

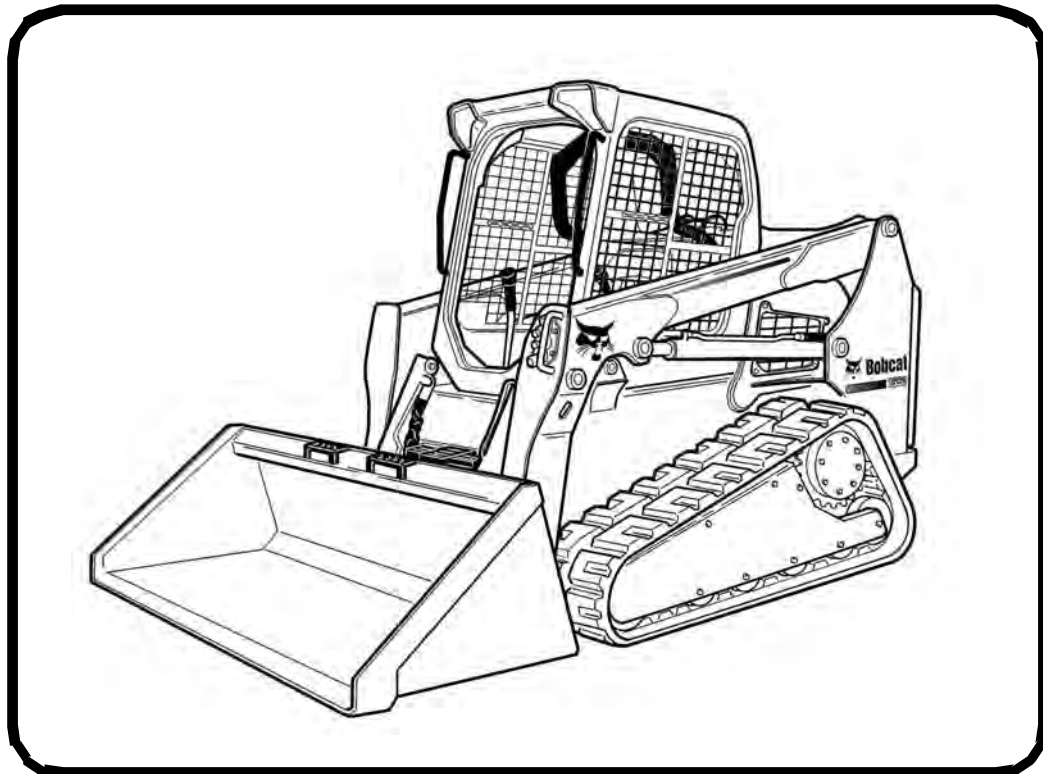


Bobcat®

Service Manual

T550 Compact Track Loader

S/N A7UJ11001 & Above



EQUIPPED WITH
BOBCAT INTERLOCK
CONTROL SYSTEM (BICS™)



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SAFETY INSTRUCTIONS



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



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

I-2019-0284



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

D-1002-1107



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

W-2044-1107

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

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

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OPERATOR CAB (CONT'D)

Lowering

Always stop the engine before raising or lowering the operator cab.

NOTE: Always use the grab handles to lower the operator cab.

Figure 10-30-4



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

NOTE: The weight of the operator cab increases when equipped with options and accessories such as: cab door, heater, air conditioning. In these cases, the operator cab may need to be raised slightly from the latch to be able to release the latch.



UNEXPECTED LOADER, LIFT ARM OR ATTACHMENT MOVEMENT CAUSED BY CAB CONTACT WITH CONTROLS CAN CAUSE SERIOUS INJURY OR DEATH

- **STOP ENGINE** before raising or lowering cab.

W-2758-0908

NOTE: On some machines, the operator cab frame can contact the steering levers while raising or lowering the operator cab. The engine **MUST** be stopped before raising or lowering the operator cab.

Support the operator cab and release the latching mechanism (Inset) [Figure 10-30-4]. Remove your hand from the latch mechanism when the operator cab is past the latch stop. Use both hands to lower the operator cab all the way down.

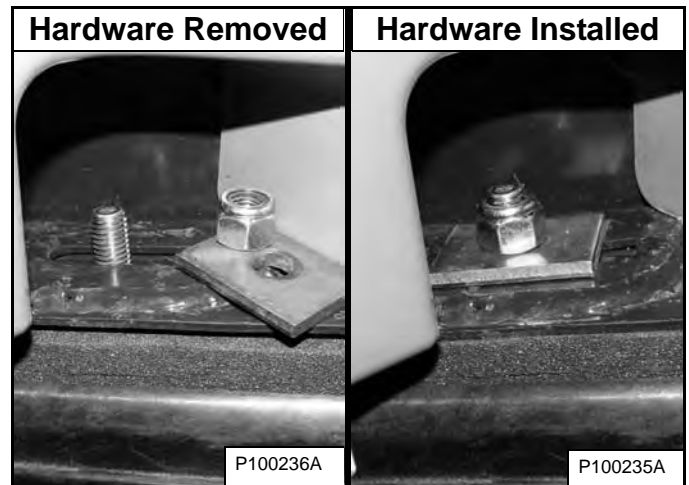


PINCH POINT CAN CAUSE INJURY

Remove your hand from the latching mechanism when the cab is past the latch stop.

W-2469-0803

Figure 10-30-5



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

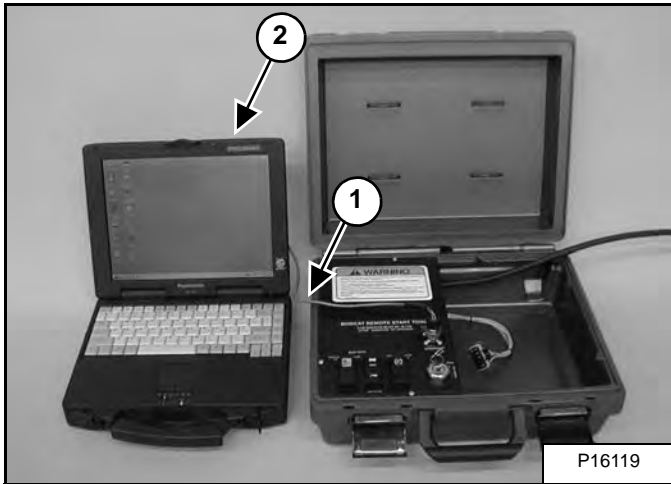
Tighten the nuts to 54 - 61 N•m (40 - 45 ft-lb) torque.

Remove the jackstands.

REMOTE START TOOL-MEL1563 (CONT'D)

Service Tool Harness Communicator - MEL1566

Figure 10-60-6



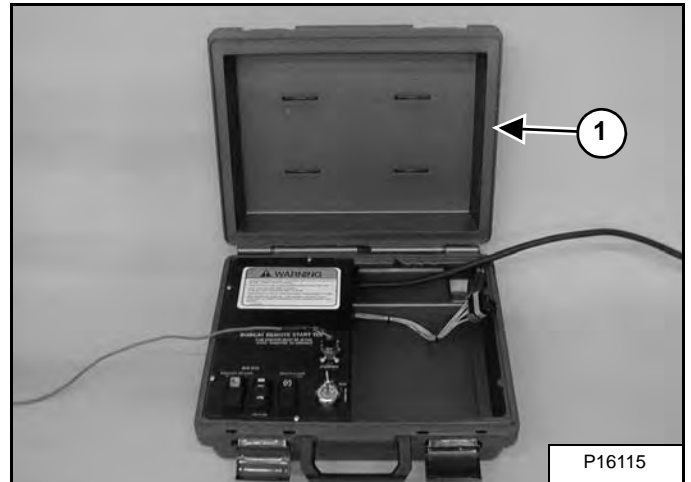
The service tool harness communicator (Item 1) is required to connect remote start tool to the Service PC (Item 2) [Figure 10-60-6].

Remote Start Procedure

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

MEL1563: Remote Start Tool Kit

Figure 10-60-7



The remote start tool (Item 1) [Figure 10-60-7] is required when the operator cab is in the raised position for service and the service technician needs to turn the key switch on or start the engine. Example: adjusting the steering linkage.

Lift and block the loader.

Raise the lift arms (if required by the procedure) and install an approved lift arm support device.

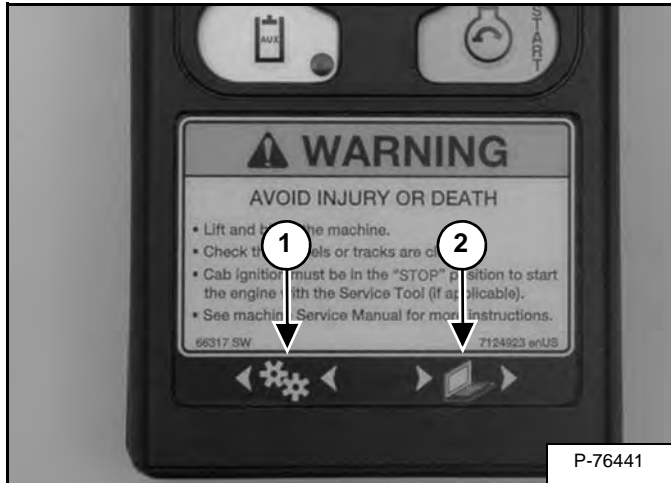
Raise the operator cab (if required by the procedure).

Open the rear door of the loader.

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

Remote Start Procedure (Cont'd)

Figure 10-61-13

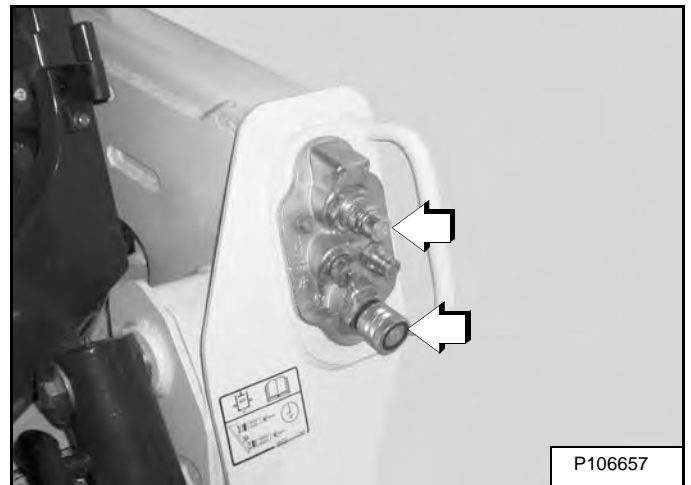


The gear icon with the left facing arrows (Item 1) [Figure 10-61-13] will illuminate and blink when the RUN key is pressed and the loader is communicating with the service tool.

The computer icon with the right facing arrows (Item 2) [Figure 10-61-13] will illuminate and blink when the Remote Start Tool (Service Tool) is transmitting data to and from the computer.

NOTE: To relieve the pressure at the rear or secondary front auxiliary, (if equipped) press the RUN button on the remote start tool. Then press the auxiliary (AUX) hydraulics button on the remote start tool and move the AUXILIARY Hydraulic Switch to the right and left several times.

Figure 10-61-14



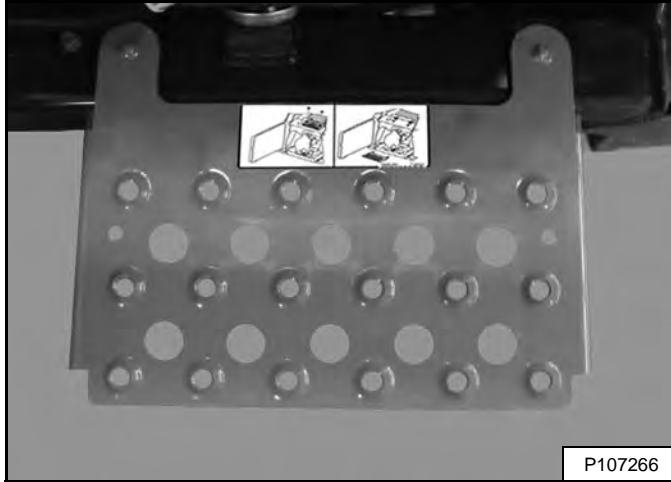
Push the couplers on the front auxiliary block toward the block and hold for five seconds to release the front auxiliary pressure [Figure 10-61-14].

ENGINE COOLING SYSTEM (LATER MODELS)

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

Maintenance Platform

Figure 10-91-1



A maintenance platform [Figure 10-91-1] is available to facilitate access when cleaning the engine cooling system.

Cleaning

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

Stop the engine, open the rear door, and remove the rear grille. (See REAR GRILLE on Page 50-60-1.)

WARNING

AVOID INJURY OR DEATH

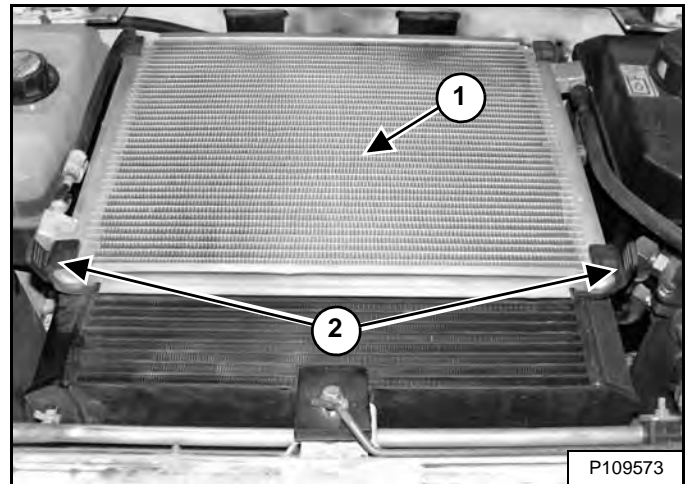
Wear safety glasses to prevent eye injury when any of the following conditions exist:

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

W-2019-0907

Loaders With Air Conditioning

Figure 10-91-2



Use low air pressure or water pressure to clean the top of the air conditioning condenser (Item 1) [Figure 10-91-2].

Unhook the two rubber straps (Item 2) [Figure 10-91-2].

NOTE: The air conditioning condenser fits into two slotted brackets mounted on the hydraulic fluid cooler and radiator assembly. Ensure the air conditioning condenser remains connected to the brackets when raising and lowering.

HYDRAULIC / HYDROSTATIC SYSTEM

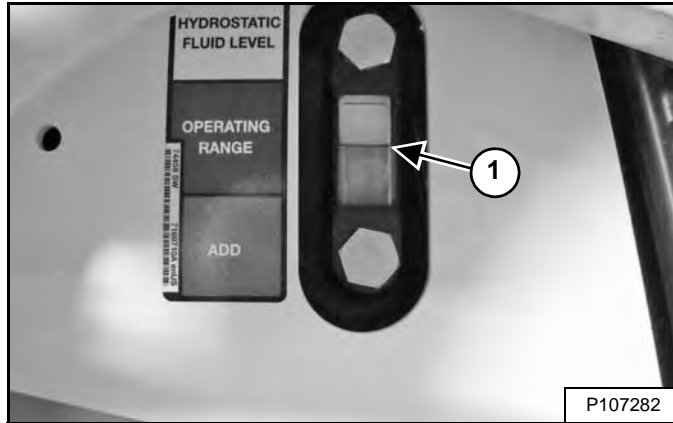
Checking And Adding Fluid

Check the hydraulic / hydrostatic fluid level every day before starting the work shift.

Park the loader on a level surface, lower the lift arms, and put the attachment flat on the ground or tilt the Bob-Tach fully back if no attachment is installed.

Stop the engine.

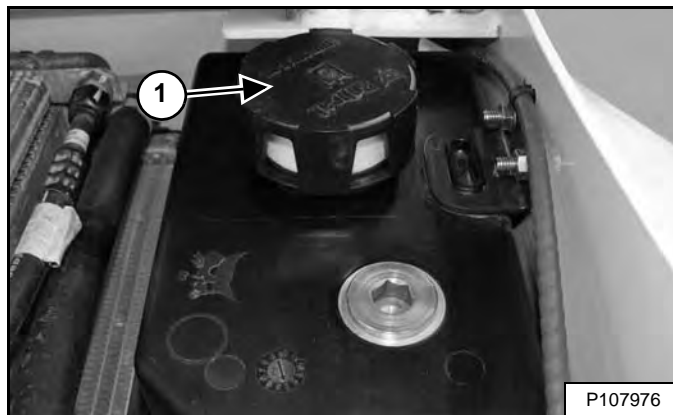
Figure 10-120-1



Check the fluid level in the sight gauge (Item 1) [Figure 10-120-1]. Keep the fluid level within the operating range.

Open the rear door and remove the rear grille. (See REAR GRILLE on Page 50-60-1.)

Figure 10-120-2



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

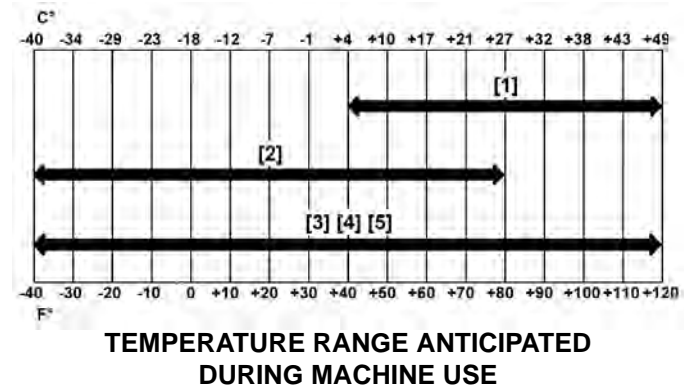
Add fluid as needed to bring the level within the operating range in the sight gauge [Figure 10-120-1].

Install the fill cap [Figure 10-120-2], install the rear grille, and close the rear door.

Hydraulic / Hydrostatic Fluid Chart

Figure 10-120-3

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



[1] VG 100; Minimum VI 130

[2] VG 46; Minimum VI 150

[3] BOBCAT All-Season Fluid

[4] BOBCAT Synthetic Fluid

[5] BOBCAT Biodegradable Hydraulic / Hydrostatic Fluid (Unlike biodegradable fluids that are vegetable based, Bobcat biodegradable fluid is formulated to prevent oxidation and thermal breakdown at operating temperatures.)

Use only recommended fluid in the hydraulic system [Figure 10-120-3]. (See Hydraulic System on Page SPEC-10-4.)

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.

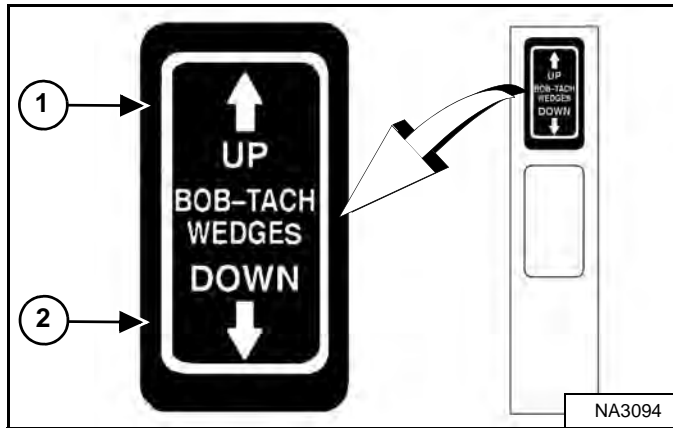
W-2103-0508

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.

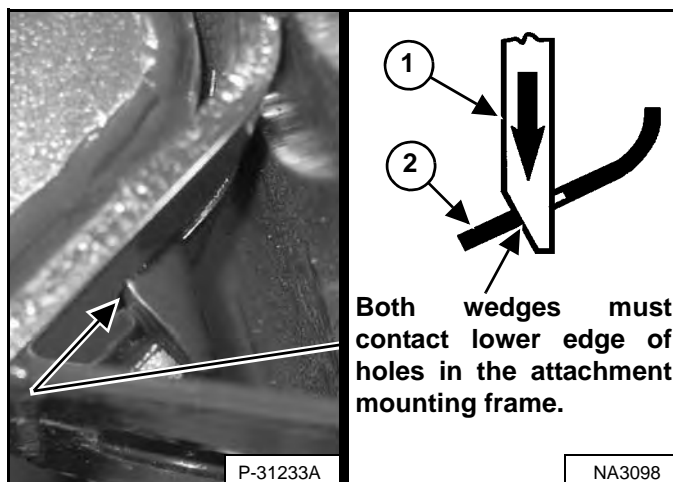
WARNING

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

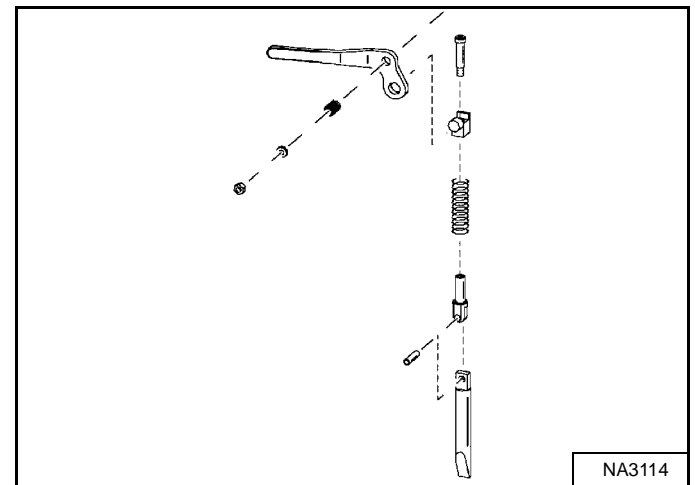


The wedges (Item 1) [Figure 10-131-2] must extend through the holes in the attachment mounting frame.

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.

Inspect for cracked welds.

Lubricate the wedges. (See SERVICE SCHEDULE on Page 10-70-1.) and (See REAR GRILLE on Page 50-60-1.)

LOADER STORAGE AND RETURN TO SERVICE

Storage

You may decide to store your Bobcat loader for an extended period of time. Perform the procedures below for 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, perform the procedures below 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.

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HYDRAULIC/HYDROSTATIC SCHEMATIC

SJC WITH ALL OPTIONS

T550 (S/N A7UJ11001 AND ABOVE)

(PRINTED AUGUST 2012)

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LEGEND

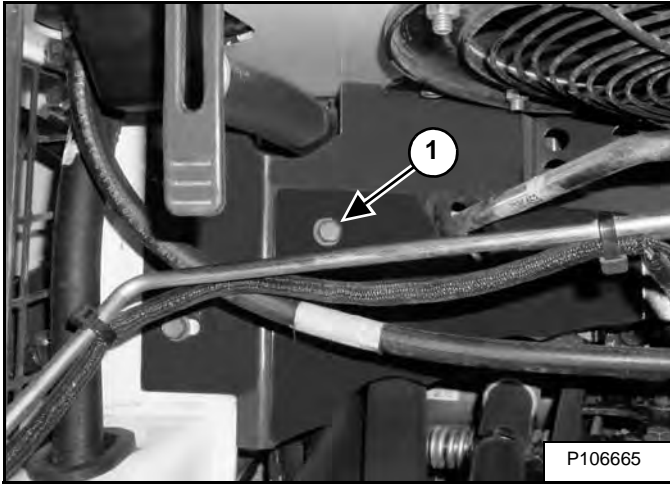
- | | | | |
|---|---|--|---|
| <p>① RESERVOIR:
Capacity at sight gauge . . . 7,6 L (2.0 U.S. gal)
System Capacity 35 L (9.25 U.S. gal)</p> <p>② SIGHT GUAGE</p> <p>③ DIFFERENTIAL PRESSURE SWITCH:
107 kPa (1,07 bar) (15 psi)
Normally Closed</p> <p>④ FILTER - HYDRAULIC (CANISTER)</p> <p>⑤ SPRING LOADED FILTER BY-PASS VALVE: 172 kPa (1,7 bar) (25 psi)</p> <p>⑥ DIAGNOSTIC COUPLER</p> <p>⑥A DIAGNOSTIC COUPLER – FILL PORT – Factory Hydraulic Oil</p> <p>⑦ RELIEF VALVE - MAIN:
23787 - 24476 kPa (238 - 245 bar) (3450 - 3550 psi) at Front Quick Couplers</p> <p>⑧ RELIEF/ANTICAVITATION VALVE - PORT: 27579 kPa (276 bar) (4000 psi)</p> <p>⑨ RELIEF/ANTICAVITATION VALVE - PORT (OPTIONAL):
27579 kPa (276 bar) (4000 psi)</p> <p>⑩ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY</p> <p>⑪ LOAD CHECK VALVE</p> <p>⑫ ANTICAVITATION VALVE</p> <p>⑬ PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL</p> <p>⑭ PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL</p> <p>⑮ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL</p> <p>⑯ FILTER - BICS CONTROL VALVE (SCREEN)</p> | <p>⑰ CHECK VALVE - With 100 kPa (1,0 bar) (14.5 psi) Spring</p> <p>⑱ RESTRICTION 2,0 mm (0.079 in)</p> <p>⑲ PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS</p> <p>⑳ LIFT CYLINDER SPOOL - MADE TO RESTRICT FLOW DURING BOOM DOWN BUT NOT DURING BOOM UP</p> <p>㉑ ANTICAVITATION VALVE</p> <p>㉒ PROPORTIONAL RELIEF VALVE – (Fan Speed Regulator): 10797 – 12300 kPa (108 - 123 bar) (1566 - 1784 psi)</p> <p>㉓ SPRING LOADED FILTER BY-PASS VALVE: 517 – 572 kPa (5,2 - 5,7 bar) (75 - 83 psi)</p> <p>㉔ FIXED CAPACITY DISPLACEMENT HYDRAULIC MOTOR</p> <p>㉕ FILTER - HYDRAULIC (CANISTER)</p> <p>㉖ SENSOR – CHARGE PRESSURE – Fan Filter</p> <p>㉗ FRONT AUXILIARY MANUAL PRESSURE BLEED-OFF VALVE</p> <p>㉘ SENSOR – HYD. TEMPERATURE</p> <p>㉙ RESTRICTION - 2,3 mm (0.09 in)</p> <p>㉚ CHECK VALVE - With 1400 kPa 14 bar (203 psi) Spring</p> <p>㉛ DRIVE MOTOR SHUTTLE VALVE</p> <p>㉜ FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR</p> <p>㉝ HYDRAULIC BRAKE – SPRING APPLIED – PRESSURE RELEASE (SAPR)</p> <p>㉞ FILTER – Brake Valve</p> <p>㉟ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – Brake Valve</p> <p>㊱ CHARGE PUMP - 49,2 L/min (13.0 U.S. gpm) at High Engine Idle</p> <p>㊲ HYDRAULIC PUMP Gear Type 64,7 L/min (17.1 U.S. gpm) at High Engine Idle</p> | <p>㊳ VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP</p> <p>㊴ RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 36500 kPa (365 bar) (5294 psi)</p> <p>㊵ RELIEF VALVE - CHARGE INLET: 2861 kPa (28,6 bar) (415 psi) at High Engine Idle With 60 ° C (140 ° F) Fluid</p> <p>㊶ CHECK VALVE – COLD WEATHER BY-PASS With 345 kPa (3,45 bar) (50 psi) Spring</p> <p>㊷ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE – FORWARD/REVERSE</p> <p>㊸ FILTER</p> <p>㊹ SERVO PISTON – Swash Plate</p> <p>㊺ NOT USED ON THIS MODEL</p> <p>㊻ PILOT ACTIVATED DIRECTIONAL CONTROL VALVE – HYDRAULIC POWERED BOB-TACH With Build-up Valve 207 kPa (2,07 bar) (30 psi)</p> <p>㊼ FILTER - BOB-TACH VALVE</p> <p>㊽ RESTRICTION - 2,03 mm (0.08 in)</p> <p>㊾ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)</p> <p>㊿ RELIEF VALVE - 8274 kPa (83 bar) (1200 psi)</p> <p>① CHECK VALVE - With 552 kPa) (5,5 bar) (80 psi) Spring</p> <p>② SHUTTLE VALVE</p> <p>③ RELIEF VALVE - 13790 kPa (137 bar) (2000 psi)</p> <p>④ CHECK VALVE - With 2068 kPa (20,7 bar) (300 psi) Spring And With 0,33 mm (0.013 in) Orifice</p> <p>⑤ RESTRICTION - 0,51 mm (0.020 in)</p> <p>⑥ RESTRICTION - 0,51 mm (0.020 in)</p> <p>⑦ PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - REAR AUXILIARY</p> <p>⑧ RELIEF VALVE: 22753 kPa (228 bar) (3300 psi)</p> <p>⑨ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TWO COIL</p> <p>⑩ RESTRICTOR - 0,8 mm (0.031 in)</p> <p>⑪ LOAD SHUTTLE VALVE - BLEED OFF</p> | <p>⑫ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Female</p> <p>⑬ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - Male</p> <p>⑭ SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)</p> <p>⑮ FLOW DIVIDER ADJUSTMENT VALVE</p> <p>⑯ PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL</p> <p>⑰ CHECK VALVE - BUCKET POSITION VALVE</p> <p>⑱ PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL</p> <p>⑲ HIGH FLOW HYDRAULIC PUMP Gear Type 36,4 L/min (9.6 U.S. gal) at High Engine Idle</p> <p>㉑ RELIEF VALVE - 24132 kPa (241 bar) (3500 psi)</p> <p>㉒ DUMP VALVE – ON / OFF</p> <p>㉓ CHECK VALVE - With 34,5 kPa (0,34 bar) (5.0 psi) Spring</p> <p>㉔ NOT USED ON THIS MODEL</p> <p>㉕ RIDE CONTROL VALVE</p> <p>㉖ HIGH PRESSURE CHAMBER</p> <p>㉗ LOW PRESSURE CHAMBER</p> |
|---|---|--|---|

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

CYLINDER (LIFT) (CONT'D)

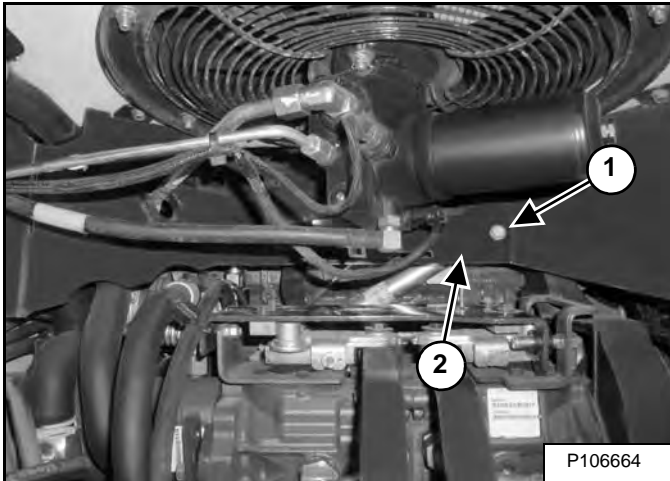
Removal And Installation (Cont'd)

Figure 20-20-6



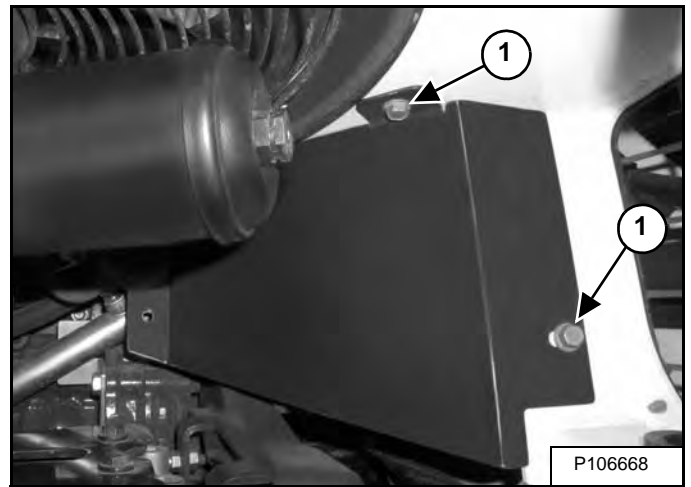
Remove the bolt (Item 1) [Figure 20-20-6].

Figure 20-20-7



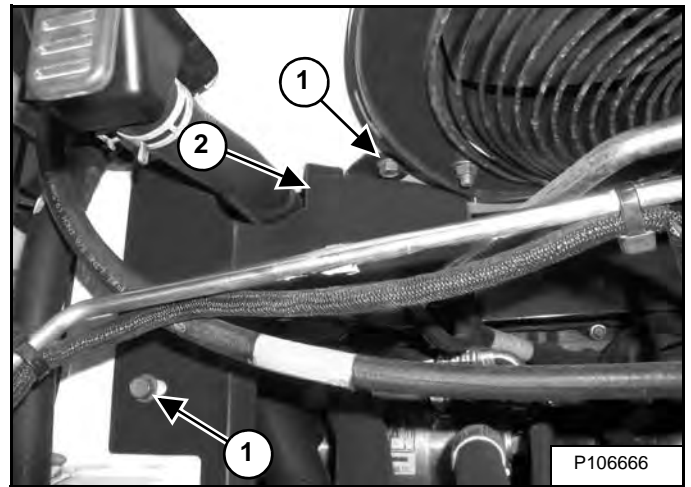
Remove the bolt (Item 1) and remove the lower plate (Item 2) [Figure 20-20-7].

Figure 20-20-8



Remove the two bolts (Item 1) [Figure 20-20-8].

Figure 20-20-9

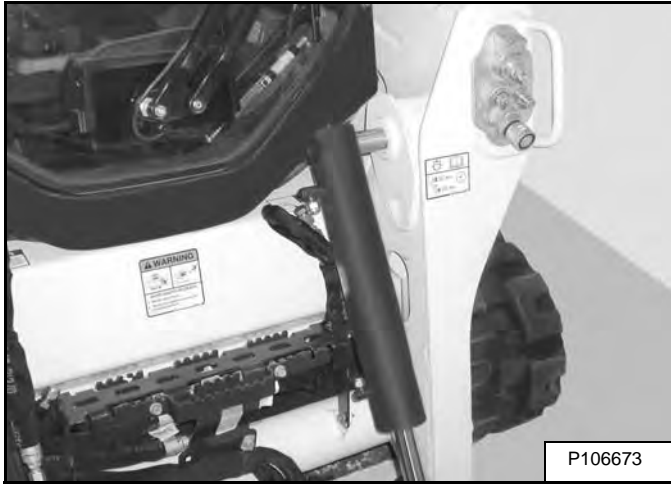


Remove the two bolts (Item 1) and reposition the upper plate (Item 2) [Figure 20-20-9].

CYLINDER (TILT) (CONT'D)

Removal And Installation (Cont'd)

Figure 20-21-7

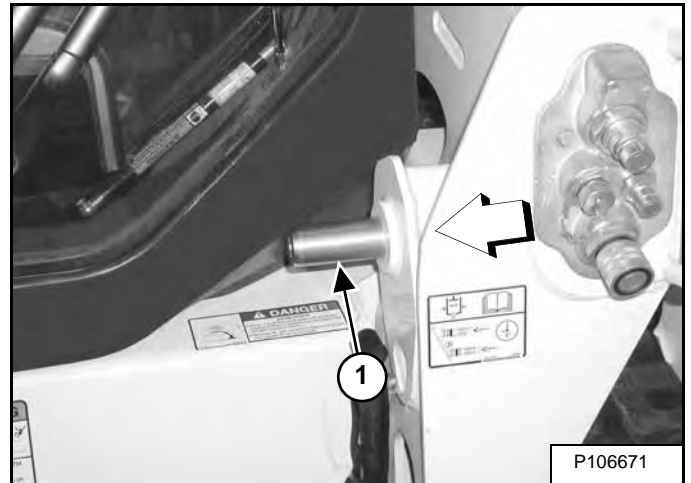


Slide the cylinder from the base pin and remove the cylinder [Figure 20-21-7].

Base End Pivot Pin Removal And Installation

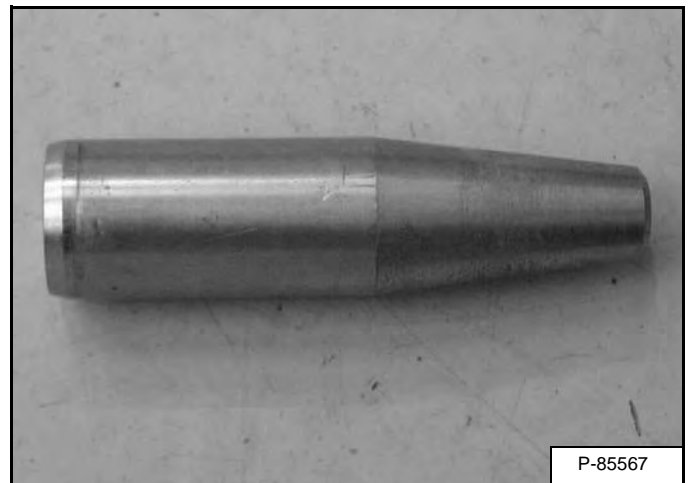
Remove the tilt cylinder from the cylinder base pin. (See Removal And Installation on Page 20-21-2.)

Figure 20-21-8



Using a 22 mm (0.875 in) drift, drive the taper pin (Item 1) [Figure 20-21-8] from the track side of the loader out of the lift arm.

Figure 20-21-9

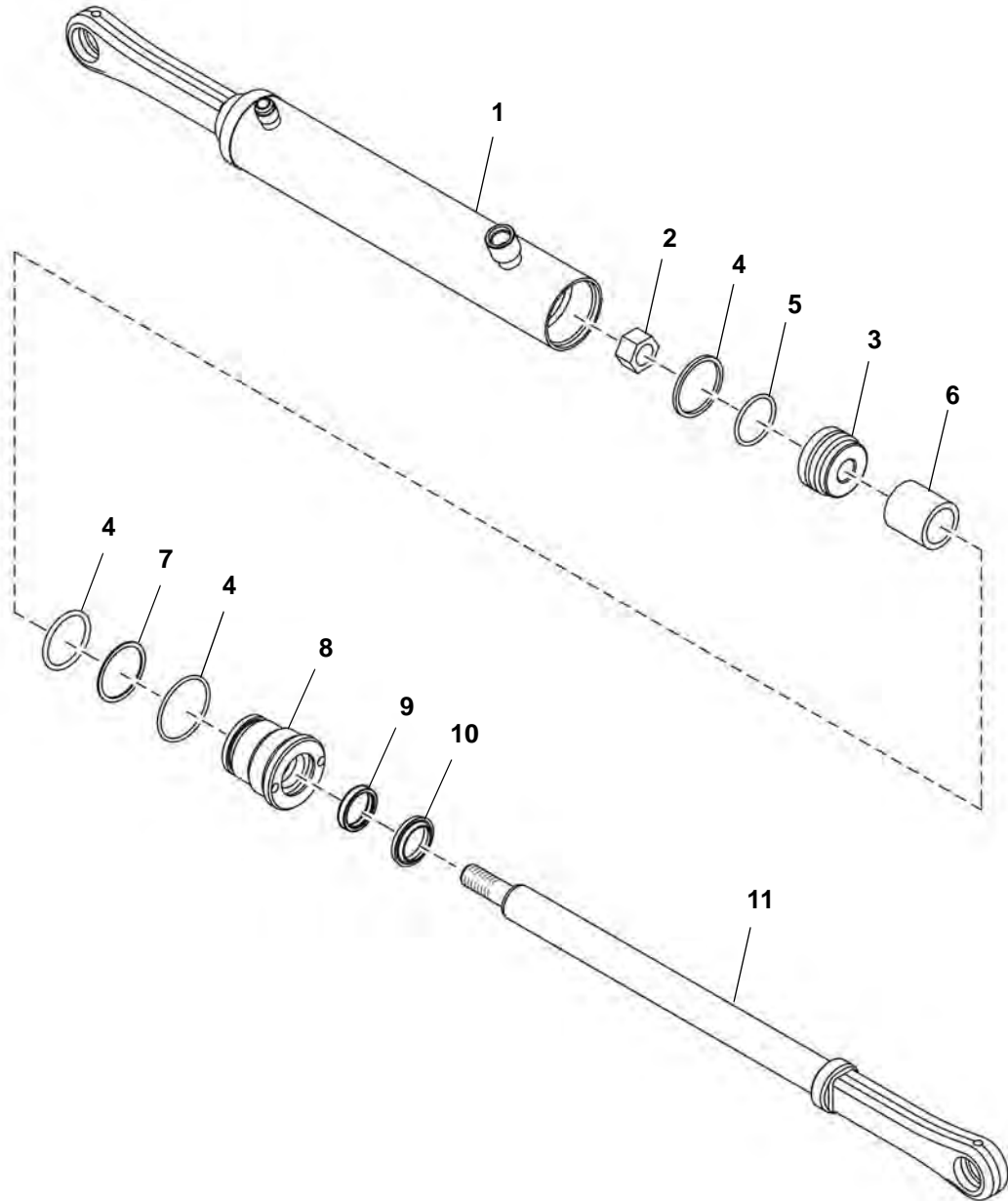


Inspect the pivot pin and replace as needed [Figure 20-21-9].

