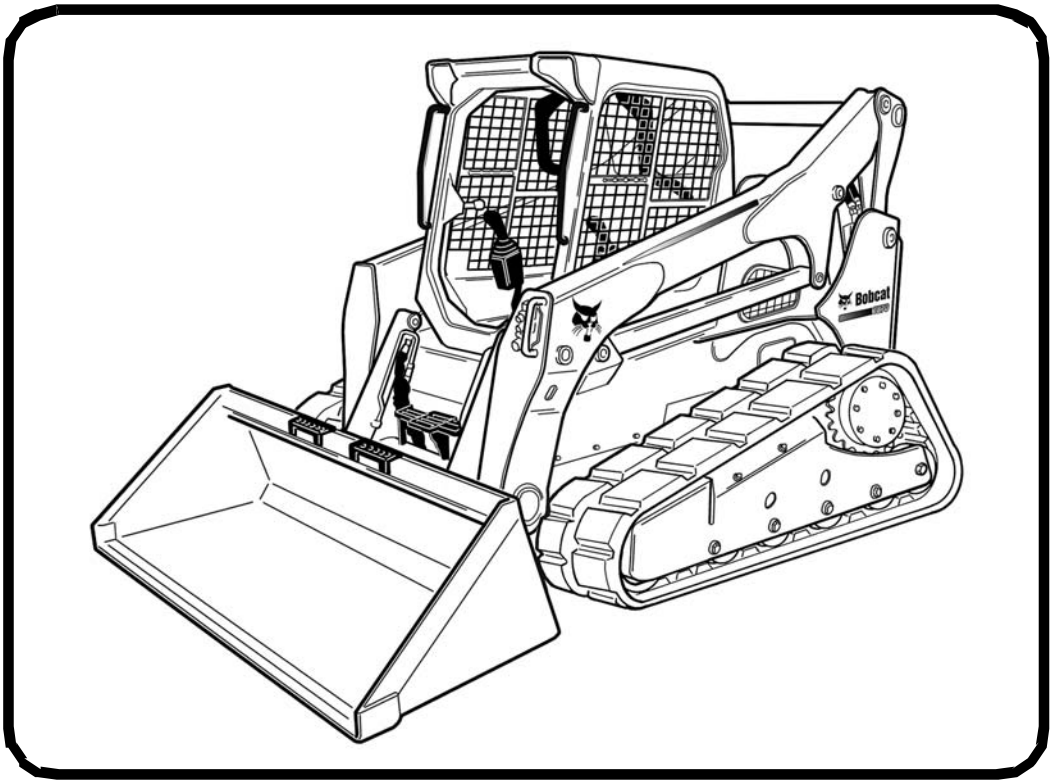
Bobcat®

Service Manual
T870 Compact Track Loader

S/N A3PG11001 & Above
S/N A3PH11001 & Above



EQUIPPED WITH
BOBCAT INTERLOCK
CONTROL SYSTEM (BICS™)

6987487 (4-11)

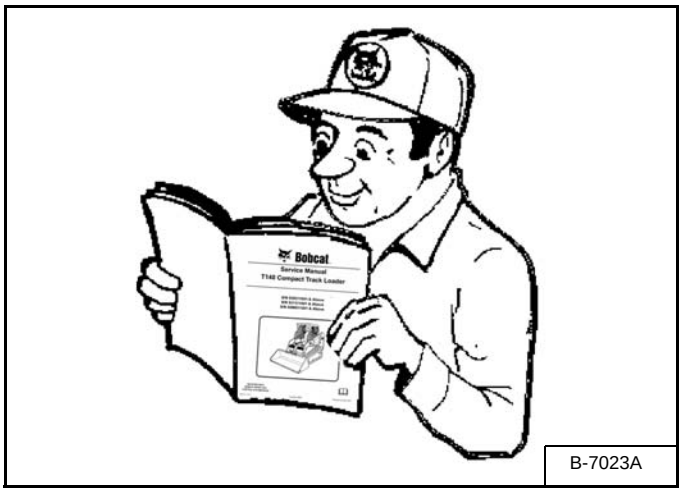
Printed in U.S.A.

FW SSL-1008 SM

LIFTING AND BLOCKING THE LOADER

Procedure

Figure 10-10-1



B-7023A

⚠ WARNING

AVOID INJURY OR DEATH

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

W-2003-0807

Read the Removal & Installation, Disassembly & Assembly, etc. completely to become familiar with the procedure before beginning **[Figure 10-10-1]**.

Always park the loader on a level surface.

⚠ WARNING

MACHINE FALLING OR MOVING CAN CAUSE SERIOUS INJURY OR DEATH

Put jackstands under the front and rear of the machine before running engine for service.

W-2718-0208

Figure 10-10-2

P-85425
P-85423

Lift the rear of the loader and install jackstands in the notched area of the frame **[Figure 10-10-2]**.

Figure 10-10-3

P-85424

Lift the front of the loader and install jackstands under the struts **[Figure 10-10-3]**.

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

NOTE: The lift arms are raised for photo clarity.

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.)

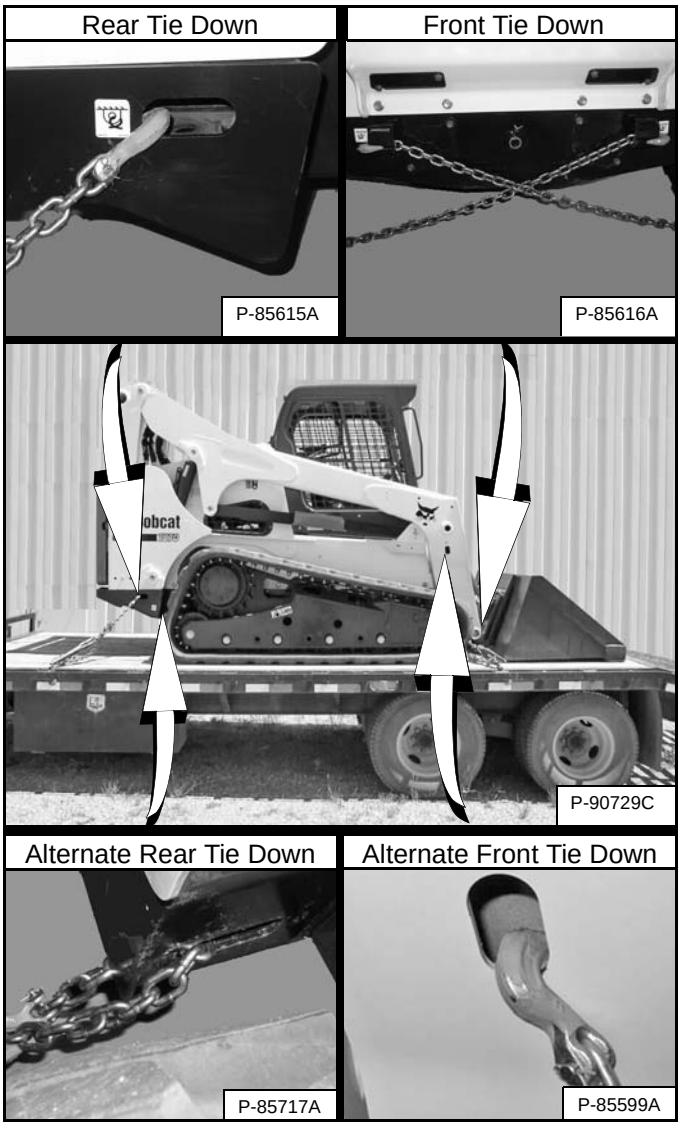
Figure 10-40-1

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]**.

1. Lower the bucket or attachment to the floor.
2. Stop the engine.
3. Engage the parking brake.
4. Install chains at the front and rear loader tie down positions **[Figure 10-40-2]**. (Lift arms shown raised for clarity.)
5. Fasten each end of the chain to the transport vehicle.
6. Use chain binders to tighten the chains.

REMOTE START TOOL (SERVICE TOOL) KIT - 7003031

Description

The Remote Start Tool (Service Tool) Kit is a replacement tool for MEL 1563 Remote Start Tool and MEL1400B BOSS® Diagnostic Tool.

The Remote Start Tool (Service Tool) Kit, P/N 7003031, can be used to service newer loaders using the supplied harness P/N 6689747.

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

AIR CLEANER SERVICE

Replacing Filter Elements

Figure 10-80-1

It is important to change the air filter element only when necessary. The service indicator (Item 1) will FLASH. Press the information button (Item 3) until the display screen (Item 2) shows the service codes. Service code **[M0117]** (Air Filter Plugged) will show in the display screen (Item 2) **[Figure 10-80-1]** when air filter change is necessary.

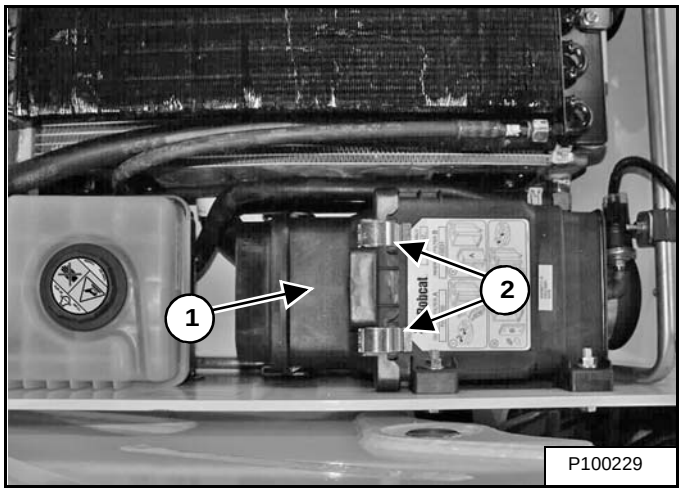
Replace the inner filter every third time the outer filter is replaced or as indicated.

Outer Filter

Remove the rear grille. (See Removing on Page 50-60-1.)

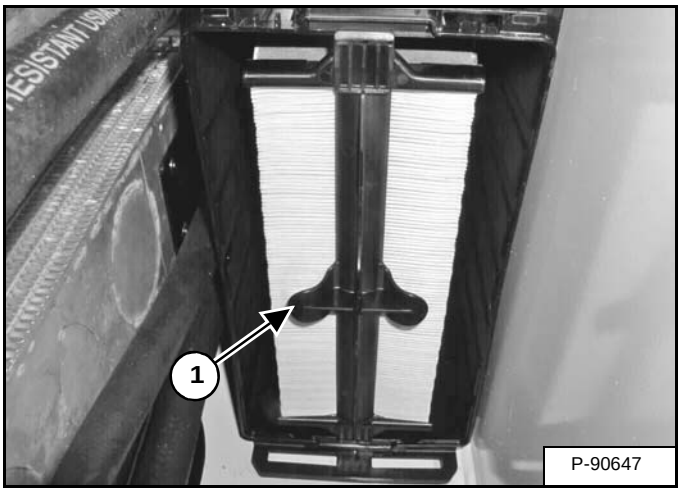
NOTE: The coolant tank can be raised to facilitate access to the air cleaner.

Figure 10-80-2



Open the latches (Item 2) and remove the cover (Item 1) **[Figure 10-80-2]**.

Figure 10-80-3



Pull the outer filter element (Item 1) **[Figure 10-80-3]** out and discard.

NOTE: Make sure the filter housing is free of dirt and debris. Verify that sealing surfaces are clean. DO NOT use compressed air.

Install new filter element. Push all the way in until it contacts the base of the housing.

Install the cover and secure the latches **[Figure 10-80-2]**.

NOTE: Ensure the intake hose is connected to the fitting on the fan housing (Inset) [Figure 10-80-5].

NOTE: Ensure the coolant tank is secured into the coolant tank bracket.

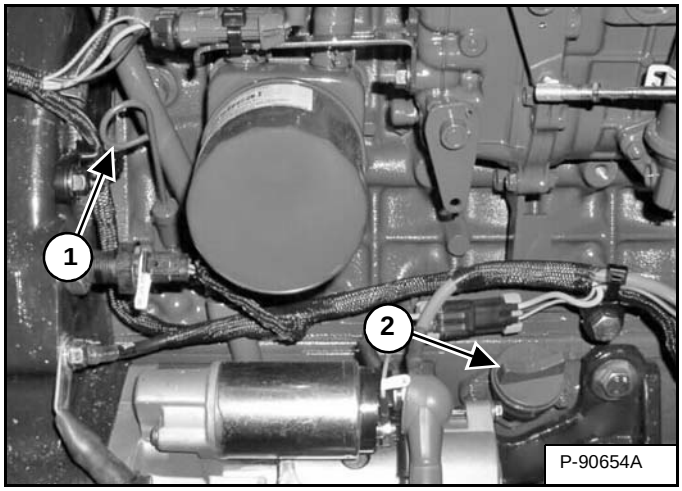
Install the rear grille. (See Removing on Page 50-60-1.)

ENGINE LUBRICATION SYSTEM

Checking And Adding Engine Oil

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

Figure 10-110-1



Park the machine on level ground. Open the rear door and remove the dipstick (Item 1) **[Figure 10-110-1]**.

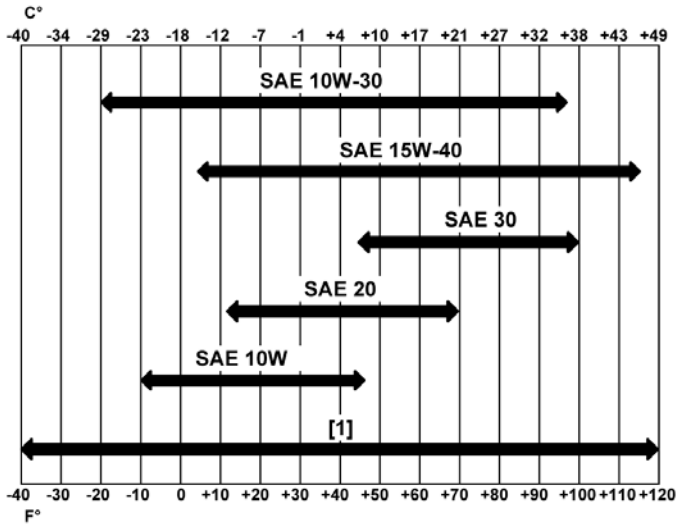
Keep the oil level between the marks on the dipstick. Do not overfill.

Remove the oil fill cap (Item 2) **[Figure 10-110-1]** to add engine oil.

Engine Oil Chart

Figure 10-110-2

ENGINE OIL
RECOMMENDED SAE VISCOSITY NUMBER (LUBRICATION OILS FOR DIESEL ENGINE CRANKCASE)



TEMPERATURE RANGE ANTICIPATED BEFORE NEXT OIL CHANGE (DIESEL ENGINES MUST USE API CLASSIFICATION CI-4 OR BETTER)

[1] Synthetic Oil - Use recommendation from Synthetic Oil Manufacturer.

Use good quality engine oil that meets API Service Classification of CI-4 or better **[Figure 10-110-2]**.

⚠ 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.

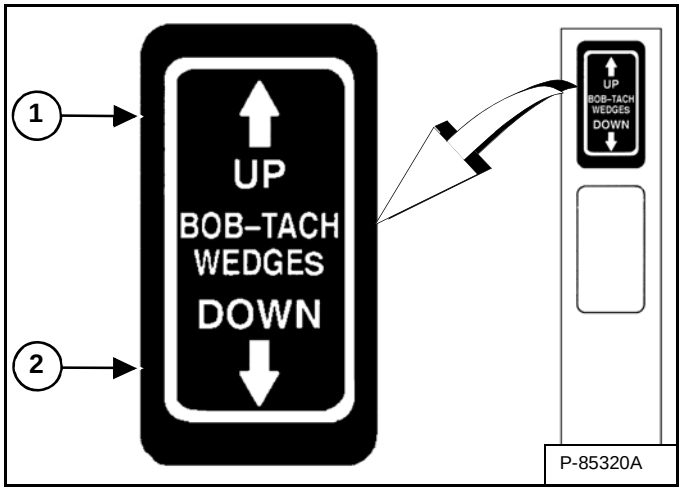
W-2103-0508

BOB-TACH (POWER)

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

Inspection And Maintenance

Figure 10-131-1



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 10-131-1]** until the wedges are fully down.

The levers and wedges must move freely.

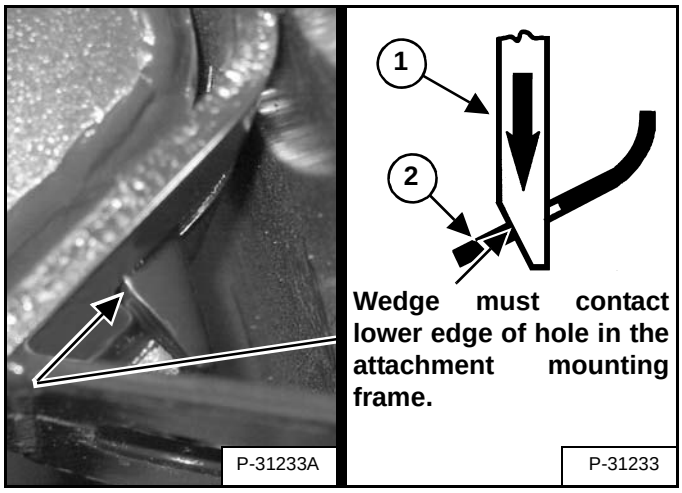
⚠ WARNING

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 10-131-2

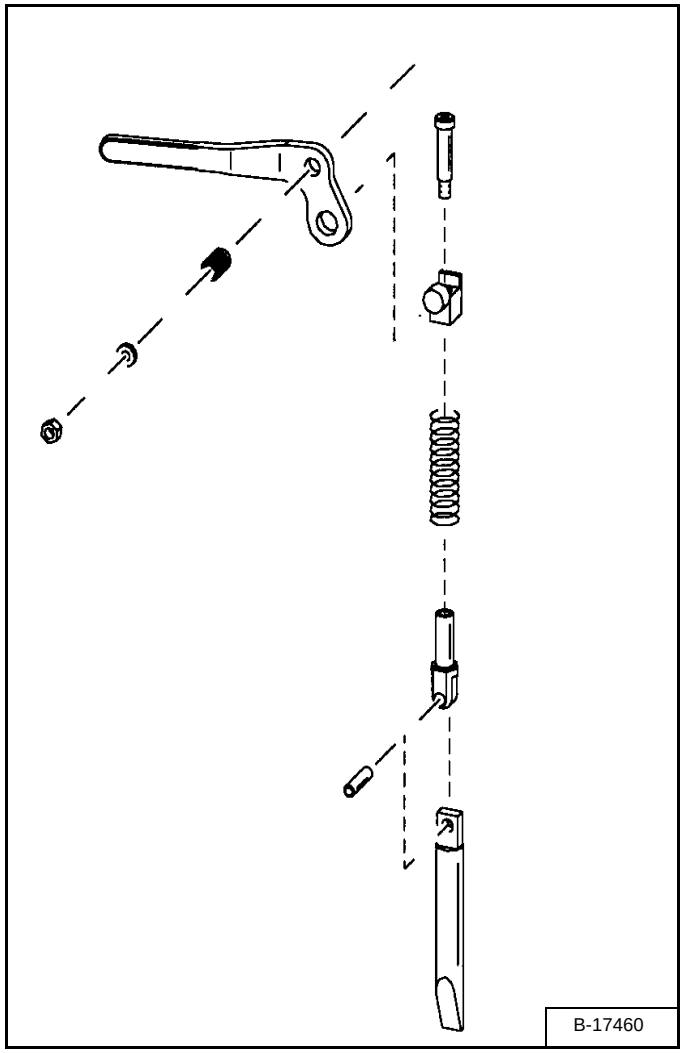


The wedges (Item 1) **[Figure 10-131-2]** must extend through the holes in the attachment mounting frame.

The spring loaded wedges (Item 1) must contact the lower edge of the holes in the attachment mounting frame (Item 2) **[Figure 10-131-2]**.

If the wedges do not contact the lower edge of the holes **[Figure 10-131-2]**, the attachment will be loose and can come off the Bob-Tach.

Figure 10-131-3



Inspect the mounting frame on the attachment and Bob-Tach, linkages and wedges for excessive wear or damage **[Figure 10-131-3]**. 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.) and (See LUBRICATING THE LOADER on Page 10-140-1.)

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 tracks.
- 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, hydraulic / hydrostatic).
- 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 track condition 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.

Troubleshooting

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

If a service code appears in the left instrument panel. (See DIAGNOSTIC SERVICE CODES on Page 60-90-1.)

WARNING

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

W-2004-1285

PROBLEM	CAUSE
The hydraulic system will not operate.	1, 2, 3, 5, 8
Slow hydraulic system action.	1, 3, 4, 6, 8
Hydraulic action is not smooth.	1, 4, 5, 6, 7
Lift arms go up slowly at full engine rpm	1, 3, 4, 5, 6, 7, 8, 9
The lift arms or Bob-Tach will move when the pedal is in neutral position	4
The lift arms come down with the pedal in neutral position	4, 9, 10, 11
Lift Arm Bypass Control valve stuck	12
Lift Arm Bypass Control valve stem bent or broken	13

KEY TO CORRECT CAUSE

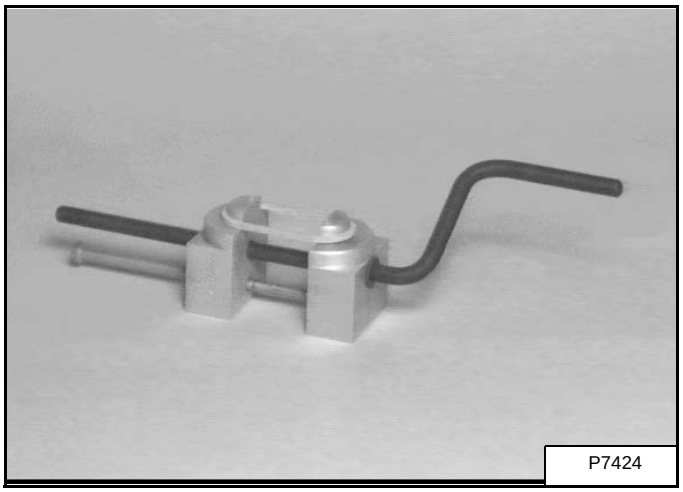
1. The fluid level is not correct.
2. The pedal linkage is disconnected.
3. The hydraulic pump has damage.
4. The pedal linkage is not adjusted correctly.
5. Relief valve is not at the correct pressure.
6. Suction leak on the inlet side of the hydraulic pump.
7. Fluid is cold. Wrong viscosity fluid. (See HYDRAULIC / HYDROSTATIC FLUID SPECIFICATIONS on Page SPEC-40-1.)
8. Exceeding the loaders rated operating capacity.
9. Internal leak in the lift cylinder(s).
10. External leak from the cylinder(s).
11. Damaged lift spool.
12. Rotate shaft.
13. Replace Lift Arm Bypass Control valve assembly.

Assembly

Use the following tools to assemble the cylinder:

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

Figure 20-20-19



Wash the cylinder parts in solvent and air dry them.

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

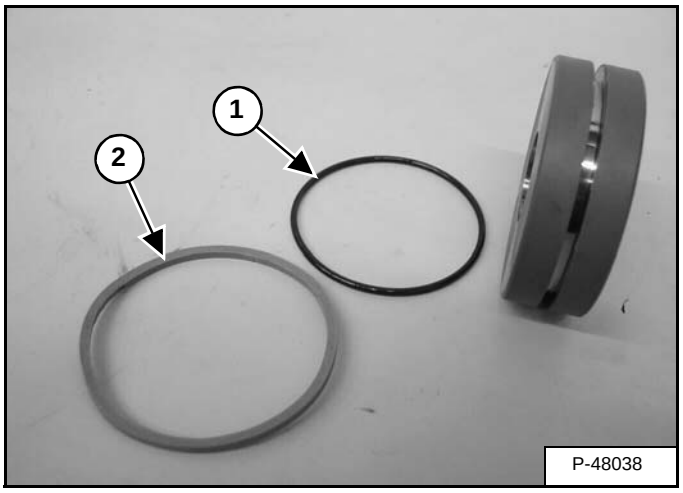
Always install new O-rings and seals during assembly.

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

Install the new seal on the tool and slowly stretch it until it fits the piston **[Figure 20-20-19]**.

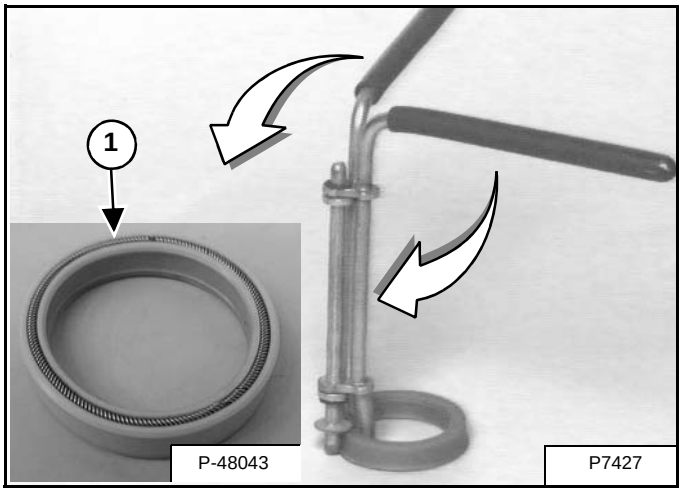
Allow the seal to stretch for 30 seconds before installing it on the piston.

Figure 20-20-20



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

Figure 20-20-21



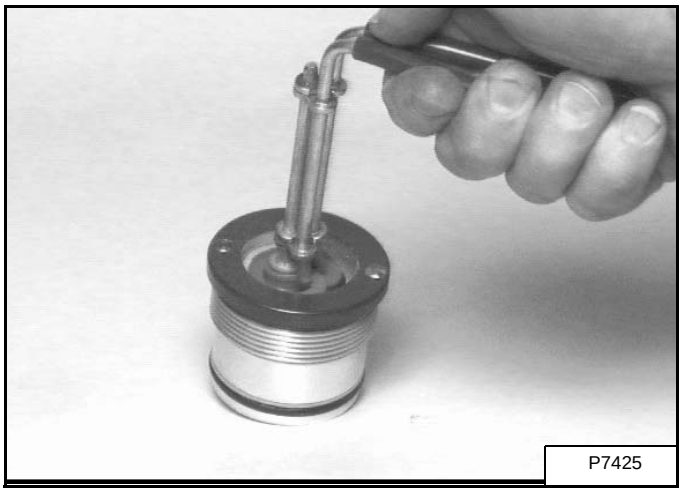
Install the rod seal on the rod seal tool (MEL1033) **[Figure 20-20-21]**.

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

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

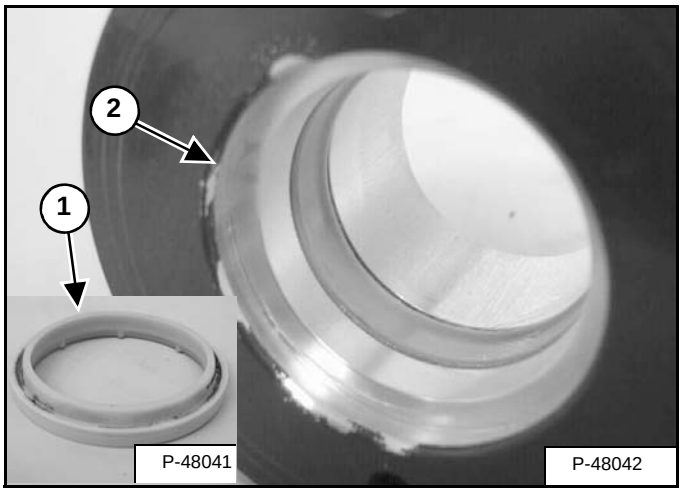
Assembly (Cont'd)

Figure 20-21-21



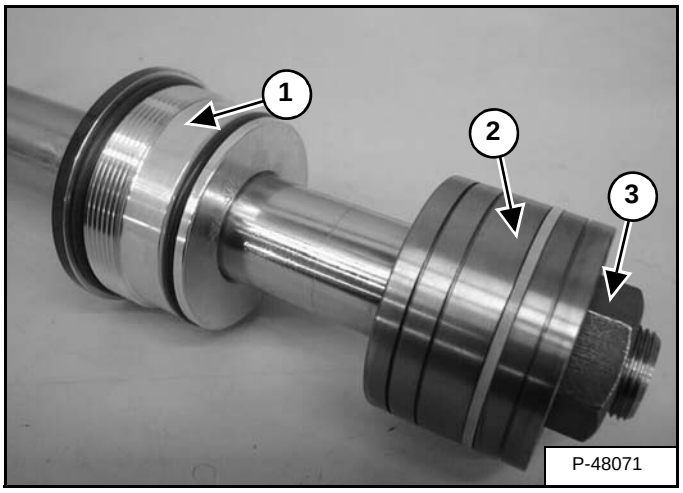
Install the rod seal in the head **[Figure 20-21-21]**.

Figure 20-21-22



Install the wiper seal, with the wiper side of the seal (Item 1) toward the outside of the head (Item 2) **[Figure 20-21-22]**.

Figure 20-21-23



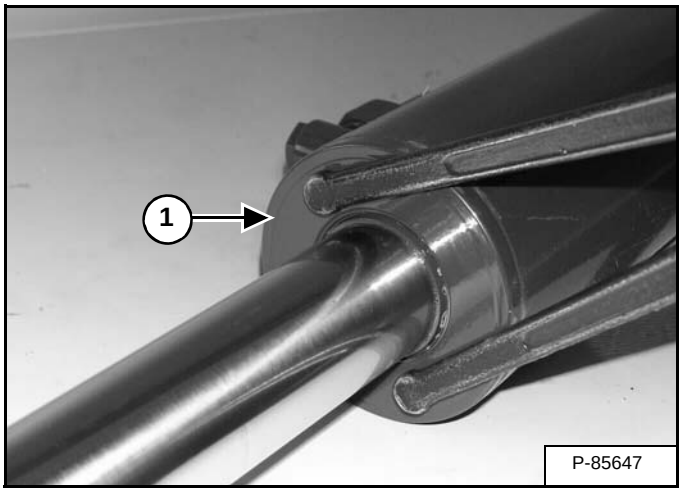
NOTE: Clean and dry the threads before installing the nut. Install the new nut from the kit.

Install the head (Item 1), piston (Item 2) and nut (Item 3) **[Figure 20-21-23]**.

Tighten the nut (Item 3) **[Figure 20-21-23]** to 1152 N•m (850 ft-lb) torque.

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

Figure 20-21-24



Using a spanner wrench, tighten the head (Item 1) **[Figure 20-21-24]** until the head is flush with the end of the cylinder tube assembly.

MAIN RELIEF VALVE

Description

The main relief valve limits the hydraulic system pressure by opening at a certain pressure and allowing the hydraulic oil to flow back to the hydraulic reservoir. (See Hydraulic System on Page SPEC-10-3.)

The main relief valve is adjustable and is located on the hydraulic control valve near the bottom, facing the front of the loader.

Actuator Removal And Installation (In Loader)

⚠ WARNING

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

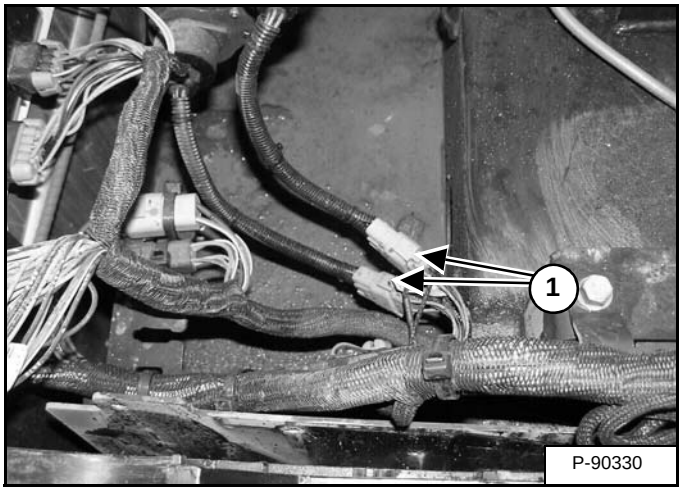
W-2059-0598

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

Stop the engine. Raise the seat bar.

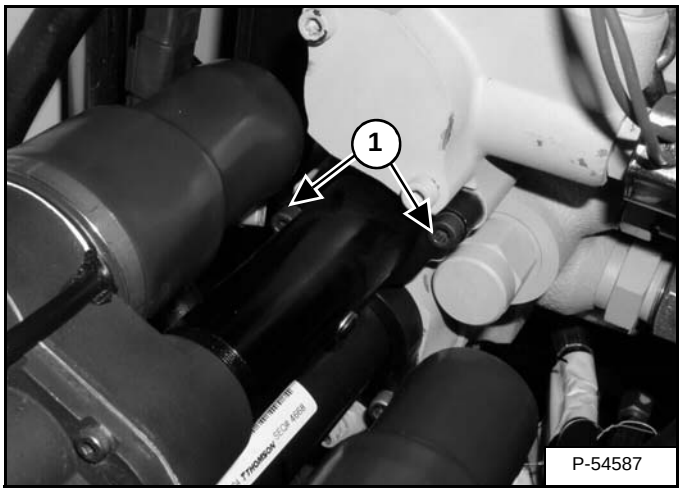
Mark the actuator wiring harness connectors for proper installation.

Figure 20-40-12



Unplug the actuator connectors (Item 1) **[Figure 20-40-12]** from the loader harness.

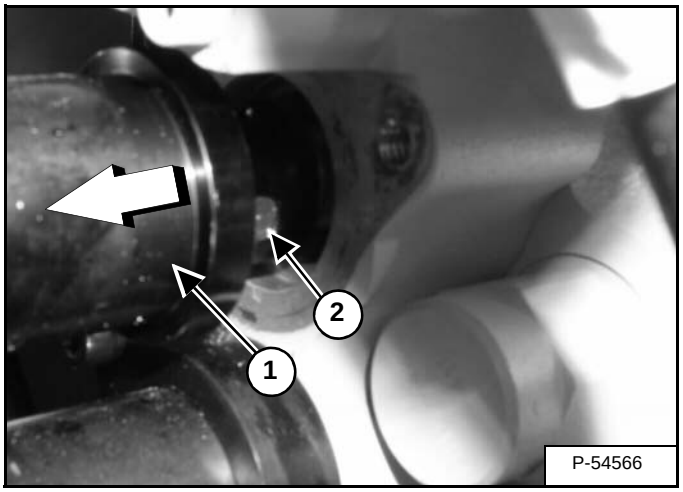
Figure 20-40-13



Remove the two screws (Item 1) **[Figure 20-40-13]** from the actuator retainer.

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

Figure 20-40-14



Pull the actuator (Item 1) **[Figure 20-40-14]** away from the control valve.

