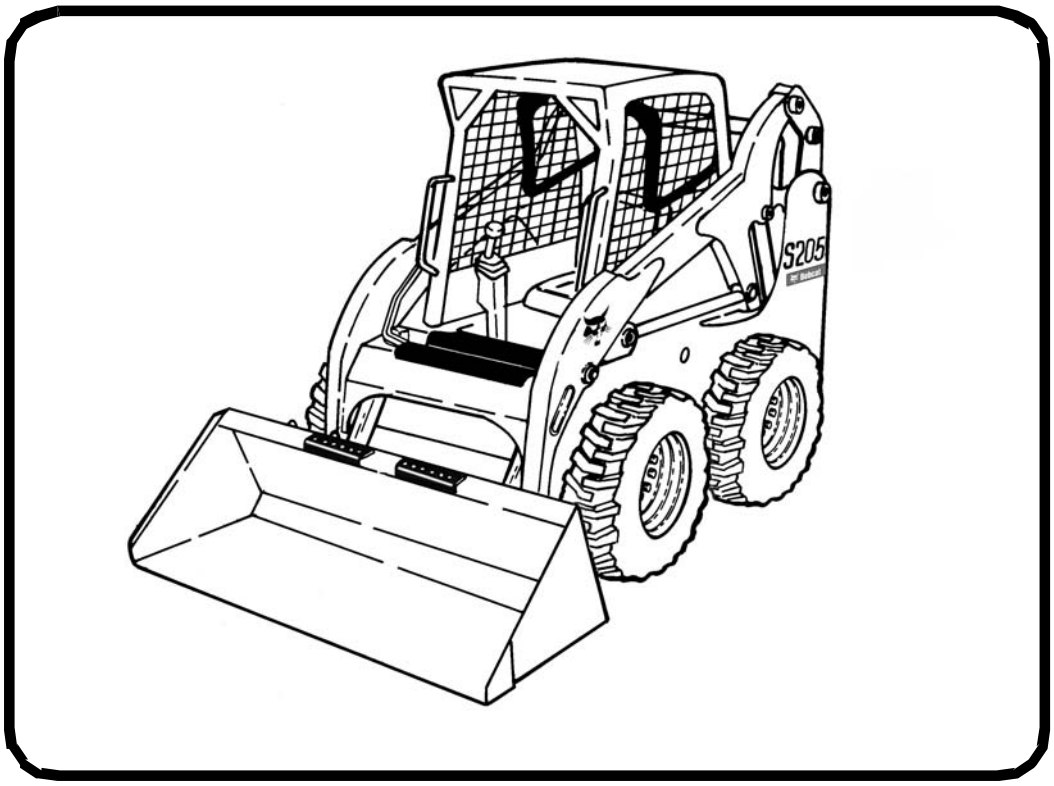
Bobcat®

Service Manual
S205 Skid-Steer Loader

S/N A3LJ11001 & Above
S/N A3LK11001 & Above
S/N ANLP11001 & Above



EQUIPPED WITH
BOBCAT INTERLOCK
CONTROL SYSTEM (BICS™)

6987050 (6-10)

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, SPEC SECTION) UNLESS OTHERWISE SPECIFIED.

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

TRANSPORTING THE LOADER ON A TRAILER

Loading And Unloading

WARNING

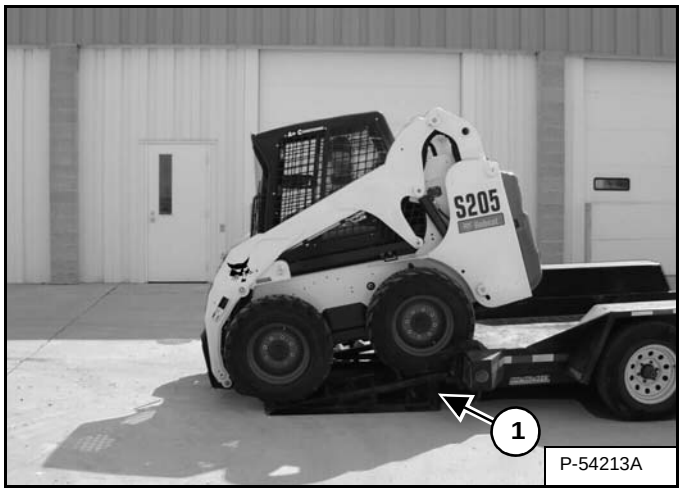
AVOID SERIOUS INJURY OR DEATH

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 for weight of loader. (See Performance on Page SPEC-10-2.)

Figure 10-40-1

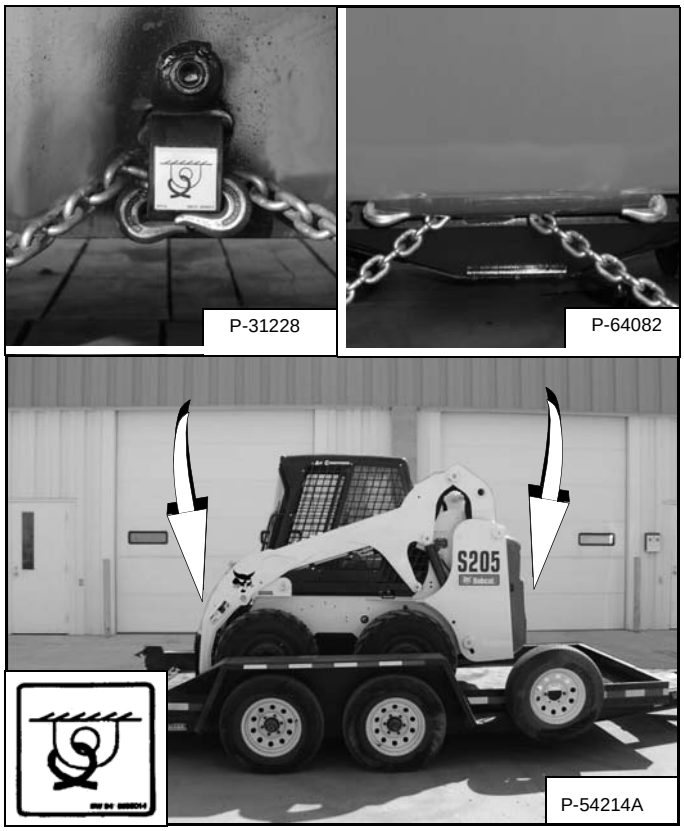


A loader with an empty bucket or no attachment must be loaded backward onto the transport vehicle **[Figure 10-40-1]**.

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 **[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

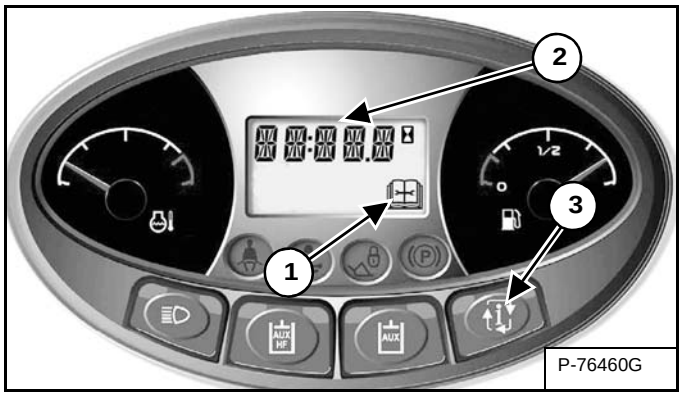
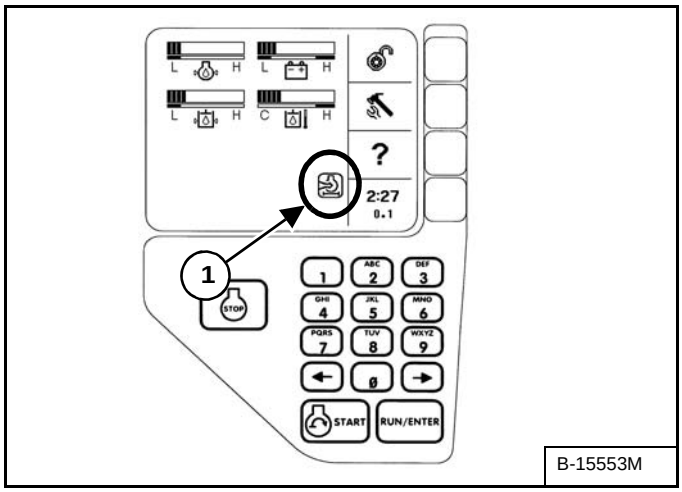


Figure 10-80-2



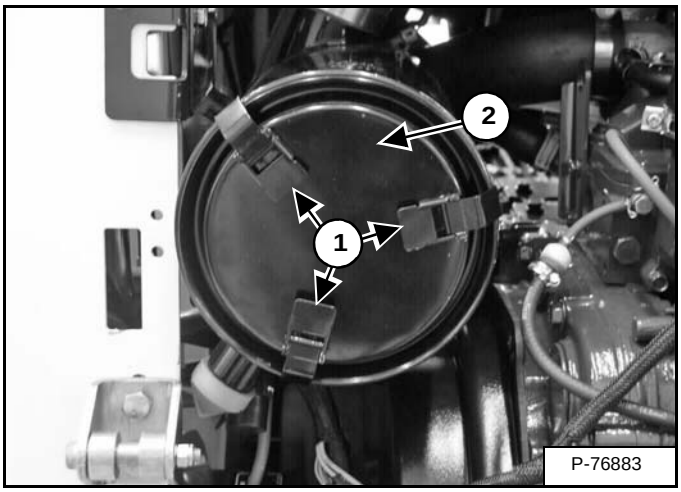
It is important to change the air filter element only when necessary. The Service indicator (Item 1) will FLASH and service code [M0117] (Air Filter Plugged) will show in the Data Display (Item 2) when the Information button (Item 3) **[Figure 10-80-1]** is held for two seconds.

The Air Cleaner icon on the Deluxe Instrumentation Panel, if equipped, will be ON (Item 1) **[Figure 10-80-2]**.

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

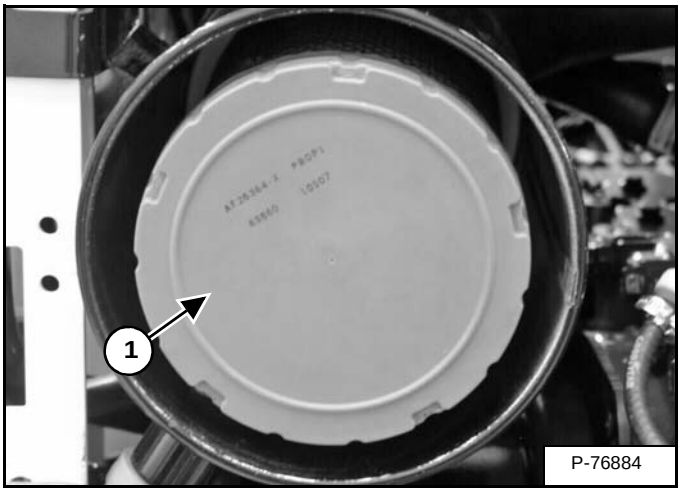
Outer Filter

Figure 10-80-3



Remove the wing nut and remove the dust cover **[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 new filter. Push all the way in until it contacts the base of the housing. Install wing nut.

Install the dust cover and the wing nut **[Figure 10-80-3]**.

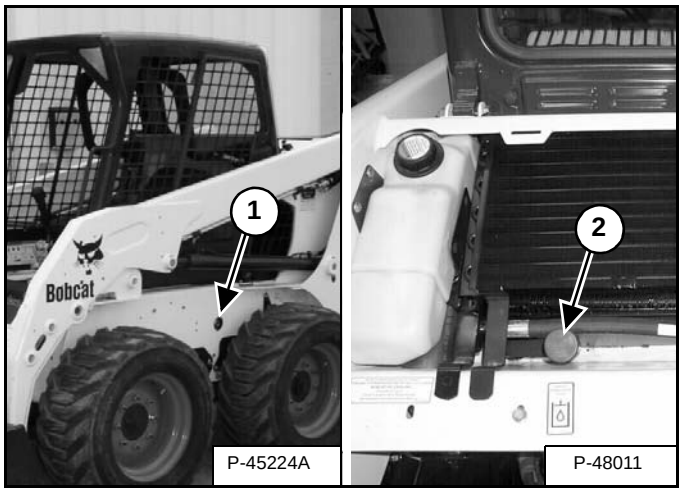
HYDRAULIC / HYDROSTATIC SYSTEM

Checking And Adding Fluid

Put the loader on a level surface, lower the lift arms and tilt the Bob-Tach fully back.

Stop the engine.

Figure 10-120-1



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

Open the rear door and raise the rear grill. Remove the fill cap (Item 2) **[Figure 10-120-1]**.

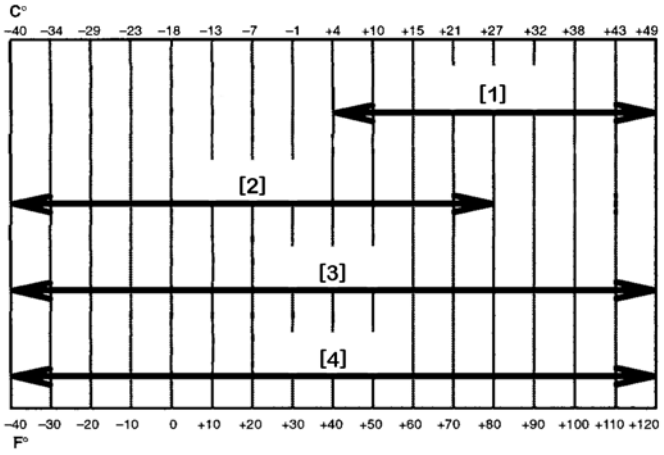
Add fluid **[Figure 10-120-2]** as needed to bring the level to the center of sight gauge. Install the fill cap (Item 2) **[Figure 10-120-1]**.

Lower the rear grill and close the rear door.

Hydraulic / Hydrostatic Fluid Chart

Figure 10-120-2

HYDRAULIC / HYDROSTATIC FLUID RECOMMENDED ISO VISCOSITY GRADE (VG) AND VISCOSITY INDEX (VI)



TEMPERATURE RANGE ANTICIPATED DURING MACHINE USE

[1]VG 100; Minimum VI 120
[2]VG 46; Minimum VI 140
[3]Synthetic Fluid; VG 46; Minimum VI 150
[4]BOBCAT Hydraulic / Hydrostatic Fluid

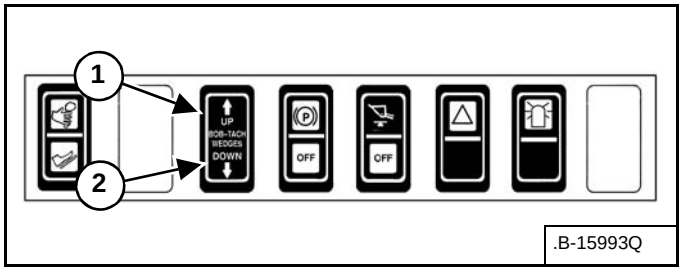
Use only recommended fluid in the hydraulic system **[Figure 10-120-2]**. (See Hydraulic System on Page SPEC-10-3.)

BOB-TACH (POWER)

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

Inspection And Maintenance

Figure 10-141-1



Push and hold the BOB-TACH “WEDGES UP” switch (Item 1) until wedges are fully raised. Push and hold the BOB-TACH “WEDGES DOWN” switch (Item 2) **[Figure 10-141-1]** until the wedges are fully down.

The levers and wedges must move freely.

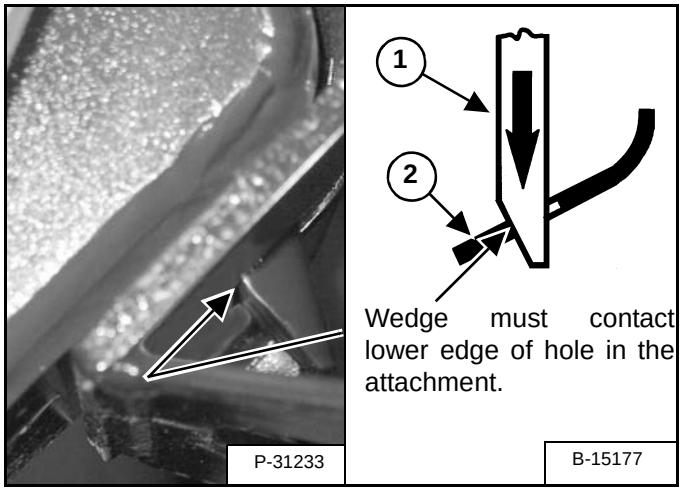
⚠ WARNING

AVOID INJURY OR DEATH

The Bob-Tach wedges must extend through the holes in the attachment mounting frame. Levers must be fully down and locked. Failure to secure wedges can allow attachment to come off.

W-2715-0208

Figure 10-141-2

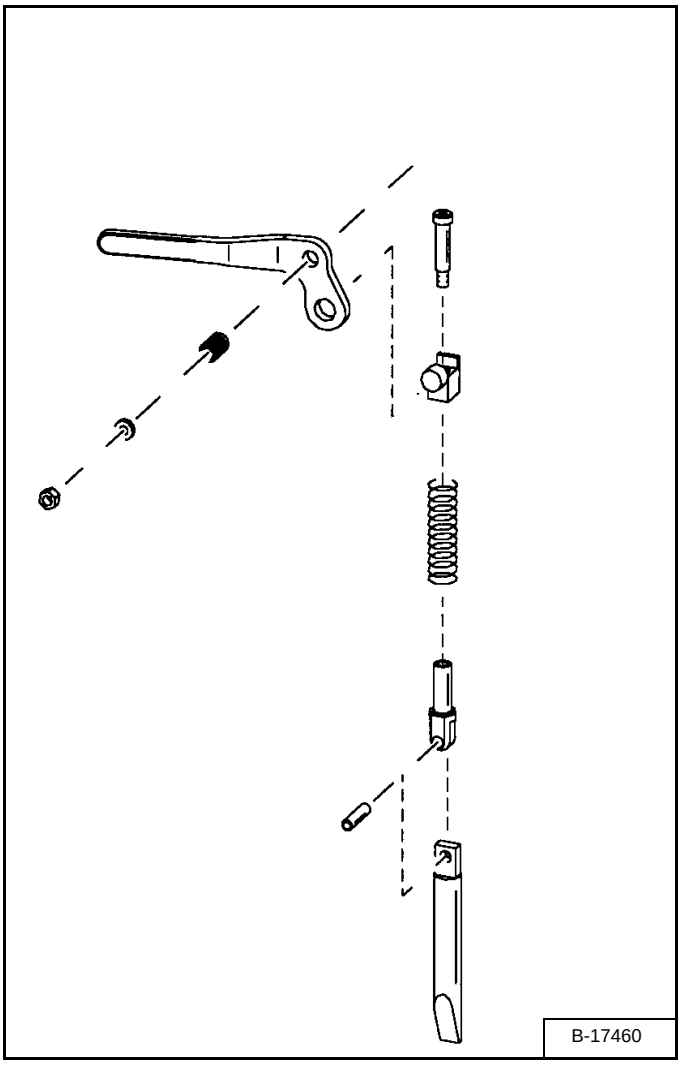


The wedges (Item 1) **[Figure 10-141-2]** must extend through the holes in the attachment mounting frame.

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

If the wedge does not contact the lower edge of the hole **[Figure 10-141-2]**, the attachment will be loose and can come off the Bob-Tach.

Figure 10-141-3



Inspect the mounting frame on the attachment and the Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-141-3]**. 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 SYSTEM (CONT'D)

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

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

HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW & 2 SPEED OPTION
S205 (S/N A3LJ11001 AND ABOVE)
(S/N A3LK11001 AND ABOVE)

(PRINTED MARCH 2008)
V-1141legend

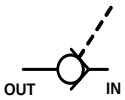
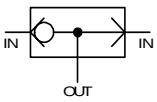
LEGEND

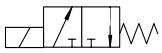
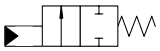
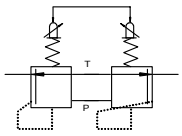
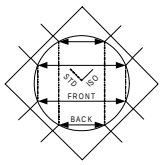
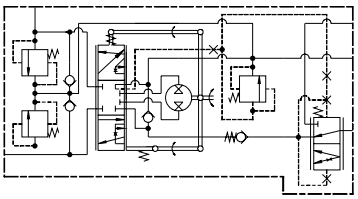
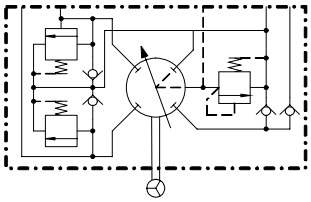
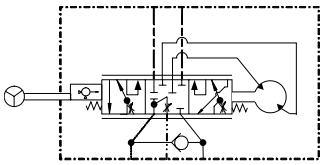
1. RESERVOIR:
   Capacity . . . . . 19.2 Qts. (18,2 L)
2. SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (3,1-3,8 bar)
3. DIFFERENTIAL PRESSURE SWITCH:
   36-44 PSI (2,5-3,0 bar)
   Normally Closed
4. DRIVE MOTOR SHUTTLE VALVE
5. RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (345 bar)
6. RELIEF VALVE - CHARGE INLET:
   360 PSI (24,8 bar)
   at High Engine Idle
   With 140 degrees F. (60 degrees C.) Fluid
7. FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE
8. HYDRAULIC PUMP . . . . . Gear Type
   16.9 GPM (64 L/min.) at High Engine Idle
9. RELIEF VALVE - MAIN:
   3250-3350 PSI (224-231 bar)
   at Front Quick Couplers
10. RELIEF/ANTICAVITATION VALVE - PORT 3500 PSI (241,3 bar)
11. ANTICAVITATION VALVE
12. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY
13. RELIEF/ANTICAVITATION VALVE - PORT (OPTIONAL) 3500 PSI (241,3 bar)
14. LOAD CHECK VALVE
15. LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP
16. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL
17. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL
18. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL
19. PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS
20. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL
21. PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL
22. FLOW DIVIDER ADJUSTMENT VALVE
23. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BASE
24. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - ROD
25. LOAD SHUTTLE VALVE - BLEED OFF
26. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL
27. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY
28. RESTRICTOR - 0.140 in. (3,6 mm)
29. RESTRICTOR - 0.031 in. (0,8 mm)
30. RELIEF VALVE: 3300 PSI (228 bar)
31. FILTER - HYDRAULIC (CANISTER)
32. FILTER - CASE DRAIN (SINTERED BRONZE)
33. FILTER - BICS CONTROL VALVE (SCREEN)
34. CHECK VALVE - BUCKET POSITION VALVE
35. RESTRICTION
36. VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP
37. CHECK VALVE - With 5 PSI (0,34 bar) Spring
38. BIDIRECTIONAL HYDROSTATIC MOTOR – 2 SPEED
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. CHARGE PUMP -
    12.8 GPM (48,5 L/min) at High Engine Idle
43. CHECK VALVE - With 300 PSI (20,7 bar) Spring And With 0.016 in. (0,40 mm) Orifice
44. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH
45. RESTRICTION - 0.089 in. (2,26 mm)
46. RESTRICTION - 0.025 in. (0,6 mm)
47. RELIEF VALVE - 2000 PSI (137 bar)
48. RELIEF VALVE - 1200 PSI (83 bar)
49. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)
50. RELIEF VALVE - 3300 PSI (228 bar)
51. DUMP VALVE - (ON/OFF)
52. CHECK VALVE
53. FILTER - BOB-TACH VALVE
54. AUXILIARY HYDRAULIC PUMP -
    9.5 GPM (36 L/min) at High Engine Idle
55. FIXED CAPACITY DISPLACEMENT HYDRAULIC MOTOR
56. ANTICAVITATION VALVE
57. PROPORTIONAL RELIEF VALVE – (Fan Speed Regulator):
    1566 - 1784 PSI (108 - 123 bar)
58. RESTRICTION - 0.343 in. (8,73 mm)
59. SENSOR – CHARGE PRESSURE – Fan Filter
60. SENSOR – HYD. TEMP. – Hyd. Filter
61. HIGH PRESSURE SHUTTLE
62. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – WARM UP
63. SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – 2 SPEED
64. PILOT ACTIVATED DIRECTIONAL CONTROL VALVE – HIGH / LO SPEED
65. RELIEF VALVE – With 125 PSI (8,6 bar) Spring

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

Printed in U.S.A.

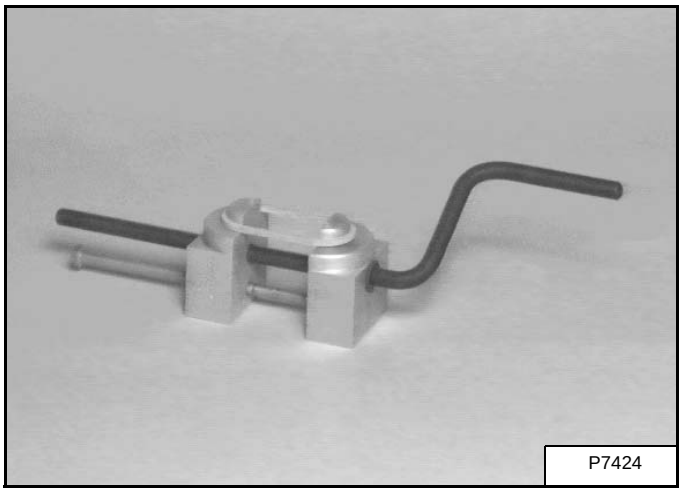
Glossary Of Hydraulic / Hydrostatic Symbols (Cont'd)

SYMBOL	DESCRIPTION
	NON-RETURN VALVE, SHUTTLE VALVE: Valve which allows free flow in one direction only.
	NON-RETURN VALVE (Check Valve) - Used as Replenishing Valve, Lock Check Valve or Anticavitation Valve - Opens if the Inlet pressure is higher than the Outlet pressure. Often contains internal spring which has NO significant pressure value.
	SPRING LOADED VALVE (bypass Valve) - Opens if the Inlet pressure is greater than the Outlet pressure plus the spring pressure.
	PILOT CONTROLLED NON-RETURN VALVE- It is possible to open the valve by pilot pressure.
	SHUTTLE VALVE - The Inlet port connected to the higher pressure is automatically connected to the Outlet port while the other Inlet port is closed.

SYMBOL	DESCRIPTION
	DIRECTIONAL CONTROL VALVE: Valve providing for the opening (fully or restricted) or the closing of one or more flow paths (represented by several squares).
	TWO PORTS and CLOSED FLOW PATHS
	SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) - controlled by an electric solenoid (with return spring).
	PILOT ACTIVATED DIRECTIONAL CONTROL VALVE (Two Position) - controlled by pressure (with return spring).
	MANUALLY ACTIVATED DIRECTION CONTROL VALVE (Variable Position) Joystick Controlled, variable pressure to shift the pilot activated directional control valve spool.
	MANUALLY ACTIVATED FLOW CONTROL VALVE (Two Position) allows for changing pilot flow to control switching joystick functions for STD / ISO Control (Excavators Only).
	STEERING CONTROL VALVE (Variable Position) - Used for controlling the hydraulic flow for the steering cylinders in relationship to the amount the steering wheel is rotated.
	
	

Disassembly And Assembly (Cont'd)

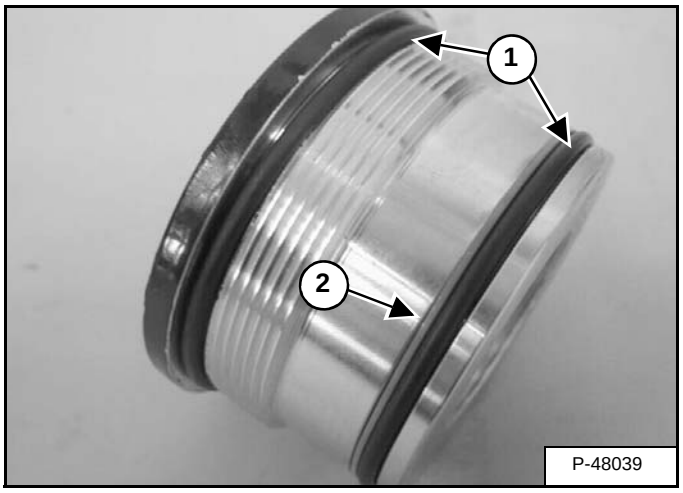
Figure 20-20-13



Assembly: Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-20-13]**. Allow the seal to stretch for 30 seconds before installing it on the piston.

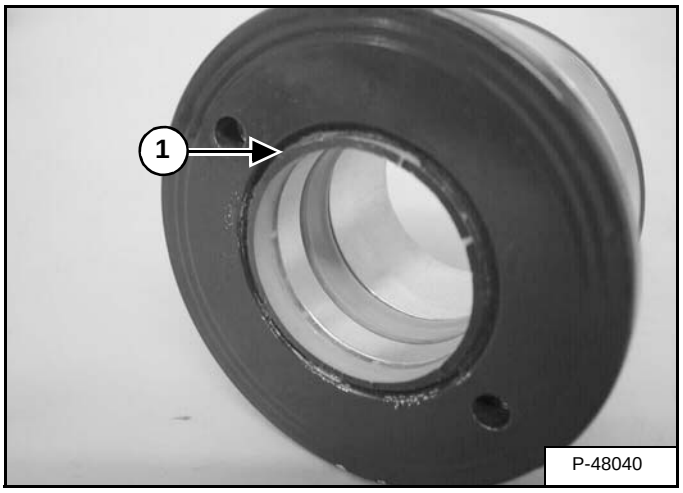
Once the seal is installed on the piston, a piston ring compressor can be used on the piston for 3 minutes to compress the seal into place.

Figure 20-20-14



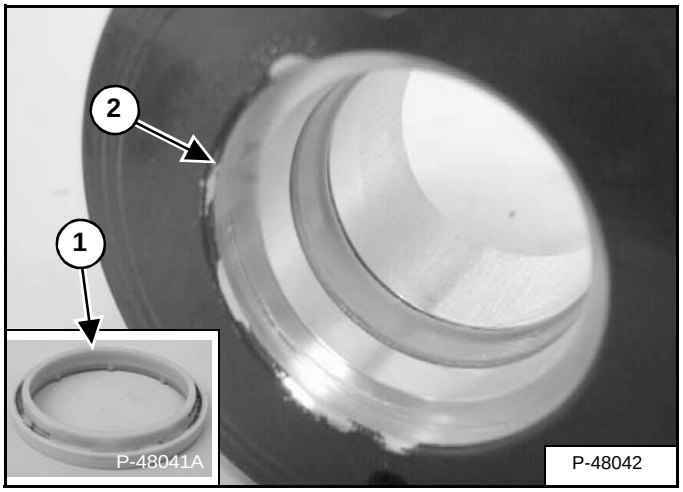
Remove the two O-rings (Item 1) and the back-up washer (Item 2) **[Figure 20-20-14]** from the cylinder head.

Figure 20-20-15



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

Figure 20-20-16



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

CYLINDER (BOB-TACH)

Testing

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

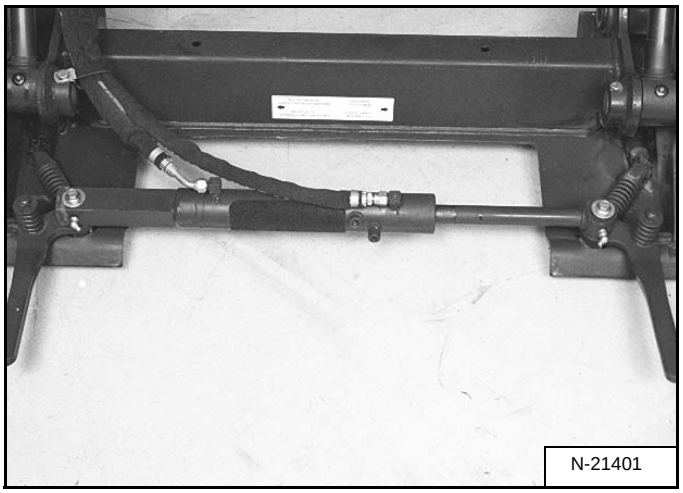
WARNING

AVOID INJURY OR DEATH

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

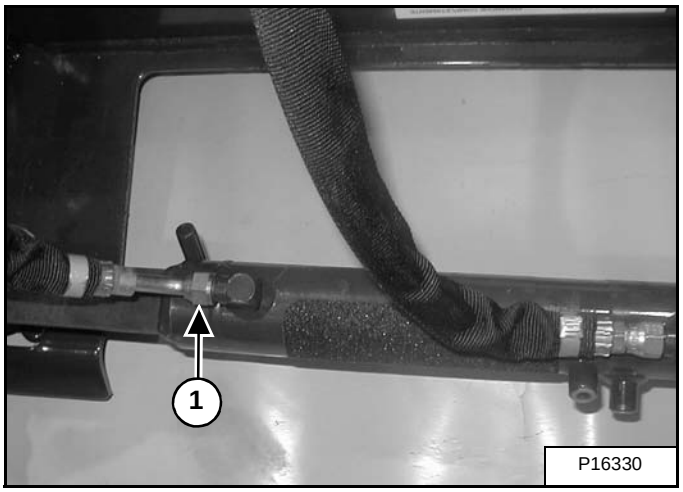
W-2072-0807

Figure 20-22-1



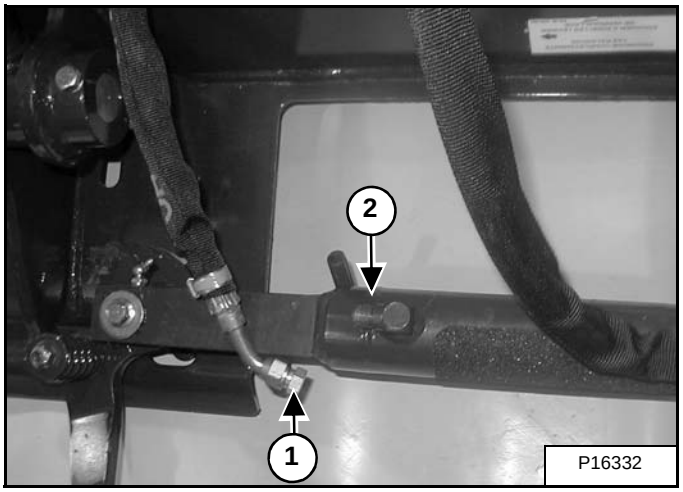
Tilt the Bob-Tach forward, so it is parallel to the floor **[Figure 20-22-1]**.

Figure 20-22-2



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

Figure 20-22-3



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

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

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

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

HYDRAULIC CONTROL VALVE (STANDARD)

Description

Figure 20-40-1

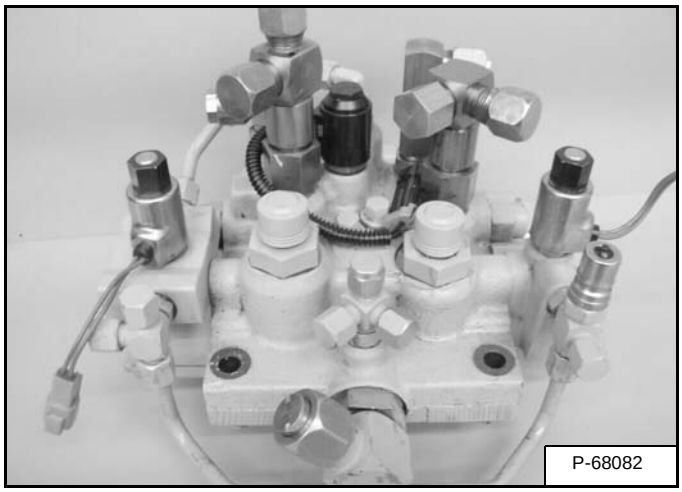
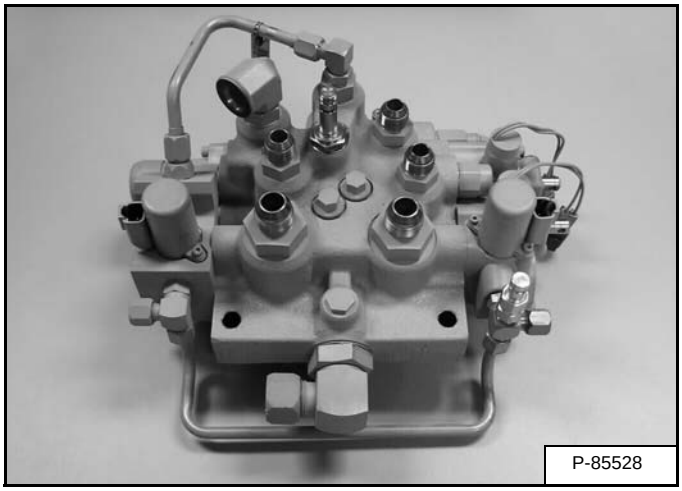


Figure 20-40-2



NOTE: The hydraulic control valve can be equipped with two different auxiliary hydraulic solenoids shown in [Figure 20-40-1] and [Figure 20-40-2].

The hydraulic control valve is located inside the mainframe on the right hand side, below the operators cab.

The hydraulic control valve is the hydraulic component that uses spools to direct the flow of hydraulic fluid to the lift, tilt and auxiliary functions.

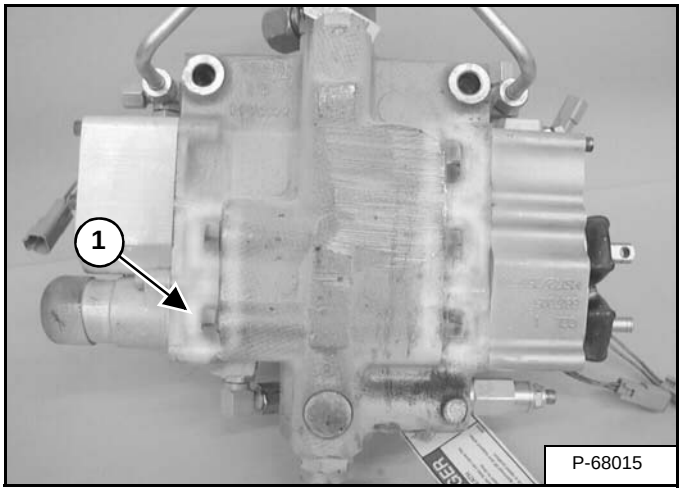
The lift and tilt functions are operated using mechanical linkages to connect the foot pedals to the lift and tilt spools.

The auxiliary function is operated by pilot pressure. There is one solenoid located by each side of the spool. Only one solenoid at a time is activated by the switch on the right side control handle/lever. The activated solenoid sends pilot pressure oil to one side of the spool and forces the spool to shift.

The hydraulic control valve contains a main relief valve which is adjustable.

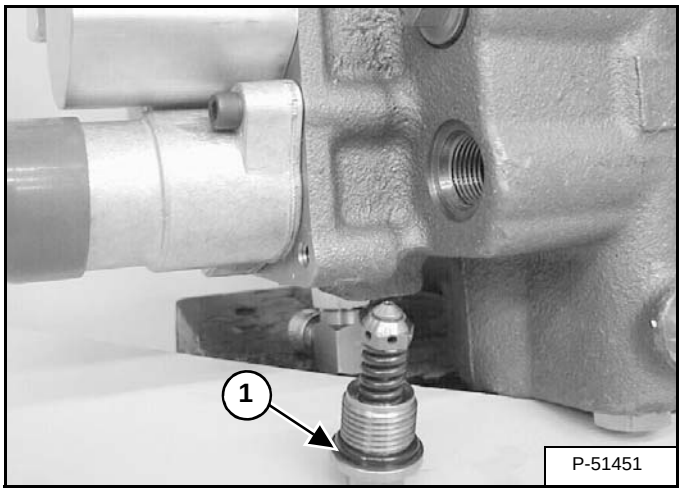
Port Relief / Anti-Cavitation Valve Removal And Installation (Lift, Base End)

Figure 20-40-30



Loosen the lift circuit port relief/anti-cavitation valve (Item 1) **[Figure 20-40-30]**.

Figure 20-40-31

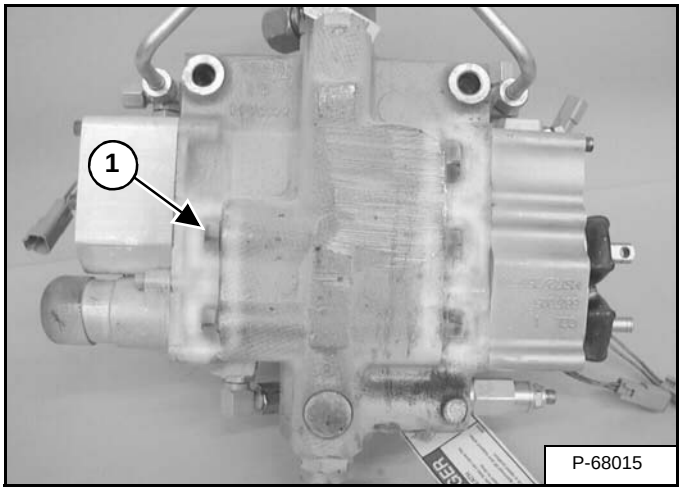


Replace the O-ring (Item 1) **[Figure 20-40-31]** before installation.

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

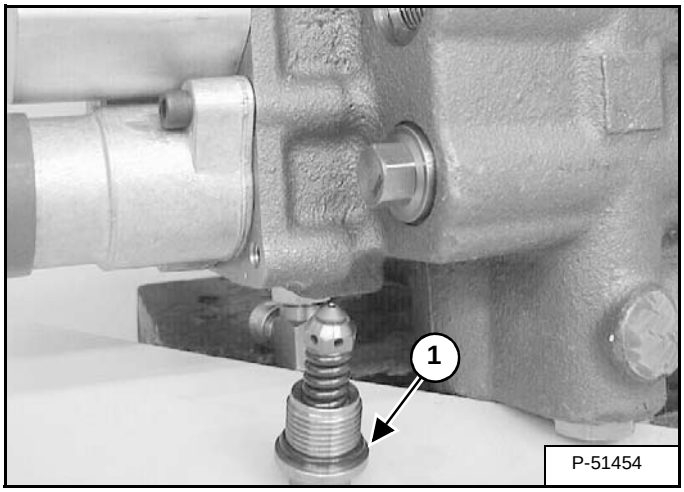
Port Relief / Anti-Cavitation Valve Removal And Installation (Tilt, Base End)

Figure 20-40-32



Remove the tilt port relief/anti cavitation valve (Item 1) **[Figure 20-40-32]** from the base end of the tilt section.

