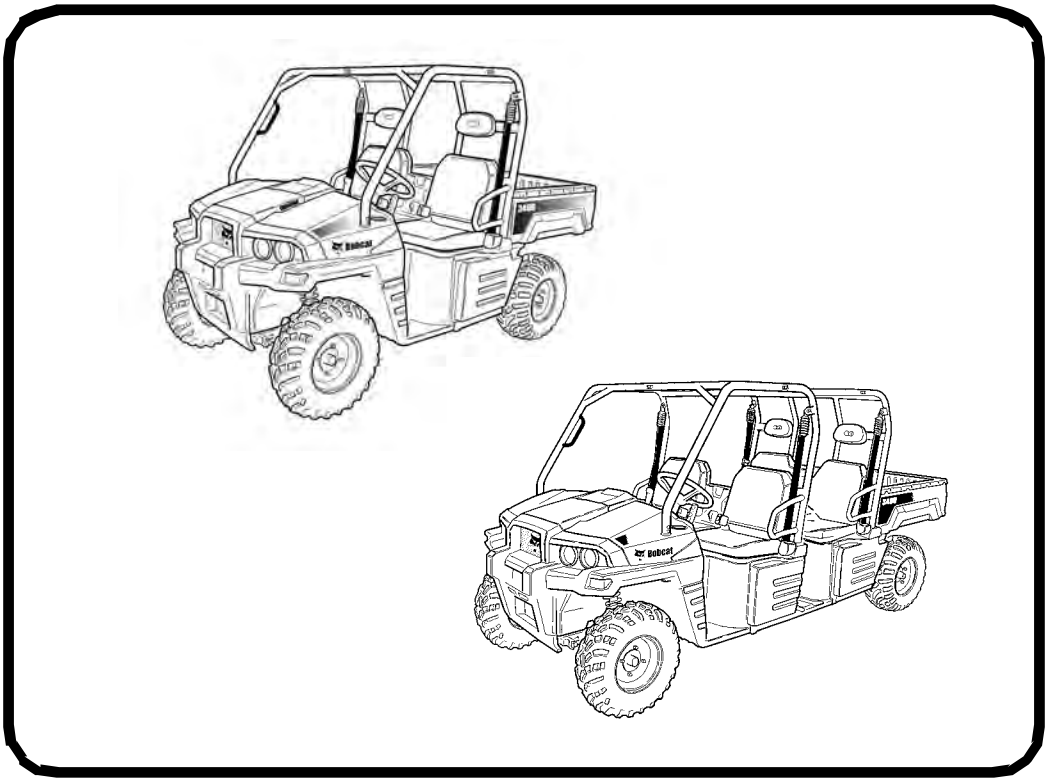
Bobcat®

Service Manual
3400, 3400XL Utility Vehicle

S/N AJNT11001 & Above
S/N AJNV11001 & Above



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Printed in U.S.A.

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SAFETY INSTRUCTIONS

Safety Alert Symbol

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

WARNING

Operator must have instructions before operating the utility vehicle. Untrained operators can cause injury or death.

W-2855-0510

IMPORTANT

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

I-2317-0510

DANGER

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

D-1022-0510

WARNING

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

W-2856-0510

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

- The Delivery Report is used to assure that complete instructions have been given to the new owner and that the vehicle is in safe operating condition.
- The Operation & Maintenance Manual delivered with the vehicle or attachment contains operating information as well as routine maintenance and service procedures. It is a part of the vehicle and can be stored in a container provided on the vehicle. Replacement Operation & Maintenance Manuals can be ordered from your Bobcat dealer.
- Safety signs (decals) instruct on the safe operation and care of your Bobcat utility vehicle 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 Service Manual and Parts Manual are available from your dealer for use by mechanics to do shop-type service and repair work.
- The Utility Vehicle 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 utility vehicle. The course is available in English and Spanish versions.
- The Utility Vehicle Safety Video is available from your Bobcat dealer or at **www.training.bobcat.com** or **www.bobcat.com**.

SI UV-0913 SM

LIFTING AND BLOCKING THE UTILITY VEHICLE

Procedure

For service work under the utility vehicle, or to remove the wheels, always support the utility vehicle with jackstands or blocks of adequate capacity for weight of utility vehicle. (See Performance on Page SPEC-10-3.)

Always park the utility vehicle on a flat level surface.

Engage the park brake. Stop the engine and put the gear selector in gear.

If removing wheel(s), loosen the wheel nuts slightly before lifting the vehicle.

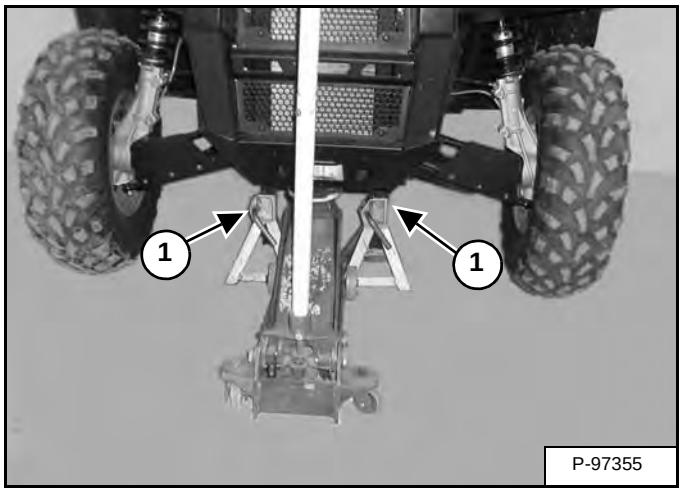
⚠ WARNING

AVOID INJURY OR DEATH

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

W-2003-0807

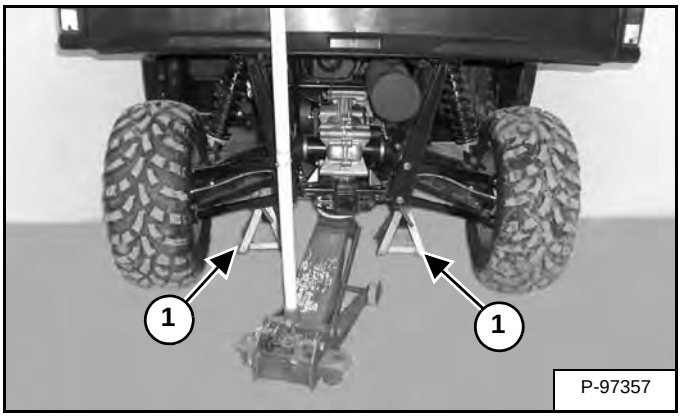
Figure 10-10-1



Place the jackstands (Item 1) **[Figure 10-10-1]** under the frame at the front of the utility vehicle.

NOTE: When lifting the utility vehicle, place the jack under front frame [Figure 10-10-1].

Figure 10-10-2



Place the jackstands (Item 1) **[Figure 10-10-2]**under the rear frame of the utility vehicle.

NOTE: When lifting the utility vehicle, place the jack under the rear frame [Figure 10-10-2].

AIR CLEANER SERVICE

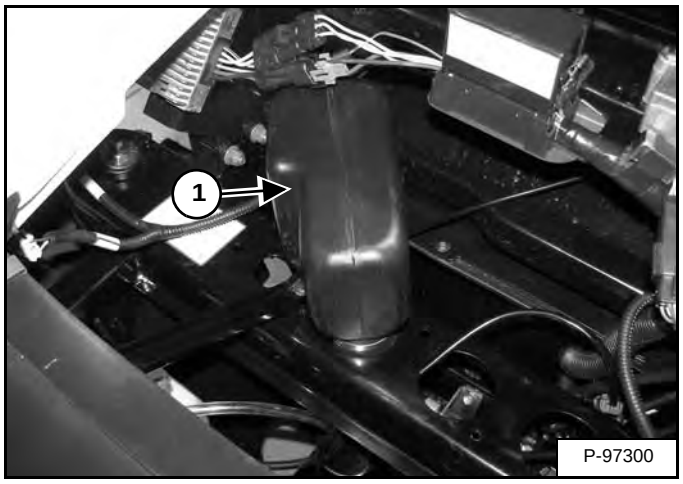
Pre-Filter Element

For the correct service interval of the pre-filter element (See SERVICE SCHEDULE on Page 10-50-1.)

The intake air pre-filter is located under the front cover. The pre-filter traps larger particles before the air reaches the main engine air filter.

Removal

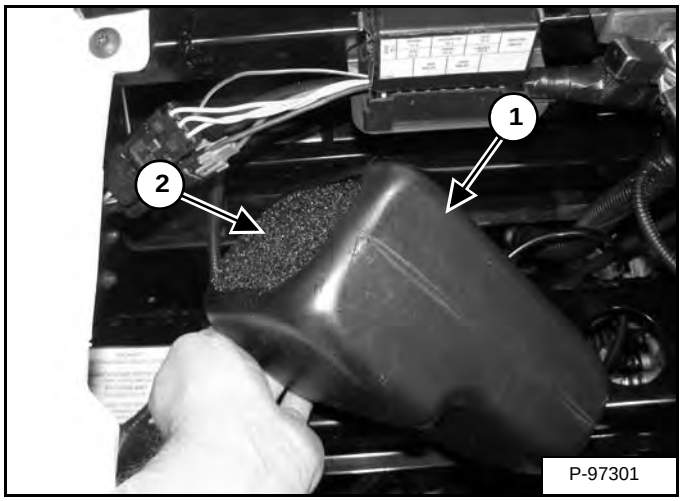
Figure 10-60-1



Remove the front cover.

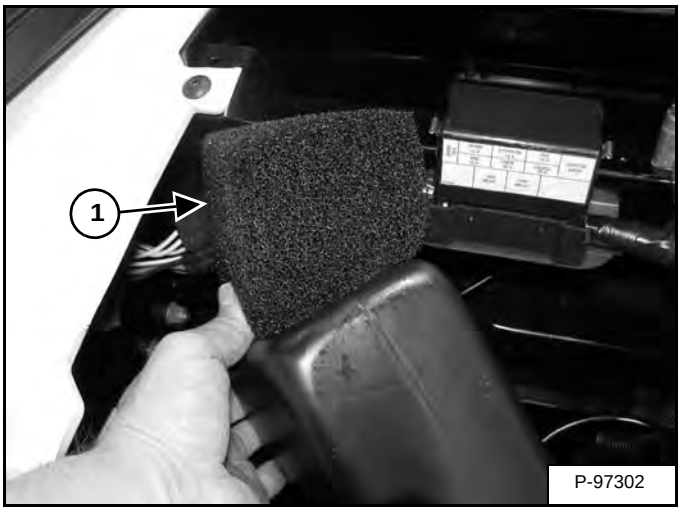
The pre-filter box (Item 1) **[Figure 10-60-1]** is connected to a rubber hose so the box can be relocated to access the element.

Figure 10-60-2



Rotate the box (Item 1) back to access the pre-filter element (Item 2) **[Figure 10-60-2]** for removal.

Figure 10-60-3



NOTE: The fiber pre-filter element must be gently removed from the box to avoid tearing or damaging the element. Inspect the element for damage. If any damage is found, replace the element.

Reach into the box and squeeze the pre-filter element (Item 1) **[Figure 10-60-3]** to collapse it to aid in removal.

DO NOT used compressed air to clean the pre-filter box. Use a clean damp cloth and wipe out the inside of the box.

Cleaning Element

If the element is dirty, clean it with a high flash point solvent, followed by hot soapy water. Rinse and dry the filter element thoroughly. Inspect element for tears or damage. Replace if necessary.

Installation

Squeeze the element (Item 1) **[Figure 10-60-3]** and insert into the box. Make sure the element is properly installed so that it fits snugly back into the box.

Reposition the box (Item 1) **[Figure 10-60-1]** back to its original location.

Reinstall the front cover.

Oil Pump Priming Procedure

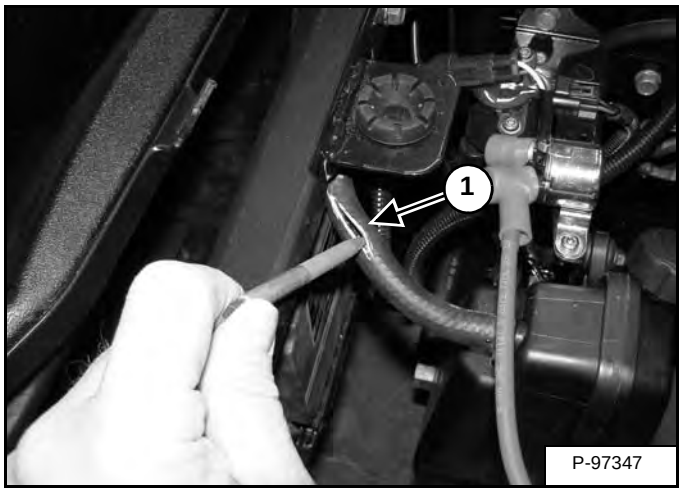
NOTE: The oil pump priming procedure must be performed whenever the oil hose connection between the oil tank and oil pump inlet hose has been disconnected.

Park the vehicle on a flat and level surface.

Move the gear selector to the neutral position, engage the park brake and stop the engine.

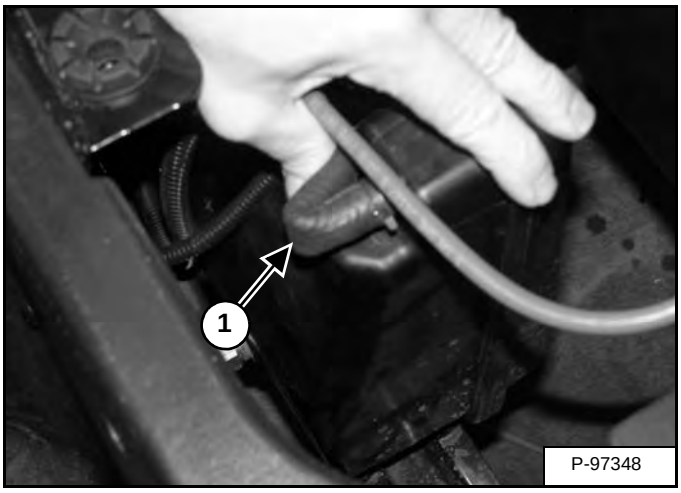
Remove the seat. (See OPERATOR SEAT on Page 30-20-1.)

Figure 10-90-6



NOTE: The oil reservoir vent hose has a pressure relief slit (Item 1) [Figure 10-90-6] cut into the hose from the factory. If replacing this hose, make sure that there is a slit in this hose for proper venting.

Figure 10-90-7



Clamp or pinch off the vent hose approximately two inches from the oil tank (Item 1) **[Figure 10-90-7]** (to avoid the end of the tank fitting), and before the vent hose pressure relief slit (Item 1) **[Figure 10-90-6]**.

Start the engine and run the engine for 10 to 20 seconds. Stop the engine.

Remove the clamp or stop pinching off the hose (Item 1) **[Figure 10-90-7]** and position it back to its original location. The oil pump will now be properly primed and ready for field operation.

NOTE: If the system is primed properly you should hear some air release when the vent hose is unclamped. If not, the system has not primed properly. Repeat the process if necessary.

SPARK ARRESTER MUFFLER

Cleaning Procedure

Clean the spark arrester muffler at the correct service interval. (See SERVICE SCHEDULE on Page 10-50-1.) Do not operate the utility vehicle with a defective exhaust system.

⚠ WARNING

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

W-2011-1285

⚠ WARNING

AVOID INJURY OR DEATH

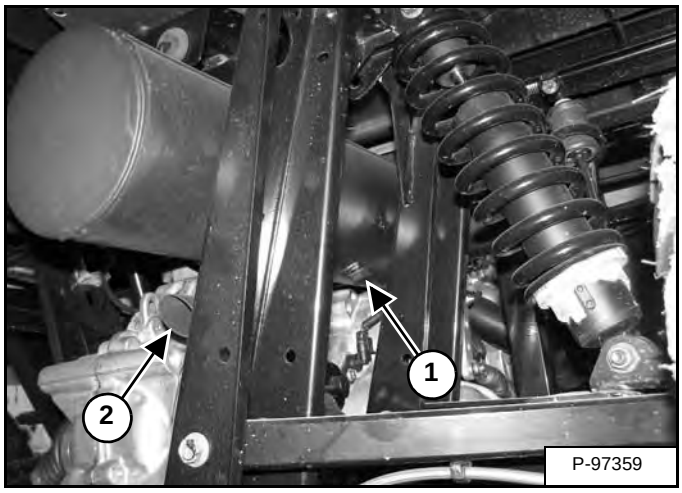
When an engine is running in an enclosed area, fresh air must be added to avoid concentration of exhaust fumes. If the engine is stationary, vent the exhaust outside. Exhaust fumes contain odorless, invisible gases which can kill without warning.

W-2050-0807

Engage the parking brake. Move the shift selector to the NEUTRAL position. Stop the engine and allow it to cool.

Remove any combustible materials from the area.

Figure 10-130-1



1. Remove the plug (Item 1) **[Figure 10-130-1]** from the cleanout hole in the spark arrester muffler.

2. Start the engine.

3. Purge accumulated carbon from the system by momentarily revving the engine several times.

4. If carbon is expelled, cover or plug the exhaust outlet (Item 2) **[Figure 10-130-1]** and rap on the pipe around the cleanout plug while revving the engine several times.

5. If particles are still are still suspected to be in the muffler, elevate the rear of the vehicle one foot higher than the front. Place blocks in front of and behind both front wheels.

6. Repeat steps 3 and 4 until no more particles are expelled when the engine is revved.

7. Stop the engine and allow the spark arrester to cool.

8. Reinstall the plug(s) (Item 1) **[Figure 10-130-1]** and remove the outlet cover or plug.

IMPORTANT

This vehicle is factory equipped with a U.S.D.A. Forestry Service approved spark arrester exhaust system.

The spark arrester muffler, if equipped, must be cleaned to keep it in working condition. The spark arrester muffler must be serviced by dumping the spark chamber every 300 hours of operation.

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

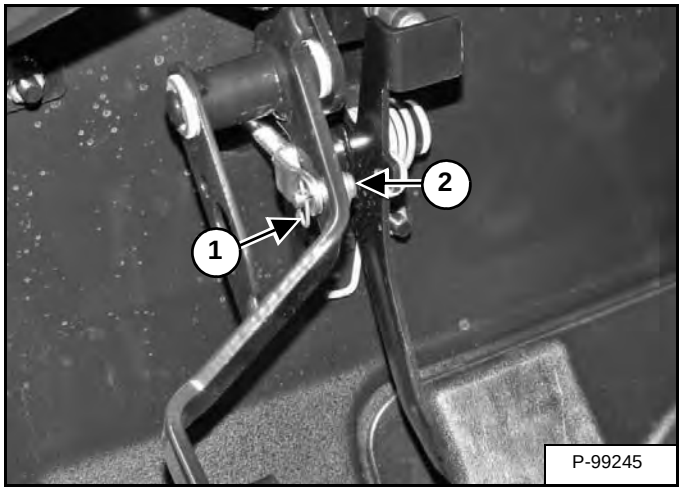
I-2331-0211

DRIVE SYSTEM

Master Cylinder Removal And Installation

Open the hood.

Figure 20-10-1



Remove the retaining clip (Item 1) and clevis pin (Item 2) **[Figure 20-10-1]** that attaches the master cylinder to the brake pedal lever.

