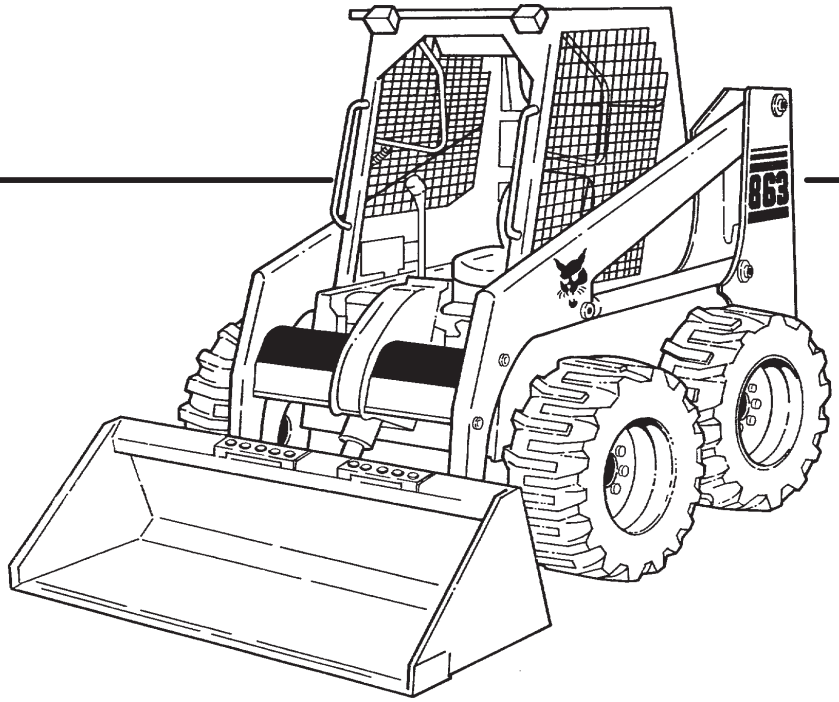
863

863

HIGH FLOW

Service Manual

(S/N 514411001–514424999)
(S/N 514511001–514524999)
(S/N 514611001–514624999)



EQUIPPED WITH BOBCAT INTERLOCK CONTROL SYSTEM (BICS™)

6724799 (7-10) Printed in U.S.A.

GLOSSARY OF HYDRAULIC/HYDROSTATIC SYMBOLS FOR LOADERS

SYMBOL DESCRIPTION

FLOW LINES and CONNECTIONS

WORKING CIRCUITS - Continuous, Solid Line - Working (Main) Line, Return Line (line conducting fluid from working devices to the reservoir) and Feed Line (main line conductor)

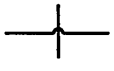
PILOT PRESSURE - Dashed Line - Pilot Line (line which conducts control fluid)

DRAIN CIRCUITS - Dotted Line - Drain Line (drain or bleed line - line conducting fluid from a component housing to the reservoir)

COMPONENTS - Long Chain Line - Enclosure outline for several components assembled in one unit

MECHANICAL CONNECTIONS - Double Line (Shaft, Lever, Piston Rod)

CONNECTED JUNCTION OF OIL LINES (Flow Line Connection)



OIL LINES CROSSING (NOT Connected)

COUPLER - Quick-Acting Coupling (uncoupled, closed by non-return valve)

SYMBOL DESCRIPTION

BASIC and MISCELLANEOUS SYMBOLS

RESTRICTION - Line with Fixed Restriction - Affected by Viscosity (property of resistance to flowing fluid)

VARIABLE ADJUSTMENT RESTRICTION - Regulated or Variable Restriction

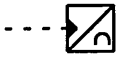
TEMPERATURE CONTROL - (indication of temperature)

TEMPERATURE INDICATOR - (temperature measurement - thermometer)

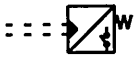
FILTER (strainer or screen) - For fluid conditioning

VENTED AND FILTERED RESERVOIR (reservoir open to atmosphere)

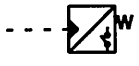
OIL COOLER (heat exchanger) - The arrows in the diamond indicate the extraction of heat (heat dissipation)



PRESSURE SENSOR - Varies electric signal with pressure



DIFFERENTIAL PRESSURE SWITCH - Switch activates when pressure difference reaches specified level



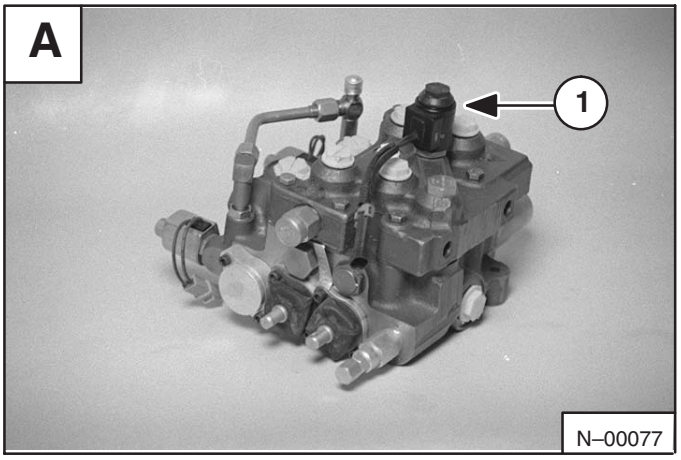
PRESSURE SWITCH - Switch activates when pressure reaches specified level

MUFFLER (silencer) - Reduces noise

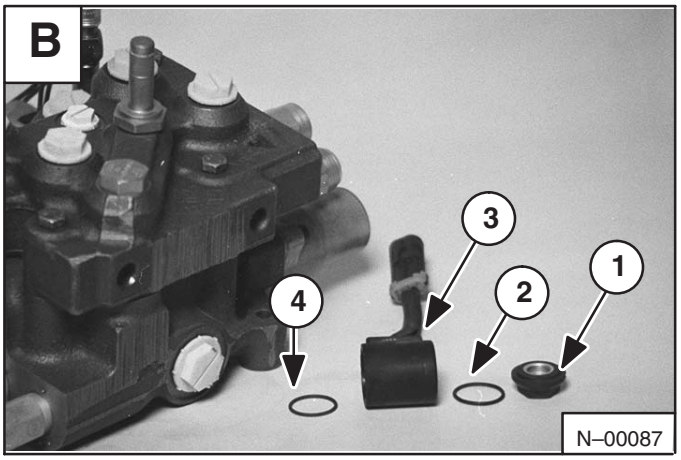
BICS™ VALVE ASSEMBLY (Cont'd)

BICS™ Valve Solenoid

Loosen the mounting nut (Item 1) **[A]** at the solenoid.

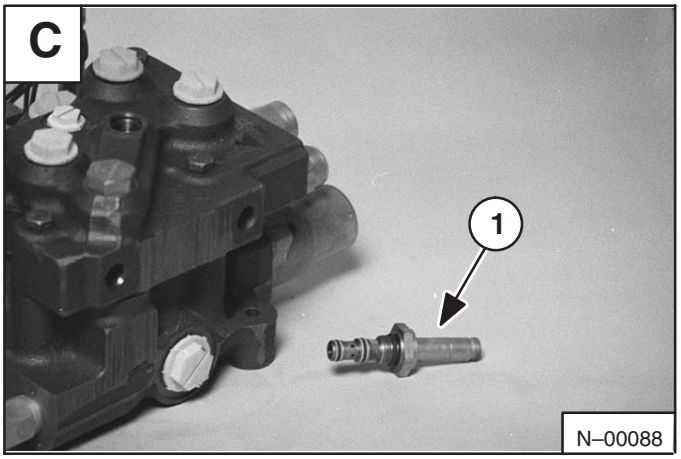


Remove the mounting nut (Item 1) **[B]**, O–ring (Item 2) **[B]**, solenoid (Item 3) **[B]**, and O–ring (Item 4) **[B]**.



Loosen and remove the solenoid cartridge (Item 1) **[C]** from the valve.

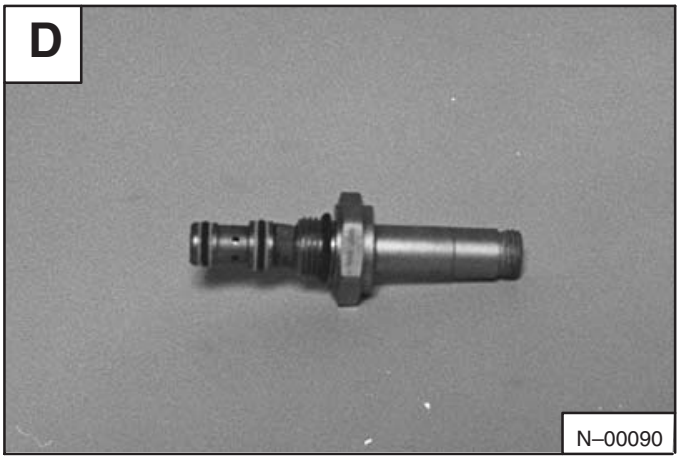
Installation: Tighten the cartridge to 20 ft.–lbs. (27 Nm) torque.



Inspect the solenoid cartridge for damage **[D]**.

Replace all the O–rings and back–up washers before installation **[D]**.

Replace the cartridge if necessary.

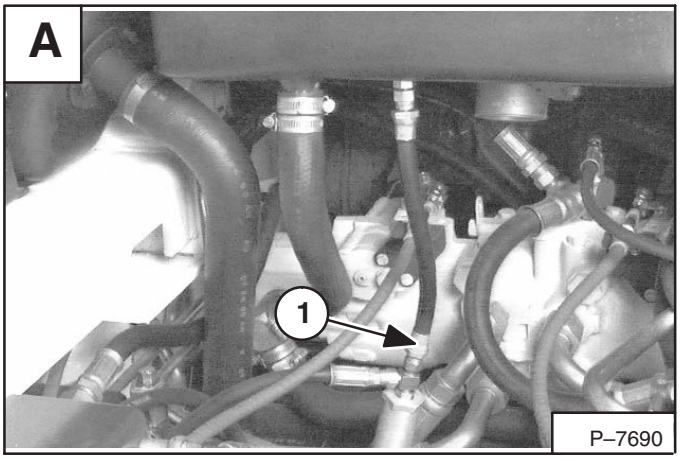


HYDRAULIC FLUID RESERVOIR

Removal and Installation

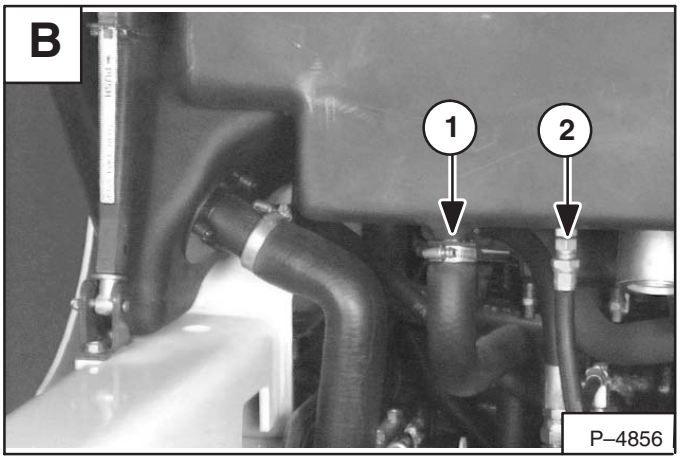
Raise the operator cab. (See Page 1–1.)

Disconnect the hose (Item 1) **[A]** at the case drain filter and drain the fluid into a container.



Loosen the hose clamp and disconnect the reservoir outlet hose (Item 1) **[B]**.

Disconnect the case drain hose (Item 2) **[B]** at the reservoir.

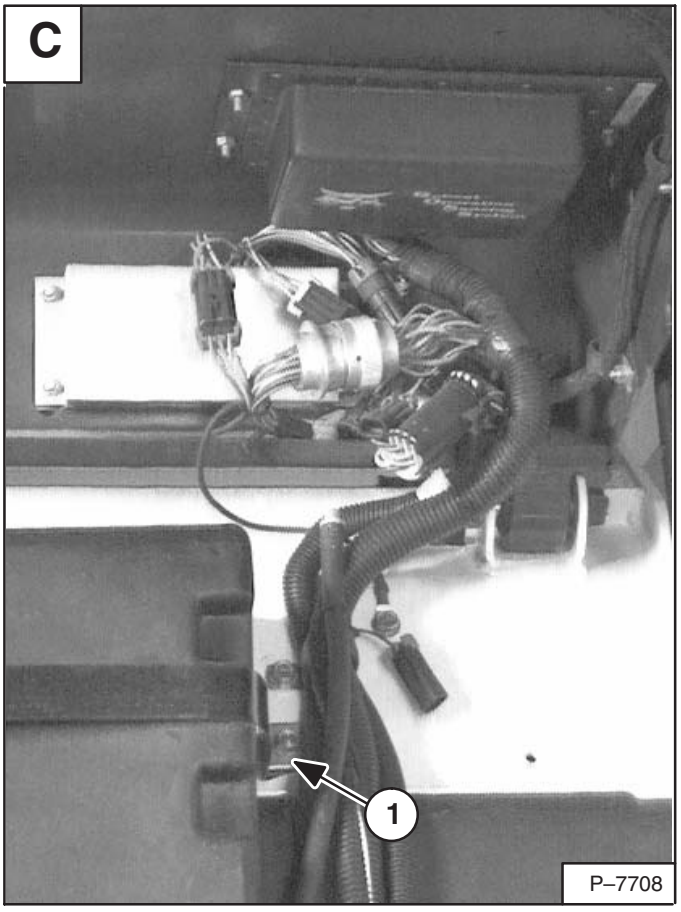


Remove the bolt and plate from the mounting strap (Item 1) **[C]** (both sides)

Installation: Tighten the bolt to 16–20 ft.–lbs. (21–27 Nm) torque.

Remove the mounting strap.

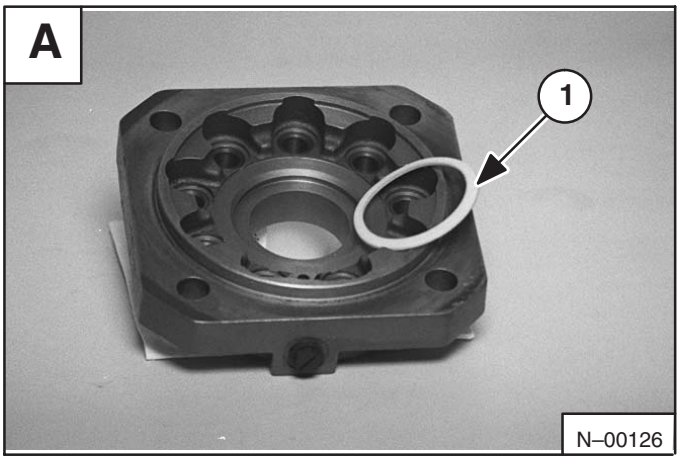
Remove the hydraulic reservoir from the loader.



HYDROSTATIC MOTOR (Cont'd)

Assembly (Cont'd)

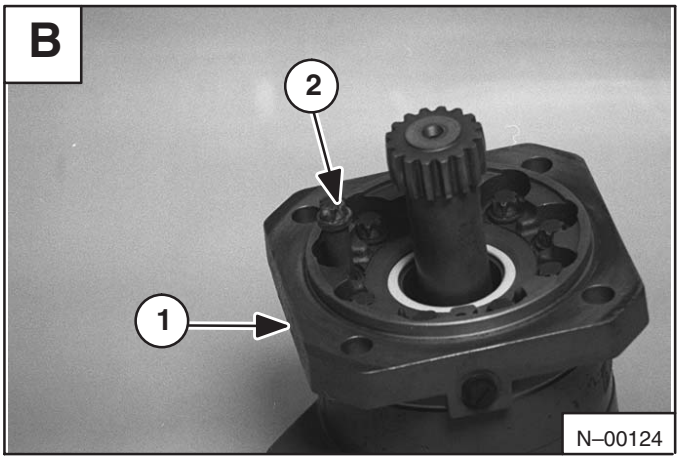
Carefully turn the mounting flange over, install the seal (Item 1) **[A]**.



Install the mounting flange (Item 1) **[B]** on the balance plate.

Be careful not to displace the seals and back–up rings.

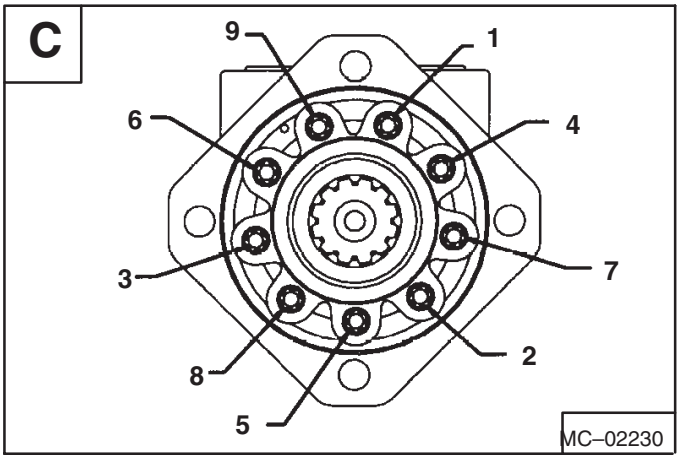
Install the nine bolts (Item 2) **[B]** into the motor. Make sure all the parts are in correct alignment.



Step One: Tighten the bolts to 50 ft.–lbs. (68 Nm) torque as shown in Figure **[C]**.

Step Two: Tighten the bolts to 105 ft.–lbs. (142 Nm) torque as shown in Figure **[C]**.

NOTE: To prevent damage to the balance plate, never lift or support the motor by the center shaft.

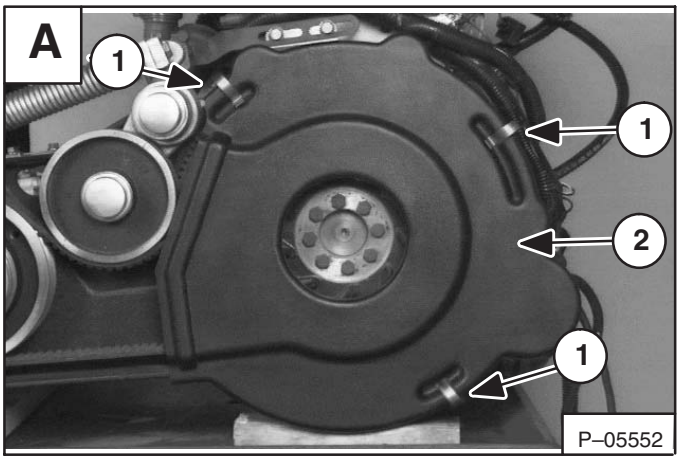


DRIVE BELT TENSIONER PULLEY

Removal and Installation

Remove the belt shield clips (Item 1) **[A]**.

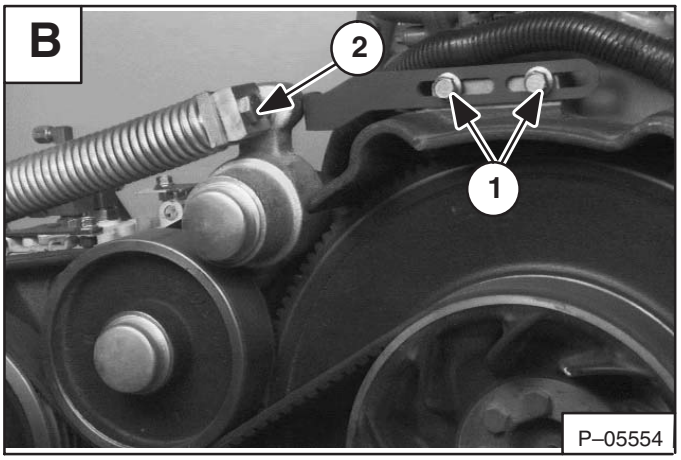
Remove the belt shield (Item 2) **[A]**.



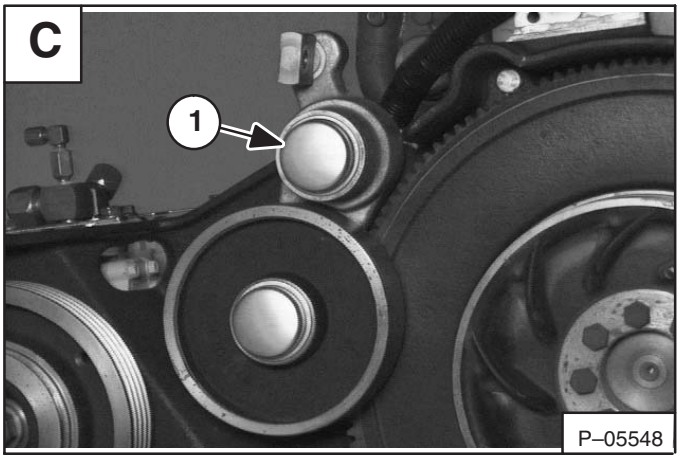
Remove the two stop mounting bolts (Item 1) **[B]**.

Remove the stop.

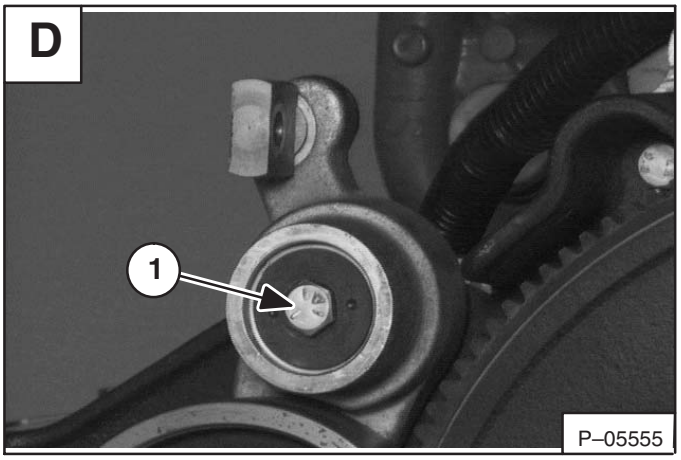
Remove the spring tension bolt (Item 2) **[B]**.



Remove the end cap (Item 1) **[C]** from the tensioner pulley arm.



Remove the mounting bolt (Item 1) **[D]** from the tensioner pulley arm.

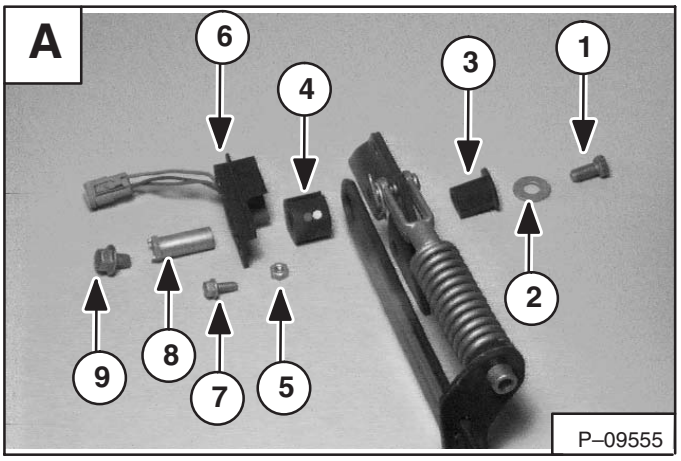


SEAT BAR (W/COMPRESSION SPRING) (Cont'd)

Assembling Components

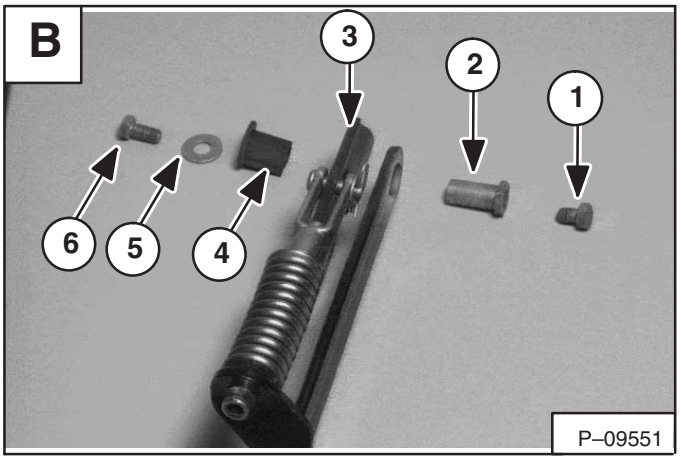
Assemble the parts as shown for the left side of the seat bar pivot assembly **[A]**:

Mounting Bolt (Item 1)
Washer (Item 2)
Keyed Plastic Bushing (Item 3)
Magnetic Bushing Assembly (Item 4)
Sensor Mounting Nut (Item 5)
Sensor Bracket (Item 6)
Sensor Mounting Bolt (Item 7)
Pivot Bushing (Item 8)
Mounting Bolt (Item 9)



Assemble the parts as shown for the right side of the seat bar pivot assembly **[B]**:

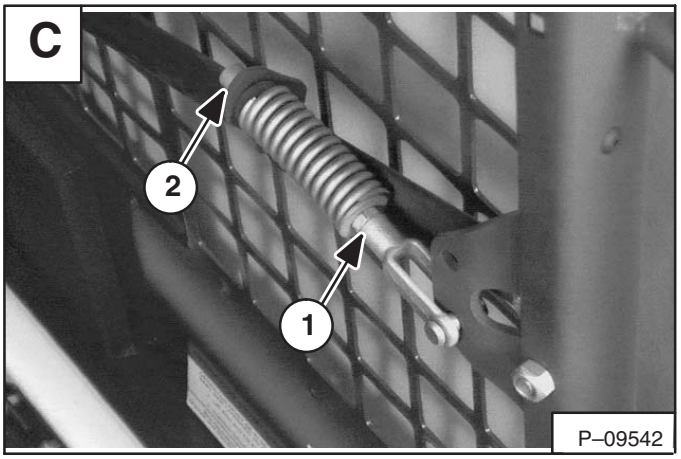
Mounting Bolt (Item 1)
Pivot Bushing (Item 2)
Mounting Bracket (Item 3)
Keyed Plastic Bushing (Item 4)
Washer (Item 5)
Mounting Bolt (Item 6)



Compression Spring Disassembly and Assembly

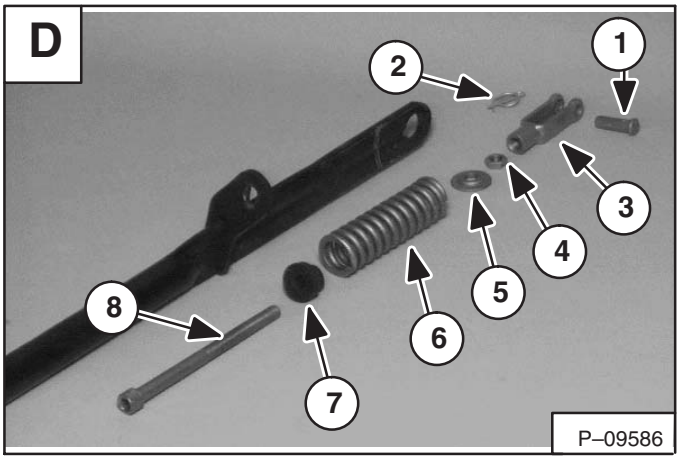
Loosen the lock nut (Item 1) **[C]** and turn the bolt (Item 2) **[C]** out of the clevis.

Assembly: Adjust the compressin spring as shown on Page 5–8; Fig. **[B]**.



Disassemble and assemble the seat bar compression spring and parts as shown in Fig. **[D]**:

Pin (Item 1)
Retaining Pin (Item 2)
Clevis (Item 3)
Lock Nut (Item 4)
Washer (Item 5)
Spring (Item 6)
Bushing (Item 7)
Bolt (Item 8)



863 BOSS - WIRING SCHEMATIC

514412954-19300
(Printed March 1999)
MC2480

CONTROLS HARNESS - 6712669

BICS CONTROLLER HARNESS - 6712134

MAINFRAME CONTROLLER HARNESS - 6712523

FILTER HARNESS (BOSS) - 6710731

REAR LIGHT HARNESS - 6714350

ENGINE HARNESS (BOSS) - 6713313 OR 6713930

CAB HARNESS (BOSS) - 6711774

CONTROLS MODULE

BOSS

FUSE BLOCK

WIRES CONNECT BY LETTER ACROSS CONNECTORS

SOME CONNECTOR BODIES NOT SHOWN FOR DRAWING CLARITY

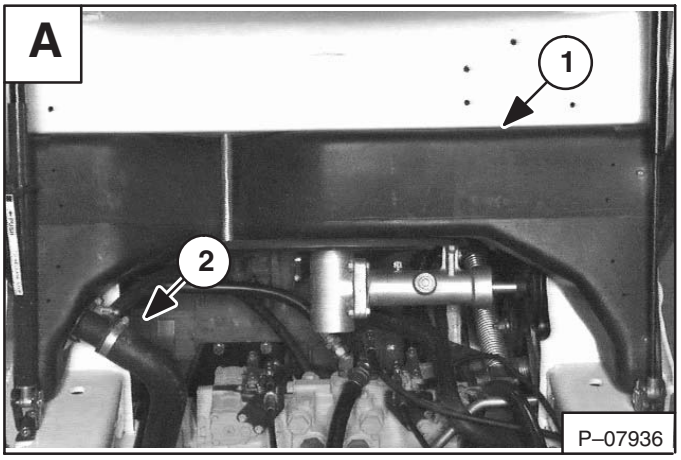
MC2480 (3-5-99)

BLOWER HOUSING/FAN GEARBOX (Cont'd)

Removal and Installation (Cont'd)

Remove the sealant from the blower housing and loader frame (Item 1) **[A]**.

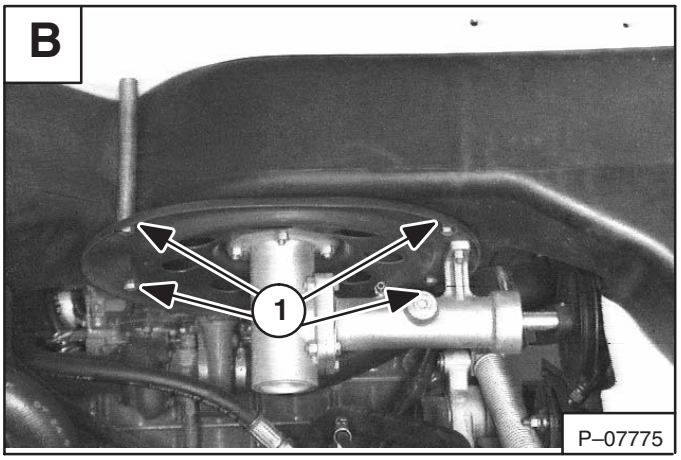
Remove fuel fill hose (Item 2) **[A]** and the fuel vent hose.



Remove the four mounting bolts (Item 1) **[B]** and spacer tubes (two outside housing and two inside housing).

NOTE: Remove the two rear mounting bolts first.

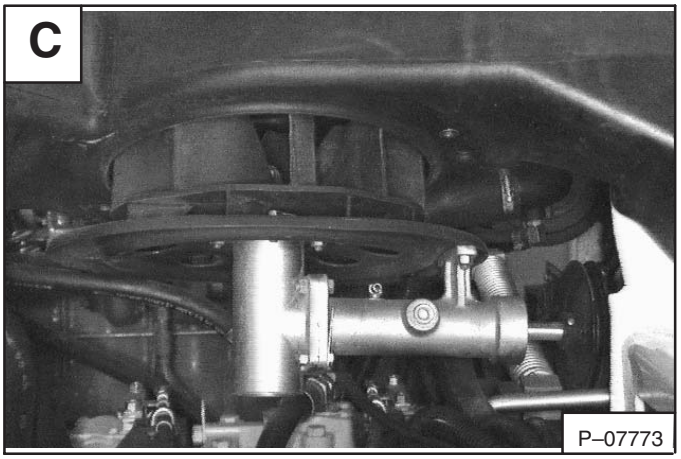
Installation: Use sealant on each end of the inside spacer tubes to prevent the tubes from falling out of the housing during installation. Tighten the mounting bolts to 25–28 ft.–lbs. (34–38 Nm) torque.



Slide the blower housing forward and remove the fan/fan gearbox assembly. Remove the blower housing **[C]**.

Installation: Use R.T.V. sealant to re–seal the blower housing to the loader frame (Item 1) **[A]**.

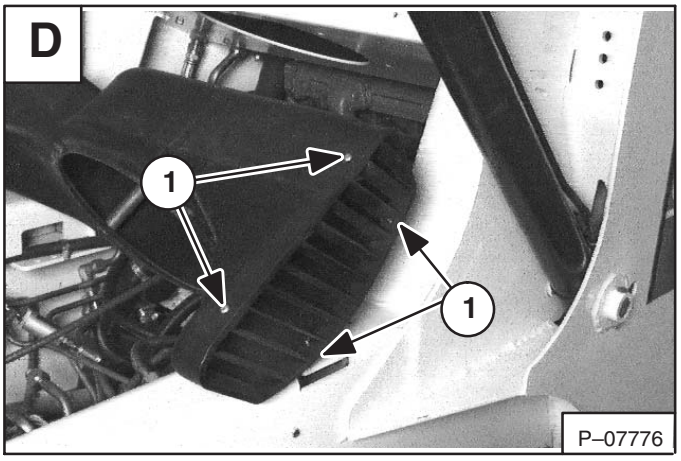
See Page 7–13 for Disassembly of the Fan Gearbox.



The blower housing must be moved away from the loader frame if the side grills need to be replaced **[D]**.

To replace the side grill, remove the four mounting screws (Item 1) **[D]** from the blower housing.

Install the new grill and replace the screws.



TIMING BELT (Cont'd)

Belt Replacement In Loader

Use the following procedure to replace the timing belt, tensioner and tensioner bolt. If the belt is broken, additional procedures are required and noted.

- ***For Broken Belt Replacement Only***
- Remove the engine muffler. (See Page 7–6.)
- Remove the valve cover. Remove and inspect the rocker arms/brackets and push rods. (See Page 7–35.)

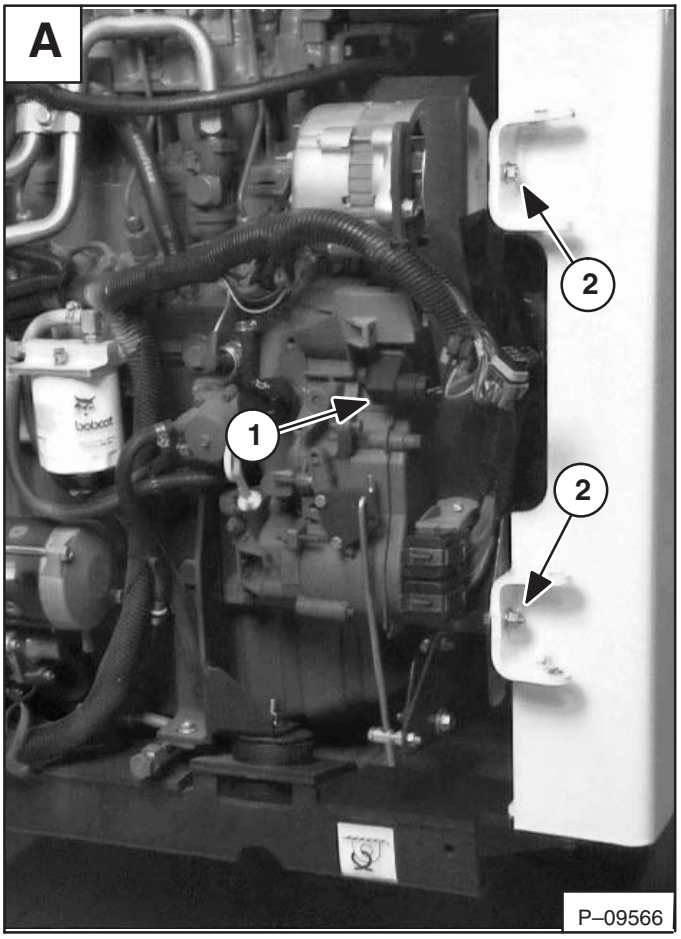
NOTE: The rear door is removed for photo clarity only.

Disconnect the negative (–) battery cable.

Loosen the screw and unplug the fuel solenoid connector (Item 1) **[A]**.

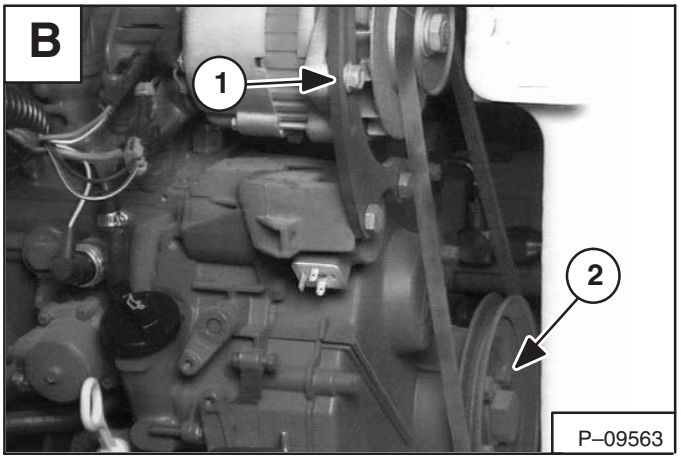
NOTE: Do not lose the rubber seal gasket on the solenoid connector.

Remove the bolts (Item 2) **[A]** holding the belt shield. Move the shield away from the work area.



Loosen the alternator adjustment bolt (Item 1) **[B]** and remove the alternator belt.

Remove the crankshaft pulley bolts (Item 2) **[B]**. Remove the pulley.



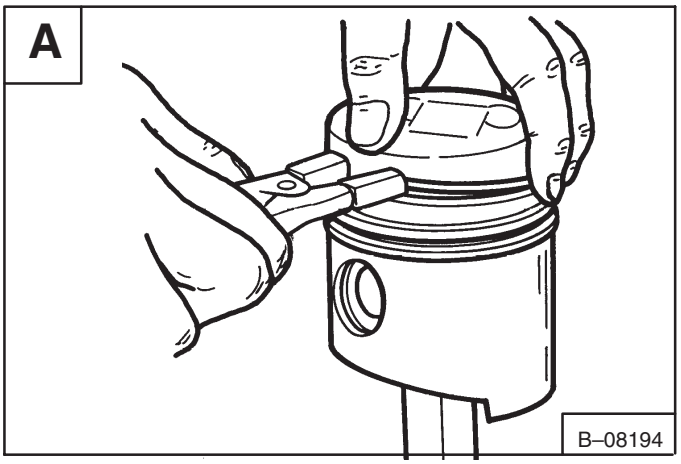
PISTON AND PISTON PIN

Checking the Piston

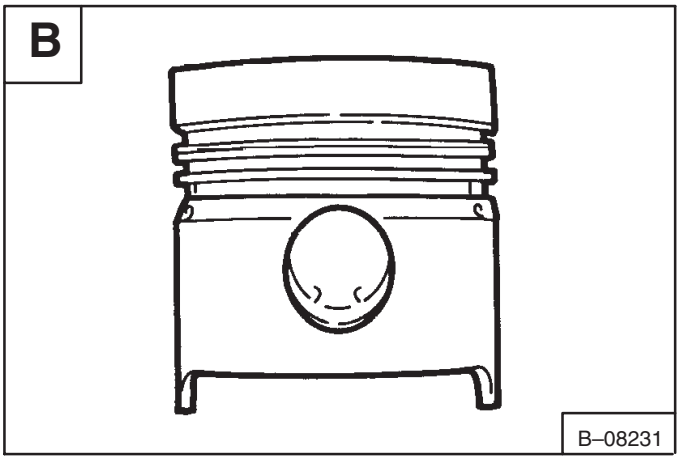
Remove the piston rings from the piston **[A]**.

Remvoe the piston from the connecting rod.

See Page 7–86 to check connecting rod specifications.



Clean and inspect piston and piston ring grooves **[B]**.



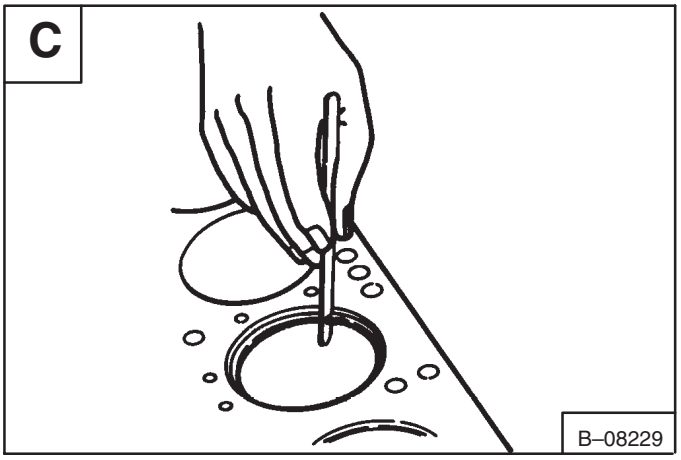
Measure the ring gap with a feeler gauge in the cylinder **[C]**.

Specifications (BF4M1011):

Wear Limit
1st Ring Gap . . . . . 0.011–0.019 inch (0,3–0,5 mm)
2nd Ring Gap . . . . . 0.031–0.041 inch (0,8–1,05 mm)
3rd Ring Gap . . . . . 0.018–0.028 inch (0,45–0,7 mm)

Specifications (BF4M1011F):

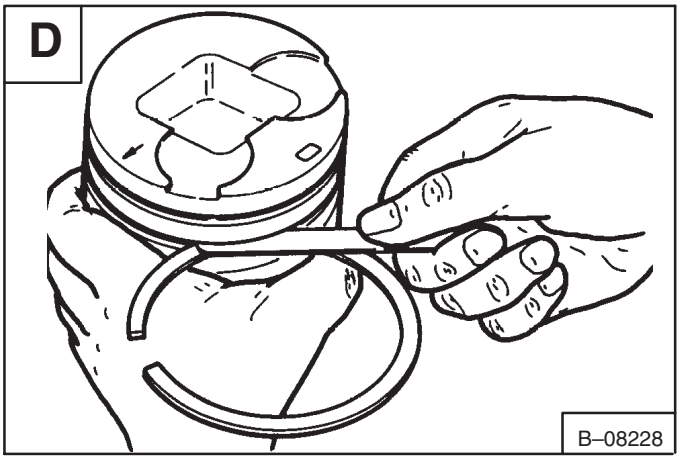
Wear Limit
1st Ring Gap . . . . . 0.012–0.020 inch (0,3–0,5 mm)
2nd Ring Gap . . . . . 0.031–0.039 inch (0,8–1,0 mm)
3rd Ring Gap . . . . . 0.018–0.028 inch (0,45–0,7 mm



Using new rings, measure the ring grooves using a feeler gauge **[D]**.

Specifications:

Wear Limit
1st Ring . . . . . 0.008 inch (0,2 mm)
2nd Ring . . . . . 0.006 inch (0,16 mm)
3rd Ring . . . . . 0.005 inch (0,12 mm)



Troubleshooting Guide

The following troubleshooting guide is provided for assistance in locating and correcting BICS system problems. It is recommended that these procedures be done by authorized Bobcat Service Personnel only.

⚠ WARNING

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

W–2004–1285

BICS SYSTEM CONTROLLER

PROBLEM	SOLUTION #
Power indicator light does not come ON.	1, 2, 3, 6
All indicator lights flashing.	4
One of the indicator lights flashing.	5
Intermittent indicator lights.	6, 7, 8, 9

SOLUTION SUGGESTIONS

1. Check that ignition switch is ON.
2. Check BICS 10 amp. fuse.
3. Check wiring and connections. Make sure the connector is securely connected to the controller. Remove controller and pull on connector to check.
4. Look at indicator light windows, if they are milky white in appearance, it is most likely caused by moisture in the controller. Allow to dry or replace the controller.
5. Refer to BICS controller troubleshooting chart. (See Page 8–4.)
6. Check wire connections to make sure connectors are locked into place.
7. Check pins in connectors for pins pushed back or bent.
8. Move the system wiring back & forth to try to find area that may be causing the intermittent connection.
9. Use sensor tester MEL1428 to isolate problem between sensor and controller and wiring.

HYDRAULIC CONNECTION SPECIFICATIONS (Cont'd)

O–ring Flare Fitting (Cont'd)

NOTE: O–ring flare fittings are not recommended in all applications. Use the standard flare fittings in these applications.

