SERVICE MANUAL

SKID STEERS

85XT
90XT
95XT

7-52254

1. Trim along dashed line.
2. Slide into pocket on Binder Spine.

TYPE 1-4

SERVICE MANUAL

SKID STEERS

85XT
90XT
95XT

7-52254

1. Trim along dashed line.
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TYPE 1-4

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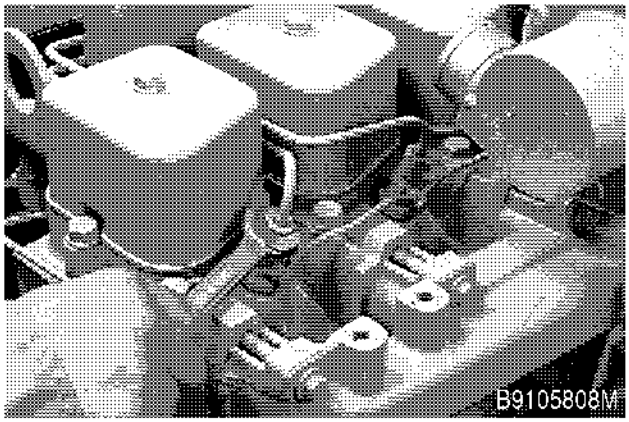
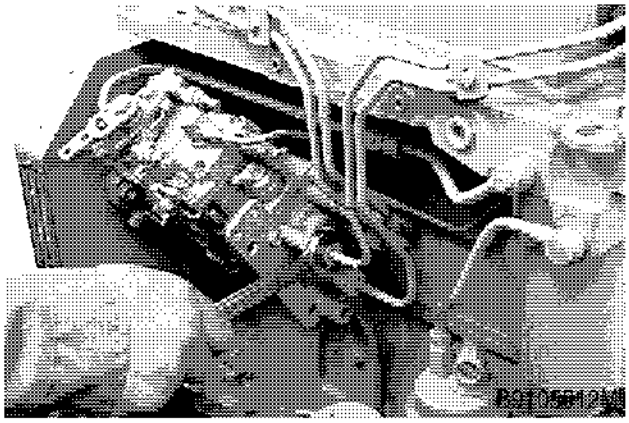
STEP 6



disconnect the fuel injector lines from the fuel injectors.

NOTE: *During installation, tighten the fittings to 22 to 28 Nm.*

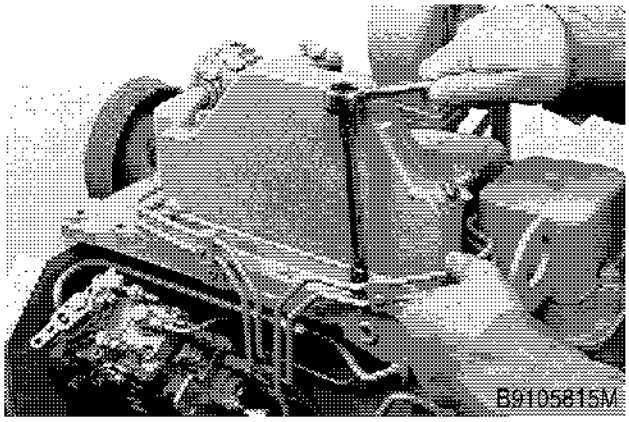
STEP 7



Put identification marks on the fuel injector lines. Disconnect the fuel injector lines from the fuel injection pump.

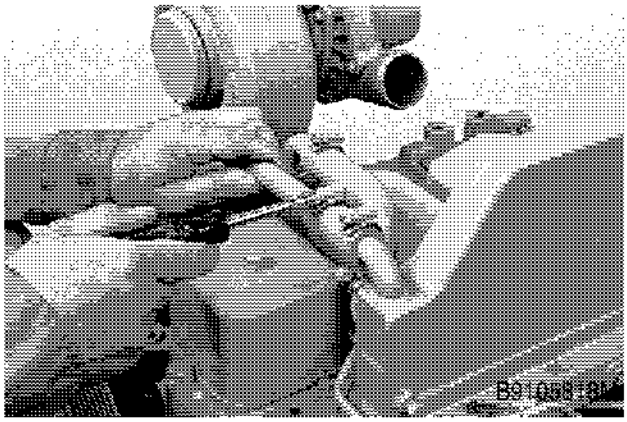
NOTE: *During installation, tighten the fittings to 22 to 28 Nm.*

STEP 8



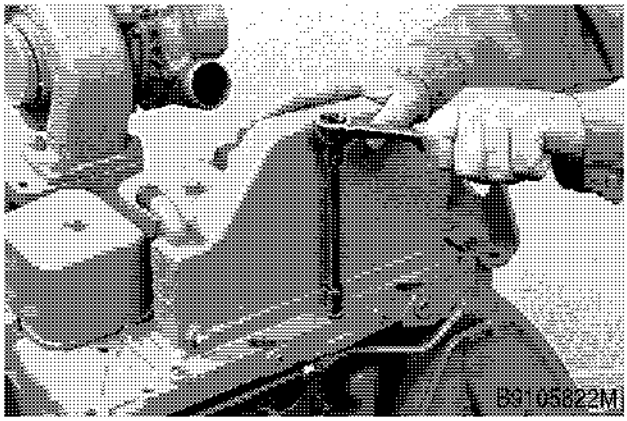
Remove the bolts from the clamps.

STEP 9



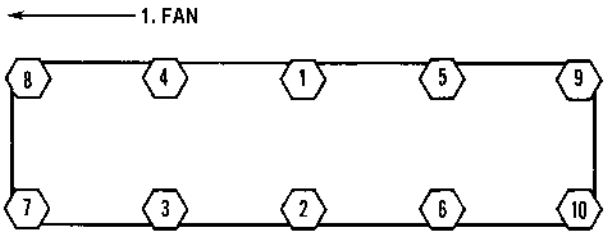
Disconnect the coolant hoses from the aftercooler. Remove the fuel injector lines from the engine.

STEP 10



Remove the remainder of the bolts from the aftercooler.