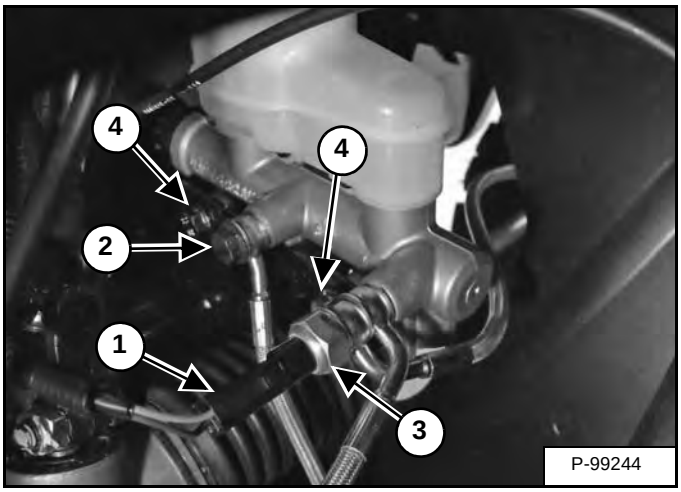
NOTE: Dispose of brake fluid properly and do not re-use.

IMPORTANT

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

I-2312-0510

Figure 20-10-2



Place a container to catch brake fluid under the master cylinder brake lines.

Disconnect the electrical connector (Item 1) **[Figure 20-10-2]** from the pressure sender.

Loosen the banjo bolt (Item 2) and pressure sender (Item 3) **[Figure 20-10-2]** for the brake lines and allow the fluid to drain.

After the fluid is drained, remove the banjo bolt (Item 2) and pressure sender (Item 3) **[Figure 20-10-2]**.

Installation: Tighten the banjo bolt (Item 2) and pressure sender (Item 3) **[Figure 20-10-2]** to 20 N•m (15 ft-lb) torque.

Remove the two mounting bolts and nuts (Item 4) **[Figure 20-10-2]** from the master cylinder.

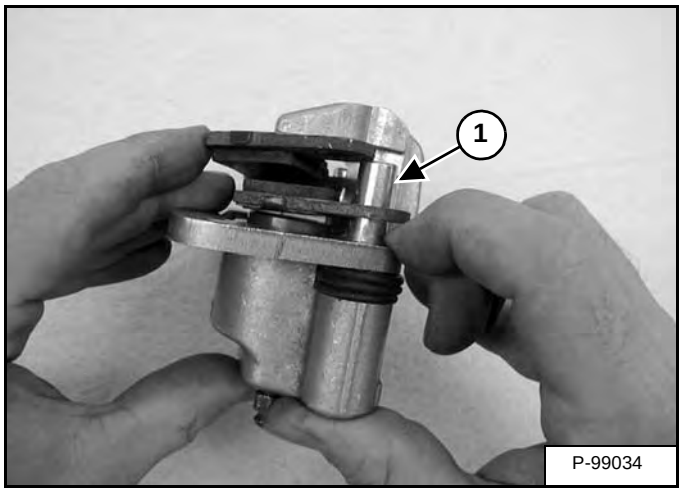
Installation: Tighten the cylinder bolts and nuts (Item 4) **[Figure 20-10-2]** to 20 N•m (15 ft-lb) torque.

NOTE: Make note of front and rear brake line locations to master cylinder.

Installation: After Installing the foot brake check pedal freeplay. Pedal freeplay should not exceed 2,29 mm (0.090 in). (See Brake Inspection on Page 20-10-11.)

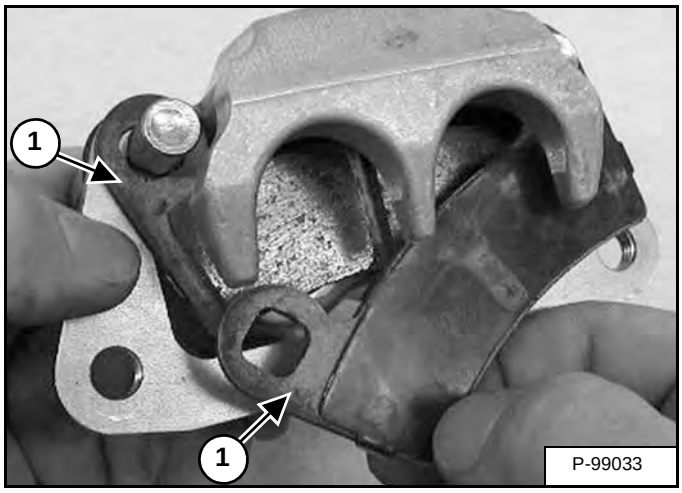
Caliper Disassembly

Figure 20-11-9



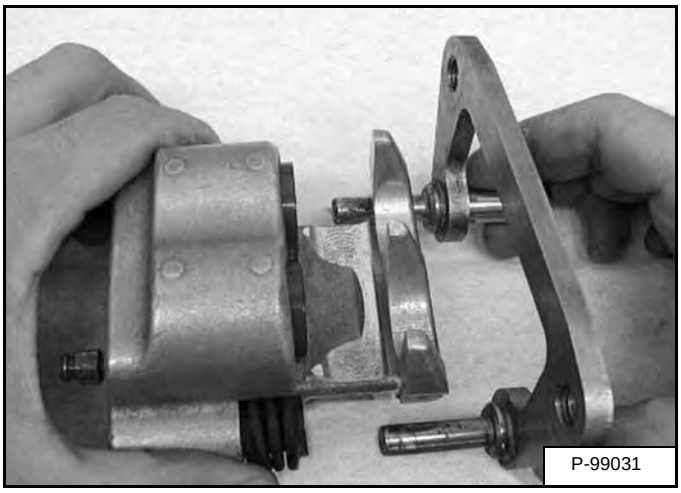
Push brake pad retainer pin (Item 1) **[Figure 20-11-9]** inward and slip brake pads past the edge.

Figure 20-11-10



Remove both brake pads (Item 1) **[Figure 20-11-10]** from the caliper.

Figure 20-11-11



Remove the mounting bracket, pin assembly and dust boot **[Figure 20-11-11]**.

Thoroughly clean the brake caliper before disassembly and prepare a clean work area to disassemble the caliper.

⚠ WARNING

Use caution and always wear safety glasses when working with compressed air.

W-2849-0510

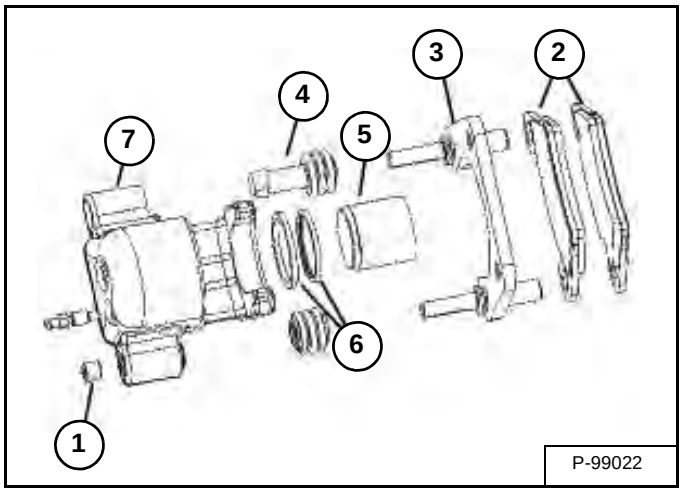
Use low pressure compressed air to remove the pistons from the caliper.

While holding the caliper and covering the pistons with a shop towel, carefully apply compressed air to the brake line inlet to force the pistons out from the caliper.

NOTE: Do Not remove the caliper pistons with a pliers. The piston sealing surfaces will become damaged if a pliers is used.

Caliper Disassembly

Figure 20-12-8



Remove the brake pad adjuster screw (Item 1) **[Figure 20-12-8]**.

Push the upper pad retainer pin inward and slip the brake pads (Item 2) **[Figure 20-12-8]** past edge, if pads are still installed.

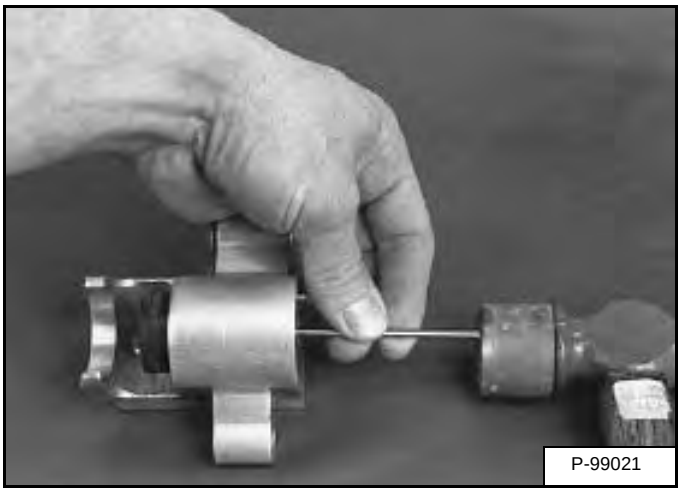
Remove the mounting bracket (Item 3) and dust boot (Item 4) **[Figure 20-12-8]**.

Remove the piston (Item 5) and square O-rings (Item 6) from the caliper body (Item 7) **[Figure 20-12-8]**.

Clean the caliper body, piston and retaining bracket with brake cleaner or alcohol.

NOTE: Be sure to clean seal grooves in caliper body.

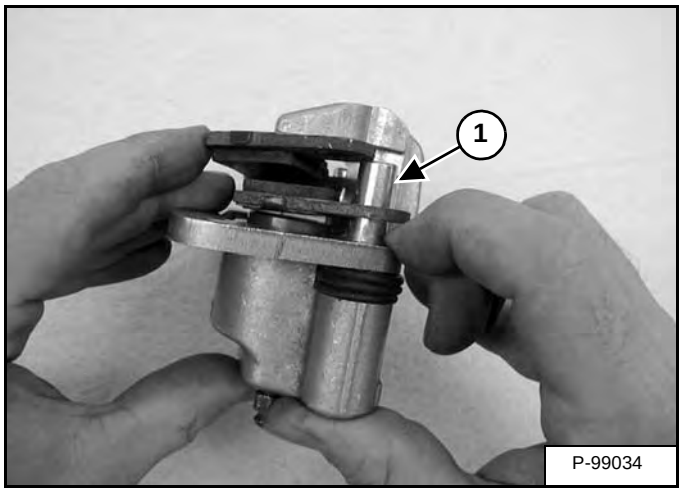
Figure 20-12-9



Remove the piston from the caliper using a piece of rod and a hammer **[Figure 20-12-9]**. Tap lightly to avoid damage.

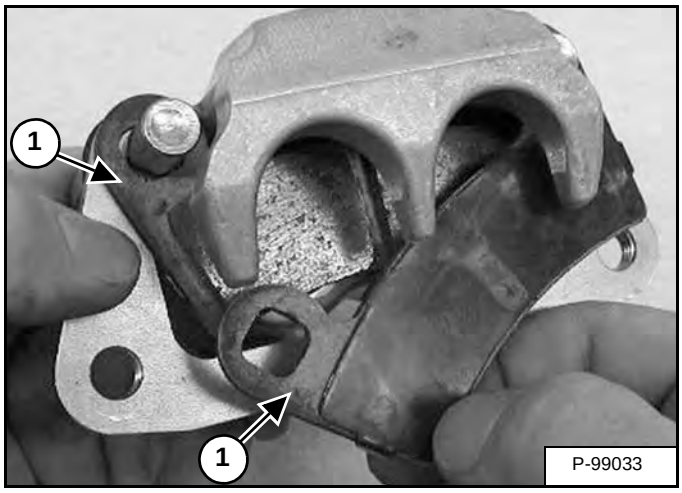
Caliper Disassembly

Figure 20-13-8



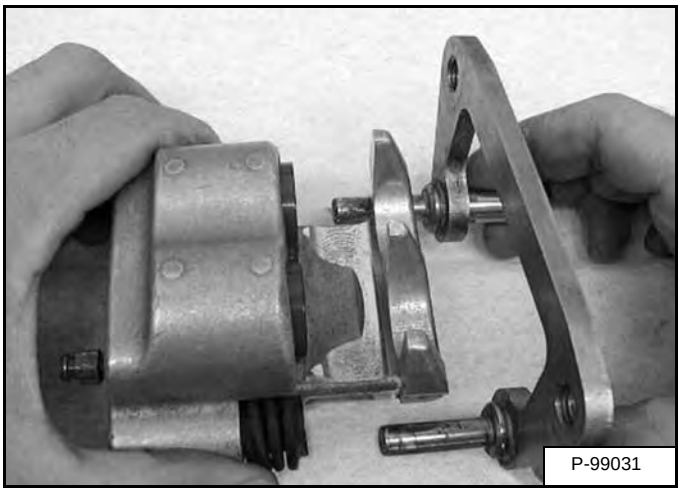
Push brake pad retainer pin (Item 1) **[Figure 20-13-8]** inward and slip brake pads past the edge.

Figure 20-13-9



Remove both brake pads (Item 1) **[Figure 20-13-9]** from the caliper.

Figure 20-13-10



Remove the mounting bracket, pin assembly and dust boot **[Figure 20-13-10]**.

Thoroughly clean the brake caliper before disassembly and prepare a clean work area to disassemble the caliper.

⚠ WARNING

Use caution and always wear safety glasses when working with compressed air.

W-2849-0510

Use low pressure compressed air to remove the pistons from the caliper.

While holding the caliper and covering the pistons with a shop towel, carefully apply compressed air to the brake line inlet to force the pistons out from the caliper.

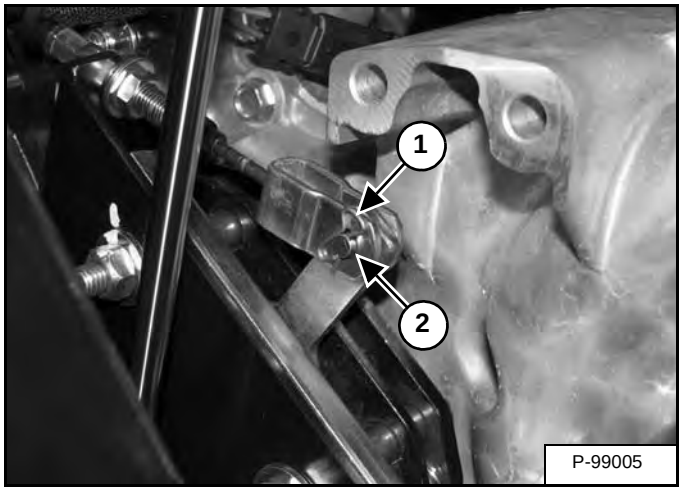
NOTE: Do Not remove the caliper pistons with a pliers. The piston sealing surfaces will become damaged if a pliers is used.

Caliper Removal

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

NOTE: Do not get oil, grease, or fluid on the parking brake pads. Damage to or contamination of the pads may cause the pads to function improperly.

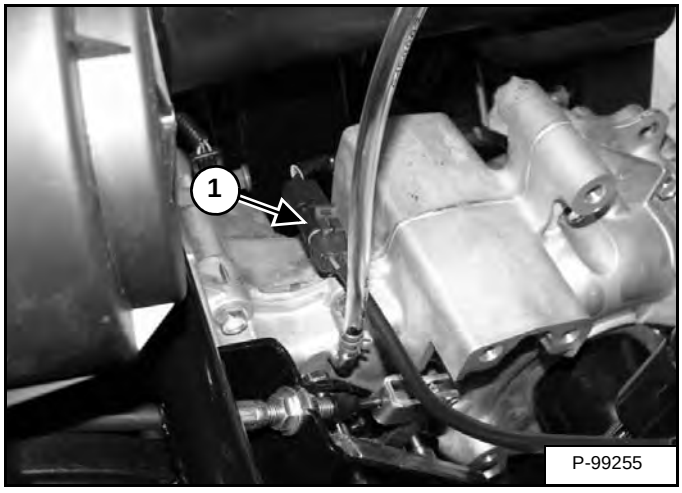
Figure 20-20-7



Remove the clip (Item 1) and pin (Item 2) **[Figure 20-20-7]** from the parking brake cable.

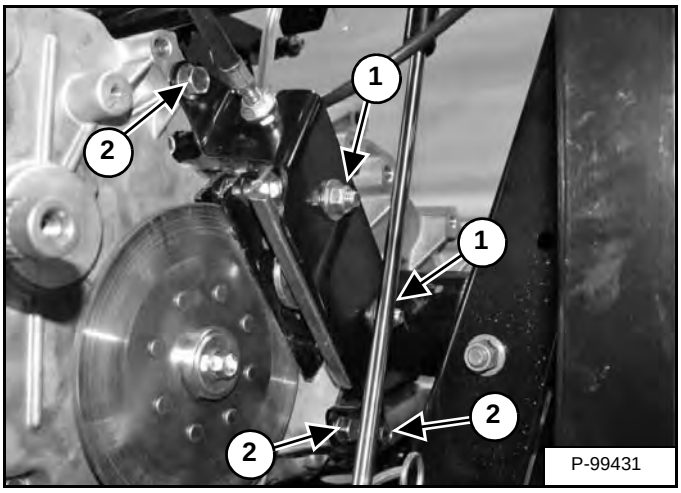
NOTE: Be sure the parking brake is not engaged.

Figure 20-20-8



Disconnect the rear differential solenoid harness (Item 1) **[Figure 20-20-8]**.

Figure 20-20-9

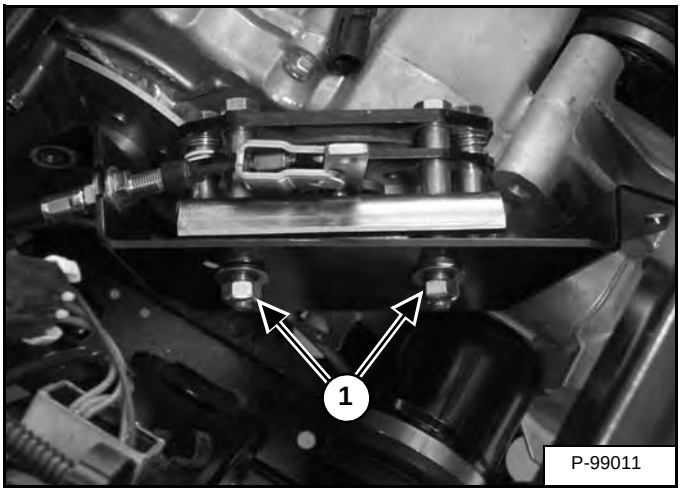


Loosen the two bolts (Item 1) **[Figure 20-20-9]** that retain the caliper to the mount bracket.

Remove the three bolts (Item 2) and remove the parking brake caliper as an assembly.

NOTE: The image shown above has the CVT system removed for picture clarity.

Figure 20-20-10



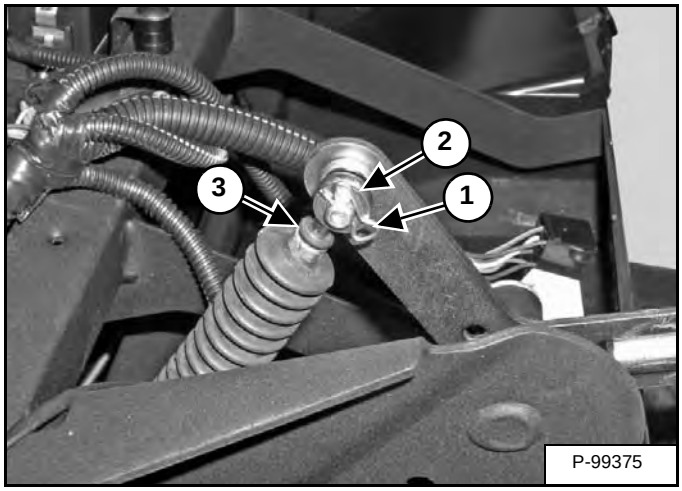
Lift the parking brake caliper and mount bracket off the brake disc.

Remove the two caliper mounting bolts (Item 1) **[Figure 20-20-10]** and remove the caliper from the mount bracket.