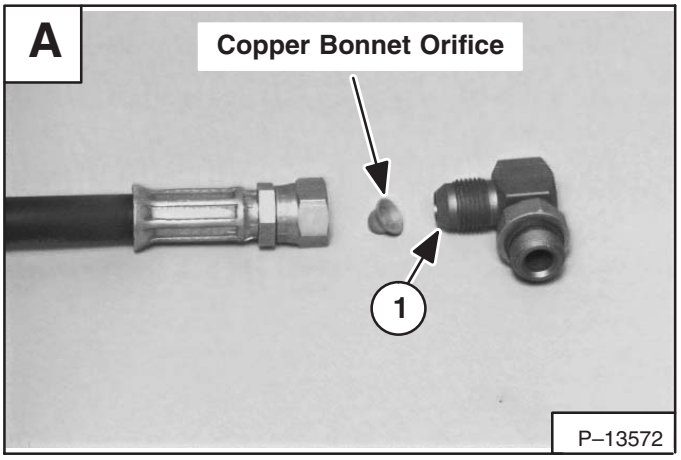
Do not use a O–ring flare fitting when a copper bonnet orifice is used. When tightened the connection at the bonnet may distort the flare face and prevent it from sealing.

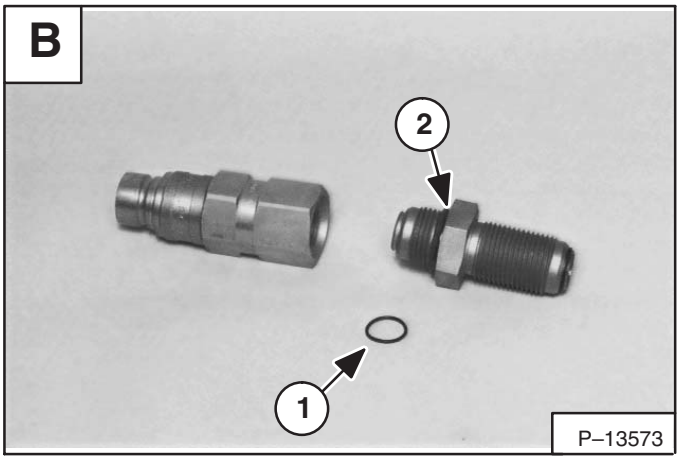
Use a standard flare fitting (Item 1) **[A]** as shown.

When a O–ring flare fitting is used as a straight thread port adapter the O–ring flare face is not used to seal. The O–ring may come off the fitting and enter the system.

Always remove the O–ring (Item 1) [B] from the flare face as shown.

An O–ring (Item 2) **[B]** is added to the flat boss of the fitting to seal the connection in this application.





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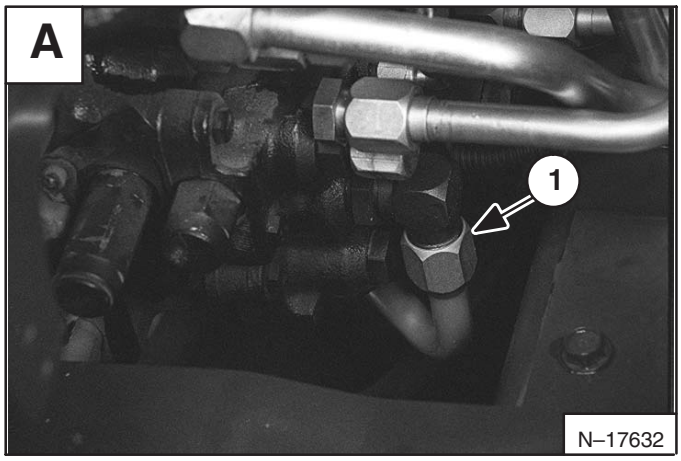
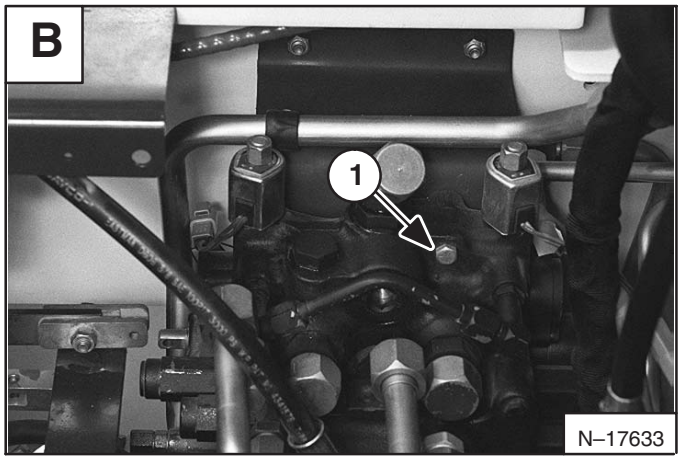
Removal and Installation (Cont'd)

Disconnect the lift tubeline (Item 1) **[A]** at the control valve.



Remove the two mounting bolts (Item 1) **[B]** from the control valve.

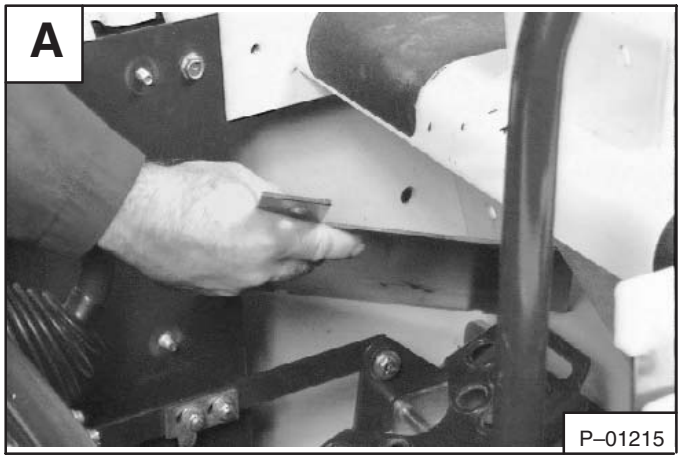
Remove the control valve from the loader.



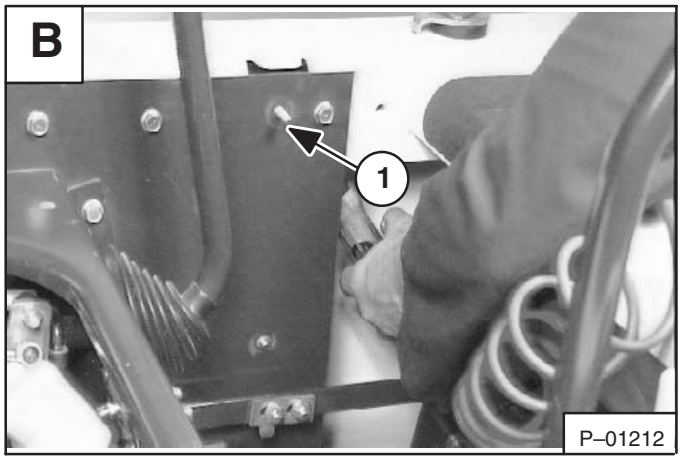
PEDAL INTERLOCK LINKAGE (Cont'd)

Removal And Installation (Cont'd)

Remove the panel from the loader frame **[A]**.



Install the mounting bolts (Item 1) **[B]** through the back of the panel as shown.



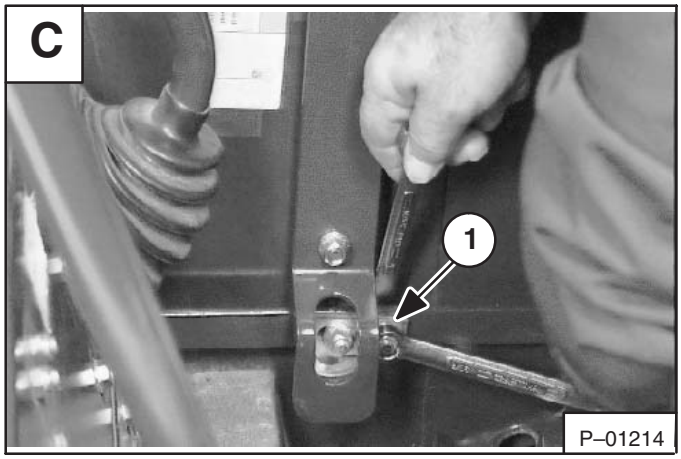
Pedal Interlock Linkage Adjustment

Check the pedal interlock linkage so it is free and locks both pedals in neutral position.

Check that the tab (Item 1) **[C]** on the linkage, slides into the slot on the interlock and holds the pedal in locked position.

If not, loosen the bolts and adjust the tab for correct engagement.

Tighten the bolts to 25–28 ft.–lbs. (34–38 Nm) torque.



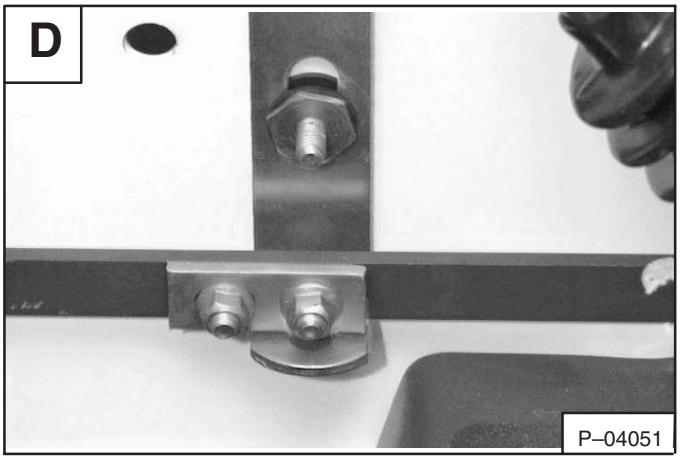
⚠ WARNING

AVOID INJURY OR DEATH

Adjust locking tabs on pedal control linkage so that lift and tilt control pedals are locked in neutral when the seat bar is up.

W–2104–1285

The locking tab should fit into the slot of the interlock as shown in figure **[D]**, when adjusted correctly.



Disassembly

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 plug (Item 1) **[A]**, spring (Item 2) **[A]** and poppet (Item 3) **[A]**.

Remove the O–ring from the plug.

Remove the end plug (Item 1) **[B]** from the housing.

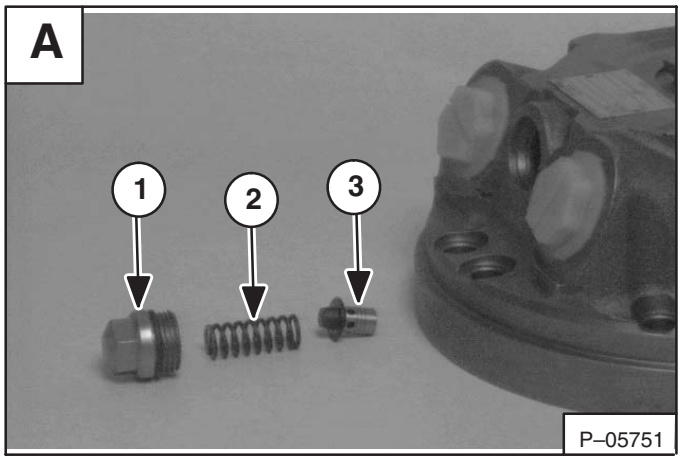
Remove the O–ring from the plug.

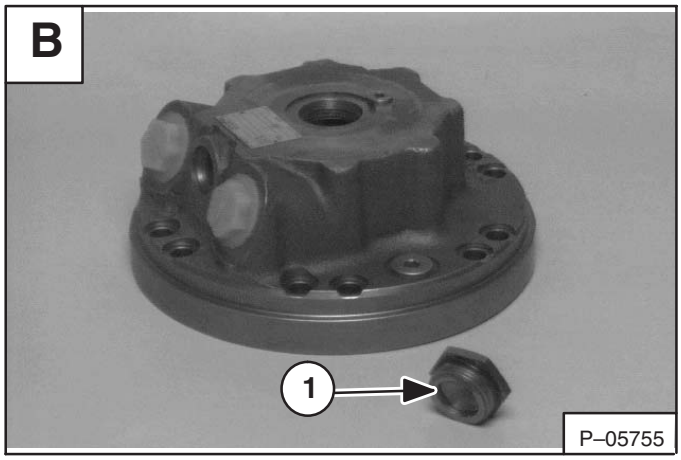
Use a brass drift and remove the distributor (Item 1) **[C]** from the housing.

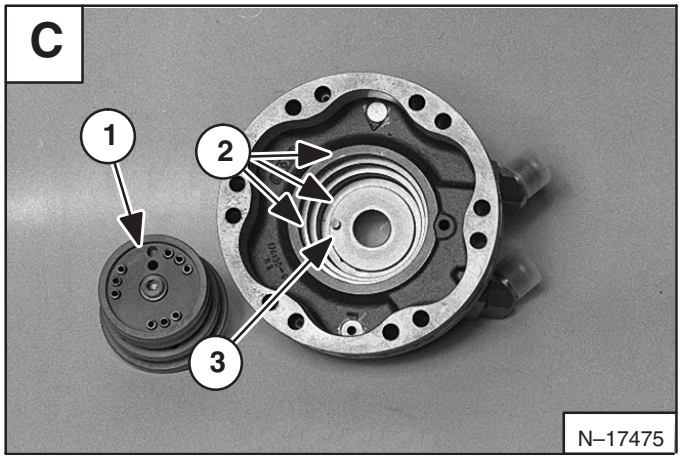
Remove the three seals (Item 2) **[C]** and O–ring (Item 3) **[C]** from the housing.

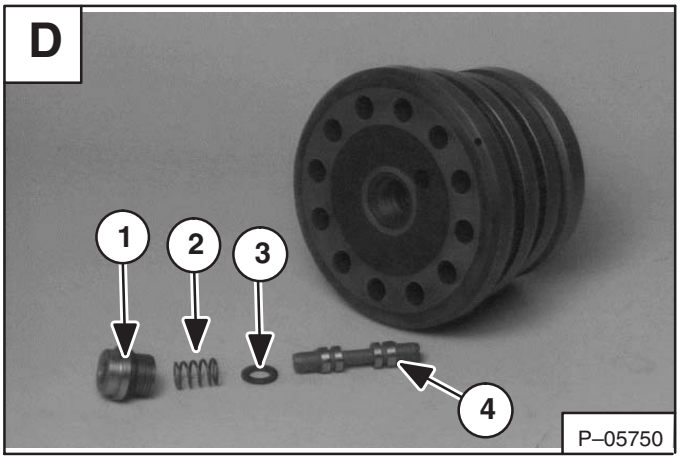
Remove the plug (Item 1) **[D]**, spring (Item 2) **[D]**, washer (Item 3) **[D]** and piston (Item 4) **[D]** from the distributor.

Remove the O–ring from the plug.





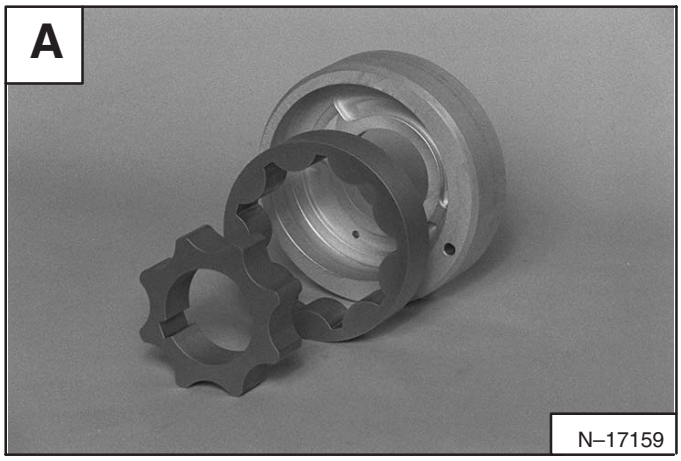




HYDROSTATIC PUMP (M46) (Cont'd)

Charge Pump Assembly

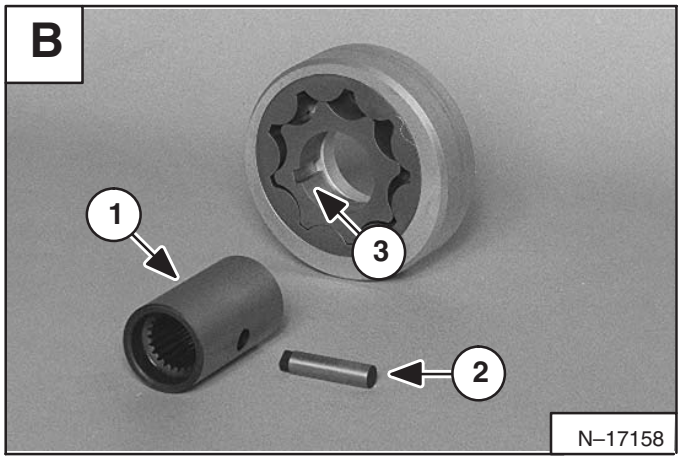
Apply oil to the gerotor assembly and gerotor cover. Install the gerotor assembly into the gerotor cover **[A]**.



Apply oil to the splined coupler (Item 1) **[B]** and drive pin (Item 2) **[B]**.

Install the splined coupler and drive pin into the gerotor assembly.

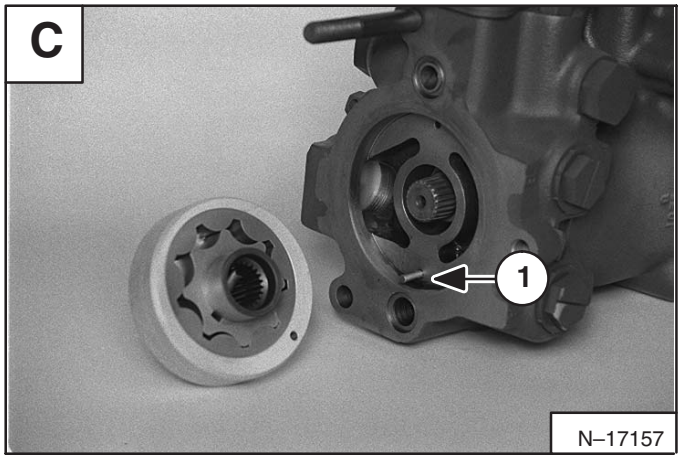
The drive pin must be engaged in the gerotor slot (Item 3) **[B]**.



Install the gerotor assembly into the pump **[C]**.

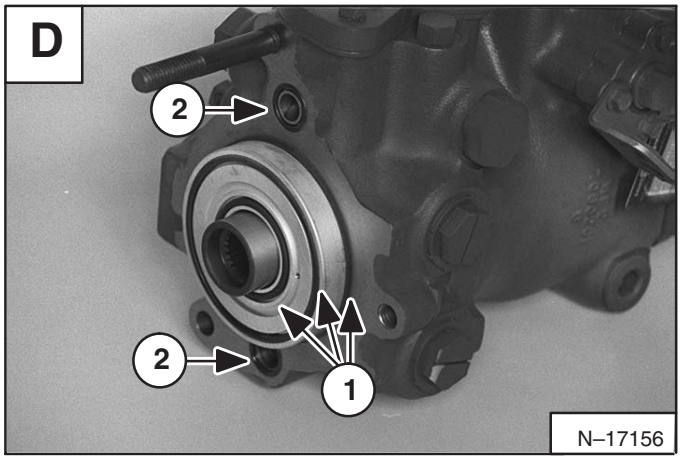
Make sure to install the gerotor assembly for the correct rotation. The pin (Item 1) **[C]** must be installed in the bottom hole in the housing.

NOTE: DO NOT align the gerotor pin with the top matching hole in the housing.



Apply petroleum jelly to the three new O–rings and install the O–rings (Item 1) **[D]** on the gerotor cover.

Apply petroleum jelly to the two small O–rings on the pump face (Item 2) **[D]**.



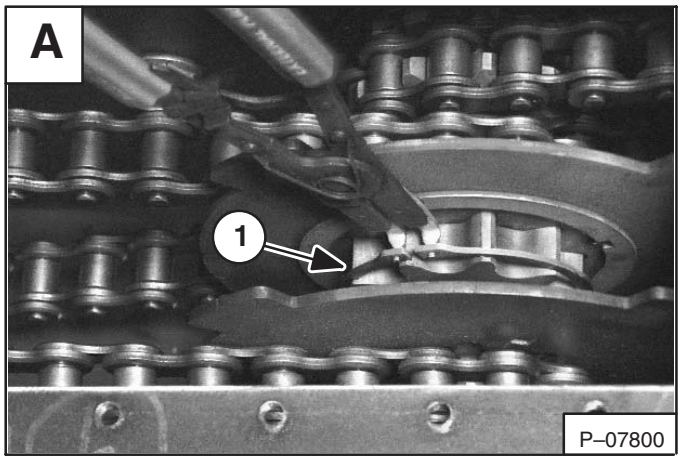
PARKING BRAKE DISC (Cont'd)

Removal And Installation (Cont'd)

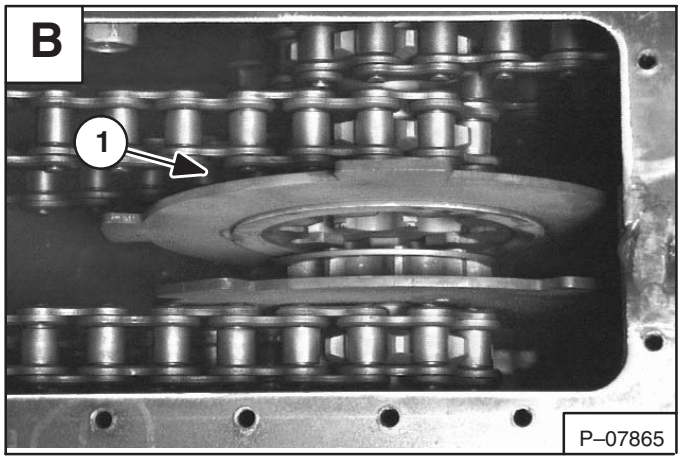
A snap ring pliers with 90° tips are needed for removing the brake disc snap ring.

Pull the disc away from snap ring.

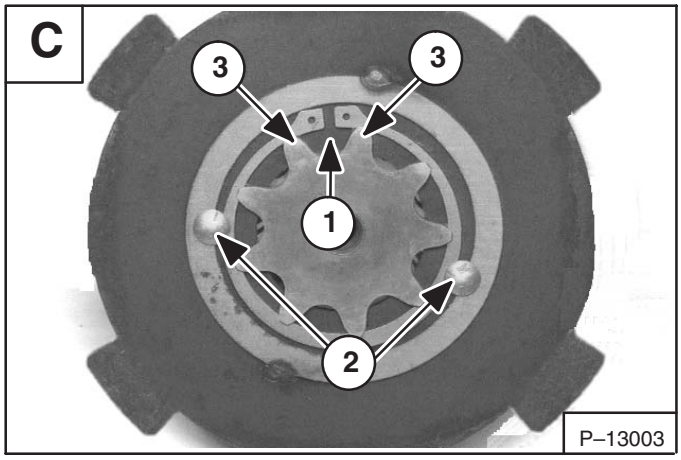
Remove the snap ring (Item 1) **[A]** from the end of the carrier shaft.



Remove the disc (Item 1) **[B]** from the shaft.



Installation: Bolting the disc to the snap ring provides proper disc alignment. Disc and shaft are shown removed for photo clarity. The snap ring end gap (Item 1) **[C]** must be between the disc bolts (Item 2) **[C]** and sprocket teeth (Item 3) **[C]** after the brake disc is installed on the shaft.



WIRING SCHEMATICS
863

DOMESTIC

863 WITHOUT BOSS - WIRING SCHEMATIC
514425001 AND ABOVE
(Printed October 1998)

863 BOSS - WIRING SCHEMATIC
514425001 AND ABOVE
(Printed October 1998)

863 WITHOUT BOSS - WIRING SCHEMATIC
WITH HIGH FLOW OPTION
514425001 AND ABOVE
(Printed October 1998)

863 BOSS - WIRING SCHEMATIC
WITH HIGH FLOW OPTION
514425001 AND ABOVE
(Printed October 1998)

OPTIONS

863 - WIRING SCHEMATIC
ATTACHMENT CONTROL OPTION
514425001 AND ABOVE
(Printed October 1998)

863 - WIRING SCHEMATIC
OPTIONS
514425001 AND ABOVE
(Printed October 1998)

REFER TO SECTION 10 FOR ADVANCED HAND CONTROL OPTIONS WIRING SCHEMATICS

TROUBLESHOOTING
Chart

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

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

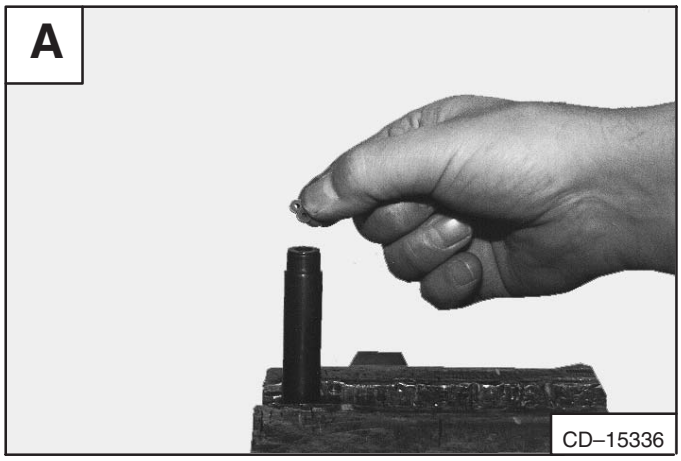
KEY TO CORRECT THE CAUSE	
1. Battery capacity low.	26. Incorrect high pressure fuel pipes.
2. Bad electrical connections.	27. Worn cylinder bores.
3. Faulty starter motor.	28. Worn valve and seats.
4. Incorrect grade of oil.	29. Broken, worn or sticking piston rings.
5. Low cranking speed.	30. Worn valve stems or guides.
6. Fuel tank empty.	31. Worn or damaged bearings.
7. Faulty stop control operation.	32. Not enough oil in the oil pan.
8. Plugged fuel line.	33. Switch/sensor is defective.
9. Plugged fuel filter.	34. Oil pump worn.
10. Restriction in the air cleaner.	35. Pressure relief valve is sticking open.
11. Air in the fuel system.	36. Pressure relief valve is sticking closed.
12. Faulty fuel injection pump.	37. Broken relief valve spring.
13. Faulty fuel injectors.	38. Faulty suction pipe.
14. Broken injection pump drive.	39. Plugged oil filter.
15. Incorrect injection pump timing.	40. Piston seizure.
16. Incorrect valve timing.	41. Incorrect piston height.
17. Poor compression.	42. Faulty engine mounting.
18. Plugged fuel tank vent.	43. Incorrect alignment of flywheel.
19. Incorrect grade of fuel.	44. Faulty thermostat.
20. Exhaust pipe restriction.	45. Plugged oil cooler
21. Cylinder head gasket leaking.	46. Plugged PCV system.
22. Overheating.	47. Damaged valve stem oil deflectors.
23. Cold running.	48. Plugged oil pump pipe strainer.
24. Incorrect tappet adjustment.	49. Broken valve spring.
25. Sticking valves.	

FUEL INJECTOR (Cont'd)

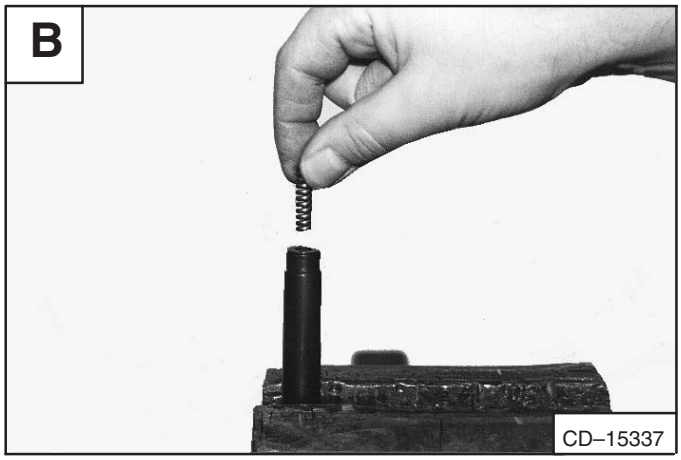
Assembly

Install the shim(s) **[A]**.

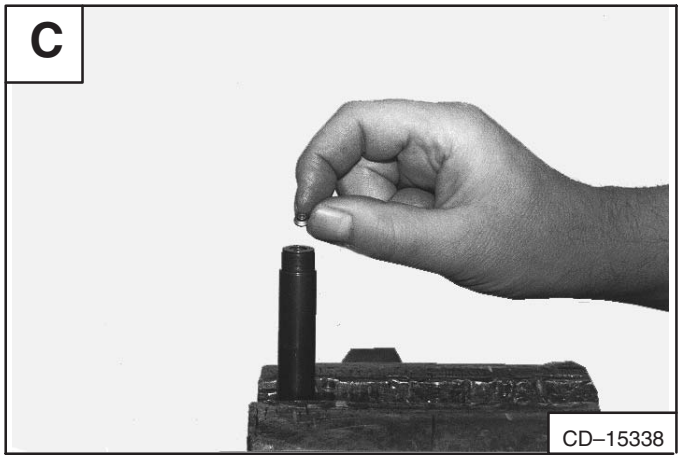
The injector opening pressure is adjusted by selecting the correct amount of shim(s). A thicker shim will increase the opening pressure at the injector nozzle.



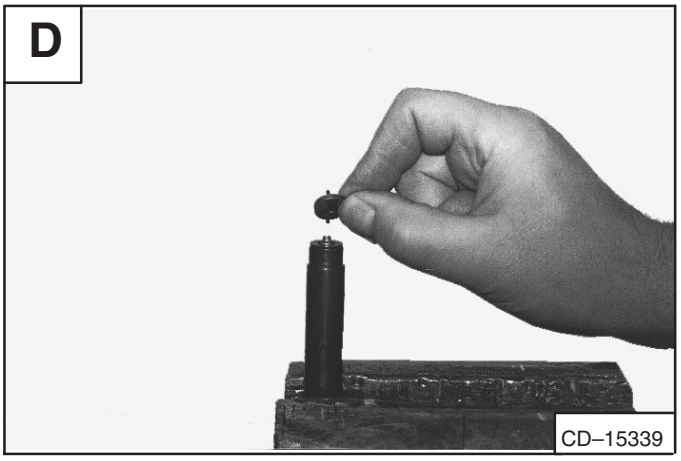
Install the compression spring **[B]**.



Install the thrust pin with the centering collar facing toward the compression spring **[C]**.



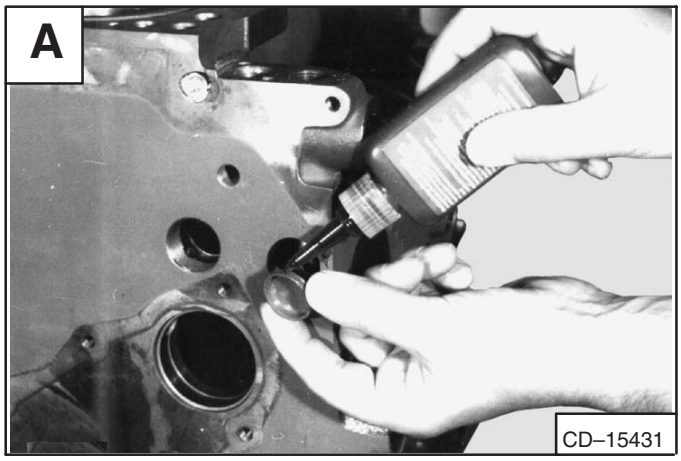
Install the adapter with the centering pins toward the thrust pin **[D]**.



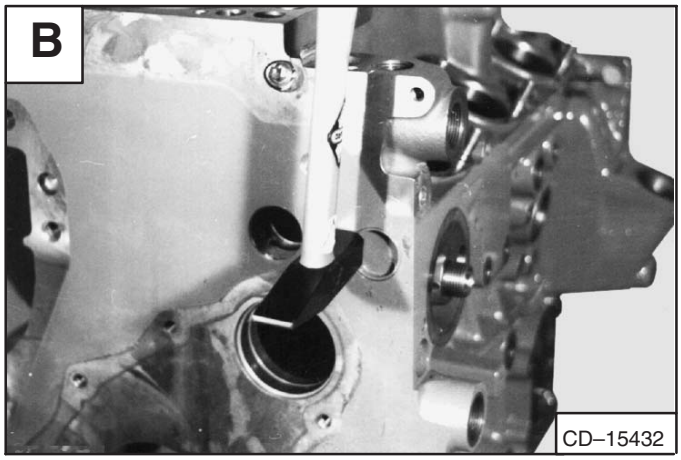
CONTROL ROD AND GUIDE BUSING (Cont'd)

Installation (Cont'd)

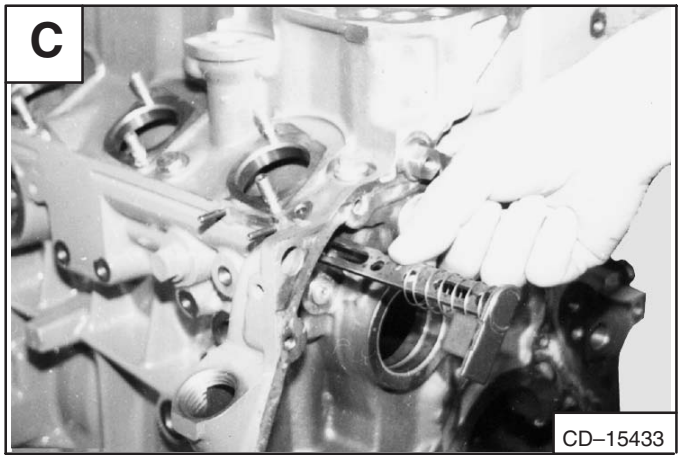
Put sealing compound on the new cover **[A]**.



Install the new cover flush with the engine block **[B]**.

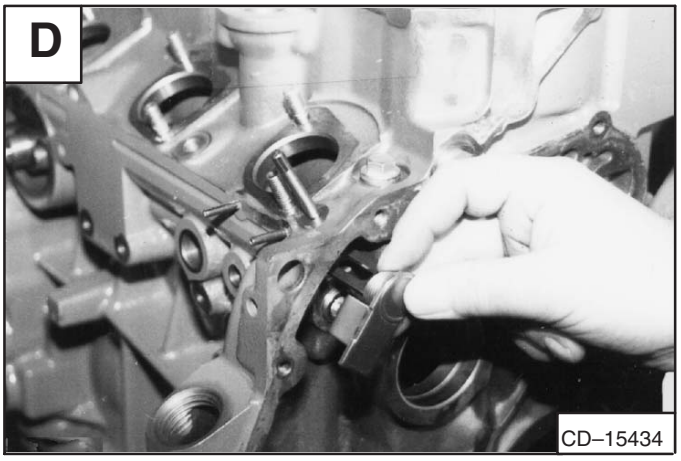


Install the control rod with starter spring into the guide bushings **[C]**.



Compress the starter spring. Install the parallel pin into the recess for the control rod travel limitation **[D]**.

Check to make sure it is flush with the surface.



SYSTEMS ANALYSIS

Continued On Next Page

BICS™ – BOBCAT INTERLOCK CONTROL SYSTEM
BOSS – BOBCAT OPEARTION SENSING SYSTEM
PWM – PULSE WITH MODULATION

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

Crankshaft And Main Bearings

Crankshaft Pin Width 1.220 (31,0)
Crankshaft Pin Diameter . . . . . 2.165 – 0.0004 – 0.0012 (55,0 – 0,01 – 0,03)
Oval Wear Limit . . 0.0004 (0,01)
Crankshaft Journal Width . . . . . 1.378 + 0,0016 (35,0, + 0,04)
Crankshaft Journal Diameter . . . . . 2.756 – 0.0004 – 0.0012 (70,0 – 0,01 – 0,03)
Oval Wear Limit . . 0.0003 (0,008)
Eccentricity Max. Permitted 0.002 (0,05)
Thrust Bearing Journal Width . . . . . 1.378 + 0.002 (35,0 + 0,04)
Main Bearing Shell I.D. . . . . 2.757 — 2.758 (70,02 — 70,055)
Radial Clearance . . 0.0011 — 0.0033 (0,03 — 0,084)
Wear Limit 0.0047 (0,12)
Bearing Bore in Crankcase . . . . . 2.953+ 0.0007 (75,0 + 0,019)
Thrust Bearing Stop Rings O.D. . . . . 1.374 – 0.005 (34,9 – 0,133)
Oversize 0.0157 (0,4)
Limit for Oversize 1.406 – 0.0052 (35,7 – 0,133)
Crankshaft End Play 0.0039 – 0.0106 (0,1 – 0,27)
Wear Limit 0.016 (0,4)

Camshaft And Bearings

Camshaft End Play 0.0118 — 0.0236 (0,3 — 0,6)
Wear Limit 0.0315 (0,8)
Camshaft Bearing I.D. . . . . 2.126+ 0.0021 (54,0+ 0,054)
Wear Limit 2.129 (54,08)
Radial Clearance . . 0.0019 — 0.0048 (0,05 — 0,124)
Cam Lift (Intake) . . 0.260 (6,6)
Cam Lift (Exhaust) 0.268 (6,8)

Oil Pump

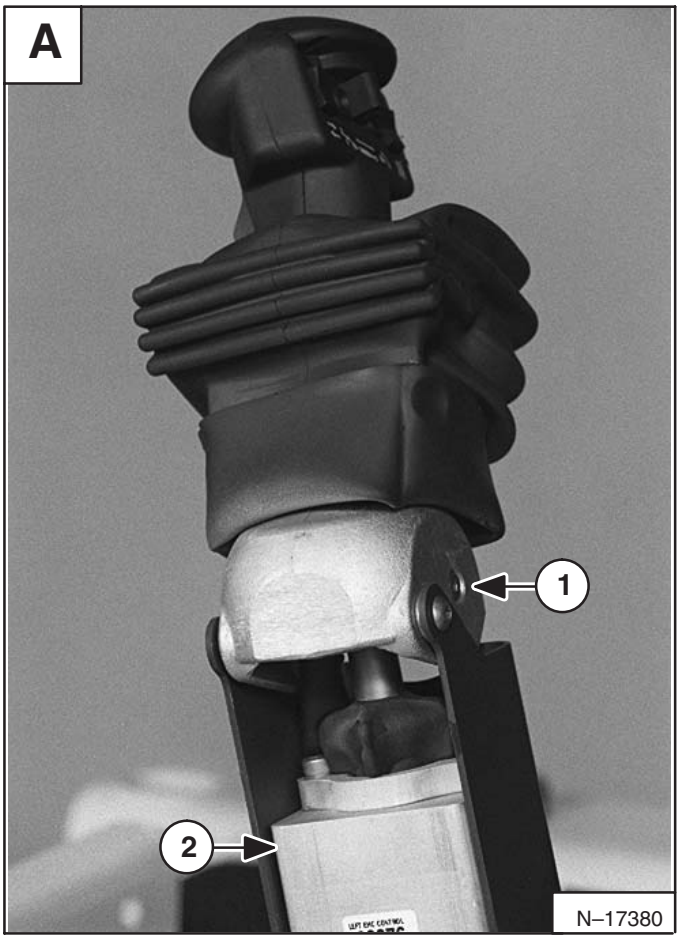
Oil Pump Pressure Setting . . . . . 101.5 PSI (700 kPa) (7 bar)
Min. Eng. OIl Pressure, Oil Temp. 230° F (110 ° C) at 900 RPM . . . . . 20.3 PSI (140 kPa) (1.4 bar)
1800 RPM . . . . . 31.9 PSI (220 kPa) (2.2 bar)
2800 RPM . . . . . 43.5 PSI (300 kPa) (3.0 bar)
Thermostat Rating . 203° F (95° C)

HANDLE CONTROL UNIT (Cont'd)

Removal And Installation (Cont'd)

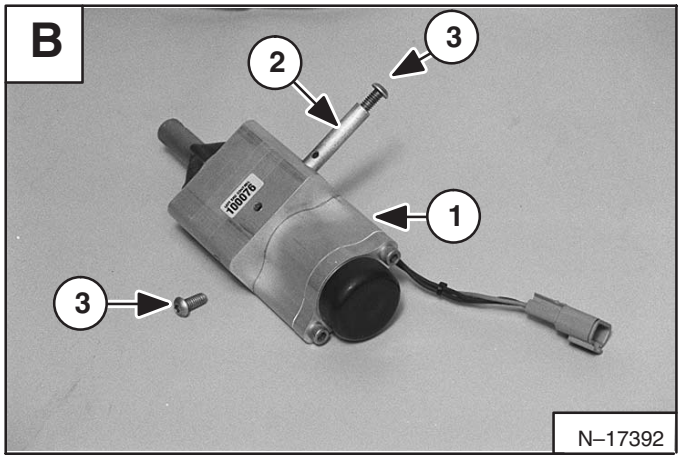
Remove the mounting bolt and nut (Item 1) **[A]** from the control handle and shaft.

Remove the control unit (Item 2) **[A]** from the control handle.

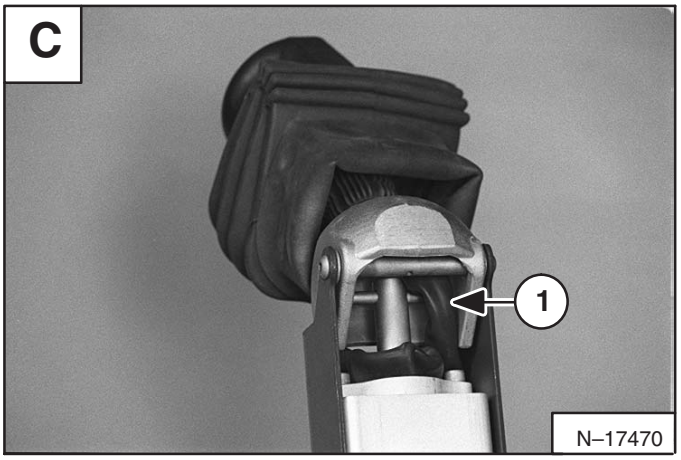


NOTE: The control unit (Item 1) [B] can only be replaced as a complete assembly.

Check the spacer (Item 2) **[B]** and screws (Item 3) **[B]** and replace as needed.



Installation: When installing the control unit into the steering handle, check the routing of the switch handle wire harness (Item 1) **[C]** to assure proper return of the control handle to neutral.



ALPHABETICAL INDEX

FUEL SYSTEM

Fuel Specifications

Use only clean, high quality diesel fuel, Grade No. 2 or Grade No. 1.

The following is a suggested blending guideline which should prevent fuel gelling during cold temperatures:

Temp.	F°	(C°)	No. 2	No.1
	+15°	(9°)	100%	0%
Down to	-20°	(-29°)	50%	50%
Below	-20°	(-29°)	0%	100%

Contact your fuel supplier for local recommendations.

Filling The Fuel Tank

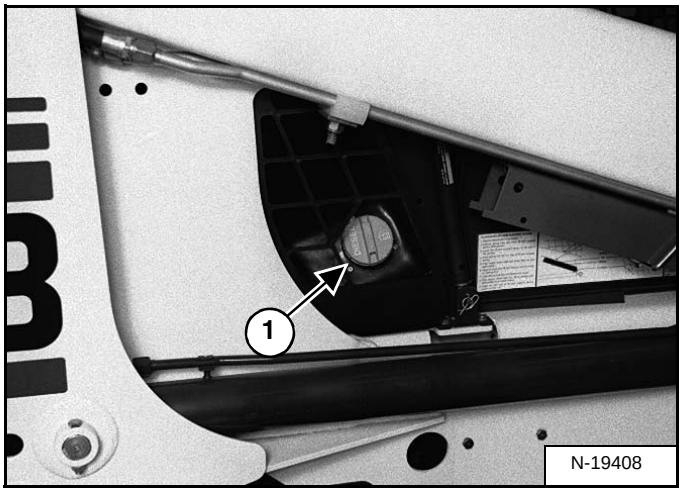
⚠ WARNING

Stop and cool the engine before adding fuel. NO SMOKING! Failure to obey warnings can cause an explosion or fire.