Figure 20-40-33

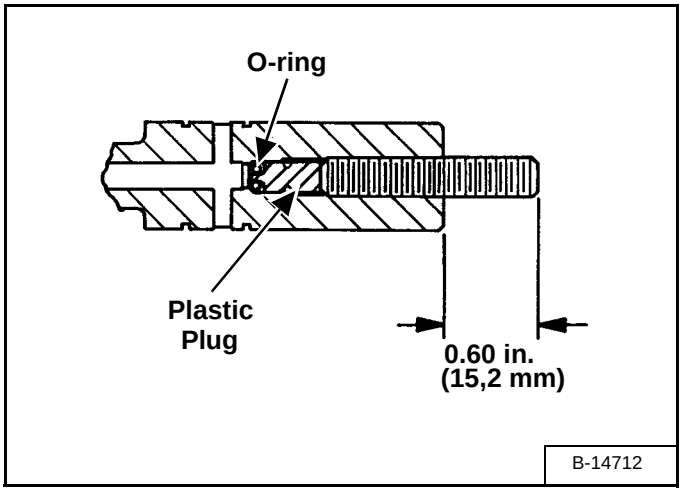


Replace the O-ring (Item 1) **[Figure 20-40-33]** before installation.

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

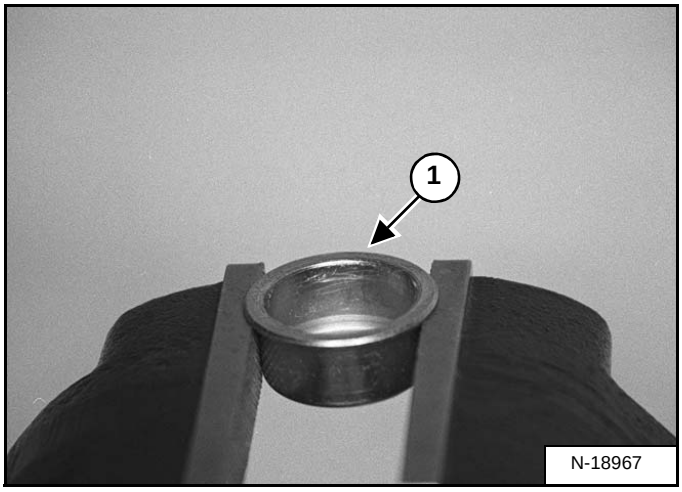
Lift Spool And Detent Removal And Installation (Cont'd)

Figure 20-40-69



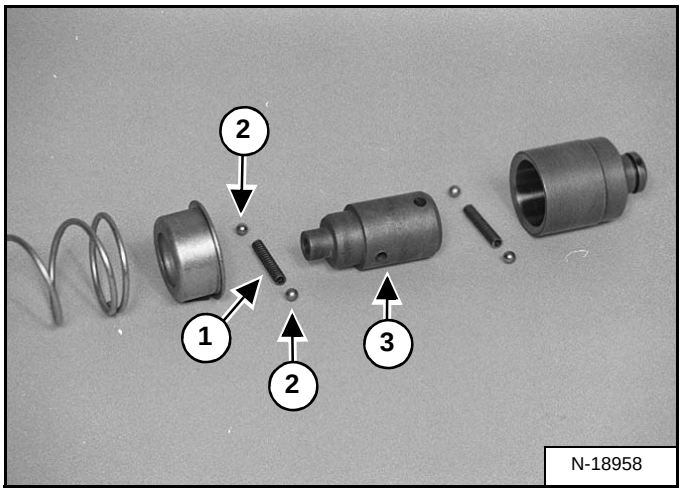
Install the stud and tighten until the other end of the stud is out about 0.600 in. (15,2 mm) from the spool **[Figure 20-40-69]**.

Figure 20-40-70



Clamp the collar (Item 1) **[Figure 20-40-70]** in a vice.

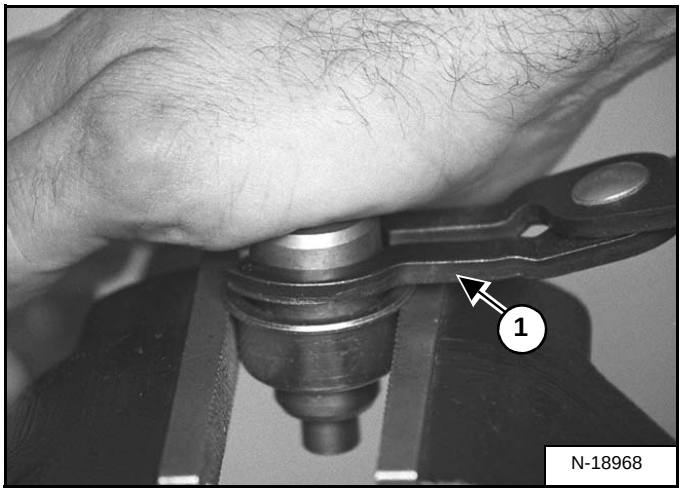
Figure 20-40-71



Apply grease on all the detent component surfaces before assembly **[Figure 20-40-71]**.

Install the spring (Item 1) and detent balls (Item 2) into the adapter (Item 3) **[Figure 20-40-71]** and compress with the detent pliers (Item 1) **[Figure 20-40-72]**.

Figure 20-40-72

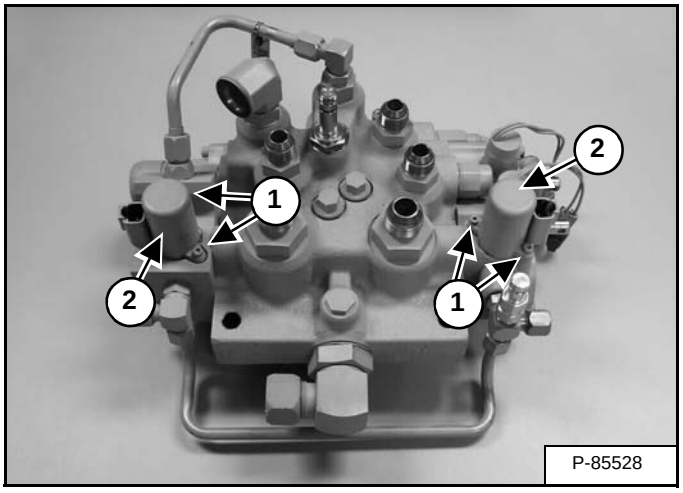


Install the detent adapter to the collar **[Figure 20-40-72]**.

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

Auxiliary Solenoid Removal And Installation (S/N A3LJ35001 & Above And A3LK35001 & Above)

Figure 20-40-106

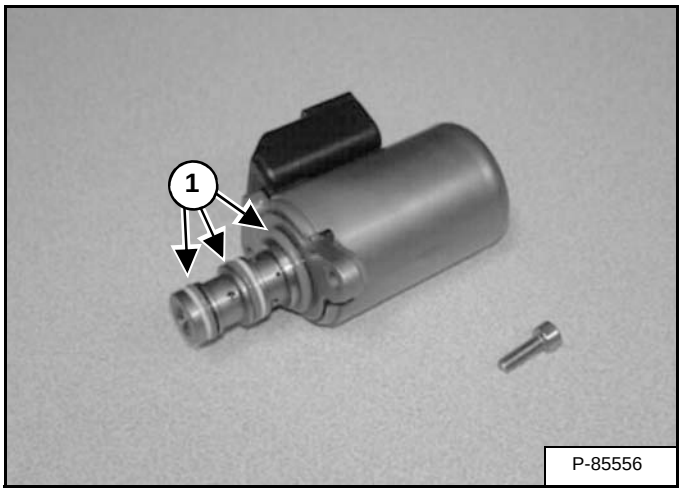


Remove the screws (Item 1) **[Figure 20-40-106]** from both solenoids.

Remove the solenoids (Item 1) **[Figure 20-40-106]** from the control valve.

Installation: Tighten the nut to 21.6 - 26.4 in.-lb. (2,44 - 2,98 N•m) torque.

Figure 20-40-107



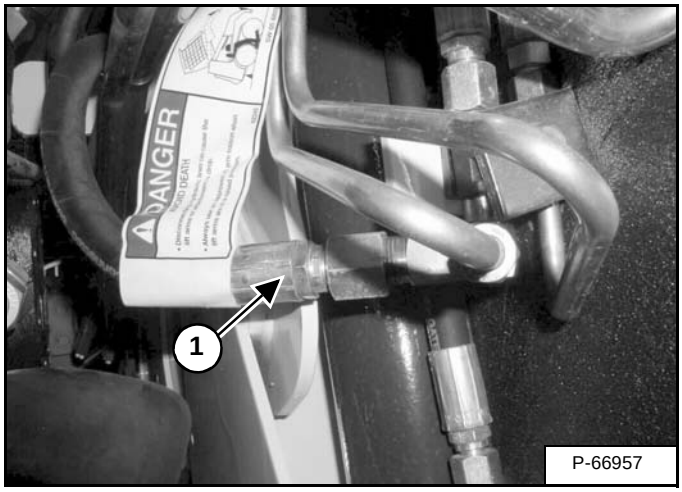
Check and remove the O-rings (Item 1) **[Figure 20-40-107]** from the solenoid stem.

Use an ohm meter to measure the solenoid coil resistance.

The correct resistance for the coil is 4.1 ± 6.1 ohm.

Removal And Installation (Cont'd)

Figure 20-41-13

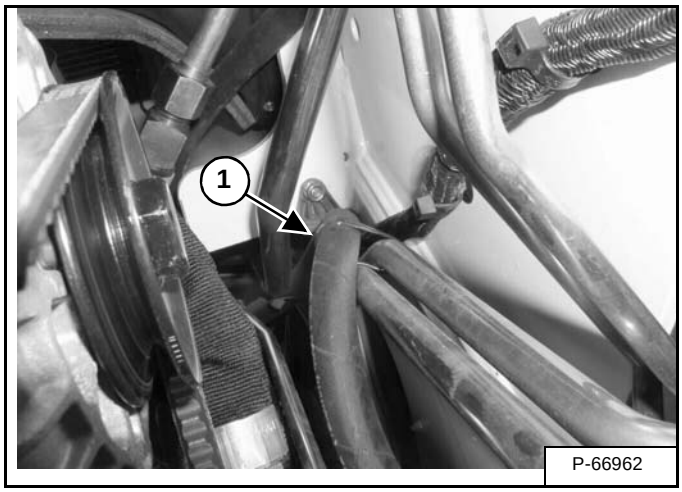


Mark all tubelines and hoses for correct installation.

The fixed end main valve hose (Item 1) **[Figure 20-41-13]** is connected to a fixed end fitting on the control valve. The hose is routed to the back upright where the hose is connected to a tee fitting that feeds the base end of both lift cylinders. The hose must be removed at the back tee fitting, located in the right side upright.

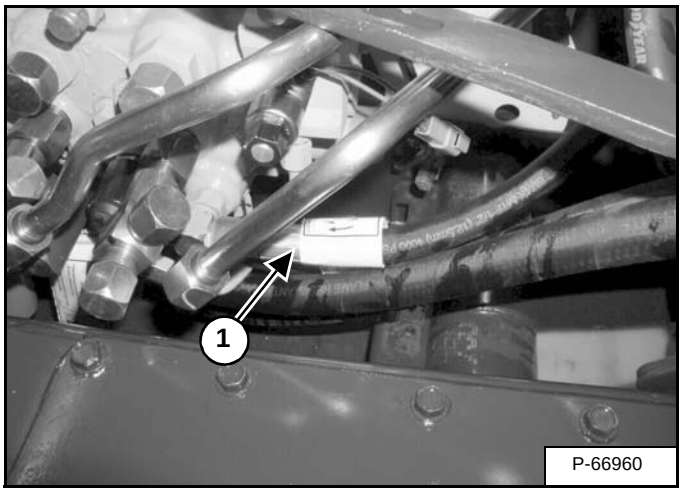
NOTE: Remember the hose routing for ease of control valve installation.

Figure 20-41-14



Remove any tie-straps (Item 1) **[Figure 20-41-14]** securing the fixed end main valve hose.

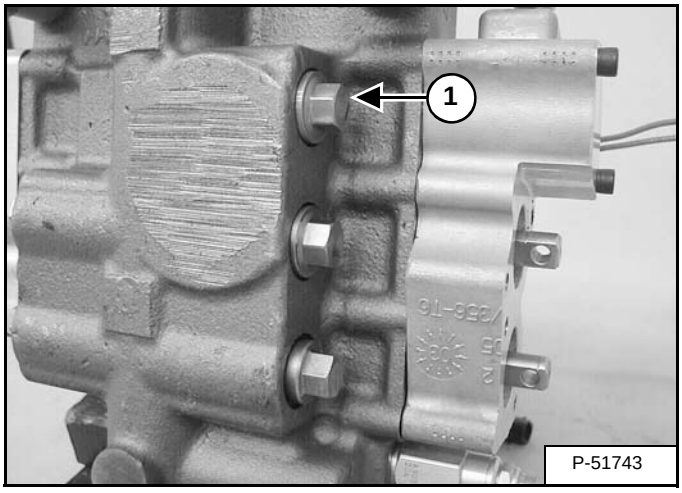
Figure 20-41-15



Remove the fixed-end main valve hose (Item 1) **[Figure 20-41-15]** from the main control valve fitting.

Port Relief Valve Removal And Installation (Cont'd)

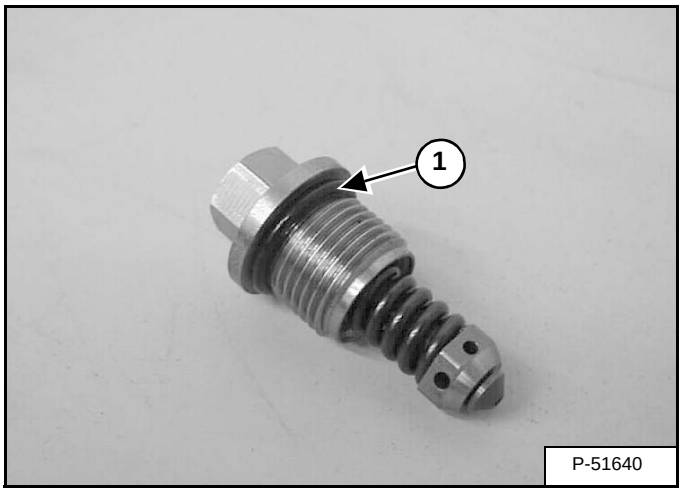
Figure 20-41-46



The control valve may be equipped with an optional auxiliary port relief valve (Item 1) **[Figure 20-41-46]**.

Remove the auxiliary port relief valve.

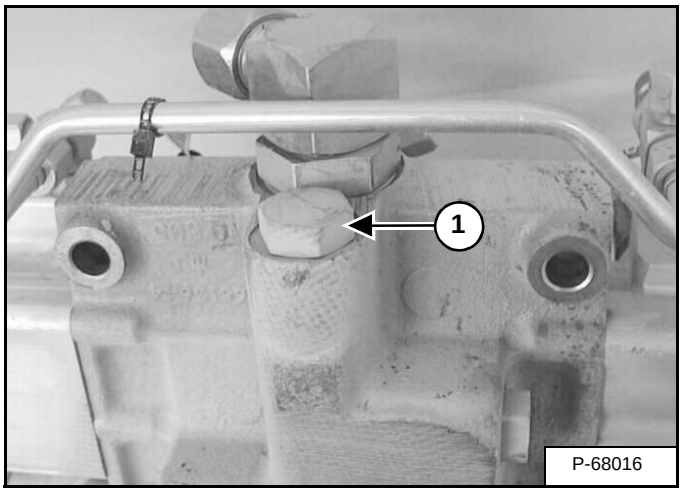
Figure 20-41-47



Installation: Always use new O-rings (Item 1) **[Figure 20-41-47]**. Lightly lubricate with oil and tighten to 38 - 45 ft.-lb. (52 - 61 N•m) torque.

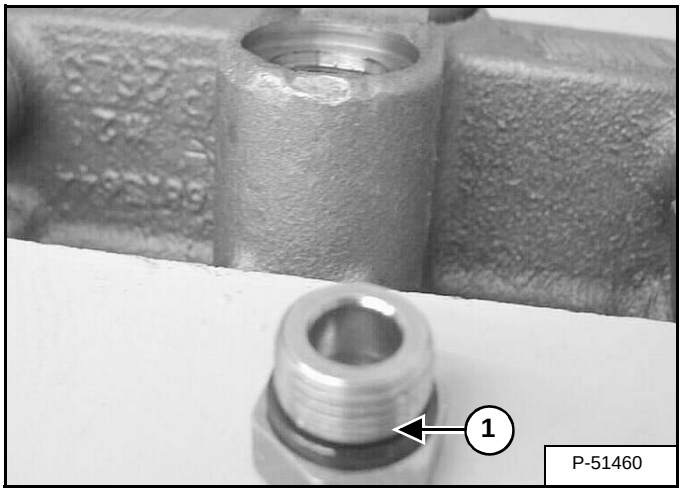
Plug Removal And Installation

Figure 20-41-48



At the top side of the control valve, remove the plug (Item 1) **[Figure 20-41-48]**.

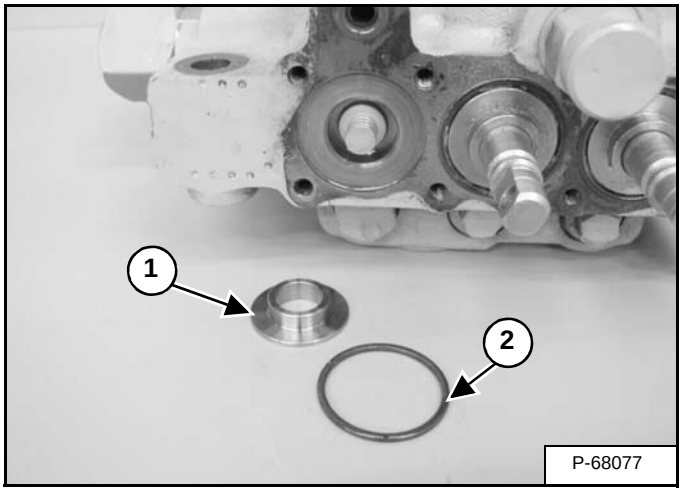
Figure 20-41-49



Installation: Always use new O-rings (Item 1) **[Figure 20-41-49]**. Tighten to 40 ft.-lb. (54 N•m) torque.

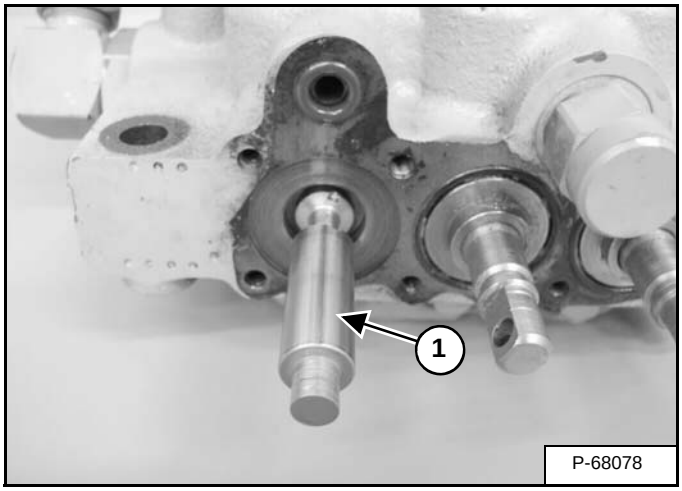
Auxiliary Spool Removal And Installation (Cont'd)

Figure 20-41-85



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-41-85]** from the auxiliary spool.

Figure 20-41-86



Remove the auxiliary spool (Item 1) **[Figure 20-41-86]**.

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.

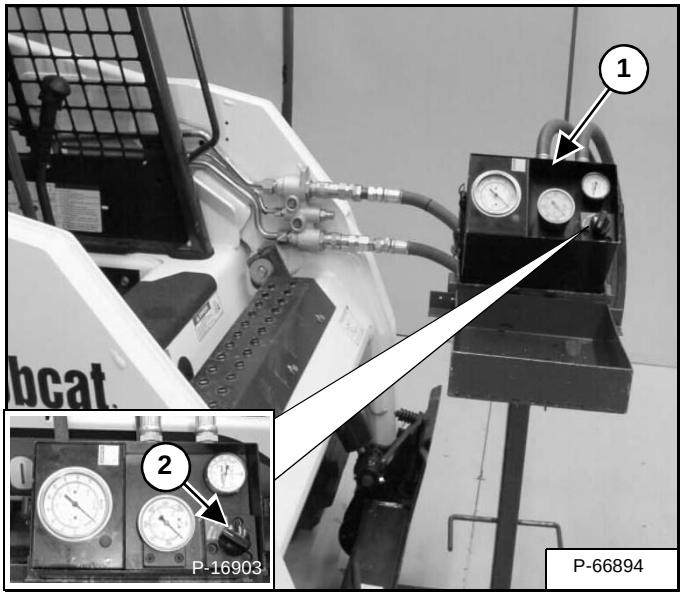
A seal kit is available to service the hydraulic pump. If any of the main components of the pump are damaged, the entire pump must be replaced.

Pump Test At Quick Couplers

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

MEL10003 - In-Line Hydraulic Tester
MEL10006 - Flow Meter Fitting Kit

Figure 20-60-1



NOTE: When testing the hydraulic flow of a machine, hoses must be at least 3/4 in. 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 2800 PSI. At approximately 2800 PSI the flow should start decreasing rapidly until the pressure reaches 3250 - 3300 PSI. At 3250 - 3300 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 (Cont'd)

Figure 20-60-19

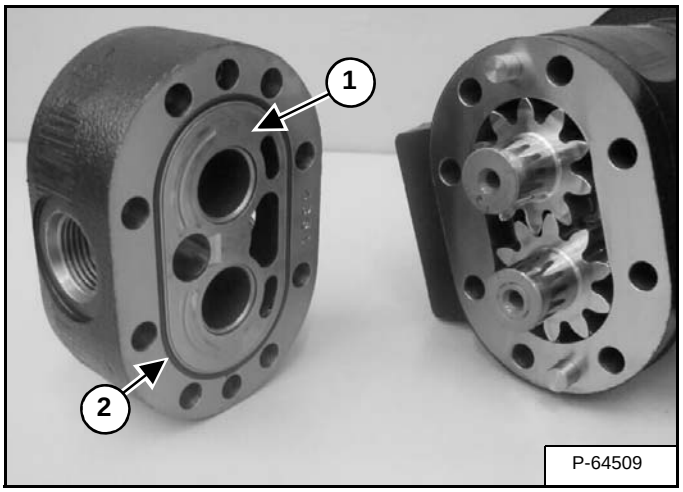
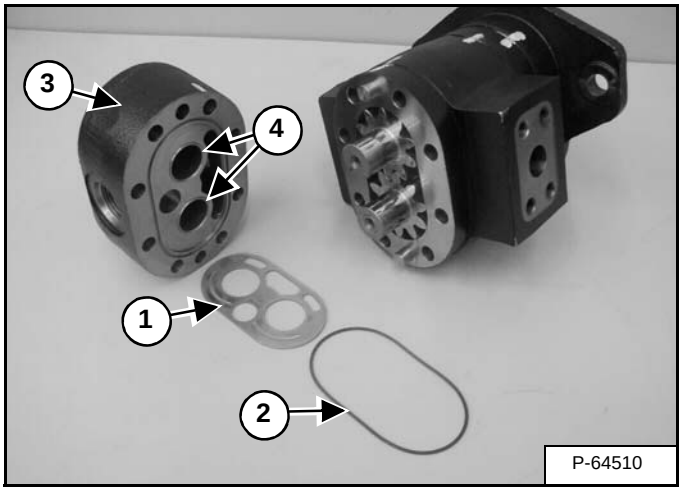


Figure 20-60-20



Remove the wear plate (Item 1) and section seal (Item 2) **[Figure 20-60-19]** & **[Figure 20-60-20]** from the pump end section.

NOTE: Position wear plate (Item 1) [Figure 20-60-20] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the pump end section (Item 3) [Figure 20-60-20] and bushings (Item 4) [Figure 20-60-20]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-60-21

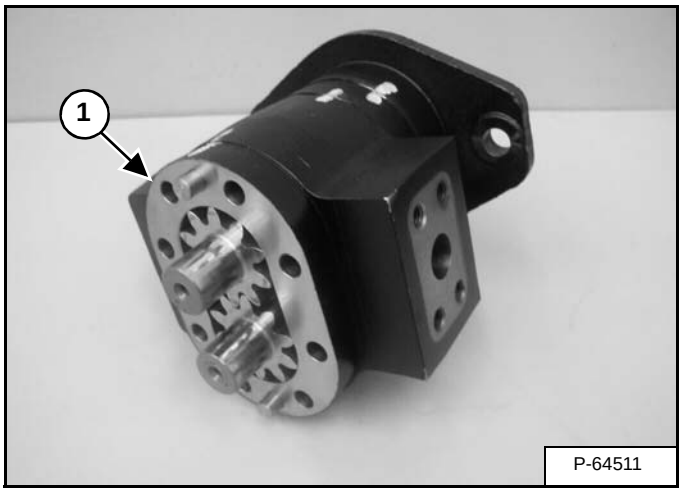
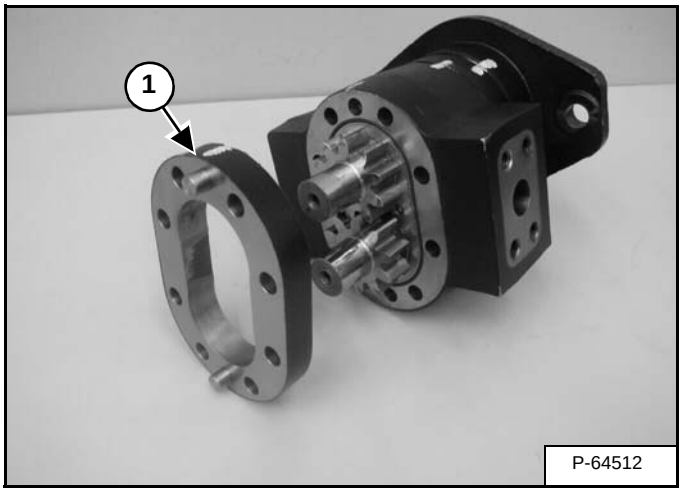


Figure 20-60-22

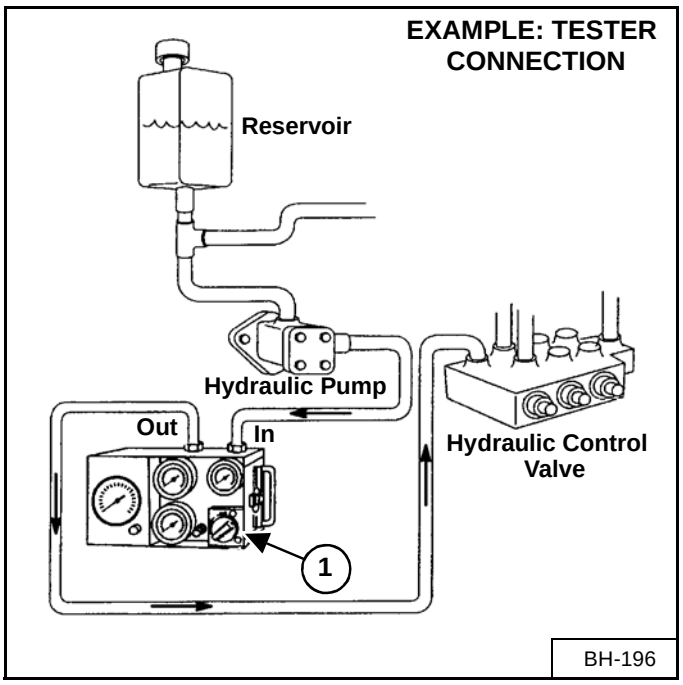


Remove the charge pump section (Item 1) **[Figure 20-60-21]** & **[Figure 20-60-22]** from the pump center section.

NOTE: Inspect the pump section (Item 1) [Figure 20-60-22]. If excessive wear or damage is visible, the pump must be replaced.

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

Figure 20-61-4



Sample tester connection shown **[Figure 20-61-4]**.

Start the engine and run at low idle RPM. Make sure the tester is connected correctly. If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full RPM*.

Warm the fluid to 140° F. (60° C.) by turning the restrictor control (Item 1) **[Figure 20-61-4]** 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.

Disassembly And Assembly (Cont'd)

Figure 20-61-23

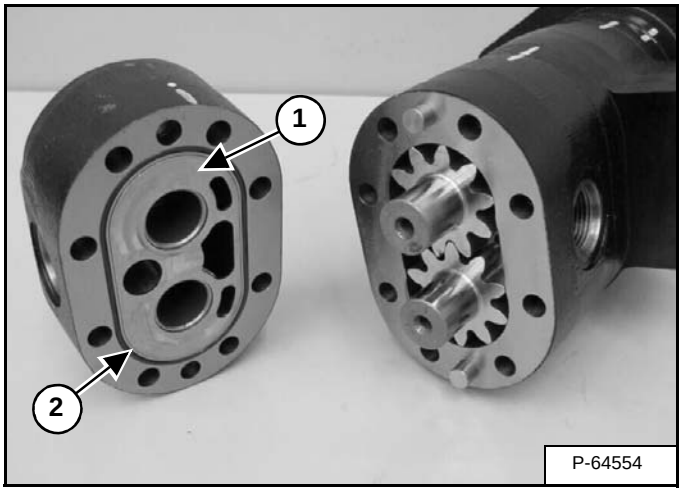
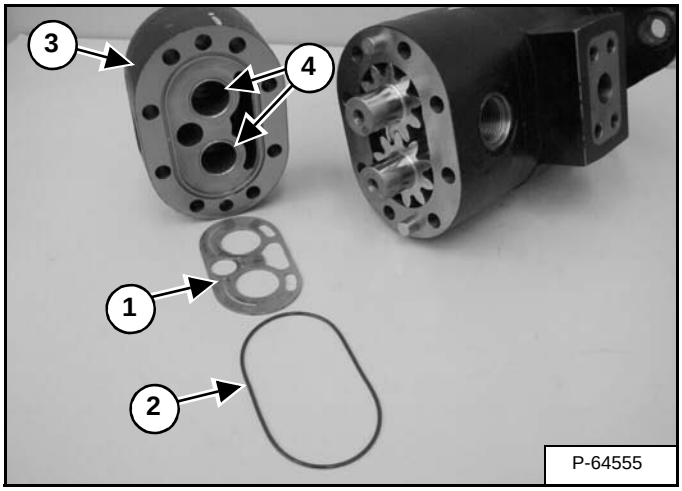


Figure 20-61-24



Remove the wear plate (Item 1) and O-ring (Item 2) **[Figure 20-61-23]** & **[Figure 20-61-24]** from the high flow end section.

NOTE: Position wear plate (Item 1) [Figure 20-61-24] inlets and traps as shown with bronze side toward gears.

NOTE: Inspect the high flow end section (Item 3) and bushings (Item 4) [Figure 20-61-24]. If excessive wear or damage is visible, the pump must be replaced.

Figure 20-61-25

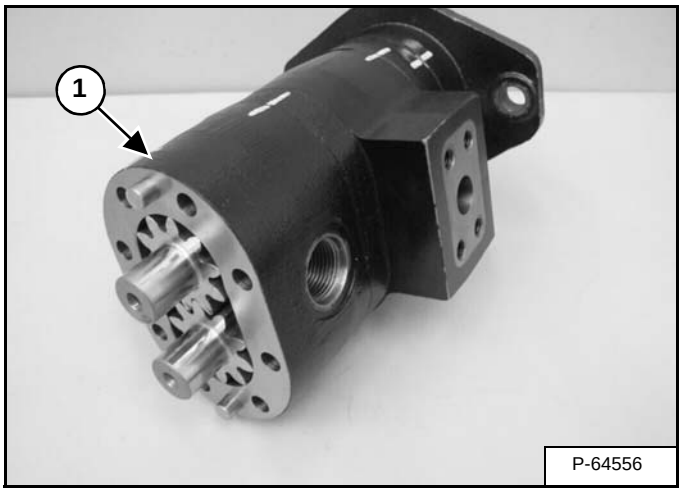
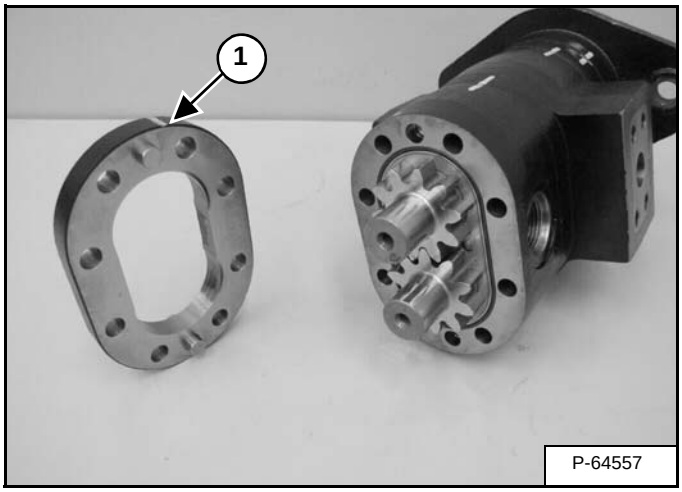


Figure 20-61-26

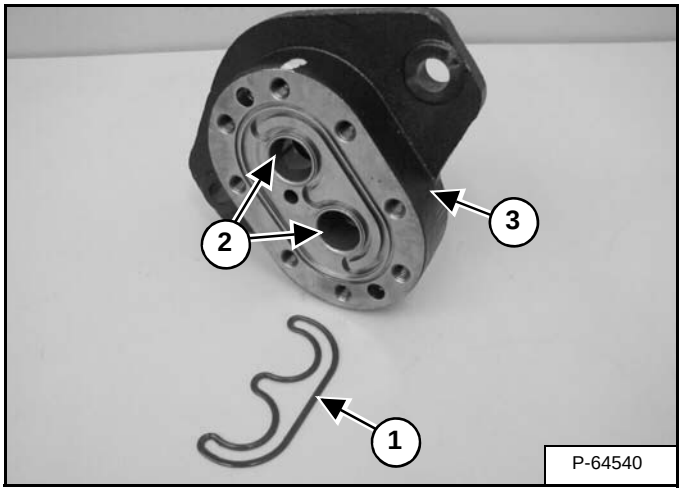


Remove the high flow pump section (Item 1) **[Figure 20-61-25]** & **[Figure 20-61-26]** from the charge center section.

NOTE: Inspect the high flow pump section (Item 1) [Figure 20-61-26]. If excessive wear or damage is visible, the pump must be replaced.

Disassembly And Assembly (Cont'd)

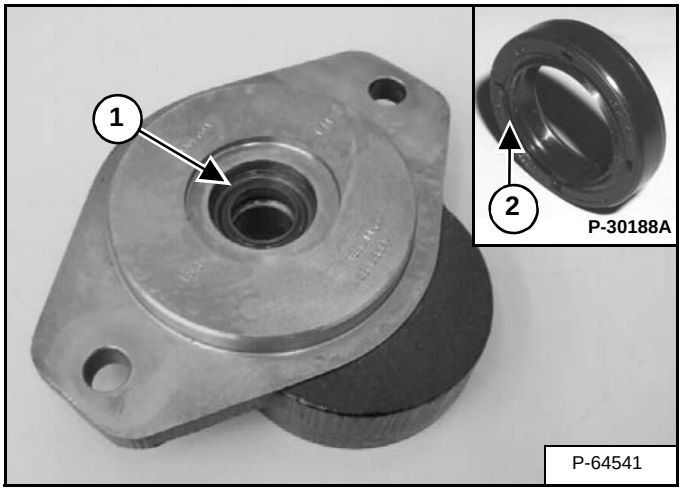
Figure 20-61-63



Inspect the pre-load seal (Item 1) **[Figure 20-61-63]** for damage and replace as needed.

NOTE: Inspect the pump flange section (Item 2) and bushings (Item 3) [Figure 20-61-63]. If excessive wear or damage is visible, the pump must be replaced.

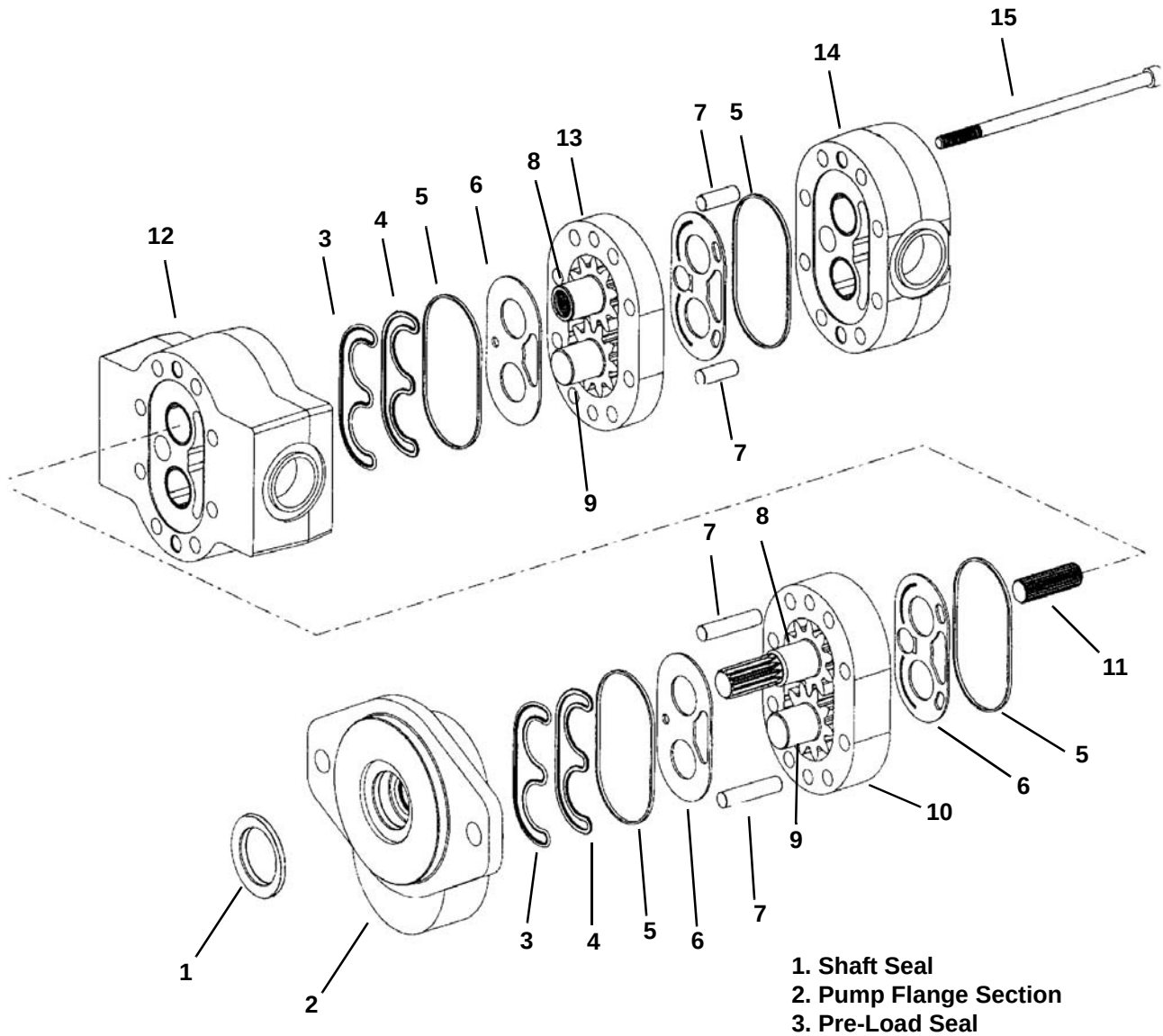
Figure 20-61-64



Remove the shaft seal (Item 1) **[Figure 20-61-64]** from the pump flange section.

Installation: The shaft seal flush surface (Item 2) **[Figure 20-61-64]** must be facing out away from the pump.

Parts Identification



1. Shaft Seal
2. Pump Flange Section
3. Pre-Load Seal
4. Load Seal
5. O-ring
6. Wear Plate
7. Pins
8. Drive Gear
9. Idler Gear
10. Auxiliary Pump Section
11. Spline Shaft
12. Pump Center Section
13. Charge Pump Section
14. Pump End Section
15. Bolt (8)

B-21259A

HYDRAULIC PUMP (SJC) (HIGH FLOW)

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.

The high flow hydraulic pump has an additional pump section that provides an additional amount of flow that is controlled by an external valve. The valve is switched from a button on the panel in the cab.

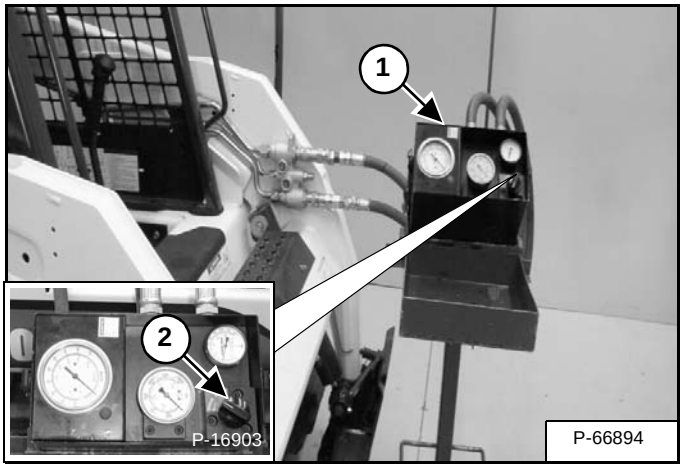
A seal kit is available to service the hydraulic pump. If any of the main components of the pump are damaged, the entire pump must be replaced.

Pump Test At Quick Couplers

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

MEL10003 - In-Line Hydraulic Tester
MEL10006 - Flow Meter Fitting Kit

Figure 20-71-1



Install a hydraulic tester (Item 1) **[Figure 20-71-1]** onto the front auxiliary quick couplers.

NOTE: When testing the hydraulic flow of a machine, hoses must be at least 3/4 in. 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.

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).

