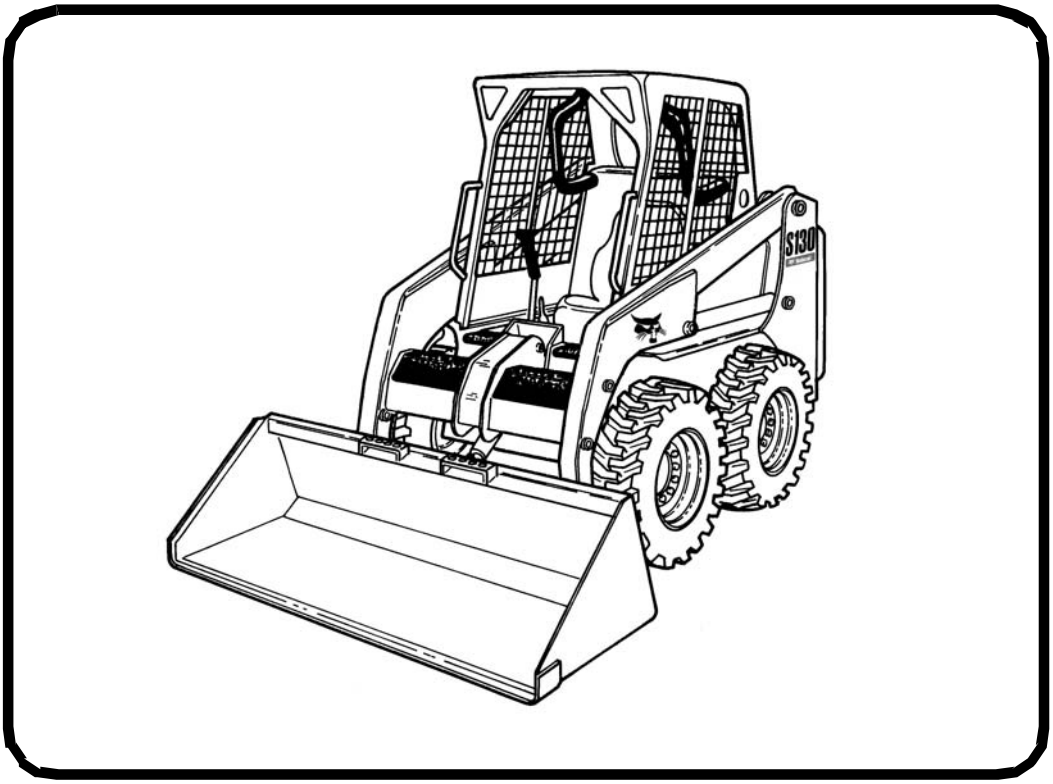
Bobcat®

Service Manual
S130 Skid-Steer Loader

S/N 529211001 & Above
S/N 529611001 & Above
S/N A84W11001 & Above
S/N A1Z711001 - A1Z759999
S/N A8NW11001 & Above
S/N A8KA11001 - A8KA59999



EQUIPPED WITH
BOBCAT INTERLOCK
CONTROL SYSTEM (BICS™)

6904121 (7-09)

Printed in U.S.A.

SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

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

W-2003-0903

IMPORTANT

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

I-2019-0284

DANGER

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

D-1002-1107

WARNING

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

W-2044-1107

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

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

TIGHTEN ALL HARDWARE PER SIZE TO GRADE 5 TORQUE (SEE STANDARD TORQUE SPECIFICATIONS FOR BOLTS, SECTION SPEC-01) UNLESS OTHERWISE SPECIFIED.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE AND STANDARD ITEMS MAY VARY.

TRANSPORTING THE LOADER ON A TRAILER

Loading And Unloading

WARNING

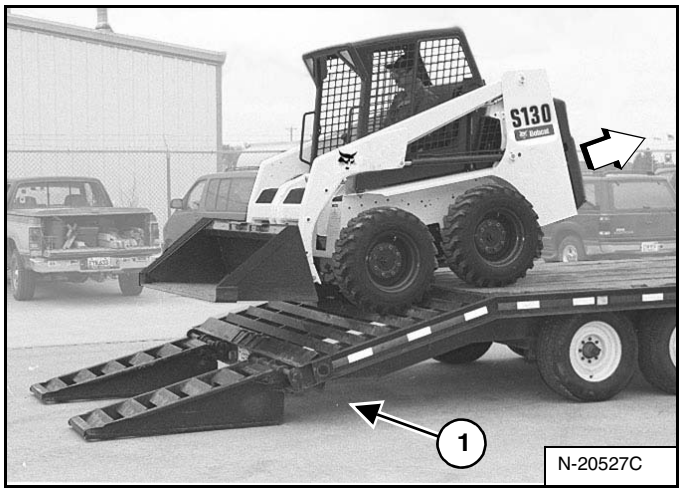
AVOID SERIOUS INJURY OR DEATH

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

W-2058-0807

Be sure the transport and towing vehicles are of adequate size and capacity. (See Capacities on Page SPEC-10-4.)

Figure 10-40-1

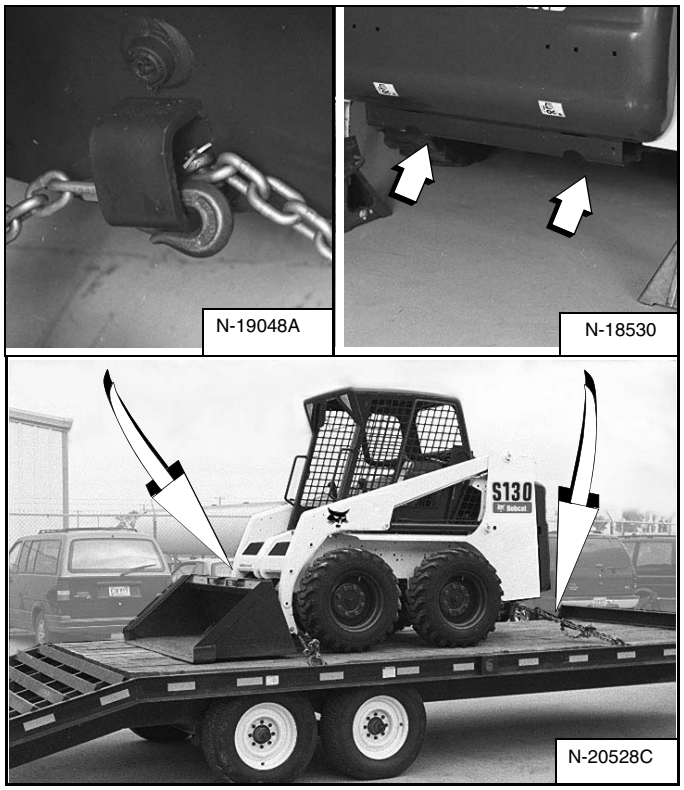


A loader with an empty bucket or no attachment must be loaded backward onto the transport vehicle **[Figure 10-40-1]**.

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.

Fastening

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.

REMOTE START TOOL (SERVICE TOOL) KIT - 6689779

Description

The Remote Start Tool (Service Tool) Kit is a replacement tool for MEL 1563 Remote Start Tool and MEL 1400B - BOSS® Diagnostic Tool.

The Remote Start Tool (Service Tool) Kit, P/N 6689779, can be used to service older loaders with the BOSS® system using the supplied BOSS® Service Tool Harness P/N 6689745.

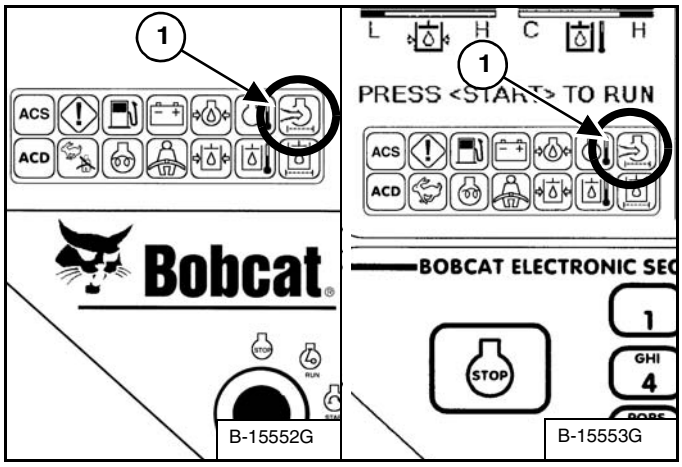
The Remote Start Tool (Service Tool) Kit, P/N 6689779, can be used to service newer loaders using the supplied harness P/N 6689747.

A computer can be connected to the Remote Start Tool (Service Tool) for diagnostics and software updates using the computer harness P/N 6689746 in conjunction with the loader harness.

AIR CLEANER SERVICE

Replacing Filter Elements

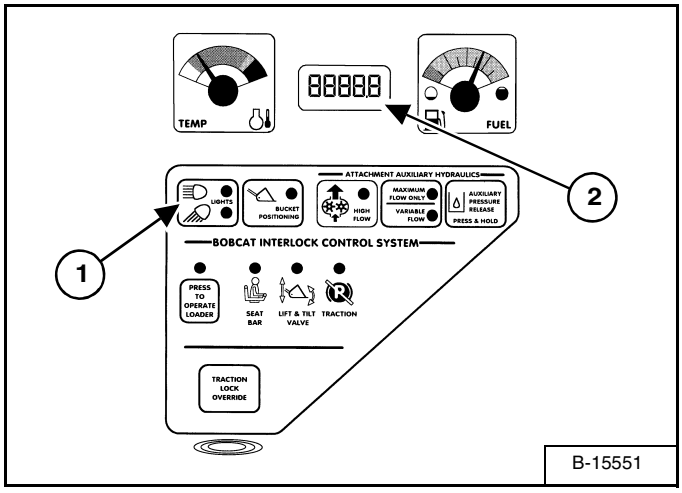
Figure 10-80-1



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.

Figure 10-80-2

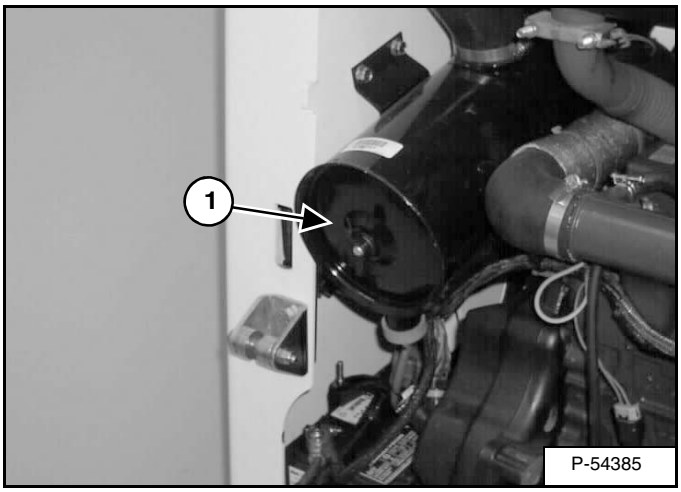


Press and hold the LIGHT button (Item 1) **[Figure 10-80-2]** for two seconds.

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]**.

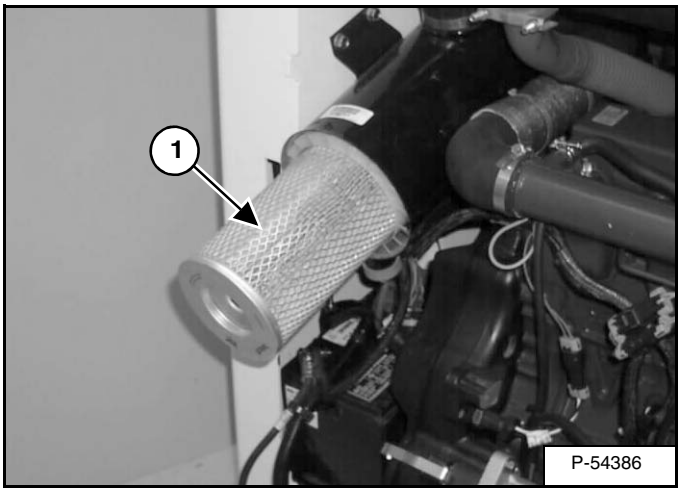
Outer Filter

Figure 10-80-3



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

Figure 10-80-4



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

NOTE: Make sure all sealing surfaces are free of dirt and debris. Do not use air pressure to clean.

Install a new outer element.

Install the dust cover and the wing nut **[Figure 10-80-4]**. (Be sure the evacuator is down.)

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

HYDRAULIC / HYDROSTATIC SYSTEM

Checking And Adding Fluid

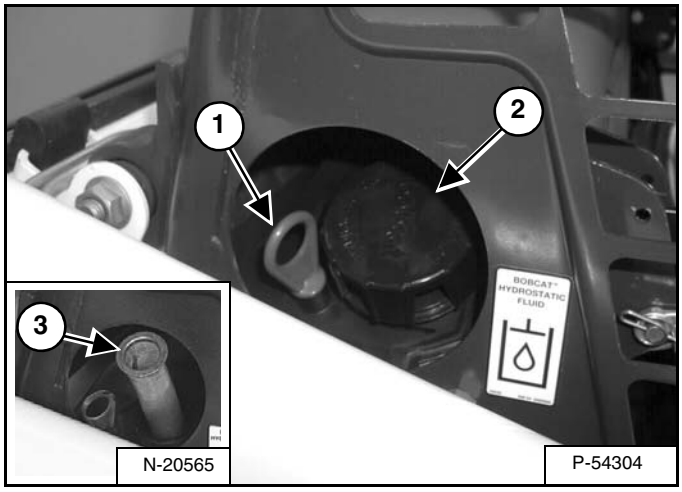
Use only recommended fluid in the hydraulic system. (See (S130) LOADER SPECIFICATIONS on Page SPEC-10-1.)

Stop the loader on a level surface.

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

Stop the engine.

Figure 10-120-1



Remove the dipstick (Item 1) **[Figure 10-120-1]**.

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

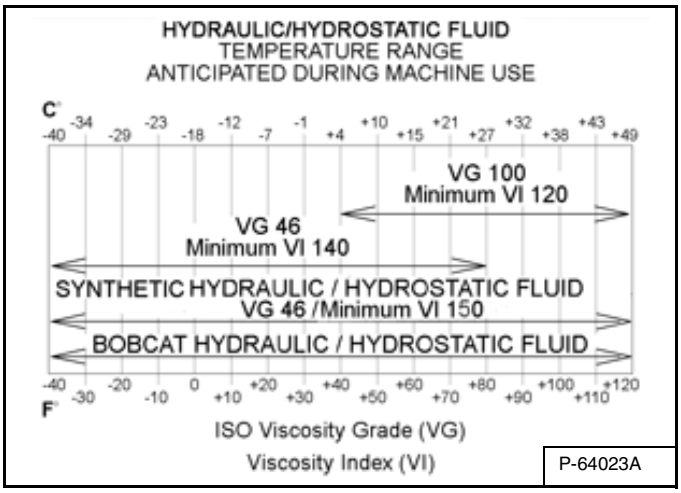
Add fluid as needed to bring the level to the top mark on the dipstick. Do not overfill.

Remove the screen (Item 3) **[Figure 10-120-1]** and clean with solvent as needed.

Install the fill cap **[Figure 10-120-1]**.

Hydraulic / Hydrostatic Fluid Chart

Figure 10-120-2



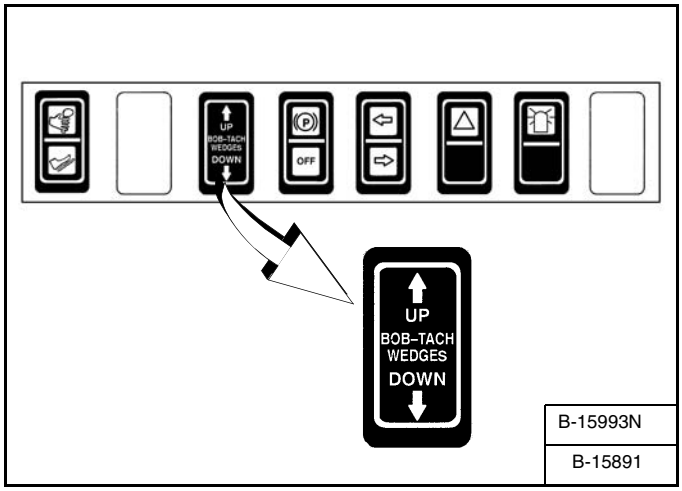
Use the correct hydraulic / hydrostatic fluid shown in chart **[Figure 10-120-2]**.

BOB-TACH (POWER)

This machine may be equipped with a Power Bob-Tach.

Inspection And Maintenance

Figure 10-141-4



Push and hold the BOB-TACH “WEDGES UP” switch **[Figure 10-141-4]** until wedges are fully raised. Push and hold the BOB-TACH “WEDGES DOWN” switch **[Figure 10-141-4]** until the wedges are fully down.

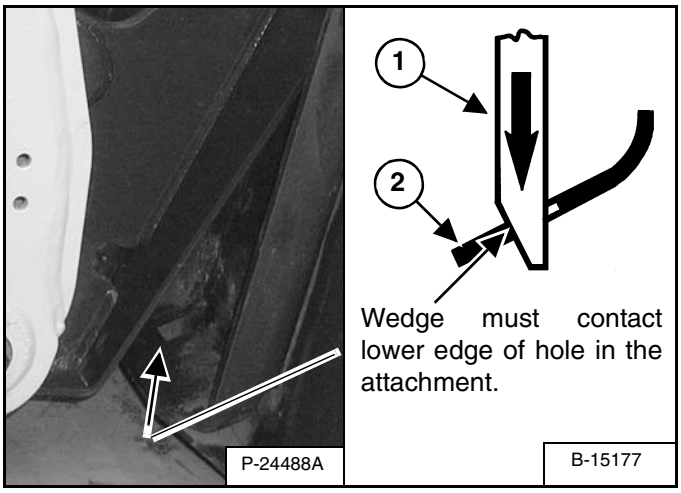
The levers and wedges must move freely.

⚠ WARNING

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

W-2102-0497

Figure 10-141-5

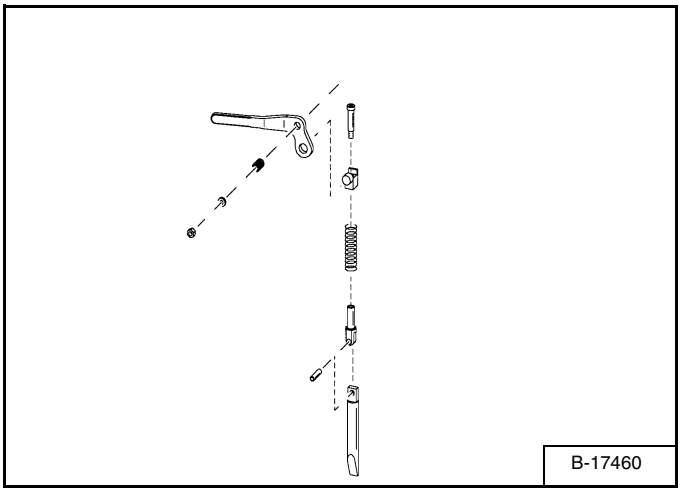


The wedges must extend through the holes in the attachment mounting frame (Item 2) **[Figure 10-141-5]**.

The spring loaded wedge (Item 1) **[Figure 10-141-5]** must contact the lower edge of the hole in the attachment (Item 2) **[Figure 10-141-5]**.

If the wedge does not contact the lower edge of the hole **[Figure 10-141-5]**, the attachment will be loose and can come off the Bob-Tach.

Figure 10-141-6



Inspect the mounting frame on the attachment and the Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-141-6]**. 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.) (See LUBRICATING THE LOADER on Page 10-150-1.)

LOADER STORAGE AND RETURN TO SERVICE

Storage

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

- Thoroughly clean the loader including the engine compartment.
- Lubricate the loader.
- Replace worn or damaged parts.
- Park the loader in a dry protected shelter.
- Lower the lift arms all the way and put the bucket flat on the ground.
- Put blocks under the frame to remove weight from the tires.
- Put grease on any exposed cylinder rods.
- Put fuel stabilizer in the fuel tank and run the engine a few minutes to circulate the stabilizer to the pump and fuel injectors.

  If biodiesel blend fuel has been used, perform the following:

  Drain the fuel tank, refill with 100% petroleum diesel fuel, add fuel stabilizer and run the engine for at least 30 minutes.
- Drain and flush the cooling system. Refill with premixed coolant.
- Replace all fluids and filters (engine, hyd. / hydro.).
- Replace air cleaner, heater and air conditioning filters.
- Put all controls in neutral position.
- Remove the battery. Be sure the electrolyte level is correct then charge the battery. Store it in a cool dry place above freezing temperatures and charge it periodically during storage.
- Cover the exhaust pipe opening.
- Tag the machine to indicate that it is in storage condition.

Return to Service

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

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

HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH SJC OPTION
S130 (S/N 529211001 & Above)
(S/N 529611001 & Above)
(S/N A1Z711001 - A1Z759999)
(S/N A8KA11001 - A8KA59999)
(S/N A84W11001 & Above)

(PRINTED FEBRUARY 2008)
V-0794legend

LEGEND

1. RESERVOIR:
   Capacity . . . . . 14.0 qt. (13,2 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: 5075 PSI (350 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:
   2650-2750 PSI (183-190 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. CHARGE PRESSURE SENSOR
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. FIXED CAPACITY DISPLACEMENT HYDRAULIC MOTOR
51. ANTICAVITATION VALVE
52. PROPORTIONAL RELIEF VALVE –
    (Fan Speed Regulator):
    1566 - 1784 PSI (108 - 123 bar)
53. CHARGE PUMP -
    12.8 GPM (48,5 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

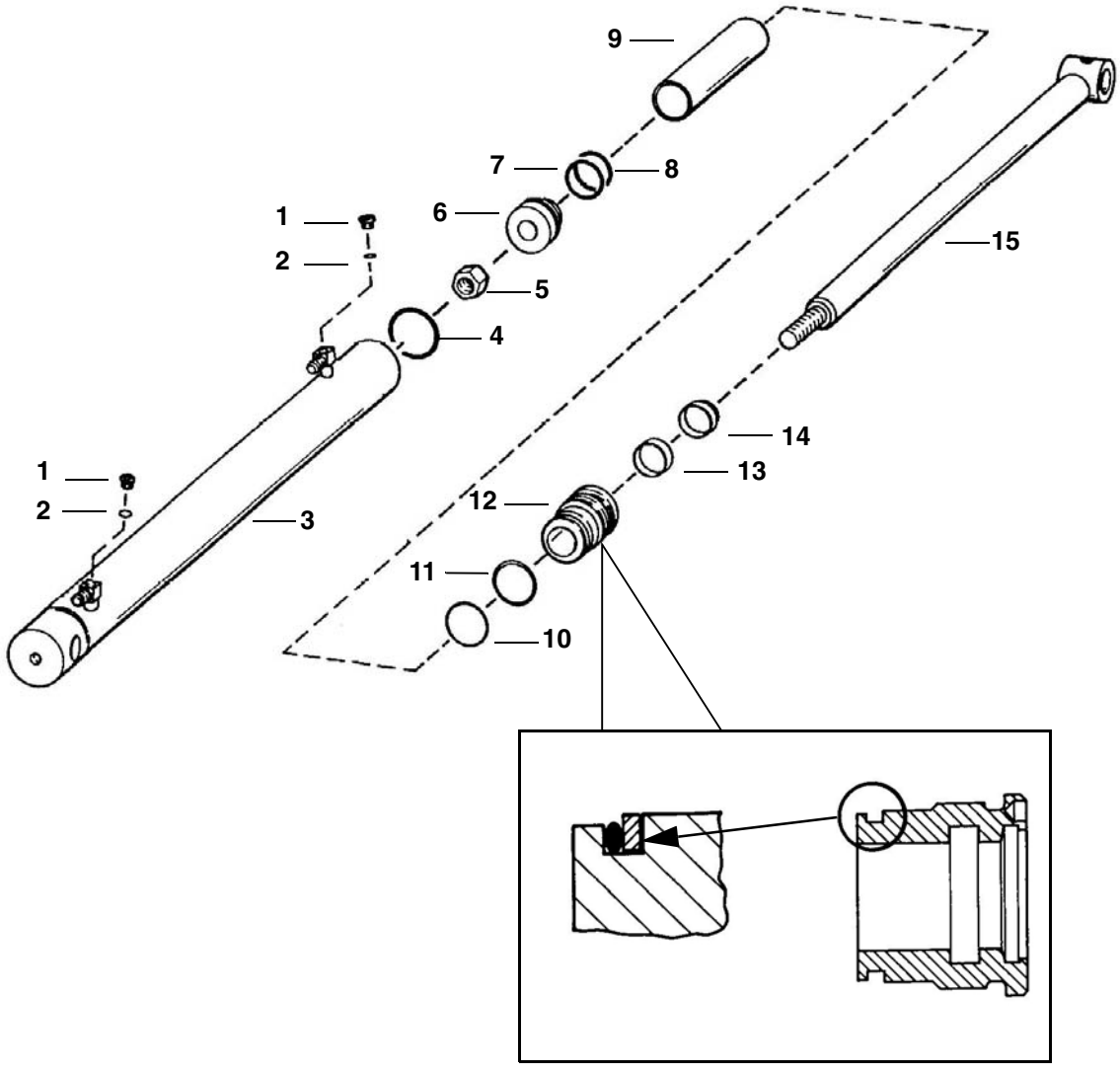
NOTE: Unless otherwise specified, springs have NO significant pressure value.

Printed in U.S.A.

V-0794legend (2-6-08)

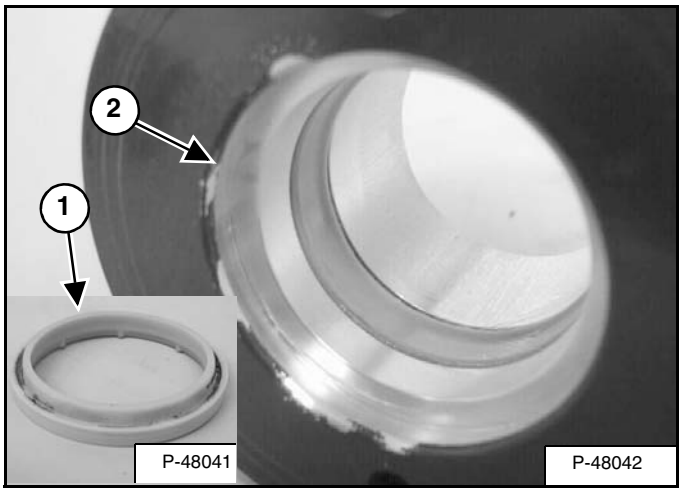
Parts Identification

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



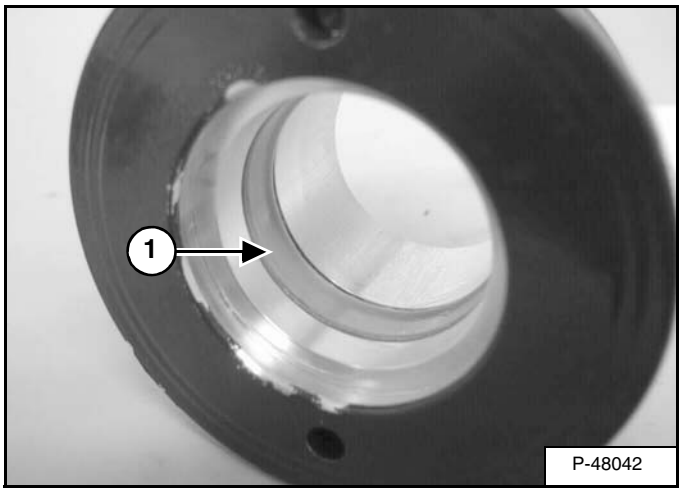
Disassembly And Assembly (Cont'd)

Figure 20-21-16



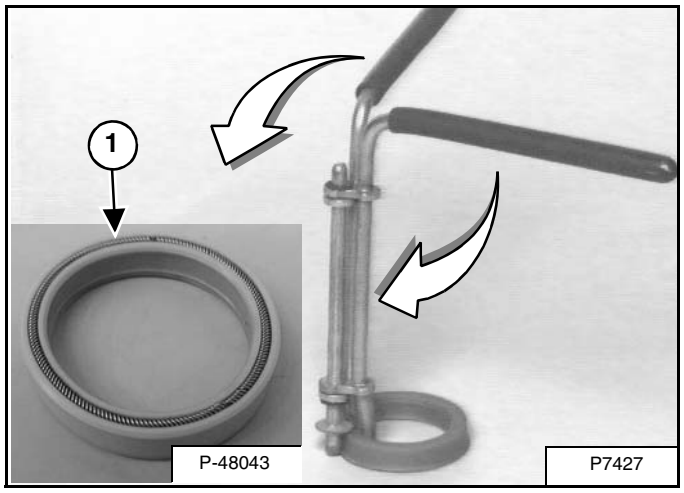
Install the wiper seal, with the wiper side of the seal (Item 1) toward the outside of the head (Item 2) **[Figure 20-21-16]**.

Figure 20-21-17



Remove the rod seal (Item 1) **[Figure 20-21-17]** from the cylinder head.

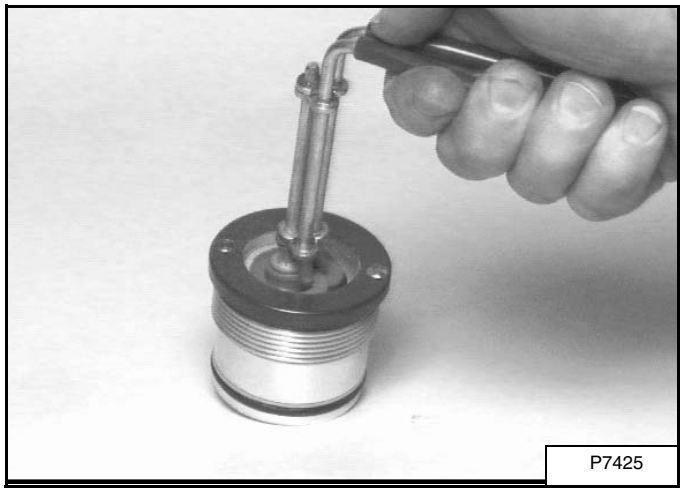
Figure 20-21-18



Assembly: Install the rod seal on the rod seal tool **[Figure 20-21-18]**.

NOTE: During installation the spring side of the seal (Item 1) [Figure 20-21-18] must be installed toward the inside of the cylinder.

Figure 20-21-19

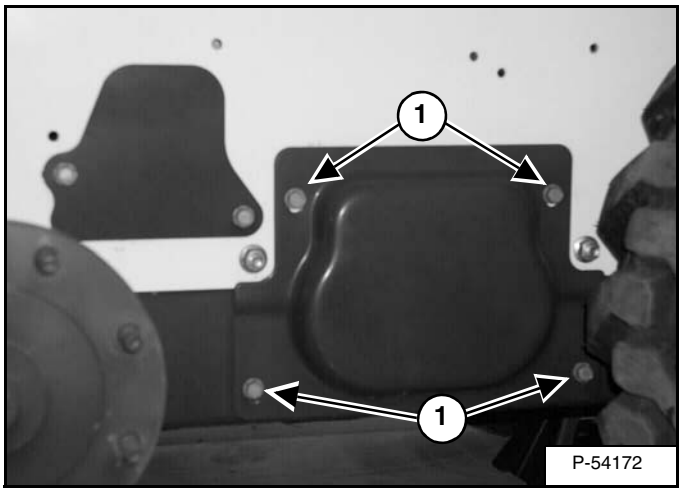


Assembly: Install the rod seal in the head. Rotate the handles to collapse the rod seal **[Figure 20-21-19]**.

MAIN RELIEF VALVE (CONT'D)

Removal and Installation

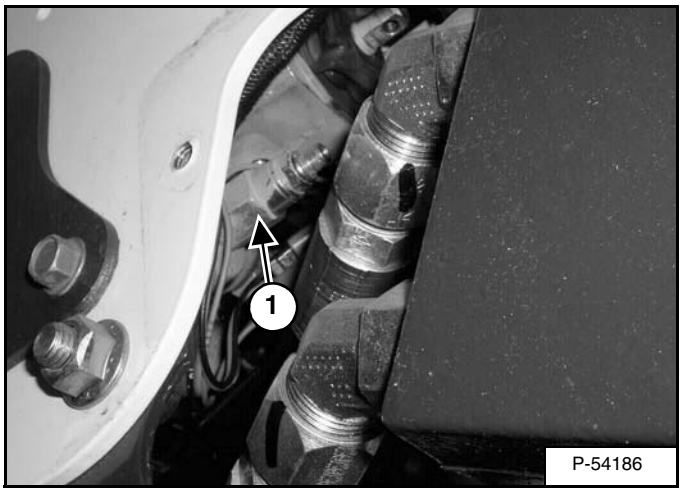
Figure 20-30-6



Remove the four motor cover mounting screws (Item 1) **[Figure 20-30-6]**.