W-2063-0887

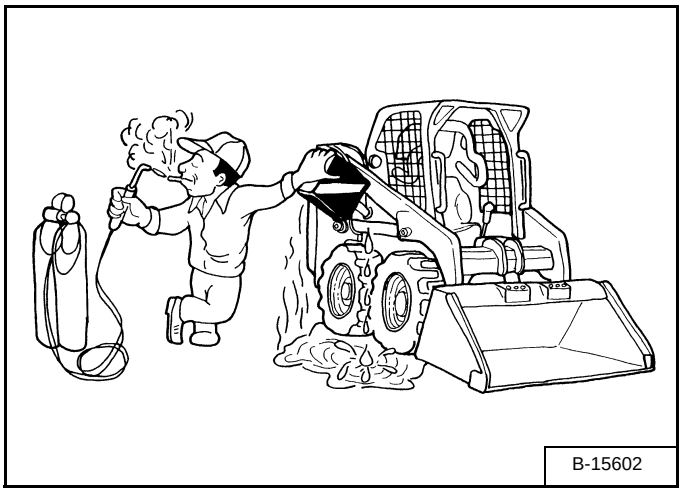
Open the rear door.

Figure 10-100-1



Remove the fuel fill cap (Item 1) **[Figure 10-100-1]**.

Figure 10-100-2



Use a clean, approved safety container to add fuel of the correct specifications. Add fuel only in an area that has free movement of air and no open flames or sparks. **NO SMOKING! [Figure 10-100-2]**.

Install and tighten the fuel cap (Item 1) **[Figure 10-100-1]**

HYDRAULIC/HYDROSTATIC SCHEMATIC
863 (S/N 514449260 - 514449563)
(S/N 514541069 - 514541072)

(PRINTED NOVEMBER 2002)
V-0161legend

LEGEND

(1) RESERVOIR:
Capacity . . . . . 18.8 Qts. (17.8 L)

(2) FILTER - CASE DRAIN (90 Micron)

(3) FILTER - HYDRAULIC (CANISTER)

(4) SPRING LOADED FILTER BY-PASS VALVE: 45-55 PSI (311-379 kPa)

(5) PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - HYDRAULIC POWERED BOB-TACH

(6) DIFFERENTIAL PRESSURE SWITCH: 36-44 PSI (248-303 kPa)

(7) FLOW DIVIDER ADJUSTMENT VALVE

(8) CHECK VALVE - BUCKET POSITION VALVE

(9) FIXED CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC MOTOR

(10) PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - FLOW CONTROL SPOOL

(11) PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - UNLOADING SPOOL

(12) PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - TILT CONTROL

(13) PILOTED ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT CONTROL

(14) SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BICS CONTROL

(15) PULL BUTTON ACTIVATED DIRECTIONAL CONTROL VALVE - LIFT ARM BY-PASS

(16) FILTER - BICS CONTROL VALVE (SCREEN)

(17) BOOM DOWN RESTRICTOR

(18) LIFT AND TILT LOAD CHECK VALVE

(19) RELIEF VALVE - MAIN: 2950-3050 PSI (20340-21030 kPa) at Front Quick Couplers

(20) RELIEF VALVE - PORT: 3500 PSI (24132 kPa)

(21) ANTICAVITATION VALVE

(22) RELIEF/ANTICAVITATION VALVE - PORT (TILT BASE END) 3500 PSI (24132 kPa)

(23) ONE WAY RESTRICTOR VALVE

(24) SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - AUXILIARY

(25) RELIEF VALVE - PORT: . . . . . (Optional) 3500 PSI (24132 kPa)

(26) RELIEF/REPLENISHING VALVE - HIGH PRESSURE: 5000 PSI (34475 kPa)

(27) CHARGE PRESSURE SWITCH

(28) RELIEF VALVE - CHARGE: 120 degrees F. (53 degrees C.) Fluid at 1775 Pump RPM 390 - 430 PSI (2689 - 2965 kPa)

(29) CHARGE PUMP 14.0 GPM (53,0 L/min.) at 2450 Engine RPM

(30) HYDRAULIC PUMP . . . . . Gear Type 20.7 GPM (78,4 L/min.) at 2450 Engine RPM

(31) DRIVE MOTOR SHUTTLE VALVE

(32) SHUTTLE RELIEF VALVE: 200 PSI (1378 kPa)

(33) SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BLEED OFF REAR AUXILIARY ("SV2")

(34) LOAD SHUTTLE VALVE - BLEED OFF

(35) PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY CLOSED ("P2" and "F2")

(36) PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY OPEN ("D1" and "P1")

(37) PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY OPEN ("D2" and "P2")

(38) FILTER - DIVERTER VALVE (SCREEN) INTEGRATED IN SOLENOID

(39) SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - TO ACTIVATE REAR AUXILIARY ("SV1")

(40) PILOT ACTIVATED DIRECTIONAL CONTROL VALVE - FOR REAR AUXILIARY - NORMALLY CLOSED ("P1" and "F1")

(41) CHECK VALVE - BICS CONTROL VALVE

(42) LIFT ARM BY-PASS RESTRICTOR

(43) CHECK VALVE - AUXILIARY

*(44) MUFFLER (If Equipped)

(45) VARIABLE CAPACITY DISPLACEMENT BIDIRECTIONAL HYDROSTATIC PUMP

(46) TWO STAGE RELIEF VALVE 1000 PSI/ 2000 PSI (6894 kPA/ 13788 kPA)

(47) SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE (TWO COIL)

(48) RELIEF VALVE - 1200 PSI (8268 kPa)

(49) PRESSURE COMPENSATED FLOW CONTROL

(50) CHECK VALVE WITH .015 (0,38mm) ORIFICE

(51) RELIEF VALVE - PORT: 3500 PSI (24132 kPa)

(52) SOLENOID ACTIVATED DIRECTIONAL CONTROL VALVE - BUCKET POSITION VALVE (ON/OFF)

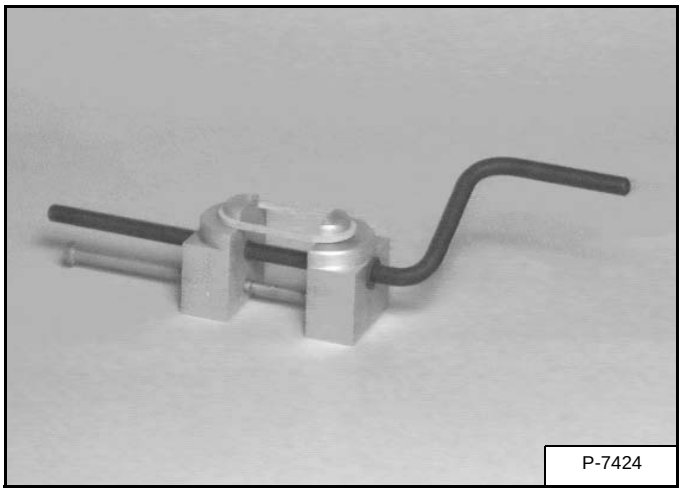
(53) ACCUMULATOR

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

Printed in U.S.A.

Assembly

Figure 20-20-16



Use the following tools to assemble the cylinder:

MEL 1396 - Seal Installation Tool
MEL 1033 - Rod Seal Installation Tool
Piston Ring Compressor
Spanner Wrench

Wash the cylinder parts in solvent and air dry them.

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

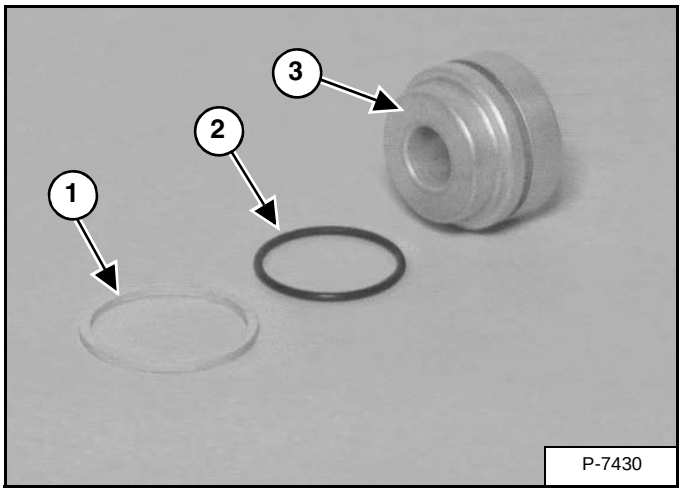
Always install new O-rings and seals during assembly.

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

Install a new seal on the tool and slowly stretch it until it fits the piston (Item 1) **[Figure 20-20-16]**.

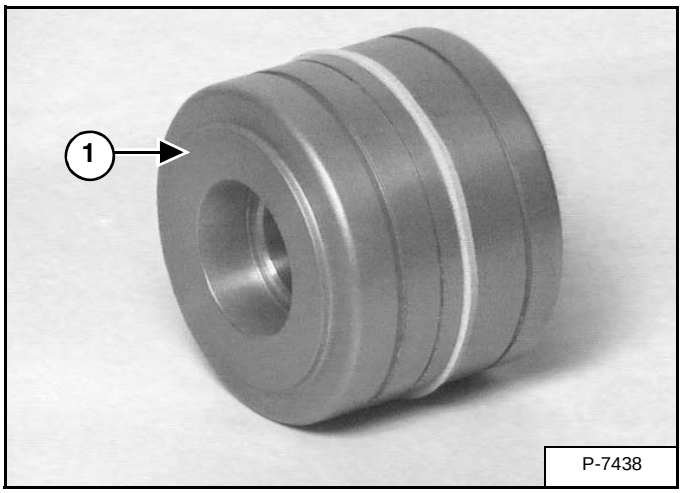
Allow the seal the stretch for 30 seconds before installing it on the piston.

Figure 20-20-17



Standard Piston: Install the seal (Item 1) **[Figure 20-20-17]** and O-ring (Item 2) **[Figure 20-20-17]** on the piston (Item 3) **[Figure 20-20-17]**.

Figure 20-20-18

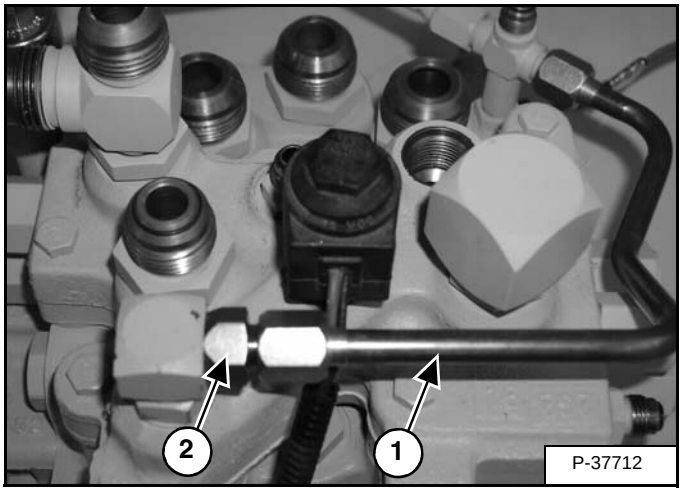


Cushion Piston: Install the seal and O-ring on the piston (Item 1) **[Figure 20-20-18]**.

Using a ring compressor to compress the seal to the correct size. Leave the piston in the compressor for about three minutes.

BICS™ Valve, Check Valve Disassembly And Assembly (514450007 & Above)

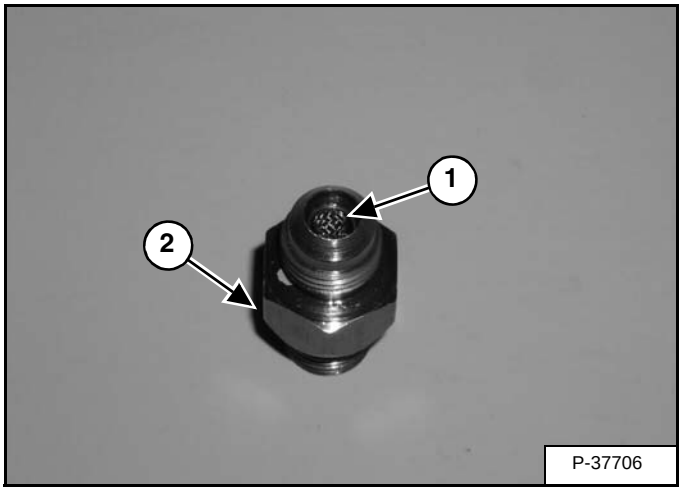
Figure 20-40-41



Remove the tubeline (Item 1) and the check valve (Item 2) **[Figure 20-40-41]**.

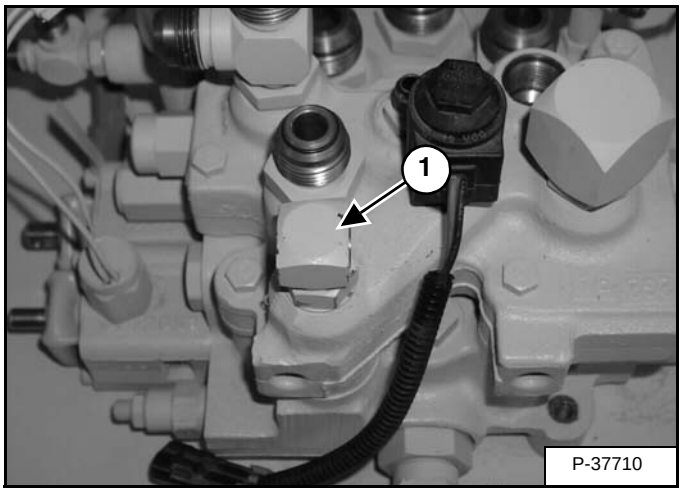
Installation: Tighten the valve to 20 ft.-lbs. (27 Nm) torque.

Figure 20-40-42



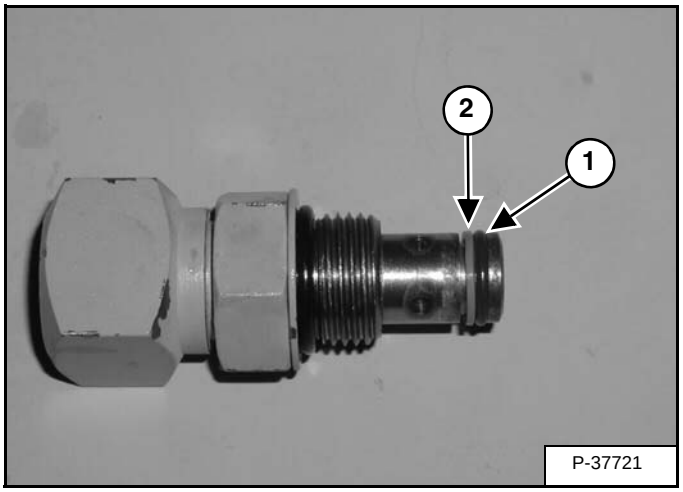
Clean and inspect the screen (Item 1) and replace the o-ring (Item 2) **[Figure 20-40-42]** on the check valve.

Figure 20-40-43



Remove the 90° fitting (Item 1) **[Figure 20-40-43]** out of the control valve.

Figure 20-40-44

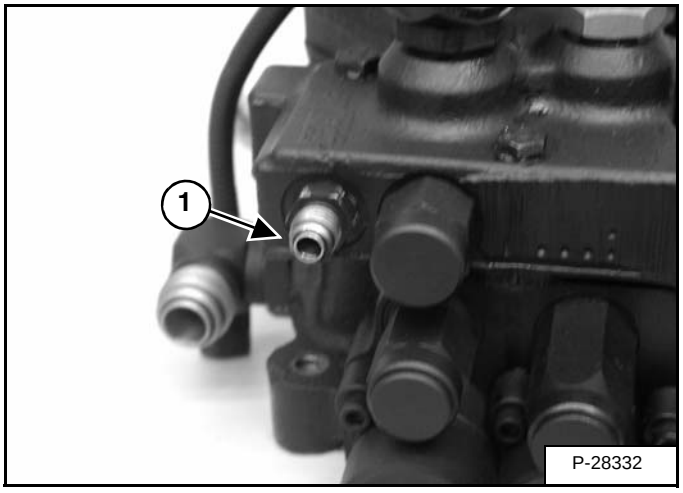


Remove the O-rings (Item 1) and back-up ring (Item 2) **[Figure 20-40-44]** from the fitting.

Install new O-rings and back-up ring on the check valve.

BICS™ Valve Lift Arm By-Pass Orifice Removal And Installation

Figure 20-41-49



Remove the fitting (Item 1) **[Figure 20-41-49]** from the BICS valve.

Figure 20-41-50

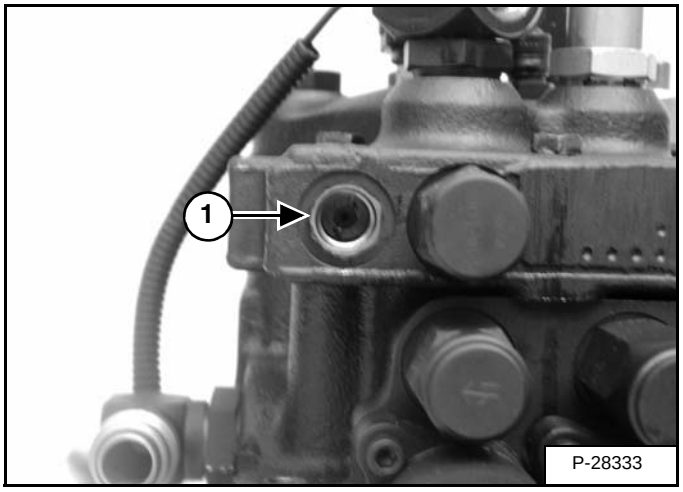
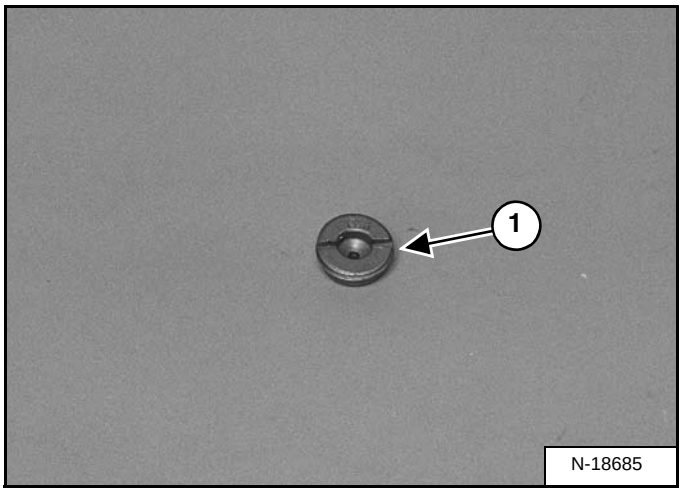


Figure 20-41-51



Using a flat blade screwdriver, remove the lift arm by-pass orifice (Item 1) **[Figure 20-41-50]** & **[Figure 20-41-51]**.

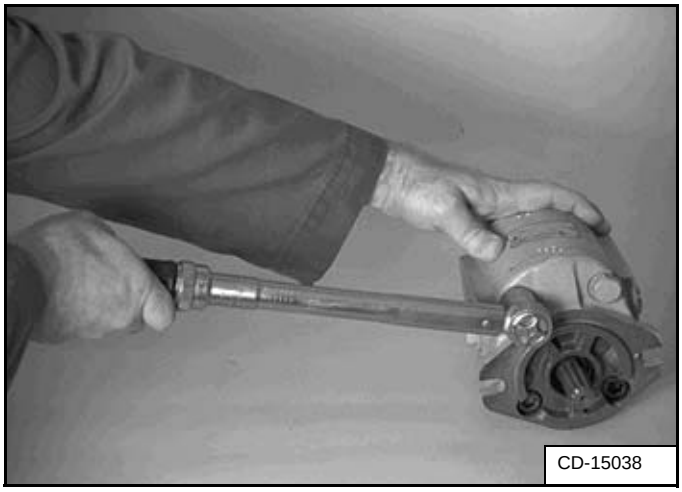
Orifice size is 0.078 inch.

Clean and inspect the orifice. Replace as needed.

Reverse the removal procedure to install the lift arm by-pass orifice.

Assembly (Cont'd)

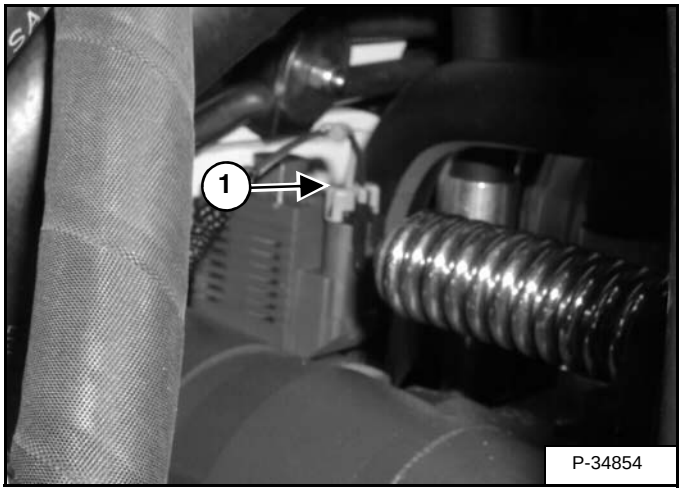
Figure 20-61-35



Tighten the large pump housing bolts (hex head & allen head) to 33-41 ft.-lbs. (46-56 Nm) torque **[Figure 20-61-35]**.

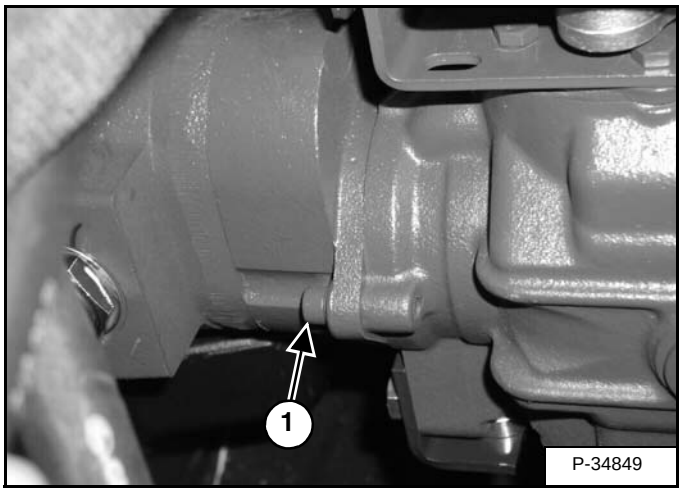
Removal And Installation (Cont'd)

Figure 20-64-22



Disconnect the electrical connector (Item 1) **[Figure 20-64-22]** from the high flow solenoid.

Figure 20-64-23



Remove the two mounting bolts (Item 1) **[Figure 20-64-23]** from the hydraulic pump.

Installation: Tighten the mounting bolts to 27-37 ft.-lbs. (37-50 Nm) torque.

Remove the hydraulic pump from the hydrostatic pump.

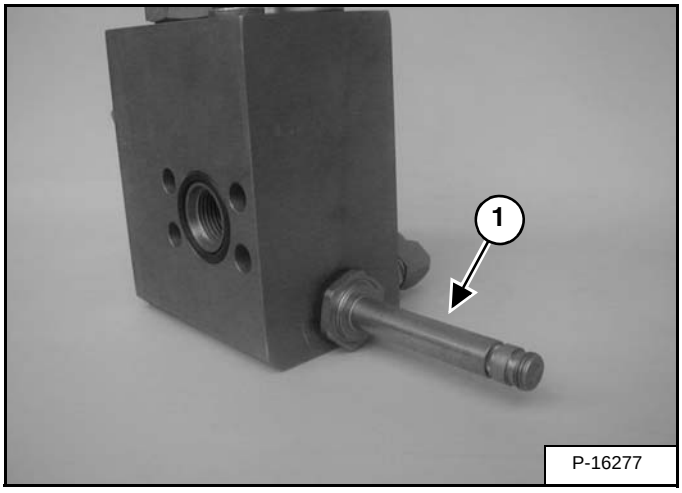
Remove the coupler and the O-ring.

Reverse the removal procedure to install the hydraulic pump.

Installation: Use a new O-ring when installing the hydraulic pump.

Disassembly And Assembly (Cont'd)

Figure 20-120-28

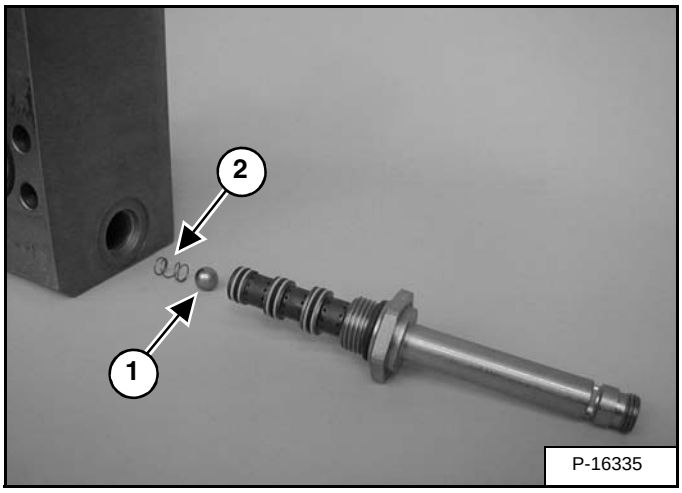


Remove the solenoid valve (Item 1) **[Figure 20-120-28]**.

Installation: Put oil on O-rings and back-up washers.

Tighten the solenoid valve to 12 ft.-lbs. (16,3 Nm) torque.

Figure 20-120-29

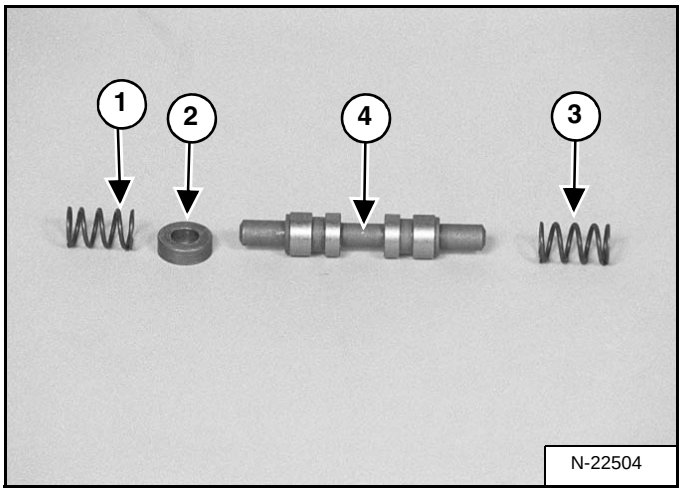


Remove the check ball (Item 1) **[Figure 20-120-29]**.

Remove the spring (Item 2) **[Figure 20-120-29]**.

Disassembly (Cont'd)

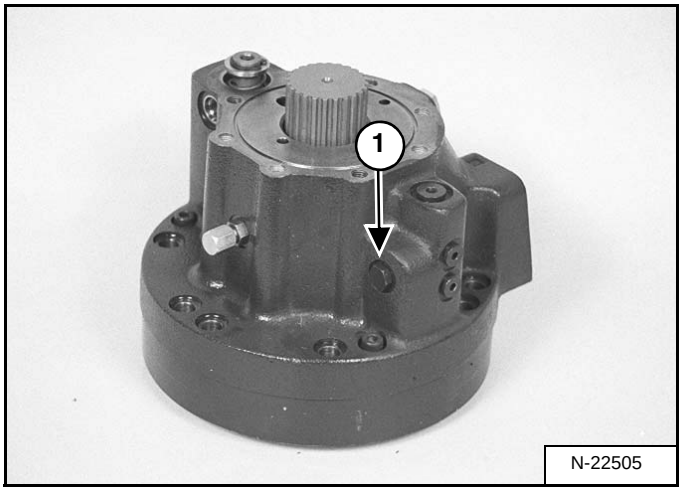
Figure 30-21-20



Remove the spring (Item 1) **[Figure 30-21-20]**, washer (Item 2) **[Figure 30-21-20]** and rear spring (Item 3) **[Figure 30-21-20]** from the spool (Item 4) **[Figure 30-21-20]**.

Inspect all parts and replace as needed.

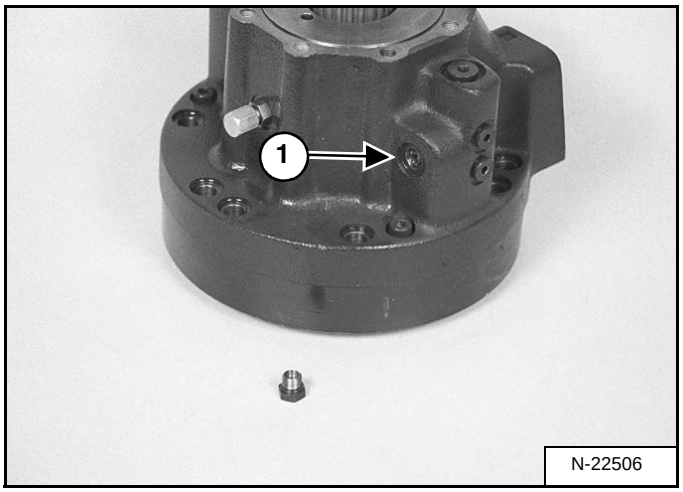
Figure 30-21-21



Remove the plug (Item 1) **[Figure 30-21-21]** from the housing.

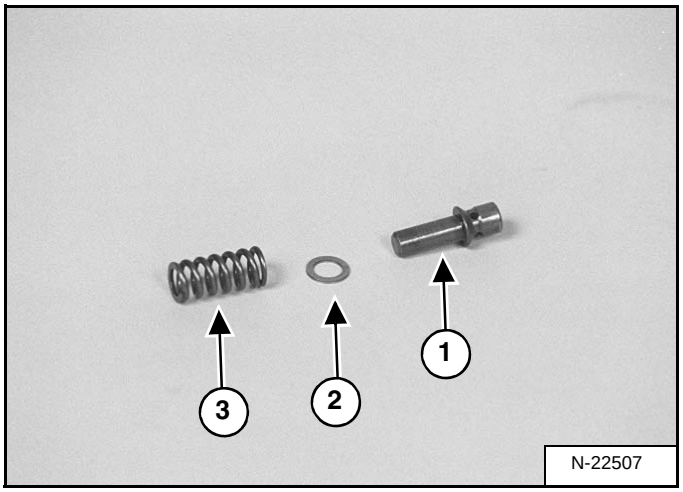
Installation: Tighten the plug to 9-11 ft.-lbs. (12-15 Nm) torque.

Figure 30-21-22



Remove the poppet assembly (Item 1) **[Figure 30-21-22]** from the housing.

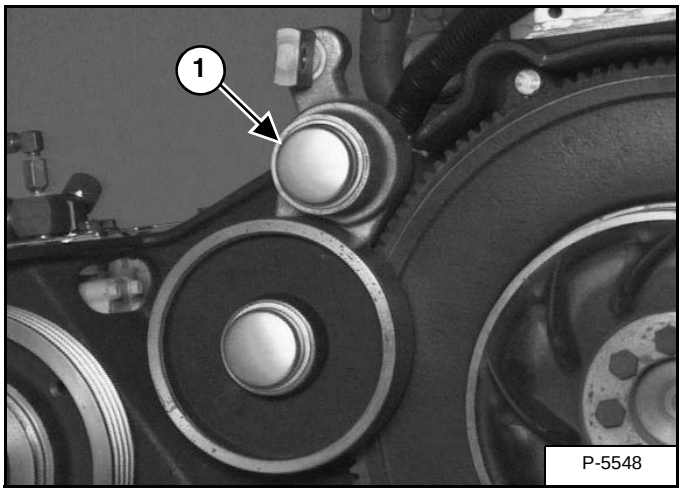
Figure 30-21-23



Inspect the poppet (Item 1) **[Figure 30-21-23]**, shim (Item 2) **[Figure 30-21-23]** and spring (Item 3) **[Figure 30-21-23]** for wear and replace as needed.

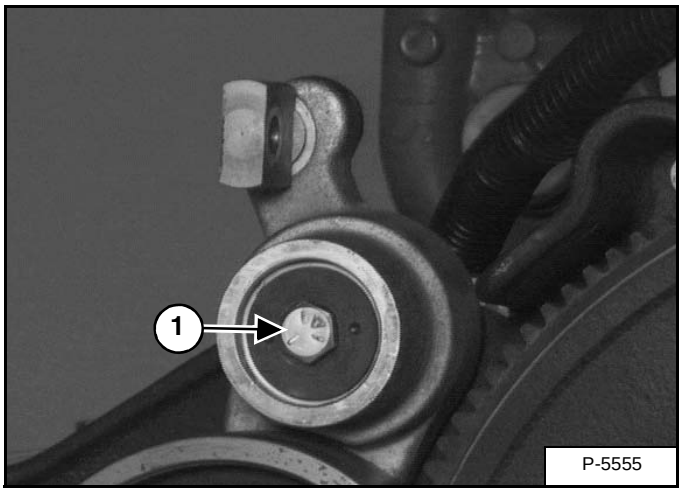
Tensioner Pulley Removal And Installation

Figure 30-50-7



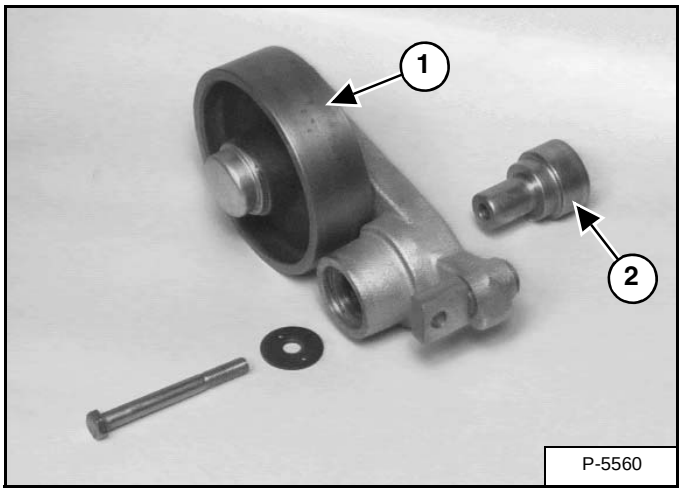
Remove the end cap (Item 1) **[Figure 30-50-7]** from the tensioner pulley arm.

Figure 30-50-8



Remove the mounting bolt (Item 1) **[Figure 30-50-8]** from the tensioner pulley arm.

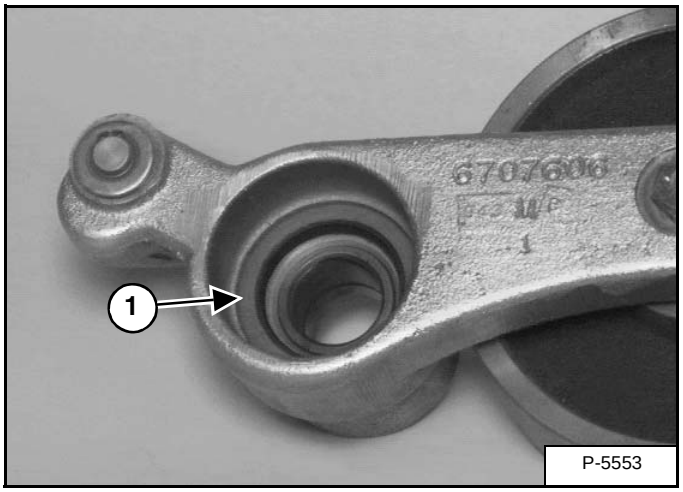
Figure 30-50-9



Remove the pulley/arm assembly (Item 1) **[Figure 30-50-9]** from the engine housing.

Remove the arm bushing (Item 2) **[Figure 30-50-9]**. Check for wear and replace as needed.

Figure 30-50-10



Check the arm seal (Item 1) **[Figure 30-50-10]**. Replace the seal as needed.

SEAT BAR (CONT'D)

Assembling Components (Cont'd)

Figure 50-10-7

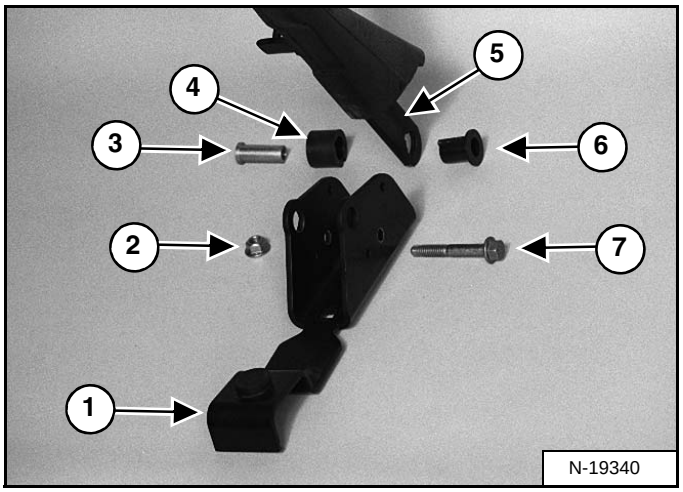
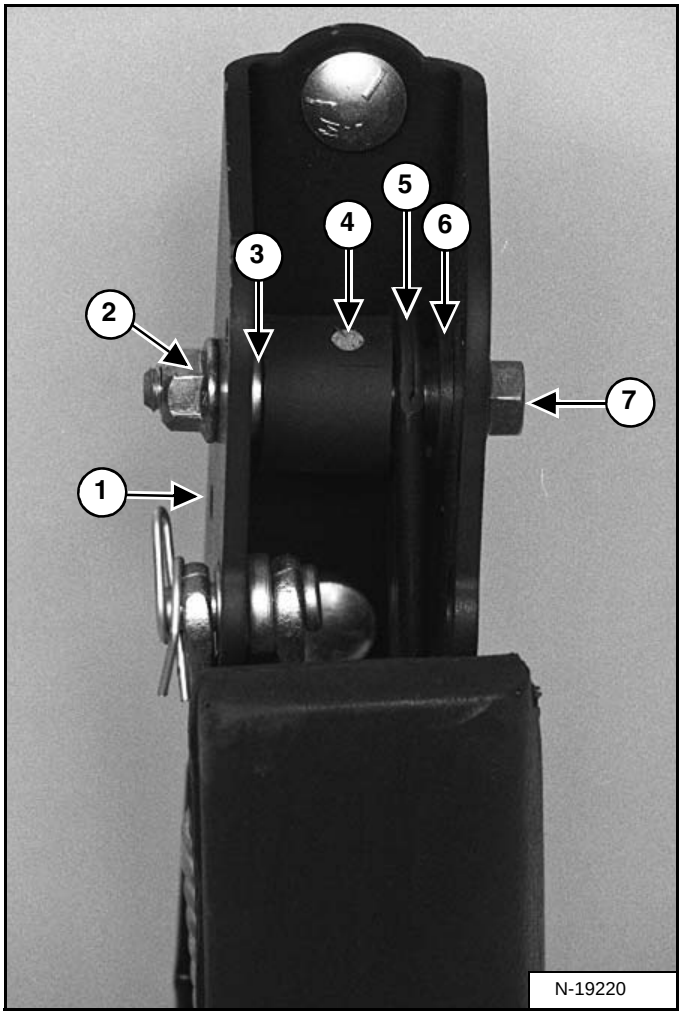


Figure 50-10-8



Assemble the parts as shown for the right side of the seat bar pivot assembly **[Figure 50-10-7]** & **[Figure 50-10-8]**.

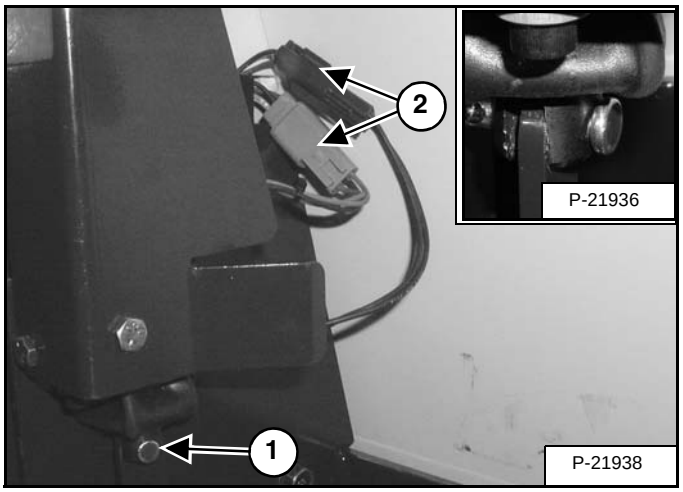
Seat Bar Mount (Item 1)
Mounting Nut (Item 2)
Pivot Bushing (Item 3)
Spacer Bushing (Item 4)
Seat Bar (Item 5)
Keyed Plastic Bushing (Item 6)
Mounting Bolt (Item 7)

Installation: Tighten the mounting bolt (Item 7) **[Figure 50-10-7]** & **[Figure 50-10-8]** to 50-70 in.-lbs. (5,6-7,9 Nm) torque.

CONTROL PEDALS (ACS)

Foot Sensor Removal And Installation

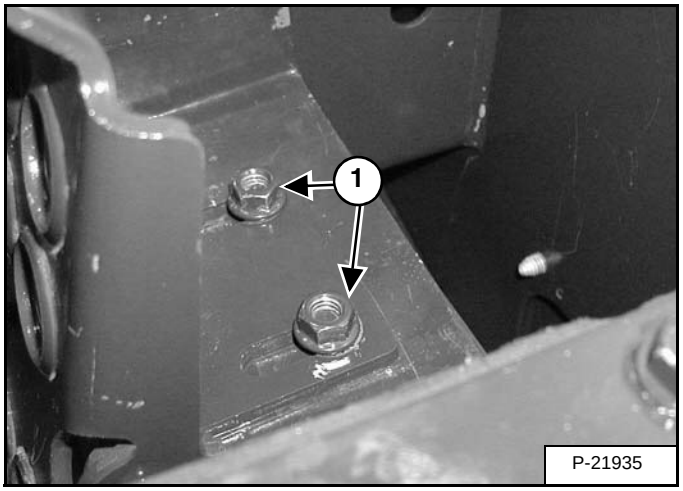
Figure 50-91-1



Pull the pin (Item 1) **[Figure 50-91-1]** holding the foot pedal linkage to the sensor.

Disconnect the two connectors (Item 2) **[Figure 50-91-1]** from the sensor and lock solenoid.

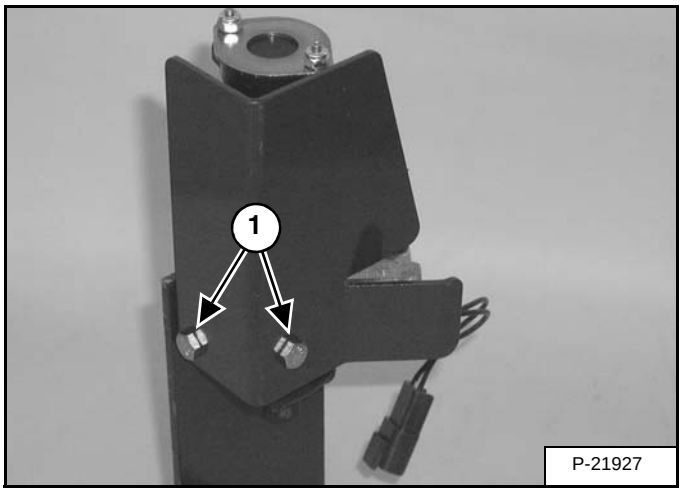
Figure 50-91-2



Tilt the foot pedal up and remove the two nuts (Item 1) **[Figure 50-91-2]**.

Remove the foot pedal and sensor assembly from the loader.

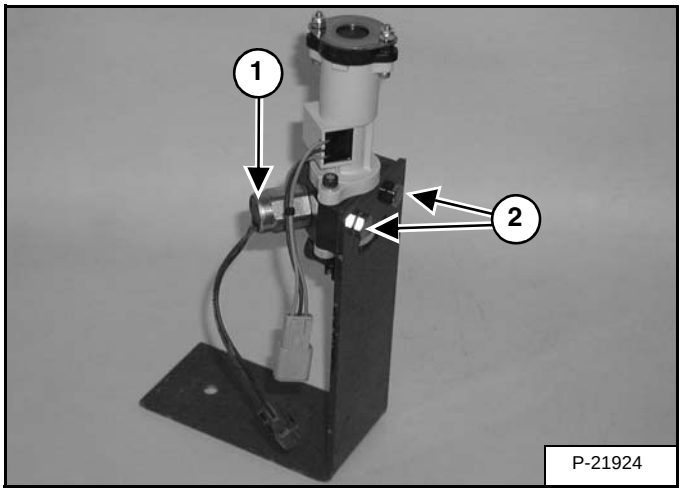
Figure 50-91-3



Remove the two bolts (Item 1) **[Figure 50-91-3]** from the foot sensor shield.

