CASE
PROFESSIONAL PARTNER

REPAIR MANUAL

SKID STEER COMPACT TRACK LOADER

450
465
450CT

(Mechanical and Pilot Control Machines - H and ISO Pattern)

87578832 NA
Replaces 87519801 NA

Revised 01-2007
Issued 08-2006

Torque

BOLT TORQUE INFORMATION

DECIMAL HARDWARE

1. Fasteners should be replaced with the same or higher grade. If higher grade fasteners are used, these should only be tightened to the strength of the original.
2. Make sure the fasteners threads are clean and that thread engagement is started. This will prevent them from failing when being tightened.
3. Tighten plastic insert or crimped steel-type lock nuts to approximately **50 %** of the dry torque, applied to the nut, not to the bolt head. Tighten toothed or serrated-type lock nuts to the full torque value.
4. The L9 (Alloy) fasteners torque values are for a bolt, nut, and two washers.
   When using L9 (Alloy) fasteners, do not use the values in this table for tapped holes.

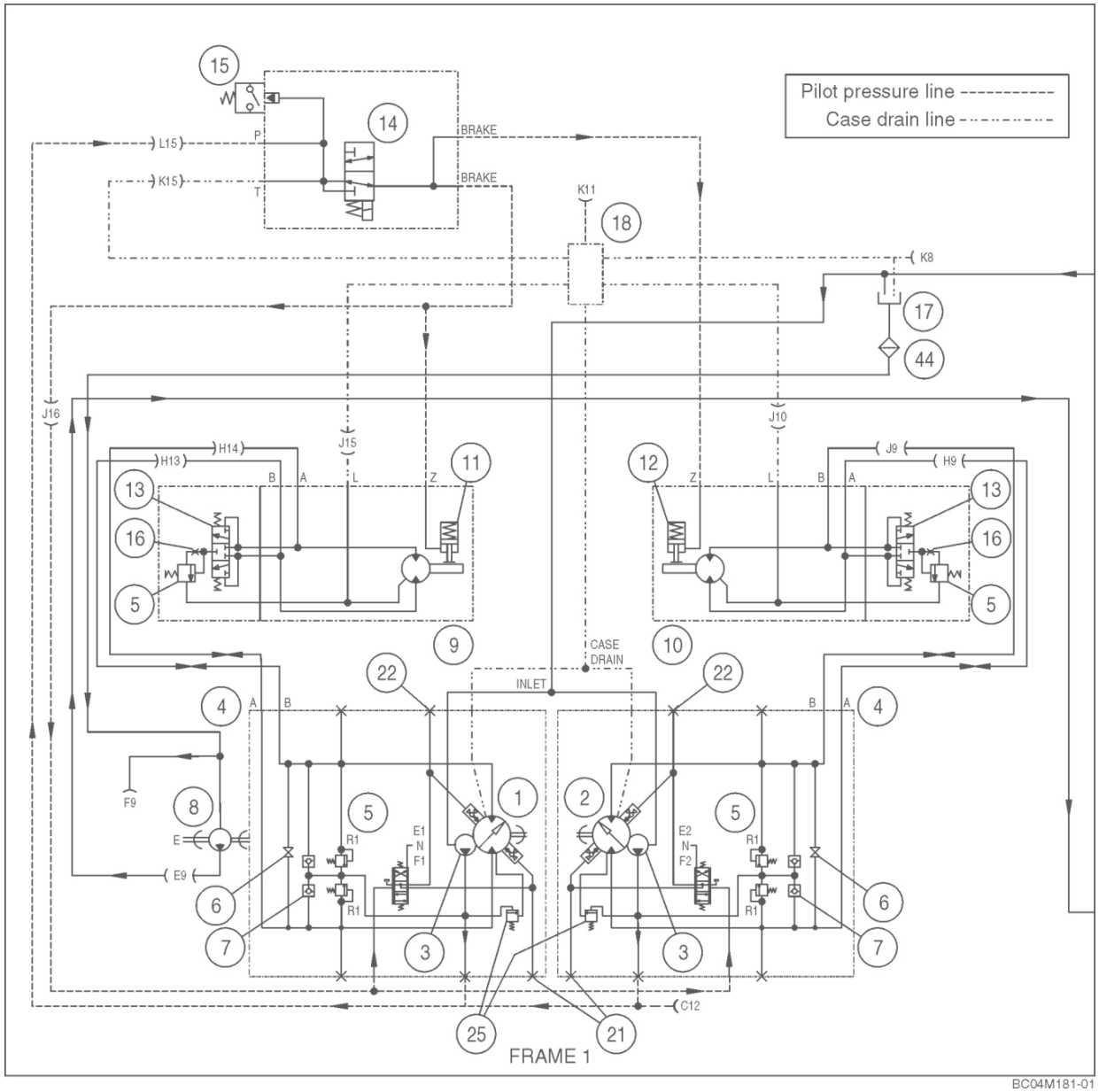
GRADE							
	1 or 2	**5**	**5.1**	**5.2**	**8**	**8.2**	**L9 (Alloy)**
SAE Markings for Bolts and Cap Screws							
	2	5			8		L9 (Alloy)
SAE Markings for Hex Nuts							

	GRADE 2 *				**GRADE 5, 5.1 or 5.2**				**GRADE 8 or 8.2**				**GRADE L9 (Alloy)**			
	Dry **		**Lubricated ****		**Dry****		**Lubricated ****		**Dry****		**Lubricated ****		**Head**		**Nut**	
SIZE	**Nm**	**lb/ft**	**Nm**	**lb/ft**	**Nm**	**lb/ft**	**Nm**	**lb/ft**	**Nm**	**lb/ft**	**Nm**	**lb/ft**	**Nm**	**lb/ft**	**Nm**	**lb/ft**
1/4 UNF	7.5	5.5	5.7	4.2	10.8	8	8.5	6.3	16.3	12	12.2	9	13.6	10	14.9	11
1/4 UNC	8.5	6.3	6.4	4.7	13.6	10	9.8	7.2	19	14	13.6	10	16.3	12	17.6	13
5/16 UNF	15	11	11	8	23	17	18	13	33	24	24	18	26	19	28	21
5/16 UNC	16	12	12	9	26	19	19	14	37	27	27	20	27	20	31	23
3/8 UNF	27	20	20	15	41	30	31	23	61	45	47	35	41	30	45	33
3/8 UNC	31	23	23	17	47	35	34	25	68	50	47	35	47	35	52	38
7/16 UNF	43	32	33	24	68	50	47	35	95	70	68	50	75	55	81	60
7/16 UNC	49	36	37	27	75	55	54	40	108	80	81	60	81	60	88	65
1/2 UNF	68	50	47	35	102	75	75	55	149	110	108	80	115	85	129	95
1/2 UNC	75	55	54	40	115	85	88	65	163	120	122	90	129	95	142	105
9/16 UNF	95	70	75	55	149	110	108	80	203	150	149	110	163	120	190	140
9/16 UNC	108	80	81	60	163	120	122	90	231	170	176	130	183	135	203	150
5/8 UNF	136	100	102	75	203	150	149	110	285	210	217	160	231	170	251	185
5/8 UNC	149	110	115	85	231	170	176	130	325	240	244	180	258	190	278	205

Contents

DISTRIBUTION SYSTEMS - A

PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schematic frame 01

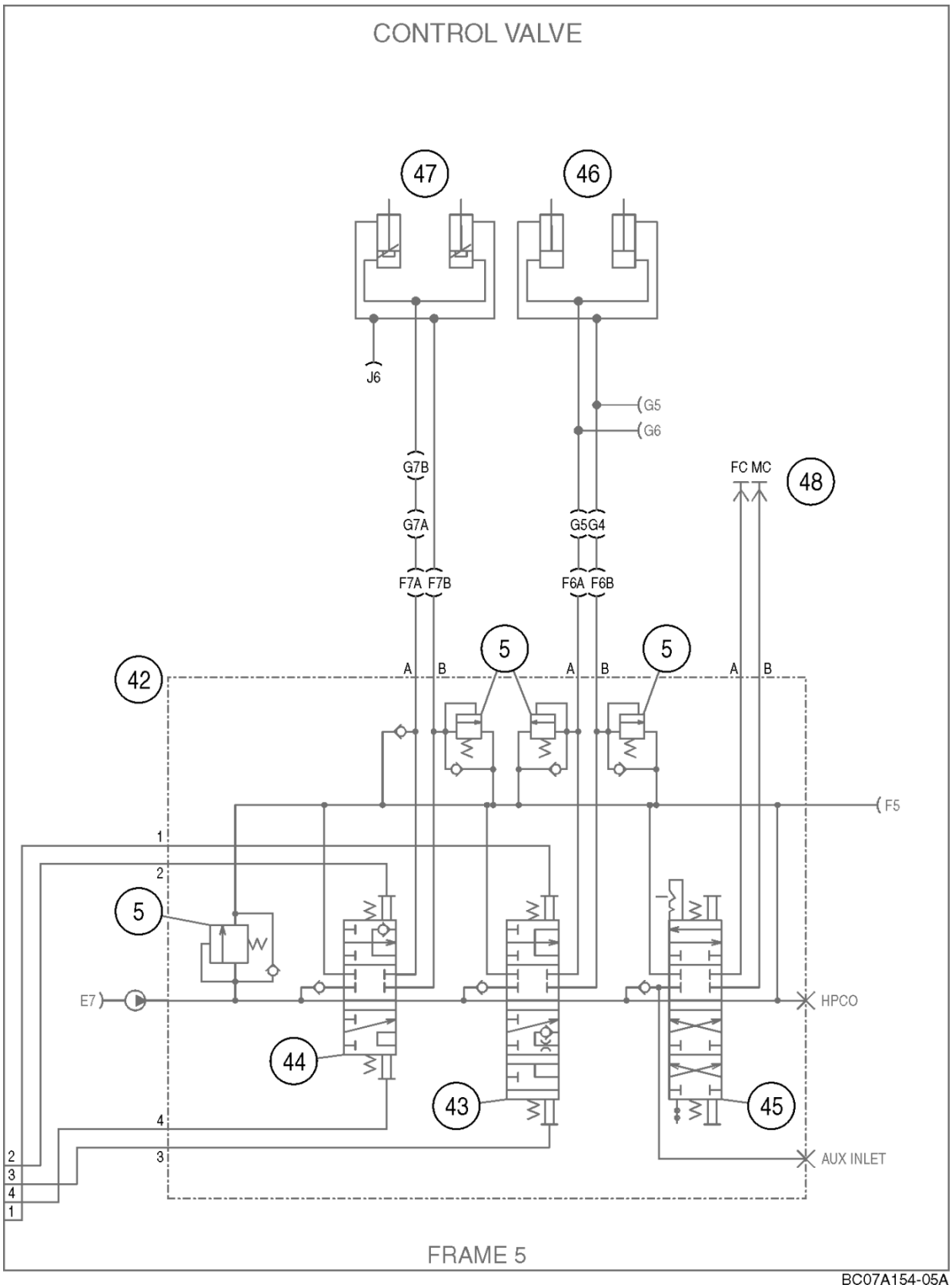


bc04m181-01 1

1. Left hydrostatic pump	9. Left drive motor	17. Hydraulic reservoir
2. Right hydrostatic pump	10. Right drive motor	18. Drain manifold
3. Charge pump	11. Left brake	21. Backup alarm switch ports
4. Hydrostatic pump	12. Right brake	22. Brake light switch ports
5. Circuit relief valve	13. Flushing valve	25. Main relief valve
6. Tow valve	14. Brake solenoid valve	44. 100 Mesh screen
7. Check valve	15. Charge pressure switch	
8. Hydraulic pump	16. Orifice	

43. Secondary auxiliary control valve

PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schematic frame 05 (ISO-Pattern Pilot Controls)



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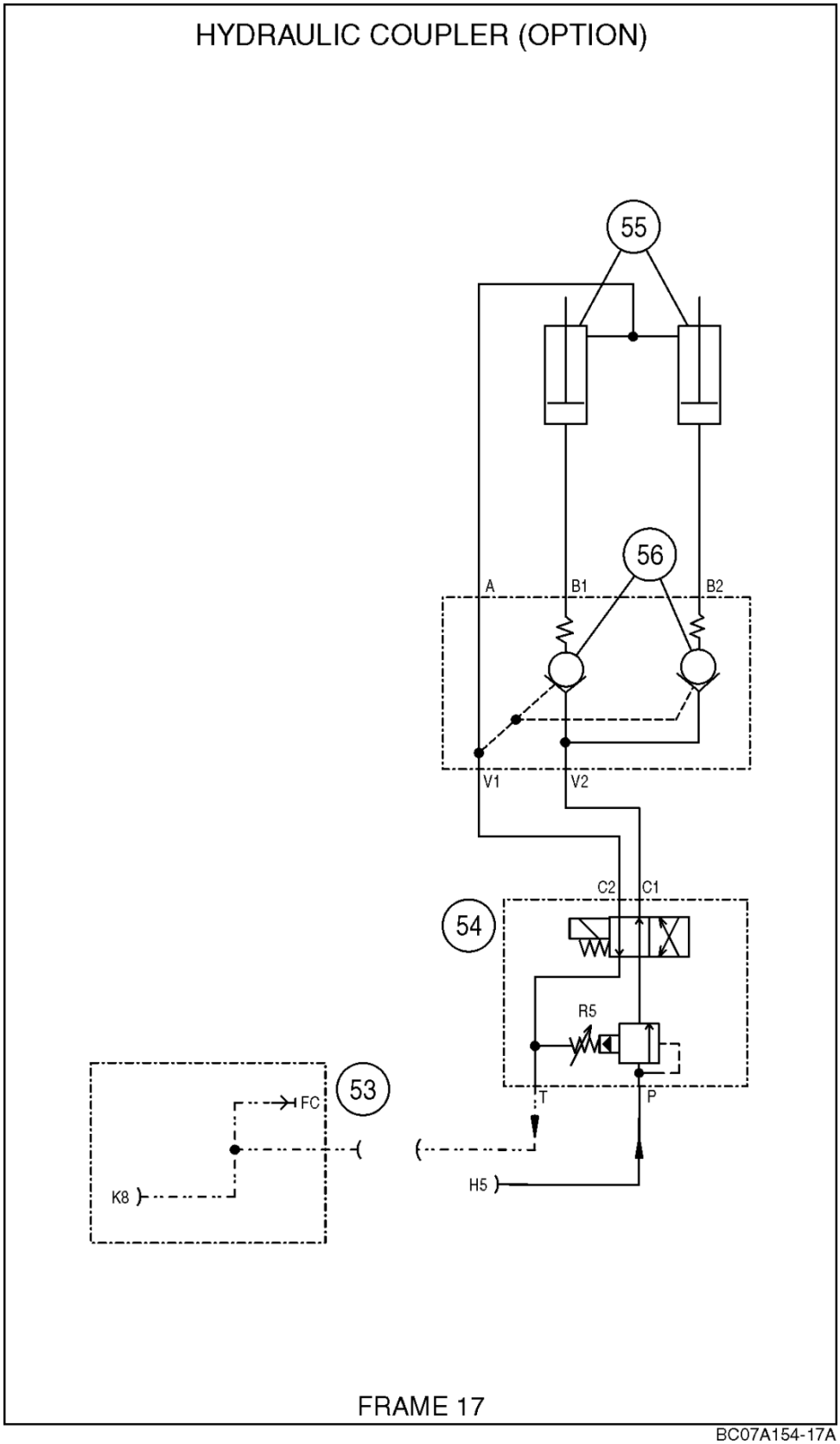
(59) Ride Control Valve	**(60)** Ride Control Accumulator

PRIMARY HYDRAULIC POWER SYSTEM - Hydraulic schematic frame 17 (H-Pattern Pilot Controls)



BC07A154-17A

BC07A154-17A 1

15. The hydraulic reservoir is located at the rear of the machine. Loosen and remove the drain plug from the reservoir.
16. Using the fitting kit **CAS10508**, install the valve in the hole for the drain plug. Make sure that the valve is closed.
17. Stop the vacuum pump.
18. Connect the inlet hose for the portable filter to the valve that is installed in the hole for the drain plug.
19. Disconnect the vacuum pump.
20. Install the outlet hose for the portable filter in the hydraulic reservoir filler neck.
21. Open the valve that is installed in the hole for the drain plug.
22. Move the switch for the portable filter to the ON position.
23. Start and run the engine at half throttle.
24. Run the portable filter for 10 minutes with the engine running at half throttle.
25. Continue to run the portable filter. Increase the engine speed to full throttle. Do the following to heat the oil to operating temperature:
    (A) Increase the engine speed to full throttle.
    (B) Hold the bucket control lever in the ROLLBACK position for five seconds.
    (C) Return the blade control lever in the NEUTRAL position for five seconds.
    (D) Repeat steps 25B and 25C until the oil is at operating temperature.
26. With the engine running at full throttle and the portable filter running, completely extend and retract the lift cylinders and the bucket cylinders. Continue to operate the cylinders two times, one after the other for 30 minutes
27. Decrease the engine speed to low idle.
28. Continue to run the portable filter for 10 minutes. During this time, move the hose up and down to help mix the oil in the reservoir.
29. Stop the portable filter
30. Stop the engine.
31. Remove the hose from the hydraulic reservoir.
32. **Reservoir - Apply vacuum (A.10.A)**
33. Close the valve that is installed in the hole for the drain plug.
34. Disconnect the inlet hose for the portable filter from the valve.
35. Start the vacuum pump. .
36. Remove the valve from the hole for the drain plug.
37. Install and tighten the drain plug.
38. Stop the vacuum pump.

11. Loosen and remove the pump mounting bolts and washers.

BD04C141x 3

12. Remove the gear pump from the hydrostatic pump mounting location.

Hydraulic pump - Assemble

1. Lubricate the bottom seal with clean hydraulic oil and insert the bottom seal into the groove of the body.

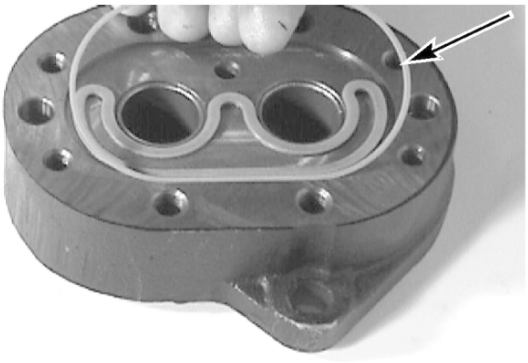
GD98J814 1

2. Lubricate the top seal with clean hydraulic oil and insert the top seal into the groove of the body.

NOTE: *The top seal will be placed on top of the bottom seal.*

GD98J813 2

3. Lubricate the new seal ring with clean hydraulic oil and insert the new seal ring into the groove of the body.



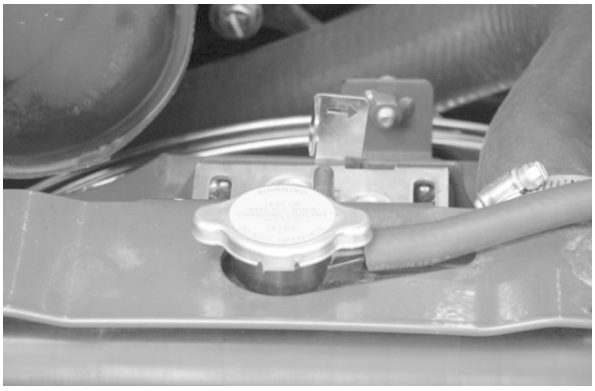
GD98J812_2 3

9. If the hydraulic oil is not at operating temperature, run the engine at full throttle and hold the bucket control lever in the ROLLBACK position for 30 seconds. Then return the bucket control lever to NEUTRAL for 15 seconds. Repeat this cycle until the temperature of the oil is at least 52°C (125°F).
10. Continue to run the engine at full throttle. Read the pressure gauge and record the Charge Pressure reading. Stop the engine.
11. The pressure reading must be 26 - 28 bar (390 - 410 psi) or the relief valve must be adjusted with shims.
12. If the pressure is correct, go to step 14. If the pressure is not correct, loosen the cap on the hydraulic reservoir. Remove the plug, shim(s), spring, and poppet for the charge pressure relief valve.
13. Inspect the parts of the charge relief valve. If the parts are good, add shim(s) from the shim kit (part number H407767) and repeat steps 9 through 13 until the pressure is correct.

IMPORTANT: *For the following test the machine MUST be raised up on supports until the tires are above the floor. This is a safety procedure if the hydraulic parking brakes fail to hold.*

Oil cooler - Remove

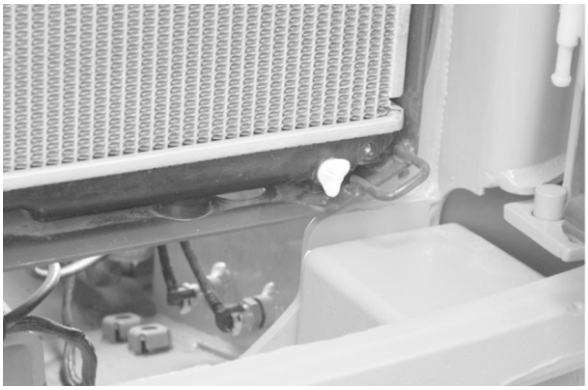
1. Lift the hood.
2. Open the rear access door on the machine.
3. Slowly loosen the radiator cap.



BD04C002x 1

4. Install a hose on the drain valve and drain the radiator into a clean container that holds approximately 19 litres (5 gallons).

NOTE: *During installation, fill the radiator and coolant reservoir completely.* ***ENGINE COOLANT SYSTEM - Capacity (B.50.A)*** *Start and run the engine until the coolant is at operating temperature. Stop the engine and check for leakage. When the coolant is cold, check the coolant reservoir level. Add coolant as required.*



BD04C003 2

5. Loosen the hose clamps on the upper and lower radiator hoses. Remove the upper and lower radiator hoses from the radiator.

bdo4c007 3

SECONDARY HYDRAULIC POWER SYSTEM - Cleaning

1. Contamination in the hydraulic system is a major cause of the malfunction of hydraulic components. Contamination is any foreign material in the hydraulic oil. Contamination can enter the hydraulic system in several ways.
   (A) When you drain the oil or disconnect any line.
   (B) When you disassemble a component.
   (C) From normal wear of the hydraulic components.
   (D) From damaged or worn seals.
   (E) From a damaged component in the hydraulic system.