CYLINDER (BOB-TACH) (CONT'D)

Parts Identification

- 1. Tube
- 2. Nut
- 3. Seal
- 4. O-ring
- 5. Piston
- 6. Spacer
- 7. Back-up ring
- 8. Head
- 9. Seal
- 10. Wiper
- 11. Rod



NA2603S

MAIN RELIEF VALVE (CONT'D)

Removal And Installation

IMPORTANT

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

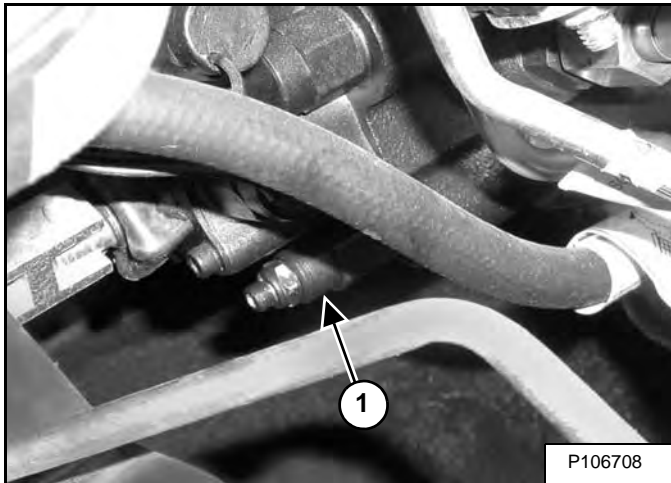
I-2003-0888

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

Clean the area around the control valve.

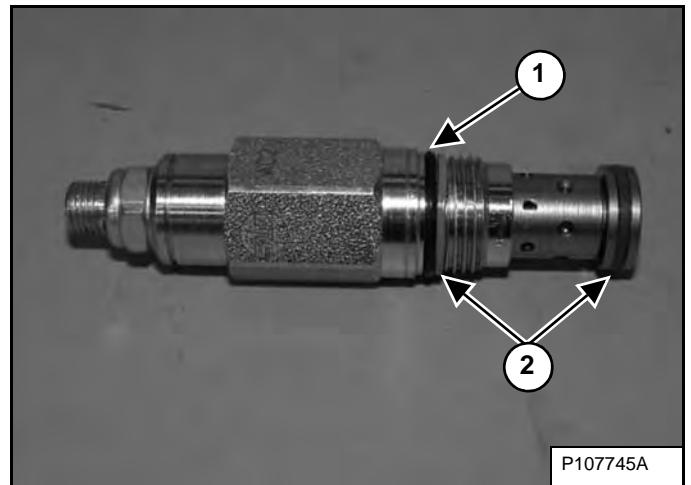
NOTE: This procedure is for standard loaders, loaders equipped with ACS option and loaders equipped with SJC option. The main relief valve is located in the same place on all of the loaders.

Figure 20-30-6



Remove the main relief valve (Item 1) [Figure 20-30-6].

Figure 20-30-7



Remove the O-ring (Item 1) and back-up rings (Item 2) [Figure 20-30-7] from the main relief valve.

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

Install new O-ring and back-up rings. Install the main relief valve [Figure 20-30-7].

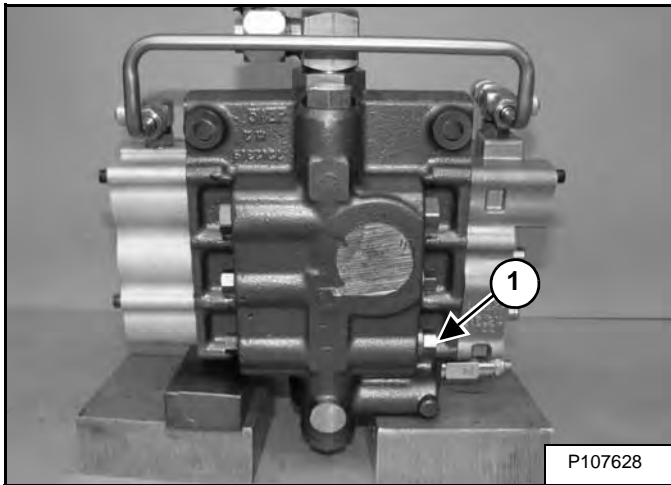
Installation: Tighten the main relief valve to 48 - 54 N•m (35 - 40 ft-lb) torque.

Test the relief valve. (See Testing on Page 20-30-2.)

HYDRAULIC CONTROL VALVE (STANDARD) (CONT'D)

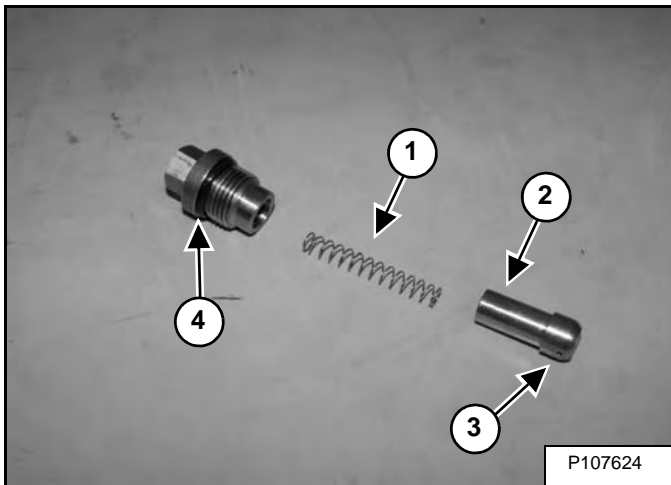
Anti-Cavitation Valve Removal And Installation (Lift, Rod End)

Figure 20-40-20



At the back side of the control valve, remove the lift section anti-cavitation valve (Item 1) [Figure 20-40-20].

Figure 20-40-21



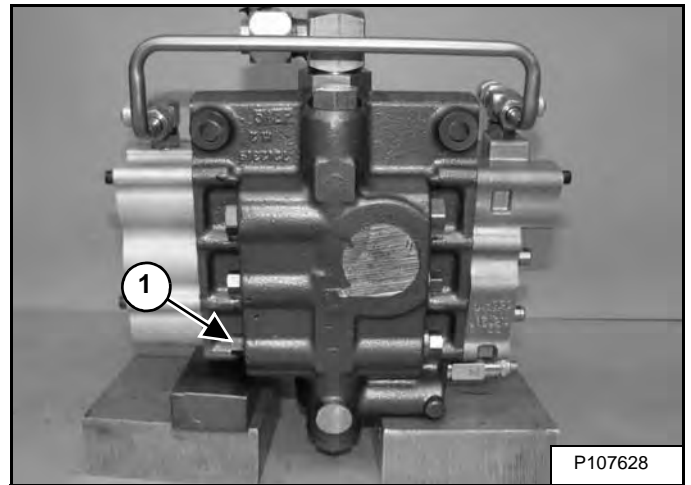
Remove the spring (Item 1) and poppet (Item 2) [Figure 20-40-21].

Inspect the orifice (Item 3) [Figure 20-40-21] in the poppet to make sure it is not plugged.

Installation: Install a new O-ring (Item 4) [Figure 20-40-21] on the plug and lightly lubricate with oil before installing. Tighten the plug to 51 - 61 N•m (38 - 45 ft-lb) torque.

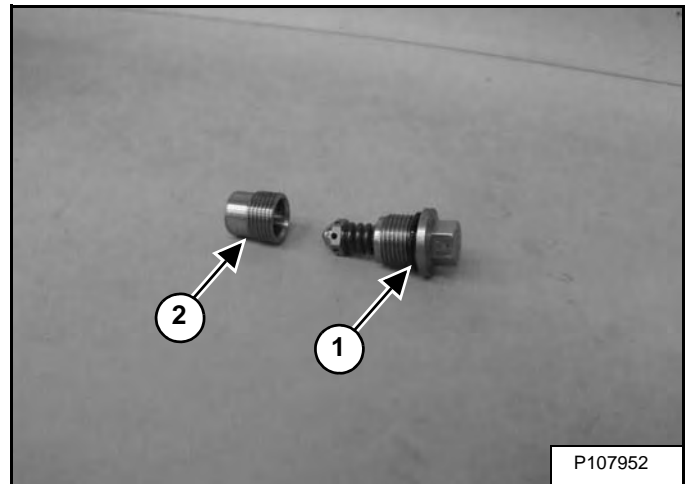
Port Relief / Anti-Cavitation Valve Removal And Installation (Lift, Base End)

Figure 20-40-22



Remove the lift circuit port relief / anti-cavitation valve and the port relief / anti-calibration seat (Item 1) [Figure 20-40-22].

Figure 20-40-23



Remove the O-ring (Item 1) [Figure 20-40-23] from the port relief / anti cavitation relief valve.

Inspect the port relief / anti-cavitation seat (Item 2) [Figure 20-40-23] for wear or damage and replace as needed.

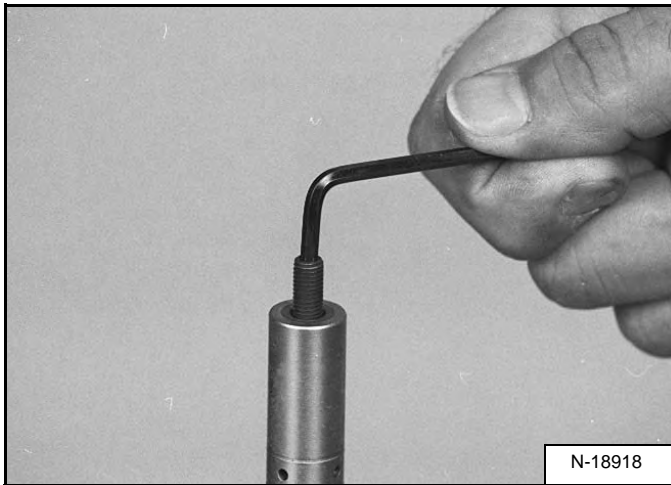
Installation: Tighten the port relief anti-cavitation relief valve to 51 - 61 N•m (38 - 45 ft-lb) torque.

Installation: Tighten the port relief / anti-cavitation seat to 47 N•m (35 ft-lb) torque.

HYDRAULIC CONTROL VALVE (STANDARD) (CONT'D)

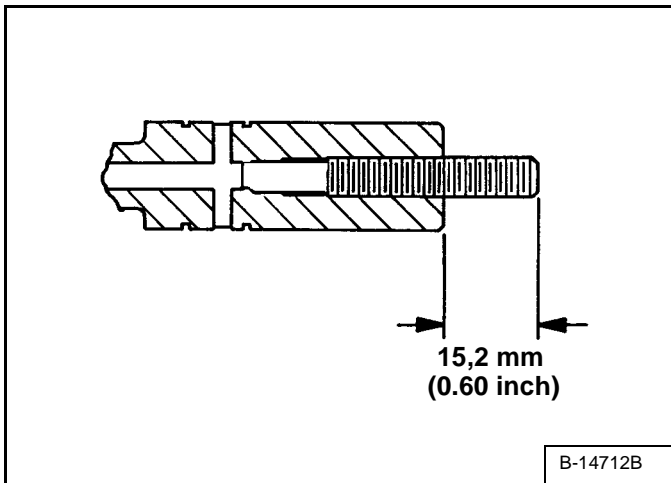
Lift Spool And Detent Removal And Installation (Cont'd)

Figure 20-40-59



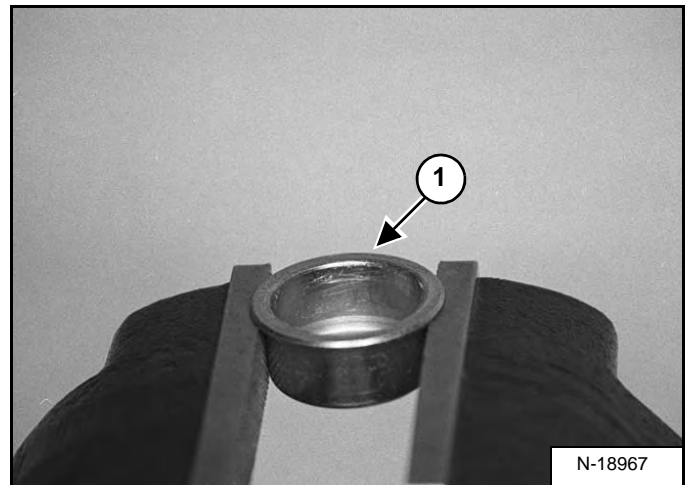
Remove the stud from the end of the spool [Figure 20-40-59].

Figure 20-40-60



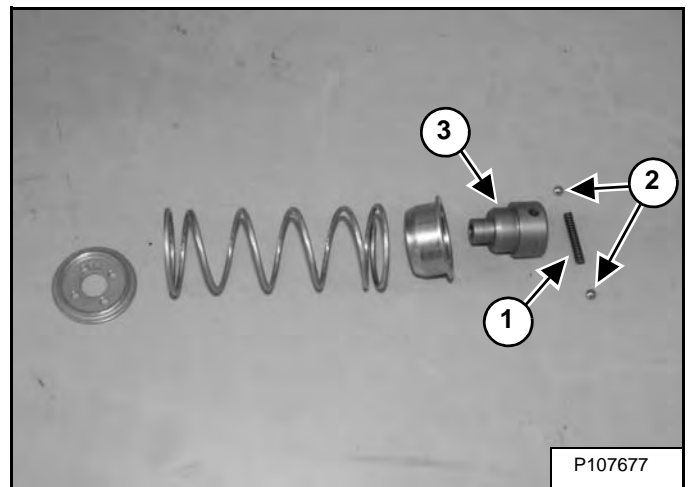
Install the stud and tighten until the other end of the stud is out about 15,2 mm (0.600 in) from the spool [Figure 20-40-60].

Figure 20-40-61



Clamp the collar (Item 1) [Figure 20-40-61] in a vice.

Figure 20-40-62



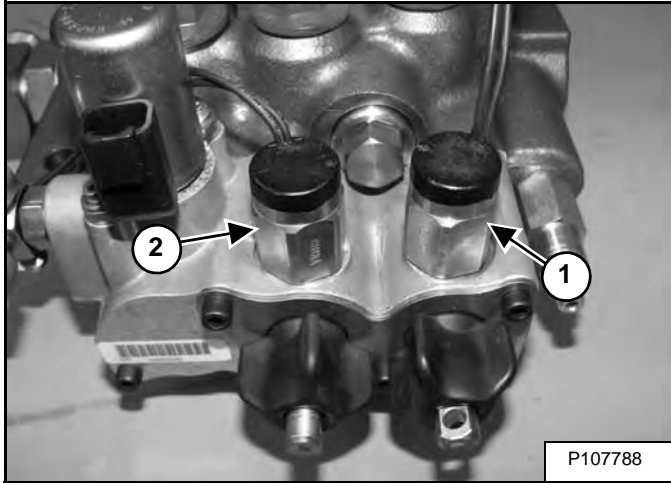
Apply grease on all the detent component surfaces before assembly [Figure 20-40-62].

Install the spring (Item 1) [Figure 20-40-62] and detent balls (Item 2) [Figure 20-40-62] into the adapter (Item 3) [Figure 20-40-62] and compress with the detent pliers (Item 1) [Figure 20-40-63].

HYDRAULIC CONTROL VALVE (STANDARD) (CONT'D)

Lock Valve Removal And Installation (Cont'd)

Figure 20-40-95

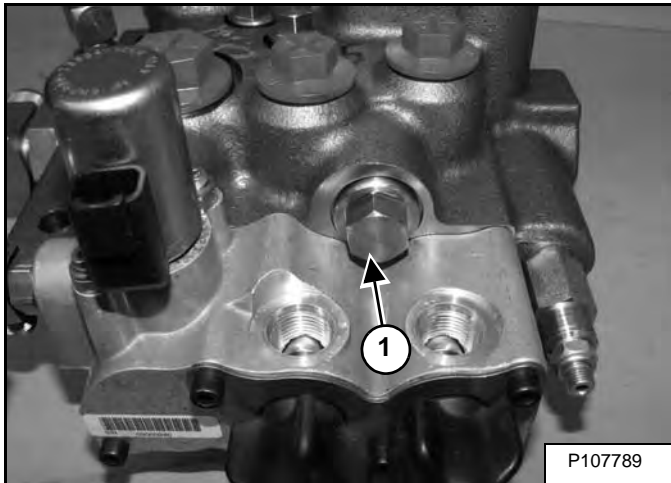


Remove the lift spool lock solenoid (Item 1) [Figure 20-40-95].

Remove the tilt spool lock solenoid (Item 2) [Figure 20-40-95].

Installation: Lubricate the O-rings and tighten the spool lock solenoids to 52 - 61 N•m (38 - 45 ft-lb) torque.

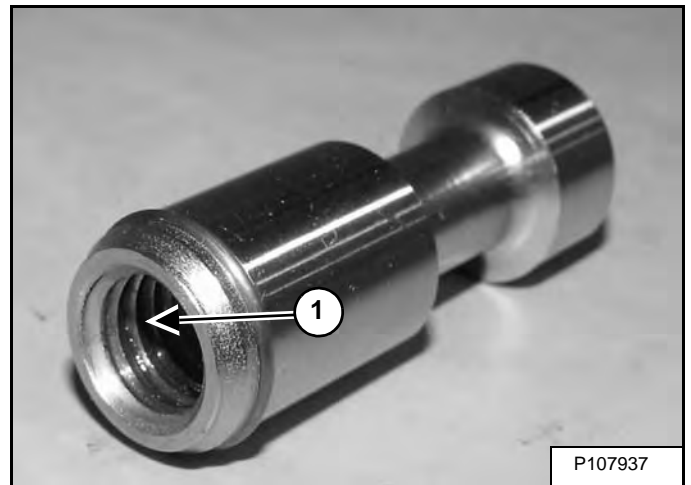
Figure 20-40-96



Remove the tilt lock valve (Item 1) [Figure 20-40-96] from the front of the control valve.

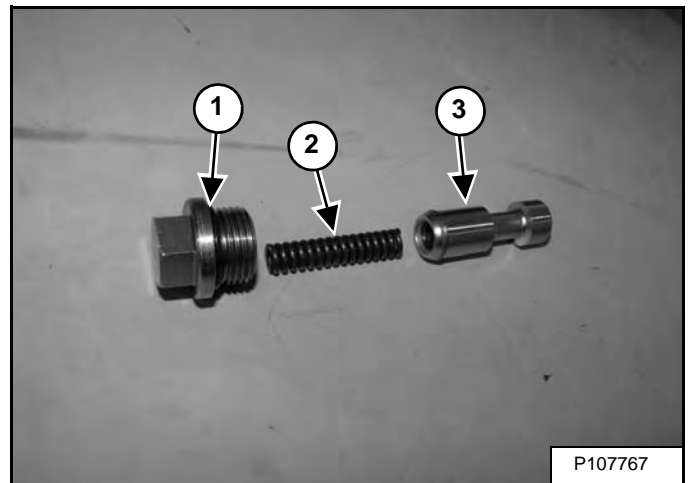
Installation: Lightly lubricate the lock valve retaining cap O-ring and tighten to 75 - 81 N•m (55 - 60 ft-lb) torque.

Figure 20-40-97



The inside diameter of the BICS™ valve (Item 1) [Figure 20-40-97] is threaded for easier removal and installation.

Figure 20-40-98



Remove the O-ring (Item 1) [Figure 20-40-98].

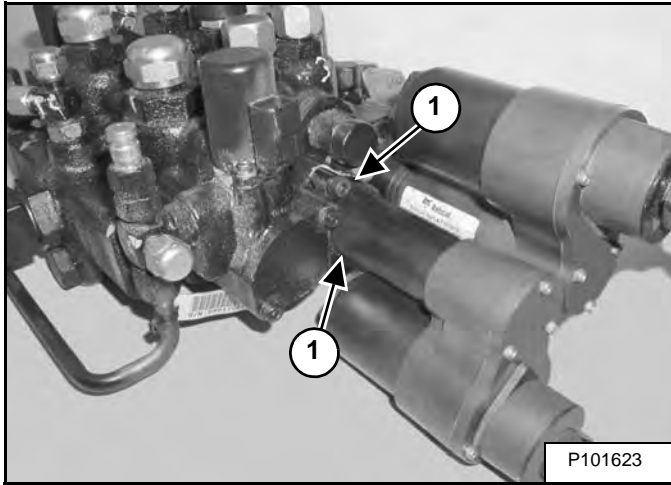
Remove and inspect the spring (Item 2) and BICS™ valve (Item 3) [Figure 20-40-98].

HYDRAULIC CONTROL VALVE (ACS) OR (SJC) (CONT'D)

Actuator Removal And Installation (Out Of Loader)

Remove the control valve from the loader.

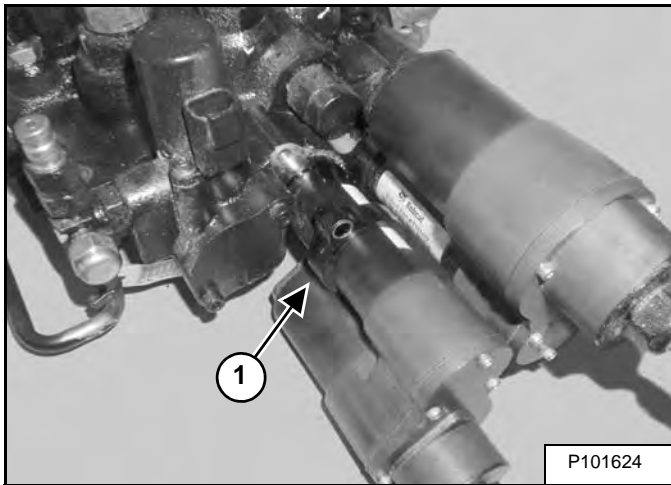
Figure 20-41-16



Remove the two mount bolts (Item 1) [Figure 20-41-16] from the actuator.

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

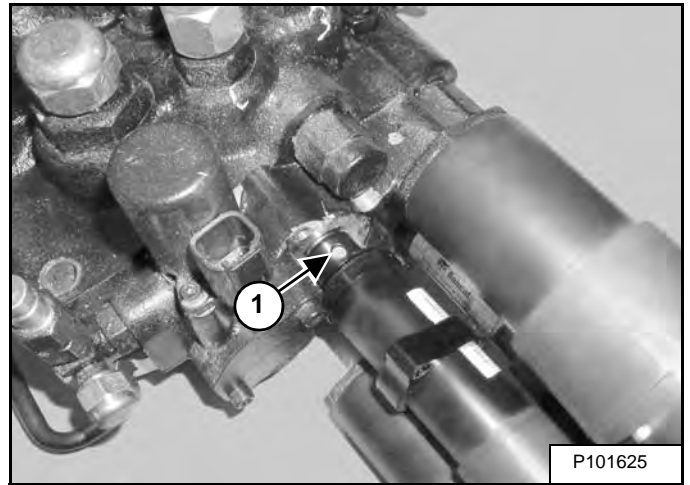
Figure 20-41-17



Slide the actuator retainer (Item 1) [Figure 20-41-17] away from the control valve.

Pull the actuator away from the control valve [Figure 20-41-17].

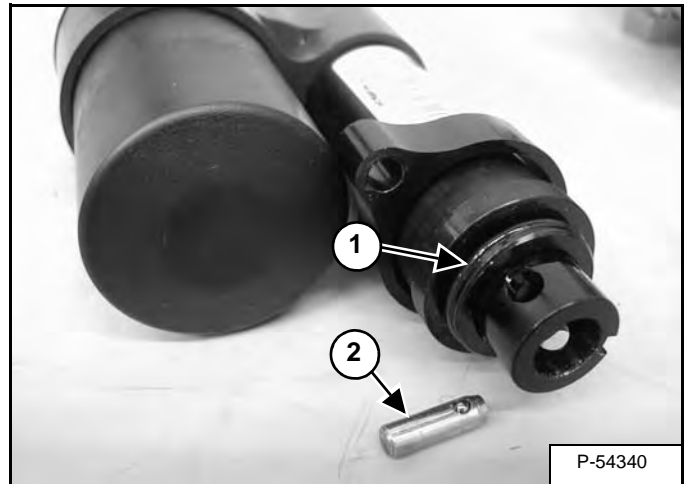
Figure 20-41-18



Using a punch and a hammer, remove the actuator linkage pin (Item 1) [Figure 20-41-18] from the actuator and the spool.

Remove the actuator and linkage pin from the valve.

Figure 20-41-19



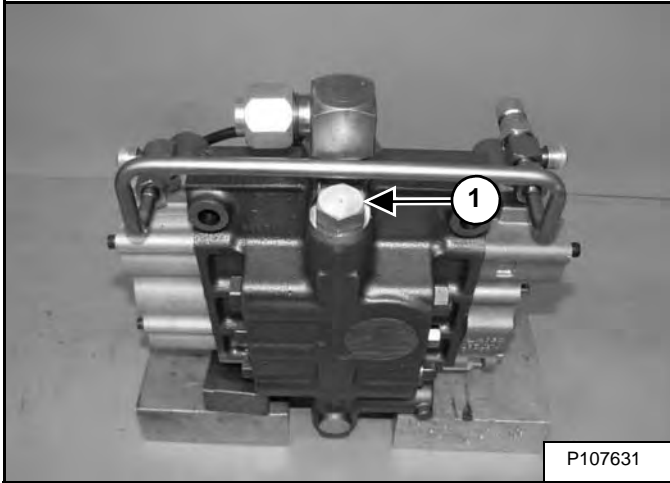
Inspect the O-ring (Item 1) [Figure 20-41-19] on the face of the actuator, and replace as needed.

Inspect the linkage pin (Item 2) [Figure 20-41-19] and replace as needed.

HYDRAULIC CONTROL VALVE (ACS) OR (SJC) (CONT'D)

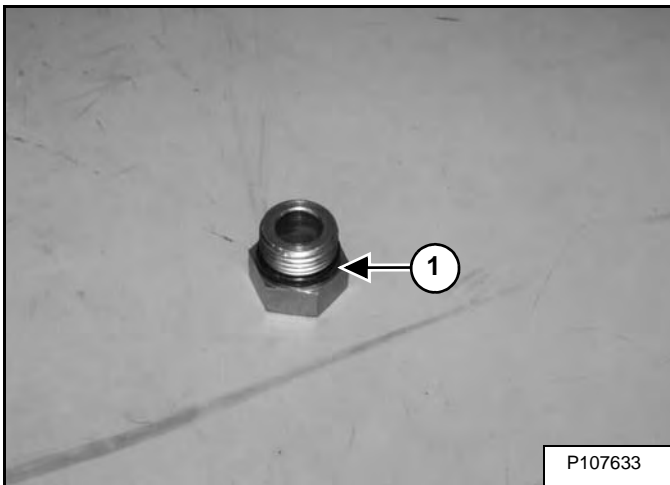
Plug Removal And Installation

Figure 20-41-49



At the top side of the control valve, remove the plug (Item 1) [Figure 20-41-49].

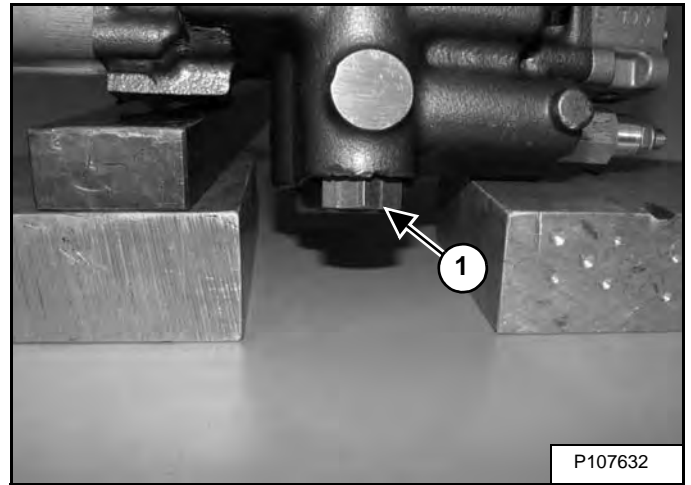
Figure 20-41-50



Remove the O-ring (Item 1) [Figure 20-41-50] from the plug.

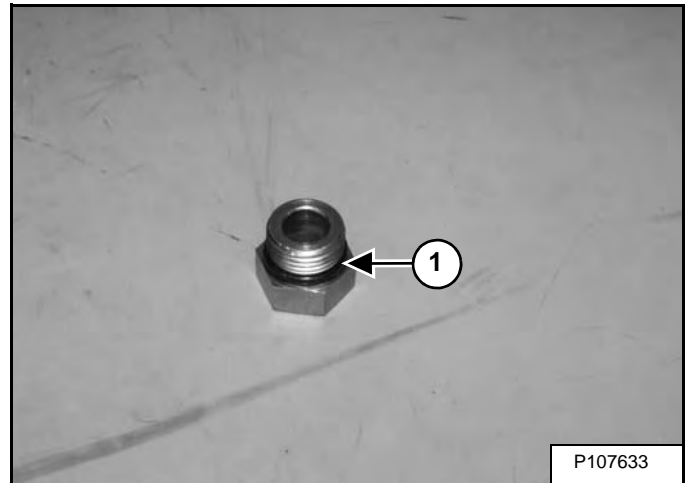
Installation: Tighten to 81,3 N•m (60 ft-lb) torque.

Figure 20-41-51



At the bottom side of the control valve remove the plug (Item 1) [Figure 20-41-51].

Figure 20-41-52



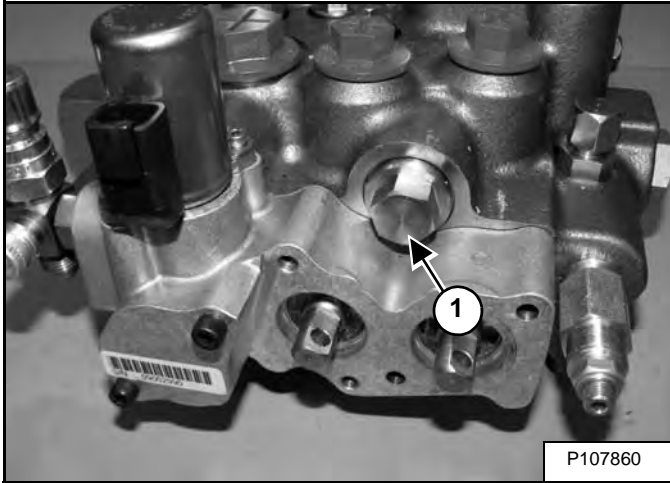
Remove the O-ring (Item 1) [Figure 20-41-52] from the plug.

Installation: Tighten to 81,3 N•m (60 ft-lb) torque.

HYDRAULIC CONTROL VALVE (ACS) OR (SJC)
(CONT'D)

Lock Valve Removal And Installation (Cont'd)

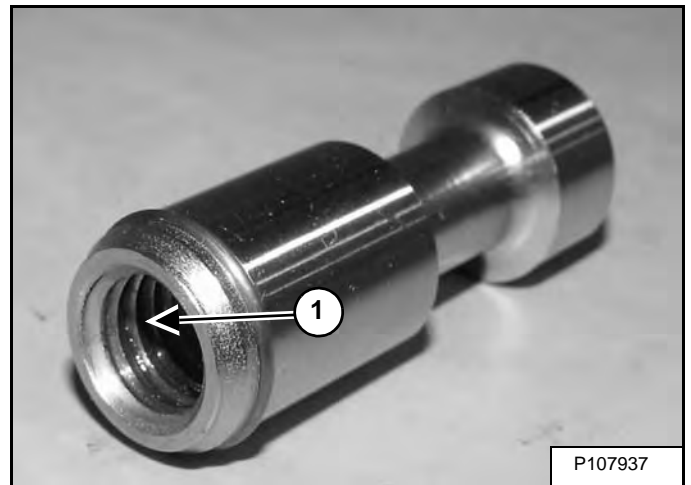
Figure 20-41-87



Remove the tilt lock valve retaining cap (Item 1) [Figure 20-41-87] from the front of the control valve.

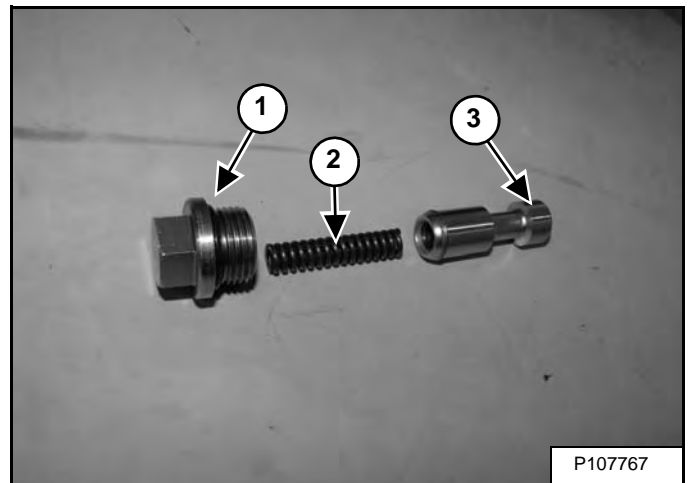
Installation: Lightly lubricate the lock valve retaining cap O-ring and tighten to 75 - 81 N•m (55 - 60 ft-lb) torque.

Figure 20-41-88



The inside diameter of the BICS™ valve (Item 1) [Figure 20-41-88] is threaded for easier removal and installation.

Figure 20-41-89



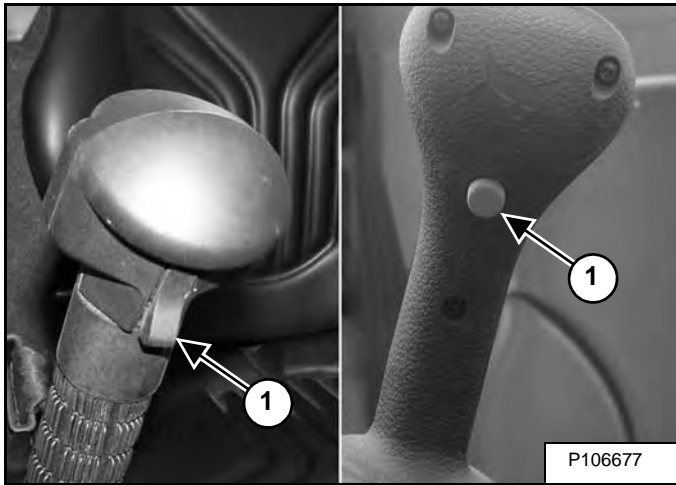
Remove the O-ring (Item 1) [Figure 20-41-89].

Remove and inspect the spring (Item 2) and BICS™ valve (Item 3) [Figure 20-41-89].

HYDRAULIC PUMP (CONT'D)

Pump Test At Quick Couplers (Cont'd)

Figure 20-60-3



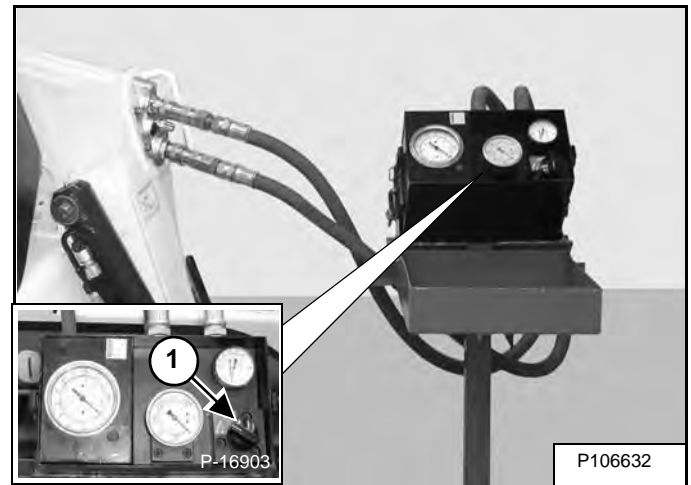
After activating the auxiliary hydraulics, press the continuous flow control switch (Item 1) [Figure 20-60-3] to allow constant auxiliary hydraulic fluid flow to the front female coupler (female coupler is pressurized).

To stop continuous auxiliary hydraulic fluid flow, press the front auxiliary hydraulic switch (Item 1) [Figure 20-60-3] a second time.

NOTE: When the operator is seated and raises the seat bar, the Auxiliary Hydraulic System (Front and Rear) will deactivate.

If no flow is indicated on the tester, the hoses are connected wrong. With the hoses connected correctly, increase the engine speed to full rpm.

Figure 20-60-4



Warm the fluid to 60°C (140°F) by turning the restrictor control (Item 1) [Figure 20-60-4] clockwise on the tester so it reads 6895 kPa (69 bar) (1000 psi).

NOTE: DO NOT EXCEED 25510 kPa (255 bar) (3700 psi).

Turn the restrictor control (Item 1) [Figure 20-60-4] counterclockwise to obtain free flow.

Check the free flow specification (See Hydraulic System on Page SPEC-10-4.)

NOTE: If free flow is below specification perform the direct pump test.

Start turning the restrictor clockwise, causing more restriction on the flow. The fluid flow should drop off slightly until the pressure reaches approximately 21374 kPa (213,7 bar) (3100 psi). At approximately 21374 kPa (213,7 bar) (3100 psi) the flow should start decreasing rapidly until the pressure reaches 23787 - 24132 kPa (237,9 - 241,3 bar) (3450 - 3500 psi). At 23787 - 24132 kPa (237,9 - 241,3 bar) (3450 - 3500 psi) the flow should be at 0 L/min (0 U.S. gpm). DO NOT exceed 25510 kPa (255 bar) (3700 psi). Turn the restrictor (Item 1) [Figure 20-60-4] counterclockwise to free flow. Shut the front auxiliary hydraulics off and stop the engine.

If pressure does not match the above information, the main relief valve needs to be adjusted. (See Adjusting on Page 20-30-4.)

If flow does not match specifications go to the Direct Pump Testing. (See Direct Pump Test (Standard Section) on Page 20-60-4.)