Installation: Tighten the bolts to 80-90- in.-lbs. (9,0-10,2 Nm) torque.

Figure 50-91-4



Remove foot lock solenoid (Item 1) **[Figure 50-91-4]**.

Installation: Apply a drop of oil to the solenoid threads and tighten the solenoid to 35-40 ft.-lbs. (47-54 Nm) lubed torque.

Remove the two bolts (Item 2) **[Figure 50-91-4]** from the bracket and sensor assembly.

Installation: Tighten the bolts to 25-28 ft.-lbs. (34-38 Nm) torque.

Remove the sensor assembly.

Handle Sensor Removal And Installation (Cont'd)

Figure 50-113-8

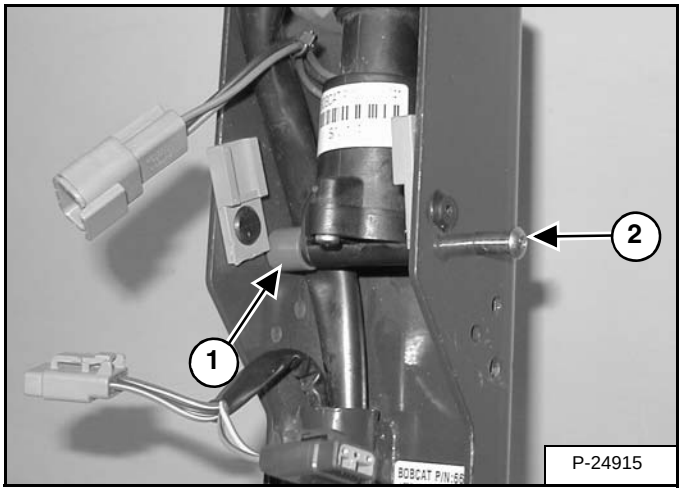
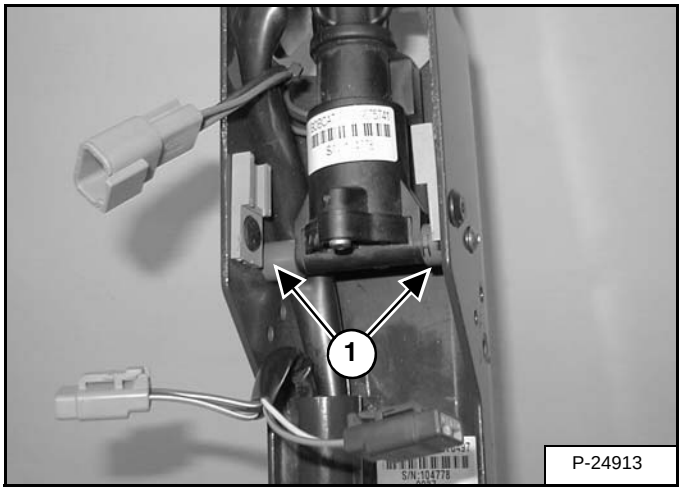


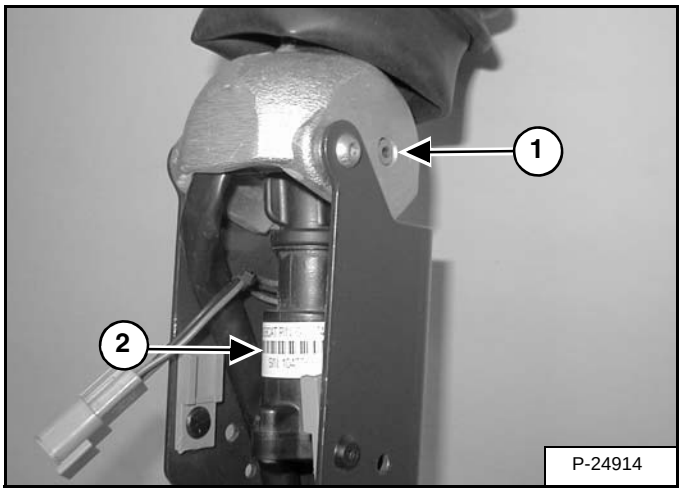
Figure 50-113-9



Remove the spacers (Item 1) **[Figure 50-113-8]** & **[Figure 50-113-9]** while removing the mounting pin (Item 2) **[Figure 50-113-8]**

EARLIER VERSION HAND CONTROLS ONLY;

Figure 50-113-10



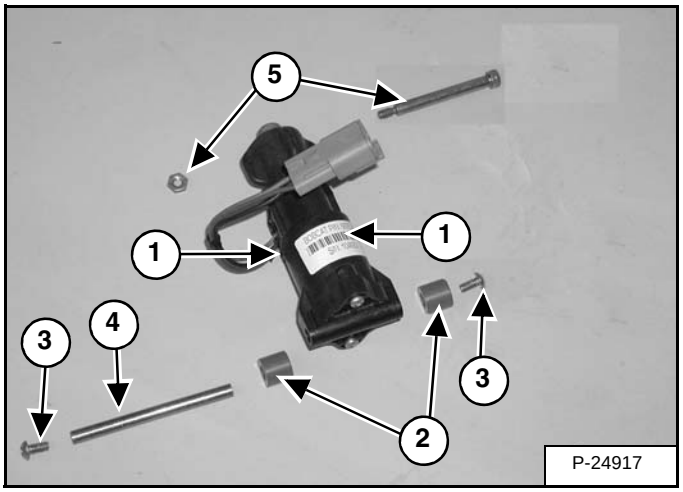
Remove the mounting bolt and nut (Item 1) **[Figure 50-113-10]** from the control handle and shaft.

NOTE: Be careful not to loose the recessed nut on the other side of the handle.

Remove the handle sensor (Item 2) **[Figure 50-113-10]** from the control handle.

Installation: Tighten the mounting bolt to 32-28 in-lbs. (3,6-4,3 Nm) torque.

Figure 50-113-11



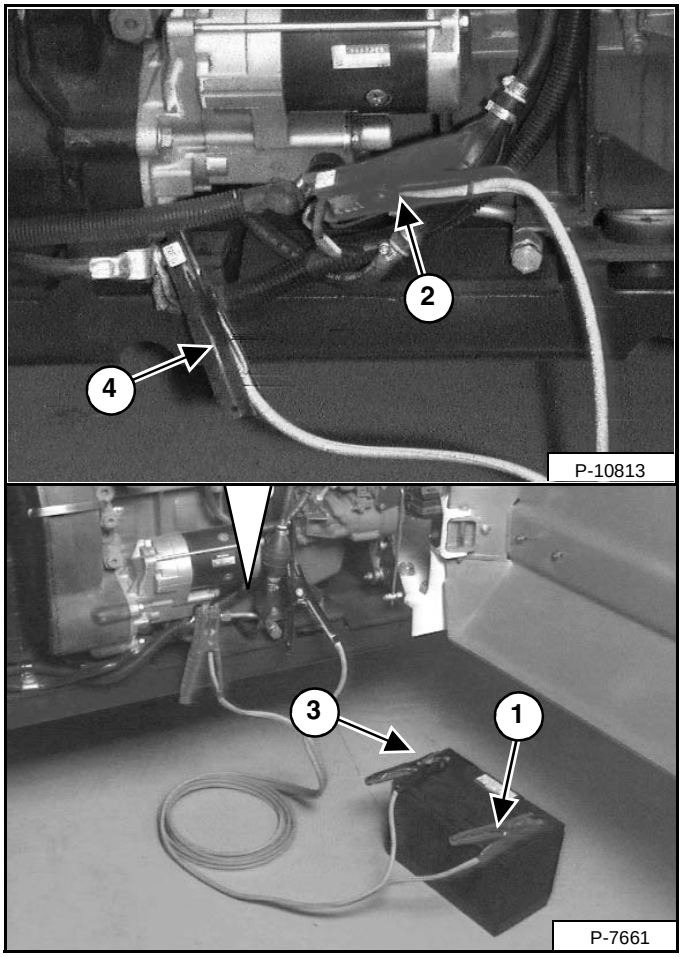
NOTE: The handle sensor (Item 1) [Figure 50-113-11] can only be replaced as a complete assembly.

Check the spacers (Item 2) **[Figure 50-113-11]**, screws (Item 3) **[Figure 50-113-11]**, mounting pin (Item 4) **[Figure 50-113-11]**, bolt/nut (Item 5) **[Figure 50-113-11]** and replace as needed.

Using A Booster Battery (Jump Starting) (Cont'd)

The ignition must be in the OFF position. The booster battery to be used must be 12 volt.

Figure 60-20-8



Connect the end of the first cable (Item 2) **[Figure 60-20-8]** to the positive (+) terminal of the booster battery. Connect the other end of the second cable (Item 2) **[Figure 60-20-8]** to the positive terminal on the starter.

Connect the end of the second cable (Item 3) **[Figure 60-20-8]** to the negative (-) terminal of the bootser battery. Connect the other end of the same cable (Item 4) **[Figure 60-20-8]** to the engine.

Keep cables away from moving parts. Start the engine.

After the engine has started, remove the ground (-) cable (Item 4) **[Figure 60-20-8]** first.

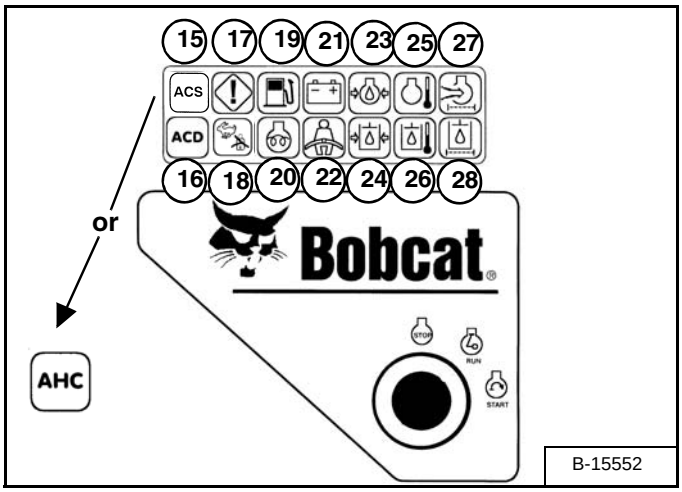
Remove the cable from the starter.

Right Panel - Standard Instrument Panel (With Key Switch)

The right instrument panel shown **[Figure 60-50-2]** is the *Standard Panel*.

The table below shows the Icons and other components of the *Right Standard Panel*.

Figure 60-50-2



REF.	FUNCTION	OPTION OR STD.	ICON/ LIGHT	ALARM	CODE	CONDITION	DESCRIPTION
AHC 15 or ACS	Advanced Hand Controls (AHC) Advanced Control System (ACS)	Opt. Opt.	ON ON	3 Beeps 3 Beeps	* *	Error Error	Error with Advanced Hand Controls (AHC). Error with Advanced Control System (ACS).
ACD 16	Attachment Control Device (ACD)	Std. Std.	ON FLASHING	--- 3 Beeps	- *	--- Error	Electrical controlled attachment is present.• Error with Attachment Control Device (ACD).
17	General Warning	Std. Std. Std.	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING ◆SHUTDOWN	Error with one or more engine or hydraulic functions. Engine speed high or in shutdown. Engine speed very high. Engine will stop in 10 seconds.
18	High Range	Std. Std.	ON ON	--- 3 Beeps	- *	--- Error	Light is ON when High Range is activated. Solenoid error.
19	Fuel Level	Std. Std.	ON FLASHING	3 Beeps 3 Beeps	* *	Error WARNING	Fuel level sender system fault. Fuel level low.
20	Glow Plugs	Std. Std.	ON FLASHING	--- 3 Beeps	- *	--- Error	Glow plugs are energized. Error with glow plugs.
21	System Voltage	Std.	ON	3 Beeps	*	WARNING	Voltage low, high or very high.
22	Seat Belt	Std.	ON	---	-	---	Light stays on for 45 seconds to remind operator to fasten seat belt.
23	Engine Oil Pressure	Std. Std. Std.	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING ◆SHUTDOWN	Engine Oil Pressure sender out of range. Engine oil level low. Engine oil pressure very low. Engine will shutdown in 10 seconds.
24	Hydrostatic Charge Pressure	Std. Std. Std.	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING ◆SHUTDOWN	Hydraulic oil pressure sender out of range. Hydraulic oil pressure low. Hydraulic charge pressure very low. Engine will stop in 10 seconds.
25	Engine Coolant Temperature	Std. Std. Std.	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING ◆SHUTDOWN	Engine coolant sender out of range. Engine coolant temperature high. Engine coolant temperature very high. Engine will stop in 10 seconds.
26	Hydraulic Oil Temperature	Std. Std. Std.	ON ON FLASHING	3 Beeps 3 Beeps Continuous	* * *	Error WARNING ◆SHUTDOWN	Hydraulic oil temperature out of range. Hydraulic oil temperature high. Hydraulic oil temperature very high. Engine will stop in 10 seconds.
27	Engine Air Filter	Std. Std.	ON FLASHING	3 Beeps 3 Beeps	* *	Error WARNING	Air filter switch not connected. Air filter with high restriction.
28	Hydraulic Filter	Std. Std.	ON FLASHING	3 Beeps 3 Beeps	* *	Error WARNING	Hydraulic filter switch not connected. Hydraulic filter with high restriction.
29	Key Switch	-	-	-	-	-	Used to start and stop the engine.

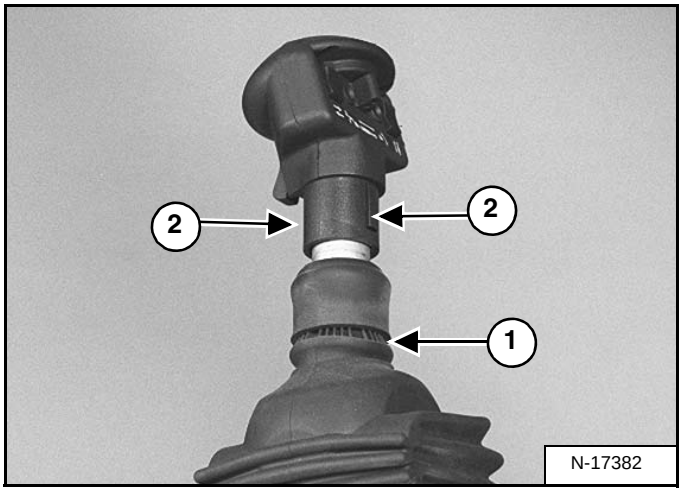
• (Early Models) ACD Icon will also be On when the 7 pin / 14 pin Connector Harness (Opt./Acc) is installed and the selector switch is in the 14 pin position.

◆ SHUTDOWN feature only in Deluxe Right Panel or Factory Option with Standard Panel. (Engine can be restarted to move or relocate loader.)

* These functions are monitored and have SERVICE CODES associated with them. See DELUXE INSTRUMENTATION SERVICE CODES on Page 60-80-1 for descriptions

Switch Handle Removal And Installation (Cont'd)

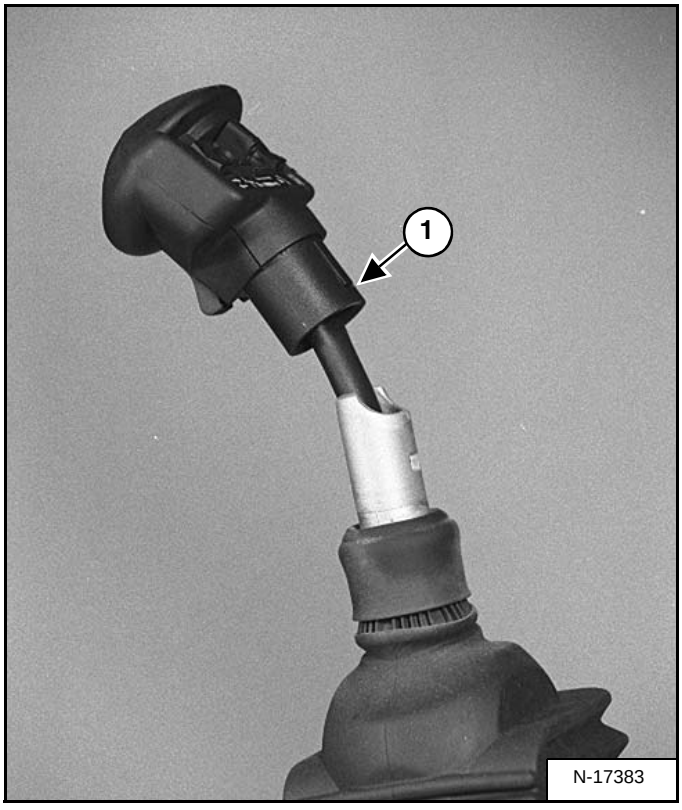
Figure 60-120-17



Roll the grip handle cover (Item 1) **[Figure 60-120-17]** down.

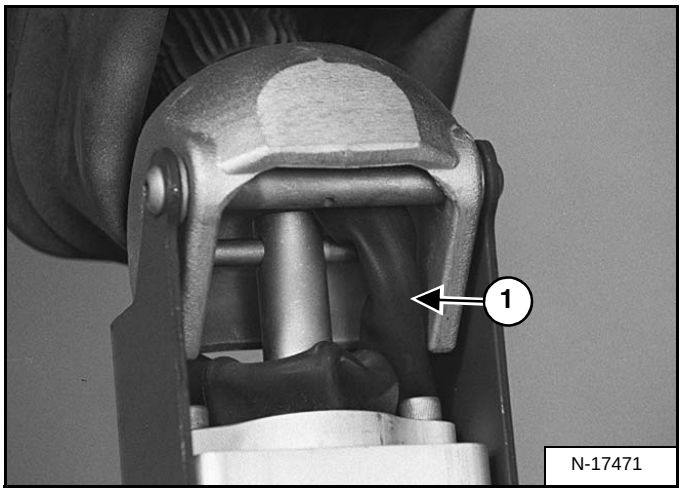
Using a small screwdriver, lift the handle tabs (Item 2) **[Figure 60-120-17]** and slightly rotate the switch handle.

Figure 60-120-18



Pull the switch handle and wiring harness assembly (Item 1) **[Figure 60-120-18]** from the steering lever.

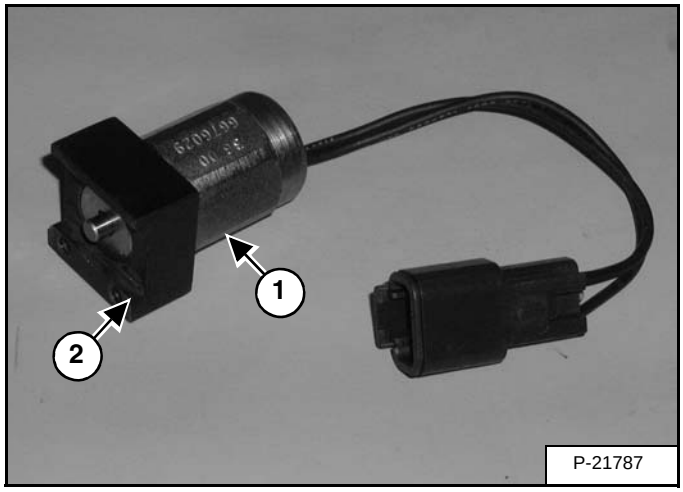
Figure 60-120-19



Installation: When installing the switch handle and wiring harness assembly into the control handle, route the harness (Item 1) **[Figure 60-120-19]** to assure proper return of the control handle to neutral position.

Handle Lock Solenoid Disassembly And Assembly

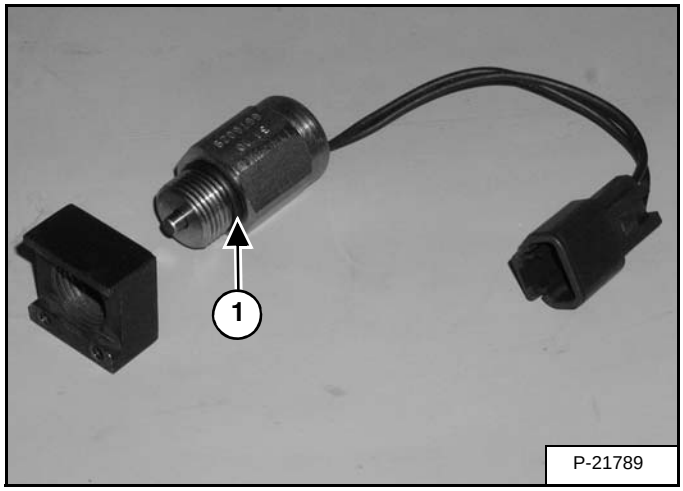
Figure 60-123-34



Remove solenoid (Item 1) **[Figure 60-123-34]** from the solenoid mount (Item 2) **[Figure 60-123-34]**.

Installation: Apply a drop of oil to the solenoid threads and tighten solenoid to 35-40 ft.-lbs. (47-54 Nm) lubed torque.

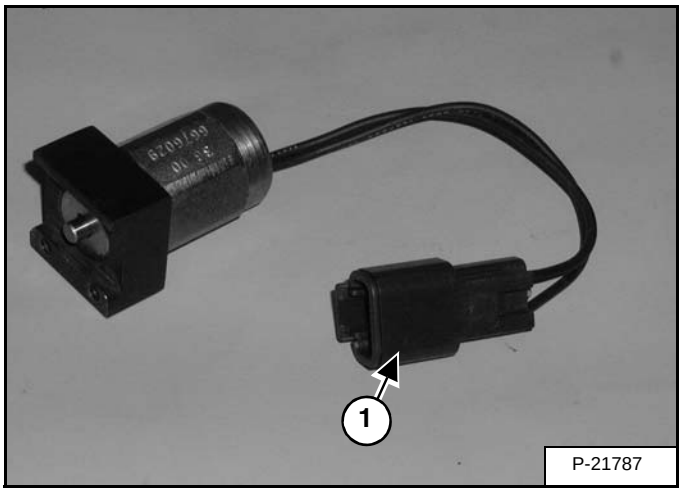
Figure 60-123-35



Check the O-ring (Item 1) **[Figure 60-123-35]** for damage. Replace as necessary.

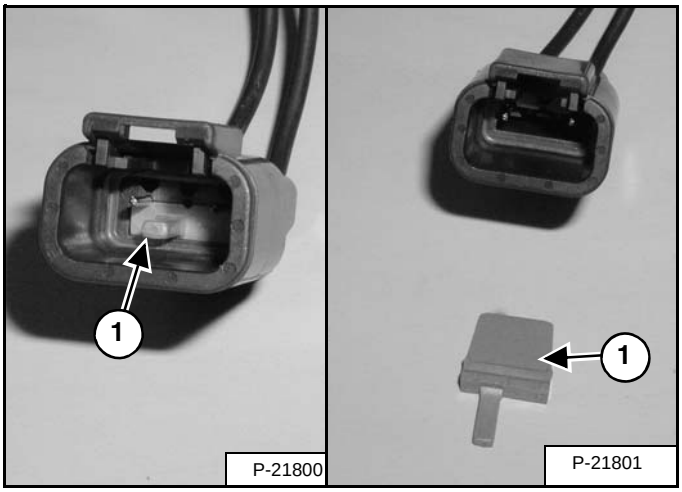
Handle Lock Solenoid Connector

Figure 60-123-36



The wire connector (Item 1) **[Figure 60-123-36]** can be removed from the solenoid, use the following procedure.

Figure 60-123-37



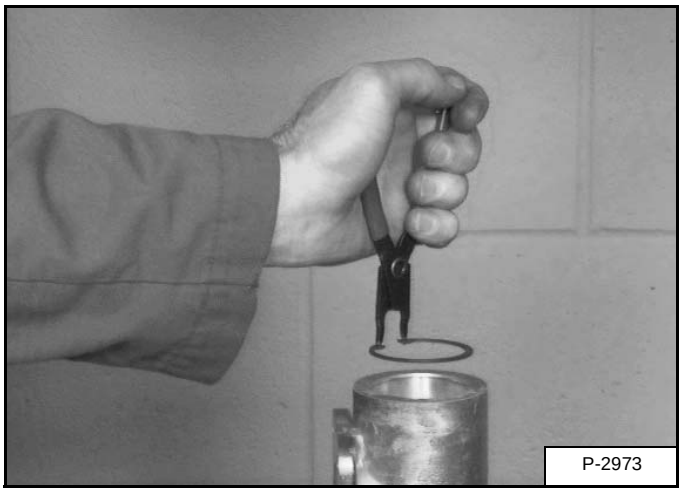
Remove the wedge (Item 1) **[Figure 60-123-37]** from the connector.

Gearbox Assembly (Cont'd)

Figure 70-60-50

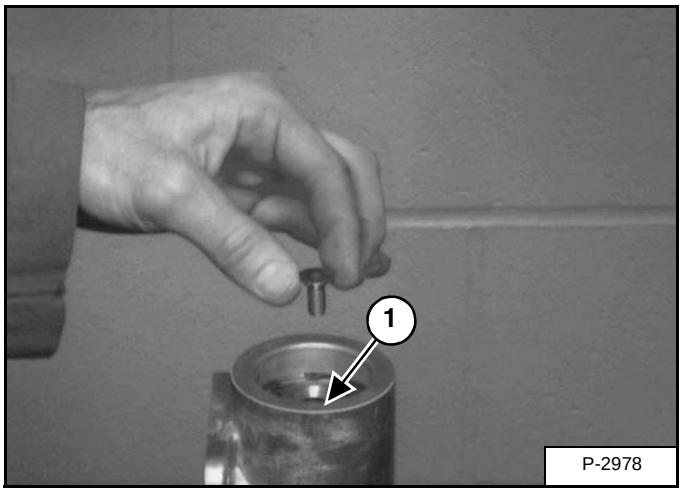
Install a bearing on the gear end of the shaft **[Figure 70-60-50]**.

Figure 70-60-51



Install the snap ring in the groove above the bearing **[Figure 70-60-51]**.

Figure 70-60-52



Install the washer (Item 1) **[Figure 70-60-52]** on the shaft. Put liquid adhesive (LOCTITE #242) on the screw threads and install the screw **[Figure 70-60-52]**.

Removal And Installation (Cont'd)

Figure 70-80-19

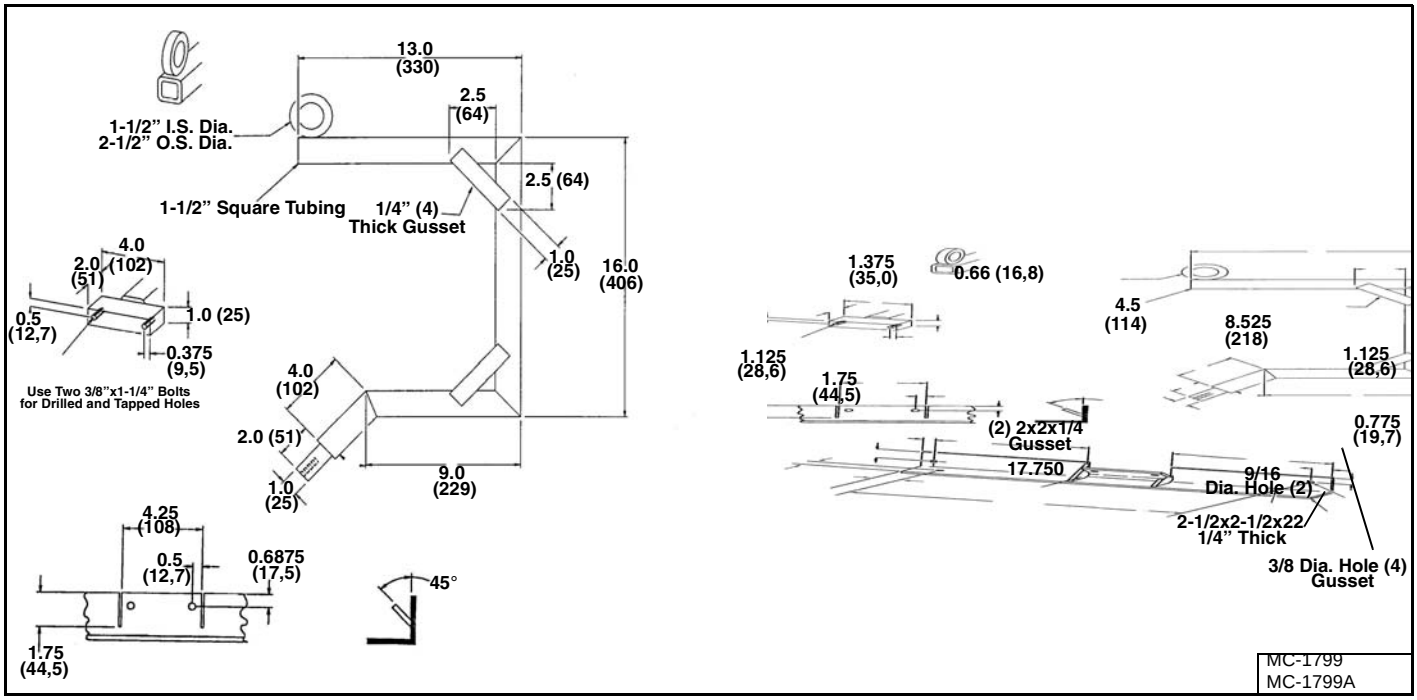
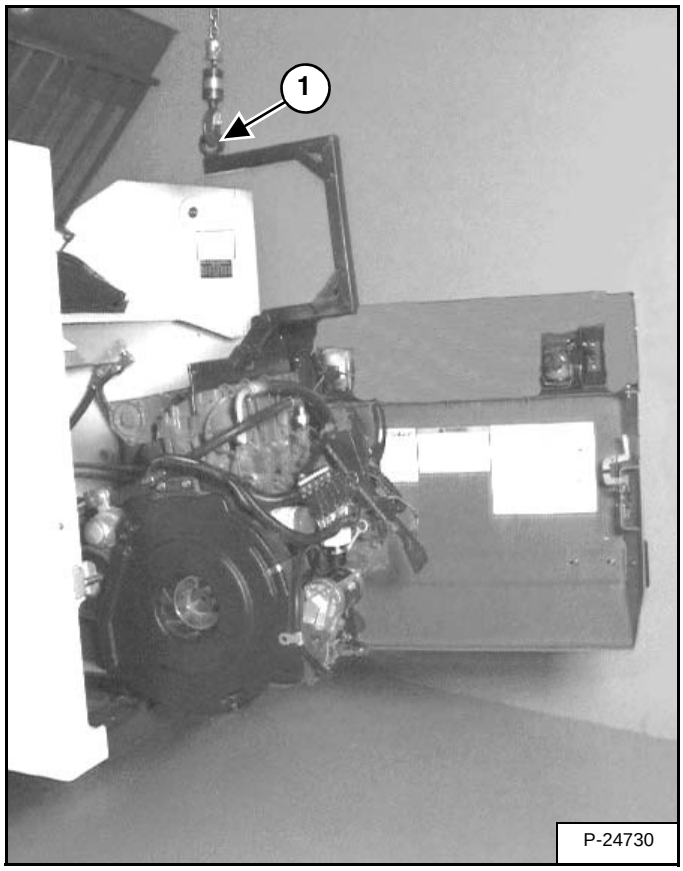


Figure 70-80-20

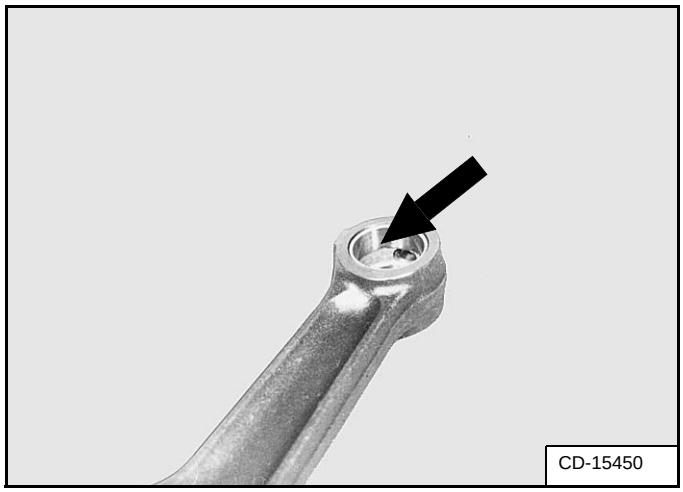


Connect a chain hoist to the ring (Item 1) **[Figure 70-80-20]** on the lift bracket.

Remove the engine/hydrostatic pump assembly from the loader **[Figure 70-80-20]**.

Connecting Rod, Checking (Cont'd)

Figure 70-100-122

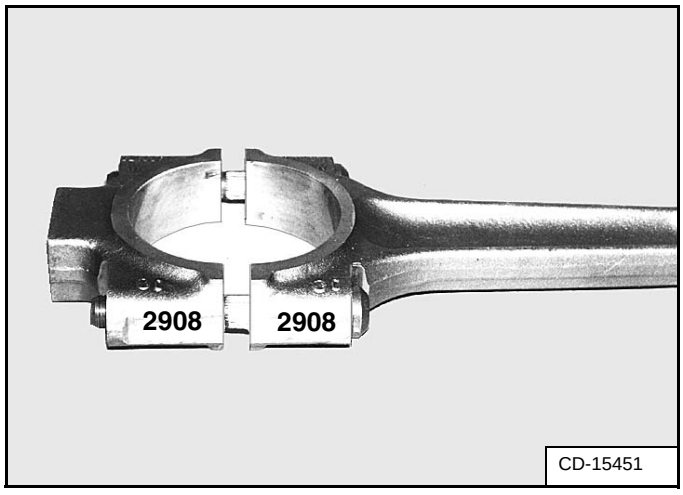


After pressing in the small end bushing, bore the bushing to the following dimensions **[Figure 70-100-122]**.

Specifications:

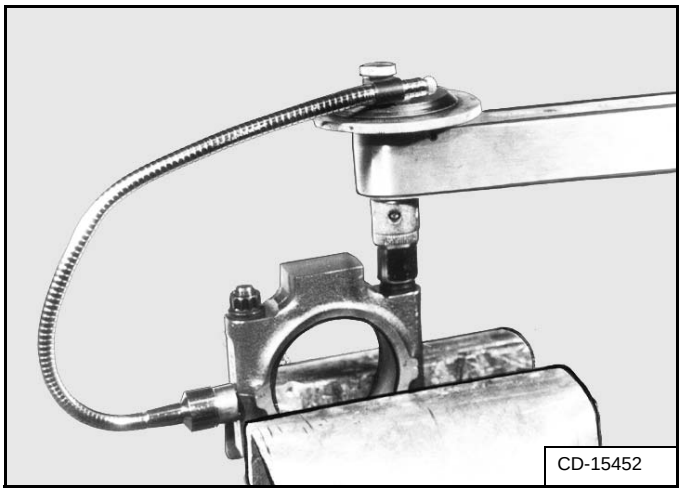
I.D. of Small End Bushing	1.181	+0.00014 +0.00009 inch
	(30 + 0,035 mm) + 0,025	

Figure 70-100-123



Install the correct cap on the correct rod **[Figure 70-100-123]**.

Figure 70-100-124



Tighten the connecting rod cap nuts as follows **[Figure 70-100-124]**.

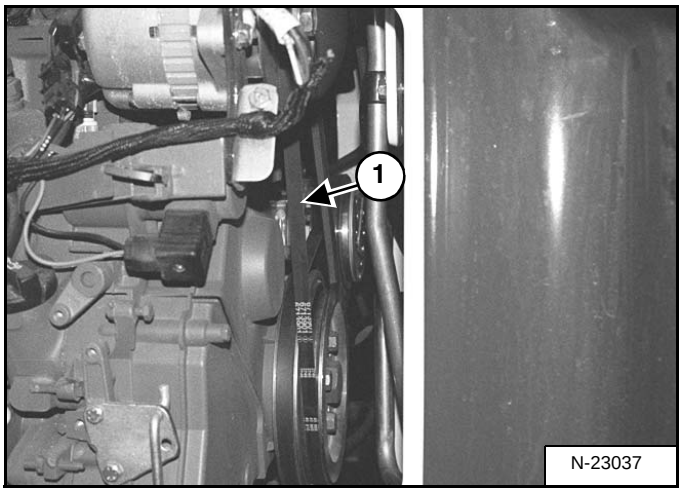
Initial Torque	22 ft.-lbs. (30 Nm)
1st Step Angle	60°
2nd Step Angle	60°

Compressor Drive Belt Inspection

It is a good rule to regularly inspect (weekly) the compressor drive belt for tension and wear.

Open the rear door.

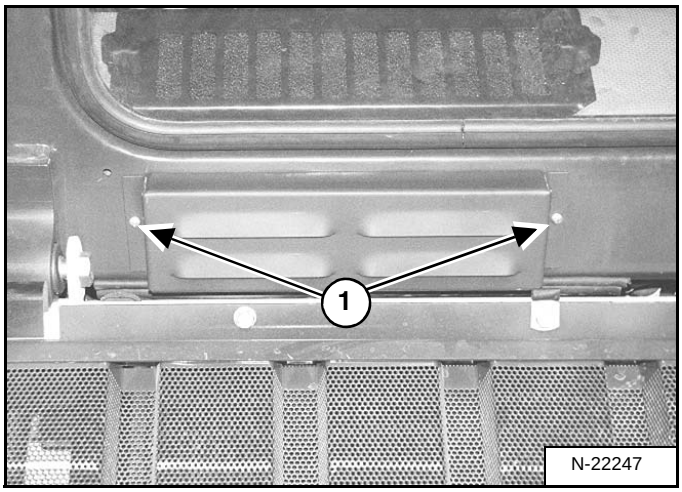
Figure 80-40-5



Check the tension on the compressor belt (Item 1) **[Figure 80-40-5]**.

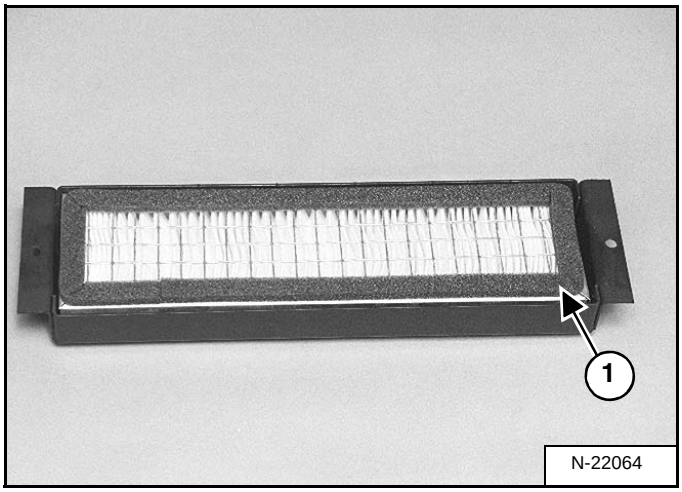
Filter Elements Removal And Installation

Figure 80-40-6



Remove the two mount bolts **[Figure 80-40-6]** from the fresh air filter cover at the rear of the loader cab.

Figure 80-40-7

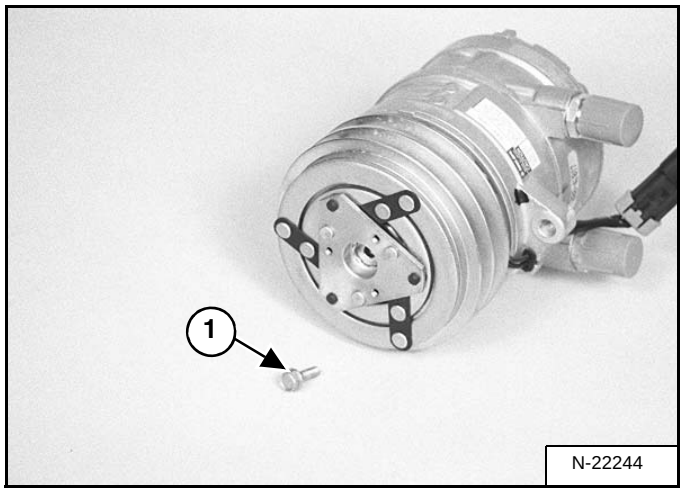


Remove the filter cover and filter (Item 1) **[Figure 80-40-7]** from the loader.

COMPRESSOR (CONT'D)

Compressor Clutch Disassembly

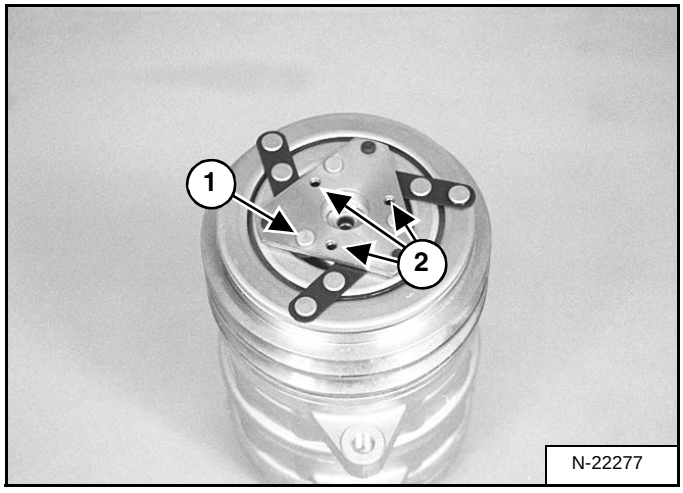
Figure 80-110-3



Remove the center armature bolt (Item 1) **[Figure 80-110-3]**.

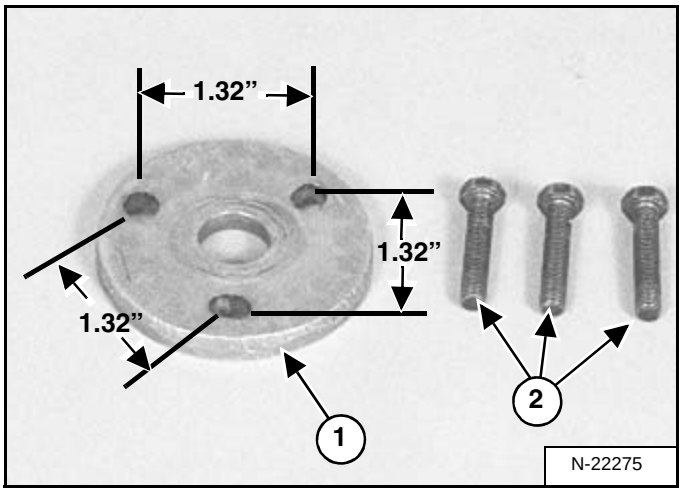
Installation: Tighten the armature bolt to 8-10 ft.-lbs. (12-14 Nm) torque.

Figure 80-110-4



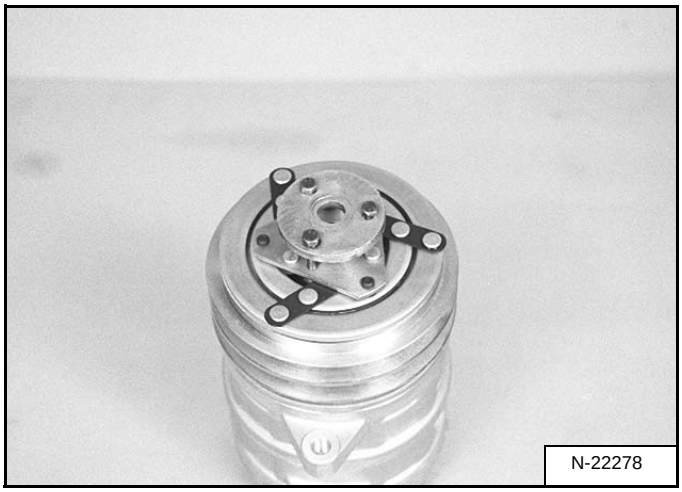
To remove the armature plate (Item 1) **[Figure 80-110-4]** from the clutch face, you must make an armature plate puller.