2. All hydraulic systems operate with some contamination. The design of the components in this hydraulic system permits efficient operation with a small amount of contamination. An increase in this amount of contamination can cause problems in the hydraulic system. The following list includes some of these problems.
   (A) Cylinder rod seals leak.
   (B) Control valve spools do not return to neutral.
   (C) Movement of control valve spools is difficult.
   (D) Hydraulic oil becomes too hot.
   (E) Pump gears, housing, and other parts wear rapidly.
   (F) Relief valves or check valves held open by dirt.
   (G) Quick failure of components that have been repaired.
   (H) Cycle times are slow; machine does not have enough power.

3. If your machine has any of these problems, check the hydraulic oil for contamination. See types of contamination below. If you find contamination, use the Portable Filter to clean the hydraulic system.

NOTE: *There are two types of contamination, microscopic and visible.*

4. Microscopic contamination occurs when very fine particles of foreign material are in suspension in the hydraulic oil.

5. These particles are too small to see or feel. Microscopic contamination can be found by identification of the following problems or by testing in a laboratory. Examples of the problems:
   (A) Cylinder rod seal leak.
   (B) Control valve spools do not return to NEUTRAL.
   (C) The hydraulic system has a high operating temperature.

Oil cooler - Install

1. Install the second auxiliary oil cooler into the mounting location.
2. Install and tighten the mounting bolts in the oil cooler mounting bracket.

bd04c086 1

3. Start the vacuum pump. **Reservoir - Apply vacuum (A.10.A)**
4. Remove the caps from the fittings and plugs from the hoses.
5. Install the hydraulic lines onto the oil cooler and tighten the fittings.

bd04c087 2

6. Stop the vacuum pump.
7. Remove the vacuum pump from the reservoir.
8. Start and run the engine at low idle for 2 to 5 minutes and check for any leaks.
9. Check the oil level in the hydraulic reservoir and add oil as required. **Reservoir - Filling (A.10.A)**

HIGH-FLOW HYDRAULIC POWER SYSTEM - Decontaminating

1. Start and run the engine at 1500 rpm (r/min).
2. Completely retract the cylinders of all attachments on the machine. Stop the engine.

⚠ WARNING ⚠

If retracting the cylinder rods causes the attachment to be raised, block the attachment in place before proceeding to the next step. 39-4

3. Move each control lever in both directions to release pressure in the hydraulic circuits.
4. Loosen and remove the filler cap from the reservoir.
5. Drain the hydraulic oil from the reservoir.
   (A) Have available acceptable equipment to drain the hydraulic oil.
   (B) Remove the drain plug from the bottom of the reservoir.
6. Remove the hydraulic filter element from the machine.
7. Install new a hydraulic filter element on the machine.
8. Install the drain plug in the bottom of the reservoir.
9. Fill the hydraulic reservoir. **Reservoir - Filling (A.10.A)**
10. Disconnect the line from the OPEN end and CLOSED end of each cylinder.
11. Be sure all control levers are in the NEUTRAL position.
12. Start and run the engine at low idle.

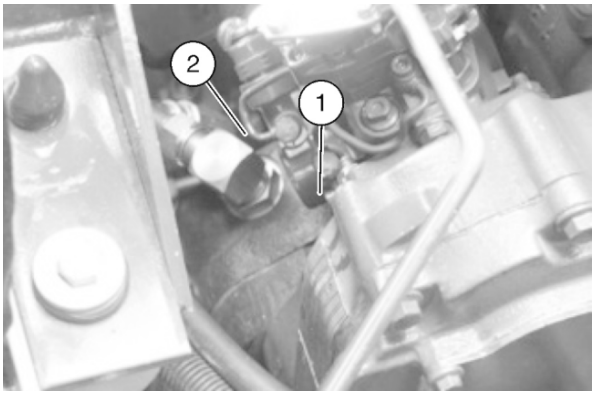
IMPORTANT: *Check the oil level in the hydraulic reservoir frequently while doing step 13. Have another person hold a container under the hydraulic lines while you do step 13.*

13. Slowly move each control lever in both directions until oil begins to flow from the open line. Hold the control lever in place until clean oil flows from the open line.
14. Stop the engine.
15. Connect the system line to the CLOSED end of each cylinder.
16. Connect a suitable drain line to the OPEN end of each cylinder and place the other end in an acceptable container for contaminated oil.
17. Start the engine and run the engine at low idle.
18. Slowly and completely extend all cylinders. As the piston rod comes in/out of the cylinder, oil will be pushed out of the OPEN end of the cylinders.

IMPORTANT: *Any attachment or part of an attachment that is raised must be supported with acceptable equipment to prevent the attachment from falling.*

Hydraulic pump - Remove (Machines Equipped With Tandem Hydrostatic Pump)

1. Place a shop towel under the High Flow Pump.
2. Remove the cap from the hydraulic reservoir. **CAS1871**
3. Connect a vacuum pump to the hydraulic reservoir. **CAS10192**
4. **Reservoir - Apply vacuum (A.10.A)** Start the vacuum pump.
5. Tag and disconnect the hose from the fitting at the suction port of the High Flow Pump.
6. Install a plug in the hose and a cap on the fitting.
7. Tag and disconnect the hose from the fitting at the pressure port of the High Flow Pump.
8. Install a plug in the hose and a cap on the fitting.
9. Stop the vacuum pump.
10. Loosen and remove the upper flange mounting bolt (1) and the lower flange mounting bolt (2) (not shown) on the High Flow Pump.



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11. Remove the High Flow Pump from the Engine mounting location.

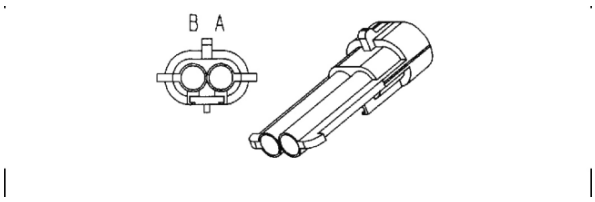
Alternator - Torque

95 Ampere Alternator	
Torque for nut for pulley	**60 - 73 Nm** (**45 - 54 lb ft**)

Alternator - Service limits

95 Ampere Alternator	
Minimum diameter of slip rings	**26.8 mm** (**1.055 in**)
Minimum length of brushes	**7 mm** (**0.27 in**)

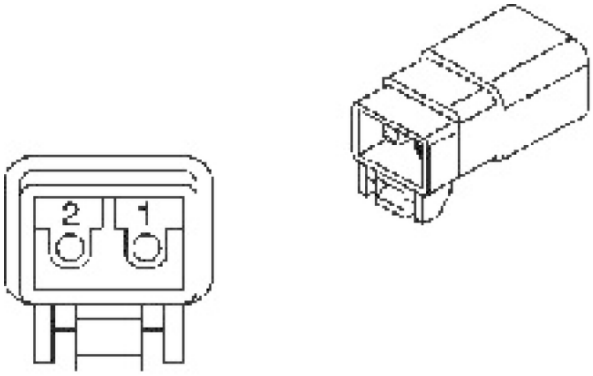
Connector 79 (Black)



256341A1 10

Cavity	Circuit ID	Description
A	319A (T)	From connector 8A pin D1
B	565A (T)	From connector 48 pin B

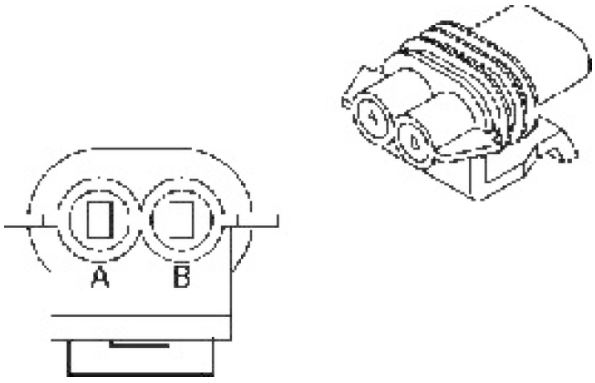
Connector 80



225316c1 11

Cavity	Circuit ID	Description
1	258B (T)	From connector 8A pin D4
2	178S (B)	To ground

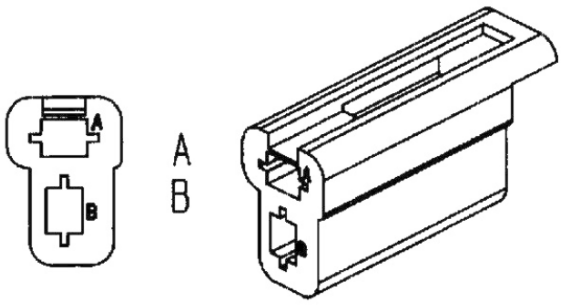
Connector 103



256340a1 12

Cavity	Circuit ID	Description
A	178U (B)	To ground
B	314B (T)	From connector 50 pin B

Connector 65A



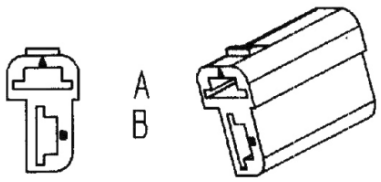
872290R1 4

Cavity	Circuit ID	Description
A	830K (R)	To connector 112 pin B wiper motor
B	178WT (B)	From connector 112 pin C

Connector 112

Cavity	Circuit ID	Description
A	835A (O)	To connector 113 pin B washer pump
B	830K (R)	From connector 65A pin A
C	178WU (B)	From connector 65A pin B

Connector 113

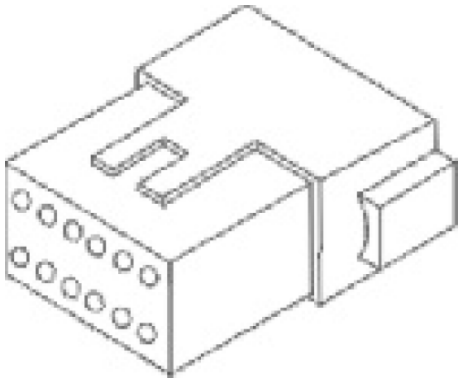


877291R1 5

Cavity	Circuit ID	Description
A	178WV (B)	To ground
B	835A (O)	From connector 112 pin A

Cavity	Circuit ID	Description
1	001B (B)	To connector 107 pin E
2	002B (DB)	To connector 107 pin F
3	817J (O)	To connector 107 pin K
4	004B (R)	To connector 107 pin G
5	005B (Y)	To connector 107 pin H
6	006B (P)	To connector 107 pin C
7	007B (T)	To connector 107 pin D
8	008B (W)	To connector 107 pin J
9	178JH (B)	To connector 107 pin B

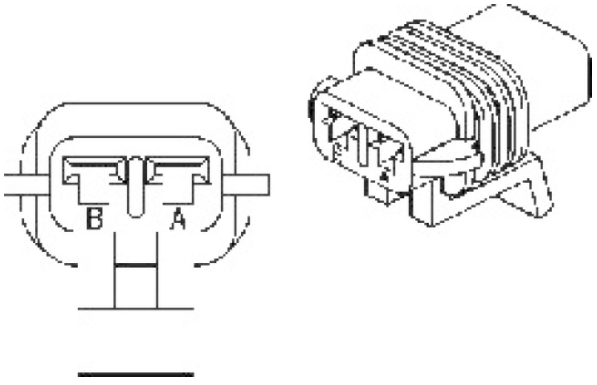
Connector 138A



225388c1 4

Cavity	Circuit ID	Description
1	001A (B)	From connector 49 pin 1
2	002A (DB)	From connector 49 pin 2
3	817H (O)	From connector 49 pin 3
4	004A (R)	From connector 49 pin 4
5	005A (Y)	From connector 49 pin 5
6	006A (P)	From connector 49 pin 6
7	007A (T)	From connector 49 pin 7
8	008A (W)	From connector 49 pin 8
9	178HJ (B)	To ground

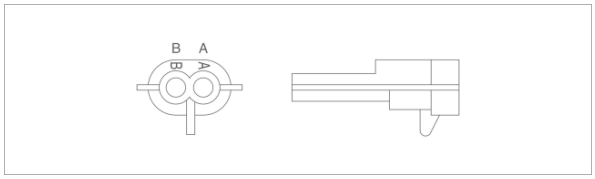
Connector 150



182069a1 5

Cavity	Circuit ID	Description
A	817B (R)	From options fuse block terminal 2
B	178BU (B)	To ground

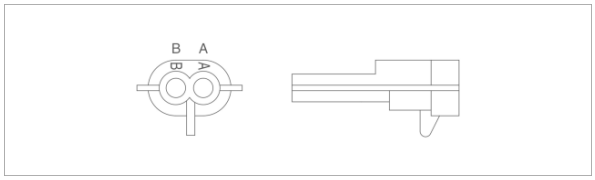
Connector 123C (Grey)



256294a1 4

Cavity	Circuit ID	Description
A	545AC (Y)	From attachment hydraulic switch (option C)
B	546AC (LB)	From attachment hydraulic switch (option C)

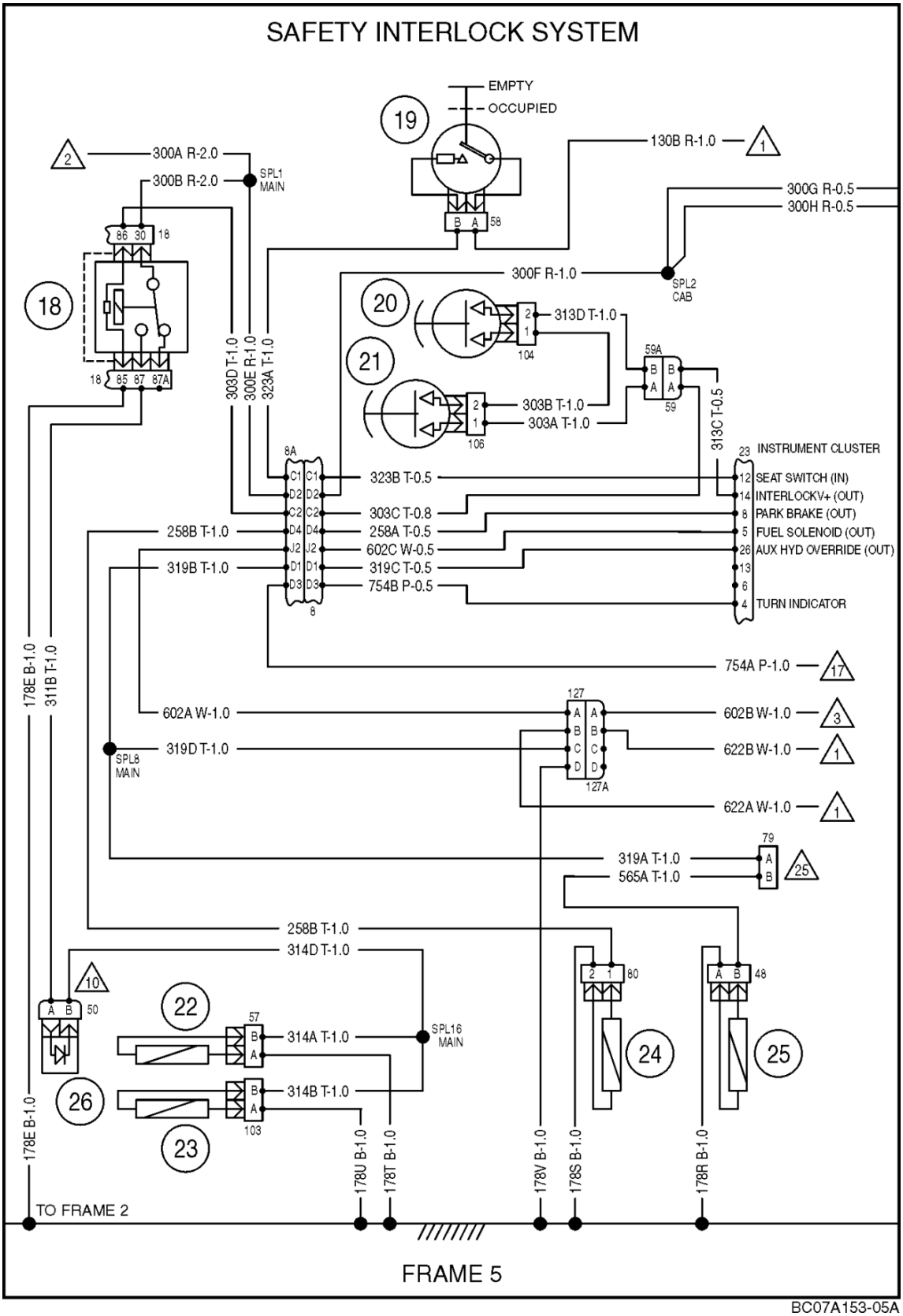
Connector 123D (Grey)



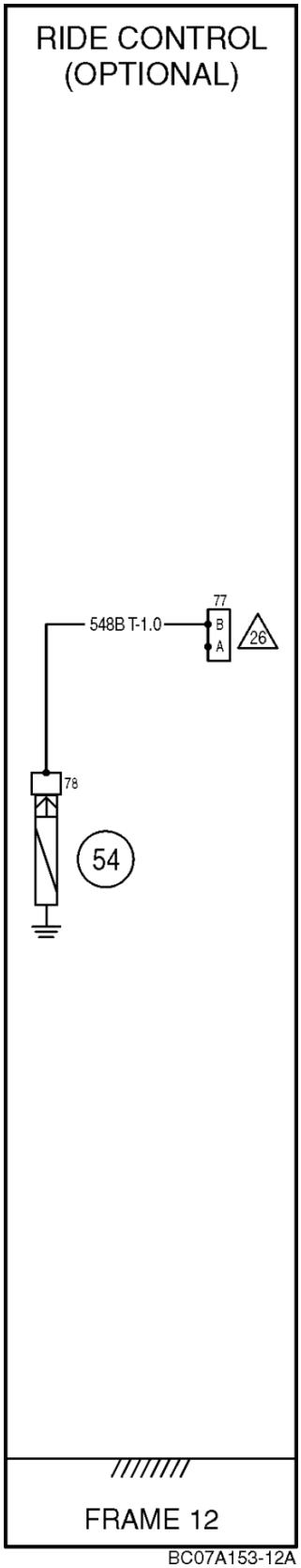
256294a1 5

Cavity	Description
A	From attachment hydraulic switch (option D)
B	From attachment hydraulic switch (option D)

Wiring harness - Electrical schematic frame 05

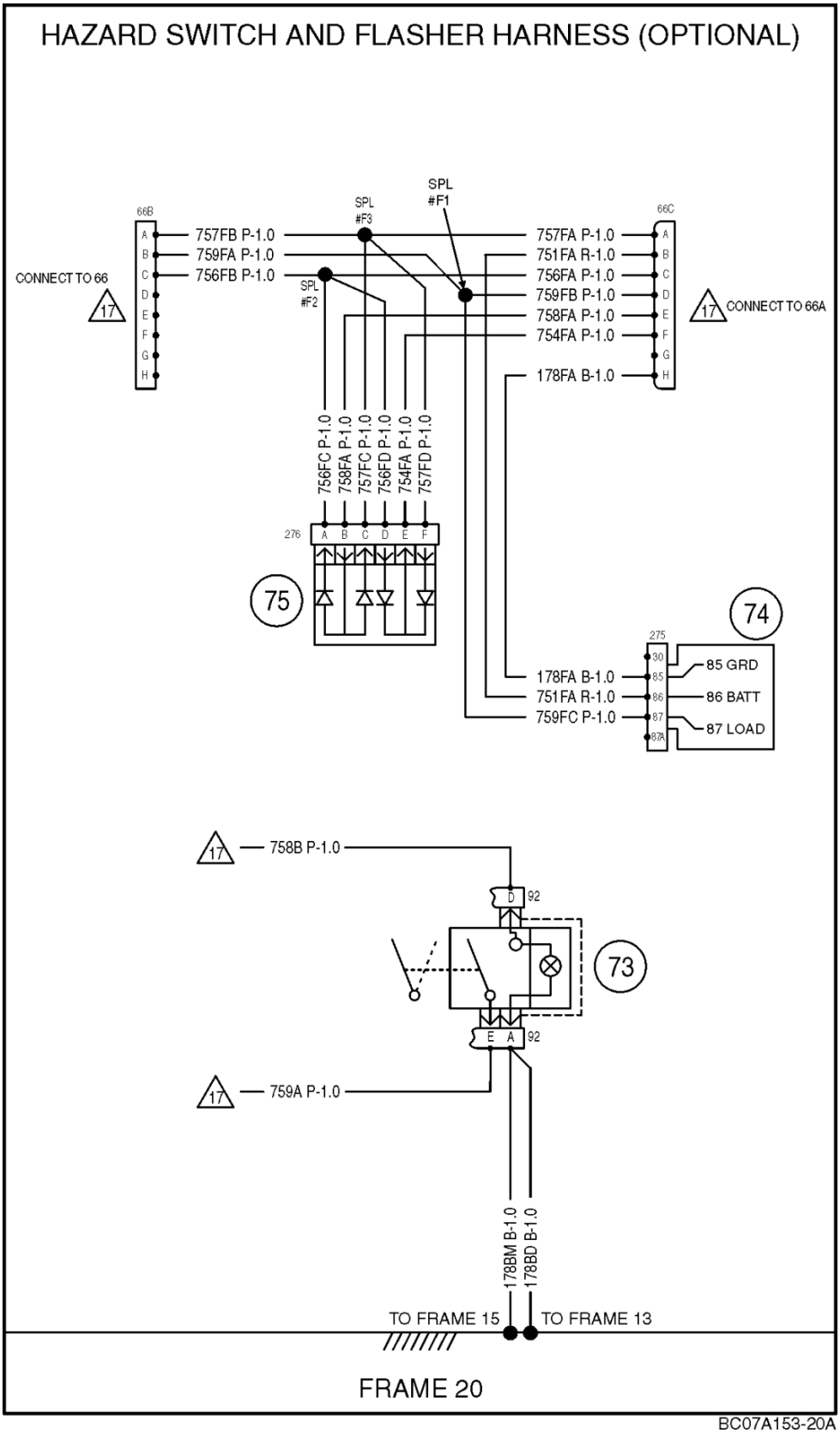


Wiring harness - Electrical schematic frame 12



(54) Ride Control Solenoid

Wiring harness - Electrical schematic frame 20



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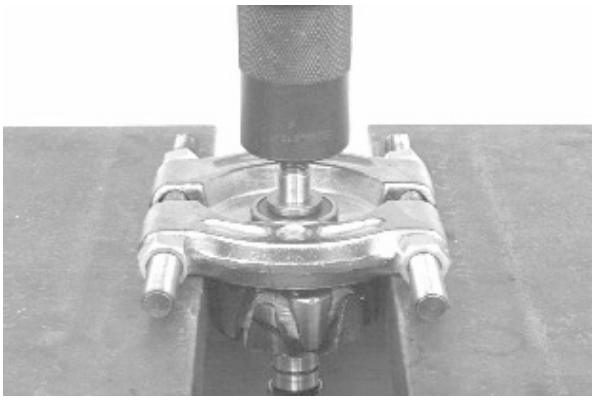
(73) Hazard Switch	**(74)** Flasher Module	**(75)** Diode Pack

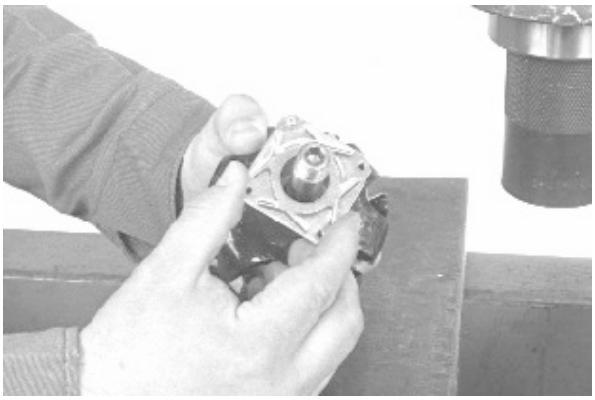
Alternator - Replace

1. Use a suitable support between the front bearing and the bearing retainer on the rotor shaft. Press the rotor shaft out of the front bearing and the spacer.