HYDRAULIC PUMP (HIGH FLOW)

Description

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

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

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

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

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

HYDRAULIC PUMP (HIGH FLOW) (CONT'D)

High Flow Relief Valve Removal And Installation

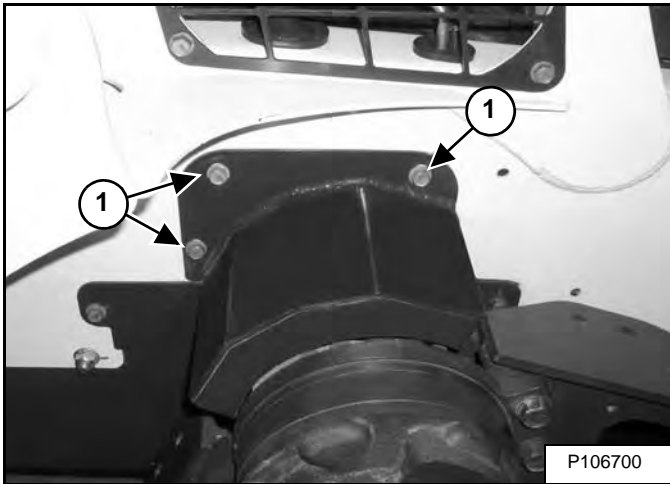
WARNING

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

W-2017-0286

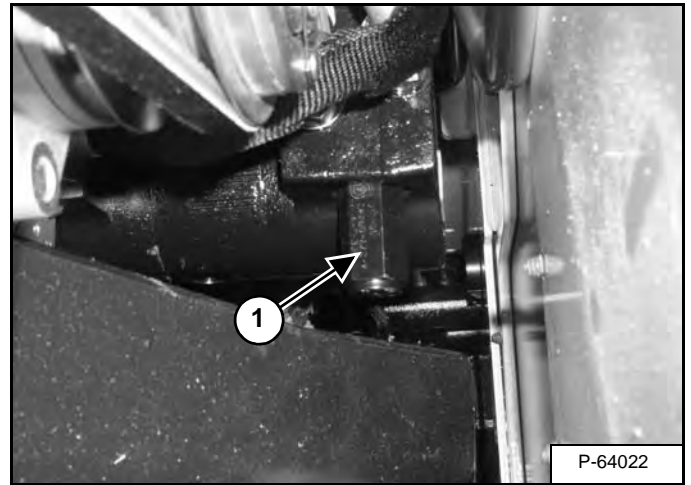
Remove the track from the right side of the loader. (See Track Removal And Installation on Page 40-20-4.) OR (See Track Removal And Installation on Page 40-21-4.)

Figure 20-61-15



Remove the bolts (Item 1) [Figure 20-61-15] from the access cover and remove the cover from the loader.

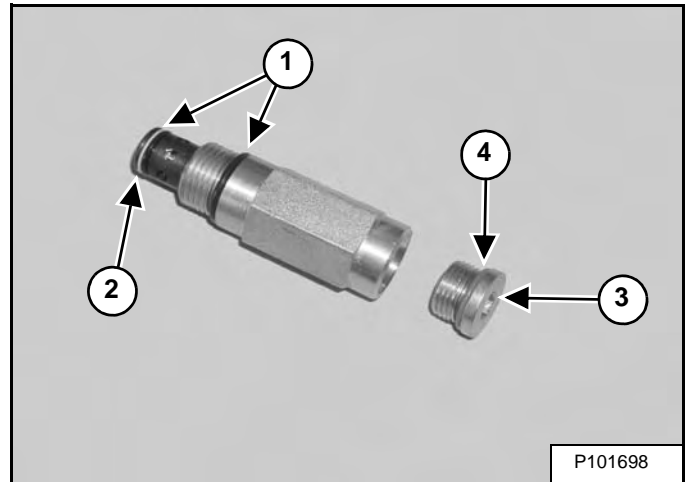
Figure 20-61-16



Remove the relief valve (Item 1) [Figure 20-61-16] from the pump.

Installation: Tighten the relief valve to 41 - 47 N•m (30 - 35 ft-lb) torque.

Figure 20-61-17



Inspect the relief valve and replace the two O-rings (Item 1) and back-up ring (Item 2) [Figure 20-61-17].

If the relief valve is bad, it must be replaced as a complete unit.

Remove the plug (Item 3) and O-ring (Item 4) [Figure 20-61-17].

HYDRAULIC FLUID RESERVOIR

Description

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

The hydraulic fluid reservoir is located behind the operator's cab under the rear grille on the right side of the loader.

Removal And Installation

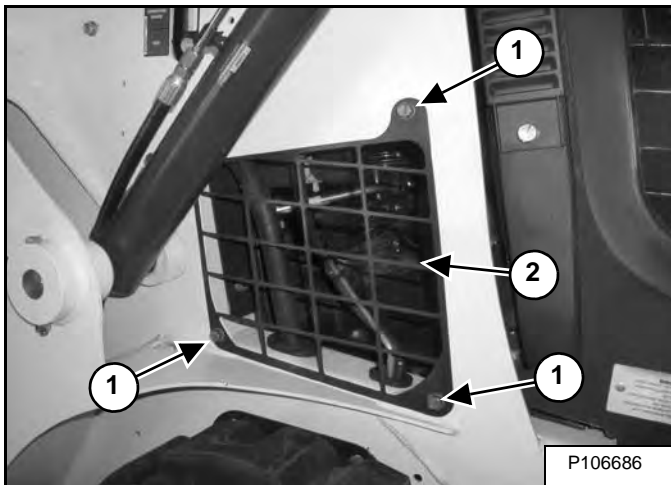
Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-2.)

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

Remove the Hydraulic / Hydrostatic Filter Housing (See Housing Removal And Installation on Page 20-70-1.)

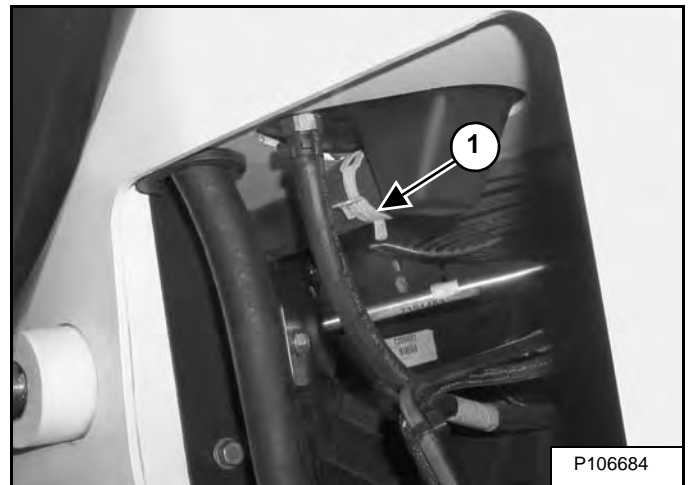
Remove the rear grille (See Removing on Page 50-60-1.)

Figure 20-80-1



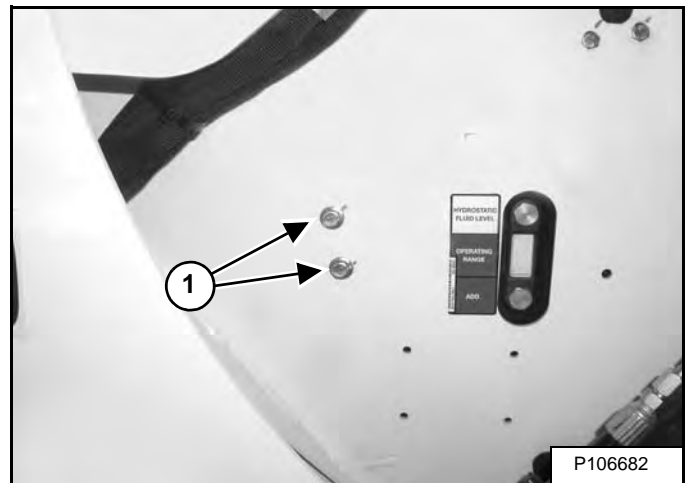
Remove the bolts (Item 1) and grille (Item 2) [Figure 20-80-1].

Figure 20-80-2



Remove the clamp and the hose (Item 1) [Figure 20-80-2].

Figure 20-80-3



Remove the two bolts (Item 1) [Figure 20-80-3].

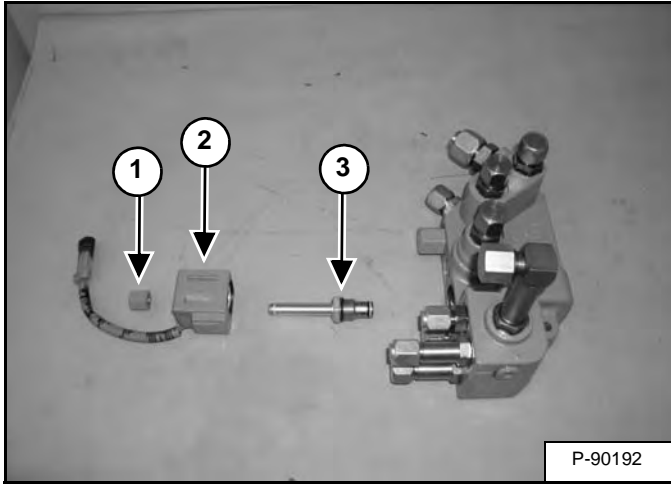
Remove the hydraulic fluid reservoir from the loader.

Installation: Tighten the bolts and nuts to 21,7 - 24,4 N•m (16 - 18 ft-lb) torque.

BUCKET POSITION VALVE (CONT'D)

Disassembly And Assembly

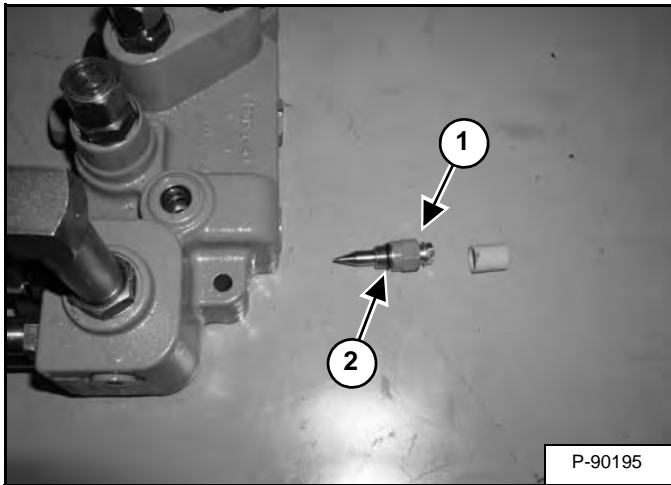
Figure 20-100-10



Remove the solenoid nut (Item 1), coil (Item 2), and the stem (Item 3) [Figure 20-100-10].

Assembly: Tighten the nut to of 8 N•m (6 ft-lb) torque. Overtightening may cause valve failure. Tighten the solenoid stem to 40,7 - 50,2 N•m (30 - 40 ft-lb) torque.

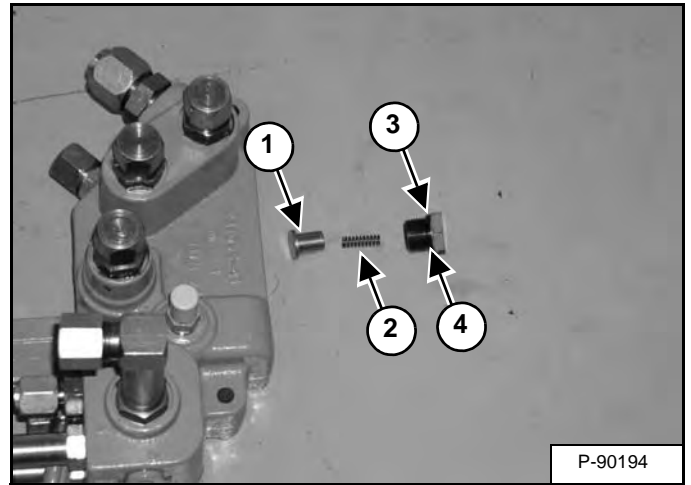
Figure 20-100-11



Remove the flow adjustment valve (Item 1). Remove the O-ring (Item 2) [Figure 20-100-11].

Assembly: Tighten the flow adjustment valve to 36,6 - 48,8 N•m (27 - 36 ft-lb) torque.

Figure 20-100-12

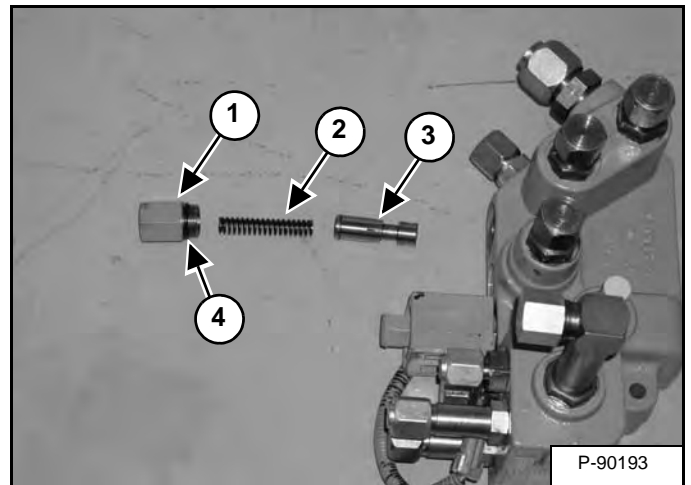


Remove the tilt cylinder check valve (Item 1), spring (Item 2) and plug (Item 3) [Figure 20-100-12].

Remove the O-ring (Item 4) [Figure 20-100-12].

Assembly: Tighten the plug to 75,9 - 86,8 N•m (56 - 64 ft-lb) torque.

Figure 20-100-13



Remove the plug (Item 1), spring (Item 2) and unloading spool (Item 3) [Figure 20-100-13].

Remove the O-ring (Item 4) [Figure 20-100-13].

Clean all parts in solvent and dry with compressed air. Inspect all parts for wear and damage. Replace all worn and damaged parts.

BOB-TACH (POWER) BLOCK (EARLY MODELS)

Description

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

The power Bob-Tach is operated by a switch on the right switch panel.

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

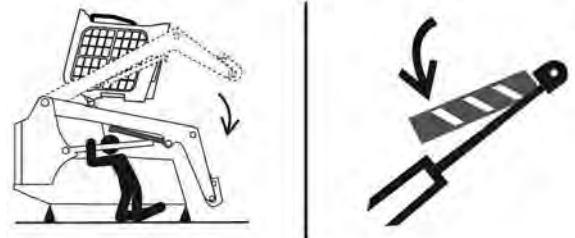
Removal And Installation

WARNING

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

W-2059-0598

DANGER



P-90328

AVOID DEATH

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

D-1009-0409

IMPORTANT

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

I-2003-0888

BOB-TACH (POWER) BLOCK (LATER MODELS)

Description

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

The power Bob-Tach is operated by a switch on the right switch panel.

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

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 supplying hydraulic flow for various attachments.

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

There are two different coupler blocks that can be used on the machine. To determine which coupler block is used, check the supplier part number on the male coupler.

Figure 20-140-1

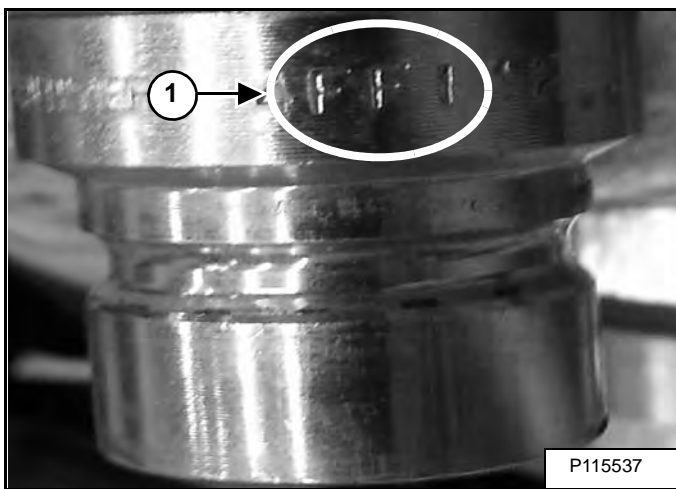
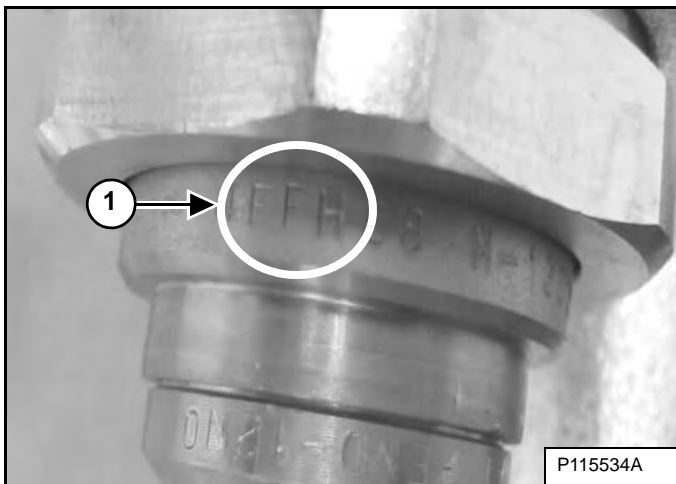


Figure 20-130-2

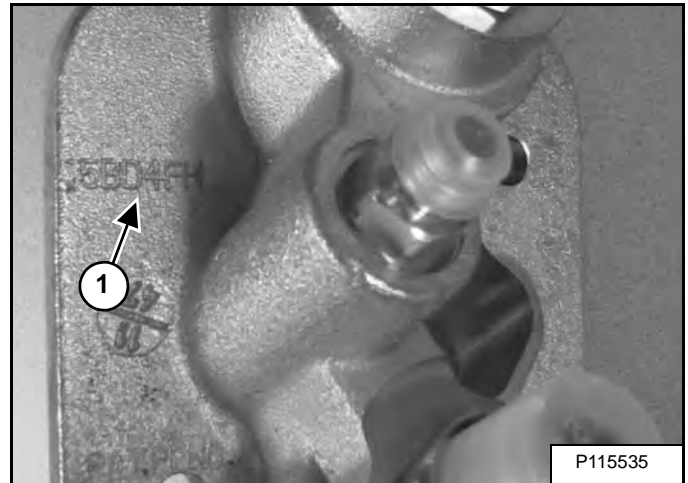


The supplier part number (Item 1) [Figure 20-140-1] and [Figure 20-130-2] is located on the male coupler.

For FFI/FI connector block. (See Disassembly And Assembly (FFI/FI) on Page 20-130-2.)

For FFH/FH connector block. (See Disassembly And Assembly (FFH/FH) on Page 20-130-4.)

Figure 20-130-3



If unable to identify the supplier part number on the male coupler of an internally mounted coupler block, remove the internally mounted coupler block from the lift arm. (See Removal And Installation on Page 20-130-2.) The supplier part number (Item 1) [Figure 20-130-3] is located on the back of the block.

NOTE: FFI/FI couplers will continue to be available but will not install in FFH/FH coupler blocks. FFH/FH couplers will not install in FFI/FI coupler blocks.

HYDROSTATIC DRIVE MOTOR

Description

The hydrostatic drive motors are driven by the hydrostatic pumps.

The hydrostatic drive motors contain a spring applied pressure release braking system to stop the loader. In addition there is a separate fluid chamber in the motor that is filled with high performance synthetic fluid for maximum durability, this fluid has a recommended service interval. (See SERVICE SCHEDULE on Page 10-70-1.)

In this system there is a case drain filter for each motor to filter the excess fluid before the hydraulic reservoir.

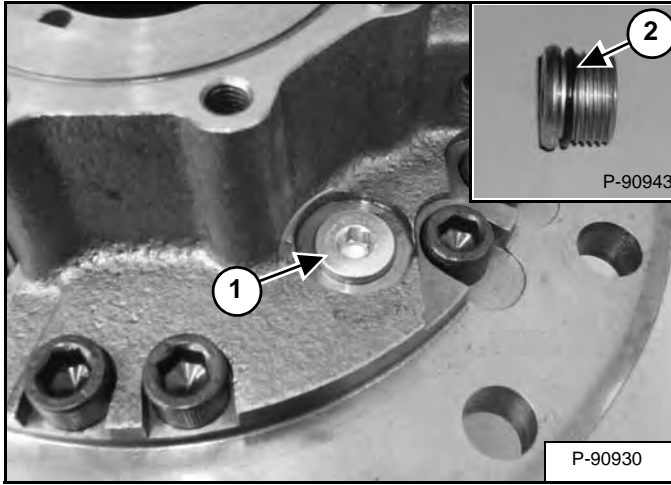
There are two hydrostatic drive motors and the motors are located on the track undercarriage.

Charge pressure from the hydraulic gear pump supplies cooling fluid to the motors.

HYDROSTATIC DRIVE MOTOR (CONT'D)

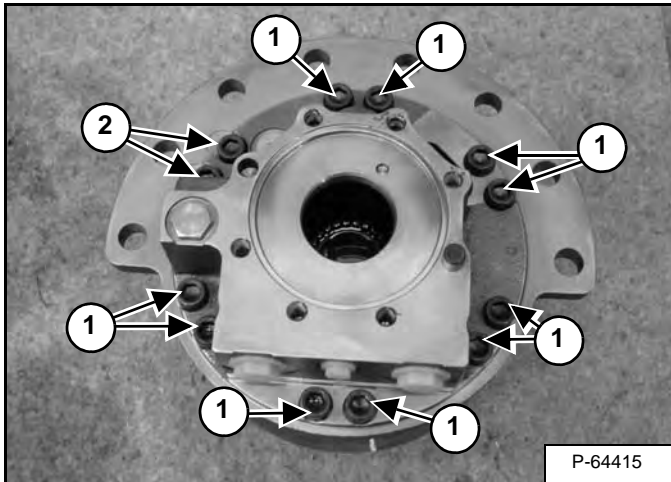
Disassembly (Cont'd)

Figure 30-20-20



Remove the plug (Item 1). Remove the O-ring (Item 2) [Figure 30-20-20].

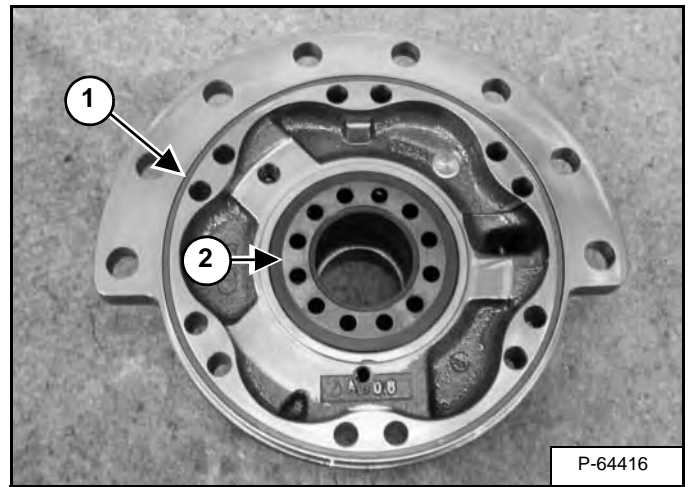
Figure 30-20-21



Mark and remove the bolts (Item 1) and (Item 2) [Figure 30-20-21] from the rear housing.

NOTE: The bolts (Item 2) [Figure 30-20-21] are shorter bolts and must be returned to the original holes.

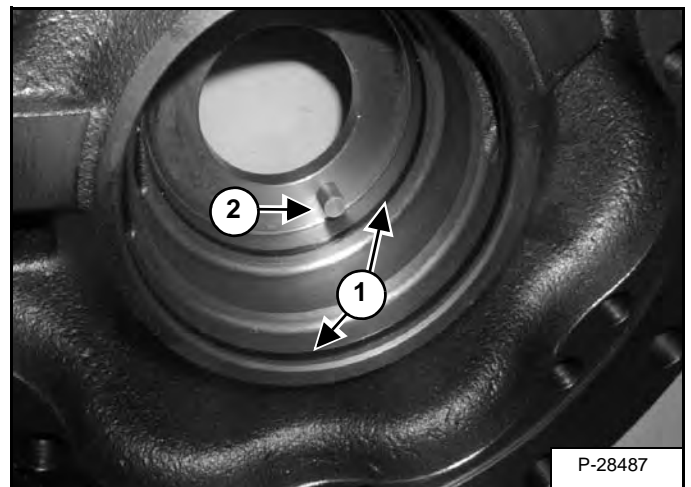
Figure 30-20-22



Remove the O-ring (Item 1) [Figure 30-20-22].

Remove the distributor (Item 2) [Figure 30-20-22] from the rear housing.

Figure 30-20-23



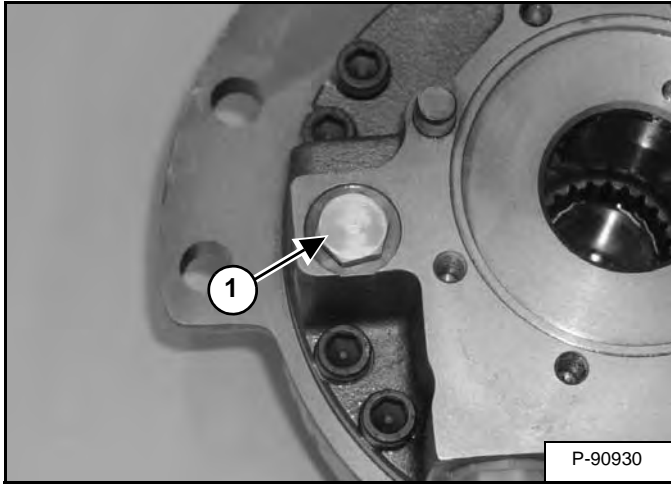
Remove the two seals and back-up rings (Item 1) [Figure 30-20-23] on the rear housing.

Remove the alignment pin (Item 2) [Figure 30-20-23].

HYDROSTATIC DRIVE MOTOR (CONT'D)

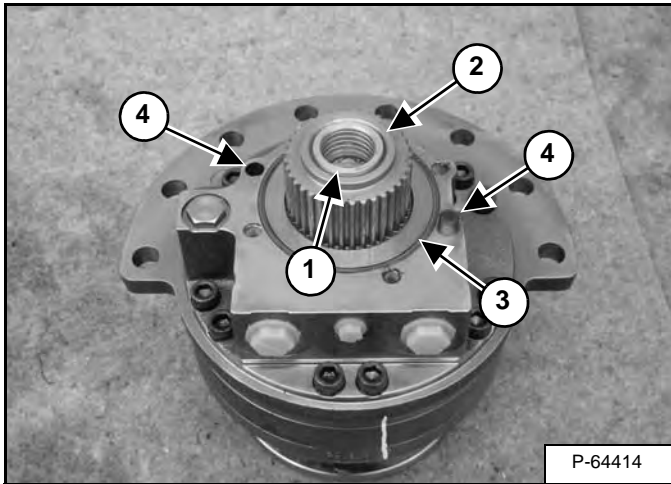
Assembly (Cont'd)

Figure 30-20-56



Install the plug (Item 1) [Figure 30-20-56]. Tighten to 40 N•m (30 ft-lb) torque.

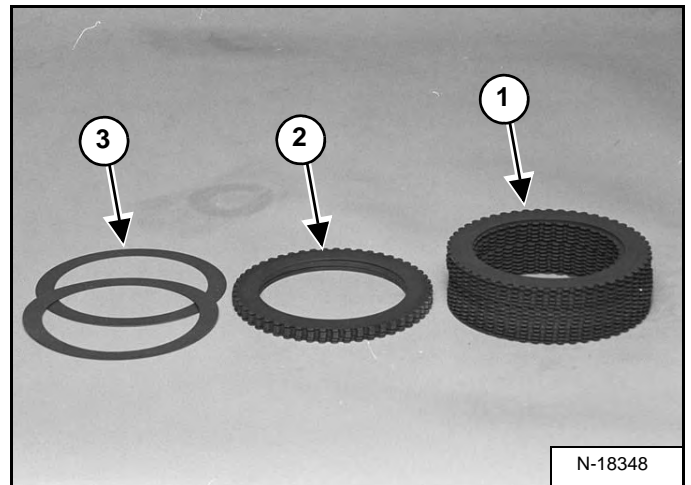
Figure 30-20-57



Install the bushing (Item 1) flush with the top of the brake shaft (Item 2) [Figure 30-20-57].

Install the O-ring (Item 3) and alignment pins (Item 4) [Figure 30-20-57].

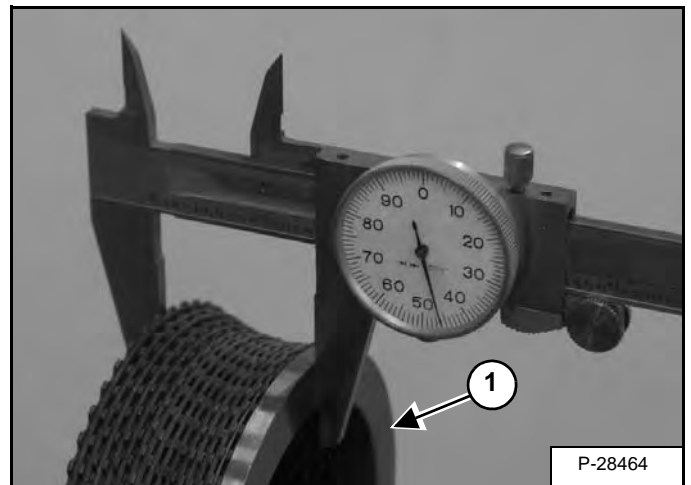
Figure 30-20-58



Assemble the brake discs into a stack (Item 1), starting with an outer disc (Item 2) [Figure 30-20-58]. Alternate the outer and inner discs, ending with an outer disc on each end of the disc pack.

NOTE: Shims (Item 3) [Figure 30-20-58] may be needed to obtain the correct disc brake height.

Figure 30-20-59



Install the brake washer (Item 1) [Figure 30-20-59] on the disc pack. Lightly clamp the disc pack in a vice and measure the height of the disc pack.

The correct disc pack height is $31,55 \pm 0,05$ mm (1.24 ± 0.002 in).

HYDROSTATIC PUMP

Description

The hydrostatic pump is composed of two hydrostatic piston pumps connected together. The pumps provide bi-directional flow to two separate drive motors. The pump flow and direction are controlled by two hand levers, one for each pump.

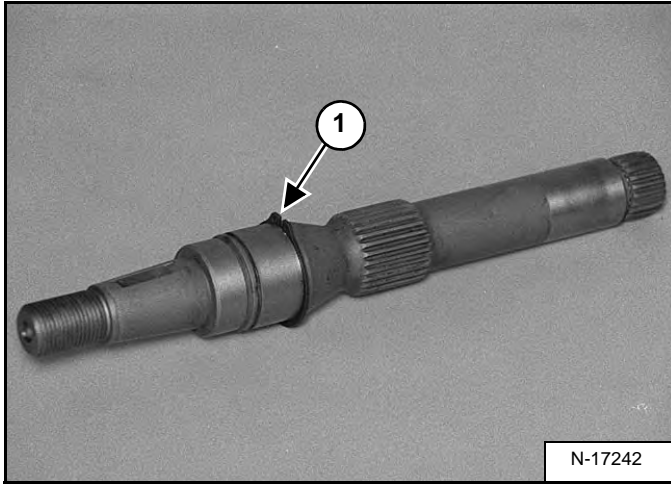
The hydrostatic pump contains replenishing valves. The function of these valves is to give replacement fluid to the low pressure side of the hydrostatic circuit. Replacement fluid is needed because of normal internal leakage and the controlled flow to the oil cooler for cooling. Another function of the replenishing valve is to keep high pressure fluid out of the low pressure side of the hydrostatic circuit.

The hydrostatic pump is located in the center of the mainframe mounted to the engine flywheel housing.

HYDROSTATIC PUMP (CONT'D)

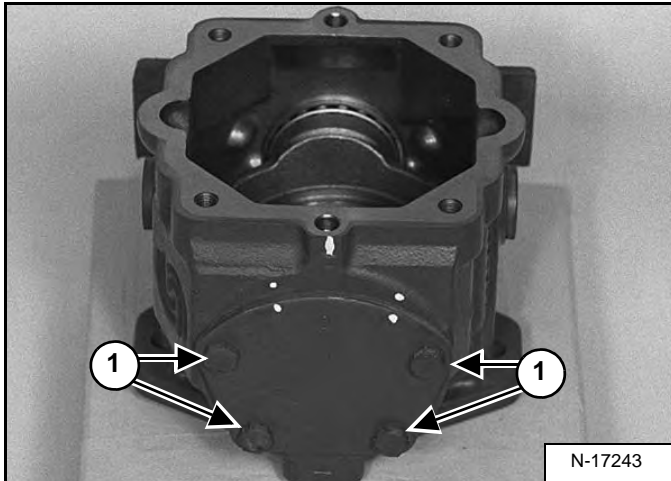
Disassembly (Cont'd)

Figure 30-40-22



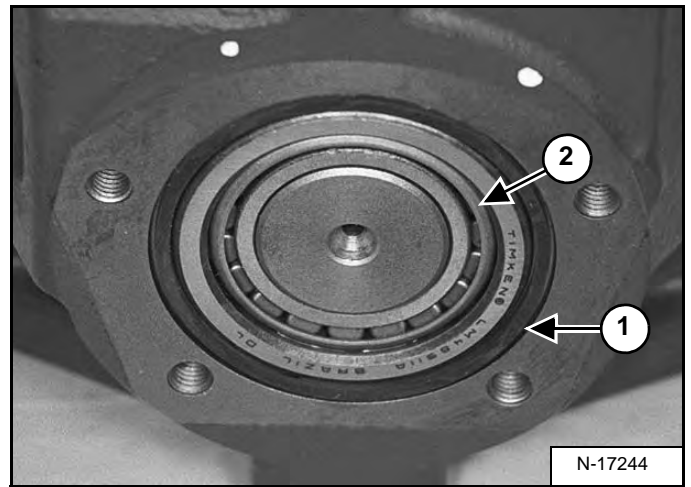
Remove the snap ring (Item 1) [Figure 30-40-22].

Figure 30-40-23



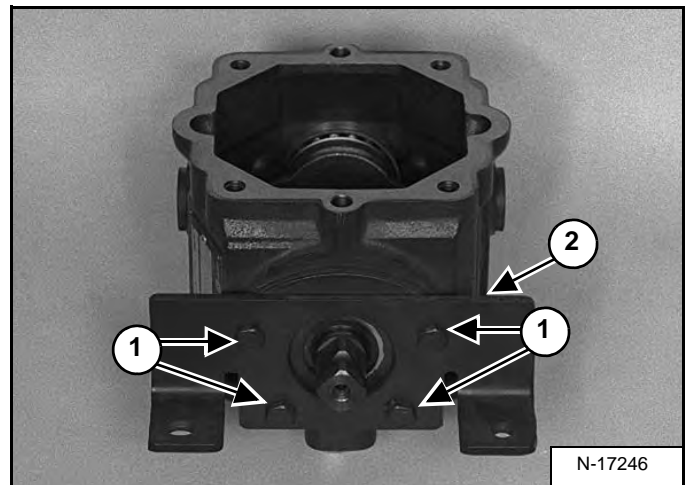
Remove the bolts (Item 1) [Figure 30-40-23] from the trunnion cover. Remove the cover.

Figure 30-40-24



Remove the O-ring (Item 1) and bearing race (Item 2) [Figure 30-40-24] from the pump housing.

Figure 30-40-25



Remove the bolts (Item 1) from the pump housing. Remove the linkage bracket (Item 2) [Figure 30-40-25].

HYDROSTATIC PUMP (SJC)

Description

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

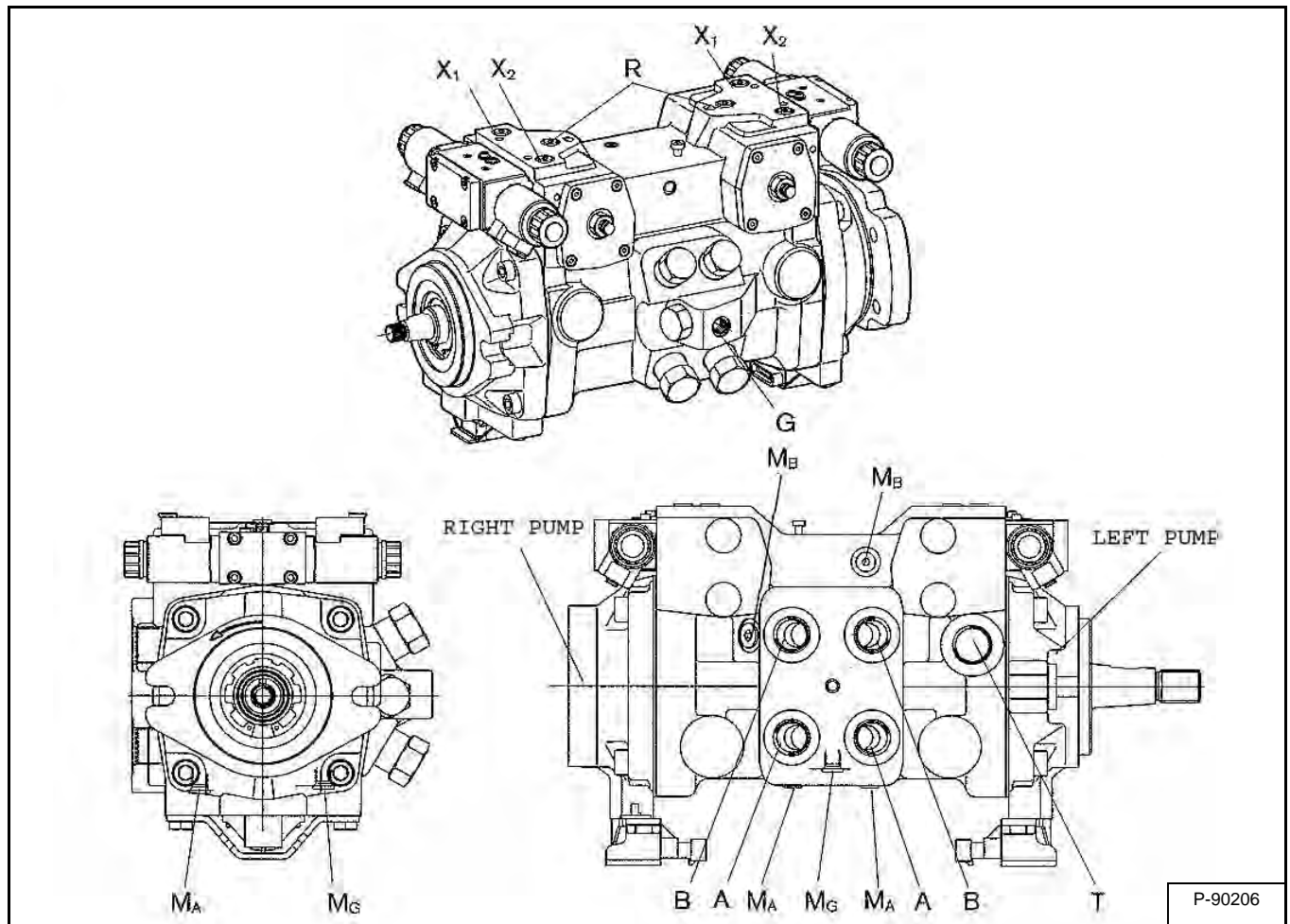
The hydraulic controllers are fed charge pressure from an external charge pump. 12 volt electrical solenoids shift a spool in the hydraulic controller that directs flow to a servo piston.

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

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

Ports are labeled on the hydrostatic pump casing.

