump not calibrated		
75-73	ISO/H pattern switch flipped while operating		

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Number Codes List (Cont'd)

CODE		CODE	
80-02	ACD output 'A' error ON		
80-03	ACD output 'A' error OFF		
81-02	ACD output 'B' error ON		
81-03	ACD output' B' error OFF		
82-02	ACD output 'C' error ON		
82-03	ACD output 'C' error OFF		
83-02	ACD output 'D' error ON		
83-03	ACD output 'D' error OFF		
84-02	ACD output 'E' error ON		
84-03	ACD output 'E' error OFF		
85-02	ACD output 'F' error ON		
85-03	ACD output 'F' error OFF		
86-02	ACD output 'G' error ON		
86-03	ACD output 'G' error OFF		
87-02	ACD output 'H' error ON		
87-03	ACD output 'H' error OFF		
90-02	Service tool output 'C' error ON		
90-03	Service tool output 'C' error OFF		
91-02	Service tool output 'D' error ON		
91-03	Service tool output 'D' error OFF		
92-02	Service tool output 'E' error ON		
92-03	Service tool output 'E' error OFF		
93-02	Service tool output 'F' error ON		
93-03	Service tool output 'F' error OFF		

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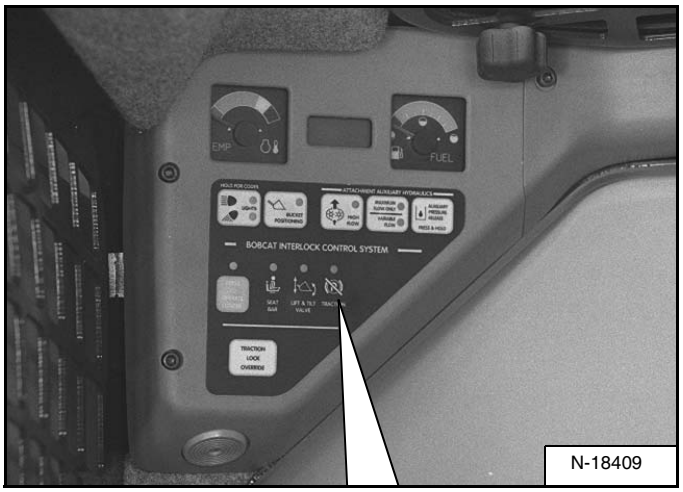


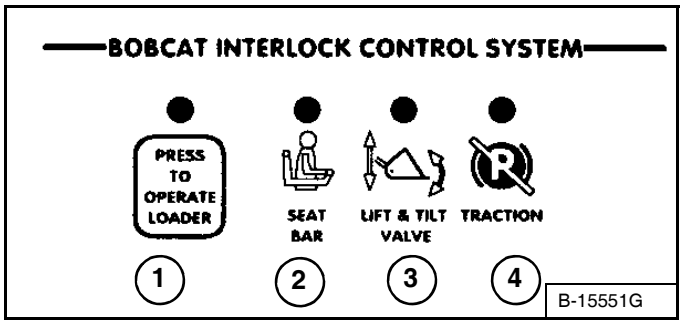
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BICS™ SYSTEM

Inspecting The BICS™ Controller (Engine STOPPED - Key ON)

Figure 60-90-1





⚠ WARNING

AVOID INJURY OR DEATH

The Bobcat Interlock Control System (BICS™) must deactivate the lift, tilt and traction drive functions. If it does not, contact your dealer for service. DO NOT modify the system.

W-2151-0394

1. Sit in the operator's seat. Turn key ON (*Standard Panel*), press RUN / ENTER Button (*Deluxe Panel*, lower the Seat Bar and disengage the parking brake pedal. Press the PRESS TO OPERATE LOADER Button. Three BICS™ lights (Items 1, 2, & 3) **[Figure 60-90-1]** [PRESS TO OPERATE LOADER, SEAT BAR, and LIFT & TILT VALVE] on left instrument panel should be ON **[Figure 60-90-1]**.

2. Raise the Seat Bar fully. All four BICS™ lights (Items 1, 2, 3, & 4) **[Figure 60-90-1]** [PRESS TO OPERATE LOADER, SEAT BAR, LIFT & TILT VALVE and TRACTION*] on left instrument panel should be OFF **[Figure 60-90-1]**

NOTE: Record what lights are blinking (if any) and number of light flashes. See Troubleshooting Guide on Page 60-90-4.

Inspecting Deactivation Of The Auxiliary Hydraulics System (Engine STOPPED - Key ON)

3. Sit in the operator's seat, lower the Seat Bar, and press the PRESS TO OPERATE LOADER Button. Press the auxiliary hydraulics FLOW Button. The auxiliary FLOW Button light will come ON. Raise the Seat Bar. The light should be OFF.

Inspecting The Seat Bar Sensor (Engine RUNNING)

4. Sit in the operator's seat, lower the seat bar, engage the parking brake pedal and fasten the seat belt.

5. Start the engine and operate at low idle. Press the PRESS TO OPERATE LOADER Button. While raising the lift arms, raise the Seat Bar fully. The lift arms should stop. Repeat using the tilt function.

Inspecting The Traction Lock (Engine RUNNING)

6. Fasten the seat belt, disengage the parking brake pedal, press the PRESS TO OPERATE LOADER Button and raise the Seat Bar fully. Move the steering levers slowly forward and backward. The TRACTION lock should be engaged. Lower the Seat Bar. Press the PRESS TO OPERATE LOADER Button.

7. Engage the parking brake pedal and move the control levers slowly forward and backward. The TRACTION lock should be engaged.

NOTE: * The TRACTION light on the left instrument panel will remain OFF until the engine is started, the PRESS TO OPERATE LOADER Button is pressed and the parking brake is disengaged.

Inspecting The Lift Arm By-Pass Control

8. Raise the lift arms 6 feet (2 meters) off the ground. Stop the engine.

Turn the lift arm by-pass control knob clockwise 1/4 turn. Pull up and hold the lift arm by-pass control knob until the lift arms slowly lower.

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Additional Inspection For Loaders With Advanced Hand Controls (ACS)

9. Sit in the operator's seat and fasten the Seat Belt. Lower the Seat Bar, start the engine and press the PRESS TO OPERATE LOADER Button.

10. Raise the lift arms about 6 feet (2 meters) off the ground.

11. Turn key OFF (*Standard Panel*), press the STOP Button (*Deluxe Panel*, and wait for the engine to come to a complete stop.

12. Turn key ON (*Standard Panel*), press RUN /ENTER Button (*Deluxe Pane*l. Press the PRESS TO OPERATE LOADER Button, move the left hand control toward the operator. The lift arms should not lower.

13. Move the right hand control away from the operator. The bucket (or attachment) should not tilt forward.

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Troubleshooting Chart

The following troubleshooting guide is provided for assistance in locating and correcting BICS™ system problems. It is recommended that these procedures be done by authorized Bobcat Service Personnel only.

⚠ WARNING

Check for correct function after adjustments, repairs or service. Failure to make correct repairs or adjustments can cause injury or death.

W-2004-1285

PROBLEM	SOLUTION#
All indicator lights flashing.	5
One of the indicator lights flashing.	1
Intermittent indicator lights.	2, 3, 4

SOLUTION SUGGESTIONS
1. Refer to BICS™ troubleshooting guide.(See Troubleshooting Guide on Page 60-90-4.)
2. Check wire connections on Bobcat controller to make sure connectors are locked into place.
3. Check pins in connectors for pins pushed back or bent.
4. Use seatbar sensor tester MEL1428 to isolate problem between sensor and controller and wiring.
5. Possible low or high voltage.

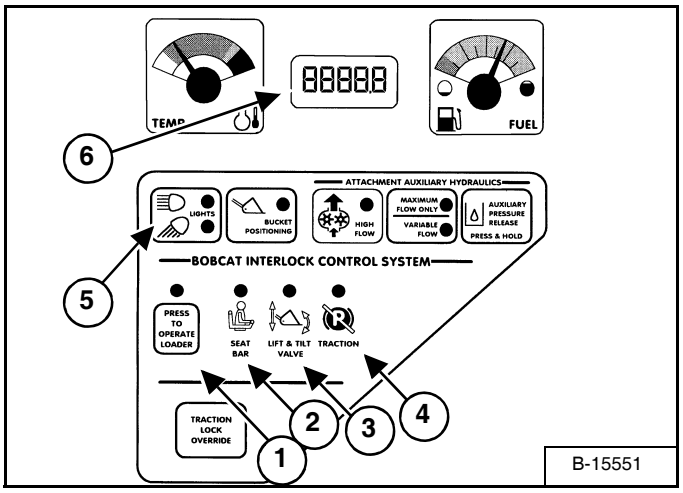
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Troubleshooting Guide

The following chart shows the effects which can happen to the loader, and the probable causes when the BICS™ Instrument Panel lights are off. See **[Figure 60-90-2]** for location of BICS™ lights and Icons. Have service procedures performed ONLY BY QUALIFIED BOBCAT SERVICE PERSONNEL.

Press and hold LIGHTS Button (Item 5) **[Figure 60-90-2]** for two seconds to view SERVICE CODES in the HOURMETER / CODE DISPLAY (Item 6) **[Figure 60-90-2]**. If more than one SERVICE CODE is present, the codes will scroll on the HOURMETER / CODE DISPLAY.

Figure 60-90-2



Indicator Light	Light ON	Light OFF	Effect on Operation of Loader When Light is OFF	SERVICE CODES Means System Error (See Your Bobcat Dealer for Service)		
				No. of Flashes	Service Code	Causes
1 PRESS TO OPERATE LOADER	PRESS TO OPERATE LOADER Button is pressed.	PRESS TO OPERATE LOADER Button is not pressed.	Lift, tilt and traction functions will not operate.	----	----	----
2 SEAT BAR	Seat Bar is down.	Seat Bar is up.	Lift and tilt functions will not operate.	2	11-05	Seat Bar sensor circuit shorted to battery voltage*.
				3	11-06	Seat Bar sensor circuit shorted to ground.
3 LIFT & TILT VALVE	Control valve can be used.	Control valve cannot be used.	Lift, tilt and traction functions will not operate.	1	17-07	Valve output circuit is open.
				2	17-05	Valve output circuit shorted to battery voltage*.
				3	17-06	Valve output circuit shorted to ground.
				3	17-06	Controller not grounded or intermittent ground.
4 TRACTION	Loader can be moved forward & backward	Loader cannot be moved forward and backward.	Loader cannot be moved forward and backward.	1	16-07	Traction lock hold solenoid circuit is open.
				2	16-05	Traction lock hold solenoid circuit shorted to battery voltage*.
				3	16-06	Traction lock hold solenoid circuit shorted to ground.
				5	15-02	Traction lock pull solenoid circuit is shorted to battery voltage* - ERROR ON (Should be OFF).
				6	15-03	Traction lock pull solenoid circuit ERROR OFF (Should be ON).
SEAT BAR LIFT & TILT VALVE TRACTION				Continuous Flashing	03-09 03-10	System voltage low System voltage high

NOTES:

Multiple SERVICE CODES and/or Abnormal Symptoms can be caused by corroded or loose ground. Check grounds and both battery connections.

ERROR OFF = shorted to ground or bad fuse, faulty wiring, faulty open relay, no voltage from relay to controller.
ERROR ON = shorted to battery voltage, faulty wiring, faulty closed relay.

*Normal BICS operating voltage is less than the electrical system voltage.

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SEAT BAR SENSOR

Troubleshooting Chart

The following troubleshooting chart is provided for assistance in locating and correcting BICS™ system problems. It is recommended that these procedures be done by authorized Bobcat Service Personnel only.

⚠ WARNING

Check for correct function after adjustments, repairs or service. Failure to make correct repairs or adjustments can cause injury or death.

W-2004-1285

PROBLEM	SOLUTION #
Indicator light does not come ON when seat bar is lowered.	1, 2, 3, 4, 5

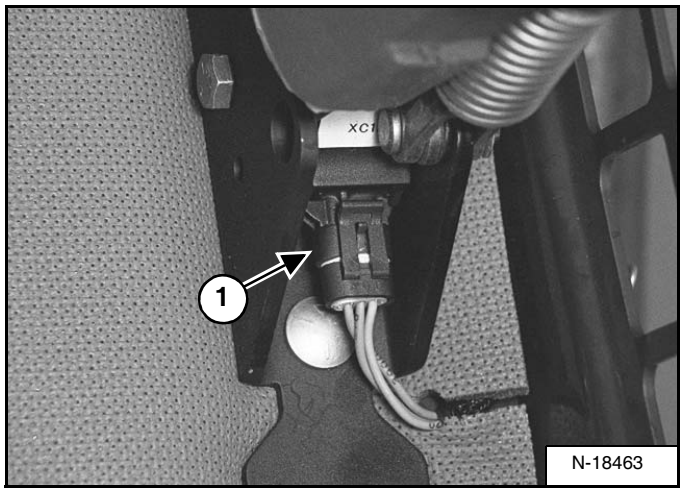
SOLUTION SUGGESTIONS

1. Check sensor wire connection.
2. Use the BICS™ sensor tester MEL 1428 with seat bar adapter MEL1567 to check sensor and controller.
3. Check for loose hardware.
4. Check keyed bushing to make sure magnet collar rotates with seat bar.
5. Check magnet collar magnets for contamination such as metal particles.

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Test

Figure 60-100-1

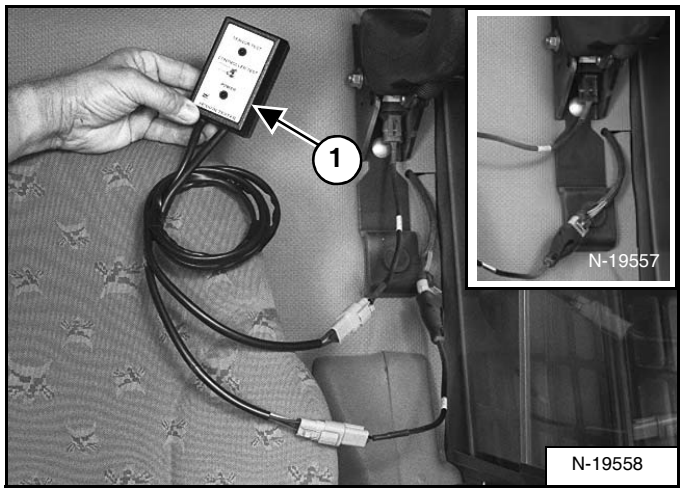


Use Sensor Tester (MEL1428) and seat bar sensor tester adatper (MEL1567) for the following procedure:

Connect the seat bar adapter sensor leads (MEL1567) to the sensor tester.

Disconnect the seat bar sensor connector (Item 1) **[Figure 60-100-1]**.

Figure 60-100-2

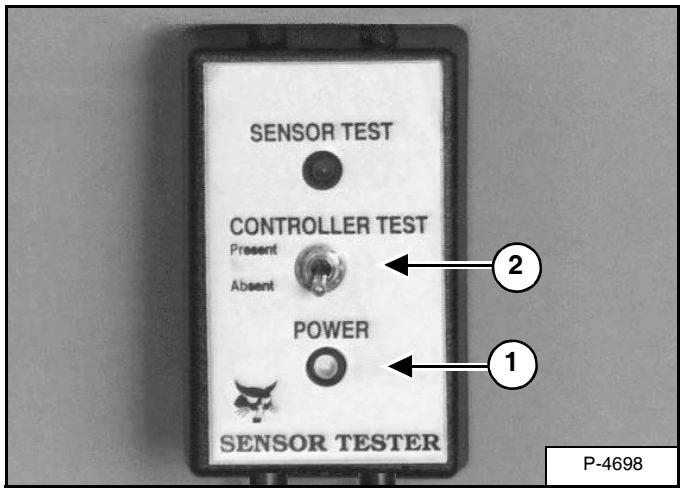


Connect the Sensor Tester (Item 1) **[Figure 60-100-2]** inline, to the seat bar sensor connectors. See inset **[Figure 60-100-2]**.

Turn the key to the ON position. **DO NOT START THE ENGINE**.

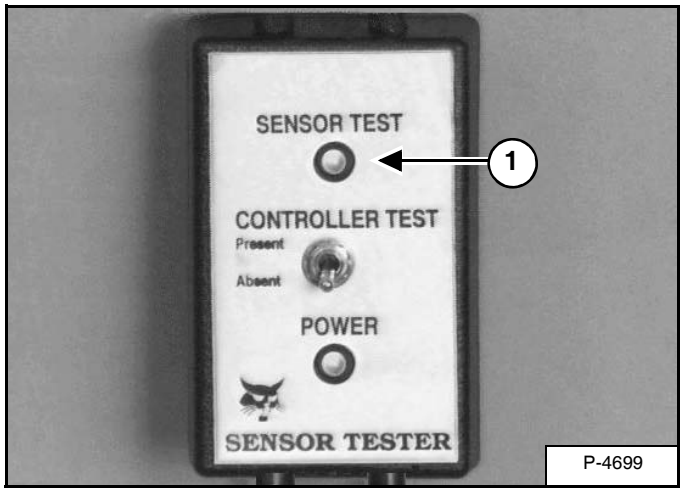
The toggle switch (Item 2) **[Figure 60-100-3]** can be in either the ***Absent*** or ***Present*** position.

Figure 60-100-3



If there is no power light (Item 1) **[Figure 60-100-3]** on the sensor tester, check the tester or wiring harness.

Figure 60-100-4



Lower the seat bar. The Sensor Test light (Item 1) **[Figure 60-100-4]** should illuminate.

Raise the seat bar. The Sensor Test light (Item 1) **[Figure 60-100-4]** should go off.

If the above test fails, there is a problem with the seat bar sensor.

Disconnect the Sensor Tester.

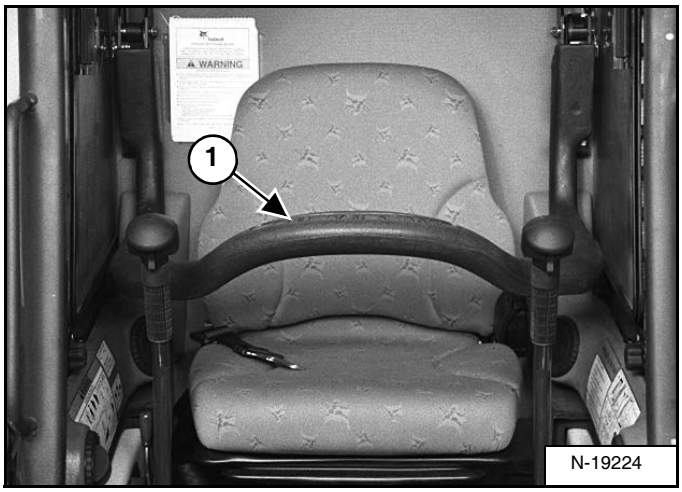
Replace the Seat Bar Sensor. (See Removal And Installation on Page 60-100-3.)

If the above test passes, run the seat bar sensor BICS™ circuit test. (See BICS™ Circuit Test on Page 60-100-5.)

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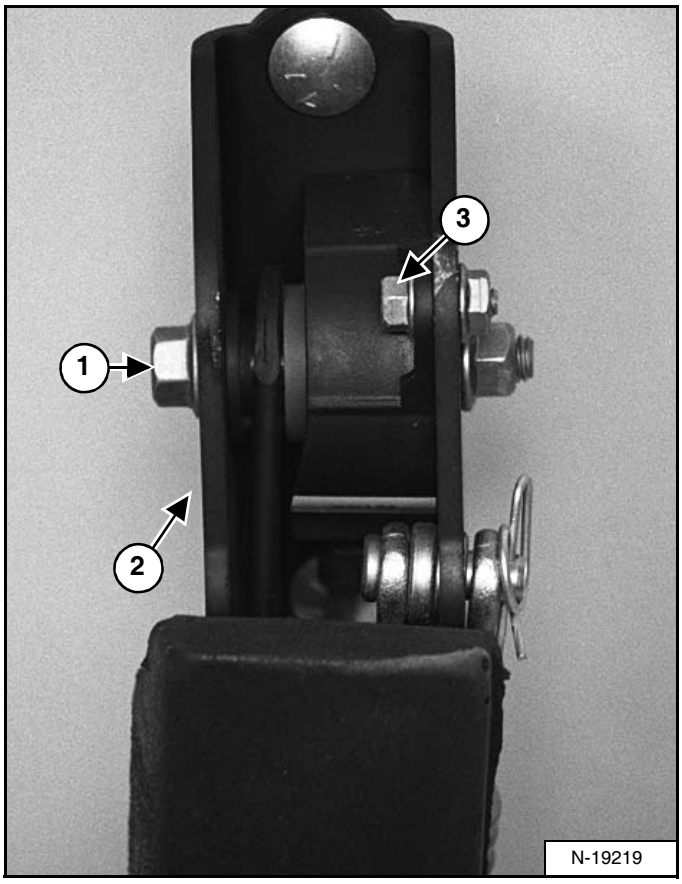
Removal And Installation

Figure 60-100-5



Remove the seat bar (Item 1) **[Figure 60-100-5]** from the loader. (See Removal And Installation on Page 50-10-1.)

Figure 60-100-6



Remove the mounting bolt (Item 1) from the seat bar mount (Item 2) **[Figure 60-100-6]**.

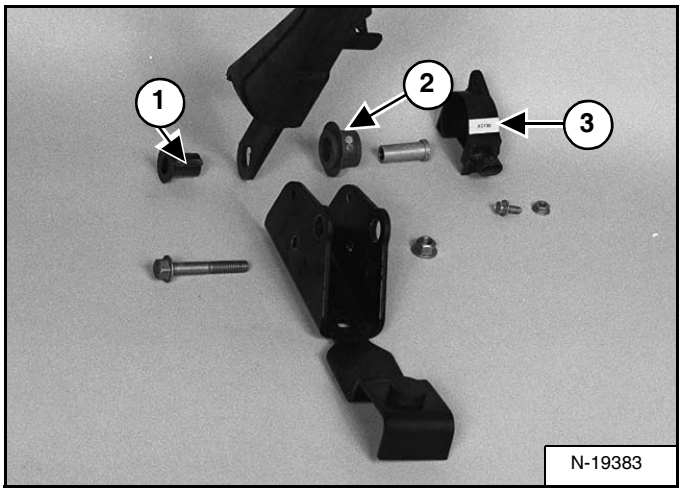
Installation: Tighten the mounting bolt to 50-70 in.-lb. (5,6-7,9 N•m) torque.

Remove the sensor mounting bolt (Item 3) **[Figure 60-100-6]** and nut.

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Removal And Installation (Cont'd)

Figure 60-100-7



Remove the keyed plastic bushing (Item 1) magnetic bushing assembly (Item 2) and sensor bracket (Item 3) **[Figure 60-100-7]**.

IMPORTANT

Be careful to not overtighten the sensor mounting bolt and nut to prevent breakage of the sensor.

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Installation: Be sure the tabs on the pivot bushing are positioned in the slotted hole (Item 1) **[Figure 60-100-7]** of the seat bar.

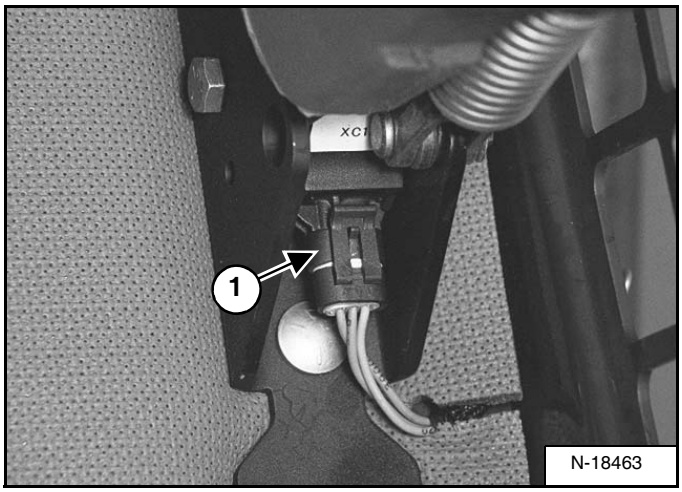
Inspect all parts for damage and wear and replace if necessary.

Reverse the removal procedure to install the seat bar sensor.

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BICS™ Circuit Test

Figure 60-100-8

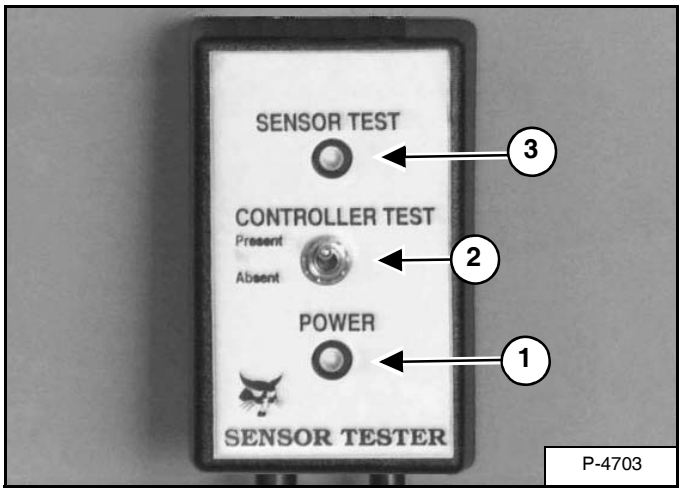


Use Sensor Testers (MEL1428) and seat bar sensor tester adapter (MEL1567) for the following procedure:

Connect the seat bar sensor tester adapter MEL1567 to the sensor tester.

Disconnect the seat bar sensor connector (Item 1) **[Figure 60-100-8]**.

Figure 60-100-9



Connect Sensor Tester (Item 1) **[Figure 60-100-9]** inline to the seat bar sensor connectors.

Turn the key to the ON position. **DO NOT START THE ENGINE**.

If there is no power light on the sensor tester, check the tester or wiring harness.

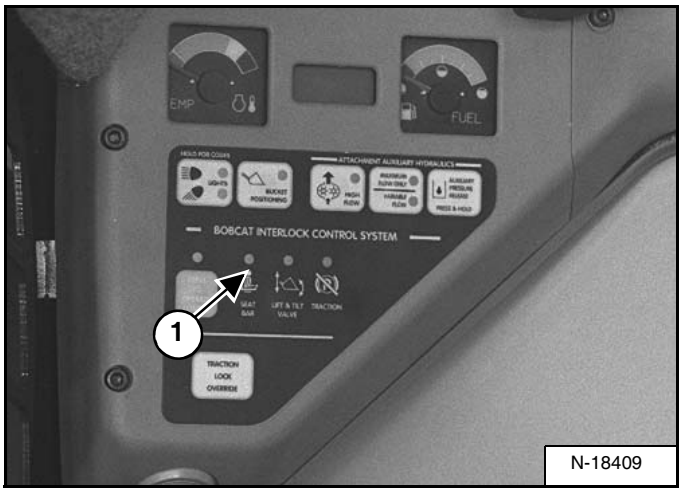
When the power light is illuminated, move the toggle switch (Item 2) **[Figure 60-100-9]** on the sensor tester to the ***Present*** position.

NOTE: The sensor test light (Item 3) [Figure 60-100-9] is only activated by the seat bar. It will be off with the seat bar up or on with the seat bar down.

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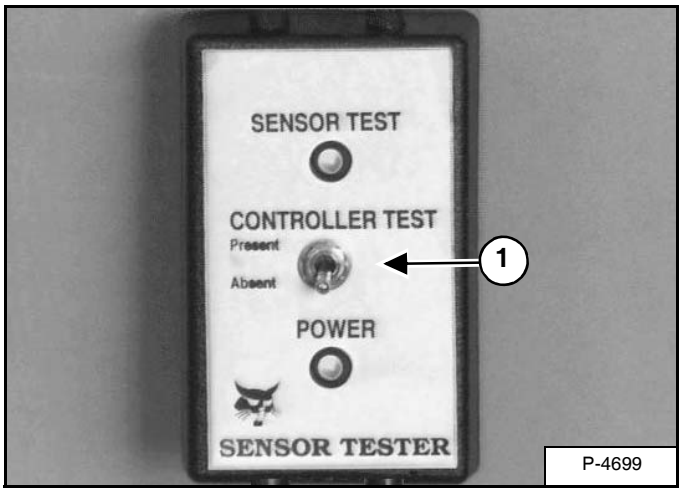
BICS™ Circuit Test (Cont'd)

Figure 60-100-10



The BICS™ seat bar indicator light (Item 1) **[Figure 60-100-10]** should illuminate.

Figure 60-100-11



Move the toggle switch (Item 1) **[Figure 60-100-11]** on the sensor tester to the ***Absent*** position.

The Seat Bar light (Item 1) **[Figure 60-100-10]** should go off.

If the above test fails, there is a problem with the Bobcat controller or the wiring harness.

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TRACTION LOCK

Troubleshooting Chart

The following troubleshooting chart is provided for assistance in locating and correcting BICS system problems. It is recommended that these procedures be done by authorized Bobcat Service Personnel only.

WARNING

Check for correct function after adjustments, repairs or service. Failure to make correct repairs or adjustments can cause injury or death.

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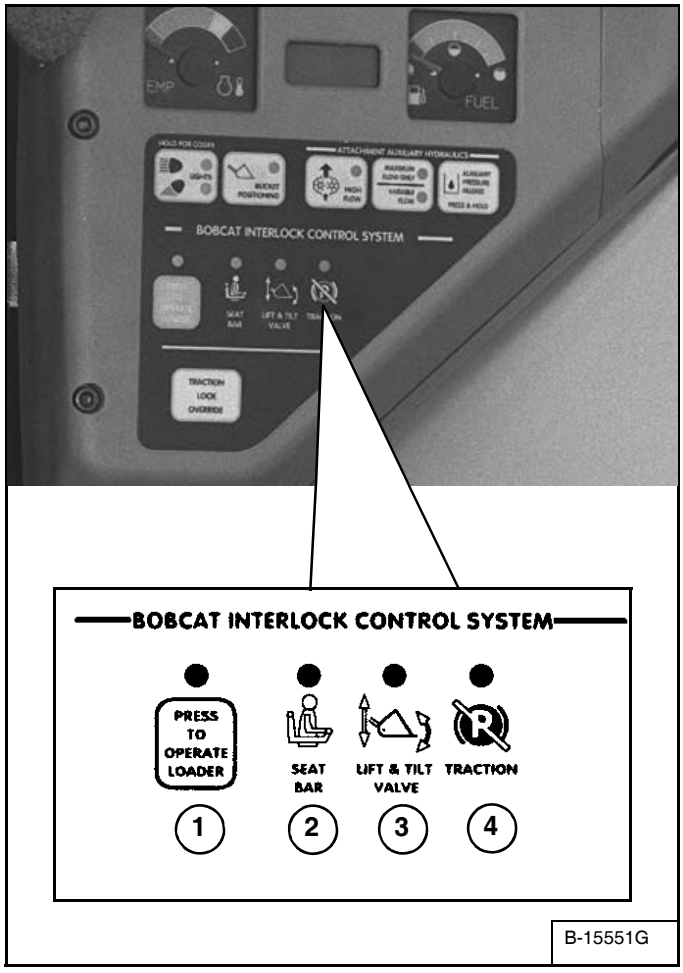
PROBLEM	CAUSE
Traction lock stays engaged.	1, 2, 3, 4, 5, 6, 7,11,12,13
Intermittent activation of traction lock.	8, 9, 10, 11

KEY TO CORRECT THE CAUSE
1. Make sure brake pedal is not engaged.
2. Maneuver loader to allow brake discs to move and remove pressure on the brake wedge so it can retract.
3. If all lights indicate the brake should be released, but it has not released, check the brake 30 amp. fuse.
4. When checking fuse, also check other fuses. Check the fuse block for correct orientation and location of fuses. (See ELECTRICAL SYSTEM INFORMATION on Page 60-10-1.)
5. To test the solenoid, the pull coil should be about 0.3 ohms and the hold coil should be about 10.9 ohms.
6. Check brake solenoid and cover mounting hardware for the correct torque.
7. Remove brake cover and check wedges for binding in the wedge guides.
8. Check wire connections for loose connector body.
9. Check for loose or bent pins in connectors.
10. Check for loose spade connectors in fuse holder.
11. Check flywheel RPM sensor and wiring.
12. Check the Display Panel for an error code. (See Electrical System Service Manual)
13. Check brake solenoid wiring voltage, solenoid wiring should read 12 volts.

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Description Of The Control System

Figure 60-110-1



The Traction Lock Control System will lock the traction drive system when the engine stops. The Traction Lock Control System is incorporated into the BICS™ System.

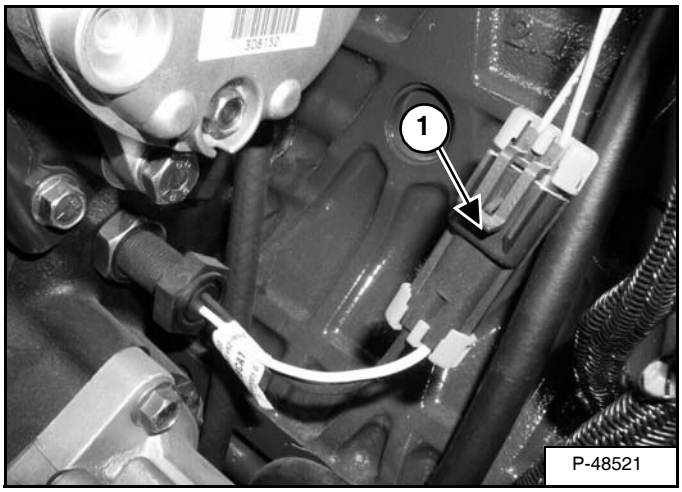
Inspecting The Control System

Fasten the seat belt, disengage the parking brake button, press the PRESS TO OPERATE LOADER Button (Item 1) **[Figure 60-110-1]** and raise the Seat Bar fully. Move the steering levers slowly forward and backward. The TRACTION lock (Item 4) **[Figure 60-110-1]** should be engaged. Lower the Seat Bar. Press the PRESS TO OPERATE LOADER Button (Item 1) **[Figure 60-110-1]**.

Engage the parking brake pedal and move the steering levers slowly forward and backward. The TRACTION lock should be engaged.

NOTE: The TRACTION light on the left instrument panel will remain OFF until the engine is started, the PRESS TO OPERATE LOADER Button is pressed and the parking brake is disengaged.

Figure 60-110-2



Check the wire connections at the engine flywheel rpm speed sensor (Item 1) **[Figure 60-110-2]**.

NOTE: When the Traction Lock Override Button is activated, the Traction Lock Override Control System will NOT engage the Traction Lock if the engine stops.

(See Adjustment on Page 60-140-1.), for Flywheel rpm sensor adjustment.

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Inspecting

Fasten the seat belt, disengage the parking brake pedal, press the green *PRESS TO OPERATE* Button and raise the Seat Bar fully. Move the control levers slowly forward and backward. The Traction lock should be engaged. Lower the Seat Bar. Press the green *PRESS TO OPERATE* Button.

Engage the parking brake pedal and move the control levers slowly forward and backward. The Traction lock should be engaged.

Solenoid Removal And Installation

⚠ WARNING

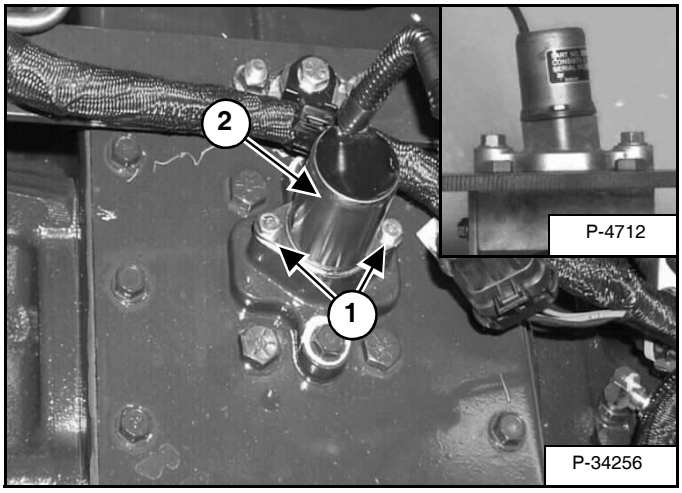
AVOID INJURY OR DEATH

Do not modify the electrical wiring connected to the traction lock solenoid or any part of the traction lock system. The traction lock provides the locking function of the parking brake. Service work on the traction lock system should only be performed by a qualified technician. Use only genuine Bobcat Company parts if repair is necessary.

W-2165-0100

Raise the loader operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Figure 60-110-3



NOTE: The loader control panel and crossbar linkage has been removed for clarity purpose only. The traction lock can be removed without removing the control panel.

Remove the two mounting screws (Item 1) **[Figure 60-110-3]** from the electric solenoid mounting bracket.

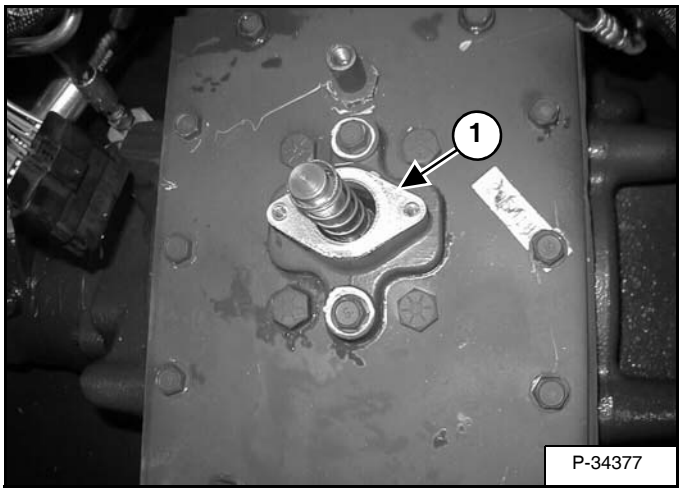
Installation: Tighten the mounting screws to 80-90 in.-lb. (9-10 N•m) torque.

Remove the electric solenoid (Item 2) from the chaincase cover **[Figure 60-110-3]**.

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Solenoid Removal And Installation (Cont'd)

Figure 60-110-4

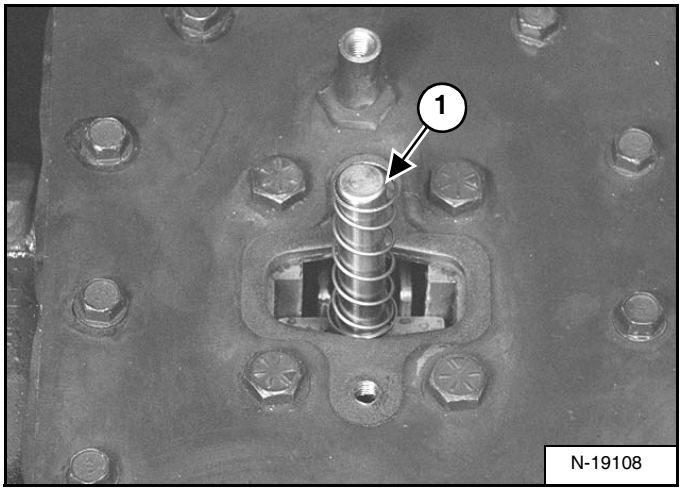


Remove the bracket (Item 1) **[Figure 60-110-4]** from the chaincase cover.

Installation: Tighten the mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

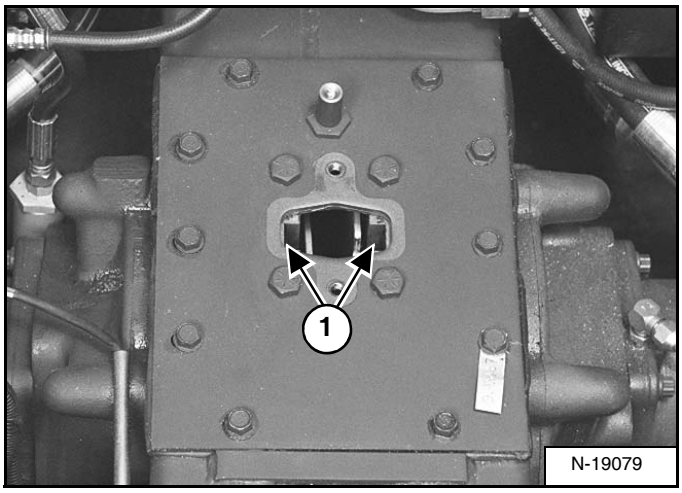
Be sure the solenoid mounting bracket is installed in the same position. The solenoid mounting surface has a slight angle which tips the top of the solenoid toward the rear of the loader when installed correctly. See inset photo **[Figure 60-110-3]**.

Figure 60-110-5



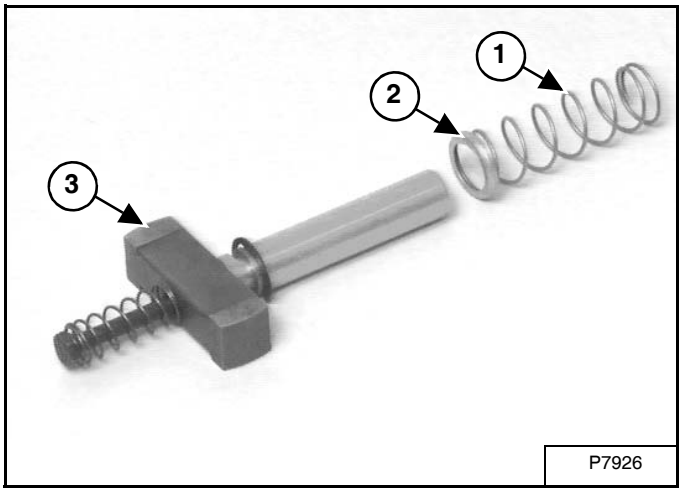
Remove the traction lock assembly (Item 1) **[Figure 60-110-5]** from the chaincase.

Figure 60-110-6



Inspect the guides (Item 1) **[Figure 60-110-6]** for wear or damage. Replace if necessary .

Figure 60-110-7



Remove and inspect the compression spring (Item 1) and spring cap washer (Item 2) **[Figure 60-110-7]** for wear or damage. Replace if necessary. The spring may also stay with the shaft when the electric solenoid and bracket are removed from the chaincase.

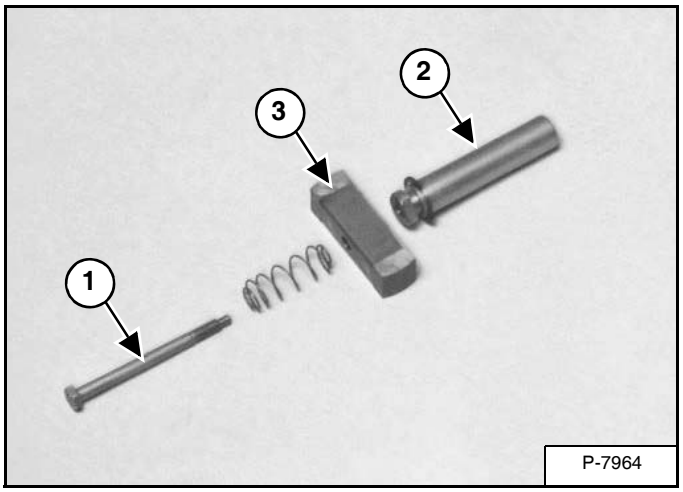
Installation: Install the compression spring (Item 1) **[Figure 60-110-7]** on the collar located on the electric solenoid.

Remove the traction lock assembly (Item 3) **[Figure 60-110-7]** from the chaincase.

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Solenoid Removal And Installation (Cont'd)

Figure 60-110-8



Remove the shaft mounting bolt (Item 1), spring from the assembly shaft (Item 2). Remove the wedge (Item 3) **[Figure 60-110-8]** and inspect all parts for damage or wear. Replace if necessary.

Installation: Thoroughly clean and dry the shaft mounting bolt (Item 1), the shaft (Item 2) and wedge (Item 3) **[Figure 60-110-8]**. Use LOCTITE #242 when assembling these parts to the traction lock assembly.

IMPORTANT

Failure to use LOCTITE may allow the traction lock assembly to loosen up which can cause damage to the traction lock system.

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Install the engine speed control. (See Removal And Installation on Page 70-20-1.)

Lower operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

Perform the BICS™ inspection procedure. (See BICS™ SYSTEM on Page 60-90-1.)

Guide Removal

The part number listed below will be needed to do the following procedure:

P/N 6633583 - Polyurethane

Raise the loader lift arms and install an approved lift arm support device.(See Installing Lift Arm Support Device on Page 10-20-1.)

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Remove the control panel from the loader. (See Removal and Installation on Page 50-100-1.)

Remove the traction lock solenoid assembly. (See Solenoid Removal And Installation on Page 60-110- 3.)

WARNING

AVOID INJURY OR DEATH

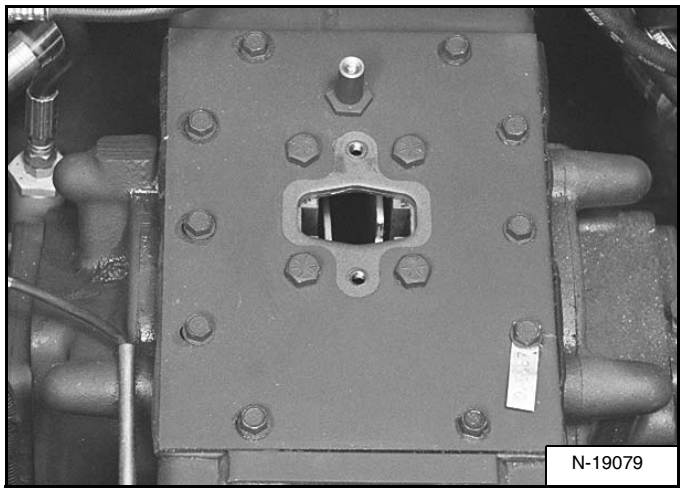
Do not modify the electrical wiring connected to the traction lock solenoid or any part of the traction lock system. The traction lock provides the locking function of the parking brake. Service work on the traction lock system should only be performed by a qualified technician. Use only genuine Bobcat Company parts if repair is necessary.

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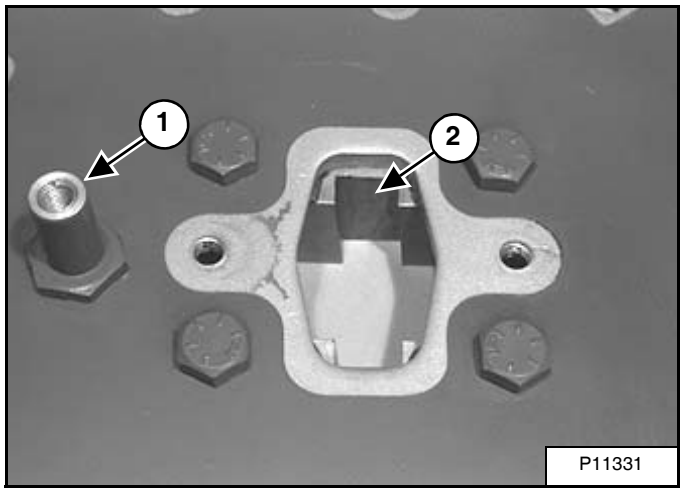
Guide Removal

Figure 60-110-9



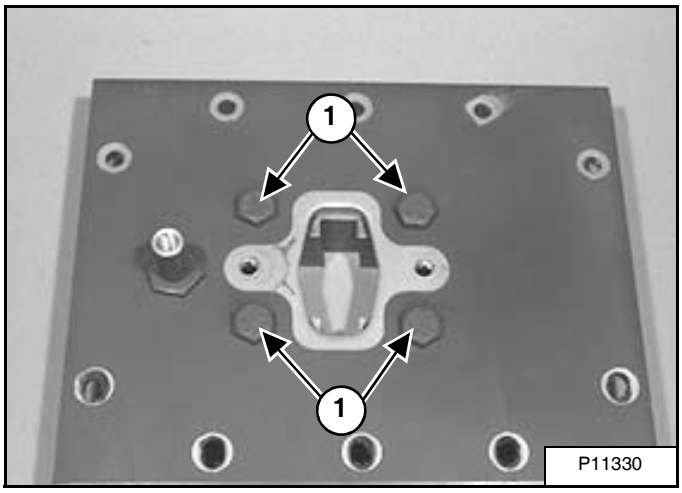
Remove the center chaincase cover **[Figure 60-110-9]** (See Center Cover Removal And Installation on Page 40-30-3.)

Figure 60-110-10



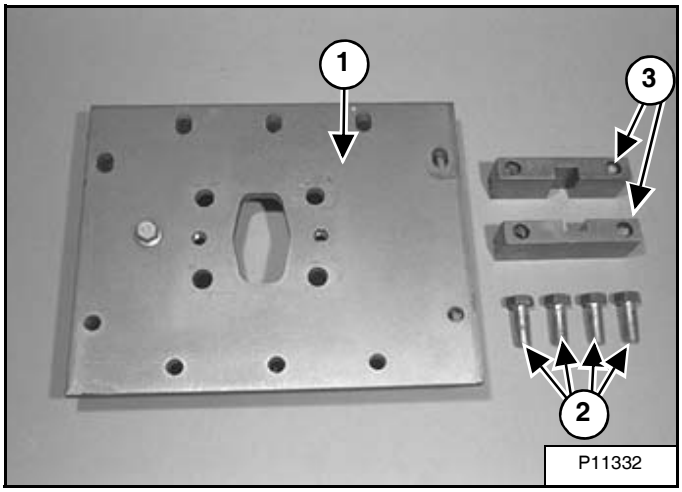
NOTE: Bolt (Item 1) is on the rear of the chaincase cover, notice the direction of the groove (Item 2) [Figure 60-110-10] in the traction lock guides.

Figure 60-110-11



To remove the traction lock guides remove the four bolts (Item 1) **[Figure 60-110-11]**.

Figure 60-110-12

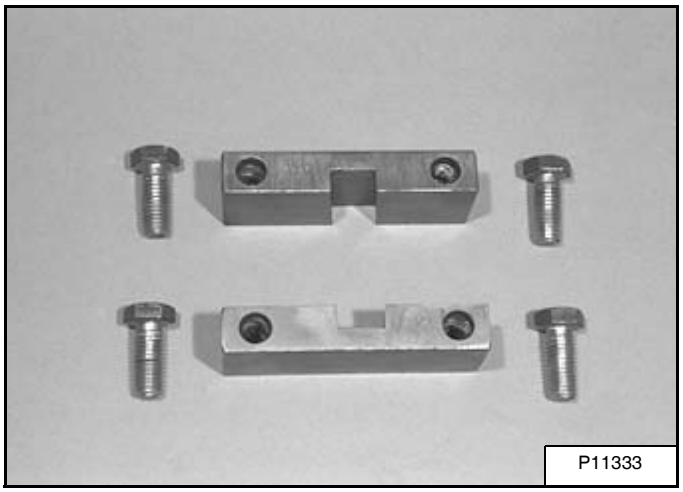


Thoroughly clean the polyurethane from the chaincase cover (Item 1), bolts (Item 2) and traction lock guides (Item 3) **[Figure 60-110-12]** and dry.

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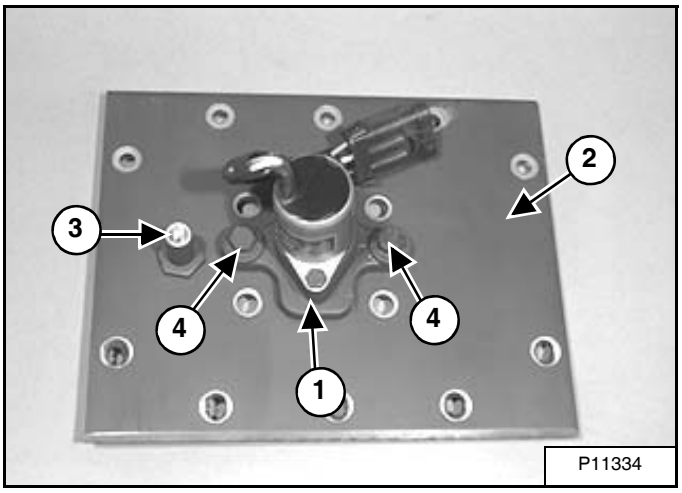
Guide Installation

Figure 60-110-13



Apply a bead of polyurethane (P/N 6633583) on the traction lock guides and bolts **[Figure 60-110-13]**.

Figure 60-110-14

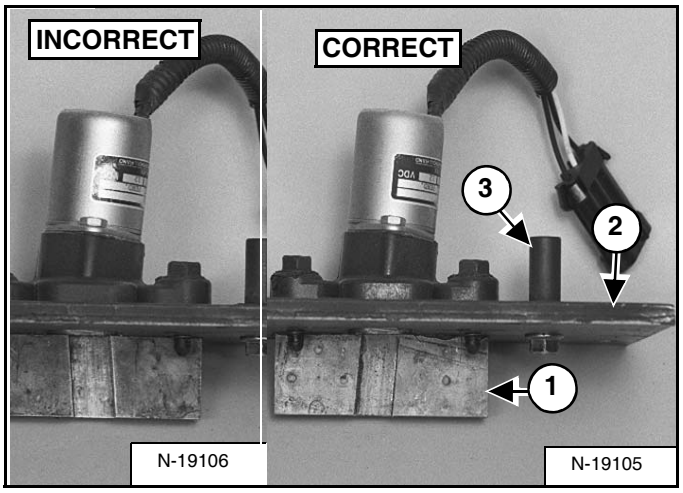


Install the electric solenoid/bracket assembly (Item 1) to the center chaincase cover (Item 2) **[Figure 60-110-14]**.

NOTE: Bolt (Item 3) [Figure 60-110-14] & [Figure 60-110-15] represents the rear of the chaincase cover.

Install and tighten the two bolts (Item 4) **[Figure 60-110-14]**.

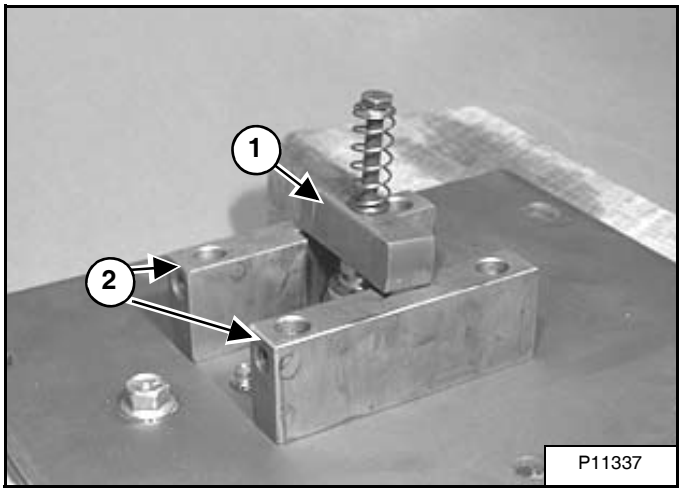
Figure 60-110-15



Install the traction lock guides (Item 1) to the chaincase cover (Item 2) **[Figure 60-110-15]** using the four bolts (removed earlier).

Do not tighten at this time.

Figure 60-110-16



Install the traction wedge assembly (Item 1) into the solenoid and traction lock guides (Item 2) **[Figure 60-110-16]**.

After the bolts have been tightened recheck to make sure the shaft assembly is moving freely in the guides.

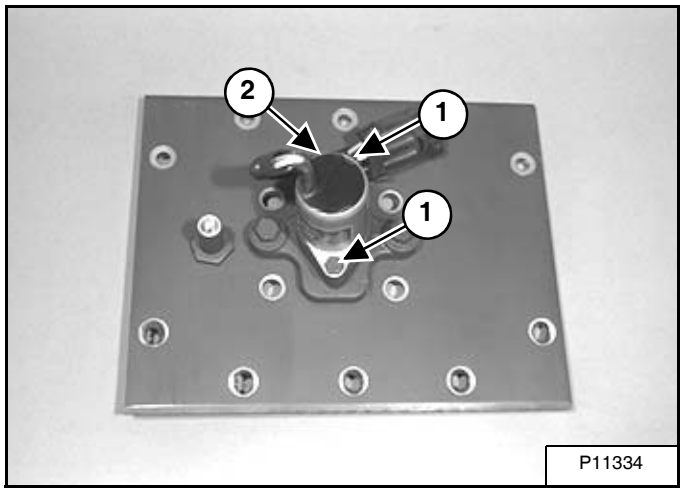
Remove the wedge assembly (Item 1) **[Figure 60-110-16]**.

NOTE: The wedge assembly must slide freely in the grooves of the guides. Tighten the four guide bolts to 90-100 ft.-lb. (123-135 N•m) torque.

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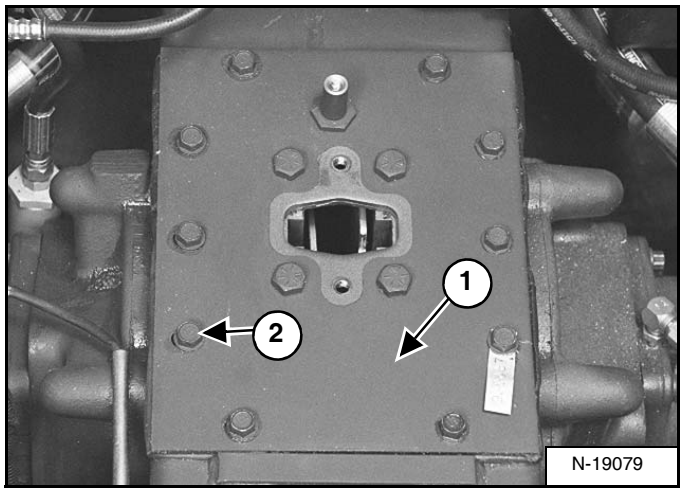
Guide Installation (Cont'd)

Figure 60-110-17



Remove the two bolts (Item 1) and remove the electric solenoid (Item 2) **[Figure 60-110-17]** from the center chaincase cover.

Figure 60-110-18

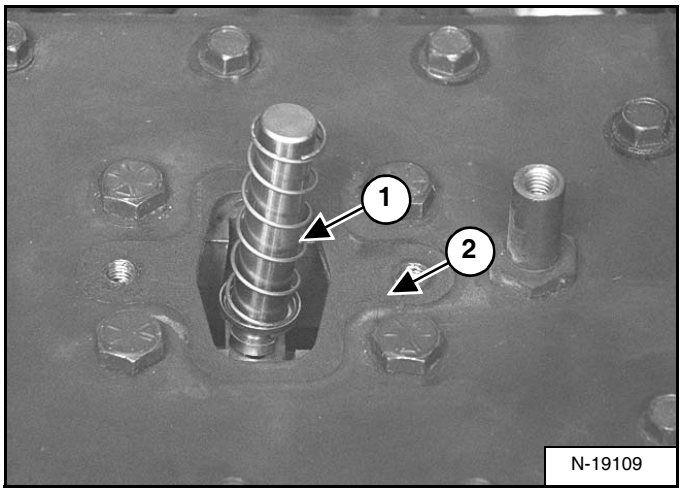


Install the chaincase cover (Item 1) using the ten mounting bolts (Item 2) **[Figure 60-110-18]**.

Tighten to 15-20 ft.-lb. (20-27 N•m) torque.

NOTE: Thoroughly clean and dry the bolts and apply polyurethane sealant to the bolt threads. Install a new gasket between the chaincase cover and the chaincase. Apply polyurethane sealant to the gasket also.

Figure 60-110-19



Install the wedge assembly (Item 1) **[Figure 60-110-19]** into the grooves in the traction lock guides making sure that there is no binding.

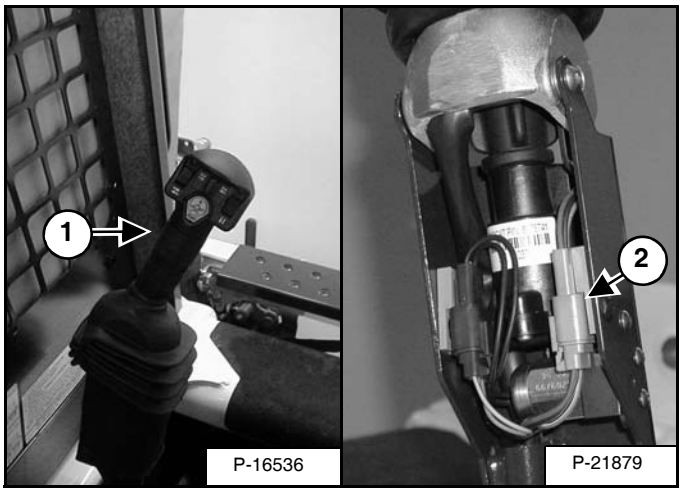
Install the gasket (Item 2) **[Figure 60-110-19]**.

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ADVANCED CONTROL SYSTEM (ACS)

Components Identification

Figure 60-120-1



The Advanced Control System (ACS) is a selectable foot/hand control system.

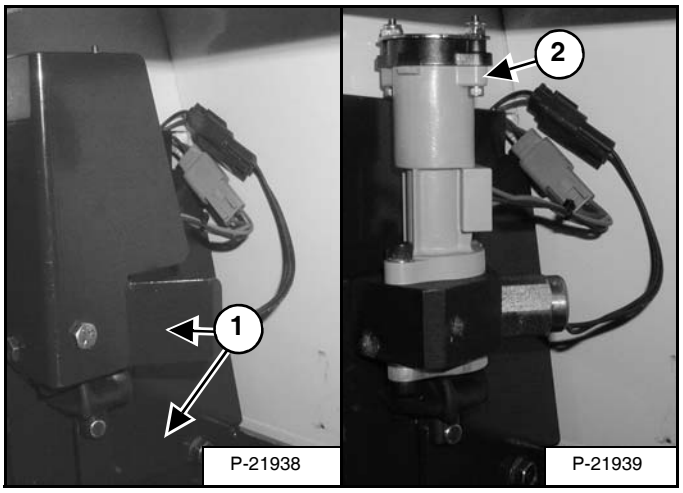
The ACS system allows the operator to quickly switch between foot and hand control modes.

Control Handle (Item 1) **[Figure 60-120-1]**.

Handle sensor (Item 2) **[Figure 60-120-1]**.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure on Page 60-120-16.)

Figure 60-120-2

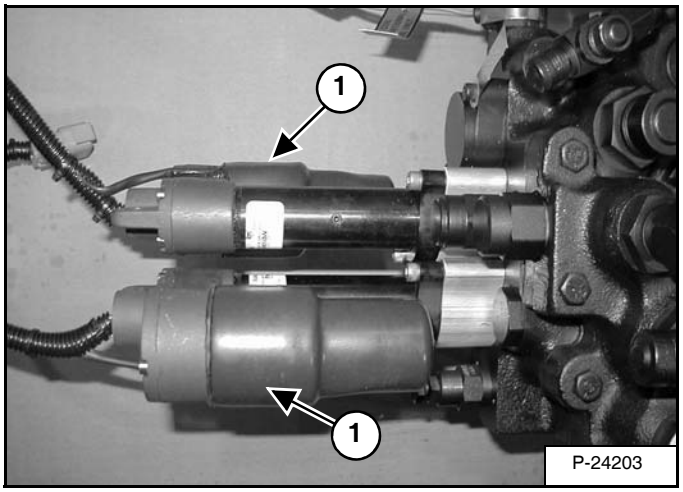


Foot control/sensor assembly (Item 1) **[Figure 60-120-2]**.

Foot sensor (Item 2) **[Figure 60-120-2]**.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure on Page 60-120-16.)

Figure 60-120-3



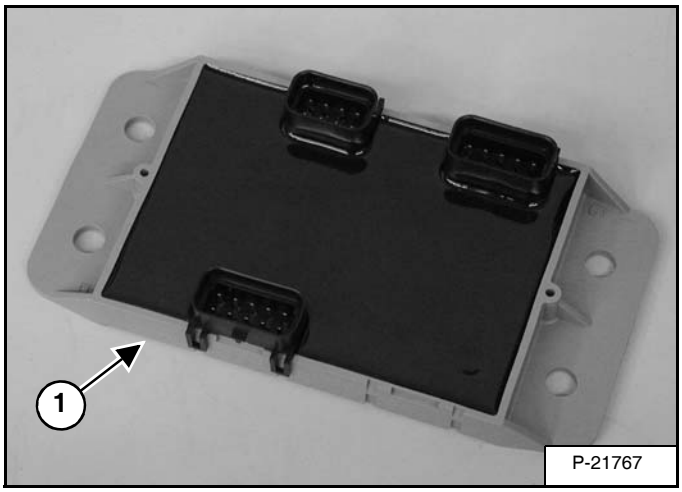
Control Valve Actuators (Item 1) **[Figure 60-120-3]**.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure on Page 60-120-16.)

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Components Identification (Cont'd)

Figure 60-120-4



ACS Controller (Item 1) **[Figure 60-120-4]**.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure on Page 60-120-16.)

Figure 60-120-5



ACS error indicator (Item 1) **[Figure 60-120-5]**.

NOTE: The ACS icon will illuminate when an error occurs. The error is stored as a service code. (See DIAGNOSTICS SERVICE CODES on Page 60-80-1.)

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ADVANCED CONTROL SYSTEM (ACS) (CONT'D)

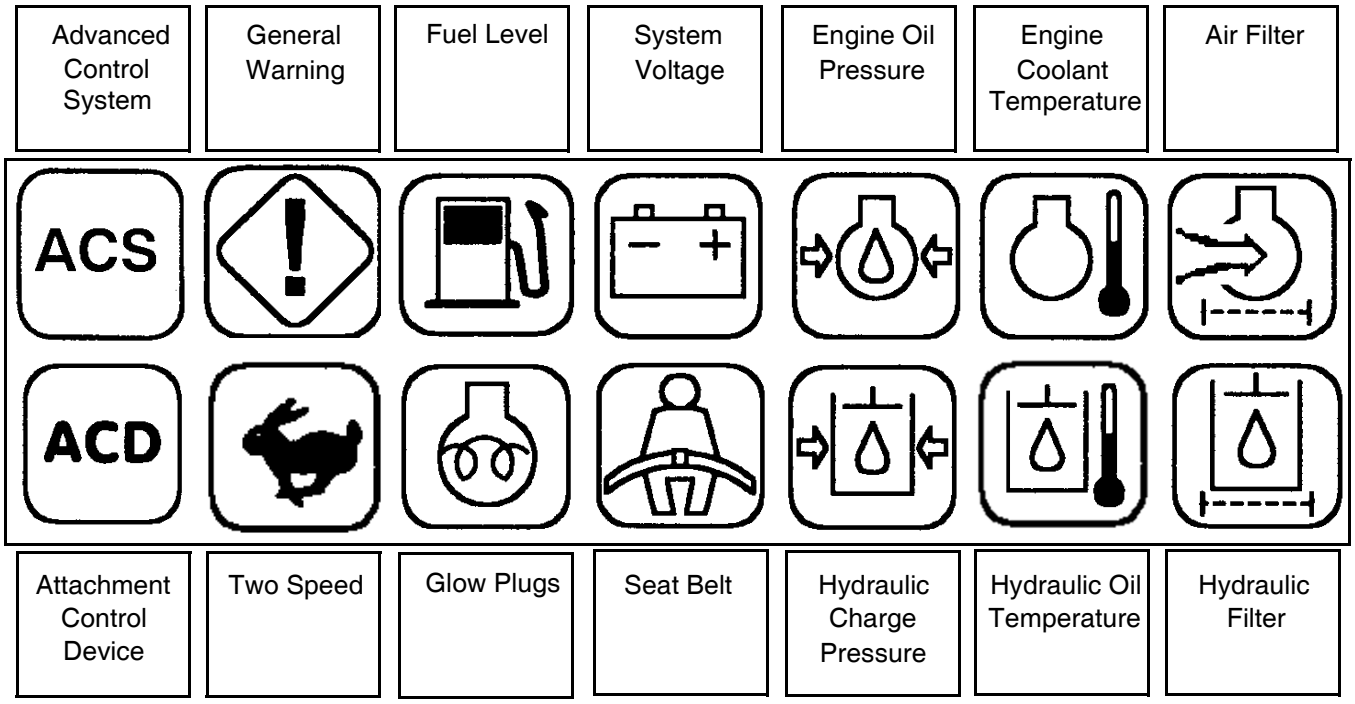
Troubleshooting Guide

The Advanced Control System (ACS) has a built-in diagnostic function which uses an icon on the right instrument panel to indicate the condition of the ACS SYSTEM. The system also records the alarm condition as a service code.

The control module continually checks the system in the order listed. The checks start with the lift handle sensor and then the lift actuator. If no problems are present, it will then check the tilt handle sensor and the tilt actuator. The system will stop its check at the first problem and then luminate the icon.

The system starts its diagnostics and calibration when the ignition key is turned ON.

The following list shows the probable causes when the icon is luminated.



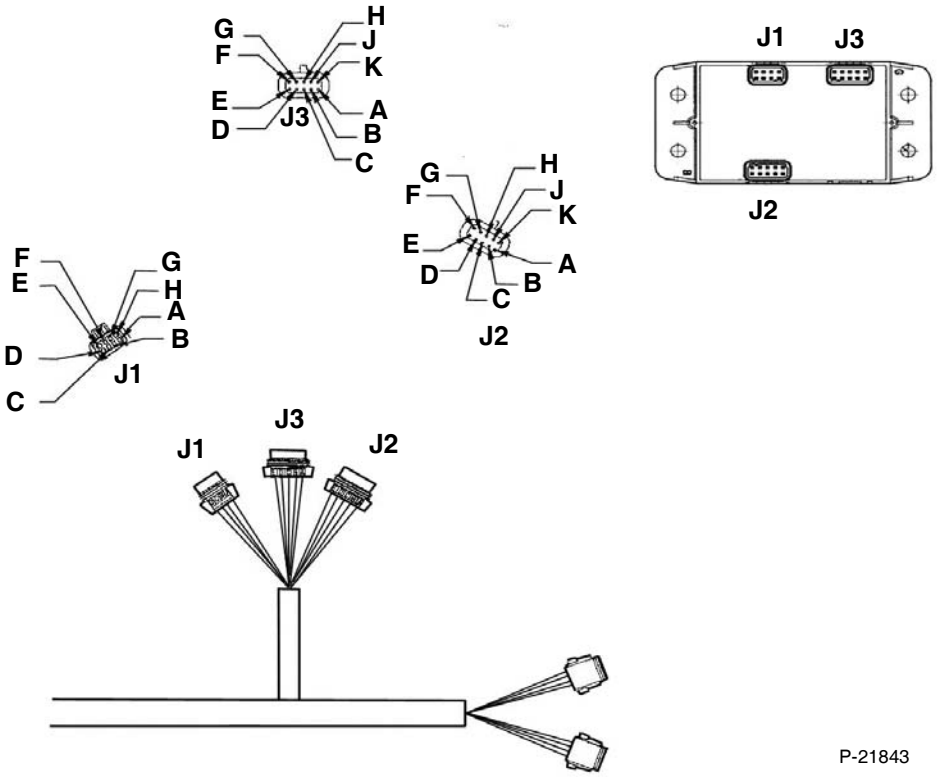
Advanced Control System

Errors-**lights** solid with 3 beeps
32-04- **ACS** in error
32-23- **ACS** not calibrated
32-31- **Tilt** actuator fault
32-34- **Tilt** actuator not calibrated
32-35- **Tilt** handle/pedal not calibrated
32-36- **Lift** actuator fault
32-39- **Lift** actuator not calibrated
32-40- **Lift** handle/pedal not calibrated
32-49- **Lift** actuator short to ground
32-50- **Tilt** actuator short to ground
32-51- **Lift** actuator short to battery
32-52- **Tilt** actuator short to battery
32-53- **Lift** handle/pedal short to ground
32-54- **Tilt** handle/pedal short to ground
32-55- **Lift** handle/pedal short to battery
32-56- **Tilt** handle/pedal short to battery
32-57- **Lift** actuator reduced performance
32-58- **Tilt** actuator reduced performance
32-59- **Lift** actuator wrong direction
32-60- **Tilt** actuator wrong direction
32-61- **Handle** lock short to ground
32-62- **Handle** lock short to battery
32-63- **Pedal** lock short to ground
32-64- **Pedal** lock short to battery
32-65- **Sensor** supply voltage out of range
32-66- **Battery** out of range
32-67- **Switch** flipped while operating

To see what error occurred. (See DIAGNOSTICS SERVICE CODES on Page 60-80-1.)

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Controller, Connector And Wire Identification



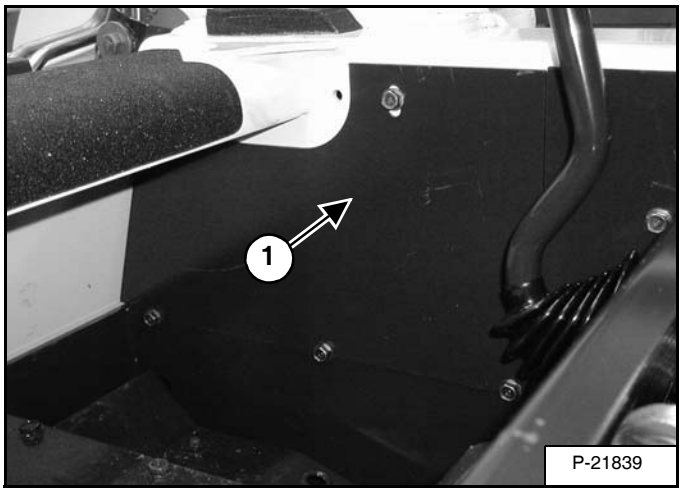
P/N	PIN	DESCRIPTION
J1		CONNECTOR, METRI-PACK
Orange	A	5V HALL EFFECT SUPPLY
Orange	B	SWITCHED ACS POWER
Green	C	HAND/FOOT INPUT
Purple	D	CAN SIGNAL HIGH ACS
Purple	E	CAN SIGNAL LOW ACS
Purple	F	CAN SHIELD ACS
Black	G	ACS GROUND
Black	H	ACS GROUND
J2		CONNECTOR, METRI-PACK
	A	OPEN
	B	OPEN
	C	OPEN
	D	OPEN
Green	E	TILT SPOOL SIGNAL
Green	F	LIFT HANDLE SIGNAL
Green	G	TILT HANDLE SIGNAL
Green	H	LIFT SPOOL SIGNAL
Green	J	LIFT PEDAL SIGNAL
Green	K	TILT PEDAL SIGNAL

P/N	PIN	DESCRIPTION
J3		CONNECTOR, METRI-PACK
Red	A	TILT ACTUATOR FOR-WARD
Red/White	B	UNSWITCHED ACS POWER
Red/White	C	UNSWITCHED ACS POWER
Black	D	LIFT ACTUATOR REVERSE
Green	E	HANDLE LOCK POWER
Red	F	LIFT ACTUATOR FOR-WARD
Green	G	PEDAL LOCK POWER
Black	H	ACS GROUND
Black	J	ACS GROUND
Black	K	TILT ACTUATOR REVERSE

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ACS Controller Removal And Installation

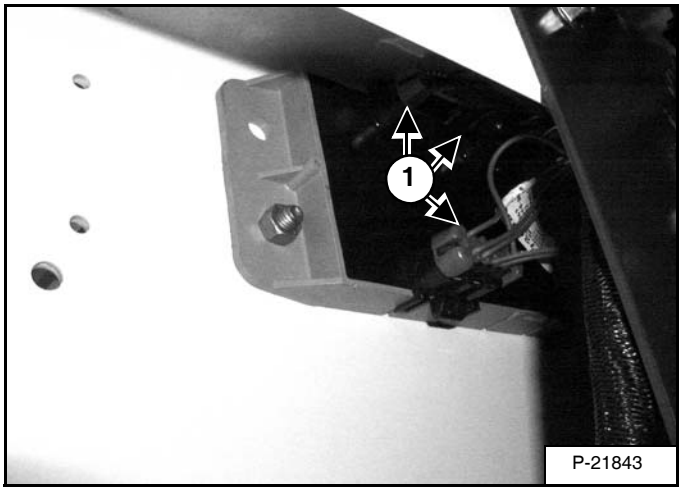
Figure 60-120-6



Loosen the bottom bolts and remove the top bolt on the right front panel **[Figure 60-120-6]**.

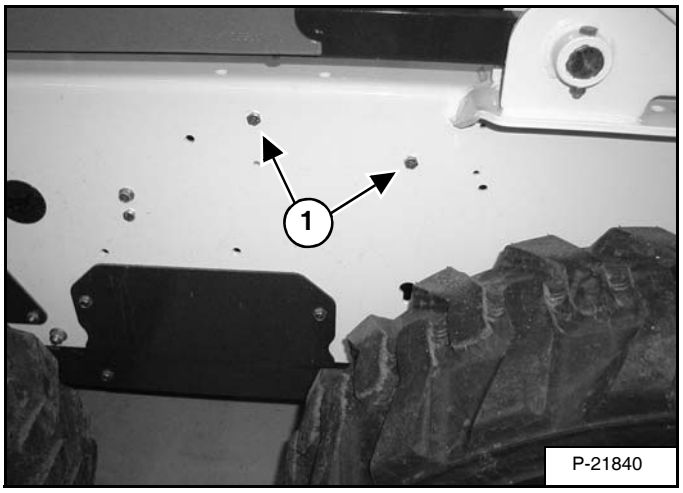
Remove the right front panel (Item 1) **[Figure 60-120-6]** from the loader.

Figure 60-120-7



Disconnect the wiring harness connectors (Item 1) **[Figure 60-120-7]** from the controller.

Figure 60-120-8



Remove the two mounting bolts (Item 1) **[Figure 60-120-8]** from the controller.

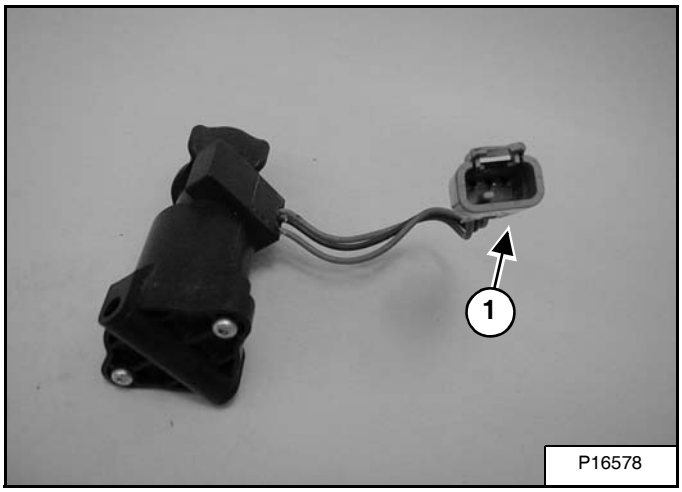
Remove the controller from the loader.

NOTE: The calibration procedure must be followed when replacing handle sensor, foot pedal sensor, actuator or ACS Controller. (See Calibration Procedure on Page 60-120-16.)

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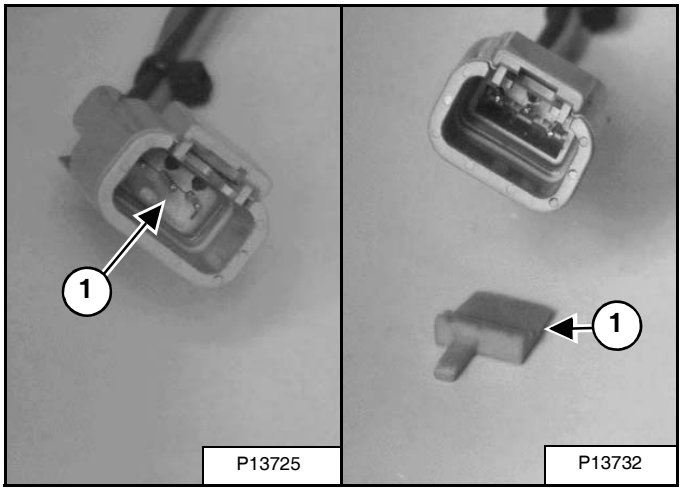
Handle Sensor Connector

Figure 60-120-9



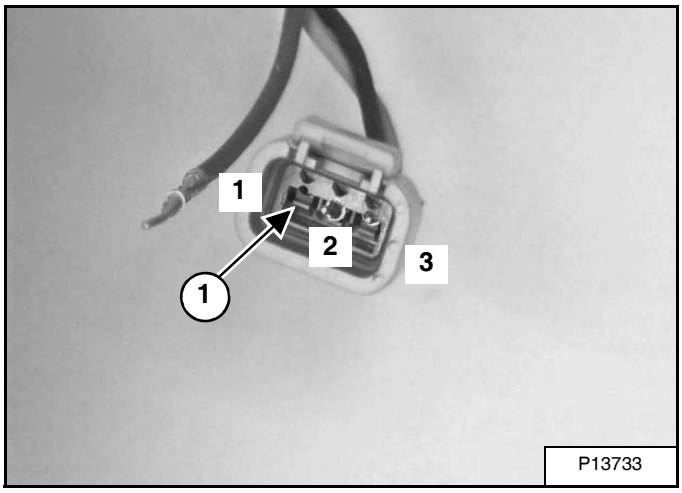
The wire connector (Item 1) **[Figure 60-120-9]** can be removed from the handle sensor wires, using the following procedure.

Figure 60-120-10



Remove the wedge (Item 1) **[Figure 60-120-10]** from the connector.

Figure 60-120-11



With a pointed tool, lift the tab (Item 1) **[Figure 60-120-11]** and pull the wire from the connector.

Installation: Install the wires into the connector as listed below **[Figure 60-120-11]**:

1-Terminal - Red

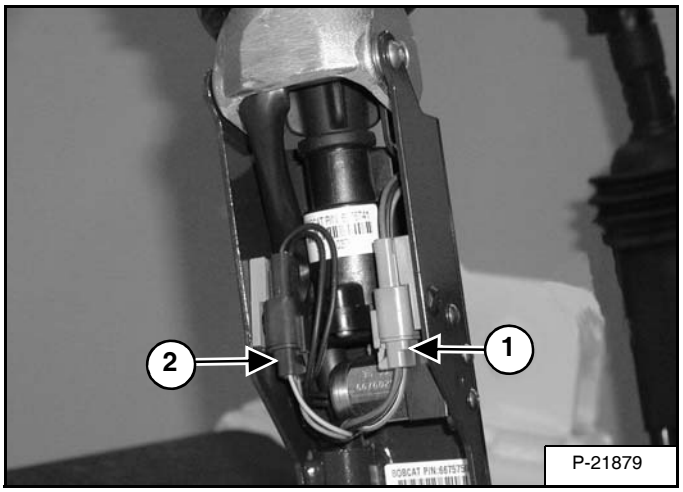
2-Terminal - Black

3-Terminal - Green

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Switch Handle Removal

Figure 60-120-12

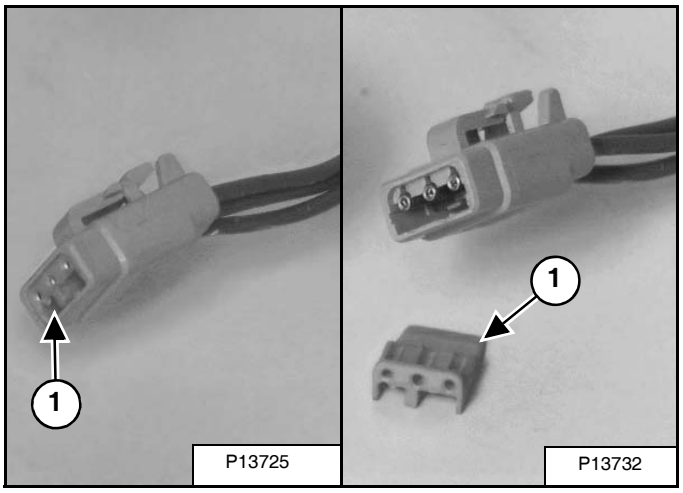


NOTE: Switch handle can be removed and installed while in loader.

Disconnect the harness connector (Item 1) **[Figure 60-120-12]** from the handle sensor connector.

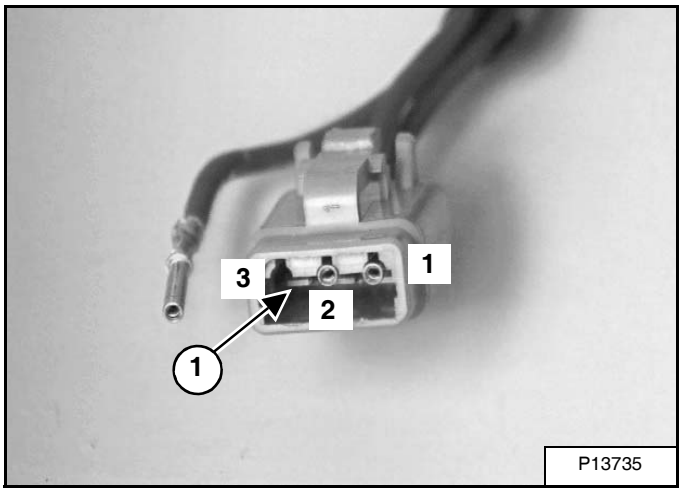
Disconnect the harness connector (Item 2) **[Figure 60-120-12]** from the handle lock solenoid connector.

Figure 60-120-13



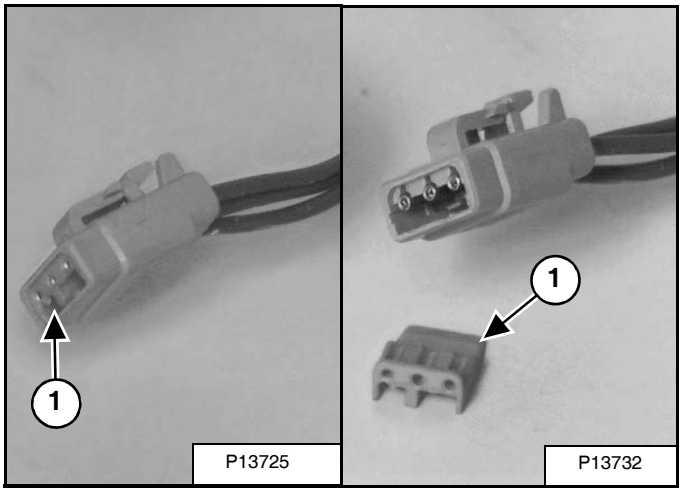
Remove the wedge (Item 1) **[Figure 60-120-13]** from the harness connector (Gray) that connects to the handle sensor connector.

Figure 60-120-14



Using a pointed tool, press down on the tab (Item 1) **[Figure 60-120-14]** and pull the wire from the connector.

Figure 60-120-15

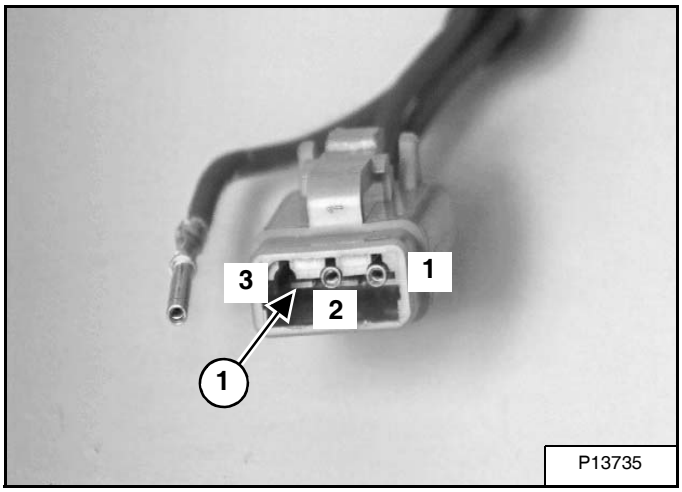


Remove the wedge (Item 1) **[Figure 60-120-15]** from the harness connector (Black) that connects to the handle lock solenoid connector.

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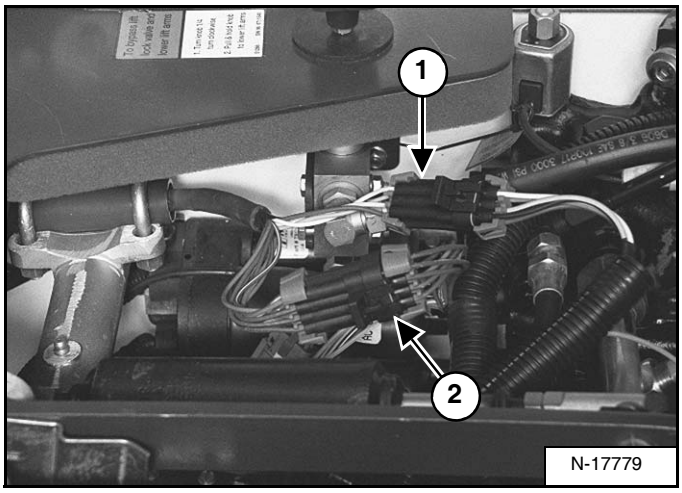
Switch Handle Removal (Cont'd)

Figure 60-120-16



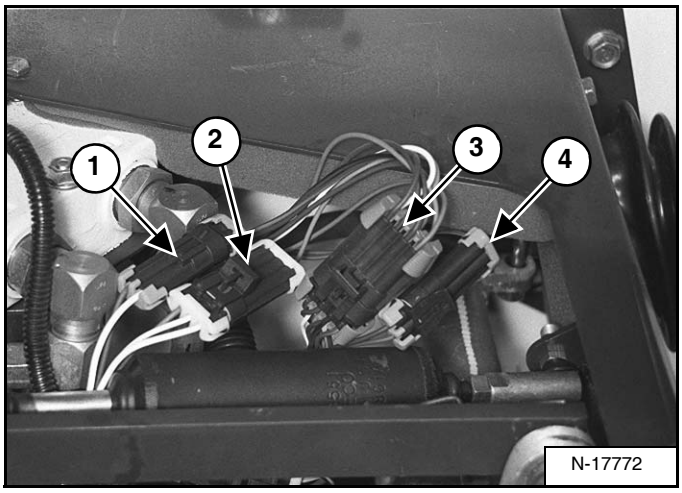
Using a pointed tool, press down on the tab (Item 1) **[Figure 60-120-16]** and pull the wire from the connector.

Figure 60-120-17



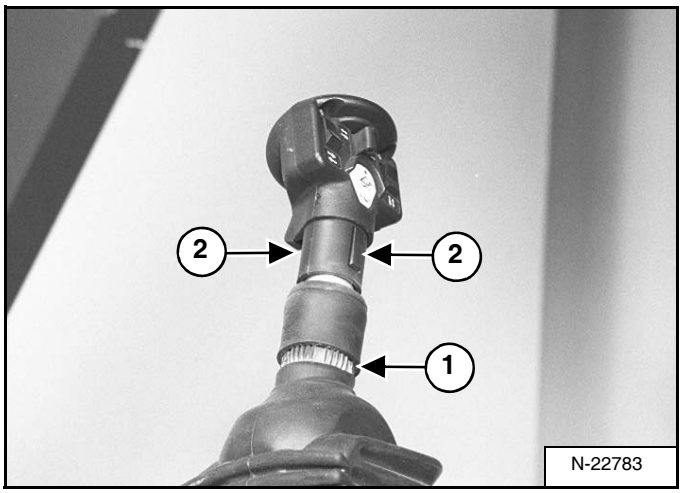
Disconnect the right switch handle connectors (Items 1 & 2) **[Figure 60-120-17]** from the loader wiring harness connectors.

Figure 60-120-18



Disconnect the left switch handle connectors (Items 1, 2, 3 & 4) **[Figure 60-120-18]** from the loader wiring harness connectors.

Figure 60-120-19



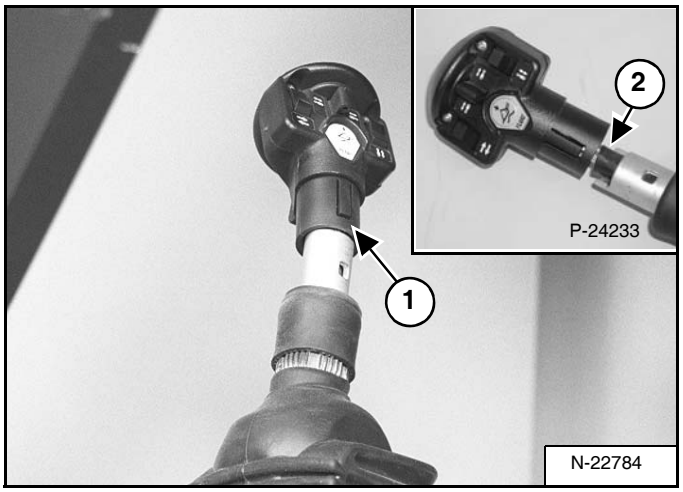
Roll the pistol grip handle cover (Item 1) **[Figure 60-120-19]** down.

Using a small screwdriver, lift the handle tabs (Item 2) **[Figure 60-120-19]** and slightly rotate the switch handle.

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Switch Handle Removal (Cont'd)

Figure 60-120-20

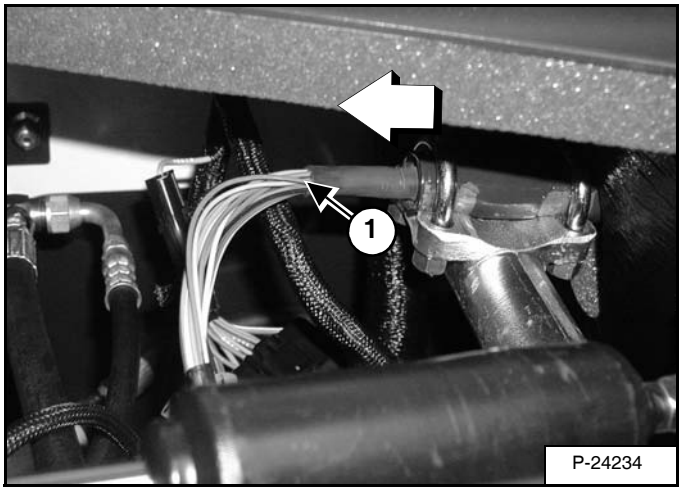


Pull the switch handle and wiring harness assembly (Item 1) **[Figure 60-120-20]** from the control lever.

Cut the wires (Item 2) **[Figure 60-120-20]** below the switch handle and remove switch handle.

NOTE: Only cut the wires if the switch handle is bad and needs replacement. If the switch handle is good and just needs to be removed for control handle or lever replacement, then remove the connectors on the end of the harness and pull switch handle and harness up through the top of the lever tube.

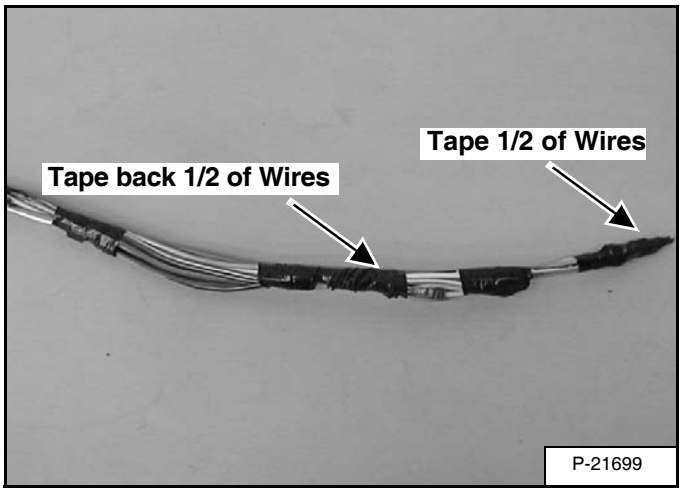
Figure 60-120-21



If the harness has been cut: pull the harness (Item 1) **[Figure 60-120-21]** out through the bottom of the control lever tube.

Switch Handle Installation

Figure 60-120-22



When installing the new switch handle, tape the wire terminals together.

The switch handle comes with a 6 inch piece of heat shrink tube slid over the end of the wires. Remove the heat shrink tube from the end of the wires before routing the harness through handle and control lever tube.

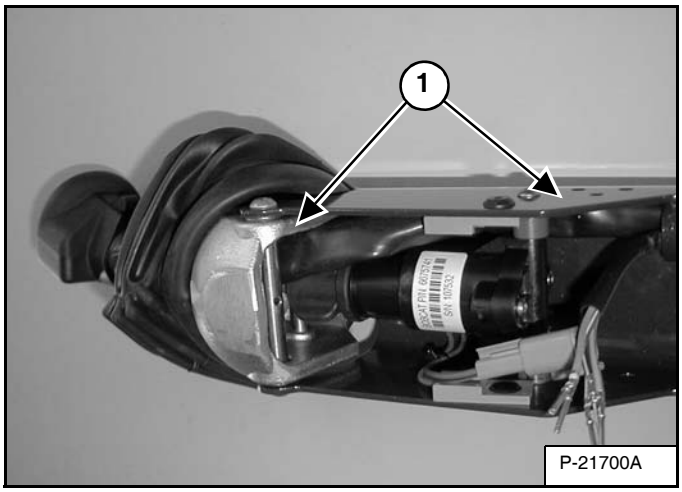
NOTE: Leave all the other heat shrink tube on the wires for protection.

Tape half of the wires back and half forward **[Figure 60-120-22]** to keep the harness small enough to route through the control lever tube.

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Switch Handle Installation (Cont'd)

Figure 60-120-23

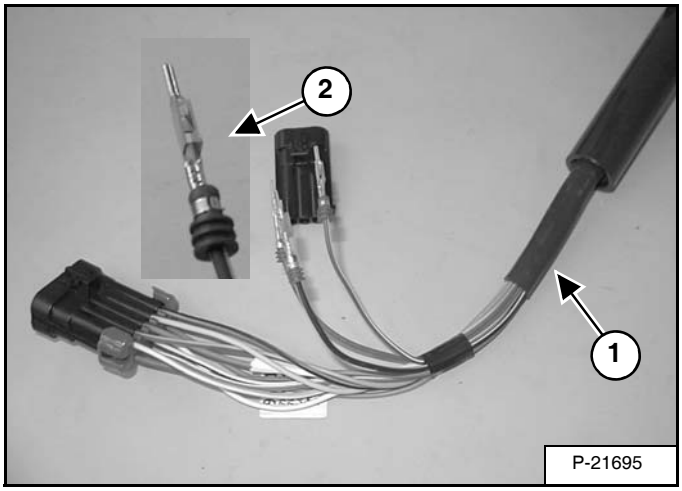


Install the new switch handle and wires from the top of the control lever.

Route wire (Item 1) **[Figure 60-120-23]** through the casting, along side the handle sensor and into the control lever tube.

NOTE: Do not pull the wire harness tight. Allow a small amount of slack or slight bend at the handle pivot area. Verify the control handle returns to neutral position.

Figure 60-120-24



Remove tape from wires for installation and install the 6 inches of heat shrink tube (Item 1) **[Figure 60-120-24]** approximately 3 inches into the control lever. Apply heat to the exposed heat shrink tube.

Inspect the wire terminal tabs (Item 2) **[Figure 60-120-24]** and re-bend tabs if necessary.

Install the wires into the connectors as listed below:

Right Switch Handle

Ten-Pin Connecter
- A-Terminal - Orange
- B-Terminal - White
- C-Terminal - White/Black
- D-Terminal - White/Red
- E-Terminal - Dk. Green
- F-Terminal - White/Lt. Green
- G-Terminal - Yellow/Red
- H-Terminal - Lt. Green
- J-Terminal - Yellow
- K-Terminal - Orange/Black

Three-Pin Connector
- A-Terminal - Red/White
- B-Terminal - Black/White
- C-Terminal - Purple/White

Left Switch Handle

Ten-Pin Connector
- A-Terminal - Orange
- B-Terminal - Dk. Blue
- C-Terminal - White
- D-Terminal - Purple
- E-Terminal - Yellow/Red
- F-Terminal - Tan
- G-Terminal - Pink
- H-Terminal - Orange/Black
- J-Terminal - Blank
- K-Terminal - Blank

Three-Pin Connector
- A-Terminal - Red/White
- B-Terminal - Black/White
- C-Terminal - Purple/White

Two-Pin Connector
- A-Terminal - Black
- B-Terminal - Red

Five-Pin Connector
- A-Terminal - Dk. Green
- B-Terminal - Brown
- C-Terminal - Blank
- D-Terminal - Yellow
- E-Terminal - Blank

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Switch Handle Installation (Cont'd)

Figure 60-120-25

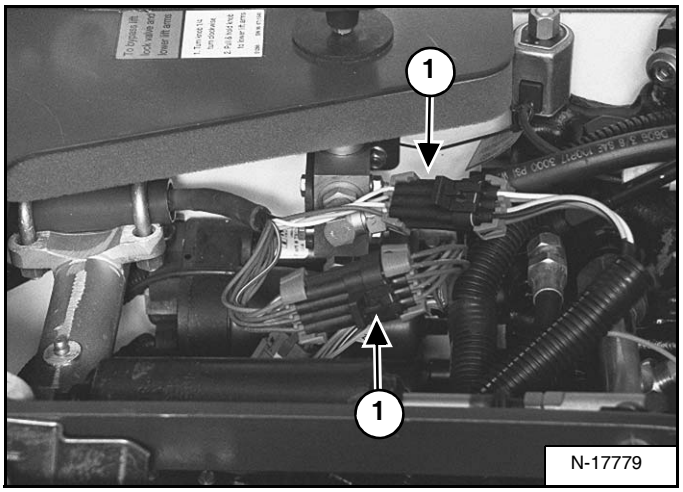
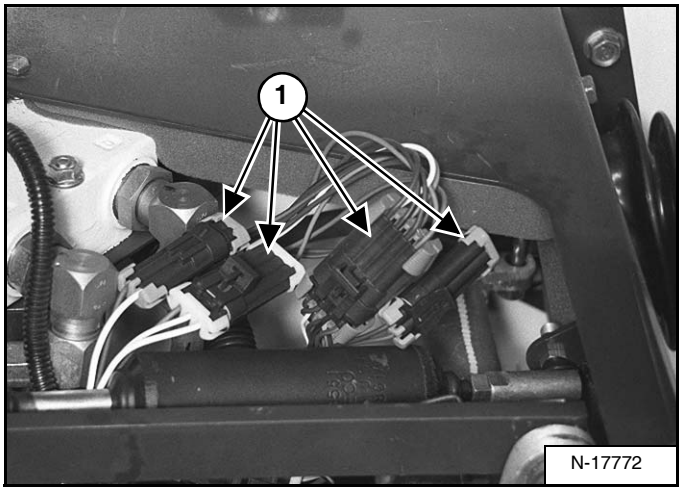
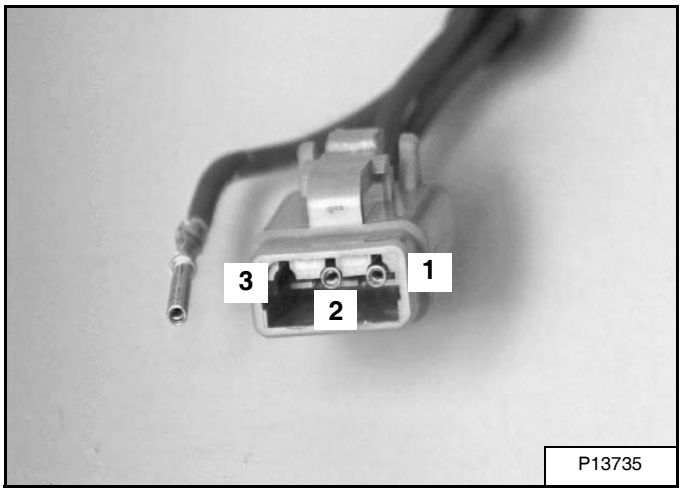


Figure 60-120-26



Connect the handle harness connectors (Item 1) **[Figure 60-120-25]** & **[Figure 60-120-26]** to the loader harness connectors.

Figure 60-120-27

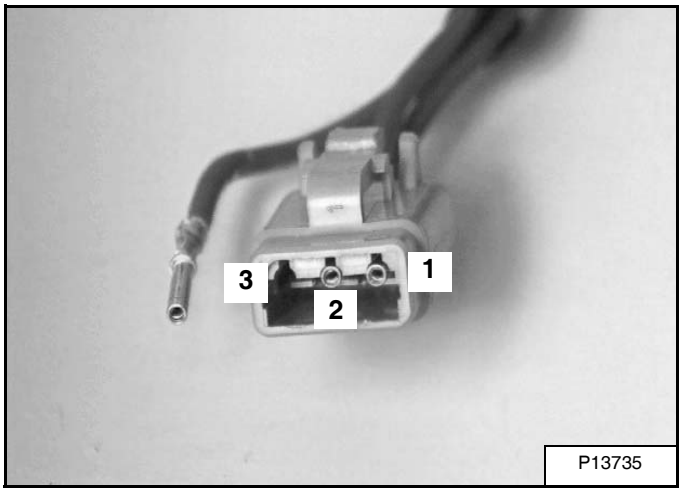


Install the wires into the connectors as listed below:

Left and Right Control Lever Switch Handle **[Figure 60-120-27]**

1-Terminal - Red/White
2-Terminal - Black/White
3-Terminal - Purple/White

Figure 60-120-28



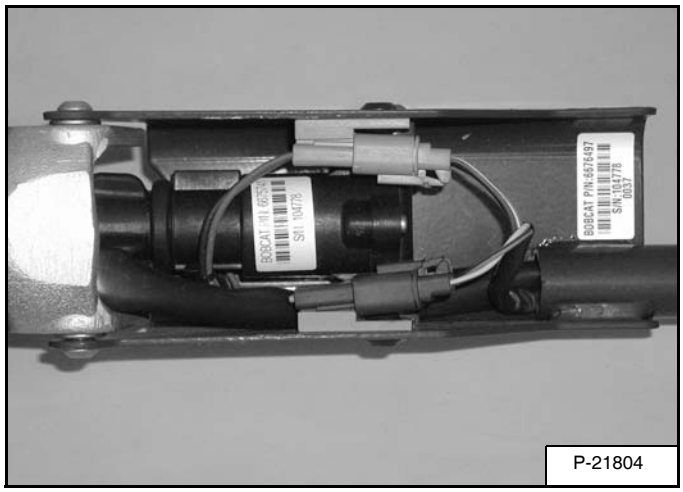
Left and Right Control Lever Switch Handle **[Figure 60-120-28]**

1-Terminal - Yellow/Red
2-Terminal - Open
3-Terminal - Orange/Black

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Switch Handle Installation (Cont'd)

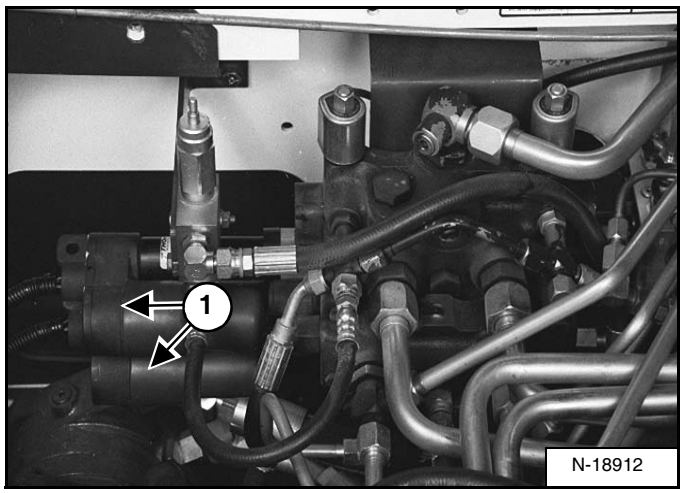
Figure 60-120-29



Connect the handle harness connectors to the sensor and lock solenoid connectors **[Figure 60-120-29]**.

Actuators Disassembly and Assembly

Figure 60-120-30

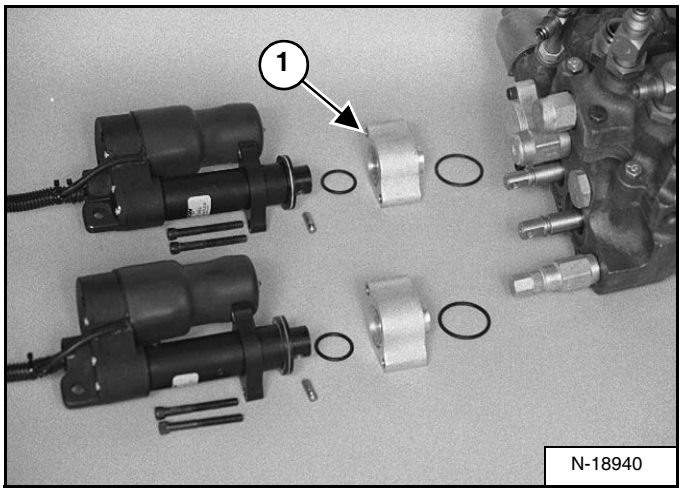


Remove the control panel. (See Removal and Installation on Page 50-100-1.)

Remove the actuator (Item 1) **[Figure 60-120-30]** from the hydraulic control valve. (See Actuator Removal And Installation on Page 20-41-12.)

Installation: Tighten the mount bolts to 90-100 in.-lb. (10,2-11,3 N•m) torque.

Figure 60-120-31

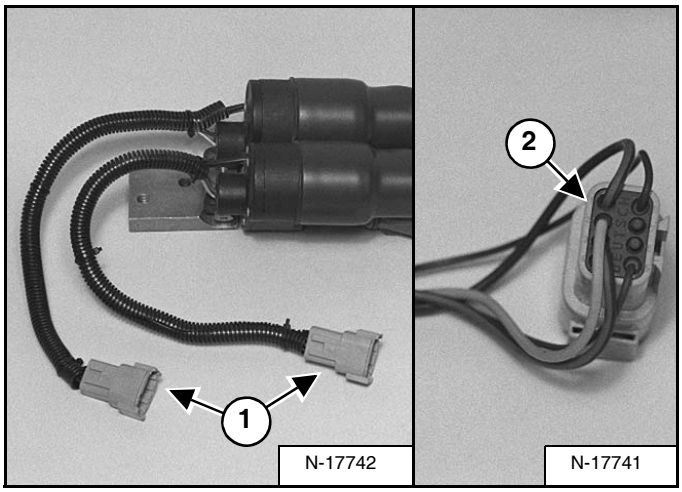


Check the mounting block (Item 1) **[Figure 60-120-31]** and bolts for wear and replace as needed.

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Actuators Disassembly and Assembly (Cont'd)

Figure 60-120-32



Check the actuator wiring harness connector (Item 1) **[Figure 60-120-32]** and replace if broken.

Installation: Install the wires into the connector as listed below. The terminal numbers are written on the back of the connector (Item 2) **[Figure 60-120-32]**.

Lift and Tilt Actuator

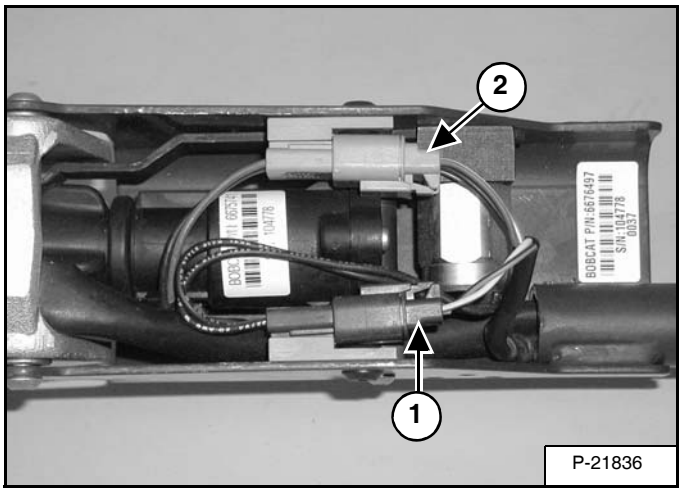
1. Terminal-Black/Green-Larger diameter wire (16 gauge)
2. Terminal-Green-Larger diameter wire (16 gauge)
3. Terminal-Red/Green-Larger diameter wire (16 gauge)
4. Terminal-Open
5. Terminal-Red-Smaller diameter wire (18 gauge)
6. Terminal-Open
7. Terminal-Open
8. Terminal-Black-Smaller diameter wire (18 gauge)

NOTE: The calibration procedure must be followed when replacing a handle sensor, foot pedal sensor, actuator or ACS controller. (See Calibration Procedure on Page 60-120-16.)

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Handle Lock Solenoid Removal And Installation

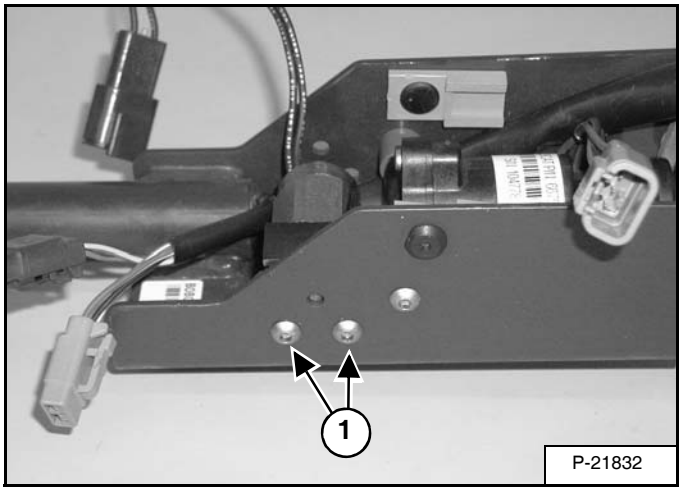
Figure 60-120-33



Disconnect the harness connector (Item 1) **[Figure 60-120-33]** from the handle sensor connector.