Shift Lever Removal And Installation

Remove the dash panel. (See Right Dash Removal And Installation on Page 30-30-2.)

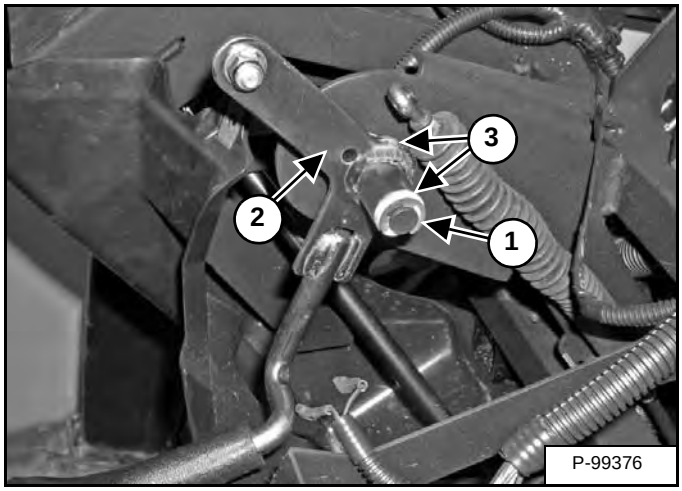
Figure 20-30-6



Remove the clip (Item 1) and washer (Item 2) retaining the shift cable (Item 3) **[Figure 20-30-6]** to the shift lever.

Disconnect the cable end from the shift lever.

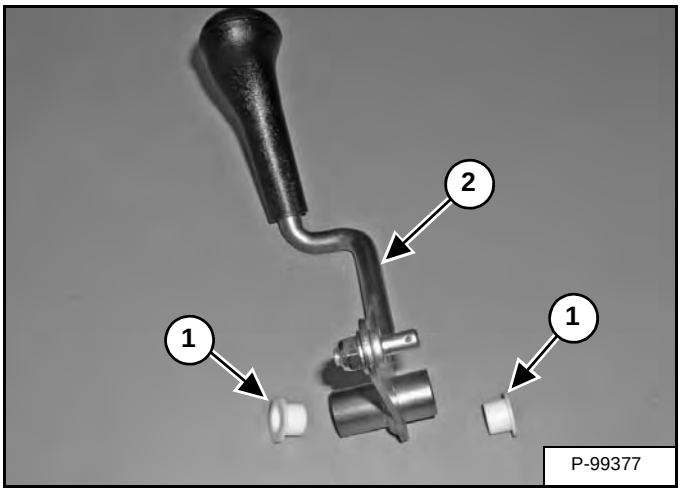
Figure 20-30-7



Remove the retaining ring (Item 1) **[Figure 20-30-7]**.

Remove the shift lever (Item 2) and both bushings (Item 3) **[Figure 20-30-7]** from the mounting bracket.

Figure 20-30-8



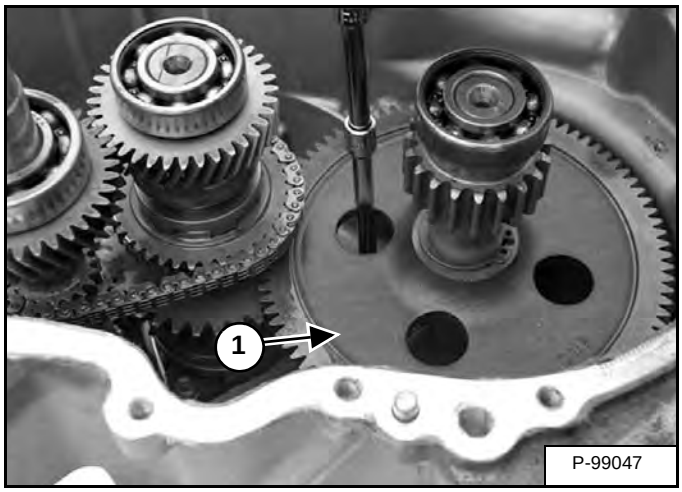
Check the bushings (Item 1) and shift lever (Item 2) **[Figure 20-30-8]** for wear or damage and replace as needed.

Parts Identification (Cont'd)

REF.	Description
1.	Screw, Self Tapping Hex
2.	Seal, Triple Lip
3.	Cover, LH
4.	Bearing, Ball
5.	Silent Chain
6.	Case, RH
7.	Bearing, Ball
8.	Sprocket, 19T
9.	Oil Deflector
10.	Screw, Self Tapping Torx
11.	Output Gear, 91T
12.	Retaining Ring
13.	Screw, Self Tapping Hex
14.	Bearing Cover, Center Drive
15.	Retaining Ring
16.	Shim
17.	Bearing, Ball
18.	Pinion, 13T Center Drive
19.	Retaining Ring
20.	Thrust Washer
21.	Gear, 40T Spur
22.	Bearing, Needle
23.	Washer
24.	Engagement Dog, 6-Face
25.	Retaining Ring
26.	Thrust Washer
27.	Sprocket, 38T 6-Face
28.	Reverse Shaft, 26T
29.	Gear, 33T 6-Face
30.	Shift Collar
31.	Bearing, Ball
32.	Seal, Triple Lip
33.	Bearing, Ball
34.	Input Shaft, 34T
35.	Silent Chain
36.	Compression Spring
37.	Shift Fork
38.	Compression Spring
39.	Rail, Shift Shaft
40.	Pin
41.	Torsion Spring
42.	Cam, Chain Tensioner
43.	Shoe, Chain Tensioner
44.	Shift Drum
45.	Gear, Sector 3 1T
46.	Shift Shaft
47.	O-ring
48.	Detent Pawl
49.	Compression Spring, Detent
50.	Cover, Sector
51.	Bellcrank, Shift Drum
52.	Lock Nut
53.	Switch, Rotary
54.	Retaining Ring
55.	Gear, Sector 16T
56.	Drain Plug, Magnetic
57.	Detent Star
58.	O-ring
59.	Retaining Ring
60.	Screw, Torx
61.	Retaining Ring
62.	Seal, Triple Lip
63.	Dowel Pin
64.	Fill Plug
65.	Compression Spring
66.	Retaining Ring
67.	Washer, Cup
68.	Engagement Dog
69.	Torsion Spring
70.	Shift Fork
71.	Side Gear, 36T
72.	Carrier Assembly
73.	Side Gear, 36T, Disconnect
74.	Gear Assembly
75.	Dowel Pin
76.	Cover
77.	Screw
78.	Solenoid
79.	Washer, Fender
80.	Bearing, Needle
81.	Lockout Disc
82.	Plug, Speed Sensor
83.	O-ring
84.	Brake Disc / Hub Assembly
85.	Washer, Fender
86.	Screw
87.	Vent Tube
88.	Seal, Triple Lip
89.	Retaining Ring
90.	Shim
91.	Shim
92.	Snorkel Tube
93.	Bearing, Ball
94.	Gear, 13T Snorkel

Snorkel / Output Gear Backlash Procedure (Cont'd)

Figure 20-30-60



Install the output gear assembly. Be sure to properly mesh the snorkel shaft bevel gear with the output bevel gear **[Figure 20-30-60]**.

Install the screws that secure the output gear (Item 1) **[Figure 20-30-60]**.

Installation: Tighten the output gear retaining screws to 11 - 16 N•m (8 - 12 ft-lb) torque.

Tighten the snorkel tube until it is lightly seated using the snorkel tool (PA-50231). Turn the output shaft to prevent binding while tightening the snorkel tube. Make sure the snorkel shaft gear and output bevel gear have 'zero' lash.

NOTE: It is important to have zero lash between the output gear and the snorkel shaft gear. If there is binding or excess lash, tighten or loosen the snorkel shaft until there is zero lash.

NOTE: Do not overtighten the snorkel tube. Gears should rotate freely without binding.

Figure 20-30-61

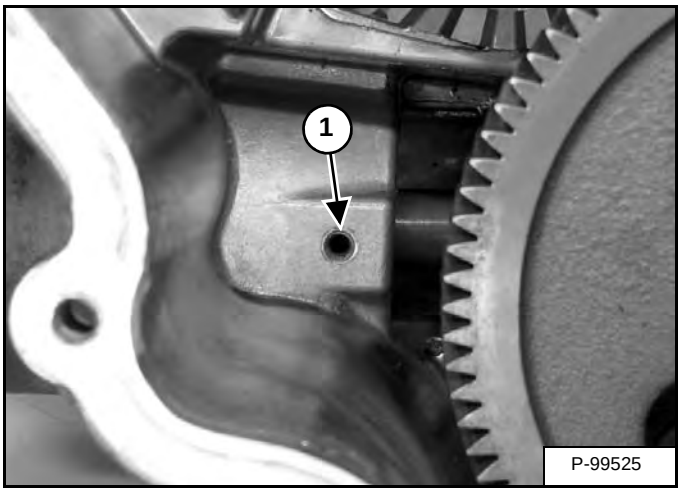
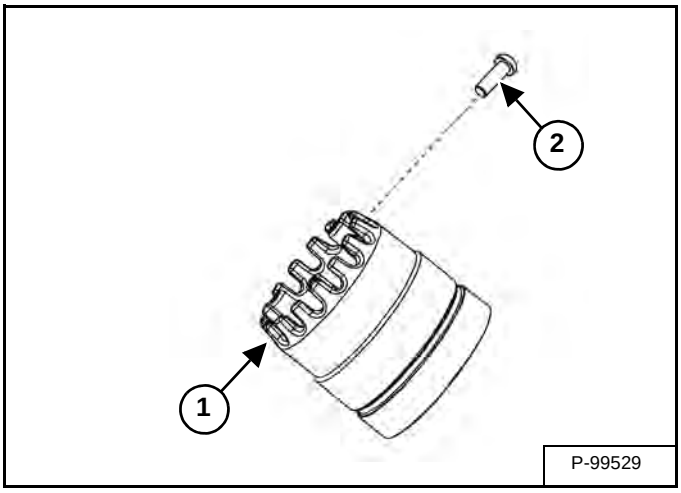


Figure 20-30-62



Look down into the gearcase at the snorkel locking screw hole opening (Item 1) **[Figure 20-30-61]** to reference your starting point.

Slowly rotate the snorkel tube (Item 1) **[Figure 20-30-62]** counterclockwise while counting the number of notches passing through the hole opening (Item 1) **[Figure 20-30-61]** as you rotate the tube. Rotate the snorkel tube to the 7th notch from the 'seated' position obtained in **[Figure 20-30-58]**.

Check the output shaft gear backlash again by feel. If the output shaft lash appears to be too tight, rotate the snorkel shaft counterclockwise to the next notch.

Once the backlash is set, apply Loctite® 242 to the threads and install the locking screw (Item 2) to secure the snorkel tube.

NOTE: The screw fits into the slots of the snorkel tube to retain it.

DRIVE BELT

Removal

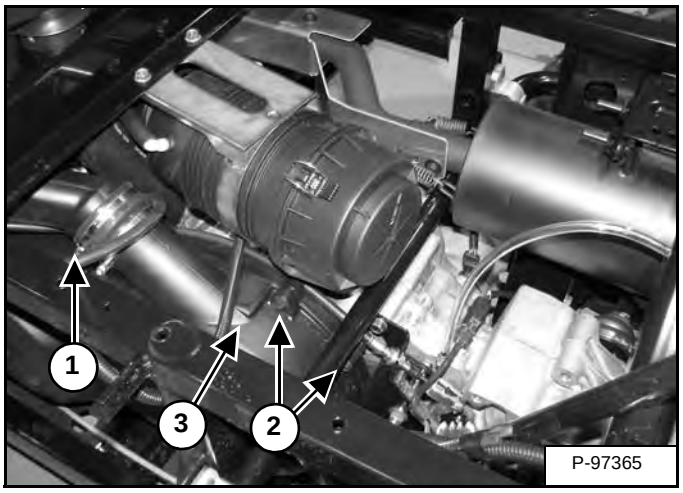
Stop the machine on a flat level surface. Engage the parking brake, put the gear selector in gear (L) and stop the engine.

Allow the belt and clutches to cool.

Raise the cargo box.

Disconnect the negative battery cable.

Figure 20-40-1

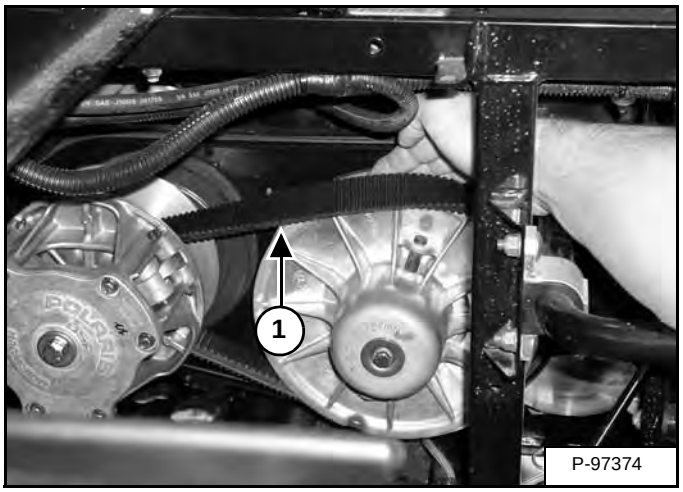


NOTE: Mark the drive belt rotation. If reusing the existing belt, it must be reinstalled so that it rotates in the same direction.

Loosen the clamp (Item 1) **[Figure 20-40-1]**.

Remove the eight bolts (Item 2) and the CVT outer cover (Item 3) **[Figure 20-40-1]**.

Figure 20-40-2



NOTE: Do not allow the belt to be twisted or turned inside out. This damages the internal belt cords and may cause the belt to flip (invert) during usage. If this happens, the belt must be replaced.

IMPORTANT

Do not use any type of tool to remove the drive belt from the clutches or drive belt and / or clutch damage may occur.

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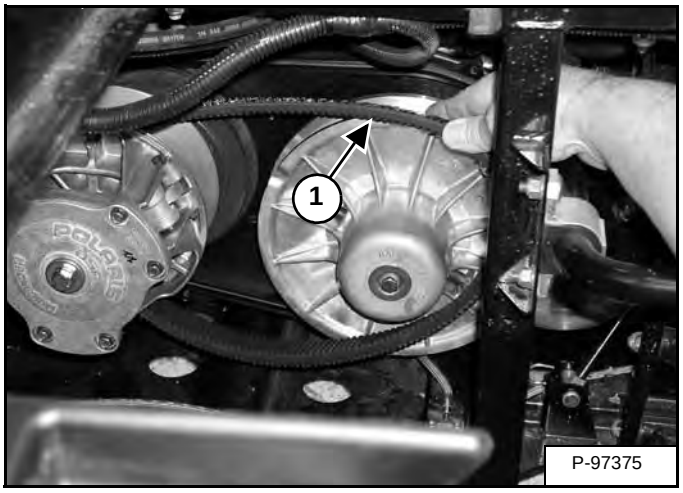
Pull upward and rearward on the belt to open the driven clutch sheaves.

Pull out and down on the belt (Item 1) **[Figure 20-40-2]** to slip the belt over the driven clutch outer sheave.

Figure 20-40-3



Remove the belt from the drive clutch **[Figure 20-40-3]**.

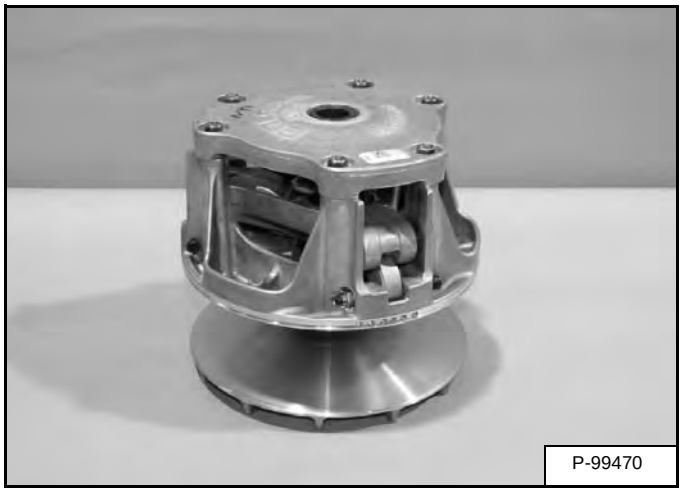
System Troubleshooting (Cont'd)

ENGINE		
PROBLEM	CAUSE	SOLUTION
Water ingestion	Cover seals or ducts leaking.	Find leak and repair as necessary.
	Operator error.	Instruct operator on guidelines for operation in wet terrain as outlined in the Operation & Maintenance Manual.
Belt slippage	Belt worn out.	Replace belt.
	Water ingestion.	Inspect and seal CVT system.
	Belt contaminated with oil or grease.	Inspect and clean.
CVT noise	Belt worn or separated, thin spots, loose belt.	Replace belt.
	Broken or worn clutch components, cover hitting clutches.	Inspect and repair as necessary.
Engagement erratic or stabby	Thin spots on belt, worn belt.	Replace belt. Refer to belt burnout troubleshooting and instruct operator.
	Drive clutch bushings stick.	Inspect and repair clutches.

Inspection

All CVT system maintenance repairs must be performed only by an authorized Bobcat service technician. Because of the critical nature and precision balance incorporated into the CVT system, it is absolutely essential that no attempt at disassembly or repair be made without factory authorized special tools and service procedures. The drive clutch **[Figure 20-51-6]** is a component of the CVT system.

Figure 20-51-6



IMPORTANT

The clutch assembly is a precisely balanced unit. Never replace parts with used parts from another clutch assembly.

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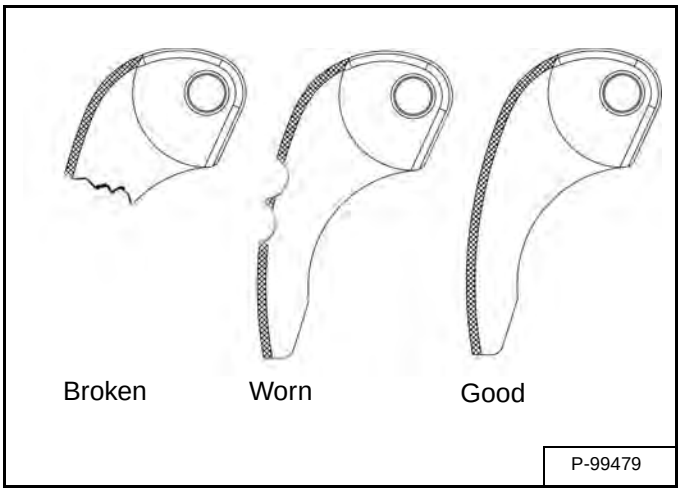
Figure 20-51-7



Remove shift weight bolts and weights. Inspect as shown. The contact surface of the weight should be smooth and free of dents or gall marks. Inspect the weight pivot bore and pivot bolts for wear or galling. If weights or bolts are worn or broken, replace in sets of three with new bolts **[Figure 20-51-7]**.

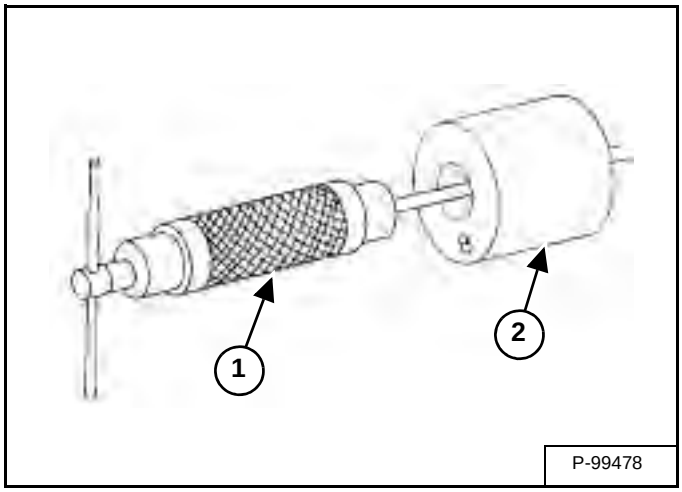
NOTE: A damaged shift weight is usually caused by a damaged or stuck roller in the spider assembly. (See Disassembly (S/N AJNT11001 & Above) on Page 20-51-7.)