Installation: Tighten the mounting screws to 15 - 20 ft.-lb. (20 - 27 N•m) torque.

Figure 20-30-7



Clean the area around the control valve. Loosen and remove the main relief valve (Item 1) **[Figure 20-30-7]**.

Remove the O-rings and back-up washers **[Figure 20-30-5]**.

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 20-30-7]** and tighten. Check the pressure again.

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

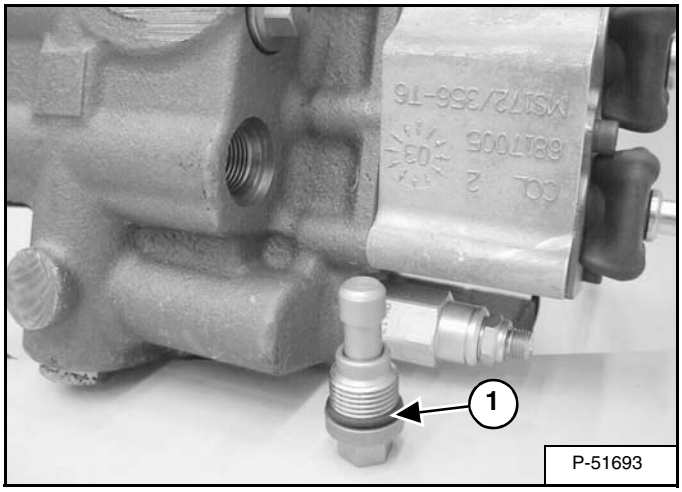
IMPORTANT

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

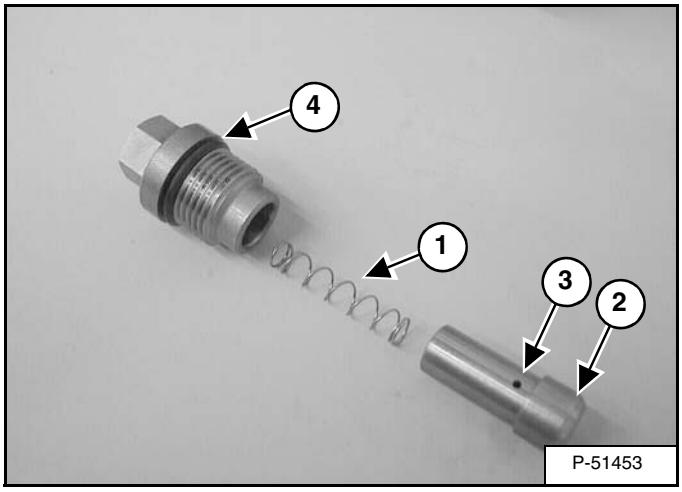
Anti-Cavitation Valve Removal And Installation (Lift, Rod End) (Cont'd)

Figure 20-40-25



Installation: Always use new O-ring (Item 1) **[Figure 20-40-25]** on the anti-cavitation valve plug. Tighten the plug to 35 - 40 ft.-lb. (47 - 54 N•m) torque.

Figure 20-40-26



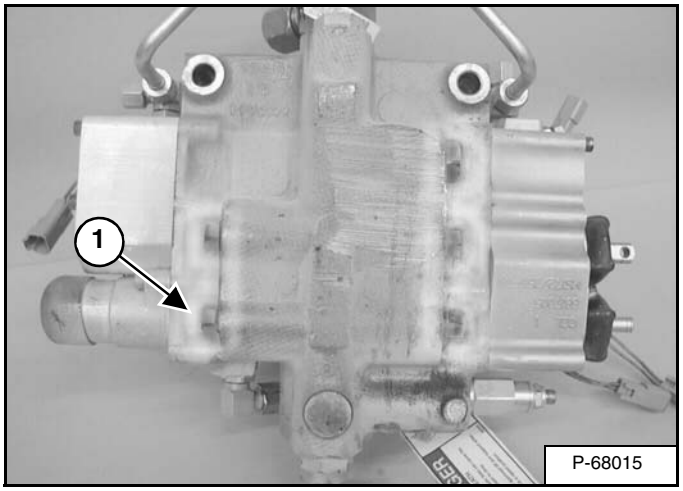
Remove the spring (Item 1) and poppet (Item 2) **[Figure 20-40-26]**.

Check the orifice (Item 3) **[Figure 20-40-26]** in the poppet to be sure it is not plugged.

Installation: Install a new O-ring (Item 4) **[Figure 20-40-26]** on the plug and lightly lubricate with oil before installing. Tighten the plug to 38 - 45 ft.-lb. (52 - 61 N•m) torque.

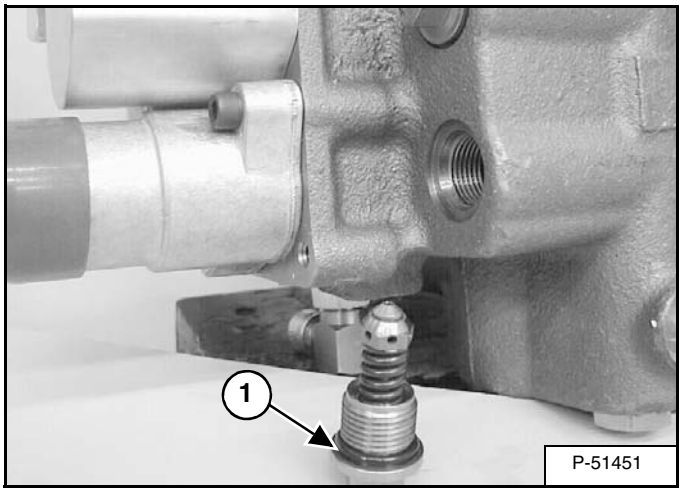
Port Relief/Anti-Cavitation Valve Removal And Installation (Lift, Base End)

Figure 20-40-27



Loosen the lift circuit port relief/anti-cavitation valve (Item 1) **[Figure 20-40-27]**.

Figure 20-40-28

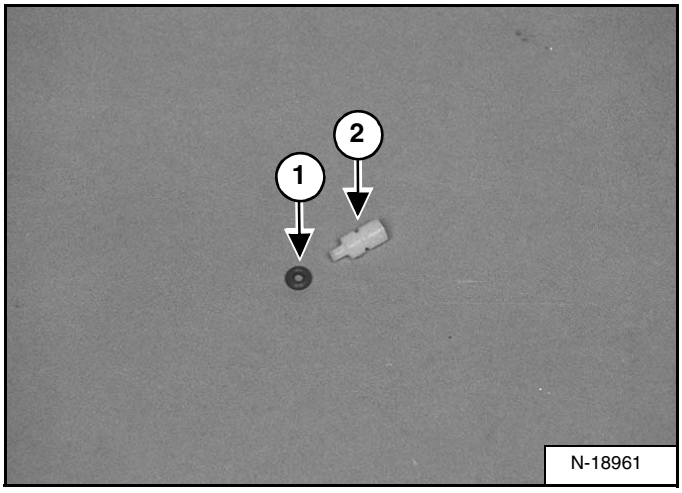


Replace the O-ring (Item 1) **[Figure 20-40-28]** before installation.

Installation: Tighten to 38 - 45 ft.-lb. (52 - 61 N•m) torque.

Lift Spool And Detent Removal And Installation (Cont'd)

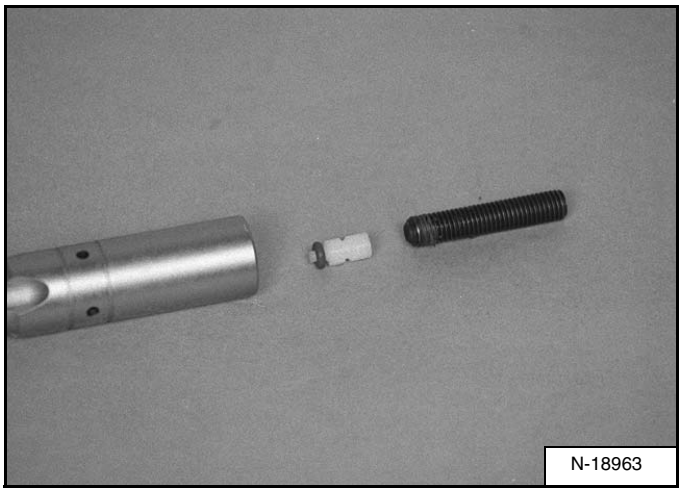
Figure 20-40-64



Install the O-ring (Item 1) over the nipple on the plastic plug (Item 2) **[Figure 20-40-64]**.

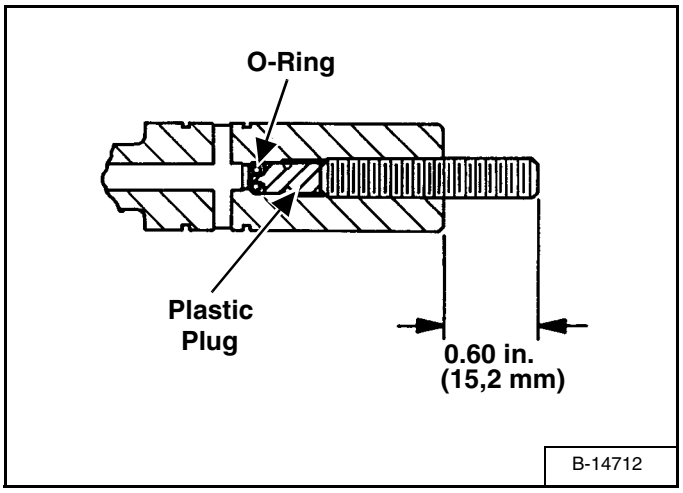
NOTE: Check the O-ring for damage. The lift spool will have an internal leak if there is damage to this O-ring. Always replace the o-ring and recheck the lift spool before the control valve is replaced.

Figure 20-40-65



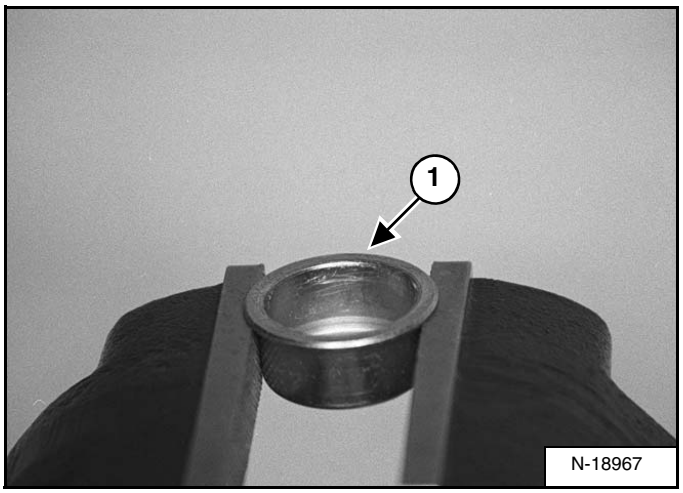
Install the plastic plug and O-ring in the spool **[Figure 20-40-65]**.

Figure 20-40-66



Install the stud and tighten until the other end of the stud is out about 0.600 in. (15,2 mm) from the spool **[Figure 20-40-66]**.

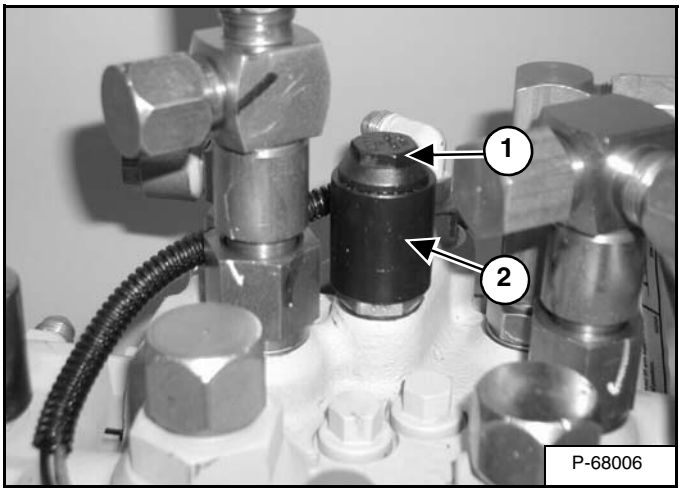
Figure 20-40-67



Clamp the collar (Item 1) **[Figure 20-40-67]** in a vise.

Solenoid Removal And Installation

Figure 20-40-103

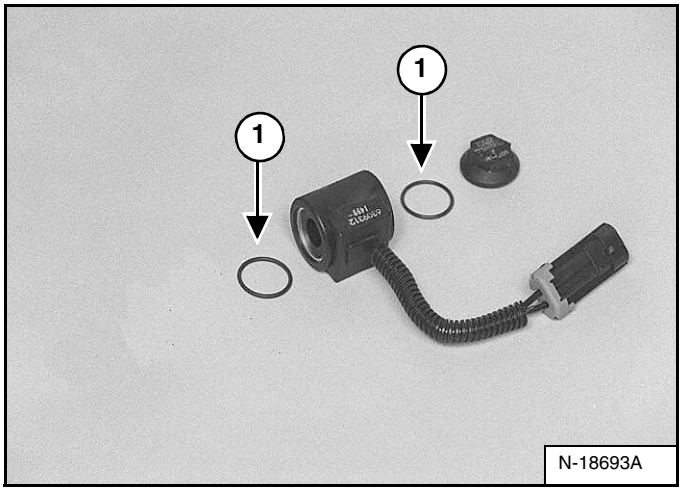


Remove the nut (Item 1) **[Figure 20-40-103]** from the solenoid stem.

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

Remove the solenoid coil (Item 2) **[Figure 20-40-103]**.

Figure 20-40-104

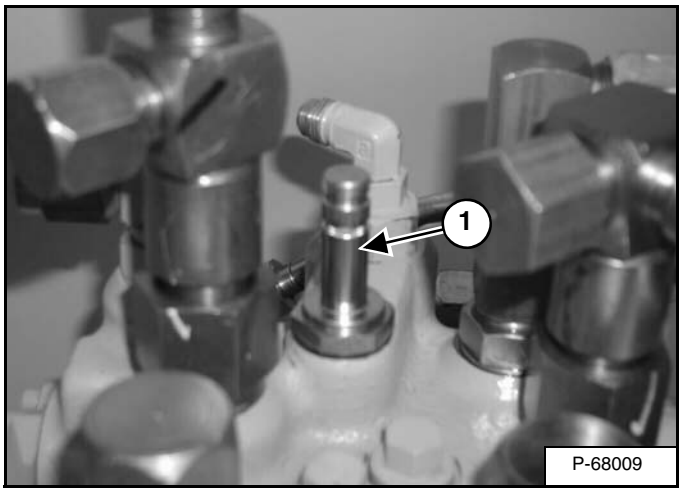


Remove the O-rings (Item 1) **[Figure 20-40-104]** from both ends of the solenoid coil.

Use an Ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is **9.79 ± 0.29 ohm**.

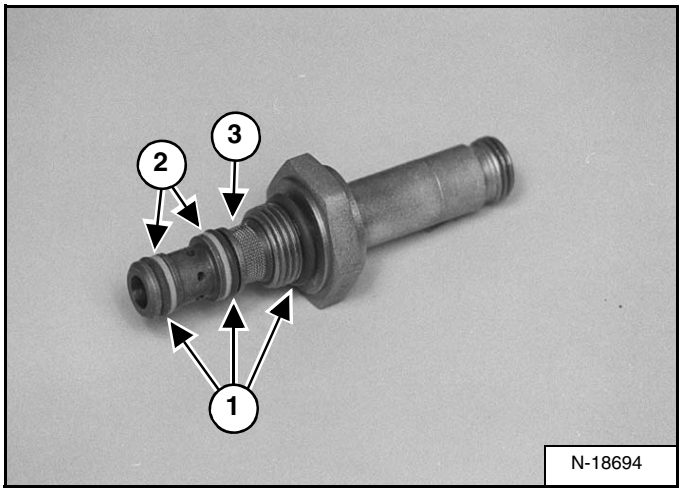
Figure 20-40-105



Remove the solenoid stem (Item 1) **[Figure 20-40-105]**.

Installation: Lubricate the O-rings and tighten the stem to 20 - 24 ft.-lb. (27 - 33 N•m) torque.

Figure 20-40-106



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-40-106]** from the cartridge.

Clean all parts in solvent and dry with compressed air.

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

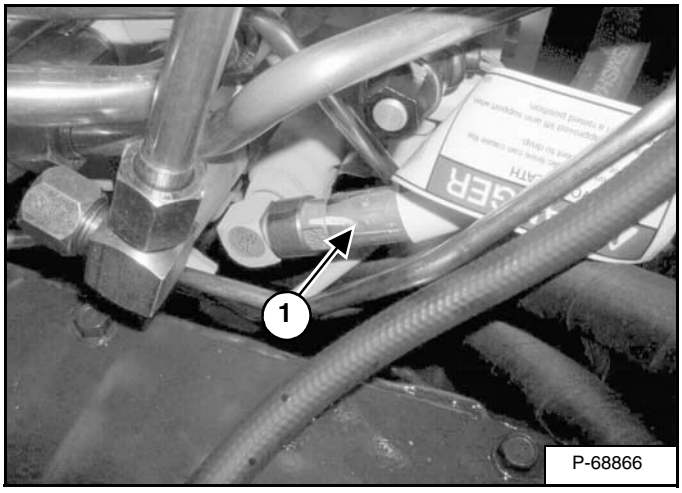
NOTE: The screen (Item 3) [Figure 20-40-106] may be cleaned with solvent. If it is torn or worn it needs to be replaced.

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 20-40-104]** & **[Figure 20-40-106]** and new back-up rings (Item 2) **[Figure 20-40-106]** on the solenoid stem.

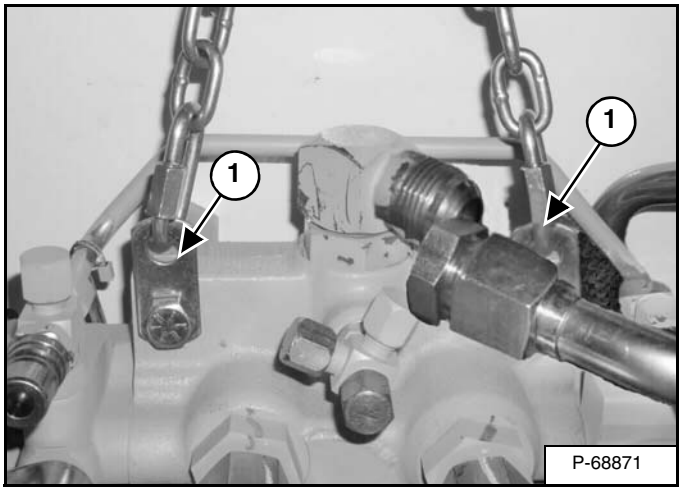
Removal And Installation (Cont'd)

Figure 20-41-14



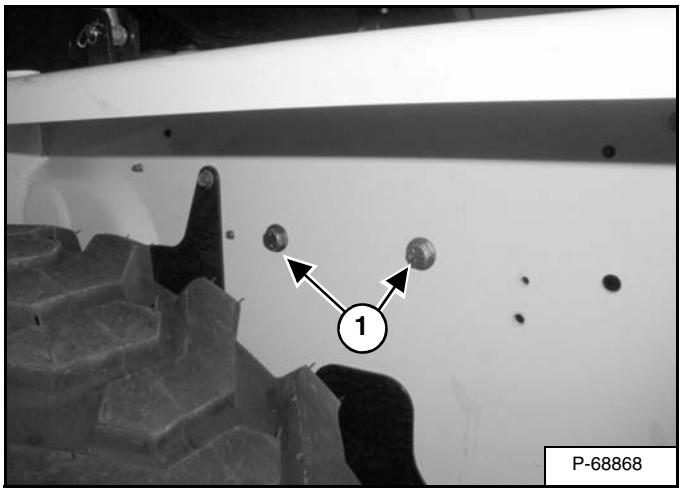
Remove the fixed-end main valve hose (Item 1) **[Figure 20-41-14]** from the main control valve fitting.

Figure 20-41-15



Connect a hoist to the lifting brackets (Item 1) **[Figure 20-41-15]** on the control valve.

Figure 20-41-16



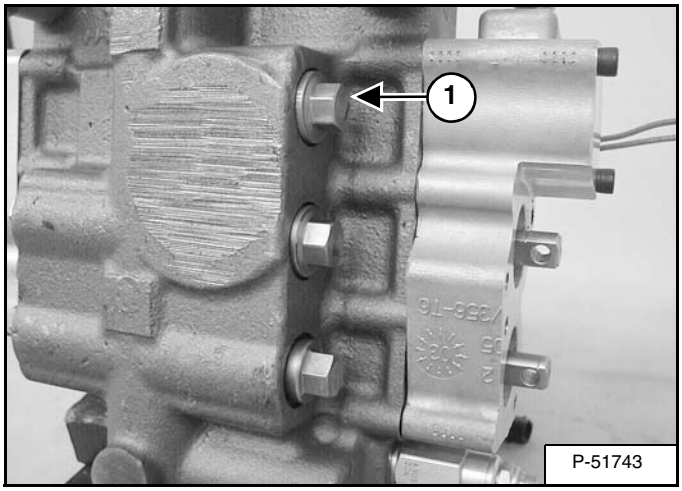
Remove the two mounting bolts (Item 1) **[Figure 20-41-16]** fastening the control valve to the side of the loader.

Remove the control valve from the loader.

Reverse procedure for installation.

Port Relief Valve Removal And Installation (Cont'd)

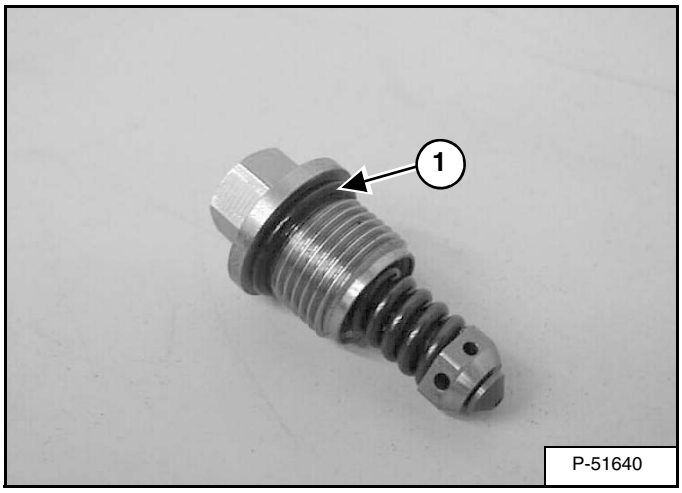
Figure 20-41-44



The control valve may be equipped with an optional auxiliary port relief valve (Item 1) **[Figure 20-41-44]**.

Remove the auxiliary port relief valve.

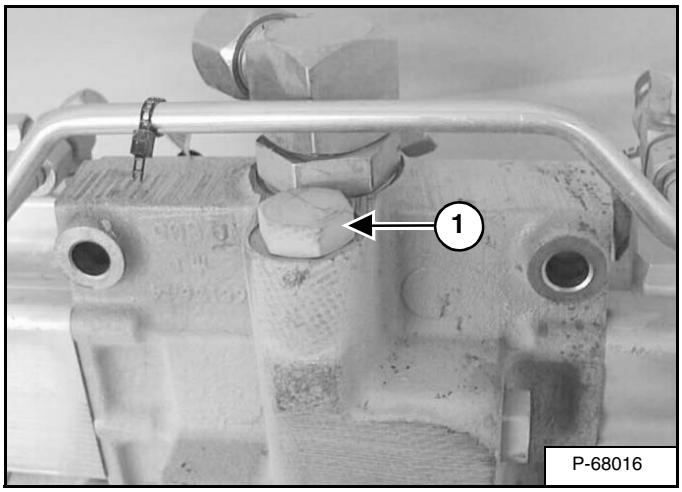
Figure 20-41-45



Installation: Always use new O-rings (Item 1) **[Figure 20-41-45]**. Lightly lubricate with oil and tighten to 38 - 45 ft.-lb. (52 - 61 N•m) torque.

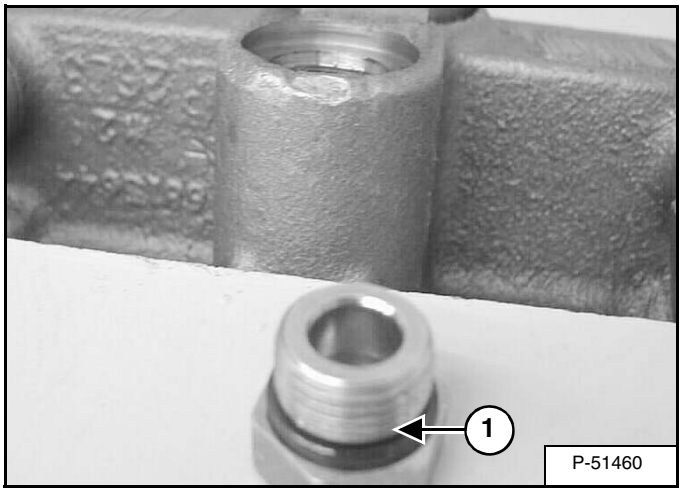
Plug Removal And Installation

Figure 20-41-46



At the top side of the control valve, remove the plug (Item 1) **[Figure 20-41-46]**.

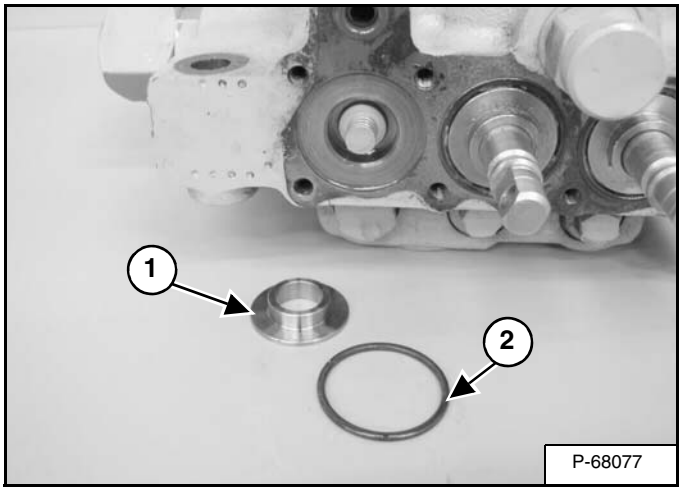
Figure 20-41-47



Installation: Always use new O-rings (Item 1) **[Figure 20-41-47]**. Tighten to 40 ft.-lb. (54 N•m) torque.

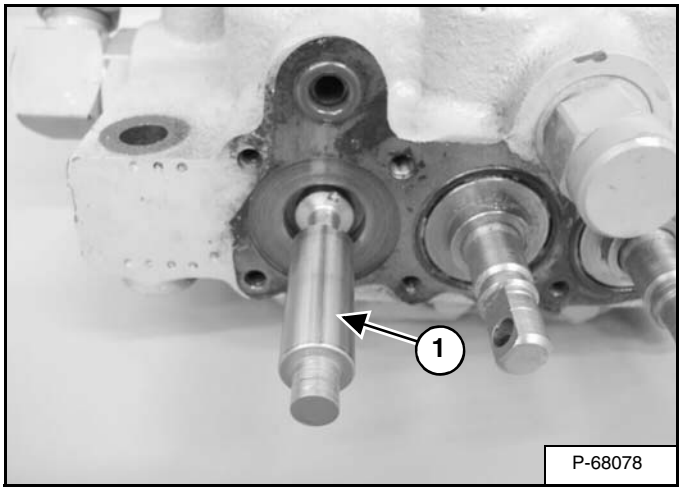
Auxiliary Spool Removal And Installation (Cont'd)

Figure 20-41-83



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-41-83]** from the auxiliary spool.

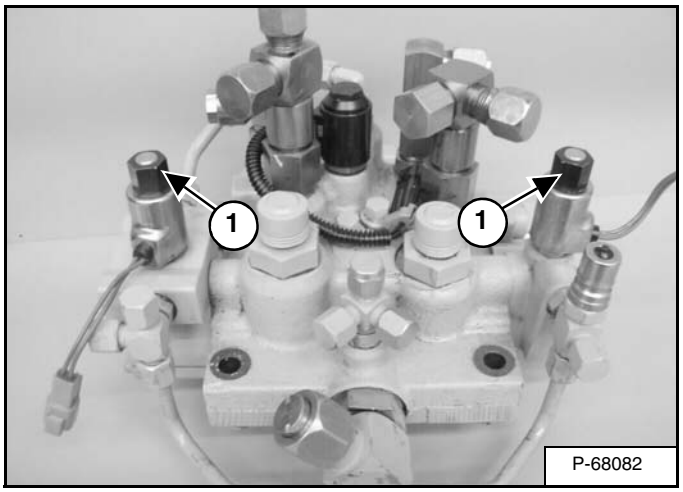
Figure 20-41-84



Remove the auxiliary spool (Item 1) **[Figure 20-41-84]**.

Auxiliary Solenoid Removal And Installation

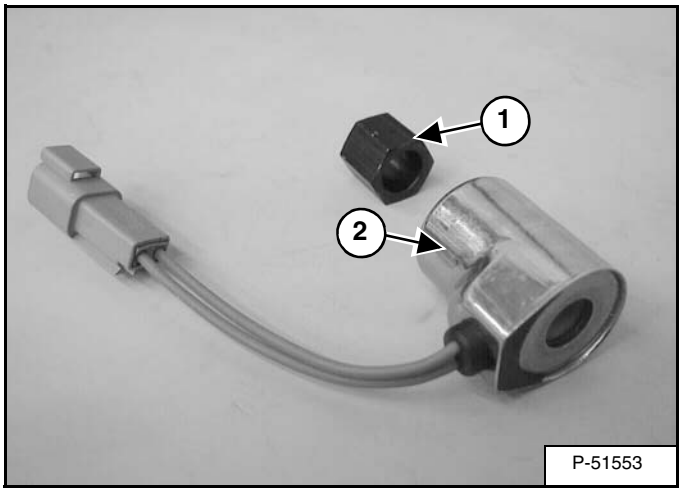
Figure 20-41-85



Remove the nut (Item 1) **[Figure 20-41-85]** from both solenoids.

Installation: Tighten the nut to 48 - 72 in.-lb. (5 - 8 N•m) torque.

Figure 20-41-86



Remove the nut (Item 1) and solenoid coil (Item 2) **[Figure 20-41-86]**.

Use an Ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is **4.9 ± 0.25 ohm**.

HYDRAULIC PUMP (STANDARD)

Description

The hydraulic gear pump is attached to the end of the hydrostatic pumps and is located on the right side of the loader between the hydraulic control valve and the engine.

The hydraulic gear pump is a combination of gear pumps that provide hydraulic flow to several hydraulic systems.

The hydraulic gear pump has a dedicated charge pump. This supplies flow to the hydraulic fan motor and charge pressure to the hydrostatic pump.

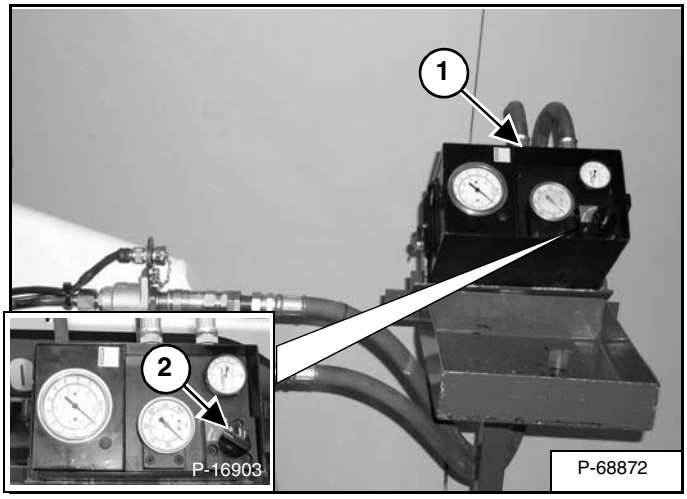
A seal kit is available to service the hydraulic pump. If any of the main components of the pump are damaged, the entire pump must be replaced.