Figure 80-110-5



The armature plate puller, (Item 1) **[Figure 80-110-5]** can be constructed by drilling three 10 mm holes in a flat circular plate, located 1.32 inches apart **[Figure 80-110-5]**.

Figure 80-110-6



Attach the puller to the armature plate using three 8 mm bolts (Item 2) **[Figure 80-110-5]**.

Turn the bolts into the three 8 mm holes (Item 2) **[Figure 80-110-4]** on the armature plate as shown in **[Figure 80-110-6]**.

LOADER SPECIFICATIONS (CONT'D)

Drive System

	863	863H
Main Drive	Hydrostatic 4 wheel drive	
Transmission	Infinitely variable tandem hydrostatic piston pumps, driving 2 fully reversing hydrostatic motors	
Final Drive	#100 Hs endless roller chain & sprockets in sealed chaincase with oil lubrication	
Total Engine to Wheel Reduction	39:1	
Axle Size	2.76 (70,1)	
Wheel Bolts	(8) 9/16"	

Capacities

Fuel	25 gals. (95 L)
Engine/Cooling Oil W/Filter	16 qts. (15,1 L)
Hydraulic/Hydro. Reservoir	4.7 gals. (17,8 L)
Hydraulic/Hydro. System	10.7 gals. (40,5 L)
Chaincase Reservoir	11 gals. (41,6 L)

Tires

Standard	12 - 16.5, 10 ply rating
Flotation	31 - 15.5 x 15,8 Ply Rating
Recommended Pressure	Inflate tires to MAXIMUM pressure shown on the side wall of the tire. DO NOT mix brands of tires used on the same loader.

Replacing Filter Element (Cont'd)

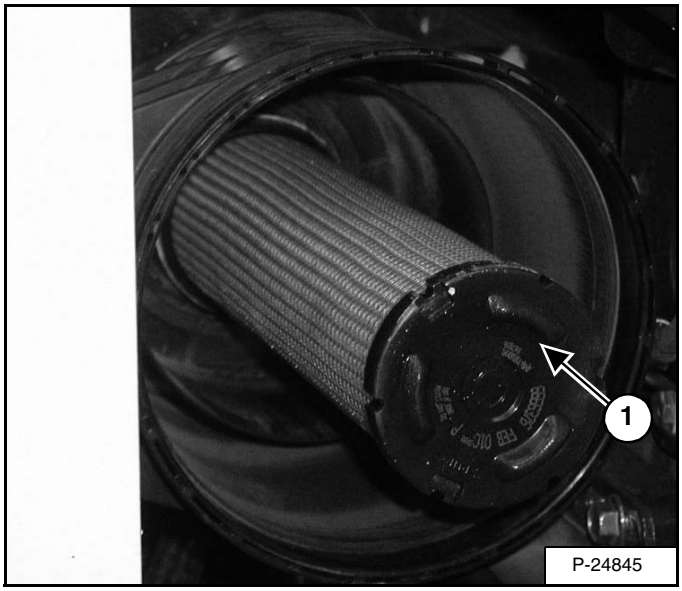
Check the air intake hose and the air cleaner housing for damage. Make sure all connections are tight.

INNER FILTER

Only replace the inner filter element under the following conditions:

- Replace the inner filter element every *third* time the outer filter is replaced.
- After the outer element has been replaced, start the engine and run at full RPM. If the HOURMETER / CODE DISPLAY shows [**01-17**] (**Air Filter Plugged**), replace the inner filter element.

Figure 10-80-5

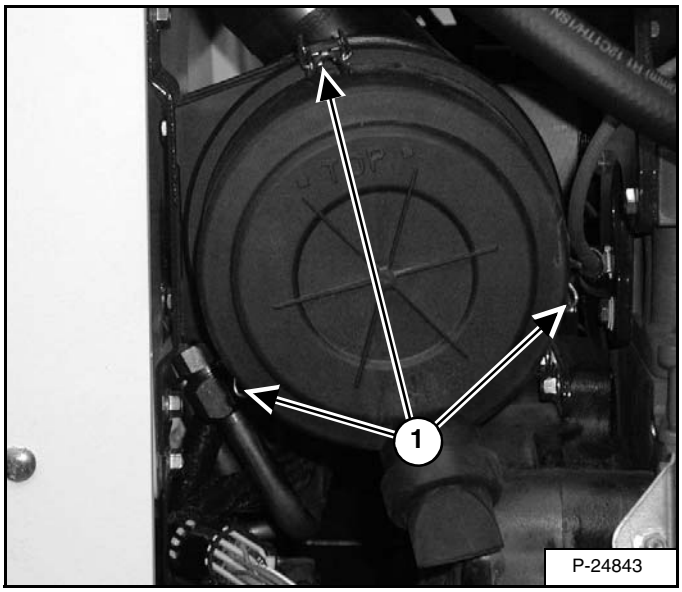


Remove the inner filter element (Item 1) **[Figure 10-80-5]**.

NOTE: Make sure all sealing surfaces are free of dirt and debris.

Install the new inner element.

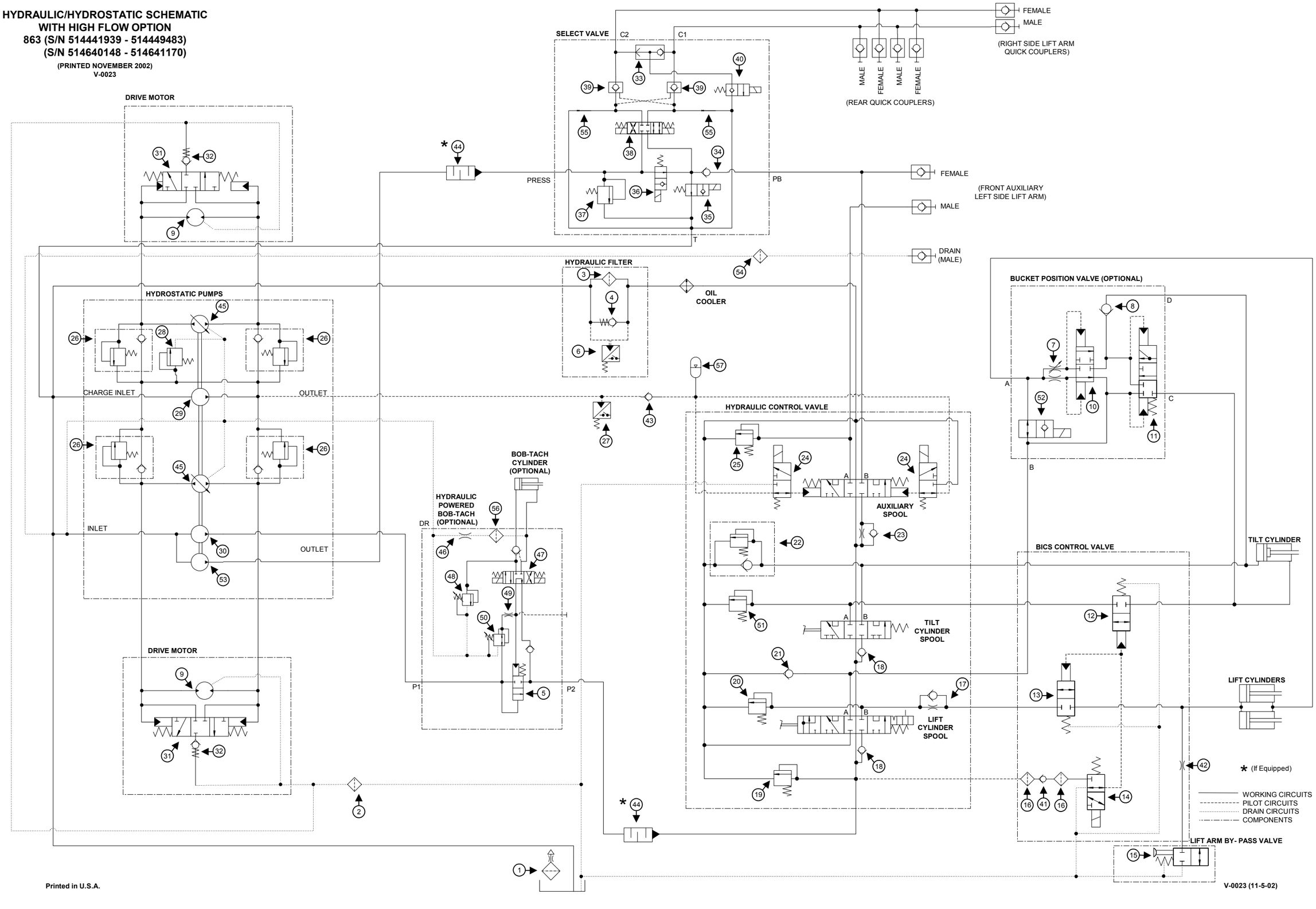
Figure 10-80-6



Install the dust cover and fasten the clamps (Item 1) **[Figure 10-80-6]**.

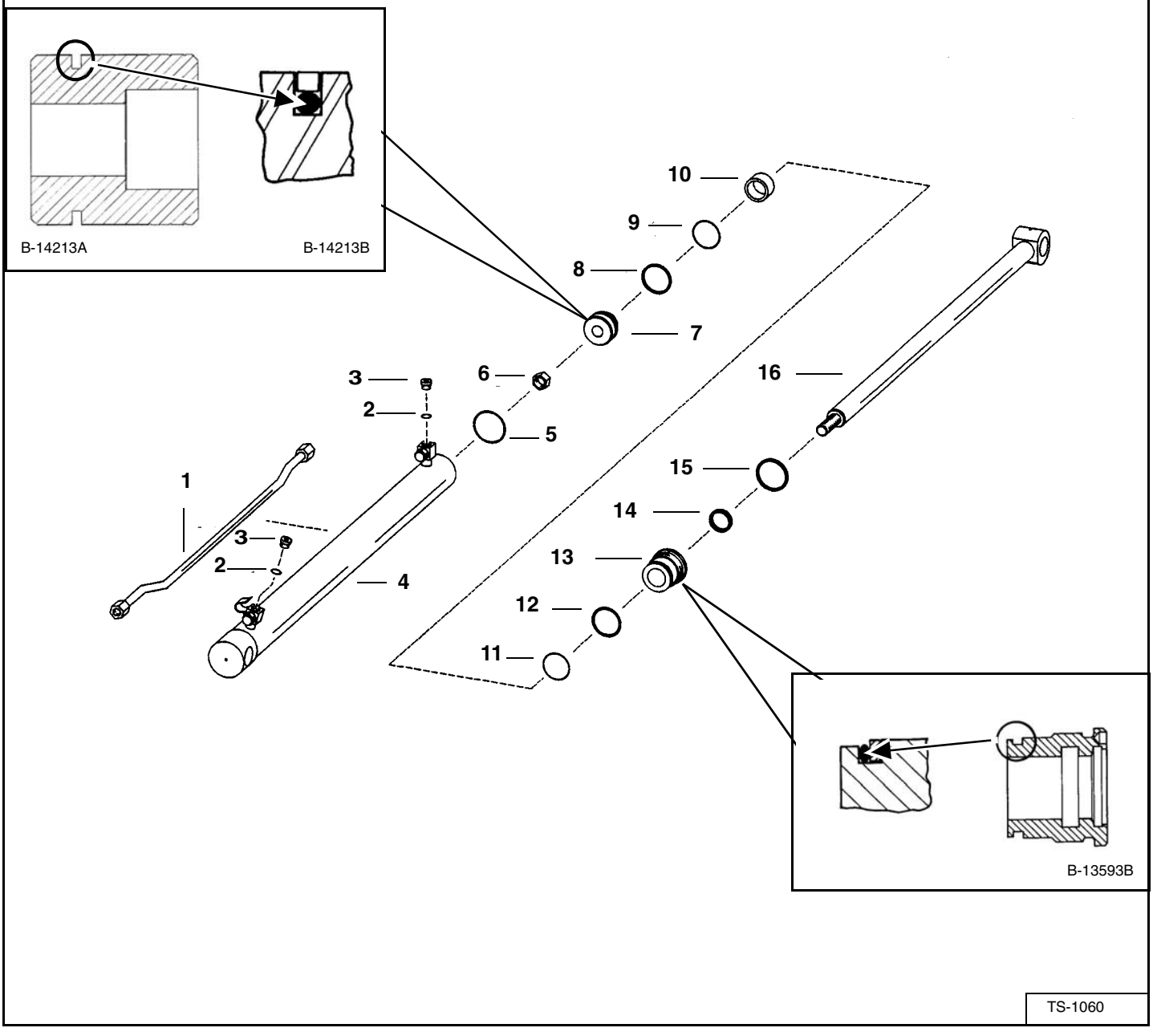
HYDRAULIC/HYDROSTATIC SCHEMATIC
WITH HIGH FLOW OPTION
863 (S/N 514441939 - 514449483)
(S/N 514640148 - 514641170)

(PRINTED NOVEMBER 2002)
V-0023



Parts Identification

1. Tube
2. O-Ring
3. Plug
4. Case
5. O-Ring
6. Nut
7. Piston
8. Ring
9. O-ring
10. Spacer
11. O-ring
12. Washer
13. Head
14. Seal
15. Seal
16. Rod

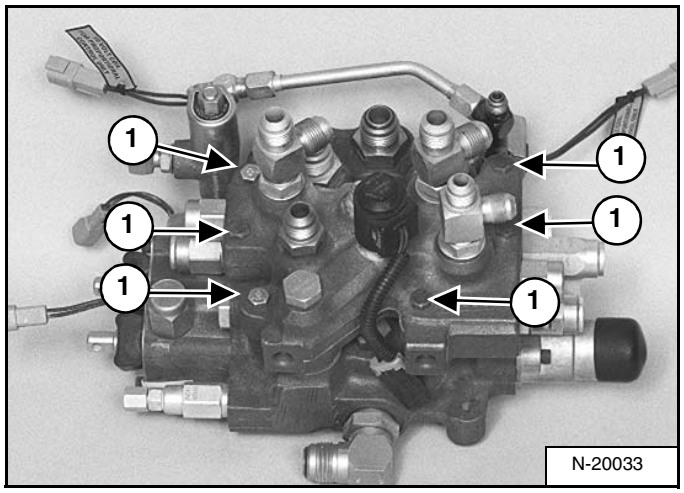


HYDRAULIC CONTROL VALVE (FOOT CONTROL) (CONT'D)

BICS™ Valve, Removal And Installation

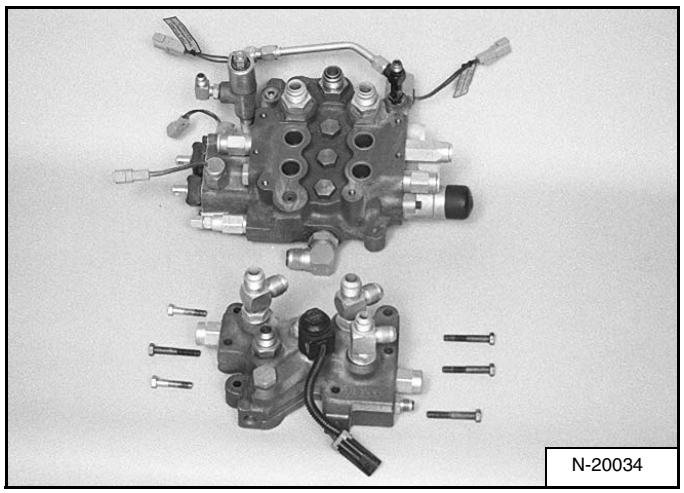
Remove the control valve (See Removal And Installation (S/N 514447863 & Below) on Page 20-40-1.)

Figure 20-40-31



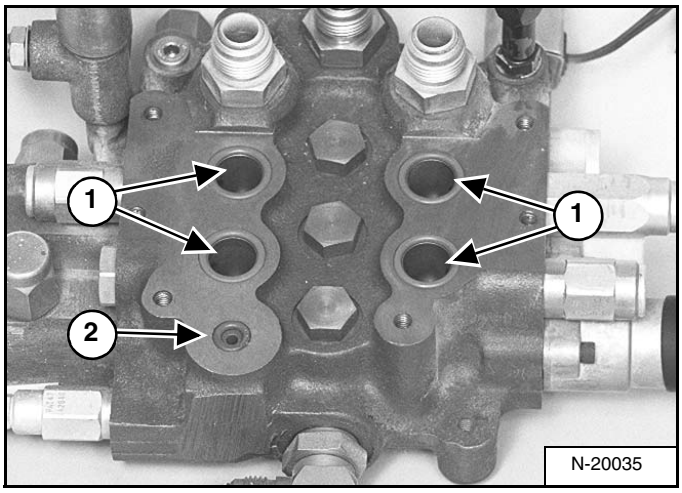
To remove the BICS™ valve from the control valve, loosen and remove the six mounting bolts (Item 1) **[Figure 20-40-31]**.

Figure 20-40-32



Remove the BICS™ valve assembly from the top of the control valve (Item 1) **[Figure 20-40-32]**.

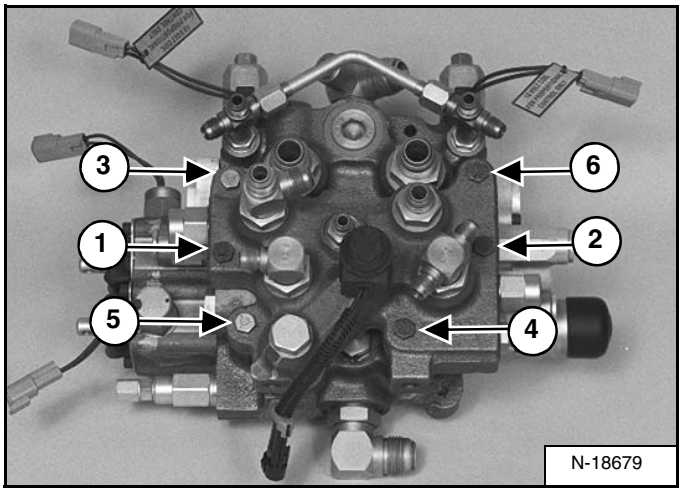
Figure 20-40-33



Remove the four large O-rings (Item 1) **[Figure 20-40-33]** and the small O-ring (Item 2) **[Figure 20-40-33]** from the top of the control valve.

Install the four large O-rings (Item 1) **[Figure 20-40-33]** and the small O-ring (Item 2) **[Figure 20-40-33]** on top of the control valve.

Figure 20-40-34

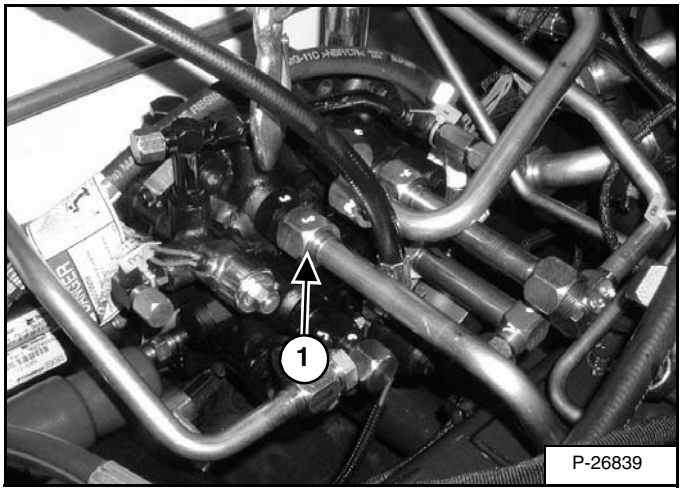


Install the six mounting bolts **[Figure 20-40-34]**.

The See BICS™ Valve, Removal And Installation (Cont'd) on Page 20-40-11 lists the correct torque specifications and tightening sequence when reinstalling the BICS™ valve assembly to the control valve. Thoroughly clean and dry bolts and threads in valve. Use liquid adhesive Loctite® #242 or equivalent.

Removal And Installation (S/N 514447864 & Above) (Cont'd)

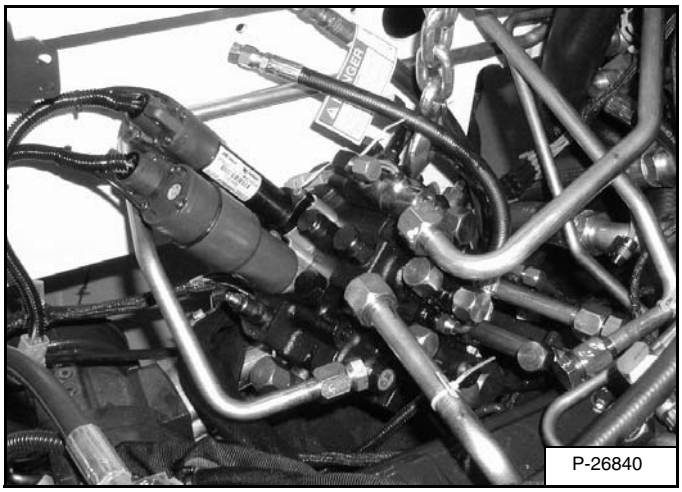
Figure 20-41-40



Disconnect the auxiliary tubeline (Item 1) **[Figure 20-41-40]** from the control valve.

Cap and plug the tubeline and fitting.

Figure 20-41-41



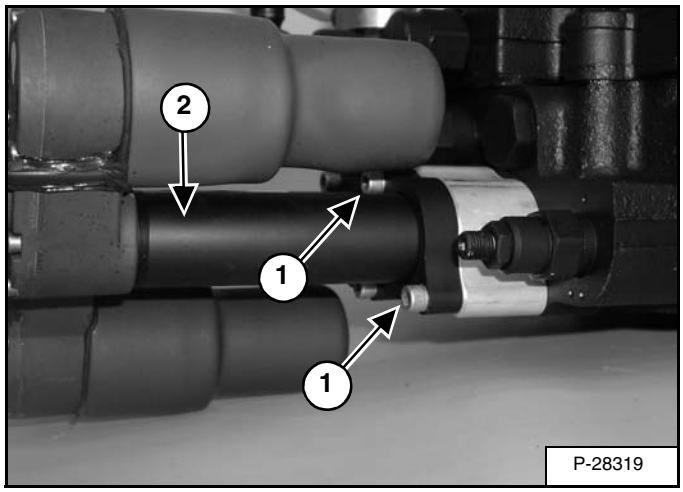
Lower the chain hoist and valve to allow clearance so the actuators can clear the tubelines.

Rotate the valve upward until the actuators are above the tubelines **[Figure 20-41-41]**.

Remove the control valve from the loader.

Actuator Removal And Installation (Out Of Loader)

Figure 20-41-42

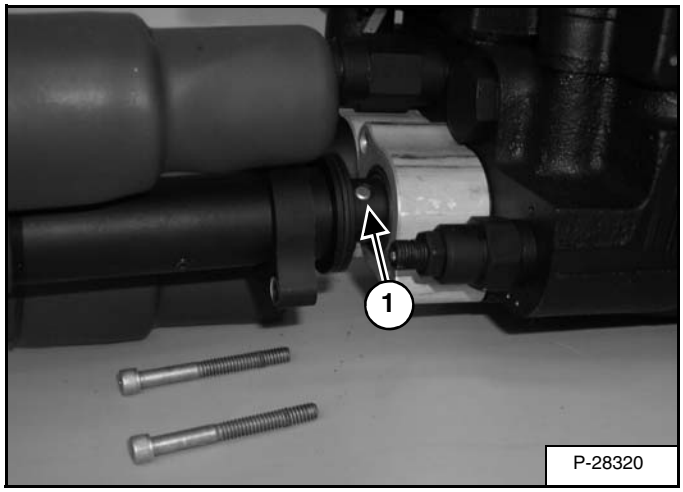


Remove the two screws (Item 1) **[Figure 20-41-42]** on the actuator retainer.

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

Pull the actuator (Item 2) **[Figure 20-41-42]** away the control valve.

Figure 20-41-43



Use a drift pin and hammer to remove the actuator pin (Item 1) **[Figure 20-41-43]** from the actuator and the lift or tilt spool.

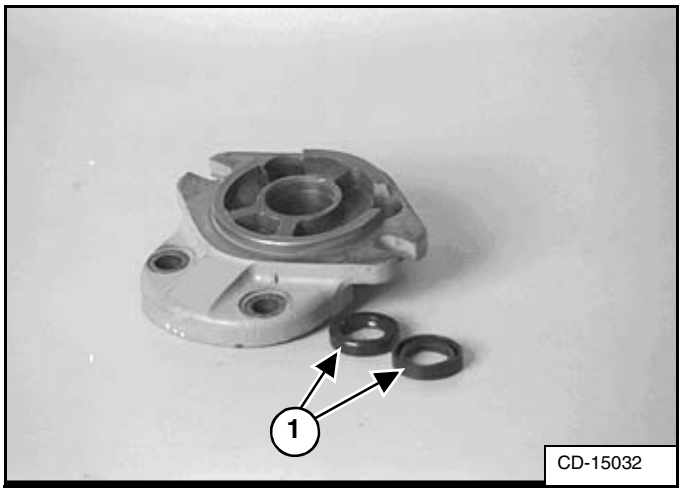
Assembly

IMPORTANT

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

I-2003-0888

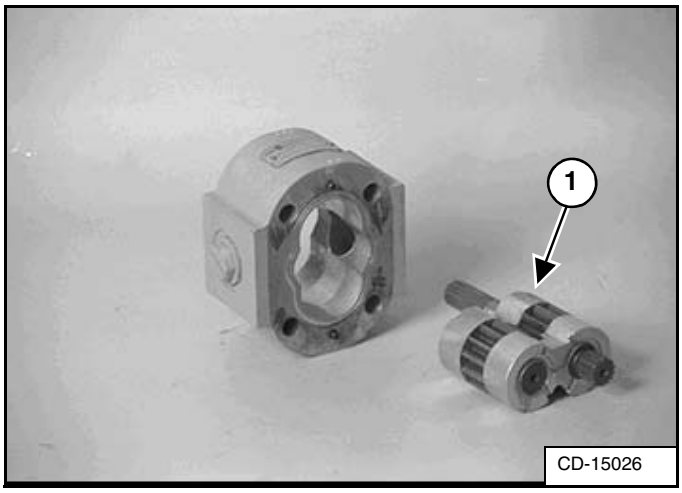
Figure 20-61-24



Install the two seals (Item 1) **[Figure 20-61-24]** into the mounting flange housing using the correct size driver tool.

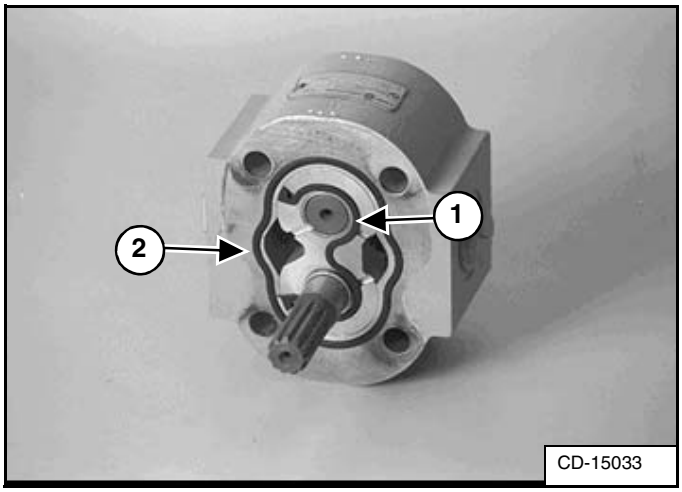
Install the inside seal with the lip facing the drive gear and the outside seal with the lip facing outward.

Figure 20-61-25



Install the large drive and idler gears into the bearing housing (Item 1) **[Figure 20-61-25]**.

Figure 20-61-26



Install the bearing housing / gears assembly into the large pump housing **[Figure 20-61-26]**.

Install the back-up / O-ring seal (Item 1) **[Figure 20-61-26]**.

Install the large O-ring (Item 2) **[Figure 20-61-26]**.

High Flow Relief Valve Removal and Installation

⚠ WARNING

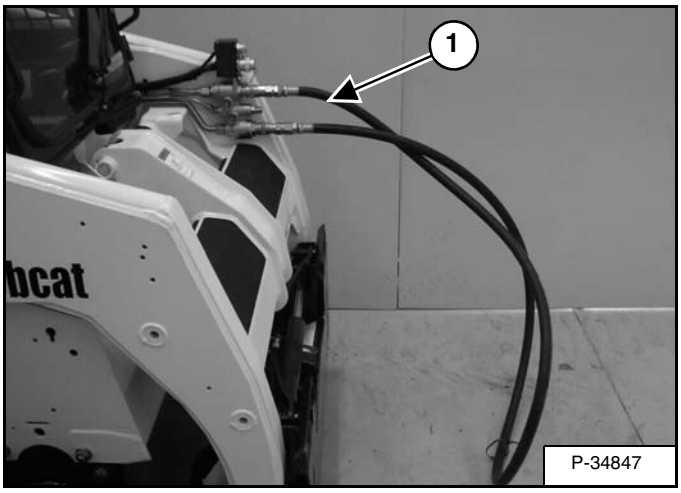
Put jackstands under the front axles and rear corners of the frame before running the engine for service. Failure to use jackstands can allow the machine to fall or move and cause injury or death.

W-2017-0286

Lift and block the loader. (See LIFTING AND BLOCKING THE LOADER on Page 10-10-1.)

Remove the right rear tire.

Figure 20-64-15



Install a jumper hose (Item 1) **[Figure 20-64-15]** onto the front auxiliary quick couplers.

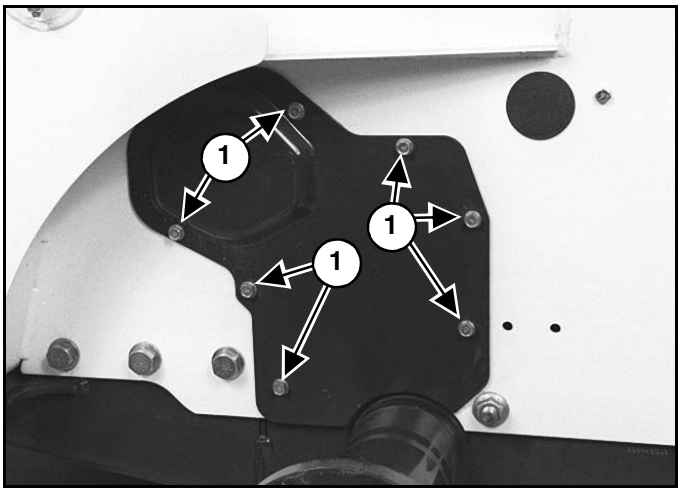
Raise the lift arms and install an approved lift arm support device. (See Engaging The Lift Arm Support Device on Page 10-20-1.)

⚠ WARNING

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

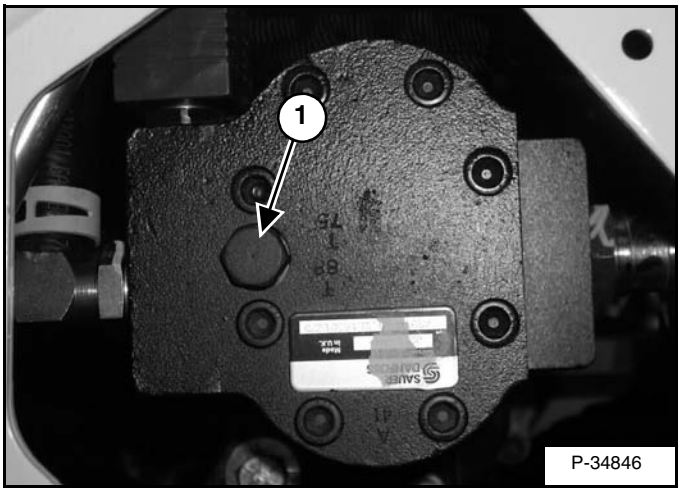
W-2059-0598

Figure 20-64-16



Remove the access cover mount bolts (Item 1) and the access cover (Item 2) **[Figure 20-64-16]** from the frame.

Figure 20-64-17



Remove the cap (Item 1) **[Figure 20-64-17]** from the pump.

Disassembly And Assembly (Cont'd)

Figure 20-120-16

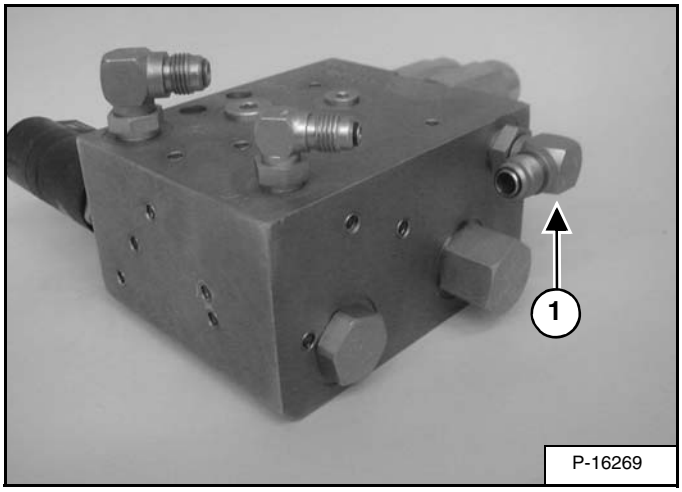
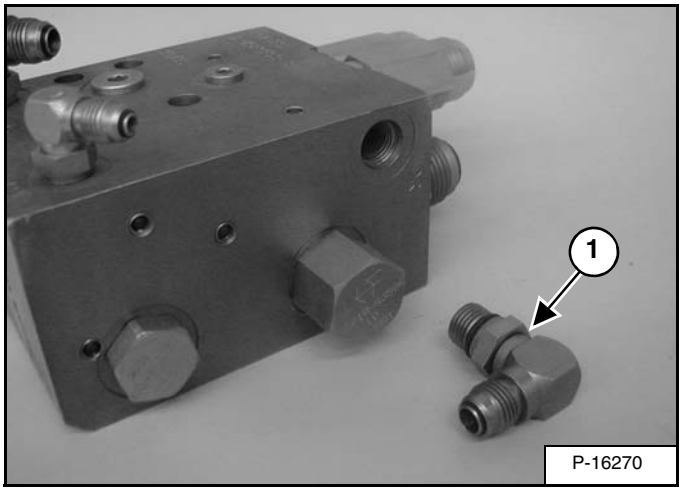


Figure 20-120-17



Remove the **DR** fitting (Item 1) **[Figure 20-120-16]** & **[Figure 20-120-17]**.

Figure 20-120-18

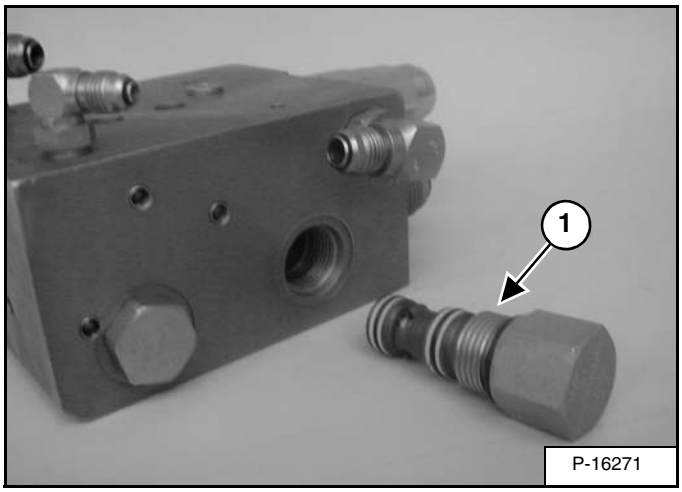
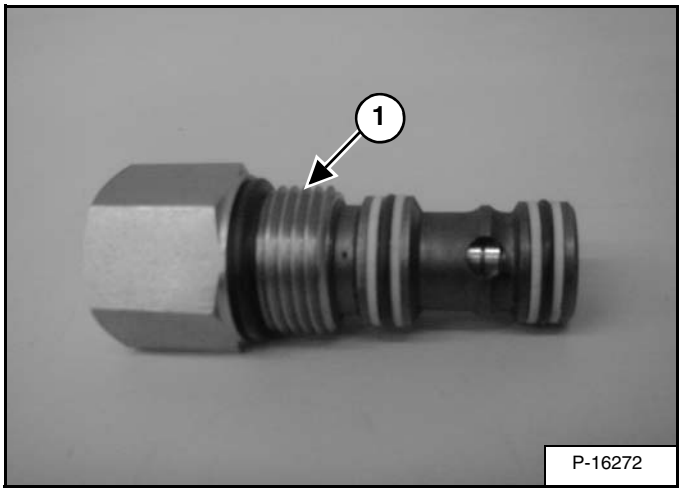


Figure 20-120-19

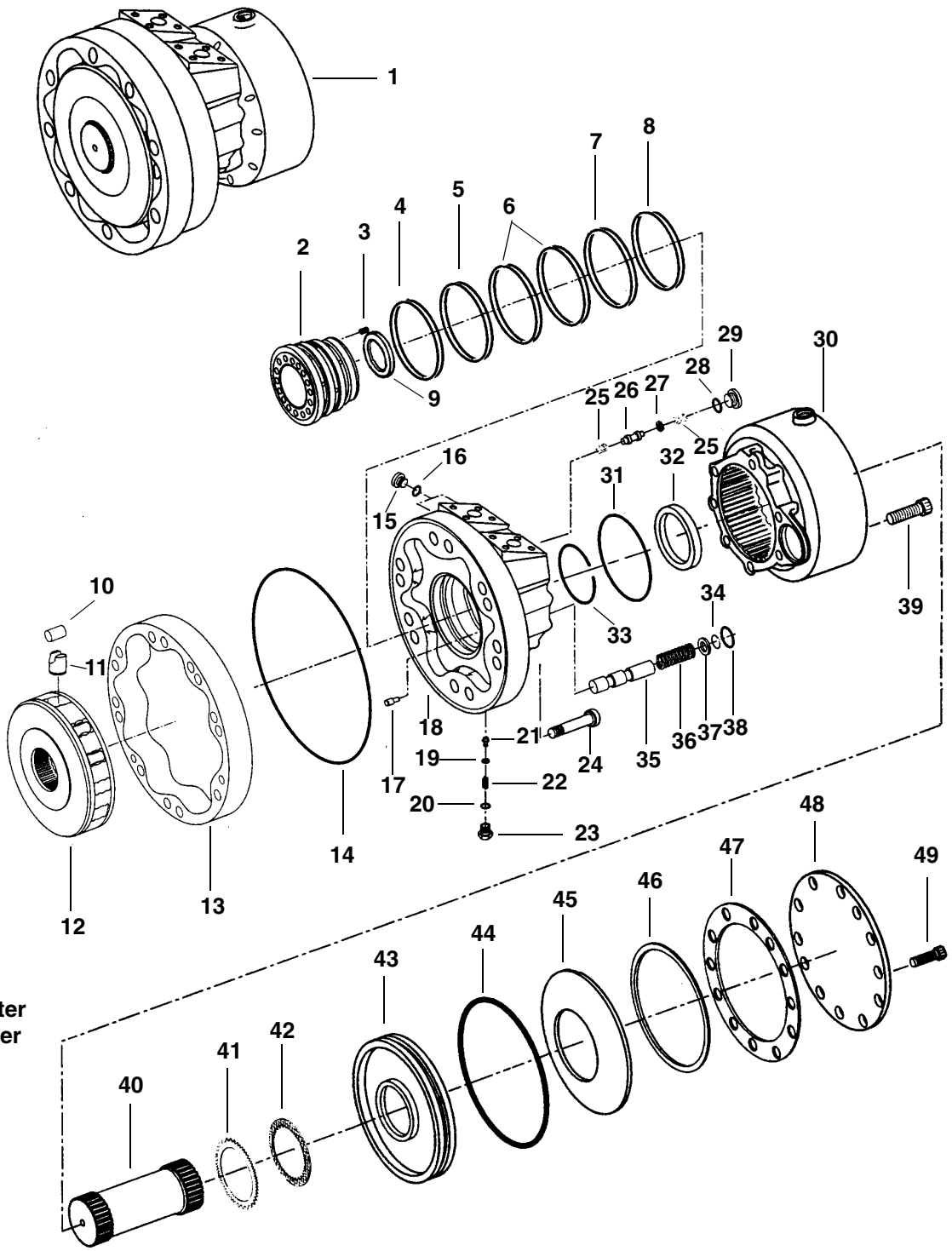


Remove the logic cartridge valve (Item 1) **[Figure 20-120-18]** & **[Figure 20-120-19]**.

Installation: Put oil on O-rings and back-up washers. Tighten to 25 ft.-lb. (33,9 N•m).

Parts Identification

1. Motor
2. Distributor
3. Spring
4. Seal / O-Ring
5. Seal / O-Ring
6. Seal / O-Ring
7. Seal / O-Ring
8. Seal / O-Ring
9. Bushing
10. Roller
11. Piston
12. Block
13. Cam
14. Quad Ring
15. Plug
16. O-Ring
17. Locating Pin
18. Housing
19. Shim
20. O-Ring
21. Poppet
22. Spring
23. Plug
24. Bolt
25. Spring
26. Spool
27. Washer
28. O-Ring
29. Plug
30. Housing
31. Quad Ring
32. Bushing
33. Snap Ring
34. Snap Ring
35. Spool
36. Spring
37. Washer
38. Quad Ring
39. Bolt
40. Shaft
41. Brake Disc-Outer
42. Brake Disc-Inner
43. Piston
44. O-Ring
45. Washer
46. Washer
47. Gasket
48. Cover
49. Bolt

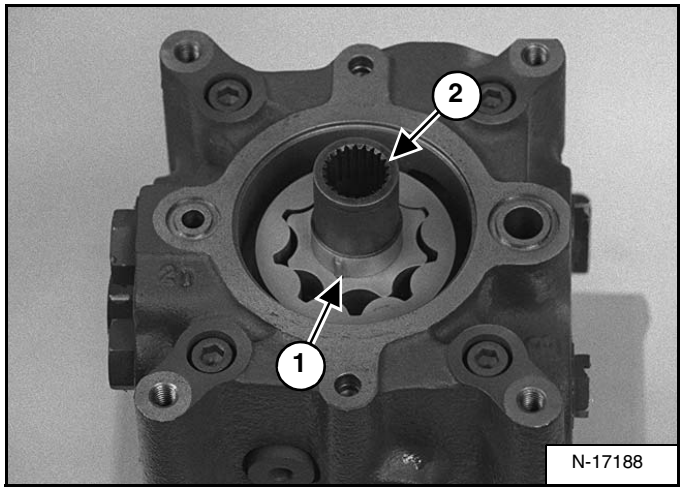


B-16657A

Assembly (Cont'd)

Charge Pump Assembly (Cont'd)

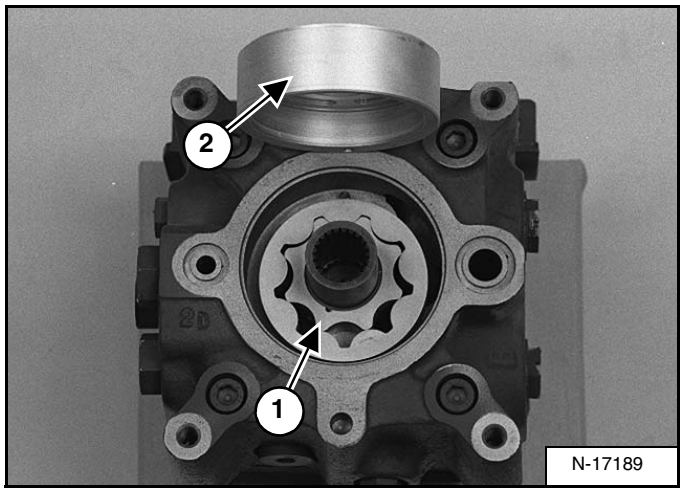
Figure 30-40-73



Apply petroleum jelly to the gerotor drive pin (Item 1) **[Figure 30-40-73]** and install the gerotor pin into the drive coupler (Item 2) **[Figure 30-40-73]**.

NOTE: The gerotor drive coupler (Item 2) [Figure 30-40-73] must be installed with the longer portion down toward the rear of the charge pump.