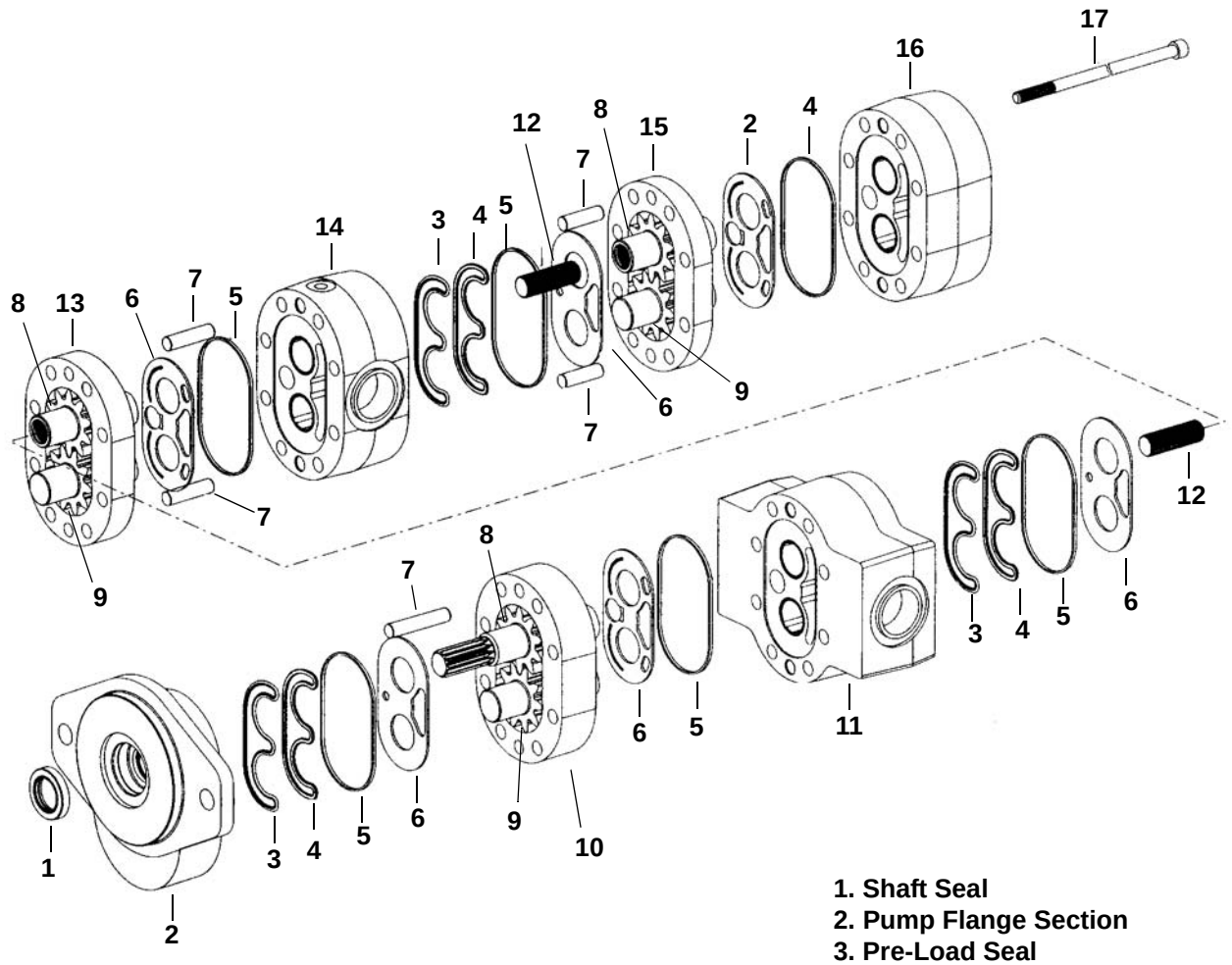
NOTE: DO NOT EXCEED 3300 PSI.

Turn the restrictor control (Item 2) **[Figure 20-71-1]** 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 2800 PSI. At approximately 2800 PSI the flow should start decreasing rapidly until the pressure reaches 3250 - 3300 PSI. At 3250 - 3300 PSI the flow should be at 0 GPM. Turn the restrictor (Item 2) **[Figure 20-71-1]** 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 20-71-2.)

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

Parts Identification

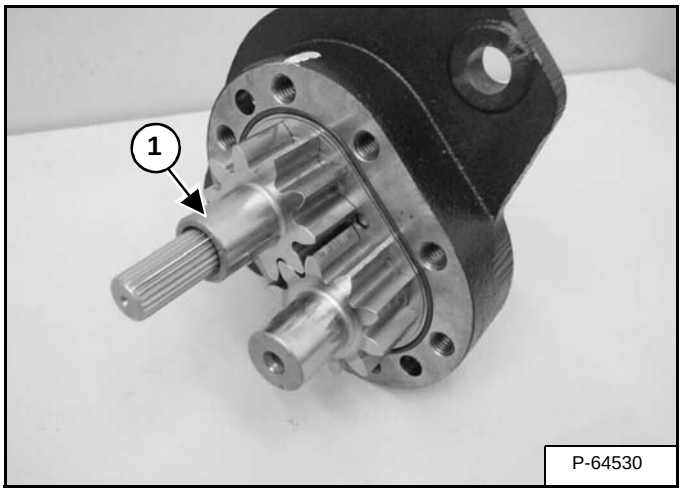


1. Shaft Seal
2. Pump Flange Section
3. Pre-Load Seal
4. Load Seal
5. O-ring
6. Valve Plate
7. Pin
8. Drive Gear
9. Idler Gear
10. Auxiliary Pump Section
11. Auxiliary Center Section
12. Splined Shaft
13. Charge Pump Section
14. Charge Center Section
15. High Flow Pump Section
16. High Flow End Section
17. Bolt

B-18248

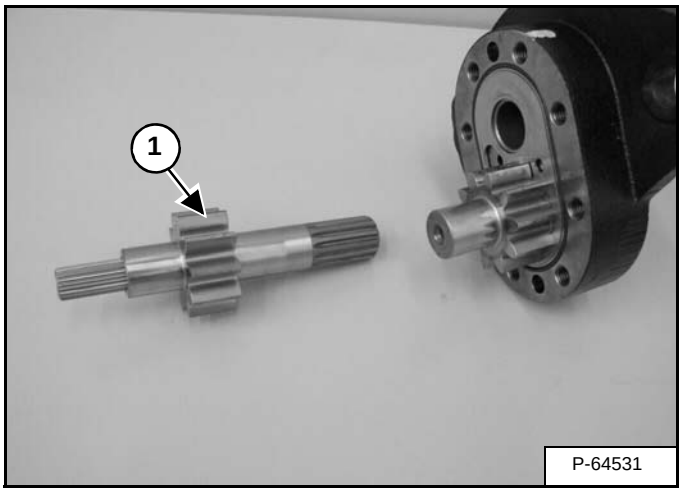
Disassembly And Assembly (Cont'd)

Figure 20-71-56



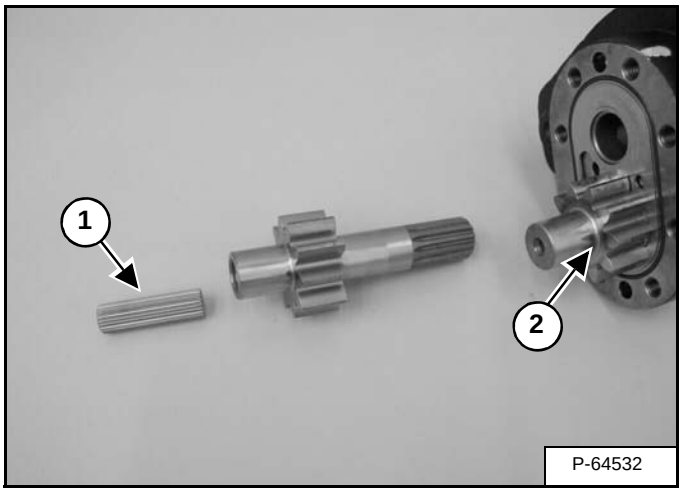
Remove the drive gear (Item 1) **[Figure 20-71-56]** from the pump flange section.

Figure 20-71-57



NOTE: Inspect the drive gear (Item 1) [Figure 20-71-57]. If excessive wear or damage is visible, the pump must be replaced.

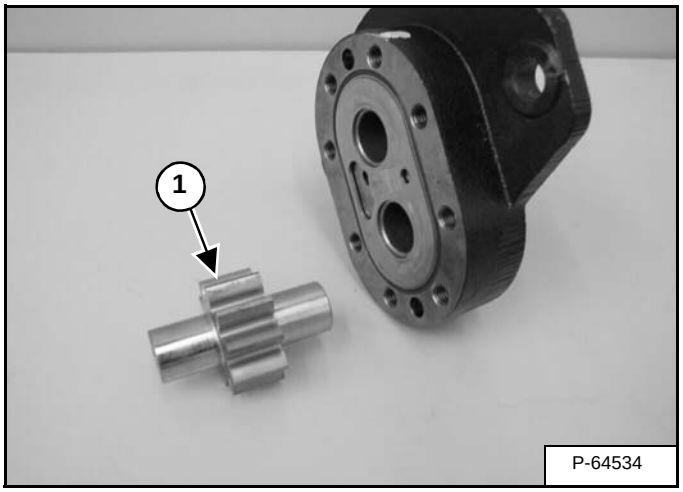
Figure 20-71-58



Remove the spline shaft (Item 1) **[Figure 20-71-58]** from the end of the drive gear.

Remove the idler gear (Item 2) **[Figure 20-71-58]**.

Figure 20-71-59

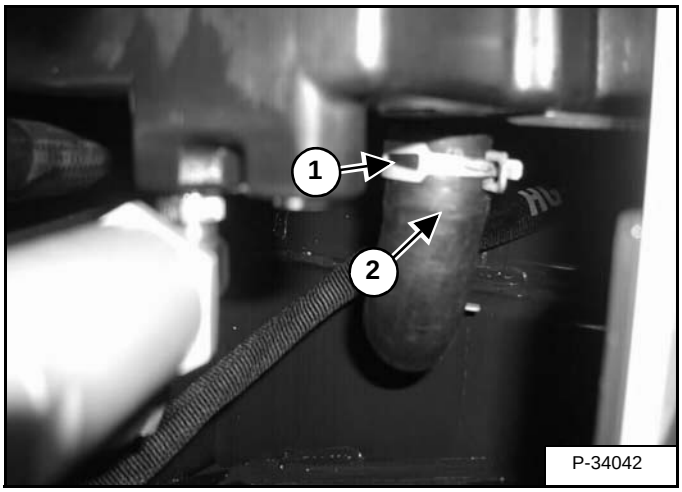


Remove the idler gear (Item 1) **[Figure 20-71-59]** from the pump flange section.

NOTE: Inspect the idler gear (Item 1) [Figure 20-71-59]. If excessive wear or damage is visible, the pump must be replaced.

Removal And Installation (Cont'd)

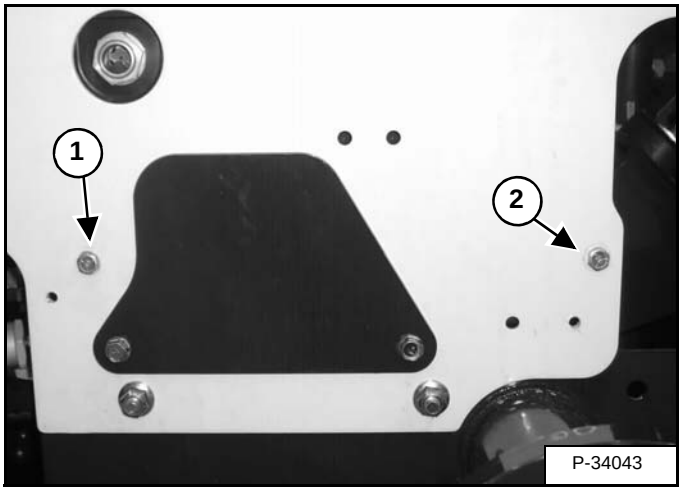
Figure 20-90-6



Remove the hose clamp (Item 1) **[Figure 20-90-6]** from the tank outlet.

Remove the hydrostatic supply hose (Item 2) **[Figure 20-90-6]** from the bottom of the reservoir.

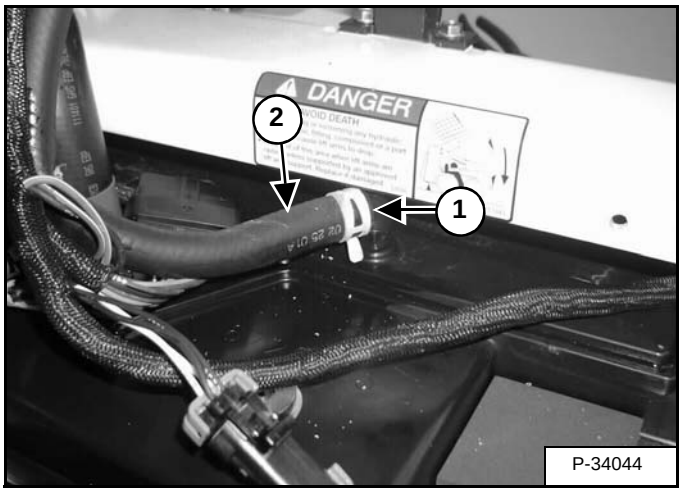
Figure 20-90-7



Remove the bolt and nut (Item 1) **[Figure 20-90-7]**.

Loosen the bolt and nut (Item 2) **[Figure 20-90-7]** to allow the hydraulic reservoir mount to drop down.

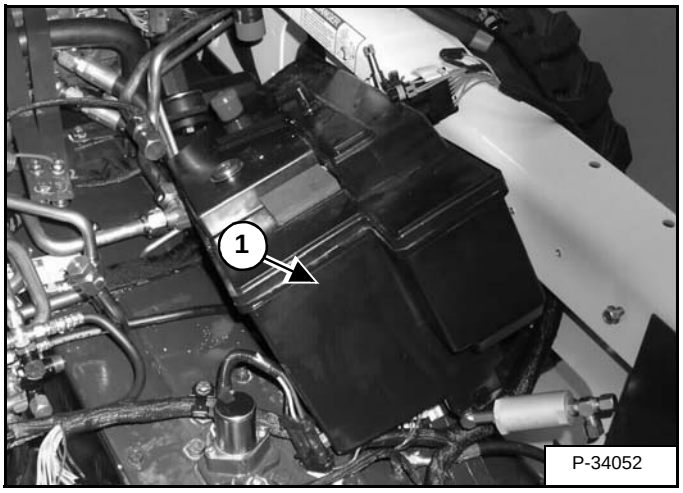
Figure 20-90-8



Remove the hose clamp (Item 1) **[Figure 20-90-8]** from the fitting.

Remove the breather hose (Item 2) **[Figure 20-90-8]** from the hydraulic reservoir.

Figure 20-90-9



Remove the hydraulic reservoir (Item 1) **[Figure 20-90-9]** from the loader.

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.

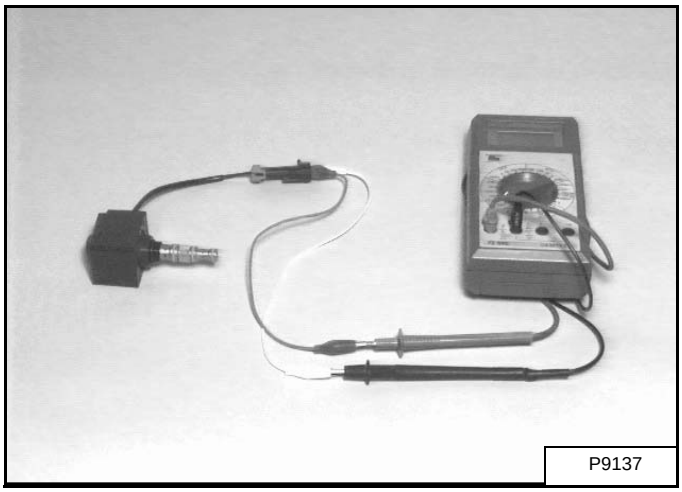
The right side auxiliaries are located on the inside of the right side lift arm at the front of the machine.

The rear auxiliary valve is located on the right side of the machine behind the blower housing. The valve is accessed by remove a panel on the right side of the machine.

See Hydraulic Schematic for more circuit information.

Solenoid Testing

Figure 20-120-1



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° F.

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

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.

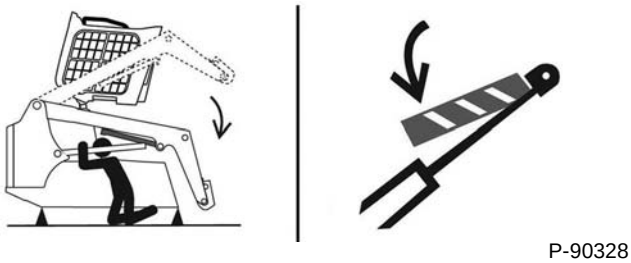
Removal And Installation

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

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.**

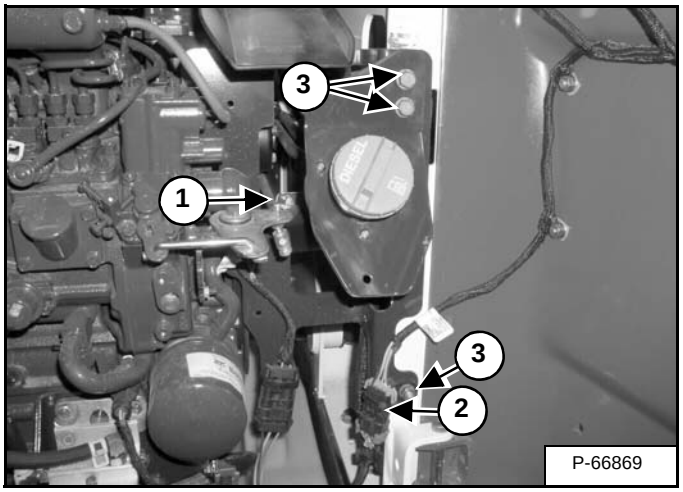
D-1009-0409

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 20-130-1



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

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

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

Open the rear door.

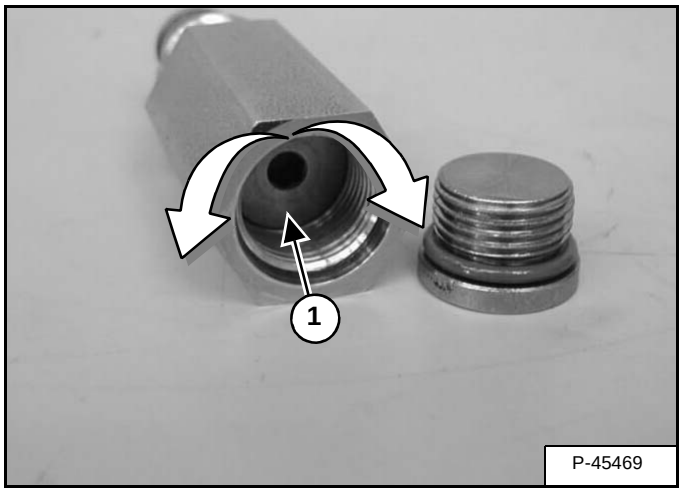
Drain the hydraulic reservoir. (See Removing And Replacing Hydraulic Fluid Page 10-120-2.)

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 bolts (Item 3) **[Figure 20-130-1]**.

High Flow Relief Valve Adjustment (Cont'd)

Figure 20-150-5



To increase the high flow relief valve PSI turn the screw (Item 1) **[Figure 20-150-5]** clockwise a 1/4 turn and recheck the high flow relief valve. (1/4 turn equals approximately 200 PSI.)

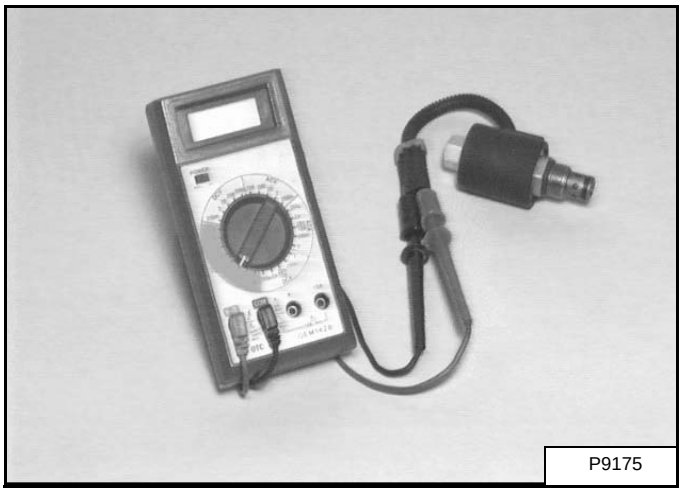
To decrease the high flow relief valve PSI turn the screw (Item 1) **[Figure 20-150-5]** counterclockwise a 1/4 turn and recheck the high flow relief valve. (1/4 turn equals approximately 200 PSI.)

NOTE: If the relief screw (Item 1) [Figure 20-150-5] has been turned in 1/4 turn and the pressure remains the same, remove and inspect the high flow relief valve, replace as needed.

Install the plug into the high flow relief valve.

Solenoid Testing

Figure 20-150-6



Use a test meter to measure coil resistance **[Figure 20-150-6]**. Coil terminals do not have polarity. Correct resistance for the pressure relief coil is 7.5 ohm.

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

HYDROSTATIC DRIVE MOTOR

Description

The hydrostatic motors are driven by high pressure from the hydrostatic pumps.

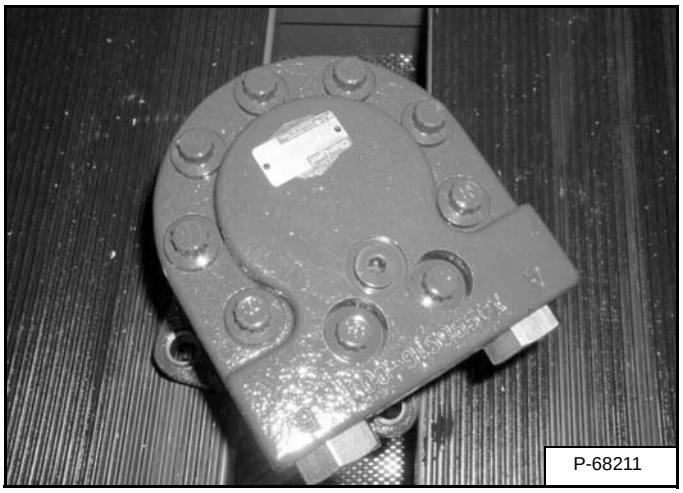
In this system there is a case drain filter for each motor to filter the excess low pressure oil before the oil enters the hydraulic reservoir.

There are two hydrostatic motors mounted to motor carriers. The motor carriers are mounted to the transmission tub which houses the drive chains.

The hydrostatic motors do not have an internal brake.

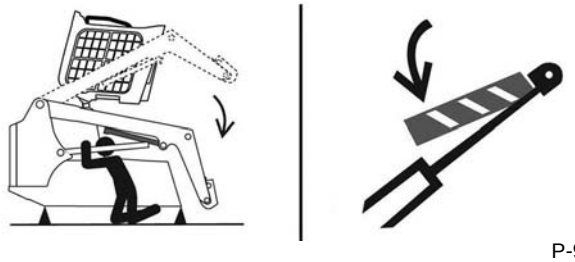
Inside the endcap of the hydrostatic motor, there is a shuttle valve. The shuttle valve helps to keep the motor cool by mixing case drain oil with cooled low pressure oil from the charge circuit. The shuttle valve is shifted by the high pressure oil coming from the hydrostatic pumps. If the shuttle valve sticks, a delay or lack of drive may or may not be felt in the controls and/or an overheated hydrostatic motor will result.

Figure 30-20-1



Removal And Installation

DANGER



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

Remove the front and rear wheel/tire assemblies. (See TIRE MAINTENANCE on Page 10-160-1.)

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

HYDROSTATIC DRIVE MOTOR (TWO-SPEED)

Description

The hydrostatic motors are driven by high pressure from the hydrostatic pumps.

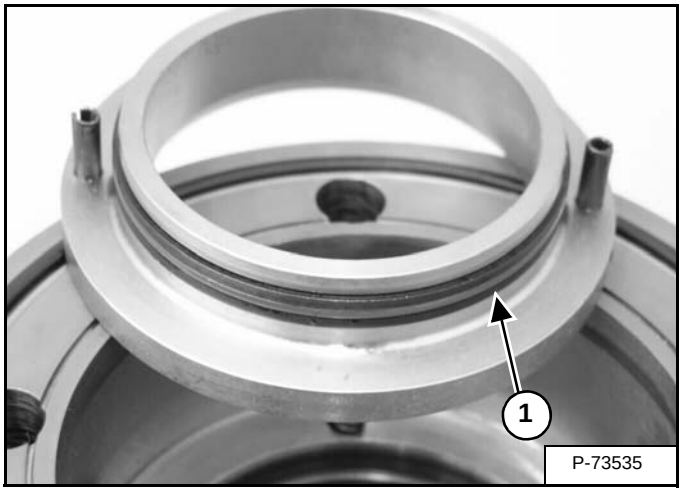
In this system there is a case drain filter for filtering the excess low pressure oil before the oil enters the hydraulic reservoir.

The hydrostatic motor contains a shuttle valve. The shuttle valve helps to keep the motor cool by mixing drive loop return oil with cooled low pressure oil from the charge circuit. The shuttle valve is shifted by the high pressure oil coming from the hydrostatic pumps. If the shuttle valve sticks, a delay or lack of drive may or may not be felt in the controls and/or an overheated hydrostatic motor will result.

There are two hydrostatic motors mounted to motor carriers. The motor carriers are mounted to the transmission chaincase which houses the drive chains.

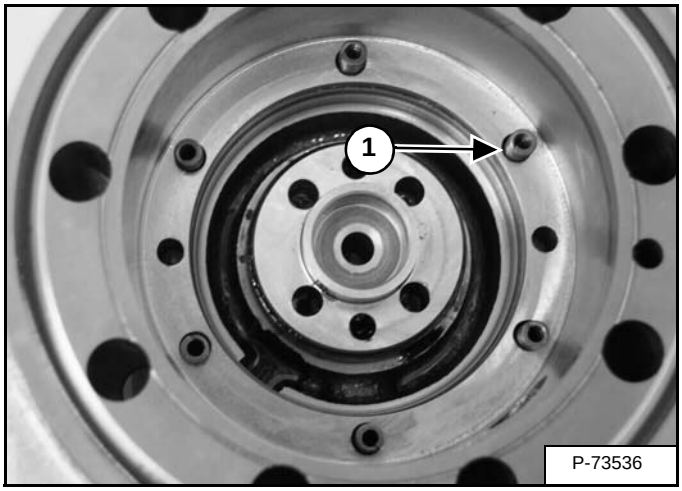
Disassembly (Cont'd)

Figure 30-21-26



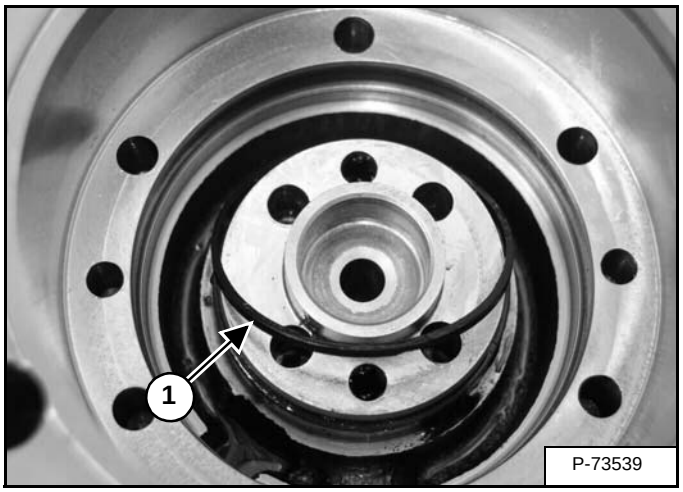
Remove and discard the O-ring and two backup rings (Item 1) **[Figure 30-21-26]** from the outer balance ring.

Figure 30-21-27



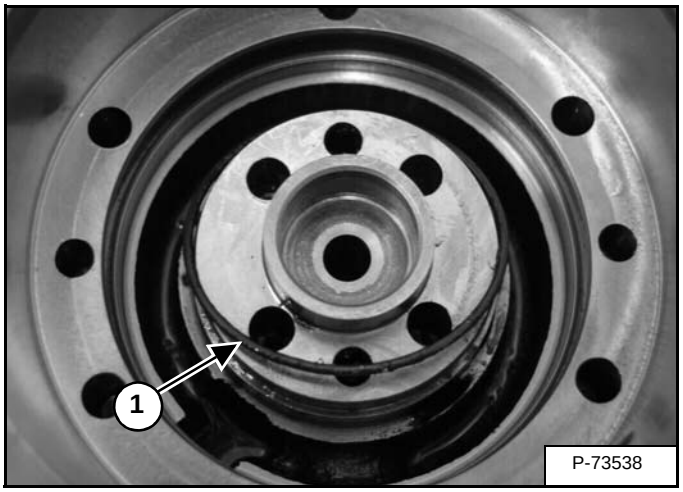
Remove the six compression springs (Item 1) **[Figure 30-21-27]** and inspect for damage.

Figure 30-21-28



Remove and discard the backup ring (Item 1) **[Figure 30-21-28]** from the valve housing.

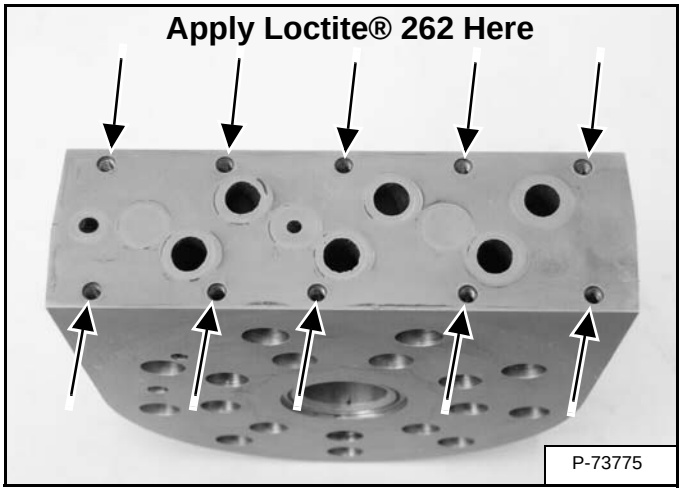
Figure 30-21-29



Remove and discard the O-ring (Item 1) **[Figure 30-21-29]** from the valve housing.

Assembly (Cont'd)

Figure 30-21-64



NOTE: Before assembling the new gasket, the spool housing, or the screws, remove any old thread sealer from the threaded holes.

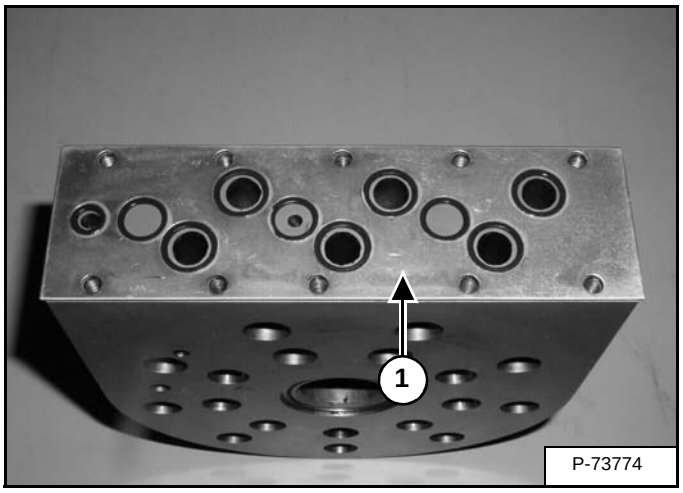
Put a VERY SMALL amount of Loctite® 262 into each of the ten threaded holes of the selector plate. DO NOT put Loctite® on the screw threads **[Figure 30-21-64]**.

Remove any trapped air from below the Loctite®. Wipe any excess Loctite® from the selector plate surface.

NOTE: If too much Loctite® is applied and any trapped air is not removed, it can pool in the bottom of the threaded holes. This can prevent the screws from reaching full thread contact and the correct torque may not be reached.

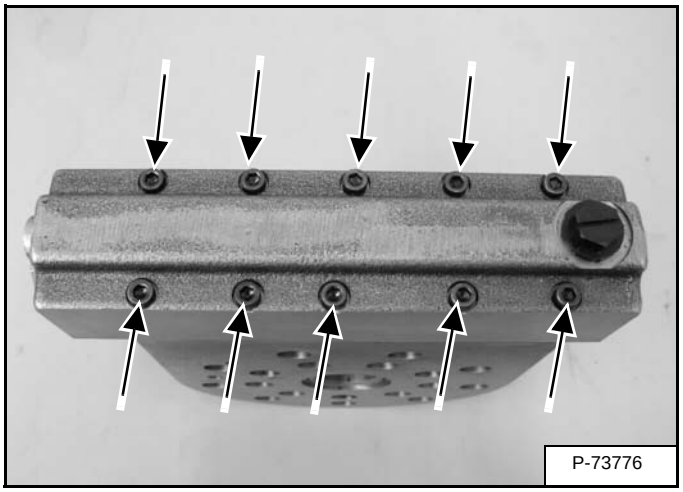
NOTE: Installing the screws can force some of the Loctite® out of the holes and onto the selector plate surface. If any Loctite® gets between the new gasket and the selector plate it will create a poor seal. Be sure to wipe excess Loctite® from the surface.

Figure 30-21-65



Install the new gasket (Item 1) **[Figure 30-21-65]** onto the selector plate.

Figure 30-21-66



Install the ten screws **[Figure 30-21-66]** through the spool housing and into the selector plate.

HYDROSTATIC MOTOR CARRIER (SINGLE AND TWO-SPEED WITH MANUAL CONTROLS)

Description

The hydrostatic motor carrier is the mating connection from the hydrostatic drive motor to the transmission case.

The hydrostatic motor carrier contains a shaft that rotates on two tapered roller bearings. the shaft has two sprockets that turn the drive chains.

The hydrostatic motor carrier has a seal which isolates the chain case oil from the hydrostatic motor case drain oil.

A brake disk is installed on each hydrostatic motor carrier. The brake disk is mounted to the shaft in the motor carrier.

The hydrostatic motor carriers are made to fit on both the right or left hand side of the loader. There are two sets of mounting holes on each hydrostatic motor carrier to fasten the hydrostatic motors. One set for the left hand side and another set for the right hand side of the loader.

Figure 30-30-1

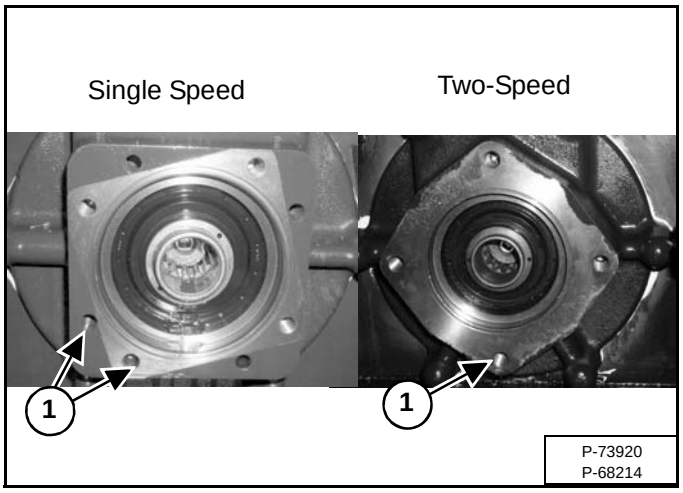
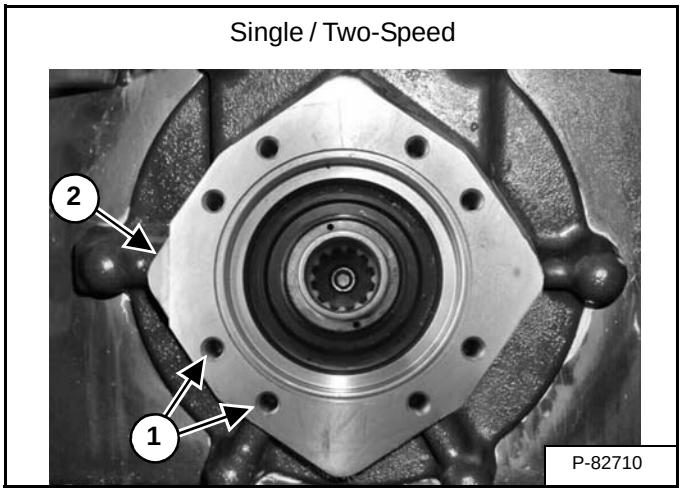


Figure 30-30-2

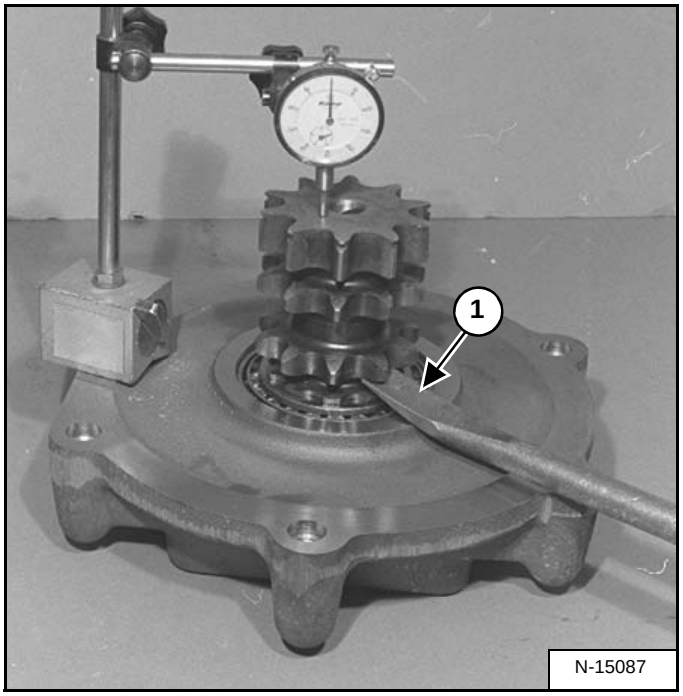


The motor carrier hydrostatic motor mounting holes (Item 1) **[Figure 30-30-1]** & **[Figure 30-30-2]** are the only difference between the single, two-speed and single / two-speed motor carriers with manual controls. The disassembly and assembly procedures are the same.

The single / two speed motor carrier has a notch (Item 2) **[Figure 30-30-2]** removed from one side of the carrier.

Disassembly And Assembly (Cont'd)

Figure 30-30-27



Install a dial indicator as shown in Photo **[Figure 30-30-27]**.

Use a pry bar (Item 1) **[Figure 30-30-27]** to lift the carrier shaft and read the end play on the dial indicator.

The carrier shaft must turn freely with end play not to exceed 0.007 in. (0,17 mm).

Disassembly And Assembly (Cont'd)

Figure 30-31-21

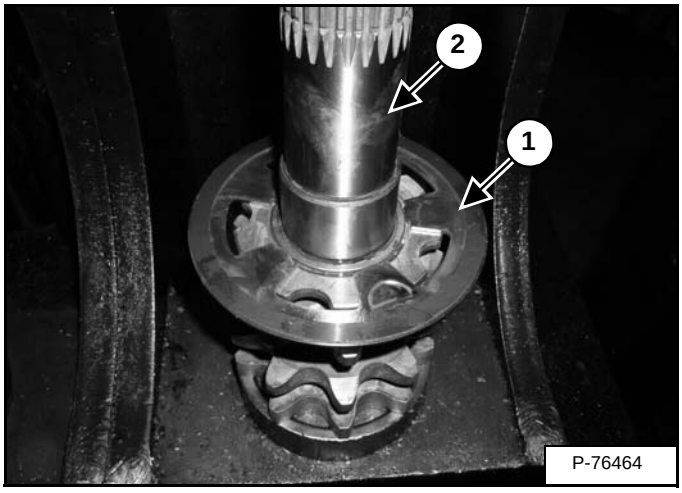
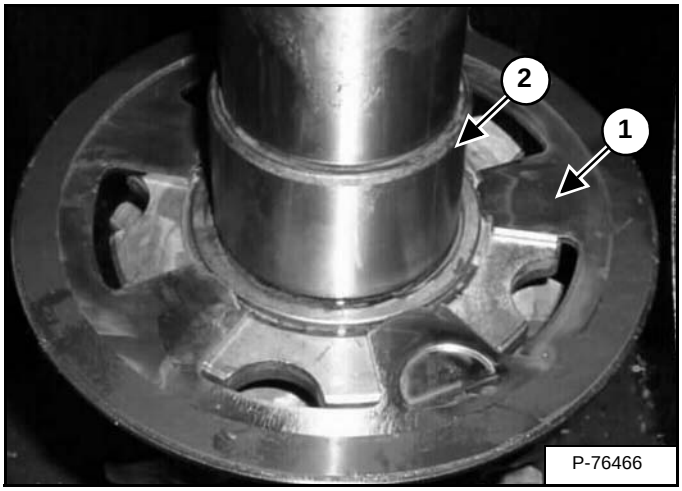


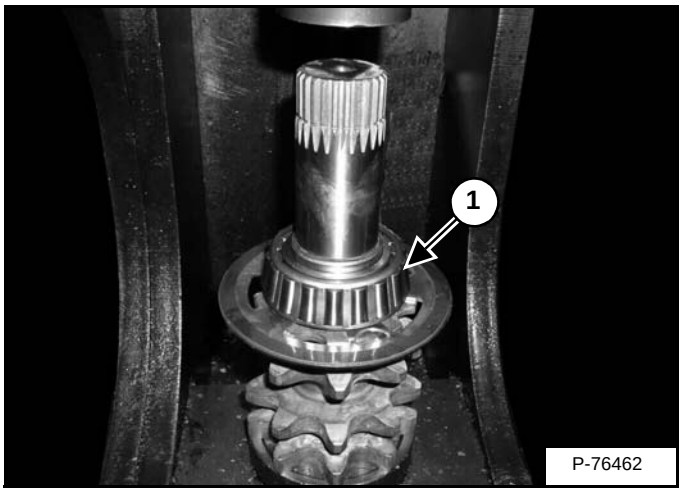
Figure 30-31-22



Install the sensor disc (Item 1) on the shaft (Item 2) **[Figure 30-31-21]** and **[Figure 30-31-22]**.

NOTE: Protrusion on disc to be aligned with pin area on sprocket.

Figure 30-31-23



Use the fabricated press tool and 3.0 in. driver tool, install the new inner bearing (Item 1) **[Figure 30-31-23]** on the sprocket shaft as shown.

Remove the press and drive tools from the sprocket shaft.