Figure 30-41-1

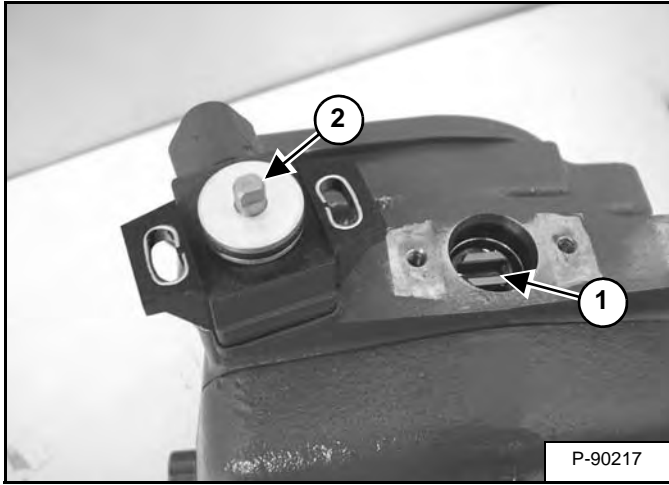


- A,B** Service Line Ports (High Pressure Outlet Ports to Drive Motors)
- T** Case Drain Port
- MA** Operating Pressure of "A" Port
- MB** Operating Pressure of "B" Port
- R** Air Bleed Port
- X1,X2** Control Pressure Gauge Port
- G** Charge Pressure Inlet Port
- MG** Gauge Port For Charge Pressure

HYDROSTATIC PUMP (SJC) (CONT'D)

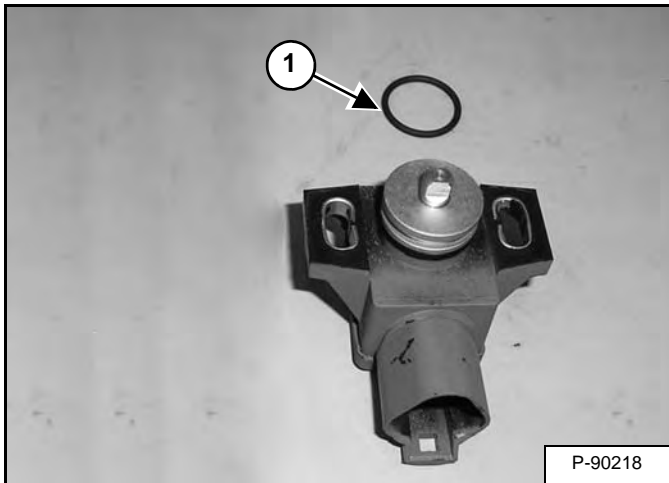
Disassembly And Assembly (Cont'd)

Figure 30-41-22



Assembly: Note the slotted portion (Item 1) of the positioning pin tightly fits the machined section on the swash plate angle sensor shaft (Item 2) [Figure 30-41-22].

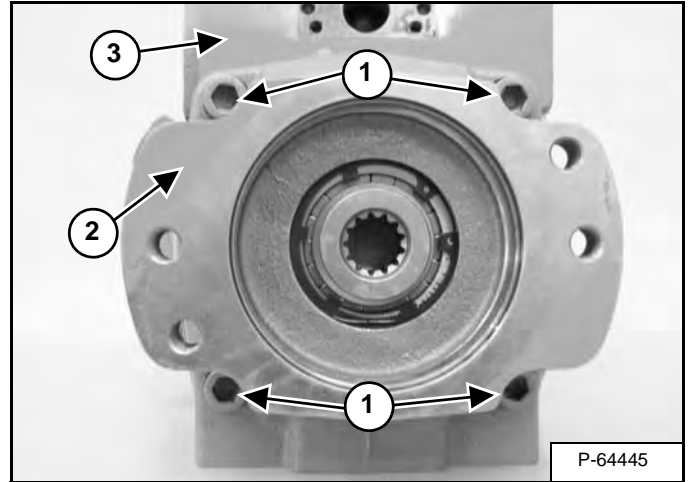
Figure 30-41-23



Inspect and replace the O-ring (Item 1) [Figure 30-41-23].

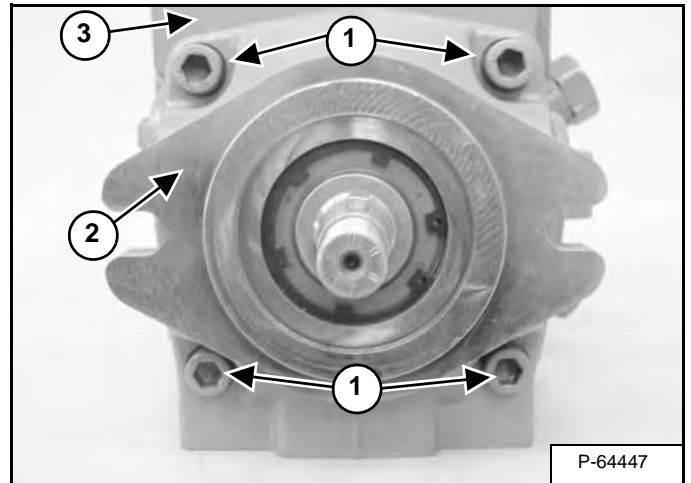
Right End Housing

Figure 30-41-24



Left End Housing

Figure 30-41-25



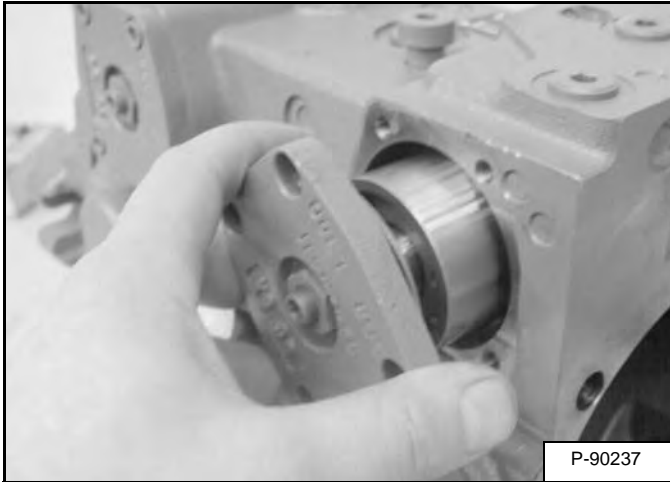
Remove the four mount bolts (Item 1) securing the end housing (Item 2) to the main case housing (Item 3) [Figure 30-41-24] and [Figure 30-41-25].

Assembly: Alternately, tighten mount bolts to 130 N•m (96 ft-lb) torque.

HYDROSTATIC PUMP (SJC) (CONT'D)

Disassembly And Assembly (Cont'd)

Figure 30-41-60



Slide the servo piston assembly out of the bore. [Figure 30-41-60].

Figure 30-41-61

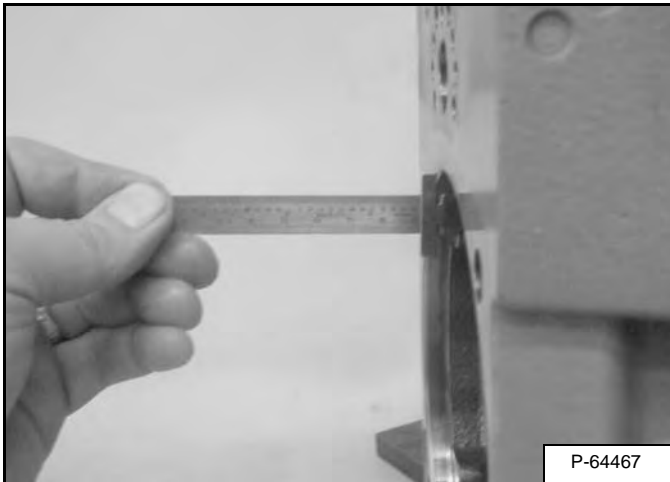
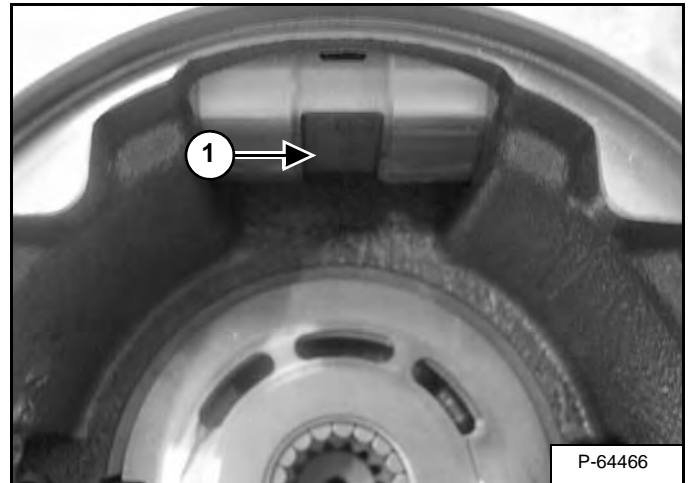
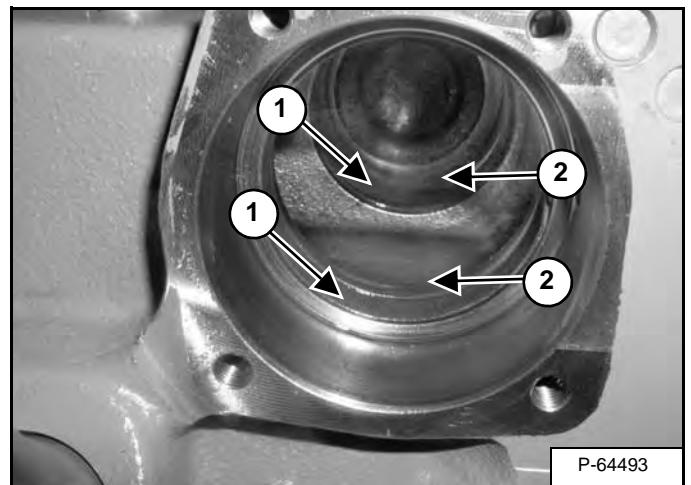


Figure 30-41-62



Assembly: Align the servo piston so the guide slot (Item 1) [Figure 30-41-62] is parallel to the driveshaft centerline. Measure with a straight-edge [Figure 30-41-61].

Figure 30-41-63



Remove the bushings (Item 1), seals and O-rings (Item 2) [Figure 30-41-63] from the pump housing.

DRIVE BELT (CONT'D)

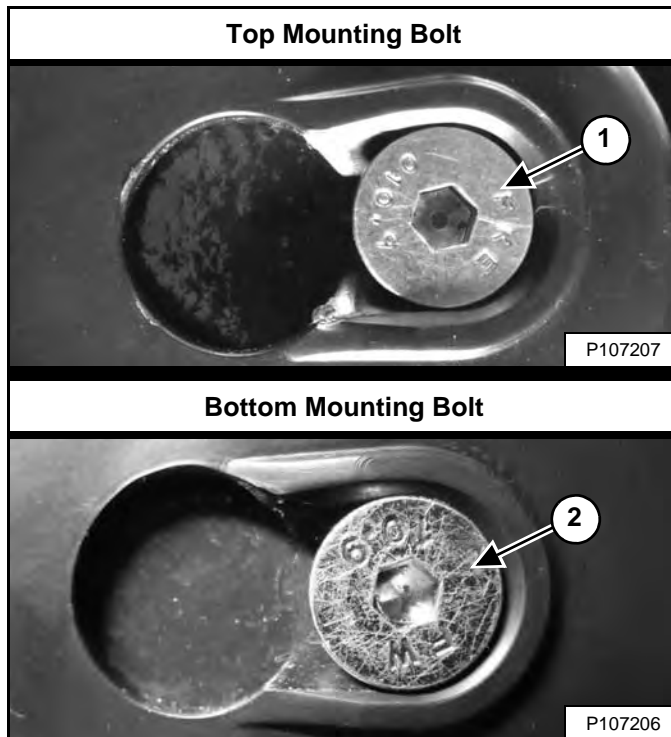
Belt Replacement (Cont'd)

Allow the spring loaded drive idler to raise slightly so that the idler is operating on spring tension and not against the stop.

NOTE: Do not set the spring loaded drive idler against the travel stop.

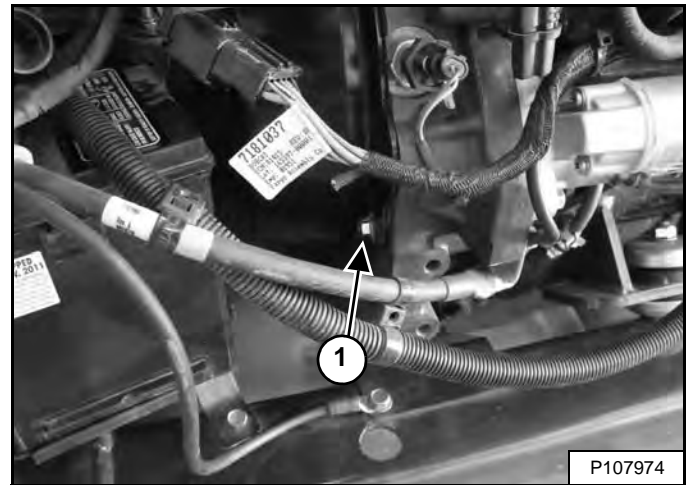
Tighten the spring loaded drive idler mounting bolt (Item 1) [Figure 30-50-7] to 48 - 54 N•m (35 - 40 ft-lb) torque.

Figure 30-50-8



Position the drive belt shield over the drive belt shield mounting bolts. Slide the drive belt shield toward the front of the loader to fully seat the shield onto the top and bottom mounting bolts (Items 1 and 2) [Figure 30-50-8].

Figure 30-50-9



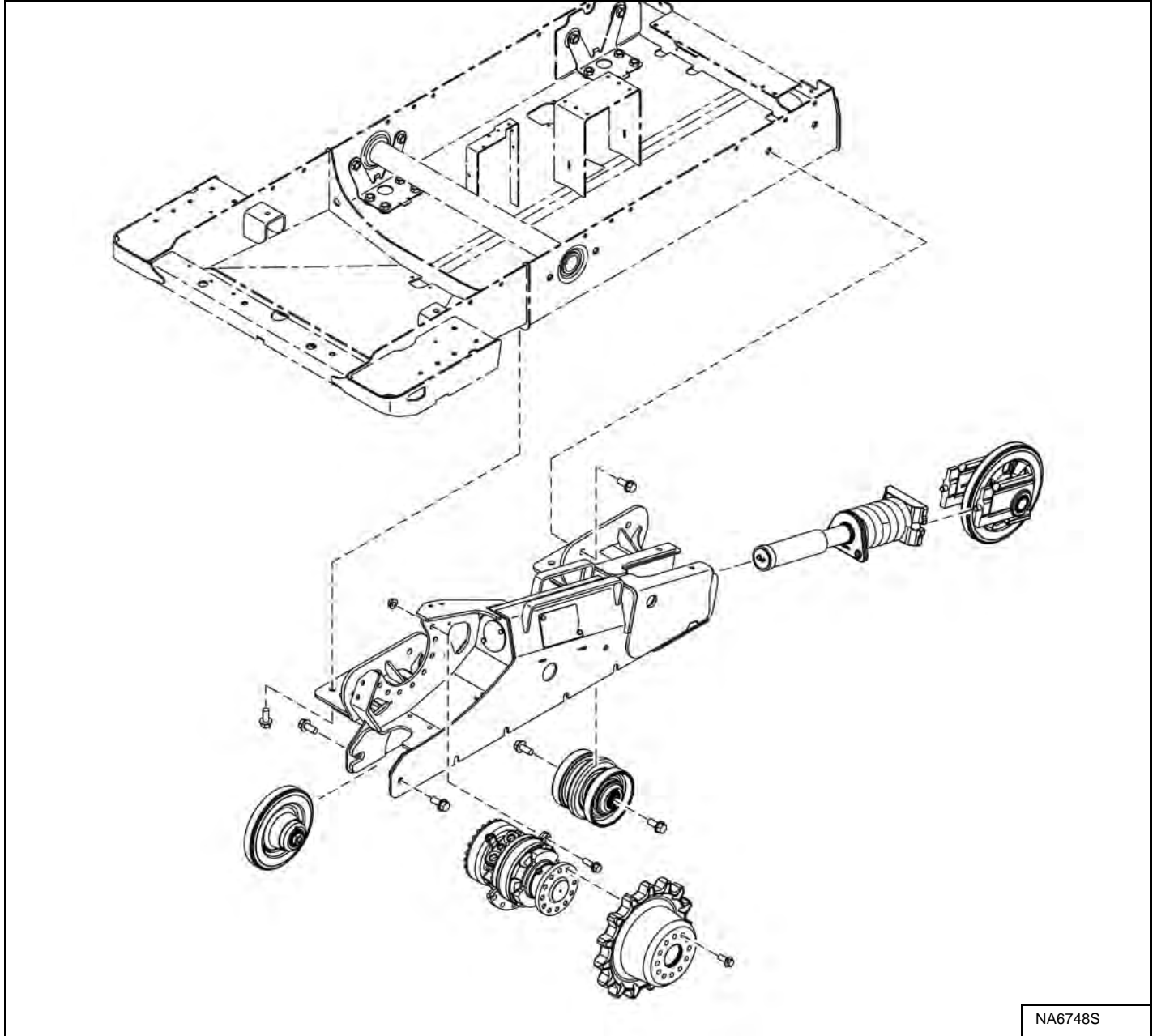
Install the drive belt shield bolt (Item 1) [Figure 30-50-9].

Close the rear door.

TRACK UNDERCARRIAGE COMPONENTS (SOLID-MOUNTED)

Description

Figure 40-20-1



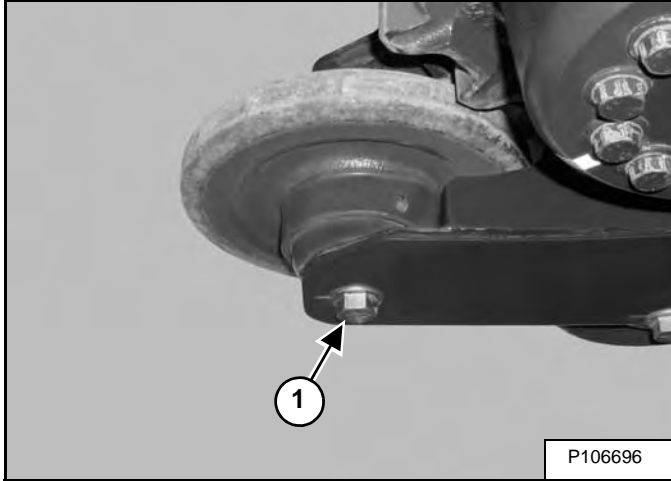
The track carriage components consist of front and rear idlers, rollers, the track, track tensioner, the drive sprocket and the track housing [Figure 40-20-1].

TRACK UNDERCARRIAGE COMPONENTS (SOLID-MOUNTED) (CONT'D)

Idler (Rear) Removal And Installation

Remove the track. (See Track Removal And Installation on Page 40-20-4.)

Figure 40-20-25



Remove the two bolts (Item 1) [Figure 40-20-25].

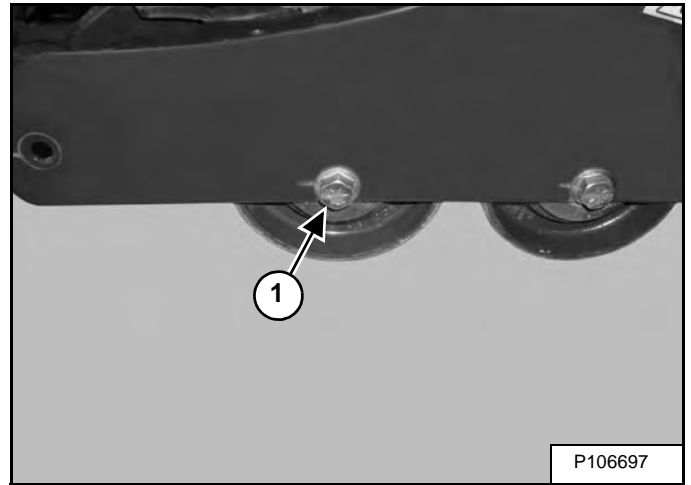
Remove the rear idler from the track frame.

Installation: Tighten the bolts to 407 - 447 N•m (300 - 330 ft-lb) torque.

Roller Removal And Installation

Remove the track. (See Track Removal And Installation on Page 40-20-4.)

Figure 40-20-26



Remove the bolts (Item 1) [Figure 40-20-26] from the roller shaft. (Both ends of the roller shaft.)

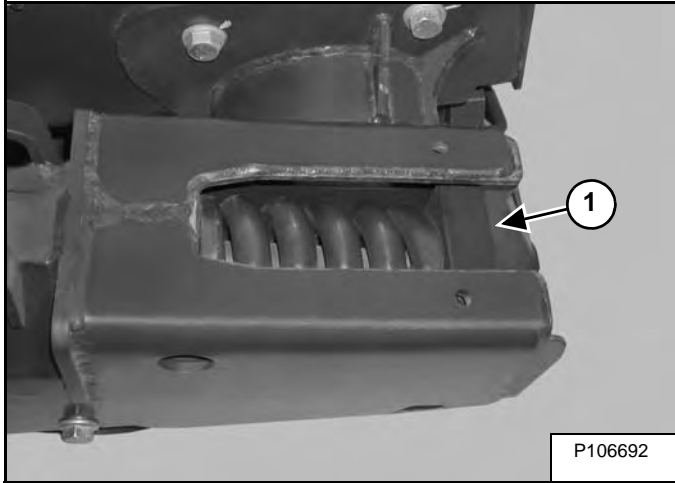
Installation: Tighten the bolts or nuts to 410 - 450 N•m (300 - 330 ft-lb) torque.

Remove the roller from the track assembly.

TRACK UNDERCARRIAGE COMPONENTS (ROLLER SUSPENSION) (CONT'D)

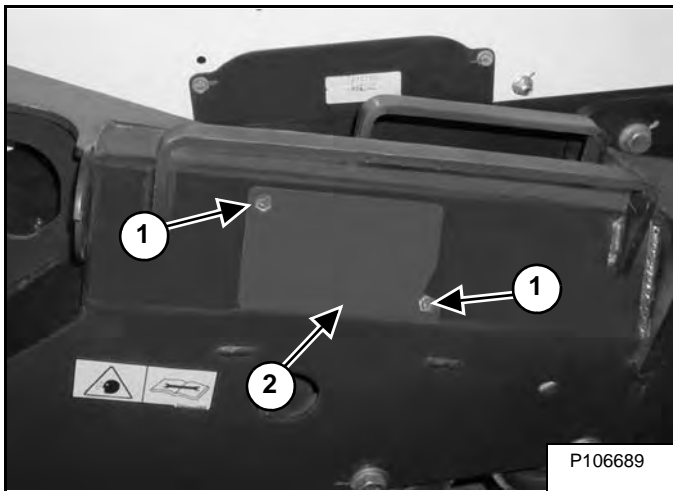
Idler (Front) Removal And Installation (Cont'd)

Figure 40-21-14



Slide the track tensioner (Item 1) [Figure 40-21-14] out of the track housing.

Figure 40-21-15



Installation: Remove the two bolts (Item 1) and cover (Item 2) [Figure 40-21-15].

Figure 40-21-16

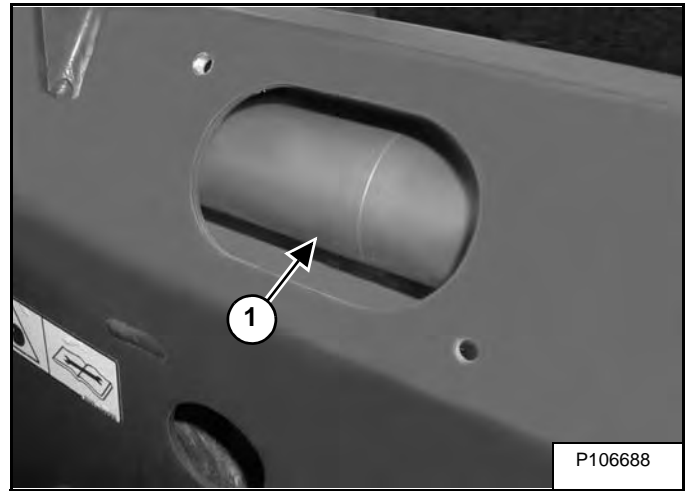
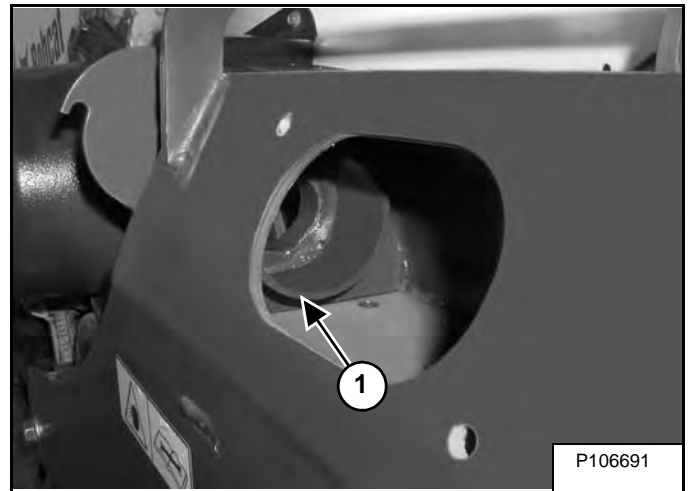


Figure 40-21-17



Installation: Track tensioner (Item 1) [Figure 40-21-16] must be seated in the guide tube (Item 1 [Figure 40-21-17]).

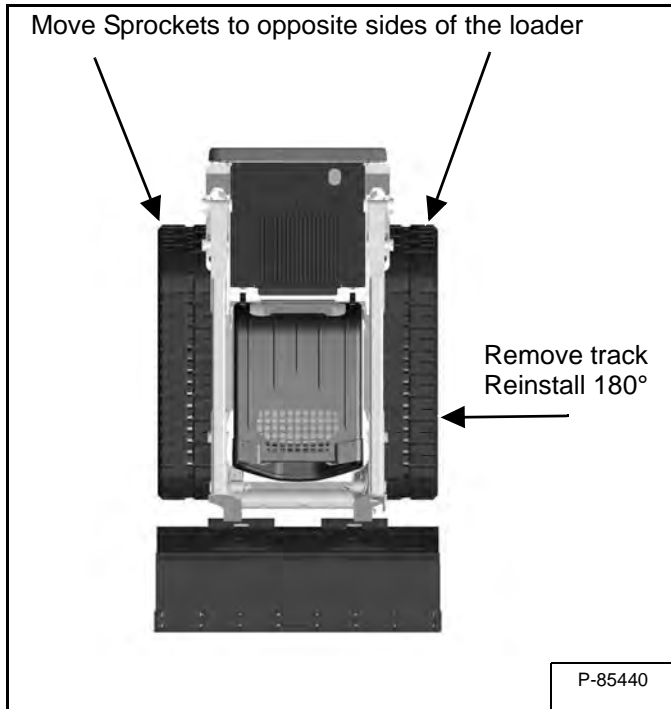
TRACK MAINTENANCE

Track Damage Identification

The following pages show photos and illustrations of track damage and the probable cause of the damage. It is intended to be used for identifying the reason for track damage and how to avoid future track damage.

Track and Sprocket Rotation:

Figure 40-30-1



NOTE: All applications and conditions will cause wear on the track embedded metal and sprocket teeth. Rotating the tracks and sprockets will extend the service life. The track can be removed and reinstalled 180 degrees. The sprocket can be removed and installed on the opposite side of the loader [Figure 40-30-1].

Prevention:

The following preventions should be taken to minimize the risk of this damage:

Recommended track tension should be periodically checked. (See Checking Tension on Page 40-20-2.) or (See Checking Tension on Page 40-21-2.)

Avoiding quick turns on bumpy and rocky fields.

Drive carefully to avoid having stones and other articles clog the rubber tracks.

Driving over sharp objects should be avoided. If this is impossible, do not make turns while driving over sharp objects.

Cutting Of Steel Cords

Figure 40-30-2

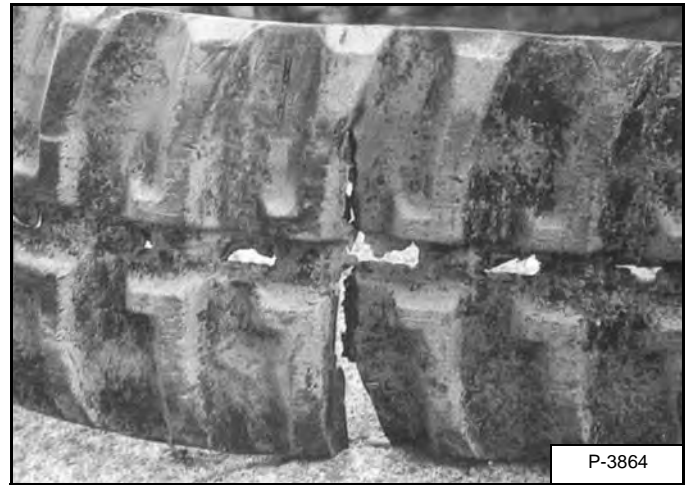
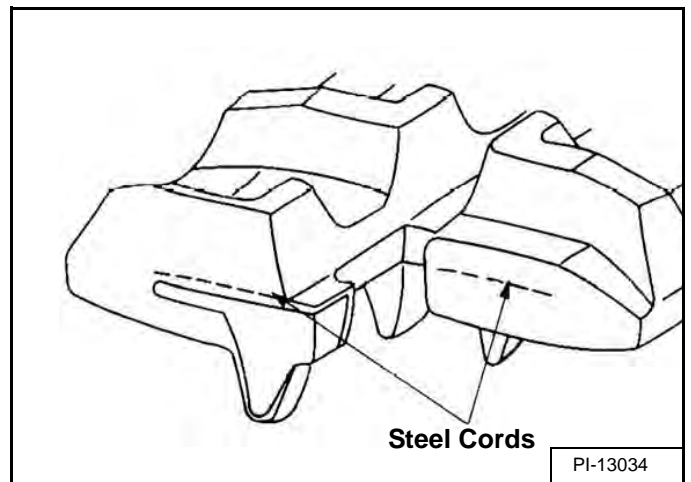


Figure 40-30-3



Damage:

Embedded steel cords are cut off [Figure 40-30-2] and [Figure 40-30-3].

TRACK MAINTENANCE (CONT'D)

Track Damage Identification (Cont'd)

Cuts On The Edges Of Track Roller Side

Figure 40-30-24

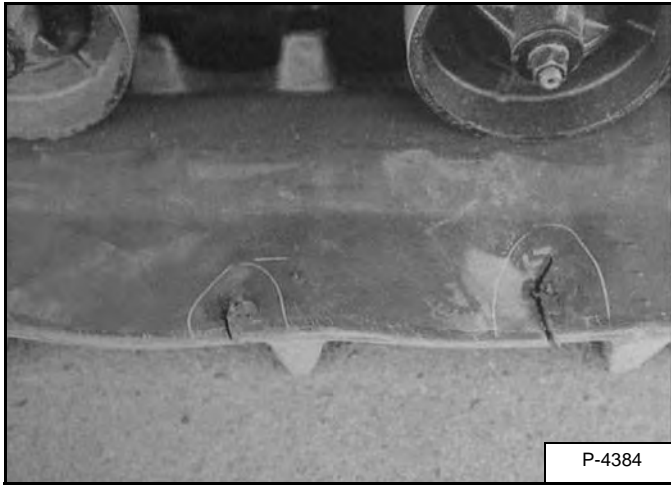
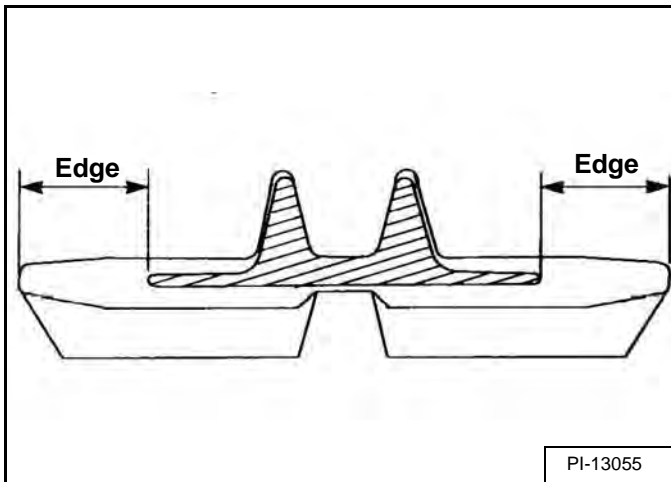


Figure 40-30-25



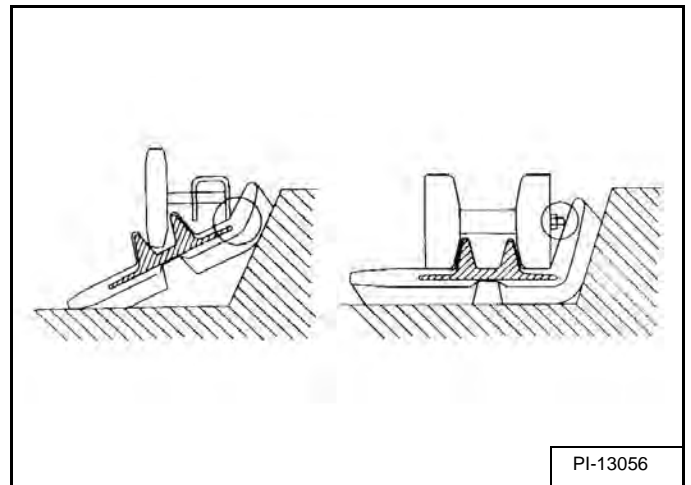
Damage:

Both edges of a rubber track have no special reinforcements. It sometimes occurs during operation that they are cut or torn off **[Figure 40-30-24]** and **[Figure 40-30-25]**.

Replacement:

In such case, the rubber track does not have to be replaced.

Figure 40-30-26



Causes of the damage:

This damage is caused by objects on the field or by interference with the machine frame.

In case of damage by objects on the operating ground:

The edges of rubber track are often deformed largely due to a bumpy ground surface, stones and other objects, which cause extensive stress on the edges resulting in the damage. Especially, when a machine drives over concrete ridges, this type of damage easily occurs **[Figure 40-30-26]**.

OPERATOR CAB

Gas Spring Removal And Installation

WARNING

Cylinder contains high pressure gas. Do not open. Opening cylinder can release rod and cause injury or death.

W-2113-0288

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

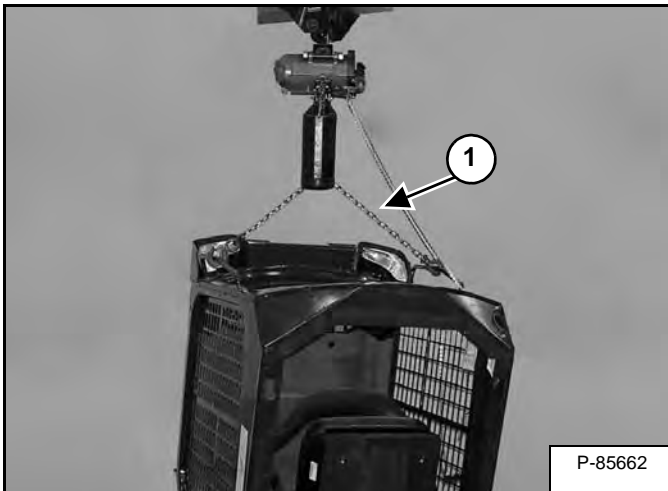
WARNING

AVOID INJURY OR DEATH

Attach a chain hoist to the grab handles of the operator cab before removing the operator cab gas spring(s). If the operator cab is tilted forward without the gas spring(s) operational, the cab will fall and could cause injury or death.

W-2760-0309

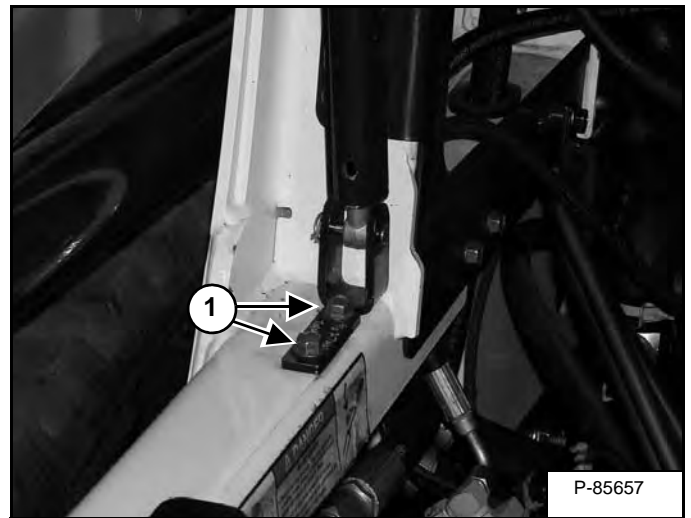
Figure 50-20-1



Install a strap and hoist (Item 1) [Figure 50-20-1] to the cab handles.

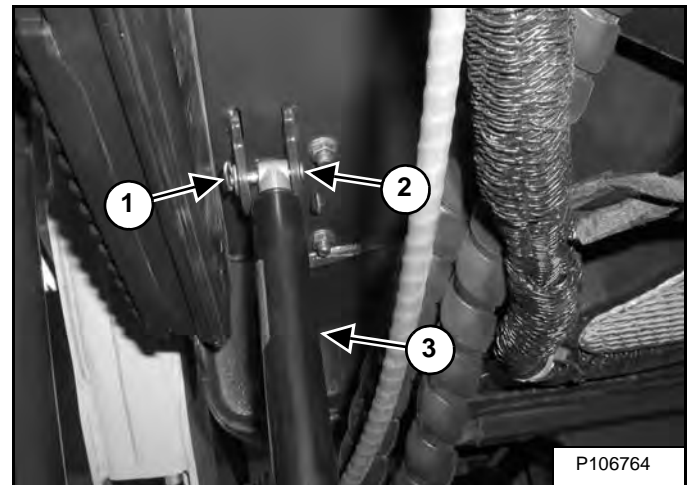
Lift the cab with the hoist to release the pressure on the gas spring(s).

Figure 50-20-2



Remove the two bolts (Item 1) [Figure 50-20-2].

Figure 50-20-3



Remove the retaining pin (Item 1), pin (Item 2), and the gas spring (Item 3) [Figure 50-20-3] from the loader.

NOTE: If the loader is equipped with a second gas spring repeat the procedure for the other side.

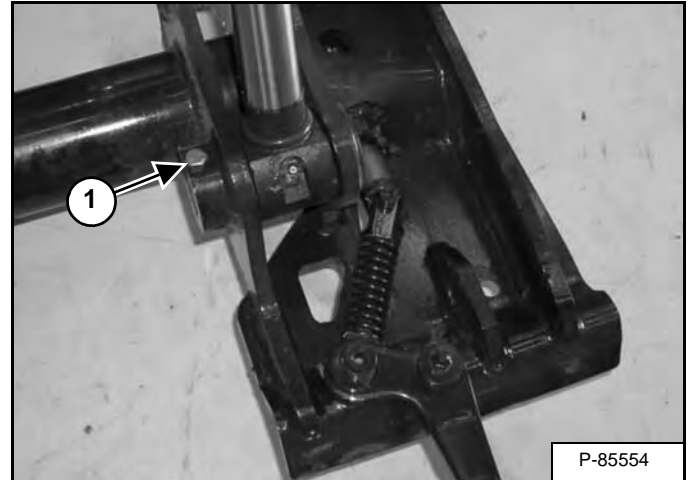
BOB-TACH (HAND LEVER)

Description

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

Removal And Installation

Figure 50-40-1



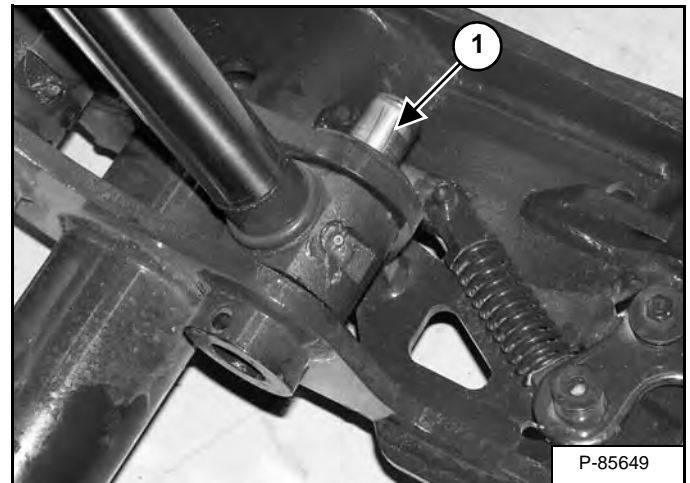
Tilt the Bob-Tach forward, parallel to the floor. Put blocks (approximately 76,2 mm [3 inches]) under each side of the Bob-Tach [Figure 50-40-1].