Disconnect the harness connector (Item 2) **[Figure 60-120-33]** from the handle lock solenoid connector.

Figure 60-120-34



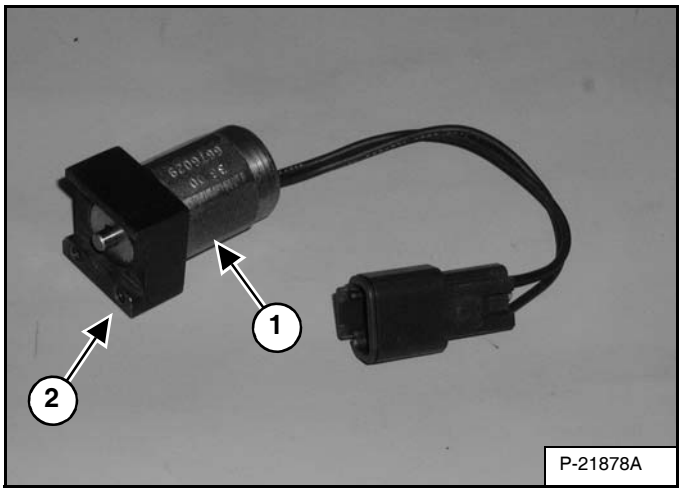
Remove the two screws (Item 1) **[Figure 60-120-34]** holding the handle lock solenoid to the handle.

Installation: Tighten the screws to 32-38 in.-lb. (3,6-4,3 N•m) torque.

Remove handle lock solenoid assembly from handle.

Handle Lock Solenoid Disassembly And Assembly

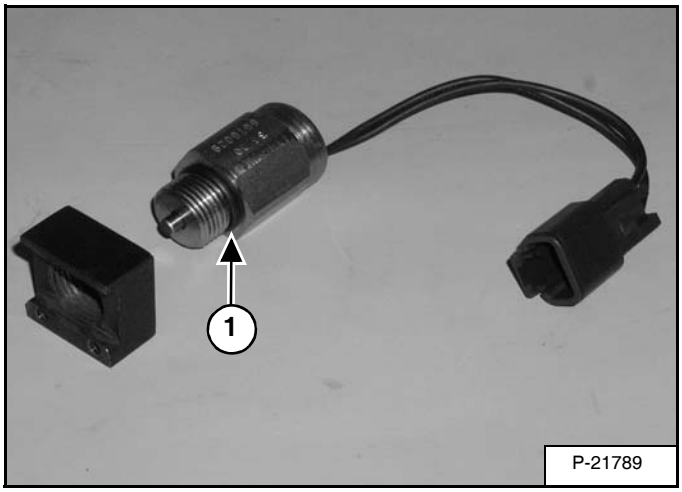
Figure 60-120-35



Remove solenoid (Item 1) from the solenoid mount (Item 2) **[Figure 60-120-35]**.

Installation: Apply a drop of oil to the solenoid threads and tighten solenoid to 35-40 ft.-lb. (47-54 N•m) lubed torque.

Figure 60-120-36

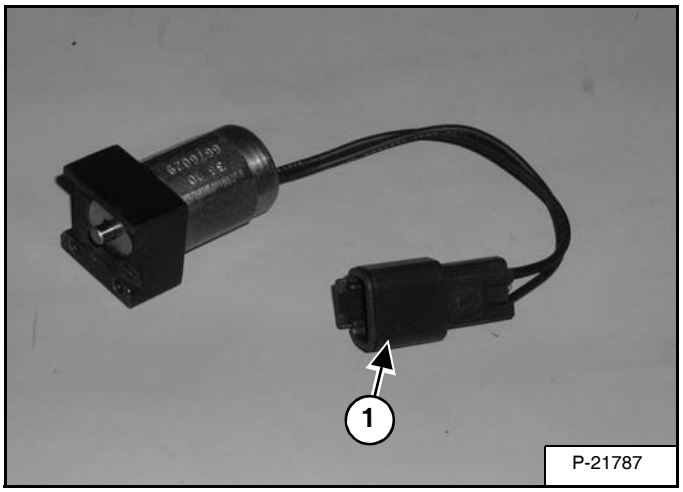


Check the O-ring (Item 1) **[Figure 60-120-36]** for damage. Replace as necessary.

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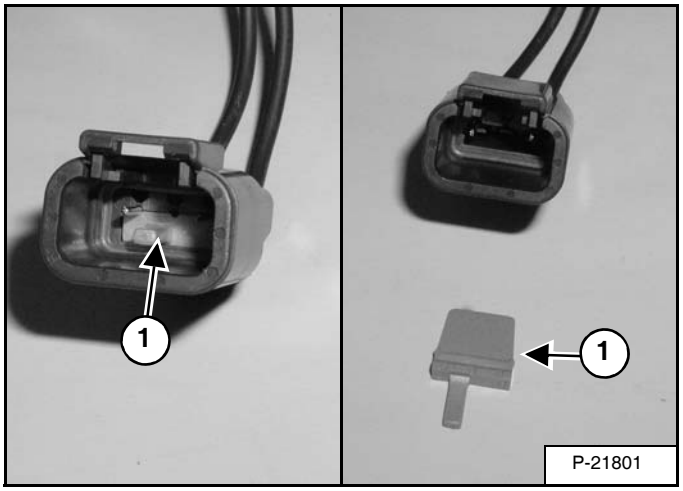
Handle Lock Solenoid Connector

Figure 60-120-37



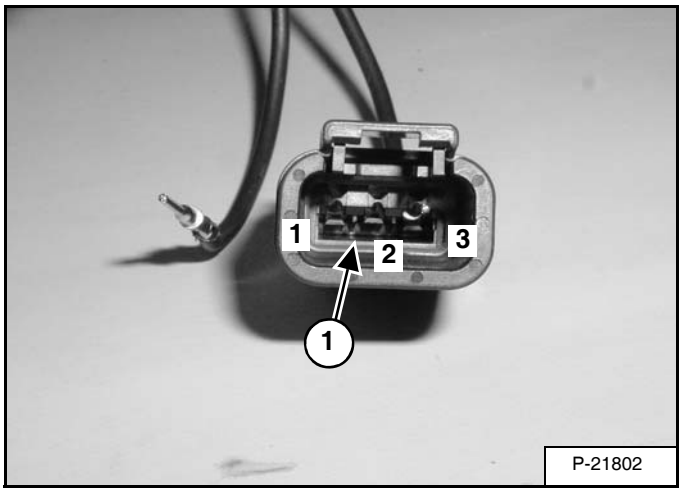
The wire connector (Item 1) **[Figure 60-120-37]** can be removed from the solenoid, using the following procedure:

Figure 60-120-38



Remove the wedge (Item 1) **[Figure 60-120-38]** from the connector.

Figure 60-120-39



With a pointed tool, lift the tab (Item 1) **[Figure 60-120-39]** and pull the wire from the connector.

Installation: Install the wires into the connector as listed below **[Figure 60-120-39]**.

1 - Terminal - Black
2 - Terminal - Open
3 - Terminal - Black

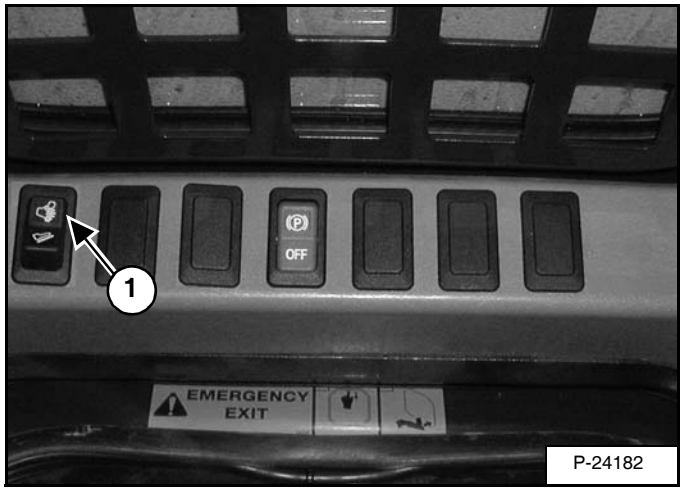
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Calibration Procedure

The new controller uses a calibration sequence to optimize the control system. The optimizing ensures full spool stroke (full flow) while preventing over stroke (loading) of the actuator.

NOTE: This calibration procedure must be followed when replacing a handle sensor, actuator or ACS controller. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

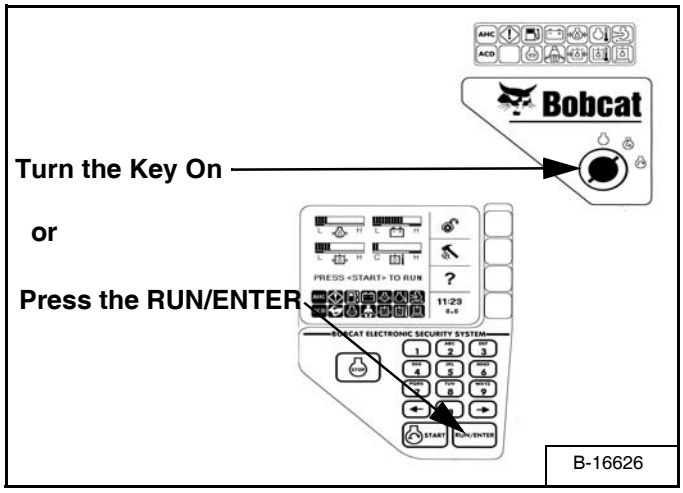
Figure 60-120-40



Update the loader service software to the latest version.

Place the rocker switch (Item 1) **[Figure 60-120-40]** in the hand control mode.

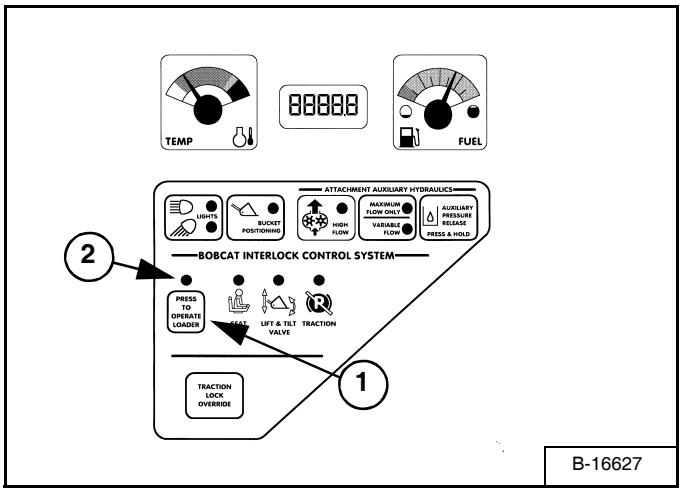
Figure 60-120-41



With the seat bar down, turn the ignition key ON (keyless panel press RUN/ENTER) **[Figure 60-120-41]**.

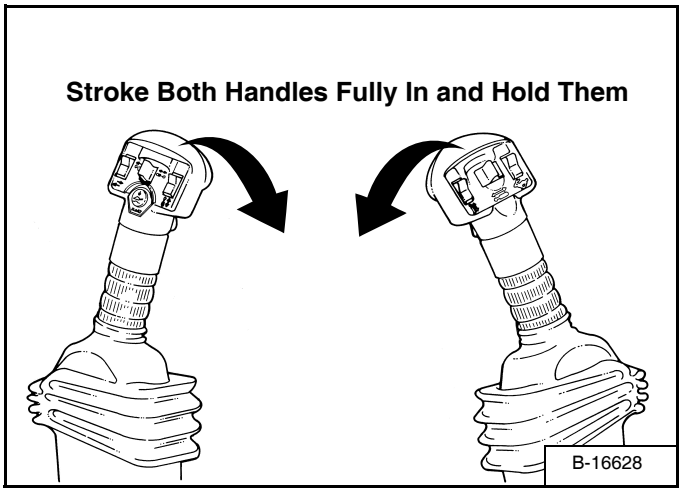
NOTE: Do not start the engine.

Figure 60-120-42



Push the PRESS TO OPERATE button (Item 1) **[Figure 60-120-42]** to unlock the hand controls.

Figure 60-120-43



Fully stroke both control handles in toward the center of the cab and hold the handles **[Figure 60-120-43]**.

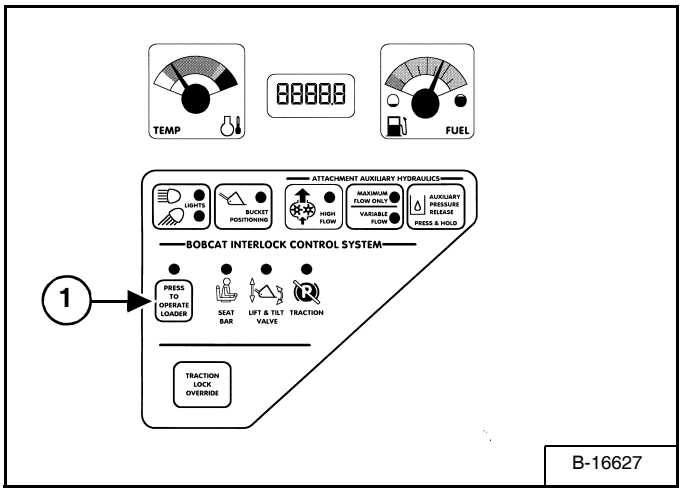
Lift the seat bar, high enough for the PRESS TO OPERATE light (Item 2) **[Figure 60-120-42]** to go **OFF**.

Lower the seat bar.

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Calibration Procedure (Cont'd)

Figure 60-120-44



Push the PRESS TO OPERATE button (Item 1) **[Figure 60-120-44]** to begin calibration.

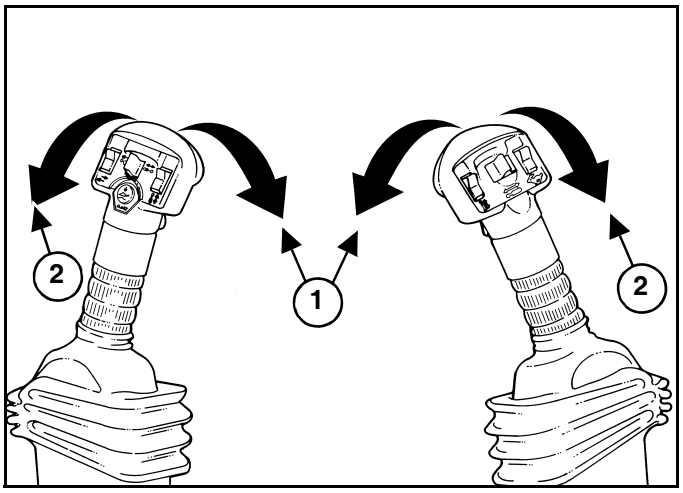
NOTE: The ACS icon will light up and if you listen closely the cycling of the actuators can be heard. The ACS icon will stay lit until the ignition key is cycled or the loader is started and a function is operated.

NOTE: During the calibration cycle, the system will beep three times. The calibration process generates two codes 32-35 (tilt handle not in neutral) and 32-40 (lift handle not in neutral). Ignore these two codes, this is normal during the calibration procedure.

Release the control handles.

NOTE: The remaining portion of the procedure must be completed in twenty seconds or less. If not the handles and pedals will lock and the procedure must be started over from the beginning.

Figure 60-120-45

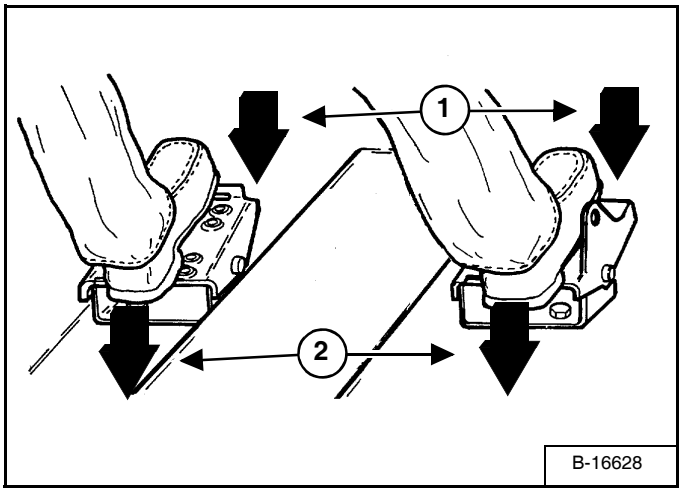


Fully move both handles in toward the center of the cab and hold the handles for one second (Item 1) **[Figure 60-120-45]**.

Fully move both handles out toward the cab side screens and hold for one second (Item 2) **[Figure 60-120-45]**.

Allow both handles to return to neutral.

Figure 60-120-46



Fully press the toe of the lift and tilt pedals (Item 1) **[Figure 60-120-46]** down and hold for one second.

Fully press the heel of the lift and tilt pedals (Item 2) **[Figure 60-120-46]** down and hold for one second.

Allow both pedals to return to neutral.

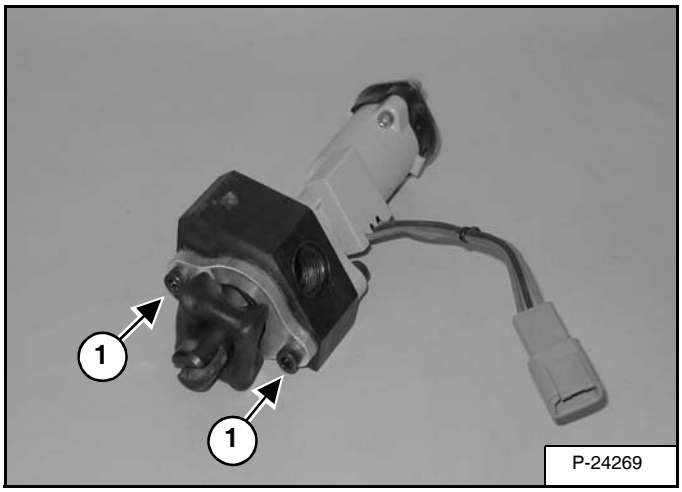
At the end of the twenty second time frame, the handles and pedals will lock.

Calibration is complete.

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Foot Sensor Disassembly And Assembly

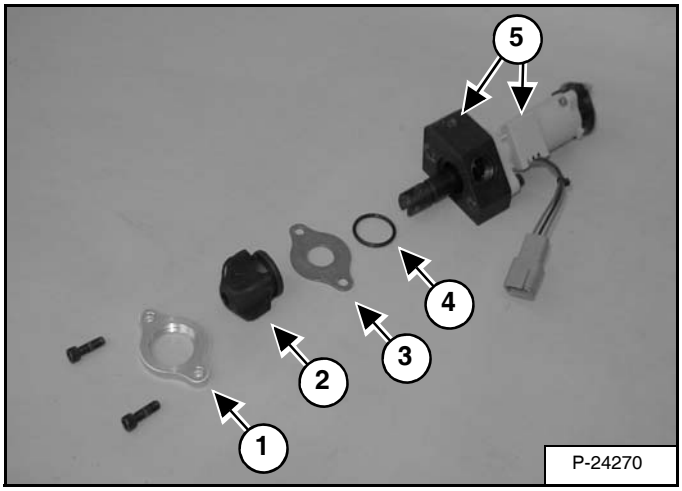
Figure 60-120-47



Remove the two bolts (Item 1) **[Figure 60-120-47]** from the end of the foot sensor.

Installation: Tighten the bolts to 90 in.-lb. (10,2 N•m) torque. Apply LOCTITE 242 to the threads.

Figure 60-120-48

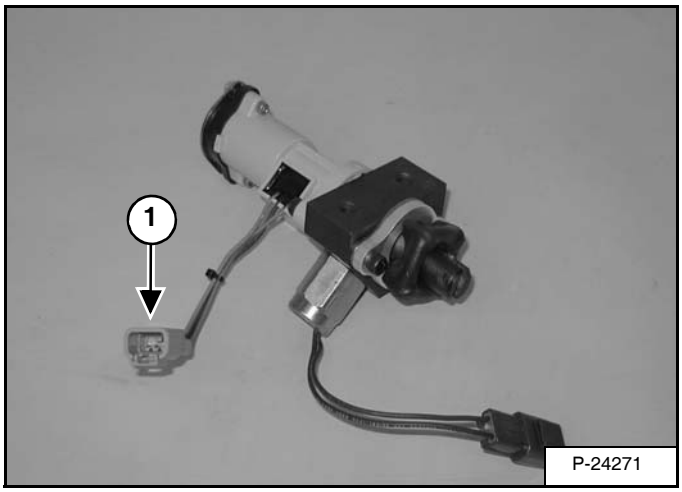


Remove the boot retainer (Item 1), boot (Item 2), spool stop plate (Item 3), O-ring (Item 4) **[Figure 60-120-48]**.

NOTE: Do not disassemble the sensor assembly (Item 5) [Figure 60-120-48]. The sensor assembly is a calibrated assembly and cannot be serviced. Order through Bobcat Parts.

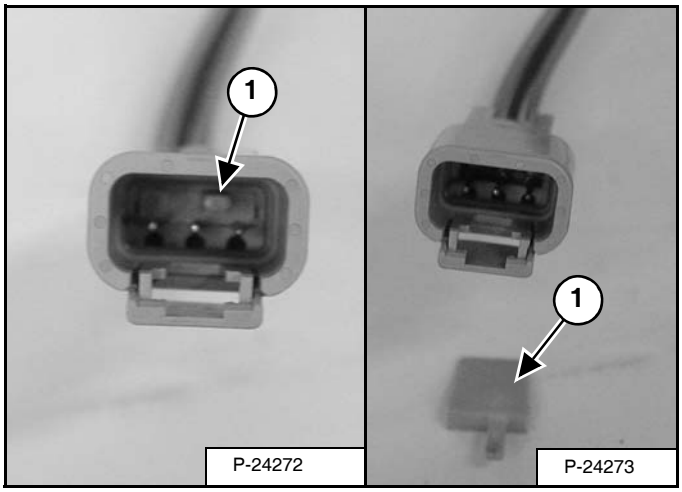
Foot Sensor Connector

Figure 60-120-49



The wire connector (Item 1) **[Figure 60-120-49]** can be removed from the sensor wires, using the following procedure:

Figure 60-120-50

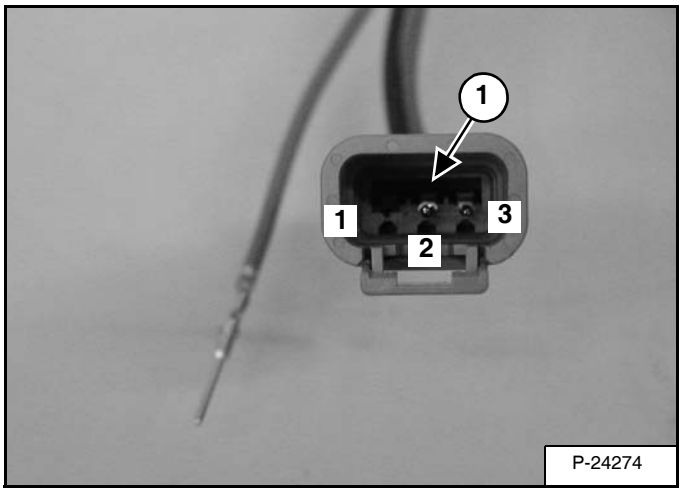


Remove the wedge (Item 1) **[Figure 60-120-50]** from the connector.

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Foot Sensor Connector (Cont'd)

Figure 60-120-51



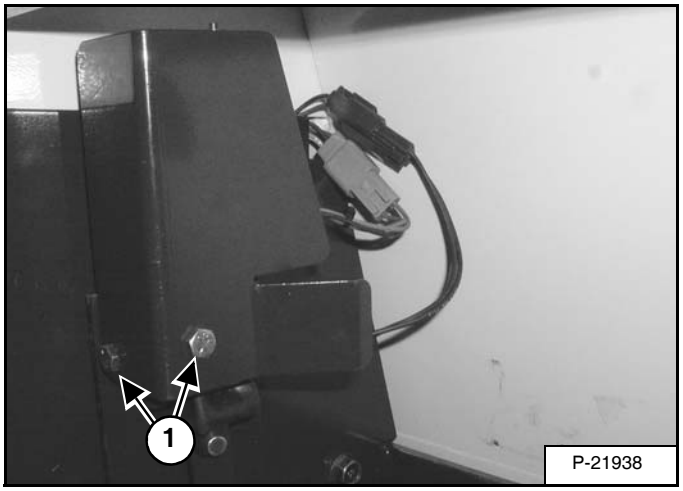
With a pointed tool, lift the tab (Item 1) **[Figure 60-120-51]** and pull the wire from the connector.

Installation: Install the wires into the connector as listed below **[Figure 60-120-51]**:

1 - Terminal - Red
2 - Terminal - Black
3 - Terminal - Green

Foot Lock Solenoid Removal And Installation

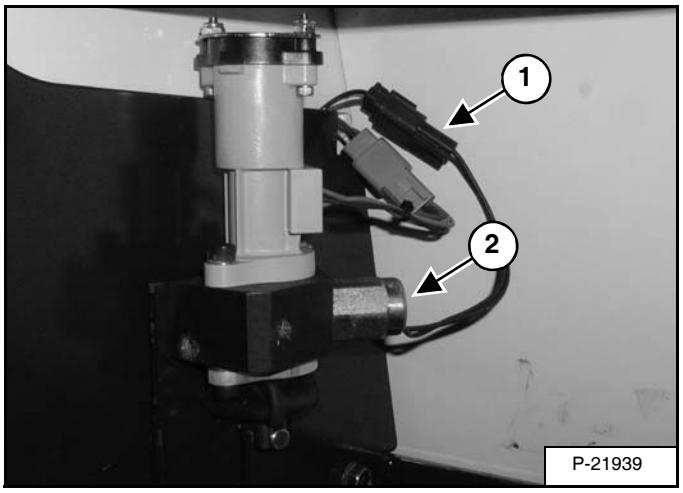
Figure 60-120-52



Remove the two bolts (Item 1) **[Figure 60-120-52]** from the foot sensor shield.

Installation: Tighten the bolts to 80-90 in.-lb. (9,0-10,2 N•m) torque.

Figure 60-120-53

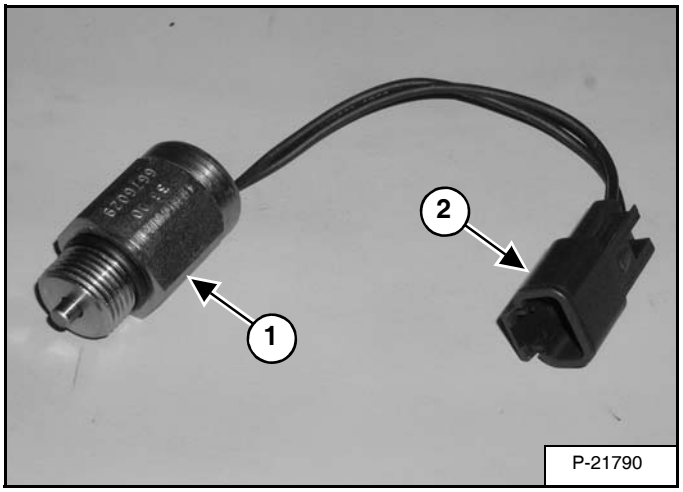


Disconnect the foot lock solenoid connector (Item 1) **[Figure 60-120-53]** from the harness.

Remove foot lock solenoid (Item 2) **[Figure 60-120-53]**.

Installation: Apply a drop of oil on the solenoid threads and tighten the solenoid to 35-40 ft.-lb. (47-54 N•m) lubed torque.

Figure 60-120-54



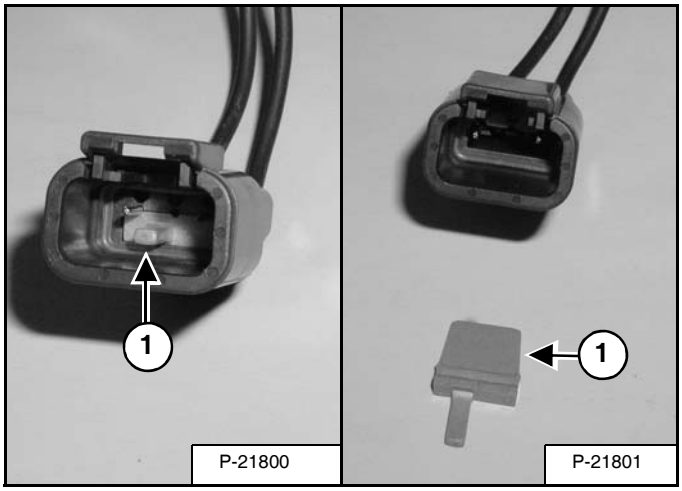
Check the O-ring (Item 1) **[Figure 60-120-54]** for damage. Replace as necessary.

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Foot Lock Solenoid Connector

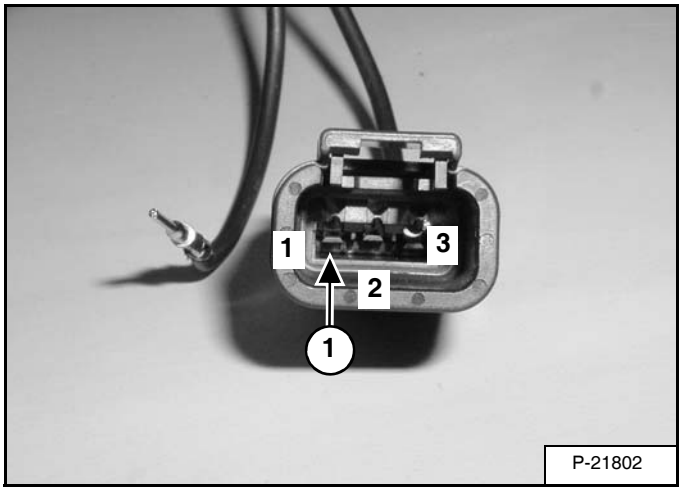
The wire connector (Item 2) **[Figure 60-120-54]** can be removed from the solenoid wires, using the following procedure:

Figure 60-120-55



Remove the wedge (Item 1) **[Figure 60-120-55]** from the connector.

Figure 60-120-56



With a pointed tool, lift the tab (Item 1) **[Figure 60-120-56]** and pull the wire from the connector.

Installation: Install the wires into the connector as listed below **[Figure 60-120-56]**:

1 - Terminal - Black

2 - Terminal - Open

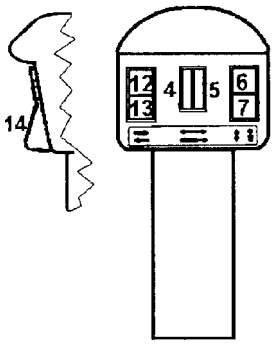
3 - Terminal - Black

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ELECTRICAL/HYDRAULIC CONTROLS REFERENCE

Controls Identification Chart

Left Side Control Handle Switches

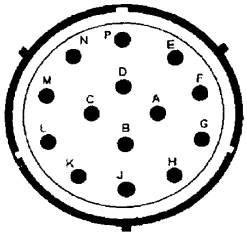


B-16447

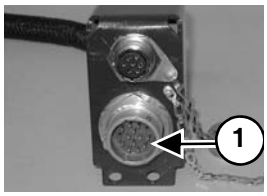
Switch Number	Solenoid Number Activated			Attachment Harness Terminal Activated
		RH	HFH	
1	1	1	1, 8	K
2	2	2	2	K
3	1	1	1, 8	K
4	2	2, 3	6, 7	K, A, D
5	1	1, 3	5, 7	K, A, C
6	1	1, 3	5, 7	K, E
7	1	1, 3	5, 7	K, F
8	1	1, 3	5, 7	K, G
9	1	1, 3	5, 7	K, H
10, 11, 12, 13, 14	-	--	--	K

Attachment Harness Connector

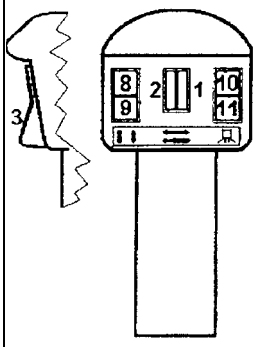
Fourteen Pin Connector Viewed from front (pin side of connector) of loader.



B-16449



Right Side Control Handle Switches



B-16448

NOTE: All diagnostics must be done at the fourteen pin connector (Item 1).

The ACD (Attachment Control Device), automatically recognizes the use of the seven or fourteen pin connector when connected.

If the ACD (Attachment Control Device) Icon, located in the right instrument panel on the loader cab flashes, check for diagnostic service codes. See the Electrical System Service Manual for the proper procedure.

RH - Loaders with Rear Hydraulics Option.

HFH - Loaders with High Flow Hydraulics Option.

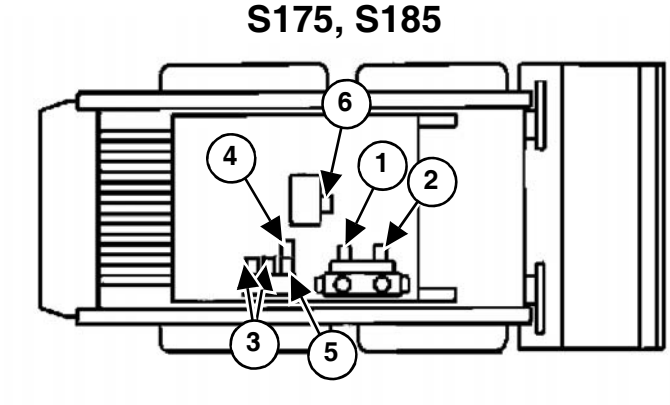
*** If harness terminals K & L are jumped together, switches 4 thru 9 will function the same as switch 1 & 2.**

*** Terminal K is activated with Key switch ON.**

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Controls Identification Chart (Cont'd)

S175, S185



Solenoid Number	Hydraulic Coupler	Wiring Number
1	Front Female (Base)	4340
2	Front Male (Rod)	4330
3	Diverter & Bleed	4450/4480
4	Rear Aux Base	4440
5	Rear Aux Rod	4430
6	High Flow	4460

NOTE: Front Auxiliary Pressure Release is accomplished by manually pushing the male and female couplers in at the front auxiliary block.

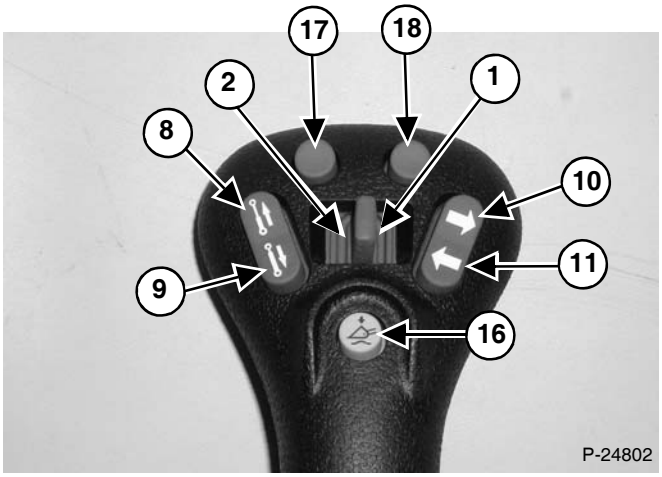
The Hydraulic Pressure Release Button will activate solenoid number 3 at the diverter valve, shut down the loader, and bleed the rear auxiliary (If so equipped.) and also the right side front auxiliary. (If so equipped.)

The High Flow Button in the left side instrument panel must be pushed ON to activate solenoid number 6 on the High Flow valve.

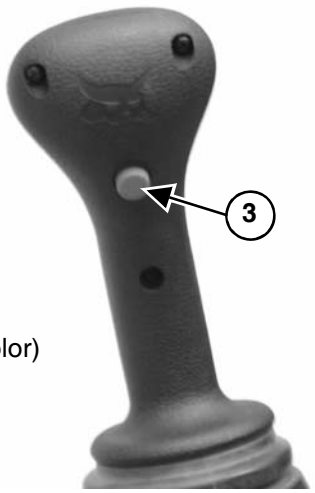
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Controls Identification Chart

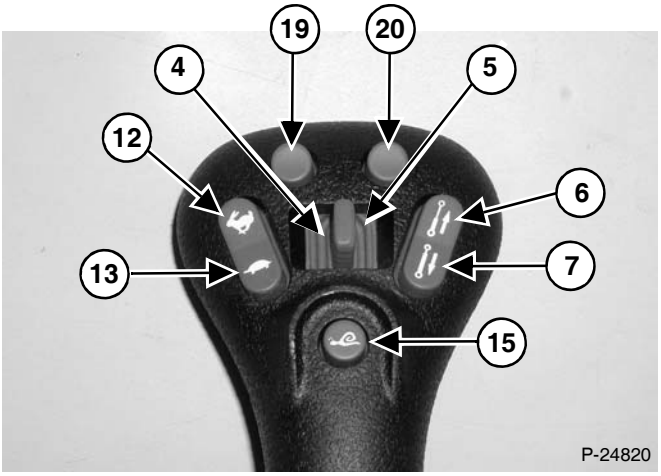
RIGHT HAND



1. Front Aux.
2. Front Aux.
3. Auxiliary Detent
8. Right Ski (Up)
9. Right Ski (Down)
10. Right Blink
11. Left Blink
16. Float (Yellow in Color)
17. Future Function
18. Future Function



LEFT HAND

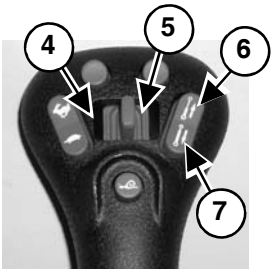
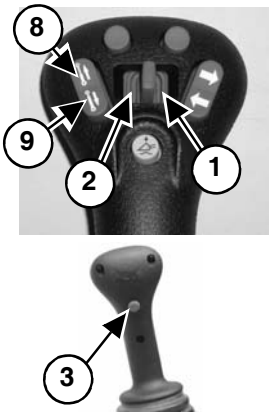


4. Rear Aux. (Side Shift
5. Rear Aux. (Side Shift)
6. Left Skit (Up)
7. Left Ski (Down)
12. Two-Speed (High)
13. Two-Speed (Low)
14. Horn
15. Inching Control (Grey in Color)
19. Future Function
20. Future Function



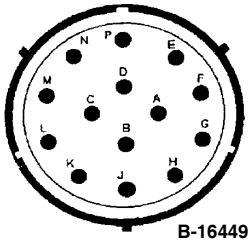
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Controls Identification Chart (Cont'd)

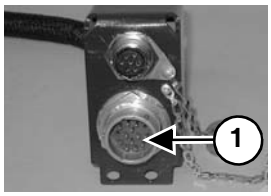
Left Side Control Handle Switches	Switch Number	Solenoid Number Activated				Attachment Harness Terminal Activated	Right Side Control Handle Switches
		STD	RH	HFH	HRH		
	1	1	1	1, 6	1, 6	K	
	2	2	2	2	2	K	
	3	1	1	1, 6	1, 6	K	
	4	2	3, 5	2	3, 5	K, A, D	
	5	1	3, 4	1	3, 4	K, A, C	
	6	1	3, 4	1	3, 4	K, E	
	7	1	3, 4	1	3, 4	K, F	
	8	1	3, 4	1	3, 4	K, G	
	9	1	3, 4	1	3, 4	K, H	

Attachment Harness Connector

Fourteen Pin Connector Viewed from front (pin side of connector) of loader.



B-16449



NOTE: All diagnostics must be done at the fourteen pin connector (Item 1). (If so equipped as a dealer installed kit.)

The ACD (Attachment Control Device) automatically recognizes the use of the seven or fourteen pin connector when connected.

If the ACD light flashes, check for diagnostic service codes. See the Electrical System Service Manual for the proper procedure.

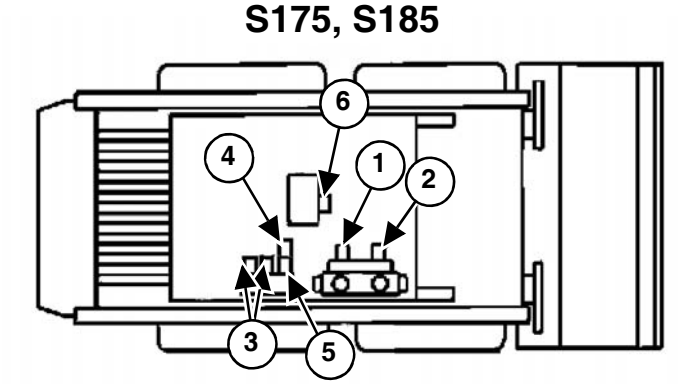
RH - Loaders with Rear Hydraulics Option.
HFH - Loaders with High Flow Hydraulics Option.
*** If harness terminals K & L are jumped together, switches 4 thru 9 will function the same as switch 1 & 2.**
*** Terminal K is activated with Key switch ON.**

HRH - Loaders with High Flow and Rear Hydraulics Option.

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Controls Identification Chart (Cont'd)

S175, S185



Solenoid Number	Hydraulic Coupler	Wiring Number
1	Front Female (Base)	4340
2	Front Male (Rod)	4330
3	Diverter & Bleed	4450/4480
4	Rear Aux Base	4440
5	Rear Aux Rod	4430
6	High Flow	4460

NOTE: Front Auxiliary Pressure Release is accomplished by manually pushing the male and female couplers in at the front auxiliary block.

The Hydraulic Pressure Release Button will activate solenoid number 3 at the diverter valve, shut down the loader, and bleed the rear auxiliary (If so equipped.) and also the right side front auxiliary. (If so equipped.)

The High Flow Button in the left side instrument panel must be pushed ON to activate solenoid number 6 on the High Flow valve.

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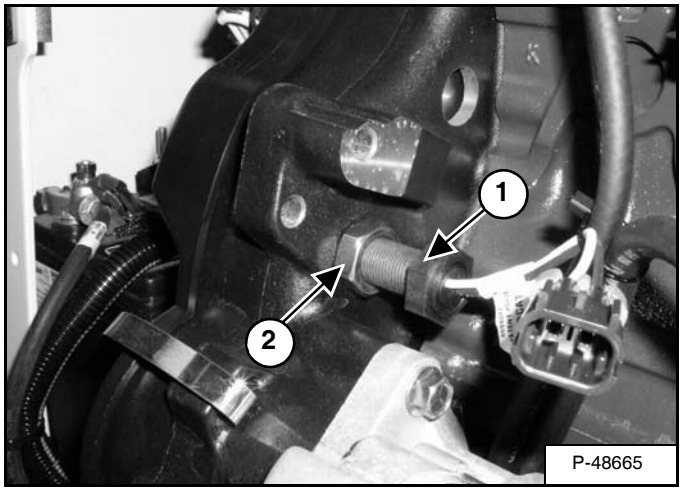


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FLYWHEEL RPM SENSOR

Adjustment

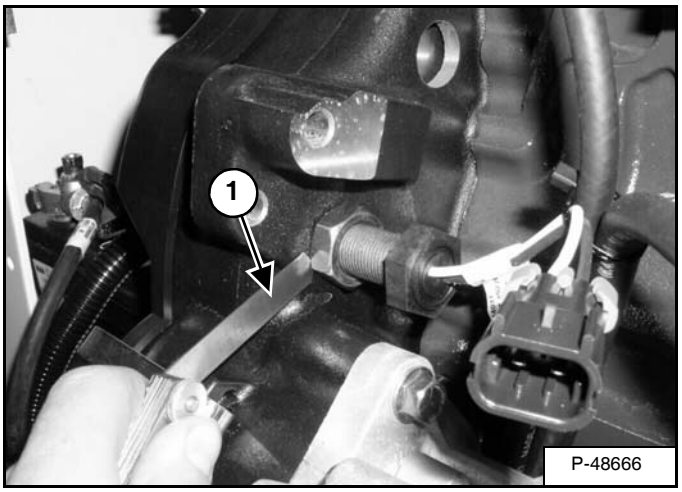
Figure 60-140-1



When reinstalling the RPM sensor, turn the rpm sensor (Item 1) **[Figure 60-140-1]** in until it makes contact with the engine flywheel.

Turn the jam nut (Item 2) **[Figure 60-140-1]** until it contacts the flywheel housing. The jam nut should not be tightened, it needs to turn with the RPM sensor when the sensor is turned back out for adjustment.

Figure 60-140-2



Turn the RPM sensor and the jam nut out from the flywheel. Set a clearance of .050 inch (1,27 mm) between the jam nut and the housing with a feeler gauge (Item 1) **[Figure 60-140-2]**.

NOTE: New RPM sensors have a plastic tip which is used as a gauge during installation. The plastic tip is designed to come off after the engine is started.

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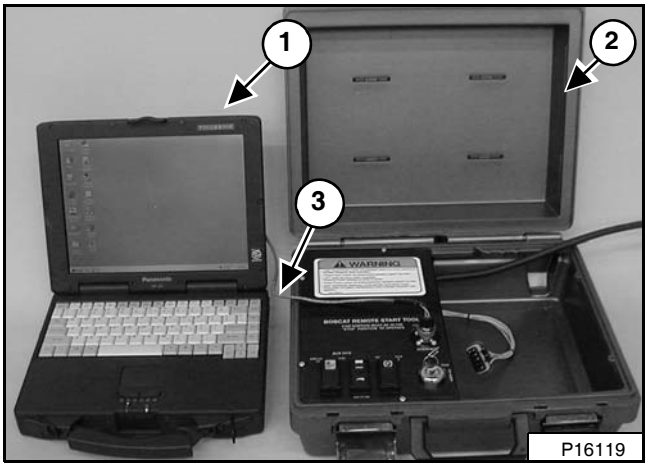


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SERVICE PC (LAPTOP COMPUTER)

Connecting The Service PC To Remote Start Tool

Figure 60-150-1



Tools that will be needed to complete the following steps are:

MEL1563 - Remote Start Tool
MEL1565 - Service Tool Harness Control
MEL1566 -Service Tool Harness Communicator (Computer Interface)

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

The Service PC (Item 1) with the remote start tool (Item 2) **[Figure 60-150-1]**. When connected to the loader, the Service PC is used to monitor, conduct diagnostic and load software.

Connect the Service Tool Harness Communicator (MEL1566) (Item 3) **[Figure 60-150-1]** to the designated serial port on the Service PC.

NOTE: The recommended serial cable length should not exceed 15 feet. A serial cable longer than 15 feet will create a degraded signal causing communication errors.

Connect the other end to the connector on the remote start tool.

Connect the remote start tool to the loader. (See Procedure on Page 10-60-1.)

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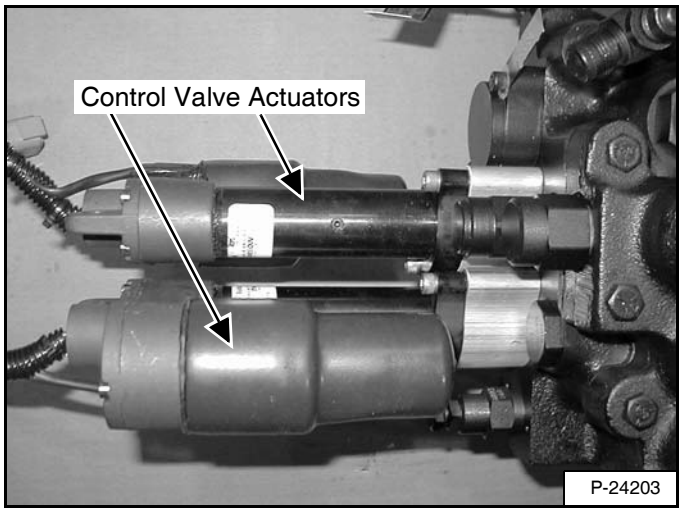
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CALIBRATION

Description

Calibration procedures must be followed when replacing a handle sensor, actuator, or any controller. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

Figure 60-160-1



[Figure 60-160-1] Excessive actuator loading can occur if the actuator and valve spool components are misaligned. Misalignment may reduce spool stroke performance and reduce the life of the actuator. Starting with version 36, the Bobcat Service Analyzer software will be able to perform tests to diagnose actuator and valve spool misalignment.

The Actuator Test is performed with the Service PC and Remote Start Tool. The Actuator Test should be used if reduced performance codes are present and when replacing a controller or actuator. The Actuator Test should be used as the preferred method of actuator and valve spool calibration.

If a Service PC is not available,: See Lift and Tilt Calibration Procedure (SJC) on page 60-160-4 **or** See Calibration Procedure (ACS) on page 60-160-11.

Actuator Testing

The Actuator Test is performed with the Service PC and Remote Start Tool. The Actuator Test should be used if reduced performance codes are present and when replacing a controller or actuator. The Actuator Test should be used as the preferred method of actuator and valve spool calibration.

NOTE: Warm the hydraulic oil to room temperature 72°F (22°C), stop the engine and clear all active service codes before running the test.

Once the test is initiated, an automatic calibration sequence will start. When calibration is complete, the test will be performed and the results can be viewed on the Service PC (Laptop) monitor.

This test will engage both actuators to fully stroke the spools then allow the centering springs to return the spools to neutral. Next, both actuators are engaged to move the spools just past the neutral points then allow the centering springs to return the spools to neutral.

When complete, the Actuator Test will show a pass mode or fail mode. The pass mode indicates that no problems were detected. The fail mode indicates one or a combination of three problems below.

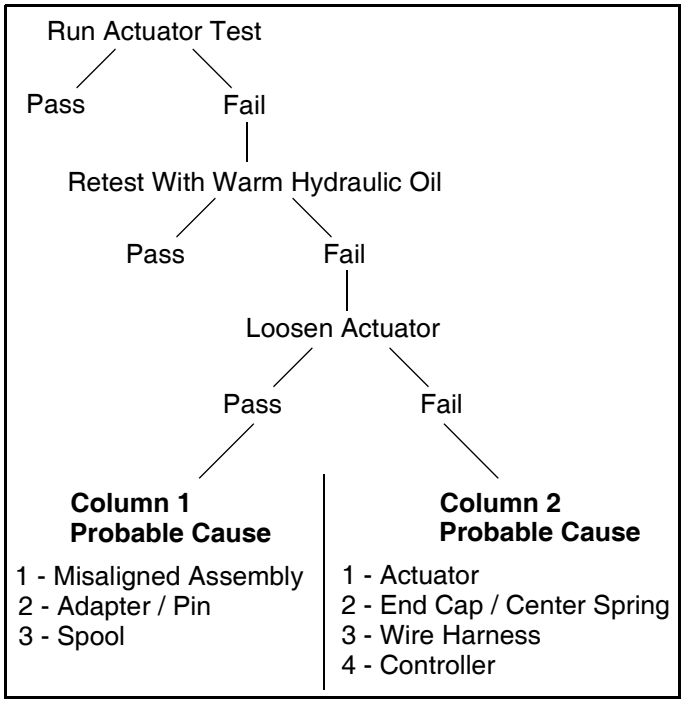
- ***Actuator slow return to neutral.*** The spool returns to neutral too slowly.
- ***Actuator did not fully extend/retract.*** During the test, the spool was not able to fully stroke in both directions.
- ***Actuator out of neutral.*** The spool did not return to the neutral window during the test.

NOTE: A time out will occur if the test cannot be completed within 8 seconds. If this happens, retry the test.

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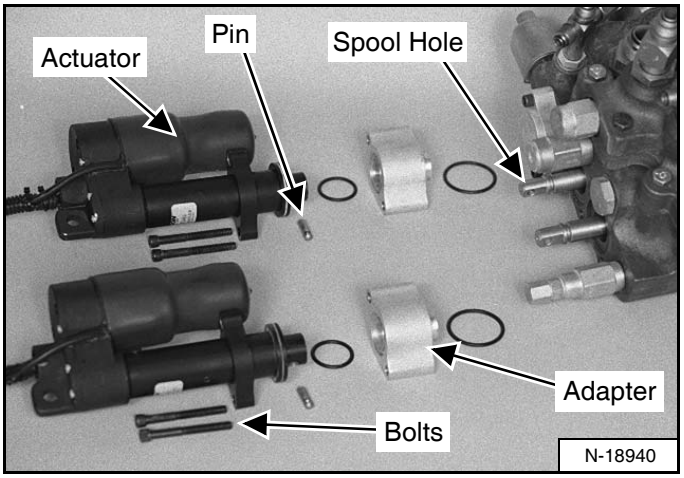
Actuator Testing (Cont'd)

Figure 60-160-2



[Figure 60-160-2] If the initial Actuator Test results in a fail mode due to a ***slow return to neutral,*** follow the troubleshooting tree to pinpoint the probable cause.

Figure 60-160-3

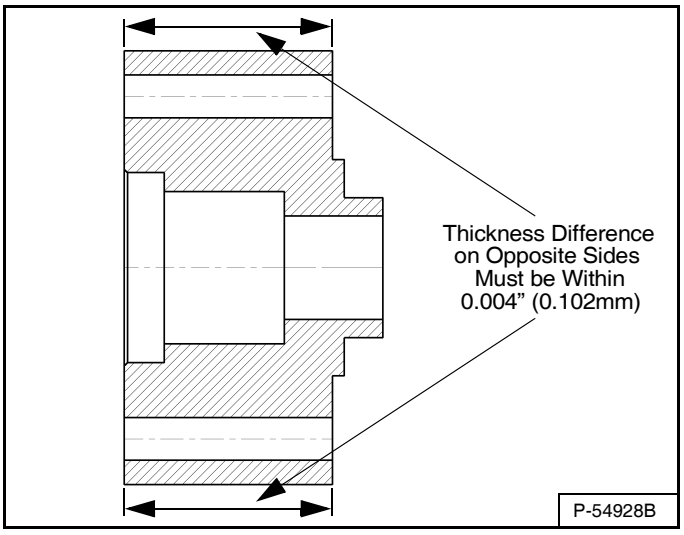


[Figure 60-160-3] If the Actuator Test fails after the hydraulic oil is warmed, go to the next step and loosen the bolts that mount the actuator to the control valve. Loosen the bolts just enough so the actuator can be moved slightly up/down or side/side.

Rerun the Actuator Test, if the test passes, check the following probable causes in **Column 1 [Figure 60-160-2]**. Check the probable causes in the order they are listed. Repairing one cause may be all that is required. Rerun the test to verify.

1. Actuator and spool misalignment. Re-tighten the two bolts evenly, turn the first bolt one turn, then turn the other bolt one turn until both bolts are tight.

Figure 60-160-4



2. **[Figure 60-160-4]** The adapter may not be machined correctly. Adapters with a large difference in thickness measured on opposite sides should be replaced.

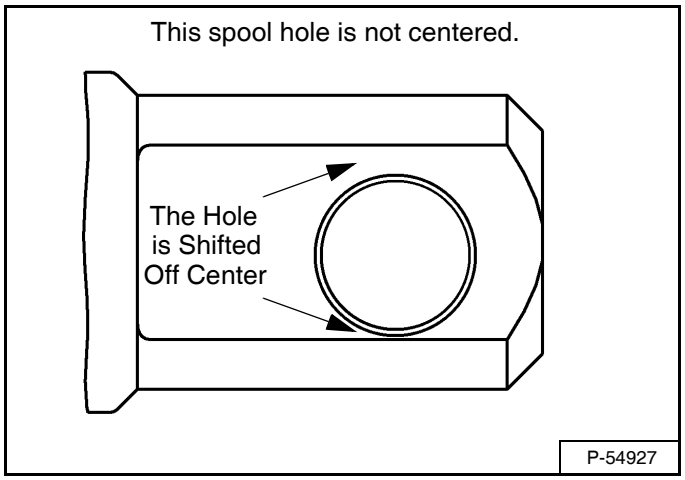
The pin may be too large. Oversized pins exceeding 0.248" (6.30mm) in diameter should be replaced.

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CALIBRATION (CONT'D)

Actuator Testing (Cont'd)

Figure 60-160-5



3. **[Figure 60-160-5]** The spool hole may not be centered, ***visually inspect both sides.*** Replace the spool if the hole is not centered.

NOTE: Later model spools have a slotted hole to reduce misalignment.

If the Actuator Test failed due to a ***slow return to neutral*** after checking the probable causes in **Column 1 [Figure 60-160-2]**, check the following probable causes in **Column 2 [Figure 60-160-2]**.

1. The actuator may be weak, replace the actuator.

2. The end cap may be defective or the centering spring may be broken. Inspect the end cap and the centering spring, replace if necessary.

3. The wire harness or connectors may have an intermittent short. Check the connections and wire harnesses.

4. The controller may be defective, replace the controller.

If the initial Actuator Test results in the fail mode ***actuator did not fully extend/retract,*** check the following.

1. The actuator connectors may be reversed between the lift and tilt actuator. Reverse the connectors and rerun the Actuator Test.

2. The actuator may be weak, replace the actuator.

3. The end cap may be defective or the centering spring may be broken. Inspect the end cap and the centering spring, replace if necessary.

If the initial Actuator Test results in the fail mode ***actuator out of neutral,*** check the following.

1. The actuator may be defective, replace the actuator.

2. The end cap may be defective or the centering spring may be broken. Inspect the end cap and the centering spring, replace if necessary.

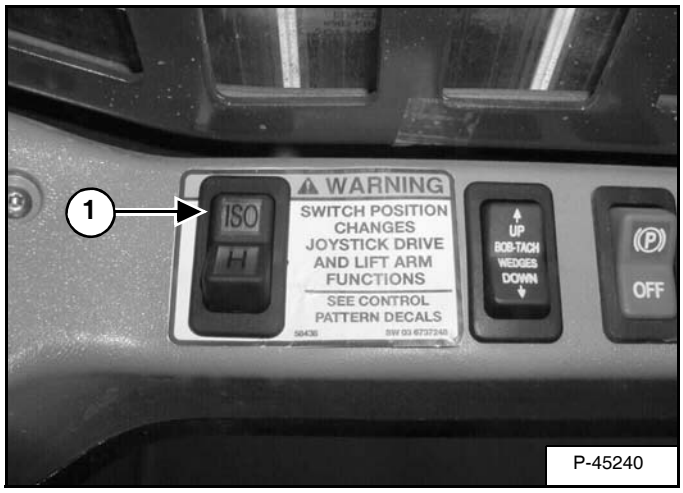
This letter is provided as technical information. Normal warranty applies.

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Lift and Tilt Calibration Procedure (SJC)

NOTE: This calibration procedure must be followed when replacing the lift or tilt actuator, SJC controller or joystick. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

Figure 60-160-6

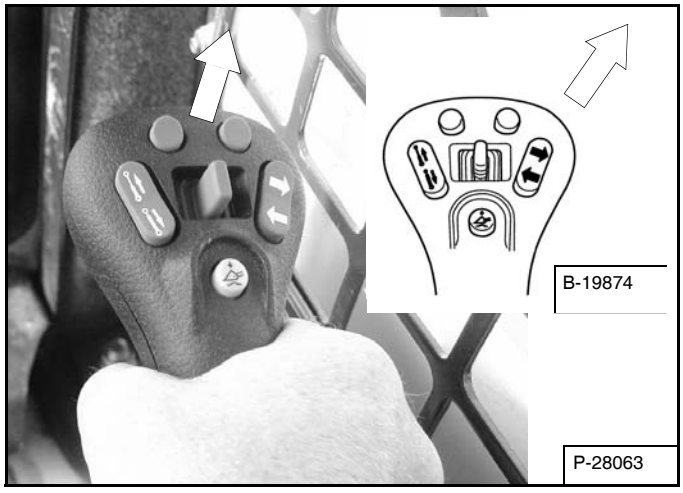


With an operator in the seat and the seat bar down.

Close the cab door. (If loader is so equipped.)

Place the loader Control Pattern Switch (Item 1) **[Figure 60-160-6]** in the **ISO** position.

Figure 60-160-7



Move the right joystick to the forward-right corner position **[Figure 60-160-7]** and hold in position.

Figure 60-160-8

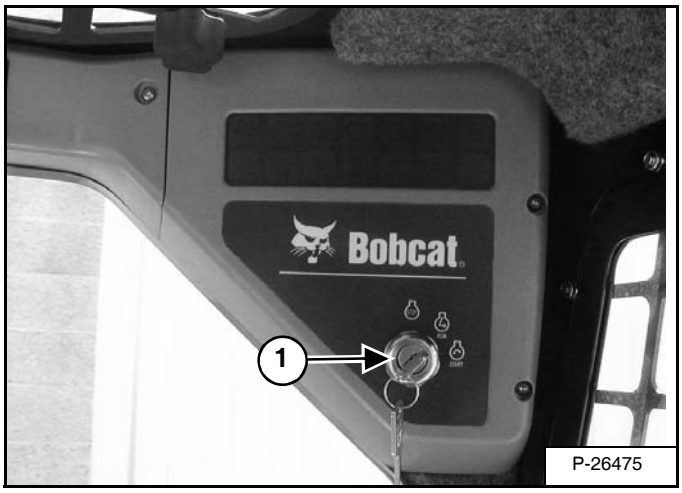


Figure 60-160-9



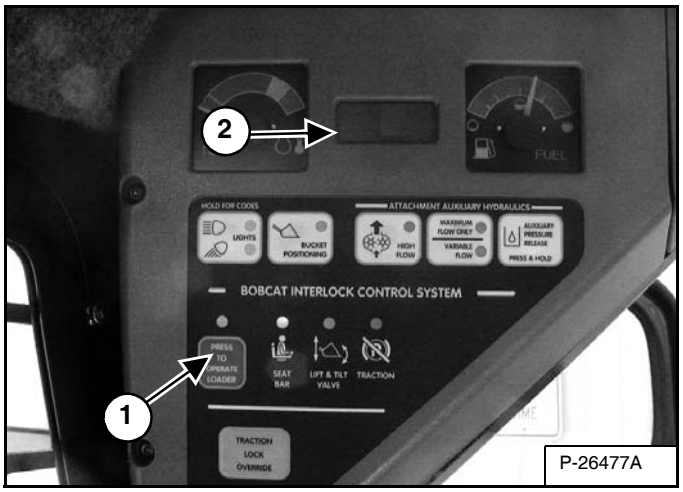
Turn the key (Item 1) **[Figure 60-160-8]** to the RUN position or press the RUN/ENTER button (Item 1) **[Figure 60-160-9]** for power, without starting the loader.

The loader Control Pattern Switch (Item 1) **[Figure 60-160-6]** will start flashing and will continue to flash until the calibration procedure is completed.

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Lift and Tilt Calibration Procedure (SJC) (Cont'd)

Figure 60-160-10



At the left panel, press the PRESS TO OPERATE Button (Item 1) **[Figure 60-160-10]** while holding the right joystick in position.

Release the joystick.

An audible beep will sound and an error code (Item 2) **[Figure 60-160-10]** (32-35 & 32-40) will be displayed if the operator presses the HOLD FOR CODES, (LIGHTS) switch.

The *SJC* controller will cycle the actuators.

The lift and tilt calibration is complete.

Hydrostatic Pump Calibration (SJC)

⚠ WARNING

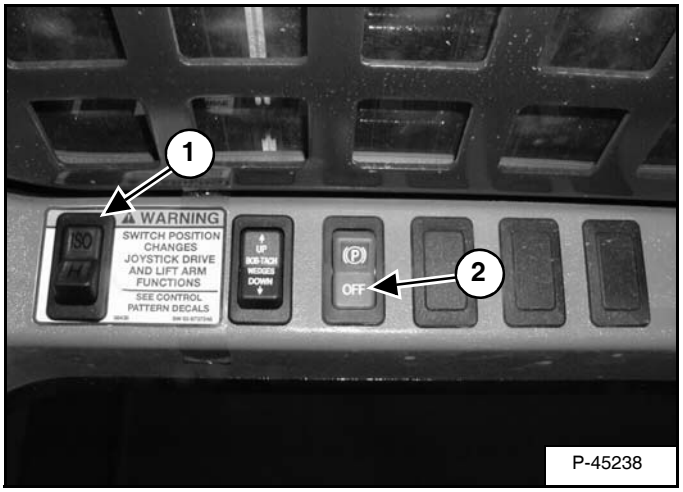
Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0286

Place the loader on jackstands. (See Procedure on Page 10-10-1.)

Operator must be in the seat and the seat bar down.

Figure 60-160-11



Close the cab door. (If loader is so equipped.)

Place the loader Control Pattern Switch (Item 1) **[Figure 60-160-11]** in the ISO position.

Verify the parking brake (Item 2) **[Figure 60-160-11]** is OFF.

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Hydrostatic Pump Calibration (SJC) (Cont'd)

Figure 60-160-12

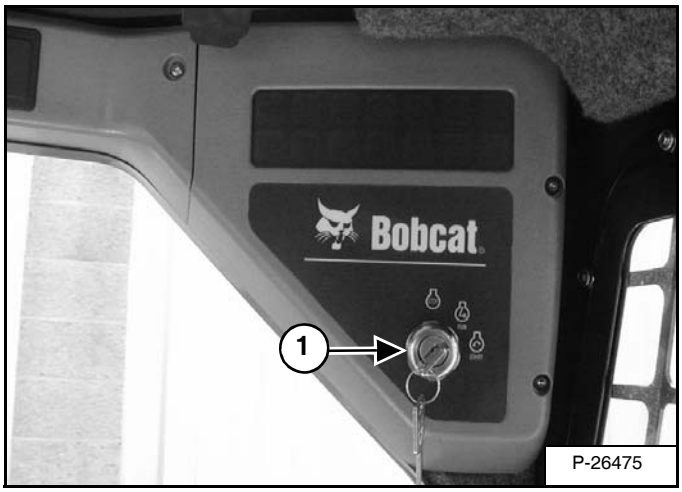
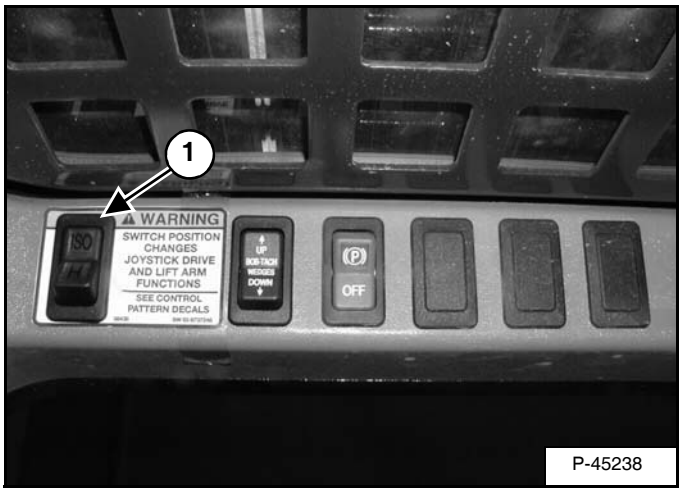


Figure 60-160-13



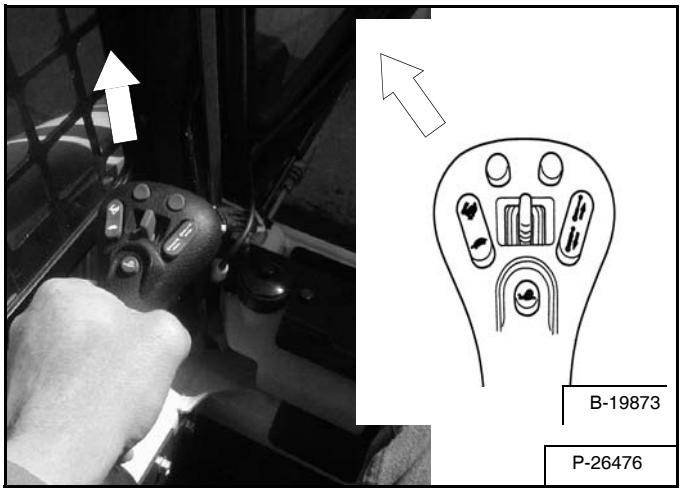
Turn the key (Item 1) **[Figure 60-160-12]** to the *RUN* position **or** press the *RUN/ENTER* button (Item 1) **[Figure 60-160-13]** for power, without starting the loader.

Figure 60-160-14



The Control Pattern **ISO** Switch (Item 1) **[Figure 60-160-14]** will start flashing.

Figure 60-160-15

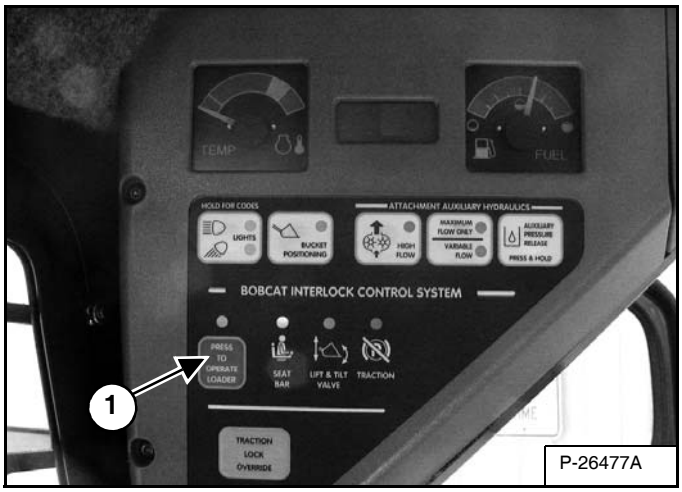


Move the left joystick to the forward-left corner position **[Figure 60-160-15]** and hold in position.

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Hydrostatic Pump Calibration (SJC) (Cont'd)

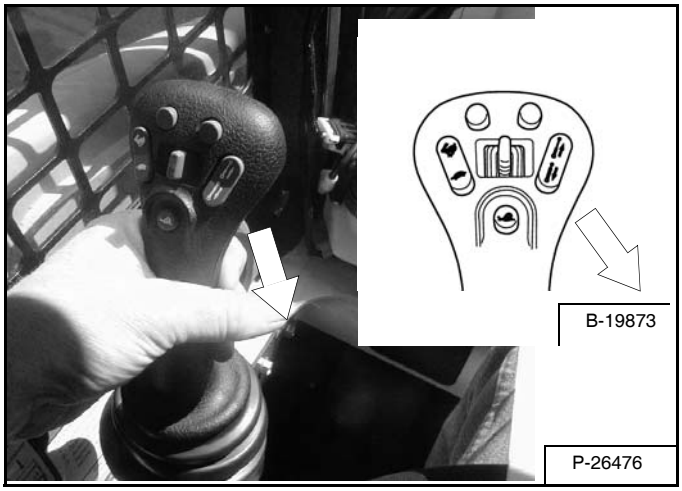
Figure 60-160-16



Press the *PRESS TO OPERATE LOADER* Button (Item 1) **[Figure 60-160-16]** while holding the left joystick in position.

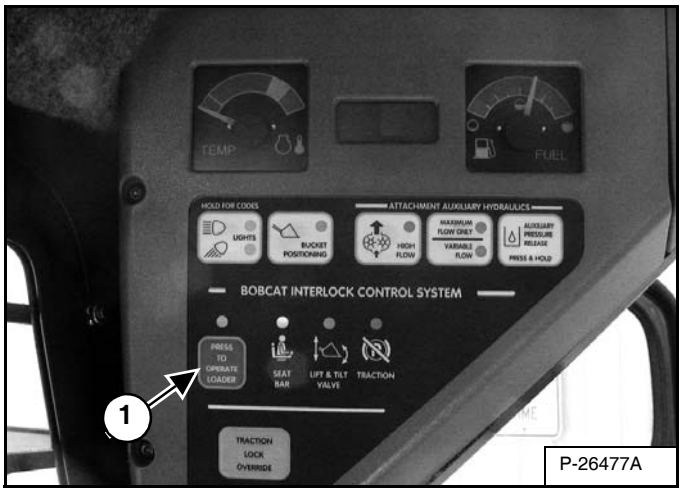
Three audible beeps will sound.

Figure 60-160-17



Move the left joystick to the reverse-right corner position **[Figure 60-160-17]** and hold in position.

Figure 60-160-18



Press the *PRESS TO OPERATE LOADER* Button (Item 1) **[Figure 60-160-18]** while holding the left joystick in position.

Three audible beeps will sound.

Figure 60-160-19

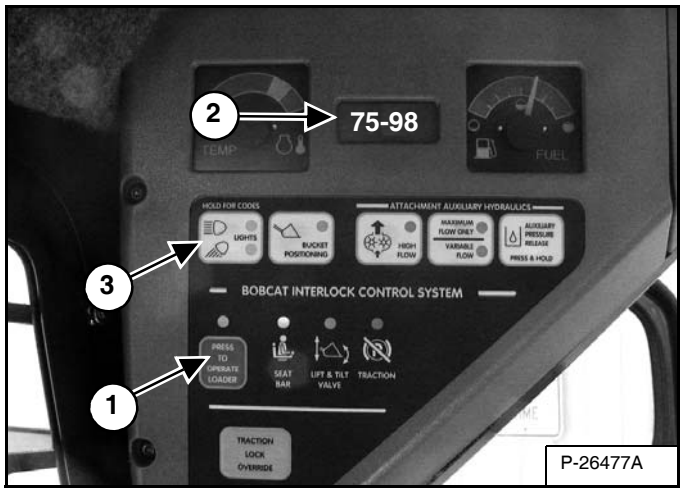


Allow the left joystick to go to the neutral position **[Figure 60-160-19]**.

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Hydrostatic Pump Calibration (SJC) (Cont'd)

Figure 60-160-20

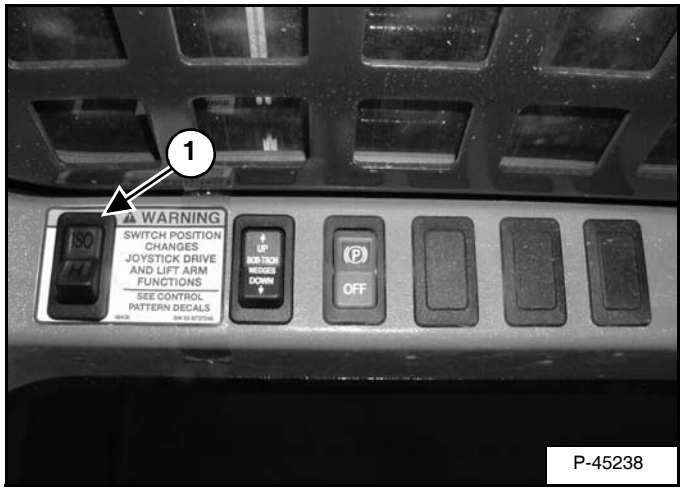


Press the *PRESS TO OPERATE LOADER* Button (Item 1) **[Figure 60-160-20]**.

Three audible beeps will sound and the error code (Item 2) **(75-98)** will be displayed if the operator presses the HOLD FOR CODES (LIGHTS) switch (Item 3) **[Figure 60-160-20]**.

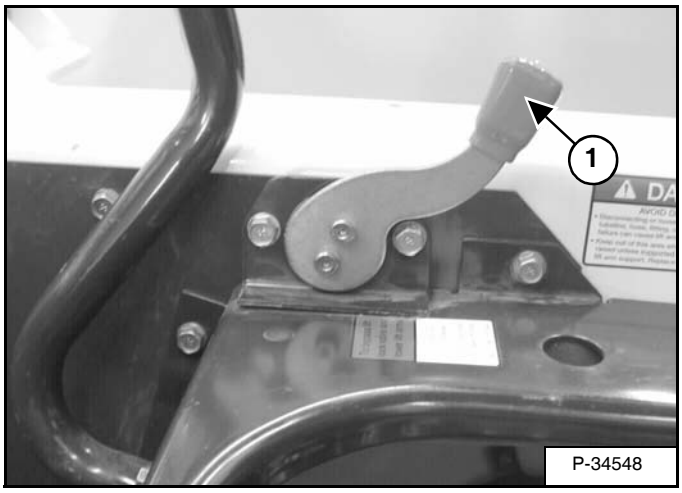
Start the engine from the *RUN, RUN/ENTER* position. **DO NOT TURN TO OFF POSITION**. This would cancel the calibration mode and the procedure would have to be repeated.

Figure 60-160-21



The Control Pattern **ISO** Switch (Item 1) **[Figure 60-160-21]** will stop flashing, and will remain ON for the rest of the calibration procedure.

Figure 60-160-22



Move the throttle (Item 1) **[Figure 60-160-22]** to high idle.

NOTE: If at any time, during calibration, the operator needs to stop the loader, turn the key OFF, lift the seat bar, or return the joystick to the neutral position.

The calibration procedure will stop.

To return to calibration mode, the operator must start the complete procedure from the beginning.

⚠ WARNING

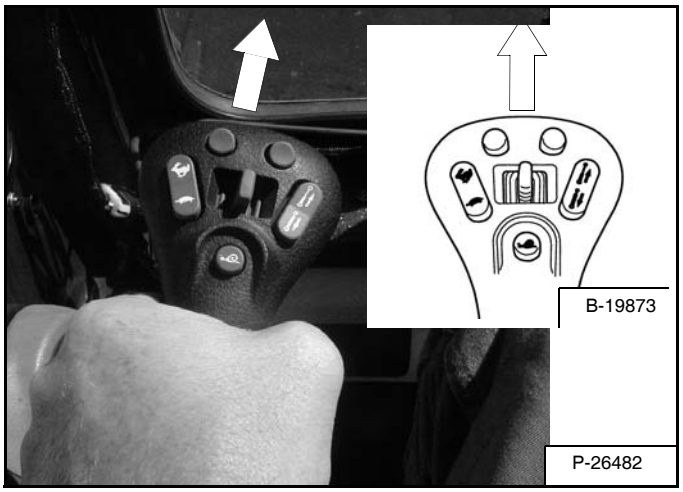
Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

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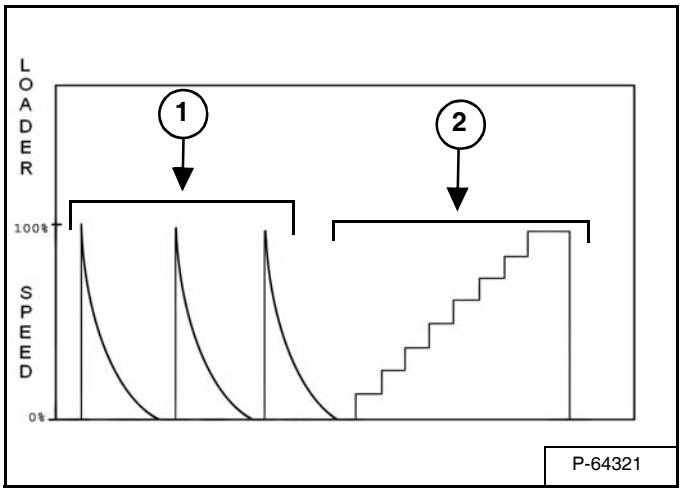
Hydrostatic Pump Calibration (SJC) (Cont'd)

Figure 60-160-23



Move and hold the left joystick to the forward position **[Figure 60-160-23]** until the forward calibration is completed.

Figure 60-160-24



The loader speed will “ramp up” quickly (Item 1) **[Figure 60-160-24]** and slow down 3 times in a row.

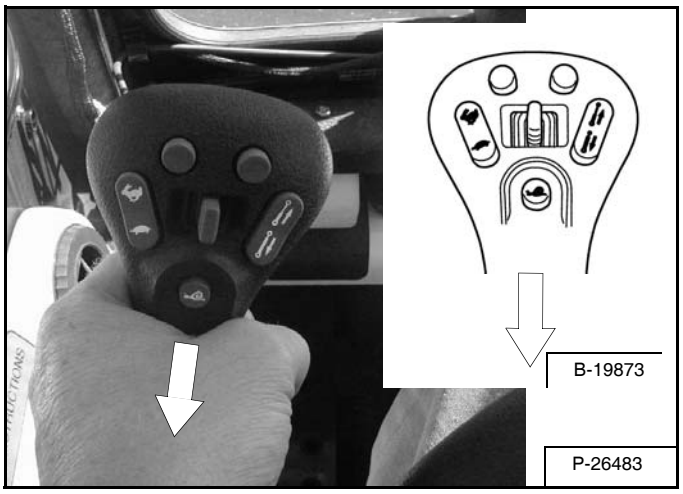
The loader will then “stair step” the speed (Item 2) **[Figure 60-160-24]** until it reaches full speed and then come to a stop.

Continue to hold the left joystick in the forward position until the loader tracks come to a stop and an audible beep is heard.

Forward calibration is complete.

NOTE: If the wheels do not stop moving in Full Speed Forward in 2 minutes or less, there was an error in the calibration procedure. The operator must shut the loader OFF, and start the calibration procedure from the beginning.

Figure 60-160-25



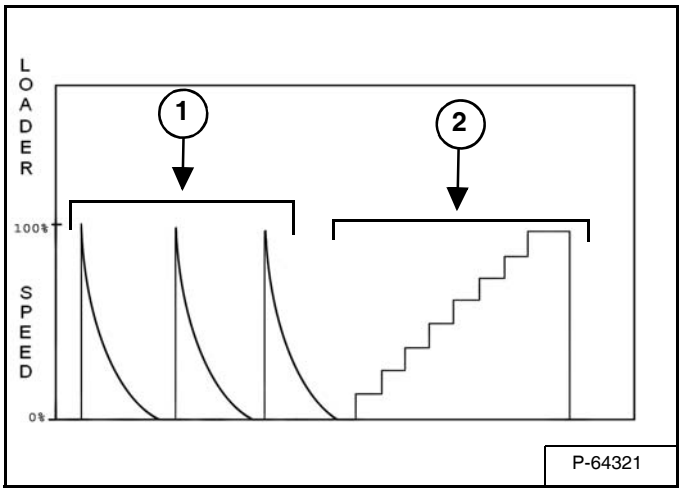
Move and hold the left joystick to the reverse position **[Figure 60-160-25]** until the reverse calibration is completed.

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CALIBRATION (CONT'D)

Hydrostatic Pump Calibration (SJC) (Cont'd)

Figure 60-160-26



The loader speed will “ramp up” quickly (Item 1) **[Figure 60-160-26]** and slow down 3 times in a row.

The loader will then “stair step” the speed (Item 2) **[Figure 60-160-26]** until it reaches full speed and then come to a stop.

Continue to hold the left joystick in the reverse position until the loader wheels come to a stop and an audible beep is heard.

Reverse calibration is complete.

NOTE: If the wheels do not stop moving in Full Speed Reverse in 2 minutes or less, there was an error in the calibration procedure. The operator must shut the loader OFF, and start the calibration procedure from the beginning.

There will be an audible beep and the PRESS TO OPERATE LOADER and TRACTION lights will go out. The SEAT BAR and LIFT AND TILT lights will remain on. The **75-98** error code will clear. There should be no other codes in the display area.

Allow the joystick to go to the neutral position.

The calibration procedure is completed.

Press the *PRESS TO OPERATE LOADER* button. Move the left joystick to forward position **[Figure 60-160-23]** and check for normal forward wheel rotation.

Move the left joystick to the reverse position **[Figure 60-160-25]** and check for normal reverse wheel rotation.

Stop the engine, and remove the loader from jackstands.

Start the loader, press the PRESS TO OPERATE LOADER button and return to normal loader operation.

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CALIBRATION (CONT'D)

Calibration Procedure (ACS)

The new controller uses a calibration sequence to optimize the control system. The optimizing ensures full spool stroke (full flow) while preventing over stroke (loading) of the actuator.

NOTE: This calibration procedure must be followed when replacing a handle sensor, actuator or ACS controller. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

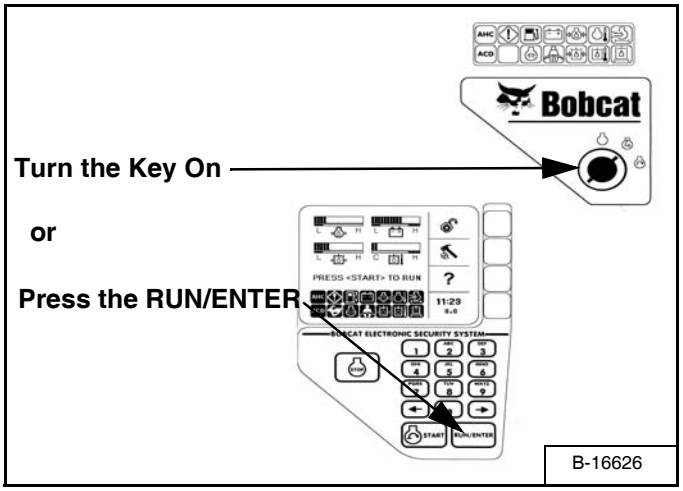
Figure 60-160-27



Update the loader service software to the latest version.

Place the rocker switch (Item 1) **[Figure 60-160-27]** in the hand control mode.

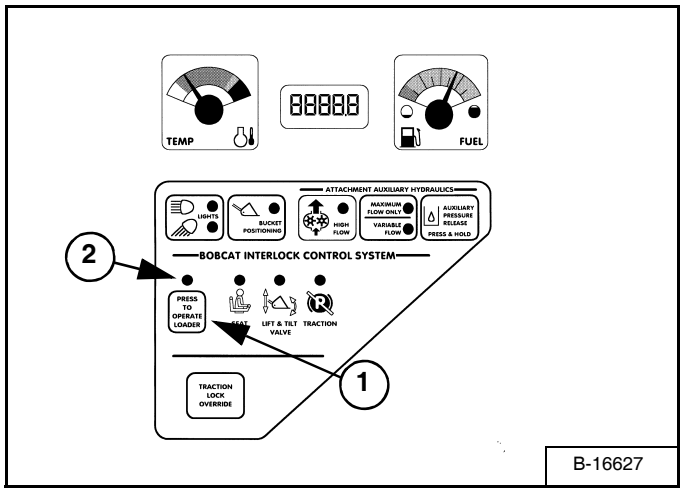
Figure 60-160-28



With the seat bar down, turn the ignition key ON (keyless panel press RUN/ENTER) **[Figure 60-160-28]**.

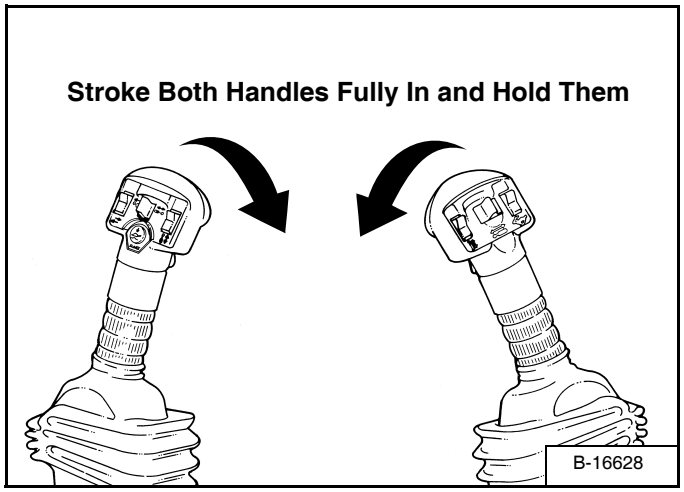
NOTE: Do not start the engine.

Figure 60-160-29



Push the PRESS TO OPERATE button (Item 1) **[Figure 60-160-29]** to unlock the hand controls.

Figure 60-160-30



Fully stroke both control handles in toward the center of the cab and hold the handles **[Figure 60-160-30]**.

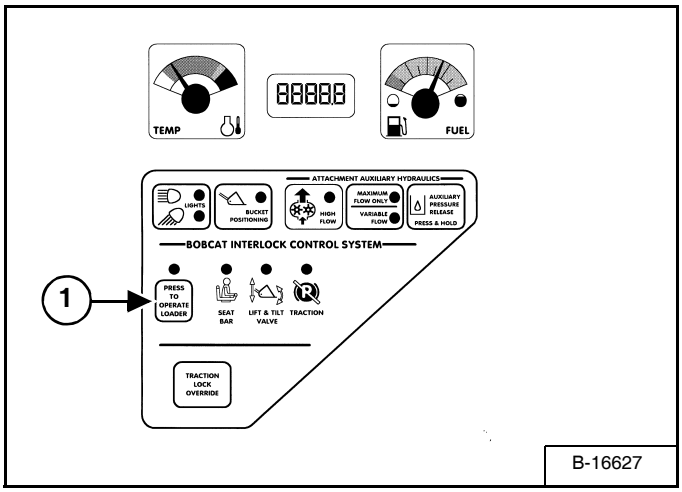
Lift the seat bar, high enough for the PRESS TO OPERATE light (Item 2) **[Figure 60-160-29]** to go **OFF**.

Lower the seat bar.

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Calibration Procedure (ACS) (Cont'd)

Figure 60-160-31



Push the PRESS TO OPERATE button (Item 1) **[Figure 60-160-31]** to begin calibration.

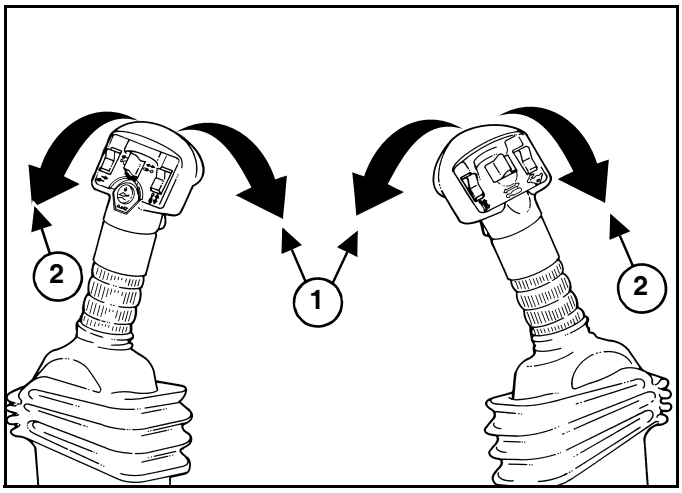
NOTE: The ACS icon will light up and if you listen closely the cycling of the actuators can be heard. The ACS icon will stay lit until the ignition key is cycled or the loader is started and a function is operated.

NOTE: During the calibration cycle, the system will beep three times. The calibration process generates two codes 32-35 (tilt handle not in neutral) and 32-40 (lift handle not in neutral). Ignore these two codes, this is normal during the calibration procedure.

Release the control handles.

NOTE: The remaining portion of the procedure must be completed in twenty seconds or less. If not the handles and pedals will lock and the procedure must be started over from the beginning.

Figure 60-160-32

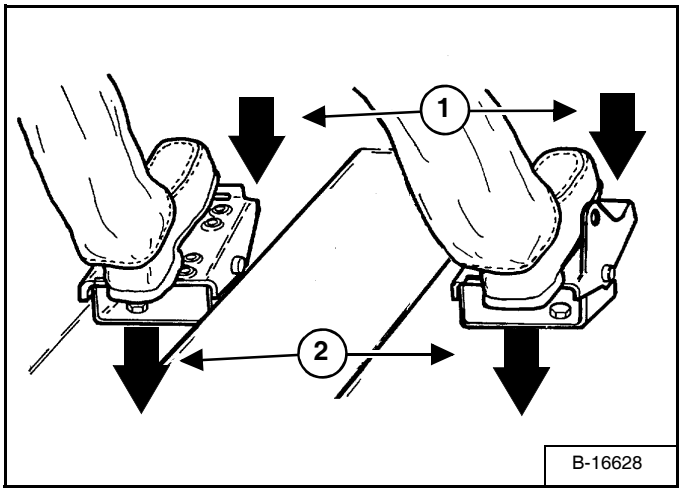


Fully move both handles in toward the center of the cab and hold the handles for one second (Item 1) **[Figure 60-160-32]**.

Fully move both handles out toward the cab side screens and hold for one second (Item 2) **[Figure 60-160-32]**.

Allow both handles to return to neutral.

Figure 60-160-33



Fully press the toe of the lift and tilt pedals (Item 1) **[Figure 60-160-33]** down and hold for one second.

Fully press the heel of the lift and tilt pedals (Item 2) **[Figure 60-160-33]** down and hold for one second.

Allow both pedals to return to neutral.

At the end of the twenty second time frame, the handles and pedals will lock.

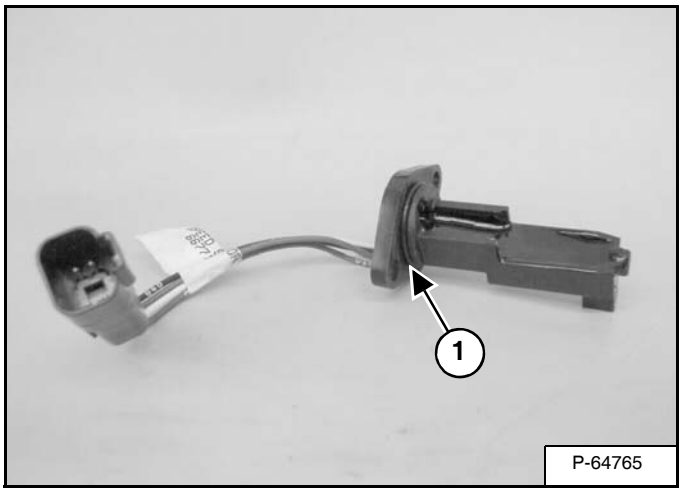
Calibration is complete.

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SPEED SENSOR

Description

Figure 60-170-1

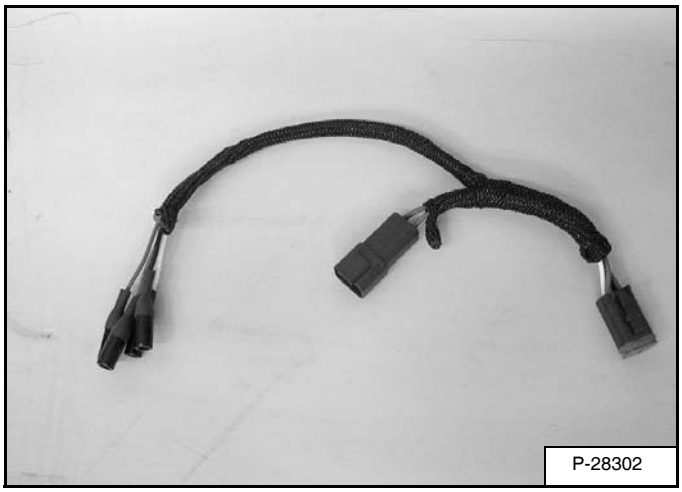


On SJC equipped loaders, the speed sensor **[Figure 60-170-1]** is used by the loader's controllers to sense if the drive motor is rotating. The end of the sensor is magnetic and counts the magnetic pulses as a rotating disc attached to the motor carrier shaft rotates by the sensor end.

The speed sensor is sealed with an o-ring (Item 1) **[Figure 60-170-1]** to keep hydraulic oil inside the motor carrier and dirt out.

Testing

Figure 60-170-2



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

MEL1609-Wheel Speed Sensor Test Harness **[Figure 60-170-2]**

MEL1563-Remote Start Tool
Multimeter

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

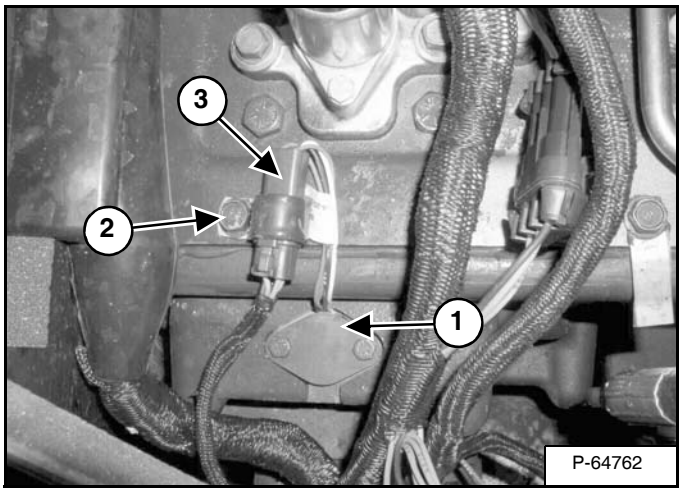
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Connect the remote start tool to the loader. ((See Procedure on Page 10-60-1.)

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Testing (Cont'd)

Figure 60-170-3



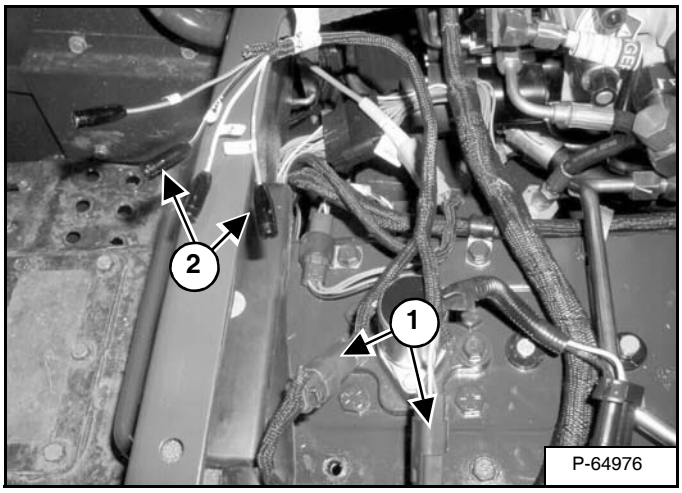
Locate the speed sensor (Item 1) **[Figure 60-170-3]** on the top of the right or left hydrostatic motor carrier.

Remove the transmission cover screw (Item 2) **[Figure 60-170-3]**, to loosen the connector clamp.

Installation: Tighten screw to 15-20 ft.-lb. (20-27 N•m) torque.

Disconnect the speed sensor wire connector (Item 3) **[Figure 60-170-3]** from the loader harness wire connector.

Figure 60-170-4



Connect the speed sensor test harness (Item 1) **[Figure 60-170-4]** in line, between the loader wiring harness and the speed sensor harness.

Turn the remote start key to ON position without starting the loader.

Take a voltage reading, with the multimeter, at the speed sensor test harness, between pin 1 and pin 3 (Item 2) **[Figure 60-170-4]**.

The voltage should be approximately 5 volts.

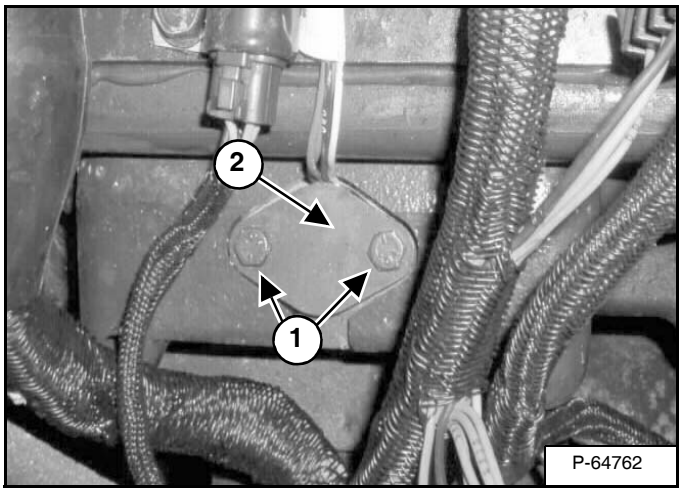
Repeat the procedure for the opposite side speed sensor. (If needed.)

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SPEED SENSOR (CONT'D)

Removal and Installation

Figure 60-170-5



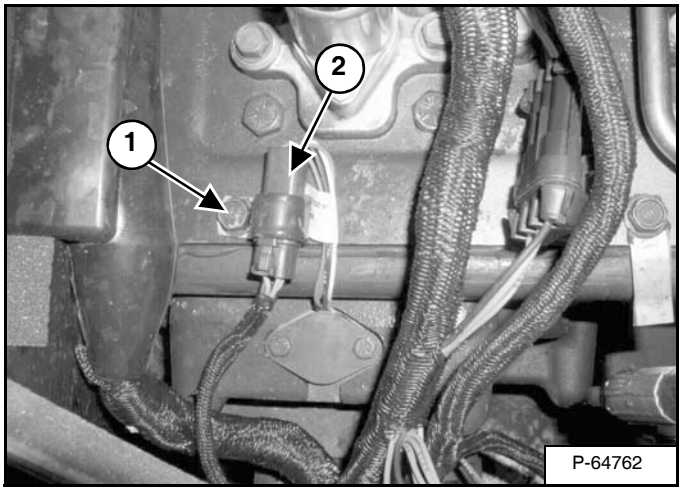
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the two, speed sensor mount bolts (Item 1) **[Figure 60-170-5]** from the top of the hydrostatic motor carrier.

Remove the mount plate (Item 2) **[Figure 60-170-5]**.

Figure 60-170-6

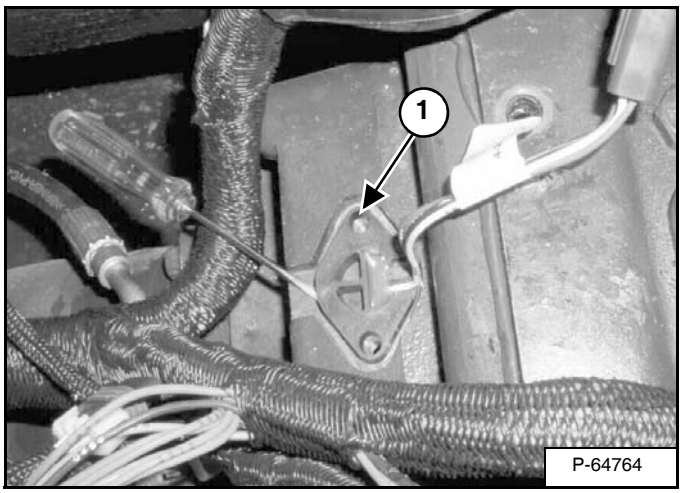


Remove the transmission cover screw (Item 1) **[Figure 60-170-6]**, to loosen the connector clamp.

Installation: Tighten screw to 15-20 ft.-lb. (20-27 N•m) torque.

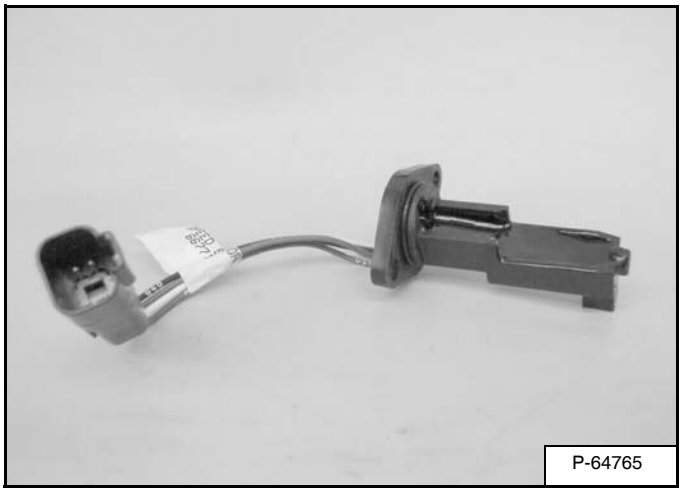
Disconnect the speed sensor electrical harness connector (Item 2) **[Figure 60-170-6]**.

Figure 60-170-7



Lift the speed sensor (Item 1) **[Figure 60-170-7]** out from the motor carrier. DO NOT pull on the wires, gently pry up with a screwdriver if necessary.

Figure 60-170-8

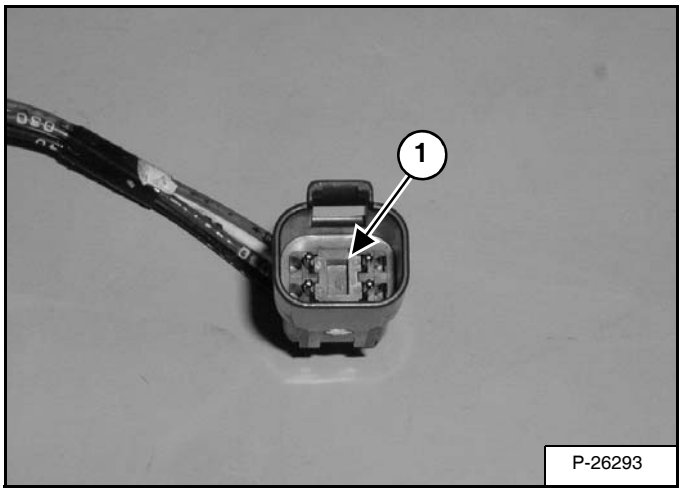


Remove the speed sensor **[Figure 60-170-8]**.

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Removal and Installation (Cont'd)

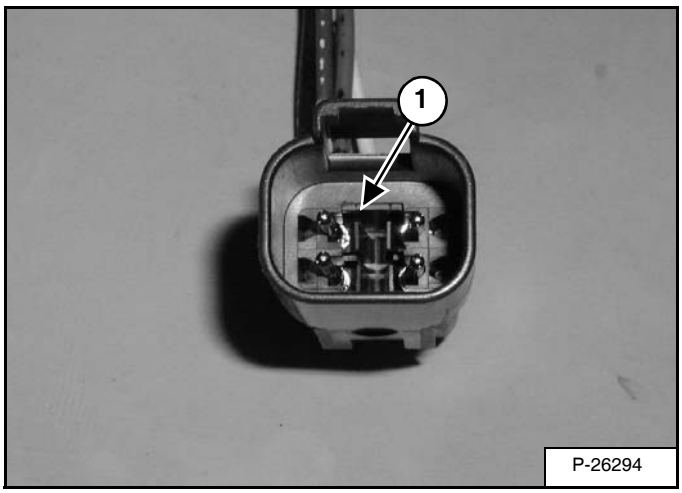
Figure 60-170-9



The electrical connector can be replaced.

Remove the connector wedge (Item 1) **[Figure 60-170-9]**.

Figure 60-170-10

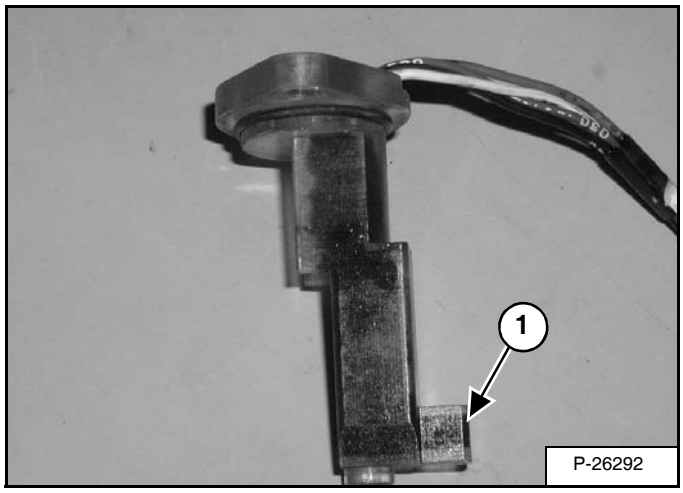


With a thin screwdriver lift the tabs and remove the wires from the connector (Item 1) **[Figure 60-170-10]**.

Wire Code

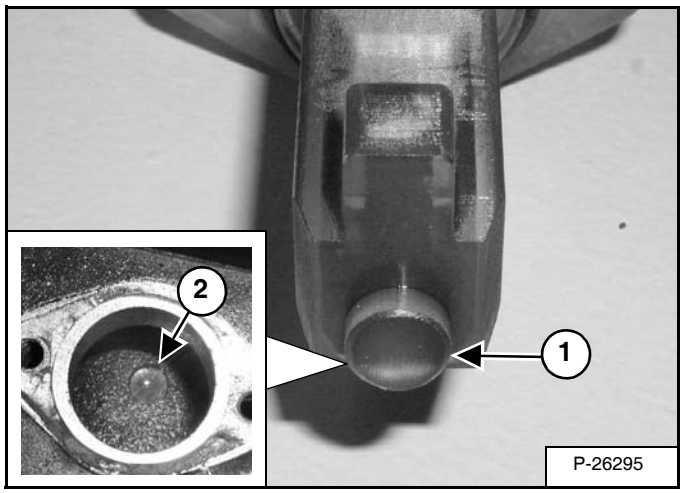
1 Red
2 White
3 Black
4 Blue

Figure 60-170-11



Installation: Be sure to install the speed sensor (Item 1) **[Figure 60-170-11]** pointing toward the transmission case.

Figure 60-170-12



Installation: The alignment pin (Item 1) at the bottom of the speed sensor must be installed in the hole (Item 2) **[Figure 60-170-12]** in the motor carrier.

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TROUBLESHOOTING

Chart

The following troubleshooting chart is provided for assistance in locating and correcting problems which are most common. Many of the recommended procedures must be done by authorized Bobcat Service Personnel only.

PROBLEM	CAUSE
Slow cranking speed.	1, 2, 3, 54
Engine will not start.	2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 27, 28, 29
Difficult to start.	1, 2, 5, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 25, 27, 28, 29,54
No power for engine.	8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 27, 28, 29
Engine is mis-firing.	8, 9, 11, 12, 13, 15, 16, 17, 21, 22, 24, 25, 26, 28
Too much fuel consumption.	10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29
Black exhaust.	10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29
Blue/white exhaust.	4, 10, 15, 16, 17, 21, 23, 27, 29, 30, 50
Low oil pressure.	4, 31, 32, 33, 34, 35, 37, 38, 39, 52
Engine knocking.	13, 15, 16, 19, 22, 24, 25, 27, 29, 31, 40, 41, 53
Engine running rough.	7, 8, 9, 10, 11, 12, 13, 17, 18, 22, 24, 25, 26, 29, 40, 53
Vibration.	12, 13, 17, 21, 22, 25, 26, 29, 40, 42, 43
High oil pressure warning.	4, 33, 36
Overheating.	10, 12, 13, 15, 16, 20, 21, 40, 44, 45, 46, 47, 48, 51
Too much crankcase pressure.	22, 27, 29, 30, 40, 49
Poor compression.	10, 16, 21, 24, 25, 27, 28, 29, 30, 41, 53
Start and stop.	9, 10, 11

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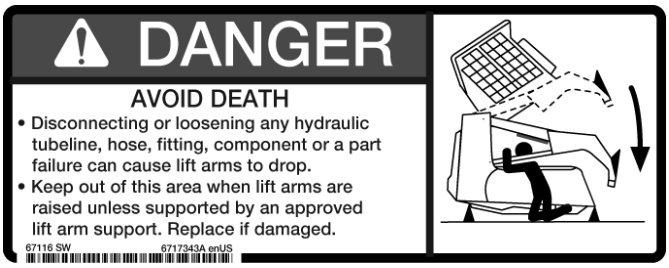
Chart (Cont'd)

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

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ENGINE SPEED CONTROL

Removal And Installation

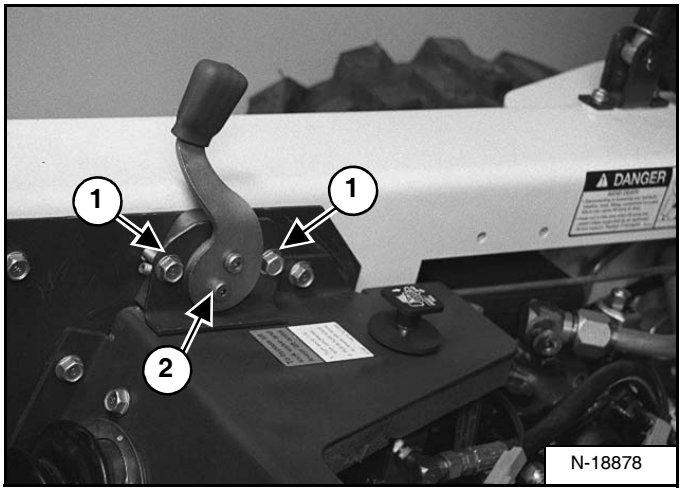


WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Figure 70-20-1



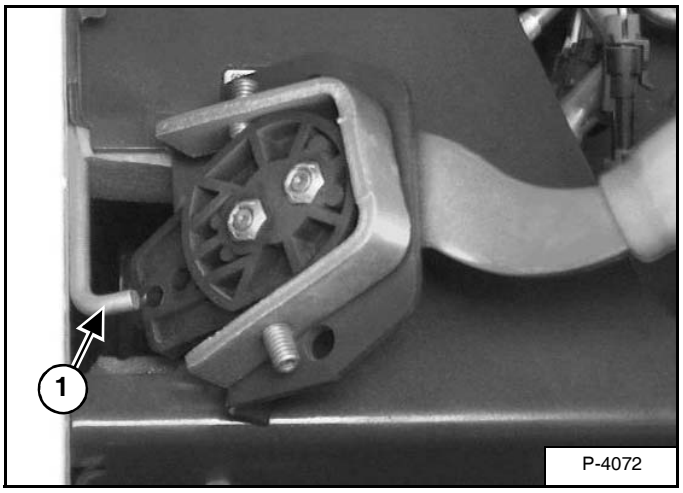
Raise the lift arms and install an approved lift arm device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the two mounting bolts (Item 1) **[Figure 70-20-1]** and nuts from the speed control mounting bracket.

Installation: Tighten the mounting bolts and nuts evenly until the speed control lever moves back and forth at a comfortable tension.