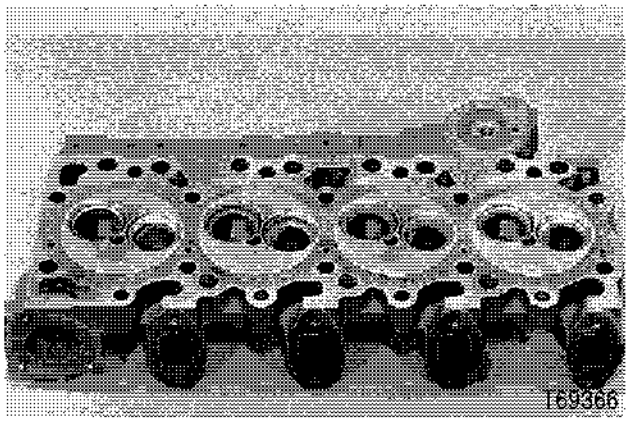
NOTE: *During installation, apply thread sealant with teflon to the bolt threads and tighten the bolts to a torque of 21 to 27 Nm in the sequence shown below.*



B9106230J

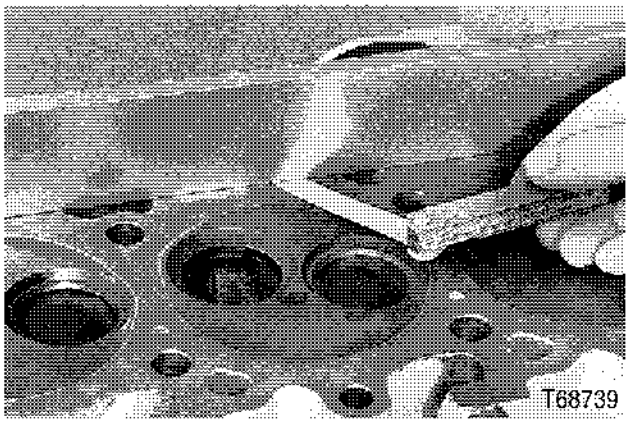
CHECKING AND RESURFACING THE CYLINDER HEAD

STEP 36



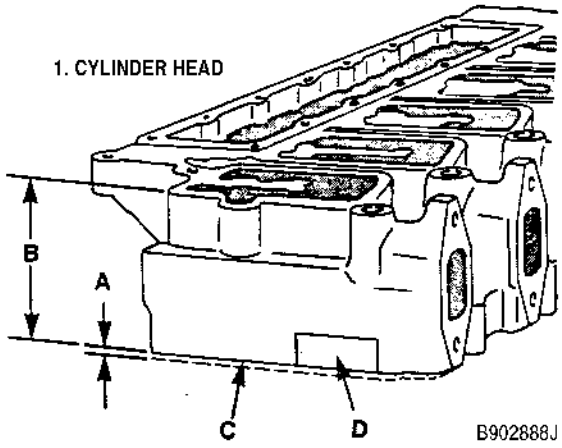
Clean the cylinder head completely. Remove carbon and other deposits. Check for cracks and any other damage to the head.

STEP 37



Check the cylinder head surface with a straight edge and feeler gauge. Resurface the cylinder head if warpage or erosion is more than 0.010 mm in any 50 mm diameter area or if there is more than 0.075 mm overall end to end or side to side.

STEP 38



Resurface the cylinder head in increments necessary to straighten the surface and maintain surface finish according to the following specifications:

A = 1.0 mm total amount of material removed.

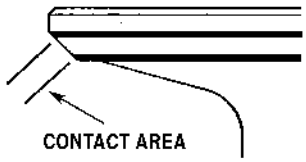
B = 93.75 mm minimum total height of the cylinder head.

C = Surface finish 1.5 to 3.2 micrometers.

D = Use this area to stamp the total thickness of cylinder head material removed in mm.

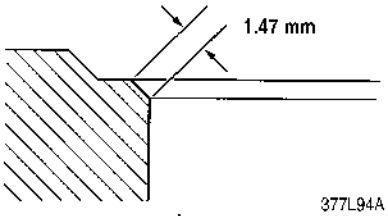
45 Degree Exhaust Valve

THIS IS THE CORRECT SEAT CONTACT AREA ON THE VALVE.

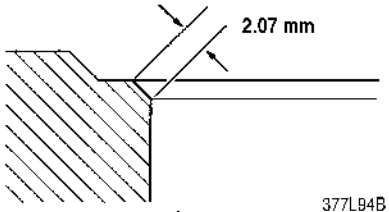


377L94D

THE CORRECT EXHAUST VALVE CONTACT AREA ON THE SEAT WILL GIVE A SEAT WIDTH OF 1.47 TO 2.07 mm.

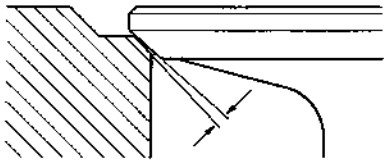


377L94A



377L94B

1 DEGREE INTERFERENCE ANGLE



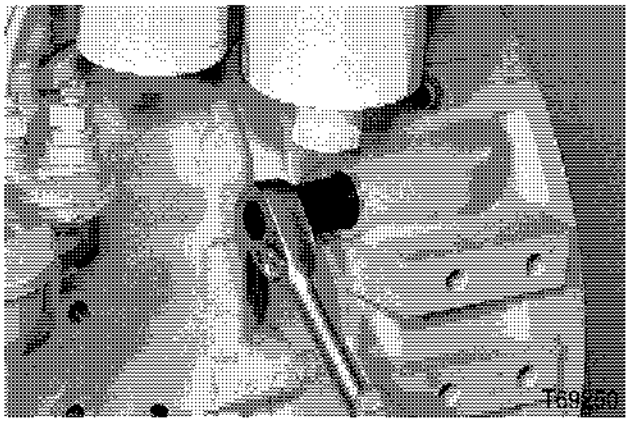
377L94C

CORRECT REFACING OF EXHAUST VALVES AND VALVE SEATS WILL GIVE A 1 DEGREE INTERFERENCE ANGLE. THIS ANGLE IS IMPORTANT BECAUSE THE ANGLE GIVES ASSISTANCE IN CUTTING CARBON AND TO SEAT THE VALVES.

IF THE VALVE HEAD IS RECESSED MORE THAN 1.5 mm, REPLACE THE VALVE AND INSTALL A VALVE SEAT.

LOCATING TOP CENTER

STEP 98



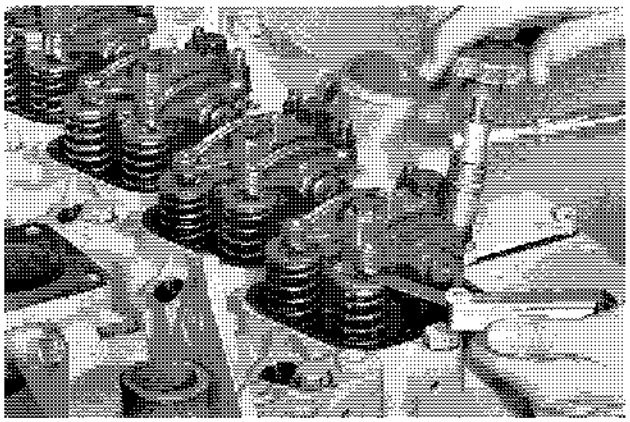
Install the engine rotating tool into the flywheel housing. Rotate the engine four revolutions to make sure the push rods are seated correctly.