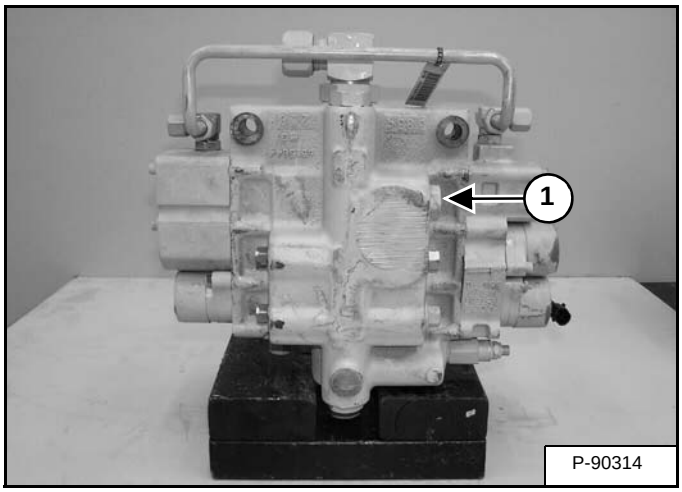
Use a punch to remove the actuator pin (Item 2) **[Figure 20-40-14]** from the actuator and spool.

Remove the actuator from the hydraulic control valve.

NOTE: The calibration procedure must be followed when replacing a lift or tilt actuator. (See Lift And Tilt Calibration (SJC) on Page 60-150-4.)

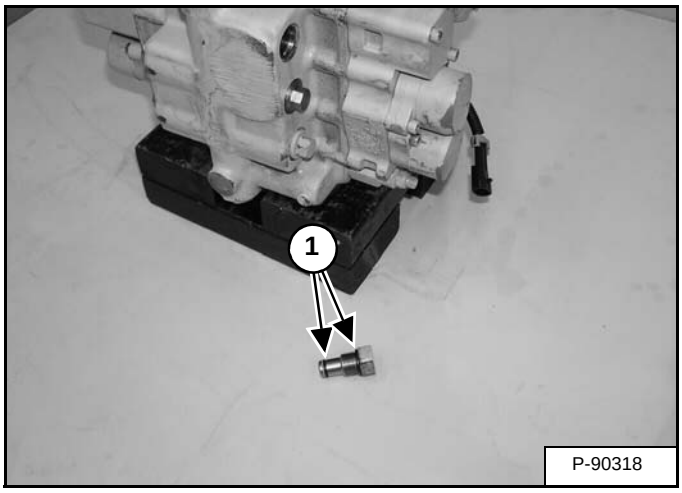
Port Relief Valve Removal And Installation

Figure 20-40-41



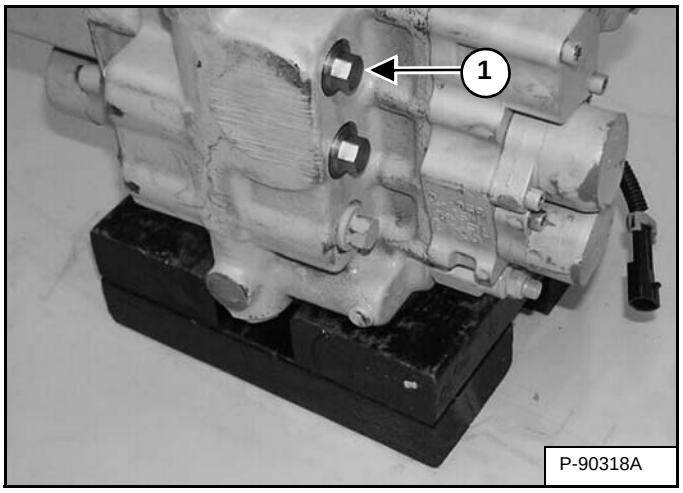
Remove the port relief plug (Item 1) **[Figure 20-40-41]** from the auxiliary circuit of the control valve.

Figure 20-40-42



Installation: Always use new O-rings (Item 1) **[Figure 20-40-42]**. Tighten to 52 - 61 N•m (38 - 45 ft-lb) torque.

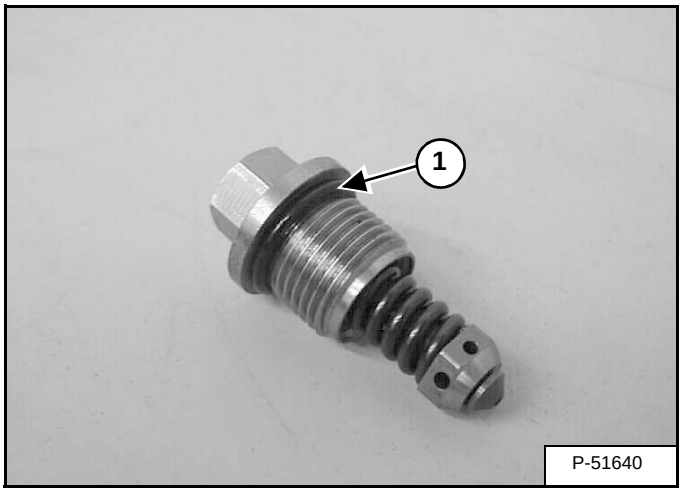
Figure 20-40-43



The control valve may be equipped with an optional auxiliary port relief valve (Item 1) **[Figure 20-40-43]**.

Remove the auxiliary port relief valve.

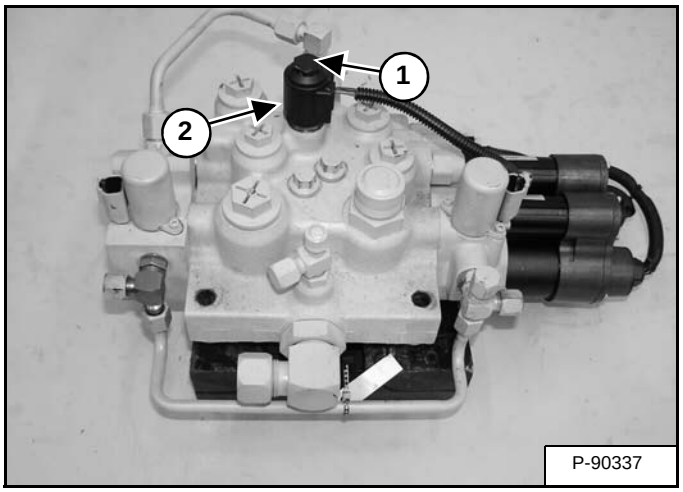
Figure 20-40-44



Installation: Always use new O-rings (Item 1) **[Figure 20-40-44]**. Tighten to 52 - 61 N•m (38 - 45 ft-lb) torque.

Solenoid Removal And Installation

Figure 20-40-81

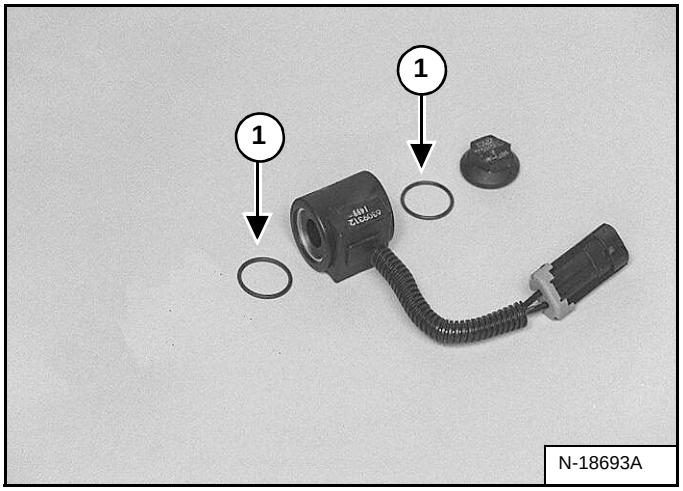


Remove the nut (Item 1) **[Figure 20-40-81]** from the solenoid stem.

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

Remove the solenoid coil (Item 2) **[Figure 20-40-81]**.

Figure 20-40-82

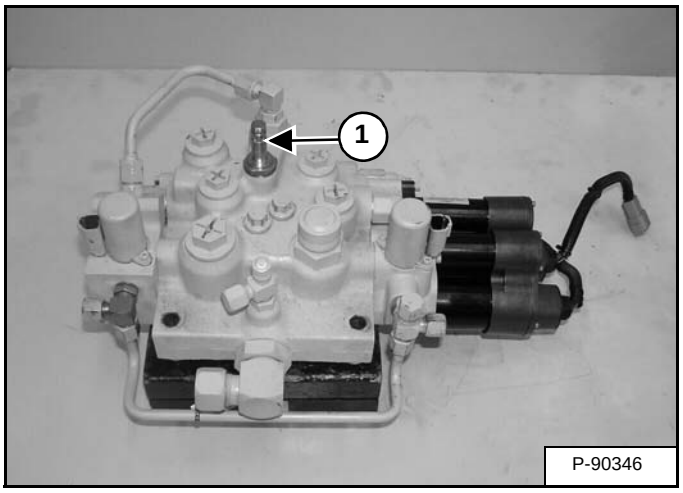


Remove the O-rings (Item 1) **[Figure 20-40-82]** from both ends of the solenoid coil.

Use an ohmmeter to measure the solenoid coil resistance.

The correct resistance for the coil is 9.5 - 10.08 ohm.

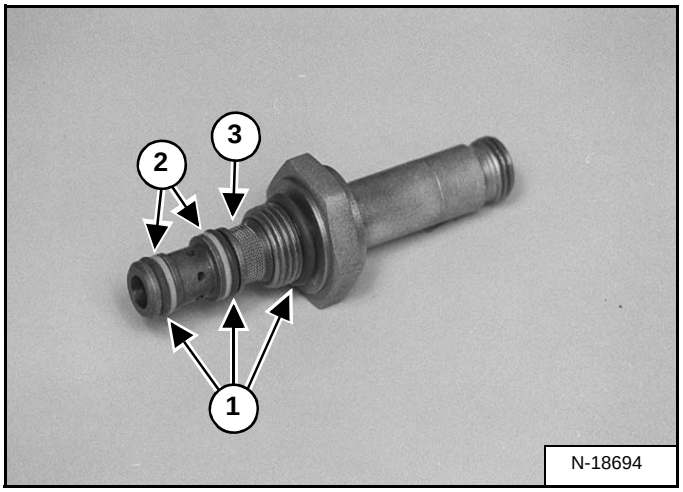
Figure 20-40-83



Remove the solenoid stem (Item 1) **[Figure 20-40-83]**.

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

Figure 20-40-84



Remove the O-rings (Item 1) and back-up rings (Item 2) **[Figure 20-40-84]** from the stem.

Clean all parts in solvent and dry with compressed air.

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

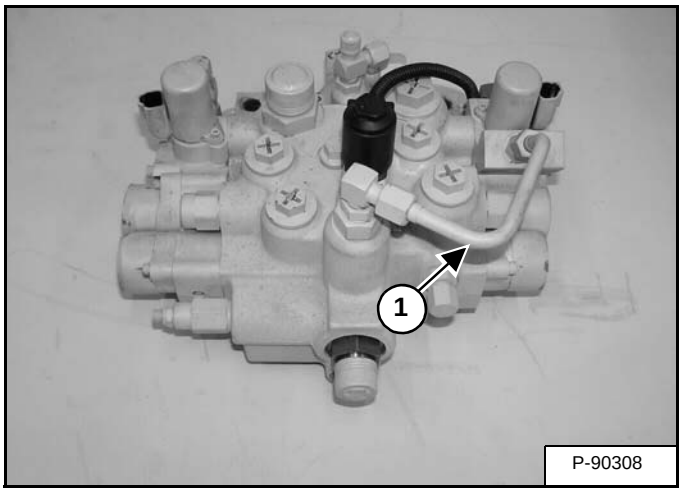
NOTE: The screen (Item 3) [Figure 20-40-84] may be cleaned with solvent. If it is torn or worn the solenoid stem needs to be replaced.

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

Install new O-rings (Item 1) **[Figure 20-40-82]** and **[Figure 20-40-84]** and new back-up rings (Item 2) **[Figure 20-40-84]** on the solenoid stem.

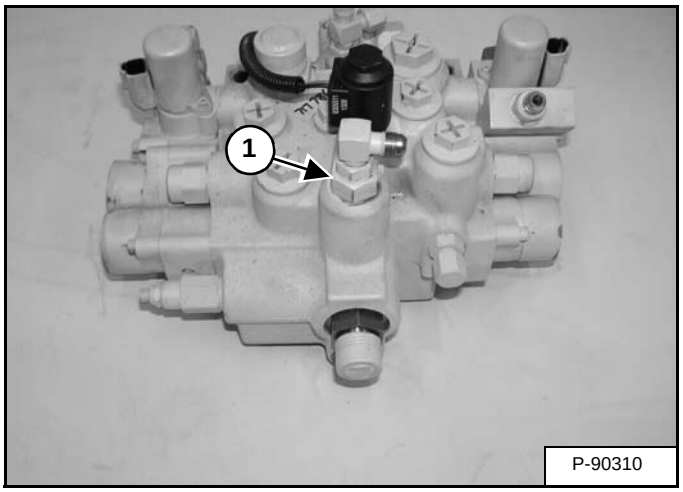
Lift Load Check Valve Removal And Installation

Figure 20-41-16



Remove the charge tubeline (Item 1) **[Figure 20-41-16]** from the BICS™ valve fitting on the top of the lift load check valve.

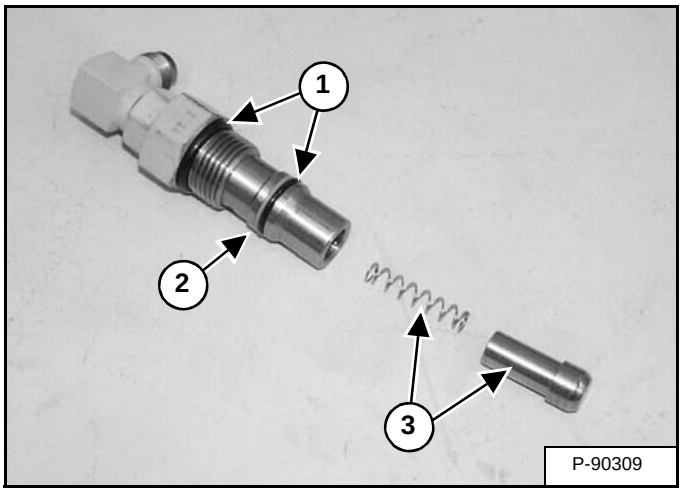
Figure 20-41-17



Remove the lift load check valve (Item 1) **[Figure 20-41-17]** and fitting from the top of the control valve.

Installation: Lubricate the O-ring and threads and tighten to 68 - 94 N•m (50- 70 ft-lb) torque.

Figure 20-41-18

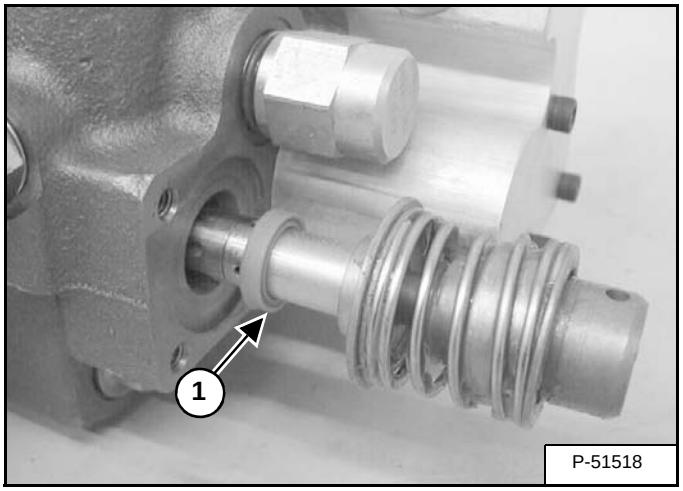


Remove and install new O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-41-18]**.

Check the free movement load check valve and spring (Item 3) **[Figure 20-41-18]**.

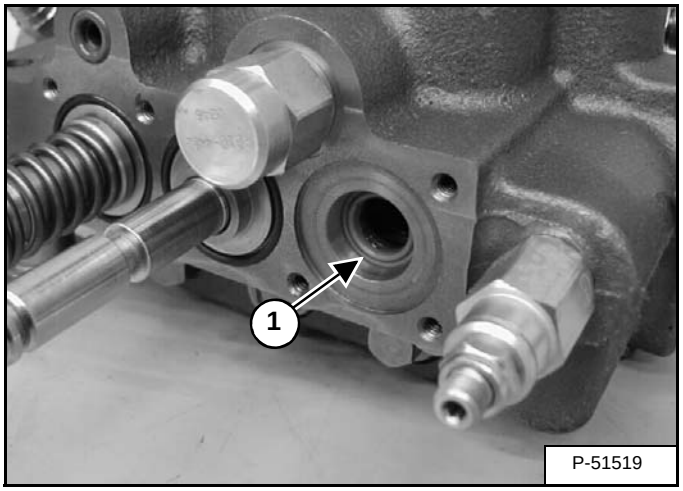
Lift Spool And Detent Removal And Installation (Cont'd)

Figure 20-41-50



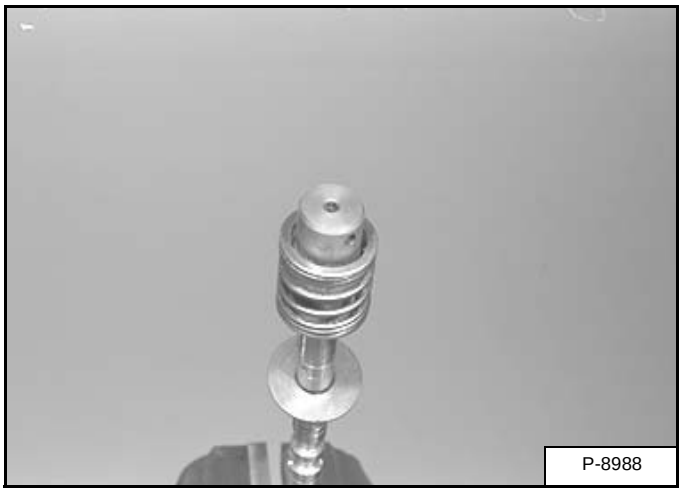
Remove the lift spool assembly and seal (Item 1) **[Figure 20-41-50]** from the control valve.

Figure 20-41-51



Remove the lift spool seal (Item 1) **[Figure 20-41-51]** from the linkage end of the valve.

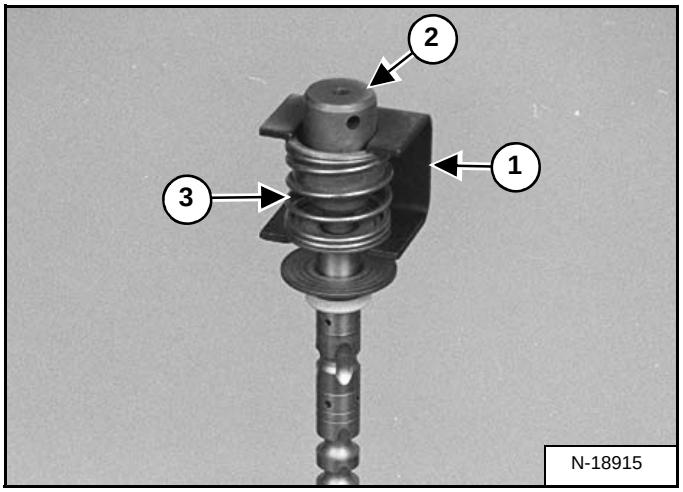
Figure 20-41-52



Clamp the linkage end of the spool in a vise **[Figure 20-41-52]**.

NOTE: Protect spool before clamping in vise.

Figure 20-41-53

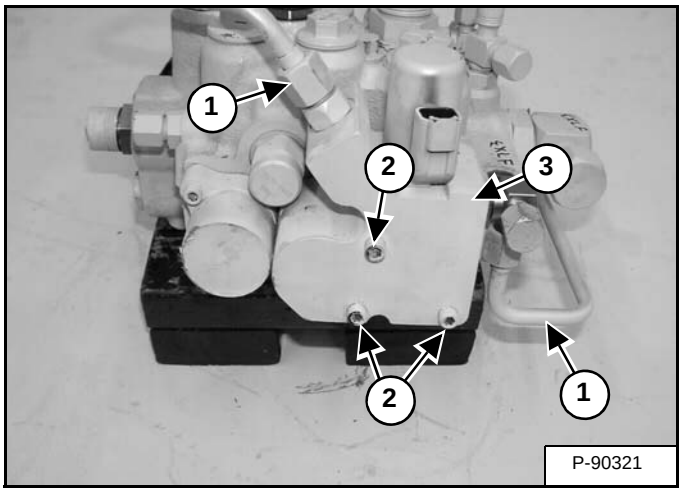


Install the spring tool (Item 1) **[Figure 20-41-53]** over the centering spring.

NOTE: Be careful when removing the detent adapter (Item 2) [Figure 20-41-53] from the centering spring, as it is under spring pressure.

Auxiliary Spool Removal And Installation

Figure 20-41-89



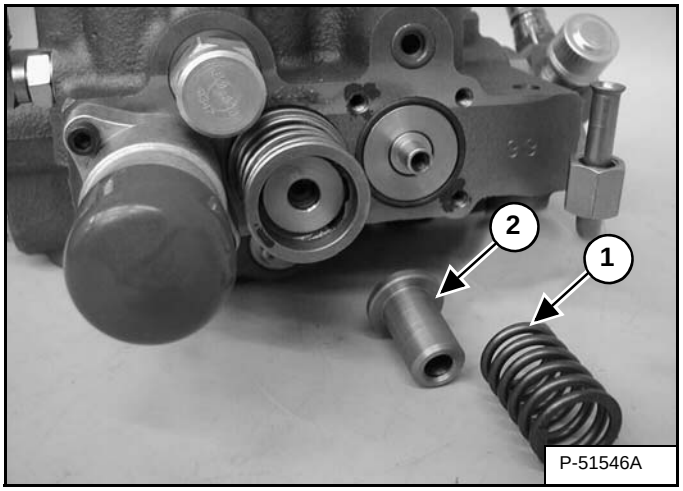
Remove the two tubelines (Item 1) **[Figure 20-41-89]** from the spool centering block.

Remove the three screws (Item 2) **[Figure 20-41-89]** from the spool centering block.

Installation: Tighten the bolt to 10,7 - 11,9 N•m (95 - 105 in-lb) torque.

Remove the spool centering block (Item 3) **[Figure 20-41-89]** from the control valve.

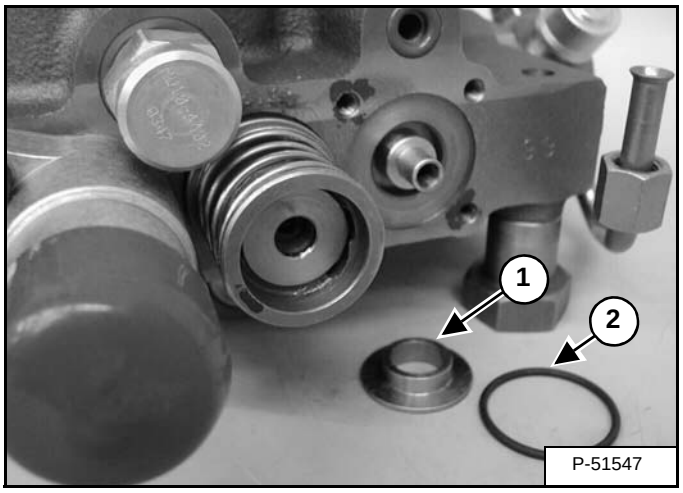
Figure 20-41-90



Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-41-90]** from the auxiliary spool.

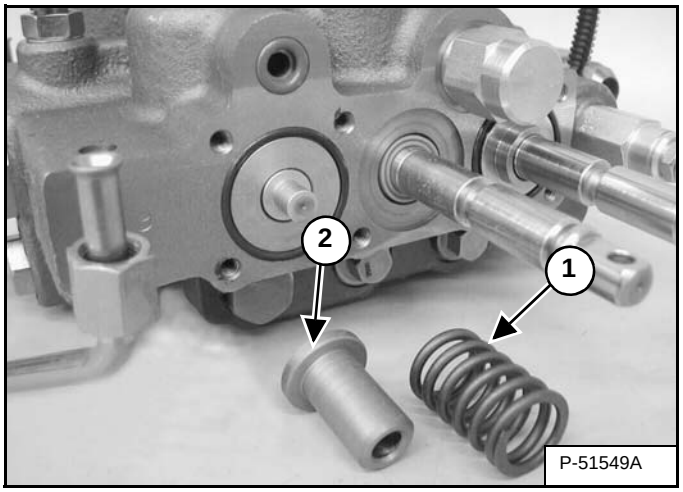
NOTE: If the centering spring retainer (Item 2) [Figure 20-41-90] must be replaced, replace the retainer on the opposite end also.

Figure 20-41-91



Remove the spacer (Item 1) and O-ring (Item 2) **[Figure 20-41-91]** from the auxiliary spool.

Figure 20-41-92

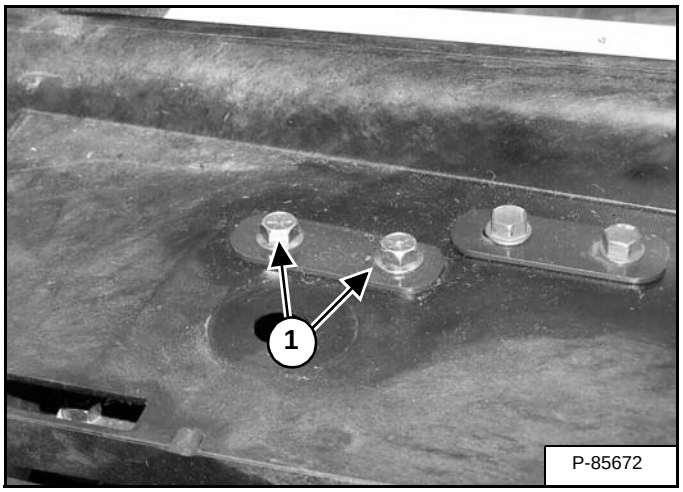


Remove the spring (Item 1) and center spring retainer (Item 2) **[Figure 20-41-92]** from the auxiliary spool.

NOTE: If the centering spring retainer (Item 2) [Figure 20-41-92] must be replaced, replace the retainer on the opposite end also.

Bracket Removal And Installation

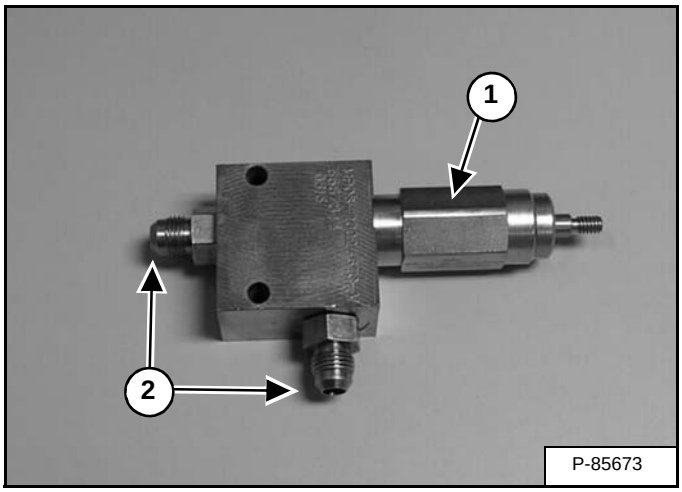
Figure 20-50-4



Remove the two bolts (Item 1) **[Figure 20-50-4]** to replace the bypass valve mounting bracket if necessary.

Disassembly And Assembly

Figure 20-50-5



Remove the lift arm bypass valve (Item 1) **[Figure 20-50-5]** from the valve block. Inspect the bypass valve for damage and replace if necessary.

Installation: Tighten the valve to 45 - 50 N•m (33 - 37 ft-lb) torque.

Inspect the hydraulic fittings (Item 2) **[Figure 20-50-5]** on the valve block for damage and replace if necessary.

Parts Identification (Cont'd)

The items listed below refer to Page 20-60-8 **[Figure 20-60-11]**.

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

Disassembly And Assembly

IMPORTANT

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

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Mark the pump sections for correct assembly.

To disassemble and assemble the hydraulic pump, follow the Parts Identification page (See Parts Identification on Page 20-60-8.) for proper placement of components along with the information below.

NOTE: A seal kit is available through Bobcat Service Parts.

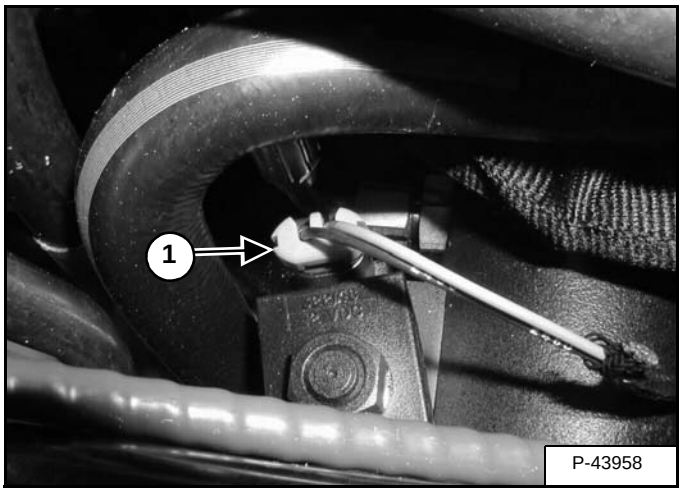
Assembly: Tighten the eight pump housing bolts (Item 17) **[Figure 20-60-11]** to 50 N•m (37 ft-lb) torque.

NOTE: Position the wear plate (Item 5) [Figure 20-60-11] inlets and traps as shown with the bronze side toward the gears on all wear plates.

NOTE: Inspect all gears, shafts and pump end sections. If any of these components have excessive wear or damage is visible, the complete pump must be replaced.

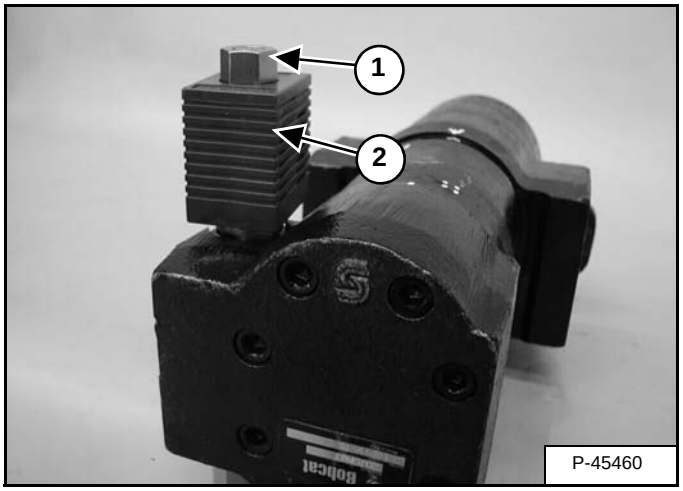
Solenoid Removal And Installation

Figure 20-61-15



At the right side access hole, disconnect the electrical connector (Item 1) **[Figure 20-61-15]** from the high flow pump solenoid.

Figure 20-61-16

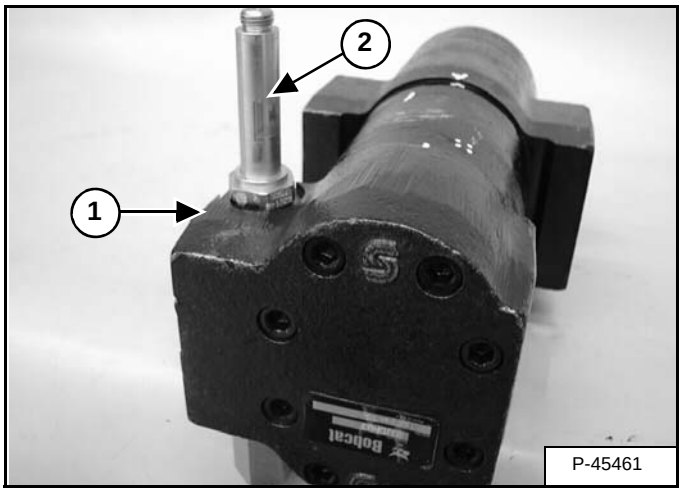


Remove the solenoid nut (Item 1) **[Figure 20-61-16]**.

Remove the solenoid (Item 2) **[Figure 20-61-16]**.

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

Figure 20-61-17

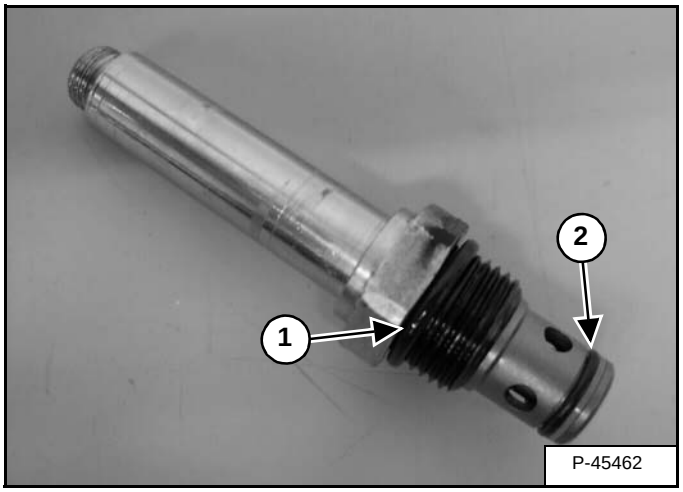


NOTE: Mark the pump housing (Item 1) [Figure 20-61-17] for proper installation of the solenoid valve cartridge.

Remove the valve cartridge (Item 2) **[Figure 20-61-17]**.

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

Figure 20-61-18



Inspect the O-ring (Item 1) **[Figure 20-61-18]** and replace as needed.

Inspect the O-ring and back-up washer (Item 2) **[Figure 20-61-18]** and replace as needed.

OIL COOLER

Description

The oil cooler is used to cool the loaders hydraulic and hydrostatic oil. Oil passages are coiled into a heat exchanger. Air is forced, with the cooling fan, around the passages cooling the oil.

The oil cooler is located underneath the rear grille between the A/C condenser (if so equipped) and the radiator.

Removal And Installation

IMPORTANT

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

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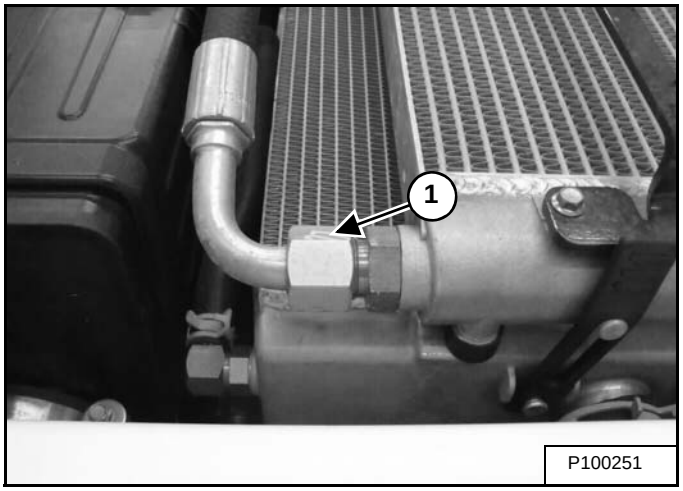
Remove the rear grille from the loader. (See Removing on Page 50-60-1.)