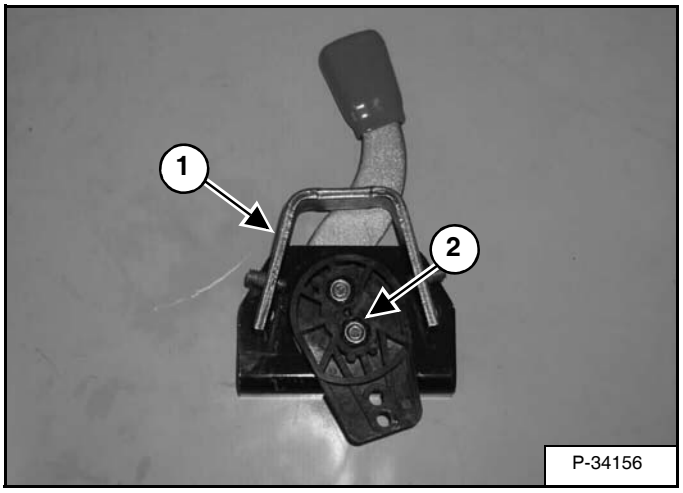
Figure 70-20-2



Pull the speed control away from the loader frame and disconnect the speed control rod (Item 1) **[Figure 70-20-2]** from the control.

Installation: Be sure to install the control rod in the bottom hole of the speed control.

Figure 70-20-3



Installation: Install the stop bracket (Item 1) **[Figure 70-20-3]** in the same location. It is necessary for the front and rear stop on the bracket to be located correctly.

Reverse the removal procedure to install the engine speed control.

Disassembly

Loosen the two control lever mounting bolts (Item 2) **[Figure 70-20-1]** and remove the mounting nuts (Item 2) **[Figure 70-20-3]**.

Assembly: Do not lubricate the engine speed control.

Replace any worn or damaged parts if necessary.

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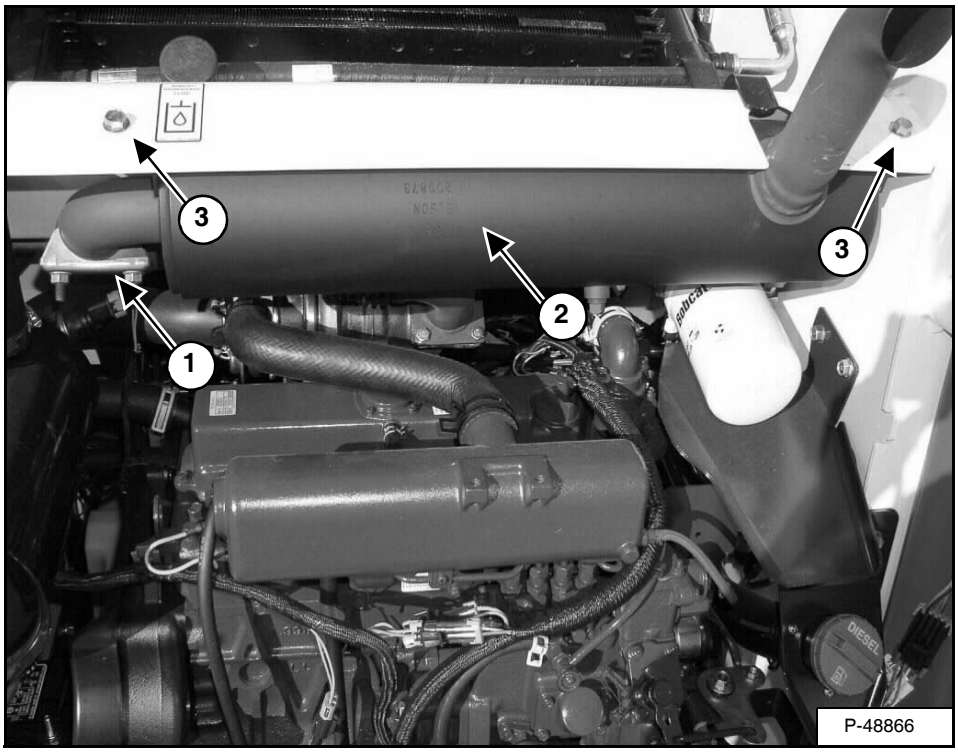


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MUFFLER

Removal And Installation

Figure 70-30-1



Open the rear door and raise the rear grill.

Remove the exhaust pipe clamp (Item 1) from the muffler (Item 2) **[Figure 70-30-1]**.

Disconnect the exhaust pipe from the muffler.

Remove both muffler mounting bolts (Item 3) **[Figure 70-30-1]** from the muffler.

Installation: Tighten the muffler mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the muffler from the loader.

Reverse the removal procedure to install the engine muffler.

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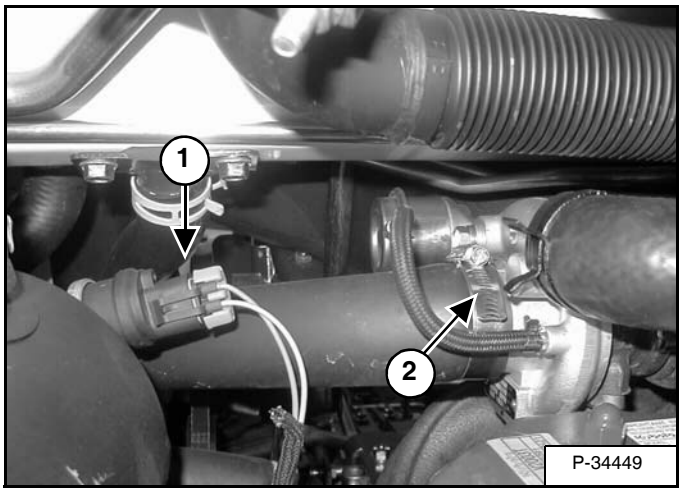


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AIR CLEANER

Removal And Installation

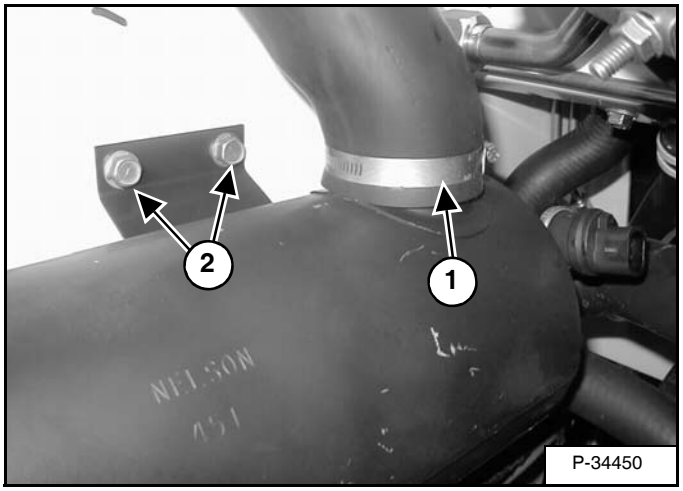
Figure 70-40-1



Disconnect the wire harness connector (Item 1) **[Figure 70-40-1]** from the air cleaner sensor on the air cleaner.

Loosen the clamp (Item 2) **[Figure 70-40-1]** from the hose on the engine manifold.

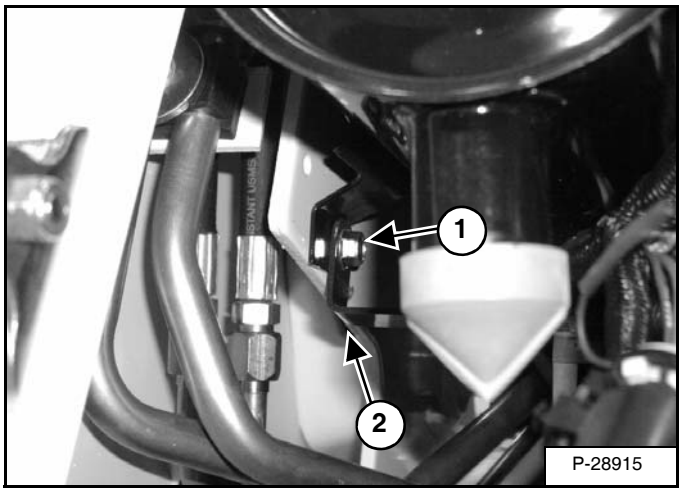
Figure 70-40-2



Loosen the hose clamp (Item 1) **[Figure 70-40-2]** on the air cleaner hose.

Remove the two mounting bolts (Item 2) **[Figure 70-40-2]** from the top mount of the air cleaner.

Figure 70-40-3



Remove the lower mounting bolt (Item 1) and engine harness mounting bracket (Item 2) **[Figure 70-40-3]** from the air cleaner.

Installation: Tighten the three mounting bolts to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the air cleaner from the engine compartment.

Reverse the removal procedure to install the air cleaner.

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RADIATOR

Removal And Installation

Stop the engine and open the rear door.

Remove the rear grill. (See Removal And Installation on Page 50-60-1.)

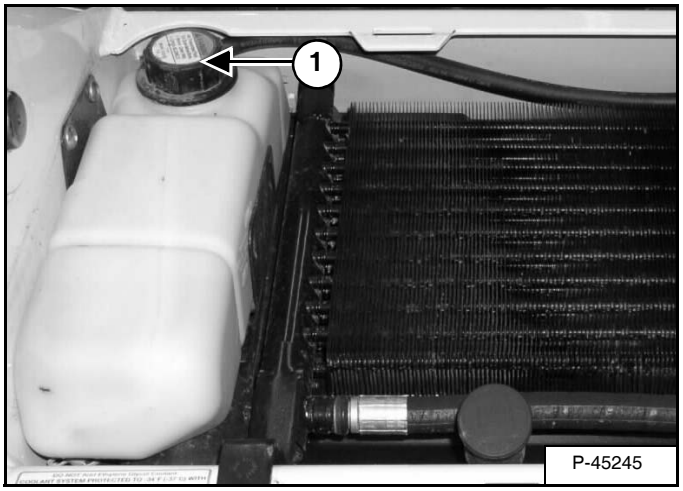
Remove the oil cooler. (See Removal and Installation on Page 30-60-1.)

⚠ WARNING

Do not remove radiator cap when the engine is hot. You can be seriously burned.

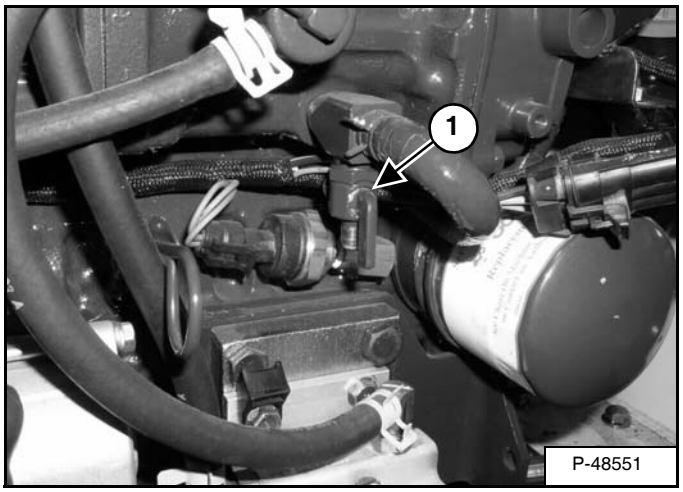
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Figure 70-50-1



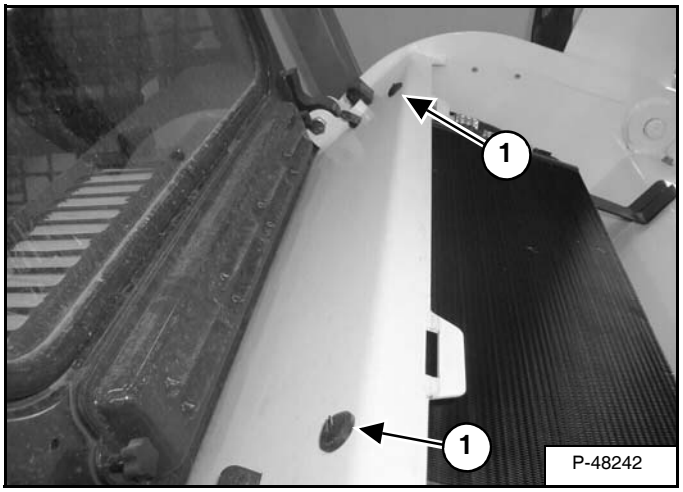
Loosen the radiator cap (Item 1) **[Figure 70-50-1]** from the pressurized expansion tank.

Figure 70-50-2



Open the drain valve (Item 1) **[Figure 70-50-2]** on the engine block and drain the coolant into a container.

Figure 70-50-3

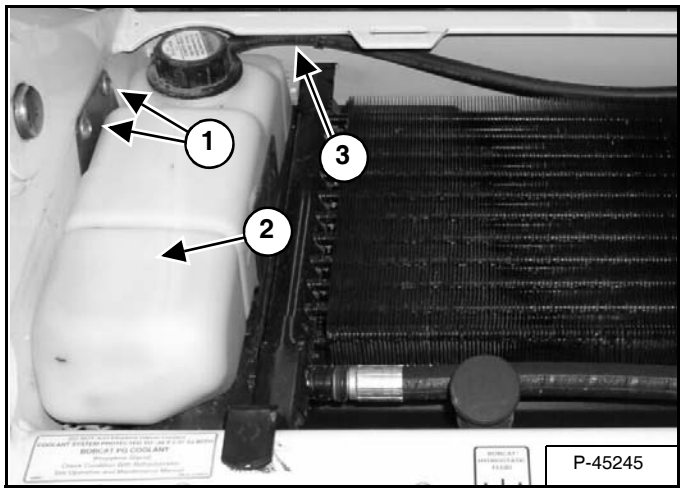


Remove the two sta-straps (Item 1) **[Figure 70-50-3]** holding the pressurized expansion tank fill hose (Item 3) **[Figure 70-50-4]**.

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Removal And Installation (Cont'd)

Figure 70-50-4

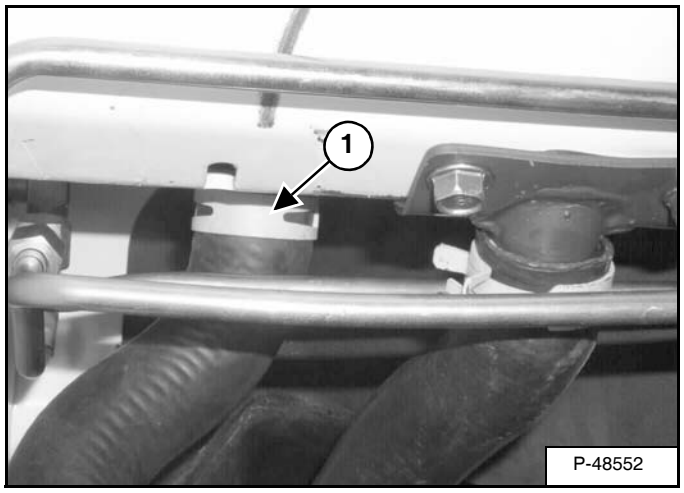


Remove the two pressurized expansion tank mounting bolts (Item 1) **[Figure 70-50-4]**.

Disconnect the pressurized expansion tank fill hose (Item 3) **[Figure 70-50-4]** at the radiator end.

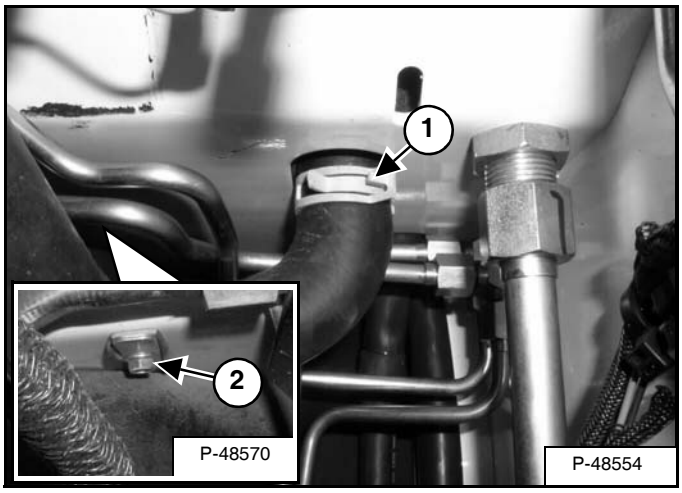
Remove the pressurized expansion tank (Item 2) with the pressurized expansion tank fill hose (Item 3) attached. **[Figure 70-50-4]**.

Figure 70-50-5



Remove the hose clamp (Item 1) **[Figure 70-50-5]** from the outlet hose.

Figure 70-50-6

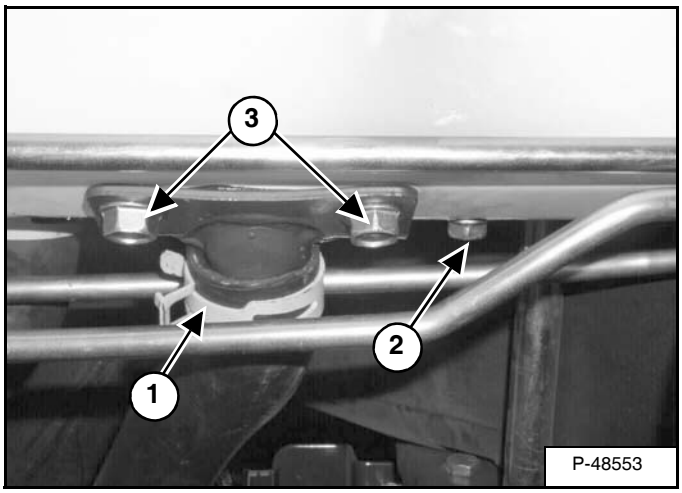


Remove the hose clamp (Item 1) **[Figure 70-50-6]** from the inlet hose.

Remove the radiator mounting bolt and block off plate (Item 2) **[Figure 70-50-6]**.

Installation: Tighten the radiator mounting bolt to 11-13 ft.-lb. (15-17 N•m) torque. Use sealant on the block off plate and bolt head (Item 2) **[Figure 70-50-6]**.

Figure 70-50-7



Remove the clamp (Item 1) **[Figure 70-50-7]** from the hydraulic fill tube.

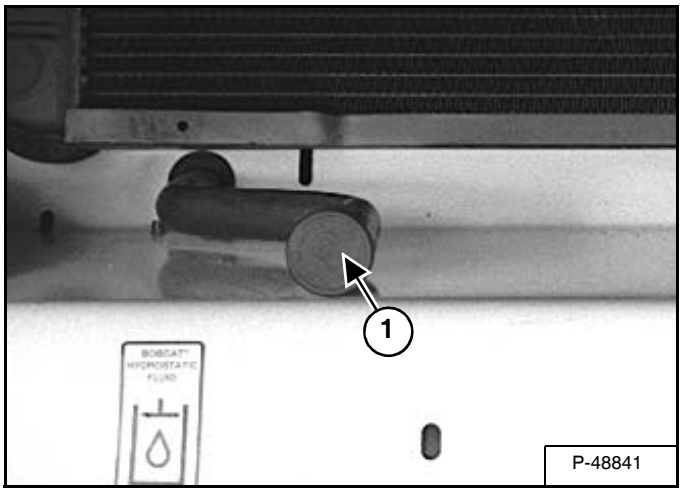
Remove the radiator mounting bolt (Item 2) **[Figure 70-50-7]**.

Remove the two hydraulic fill tube mounting bolts (Item 3) **[Figure 70-50-7]**.

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Removal And Installation (Cont'd)

Figure 70-50-8



Remove the hydraulic fill tube (Item 1) **[Figure 70-50-8]**.

Lift the radiator up and remove it from the loader.

Reverse the above procedure to install the radiator.

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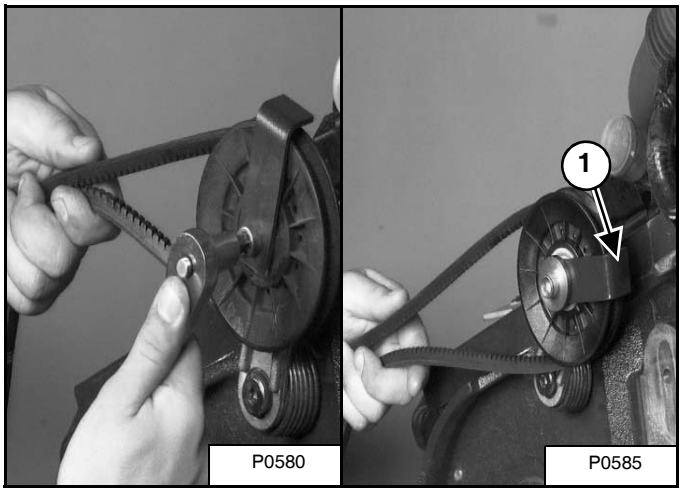


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COOLING FAN

Drive Tension Pulley Removal And Installation

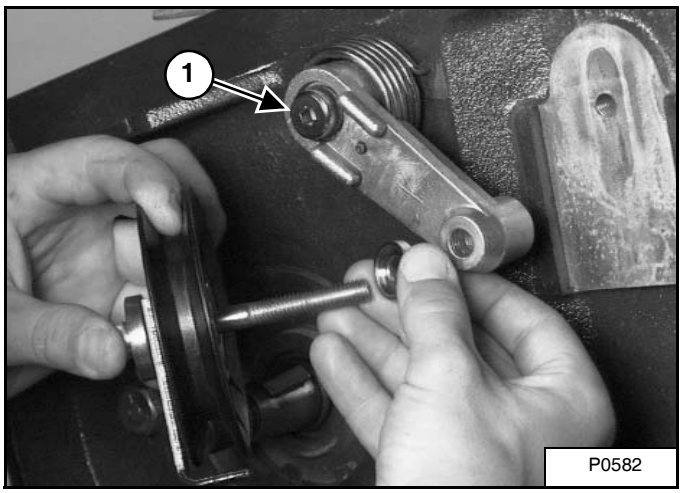
Figure 70-60-1



Loosen the idler pulley bolt **[Figure 70-60-1]**.

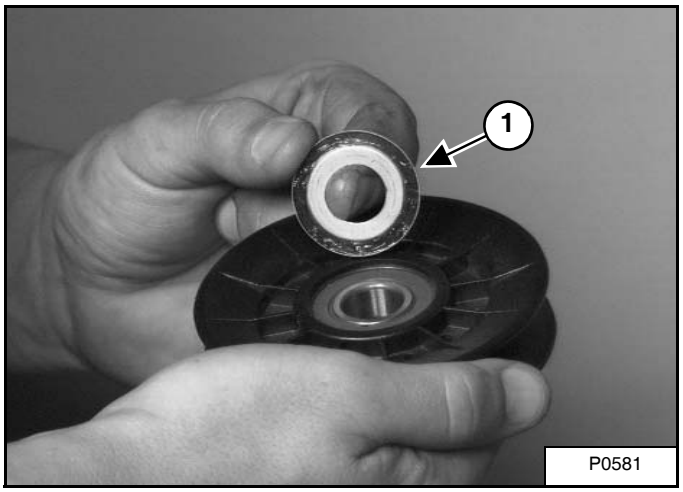
Installation: Install the retainer bracket (Item 1) **[Figure 70-60-1]** for the fan belt at the 3 o'clock position.

Figure 70-60-2



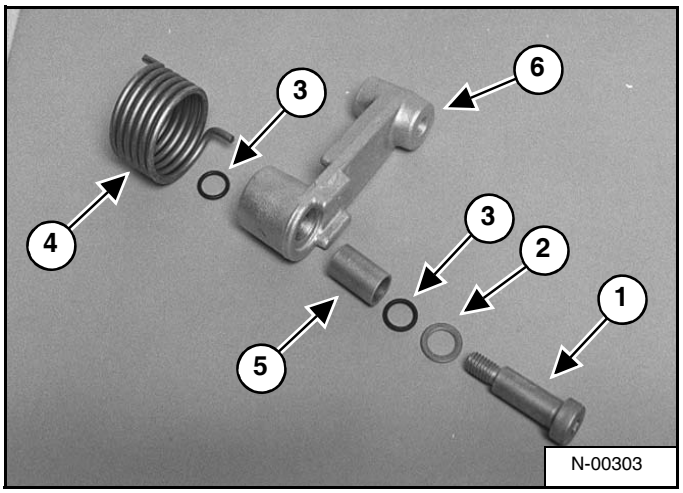
Remove the spacers, bolt and washer from the arm **[Figure 70-60-2]**.

Figure 70-60-3



Installation: Put a small amount of grease around the outside edge (Item 1) **[Figure 70-60-3]** on the grease rings.

Figure 70-60-4



Remove the bolt (Item 1) **[Figure 70-60-2]** & **[Figure 70-60-4]** from the idler pulley pivot arm (Item 6) **[Figure 70-60-4]**.

Remove the thrust washer (Item 2), O-rings (Item 3) and spring (Item 4) **[Figure 70-60-4]**.

Check all parts for damage or wear and replace them as needed.

NOTE: When making any repairs, replace the bushing (Item 5) [Figure 70-60-4] with a new bushing, if worn. Clean all parts and assemble dry. Do not lubricate

Installation: Reverse the removal procedure to install the tension pulley.

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Gearbox/Blower Housing Removal And Installation

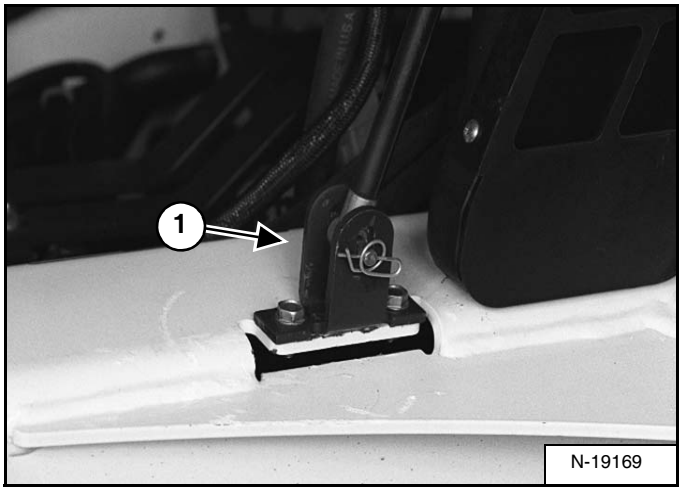


WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Figure 70-60-5



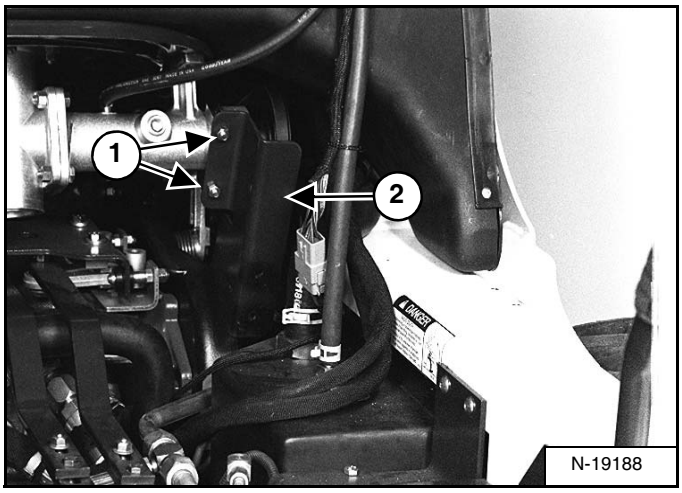
Put jackstands under the rear corners of the loader.

Raise the lift arms and install an approved lift arm device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the left gas cylinder mounting bracket (Item 1) **[Figure 70-60-5]**. (See Gas Cylinder Removal And Installation on Page 50-20-1.)

Figure 70-60-6

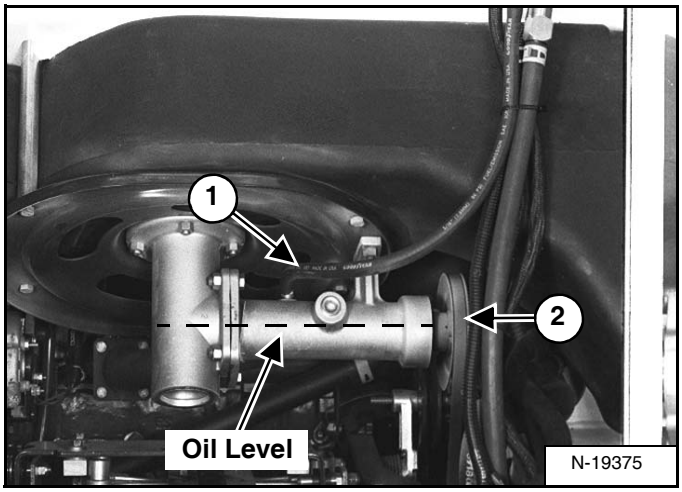


Remove the nuts (Item 1) **[Figure 70-60-6]** from the u-bolt which mounts the fan belt shield (Item 2) **[Figure 70-60-6]** to the blower fan.

Remove the fan belt shield (Item 2) **[Figure 70-60-6]** from the blower fan.

Installation: Be sure to tighten the shield so it does not interfere with the fan belt.

Figure 70-60-7



Disconnect the breather hose (Item 1) **[Figure 70-60-7]** from the electrical harnesses on the loader frame.

Installation: Make sure the breather hose is unrestricted when routing.

Remove the fan drive belt (Item 2) **[Figure 70-60-7]** from the pulley on the blower fan.

NOTE: When checking the fan gearbox oil level, be sure the level does not go above the top of the shaft in the gearbox [Figure 70-60-7]. Use a light colored 90W gear lube if the level is low.

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Gearbox/Blower Housing Removal And Installation (Cont'd)

Figure 70-60-8

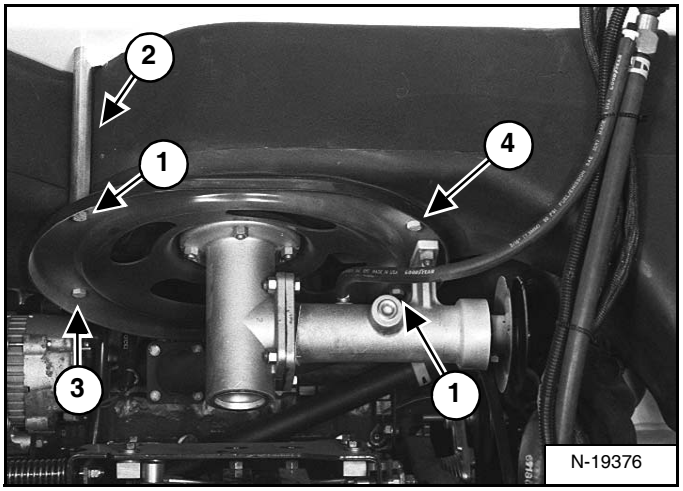
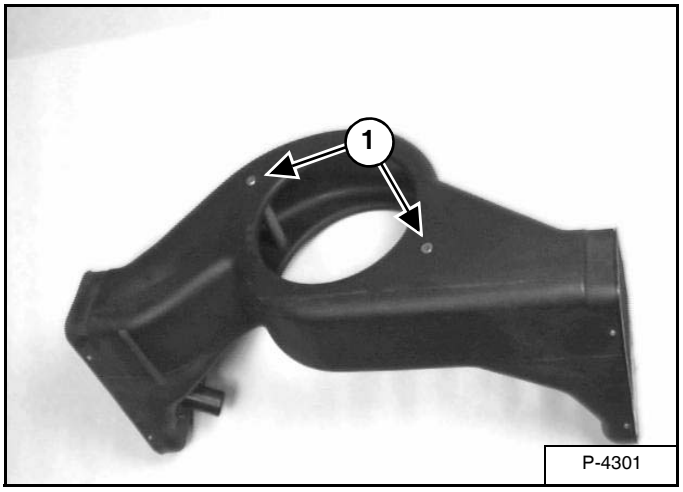


Figure 70-60-9



Remove the two mounting bolts (Item 1) **[Figure 70-60-8]** and the two spacer tubes (Item 2) **[Figure 70-60-8]** from the blower fan.

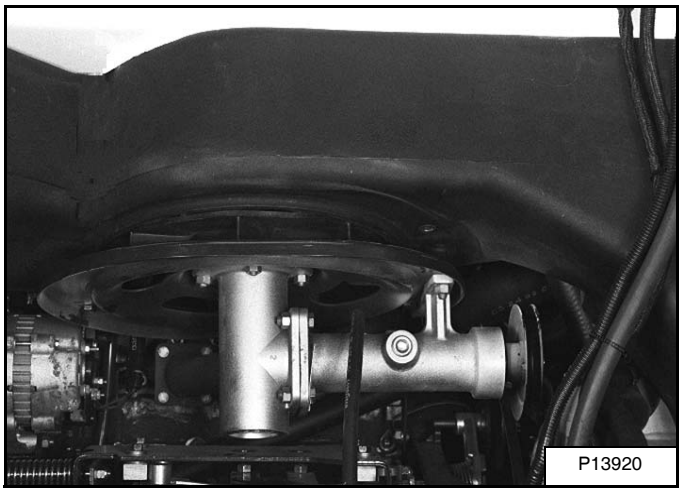
Remove the rear mounting bolt (Item 3) **[Figure 70-60-8]**.

Remove the front mounting bolt (Item 4) **[Figure 70-60-8]**.

NOTE: Mounting bolts (Items 3 & 4) [Figure 70-60-8] use wave washer (Item 1) [Figure 70-60-9] to prevent tubes and bolts from falling out of the housing during installation.

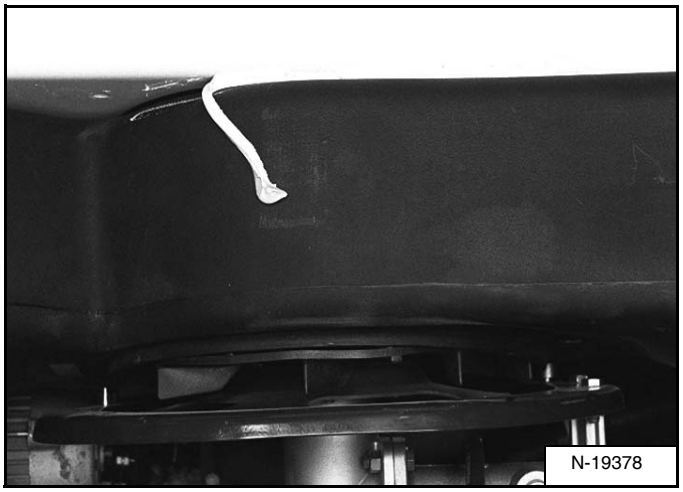
Installation: Tighten the four mounting bolts 25-28 ft.-lb. (34-38 N•m) torque.

Figure 70-60-10



Lower the blower fan from the housing until it rests on the steering linkage plate **[Figure 70-60-10]**.

Figure 70-60-11



Remove the strip of sealant along the top of the blower housing **[Figure 70-60-11]**.

Installation: Use R.T.V. sealant to reseal the blower housing.

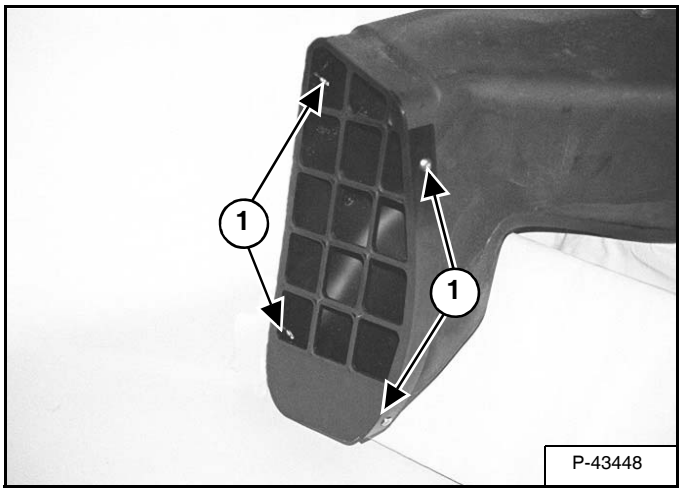
Loosen the electrical harnesses from the frame of the loader.

Slide the blower fan and housing forward and remove both from the loader.

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Blower Housing Grill Removal And Installation

Figure 70-60-12

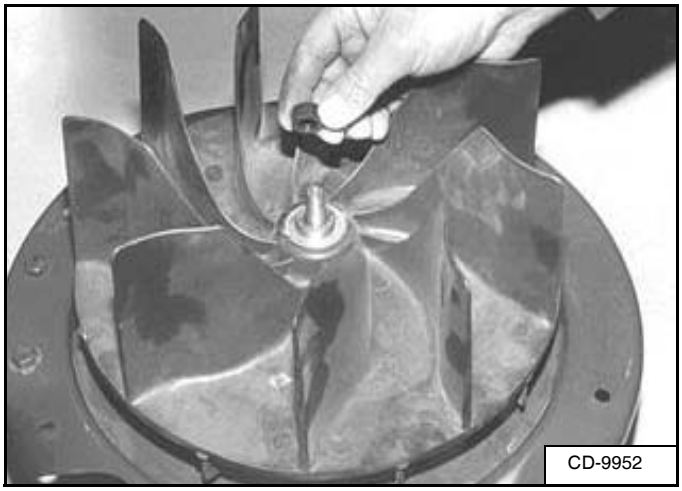


To replace the blower housing grill, remove the four mounting bolts (Item 1) **[Figure 70-60-12]** from the grill.

Install the new grill and replace the mounting bolts.

Blower Disassembly And Assembly

Figure 70-60-13



Remove the lock nut and spacer **[Figure 70-60-13]**.

Installation: Tighten the nut to 45-55 ft.-lb. (61-75 N•m) torque.

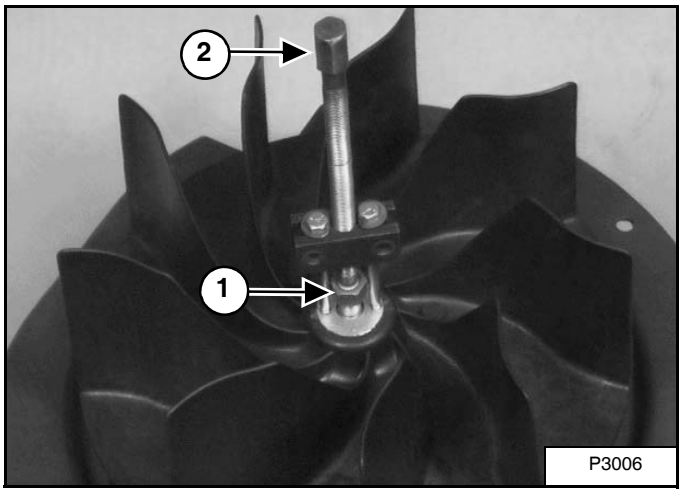
WARNING

AVOID INJURY OR DEATH

Wear safety goggles to prevent eye injury when drilling or grinding.

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Figure 70-60-14



Use the following procedure to remove the fan from the shaft.

Install the nut (Item 1) **[Figure 70-60-14]** on the tapered shaft to protect the shaft and threads.

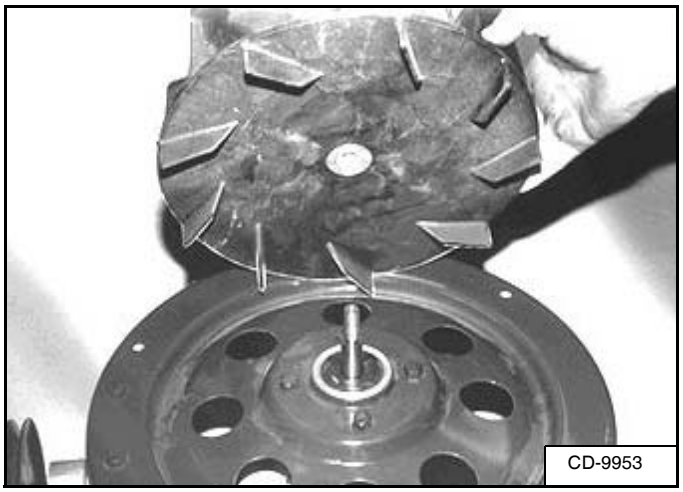
Install the puller on the fan as shown **[Figure 70-60-14]**.

As the center bolt (Item 2) **[Figure 70-60-14]** is tightened, periodically strike the bolt head to loosen the fan from the shaft.

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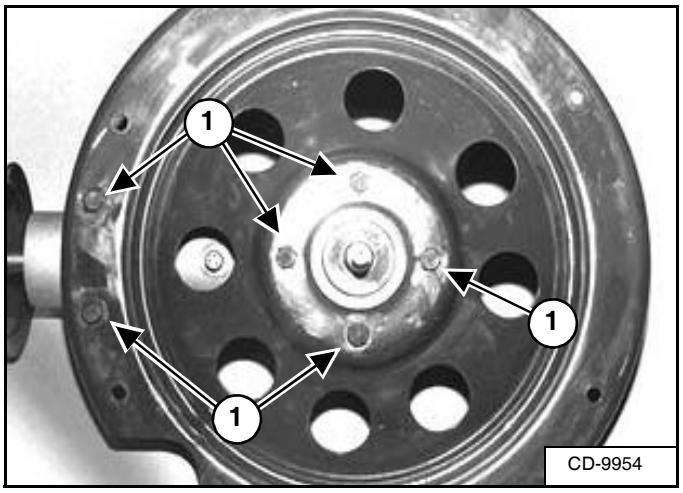
Blower Disassembly And Assembly (Cont'd)

Figure 70-60-15



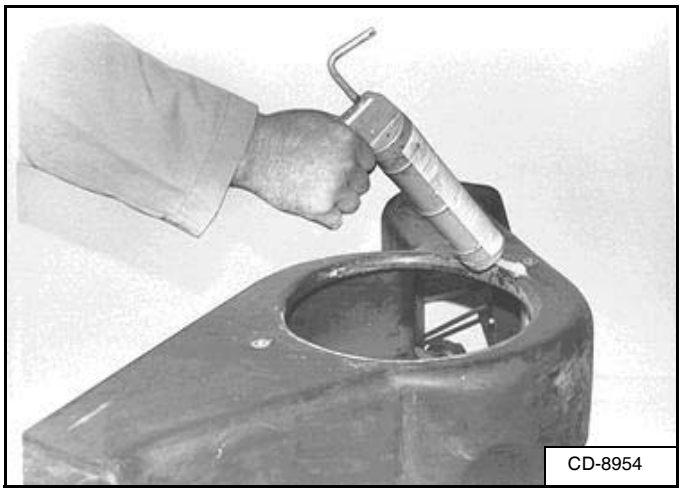
Remove the fan from the tapered shaft **[Figure 70-60-15]**.

Figure 70-60-16



To remove the blower housing mounting plate, remove the six bolts (Item 1) **[Figure 70-60-16]**.

Figure 70-60-17

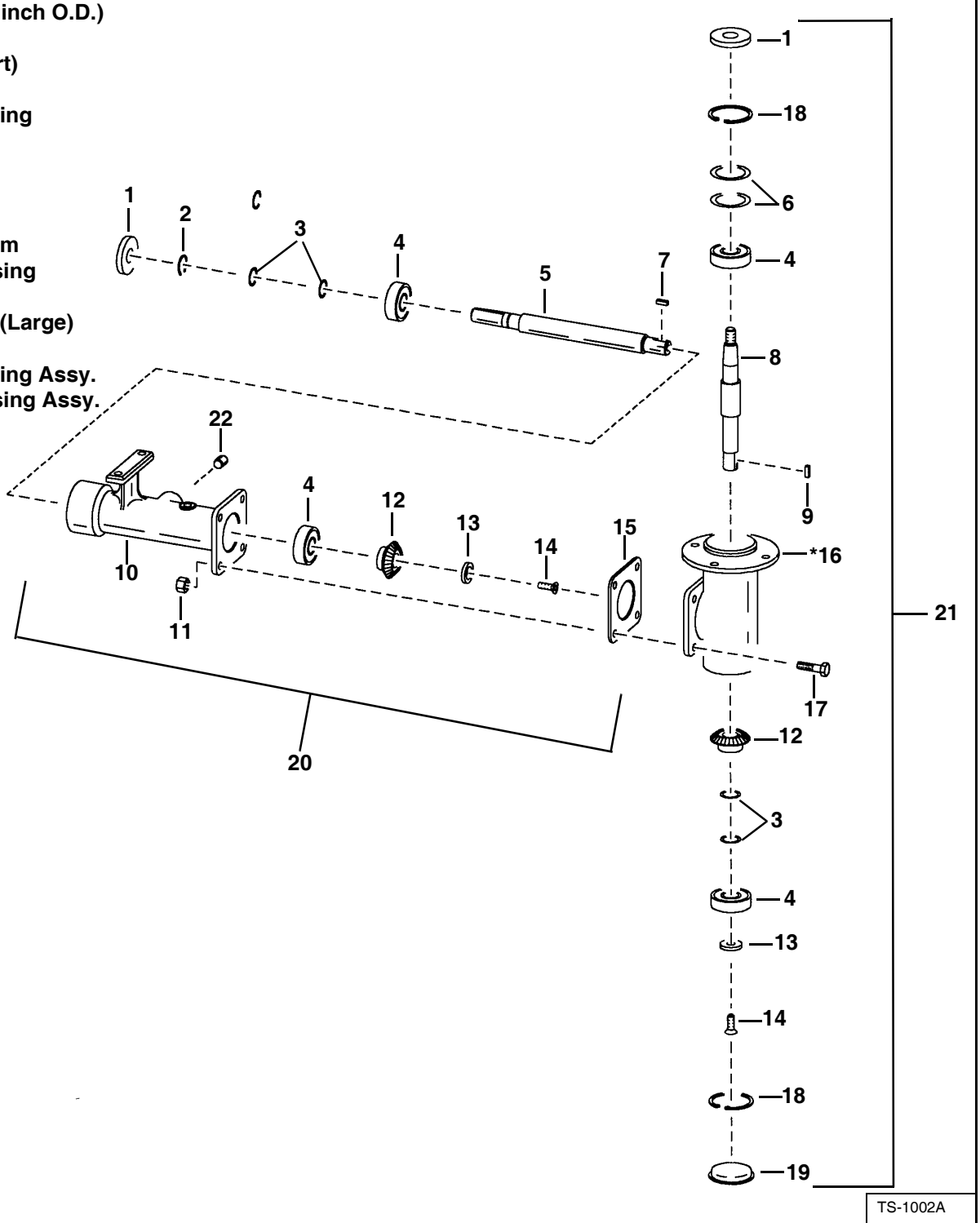


Installation: Clean the surface where the blower housing contacts the loader frame. Put a bead of R.T.V. sealant on the blower housing **[Figure 70-60-17]**.

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Gearbox Parts Identification

1. Seal
2. Snap Ring (Small)
3. Shims (1.0 inch O.D.)
4. Bearing
5. Shaft (Long)
6. Shims (2.0 inch O.D.)
7. Long Key
8. Shaft (Short)
9. Short Key
10. Long Housing
11. Nut
12. Gear
13. Washer
14. Screw
15. Square Shim
16. Short Housing
17. Bolt
18. Snap Ring (Large)
19. Cap
20. Long Housing Assy.
21. Short Housing Assy.
22. Fill Plug

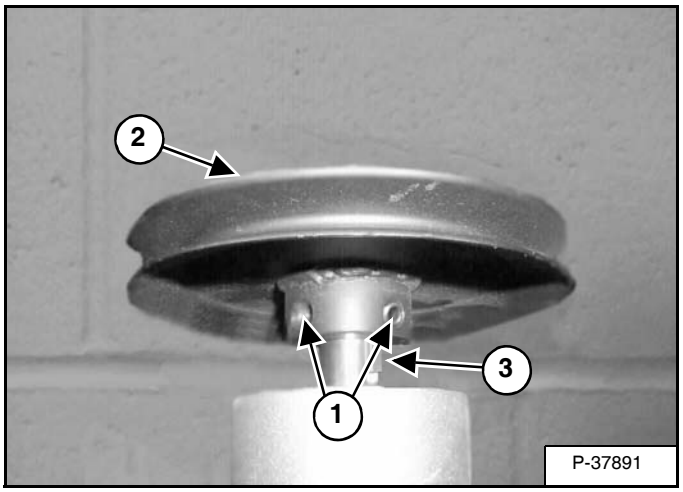


***Individal Part not available.** (See Gearbox Disassembly on Page 70-60-7.)

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Gearbox Disassembly

Figure 70-60-18



NOTE: When repairing the gearbox order the following as needed.

1. **Complete Assembly**
2. **Long Housing Assembly**
3. **Long Housing**
4. **Short Housing Assembly (See Note Below)**
5. **Internal Parts**

NOTE: The short housing is only available as an assembly. (See Gearbox Parts Identification on Page 70-60-6.) (Order parts from Bobcat Parts.)

NOTE: Be sure to count the number and thickness of shims during disassembly. Install the shims in the original location during assembly.

NOTE: Always replace seals during assembly. Replace the parts in the gearbox as needed.

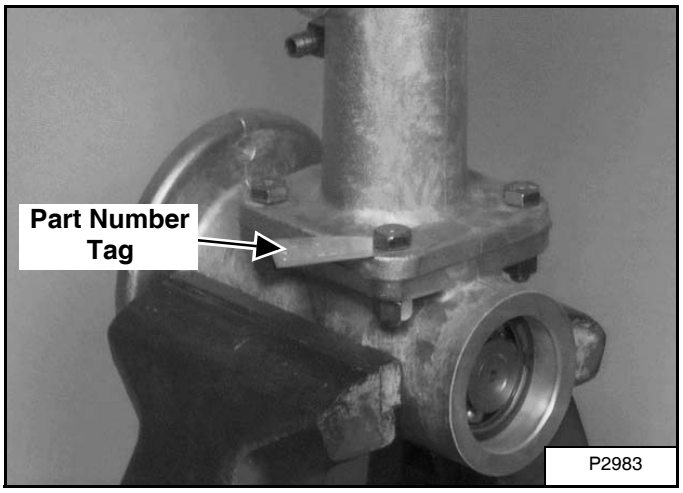
Remove the fan and blower housing mounting plate. (See Gearbox/Blower Housing Removal And Installation on Page 70-60-2.)

Long Housing

Loosen the set bolts (Item 1) and remove the pulley (Item 2) **[Figure 70-60-18]**.

Remove the long key (Item 3) **[Figure 70-60-18]**.

Figure 70-60-19



Remove the four mounting bolts and the part number tag **[Figure 70-60-19]**.

Remove the oil from the gearbox.

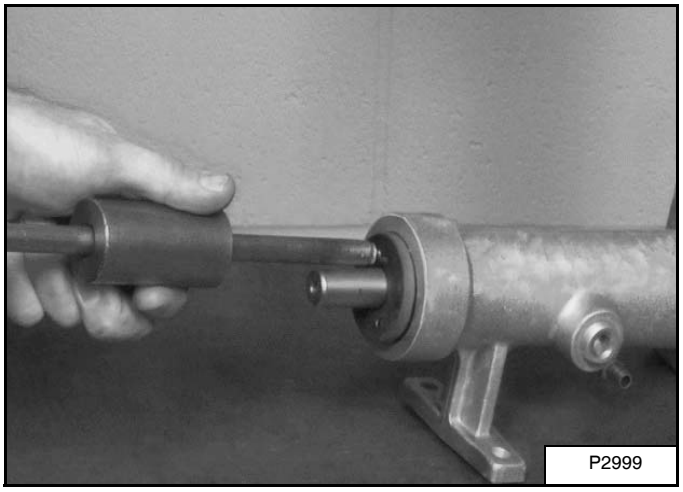
⚠ WARNING

AVOID INJURY OR DEATH

Wear safety goggles to prevent eye injury when drilling or grinding.

W-2108-1186

Figure 70-60-20

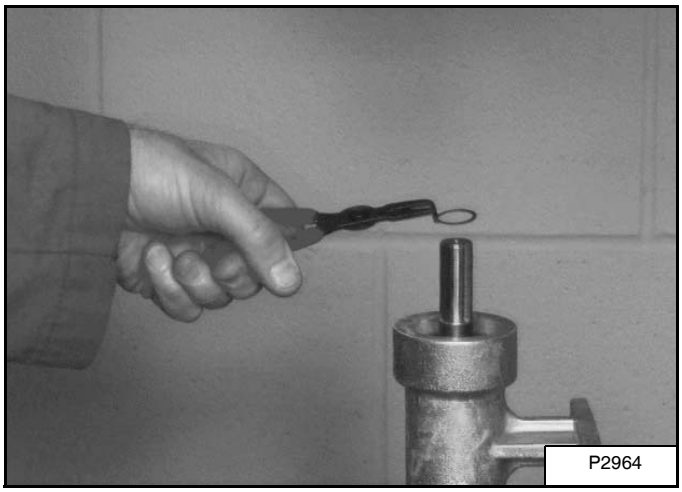


Drill an 1/8 inch (3 mm) hole in the seal. Use a slide hammer tool to remove the seal **[Figure 70-60-20]**.

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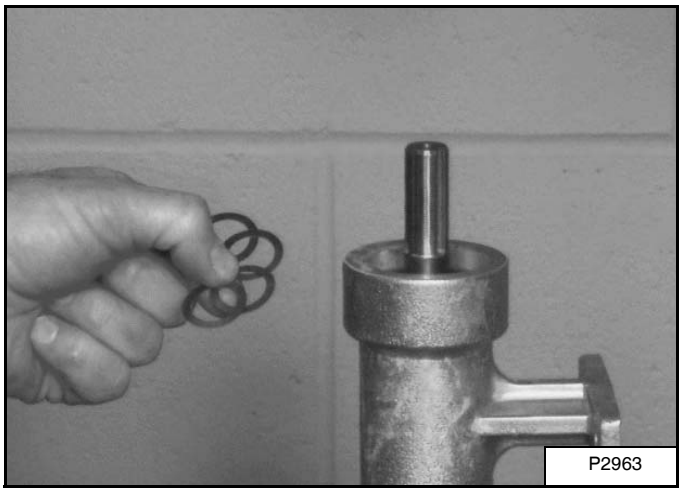
Gearbox Disassembly (Cont'd)

Figure 70-60-21



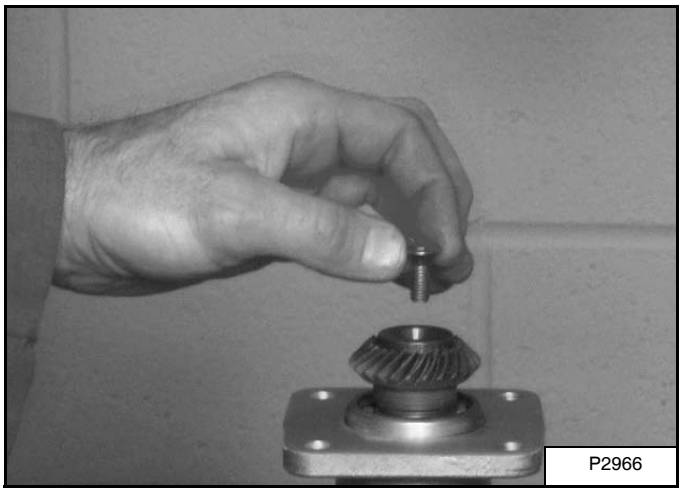
Remove the small snap ring **[Figure 70-60-21]**.

Figure 70-60-22



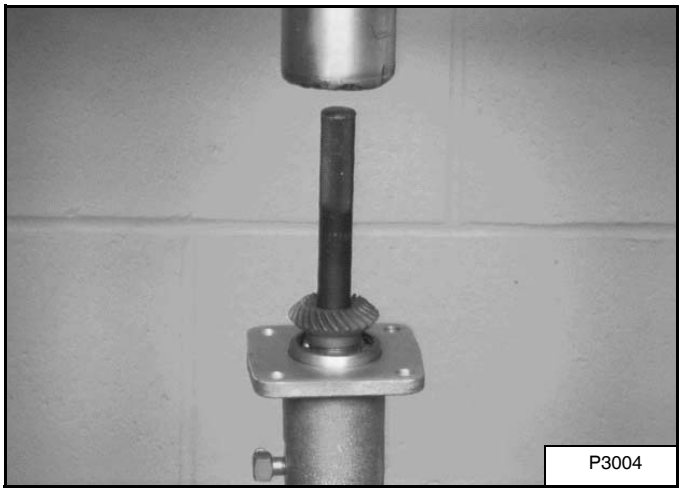
Remove the small shims **[Figure 70-60-22]**.

Figure 70-60-23



Remove the screw and washer from the shaft **[Figure 70-60-23]**.

Figure 70-60-24



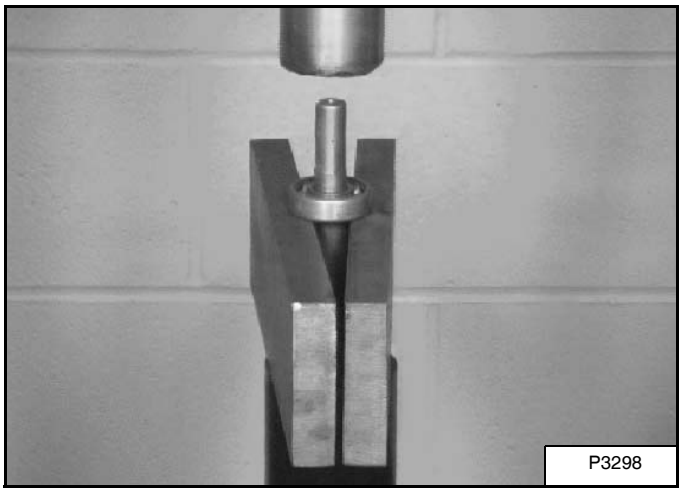
Support the lower flange and press the shaft from the bearing **[Figure 70-60-24]**.

NOTE: The gear and the other bearing (pulley end) will be removed with the shaft.

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Gearbox Disassembly (Cont'd)

Figure 70-60-25



Support the bearing and press the shaft from the bearing **[Figure 70-60-25]**.

Figure 70-60-26



Short Housing

Remove the end cap **[Figure 70-60-26]**.

Use care not to damage the housing.

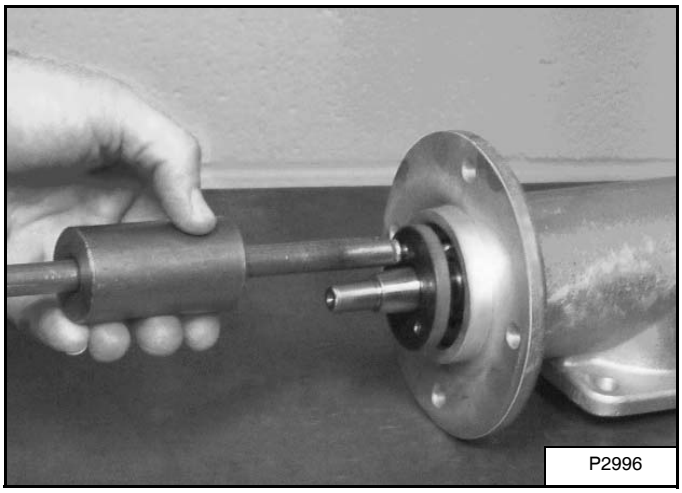
⚠ WARNING

AVOID INJURY OR DEATH

Wear safety goggles to prevent eye injury when drilling or grinding.

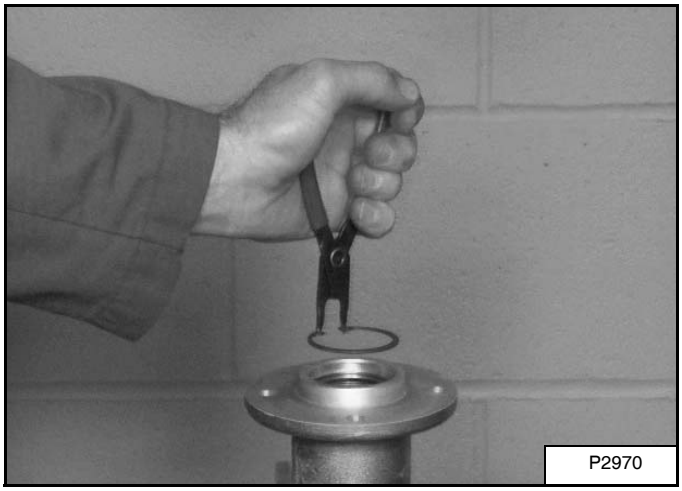
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Figure 70-60-27



Drill an 1/8 inch (3 mm) hole in the seal. Use a slide hammer tool to remove the seal **[Figure 70-60-27]**.

Figure 70-60-28

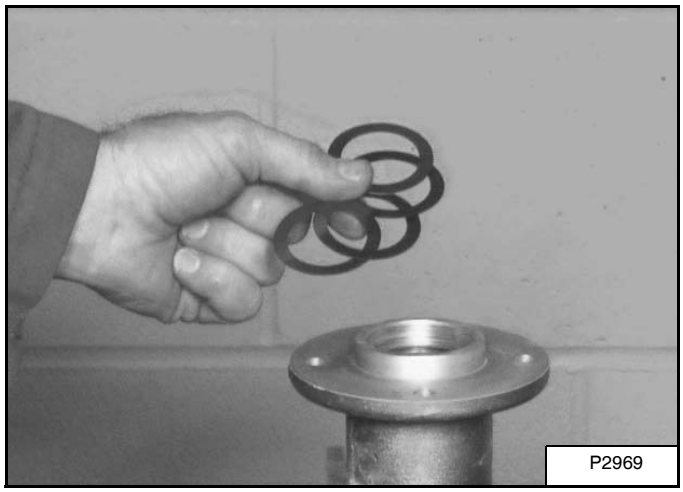


Remove the large snap ring from the flange end of the housing **[Figure 70-60-28]**.

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Gearbox Disassembly (Cont'd)

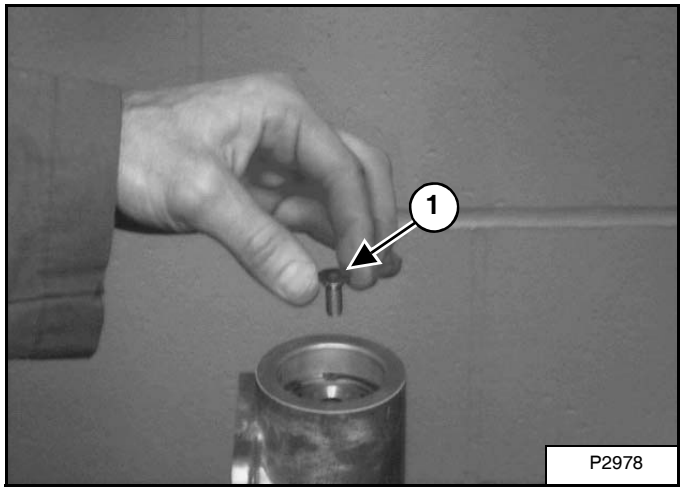
Figure 70-60-29



Remove the large shims from the housing **[Figure 70-60-29]**.

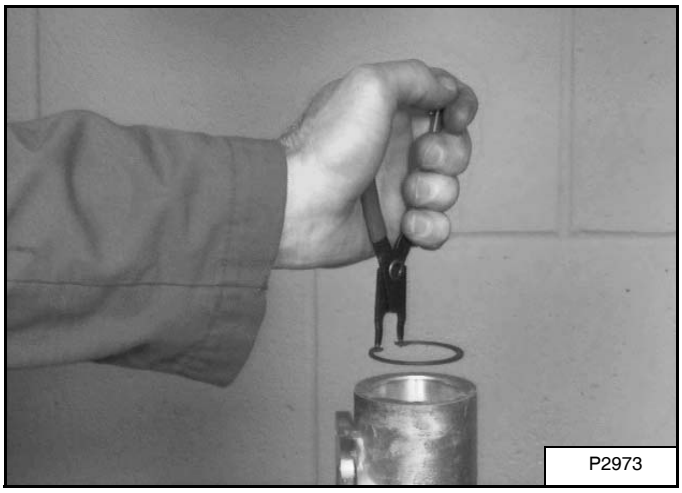
NOTE: Use the same size and thickness of shims during assembly.

Figure 70-60-30



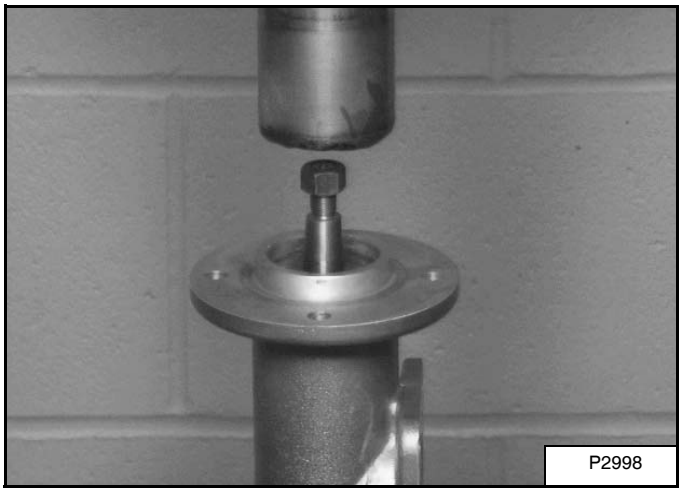
Remove the screw and washer (Item 1) **[Figure 70-60-30]** from the shaft.

Figure 70-60-31



Remove the snap ring from the cap end of the housing **[Figure 70-60-31]**.

Figure 70-60-32



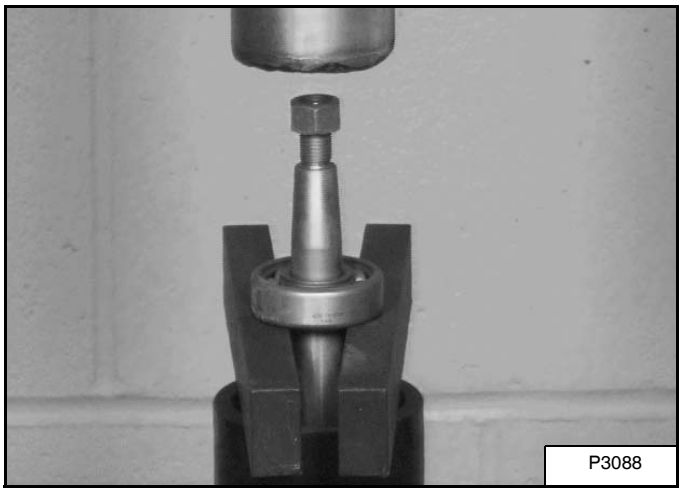
Press the shaft from the housing **[Figure 70-60-32]**.

NOTE: Both bearings may come out of the housing with the shaft. If one bearing remains in the housing use a non metal object to tap the bearing from the housing.

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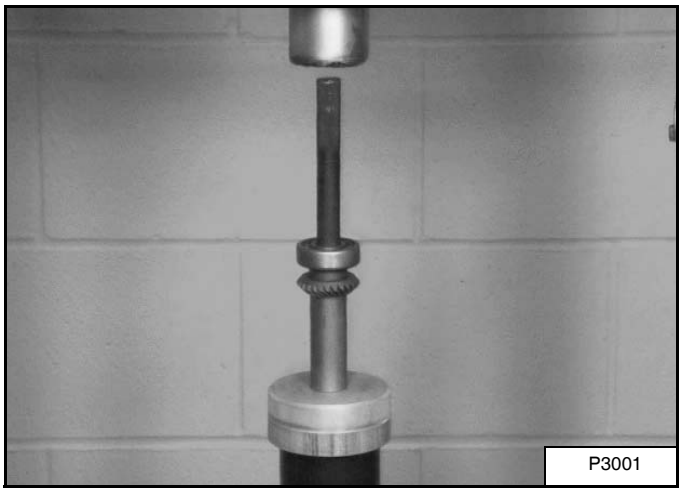
Gearbox Disassembly (Cont'd)

Figure 70-60-33



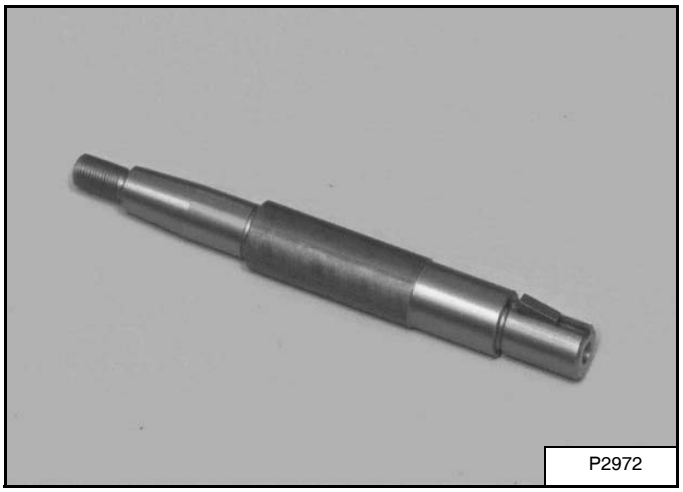
Press the bearing from the tapered end of the shaft **[Figure 70-60-33]**.

Figure 70-60-34



Press the bearing, shims and gear from the shaft **[Figure 70-60-34]**.

Figure 70-60-35

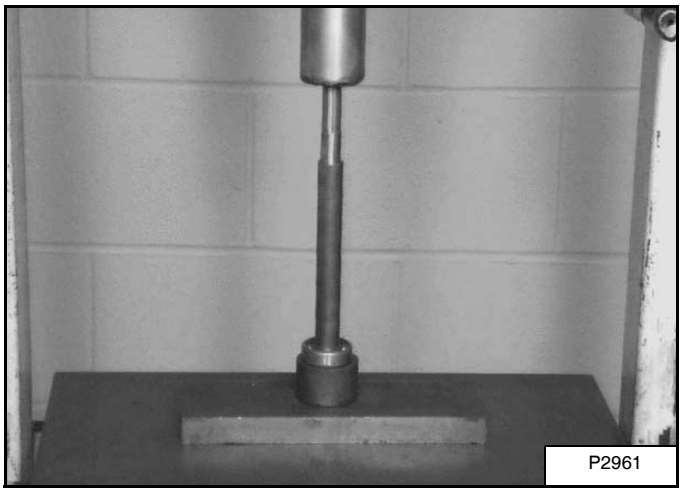


Remove the key from the shaft **[Figure 70-60-35]**.

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Gearbox Assembly

Figure 70-60-36



NOTE: When ordering parts for the Fan Gearbox, (See Gearbox Disassembly on Page 70-60-7.)

NOTE: Do not install the seals and cap in the housing until after the backlash has been checked.

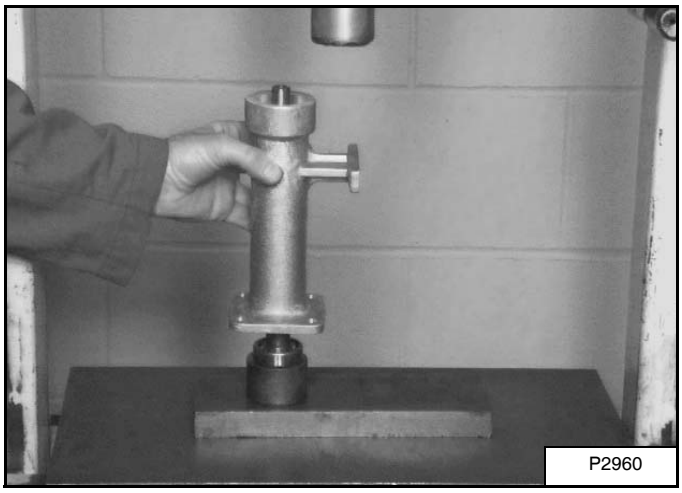
NOTE: Use care when pressing the bearings into the aluminum housing. The housing can be damaged if too much pressure is used.

NOTE: For procedures requiring the use of LOCTITE #242 adhesive, thoroughly clean and dry affected parts before the application of LOCTITE #242.

Long Housing

Press a bearing on the short keyed end of the long shaft **[Figure 70-60-36]**.

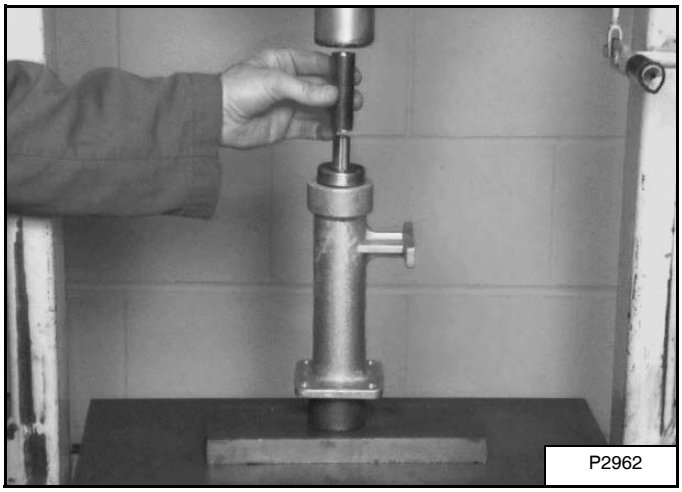
Figure 70-60-37



Install the long housing on the shaft **[Figure 70-60-37]**.

Be sure the bearing is seated in the bore at the lower end of the housing.

Figure 70-60-38



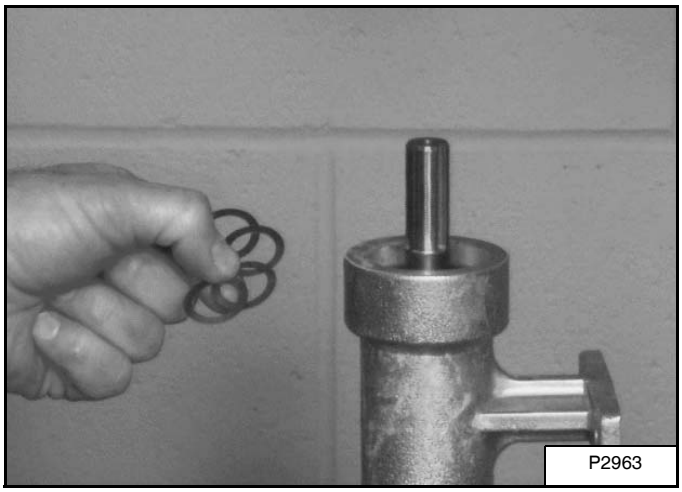
Install a bearing on the long keyed end of the shaft **[Figure 70-60-38]**.

Support the lower bearing and press the other bearing in the housing until the bearings seat in the housing **[Figure 70-60-38]**.

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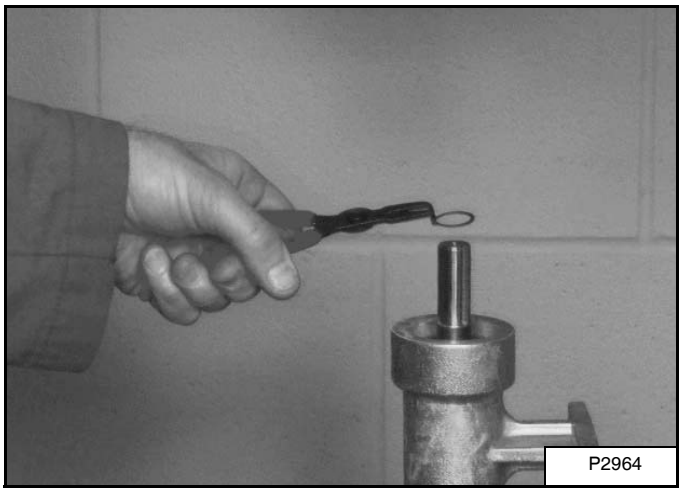
Gearbox Assembly (Cont'd)

Figure 70-60-39



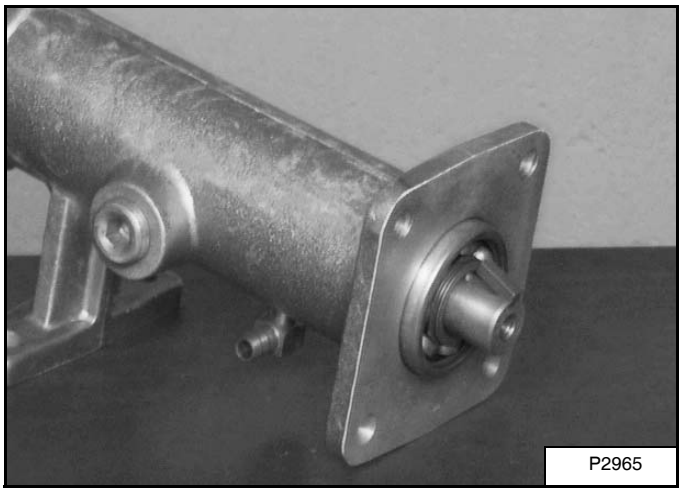
Install on the bearing, the same number and size shims that were removed during disassembly **[Figure 70-60-39]**.

Figure 70-60-40



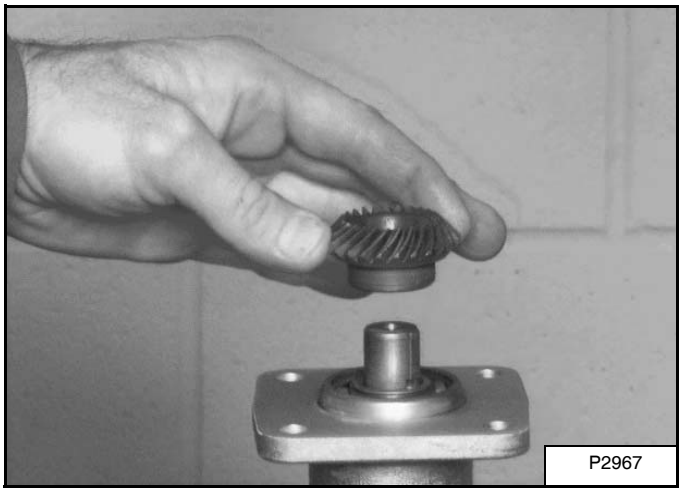
Install the small snap ring in the groove above the shims **[Figure 70-60-40]**.

Figure 70-60-41



Install the gear key in the flange end of the shaft **[Figure 70-60-41]**.

Figure 70-60-42

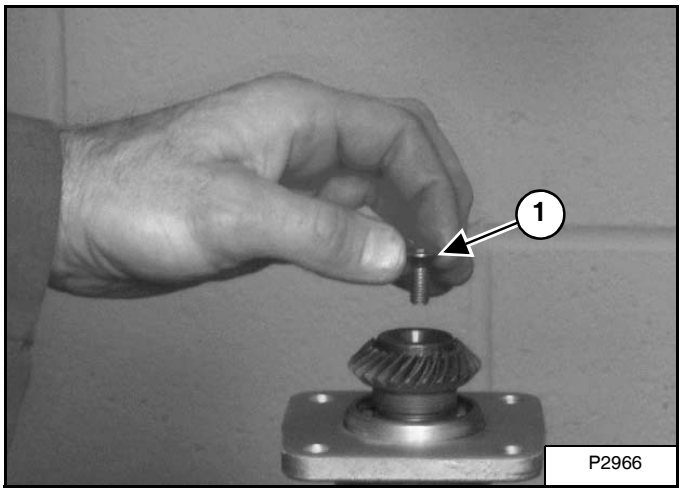


Align the key and gear. While supporting the bearing on the other end, press the gear on the shaft until it seats against the bearing **[Figure 70-60-42]**.

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Gearbox Assembly (Cont'd)

Figure 70-60-43

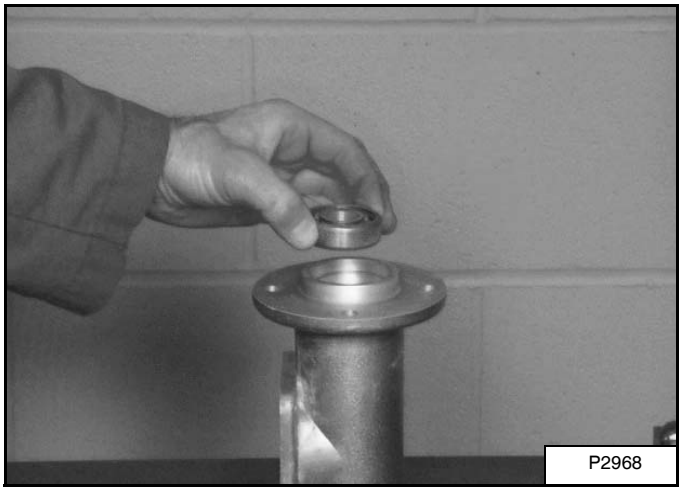


Install the washer (Item 1) **[Figure 70-60-43]**.

Put liquid adhesive (LOCTITE #242) on the screw threads. Install and tighten the screw **[Figure 70-60-43]**.

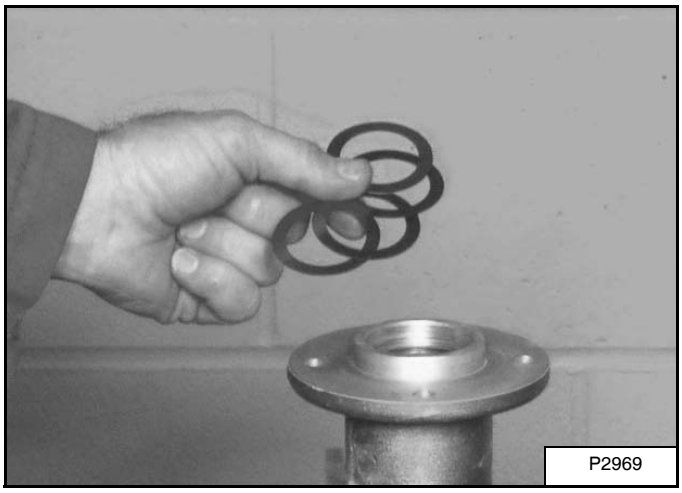
Short Housing

Figure 70-60-44



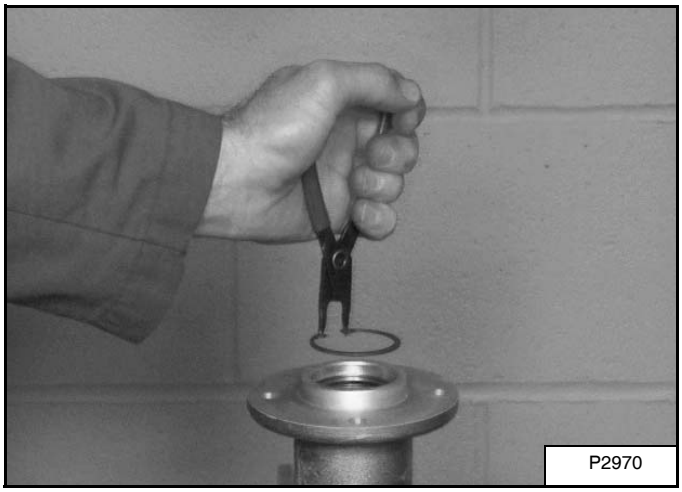
Install a bearing in the flanged end of the housing **[Figure 70-60-44]**.

Figure 70-60-45



Install the large shims on the bearing (flanged end) **[Figure 70-60-45]**

Figure 70-60-46

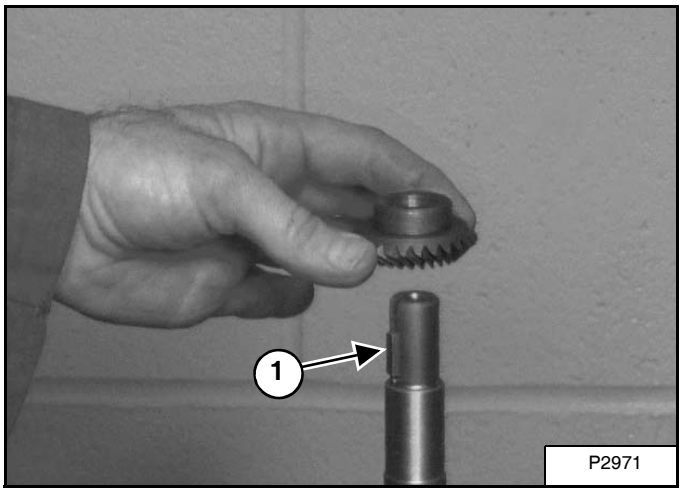


Install the large snap ring in the groove above the shims **[Figure 70-60-46]**.

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Gearbox Assembly (Cont'd)

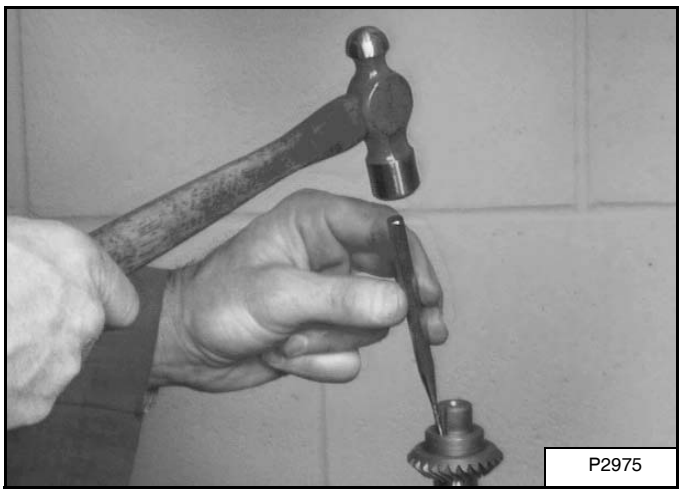
Figure 70-60-47



Install the short key (Item 1) **[Figure 70-60-47]**.

Align and press the gear on the shaft (teeth toward the tapered end of the shaft) **[Figure 70-60-47]**.

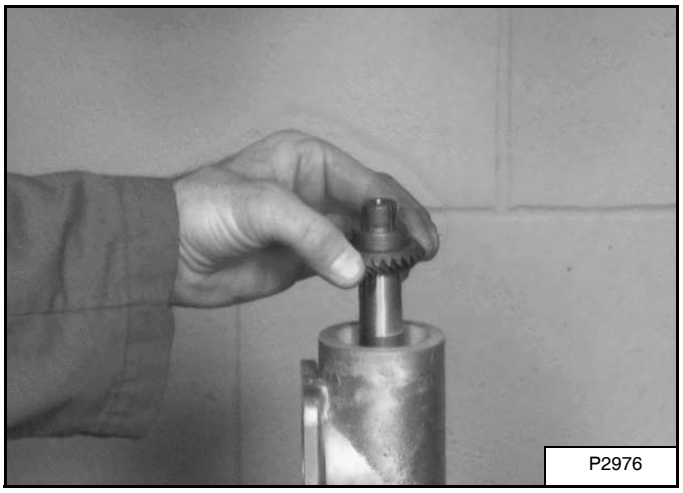
Figure 70-60-48



After the gear is seated, drive the key down inside the gear key way **[Figure 70-60-48]**.

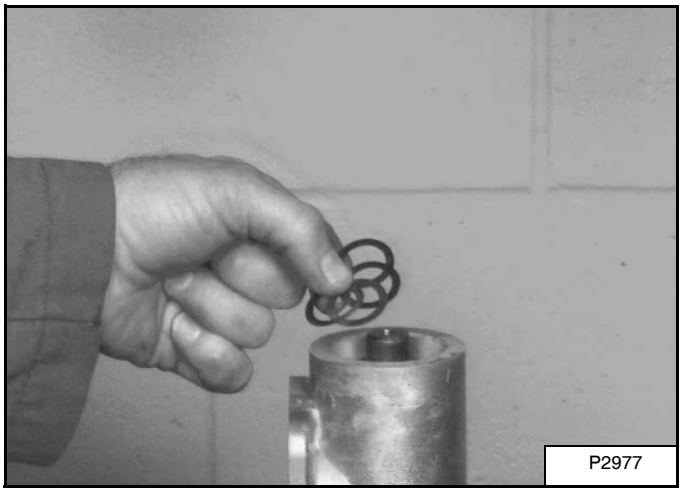
NOTE: This will prevent damage to the shims when the bearing is installed later.

Figure 70-60-49



Install the shaft in the housing, tapered end in the bearing at the round flange end of the housing **[Figure 70-60-49]**.

Figure 70-60-50

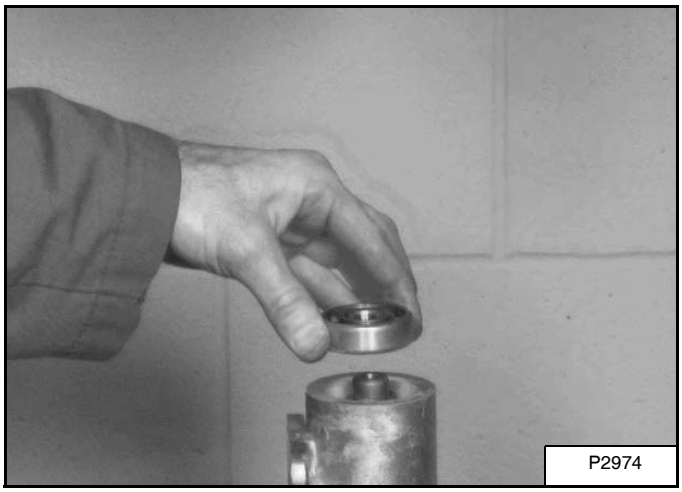


Install on the shaft, the same number and size shims that were removed during disassembly **[Figure 70-60-50]**.

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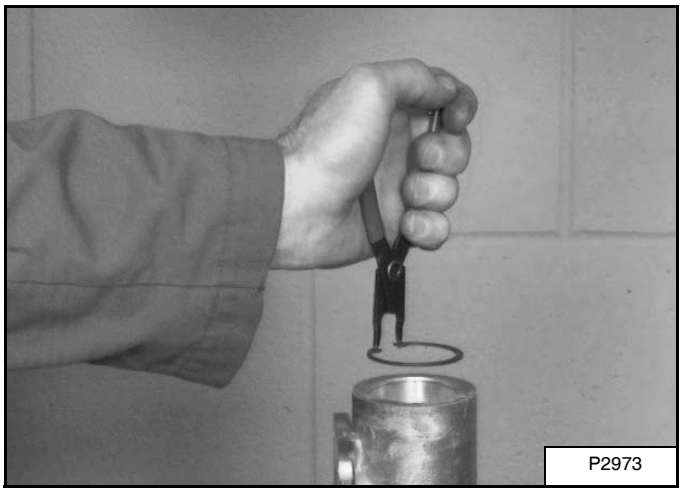
Gearbox Assembly (Cont'd)

Figure 70-60-51



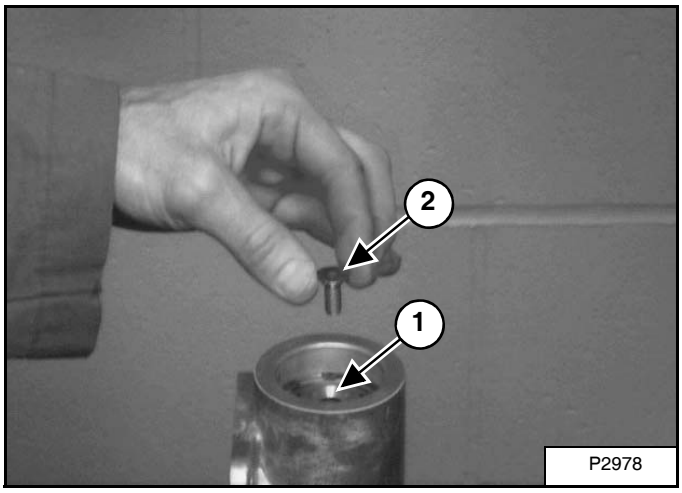
Install a bearing on the gear end of the shaft **[Figure 70-60-51]**.

Figure 70-60-52



Install the snap ring in the groove above the bearing **[Figure 70-60-52]**.

Figure 70-60-53

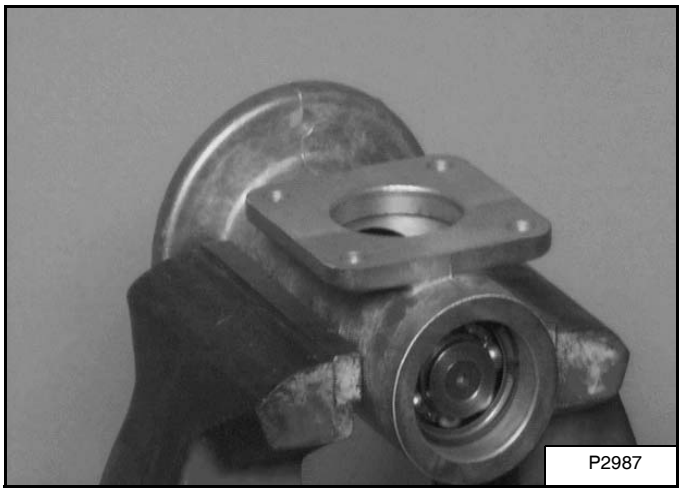


Install the washer (Item 1) on the shaft. Put liquid adhesive (LOCTITE #242) on the screw threads and install the screw (Item 2) **[Figure 70-60-53]**.

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Gearbox Checking Backlash

Figure 70-60-54



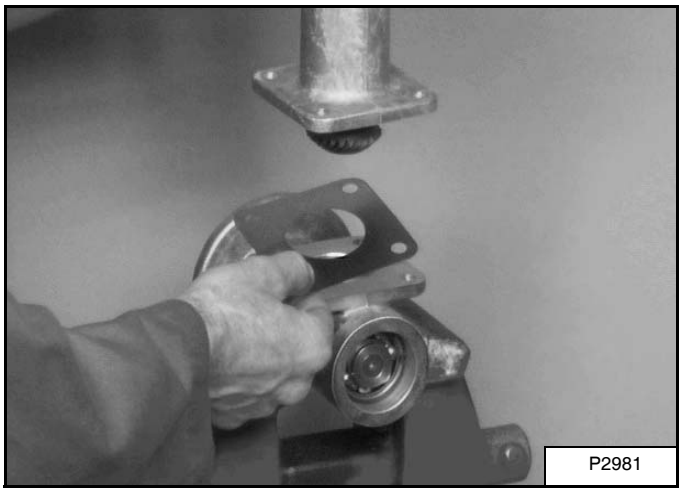
NOTE: For procedures requiring the use of LOCTITE #518 adhesive, thoroughly clean and dry affected parts before the application of LOCTITE #518. LOCTITE #518 is a gasket eliminator that cures to a flexible seal between the mounting surfaces.

The backlash tolerance between the gears should be 0.005-0.008 inch (0,127-0,203 mm).

To check the gear backlash use the following procedure:

Put the short housing in a vise, square flange facing up as shown **[Figure 70-60-54]**.

Figure 70-60-55

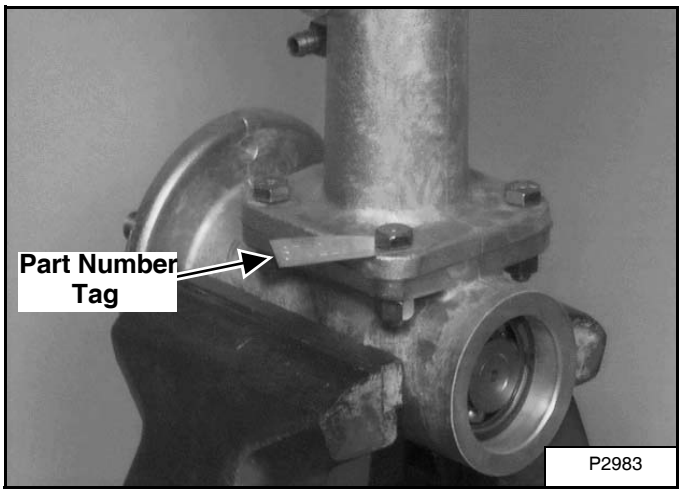


Install the same size and number of square shims (if present during disassembly) between the two housings **[Figure 70-60-55]**.

Set the long housing on the short housing with the sealant.

NOTE: If square shims are used, put a small amount of (LOCTITE 518) on both sides of all shims.

Figure 70-60-56



Install the four mounting bolts through the flange holes **[Figure 70-60-56]**.

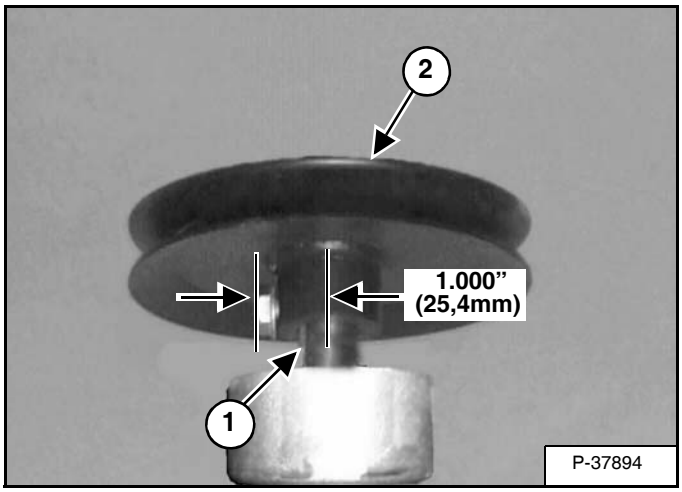
Install the part number tag **[Figure 70-60-56]**.

Install and tighten the nut to 25-28 ft.-lb. (34-38 N•m) torque.

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Gearbox Checking Backlash (Cont'd)

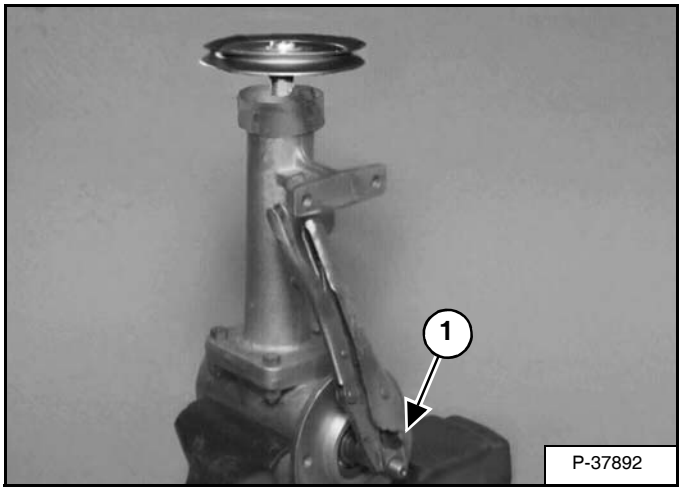
Figure 70-60-57



Install the long key (Item 1) and the pulley (Item 2) **[Figure 70-60-57]**.

Install a bolt in the set screw hole to maintain a 1.0 inch (25,4 mm) distance from the shaft center to the bolt head (to be used with a dial indicator) **[Figure 70-60-57]**.

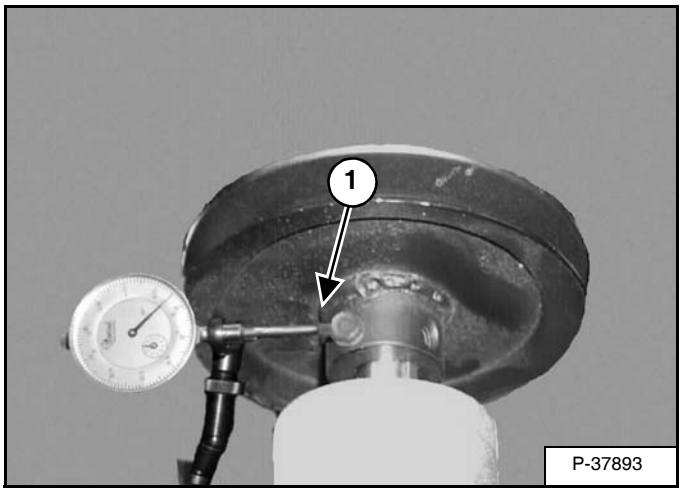
Figure 70-60-58



Put the fan nut (Item 1) **[Figure 70-60-58]** on the shaft and tighten snugly.

Install a locking pliers on the fan nut and support the handle against the long housing **[Figure 70-60-58]**.

Figure 70-60-59



Using a magnetic based dial indicator mounted on a bench vise, touch the dial stem on the bolt (Item 1) **[Figure 70-60-59]**.

Hold the locking pliers against the long housing and rotate the pulley back and forth to read the dial gauge **[Figure 70-60-59]**.

If the backlash is GREATER than 0.008 inch (0,203 mm), do the following:

1. Remove a square shim(s) (if present) between the two housings.

2. Remove a large shim(s) from the tapered end of the short shaft and add a small shim (s) of the same thickness between the bearing and the gear on the screw end of the shaft.

If the backlash is LESS than 0.005 inch (0,127 mm) do the following:

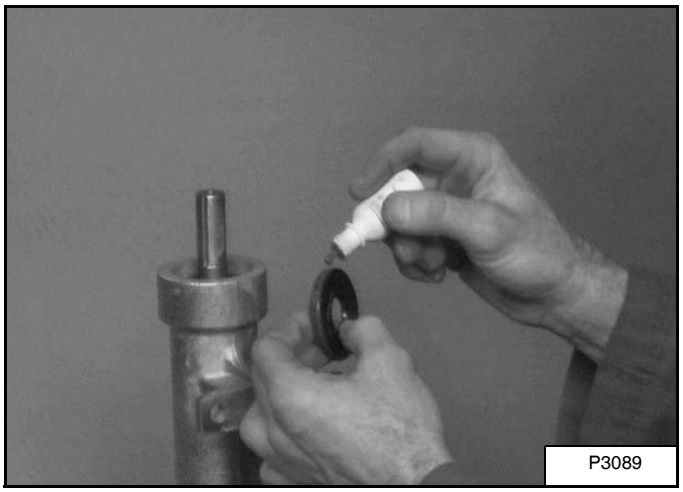
1. Add a square shim(s) between the two housings.

2. Remove a small shim(s) between the bearing and the gear on the screw end of the short shaft and add a large shim(s) of the same thickness between the snap ring and the bearing on the tapered end of the shaft.

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Gearbox Checking Backlash (Cont'd)

Figure 70-60-60



When the backlash is correct, install the seals, cap and gear oil as follows:

Remove the bolts from the flanges and separate the two housings.

Put liquid adhesive (LOCTITE #242) on the outside diameter of the seal(s) **[Figure 70-60-60]**.

Figure 70-60-61

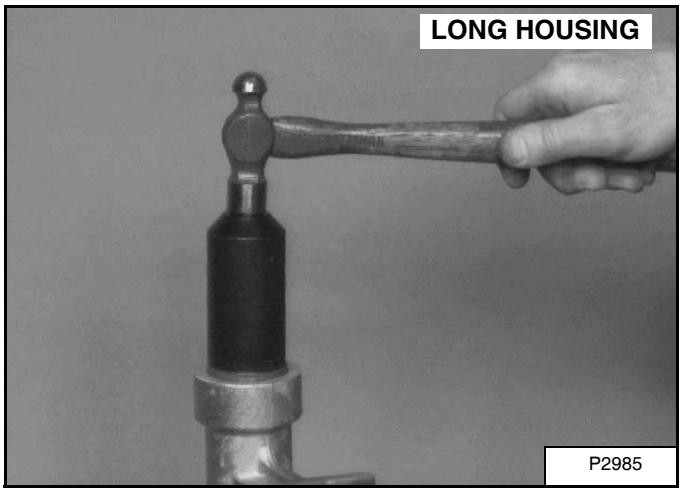
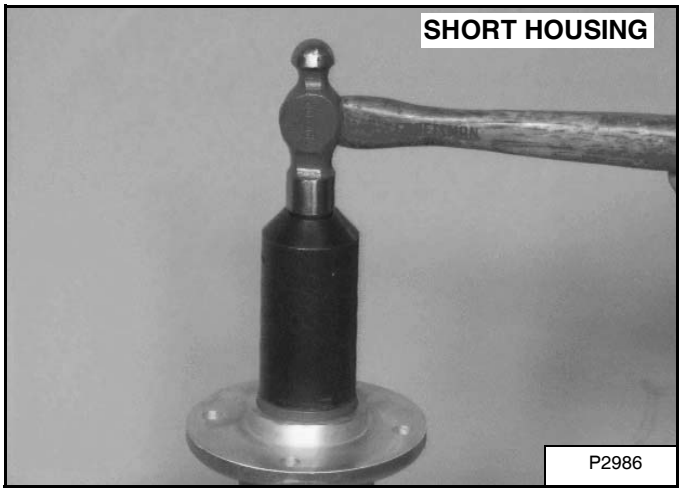


Figure 70-60-62



Install the seal(s) flush with the housing surface **[Figure 70-60-61]** & **[Figure 70-60-62]**.

Clean any oil from the flange surface.

Install the long housing on the short housing flange.

Install the four bolts and part number tag.

Install and tighten the nuts to 25-28 ft.-lb. (34-38 N•m) torque.

NOTE: When filling the fan gearbox with oil, be sure the level does not go above the top of the shaft in the gearbox. Use a light colored 90W gear lube.

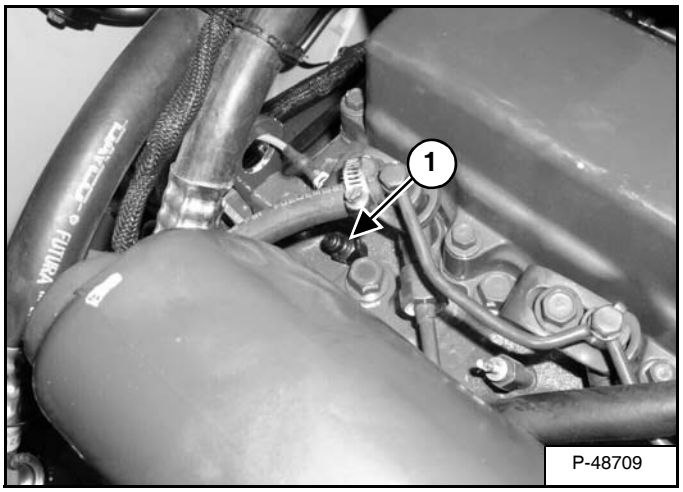
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Compression Checking

Figure 70-70-1



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

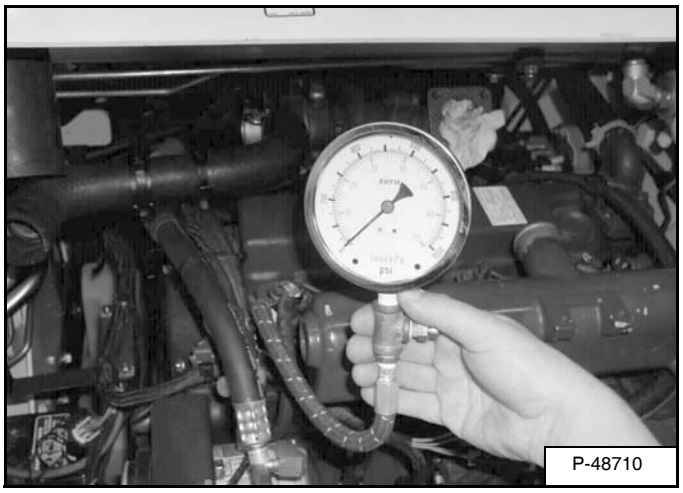
MEL10630 - Engine Compression Kit
MEL1631 - Compression Adapter

The engine must be at operating temperature.

Remove the glow plugs. (See Glow Plugs Removal And Installation on Page 70-70-2.)

Install the correct compression adapter (Item 1) **[Figure 70-70-1]** into the cylinder head.

Figure 70-70-2



Connect the compression gauge to the adapter **[Figure 70-70-2]**.

Make sure the engine speed control is fully backward (engine idle).

Disconnect the fuel stop solenoid.

Crank the engine with the starter cranking rpm.

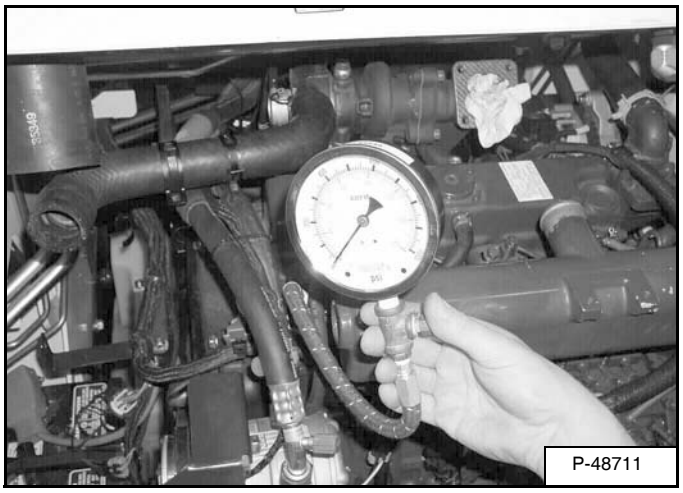
If the measurement is below the allowable limit, check the cylinder, piston ring, top clearance, valve and cylinder head.

Compression Pressure should be 427-469 PSI (2944,1 - 3233,6 kPa)

Allowable Limit (minimum) is 341 PSI (2351,1 kPa)

No more than 10% variance among cylinders.

Figure 70-70-3



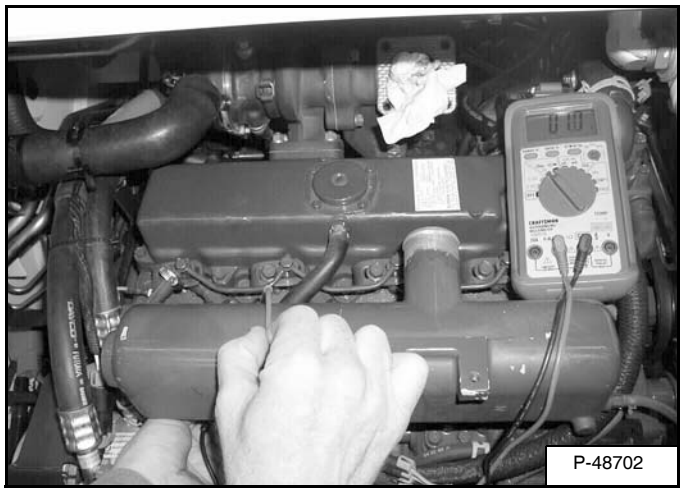
Push the button on the compression gauge to release pressure **[Figure 70-70-3]**.

Connect the fuel stop solenoid.

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Glow Plugs Checking

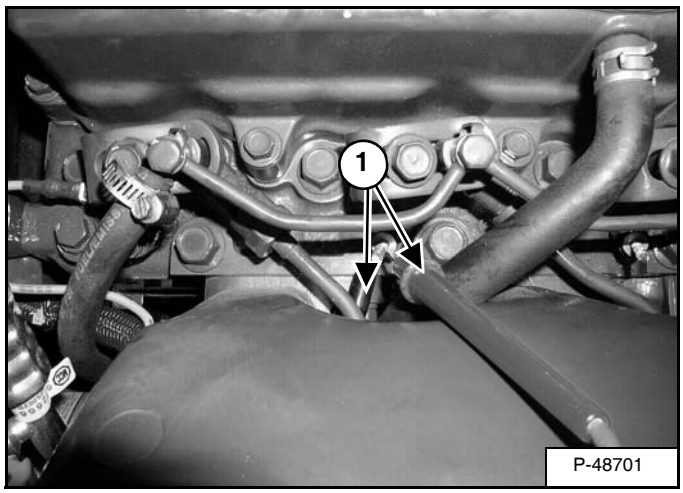
Figure 70-70-4



Disconnect the glow plug cables and leads.

Use an ohmmeter to check the glow plugs **[Figure 70-70-4]**.The resistance should be approximately one ohm.

Figure 70-70-5

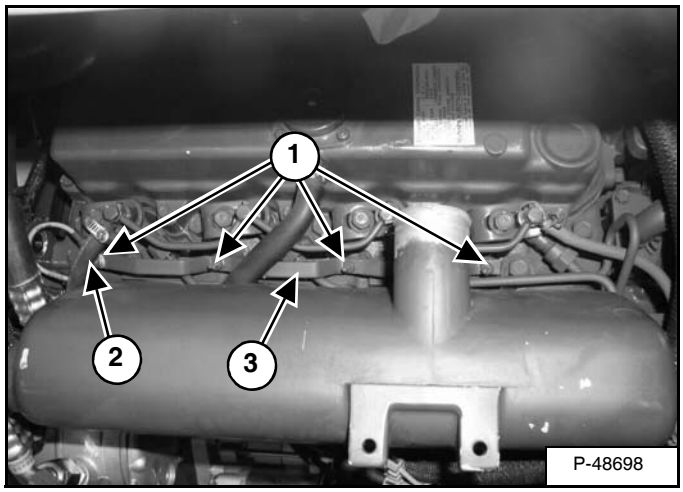


Touch one probe to the end of the glow plug and the other probe to the body of glow plug (Item 1) **[Figure 70-70-5]**.

Repeat the procedure for each glow plug.

Glow Plugs Removal And Installation

Figure 70-70-6



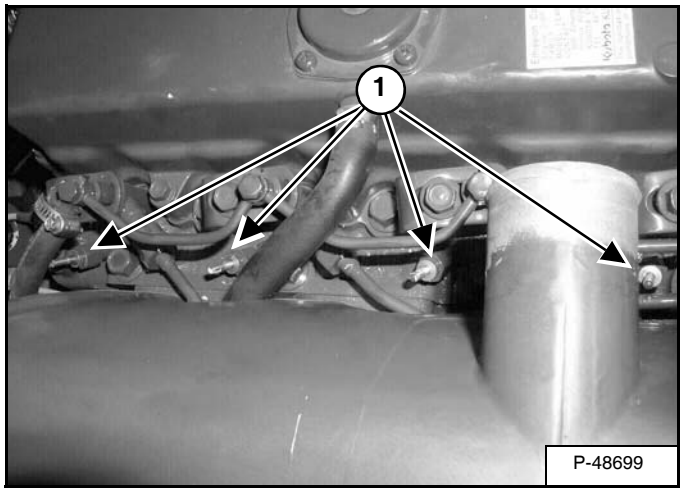
Disconnect the negative (-) cable from the battery.