STEP 99

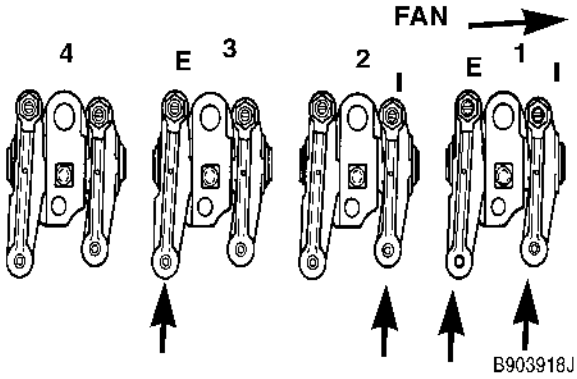
While turning the engine, push the lock pin in. When the lock pin moves into the camshaft gear the engine will be at top center.

ADJUSTING THE ROCKER ARM TO VALVE CLEARANCE
Cold Setting

STEP 100



Check and adjust the intake and exhaust valves as the arrows show below.

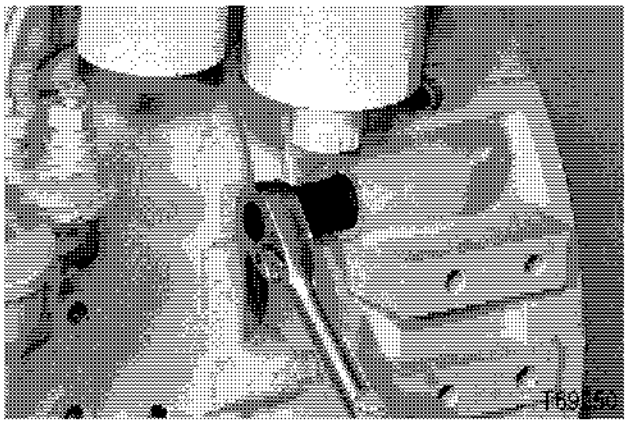


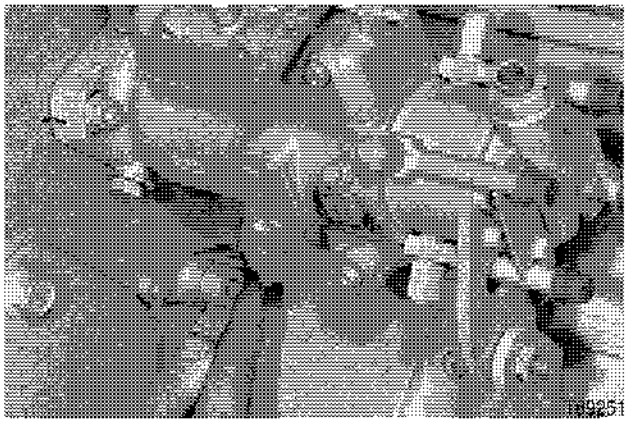
Number one cylinder top center compression stroke.

Valve Clearance, Cold: Intake Valves - 0.254 mm

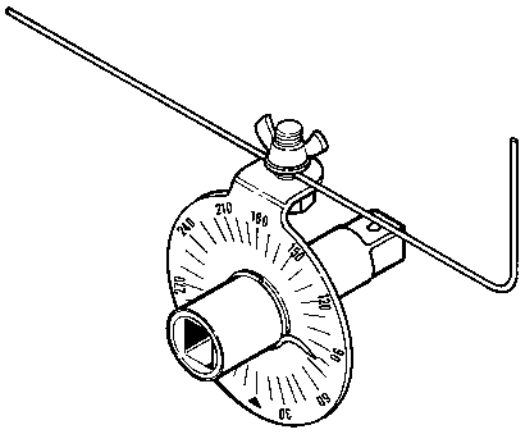
Exhaust Valves -.508 mm

STEP 101

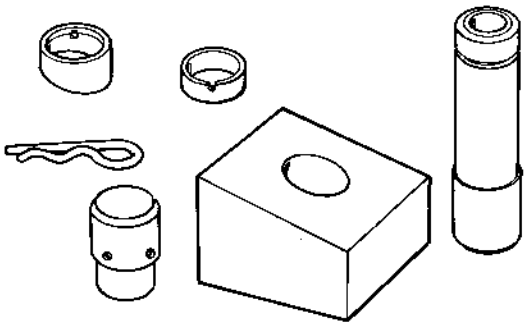




Install the engine rotating tool. Move the engine a small amount in each direction. Pull the lock pin out.

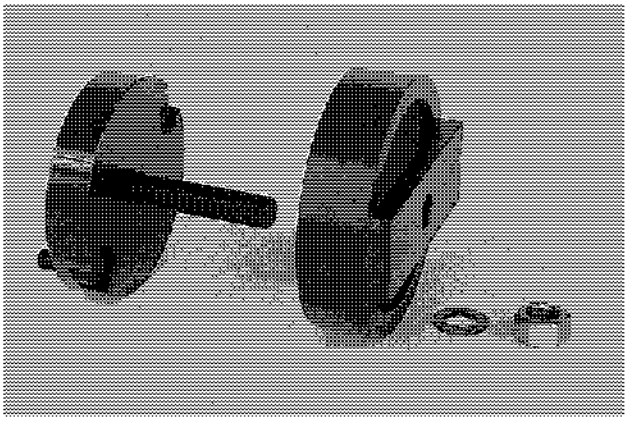


CAS-2162 Torque Angle Gauge



CAS-10900 Connecting Rod Pin Bushing Removal and Installation Tool

Three Bond Silver RTV Sealer
J823494 - 3 OZ Tube



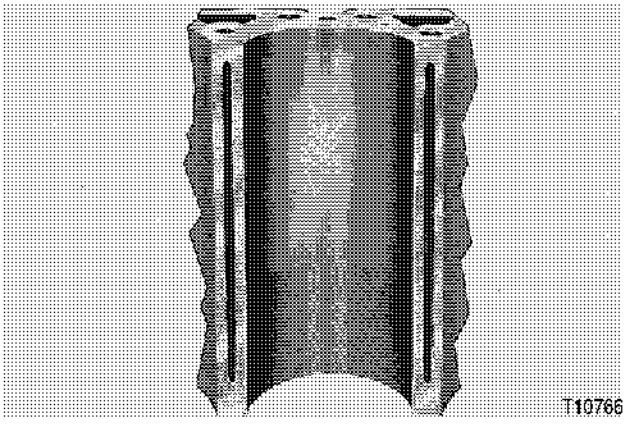
CAS-2355 Rear Crankshaft Seak Installation Tool

CYLINDER WALL INSPECTION

STEP 70

Inspect the cylinder walls for the following conditions.