Lower the Bob-Tach onto the blocks.

Remove the bolt and nut (Item 1) [Figure 50-40-1] from the rod end pivot pin.

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

Figure 50-40-2

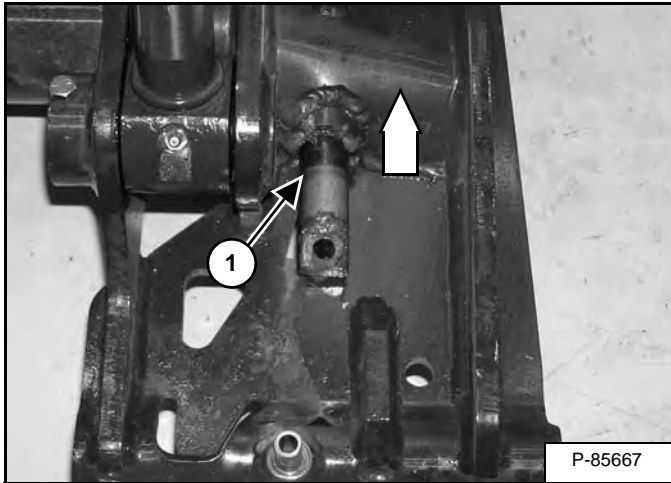


Remove the rod end pivot pin (Item 1) [Figure 50-40-2].

BOB-TACH (POWER) (CONT'D)

Lever And Wedge Disassembly And Assembly (Cont'd)

Figure 50-41-14

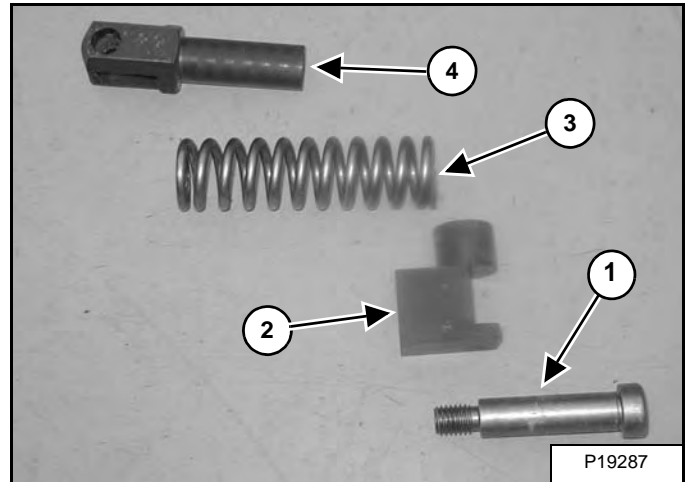


Remove the wedge (Item 1) [Figure 50-41-14] out the bottom of the Bob-Tach.

Always replace bent or broken wedges.

Earlier Design

Figure 50-41-15

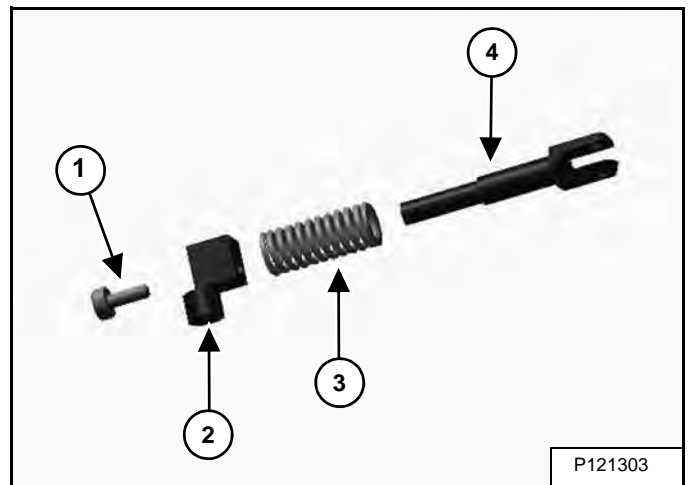


If the bolt (Item 1), handle pivot (Item 2), spring (Item 3), or clevis (Item 4) are damaged, put the assembly in a vise. Remove the bolt (Item 1) [Figure 50-41-15] and replace the damaged parts as needed.

Assembly: Clean the threads and apply Loctite® 242 to the bolt (Item 1) [Figure 50-41-15], tighten to 125 - 135 N•m (90 - 100 ft-lb) torque.

Later Design

Figure 50-41-16



If the bolt (Item 1), handle pivot (Item 2), spring (Item 3), or clevis (Item 4) are damaged, put the assembly in a vise. Remove the bolt (Item 1) [Figure 50-41-16] and replace the damaged parts as needed.

Assembly: Clean the threads and apply Loctite® 242 to the bolt (Item 1) [Figure 50-41-16], tighten to 48 - 54 N•m (35 - 40 ft-lb) torque.

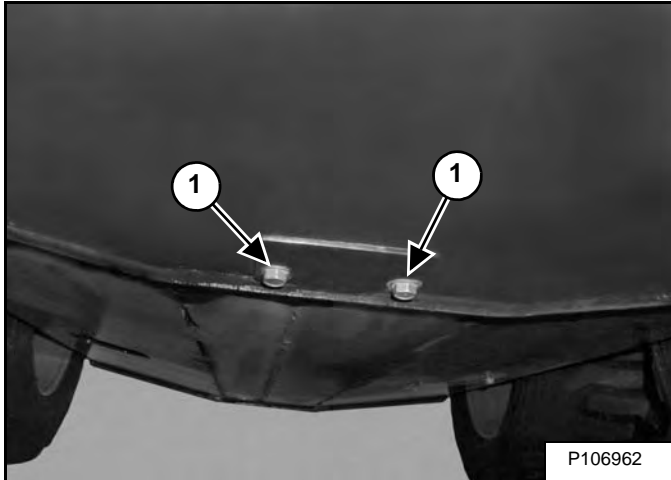
FUEL TANK

Removal And Installation

Remove the engine / hydrostatic pump assembly from the loader. (See Engine Removal And Installation on Page 70-10-7.)

Early Models

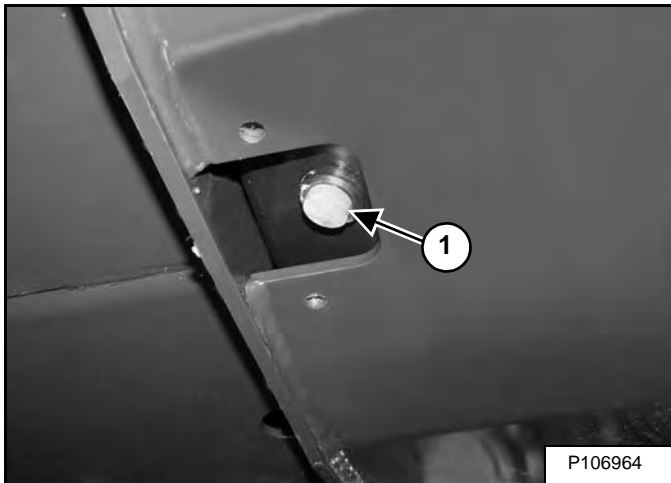
Figure 50-80-1



Remove the bolts (Item 1) [Figure 50-80-1] from the access cover at the rear of the loader frame.

Remove the access cover.

Figure 50-80-2

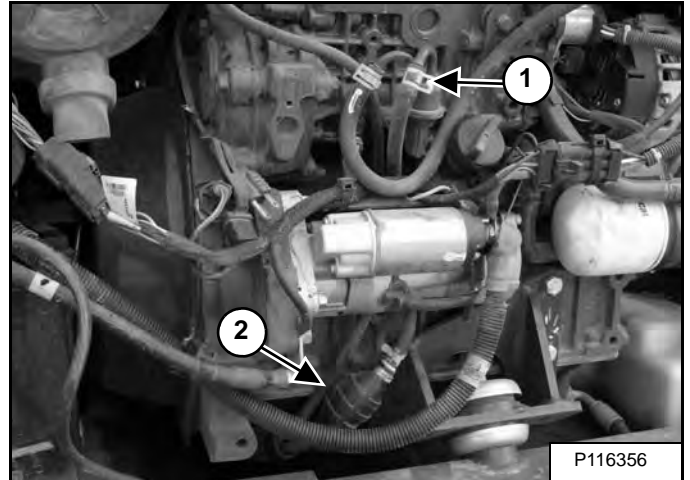


Remove the drain plug (Item 1) [Figure 50-80-2].

Drain the fuel into a container.

Later Models

Figure 50-80-3



Remove the hose (Item 1) [Figure 50-80-3] from the fuel pump and place into a suitable container.

Squeeze the hand pump (priming bulb) (Item 2) [Figure 50-80-3] to start the fuel siphoning from the tank.

Drain the fuel into the container.

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

! 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

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CONTROL PEDALS AND LINKAGES (ACS) (CONT'D)

Floor Pan Removal And Installation

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

Remove the pedals. (See Pedal Removal And Installation on Page 50-91-1.)

Remove the access panels. (See ACCESS PANEL (INSIDE) on Page 50-120-1.)

Figure 50-91-7

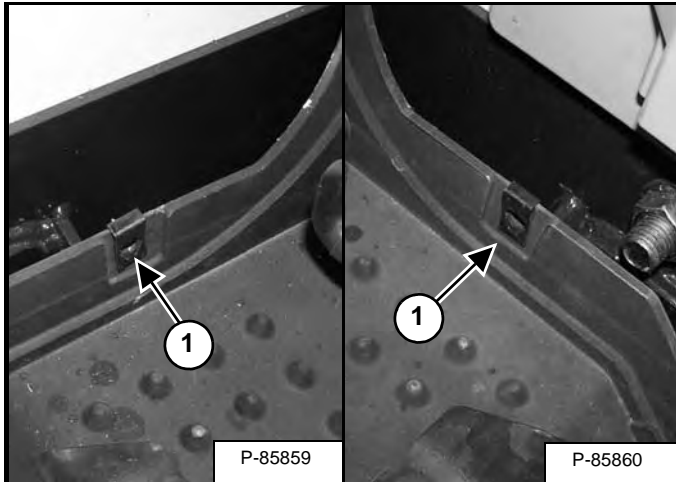
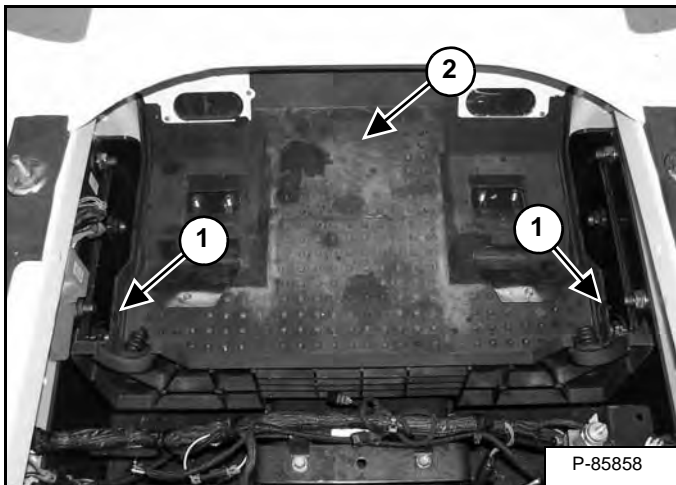


Figure 50-91-8



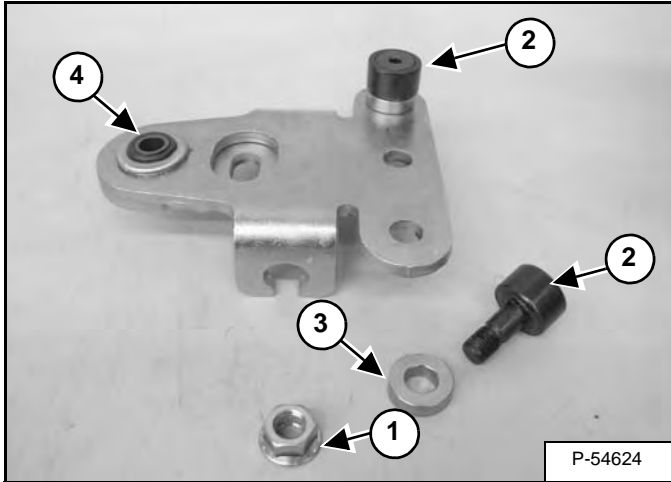
Remove the clips (Item 1) [Figure 50-91-7] and [Figure 50-91-8] from the sides of the floor pan.

Remove the floor pan (Item 2) [Figure 50-91-8].

CONTROL PANEL (CONT'D)

Pintle Arm Disassembly And Assembly

Figure 50-100-22

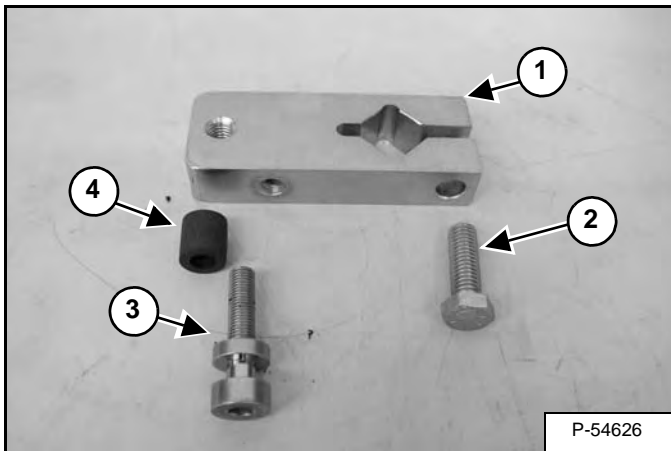


Remove the nut (Item 1) from the pintle roller cams (Item 2) and inspect the pintle roller cams and washers (Item 3) for damage [Figure 50-100-22].

Inspect the torsion bushing (Item 4) [Figure 50-100-22] for damage and replace as needed.

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

Figure 50-100-23



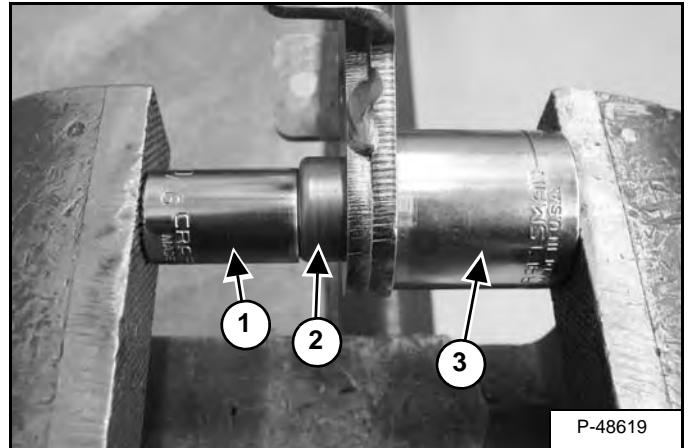
Remove the pintle base (Item 1) [Figure 50-100-23] from the pump shaft.

Remove the retaining bolt (Item 2), adjusting screw (Item 3) and neoprene dampener (Item 4) [Figure 50-100-23] from the pintle base.

Inspect parts for wear and damage, replace as needed.

NOTE: Anti-sieze should be used on the adjusting screw to prevent corrosion and allow free movement while adjusting.

Figure 50-100-24



Using a bushing driver (Item 1) remove the torsion bushing (Item 2) by pressing the bushing through the pintle arm into an oversized socket (Item 3) to catch the torsion bushing [Figure 50-100-24].

Installation: Install the torsion bushing (Item 2) [Figure 50-100-24] into the pintle arm using the same procedure as the removal.

NOTE: When the torsion bushing is installed, the amount of bushing on each side of the pintle arm should be the same.

CONTROL PANEL (SJC)

Description

The control panel is connected to the lower main frame and wraps around the operator seat. There are no mechanical linkages connecting to the hydrostatic pumps or the control valve.

Removal And Installation

! WARNING

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

W-2017-0286



P-90328

AVOID DEATH

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

D-1009-0409

! WARNING

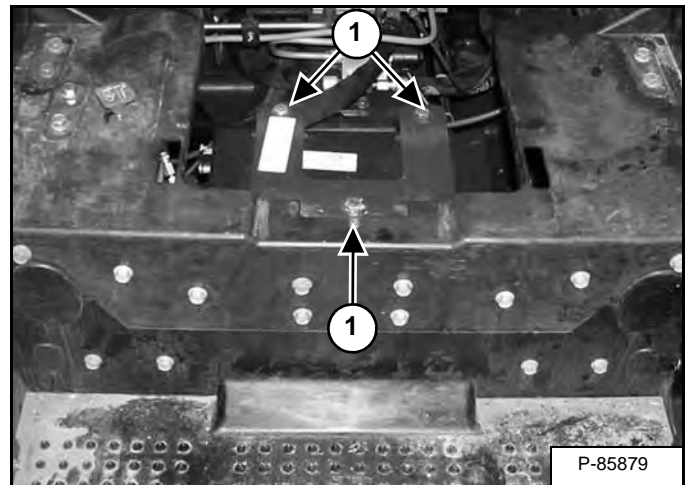
Never work on a machine with the lift arms up unless the lift arms are secured by an approved lift arm support device. Failure to use an approved lift arm support device can allow the lift arms or attachment to fall and cause injury or death.

W-2059-0598

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-2.)

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

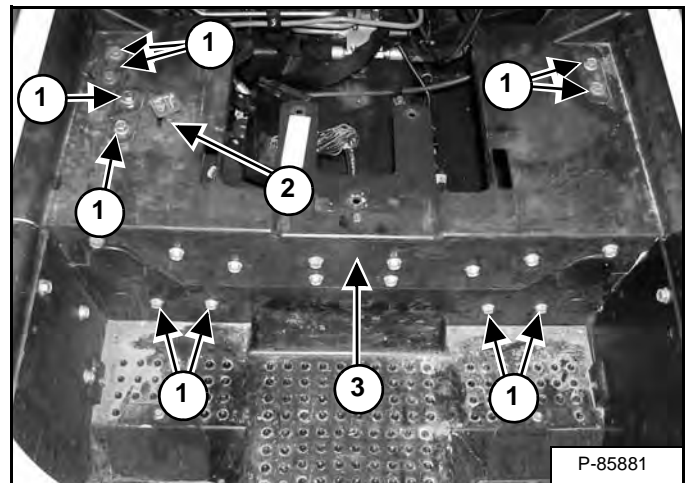
Figure 50-101-1



P-85879

Remove the three bolts (Item 1) [Figure 50-101-1] that secure the controller.

Figure 50-101-2



P-85881

Remove the ten panel bolts (Item 1) [Figure 50-101-2].

Remove the lift arm bypass knob and rubber washer (Item 2) [Figure 50-101-2].

Remove the control panel (Item 3) [Figure 50-101-2].

CONTROL HANDLE / LEVER (SJC)

Description

The control panel has two electronic handles that control the steering, lift, and tilt functions. There are no mechanical connections to the hydrostatic pumps or the control valve.

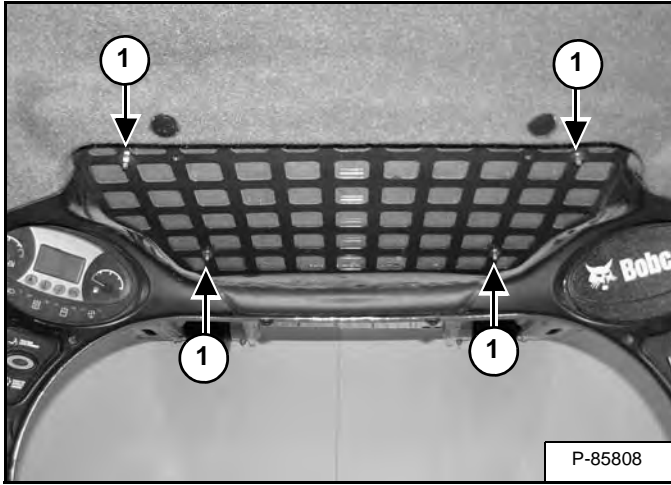
Joystick Testing

See Bobcat Advanced Troubleshooting System (B.A.T.S.) or connect to service analyzer to test function.

WINDOW (TOP)

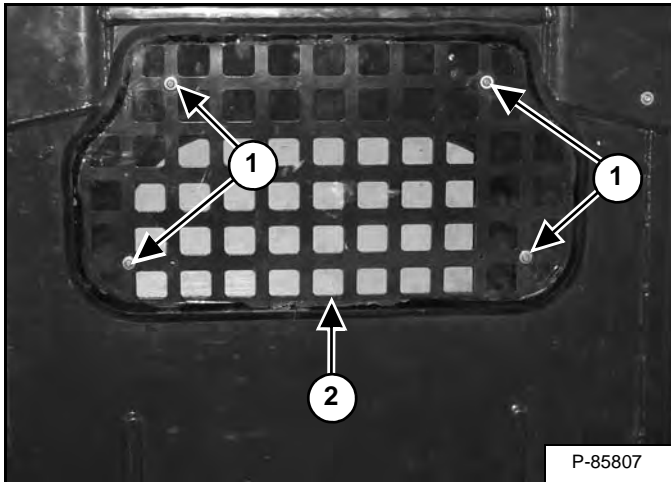
Removal And Installation

Figure 50-131-1



From inside the operator cab, remove the four nuts (Item 1) [Figure 50-131-1].

Figure 50-131-2



Remove the bolts (Item 1). Separate the window adhesive (Item 2) [Figure 50-131-2] from the cab.

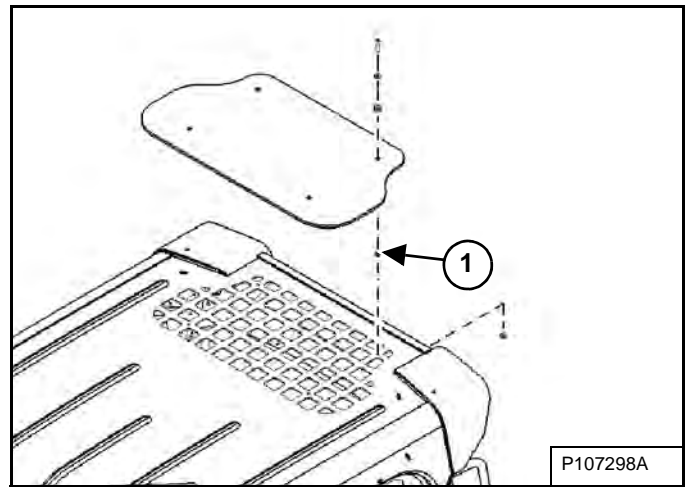
Remove the existing adhesive from the mounting surfaces.

Prime and paint any bare metal or scratches.

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

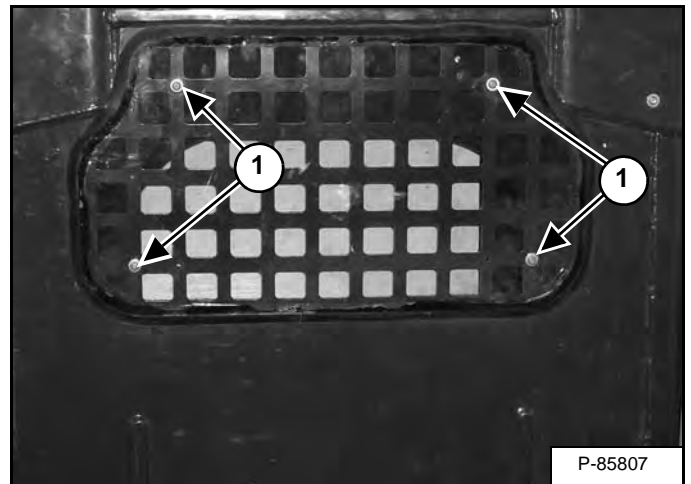
Approximately 10 mm (0.38 in) from the edge of the window, apply a consistent and continuous 10 mm (0.38 in) bead of adhesive to the window.

Figure 50-131-3



To help control the amount of adhesive compression during installation and maintain the ideal adhesive thickness to maintain the bond, bushing spacers (Item 1) [Figure 50-131-3] have been added between the window and cab.

Figure 50-131-4



Align the window and cab holes prior to placing window. Install the bolts (Item 1) [Figure 50-131-4] through the window grommets, bushing spacers and cab.

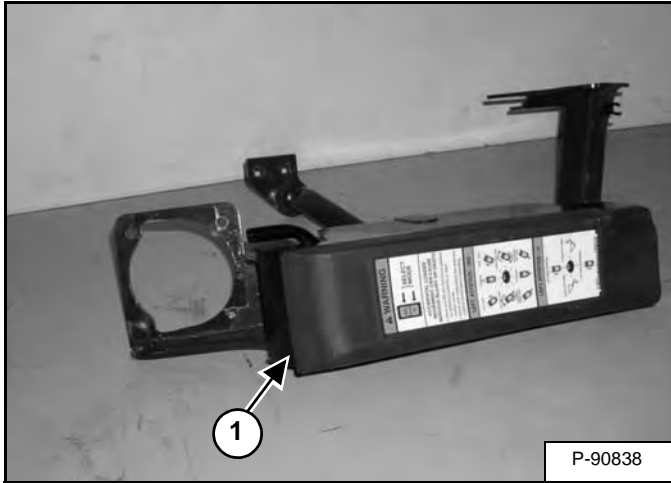
ARMREST (CONT'D)

Disassembly And Assembly

Remove the joystick. (See Joystick Removal And Installation on Page 50-112-2.)

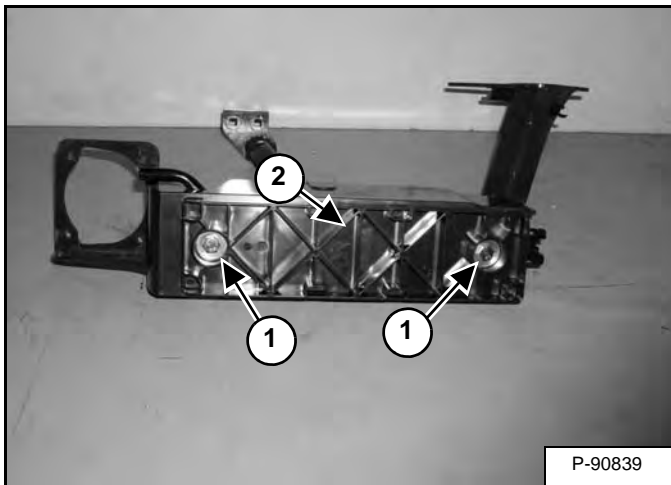
Remove the armrest. (See Removal And Installation on Page 50-150-2.)

Figure 50-150-5



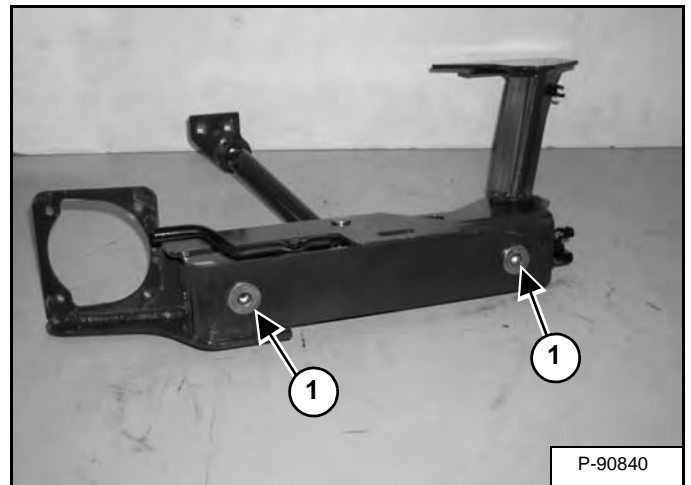
Lift up on one edge and remove the armrest cover (Item 1) [Figure 50-150-5].

Figure 50-150-6



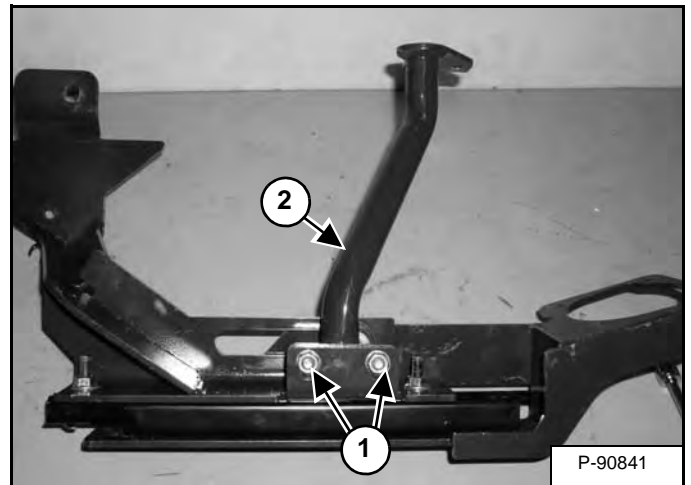
Remove the two bolts, washers (Item 1) and the armrest shell (Item 2) [Figure 50-150-6].

Figure 50-150-7



Remove the two washers (Item 1) [Figure 50-150-7].

Figure 50-150-8



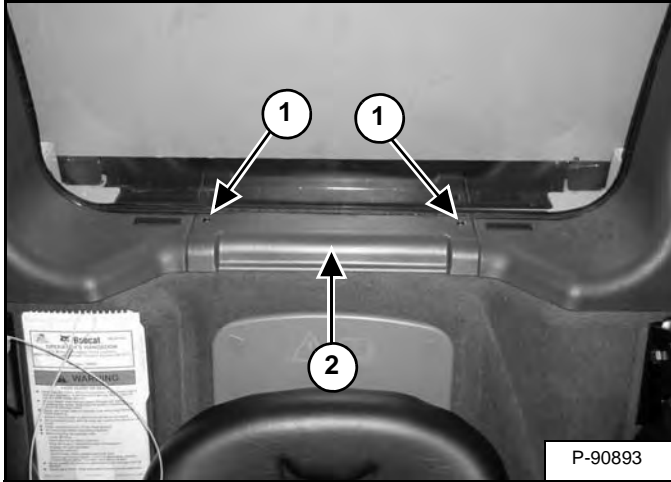
Remove the two nuts, bolts (Item 1) and the support tube (Item 2) [Figure 50-150-8].

HEADLINER

Removal And Installation

Remove the cab light (if equipped). (See Cab Light Removal And Installation on Page 60-60-2.)

Figure 50-180-1

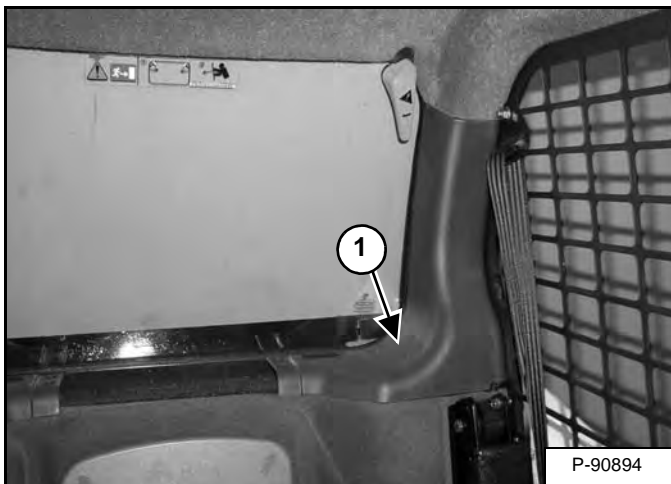


Remove the two screws (Item 1) and the rear shelf (Item 2) [Figure 50-180-1] (if equipped).

NOTE: The rear shelf has two panel clips on the bottom. Lift vertically to remove the shelf.

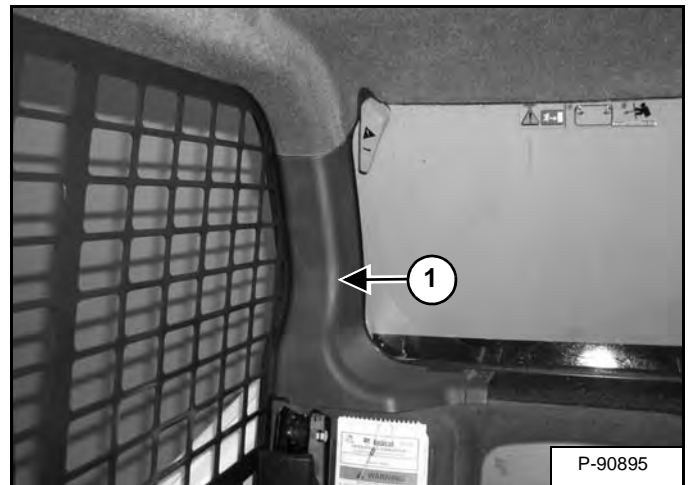
Installation: Tighten the screws to 2,3 N•m (20 in-lb) torque.

Figure 50-180-2



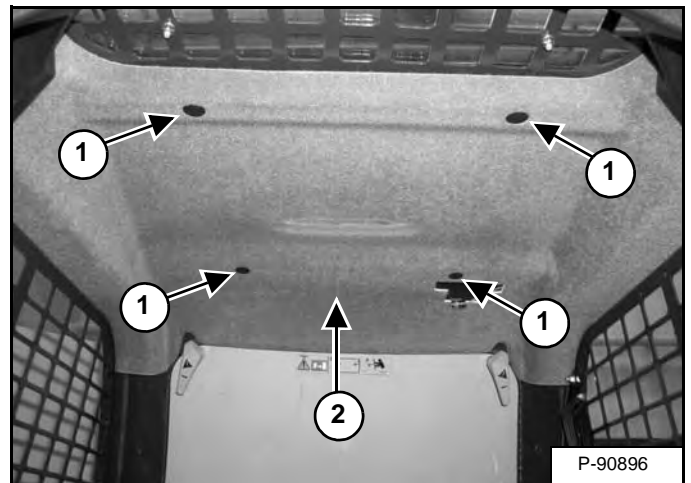
Remove the air duct (Item 1) [Figure 50-180-2] (if equipped).

Figure 50-180-3



Remove the air duct (Item 1) [Figure 50-180-3] (if equipped).

Figure 50-180-4

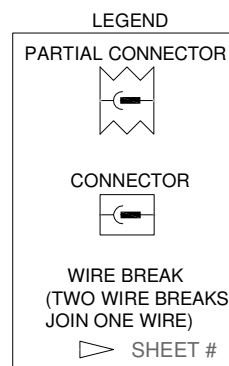


Remove the four retainers (Item 1) and remove the headliner (Item 2) [Figure 50-180-4].

Installation: Route the cab light wire harness in the groove on the topside of the headliner (if equipped with HVAC).