Pump Test At Quick Couplers

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

MEL10003 - In-Line Hydraulic Tester
MEL10006 - Flowmeter Fitting Kit

Figure 20-60-1



NOTE: When testing the hydraulic flow of a machine, hoses must be at least 3/4 inch in diameter and connected directly to the hydraulic tester without using any type of "quick coupler" on the connection to the tester. Also make sure your hydraulic tester is capable of at least 50 GPM.

Install a hydraulic tester (Item 1) **[Figure 20-60-1]** onto the front auxiliary quick couplers.

This procedure will require a operator in the cab and one operator running the tester.

Start the engine and run at low idle RPM. Press the Front Auxiliary button. Engage the front auxiliary with the trigger on the right handle. 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 clockwise on the tester so it reads about a 1000 PSI (69 bar).

NOTE: *DO NOT EXCEED 3300 PSI.*

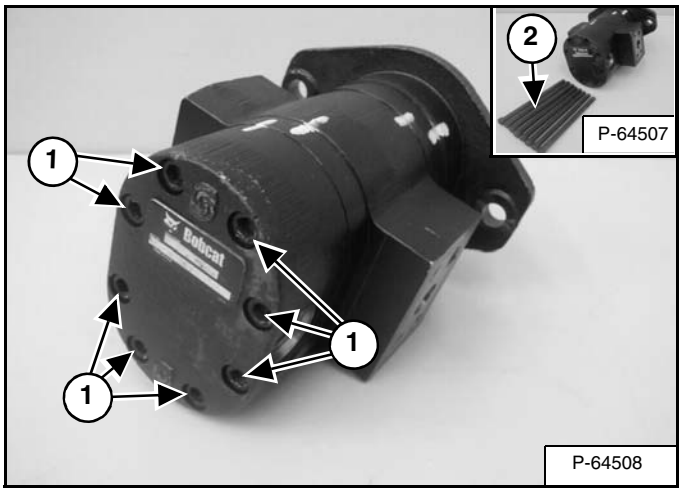
Turn the restrictor control (Item 2) **[Figure 20-60-1]** on the tester counterclockwise to obtain free flow, the flow should be approximately 16 - 17 GPM. Start turning the restrictor clockwise, causing more restriction on the flow. The GPM should drop off slightly until the pressure reaches approximately 2400 PSI. At approximately 2400 PSI the flow should start decreasing rapidly until the pressure reaches 2650 - 2750 PSI. At 2650 - 2750 PSI the flow should be at 0 GPM. Turn the restrictor (Item 2) **[Figure 20-60-1]** counterclockwise to free flow. Shut the front auxiliary hydraulics off.

If flow and pressure specs are not obtained, go to Direct Pump Testing. (See Direct Pump Test (Standard Section) on Page 20-60-2.)

*Refer to (See Hydraulic System on Page SPEC-10-3.) for system relief pressure and full RPM.

Disassembly And Assembly

Figure 20-60-22



Mark the pump sections for correct assembly **[Figure 20-60-22]**.

Remove the eight pump housing bolts (Item 1) **[Figure 20-60-22]**.

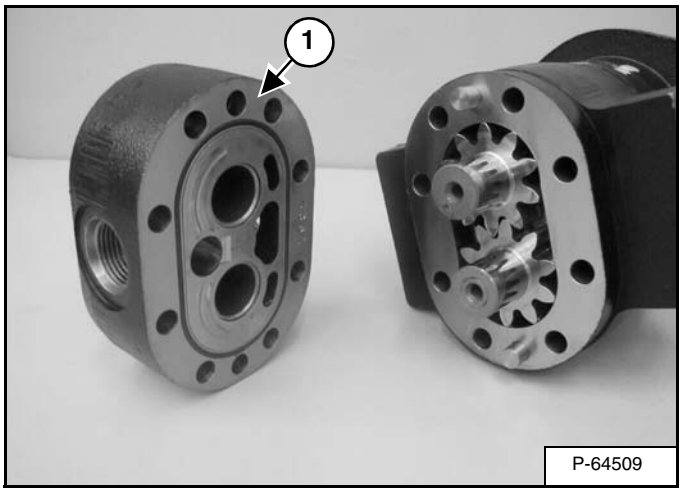
Installation: Tighten the bolts (Item 2) **[Figure 20-60-22]** to 54 ft.-lb. (73,2 N•m) torque.

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

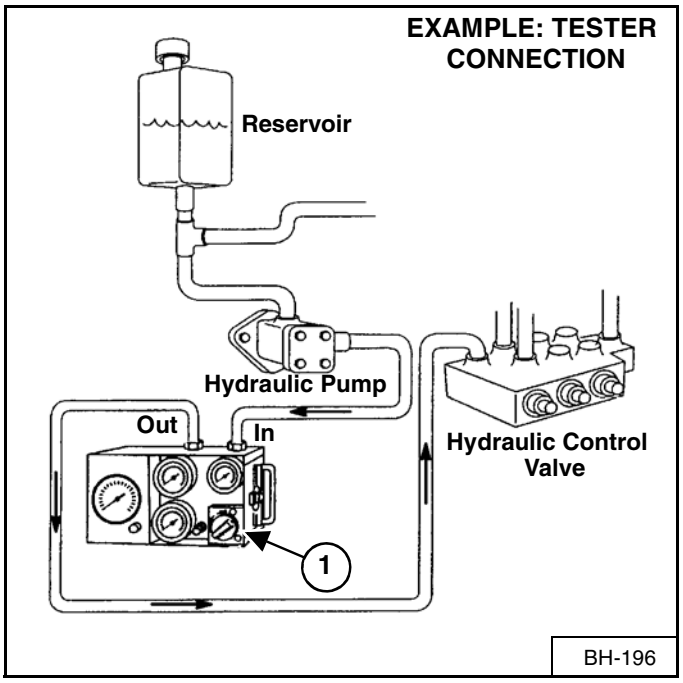
Figure 20-60-23



Remove the pump end section (Item 1) **[Figure 20-60-23]**.

Direct Pump Test (Standard Section) (Cont'd)

Figure 20-70-55



Sample tester connection shown **[Figure 20-70-55]**.

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 20-70-55]** 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.

$$\% = \frac{\text{HIGH PRESSURE FLOW (GPM)}}{\text{FREE FLOW (GPM)}} \times 100$$

A low percentage may indicate a failed pump.

*Refer to (See Hydraulic System on Page SPEC-10-3.) for system relief pressure and full RPM.

HYDRAULIC FLUID RESERVOIR

Description

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

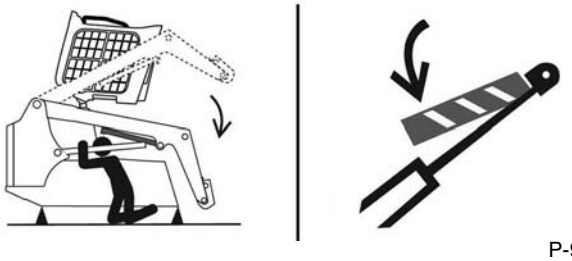
The hydraulic fluid reservoir is secured to the main frame behind the operators cab.

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 on Page 10-20-1.)

⚠ DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

⚠ 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

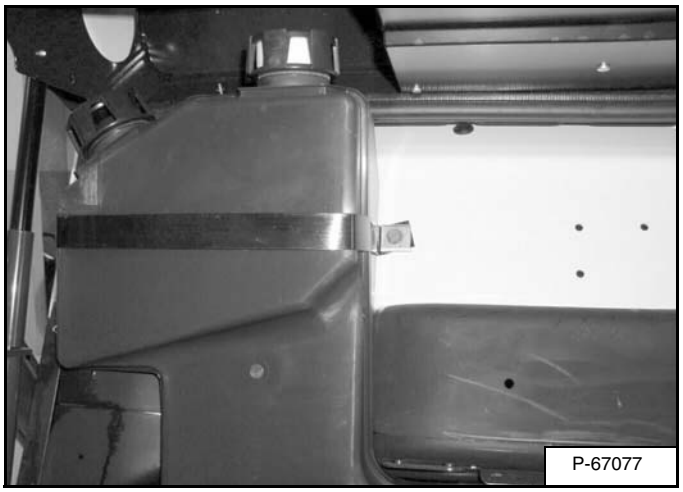
When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0888

Stop the engine.

Raise the operator cab. (See Raising on Page 10-30-2.)

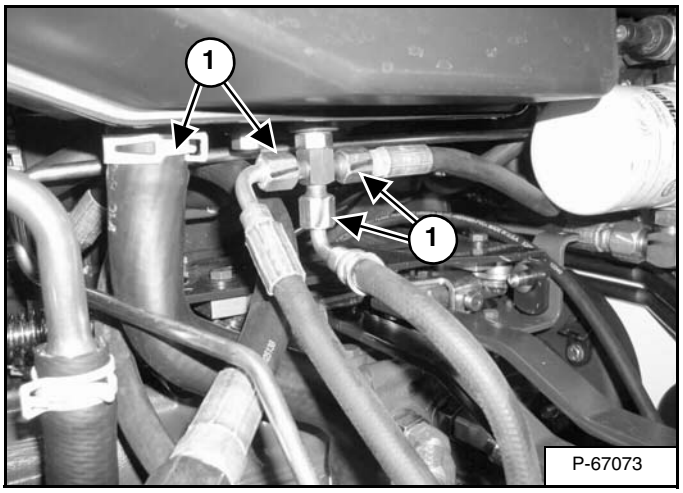
Figure 20-90-1



P-67077

Drain the hydraulic fluid reservoir **[Figure 20-90-1]**. (See Removing And Replacing Hydraulic Fluid on Page 10-120-2.)

Figure 20-90-2



P-67073

Mark and disconnect the hoses (Item 1) **[Figure 20-90-2]** from the hydraulic fluid reservoir.

REAR AUXILIARY DIVERTER VALVE

Description

The rear auxiliary diverter valve is an optional valve that diverts oil from the front auxiliary circuit to two sets of rear auxiliary couplers or the right side auxiliaries. The couplers are used for rear mounted attachments. The right side auxiliaries are used for older attachments.

The rear couplers are located, one set on each side of the rear frame uprights.

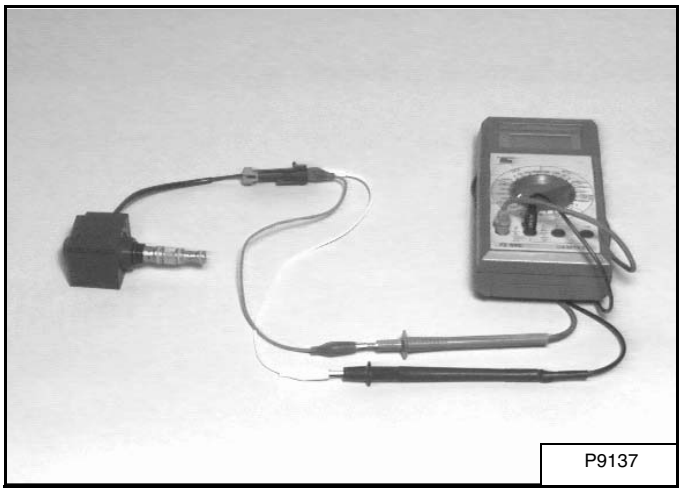
The right side auxiliaries are located on the inside of the right side lift arm at the front of the machine.

The rear auxiliary valve is located on the right side of the machine below the fuel fill hose. The valve is accessed by opening the rear door.

See Hydraulic schematic for more circuit information.

Solenoid Testing

Figure 20-120-1



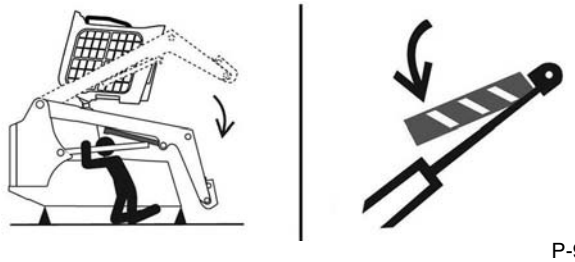
P9137

Use a test meter to measure coil resistance **[Figure 20-120-1]**. Coil wires do not have polarity. Correct resistance is 8.6 - 9.5 ohm @ 68 degrees fahrenheit.

Replace the test meter with 12 volt power. You can see and hear the spool shift.

Removal And Installation

DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

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

AVOID INJURY OR DEATH

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

W-2103-0508

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

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

Raise the operator cab. (See Raising on Page 10-30-2.)

BOB-TACH (POWER) BLOCK

Description

The Power Bob-Tach block is an option that allows the operator to hydraulically control the Bob-Tach levers for mounting and dismounting the attachments.

The power Bob-Tach is operated by a switch on the front console.

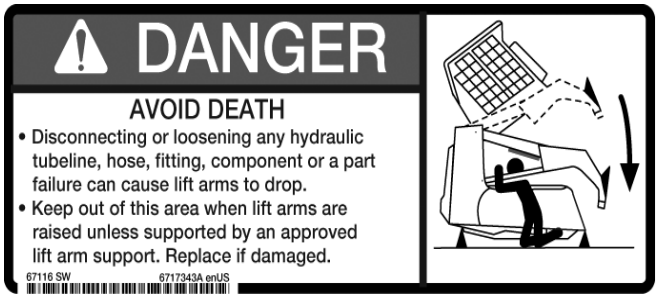
The power Bob-Tach block is mounted on the right side of the machine in front of the engine on the backside of the hydraulic gear pump.

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.)

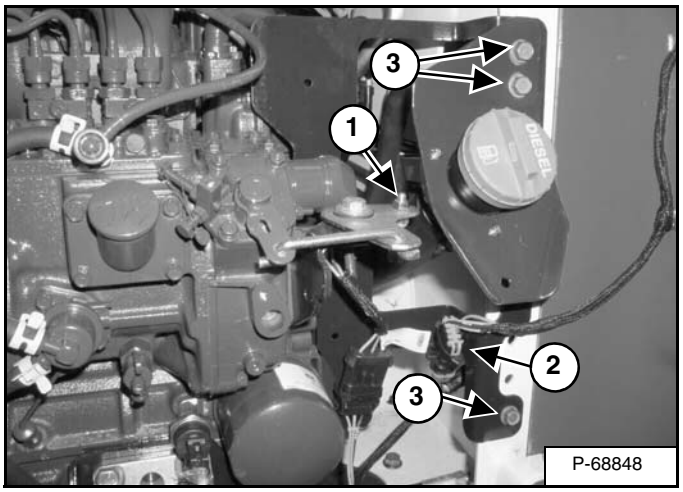
Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-1.)

Raise the operator cab. (See Raising on Page 10-30-2.)

Open the rear door.

Drain the hydraulic reservoir. (See Removing And Replacing Hydraulic Fluid on Page 10-120-2.)

Figure 20-130-1



Remove the nut from the speed control linkage (Item 1) and unplug the rear lights electrical connector (Item 2) **[Figure 20-130-1]**.

Remove the fuel fill bracket mounting screws (Item 3) **[Figure 20-130-1]**.

Installation: Tighten screws to 15 - 20 ft.-lb. (20 - 27 N•m) torque.

HYDROSTATIC SYSTEM INFORMATION

Troubleshooting

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.

If the service code appears in the left instrument panel, refer to the Electrical Service Manual for the probable cause.

⚠ WARNING

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

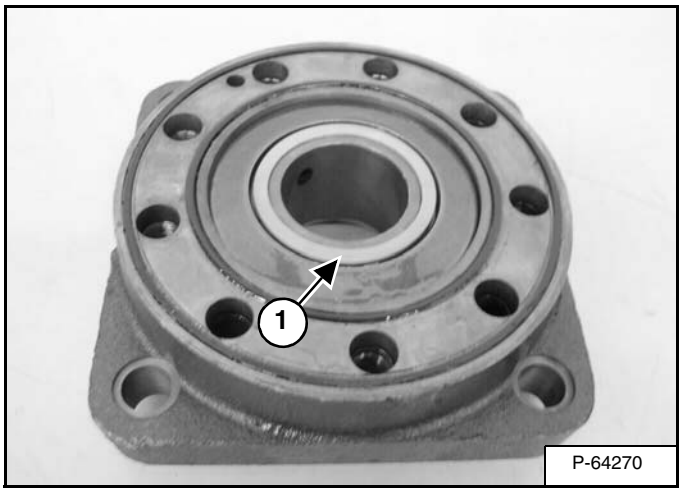
W-2004-1285

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, 10
The hydrostatic system is overheating.	8, 9

KEY TO CORRECT THE CAUSE	
1.	The hydrostatic pump relief / 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.
10.	The hydrostatic pump is not properly calibrated, and/or incorrect steering drift compensation setting.

Disassembly And Assembly (Cont'd)

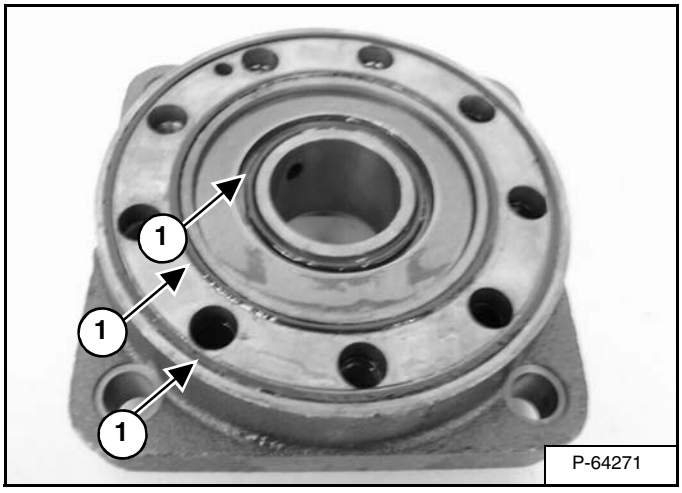
Figure 30-20-18



Remove the back up ring (Item 1) **[Figure 30-20-18]**.

Assembly: Apply grease to back up ring. One side of the back up ring is grooved to fit against the o-ring underneath.

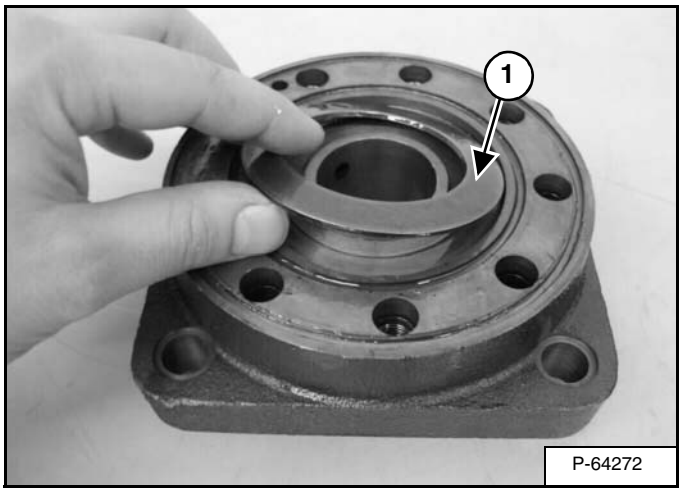
Figure 30-20-19



Remove and inspect/replace the seals (Item 1) **[Figure 30-20-19]** from the geroler.

Assembly: Apply grease to seals.

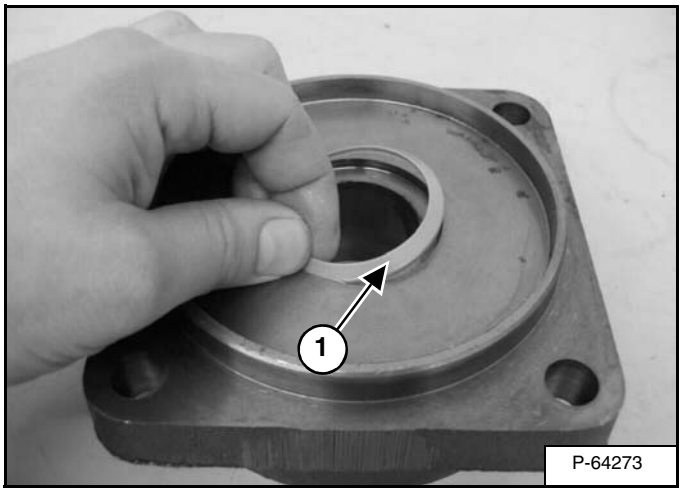
Figure 30-20-20



Remove the belleville spring. (Item 1) **[Figure 30-20-20]**.

Assembly: If the belleville spring is no longer cone shaped, replace with new.

Figure 30-20-21

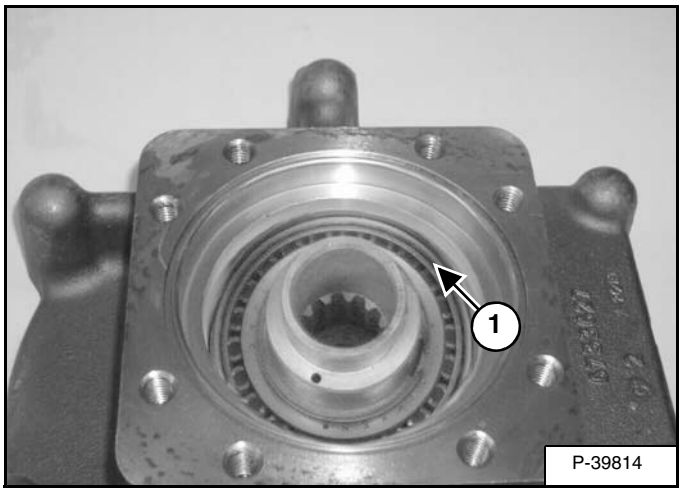


Carefully turn the mounting flange over and remove the seal (Item 1) **[Figure 30-20-21]**.

Assembly: Replace the seal.

Disassembly and Assembly (Cont'd)

Figure 30-30-21



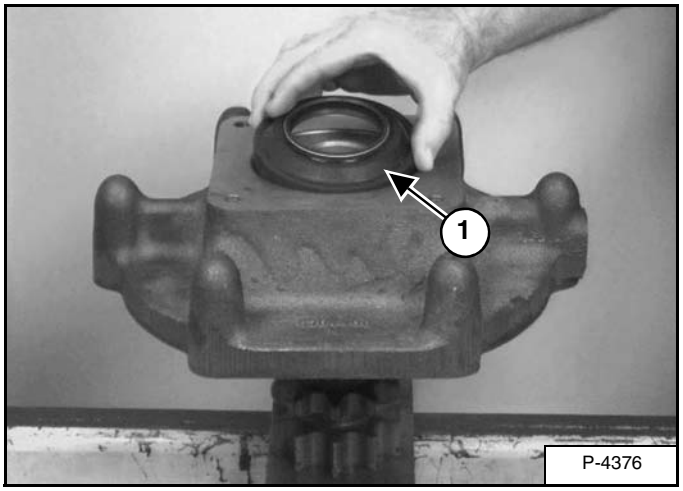
Put the snap ring (Item 1) **[Figure 30-30-21]** over the end of the sprocket shaft.

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 30-30-21]** over the sprocket.

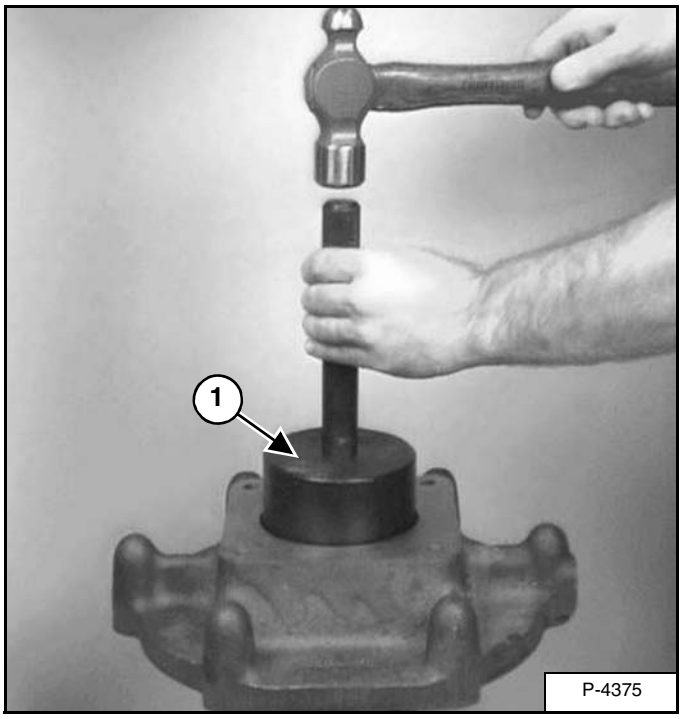
Press the snap ring on until it snaps into the groove on the shaft.

Figure 30-30-22



Put a new shaft seal (Item 1) **[Figure 30-30-22]** on the sprocket shaft.

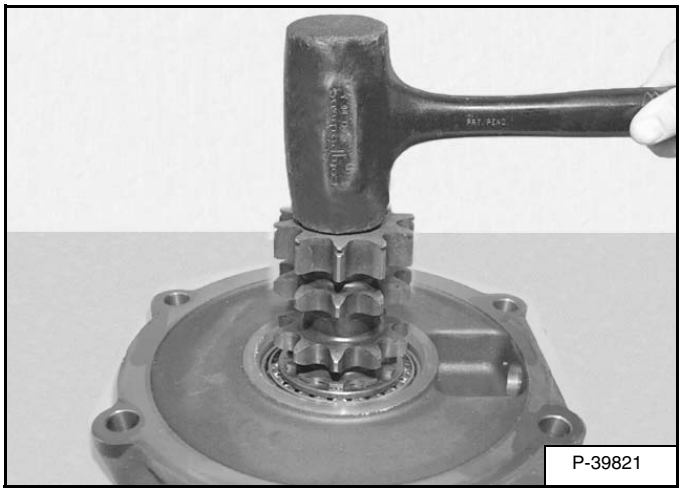
Figure 30-30-23



Use MEL1420 Carrier Seal Tool (Item 1) **[Figure 30-30-23]** and install the shaft seal.

Hit the tool with a hammer until the seal is fully seated on the carrier shaft **[Figure 30-30-23]**.

Figure 30-30-24

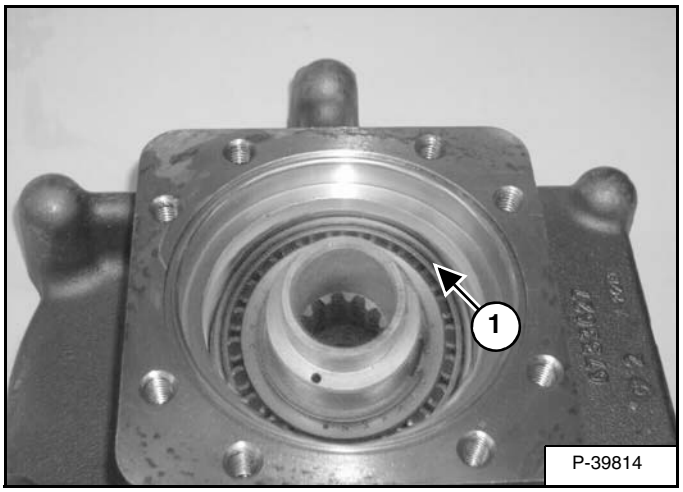


Check the end play of the motor carrier as follows:

Use a rubber mallet **[Figure 30-30-24]**, tap down on the cluster shaft.

Disassembly and Assembly (Cont'd)

Figure 30-31-21



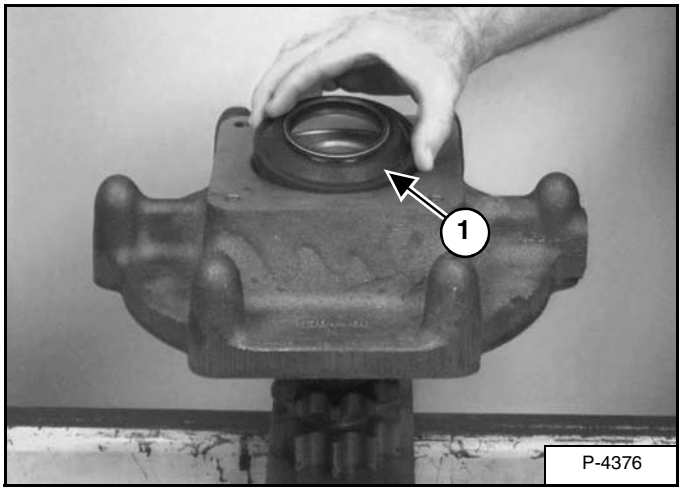
Put the snap ring (Item 1) **[Figure 30-31-21]** over the end of the sprocket shaft.

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 30-31-21]** over the sprocket.

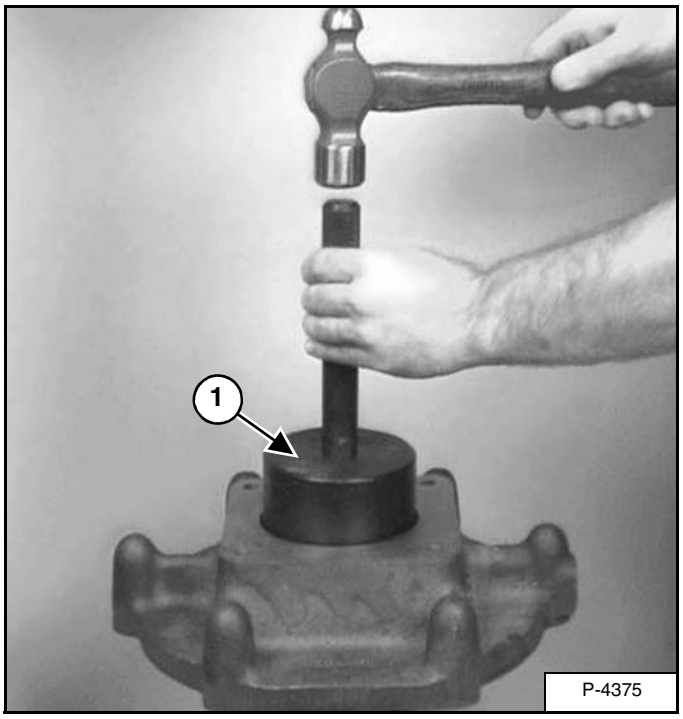
Press the snap ring on until it snaps into the groove on the shaft.

Figure 30-31-22



Put a new shaft seal (Item 1) **[Figure 30-31-22]** on the sprocket shaft.

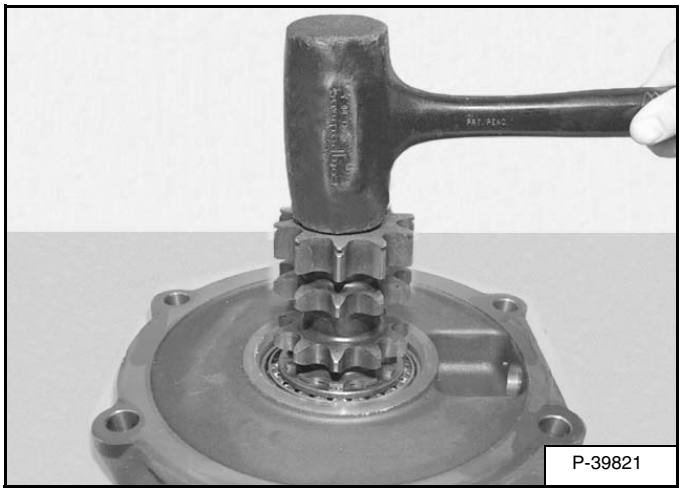
Figure 30-31-23



Use MEL1420 Carrier Seal Tool (Item 1) **[Figure 30-31-23]** and install the shaft seal.

Hit the tool with a hammer until the seal is fully seated on the carrier shaft **[Figure 30-31-23]**.