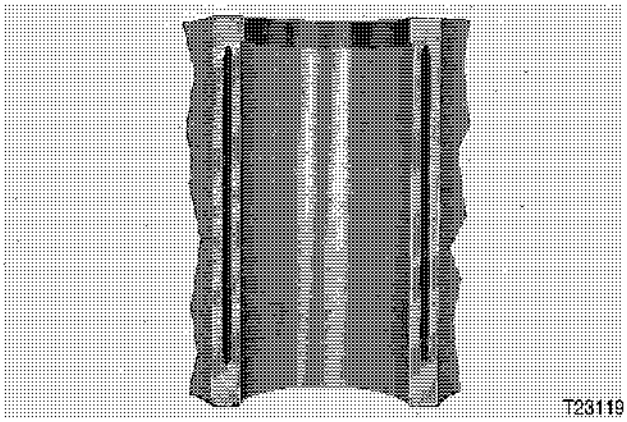
Normal Wear



A smooth surface with some of the cross-hatch pattern showing between the upper and lower limits of the ring movement area shows normal wear. There will always be a small amount of wear present because of combustion pressure moving the top ring against the cylinder wall.

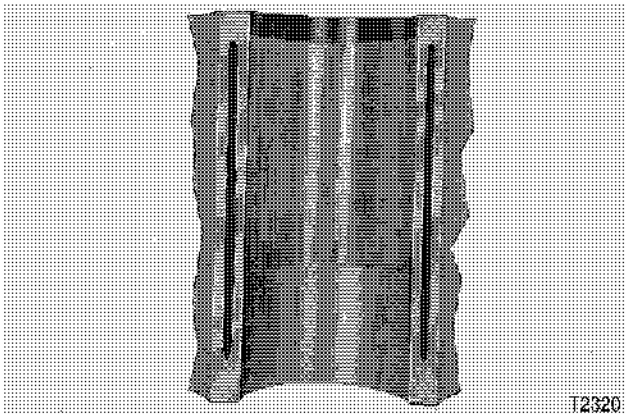
Normal wear shows acceptable cylinder wall conditions and the cylinder need not be machined.

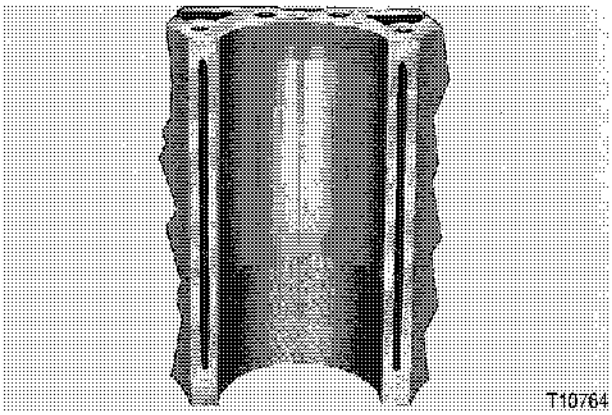
Worn Cylinder Wall



A smooth surface between the upper and lower limits of the ring movement area shows a worn cylinder wall because of normal wear and the cylinder must be machined.

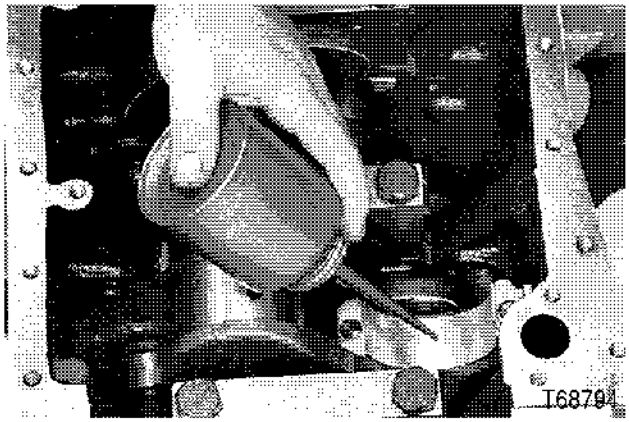
Scoring on Cylinder Walls





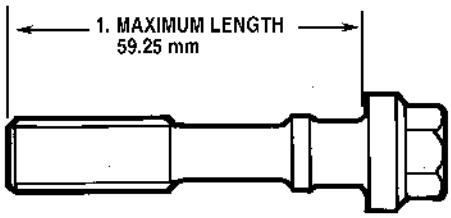
Scoring on cylinder walls is caused by metal moving from one location to a different location. This is shown by heavy vertical lines. The Vertical lines are caused by metal coming in contact with the piston. The scoring can be one specific area or it can occur the complete length on the piston movement. If this condition is present, the cylinder must be machined and the piston and rings replaced.

STEP 119



Apply lubrication to the bearing liners before installation, using clean engine oil.

STEP 120

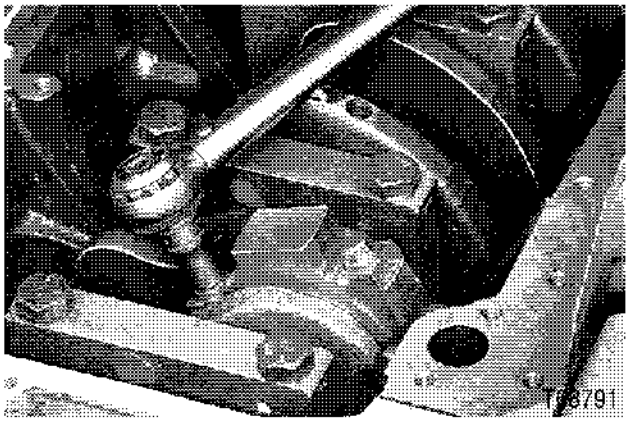


7L92

Measure the length of the connecting rod bolts. If the bolts length is more than 59.25 mm the bolt must be replaced.