Adjusting (Cont'd)

SJC Machines

IMPORTANT

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

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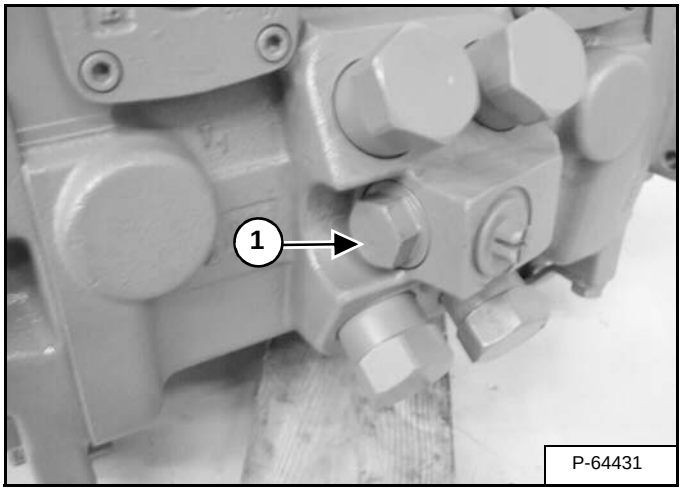
Figure 30-40-14

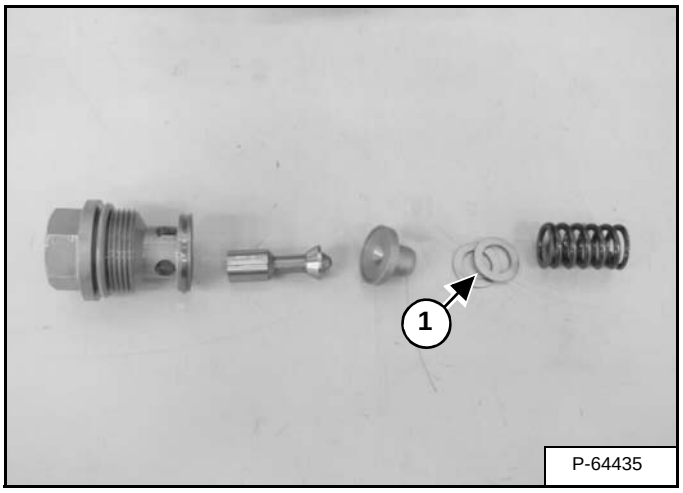


If the charge pressure is not correct remove the charge relief valve (Item 1) **[Figure 30-40-14]**.

NOTE: The pump has been removed for photo clarity. The charge pressure relief valve is located on the engine side of the hydrostatic pump when installed in the loader.

Assembly: Always use a new O-ring. Tighten the plug to 30 - 50 ft.-lb. (41 - 68 N•m) torque.

Figure 30-40-15



Check the poppet and spring for wear or damage.

Inspect the seat inside the hydrostatic pump case for wear or damage.

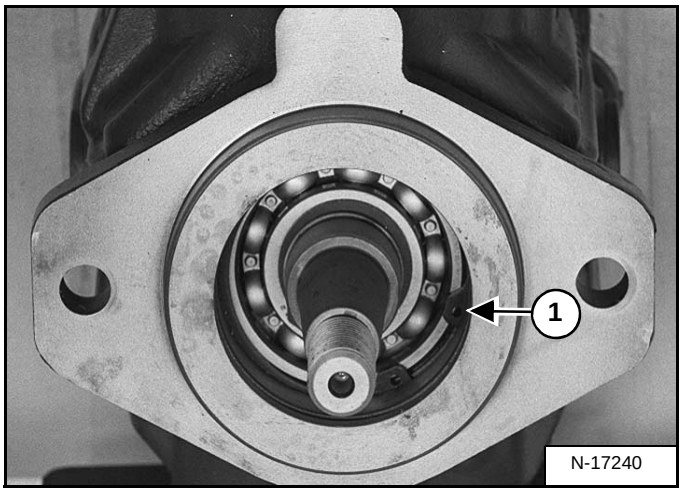
There are several different thickness of shims (Item 1) **[Figure 30-40-15]** used to adjust the charge pressure.

NOTE: 1,0 mm shim (Item 1) [Figure 30-40-15] = 43.5 PSI (3 bar) in pressure change. Adding shims increases charge pressure. Removing shims decreases charge pressure.

The charge pressure should be set at 335 - 385 PSI (23,1 - 26,5 bar).

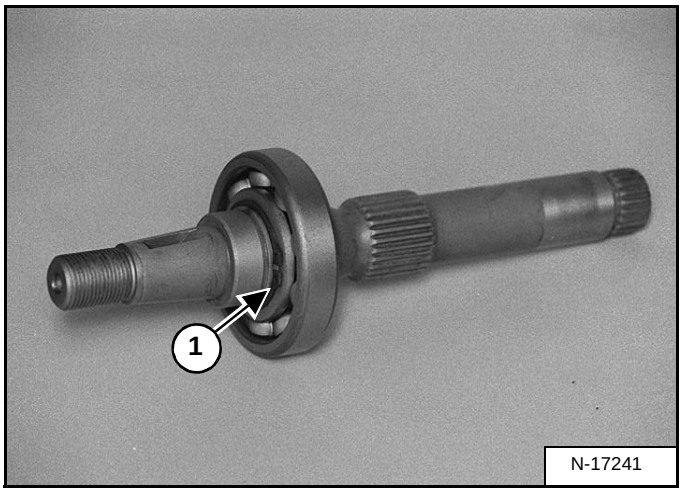
Disassembly (Cont'd)

Figure 30-50-19



Remove the snap ring (Item 1) **[Figure 30-50-19]** from the pump housing and remove the driveshaft and bearing from the housing.

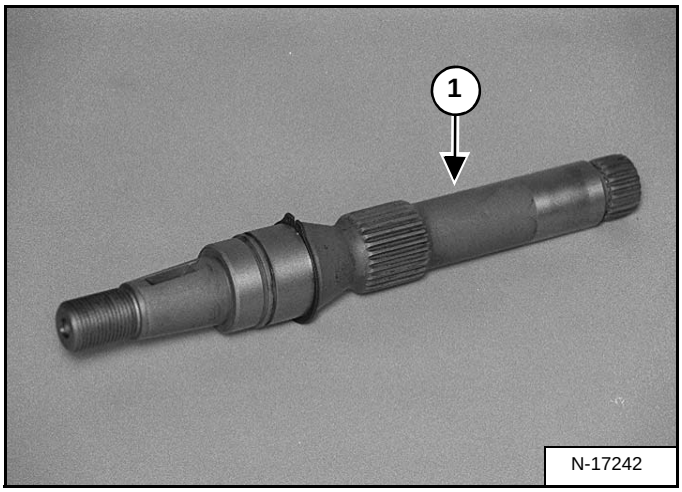
Figure 30-50-20



Remove the snap ring (Item 1) **[Figure 30-50-20]** from the driveshaft and remove the bearing.

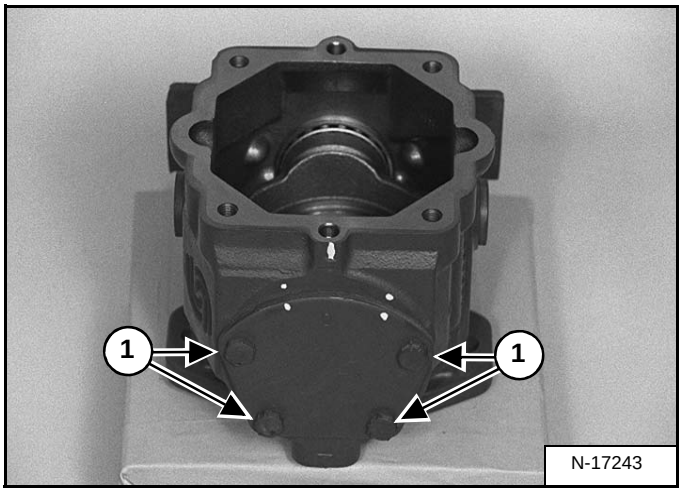
Check the bearing for wear and replace if worn.

Figure 30-50-21



Check the pump shaft (Item 1) **[Figure 30-50-21]** for wear and replace if needed.

Figure 30-50-22



Remove the four mount bolts (Item 1) **[Figure 30-50-22]** from the lower trunnion cover. Remove the cover.

HYDROSTATIC PUMP (SJC)

Description

The SJC hydrostatic pump is a fully proportional dual piston pump in one pump casing. The endcaps are removable to gain access to the rotating assemblies.

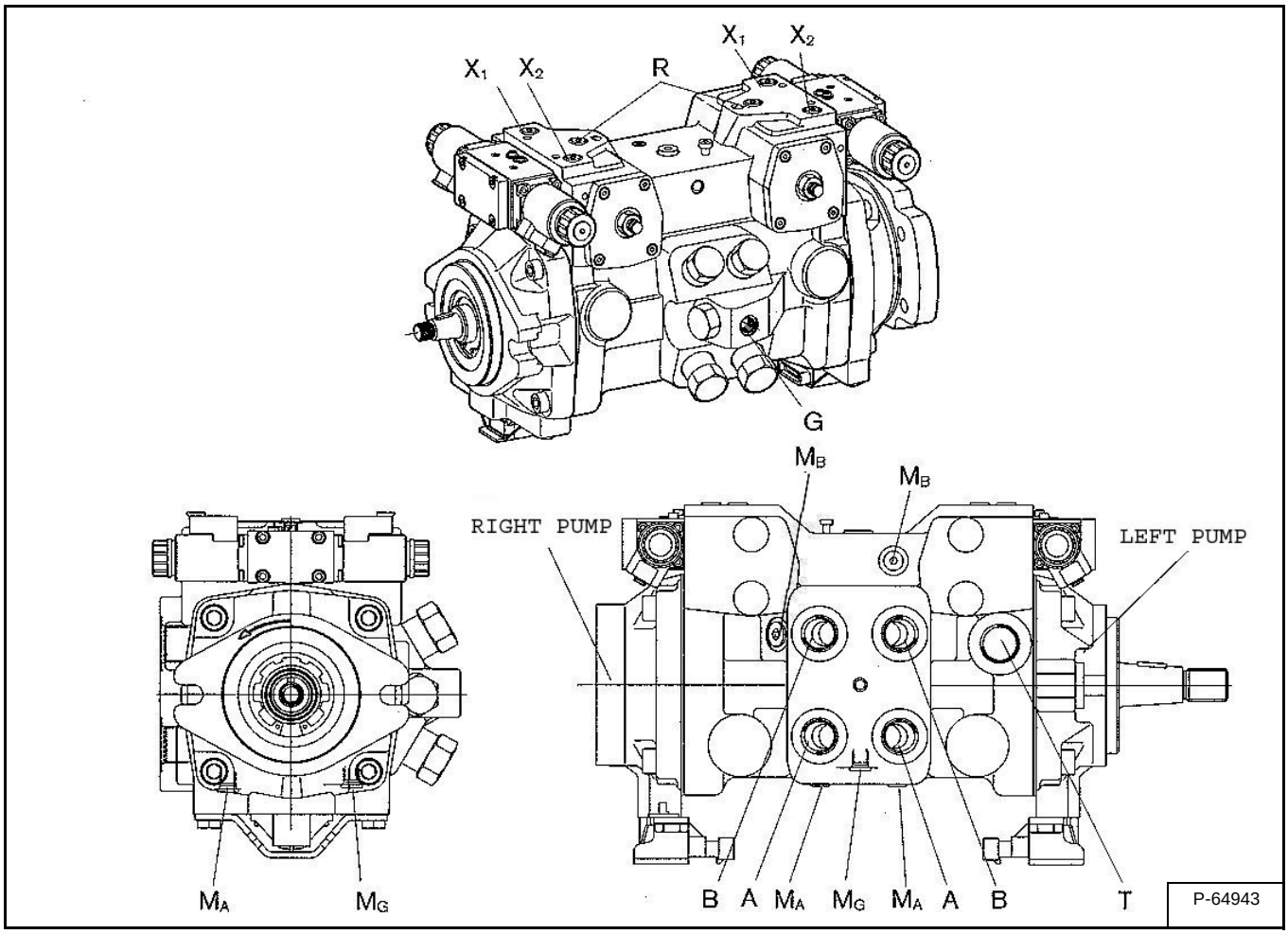
The hydraulic controllers are fed charge pressure from an external charge pump. 12 volt electrical solenoids shift a spool in the hydraulic controller that directs flow to a servo piston.

The servo piston strokes the swash plate in the rotating group. The rotating group generates flow to the A or B ports on the hydrostatic pump. The flow from the A and B ports is sent to the hydrostatic drive motors where forward or reverse drive motor rotation is obtained.

There are swash plate angle sensors on the bottom of the pump that monitor swash plate movement.

Ports are labeled on the hydrostatic pump casting.

Figure 30-51-1



A,B Service Line Ports (High Pressure Outlet Ports to Drive Motors)

T_1 Case Drain Port

M_A Operating Pressure of “A” Port

M_B Operating Pressure of “B” Port

R Air Bleed Port

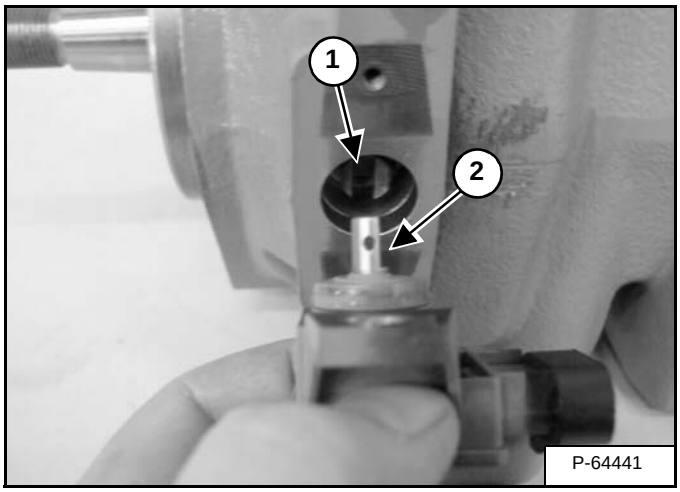
X_1,X_2 Control Pressure Gauge Port

G Charge Pressure Inlet Port

M_G Gauge Port For Charge Pressure

Disassembly And Assembly (Cont'd)

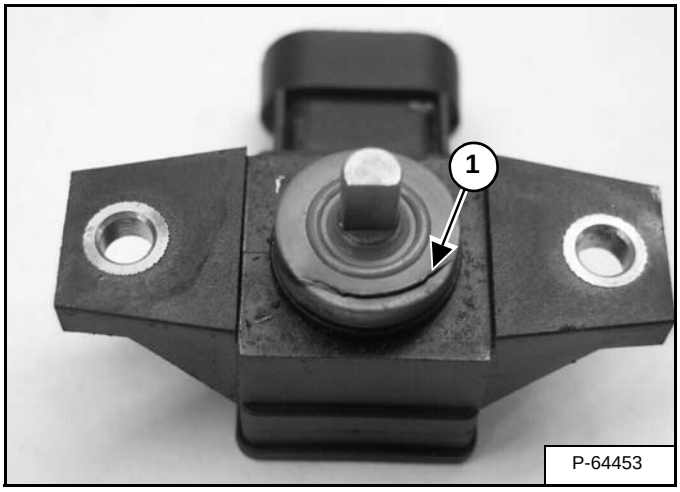
Figure 30-51-26



Assembly: Note the slotted portion (Item 1) of the positioning pin tightly fits the machined section on the swash plate angle sensor shaft (Item 2) **[Figure 30-51-26]**.

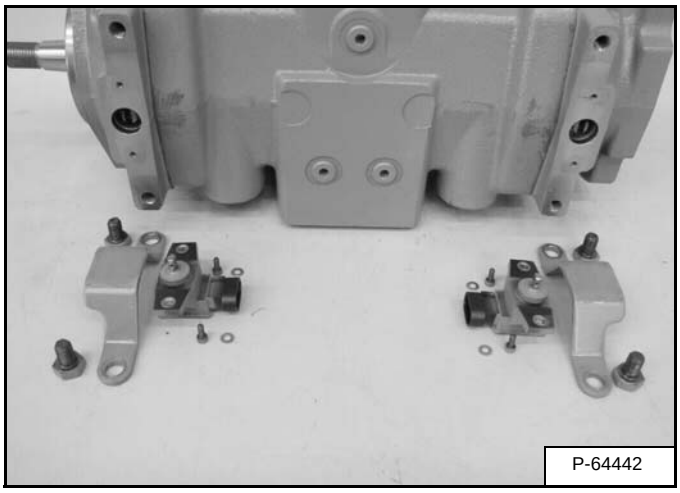
Note the machined section of the swash plate angle sensor shaft faces the center of the hydrostatic pump.

Figure 30-51-27



NOTE: Improperly installing the swash plate angle sensor, with the shaft facing toward the outside of the hydrostatic pump, will make it hard to install the sensor mounting bolts and also destroy the seal (Item 1) [Figure 30-51-27].

Figure 30-51-28

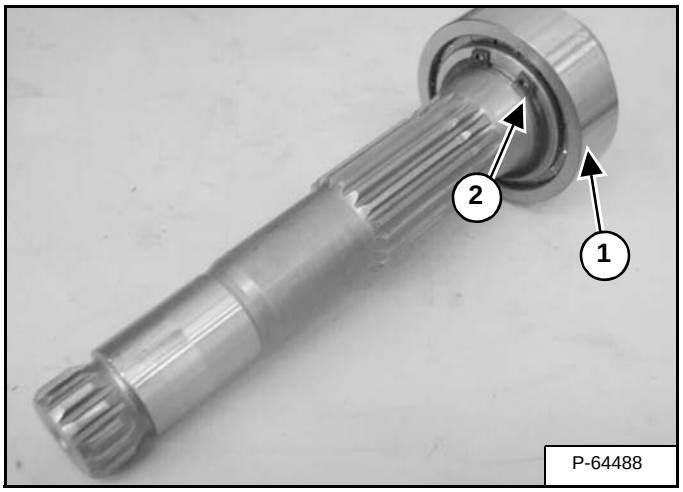


Both swash plate angle sensors and associated hardware removed from the hydrostatic pump. **[Figure 30-51-28]**.

HYDROSTATIC PUMP (SJC) (CONT'D)

Disassembly And Assembly (Cont'd)

Figure 30-51-61

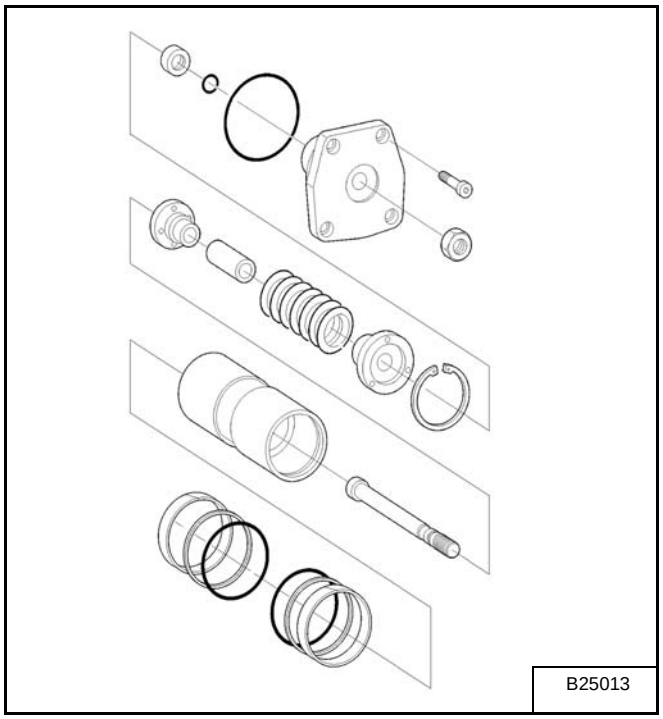


The drive shaft can be tapped out of the end housing with a rubber mallet.

Inspect wear surfaces for scratches, and inspect splines for excessive wear.

Inspect bearing (Item 1); if bearing needs replacement, remove snap ring (Item 2) **[Figure 30-51-61]** and remove bearing.

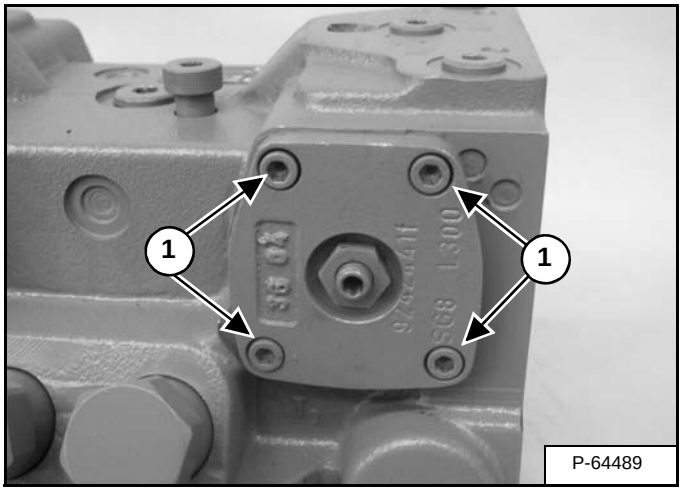
Figure 30-51-62



Servo Piston Assembly **[Figure 30-51-62]**.

The Servo Piston Assembly **[Figure 30-51-62]** cannot be removed unless the hydraulic controller and rotating group is removed first.

Figure 30-51-63

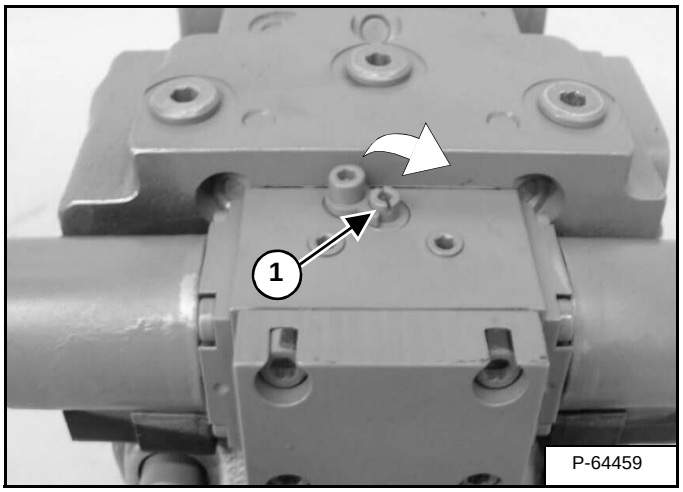


Remove servo piston mounting bolts (Item 1) **[Figure 30-51-63]**.

Installation: Tighten bolts to 7.7 ft.-lb. (10,4 N•m) torque.

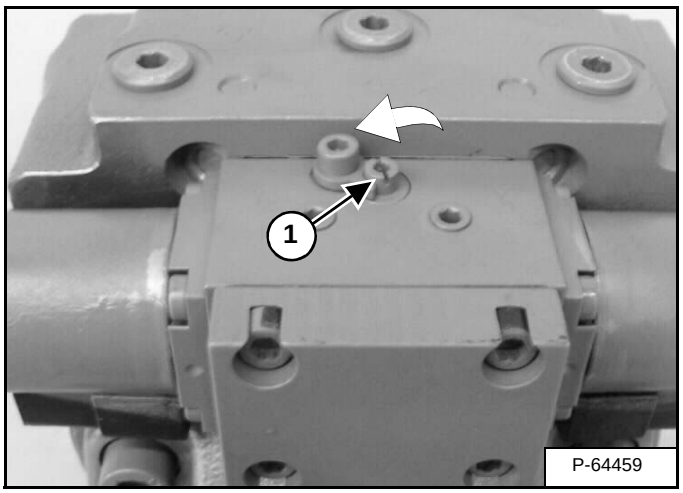
Hydraulic Controller Neutral Adjustment (Cont'd)

Figure 30-51-92



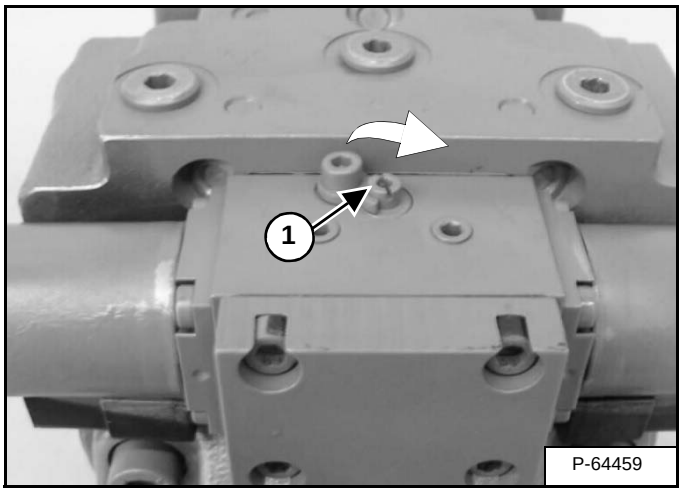
Turn the adjustment screw (Item 1) **[Figure 30-51-92]** clockwise, until one of the gauges registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-51-93



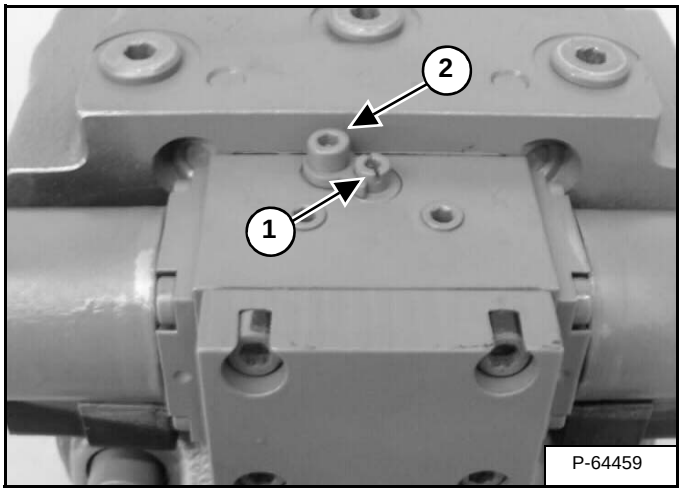
Turn the adjustment screw (Item 1) **[Figure 30-51-93]** counterclockwise, until the other gauge registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-51-94



Turn the adjustment screw (Item 1) **[Figure 30-51-94]** clockwise, to a position halfway between the recorded positions. The pressure gauges should read equal pressures.

Figure 30-51-95



While holding the adjustment screw (Item 1) in position, tighten the locking screw (Item 2) **[Figure 30-51-95]** to 4.5 ft.-lb. (6,1 N•m) torque.

Shut loader OFF.

Remove the pressure gauges from the X1 and X2 ports on the pump. Install the plugs and tighten to 18 ft.-lb. (25 N•m) torque.

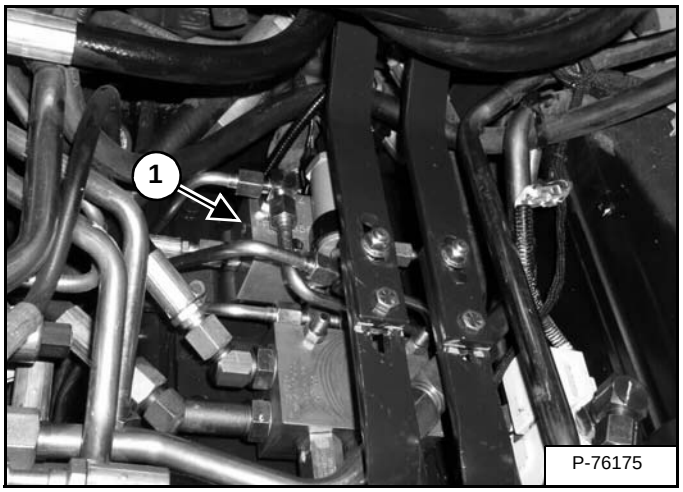
Connect the hydraulic controller wire connectors to the loader wiring harness.

Perform a controller calibration procedure. (See CALIBRATION on Page 60-160-1.)

TWO-SPEED VALVE

Description

Figure 30-70-1



The two-speed valve (Item 1) **[Figure 30-70-1]** is located on top of the chaincase in front of the hydrostatic pump. The high range is selected by a switch located on the right handle for manual loaders and on the left joystick for SJC loaders.

When the high range is selected, the two-speed solenoid is energized by the Bobcat Controller. The valve shifts and directs charge pressure oil to the shift spool in each motor. The charge pressure hydraulic oil shifts the spools allowing the motors to move into high range. When low range is selected, the solenoid is de-energized and the shift spools are spring returned to low range.

The two-speed valve also contains a two-speed pre-warming solenoid, which provides warm hydraulic oil to preheat the drive motors preventing damage in cold conditions. When the hydraulic oil reaches a pre-determined temperature, the pre-warming solenoid is turned off and the two-speed is engaged.

The case drain filter for the drive motors is mounted to the top of the two-speed valve.

BRAKE (SINGLE SPEED)

Description

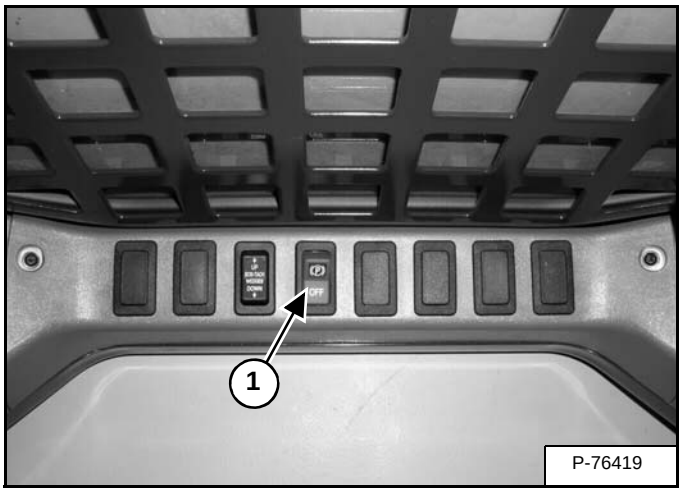
The brake is used to hold the machine in place. The brake is operated by a switch (Item 1) **[Figure 40-10-1]** located on the front accessory panel.

The brake is applied by a spring-loaded wedge that drops into two notched brake discs attached to the motor carrier shafts. An electric solenoid is sent power from a relay to pull the wedge away from the discs. A signal from the main Bobcat controller holds the wedge away from the discs.

The hold signal will be interrupted and the wedge will drop if the engine RPM drops below 700 RPM, the seat bar sensor fails or if there is a break in the wires for the brake solenoid.

For more information on the brake. (See TRACTION LOCK on Page 60-120-1.)

Figure 40-10-1



Disc Removal And Installation

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

⚠ WARNING

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

W-2059-0598

Raise the loader operator cab. (See Raising on Page 10-30-1.)

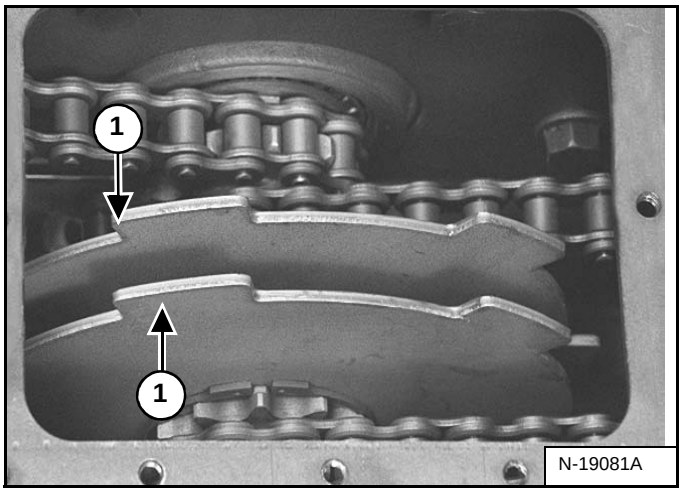
Disconnect and remove the engine speed control. (See Removal And Installation on Page 70-20-1.)

Remove the control panel from the loader. (See Removal And Installation on Page 50-100-2.)

Remove the center chaincase cover. (See Center Cover Removal And Installation on Page 40-30-2.)

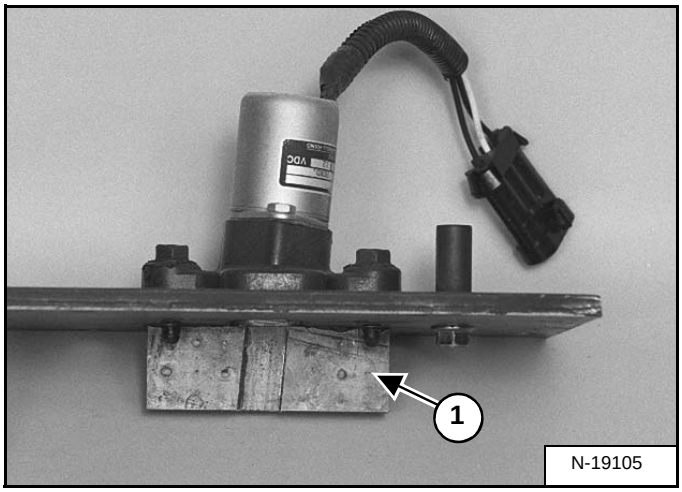
Remove the traction lock assembly. (See Removal And Installation on Page 60-120-2.)

Figure 40-10-2



The parking brake discs (Item 1) **[Figure 40-10-2]** are located beneath the center chaincase cover.

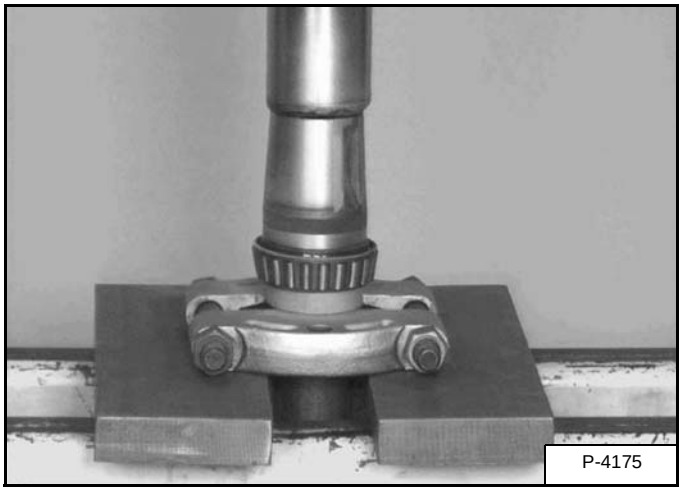
Figure 40-10-3



Inspect the traction lock guides (Item 1) **[Figure 40-10-3]** and the brake disc for damage or wear and replace as necessary. (See Inspecting on Page 60-120-6.)

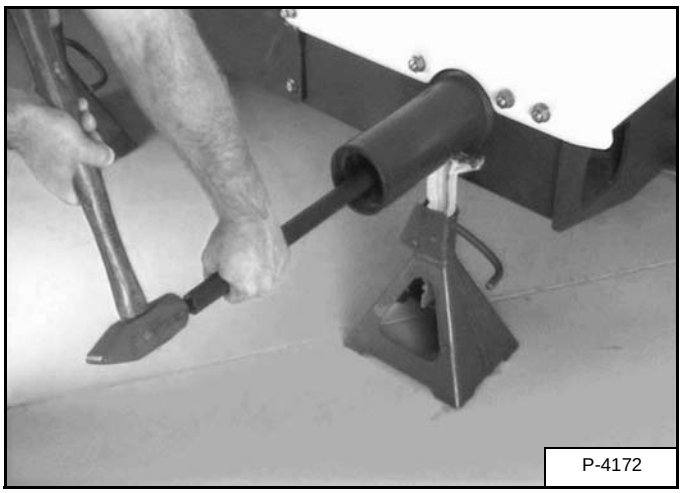
Axle Sprocket And Bearings Removal And Installation (Cont'd)

Figure 40-20-13



When the bearing reaches the bearing mounting surface, continue the installation until the bearing is fully seated **[Figure 40-20-13]**.

Figure 40-20-14

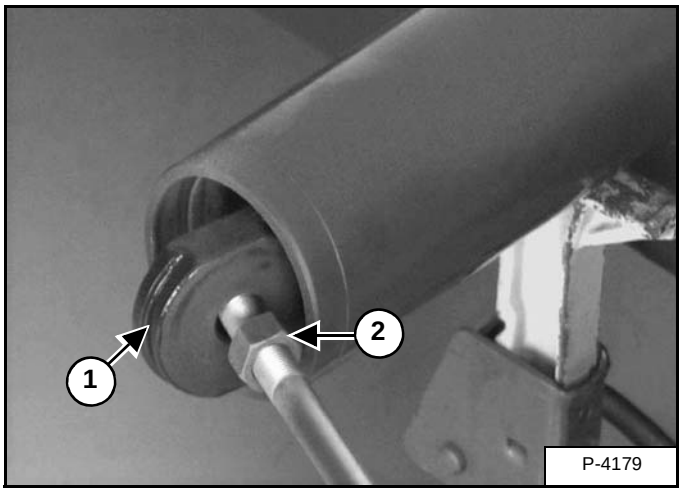


Use the tools provided in the MEL1202B Axle Bearing Service Set for bearing cup removal and installation. A slide hammer is also necessary for this procedure.

Use the long rod and bearing cup tool to remove the inner bearing cup **[Figure 40-20-14]**.

Hit the long rod with a hammer to remove the bearing cup from the axle tube **[Figure 40-20-14]**.

Figure 40-20-15

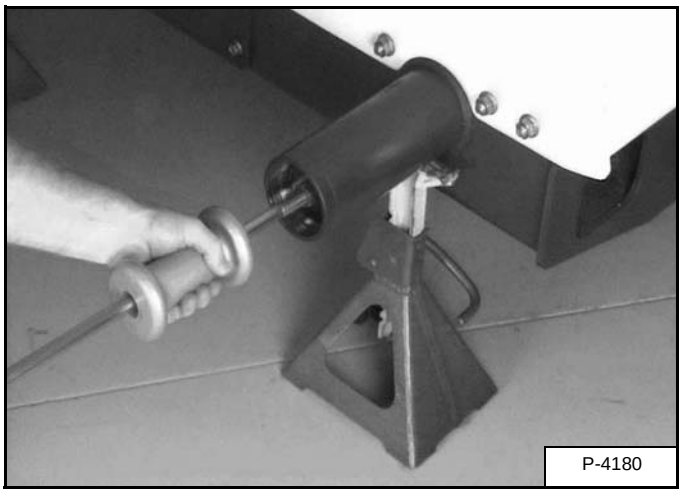


To remove the outer bearing cup, place the bearing cup tool (Item 1) **[Figure 40-20-15]** on the slide hammer.

Leave the bearing cup tool loose until the tool is installed inside the tube **[Figure 40-20-15]**.

After the bearing cup tool is inside the axle tube, pull the tool against the bearing cup and tighten the nut (Item 2) **[Figure 40-20-15]** on the tool.

Figure 40-20-16



Use the slide hammer and remove the bearing cup from the axle tube **[Figure 40-20-16]**.

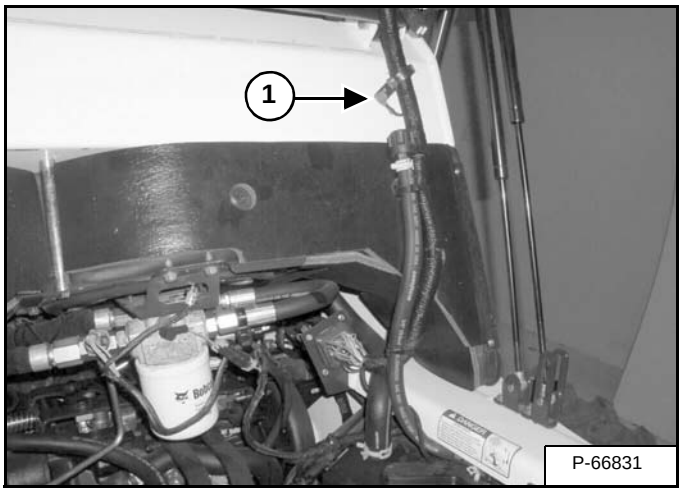
MAINFRAME (CONT'D)

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

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

Removal And Installation (Cont'd)

Figure 50-20-13

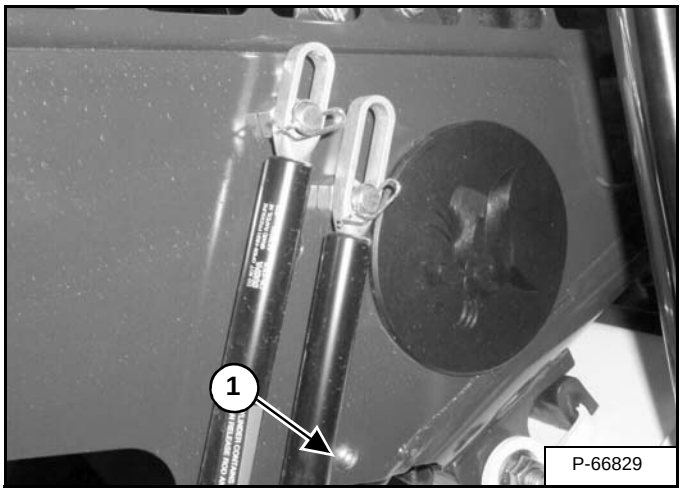


Remove screw (Item 1) **[Figure 50-20-13]** from the cab ground.

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

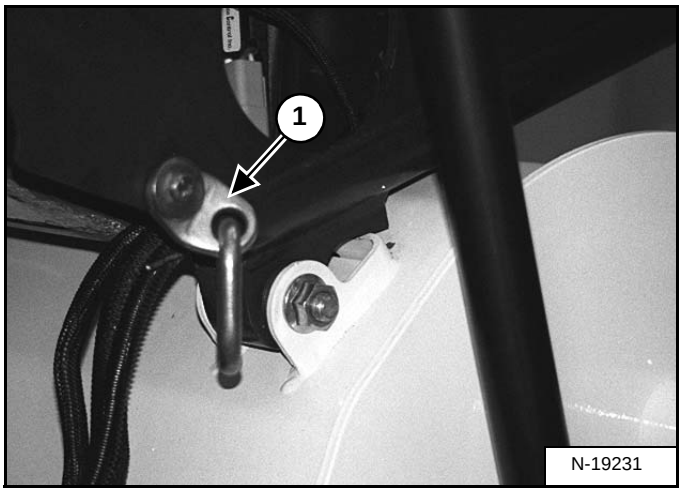
Remove any tie-straps connected to the harness **[Figure 50-20-13]**.