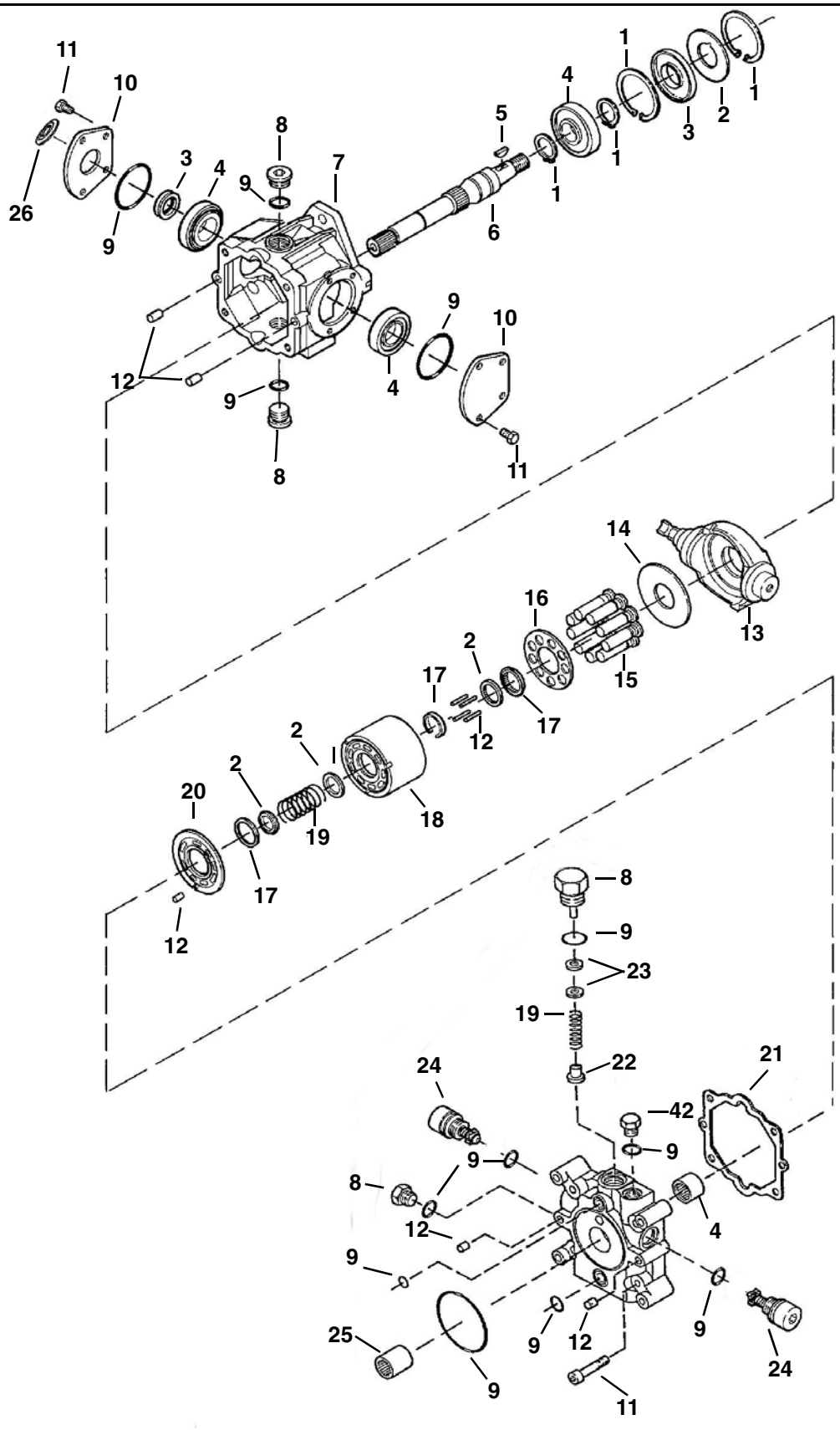
Figure 30-31-24



Check the end play of the motor carrier as follows:

Use a rubber mallet **[Figure 30-31-24]**, tap down on the cluster shaft.

Parts Identification (Left Half)



Ref.	Description
1.	Snap Ring
2.	Washer
3.	Seal
4.	Bearing
5.	Key
6.	Shaft
7.	Housing
8.	Plug
9.	O-ring
10.	Cover
11.	Bolt
12.	Pin
13.	Swash Plate
14.	Wear Plate
15.	Piston Assembly
16.	Piston Retainer
17.	Retainer
18.	Block
19.	Spring
20.	Valve Plate
21.	Gasket
22.	Poppet
23.	Shim
24.	Replenishing/High Pressure Relief Valve
25.	Coupler
26.	Dust Seal

D-2428C

Assembly (Cont'd)

Figure 30-50-38

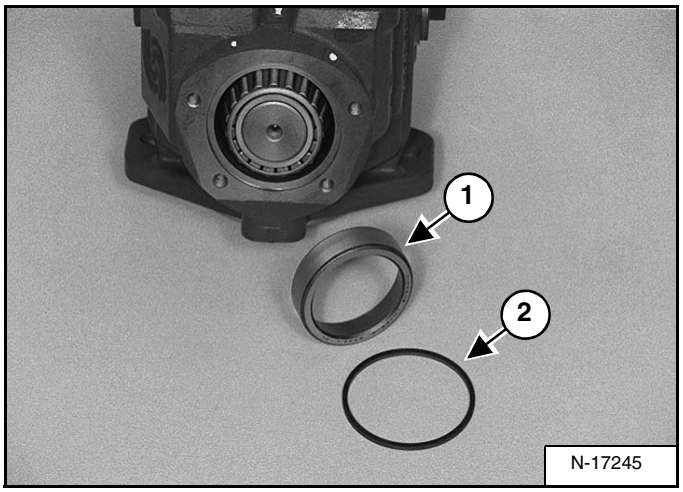
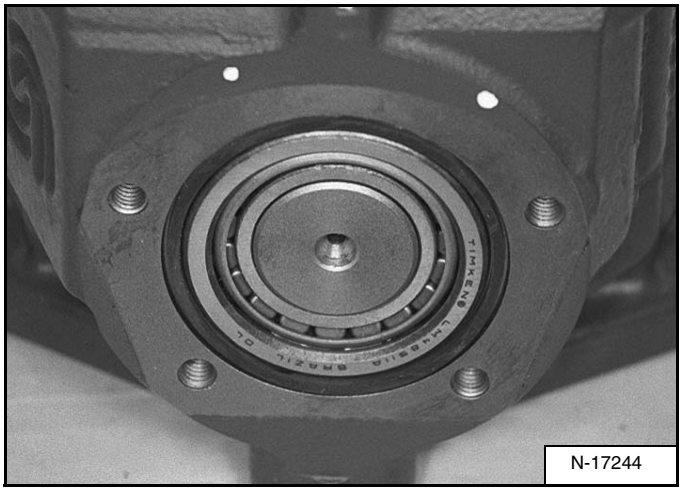
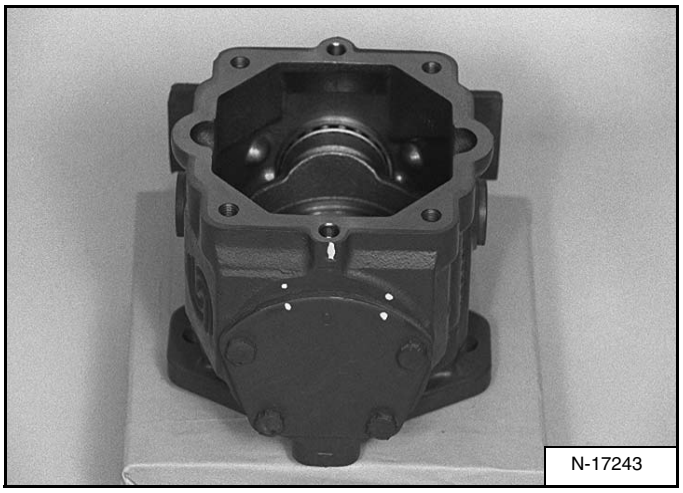


Figure 30-50-39



Install the bearing race (Item 1) **[Figure 30-50-38]** and O-ring (Item 2) **[Figure 30-50-38]** at the lower trunnion as shown in **[Figure 30-50-39]**.

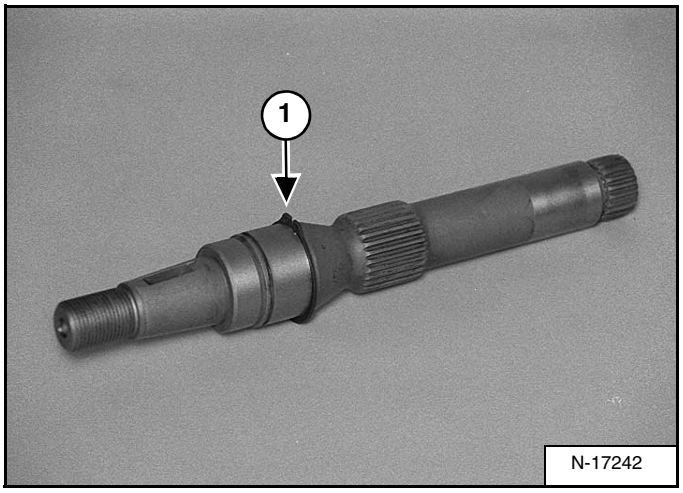
Figure 30-50-40



Align the marks on the lower trunnion cover and pump housing as shown in **[Figure 30-50-40]**.

Install the four mounting bolts and tighten to 18 - 22 ft.-lb. (24 - 30 N•m) torque.

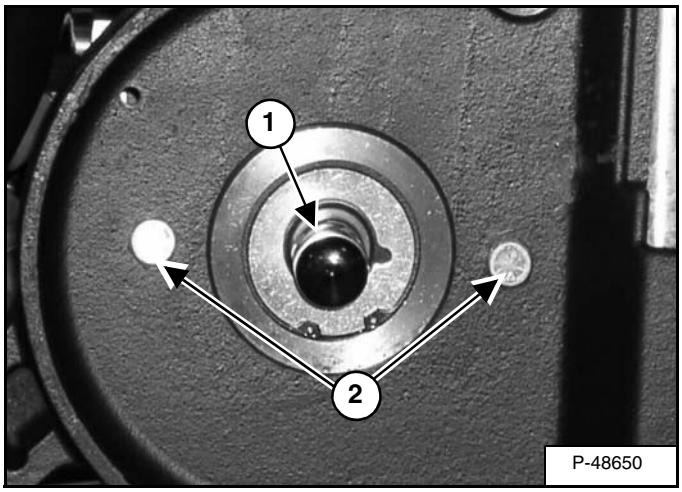
Figure 30-50-41



Install the snap ring (Item 1) **[Figure 30-50-41]** on the pump shaft.

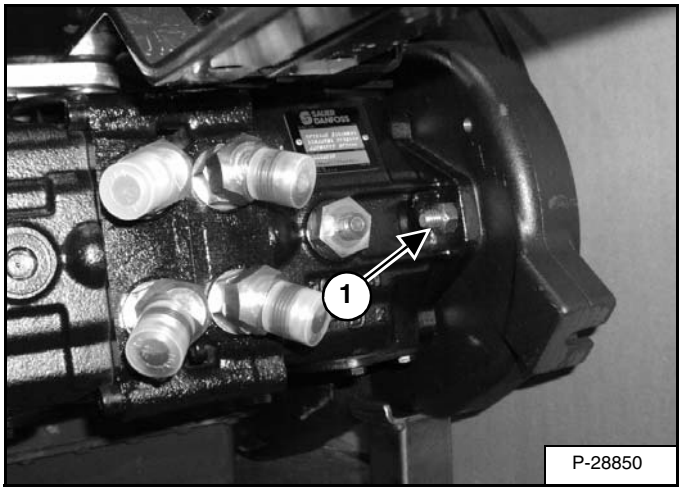
Removal And Installation (Cont'd)

Figure 30-51-12



Installation: Install the key in the hydrostatic pump shaft (Item 1) **[Figure 30-51-12]** before installing the pump drive pulley.

Figure 30-51-13



Hold the nut (Item 1) **[Figure 30-51-13]** on the two hydrostatic pump mounting bolts (Item 2) **[Figure 30-51-12]**.

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.

Reverse the removal procedure to install the hydrostatic pump assembly.

Hydrostatic Pump Start Up

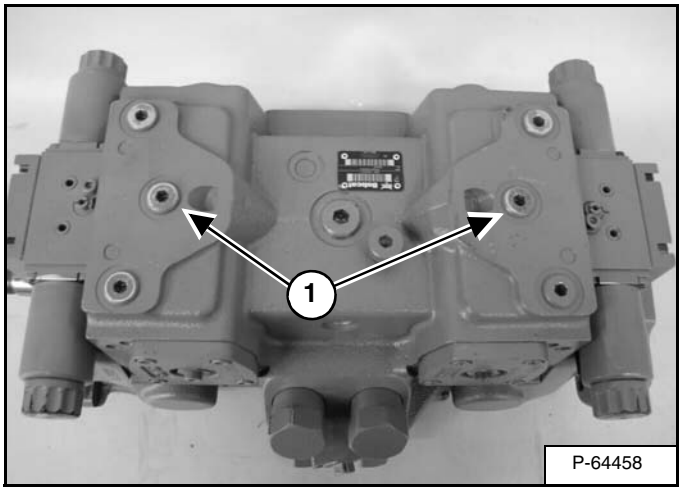
Before putting a hydrostatic pump back into operation, the hydrostatic pump should be filled with hydrostatic fluid. This should be performed when installing a new hydrostatic pump or a pump that has been disassembled.

Starting a hydrostatic pump dry may cause premature wear or permanent pump damage.

Under normal operation, the charge pump will keep the hydrostatic pumps filled.

Filling the hydrostatic pump is best done by removing a plug at the top of the hydrostatic pump. A clean funnel should be used to avoid washing contaminants into the hydrostatic pump. The goal is to fill the hydrostatic pump as much as possible before start up.

Figure 30-51-14



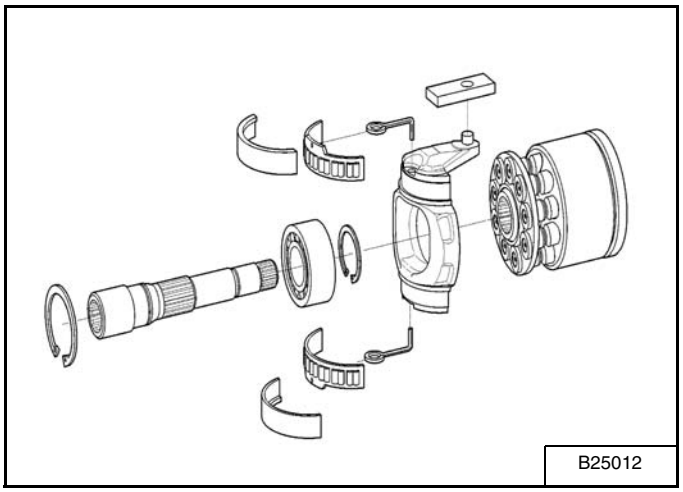
Remove the air bleed plugs (Item 1) **[Figure 30-51-14]**.

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.

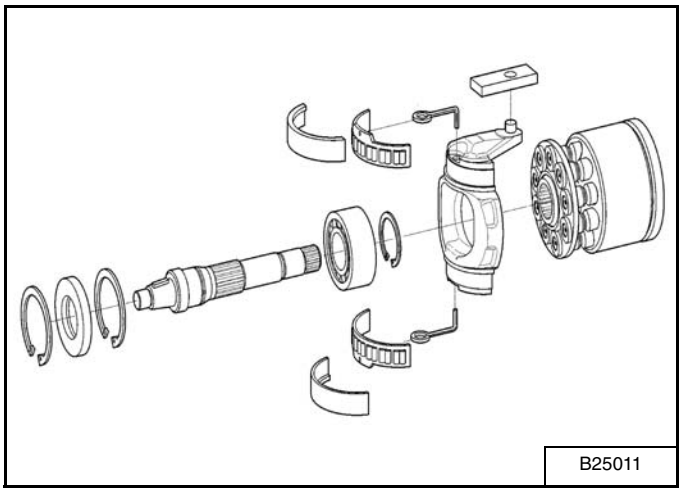
Disassembly And Assembly (Cont'd)

Figure 30-51-40



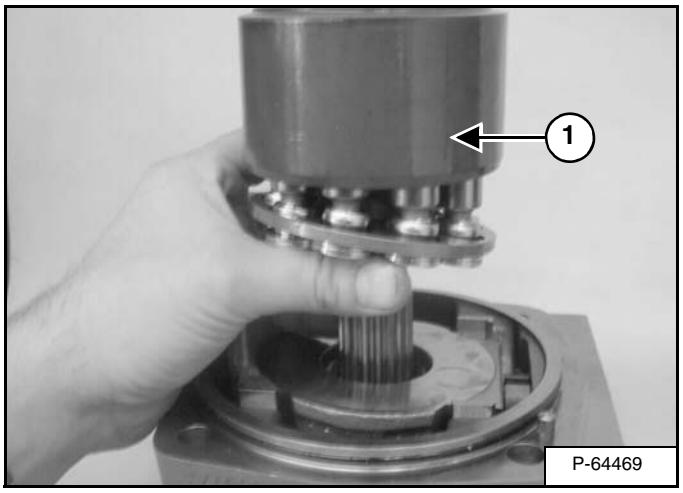
Right Side Rotating Group **[Figure 30-51-40]**.

Figure 30-51-41



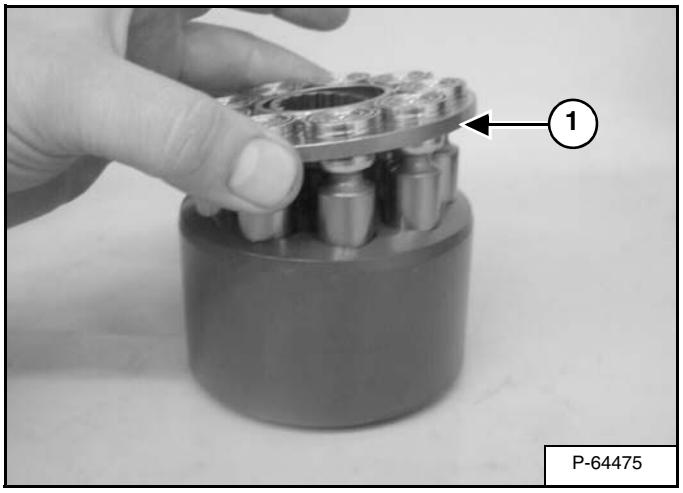
Left Side Rotating Group **[Figure 30-51-41]**.

Figure 30-51-42



Remove the piston assembly (Item 1) **[Figure 30-51-42]**.

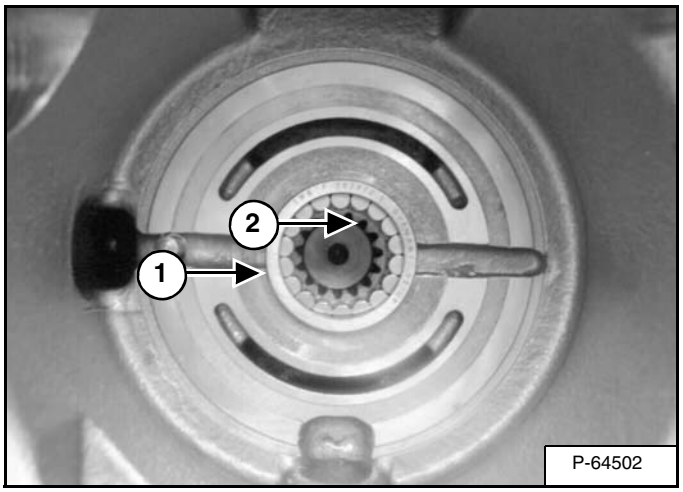
Figure 30-51-43



Remove the pistons (Item 1) **[Figure 30-51-43]** from the rotating block.

Disassembly And Assembly (Cont'd)

Figure 30-51-78



Bearings (Item 1) **[Figure 30-51-78]** in case housing are replaced by using a press and bearing driver.

Inspect center coupler (Item 2) **[Figure 30-51-78]**.

Mechanical Neutral Adjustment

The pump mechanical neutral adjustment sets the position of the servo piston and pump swash plate 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.

W-2017-0286

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

Raise the operator cab. (See Raising on Page 10-30-2.)

Connect the remote start tool. (See REMOTE START TOOL KIT-MEL1563 on Page 10-60-1.)

Disconnect the swash plate angle sensors in the electrical harness. This prevents unwanted swash plate 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

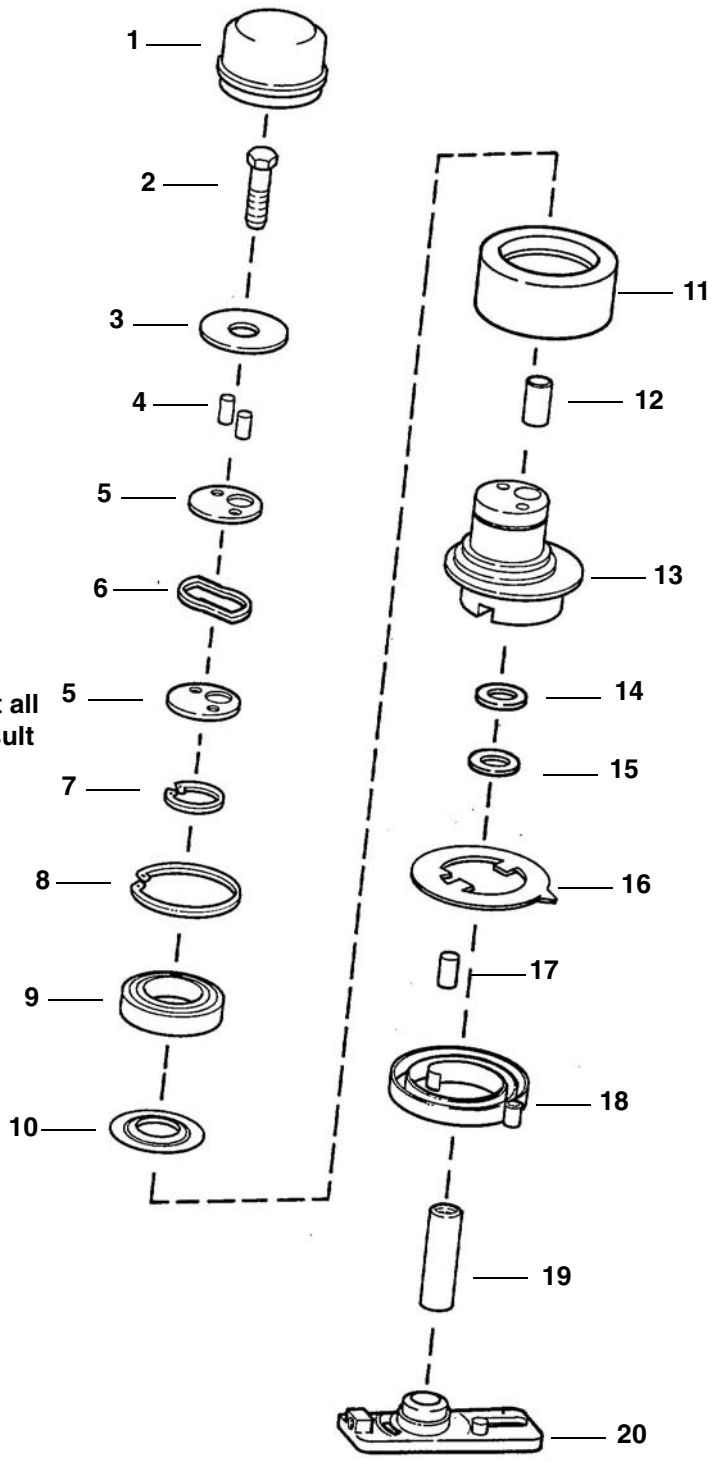
Hydraulic fluid escaping under pressure can have sufficient force to enter a person's body by penetrating the skin. This can cause serious injury and possible death if proper medical treatment by a physician familiar with this injury is not received immediately.

W-2145-0290

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

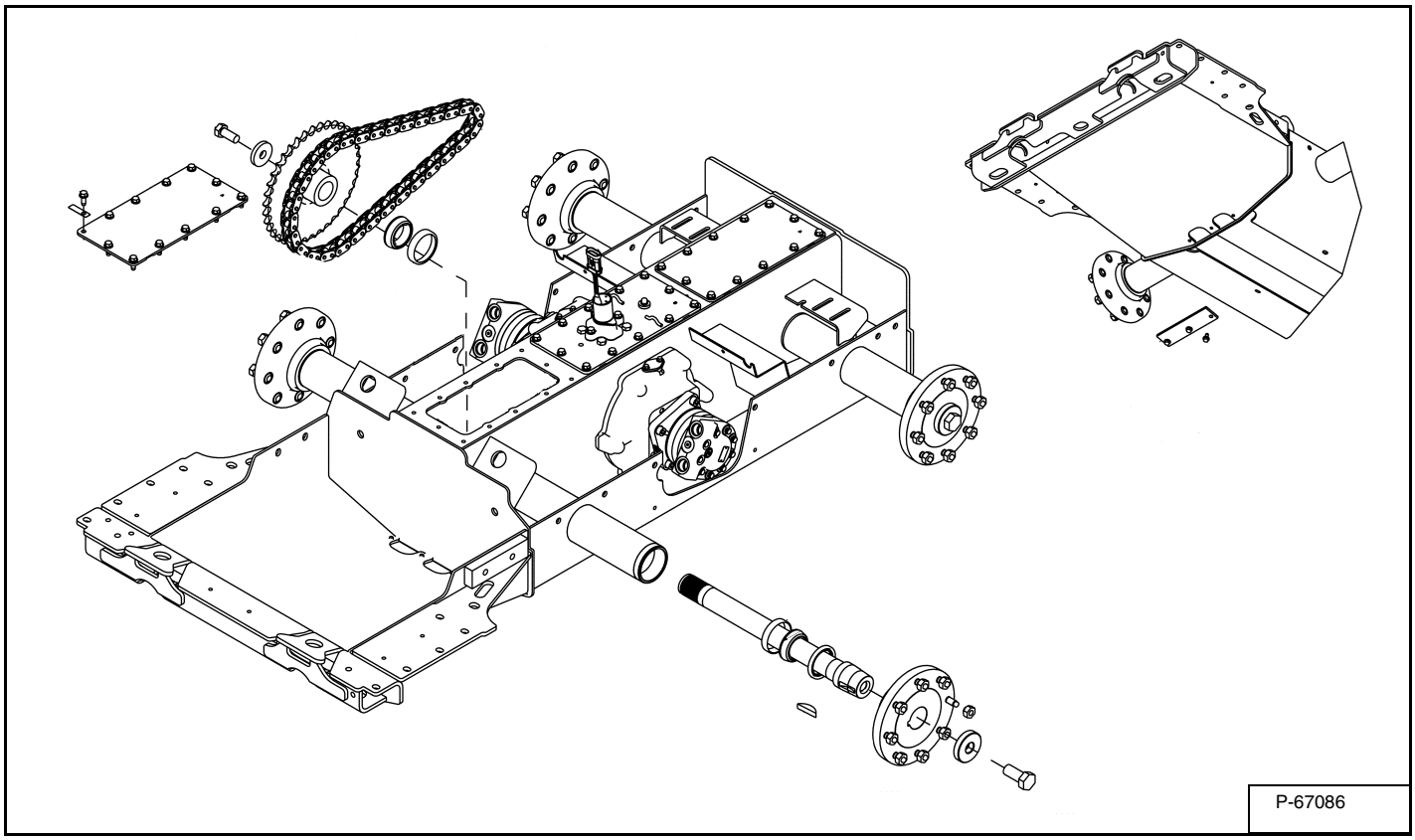
NOTE: Belt tensioner parts are not all available individually. Consult parts catalog for available sub-assemblies.



E-2296

DRIVE COMPONENTS

Description



The drive components consist of the chaincase, drive chains, sprockets, axleshafts, hubs and a brake.

The chaincase is partially filled with hydraulic fluid to lubricate the chains and bearings.

On the bottom of the chaincase, these is a cover for access to the fuel tank drain plug.

CHAINCASE

Description

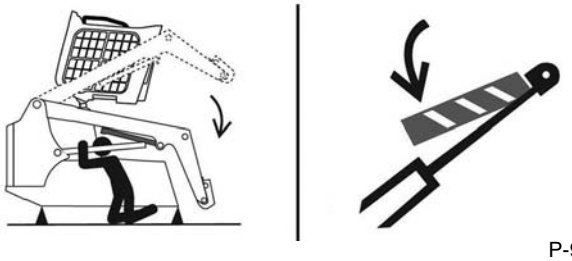
The chaincase contains the drive components.

Front Cover Removal And Installation

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

Raise the loader operator cab. (See Raising on Page 10-30-2.)

⚠ DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

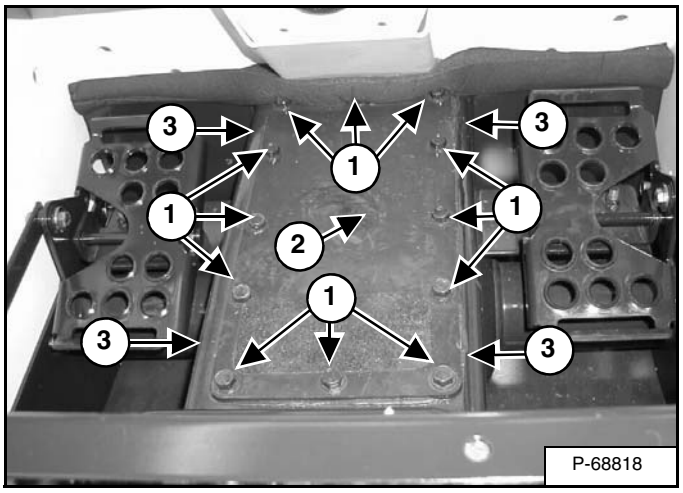
D-1009-0409

⚠ 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 40-30-1



Remove the front chaincase cover mounting screws (Item 1) **[Figure 40-30-1]**.

Remove the front chaincase cover (Item 2) **[Figure 40-30-1]** from the loader.

NOTE: There are machined recesses (Item 3) [Figure 40-30-1] on the bottom side of the cover to help pry the covers off.

Installation: Apply polyurethane sealer to mating surfaces. Polyurethane sealant should be applied to the screw threads to stop oil leakage. Tighten the mounting screws to 20 - 25 ft.-lb. (27 - 34 N•m) torque.

Disassembly And Assembly (Cont'd)

Figure 50-10-9

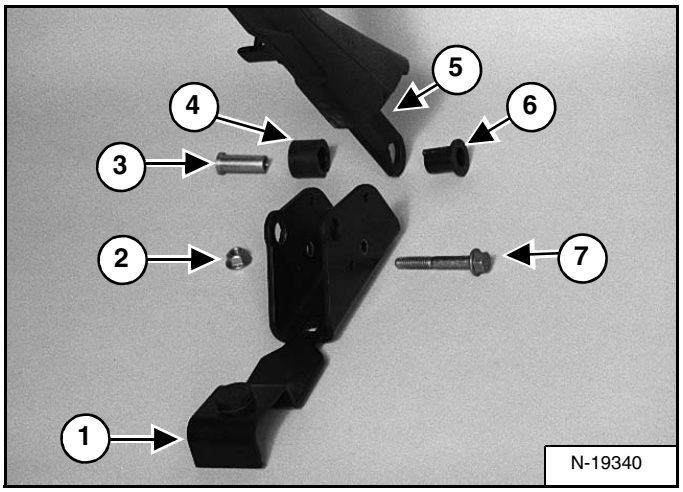
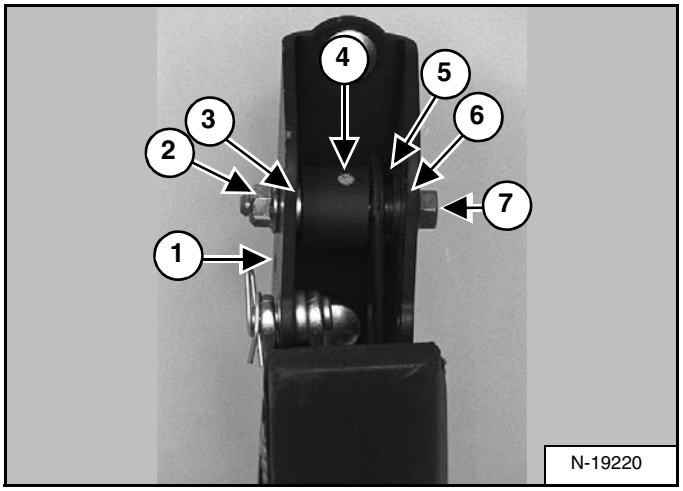


Figure 50-10-10



Assemble the parts as shown for the right side of the seat bar pivot assembly **[Figure 50-10-9]** & **[Figure 50-10-10]**.