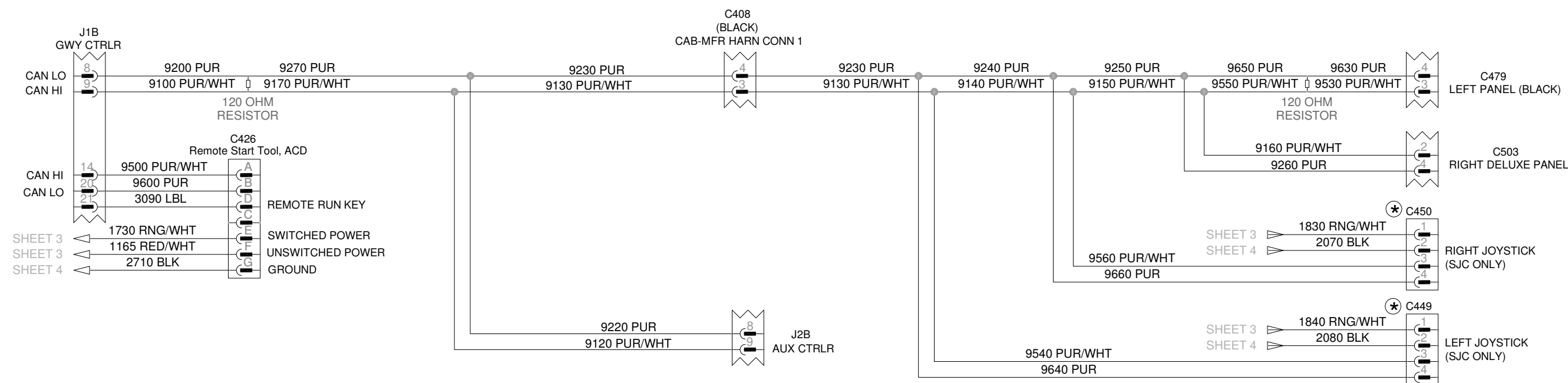
WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
GROUP DESCRIPTION	GROUP NUMBER RANGE	WIRE COLOR	COLOR CODE
BATT FEED, GENERAL	1000 THROUGH 1499	RED	RED
BATT FEED, FUSED	1000 THROUGH 1499	RED/WHITE	RED/WHT
BATT FEED, SWITCHED	1500 THROUGH 1999	ORANGE/WHITE	RNG/WHT
BATTERY GROUND	2000 THROUGH 2999	BLACK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

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HVAC	PAGE 12
OPTIONS	PAGE 13



CAN BUS

* DLX CAB HARN 7210556 ONLY
(NOT IN STD CAB HARN 7210557)



WIRING SCHEMATIC
(MANUAL MACHINE)
T550 (S/N A7UJ11001 AND ABOVE)
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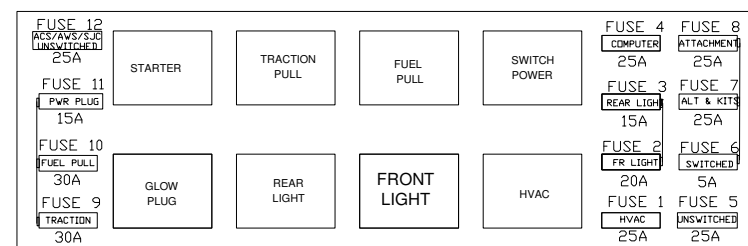
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7210762 (A)

J1 CONNECTOR ASSIGNMENTS(GATEWAY CONTROLLER)			
PIN	FUNCTION	PIN	FUNCTION
A-1	HYDRAULIC LOCK RETURN	B-1	HYD CHARGE PRESS
A-2	LIFT SPOOL LOCK RETURN	B-2	UNSW BATT
A-3	FUEL PULL RELAY	B-3	UNSW BATT
A-4	SWITCHED POWER OUT RELAY	B-4	FUEL HOLD
A-5	LIGHT 1 RELAY	B-5	LIFT SPOOL LOCK
A-6	GLOW PLUG RELAY	B-6	TRACTION LOCK HOLD
A-7	STARTER RELAY	B-7	TILT SPOOL LOCK
A-8	TRACTION PULL RELAY	B-8	CAN LO 1
A-9	FAN 1 RELAY	B-9	CAN HI 1
A-10	TILT SPOOL LOCK RETURN	B-10	SPOOL LOCK SENSOR 2
A-11	SPARE DIGITAL, ECU SINKS	B-11	SEAT BAR
A-12	SPARE DIGITAL, ECU SOURCES	B-12	FUEL LEVEL
A-13	TRACTION PULL RELAY FDBK	B-13	BICS HYD LOCK HOLD
A-14	GLOW PLUG RELAY FDBK	B-14	CAN HI 2
A-15	ENGINE SPEED	B-15	GROUND P1
A-16	AIR FILTER SWITCH	B-16	GROUND P2
A-17	LIGHT 2 RELAY	B-17	GROUND P3, SENSOR
A-18	FAN 2 RELAY	B-18	ENGINE COOLANT TEMP
A-19	PTOL LED	B-19	FAN 2 OUTPUT
A-20	PTOL SWITCH	B-20	CAN LO 2
A-21	SWITCHED POWER OUT RELAY FDBK	B-21	REMOTE KEY
A-22	STATER RELAY FDBK	B-22	RUN/ENTER
A-23	HYD OIL FILTER SW2	B-23	SENSOR SUPPLY 8V
A-24	START ENGINE	B-24	SENSOR SUPPLY 5V
A-25	ENGINE OIL PRESS	B-25	TWO SPEED MAKEUP
A-26	SPARE	B-26	TWO SPEED COIL
A-27	SPARE		
A-28	LIGHT 2 RELAY FDBK		
A-29	FAN 1 RELAY FDBK		
A-30	FUEL PULL RELAY FDBK		
A-31	LIGHT 1 RELAY FDBK		
A-32	HYD OIL TEMP		
A-33	SPARE ANALOG		
A-34	HYD OIL FILTER SW1		

J2 CONNECTOR ASSIGNMENTS(AUXILLIARY CONTROLLER)			
PIN	FUNCTION	PIN	FUNCTION
A-1	FRONT AUX (F) RETURN	B-1	
A-2	REAR AUX (F) RETURN	B-2	UNSW BATT
A-3	LEFT BLINKER RELAY	B-3	UNSW BATT
A-4	RIGHT BLINKER RELAY	B-4	DIVERTED SOLENOID
A-5	HORN RELAY	B-5	REAR AUX (F)
A-6		B-6	RELIEF SOLENOID
A-7	OUTPUT SPARE	B-7	REAR AUX (M)
A-8		B-8	CAN LO 1
A-9		B-9	CAN HI 1
A-10	REAR AUX (M) RETURN	B-10	
A-11	LH PADDLE RIGHT	B-11	
A-12	LH PADDLE LEFT	B-12	
A-13	RH RIGHT BUTTON UP	B-13	FRONT AUX (F)
A-14	DIGITAL INPUT SPARE	B-14	CAN HI 2
A-15		B-15	GROUND
A-16		B-16	GROUND
A-17		B-17	HANDLE POT GND
A-18	FRONT AUX (M) RETURN	B-18	RH PWM POT SIGNAL
A-19		B-19	FRONT AUX (M)
A-20	LH FLOAT BUTTON	B-20	CAN LO 2
A-21	HYDRAULIC DETENT	B-21	RH TRIGGER
A-22	LH RIGHT BUTTON DOWN	B-22	SWITCHED POWER
A-23	RH CENTER BUTTON	B-23	HANDLE POT POWER
A-24	DIGITAL INPUT SPARE	B-24	
A-25		B-25	BUCKET POSITION (SPARE)
A-26	HIGH FLOW RETURN	B-26	HIGH FLOW
A-27	BUCKET POSITION(SPARE) RETURN		
A-28	LH RIGHT BUTTON		
A-29	RH RIGHT BUTTON DOWN		
A-30	RH LEFT UP		
A-31	RH LEFT DOWN		
A-32			
A-33			
A-34	DIGITAL INPUT SPARE		

HARNES PART NUMBER	
MAIN FRAME	7210555
STD CAB	7210557
DLX CAB	7210556
DLX FUEL	7175293
STD FUEL	7149219
ENG 2403	7181036
ENG 2607	7181037
TAILGATE DOM	7217484
WHL 2 SPD ADP	7159366
TRK BRAKE ADP	7165061
ACS	7196667
SJC	7196668



WIRING SCHEMATIC (ACS / SJC MACHINE) T550 (S/N A7UJ11001 AND ABOVE)

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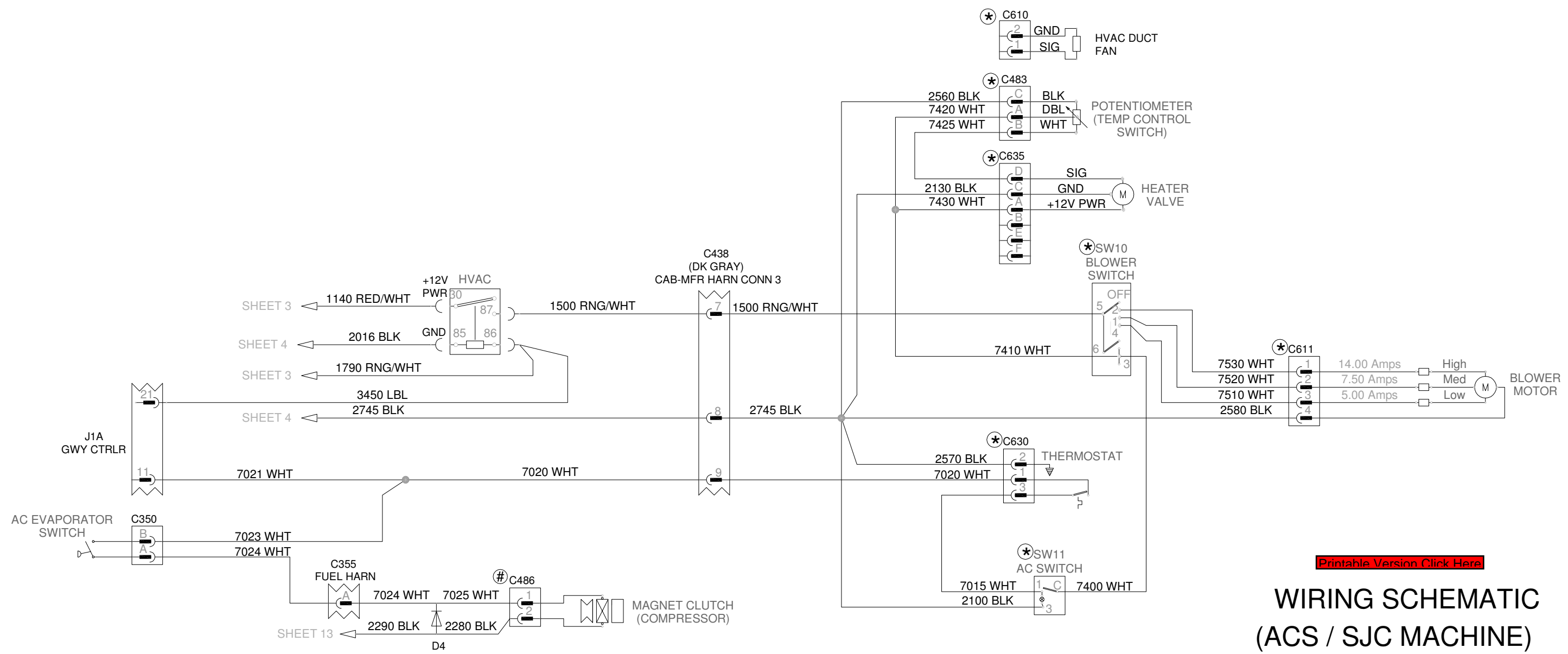
7210761 (A)

WIRE CATEGORIES FOR COLORS AND NUMBER RANGE			
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SJC		7196668

HVAC

- * DLX CAB HARN 7210556 ONLY
(NOT IN STD CAB HARN 7210557)
- # DLX FUEL HARN 7184255 ONLY
(NOT IN STD FUEL HARN 7149219)



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**WIRING SCHEMATIC
(ACS / SJC MACHINE)
T550 (S/N A7UJ11001 AND ABOVE)
Sheet 12 of 15**

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7210761 (A)

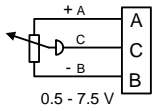
ELECTRICAL SYSTEM INFORMATION (CONT'D)

Glossary Of Electrical Symbols (Cont'd)

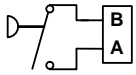
SYMBOL

DESCRIPTION

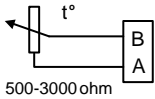
SENDERS AND SENSORS



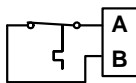
PRESSURE SENDER - Provides a variable voltage proportional to pressure. (Sender voltage rating is listed to show volts at high and low setting.)



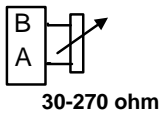
PRESSURE SWITCH - Switch opens or closes at a predetermined pressure to active a function or to turn on a warning light. (Switch is shown in the open position.)



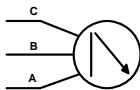
TEMPERATURE SENDER - Provides a variable resistance (ohm) signal proportional to temperature. (Sender ohm rating is listed to show ohms at high and low setting.)



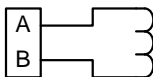
TEMPERATURE SWITCH - The switch opens or closes at a predetermined temperature to active a function or to turn on a warning light. (Switch is shown in the closed position.)



FUEL SENDER - Provides a variable resistance, based on the fuel level in the tank. (Sender ohm rating is listed to show ohms 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.

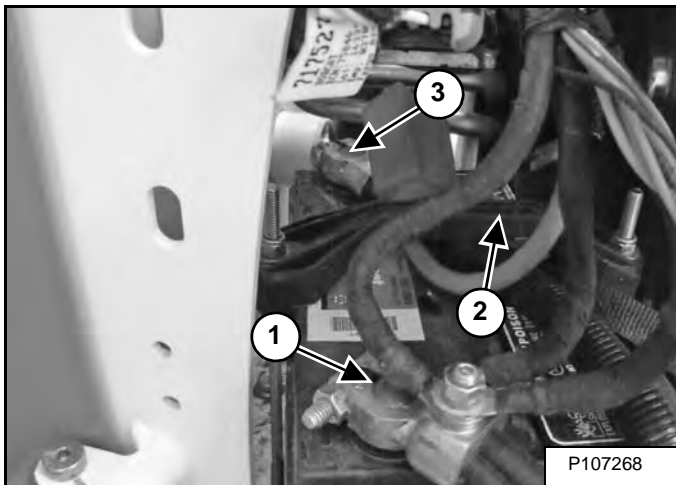
In case of acid contact, wash immediately with water. In case of eye contact get prompt medical attention and wash eye with clean, cool water for at least 15 minutes.

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

W-2065-0807

Stop the engine and open the rear door.

Figure 60-20-1



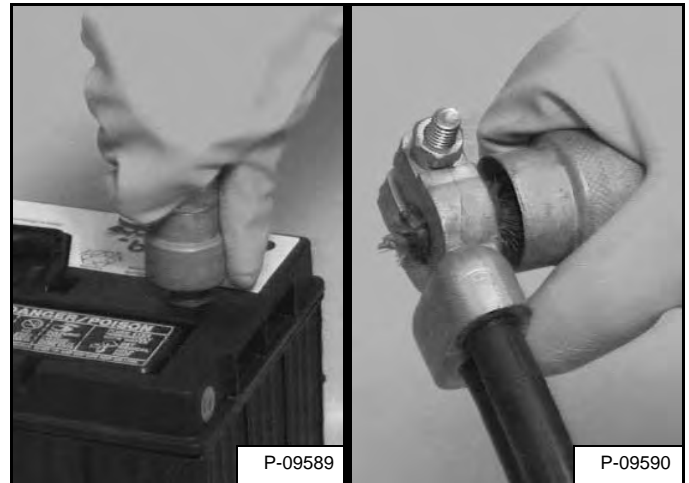
Disconnect the negative (-) cable (Item 1) [Figure 60-20-1].

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.

Put Bobcat Battery Saver or grease on the battery terminals and cable ends to prevent corrosion.

Close the rear door.

! 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.

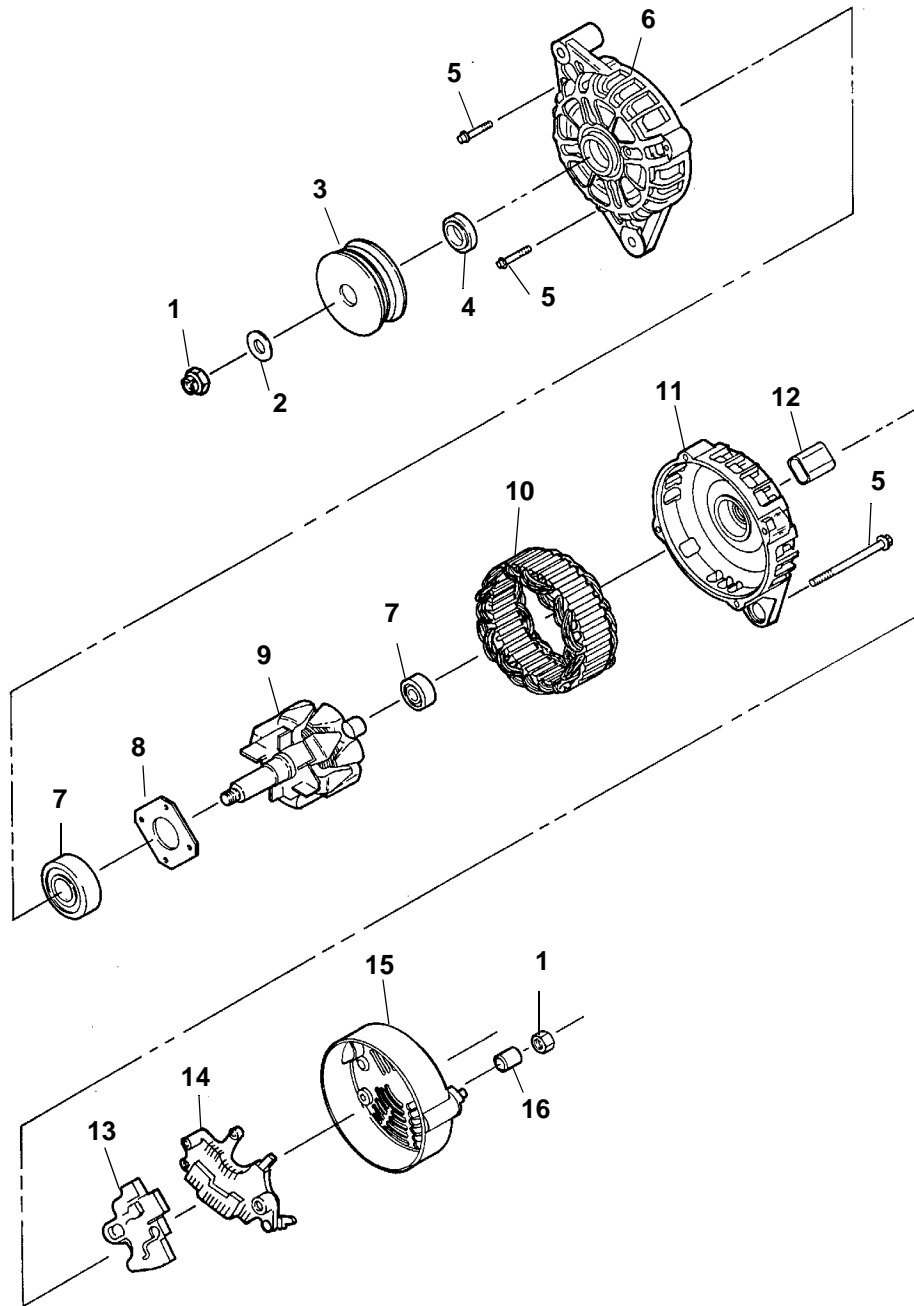
Do not jump start or charge a frozen or damaged battery. Warm battery to 16°C (60°F) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery. Never lean over battery while boosting, testing or charging.

W-2066-0910

ALTERNATOR (CONT'D)

Parts Identification

- 1. Nut
- 2. Washer
- 3. Pulley
- 4. Spacer
- 5. Bolt
- 6. Case Half
- 7. Bearing
- 8. Retainer
- 9. Rotor
- 10. Stator
- 11. Case Half
- 12. Sleeve
- 13. Regulator
- 14. Rectifier
- 15. Cover
- 16. Spacer



C-3529

INSTRUMENT PANELS (CONT'D)

Right Panel (Deluxe Instrumentation Panel) (Cont'd)

Figure 60-50-6



The first screen you will see on your new loader will be as shown in **[Figure 60-50-6]**.

When this screen is on the display you can enter the password and start the engine or change the default language.

NOTE: Your new loader (with Deluxe Instrumentation Panel) will have an Owner Password. Your dealer will provide you with this password. Change the password to one that you will easily remember to prevent unauthorized use of your loader. Keep your password in a safe place for future needs.

Change Language:

Press the left or right scroll button to cycle through the languages. The language that is stopped on will be the default language used for the deluxe instrumentation panel **[Figure 60-50-6]**.

The language can be changed at any time. (See CONTROL PANEL SETUP on Page 60-180-1.)

Enter The Password:

Use the numbers on the keypad to enter the password. Then press the **[ENTER]** button. A symbol will appear on the display screen for each number entered **[Figure 60-50-6]**. The left scroll button can be used to backspace if an incorrect number is entered.

If the correct password is not entered, **[INVALID PASSWORD TRY AGAIN]** will appear on the display screen and the password will have to be reentered.

See CONTROL PANEL SETUP for further description of screens to setup the system for your use. (See CONTROL PANEL SETUP on Page 60-180-1.)

BOBCAT CONTROLLERS (GATEWAY AND AUXILIARY)

Description

The Gateway controller is the main controller, it provides information to all other controllers. All loaders have a Gateway and Auxiliary controller.

The Gateway and Auxiliary controllers are located under the cab on the left inner frame.

BOBCAT CONTROLLER (ACS) (CONT'D)

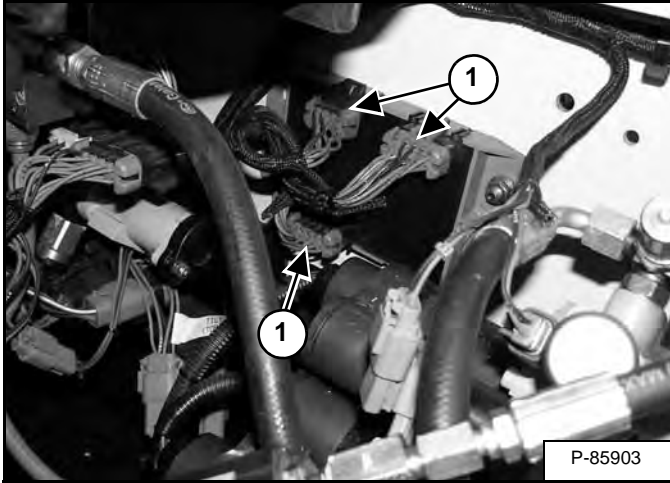
Removal And Installation

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-2.)

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

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

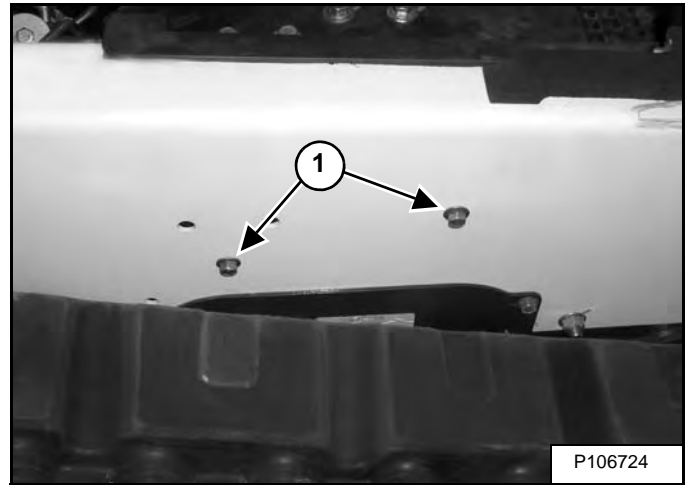
Figure 60-71-1



Disconnect the wire harness (Item 1) [Figure 60-71-1] from the controller.

NOTE: The connectors are keyed and will only plug in one way.

Figure 60-71-2



Remove the two bolts (Item 1) [Figure 60-71-2] from the controller.

Remove the controller from the loader.

NOTE: The calibration procedure must be followed when replacing a controller. (See Lift And Tilt Calibration (ACS) on Page 60-150-11.)

DIAGNOSTIC SERVICE CODES (CONT'D)

Service Codes List (Cont'd)

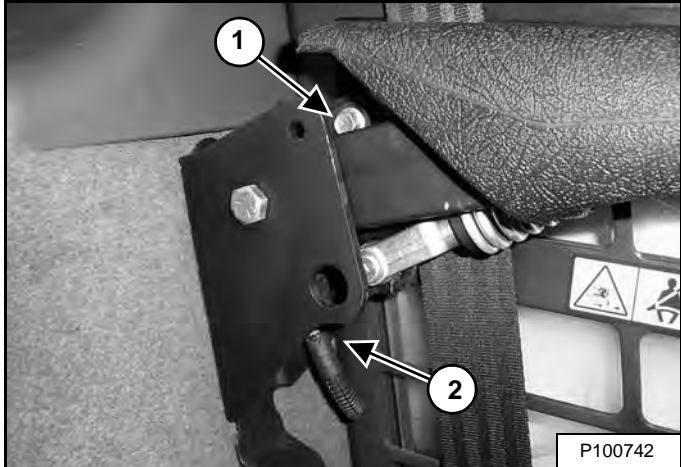
CODE	DESCRIPTION	CODE	DESCRIPTION
M0117	Air filter plugged	M1307	Fuel hold solenoid open circuit
M0216	Hydraulic / Hydrostatic filter not connected	M1402	Fuel pull solenoid error ON
M0217	Hydraulic / Hydrostatic filter plugged	M1403	Fuel pull solenoid error OFF
M0309	System voltage too low	M1407	Fuel pull solenoid open circuit
M0310	System voltage too high	M1428	Fuel pull solenoid failure
M0311	System voltage extremely high	M1502	Traction lock pull output error ON
M0314	System voltage extremely low	M1503	Traction lock pull output error OFF
M0322	System voltage out of range low	M1507	Traction lock pull output open circuit
M0409	Engine oil pressure too low	M1528	Traction lock pull output failure
M0414	Engine oil pressure extremely low	M1605	Traction lock hold solenoid short to battery
M0415	Engine oil pressure in shutdown	M1606	Traction lock hold solenoid short to ground
M0421	Engine oil pressure out of range high	M1607	Traction lock hold solenoid open circuit
M0422	Engine oil pressure out of range low	M1705	Hydraulic lock valve short to battery
M0509	Hydraulic charge pressure too low	M1706	Hydraulic lock valve short to ground
M0510	Hydraulic charge pressure too high	M1707	Hydraulic lock valve open circuit
M0511	Hydraulic charge pressure extremely high	M1732	Hydraulic lock valve overcurrent
M0514	Hydraulic charge pressure extremely low	M1805	Lift spool lock output short to battery
M0515	Hydraulic charge pressure in shutdown	M1806	Lift spool lock output short to ground
M0521	Hydraulic charge pressure out of range high	M1807	Lift spool lock output open circuit
M0522	Hydraulic charge pressure out of range low	M1832	Lift spool lock output overcurrent
M0610	Engine speed too high	M2005	Two-speed primary solenoid short to battery
M0611	Engine speed extremely high	M2006	Two-speed primary solenoid short to ground
M0613	Engine speed no signal	M2007	Two-speed primary solenoid open circuit
M0615	Engine speed in shutdown	M2032	Two-speed primary solenoid overcurrent
M0618	Engine speed out of range	M2102	Glow plug output error ON
M0634	Engine speed invalid information from ECU	M2103	Glow plug output error OFF
M0710	Hydraulic fluid temperature too high	M2107	Glow plug output open circuit
M0711	Hydraulic fluid temperature extremely high	M2128	Glow plug output failure
M0715	Hydraulic fluid temperature in shutdown	M2202	Starter output error ON
M0721	Hydraulic fluid temperature out of range high	M2203	Starter output error OFF
M0722	Hydraulic fluid temperature out of range low	M2207	Starter output open circuit
M0810	Engine coolant temperature too high	M2228	Starter output failure
M0811	Engine coolant temperature extremely high	M2302	Starter relay error ON
M0815	Engine coolant temperature in shutdown	M2303	Starter relay error OFF
M0821	Engine coolant temperature out of range high	M2402	Fuel pull relay error ON
M0822	Engine coolant temperature out of range low	M2403	Fuel pull relay error OFF
M0909	Fuel level too low	M2502	Traction pull relay error ON
M0921	Fuel level out of range high	M2503	Traction pull relay error OFF
M0922	Fuel level out of range low	M2602	Glow plug relay error ON
M1016	Hydraulic charge filter not connected	M2603	Glow plug relay error OFF
M1017	Hydraulic charge filter plugged	M2721	Throttle primary sensor out of range high
M1121	Seat bar sensor out of range high	M2722	Throttle primary sensor out of range low
M1122	Seat bar sensor out of range low	M2821	Throttle secondary sensor out of range high
M1128	Seat bar sensor failure	M2822	Throttle secondary sensor out of range low
M1305	Fuel hold solenoid short to battery	M3028	Controller memory failure
M1306	Fuel hold solenoid short to ground	M3128	Interrupted power failure

SEAT BAR SENSOR (CONT'D)

Removal

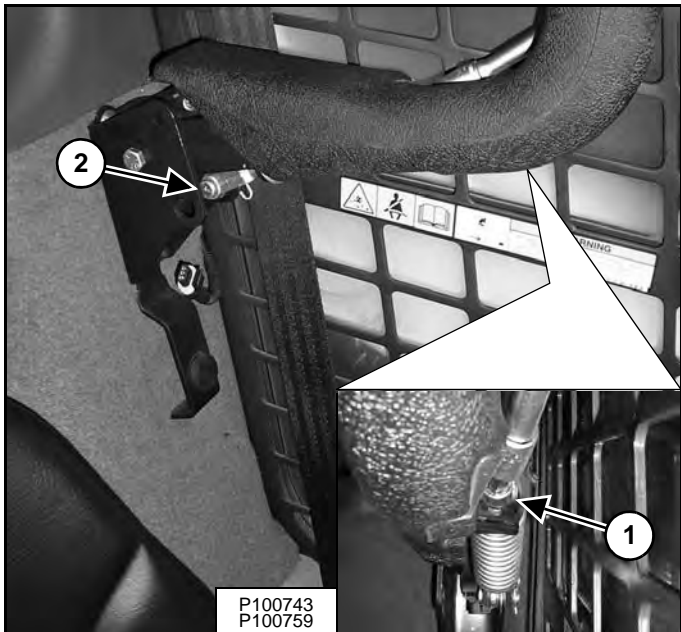
NOTE: This procedure is performed with the seat bar in the raised position and the technician in the operators seat.

Figure 60-100-5



Remove the sensor bolt and nut (Item 1) [Figure 60-100-5]. Disconnect the sensor wiring connector (Item 2) [Figure 60-100-5].

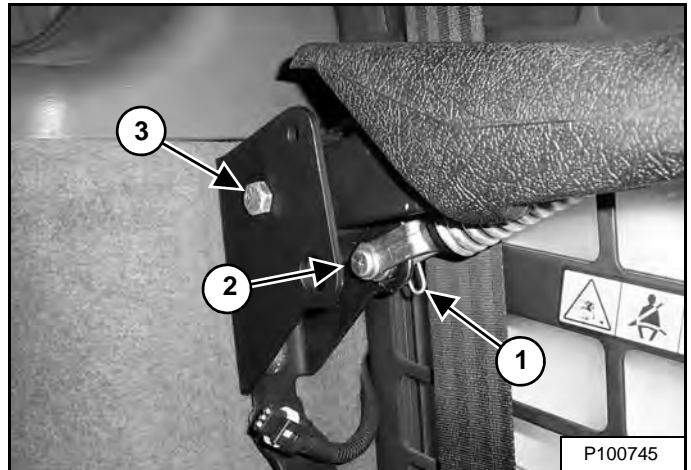
Figure 60-100-6



Tighten the clevis bolt (Item 1) until spring tension is released from the clevis pin (Item 2) [Figure 60-100-6].

NOTE: Approximately four turns of the clevis bolt should be adequate to release the spring tension. When tension is released, the clevis pin can easily be rotated using the retaining pin.

Figure 60-100-7



Remove the retaining pin (Item 1) and clevis pin (Item 2). Remove the bolt and nut (Item 3) [Figure 60-100-7].

Figure 60-100-8



Pull the front of the seat bar down slightly from the top of the cab, while raising the sensor end of the seat bar up, away from the mount [Figure 60-100-8].

NOTE: The sensor end of the seat bar will raise easily **ONLY** if the front of the seat bar is pulled slightly down from the top of the cab.

CONTROL SYSTEM (ACS)

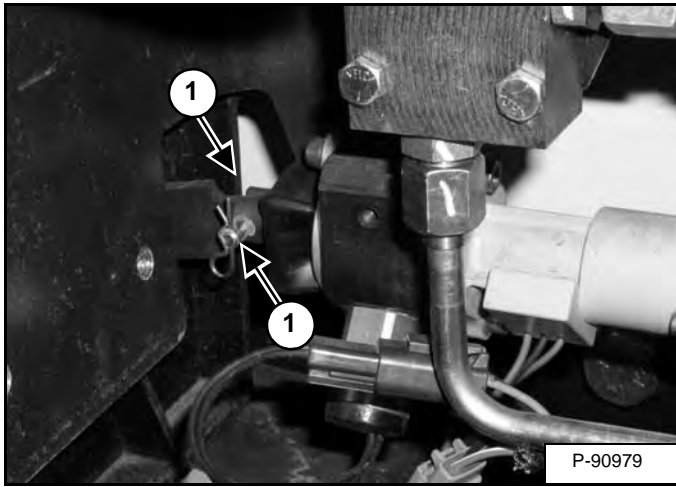
Description

The ACS option allows the operator to switch between foot and hand control modes. It uses the electric actuators to control the lift and tilt spools, foot sensors, handle sensors and a specially designed control handle.

CONTROL SYSTEM (ACS) (CONT'D)

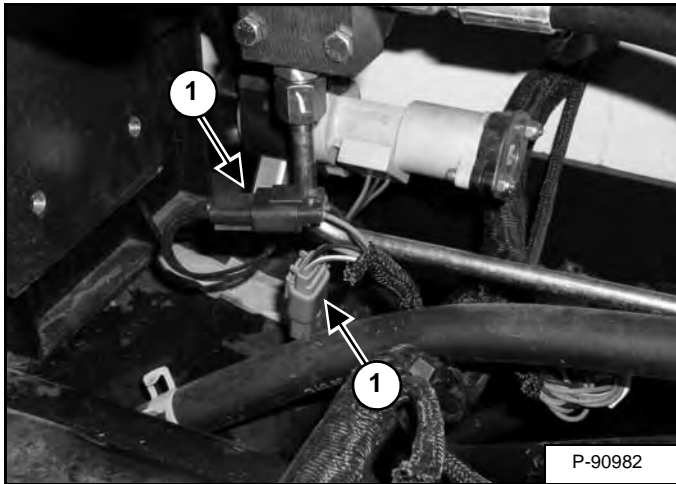
Foot Sensor Removal And Installation

Figure 60-120-28



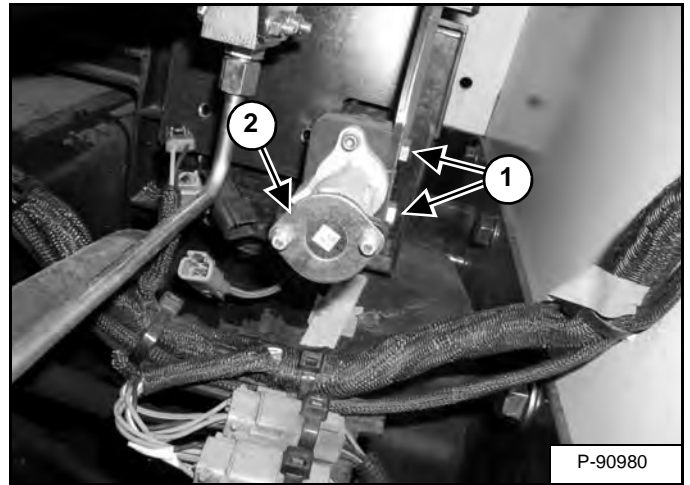
Remove the clip and the pin (Item 1) [Figure 60-120-28] from the foot sensor.

Figure 60-120-29



Disconnect the wire harness (Item 1) [Figure 60-120-29] from the foot sensor.



Figure 60-120-30

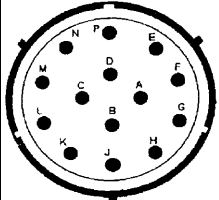


Remove the two bolts (Item 1) and the foot sensor (Item 2) [Figure 60-120-30].

ELECTRICAL / HYDRAULIC CONTROLS (ACS) (CONT'D)

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			
 P-90898 P-90900	1	1	1	1, 7	1, 7	K	 P-90899 P-90900A	
	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		
	10, 11, 12, 13, 14	-	--	--		K		



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.

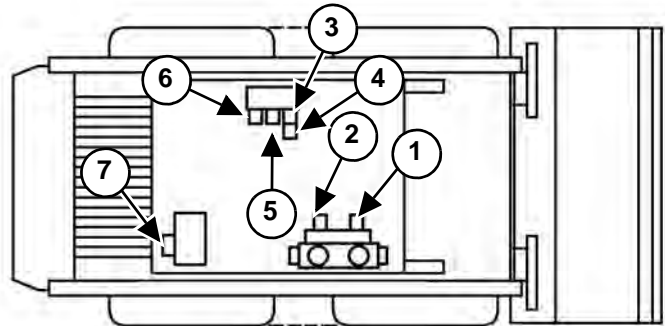
NOTE: For diagnostics and troubleshooting connect the Service PC (See SERVICE PC (LAPTOP COMPUTER) on Page 60-140-1.)

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)

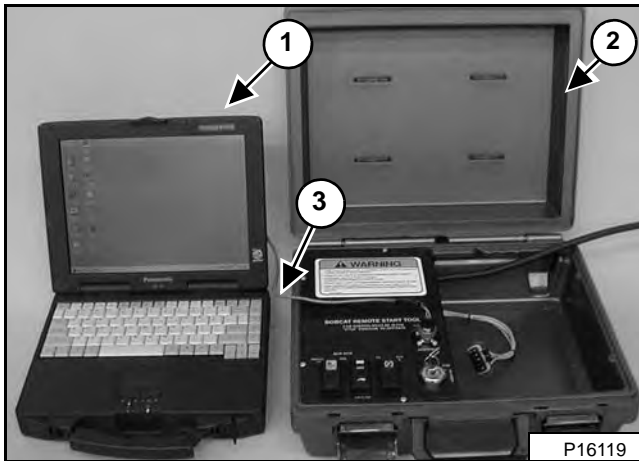
Connecting Remote Start Tool

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.

Figure 60-140-1



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)

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

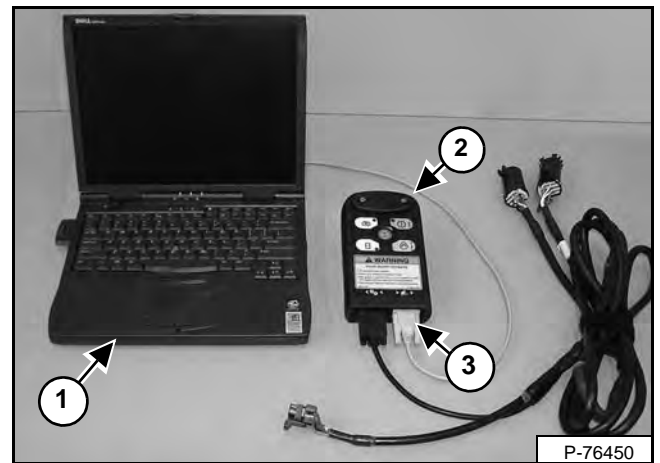
Order from Bobcat Parts P/N: 7217666 - Remote Start Tool (Service Tool) Kit

Kit Includes:

7022042 - 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.

Figure 60-140-2



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 - 7217666 on Page 10-61-1.)

CALIBRATION (CONT'D)

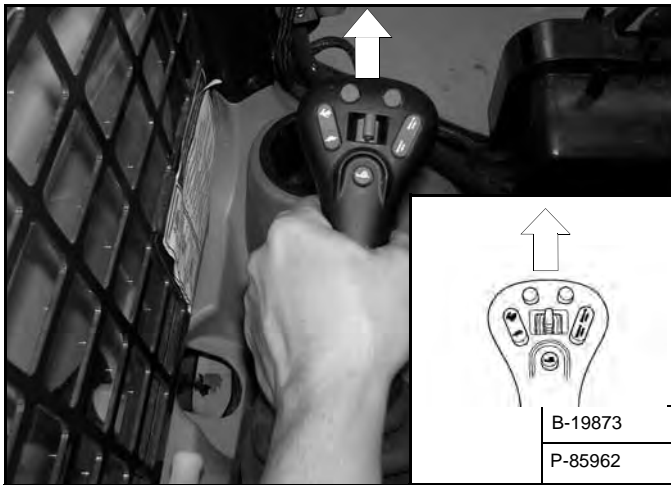
Hydrostatic Pump Calibration (SJC) (Cont'd)

! 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.

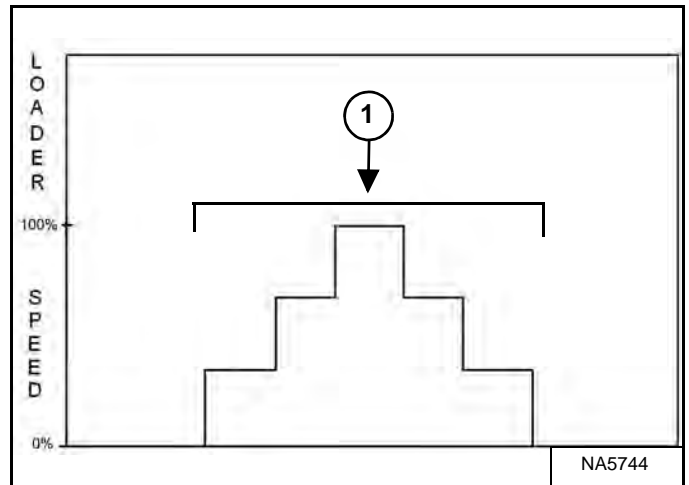
W-2017-0286

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 tires or tracks will **momentarily reverse** then rotate forward and “stair step” the speed (Item 1) [Figure 60-150-20] until it reaches full speed and then “stair step” down and 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.

CONTROL PANEL SETUP

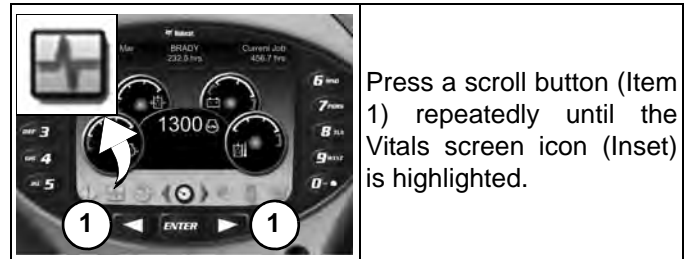
Right Panel Setup (Deluxe Instrumentation Panel)

Icon Identification

Figure 60-180-1



Vitals



Press a scroll button (Item 1) repeatedly until the Vitals screen icon (Inset) is highlighted.



Displays select system operating levels.

You can monitor real-time displays of:

- Engine Speed**
- Engine Oil Pressure**
- Engine Coolant Temperature**
- System Voltage**
- Hydraulic Charge Pressure**
- Hydraulic Fluid Temperature**

ICON	DESCRIPTION
Mon, 17 Mar 3:45 PM	DATE / TIME
BRADY 232.5 hrs	USER / HOURMETER
Current Job 456.7 hrs	CURRENT JOB HOURS
	ACTIVE WARNINGS screen icon
	VITALS screen icon
	SERVICE screen icon
	MAIN screen icon
	ATTACHMENTS screen icon
	SECURITY screen icon
	DISPLAY screen icon
	HOME icon (Return to MAIN screen)
	LEFT SCROLL button
	RIGHT SCROLL button
	ENTER button

The Deluxe Instrumentation Panel is easy to use. Continue to set your own preferences for operating / monitoring your Bobcat loader.