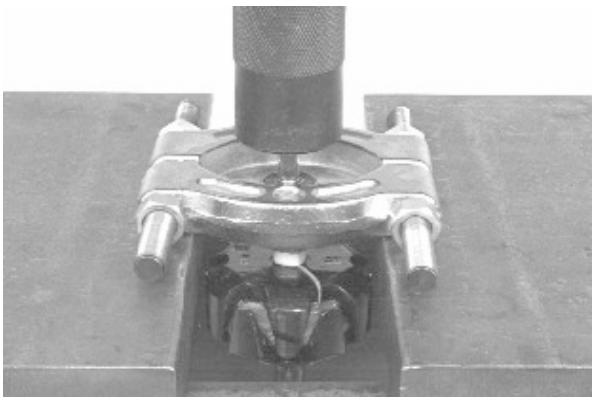
B8971426M 1

2. Remove the bearing retainer.



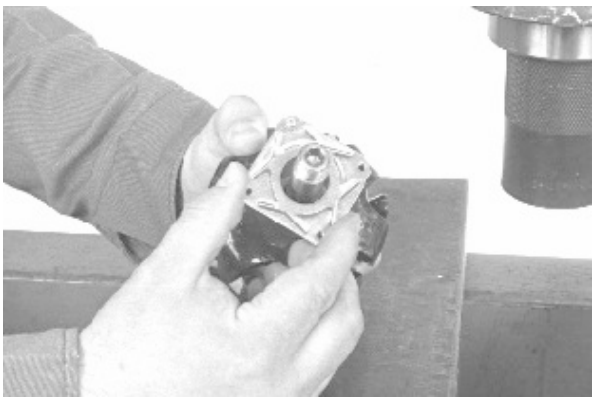
B8971429M 2

3. Use a suitable support between the rear bearing and the slip ring on the other end of the rotor shaft. Press the rotor shaft out of the rear bearing.



B8971432M 3

4. Install the bearing retainer on the rotor shaft.



B8971429M 4

Battery - Filling

1. Remove the caps from the battery.
2. Fill each cell to the top of the separators with electrolyte. This will permit the volume of electrolyte to increase when heated by charging the battery.
3. Install the caps on the battery.
4. Connect a battery charger to the battery.
5. Charge the battery at 30 amperes until the specific gravity is 1.250 or more and the temperature of the electrolyte is at least **15.5 °C (60 °F).**
6. If necessary, fill each cell with electrolyte until the electrolyte is just below split ring at the bottom of the cell opening.

DISTRIBUTION SYSTEMS - A

LIGHTING SYSTEM - 40.A

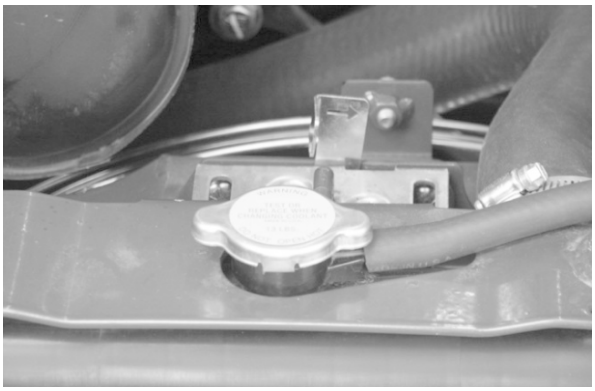
450CT
450
465

Contents

DISTRIBUTION SYSTEMS - A

HYDRAULIC COMMAND SYSTEM - 14.A

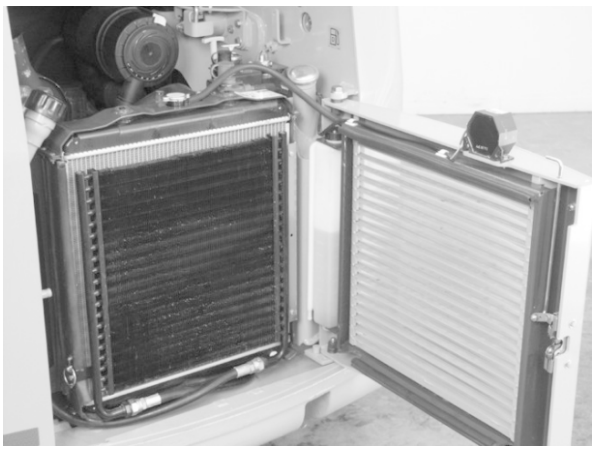
9. Disconnect the overflow hose from the radiator neck.



BD04C002x 3

10. Connect acceptable lifting equipment to the rear access door.

11. Disconnect the wiring harness connector for the back up alarm on the rear access door. Loosen and remove the hardware that fastens the top and the bottom of the rear access door to the frame.

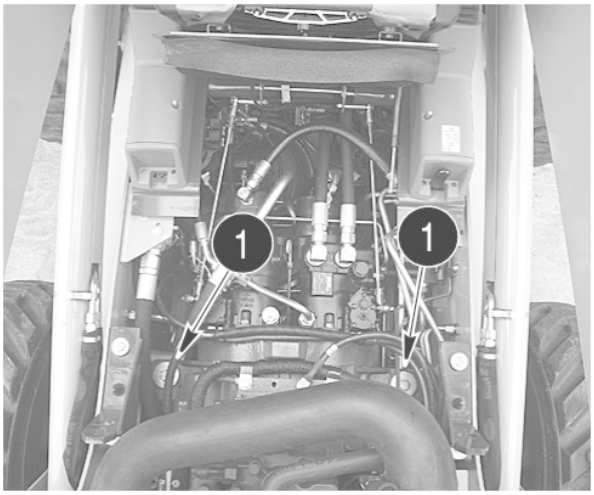


bd04c088 4

12. Disconnect the electrical connectors from the rear tail lamp assemblies on both sides of the hood.

bd99e038 5

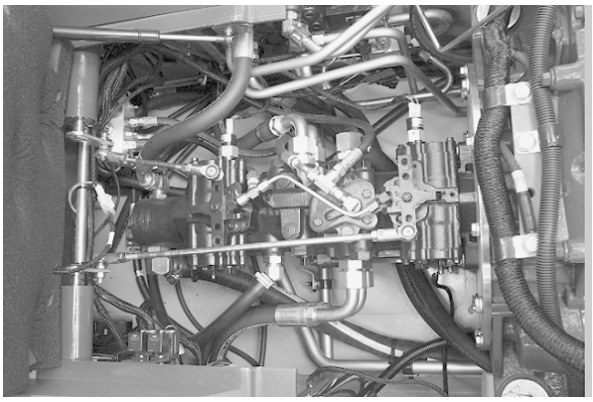
55. Loosen and remove the two front engine mounting bolts **(1)** from the chassis mounting locations on each side of the engine.



bd04m002_1 39

56. Lift the engine using acceptable lifting equipment capable of lifting 272 kg (600 pounds) to the lifting eyes on the engine. Remove the engine from the chassis.

42. Disconnect the wiring from the connectors on each of the backup alarm switches on the tandem pump.

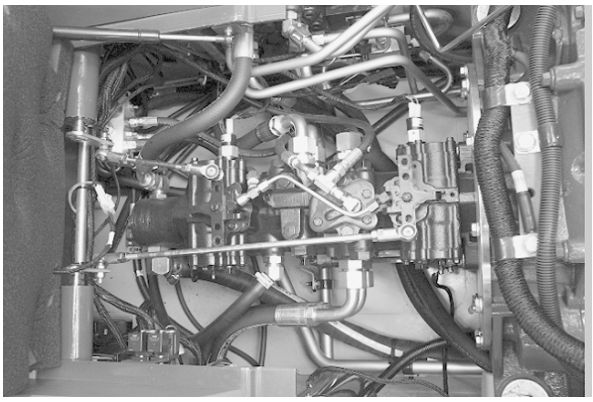


bd06f217 30

43. Disconnect the wire from the charge pressure switch on the tandem pump.

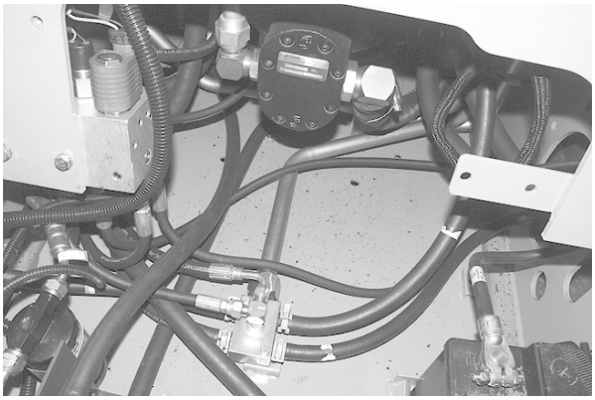
bd04c029 31

44. **Reservoir - Apply vacuum (A.10.A)** Disconnect all of the hoses from the tandem pump. Tag the hoses and fittings for use during assembly. Install caps and plugs on the fittings.



bd06f217 32

45. Disconnect the hoses from the gear pump. Tag the hoses and fittings for use during assembly. Install caps and plugs on the fittings.



bd06f222 33

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POWER PRODUCTION - B

FUEL AND INJECTION SYSTEM - 20.A

Radiator - Install

1. Radiator install is the reverse of radiator remove. **Radiator - Remove (B.50.A)**
2. After radiator has been installed, refer to the following procedure for filling the radiator. **Radiator - Filling (B.50.A)**

Contents

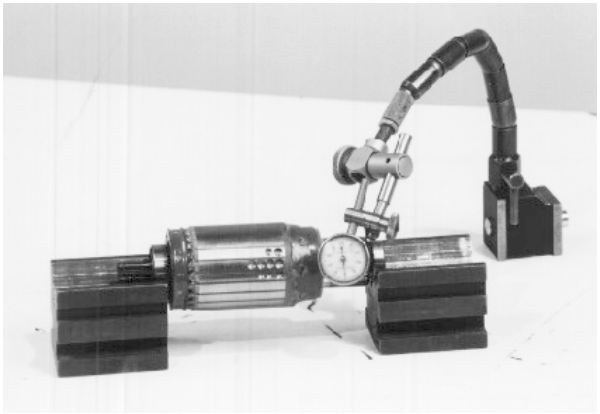
POWER PRODUCTION - B

STARTING SYSTEM - 80.A

Engine starter - Visual inspection

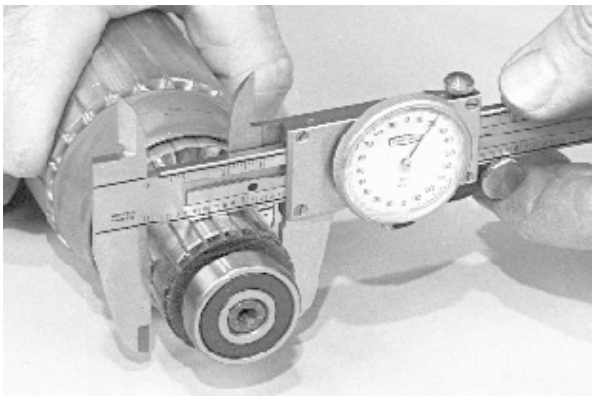
NOTE: *All parts except the starter drive, must be cleaned using mineral spirits with a clean, dry cloth or brush.*

1. If the length of a brush that is attached to the brush holder is less than **11 mm** (**7/16 in**), replace with a new brush assembly.
2. If the length of a brush that is attached to the field coil is less than **11 mm** (**7/16 in**), replace with a new field frame assembly.
3. Use a spring scale to check the tension of the brush springs. Pull the brush spring up until the brush spring is just above the brush holder. The scale indication must be between **1.8 - 4.1 kg** (**4 - 9 lb**). If a brush spring tension is not as specified, replace with a new brush spring.
4. Test the armature on an armature tester. Follow the equipment manufacturer's instructions.
5. Place the armature on vee-blocks. Check the runout of the armature with a dial indicator. The runout must not be more than **0.05 mm** (**.002 in**).



b834918 1

6. If the runout is more than **0.05 mm** (**.002 in**), use a lathe to remove enough material for the runout to be less than specified.
7. Measure the diameter of the commutator. The diameter must not be less than **35 mm** (**1.377 in**). If the diameter is less than specified, replace with a new armature.



b313141 2

8. If the depth of the groove between the commutator bars is less than **0.2 mm** (**.008 in**), cut the insulation between the commutator bars to a depth of **0.4 - 0.8 mm** (**1/64 - 1/32 in**). Use sandpaper to remove the rough edges from the commutator bars.

31. Use the bolts to mount the cover to the field frame. Tighten the bolts. Do not overtighten.

b330818 31

32. Install the cable, lock washer, and nut onto the motor terminal. Tighten the nut. Do not overtighten.

b330731 32

33. Pull the boot over the motor terminal.

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POWER PRODUCTION - B

STARTING SYSTEM - 80.A

Pump drive - Visual inspection

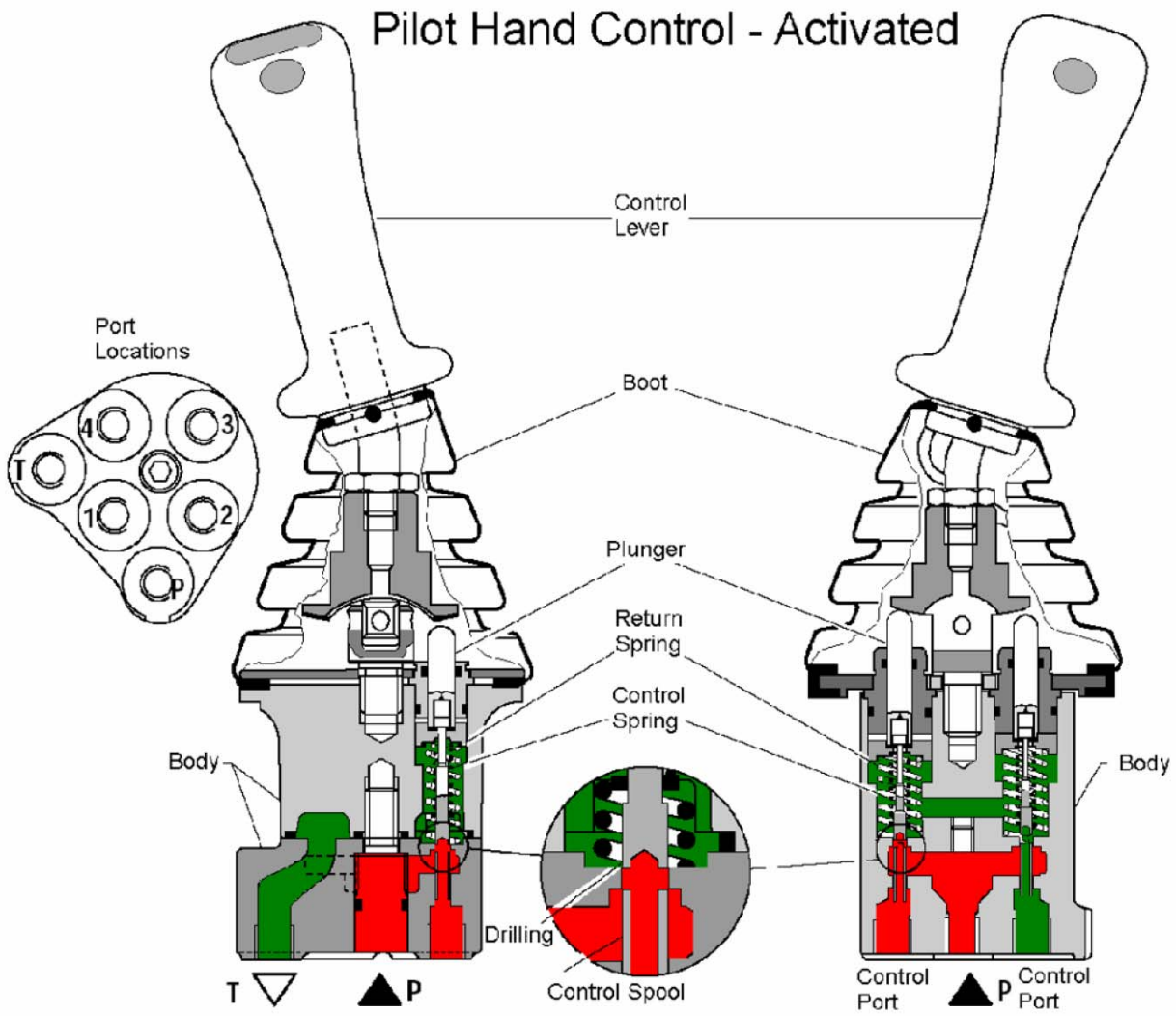
1. Inspect the splitter box cover **(12)** and the splitter box **(5)** for cracks or any other damage. Use new parts as required.
2. Inspect the adapter spacer **(2)** for cracks or any other damage. Use new parts as required.
3. Inspect the pump drive gear **(9)** and the pump driven gears **(23)** for cracks, chipped drive teeth, wear, or any other damage. Use new parts as required.
4. If the pump driven gears **(23)** were removed, inspect the splines on the pump drive shaft and the inside of the pump driven gear **(23)** for wear or any other damage. Apply Molycote to the splines of the pump shaft before installing the pump driven gears **(23)** on the pump shaft. Use new parts as required.
5. Lubricate a new seal **(7)** lip with gear oil and use acceptable tools to install the seal **(7)** into the splitter box **(5)**.

POWER TRAIN - C

TRANSMISSION Hydrostatic - 20.F

450CT
450
465

450/465 Split Pump Hydrostatic Installation	
(1) Right Hand Hydrostatic Pump	**(5)** Gear Pump
(2) Left Hand Hydrostatic Pump	**(6)** Manifold
(3) Right Hand Drive Motor	**(7)** Brake/Two Speed Valve
(4) Left Hand Drive Motor	



Straight Forward Travel

The hydrostatic pump displacement is infinitely variable between zero and 100%. A given swashplate position can be affected by drive system pressure, control pressure to the pilot hand control valve from the anti-stall cartridge, pilot hand control lever position, pump drive speed, as well as the servo stroking piston centering springs. Flow direction is determined by which pump servo cylinder control port is pressurized. Steering is caused by porting an opposing pressure to the servo piston causing the servo piston to return towards neutral. The slower the travel side causes the machine to steer in that direction. There are four shuttle check valves installed in the lower section of the travel system. These shuttle check valves interconnect a number of the control spool output ports.

•One of the shuttle check valves interconnects the output from control spool number 1 to both the E and F output ports. The backup alarm switch is also actuated when this controller is activated.

•Another shuttle check valve interconnects the output from control spool number 2 to both the C and F output ports.

•Another shuttle check valve interconnects the output from control spool number 3 to both the C and D output ports.