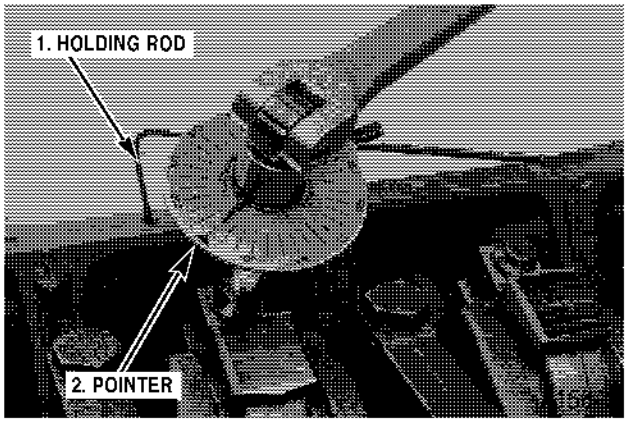
IMPORTANT: *Each bolt length must be checked before installation.*

STEP 121



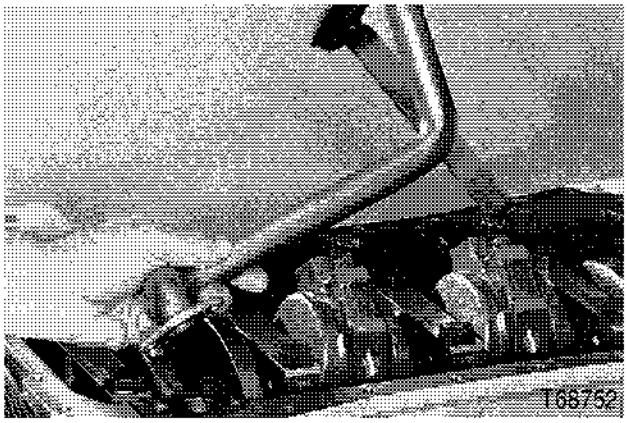
Lubricate the connecting rod bolts with clean engine oil and tighten the bolts to a torque of 60 Nm.

STEP 122



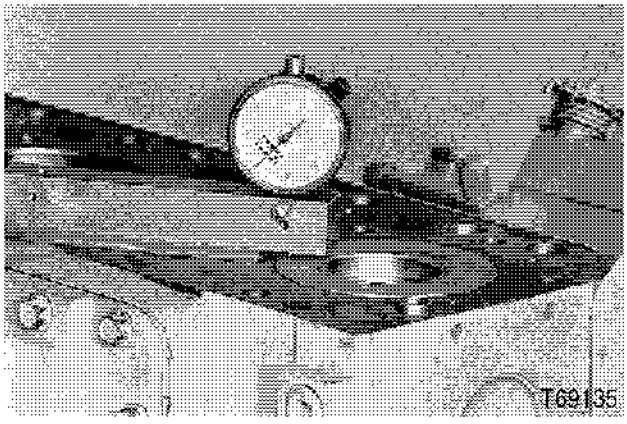
Install the torque angle gauge. Position and lock the holding rod. Turn the pointer to 60 degrees. Tighten the bolt until the pointer is at 0degrees.

STEP 123



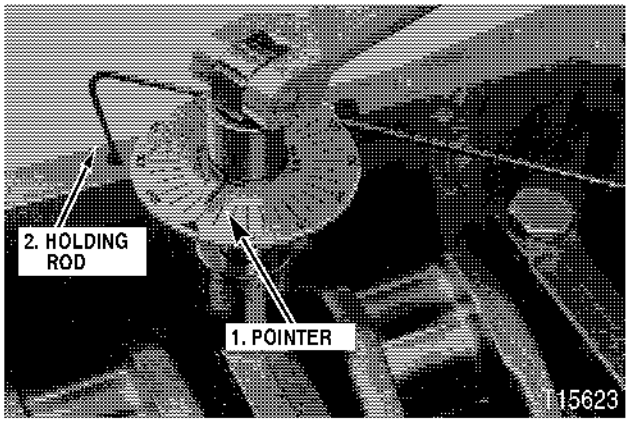
Install the engine oil inlet tube. See Section 2445 of the service manual for the inlet tube and the oil pan installation.

STEP 124



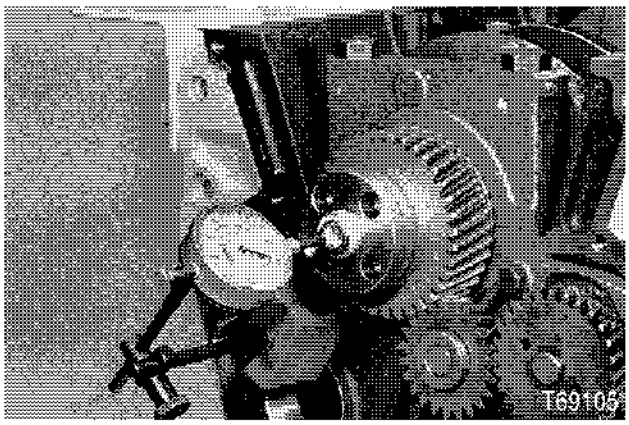
Use a dial indicator to check piston protrusion. The piston protrusion must not be more than 0.660 mm plus any amount of material removed during resurfacing.

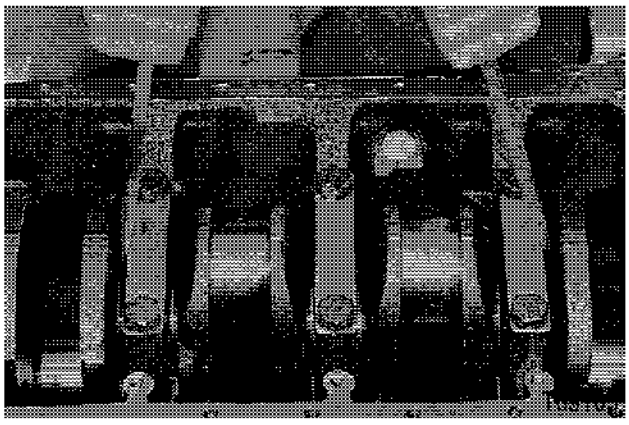
STEP 192



Install the torque angle gauge. Position and lock the holding rod. Turn the pointer to 60 degrees. Tighten the bolt until the pointer is at 0 degrees.