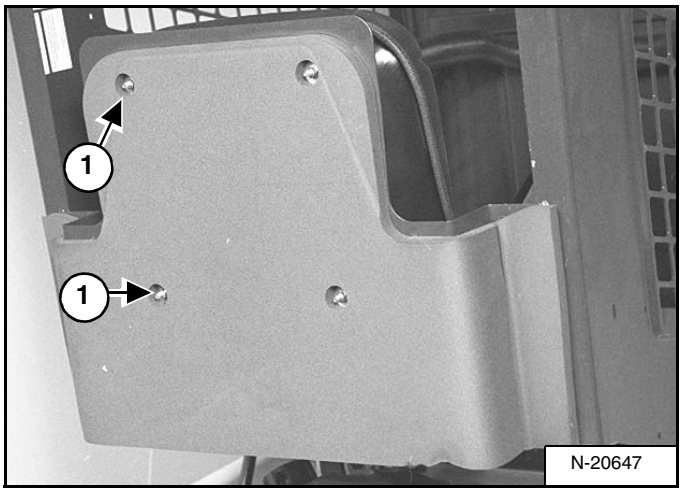
Seat Bar Mount (Item 1)
Mounting Nut (Item 2)
Pivot Bushing (Item 3)
Spacer Bushing (Item 4)
Seat Bar (Item 5)
Keyed Plastic Bushing (Item 6)
Mounting Bolt (Item 7)

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.

OPERATOR SEAT (SUSPENSION)

Removal And Installation

Figure 50-31-1

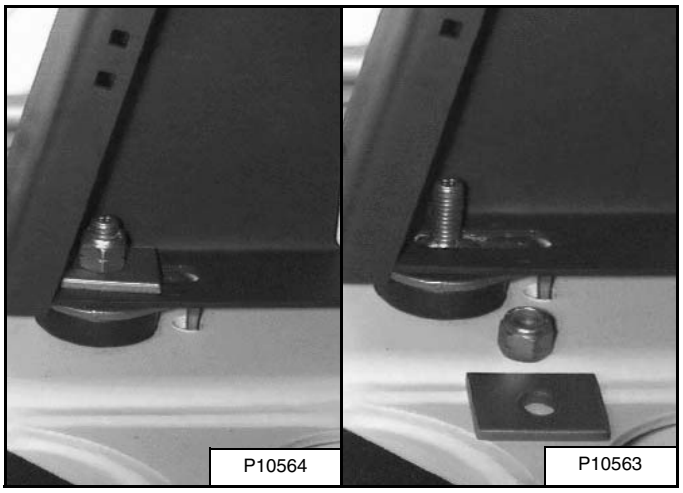


Raise the operator cab. (See Raising on Page 10-30-2.)

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

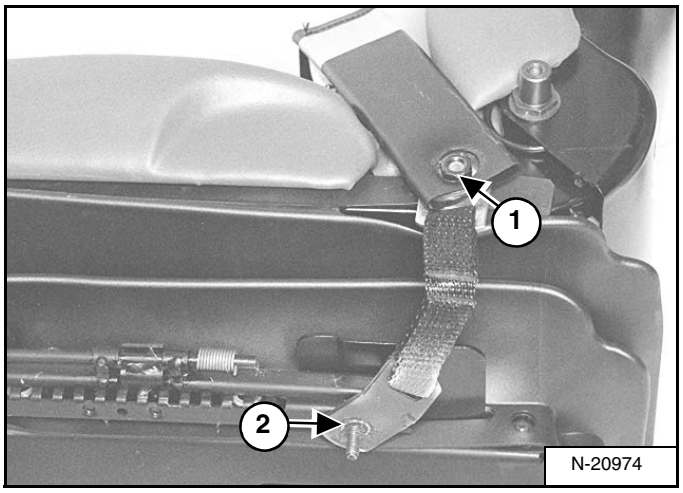


Lower the cab and install one of the mounting washers and a nut **[Figure 50-31-2]**.

NOTE: With the seat removed, the cab will raise.

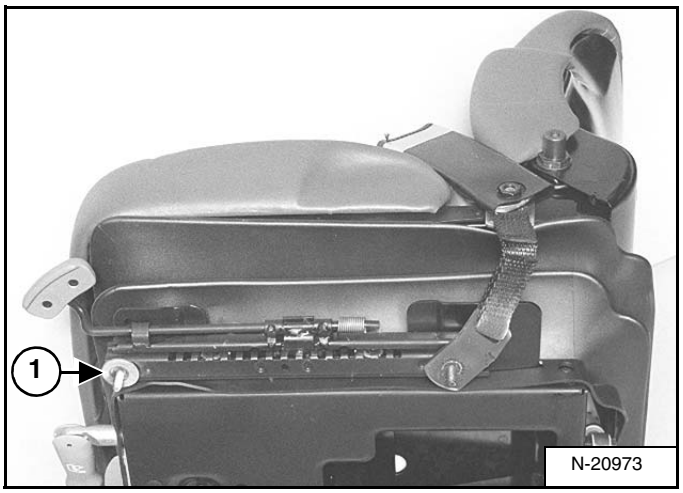
Reverse the removal procedure to install the operator seat.

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].

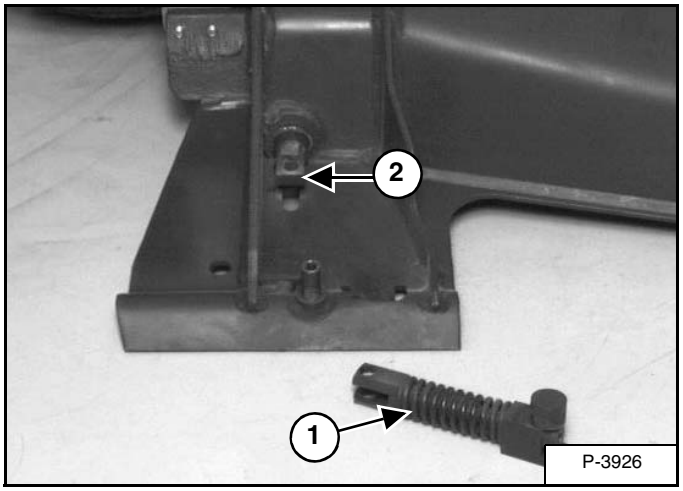
Figure 50-31-4



NOTE: Verify the front two seat rail studs have washers attached (Item 1) [Figure 50-31-4].

Lever And Wedge Disassembly And Assembly (Cont'd)

Figure 50-40-12

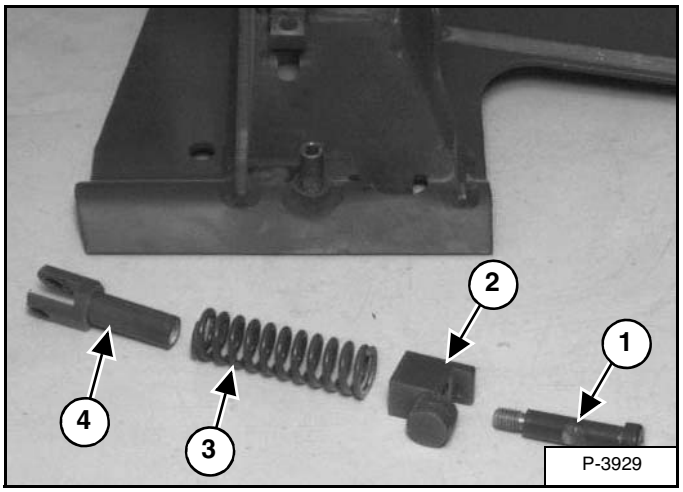


Remove the spring, bolt and clevis assembly (Item 1) **[Figure 50-40-12]**.

Remove the wedge (Item 2) **[Figure 50-40-12]** from the Bob-Tach frame.

Always replace bent or broken wedges.

Figure 50-40-13



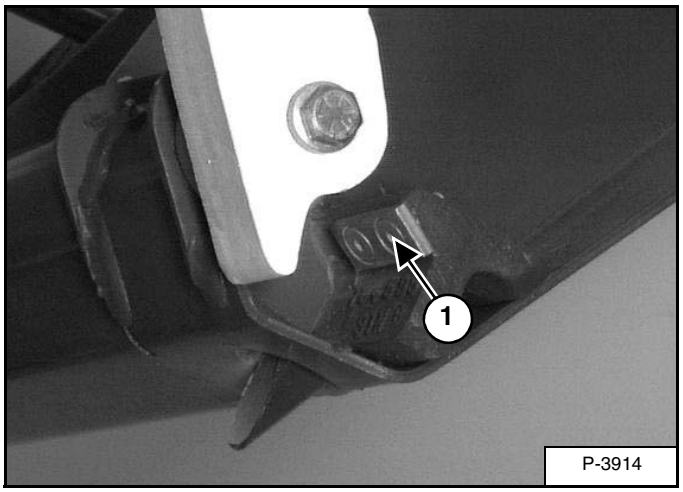
If the bolt (Item 1), handle pivot (Item 2), spring (Item 3) or clevis (Item 4) are damaged, put the assembly in the vise. Loosen and remove the bolt (Item 1) **[Figure 50-40-13]** with a 5/16 inch allen wrench.

Replace the worn or damaged parts as needed.

Reverse the removal procedure to install the Bob-Tach Lever and Wedge.

Bob-Tach Stops

Figure 50-40-14

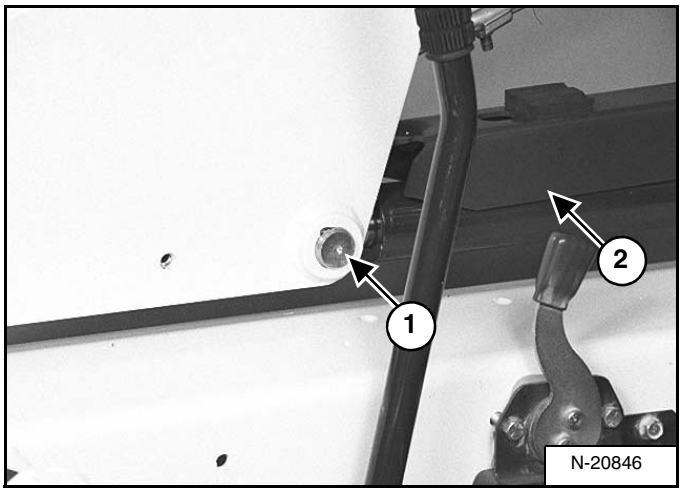


Remove and replace the Bob-Tach stop (Item 1) **[Figure 50-40-14]** (both sides) if worn or damaged.

NOTE: The Bob-Tach stop (Item 1) [Figure 50-40-14] must contact the lift arm at the same time the tilt cylinder reaches full extension. Use available shims to adjust the Bob-Tach stop and tilt cylinder sequence as closely as possible.

Removal And Installation (Cont'd)

Figure 50-50-8



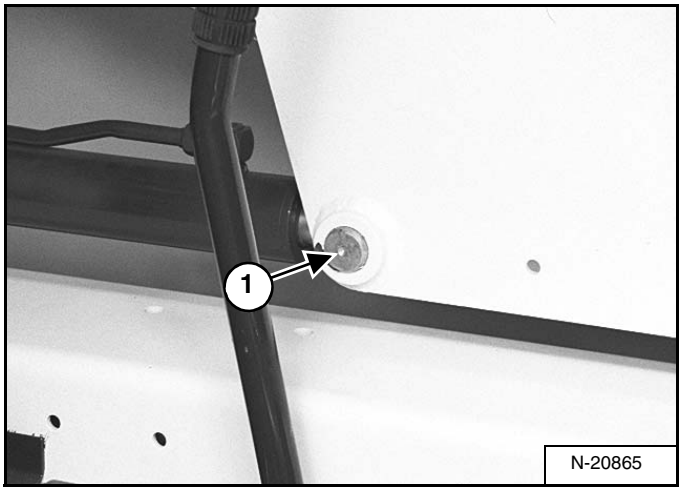
Raise the operator cab. (See Raising on Page 10-30-2.)

Remove the right side lift cylinder pivot pin (Item 1) **[Figure 50-50-8]**.

NOTE: Put a piece of cardboard under the rod end of the lift cylinders to protect the fender from scratches.

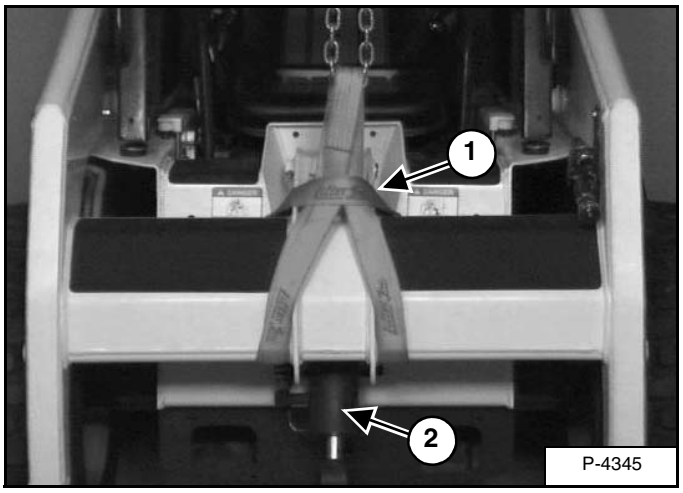
Remove the lift arm support device (Item 2) **[Figure 50-50-8]**.

Figure 50-50-9



Remove the left side lift cylinder pivot pin (Item 1) **[Figure 50-50-9]**.

Figure 50-50-10



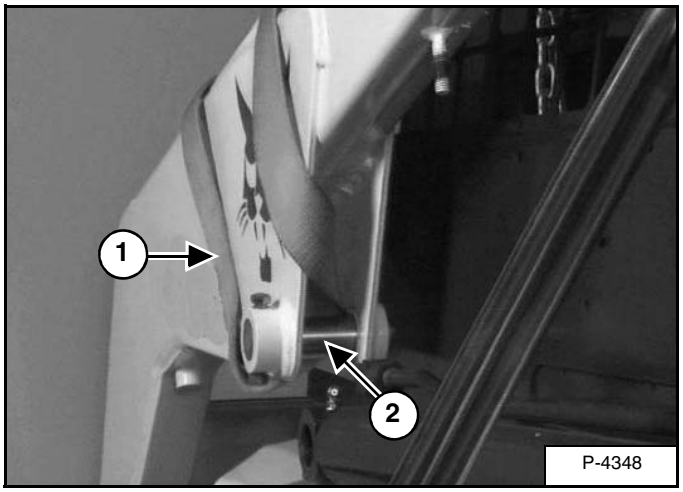
Wrap one of the 7 ft. lifting straps around the lift arm crossmember as shown **[Figure 50-50-10]**.

Both loops of the lifting strap should be supported by the chain hoist **[Figure 50-50-10]**.

Use a chain hoist and lifting strap to raise the lift arms enough to remove the tilt cylinder base end pivot pin (Item 1) **[Figure 50-50-10]**.

Remove the tilt cylinder (Item 2) **[Figure 50-50-10]** from the lift arm crossmember and put on the blocking.

Figure 50-50-11



Put the middle of the second lifting strap (Item 1) **[Figure 50-50-11]** up into the lift arm as shown.

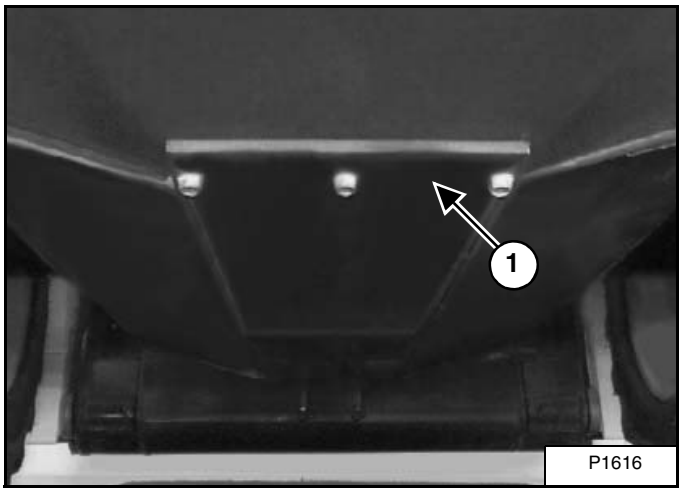
Install the lift cylinder pivot pin (Item 2) **[Figure 50-50-11]** and secure the pin with the mounting bolt and nut.

Wrap both ends of the strap around the top of the lift arm and down the back of the lift arm **[Figure 50-50-11]**.

FUEL TANK

Removal And Installation

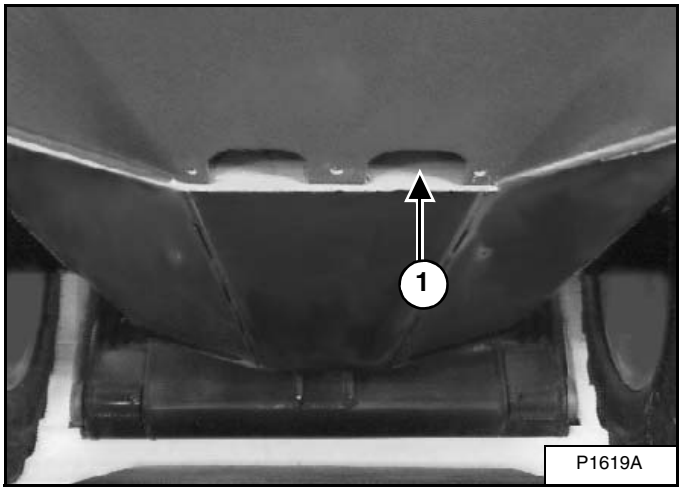
Figure 50-80-1



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 15 - 20 ft.-lb. (20 - 27 N•m) torque.

Figure 50-80-2

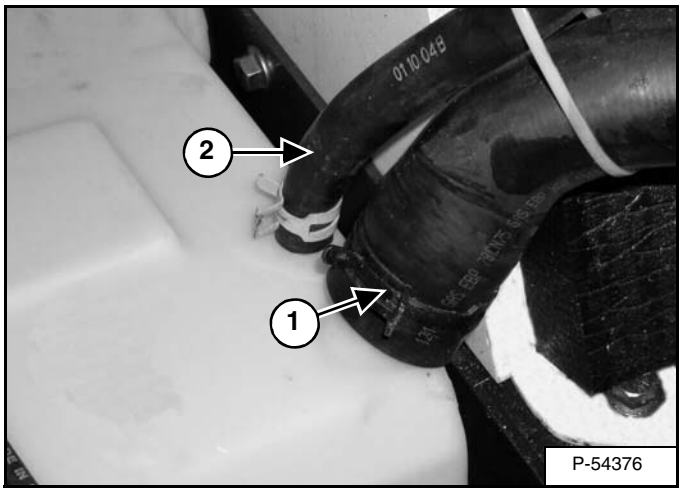


Drain the fuel from the tank through the fuel drain (Item 1) **[Figure 50-80-2]**.

Open the rear door of the loader.

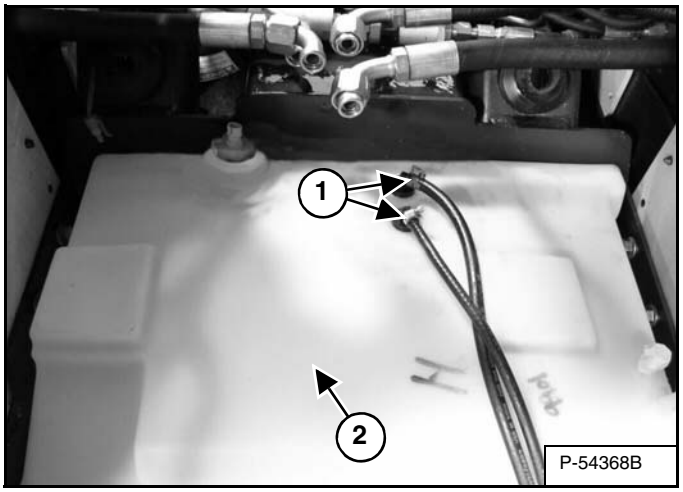
Remove the engine/hydrostatic pump assembly from the loader. (See Engine Removal And Installation on Page 70-10-8.)

Figure 50-80-3



Disconnect the fuel fill hose (Item 1) and the vent hose (Item 2) **[Figure 50-80-3]** from the fuel tank.

Figure 50-80-4



Remove the fuel supply and return hoses (Item 1) **[Figure 50-80-4]**.

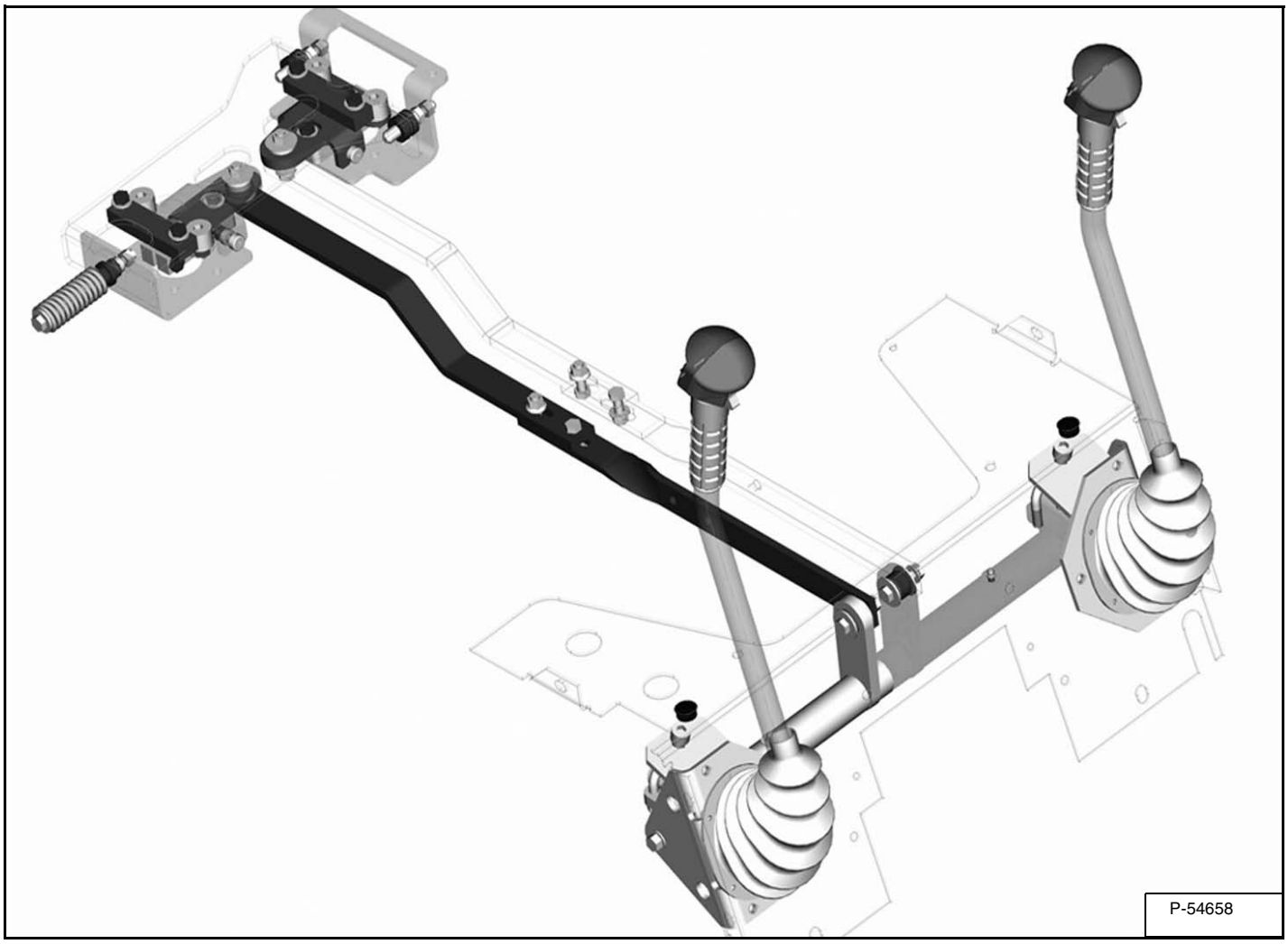
Lift the fuel tank (Item 2) **[Figure 50-80-4]** and remove from the loader.

Reverse the removal procedure to install the fuel tank.

CONTROL PANEL

Description

Figure 50-100-1



The steering system **[Figure 50-100-1]** 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”.

The steering system returns the levers to their starting position by means of the centering spring and the returning force of the torsion bushings.

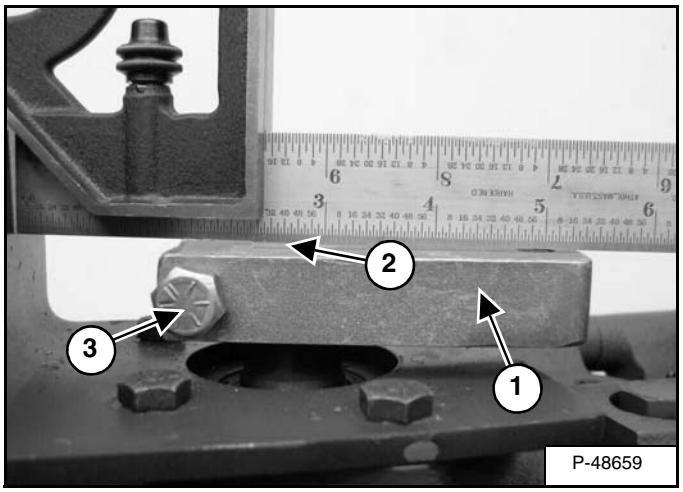
NOTE: Torsion bushings need to be replaced if torn or rotating in the housing. Loosen torsion bushing bolts slightly before adjustments are made. Do not fully tighten torsion bushing bolts again until all steering adjustments have been made first.

Sequence of steering adjustments:

1. Set neutral of pintle arms, “creep”
2. Set linkage travel at steering linkage bars
3. Set drift at drift adjustment bolts

Linkage Removal And Installation (Cont'd)

Figure 50-100-23



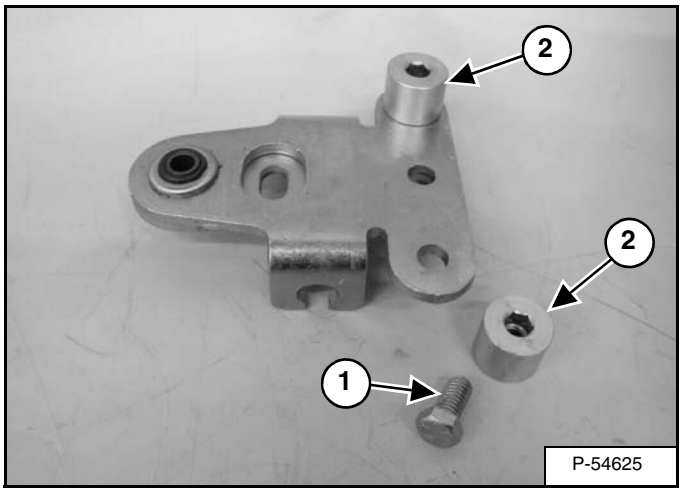
NOTE: When installing the pintle base (Item 1) onto the pump shaft, the cutouts on the pump shaft will not line up with the bolt (Item 3) [Figure 50-100-23].

Installation: Install the pintle base (Item 1) onto the pump shaft (Item 2) **[Figure 50-100-23]**. 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 50-100-13 for Linkage Neutral Adjusting procedure.

Pintle Arm Disassembly and Assembly

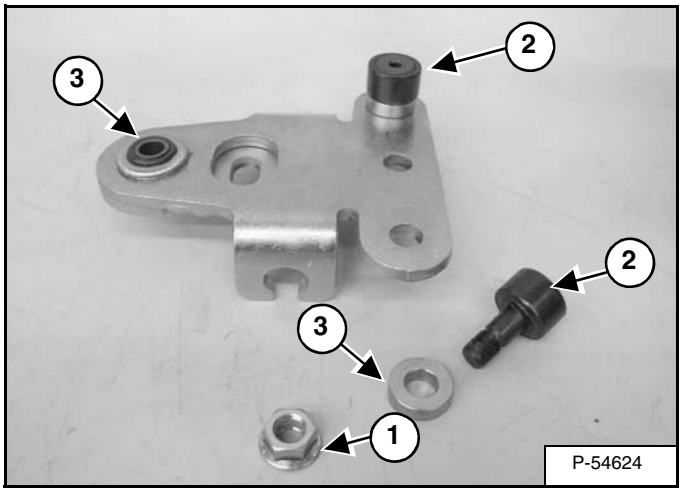
Figure 50-100-24



Remove the bolt (Item 1) from the pintle solid cams (Item 2) **[Figure 50-100-24]** 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 50-100-25



NOTE: The pintle roller cams (Item 2) [Figure 50-100-25] 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 50-100-25]**.

Inspect the torsion bushing (Item 3) **[Figure 50-100-25]** for damage and replace as needed.

Installation: Tighten the nuts to 35 - 40 ft.-lb. (47,5 - 54,2 N•m) torque.

CONTROL PANEL (SJC)

Description

With the option of SJC you receive a control panel that has two electronic handles that control the steering, lift and tilt functions. There is no mechanical linkages connecting to the hydrostatic pumps or the control valve.

The control panel is connected to the lower main frame and wraps around and underneath the operator seat.

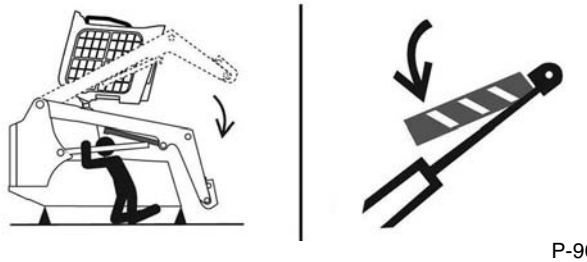
Removal And Installation

⚠ 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.

W-2017-0286

⚠ DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

⚠ WARNING

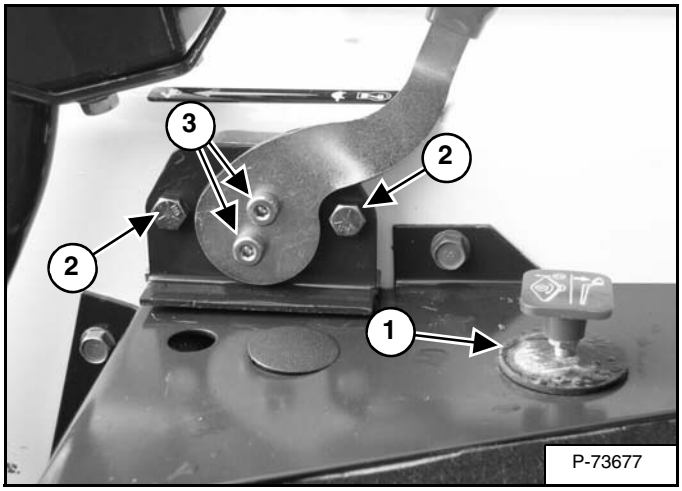
Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

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

Raise the operator cab. (See Raising on Page 10-30-2.)

Figure 50-101-1



Remove the lift arm bypass control knob and rubber washer (Item 1) **[Figure 50-101-1]**.

Remove the bolts from the speed control bracket (Item 2) **[Figure 50-101-1]**.

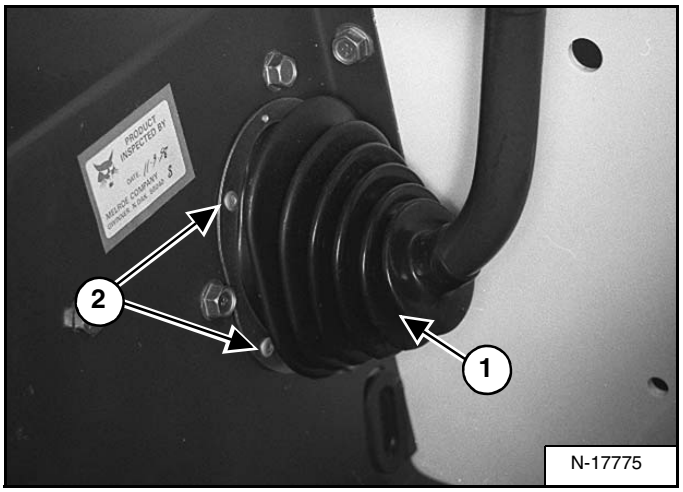
Installation: Tighten the screws to 15 - 20 ft.-lb. (20 - 27 N•m) torque.