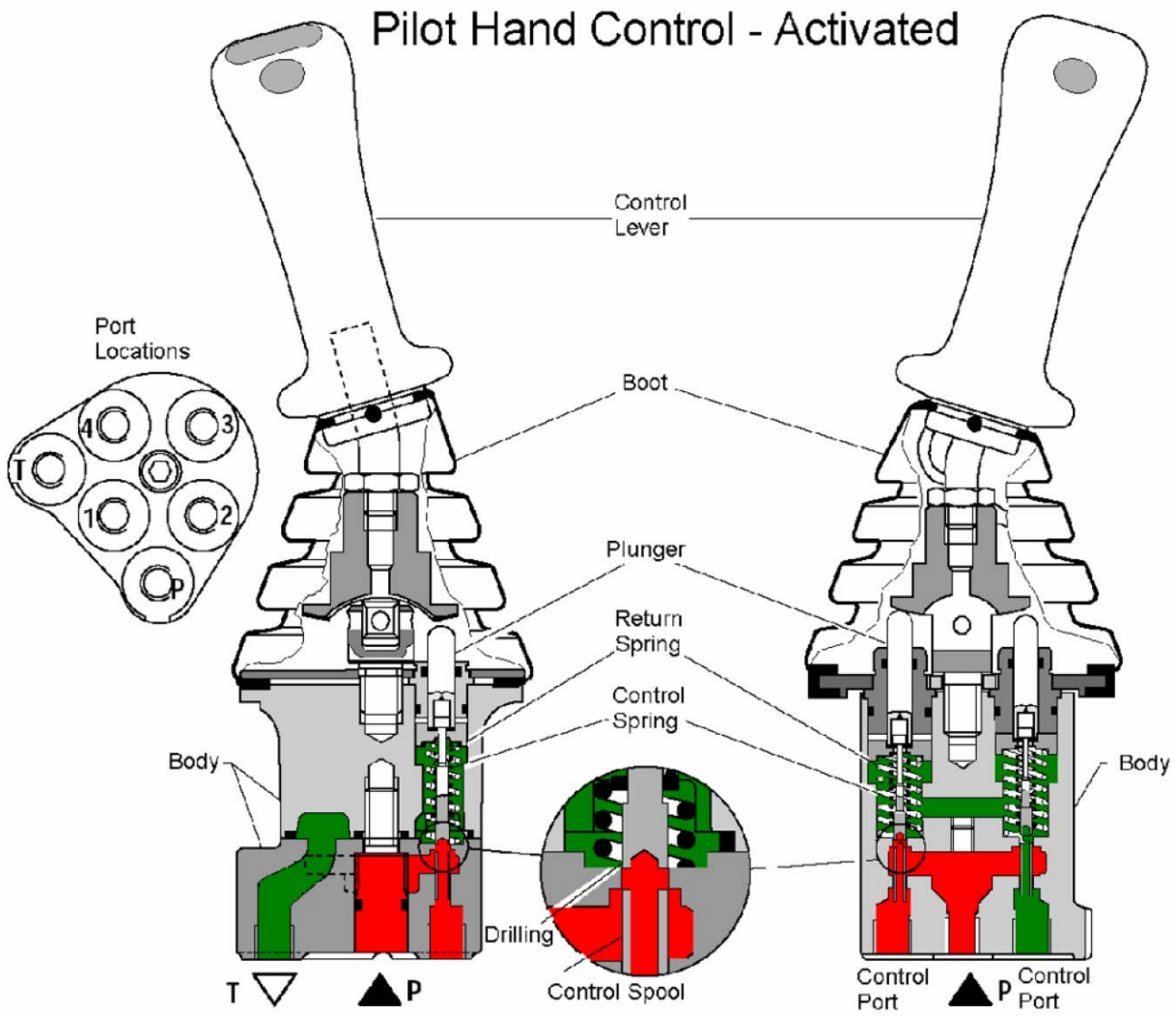
•Another shuttle check valve interconnects the output from control spool number 4 to both the D and E output ports.

Actuating the travel control lever toward the straight forward direction causes controller number 3 to be pressurized in proportion to the distance that the lever is moved.

Activating controller number 3 causes the machine to travel straight in the forward direction by pressurizing both the C and D Shuttle Check Valves.

Pressurized oil from the C Shuttle Check Valve is connected to the RH Forward servo piston through controller port C and pump port X4B.

Pressurized oil from the D Shuttle Check Valve is connected to the LH Forward servo piston through controller port D and pump port X4A.



BS06K467 2

Straight Forward Travel

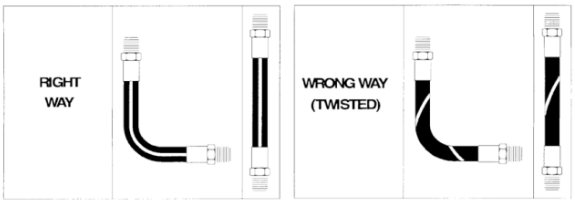
The hydrostatic pump displacement is infinitely variable between zero and 100%. A given swashplate position can be affected by drive system pressure, control pressure to the pilot hand control valve from the anti-stall cartridge, pilot hand control lever position, pump drive speed, as well as the servo stroking piston centering springs. Flow direction is determined by which pump servo cylinder control port is pressurized.

Steering is caused by pressure acting on the servo piston causing the servo piston to increase displacement of the hydrostatic pump. The opposite side of the servo piston is ported back to tank.

There are four work ports that send pilot pressure to different areas of the hydrostatic pump and loader control valve. Actuating the right and left travel control levers toward the straight forward direction causes controller number 3 to be pressurized in proportion to the distance that the lever is moved. Activating controller number 3 causes the machine to travel straight in the forward direction by pressurizing both the left and right hand servo pistons on one side in the hydrostatic pump. Return oil from the non-pressurized sides of the servo pistons is forced back through number 1 control back to tank.

TRANSMISSION Hydrostatic - Startup test

1. Prior to installation, inspect the pump, motor, hoses, adapters, and fittings for cleanliness. Check for proper pump rotation.
2. Install the pump and/or motor with attaching parts on the machine. Be sure to install hoses properly without twisting. See figure 1.



hs01d069 1

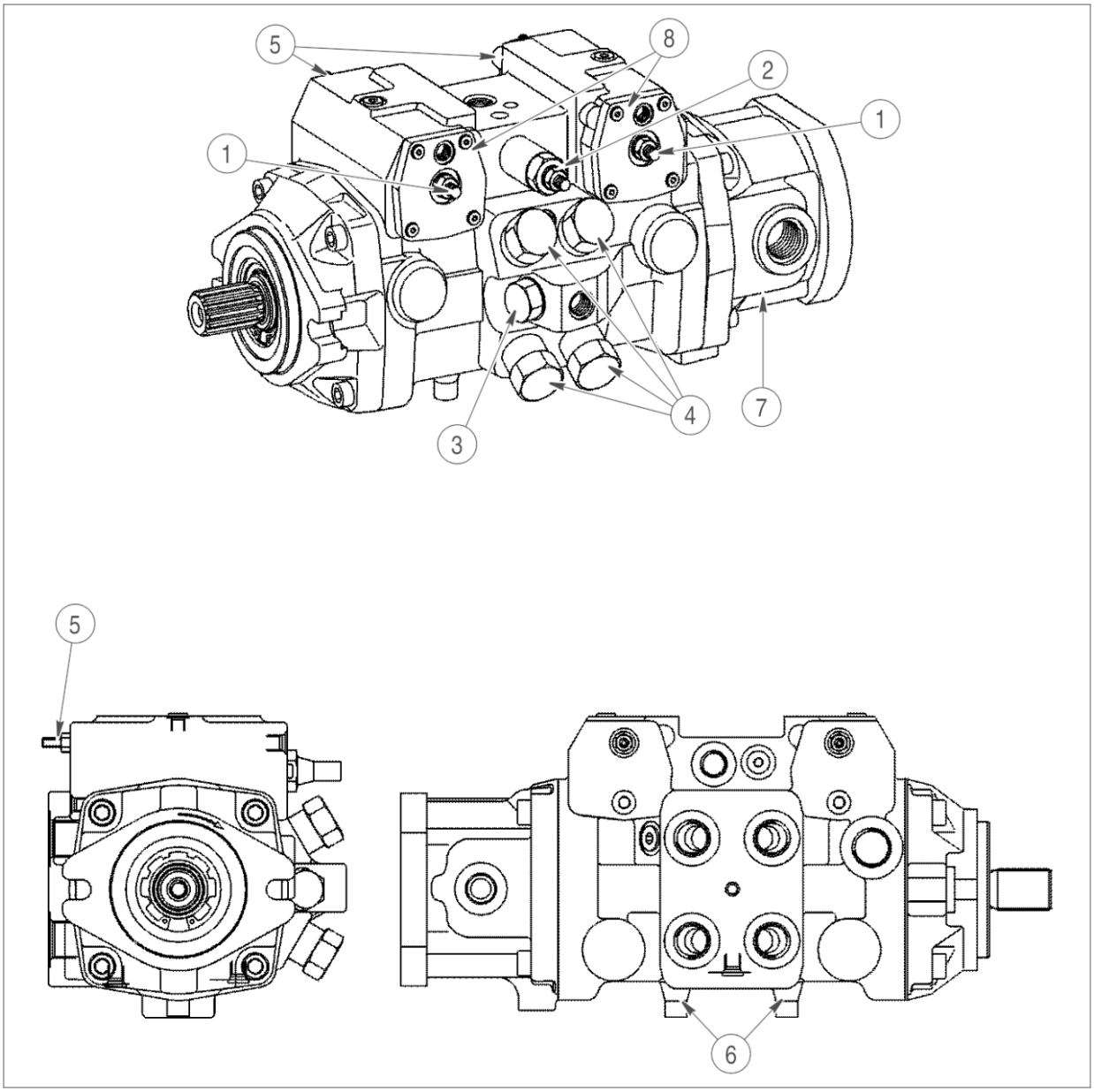
3. Fill reservoir with recommended clean hydraulic oil. Refer to the following: **Reservoir - Filling (A.10.A)**
4. Install a 40 bar (600 PSI) pressure gauge with a dampener valve in the charge pressure test port.
5. Disconnect the wire from the shutoff solenoid on the injection pump.
6. Center the control lever on the pump to insure the pump is in neutral.

IMPORTANT: *Raise the machine up on supports until the tires are up off of the floor. This will allow the ground drive to be operated to get the air out of the system. Clear the area of all unauthorized personnel and operate the starter from the operator's seat.*

NOTE: *Cranking the engine will get hydraulic oil into the circuit without harming the components.*

7. Crank the engine until pressure starts to build on the gauge.
8. Connect the wire for the fuel injection pump.
9. Start the engine and run at low idle until the 40 bar (600 PSI) pressure gauge rises and stabilizes above the minimum pressure specified in the charge pressure test.
10. After proper charge pressure has been reached, increase engine to full throttle and operate system to its fullest travel in all directions. If charge pressure remains stable, the system is satisfactory.
11. Stop the engine. Remove the pressure gauge and reinstall the plug. Check all fittings for leaks.
12. Check oil level in the reservoir. Refer to the following: **Reservoir - Filling (A.10.A)** Add hydraulic oil as required.

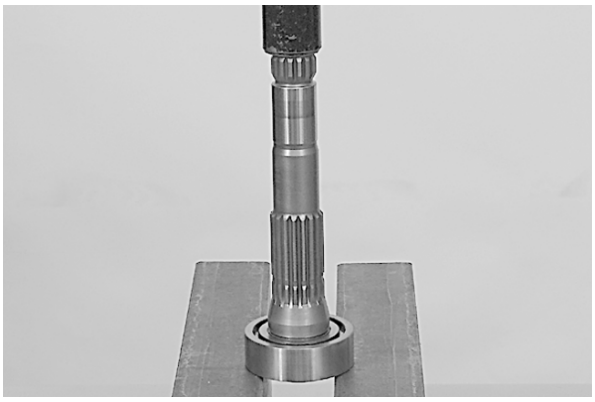
Pump Left hand pump - Disassemble (Machines Equipped With Pilot Controls)



BS06J363_1 1

A20 and A22 Variable Axial Piston Pump	
1. Centering Adjustment	5. Mechanical Stroke Limiter
2. Control Cartridge	6. Timing Adjustment Screw
3. Low Pressure Valve	7. Inner Gear Pump
4. High Pressure Valve	8. Hydraulic Control

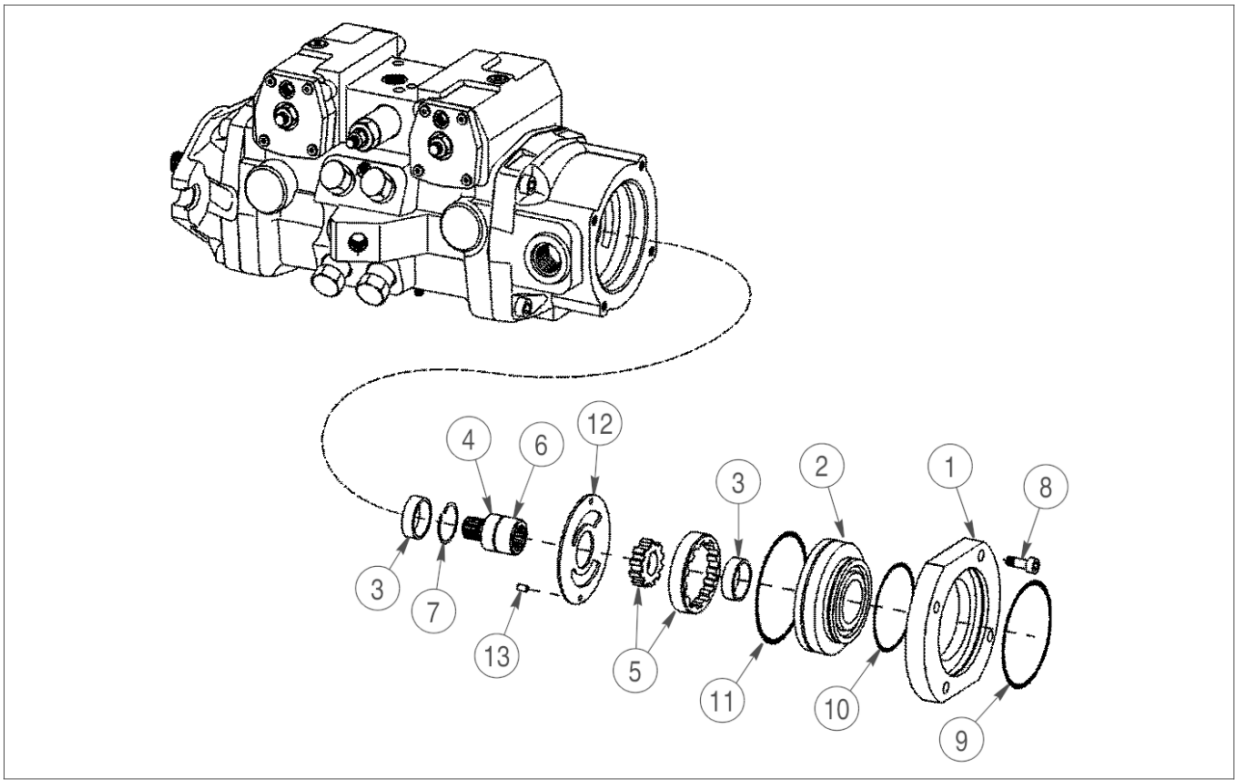
41. Use acceptable tools and remove the drive shaft from the bearing.



BD06J096 40

42. Remove the spacer from the drive shaft.

BD06J098 41



BS06J364_1 42

Internal Gear Pump		
1. Intermediate Flange	6. Shaft Key (Not Shown)	10. O-Ring
2. IZP Housing	7. Snap Ring	11. O-Ring

Pump Left hand pump - Assemble (Machines Equipped With Pilot Controls)

Pump Housing Bearing

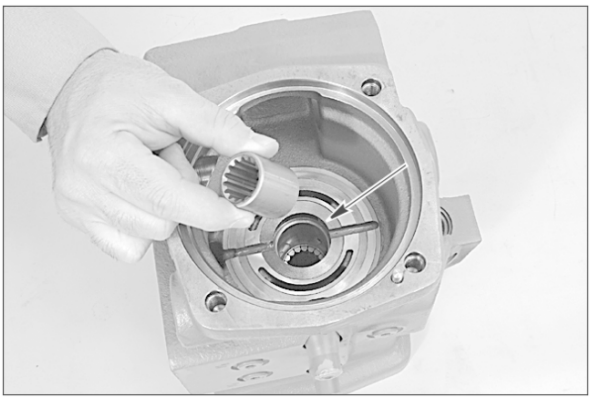
1. Use acceptable tools and install the bearing into the pump housing.

NOTE: *Bearing installation is the same for both pumps.*

BD06J125 1

2. Insert the drive coupling from the other side.

NOTE: *Make sure the drive coupling is installed in the pump housing prior to installing both pump house bearings.*

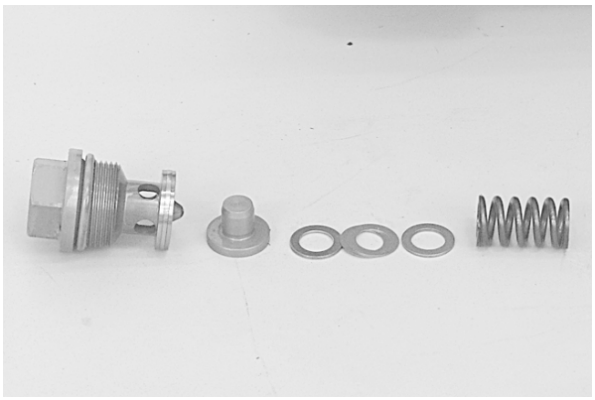


BD06J049_1 2

3. If the other pump bearing was removed, install it at this time.

Low (Boost) Pressure Relief Valve

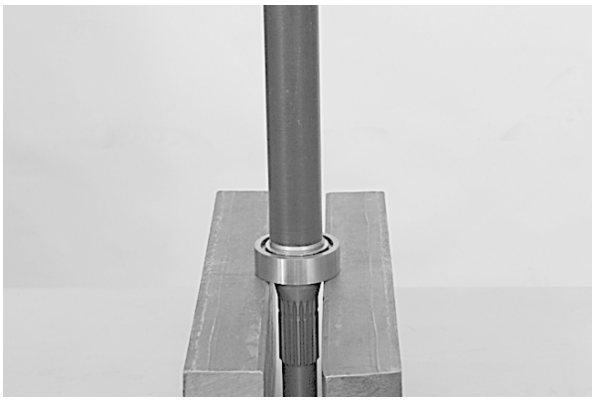
4. See Low (Boost) Pressure Relief Valve photo.