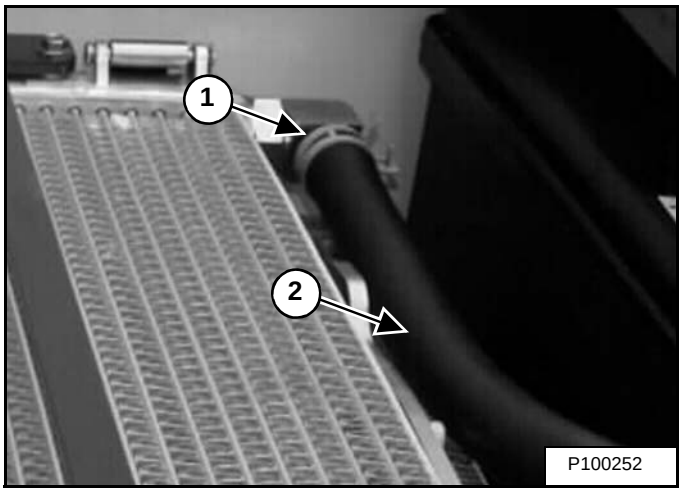
Figure 20-90-1



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

Cap or plug all hoses and fittings.

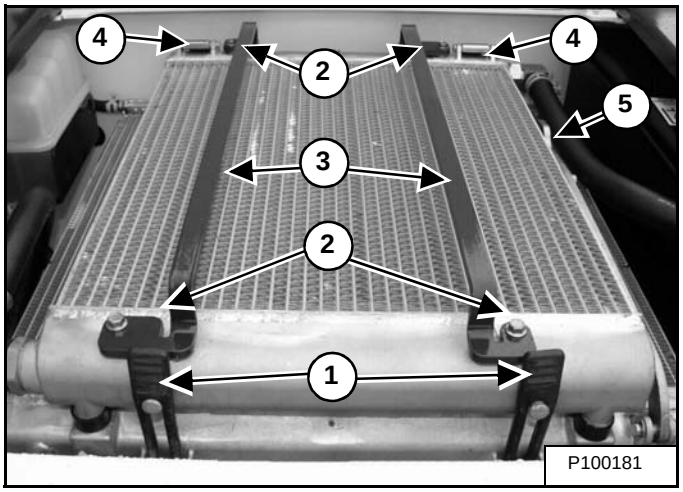
Figure 20-90-2



Remove hose clamp (Item 1) and hose (Item 2) **[Figure 20-90-2]**.

Cap or plug all hoses and fittings.

Figure 20-90-3



Undo the rubber straps (Item 1) **[Figure 20-90-3]**

Remove the bolts (Item 2) and remove the condenser guards (Item 3) **[Figure 20-90-3]**.

Remove the clips and pins (Item 4) **[Figure 20-90-3]**.

Remove the bolt (Item 5) **[Figure 20-90-3]** from the prop rod.

Lift up the oil cooler and remove the cooler from the loader.

Disassembly And Assembly (Cont'd)

Figure 20-110-12

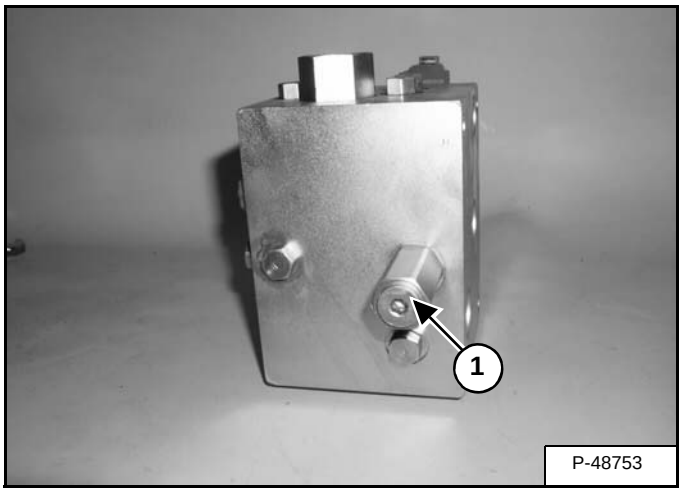
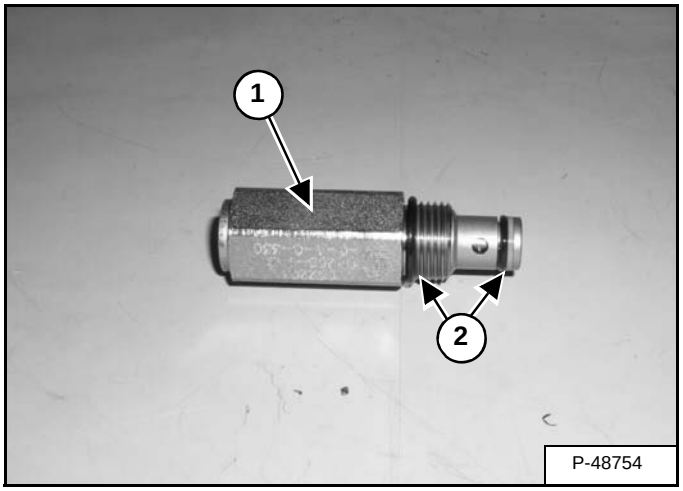


Figure 20-110-13



Remove the relief valve (Item 1) **[Figure 20-110-12]** and **[Figure 20-110-13]** from the diverter valve and inspect the O-rings and back-up washers (Item 2) **[Figure 20-110-13]** for damage.

Assembly: Put oil on O-ring and back-up washers. Tighten to 27 - 34 N•m (20 - 25 ft-lb) torque.

Figure 20-110-14

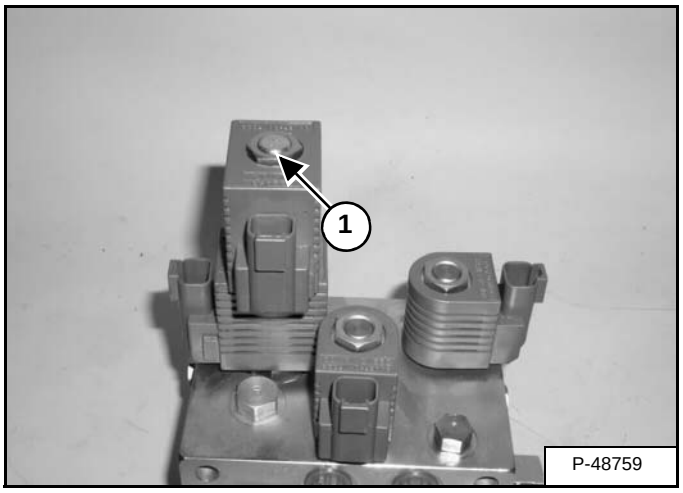
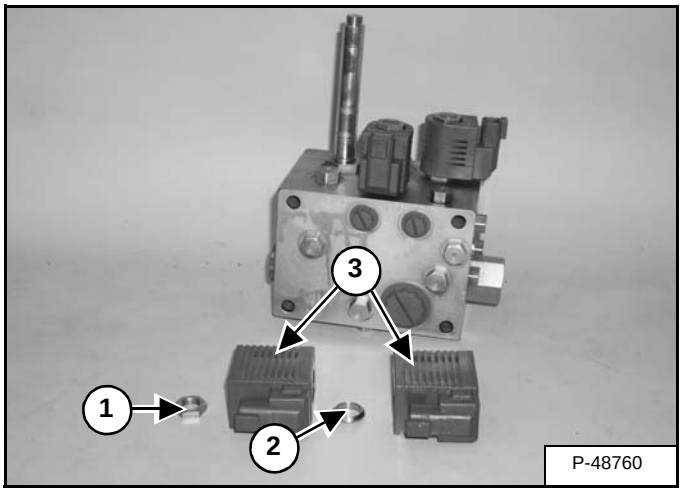


Figure 20-110-15



NOTE: Before removing the solenoid coils mark the coils for proper alignment.

Remove the nut (Item 1) **[Figure 20-110-14]** and **[Figure 20-110-15]** from the solenoid valve stem.

Assembly: Tighten the nut to 5 - 8 N•m (4 - 6 ft-lb) torque.

Remove the spacer (Item 2) and solenoid valve coils (Item 3) **[Figure 20-110-15]**.

FRONT AUXILIARY HYDRAULIC COUPLER BLOCK

Description

The front auxiliary hydraulic coupler block is the connection block that houses the two main auxiliary couplers along with a case drain coupler. These couplers are for suppling hydraulic flow for various attachments.

The front auxiliary coupler block is located at the front of the left side lift arm.

Removal And Installation

IMPORTANT

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

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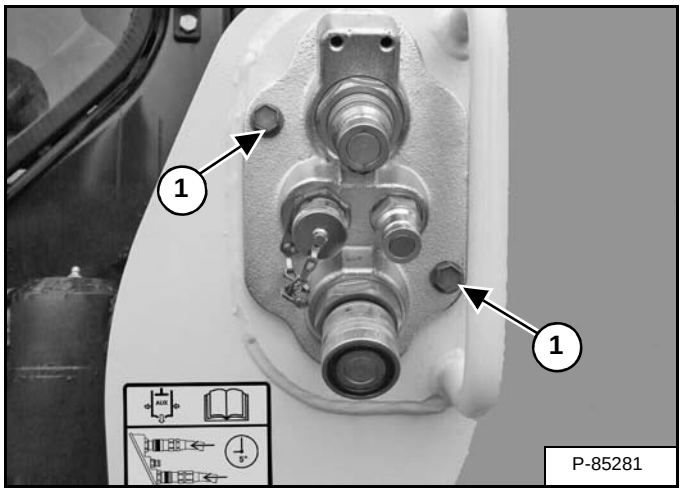
Figure 20-130-1



Remove the two mounting bolts (Item 1) **[Figure 20-130-1]**.

Pull the block away from the lift arms and disconnect the auxiliary hoses from the coupler block **[Figure 20-130-1]**.

Disassembly And Assembly

Figure 20-130-2

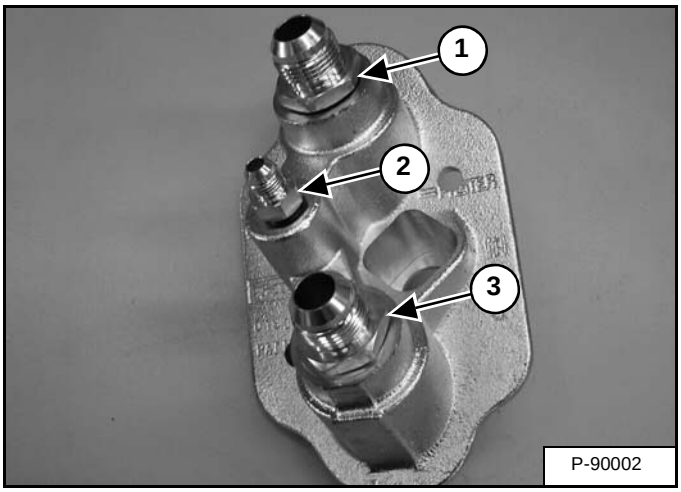
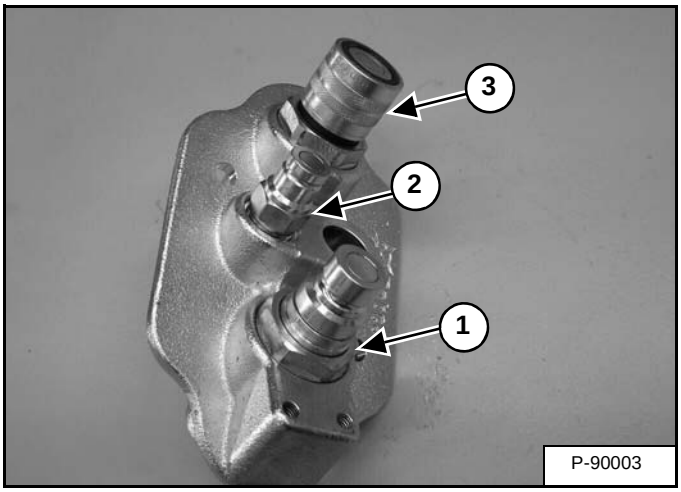


Figure 20-130-3

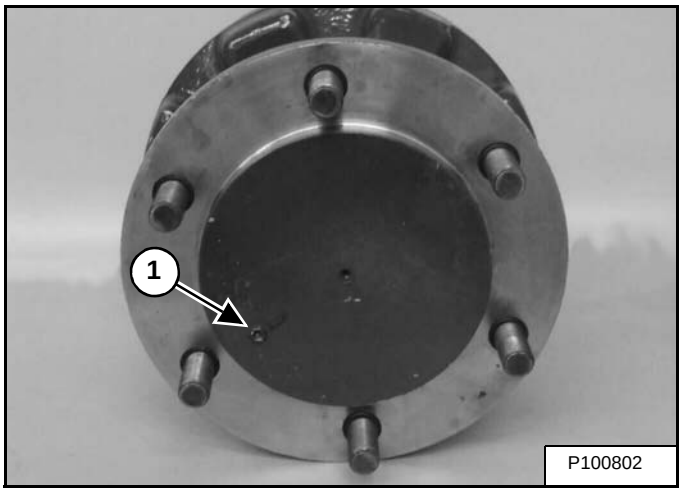


Parts Identification (Cont'd)

Ref.	Description
1.	PLUG
2.	SHAFT
3.	SEAL
4.	BEARING
5.	HOUSING / FRONT
6.	SEAL
7.	BEARING
8.	WASHER
9.	SPLIT RINGS
10.	O-RING
11.	NUT
12.	STUD
13.	RPM TARGET DISC
14.	ROLL PIN
15.	SNAP RING
16.	RETAINER
17.	ROLLER
18.	PISTON
19.	BLOCK
20.	CAM
21.	DISTRIBUTOR
22.	SPRING
23.	SEAL W / O-RING
24.	SEAL W / O-RING
25.	SEAL W / O-RING
26.	PLUG
27.	O-RING
28.	SPRING
29.	SHIM
30.	POPPET
31.	PLUG
32.	O-RING
33.	SPRING
34.	SPOOL
35.	WASHER
36.	O-RING
37.	PLUG
38.	DOWEL
39.	PIN
40.	O-RING
41.	O-RING
42.	PLUG
43.	GASKET / COVER
44.	BOLT
45.	HOUSING / REAR
46.	HOUSING / BRAKE
47.	SHAFT
48.	SHIM
49.	SHIM
50.	DISC / OUTER
51.	DISC / INNER
52.	SEAL
53.	WASHER
54.	BOLT
55.	BUSHING
56.	PISTON
57.	SEAL
58.	DISC SPRING
59.	GASKET
60.	COVER PLATE
61.	BOLT
62.	SNAP RING
63.	SNAP RING

Disassembly And Assembly (Cont'd)

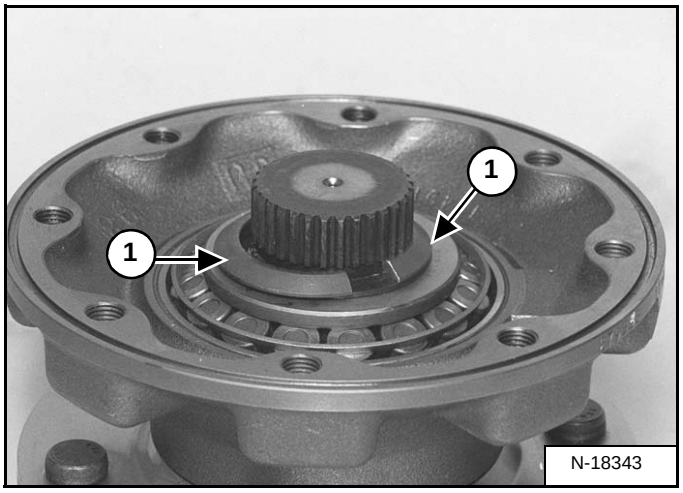
Figure 30-20-39



Disassembly: Remove the oil fill plug (Item 1) **[Figure 30-20-39]** from the housing to drain the oil from the bearing and face seal area.

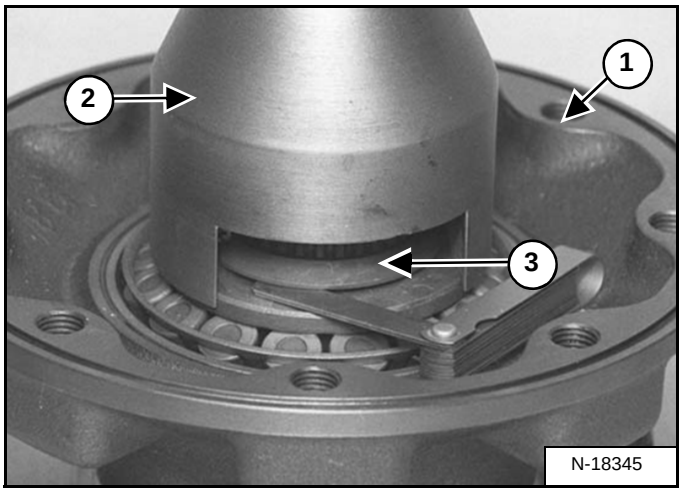
Assembly: Install drain plug using Loctite® 243, tighten flush with the face of the hub.

Figure 30-20-40



Disassembly: With a hammer and punch remove the split ring and the preload washer located under the split ring (Item 1) **[Figure 30-20-40]**.

Figure 30-20-41



Assembly: Install the front housing (Item 1) and bearing over the shaft. Install the special tool (MEL1562) (Item 2) **[Figure 30-20-41]** over the bearing and press the bearing onto the shaft. Apply 40 kN (9000 lbf) to set the bearing. Rotate the housing to check for free travel.

NOTE: The 40 kN (9000 lbf) is NOT the amount of pressure required by the press. It is the amount of downward force applied by the press.

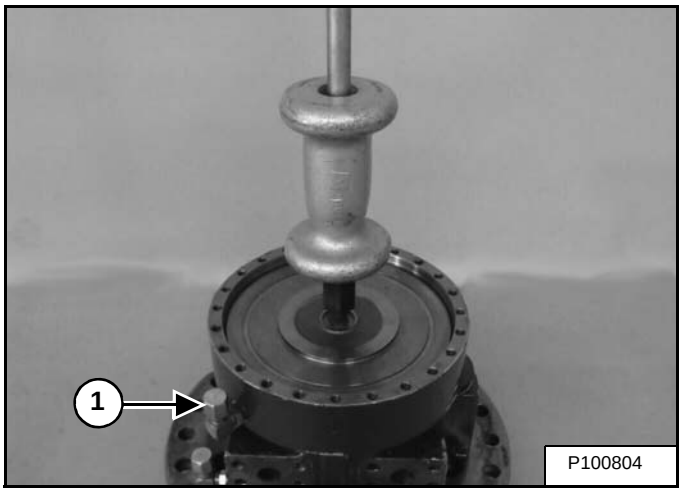
Assembly: Install the split ring (Item 3) **[Figure 30-20-41]** with a feeler gauge measure the distance between the split ring and the top of the bearing inner race.

Assembly: Add the necessary washer to get closest to the measurement and re install the split ring.

Assembly: Release the pressure from the bearing and remove the tool.

Disassembly And Assembly (Cont'd)

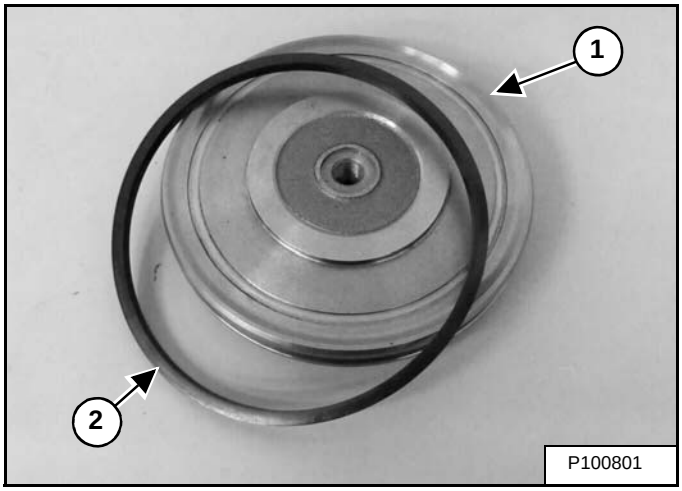
Figure 30-21-8



Remove the piston from the brake housing **[Figure 30-21-8]**.

NOTE: The use of air pressure through the brake line connection (Item 1) [Figure 30-21-8] will aid in piston removal.

Figure 30-21-9

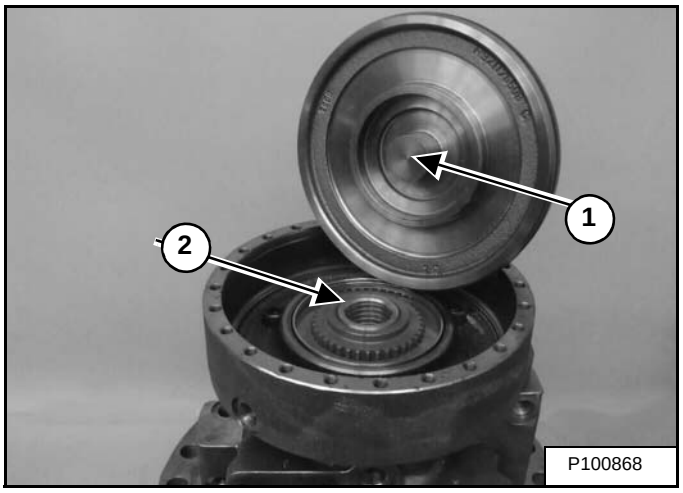


Inspect the brake piston (Item 1) **[Figure 30-21-9]** for damage including the surface that contacts the brake shaft.

Replace the seal (Item 2) **[Figure 30-21-9]**.

Assembly: Apply oil to the seal (Item 2) **[Figure 30-21-9]** for added protection when installing the brake piston.

Figure 30-21-10

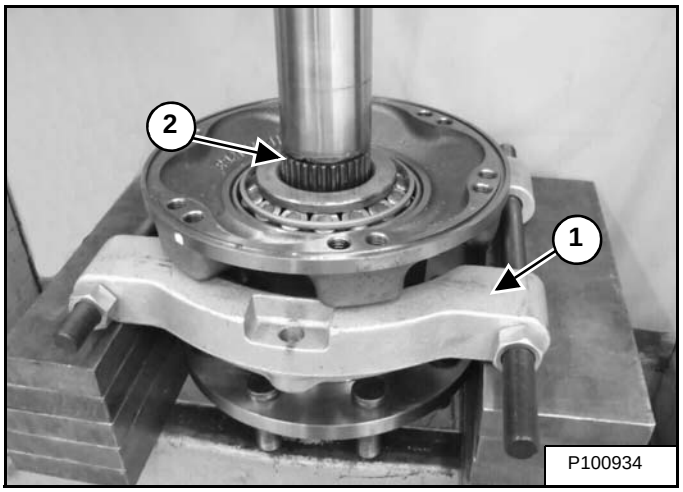


Inspect the piston surface (Item 1) and the bushing surface (Item 2) **[Figure 30-21-10]** in the brake shaft.

NOTE: The bushing (Item 2) [Figure 30-21-10] can be replaced in the brake shaft. When the bushing is replaced, install the bushing flush with the top of the brake shaft.

Disassembly And Assembly (Cont'd)

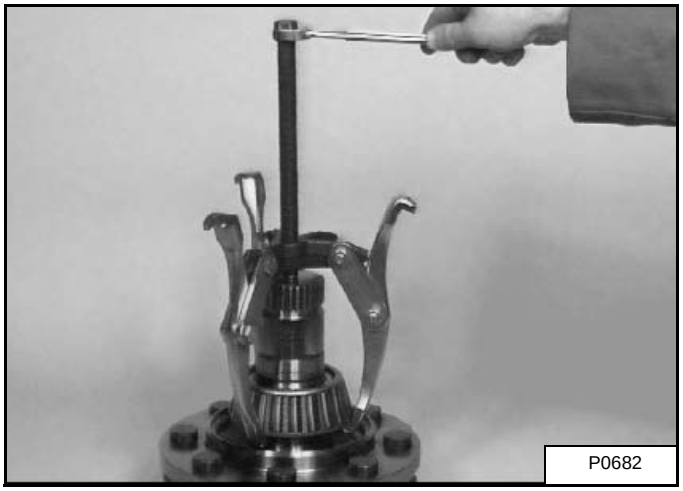
Figure 30-21-43



Disassembly: Install the bearing puller (Item 1) **[Figure 30-21-43]** under the front housing and support the puller and housing with blocks.

Disassembly: Press the shaft (Item 2) **[Figure 30-21-43]** from the housing.

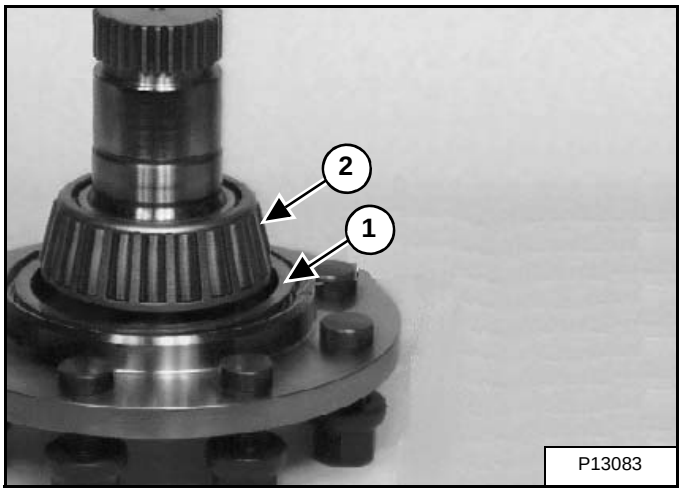
Figure 30-21-44



Disassembly: Use a bearing puller to remove the bearing from the shaft **[Figure 30-21-44]**.

NOTE: The bearing will become unserviceable during the removal procedure. Be sure to have a new bearing on hand before removing the old bearing.

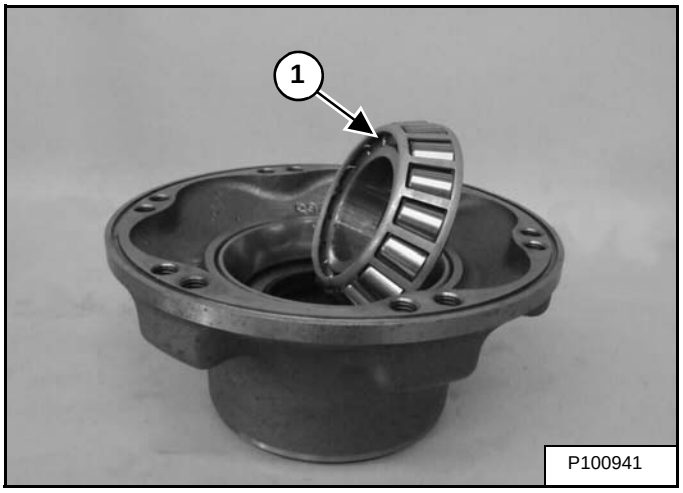
Figure 30-21-45



Assembly: Remove and replace the face seal (Item 1) **[Figure 30-21-45]** from the shaft.

Assembly: Install a new bearing (Item 2) **[Figure 30-21-45]** onto the shaft.

Figure 30-21-46

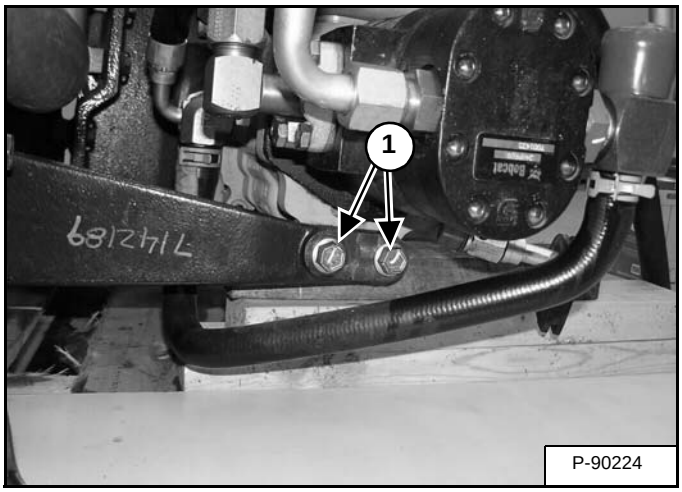


Remove and inspect the bearing (Item 1) **[Figure 30-21-46]** located in the front housing.

Replace the bearing and bearing cup if worn or damaged.

Removal And Installation (Cont'd)

Figure 30-40-11



Remove the two mounting bolts (Item 1) **[Figure 30-40-11]** at the hydraulic pump mounting bracket.

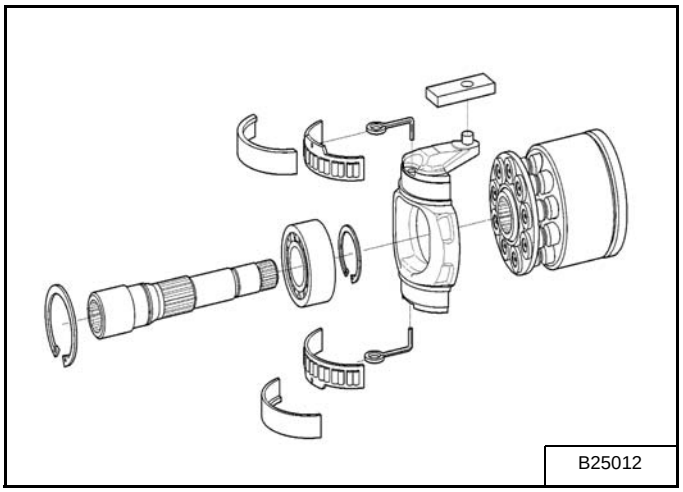
Installation: Tighten mounting bolt to 125 - 135 N•m (90 - 100 ft-lb)

Remove the hydrostatic pump from the mounting bracket and drive belt housing.

BEFORE START UP: Fill the hydrostatic pump with hydraulic oil. This will remove trapped air in the hydrostatic pumps before start up. (See Hydrostatic Pump Start Up on Page 30-40-6.)

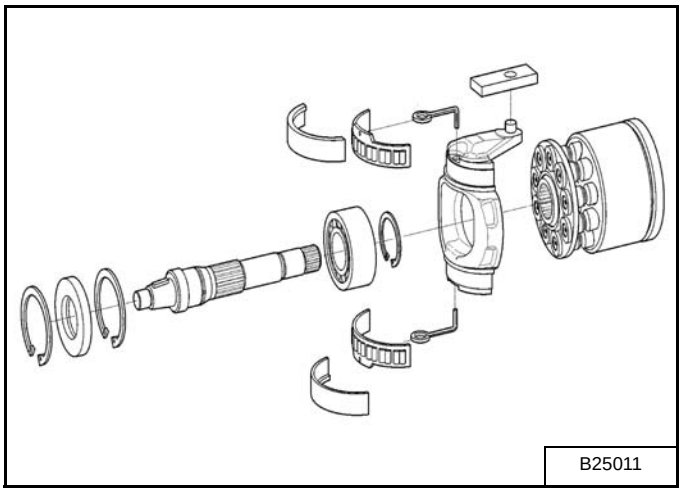
Disassembly And Assembly (Cont'd)

Figure 30-40-36



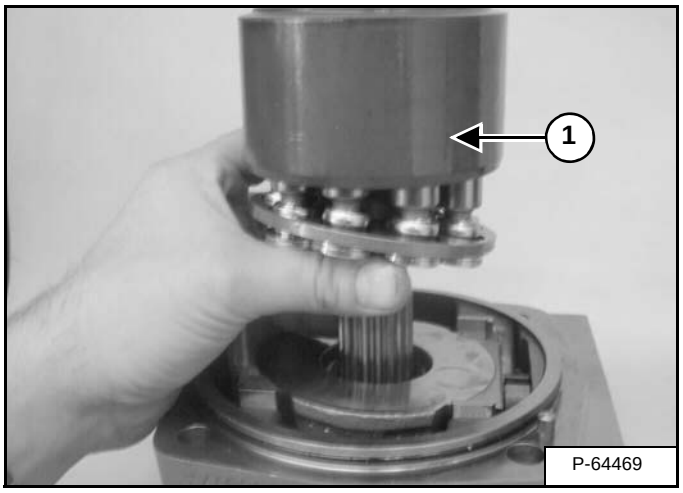
Right Side Rotating Group **[Figure 30-40-36]**.

Figure 30-40-37



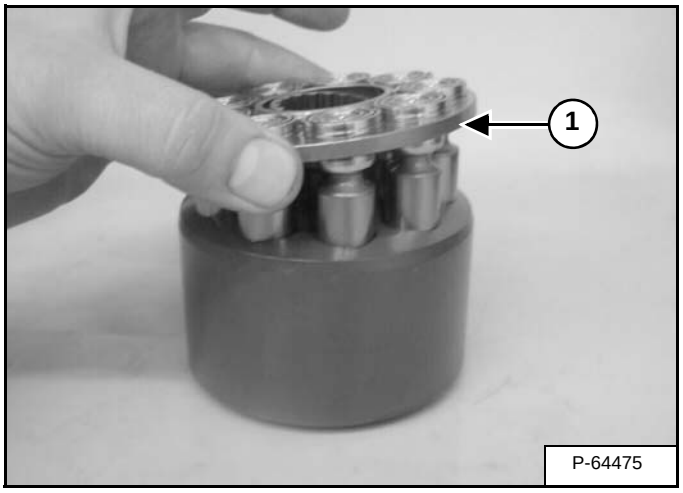
Left Side Rotating Group **[Figure 30-40-37]**.

Figure 30-40-38



Remove the piston assembly (Item 1) **[Figure 30-40-38]**.

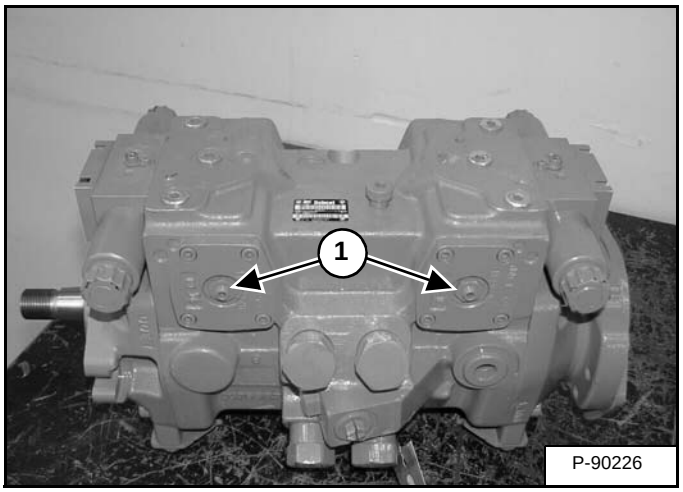
Figure 30-40-39



Remove the pistons (Item 1) **[Figure 30-40-39]** from the rotating block.