Moveable Sheave Bushing Removal And Installation

Order piston pin puller (PN 2870386).

A bushing replacement tool kit is available, order (2871226).

Figure 20-51-37

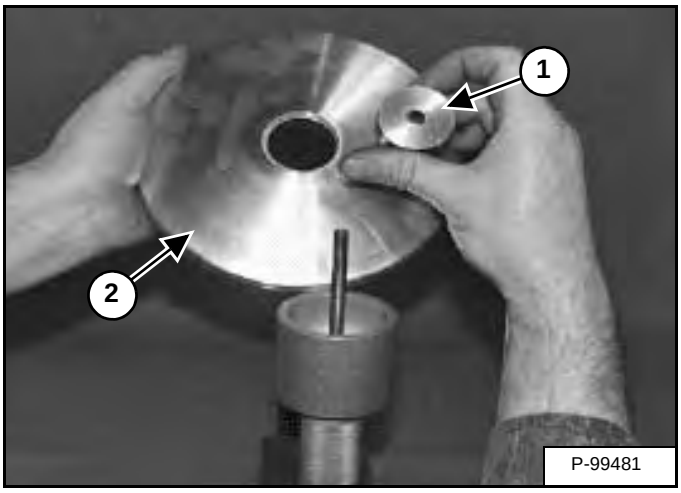


Install handle end of the piston pin puller (Item 1) **[Figure 20-51-37]** securely into bench vise and lightly grease puller threads.

Remove nut from puller rod and set aside.

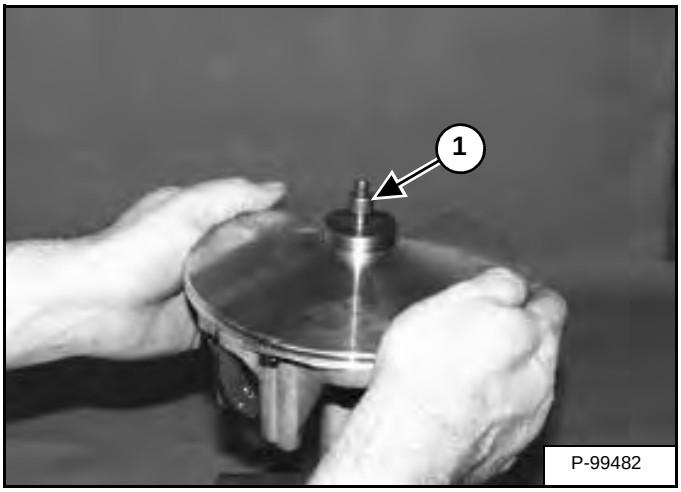
Install the main puller adapter (#8) (Item 2) **[Figure 20-51-37]** onto the piston pin puller.

Figure 20-51-38



Insert the Number Two Adapter (#10) (Item 1) into the bushing from belt side as shown. With towers pointing toward vise, slide sheave (Item 2) **[Figure 20-51-38]** and bushing onto puller rod.

Figure 20-51-39



Install the nut (Item 1) **[Figure 20-51-39]** removed earlier onto end of puller rod and hand tighten. Turn puller barrel to increase tension on sheave if needed. Nut is left hand thread.

Turn sheave and puller barrel together counterclockwise on puller rod until bushing is removed.

Remove nut from puller rod and set aside.

Pull bushing removal tool and adapter from puller rod. Remove bushing from tool and discard.

CONTINUOUS VARIABLE TRANSMISSION (CVT) (DRIVEN CLUTCH)

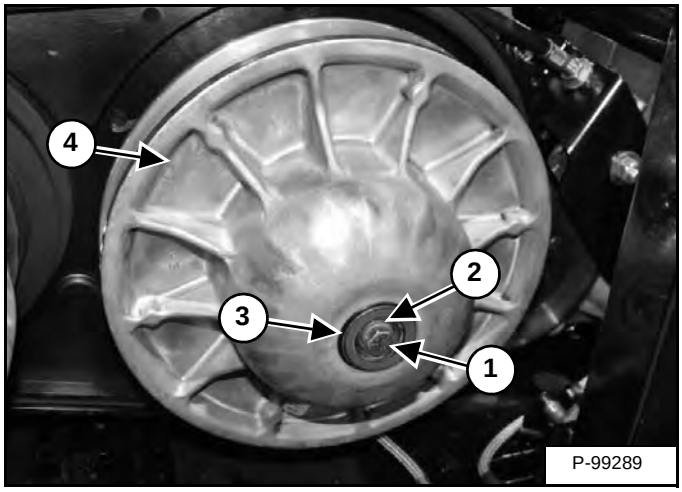
Removal And Installation

Raise the cargo box.

Remove the outer CVT cover. (See CVT (Outer) Cover Removal And Installation on Page 20-50-7.)

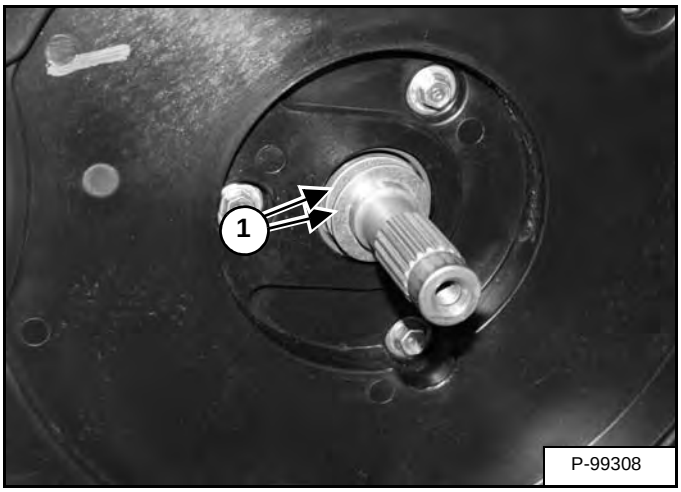
Remove the drive belt. (See Removal on Page 20-40-1.)

Figure 20-52-1



Remove the bolt (Item 1), lock washer (Item 2), washer (Item 3) and driven clutch (Item 4) **[Figure 20-52-1]**. Tighten the bolt to 23,3 N•m (17 ft-lb) torque

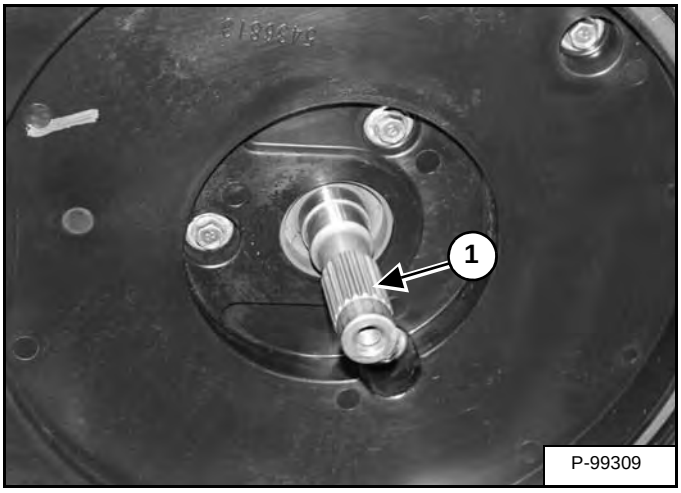
Figure 20-52-2



Remove the clutch offset spacers (Item 1) **[Figure 20-52-2]**.

Installation: Install the spacers (Item 1) **[Figure 20-52-2]** in the same order they were removed.

Figure 20-52-3



Installation: Clean the splines inside the driven clutch and on the transmission input shaft (Item 1) **[Figure 20-52-3]**. Apply a light film of grease to the splines on the shaft.

FINAL DRIVE

Description

Care should be exercised during drive shaft removal or when servicing CV joints. Drive shaft components are precision parts.

Cleanliness and following these instructions is very important to ensure proper shaft function and a normal service life.

- The complete drive shaft and joint should be handled by getting hold of the interconnecting shaft to avoid disassembly or potential damage to the drive shaft joints.

- Over-angling of joints beyond their capacity could result in boot or joint damage.

- Make sure surface-ground areas and splines of shaft are protected during handling to avoid damage.

- Do not allow boots to come in contact with sharp edges or hot engine and exhaust components.

- Drive shaft is not to be used as a lever arm to position other suspension components.

- Never use a hammer or sharp tools to remove or to install boot clamps.

- Be sure joints are thoroughly clean and that the proper amount and type of grease is used to refill when joint boots are replaced and when joints are cleaned.

Outer CV Joint And Boot (Front Drive Shaft) Removal And Installation (Cont'd)

IMPORTANT

Complete disassembly of the CV joint is NOT recommended. The internal components are a precision fit and develop their own characteristic wear patterns. Intermixing the internal components could result in looseness, binding, and / or premature failure of the joint.

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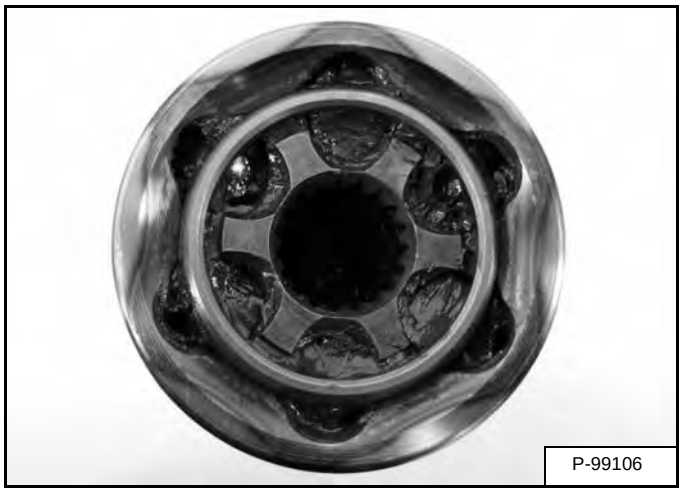
NOTE: If the grease in the joint is obviously contaminated with water and / or dirt, the joint should be replaced.

Figure 20-60-28



Thoroughly clean the joint with an appropriate solvent and dry the joint to prevent any residual solvent from being left in the joint upon reassembly **[Figure 20-60-28]**.

Visually inspect the joint by tilting the inner race to one side to expose each ball. Severe pitting, galling, play between the ball and its cage window, any cracking or damage to the cage, pitting or galling or chips in raceways call for joint replacement.

NOTE: Shiny areas in ball tracks and on the cage spheres are normal. Do not replace CV joints because parts have polished surfaces. Replace CV joint only if components are cracked, broken, worn or otherwise unserviceable.

Clean the splines on the end of the shaft and apply a light coat of grease prior to reassembly.

Slide the small boot clamp and boot (small end first) onto the drive shaft and position the boot in it's groove machined in the shaft.

Install a NEW circlip on the end of the shaft.

Grease the joint with the special CV joint grease provided in the boot replacement kit. Fill the cavity behind the balls and the splined hole in the joint's inner race. Pack the ball tracks and outer face flush with grease. Place any remaining grease into the boot.

IMPORTANT

The grease provided in the replacement kit is specially formulated for wear resistance and durability. DO NOT use substitues or mix with other lubricants.

I-2328-0510

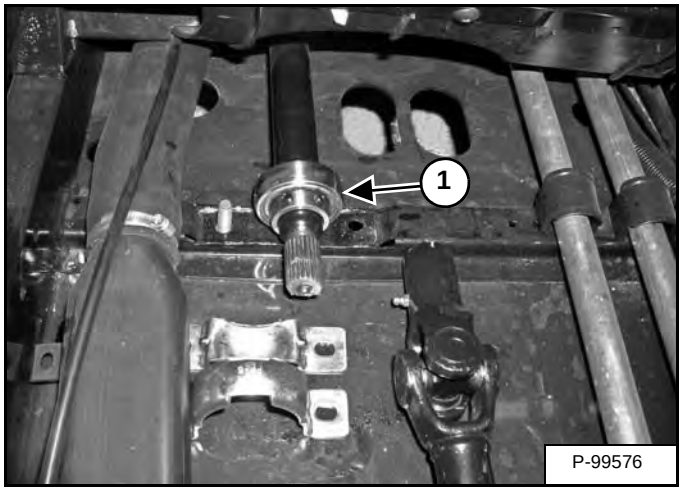
NOTE: The amount of grease that's provided is pre-measured, so use all the grease.

Boot Replacement Grease Requirements:

Outer CV Joint Capacity	150 g

Support Bearing Removal And Installation (S/N AJNV11001 & Above) (Cont'd)

Figure 20-60-52



Slide the bearing (Item 1) **[Figure 20-60-52]** off the end of the shaft.

Installation: clean the surface of the shaft and install the new bearing.

Installation: Align the front and rear portions of the propshaft and slide them together.

Installation: Install the upper and lower halves of the bearing support along with the two fasteners. Finger tighten only.

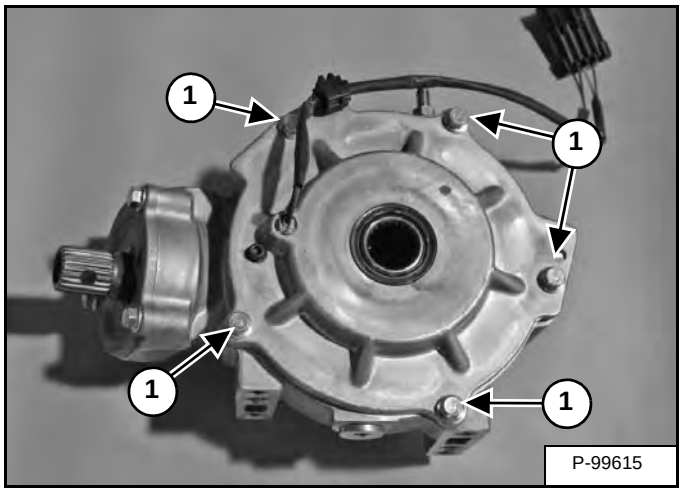
Installation: Slide the rear portion of the propshaft forward or backward to obtain the proper spline engagement.

Installation: Tighten the two bearing set screws and then tighten the bearing support fasteners

Installation: Tighten the two bearing set screws and then tighten the bearing support fasteners to 41 - 49 N•m (30 - 36 ft-lb) torque.

Front Gearcase Disassembly / Inspection

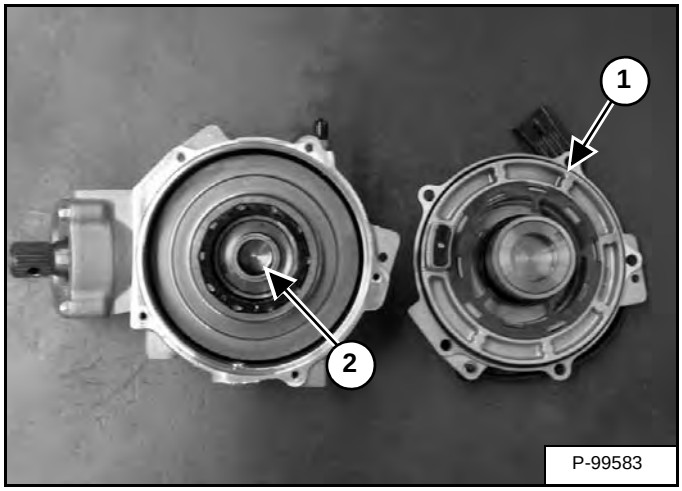
Figure 20-60-72



Drain and properly dispose of used lubricant. Remove any metal particles from the drain plug magnet.

Remove the five screws (Item 1) **[Figure 20-60-72]** retaining the outer cover assembly.

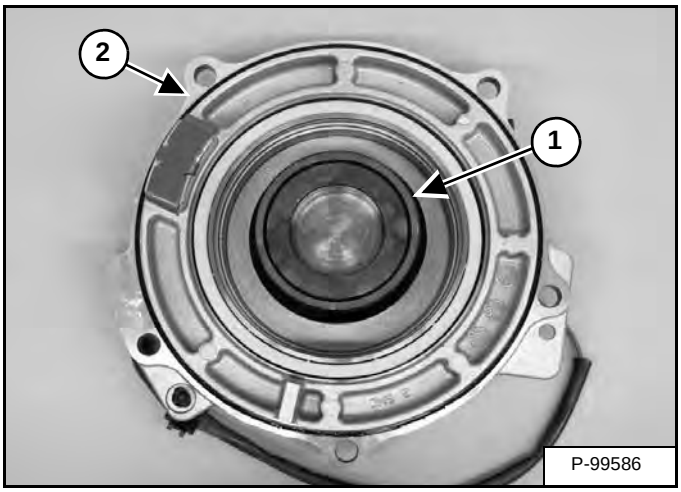
Figure 20-60-73



Remove the output cover assembly (Item 1) **[Figure 20-60-73]** from the gearcase.

NOTE: The thrust bushing (Item 2) [Figure 20-60-73] located between the two output hubs is pressed into assembly.

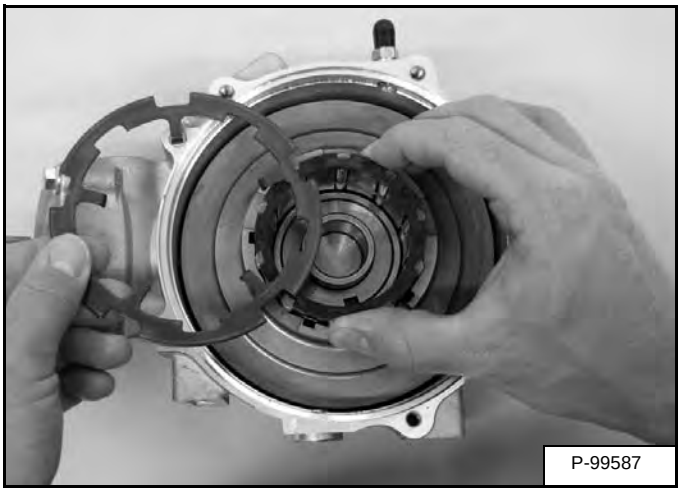
Figure 20-60-74



Remove the RH output hub assembly (Item 1) from the outer cover plate assembly (Item 2) **[Figure 20-60-74]**.

Inspect the bearing and contact surfaces of the output hub for signs of wear or damage. Replace component if found to be worn or damaged.

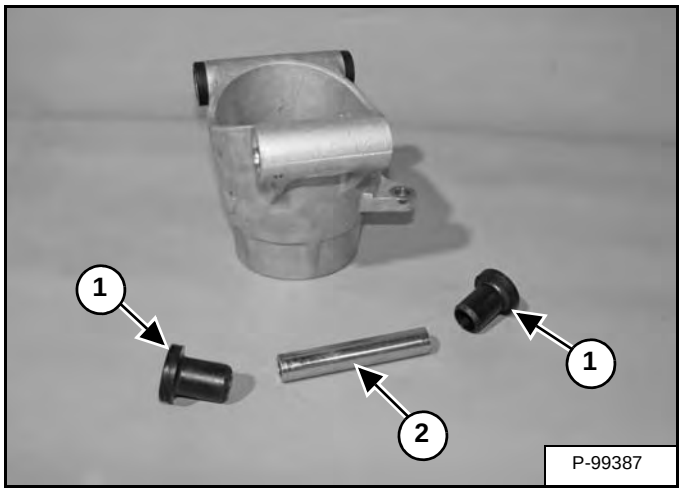
Figure 20-60-75



Remove the armature plate, roll cage assembly and ring gear **[Figure 20-60-75]**.