BD06J024 3

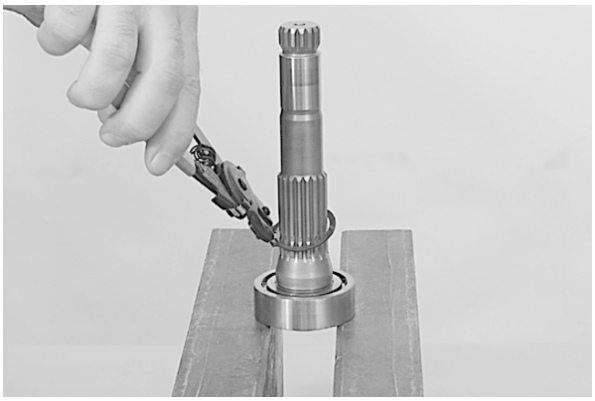
Low (Boost) Pressure Relief Valve

39. Use acceptable tools and install the bearing on the drive shaft.



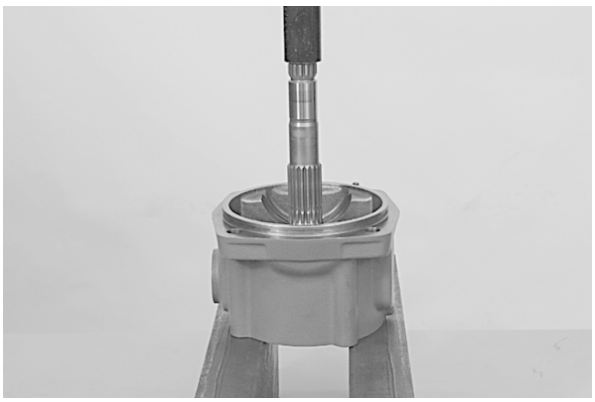
BD06J097 36

40. Use acceptable tools and install the retaining ring on the drive shaft.



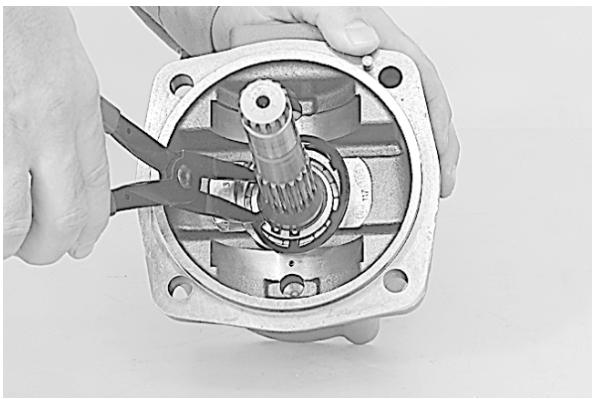
BD06J095 37

41. Use acceptable tools and install the bearing and the drive shaft assembly into the rotary group housing.



BD06J094 38

42. Use acceptable tools and install the snap-ring into the rotary housing.

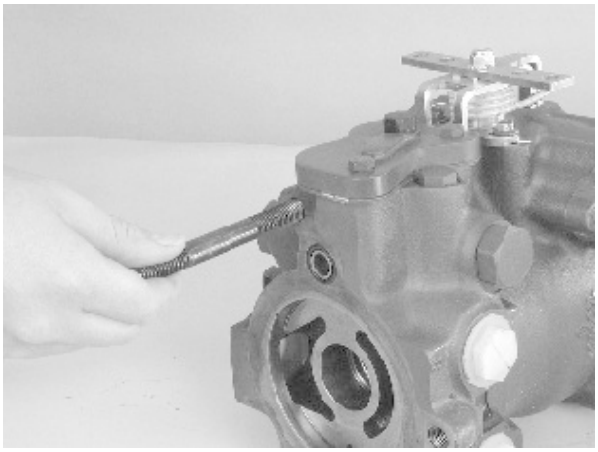


BD06J091 39

4. Remove the outer gear from the charge pump cover.

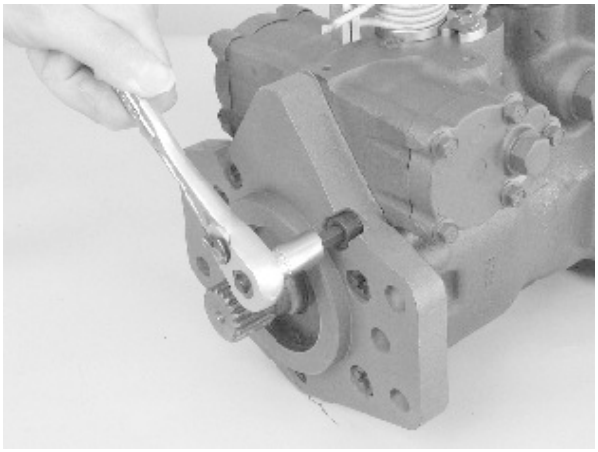
BD01H189 4

5. Remove the bolt stud.



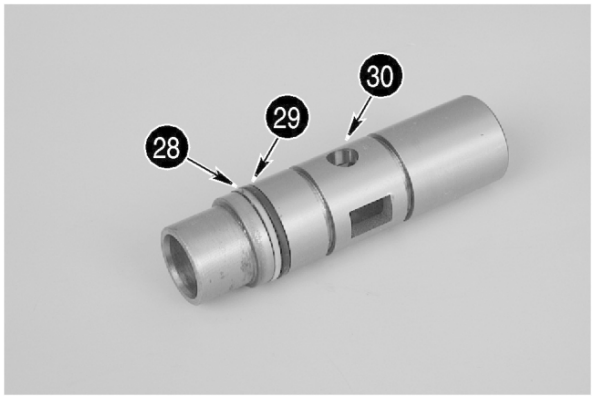
BD01H192 5

6. Remove the special bolts from the cover.



BD01H190 6

39. Remove and discard the backup ring **(28)** and the O-ring **(29)** from the sleeve **(30)**.

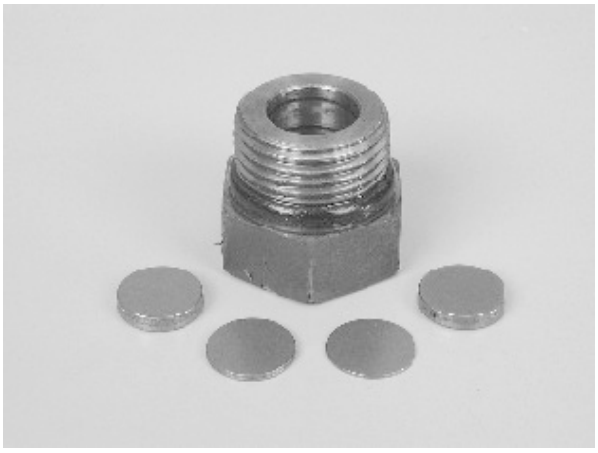


BD01H214 38

40. Remove the hex plug and shims for the charge pressure relief valve.

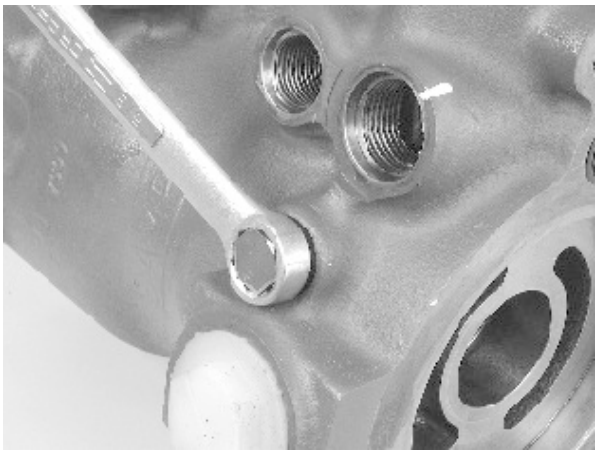
BD01H215 39

41. Remove the shims from the hex plug. Save the shims for later use.



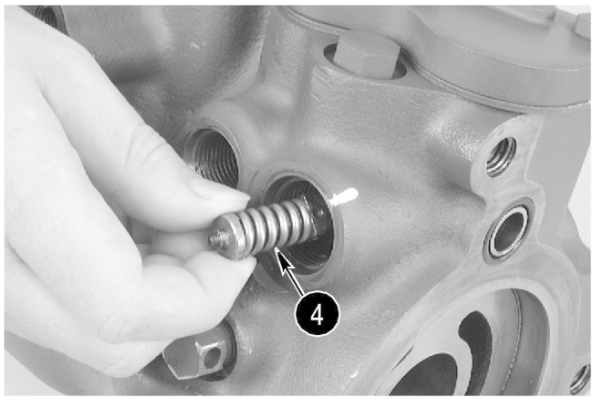
BD01H227 40

4. Tighten the bypass valve to a torque of **9 - 13 Nm (84 - 120 lb in)**



BD01H222 4

5. Thread the circuit relief-check valve **(4)** into the housing.

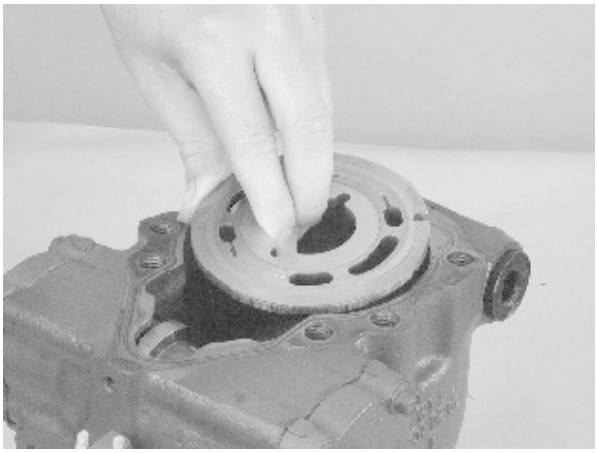


B9109025_2 5

6. Insert the spring on top of the circuit relief-check valve.

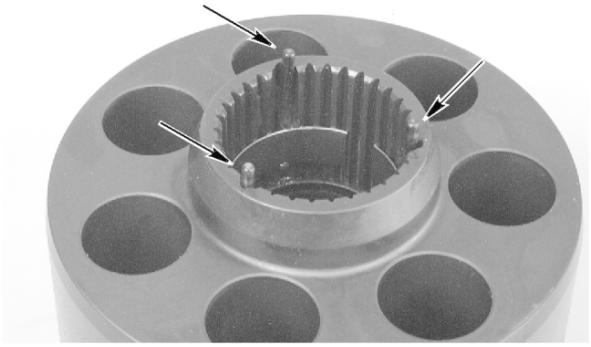
BD01H220 6

39. Lubricate the wear plate with clean oil. Align the notch on the wear plate with the roll pin that is located inside the cylinder port. Insert the wear plate with the bronze surface side up, into the cylinder port.



BD01H197 39

40. Ensure that the three pins are still inserted in the cylinder block.



BD01H198 40

41. Hook the retaining collar and slide it up the splines until it reaches the top.

BD01H247 41

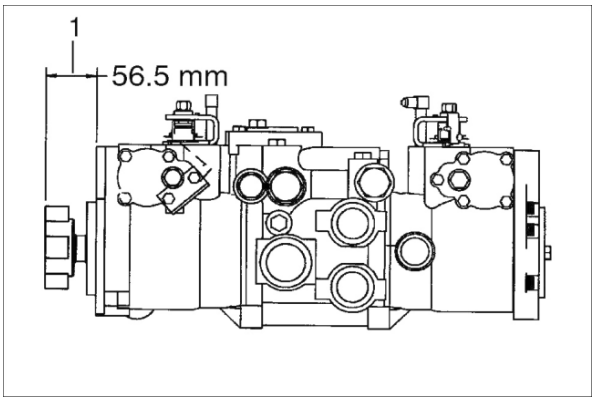
Pump Right hand pump - Measure

1. Measuring the right hand pump is the same as measuring the left hand pump. Refer to the following procedure: **Pump Left hand pump - Measure (C.20.F)**

Pump - Install (Machines Equipped With Tandem Hydrostatic Pump)

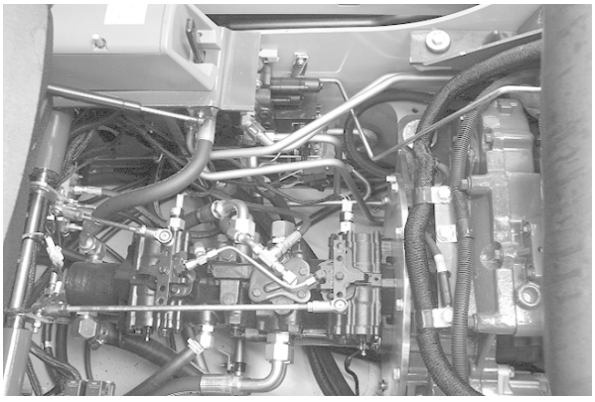
1. If the pump drive coupler hub was removed from the tandem pump input shaft, install the pump drive coupler hub onto the tandem pump input shaft.

   (1) Dimension from pump flange to outer hub face.



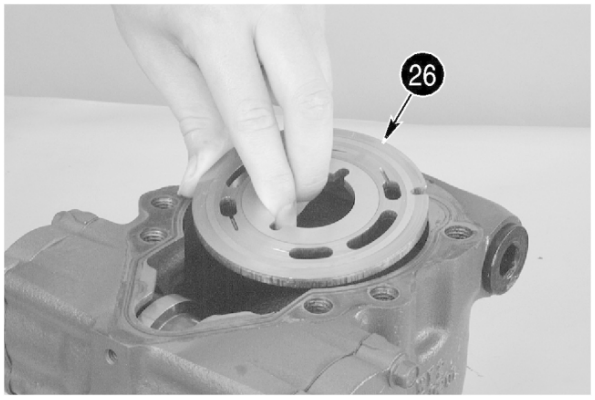
BS04E024 1

2. The outer face of the pump drive coupler hub should extend **56.5 mm** (**2.23 in**) from pump mounting flange as shown in Figure 1. Tighten the pump drive coupler hub set screws **50 - 54 Nm** (**37 - 40 lb ft**).
3. Connect acceptable lifting equipment to the tandem pump.
4. Use the lifting equipment to move the tandem pump into the mounting location.
5. Move the tandem pump towards the engine. Engage the splines of the pump drive coupler hub with the splines in the pump drive flange.
6. Apply Loctite 243 to all of the pump and support mounting bolts except for the 2 bottom support mounting bolts.
7. Install the 4 tandem pump mounting bolts and washers into the tandem pump mounting flange and the 4 mounting bolts and washers in the pump support bracket.



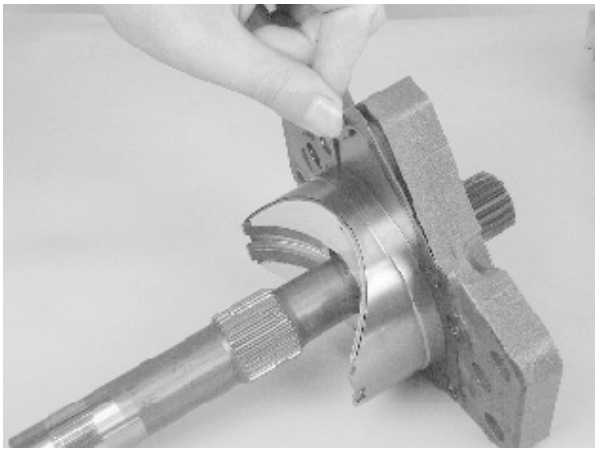
bd06f218 2

13. Remove the wear plate **(26)**.



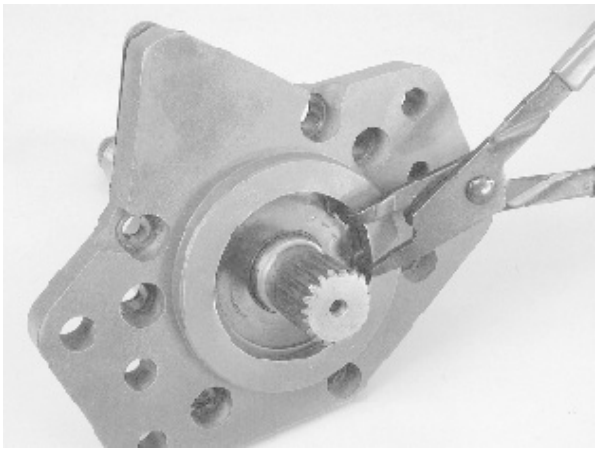
BD01H197_2 13

14. Remove the gasket.



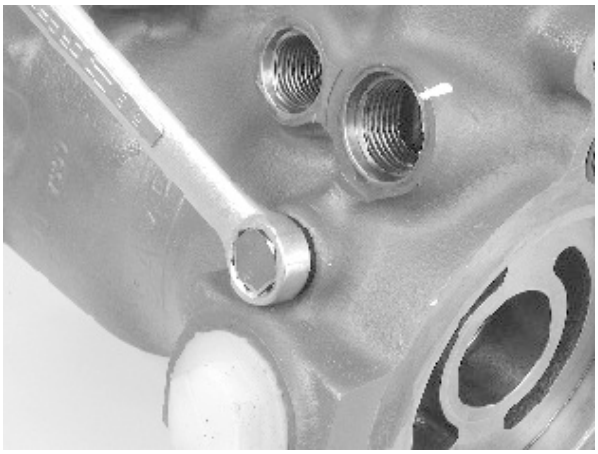
BD01H199 14

15. Remove the snap ring from the seal.



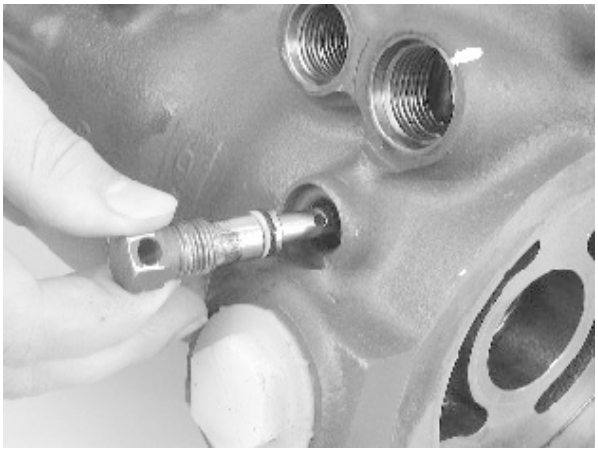
BD01H200 15

48. Loosen the bypass valve.



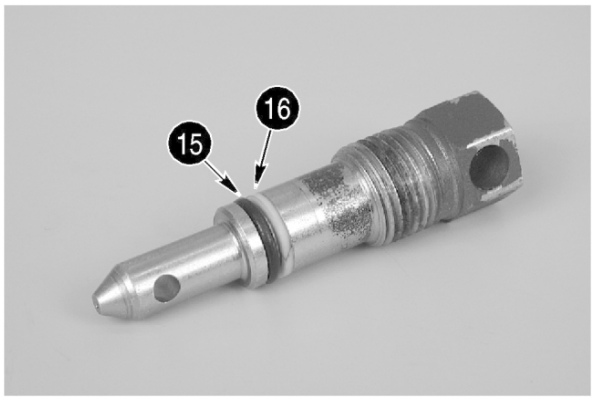
BD01H222 47

49. Thread the bypass valve counterclockwise until it is removed.



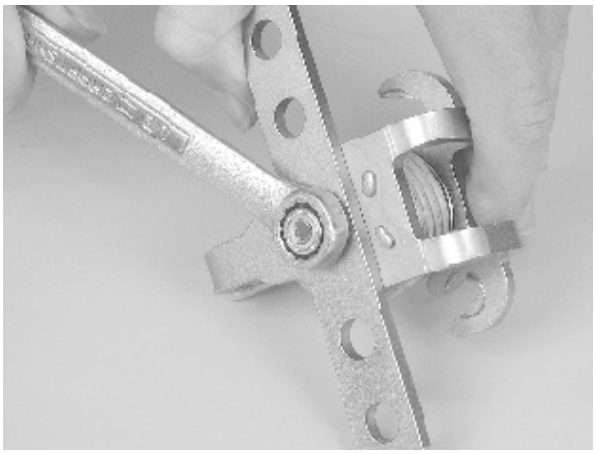
BD01H223 48

50. Remove and discard the O-ring **(15)** and backup ring **(16)**.



BD01H228 49

14. Slide the washer and nut onto the protruding threads of the spool. Hold the spool assembly in place. Tighten the nut, but do not overtighten.

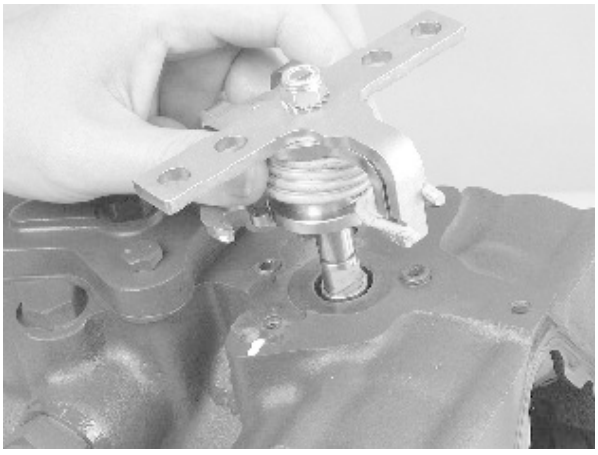


BD01H210 14

15. Lubricate the sleeve. Insert the sleeve into the housing. Ensure that the notch on the end of the sleeve is properly aligned with the notch inside housing.

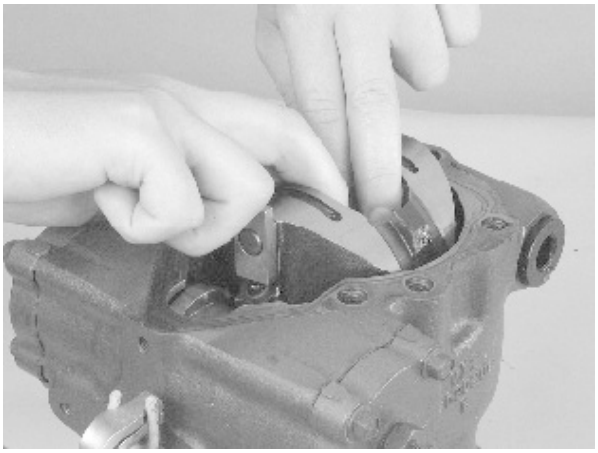
BD01H209 15

16. Lubricate the spool. Insert the spool inside the sleeve.



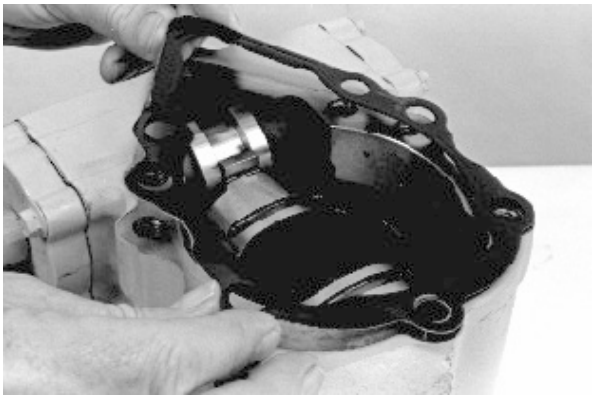
BD01H208 16

48. Install the swash plate. The pin must engage the slot in the body of the control valve. The retainer must engage the groove in the piston.



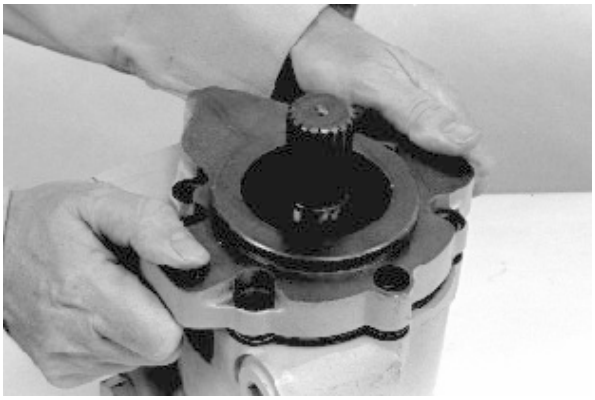
BD01H193 48

49. Place a new gasket on the outside rim.



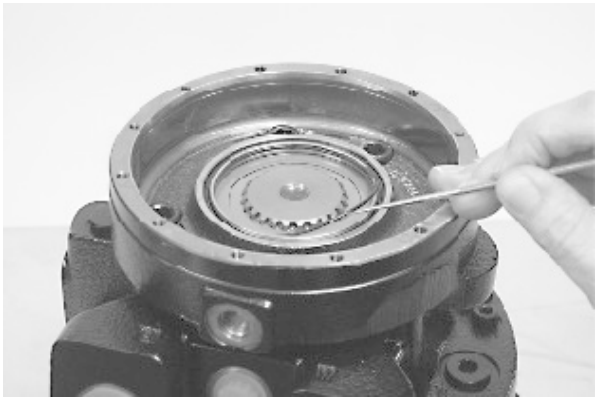
B9109117 49

50. Carefully place the cover and the shaft assembly onto the gasket. Rotate the shaft to align the support with the cylinder block.