Mechanical Neutral Adjustment (Cont'd)

Figure 30-40-74



Loosen the pump neutral adjustment lock nut (Item 1) **[Figure 30-40-74]**.

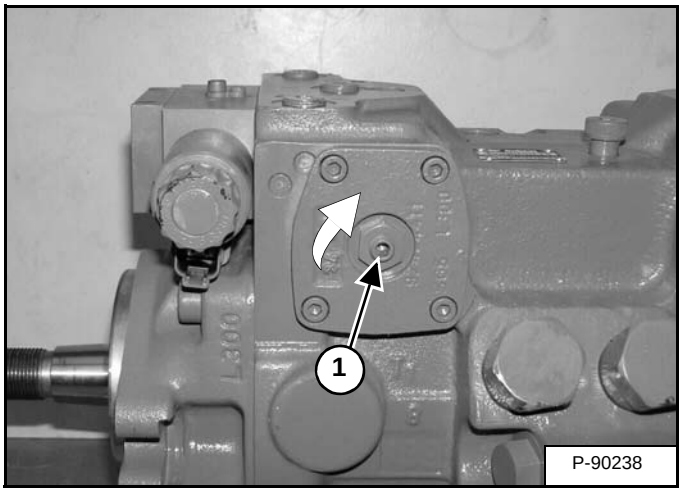
Start the loader using the remote start tool and run at idle.

⚠ WARNING

Stay clear of the loader wheels. They will turn whenever the pump is not centered.

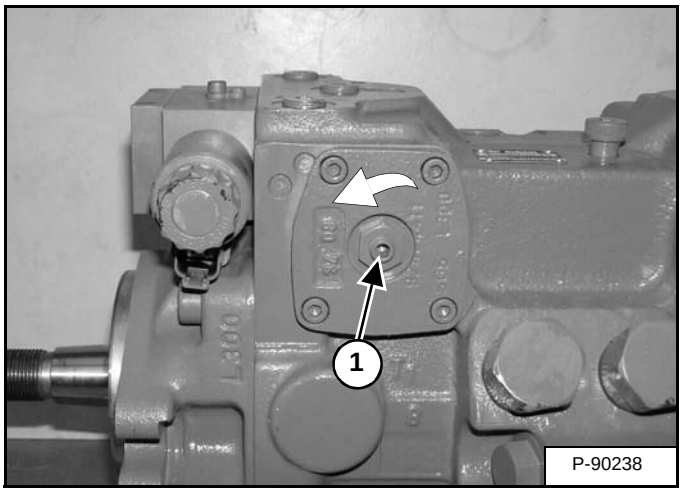
W-2276-1297

Figure 30-40-75



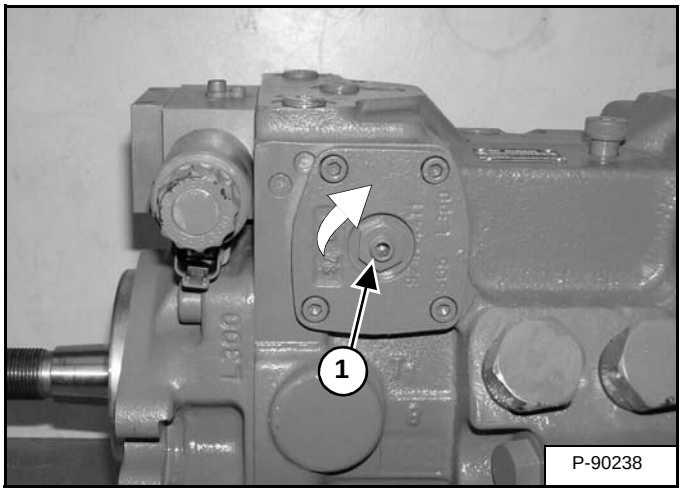
Turn the adjustment screw (Item 1) **[Figure 30-40-75]** clockwise, until one of the gauges registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-40-76



Turn the adjustment screw (Item 1) **[Figure 30-40-76]** counterclockwise, until the other gauge registers an increase in system pressure. Mark the position of the adjustment screw.

Figure 30-40-77

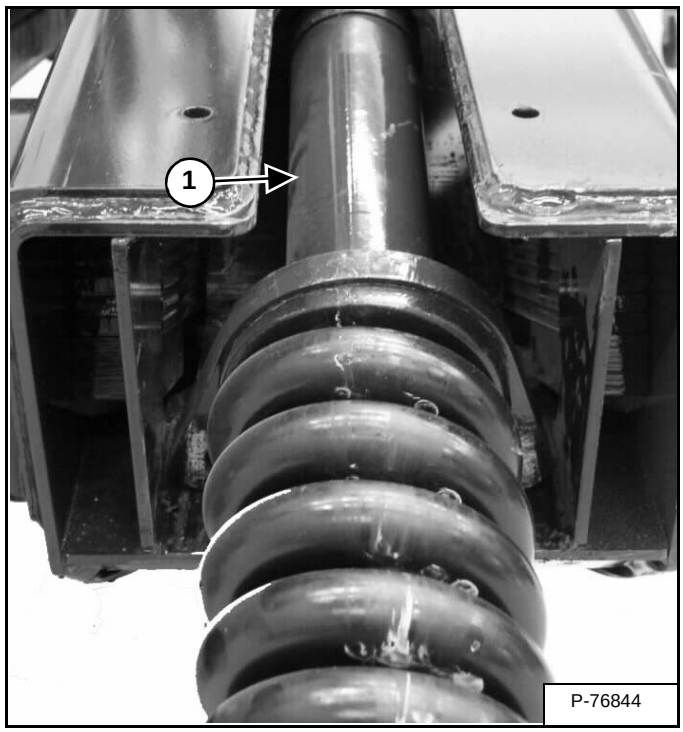


Turn the adjustment screw (Item 1) **[Figure 30-40-77]** clockwise, to a position halfway between the recorded positions. The pressure gauges should read equal pressures.

DRIVE SYSTEM

Idler (Front) Removal And Installation (Cont'd)

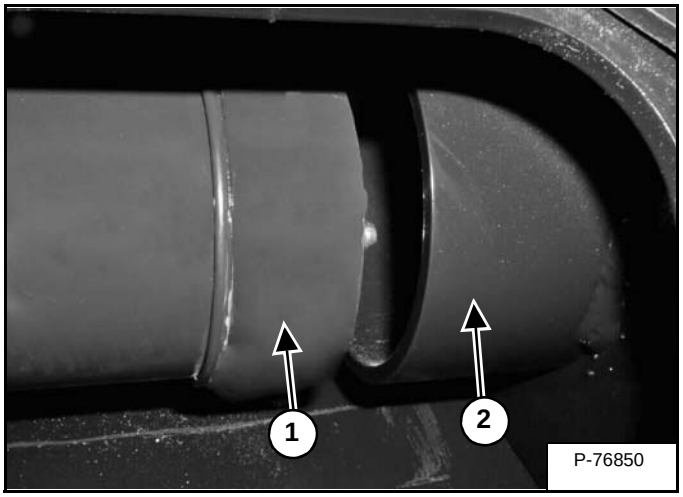
Figure 40-20-14



Slide the track tensioner (Item 1) **[Figure 40-20-14]** out of the track housing.

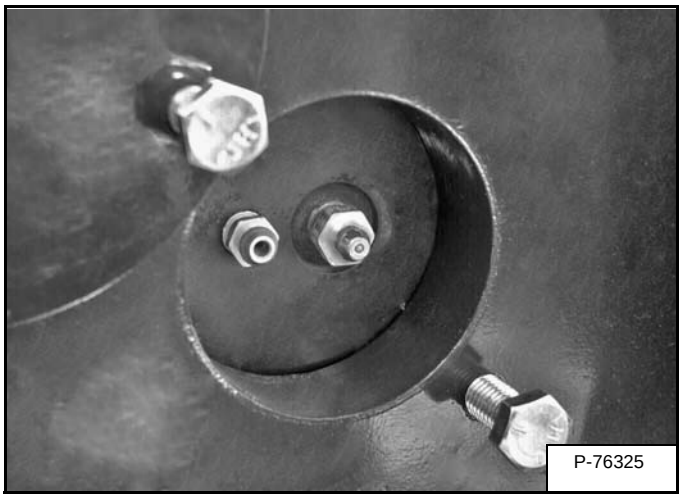
Installation: Track tensioner must be oriented as shown in **[Figure 40-20-14]** before sliding it into the track housing.

Figure 40-20-15



Installation: Track tensioner (Item 1) must slide into the guide tube (Item 2) **[Figure 40-20-15]**.

Figure 40-20-16

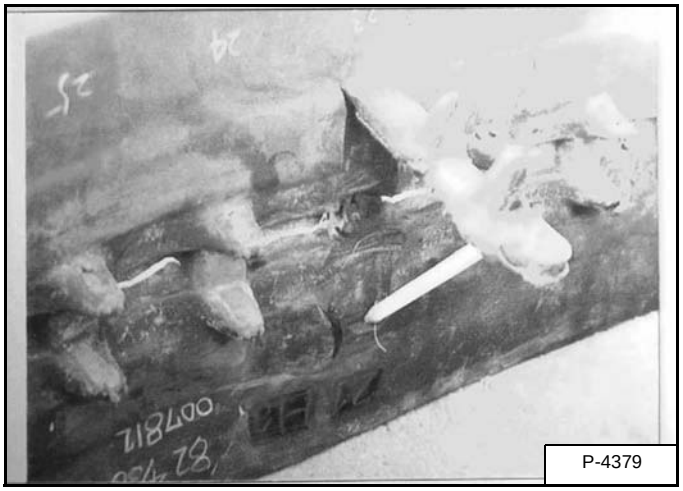


Installation: Track tensioner must be seated properly against the end of the track housing **[Figure 40-20-16]**.

Track Damage Identification (Cont'd)

Separation Of Embedded Metals

Figure 40-30-7



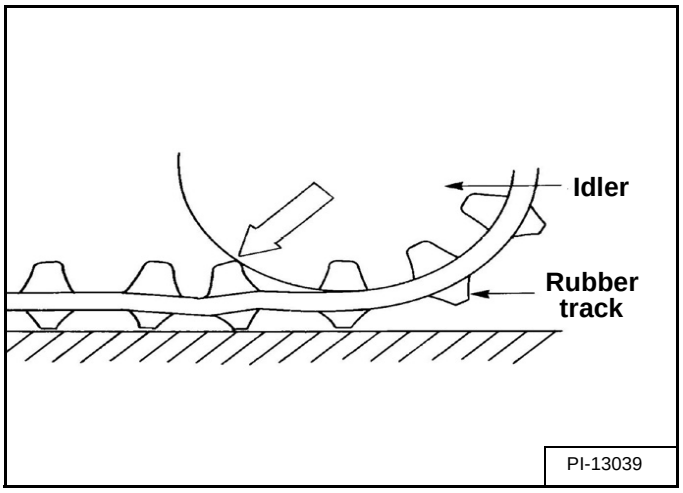
Damage:

Extraordinary outer forces applied to embedded metals cause their separation from the rubber track's body **[Figure 40-30-7]**.

Replacement:

Even a partial separation of embedded metals requires replacement of the track.

Figure 40-30-8

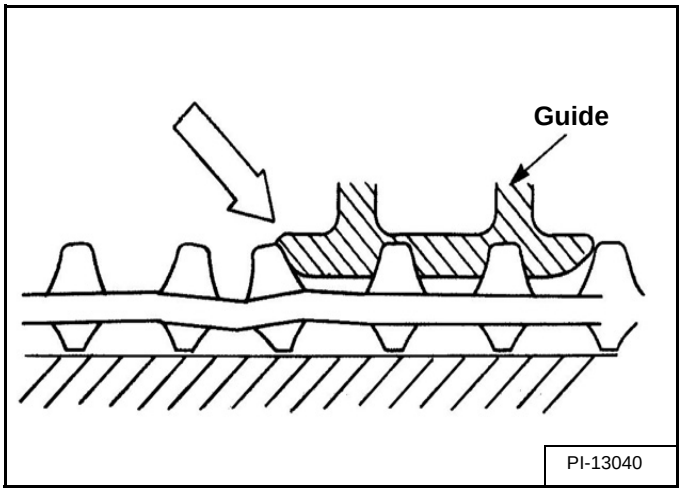


Causes of the damage:

Embedded metals are adhered between the steel cords and the rubber body. The following cases generate external forces greater than the adhesion strength, causing separation of the embedded metals:

When the idler continually rides on the projections of embedded metals, the embedded metals will eventually peel off **[Figure 40-30-8]**.

Figure 40-30-9

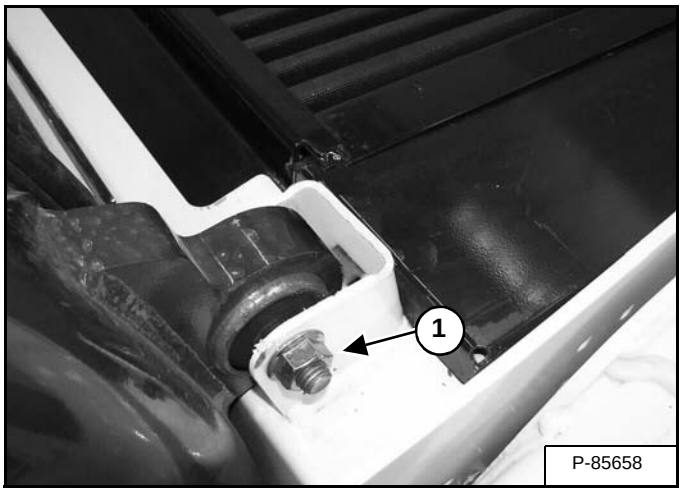


When a rubber track is detracked, it becomes stuck between the guide or the undercarriage frame, causing the separation of embedded metals **[Figure 40-30-9]**.

MAINFRAME

Removal And Installation (Cont'd)

Figure 50-20-6



Remove the two cab mount bolts and nuts (Item 1) **[Figure 50-20-6]** from both sides of the cab.

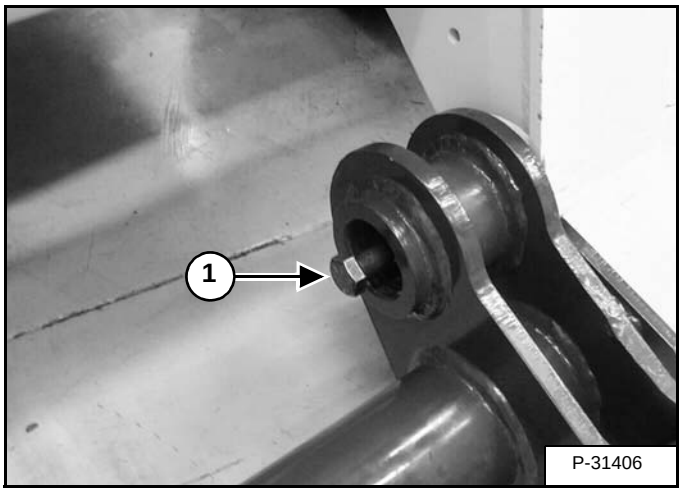
Installation: Tighten the cab mount bolts and nuts to 24,4 - 29,8 N•m (18 - 22 ft-lb) torque.

Figure 50-20-7

Using a strap and a hoist remove the cab from the loader.

Removal And Installation (Cont'd)

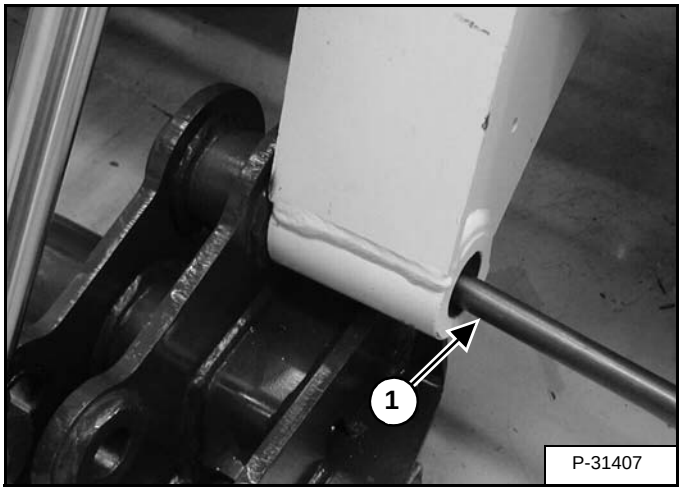
Figure 50-40-7



Remove the retainer bolt (Item 1) **[Figure 50-40-7]** from the Bob-Tach pin.

Installation: Tighten the retainer nut and bolt (Item 1) **[Figure 50-40-6]** and **[Figure 50-40-7]** to 446 N•m (330 ft-lb) torque.

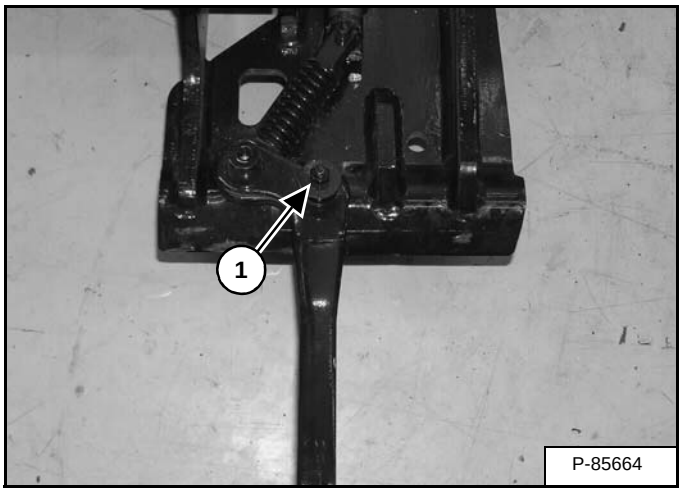
Figure 50-40-8



With a 0,875 mm (7/8 in) punch (Item 1) **[Figure 50-40-8]** and a hammer, drive the pivot pin out of the lift arm and Bob-Tach.

Lever And Wedge Disassembly And Assembly

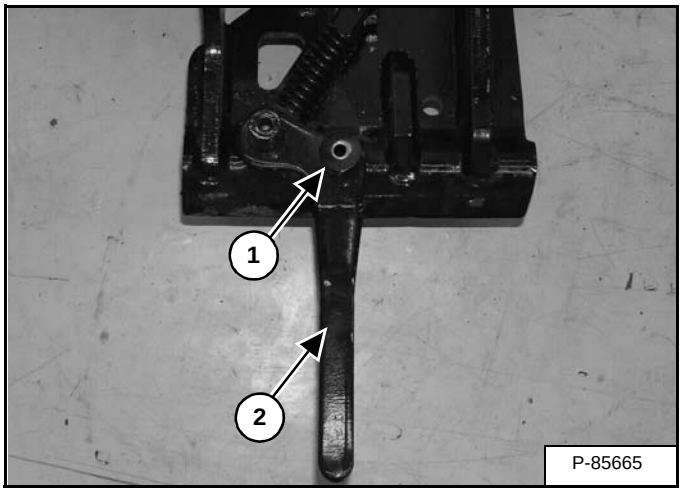
Figure 50-40-9



Remove the lever mounting nut (Item 1) **[Figure 50-40-9]**.

Installation: Tighten the nut to 48 - 54 N•m (35 - 40 ft-lb) torque.

Figure 50-40-10

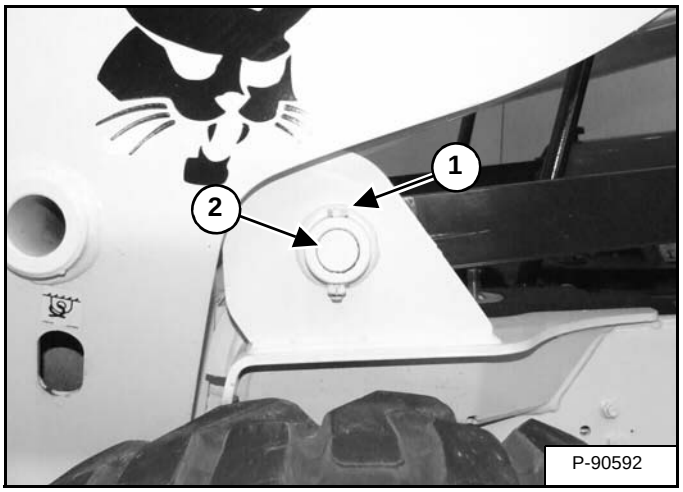


Remove the washer and spring, (Item 1) and the lever assembly (Item 2) **[Figure 50-40-10]**.

LIFT ARMS

Stabilizer Bar Removal And Installation

Figure 50-50-1



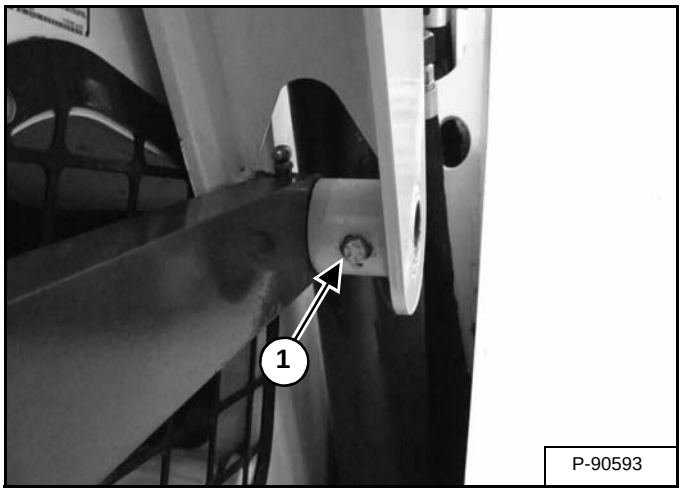
Raise the operator cab. (See Raising on Page 10-30-1.)

NOTE: Remove the lift arm stabilizer bar from one side of the loader at a time.

Remove the retainer bolt (Item 1) **[Figure 50-50-1]** and nut from the front stabilizer bar pivot pin.

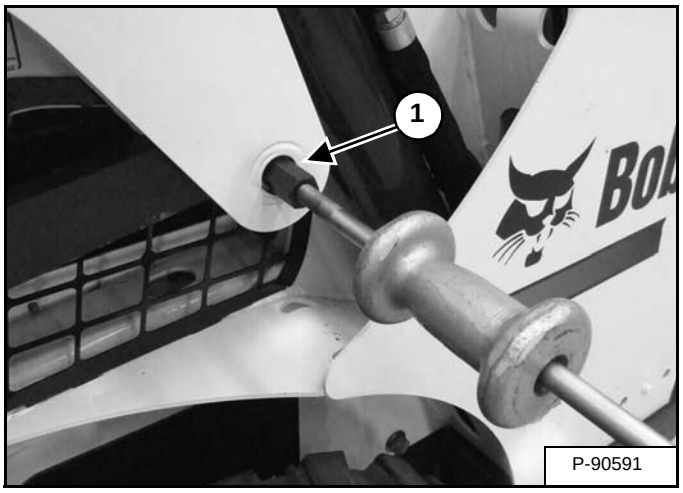
Remove the stabilizer bar pivot pin (Item 2) **[Figure 50-50-1]**.

Figure 50-50-2



Remove the retainer bolt (Item 1) **[Figure 50-50-2]** from the stabilizer bar rear pivot pin at the lift arm.

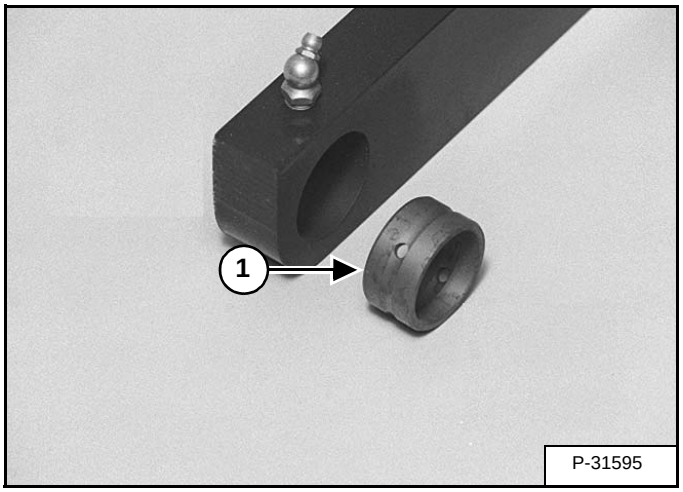
Figure 50-50-3



With a slide hammer, remove the rear lift arm stabilizer pin (Item 1) **[Figure 50-50-3].**

Remove the stabilizer bar from the loader.

Figure 50-50-4

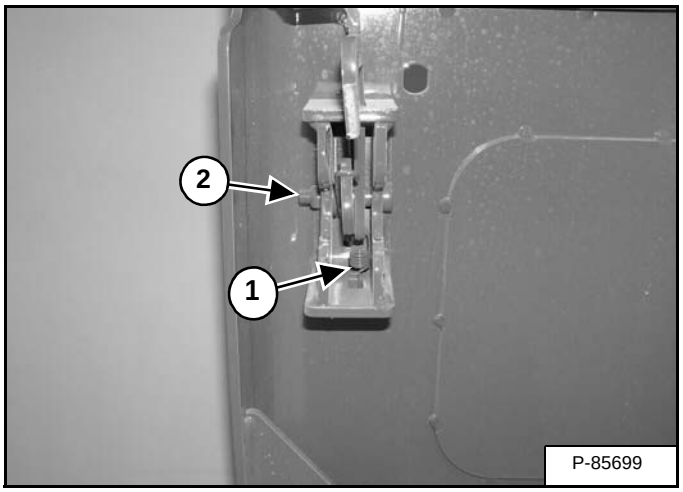


Remove the bushings (Item 1) **[Figure 50-50-4]** from the stabilizer bar (both ends).

Inspect the bushings and replace as needed.

Latch Removal And Installation

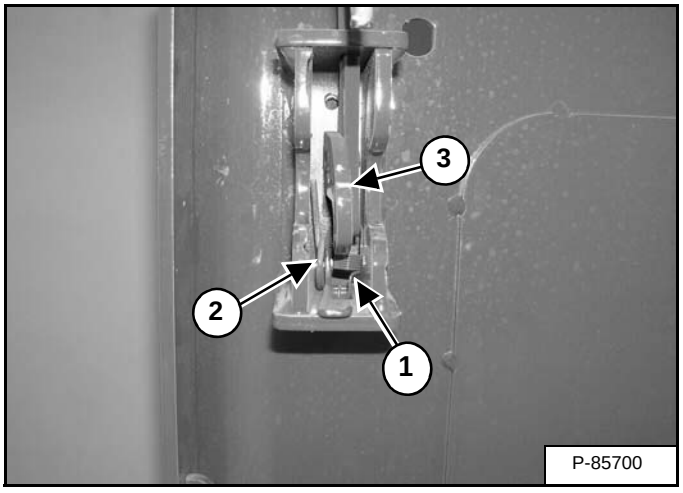
Figure 50-70-7



Disconnect the spring (Item 1) **[Figure 50-70-7]** from the rear door.

Remove the bolt and nut (Item 2) **[Figure 50-70-7]** from the latch.

Figure 50-70-8

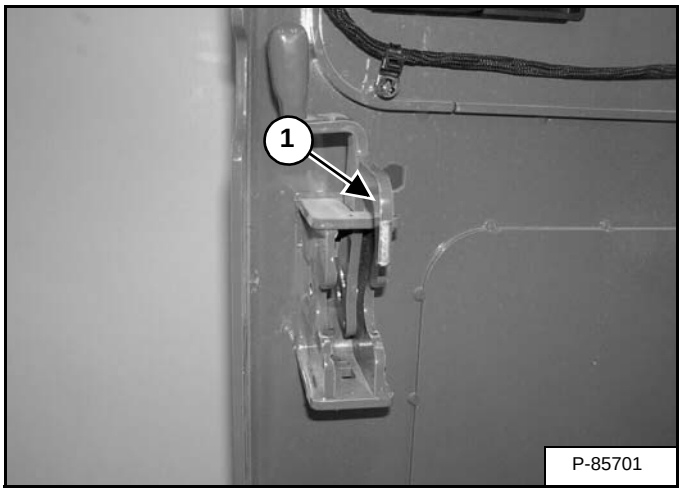


Remove the spring (Item 1) **[Figure 50-70-8]** from the door handle.

Remove the spring (Item 2) **[Figure 50-70-8]** from the door latch.

Remove the door latch (Item 3) **[Figure 50-70-8]** from the door handle.

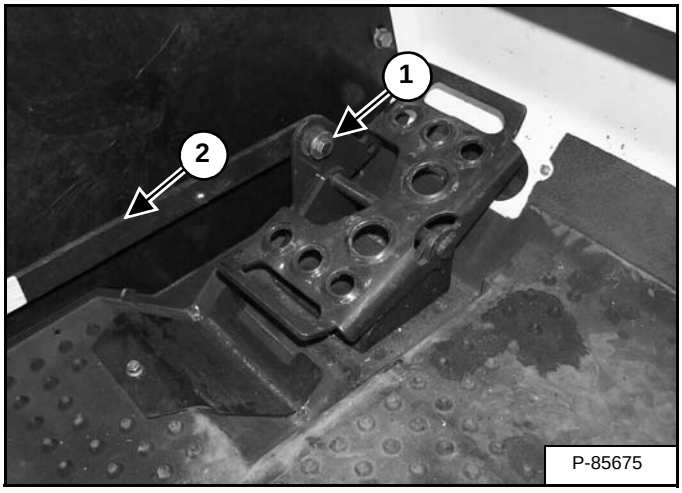
Figure 50-70-9



Remove the door handle (Item 1) **[Figure 50-70-9]** from the rear door.

Linkage Removal And Installation (Cont'd)

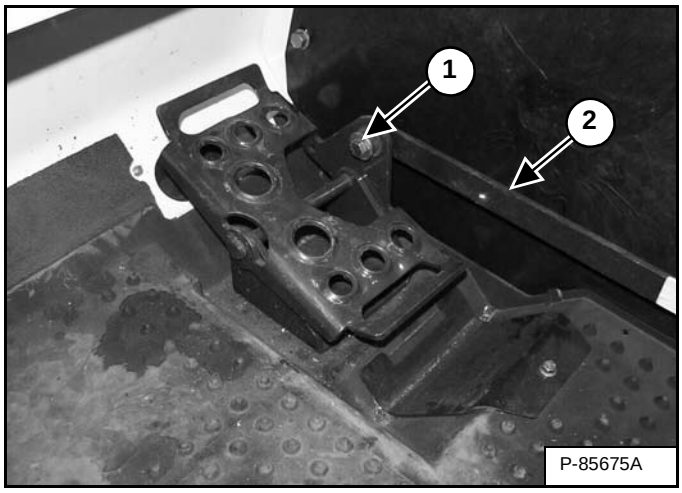
Figure 50-90-7



Remove the bolt (Item 1) **[Figure 50-90-7]** and nut from the pedal linkage.

Remove the linkage (Item 2) **[Figure 50-90-7]**.

Figure 50-90-8



Remove the bolt (Item 1) **[Figure 50-90-8]** and nut from the pedal linkage.

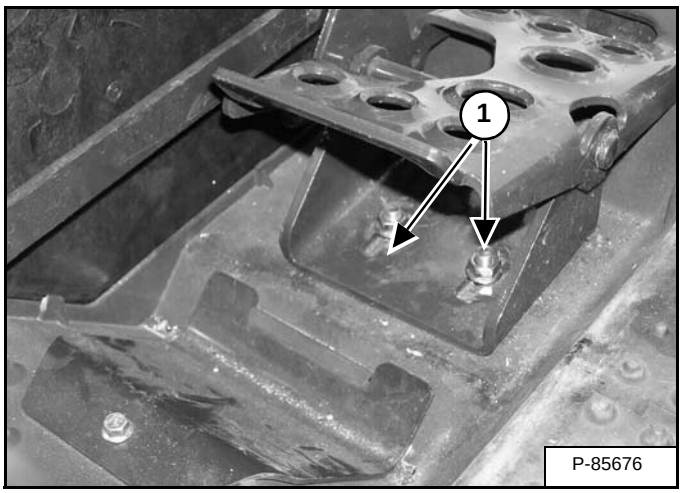
Remove the linkage (Item 2) **[Figure 50-90-8]**.

Pedal (Adjusting)

After installing the pedal, adjust the pedal angle so that there is clearance under the rear of the pedal. The valve spool must travel full stroke without the pedal hitting the floor panel.

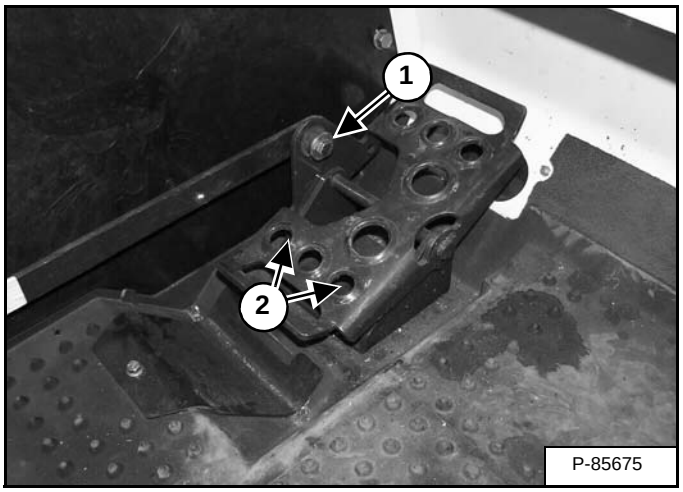
The pedals should be positioned at a comfortable angle so full movement of the pedal can be reached easily while properly sitting in the loader seat.

Figure 50-90-9



Loosen the two mounting bolts (Item 1) **[Figure 50-90-9]** from the pedal mounting bracket.

Figure 50-90-10



Loosen the bolt (Item 1) **[Figure 50-90-10]** and nut on the pedal linkage.

Check the bushing in the pedal for wear and replace as needed.

Tilt the pedal back and forth until an acceptable "neutral" angle is achieved on the pedal.