Remove the nut (Item 1) **[Figure 70-70-6]** from the top of each glow plug.

Disconnect the engine harness wire (Item 2) **[Figure 70-70-6]** from the glow plug.

Remove the glow plug connecting strap (Item 3) **[Figure 70-70-6]**.

Figure 70-70-7



Loosen and remove the glow plug (Item 1) **[Figure 70-70-7]**.

Installation: Tighten the glow plug to 14.5-18.1 ft.-lb. (19,6-24,5 N•m) torque.

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Glow Plugs Removal And Installation (Cont'd)

Figure 70-70-8

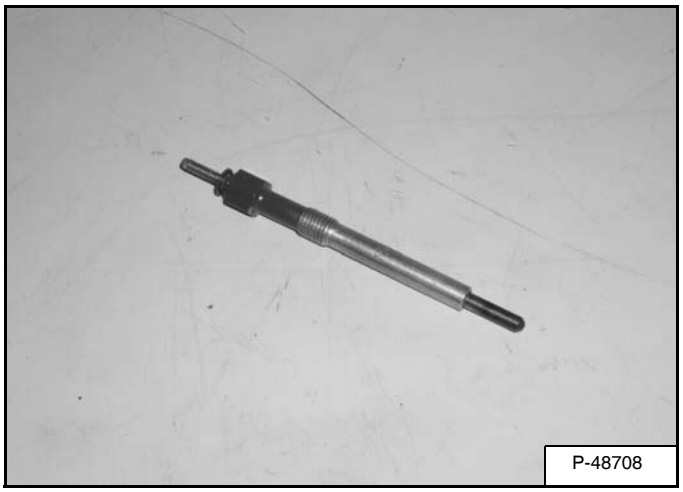
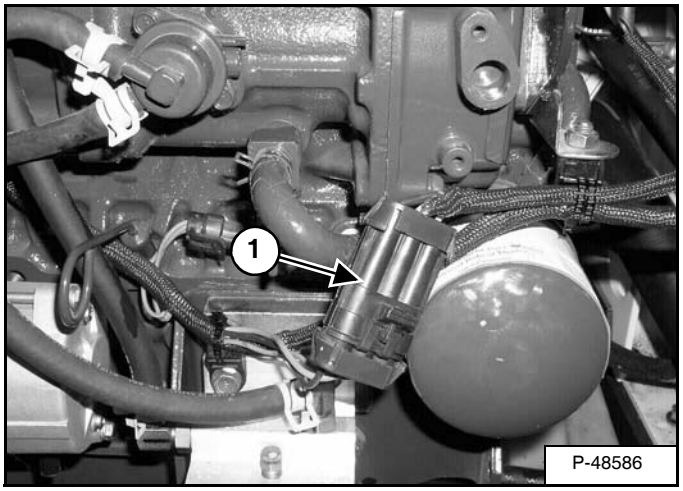


Photo **[Figure 70-70-8]** shows the glow plug assembly removed from the engine. Inspect the glow plugs and replace when necessary.

Fuel Shut-Off Solenoid, Checking

Figure 70-70-9

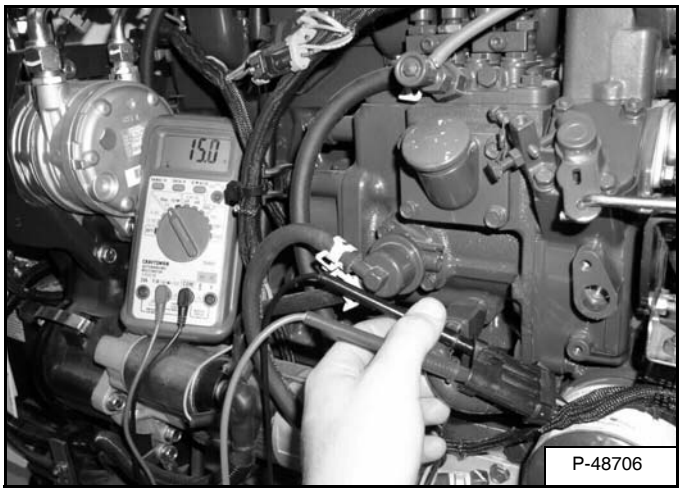


Stop the engine and open the rear door **[Figure 70-70-9]**.

Disconnect the connector (Item 1) **[Figure 70-70-9]** from the fuel shut-off solenoid.

Use an ohmmeter to check the fuel shut-off solenoid.

Figure 70-70-10



The reading between electrical connector terminal C and terminal A must be between approximately 15.6 ohms **[Figure 70-70-10]**.

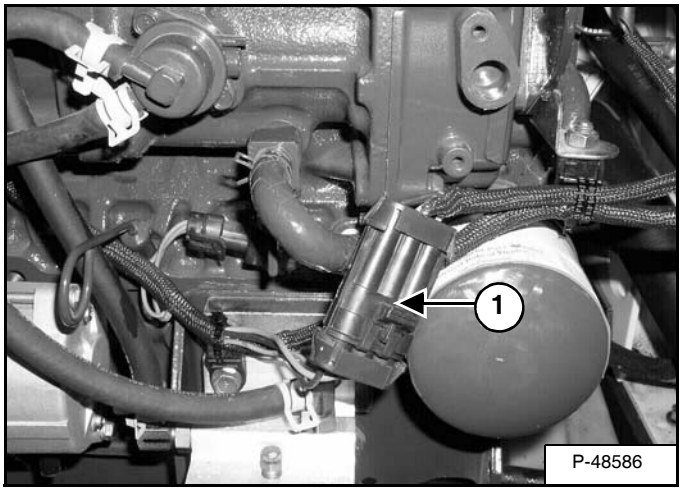
The reading between electrical connector terminal C and terminal B must be between approximately .35-.4 ohms.

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Fuel Shut-Off Solenoid Removal And Installation

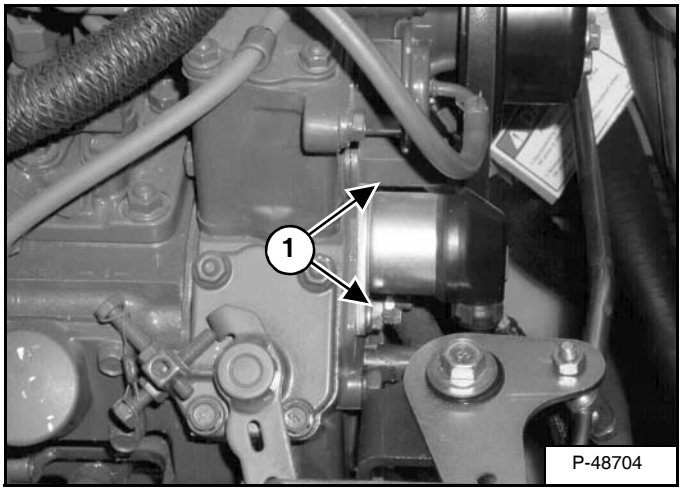
Stop the engine and open the rear door.

Figure 70-70-11



Disconnect the connector (Item 1) **[Figure 70-70-11]**.

Figure 70-70-12



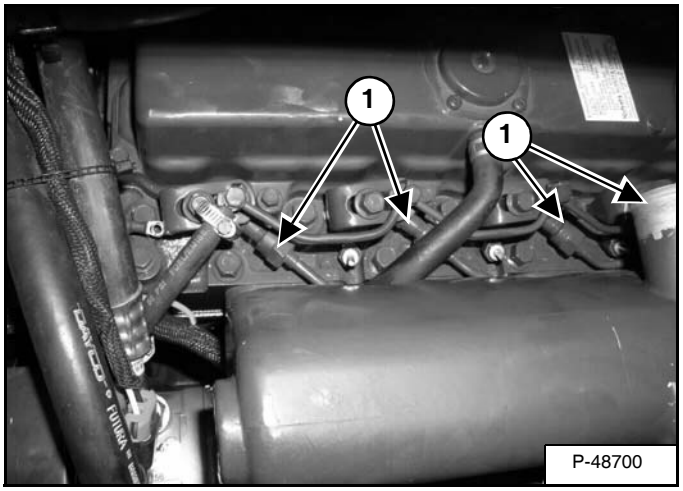
Remove the mounting nuts (Item 1) **[Figure 70-70-12]** of the fuel shut-off solenoid.

Reverse the above procedure to install the fuel shut-off solenoid.

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Fuel Injection Pump Removal And Installation (Turbo)

Figure 70-70-13



Clean the area around the injection pump thoroughly.

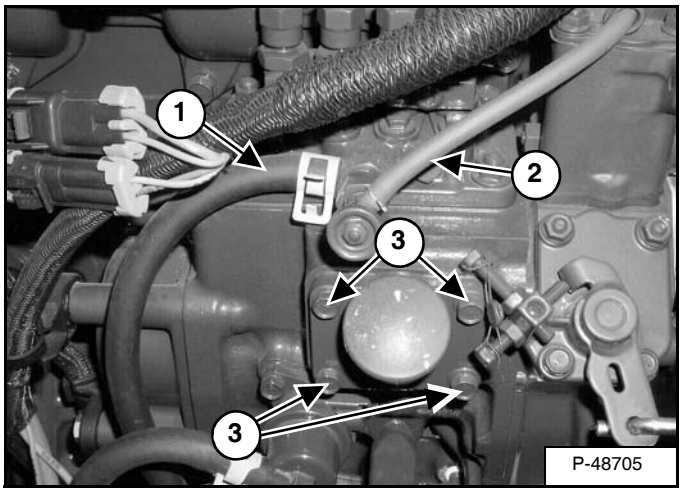
Disconnect the high pressure fuel lines (Item 1) **[Figure 70-70-13]** from the fuel injectors.

IMPORTANT

Do not bend the high pressure fuel injection tubes when removing or installing them.

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Figure 70-70-14

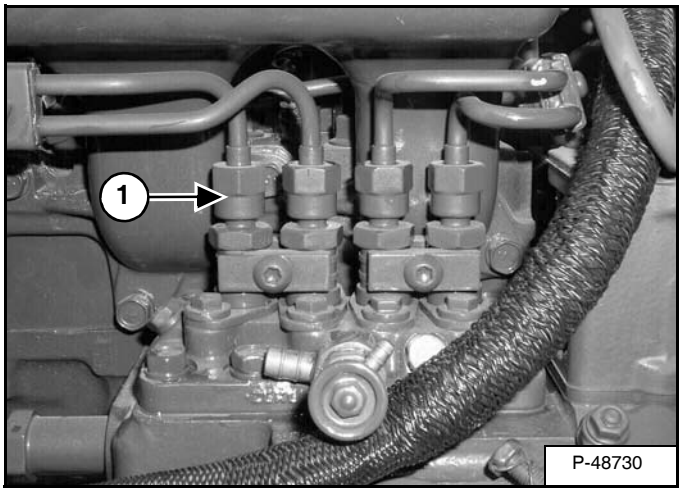


Disconnect the fuel inlet hose (Item 1) and the fuel return hose (Item 2) **[Figure 70-70-14]** from the injection pump vent .

Cap the inlets on the injection pump vent where the hoses were removed **[Figure 70-70-14]**.

Remove the four oil fill bolts (Item 3) **[Figure 70-70-14]**.

Figure 70-70-15

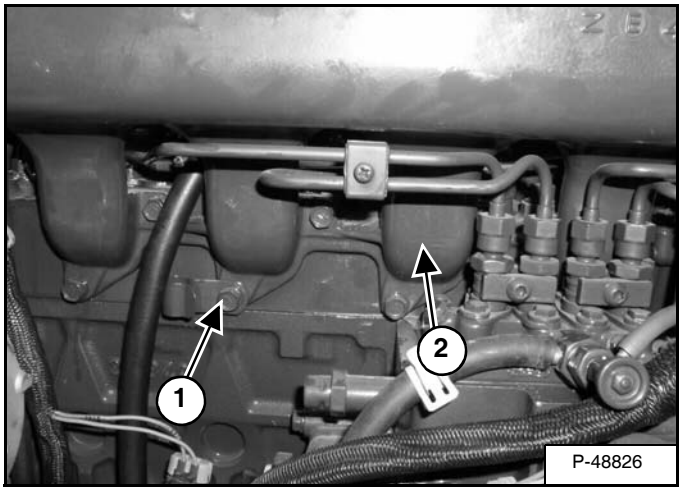


Remove the high pressure fuel lines (Item 1) **[Figure 70-70-15]** from the injection pump.

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Fuel Injection Pump Removal And Installation (Turbo) (Cont'd)

Figure 70-70-16



Remove the seven mounting bolts (Item 1) from the intake manifold (Item 2) **[Figure 70-70-16]**.

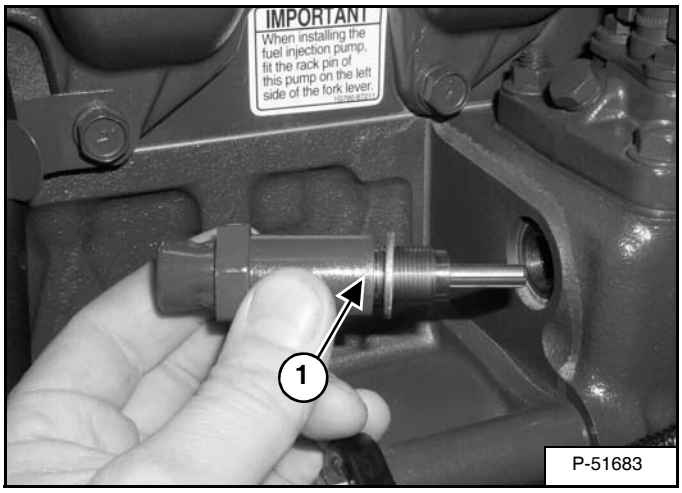
Installation: Tighten the mounting bolts to 16-20 ft.-lb. (22-27 N•m) torque.

Remove the intake manifold from the engine.

Installation: Replace the manifold gasket if it is worn or damaged.

Remove the fuel shut-off solenoid. (See Fuel Shut-Off Solenoid Removal And Installation on Page 70-70-4.)

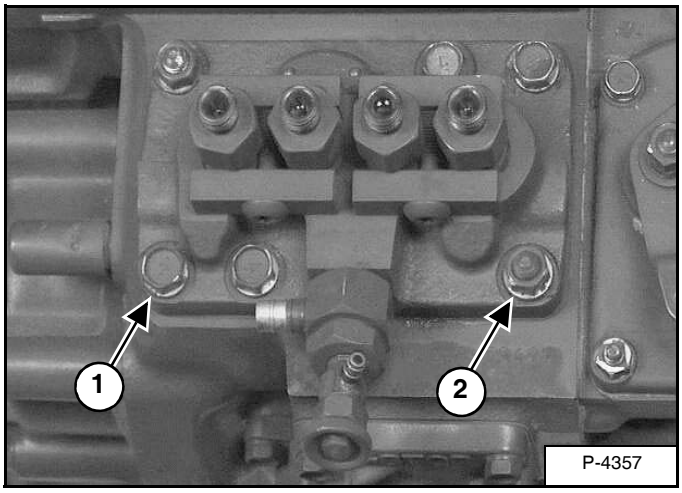
Figure 70-70-17



Remove the high-idling body (Item 1) **[Figure 70-70-17]** from the engine block.

Installation: Tighten the high-idling body to 32.6-36.3 ft.-lb. (44-49 N•m) torque.

Figure 70-70-18



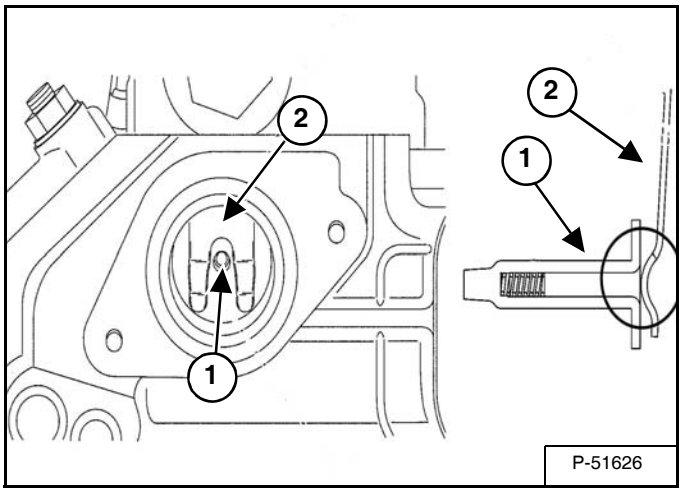
Remove the four mounting bolts (Item 1) and two nuts (Item 2) **[Figure 70-70-18]** from the injection pump.

Installation: Tighten the mounting bolts to 16-20 ft.-lb. (22-27 N•m) torque.

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Fuel Injection Pump Removal And Installation (Turbo) (Cont'd)

Figure 70-70-19



NOTE: Before removing the injection pump assembly, be sure to remove the stop solenoid and high idling body. Also check to see if the stop solenoid guide (Item 1) touches the boost lever (Item 2) [Figure 70-70-19].

Remove the injection pump and shim(s) from the engine.

Figure 70-70-20

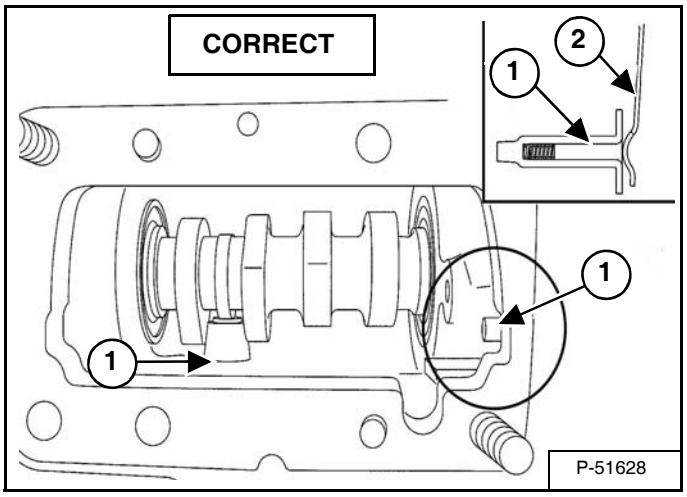
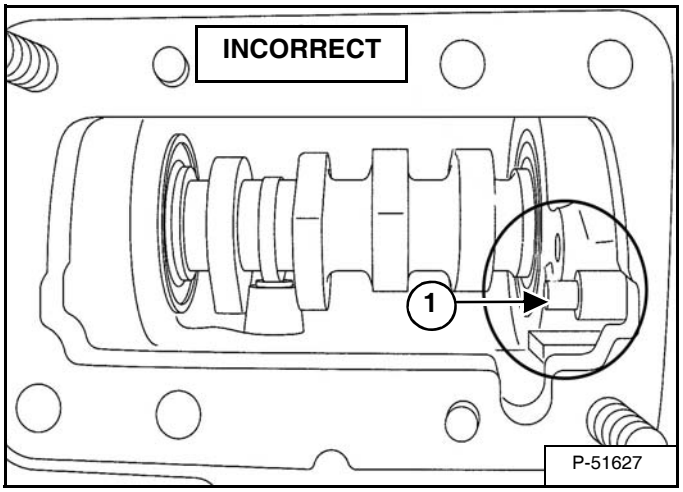


Figure 70-70-21

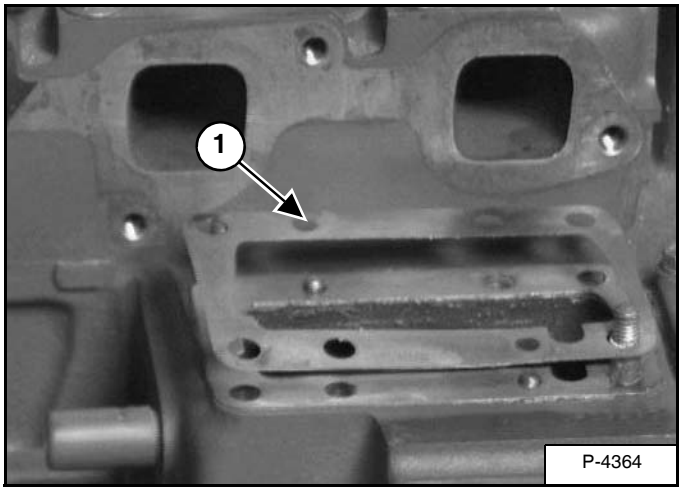


Installation: Check to see if the stop solenoid guide (Item 1) **[Figure 70-70-20]** and **[Figure 70-70-21]** touches the boost lever (Item 2) **[Figure 70-70-20]**.

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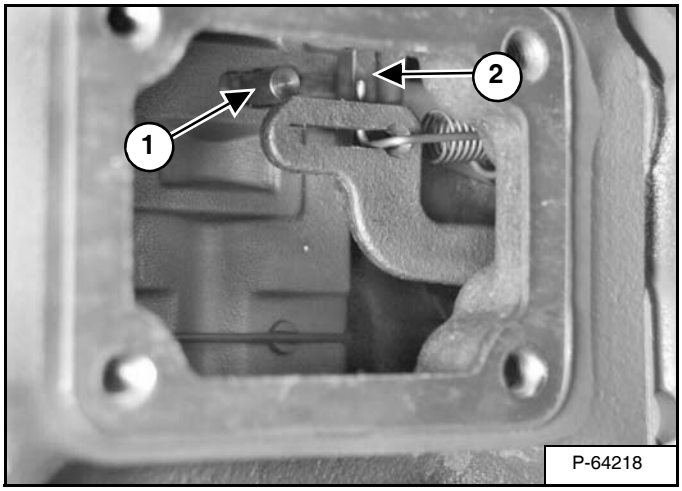
Fuel Injection Pump Removal And Installation (Turbo) (Cont'd)

Figure 70-70-22



Install the shim(s) (Item 1) **[Figure 70-70-22]** on the injection pump mounting surface. For information on the number of shims used. (See Timing The Injection Pump on Page 70-70-12.)

Figure 70-70-23



Install the injection pump in the engine.

Ensure the control rack pin (Item 1) is to the left side of the fork lever (Item 2) **[Figure 70-70-23]**.

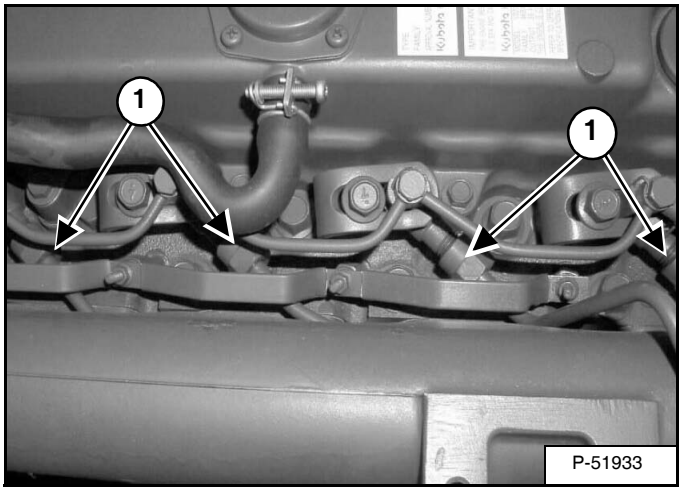
IMPORTANT

Do not attempt to maintain or adjust unless you are trained and have the correct equipment.

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Fuel Injection Pump Removal And Installation (Non-Turbo)

Figure 70-70-24



Clean the area around the injection pump thoroughly.

Disconnect the high pressure fuel lines (Item 1) **[Figure 70-70-24]** from the fuel injectors.

IMPORTANT

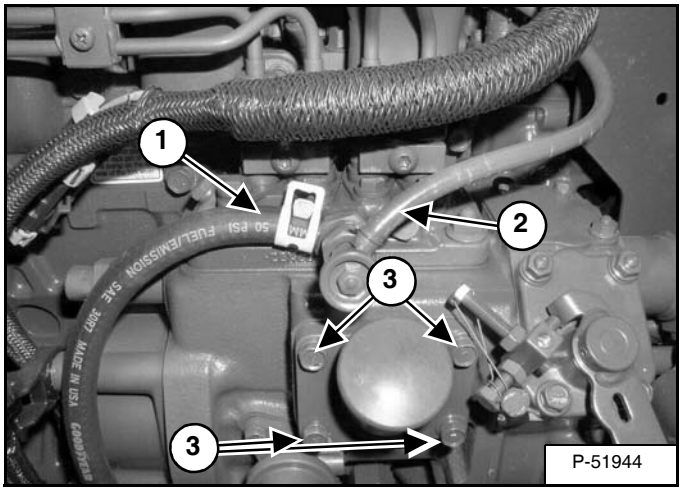
Do not bend the high pressure fuel injection tubes when removing or installing them.

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Fuel Injection Pump Removal And Installation (Non-Turbo) (Cont'd)

Figure 70-70-25

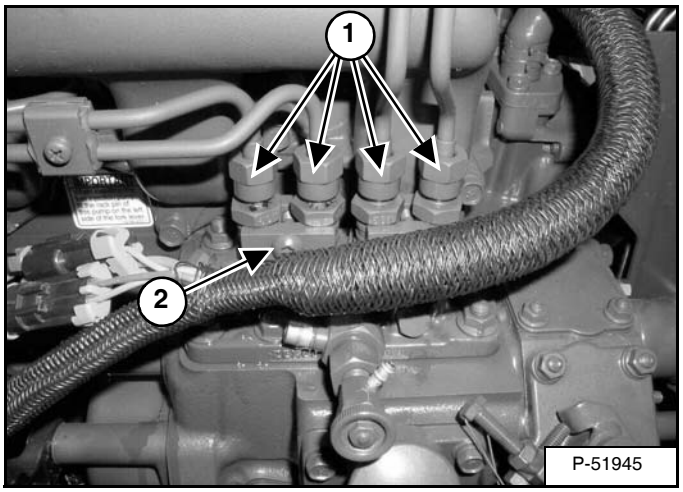


Disconnect the fuel inlet hose (Item 1) and the fuel return hose (Item 2) from the injection pump vent **[Figure 70-70-25]**.

Cap the inlets on the injection pump vent where the hoses were removed **[Figure 70-70-25]**.

Remove the four oil fill tube bolts (Item 3) **[Figure 70-70-25]**.

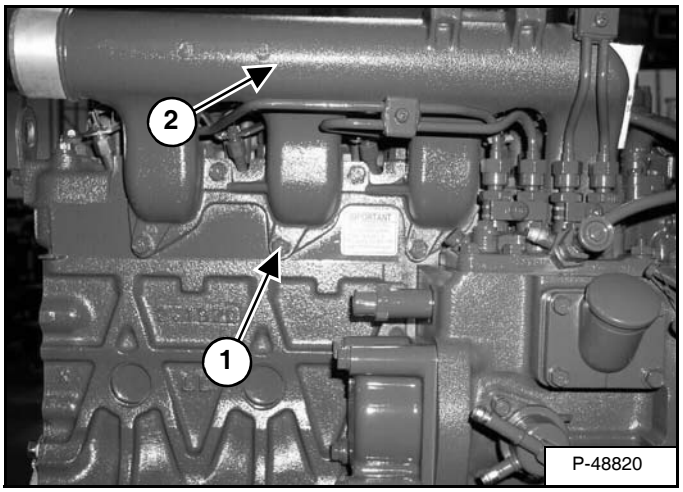
Figure 70-70-26



Remove the high pressure fuel lines (Item 1) **[Figure 70-70-26]** from the injection pump.

Note: Do not loosen the clamp screws (Item 2) [Figure 70-70-15] on the injection pump. This is to be done only when the entire injection pump is sent out to be serviced.

Figure 70-70-27



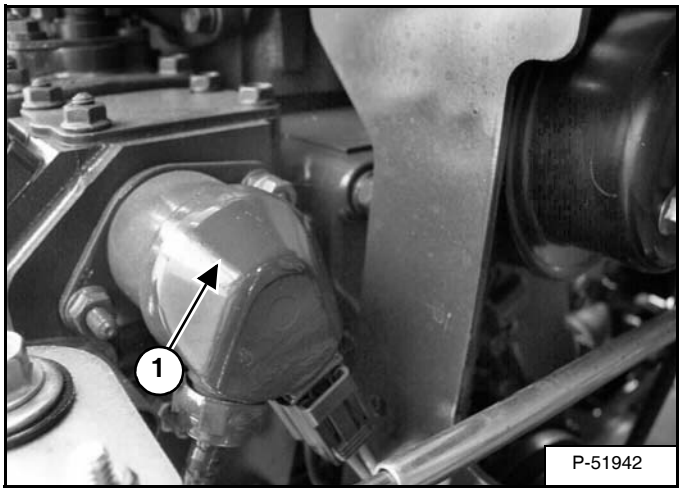
Remove the mounting bolts (Item 1) from the intake manifold (Item 2) **[Figure 70-70-27]**.

Installation: Tighten the mounting bolts to 16-20 ft.-lb. (22-27 N•m) torque.

Remove the intake manifold from the engine.(See Removal And Installation on Page 70-80-1.)

Installation: Replace the manifold gasket if it is worn or damaged.

Figure 70-70-28

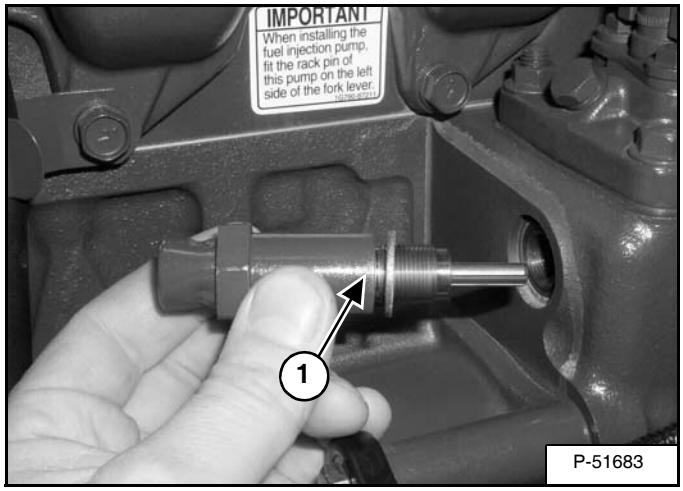


Remove the fuel shut-off solenoid (Item 1) **[Figure 70-70-28]**. (See Fuel Shut-Off Solenoid Removal And Installation on Page 70-70-4.)

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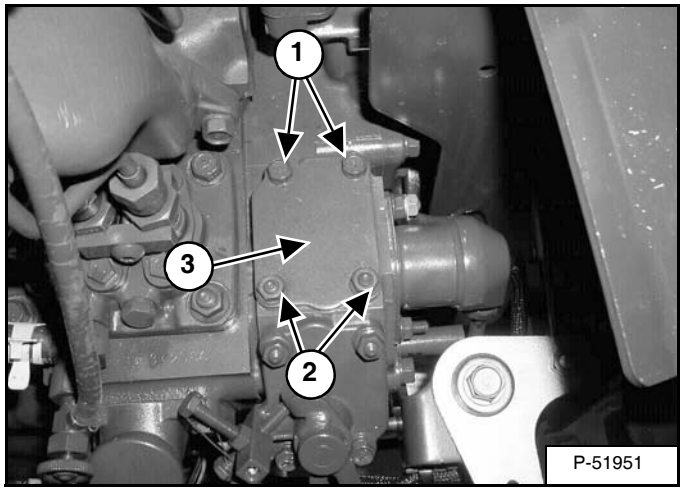
Fuel Injection Pump Removal And Installation (Non-Turbo) (Cont'd)

Figure 70-70-29



Remove the high-idling body (Item 1) **[Figure 70-70-29]** from the engine block.

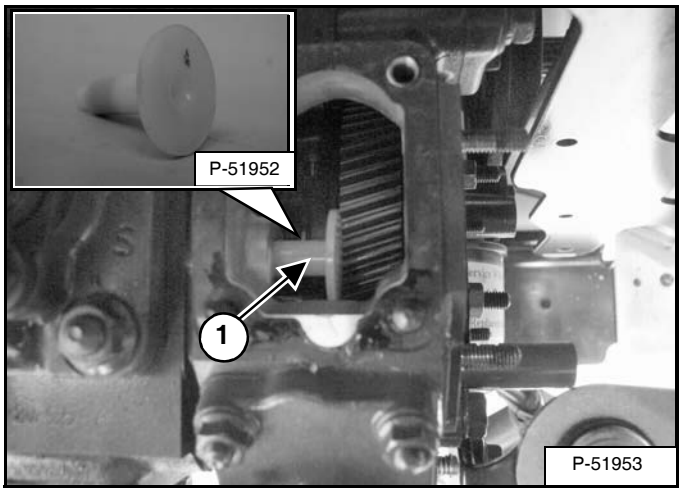
Figure 70-70-30



Remove the cover plate bolts (Item 1) and nuts (Item 2) **[Figure 70-70-30]**.

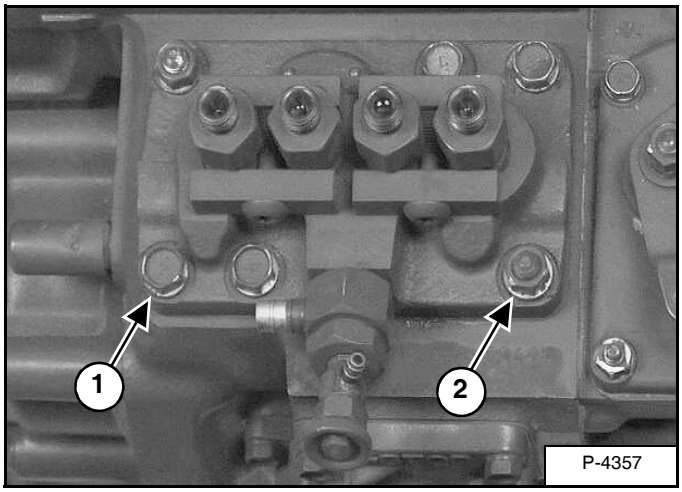
Remove the cover plate (Item 3) **[Figure 70-70-30]**.

Figure 70-70-31



Remove the stop solenoid guide (Item 1) **[Figure 70-70-31]**.

Figure 70-70-32



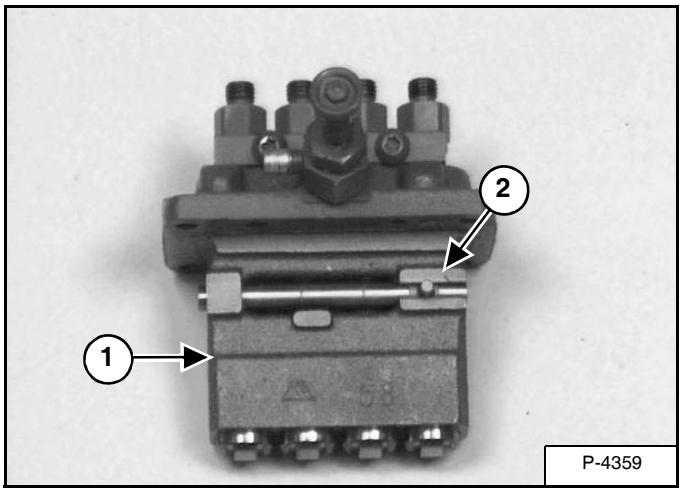
Remove the four mounting bolts (Item 1) and two nuts (Item 2) **[Figure 70-70-32]** from the injection pump.

Installation: Tighten the mounting bolts to 16-20 ft.-lb. (22-27 N•m) torque.

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Fuel Injection Pump Removal And Installation (Non-Turbo) (Cont'd)

Figure 70-70-33



Remove the injection pump (Item 1) **[Figure 70-70-33]** and shim(s) from the engine.

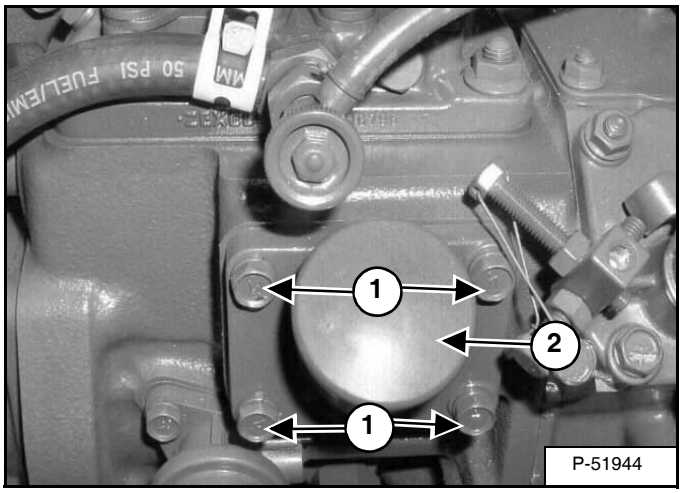
NOTE: The pin (Item 2) [Figure 70-70-33] located on the control rack, needs to be installed correctly during installation. See the following procedure for correct installation.

IMPORTANT

Do not attempt to maintain or adjust unless you are trained and have the correct equipment.

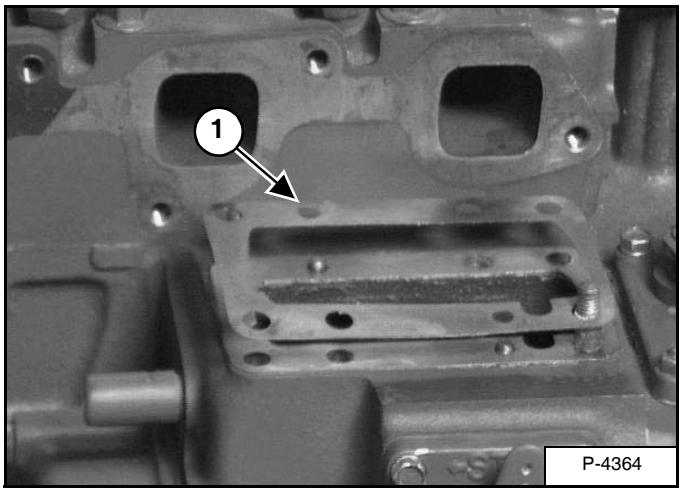
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Figure 70-70-34



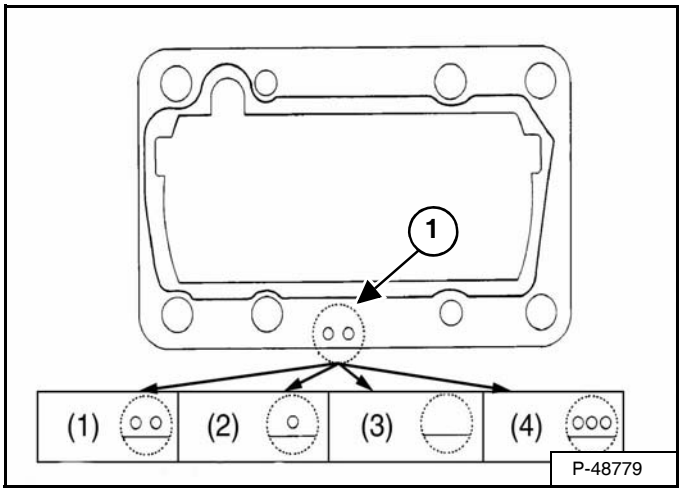
Installation: Remove the bolts (Item 1) that secure the fill cover (Item 2) **[Figure 70-70-34]** from the injection pump chamber.

Figure 70-70-35



Install the shim(s) (Item 1) **[Figure 70-70-35]** on the injection pump mounting surface. For information on the number of shims used. (See Timing The Injection Pump on Page 70-70-12.)

Figure 70-70-36



The size of shims are identified by a symbol (Item 1) **[Figure 70-70-36]** on the shims.

(1) Two holes means .0008 in (.20 mm) shim.

(2) One hole means .0010 in (.25 mm) shim.

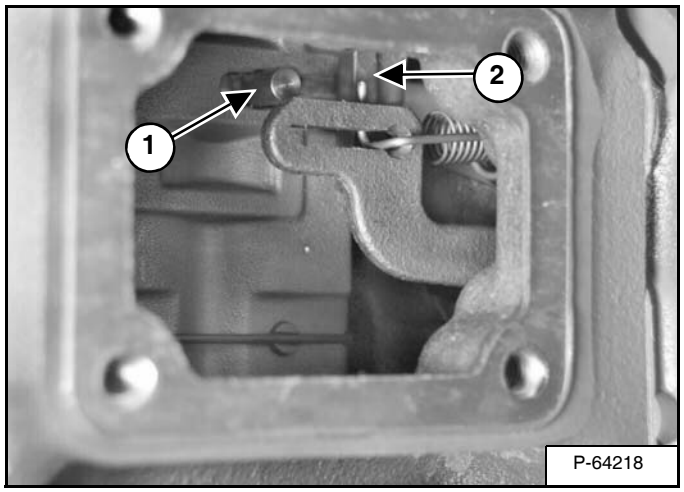
(3) Without hole means .0012 in (.30 mm) shim.

(4) Three holes means .0014 in (.35 mm) shim.

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Fuel Injection Pump Removal And Installation (Non-Turbo) (Cont'd)

Figure 70-70-37



Install the injection pump in the engine.

Ensure the control rack pin (Item 1) is to the left side of the fork lever (Item 2) **[Figure 70-70-37]**.

Timing The Injection Pump

IMPORTANT

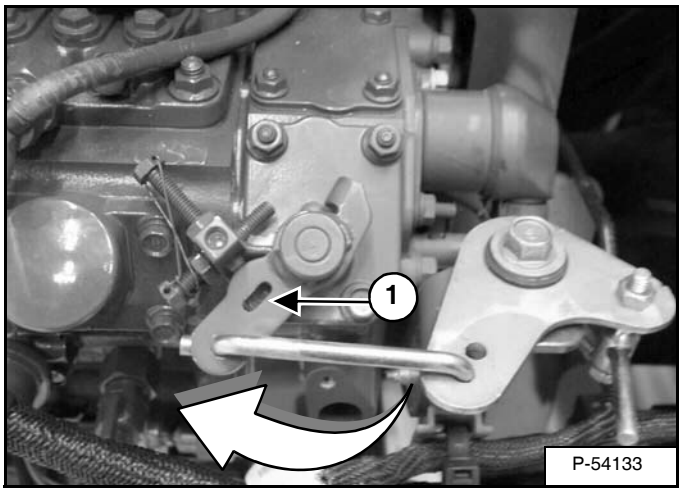
Do not attempt to maintain or adjust unless you are trained and have the correct equipment.

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Timing the injection pump is done by changing the number of shims between the injection pump and the injection pump mounting surface.

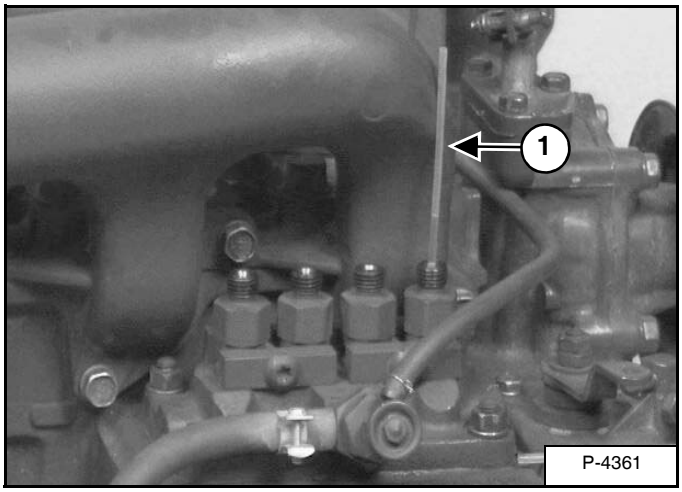
Disconnect the number one cylinder high pressure line from the injection pump.

Figure 70-70-38



Turn the fuel supply lever (Item 1) **[Figure 70-70-38]** to the ON position.

Figure 70-70-39

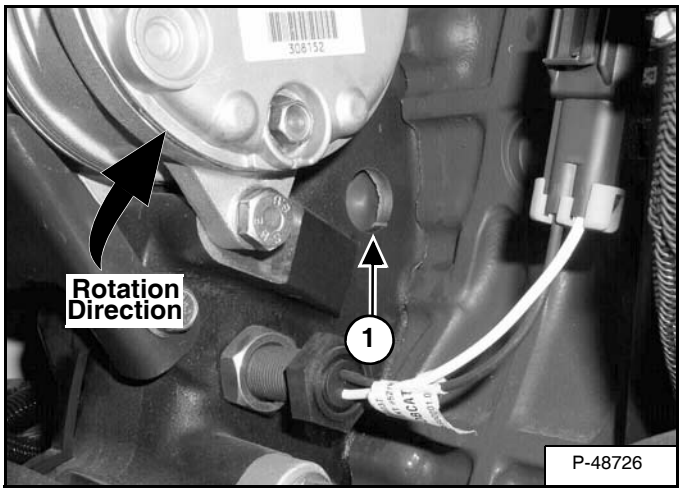


Install a short plastic tube (Item 1) **[Figure 70-70-39]** in the number one cylinder port of the injection pump. The tube should fit securely in the port and point upward.

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Timing The Injection Pump (Cont'd)

Figure 70-70-40



Rotate the engine in the direction shown **[Figure 70-70-40]**.

Continue rotation until flywheel timing mark just appears in the window (Item 1) **[Figure 70-70-40]**.

NOTE: The flywheel has three timing marks.

The first mark to appear in the window with the rotation is 9.25° which is used for loaders with the Kubota V2003T engine.

The second mark to appear in the window is 8.2° which is used for loaders with the Kubota V2203 engine.

The third mark to appear in the window is 6.75° which is used for loaders with the Kubota V2403 engine.

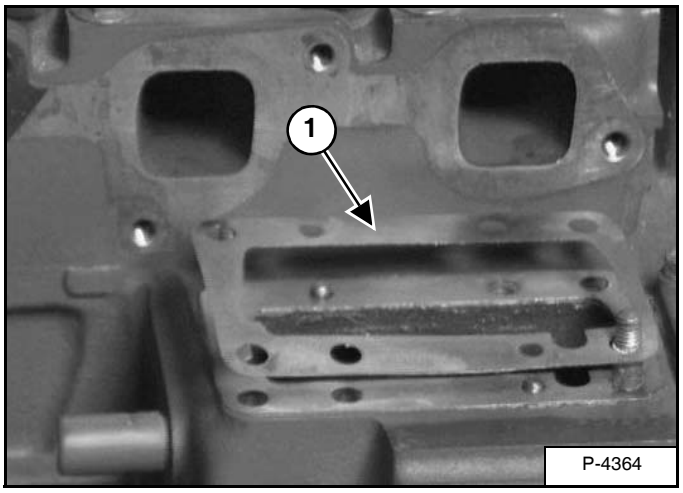
Rotate slowly until fuel just starts to flow upward into the plastic tube.

At this instant, the **9.25° BTDC** timing mark on the flywheel should be aligned with the mark in the window (Item 1) **[Figure 70-70-40]** for the **V2003T** engine.

OR

The **8.2° BTDC** on the flywheel should be aligned with the mark in the window (Item 1) **[Figure 70-70-40]** for the **V2203** engine.

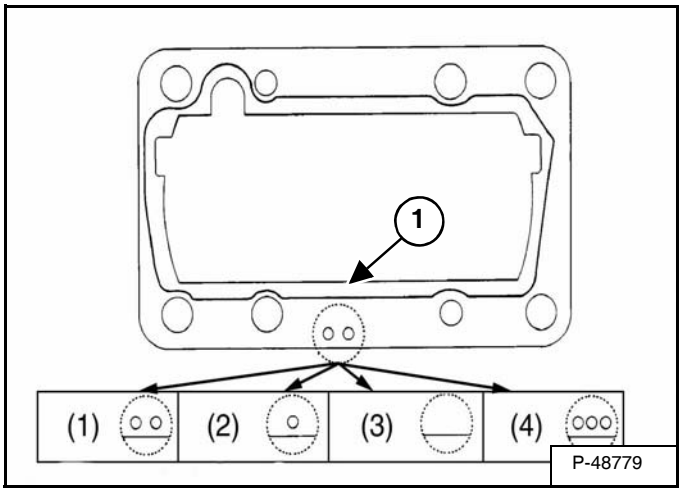
Figure 70-70-41



Add or subtract shim(s) (Item 1) **[Figure 70-70-41]** as needed to adjust the fuel delivery timing.

NOTE: Adding or removing one shim will vary the timing by 1.5°. Adding shims retards timing.

Figure 70-70-42



The size of shims are identified by a symbol on the shims.

(1) Two holes means .0008 in (.20 mm) shim.

(2) One hole means .0010 in (.25 mm) shim.

(3) Without hole means .0012 in (.30 mm) shim.

(4) Three holes means .0014 in (.35 mm) shim.

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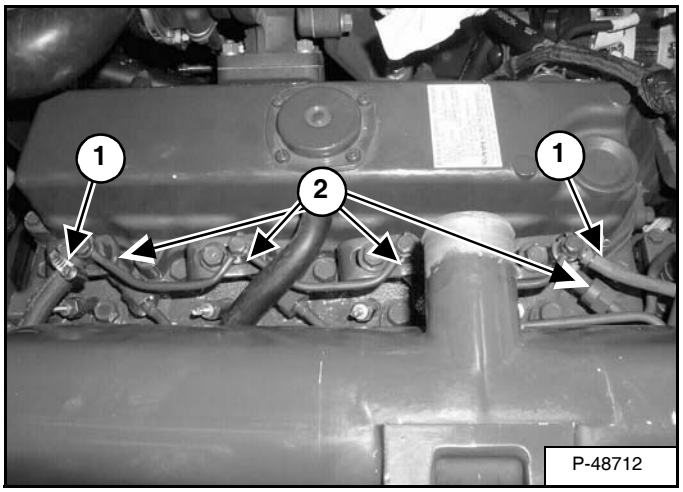
Fuel Injector Removal And Installation

⚠ WARNING

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

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Figure 70-70-43



The following are some problems caused by faulty injectors:

- -Engine is hard to start or will not start
- -Rough engine operation and idle
- -Engine will not have full power
- -Excessive exhaust smoke

Disconnect the fuel return hoses (Item 1) **[Figure 70-70-43]** from the injectors.

Disconnect the high pressure fuel lines (Item 2) **[Figure 70-70-43]** from the fuel injectors and from the injection pump.

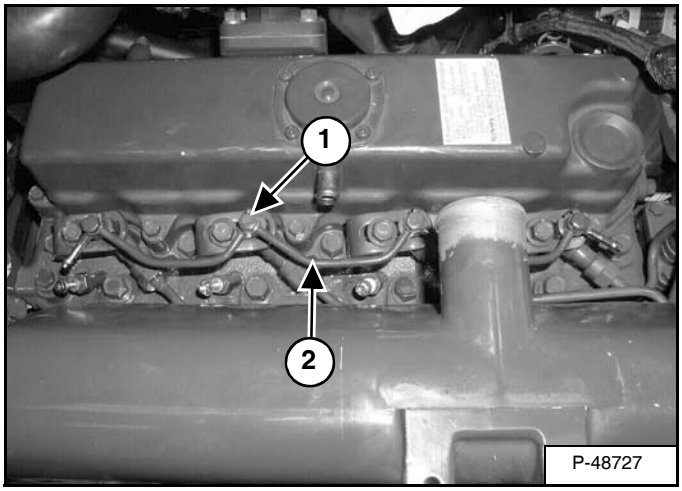
Remove the high pressure fuel lines from the engine.

IMPORTANT

Do not bend the high pressure fuel injection tubes when removing or installing them.

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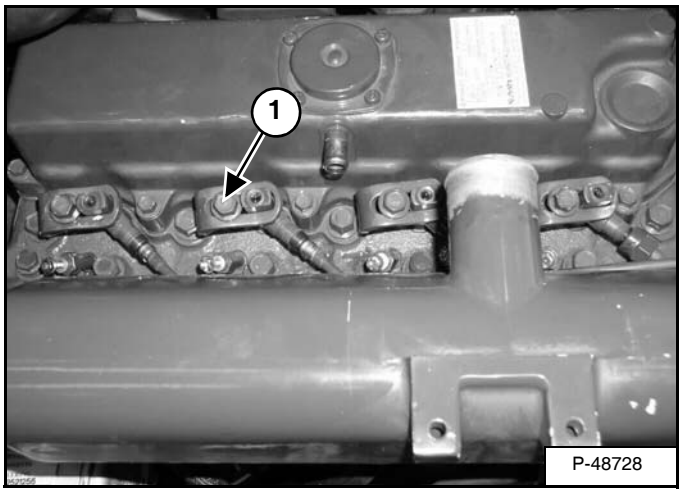
Figure 70-70-44



Remove the four retainer bolts from the top of the fuel injectors (Item 1) **[Figure 70-70-44]**.

Remove the fuel return tube (Item 2) **[Figure 70-70-44]** from the fuel injectors.

Figure 70-70-45



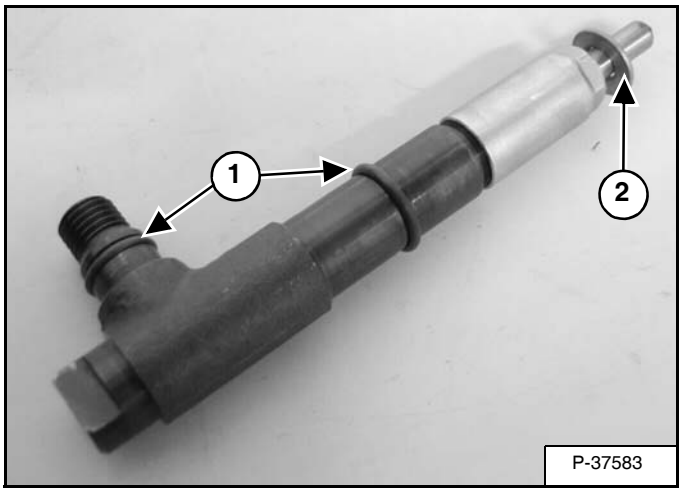
Remove the injector nozzle holder bolt (Item 1) **[Figure 70-70-45]** from the cylinder head.

Pull on the injector nozzle to remove the injector nozzle from the cylinder head.

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Fuel Injector Removal And Installation (Cont'd)

Figure 70-70-46



[Figure 70-70-46] shows the injector nozzle removed from the cylinder. Inspect the injector and replace if necessary.

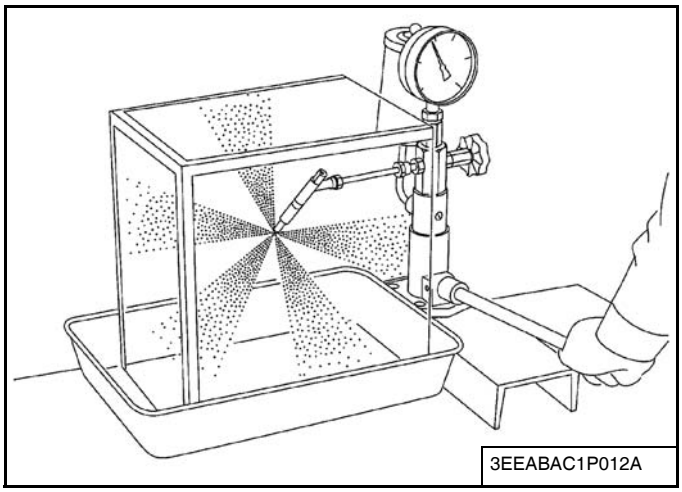
Check and replace the injector nozzle O-rings (Item 1) and the nozzle washer (Item 2) before installing new or used injectors. **[Figure 70-70-46]**.

Checking Nozzle Injection Pressure

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

OEM1064 - Injector Nozzle Tester

Figure 70-70-47



Set the injection nozzle to the nozzle tester.

Slowly move the tester handle to measure the pressure at which fuel begins jetting out from the nozzle.

If the measurement is not within the factory specifications, replace the injection nozzle assembly.

NOTE: Injection nozzle gasket must be replaced when the injection nozzle is removed for checking.

Injection pressure	Factory spec.	18.6 to 20.1 MPa 190 to 205 kgf/cm² 2702 to 2916 PSI

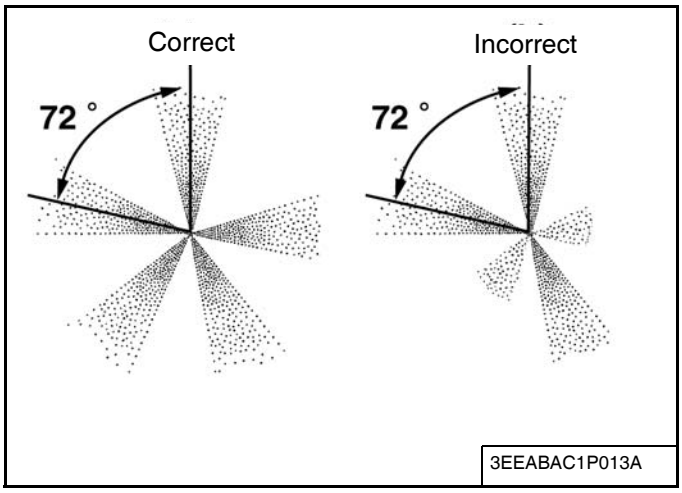
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Nozzle Spraying Condition

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

OEM1064 - Injector Nozzle Tester

Figure 70-70-48



Set the injection nozzle to a nozzle tester, and check the nozzle spraying condition.

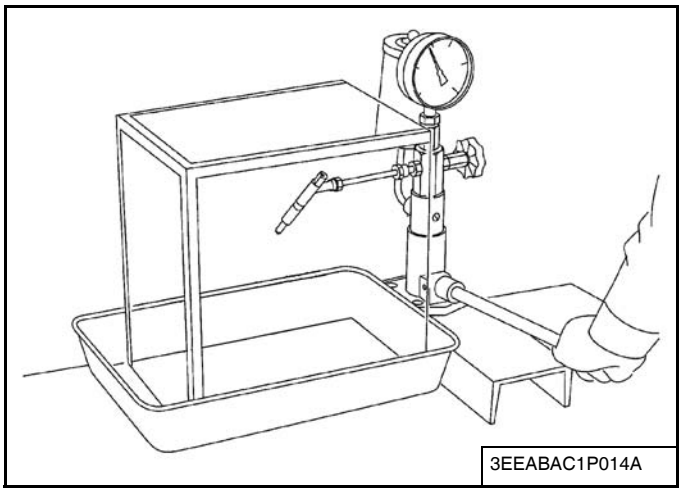
If the spraying condition is defective, replace the injection nozzle assembly.

Valve Seat Tightness

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

OEM1064 - Injector Nozzle Tester

Figure 70-70-49



Set the injection nozzle to a nozzle tester.

Raise the fuel pressure, and keep at 16.67 MPa (170 kgf/cm², 2418 PSI) for 10 seconds.

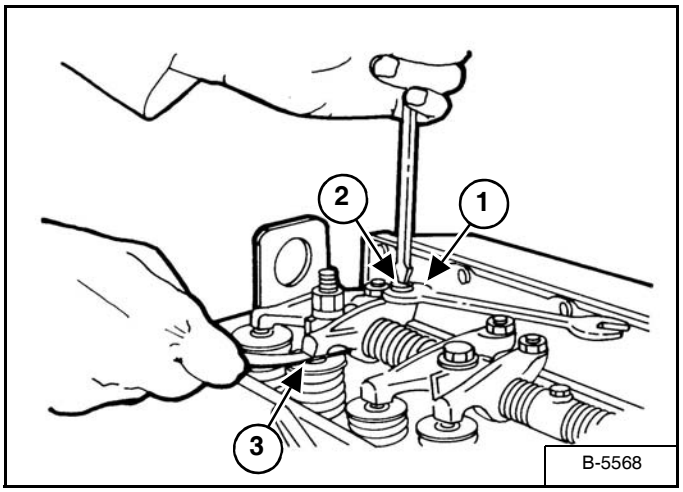
If any fuel leak is found, replace the injection nozzle assembly.

Valve seat tightness	Factory spec.	No fuel leak at 16.67 MPa 170 kgf/cm² 2418 PSI

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Valve Clearance Adjustment

Figure 70-70-50



Adjust the valve clearance as follows:

Loosen the lock nut (Item 1) **[Figure 70-70-50]**.

Turn the adjustment screw (Item 2) **[Figure 70-70-50]** until the correct clearance is obtained.

NOTE: The clearance is measured between the rocker arm and valve stem tip (Item 3) [Figure 70-70-50].

Figure 70-70-51

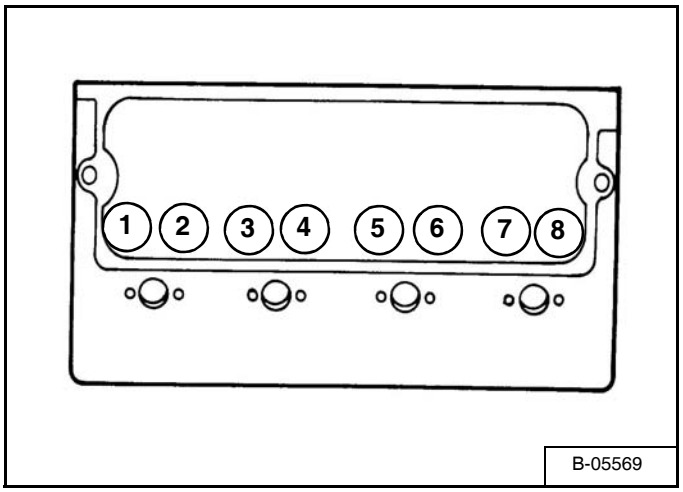


Figure 70-70-52

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

Adjust the valve clearance as follows:

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

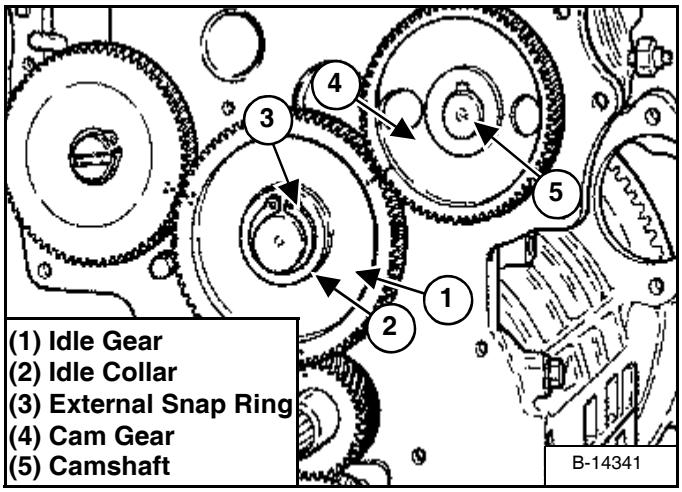
Use the following sequence to set the valves **[Figure 70-70-51]** & **[Figure 70-70-52]**:

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

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Valve Timing, Checking

Figure 70-70-53



(1) Idle Gear
(2) Idle Collar
(3) External Snap Ring
(4) Cam Gear
(5) Camshaft

Stop the engine and open the rear door.

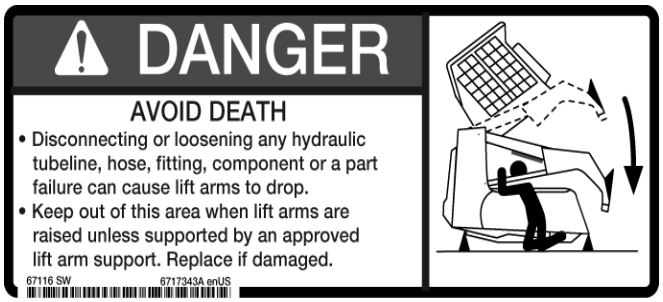
Remove the engine. (See Removal And Installation on Page 70-80-1.)

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-10.)

Make sure the timing marks are in correct alignment **[Figure 70-70-53]**.

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Removal And Installation



WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Put jackstands under the rear corners of the loader.

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Drain the hydraulic reservoir. (See Replacing Hydraulic Fluid on Page 10-120-1.)

Disconnect the steering linkage. (See Linkage Removal And Installation on Page 50-101-7.)

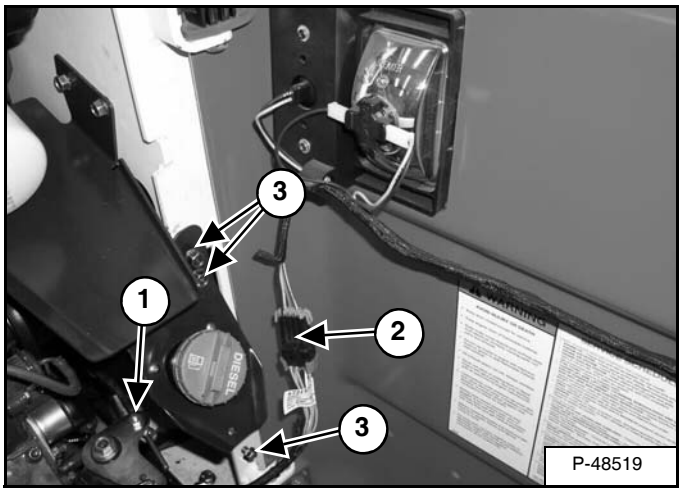
Remove the battery from the loader. (See Removal And Installation on Page 60-20-1.)

Drain the engine coolant from the cooling system. (See ENGINE COOLING SYSTEM on Page 10-90-1.)

Remove the air cleaner. (See Removal And Installation on Page 70-40-1.)

Remove the muffler. (See Removal And Installation on Page 70-30-1.)

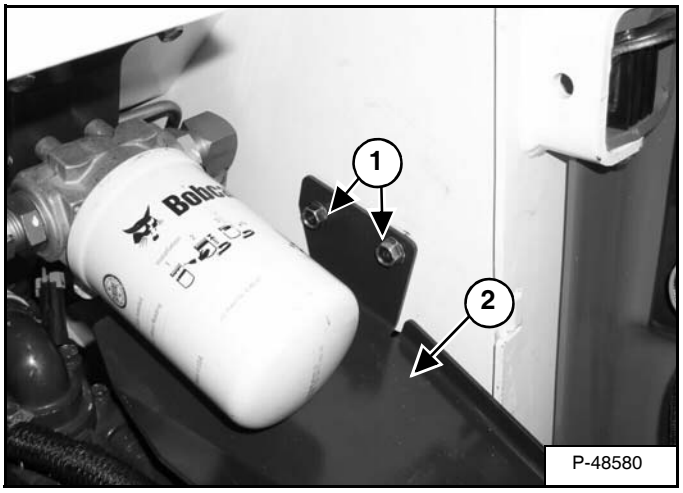
Figure 70-80-1



Remove the nut from the speed control linkage (Item 1) and unplug the rear lights electrical connector (Item 2) **[Figure 70-80-1]**.

Remove the bracket mounting bolts (Item 3) **[Figure 70-80-1]** for the fuel fill to make installation easier.

Figure 70-80-2

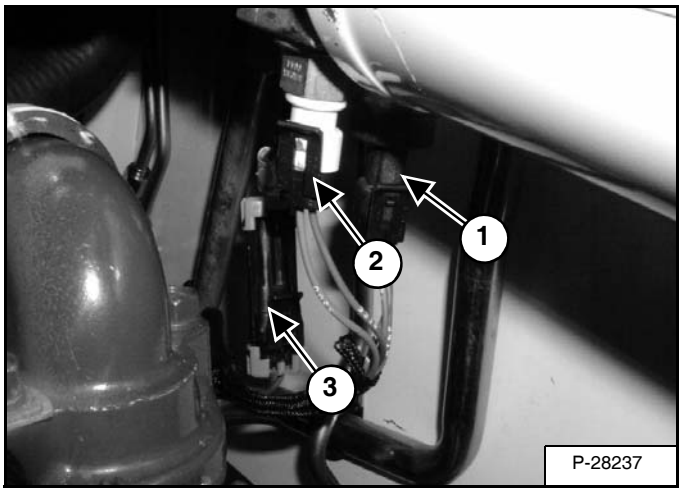


Remove the two mounting bolts (Item 1) to remove the oil filter drip shield (Item 2) **[Figure 70-80-2]**.

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Removal And Installation (Cont'd)

Figure 70-80-3

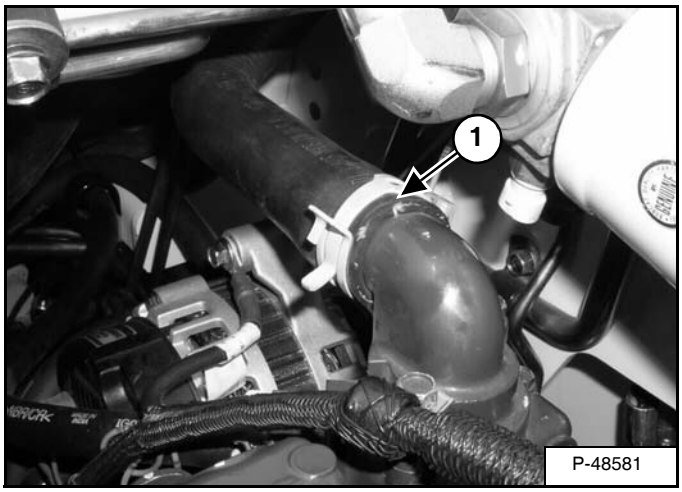


Disconnect the wires from the charge pressure sender (Item 1) **[Figure 70-80-3]** from the filter housing.

Disconnect the temperature sender connector (Item 2) **[Figure 70-80-3]** from the filter housing.

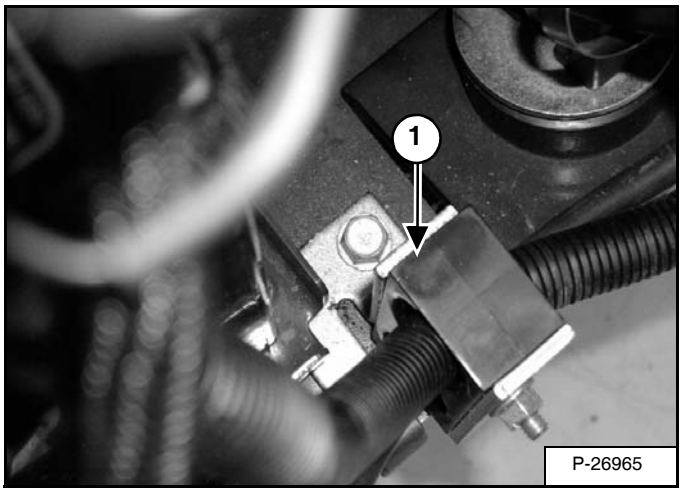
Disconnect the wire connector (Item 3) **[Figure 70-80-3]** from the differential pressure switch on the filter housing.

Figure 70-80-4



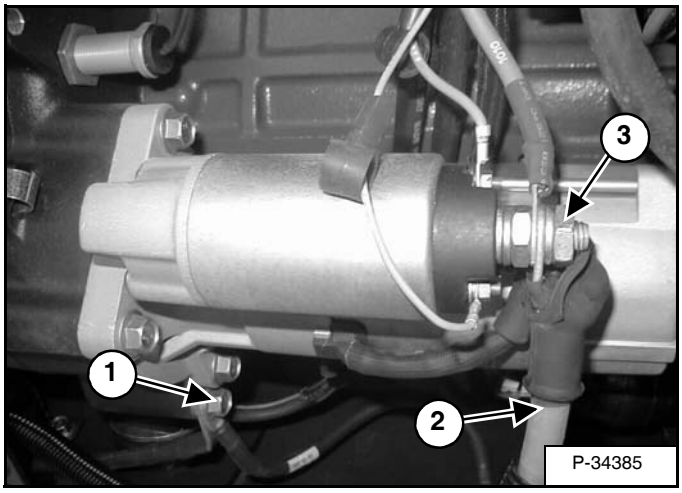
Disconnect radiator hose (Item 1) **[Figure 70-80-4]**.

Figure 70-80-5



Remove battery cable bracket (Item 1) **[Figure 70-80-5]**.

Figure 70-80-6



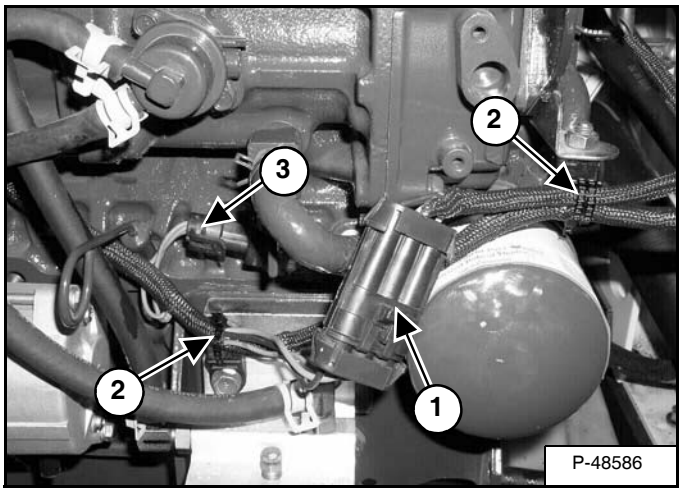
Disconnect negative battery cables from starter mount bolt (Item 1) **[Figure 70-80-6]**.

Disconnect positive battery cable (Item 2) from starter terminal (Item 3) **[Figure 70-80-6]**.

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Removal And Installation (Cont'd)

Figure 70-80-7

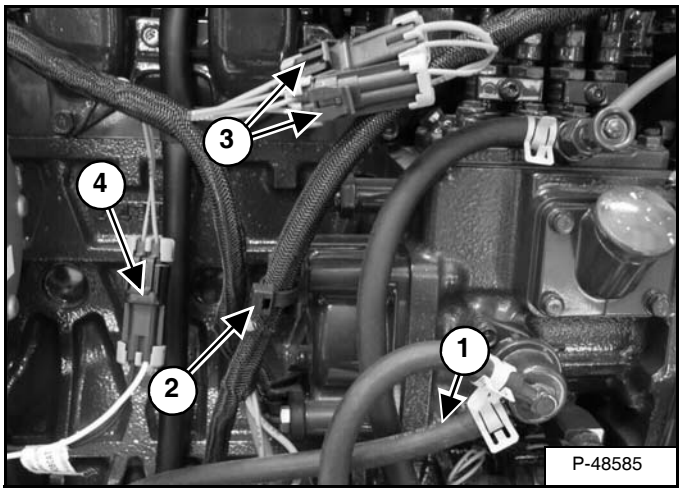


Disconnect the fuel stop wire harness (Item 1) **[Figure 70-80-7]**.

Remove the tie straps (Item 2) **[Figure 70-80-7]** from wiring harness clamp.

Disconnect engine oil pressure wire harness (Item 3) **[Figure 70-80-7]**.

Figure 70-80-8



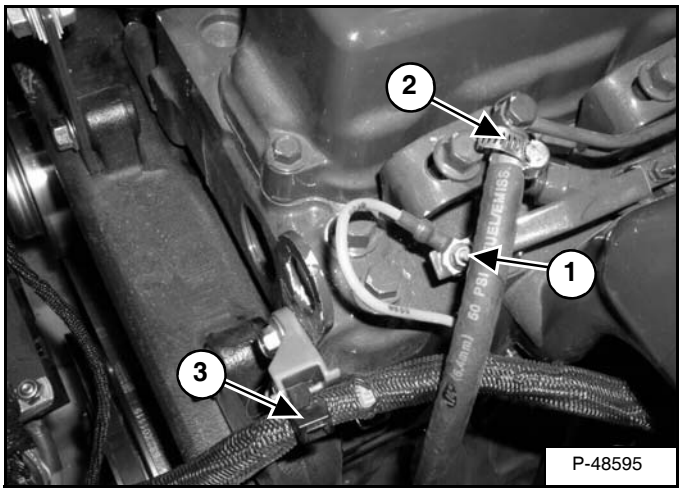
Disconnect fuel line (Item 1) **[Figure 70-80-8]**.

Cut tie straps (Item 2) **[Figure 70-80-8]**.

Mark and disconnect loader harness wire connectors (Item 3) **[Figure 70-80-8]**.

Disconnect engine speed harness (Item 4) **[Figure 70-80-8]**.

Figure 70-80-9

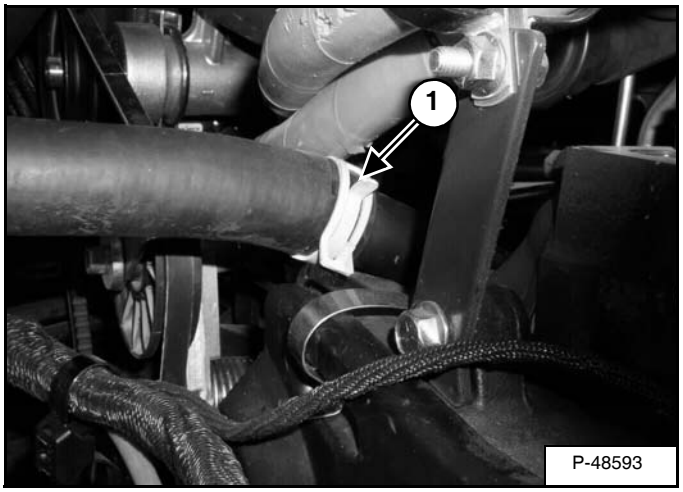


Disconnect glow plug wire (Item 1) **[Figure 70-80-9]**.

Disconnect and plug fuel return line (Item 2) **[Figure 70-80-9]**.

Remove the tie strap (Item 3) **[Figure 70-80-9]** from wiring harness clamp and move the wire harness to the left side of loader to allow clearance for engine removal.

Figure 70-80-10



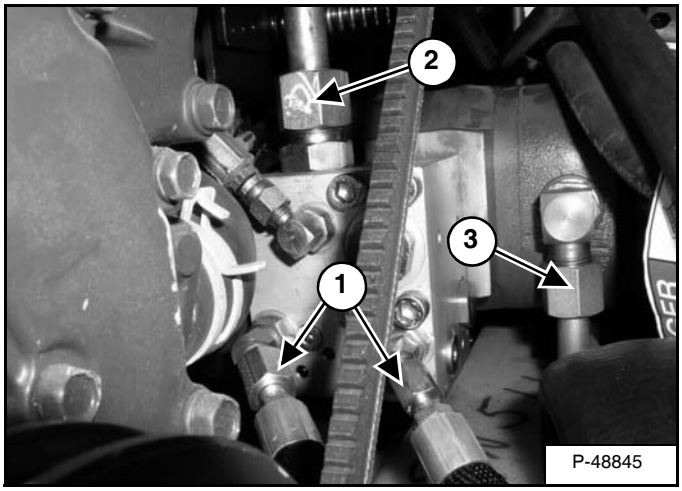
Disconnect engine coolant hose (Item 1) **[Figure 70-80-10]**.

Cap or plug all hoses and fittings.

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Removal And Installation (Cont'd)

Figure 70-80-11



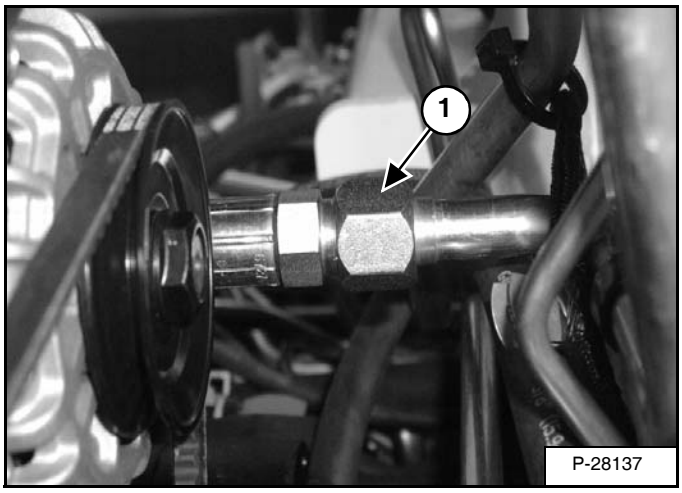
Disconnect power Bob-Tach hoses (Item 1) **[Figure 70-80-11]** and solenoid connectors (If so equipped).

Disconnect outlet hose (Item 2) **[Figure 70-80-11]**.

Disconnect high flow outlet hose (Item 3) **[Figure 70-80-11]** (If so equipped).

Cap or plug all hoses and fittings.

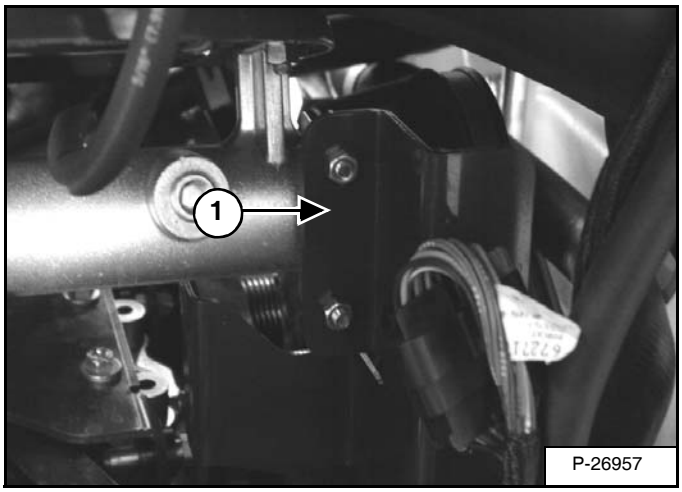
Figure 70-80-12



Disconnect inlet hydrostatic motor hose from hydraulic filter tubeline (Item 1) **[Figure 70-80-12]**.

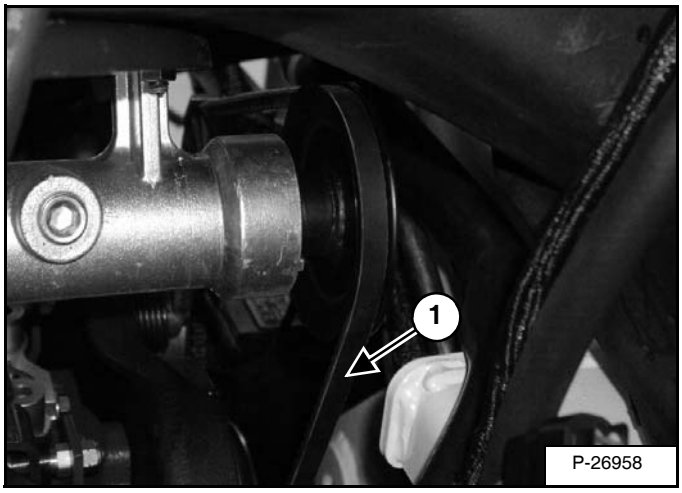
Cap or plug all hoses and fittings.

Figure 70-80-13



Remove fan belt shield (Item 1) **[Figure 70-80-13]**.

Figure 70-80-14

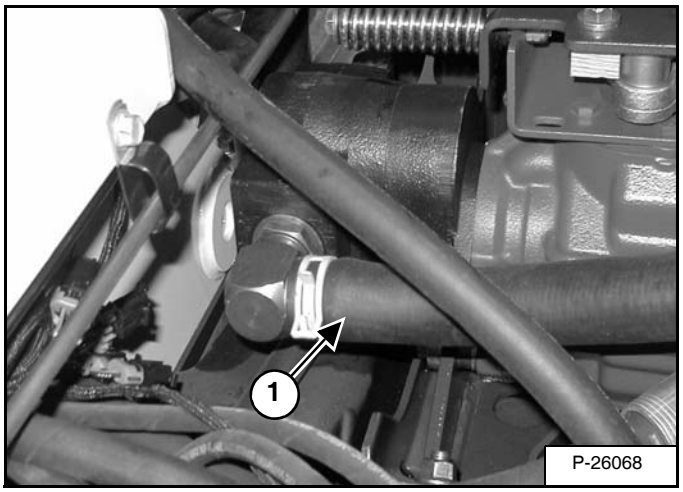


Remove fan belt (Item 1) **[Figure 70-80-14]** from pulley.

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Removal And Installation (Cont'd)

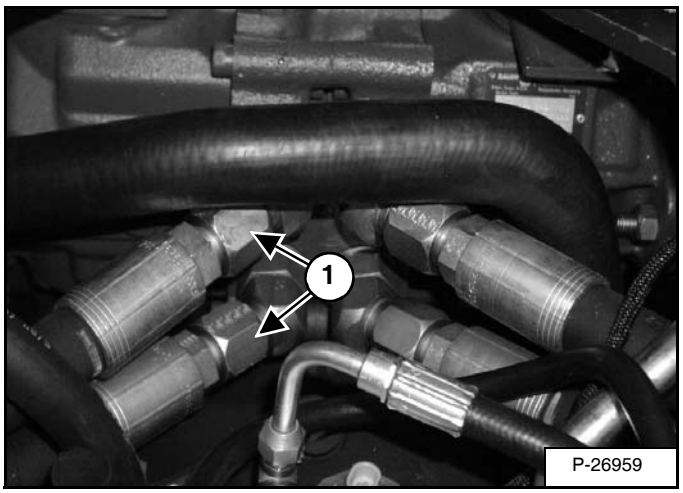
Figure 70-80-15



Disconnect inlet gear pump hose (Item 1) **[Figure 70-80-15]**.

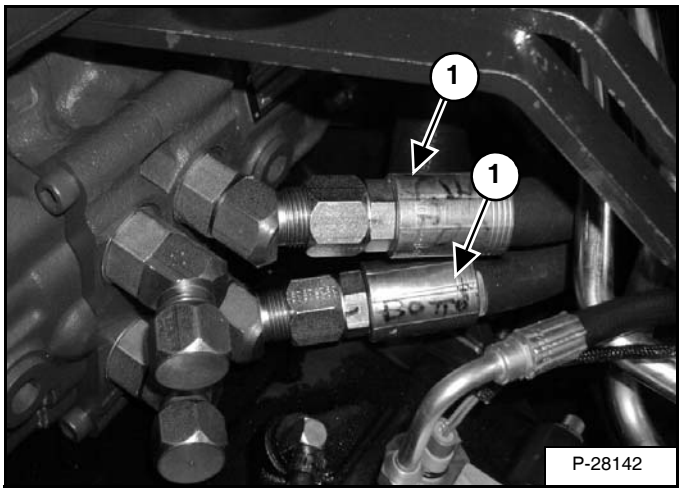
Cap or plug all hoses and fittings.

Figure 70-80-16



Mark and disconnect the two right drive motor hoses (Item 1) **[Figure 70-80-16]**.

Figure 70-80-17



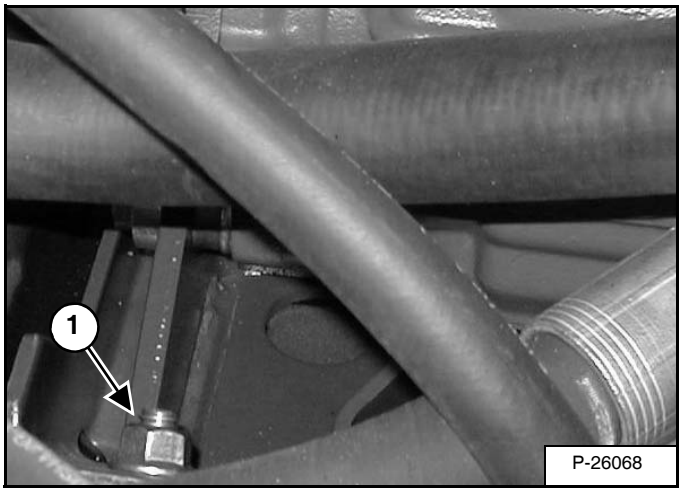
Mark and disconnect the left drive motor hoses (Item 1) **[Figure 70-80-17]**.

Cap or plug all hoses and fittings.

NOTE: Due to the left drive motor hoses (Item 1) [Figure 70-80-17] orientation, hoses may not be completely removed from fittings until engine and pump is partially removed.

Installation: Install the left drive motor hoses prior to alignment with engine mount bolts.

Figure 70-80-18



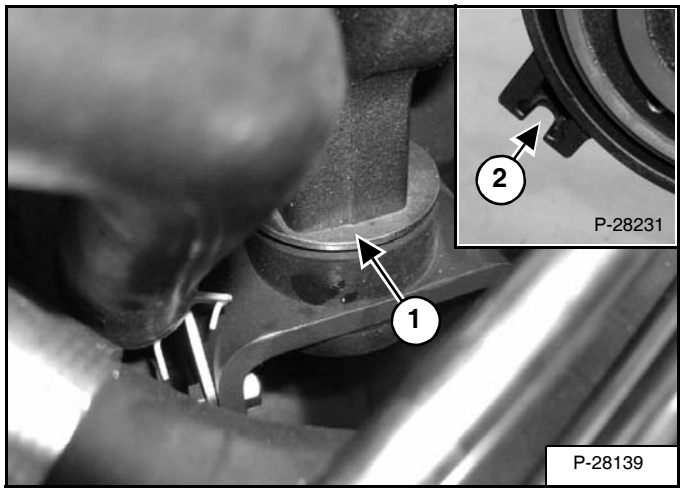
Remove the mounting bolt and nut (Item 1) **[Figure 70-80-18]** from the right front engine mount.

Installation: Tighten the mounting bolt to 70 ft.-lb. (95 N•m) torque.

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Removal And Installation (Cont'd)

Figure 70-80-19



Remove the mounting bolt (Item 1) **[Figure 70-80-19]** and nut from the left front engine mount.

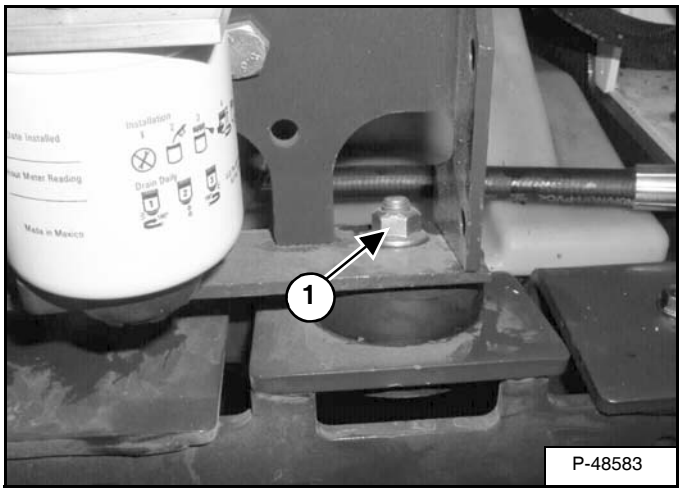
Installation: Slide the engine mount slot (Item 2) **[Figure 70-80-19]** in between engine mount washer and nut. Tighten the mounting bolt to 70 ft.-lb. (95 N•m) torque.

NOTE: To aid in the removal of the left front engine mount bolt, remove the control panel. (See Removal and Installation on Page 50-100-1.)

Use 1/2 inch drive impact wrench, with a 12 inch extension, on a 3/4 inch flex socket.

Removal will be accomplished by reaching under the hydraulic reservoir to the engine mount bolt.

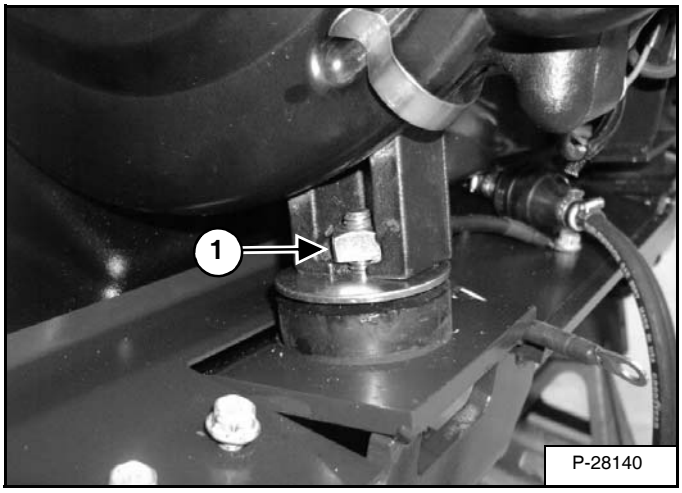
Figure 70-80-20



Remove the mounting bolt and nut (Item 1) **[Figure 70-80-20]** from the right rear engine mount.

Installation: Tighten the mounting bolt to 70 ft-lb. (95 N•m) torque.

Figure 70-80-21



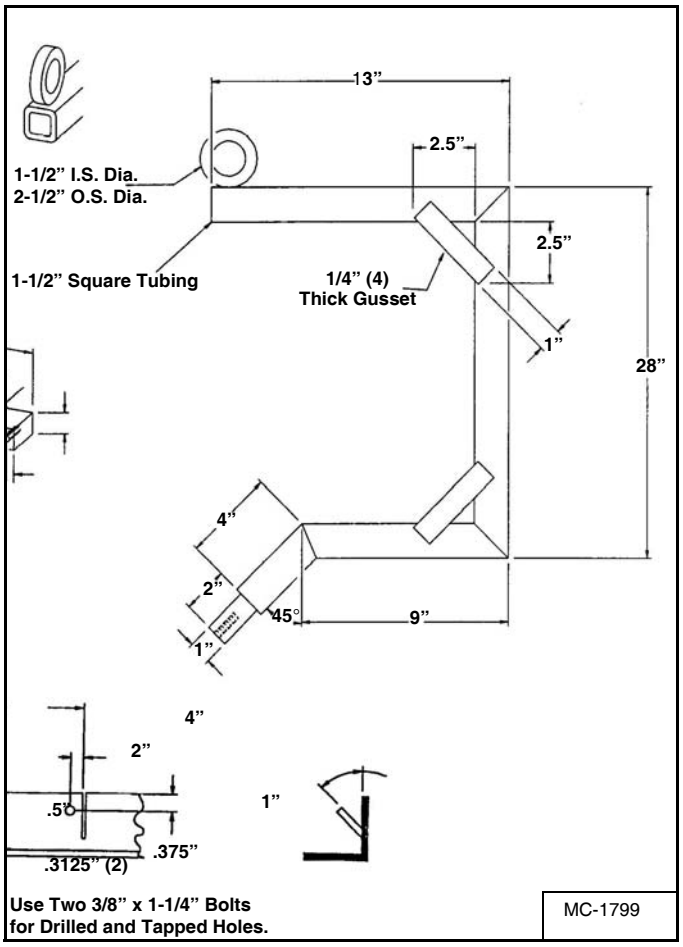
Remove the mounting bolt and nut (Item 1) **[Figure 70-80-21]** from the left rear engine mount.

Installation: Tighten the mounting bolt to 70 ft-lb. (95 N•m) torque.

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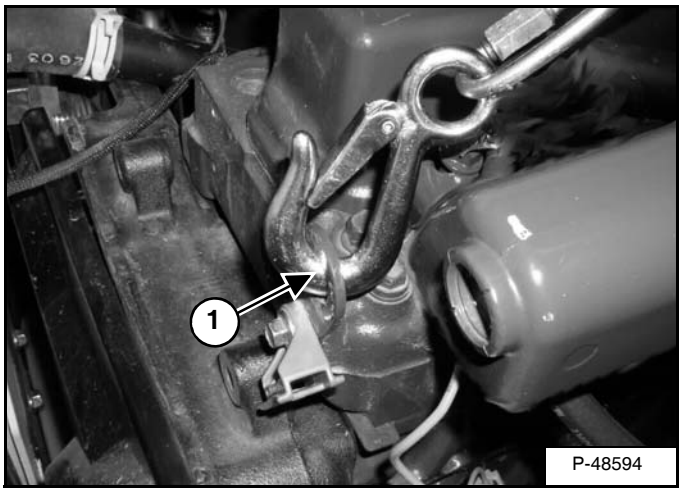
Removal And Installation (Cont'd)

Figure 70-80-22



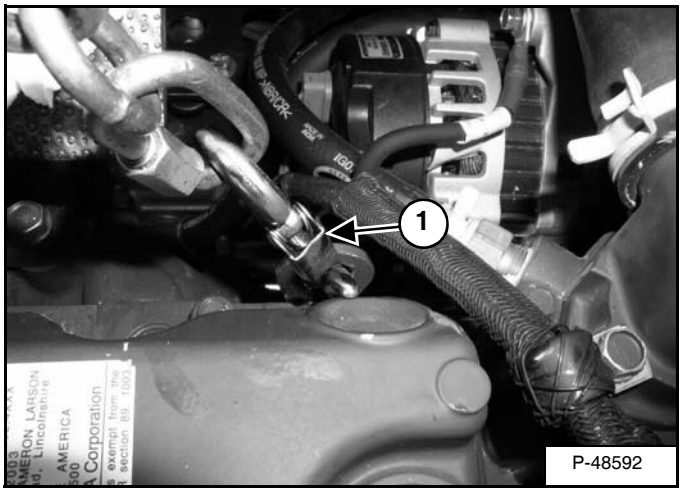
A tool needs to be fabricated to use in the removal procedure. This tool allows the engine/hydrostatic pump assembly to be lifted evenly for easier removal. Use the dimensions shown in **[Figure 70-80-22]** to make the engine removal tool.

Figure 70-80-23



Fasten securely one end of the chain to the lifting eye (Item 1) **[Figure 70-80-23]**.

Figure 70-80-24



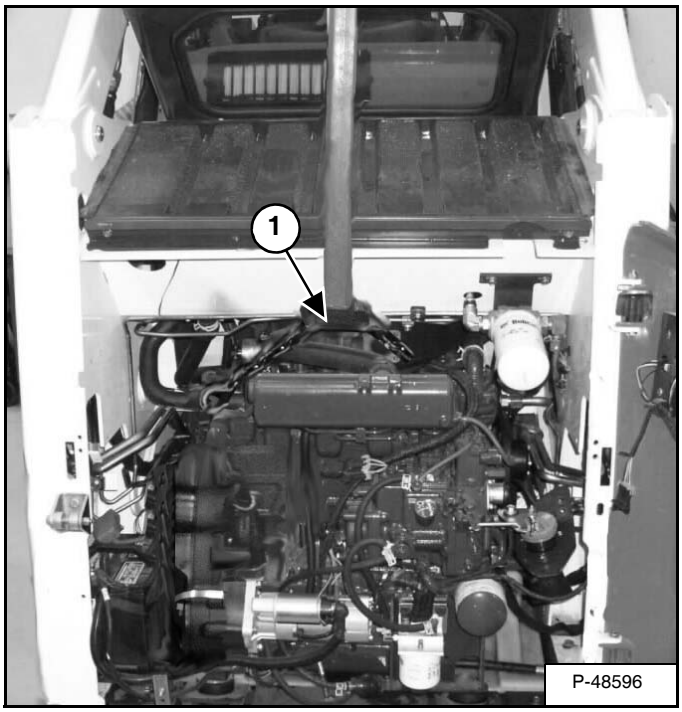
Fasten securely one end of the chain to the other lifting eye (Item 1) **[Figure 70-80-24]**.

NOTE: You may need to adjust the chain which fastens to the engine a couple of times to reach the correct lifting position.

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Removal And Installation (Cont'd)

Figure 70-80-25



Install the chain hoist on the eyelet **[Figure 70-80-25]** of the removal tool.

Fasten a chain to other end of the removal tool with two bolts as shown in (Item 1) **[Figure 70-80-25]**.

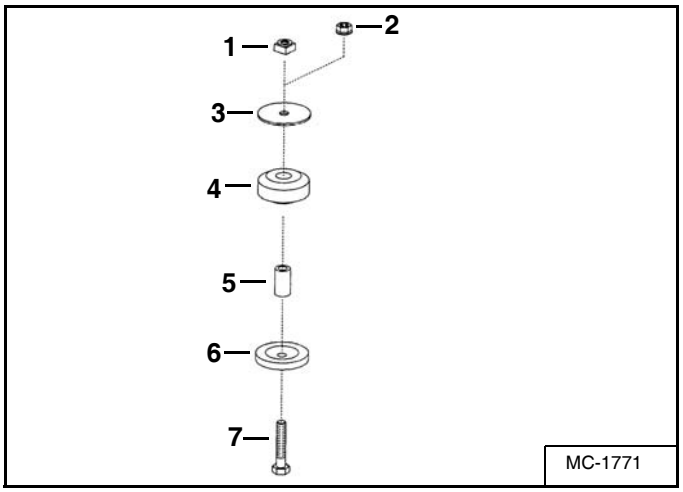
Remove the engine/hydrostatic pump assembly from the loader.

Reverse the removal procedure to install the engine.

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Engine Mount Replacement

Figure 70-80-26



Use the following procedure to install new engine mounts:

Remove the existing mount from the engine. Refer to engine removal and installation for engine mount locations.

Replace all four engine mounts two front and two rear.

Use the parts shown to install the new engine mounts **[Figure 70-80-26]**:

Square Nut - (Item 1) - Used on left side engine mounts

Hex Nut - (Item 2) - Used on right side engine mounts

Mount Washer - (Item 3)

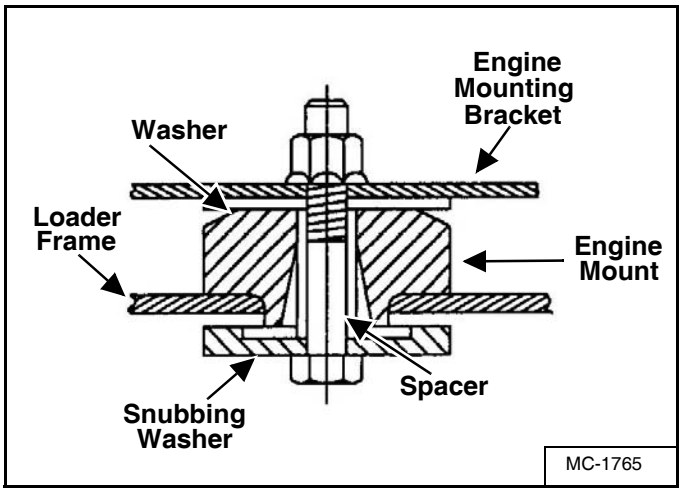
Engine Mount - (Item 4)

Tube Spacer - (Item 5)

Snubbing Washer - (Item 6)

Mounting Bolt - (Item 7)

Figure 70-80-27



Install the new engine mount as shown in the cut away side view **[Figure 70-80-27]**.

Tighten the mounting bolts to 70 ft.-lb. (95 N•m) torque.

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FLYWHEEL AND HOUSING

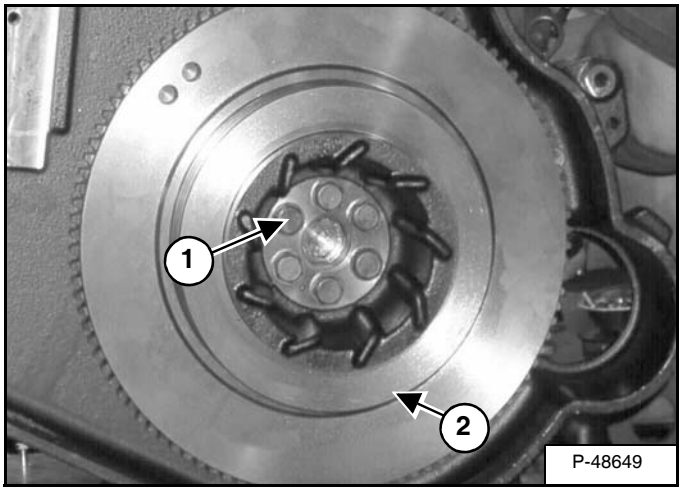
Flywheel Removal And Installation

Remove the drive belt shield. (See Shield Removal And Installation on Page 30-50-1.)

Remove the drive belt. (See Drive Belt Replacement on Page 30-50-3.)

Remove the drive belt tension pulley. (See Tensioner Pulley Removal And Installation on Page 30-50-4.)

Figure 70-90-1



Remove the six mounting bolts (Item 1) from the engine flywheel (Item 2) **[Figure 70-90-1]**.

Installation: Apply engine oil to the threads and seats before tightening. Tighten to 72-80 ft.-lb. (98-108N•m) torque.

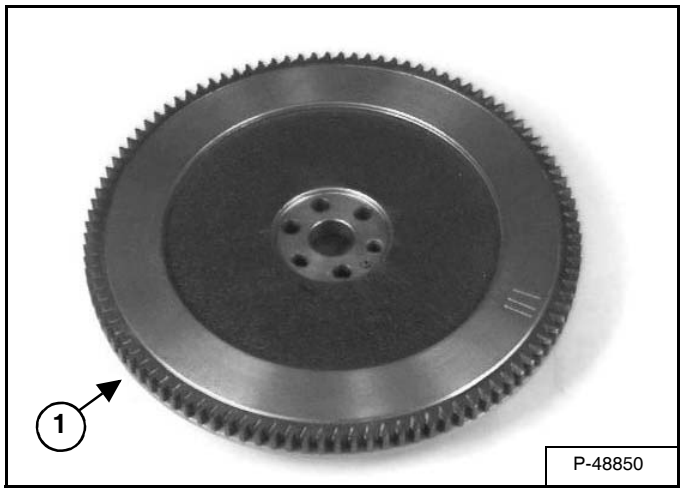
Remove the flywheel from the engine.

Installation: Be sure to align the hole in the flywheel with the pin located on the crankshaft.

Reverse the removal procedure to install the flywheel.

Ring Gear Removal And Installation

Figure 70-90-2



The ring gear (Item 1) **[Figure 70-90-2]** on the flywheel is an interference fit. Heat the ring gear enough to expand the gear. Hit the ring gear evenly around the gear to remove it from the flywheel.

Clean the outer surface of the flywheel thoroughly so the new ring gear will fit smoothly onto the flywheel.

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

Fit the ring on the flywheel and be sure the gear is seated correctly.

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Housing Removal And Installation

Remove the drive belt shield. (See Shield Removal And Installation on Page 30-50-1.)

Remove the engine/hydrostatic pump package from the loader.(See Removal And Installation on Page 70-80-1.)

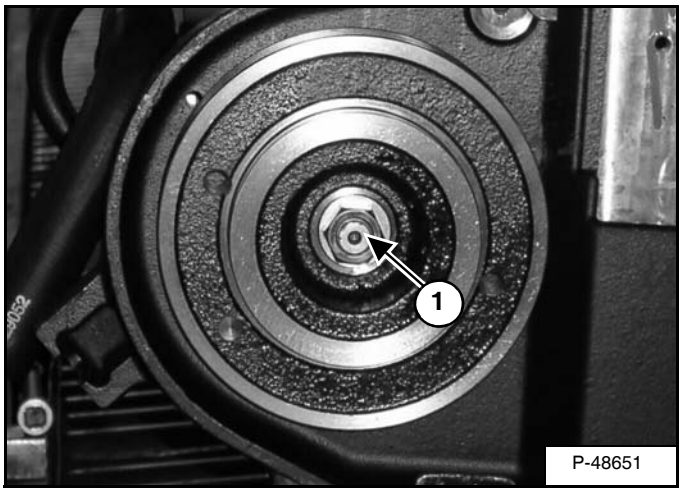
Remove the drive belt. (See Drive Belt Replacement on Page 30-50-3.)

Remove the drive belt tension pulley. (See Tensioner Pulley Removal And Installation on Page 30-50-4.)

Remove the starter. (See Removal And Installation on Page 60-40-2.)

Remove the flywheel. (See Flywheel Removal And Installation on Page 70-90-1.)

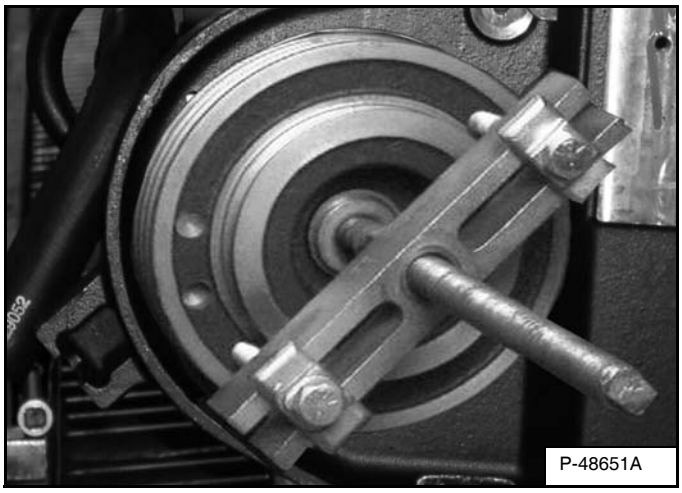
Figure 70-90-3



Remove the hydrostatic pump drive pulley mounting nut (Item 1) **[Figure 70-90-3]** and washer.

Installation: Tighten the mounting nut to 175-200 ft.-lb. (237-271 N•m) torque.

Figure 70-90-4



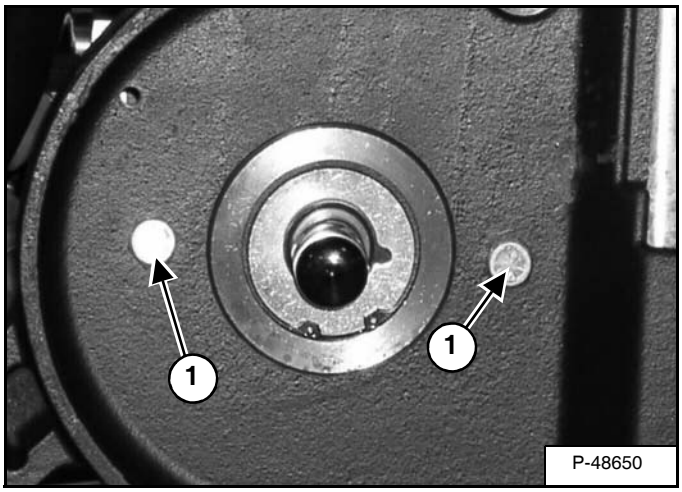
Install a puller in the drive pulley and remove the pulley from the hydrostatic pump shaft **[Figure 70-90-4]**.

Installation: Install the pulley key in the shaft before installing the drive pulley.

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Housing Removal And Installation (Cont'd)

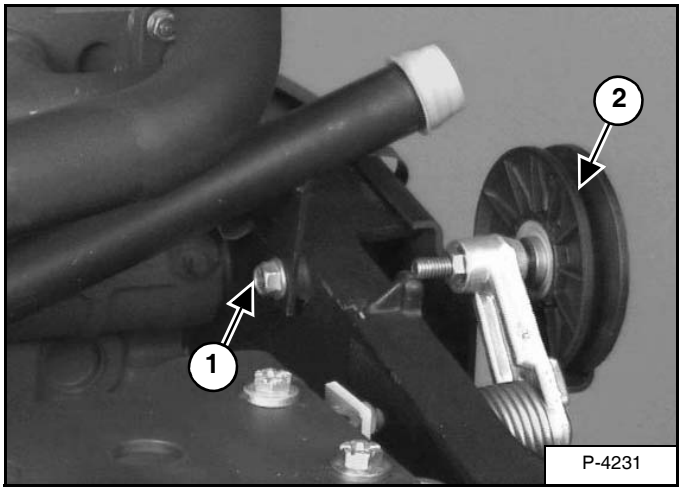
Figure 70-90-5



Remove the two mounting bolts (Item 1) **[Figure 70-90-5]** from the drive belt housing which mount the hydrostatic pump to the housing.

Installation: Tighten the mounting bolts to 65-70 ft.-lb. (88-95 N•m) torque.

Figure 70-90-6

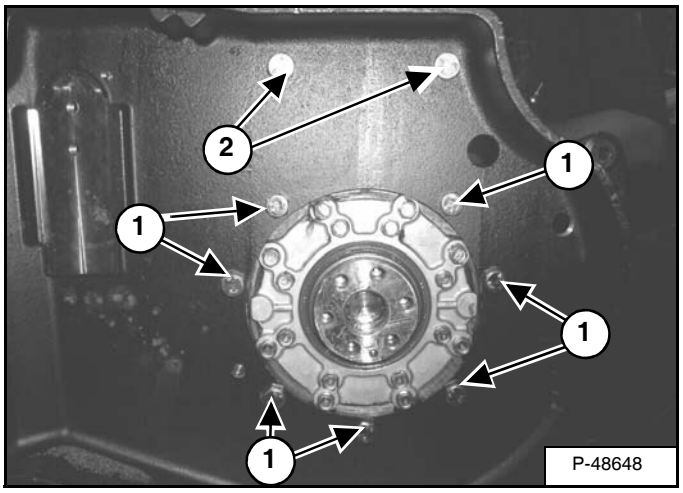


Remove the mounting bolt (Item 1) **[Figure 70-90-6]** from engine coolant tubeline mounting bracket which is attached to the belt shield housing.

Installation: Tighten the mounting bolt to 25-28 ft.-lb. (34-38 N•m) torque.

Remove the blower fan drive belt tensioner assembly (Item 2) **[Figure 70-90-6]** from the housing.

Figure 70-90-7



Remove the seven mounting bolts (Item 1) **[Figure 70-90-7]** which fasten the housing on the engine.

Installation: Tighten the mounting bolts to 35-40 ft.-lb. (48-54 N•m) torque.

Remove the bolt (Item 2) **[Figure 70-90-7]** which fasten the two drain hoses to the housing.

Installation: Tighten the mounting bolts to 60-65 ft.-lb. (82-88 N•m) torque.

Remove the housing.

Reverse the removal procedure to install the housing.