Remove the bolts from the speed control lever (Item 3) **[Figure 50-101-1]**.

Installation: Tighten the two screws evenly until the speed control lever moves back and forth at a comfortable tension.

Boot Removal And Installation

Figure 50-111-22



To replace the rubber boot (Item 1) **[Figure 50-111-22]** on the control panel, remove the control lever. (See Boot Removal And Installation on Page 50-110-1.)

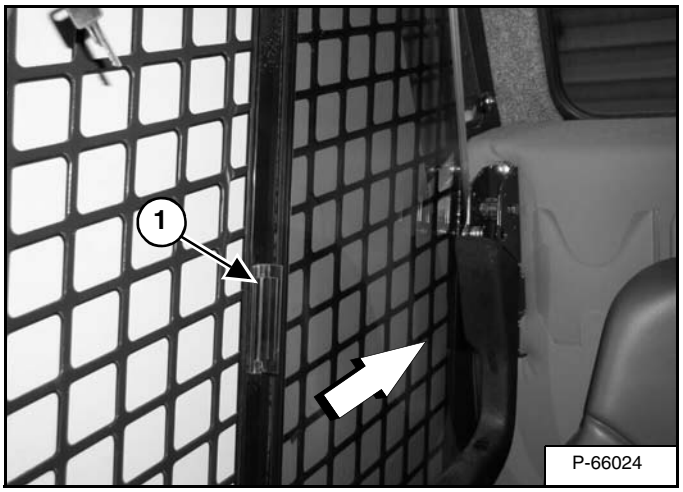
Drill out the four rivets (Item 2) **[Figure 50-111-22]** located on the flange of the rubber boot and remove the old boot.

Install the new boot and reinstall the control lever. (See Boot Removal And Installation on Page 50-110-1.)

WINDOW (SIDE)

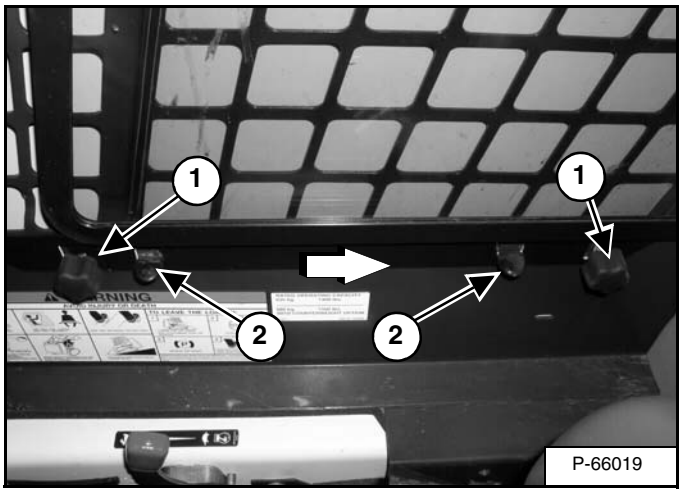
Removal And Installation

Figure 50-122-1



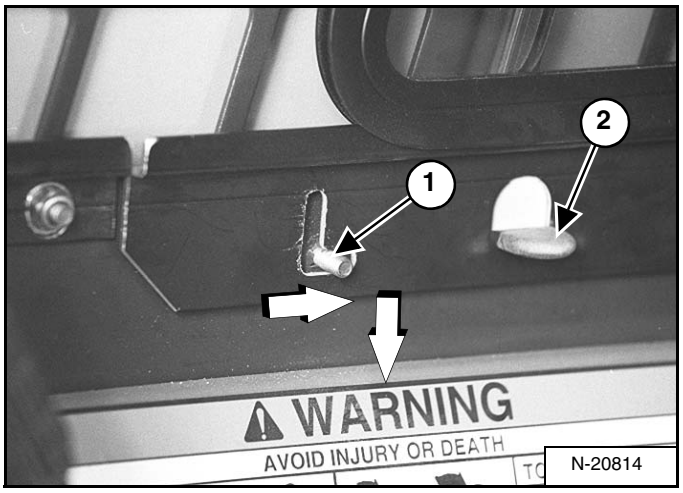
Release the latch (Item 1) **[Figure 50-122-1]** and slide the front window back towards the rear of the operator cab.

Figure 50-122-2



From inside the operator cab, loosen the knobs (Item 1) **[Figure 50-122-2]** and **[Figure 50-122-3]** on the window slide rail bolts.

Figure 50-122-3



NOTE: [Figure 50-122-3] is shown with the washer and knob removed to illustrate the direction of movement.

Move the window slide rail using the two thumb pads (Item 2) **[Figure 50-122-2]** and **[Figure 50-122-3]** towards the rear of the operator cab and then down towards the bottom of the operator cab.

NOTE: The top of the window should come out of the top slide rail at this time. Make sure the window is secure and does not fall. Make sure the slide rails are in alignment and the window is positioned in the top track during installation.

Remove the front side window from the operator cab.

WIRNG SCHEMATIC
(MAINFRAME)
S130 (S/N 529211001 - 529214882)
(S/N 529611001 - 529611918)

(PRINTED MAY 2007)

7113368

SMALL - MEDIUM MAINFRAME HARNESS 7116259

BOB J2 CONNECTOR

BOB J1 CONNECTOR

k-series

P7
FUSE RELAY CENTER

C113 DI ENGINE HARNESS CONN

DI ENGINE HARNESS 7104379

C106 ENGINE SPEED SENSOR

C104 ENGINE COOLANT SENSOR 500 - 3000 OHM

STARTER

ALTERNATOR

C110 EXCITATION

LIFT SPOOL LOCK (NOT USED WITH ACS)

TILT SPOOL LOCK (NOT USED WITH ACS)

HYD LOCK 9,8 OHM 12 V

BUCKET POSITION 9,8 OHM 12 V

DIFF SWITCH HARNESS 6728626 HYD FAN SWITCH

FRONT BASE 3,3 OHM PWM

FRONT ROD 3,3 OHM PWM

HYDRAULIC TEMPERATURE SENDER 500 - 3000 OHM

AIR FILTER SWITCH

FUEL SENDER 30 - 270 OHM

C362 TO REAR AUX HARNESS

C446 HYDRAULIC FAN 7,2 OHM 12 V

C105 HYDRAULIC CHARGE PRESSURE 0,5 - 7,5 V

C112 HYDRAULIC OIL PRESS SWITCH T1

DIFF SWITCH HARNESS 6728626

C107 ENGINE OIL PRESSURE 0,5 - 7,5 V

WHEEL MACHINES

C425 TRACTION LOCK 10,9 OHM 0,3 OHM PULL HOLD

FUEL SHUTOFF SOLENOID 24,5 OHM 0,33 OHM

C102 C101

FUEL SOL HARNESS 6814830

T3 PRE HEATER

FUSE 4 25 A
GLOW PLUG
FUSE 6 30 A
FUEL PULL
FUSE 5 30 A
TRACTION LOCK
FUSE 7 15 A
STARTER
FUSE 1 25 A
HVAC
FUSE 12 25 A
SWITCHED POWER
FUSE 11 25 A
REAR LIGHT
FUSE 3 15 A
FRONT WORK LIGHTS
FUSE 2 15 A
FUSE 8 5 A
FUSE 10 25 A
FUSE 9 25 A

BATTERY

MEGAFUSE 100,0 Amps

CONNECTS TO C407-2 (THIS PAGE)

C407-1 LIGHT PWR CONN

C489 ACCESSORY CONN

C410 LEFT HANDLE CONN

C409 RIGHT HANDLE CONN

(SEE ACS SCHEMATIC) (NOT USED WITH SJC OR AWS)

C103 TAILGATE CONN

SEE OPTIONS SHEET

(USED FOR EUROPEAN ROADLIGHT KIT) (SEE OPTIONS SHEET)

EURO LIGHT CONN

BACKUP ALARM CONN

C492

TO SJC / ACS HARNESS

RESISTOR 120 OHM

C426 CAN CONN

(REMOTE START TOOL / ACD CONNECTOR)

C408 CAB-MFR HARNESS CONN

POWER BOBTACH HARNESS 7112290

C606

C607, C608 POWER BOB CONNS

(SEE ACS SCHEMATIC)

C411 LEFT HANDLE 5 WAY CONN

C407-2 FRONT LIGHT POWER

CONNECTS TO C407-1 (THIS PAGE)

MEDIUM MAINFRAME GROUNDS

T6 BATT GND

T8 BATT GND

T1 BATT GND

J1-BOB CONTROLLER GROUND PIN 23

6718034 (2)
6702444 (6)
6679820 (8)
6654806 (3)
6663289

FUSE 5 TRACTION 30A	FUSE 1 HVAC 25A	HVAC	FRONT & MARKER LIGHT	REAR LIGHT	SWITCH POWER	FUSE 9 UNSWITCHED 25A
FUSE 6 FUEL PULL 30A	FUSE 2 HTR & HALT 15A					FUSE 10 ACC SWITCHED 25A
FUSE 7 PWR PLUG 15A	FUSE 3 REAR LT 15A	GLOW PLUG / PRE-HEATER	FUEL PULL	TRACTION PULL	STARTER	FUSE 11 ALT & INTS 25A
FUSE 8 ACC SWITCHED 5A	FUSE 4 COMPUTER 25A					FUSE 12 SWITCH PWR 25A

PRINTED IN U.S.A.

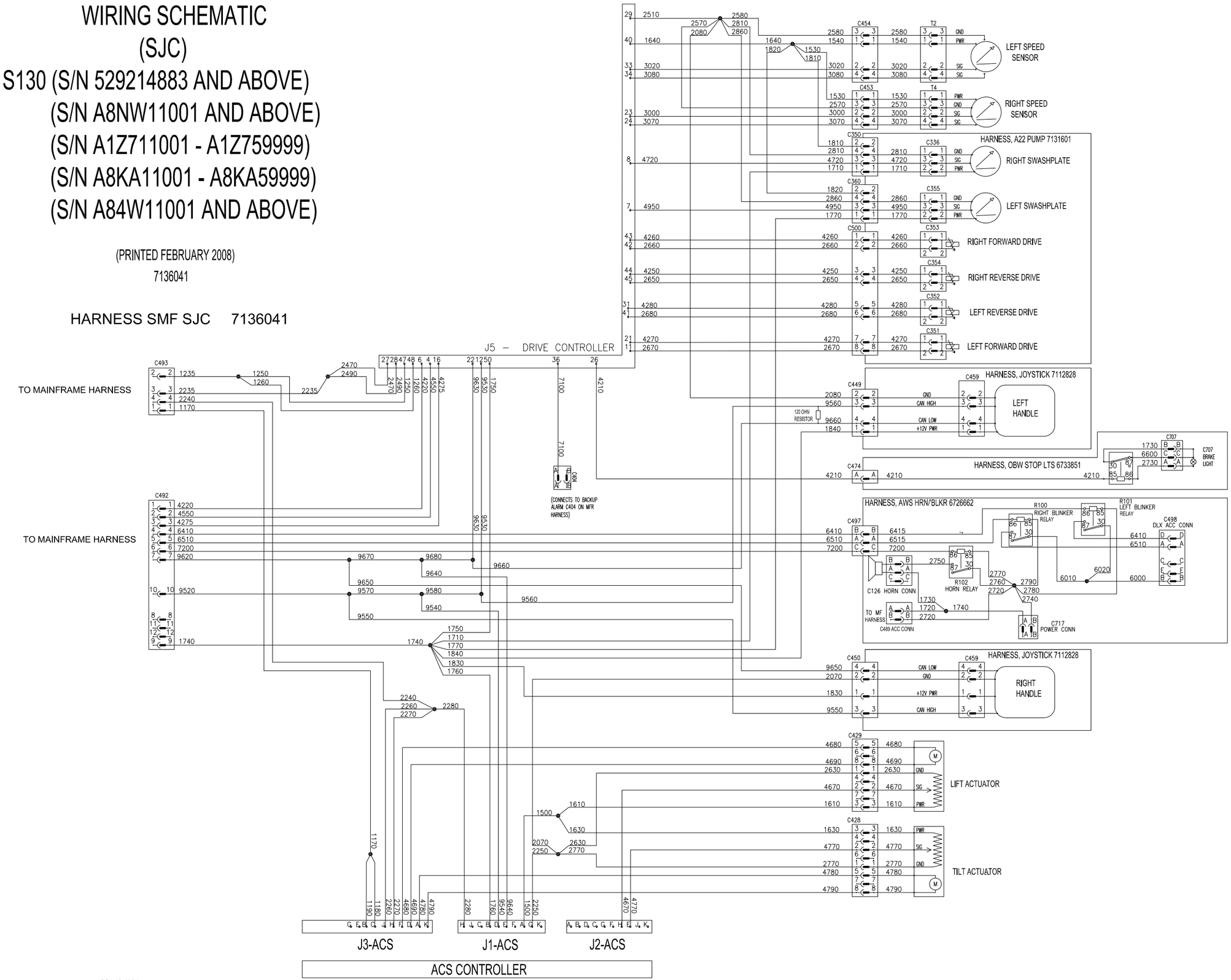
7113368 (4-17-07)

WIRING SCHEMATIC
(SJC)
S130 (S/N 529214883 AND ABOVE)
(S/N A8NW11001 AND ABOVE)
(S/N A1Z711001 - A1Z759999)
(S/N A8KA11001 - A8KA59999)
(S/N A84W11001 AND ABOVE)

(PRINTED FEBRUARY 2008)

7136041

HARNESS SMF SJC 7136041

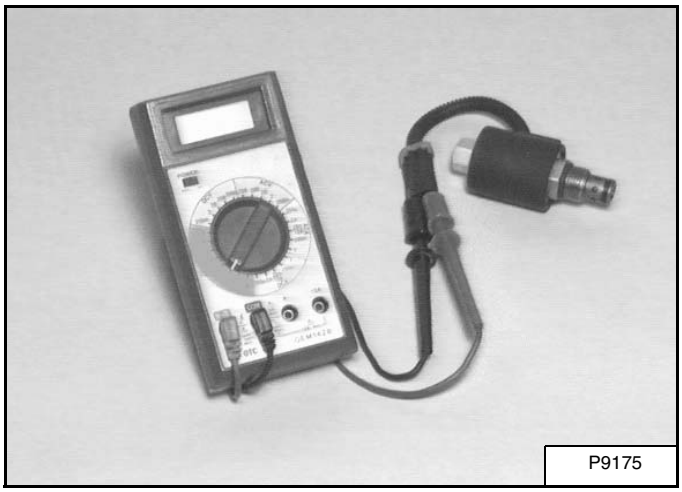


Printed In U.S.A.

7136041 (2-6-08)

Solenoid Testing

Figure 60-10-6



Use a test meter to measure coil resistance **[Figure 60-10-6]**. Coil wires do not have polarity. Correct resistance for the pressure relief (small) coil is 7-10 ohm and the other coils 5 - 8 ohm.

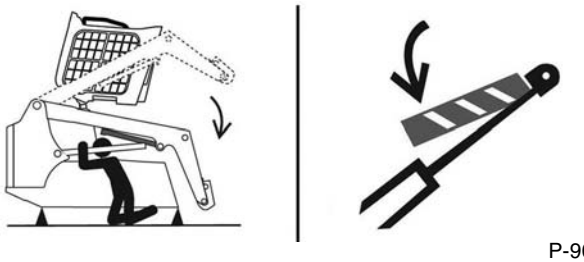
Replace the test meter with 12 volt power. You can see and hear the spool shift.

ALTERNATOR (CONT'D)

Removal And Installation

Place jackstands under the rear corners of the loader.

⚠ DANGER



P-90328

AVOID DEATH

- **Disconnecting or loosening any hydraulic tubeline, hose, fitting, component or a part failure can cause lift arms to drop.**
- **Keep out of this area when lift arms are raised unless supported by an approved lift arm support. Replace if damaged.**

D-1009-0409

⚠ 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

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.**

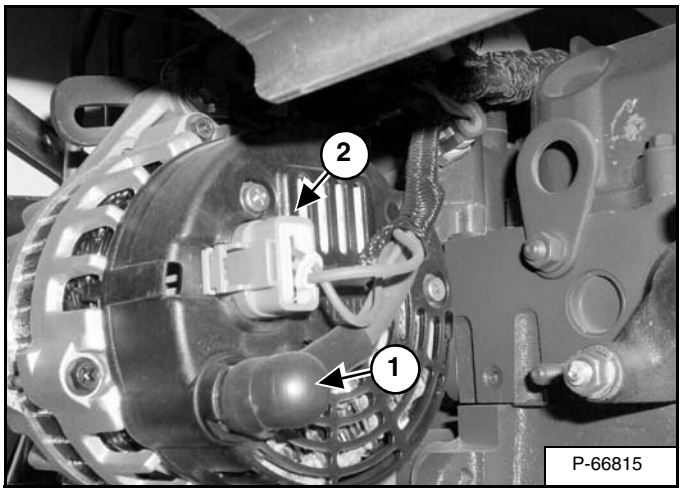
I-2023-1285

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

Raise the operator cab. (See Raising on Page 10-30-2.)

Disconnect the negative (-) cable from the battery.

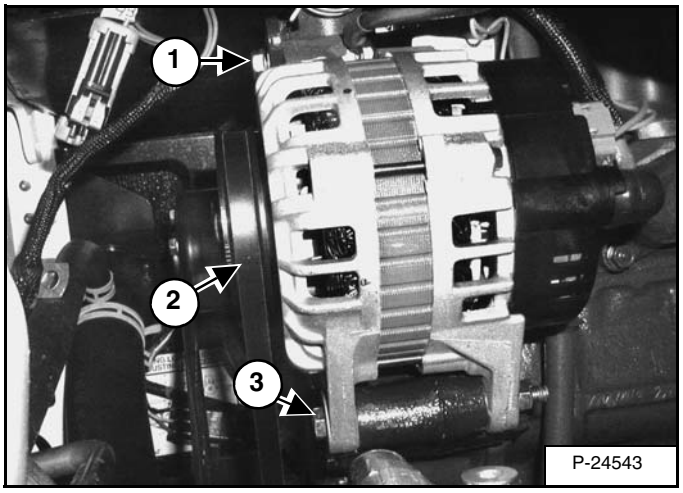
Figure 60-30-7



Disconnect the red wire (Item 1) **[Figure 60-30-7]** from the alternator which comes from the battery.

Disconnect the wiring harness connector (Item 2) **[Figure 60-30-7]** from the alternator.

Figure 60-30-8



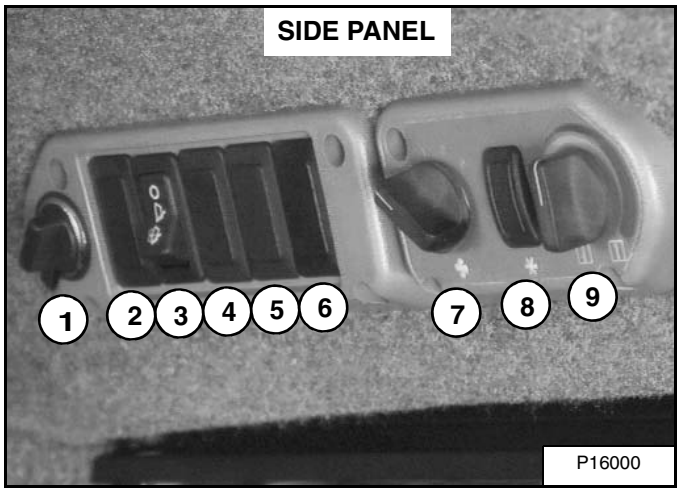
Remove the adjustment bolt (Item 1) **[Figure 60-30-8]** from the mounting bracket.

Remove the alternator belt (Item 2) **[Figure 60-30-8]** from the alternator pulley.

Remove the mounting bolt (Item 3) **[Figure 60-30-8]**.

Side And Front Panels

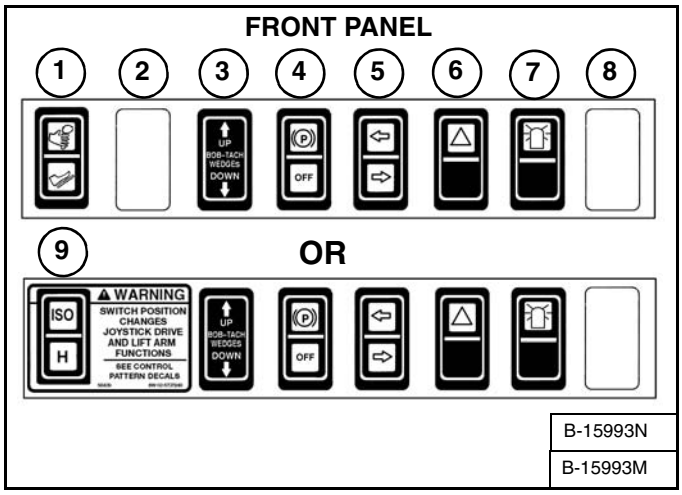
Figure 60-50-6



Side Panel **[Figure 60-50-6]**

REF. NO.	DESCRIPTION	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	NOT USED	- - -
9	TEMPERATURE CONTROL	Turn clockwise to increase the temperature; counterclockwise to decrease.

Figure OI-7



NOTE: Parking Brake (Item 13) [Figure OI-7] is standard on all loaders.

Front Panel **[Figure OI-7]**

REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	ADVANCED CONTROL SYSTEM (ACS)	Press the top to select Hand Controls; bottom to select Foot Controls.
2	NOT USED	- - -
3	POWER BOB-TACH	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.
4	PARKING BRAKE (Standard on all Loaders)	Press the top to engage the PARKING BRAKE; bottom to disengage.
5	TURN SIGNAL INDICATORS	Indicates left or right TURN SIGNALS are ON.
6	HAZARD LIGHTS	Press the top to turn the HAZARD LIGHTS ON; bottom to turn OFF.
7	ROTATING BEACON	Press the top to turn the ROTATING BEACON ON; bottom to turn OFF.
8	NOT USED	- - -
9	SELECTABLE JOYSTICK CONTROL (SJC)	Press the top to select 'ISO' Control Pattern; bottom to select 'H' Control Pattern.

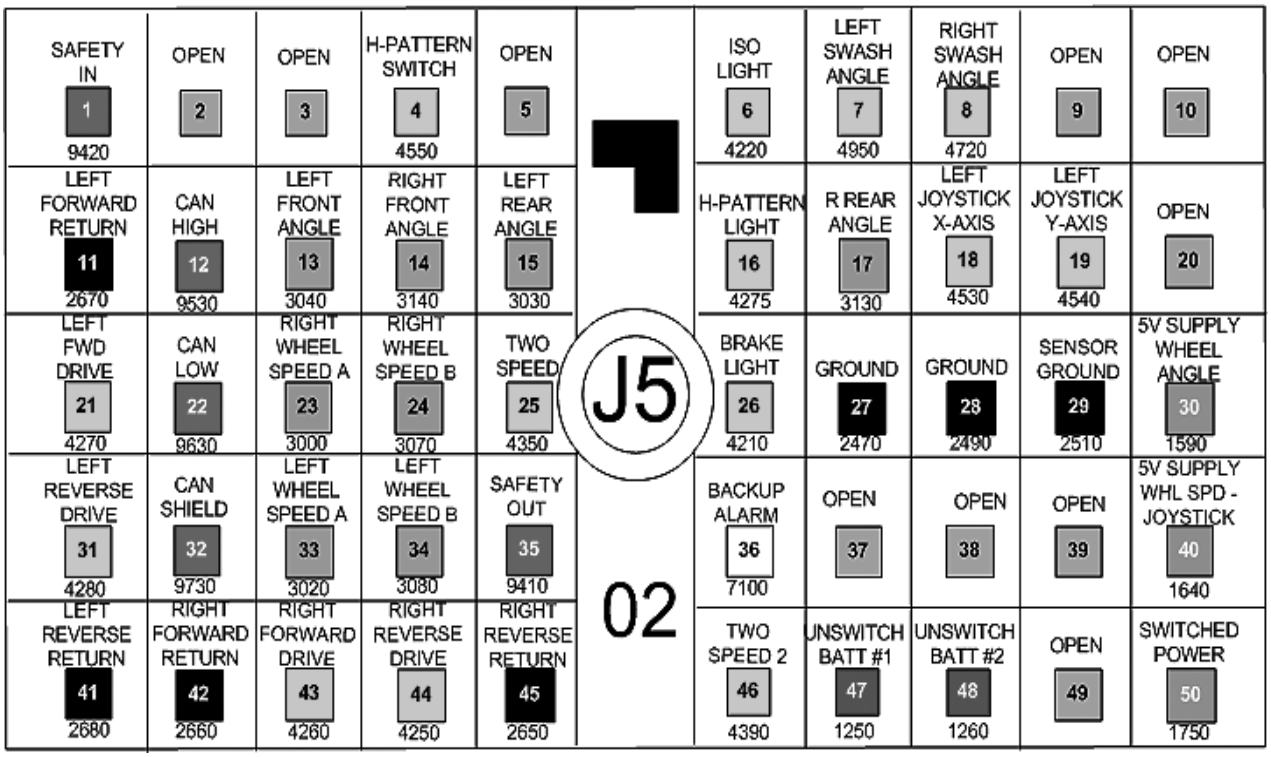
BOBCAT CONTROLLER (MAIN)

Description

The main controller provides information to all other controllers. All loaders have a main controller.

The main controller is located behind the access panel near the operators left foot.

Connector Identification (Cont'd)



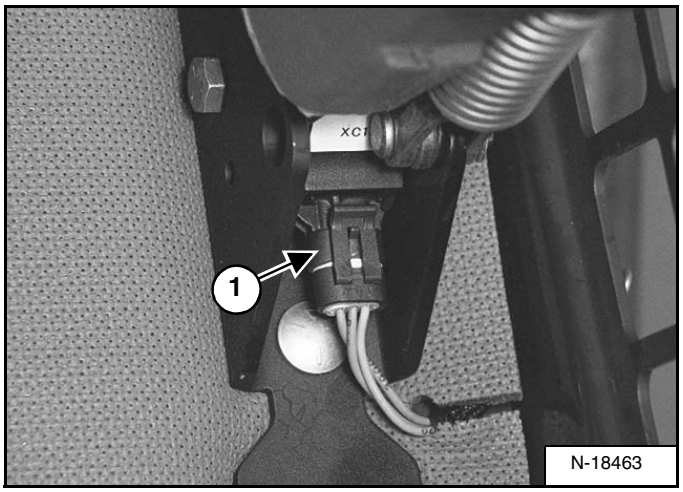
P-64296

Service Codes List (Cont'd)

CODE		CODE	
40-28	Right joystick internal failure	75-18	Right swash plate not in neutral
40-48	Right joystick multiple	75-19	Left joystick X-axis out of range high
		75-21	Left joystick Y-axis out of range high
41-09	Alternator voltage low	75-22	Right joystick Y-axis out of range high
41-10	Alternator voltage high	75-23	Right front wheel angle sensor out of range high
41-11	Alternator voltage extremely high	75-24	Left front wheel angle sensor out of range high
		75-25	Right rear wheel angle sensor out of range high
44-02	Horn error ON	75-26	Left rear wheel angle sensor out of range high
44-03	Horn error OFF	75-27	Left swash plate out of position
		75-28	Right swash plate out of position
45-02	Right blinker error ON	75-29	Left joystick X-axis out of range low
45-03	Right blinker error OFF	75-31	Left joystick Y-axis out of range low
		75-32	Right joystick Y-axis out of range low
46-02	Left blinker error ON	75-33	Right front wheel angle sensor out of range low
46-03	Left blinker error OFF	75-34	Left front wheel angle sensor out of range low
		75-35	Right rear wheel angle sensor out of range low
47-21	8 volt sensor supply out of range high	75-36	Left rear wheel angle sensor out of range low
47-22	8 volt sensor supply out of range low	75-37	5 volt sensor supply 1 out of range low
		75-38	Sensor supply 2 out of range low
48-02	Front light relay error ON	75-39	Left swash plate sensor out of range high
48-03	Front light relay error OFF	75-40	Left swash plate sensor out of range low
		75-41	Right swash plate sensor out of range high
49-02	Rear light relay error ON	75-42	Right swash plate sensor out of range low
49-03	Rear light relay error OFF	75-43	Left forward drive solenoid error ON
		75-44	Left reverse drive solenoid error ON
60-21	Rear auxiliary control out of range high	75-45	Right forward drive solenoid error ON
60-22	Rear auxiliary control out of range low	75-46	Right reverse drive solenoid error ON
60-23	Rear auxiliary control not in neutral	75-47	Right front steer extend short to battery
		75-48	Left front steer extend short to battery
64-02	Switched power relay error ON	75-49	Right rear steer extend short to battery
64-03	Switched power relay error OFF	75-50	Left rear steer extend short to battery
		75-51	Steer pressure short to battery
73-04	Remote control in error	75-52	Backup alarm error ON
73-13	Remote control no signal	75-53	Left forward drive solenoid error OFF
		75-54	Left reverse drive solenoid error OFF
74-72	Bobcat controller in boot code	75-55	Right forward drive solenoid error OFF
		75-56	Right reverse drive solenoid error OFF
75-01	CAN joystick information error	75-57	Right front steer extend short to ground
75-04	No communication from drive controller	75-58	Right front steer retract short to ground
75-05	Left joystick X-axis not in neutral	75-59	Left front steer extend short to ground
75-07	Left joystick Y-axis not in neutral	75-60	Left front steer retract short to ground
75-08	Right joystick Y-axis not in neutral	75-61	Right rear steer extend short to ground
75-09	ISO/H pattern switch short to ground or battery	75-62	Right rear steer retract short to ground
75-13	Right front wheel angle sensor stuck	75-63	Left rear steer extend short to ground
75-14	Left front wheel angle sensor stuck	75-64	Left rear steer retract short to ground
75-15	Right rear wheel angle sensor stuck	75-65	Steer pressure short to ground
75-16	Left rear wheel angle sensor stuck	75-66	Backup alarm error OFF
75-17	Left swash plate not in neutral	75-67	No communication from Bobcat controller

Bobcat Interlock Control System (BICS) Circuit Test

Figure 60-110-8

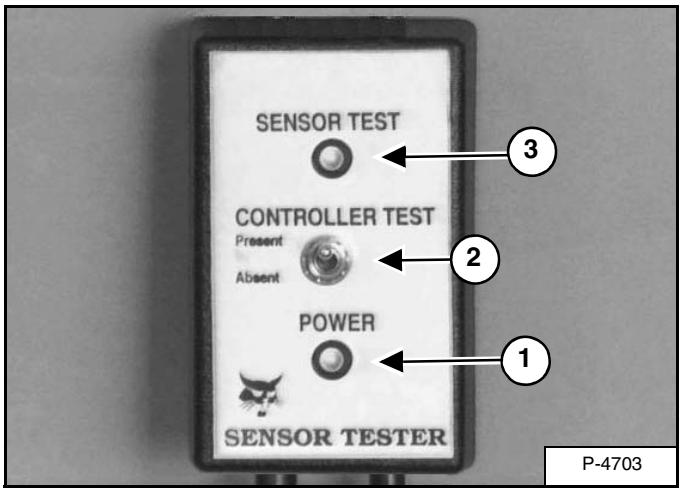


Use Sensor Testers (MEL1428) and seat bar sensor tester adapter (MEL1567) for the following procedure:

Connect the seat bar sensor tester adapter MEL1567 to the sensor tester.

Disconnect the seat bar sensor connector (Item 1) **[Figure 60-110-8]**.

Figure 60-110-9



Connect Sensor Tester (Item 1) **[Figure 60-110-9]** inline to the seat bar sensor connectors.

Turn the key to the ON position. **DO NOT START THE ENGINE**.

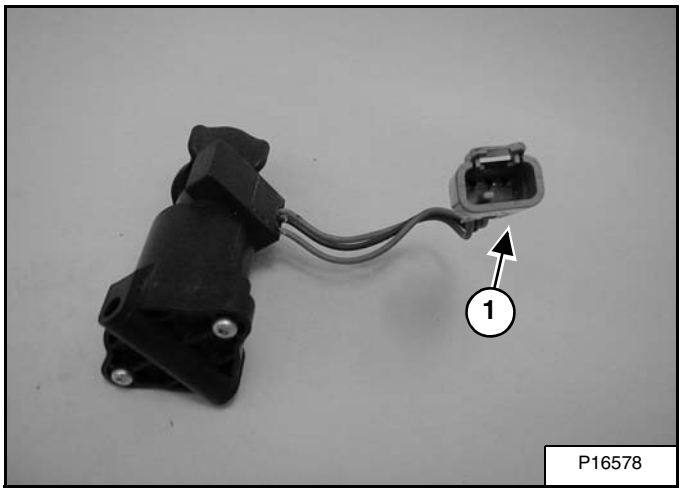
If there is no power light on the sensor tester, check the tester or wiring harness.