MAINTENANCE CLOCK (CONT'D)

Setup (Cont'd)

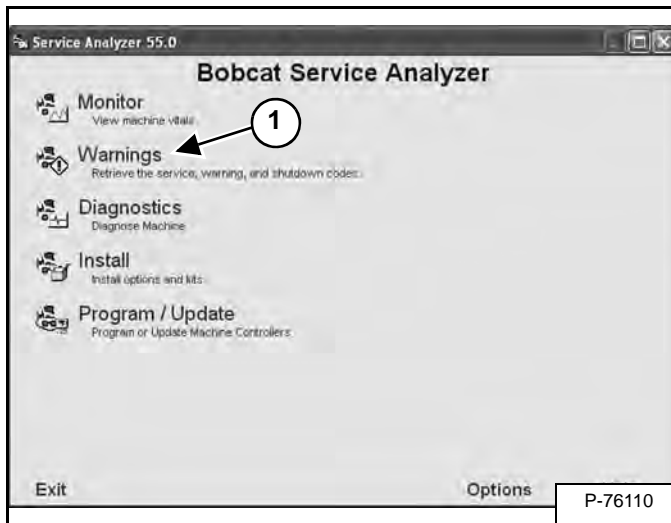
Figure 60-200-8



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

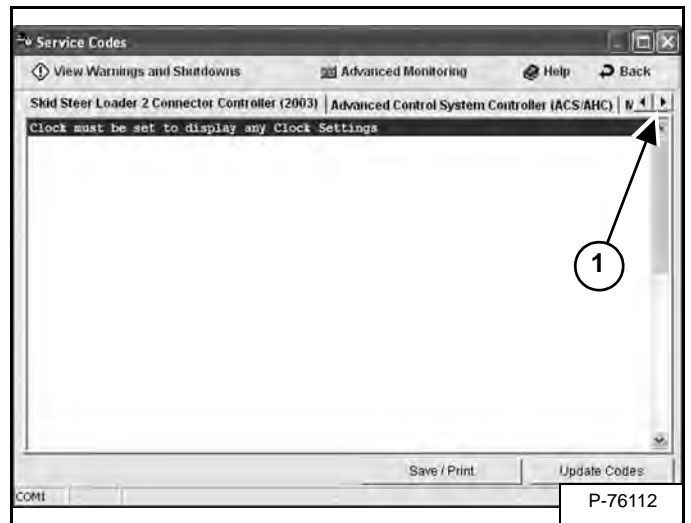
Click Back (Item 2) [Figure 60-200-8] to return to the Bobcat Service Analyzer screen.

Figure 60-200-9



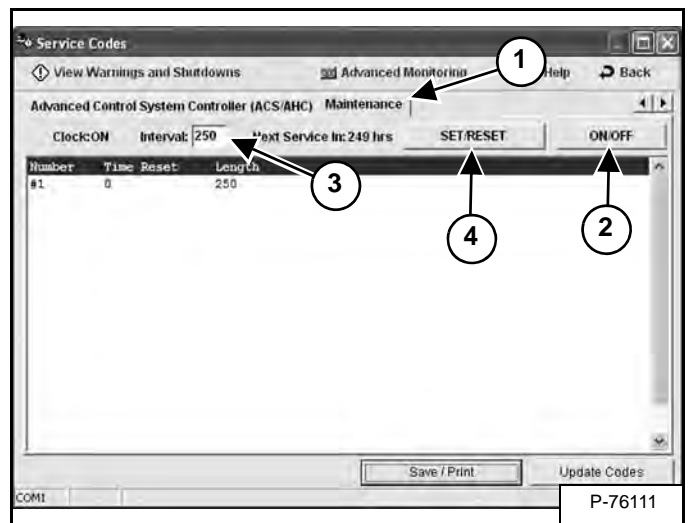
Select Warnings (Item 1) [Figure 60-200-9].

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.

FRONT HORN

Removal And Installation

Remove the left side lower panel. (See Removal And Installation on Page 50-160-1.)

Figure 60-220-1

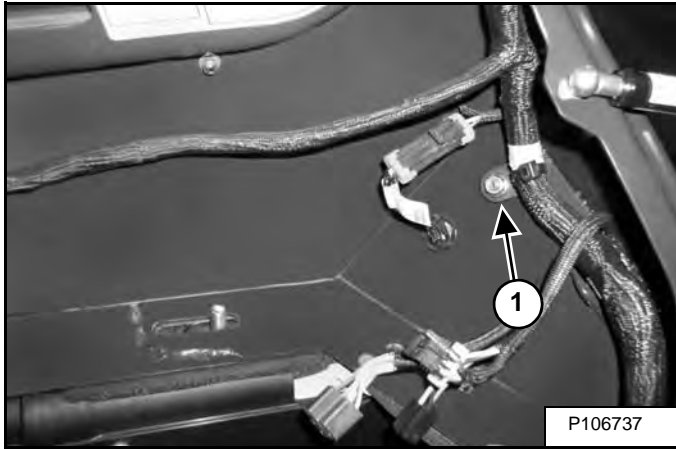
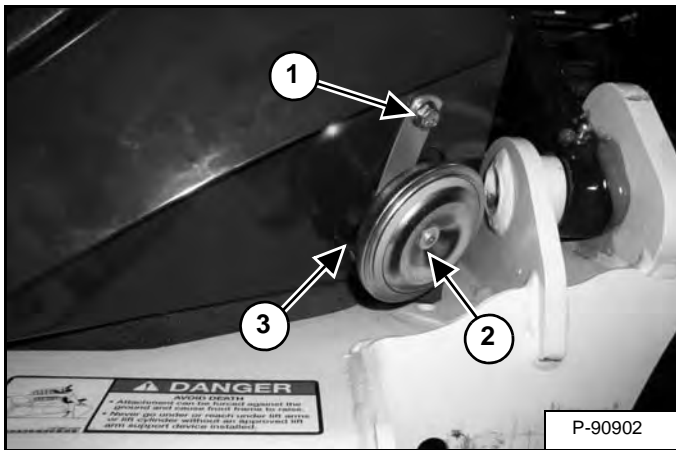


Figure 60-220-2



Remove the nut (Item 1) [Figure 60-220-1] and bolt (Item 1) [Figure 60-220-2].

Lower the horn (Item 2) [Figure 60-220-2] away from the cab. Disconnect the wire harness (Item 3) from the horn.

ENGINE INFORMATION (CONT'D)

Specifications (Cont'd)

Cylinder Bore

Cylinder Bore I.D.	87 - 87,022 mm (3.4252 - 3.4260 in)
Allowable Limit	87,15 mm (3.431 in)
Oversized Cylinder Liner (Bore) I.D.	87,25 - 87,272 mm (3.345 - 3.4359 in)
Allowable Limit	87,4 mm (3.441 in)

Piston Rings

Ring Gap (Top Ring)	20 - 35 mm (0.0079 - 0.013 in)
Allowable Limit	1,25 mm (0.0492 in)
Ring Gap (2nd Ring)	0,30 - 0,45 mm (0.012 - 0.017 in)
Allowable Limit	1,25 mm (0.0492 in)
Ring Gap (Oil Ring)	0,25 - 0,45 mm (0.0099 - 0.017 in)
Allowable Limit	1,25 mm (0.0492 in)
Side Clearance of Ring Groove:	
Top Ring	0,050 - 0,090 mm (0.0020 - 0.0035 in)
Allowable Limit	0,15 mm (0.0059 in)
Second Ring	0,090 - 0,12 mm (0.0035 - 0.0047 in)
Allowable Limit	0,0079 mm (0.20 in)
Oil Ring	0,020 - 0,060 mm (0.00079 - 0.0023 in)
Allowable Limit	0,15 mm (0.0059 in)

Pistons

Piston Pin Bore	26,000 - 26,013 mm (1.0237 - 1.0237 in)
Allowable Limit	25,05 mm (0.9862 in)

Connecting Rod

Piston Pin O.D.	26,006 - 26,011 mm (1.0239 - 1.024 in)
Small End Bushing I.D.	26,025 - 26,040 mm (1.0246 - 1.0252 in)
Oil Clearance Between Piston Pin And Small End Bushing	0,014 - 0,034 mm (0.00056 - 0.0013 in)
Allowable Limit	0,15 mm (0.0059 in)
Connecting Rod Alignment Allowable Limit	0,05 mm (0.002 in)

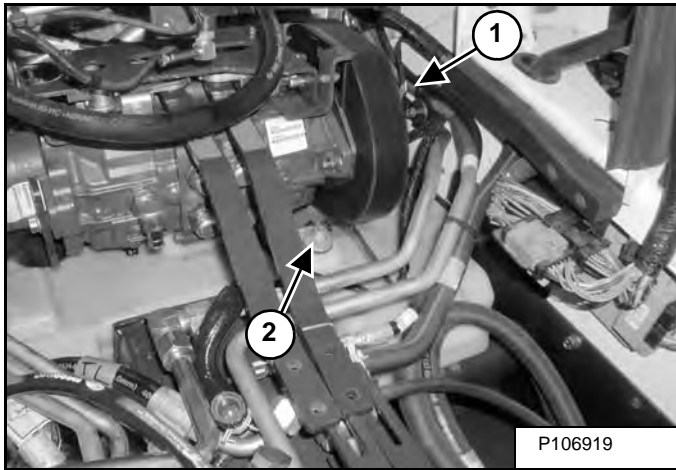
Oil Pump

Oil Pressure Rated rpm	193 - 393 kPa (1,9 - 3,9 bar) (28 - 57 psi)
Allowable Limit	144,8 kPa (1,4 bar) (21 psi)
Idle Speed Allowable Limit	48,3 kPa (0,48 bar) (7 psi)
Clearance Between Inner Rotor And Outer Rotor	0,030 - 0,090 mm (0.002 - 0.003 in)
Clearance Between Outer Rotor And Pump Body	0,100 - 0,184 mm (0.00394 - 0.00724 in)
End Clearance Between Inner Rotor And Cover	0,025 - 0,075 mm (0.00099 - 0.0029 in)

ENGINE INFORMATION (CONT'D)

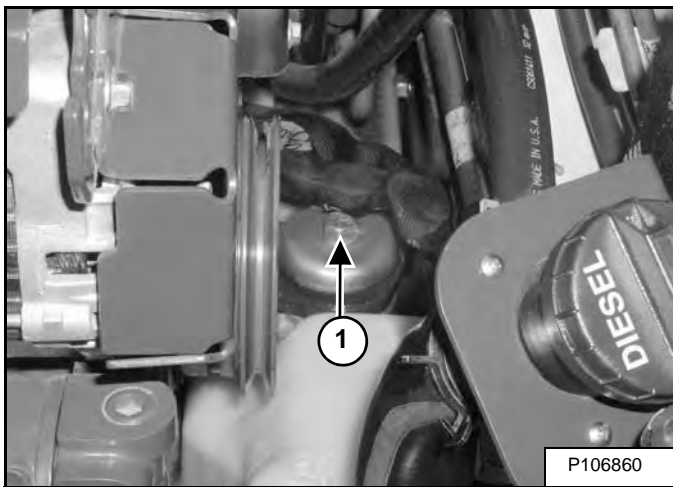
Engine Removal And Installation (Cont'd)

Figure 70-10-24



Disconnect the wire harness (Item 1) from the main frame wire harness. Disconnect the harness (Item 2) [Figure 70-10-24] from the fuel load sending unit.

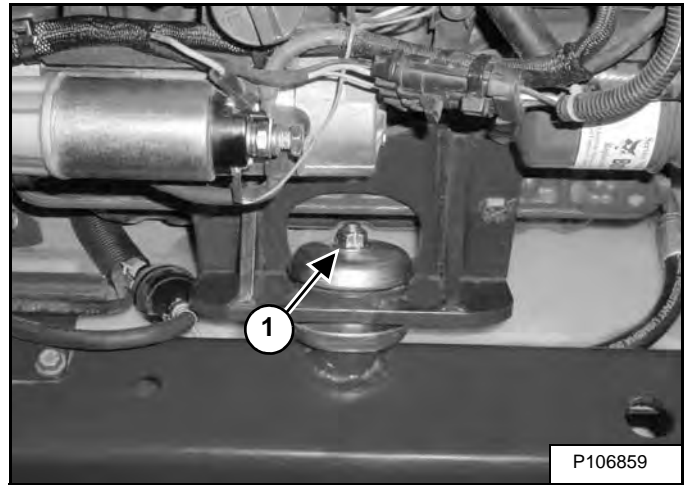
Figure 70-10-25



Remove the bolt (Item 1) [Figure 70-10-25], cup washer and mount.

Installation: Tighten the mounting bolt to 135 N•m (100 ft-lb) torque.

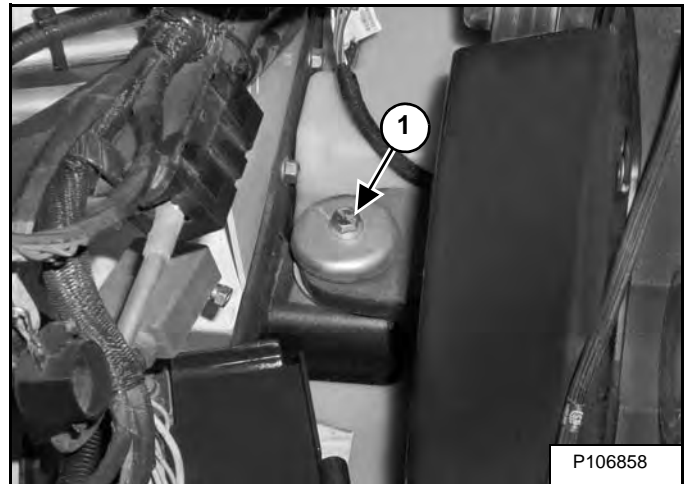
Figure 70-10-26



Remove the nut (Item 1) [Figure 70-10-26], washer, cup washer, mount and bolt.

Installation: Tighten the mounting bolt and nut to 135 N•m (100 ft-lb) torque.

Figure 70-10-27



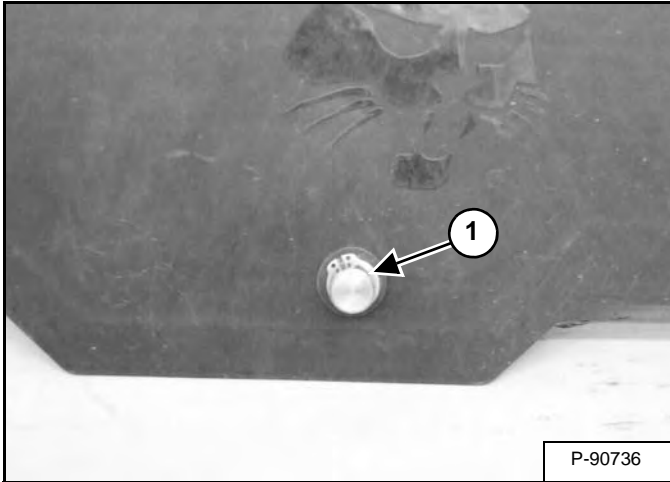
Remove the bolt (Item 1) [Figure 70-10-27], cup washer and mount.

Installation: Tighten the mounting bolt to 135 N•m (100 ft-lb) torque.

ENGINE SPEED CONTROL (FOOT) (CONT'D)

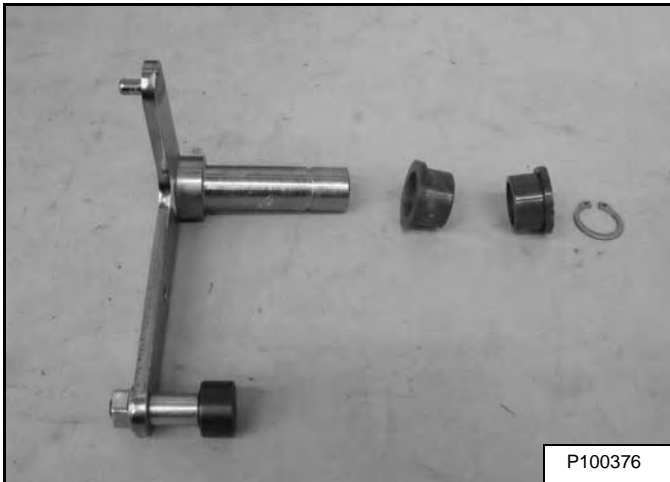
Disassembly And Assembly (Cont'd)

Figure 70-21-9



Remove the snap ring (Item 1) [Figure 70-21-9] from the engine speed control foot pedal pivot.

Figure 70-21-10



The engine speed control foot pedal pivot assembly shown disassembled, replace worn parts as needed [Figure 70-21-10].

NOTE: No lubrication is necessary or recommended on the engine speed control.

Figure 70-21-11

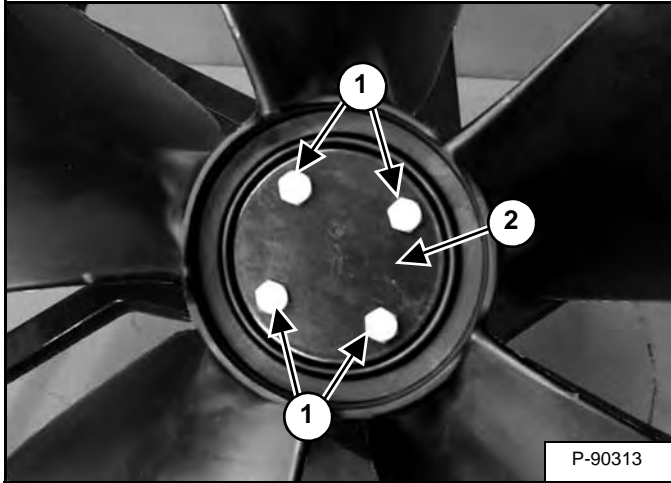


The engine speed control foot pedal pivot assembly roller bearing shown disassembled [Figure 70-21-11].

ENGINE COOLING SYSTEM (EARLY MODELS) (CONT'D)

Hydraulic Fan Motor Removal And Installation

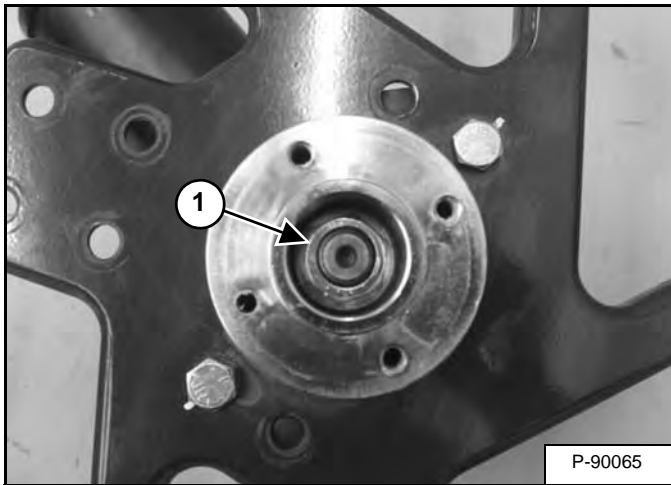
Figure 70-50-11



Remove the four bolts (Item 1) and the cover plate (Item 2) [Figure 70-50-11].

Installation: Tighten the bolts to 10,2 N•m (7.5 ft-lb) torque.

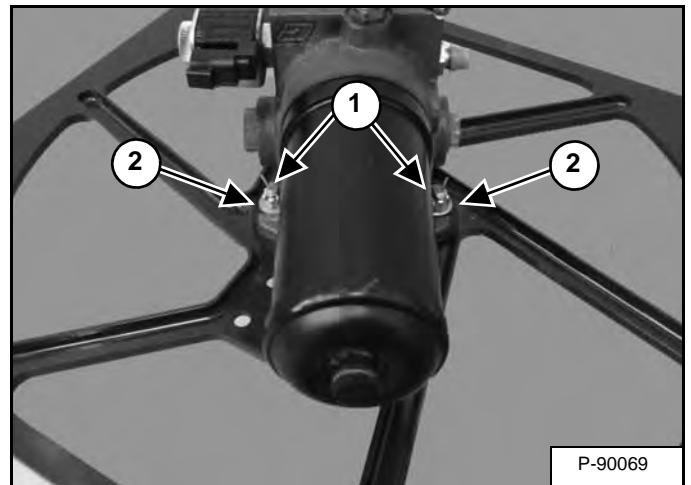
Figure 70-50-12



Remove the nut (Item 1) [Figure 70-50-12] and washer from the motor shaft.

Installation: Tighten the nut to 61 - 75 N•m (45 - 55 ft-lb) torque.

Figure 70-50-13

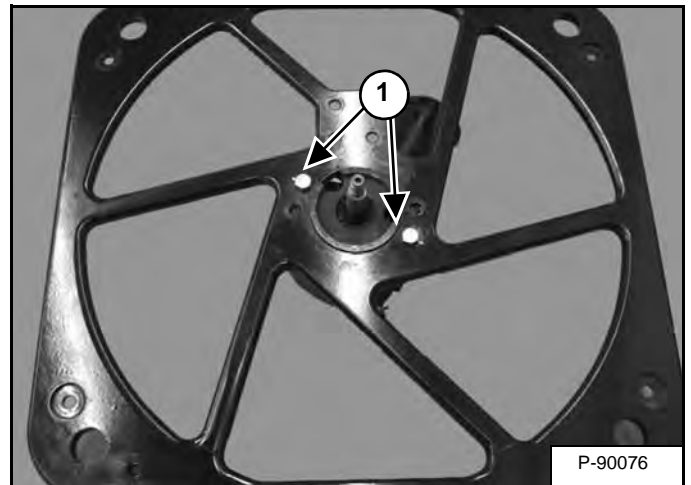


Remove the cotter pins and nuts (Item 1) [Figure 70-50-13].

Remove the two washers (Item 2) [Figure 70-50-13].

Installation: Tighten the nuts to 10,2 N•m (7.5 ft-lb) torque.

Figure 70-50-14



Remove the two bolts (Item 1) [Figure 70-50-14]. Remove the motor.

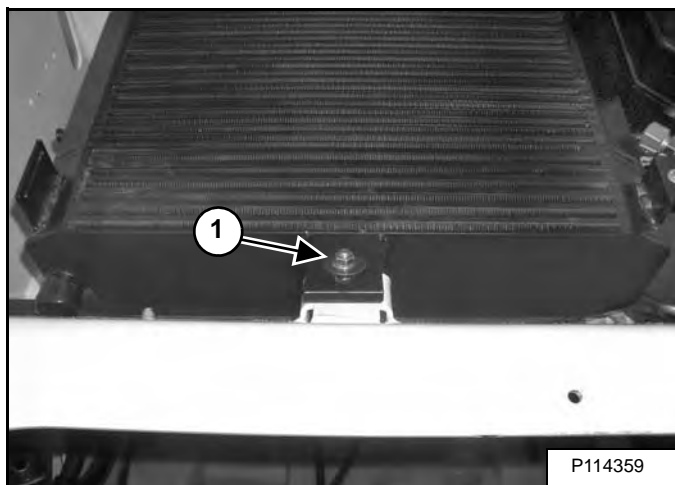
Installation: Tighten the bolts to 10,2 N•m (7.5 ft-lb) torque.

NOTE: Always install new bolts, nuts, cotter pins, and rubber gasket when installing the fan motor.

ENGINE COOLING SYSTEM (LATER MODELS) (CONT'D)

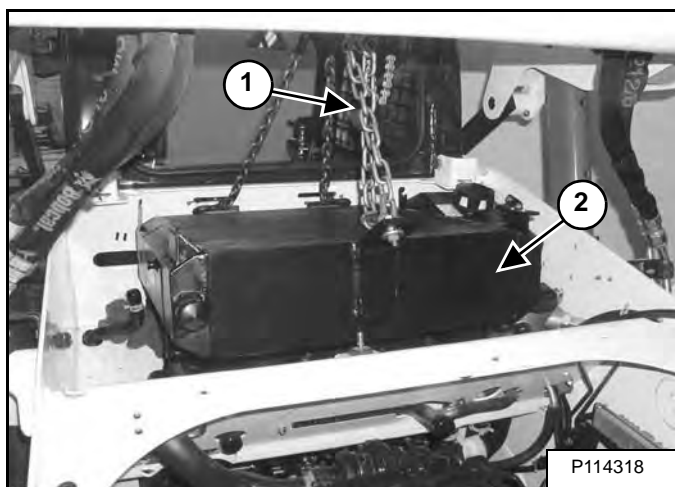
Radiator / Oil Cooler Removal And Installation (Cont'd)

Figure 70-51-9



Remove the nut (Item 1) [Figure 70-51-9].

Figure 70-51-10

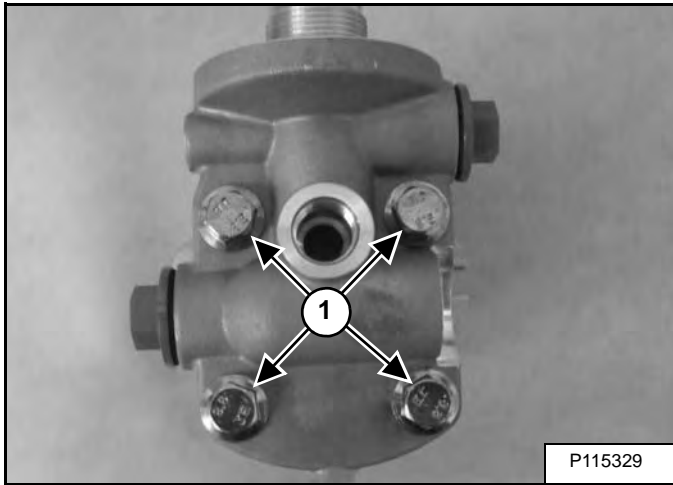


Attach the lifting device (Item 1) and remove the cooler (Item 2) [Figure 70-51-10].

ENGINE COOLING SYSTEM (LATER MODELS) (CONT'D)

Hydraulic Fan Disassembly And Assembly (Cont'd)

Figure 70-51-40



Assemble the fan motor and the filter adapter. Install the four bolts (Item 1) [Figure 70-51-40].

Installation: Tighten the four bolts (Item 1) [Figure 70-51-40] to 37 - 45 N•m (27 - 33 ft-lb) torque.

Blower Housing Removal And Installation

IMPORTANT

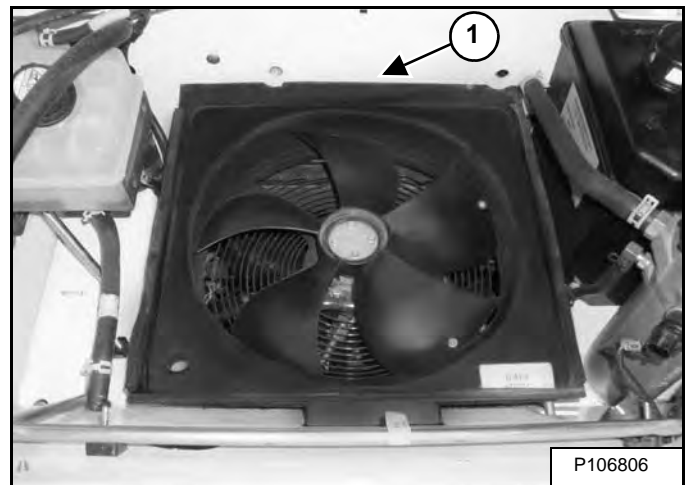
When repairing hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I-2003-0888

Remove the air conditioning condenser if equipped. (See Removal And Installation on Page 80-60-1.)

Remove the radiator / oil cooler. (See Radiator / Oil Cooler Removal And Installation on Page 70-51-1.)

Figure 70-51-41



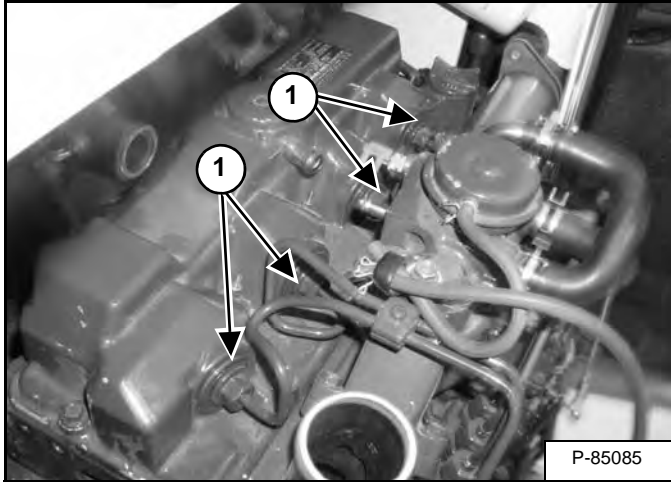
Pull up and remove the blower housing (Item 1) [Figure 70-51-41] from the loader.

FUEL SYSTEM (CONT'D)

Fuel Injection Pump Assembly Removal And Installation

Remove the alternator. (See Removal And Installation on Page 60-30-5.)

Figure 70-70-6



Clean the area around the injection pump thoroughly.

Disconnect the high pressure fuel lines (Item 1) [Figure 70-70-6] from the fuel injectors.

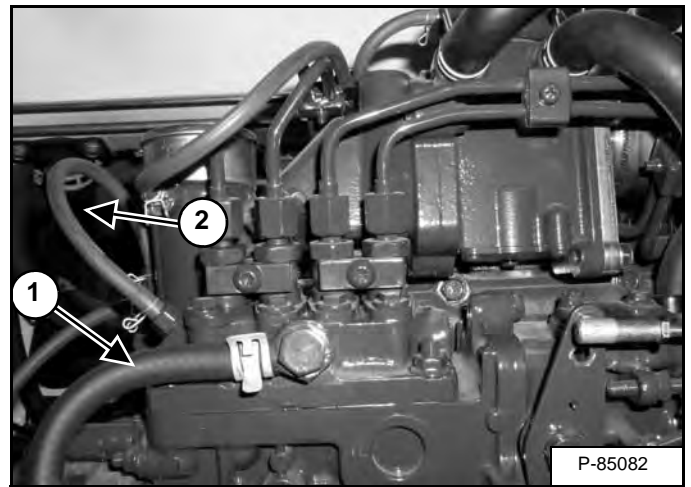
Installation: Tighten the injection pipe retaining nut to 23 - 36 N•m (17 - 26 ft-lb) torque.

IMPORTANT

Do not bend the high pressure fuel injection tubes when removing or installing them.

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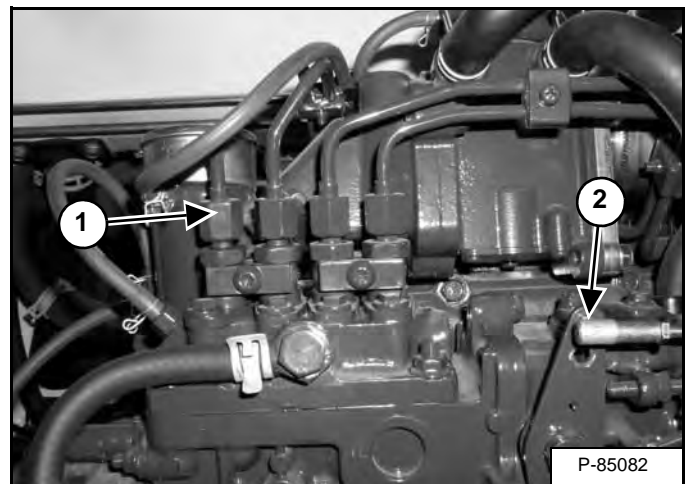
Figure 70-70-7



Disconnect the fuel inlet hose (Item 1) and the fuel return hose (Item 2) [Figure 70-70-7] from the injection pump vent.

Cap the inlets on the injection pump vent where the hoses were removed [Figure 70-70-7].

Figure 70-70-8



Remove the high pressure fuel lines (Item 1) [Figure 70-70-8] from the injection pump.

Installation: Tighten the injection pipe retaining nut to 23 - 36 N•m (17 - 26 ft-lb) torque.

Remove the engine speed control linkage (Item 2) [Figure 70-70-8].

FUEL SYSTEM (CONT'D)

Fuel Injection Pump Removal And Installation

NOTE: The injection pump can be removed and installed with the crankshaft at any position.

⚠ WARNING

AVOID INJURY OR DEATH

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

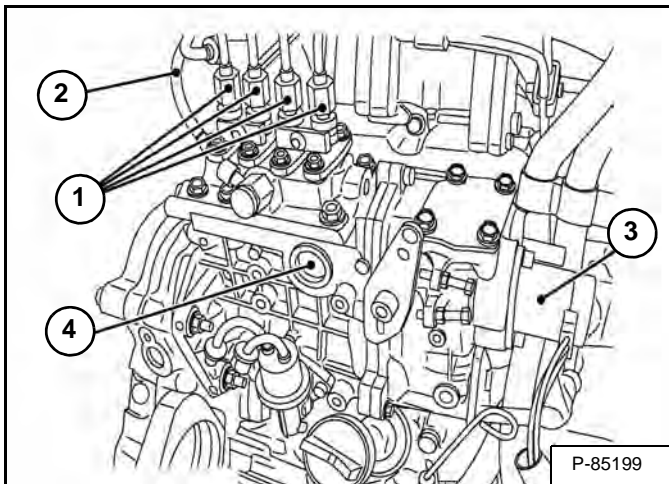
W-2072-0807

IMPORTANT

Do not bend the high pressure fuel injection tubes when removing or installing them.

I-2029-0289

Figure 70-70-34



Remove all injection pipes (Item 1) [Figure 70-70-34].

Installation: Tighten the injection pipe retaining nut to 23 - 36 N•m (17 - 26 ft-lb) torque.

Remove overflow hose (Item 2) [Figure 70-70-34].

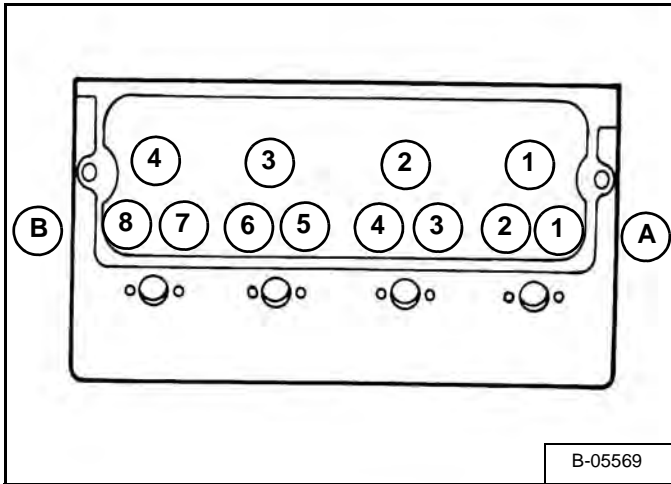
Remove fuel stop solenoid (Item 3) [Figure 70-70-34].

Remove sight cover from housing (Item 4) [Figure 70-70-34].

CYLINDER HEAD (CONT'D)

Valve Clearance Adjustment (Cont'd)

Figure 70-80-7



NOTE: (A) is the front cover side, (B) is the flywheel housing side.

Figure 70-80-8

Cylinder Number	1		2		3		4	
	1	2	3	4	5	6	7	8
Valve Number	1	2	3	4	5	6	7	8
Valve I=Intake E=Exhaust	I	E	I	E	I	E	I	E

Adjust the valve clearance cold as follows:

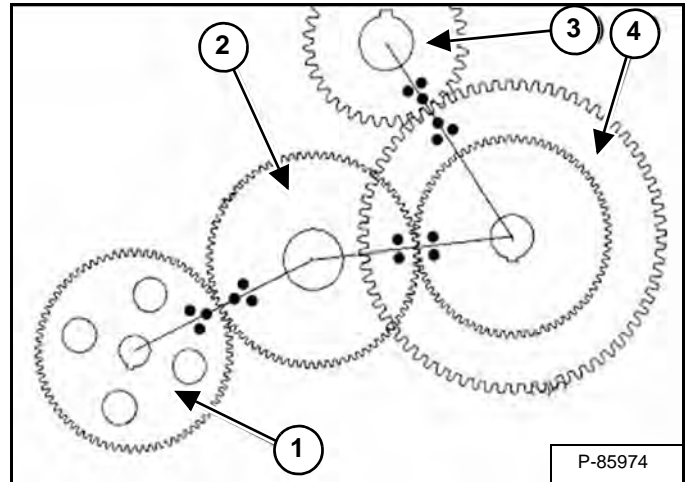
0,13 - 0,17 mm (0.0052 - 0.0068 in) Intake and Exhaust

Use the following sequence to set the valves **[Figure 70-80-7]** and **[Figure 70-80-8]**:

1. With the No. 1 cylinder set at compression top dead center set valves 1, 2, 3 and 6.
2. With the No. 1 cylinder at overlap position set valves 4, 5, 7 and 8.

Valve Timing - Inspecting

Figure 70-80-9



Stop the engine and open the rear door.

Remove the engine / hydrostatic pump package from the loader. (See Engine Removal And Installation on Page 70-10-7.)

Remove the flywheel. (See Flywheel Removal And Installation on Page 70-120-1.)

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

Make sure timing marks are in correct alignment **[Figure 70-80-9]**.

Injection Pump Gear (Item 1) **[Figure 70-80-9]**.

Idle Gear (Item 2) **[Figure 70-80-9]**.

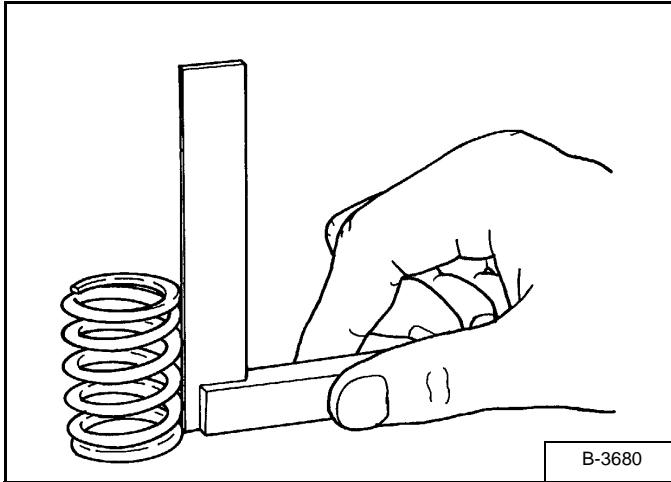
Crank Gear (Item 3) **[Figure 70-80-9]**.

Cam Gear (Item 4) **[Figure 70-80-9]**.

CYLINDER HEAD (CONT'D)

Valve Spring

Figure 70-80-37



Measure the length of the valve spring. If the measurement is less than the allowable limit, replace the spring **[Figure 70-80-37]**.

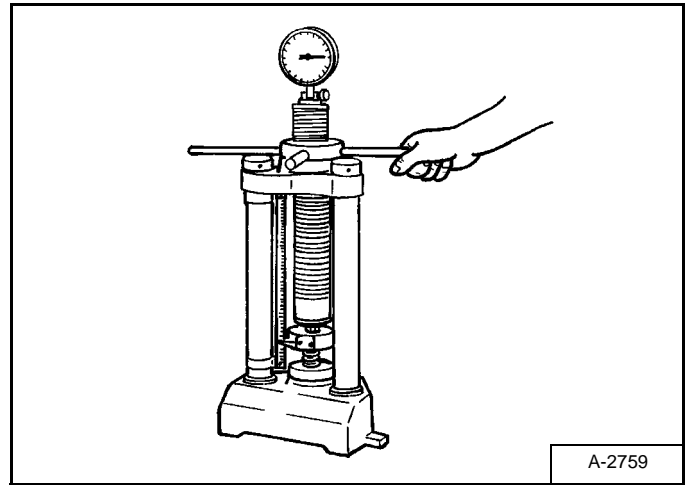
Free Length	35,4 - 35,9 mm (1.40 - 1.41 in)
Allowable Limit	34,9 mm (1.37 in)

Put the spring on a flat surface, place a square on the side of the spring **[Figure 70-80-37]**.