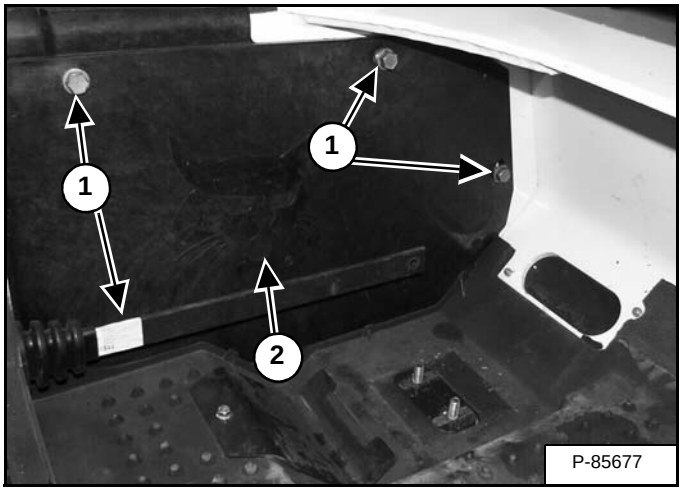
Tighten the two nuts (Item 2) and pivot bolt (Item 1) **[Figure 50-90-10]** on the pedal assembly to standard torque.

ACCESS PANEL (INSIDE)

Removal And Installation (Left)

Remove the control pedal. (See Pedal Removal And Installation on Page 50-90-1.)

Figure 50-120-1



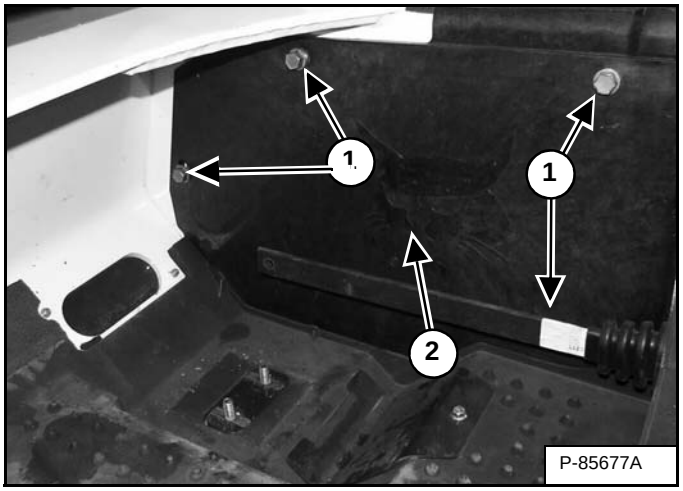
Remove the four mounting screws (Item 1), and remove the left access panel (Item 2) **[Figure 50-120-1]**.

Remove the front access panel from the loader.

Removal And Installation (Right)

Remove the control pedal. (See Pedal Removal And Installation on Page 50-90-1.)

Figure 50-120-2



Remove the top mounting screw (Item 1), and loosen the two bottom mounting screws (Item 2) **[Figure 50-120-2]** from the front access panel.

Remove the front access panel from the loader.

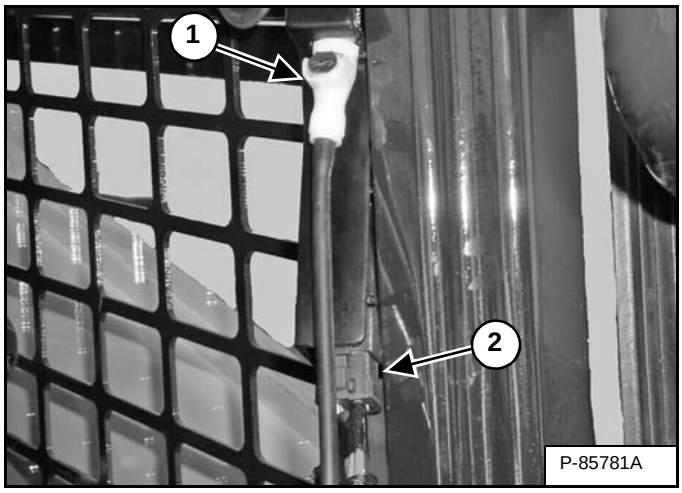
CAB DOOR

Description

The standard cab door is available as an option or dealer installed kit.

Removal And Installation

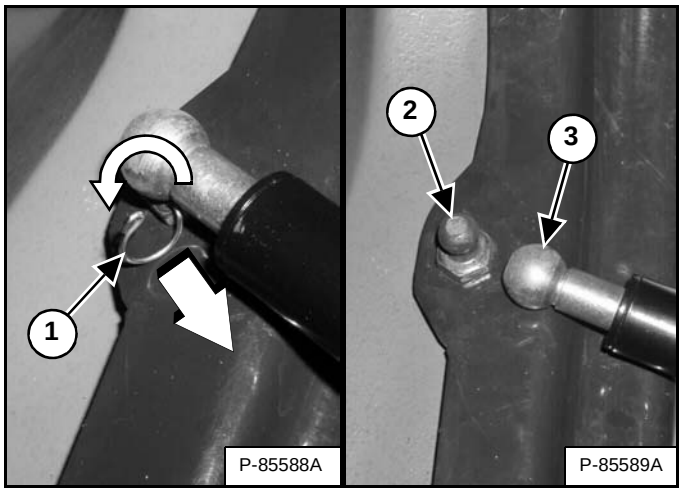
Figure 50-140-1



Open the cab door.

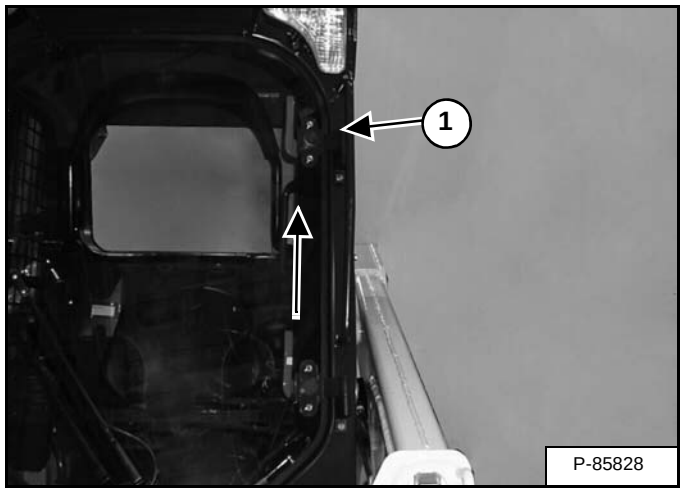
Disconnect electrical connector (Item 2) and washer fluid hose (Item 1) **[Figure 50-140-1]**.

Figure 50-140-2



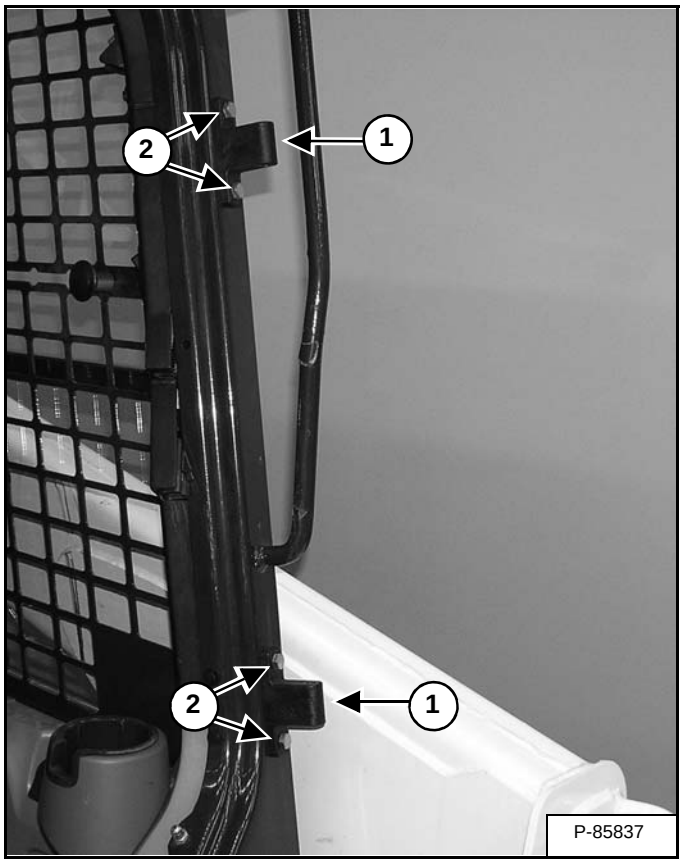
Rotate and pull the clip (Item 1) out of the gas spring socket. Pull the gas spring socket (Item 3) straight off the ball stud fitting (Item 2) **[Figure 50-140-2]**.

Figure 50-140-3



Lift the door (Item 1) **[Figure 50-140-3]** off the hinges.

Figure 50-140-4



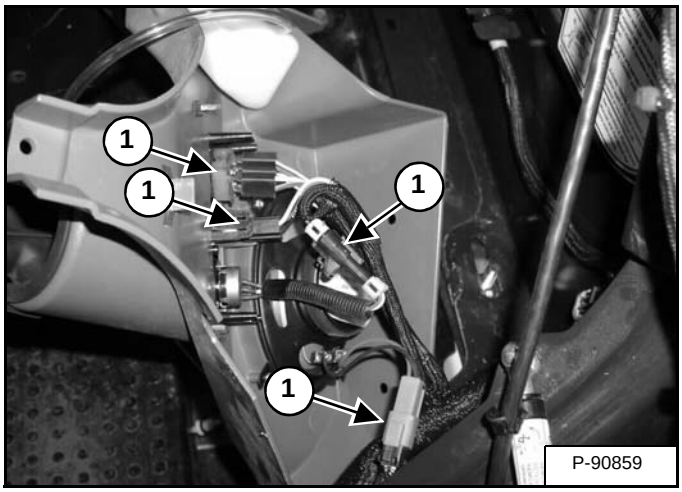
Remove the four bolts and nuts (Item 2) **[Figure 50-140-4]** from the cab.

Remove the hinges (Item 1) **[Figure 50-140-4]** from the cab.

Installation: Install the hinges (Item 1) on the cab and use the bolts and nuts (Item 2) **[Figure 50-140-4]** to secure the hinges. Tighten to 9,6 - 10,7 N•m (85 - 90 in-lb) torque.

Removal And Installation (Cont'd)

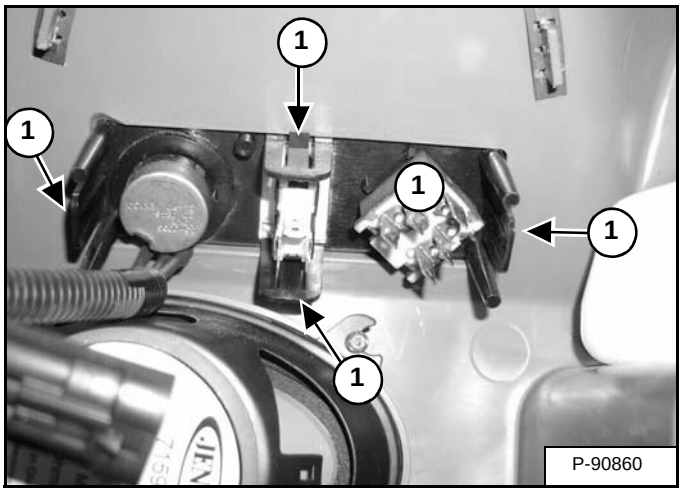
Figure 50-160-9



Disconnect the HVAC or radio wire harnesses (Item 1) **[Figure 50-160-9]** (if equipped).

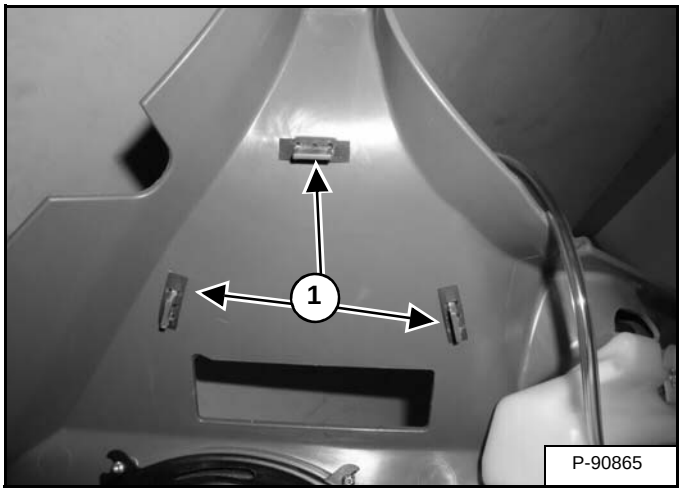
Disassembly And Assembly

Figure 50-160-10



Press the four tabs (Item 1) **[Figure 50-160-10]** and remove the HVAC control out of the left side lower panel.

Figure 50-160-11



NOTE: If the three clips (Item 1) [Figure 50-160-11] are removed the cup holder will need to be replaced.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
GROUNDING	2000 THROUGH 2999	BLACK	BLK
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
ATTACHMENT CONTROLS	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
ACCESSORIES	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

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GROUND	PAGE 4
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ENGINE	PAGE 6
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CAB DISPLAY	PAGE 8
CAB	PAGE 9
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LIGHTS	PAGE 11
HVAC	PAGE 12
OPTIONS	PAGE 13

LEGEND

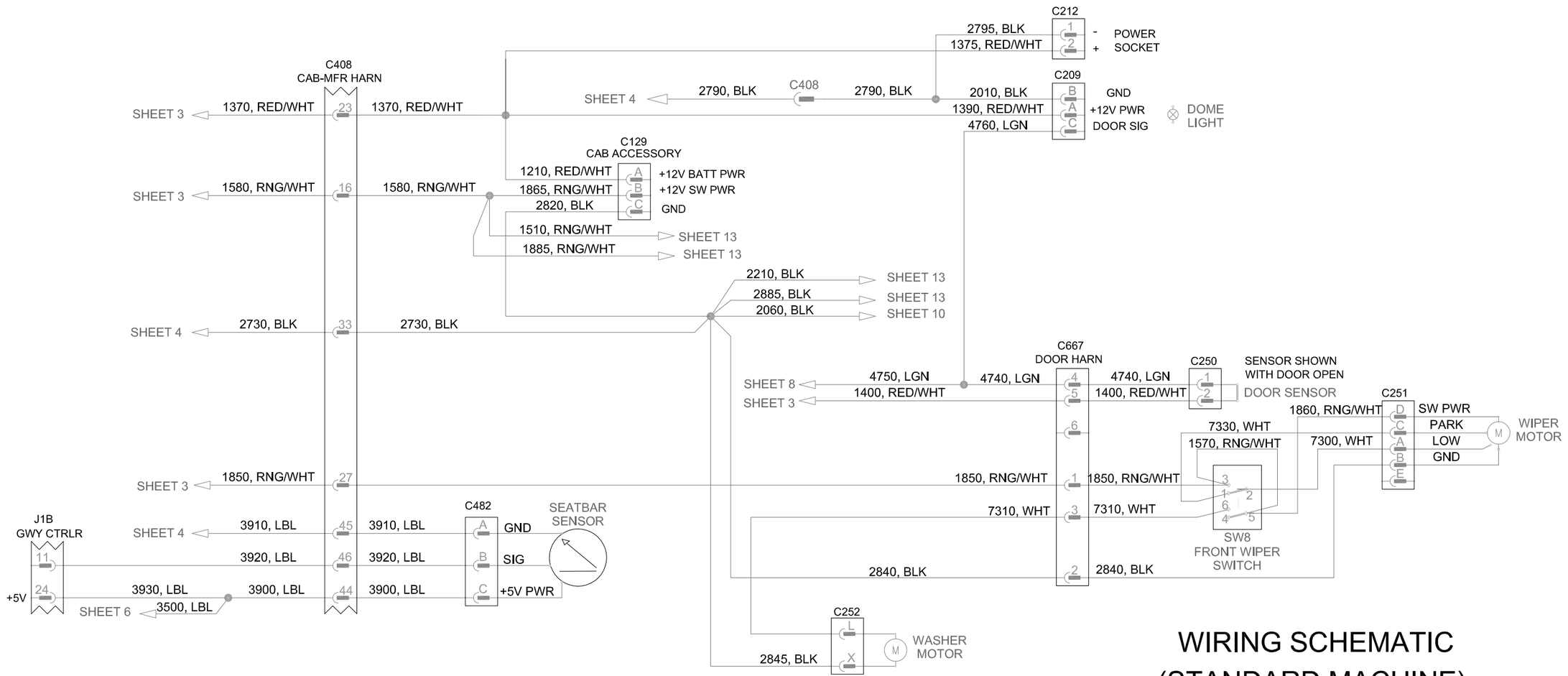
PARTIAL CONNECTOR

CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

CAB



WIRING SCHEMATIC
(STANDARD MACHINE)
T870 (S/N A3PG11001 AND ABOVE)
(S/N A3PH11001 AND ABOVE)

Sheet 9 of 13

(PRINTEDAUGUST 2010)

719067

Printed In U.S.A.

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
GROUNDING	2000 THROUGH 2999	BLACK	BLK
MONITORING	3000 THROUGH 3999	LIGHT BLUE	LBL
HYDRAULIC	4000 THROUGH 4999	LIGHT GREEN	LGN
ATTACHMENT CONTROLS	5000 THROUGH 5999	YELLOW	YEL
LIGHTS	6000 THROUGH 6999	PINK	PNK
ACCESSORIES	7000 THROUGH 7999	WHITE	WHT
ENGINE	8000 THROUGH 8999	TAN	TAN
COMMUNICATION	9000 THROUGH 9999	PURPLE	PUR
COMMUNICATION	9000 THROUGH 9999	PURPLE/WHITE	PUR/WHT

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LEGEND

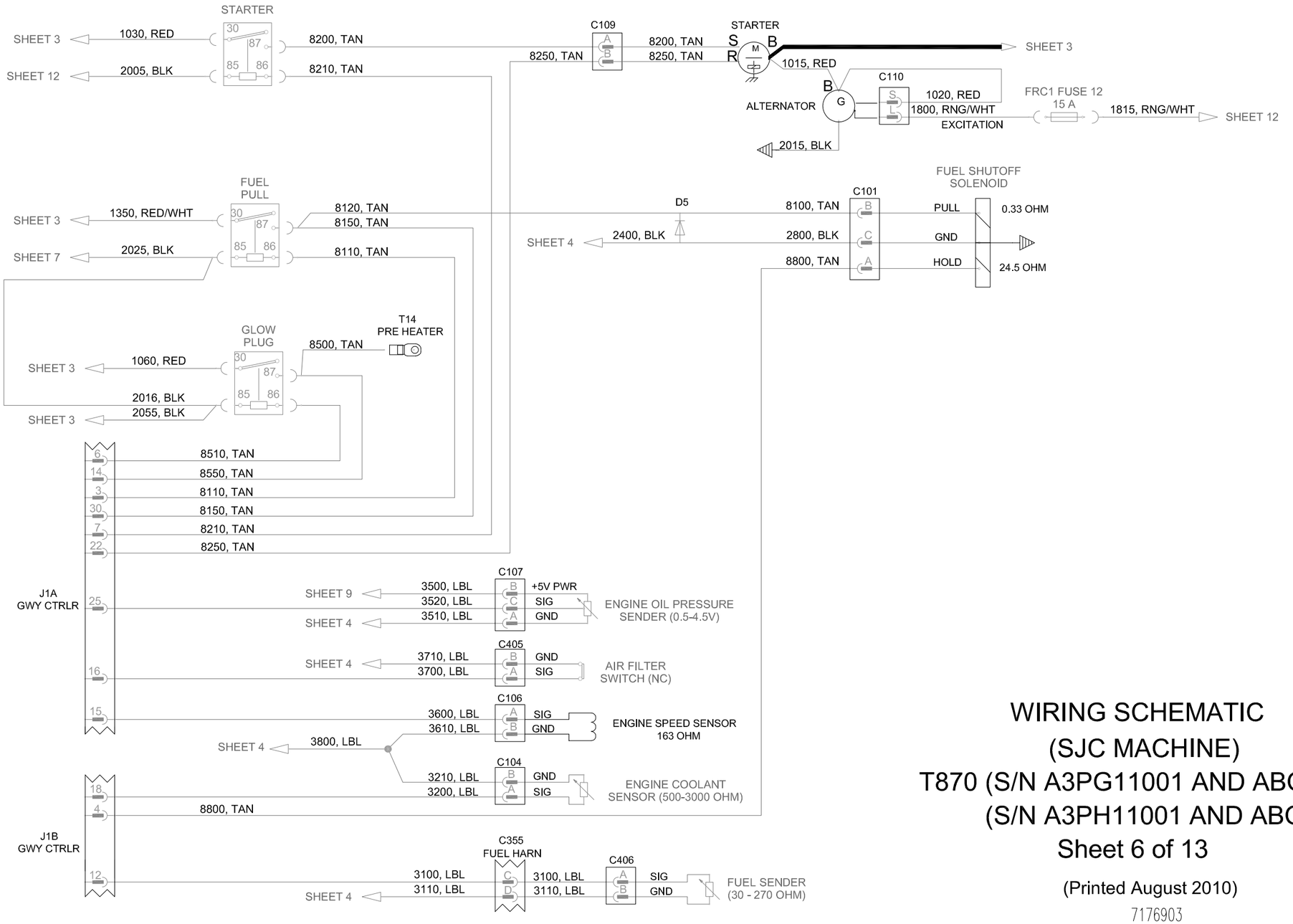
PARTIAL CONNECTOR

CONNECTOR

WIRE BREAK
(TWO WIRE BREAKS
JOIN ONE WIRE)

SHEET #

ENGINE

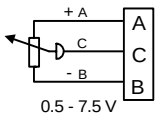
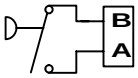
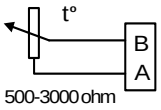
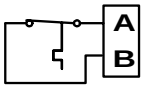
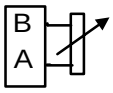
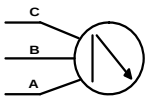
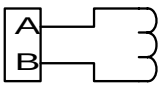


WIRING SCHEMATIC
(SJC MACHINE)
T870 (S/N A3PG11001 AND ABOVE)
(S/N A3PH11001 AND ABOVE)
Sheet 6 of 13

(Printed August 2010)
7176903

Printed In U.S.A.

Glossary Of Electrical Symbols (Cont'd)

SYMBOL	DESCRIPTION
	SENDERS AND SENSORS
	PRESSURE SENDER - Provides a variable voltage proportional to pressure. (Sender voltage rating is listed to show volts at high and low setting.)
	PRESSURE SWITCH - Switch opens or closes at a predetermined pressure to active a function or to turn on a warning light. (Switch is shown in the open position.)
	TEMPERATURE SENDER - Provides a variable resistance (ohm) signal proportional to temperature. (Sender ohm rating is listed to show ohm at high and low setting.)
	TEMPERATURE SWITCH - The switch opens or closes at a predetermined temperature to active a function or to turn on a warning light. (Switch is shown in the closed position.)
	FUEL SENDER - Provides a variable resistance, based on the fuel level in the tank. (Sender ohm rating is listed to show ohm at full and empty setting.)
	HALL EFFECT SENSOR - Detects linear or rotary position and provides a proportional variable voltage.
	SPEED SENSOR - magnetic pickup - detects rpm.

BATTERY

Removal And Installation

⚠ WARNING

AVOID INJURY OR DEATH

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

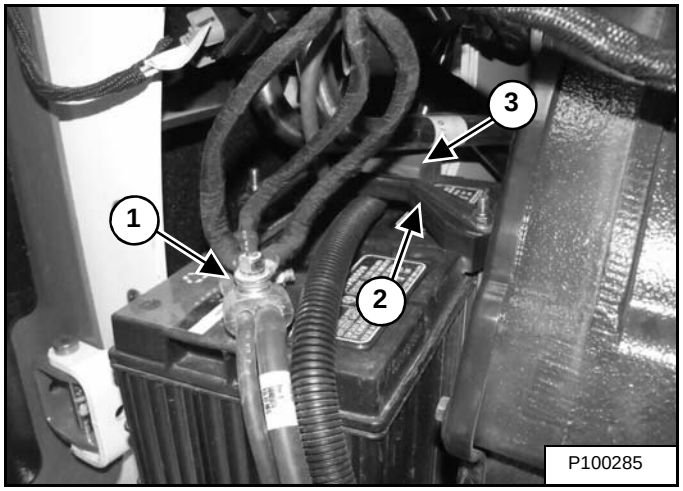
In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

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

W-2065-0807

Open the rear door.

Figure 60-20-1



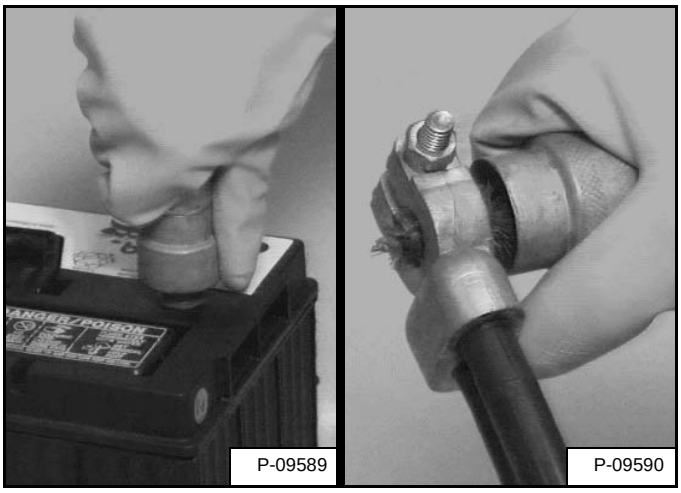
Disconnect the negative (-) cable (Item 1) **[Figure 60-20-1]**.

Remove the battery hold down clamp (Item 2) **[Figure 60-20-1]**.

Disconnect the positive (+) cable (Item 3) **[Figure 60-20-1]** from the battery.

Remove the battery from the loader.

Figure 60-20-2



Always clean the battery terminals and cable ends when installing a new or used battery **[Figure 60-20-2]**.

When installing the battery in the loader, do not touch any metal parts with the battery terminals.

Connect the negative (-) cable last to prevent sparks.

Connect and tighten the battery cables.

Install and tighten the battery hold down.

⚠ WARNING

BATTERY GAS CAN EXPLODE AND CAUSE SERIOUS INJURY OR DEATH

Keep arcs, sparks, flames and lighted tobacco away from batteries. When *jumping* from booster battery make final connection (negative) at machine frame.

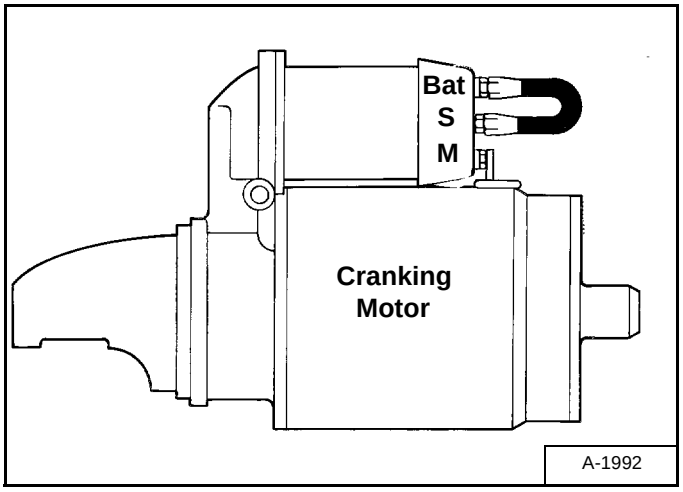
Do not jump start or charge a frozen or damaged battery. Warm battery to 16°C (60°F) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

W-2066-0910

STARTER

Testing

Figure 60-40-1



The key switch must be in the OFF position.

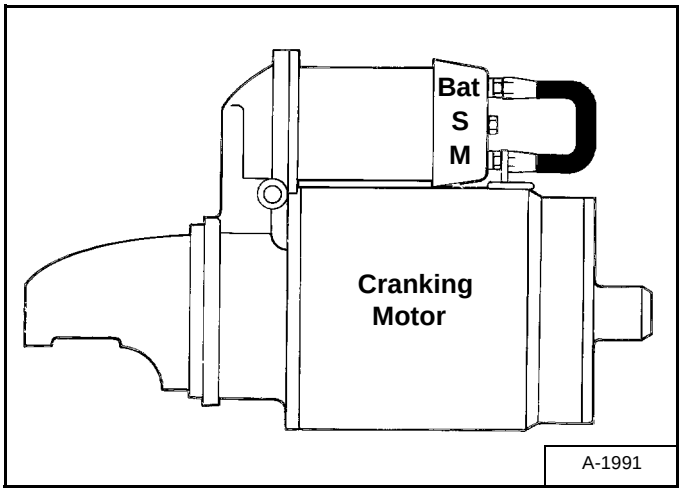
The battery must be at full charge.

The cable connections on the battery must be clean and tight.

Connect a jumper wire between S terminal and BAT terminal **[Figure 60-40-1]**.

If the starter turns but does not turn the engine, the starter drive has a defect.

Figure 60-40-2



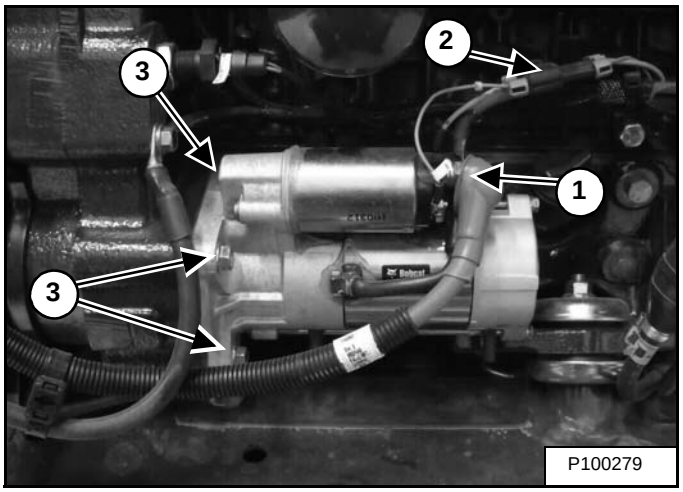
Connect a jumper wire (of at least 4 gauge in size) between the M terminal and the BAT terminal **[Figure 60-40-2]**.

If the starter turns, the defect is in the solenoid.

If the starter does not turn, the starter is defective.

Removal And Installation

Figure 60-40-3



Open the rear door.

Disconnect the negative (-) cable from the battery.

Disconnect the wires and positive (+) cable (Item 1) **[Figure 60-40-3]** from the starter solenoid.

Installation: Tighten the nut to 14,7 - 16,7 N•m (10.8 - 12.3 ft-lb) torque.

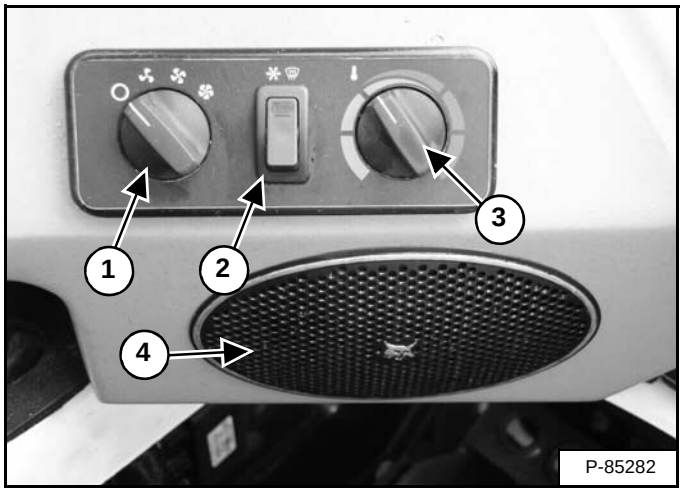
Disconnect the wire connector (Item 2) **[Figure 60-40-3]** from the two solenoid wires.

Remove the three mounting bolts (Item 3) **[Figure 60-40-3]**.

Remove the starter from the engine.

Left Side Lower Panel

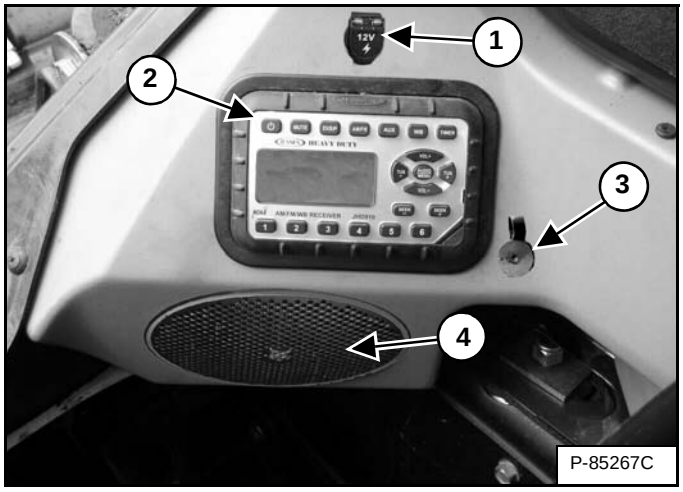
Figure 60-50-9



REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	FAN MOTOR (Option)	Turn clockwise to increase fan speed; counterclockwise to decrease. There are four positions; OFF-1-2-3.
2	AIR CONDITIONING / DEFROST SWITCH (Option)	Press top of switch to start; bottom to stop. Switch will light blue when started. Fan Motor (Item 1) must be ON for A/C to operate.
3	TEMPERATURE CONTROL (Option)	Turn clockwise to increase the temperature; counterclockwise to decrease.
4	SPEAKER (Option)	Left speaker used with optional radio.

Right Side Lower Panel

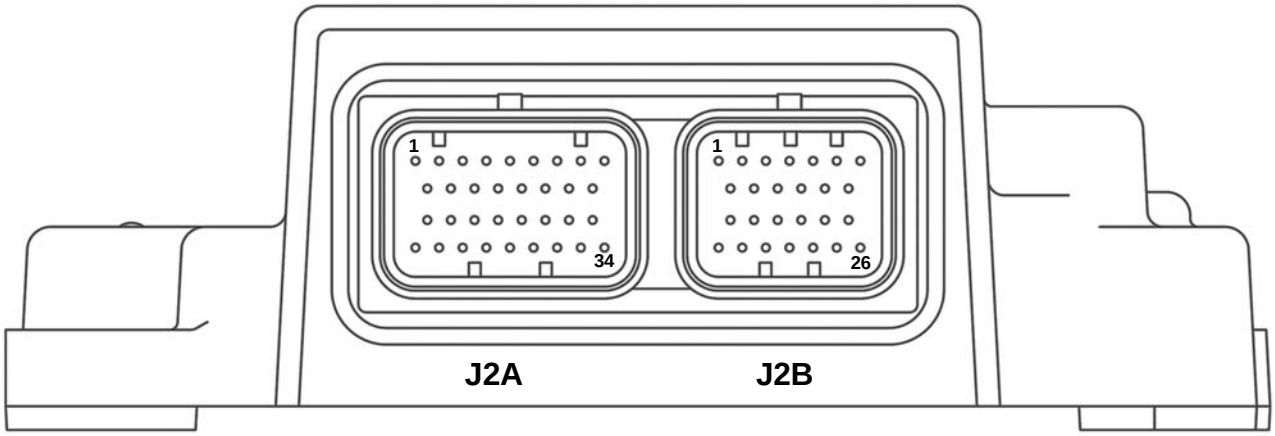
Figure 60-50-10



REF. NO.	DESCRIPTION	FUNCTION / OPERATION
1	POWER PORT	Provides a 12 volt receptacle for accessories.
2	RADIO (Option)	See Radio in this manual.
3	HEADPHONE JACK (Option)	Used to connect headphones to the optional radio output. Automatically silences speakers when used.
4	SPEAKER (Option)	Right speaker used with optional radio.