STEP 193

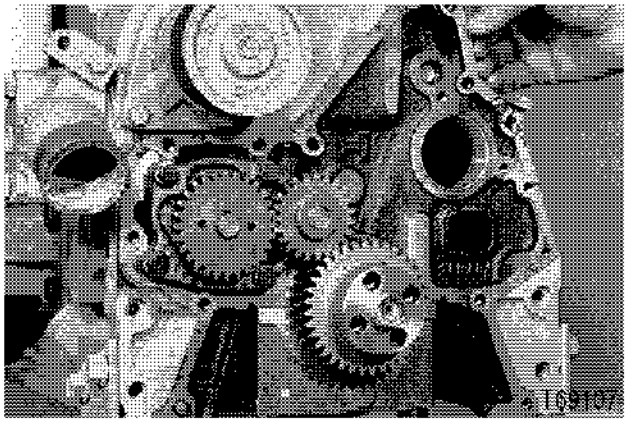




Put a dial indicator on the crankshaft gear. Check the crankshaft end clearance. The end clearance must be 0.041 to 0.119 mm. If the clearance is more than 0.119 mm, replace all the main bearing liners or the crankshaft.

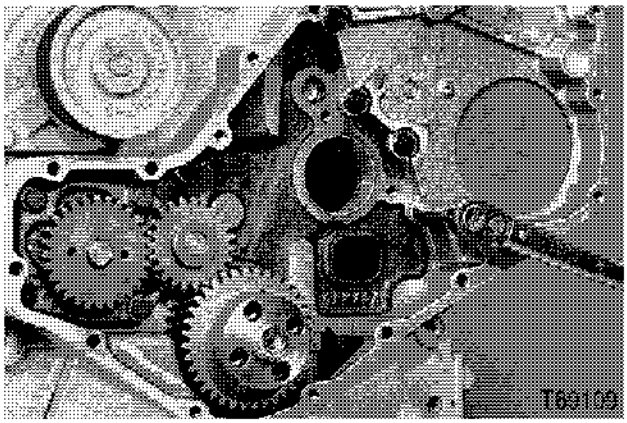
NOTE: *To get an accurate reading, use a pry bar between the crankshaft and the number two and number four main bearing caps as shown above.*

STEP 194



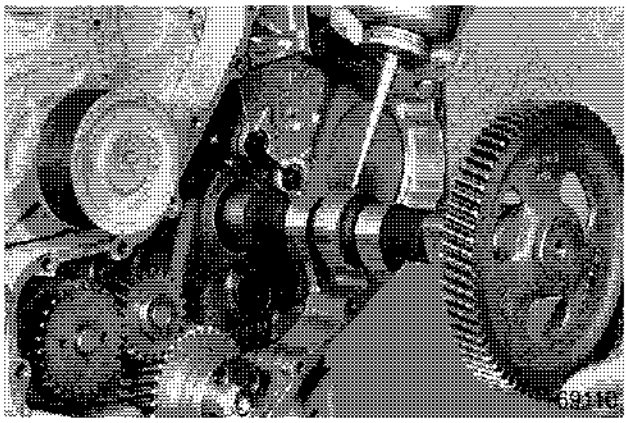
Install a new front housing gasket.

STEP 195



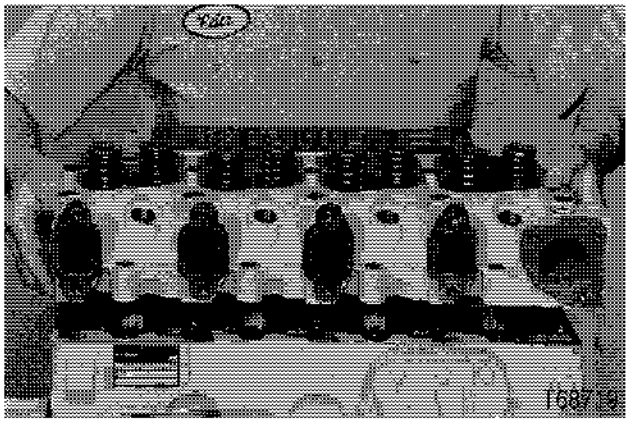
Install the front housing and tighten the bolts to a torque of 21 to 27 Nm.

STEP 196



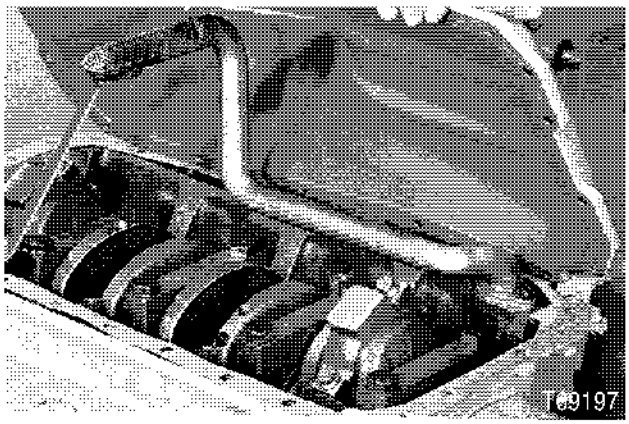
Add lubrication to the camshaft bearing journals. Use clean engine oil.

STEP 268



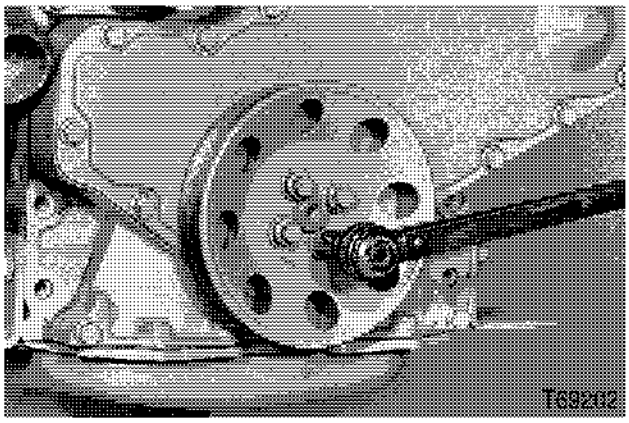
Install the cylinder head. See Section 2415 for cylinder head installation.