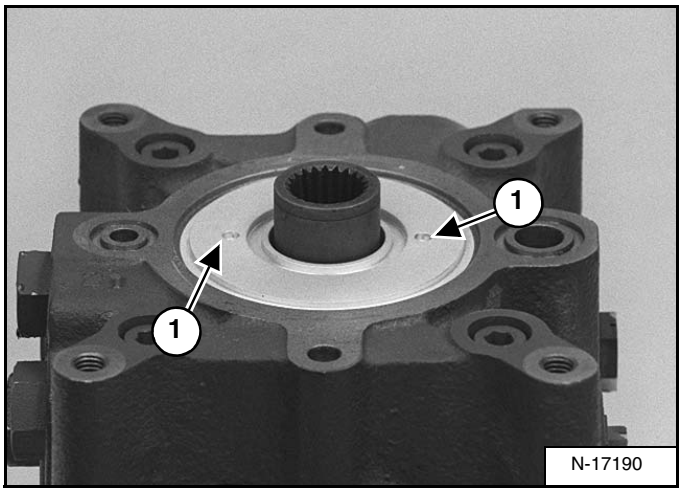
Figure 30-40-74



Install the coupler and drive pin into the gerotor, be sure the pin engages the gerotor slot (Item 1) **[Figure 30-40-74]**.

Install the gerotor spacer (Item 2) **[Figure 30-40-74]** into the charge pump end cap.

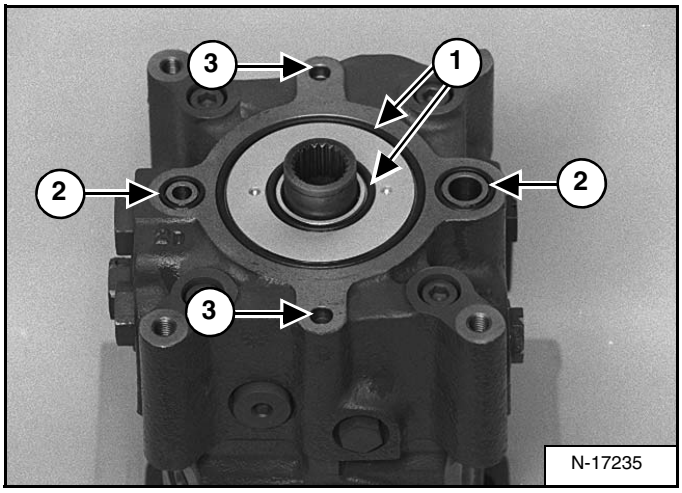
Figure 30-40-75



A spanner wrench may be used in the two holes (Item 1) **[Figure 30-40-75]** to slightly rotate the gerotor spacer to align with the locating pin.

When the spacer is properly installed the surface of the gerotor spacer and charge pump face are flush **[Figure 30-40-75]**.

Figure 30-40-76



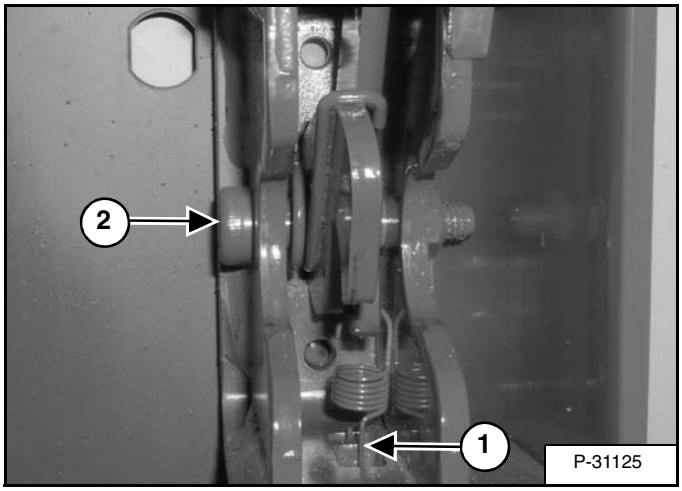
Install the two large O-rings (Item 1) **[Figure 30-40-76]** into the gerotor cap.

Install the two smaller O-rings (Item 2) **[Figure 30-40-76]** in the charge pump housing end cap.

Install the two aligning pins into the alignment holes (Item 3) **[Figure 30-40-76]** in the charge pump.

Latch Removal And Installation (S/N 514449209 & Above)

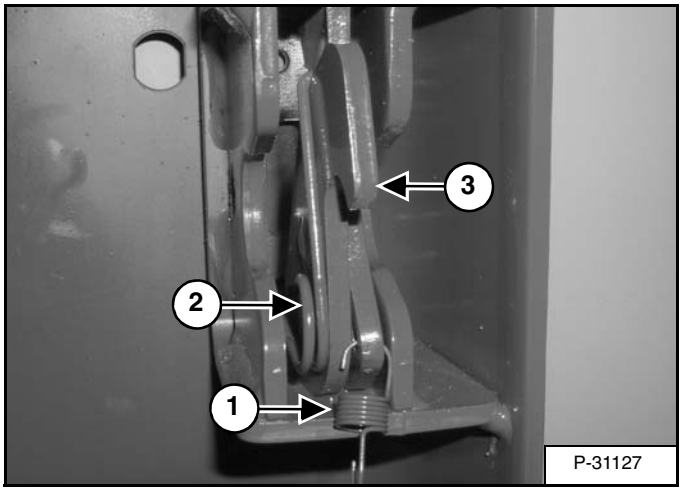
Figure 50-70-8



Disconnect the spring (Item 1) **[Figure 50-70-8]** from the tailgate.

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

Figure 50-70-9



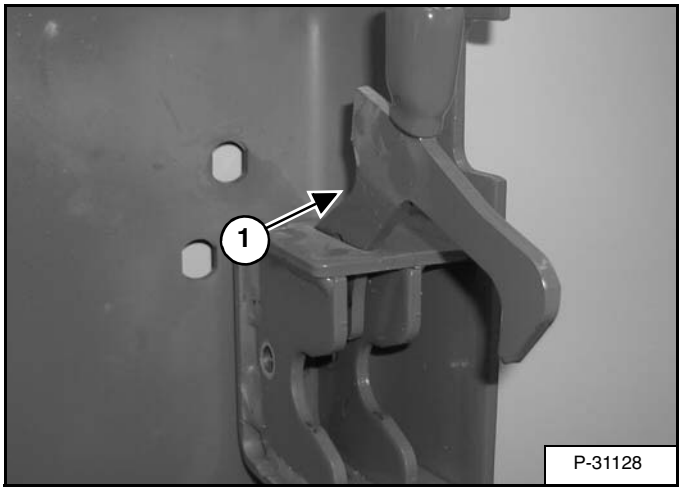
Remove the spring (Item 1) **[Figure 50-70-9]** from the door handle.

Remove the spring (Item 2) **[Figure 50-70-9]** from the door latch.

Remove the door latch (Item 3) **[Figure 50-70-9]** from the lever.

Latch Removal And Installation (S/N 516815094, 517515071, 518915872 & Above.) (Cont'd)

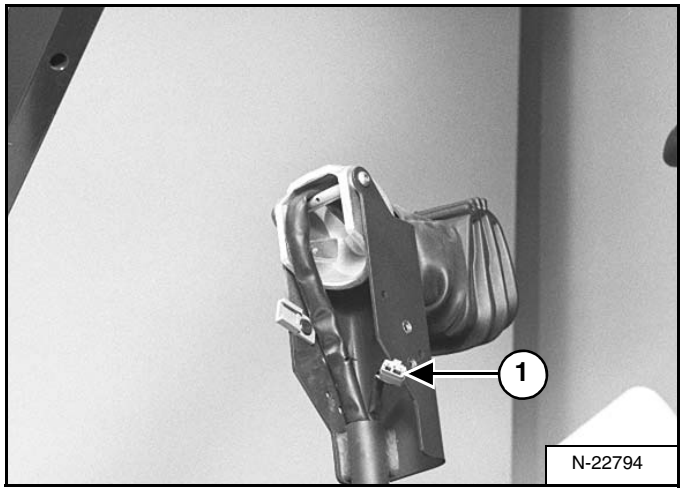
Figure 50-70-10



Remove the lever (Item 1) **[Figure 50-70-10]** from the rear door.

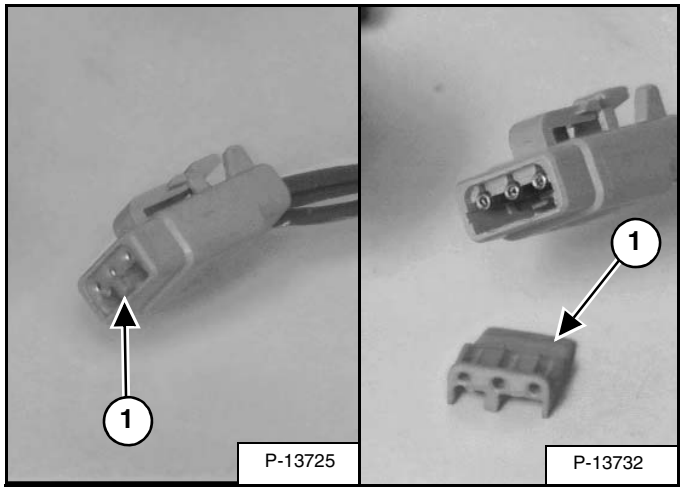
Control Handle Removal And Installation

Figure 50-112-19



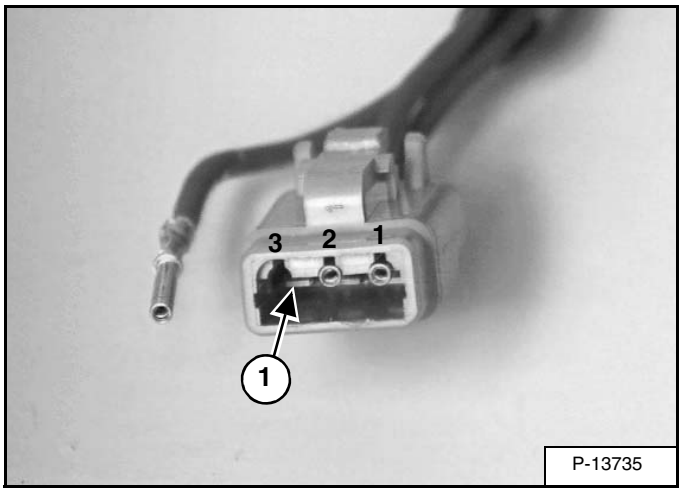
To remove the switch handle, the connector (Item 1) **[Figure 50-112-19]** must be removed from the wires.

Figure 50-112-20



Remove the wedge (Item 1) **[Figure 50-112-20]** from the connector.

Figure 50-112-21



Using a pointed tool, press down on the tab (Item 1) **[Figure 50-112-21]** and pull the wire from the connector.

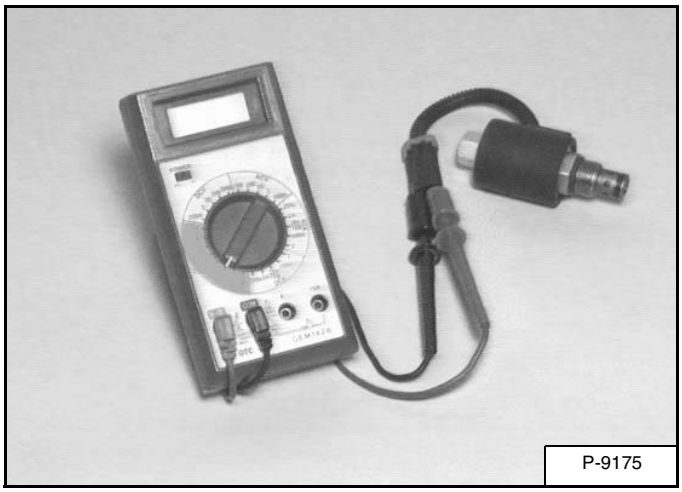
Installation: Install the wires into the connector as listed below **[Figure 50-112-21]**:

Right Control Lever Switch Handle
- 1 - Terminal - Red/White
- 2 - Terminal - Black/White
- 3 - Terminal - Purple/White

Left Control Lever Switch Handle
- 1 - Terminal - Red/White
- 2 - Terminal - Black/White
- 3 - Terminal - Purple/White

Solenoid Test

Figure 60-10-8

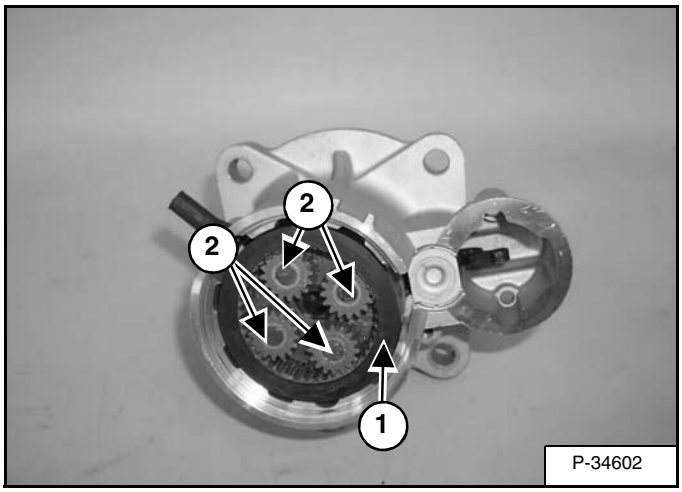


Use a test meter to measure coil resistance **[Figure 60-10-8]**. Coil wires do not have polarity. Correct resistance for the pressure relief (small) coil is 7-10 ohm and the other coils 5-8 ohms.

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

Disassembly and Assembly (Cont'd)

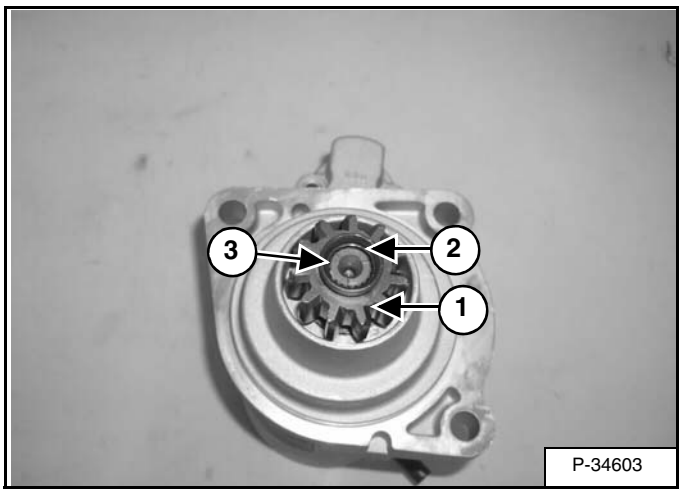
Figure 60-41-14



Remove the rubber retainer (Item 1) **[Figure 60-41-14]**.

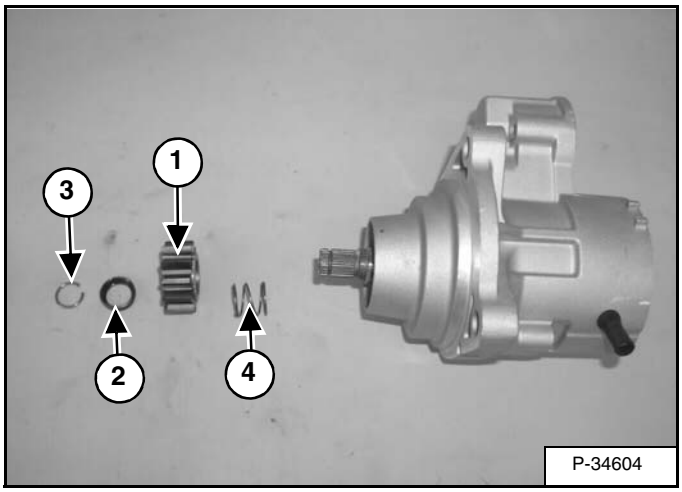
Remove the planetary gears (Item 2) **[Figure 60-41-14]** and inspect for damage.

Figure 60-41-15



Press down on the pinion (Item 1) **[Figure 60-41-15]** & **[Figure 60-41-16]** and retainer (Item 2) **[Figure 60-41-15]** & **[Figure 60-41-16]**.

Figure 60-41-16



Remove the snap ring (Item 3) **[Figure 60-41-15]** & **[Figure 60-41-16]**

Remove the retainer (Item 2) **[Figure 60-41-15]** & **[Figure 60-41-16]** and pinion (Item 1) **[Figure 60-41-15]** & **[Figure 60-41-16]**.

Remove the spring (Item 4) **[Figure 60-41-16]**.

Installation: Inspect all parts for wear and replace as needed.

ADVANCED HAND CONTROL SYSTEM (ACH) (CONT'D)

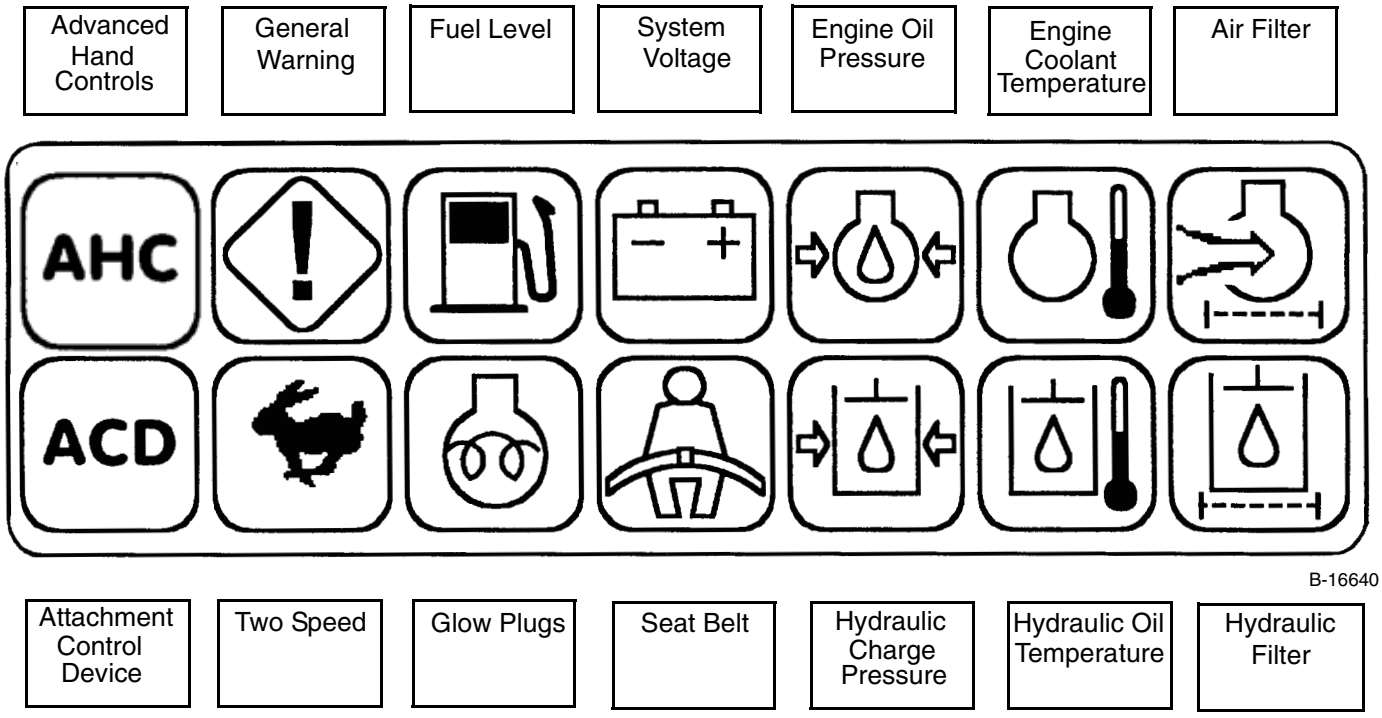
Trouble shooting Guide

The Advanced Hand Control System (AHC) has a built-in diagnostic function which uses an icon on the right instrument panel to indicate the condition of the AHC System. The system also records the alarm condition as a service code.

The control module continually checks the system in the order listed. The checks start with the lift handle controller and then the lift actuator. If no problems are present, it will then check the tilt handle controller and the tilt actuator. The system will stop its check at the first problem and then luminate the icon.

The system starts its diagnostics and calibration when the ignition key is turned ON.

The following list shows the probable causes when the icon is luminated.



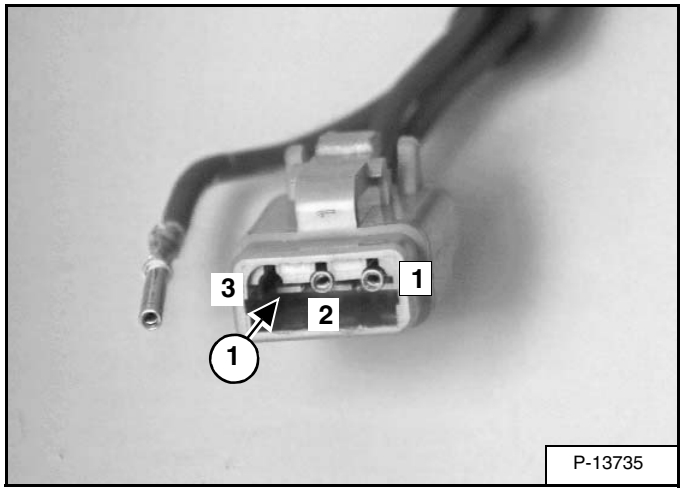
Advanced Hand Controls

Errors - **lights** solid with 3 beeps
32-31 - **Tilt** actuator fault
32-32 - **Tilt** actuator wiring fault
32-33 - **Tilt** handle wiring fault
32-34 - **Tilt** actuator not calibrated
32-35 - **Tilt** handle not calibrated
32-36 - **Lift** actuator fault
32-37 - **Lift** actuator wiring fault
32-38 - **Lift** handle wiring fault
32-39 - **Lift** actuator not calibrated
32-40 - **Lift** handle not calibrated
32-41 - **Invalid** Frequency

To see what error occurred. Check the service code on the left instrument panel. (See DELUXE INSTRUMENTATION SERVICE CODES on Page 60-80-1.)

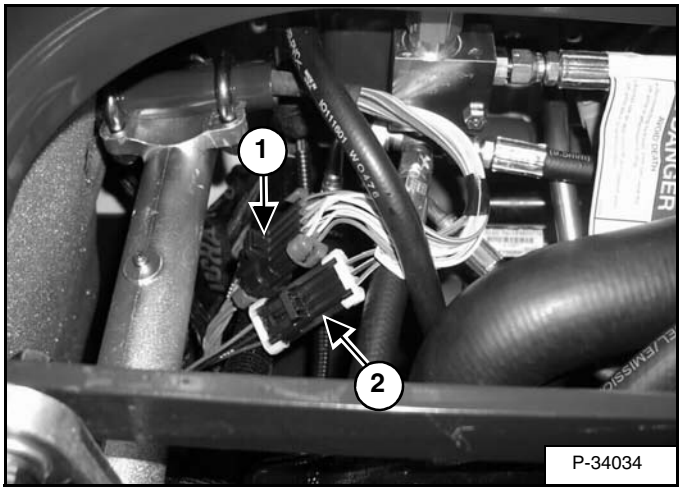
Switch Handle Removal (Cont'd)

Figure 60-123-16



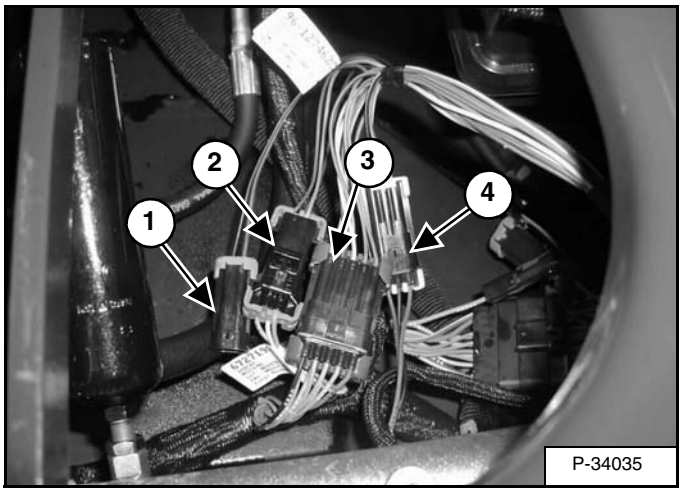
Use a pointed tool, press down on the tab (Item 1) **[Figure 60-123-16]** and pull the wire from the connector.

Figure 60-123-17



Disconnect the right switch handle connectors (Items 1 & 2) **[Figure 60-123-17]** from the loader wiring harness connectors.

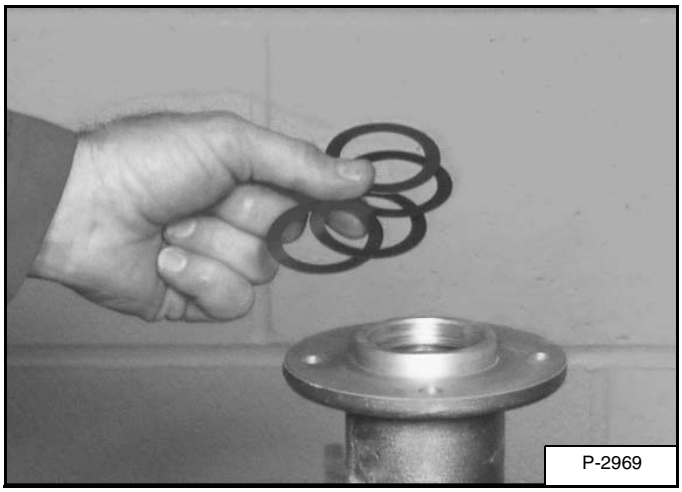
Figure 60-123-18



Disconnect the left switch handle connectors (Items 1, 2, 3 & 4) **[Figure 60-123-18]** from the loader wiring harness connectors.

Gearbox Disassembly (Cont'd)

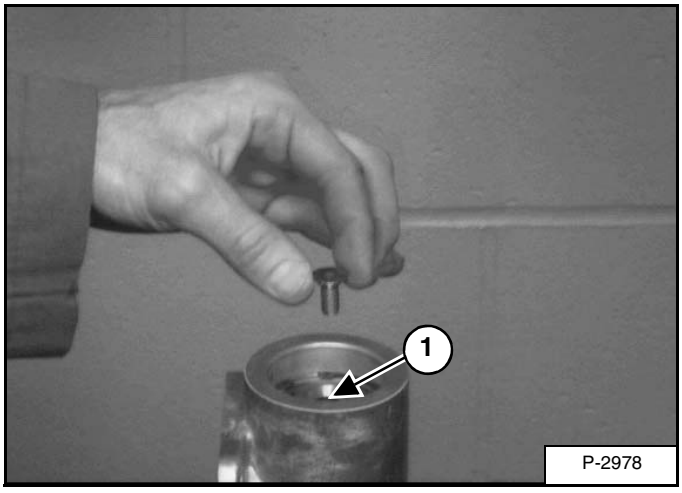
Figure 70-60-28



Remove the large shims from the housing **[Figure 70-60-28]**.

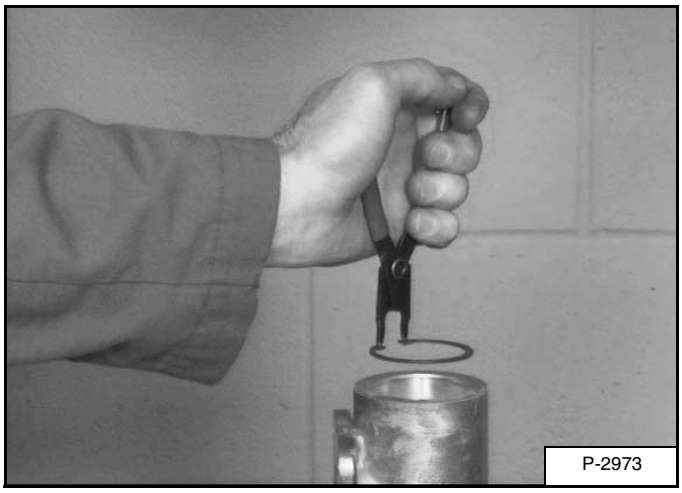
NOTE: Use the same size and thickness of shims during assembly.

Figure 70-60-29



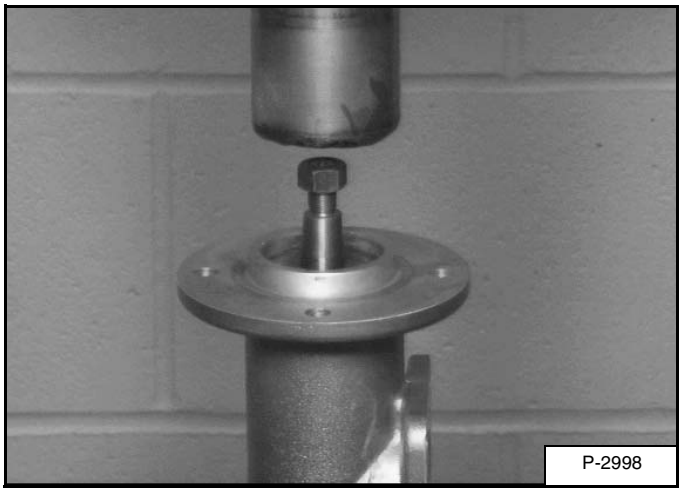
Remove the screw and washer (Item 1) **[Figure 70-60-29]** from the shaft.

Figure 70-60-30



Remove the snap ring from the cap end of the housing **[Figure 70-60-30]**.

Figure 70-60-31



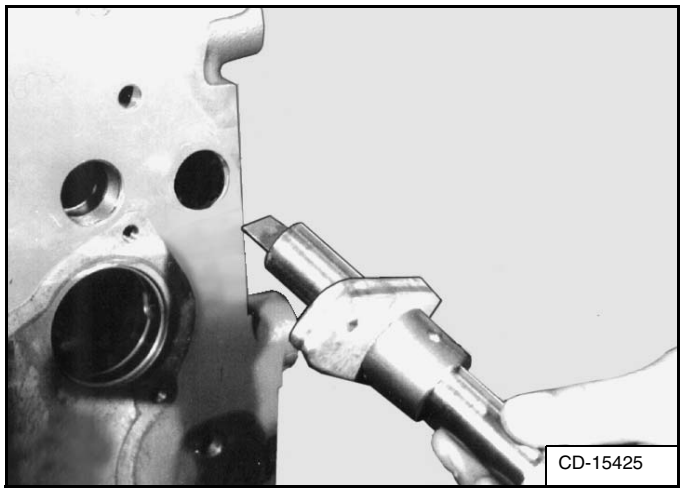
Press the shaft from the housing **[Figure 70-60-31]**.

NOTE: Both bearings may come out of the housing with the shaft. If one bearing remains in the housing, use a non metal object to tap the bearing from the housing.


Bobcat®

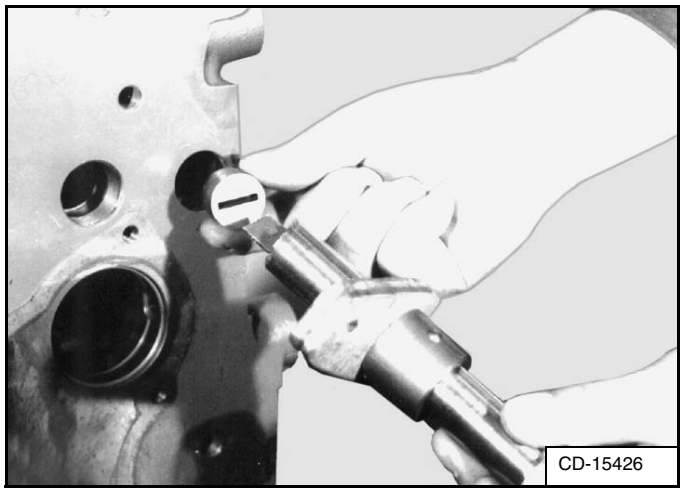
Control Rod Guide Bushing Installation (Cont'd)

Figure 70-100-100



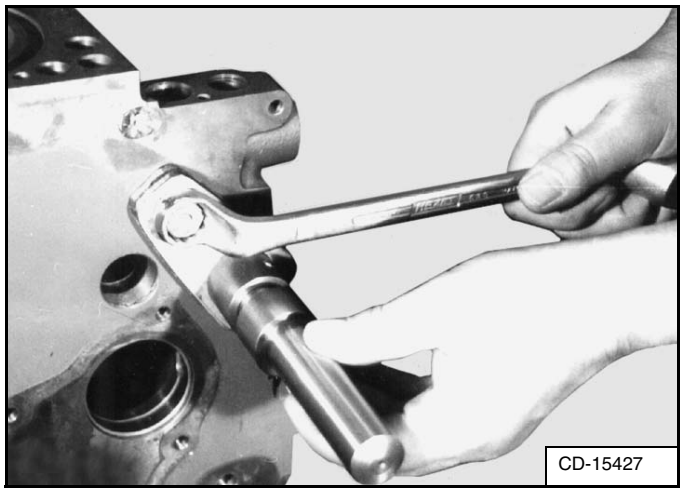
Assemble the arbor without the spacer **[Figure 70-100-100]**.

Figure 70-100-101



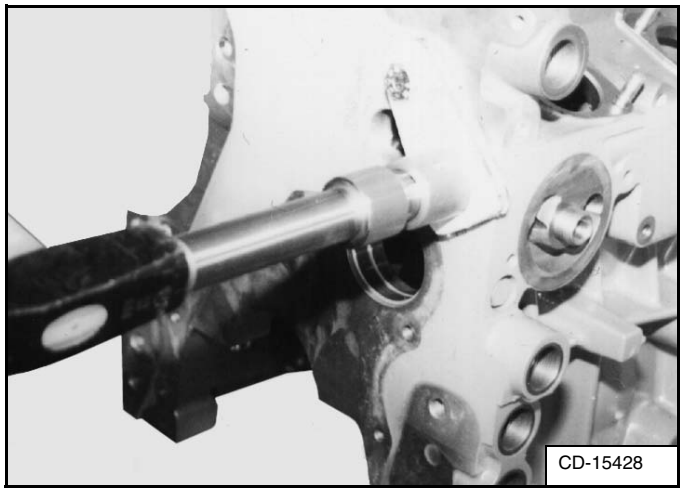
Install the guide bushing on the arbor assembly with the chamfer pointing toward the crankcase **[Figure 70-100-101]**.

Figure 70-100-102



Fasten the arbor assembly and guide bushing to the engine block **[Figure 70-100-102]**.

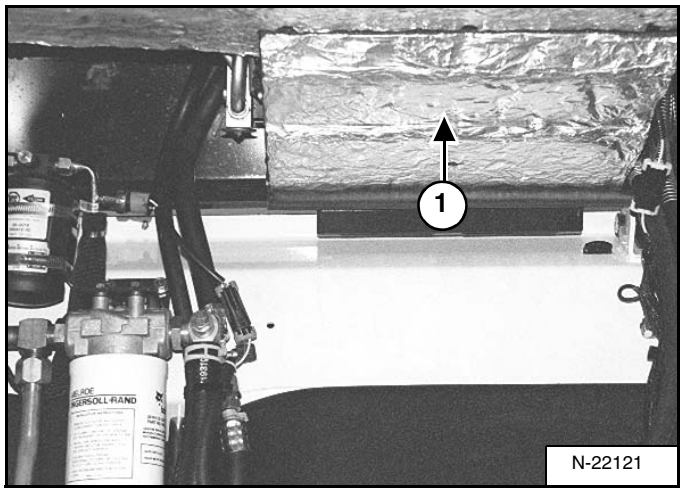
Figure 70-100-103



Drive in the guide bushing as far as it will go, at the flywheel end **[Figure 70-100-103]**.

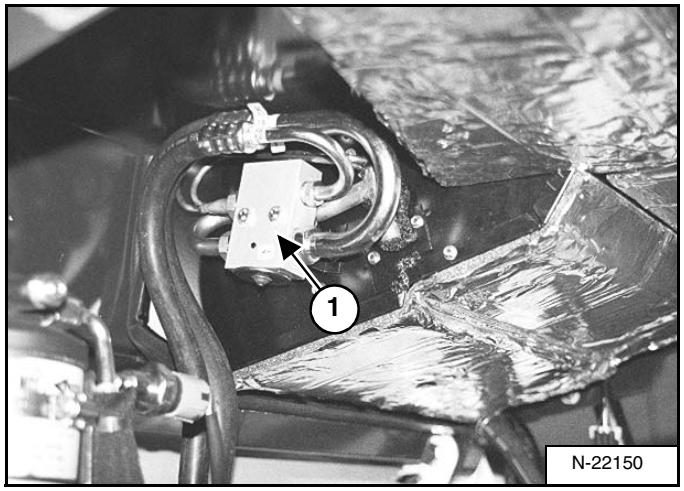
Identification (Cont'd)

Figure 80-20-5



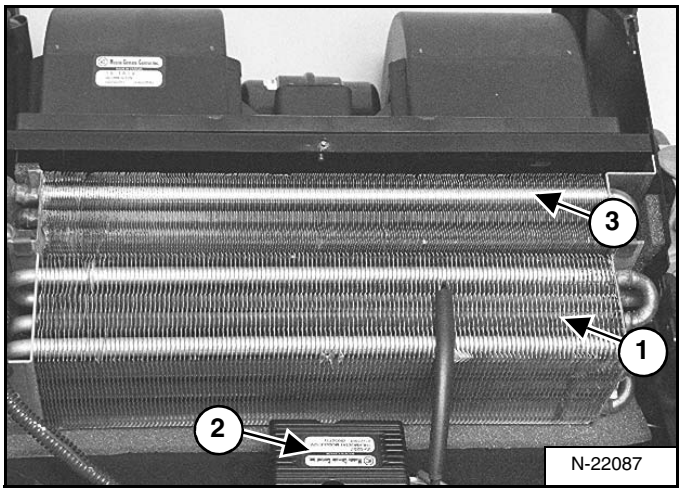
Heater / Evaporator Unit: The heater / evaporator unit (Item 1) **[Figure 80-20-5]** is located behind the loader cab. The unit delivers the cold air for the A/C and warm air for heat into the cab. The unit contains the blower, heat & A/C coils, thermostat and expansion valve.

Figure 80-20-6



Expansion Valve: The expansion valve (Item 1) **[Figure 80-20-6]** controls the amount of refrigerant entering the evaporator coil.

Figure 80-20-7

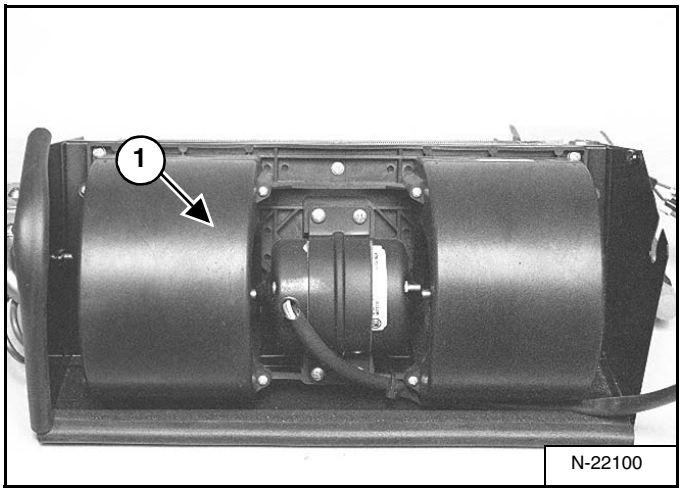


Evaporator Coil: The evaporator coil (Item 1) **[Figure 80-20-7]** cools and dehumidifies the air before it enters the cab.

Thermostat: The thermostat (Item 2) **[Figure 80-20-7]** controls the temperature of the evaporator coil.

Heater Coil: The heater coil (Item 3) **[Figure 80-20-7]** supplies the warm air into the cab by passing air through the coil.

Figure 80-20-8



Heater / Evaporator Blower: The blower (Item 1) **[Figure 80-20-8]** is used to push air through the heater and evaporator coils and into the cab.

Reclamation Procedure (Cont'd)

NOTE: Only A/C trained technicians should perform the reclaiming and recharging procedure.

⚠ WARNING

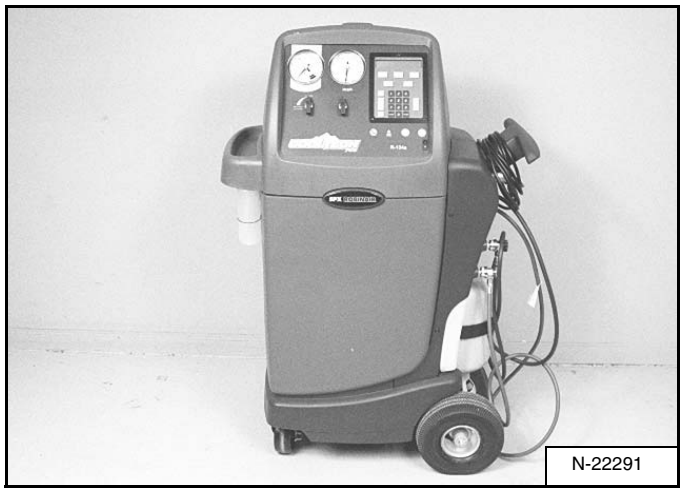
HFC 134A refrigerant can be dangerous if not properly handled. Liquid 134A may cause blindness if it contacts the eyes and may cause serious frostbite if it contacts the skin.

- **Gaseous 134A becomes lethal (phosgene) gas when it contacts open flame or very hot substances.**
- **NEVER SMOKE when there is the possibility of even small amounts of 134A in the air.**

Any servicing work that involves release or addition of 134A to the system must be done by a competent refrigeration dealer who has the proper equipment, knowledge, and experience to service refrigeration equipment.

W-2373-0500

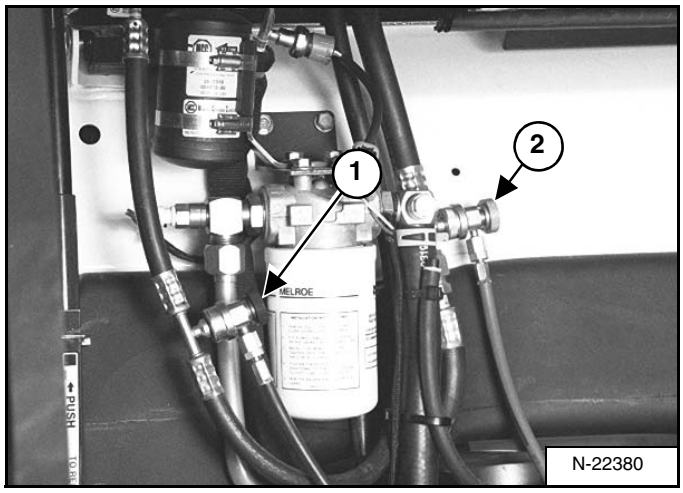
Figure 80-100-4



Use an approved recovery / charging unit **[Figure 80-100-4]** to evacuate the system.

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

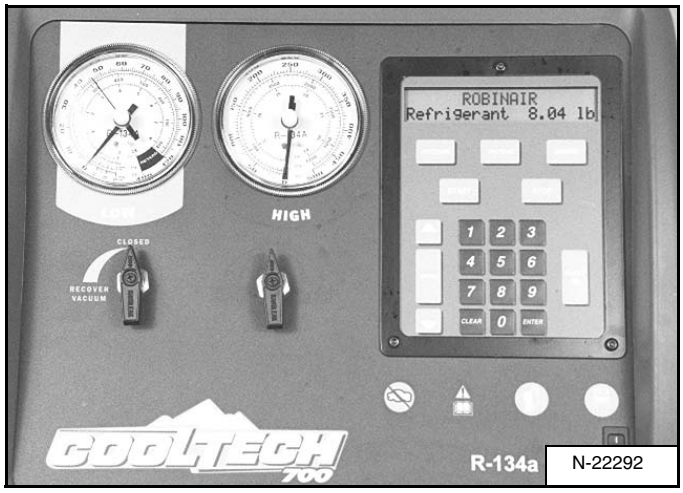
Figure 80-100-5



Connect the Red hose (Item 1) **[Figure 80-100-5]** to the high pressure port and open the valve.

Connect the Blue hose (Item 2) [**[Figure 80-100-5]** to the low pressure port and open the valve.

Figure 80-100-6



Turn the reclaimer unit **[Figure 80-100-6]** to the ON position and follow the on screen instructions.