Connector Identification (Cont'd)

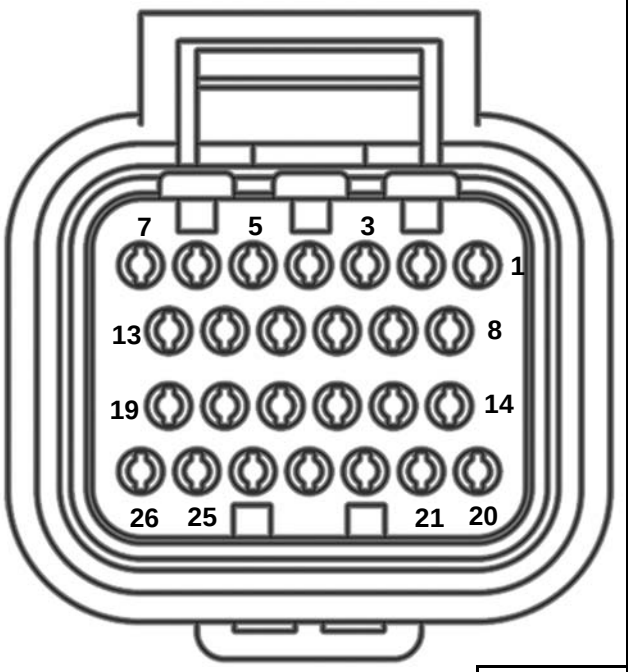
Auxiliary Controller



Harness Connector View

J2A

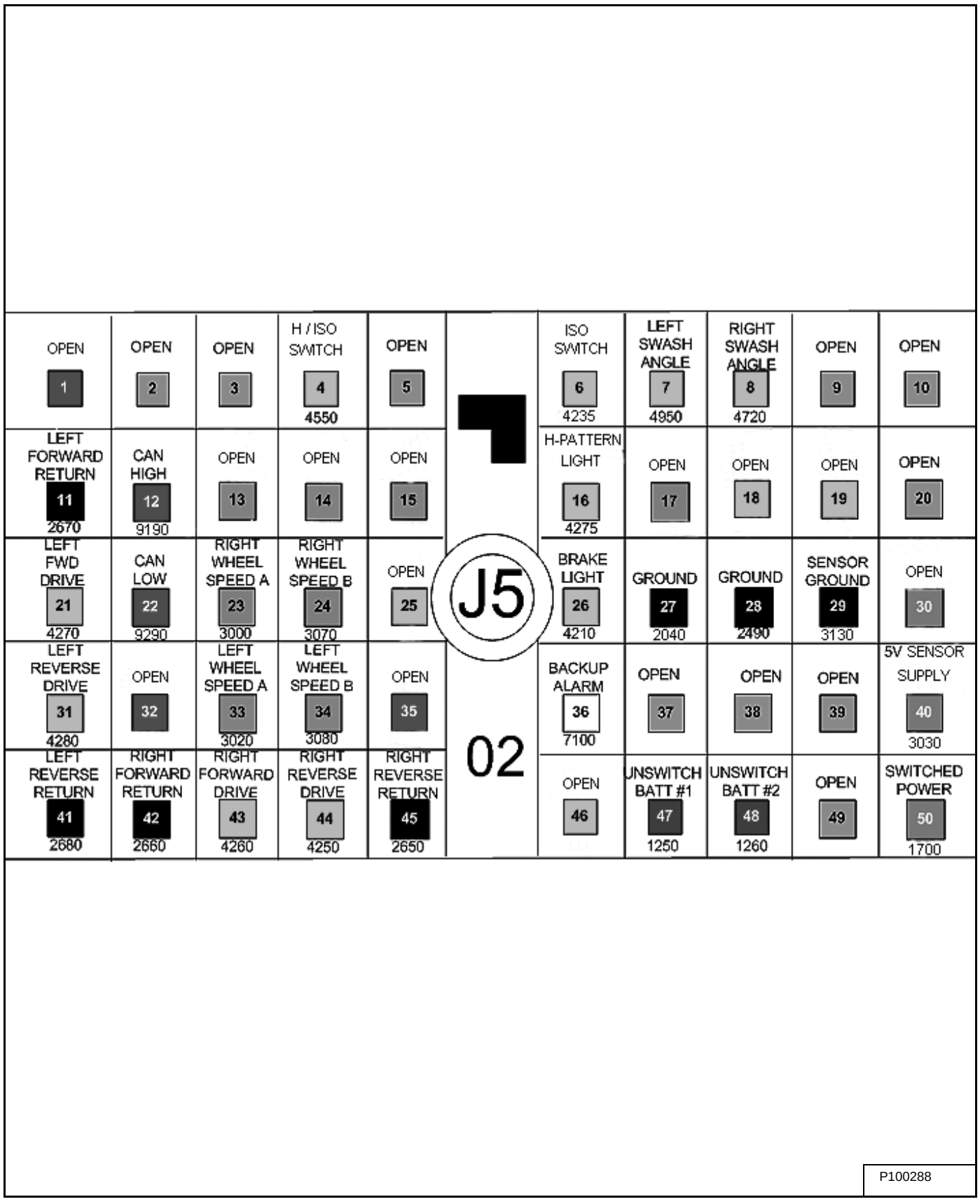
Harness Connector View



J2B

P-76647
P-76646
P-76645

Connector Identification (Cont'd)

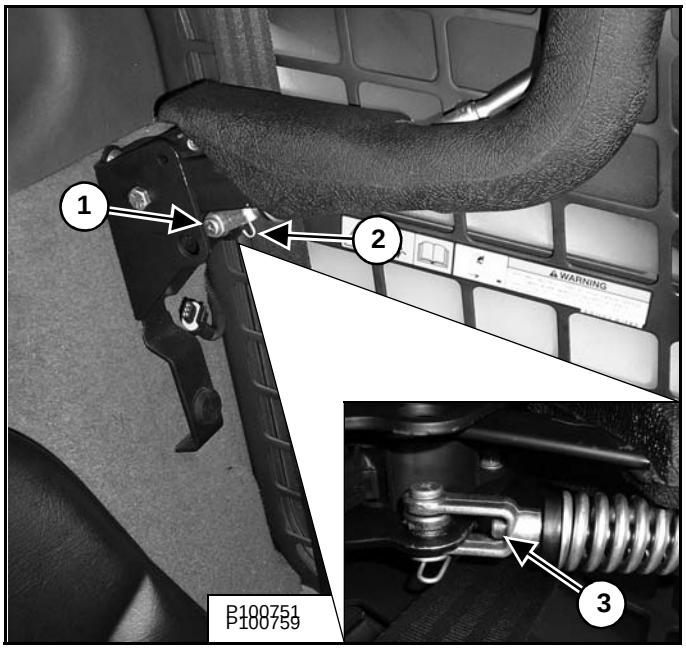


Service Codes List (Cont'd)

CODE	DESCRIPTION	CODE	DESCRIPTION
M1502	Traction lock pull output error ON	M3805	Auxiliary hydraulic lock short to battery
M1503	Traction lock pull output error OFF	M3806	Auxiliary hydraulic lock short to ground
M1507	Traction lock pull output open circuit	M3807	Auxiliary hydraulic lock open circuit
M1528	Traction lock pull output failure	M3832	Auxiliary hydraulic lock overcurrent
M1605	Traction lock hold solenoid short to battery	M4109	Alternator low
M1606	Traction lock hold solenoid short to ground	M4110	Alternator high
M1607	Traction lock hold solenoid open circuit	M4304	Keyless panel no communication
M1705	Hydraulic lock valve solenoid short to battery	M4404	Auxiliary no communication
M1706	Hydraulic lock valve solenoid short to ground	M4621	5 volt sensor supply out of range high
M1707	Hydraulic lock valve solenoid open circuit	M4622	5 volt sensor supply out of range low
M1732	Hydraulic lock valve solenoid overcurrent	M4721	8 volt sensor supply out of range high
M1805	Lift spool lock short to battery	M4722	8 volt sensor supply out of range low
M1806	Lift spool lock short to ground	M4802	Front light relay error ON
M1807	Lift spool lock open circuit	M4803	Front light relay error OFF
M1832	Lift spool lock overcurrent	M4807	Front light relay open circuit
M2005	Two-speed primary short to battery	M4902	Rear light relay error ON
M2006	Two-speed primary short to ground	M4903	Rear light relay error OFF
M2007	Two-speed primary open circuit	M4907	Rear light relay open circuit
M2032	Two-speed primary overcurrent	M5002	Front light output error ON
M2102	Glow plug output error ON	M5003	Front light output error OFF
M2103	Glow plug output error OFF	M5007	Front light output open circuit
M2107	Glow plug output open circuit	M5028	Front light output failure
M2128	Glow plug output failure	M5102	Rear light output error ON
M2202	Starter output error ON	M5103	Rear light output error OFF
M2203	Starter output error OFF	M5107	Rear light output open circuit
M2207	Starter output open circuit	M5128	Rear light output failure
M2228	Starter output failure	M5202	PTOL switch error ON
M2302	Starter relay error ON	M5221	PTOL switch out of range high
M2303	Starter relay error OFF	M5222	PTOL switch out of range low
M2402	Fuel pull relay error ON	M5305	PTOL LED short to battery
M2403	Fuel pull relay error OFF	M5306	PTOL LED short to ground
M2502	Traction pull relay error ON	M5405	Tilt spool lock short to battery
M2503	Traction pull relay error OFF	M5406	Tilt spool lock short to ground
M2602	Glow plug relay error ON	M5407	Tilt spool lock open circuit
M2603	Glow plug relay error OFF	M5432	Tilt spool lock overcurrent
M2721	Throttle primary out of range high	M6402	Switched power relay error ON
M2722	Throttle primary out of range low	M6403	Switched power relay error OFF
M2821	Throttle secondary out of range high	M6505	EEC power short to battery
M2822	Throttle secondary out of range low	M6506	EEC power short to ground
M3128	Interrupted power failure	M6507	EEC power open circuit
M3204	Workgroup no communication	M6604	EEC power no communications
M3304	Deluxe panel no communication	M7002	Switched power output error ON
M3505	Hydraulic fan short to battery	M7003	Switched power output error OFF
M3506	Hydraulic fan short to ground	M7007	Switched power output open circuit
M3507	Hydraulic fan open circuit	M7028	Switched power output failure
M3532	Hydraulic fan overcurrent	M7102	Electric fan 1 output error ON
M3705	Two-speed secondary short to battery	M7103	Electric fan 1 output error OFF
M3706	Two-speed secondary short to ground	M7128	Electric fan 1 output failure
M3707	Two-speed secondary open circuit	M7202	Electric fan 1 relay error ON
M3732	Two-speed secondary overcurrent	M7203	Electric fan 1 relay error OFF

Removal And Installation (Cont'd)

Figure 60-110-12



Reinstall the clevis pin (Item 1), and retaining pin (Item 2) **[Figure 60-110-12]**.

Loosen the clevis bolt (Item 3) until the end of the bolt is flush with the clevis, then tighten the clevis bolt three full turns to set proper tension of the compression spring.

Reconnect the sensor wiring connector (Item 2) **[Figure 60-110-5]**.

Reinstall the sensor mounting bolt and nut (Item 1) **[Figure 60-110-5]** and tighten to 6,8 N•m (60 in.-lb.) torque.

IMPORTANT

Be careful to not overtighten the sensor mounting bolt and nut to prevent breakage of the sensor.

I-2088-1095

Verify correct seat bar sensor function by performing all of the steps in the Bobcat Interlock Control System (BICS™) inspection as described in the loader Operation & Maintenance Manual.

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-24820A P-28316A	10, 11, 12, 13, 14	-	--	--		K	No Jumpers	P-24802A P-28316A

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.

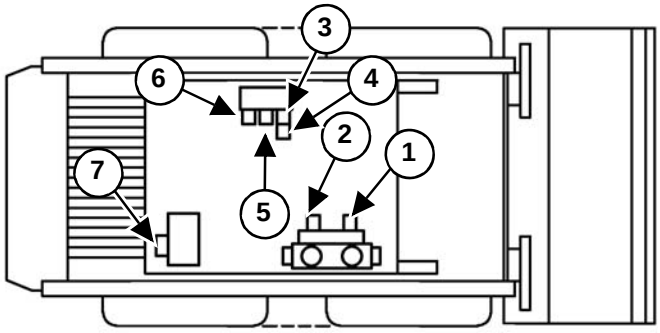
NOTE: For diagnostics and troubleshooting connect the Service PC (See SERVICE PC (LAPTOP COMPUTER) on Page 60-140-1.)

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.



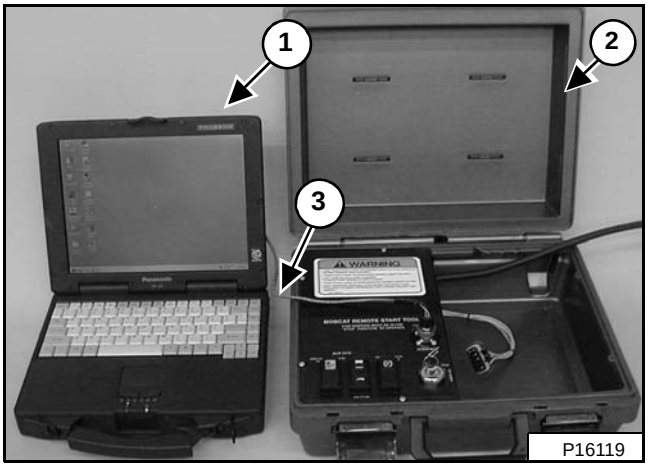
NA1892

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 60-140-1



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

MEL1563 - Remote Start Tool Kit
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 60-140-1]**. 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 60-140-1]** to the designated serial port on the Service PC.

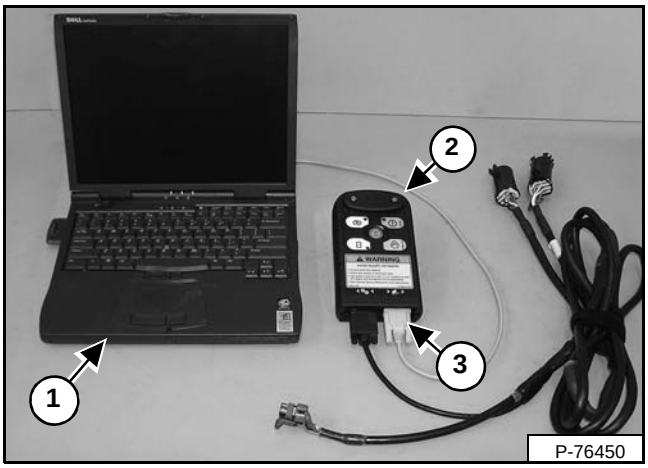
NOTE: The recommended serial cable length should not exceed 4,6 m (15 ft). A serial cable longer than 4,6 m (15 ft) will create a degraded signal causing communication errors.

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.)

Connecting Remote Start Tool (Service Tool)

Figure 60-140-2



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

Order from Bobcat Parts P/N: 7003031 - Remote Start Tool (Service Tool) Kit

Kit Includes:

7003030 - 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 60-140-2]**. 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 60-140-2]** to the designated serial port on the Service PC.

NOTE: The recommended serial cable length should not exceed 4,6 m (15 ft). A serial cable longer than 4,6 m (15 ft) 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 - 7003031 on Page 10-61-1.)

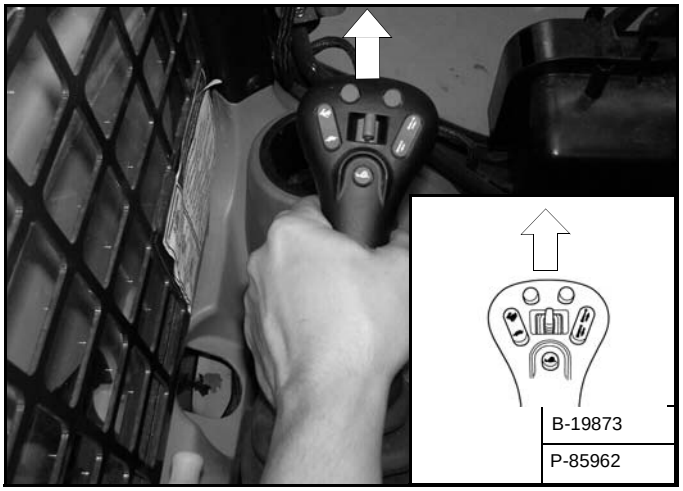
Hydrostatic Pump Calibration (SJC) (Cont'd)

⚠ 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.

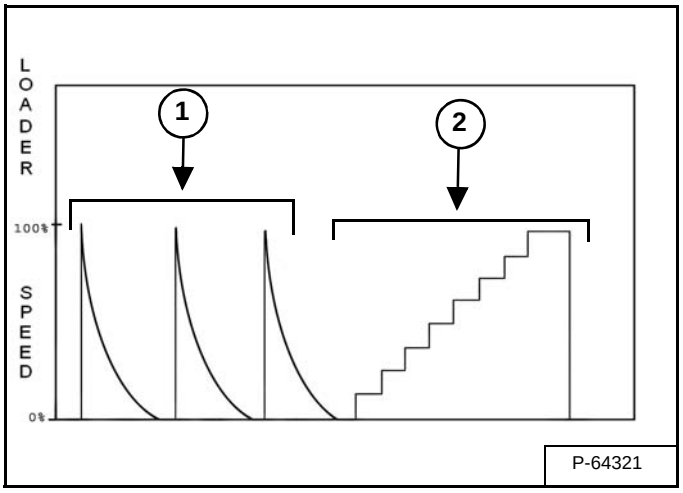
W-2017-0286

Figure 60-150-19



Move and hold the left joystick to the forward position **[Figure 60-150-19]** until the forward calibration is completed.

Figure 60-150-20



The loader speed will “ramp up” quickly (Item 1) **[Figure 60-150-20]** and slow down 3 times in a row.

The loader will then “stair step” the speed (Item 2) **[Figure 60-150-20]** 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.

FLYWHEEL RPM SENSOR

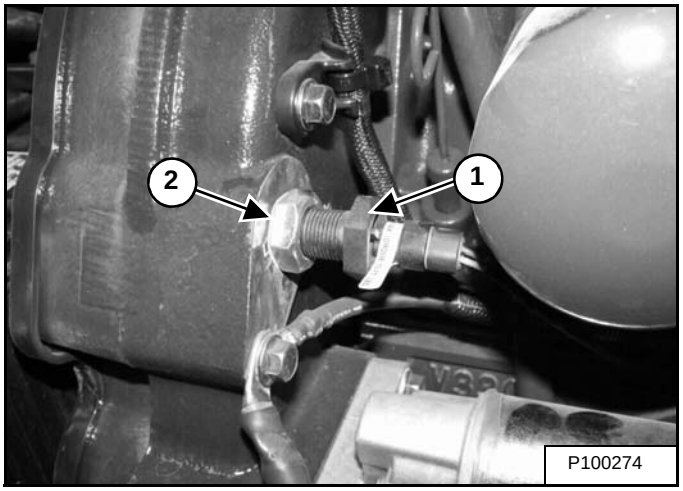
Description

The flywheel rpm sensor has a magnet located on the end of the sensor which senses breaks between the ring gear teeth, the sensor relays this information back to the controller which registers the rpm of the engine.

The flywheel rpm sensor is located just above the starter on the left side of the engine.

Adjusting

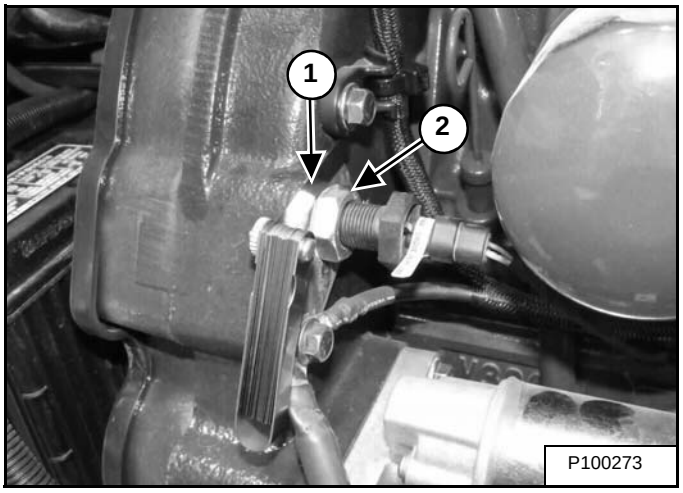
Figure 60-170-1



When reinstalling the rpm sensor, turn the rpm sensor (Item 1) **[Figure 60-170-1]** in until it makes contact with the engine flywheel.

Turn the jam nut (Item 2) **[Figure 60-170-1]** until it contacts the flywheel housing. The jam nut should not be tightened, it needs to turn with the rpm sensor when the sensor is turned back out for adjustment.

Figure 60-170-2



Turn the rpm sensor and the jam nut out from the flywheel. Set a clearance of 1,27 mm (0.050 in) between the jam nut and the housing with a feeler gauge (Item 1) **[Figure 60-170-2]**.

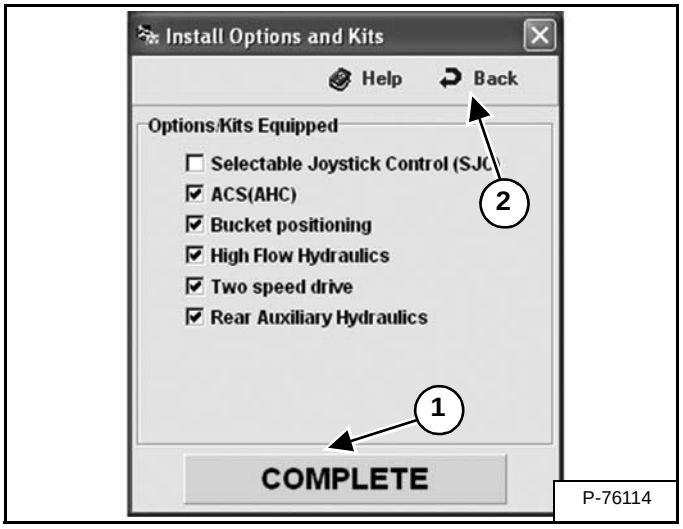
Remove the feeler gauge.

Tighten the jam nut (Item 2) **[Figure 60-170-2]** to 20,3 N•m (15 ft-lb) torque.

NOTE: New rpm sensors have a plastic tip which is used as a gauge during installation. The plastic tip is designed to come off after the engine is started.

Setup (Cont'd)

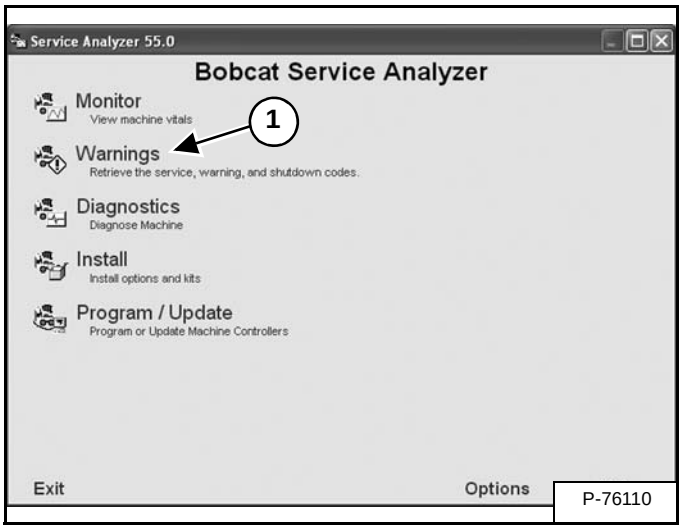
Figure 60-200-8



A green COMPLETE (Item 1) **[Figure 60-200-8]** message will be displayed when the dealer information has been transferred to the machine controller.

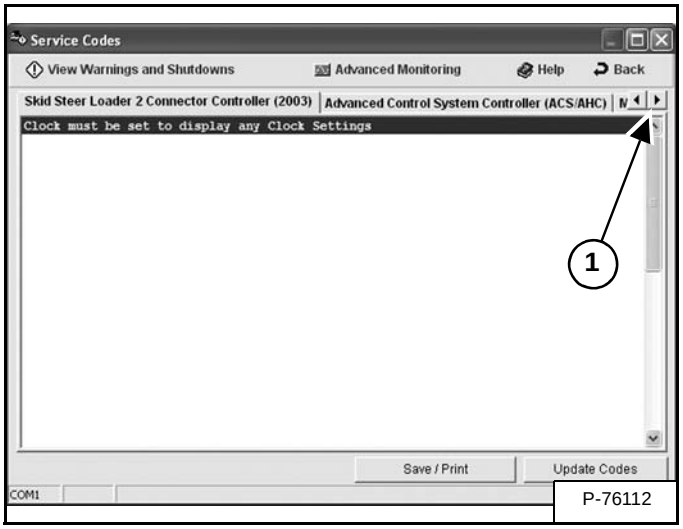
Click Back (Item 2) **[Figure 60-200-8]** to return to the Bobcat Service Analyzer screen.

Figure 60-200-9



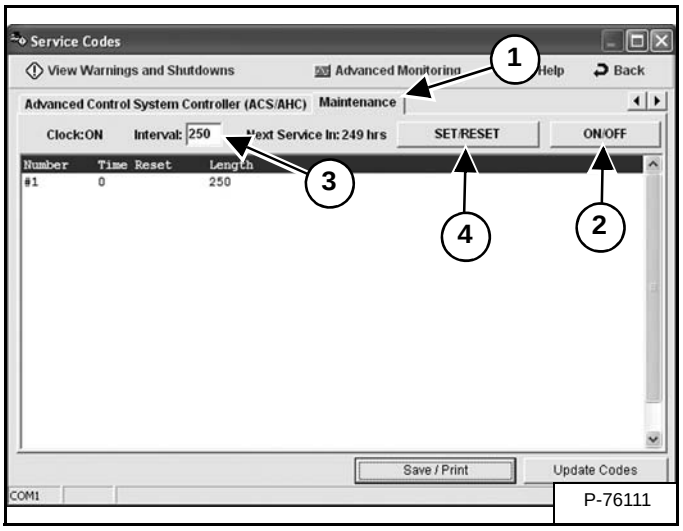
Select Warnings (Item 1) **[Figure 60-200-9]**.

Figure 60-200-10



Click the right arrow (Item 1) **[Figure 60-200-10]** to scroll through the tabs.

Figure 60-200-11



Click the Maintenance tab (Item 1) **[Figure 60-200-11]** to view the maintenance clock screen.

Click ON / OFF (Item 2) to turn the maintenance clock on or off **[Figure 60-200-11]**.

The default Interval (Item 3) is 250 hours, it can also be changed by placing the cursor in the box and typing the new interval. Click SET / RESET (Item 4) **[Figure 60-200-11]** to reset and set the maintenance clock.

Troubleshooting (Joystick)

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

WARNING

AVOID INJURY OR DEATH

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

W-2003-0807

PROBLEM	CAUSE
Front horn will not sound when the operator presses the front horn button	1, 2, 3, 4, 5, 6

KEY TO CORRECT THE CAUSE
1. The ground connection is not making a good contact.
2. The front horn is damaged.
3. The front horn wires are disconnected.
4. Check the fuses.
5. The wiring is damaged.
6. The joystick controller is not working correctly.

All dimensions are given in inches. Respective metric dimensions are given in millimeters enclosed by parentheses.

Torque Values

Thread Size (Dia. x Pitch)	Material		
	Head Mark 4	Head Mark 7	Head Mark 10
M5 x 0.8		4 - 5 N•m (3 - 4 ft-lb)	
M6 x 1.0		8 - 9 N•m (6 - 7 ft-lb)	8 - 12 N•m (6 - 9 ft-lb)
M8 x 1.25	8 - 12 N•m (6 - 9 ft-lb)	15 - 22 N•m (11 - 16 ft-lb)	24 - 34 N•m (18 - 25 ft-lb)
M10 x 1.25	18 - 24 N•m (13 - 18 ft-lb)	30 - 41 N•m (22 - 30 ft-lb)	49 - 68 N•m (36 - 50 ft-lb)
M12 x 1.25	30 - 41 N•m (22 - 30 ft-lb)	54 - 73 N•m (40 - 54 ft-lb)	94 - 118 N•m (69 - 87 ft-lb)
M14 x 1.5	49 - 68 N•m (36 - 50 ft-lb)	79 - 108 N•m (58 - 80 ft-lb)	157 - 186 N•m (116 - 137 ft-lb)

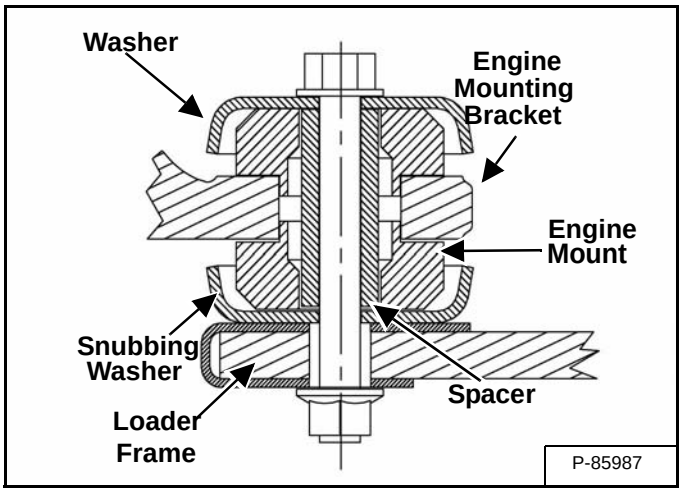
Troubleshooting

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

PROBLEM	CAUSE
Slow cranking speed.	1, 2, 3, 54
Engine will not start.	2, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 27, 28, 29
Difficult to start.	1, 2, 5, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 25, 27, 28, 29,54
No power for engine.	8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 20, 21, 22, 23, 27, 28, 29
Engine is misfiring.	8, 9, 11, 12, 13, 15, 16, 17, 21, 22, 24, 25, 26, 28
Too much fuel consumption.	10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29
Black exhaust.	10, 12, 13, 15, 16, 17, 19, 20, 21, 23, 24, 25, 27, 28, 29
Blue / white exhaust.	4, 10, 15, 16, 17, 21, 23, 27, 29, 30, 50
Low oil pressure.	4, 31, 32, 33, 34, 35, 37, 38, 39, 52
Engine knocking.	13, 15, 16, 19, 22, 24, 25, 27, 29, 31, 40, 41, 53
Engine running rough.	7, 8, 9, 10, 11, 12, 13, 17, 18, 22, 24, 25, 26, 29, 40, 53
Vibration.	12, 13, 17, 21, 22, 25, 26, 29, 40, 42, 43
High oil pressure warning.	4, 33, 36
Overheating.	10, 12, 13, 15, 16, 20, 21, 40, 44, 45, 46, 47, 48, 51
Too much crankcase pressure.	22, 27, 29, 30, 40, 49
Poor compression.	10, 16, 21, 24, 25, 27, 28, 29, 30, 41, 53
Start and stop.	9, 10, 11

Engine Mount Replacement (Cont'd)

Figure 70-10-29

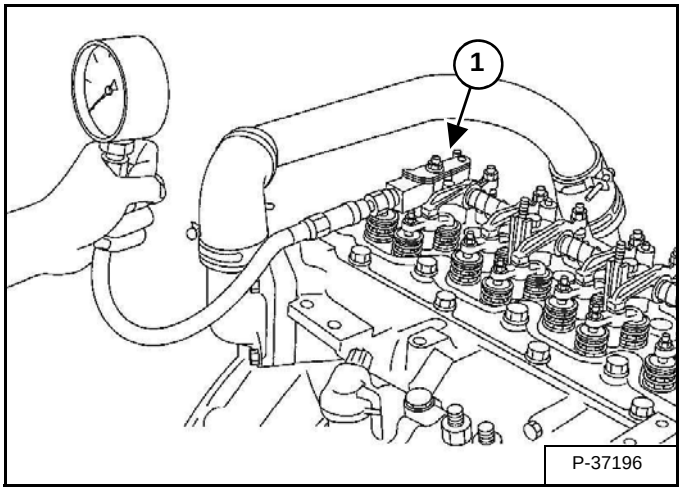


Install the new engine mount as shown in the cut away side view **[Figure 70-10-28]**.

Tighten the mounting bolts to 122 - 135 N•m (90 - 100 ft-lb) torque.

Compression - Checking

Figure 70-10-30



After warming up the engine, stop the engine and remove the muffler, high pressure pipes, cylinder head cover, overflow pipe, all nozzle holders and all nozzle gaskets.

NOTE: Disconnect the fuel shutoff solenoid wiring harness.

Install a compression tester and nozzle adaptor (MEL1614) for diesel engines into the nozzle holder hole (Item 1) **[Figure 70-10-30]**.

Figure 70-10-31

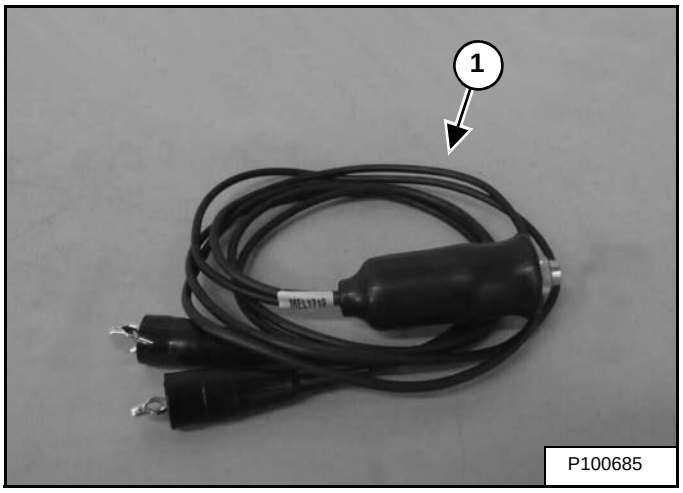
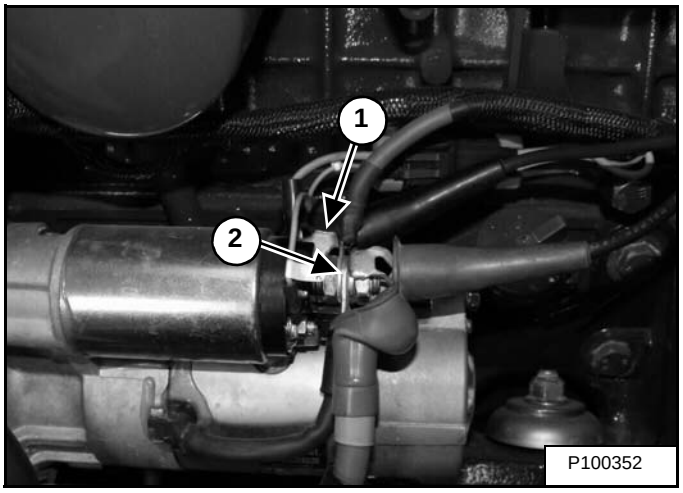


Figure 70-10-32



Attach a push button starter switch (MEL1712) (Item 1) **[Figure 70-10-31]** to the starter terminal S (Item 1) and the positive battery cable (Item 2) **[Figure 70-10-32]**. Engage the starter 7 - 10 seconds until a maximum compression reading is obtained.