When the power light is illuminated, move the toggle switch (Item 2) **[Figure 60-110-9]** on the sensor tester to the ***Present*** position.

NOTE: The sensor test light (Item 3) [Figure 60-110-9] is only activated by the seat bar. It will be off with the seat bar up or on with the seat bar down.

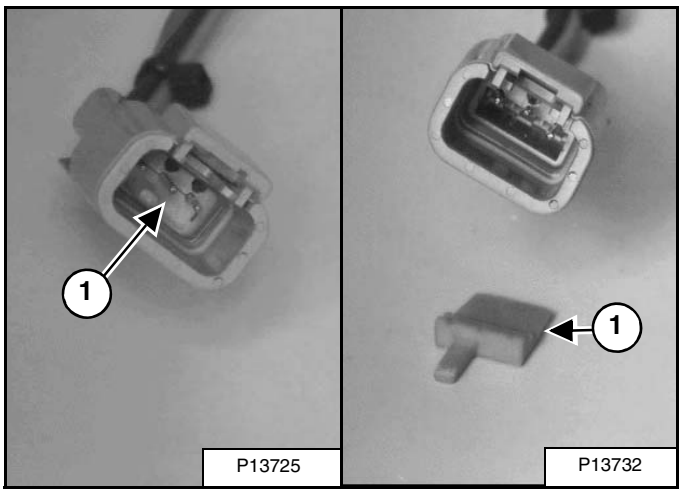
Handle Sensor Connector Disassembly And Assembly

Figure 60-130-1



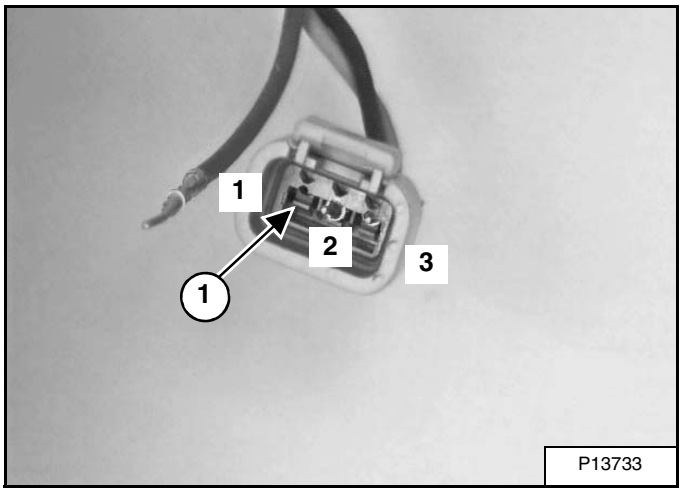
The wire connector (Item 1) **[Figure 60-130-1]** can be removed from the handle sensor wires, using the following procedure.

Figure 60-130-2



Remove the wedge (Item 1) **[Figure 60-130-2]** from the connector.

Figure 60-130-3



With a pointed tool, lift the tab (Item 1) **[Figure 60-130-3]** and pull the wire from the connector.

Installation: Install the wires into the connector as listed below **[Figure 60-130-3]**:

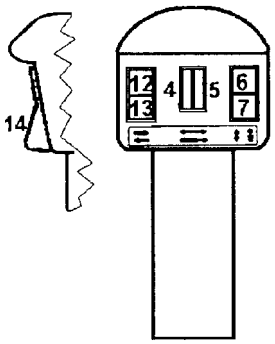
1-Terminal - Red

2-Terminal - Black

3-Terminal - Green

Identification Chart

Left Side Control Handle Switches

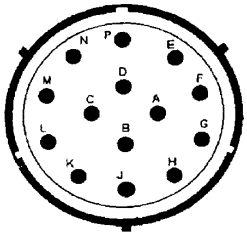


B-16447

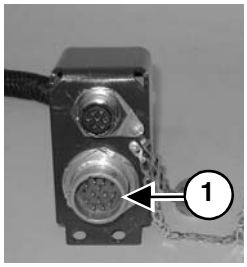
Switch Number	Solenoid Number Activated			Attachment Harness Terminal Activated
		RH	HFH	
1	1	1	1, 8	K
2	2	2	2	K
*3	1	1	1, 8	K
4	2	2, 3	6, 7	K, A, D
5	1	1, 3	5, 7	K, A, C
6	1	1, 3	5, 7	K, E
7	1	1, 3	5, 7	K, F
8	1	1, 3	5, 7	K, G
9	1	1, 3	5, 7	K, H
10, 11, 12, 13, 14	-	--	--	K

Attachment Harness Connector

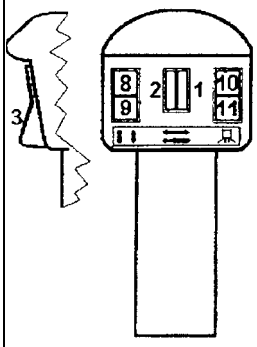
Fourteen Pin Connector Viewed from front (pin side of connector) of loader.



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) Icon, located in the right instrument panel on the loader cab, must be illuminated continuously.

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.

*** 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.**

Actuator Testing (Cont'd)

If the initial Actuator Test results in the fail mode ***actuator did not fully extend / retract,*** check the following.

- The actuator connectors may be reversed between the lift and tilt actuator. Reverse the connectors and rerun the Actuator Test.
- The actuator may be weak, replace the actuator.
- The spool end cap may be defective or the centering spring may be broken. Inspect the end cap and the centering spring, replace if necessary.
- Contamination in the spool.

If the initial Actuator Test results in the fail mode ***actuator out of neutral,*** check the following.

- The actuator may be defective, replace the actuator.
- The spool end cap may be defective or the centering spring may be broken. Inspect the end cap and the centering spring, replace if necessary.
- Contamination in the spool.

Lift And Tilt Calibration (ACS)

The 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 and resets the calibration points in the controller.

NOTE: The Actuator Test is the preferred method to calibrate the lift and tilt actuator. (See Actuator Testing on Page 60-160-1.)

NOTE: This calibration procedure must be followed when replacing a hydraulic control valve, actuator or ACS controller. Failure to calibrate after component replacement may result in poor performance or reduced life of actuator(s).

Figure 60-160-3

Update the loader service software to the latest version.

Place the rocker switch (Item 1) **[Figure 60-160-3]** in the hand control mode.

STEERING DRIFT COMPENSATION

Steering Drift Compensation is available on SJC equipped machines.

NOTE: Software version 61 or higher is required to support this feature. The loader's software version can be displayed in the HOURMETER / CODE display. (See Operation and Maintenance Manual for correct procedure.) See your Bobcat dealer to update your machine's software version if necessary.

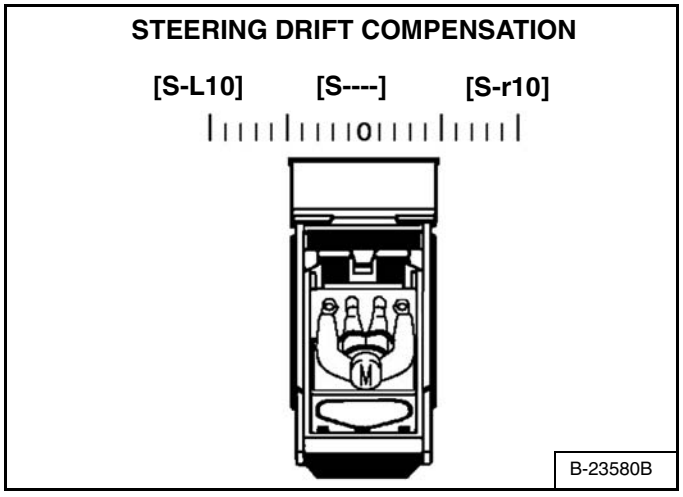
Description

Steering Drift Compensation can be used to reduce steering drift to maintain a desired travel path.

Examples of applications where this feature can be used:

- To compensate for normal variations such as tire inflation pressure, track tension, tire wear and track wear.
- Using side shift attachments such as trenchers, planers and silt fence installers.
- Driving on uneven terrain such as crowned road surfaces.

Figure 60-161-1



Steering drift compensation contains a total of 21 settings. Steering drift compensation can be set to any point from neutral to **[S-L10]** left and from neutral to **[S-r10]** right. **[S----]** is displayed when set for neutral **[Figure 60-161-1]**.

Selecting And Adjusting

NOTE: Changes CANNOT be performed until the seat bar is lowered, the engine is started and the PRESS TO OPERATE LOADER button is pressed to enable the BICS.

Perform pre-starting and starting procedures:

1. Fasten seat belt.
2. Lower seat bar.
3. Place joysticks in neutral position.
4. Start the engine.
5. Press the PRESS TO OPERATE LOADER button.

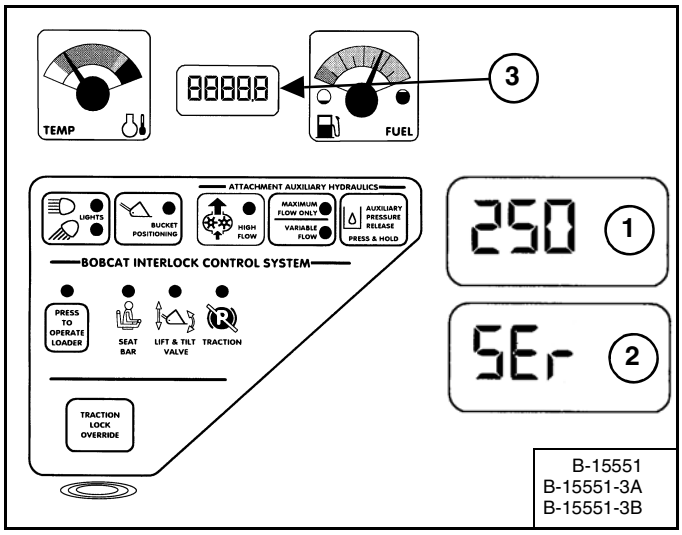
NOTE: Raising the seat bar or changing drive control patterns (ISO / H) will cause the machine to disengage from steering drift compensation. The current settings will remain in effect until the STOP button is pressed (Keyless Panel) or the key is turned OFF (Key Switch Panel).

MAINTENANCE CLOCK

Description

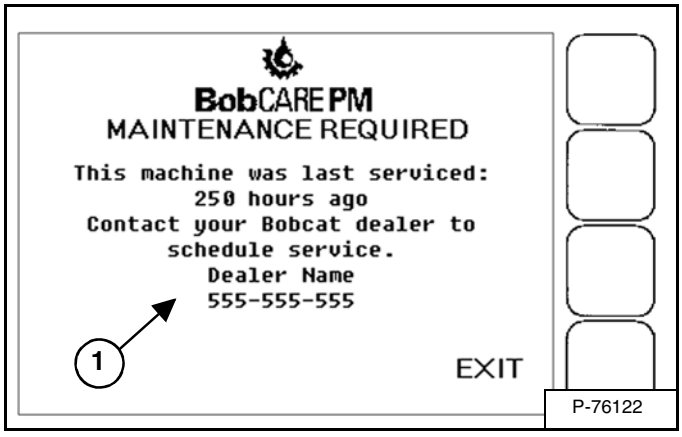
The Maintenance Clock alerts the operator when the next service interval is due. *EXAMPLE:* The Maintenance Clock can be set to a 250 hour interval as a reminder for the next 250 hour planned maintenance.

Figure 60-200-1



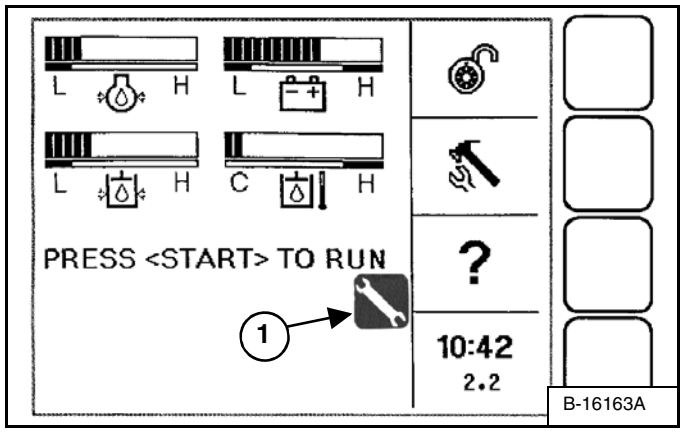
During machine operation, a two beep alarm will sound when there are less than 10 hours until the next planned maintenance. The hour interval (Item 1) and **[SEr]** (Item 2) will alternate in the display screen (Item 3) **[Figure 60-200-1]** for 10 seconds. The display will then revert back to the previous display and will appear for 10 seconds every time the machine is started until the maintenance clock is reset.

Figure 60-200-2



The Keyless Right Panel, if equipped, will display a message (Item 1) **[Figure 60-200-2]** alerting the operator to service the machine. This message will remain for 10 seconds before reverting back to the previous screen and will appear for 10 seconds every time the machine is started until the maintenance clock is reset.

Figure 60-200-3



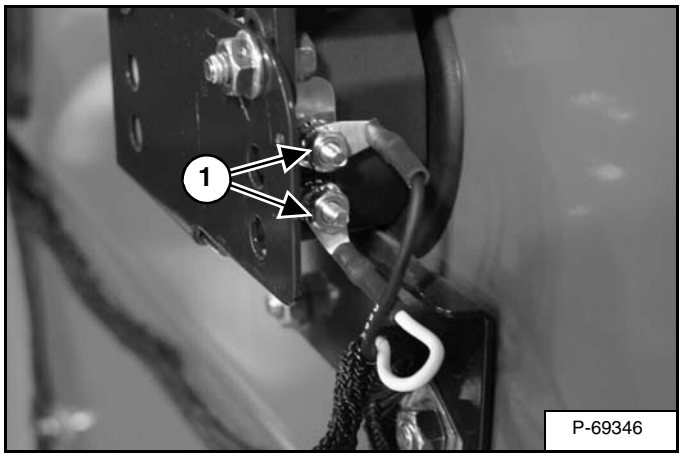
The Keyless Right Panel, if equipped, will display a wrench icon (Item 1) **[Figure 60-200-3]** alerting the operator to service the machine. This icon will remain on the display until the maintenance clock is reset.

NOTE: Key Switch machines will not display the BobCARE^{SM} PM message or wrench icon on the right panel.

Alarm Removal And Installation

Stop the engine and open the tailgate.

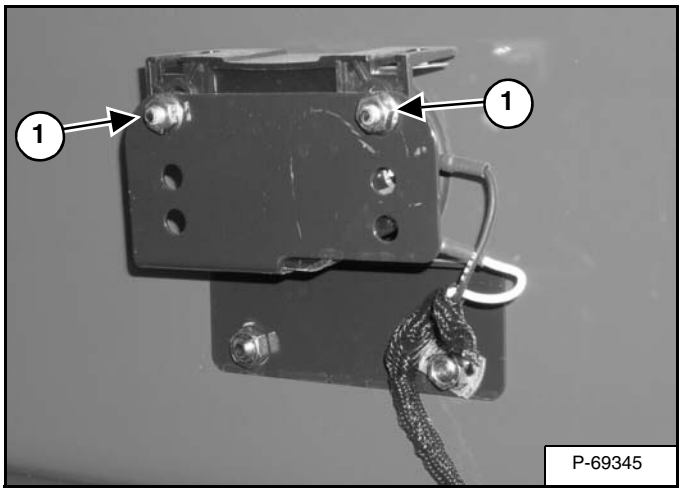
Figure 60-210-4



Mark the wires for ease of assembly. Disconnect the wires (Item 1) **[Figure 60-210-5]** from the alarm.

Installation: Make sure the wire harness ends do not touch the mounting bolts during assembly.

Figure 60-210-5



Remove the two hex head bolts, washers, and lock nuts (Item 1) **[Figure 60-210-5]**. Remove the alarm from the mounting bracket.

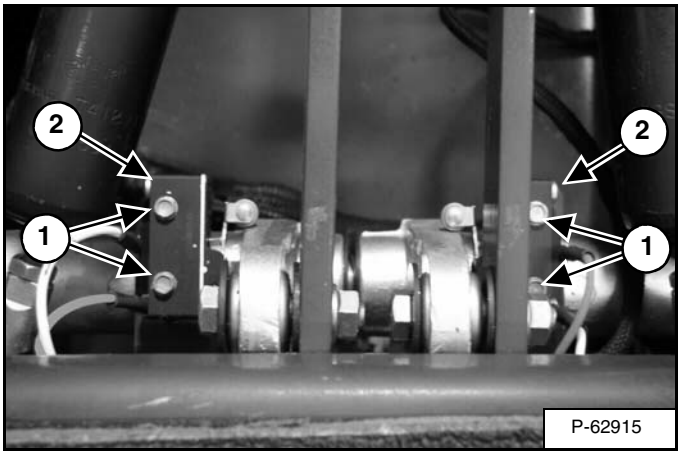
Switch Removal And Installation

NOTE: Joystick equipped machines do not have back-up alarm switches and can not be adjusted.

Standard Controls and ACS (If Equipped)

Stop the engine and raise the operator cab. (See Raising on Page 10-30-2.)

Figure 60-210-6



Place the steering levers in the neutral position.

Loosen the screws (Item 1) securing the back-up alarm switches. Slide the switch assemblies (Item 2) **[Figure 60-210-6]** off the mounting bracket.

Installation: Slide the alarm switches onto the mounting bracket so the threaded plates are under the mounting bracket. The rollers will face to the inside. During installation of switches, adjusting the switches (See Adjusting Switch Position on Page 60-210-2.) and inspecting back-up alarm operation (See Inspecting on Page 60-210-1.) are required.

Troubleshooting (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 enough 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

Compression - Checking

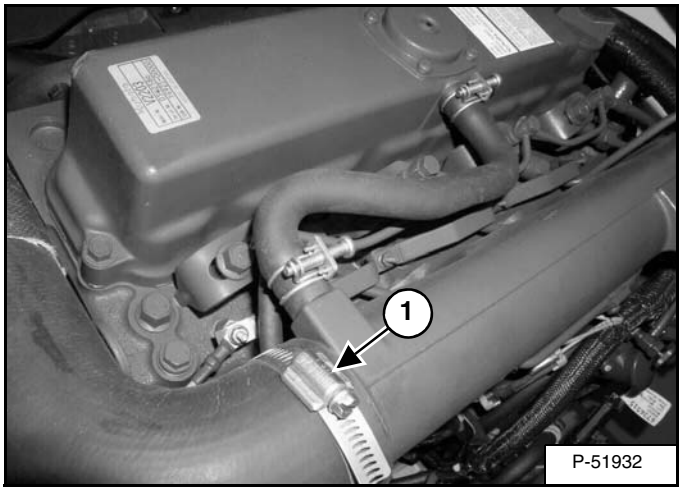
The tools listed will be needed to do the following procedure:

MEL10630 - Engine Compression Kit

MEL1631 - Compression Adapter

The engine must be at operating temperature.

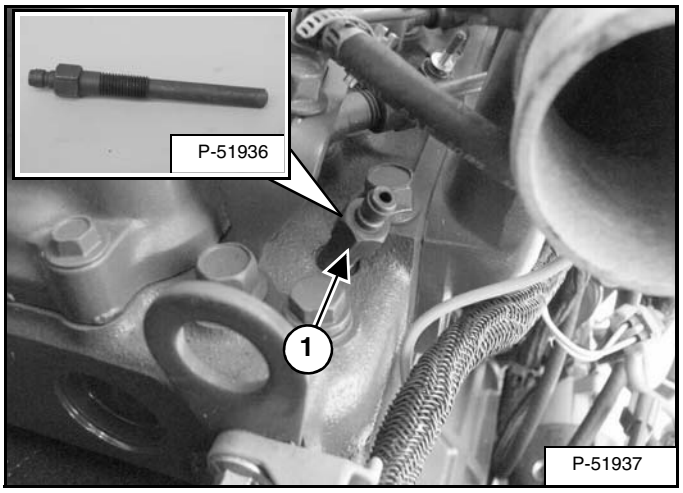
Figure 70-10-25



Disconnect the air cleaner inlet hose (Item 1) **[Figure 70-10-25]** from the intake manifold.

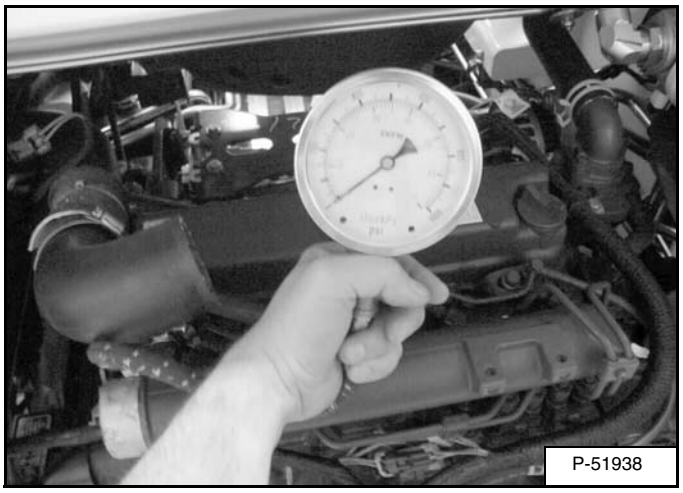
Remove the glow plugs. (See Glow Plugs Removal And Installation on Page 70-80-1.)

Figure 70-10-26



Install the correct compression adapter (Item 1) **[Figure 70-10-26]** into the cylinder head.

Figure 70-10-27



Connect the compression gauge to the adapter **[Figure 70-10-27]**.

Make sure the engine speed control is fully backward (engine idle).

Disconnect the fuel stop solenoid.

Crank the engine with the starter cranking rpm.

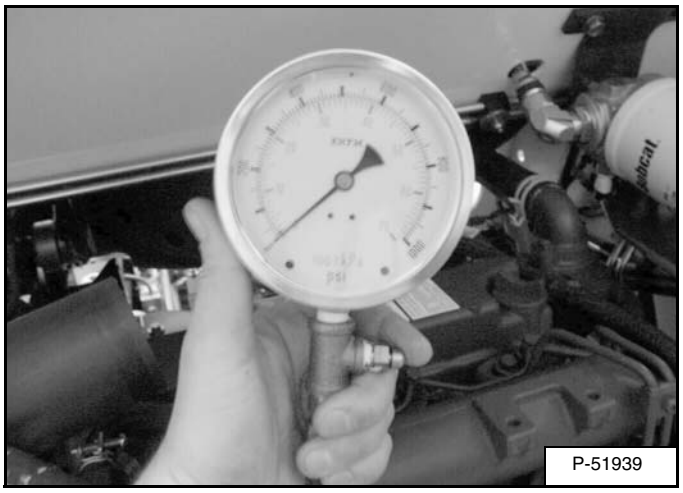
If the measurement is below the allowable limit, check the cylinder, piston ring, top clearance, valve and cylinder head.

Compression Pressure should be 427 - 469 PSI (29,4 - 32,3 bar)

Allowable Limit (minimum) is 341 PSI (23,5 bar)

No more than 10% variance among cylinders.

Figure 70-10-28



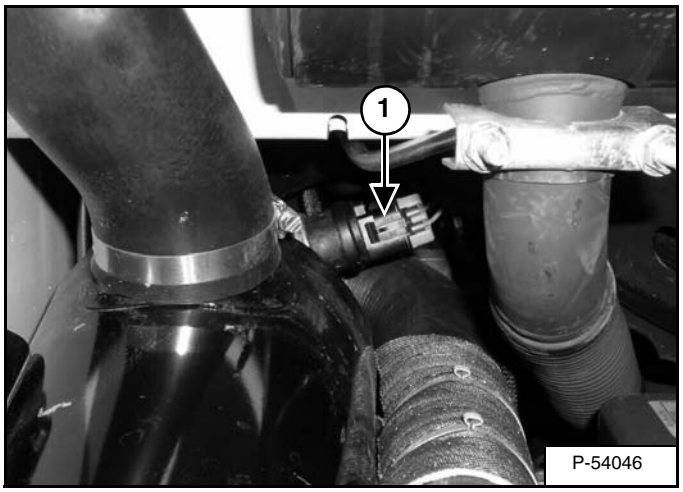
Push the button on the compression gauge to release pressure **[Figure 70-10-28]**.

Connect the fuel stop solenoid.

AIR CLEANER

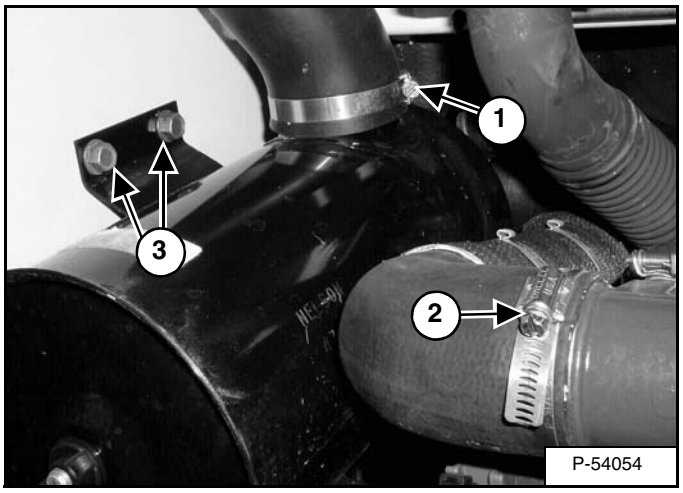
Housing Removal And Installation

Figure 70-40-1



Disconnect the wire harness connector (Item 1) **[Figure 70-40-1]** from the air cleaner sensor on the air cleaner.

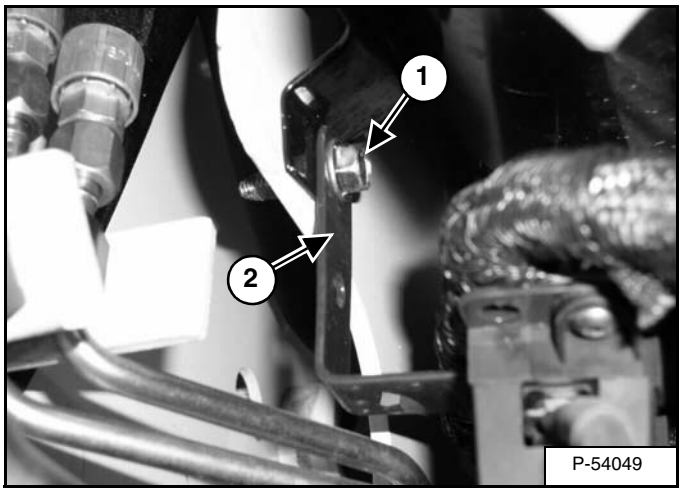
Figure 70-40-2



Loosen the hose clamp (Item 1) **[Figure 70-40-2]** on the air cleaner hose.

Loosen the clamp (Item 2) **[Figure 70-40-2]** from the hose on the engine manifold.

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.

Remove the two upper mounting bolts (Item 3) **[Figure 70-40-2]** from the top mount of the air cleaner.

Installation: Tighten the three mounting bolts to 15 - 20 ft.-lb. (20 - 27 N•m) torque.

Remove the air cleaner from the engine compartment.

Reverse the removal procedure to install the air cleaner.

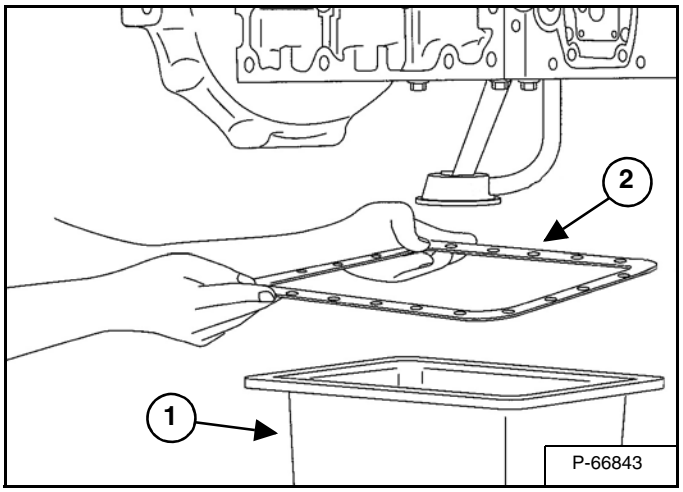
LUBRICATION SYSTEM

Oil Pan Removal And Installation

Remove the engine and hydrostatic pump assembly from the loader. (See Engine Removal And Installation on Page 70-10-8.)

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

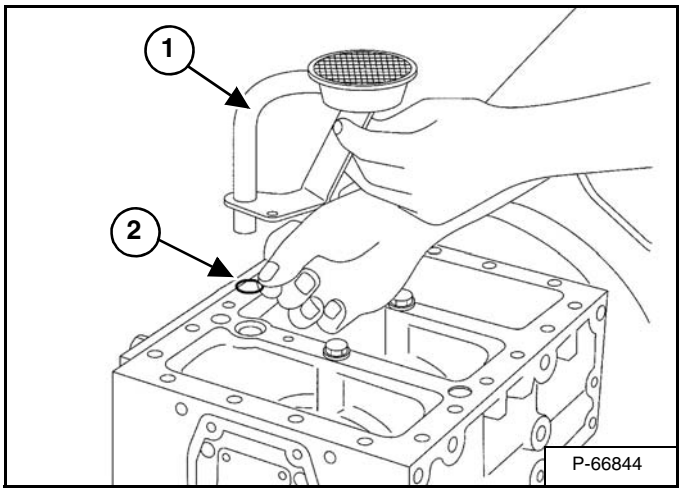
Figure 70-60-1



Remove oil pan bolts securing oil pan (Item 1) **[Figure 70-60-2]**. Slightly tapping on the oil pan with a soft mallet will break loose the oil pan from the engine block.

Installation: Use a liquid gasket adhesive to the oil pan side of the oil pan gasket. Tighten oil pan bolts to 29 - 33 ft.-lb. (39 - 75 N•m) torque.

Figure 70-60-2



Remove the oil strainer (Item 1) and O-ring (Item 2) **[Figure 70-60-2]** from the engine block.

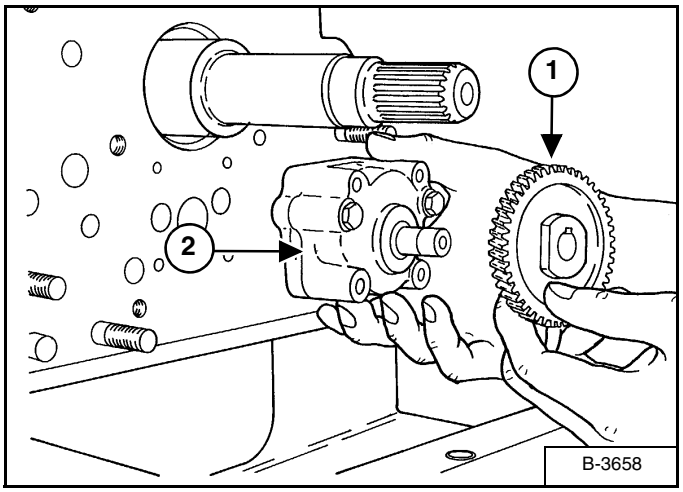
Installation: Apply oil to O-ring.

Oil Pump Removal And Installation

Remove the timing gearcase cover. (See Timing Gearcase Cover Removal And Installation on Page 70-100-1.)

Remove the crankshaft gear.