Bobcat®


Bobcat®

FINAL DRIVE TRANSMISSION (CHAINCASE)

Checking and Adding Oil

The chaincase contains the final drive sprockets and chains and uses the same type of oil as the hydraulic/hydrostatic system. (See *SPECIFICATIONS*, Page 9–1.)

To check the chaincase oil level, use the following procedure:

Drive the loader on a level surface. Stop the engine.

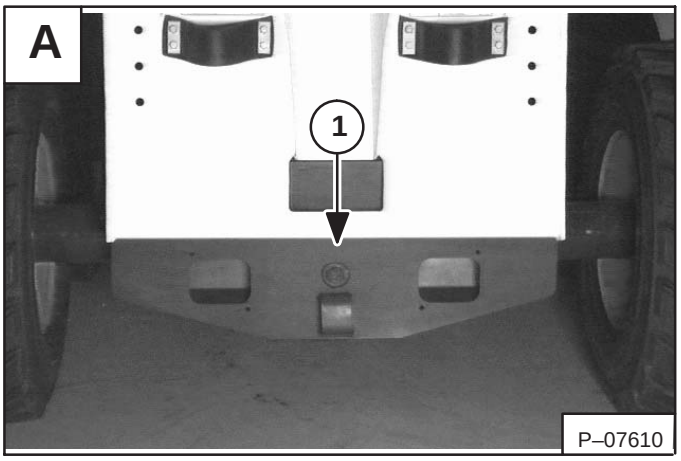
Remove the plug (Item 1) **[A]** from the front of the chaincase housing.

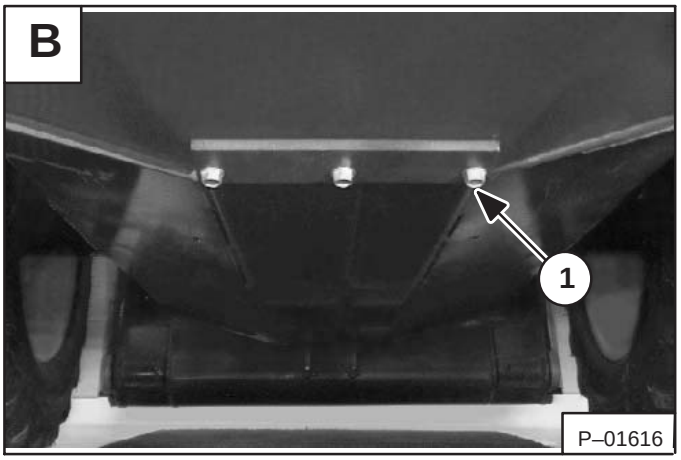
If oil can be reached with the tip of the your finger through the hole the oil level is correct.

If the level is low, add oil through the check plug hole until the oil flows from the hole. Install and tighten the plug.

Removing Oil From the Chaincase

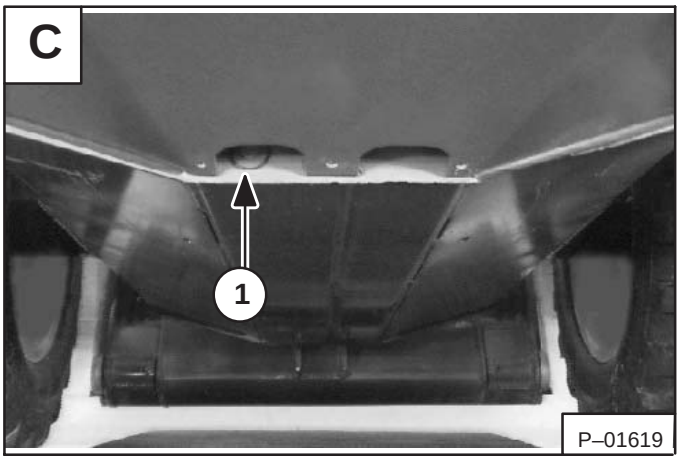
To drain the oil from the chaincase, remove the cover (Item 1) **[B]** over the drain plug at the rear of the chaincase.





Remove the drain plug (Item 1) **[C]** and drain the oil into a container.

NOTE: When installing the drain plug into the chaincase, always use a NEW drain plug.



BICS™ VALVE ASSEMBLY

Lift Arm By–Pass Orifice

Remove the control valve from the loader. (See Page 2–28.)

To remove, replace or check the orifice for the lift arm by–pass function, use the following procedure.

IMPORTANT

When making repairs on 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.

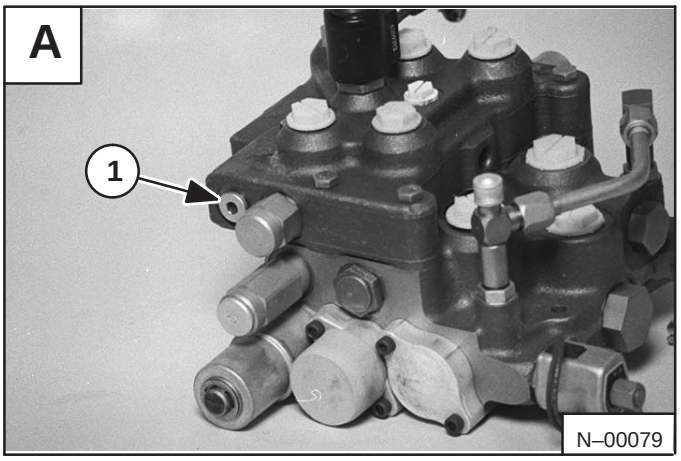
I–2003–0284

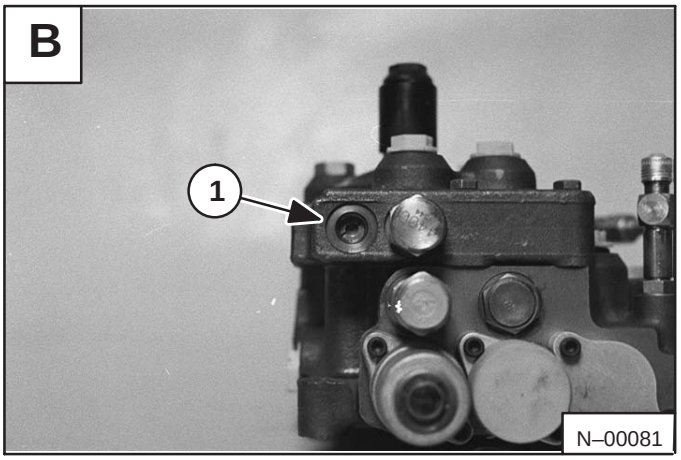
Remove the fitting (Item 1) **[A]** from the BICS valve.

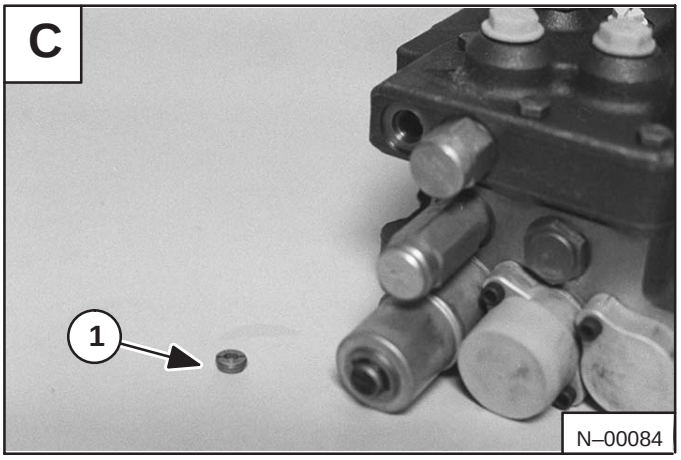
The orifice (Item 1) **[B]** is slotted so a flat blade screwdriver can be used to remove it.

Remove the orifice (Item 1) **[C]** from the valve.

Clean and inspect the orifice. Replace as needed.







HYDRAULIC PUMP (Double Gear) 863H (Cont'd)

Assembly

Always use new O–rings and seals when assembling the hydraulic pump.

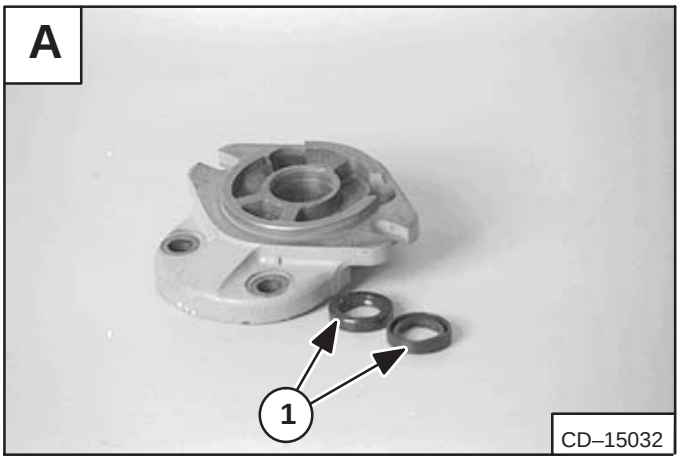
IMPORTANT

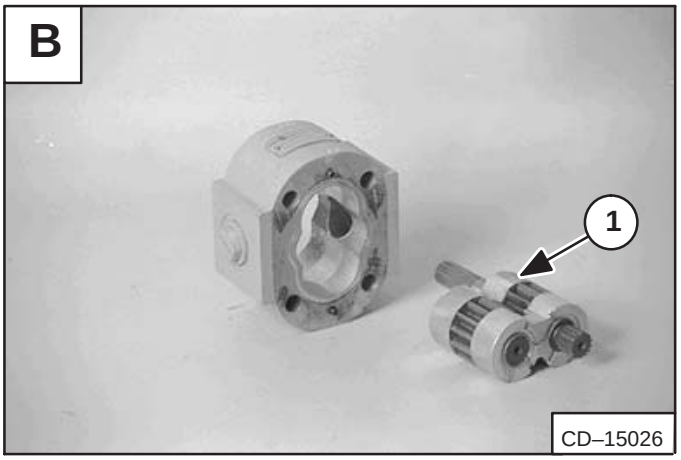
When making repairs on hydrostatic and hydraulic systems, clean the work area before disassembly and keep all parts clean. Always use caps and plugs on hoses, tubelines and ports to keep dirt out. Dirt can quickly damage the system.

I–2003–0284

Install the two seals (Item 1) **[A]** into the mounting flange housing using the correct size driver tool.

Install the inside seal with the lip facing the drive gear and the outside seal with the lip facing outward.



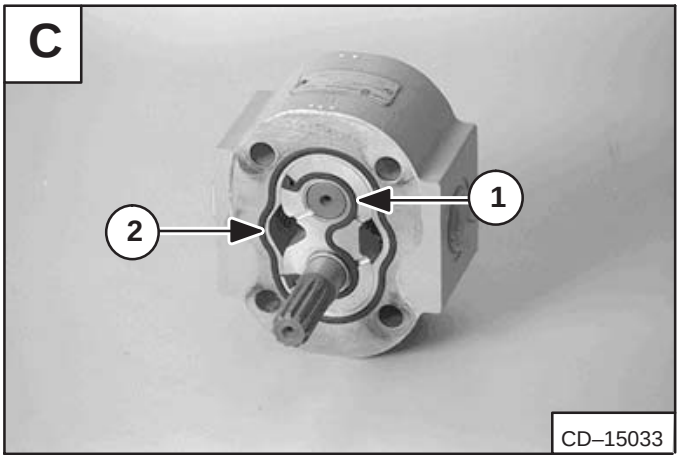


Install the large drive and idler gears into the bearing housing (Item 1) **[B]**.

Install the bearing housing/gears assembly into the large pump housing **[C]**.

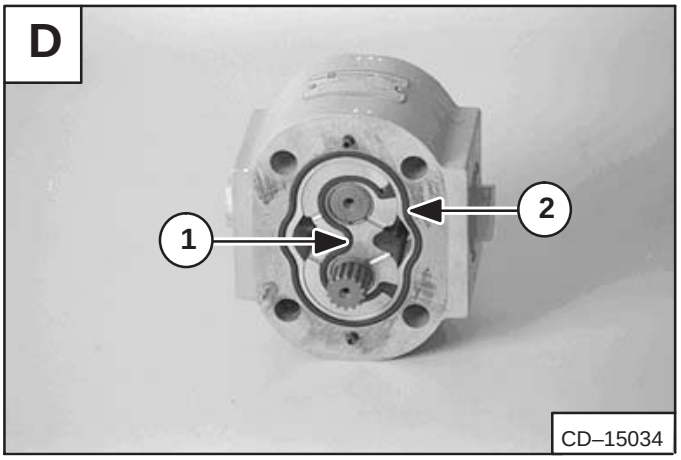
Install the back–up seal/O–ring seal (Item 1) **[C]**.

Install the large O–ring (Item 2) **[C]**.



Turn the large pump housing around; install the back–up seal/O–ring seal (Item 1) **[D]**.

Install the large O–ring (Item 2) **[D]**.



Assembly

IMPORTANT

When making repairs on 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–2003–0284

NOTE: Always use new O–rings and seals when assembling the motor. Put a small amount of grease on all the O–rings and seals for easier installation.

Install the poppet (Item 1) **[A]**, spring (Item 2) **[A]**, and dash pot sleeve (Item 3) **[A]** into the gerolor side of the end plate housing.

Install the plug (Item 4) **[A]** until it is flush with the end plate housing surface.

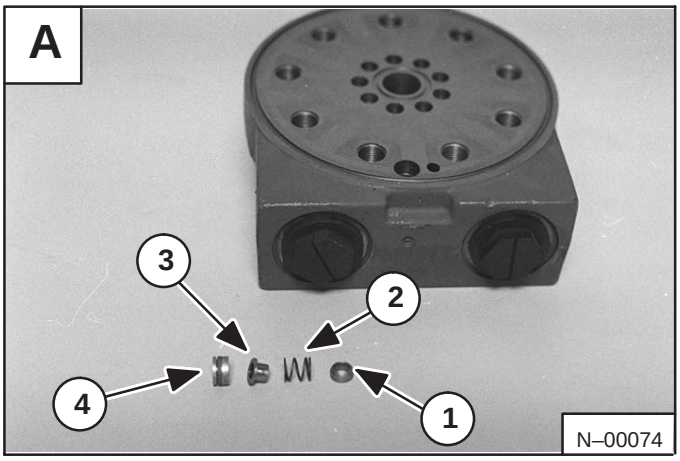
Install the shuttle piston (Item 1) **[B]**, into the opposite side of the end plate housing. Install the poppet (Item 2) **[B]**, spring (Item 3) **[B]**, and dash pot sleeve (Item 4) **[B]** onto the piston.

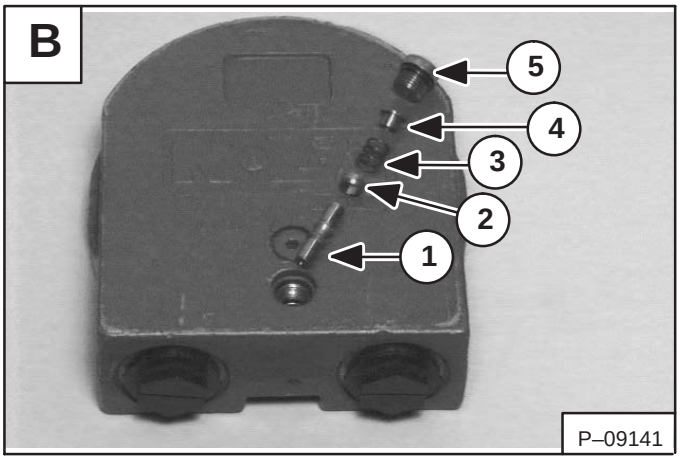
Install the plug (Item 5) **[B]** and tighten to 30 ft.–lbs. (41 Nm) torque.

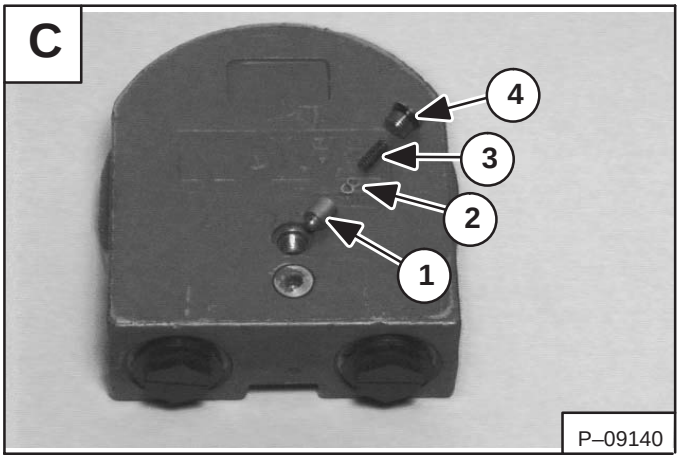
Install the shuttle relief piston (Item 1) **[C]**, shims (Item 2) **[C]** and spring (Item 3) **[C]**.

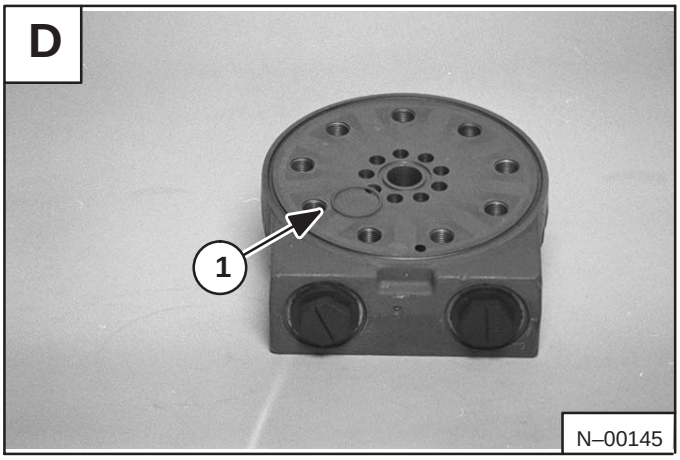
Install the plug (Item 4) **[C]** and tighten to 20 ft.–lbs. (27 Nm) torque.

Install the small O–ring (Item 1) **[D]** on the end plate housing.





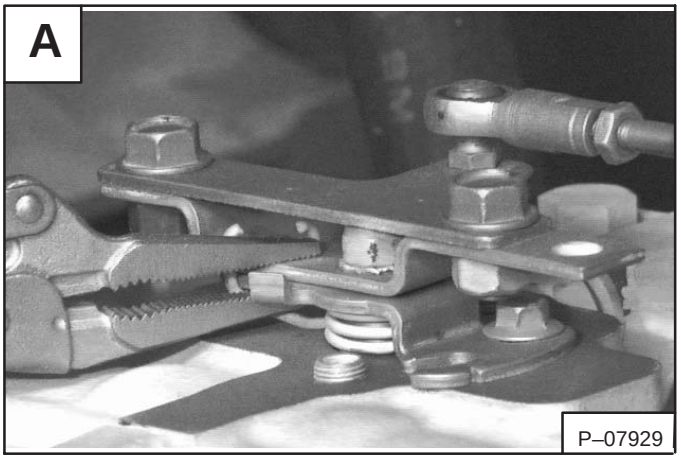




HYDROSTATIC PUMP (Cont'd)

Displacement Control Servo (Cable Linkage) (Cont'd)

3. Clamp the control lever to the neutral adjustment bracket with a small locking pliers **[A]**.

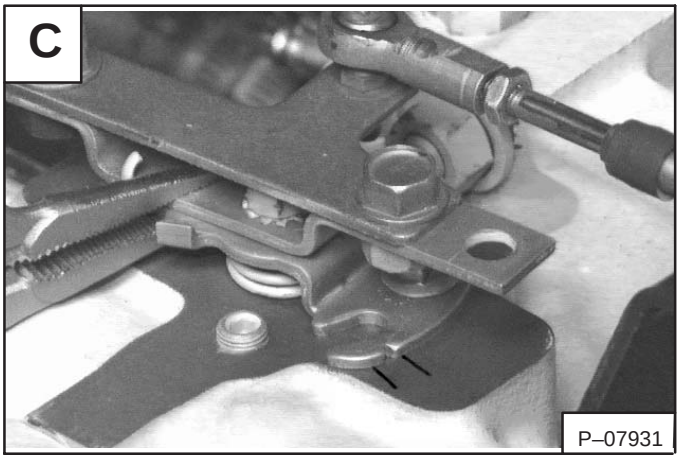


4. Start the engine. With the engine running at full RPM, move the control lever forward until the wheels just begin to move. Mark the position on the bracket (felt tip pen) **[B]**.

5. Move the control lever in reverse until the wheels just begin to move. Mark this position.

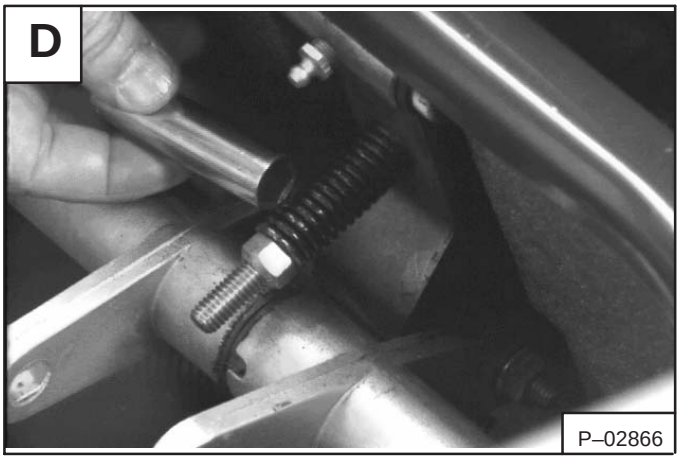
6. Stop the engine.

7. Position the neutral adjustment bracket between the two marks and tighten the holddown bolt **[C]**. Remove the locking pliers. Start the engine and check in both directions to be sure the pump will return to neutral.



8. Remove the socket from blocking the neutral spring bracket **[D]**.

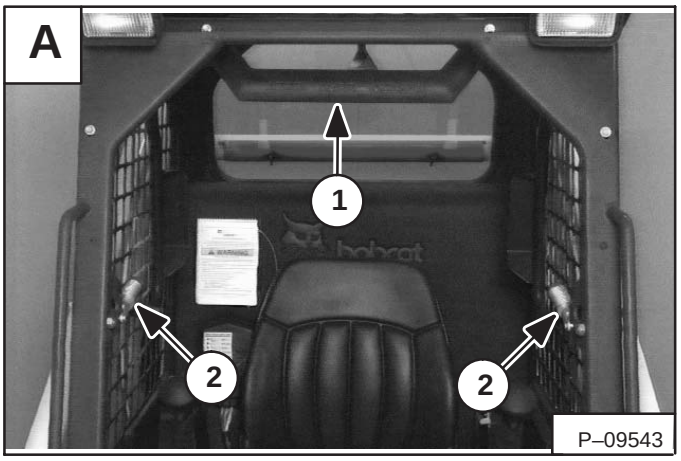
9. Adjust the steering neutral setting. (See Page 3–12.)



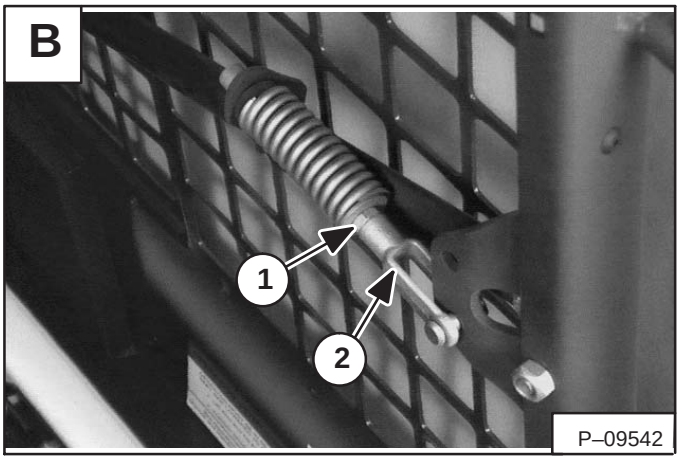
SEAT BAR (W/COMPRESSION SPRING)

Removal and Installation

Lower the seat bar (Item 1) **[A]** so the compression springs (Item 2) **[A]** will be in a down position.

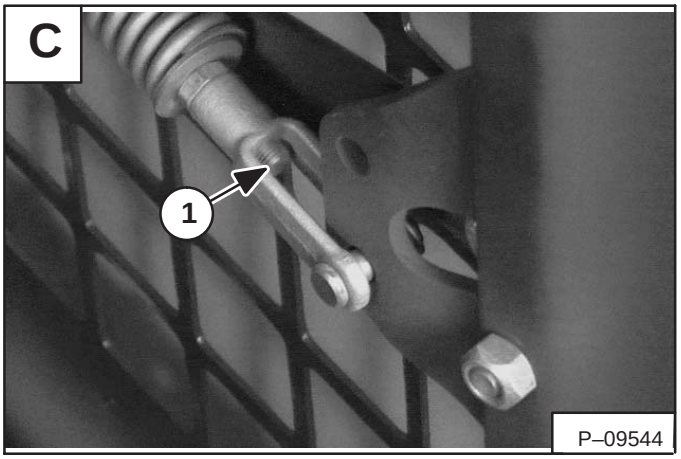


Loosen the adjustment lock nut (Item 1) **[B]** (both sides).

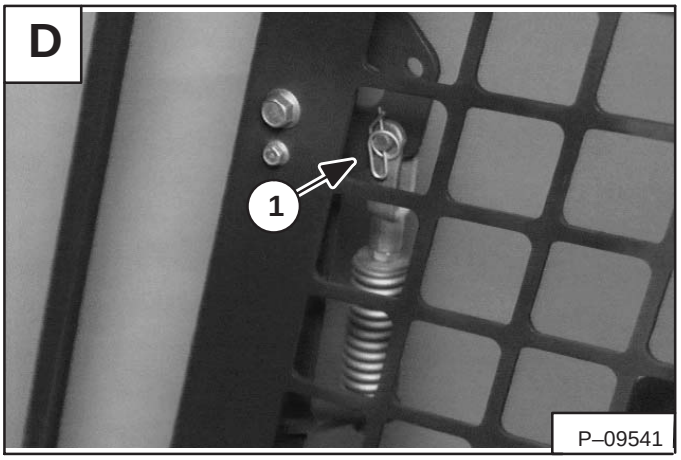


Turn the bolt (Item 1) **[C]** into the clevis five turns (both sides).

Installation: The compression spring is adjusted correctly when the bolt is flush with the clevis (Item 2) **[B]**.



Remove the retaining pin (Item 1) **[D]** and clevis pin (both sides).



863 BOSS - WIRING SCHEMATIC

WITH HIGH FLOW OPTION
514411983-12953
(Printed March 1999)
MC2521

HIGH FLOW CONTROLS HARNESS - 6712524

BICS CONTROLLER HARNESS - 6712134

MAINFRAME CONTROLLER HARNESS - 6712523

FILTER HARNESS (BOSS) - 6710731

REAR LIGHT HARNESS - 6714350

ENGINE HARNESS (BOSS) - 6710493

CAB HARNESS (BOSS) - 6711774

CONTROLS MODULE

BOSS

* PIN NUMBER = 30 PIN CONNECTOR

PIN NUMBER = 18 PIN CONNECTOR

FUSE BLOCK

FUSE 1	BICS 10A	15A ENGINE	FUSE 5
FUSE 2	BOSS 10A	15A PWM	FUSE 6
FUSE 3	LIGHT 25A	25A BRAKE	FUSE 7
FUSE 4	ACCESSORY 25A	25A ACCESSORY	FUSE 8

WIRES CONNECT BY LETTER ACROSS CONNECTORS

SOME CONNECTOR BODIES NOT SHOWN FOR DRAWING CLARITY

MC2521 (3-5-99)

ENGINE MUFFLER

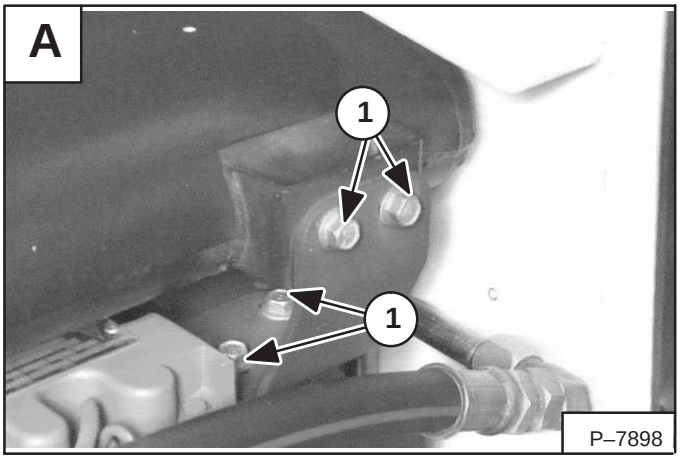
Removal and Installation

Open the rear door.

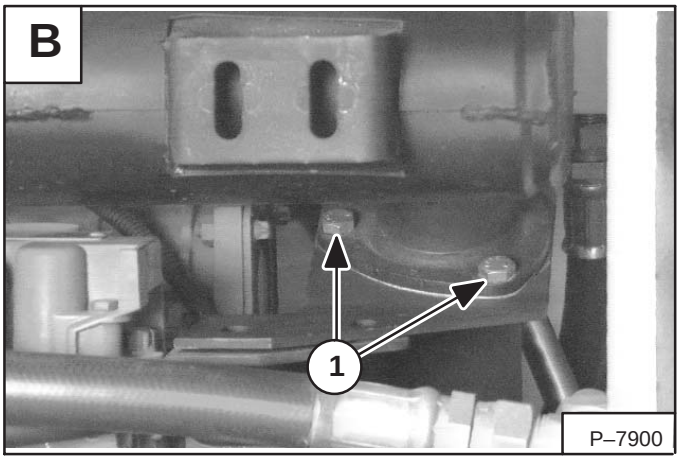
Raise the rear grill.

Remove the four bolts and nuts (Item 1) **[A]** from the engine muffler mounting bracket.

Remove the bracket.

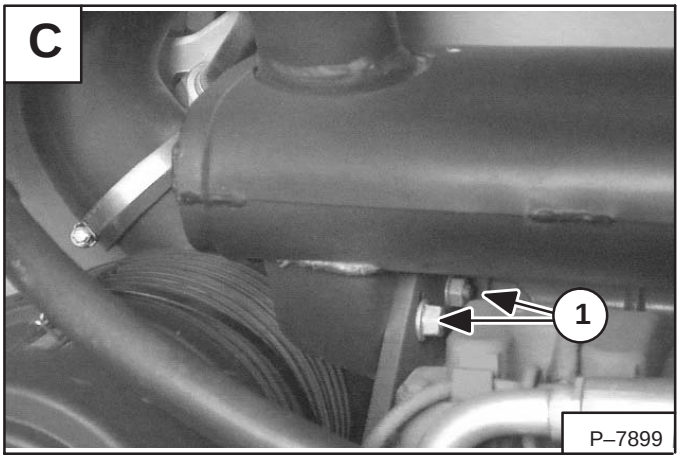


Remove the three bolts and nuts (Item 1) **[B]** from the muffler exhaust flange.



Remove the two bolts and nuts (Item 1) **[C]** from the muffler mounting bracket.

Remove the muffler.



TIMING BELT (Cont'd)

Installation

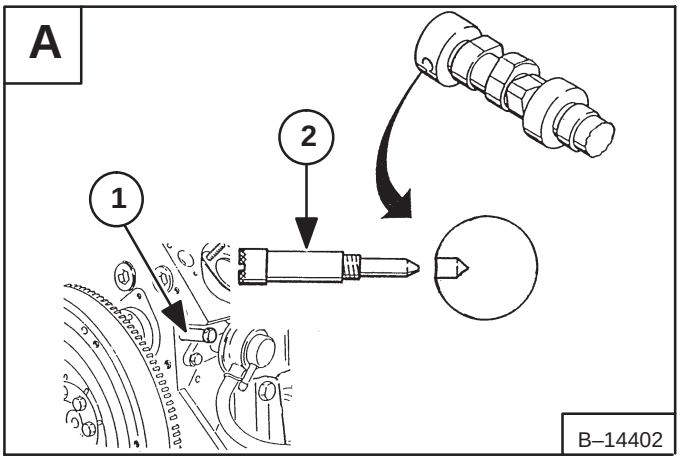
NOTE: Remove the fuel injectors and rocker brackets from the cylinder head. (See Page 7–40.) This will let the crankshaft turn easier for timing belt installation.

The camshaft plug is located at the rear of the engine block (Item 1) **[A]** on the fuel injection pump side. (See Page 7–55, for the correct tool.)

Remove the plug.

Rotate the camshaft until the notch in the camshaft can be seen through the plug hole.

Install the timing tool (Item 2) **[A]** and tighten.

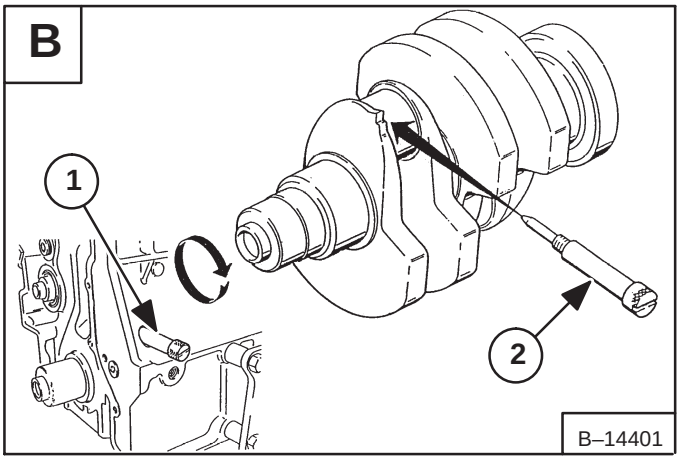


The crankshaft plug is located at the front of the engine block (Item 1) **[B]** on the exhaust manifold side.

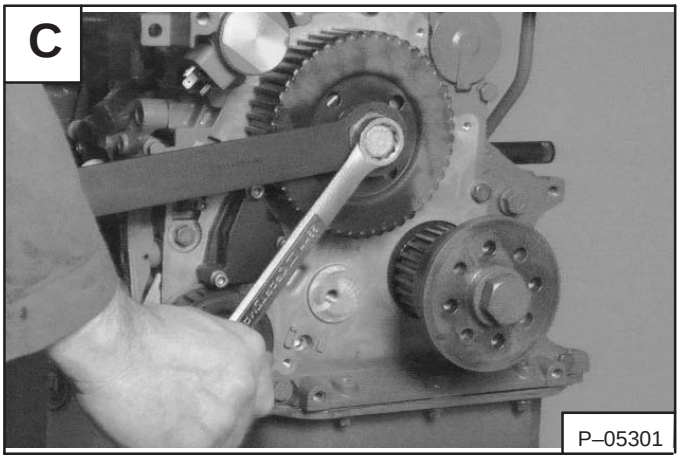
Remove the plug.

Rotate the crankshaft until the flat spot on the crankshaft throw can be seen through the plug hole. Turn the crankshaft back a small amount. Install the timing tool (Item 2) **[B]** and tighten.

Rotate the crankshaft until it hits the timing tool and stops.

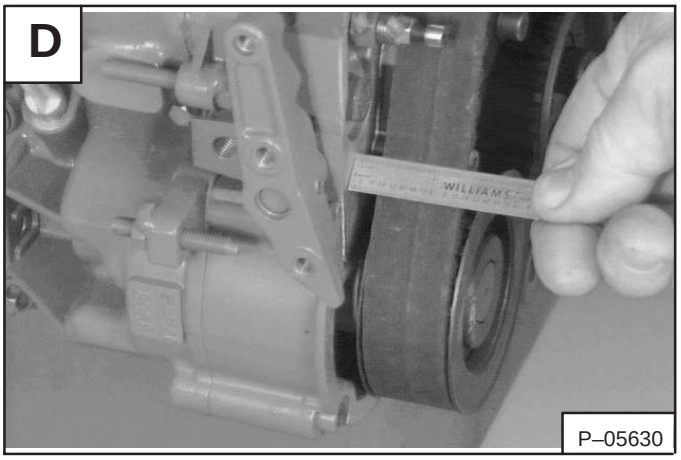


Loosen the nut at the camshaft gear **[C]**. (See Page 7–55, for correct tool.)



Install the new timing belt.

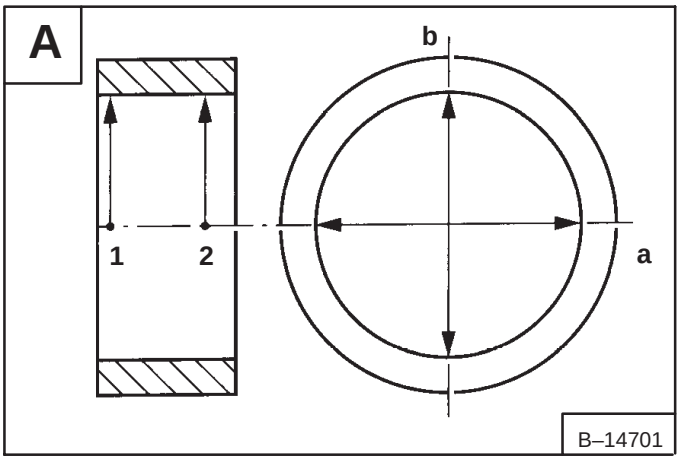
Measure the distance from the edge of the belt to the front cover surface **[D]**.



CONNECTING ROD

Checking the Connecting Rod

When checking the connecting rod large and small end, measure at the points **(1**) and **(2)** and in planes **(a)** and **(b) [A]**.

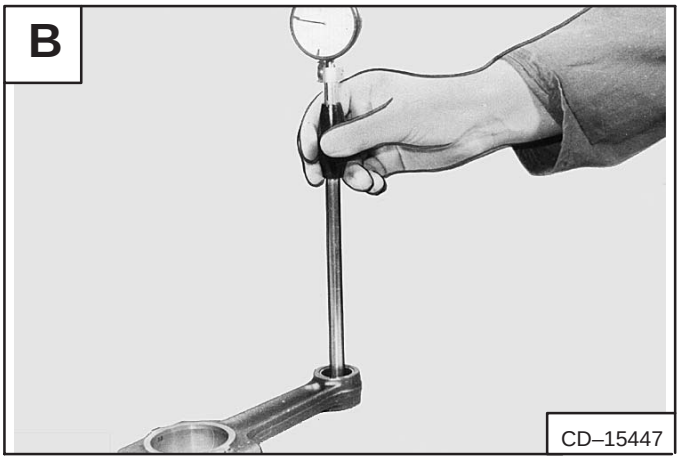


Check the small end bushing **[B]**.

Specifications:

I.D. of Small End Bushing . . . . . 1.181 $^{+ 0.00014}_{+ 0.00009}$ inch
($30^{+ 0,035}_{+ 0,025}$ mm)

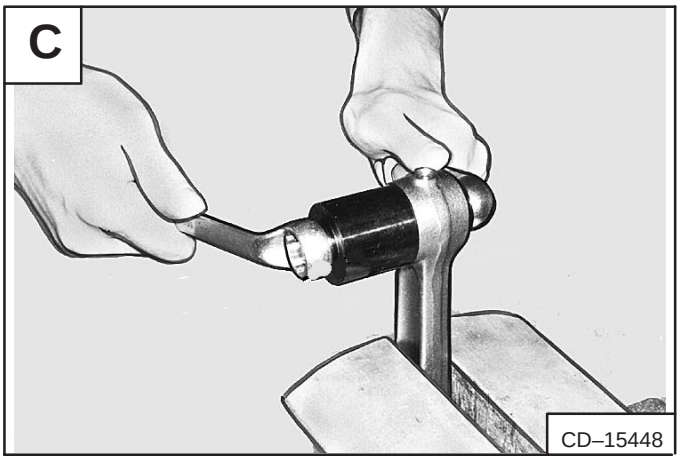
Wear Limit Bushing
Clearance . . . . . 0.003 inch (0,08 mm)



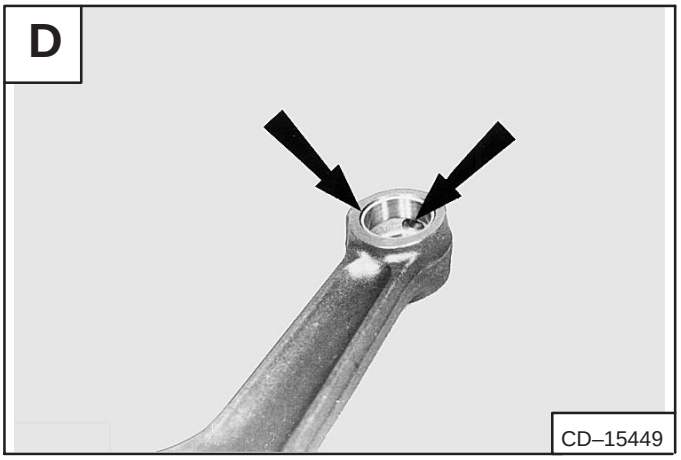
Replace small end busing as needed **[C]**.

Bore for Small End Bushing . . . . . 1.299 + 0.0008 inch
(33 + 0,02 mm)

O.D. of Small End Bushing . . . . . 1.299 $^{+ 0.004}_{+ 0.0027}$ inch
(33 $^{+ 0,110}_{+ 0,070}$ mm)



Press in the small end bushing, make sure the lubrication holes are in alignment **[D]**.

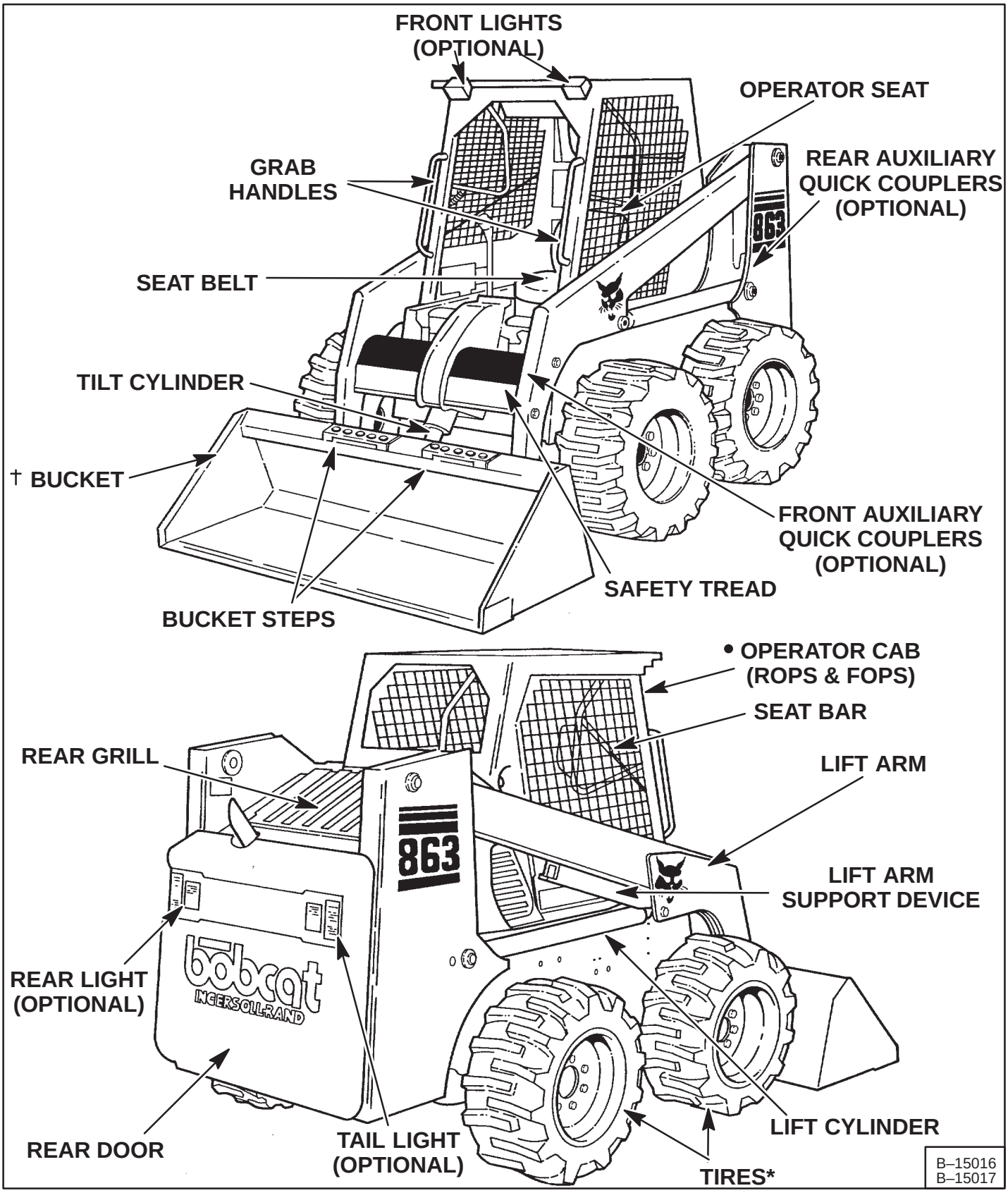


TORQUE SPECIFICATIONS FOR LOADER

Specifications

Item	*Ft.–Lbs.*	*Nm*
Air Cleaner Mounting Bolts	25–28	34–38
Alternator Pulley Nut	50	68
Axle Hub Mounting Bolt	175–190	240–260
Axle Sprocket Bolt	475–525	645–710
BICS™ Control Valve Mounting Bolts	15–16	20–22
Bob–Tach Lever Pivot Bolt	25–28	34–38
Control Pedal Linkage Bolts	21–25	28–34
Control Valve Mounting Bolts & Nuts	15–16	20–22
Engine Mounting Bolts	65–70	88–95
Exhaust Pipe to Exhaust Manifold	20–35	27–47
Filter Housing Mounting Bolts	25	34
Front Panel Bolts	16–20	22–27
Hydraulic Pump Bolts	45–50	61–68
Hydraulic Pump Mounting Bolts	25–27	34–37
Hydraulic Reservoir Strap Bolts	16–20	22–27
Hydrostatic Motor Mounting Bolts	210–230	285–310
Hydrostatic Pump Mounting Bolts	65–70	88–95
Hydrostatic Pump Pulley Bolt	175–200	237–271
Lift Arm By–Pass Control Valve Mounting Bolts	15–16	20–22
Main Frame to Chaincase Bolts	300–330	410–450
Main Relief Valve	35–40	47–54
Motor Carrier Bolts	330	447
Operator Cab Fastening Nuts	40–50	54–68
Operator Cab Pivot Bolts & Nuts	25–35	34–47
Pedal Lock Linkage to Main Frame Bolts	7–8	9,5–10,8
Pedal Lock Linkage Tab Bolt	25	34
Pivot Pins Lock Bolt & Nut	18–20	24–27
Seat Belt Fastening Bolts	40–45	54–61
Seat Mounting Bolts	9–11	12,2–15
Seat Bar Pivot Bolts	25–28	34–38
Wheel Nuts	105–115	142–156

BOBCAT LOADER IDENTIFICATION



* TIRES – Flotation tires are shown. Optional tires are available.