Repeat this procedure multiple times per cylinder until a average compression reading is recorded.

If the measurement is below the allowable limit, apply a small amount of oil to the cylinder wall through the nozzle hole and measure the compression pressure again.

If the compression pressure increase after applying oil. check the cylinder wall and piston rings.

If the compression pressure is still less than the allowable limit, check the top clearance, valve and cylinder head.

NOTE: Check the compression pressure with the specified valve clearance.

Always use a fully charged battery for performing this test.

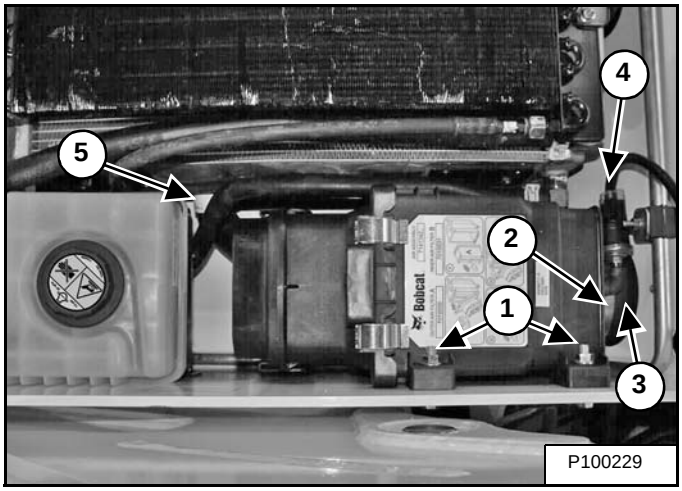
Variances in cylinder compression values should be under 10%.

AIR CLEANER

Housing Removal And Installation

Remove the rear grille from the loader. (See Removing on Page 50-60-1.)

Figure 70-40-1



Remove the top two mounting bolts (Item 1) **[Figure 70-40-1]** from the air cleaner assembly.

Loosen the hose clamp (Item 2) and disconnect the hose (Item 3) **[Figure 70-40-1]** from the air cleaner.

Disconnect the wire connector (Item 4) **[Figure 70-40-1]** from the air cleaner sender.

Disconnect the scavenger hose (Item 5) **[Figure 70-40-1]**.

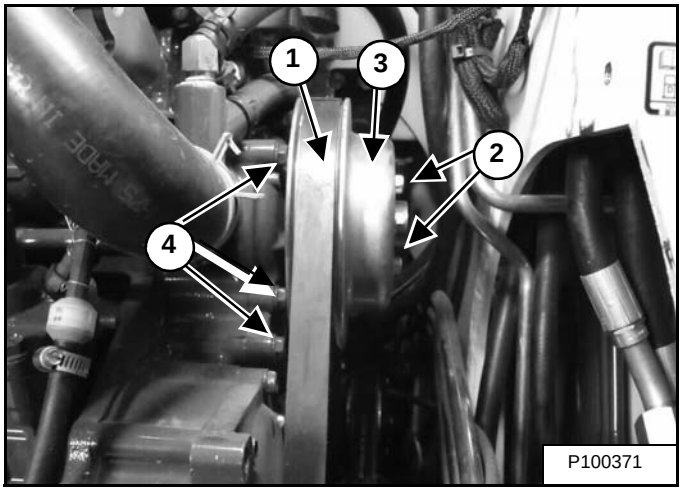
Remove the air cleaner from the loader.

Reverse procedure for installation.

Water Pump Removal And Installation

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

Figure 70-50-23



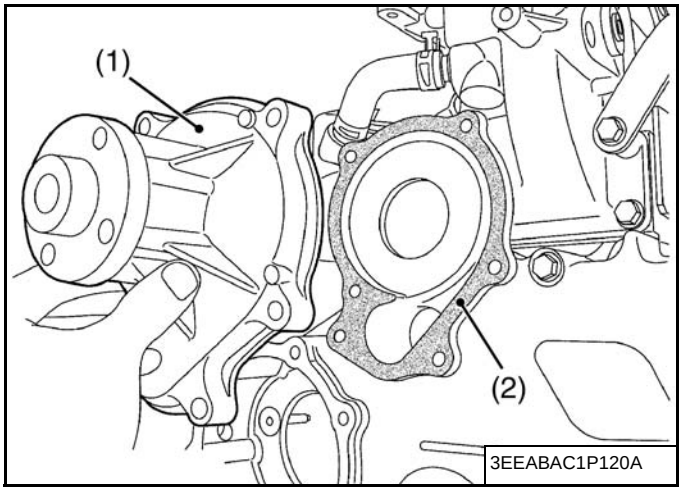
Remove the alternator belt (Item 1) **[Figure 70-50-23]**.

Remove the four bolts (Item 2) from the water pump pulley (Item 3) **[Figure 70-50-23]**.

Remove the water pump pulley (Item 3) **[Figure 70-50-23]**

Remove the six water pump bolts (Item 4) **[Figure 70-50-23]**.

Figure 70-50-24

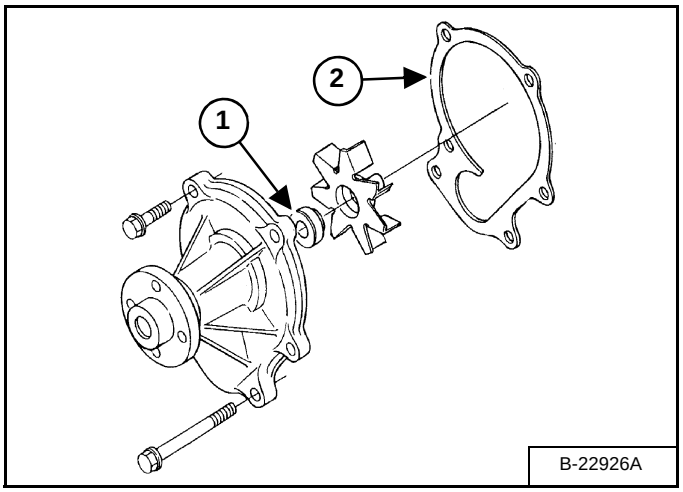


Remove the water pump (Item 1) **[Figure 70-50-24]** from the gearcase.

When mounting the water pump, use a new gasket (Item 2) **[Figure 70-50-24]**.

Water Pump Disassembly And Assembly

Figure 70-50-25

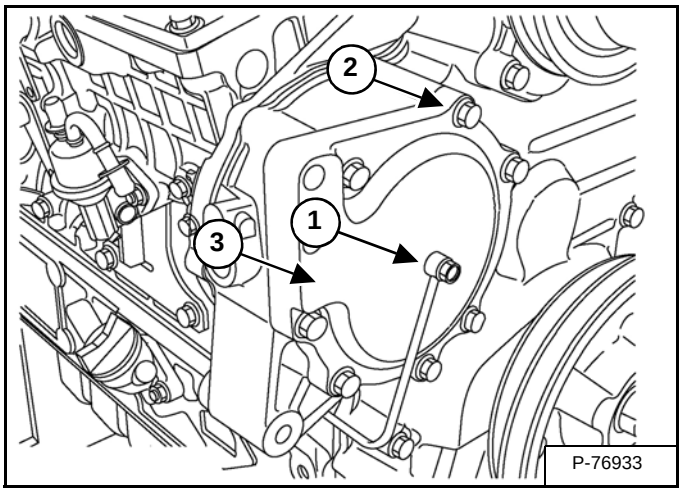


Remove the water pump assembly.

NOTE: The seal (Item 1) is not a replacement part, order water pump assembly. The gasket (Item 2) is available from Bobcat parts [Figure 70-50-25].

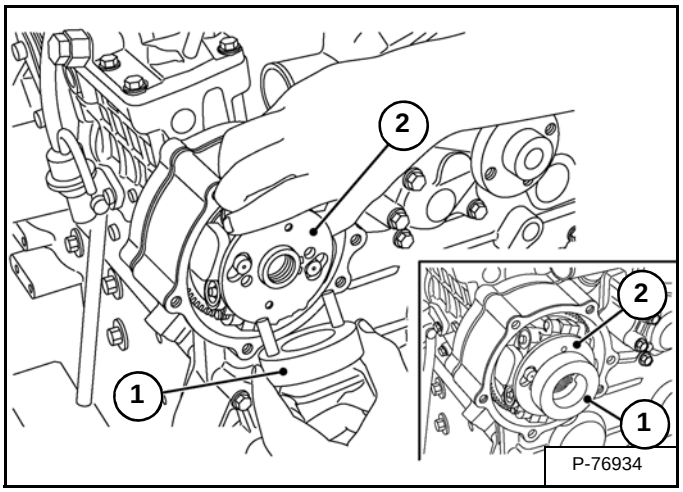
Fuel Injection Pump Assembly Removal (Cont'd)

Figure 70-70-6



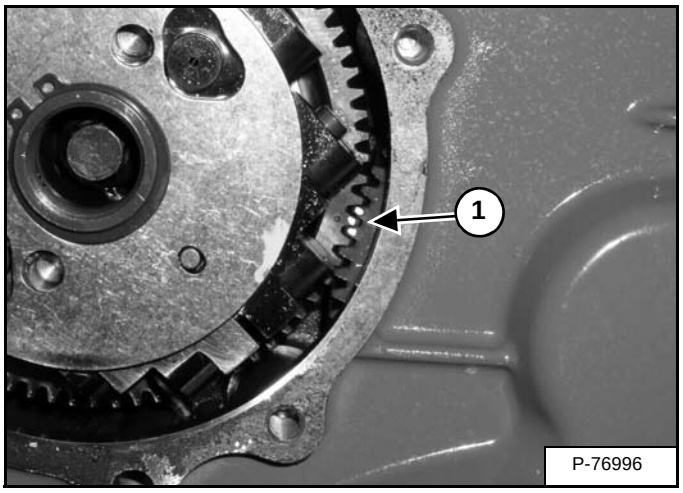
Remove the lubrication tubeline (Item 1), the timer gear cover mounting bolts (Item 2) and the timer gear cover (Item 3) **[Figure 70-70-6]**.

Figure 70-70-7



Install the 0 rad (0°) Restoring Jig (MEL1656) (Item 1) on to the timer gear (Item 2) **[Figure 70-70-7]**.

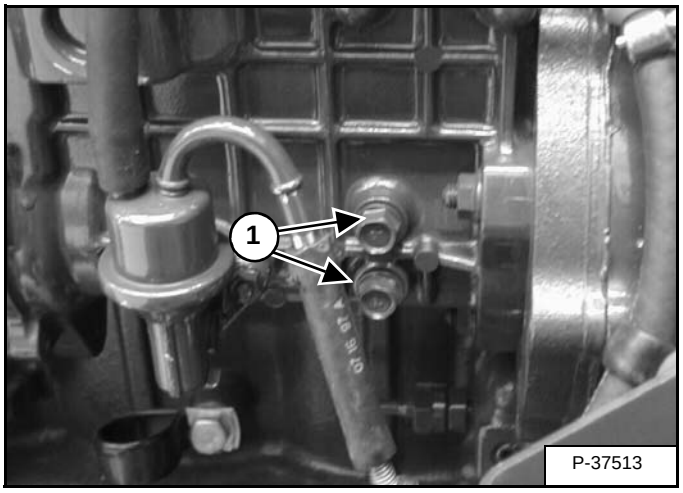
Figure 70-70-8



With the number four piston at T.D.C. compression stroke place a mark on the timer gear and the idler gear where the teeth engage (Item 1) **[Figure 70-70-8]**.

Pin the flywheel so that the engine does not turn.

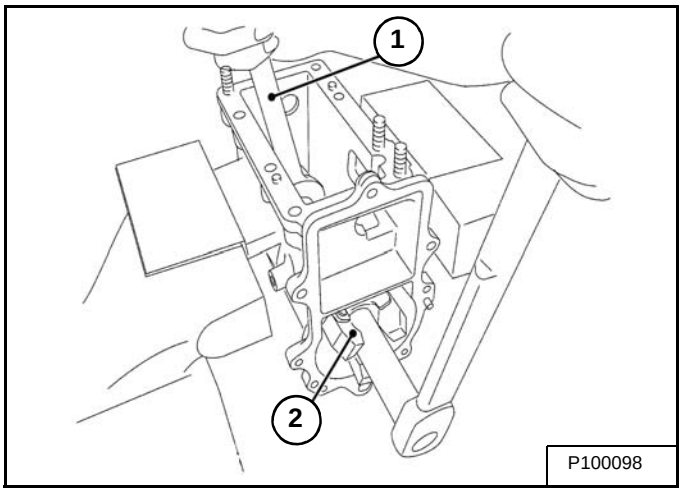
Figure 70-70-9



Remove the two flange bolts (Item 1) **[Figure 70-70-9]** from the injection pump assembly.

Fuel Camshaft Removal And Installation (Cont'd)

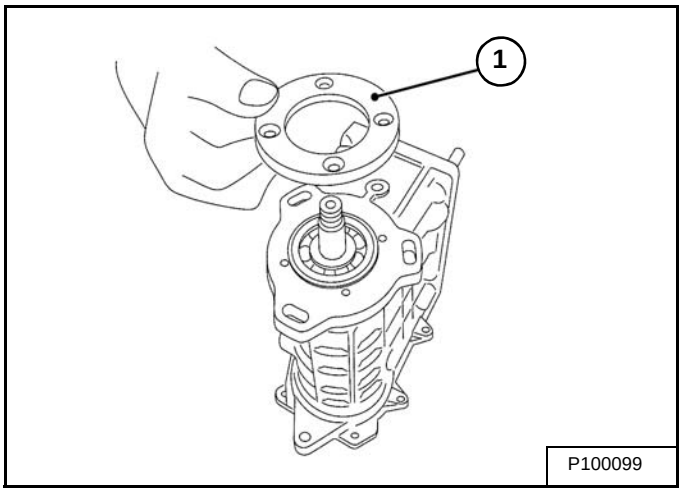
Figure 70-70-42



Fix the fuel camshaft with a open end wrench (Item 1), and remove the governor weight mounting nut and the governor weight (Item 2) **[Figure 70-70-42]**.

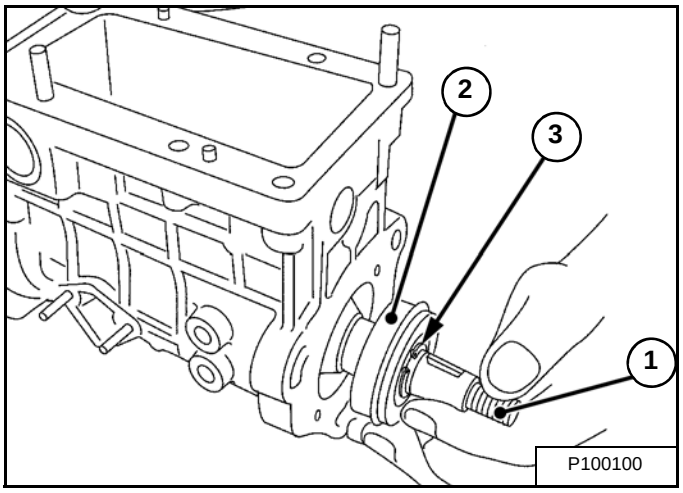
NOTE: Do not use the fuel camshaft lock bolts, when remove the governor weight mounting nut. Otherwise, the lock bolts or injection pump housing might get damaged.

Figure 70-70-43



Loosen the fuel camshaft stopper mounting screws and remove the fuel camshaft stopper (Item 1) **[Figure 70-70-43]**.

Figure 70-70-44



Pull out the fuel camshaft (Item 1) and bearings (Item 2) **[Figure 70-70-44]** together.

After removing the bearing's snap ring (Item 3) **[Figure 70-70-44]**, press out the bearings.

Press the bearings into the fuel camshaft.

Install the snap ring at the gear side's bearing.

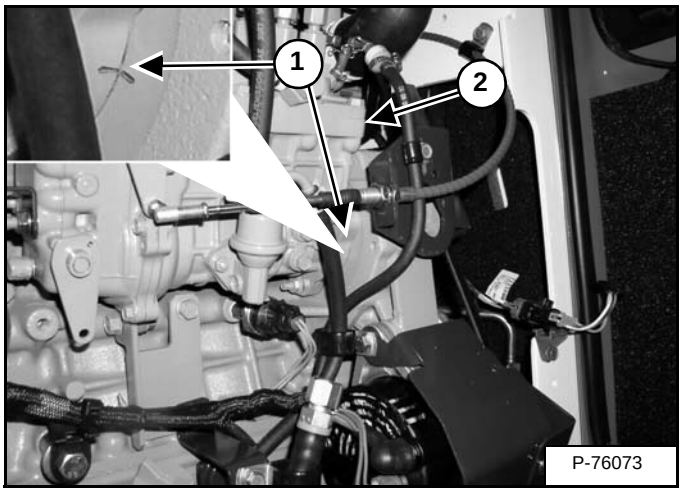
Install the fuel camshaft and bearings to the injection pump housing.

Install the fuel camshaft stopper and tighten the fuel camshaft stopper mounting screws to 7,9 - 9,3 N•m (5.8 - 6.9 ft-lb) torque.

Attach the governor weight to the fuel camshaft and tighten the governor weight mounting nut to 63 - 72 N•m (47 - 53 ft-lb) torque.

Injection Pump - Timing (Cont'd)

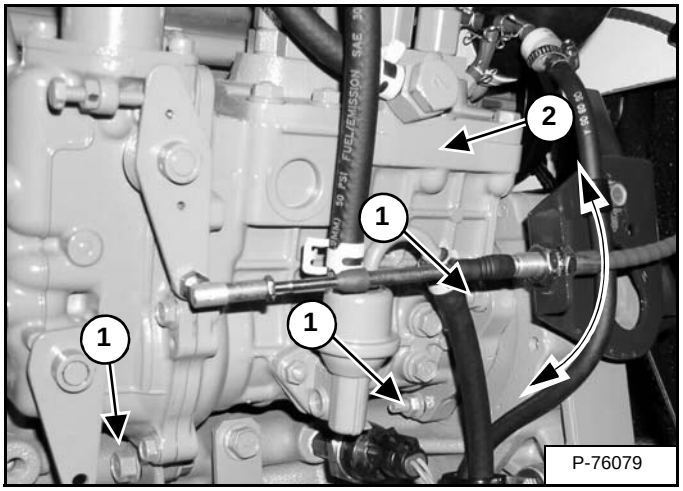
Figure 70-70-78



Make sure the injection pump assembly timing mark (Item 1) is aligned with the crankcase timing mark (Item 1) **[Figure 70-70-78]**.

NOTE: If the injection timing is not within the specification, rotate the injection pump assembly to adjust the injection timing.

Figure 70-70-79



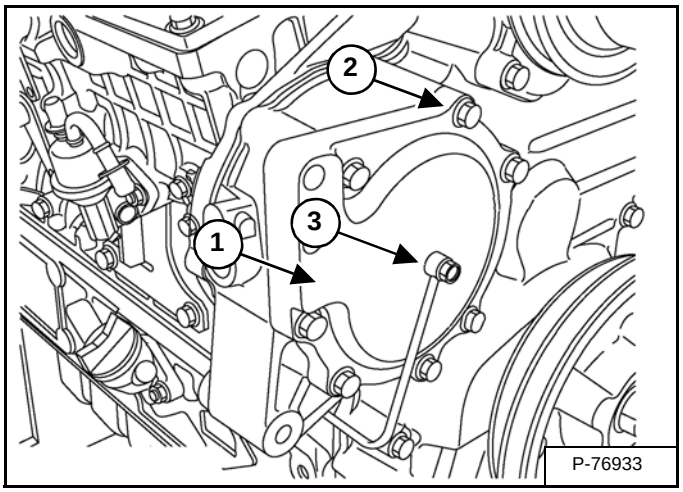
Loosen the four fuel injection pump housing nuts (Item 1) **[Figure 70-70-79]**.

Rotate the injection pump (Item 2) **[Figure 70-70-79]** counterclockwise (viewed from the flywheel side) to delay the injection timing.

Rotate the injection pump (Item 2) **[Figure 70-70-79]** clockwise (viewed from the flywheel side) to advance the injection timing.

Remove the 0 rad (0 °) Restoring Jig (MEL1656).

Figure 70-70-80



Install the timer gear cover (Item 1), the gear cover mounting bolts (Item 2) and lubrication tubeline (Item 3) **[Figure 70-70-80]**.

Tighten the mounting bolts (Item 2) **[Figure 70-70-80]** to 24 - 28 N•m (17 - 20 ft-lb) torque.

Install flywheel rpm sensor. (See Adjusting on Page 60-170-1.)

Cylinder Head Removal And Installation (Cont'd)

Figure 70-80-22

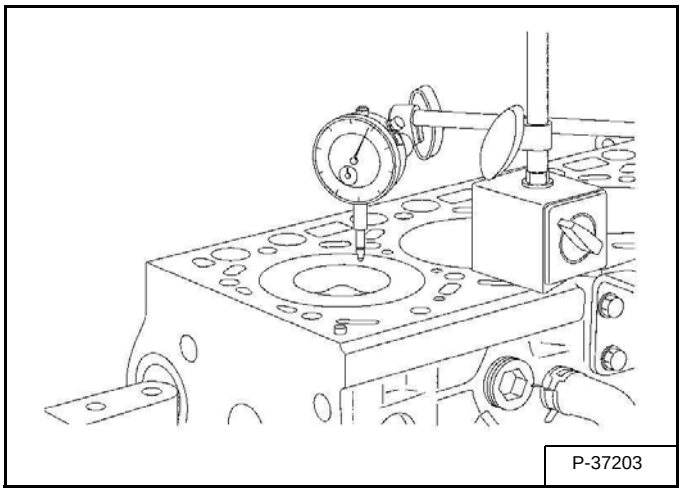
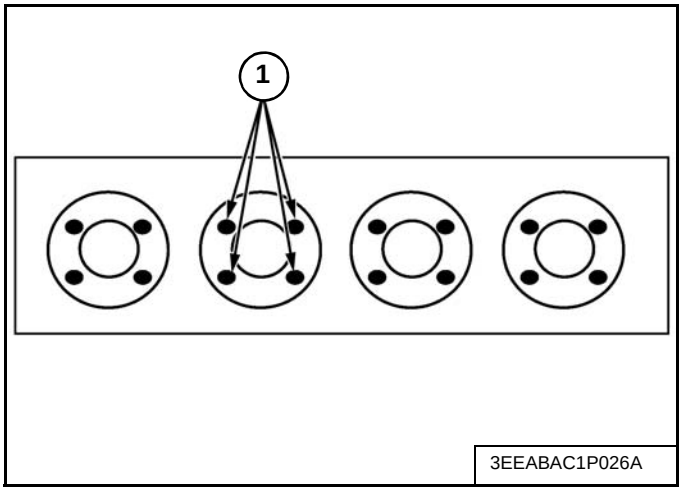


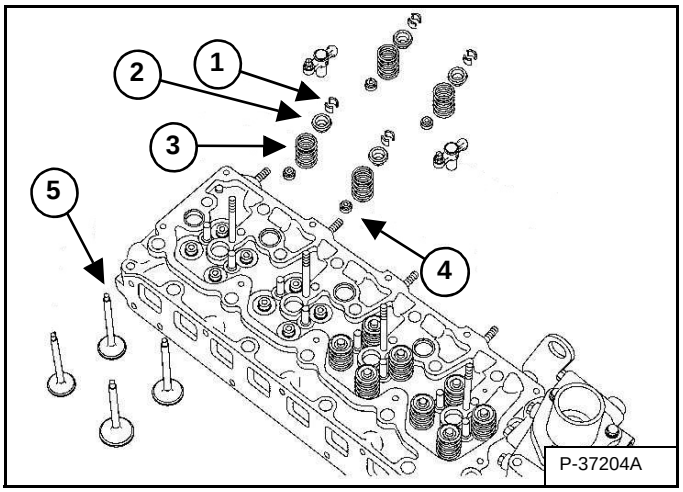
Figure 70-80-23



Measure the piston head's recessing or protrusion from the crankcase cylinder face (Item 1) **[Figure 70-80-22]** at four spots per each piston using the dial gauge as shown in **[Figure 70-80-23]** and average the four pistons.

Cylinder Head Disassembly And Assembly

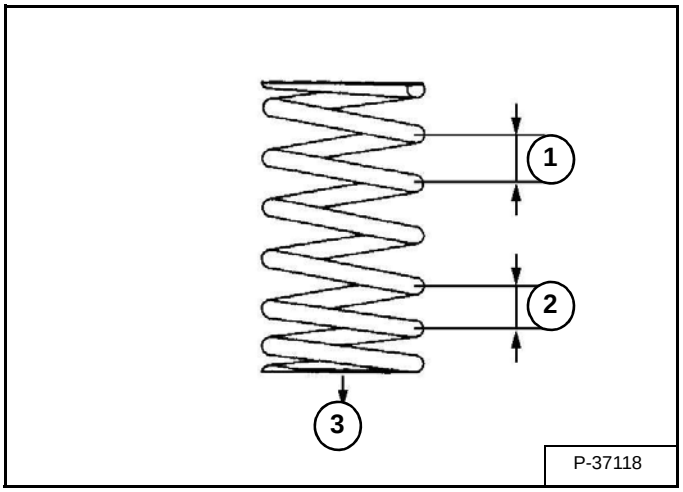
Figure 70-80-24



Remove the valve spring collets (Item 1) after compressing the valve spring (Item 3) with the valve spring retainer (Item 2) **[Figure 70-80-24]**.

Remove the valve seal (Item 4) and the valve (Item 5) **[Figure 70-80-24]**.

Figure 70-80-25



Install the valve spring with its small-pitch end (Item 2) downward toward the head side (Item 3) **[Figure 70-80-25]**.

Wash the valve stem and valve guide hole, and apply engine oil sufficiently.

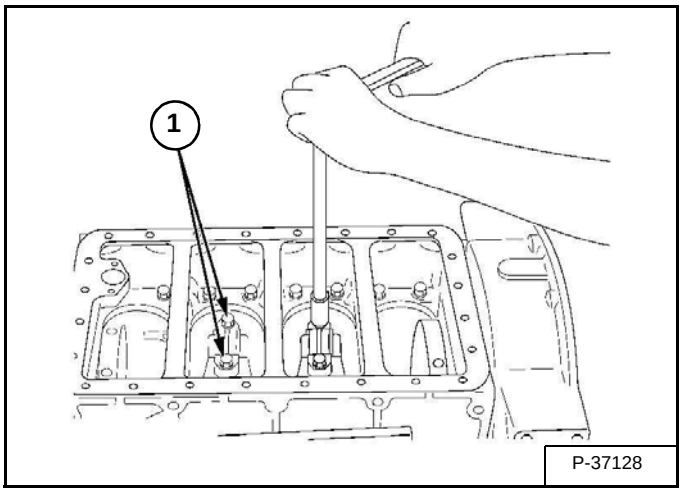
After installing the valve spring collets, lightly tap the stem to assure proper fit with a plastic hammer.

Piston And Connecting Rod Removal And Installation

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

Remove the cylinder head. (See Cylinder Head Removal And Installation on Page 70-80-5.)

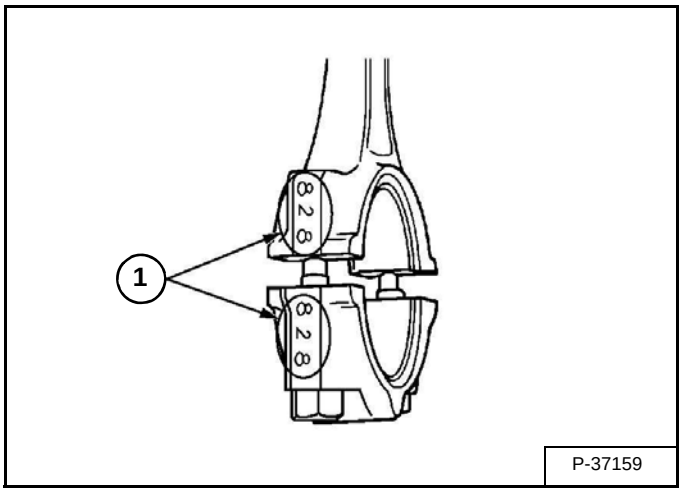
Figure 70-90-1



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

Remove the connecting rod caps.

Figure 70-90-2



Align the marks (Item 1) **[Figure 70-90-2]** with each other. (Face the marks toward the injection pump.)

Apply engine oil to the connecting rod bolts and lightly thread it in by hand then tighten it to the specified torque. If the connecting rod bolts do not thread together smoothly, clean the threads. If the connecting rod bolt is still hard to thread in, replace it.

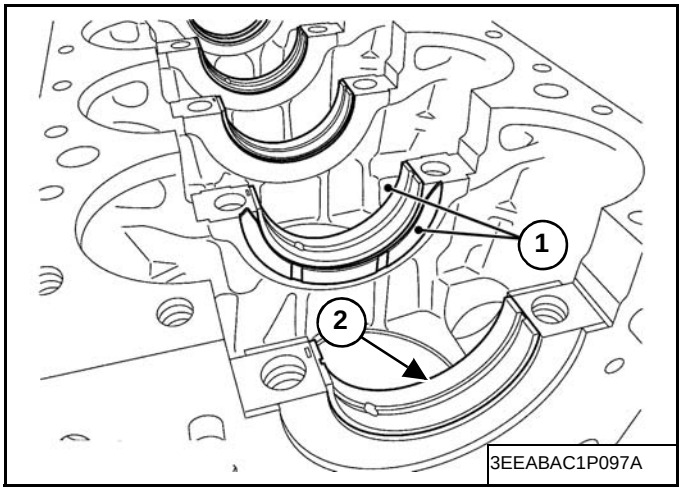
NOTE: When using the existing crank bearing, put marks on the crank pin bearing and the connecting rod in order to keep their position.

Insert the crank pin bearing.

Tightening torque	Connecting rod screw	79 - 83 N•m (58 - 61 ft-lb)

Crankshaft And Bearings Installation

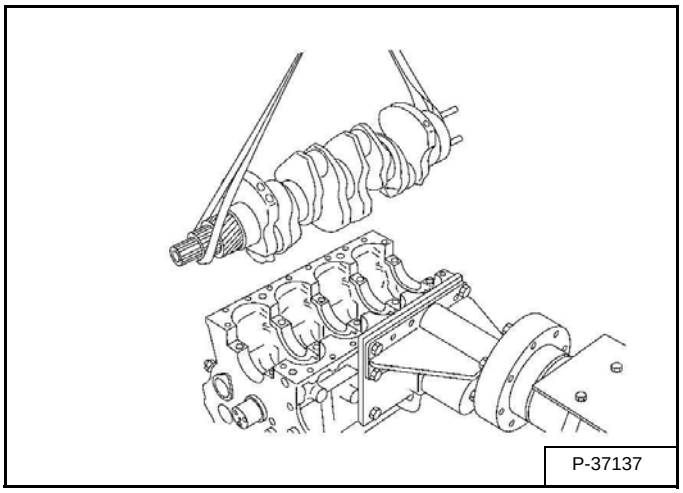
Figure 70-90-28



Install the thrust bearing (Item 1) **[Figure 70-90-28]** on both sides of the fourth mainbearing case with the oil groove facing out.

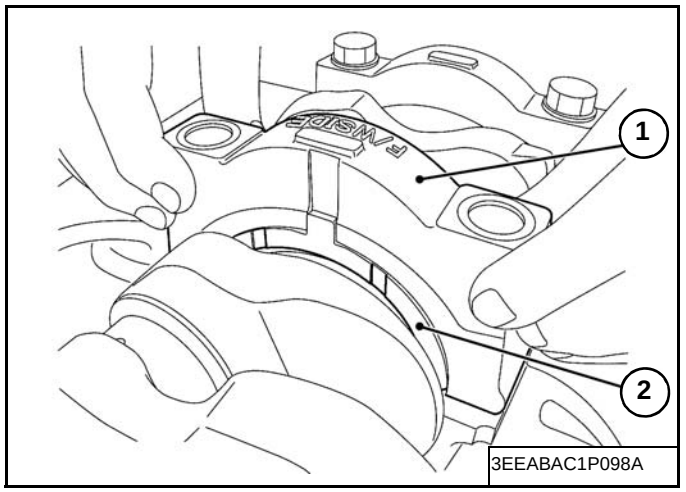
Install the main bearings (Item 2) **[Figure 70-90-28]**.

Figure 70-90-29



Install the crankshaft **[Figure 70-90-29]**.

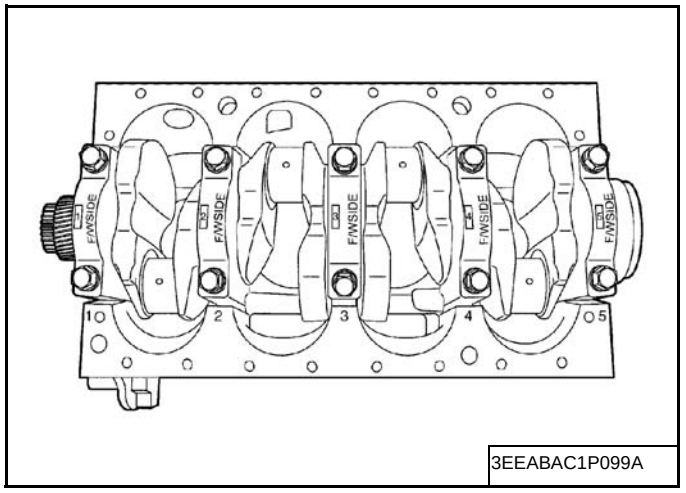
Figure 70-90-30



NOTE: Install the main bearing case having the same number as the one engraved on the crankcase, and set the casting mark "F/W SIDE" on the main bearing case towards the flywheel side.

Install the fourth bearing case (Item 1) and the thrust bearing (Item 2) **[Figure 70-90-30]**.

Figure 70-90-31



NOTE: Install the main bearing case having the same number as the one engraved on the crankcase, and set the casting mark "F/W SIDE" on the main bearing case towards the flywheel side.