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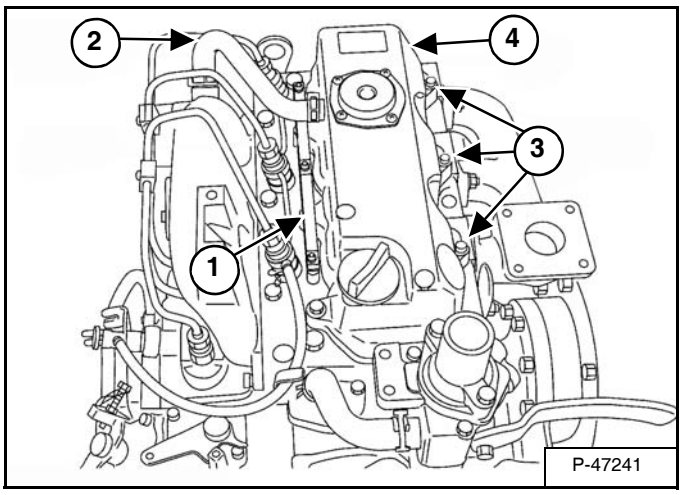


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RECONDITIONING THE ENGINE-V2203-M-DI AND V2003-M-DI-T (TURBO)

Cylinder Head Removal And Installation

Figure 70-100-1

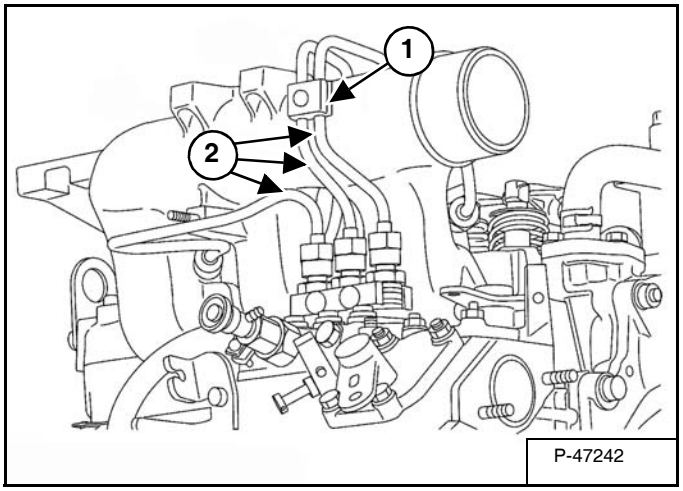


Remove the glow plug lead (Item 1), breather hose (Item 2), and valve cover bolts (Item 3) **[Figure 70-100-1]**.

Remove the valve cover (Item 4) **[Figure 70-100-1]** and gasket.

Installation: Tighten the valve cover bolts to 5-8 ft.-lb. (7-11 N•m)

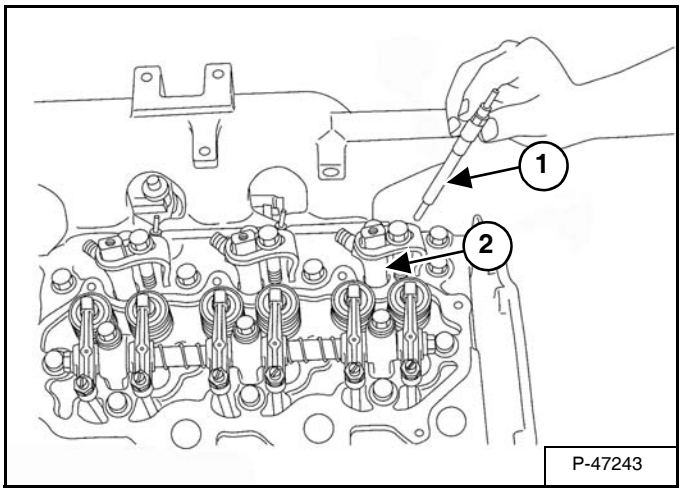
Figure 70-100-2



Loosen the bolts on the clamps (Item 1) and remove the injection tubes (Item 2) **[Figure 70-100-2]**.

Remove the overflow tube assembly.

Figure 70-100-3

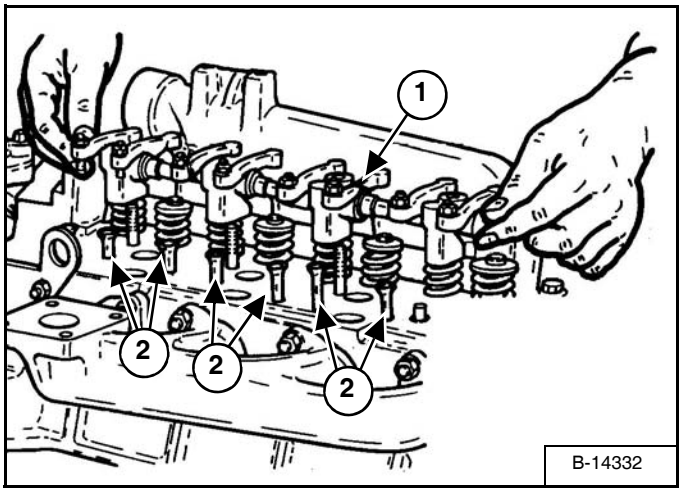


Remove the glow plugs (Item 1) and fuel injector holder assemblies (Item 2) **[Figure 70-100-3]**.

Installation: Tighten the glow plugs to 11-14.5 ft.-lb. (15-19.6 N•m) torque.

Tighten the injector holders to 19-22 ft.-lb. (25.5-29.4 N•m) torque.

Figure 70-100-4



Remove the rocker arm bolts and remove the rocker arm assembly (Item 1) **[Figure 70-100-4]**.

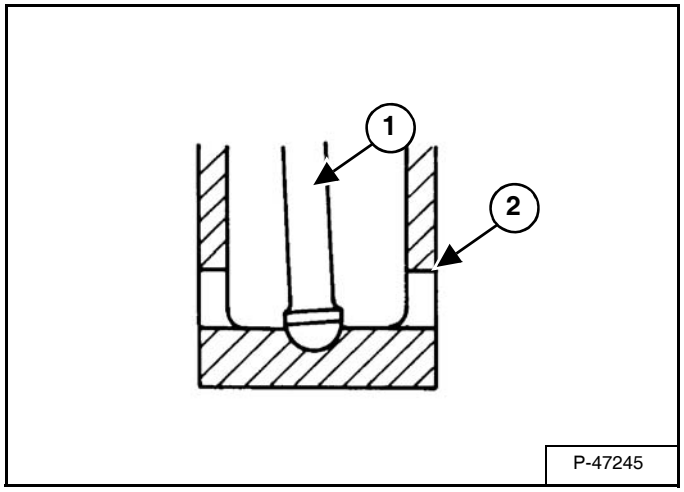
Installation: Tighten the bolts to 17-20 ft.-lb. (23.5 - 27.5 N•m) torque.

Remove the pushrods (Item 2) **[Figure 70-100-4]**.

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Cylinder Head Removal And Installation (Cont'd)

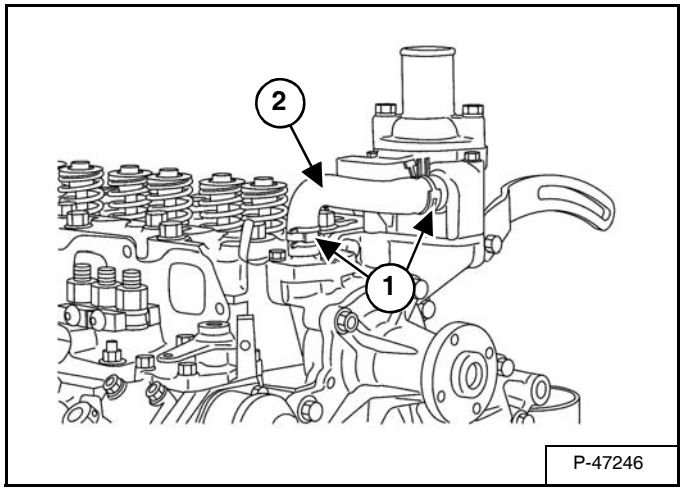
Figure 70-100-5



Installation: The push rod (Item 1) must be seated in the tappet (Item 2) **[Figure 70-100-5]** correctly or the push rods will be damaged.

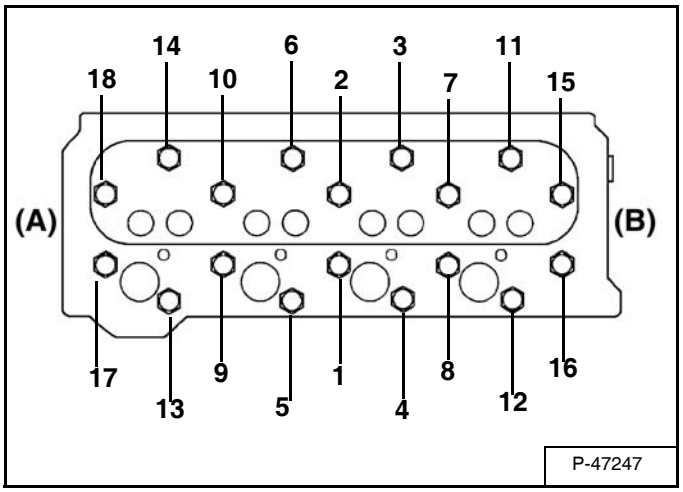
After installing the rocker arm assembly and push rods, the valve lash must be adjusted. (See Valve Tappets on Page 70-100-20.).

Figure 70-100-6



Remove the clamps (Item 1) and remove the hose (Item 2) **[Figure 70-100-6]**.

Figure 70-100-7



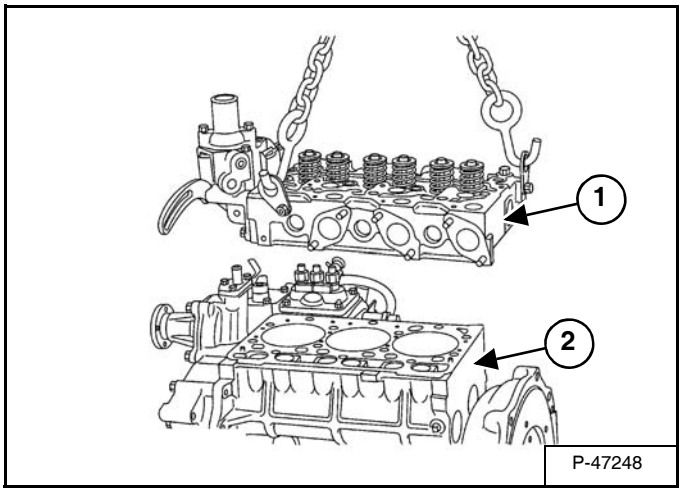
Remove the cylinder head bolts in order of #18 to #1 **[Figure 70-100-7]**.

NOTE: (A) is the gearcase side, (B) is the flywheel side.

Installation: Put oil on the bolt threads. Tighten the bolts in the correct sequence in order of #1-#18 to 68-72 ft.-lb. (93-98 N•m).

NOTE: Re-tighten the cylinder head bolts in the correct sequence after the engine has been run for 30 minutes.

Figure 70-100-8

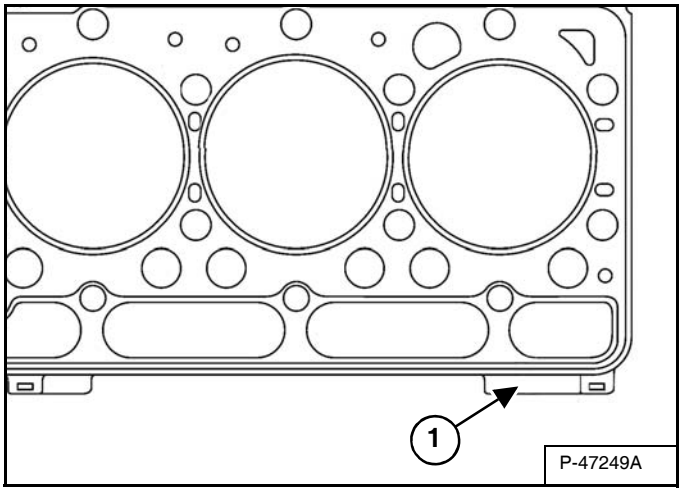


Remove the cylinder head (Item 1) and gasket (Item 2) **[Figure 70-100-8]**.

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Cylinder Head Removal And Installation (Cont'd)

Figure 70-100-9

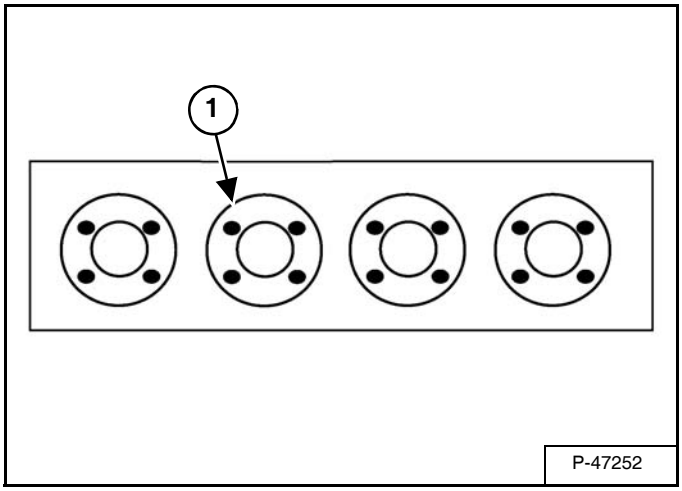


When replacing just the gasket, use a new gasket that has the same mark (Item 1) **[Figure 70-100-9]** as the original gasket.

When replacing the gasket after an engine rebuild, the piston protrusion must be measured.

(See Cylinder Head Top Clearance on Page 70-100-5.)

Figure 70-100-10



Measure and record the protrusion of each piston in the four places shown (Item 1) **[Figure 70-100-10]**. Find the average of each piston, then find the combined average of the four pistons.

Figure 70-100-11

Gasket Size (Number)	Piston Protrusion
15	0.475 to 0.525 mm 0.0187 to 0.0207 in.
20	0.525 to 0.575 mm 0.0207 to 0.0226 in.
25	0.575 to 0.625 mm 0.0226 to 0.0246 in.
30	0.625 to 0.067 mm 0.0246 to 0.0266 in.
35	0.675 to 0.725 mm 0.0266 to 0.0285 in.

Select the correct gasket size (thickness) from the chart **[Figure 70-100-11]**.

Find the measurement of the highest piston protrusion and the lowest piston protrusion (recorded earlier) for each piston.

If the highest measurement exceeds the piston protrusion of the selected gasket, use the gasket which is one size larger. If the measurement exceeds gasket size 35, the engine must be disassembled, clearances checked, and reassembled.

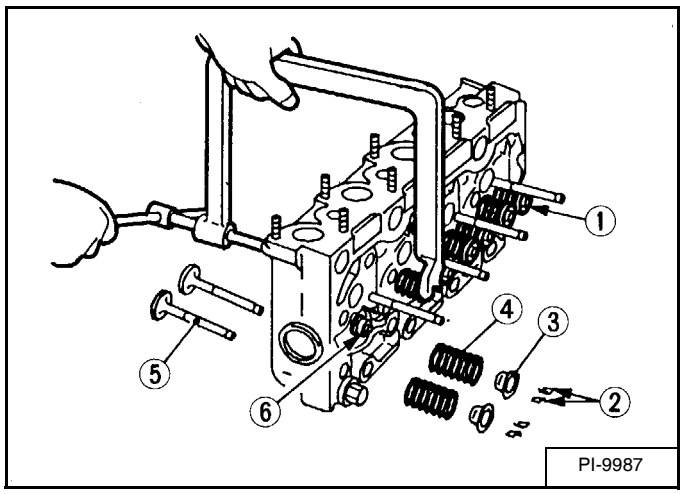
If the measurement is two sizes smaller than the selected gasket or smaller than gasket size 15, the engine must be disassembled, clearances checked, and reassembled.

After the gasket and cylinder head have been installed, turn the crankshaft by hand to be sure there is no interference between the piston, cylinder, and valves.

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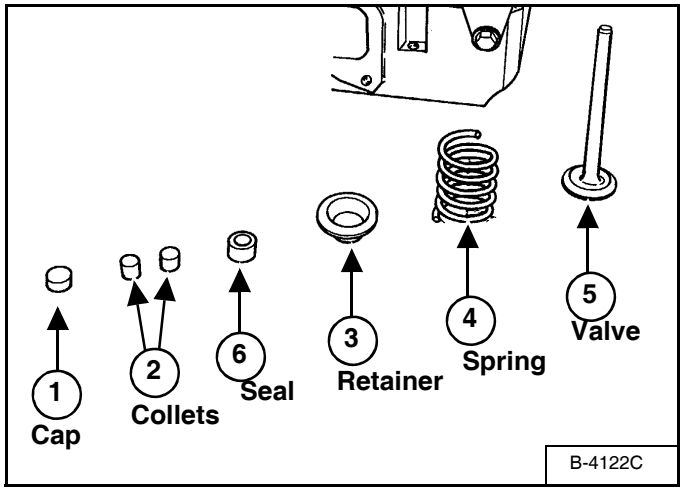
Cylinder Head Disassembly And Assembly

Figure 70-100-12



Use a valve spring compressor to compress the valve spring **[Figure 70-100-12]**.

Figure 70-100-13

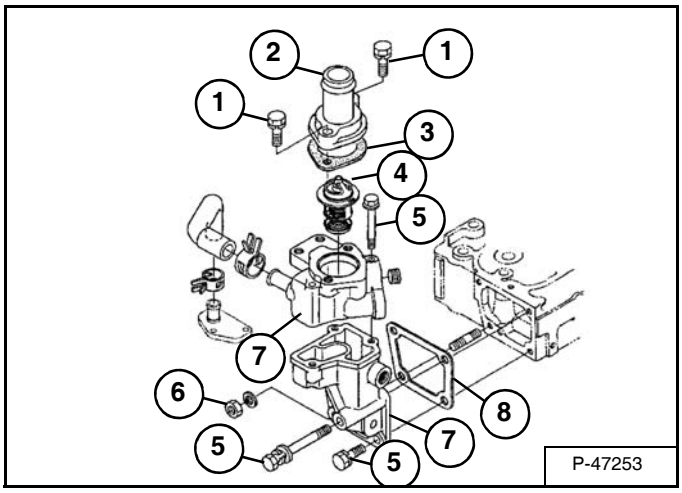


Remove the valve cap (Item 1) and valve spring collet (Item 2) **[Figure 70-100-12]** & **[Figure 70-100-13]**.

Remove the valve spring retainer (Item 3) and the spring (Item 4) **[Figure 70-100-12]** & **[Figure 70-100-13]**.

Remove the seal (Item 6) and the valve (Item 5) **[Figure 70-100-12]** & **[Figure 70-100-13]**.

Figure 70-100-14



Remove the bolts (Item 1), housing (Item 2), gasket (Item 3) and thermostat (Item 4) **[Figure 70-100-14]**.

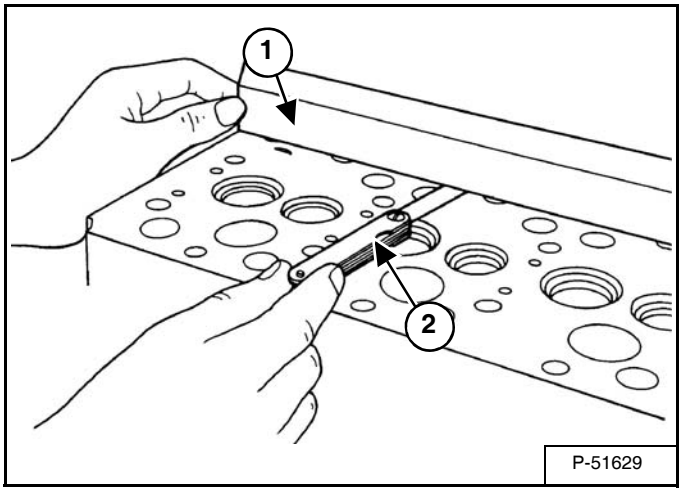
Remove bolts (Item 5), nut (Item 6), top and bottom housing (Item 7), and gasket (Item 8) from the cylinder head **[Figure 70-100-14]**.

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Cylinder Head Servicing

Clean the surface of the cylinder head.

Figure 70-100-15

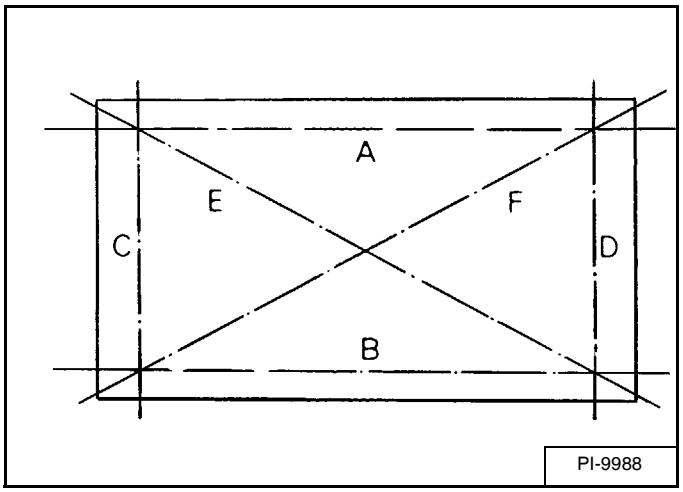


Put a straight edge (Item 1) **[Figure 70-100-15]** on the cylinder head.

NOTE: Do not put the straight edge across combustion chambers.

Put a feeler gauge (Item 2) **[Figure 70-100-15]** between the straight edge and the surface of the cylinder head.

Figure 70-100-16

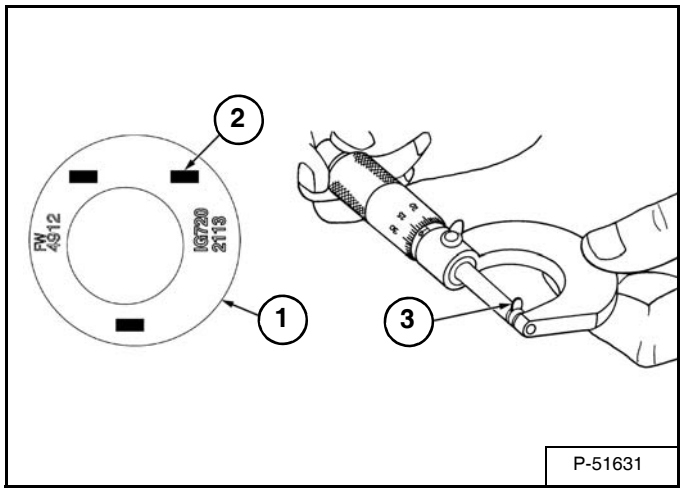


Put the straight edge on the cylinder head's four sides and two diagonal as shown in figure **[Figure 70-100-16]**.

The maximum distortion of the head surface is ± 0.002 inch (± 0,05 mm). If the measurement exceeds the specification, replace the cylinder head.

Cylinder Head Top Clearance

Figure 70-100-17



Install the cylinder head gasket. Put the piston (Item 1) **[Figure 70-100-17]** being checked at T.D.C.

Put 3 pieces of 0.06 inch (1,5 mm) diameter solder (Item 2) **[Figure 70-100-17]** on the top of the piston. Use grease to hold them in position.

NOTE: Put the solder in position so they do not touch the valves.

Turn the piston to bottom dead center.

Install the cylinder head and tighten to the correct torque in the correct sequence. (See Cylinder Head Removal And Installation on Page 70-100-1.)

Turn the crankshaft until the piston exceeds T.D.C. Remove the cylinder head.

Remove the solder wire (Item 3) **[Figure 70-100-17]** and measure it.

If the measurement exceeds the specifications, check the oil clearance of the crank pin journal or the piston pin.

Top Clearance	0.0236-0.0276 inch (0,6-0,7 mm)

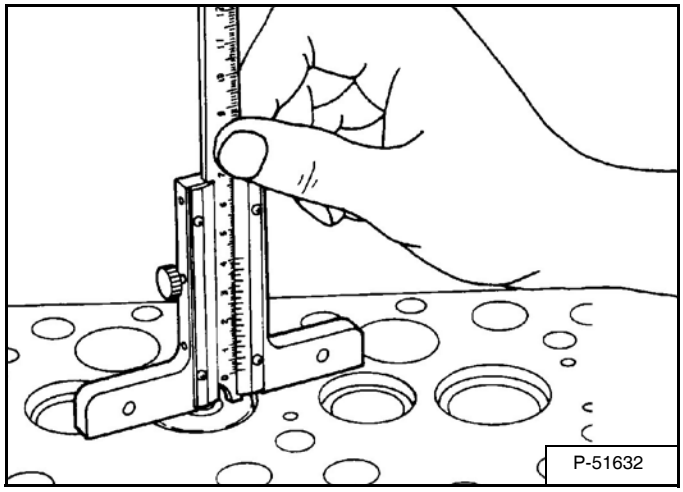
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Valve Guide Checking

Remove the valve and spring from the cylinder head. (See Cylinder Head Disassembly And Assembly on Page 70-100-4.)

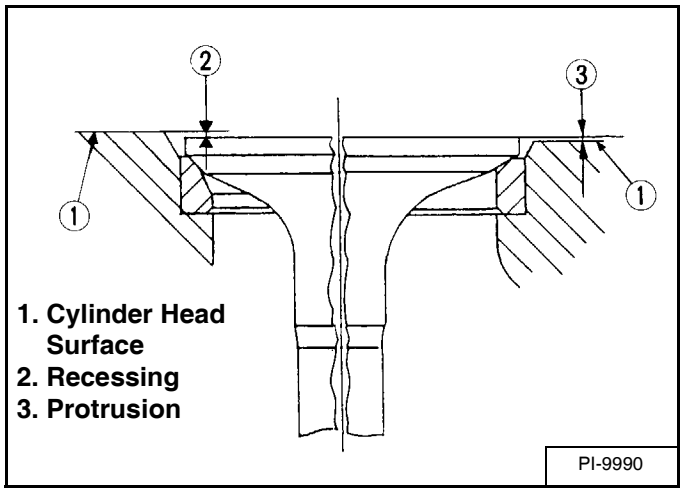
Clean the valve seat and combustion chamber.

Figure 70-100-18



Install the valve into the guide. Measure the valve recessing or protrusion with a depth gauge **[Figure 70-100-18]**.

Figure 70-100-19

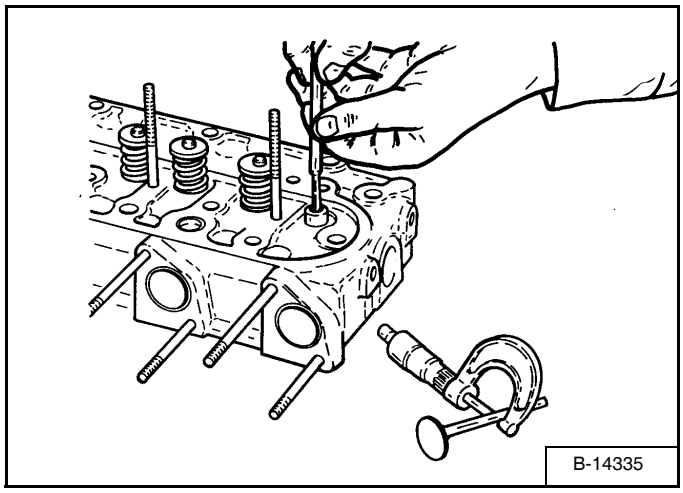


If the measurement exceeds the allowable limit, replace the valve or cylinder head **[Figure 70-100-19]**.

Protrusion	0.002 inch (0,5 mm)
Recessing	0.006 inch (0,15 mm)
Allowable Limit (Recessing)	0.016 inch (0,4 mm)

Remove the carbon from the valve guide.

Figure 70-100-20



Measure the valve stem O.D. **[Figure 70-100-20]**.

Measure the valve guide I.D. **[Figure 70-100-20]**.

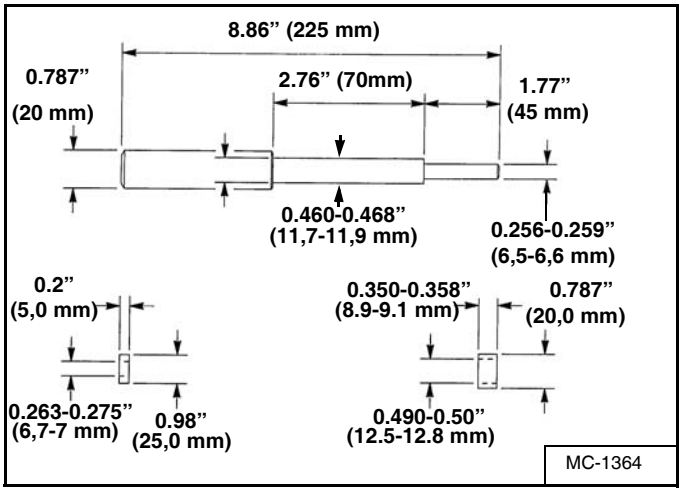
Calculate the clearance. If the clearance exceeds the allowable limit, replace the valve and/or valve guide.

Valve Guide I.D.	0.3156-0.3161 inch (8,015-8,03 mm)
Valve Stem O.D.	0.3134-0.3140 inch (7,96-7,98 mm)
Clearance Between Valve Stem and Guide	0.0016-0.0028 inch (0,04-0,07 mm)
Allowable Limit	0.004 inch (0,1 mm)

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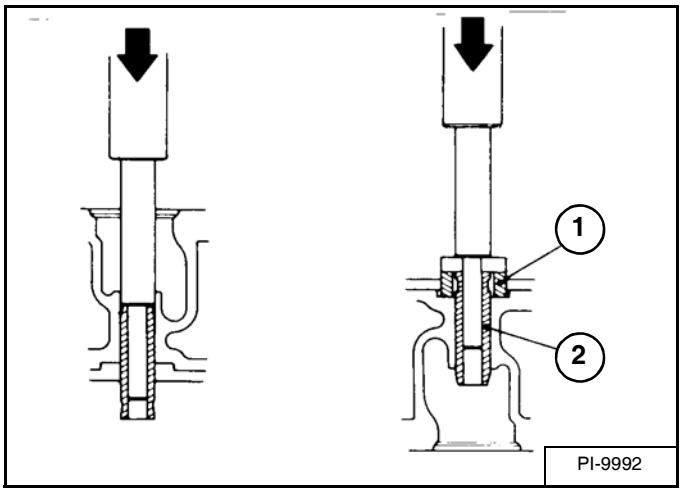
Valve Guide Checking (Cont'd)

Figure 70-100-21



To remove and replace the valve guide, make the driver tool as shown in figure **[Figure 70-100-21]**.

Figure 70-100-22



Press the used valve guide out of the cylinder head using the special driver tool **[Figure 70-100-22]**.

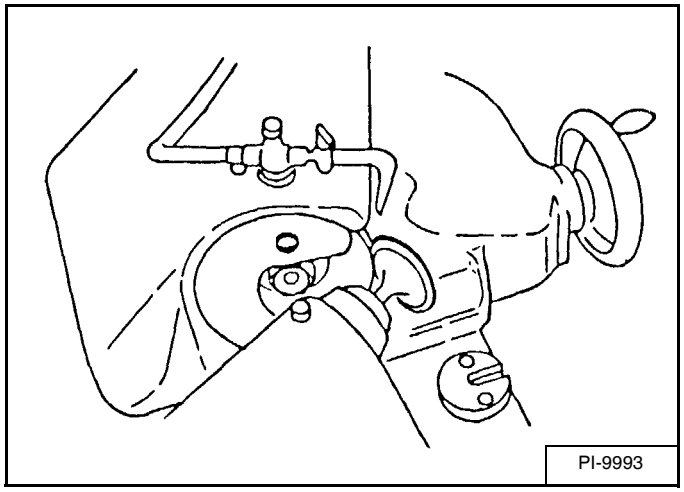
Put oil on the outside diameter of the new valve guide. Press the new valve guide into the cylinder head from the top side. Use the special driver tools (Items 1 & 2) **[Figure 70-100-22]**, press the new guide until the tool contacts the cylinder head.

Ream the valve guide to the correct specifications.

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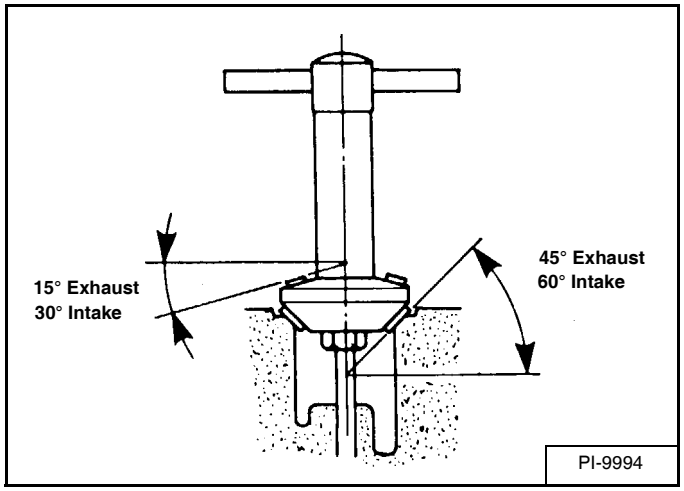
Reconditioning The Valve And Valve Seat

Figure 70-100-23



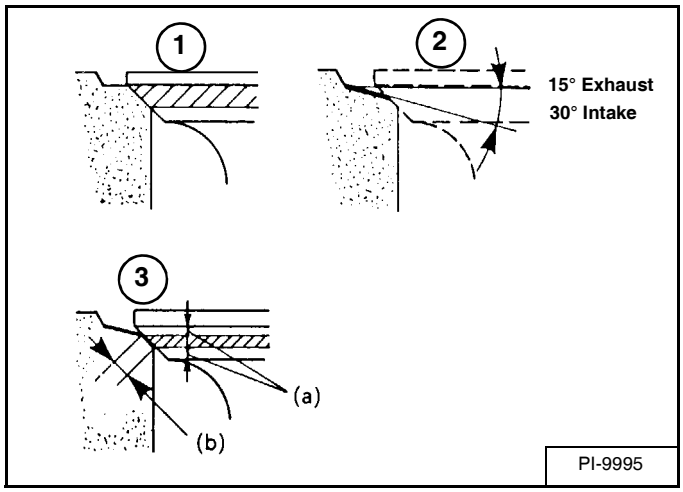
Grind the valve face to the correct angle using a valve refacer **[Figure 70-100-23]**.

Figure 70-100-24



Grind the valve seat surface in the cylinder head to the correct angle **[Figure 70-100-24]**.

Figure 70-100-25



Check the seat surface and valve face (Item 1) **[Figure 70-100-25]**.

(a) identical dimensions above and below the valve seat

If the seat surface (b) is too wide, use a 30 degree cutter (Item 2) on the intake, and a 15 degree cutter on the exhaust to get the correct width (Item 3) **[Figure 70-100-25]**.

Valve Seat Width

Intake	0.0835 inch (2,12 mm)
Exhaust	0.0835 inch (2,12 mm)

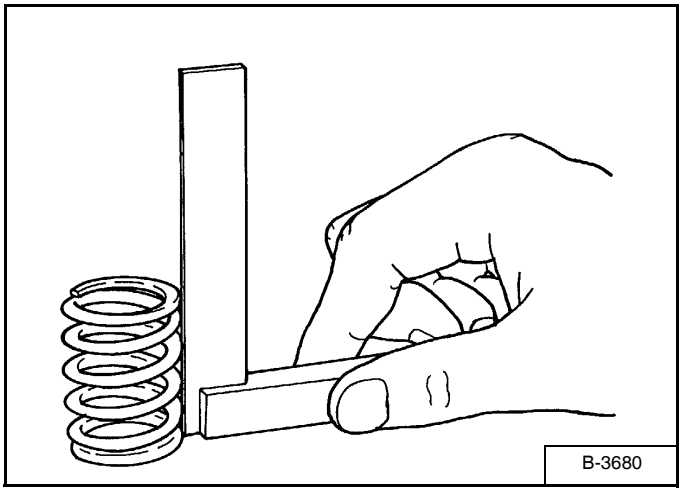
Valve Seat & Face Angle

Intake	60°
Exhaust	45°

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Valve Spring

Figure 70-100-26



Measure the length of the valve spring. If the measurement is less than the allowable limit, replace the spring **[Figure 70-100-26]**.

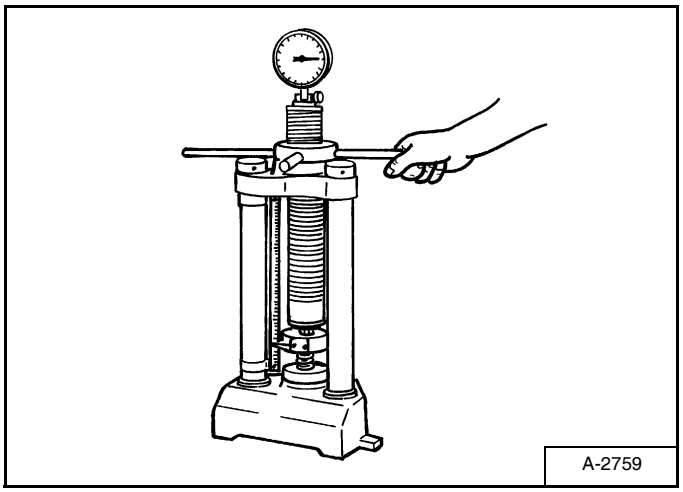
Free Length	1.6417-1.6614 inch (41,7-42,2 mm)
Allowable Limit	1.622 inch (41,2 mm)

Put the spring on a flat surface, place a square on the side of the spring **[Figure 70-100-26]**.

Rotate the spring and measure the maximum tilt. If the measurement excess the allowable limit, replace the spring.

Tilt Allowable Limit	0.039 inch (1,0 mm)

Figure 70-100-27



Put the spring on a tester and compress to specified length **[Figure 70-100-27]**.

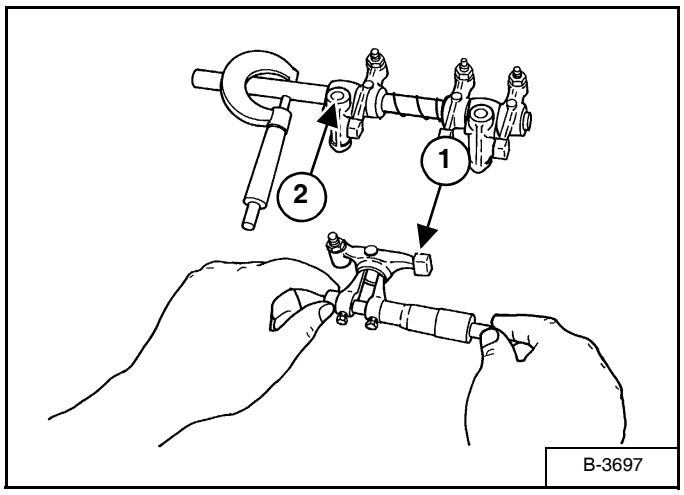
Read the compressed load on the gauge. If the measurement exceeds allowable limit, replace the spring.

Setting Length	1.378 inch (35,0 mm)
Setting Load	26.4 lb. (117,6 N)
Allowable Limit	22.5 lb. (100,0 N)

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Rocker Arm And Shaft Checking

Figure 70-100-28



Measure the rocker arm I.D. (Item 1) **[Figure 70-100-28]** with an inside micrometer.

Measure the rocker arm shaft O.D. (Item 2) **[Figure 70-100-28]** with an outside micrometer.

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

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

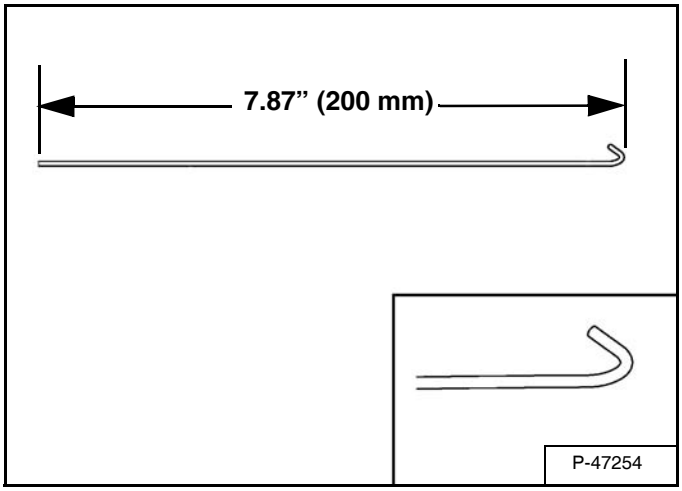
Oil Clearance Between Rocker Arm & Shaft	0.0006-0.0018 inch (0,016-0,045 mm)
Allowable Limit	0.004 inch (0,10 mm)
Rocker Arm Shaft O.D.	0.5501-0.5506 inch (13,973-13,984 mm)
Rocker Arm I.D.	0.5512-0.5519 inch (14,0-14,02 mm)

Timing Gearcase Cover Removal And Installation

Remove the fuel injection pump. (See Fuel Injection Pump Removal And Installation (Turbo) on Page 70-70-5.)

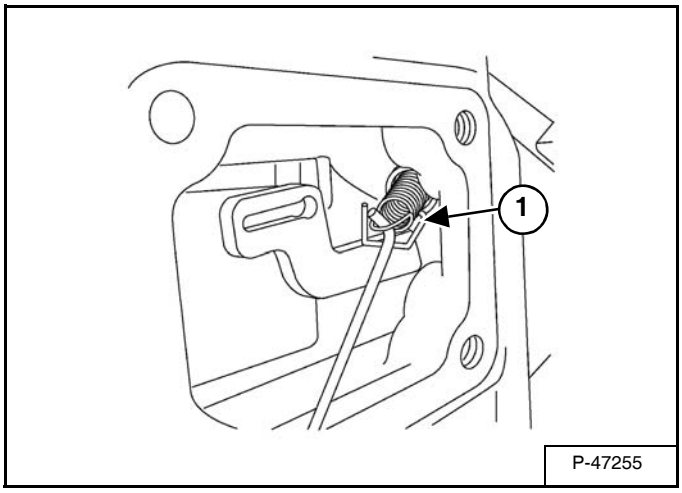
Remove the cylinder head, rocker arms and push rods. (See Cylinder Head Removal And Installation on Page 70-100-1.)

Figure 70-100-29



Bend a hook on the end of a 7.87 inch (200 mm) long, 0.050 inch (1.2 mm) diameter hard wire **[Figure 70-100-29]**.

Figure 70-100-30

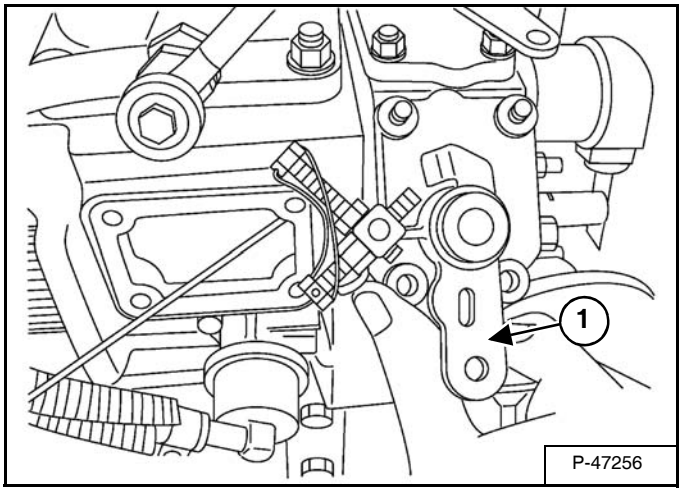


Disconnect the two governor springs (Item 1) **[Figure 70-100-30]**.

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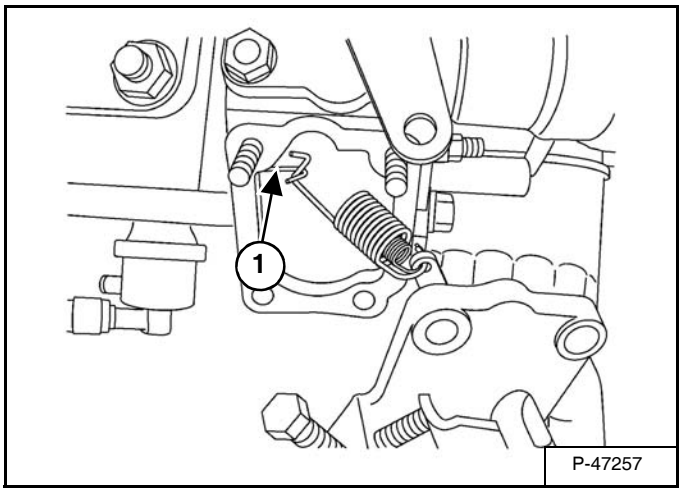
Timing Gearcase Cover Removal And Installation (Cont'd)

Figure 70-100-31



Remove the speed control plate (Item 1) **[Figure 70-100-31]**.

Figure 70-100-32



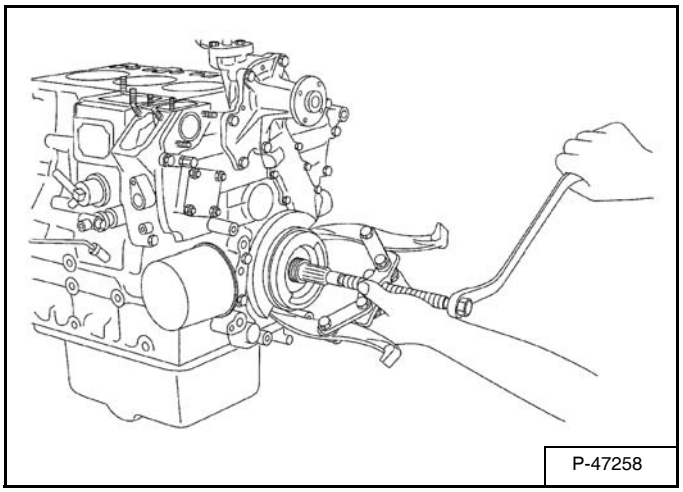
Remove the wire (Item 1) **[Figure 70-100-32]** from the springs.

Installation: Do not drop the governor springs into the gear case.

Remove the crankshaft pulley nut.

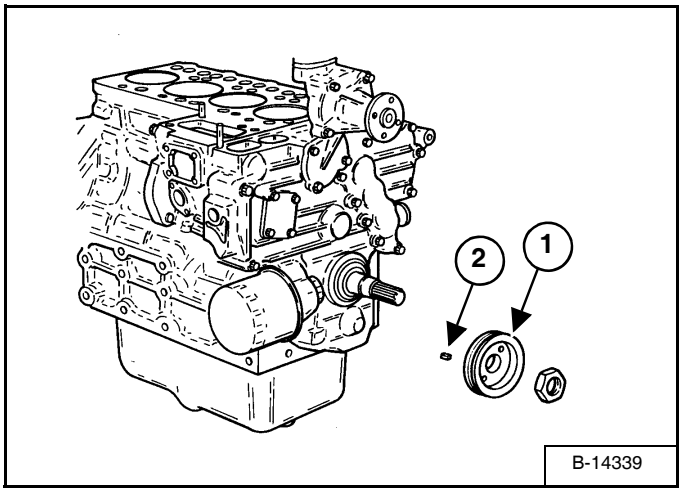
Installation: Tighten the nut to 101-116 ft.-lb. (137-157 N•m) torque.

Figure 70-100-33



Use a puller and remove the crankshaft pulley. **[Figure 70-100-33]**.

Figure 70-100-34



Remove the crankshaft pulley (Item 1) and key (Item 2) **[Figure 70-100-34]**.

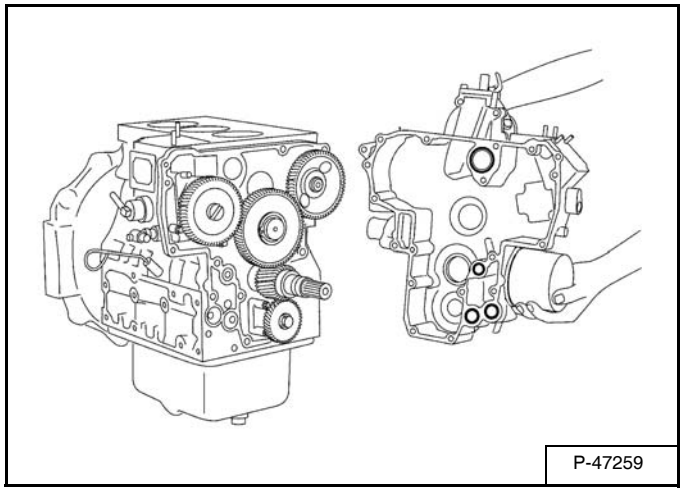
Remove the bolts from the timing gearcase cover.

Installation: Tighten the bolts to 13-15 ft.-lb. (18-20 nm) torque.

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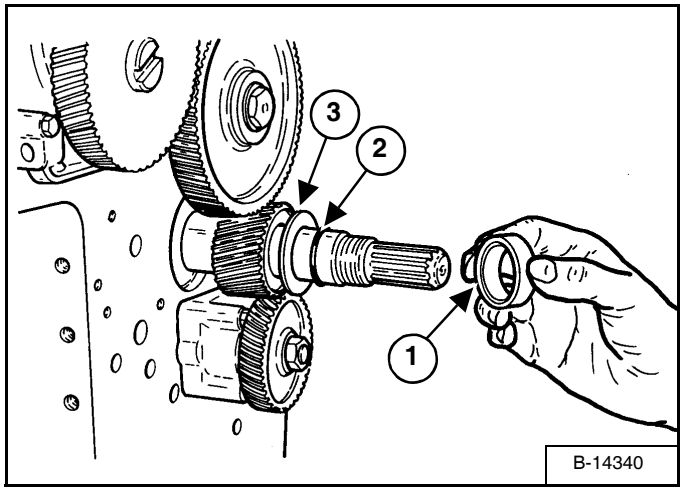
Timing Gearcase Cover Removal And Installation (Cont'd)

Figure 70-100-35



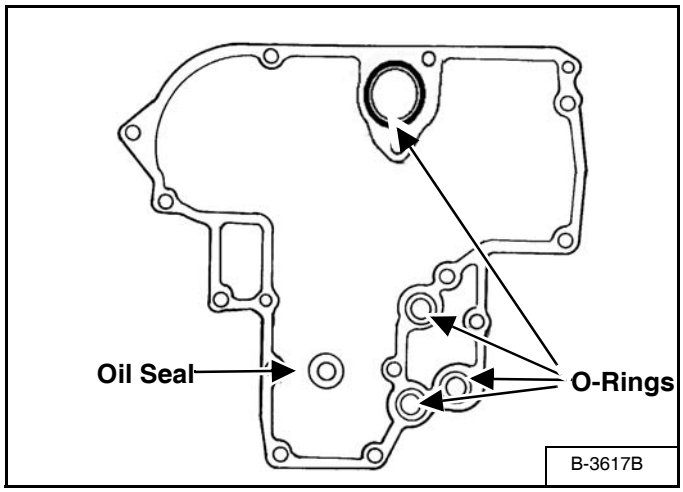
Remove the timing gearcase cover **[Figure 70-100-35]**.

Figure 70-100-36



Remove the crankshaft collar (Item 1), O-ring (Item 2) and oil slinger (Item 3) **[Figure 70-100-36]**.

Figure 70-100-37



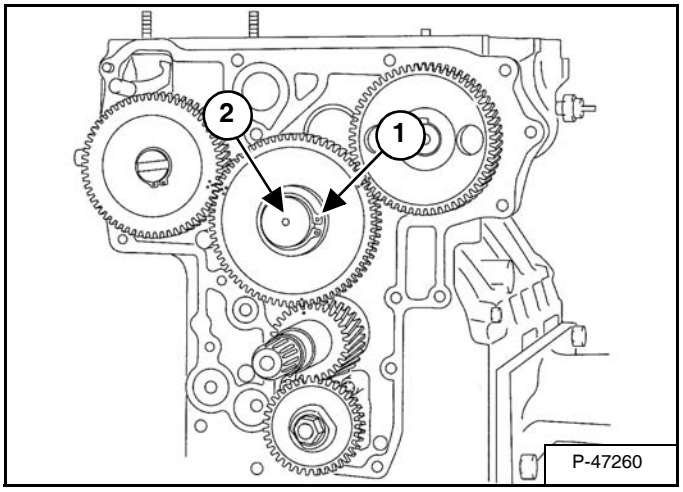
Installation: Install new O-rings and oil seal into the timing gearcase cover **[Figure 70-100-37]**.

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Idler Gear And Camshaft Removal And Installation

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-10.)

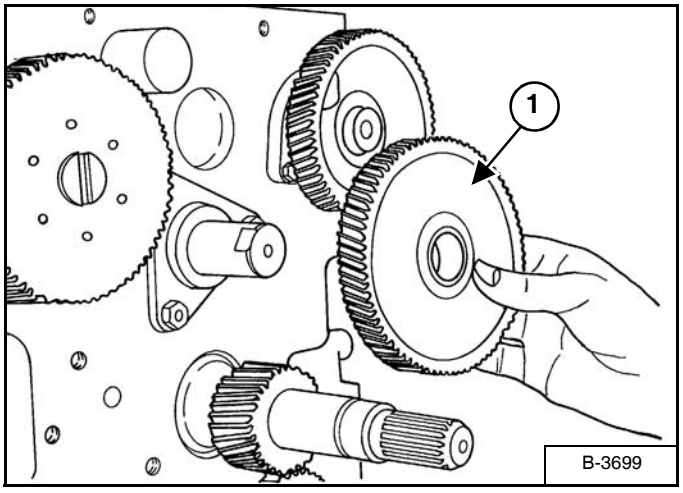
Figure 70-100-38



Remove the snap ring (Item 1) and collar from the idler gear shaft (Item 2) **[Figure 70-100-38]**.

Installation: Make sure the timing marks are in correct alignment when installing the timing gears **[Figure 70-100-38]**.

Figure 70-100-39

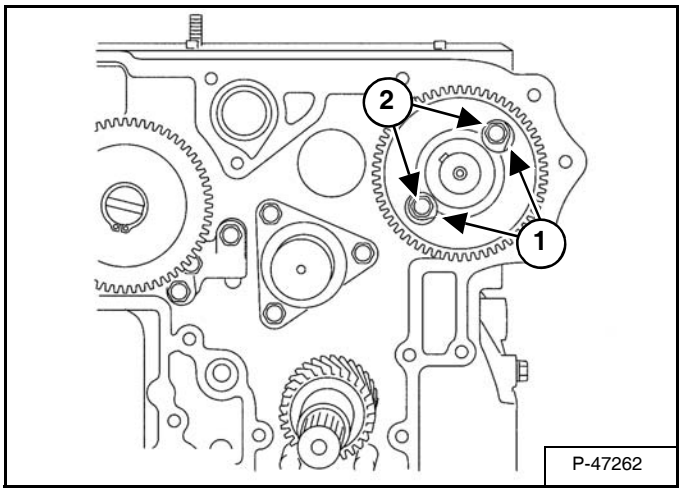


Remove the idler gear (Item 1) **[Figure 70-100-39]**.

Installation: Check the idler gear end play. If the clearance exceeds the allowable limit, replace the gear collar.

Idler Gear End Play	0.0047-0.0189" (0.12-0.48mm)
Allowable Limit	0.0354" (0,9 mm)

Figure 70-100-40

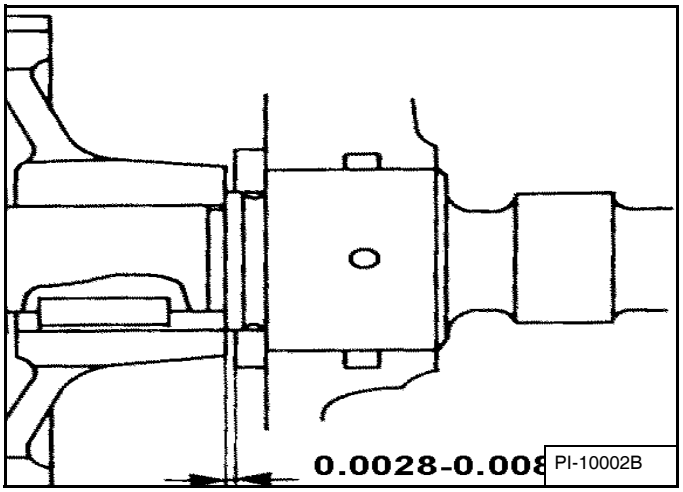


Align the holes (Item 1) on the camshaft gear with the camshaft retainer plate bolts (Item 2) **[Figure 70-100-40]**. Remove the bolts.

Installation: Tighten the camshaft retainer bolts to 18-20 ft.-lb. (24-27 N•m) torque.

Remove the camshaft from the engine block.

Figure 70-100-41



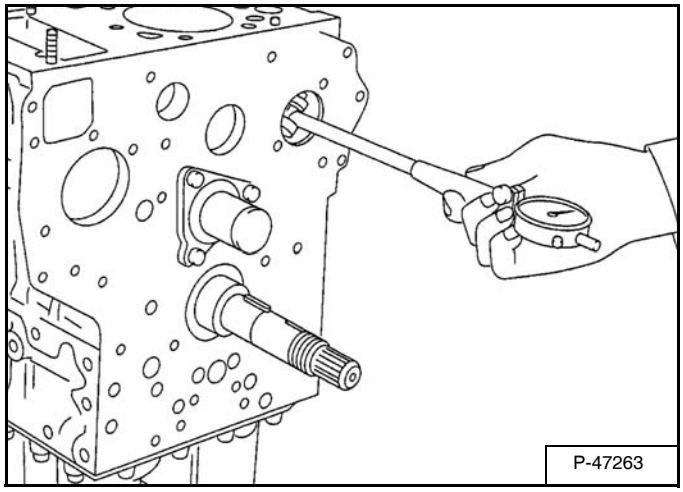
Installation: Check the camshaft end play. If clearance exceeds the allowable limit, replace the camshaft retainer plate **[Figure 70-100-41]**.

Camshaft End Play	0.0028-0.0087 inch (0,07-0,22 mm)
Allowable Limit	0.0118 inch (0,3 mm)

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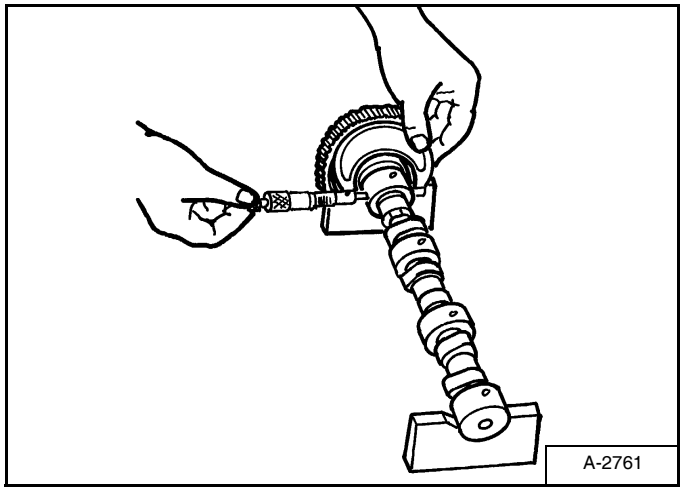
Camshaft Servicing

Figure 70-100-42



Measure the cylinder block bore in the engine block **[Figure 70-100-42]**.

Figure 70-100-43

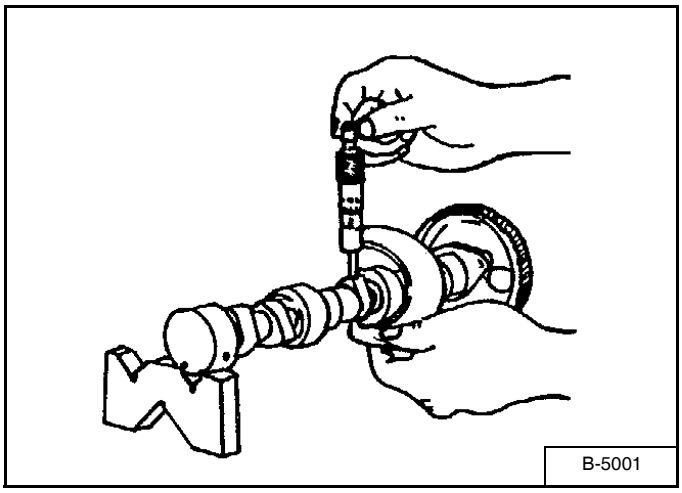


Measure the camshaft journal **[Figure 70-100-43]**.

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

Cylinder Block Bore I.D.	1.5748-1.5758 inch (40,0-40,03 mm)
Journal O.D.	1.5722-1.5728 inch (39,93-39,95 mm)
Oil Clearance of Camshaft Journal	0.002-0.0036 inch (0,05-0,091 mm)
Allowable Limit	0.0059 inch (0,15 mm)

Figure 70-100-44

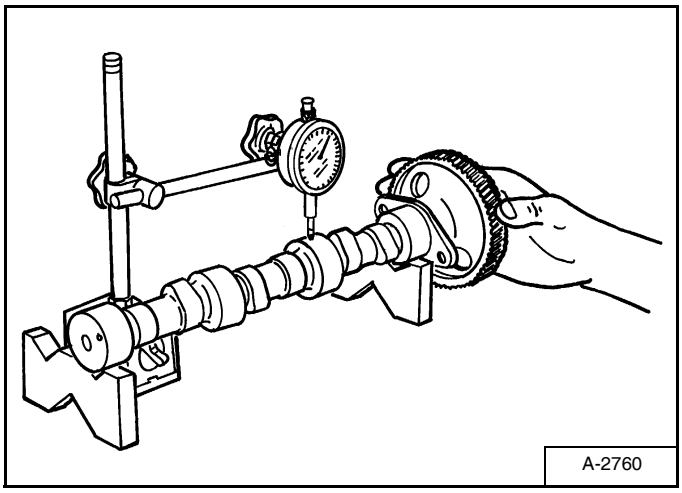


Measure the cam lobes at their highest point **[Figure 70-100-44]**.

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

Cam Lobe Height	1.3346 inch (33,9 mm)
Allowable Limit	1.3327 inch (33,85 mm)

Figure 70-100-45



Put the camshaft in V-blocks. Install a dial indicator **[Figure 70-100-45]**.

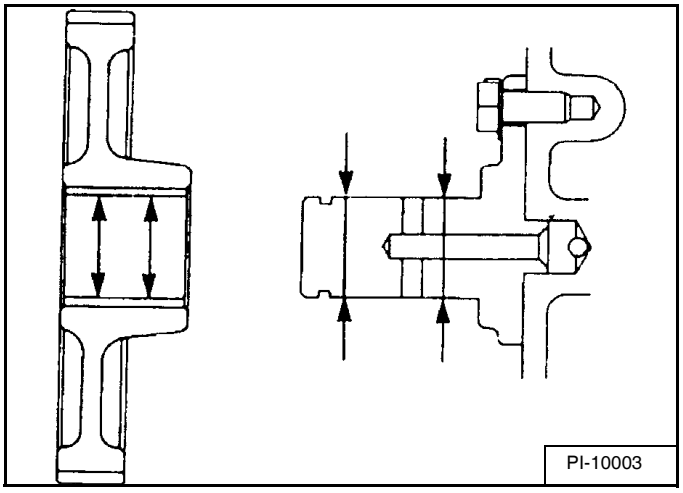
Turn the camshaft at a slow rate. If the misalignment exceeds the allowable limit, replace the camshaft.

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

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Idler Gear And Shaft Servicing

Figure 70-100-46



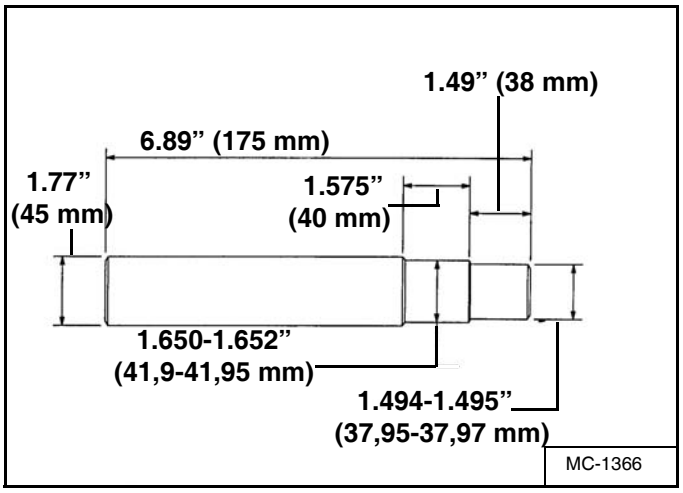
Measure the O.D. of the idler gear shaft **[Figure 70-100-46]**.

Measure the I.D. of the idler gear bushing **[Figure 70-100-46]**.

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

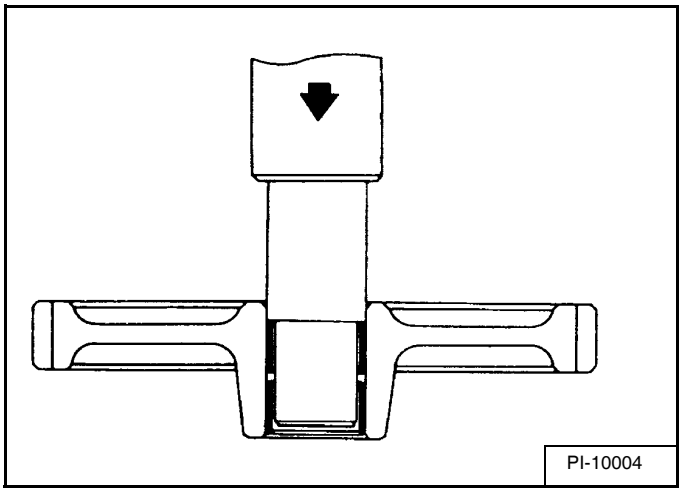
Idler Gear Shaft O.D.	1.4945-1.4951 inch (37,96-37,98 mm)
Idler Gear Bushing I.D.	1.4961-1.4970 inch (38,0-38,03 mm)
Clearance Between Idler Shaft & Gear Bushing	0.001-0.0026 inch (0,025-0,07 mm)
Allowable Limit	0.0039 inch (0,1 mm)

Figure 70-100-47



To replace the idler gear bushing, make a driver tool as shown in figure **[Figure 70-100-47]**.

Figure 70-100-48



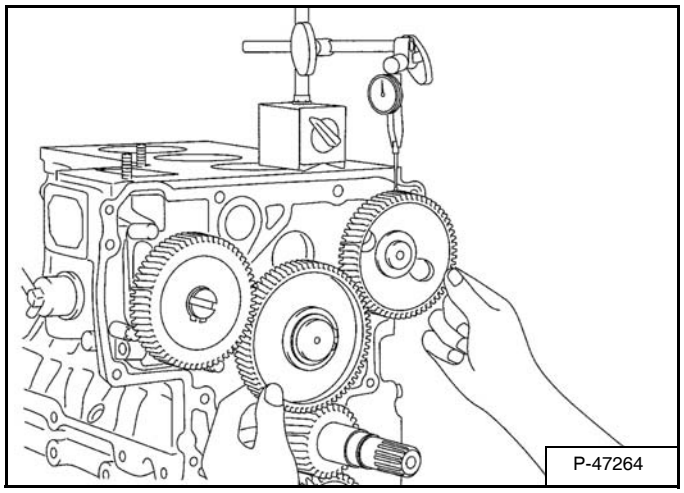
Use a press and special driver tool, to remove the old bushing and install the new bushing **[Figure 70-100-48]**.

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Timing Gears Checking Backlash

When the gears are installed, check the backlash of the gears.

Figure 70-100-49



Install a dial indicator **[Figure 70-100-49]**.

Hold one gear while turning the other gear **[Figure 70-100-49]**.

If the backlash exceeds the allowable limit, check the oil clearance of the shaft and gear. If the oil clearance is correct, replace the gear.

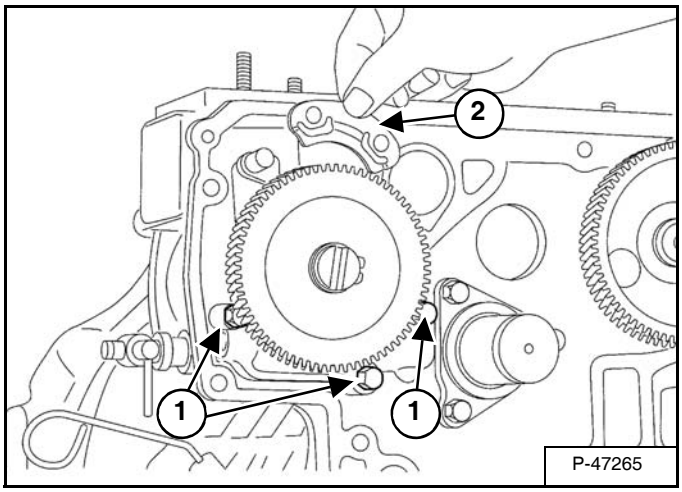
Crank Gear & Idler Gear	0.0016-0.0044 inch (0,042-0,112 mm)
Allowable Limit	0.0059 inch (0,15 mm)
Cam Gear & Idler Gear	0.0016-0.0045 inch (0,042-0,115 mm)
Allowable Limit	0.0059 inch (0,15 mm)
Injection Pump Gear & Idler Gear	0.0016-0.0045 inch (0,042-0,115 mm)
Allowable Limit	0.0059 inch (0,15 mm)
Oil Pump Gear & Crankgear	0.0016-0.0043 inch (0,042-0,109 mm)
Allowable Limit	0.0059 inch (0,15 mm)

Fuel Camshaft Removal And Installation

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-10.)

Remove the idler gear. (See Idler Gear And Camshaft Removal And Installation on Page 70-100-13.)

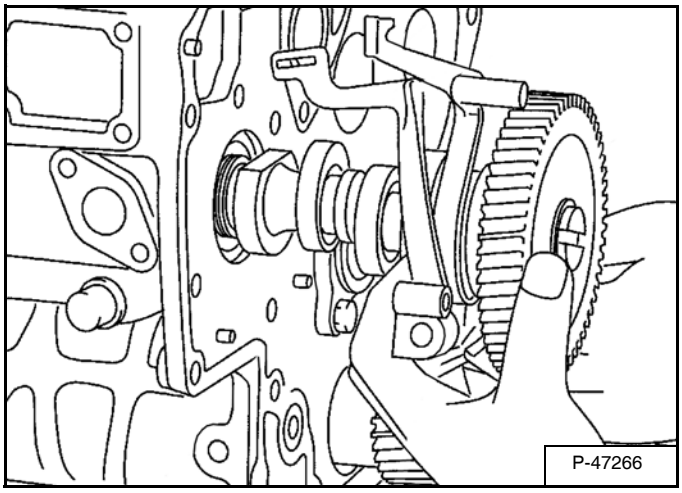
Figure 70-100-50



Remove the three bolts (Item 1) **[Figure 70-100-50]**.

Remove the two bolts and fuel camshaft retainer plate (Item 2) **[Figure 70-100-50]**.

Figure 70-100-51



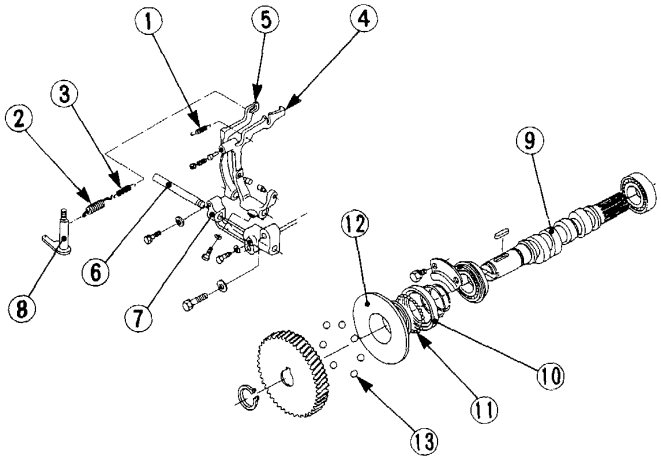
Remove the fuel camshaft and fork lever assembly at the same time **[Figure 70-100-51]**.

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Fuel Camshaft Governor

The governor serves to keep the engine speed constant by automatically adjusting the amount of fuel supplied to the engine according to changes in the load.

Figure 70-100-52



1. **Start Spring**
2. **Governor Spring**
3. **Governor Spring**
4. **Fork Lever**
5. **Fork Lever**
6. **Fork Lever Shaft**
7. **Fork Lever Holder**
8. **Governor Lever**
9. **Fuel Camshaft**
10. **Governor Ball Case**
11. **Steel Balls**
12. **Governor Sleeve**
13. **Steel Ball**

PI-10008

Disassemble and assemble the governor and fuel camshaft as shown in figure **[Figure 70-100-52]**.

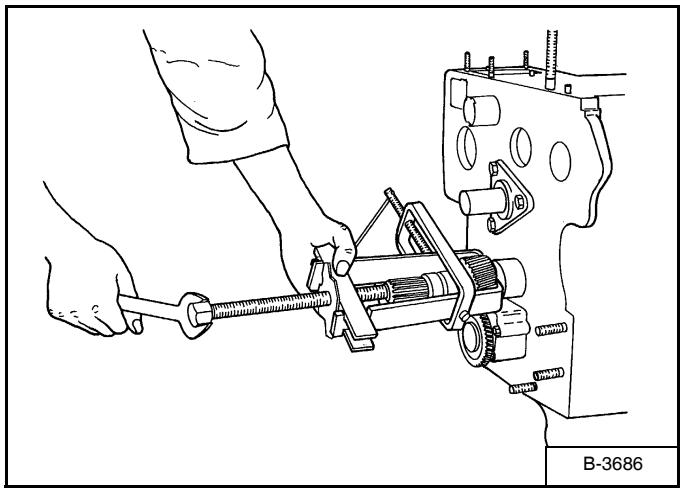
Check all the parts for wear or damage and replace as needed.

Crankshaft Gear Removal And Installation

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-10.)

Remove the idler gear. (See Idler Gear And Camshaft Removal And Installation on Page 70-100-13.)

Figure 70-100-53



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Remove the crankshaft gear with a puller **[Figure 70-100-53]**.

Remove the crankshaft key.

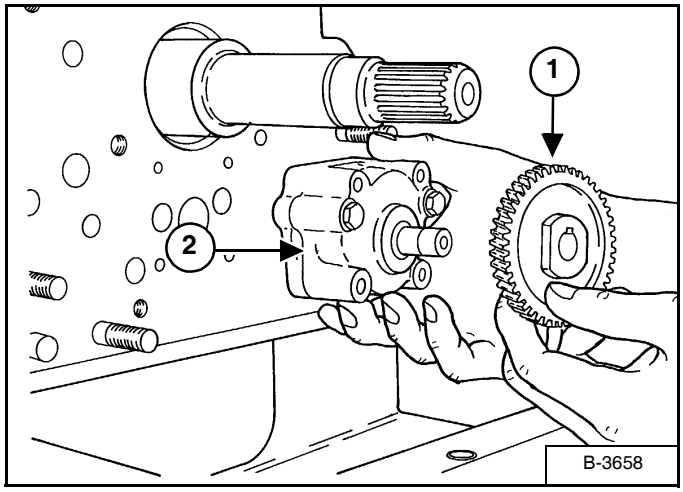
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Oil Pump Removal And Installation

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-10.)

Remove the crankshaft gear.

Figure 70-100-54



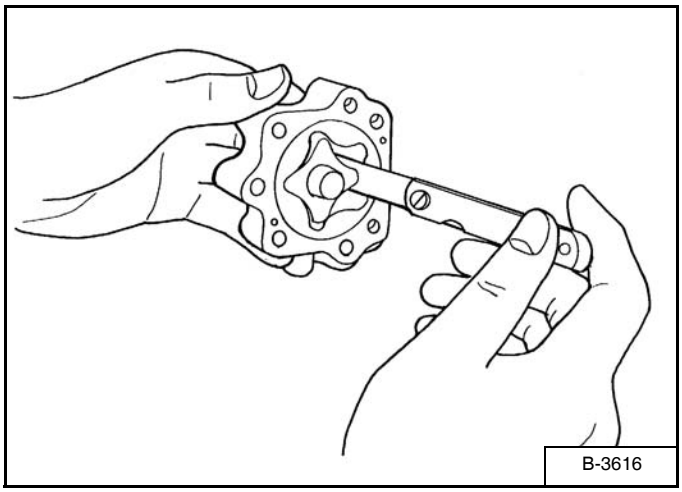
Remove the nut from the oil pump shaft. Use a puller to remove the oil pump gear (Item 1) **[Figure 70-100-54]**.

Remove the oil pump mounting bolts. Remove the oil pump (Item 2) **[Figure 70-100-54]**.

Installation: Tighten the oil pump mounting bolts to 60-72 in.-lb. (6,9-8,1 N•m) torque.

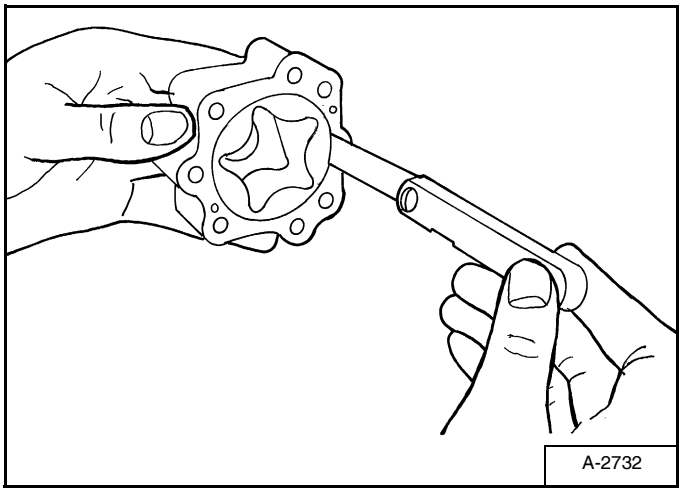
Oil Pump Service

Figure 70-100-55



Measure the clearance between the lobes of the inner rotor and outer rotor **[Figure 70-100-55]**.

Figure 70-100-56



Measure the clearance between the outer rotor and pump body **[Figure 70-100-56]**.

If the clearance exceeds the allowable limit, replace the oil pump.

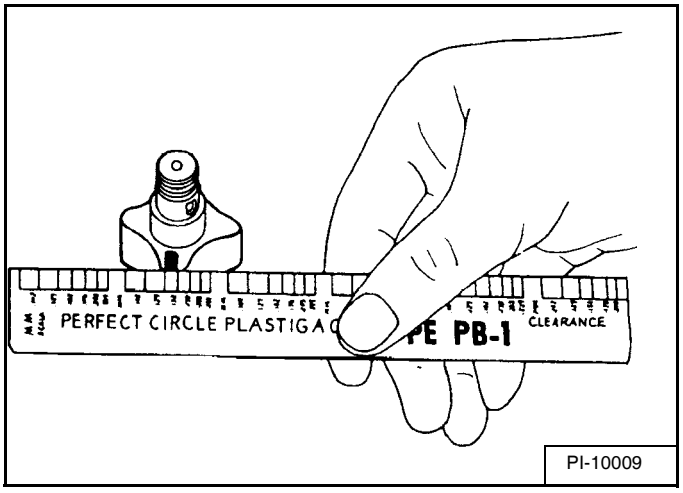
Clearance Between Inner & Outer Rotor
0.0012-0.0055 inch
(0,03-0,14 mm)

Clearance Between Outer Rotor & Body
0.0043-0.0075 inch
(0,11-0,19 mm)

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Oil Pump Service (Cont'd)

Figure 70-100-57



Put a piece of press gauge on the rotor face **[Figure 70-100-57]**.

Install the cover and tighten the bolts.

Remove the cover carefully. Measure the width of the press gauge **[Figure 70-100-57]**.

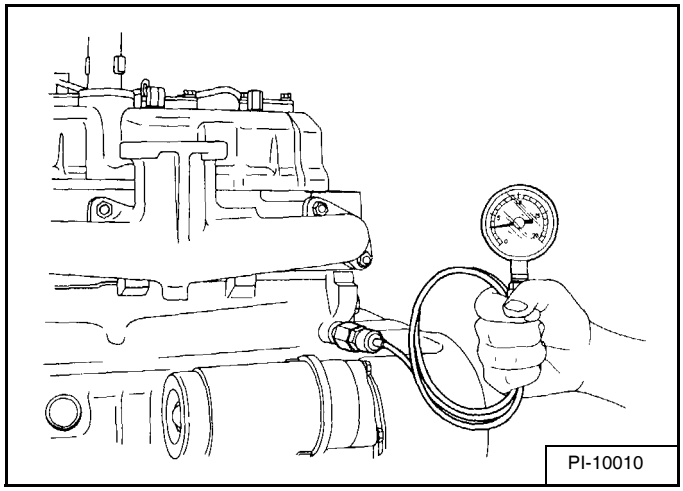
If the clearance exceeds the allowable limit replace the oil pump.

End Clearance	0.0041-0.0059 inch (0,11-0,15 mm)

Checking Engine Oil Pressure

Remove the oil pressure sender.

Figure 70-100-58



Install a pressure gauge **[Figure 70-100-58]**.

Start the engine and run until it is at operating temperature.

If the oil pressure is less than the allowable limit, check the following items:

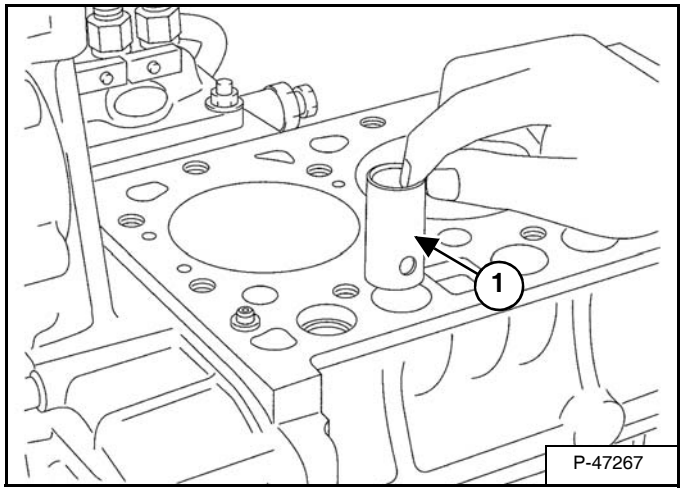
* Engine Oil Level Low
* Oil Pump Defective
* Oil Galley Plugged
* Oil Strainer Plugged
* Excessive Clearance at the Rod & Main Bearings
* Oil Pump Relief Valve Stuck

At Idle Speed Allowable Limit	7 PSI (0.50 Bar)
At Rated Speed	43-64 PSI (2.94-4.41 Bar)
Allowable Limit	36 PSI (2.45 Bar)

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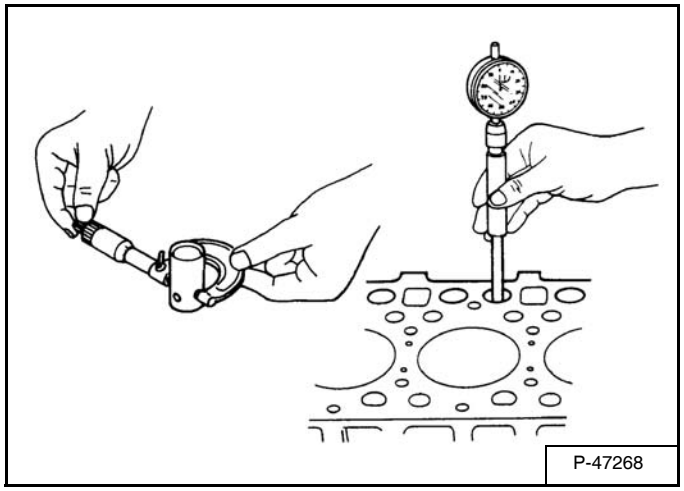
Valve Tappets

Figure 70-100-59



Remove the valve tappets (Item 1) **[Figure 70-100-59]**.

Figure 70-100-60



Measure the O.D. of the tappet **[Figure 70-100-60]**.

Measure the ID of the tappet bore **[Figure 70-100-60]**.

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

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

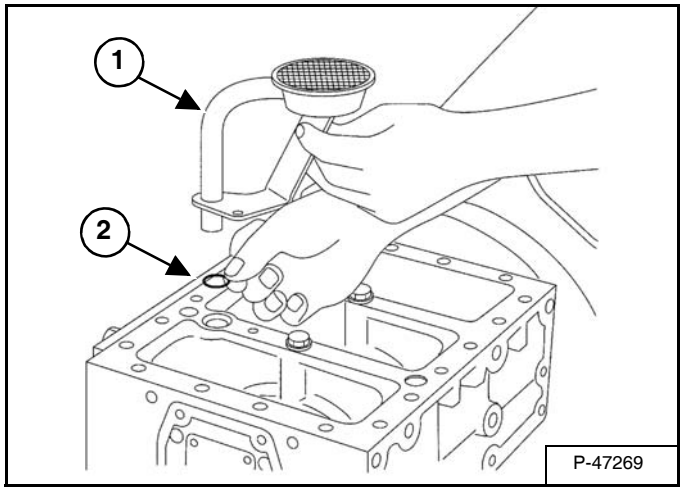
Piston And Connecting Rod Removal And Installation

Remove the cylinder head. (See Cylinder Head Removal And Installation on Page 70-100-1.)

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

Remove the oil pan.

Figure 70-100-61



Remove the oil pump strainer (Item 1) and O-ring (Item 2) **[Figure 70-100-61]** by tapping the edge of the strainer with a soft faced hammer.

Turn the flywheel and put a pair of connecting rods at bottom dead center.

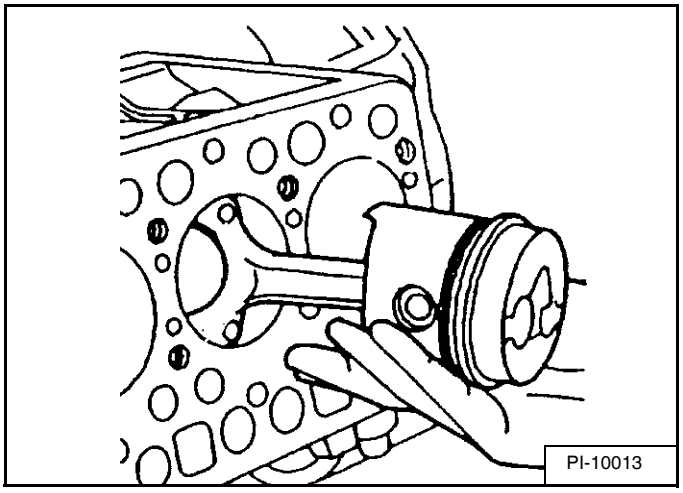
Remove the connecting rod bolts.

Installation: Tighten the connecting rod bolts to 33-36 ft.-lb. (44-49 N•m) torque.

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Piston And Connecting Rod Removal And Installation (Cont'd)

Figure 70-100-62

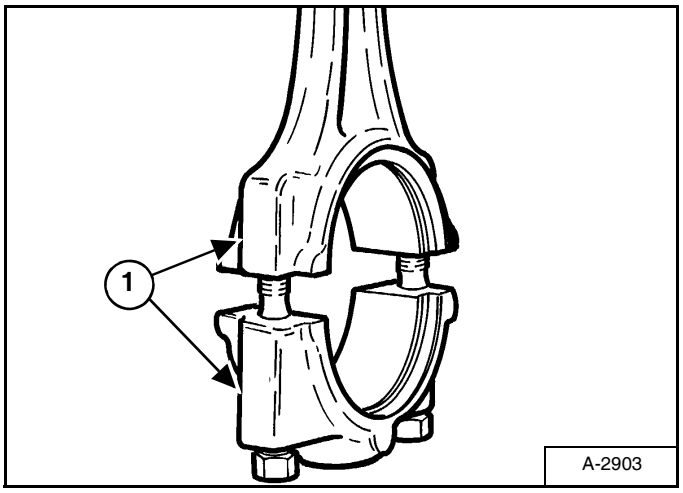


Remove the rod cap and bearing **[Figure 70-100-62]**.

Use a hammer handle and push the piston/connecting rod assembly out of the cylinder bore **[Figure 70-100-62]**.

NOTE: Make sure the pistons are marked so they will be returned to the same cylinder bore.

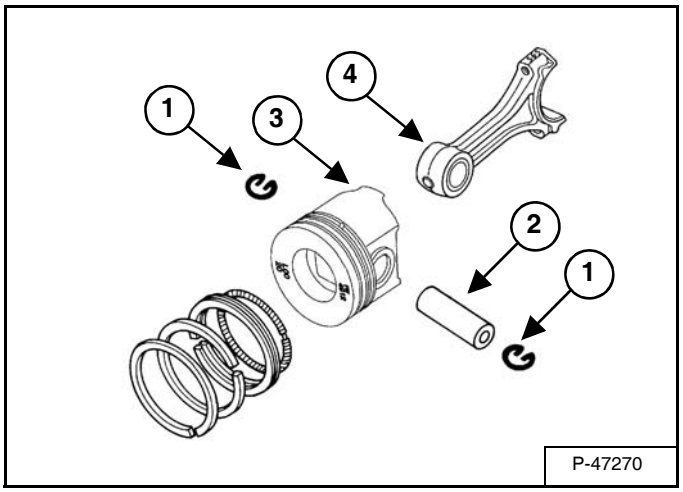
Figure 70-100-63



Installation: Make sure the marks on the connecting rod and bearing are aligned when installing the bearing cap **[Figure 70-100-63]**.

Repeat the procedure to remove the other piston/ connecting rod assemblies from the engine block.

Figure 70-100-64

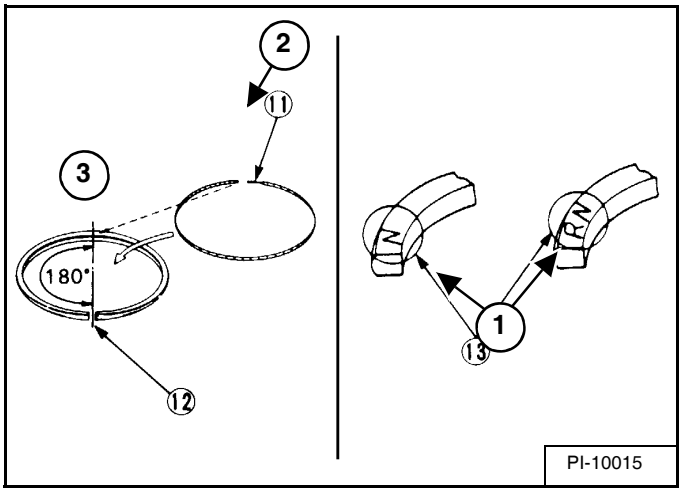


Remove the piston rings **[Figure 70-100-64]**.

Remove the snap ring (Item 1) and piston pin (Item 2) **[Figure 70-100-64]**.

Separate the piston (Item 3) from the connecting rod (Item 4) **[Figure 70-100-64]**.

Figure 70-100-65

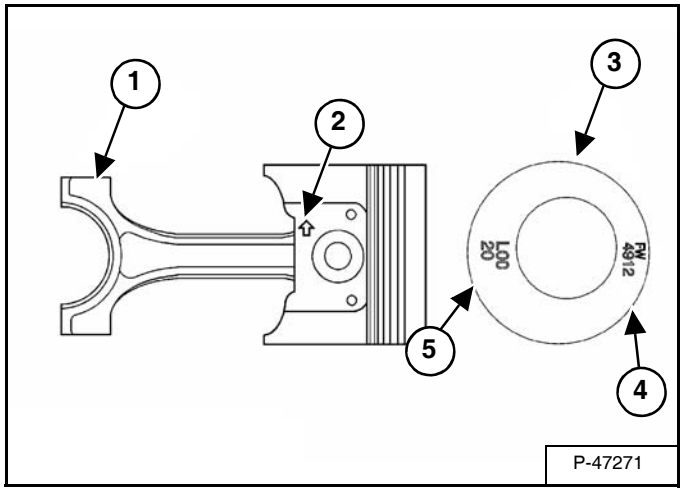


Installation: When installing new rings, assemble the ring so the mark (Item 1) near the gap faces the top of the piston. When installing the oil ring, place the expander joint (Item 2) on the opposite side of the oil ring gap (Item 3) **[Figure 70-100-65]**.

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Piston And Connecting Rod Removal And Installation (Cont'd)

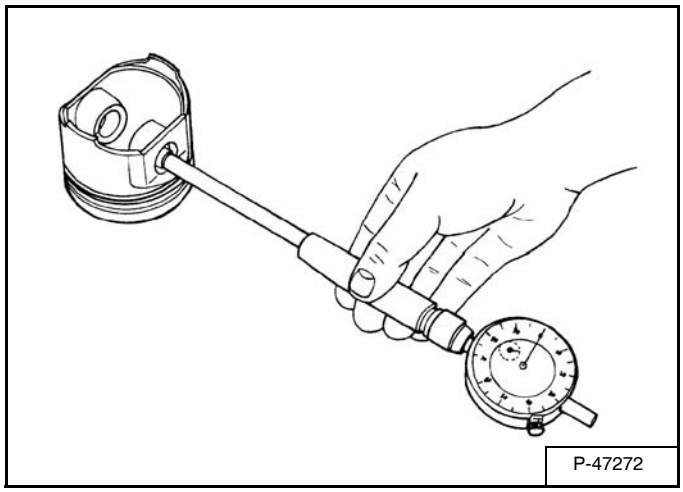
Figure 70-100-66



Installation: When reassembling, align the marks (Item 1) on the connecting rod and piston (Item 2). Heat the piston in clean engine oil to 176° F. (80° C.) and tap the piston pin into position. Place the piston rings so that there are gaps every 120° (Items 3, 4 & 5) **[Figure 70-100-66]** with no gap facing the piston pin in the cylinder.

Piston And Connecting Rod Servicing

Figure 70-100-67



Measure the I.D. of the piston pin bore in both horizontal and vertical directions **[Figure 70-100-67]**.

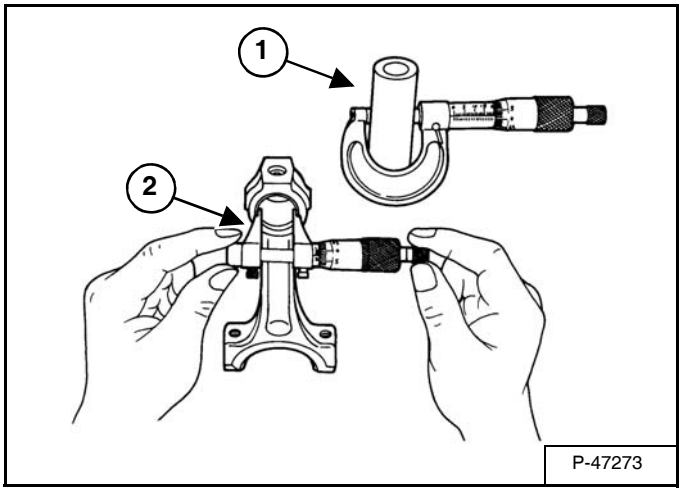
If the measurement exceeds the allowable limit, replace the piston.

Piston Bore I.D.	0.9843-0.9848 inch (25,0-25,013 mm)
Allowable Limit	0.9862 inch (25,05 mm)

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Piston And Connecting Rod Servicing (Cont'd)

Figure 70-100-68



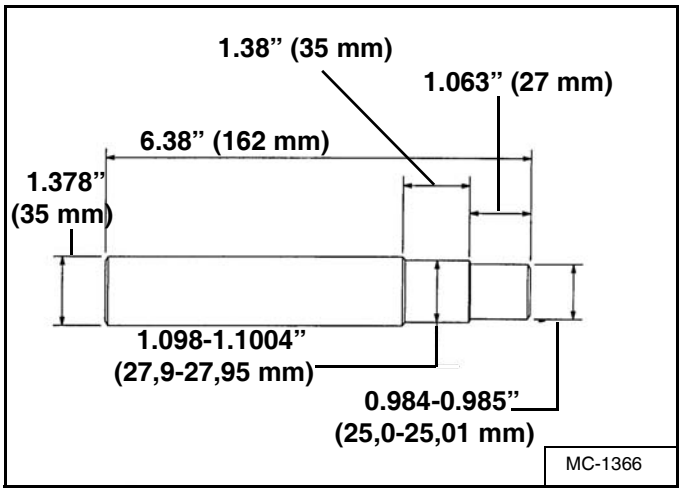
Measure the O.D. of the piston pin (Item 1) **[Figure 70-100-68]**.

Measure the I.D. of the connecting rod small end (Item 2) **[Figure 70-100-68]**.

Calculate the oil clearance. If the clearance exceeds the allowable limit, replace the bushing. If it still exceeds the specifications, replace the piston pin.

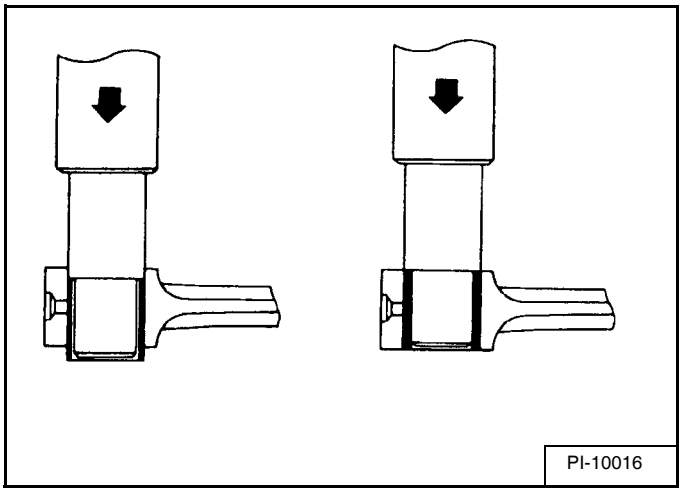
Piston Pin O.D.	0.9843-0.9847 inch (25,0-25,011 mm)
Bushing I.D.	0.9852-0.9858 inch (25,03-25,04 mm)
Oil Clearance Between Piston Pin & Bushing	0.0006-0.0015 inch (0,014-0,038 mm)
Allowable Limit	0.0059 inch (0,15 mm)

Figure 70-100-69



To replace the connecting rod small end bushing, make a driver tool as shown in figure **[Figure 70-100-69]**.

Figure 70-100-70



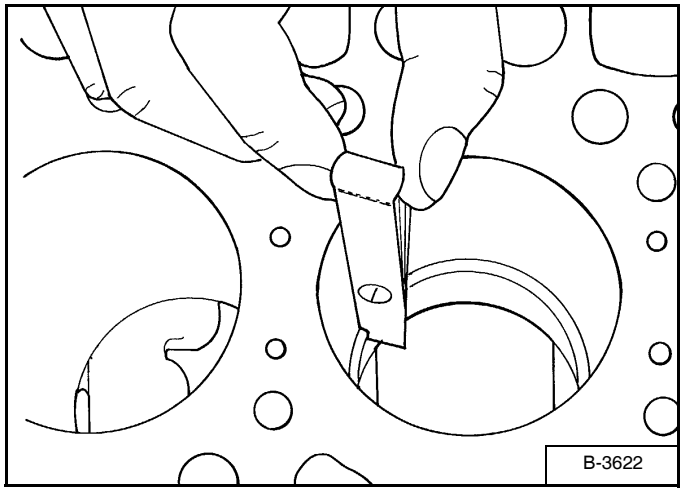
Use a press and special driver tool to remove the small end bushing **[Figure 70-100-70]**.

Installation: Clean the small end bushing and bore. Put oil on the bushing and press into the connecting rod until it is flush **[Figure 70-100-70]**.

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Piston And Connecting Rod Servicing (Cont'd)

Figure 70-100-71



Install a piston ring into the lower part of the cylinder bore. Measure the ring gap with a feeler gauge **[Figure 70-100-71]**.

If the gap exceeds the allowable limit, replace the ring.

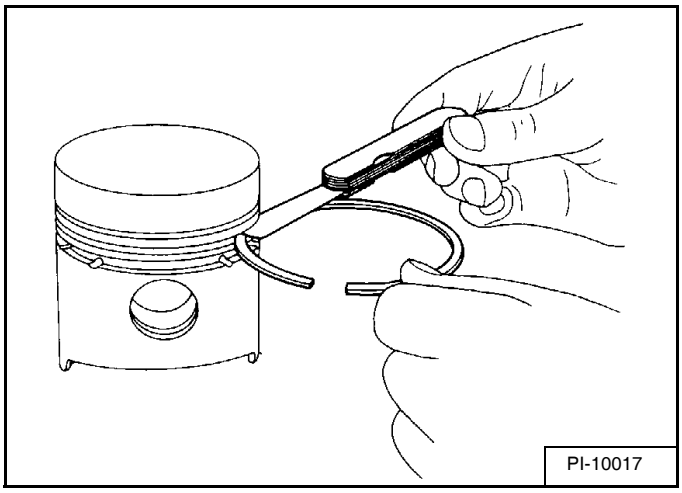
Kubota V2203-M-DI

Top Ring Gap	0.0079-0.0138 inch (0,2-0,35 mm)
Oil Ring Gap	0.0079-0.0157 inch (0,20-0,40 mm)
Allowable Limit	0.0492 inch (1,25 mm)
Second Ring Gap	0.0138-0.0197 inch (0.35-0,50 mm)

Kubota V2003-M-DI-T (Turbo)

Top Ring Gap	0.0079-0.0138 inch (0,2-0,35 mm)
Oil Ring Gap	0.0098-0.0177 inch (0,25-0,45 mm)
Allowable Limit	0.0492 inch (1,25 mm)
Second Ring Gap	0.0157-0.0217 inch (0.40-0,55 mm)

Figure 70-100-72



Remove the carbon from the ring grooves. Measure the clearance between the ring and groove with a feeler gauge **[Figure 70-100-72]**.

If the clearance exceeds the allowable limit, replace the ring. If the clearance still exceeds the allowable limit, replace the piston.

Kubota V2203-M-DI

Compression Rings	0.0020-0.0035 inch (0,05-0,09 mm)
Allowable Limit	0.0079 inch (0,2 mm)
Oil Ring	0.0012-0.0028 inch (0,03-0,07 mm)
Allowable Limit	0.0059 inch (0,15 mm)

Kubota V2003-M-DI-T (Turbo)

Compression Rings	0.0037-0.0050 inch (0,093-0,128 mm)
Allowable Limit	0.0079 inch (0,2 mm)
Oil Ring	0.0008-0.0024 inch (0,02-0,06 mm)
Allowable Limit	0.0059 inch (0,15 mm)

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Connecting Rod Alignment

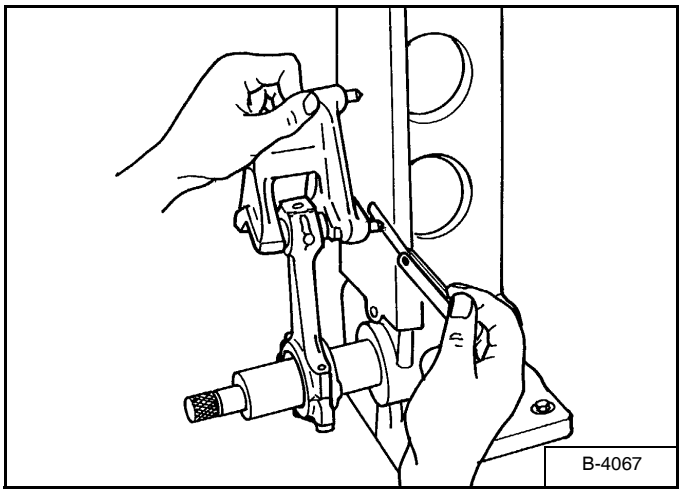
NOTE: The small end bushing is the basis of this check, check the bushing for wear before doing this check.

Install the piston pin into the connecting rod.

Install the connecting rod on an alignment tool.

Put the gauge over the piston pin and move it against the face plate.

Figure 70-100-73



If the gauge does not fit squarely against the face plate, measure the space between the gauge and face plate **[Figure 70-100-73]**.

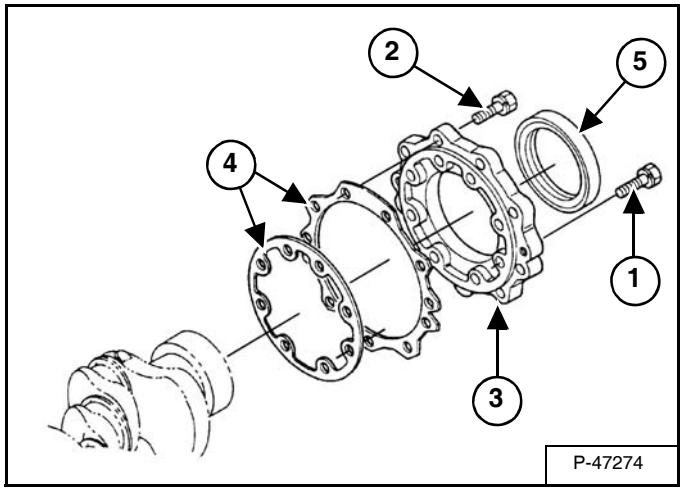
If the measurement exceeds the allowable limit, replace the connecting rod.

Rod Alignment	0.002 inch (0,05 mm)

Crankshaft And Bearings Removal And Installation

Remove the piston and connecting rod assemblies. (See Piston And Connecting Rod Removal And Installation on Page 70-100-20.)

Figure 70-100-74



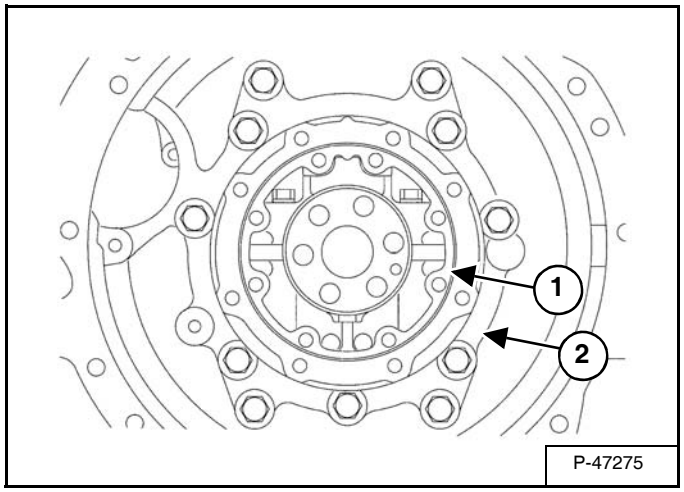
Mark and remove the inside screws (Item 1) first, then remove the outside screws (Item 2) **[Figure 70-100-74]**.

NOTE: The inside bolts are different length than the outside bolts.

Install two screws in the bearing case cover and remove the cover (Item 3) **[Figure 70-100-74]**.

Remove the two gaskets (Item 4) and oil seal (Item 5) **[Figure 70-100-74]** from the cover.

Figure 70-100-75

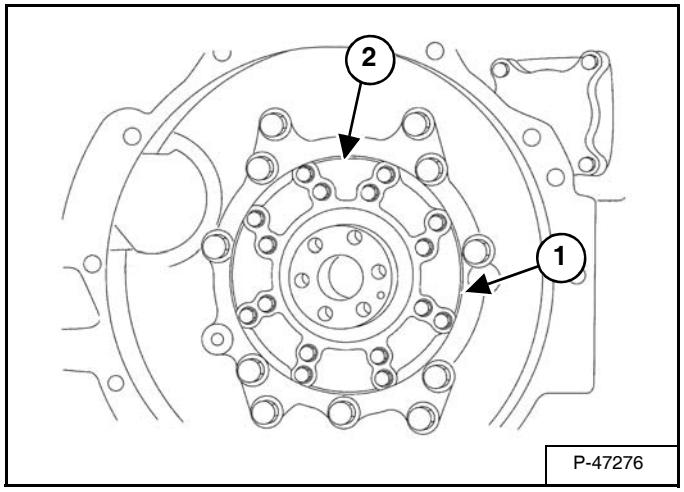


Installation: Install the gaskets (Item 1) & (Item 2) **[Figure 70-100-75]** as shown.

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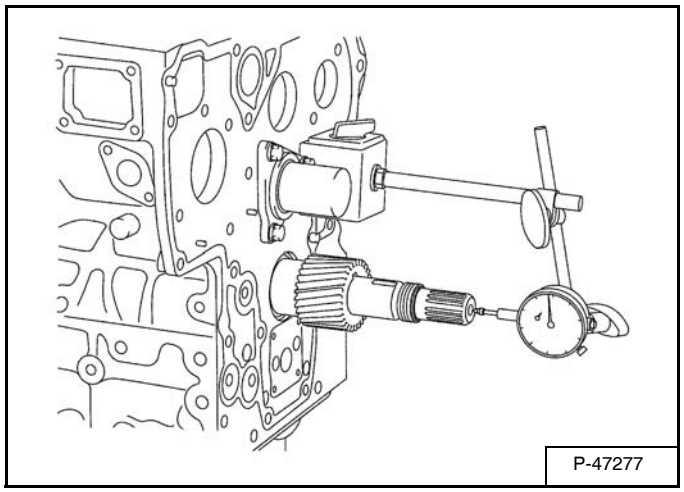
Crankshaft And Bearings Removal And Installation (Cont'd)

Figure 70-100-76



Install the bearing case cover (Item 1) **[Figure 70-100-76]** with the casting mark (Item 2) **[Figure 70-100-76]** in the upward position. Tighten the bolts to 17-20 ft.-lb. (23.5-27.5 N•m) torque.

Figure 70-100-77

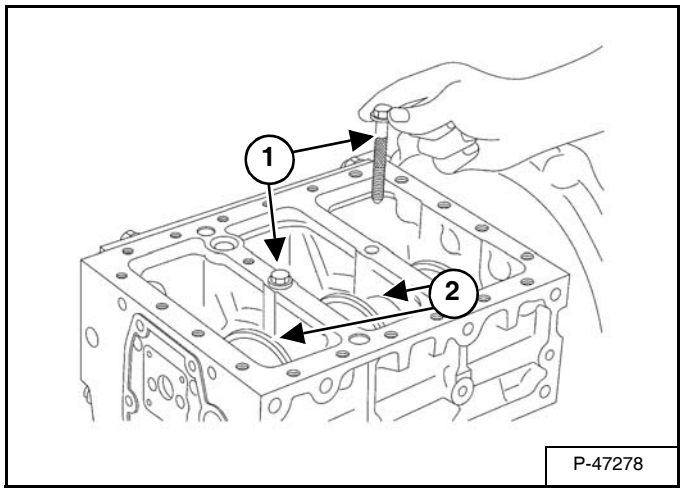


Before removing the crankshaft/main bearings, check the end play. Install a dial indicator. Move the crankshaft **[Figure 70-100-77]** to the flywheel side, zero the dial indicator. Measure the end play by pulling the crankshaft toward the gear case side.

If the measurement exceeds the allowable limit, replace the thrust washers **[Figure 70-100-77]**.

End Play	0.0059-0.0138 inch (0,15-0,35 mm)
Allowable Limit	0.0197 inch (0,5 mm)

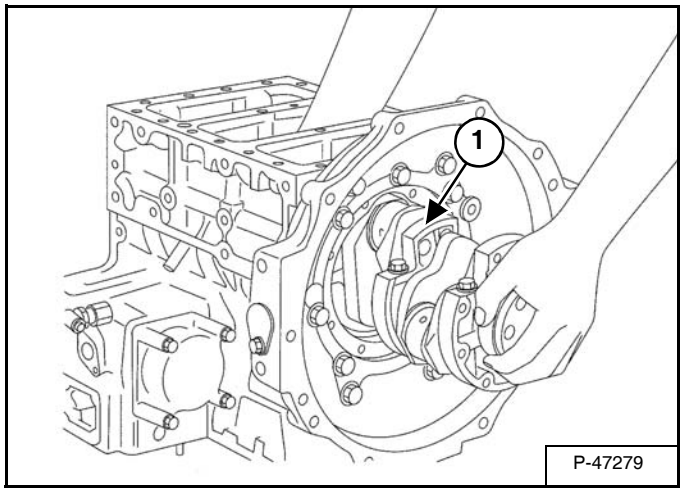
Figure 70-100-78



Remove the main bearing case bolt (Item 1) **[Figure 70-100-78]**.

Installation: Align the bearing case hole (Item 2) **[Figure 70-100-78]** with the hole in the block. Put oil on the bolt threads and tighten to 51-54 ft.-lb. (69-73 N•m) torque.

Figure 70-100-79



Remove the crankshaft/main bearing assembly from the engine block **[Figure 70-100-79]**.

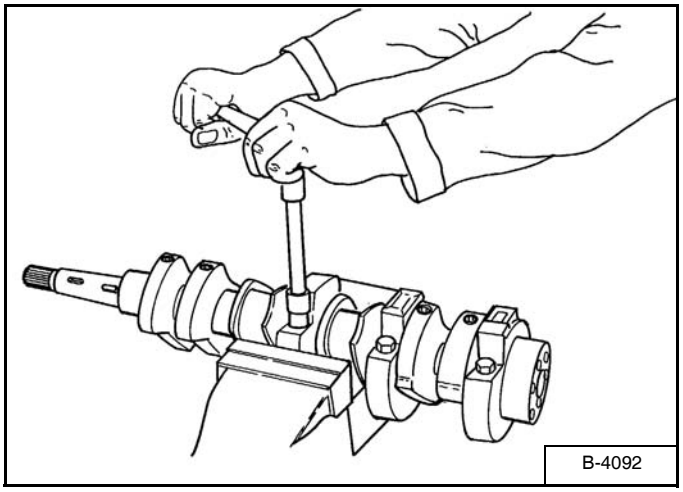
NOTE: Turn the crankshaft as needed to allow the crank pin journals to pass through the cut out (Item 1) [Figure 70-100-79] of the engine block.