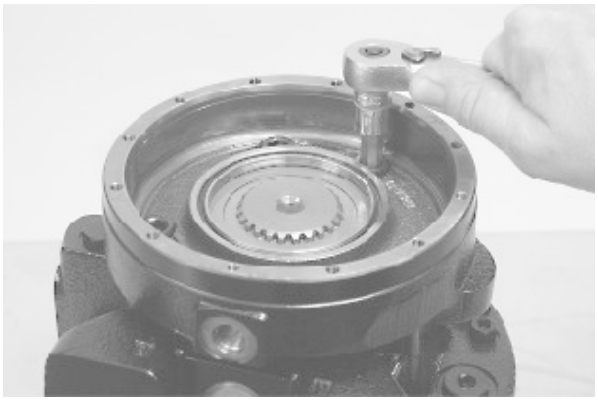
B9109118 50

8. Remove the O-ring.



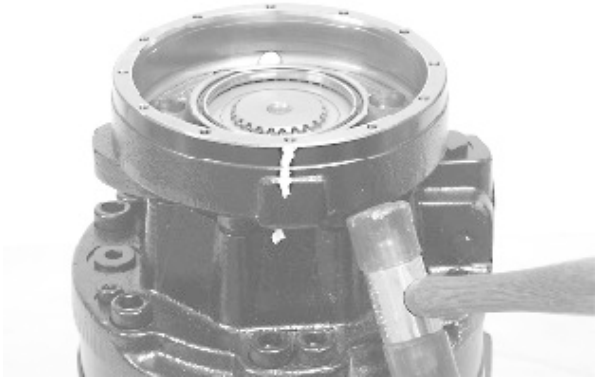
bd04e010 8

9. Loosen and remove the socket head cap screws and washers from the brake housing.



bd04e011 9

10. Use a soft hammer to loosen the brake housing.



bd04e014 10

11. Remove the brake housing from the motor case.

bd04e015 11

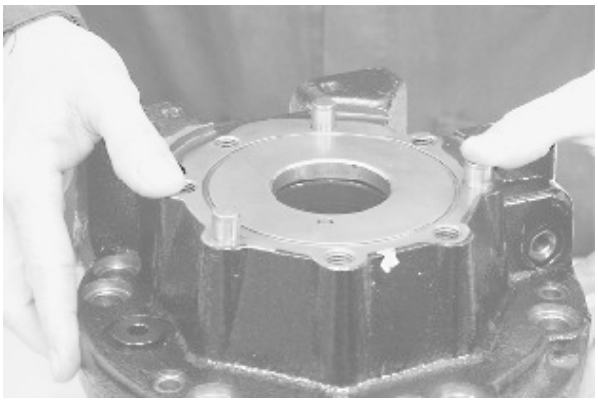
52. Remove the rear motor case.

bd04e053 52

53. Remove the seal from the rear case.

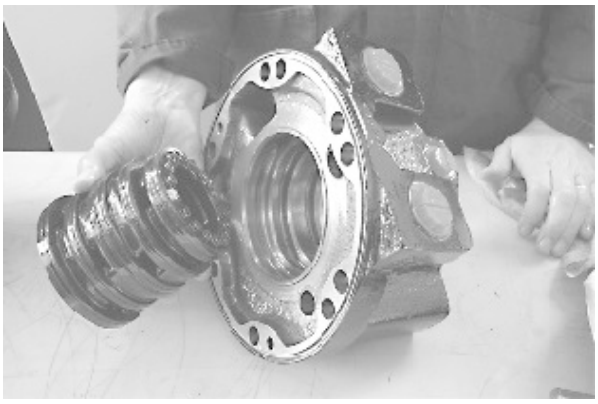
bd04e030 53

54. Drop the rear case assembly from approximately 80mm onto a wooden or plastic surface. This will release the distributor from the rear case.



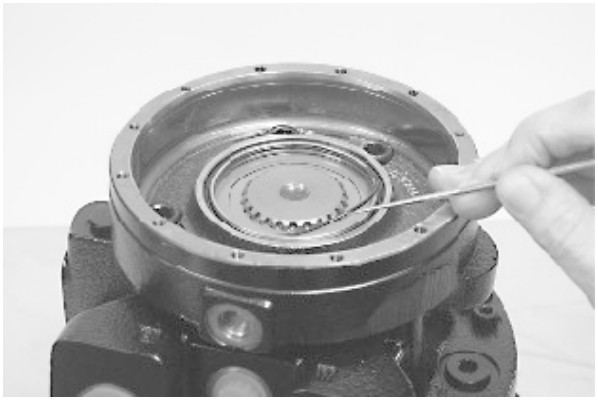
bd04e042 54

55. Remove the distributor from the rear case. Make a record of the number of springs and the stop pin location in the distributor for use during the assembly procedure.



bd04e055 55

33. Lubricate the seal with clean hydraulic oil. Install the seal in the brake housing.



bd04e010 26

34. Lubricate the seals on the piston with clean hydraulic oil and install the piston into the brake housing.

bd04e009 27

35. Install the disc spring on top of the piston.

bd04e006 28

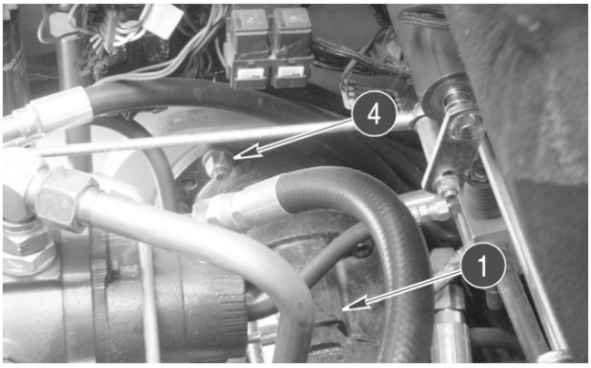
36. Install the gasket on the brake housing.

bd04e005 29

Motor - Install

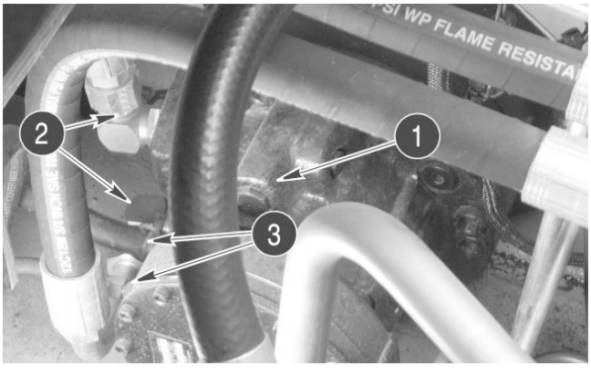
450, 465

1. Use acceptable lifting equipment and move the drive motor/brake assembly into the chassis mounting location.
2. Install the drive motor/brake assembly **(1)** mounting bolts **(4)** into the drive motor/brake assembly mounting flange. Tighten the mounting bolts using the torque turn method to a torque of **122 - Nm (90 - Foot pounds) plus 60 degrees.**



bd04m049_1 1

3. Start the vacuum pump. **Reservoir - Apply vacuum (A.10.A)**
4. Remove the caps from the fitting and plugs from the hoses.
5. Connect the hydraulic connections **(2 and 3)** to the proper locations on the drive motor/brake assembly **(1)**. Tighten the connections.

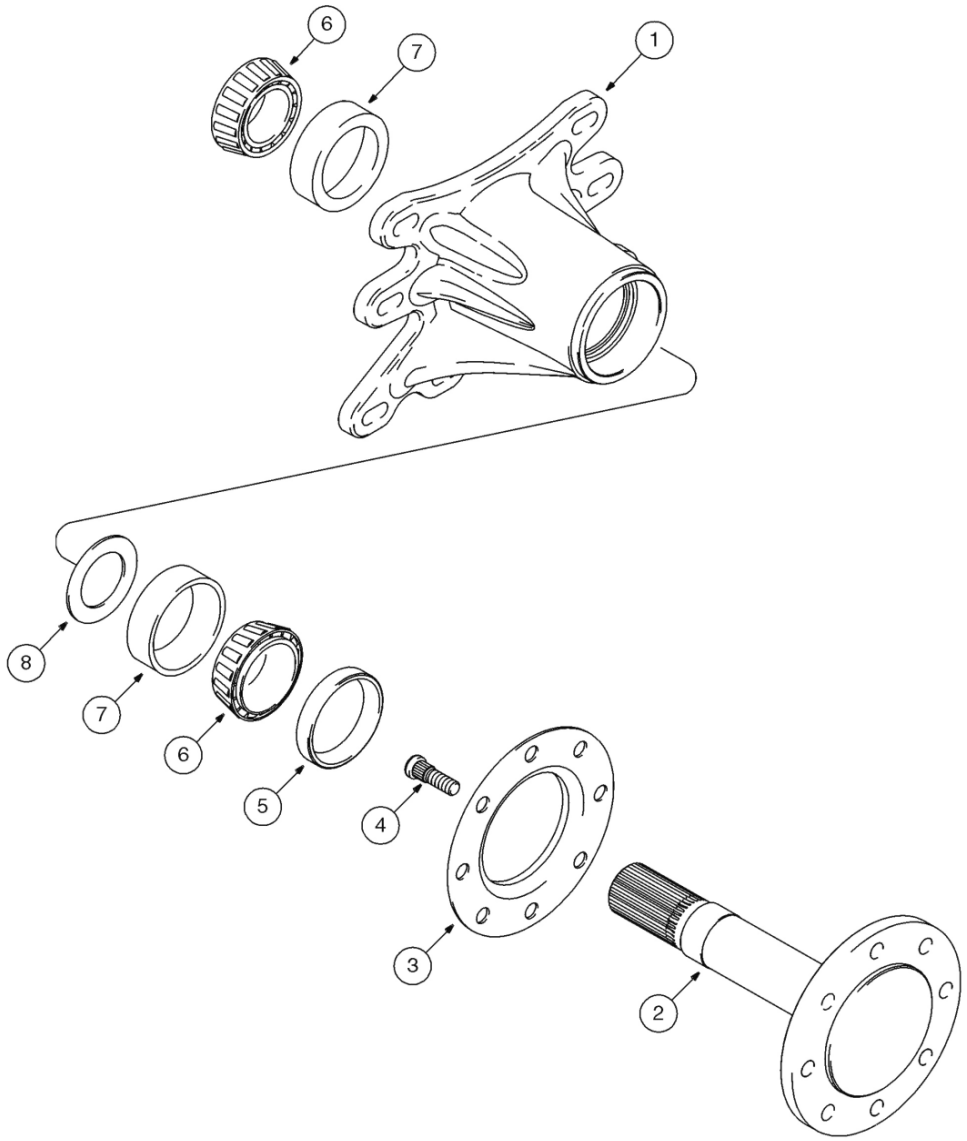


bd04m048_1 2

6. Stop the vacuum pump. Remove the vacuum pump from the reservoir. Install the filler cap on the reservoir.
7. Refer to the following procedure for installation of the drive chains onto the drive sprockets. **Axle - Install (D.10.A) REAR AXLE - Install (D.12.A)**
8. If the hydrostatic pumps were removed, refer to the following procedure for installation of the hydrostatic pumps: **Pump Left hand pump - Install (C.20.F) Pump Right hand pump - Install (C.20.F)**
9. Start and run the engine at low idle for 2 to 5 minutes and check for any leaks.
10. Stop the engine.
11. Check the oil level in the hydraulic reservoir and add hydraulic oil as required. **Reservoir - Filling (A.10.A)**

Contents

TRAVELLING - D



BC00G044 12

1. Axle housing	5. Seal
2. Axle shaft	6. Bearing
3. Seal guard	7. Bearing cup
4. Stud	8. Plastic grease disc

REAR AXLE - Remove

450, 465

1. Removal of the rear axle is the same as the front axle.
   Please refer to **FRONT AXLE - Remove (D.10.A)**.

Exploded View of Solenoid Valve		
1. Body	4. Coil	7. 0-Ring
2. Nut	5. Plate	8. Backup Ring
3. Cover	6. Solenoid	

Electrical control Solenoid - Testing

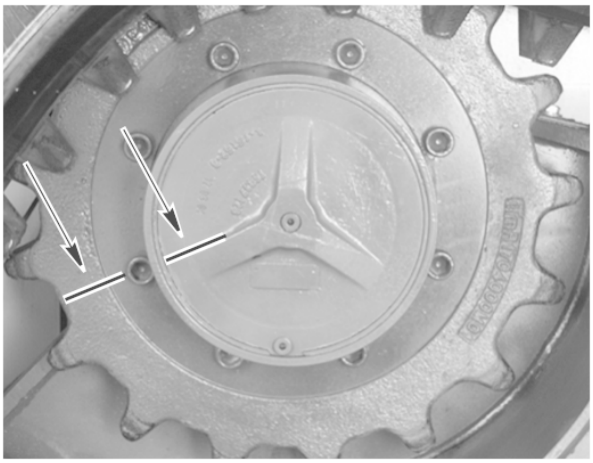
NOTE: *For wiring diagram refer to* ***Wiring harness - Electrical schematic frame 05 (A.30.A)***

N°	Test Point	Expected Result	Other Result (Possible Cause)
1	Disconnect the connector from the hydraulic brake solenoid. Have another person sit in the operators seat and pull the seat bar down to the operating position. Turn the key switch to the ON position. Instrument cluster pin 8 or terminal for wire 258A (T) to ground.	Approximately 0 volts	Bad instrument cluster output.
2	Terminal for wire 178S (B) at the brake solenoid to ground.	Continuity	Bad solenoid ground.
3	Push and release the Park brake button on the instrument cluster. Instrument cluster pin 8 or terminal for wire 258A (T) to ground.	Approximately 12 volts	Bad instrument cluster output.
4	Reconnect the connector to the hydraulic brake solenoid. Terminal for wire 258B (T) at the brake solenoid to ground.	Approximately 12 volts	Check the circuit for wire 258B (T) to the instrument cluster.

Drive sprocket - Remove

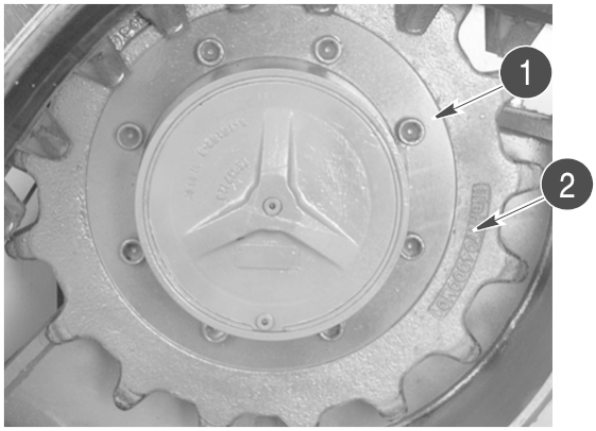
450CT

1. Prior operation: Refer to **Rubber track - Tension adjust (D.50.B)** and completely loosen the tension on the track.
   Make reference marks on the cover and the drive sprocket to be used for alignment and the bolt torque procedure during installation.



bd05c020_2 1

2. Loosen and remove the socket head cap screws **(1)** from the drive sprocket **(2)**. Use acceptable lifting equipment and lift the track above the drive sprocket to allow the guide teeth to disengage from the drive sprocket. Slide the drive sprocket off of the hub and remove the drive sprocket.



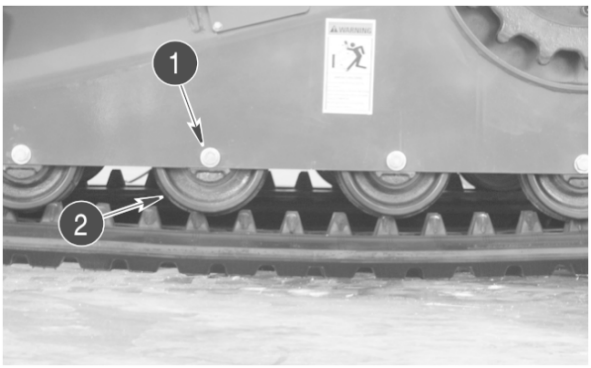
bd05c020_3 2

Roller - Install

450CT

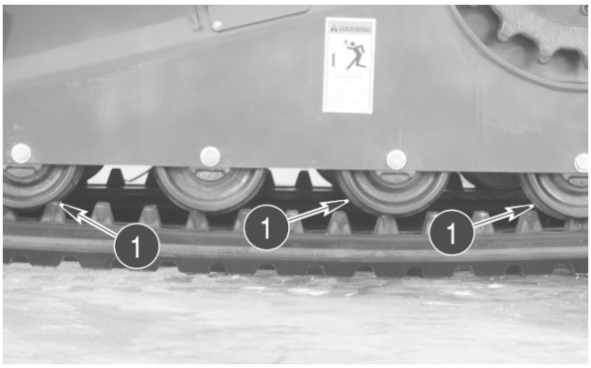
NOTE: *Photos are for reference only. Photo shows track installed on the machine.*

1. Install the roller **(2)** into the mounting location in the track frame. Install the cap screw **(1)** and washer into the track frame and through the roller pilot hole. Tighten the mounting bolt **(1)** to a torque of **336 - 371 Nm**. **(248 - 274 lb ft)**



bd05c021_1 1

2. Install the remaining rollers in the track frame mounting locations. Install the cap screw and washer into the track frame and through the roller pilot hole. Tighten the mounting bolt to a torque of **336 - 371 Nm**. **(248 - 274 lb ft)**



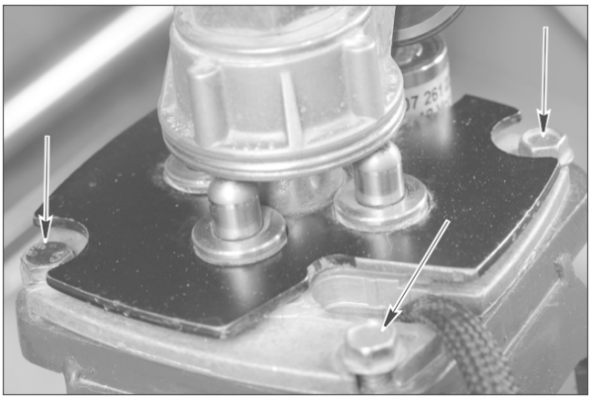
bd05c021_2 2

Next operation:
Refer to **Rubber track - Install (D.50.B)** and install the track.
After the track has been installed, follow the procedure **Rubber track - Tension adjust (D.50.B)** and adjust the tension of the track.

6. Refer to: **Final drive - General specification (D.15.A)** and **Final drive - Capacity (D.15.A)** for the correct type and quantity of synthetic gear oil.

Command - Install Left Control Valve (Machines Equipped with ISO and H-Pattern Pilot Controls)

1. Install pilot controller into the mount. Install and tighten the bolts to secure the pilot controller to the mount.



BD06N010_1 1

2. Start the vacuum pump.
3. Remove caps and plugs from all fittings. Install the hoses in the correct locations on the controller and tighten all hoses.

BD06N005 2

4. Stop the vacuum pump.
5. Disconnect the vacuum pump from the hydraulic reservoir.
6. Connect the magnetic detent electrical harness connector.

BD06N005_1 3

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SERVICE - Technical Publications & Tools

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3. Grid heat output – applies power to the grid heater relay for an interval of time determined by the temperature of the engine coolant each time the ignition key is turned from off to on.
4. Hydraulic auxiliary override – enables a continuous hydraulic flow to attachments when an operator leaves the seat to operate an attachment. If not pushed, provides a safety interlock during operator entry/exit of the loader.
Additionally, a four push-button operator selector area located on the EIC provides the following functions during normal operation: (6) work lights (ON/OFF) (8) road lights (ON/OFF) (9) parking brake (SET/RELEASE) and (7) auxiliary hydraulic interlock override.
Push Button Functional Description:
Work lights and road lights – toggles the state of the lights indicated by an associated LED. Only works when the ignition key is ON.
Parking brake – for machines with hydraulically actuated brake, this button toggles the state of the parking brake. A back lighted symbol displays the state of the brake. At power up, loader motion, hydraulic flow to attachments and movement of the boom and bucket are inhibited until this button is pushed. At power up only, a flashing LED near this push button prompts the operator to release the brake to begin operation. Only works when the ignition key is ON.
Auxiliary hydraulic override – if pressed, the light next to the switch will turn on for thirty seconds. Within that period of time, an operator may leave the seat without interruption to attachment hydraulic flow. This feature is turned off or reset while the operator is in the seat and (1) the operator again pushes the button during the thirty seconds (2) automatically after thirty seconds or (3) leaves to operate the attachment and then sits back down in the seat at some later time. When the operator returns to the seat after using an implement for an extended period of time, the brake button must be pushed again to enable the loader hydraulic system and turn off the brake. The override feature is primarily used to support attachments such as a backhoe or other out-of-cab operated implements.
Restraint System:
The EIC contains logic to ensure operator safety. The EIC continually monitors the seat switch, seat restraint bar switch. If, during operation, any of these restraint devices indicates to the EIC that the operator has left the seat or is about to leave the seat, the EIC will inhibit hydraulic flow to the boom and bucket and will set the brake. Additionally, if the operator has not pressed the auxiliary hydraulic override push button, flow will be halted to attachments via hydraulic solenoid interlock or automatic engine shut down provided that the auxiliary control is displaced from neutral. To prevent annoying attachment flow interruption and hydraulic brake activation due to operator-induced seat switch bounce, the EIC implements a short seat switch time delay prior to halting auxiliary flow.
The EIC will power up when an operator sits in the seat. This enables viewing of fuel level and engine hours without use of the ignition key. If the operator is in the seat for more than thirty seconds and the ignition key is not turned on, the EIC will turn itself off.
EIC Special Functions (Setup Menu):
Special machine setup features are available via the operator push button selector area. The EIC will display the word “SETUP” as a first menu item visual “anchor” message. The choices available are
(1) Select engine type (for correct cold engine preheat profile).
(2) Select brake type: hydraulic or no brake.
(3) Display EIC software revision level.
(5) Modify engine hours (coded entry required).
Push Button Definitions:

Any button: Any button may be depressed and held for six seconds to enter the setup mode. The seat must be unoccupied and the ignition key off during this time, but the operator may sit in the seat after the setup mode is entered.
Parking brake: Provides for editing the values that a setup menu item (engine type, brake type, engine hours) can have. When a value has been changed, this button is also used to save the value in memory. Verification of the saved value is automatic. The display will blank and go dark. Then, after a short delay time, the value will be retrieved from memory and shown again in the display. After this visual verification, the word “SETUP” will again appear in the display.
Road light: Used to view in succession all of the values that an item can have. When changing engine hours, this button increments a flashing digit value in a circular manner from 0 – 9.
Work light: Used to navigate to the next menu item. When changing engine hours, this button causes the flashing emphasis to move to the next digit to the right.
Auxiliary override: This button functions as an unconditional setup exit without save from any location in the menu. When this button is pushed, the EIC will turn off. If the operator is in the seat, the EIC will immediately power up normally. None of any changed information will be saved unless that information was first saved using the parking brake button and then verified.
To exit the Setup Menu: (1) Leave the loader. After three seconds the EIC will automatically power down, (2) place the ignition key in either the ACC or the ON position or (3) push and release the auxiliary override button.
Special feature choices (1) display/select engine type, (2) display/change brake type and (3) display/change engine hours are the only values that may be modified.