STEP 269



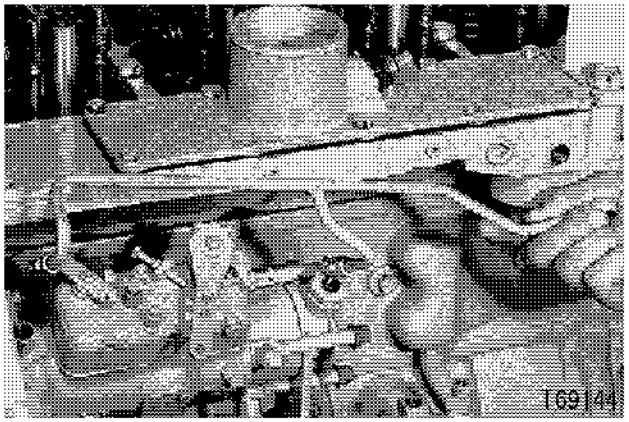
If the engine oil pan was removed, see Section 2445 in the service manual for installation.

STEP 270



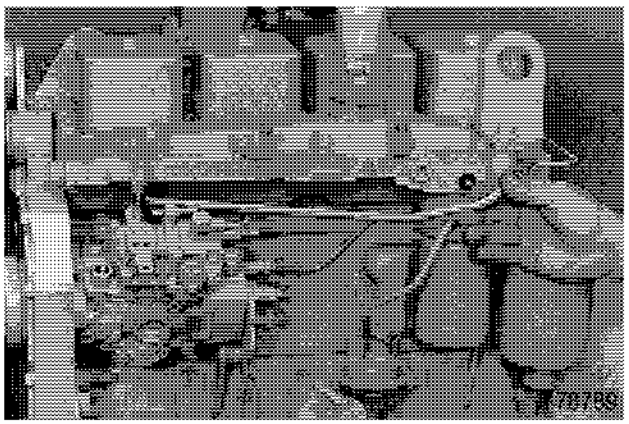
Install the front crankshaft pulley and tighten the bolts to a torque of 120 to 130 Nm.

STEP 271 CAV INJECTION PUMP



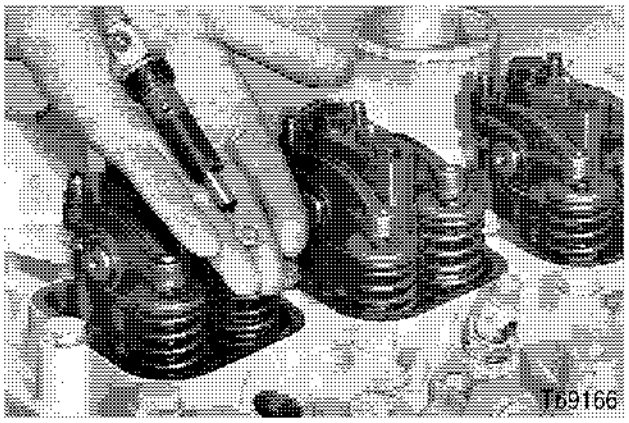
See Section 3414 in the service manual to install the injection pump fuel lines.

STEP 272 BOSCH INJECTION PUMP



See Section 3415 in the service manual to install the injection pump fuel lines.

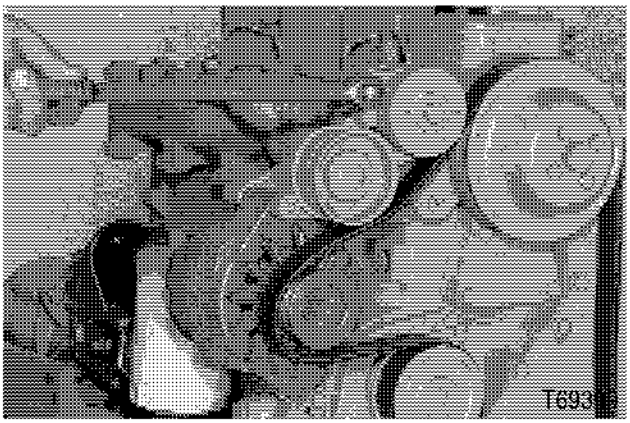
STEP 273



See Section 3413 in the service manual to install the fuel injector.

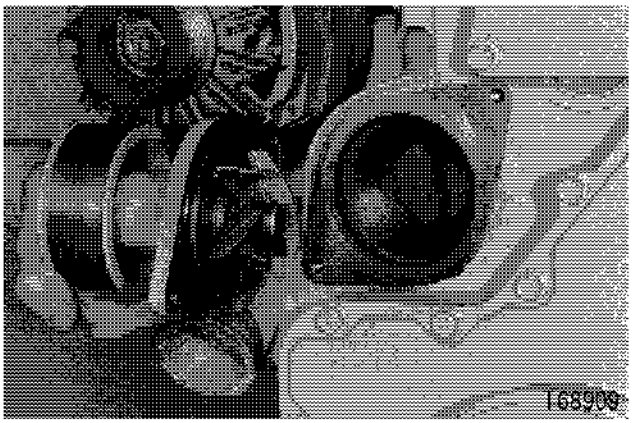
WATER PUMP
Removal

STEP 1



Lift the belt tensioner pulley and remove the fan belt.

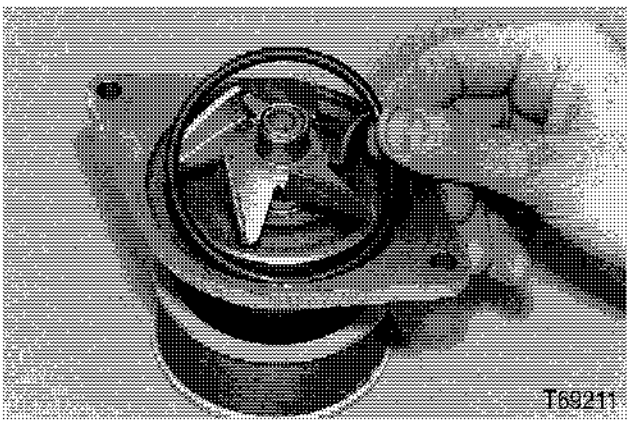
STEP 2



Remove the water pump bolts and the water pump.