Mark the bearing case halves for correct installation.

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Crankshaft And Bearings Removal And Installation (Cont'd)

Figure 70-100-80

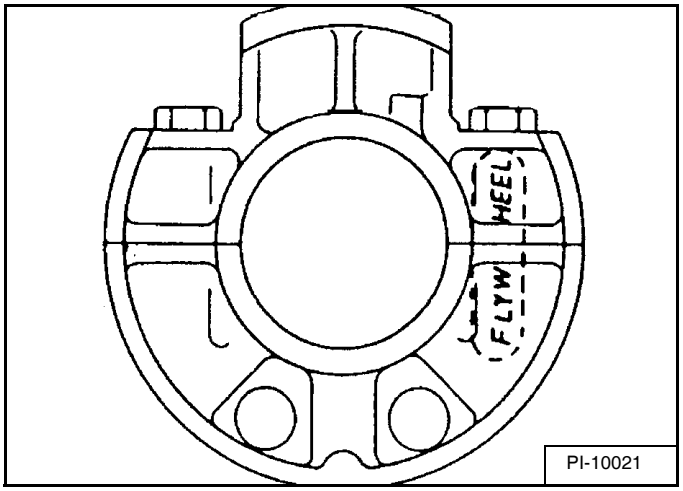


Remove the two bearing case bolts **[Figure 70-100-80]**.

Remove the bearing case and bearing.

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

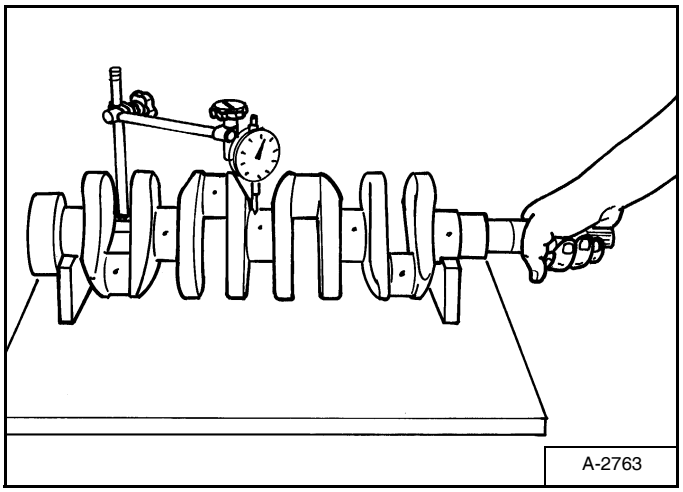
Figure 70-100-81



Installation: When installing the main bearing case assemblies, face the mark FLYWHEEL to the flywheel side of the engine block **[Figure 70-100-81]**. The thrust washers oil grooves must face outward.

Crankshaft And Bearings, Servicing

Figure 70-100-82



Put the crankshaft on V-blocks. Install a dial indicator on the center journal **[Figure 70-100-82]**.

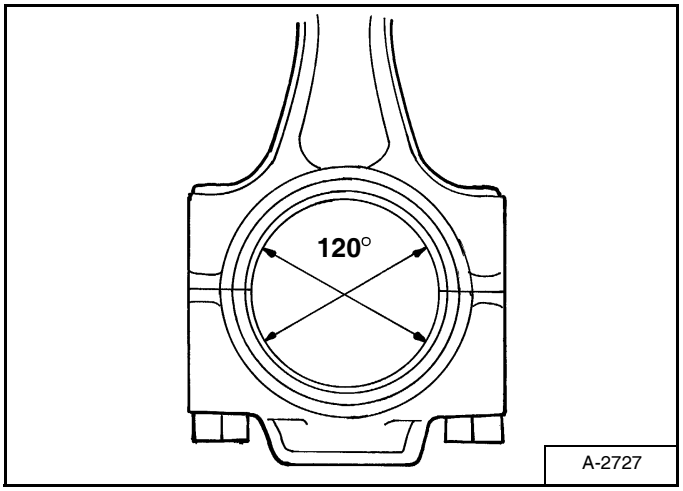
Turn the crankshaft at a slow rate to obtain the misalignment (one half of the alignment measurement).

If the misalignment exceeds the allowable limit, replace the crankshaft.

Alignment	0.0008 inch (0,02 mm)

Tighten the connecting rod bolts to 33-36 ft.-lb. (45-49 N•m) torque.

Figure 70-100-83

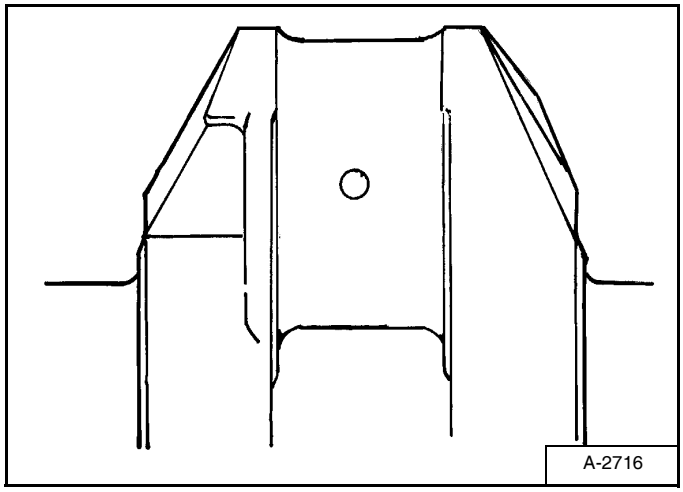


Measure the crankpin bearing I.D. **[Figure 70-100-83]**.

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Crankshaft And Bearings, Servicing (Cont'd)

Figure 70-100-84

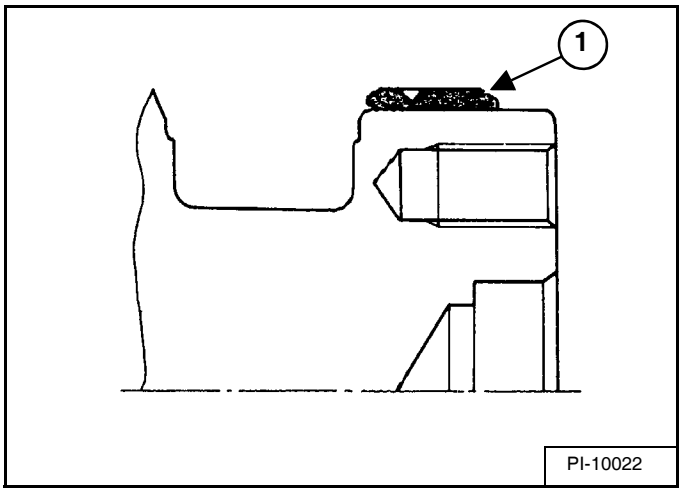


Measure the crankpin O.D. **[Figure 70-100-84]**.

Calculate the oil clearance.

Crankpin Bearing I.D.	1.8504-1.8522 inch (47,0-47,05 mm)
Crankpin O.D.	1.8488-1.8494 inch (46,96-46,98 mm)
Oil Clearance	0.0010-0.0034 inch (0,025-0,087 mm)
Allowable limit	0.0079 inch (0,2 mm)

Figure 70-100-85



Check the wear on the crankshaft sleeve (Item 1) **[Figure 70-100-85]**.

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

Wear of Sleeve	0.0039 inch (0,1 mm)

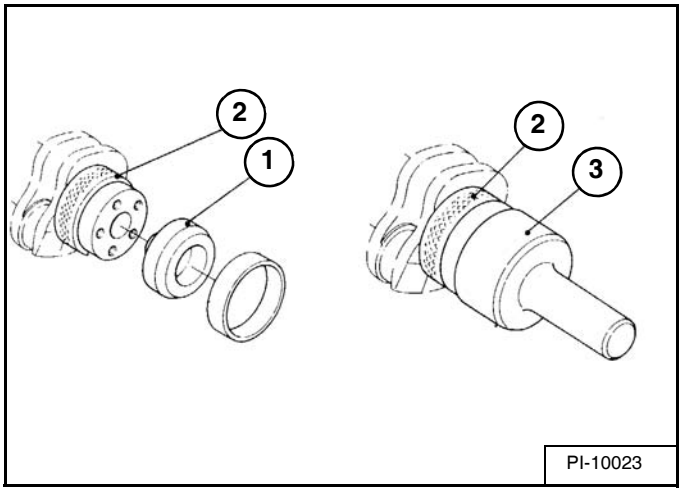
The special tool set will be needed to replace the crankshaft sleeve.

Remove the sleeve.

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Crankshaft And Bearings, Servicing (Cont'd)

Figure 70-100-86

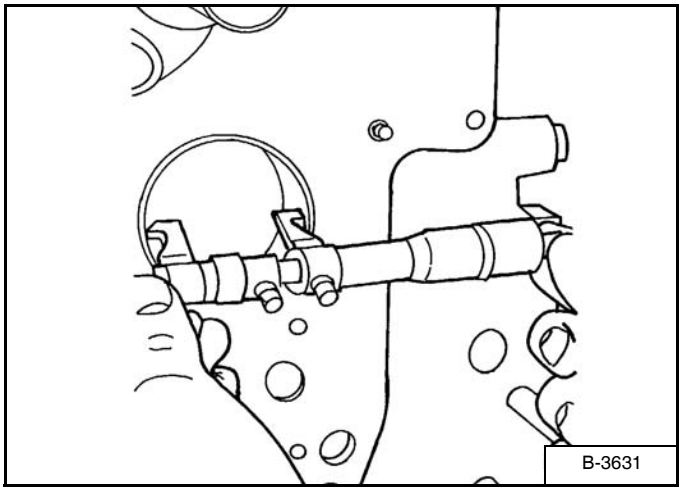


Install the sleeve guide (Item 1) and stop (Item 2) **[Figure 70-100-86]**.

Heat the sleeve to approximately 300° F (150° C). Install the sleeve on the crankshaft using the special driver tool (Item 3) **[Figure 70-100-86]**.

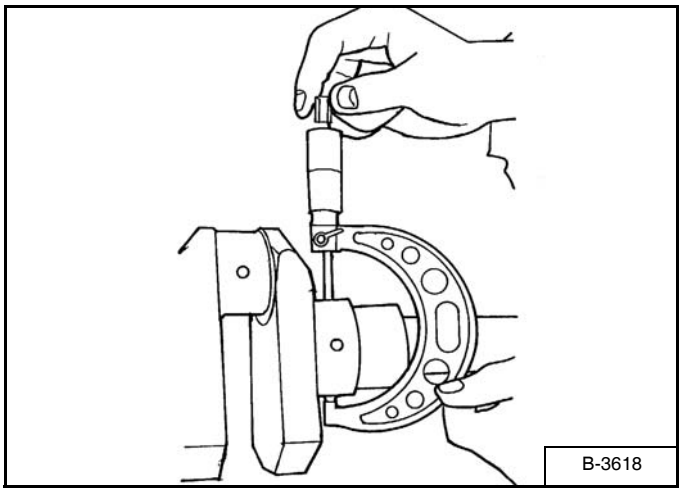
NOTE: The sleeve is installed with the larger chamfered surface to the front of the crankshaft (Item 1) [Figure 70-100-85 on Page 28].

Figure 70-100-87



Measure the I.D. of the No. 1 crankshaft bearing **[Figure 70-100-87]**.

Figure 70-100-88



Measure the O.D. of the crankshaft journal **[Figure 70-100-88]**.

Calculate the oil clearance.

If the clearance exceeds the allowable limit, replace the crankshaft bearing.

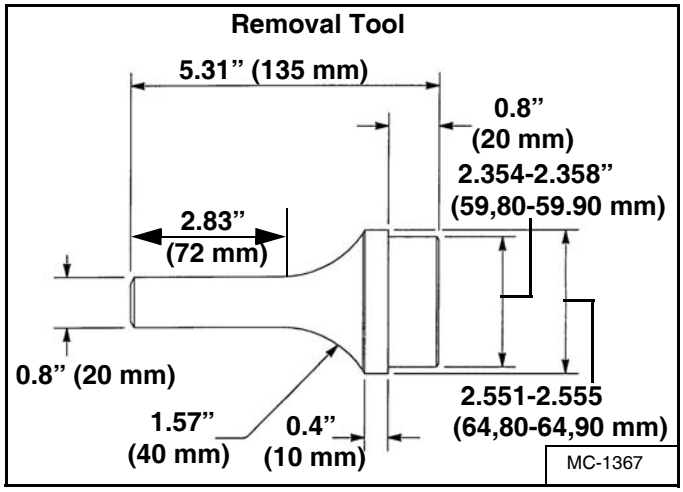
Bearing 1:

Bearing I.D.	2.3614-2.3637 inch (59,98-60,04 mm)
Journal O.D.	2.3591-2.3598 inch (59,92-59,94 mm)
Oil Clearance	0.016-0.0046 inch (0,040-0,12 mm)
Allowable Limit	0.0079 inch (0,2 mm)

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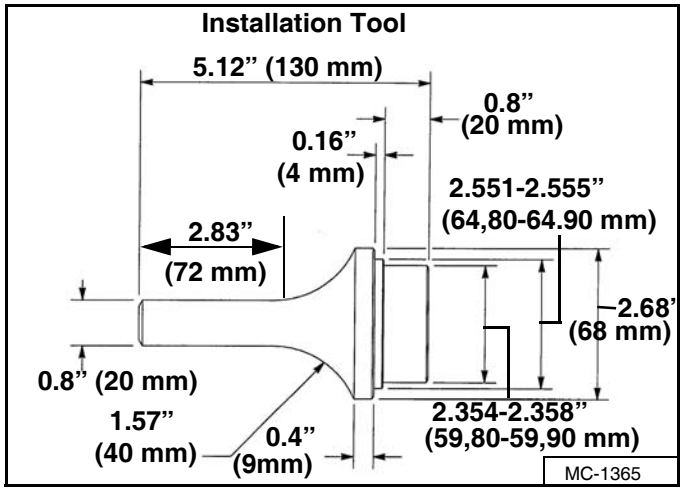
Crankshaft And Bearings, Servicing (Cont'd)

Figure 70-100-89



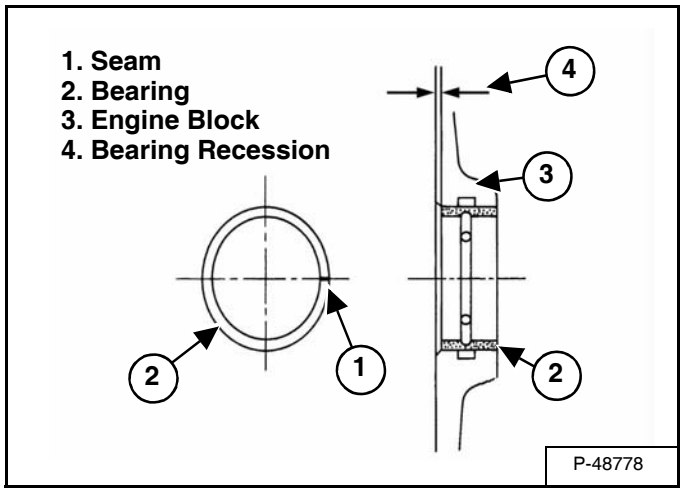
To remove the front bearing make the tool as shown in figure **[Figure 70-100-89]**.

Figure 70-100-90



To install the front bearing make the tool as shown in figure **[Figure 70-100-90]**.

Figure 70-100-91



Remove the front bearing with the special removal tool **[Figure 70-100-89]**.

Installation: Clean the new bearing (Item 2) and bore, apply oil to the bearing and bore. Install the new bearing with the seam (Item 1) **[Figure 70-100-91]** towards the exhaust manifold side, using the installation driver tool.

Check the depth (Item 4) of the bearing (Item 2) from the face of the engine block (Item 3) **[Figure 70-100-91]**. This will ensure proper bearing alignment with the crankshaft.

Bearing Number 1 Recession	0.1654-0.1772 inch (4,2-4,5 mm)

Clean the crankshaft journal and bearing. Put a strip of press gauge on the center journal.

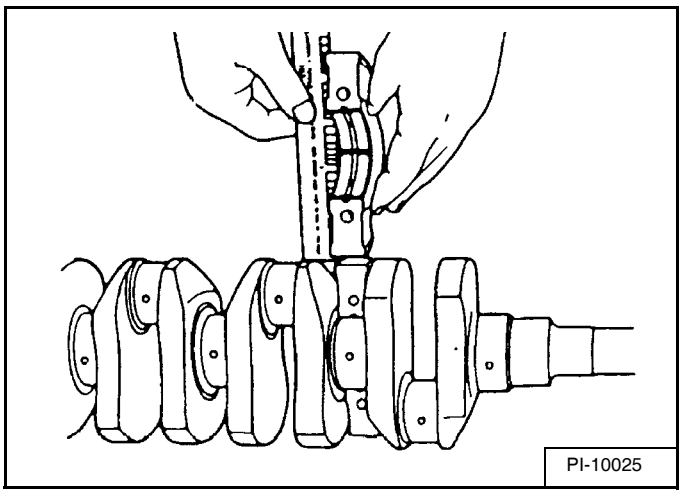
Install the main bearing case halves and tighten the bolts. Remove the bearing case halves.

NOTE: DO NOT turn the crankshaft with the press gauge installed. Incorrect measurements will be obtained.

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Crankshaft And Bearings, Servicing (Cont'd)

Figure 70-100-92



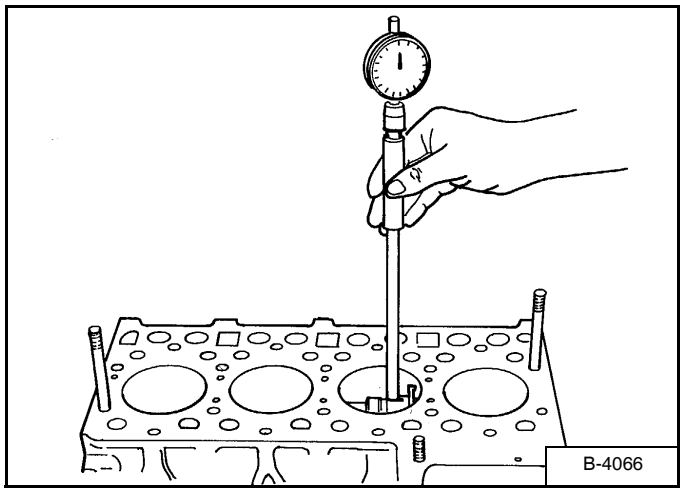
Measure the flattened press gauge **[Figure 70-100-92]**.

If the clearance exceeds the allowable limit, replace the No. 2 crankshaft bearing.

Crankshaft Journal O.D.	2.3591-2.3598 inch (59,92-59,94 mm)
Bearing I.D.	2.3614-2.3632 inch (59,98-60,02 mm)
Oil Clearance	0.0016-0.0041 inch (0,04-0,12 mm)
Allowable Limit	0.0079 inch (0,2 mm)

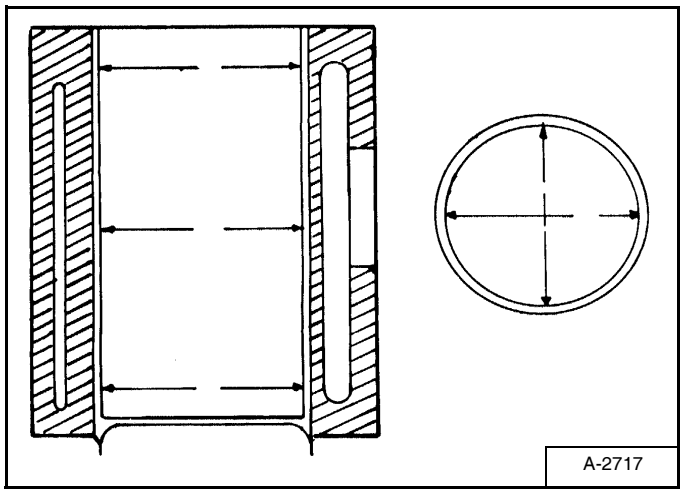
Cylinder Bore, Checking

Figure 70-100-93



Use a gauge to check the inside measurement of the cylinder bore **[Figure 70-100-93]**.

Figure 70-100-94



Measure the six points as shown in figure **[Figure 70-100-94]** to find the maximum wear.

The factory specifications are:

Kubota V2203-M-DI

3.4252-3.4261 inch (87,0-87,022 mm)

The wear limit is: +0.0059 inch (+0,15 mm).

Kubota V2003-M-DI-T (Turbo)

3.2677-3.2686 inch (83-83,02 mm).

The wear limit is +0.0059 inch (+0,15 mm).

If the cylinder bore is not within specifications, re-bore the cylinder for oversize piston.

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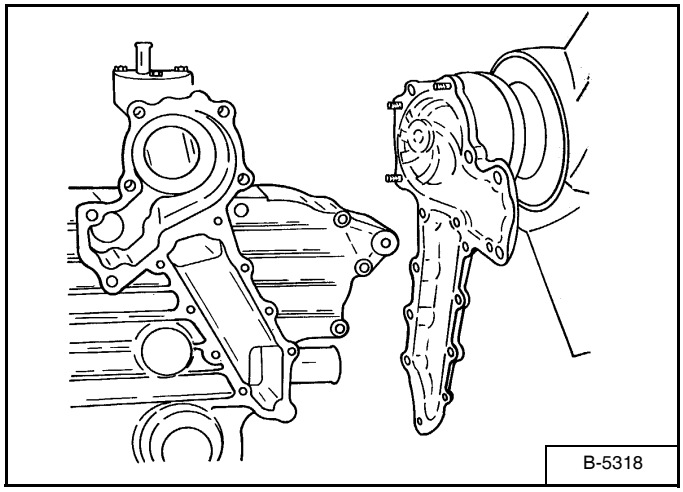
Water Pump Removal And Installation

Drain the cooling system.

Remove the alternator belt.

Remove the water pump bolts.

Figure 70-100-95

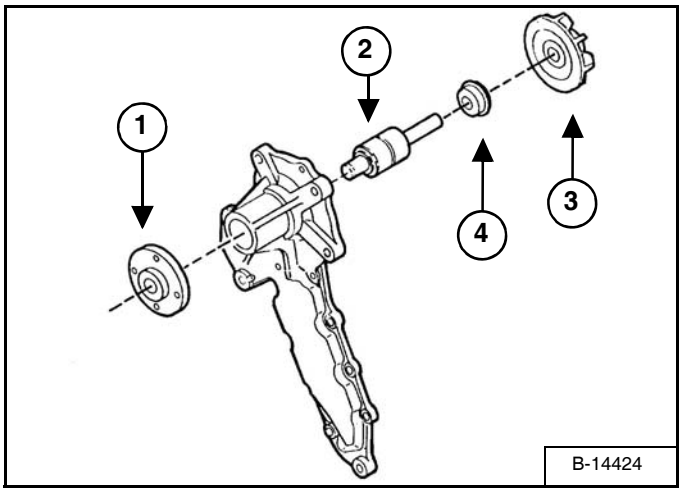


Remove the water pump **[Figure 70-100-95]**.

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

Water Pump Disassembly And Assembly

Figure 70-100-96



Remove the flange (Item 1) **[Figure 70-100-96]**.

Press the shaft (Item 2) and impeller (Item 3) **[Figure 70-100-96]** out the impeller side of the water pump.

Remove the impeller (Item 3) **[Figure 70-100-96]** from the shaft.

Remove the seal (Item 4) **[Figure 70-100-96]**.

Install a new seal (Item 4) **[Figure 70-100-96]** when assembling the water pump.

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TURBOCHARGER

Checking

Inspect the turbine fins and the turbo housing for damage.

Spin turbine by hand. Turbine should spin freely.

If the turbine is damaged replace the turbocharger.

Check the oil tubelines for leaks.

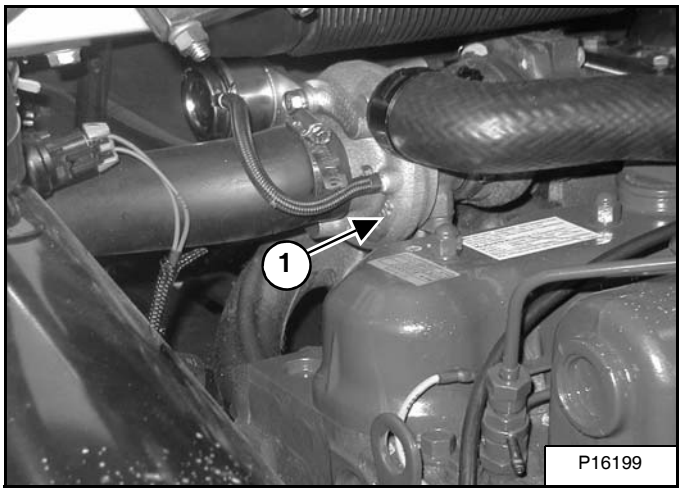
Description

⚠ WARNING

Turbochargers, operate at high speed and high temperatures. Keep fingers, tools and other objects away from the inlet and outlet ports. Avoid contact with hot surfaces.

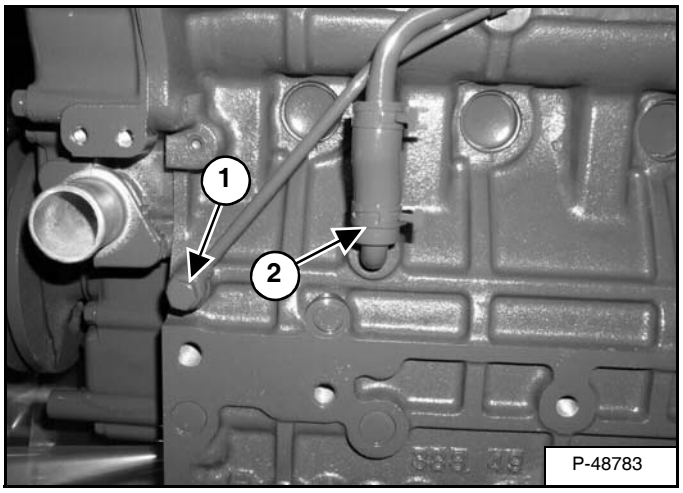
W-2257-1196

Figure 70-110-1



The turbocharger (Item 1) **[Figure 70-110-1]** is placed between the exhaust and intake manifolds. It is driven by hot exhaust gases and supplies air at more than atmospheric pressure to the intake. It is lubricated by oil from the main galley.

Figure 70-110-2



The oil flows from the fitting (Item 1) on the front of the engine to the turbocharger and returns to the engine block through the fitting (Item 2) **[Figure 70-110-2]** .

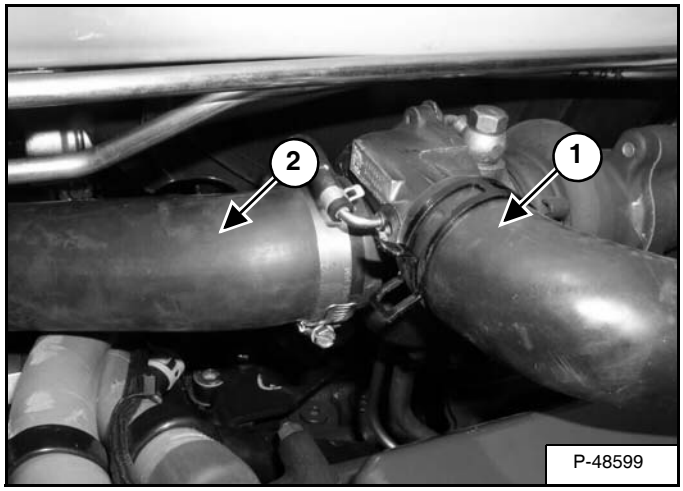
The turbocharger internal components are not serviceable.

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Removal And Installation

Remove the muffler. (See Removal And Installation on Page 70-30-1.)

Figure 70-110-3



Remove the compressor outlet hose (Item 1) **[Figure 70-110-3]** from the turbo.

Remove the air cleaner hose (Item 2) **[Figure 70-110-3]** from the turbocharger.

Figure 70-110-4

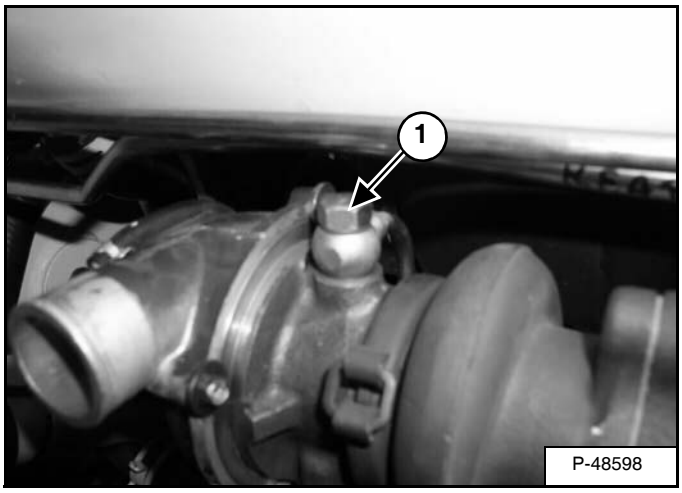
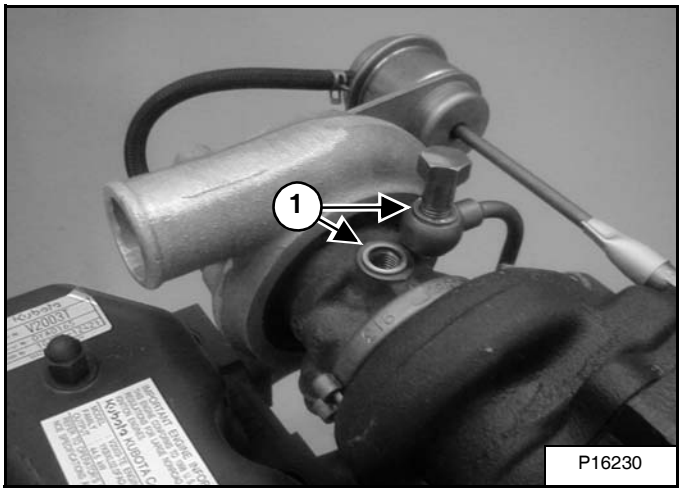


Figure 70-110-5



Remove the oil supply line fitting (Item 1) **[Figure 70-110-4]** and the brass washer(s) (Item 1) **[Figure 70-110-5]** from the turbocharger.

Installation: Tighten to 12-15 ft.-lb. (16,0-20,3 N•m) torque.

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Removal And Installation (Cont'd)

Figure 70-110-6

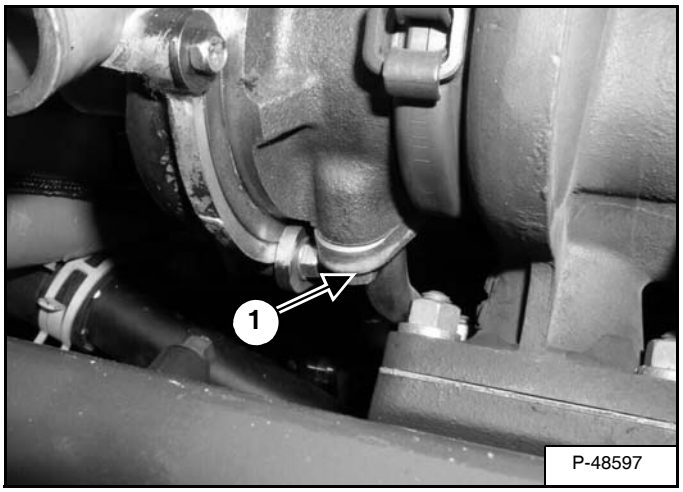
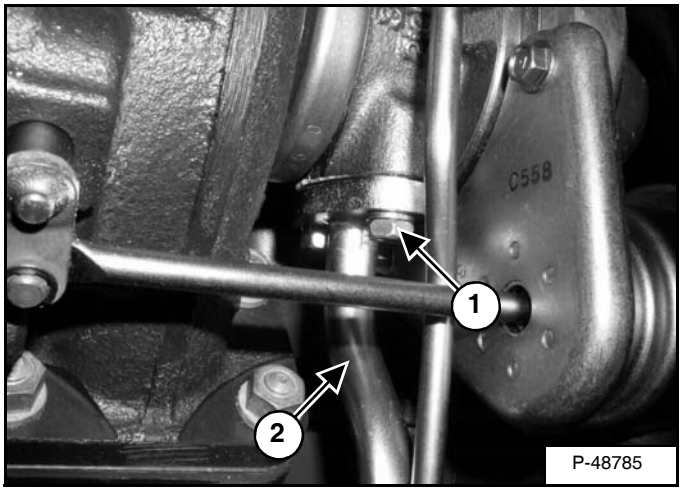


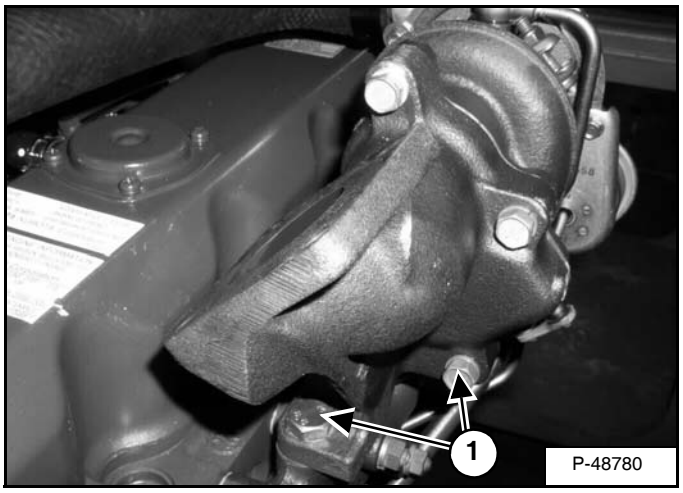
Figure 70-110-7



Remove the mounting bolts (Item 1) **[Figure 70-110-6]** & **[Figure 70-110-7]** from the oil return line (Item 2) **[Figure 70-110-6]** & **[Figure 70-110-7]**.

Installation: Tighten to 84-132 in.-lb. (9,5-15,0 N•m) torque.

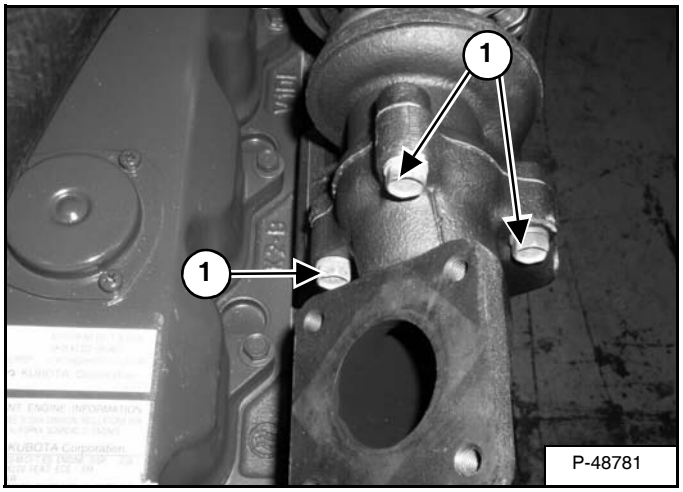
Figure 70-110-8



Remove the mounting bolt (Item 1) **[Figure 70-110-8]** from the exhaust muffler flange.

Installation: Tighten to 17-20 ft.-lb. (23,0-27,0 N•m) torque.

Figure 70-110-9



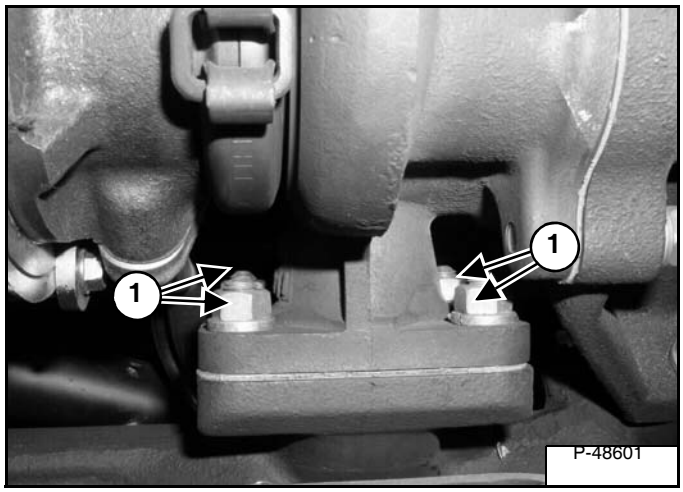
Remove the mounting bolt (Item 1) **[Figure 70-110-9]** from the exhaust muffler flange.

Installation: Tighten to 17-20 ft.-lb. (23,0-27,0 N•m) torque.

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Removal And Installation (Cont'd)

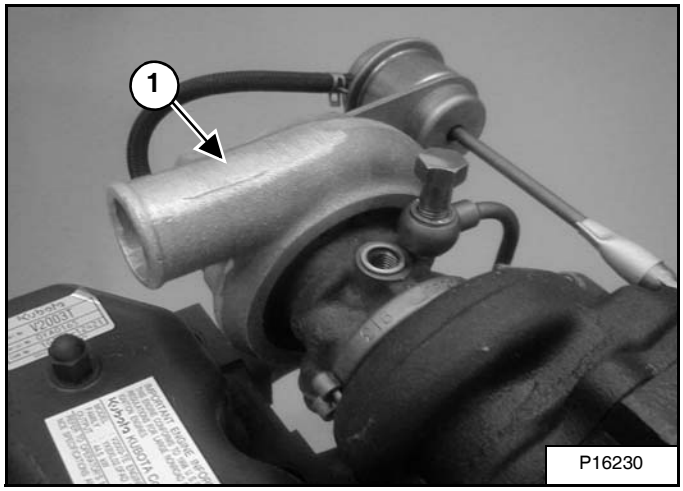
Figure 70-110-10



Remove the mounting nut and washer (Item 1) **[Figure 70-110-10]** from the turbocharger.

Installation: Tighten to 17-20 ft.-lb. (23,0-27,0 N•m) torque.

Figure 70-110-11



Remove the turbocharger assembly (Item 1) **[Figure 70-110-11]** from the engine.

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HEATING, VENTILATION, AIR CONDITIONING

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AIR CONDITIONING SYSTEM FLOW

Principals

In an air conditioning system the refrigerant is circulated under pressure through five major components in a closed circuit. At these five points in the system the refrigerant goes through pressure and temperature changes.

The compressor (Item 1) See Chart on Page 80-10-3. takes in heated, low pressure refrigerant gas through the suction valve (low pressure side) and as the name indicates, pressurizes the heated refrigerant and forces it through the discharge valve (high pressure side) on the condenser (Item 2) See Chart on Page 80-10-3.

Ambient air passing through the condenser removes the heat from refrigerant resulting in physical state change in the refrigerant from a gas to a liquid.

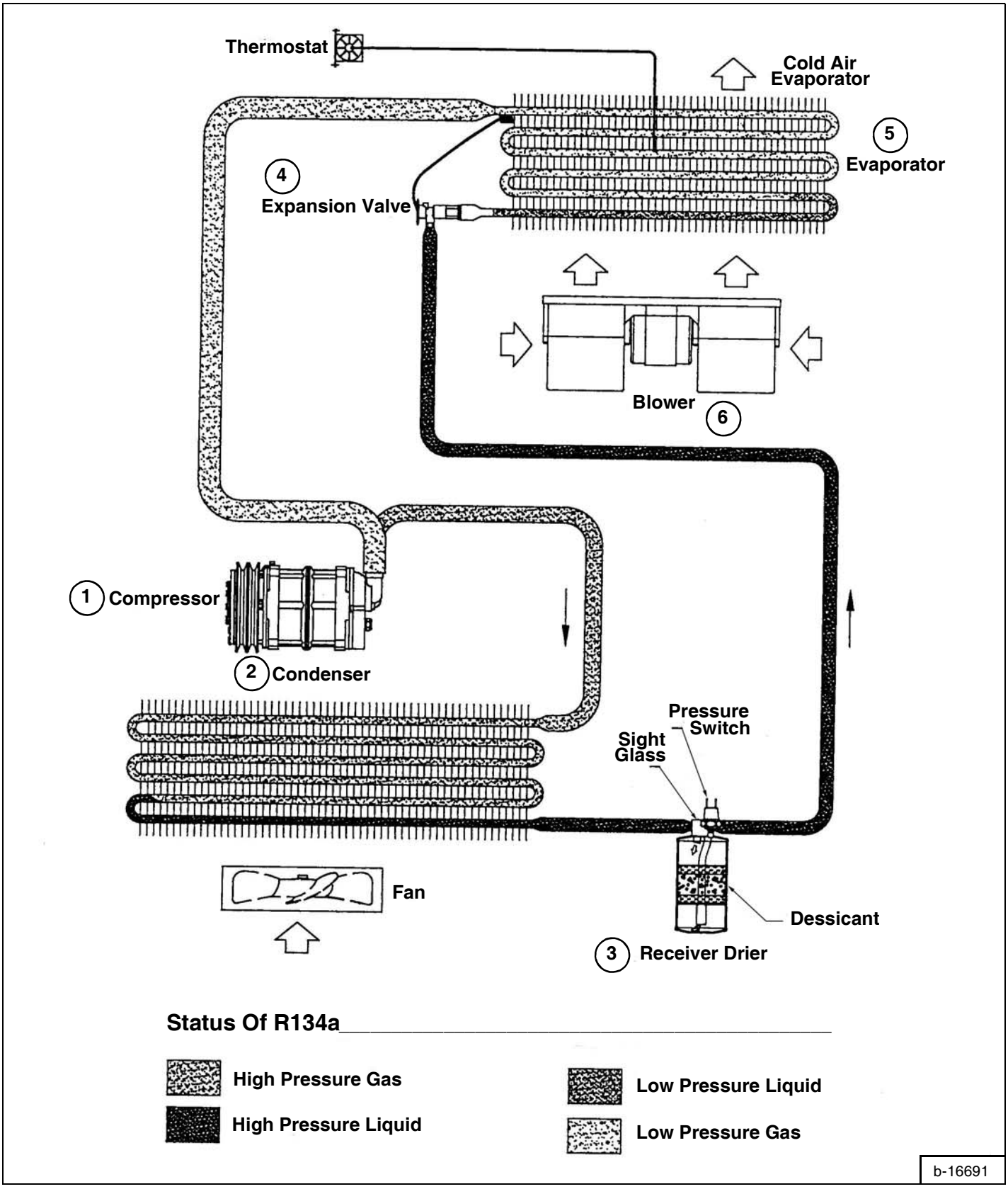
The liquid refrigerant moves on to the receiver/drier (Item 3) See Chart on Page 80-10-3. where impurities such as moisture and dirt are filtered out. The receiver/drier also serves as the storage tank for the liquid refrigerant. The liquid refrigerant (still under high pressure) flows to the expansion valve (Item 4) See Chart on Page 80-10-3.

The expansion valve meters the amount of refrigerant into the evaporator coil (Item 5) See Chart on Page 80-10-3. As the refrigerant passes through the expansion valve, it again changes its physical state. It becomes a low temperature, low-pressure liquid and saturated vapor. The low pressure liquid immediately starts to boil and vaporize as it enters the evaporator. The hot humid air of the machine's cab is drawn through or blown into the evaporator by the evaporator fan (Item 6) See Chart on Page 80-10-3. Since the refrigerant is colder than the air, it absorbs the heat from the air and produces cooled air, which is pushed into the cab by the fan. The moisture in the air condenses on the evaporator coil and drips into the drain pan, which directs the water out of the cab.

The refrigerant cycle is completed when the heated low pressure gas is again drawn into the compressor.

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Chart



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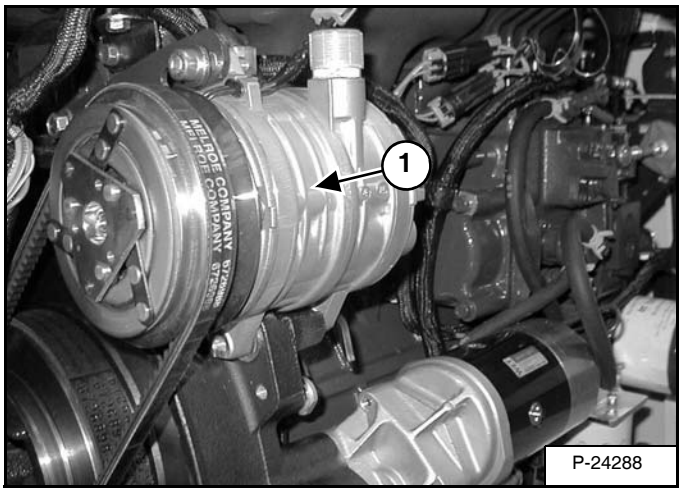


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COMPONENTS

Identification

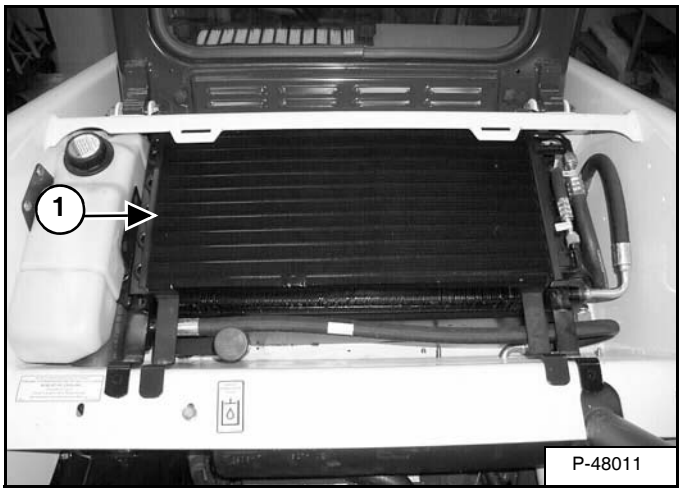
Figure 80-20-1



Compressor: The compressor (Item 1) **[Figure 80-20-1]** is the pump that circulates the refrigerant throughout the system. It raises the pressure of the refrigerant for heat transfer through the condenser and evaporator.

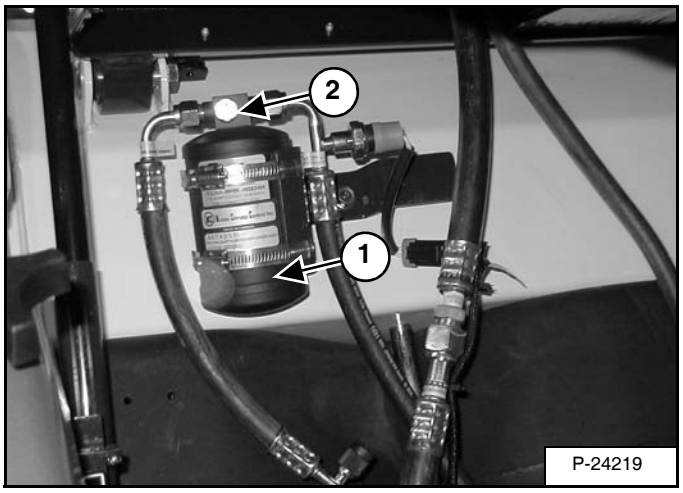
NOTE: The A/C system (Compressor) is recommended to be turned on for at least 5 minutes weekly throughout the year to lubricate the internal components.

Figure 80-20-2



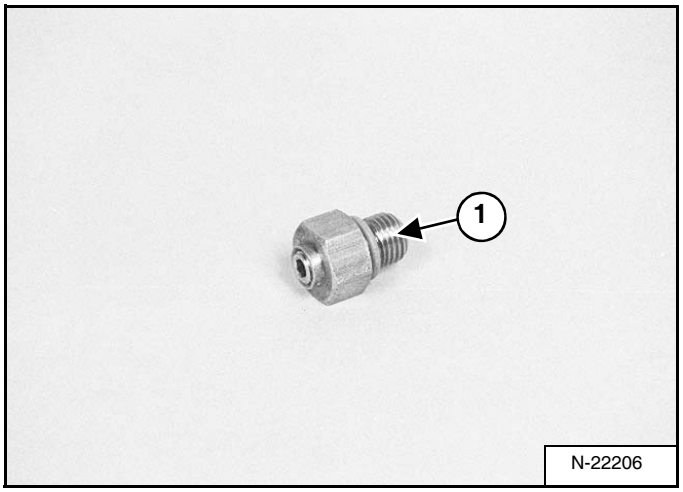
Condenser: The condenser (Item 1) **[Figure 80-20-2]** is the unit that receives the high pressure, high temperature refrigerant vapor from the compressor and condenses it into a high temperature liquid.

Figure 80-20-3



Receiver/Drier: The receiver/drier (Item 1) **[Figure 80-20-3]** is the unit that receives the liquid refrigerant from the condenser and removes moisture and foreign matter from the system. It also serves as a storage tank for the extra liquid refrigerant until it is needed by the evaporator.

Figure 80-20-4

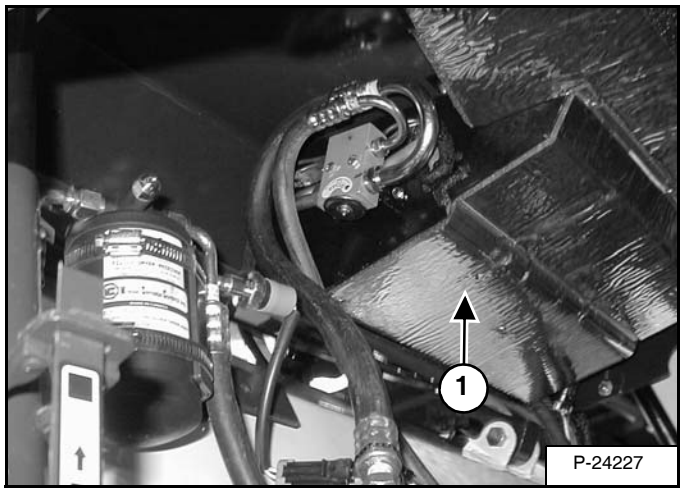


Pressure Relief Valve: The pressure relief valve (Item 2) **[Figure 80-20-3]** is located on the receiver drier assembly. This small brass valve (Item 1) **[Figure 80-20-4]** is a safety feature that is designed to open and release the A/C charge if the pressure reaches 535 PSI.

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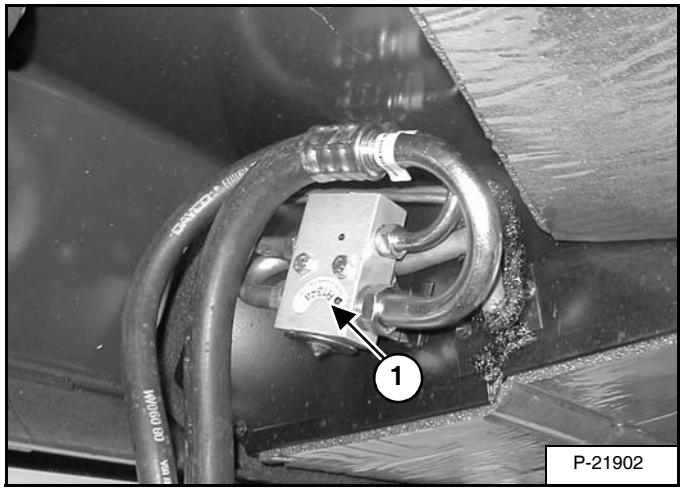
Identification (Cont'd)

Figure 80-20-5



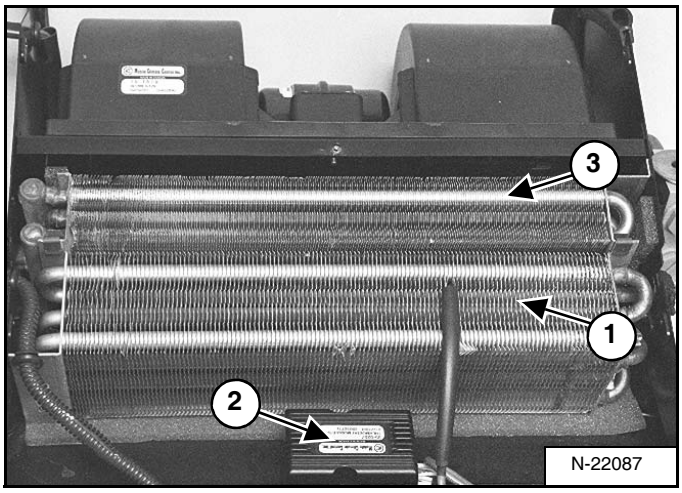
Heater/Evaporator Unit: The heater/evaporator unit (Item 1) **[Figure 80-20-5]** is located behind the loader cab. The unit delivers the cold air for the A/C and warm air for heat into the cab. The unit contains the blower, heat & A/C coils , thermostat and expansion valve.

Figure 80-20-6



Expansion Valve: The expansion valve (Item 1) **[Figure 80-20-6]** controls the amount of refrigerant entering the evaporator coil.

Figure 80-20-7

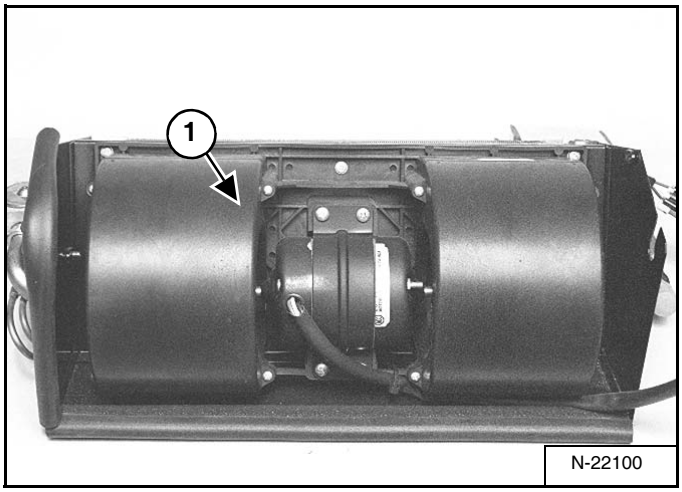


Evaporator Coil: The evaporator coil (Item 1) **[Figure 80-20-7]** cools and dehumidifies the air before it enters the cab.

Thermostat: The thermostat (Item 2) **[Figure 80-20-7]** controls the temperature of the evaporator coil.

Heater Coil: The heater coil (Item 3) **[Figure 80-20-7]** supplies the warm air into the cab by passing air through the coil.

Figure 80-20-8

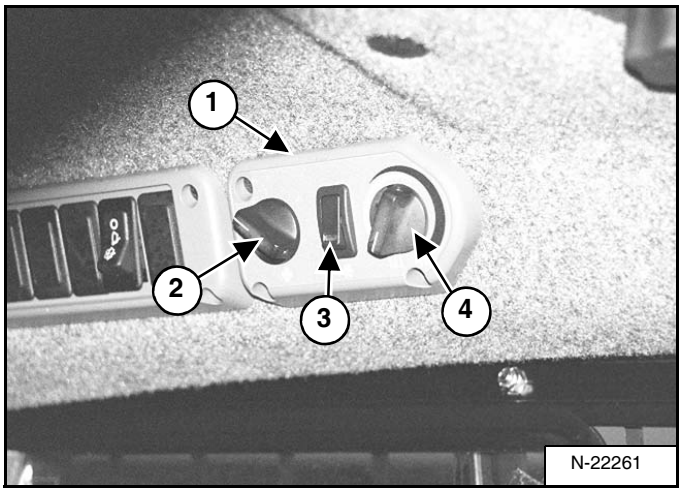


Heater/Evaporator Blower: The blower (Item 1) **[Figure 80-20-8]** is used to push air through the heater and evaporator coils and into the cab.

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Identification (Cont'd)

Figure 80-20-9



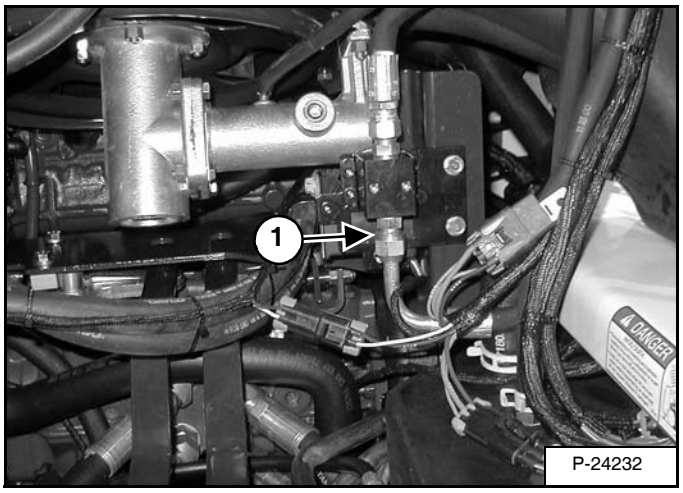
Control Panel: The panel (Item 1) **[Figure 80-20-9]** has three separate components.

Fan Switch: This is a four position rotary switch (Item 2) **[Figure 80-20-9]**. When the fan switch is in the off position the A/C will not engage, but the heat valve will operate, as it is controlled by the ignition power.

A/C Switch: The rocker switch (Item 3) **[Figure 80-20-9]** will be illuminated when the A/C is engaged.

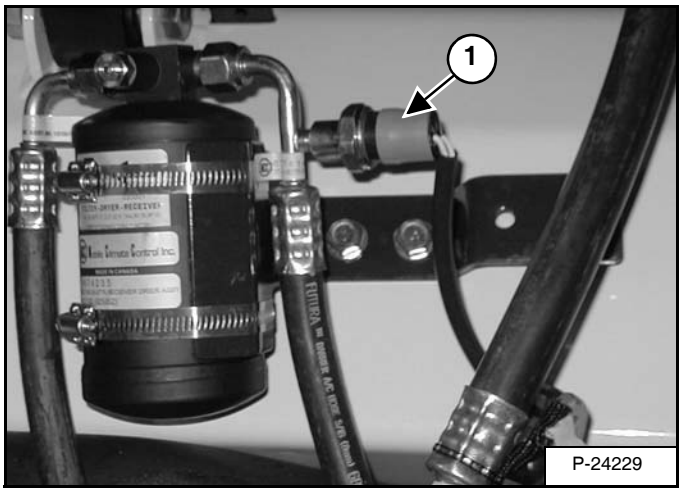
Potentiometer: The potentiometer (Item 4) **[Figure 80-20-9]** controls the Heat Valve from fully Off to fully On. This can be used in conjunction with the A/C for defrost of the windows and temperature control.

Figure 80-20-10



Heater Valve: The heater valve (Item 1) **[Figure 80-20-10]** is used to control the amount of engine coolant that flows to the heater coil.

Figure 80-20-11



Pressure Switch: The pressure switch (Item 1) **[Figure 80-20-11]** will disengage the compressor clutch at high pressure readings over 384 PSI. (2647 kPa) on the high side, or at very low pressure of 28 PSI (193 kPa) or less on the high side, which indicates loss of refrigerant.

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SAFETY

Safety Equipment

Figure 80-30-1

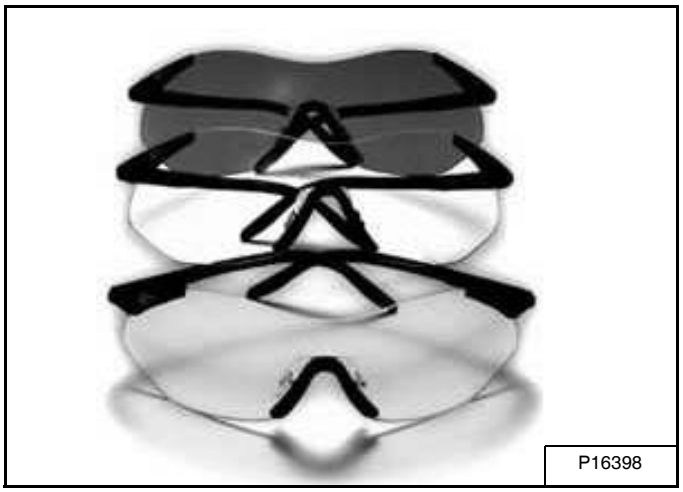


Figure 80-30-2



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

In addition to exercising caution in your work, **DO WEAR SAFETY GLASSES OR A FACE SHIELD [Figure 80-30-1]** when you are using R-134a or a leak detector, adjusting service valves or the manifold gage set connectors. Safety glasses or a transparent face shield are practical safety items and one or the other is absolutely required.

⚠ WARNING

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

W-2371-0500

R-134a inside a canister or in an A/C system is a liquid under pressure. When it escapes or releases into the air, **ITS TEMPERATURE DROPS TO 21.6 F DEGREES "INSTANTLY"**. If it spills on your skin or in your eyes you should flood the area with cool water and **SEEK MEDICAL ATTENTION FAST!** It is a good idea to wear gloves **[Figure 80-30-2]** to prevent frost bite if you should get refrigerant on your hands.

⚠ WARNING

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

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

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

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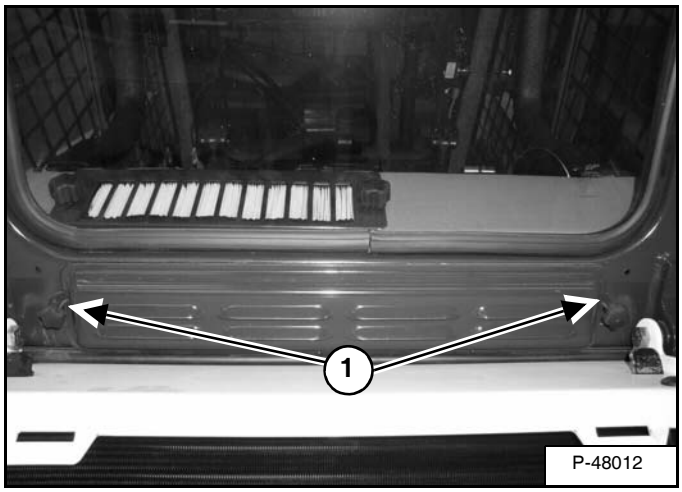
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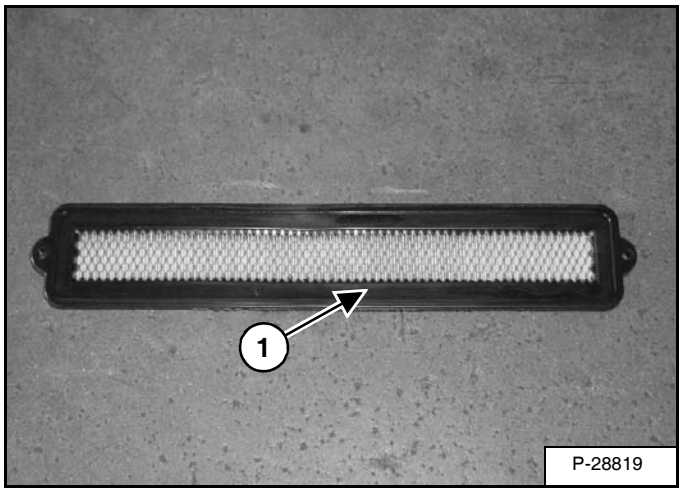
Filter Elements Removal And Installation

Figure 80-40-1



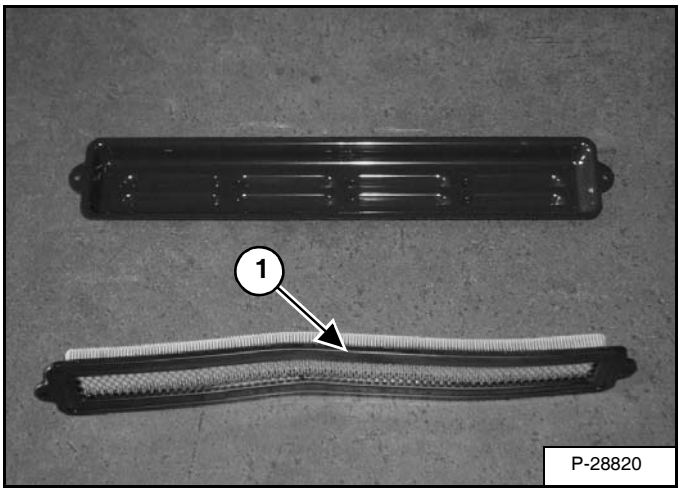
Remove the two mount bolts (Item 1) **[Figure 80-40-1]** from the fresh air filter cover at the rear of the loader cab.

Figure 80-40-2



Remove the filter cover and filter (Item 1) **[Figure 80-40-2]** from the loader.

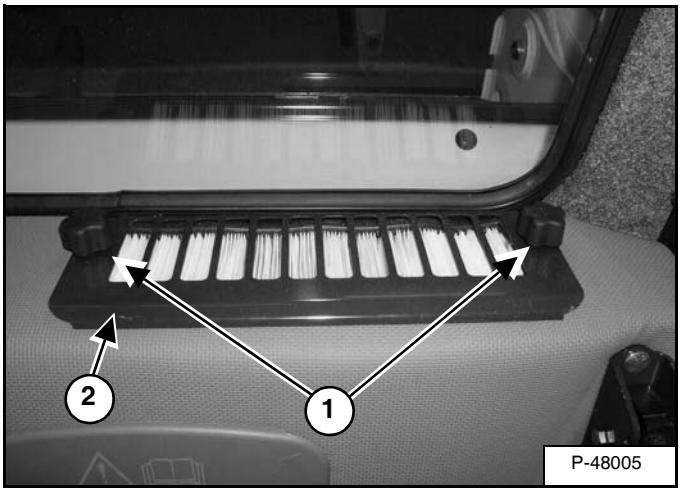
Figure 80-40-3



Remove the filter (Item 1) **[Figure 80-40-3]** from the cover.

The fresh air filter must be cleaned sometimes as often as twice a day, depending on the environment. The filter can be cleaned by removing and shaking it. A small amount of air pressure can be used to clean the filter. However the fresh air filter should be changed at least 2-4 times per year in normal conditions. In extremely dusty conditions the fresh air filter many need to be changed weekly.

Figure 80-40-4



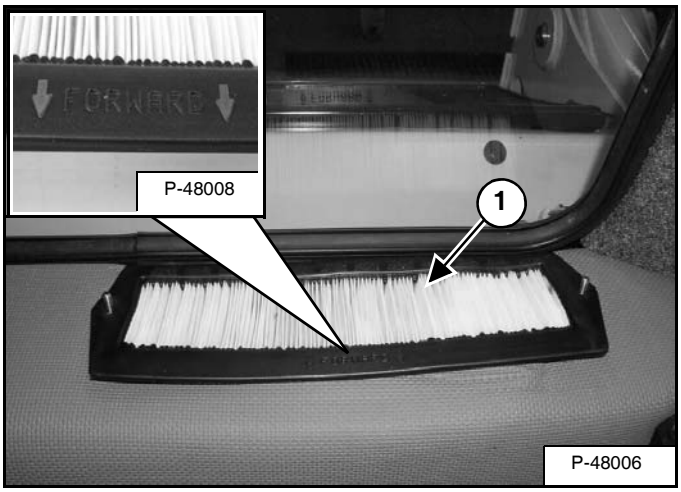
Remove the two retaining knobs (Item 1) **[Figure 80-40-4]** from the recirculating air filter cover, at the back of the cab.

Remove the retaining cover (Item 2) **[Figure 80-40-4]** from the loader cab.

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Filter Elements Removal And Installation (Cont'd)

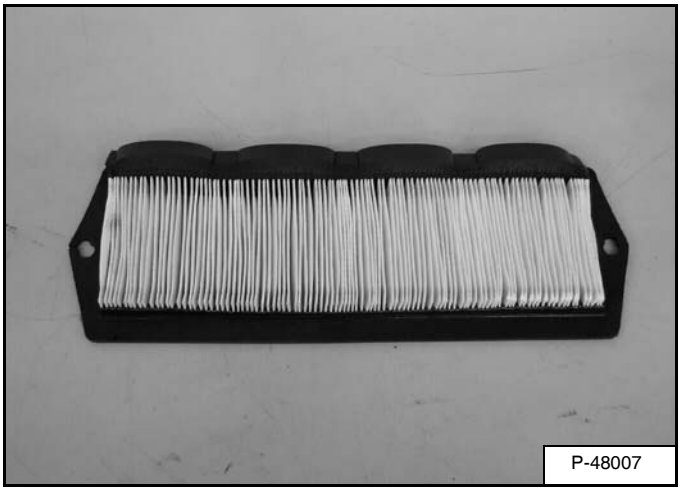
Figure 80-40-5



Remove the recirculating air filter (Item 1) **[Figure 80-40-5]** from the rear of the cab.

Installation: Make sure the arrows on the filter are facing the front of the loader. (Inset) **[Figure 80-40-5]**.

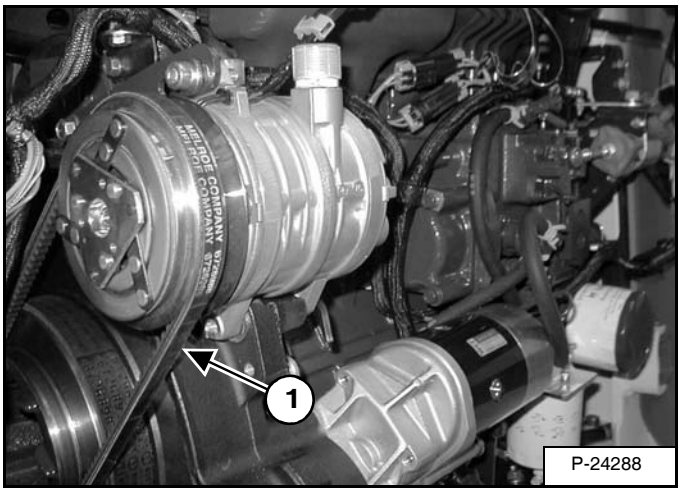
Figure 80-40-6



The recirculating air filter is made of a paper filtering media with a rubber seal. A small amount of air can be used to clean the filter. It does not require cleaning as frequently as the fresh air intake filter **[Figure 80-40-6]**.

Compressor Drive Belt Inspection

Figure 80-40-7



It is a good rule to regularly inspect (weekly) the compressor drive belt for tension and wear.

Open the rear door.

Remove the drive belt cover.

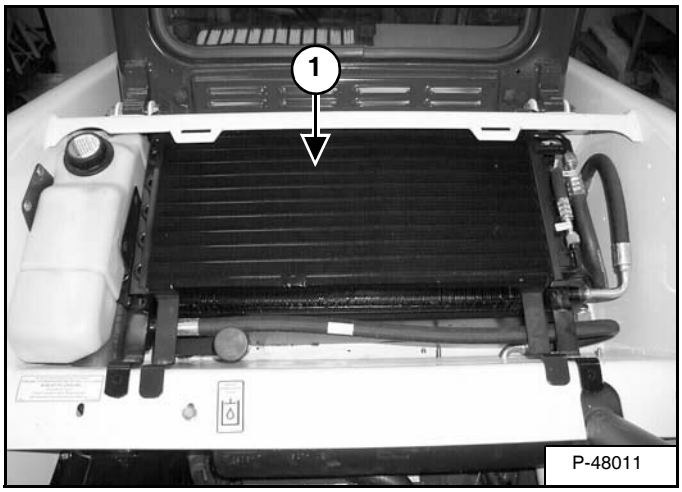
Remove the compressor drive belt cover.

Check the tension on the compressor belt (Item 1) **[Figure 80-40-7]**.

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Cleaning The Condenser

Figure 80-40-8

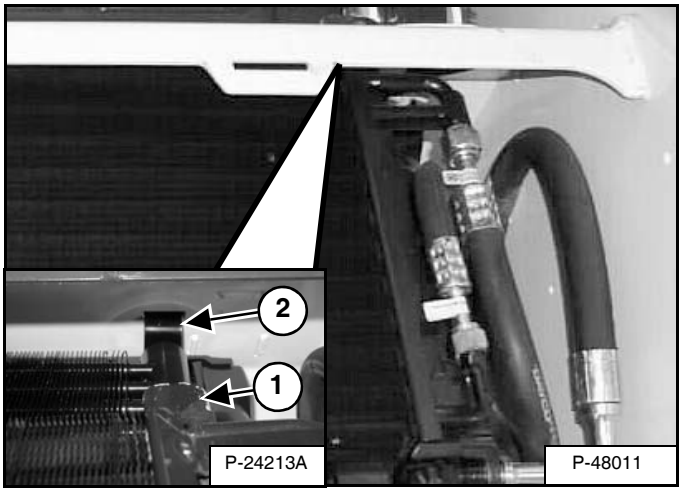


Open the rear door.

Remove the rear grill on the loader.

Check the condenser (Item 1) **[Figure 80-40-8]** for mud or dirt.

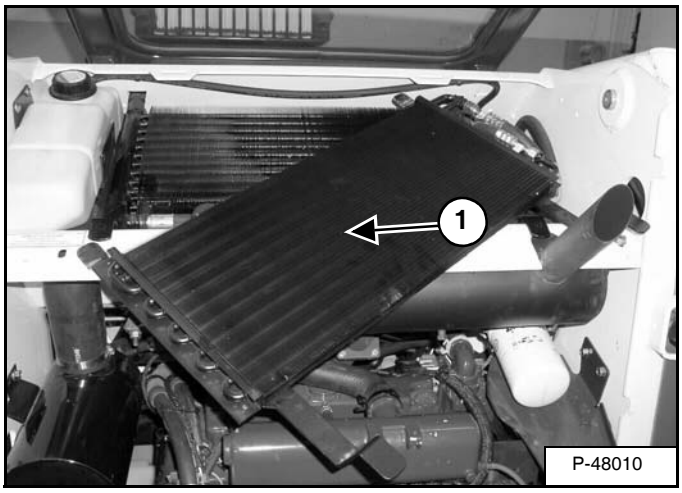
Figure 80-40-9



Lift the rear of the condenser and pull towards rear of machine until the front tabs (Item 1) slide out of mount (Item 2) **[Figure 80-40-9]**.

With the condenser removed from the machine, the oil cooler can also be lifted.

Figure 80-40-10



With water or air, the condenser (Item 1) **[Figure 80-40-10]** can be cleaned.

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BASIC TROUBLESHOOTING

Poor A/C Performance

Figure 80-50-1

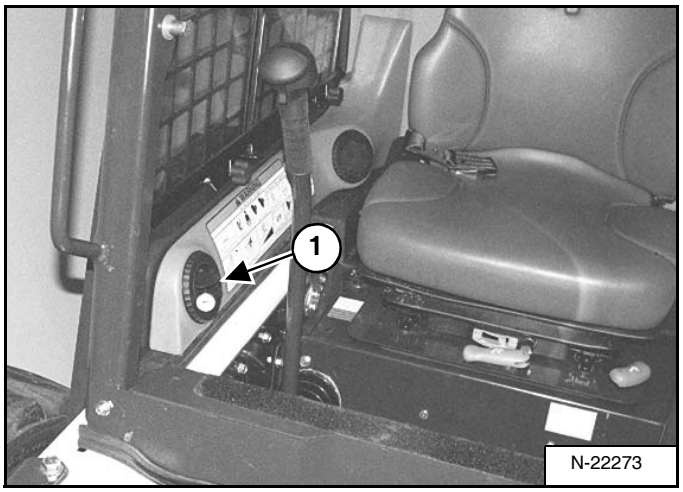
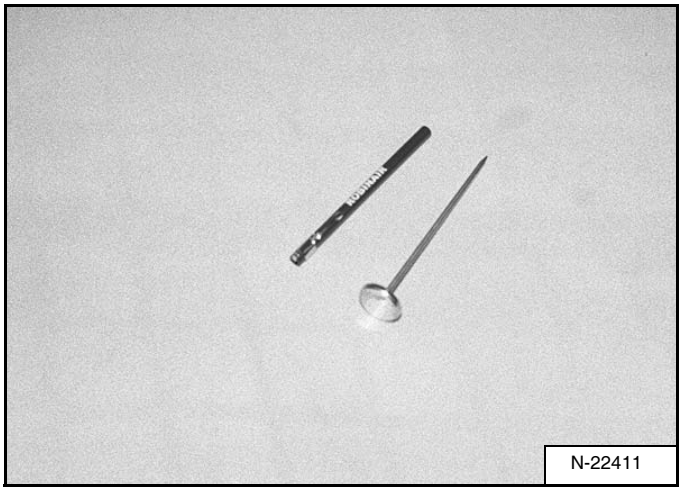


Figure 80-50-2



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

Check the temperature at the louvers (Item 1) **[Figure 80-50-1]** with a thermometer **[Figure 80-50-2]**.

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

If louver temperature is too high, (See SYSTEM TROUBLESHOOTING CHART on Page 80-70-1.)

Check the blower fan for proper operation or noise, and replace if necessary. (See HEATER/AC FAN on Page 80-210-1.)

Check the belt tension on the A/C compressor. ((See COMPRESSOR on Page 80-110-1.)

Check the A/C condenser for dirt or mud, and clean if necessary. (See CONDENSER on Page 80-120-1.)

Check the A/C evaporator coil for dirt or mud, and clean if necessary. (See EVAPORATOR on Page 80-190-1.)

Inspect the sight glass located on the receiver/drier for air bubbles. (See RECEIVER/DRIER on Page 80-130-1.)

Check the engine coolant to see if it is bypassing the heater valve. (See HEATER VALVE on Page 80-210-1.)

⚠ WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

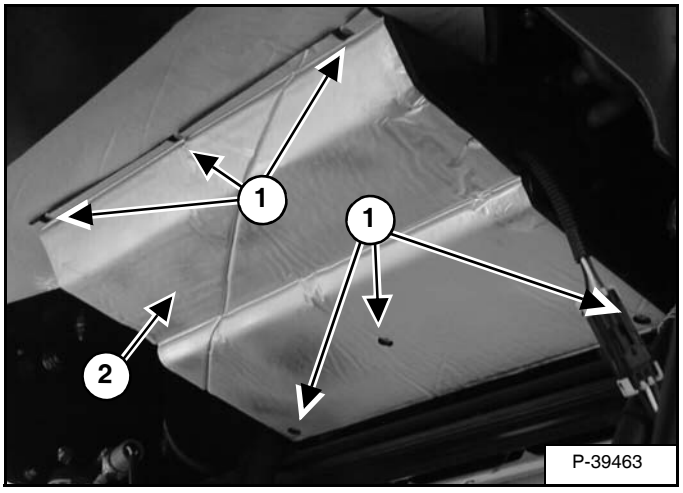
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Cleaning The A/C Evaporator Coil & Heater Coil

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Figure 80-50-3



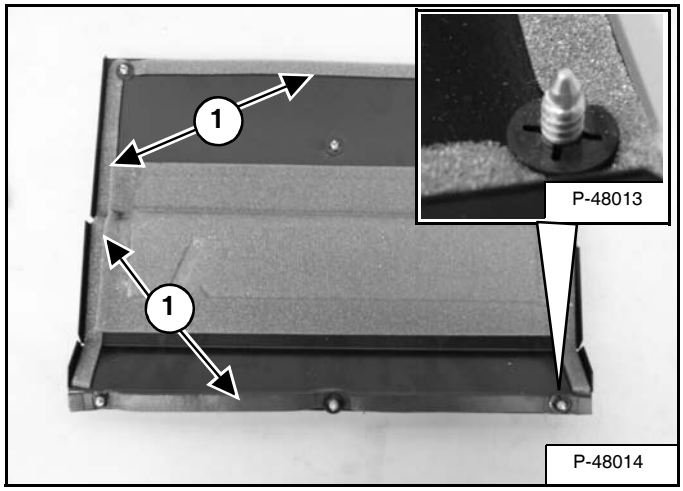
At the rear of the cab, Remove the six mounting screws (Item 1) **[Figure 80-50-3]**.

Remove the access cover (Item 2) **[Figure 80-50-3]** from the loader.

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Cleaning The A/C Evaporator Coil & Heater Coil (Cont'd)

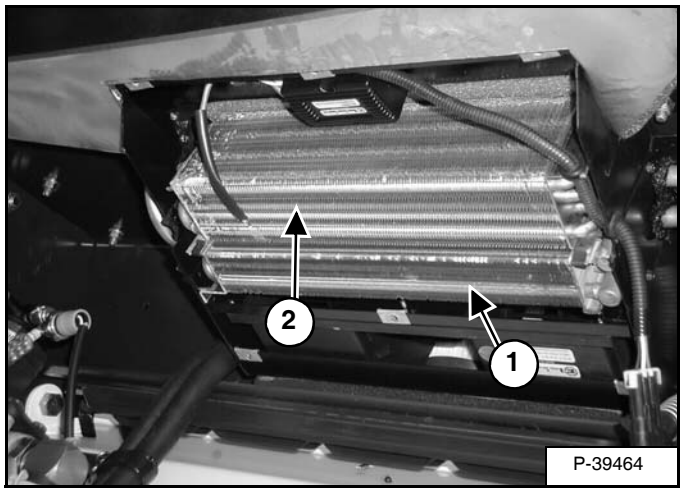
Figure 80-50-4



The access cover is sealed to the heater unit with a foam gasket (Item 1) that keeps out dirt and debris. Check the gasket for rips and tears. Replace as needed.

The cover is held in place with screws that are held to the cover with plastic retainers (Inset) . These help hold the screws when installing the cover.

Figure 80-50-5



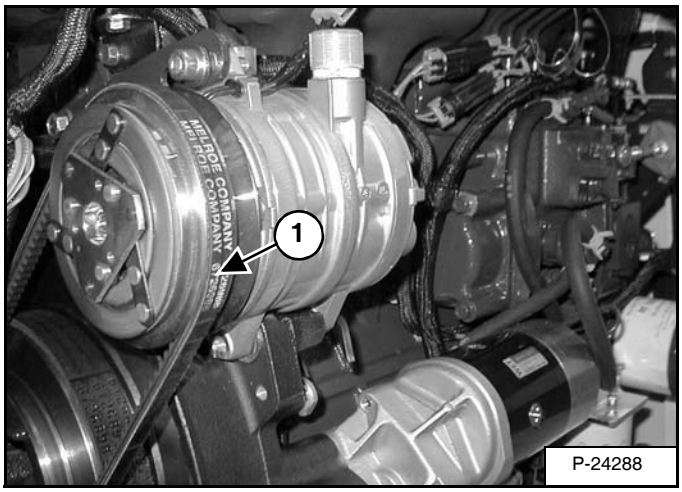
With air or water, clean the heater coil (Item 1) and evaporator coil (Item 2) **[Figure 80-50-5]**.

Replace the cover.

Lower the operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

Compressor Drive Belt Inspection

Figure 80-50-6



Regularly inspect (weekly) the compressor drive belt for wear.

Open the rear door.

Remove the drive belt cover.

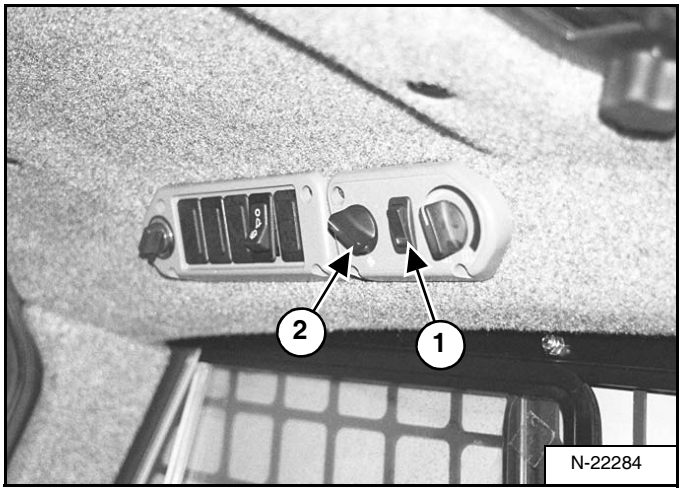
Remove the compressor belt cover.

Check the tension on the compressor belt (Item 1) **[Figure 80-50-6]**.

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Checking The Electrical System

Figure 80-50-7



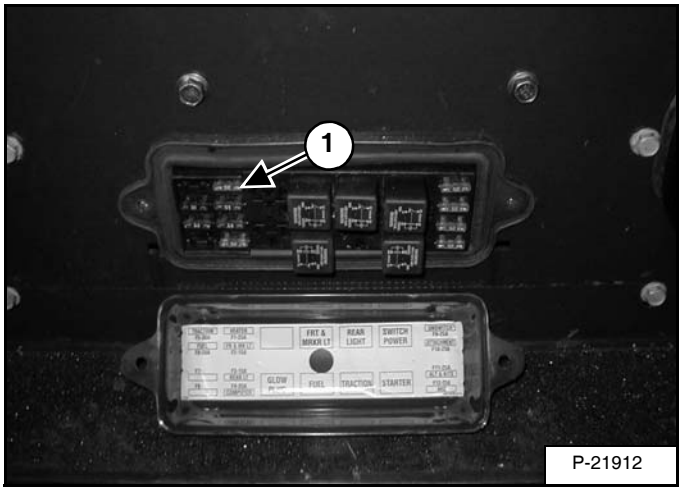
Check to see if the compressor clutch is engaging.

With an operator in the loader seat and the cab door open, turn the loader key switch to RUN (Standard Panel) OR press the RUN/ENTER Button (Deluxe Panel),without starting the loader.

Push the A/C switch (Item 1) to the ON position. Turn the blower fan switch (Item 2) **[Figure 80-50-7]** to the first On position.

The compressor clutch should make a click sound, which indicates the clutch is engaging.

Figure 80-50-8

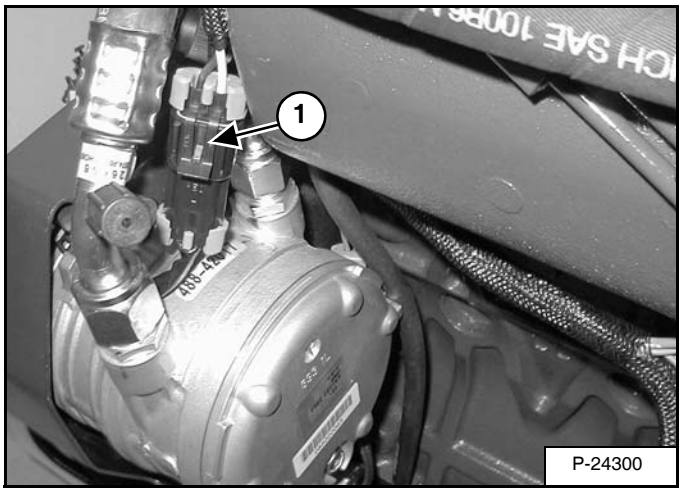


If the compressor clutch does not engage, check the loader fuse (Item 1) **[Figure 80-50-8]** located on the control panel in the loader cab.

Replace the fuse if burned out.

NOTE: The decal inside the fuse cover, refers to the fuse as HEATER. This fuse controls the power for both the Heater and the A/C systems.

Figure 80-50-9

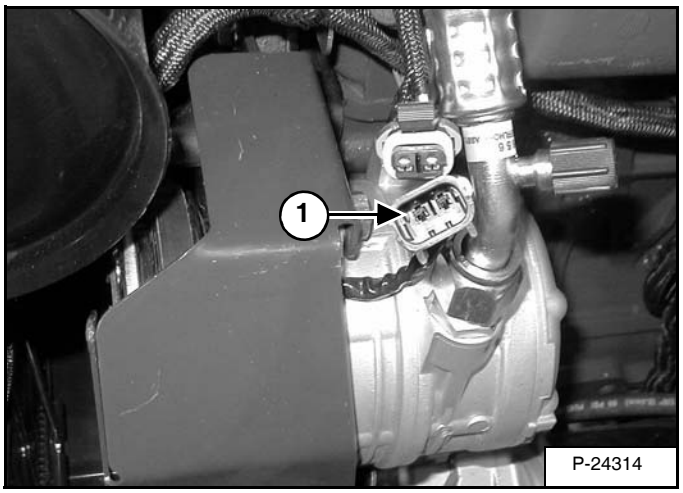


Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Disconnect the loader harness (Item 1) **[Figure 80-50-9]** from the compressor clutch wire.

Figure 80-50-10



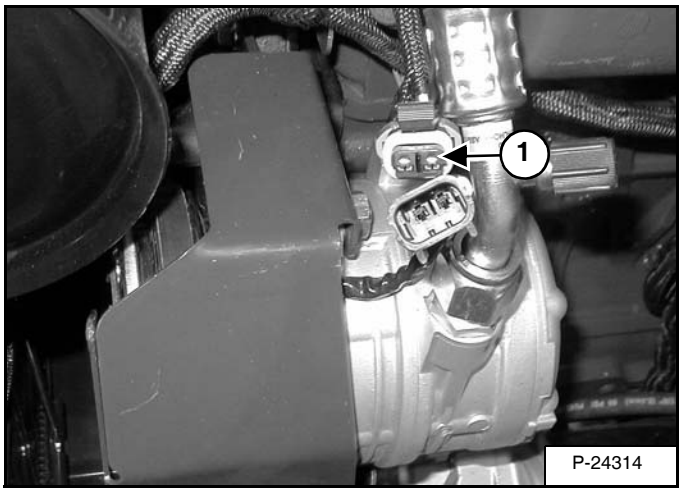
With a multimeter, check the resistance to the compressor clutch (Item 1) **[Figure 80-50-10]**.

If there is no resistance value, replace the compressor clutch.(See COMPRESSOR on Page 80-110-1.)

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Checking The Electrical System (Cont'd)

Figure 80-50-11



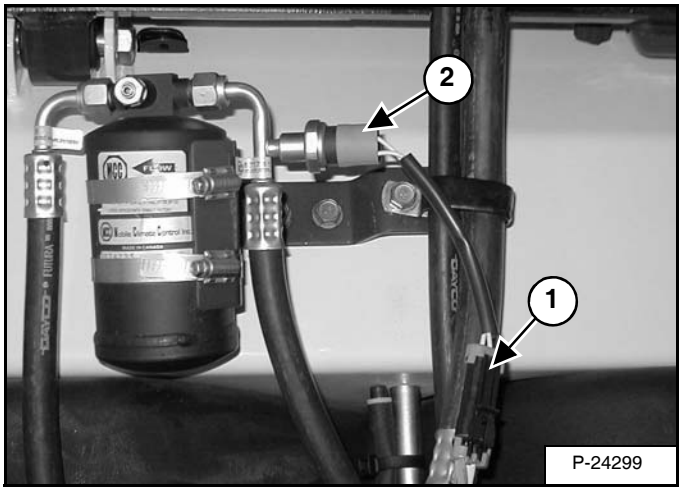
With a multimeter, check the voltage to the compressor clutch at the loader harness (Item 1) **[Figure 80-50-11]**

The voltage reading should be around 12 volts.

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

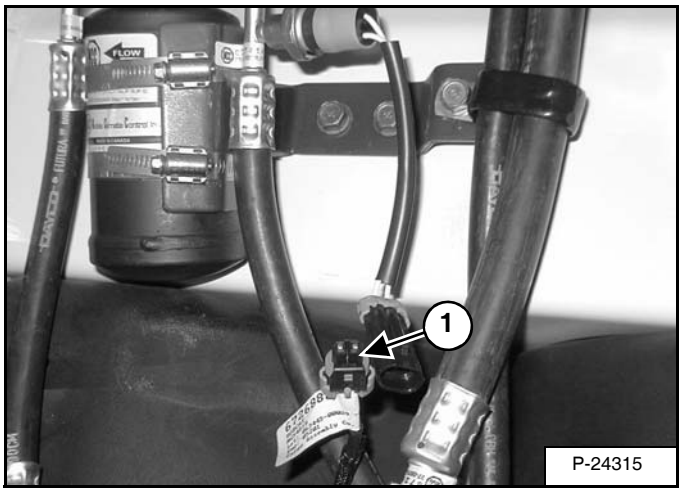
If there is power at the clutch, reconnect the wiring harness to the compressor clutch.

Figure 80-50-12



Disconnect the loader harness (Item 1) from the pressure switch (Item 2) **[Figure 80-50-12]**.

Figure 80-50-13

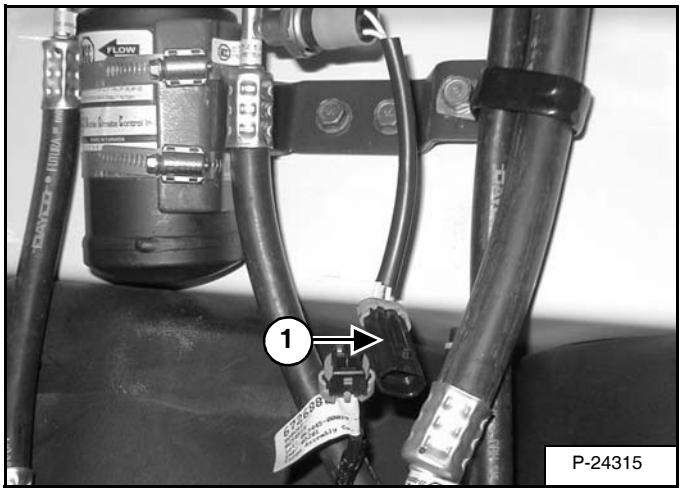


Using a multimeter check the loader wiring harness (Item 1) **[Figure 80-50-13]** for voltage.

The voltage should be around 12 volts.

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

Figure 80-50-14



If there is voltage at the harness, check the resistance at the pressure switch (Item 1) **[Figure 80-50-14]**.

If there is no resistance value, check for low refrigerant level. (See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

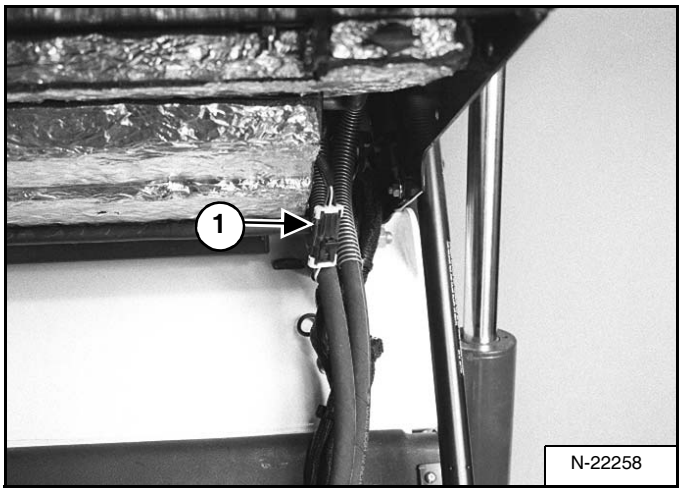
If a resistance value is observed, the pressure switch is good.

Reconnect the loader harness to the pressure switch.

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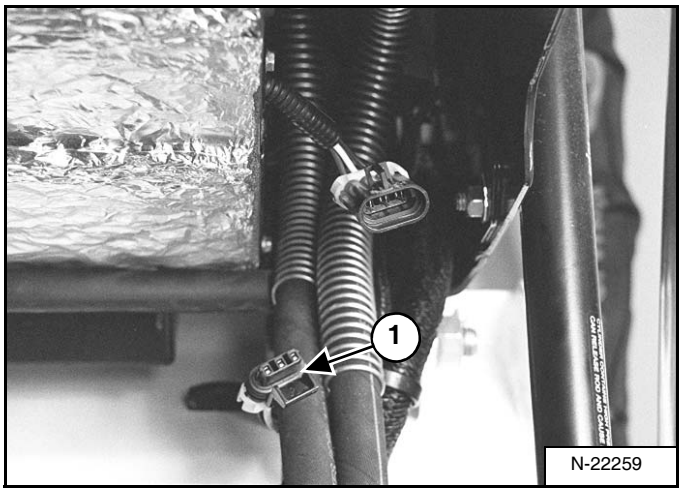
Checking The Electrical System (Cont'd)

Figure 80-50-15



Disconnect the thermostat wiring connector (Item 1) **[Figure 80-50-15]** from the loader wiring harness.

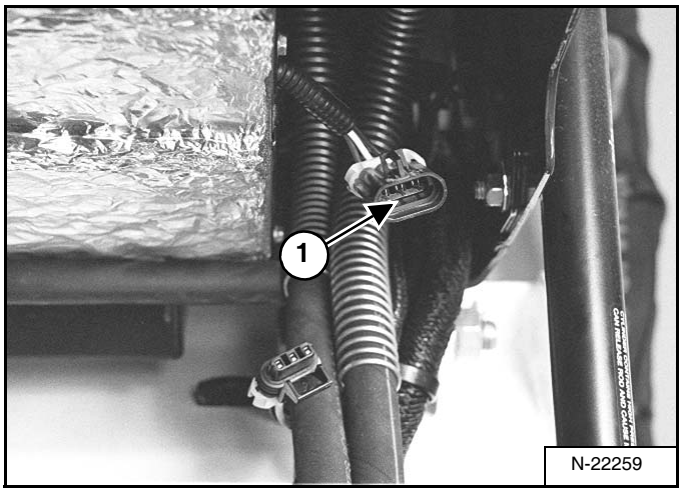
Figure 80-50-16



Check the loader harness (Item 1) **[Figure 80-50-16]** for voltage. The voltage should be 12 volts.

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

Figure 80-50-17



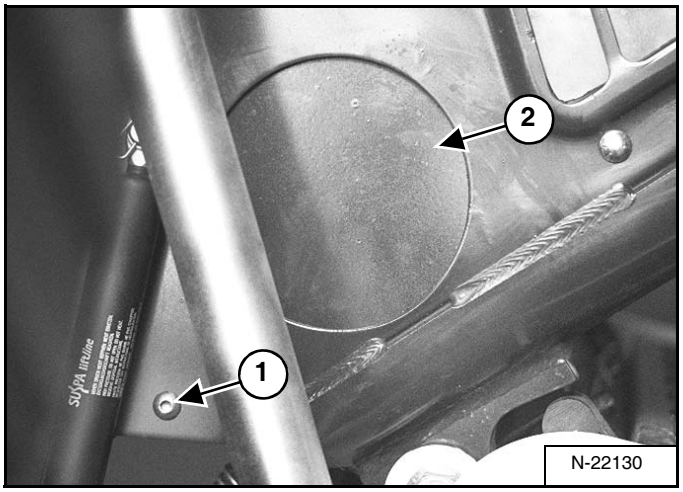
If there is voltage at the wiring harness, check the thermostat (Item 1) **[Figure 80-50-17]** for resistance.

The resistance value of the thermostat should be 10 Ohms at 68° F (20° C).

If there is no resistance value, replace the thermostat. (See THERMOSTAT on Page 80-170-1.)

If there is a resistance value, check the blower fan.

Figure 80-50-18



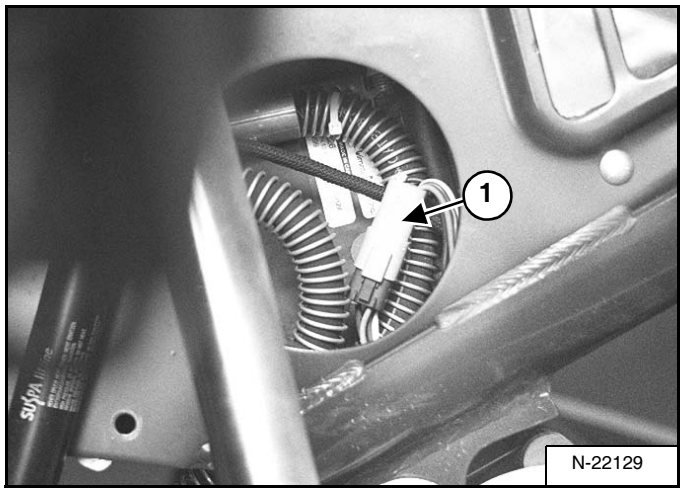
Remove the mount bolt (Item 1) **[Figure 80-50-18]** from the left side cab access cover.

Remove the access cover (Item 2) **[Figure 80-50-18]** from the loader.

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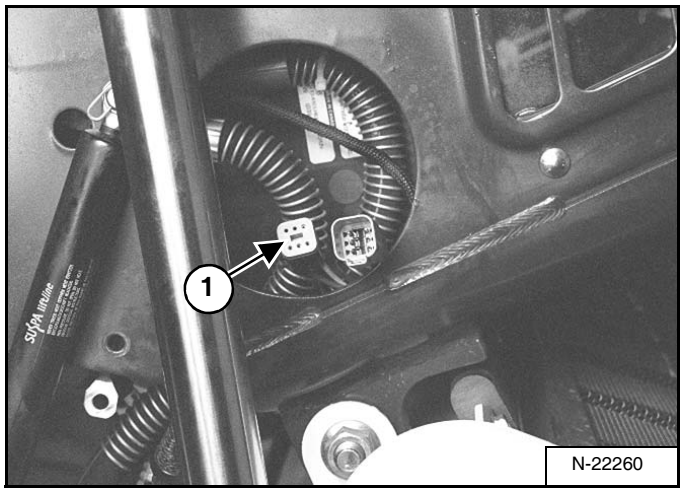
Checking The Electrical System (Cont'd)

Figure 80-50-19



Disconnect the blower fan wiring connector (Item 1) **[Figure 80-50-19]** from the loader wiring harness.

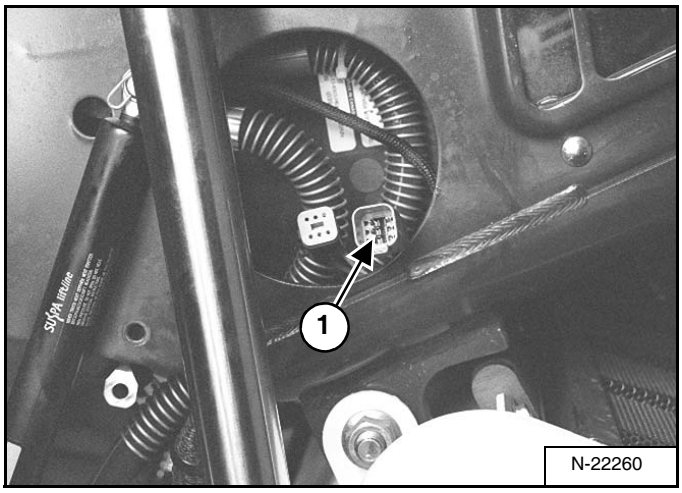
Figure 80-50-20



Check the loader harness (Item 1) **[Figure 80-50-20]** for voltage. The voltage should be 12 volts.

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

Figure 80-50-21

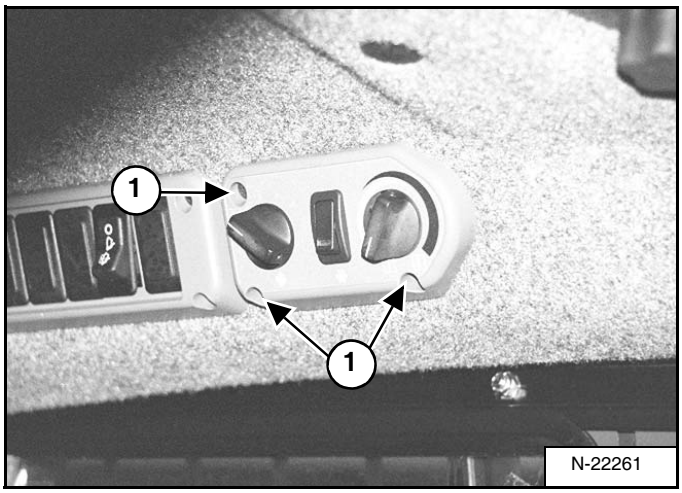


If there is voltage at the wiring harness, check the resistance to the blower fan at the blower fan wiring connector (Item 1) **[Figure 80-50-21]**.

If there is no resistance value replace the blower fan. (See HEATER/AC FAN on Page 80-210-1.)

If there is a resistance value check the climate controls at the control panel inside the loader cab.

Figure 80-50-22

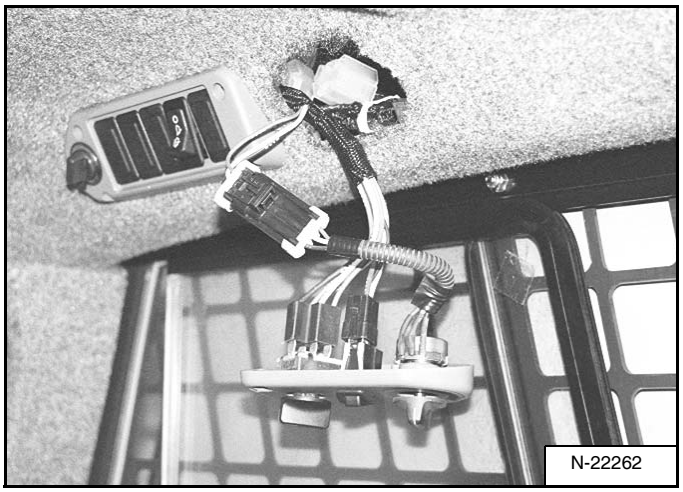


Remove the three mount bolts (Item 1) **[Figure 80-50-22]** from the cab control panel.

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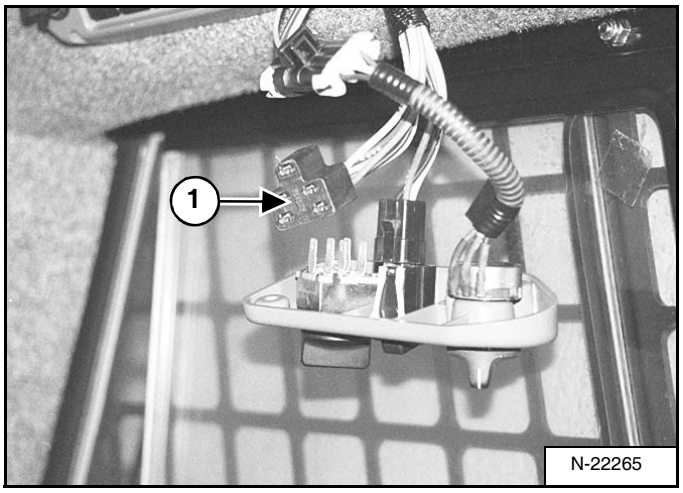
Checking The Electrical System (Cont'd)

Figure 80-50-23



Remove the control panel and wiring harness from the cab **[Figure 80-50-23]**.

Figure 80-50-24

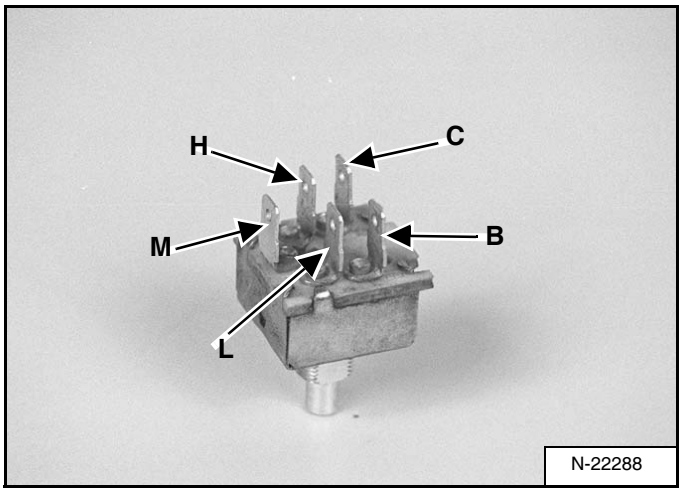


Disconnect the loader wiring harness (Item 1) **[Figure 80-50-24]** from the blower switch.

Check the loader harness for voltage. The voltage should be 12 volts.

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

Figure 80-50-25



If there is voltage at the wiring harness, check the blower switch **[Figure 80-50-25]** for resistance.

With the switch in the OFF position, there should be zero resistance between all terminals.

With the switch in the **1** position, there should be resistance between **C** terminal and the **B** terminal, between the **C** terminal and the **L** terminal, and also between the **B** terminal and the **L** terminal frame **[Figure 80-50-25]**.

With the switch in the **2** position, there should be resistance between **C** terminal and the **B** terminal, between the **C** terminal and the **M** terminal, and also between the **B** terminal and the **M** terminal frame **[Figure 80-50-25]**.

With the switch in the **3** position, there should be resistance between **C** terminal and the **B** terminal, between the **C** terminal and the **H** terminal, and also between the **B** terminal and the **H** terminal frame **[Figure 80-50-25]**.

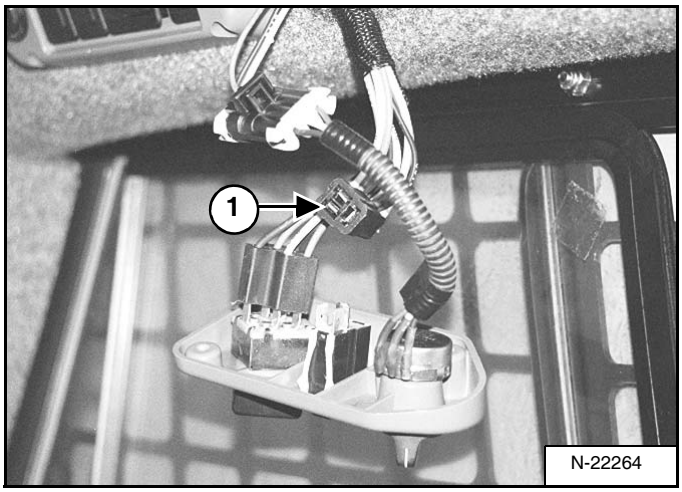
If any of the above resistance tests fail, replace the blower switch.

If the above resistance tests are good, check the A/C switch.

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Checking The Electrical System (Cont'd)

Figure 80-50-26

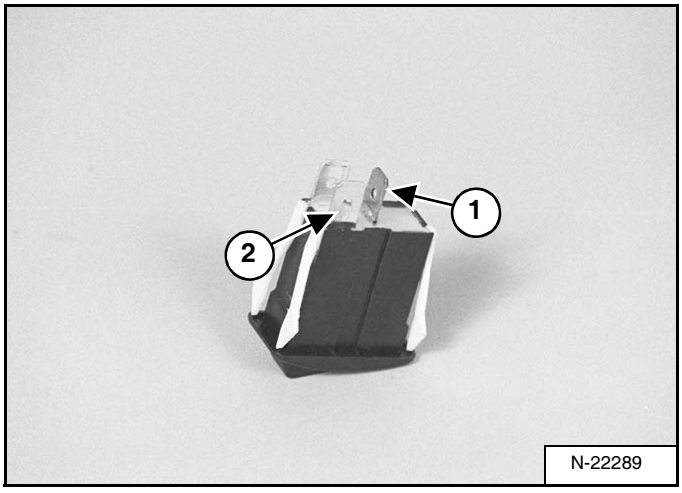


At the loader cab, disconnect the loader harness (Item 1) **[Figure 80-50-26]** from the A/C switch.

Check the harness for voltage. The voltage should be 12 volts.

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

Figure 80-50-27



If there is voltage at the wiring harness, check the A/C switch **[Figure 80-50-27]** for resistance.

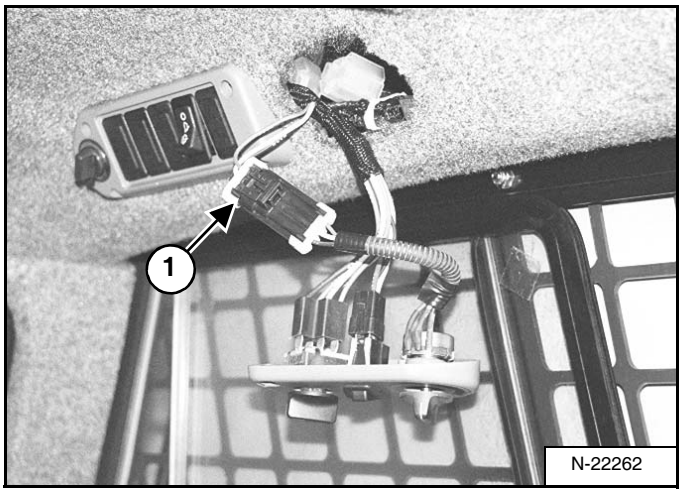
With the switch in the OFF position there should be no resistance between any of the three terminals on the A/C switch.

With the switch in the ON position there should be resistance between terminal (Item 1) and terminal (Item 2) **[Figure 80-50-27]**.

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

If a resistance value is found, check the potentiometer.

Figure 80-50-28

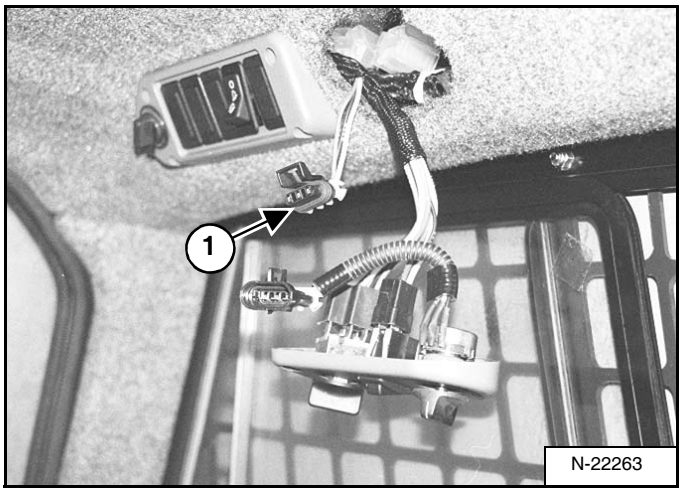


The potentiometer will effect the A/C system and also effect the operation of the heater.