Suspension Seat Mounting (If Equipped)	
3. Plate	10. Flange nut
4. Pad	11. Retainer
5. Strut	12. Ball stud
6. Cap screw	13. Cap
7. Screw	14. Filling strip

Instrument panel - Remove

1. Disconnect the battery.
2. Loosen and remove the screws that fasten the instrument panel to the console.
3. Pull the instrument panel out of the console far enough to disconnect the electrical connector from the rear of the instrument panel.
4. Disconnect the electrical connector from the socket on the rear of the instrument panel and remove the instrument panel from the console.

ROPS - Remove

1. If the machine has been rolled over or the ROPS canopy has been damaged (such as hitting an overhead object during transport), the ROPS canopy shall be replaced in order to maintain maximum protection.
2. After an accident, check for damage to the ROPS canopy, the operators seat, the seat belt, all accessories, and wiring in the ROPS canopy. Before operating the machine again, all damaged parts must be replaced.

NOTE: *Do not weld or try to straighten a ROPS canopy.*

⚠ WARNING ⚠

Improper ROPS inspection or maintenance can cause injury or death. Do the recommended ROPS inspection shown in this manual. If you must replace the ROPS, ROPS parts, or ROPS mounting hardware, use only the replacement parts shown in the parts catalog for this machine. SA029

⚠ WARNING ⚠

Do not modify ROPS in any manner. Unauthorized modifications such as welding, drilling, cutting or adding attachments can weaken the structure and reduce your protection. Replace ROPS if subjected to roll-over or damage. Do not attempt to repair. SB026

⚠ WARNING ⚠

If you operate this machine without a ROPS and the machine rolls over, you can be injured or killed. Remove the ROPS only for service or replacement. Do not operate this machine with the ROPS removed. SA027

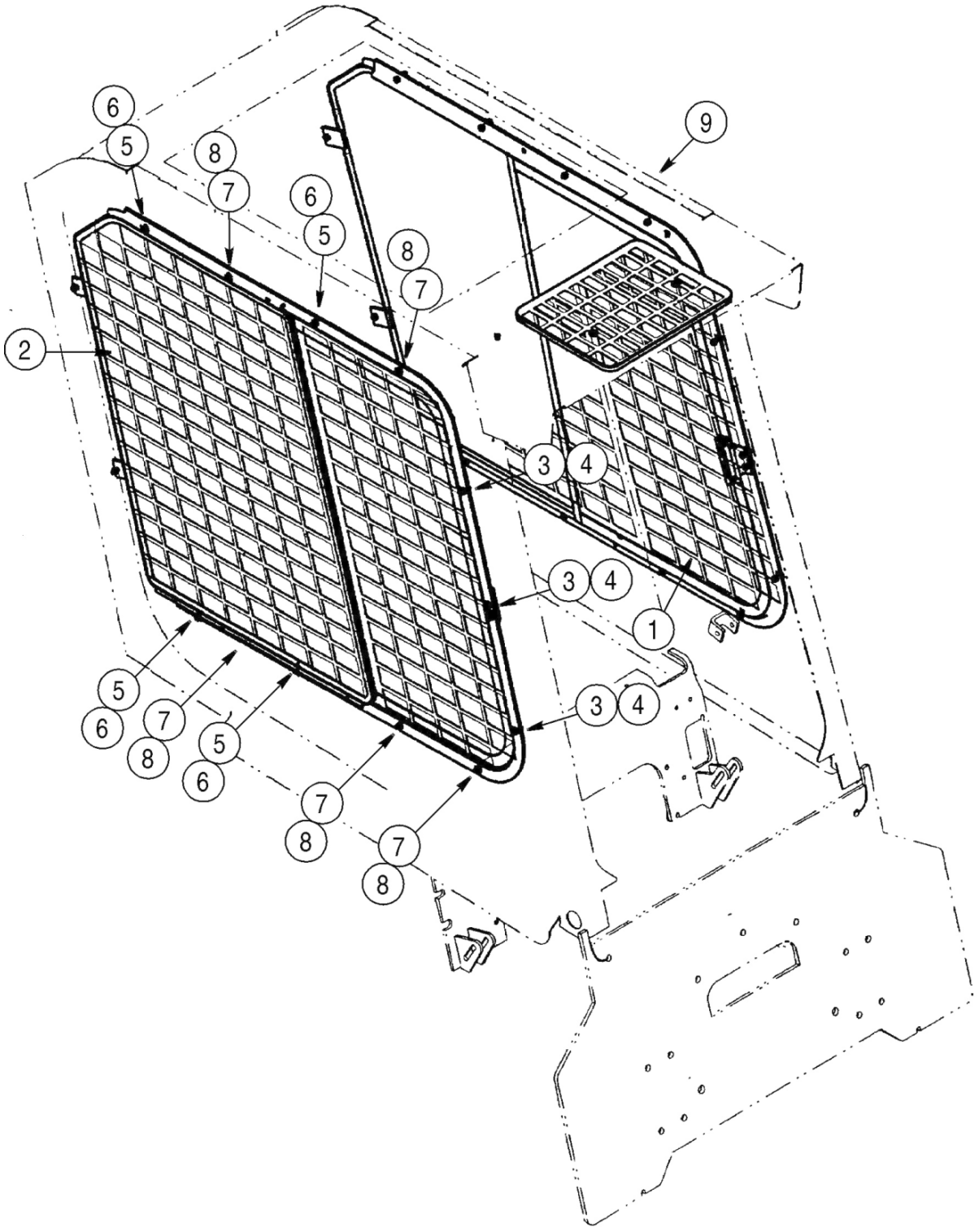
⚠ WARNING ⚠

Adding additional weight (attachments, etc). to the machine can cause injury or death. Do not exceed the gross weight printed on the ROPS label. SA028

⚠ WARNING ⚠

Securely fasten your seat belt. Your machine is equipped with a ROPS cab, ROPS canopy or ROPS frame for your protection. The seat belt can help insure your safety if it is used and maintained. Never wear a seat belt loosely or with slack in the belt system. Never wear the belt in a twisted condition or pinched between the seat structural members. M437

3. After the first 20 hours of operation and after every 500 hours of operation, do the following:



BS03D034 2

ROPS Canopy (Equipped With Sliding Side Windows)	
1. LH window	6. Jam nut
2. RH window	7. Bolt
3. Bolt	8. Jam nut
4. Jam nut	9. ROPS frame
5. Bolt	

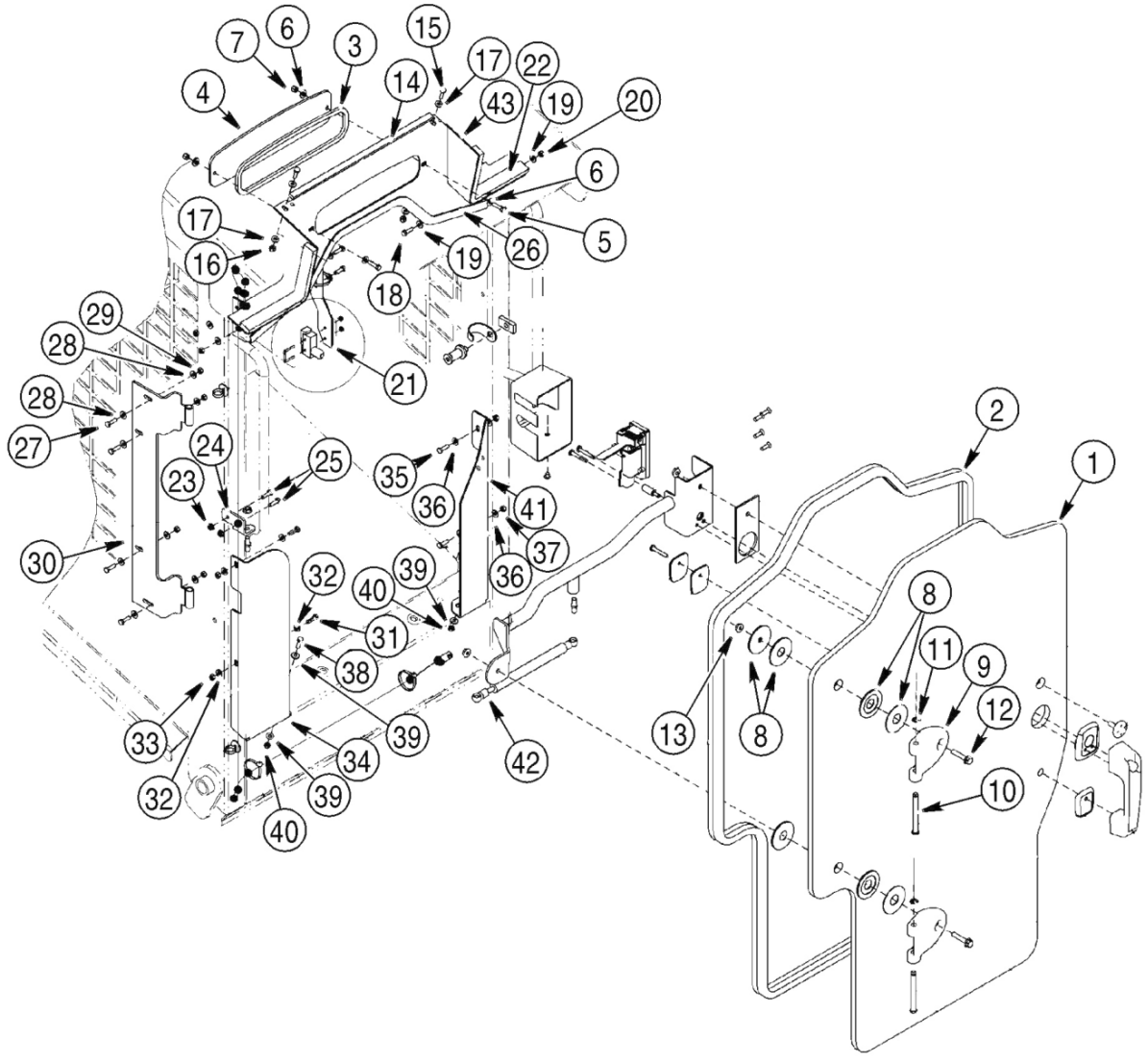
ROPS Canopy - Top and Side Windows (If Equipped)	
1. Top window	5. Locknut
2. Seal	6. Frame
3. Bolt	7. Washer
4. Cap	

20. INSTALLATION OF THE DOOR FRAME WINDOW.

NOTE: *Refer to the following illustration.*

21. Put the seal **(3)** and window **(4)** in place on the bracket **(43)**.

22. Install the bolts **(5)**, washers **(6)**, and lock nuts **(8)**.

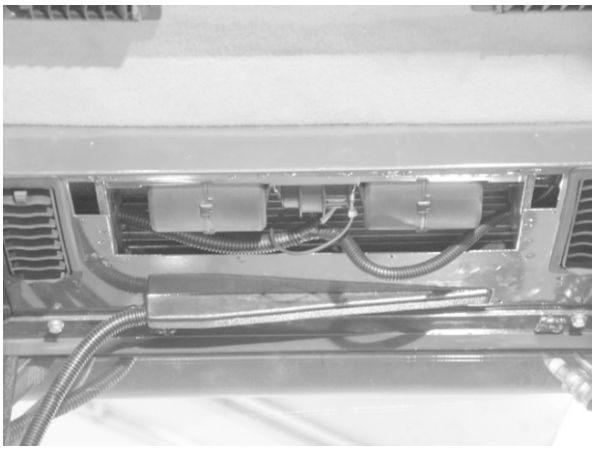


BS01H288 4

ROPS Canopy - Front Door Mounting and Frame				
1. Front door	10. PIN	19. Washer	28. Washer	37. Lock nut
2. Seal	11. Retaining ring	20. Lock nut	29. Locknut	38. Bracket
3. Seal	12. Flange bolt	21. Bracket	30. Bracket	39. Washer
4. Window	13. Flange nut	22. Seal	31. Bolt	40. Lock nut
5. Bolt	14. Seal	23. Flange nut	32. Washer	41. Bracket
6. Washer	15. Bolt	24. Bracket	33. Lock nut	42. Gas strut cylinder

Ventilation system - Remove

1. BLOWER MOTOR ASSEMBLY
   Loosen and remove the screws which fasten the cover on the bottom of the HVAC unit. Remove the cover.

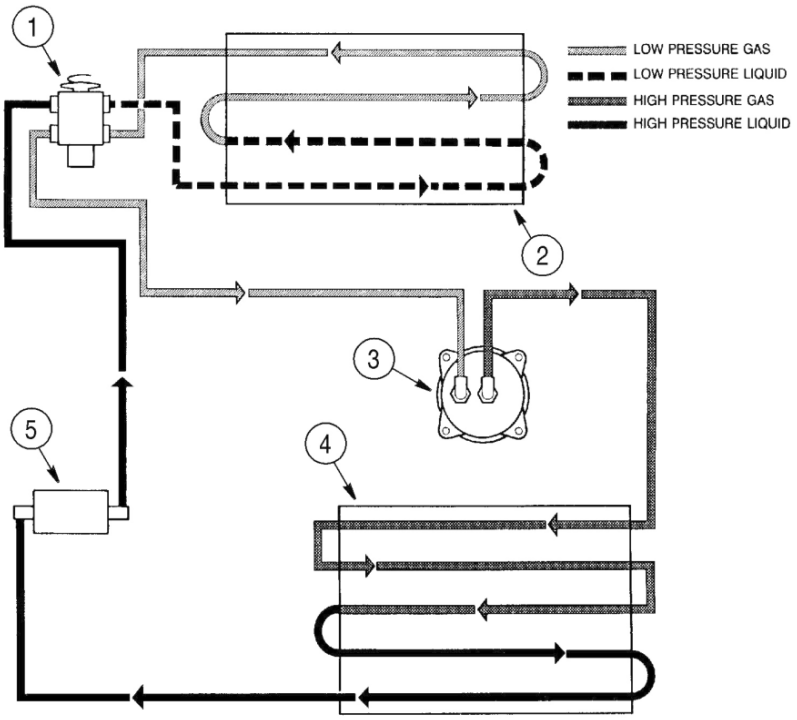


bd04n030 1

2. Disconnect the electrical connections from the blower motor assembly.
3. Loosen and remove the screws which fasten the blower motor assembly to the HVAC unit.
4. Remove the blower motor assembly from the HVAC unit.

ENVIRONMENT CONTROL Air-conditioning system - Dynamic description

The refrigerant circuit of the air conditioning system contains five major components: compressor, condenser, receiver-drier, expansion valve and evaporator. These components are connected by tubes and hoses and operate as a closed system. The air conditioner system is charged with HFC134a refrigerant.
The compressor receives the refrigerant as a low pressure gas. The compressor then compresses the refrigerant and sends it in the form of a high pressure gas to the condenser. The air flow through the condenser then removes the heat from the refrigerant. As the heat is removed the refrigerant changes to a high pressure liquid.
The high pressure refrigerant liquid then flows from the condenser to the receiver-drier. The receiver-drier is a container filled with moisture removing material, which removes any moisture that may have entered the air conditioner system in order to prevent corrosion of the internal components of the air conditioner system.
The refrigerant still in a high pressure liquid form, then flows from the receiver-drier to the expansion valve. The expansion valve then causes a restriction in flow of refrigerant to the evaporator core.
As the refrigerant flows through the evaporator core the refrigerant is heated by the air around and flowing through the evaporator fins. The combination of increased heat and decreased pressure causes the air flow through the evaporator fins to become very cool and the liquid refrigerant to become a low pressure gas. The cooled air then passes from the evaporator to the cab for the operator's comfort.
The electrical circuit of the Air Conditioning System consists of a fan speed control, temperature control, thermostat, 20 amp fuse, a blower motor, compressor clutch, low pressure switch, high pressure switch, and indicator light.

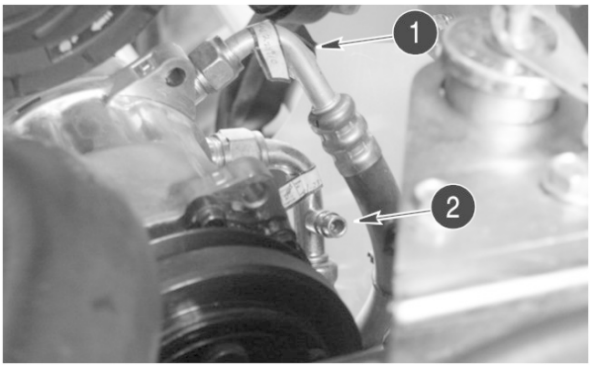


208L95 1

(1) Expansion valve
(2) Evaporator
(3) Compressor
(4) Condenser
(5) Receiver drier

11. Disconnect the hoses from the service ports **(1 and 2)** and install the caps.

    (1 and 2) Service Ports



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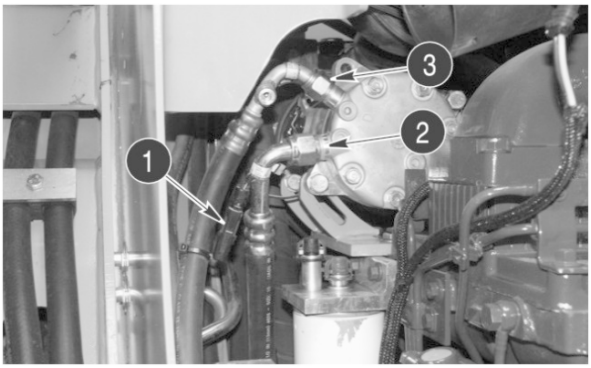
5. Slowly remove the protective cap, install new O-ring and connect the low pressure line **(2)** to the inlet port on the compressor.



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6. Carefully remove the protective cap, install new O-ring and connect the high pressure line **(3)** to the discharge port on the compressor.

7. Connect the **OEM1415** to the high and low charge ports in the hose fittings connected to the compressor. Evacuate the system and charge the system with reclaimed or new refrigerant; see **ENVIRONMENT CONTROL Air-conditioning system - Evacuate (E.40.C)** and **ENVIRONMENT CONTROL Air-conditioning system - Charging (E.40.C)** for these procedures.

9. Place the bearing dust cover in the bore. Place driver from special tool kit over the dust cover.

A21269 9

10. Gently tap the dust cover until it is seated.

A21270 10

11. Install the shim(s) on the rotor shaft.

A21256 11

12. Install the front plate on the rotor shaft. Make sure the keyway in the plate is aligned with the key in the shaft. Install the driver over the shaft.

A21271 12

Compressor - Problem solving

OPERATION

Compressor belt, mounting brackets, clutch and belt alignment.

TROUBLESHOOTING

1. Loose or broken drive belt - Adjust the tension on a new belt at 200 to 245 N (45 to 55 lbs).
2. Too much belt wear - replace a worn belt, because a worn belt will cause too much slippage.
3. Loose bracket mounting bolts- tighten the bolts to the correct torque.
4. Bracket has breaks or cracks - replace the bracket.
5. The compressor belt will slip on the compressor pulley if there is compressor seizure. Remove the compressor for service or replacement.
6. Remove the dust cover and check the air gap on the compressor clutch. The gap between the front plate and pulley assembly must be 0.41 to 0.79 mm (0.016 to 0.031 inch).
7. Use a socket wrench to slowly rotate the compressor clockwise. Compressor rotation should be smooth and not require much effort.