† BUCKET – Several different buckets and other attachments are available for the Bobcat loader.

• ROPS, FOPS – Roll Over Protective Structure, per SAE J1040 and ISO 3471 and Falling Object Protective Structure per SAE J1043 and ISO 3449 Level l. Level ll FOPS is available for protection from heavy falling objects. The Bobcat loader is base–equipped with a standard operator cab as shown. Extra insulated cab is available as an option (Reduced noise level).

HYDRAULIC/HYDROSTATIC SCHEMATIC (M46 PUMPS)
863 (S/N 514425001-39999) WITH HIGH FLOW OPTION
(S/N 514625001-39999)

(Printed October 1998)

MC2460

+ (If Equipped)

SELECT VALVE

C1

C2

PP

Press.

PB

T

HYDRAULIC FILTER

OIL COOLER

FEMALE

MALE

RIGHT SIDE LIFT ARM

MALE

FEMALE

MALE

FEMALE

REAR QUICK COUPLERS (Optional)

FEMALE

FRONT AUXILIARY (LEFT SIDE LIFT ARM)

MALE

DRAIN (MALE)

DRIVE MOTOR

HYDROSTATIC PUMPS

OUTLET

OUTLET

OUTLET

INLET

HYDRAULIC CONTROL VALVE

AUXILIARY SPOOL

TILT CYLINDER SPOOL

LIFT CYLINDER SPOOL

DRIVE MOTOR

BUCKET POSITION VALVE (OPTIONAL)

TILT CYLINDER

BICS CONTROL VALVE

LIFT CYLINDERS

LIFT ARM BY-PASS VALVE

WORKING CIRCUITS
PILOT CIRCUITS
DRAIN CIRCUIT S
COMPONENTS

MC 2460 (10-14-98)

Printed in U.S.A.

HYDRAULIC CONTROL VALVE (Cont'd)

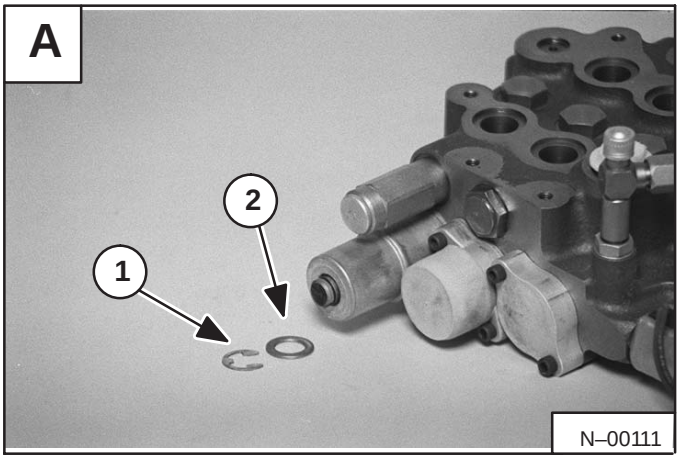
Lift Spool and Detent

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

MEL1278 – Detent Tool

Use a screwdriver to remove the snap ring (Item 1) **[A]**.

Remove the washer (Item 2) **[A]**.



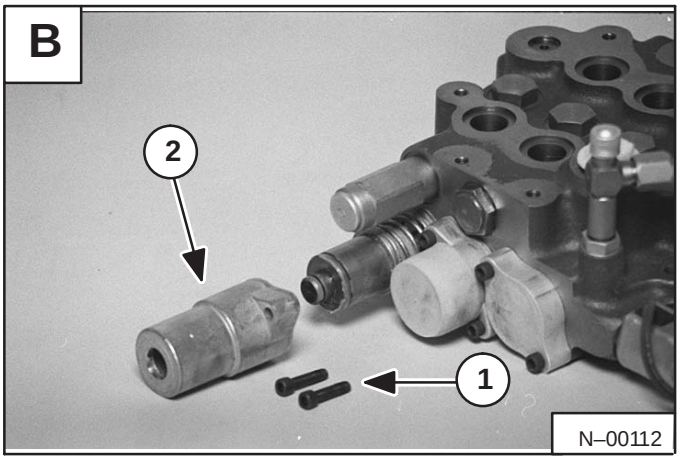
Remove the screws (Item 1) **[B]** from the detent sleeve.

Remove the detent sleeve (Item 2) **[B]**.

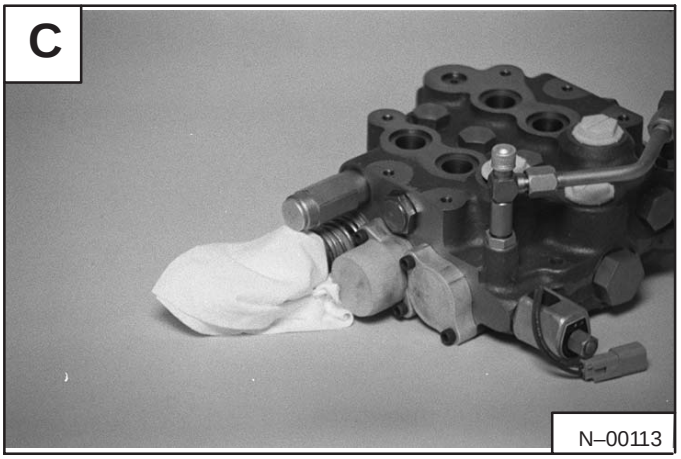
IMPORTANT

The detent assembly has small springs and balls. Do not lose these parts during disassembly and assembly.

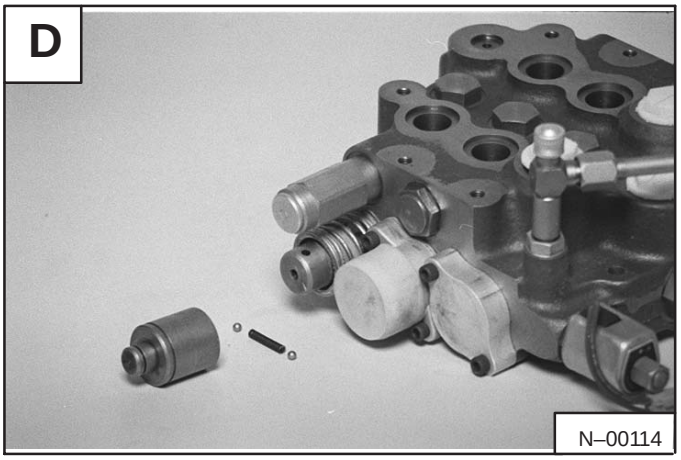
I–2012–0284



Put a rag around the detent assembly **[C]**. This will prevent the detent balls and spring from being lost when the detent sleeve is removed.



Remove the detent sleeve, detent balls and spring **[D]**.

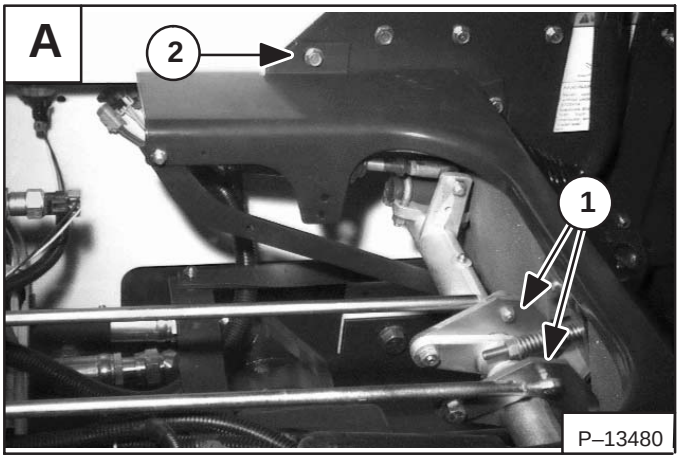


FRONT PANEL (M46 Pump & AHC) (Cont'd)

Removal and Installation (Cont'd)

Disconnect the steering linkage ball joints (Item 1) **[A]** from the steering cross shaft.

Remove the top mounting bolt (Item 2) **[A]**.

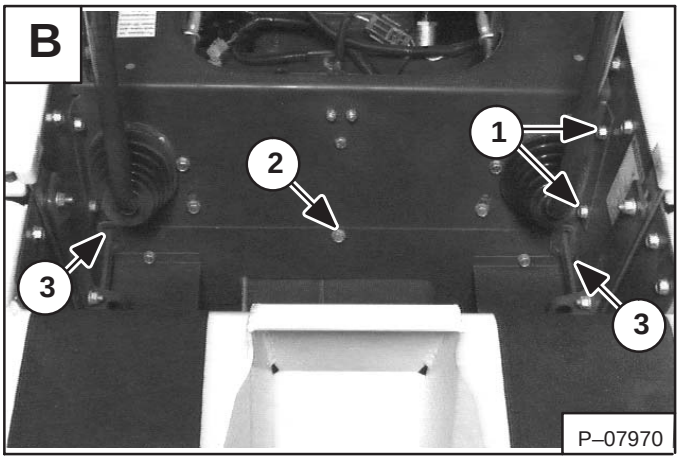


Remove the two mounting bolts (Item 1) **[B]** at the side of the front panel (both sides).

Remove the mounting bolt (Item 2) **[B]** on the bottom of the front panel.

Remove the front panel.

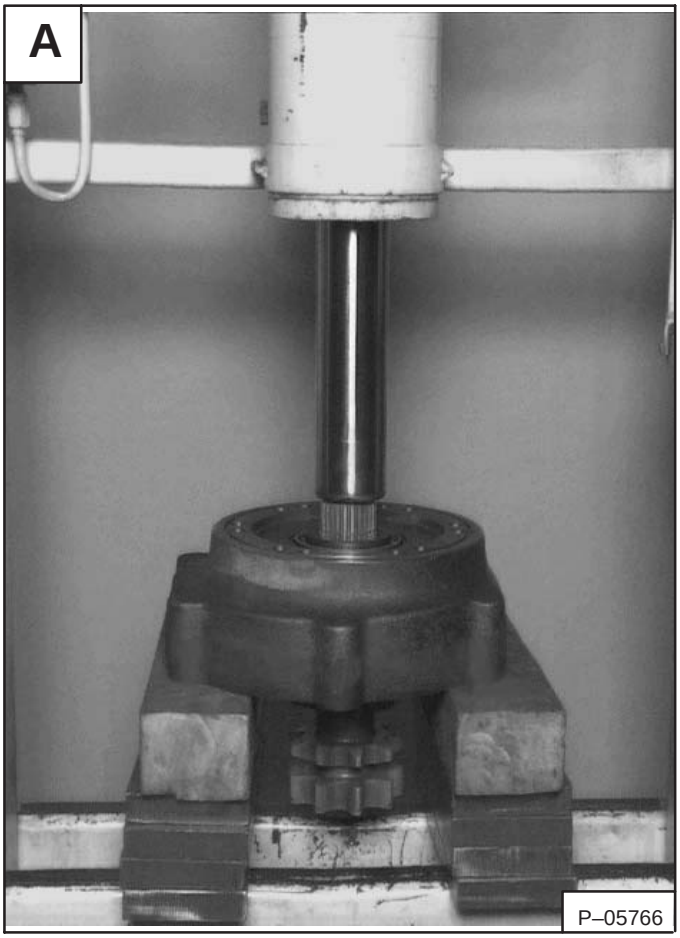
Installation: Align pedal linkage grommets in steering panel and lower cover slots (Item 3) **[B]**.



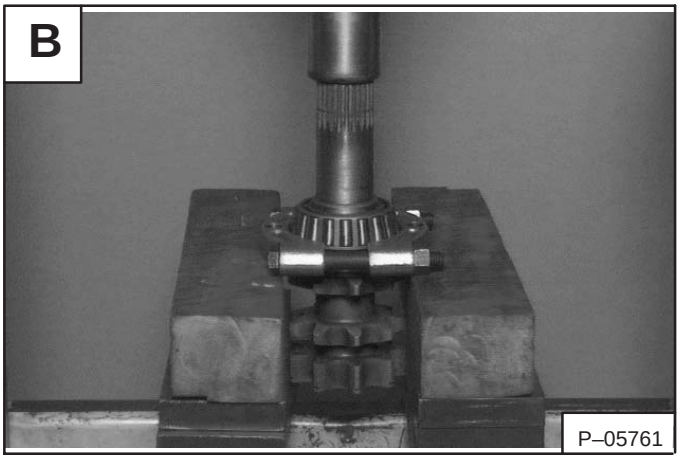
MOTOR CARRIER (Cont'd)

Disassembly (Cont'd)

Use a hydraulic press, remove the shaft from the housing **[A]**.

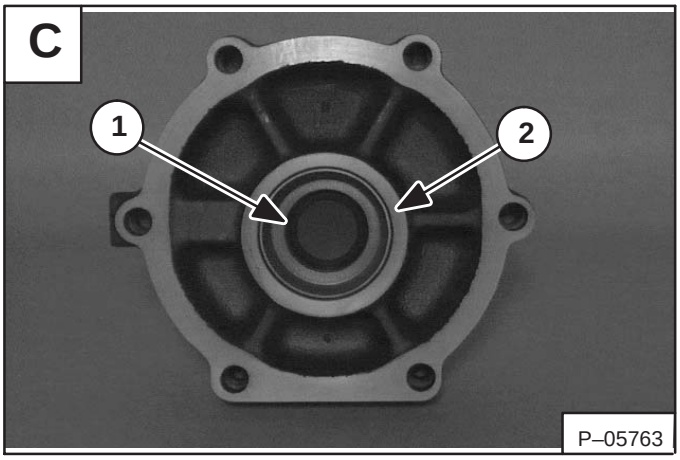


Install the bearing puller tool under the bearing flange, use the hydraulic press to remove the bearing from the shaft **[B]**.

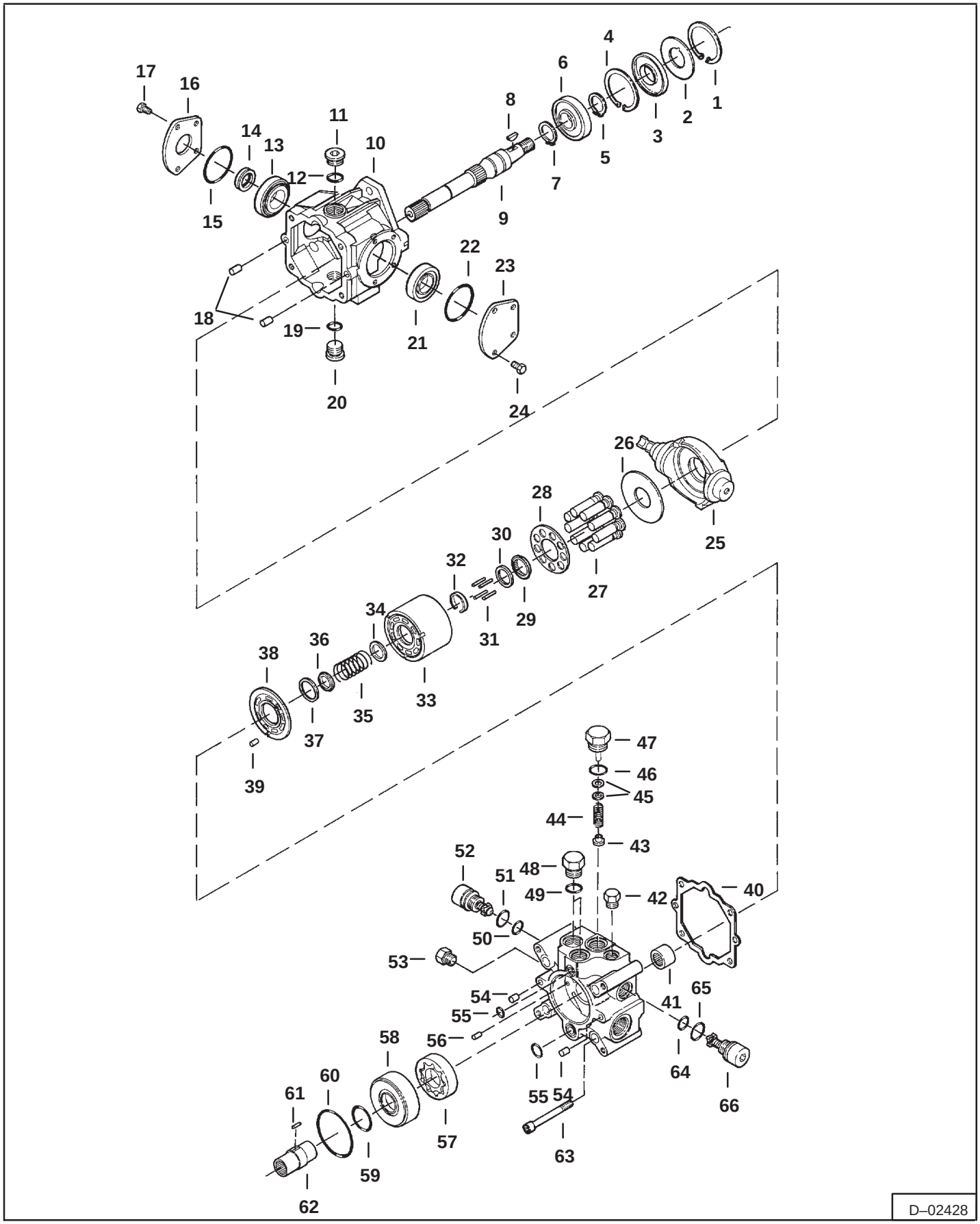


Remove the two seals (Item 1) **[C]** from the housing.

Check the bearing cup (Item 2) **[C]** (both sides) and replace as needed.



Parts Identification (Left Half)

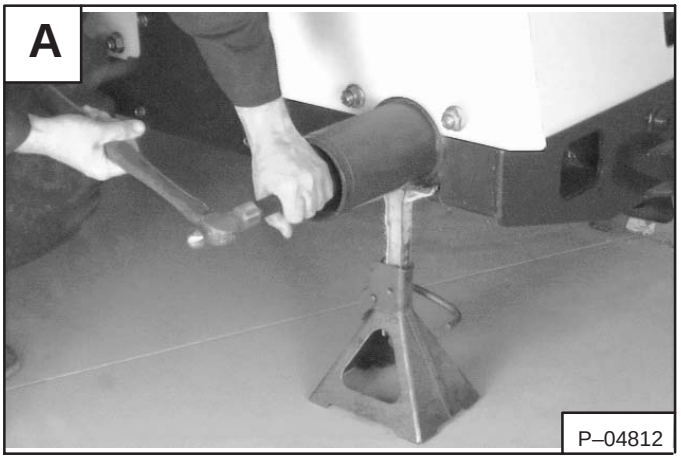


AXLE, SPROCKET AND BEARINGS (Cont'd)

Removal And Installation (Cont'd)

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

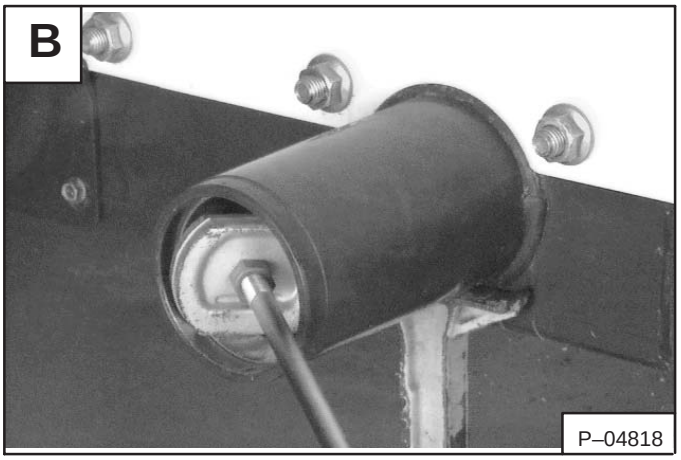
Use the long rod and bearing cup tool to remove the inner bearing cup **[A]**.



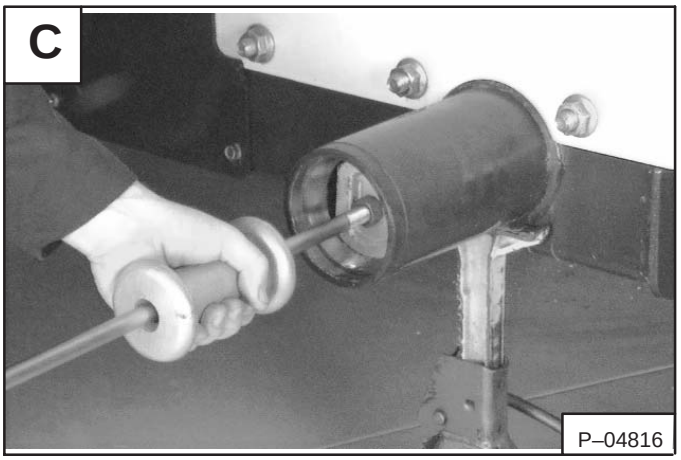
To remove the outer bearing cup, install a bearing cup tool on the slide hammer.

Leave the bearing cup tool loose until the tool is installed inside the tube **[B]**.

Pull the tool against the bearing cup and tighten the nut.



Use the slide hammer and remove the bearing cup from the axle tube **[C]**.



863 WITHOUT BOSS - WIRING SCHEMATIC

WITH HIGH FLOW AND ADVANCED HAND CONTROL OPTION

S/N 514425001-39999

(Printed October 1998)

MC2413

HIGH FLOW ADVANCED HAND CONTROLS HARNESS - 6716541

BICS CONTROLLER HARNESS - 6713932

MAINFRAME CONTROLLER HARNESS - 6712523

FILTER HARNESS (WITHOUT BOSS)-6716642

CAB HARNESS (WITHOUT BOSS) - 6711767

REAR LIGHT HARNESS - 6714350

ENGINE HARNESS (WITHOUT BOSS) - 6715947 OR 6718070

FUSE BLOCK

FUSE 1	BICS 10A	10A DIESEL	FUSE 5
FUSE 2	BOBS 10A	25A PWM	FUSE 6
FUSE 3	LIGHT 25A	20A BRAKE	FUSE 7
FUSE 4	ACCESSORY 20A	25A ACCESSORY	FUSE 8

WIRES CONNECT BY LETTER ACROSS CONNECTORS

SOME CONNECTOR BODIES NOT SHOWN FOR DRAWING CLARITY

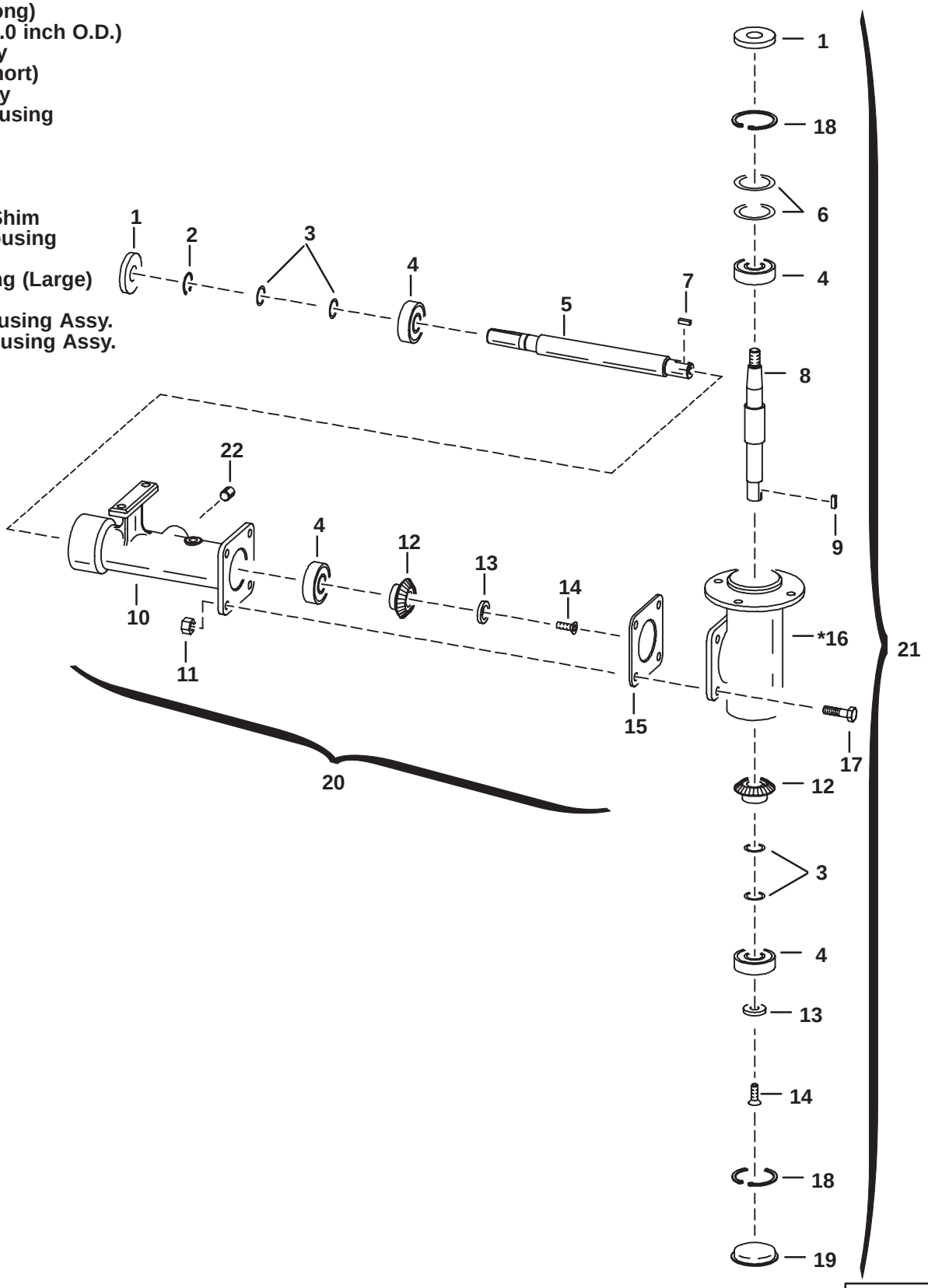
RED = RED
RNG = ORANGE
BLK = BLACK
LBL = LIGHT BLUE
DBL = DARK BLUE
LGN = LIGHT GREEN
DGN = DARK GREEN
YEL = YELLOW
PNK = PINK
WHT = WHITE
BRN = BROWN
TAN = TAN
PUR = PURPLE
GRY = GREY

MC2413 (10-29-99)

FAN GEARBOX

Parts Identification

1. Seal
2. Snap Ring (Small)
3. Shims (1.0 inch O.D.)
4. Bearing
5. Shaft (Long)
6. Shims (2.0 inch O.D.)
7. Long Key
8. Shaft (Short)
9. Short Key
10. Long Housing
11. Nut
12. Gear
13. Washer
14. Screw
15. Square Shim
*16. Short Housing
17. Bolt
18. Snap Ring (Large)
19. Cap
20. Long Housing Assy.
21. Short Housing Assy.
22. Fill Plug



* Individual Part not available

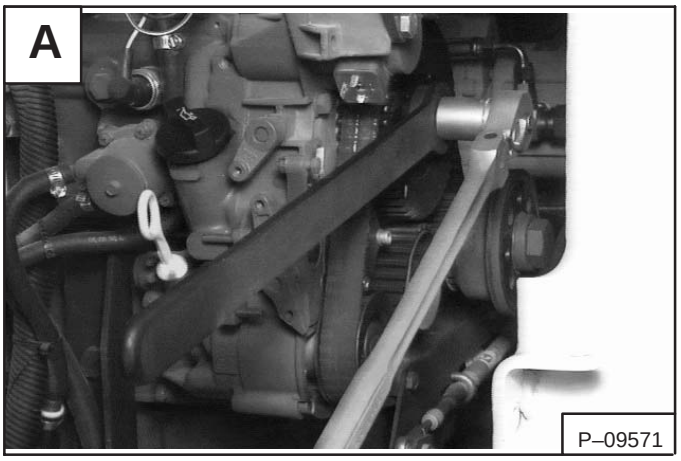
TS–01002

TIMING BELT (Cont'd)

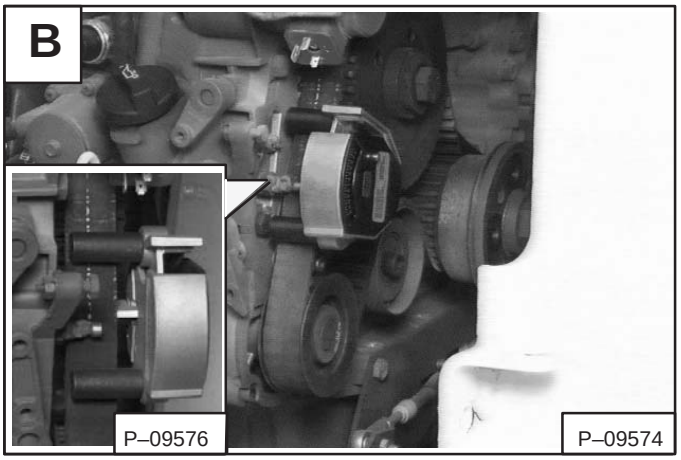
Belt Replacement In Loader (Cont'd)

Install the camshaft gear tool (Item 1) **[A]**. (See Page 7–55 for correct tool.)

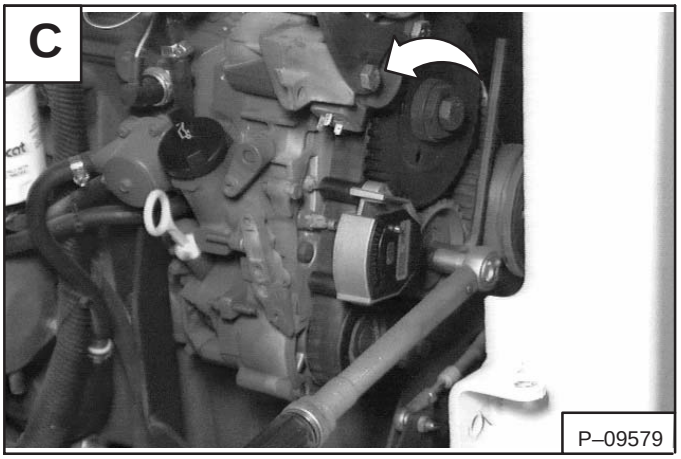
Loosen the camshaft gear **[A].**



Install the belt tension tool as shown in Figure **[B]**. (See Page 7–55 for the correct tool.)



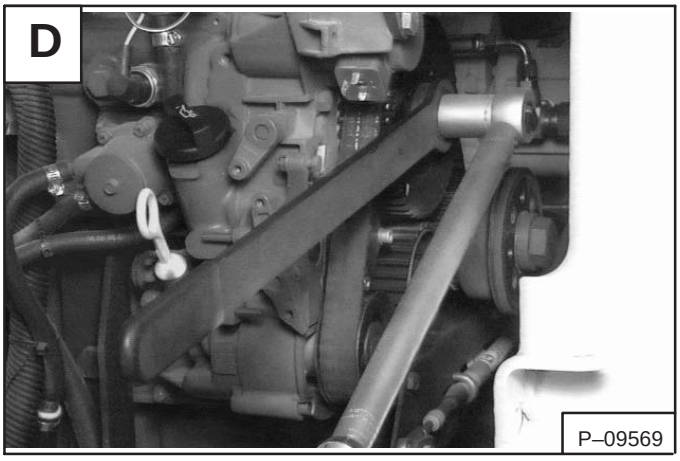
Use a hex wrench to turn the idler tension pulley in counterclockwise direction as shown in figure **[C]**. Obtain a scale reading of 3.0–3.5. Tighten the idler tension pulley mount bolt to 33 ft.–lbs. (45 Nm) torque.



Remove the belt tension tool, hex wrench and torque wrench.

Install the camshaft gear tool.

Tighten camshaft bolt to 22 ft.–lbs. (30 Nm) torque as shown in figure **[D]**. Mark the camshaft bolt and tighten an additional 210°.



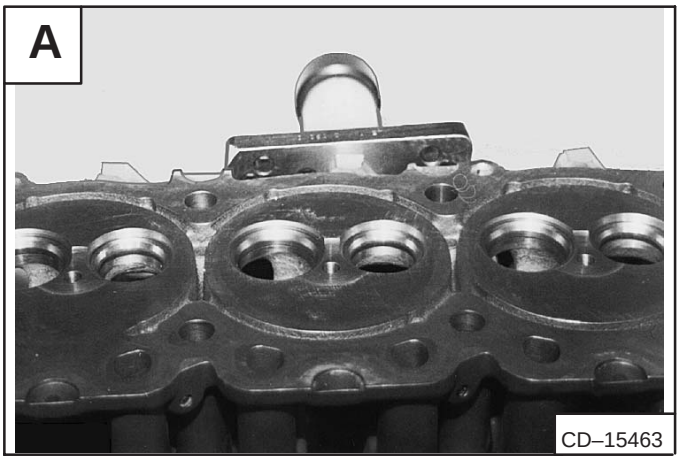
CYLINDER HEAD (Cont'd)

Checking Valve Seats

Measure the valve seat width **[A]**.

Specifications (BF4M1011):
Width . . . . . 0.067 ± 0.016 inch (1,7 ± 0,4 mm)

Specifications (BF4M1011F):
Width (Intake) . . . 0.062 ± 0.016 inch (1,58 ± 0,4 mm)
(Exhaust) . . . . . 0.067 ± 0.016 inch (1,7 ± 0,4 mm)



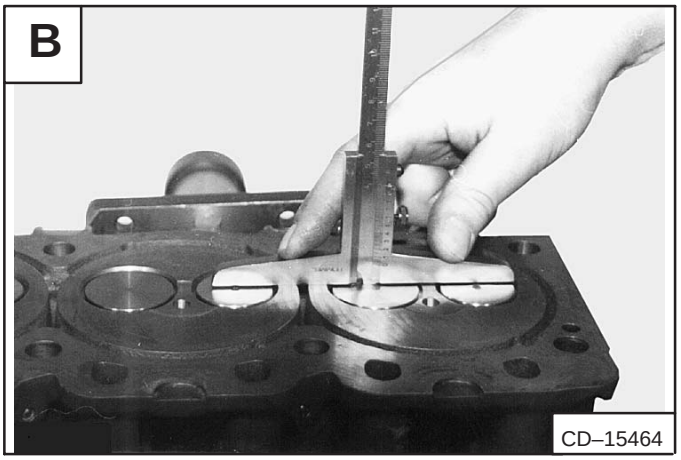
Measure the valve clearance between the valve head and cylinder head sealing surface **[B]**.

Valve penetration into cylinder head:

Specifications (BF4M1011):
Wear Limit . . . . . 0.039 ± 0.005 inch (1,0 ± 0,13 mm)

Specifications (BF4M1011F):
Wear Limit . . . . 0.0512 ± 0.0051 inch (1,3 ± 0,13 mm)

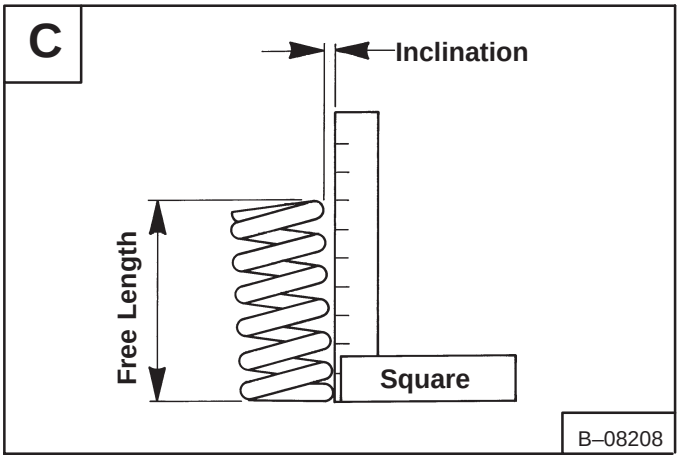
Recondition the valve seats and valve guides if worn.



Valve Spring

Measure valve spring free length **[C]**.

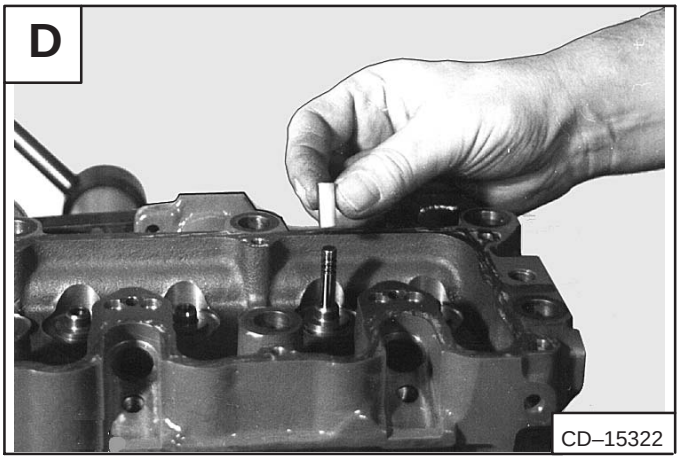
Specifications:
Valve Spring Dia. . . . . 0.132 inch (3,35 mm)
Free Length . . . . . 1.74 inch (44,3 mm)
Valve Spring Dia. . . . . 0.134 inch (3,40 mm)
Free Length . . . . . 1.547 inch (39,3 mm)
Inclination . . . . . 0.126 inch (3,2 mm)



Assembly

Install the valve into the cylinder head **[D]**.

Install the protective sleeve or masking tape on the valve stem grooves **[D]**.



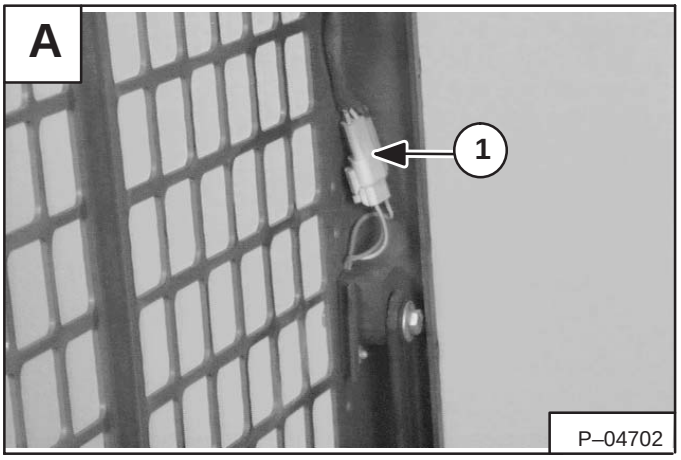
SEAT BAR SENSOR (Cont'd)

Seat Bar Sensor Test

Use Sensor Tester (MEL1428) for the following procedure:

Disconnect the short adatper test leads if connected.

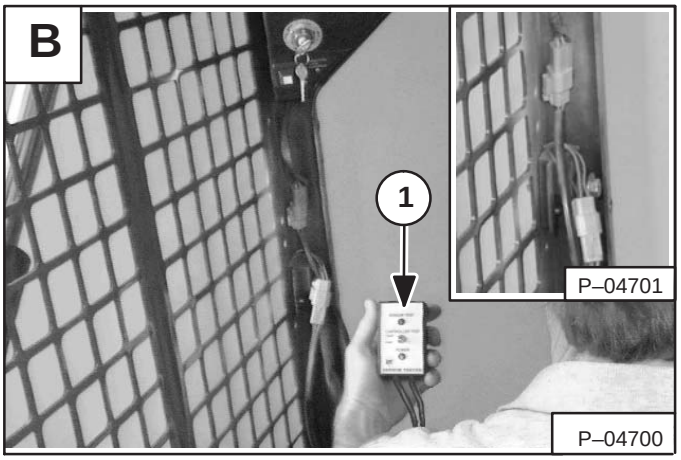
Disconnect the seat bar sensor connector (Item 1) **[A]**.



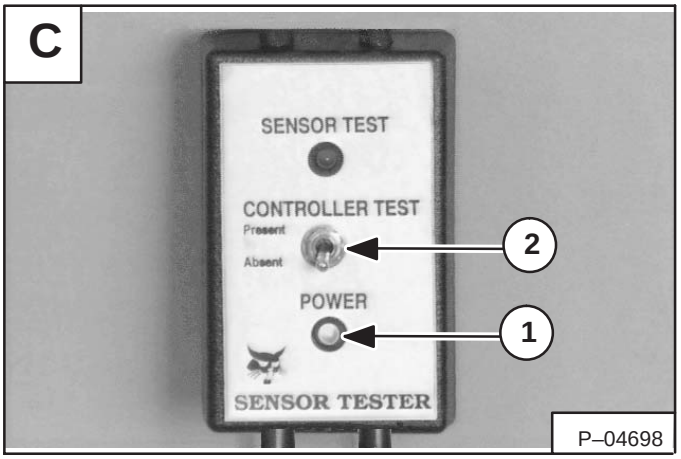
Connect the Sensor Tester (Item 1) **[B]** inline, to the seat bar sensor connectors. See inset **[B]**.

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

The toggle switch (Item 2) **[C]** can be in either the ***Absent*** or ***Present*** position.



If there is no power light (Item 1) **[C]** on the sensor tester, check the tester or wiring harness.



Lower the seat bar. The Sensor Test light (Item 1) **[D]** should illuminate.

Raise the seat bar. The Sensor Test light (Item 1) **[D]** should go off.

If the above test fails, there is a problem with the seat bar sensor.

Disconnect the Sensor Tester.

Replace the Seat Bar Sensor. (See Page 8–17.)

If the above test passes, run the BICS controller seat bar circuit test. (See Page 8–18.)