Figure 70-60-3



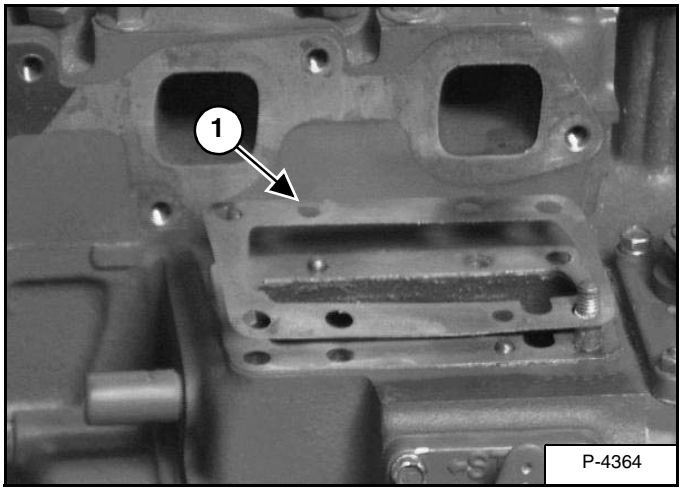
Remove the nut from the oil pump shaft. Use a puller to remove the oil pump gear (Item 1) **[Figure 70-60-3]**.

Remove the oil pump mounting bolts. Remove the oil pump (Item 2) **[Figure 70-60-3]**.

Installation: Tighten the oil pump mounting bolts to 60 - 72 in.-lb. (6,9 - 8,1 N•m) torque.

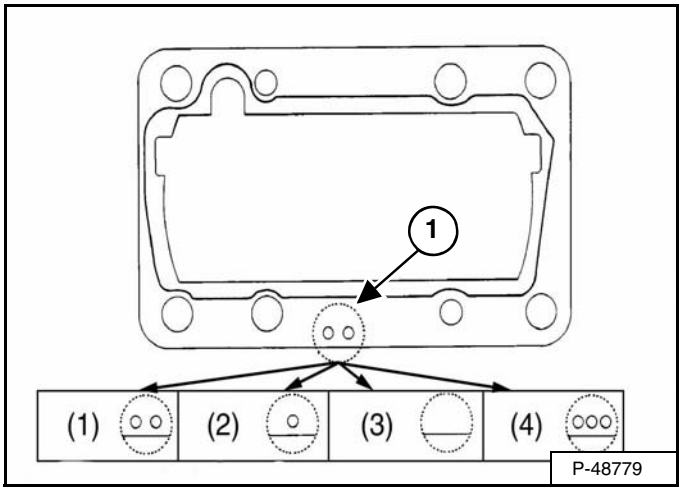
Fuel Injection Pump Removal And Installation (Cont'd)

Figure 70-70-18



Install the shim(s) (Item 1) **[Figure 70-70-18]** on the injection pump mounting surface. For information on the number of shims used. (See Injection Pump - Timing on Page 70-70-8.)

Figure 70-70-19



The size of shims are identified by a symbol (Item 1) **[Figure 70-70-19]** on the shims.

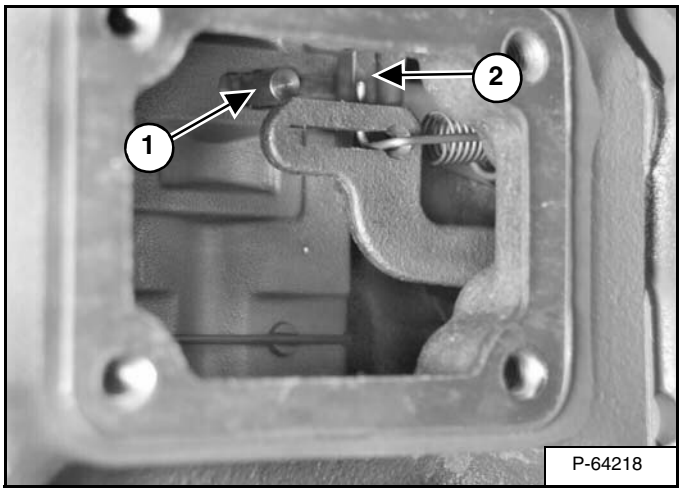
(1) Two holes means 0.0008 in (0.20 mm) shim.

(2) One hole means 0.0010 in (0.25 mm) shim.

(3) Without hole means 0.0012 in (0.30 mm) shim.

(4) Three holes means 0.0014 in (0.35 mm) shim.

Figure 70-70-20

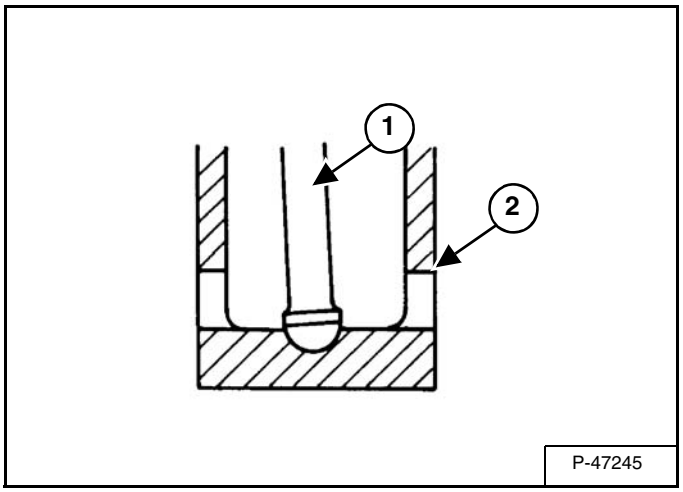


Install the injection pump in the engine.

Ensure the control rack pin (Item 1) is to the left side of the fork lever (Item 2) **[Figure 70-70-20]**.

Cylinder Head Removal And Installation (Cont'd)

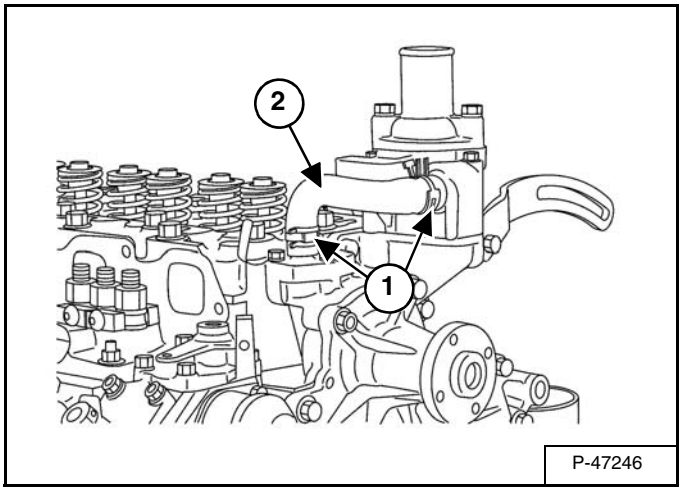
Figure 70-80-13



Installation: The push rod (Item 1) must be seated in the tappet (Item 2) **[Figure 70-80-13]** correctly or the push rods will be damaged.

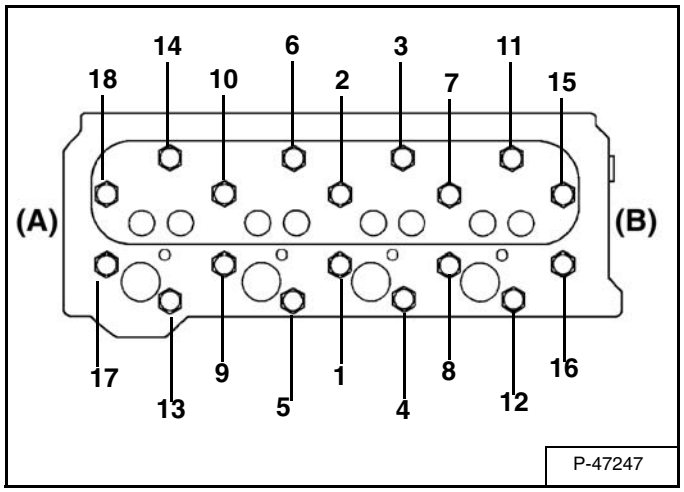
After installing the rocker arm assembly and push rods, the valve lash must be adjusted. (See Valve Clearance Adjustment on Page 70-80-2.)

Figure 70-80-14



Remove the clamps (Item 1) and remove the hose (Item 2) **[Figure 70-80-14]** from the thermostat housing.

Figure 70-80-15



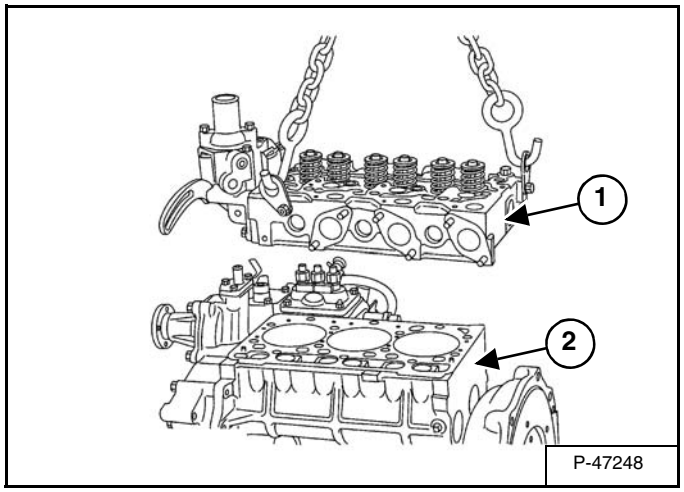
Remove the cylinder head bolts in order of #18 to #1 **[Figure 70-80-15]**.

NOTE: (A) is the water pump 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.

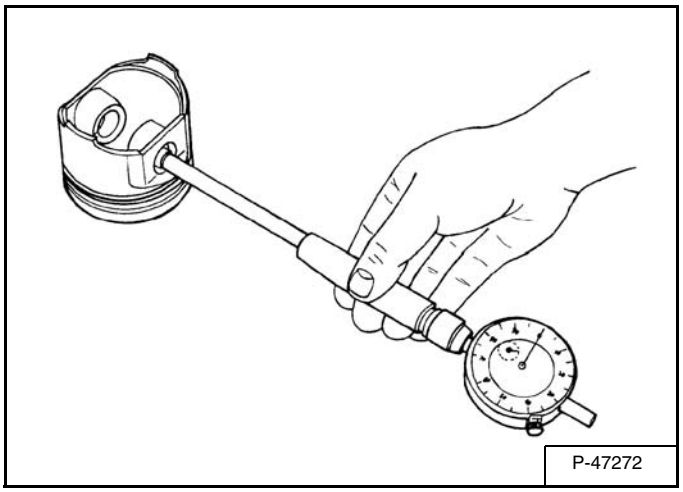
Figure 70-80-16



Remove the cylinder head (Item 1) and gasket (Item 2) **[Figure 70-80-16]**.

Piston And Connecting Rod - Servicing

Figure 70-90-7

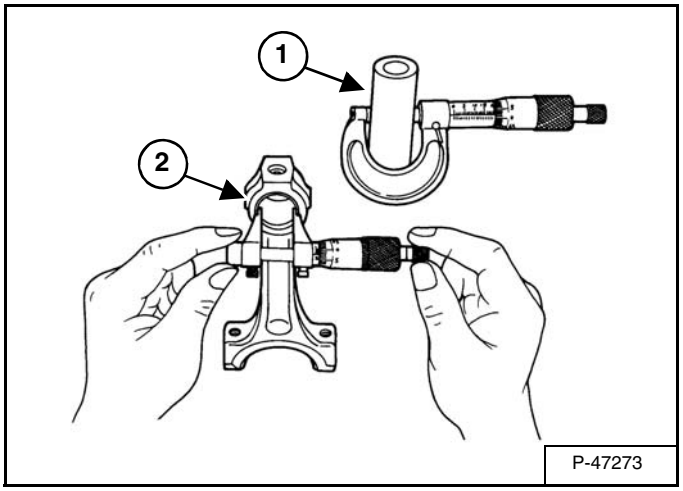


Measure the I.D. of the piston pin bore in both horizontal and vertical directions **[Figure 70-90-7]**.

If the measurement exceeds the allowable limit, replace the piston.

Piston Bore I.D.	0.9843 - 0.9848 in. (25,0 - 25,013 mm)
Allowable Limit	0.9862 in. (25,05 mm)

Figure 70-90-8



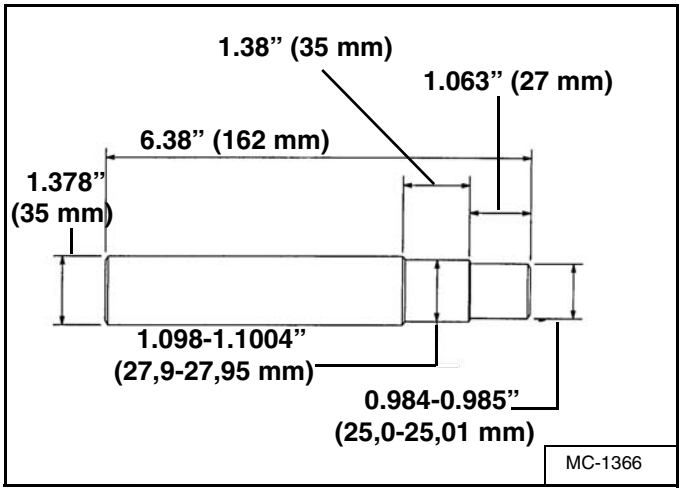
Measure the O.D. of the piston pin (Item 1) **[Figure 70-90-8]**.

Measure the I.D. of the connecting rod small end (Item 2) **[Figure 70-90-8]**.

Calculate the oil clearance. If the clearance exceeds the allowable limit, replace the bushing. If it still exceeds the specifications, replace the piston pin.

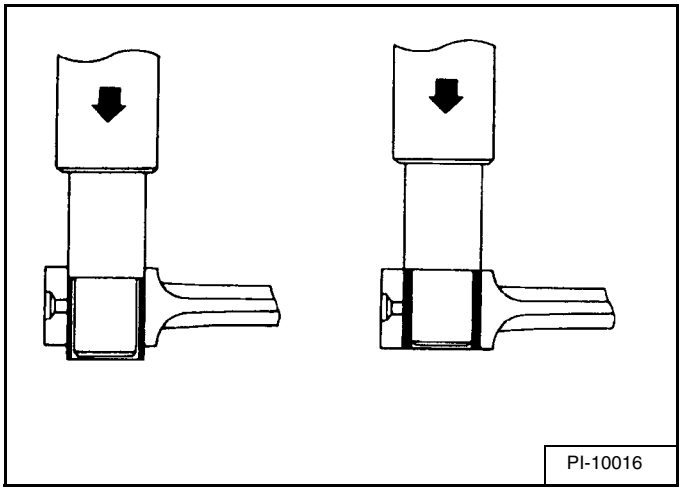
Piston Pin O.D.	0.9843 - 0.9847 in. (25,0 - 25,011 mm)
Bushing I.D.	0.9852 - 0.9858 in. (25,03 - 25,04 mm)
Oil Clearance Between Piston Pin & Bushing	0.0006 - 0.0015 in. (0,014 - 0,038 mm)
Allowable Limit	0.0059 in. (0,15 mm)

Figure 70-90-9



To replace the connecting rod small end bushing, make a driver tool as shown in figure **[Figure 70-90-9]**.

Figure 70-90-10



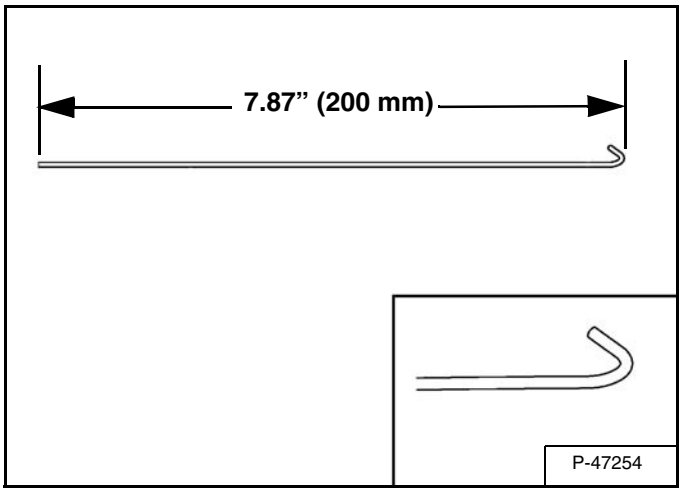
Use a press and special driver tool to remove the small end bushing **[Figure 70-90-10]**.

Installation: Clean the small end bushing and bore. Put oil on the bushing and press into the connecting rod until it is flush **[Figure 70-90-10]**.

CAMSHAFT AND TIMING GEARS

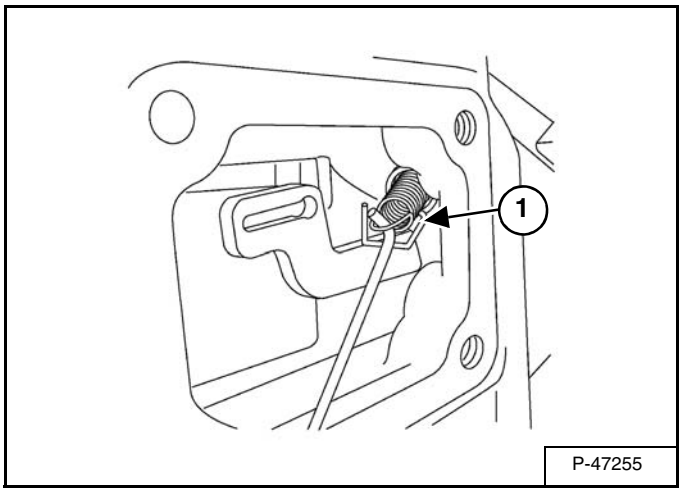
Timing Gearcase Cover Removal And Installation

Figure 70-100-1



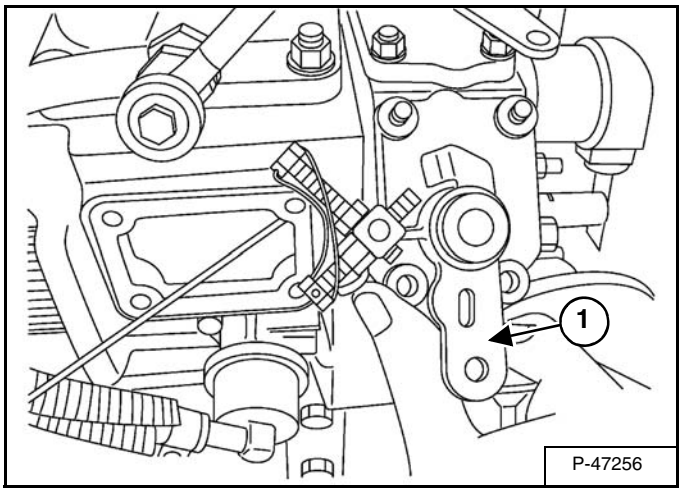
Bend a hook on the end of a 7.87 in. (200 mm) long, 0.050 in. (1.2 mm) diameter hard wire **[Figure 70-100-1]**.

Figure 70-100-2



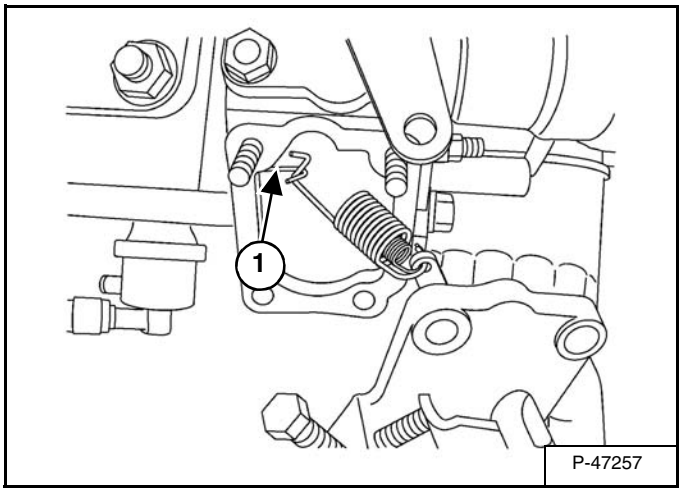
Disconnect the two governor springs (Item 1) **[Figure 70-100-2]**.

Figure 70-100-3



Remove the speed control plate (Item 1) **[Figure 70-100-3]**.

Figure 70-100-4



Remove the wire (Item 1) **[Figure 70-100-4]** 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.

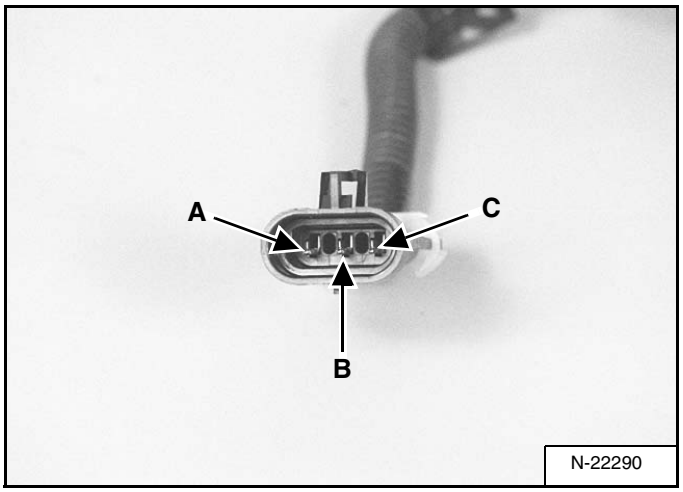
HEATER

TIGHTEN ALL HARDWARE PER SIZE TO GRADE 5 TORQUE (SEE STANDARD TORQUE SPECIFICATIONS FOR BOLTS, SECTION SPEC-01) UNLESS OTHERWISE SPECIFIED.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE AND STANDARD ITEMS MAY VARY.

Electrical System (Cont'd)

Figure 80-30-10

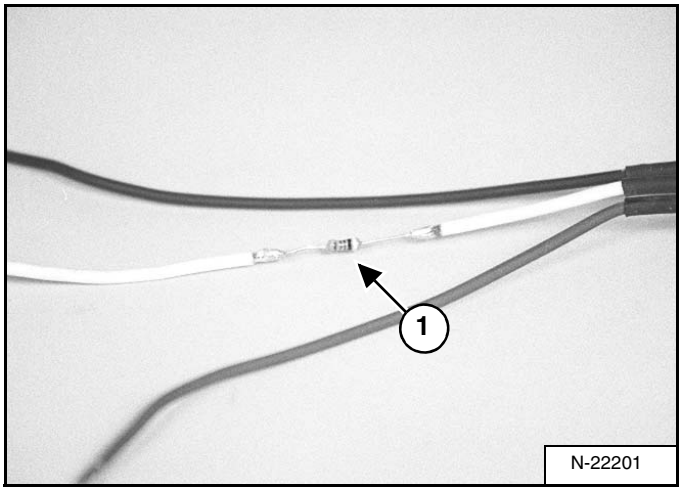


If there is voltage at the wiring harness, check the potentiometer **[Figure 80-30-10]** for resistance.

The resistance should be 10 K Ohm's between wire terminal **A** and wire terminal **C** frame **[Figure 80-30-10]**.

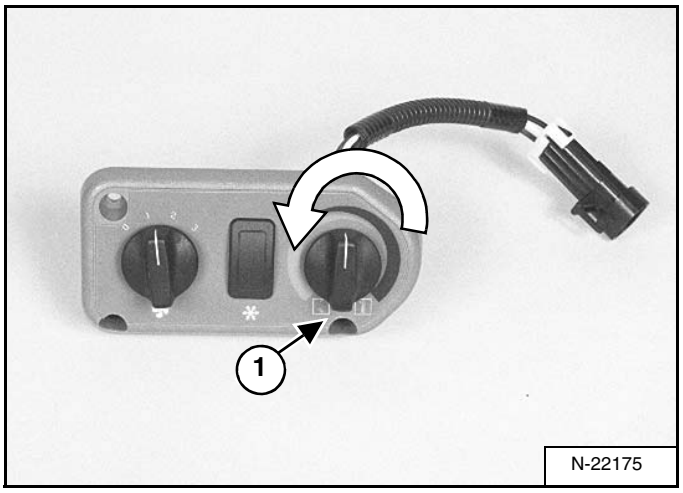
If no resistance is found replace the potentiometer.

Figure 80-30-11



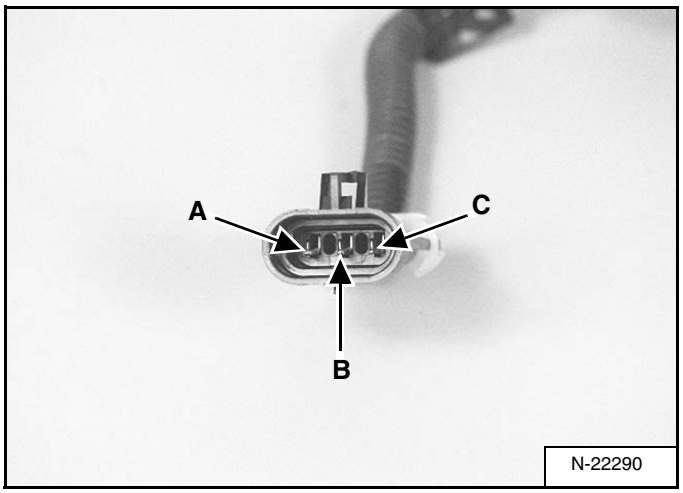
The white wire **B**, (Item 1) **[Figure 80-30-11]**, on the potentiometer, is a resistor wire.

Figure 80-30-12



To check the resistance of the white wire, turn the potentiometer control (Item 1) **[Figure 80-30-12]** to the full A/C position.

Figure 80-30-13



The resistance between the wire terminal **A** and wire terminal **B** frame **[Figure 80-30-13]** should be approximately 49 K Ohm's.

Check the resistance between the wire terminal **C** and wire terminal **B** frame **[Figure 80-30-13]** should be approximately 39 K Ohm's.

Disassembly And Assembly (Cont'd)

Figure 80-60-8

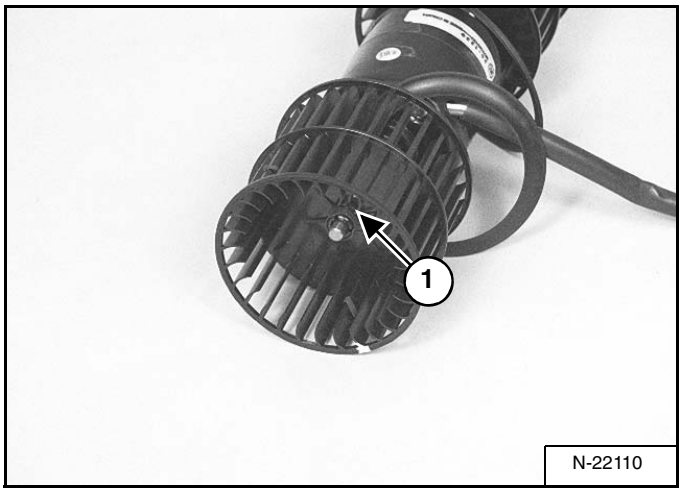
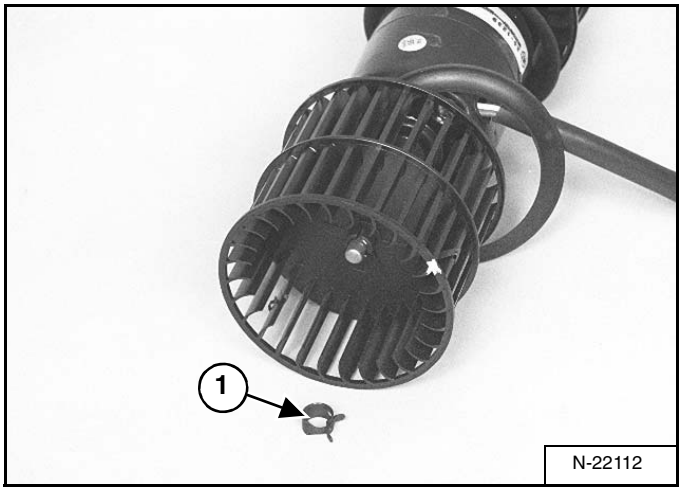
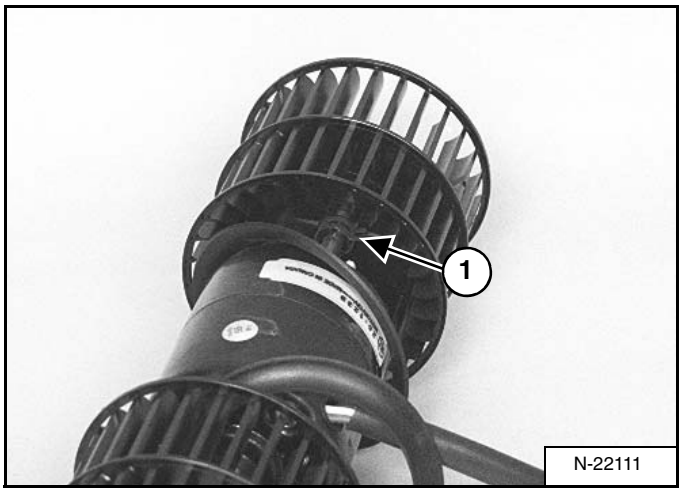


Figure 80-60-9



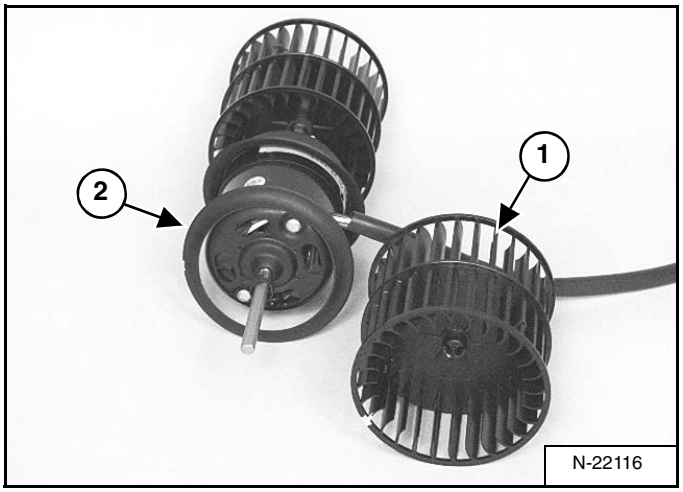
Remove the outside blower wheel clamp (Item 1) **[Figure 80-60-8]** & **[Figure 80-60-9]** from the blower wheel.

Figure 80-60-10



Remove the inside blower wheel clamp (Item 1) **[Figure 80-60-10]** from the blower wheel.

Figure 80-60-11



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 80-60-11]** from the blower fan motor shaft.

Repeat the procedure for the other blower wheel.

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 Bobcat that have zinc phosphate coating are specified by the letter H following the part number.

	Thread size	sae grade 5	sae grade 8
in.-lb. (N•m)	0.250	80 - 90 (9,0 - 10,2)	110 - 120 (12,4 - 13,6)
	0.3125	180 - 200 (20,3 - 22,6)	215 - 240 (24,2 - 27)
ft.-lb. (N•m)	0.375	25 - 28 (34 - 38)	35 - 40 (47 - 54)
	0.4375	40 - 45 (54 - 61)	60 - 65 (81 - 88)
	0.500	65 - 70 (88 - 95)	90 - 100 (122 - 136)
	0.5625	90 - 100 (122 - 136)	125 - 140 (170 - 190)
	0.625	125 - 140 (170 - 190)	175 - 190 (240 - 260)
	0.750	220 - 245 (300 - 330)	300 - 330 (410 - 450)
	0.875	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)

Bobcat

SERVICE MANUAL REVISION

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	X
SALES MANAGER	☐

NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: **S130 - 1**
Date: **23 March 2006**
Product: **Bobcat Loader**
Model: **S130**
Manual No: **6904121 (11-05)**

The following Sections are a revision to the above Service Manual.

COVER	40-10
FOREWORD	40-20
10-20	50-40
10-30	50-41
10-70	50-50
10-90	50-80
10-100	50-100
10-120	
10-140	60-10
10-160	60-30
10-200	60-50
	60-70
20-01	60-140
20-20	
20-40	70-10
20-41	70-50
20-60	70-70
20-80	70-90
30-10	80-30
30-30	80-50
30-40	
	SPEC-40

Printed in U.S.A.

Bobcat

SERVICE MANUAL REVISION

ROUTE TO ATTENTION	
PARTS MANAGER	☐
SERVICE MANAGER	X
SALES MANAGER	☐

NOTICE **Insert This Sheet With The Below Listed Manual For Future Reference.**

Revision No: **S130 - 6**
Date: **7 September 2007**
Product: **Bobcat Loader**
Model: **S130**
Manual No: **6904121 (9-07)**

The following Sections are a revision to the above Service Manual.

COVER	
10-70	

Printed in U.S.A.