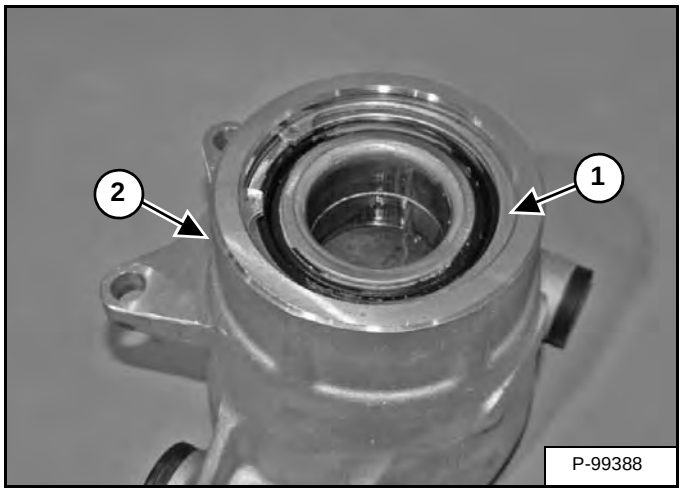
Rear Bearing Carrier Disassembly And Assembly

Figure 20-60-101



Check the rubber bushings (Item 1) and spacer tubes (Item 2) **[Figure 20-60-101]** for damage or wear and replace as needed.

Figure 20-60-102



Remove the retaining ring (Item 1) from the bearing carrier (Item 2) **[Figure 20-60-102]**.

Figure 20-60-103

From the back side, tap the outer bearing race with a drift punch in the reliefs as shown **[Figure 20-60-103]**

NOTE: Drive bearing out evenly by tapping on outer race only. Once bearing is at bottom of casting, support casting on outer edges so bearing can be removed.

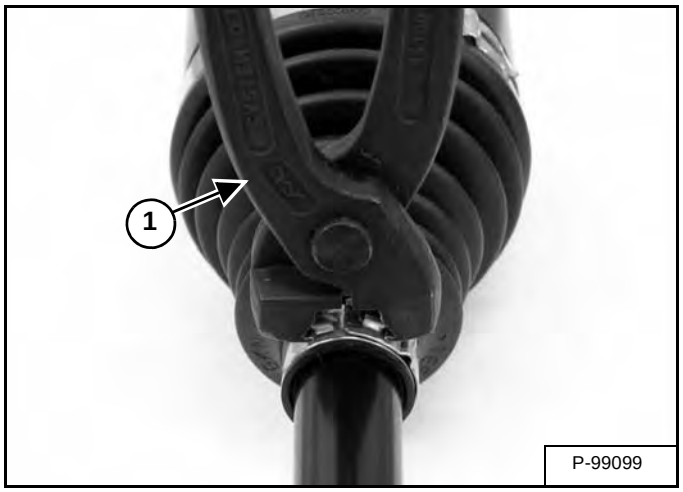
Inspect the bearing.

NOTE: Due to extremely close tolerances and minimal wear, the bearings must be inspected visually, and by feel. While rotating bearings by hand, inspect for rough spots, discoloration, or corrosion. The bearings should turn smoothly and quietly, with no detectable up and down movement and minimal movement sideways between inner and outer race.

Inspect the bearing housing for scratches, wear or damage. Replace housing if damaged.

Inner Plunging Joint And Boot (Rear Drive Shaft) Removal And Installation (Cont'd)

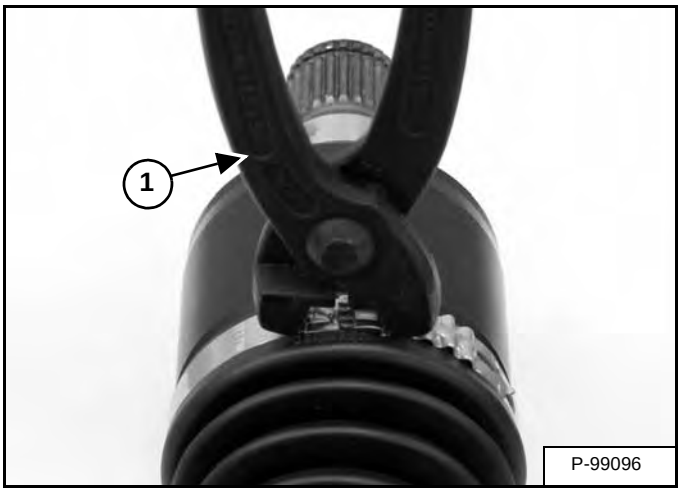
Figure 20-60-131



Pull the boot over the joint and position the boot lips into the grooves on the joint housing and shaft. Make sure the boot is not dimpled or collapsed.

Install and tighten the large clamp using the axle boot clamp tool (Item 1) **[Figure 20-60-131]**.

Figure 20-60-132



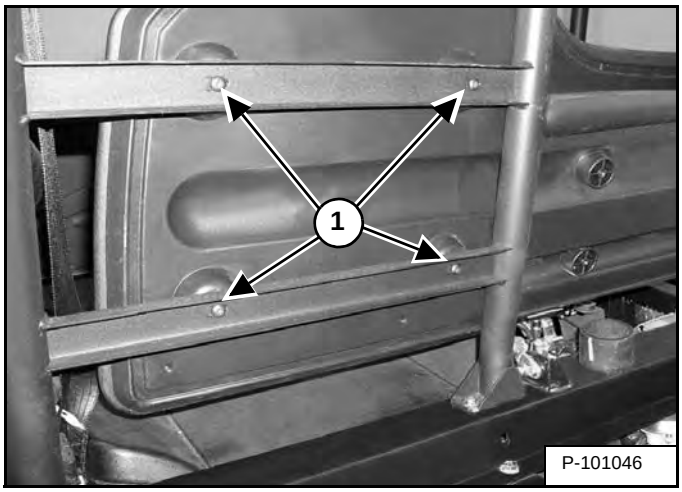
Pull out on the drive shaft to center the joint in the housing. Slide a straight O-ring or a small pick or a small slotted screw driver between the large end of the boot and the joint housing and lift up to equalize the air pressure in the boot.

Position the boot lip in its groove. Install and tighten the large clamp using the axle boot clamp tool (Item 1) **[Figure 20-60-132]**.

OPERATOR SEAT

Seat Back Removal And Installation

Figure 30-20-1



Remove the four screws (Item 1) **[Figure 30-20-1]** that secure the back. (Both sides)

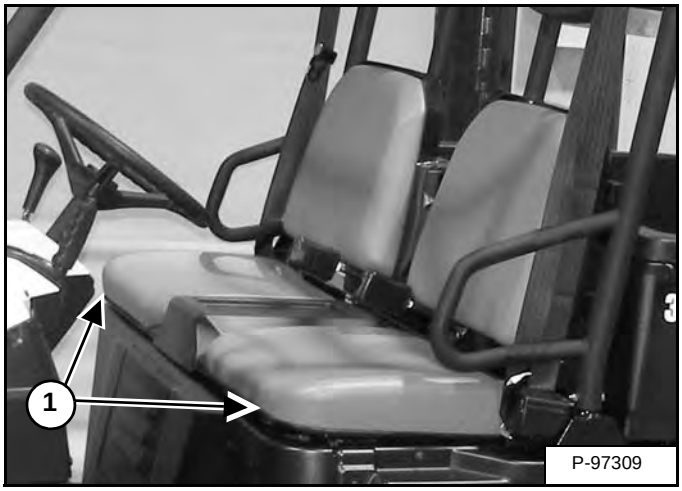
Installation: Tighten the screws to 2 - 2,5 N•m (18 - 20 in-lb) torque.

Remove the seat back.

Seat Base Removal And Installation

Removal

Figure 30-20-2

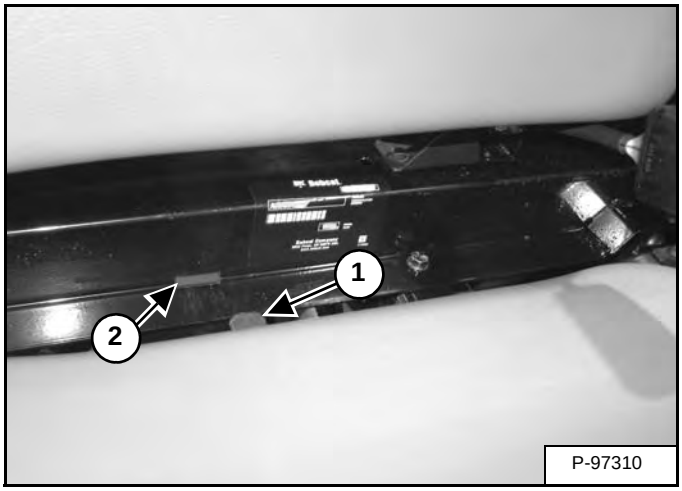


Lift up on the front corners (Item 1) **[Figure 30-20-2]** of the seat (one corner at a time). (There is a retainer post on the front corners of the seat that fits into a grommet that secures the front seat.)

Slide the seat forward to remove.

Installation

Figure 30-20-3



Position the tabs (Item 1) on the rear of the seat to the grooves (Item 2) **[Figure 30-20-3]** in the frame.

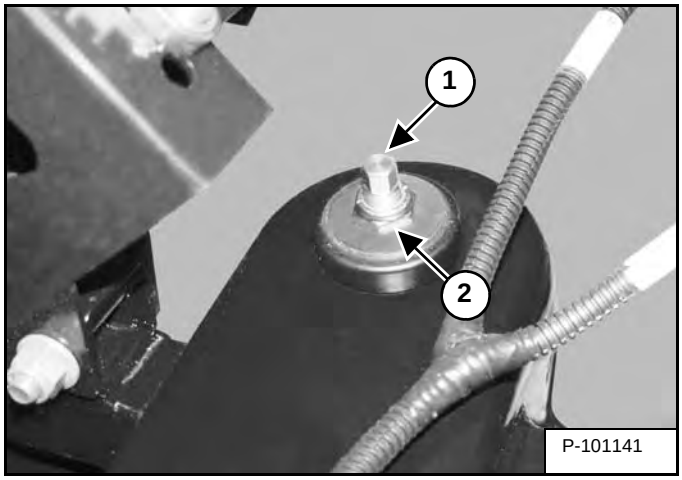
STRUT

Strut Cartridge Removal And Installation

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

Raise and support the front of the vehicle.

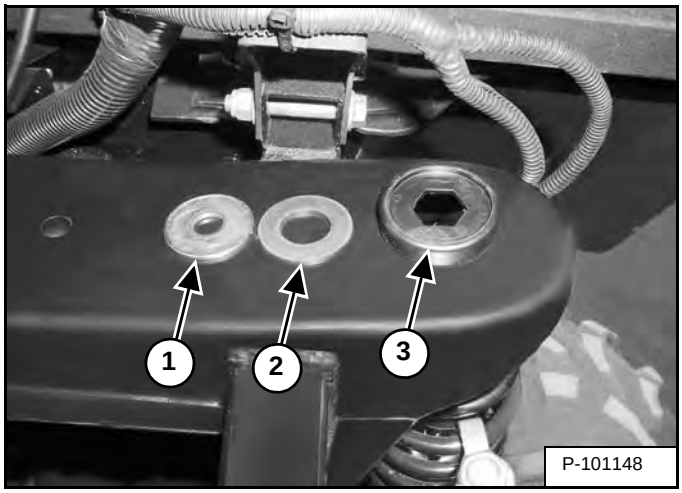
Figure 30-50-1



Hold the strut rod (Item 1) and remove the nut (Item 2) **[Figure 30-50-1]**.

Installation: Tighten the nut to 21 N•m (15 ft-lb) torque.

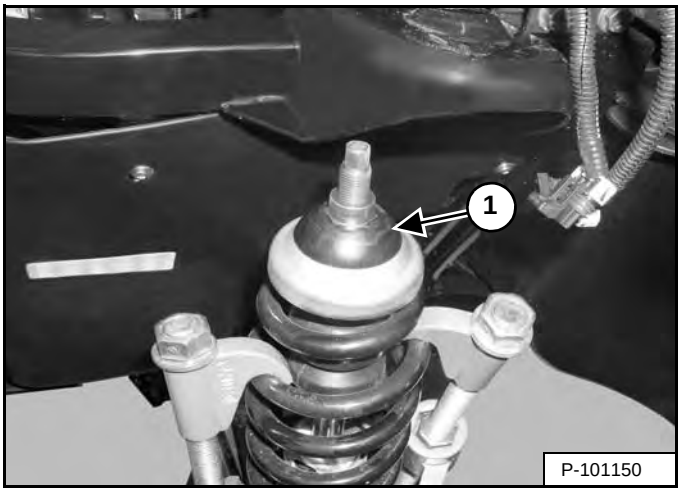
Figure 30-50-2



Remove the washer (Item 1) spacer (Item 2) and the pivot ball (Item 3) **[Figure 30-50-2]**.

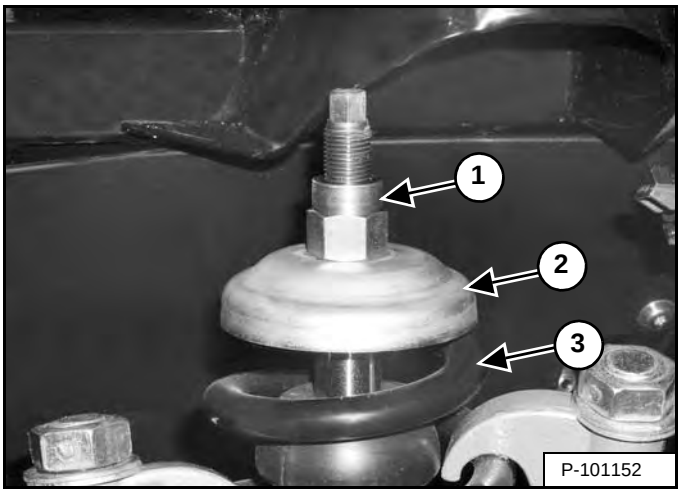
Use a coil spring compressor to compress the strut spring.

Figure 30-50-3



Remove the bottom pivot ball (Item 1) **[Figure 30-50-3]**.

Figure 30-50-4

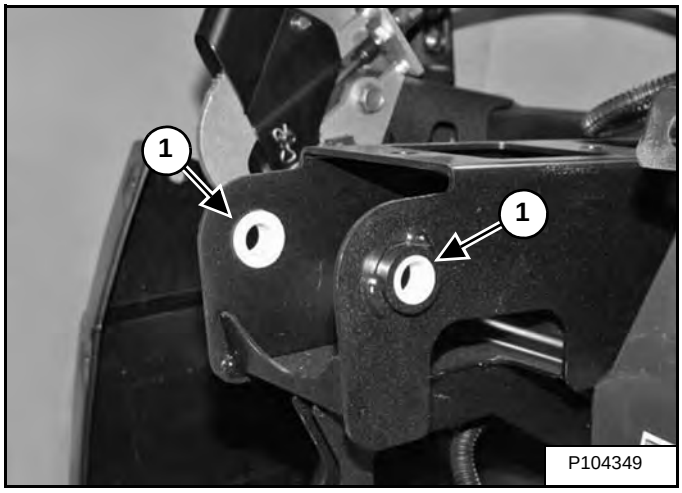


Remove the nut (Item 1) and spring retainer (Item 2) **[Figure 30-50-4]**.

Remove the coil spring (Item 3) **[Figure 30-50-4]** and compress the strut cartridge.

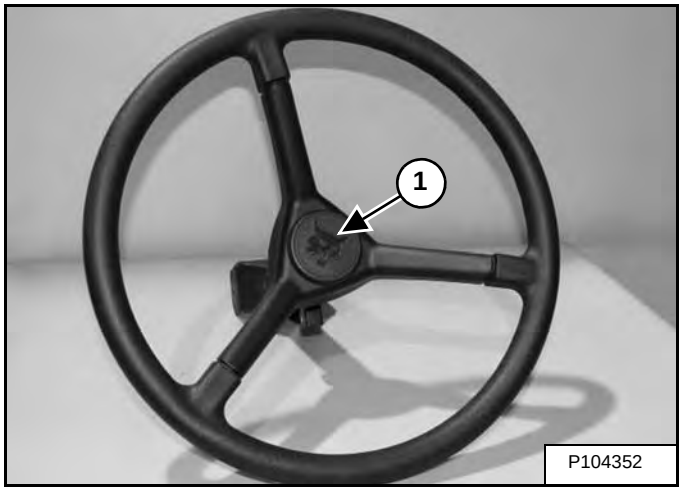
Steering Shaft Removal And Installation (Cont'd)

Figure 30-61-8



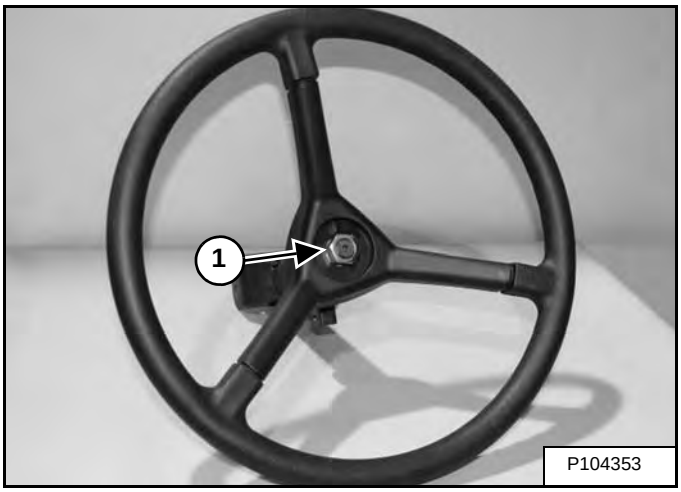
Check the plastic bushings (Item 1) **[Figure 30-61-8]** for wear or damage and replace as needed.

Figure 30-61-9



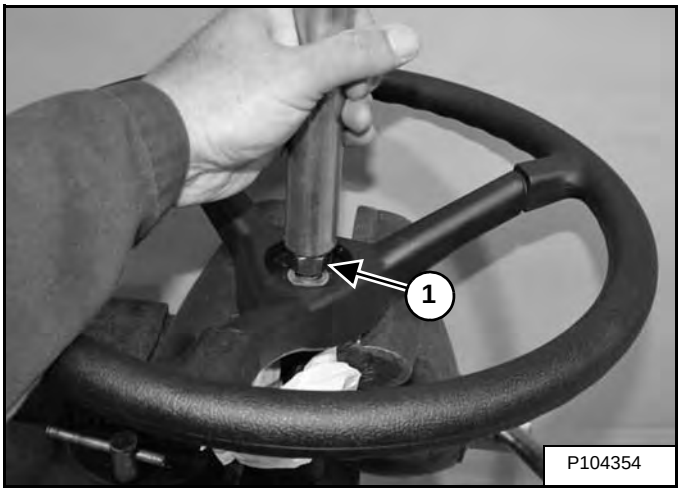
Remove the steering wheel cap (Item 1) **[Figure 30-61-9]**.

Figure 30-61-10



Loosen the nut (Item 1) **[Figure 30-61-10]** and back it half way off the steering shaft.

Figure 30-61-11



Place the assembly in a vise.

Using a large bronze drift and hammer, strike the steering shaft nut (Item 1) **[Figure 30-61-11]** to pop the steering wheel off the shaft taper.

Once the steering wheel pops loose, completely remove the nut (Item 1) **[Figure 30-61-11]** and remove the steering wheel from the shaft.

Installation: Apply Loctite® and tighten the nut to 34 - 42 N•m (25 - 31 ft-lb) torque.