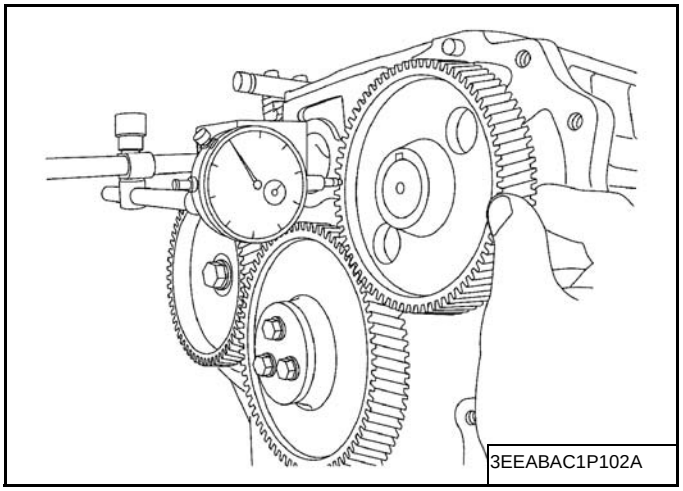
Apply oil to the bearing case bolts and tighten them to the specified torque.

Tightening torque	Main bearing case screw	137 - 147 N•m (102 - 108 ft-lb)

Camshaft - Servicing

Side Clearance

Figure 70-100-8



Set a dial indicator with its tip on the camshaft **[Figure 70-100-8]**.

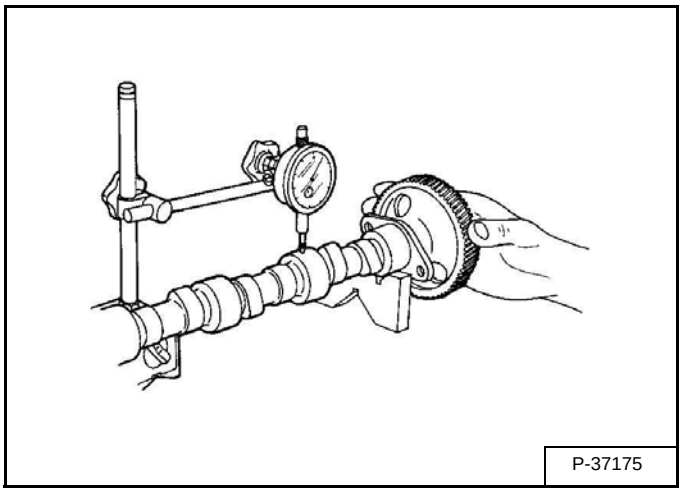
Measure the side clearance by moving the camshaft gear to the front and rear.

If the measurement exceeds the allowable limit, replace the camshaft stopper.

Side clearance	Factory spec.	0,070 - 0,22 mm (0.0028 - 0.0086 in)
	Allowable limit	0,030 mm (0.012 in)

Alignment

Figure 70-100-9



Support the camshaft with V block on the surface plate and set a dial indicator with its tip on the intermediate journal at right angle **[Figure 70-100-9]**.

Rotate the camshaft on the V blocks and get the misalignment (half of the measurement).

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

Camshaft alignment	Allowable limit	0,01 mm (0.0004 in)

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

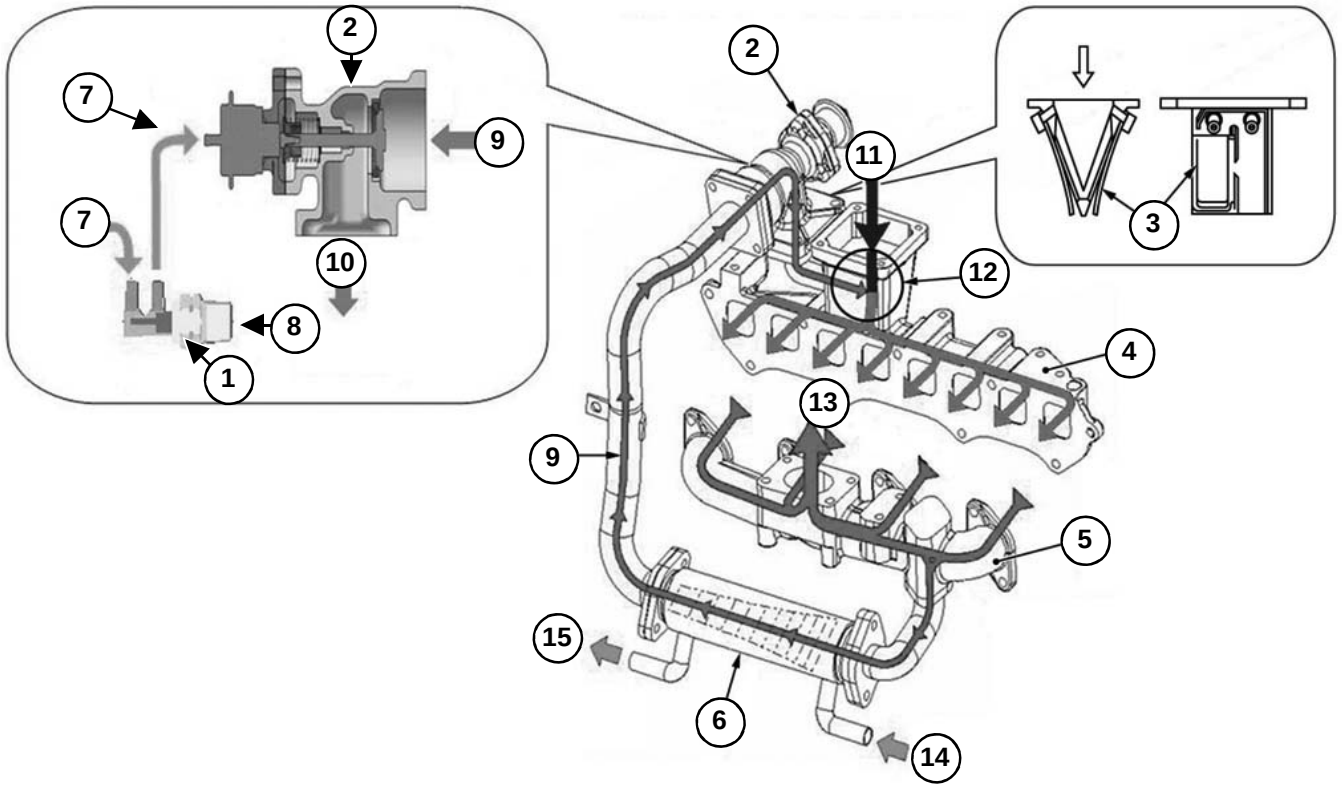
Description

Exhaust Gas Recirculation (EGR) is a system in which the exhaust gas with lean oxygen is cooled and returned to the cylinders again in order to lower the combustion temperature.

An External / Mechanical EGR consists of a water cooled EGR cooler, mechanical EGR valve, reed valve and thermo valve. When the coolant temperature is high and the boost pressure is low, the EGR valve will not open. If the coolant temperature is high and the boost pressure is also high, the EGR valve will open allowing cooled gas back into the intake manifold.

The reed valve between the EGR valve and the intake manifold prevents fresh air from flowing into EGR system.

Figure 70-130-1

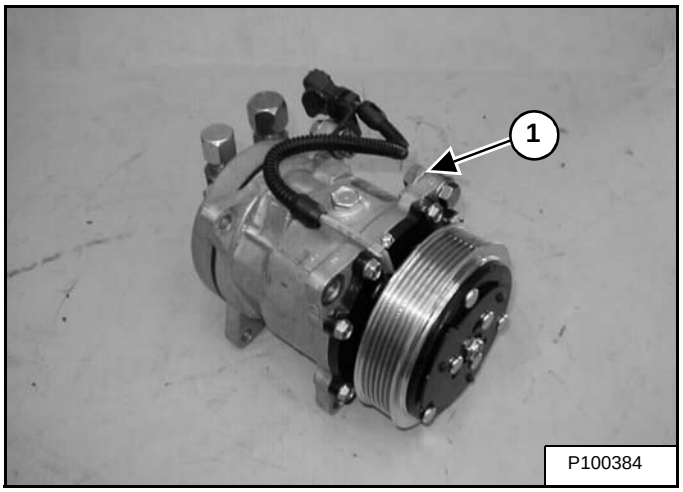


The items listed below refer to Page 70-130-1 **[Figure 70-130-1]**.

1. Thermo Valve
2. Mechanical EGR Valve
3. Reed Valve
4. Intake Manifold
5. Exhaust Manifold
6. EGR Cooler
7. Boost Pressure
8. Coolant Temperature
9. Cooled EGR Gas
10. To The Intake Manifold
11. Fresh Air
12. Cooled EGR Gas Merges With Fresh Air
13. Exhaust
14. Coolant Inlet
15. Coolant Outlet

Components

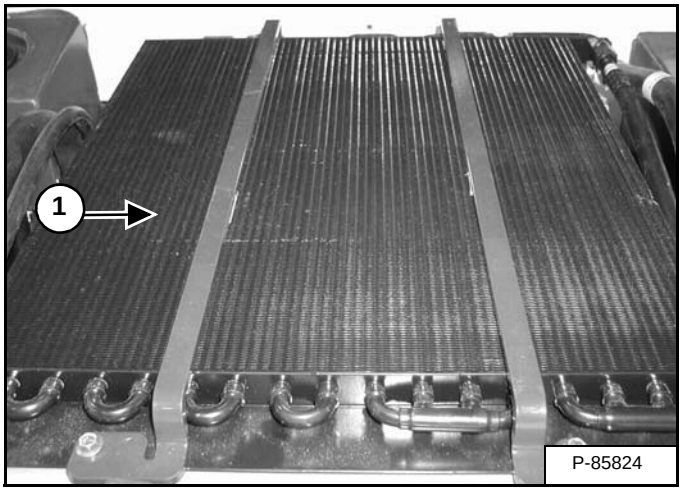
Figure 80-10-1



Compressor: The compressor (Item 1) **[Figure 80-10-1]** is the pump that circulates the refrigerant throughout the system. It raises the pressure of the refrigerant for heat transfer through the condenser and evaporator.

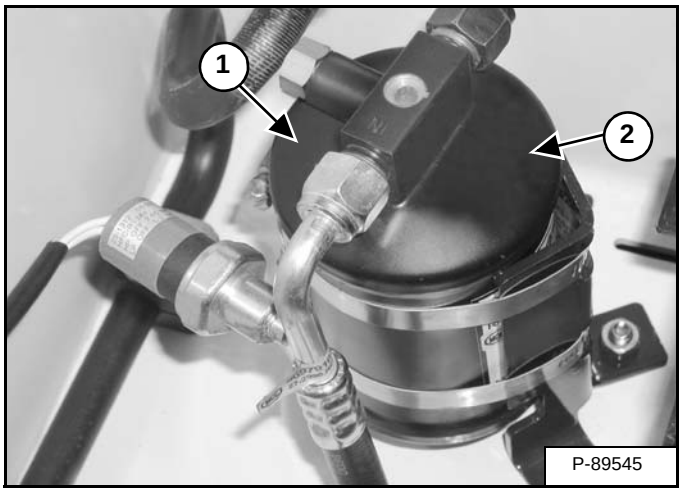
NOTE: The A/C system (Compressor) is recommended to be turned on for at least 5 minutes weekly throughout the year to lubricate the internal components.

Figure 80-10-2



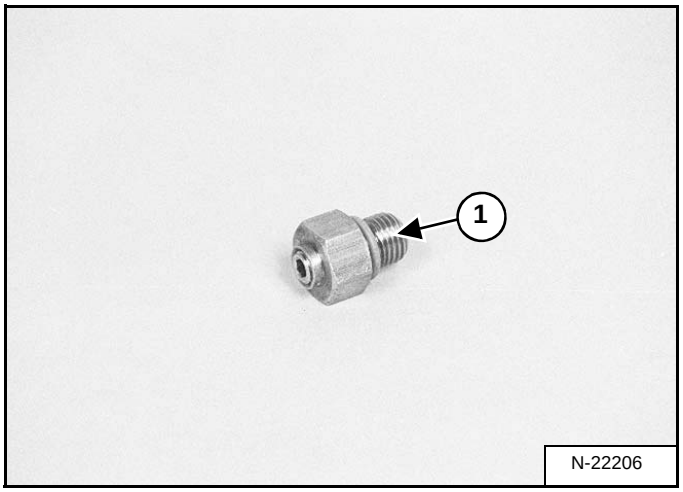
Condenser: The condenser (Item 1) **[Figure 80-10-2]** is the unit that receives the high pressure, high temperature refrigerant vapor from the compressor and condenses it into a high temperature liquid.

Figure 80-10-3



Receiver / Drier: The receiver / drier (Item 1) **[Figure 80-10-3]** is the unit that receives the liquid refrigerant from the condenser and removes moisture and foreign matter from the system. It also serves as a storage tank for the extra liquid refrigerant until it is needed by the evaporator.

Figure 80-10-4



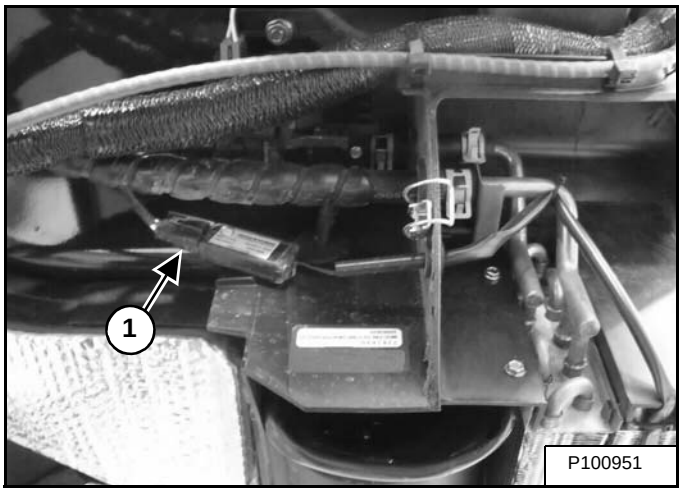
Pressure Relief Valve: The pressure relief valve (Item 2) **[Figure 80-10-3]** is located on the receiver drier assembly. This small brass valve (Item 1) **[Figure 80-10-4]** is a safety feature that is designed to open and release the A/C charge if the pressure reaches 3688,7 kPa (36,9 bar) (535 psi).

Gauge Pressure Related Troubleshooting (Cont'd)

Possible Cause	Inspection	Solution
High pressure side Too low.		
1. Low refrigerant charge.	The high side pressure will be low.	Repair any leaks and recharge the refrigerant to the correct level.
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)

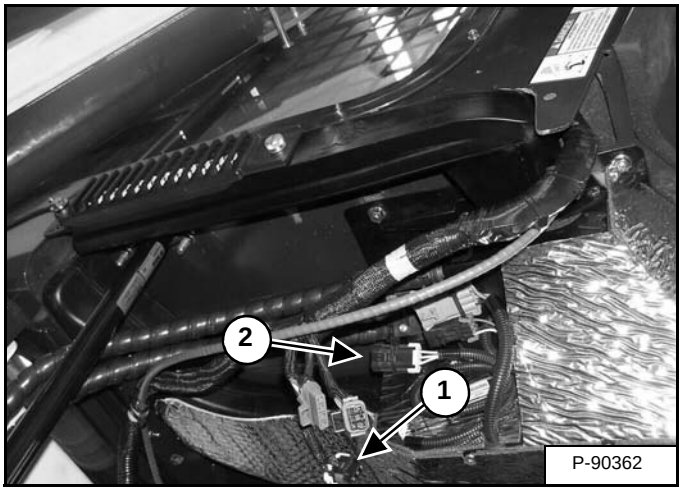
Figure 80-30-12



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

Disconnect the thermostat wiring connector (Item 1) **[Figure 80-30-12]** from the loader wiring harness.

Figure 80-30-13



Check the loader harness (Item 1) **[Figure 80-30-13]** for voltage. The voltage should be battery voltage.

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

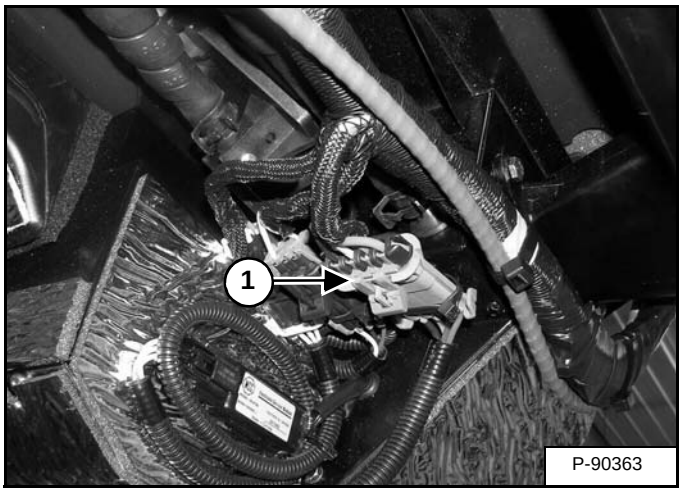
If there is voltage at the wiring harness, check the thermostat (Item 2) **[Figure 80-30-13]** for resistance.

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

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

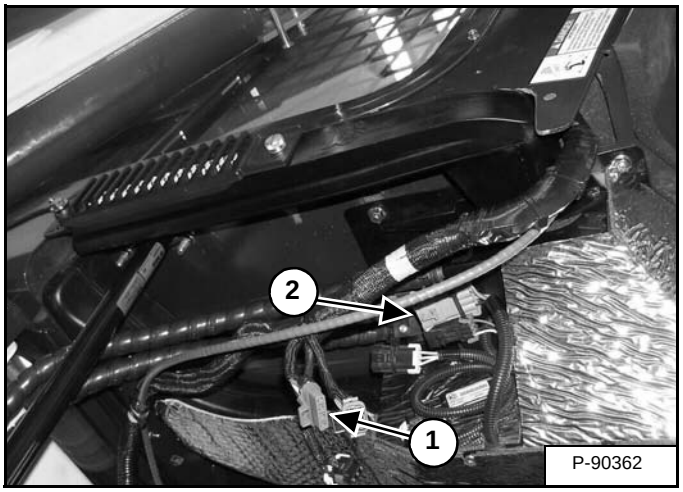
If there is a resistance value, check the blower.

Figure 80-30-14



Disconnect the blower wiring connector (Item 1) **[Figure 80-30-14]** from the loader wiring harness.

Figure 80-30-15



Check the loader harness (Item 1) **[Figure 80-30-15]** for voltage. The voltage should be battery voltage.

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 resistance to the blower at the blower wiring connector (Item 2) **[Figure 80-30-15]**.

If there is no resistance value replace the blower. (See Removal And Installation on Page 80-130-1.)

If there is a resistance value check the climate controls at the control panel inside the loader cab.

COMPRESSOR

Removal And Installation

NOTE: If compressor is being removed for engine removal it is not necessary to remove the A/C hoses. Remove the mounting bolts and belt and reposition the compressor.

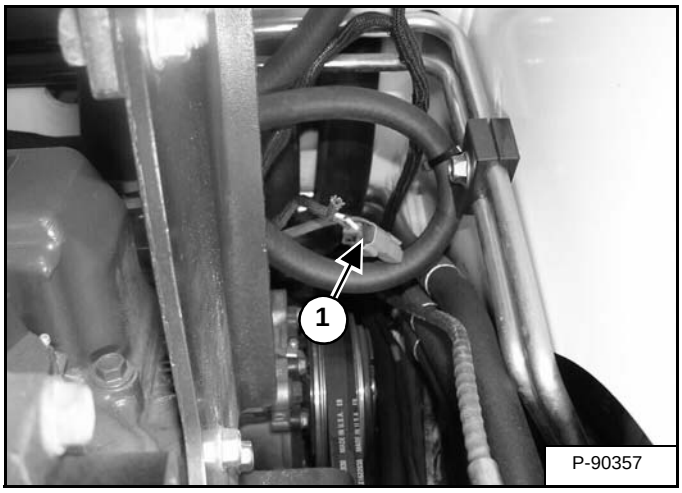
Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-1.)

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

Evacuate the A/C system. (See Reclamation And Charging With Recovery / Charging Unit on Page 80-40-2.)

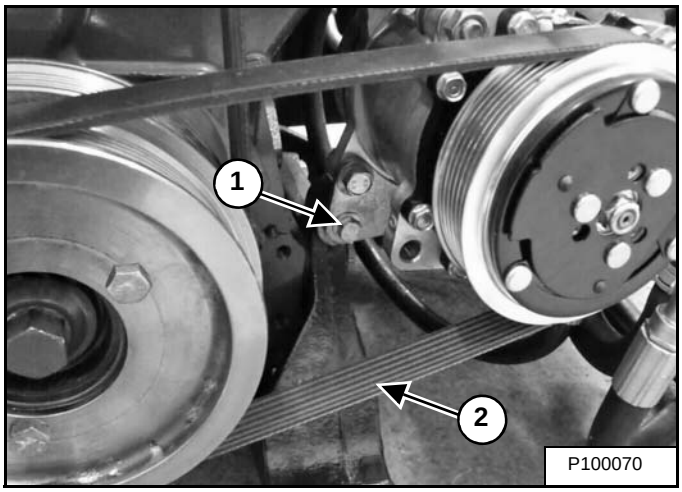
Open the rear door.

Figure 80-50-1



Disconnect the loader harness (Item 1) **[Figure 80-50-1]** from the compressor clutch wire.

Figure 80-50-2



Remove the compressor mount bolt (Item 1) and the belt (Item 2) **[Figure 80-50-2]**.

Installation: Tighten the compressor mount bolt to 46 N•m (34 ft-lb) torque.

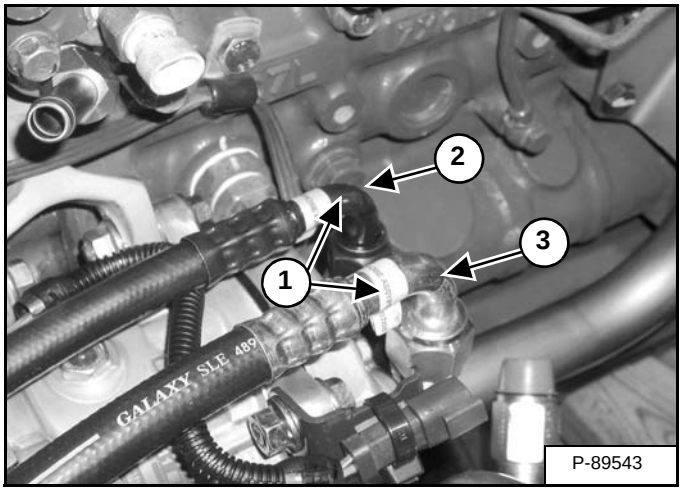
⚠ WARNING

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

W-2371-0500

NOTE: Engine removed for photo clarity.

Figure 80-50-3



Remove the compressor hoses (Item 1) **[Figure 80-50-3]** from the compressor.

Installation: Tighten the compressor hose (Item 2) to 20 -27 N•m (15 - 20 ft-lb) torque.

Installation: Tighten the compressor hose (Item 3) to 28 - 37 N•m (21 - 27 ft-lb) torque.

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

EVAPORATOR / HEATER UNIT

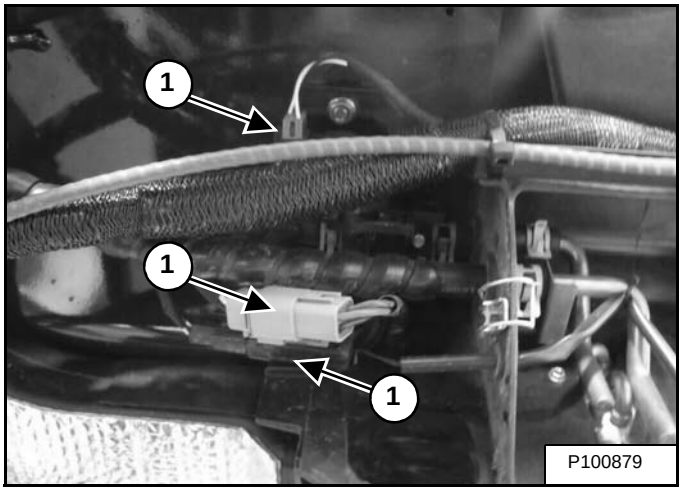
Removal And Installation

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.)

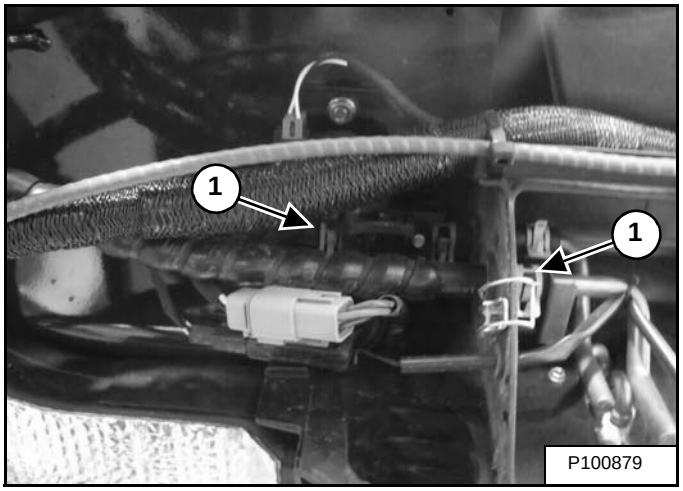
Evacuate the A/C system. (See Reclamation And Charging With Recovery / Charging Unit on Page 80-40-2.)

Figure 80-80-1



Disconnect the expansion / heater unit wiring (Item 1) **[Figure 80-80-1]**.

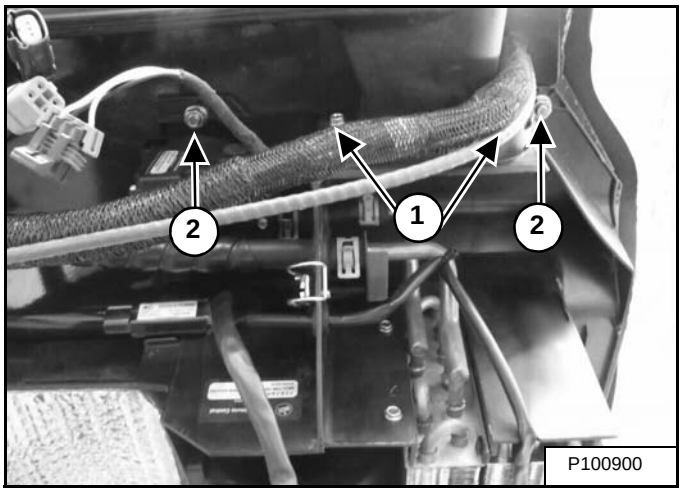
Figure 80-80-2



NOTE: Cap the heater hoses and the heater valve with plugs to prevent coolant loss from the system.

Remove the two hoses (Item 1) **[Figure 80-80-2]**.

Figure 80-80-3

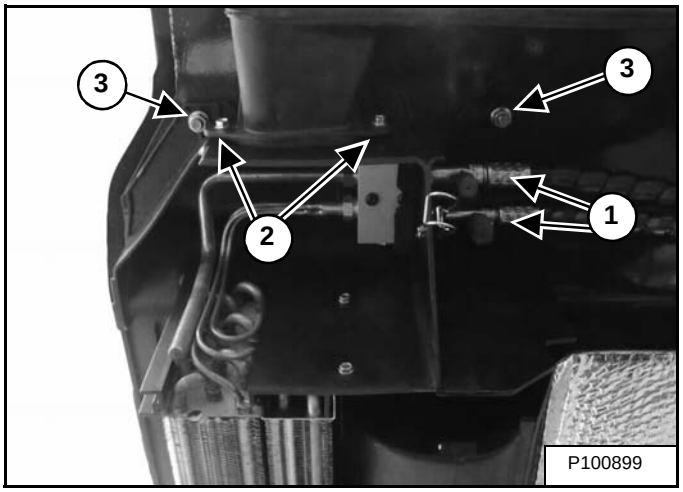


NOTE: Support the evaporator / heater unit before removing the mounting hardware.

Remove the two bolts (Item 1) **[Figure 80-80-3]**.

Remove the two nuts (Item 2) **[Figure 80-80-3]**.

Figure 80-80-4



Disconnect the two A/C hoses (Item 1) **[Figure 80-80-4]**.

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

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

Remove the two bolts (Item 2) **[Figure 80-80-4]**.

Remove the two nuts (Item 3) **[Figure 80-80-4]**.

Remove evaporator / heater unit from the loader.

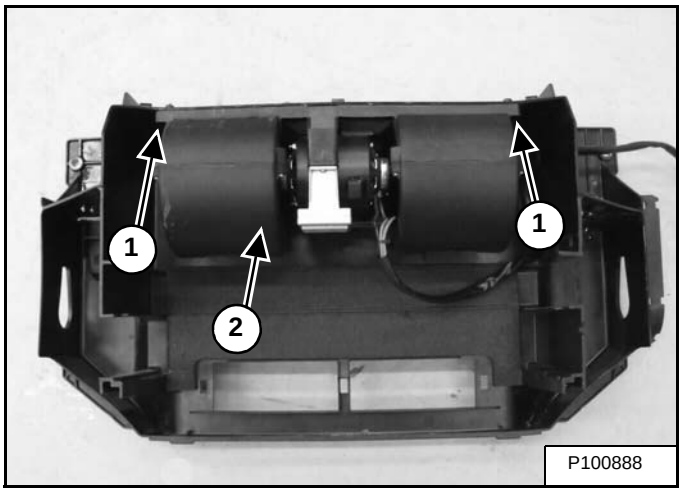
BLOWER FAN

Removal And Installation

Remove the evaporator / heater unit. (See Removal And Installation on Page 80-120-1.)

Remove the heater coil. (See Removal And Installation on Page 80-120-1.)

Figure 80-130-1

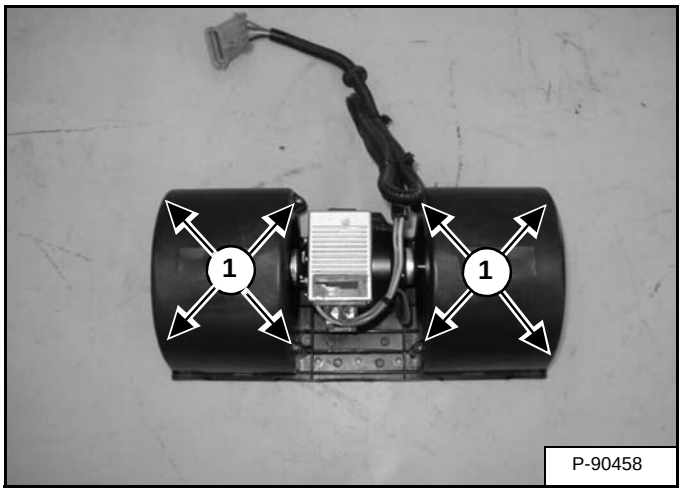


Remove the two screws (Item 1) **[Figure 80-130-1]**.

Remove the blower fan (Item 2) **[Figure 80-130-1]** from the evaporator / heater unit.

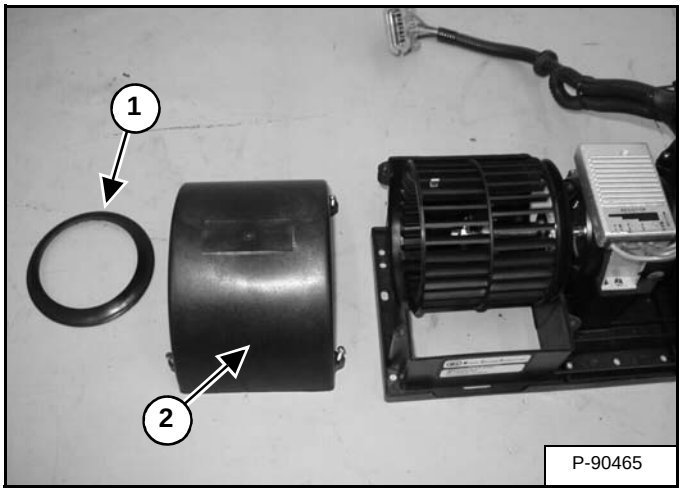
Disassembly And Assembly

Figure 80-130-2



Remove the eight screws (Item 1) **[Figure 80-130-2]** from the blower wheel cover.

Figure 80-130-3



Remove the outside rings (Item 1) and the blower wheel cover (Item 2) **[Figure 80-130-3]**.

Repeat for other side.

Inspect the outside rings and blower wheel covers for wear and replace as needed **[Figure 80-130-3]**.

(T870) LOADER SPECIFICATIONS (CONT'D)

Controls

Vehicle Steering	Direction and speed controlled by two hand operated steering handles *or* optional joystick(s)
Loader Hydraulics - Lift and Tilt - Front Auxiliary - Rear Auxiliary (Option)	 Controlled by separate foot pedals or optional Selectable Joystick Controls (SJC) Controlled by electrical switch on Right Hand steering handle or joystick Controlled by electrical switch on Left Hand steering handle or joystick
Auxiliary Pressure Release	Pressure relieved through quick couplers; Push couplers in, hold for 5 seconds
Engine	Hand lever speed control, additional foot operated speed control pedal with SJC option; key-type start switch *or* optional Keyless Start Panel *or* optional Deluxe Instrumentation Panel and function error shutdown.
Starting Aid	Air Intake Heater - Automatically activated as needed in RUN position
Service Brake	Two independent hydrostatic systems controlled by two hand operated steering handles or optional joystick(s)
Secondary Brake	One of the hydrostatic transmissions
Parking Brake (Standard)	Spring applied pressure release multi-disk brake activated by manually operated switch on left instrument panel

Hydraulic System

Pump Type	Engine driven, gear type
Pump Capacity - Standard	90,1 L/min (23.8 U.S. gpm)
Pump Capacity - High-Flow Option	141,6 L/min (37.4 U.S. gpm)
System Relief at Quick Couplers	23,8 - 24,5 MPa (238 - 245 bar) (3450 - 3550 psi)
Filter (Hydraulic / Hydrostatic)	Replaceable beta 10 micron = 200, drop in element
Filter (Charge)	Replaceable beta 10 micron = 200, drop in 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 88,9 mm (3.50 in) 82,6 mm (3.25 in) 50,8 mm (2.00 in) 38,1 mm (1.50 in) 698,8 mm (27.51 in) 388,4 mm (15.29 in)
Control Valve - SCPA	3-Spool, open center, manually operated with spring detent for lift float. Electrically controlled auxiliary spool
Control Valve - SJC	3-Spool, open center with electric actuator controlled lift with float and tilt. Electrically controlled auxiliary spool
Fluid Lines	SAE Standard tubelines, hoses and fittings
Fluid Type	BOBCAT FLUID, Hydraulic / Hydrostatic 6903117 - (Two - 2.5 U.S. gal) 6903118 - (5 U.S. gal) 6903119 - (55 U.S. gal)
Hydraulic Function Time: Raise Lift Arms Lower Lift Arms Bucket Dump Bucket Rollback	 5.7 Seconds 3.9 Seconds 2.8 Seconds 2.3 Seconds

ALPHABETICAL INDEX