Figure 50-20-14



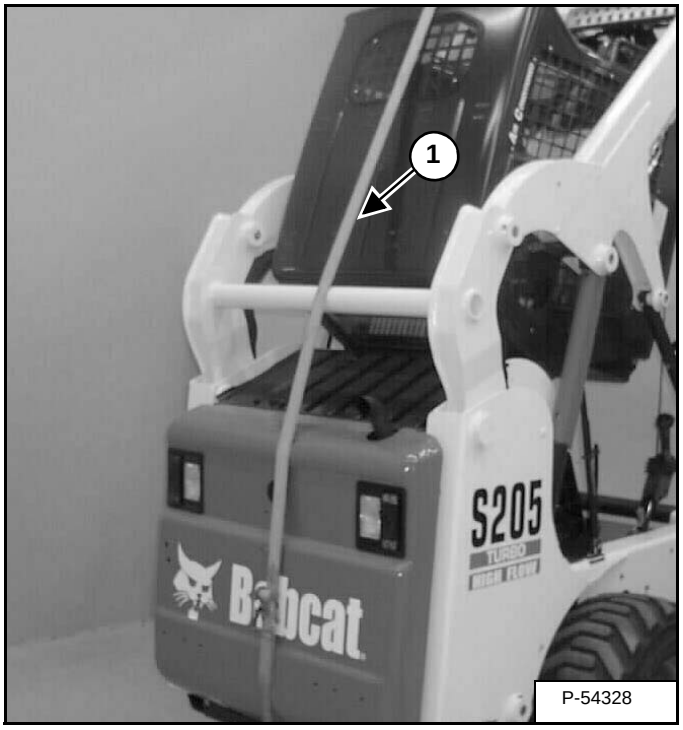
Remove the bolt (Item 1) **[Figure 50-20-14]** from the cab ground.

Figure 50-20-15



Install lift eye (Item 1) **[Figure 50-20-15]** (both sides) to the cab.

Figure 50-20-16



Remove the strap (Item 1) **[Figure 50-20-16]** preventing the cab from tipping forward.

Lower the cab.

Start the engine.

Remove the lift arm support device. (See Installing on Page 10-20-1.)

Stop the engine.

BOB-TACH (HAND LEVER)

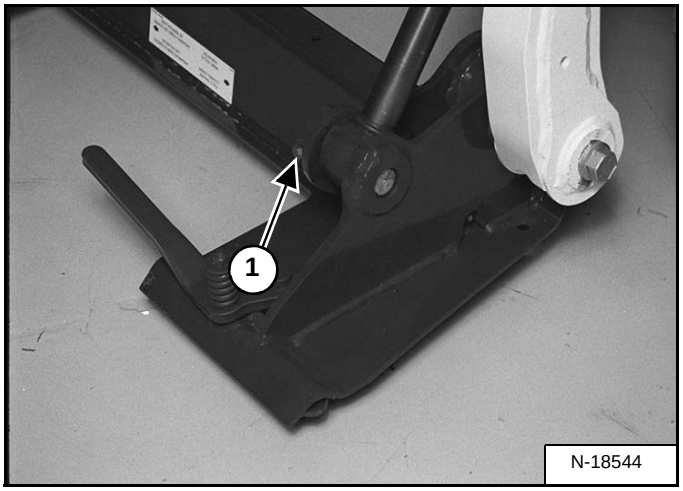
Description

The Bob-Tach is the section of the loader lift arm that attachments mount to. The Power Bob-Tach uses two manually operated, spring assisted, locking wedge and lever assemblies to secure the attachment the Bob-Tach.

The Bob-Tach is located on the front of the loader connected to the loader lift arms.

Removal And Installation

Figure 50-40-1



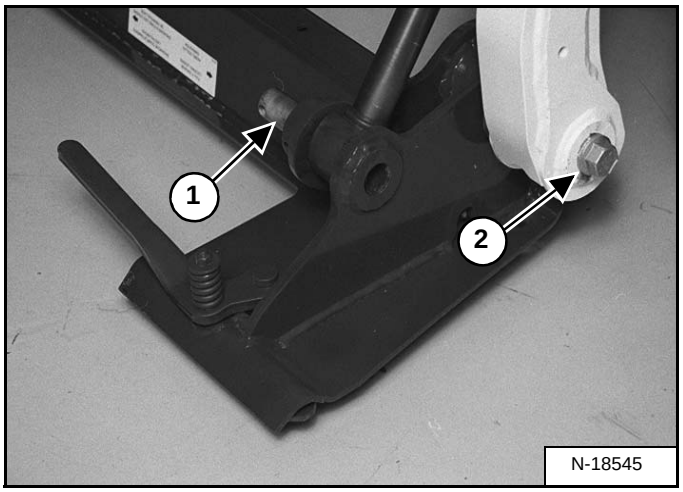
Tilt the Bob-Tach forward, so it is parallel to the floor. Put blocks (approximately 3 in.) under each side of the Bob-Tach **[Figure 50-40-1]**.

Lower the Bob-Tach onto the blocks.

Remove the retainer bolt (Item 1) **[Figure 50-40-1]** and nut from the tilt cylinder rod end pin (both sides).

Installation: Tighten the retainer bolt and nut to 25 - 30 ft.-lb. (34 - 38 N•m) torque.

Figure 50-40-2



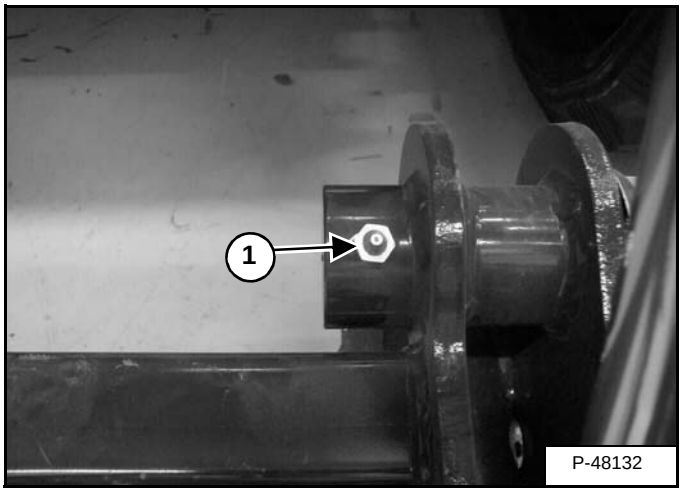
Remove the pivot pin (Item 1) **[Figure 50-40-2]** from the tilt cylinder rod end (both sides).

Remove the tilt cylinder rod end from the Bob-Tach (both sides).

Loosen the bolt (Item 2) **[Figure 50-40-2]** at the Bob-Tach pivot pin.

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

Figure 50-40-3



Remove the grease fitting (Item 1) (both sides) **[Figure 50-40-3]** out of the Bob-Tach frame. This allows grease to escape when driving the pivot pins into the Bob-Tach frame.

Removal And Installation

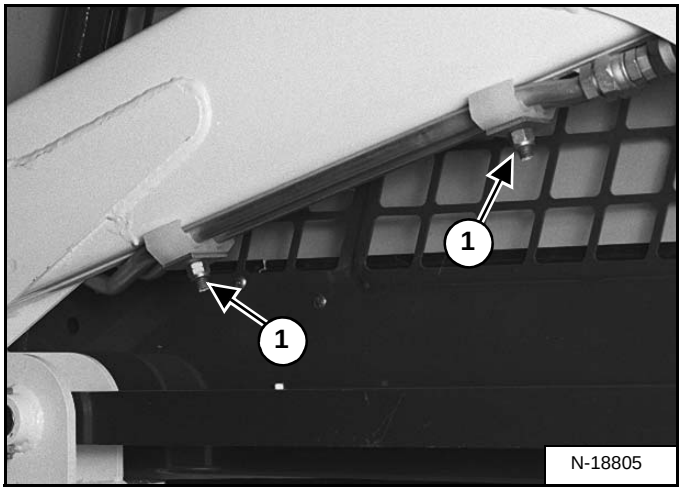
Figure 50-50-8

Roll the Bob-Tach fully forward. Stop the engine.

Remove the Bob-Tach frame from the lift arms. (See Removal And Installation on Page 50-40-1.)

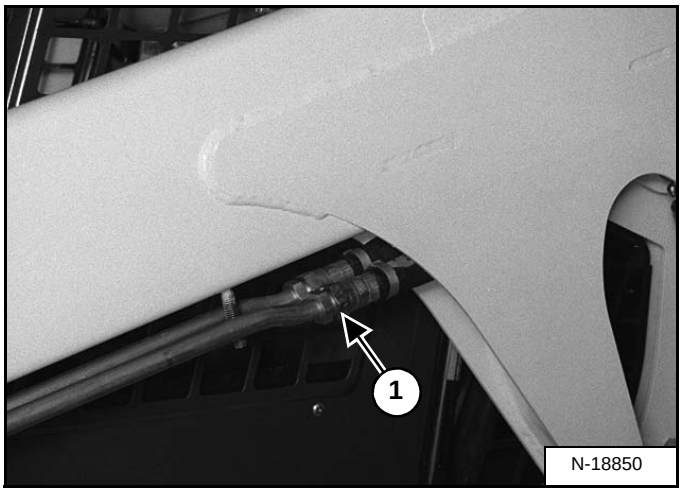
Install jackstands under the rear of the loader **[Figure 50-50-8]**.

Figure 50-50-9



Remove the tubeline clamps (Item 1) **[Figure 50-50-9]** under the lift arms (both sides).

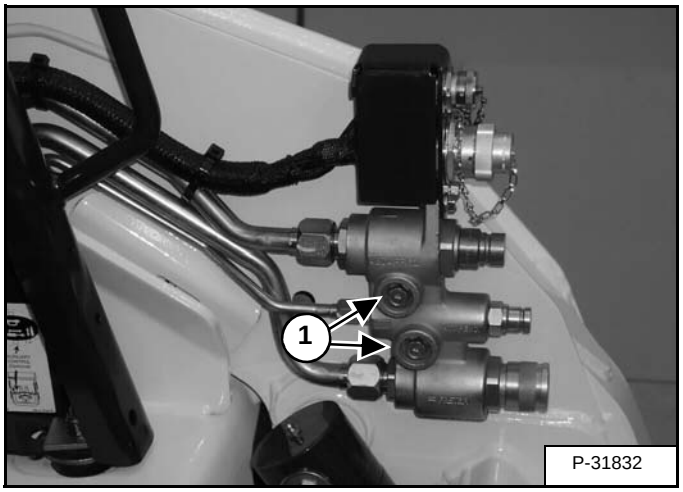
Figure 50-50-10



Mark the tubelines for correct installation (both sides). Pull the tubelines down, disconnect the hoses (Item 1) **[Figure 50-50-10]** (both sides).

Install plugs into the hose and tubeline ends.

Figure 50-50-11



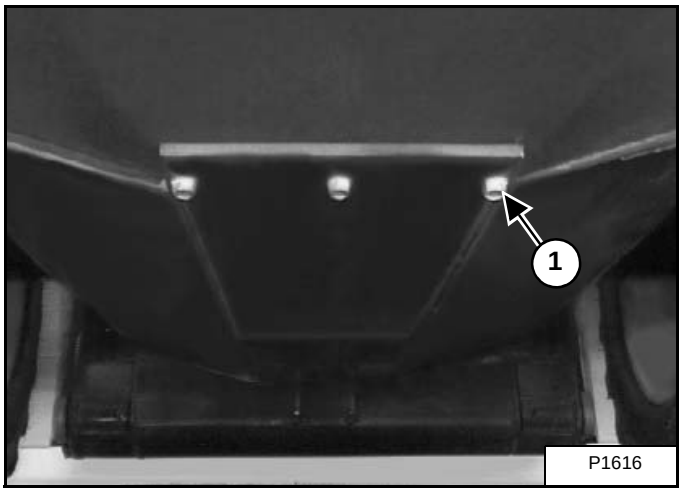
Remove the front auxiliary mount mounting bolts (Item 1) **[Figure 50-50-11]**.

Remove the front auxiliary tubelines from the lift arms.

FUEL TANK

Removal And Installation

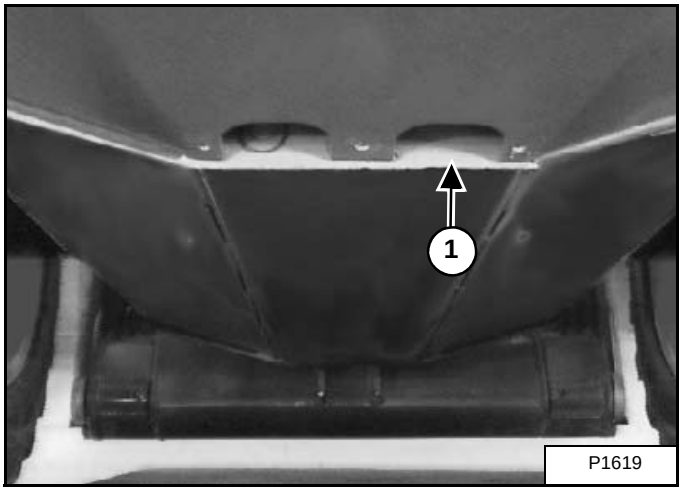
Figure 50-80-1



Remove the cover (Item 1) **[Figure 50-80-1]** which is installed over the fuel drain near the rear of the chaincase.

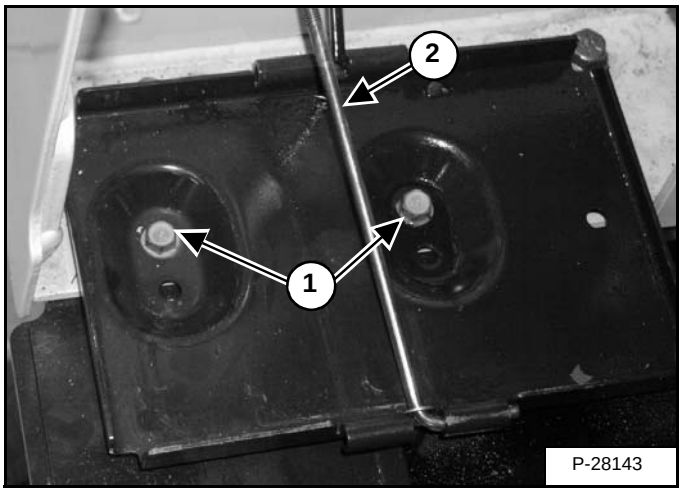
Installation: Tighten the cover mounting bolts to 190 - 240 in.-lb. (21,5 - 27 N•m) torque.

Figure 50-80-2



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

Figure 50-80-3



Open the rear door of the loader.

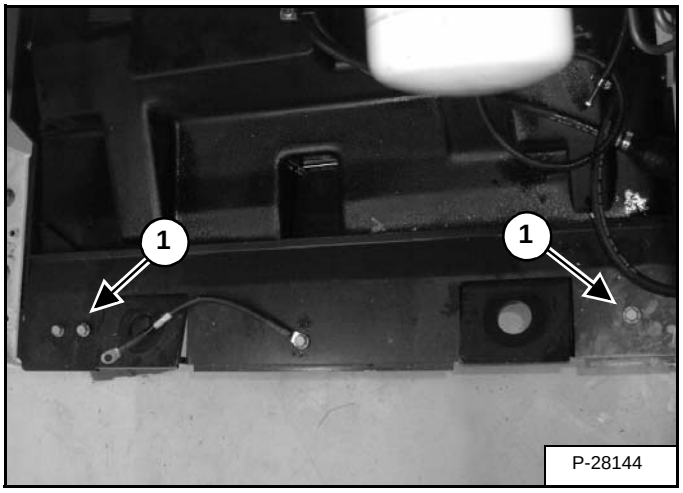
Remove the engine/hydrostatic pump assembly from the loader. (See Engine Removal And Installation on Page 70-10-8.)

Remove the two mounting bolts (Item 1) **[Figure 50-80-3]** from the battery holder.

Installation: Tighten the battery holder mounting bolts to 190 - 240 in.-lb. (21,5 - 27 N•m) torque.

Remove the battery holder (Item 2) **[Figure 50-80-3]** from the loader.

Figure 50-80-4

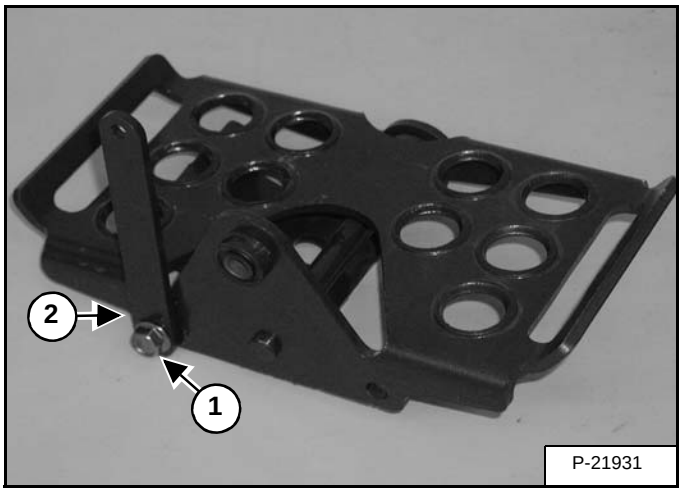


Remove the mounting bolts (Item 1) **[Figure 50-80-4]** from the fuel tank retainer bracket.

Installation: Tighten the mounting bolts to 190 - 240 in.-lb. (21,5 - 27 N•m) torque.

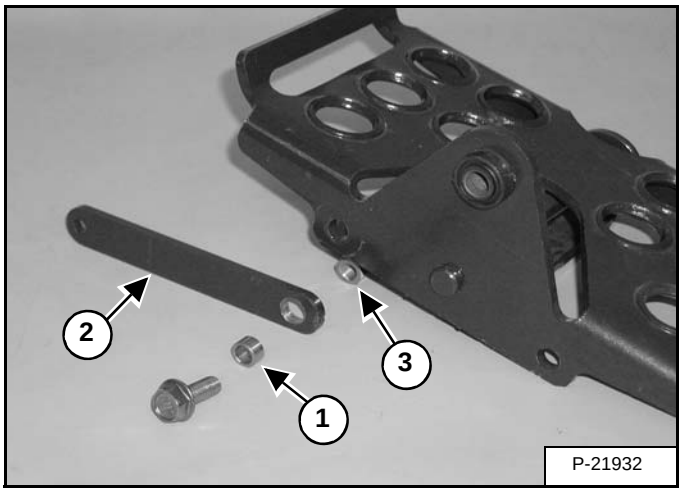
Foot Pedal Linkage Disassembly And Assembly

Figure 50-91-7



Remove the bolt (Item 1) holding the linkage (Item 2) to the side of the foot pedal **[Figure 50-91-7]**.

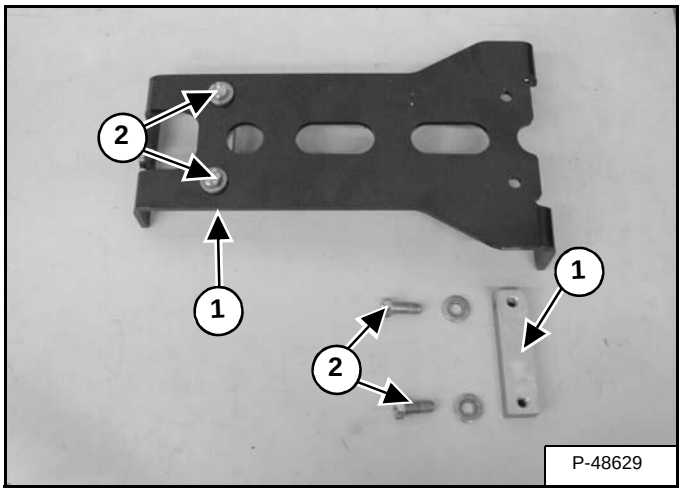
Figure 50-91-8



Remove the spacer (Item 1), linkage (Item 2), and nut (Item 3) from the foot pedal **[Figure 50-91-8]**.

Linkage Removal And Installation (Cont'd)

Figure 50-100-18



Check the wear on the centering blocks (Item 1) **[Figure 50-100-18]**.

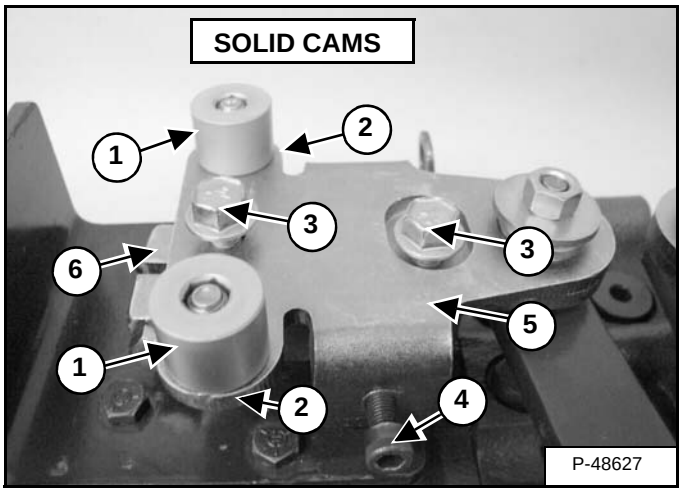
If the centering blocks need replacement, remove the bolts (Item 2) **[Figure 50-100-18]**. Remove the centering blocks.

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

NOTE: The washers go between the bolts and the centering plate.

NOTE: If the centering blocks are worn, they can be removed and rotated 180 degrees and reinstalled. If the solid cams are worn, they can be loosened and rotated 90 degrees and reinstalled.

Figure 50-100-19



If the surface of any of the four solid pintle cams (Item 1) are worn, loosen the bolt (Item 2) and rotate the cams 1/4 turn **[Figure 50-100-19]**.

Remove the bolts and washers (Item 3) **[Figure 50-100-19]** from the pintle.

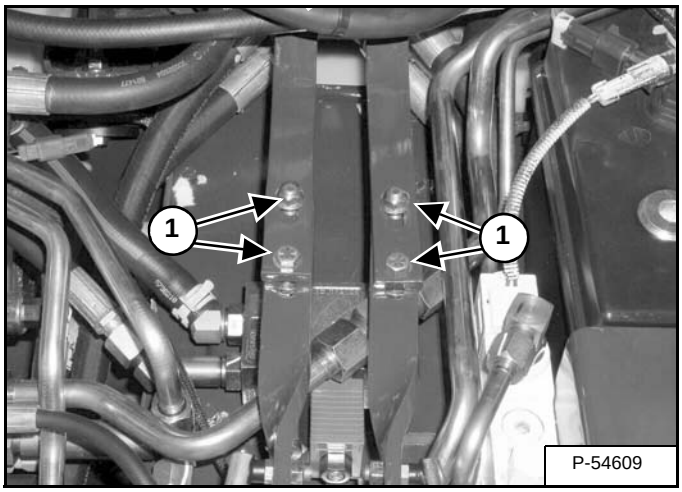
Installation: Tighten the bolts to 35 - 40 ft.-lb. (47,5 - 54,2 N•m) torque.

Loosen the creep adjustment bolt (Item 4) **[Figure 50-100-19]**.

Remove the pintle arm (Item 5) from the pintle base (Item 6) **[Figure 50-100-19]**.

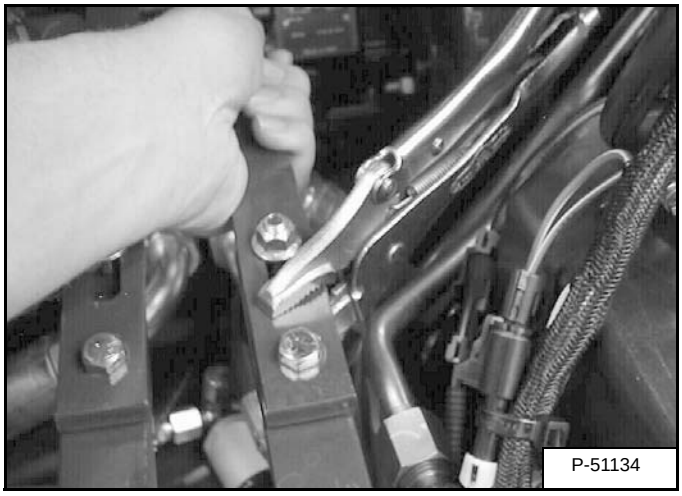
Linkage Travel (Adjusting) (Cont'd)

Figure 50-100-43



Loosen the two bolts and nuts (Item 1) **[Figure 50-100-43]** on each steering linkage bar.

Figure 50-100-44



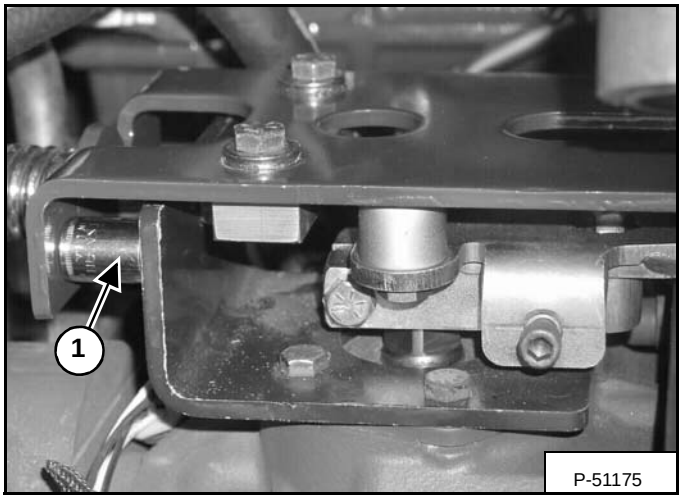
Move the left control lever to the full forward position, then pull forward on the left rear linkage bar until the pintle arm is rotated to the front as far as possible **[Figure 50-100-44]**. Use a locking plier, clamp the two linkage bars together.

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

Check the lever movement to make sure that the pintle arm and the control lever are both at full stroke at the same time. This will allow for maximum forward speed.

Repeat the linkage travel adjustment procedure for the right side linkage.

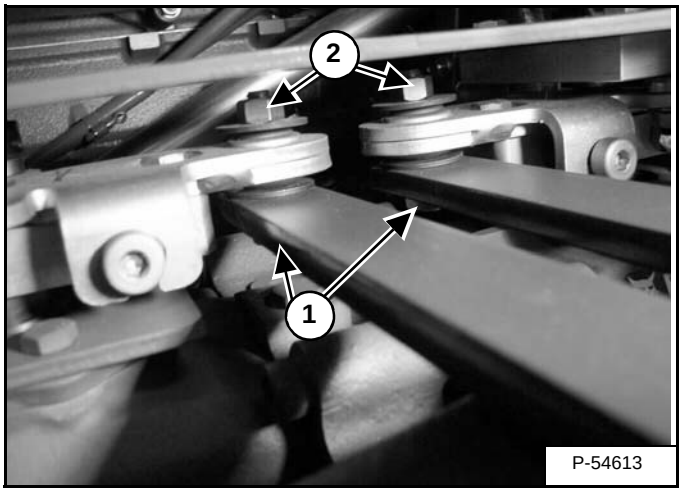
Figure 50-100-45



Remove the spacer (Item 1) **[Figure 50-100-45]**.

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

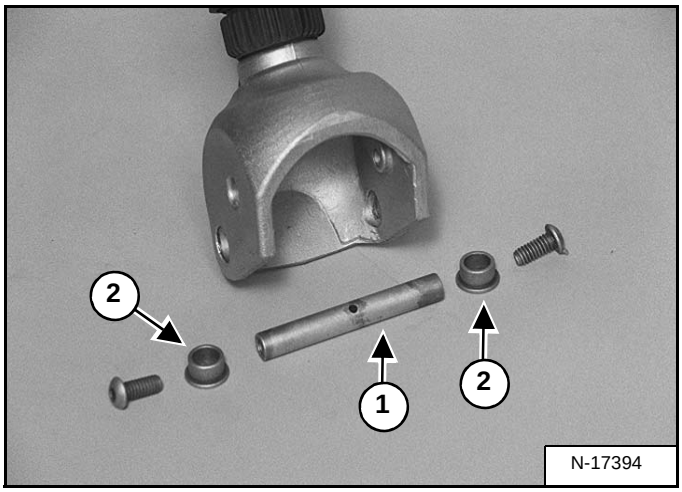
Figure 50-100-46



Tighten the two bolts (Item 1) and nuts (Item 2) to 35 - 40 ft.-lb. (47,5 - 54,2 N•m) **[Figure 50-100-46]**.

Handle Disassembly And Assembly

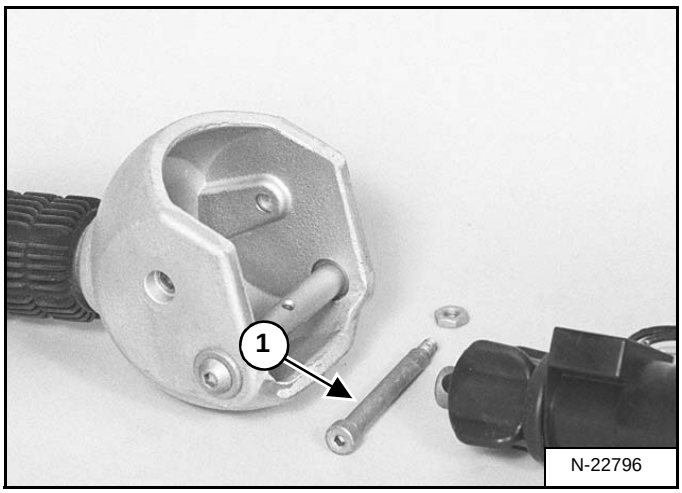
Figure 50-111-19



Remove the handle sleeve (Item 1) and bushings (Item 2) from the handle **[Figure 50-111-19]**.

Check all parts for wear and replace as needed.

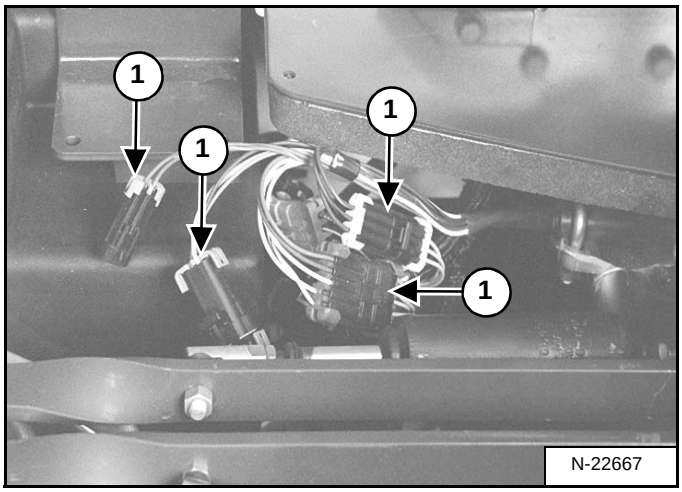
Figure 50-111-20



Check the mounting bolt (Item 1) **[Figure 50-111-20]** that connects the handle to the handle sensor for wear, replace as needed.

Lever Removal And Installation

Figure 50-111-21



Disconnect the electrical connectors (Item 1) **[Figure 50-111-21]** from the control lever switch handle.

Remove the electrical connectors from the control lever switch handle. (See Handle Sensor Connector Disassembly And Assembly on Page 60-130-3.)

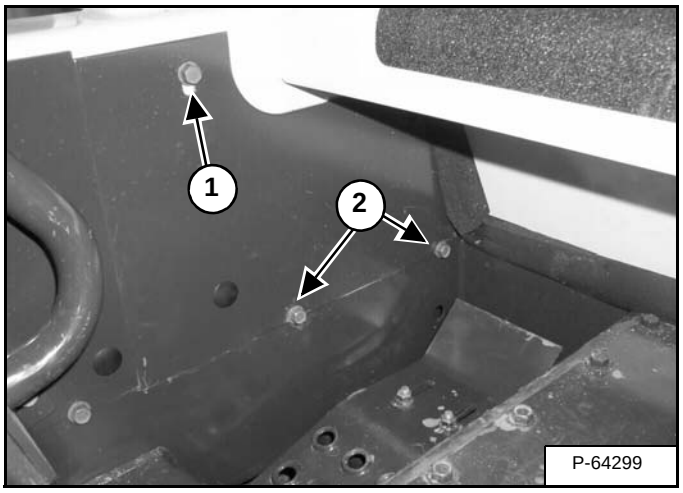
ACCESS PANEL (INSIDE) (SJC)

Removal And Installation (Left)

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 10-30-1.)

Figure 50-121-1

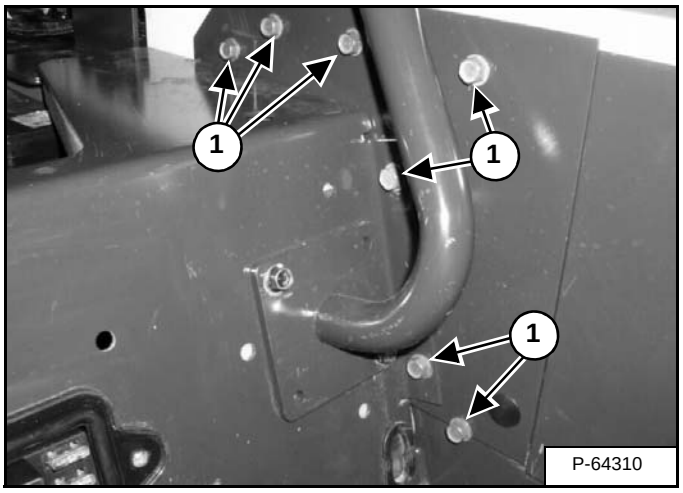


Remove the top mounting screw (Item 1) and loosen the two bottom screws (Item 2) **[Figure 50-121-1]**.

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

Remove the inside front access panel from the loader.

Figure 50-121-2



Remove the seven mount screws (Item 1) **[Figure 50-121-2]**

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

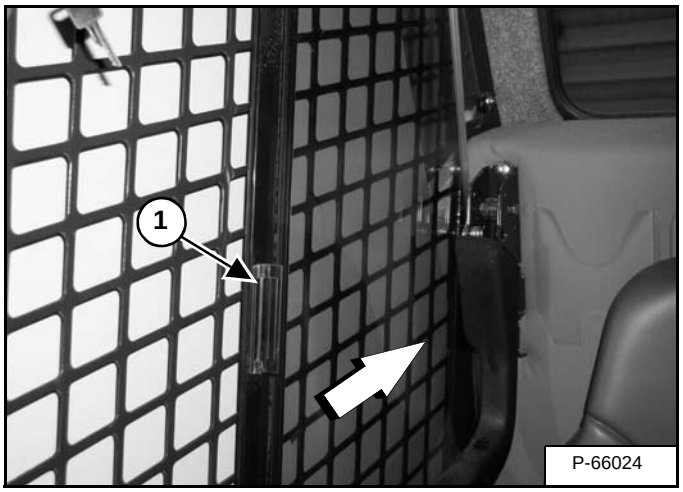
Move the lever assembly a slight amount toward the center of the loader, to allow clearance for the panel to be removed.

Remove the inside rear access panel from the loader.

WINDOW (SIDE)

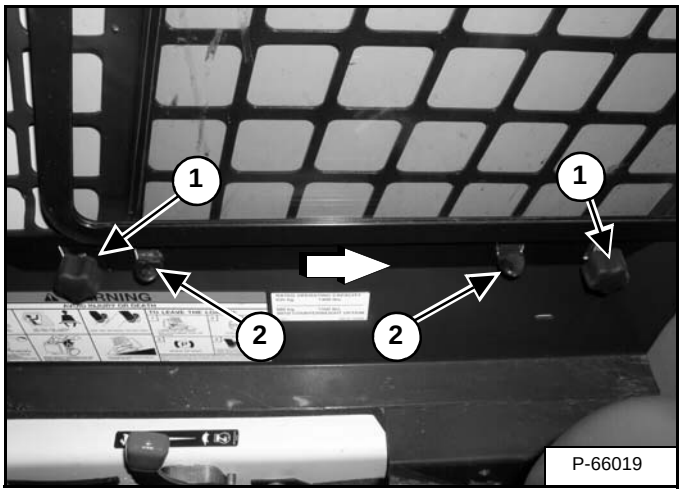
Removal And Installation

Figure 50-132-1



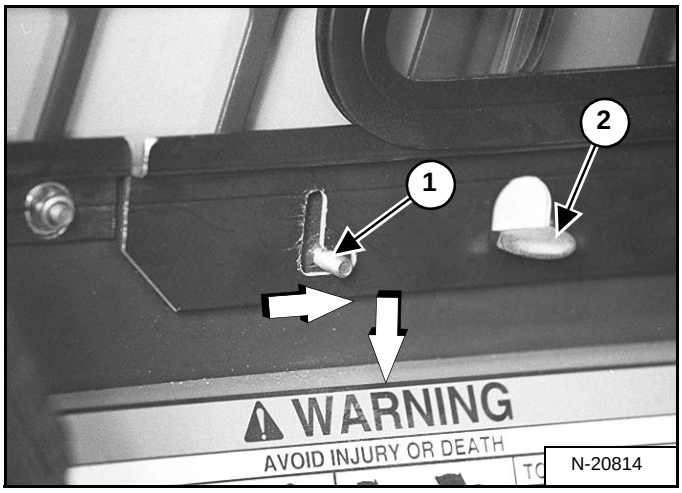
Release the latch (Item 1) **[Figure 50-132-1]** and slide the front window back towards the rear of the operator cab.

Figure 50-132-2



From inside the operator cab, loosen the knobs (Item 1) **[Figure 50-132-2]** and **[Figure 50-132-3]** on the window slide rail bolts.

Figure 50-132-3



NOTE: [Figure 50-132-3] 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 50-132-2]** and **[Figure 50-132-3]** 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.

ELECTRICAL SYSTEM & ANALYSIS

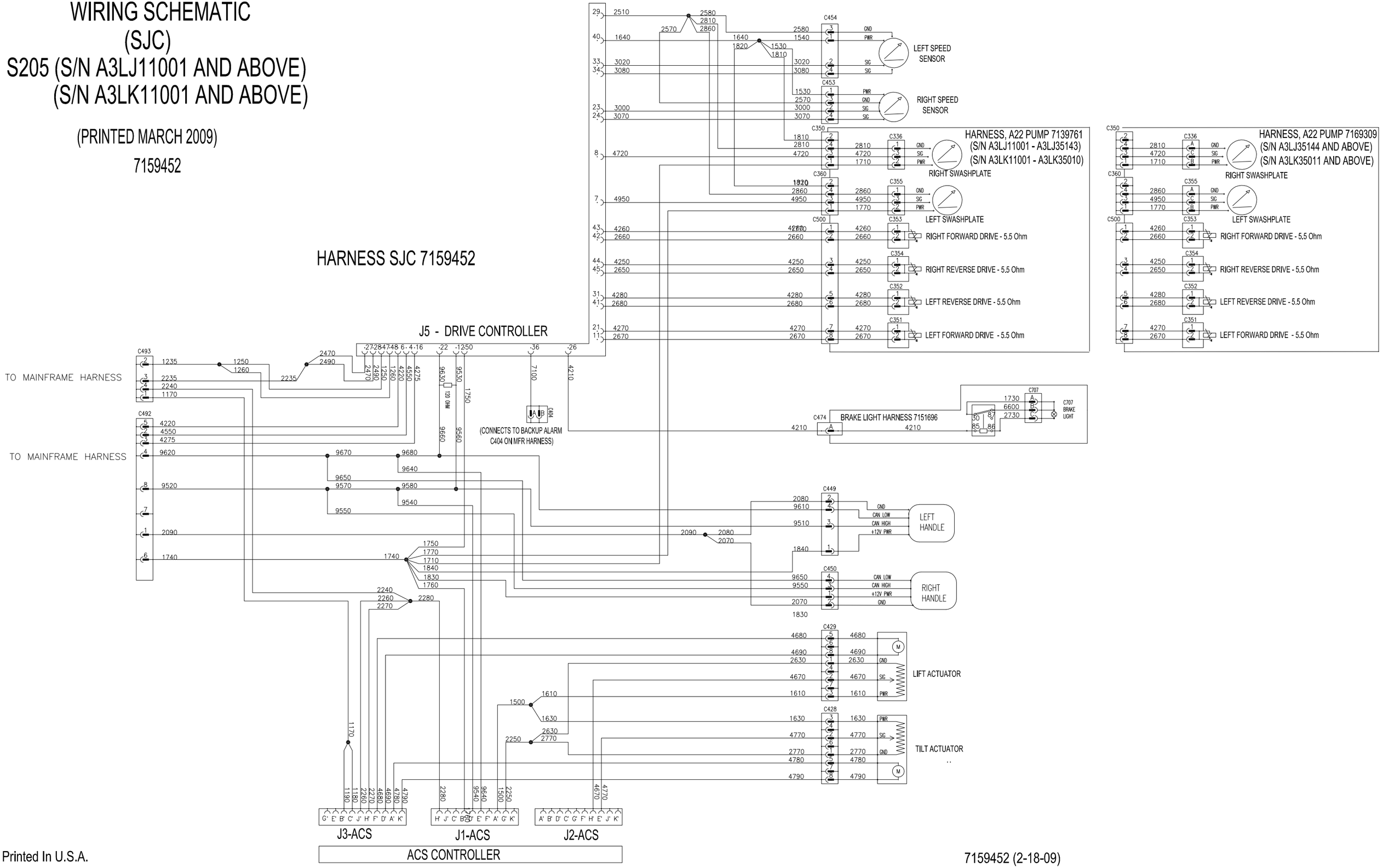
Continued On Next Page

WIRING SCHEMATIC
(SJC)
S205 (S/N A3LJ11001 AND ABOVE)
(S/N A3LK11001 AND ABOVE)

(PRINTED MARCH 2009)

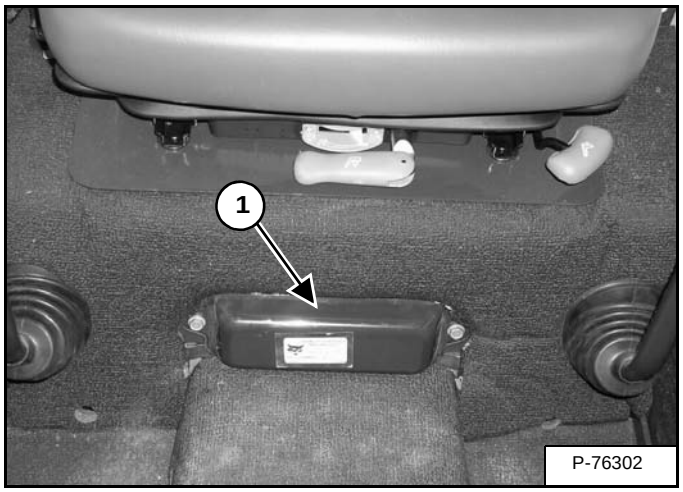
7159452

HARNESS SJC 7159452



Fuse And Relay Location / Identification

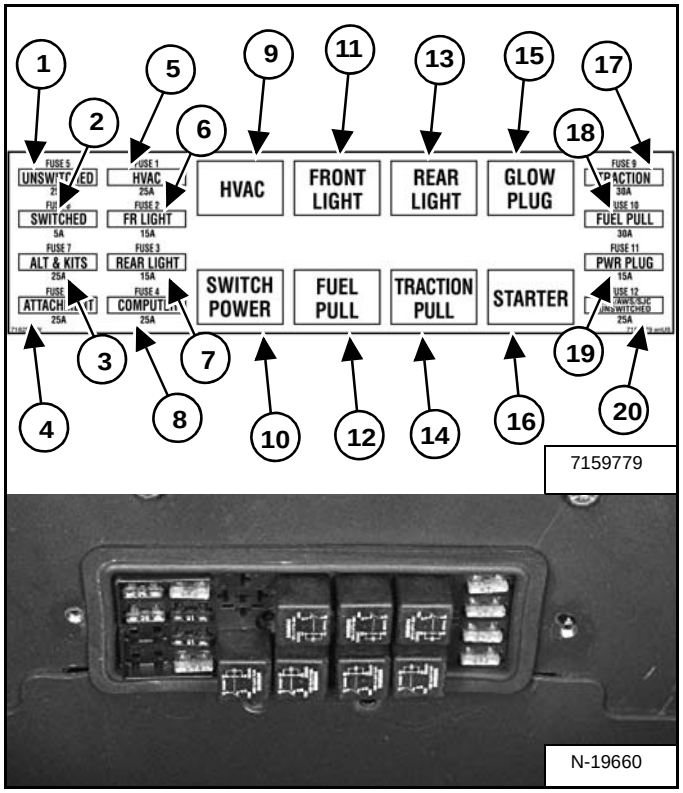
Figure 60-10-2



The electrical system is protected from overload by fuses and relays under the fuse panel cover (Item 1) **[Figure 60-10-2]**. A decal is inside the cover to show location and amp ratings.