Rotate the spring and measure the maximum tilt. If the measurement exceeds the allowable limit, replace the spring.

Tilt Allowable Limit	1,0 mm (0.039 in)
----------------------	-------------------

Figure 70-80-38



Put the spring on a tester and compress to specified length **[Figure 70-80-38]**.

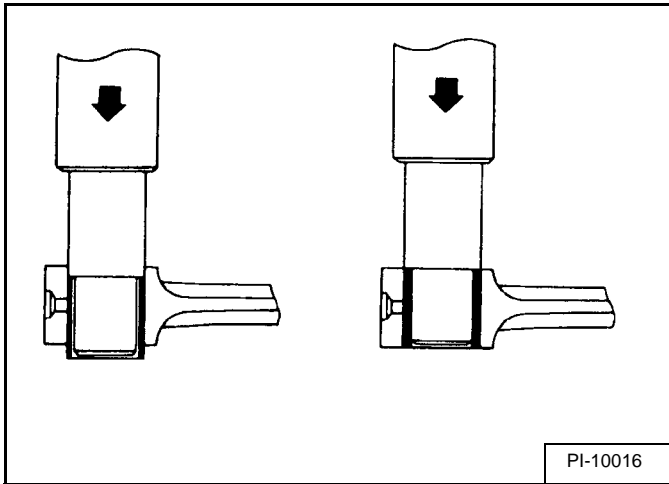
Read the compressed load on the gauge. If the measurement exceeds allowable limit, replace the spring.

Setting Length	29,7 mm (1.17 in)
Setting Load	60,8 N (14.3 lb)
Allowable Limit	45,9 N (10.3 lb)

CRANKSHAFT AND PISTONS (CONT'D)

Piston And Connecting Rod - Servicing (Cont'd)

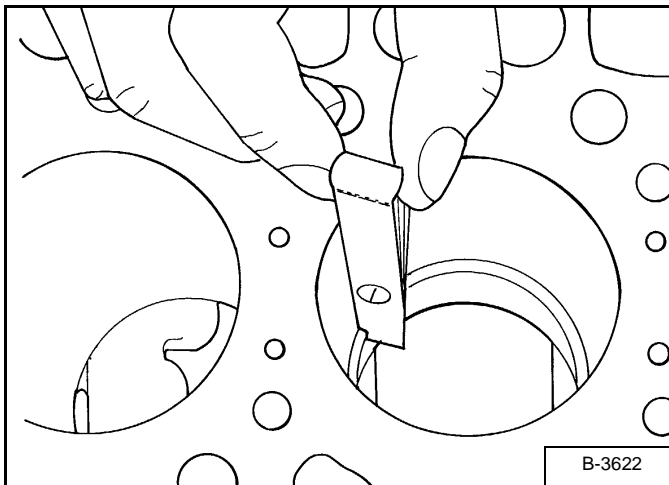
Figure 70-90-12



Use a press and special driver tool to remove the small end bushing [Figure 70-90-12].

Installation: Clean the small end bushing and bore. Put oil on the bushing and press into the connecting rod until it is flush [Figure 70-90-12].

Figure 70-90-13

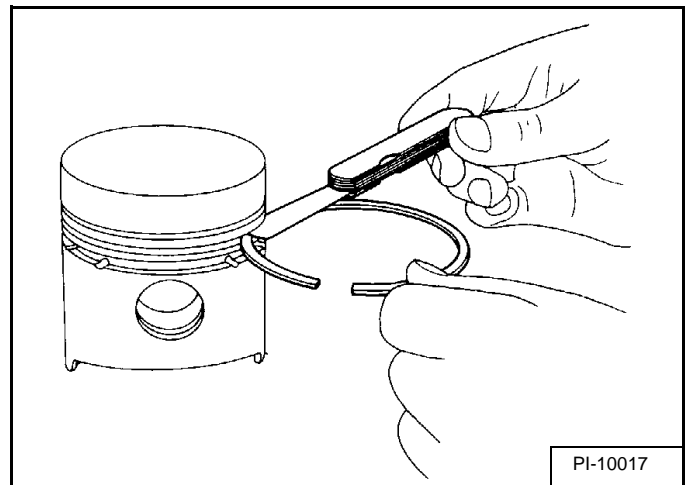


Install a piston ring into the lower part of the cylinder bore. Measure the ring gap with a feeler gauge [Figure 70-90-13].

If the gap exceeds the allowable limit, replace the ring.

Top Ring Gap	0,2 - 0,35 mm (0.0079 - 0.013 in)
Oil Ring Gap	0,25 - 0,45 mm (0.0099 - 0.017 in)
Allowable Limit	1,25 mm (0.0492 in)
Second Ring Gap	0,30 - 0,45 mm (0.012 - 0.017 in)

Figure 70-90-14



Remove the carbon from the ring grooves. Measure the clearance between the ring and groove with a feeler gauge [Figure 70-90-14].

If the clearance exceeds the allowable limit, replace the ring. If the clearance still exceeds the allowable limit, replace the piston.

Top Ring	0,050 - 0,090 mm (0.0020 - 0.0035 in)
Allowable Limit	0,15 mm (0.0059 in)
Second Ring	0,090 - 0,12 mm (0.0036 - 0.0047 in)
Allowable Limit	0,20 mm (0.0079 in)
Oil Ring	0,020 - 0,060 mm (0.0079 - 0.0023 in)
Allowable Limit	0,15 mm (0.0059 in)

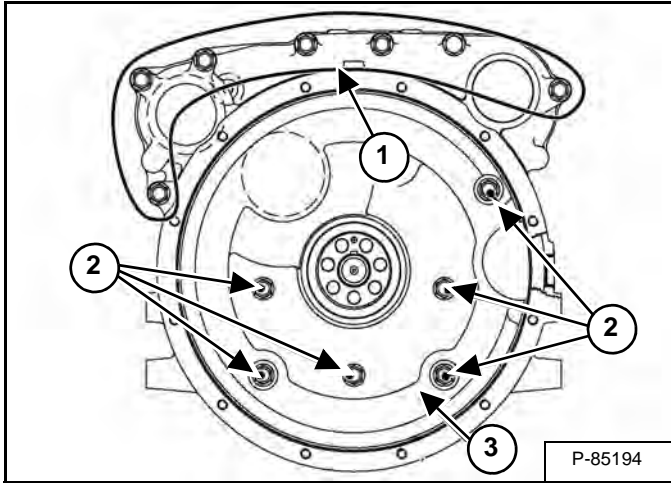
CAMSHAFT AND TIMING GEARS

Timing Gearcase Cover Removal

Remove the flywheel. (See Flywheel Removal And Installation on Page 70-120-1.)

Remove the housing. (See Housing Removal And Installation on Page 70-120-3.)

Figure 70-100-1



Remove the seven outside timing gearcase cover mounting bolts (Item 1) **[Figure 70-100-1]**.

Remove the six inside timing gearcase cover mounting bolts (Item 2) **[Figure 70-100-1]**.

Remove the timing gearcase cover (Item 3) **[Figure 70-100-1]**.

FLYWHEEL AND HOUSING

Flywheel Removal And Installation

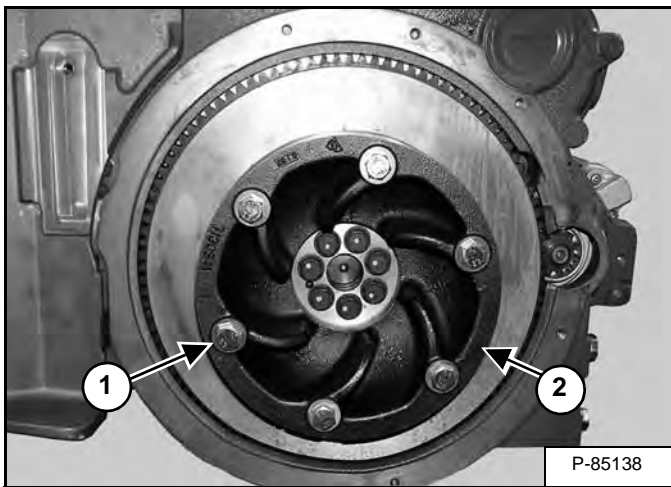
Remove the engine / hydrostatic pump package from the loader. (See Engine Removal And Installation on Page 70-10-7.)

Remove the drive belt shield. (See DRIVE BELT on Page 30-50-1.)

Remove the drive belt tension pulley. (See Belt Replacement on Page 30-50-2.)

Remove the drive belt. (See DRIVE BELT on Page 30-50-1.)

Figure 70-120-1

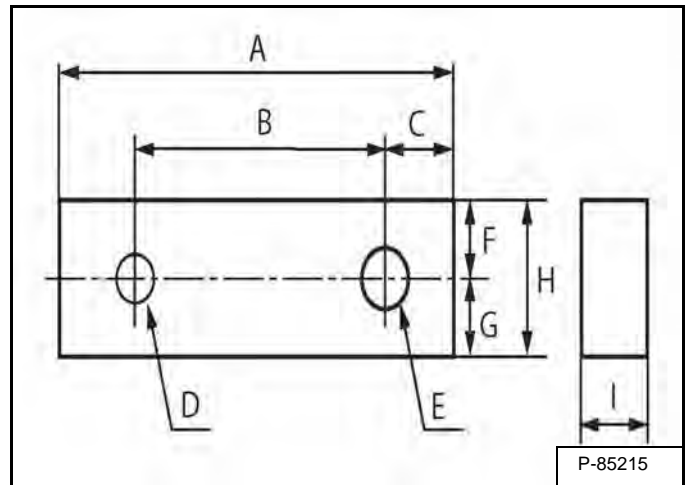


Remove the six mounting bolts (Item 1) from the pulley (Item 2) [Figure 70-120-1].

Remove the pulley (Item 2) [Figure 70-120-1].

Installation: Tighten to 43 - 47 N•m (32 - 35 ft-lb) torque.

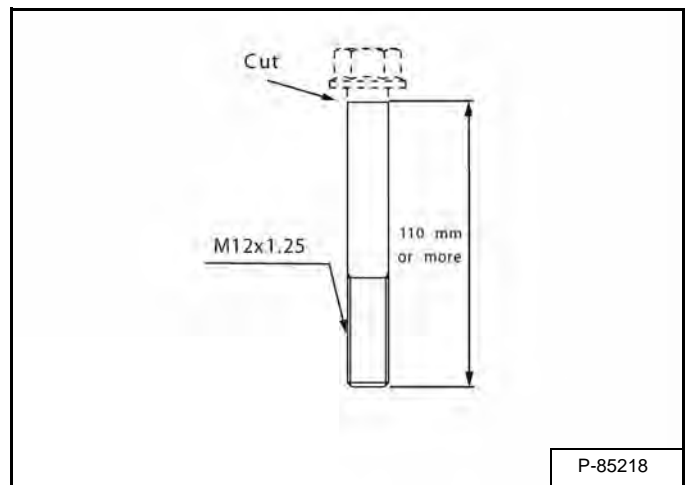
Figure 70-120-2



Make flywheel stop tool as shown above in [Figure 70-120-2].

A	144 mm (5.67 in)
B	104 mm (4.09 in)
C	20,0 mm (0.787 in)
D	10,0 mm dia. (0.394 in dia.)
E	12,0 mm dia. (0.472 in dia.)
F	16,0 mm dia. (0.630 in dia.)
G	16,0 mm dia. (0.630 in dia.)
H	32,0 mm (1.26 in)
I	16,0 mm (0.630 in)

Figure 70-120-3



Make flywheel guide bolts as shown above to aid in removal and installation of flywheel [Figure 70-120-3].

HEATING, VENTILATION AND AIR CONDITIONING (HVAC)

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Removal And Installation	80-61-1

REGULAR MAINTENANCE (CONT'D)

Air Conditioning Service Chart

Service Company / Phone Number:

Date:

Machine Model:

Machine Dealer:

Machine Serial Number:

Customer:

Machine Hours:

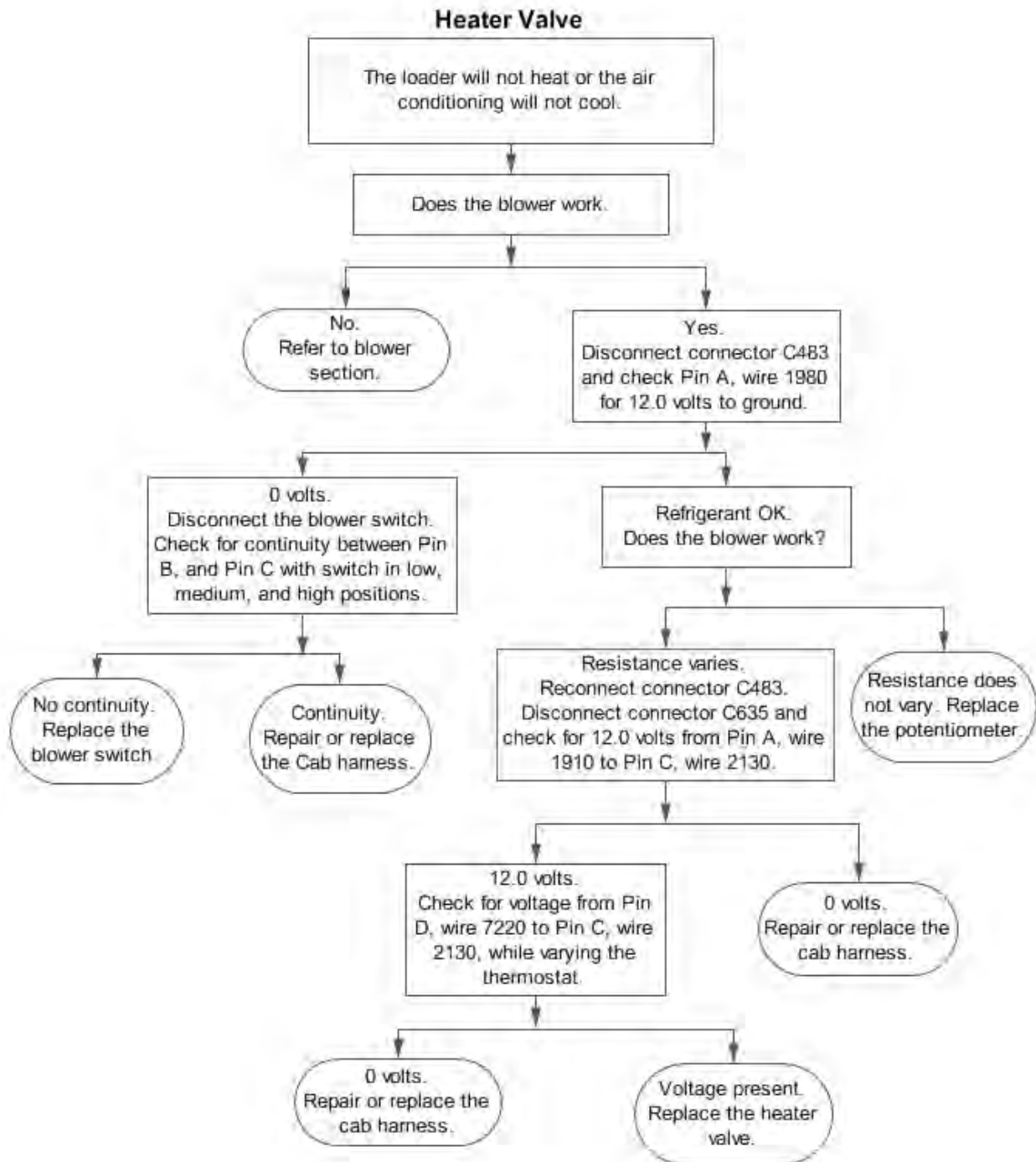
Pre Service Conditions	15 Minutes	30 Minutes	Notes
Ambient Temperature:			
Louver Temperature:			
Cab Temperature At Head Position:			
Temperature Into Condenser:			
High Side Pressure			
Low Side Pressure			
Ambient Humidity			
Observations:			

Explain Services Required:

Post Service Conditions	15 Minutes	30 Minutes	Notes
Ambient Temperature:			
Louver Temperature:			
Cab Temperature at Head Position:			
Temperature Into Condenser:			
High Side Pressure			
Low Side Pressure			
Ambient Humidity			
Observations:			

TROUBLESHOOTING (CONT'D)

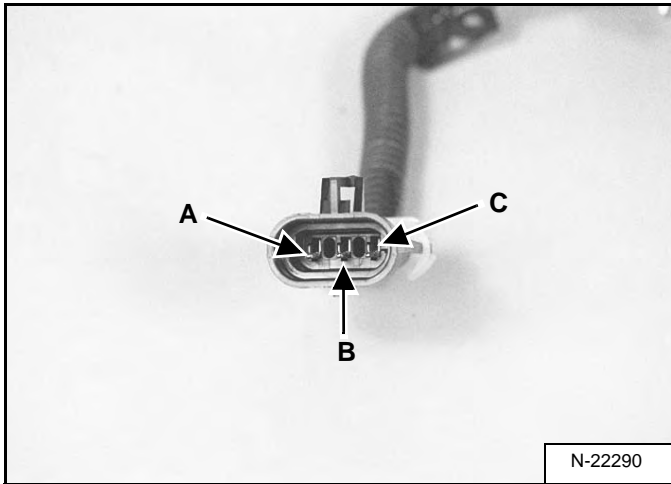
Troubleshooting Tree (Cont'd)



TROUBLESHOOTING (CONT'D)

Electrical System (Cont'd)

Figure 80-30-22

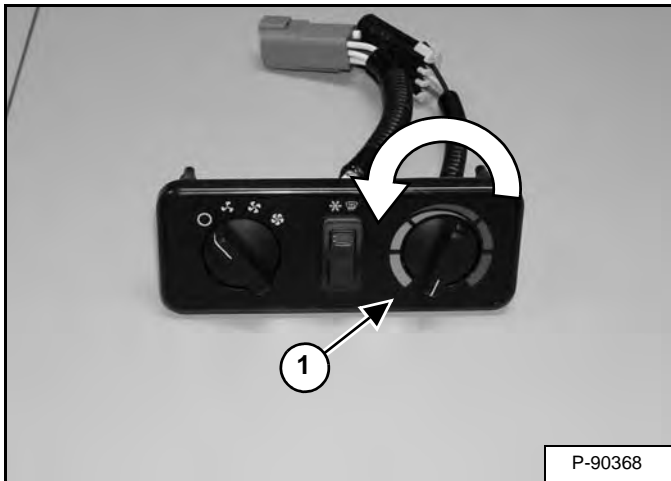


If there is voltage at the wiring harness, test the potentiometer [Figure 80-30-22] for resistance.

The resistance should be 10 K Ohm between wire pin **A** and wire pin **C** frame [Figure 80-30-22].

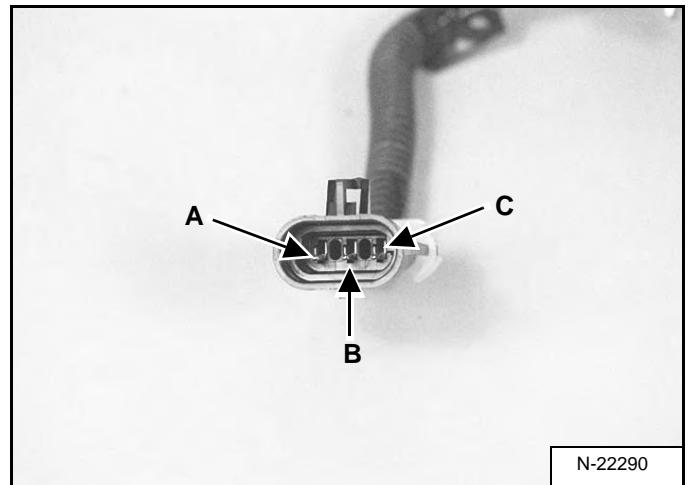
If no resistance is found replace the potentiometer.

Figure 80-30-23



To test the resistance of the white wire, turn the potentiometer control (Item 1) [Figure 80-30-23] counterclockwise to the full A/C position.

Figure 80-30-24



The resistance between the wire terminal **A** and wire terminal **B** frame [Figure 80-30-24] should be around 0 K Ohm.

Test the resistance between the wire terminal **C** and wire terminal **B** frame [Figure 80-30-24] should be around 10 K Ohm.

COMPRESSOR (CONT'D)

Oil Check

Figure 80-50-6

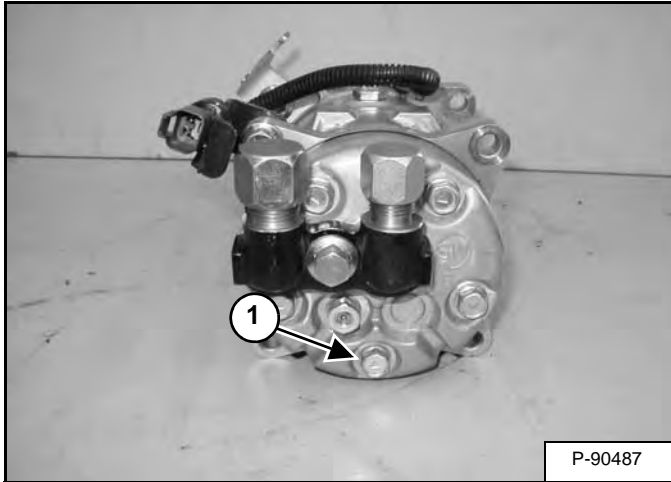
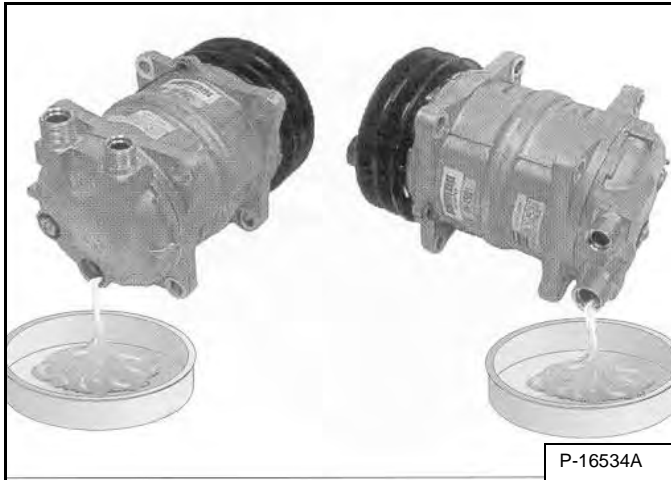


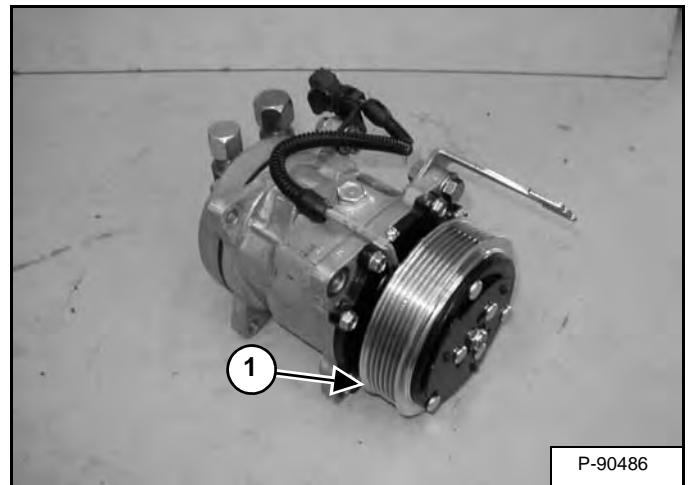
Figure 80-50-7



Remove the oil drain plug (Item 1) [Figure 80-50-6] and drain the oil through the connectors and the oil drain hole [Figure 80-50-7].

Installation: Tighten the oil drain plug to 13 - 15 N•m (9.4 - 10.8 ft-lb) torque.

Figure 80-50-8



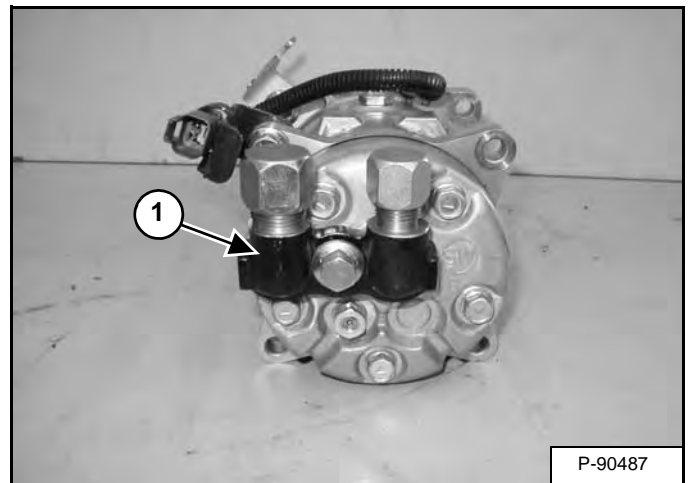
NOTE: After draining the oil through the drain hole and the connectors, extract the remaining oil through the discharge-side connector by rotating the drive pulley (Item 1) [Figure 80-50-8] several times by hand.

Measure the drained oil in a measuring cylinder.

Inspect the oil for contamination, dirt, metal shavings, or varnish color, discard the oil if contaminated.

NOTE: If metal shavings are found in the compressor oil, replace the complete compressor assembly.

Figure 80-50-9



Add new compressor oil through the suction side connector (Item 1) [Figure 80-50-9].

Installation: Add 150 - 170 cc's of PAG 100 oil.

NOTE: The suction port on the compressor is marked with an SUC and is the larger port on the compressor.

RECEIVER / DRIER (LATER MODELS)

Receiver / Drier Removal And Installation

WARNING

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

W-2059-0598

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

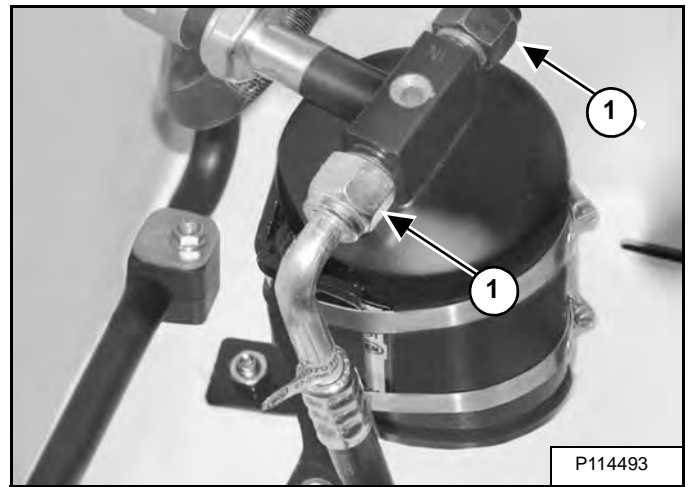
Remove the refrigerant from the A/C system. (See Reclamation And Charging With Recovery / Charging Unit on Page 80-40-2.)

WARNING

In the event of a leak, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R-134a refrigerant gives a toxic gas.

W-2371-0611

Figure 80-71-1



NOTE: Mark the A/C hoses (Item 1) [Figure 80-71-1] for proper installation.

Remove the two A/C hoses (Item 1) [Figure 80-71-1] from the receiver / drier.

Installation: Tighten the two A/C hoses (Item 1) [Figure 80-71-1] to 30 N•m (22 ft-lb) torque.

Both fittings on the drier are the same size, so the hoses can be hooked up incorrectly.

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

NOTE: When replacing a receiver / drier in an A/C system 1 fl oz (30 in³) of PAG 100 oil must be added to the system when recharging.

EVAPORATOR COIL

Removal And Installation

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-2.)

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

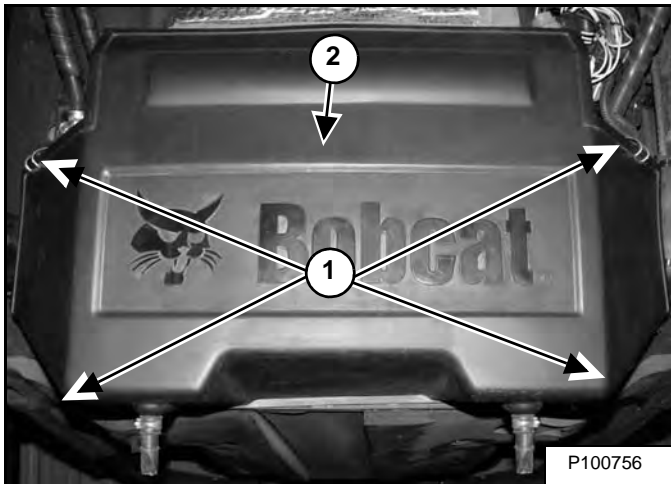
Evacuate the A/C system. (See Reclamation And Charging With Recovery / Charging Unit on Page 80-40-2.)

WARNING

In the event of a leak, wear safety goggles. Escaping refrigerant can cause severe injuries to eyes. In contact with a flame, R-134a refrigerant gives a toxic gas.

W-2371-0611

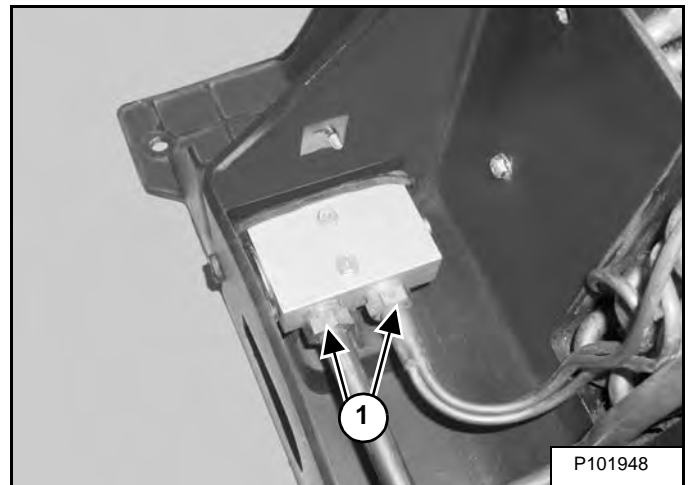
Figure 80-110-1



Release the four latches (Item 1) and remove the cover (Item 2) [Figure 80-110-1].

Installation: (See Installing on Page 80-150-1.)

Figure 80-110-2



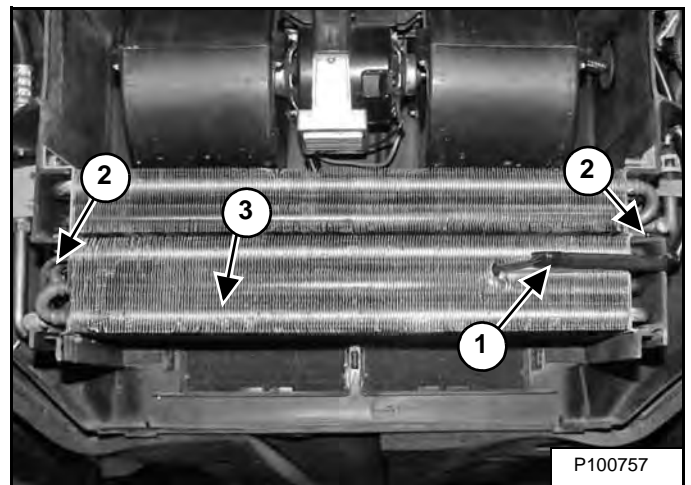
NOTE: The evaporator / heater unit is removed for photo clarity.

Remove the two evaporator fittings (Item 1) [Figure 80-110-2] from the expansion valve.

Installation: Tighten the two evaporator fittings to 30 N•m (22 ft-lb) torque.

Cap and plug the evaporator fittings (Item 1) [Figure 80-110-2] and the expansion valve fittings with the proper A/C caps and plugs.

Figure 80-110-3



Remove the thermostat probe (Item 1) [Figure 80-110-3] from the evaporator coil.

Remove the two retaining clips (Item 2) [Figure 80-110-3] that connect the evaporator coil, to the heater coil.

Remove the evaporator coil (Item 3) [Figure 80-110-3].

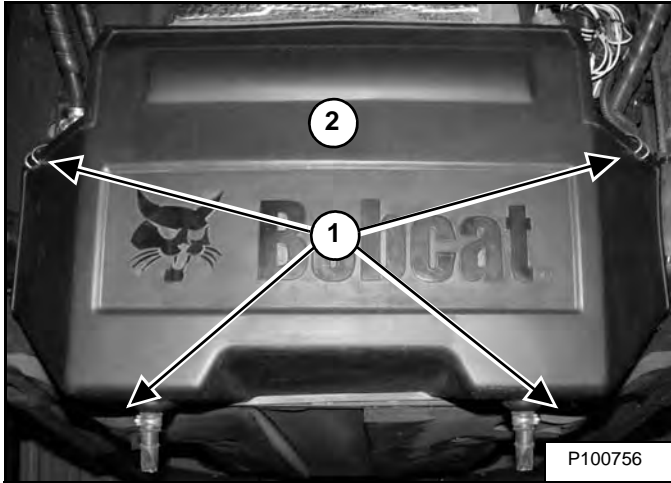
EVAPORATOR / HEATER COVER

Removing

Raise the lift arms and install an approved lift arm support device. (See Installing on Page 10-20-2.)

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

Figure 80-150-1

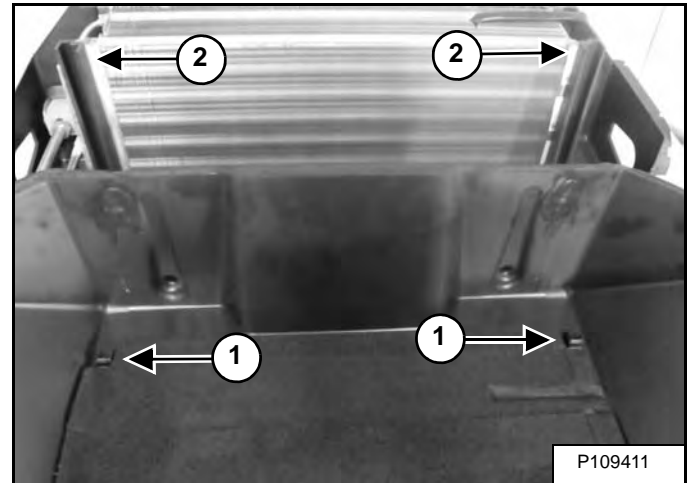


Unhook the cover latches (Item 1) and remove the cover (Item 2) [Figure 80-150-1].

Installing

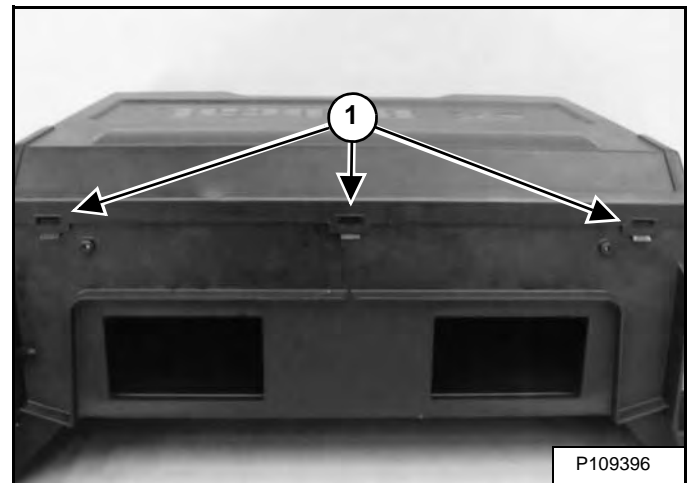
NOTE: The evaporator / heater unit is shown removed for photo clarity.

Figure 80-150-2



NOTE: The tabs (Item 1) must rest inside the core supports (Item 2) [Figure 80-150-2] when positioning the cover on the HVAC body.

Figure 80-150-3



NOTE: DO NOT hook the tabs (Item 1) [Figure 80-150-3] until later. Damage to the seal can occur allowing water to enter the housing causing premature internal component failure.

TECHINCAL SERVICE GUIDE SPECIFICATIONS

Engine

Engine Oil Pressure at Low Idle	48 kPa (4,9 bar) (7 - 14 psi)
Engine Oil Pressure at High Idle	200 - 390 kPa (2 - 4 bar) (29 - 56 psi)
Firing Order	1-3-4-2
Location of Number 1 Cylinder	Closest to water pump
Injection Timing	1° BTDC - 0.5° ATDC
Crankshaft Rotation (Facing Crankshaft Pulley)	Clockwise
Compression at Cranking Speed	10% variance between pistons. 3090 - 3280 kPa (31 - 33 bar) (448 - 476 psi)
Valve Clearance (Cold) Intake	0,13 - 0,17 mm (0.0052 - 0.068 in)
Valve Clearance (Cold) Exhaust	0,13 - 0,17 mm (0.0052 - 0.068 in)

NOTE: For additional engine specifications, (See Specifications on Page 70-10-2.)

Engine Torques

Engine Oil Drain Cap	54,2 N•m (40 ft-lb)
Fuel Injection Tubeline Nuts	23 - 36 N•m (17 - 26 ft-lb)
Injection Pump Mounting Nuts	18 - 20 N•m (13 - 15 ft-lb)
Valve Cover Bolts	9,8 - 11,2 N•m (7 - 8 ft-lb)
Head Bolts	147 - 156 N•m (109 - 115 ft-lb)

NOTE: For additional engine torques, (See Torque Values on Page 70-10-5.)

Cooling System










Coolant Type and Mix	47% Water and 53% Propylene Glycol
Radiator Cap Pressure	97 kPa (1 bar) (14 psi)
Thermostat	Fully Open at 95°C (203°F)

NOTE: For additional cooling system information, (See ENGINE COOLING SYSTEM (EARLY MODELS) on Page 70-50-1.)

SERVICE TOOLS REQUIRED

The following is a list of service tools required for servicing loaders.

Remote Start Tools

TOOL PART NUMBER	DESCRIPTION	MODELS USED ON	COMMENT	IMAGE
MEL1563	Remote Start Tool	S70 S450 - S850 T450 - T870 A770	This tool has been replaced by the new remote start tool 7003031, see below. MEL1563 includes: MEL1565 and MEL1566.	
MEL1565	Service Tool Harness	S70 S450 - S850 T450 - T870	Used with MEL1563 to connect remote start tool to machine	
MEL1566	Service Tool Harness Communicator	S70 S450 - S850 T450 - T870 A770	Used with MEL1563 to connect remote start tool to PC	
7217666 (Was 7003031) (Was 6689779)	Remote Start Tool KIT	S70 S450 - S850 T450 - T870 A770	This tool replaced the original remote start tool kit MEL1563 and 7003031. Kit 7217666 includes: 7022042, 6689747, 6689746 and 6689745.	
7022042 (Was 7003030) (Was 6689778)	Remote Start Tool		This tool replaces remote start tool 6689778 and 7003030.	
6689747	Remote Start Tool Harness		Used with 7003030 to connect remote start tool to loader	
6689746	Remote Start Tool Harness		Used with 7003030 to connect Service PC to remote start tool.	
6689745	BOSS Service Tool Harness		Included with 7003031 but only used on early model loaders equipped with BOSS.	
7152935	Service Tool Harness	Loaders with the 7 pin attachment harness.	Used to connect the 7 pin attachment harness to remote start tool.	

See BobcatNET for parts ordering information. (For Europe dealers, see the Bobcat Special Tools Catalogue for additional information and part numbers.)

ST LDR-0815

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