CONTROL ARMS

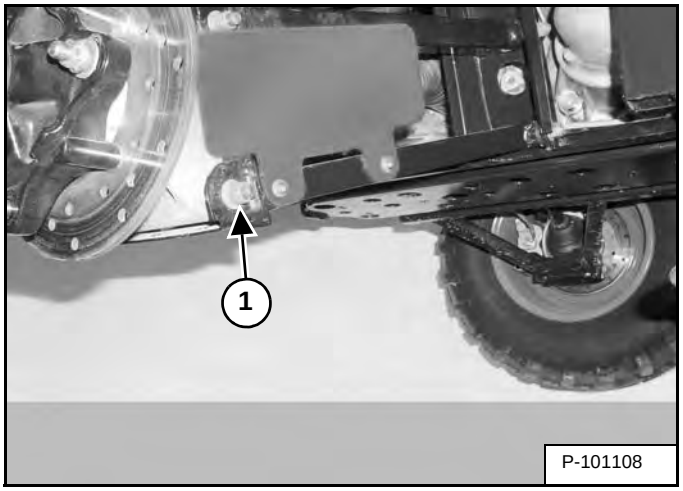
Removal And Installation (Rear Lower Arm)

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

Remove the tire assembly. (See TIRE MAINTENANCE on Page 10-120-1.)

NOTE: The removal and installation procedure is the same for left and right rear control arms.

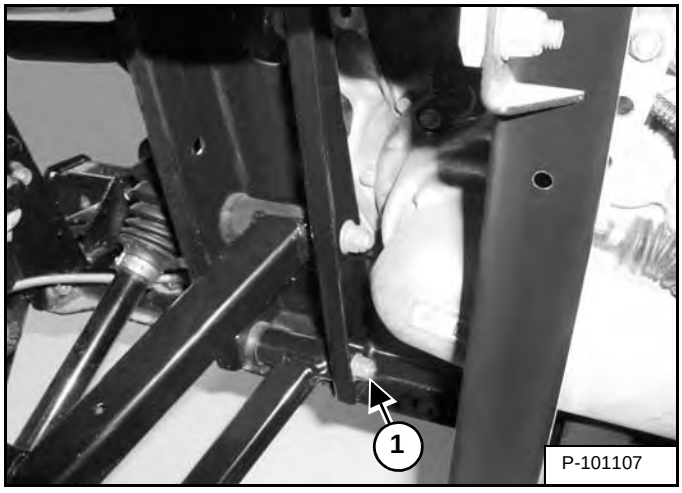
Figure 30-100-1



Remove the nut (Item 1) **[Figure 30-100-1]** and bolt.

Installation: Tighten the nut to 41 N•m (30 ft-lb) torque.

Figure 30-100-2



Remove the bolts and nuts (Item 1) from the lower control arm **[Figure 30-100-2]** (Both sides).

Installation: Tighten the nut to 41 N•m (30 ft-lb) torque.

Remove the lower control arm from the machine.

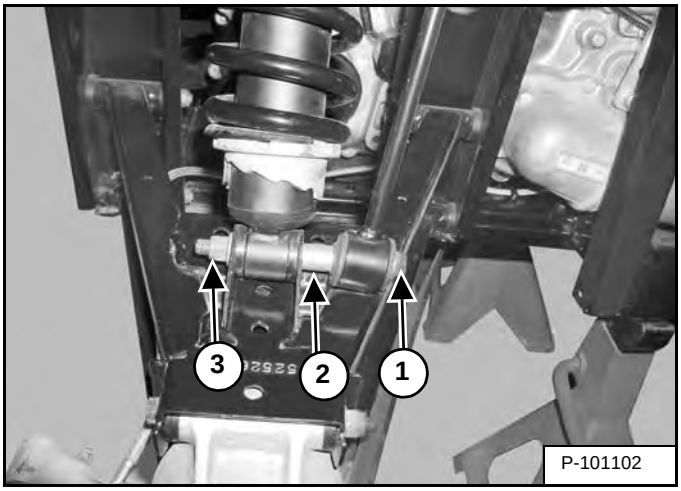
Removal And Installation (Upper Arm)

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

Remove the tire assembly. (See TIRE MAINTENANCE on Page 10-120-1.)

NOTE: The removal and installation procedure is the same for all upper control arms.

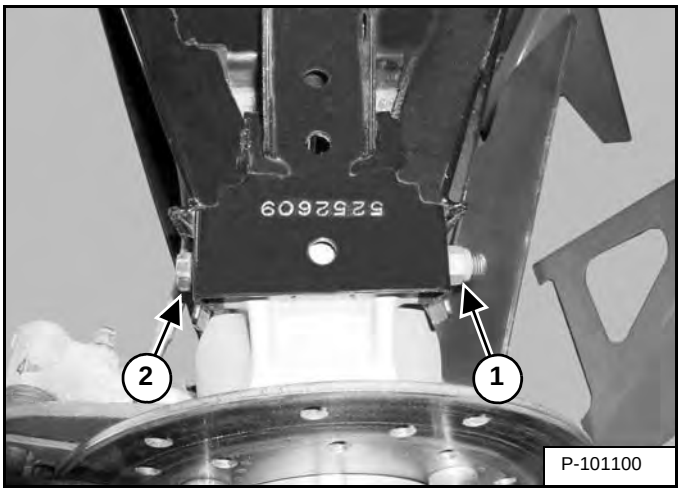
Figure 30-100-3



Remove the bottom shock mount bolt (Item 1), spacer (Item 2) and nut (Item 3) **[Figure 30-100-3]** from the upper control arm.

Installation: Tighten the bolt to 41 N•m (30 ft-lb) torque.

Figure 30-100-4



Remove the nut (Item 1) and bolt (Item 2) **[Figure 30-100-4]**.

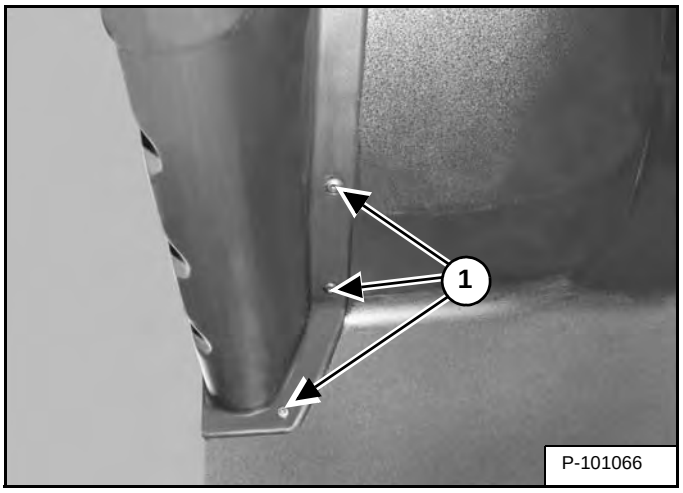
Installation: Tighten the nut to 41 N•m (30 ft-lb) torque.

FENDER

Removal And Installation (Front)

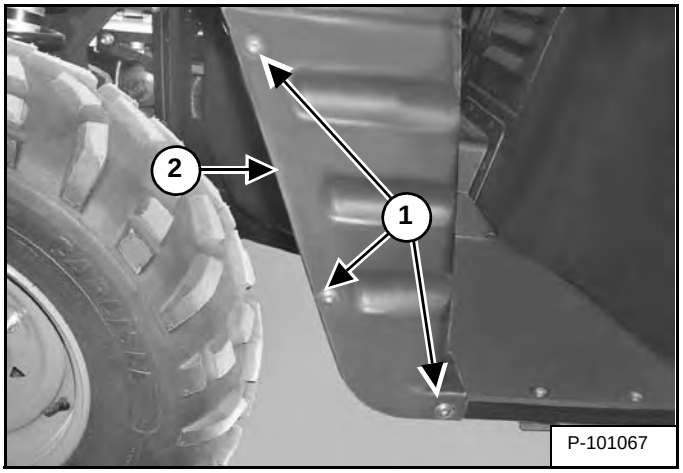
NOTE: Left front fender shown. Procedures are the same for the right front.

Figure 30-140-1



Remove the three screws (Item 1) **[Figure 30-140-1]**.

Figure 30-140-2

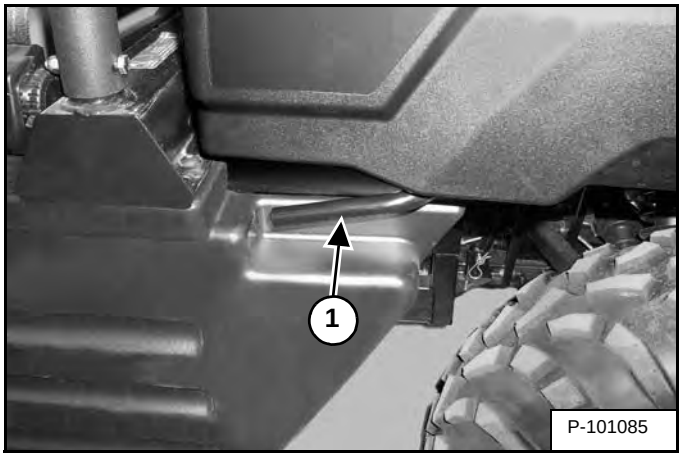


Remove the three screws (Item 1) and fender (Item 2) **[Figure 30-140-2]**.

Removal And Installation (Rear)

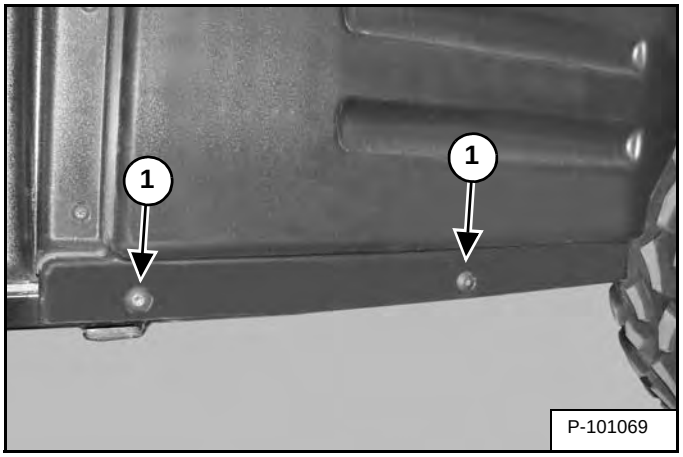
NOTE: Left front fender shown. Procedures are the same for the right front.

Figure 30-140-3



Pull up on the lever (Item 1) **[Figure 30-140-3]** and raise the cargo box.

Figure 30-140-4



Remove the two screws (Item 1) **[Figure 30-140-4]**.

WIRE COLOR LEGEND

RED	RED
BLACK	BLK
WHITE	WHT
BROWN	BRN
ORANGE	ORG
YELLOW	YEL
PURPLE	PUR
PINK	PNK
GRAY	GRY
TAN	TAN
LIGHT BLUE	LBU
DARK BLUE	DBU
LIGHT GREEN	GRN
DARK GREEN	DGN

BRN — A/B — A/B — RED — BLK — FUSIBLE LINK — RECTIFIER/ REGULATOR

YEL — A/B/C — A/B/C — YEL — YEL

ORG — ORG — BRN — GRN/RED — A/B/C — A/B/C — HALL SENSOR

100 Ohm — 1000 pf — .01 uf — 68 Ohm — X — SPEED SENSOR

DIAGNOSTIC CONNECTOR A B C D E F G H — RED/WHT — BRN — YEL — DGN — DGN — YEL

ECU MODULE

YEL	43	
DGN	44	
DGN	48	
YEL	47	
GRN/RED	42	
BLK	58	
WHT	57	
ORG	34	
OPEN	14	
OPEN	15	
OPEN	16	
OPEN	17	
WHT/BLK	25	
RED/DBL	1	
RED/DBL	31	
DGN/RED	7	
RED/DGN	6	
LBU/BLK	9	
LBU/RED	8	
RED/YEL	11	
ORG	19	
WHT/YEL	4	
GRN	28	
BLK	3	
DGN/WHT	50	
OPEN	30	
DGN	53	
OPEN	5	
OPEN	2	
PUR	46	
LBL	38	
OPEN	40	
YEL	54	
OPEN	32	
ORG	55	
OPEN	45	
OPEN	49	
YEL	39	
OPEN	56	
BRN/WHT	10	
WHT/DGN	27	
GRY	29	
OPEN	51	
OPEN	52	
BRN	41	
BRN	33	
BRN	12	
BRN	13	
ORG/RED	18	
OPEN	20	
OPEN	21	
OPEN	22	
OPEN	35	
OPEN	36	
OPEN	37	
BLK/WHT	23	
DBL/WHT	24	
PUR	59	
OPEN	26	
OPEN	60	

STATOR — P2 P1 — A B C D — BLK — WHT — BRN

CRANK POSITION SENSOR — YE1 — YE2 — YE3 — STATOR — WH/RD — WH — (LOCATED UNDER RECOIL)

RESISTANCES (±20% @ 68°F/20°C)		
STATOR	YE1 TO YE2	0.4Ω ±15%
	YE2 TO YE3	0.4Ω ±15%
	YE1 TO YE3	0.4Ω ±15%
	GROUND TO YE1, YE2, YE3	OPEN
CRANK POSITION SENSOR	WH/RD TO WH	185Ω ±20%

ECM RELAY — B9 — A8 — RED/WHT — RED/DBL — RED/WHT — RED/YEL — A9 — B8

FAN RELAY — A7 — B6 — RED/WHT — ORG — ORG/BLK — RED/WHT — A6 — B7

M — FAN MOTOR — B/A — B/A — BRN

RED — 8 AMP CIRCUIT BREAKER — RED/WHT

FUEL INJECTOR — P1 P1 — P2 P2 — WHT/BLK — RED/DBL — RED/DBL — RED/DBL

IDLE AIR CONTROL

2	RED/DBL	
5	RED/DBL	
1	DGN/RED	
3	RED/DGN	
4	LBU/BLK	
6	LBU/RED	

RED/LBL — 1 — 2 — WHT/YEL — EV SOLENOID

STARTER SOLENOID — STARTER — M — BATTERY — - — + — FRAME GRD — ENGINE GRD

2 2 — 2 1 — ORG — WHT/RED — BRAKE PRESSURE SWITCH — ORG — ORG — BRN

UNSWITCHED POWER 10A — D5 — D4 — RED/WHT

FUSIBLE LINK — BLK — RED — BLK — RED

WHT/RED — ORG — WHT/RED — WHT/RED — 6 4 2 1 — C455 — 6 4 2 1

I — B — ST — START — RUN — OFF — IGNITION SWITCH

HOURMETER — - — + — BRN — RED/LBL

FUEL PUMP — RED/LBL — A/B/C — A/B/C — BRN — M

EFI RELAY — EFI 20A — D7 — D6 — RED/GRN — B5 — A4 — RED/LBL — ORG — A5 — B4 — GRN

IGNITION COIL — RED/YEL — P2 — P1 — Primary 0.6 k Ohm — Secondary 1.6 k Ohm

RED/GRN — 20A C4 — DRIVE

CHASSIS RELAY (SWITCHED POWER) — D9 — C8 — WHT — ORG — C9 — D8 — BRN

LIGHTS 20A — WHT — C7 — C6 — RED/YEL

LIGHT SWITCH — RED/YEL — DGR — YEL — BRN — RED/YEL

DGR — DGR — BRN — A/B/C — C/B/A — LEFT LOW BEAM — RIGHT

BRN — YEL — YEL — BRN — LEFT HIGH BEAM — RIGHT

RED/DBL — BLK/WHT — CHECK ENGINE LIGHT

TURF SOLENOID DRIVER — RED — GRN — BRN — RED — LBL — A/B/C — A/B/C — RED/GRN — DGN/WHT — BRN — RED — LBL — REAR DIFFERENTIAL SOLENOID (POWERED TO UNLOCK DIFF) — A = SOL + — B = SOL -

RED/GRN — BRN/WHT — D/C/B/A — D/C/B/A — GRY — BRN/WHT — AWD (4X4) HUB SOLENOID

TPS — 1 2 3 — PUR — DGN — ORG

AIR TEMP. SENSOR — 2 1 — PUR — LBL

MAP SENSOR — 1 2 3 — YEL — PUR — ORG

ENGINE COOLANT SENDER — t — 1 2 — PUR — YEL — 77°F (25° C) = 29.8 ohm — 248° F (120° C) = 1.22 ohm

DRIVE MODE SWITCH — RED/GRN — BRN — BRN — WHT/DGN — GRY — RED/YEL

PARK BRAKE SWITCH — B/A — B/A — ORG/RED — RED/YEL

CASE GROUND

RED/WHT — PUR — BACK-UP ALARM (IF EQUIPPED)

TRANSMISSION SWITCH

	A	B	C	D	E	F
H	o		o			
L			o	o		
N				o	o	
R					o	o
PARK						o

OPEN — F — PUR — E — DGN/WHT — D — BRN — C — WHT/DBL — B — DBL/RED — A

RED/YEL — ORG/RED — DBL/WHT — PUR — DGN/WHT — WHT/DBL — DBL/RED — RED/YEL

A B C D E F G H

INDICATOR PANEL — BRAKE — TEMP — R — N — L — H

Hourmeter — BRN
Power Port — BRN
Head Light Switch — BRN
Brake Icon Light — BRN
Drive Mode Switch — BRN
Drive Mode Switch — BRN
Tail Light — BRN
Right High Beam — BRN
Left Low Beam — BRN
Right Low Beam — BRN
Left High Beam — BRN

GROUNDS

Power Port — BRN
Fan Motor — BRN
Turf Solenoid Driver — BRN
Stator — BRN
Rectifier / Regulator — BRN
Fuel Pump — BRN
Terminal Block — BRN

EMC Pin 33 — BRN
EMC Pin 13 — BRN
EMC Pin 12 — BRN
Box Lift Switch — BRN
Speed Sensor — BRN
Diagnostic Connector — BRN
Brake Pressure Switch — BRN
Transmission Switch — BRN
Box Lift Switch — BRN
Chassis Relay — BRN

CHASSIS RELAY — ECM RELAY — FAN RELAY — EFI RELAY — 30 — 85 — 86 — 87 — 87A

BOX LIFT MOTOR — M — A/B — A/B — DBL/WHT — DGR/WHT

BOX LIFT SWITCH (OPTIONAL) — 1 2 3 4 5 6 7 8 — BRN — BRN — RED/DBL

BOX LIFT (OPTION) 20A — D2 — D3 — WHT

ACCESSORY (SWITCHED POWER) 20A — C3 — C2 — ORG/WHT

BRN — ORG/WHT — 12V POWER PORT

ORG/WHT — (SWITCHED POWER) — BRN — (GRD) — RED — (UNSWITCHED POWER) — TERMINAL BLOCK

RED/YEL — P3 P3 — BRN — P2 P2 — ORG — P1 P1

TAIL LIGHTS — A B C — A B C — A B C — A B C

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WIRING SCHEMATIC

3400 (S/N AJNT11001 AND ABOVE)
3400XL (S/N AJNV11001 AND ABOVE)

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V-1393

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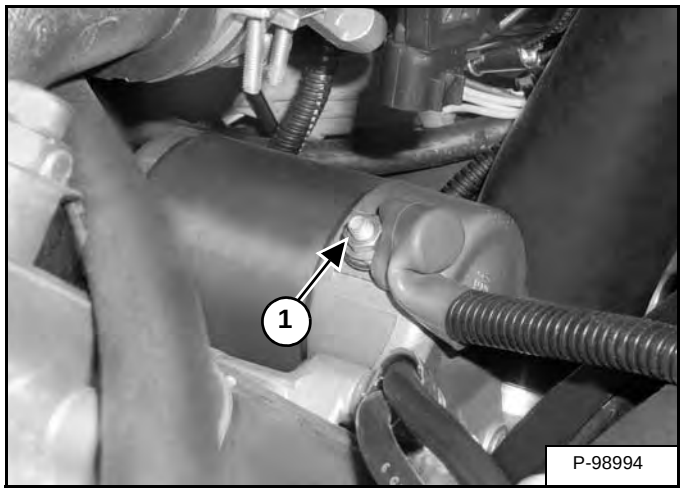
Removal And Installation

Figure 40-40-3

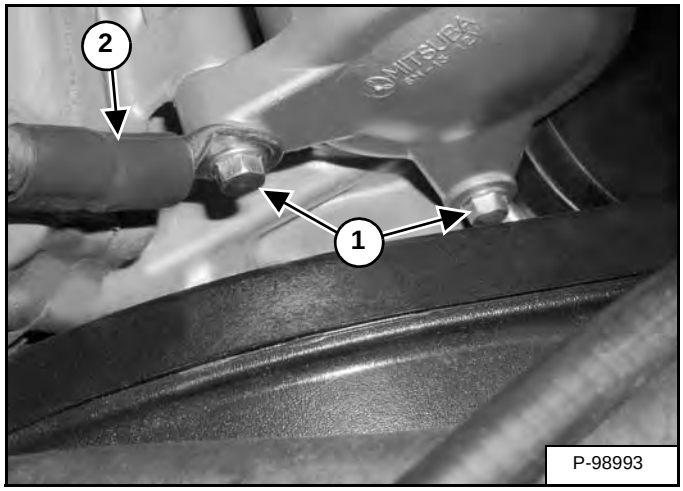


Stop the engine and remove the seat base.