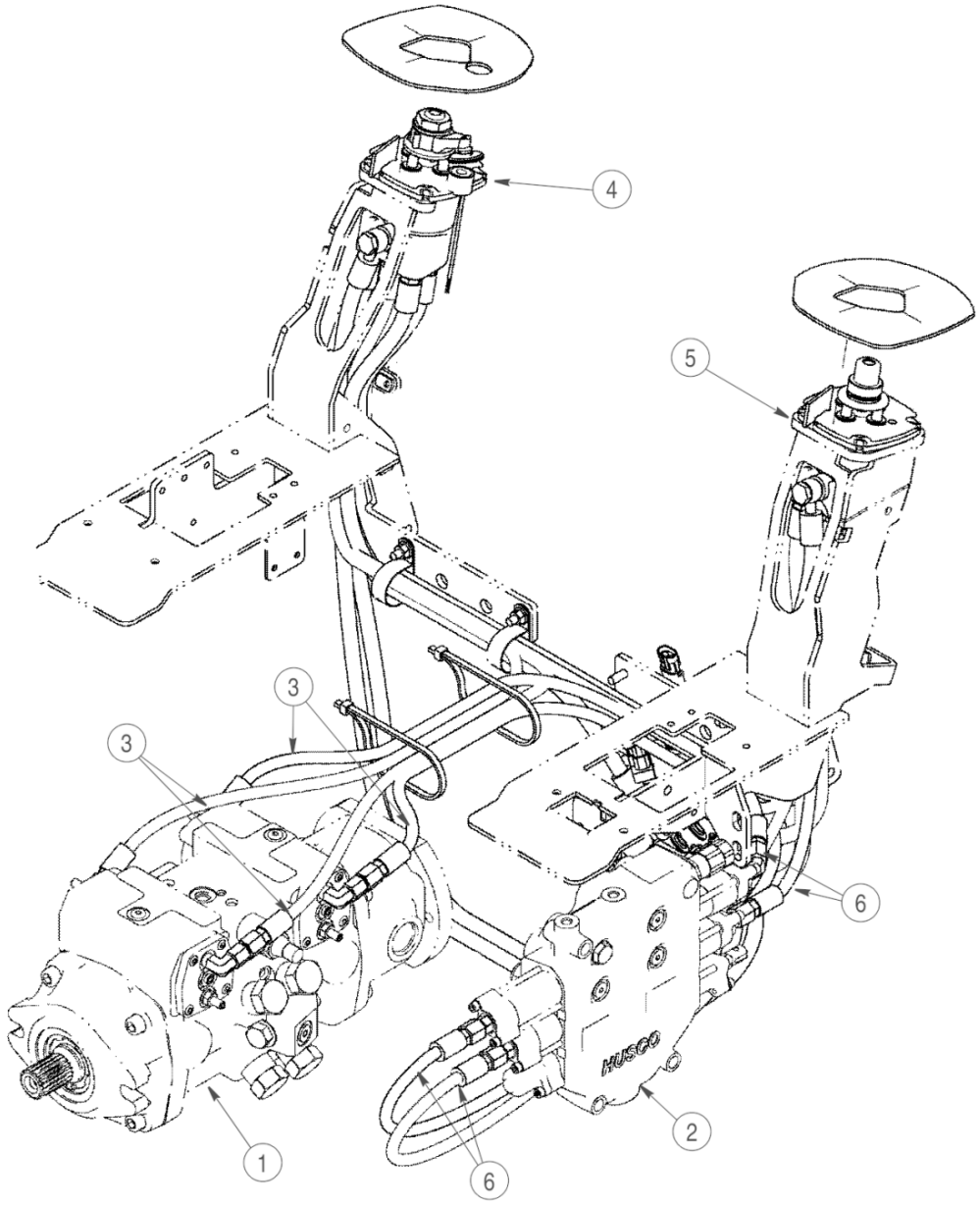
NOTE: *The compressor pulley and the compressor drive pulley must be aligned within 1.6 mm (1/16 inch) of each other. Use a straight edge to check pulley alignment. Adjust the compressor mounting bracket if needed. The drive belt should be located in the forward clutch groove.*

Index

BODY AND STRUCTURE - E

SAFETY SECURITY ACCESSORIES Safety - 50.B

Command - Exploded view (Machines Equipped with Pilot Controls)



BS07A095_1 1

Loader Control (Machines Equipped with H-Pattern Pilot Controls)	
(1) Hydrostatic Pump	**(4)** LH Joystick (H-Pattern)
(2) Loader Control Valve	**(5)** RH Joystick (H-Pattern)
(3) Pilot Pump Control	**(6)** Pilot Loader Control

SINGLE ARM Lift - Remove

465

1. Park the machine on a level surface.
2. Clean any dirt and grease from the hydraulic connections for the bucket and lift cylinders. If the machine is equipped with auxiliary hydraulic circuits at the rear of the machine, clean any dirt and grease from the hydraulic connections.
3. Raise the rear of the machine off the ground far enough to remove the rear wheels.
4. Place the machine on acceptable stands.
5. Remove the rear wheels from the machine.
6. Attach acceptable lifting slings to the loader arms on each side of the loader frame towards the rear of the machine.
7. Remove the bolts **(4 and 7)**, washers **(5)**, special nuts **(6 and 8)** and the step plate **(3)** from the tube between the loader arms, refer to the illustration of the Loader Frame.
8. Attach an acceptable lifting sling to the center of the tube between the loader arms.
9. Attach the lifting slings to acceptable lifting equipment.
10. Relieve any pressure from the hydraulic system by moving the hydraulic bypass control lever to the bypass position and moving the loader control levers in both directions.
11. Raise the upper rear access door to gain access to the hydraulic lines that operate the loader and the auxiliary and high flow hydraulic systems.
12. Tags all hydraulic lines and couplings for use during assembly procedure.
13. Loosen and remove all the hydraulic lines that pass through both uprights of the chassis.
14. Plug and cap the fittings and coupling to minimize the loss of hydraulic oil and to prevent contamination from entering the hydraulic system.
15. Remove the retaining rings (if equipped) from the hydraulic couplings on each side of the uprights and push the hydraulic couplings into the center of the uprights.

IMPORTANT: *Be sure all of the hydraulic couplings are out of the mounting holes in the chassis uprights before attempting to remove the loader frame from the chassis.*

16. Loosen and remove the grease fitting **(18)** from right lift cylinder pivot pin **(14)**, refer to the illustration of Loader Frame.
17. Remove the bolt **(16)**, washer **(17)**, spacer **(15)**, pin **(14)** and bushing **(20)** from the right hand link assembly **(19)**. Use an acceptable support and attach the lift cylinder to the loader frame.

SINGLE ARM Lift - Remove

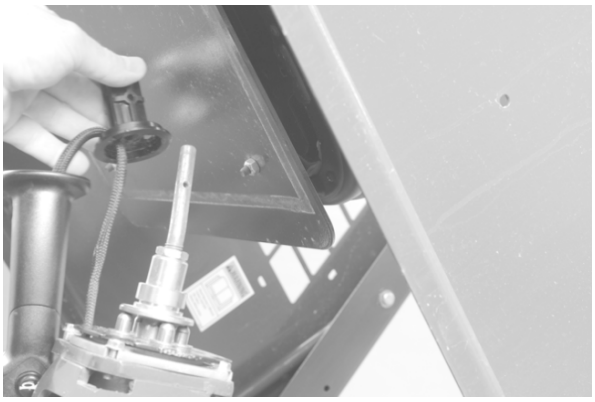
450, 450CT

1. Park the machine on a level surface. Clean any dirt and grease from the hydraulic connections for the bucket and lift cylinders. If the machine is equipped with auxiliary hydraulic circuits at the rear of the machine, clean any dirt and grease from the hydraulic connections.
2. Attach acceptable lifting slings to the loader arms on each side of the loader frame towards the rear of the machine.
3. Remove the cap screws from the step plate (17) and remove the step plate (17) from the tube between the loader arms.
4. Attach an acceptable lifting sling to the center of the tube between the loader arms.
5. Attach the lifting slings to acceptable lifting equipment.
6. Relieve any pressure from the hydraulic system by moving the hydraulic bypass control lever to the bypass position and moving the loader control levers in both directions.
7. Raise the upper rear access door to gain access to the hydraulic lines that operate the loader and the auxiliary and high flow hydraulic systems. Fasten identification tags to all hydraulic lines and couplings for use during assembly procedure. Loosen and remove all the hydraulic lines that pass through both uprights of the chassis. Plug and cap the fittings and couplings to minimize the loss of hydraulic oil and to prevent contamination from entering the hydraulic system.
8. Remove the retaining rings (if equipped) from the couplings and push the couplings into the center of the uprights.

IMPORTANT: *Be sure all of the hydraulic couplings are out of the mounting holes in the chassis uprights before attempting to remove the loader frame from the chassis.*

9. Loosen and remove the cap screw and lock nut from the right lift cylinder pivot pin (1). Use acceptable tools and remove the pivot pin (1) from the loader frame (5). Use an acceptable support and attach the lift cylinder to the chassis.
10. Follow the procedure in step 9 and remove the left side lift cylinder pivot pin (1).
11. Loosen and remove the cap screw and lock nut from the right link arm pivot pin (2). Use acceptable tools and remove the pivot pin (2) from the chassis upright.
12. Follow the procedure in step 11 to remove the left link arm pivot pin (2).
13. Loosen and remove the cap screw and lock nut from the right loader frame pivot pin (3). Use acceptable tools and remove the pivot pin from the chassis upright.

6. Remove the handle adapter.



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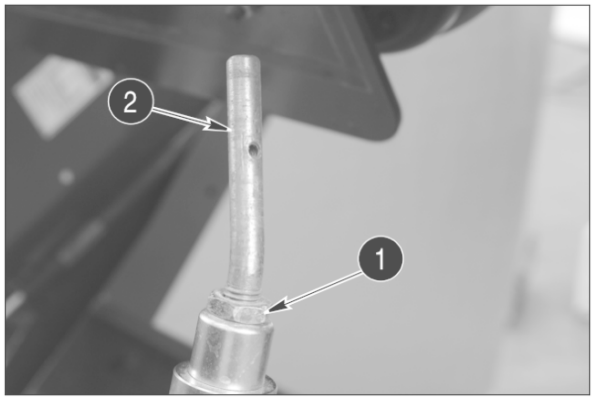
7. Loosen the jam nut, (1) and remove the rod assembly, (2).



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8. Connect a vacuum pump to the hydraulic reservoir.
9. Start the vacuum pump.
10. Tag and disconnect all the hoses from the controller. Install caps and plugs on all fittings and hoses.

BD06N011 6

11. Stop the vacuum pump.

8. Stop the vacuum pump. Disconnect the vacuum pump from the hydraulic reservoir and install the filler cap on the reservoir filler neck.
9. Using the reference tags from disassembly, connect all of the electrical connections to the correct locations on the loader control valve.
10. Clean up any hydraulic oil from the equipment and floor.
11. Start the engine and run the engine at low idle.
12. Operate the loader controls to completely extend and retract the lift and tilt cylinders to remove any air from the hydraulic system.
13. Lower the loader arms completely.
14. Stop the engine.
15. Check for any oil leakage.
16. Check the hydraulic oil level in the reservoir. Add hydraulic oil as required. **Reservoir - Filling (A.10.A)**
17. Install the cap on the reservoir.

Relief valve - Flow test

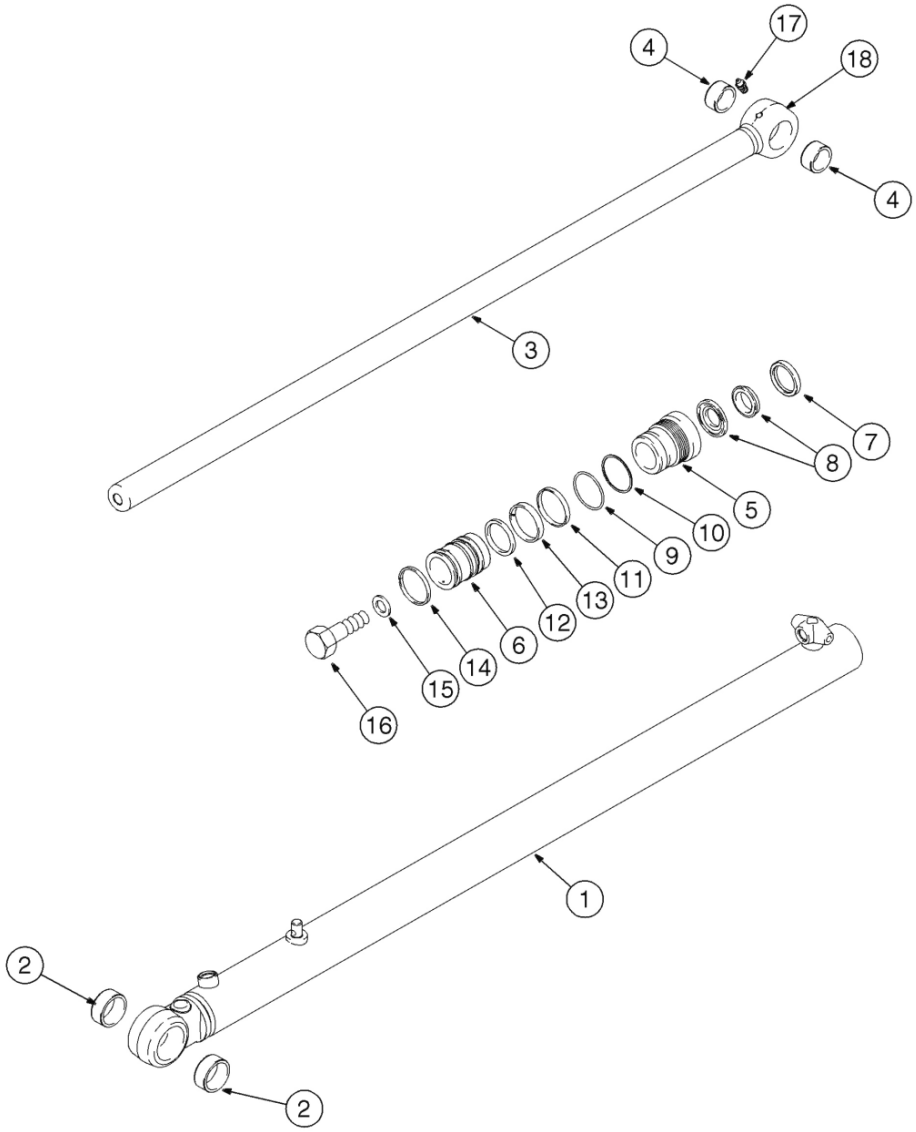
Prior operation:
Relief valve - Flow test (A.10.A)

1. Start the engine and run the engine at 2300 r/min (rpm).
2. Hold the lift control lever in the LIFT position and adjust the pressure valve on the flowmeter until the pressure gauge indicates 124 bar (1800 psi). Adjust the engine speed to keep the engine running at 2300 r/min (rpm). Read the flow gauge and record the reading as test number 9.
3. Hold the lift control lever in the LOWER position and adjust the pressure valve on the flowmeter until the pressure gauge indicates 124 bar (1800 psi). Adjust the engine speed to keep the engine running at 2300 r/min (rpm). Read the flow gauge and record the reading as test number 10.

NOTE: *Understanding the results of the tests are outlined in the steps below.*

4. Refer to **Hydraulic pump - Flow test (A.10.A)** If the flow indication for a circuit was approximately the same as the flow indication at the same pressure in Test Number 1 of the Hydraulic Pump Flow Test , the circuit is good.
5. If the flow indication for a circuit was more than 3.8 L/min (one gpm) less than the flow indication at the same pressure in **Hydraulic pump - Flow test (A.10.A)** Test Number 1, there is leakage in that circuit.
6. Leakage in the lift circuits can be caused by any of the following problems:
   A. Damaged or worn packing in one or both of the lift cylinders.
   B. Damaged or worn spool or spool bore in the loader control valve.
   C. Defective circuit relief valves.
   D. Inadequate control spool travel.
7. If the flow indication for every circuit tested was more than 3.8 L/min (one gpm) less than the flow indication at the same pressure in test number. 1, there is leakage at a point common to the entire system. A probable cause is a damaged or worn main relief valve or seals.

450 Loader Lift Cylinder		
(3) Piston Rod	**(9)** Wiper	**(15)** Wear Ring
(4) Washer	**(10)** Buffer and Rod Seal	**(16)** Ring
(5) Cap Screw	**(11)** O-Ring	**(17)** Plug
(6) Grease Fitting	**(12)** O-Ring	**(18)** O-Ring



BT97F009 2

Loader Lift Cylinder

465 Loader Lift Cylinder		
1. Tube	7. Wiper	13. Wear ring
2. Bushing	8. Seal (kit)	14. Wear ring
3. Piston Rod	9. O-ring	15. Washer
4. Bushing	10. Backup ring	16. Bolt
5. Packing gland	11. Seal	17. Grease fitting
6. Piston	12. Backup Ring	18. Rod end

4. Inspect the glands **(2)** and **(14)**, for rust or corrosion. Clean and remove the rust or corrosion from the gland.
5. Inspect the piston **(3)**. Check to see if it is worn or damaged. If the piston is worn or damaged, replace with a new accumulator.
6. Inspect the gland ends of the tube **(1)** for sharp edges. Remove the sharp edges. Sharp edges can damage the seals **(4)**, quad ring **(5)**, and O-rings **(6)**.

Control valve - General specification

450, 465

Port Relief Valve Cartridge Pressures at 2.84 L/min (0.75 US gpm)				
	465 Machines (Equipped with Standard Auxiliary Hydraulics.)	**450 Machines and 465 Machines (Equipped with Electro - Hydraulic)**	**445 Machines**	**435 Machines**
Port A1	None	None	None	None
Port B1	**23097 kPa (3350 psi)**	**23097 kPa (3350 psi)**	**23097 kPa (3350 psi)**	**23097 kPa (3350 psi)**
Port A2	Shut-Off Plug	**26200 kPa (3800 psi)**	Shut-Off Plug	Shut-Off Plug
Port B2	Anti-Void	**23097 kPa (3350 psi)**	Anti-Void	Anti-Void

Control valve - General specification

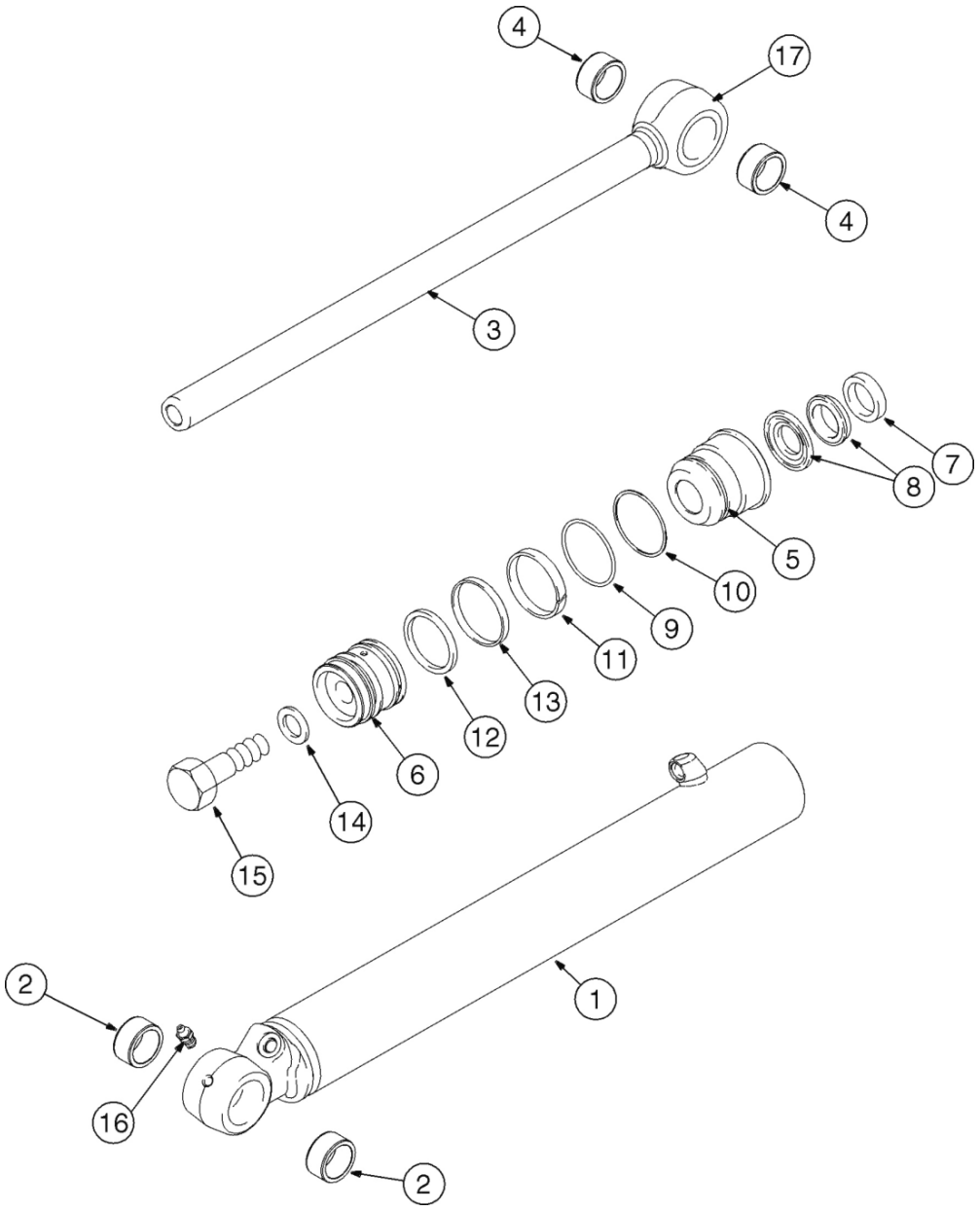
450CT

Port Relief Valve Cartridge Pressures at 2.84 L/min (0.75 US gpm)		
	450CT Machines	**445CT Machines**
Port A1	**26200 kPa (3800 psi)**	**26200 kPa (3800 psi)**
Port B1	**21734 kPa (3100 psi)**	**21734 kPa (3100 psi)**
Port A2	**26200 kPa (3800 psi)**	**26200 kPa (3800 psi)**
Port B2	**21734 kPa (3100 psi)**	**21734 kPa (3100 psi)**

39. Disconnect the vacuum pump from the opening in the reservoir.
40. Install new hydraulic and hydrostatic filter elements on the machine.
41. Start the engine. Check for oil leakage around the new hydraulic and hydrostatic filters.
42. Stop the engine.
43. Check the level of the oil in the reservoir and add oil as required. **Reservoir - Filling (A.10.A)**

Cylinder - Visual inspection

465



BT97F010 1

Loader Bucket Cylinder

1. Tube	7. Wiper	13. Wear ring
2. Bushing	8. Seal (kit)	14. Washer
3. Piston Rod	9. O-ring	15. Bolt
4. Bushing	10. Backup ring	16. Grease fitting
5. Packing gland	11. Seal	17. Rod end
6. Piston	12. Backup ring	

1. Clean the piston **(6)**, packing gland **(5)**, piston rod **(3)**, tube **(1)**, washer **(15)**, and bolt **(16)** in cleaning solvent.

16. Lubricate a new piton ring (11) with clean hydraulic oil and install on top of the ring (12) on the outside of the piston (6).
17. Lubricate the inside of the tube (1) and the piston (6) with clean hydraulic oil.
18. Start the tube (1) onto the piston rod (3) assembly. Be careful not to damage the wear ring (11) and the O-ring (12).
19. When the piston (6) is in the smooth part of the tube (1), start the gland (5) into the tube (1).
20. Lubricate the new O-ring (9) on the gland (5) with clean hydraulic oil.
21. Tighten the gland (5) to 407 Nm ± 68 Nm (300 pound-feet ± 50 pound-feet).
22. If hoses were removed with the cylinder, install new O-rings, if equipped, on the hose fittings. Lubricate the new O-rings with clean hydraulic oil and install the hoses.

Contents

TOOLS AND COUPLERS - J

CARRYING Unarticulated tools - 50.B

Control valve - Remove

1. For loader control valve removal refer to the following procedure. **Control valve - Remove (H.40.B)**