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

At the loader cab, disconnect the loader harness (Item 1) **[Figure 80-50-28]** from the potentiometer.

Figure 80-50-29



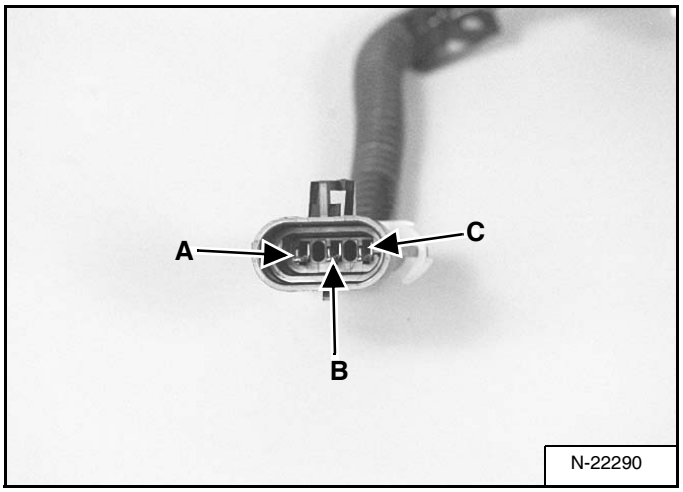
Check the loader harness (Item 1) **[Figure 80-50-29]** for voltage. The voltage should be 12 volts.

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

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Checking The Electrical System (Cont'd)

Figure 80-50-30

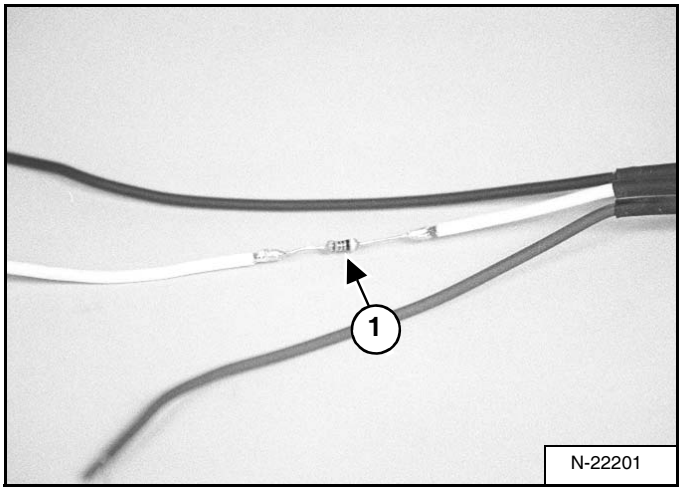


If there is voltage at the wiring harness, check the potentiometer **[Figure 80-50-30]** for resistance.

The resistance should be 10 K Ohm's between wire terminal A and wire terminal C frame **[Figure 80-50-30]**.

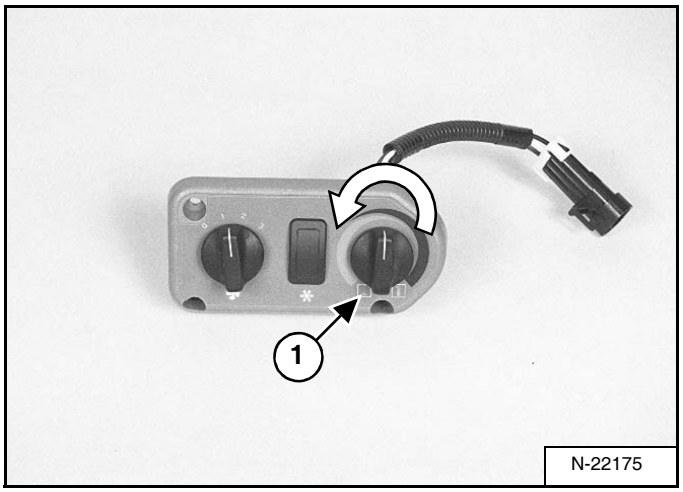
If no resistance is found, replace the potentiometer.

Figure 80-50-31



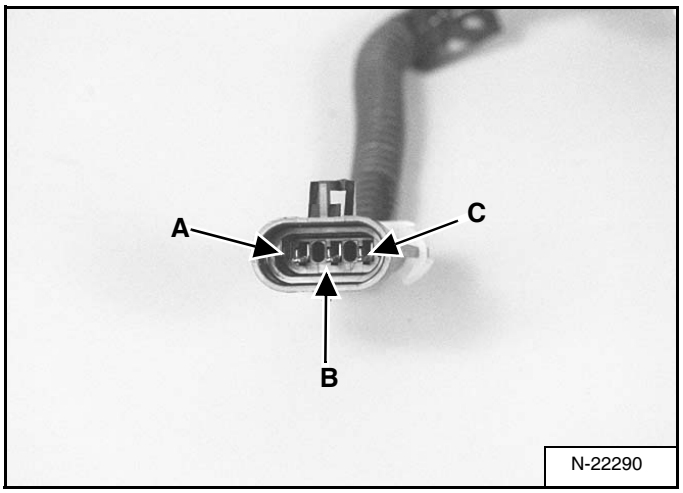
The white wire B, (Item 1) **[Figure 80-50-31]**, on the potentiometer, is a resistor wire.

Figure 80-50-32



To check the resistance of the white wire, turn the potentiometer control (Item 1) to the full A/C position **[Figure 80-50-32]**.

Figure 80-50-33



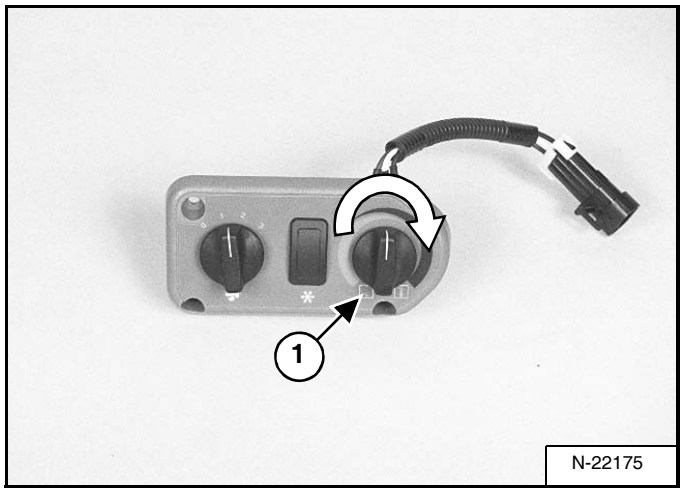
The resistance between the wire terminal A and wire terminal B frame **[Figure 80-50-33]** should be approximately 49 K Ohm's.

Check the resistance between the wire terminal C and wire terminal B frame **[Figure 80-50-33]** should be approximately 39 K Ohm's.

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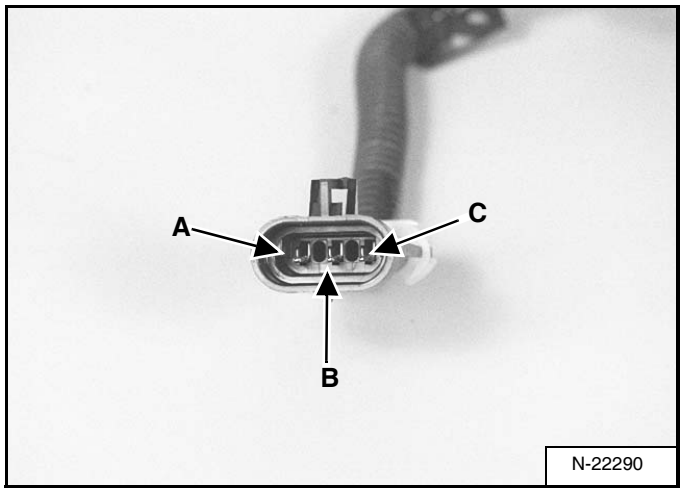
Checking The Electrical System (Cont'd)

Figure 80-50-34



To check the resistance of the white wire, turn the potentiometer control (Item 1) **[Figure 80-50-34]** to the full Heater position.

Figure 80-50-35



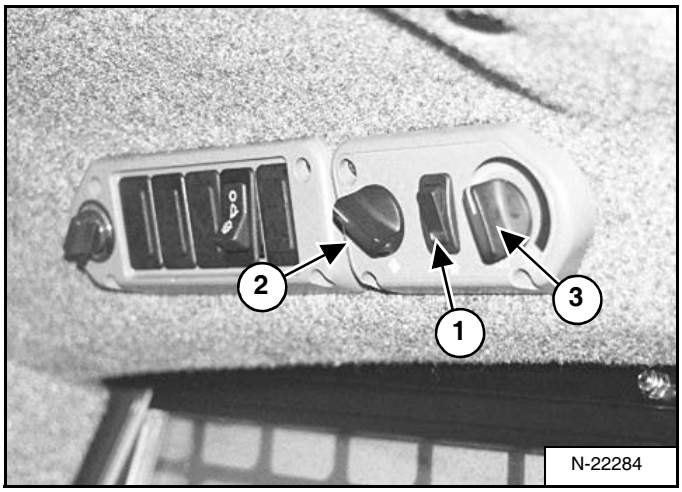
Check the resistance between the wire terminal A and wire terminal B frame **[Figure 80-50-35]** should be approximately 39 K Ohm's.

Check the resistance between the wire terminal C and wire terminal B frame **[Figure 80-50-35]** should be approximately 49 K Ohm's.

If the resistance is not found, replace the potentiometer.

Engine Coolant By-Passing The Heater Valve

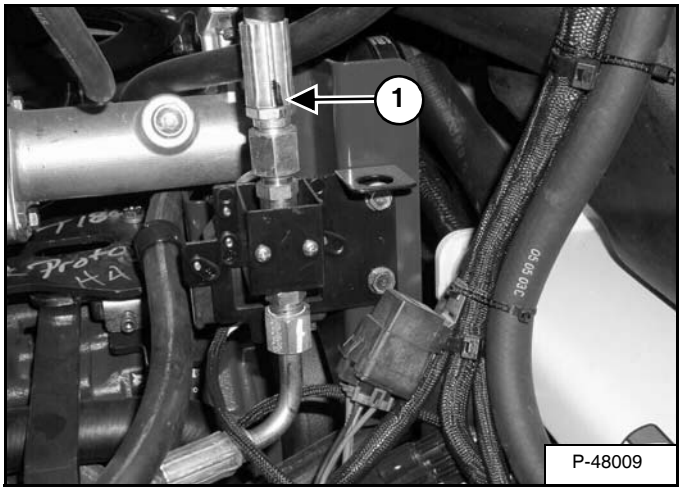
Figure 80-50-36



Raise the lift arms and install an approved lift arm support device.(See Installing Lift Arm Support Device on Page 10-20-1.)

Push the A/C switch (Item 1) to the OFF position. Turn the fan switch (Item 2) to the High Speed position. Turn the temperature control (Item 3) **[Figure 80-50-36]** to the High A/C position, with the loader ignition switch OFF.

Figure 80-50-37



Raise the operator cab.(See Raising The Operator Cab on Page 10-30-1.)

Connect the remote start tool to the loader. (See Procedure on Page 10-60-1.)

Start the loader and run at high idle, for ten minutes.

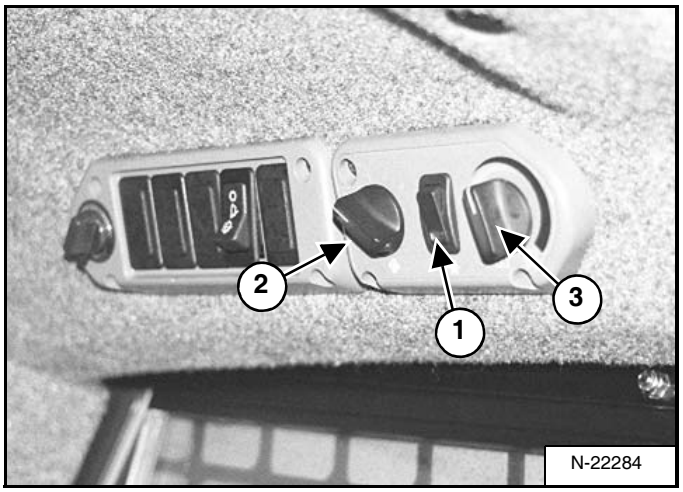
Check the heater hose (Item 1) **[Figure 80-50-37]** for temperature.

If the hose is hot, the heater valve is leaking by, and needs to be replaced.

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Heater Valve Not Opening Or Closing

Figure 80-50-38



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Push the A/C switch (Item 1) to the OFF position. Turn the fan switch (Item 2) to position 1. Turn the temperature control (Item 3) **[Figure 80-50-38]** to the High A/C position, with the loader ignition switch OFF.

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Connect the remote start tool to the loader. (See Procedure on Page 10-60-1.)

Place the remote start tool on the left fender of the loader, so the heater valve can be clearly seen. Watch the valve shaft (Item 1) **[Figure 80-50-39]**, as the key of the remote start tool is turned to the ON position without starting the loader. The heater valve should rotate. Place a mark on the loader shaft.

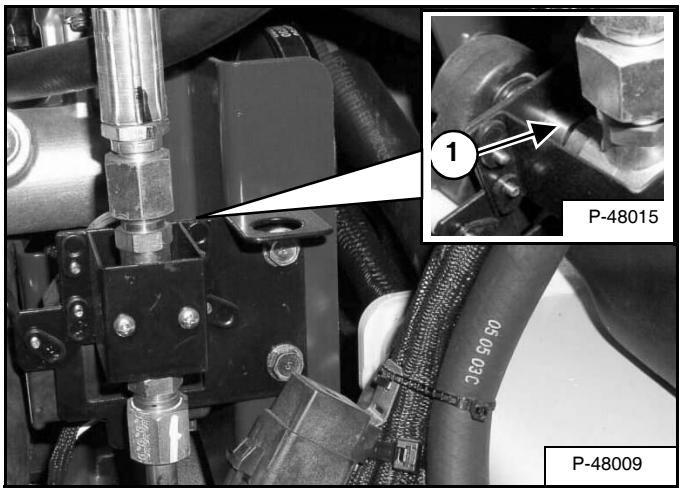
Turn the key of the remote start tool to the OFF position and remove the remote start tool from fender.

Lower operator cab.

Turn the temperature control (Item 3) **[Figure 80-50-38]** to the High Heater position, with the loader ignition switch OFF.

Raise the operator cab.

Figure 80-50-39



Place the remote start tool on the left fender of the loader, so the heater valve can be clearly seen. Watch the valve shaft (Item 1) **[Figure 80-50-39]**, as the key of the remote start is turned to the ON position without starting the loader. The heater valve should rotate.

If it does not rotate, check the potentiometer. (See HEATER VALVE on Page 80-220-1.) for proper function.

Replace the heater valve. (See HEATER VALVE on Page 80-220-1.)

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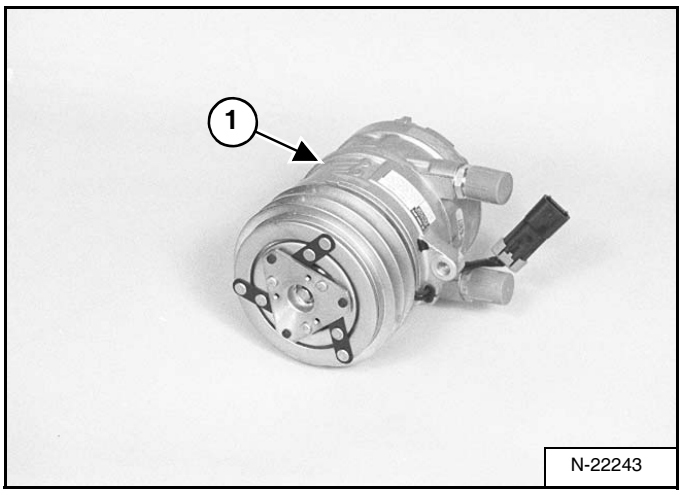


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GENERAL AIR CONDITIONING SERVICE GUIDELINES

Compressor Oil

Figure 80-60-1



The compressor (Item 1) **[Figure 80-60-1]** is factory filled with 150-170 cc's of PAG oil (Poly Alkelene Glycol).

Unlike engine oil, it is not necessary to frequently check or change the compressor oil.

It is necessary to check, replenish or replace the compressor oil in the following cases:

1. When the evaporator, condenser or receiver-drier is replaced.

2. When refrigerant has leaked from the system.

3. When refrigerant is suddenly released from the cooling cycle.

4. When any oil related problems occur in the cooling cycle.

When one of the components (the evaporator, condenser or receiver-drier) is replaced, one ounce (30 cc) of PAG oil should be added for each component replaced.

If the A/C compressor is changed, no oil should be added to the system, because the compressor comes factory filled with oil.

NOTE: Only PAG oil should be used. Never mix R-12 and R-134a Oils.

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Compressor Oil Check

Figure 80-60-2

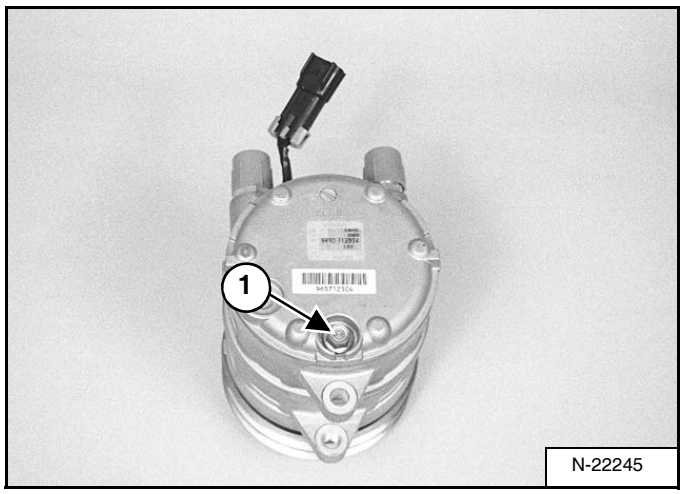
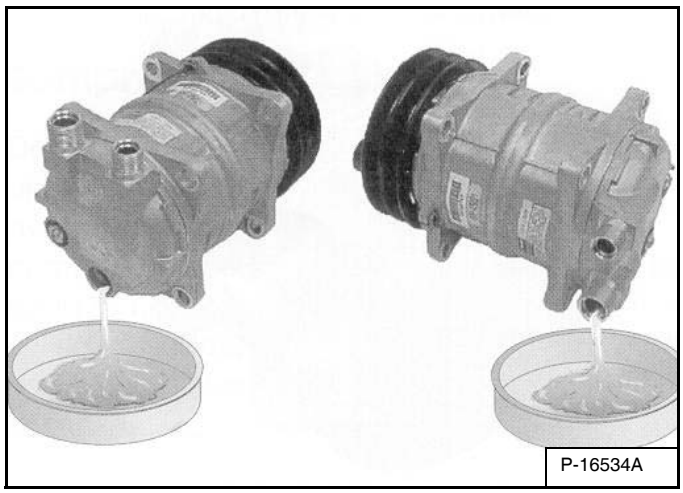


Figure 80-60-3



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

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

If the amount of refrigerant in the system has decreased, charge the system. (See CONDENSER on Page 80-120-1.)

Open the cab door and windows.

Run the blower at maximum speed.

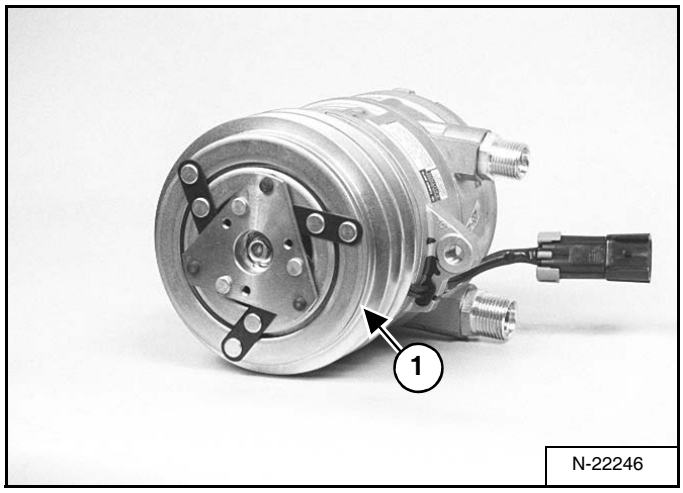
Run the compressor for at least 20 minutes at 800-1200 RPM.

Remove the compressor from the loader. (See COMPRESSOR on Page 80-110-1.)

Remove the oil drain plug (Item 1) **[Figure 80-60-2]** and drain the oil through the connectors and the oil drain hole **[Figure 80-60-3]**.

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

Figure 80-60-4



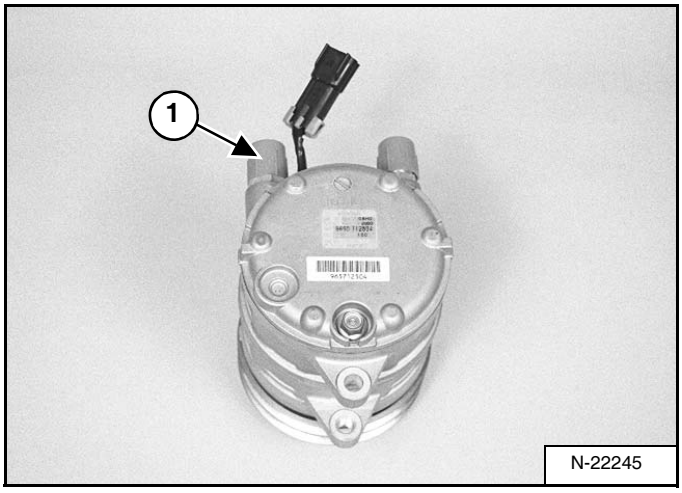
NOTE: After draining the oil through the drain hole and the connectors, extract the remaining oil through the discharge-side connector by rotating the drive pulley (Item 1) [Figure 80-60-4] several times by hand.

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GENERAL AIR CONDITIONING SERVICE GUIDELINES (CONT'D)

Compressor Oil Check (Cont'd)

Figure 80-60-5



Measure the drained oil in a measuring cylinder.

Check the oil for contamination, dirt, metal shavings, or varnish color, discard the oil if contaminated.

NOTE: If metal shavings are found in the compressor oil, replace the complete compressor assembly.

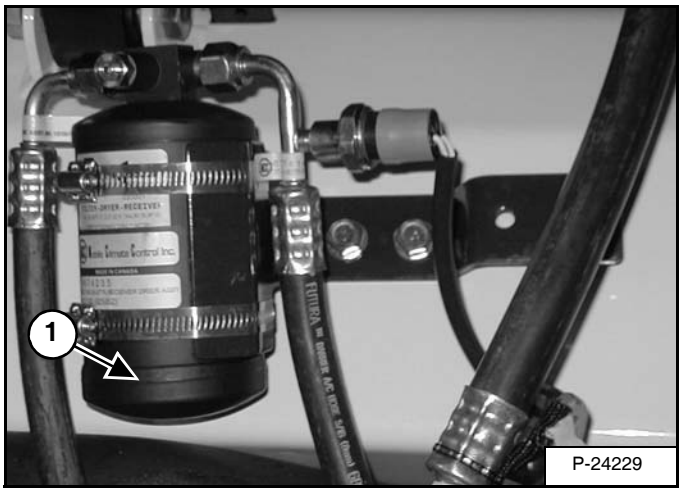
Add new compressor oil through the suction side connector (Item 1) **[Figure 80-60-5]**.

Installation: Add 150 -170 cc's of PAG oil.

NOTE: The suction port on the compressor is marked with an S and is the larger port on the compressor.

Component Replacement And Refrigeration Leaks

Figure 80-60-6



Whenever the A/C system is opened to the atmosphere or there has been a leak in the system, the receiver/drier (Item 1) **[Figure 80-60-6]** must be changed.

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

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SYSTEM TROUBLESHOOTING CHART

Blower motor does not operate

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

Blower motor operates normally, but air flow is insufficient

Possible Cause	Inspection	Solution
1. Evaporator inlet obstruction.	Check evaporator for plugging.	Remove obstruction and clean evaporator fins with air or water.
2. Air leak.	Check to make sure air hoses are properly hooked to Louvers, and air ducts.	Repair of adjust.
3. Defective thermo. switch (frozen evaporator).	Check thermostat using a circuit tester.	Replace thermostat.

Insufficient cooling although air flow and compressor operation are normal

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

The compressor does not operate at all, or operates improperly

Possible Cause	Inspection	Solution
1. Loose drive belt.	The belt is vibrating or oscillating.	Adjust tension.
2. Internal compressor malfunction.	The compressor is locked up and the belt slips.	Replace compressor.
	Magnetic clutch related	
3. Low battery voltage.	Clutch slips.	Recharge the battery.
4. Faulty coil.	Clutch slips.	Replace the magnetic clutch.
5. Oil on the clutch surface.	Clutch slips.	Replace or clean the clutch surface.
6. Open oil.	Clutch does not engage and there is no reading when a circuit tester is connected between the coil and terminals.	Replace clutch.
7. Broken wiring or poor ground.	Clutch will not engage. Inspect the ground and connections.	Repair.
8. Wiring harness components.	Test the conductance of the pressure switch, thermostat, Relay, etc.	Check operation.

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SYSTEM TROUBLESHOOTING CHART (CONT'D)

Gauge Pressure Related Troubleshooting

Normal compressor suction (low side) and discharge (high side) pressure at ambient temperatures of 86-96 degrees F (30-38 degrees C) and compressor speed of approximately 2000 RPM are:

High pressure side pressure: 210-265 PSI

Low pressure side pressure: 15-33 PSI

As a rule of thumb, the high side pressure will be around eight times greater than the low side pressure.

Possible Cause	Inspection	Solution
Low pressure side too high.	The low pressure side pressure normally becomes too high when the high pressure side pressure is too high. As this is explained below, the following inspection is only used when the low pressure side is too high.	
1. Expansion valve opens too far.	Frost is present on the suction hose.	Replace expansion valve.
2. Dective compressor.	The high and low pressure side gauge pressures equalize when the compressor is engaged.	Replace compressor.
Low pressure side Too low.		
1. Low refrigerant charge.	The high side pressure will be low and bubbles may be present in sight glass on receive drier.	Repair any leaks and recharge the refrigerant to the correct level.
2. Clogged or closed expansion valve.	The expansion valve's inlet side is frosted. Moisture or other Contaminants can be the cause.	Clean or replace the expansion Valve.
3. Restriction between drier and expansion valve.	Frost on the line between drier and expansion valve. A Negative low pressure reading may be shown.	Flush system or replace hose.
High pressure side Too high.		
1. Poor condenser performance.	Dirty or clogged condenser fins. Condenser fans not Operating.	Clean fins, and/or repair the fan.
2. Excessive refrigerant.	The high pressure side pressure will be high.	Use refrigerant recovery equipment to capture excess refrigerant. Charge to the correct refrigerant level.
3. Excessive oil charge.	The high pressure side will be high.	Evacuate system. Remove oil from condenser and compressor. Measure oil from compressor and add correct oil charge back into compressor. Flush system with nitrogen. Replace drier.
4. Air in system.	Pressure is high on both high and low sides.	Evacuate and recharge with Refrigerant.
5. Restriction in drier, condenser or high pressure line.	High pressure side will be high, and low pressure side will be low.	Evacuate and flush system replacing defective parts.
High pressure side Too low.		
1. Low refirgerant charge.	The high side pressure will be low and bubbles may be present in sight glass on receive drier.	Repair any leaks and recharge the refrigerant to the correct level.

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Gauge Pressure Related Troubleshooting (Cont'd)

Possible Cause	Inspection	Solution
System pressures equal		
1. Clutch not operating.	See magnetic clutch related topics above.	
2. Compressor not pumping.	Equal high and low pressures.	Replace compressor.

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TEMPERATURE/PRESSURE

Chart

NORMAL EVAPORATOR RANGE	
TEMP F.	PSIG
16	15.69
18	17.04
20	18.43
22	19.87
24	21.35
26	22.88
28	24.47
30	26.10
32	27.79
34	29.52
36	31.32
38	33.17
40	35.07
42	37.03
44	39.05
45	40.09
50	45.48
55	51.27
60	57.47
65	64.10
70	71.19
75	78.75
80	86.80
85	95.40
90	104.40
91	106.30
92	108.20

NORMAL CONDENSER RANGE	
TEMP F.	PSIG
93	110.20
94	112.10
95	114.10
100	124.30
102	128.50
104	132.90
106	137.30
108	141.90
110	146.50
112	151.30
114	156.10
116	161.10
118	166.10
120	171.30
122	176.60
124	182.00
126	187.50
128	193.10
130	198.90
135	213.70
140	229.40
145	245.80
150	263.00
155	281.10
160	300.10
165	320.10
170	340.80

Evaporator

Pressures represent gas temperatures inside the coil. not the coil surface. For an estimate of the temperature of the air coming off the coil add 8-10 degrees F. to the temperature on the chart.

Condenser

Temperatures are not ambient temperatures but condensing temperatures. Add 40 degrees F. to the ambient temperature to get the condensing temperature and then refer to the pressure chart to see appropriate pressure for ambient temperature.

Example: Ambient Temperature=90 degrees F.
90 degrees F.
+40 degrees F.
130 degrees F. condenser temperature=200 psig

Conditions and pressures will vary from system to system.

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Chart

Service Company/Phone Number:
Date:
Machine Model: Machine Dealer:
Machine Serial Number: Customer:
Machine Hours:

Pre Service Conditions	15 Minutes	30 Minutes	Notes
Ambient Temperature:			
Louver Temperature:			
Cab Temperature At Head Position:			
Temperature Into Condenser:			
High Side Pressure			
Low Side Pressure			
Ambient Humidity			
Observations:			

Explain Services Required:

Post Service Conditions	15 Minutes	30 Minutes	Notes
Ambient Temperature:			
Louver Temperature:			
Cab Temperature at Head Position:			
Temperature Into Condenser:			
High Side Pressure			
Low Side Pressure			
Ambient Humidity			
Observations:			

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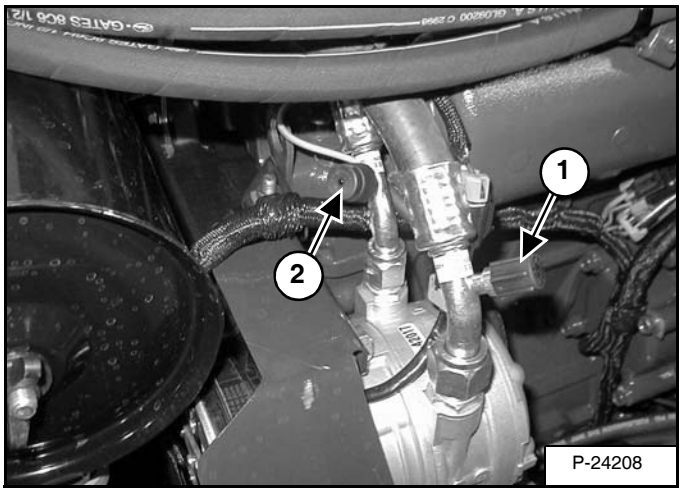


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SYSTEM CHARGING AND RECLAMATION

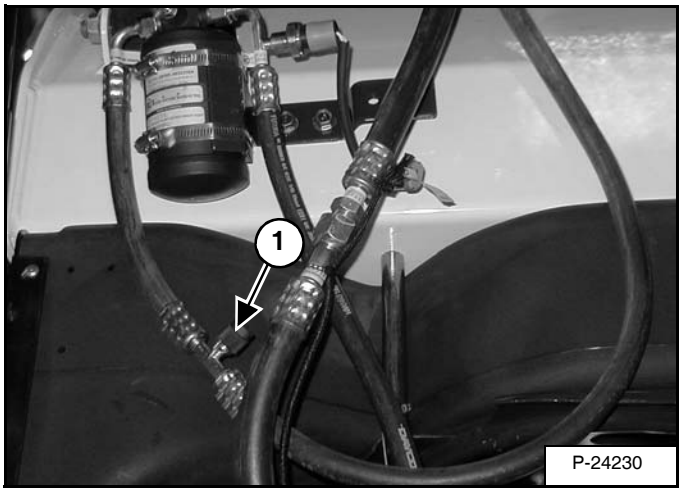
Reclamation Procedure

Figure 80-100-1



Open the rear door and locate the low pressure port (Item 1), and high pressure port (Item 2) **[Figure 80-100-1]**.

Figure 80-100-2



NOTE: Do not use this port (Item 1) [Figure 80-100-2] for testing or charging.

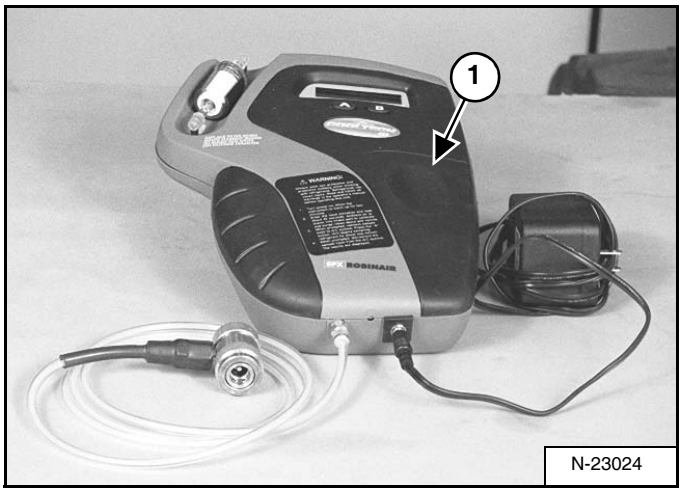
⚠ WARNING

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

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NOTE: This test is run with the loader engine OFF, and the A/C switch in the OFF position.

Figure 80-100-3

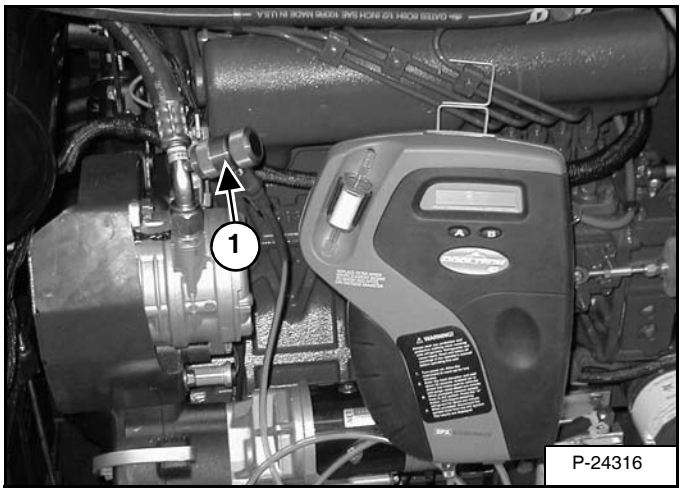


NOTE: Before reclaiming a refrigeration system, it is recommended to identify the type of refrigerant that is in the A/C system and if it is pure enough to use. The tool MEL 1592, Refrigerant Identifier (Item 1) [Figure 80-100-3] will determine, the kind of refrigerant and any possible harmful or dangerous substances that may be present in the system. Thus preventing mixing of dangerous material with your reclaimed R-134a in your reclaimer, and further contamination to other A/C systems that are reclaimed and charged from your MEL 1581 Recovery/Recycling/Recharging Machine.

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Reclamation Procedure (Cont'd)

Figure 80-100-4



Remove the protective cap and connect the Refrigerant Identifier to the low pressure hose (Item 1) **[Figure 80-100-4]**.

Connect the Refrigerant Identifier to its power source.

Follow the steps displayed on the refrigerant identifier screen.

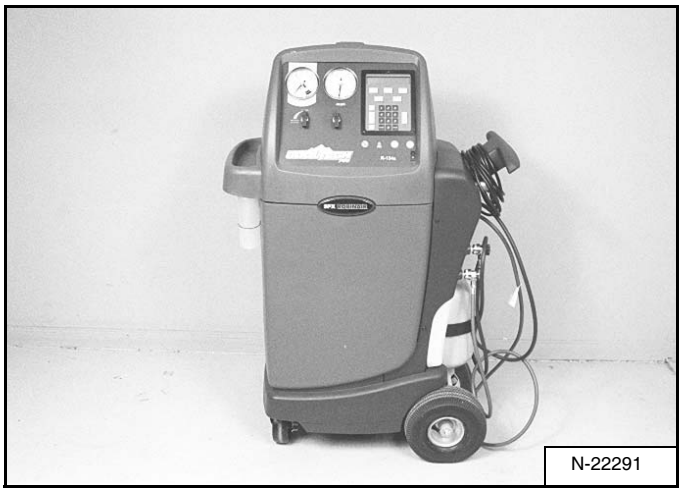
Allow two minutes for the refrigerant identifier to display the type of refrigerant and air content. An alarm will sound if potentially flammable hydrocarbons are present and will also indicate on the visual display.

Disconnect the refrigerant identifier from the loader A/C.

If the refrigerant is dangerous or flammable, it must be evacuated from the A/C system into a separate container and properly and safely disposed of.

If R134a is found , evacuate the system.

Figure 80-100-5



IMPORTANT: Only A/C trained technicians should perform the reclaiming and recharging.

⚠ WARNING

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

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

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

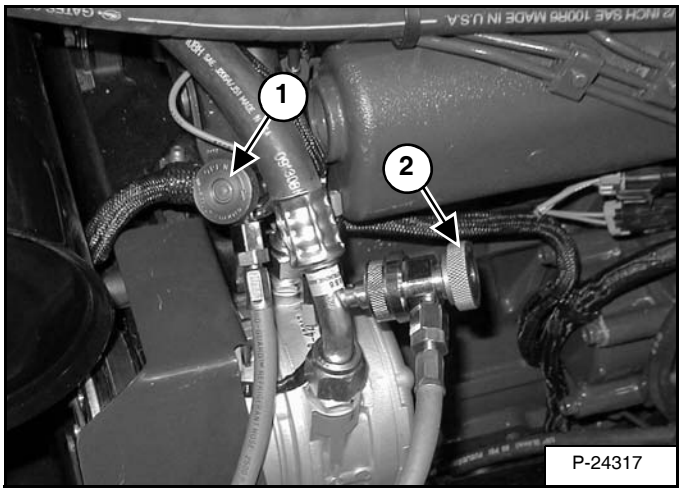
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Use an approved recovery/charging unit **[Figure 80-100-5]** to evacuate the system.

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Reclamation Procedure (Cont'd)

Figure 80-100-6

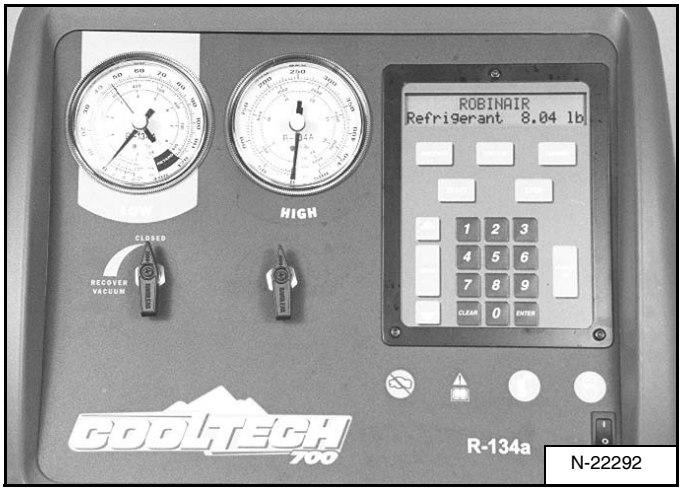


Connect the reclaimer to the loader A/C charge ports.

Connect the Red hose (Item 1) **[Figure 80-100-6]** to the high pressure port and open the valve.

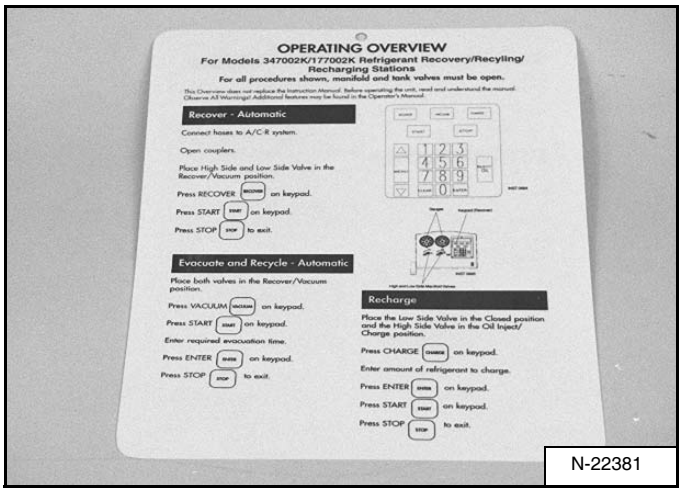
Connect the Blue hose (Item 2) **[Figure 80-100-6]** to the low pressure port and open the valve.

Figure 80-100-7



Turn the reclaimer unit **[Figure 80-100-7]** to the ON position and follow the on screen instructions.

Figure 80-100-8



NOTE: The reclaimer unit, has a complete step by step set of instructions [Figure 80-100-8] to follow for reclimation and recharging of the A/C system. A trained technician should follow these instructions as they may very slightly depending on the model and brand of reclaimer used.

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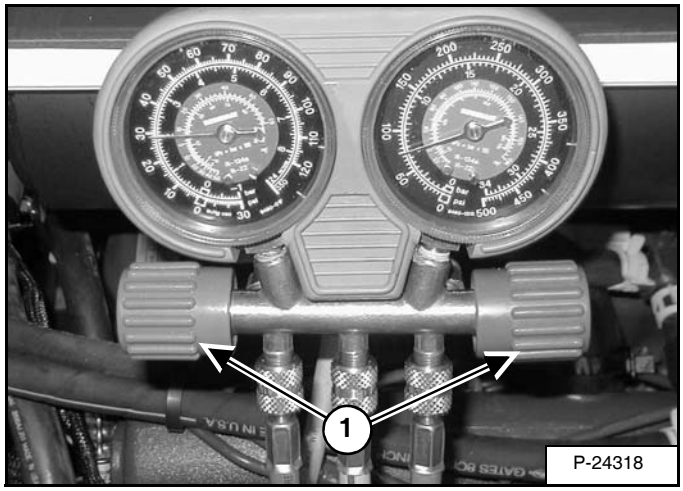
Charging Procedure With A Manifold Gauge Set

⚠ WARNING

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

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Figure 80-100-9

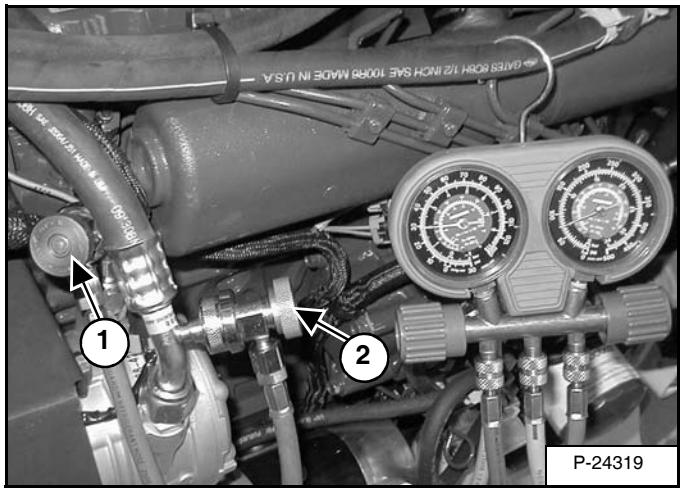


Open the rear door.

Check to see that the hand valves (Item 1) **[Figure 80-100-9]** are closed on the manifold gauge set.

If there is any refrigerant in the A/C system, it must be recovered by an approved A/C reclamation procedure. (See Reclamation Procedure on Page 80-100-1.)

Figure 80-100-10

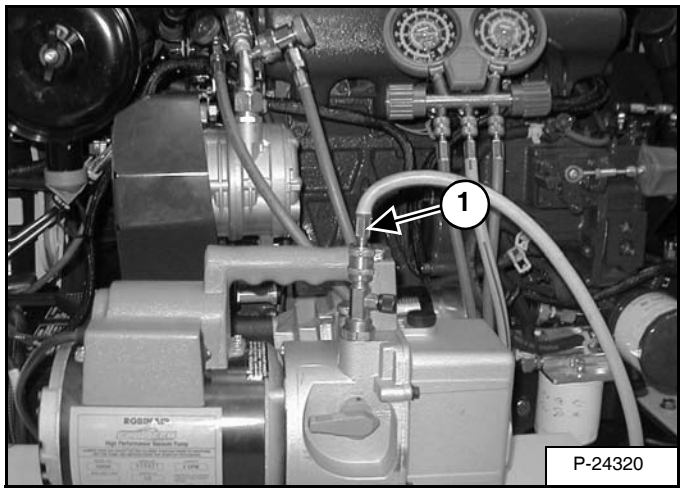


Connect the gauges to the loader A/C charge ports.

Connect the Red hose (Item 1) **[Figure 80-100-10]** to the high pressure port and open the valve.

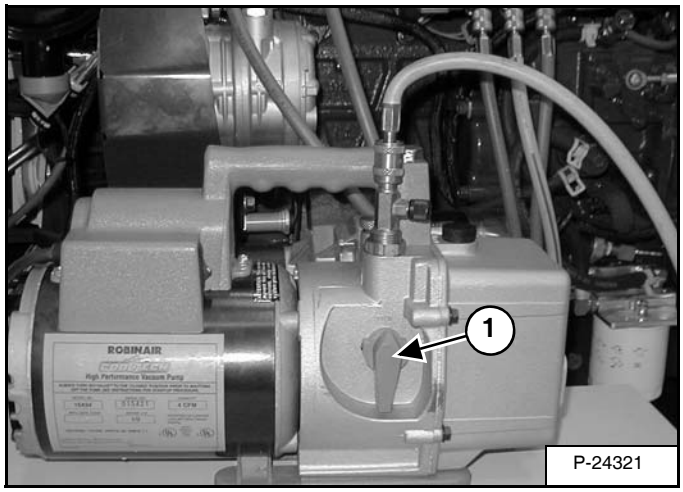
Connect the Blue hose (Item 2) **[Figure 80-100-10]** to the low pressure port and open the valve.

Figure 80-100-11



Connect the Yellow hose (Item 1) **[Figure 80-100-11]** to the vacuum pump.

Figure 80-100-12



Start the vacuum pump and open ISO-valve (Item 1) **[Figure 80-100-12]** on the vacuum pump.

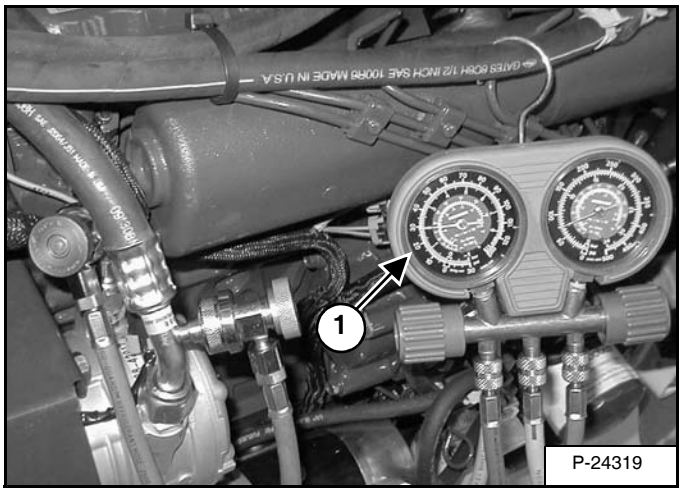
Run the vacuum pump for at least 5-10 minutes to insure that a vacuum has been pulled on the system.

Close the ISO-valve (Item 1) **[Figure 80-100-12]** (which isolates the vacuum pump from the A/C system) and turn OFF the vacuum pump.

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Charging Procedure

Figure 80-100-13

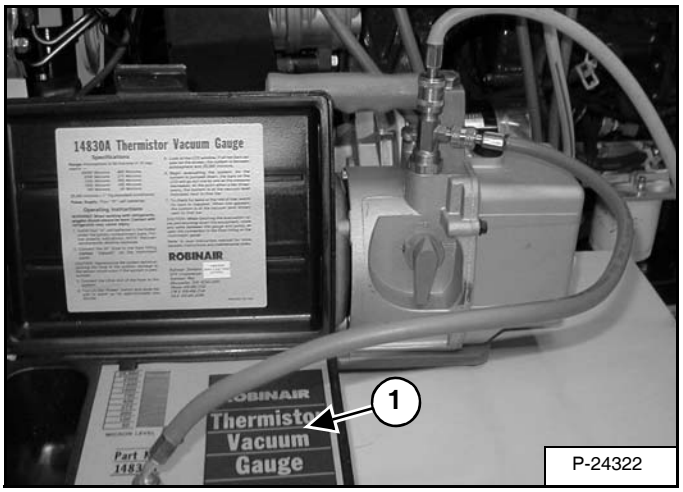


NOTE: Vacuum pressure indicated on the low pressure (Blue) gauge (Item 1) [Figure 80-100-13]. Let stand for 5-10 min. and recheck the pressure for changes.

If the pressure drops, this may be an indication of a leak in the A/C system.

Determine the problem with the A/C system and repair it.

Figure 80-100-14



A thermistor vacuum gauge (Item 1) **[Figure 80-100-14]** can be used to determine the critical vacuum level during evacuation. It is a solid state instrument that constantly monitors and visually indicates the vacuum level.

The thermistor vacuum gauge is used with the vacuum pump **[Figure 80-100-14]**.

Start the vacuum pump and open ISO-valve on the vacuum pump.

Be sure that both hand valves, and both charge port valves are open.

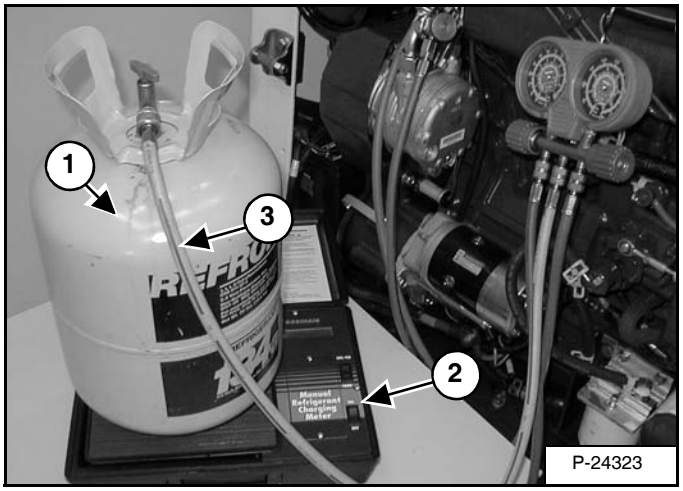
Run the vacuum pump for at least 45 minutes to insure that all the moisture is boiled out of the system.

Stop the vacuum pump and close the ISO-valve on the vacuum pump.

Close both hand valves on the manifold gauge set and remove the yellow hose from the vacuum pump that goes to the manifold gauge set.

Remove the vacuum pump and thermister vacuum gauge.

Figure 80-100-15



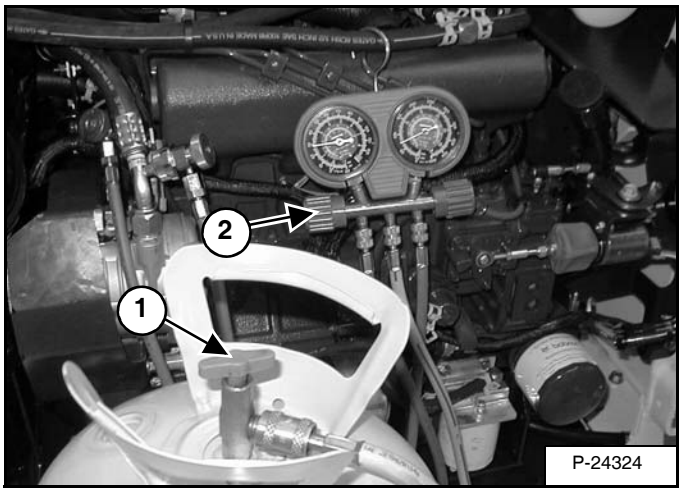
Place a refrigerant container with R134a (Item 1) on a charging scale (Item 2) **[Figure 80-100-15]** and zero out the scale.

Connect the yellow hose (Item 3) **[Figure 80-100-15]** from the manifold gauge set to the valve on the refrigerant tank.

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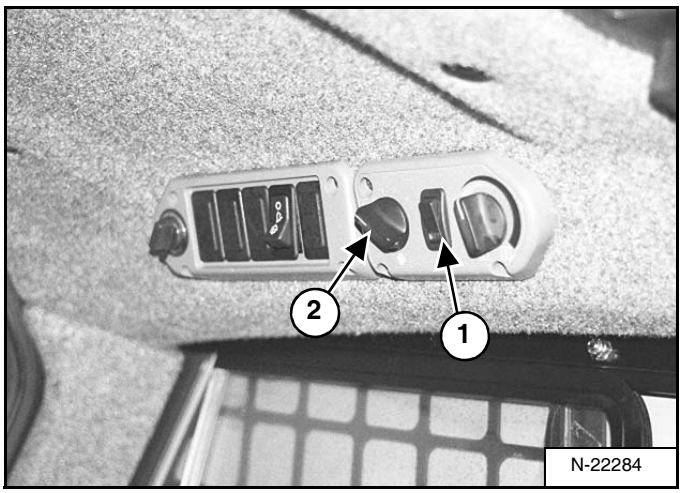
Charging Procedure (Cont'd)

Figure 80-100-16



Open the valve on the refrigerant container (Item 1) and open the low pressure hand valve (Blue) (Item 2) **[Figure 80-100-16]** on the manifold gauge set. Allow the vacuum to pull in the refrigerant until the pressure stabilizes.

Figure 80-100-17



Connect the remote start tool to the loader. (See Procedure on Page 10-60-1.)

Press the A/C (Item 1) **[Figure 80-100-17]** switch to ON position.

Turn fan switch (Item 2) **[Figure 80-100-17]** to HIGH position.

Start loader engine, with the remote start switch, and run at medium speed.

Watch the scale and run system until the predetermined amount of refrigerant is added to the A/C system.

The A/C system holds 2.0 lb. (0,91 kg) of refrigerant.

Turn OFF the valve on the refrigerant container, and hand valves on the manifold gauge set.

Turn OFF the engine, and remove the A/C charging equipment from the loader.

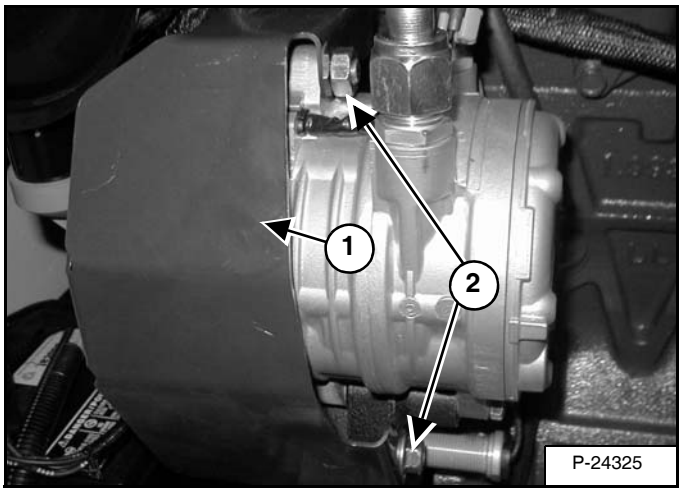
Lower the operator cab. (See Lowering The Operator Cab on Page 10-30-2.)

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COMPRESSOR

Removal And Installation

Figure 80-110-1

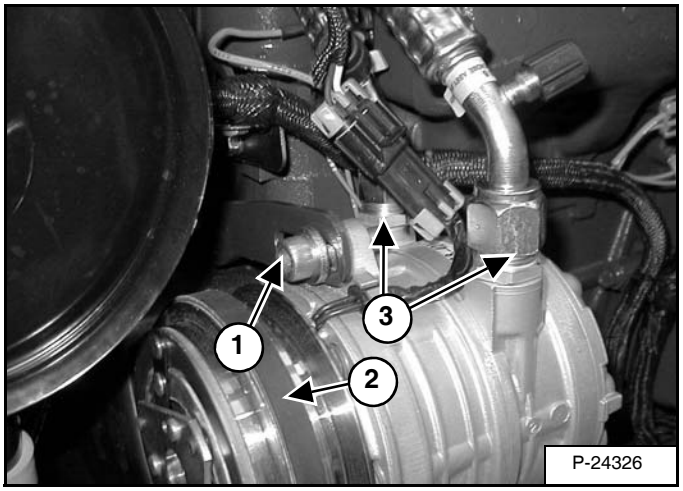


Remove drive belt guard.

Remove A/C belt guard (Item 1), by removing the mounting bolt and nut (Item 2) **[Figure 80-110-1]**.

Evacuate the A/C system. (See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

Figure 80-110-2



Remove the compressor adjustment bolt (Item 1) **[Figure 80-110-2]**.

Installation: Tighten the compressor adjustment bolt to 34 ft.-lb. (46 N•m) torque.

Remove the compressor belt (Item 2) **[Figure 80-110-2]**.

Mark the compressor hoses for proper installation.

⚠ WARNING

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

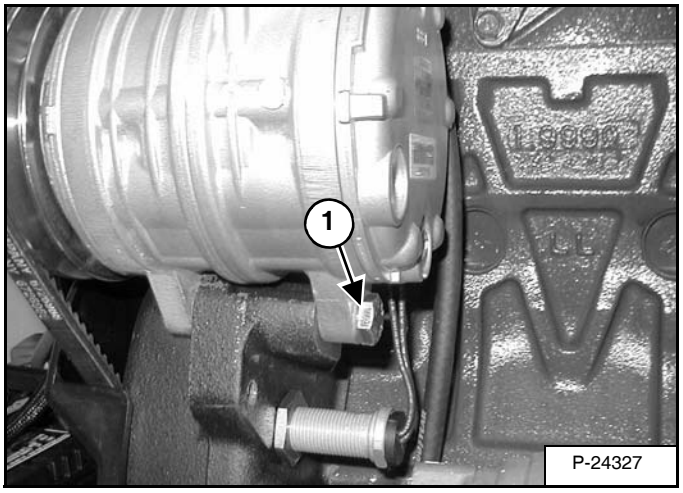
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Remove the compressor hoses (Item 3) **[Figure 80-110-2]** from the compressor.

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

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

Figure 80-110-3



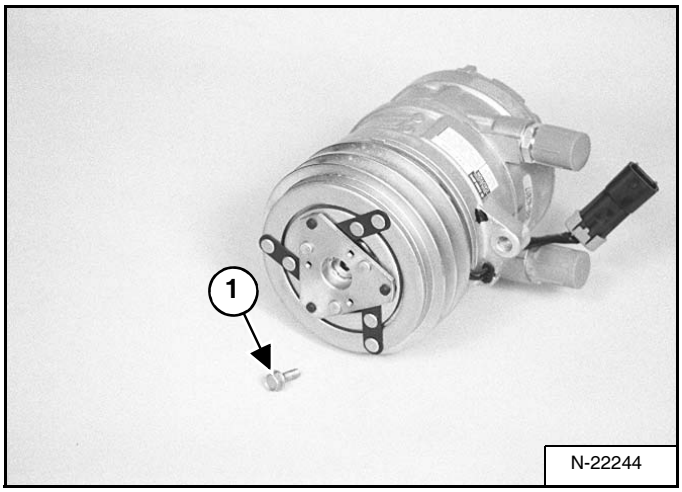
Remove the compressor mount bolt (Item 1) **[Figure 80-110-3]**.

Remove the compressor from the loader.

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Compressor Clutch Disassembly

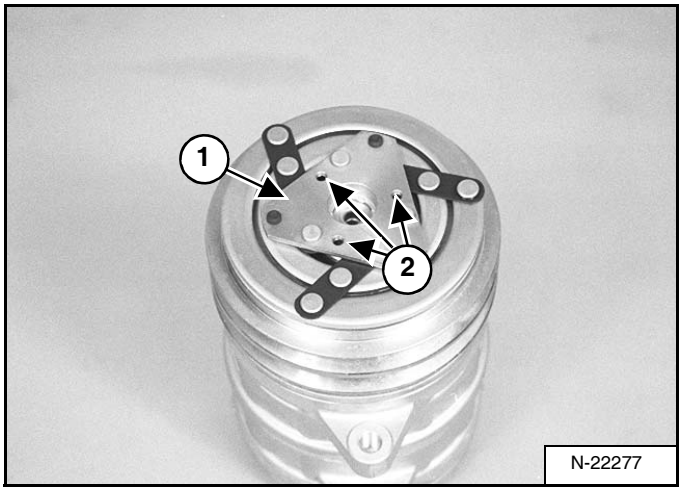
Figure 80-110-4



Remove the center armature bolt (Item 1) **[Figure 80-110-4]**.

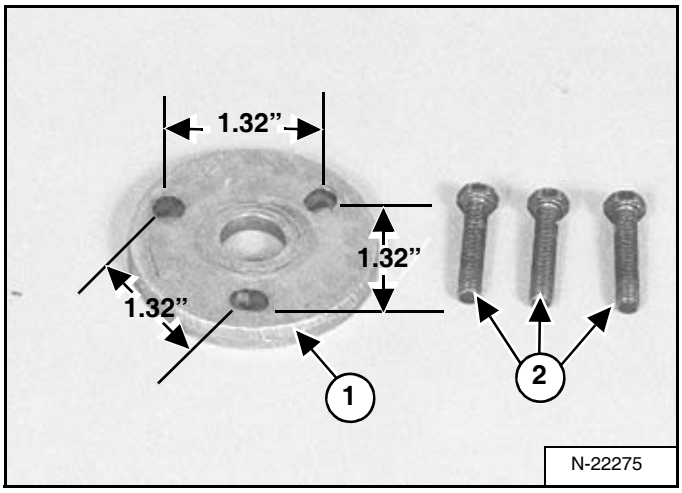
Installation: Tighten the armature bolt to 8-10 ft.-lb. (12-14 N•m) torque.

Figure 80-110-5



To remove the armature plate (Item 1) **[Figure 80-110-5]** from the clutch face, you must make an armature plate puller.

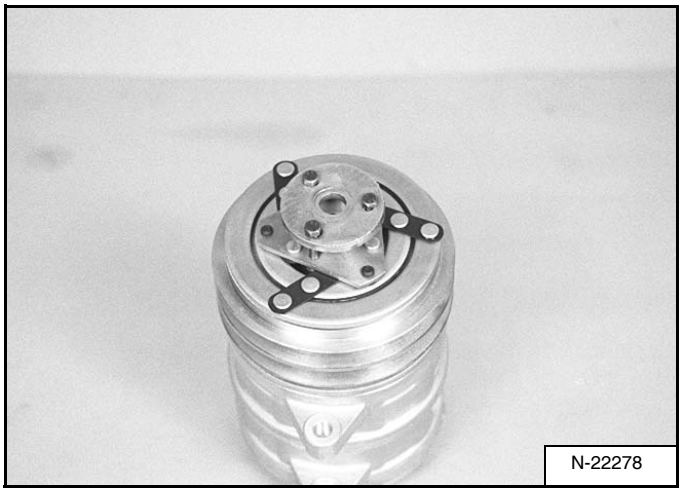
Figure 80-110-6



The armature plate puller, (Item 1) can be constructed by drilling three 10 mm holes in a flat circular plate, located 1.32 inches apart **[Figure 80-110-6]**.

Attach the puller to the armature plate using three 8 mm bolts (Item 2) **[Figure 80-110-6]**.

Figure 80-110-7

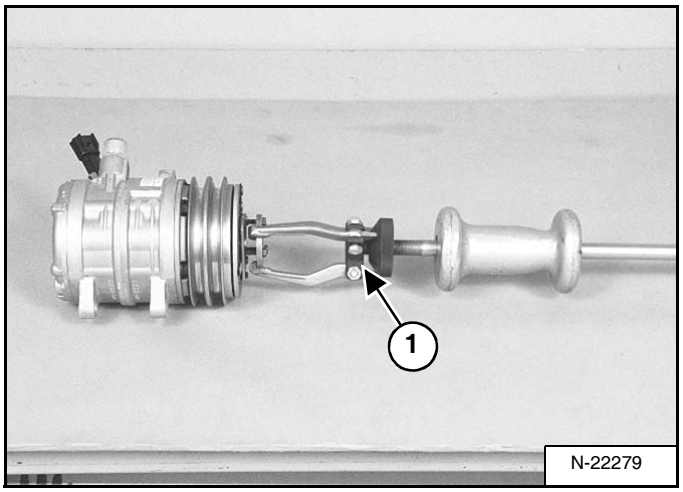


Turn the bolts into the three 8 mm holes (Item 2) **[Figure 80-110-5]** on the armature plate as shown in **[Figure 80-110-7]**.

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Compressor Clutch Disassembly (Cont'd)

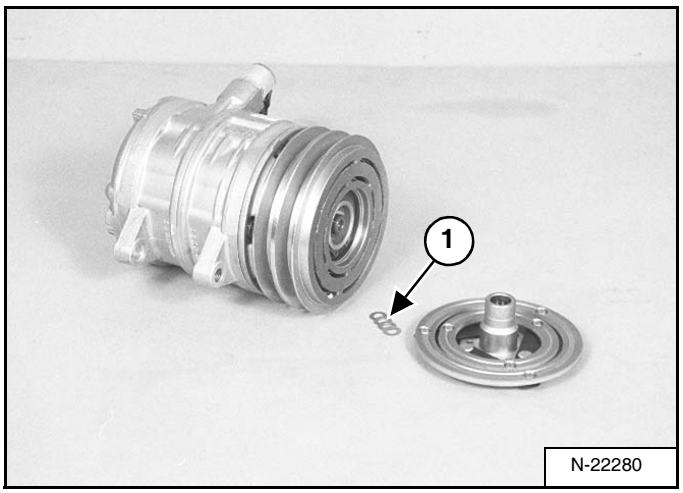
Figure 80-110-8



Attach a slide hammer puller (Item 1) **[Figure 80-110-8]** to the armature puller disk.

Remove the armature plate from the compressor clutch.

Figure 80-110-9



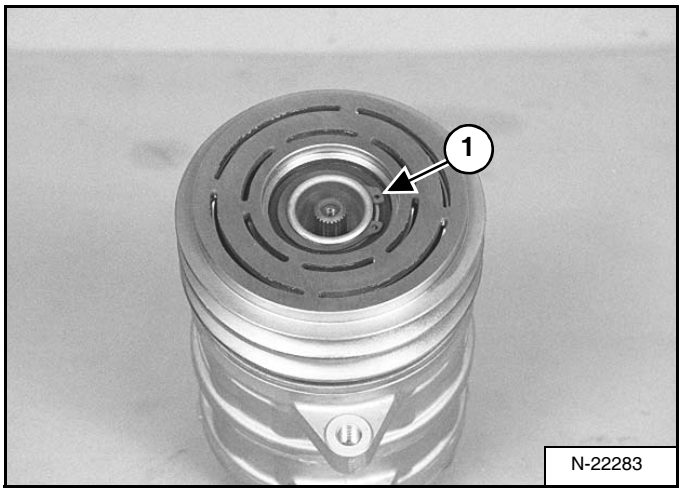
Remove the shims (Item 1) **[Figure 80-110-9]** from either the armature shaft or armature plate.

Installation: Insure that the clutch has the correct clearance by adding the shims (Item 1) **[Figure 80-110-9]**.

The specified clearance for the clutch is 0.01-0.02 in. (0.3-0.6 mm). Adjusting shims are available in the following thicknesses:

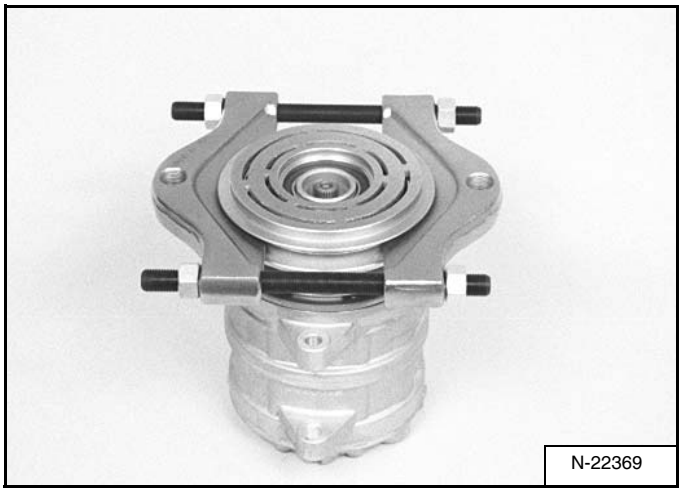
0.0039 in. (0.1 mm)
0.0118 in. (0.3 mm)
0.0197 in. (0.5 mm)

Figure 80-110-10



Remove the snap ring (Item 1) **[Figure 80-110-10]** from the pulley assembly.

Figure 80-110-11

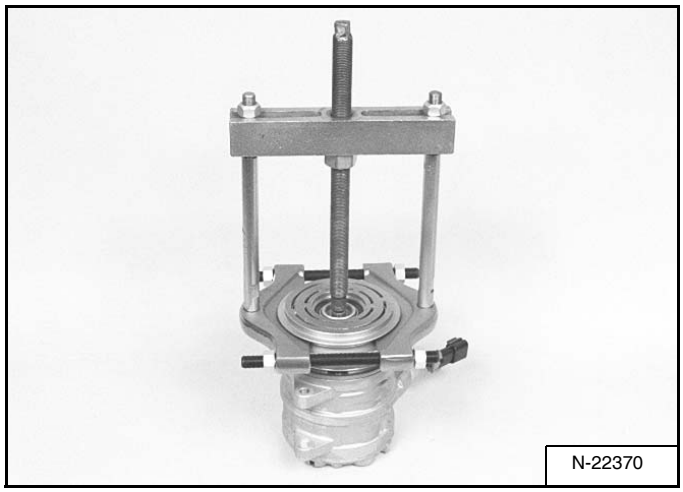


Install the pulley puller tool MEL 1595 on the compressor pulley **[Figure 80-110-11]**.

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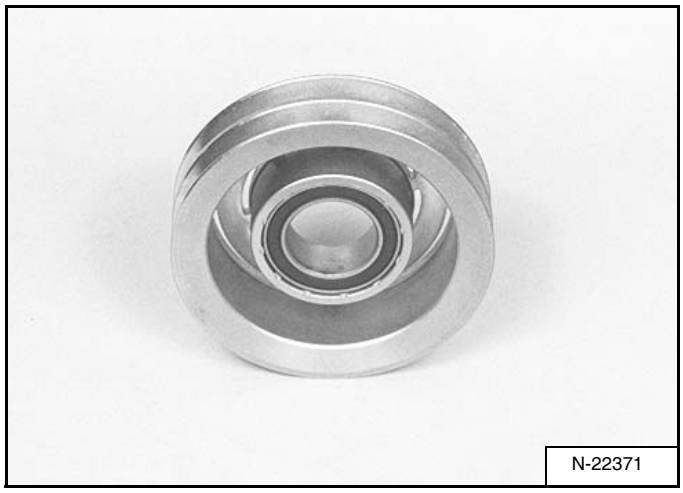
Compressor Clutch Disassembly (Cont'd)

Figure 80-110-12



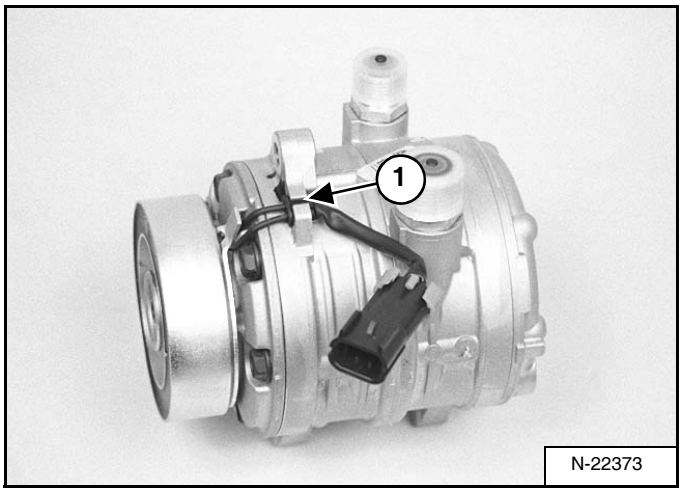
Remove the pulley from the compressor **[Figure 80-110-12]**.

Figure 80-110-13



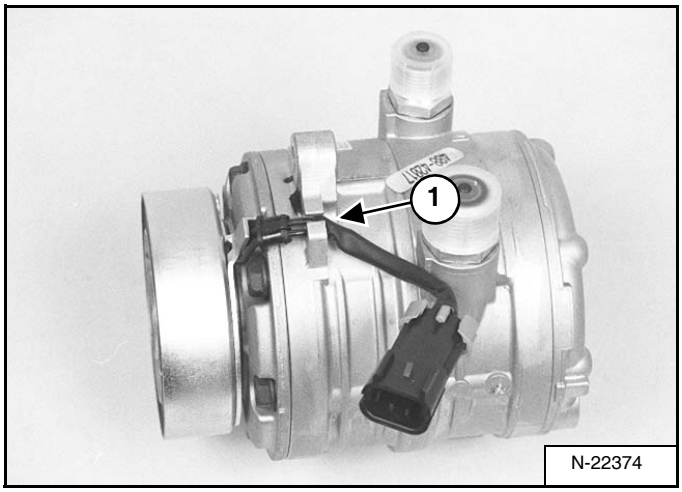
The pulley assembly and bearing **[Figure 80-110-13]** must be replaced as a complete unit.

Figure 80-110-14



Slide the wire grommet (Item 1) **[Figure 80-110-14]** from the wire holder.

Figure 80-110-15

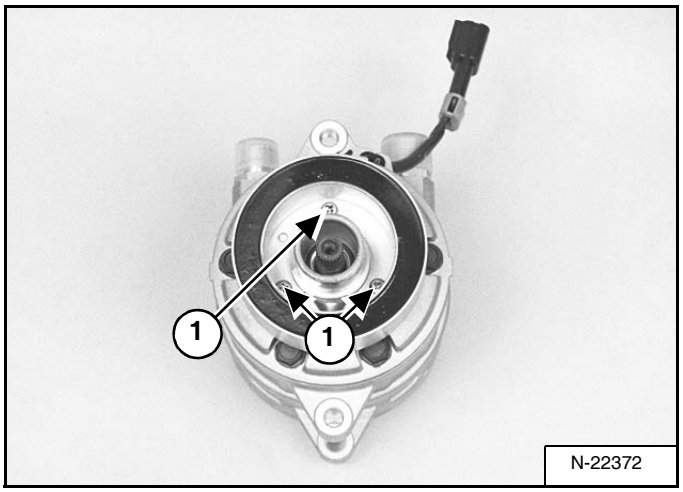


Remove the coil lead wire (Item 1) **[Figure 80-110-15]** from the wire holder on the compressor.

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Compressor Clutch Disassembly (Cont'd)

Figure 80-110-16

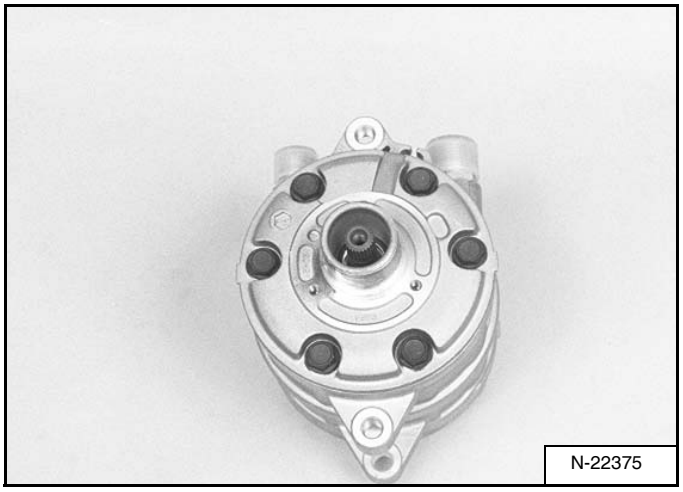


Remove the three coil mount bolts (Item 1) **[Figure 80-110-16]** from the compressor.

Installation: Tighten the mount bolts to 2.9-4.3 ft.-lb. (4-6 N•m) torque.

Remove the coil from the compressor.

Figure 80-110-17



The compressor **[Figure 80-110-17]** must be replaced as a complete unit.

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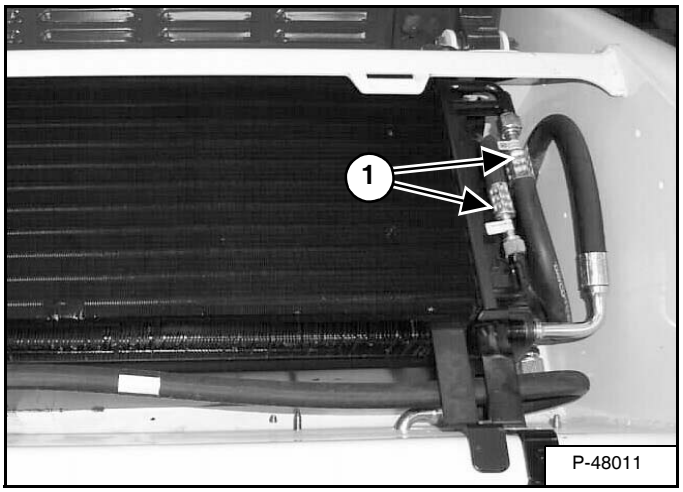


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CONDENSER

Removal And Installation

Figure 80-120-1



Remove the refrigerant from the A/C system. (See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

Open the rear door of the loader.

Open the rear grill on the loader.

Mark the two A/C hoses (Item 1) **[Figure 80-120-1]** for proper installation.

⚠ WARNING

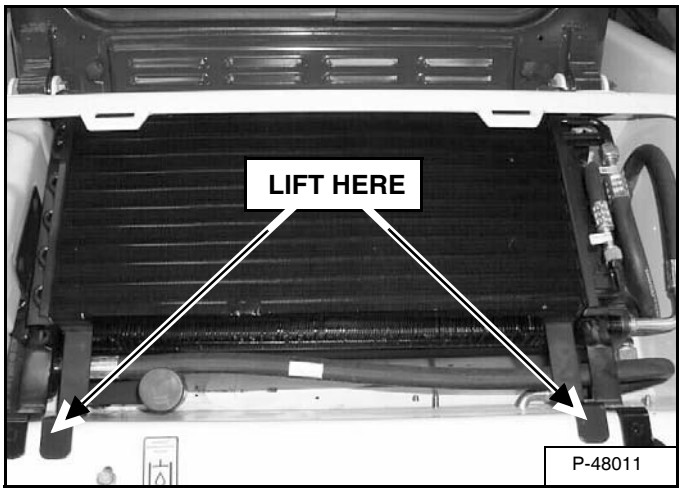
In the event of a leakage, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R134a refrigerant gives a toxic gas.

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Disconnect the two hoses from the condenser (Item 1) **[Figure 80-120-1]**.

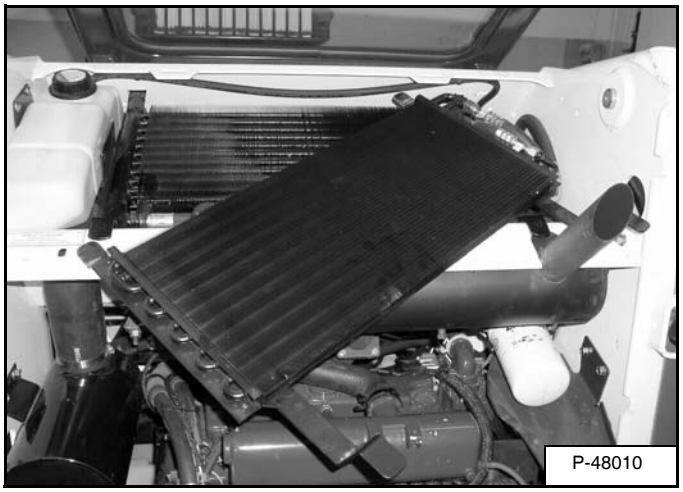
Cap and plug the hoses and the condenser fittings with the proper A/C caps and plugs.

Figure 80-120-2



Lift the rear of the condenser **[Figure 80-120-2]**, and pull toward the rear of the loader until the front tabs (Item 1) **[Figure 80-120-4]** slide out of bracket (Item 2) **[Figure 80-120-4]**

Figure 80-120-3

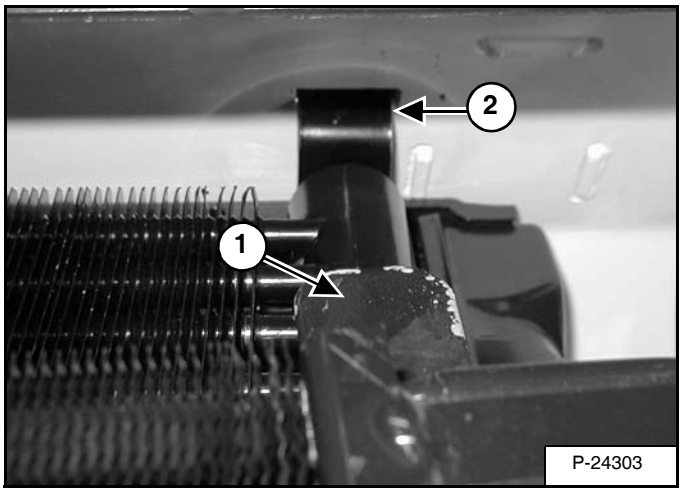


Remove the condenser from the loader **[Figure 80-120-3]**.

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Removal And Installation (Cont'd)

Figure 80-120-4



Installation: Make sure to insert tabs (Item 1), into the mounts (Item 2) **[Figure 80-120-4]**, evenly for ease of installation.

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RECEIVER/DRIER

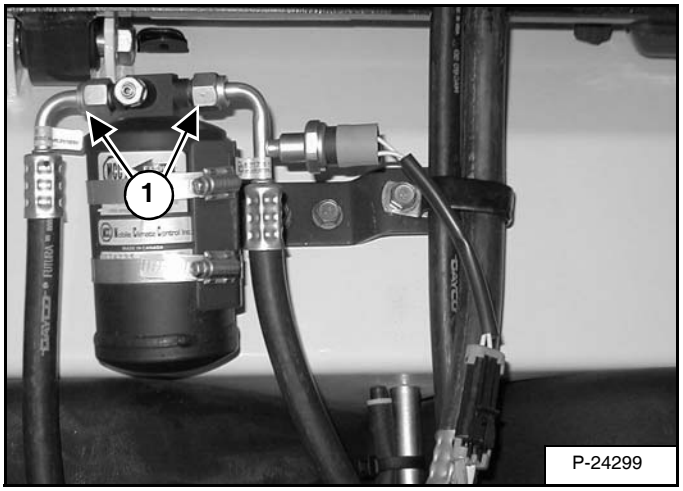
Removal And Installation

WARNING

Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

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Figure 80-130-1



Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.))

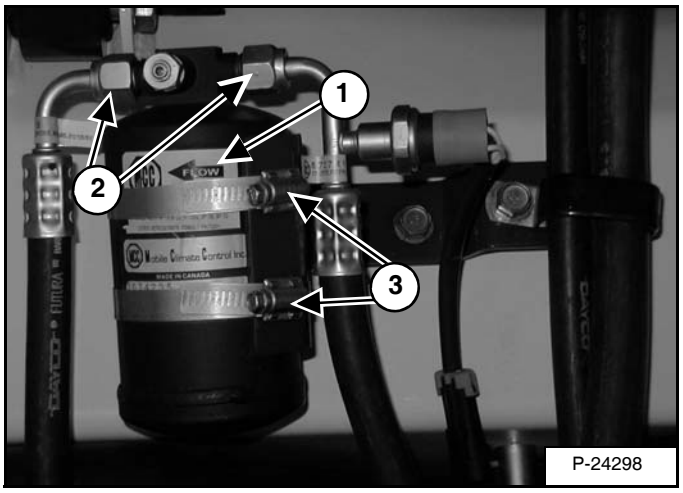
Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the refrigerant from the A/C system.(See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

Mark the A/C hoses (Item 1) **[Figure 80-130-1]** for proper installation.

Both fittings on the drier are the same size, so the hoses can be hooked up incorrectly.

Figure 80-130-2



Note the flow direction on the drier (Item 1) **[Figure 80-130-2]** for proper installation.

WARNING

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

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Remove the two A/C hoses (Item 2) **[Figure 80-130-2]** from the receiver/drier.

Cap and plug the hoses and the receiver/drier fittings with the proper A/C caps and plugs.

Loosen the hose clamps (Item 3) **[Figure 80-130-2]** that holds the receiver/drier to the mount.

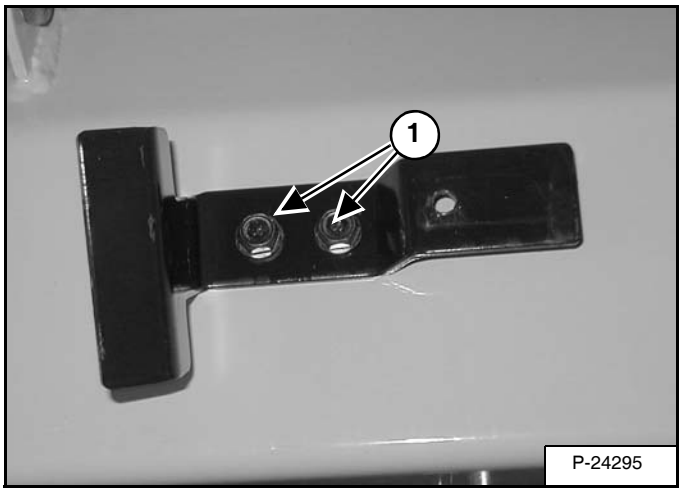
Remove the receiver/drier from the loader.

NOTE: When replacing a receiver/drier in an A/C system 1 fl. oz. (30 cc) of PAG oil must be added to the system when recharging.

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Removal And Installation (Cont'd)

Figure 80-130-3



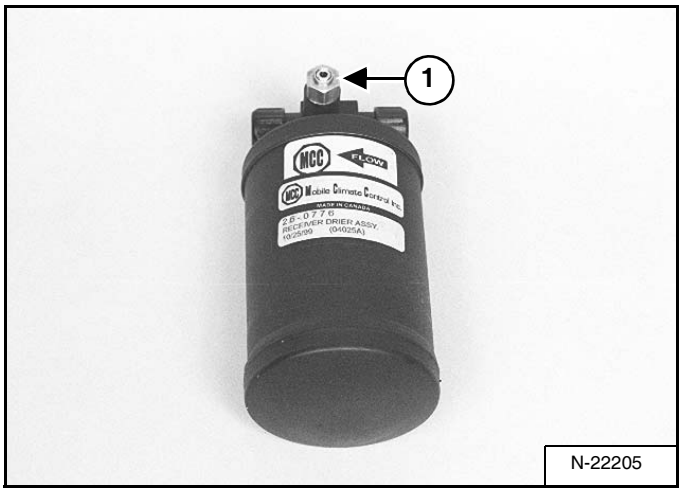
Remove the two mount bolts (Item 1) **[Figure 80-130-3]** from the receiver/drier mount bracket.

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PRESSURE RELIEF VALVE

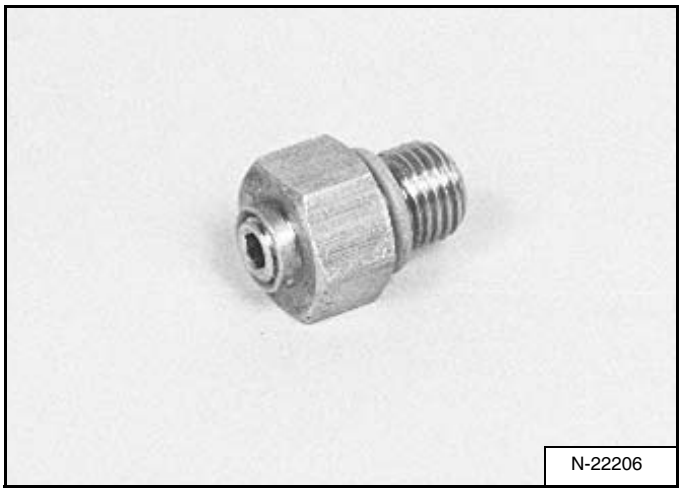
Removal And Installation

Figure 80-140-1



The pressure relief valve (Item 1) **[Figure 80-140-1]** is located on the receiver drier assembly.

Figure 80-140-2



The pressure relief valve **[Figure 80-140-2]** is designed to open and release the A/C charge if the pressure reaches 535 PSI (3689 kPa).

This will cause the A/C system to shut down, saving the compressor.

The Pressure Relief Valve is a secondary protection device in the A/C system, with the Pressure Switch shutting down the system at 384 PSI (2648 kPa).

NOTE: If a Pressure Relief Valve is found open, check the A/C system for problems. Replace the complete receiver/drier unit.

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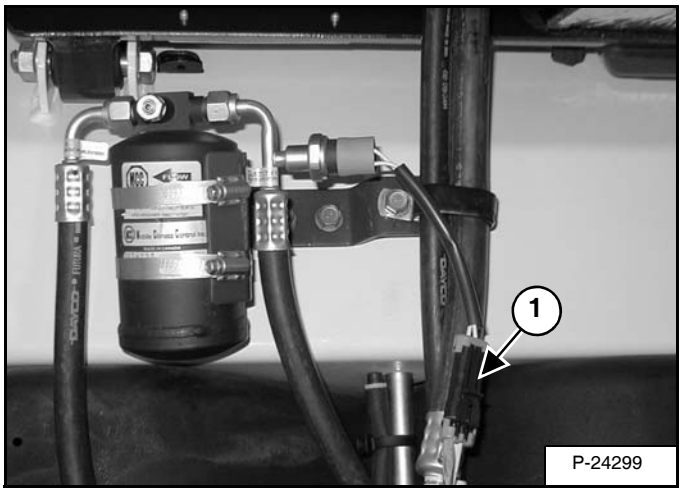


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PRESSURE SWITCH

Removal And Installation

Figure 80-150-1



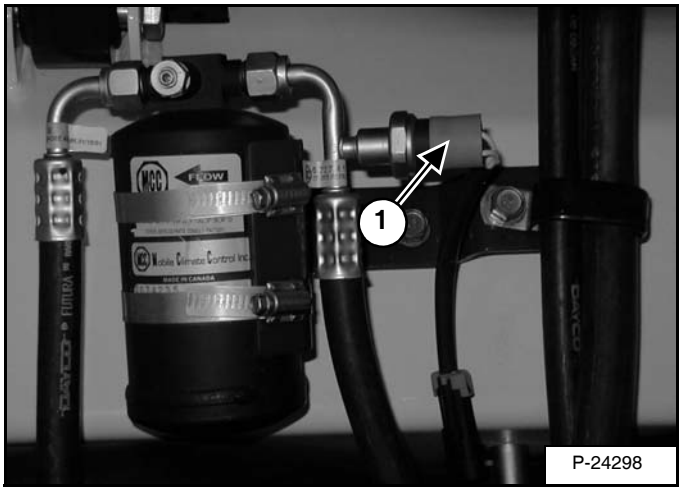
Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Disconnect the loader wire harness (Item 1) **[Figure 80-150-1]** from the pressure switch wire harness.

NOTE: The pressure switch can be changed without evacuating the A/C system.

Figure 80-150-2



WARNING

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

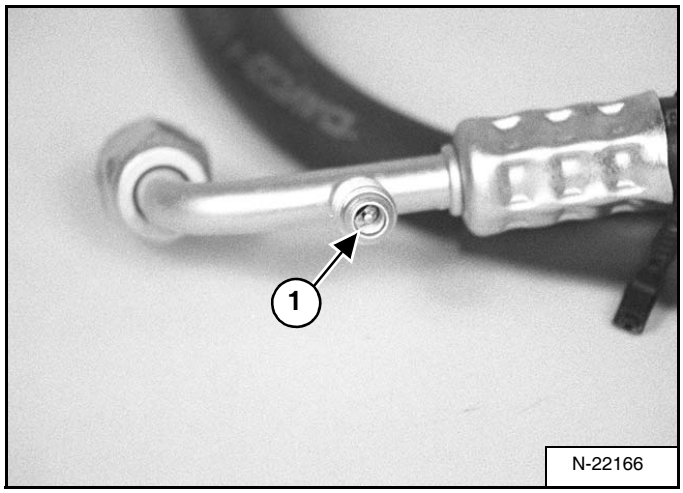
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Remove the pressure switch (Item 1) **[Figure 80-150-2]** from the A/C high pressure hose.

Remove the pressure switch from the loader.

Schraeder Valve Removal And Installation

Figure 80-150-3



The schraeder valve (Item 1) **[Figure 80-150-3]** is located in the A/C high pressure hose and is located under the pressure switch.

Raise the loader lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the refrigerant from the A/C system. (See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

Remove the pressure switch.

With a tire valve core removal tool, remove the valve core from the hose.

Replace with a new core.

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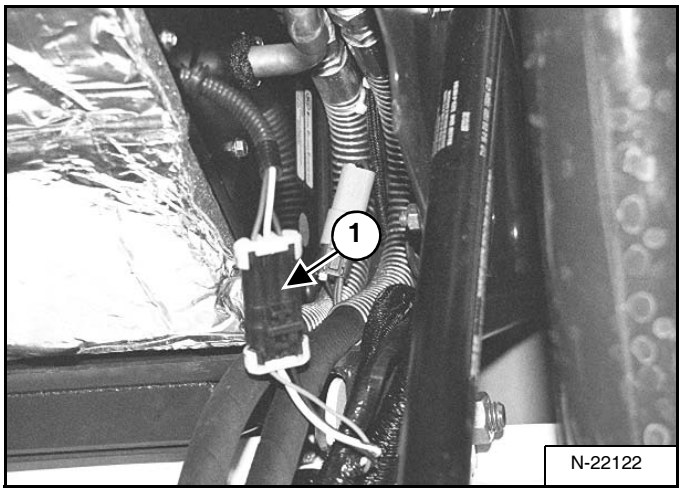


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EVAPORATOR/HEATER UNIT

Removal And Installation

Figure 80-160-1



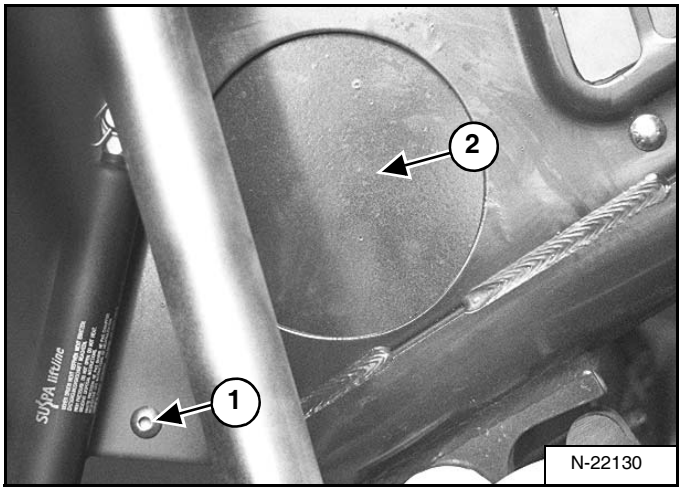
Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Evacuate the A/C system.(See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

At the rear of the cab, disconnect the thermostat wiring connector (Item 1) **[Figure 80-160-1]**.

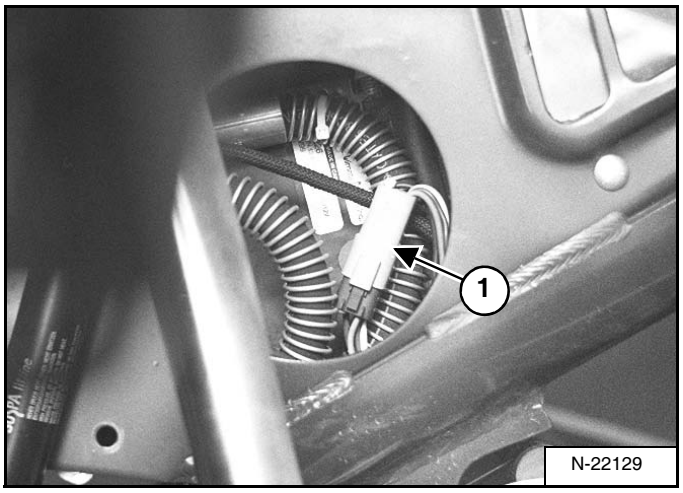
Figure 80-160-2



Remove the mount bolt (Item 1) **[Figure 80-160-2]** from the left side cab access cover.

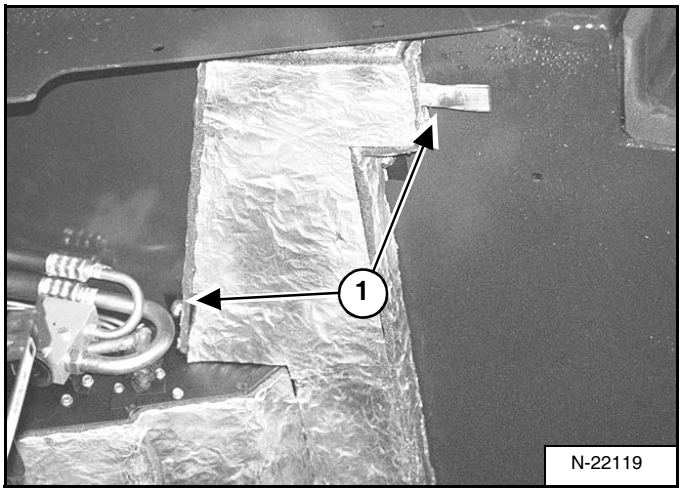
Remove the access cover (Item 2) **[Figure 80-160-2]** from the loader.

Figure 80-160-3



Disconnect the blower fan wiring connector (Item 1) **[Figure 80-160-3]** from the loader wiring harness.

Figure 80-160-4

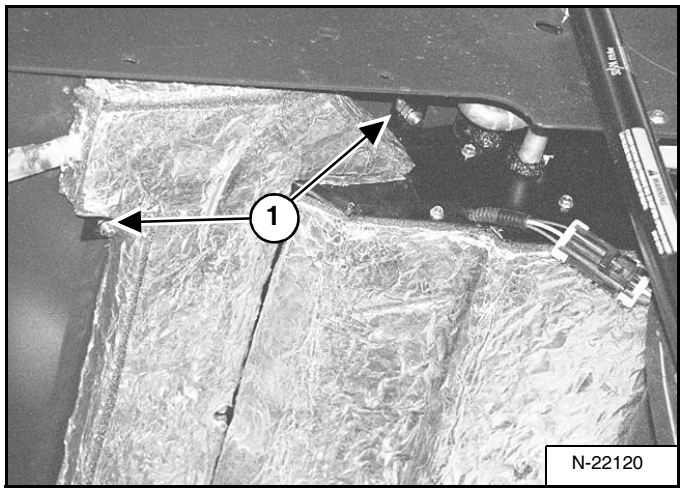


Remove the two mounting nuts (Item 1) **[Figure 80-160-4]**.

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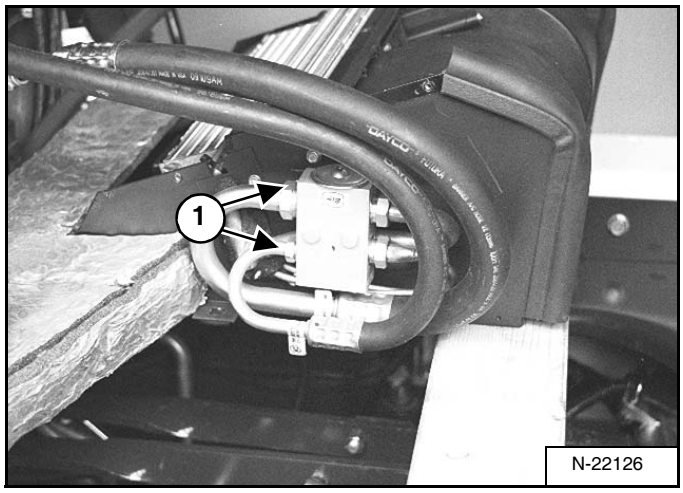
Removal And Installation (Cont'd)

Figure 80-160-5



Remove the two mounting nuts (Item 1) **[Figure 80-160-5]**.

Figure 80-160-6



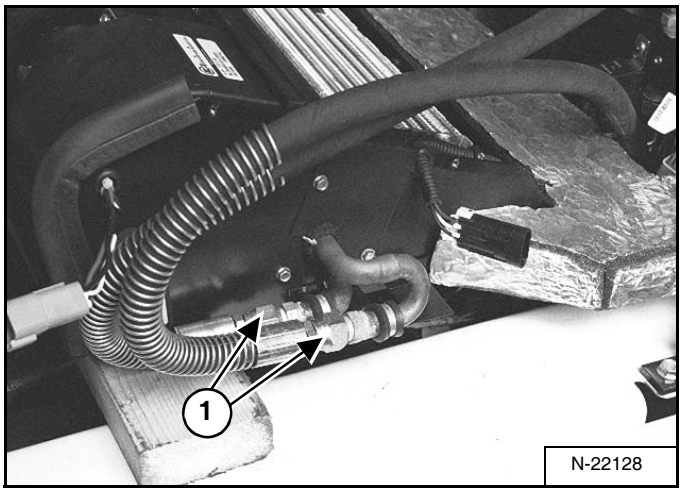
Remove the Evaporator/Heater Unit from the rear of the cab. Place it on the fenders of the loader supported by 2X4's (blocking) **[Figure 80-160-6]**.

⚠ WARNING

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

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Figure 80-160-7



Remove the two A/C hoses (Item 1) **[Figure 80-160-6]** from the expansion valve.

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

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

Remove the heater hoses (Item 1) **[Figure 80-160-7]** from the heater coil.

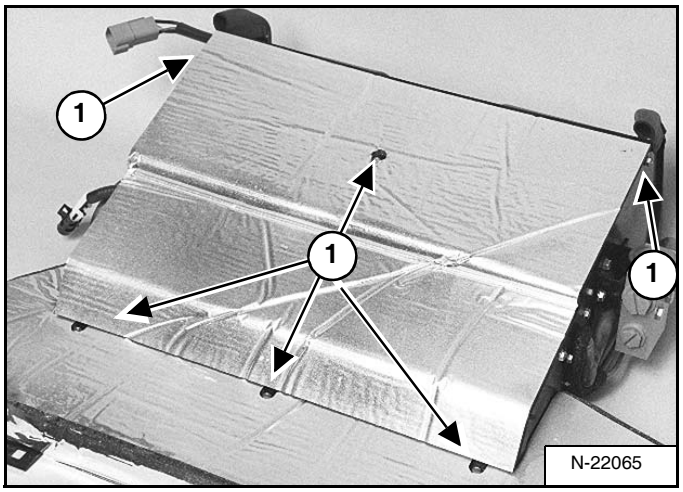
Installation: Tighten the Heater hoses to 22 ft.-lb. (29,8 N•m) torque.

Remove the evaporator/heater unit from the loader.

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Disassembly And Assembly

Figure 80-160-8



Remove the six mount bolts (Item 1) **[Figure 80-160-8]** from the Evaporator/Heater Unit rear cover.

Remove the rear cover from the unit.

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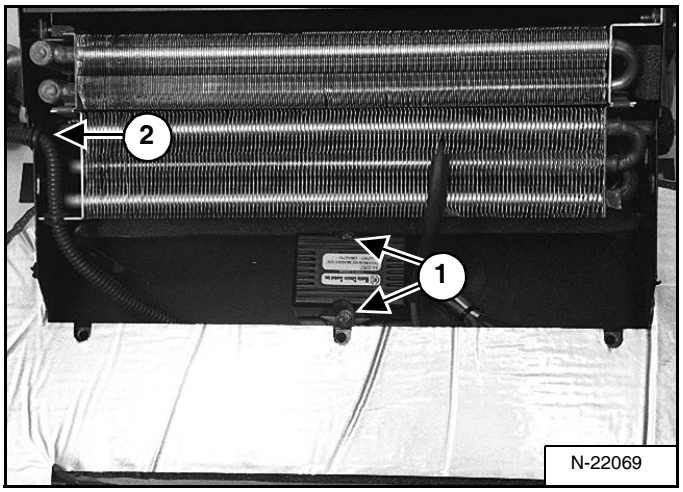


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THERMOSTAT

Removal And Installation

Figure 80-170-1

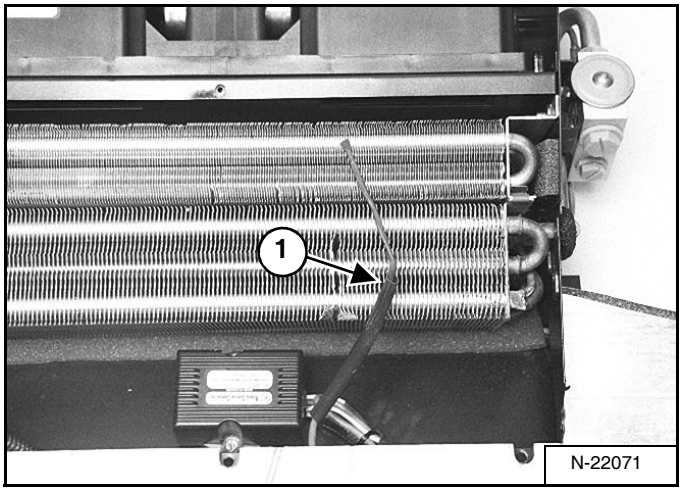


NOTE: The thermostat can be changed without evacuating the A/C system, or removing the evaporator/heater unit from the loader.

Remove the rear cover from the evaporator/heater unit. (See EVAPORATOR/HEATER UNIT on Page 80-160-1.))

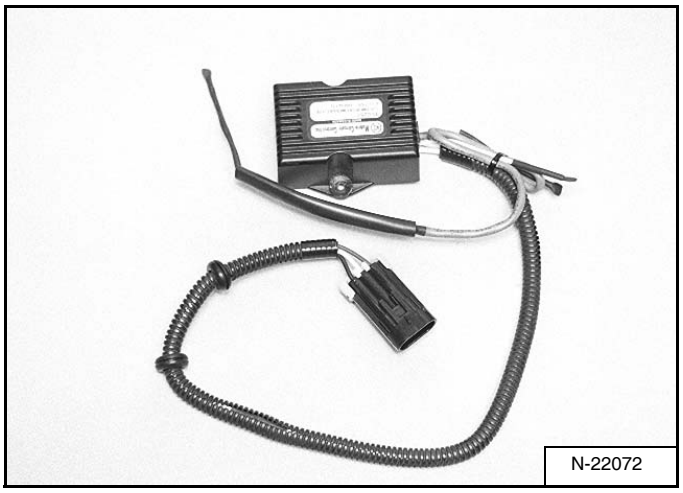
Remove the two thermostat mount bolts (Item 1), and remove the wiring harness and grommet (Item 2) **[Figure 80-170-1]** from the evaporator/heater housing.

Figure 80-170-2



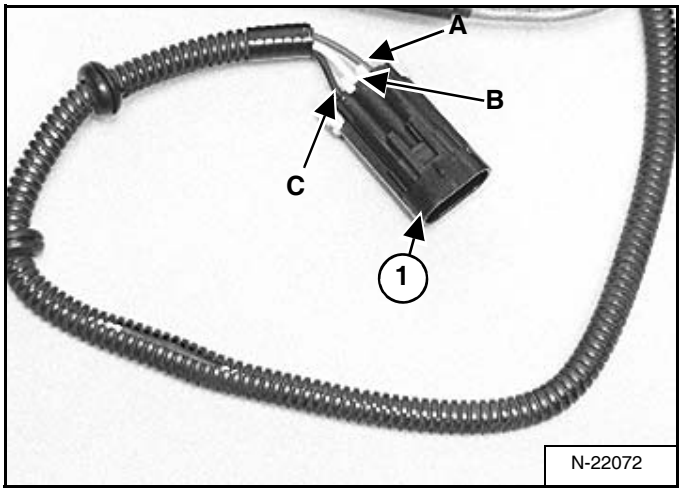
Remove the thermostat probe (Item 1) **[Figure 80-170-2]** from the A/C evaporator coil.

Figure 80-170-3



Remove the thermostat from the unit **[Figure 80-170-3]**.

Figure 80-170-4



The wire connector (Item 1) **[Figure 80-170-4]** can be changed. The wiring position and color in the connector is:

A	Blue
B	White
C	Black

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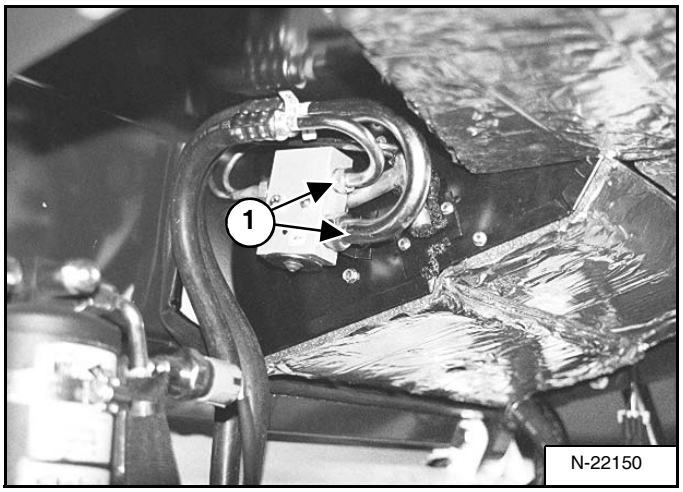


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EXPANSION VALVE

Removal And Installation

Figure 80-180-1



NOTE: The expansion valve can be changed without removing the evaporator/heater unit from the loader.

Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

(See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

⚠ WARNING

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

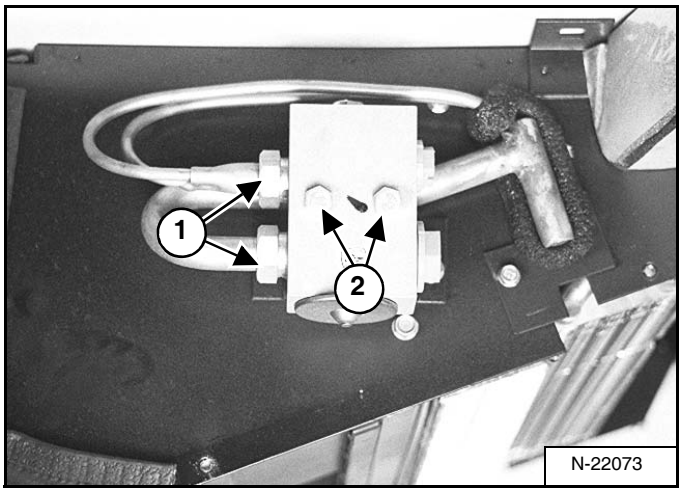
W-2371-0500

Remove the two A/C hoses (Item 1) **[Figure 80-180-1]** from the expansion valve.

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

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

Figure 80-180-2



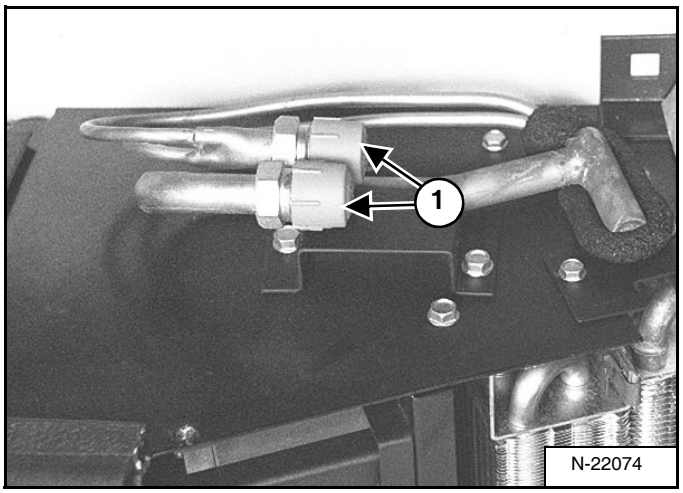
Remove the two evaporator fittings (Item 1) **[Figure 80-180-2]** from the expansion valve.

Installation: Tighten the two evaporator fittings to 22 ft.-lb. (29,8 N•m) torque.

Remove the two mount bolts (Item 2) **[Figure 80-180-2]**.

Remove the expansion valve from the loader.