Remove the negative (-) and positive (+) cables from the battery.

Disconnect the positive cable (Item 1) **[Figure 40-40-3]** from the starter.

Figure 40-40-4



Remove the mounting bolts (Item 1) and the ground wires (Item 2) **[Figure 40-40-4]** from the starter.

Remove the starter from the engine.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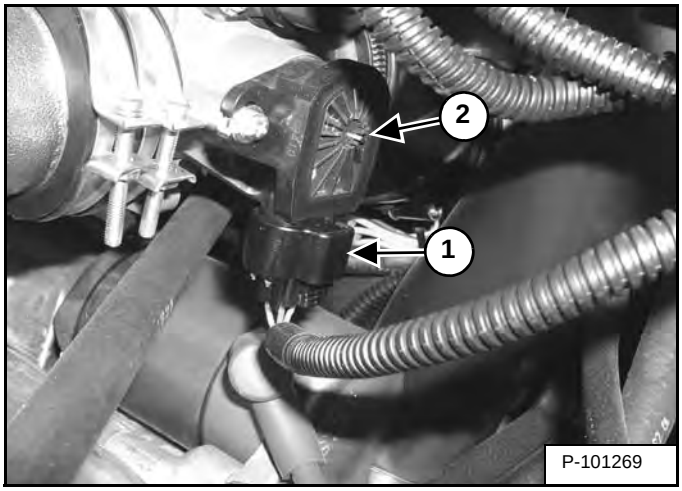
ELECTRONIC FUEL INJECTION SENSORS (CONT'D)

Throttle Position Sensor (TPS) (Cont'd)

Checking TPS Reading

Figure 40-90-14

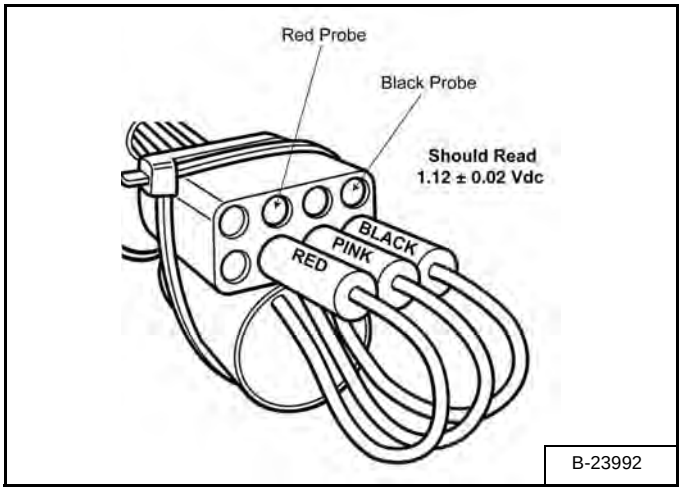


Remove the seat base and disconnect the harness (Item 1) from the TPS (Item 2) **[Figure 40-90-14]**.

Assemble IPS Tester. (See Throttle Position Sensor (TPS) on Page 40-90-5.)

Plug the TPS tester into the TPS.

Figure 40-90-15



Set your voltmeter to read DC volts. Insert the red and black voltmeter probes into the test ports as shown **[Figure 40-90-15]**.

Move the throttle open and closed slowly while reading the display. The voltage should increase and decrease smoothly without any "jumps" when the throttle is applied.

If voltage varier with throttle movement, continue on to the next step. If the sensor did not function correctly, replace it.

Allow the throttle pedal to rest in the idle position. The voltmeter should read 1.12 ± 0.02 vdc.

If the voltage does not read within the specified, proceed to the TPS Adjustment. (See Throttle Position Sensor (TPS) on Page 40-90-5.) If the voltage reading is within specification no adjustment is required.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Digital Wrench™ Diagnostic Software

Description

This software installs on laptop computers equipped with a CD drive and serial port connection. It is for use by Bobcat authorized dealership personnel only to perform the following tests and observations:

View or clear trouble codes

Analyze real-time engine data

Re flash ECU calibration files

Perform guided diagnostic procedures

Create customer service account records

Perform output state control tests

Diagnostic Software Version

Always use the most current version of the Digital Wrench™ software to ensure you have the latest updates or enhancements. New reprogramming files and guided diagnostic procedures are added to these updates as they become available. For information on how to determine if you have the latest update available, refer to "Digital Wrench™ Version and Update ID".

ECU Replacement

Although the need for ECU replacement is unlikely, a specific replacement procedure is required to ensure that all essential data contained within the original ECU is transferred to the replacement ECU. All replacement ECU's are shipped with no programming and must be programmed prior to vehicle use or the vehicle will not start.

Refer to procedure and carefully follow all instructions provided in Digital Wrench™.

Guided Diagnostic Available

Guided diagnostics are available within Digital Wrench™ for all supported Trouble Codes (that is, any fault that will turn on the 'Check Engine' indicator).

In addition guided diagnostics are also available for many other electrical sub systems.

Diagnostic procedures are added to subsequent versions of Digital Wrench™ as they become available. check your release version often and upgrade when available to be sure you are using the most current software available.

Digital Wrench™ Communication Errors

If you experience problems connecting to a vehicle or any Digital Wrench™ related problem, visit the digital Wrench™ Knowledge Base for the most current troubleshooting information. FAQs, downloads and software updates at *BobcatNET*.

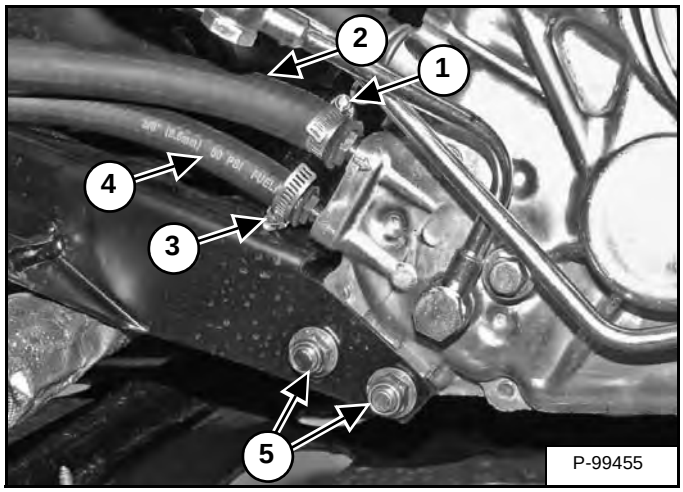

Bobcat®

Torque Values

TORQUE SPECIFICATIONS		
Fastener	Size	N•m (ft-lb)
Blind Plug (Oil Pressure)	28 tpi 1/8 Pipe Thread	9 - 15 (6.5 - 11)
Camshaft Sprocket	6 mm	7 - 9 (5 - 6.5)
Camshaft Chain Tensioner Lever	6 mm	7 - 9 (5 - 6.5)
Camshaft Chain Tensioner	6 mm	7 - 9 (5 - 6.5)
Camshaft Chain Tensioner Cap	11 mm	9 (6.5)
Throttle Body	8 mm	16 - 20 (12 - 14)
Crankcase	8 mm	19 - 21 (14 - 15)
Crankshaft Slotted Nut (Cam Chain Drive Sprocket)	28 mm	47 - 69 (35 - 51)
Cylinder Base Bolts	10 mm 6 mm	61 - 67 (45 - 49) 9 - 11 (6 - 8)
Cylinder Head Bolts	11 mm 6 mm	Refer to engine assembly for torque procedure
Drive Clutch Bolt	7/16 - 20	55 (40)
Flywheel	16 mm	78 - 98 (58 - 72)
Oil Delivery Pipe	12 mm	15 - 21 (11 - 15)
Oil Drain Bolt (Crankcase)	14 mm	19 - 23 (14 - 17)
Oil Filter Pipe Fitting	20 mm	49 - 59 (36 - 43)
Hard Metal Oil Line Banjo Fitting	N/A	15 - 21 (11 - 16)
Oil Hose Fitting	1/8 Pipe Thread	9 - 15 (6.5 - 11)
Oil Pump	6 mm	7 - 9 (5 - 6.5)
Oil Pump Case Screw	5 mm	2 - 3 (1.5 - 2)
One Way Valve	11 mm	20 - 25 (14 - 19)
Recoil Housing	6 mm	7 - 9 (5 - 6.5)
Rocker Cover	6 mm	9 - 11 (7 - 8)
Rocker Support	8 mm	11 - 13 (8 - 10)
Rocker Adjuster Screw	6 mm	8 - 10 (6 - 7)
Water Pump Impeller Nut	6 mm	7 - 9 (5 - 6.5)
Water Pump Housing Cover	6 mm	7 - 9 (5 - 6.5)
Stator Plate	6 mm	7 - 9 (5 - 6.5)
Starter Motor	6 mm	7 - 9 (5 - 6.5)
14 mm	Spark Plug	12 - 15 (9 - 11)
Thermistor	--	35 ± 3 (26 ± 2.1)

Engine Removal And Installation (Cont'd)

Figure 50-10-17



Loosen the clamp (Item 1) and disconnect the hose (Item 2) **[Figure 50-10-17]** that connects to the bottom of the oil reservoir.

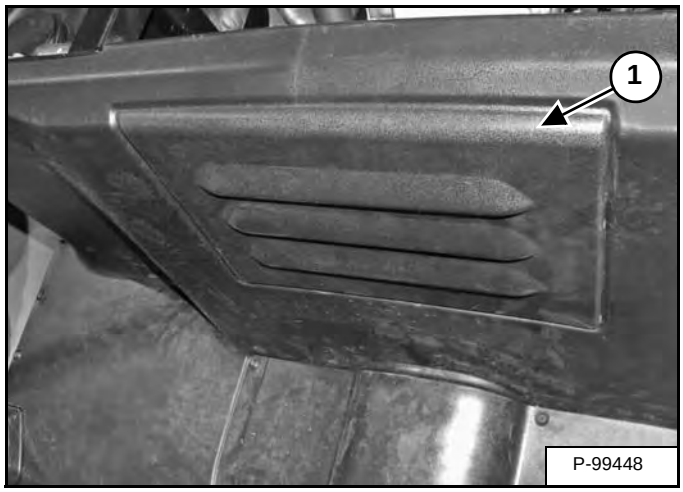
Loosen the clamp (Item 3) and disconnect the hose (Item 4) **[Figure 50-10-17]** that connects to the middle of the oil reservoir.

NOTE: Drain and dispose of the fluids properly.

Remove the nuts and bolts (Item 5) **[Figure 50-10-17]** from the front engine mount.

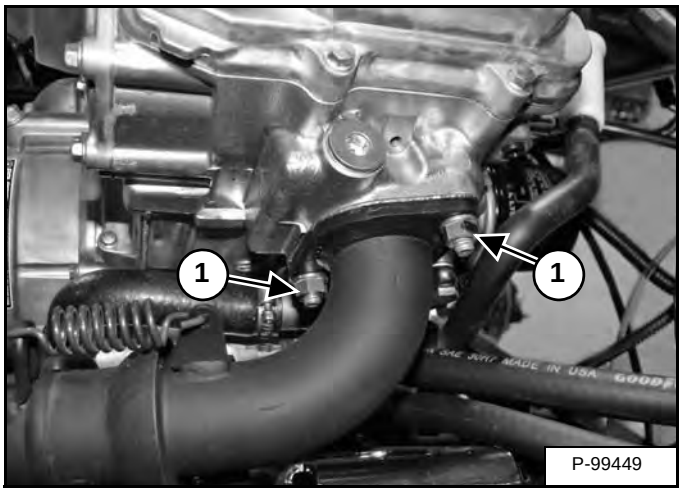
Installation: Tighten the nuts and bolts to 41 N•m (30 ft-lb) torque.

Figure 50-10-18



Lift and remove the engine access cover (Item 1) **[Figure 50-10-18]** to access the engine components.

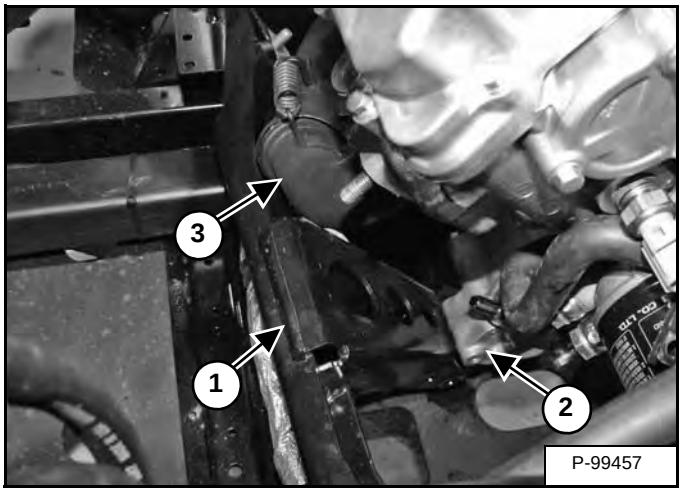
Figure 50-10-19



Remove the two nuts (Item 1) **[Figure 50-10-19]** and lock washers. Disconnect the exhaust from the engine.

Installation: Inspect the exhaust gasket for damage and replace if needed.

Figure 50-10-20



Move the front engine mount (Item 1) so the engine (Item 2) **[Figure 50-10-20]** will clear upon removal.

Shift the exhaust pipe (Item 3) **[Figure 50-10-20]** out of the way as needed.

NOTE: Lift or lower the engine as needed to move the front engine mount.


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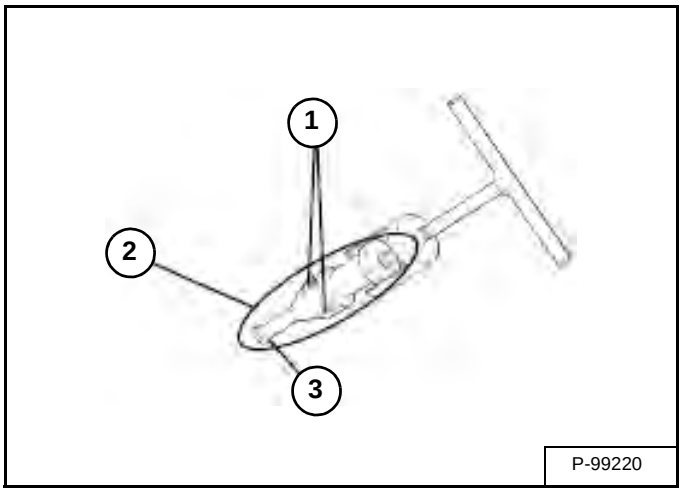
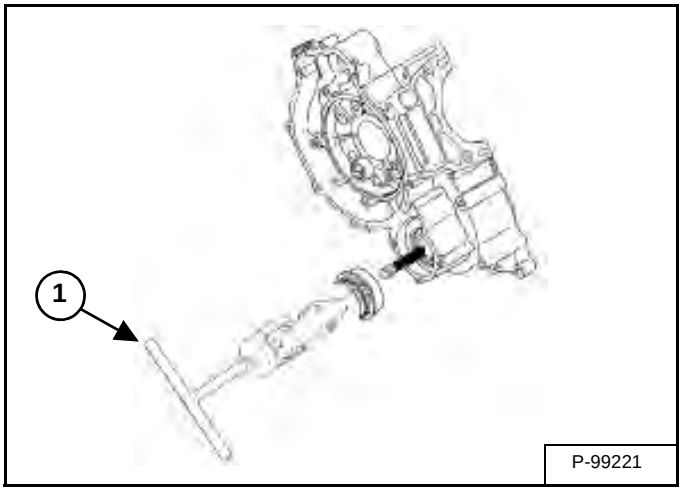
Figure 50-50-19



Tighten the hex socket screws (Item 1) on the puller legs (Item 2) sufficiently so the lip (Item 3) **[Figure 50-50-19]** of the puller legs will grasp the mechanical seal.

Water Pump Mechanical Seal Removal (Engine Installed) (Cont'd)

Figure 50-50-20



Turn the puller T-handle (Item 1) **[Figure 50-50-20]** clockwise until it contacts the water pump shaft. Continue rotating until the remaining portion of the mechanical seal has been removed from the cases. Pump shaft oil seal can also be replaced at this time.

To install the water pump mechanical seal, (See Water Pump Mechanical Seal Removal (Engine Installed) on Page 50-50-7.)

Fuel Pump Test

NOTE: The fuel pump is a serviceable assembly and must be replaced if determined to be faulty. If a fuel delivery problem is suspected, make certain the pump is being activated by the ECU and fuel pump relay, all electrical connections are properly secured, the fuses are good, and a minimum of 7.0 volts is being supplied. If during starting, the battery voltage drops below 7.0 volts, a reduction of fuel pressure may occur resulting in a lean starting condition.

⚠ WARNING

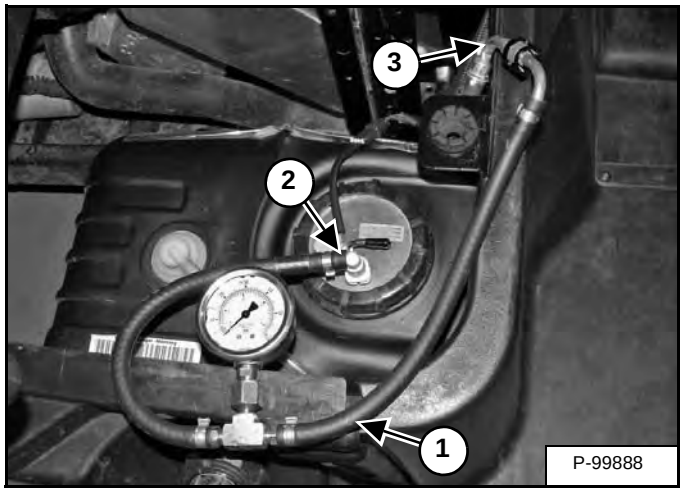
Fuel is extremely flammable and may cause severe burns, injury, or death.
Do not use any device that produces a flame or electrical devices that may spark around fuel or vapors.

W-2862-0710

The fuel pressure must be relieved from the system before disconnecting the fuel line. (See Relieving Fuel Pressure on Page 50-70-2.)

Order fuel pressure gauge adapter (PN PV-48656).

Figure 50-70-4



Cover the fuel line connection with a shop towel and disconnect the fuel line from the fuel pump.