Remove the cover to check or replace the fuses.

Figure 60-10-3



The location and sizes are shown below and **[Figure 60-10-3]**.

REF	DESCRIPTION	AMP	REF	DESCRIPTION	AMP
1	Unswitched Horn	25	**11**	Front & Marker Lights	R
2	ACS/AWS/SJC Switched	5	**12**	Fuel Shutoff	R
3	Alternator & Accessories Back-up Alarm	25	**13**	Rear Lights	R
4	Attachments	25	**14**	Traction	R
5	Heater & Air Conditioning	25	**15**	Glow Plugs	R
6	Front & Marker Lights	15	**16**	Starter	R
7	Rear Lights	15	**17**	Traction	30
8	Bobcat Controller	25	**18**	Fuel Shutoff	30
9	Heater & Air Conditioning	R	**19**	Power Plug	15
10	Switch Power	R	**20**	ACS/AWS/SJC Unswitched	25

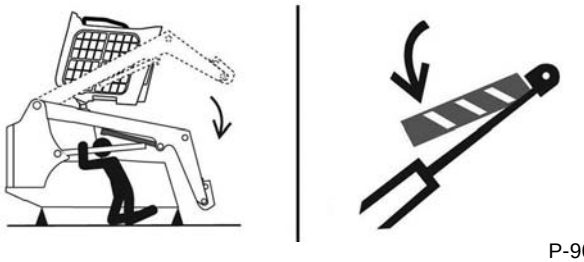
R - Relay

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.**

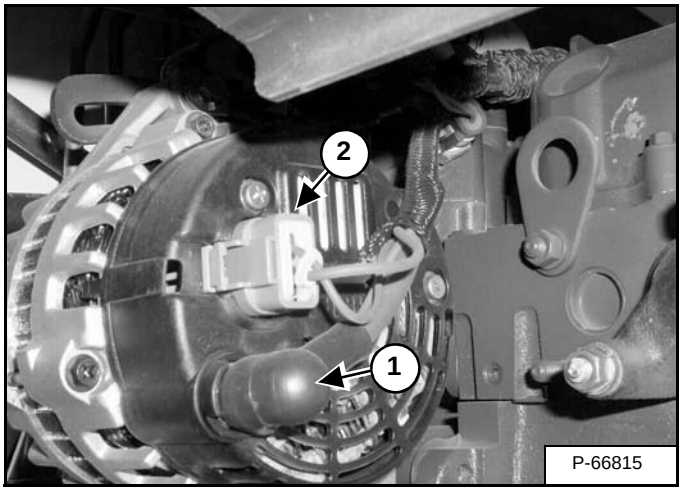
I-2023-1285

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 10-30-1.)

Disconnect the negative (-) cable from the battery.

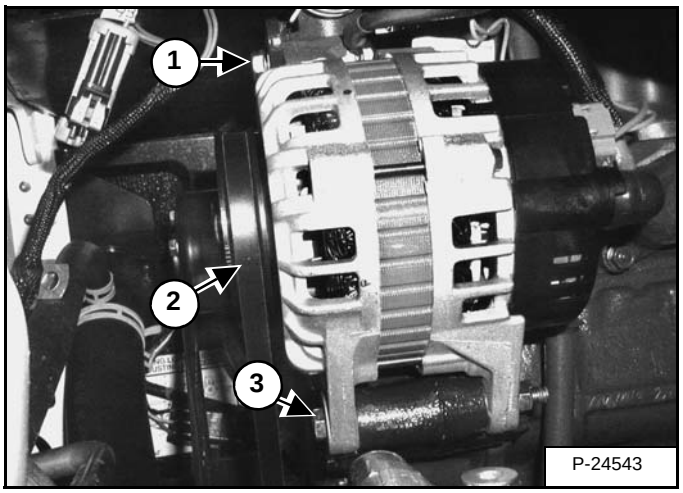
Figure 60-30-8



Disconnect the red wire (Item 1) **[Figure 60-30-8]** from the alternator which comes from the battery.

Disconnect the wiring harness connector (Item 2) **[Figure 60-30-8]** from the alternator.

Figure 60-30-9



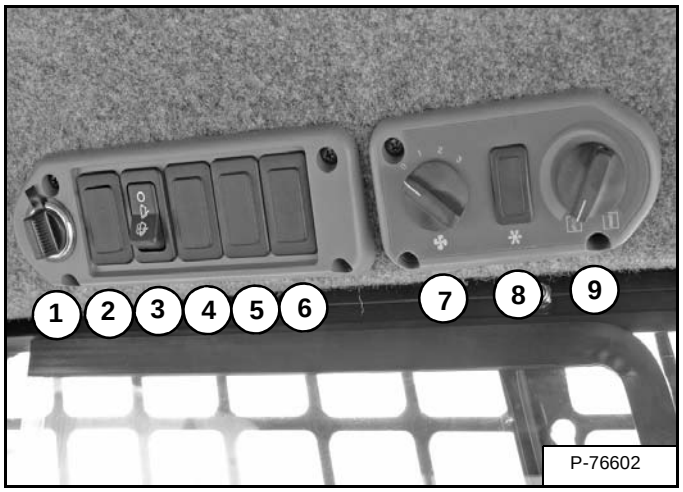
Remove the adjustment bolt (Item 1) **[Figure 60-30-9]** from the mounting bracket.

Remove the alternator belt (Item 2) **[Figure 60-30-9]** from the alternator pulley.

Remove the mounting bolt (Item 3) **[Figure 60-30-9]**.

Side Panel

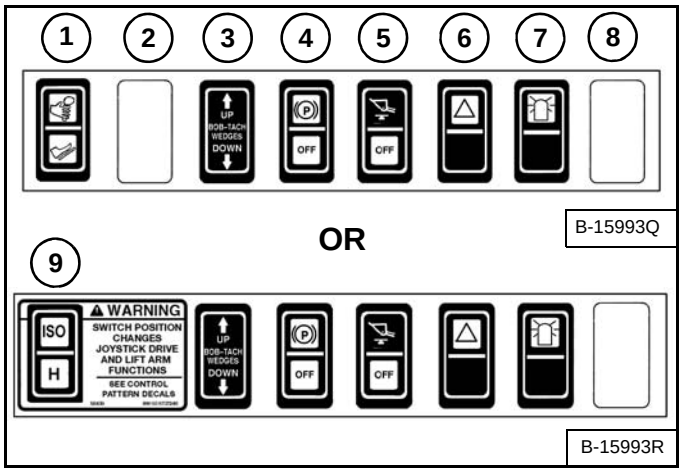
Figure 60-50-6



REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	POWER PORT	Provides a 12 volt receptacle for accessories.
2	NOT USED	- - -
3	FRONT WIPER (Option)	Press the bottom of the switch to start the front wiper (press and hold for washer fluid). Press the top of the switch to stop the wiper.
4	REAR WIPER (Option)	Press the bottom of the switch to start the rear wiper (press and hold for washer fluid). Press the top of the switch to stop the wiper.
5	NOT USED	- - -
6	NOT USED	- - -
7	FAN MOTOR (Option)	Turn clockwise to increase fan speed; counterclockwise to decrease. There are four positions; OFF-1-2-3.
8	AIR CONDITIONING SWITCH (Option)	Press bottom of switch to start; top to stop. Fan Motor (Item 7) must be ON for A/C to operate.
9	TEMPERATURE CONTROL (Option)	Turn clockwise to increase the temperature; counterclockwise to decrease.

Front Panel

Figure 60-50-7

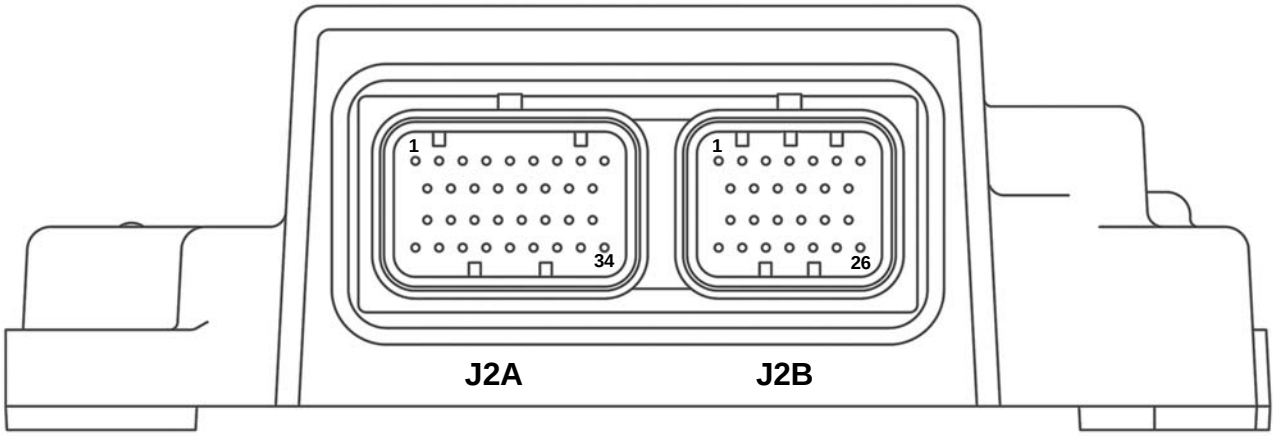


NOTE: Parking Brake (Item 4) [Figure 60-50-7] is standard on all loaders.

REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	ADVANCED CONTROL SYSTEM (ACS) (Option)	Press the top to select Hand Controls; bottom to select Foot Controls.
2	NOT USED	- - -
3	POWER BOB-TACH (Option)	Press and hold the up arrow to disengage 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	HYDRAULIC BUCKET POSITIONING (Option)	Press the top to engage Hydraulic Bucket Positioning; bottom to disengage.
6	HAZARD LIGHTS (Option)	Press the top to turn the HAZARD LIGHTS ON; bottom to turn OFF.
7	ROTATING BEACON (Option)	Press the top to turn the ROTATING BEACON ON; bottom to turn OFF.
8	NOT USED	- - -
9	SELECTABLE JOYSTICK CONTROLS (SJC) (Option)	Press the top to select 'ISO' Control Pattern; bottom to select 'H' Control Pattern.

Connector Identification (Cont'd)

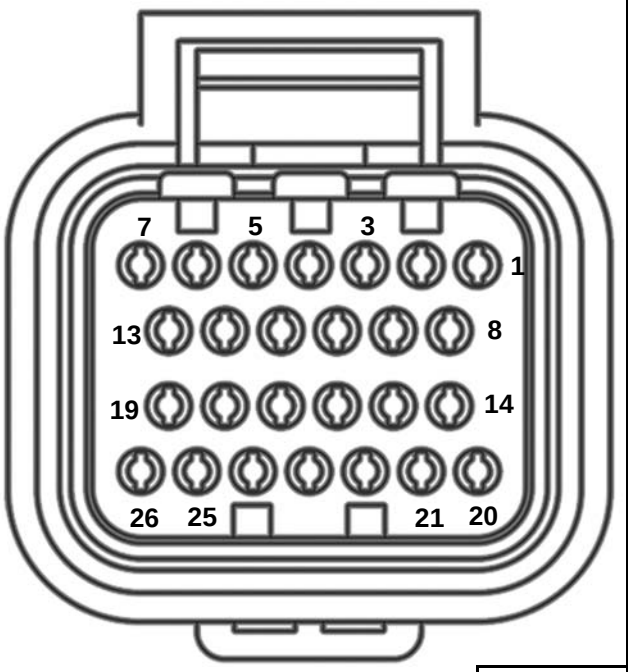
Auxiliary Controller



Harness Connector View

J2A

Harness Connector View



J2B

P-76647
P-76646
P-76645

BOBCAT CONTROLLER (SJC) (DRIVE)

Description

The drive controller is only on loaders equipped with the SJC option. This controller processes information for the drive functions.

The drive controller is located behind the right side access panel near the operators right foot.

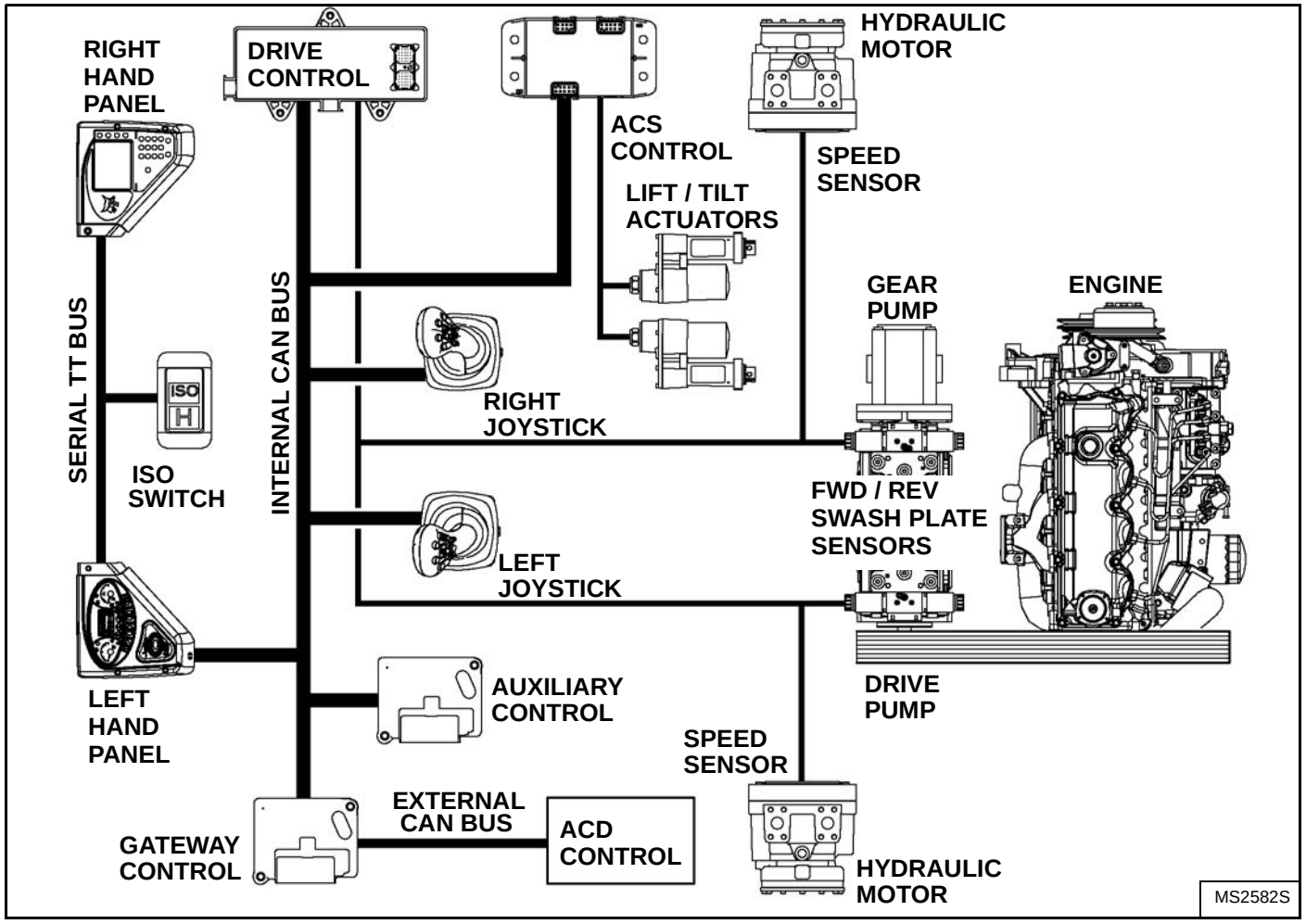
The drive controller monitors the position of the left joystick, pump swash plate angles and the output of the wheel speed sensors.

The drive controller works along with the ACS controller and communicates with the Gateway controller in an SJC system. All these controllers are capable of software upgrades.

The SJC system uses electronic joysticks to control both of the workgroups (lift and tilt) and the drive functions of the loader. The control can be switched from ISO and H-Pattern drive control layouts.

The workgroup actuators are the same used on the ACS system.

The hydrostatic drive pump is a Rexroth A22 unit. It has two electromagnetic coils on each of the two pumps to control the drive of the loader. The coils will direct the forward and reverse outputs of the pump to the drive motors. The Rexroth pump is equipped with position sensors mounted to the bottom of the swash plates to provide feedback to the controllers to sense uncommanded swash plate movement.



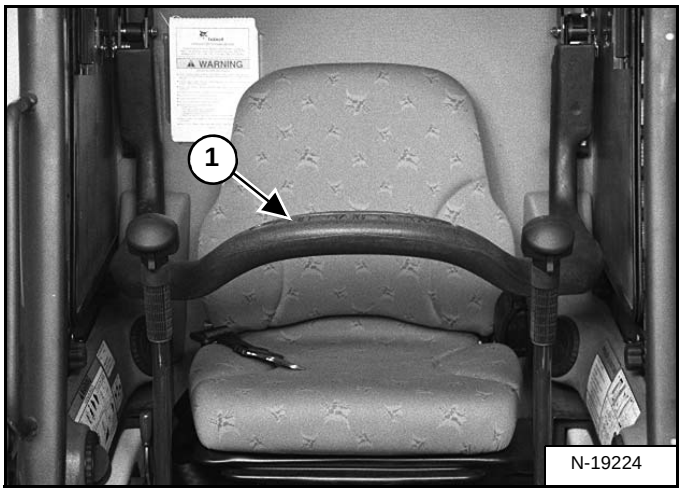
Service Codes List (Cont'd)

CODE	DESCRIPTION	CODE	DESCRIPTION
D7521	Left joystick Y-axis out of range high	D7572	Drive pump not calibrated
D7522	Right joystick Y-axis out of range high	D7573	Operating mode switch flipped while operating
D7523	Right front wheel angle sensor out of range high	D7574	Right wheel speed uncommanded motion
D7524	Left front wheel angle sensor out of range high	D7575	Left wheel speed uncommanded motion
D7525	Right rear wheel angle sensor out of range high	D7576	No communication from ACS controller
D7526	Left rear wheel angle sensor out of range high	D7577	Left speed sensor out of range high
D7527	Left swash plate out of position	D7578	Right speed sensor out of range high
D7528	Right swash plate out of position	D7579	Left speed sensor out of range low
D7529	Left joystick X-axis out of range low	D7580	Right speed sensor out of range low
D7531	Left joystick Y-axis out of range low	D7581	Right front steer retract short to battery
D7532	Right joystick Y-axis out of range low	D7582	Left front steer retract short to battery
D7533	Right front wheel angle sensor out of range low	D7583	Right rear steer retract short to battery
D7534	Left front wheel angle sensor out of range low	D7584	Left rear steer retract short to battery
D7535	Right rear wheel angle sensor out of range low	D7585	Sensor supply 1 out of range high
D7536	Left rear wheel angle sensor out of range low	D7586	Sensor supply 2 out of range high
D7537	Sensor supply 1 out of range low	D7587	Software update required
D7538	Sensor supply 2 out of range low	D7588	Switched power stuck ON
D7539	Left swash plate sensor out of range high	D7589	Switched power error OFF
D7540	Left swash plate sensor out of range low	D7591	Left swash plate sensor reversed
D7541	Right swash plate sensor out of range high	D7592	Right swash plate sensor reversed
D7542	Right swash plate sensor out of range low	D7593	Right speed sensor unresponsive
D7543	Left forward drive solenoid error ON	D7594	Left speed sensor unresponsive
D7544	Left reverse drive solenoid error ON	D7595	Left speed sensor reversed
D7545	Right forward drive solenoid error ON	D7596	Right speed sensor reversed
D7546	Right reverse drive solenoid error ON	D7597	Controller programmed
D7547	Right front steer extend short to battery	D7598	In drive calibration mode
D7548	Left front steer extend short to battery	D7599	In angle calibration mode
D7549	Right rear steer extend short to battery		
D7550	Left rear steer extend short to battery	H1221	Right Primary out of range high
D7551	Steer pressure short to battery	H1222	Right Primary out of range low
D7552	Back-up alarm error ON	H1224	Right Primary not in neutral
D7553	Left forward drive solenoid error OFF	H1321	Left Primary out of range high
D7554	Left reverse drive solenoid error OFF	H1322	Left Primary out of range low
D7555	Right forward drive solenoid error OFF	H1324	Left Primary not in neutral
D7556	Right reverse drive solenoid error OFF	H2005	Boost solenoid short to battery
D7557	Right front steer extend short to ground	H2006	Boost solenoid short to ground
D7558	Right front steer retract short to ground	H2007	Boost solenoid open circuit
D7559	Left front steer extend short to ground	H2032	Boost solenoid overcurrent
D7560	Left front steer retract short to ground	H2205	Pressure control solenoid short to battery
D7561	Right rear steer extend short to ground	H2206	Pressure control solenoid short to ground
D7562	Right rear steer retract short to ground	H2207	Pressure control solenoid open circuit
D7563	Left rear steer extend short to ground	H2232	Pressure control solenoid overcurrent
D7564	Left rear steer retract short to ground	H2305	Rear base solenoid short to battery
D7565	Steer pressure short to ground	H2306	Rear base solenoid short to ground
D7566	Back-up alarm error OFF	H2307	Rear base solenoid open circuit
D7567	No communication from Gateway controller	H2332	Rear base solenoid overcurrent
D7568	Angle sensors not calibrated	H2405	Rear rod solenoid short to battery
D7569	Battery voltage out of range high	H2406	Rear rod solenoid short to ground
D7570	Interrupted power	H2407	Rear rod solenoid open circuit
D7571	Battery voltage out of range low	H2432	Rear rod solenoid overcurrent

SEAT BAR SENSOR (CONT'D)

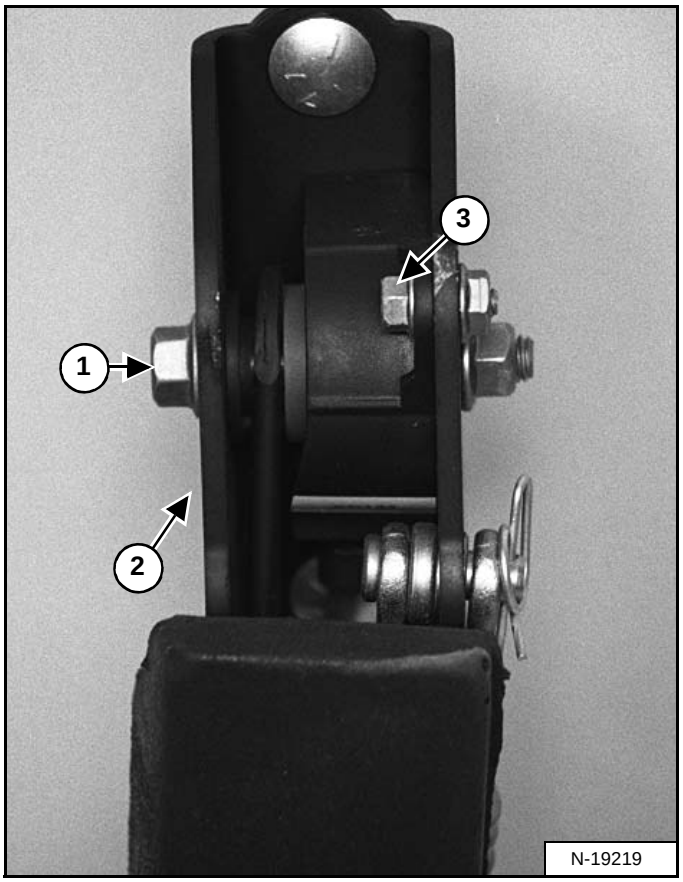
Removal And Installation

Figure 60-110-5



Remove the seat bar (Item 1) **[Figure 60-110-5]** from the loader. (See Removal And Installation on Page 50-10-1.)

Figure 60-110-6



Remove the mounting bolt (Item 1) from the seat bar mount (Item 2) **[Figure 60-110-6]**.

Installation: Tighten the mounting bolt to 50 - 70 in.-lb. (5,6 - 7,9 N•m) torque.

Remove the sensor mounting bolt (Item 3) **[Figure 60-110-6]** and nut.

CONTROL SYSTEM (ACS)

Description

The (ACS) Actuator Control System system is an option that allows the operator to quickly switch between foot and hand control modes.

The ACS control uses the electric actuators on the main hydraulic control valve to control the lift and tilt spools in the hydraulic control valve, foot sensors, handle sensors and a specially designed control handle.

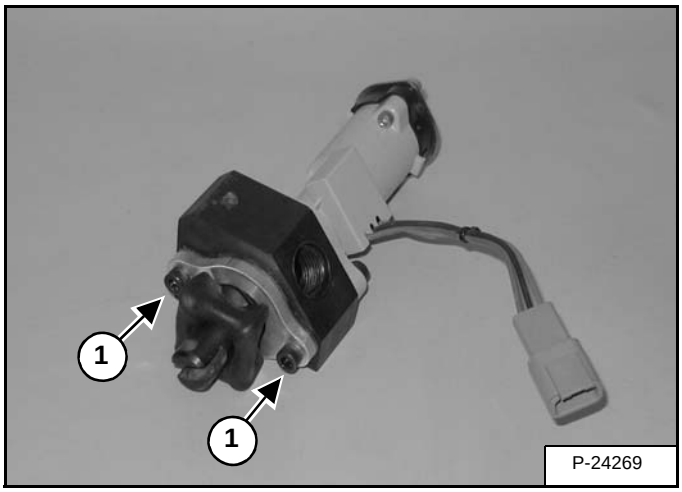
Hand controls contain a locking solenoid which lock when the switch on the center control panel is switched to foot mode.

Foot controls also contain solenoids which lock when the switch on the center control panel is switched to hand mode.

Both the hand and foot controls contain sensors that relay information to the ACS controller as to which function should be activated and how far the spool should be moved.

Foot Sensor Disassembly And Assembly

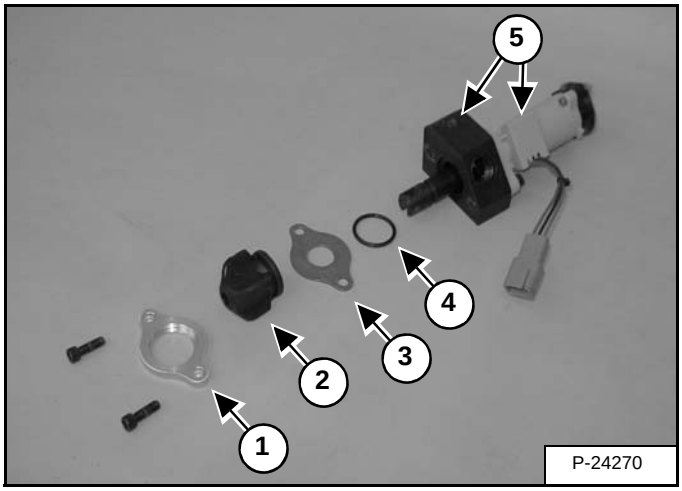
Figure 60-130-28



Remove the two bolts (Item 1) **[Figure 60-130-28]** from the end of the foot sensor.

Installation: Tighten the bolts to 90 in.-lb. (10,2 N•m) torque. Apply Loctite® 242 to the threads.

Figure 60-130-29



Remove the boot retainer (Item 1), boot (Item 2), spool stop plate (Item 3), O-ring (Item 4) **[Figure 60-130-29]**.

NOTE: Do not disassemble the sensor assembly (Item 5) [Figure 60-130-29]. The sensor assembly is a calibrated assembly and cannot be serviced. Order through Bobcat Parts.

Identification Chart ACD Group 0

Left side Control Handle Switches	Switch Number	Solenoid Number Activated				Attachment Harness Terminal Activated	Attachment Harness Connector	RIght Side Control Handle Switches
		STD	RH	HFH	RH / HFH		Fourteen Pin Connector Viewed from front (pin side of connector) of loader.	
	1	1	1	1, 7	1,7	K		
	2	2	2	2	2	K		
	3	1	1	1, 7	1,7	K		
	4	2	3,5,6	2	3,5,6	K,A,D		
	5	1	4,5,6	1	4,5,6	K,A,C		
	6	1	4,5,6	1	4,5,6	K,E		
	7	1	4,5,6	1	4,5,6	K,F		
	8	1	4,5,6	1	4,5,6	K,G		
	9	1	4,5,6	1	4,5,6	K,H		
P-90898 P-90900	10, 11, 12, 13, 14	-	--	--		K	No Jumpers	P-90899 P-90900A

RH - Loaders with Rear Hydraulics Option.
HFH - Loaders with High Flow Hydraulics Option.
RH / HFH - Loaders with Rear Hydraulics and High Flow Hydraulics Option.
Terminal K is activated with Key switch ON.

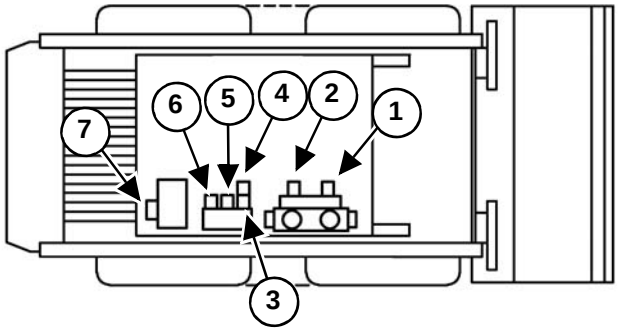
NOTE: For diagnostics and troubleshooting connect the Service PC (See SERVICE PC (LAPTOP COMPUTER) on Page 60-150-1.)

The ACD (Attachment Control Device) automatically recognizes the use of the seven or fourteen pin connector when connected.

Pressing the auxiliary hydraulics button and moving the rear auxiliary hydraulic switch to the right and left several times activates solenoid numbers 3,4,5, and 6 at the diverter valve.

Front Auxiliary Pressure Release is accomplished by manually pushing the male and female couplers in at the front auxiliary block.

The High Flow Button in the left side instrument panel must be pushed ON to activate solenoid number seven at the gear pump.



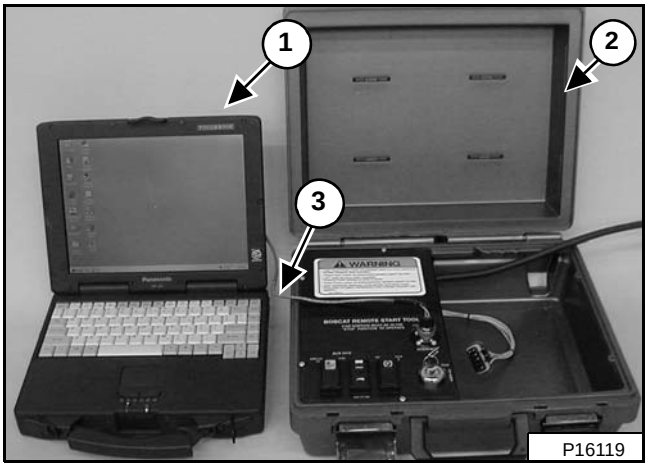
NA1891

Solenoid Number	Hydraulic Coupler	Wiring Number
1	Front Male (Rod)	4330
2	Front Female (Base)	4340
3	Diverter Rear (Rod)	4430
4	Diverter Rear (Base)	4440
5	Bleed / Lock Valve (Base)	4480
6	Bleed / Lock Valve (Rod)	4450
7	High Flow on Pump	4460

SERVICE PC (LAPTOP COMPUTER)

Connecting Remote Start Tool

Figure 60-150-1



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

MEL1563 or 6689779 - Remote Start Tool
MEL1565 - Service Tool Harness Control
MEL1566 - Service Tool Harness Communicator (Computer Interface)

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

The Service PC (Item 1) with the Remote Start Tool (Item 2) **[Figure 60-150-1]**. When connected to the loader, the Service PC is used to monitor, conduct diagnostics, and upgrade software.

Connect the Service Tool Harness Communicator (MEL1566) (Item 3) **[Figure 60-150-1]** to the designated serial port on the Service PC.

NOTE: The recommended serial cable length should not exceed 15 feet. A serial cable longer than 15 feet will create a degraded signal causing communication errors.

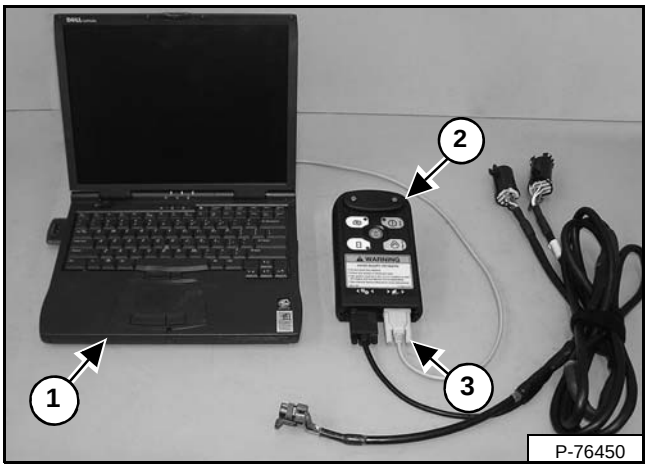
Connect the other end to the connector on the Remote Start Tool.

Connect the Remote Start Tool to the loader. (See REMOTE START TOOL KIT-MEL1563 on Page 10-60-1.)

NOTE: Refer to BobcatNET for PC requirements and the latest Service Analyzer software.

Connecting Remote Start Tool (Service Tool)

Figure 60-150-2



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

Order from Bobcat Parts P/N: 6689779 - Remote Start Tool (Service Tool) Kit

Kit Includes:

6689778 - Remote Start Tool (Service Tool)
6689747 - Loader Service Tool Harness
6689746 - Computer Service Tool Harness
6689745 - BOSS® Service Tool Harness

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

The Service PC (Item 1) with the Remote Start Tool (Service Tool) (Item 2) **[Figure 60-150-2]**. When connected to the loader, the Service PC is used to monitor, conduct diagnostics, and upgrade software.

Connect the Remote Start Tool (Service Tool) Computer Service Tool Harness (Item 3) **[Figure 60-150-2]** to the designated serial port on the Service PC.

NOTE: The recommended serial cable length should not exceed 15 feet. A serial cable longer than 15 feet will create a degraded signal causing communication errors.

Connect the other end to the connector on the Remote Start Tool (Service Tool).

Connect the Remote Start Tool (Service Tool) to the loader. (See REMOTE START TOOL (SERVICE TOOL) KIT - 6689779 on Page 10-61-1.)

NOTE: Refer to BobcatNET for PC requirements and the latest Service Analyzer software.

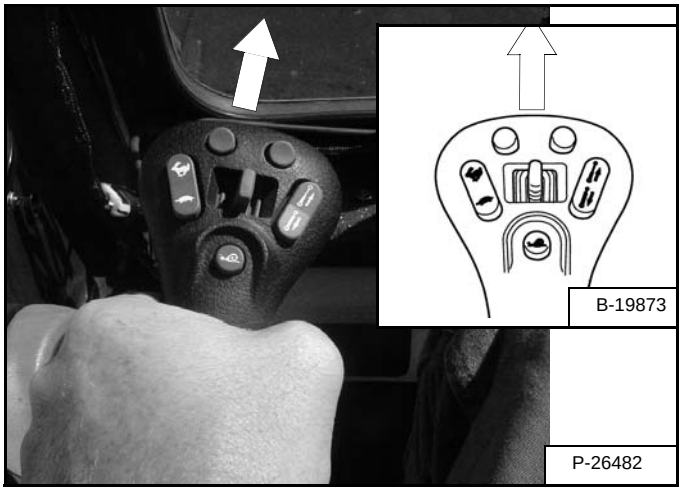
Hydrostatic Pump Calibration (SJC) (Cont'd)

⚠ WARNING

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

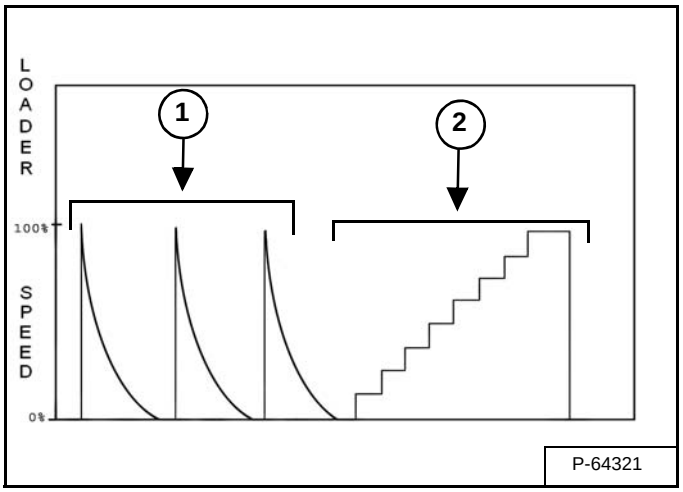
W-2017-0286

Figure 60-160-18



Move and hold the left joystick to the forward position **[Figure 60-160-18]** until the forward calibration is completed.

Figure 60-160-19



The loader speed will “ramp up” quickly (Item 1) **[Figure 60-160-19]** and slow down 3 times in a row.

The loader will then “stair step” the speed (Item 2) **[Figure 60-160-19]** until it reaches full speed and then come to a stop.

Continue to hold the left joystick in the forward position until the loader wheels or tracks come to a stop and an audible beep is heard.

Forward calibration is complete.

NOTE: If the wheels or tracks do not stop moving in Full Speed Forward in 2 minutes or less, there was an error in the calibration procedure. The operator must shut the loader OFF, and start the calibration procedure from the beginning.

PASSWORD SETUP (DELUXE INSTRUMENTATION PANEL)

Password Setup is available on machines with a Deluxe Instrumentation Panel.

Password Description

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

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

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

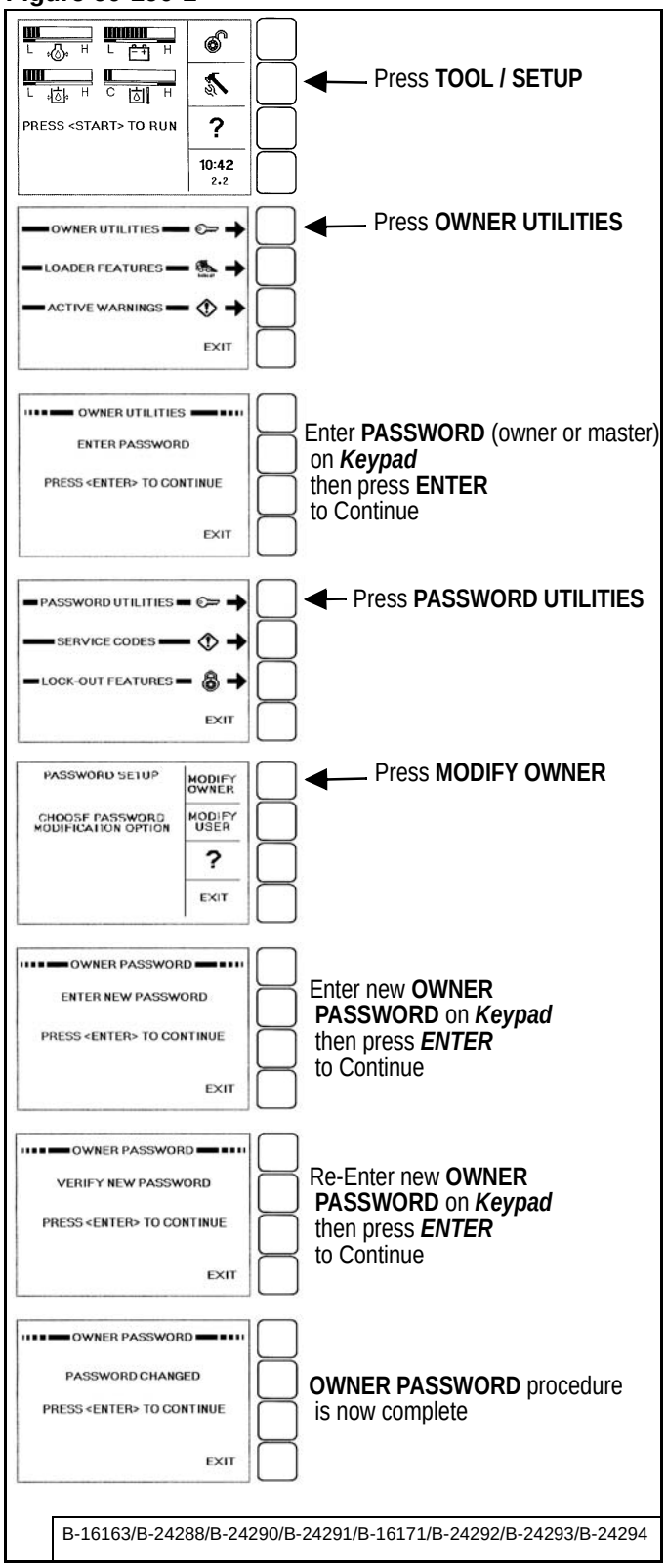
Owner Password:
Allows for full use of the loader and to setup the Deluxe Instrumentation Panel. There is only one owner password. It must be used to change the owner or user passwords. Owner should change the password as soon as possible for security of the loader.

User Password:
Allows starting and operating the loader; cannot change password or any of the other setup features.

For the procedures to change passwords (See Changing The Owner Password on this Page) (See Changing The User Passwords on Page 60-190-2.)