Figure 80-180-3

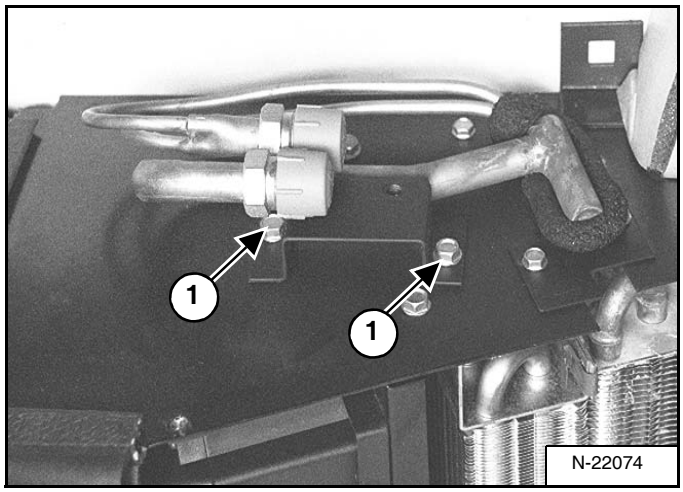


Cap and plug the evaporator tubelines (Item 1) **[Figure 80-180-3]** and the expansion valve fittings with the proper A/C caps and plugs.

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Removal And Installation (Cont'd)

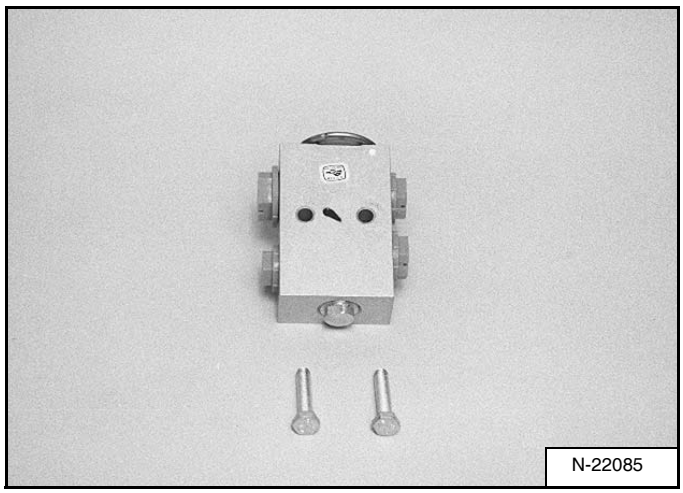
Figure 80-180-4



Remove the two mount bolts (Item 1) **[Figure 80-180-4]** from the expansion valve mount.

Remove the expansion valve mount from the unit.

Figure 80-180-5



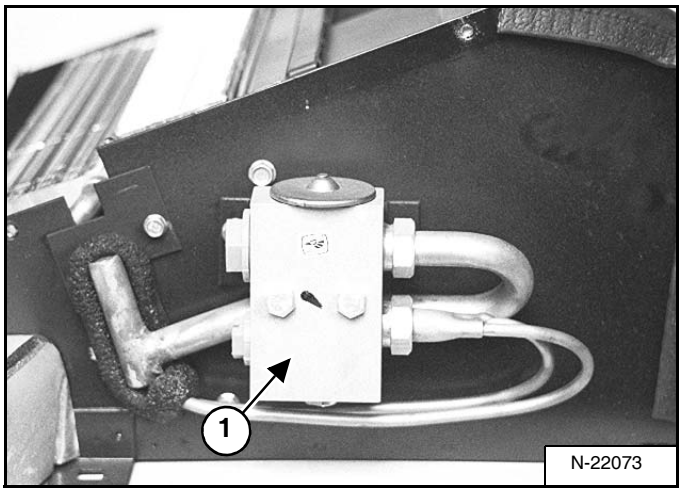
The expansion valve **[Figure 80-180-5]** is replaced as a complete unit.

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EVAPORATOR

Removal And Installation

Figure 80-190-1



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

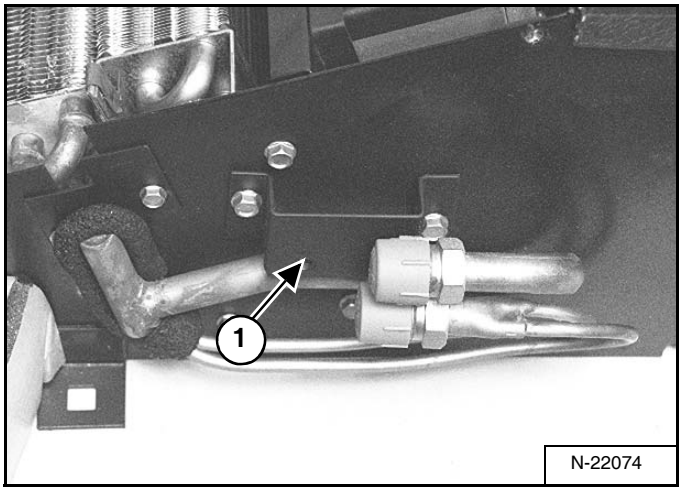
Raise the operator cab.(See Raising The Operator Cab on Page 10-30-1.)

Evacuate the A/C system. (See SYSTEM CHARGING AND RECLAMATION on Page 80-100-1.)

Remove the evaporator/heater unit from the back of the cab. (See EVAPORATOR/HEATER UNIT on Page 80-160-1.)

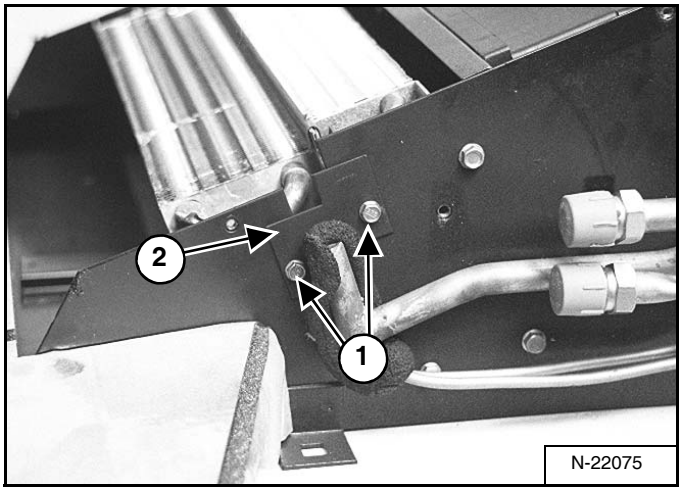
Remove the expansion valve (Item 1) **[Figure 80-190-1]** from the unit. (See EXPANSION VALVE on Page 80-180-1.)

Figure 80-190-2



Remove the expansion valve mount bracket (Item 1) **[Figure 80-190-2]** from the unit.

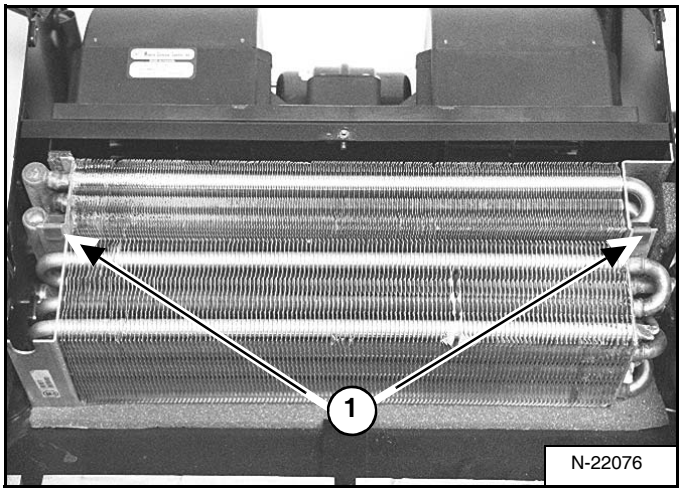
Figure 80-190-3



Remove the two mount bolts (Item 1) from the mount plate (Item 2) **[Figure 80-190-3]**.

Remove the mount plate from the unit.

Figure 80-190-4



Remove the two retaining clips (Item 1) **[Figure 80-190-4]** that connect the evaporator coil, to the heater coil.

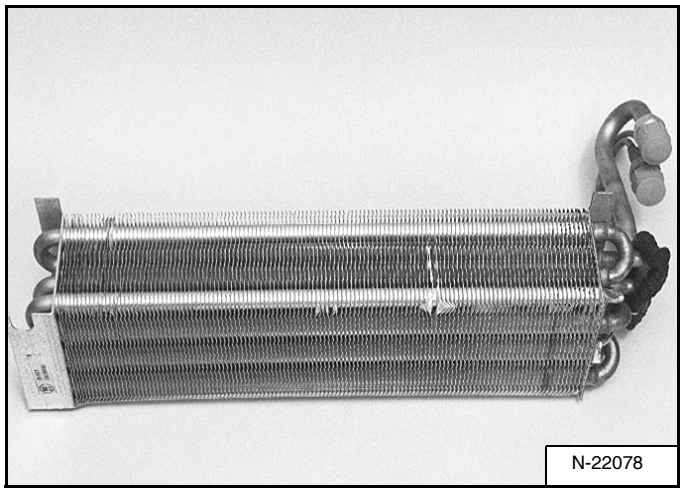
Remove the evaporator coil from the unit.

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EVAPORATOR (CONT'D)

Removal And Installation (Cont'd)

Figure 80-190-5



Inspect the evaporator coil **[Figure 80-190-5]** for leaks, and replace as needed.

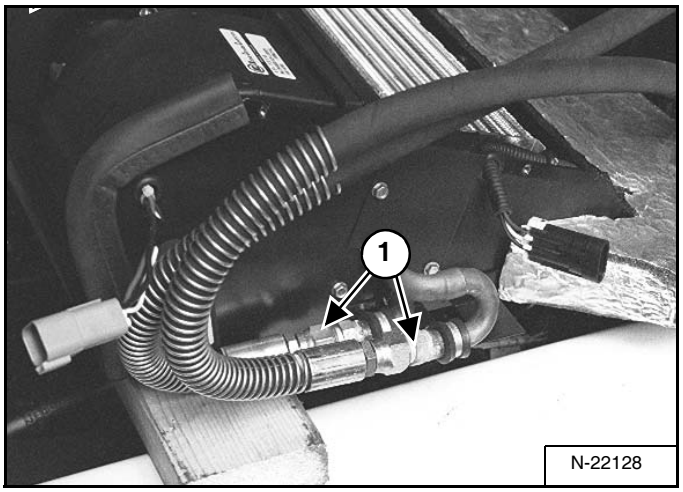
Clean with low water or air pressure.

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HEATER COIL

Removal And Installation With A/C

Figure 80-200-1



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the evaporator/heater unit from the back of the cab.(See EVAPORATOR/HEATER UNIT on Page 80-160-1.)

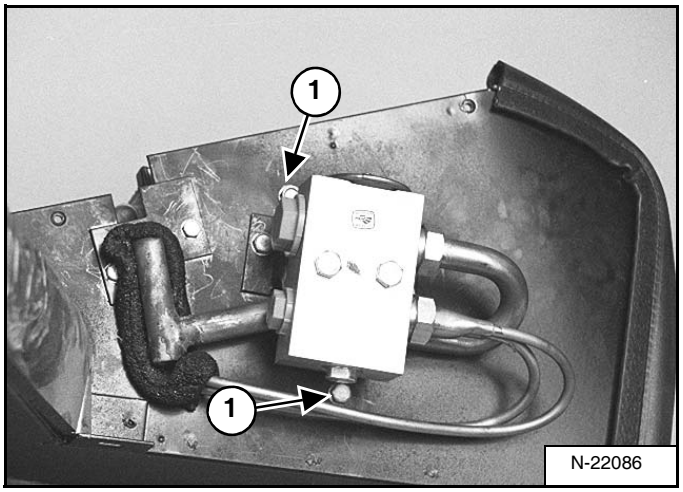
Mark the heater hoses (Item 1) **[Figure 80-200-1]** for proper installation.

Remove the two heater hoses from the heater coil.

Cap the hoses and the heater coil with hydraulic caps and plugs to prevent oil loss from the system.

Installation: Tighten the two heater hose fittings to 22 ft.-lb. (29,8 N•m) torque.

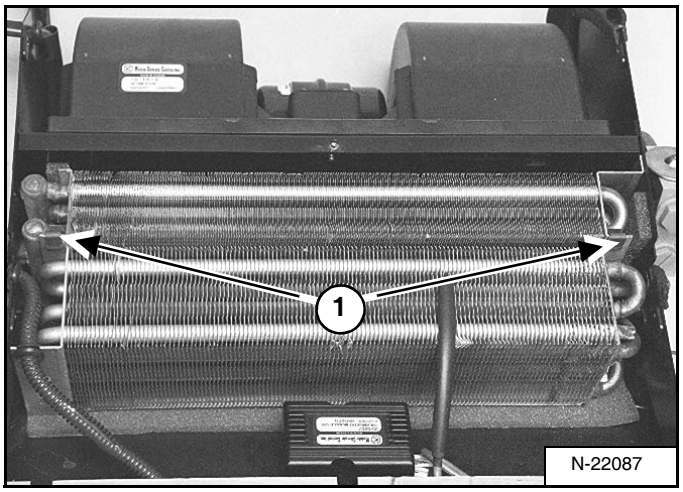
Figure 80-200-2



Remove the rear cover from the evaporator/heater unit. (See EVAPORATOR/HEATER UNIT on Page 80-160-1.)

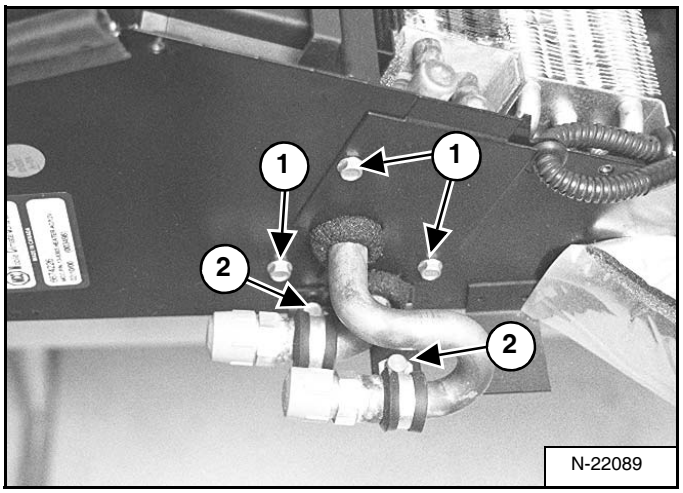
Remove the two mount bolts (Item 1) **[Figure 80-200-2]** from the heater coil at the expansion valve end of the unit.

Figure 80-200-3



Remove the two retaining clips (Item 1) **[Figure 80-200-3]** that connect the evaporator coil, to the heater coil.

Figure 80-200-4



Remove the three mount bolts (Item 1) **[Figure 80-200-4]** and remove the mount plate from the end of the unit.

Remove the two mount bolts (Item 2) **[Figure 80-200-4]** that support the heater coil tubelines to the unit.

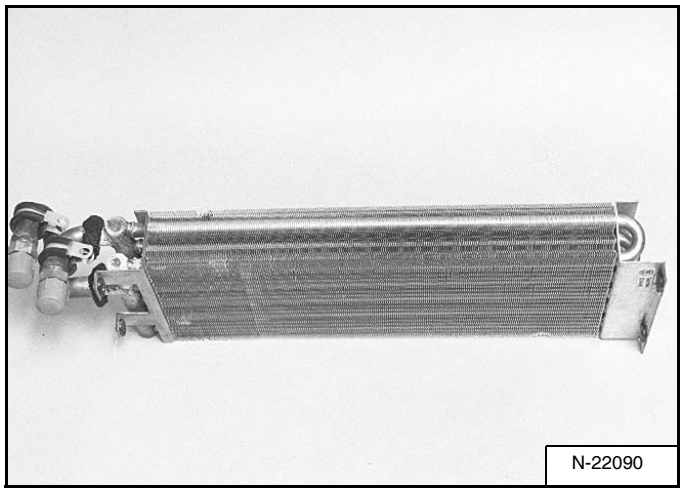
Remove the heater coil from the unit.

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HEATER COIL (CONT'D)

Removal And Installation With A/C (Cont'd)

Figure 80-200-5

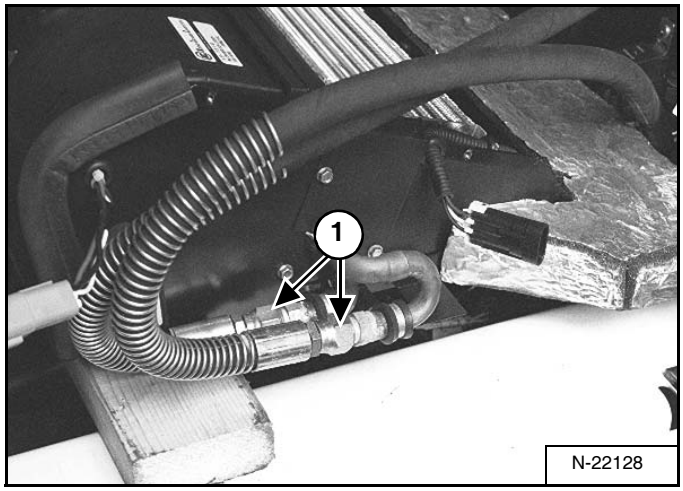


The heater coil **[Figure 80-200-5]** can be cleaned with low air or water pressure.

If the heater coil needs replacement it must be replaced as complete unit.

Removal And Installation Without A/C

Figure 80-200-6



Raise the lift arms and install an approved lift arm support device.(See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab. (See Raising The Operator Cab on Page 10-30-1.)

Remove the heater unit from the back of the cab. (See EVAPORATOR/HEATER UNIT on Page 80-160-1.)

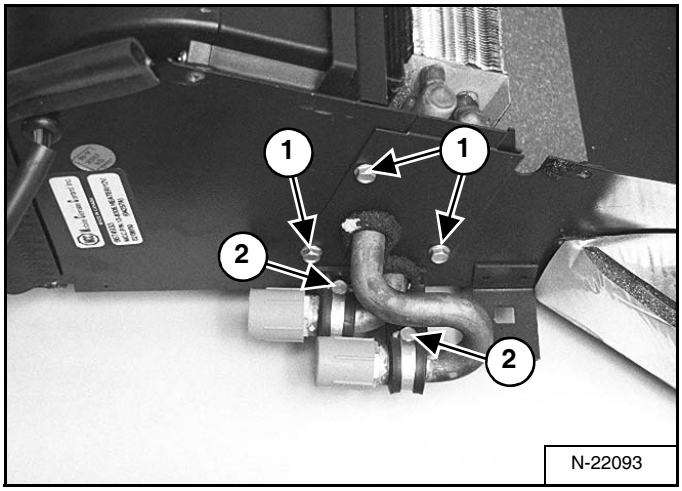
Mark the heater hoses (Item 1) **[Figure 80-200-6]** for proper installation.

Remove the two heater hoses from the heater coil.

Cap the hoses and the heater coil with hydraulic caps and plugs to prevent oil loss from the system.

Installation: Tighten the two heater hose fittings to 22 ft.-lb. (29,8 N•m) torque.

Figure 80-200-7

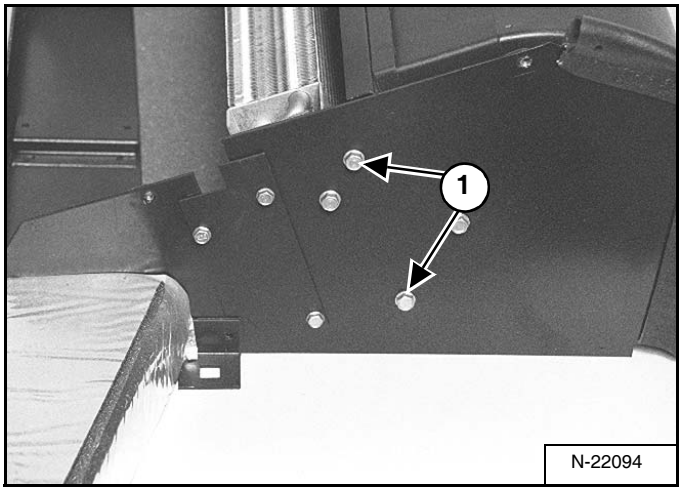


Remove the rear cover from the evaporator/heater unit. (See EVAPORATOR/HEATER UNIT on Page 80-160-1.)

Remove the three mount bolts (Item 1) **[Figure 80-200-7]** and remove the mount plate from the end of the unit.

Remove the two mount bolts (Item 2) **[Figure 80-200-7]** that support the heater coil tubelines to the unit.

Figure 80-200-8



Remove the two mount bolts (Item 1) **[Figure 80-200-8]** from the heater coil.

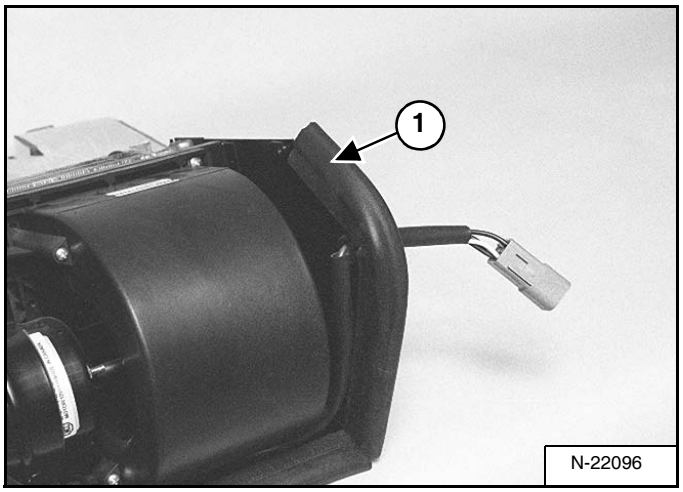
Remove the heater coil from the unit.

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HEATER/AC FAN

Removal And Installation

Figure 80-210-1



Raise the lift arms and install an approved lift arm support device. (See Installing Lift Arm Support Device on Page 10-20-1.)

Raise the operator cab.(See Raising The Operator Cab on Page 10-30-1.)

Remove the evaporator/heater unit from the back of the cab. (See EVAPORATOR/HEATER UNIT on Page 80-160-1.)

NOTE: The heater/AC fan assembly can be removed from the evaporator/heater unit without disconnecting the heater or A/C plumbing. The unit is removed here for photo clarity.

Remove the grommet (Item 1) **[Figure 80-210-1]** from the side of the evaporator/heater unit.

Figure 80-210-2

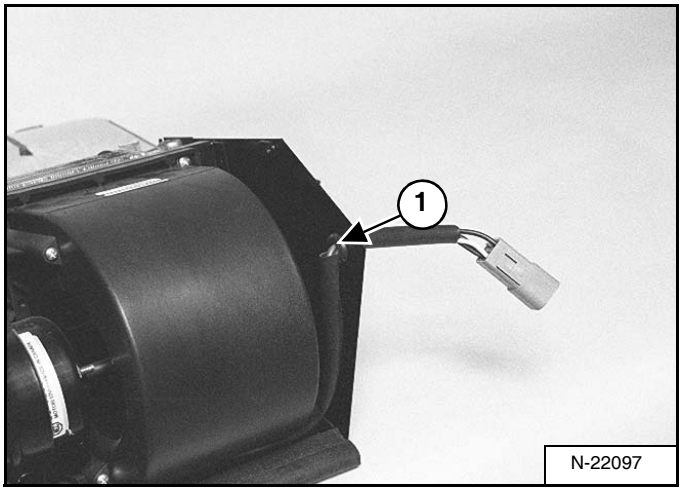
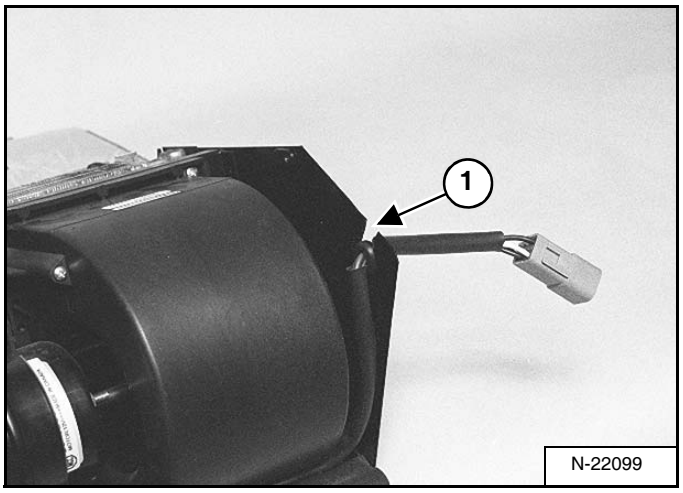
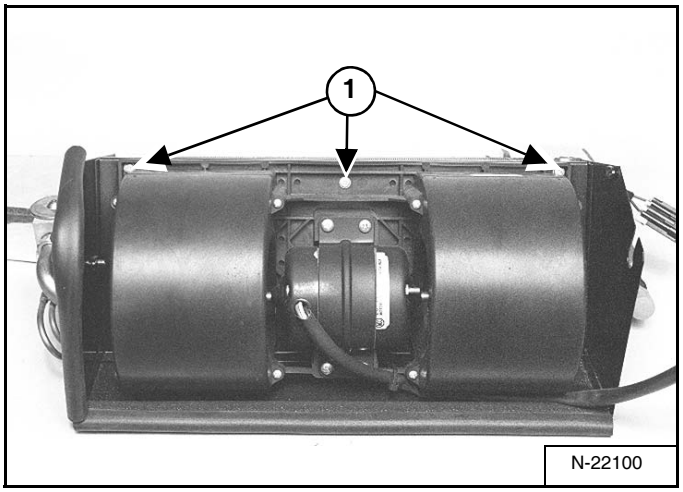


Figure 80-210-3



Remove the blower fan wiring harness and grommet (Item 1) **[Figure 80-210-3]** from the unit

Figure 80-210-4



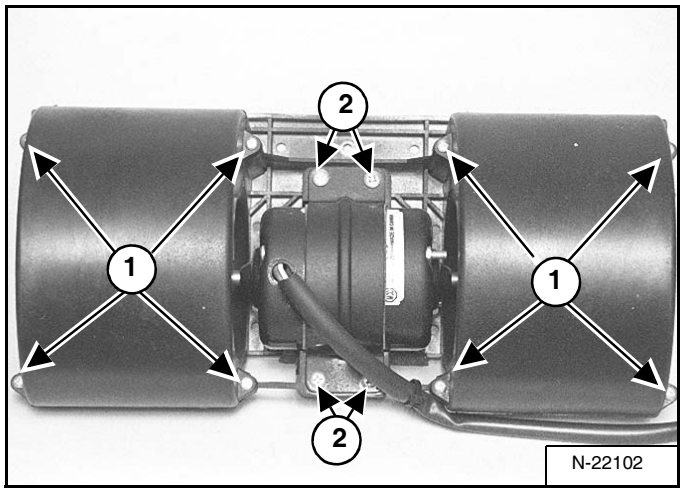
Remove the three mount bolts (Item 1) **[Figure 80-210-4]** from the blower fan housing.

Remove the blower fan housing from the evaporator/heater unit.

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Disassembly And Assembly

Figure 80-210-5



Remove the eight mount bolts (Item 1) **[Figure 80-210-5]** from the blower wheel cover.

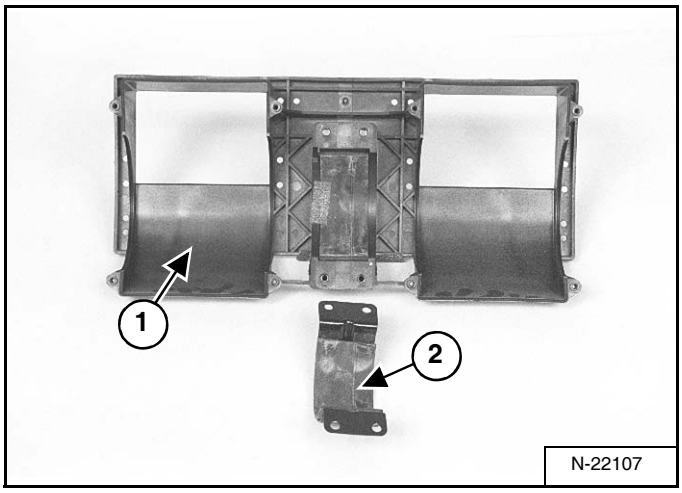
Remove the blower wheel cover from the fan housings.

Remove the four mount bolts (Item 2) **[Figure 80-210-5]** from the fan motor mount.

Remove the fan motor mount.

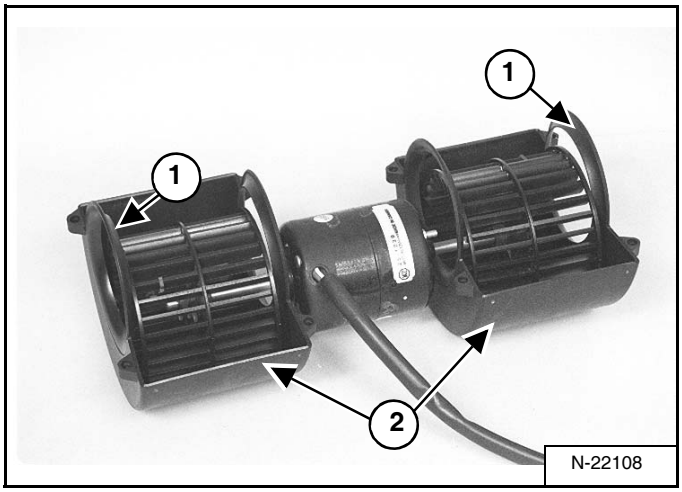
Remove the fan motor assembly from the housing.

Figure 80-210-6



Check the blower housing (Item 1) and fan motor mount (Item 2) **[Figure 80-210-6]** for wear and replace as needed.

Figure 80-210-7

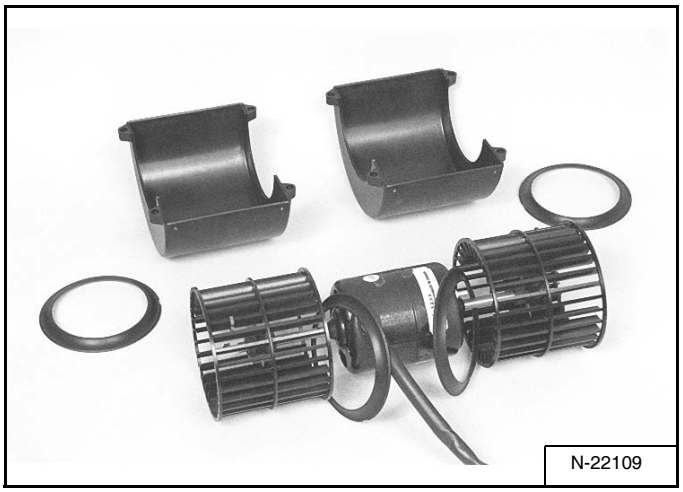


Remove the outside rings (Item 1) and fan wheel covers (Item 2) **[Figure 80-210-7]** from the fan motor and blower wheels.

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Disassembly And Assembly (Cont'd)

Figure 80-210-8



Inspect the end rings and fan wheel covers for wear and replace as needed **[Figure 80-210-8]**.

Figure 80-210-9

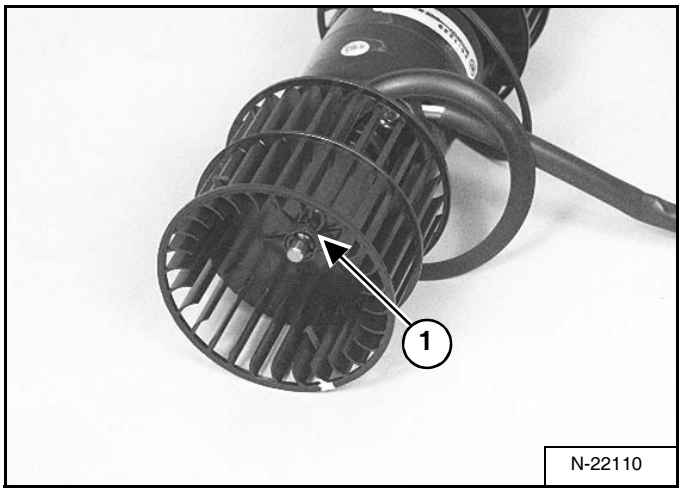
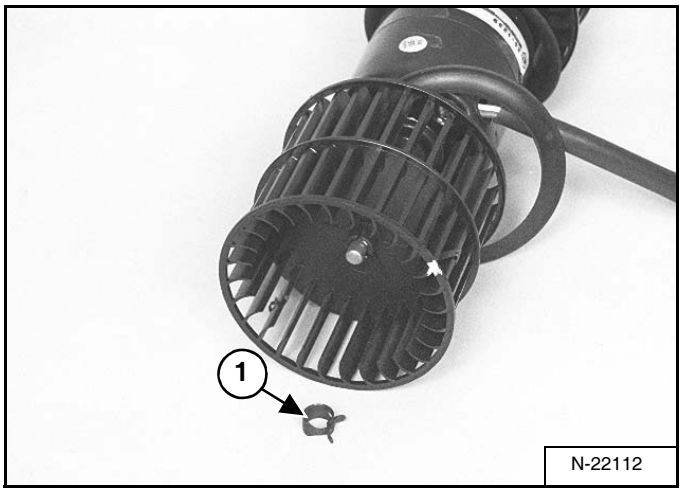
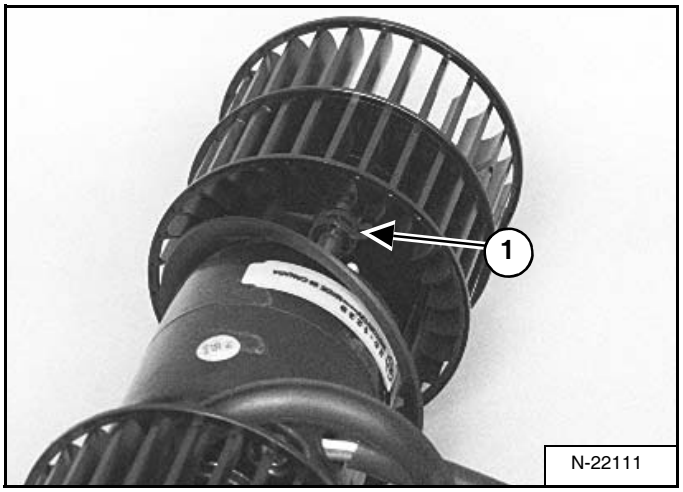


Figure 80-210-10



Remove the outside blower wheel clamp (Item 1) **[Figure 80-210-9]** & **[Figure 80-210-10]** from the blower wheel.

Figure 80-210-11

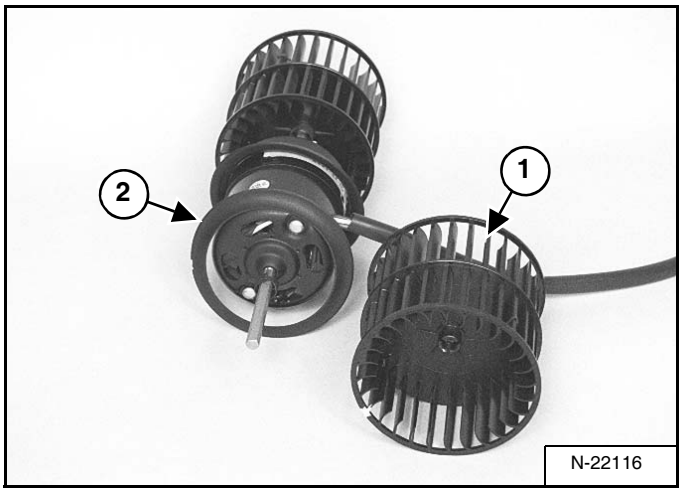


Remove the inside blower wheel clamp (Item 1) **[Figure 80-210-11]** from the blower wheel.

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Disassembly And Assembly (Cont'd)

Figure 80-210-12



Note: Before removing blower wheels, mark their orientation to ensure they are assembled back on the correct side and the fins are facing the same direction.

Remove the blower wheel (Item 1) and inside ring (Item 2) **[Figure 80-210-12]** from the blower fan motor shaft.

Repeat the procedure for the other blower wheel.

Wire Connector Removal and Installation

Figure 80-210-13

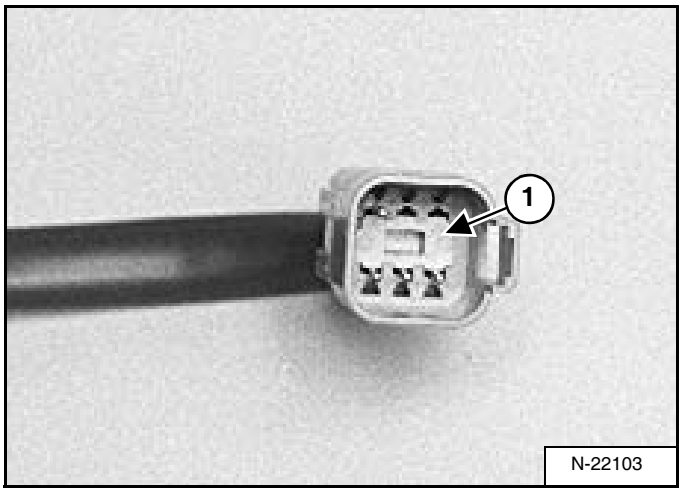
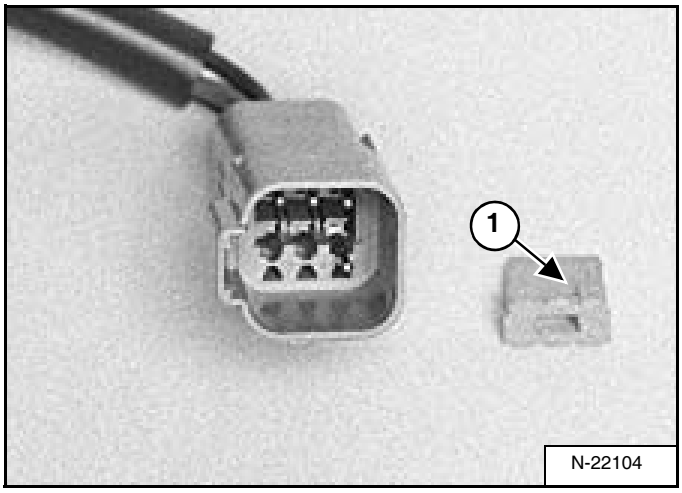


Figure 80-210-14

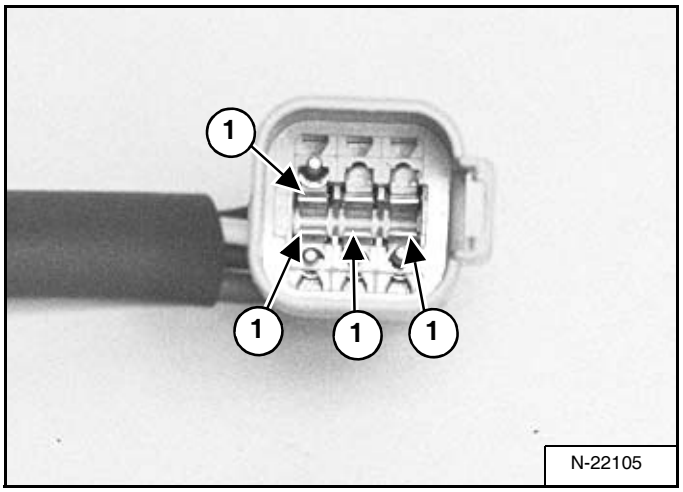


Remove the plastic wedge (Item 1) **[Figure 80-210-13]** & **[Figure 80-210-14]** from the center of the blower fan motor wiring connector.

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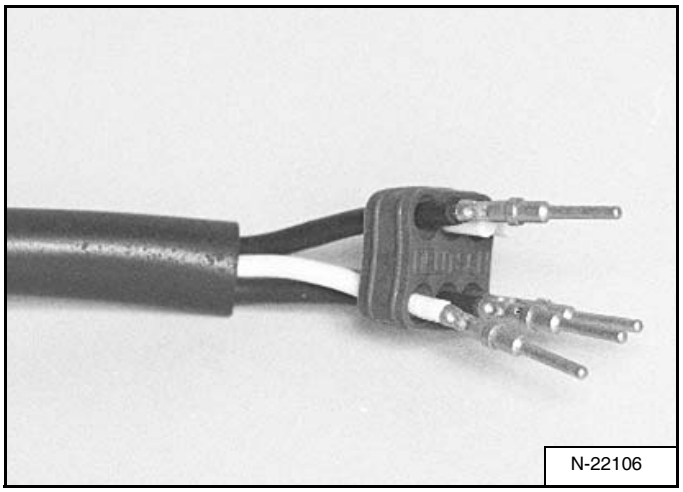
Wire Connector Removal and Installation (Cont'd)

Figure 80-210-15



With a pointed screw driver lightly press in on the tabs (Item 1) **[Figure 80-210-15]** and remove the individual wires from the connector.

Figure 80-210-16



The wiring code for the blower fan connectors **[Figure 80-210-16]**i:

Number on Connector	Wire Color
1	Orange
2	Red
3	Yellow
4	Black
5	Open
6	Open

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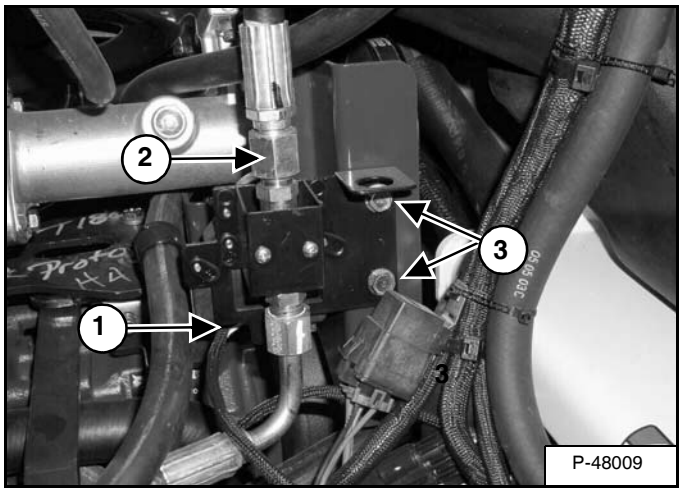


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HEATER VALVE

Removal And Installation

Figure 80-220-1



Disconnect the loader wiring harness (Item 1) **[Figure 80-220-1]**.

Remove the two coolant hoses (Item 2) **[Figure 80-220-1]** from the heater valve.

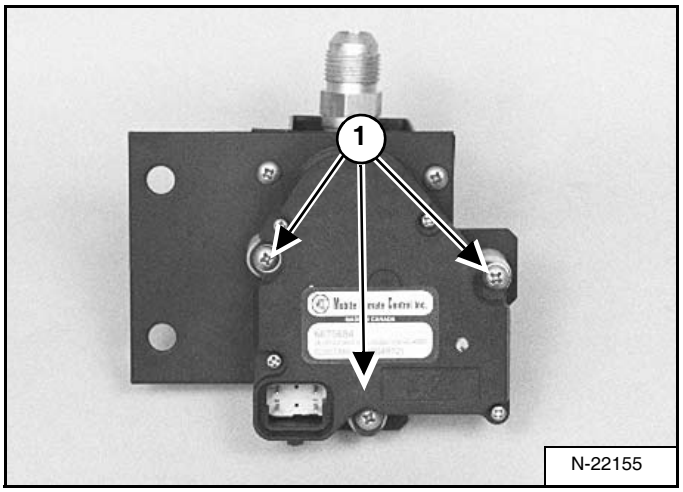
NOTE: Cap the hoses and the heater valve to prevent contamination and coolant loss from the system.

Remove the two heater valve mounting bolts (Item 3) **[Figure 80-220-1]**.

Remove the heater valve from the loader.

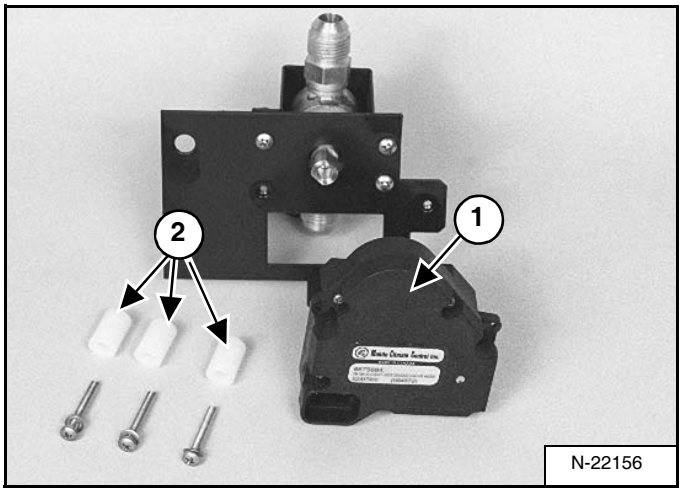
Disassembly And Assembly

Figure 80-220-2



Remove the three mount bolts (Item 1) **[Figure 80-220-2]** from the heater valve actuator.

Figure 80-220-3

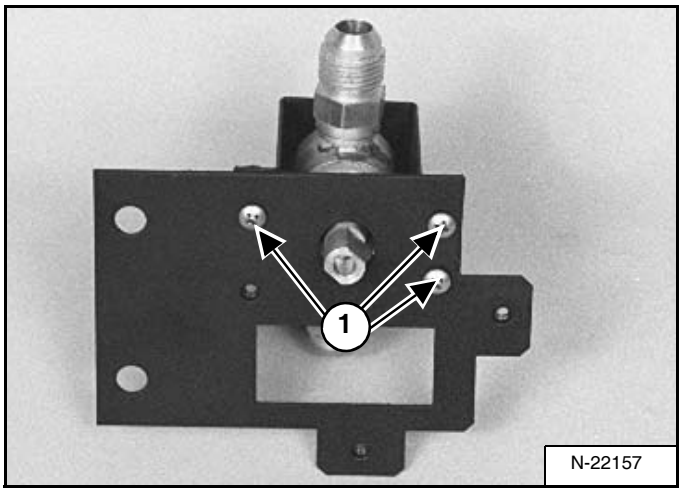


Remove the actuator (Item 1) and the three mounting spacers (Item 2) **[Figure 80-220-3]** from the heater valve mount plate.

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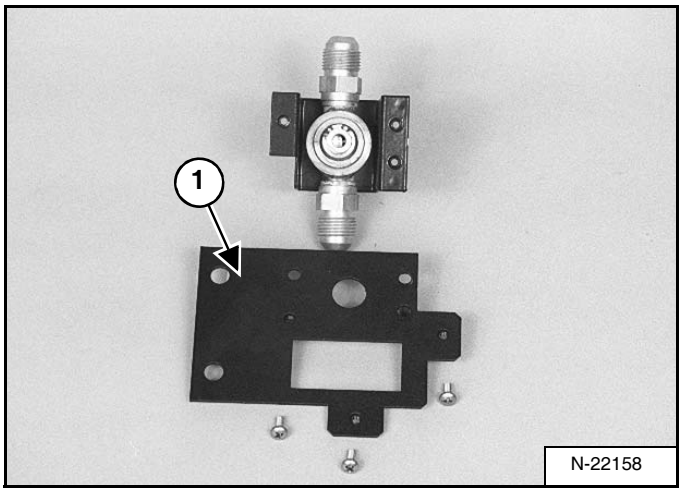
Disassembly And Assembly (Cont'd)

Figure 80-220-4



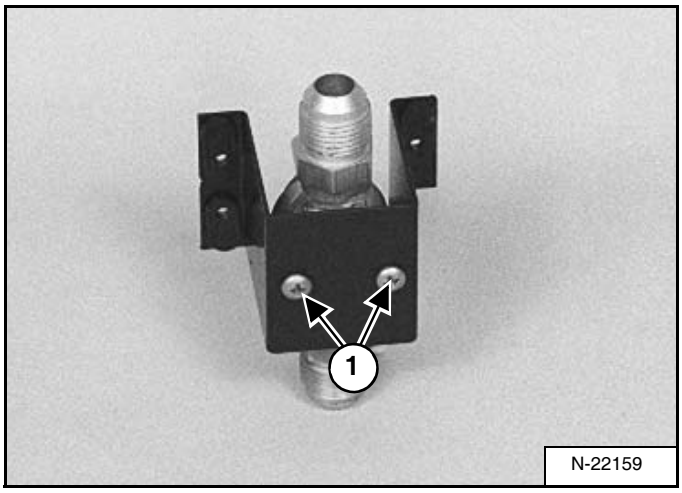
Remove the three mounting bolts (Item 1) **[Figure 80-220-4]** from the heater valve mount plate.

Figure 80-220-5



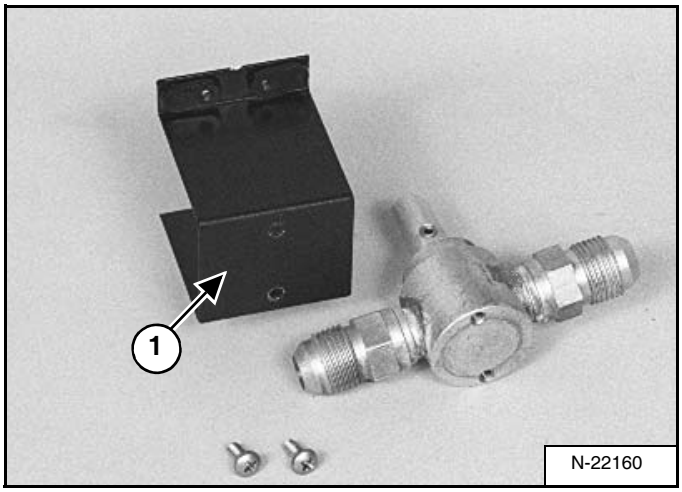
Remove the mount plate (Item 1) **[Figure 80-220-5]** from the heater valve bracket.

Figure 80-220-6



Remove the two mounting bolts (Item 1) **[Figure 80-220-6]** from the heater valve.

Figure 80-220-7



Remove the heater valve mount bracket (Item 1) **[Figure 80-220-7]** from the heater valve.

Replace the parts as needed.

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SPECIFICATIONS

CONVERSIONS SPEC-60-1
Decimal And Millimeter Equivalents. SPEC-60-1
U.S. To Metric Conversion. SPEC-60-1

ENGINE SPECIFICATIONS - KUBOTA V2003-M-DI-T (TURBO) SPEC-21-1
Camshaft SPEC-21-2
Connecting Rod SPEC-21-3
Crankshaft SPEC-21-4
Cylinder Head SPEC-21-1
Cylinder Liner. SPEC-21-3
Fuel Injection Nozzles SPEC-21-1
Fuel Injection Pump SPEC-21-1
Oil Pump SPEC-21-3
Pistons SPEC-21-3
Piston Rings. SPEC-21-3
Rocker Arms SPEC-21-2
Tappet SPEC-21-2
Thermostat. SPEC-21-4
Timing Gear SPEC-21-4
Valves SPEC-21-1
Valve Springs. SPEC-21-2
Valve Timing SPEC-21-2

ENGINE SPECIFICATIONS-KUBOTA V2203-M-DI SPEC-20-1
Camshaft SPEC-20-2
Connecting Rod SPEC-20-3
Crankshaft SPEC-20-4
Cylinders SPEC-20-3
Cylinder Head SPEC-20-1
Fuel Injection Nozzles SPEC-20-1
Fuel Injection Pump SPEC-20-1
Oil Pump SPEC-20-3
Pistons SPEC-20-3
Piston Rings. SPEC-20-3
Rocker Arms SPEC-20-2
Tappet SPEC-20-2
Thermostat. SPEC-20-4
Timing Gear SPEC-20-4
Valves SPEC-20-1
Valve Springs. SPEC-20-2
Valve Timing SPEC-20-2

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HYDRAULIC CONNECTION SPECIFICATIONS SPEC-40-1
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O-ring Face Seal Connection. SPEC-40-1
O-ring Flare Fitting SPEC-40-3
Port Seal Fitting SPEC-40-5
Straight Thread O-ring Fitting SPEC-40-2
Tubelines And Hoses. SPEC-40-2

HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS SPEC-50-1
Specifications. SPEC-50-1

LOADER SPECIFICATIONS. SPEC-10-1
Capacities SPEC-10-4
Controls SPEC-10-2
Drive System SPEC-10-4
Electrical SPEC-10-3
Engine SPEC-10-2
Hydraulic System SPEC-10-3
Machine Dimensions SPEC-10-1
Performance SPEC-10-2
Tires SPEC-10-4

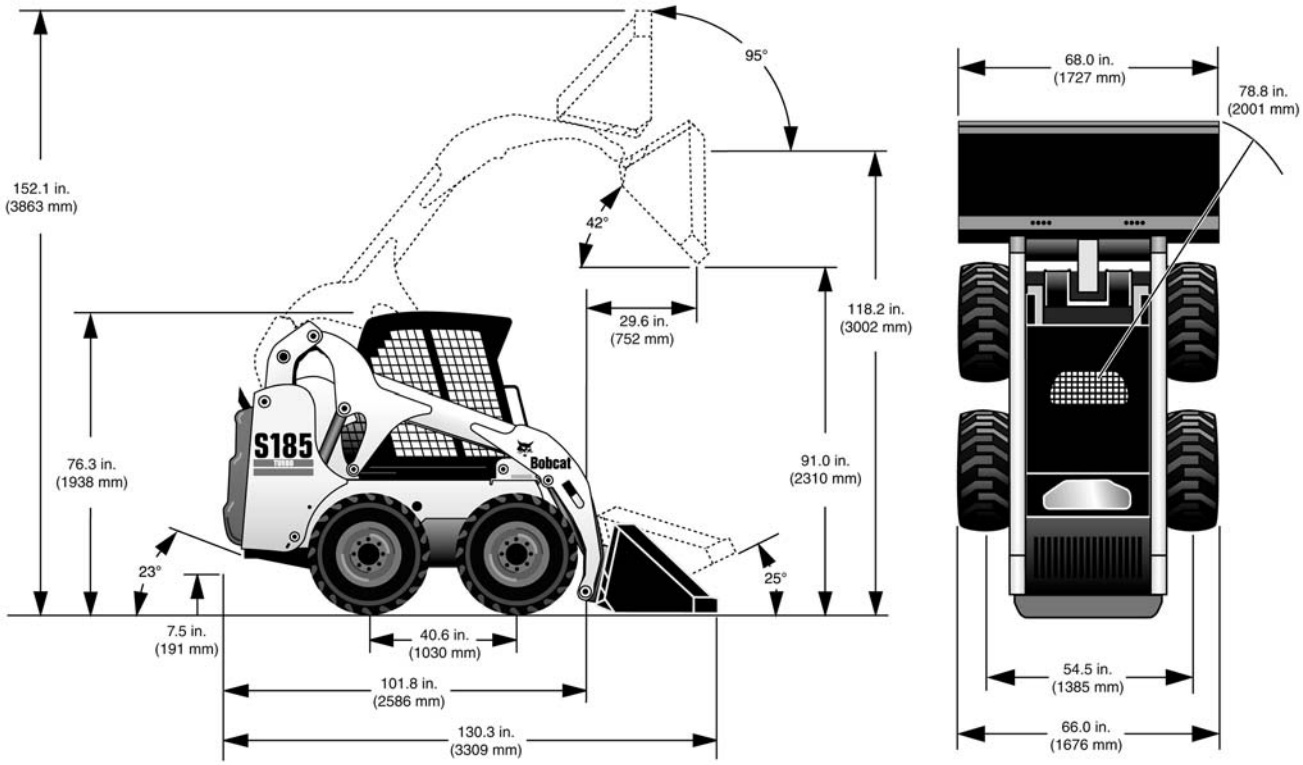
TORQUE SPECIFICATIONS FOR BOLTS. SPEC-30-1
Torque For General Metric Bolts SPEC-30-2
Torque For General SAE Bolts SPEC-30-1

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LOADER SPECIFICATIONS

Machine Dimensions

- Dimensions are given for loader equipped with standard tires and dirt bucket and may vary with other bucket types. All dimensions are shown in inches. Respective metric dimensions are given in millimeters inclosed by parentheses.
- Where applicable, specification conform to SAE or ISO standards and are subject to change without notice.



B-17328

TIRE DESCRIPTION	WIDTH (OVER TIRES)	WHEEL TREAD
10-16.5 TIRES	66.0in. (1676mm) or 60.0in (1524mm)	54.5in. (1385mm) or 48.5in. (1232mm)
31-15x15 TIRES	72.0in. (1829mm)	55.9in. (1420mm)

BUCKET WIDTH	WIDTH (OVER BUCKET)
62”	62.0in. (1575mm)
68”	68.0in. (1727mm)
74”	74.0in. (1880mm)

* Recommended Pressure-Inflate tires to MAXIMUM pressure shown on the side wall of the tire. DO NOT mix brands of tires used on the same loader.

Changes of structure or weight distribution of the loader can cause changes in control and steering response and can cause failure of the loader parts.

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LOADER SPECIFICATIONS (CONT'D)

Performance

	S175	S185
Rated Operating Capacity (ISO)	1750 lb. (794kg)	1850 lb. (839kg)
Tipping Load (SAE Rating)	3900 lb. (1769 kg)	
Operating Weight	5808 lb. (2635 kg)	
SAE Breakout Force-Lift	3400 lb. (15123 N)	3600 lb. (16013 N)
-Tilt	3240 lb. (14412 N)	3550 lb. (15791 N)
Axle Torque	4900 ft.- lb. (6644 N•m)	
Travel Speed	0-7.3 MPH (11,7 km/hr.)	

Controls

Vehicle Steering	Direction and Speed controlled by two hand levers.
Loader Hydraulics Lift and Tilt	Controlled by separate foot pedals or optional hand controls.
Front Auxiliary	Controlled by electrical switch on RH steering lever.
Rear Auxiliary (Option)	Controlled by electrical switch on LH steering lever.
Engine	Hand lever throttle: Key-type starter switch and shutdown. Keyless start and shutdown with deluxe instrumentation.
Starting Aid	Glow Plugs Automatically activated by standard or deluxe instrumentation.
Service Brake	Two independent hydrostatic systems controlled by two hand opertated steering levers.
Secondary Brake	One of the hydrostatic transmissions.
Parking Brake	Mechanical Disc, switch in control panel.

Engine

Make/Model	Kubota V2203-M-DI	Kubota V2003-M-DI-T
Fuel/Cooling	Diesel/Liquid	Diesel/Liquid
Horsepower (SAE Net)	46 HP (34kW)	56 HP (42kW)
Maximum Governed RPM	2800 RPM	2800 RPM
Torque (SAE Net)	103.5 ft.-lb. (140 N•m) @ 1700 RPM	120.8 ft.-lb. (164 N•m) @ 1825 RPM
Number of Cylinders	Four	Four
Displacement	134 cu.in. (2,2L)	122 cu.in. (2,0L)
Bore/Stroke	3.425/3.638 (87.0/92.4)	3.268/3.638 (83.0/92.4)
Lubrication	Pressure System W/Filter	Pressure System W/Filter
Crankcase Ventilation	Closed Breathing	Open Breathing
Air Induction	Naturally aspirated	Turbocharged
Air Cleaner	Dry replaceable cartridge w/safety element	Dry replaceable cartridge w/safety element
Ignition	Diesel-Compression	Diesel-Compression
Maximum Governed RPM	2800 RPM	2800 RPM
High Idle RPM	2860-3000	2860-3000
Low Idle RPM	1075-1225	1195-1245

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Hydraulic System

	S175	S185
Pump	Engine Driven, Gear Type	
Pump Capacity	16.9 GPM (64 L/min.) at High Idle	
Charge Pump Capcity (SJC)	12.8 GPM (48,5 L/min.) at High Idle	
High Flow (Option)	26.4 GPM (99,9 L/min.) at High Idle	
System Relief at Quick Couplers	3300 PSI (206 Bar)	
Filter	Full flow replaceable, 3 micron synthetic media element	
Hydraulic Cylinders	Doubleacting; Tilt cylinders have cushioning feature on dump	
Bore Diameter: Lift Cylinder (2)	2.50 (63,5)	
Tilt Cylinder (2)	2.75 (69,9)	
Rod Diameter: Lift Cylinder (2)	1.50 (38,1)	
Tilt Cylinder (2)	1.375 (34,9)	
Stroke: Lift Cylinder (2)	23.67 (601,2)	
Tilt Cylinder (2)	13.19 (335,0)	
Control Valve	3-spool, open center type w/float detent on lift and electrically controlled auxiliary spool.	
Fluid Lines	SAE standard tubelines, hoses & fittings	
Fluid Type	BOBCAT FLUID, Hydraulic/Hydrostatic 6903117 - (Two - 2.5 gal. containers) 6903118 - (5 gal.) 6903119 - (55 gal.)	
Hydraulic Function Time: Raise Lift Arms	3.49 Seconds	
Lower Lift Arms	2.54 Seconds	
Bucket Dump	2.28 Seconds	
Bucket Rollback	1.78 Seconds	

Electrical

Alternator	Belt driven, 90 amp., open
Battery	12 volt, 600 cold cranking amps. @ 0°F. (-18°C); 115 minute reserve capacity at 25 amps.
Starter	12 volt, Gear reduction type, 3.62 HP (2,7Kw)
Instrumentation	**Gauges:** Hourmeter, Fuel, Engine Coolant Temperature. **Warning lights:** Fuel Level, Glow Plugs, System Voltage, Seat Belt, Engine Coolant Temperature, Engine Oil Pressure, Hydrostatic Charge Pressure, Hydraulic Oil Temperature, Engine Air Filter & Hydraulic Filter. **Other:** Audible Alarm, BICS Function, Lights, Opt./Accessory Switches. **Optional Deluxe Instrumentation:** *Same gauges and warning lights as standard instrumentation. *Additional bar-type gauges for: Engine Oil Pressure, System Voltage, Hydrostatic Charge Pressure and Hydraulic Oil Temperature. *Additional Features Incl.: Keyless Start, Clock, Job Clock, Help Screens, Diagnostic Capability, Automatic Shutdown Function.

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LOADER SPECIFICATIONS (CONT'D)

Drive System

	S175	S185
Main Drive	Hydrostatic 4 wheel drive	
Transmission	Infinitely variable tandem hydrostatic piston pumps, driving 2 fully reversing hydrostatic motors.	
Final Drive	#80 HSOC endless roller chain & sprockets in sealed chaincase with oil lubrication.	
Total Engine to Wheel Reduction	33:1	
Axle Size	2.00 (50,8)	
Wheel Bolts	(8) 9/16"	

Capacities

Cooling System W/Heater (Includes Recovery Bottle)	12 qts. (11,4 L)
Cooling System W/O Heater (Includes Recovery Bottle)	11 qts. (10,4 L)
Fuel	23.0 gals. (87,1 L)
Engine Oil W/Filter	9.5 qts. (9,0 L)
Hydraulic/Hydro. System W/Reservoir	8.5 gals. (32,2 L)
Chaincase Reservoir	9 gals. (34,1 L)

Tires

Flotation	10-16.5, 8 Ply Rating
Ultra Grip	31 x 15.5-15, 8 Ply Rating
Recommended Pressure	Inflate Tires to Maximum Pressure Shown On The Side Wall Of The Tire. Do Not Mix Brands Of Tires Used On The Same Loader.

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ENGINE SPECIFICATIONS-KUBOTA V2203-M-DI

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

Fuel Injection Nozzles

Opening Pressure	2702-2916 PSI (18600-20100 kPa)
Fuel Tightness Nozzle Seat	Dry Nozzle at 2418 PSI (16672 kPa) for 10 seconds

Fuel Injection Pump

Injection Timing	6.2-8.2 degrees B.T.D.C.
High Idle	2860-3000 RPM
Low Idle	1195-1245 RPM

Cylinder Head

Cylinder Head Surface Distortion	0.002 (0,05) Max.
Thickness of Gasket (Used)	0.0453-0.0492 (1,15-1,25)
(New)	0.0512-0.0551 (1,3-1,4)
Top Clearance (Piston to Head)	0.0236-0.0276 (0,60-0,70)
Compression	427-469 PSI (2940-3240 kPa)
Allowable Limit	341 PSI (2350 kPa)
Difference Between Cylinders	10%

Valves

Valve Seat Width (Intake & Exhaust)	0.084 (2,12)
Valve Seat Angle	Intake 60 degrees, Exhaust 45 degrees
O.D. of Valve Stems	0.3134-0.3140 (7,96-7,98)
I.D. of Valve Guides	0.3156-0.3161 (8,015-8,03)
Clearance Between Valve Stem & Guide	0.0016-0.0028 (0,04-0,07)
Allowable Limit	0.004 (0,1)
Valve Clearance (Cold)	0.0071-0.0087 (0,18-0,22)
Valve Recessing (Protrusion)	0.002 (0,05)
(Recess)	0.006 (0,15)

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

Valve Springs

Free Length	1.642-1.661 (41,7-42,2)
Allowable Limit	1.622 (41,2)
Fitted Length	1.378 (35,0)
Compress to Fitted Length	26.4 lb. (117,6 N)
Allowable Limit	22.5 lb. (100,0 N)

Valve Timing

Intake Valve (Open)	9 degrees B.T.D.C.
(Close)	45 degrees A.T.D.C.
Exhaust Valve (Open)	50 degrees B.T.D.C.
(Close)	12 degrees A.T.D.C.

Rocker Arms

O.D. of Rocker Arm Shaft	0.5501-0.5506 (13,973-13,984)
I.D. of Rocker Arm Bushings	0.5512-0.5519 (14,0-14,018)
Clearance Between Rocker Arm & Bushing	0.0006-0.0018 (0,016-0,045)
Allowable Limit	0.0039 (0,10)

Camshaft

Journal O.D.	1.5722-1.5728 (39,934-39,95)
Bearing I.D.	1.5748-1.5758 (40,0-40,025)
Oil Clearance	0.002-0.0036 (0,05-0,091)
Allowable Limit	0.006 (0,15)
Alignment Allowable Limit	0.0004 (0,01)
Cam Lobe Height	1.3346 (33,90)
Allowable Limit	1.3327 (33,85)
End Clearance	0.0028-0.0087 (0,07-0,22)
Allowable Limit	0.012 (0,3)

Tappet

Clearance Between Tappet & Guide	0.0071-0.0087 (0,18-0,22)
Tappet O.D.	0.9433-0.9441 (23,959-23,98)
Tappet Guide I.D.	0.9449-0.9457 (24,0-24,021)

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

Cylinders

Cylinder Bore I.D.	3.4252-3.4261 (87,00-87,022)
Allowable Limit	+0.0059 (+0,15)

Piston Rings

Ring Gap (Top Ring)	0.0079-0.0138 (0,20-0,35)
Limit Permitted	0.0492 (1,25)
Ring Gap (2nd Ring)	0.0138-0.0197 (0,35-0,50)
Limit Permitted	0.0492 (1,25)
Ring Gap (Oil Ring)	0.079-0.0157 (0,20-0,40)
Limit Permitted	0.0492 (1,25)
Side Clearance of Ring Groove:	
Top Ring	0.0037-0.0047 (0,093-0,12)
Second Ring	0.0037-0.0047 (0,094-0,12)
Oil Ring	0.0008-0.002 (0,02-0,052)

Pistons

Piston Pin Bore	0.9843-0.9848 (25,0-25.013)
Limit Permitted	0.9862 (25,05)

Connecting Rod

Piston Pin O.D.	0.9843-0.9847 (25,002-25,011)
Small End Bushing I.D.	0.9852-0.9858 (25,025-25,04)
Clearance Between Piston Pin & Small End Bushing	0.0006-0.0015 (0,014-0,038)
Allowable Limit	0.0059 (0,15 mm)
Connecting Rod Alignment Allowable Limit	0.002 (0,05)

Oil Pump

Oil Pressure Rated RPM	43-64 PSI (294-441 kPa)
Limit Permitted	36 PSI (248 kPa)
Idle Speed	14 PSI (98 kPa)
Limit Permitted	7 PSI (49 kPa)
Clearance Between Inner Rotor & Outer Rotor	0.0012-0.0055 (0,03-0,14)
Outer Rotor & Pump Body	0.0043-0.0075 (0,11-0,19)
End Clearance Between Inner Rotor & Cover	0.0041-0.0059 (0,105-0,15)
Limit Permitted	0.0079 (0,20)

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

Crankshaft

Crankshaft Alignment Limit Permitted	0.00079 (0,02)
Oil Clearance Between Journal & Bearing #1	0.0016-0.0046 (0,04-0,118)
Limit Permitted	0.0079 (0,2)
Journal O.D. #1	2.3591-2.3598 (59,921-59,940)
Bearing I.D. #1	2.3614-2.3637 (59,98-60,039)
Oil Clearance Between Journal & Bearing #2	0.0016-0.0041 (0,04-0,104)
Limit Permitted	0.0079 (0,2)
Journal O.D. #2	2.3591-2.3598 (59,921-59,940)
Bearing I.D. #2	2.3614-2.3632 (59,98-60,025)
Oil Clearance Between Crank Pin & Bearing	0.0010-0.0034 (0,025-0,087)
Limit Permitted	0.0079 (0,2)
Crank Pin O.D.	1.8488-1.8494 (46,96-46,97)
Crank Pin Bearing I.D.	1.8504-1.8522 (47,0-47,046)
Crankshaft Side Clearance	0.0059-0.0138 (0,15-0,35)
Limit Permitted	0.0197 (0,5)

Timing Gear

Timing Gear Backlash:	
Crank Gear-Idle Gear	0.0016-0.0044 (0,042-0,112)
Idle Gear-Cam Gear	0.0016-0.0045 (0,042-0,115)
Idle Gear-Injection Pump Gear	0.0016-0.0045 (0,042-0,115)
Crank Gear-Oil Pump Gear	0.0016-0.0043 (0,042-0,109)
Limit Permitted	0.006 (0,15)
Clearance Between Idle Gear Shaft & Idle Gear Bushing	0.001-0.0026 (0,025-0,066)
Limit Permitted	0.004 (0,10)
Idle Gear Side Clearance Idle Gear	0.005-0.019 (0,12-0,48)

Thermostat

Valve Opening Temperature	176.9-182.3°F (80.5-83.5°C)
Valve Fully Open	203°F (95°C)

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ENGINE SPECIFICATIONS - KUBOTA V2003-M-DI-T (TURBO)

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

Fuel Injection Nozzles

Opening Pressure	2702-2916 PSI (18.6-20.1 MPa)
Fuel Tightness Nozzle Seat	Dry Nozzle at 2418 PSI (16.67 MPA)

Fuel Injection Pump

Injection Timing	8.5-10 degrees B.T.D.C.
High Idle	2860-3000 RPM
Low Idle	1075-1225 RPM
Cylinder Bore	
I.D. of Bore	3.2677-3.2686 (83,0-83,022)
Allowable Limit	+0.0059 (+0,15)

Cylinder Head

Cylinder Head Surface Distortion	0.002 (0,05) Max.
Top Clearance (Piston to Head)	0.0236-0.0276 (0,60-0,70)
Compression	427-469 PSI (2944,1 - 3233,6 kPa)
Allowable Limit	341 PSI (2351,1 kPa)
Difference Between Cylinders	10% or less

Valves

Valve Seat Width (Intake & Exhaust)	0.0835 (2,12)
Valve Seat Angle	Intake 60 degrees, exhaust 45 degrees
O.D. of Valve Stems	0.3134-0.3140 (7,96-7,98)
I.D. of Valve Guides	0.3156-0.3161 (8,015-8,03)
Clearance Between Valve Stem & Guide	0.0016-0.0028 (0,04-0,07)
Allowable Limit	0.0039 (0,1)
Valve Clearance (Cold)	0.0071-0.0087 (0,18-0,22)
Valve Recessing (Protrusion)	0.002 (0,05)
(Recess)	0.0059 (0,15)

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

Valve Springs

Free Length	1.6417-1.6614 (41,7-42,2)
Allowable Limit	1.622 (41,2)
Fitted Length	1.378 (35,0)
Compress to Fitted Length	26.4 lb. (117,6 N)
Allowable Limit	22.5 lb. (100,0 N)
Tilt Allowable Limit	0.039 (1,0)

Valve Timing

Intake Valve (Open)	9 degrees B.T.D.C.
(Close)	45 degrees A.B.D.C.
Exhaust Valve (Open)	50 degrees B.B.D.C.
(Close)	12 degrees A.T.D.C.

Rocker Arms

O.D. of Rocker Arm Shaft	0.5501-0.5506 (13,973-13,984)
I.D. of Rocker Arm Bushings	0.5512-0.5519 (14,0-14,018)
Clearnace Between Rocker Arm & Bushing	0.0006-0.0018 (0,016-0,045)
Allowable Limit	0.0039 (0,1)

Camshaft

Journal O.D.	1.5722-1.5728 (39.934-39,95)
Bearing I.D.	1.5748-1.5758 (40,0-40,025)
Oil Clearance	0.002-0.0036 (0,05-0,091)
Allowable Limit	0.0059 (0,15)
Alignment Allowable Limit	0.0004 (0,01)
Cam Lobe Height (Intake)	1.3346 (33,90)
Allowable Limit (Intake)	1.3327 (33,85)
Cam Lobe Height (Exhaust)	1.3346 (33,90)
Allowable Limit (Exhaust)	1.3327 (33,85)
Side Clearance	0.0028-0.0087 (0,07-0,22)
Allowable Limit	0.0118 (0,3)

Tappet

Clearance Between Tappet & Guide	0.0008-0.0024 (0,02-0,062)
Allowable Limit	0.0028 (0,07)
Tappet O.D.	0.9433-0.9441 (23,959-23,98)
Tappet Guide I.D.	0.9449-0.9457 (24,0-24,021)

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

Cylinder Liner

Cylinder Bore I.D.	3.2677-3.2686 (83,0-83,022)
Allowable Limit	+0.0059 (+0,15)
Oversized Cylinder Liner (Bore) I.D.	3.2776-3.2784 (83,25-83,27)
Allowable Limit	+0.0059 (+0,15)

Piston Rings

Ring Gap (Top Ring)	0.0079-0.0138 (0,2-0,35)
Allowable Limit	0.0492 (1,25)
Ring Gap (2nd Ring)	0.0157-0.0217 (0,4-0,55)
Allowable Limit	0.0492 (1,25)
Ring Gap (Oil Ring)	0.0098-0.0177 (0,25-0,45)
Allowable Limit	0.0492 (1,25)
Side Clearance of Ring Groove:	
Second Ring	0.0037-0.0050 (0,093-0,128)
Allowable Limit	0.20 (0,0079)
Oil Ring	0.0008-0.0021 (0,02-0,060)
Allowable Limit	0.0059 (0,15)

Pistons

Piston Pin Bore	0.9843-0.9848 (25,0-25,013)
Allowable Limit	0.9862 (25,05)

Connecting Rod

Piston Pin O.D.	0.9843-0.9847 (25,002-25,011)
Small End Bushing I.D.	0.9852-0.9858 (25,025-25,04)
Clearance Between Piston Pin & Small End Bushing	0.0006-0.0015 (0,014-0,038)
Allowable Limit	0.0059 (0,15)
Connecting Rod Alignment Allowable Limit	0.002 (0,05)

Oil Pump

Oil Pressure Rated RPM	43-64 PSI (294-441 kPa)
Allowable Limit	36 PSI (245 kPa)
Idle Speed Allowable Limit	7 PSI (49 kPa)
Clearance Between Inner Rotor & Outer Rotor	0.0012-0.0055 (0,03-0,14)
Clearance Between Outer Rotor & Pump Body	0.0043-0.0075 (0,11-0,19)
End Clearance Between Inner Rotor & Cover	0.0041-0.0059 (0,105-0,15)

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

Crankshaft

Crankshaft Alignment Limit Permitted	0.00079 (0,02)
Oil Clearance Between Journal & Bearing #1	0.0016-0.0046 (0,04-0,118)
Limit Permitted	0.0079 (0,2)
Journal O.D. #1	2.3591-2.3598 (59,921-59,940)
Bearing I.D. #1	2.3614-2.3637 (59,98-60,039)
Oil Clearance Between Journal & Bearing #2	0.0016-0.0041 (0,04-0,104)
Limit Permitted	0.0079 (0,2)
Journal O.D. #2	2.3591-2.3598 (59,921-59,940)
Bearing I.D. #2	2.3614-2.3632 (59,98-60,025)
Oil Clearance Between Crank Pin & Bearing	0.0010-0.0034 (0,025-0,087)
Limit Permitted	0.0079 (0,2)
Crank Pin O.D.	1.8488-1.8494 (46,96-46,97)
Crank Pin Bearing I.D.	1.8504-1.8522 (47,0-47,046)
Crankshaft Side Clearance	0.0059-0.0138 (0,15-0,35)
Limit Permitted	0.0197 (0,5)

Timing Gear

Timing Gear Backlash:	
Crank Gear-Idle Gear	0.0016-0.0044 (0,0415-0,1122)
Allowable Limit	0.0059 (0,15)
Idle Gear-Cam Gear	0.0016-0.0045 (0,0415-0,1154)
Allowable Limit	0.0059 (0,15)
Idle Gear-Injection Pump Gear	0.0016-0.0045 (0,0415-0,1154)
Allowable Limit	0.0059 (0,15)
Crank Gear-Oil Pump Gear	0.0016-0.0043 (0,0415-0,109)
Allowable Limit	0.0059 (0,15)
Clearance Between Idle Gear Shaft & Idle Gear Bushing:	
Idle Gear	0.001-0.0026 (0,025-0,066)
Allowable Limit	0.0039 (0,10)
Idle Gear Bushing I.D.	1.4961-1.4970 (38,0-38,025)
Allowable Limit	0.0039 (0,10)
Idle Gear Shaft O.D.	1.4944-1.4951 (37,959-37,975)
Idle Gear Side Clearance Idle Gear	0.0079-0.020 (0,2-0,51)
Allowable Limit	0.0315 (0,8)

Thermostat

Valve Opening Temperature	176.9-182.3°F (80.5-83.5°C)
Valve Fully Open	203°F (95°C)

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TORQUE SPECIFICATIONS FOR BOLTS

Torque For General SAE Bolts

The following table shows standard torque specifications for bolts with zinc phosphate coating. Bolts purchased from Melroe that have zinc phosphate coating are specified by the letter H following the part number.

	Thread size	sae grade 5	sae grade 8
INCH. LBS. (N•m)	.250	80-90 (9,0-10,2)	110-120 (12,4-13,6)
	.3125	180-200 (20,3-22,6)	215-240 (24,2-27-1)
FOOT LBS. (N•m)	.375	25-28 (34-38)	35-40 (47-54)
	.4375	40-45 (54-61)	60-65 (81-88)
	.500	65-70 (88-95)	90-100 (122-136)
	.5625	90-100 (122-136)	125-140 (170-190)
	.625	125-140 (170-190)	175-190 (240-260)
	.750	220-245 (300-330)	300-330 (410-450)
	.875	330-360 (450-490)	475-525 (645-710)
	1.000	475-525 (645-710)	725-800 (985-1085)
	1.125	650-720 (880-975)	1050-1175 (1425-1600)
	1.250	900-1000 (1200-1360)	1475-1625 (2000-2200)
	1.375	1200-1350 (1630-1830)	2000-2200 (2720-2980)
	1.500	1500-1650 (2040-2240)	2600-2850 (3530-3870)
	1.625	2000-2800 (2720-2980)	3450-3800 (4680-5150)
	1.750	2500-2750 (3390-3730)	4300-4800 (5830-6500)
	1.875	3150-3500 (4270-4750)	5500-6100 (7450-8300)
	2.000	3800-4200 (5150-5700)	6500-7200 (8800-9800)

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TORQUE SPECIFICATIONS FOR BOLTS (CONT'D)

Torque For General Metric Bolts

THREAD SIZE (DIA. X PITCH)	MATERIAL		
	HEAD MARK 4	HEAD MARK 7	HEAD MARK 10
M 5 x 0.8		3-4 ft.-lb. (4-5 N•m)	
M 6 x 1.0		6-7 ft.-lb. (8-9 N•m)	6-9 ft.-lb. (8-12 N•m)
M 8 x 1.25	6-9 ft.-lb. (8-12 N•m)	11-16 ft.-lb. (15-22 N•m)	18-25 ft.-lb. (24-34 N•m)
M 10 x 1.25	13-18 ft.-lb. (18-24 N•m)	22-30 ft.-lb. (30-41 N•m)	36-50 ft.-lb. (49-68 N•m)
M 12 x 1.25	22-30 ft.-lb. (30-41 N•m)	40-54 ft.-lb. (54-73 N•m)	69-87 ft.-lb. (94-118 N•m)
M 14 x 1.25	36-50 ft.-lb. (49-68 N•m)	58-80 ft.-lb. (79-108 N•m)	116-137 ft.-lb. (157-186 N•m)

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HYDRAULIC CONNECTION SPECIFICATIONS

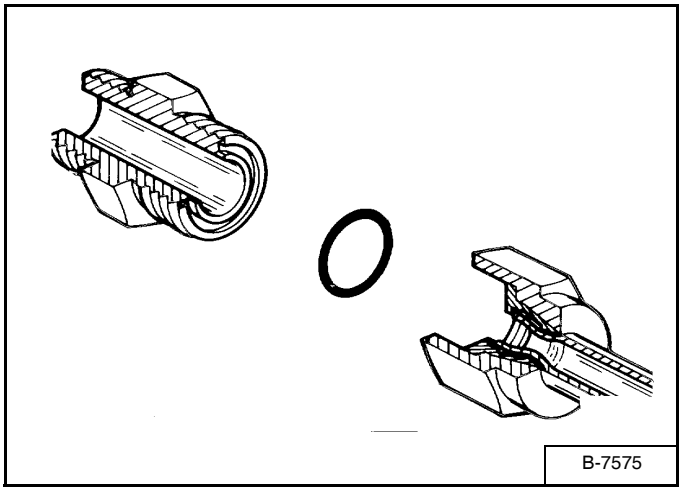
O-ring Face Seal Connection

IMPORTANT

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

I-2003-0888

Figure SPEC-40-1



When the fitting is tightened, you can feel when the fitting is tight to eliminate leakage caused by under or over torqued fittings. Use vaseline petroleum jelly to hold the O-ring in position until the fittings are assembled **[Figure SPEC-40-1]**.

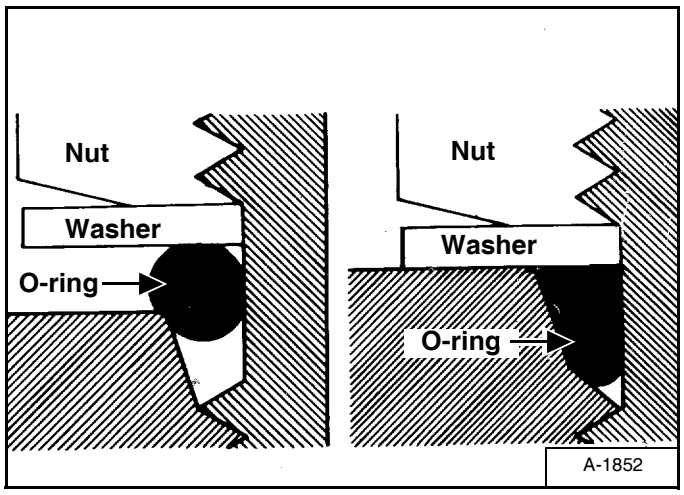
Figure SPEC-40-2

O-ring Face Seal Tightening Torque		
Tubeline Outside Diameter	**Thread Size**	*** TORQUE Ft.-lb. (N•m)**
1/4”	9/16” - 18	13 (18)
3/8”	11/16” - 16	22 (30)
1/2”	13/16” - 16	40 (54)
5/8”	1” - 14	60 (81)
3/4”	1-3/16” - 12	84 (114)
7/8”	1-3/16” - 12	98 (133)
1”	1-7/16” - 12	118 (160)
1-1/4”	1-11/16” - 12	154 (209)
1-1/2”	2” - 12	163 (221)

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Straight Thread O-ring Fitting

Figure SPEC-40-3



Lubricate the O-ring before installing the fitting. Loosen the jam nut and install the fitting. Tighten the jam nut until the washer is tight against the surface **[Figure SPEC-40-3]**.

Tubelines And Hoses

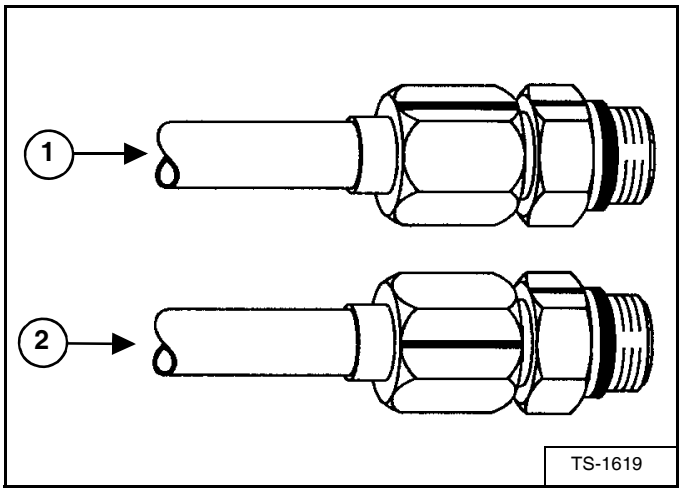
Replace any tubelines that are bent or flattened. They will restrict flow, which will slow hydraulic action and cause heat.

Replace hoses which show signs of wear, damage or weather cracked rubber.

Always use two wrenches when loosening and tightening hose or tubeline fittings.

Flare Fitting

Figure SPEC-40-4



Use the following procedure to tighten the flare fitting:

Tighten the nut until it makes contact with the seat. Make a mark across the flats of both the male and female parts of the connection (Item 1) **[Figure SPEC-40-4]**

Use the chart **[Figure SPEC-40-5 on Page 3]** to find the correct tightness needed (Item 2) **[Figure SPEC-40-4]**. If the fitting leaks after tightening, disconnect it and inspect the seat area for damage.

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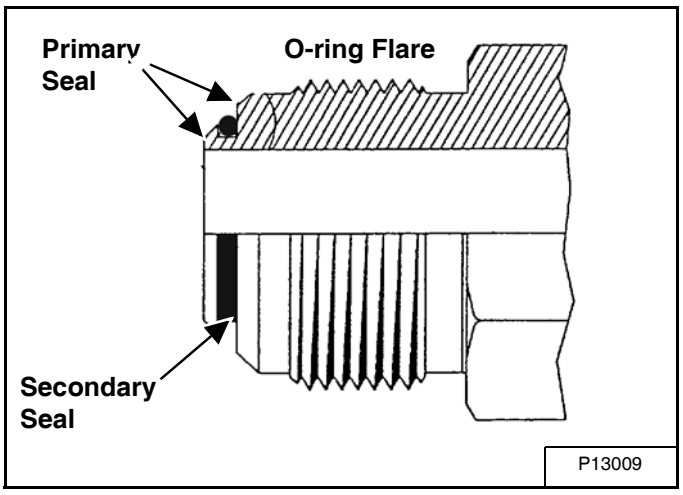
Flare Fitting (Cont'd)

Figure SPEC-40-5

Flare Fitting Tightening Torque		
Tubeline Outside Diameter	Thread Size	TORQUE Ft.-lb. (N•m)
1/4"	7/16" - 20	13 (18)
5/16"	1/2" - 20	17 (23)
3/8"	9/16" - 18	22 (30)
1/2"	3/4" - 16	40 (54)
5/8"	7/8" - 14	60 (81)
3/4"	1-1/16" - 12	84 (114)
7/8"	1-3/16" - 12	98 (133)
1"	1-5/16" - 12	118 (160)
1-1/4"	1-5/8" - 12	154 (209)
1-1/2"	1-7/8" - 12	163 (221)
2"	2-1/2" - 12	252 (342)

O-ring Flare Fitting

Figure SPEC-40-6

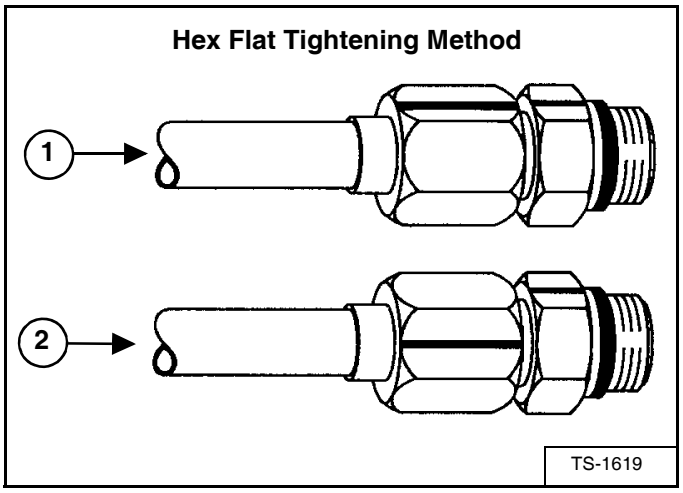


The flare is the primary seal, the O-ring is the secondary seal and helps absorb vibration and pressure pulses at the connection **[Figure SPEC-40-6]**.

If necessary, the O-ring-flare fitting can be used without an O-ring.

Use the following procedure to tighten the O-ring flare fitting.

Figure SPEC-40-7



Tighten the nut until it contacts with the seat. Make a mark across the flats of both the male and female parts of the connection (Item 1) **[Figure SPEC-40-7]**.

Use the chart **[Figure SPEC-40-8 on Page 4]** to find the correct tightness needed (Item 2) **[Figure SPEC-40-7]**. If the fitting leaks after tightening, disconnect it and inspect the seat area for damage.

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HYDRAULIC CONNECTION SPECIFICATIONS (CONT'D)

O-ring Flare Fitting (Cont'd)

Figure SPEC-40-8

O-ring Flare Fitting Tightening Torque		
Tubeline Outside Diameter	**Thread Size**	*** TORQUE Ft.-lb. (N•m)**
1/4"	7/1" - 20	13 (18)
5/16"	1/2" - 20	17 (23)
3/8"	9/16" - 18	22 (30)
1/2"	3/4" - 16	40 (54)
5/8"	7/8" - 14	60 (81)
3/4"	1-1/16" - 12	84 (114)
7/8"	1-3/16 - 12	98 (133)
1"	1-5/16" - 12	118 (160)
1-1/4"	1-5/8" - 12	154 (209)
1-1/2"	1-7/8" - 12	163 (221)
2"	2-1/2" - 12	252 (342)

* If a torque wrench is used to tighten a new fitting to a used hose/tubeline.

* If a toque wrench is used to tighten a used fittng to a new hose/tubeline.

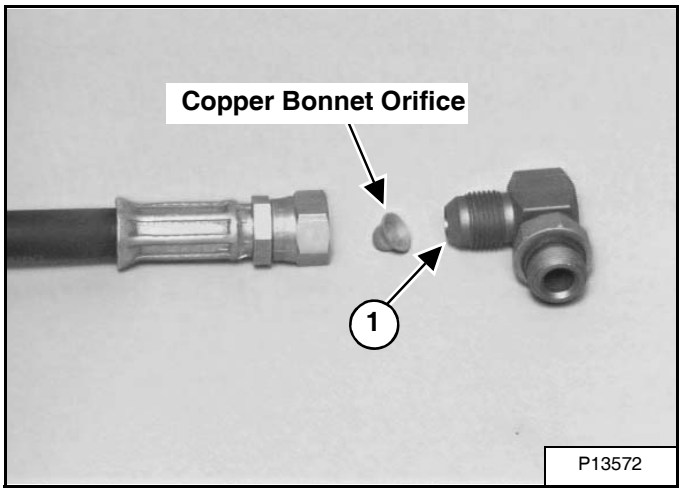
* If a torque wrench is used to tighten a new fitting to a new hose/tubeline.

** If using the hex flat tightening method to tighten a new fitting to a new hose/tubeline.

** If using the hex flate tighening method to tighten a new fitting to a used hose/tubeline.

*** If using the hex flat tightening method to tighten a used fitting to a new hose/tubeline.

Figure SPEC-40-9



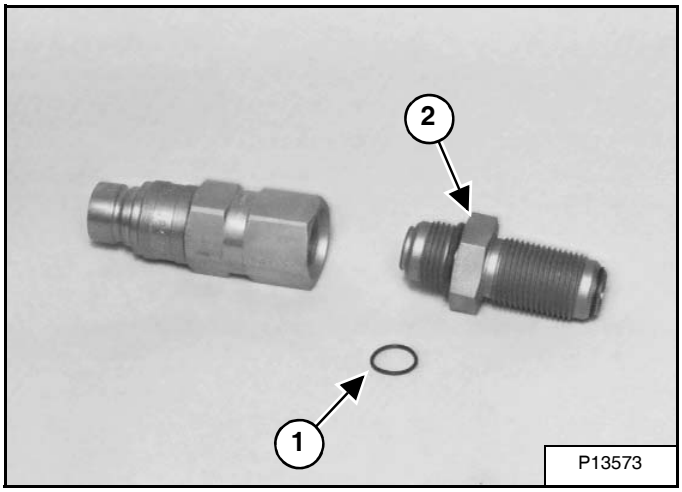
NOTE: O-ring flare fittings are not recommended in all applications. Use the standard flare fittings in these applications.

Do not use a O-ring flare fitting when a copper bonnet orifice is used. When tightened the connection at the bonnet may distort the flare face and prevent it from sealing.

Use a standard flare fitting (Item 1) **[Figure SPEC-40-9]** as shown.

When a O-ring flare fitting is used as a straight thread port adapter the O-ring flare face is not used to seal. The O-ring may come off the fitting and enter the system.

Figure SPEC-40-10



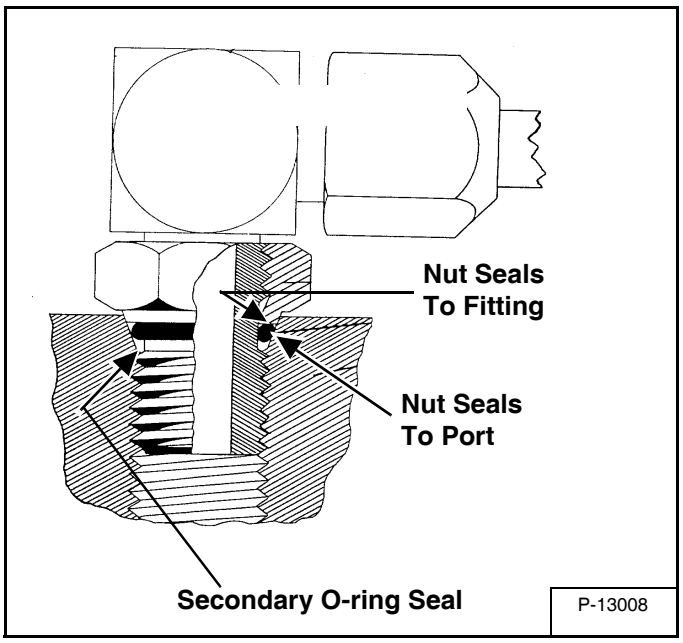
NOTE: Always remove the O-ring (Item 1) [Figure SPEC-40-10] from the flare face as shown.

An O-ring (Item 2) **[Figure SPEC-40-10]** is added to the flat boss of the fitting to seal the connection in this application.

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Port Seal Fitting

Figure SPEC-40-11



The nut is the primary seal, the O-ring is the secondary seal and helps absorb vibration and pressure pulses at the connection **[Figure SPEC-40-11]**.

The hex portion of the nut does not contact the surface of the component when the nut is tight.

Figure SPEC-40-12

Port Seal and O-ring Boss Tightening Torque	
Thread Size	**TORQUE Ft.-lb. (N•m)**
7/16” - 20	13 18)
9/16” - 18	22 (30)
3/4” -1 6	40 (54)
7/8” - 14	60 (81)
1-1/16” - 12	84 (114)
1-3/16” - 12	98 (133)
1-5/16” - 12	118 (160)
1-7/16” - 12	154 (209)
1-5/8” - 12	163 (221)

Use the following procedure to tighten the port seal fitting:

Port seal and nut, washer and O-ring (O-ring Boss) fittings use the same tightening torque valve chart.

If a torque wrench cannot be used, use the following method.

Tighten the nut until it just makes metal to metal contact, you can feel the resistance.

Tighten the nut with a wrench no more than one hex flat maximum.

Do not over tighten the port seal fitting.

NOTE: If a torque wrench cannot be used, use the hex flat tightening method as an approximate guideline.

NOTE: Port seal fittings are not recommended in all applications. Use O-ring boss fittings in these applications.

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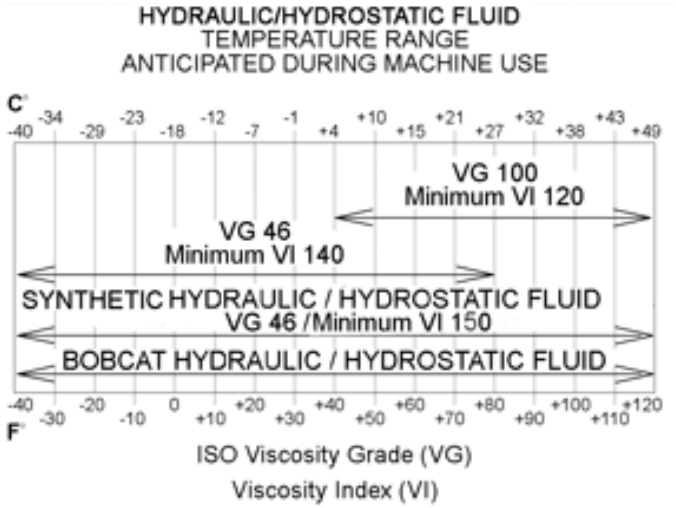
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HYDRAULIC/HYDROSTATIC FLUID SPECIFICATIONS

Specifications

Use Bobcat hydraulic/hydrostatic transmission fluid (P/N 6903117 - 2, 2 1/2 Gal.), (P/N 6903118 - 5 Gal.), (P/N 6903119 - 55 Gal.).

Hydraulic Fluid Chart



DO NOT use automatic transmission fluids in the loader or permanent damage to the transmission will result.

⚠ WARNING

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

W-2072-0496

When temperatures below zero degree F (-18°C) are common, the loader must be kept in a warm building. Extra warm-up time must be used each time the loader is started during cold temperature conditions. Cold fluid will not flow easily and it makes action of the hydraulic function slower. Loss of fluid flow to the hydrostatic transmission pump (indicated by TRANS light ON) can cause transmission damage in less than 60 seconds.

⚠ WARNING

During cold weather (32°F [0°C] and below), do not operate machine until the engine has run for at least five minutes at less than half throttle. This warm-up period is necessary for foot pedal operation and safe stopping. Do not operate controls during warm-up period.

When temperatures are below -20°F (-30°C), the hydrostatic oil must be heated or kept warm. The hydrostatic system will not get enough oil at low temperatures. Park the machine in an area where the temperature will be above 0°F (-18°C) if possible.

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CONVERSIONS

Decimal And Millimeter Equivalents

FRACTIONS	DECIMALS	MM
1/64	0.015625	0.397
1/32	0.03125	0.794
3/64	0.046875	1.191
1/16	0.0625	1.588
5/64	0.078125	1.984
3/32	0.09375	2.381
7/64	0.109375	2.778
1/8	0.1250	3.175
9/64	0.140625	3.572
5/32	0.15625	3.969
11/64	0.171875	4.366
3/16	0.1876	4.762
13/64	0.203125	5.159
7/32	0.21875	5.556
15/64	0.234375	5.953
1/4	0.2500	6.350
17/64	0.265625	6.747
9/32	0.28125	7.144
19/64	0.296875	7.541
5/16	0.3125	7.938
21/64	0.328125	8.334
11/32	0.34375	8.731
23/64	0.359375	9.128
3/8	0.3750	9.525
25/64	0.390625	9.922
13/32	0.40625	10.319
27/64	0.421875	10.716
7/16	0.4375	11.112
29/64	0.453125	11.509
15/32	0.46875	11.906
31/64	0.484375	12.303
1/2	0.5000	12.700

FRACTIONS	DECIMALS	MM
33/64	0.515625	13.097
17/32	0.53125	13.494
35/64	0.546875	13.891
9/16	0.5625	14.288
37/64	0.578125	14.684
19/32	0.59375	15.081
39/64	0.609375	15.478
5/8	0.6250	15.875
41/64	0.640625	16.272
21/32	0.65625	16.669
43/64	0.671875	17.066
11/16	0.6875	17.462
45/64	0.703125	17.859
23/32	0.71875	18.256
47/64	0.734375	18.653
3/4	0.7500	19.050
49/64	0.765625	19.447
25/32	0.78125	19.844
51/64	0.796875	20.241
13/16	0.8125	20.638
53/64	0.828125	21.034
27/32	0.84375	21.431
55/64	0.859375	21.828
7/8	0.8750	22.225
57/64	0.890625	22.622
29/32	0.90625	23.019
59/64	0.921875	23.416
15/16	0.9375	23.812
61/64	0.953125	24.209
31/32	0.96875	24.606
63/64	0.984375	25.003
1	1.000	25.400

1 mm = 0.03937”

0.001 = 0.0254 mm

U.S. To Metric Conversion

	TO CONVERT	INTO	MULTIPLY BY
LINEAR MEASUREMENT	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
AREA	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
VOLUME	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
WEIGHT	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces (Avdp.)	Grams	28.3495
PRESSURE	Pounds/Sq. In.	Kilopascal	6.895
WORK	Foot–Pounds	Newton–Meter	1.356
LIQUID VOLUME	Quarts	Liters	0.9463
	Gallons	Liters	3.785
LIQUID FLOW	Gallons/Minute	Liters/Minute	3.785
TEMPERATURE	Fahrenheit	Celsius	1.Subtract 32° 2. Multiply by 5/9

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SERVICE MANUAL REVISION

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	☒
SALES MANAGER	☐

NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: **S175, S185-1**
Date: **8 January, 2004**
Product: **Bobcat Loader**
Model: **S175, S185**
Manual No: **6902732 (11-03)**

The following pages are a revision to the above Service Manual.

Take out existing pages and put in the new pages as listed below:

TAKE OUT	PUT IN	REVISION DESCRIPTION
10-170-1 thru 10-170-2	10-170-1 thru 10-170-2	Revised Text
50-100-1 thru 50-100-14	50-100-1 thru 50-100-14	Revised Text
	50-101-1 thru 50-101-20	Added CONTROL PANEL (ADJUSTABLE PINTLES)

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SERVICE MANUAL REVISION

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	☒
SALES MANAGER	☐

NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: S175, S185-2
Date: 20 April, 2004
Product: Bobcat Loader
Model: S175, S185
Manual No: 6902732 (11-03)

The following pages are a revision to the above Service Manual.

Take out existing pages and put in the new pages as listed below:

TAKE OUT	PUT IN	REVISION DESCRIPTION
10-70-1 thru 10-70-2	10-70-1 thru 10-70-2	Revised Text
10-110-1 thru 10-110-2	10-110-1 thru 10-110-2	Revised Text
10-130-1 thru 10-130-2	10-130-1 thru 10-130-2	Revised Text
10-150-1 thru 10-150-2	10-150-1 thru 10-150-2	Revised Text
10-170-1 thru 10-170-2	10-170-1 thru 10-170-2	Revised Text
20-01 thru 20-04	20-01 thru 20-04	Revised Text
HYD./HYDO SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED NOVEMBER 2002) V-0444 title & legend	HYD./HYDO SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED APRIL 2002) V-0444 title & legend	Revised Text
HYD./HYDO SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED NOVEMBER 2002) V-0445 title & legend	HYD./HYDO SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED APRIL 2002) V-0445 title & legend	Revised Text

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TAKE OUT	PUT IN	REVISION DECRIPTION
20-21-1 thru 20-21-10	20-21-1 thru 20-21-10	Revised Text
20-40-1 thru 20-40-32	20-40-1 thru 20-40-32	Revised Text
20-41-1 thru 20-41-24	20-41-1 thru 20-41-24	Revised Text
	20-42-1 thru 20-42-34	Added Hyd. Control Valve (1 piece casting) (Foot Control)
	20-43-1 thru 20-43-30	Added Hyd. Control Valve (1 piece casting) (Advanced Hand Control) (ACS)
20-60-1 thru 20-60-12	20-60-1 thru 20-60-12	Revised Text
20-61-1 thru 20-61-16	20-61-1 thru 20-61-16	Revised Text
20-100-1 thru 20-100-8	20-100-1 thru 20-100-8	Revised Text
50-01 thru 50-02	50-01 thru 50-02	Revised Text
50-30-1 thru 50-30-2	50-30-1 thru 50-30-2	Revised Text
50-31-1 hru 50-31-6	50-31-1 hru 50-31-6	Revised Text
50-100-1 thru 50-100-14	50-100-1 thru 50-100-14	Revised Text
50-101-1 thru 50-101-20	50-101-1 thru 50-101-20	Revised Text
60-30-1 thru 60-30-10	60-30-1 thru 60-30-10	Revised Text
60-40-1 thru 60-40-10	60-40-1 thru 60-40-10	Revised Text
60-80-1 thru 60-80-6	60-80-1 thru 60-80-6	Revised Text
60-120-1 thru 60-120-20	60-120-1 thru 60-120-20	Revised Text
70-01 thru 70-02	70-01 thru 70-02	Revised Text
70-70-1 thru 70-70-14	70-70-1 thru 70-70-18	Revised Text
70-100-1 thru 70-100-32	70-100-1 thru 70-100-32	Revised Text
80-50-1 thru 80-50-12	80-50-1 thru 80-50-12	Revised Text
80-70-1 thru 80-70-4	80-70-1 thru 80-70-4	Revised Text
SPEC-10-1 thru SPEC-10-4	SPEC-10-1 thru SPEC-10-4	Revised Text

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SERVICE MANUAL REVISION

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	☒
SALES MANAGER	☐

NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: **S175, S185-3**
Date: **10 May, 2004**
Product: **Bobcat Loader**
Model: **S175, S185**
Manual No: **6902732 (11-03)**

The following pages are a revision to the above Service Manual.

Take out existing pages and put in the new pages as listed below:

TAKE OUT	PUT IN	REVISION DESCRIPTION
10-90-1 thru 10-90-4	10-90-1 thru 10-90-4	Revised Text
10-120-1 thru 10-120-4	10-120-1 thru 10-120-4	Revised Text
20-01 thru 20-04	20-01 thru 20-04	Revised Text
HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED APRIL 2004) V-0444 tilte & legend	HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED MAY 2004) V-0444 tilte & legend	Revised Text
HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED APRIL 2004) V-0444	HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED MAY 2004) V-0444	Revised Text
HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED APRIL 2004) V-0445 tilte & legend	HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED MAY 2004) V-0445 tilte & legend	Revised Text

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TAKE OUT	PUT IN	REVISION DESCRIPTION
HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED APRIL 2004) V-0445	HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED MAY 2004) V-0445	Revised Text
	HYD./HYDRO. SCHEMATIC S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED MAY 2004) V-0565 tilte & legend	Added
	HYD./HYDRO. SCHEMATIC S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED MAY 2004) V-0565	Added
	HYD./HYDRO. SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED MAY 2004) V-0566 tilte & Legend	Added
	HYD./HYDRO. SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED MAY 2004) V-0566	Added
20-40-1 thru 20-40-32	20-40-1 thru 20-40-32	Revised Text
20-41-1 thru 20-41-24	20-41-1 thru 20-41-24	Revised Text
20-42-1 thru 20-42-34	20-42-1 thru 20-42-34	Revised Text
20-43-1 thru 20-43-30	20-43-1 thru 20-43-30	Revised Text
WIRING SCHEMATICS OPTIONS S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED NOVEMBER 2003) V-0442	WIRING SCHEMATICS OPTIONS S175 (S/N 525211001 AND ABOVE) (S/N 525311001 AND ABOVE) S185 (S/N 525011001 AND ABOVE) (S/N 525111001 AND ABOVE) (PRINTED MAY 2004) V-0442	Revised
60-10-1 thru 60-10-6	60-10-1 thru 60-10-6	Revised Text
60-40-1 thru 60-40-10	60-40-1 thru 60-40-10	Revised Text
SPEC-21-1 thru SPEC-21-6	SPEC-21-1 thru SPEC-21-6	Revised Text

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SERVICE MANUAL REVISION

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NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: **S175, S185-4**
Date: **14 April, 2005**
Product: **Bobcat Loader**
Model: **S175, S185**
Manual No: **6902732 (11-03)**

The following Sections are a revision to the above Service Manual.

Take out existing Sections and put in the new Sections as listed below:

TAKE OUT	PUT IN	REVISION DESCRIPTION
Section 10-50	Section 10-50	Revised Text
Section 10-110	Section 10-110	Revised Text
Section 10-130	Section 10-130	Revised Text
HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED MAY 2004) V-0444	HYD./HYDRO. SCHEMATIC S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED APRIL 2005) V-0444	Revised Text
HYD./HYDRO. SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED MAY 2004) V-0445	HYD./HYDRO. SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525211001 -525214999) (S/N 525311001 - 525314999) S185 (S/N 525011001 - 525014999) (S/N 525111001 - 525114999) (PRINTED APRIL 2005) V-0445	Revised Text
HYD./HYDRO. SCHEMATIC S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED MAY 2004) V-0565	HYD./HYDRO. SCHEMATIC S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED APRIL 2005) V-0565	Revised Text

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TAKE OUT	PUT IN	REVISION DESCRIPTION
HYD./HYDRO. SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED MAY 2004) V-0566	HYD./HYDRO. SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED APRIL 2005) V-0566	Revised Text
Section 20-21	Section 20-21	Revised Text
Section 20-30	Section 20-30	Revised Text
Section 20-40	Section 20-40	Revised Text
Section 20-41	Section 20-41	Revised Text
Section 20-110	Section 20-110	Revised Text
30-01, 30-02	30-01, 30-02	Revised Text
Section 30-20	Section 30-20	Revised Text
Section 30-30	Section 30-30	Revised Text
40-01, 40-02	40-01, 40-02	Revised Text
Section 40-30	Section 40-30	Revised Text
Section 50-40	Section 50-40	Revised Text
Section 50-41	Section 50-41	Revised Text
Section 50-101	Section 50-101	Revised Text
Section 60-120	Section 60-120	Revised Text
Section 70-70	Section 70-70	Revised Text
Section 70-100	Section 70-100	Revised Text
Section SPEC-10	Section SPEC-10	Revised Text
Section SPEC-20	Section SPEC-20	Revised Text
Section SPEC-21	Section SPEC-21	Revised Text
Section SPEC-50	Section SPEC-50	Revised Text

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NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: **S175, S185-5**
Date: **5 July 2005**
Product: **Bobcat Loader**
Model: **S175, S185**
Manual No: **6902732 (11-03)**

The following Sections are a revision to the above Service Manual.

Take out existing Sections and put in the new Sections as listed below:

TAKE OUT	PUT IN	REVISION DESCRIPTION
Maintenance Safety	Maintenance Safety	Revised
ALPHABETICAL INDEX	ALPHABETICAL INDEX	Revised Text
Foreword i-x	Foreword i-x	Updated Safety pages
Section 10-120	Section 10-120	Revised Text
20-01	20-01	Revised Text
HYD/HYDRO SCHEMATIC S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED APRIL 2005) V-0565	HYD/HYDRO SCHEMATIC S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED JULY 2005) V-0565	Revised
HYD/HYDRO SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED APRIL 2005) V-0566	HYD/HYDRO SCHEMATIC WITH HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED JULY 2005) V-0566	Revised
	HYD/HYDRO SCHEMATIC WITH SJC OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED JULY 2005) V-0715	Added

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TAKE OUT	PUT IN	REVISION DESCRIPTION
	HYD/HYDRO SCHEMATIC WITH SJC AND HIGH FLOW OPTION S175 (S/N 525215000 AND ABOVE) (S/N 525315000 AND ABOVE) S185 (S/N 525015000 AND ABOVE) (S/N 525115000 AND ABOVE) (PRINTED JULY 2005) V-0716	Added
	Section 20-62	Added Hydraulic Pump (SJC)
	Section 20-63	Added Hydraulic Pump (High Flow) (SJC)
Section 20-70	Section 20-70	Revised Text
30-01	30-01	Revised Text
Section 30-20	Section 30-20	Revised Text
	Section 30-21	Added Hydrostatic Motor Carrier
	Section 30-22	Added Hydrostatic Motor Carrier (SJC)
Section 30-30	Section 30-30	Revised Text
	Section 30-41	Added Hydrostatic Pump (SJC)
50-01	50-01	Revised Text
	Section 50-102	Added Control Panel (SJC)
	Section 50-112	Added Control Handle (SJC)
60-01	60-01	Revised Text
ALL WIRING SCHEMATICS (PRINTED NOVEMBER 2003)	ALL WIRING SCHEMATICS (PRINTED JULY 2005)	Revised
Section 60-50	Section 60-50	Revised Text
	Section 60-71	Added Controller (Selectable Joystick Control) (SJC)
Section 60-80	Section 60-80	Revised Text
	Section 60-131	Added Electrical/Hydraulic Controls Reference (Selectable Joystick Control) (SJC)
	Section 60-150	Added Service PC (Laptop Comuter)
	Section 60-160	Added Calibration
	Section 60-170	Added Speed Sensor
Section SPEC-10	Section SPEC-10	Revised Text

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NOTICE Insert This Sheet With The Below Listed Manual For Future Reference.

Revision No: S175, S185-6
Date: 23 March 2006
Product: Bobcat Loader
Model: S175, S185
Manual No: 6902732 (11-03)

S175, S185 Service Manual (P/N 6902732) Dated (2-06) contains updated service information which replaces the previous S175, S185 Service Manual (P/N 6902732) Dated (11-03).

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