Install the Fuel Pressure Gauge Adapter (Item 1) in-line between the fuel pump outlet (Item 2) and fuel line (Item 3) **[Figure 50-70-4]**.

Turn on the key switch to activate the pump and check the system pressure on the gauge. If system pressure of 269 kPa (2,69 bar) (39 psi) ± 3 is observed, turn the key switch "off" and depress the valve button on the tester to relieve the system pressure.

Fuel Pump Pressure	248 - 290 kPa (2,48 - 2,9 bar) (36 - 42 psi)

NOTE: If the pressure is too high or too low, replace the fuel pump.

If the pump did not activate while turning the key switch, disconnect the plug from the fuel pump. Connect a DC voltmeter across terminals "A" and "C" in the plug on the vehicle harness side. Turn on the key switch and observe voltage to ensure a minimum of 7 volts is present.

NOTE: If the voltage was below 7 VDC, test battery, ignition switch, fuel pump relay and wiring harness.

If the reading is between 7 and 14 volts, turn key switch off and connect an ohmmeter between the terminals "A" and "C"' in the plug on the pump harness to check for continuity within the fuel pump.

NOTE: If there was no continuity between the pump terminals, replace the fuel pump.

If voltage at the plug was within the specified range, and there was continuity across the pump terminals, reconnect the plug to the pump, making sure you have clean connections. Turn on the key switch and listen for the pump to activate.

NOTE: If the pump starts, verify you have the correct amount of fuel pressure.

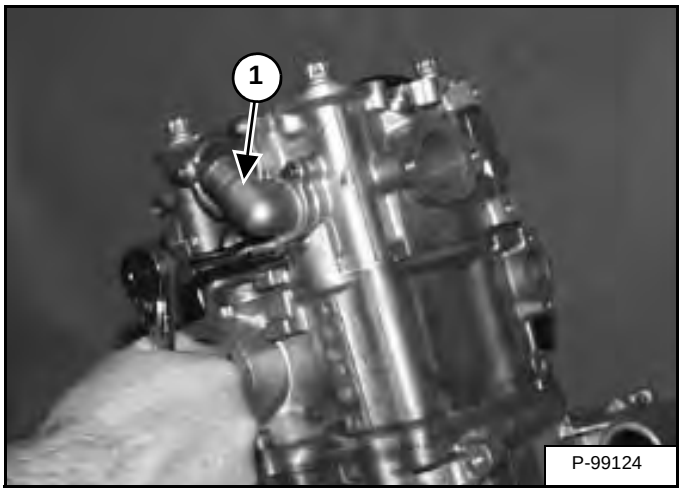
If the pump still does not operate, check ECU operation by plugging in a known-good ECU of the same model.

NOTE: If the pump still does not operate, replace the fuel pump.


Bobcat®

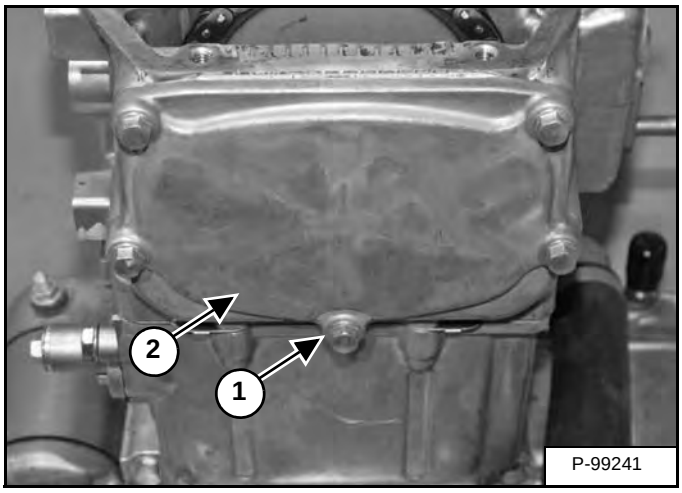
Camshaft Removal

Figure 50-80-23



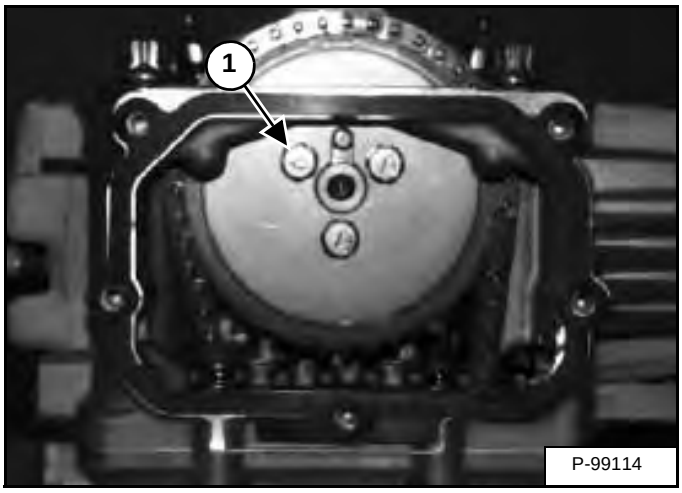
Remove the thermostat housing (Item 1) **[Figure 50-80-23]**.

Figure 50-80-24



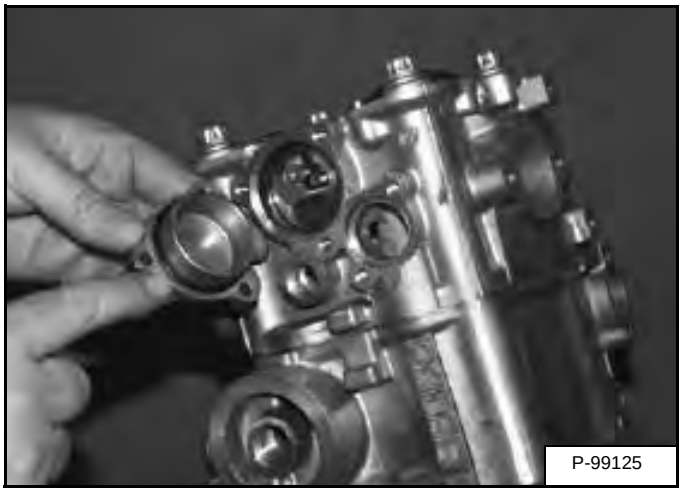
Remove the bolts (Item 1) and remove the camshaft sprocket inspection cover (Item 2) **[Figure 50-80-24]**.

Figure 50-80-25



Loosen the camshaft sprocket bolts (Item 1) **[Figure 50-80-25]**.

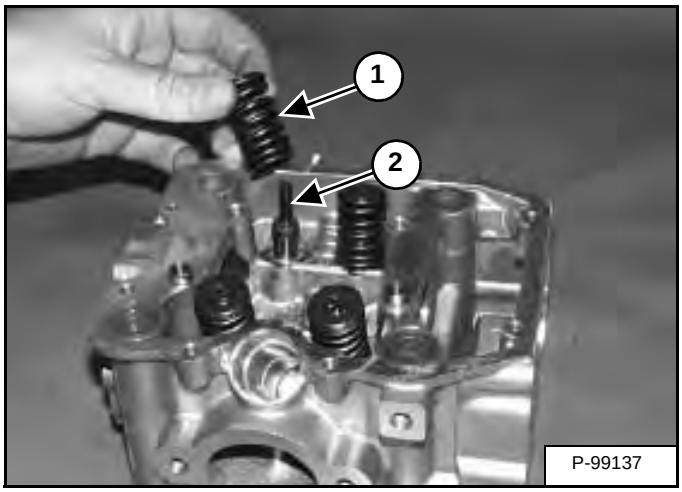
Figure 50-80-26



Remove camshaft end cap and O-ring **[Figure 50-80-26]**.

Cylinder Head Disassembly (Cont'd)

Figure 50-80-47



Remove spring retainer and spring (Item 1) **[Figure 50-80-47]**.

NOTE: The valve springs should be positioned with the tightly wound coils against the cylinder head on progressively wound springs (Item 1) [Figure 50-80-47].

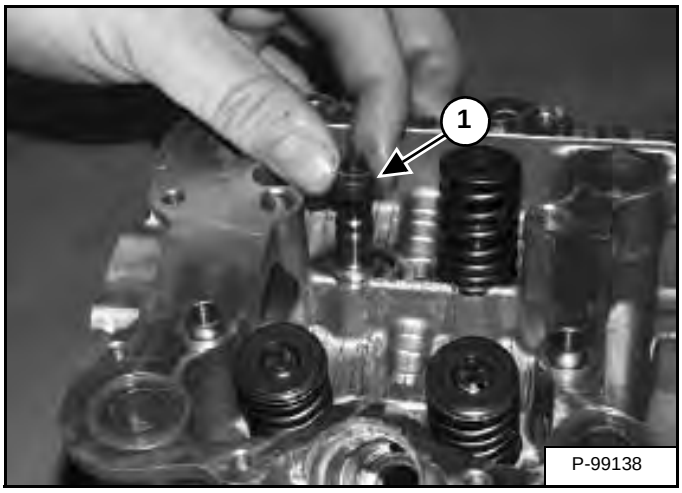
Push valve (Item 2) **[Figure 50-80-47]** out, keeping it in order for reassembly in the same guide.

Measure free length of spring with a Vernier caliper. Check spring for squareness. Compare to specifications. Replace spring if either measurement is out of specification.

Valve Spring (Overall Length)	Factory spec.	42,0 mm (1.654 in)
	Allowable limit	40,0 mm (1.575 in)

Valve Spring (Squareness)	1,9 mm (0.075 in)

Figure 50-80-48

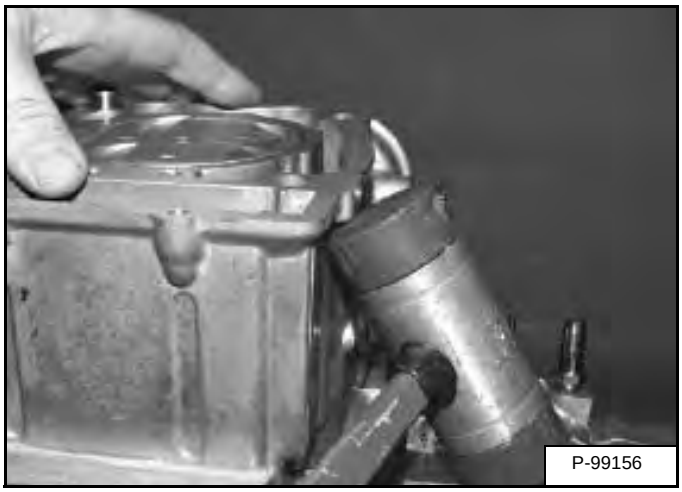


Remove the valve seals (Item 1) **[Figure 50-80-48]**.

NOTE: Replace seals whenever the cylinder head is disassembled. Hardened, cracked or worn valve seals will cause excessive oil consumption and carbon buildup.

Cylinder Removal (Cont'd)

Figure 50-80-70



Tap cylinder lightly with a plastic hammer in the reinforced areas only until loose **[Figure 50-80-70]**.

Rock cylinder forward and backward and lift it from the crankcase, supporting piston and connecting rod. Support piston with support blocks.

Remove dowel pins from crankcase.

Cylinder Inspection

Figure 50-80-71

Remove all gasket material from the cylinder sealing surfaces.

Inspect the top of the cylinder for warpage using a straight edge and feeler gauge **[Figure 50-80-71]**.

Cylinder warpage	0,05 mm (0.002 in)

Piston Ring Installation

NOTE: Apply clean engine oil to all ring surfaces and ring lands. Always check piston ring installed gap before rings are installed on piston (See Piston Ring Installed Gap on Page 50-80-39.) If the piston has been in service, clean any accumulated carbon from the ring grooves and oil control ring holes.

Figure 50-80-87

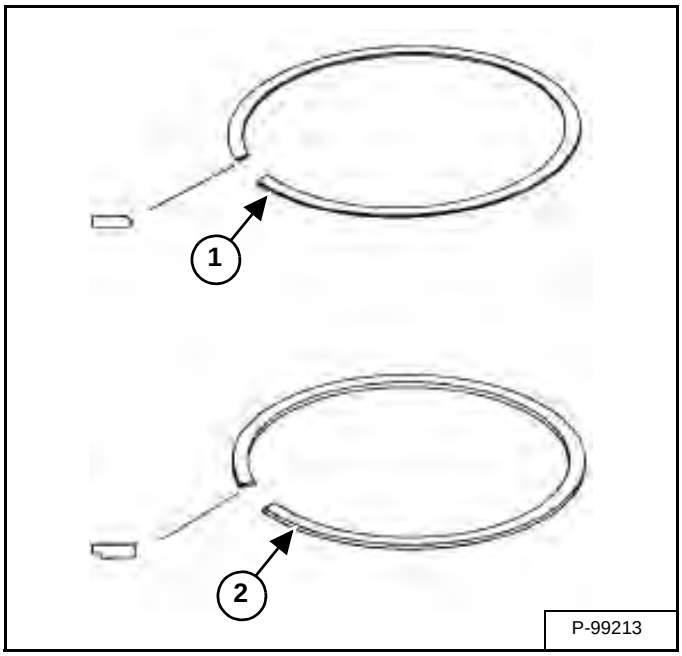
Place the oil control ring expander in oil ring groove with the end gap facing forward. The expander has no up or down marking and can be installed either way. The ends should butt squarely together and must not overlap.

Install the oil ring top rail.

NOTE: The top rail has a locating tab to prevent rotation. The tab must be positioned in the notch on the side of the piston as shown (Item 1) [Figure 50-80-87]

Install the bottom rail with the gap at least 30° from the end of the expander on the side opposite the top rail gap.

Figure 50-80-88



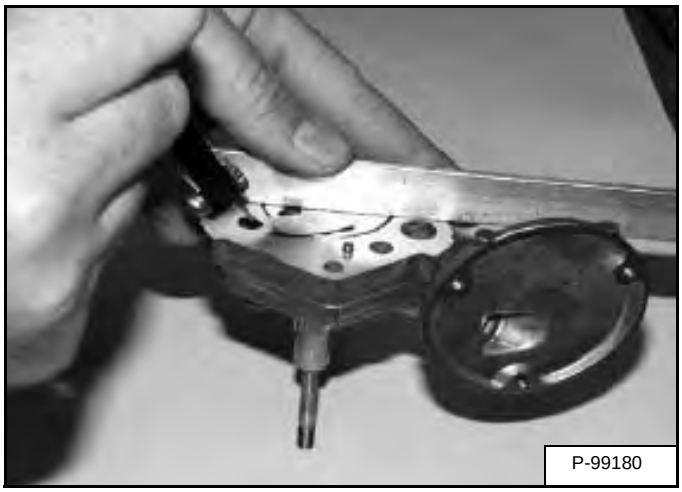
Install the top ring (chrome faced) (Item 1) **[Figure 50-80-88]** with the "R" mark facing up and the end gap facing forward (toward the exhaust).

Install the second ring (Item 2) **[Figure 50-80-88]** with the "R" mark facing up. Position the end gap toward the rear (intake) side of the piston.

Check to make sure the rings rotate freely in the groove when compressed.

Oil Pump Removal / Inspection (Cont'd)

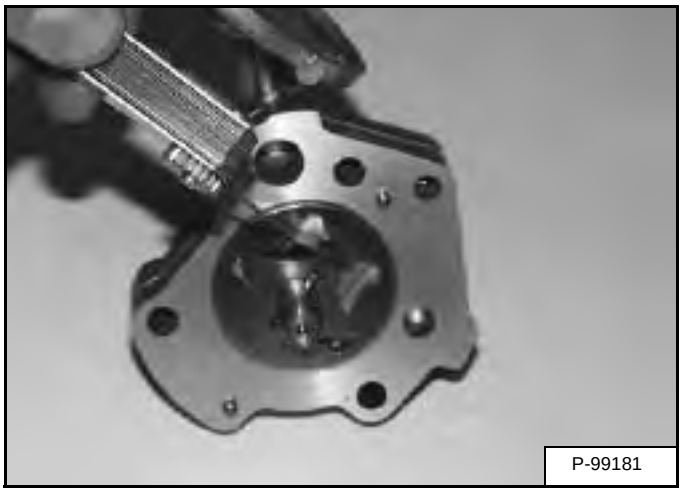
Figure 50-80-115



Measure pump end clearance using a feeler gauge and straight edge **[Figure 50-80-115]**.

Pump End Clearance	Factory spec.	0,0254 - 0,0762 mm (0.001 - 0.003 in)
	Wear limit	0,1016 mm (0.004 in)

Figure 50-80-116



Measure rotor tip clearance with a feeler gauge **[Figure 50-80-116]**.

Rotor Tip Clearance	Factory spec.	0,127 mm (0.005 in)
	Wear limit	0,2032 mm (0.008 in)

Remove inner and outer feed rotor and pump chamber body.

Repeat measurements for scavenge rotor.

Remove inner and outer scavenge rotor and inspect pump shaft for wear.

Oil Pump Assembly

Clean and dry all parts thoroughly. Apply clean engine oil to all parts. Do not use gasket sealer on the pump body mating surfaces or oil passages will become plugged.

Install pump shaft and scavenge rotor drive pin.

Install outer scavenge rotor, inner scavenge rotor, and scavenge casing.

Install outer feed rotor and inner feed rotor drive pin.

Install inner feed rotor and feed chamber cover with screw.

Tighten screw securely.

Install screen on pump body.

Install oil pump on crankcase and tighten the oil pump attachment bolts to 8 N•m (6 ft-lb) torque.

Crankshaft / Counter Balance / Oil Pump Installation

Lubricate all bearings with clean engine oil before assembly.

Use the Crankshaft / Water Pump Installation Kit (PN 2871283) to prevent damage to the crankshaft and main bearings during installation.

Install the crankshaft into the PTO side crankcase. Screw the threaded rod into the crankshaft until the threads are engaged a minimum of 25,4 mm (1 in).

Install the collar, washer, and nut onto the threaded rod. Hold the crankshaft and tighten the nut to draw the crankshaft into the main bearings until fully seated. Loosen the nut and remove the threaded rod from the crankshaft. If removal is difficult, install two nuts on the end of the threaded rod and tighten against each other.

Install the proper shim on the magneto end of the crankshaft.

Place the balancer shaft in the PTO crankcase aligning the timing marks on the crankshaft and balancer gears. Install the proper shim washer on the shaft.

Inspect the oil pump sealing surface on the crankcase. Apply a light film of engine oil to the surface and install the oil pump. Tighten the oil pump bolts to 8 N•m (6 ft-lb) torque.

NOTE: Do not use gasket sealer on the pump mating surfaces.

NOTE: After engine is assembled and the vehicle is prepared for field operation, oil pump MUST be primed. Follow oil pump priming procedure. (See Oil Pump Priming Procedure on Page 50-80-61.)

Align the drive gear with the drive pin on the pump shaft and install the gear. Be sure the gear is fully seated and properly engaged.

Install the proper shim washer on the pump shaft.

Tires

Factory Supplied Tires (AT489)	Tire Size	Wheel Size	**3400** - Tire Pressure	**3400XL** - Tire Pressure
Front	25 x 10 - 12	12 x 6	69 kPa (0,69 bar) (10 psi)	69 kPa (0,69 bar) (10 psi)
Rear	25 x 11 - 12	12 x 8	69 kPa (0,69 bar) (10 psi)	152 kPa (1,52 bar) (22 psi)

NUT TYPE	LOCATION	TORQUE
2-Piece Flange Nut 	Front and Rear	47 N•m (35 ft-lb)
Lug Nut 	Front and Rear	40 N•m plus 90° (1/4 turn) (30 ft-lb) plus 90° (1/4 turn)

NOTE: The wheel nuts must be checked and torqued after the first eight hours of operation of a new machine and after the first eight hours of operation when wheel(s) have been removed for service.