Changing The Owner Password

Figure 60-190-1



B-16163/B-24288/B-24290/B-24291/B-16171/B-24292/B-24293/B-24294

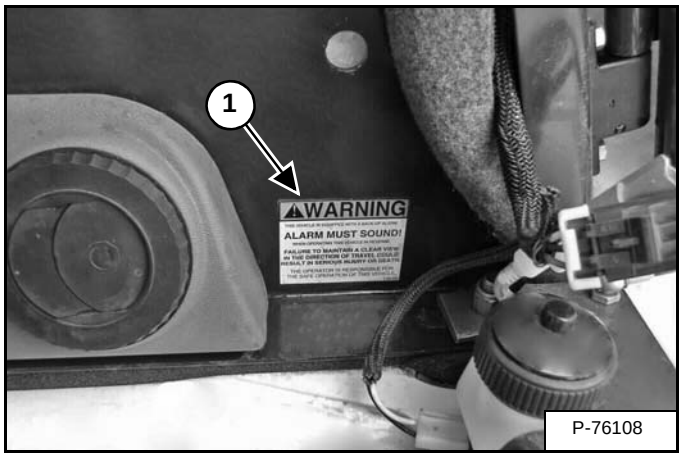
BACK-UP ALARM SYSTEM

Description

This machine may be equipped with a back-up alarm system. The back-up alarm will sound when the operator moves both steering levers or joystick(s) into the reverse position. Slight movement of the steering levers into the reverse position is required with hydrostatic transmissions, before the back-up alarm will sound.

Inspecting

Figure 60-210-1



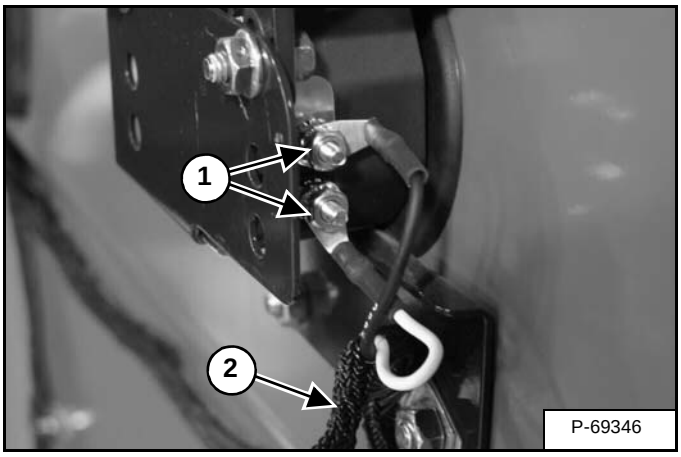
Inspect for damaged or missing back-up alarm decal (Item 1) **[Figure 60-210-1]**. Replace if required.

Sit in the seat and fasten the seat belt. Engage the parking brake. Pull the seat bar all the way down. Start the engine. Press the PRESS TO OPERATE LOADER button. Disengage the parking brake.

Move both steering levers or joystick(s) into the reverse position. The back-up alarm must sound when all wheels or both tracks are moving in reverse.

The back-up alarm is located on the inside of the rear door.

Figure 60-210-2



Inspect the back-up alarm electrical connections (Item 1) **[Figure 60-210-2]**, wire harness (Item 2) **[Figure 60-210-2]** and back-up alarm switches (if equipped) (Item 2) **[Figure 60-210-3]** for tightness and damage. Repair or replace any damaged components.

If the back-up alarm switches require adjustment, (See Adjusting Switch Position on Page 60-210-2.)

ENGINE INFORMATION

Description

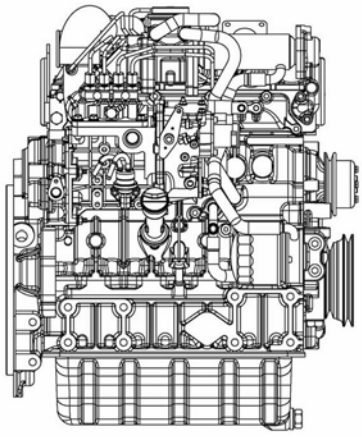
The S205 has a Kubota direct injected V2607-DI-T turbo diesel engine with a displacement of 158.7 cu.in. (2,6 L). The engine is rated at an SAE Net 61 HP (45,5 kW) and has a closed crankcase ventilation system **[Figure 70-10-1]**.

The engine has 4 cylinders and the rotation is counter-clockwise (viewed from the flywheel side). It is equipped with glow plugs for assisting in cold starts. Engine block heaters are also available from Bobcat Parts. To meet emission regulations it is also equipped with an Exhaust Gas Recirculation (EGR) system to reduce Nitrogen Oxide (NOx).

The engine serial number is stamped on the engine and is located near the injection pump. The model number is located on the valve cover. Use these numbers to obtain the correct service parts.

The engine is liquid cooled with a propylene glycol/water mixture in a radiator. Coolant flow is controlled by a thermostat. The cooling fan is driven by a hydraulic motor. The speed of the fan is determined by the engine coolant temperature sensor and the hydraulic/hydrostatic fluid temperature sensor.

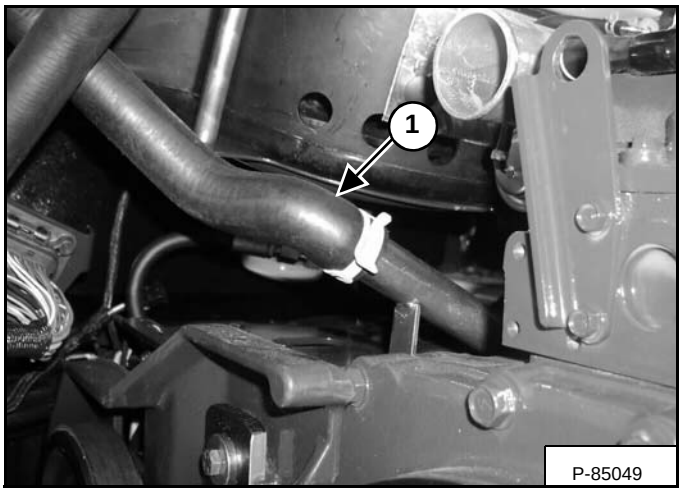
Figure 70-10-1



P-85028

Engine Removal And Installation (Cont'd)

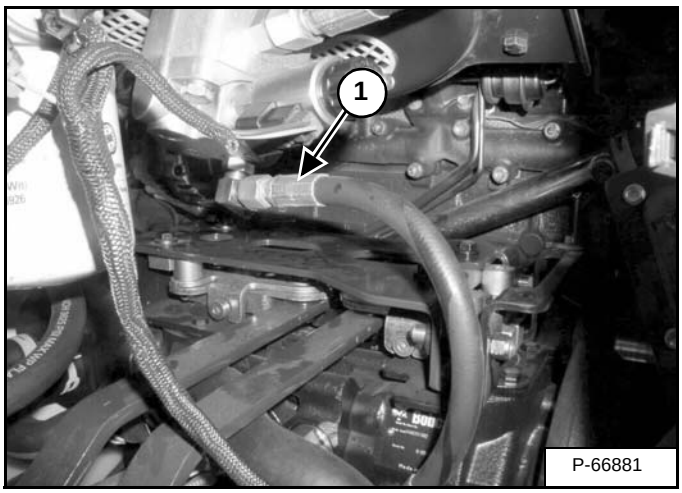
Figure 70-10-12



Disconnect engine coolant hose (Item 1) **[Figure 70-10-12]**.

Cap or plug all hoses and fittings.

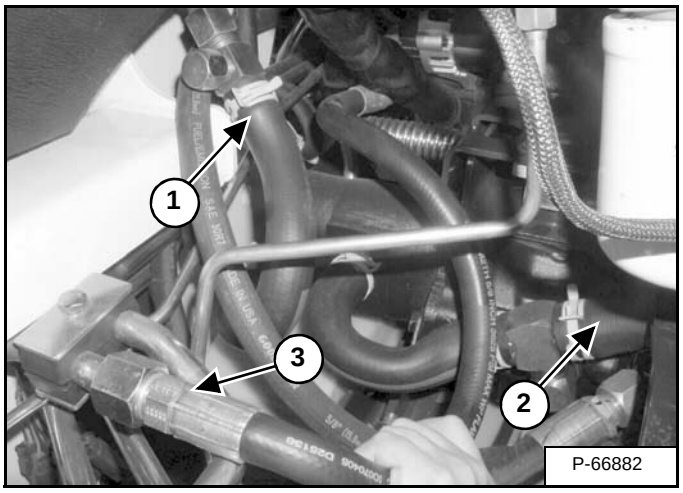
Figure 70-10-13



Disconnect drain hose (Item 1) **[Figure 70-10-13]** from the hydraulic cooling fan.

Cap or plug all hoses and fittings.

Figure 70-10-14



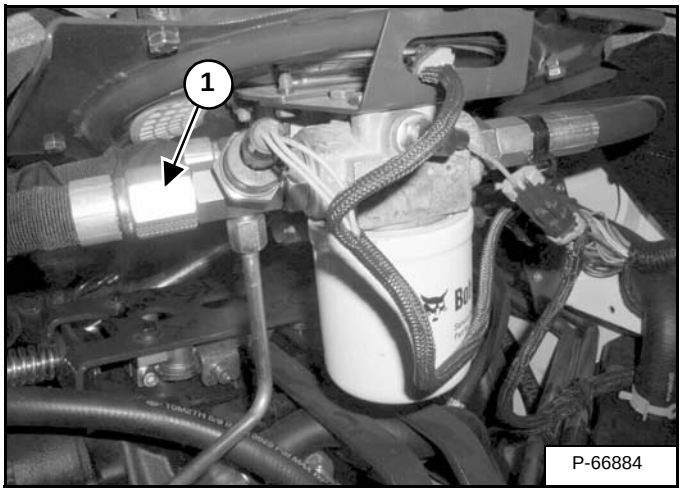
Disconnect gear pump inlet hose (Item 1) **[Figure 70-10-14]**.

Disconnect supply hose (Item 2) **[Figure 70-10-14]** from hydraulic fluid reservoir.

Disconnect gear pump outlet hose (Item 3) **[Figure 70-10-14]**.

Cap or plug all hoses and fittings.

Figure 70-10-15

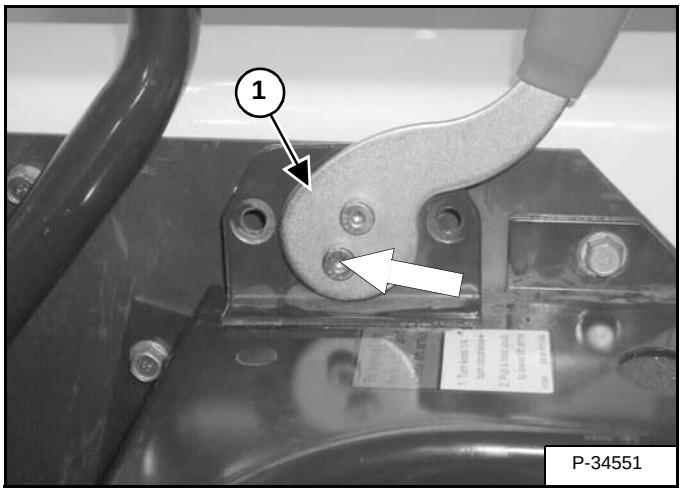


Mark and disconnect the charge pump/fan filter outlet hose (Item 1) **[Figure 70-10-15]**.

Cap or plug all hoses and fittings.

Removal And Installation (Cont'd)

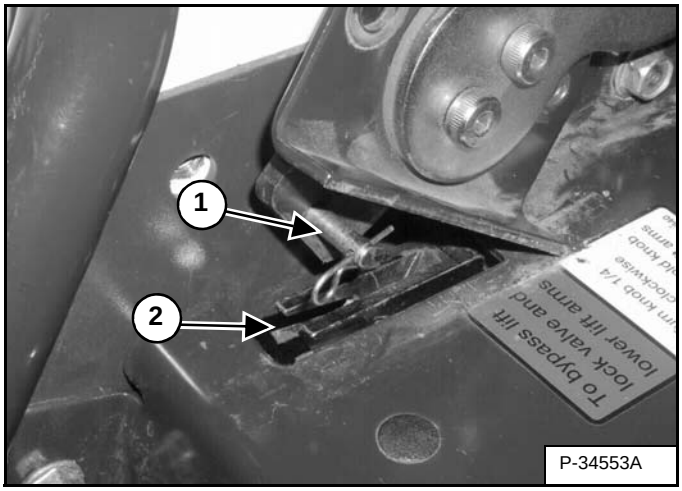
Figure 70-21-8



At the bottom side of the control panel, move the speed control linkage toward the rear of the loader.

Slide the hand speed control lever (Item 1) **[Figure 70-21-8]** forward and lift, and disconnect the assembly from the speed control cable.

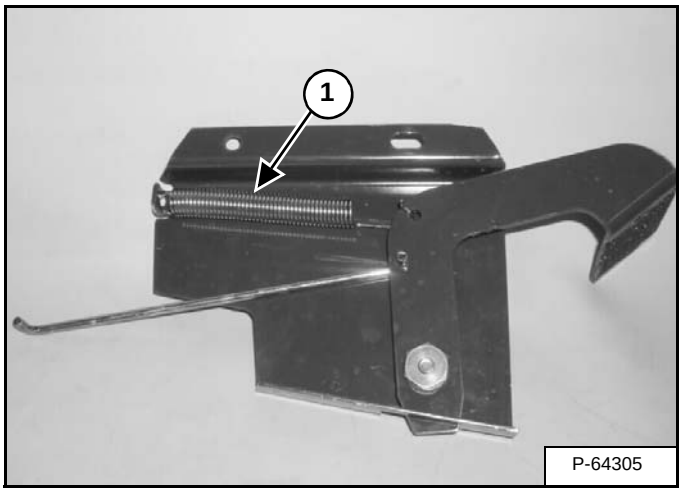
Figure 70-21-9



Installation: When installing the hand speed control to the speed control cable, be sure the speed control lever (Item 1) fits in the notch (Item 2) **[Figure 70-21-9]** of the speed control rod clevis.

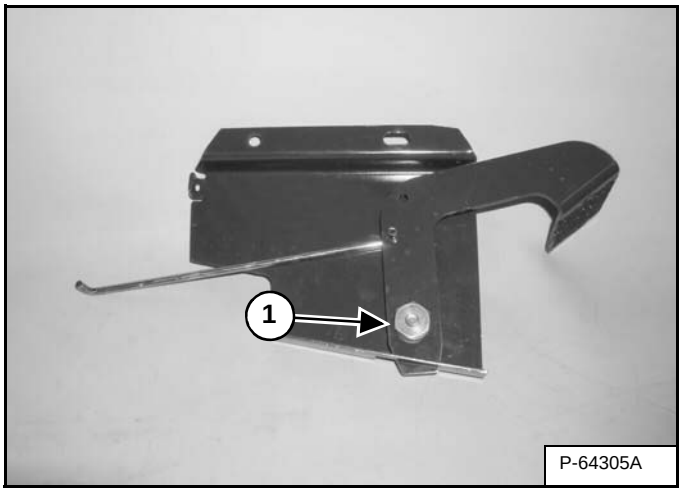
Disassembly And Assembly

Figure 70-21-10



Remove the spring (Item 1) **[Figure 70-21-10]** from the foot speed control assembly.

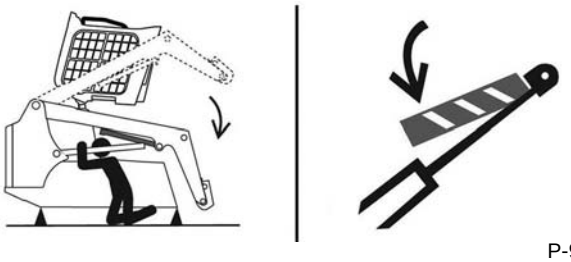
Figure 70-21-11



Remove the bushing/nut (Item 1) **[Figure 70-21-11]** from the pedal lever.

Blower Housing Removal And Installation (S/N A3LJ29999 & Below And A3LK29999 & Below)

⚠ 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.

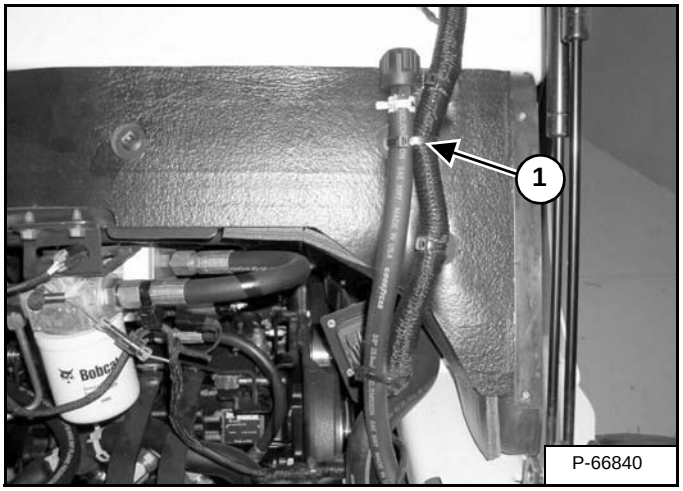
I-2003-0888

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 10-30-1.)

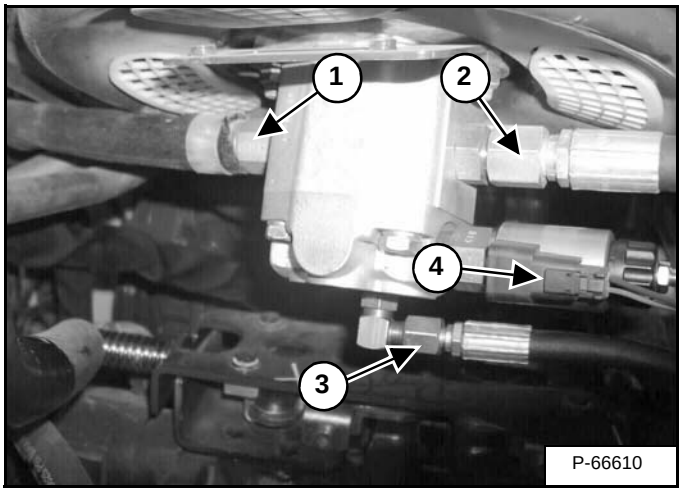
Remove the fan motor/charge pump filter housing. (See Charge Filter Housing Removal And Installation on Page 20-80-3.)

Figure 70-50-10



Remove cable ties (Item 1) **[Figure 70-50-10]** attached to blower housing.

Figure 70-50-11



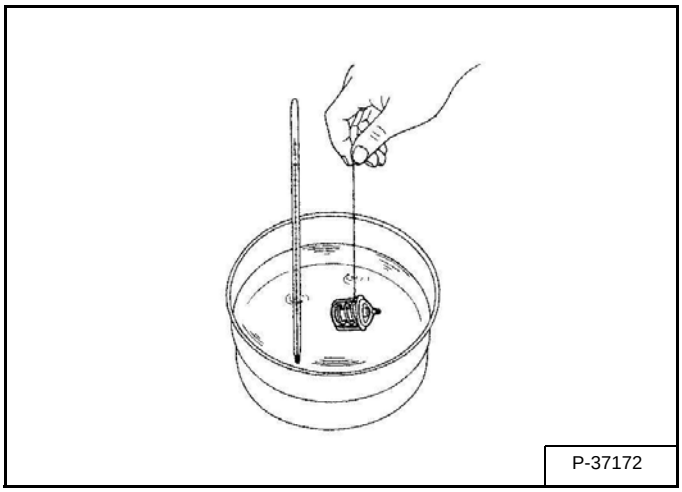
Remove the fan motor inlet hose (Item 1) and outlet hose (Item 2) **[Figure 70-50-11]**.

Remove the fan case drain hose (Item 3) **[Figure 70-50-11]**.

Disconnect the electrical connector (Item 4) **[Figure 70-50-11]**.

Thermostat - Checking

Figure 70-50-35



Push down the thermostat valve and insert a string between the valve and the valve seat.

Place the thermostat and a thermometer in a container with water and gradually heat the water **[Figure 70-50-35]**.

Hold the string to suspend the thermostat in the water. When the water temperature rises, the thermostat valve will open, allowing it to fall down from the string.

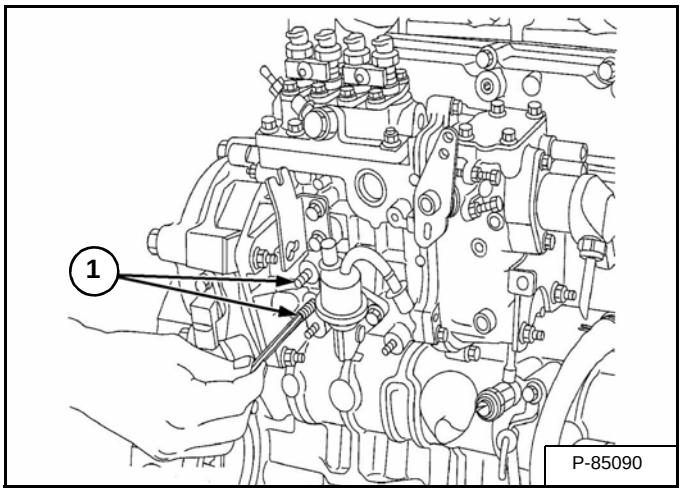
Continue heating the water and read the temperature when the valve has risen by about 0.315 in. (8 mm).

If the measurement is not acceptable, replace the thermostat.

Thermostat's valve opening temperature	Factory spec.	80° - 84° C 176° - 183° F
Temperature at which thermostat completely opens	Factory spec.	95° C 203° F

Fuel Injection Pump Assembly Removal And Installation (Cont'd)

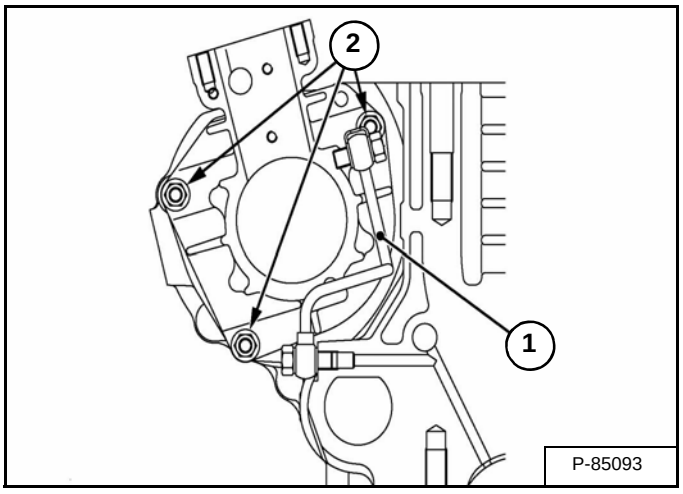
Figure 70-70-13



Install one lock tool in the upper plug opening (Item 1) and tighten until it comes in contact with the fuel camshaft. Make sure the fuel camshaft is not moving. Install second lock tool in lower opening (Item 1) **[Figure 70-70-13]** and repeat the process.

NOTE: Do not over tighten the lock screws after they have contacted the fuel camshaft. Otherwise the injection pump may become damaged.

Figure 70-70-14



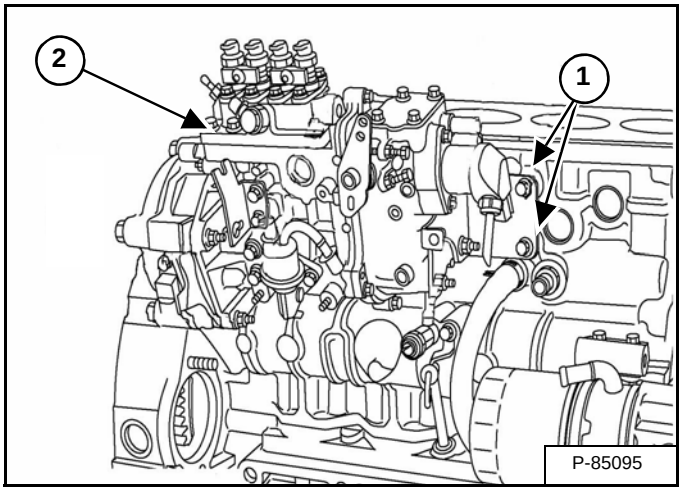
Remove the lubricating oil pipe (Item 1) **[Figure 70-70-14]**.

Remove the three injection pump mounting nuts (Item 2) **[Figure 70-70-14]**

Installation: Tighten the lubricating oil pipe to 12 - 14 ft.-lb. (16 - 19 N•m) torque.

Installation: Tighten the injection pump mounting nuts to 13 - 15 ft.-lb. (18 - 20 N•m) torque.

Figure 70-70-15



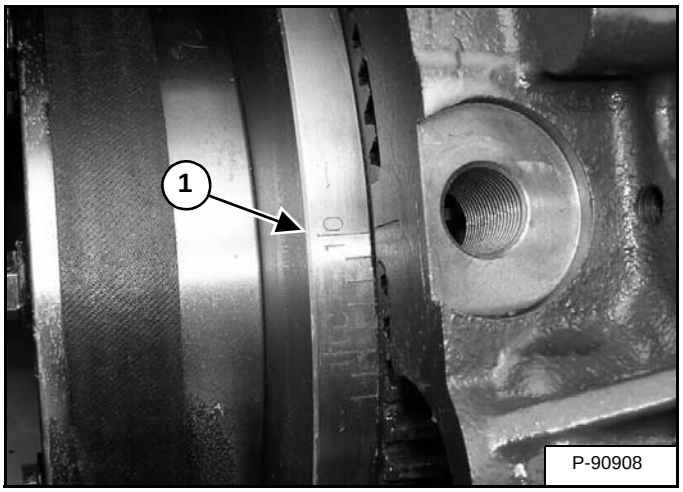
Remove injection pump support (Item 1) **[Figure 70-70-15]**.

Remove injection pump assembly (Item 2) **[Figure 70-70-15]**.

Installation: Reverse procedure to install.

Injection Pump - Timing (Cont'd)

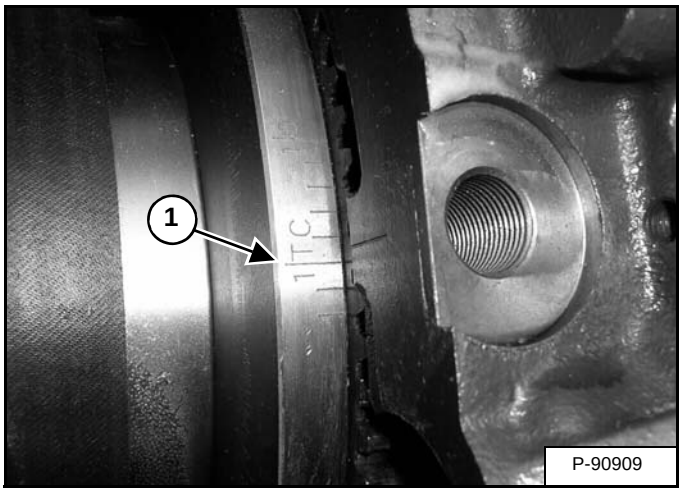
Figure 70-70-42



Next turn the flywheel counterclockwise to 10 degrees (0,17 rad) before top dead center (Item 1) **[Figure 70-70-42]**.

Then slowly turn the flywheel counterclockwise and stop turning when the fuel just begins to come up the holder (Item 2) **[Figure 70-70-41]** to get the present injection timing.

Figure 70-70-43



Check the degree marks on the flywheel. The flywheel has a 1TC mark (Item 1) **[Figure 70-70-43]** that indicates top dead center for cylinder number one. Each mark on the flywheel is 2 degrees.

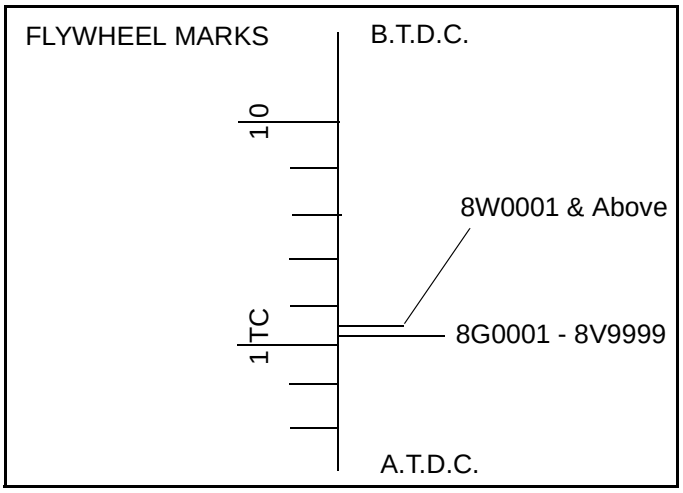
NOTE: If the injection pump timing is not within the specification, then rotate the injection pump assembly upwards to advance, or downwards to retard the injection pump timing. Rotating the pump 0.025 inch (0,64 mm) is equal to approximately 1 degree.

The table below lists the fuel timing specification, based on the engine serial number.

KUBOTA V2607T	RANGE	SETTING
ENGINE S/N 8W0001 & Above	1.00° B.T.D.C. TO 0.50° A.T.D.C	1.00° B.T.D.C.
ENGINE S/N 8G0001 - 8V9999	0.50° B.T.D.C. TO 1.00° A.T.D.C.	0.50° B.T.D.C.

NOTE: Set the timing to the advanced end of the specification range [Figure 70-70-44]. An engine timed after top dead center will exhibit long cranking times on initial startup in cold temperatures.

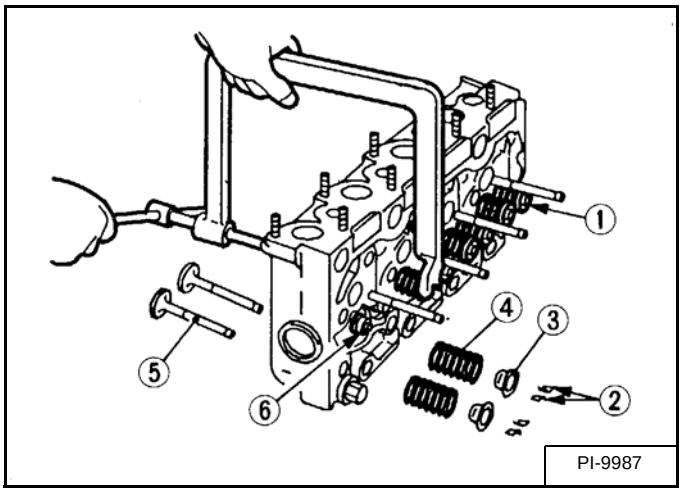
Figure 70-70-44



When timing is correct tighten the three injection pump mounting bolts to 14 ft. - lb. (19 N•m) torque.

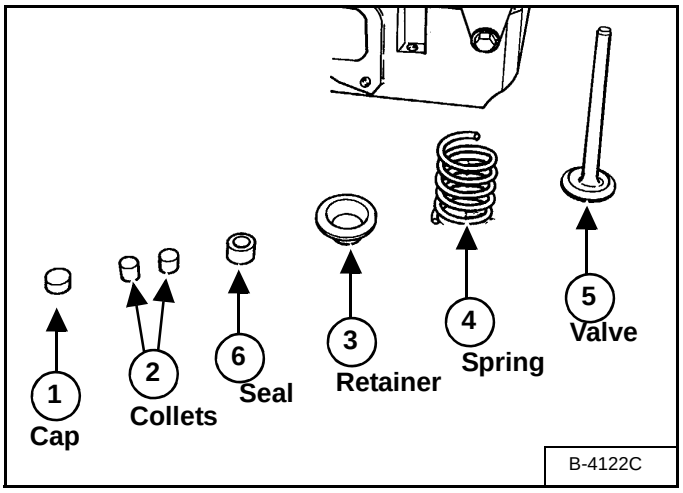
Cylinder Head Disassembly And Assembly

Figure 70-80-23



Use a valve spring compressor to compress the valve spring **[Figure 70-80-23]**.

Figure 70-80-24



Remove the valve cap (Item 1) and valve spring collet (Item 2) **[Figure 70-80-23]** & **[Figure 70-80-24]**.

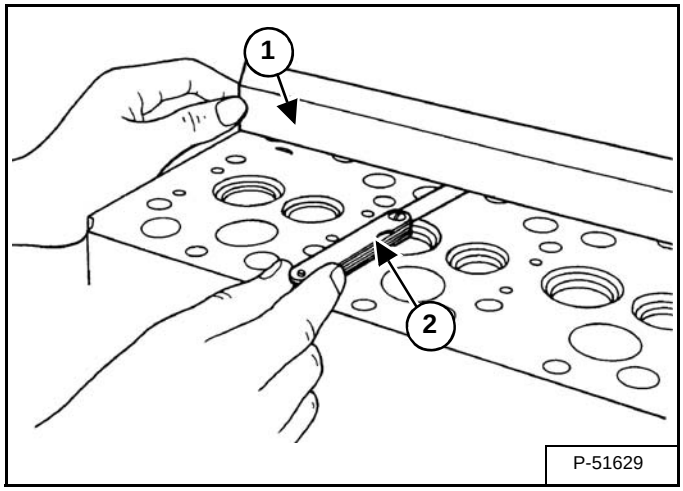
Remove the valve spring retainer (Item 3) and the spring (Item 4) **[Figure 70-80-23]** & **[Figure 70-80-24]**.

Remove the seal (Item 6) and the valve (Item 5) **[Figure 70-80-23]** & **[Figure 70-80-24]**.

Cylinder Head - Servicing

Clean the surface of the cylinder head.

Figure 70-80-25

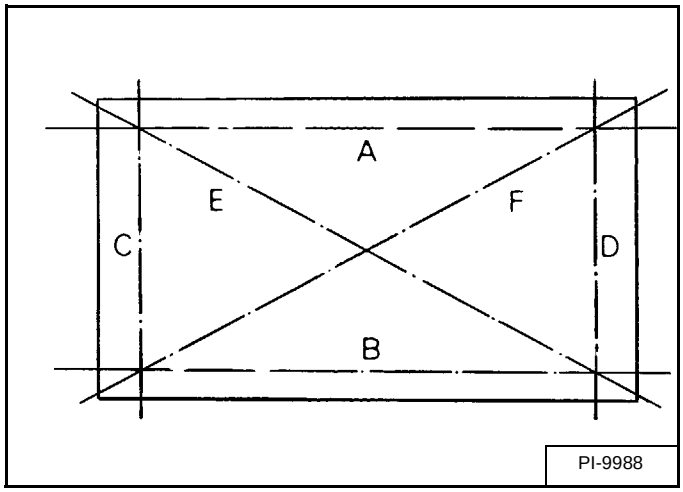


Put a straight edge (Item 1) **[Figure 70-80-25]** on the cylinder head.

NOTE: Do not put the straight edge across combustion chambers.

Put a feeler gauge (Item 2) **[Figure 70-80-25]** between the straight edge and the surface of the cylinder head.

Figure 70-80-26



Put the straight edge on the cylinder head's four sides and two diagonal as shown in figure **[Figure 70-80-26]**.

The maximum distortion of the head surface is ± 0.002 inch (± 0,05 mm). If the measurement exceeds the specification, replace the cylinder head.

CRANKSHAFT AND PISTONS

Piston And Connecting Rod Removal And Installation

Remove the cylinder head. (See Cylinder Head Removal And Installation on Page 70-80-4.)

Remove the top edge from the cylinder bore with a ridge reamer.

Remove the oil pan and oil pump strainer. (See Oil Pan Removal And Installation on Page 70-60-1.)

Figure 70-90-1

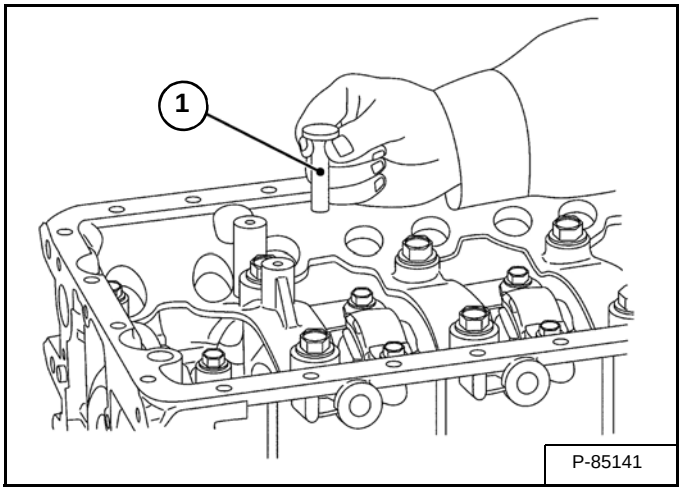
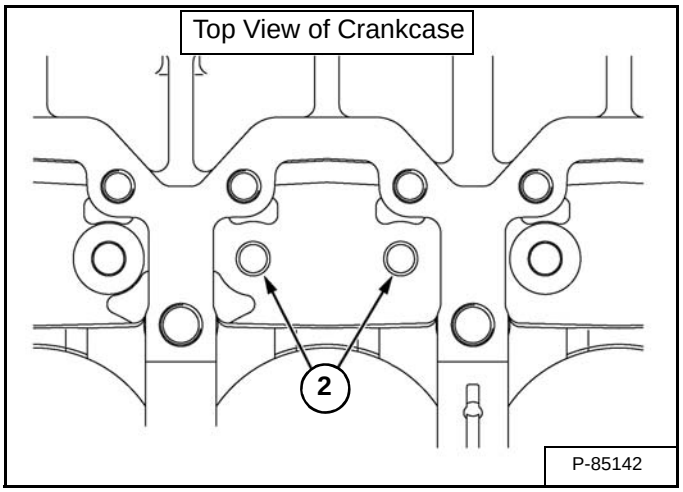


Figure 70-90-2

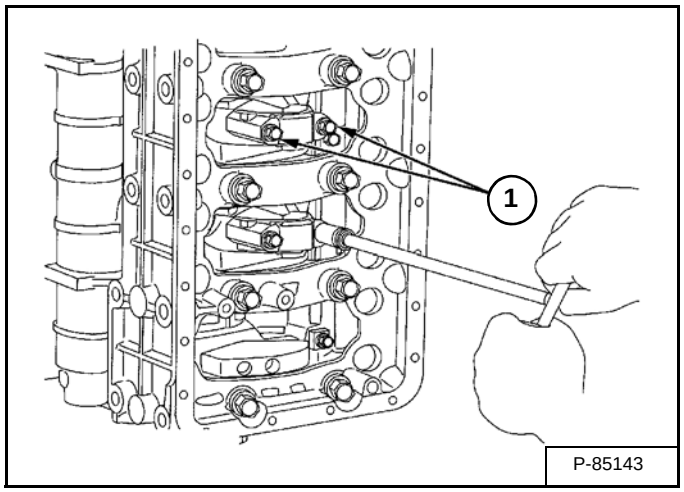


Remove the tappet (Item 1) **[Figure 70-90-1]** from the tappet bore (Item 2) **[Figure 70-90-2]** using a magnetic tool.

Installation: Apply engine oil to the tappet during installation.

NOTE: Mark the location of the tappets to prevent them from becoming interchanged.

Figure 70-90-3



Remove the connecting rod bolts (Item 1) **[Figure 70-90-3]**.

NOTE: Mark the location of the rod bearings to prevent them from becoming interchanged.

Installation: Tighten the connecting rod bolts to 33 - 36 ft.-lb. (44 - 49 N•m) torque.

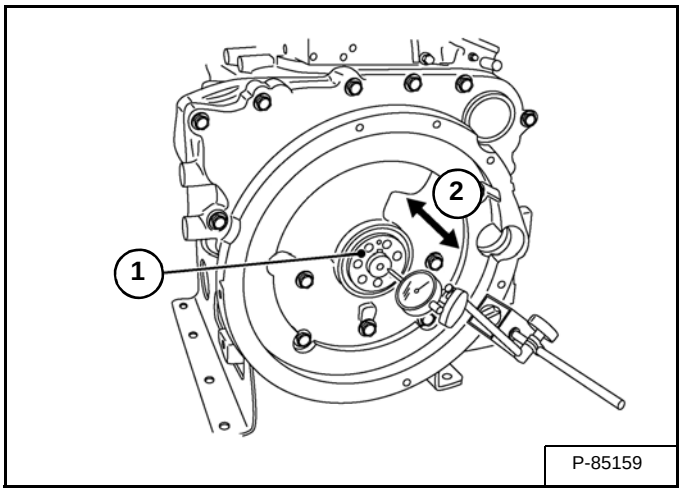
Installation: Apply engine oil to the connecting rod bolts and lightly screw in by hand.

Installation: Install the rod bearing with the centrally lined groove towards the connecting rod, and the non grooved side towards the cap.

Installation: Make sure the marks on the connecting rod and bearing are aligned and facing the injection pump when installing the bearing cap.

Crankshaft And Bearings - Servicing

Figure 70-90-28



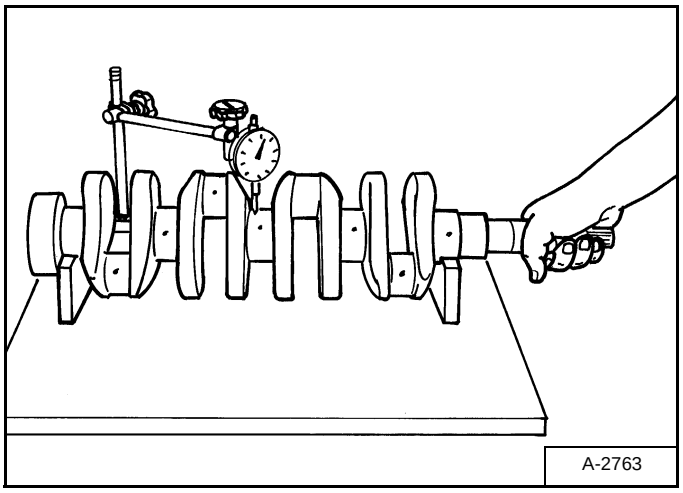
Set a dial indicator with its tip on the end of the crankshaft (Item 1) **[Figure 70-90-28]**.

Measure the side clearance by moving the crankshaft side to side (Item 2) **[Figure 70-90-28]**.

If the misalignment exceeds the allowable limit, replace the crankshaft.

Side clearance of crankshaft	Factory Spec.	0.0059 - 0.013 in. (0,15 - 0,35 mm)
	Allowable limit	0.020 in. (0,50 mm)

Figure 70-90-29



Put the crankshaft on V-blocks. Install a dial indicator on the center journal **[Figure 70-90-28]**.

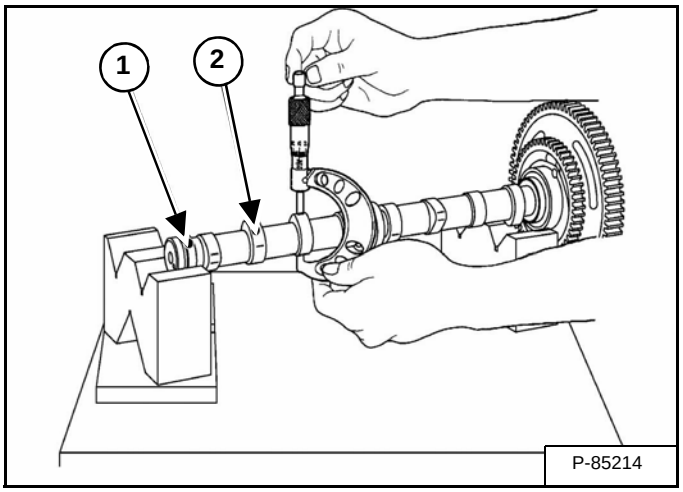
Turn the crankshaft at a slow rate to obtain the misalignment (one half of the alignment measurement).

If the misalignment exceeds the allowable limit, replace the crankshaft.

Alignment	0.0008 in. (0,02 mm)

Camshaft - Servicing (Cont'd)

Figure 70-100-14

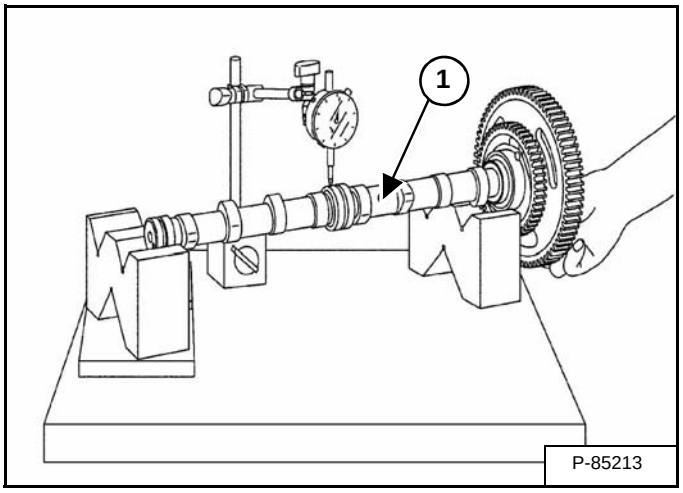


Measure the cam lobes at their highest point (Item 2) **[Figure 70-100-14]**.

If the measurement is less than the allowable limit, replace the camshaft (Item 1) **[Figure 70-100-14]**.

Cam Lobe Height Intake	1.282 in. (32,56 mm)
Cam Lobe Height Exhaust	1.299 in. (33,00 mm)
Allowable Limit Intake	1.264 in. (32,10 mm)
Allowable Limit Exhaust	1.280 in. (32,50 mm)

Figure 70-100-15



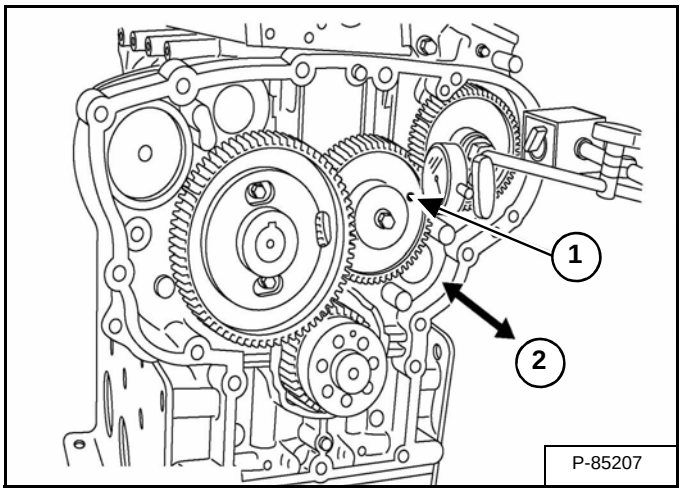
Put the camshaft (Item 1) in V-blocks. Install a dial indicator **[Figure 70-100-15]**.

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

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

Idler Gear And Shaft - Servicing

Figure 70-100-16



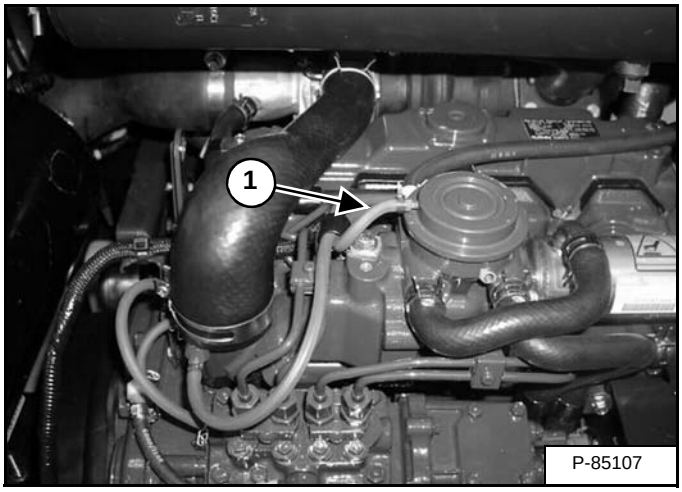
Mount a dial indicator and check idle gear (Item 1) end play (Item 2) **[Figure 70-100-16]**.

Installation: Check the idler gear end play. If the clearance exceeds the allowable limit, replace the gear collar.

Idler Gear End Play	0.0020 - 0.0078 in. (0,050 - 0,020 mm)
Allowable Limit	0.035 in. (0,90 mm)

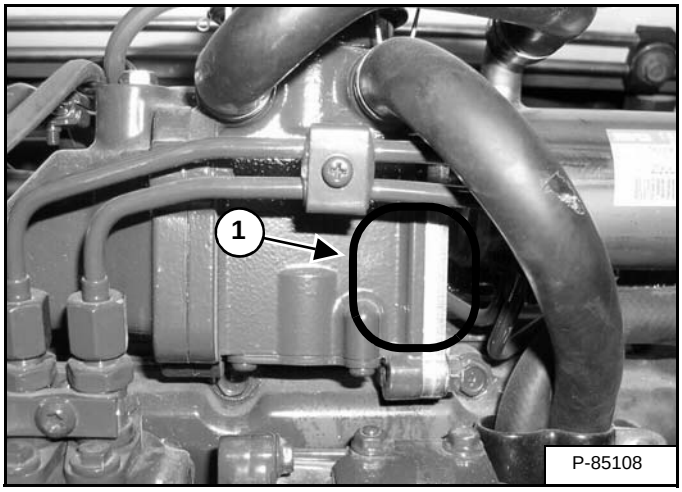
Testing (Cont'd)

Figure 70-130-3



Disconnect the boost hose (Item 1) **[Figure 70-130-3]** from the EGR valve.

Figure 70-130-4



Measure the surface temperature of the EGR system (Item 1) **[Figure 70-130-4]** with an Infrared Thermometer.

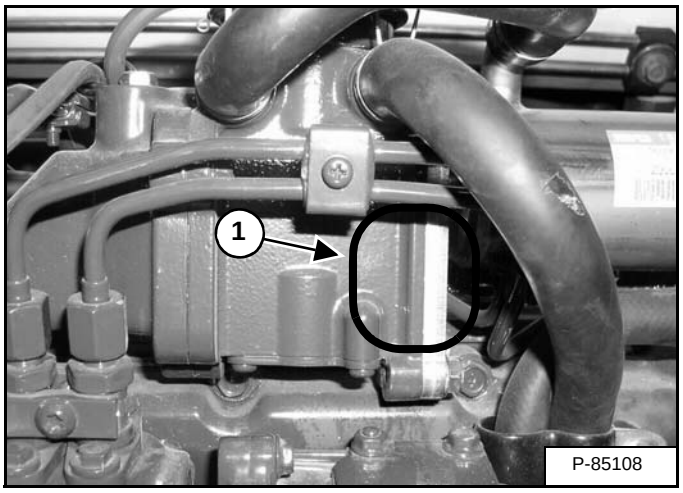
If the surface temperature of the EGR system declines, the thermo valve has failed.

If the surface temperature of the EGR system stays above 212° F (100° C), the EGR valve has failed.

Hot Engine Coolant Temperature Test

Verify the engine temperature is above 158° F (70° C), if the engine temperature is below 158° F (70° C) run the engine to bring the temperature above 158° F (70° C) then continue with the Hot Engine Coolant Temperature Test.

Figure 70-130-5

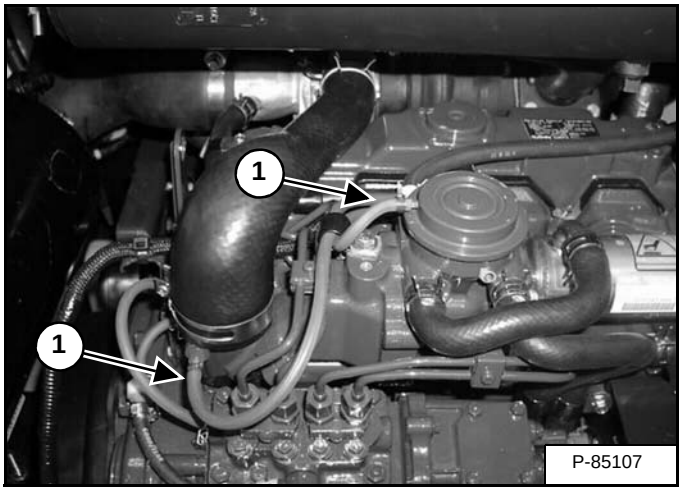


Measure the surface temperature of the EGR system (Item 1) **[Figure 70-130-5]** with an Infrared Thermometer.

With the engine coolant temperature above 158° F (70° C) and the surface temperature of the EGR system 212° F (100° C) or above, the EGR system is OK.

If the surface temperature of the EGR system is 122° F (50° C) or below continue this Hot Engine Coolant Temperature Test.

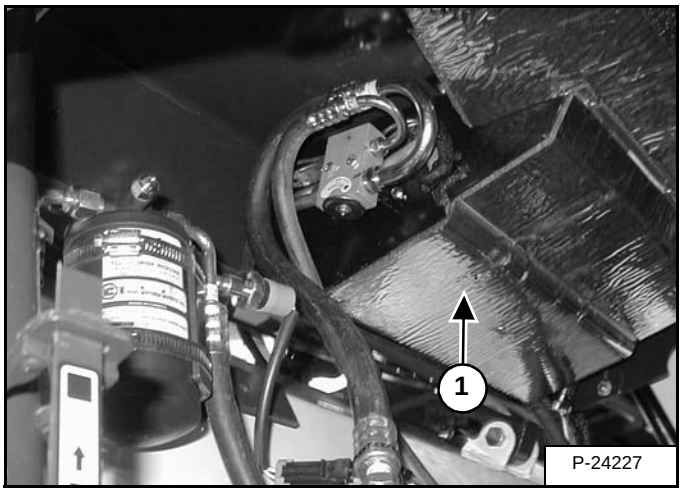
Figure 70-130-6



Disconnect the two hoses (Item 1) **[Figure 70-130-6]**.

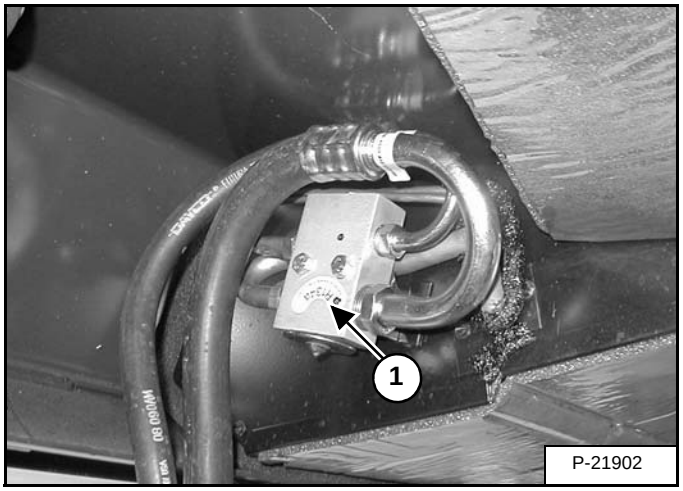
Components (Cont'd)

Figure 80-10-5



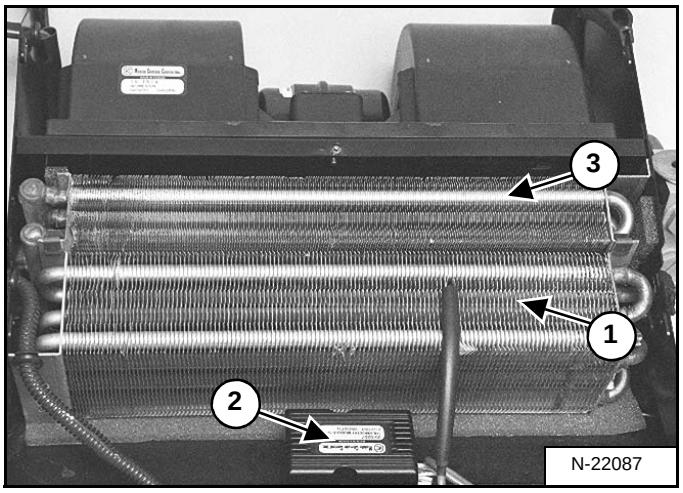
Heater/Evaporator Unit: The heater/evaporator unit (Item 1) **[Figure 80-10-5]** is located behind the loader cab. The unit delivers the cold air for the A/C and warm air for heat into the cab. The unit contains the blower, heat & A/C coils, thermostat and expansion valve.

Figure 80-10-6



Expansion Valve: The expansion valve (Item 1) **[Figure 80-10-6]** controls the amount of refrigerant entering the evaporator coil.

Figure 80-10-7

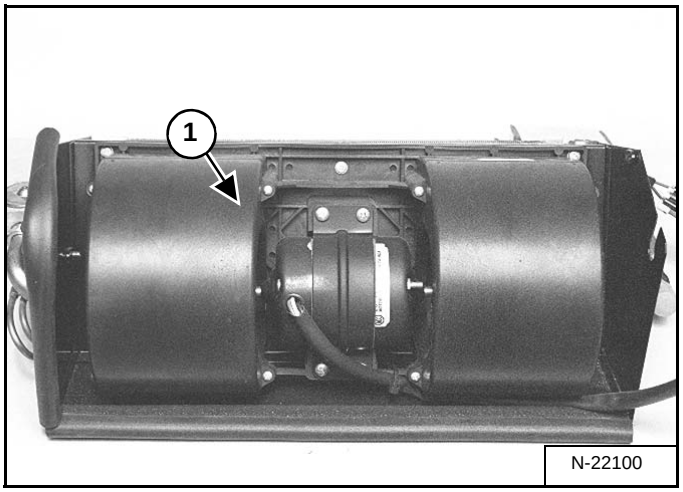


Evaporator Coil: The evaporator coil (Item 1) **[Figure 80-10-7]** cools and dehumidifies the air before it enters the cab.

Thermostat: The thermostat (Item 2) **[Figure 80-10-7]** controls the temperature of the evaporator coil.

Heater Coil: The heater coil (Item 3) **[Figure 80-10-7]** supplies the warm air into the cab by passing air through the coil.

Figure 80-10-8



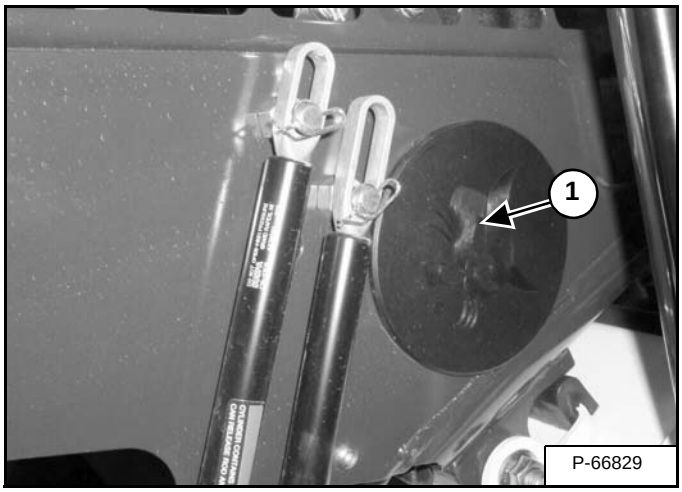
Heater/Evaporator Blower: The blower (Item 1) **[Figure 80-10-8]** is used to push air through the heater and evaporator coils and into the cab.

Gauge Pressure Related Troubleshooting (Cont'd)

Possible Cause	Inspection	Solution
System pressures equal		
1. Clutch not operating.	See magnetic clutch related topics above.	
2. Compressor not pumping.	Equal high and low pressures.	Replace compressor.

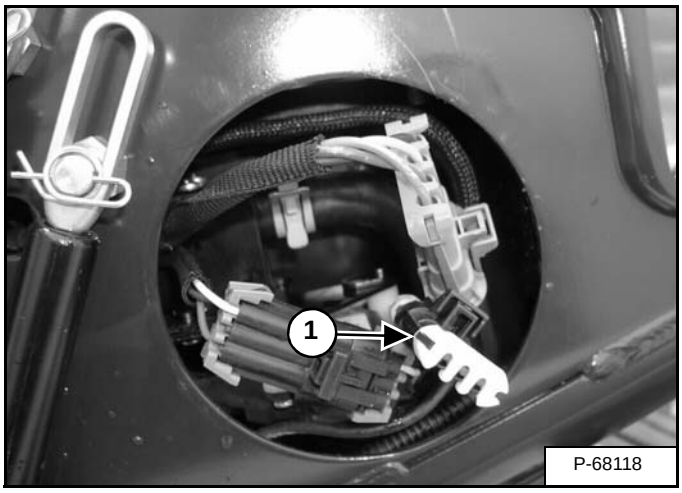
Electrical System (Cont'd)

Figure 80-30-12



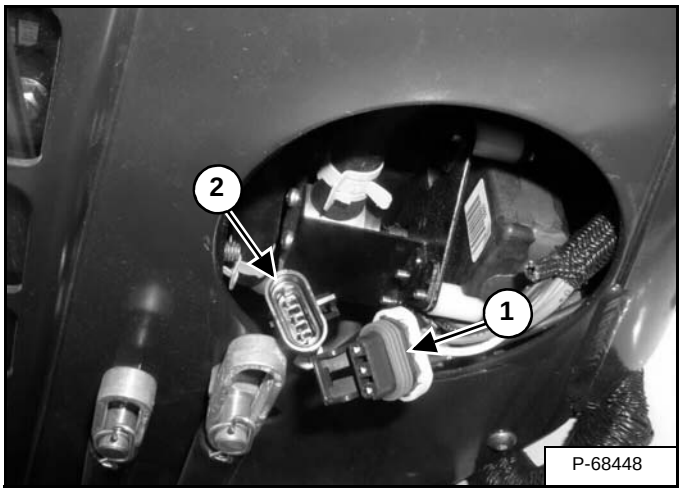
Remove the access cover (Item 1) **[Figure 80-30-12]** from the loader.

Figure 80-30-13



Disconnect the thermostat wiring connector (Item 1) **[Figure 80-30-13]** from the loader wiring harness.

Figure 80-30-14



Check the loader harness (Item 1) **[Figure 80-30-14]** for voltage. The voltage should be 12 volts.

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

If there is voltage at the wiring harness, check the thermostat (Item 2) **[Figure 80-30-14]** for resistance.

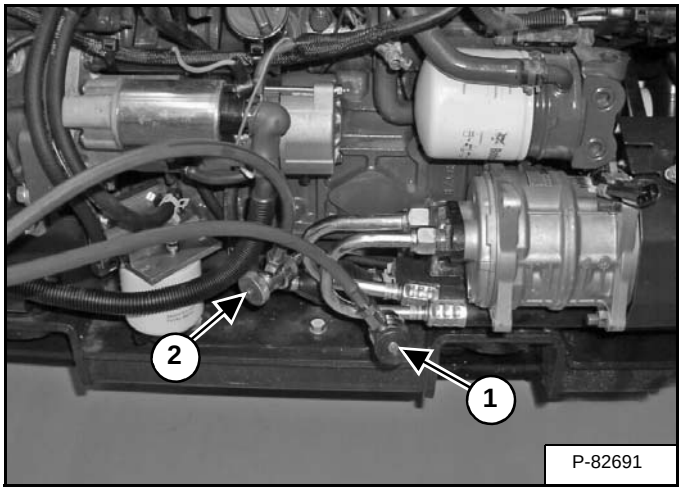
The resistance value of the thermostat should be 10 ohm at 68° F (20° C).

If there is no resistance value, replace the thermostat. (See Removal And Installation on Page 80-90-2.)

If there is a resistance value, check the blower fan.

Reclamation And Charging With Recovery / Charging Unit (Cont'd)

Figure 80-40-6

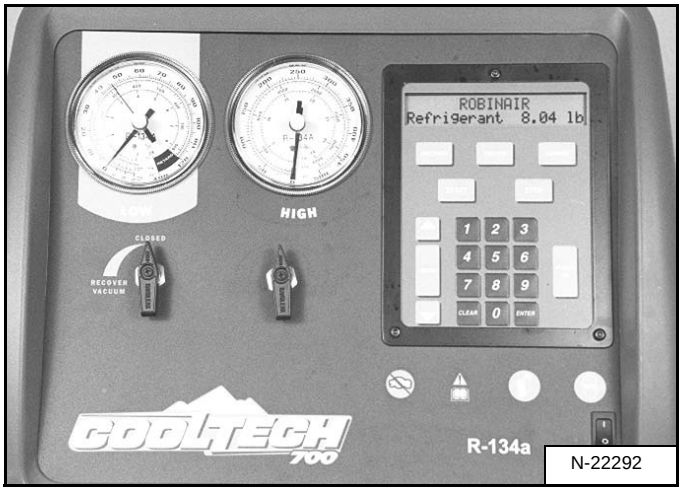


Connect the reclaimer to the loader A/C charge ports.

Connect the Red hose (Item 1) **[Figure 80-40-6]** to the high pressure port and open the valve.

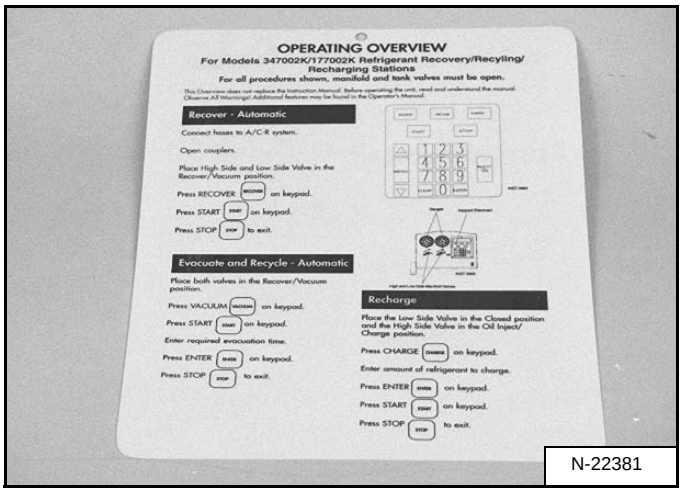
Connect the Blue hose (Item 2) **[Figure 80-40-6]** to the low pressure port and open the valve.

Figure 80-40-7



Turn the reclaimer unit **[Figure 80-40-7]** to the ON position and follow the on screen instructions.

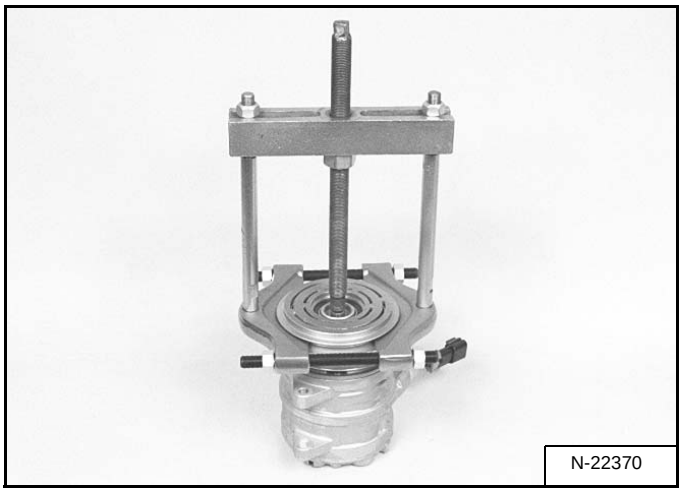
Figure 80-40-8



NOTE: The reclaimer unit, has a complete step by step set of instructions [Figure 80-40-8] to follow for reclamation and recharging of the A/C system. A trained technician should follow these instructions as they may very slightly depending on the model and brand of reclaimer used.

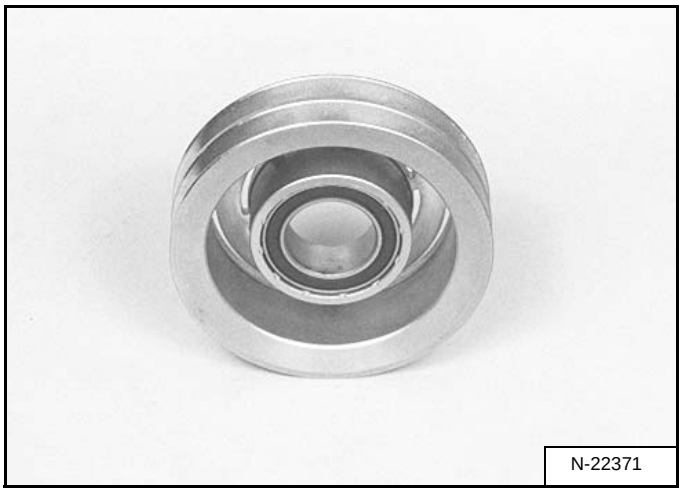
Clutch Disassembly And Assembly (Cont'd)

Figure 80-50-17



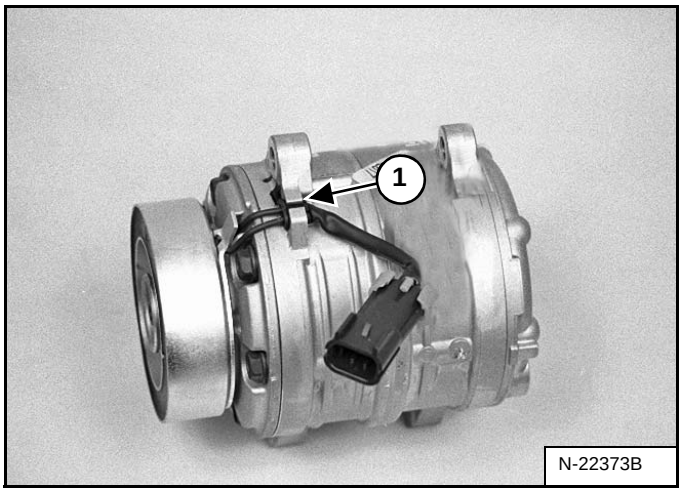
Remove the pulley from the compressor **[Figure 80-50-17]**.

Figure 80-50-18



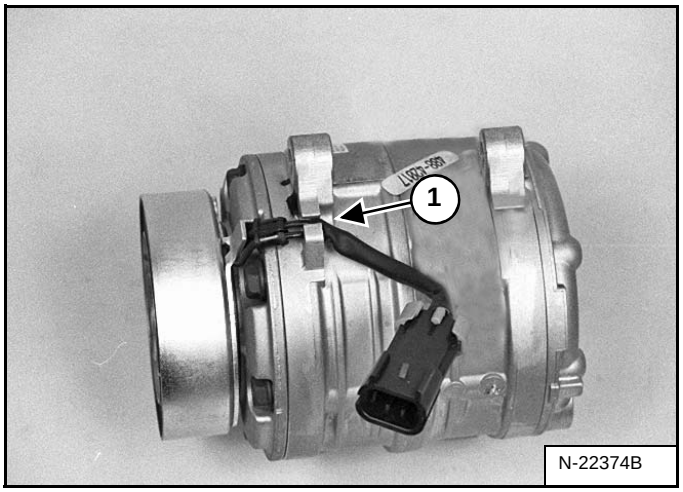
The pulley assembly and bearing **[Figure 80-50-18]** must be replaced as a complete unit.

Figure 80-50-19



Slide the wire grommet (Item 1) **[Figure 80-50-19]** from the wire holder.

Figure 80-50-20



Remove the coil lead wire (Item 1) **[Figure 80-50-20]** from the wire holder on the compressor.

THERMOSTAT

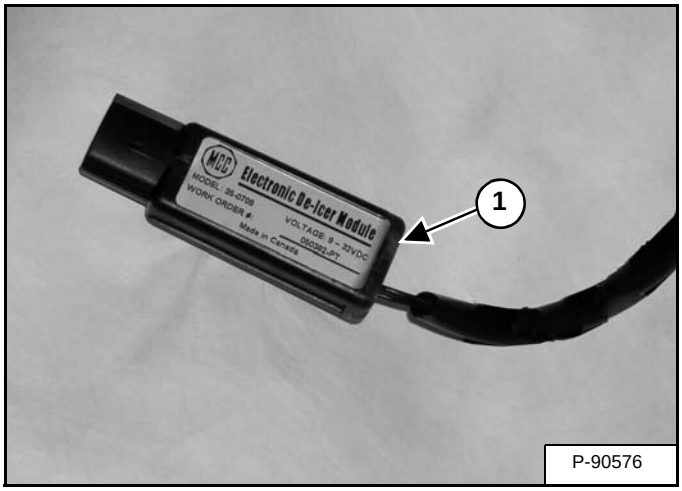
Description

The Electronic De-icing Thermostat (EDT) is a micro controller based module that measures evaporator coil temperature and cycles the compressor clutch to maintain a constant evaporator pressure. Onboard circuit protection and diagnostics are also built into the module.

NOTE: The EDT has a six second delay before start up to protect the compressor clutch.

The EDT will turn the clutch on when the evaporator coil temperature is above 35.6° F (2° C). If the EDT does not detect any malfunction, it will continue to operate and the status LED will be lit continuously. When the evaporator temperature is below 28.4° F (-2° C), the EDT will turn off the clutch and status LED.

Figure 80-90-1



When the EDT detects an open or short from the temperature sensor, the status LED (Item 1) **[Figure 80-90-1]** will blink once per second and the output signal to the clutch will be turned off. The status LED will flash two times per second when EDT detects an open circuit (current draw less than 200 mA), short circuit or over current (current draw greater than 7A) from the clutch output. The status LED will flash three times per second when the compressor clutch is shorted to ground.

NOTE: The EDT will attempt to restart every 20 seconds until the fault is repaired.

The EDT has the following protection built in:

1. Over temperature
2. Over current from clutch output
3. Voltage (Above and below operational limits or reverse voltage)
4. Short circuit protection (Output shorted to ground)
5. Temperature sensor open and short detection

MALFUNCTION	DETECTION INTERVAL	STATUS LED
Temperature sensor	Continuous	1x per second
Temperature sensor open and short detection	At A/C start up	2x per second
Compressor clutch short to battery	Continuous	3x per second

BLOWER FAN

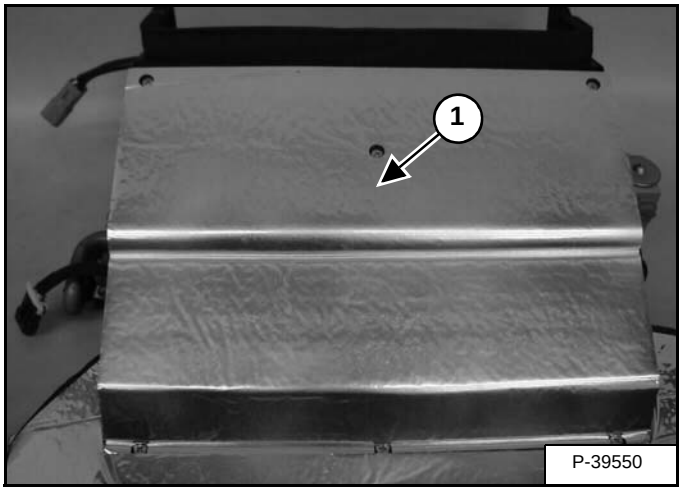
Removal And Installation

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 10-30-1.)

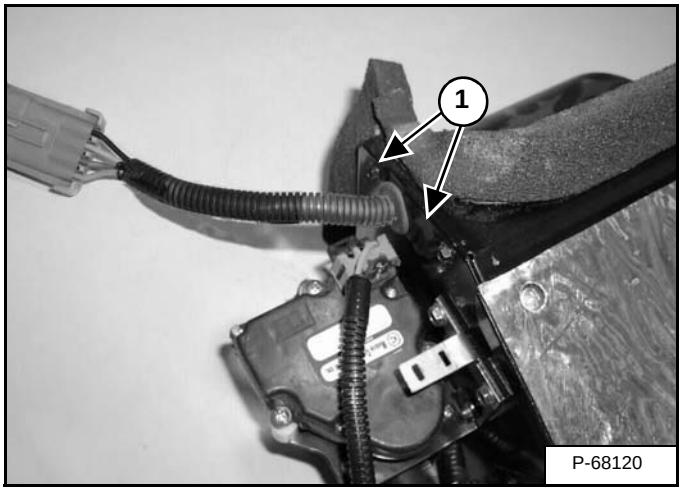
NOTE: The blower fan assembly can be removed from the evaporator/heater unit without disconnecting the heater or A/C plumbing. The unit is remove here for photo clarity.

Figure 80-130-1



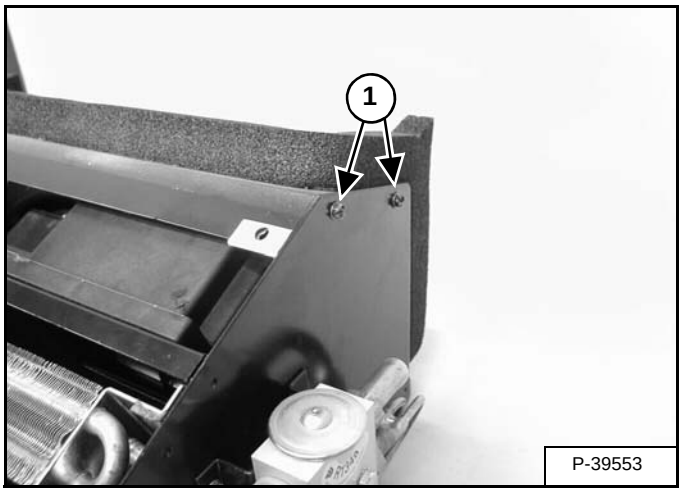
Remove the cover (Item 1) **[Figure 80-130-1]** from the evaporator/heater unit.

Figure 80-130-2



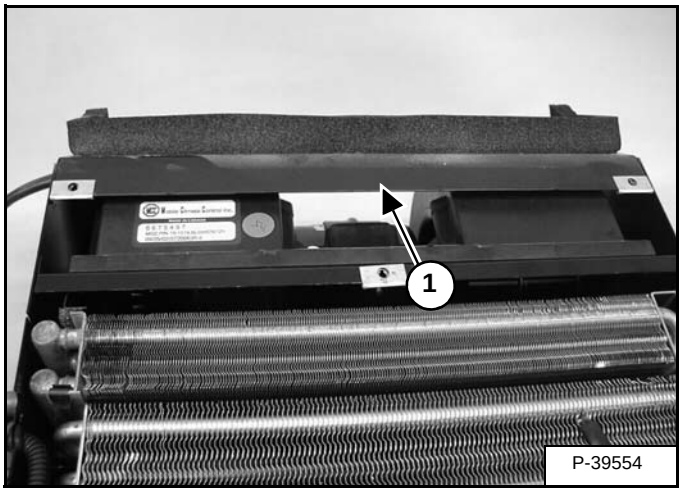
Remove the two flange mount bolts (Item 1) **[Figure 80-130-2]** from the evaporator/heater unit.

Figure 80-130-3



Remove the two flange mount bolts (Item 1) **[Figure 80-130-3]** from the evaporator/heater unit.

Figure 80-130-4



Remove the flange and attached foam (Item 1) **[Figure 80-130-4]** from the unit.

Controls

Vehicle Steering	Direction and speed controlled by two hand operated steering levers *or* optional joystick(s).
Loader Hydraulics - Lift and Tilt	Controlled by separate foot pedals or optional Advanced Control System (ACS) or optional Selectable Joystick Control (SJC)
- Front Auxiliary	Controlled by electrical switch on Right Hand steering lever or optional Right Hand Selectable Joystick Control (SJC)
- Rear Auxiliary (Option)	Controlled by electrical switch on Left Hand steering lever or optional Left Hand Selectable Joystick Control (SJC)
Auxiliary Pressure Release	Pressure relieved through front quick couplers. Push couplers in, hold for 5 seconds.
Engine	Hand lever speed control; key-type start switch *or* optional Deluxe Instrumentation Panel and function error shutdown.
Service Brake	Two independent hydrostatic systems controlled by two hand operated steering levers *or* optional joystick(s).
Secondary Brake	One of the hydrostatic transmissions.
Parking Brake (Standard on Single Speed and Two-Speed Loaders)	Mechanical disc, manually operated switch on front instrument panel.

Hydraulic System

Pump Type	Engine driven gear type
Pump Capacity - Standard - High-Flow Option	16.9 GPM (64 L/min.) @ 2850 Engine RPM @ 91% efficiency 26.4 GPM (99,9 L/min.) @ 2850 Engine RPM @ 91% efficiency
System Relief at Quick Couplers	3250 - 3350 PSI (224 - 231 bar)
Filters	Full flow replaceable, 3-micron synthetic media element
Hydraulic Cylinders Bore Diameter: Lift Cylinder (2) Tilt Cylinder (2) Rod Diameter: Lift Cylinder (2) Tilt Cylinder (2) Stroke: Lift Cylinder (2) Tilt Cylinder (2)	Double-acting; tilt cylinders have cushioning feature on dump and rollback 2.50 in. (63,5 mm) 2.75 in. (69,9 mm) 1.50 in. (38,1 mm) 1.375 in. (34,9 mm) 23.67 in. (601,2 mm) 13.19 in. (335,0 mm)
Control Valve	3 spool, open center type with float detent on lift and electrically controlled auxiliary spool.
Fluid Type	BOBCAT FLUID, Hydraulic/Hydrostatic 6903117 - (2.5 Gal.) 6903118 - (5 Gal.) 6903119 - (55 Gal.)
Fluid Lines	SAE Standard tubelines, hoses and fittings
Hydraulic Function Time: Raise Lift Arms Lower Lift Arms Bucket Dump Bucket Rollback	 3.6 Seconds 2.4 Seconds 2.6 Seconds 2.0 Seconds

CONVERSIONS

Decimal And Millimeter Equivalent Chart

FRACTIONS	DECIMALS	MM
1/64	0.015625	0.397
1/32	0.03125	0.794
3/64	0.046875	1.191
1/16	0.0625	1.588
5/64	0.078125	1.984
3/32	0.09375	2.381
7/64	0.109375	2.778
1/8	0.1250	3.175
9/64	0.140625	3.572
5/32	0.15625	3.969
11/64	0.171875	4.366
3/16	0.1876	4.762
13/64	0.203125	5.159
7/32	0.21875	5.556
15/64	0.234375	5.953
1/4	0.2500	6.350
17/64	0.265625	6.747
9/32	0.28125	7.144
19/64	0.296875	7.541
5/16	0.3125	7.938
21/64	0.328125	8.334
11/32	0.34375	8.731
23/64	0.359375	9.128
3/8	0.3750	9.525
25/64	0.390625	9.922
13/32	0.40625	10.319
27/64	0.421875	10.716
7/16	0.4375	11.112
29/64	0.453125	11.509
15/32	0.46875	11.906
31/64	0.484375	12.303
1/2	0.5000	12.700

FRACTIONS	DECIMALS	MM
33/64	0.515625	13.097
17/32	0.53125	13.494
35/64	0.546875	13.891
9/16	0.5625	14.288
37/64	0.578125	14.684
19/32	0.59375	15.081
39/64	0.609375	15.478
5/8	0.6250	15.875
41/64	0.640625	16.272
21/32	0.65625	16.669
43/64	0.671875	17.066
11/16	0.6875	17.462
45/64	0.703125	17.859
23/32	0.71875	18.256
47/64	0.734375	18.653
3/4	0.7500	19.050
49/64	0.765625	19.447
25/32	0.78125	19.844
51/64	0.796875	20.241
13/16	0.8125	20.638
53/64	0.828125	21.034
27/32	0.84375	21.431
55/64	0.859375	21.828
7/8	0.8750	22.225
57/64	0.890625	22.622
29/32	0.90625	23.019
59/64	0.921875	23.416
15/16	0.9375	23.812
61/64	0.953125	24.209
31/32	0.96875	24.606
63/64	0.984375	25.003
1	1.000	25.400

1 mm = 0.03937”

0.001 = 0.0254 mm

U.S. To Metric Conversion Chart

	TO CONVERT	INTO	MULTIPLY BY
LINEAR MEASUREMENT	Miles	Kilometers	1.609
	Yards	Meters	0.9144
	Feet	Meters	0.3048
	Feet	Centimeters	30.48
	Inches	Meters	0.0254
	Inches	Centimeters	2.54
	Inches	Millimeters	25.4
AREA	Square Miles	Square Kilometers	2.59
	Square Feet	Square Meters	0.0929
	Square Inches	Square Centimeters	6.452
	Acre	Hectare	0.4047
VOLUME	Cubic Yards	Cubic Meters	0.7646
	Cubic Feet	Cubic Meters	0.02832
	Cubic Inches	Cubic Centimeters	16.39
WEIGHT	Tons (Short)	Metric Tons	0.9078
	Pounds	Kilograms	0.4536
	Ounces (Avdp.)	Grams	28.3495
PRESSURE	Pounds/Sq. In.	Kilopascal	6.895
WORK	Foot–Pounds	Newton–Meter	1.356
LIQUID VOLUME	Quarts	Liters	0.9463
	Gallons	Liters	3.785
LIQUID FLOW	Gallons/Minute	Liters/Minute	3.785
TEMPERATURE	Fahrenheit	Celsius	1.Subtract 32° 2. Multiply by 5/9

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SERVICE MANUAL REVISION

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

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

Revision No: **S205 - 5**
Date: **14 November 2008**
Product: **Bobcat Loader**
Model: **S205**
Manual No: **6987050 (11-08)**

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

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FOREWORD

30-01
30-20
30-21
30-30
30-31

80-10
80-30
80-40
80-50
80-70

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SERVICE MANUAL REVISION

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Date: **15 July 2009**
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Model: **S205**
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30-21	

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