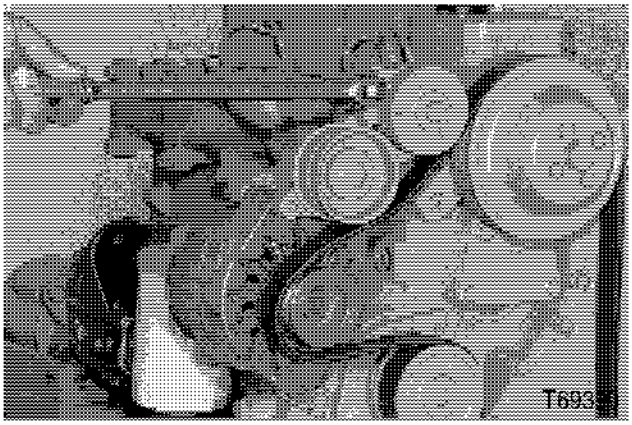
Installation

STEP 3



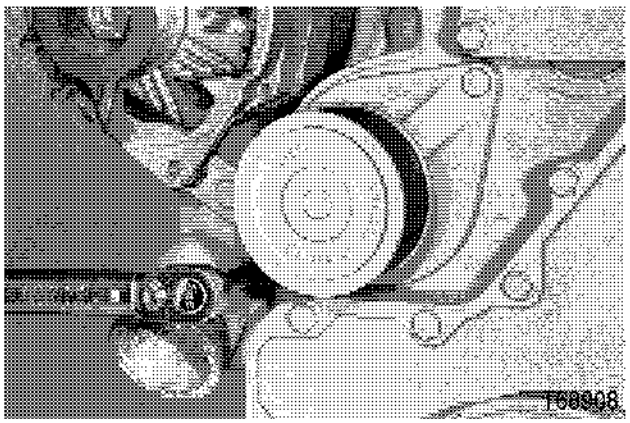
Install a new o-ring into the water pump housing.

STEP 5



Lift the belt tensioner pulley and install the fan belt.

STEP 4



Install the water pump and tighten the water pump retaining bolts to a torque of 21 to 27 Nm.

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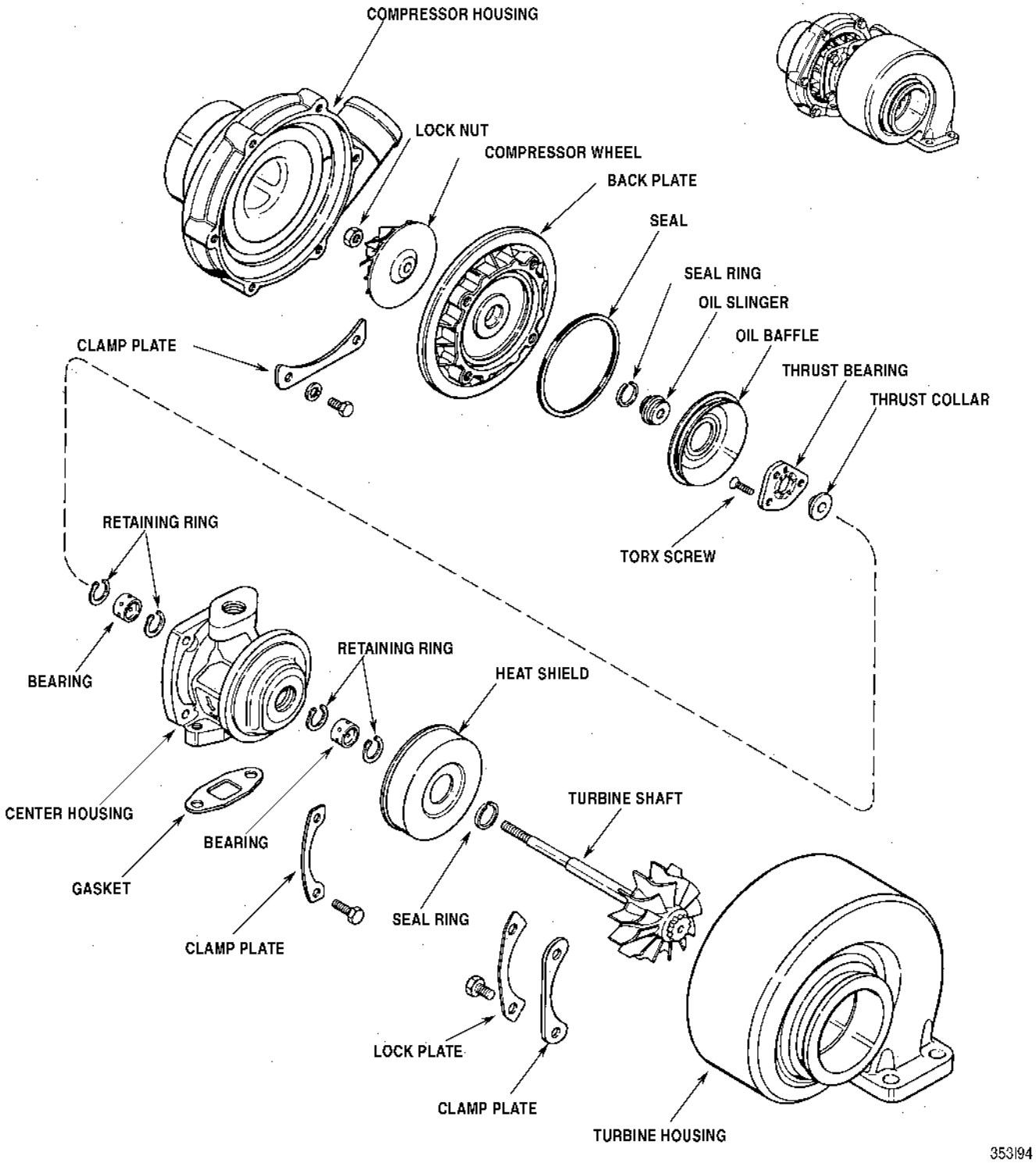
SPECIFICATIONS

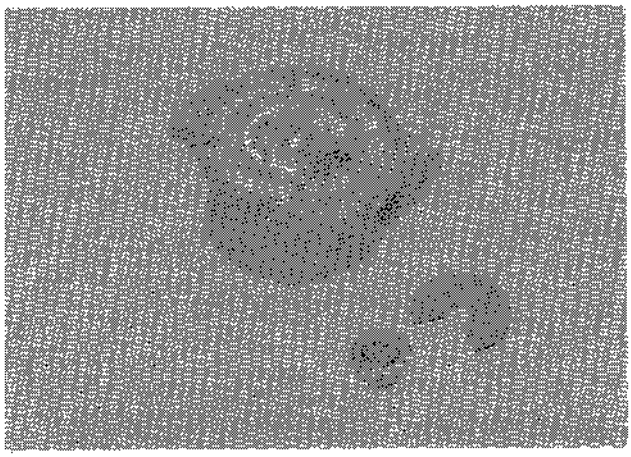
Turbine Wheel Horizontal Movement	0.10 to 0.16 mm
Turbine Wheel Vertical Movement	0.30 to 0.46 mm

Assembly



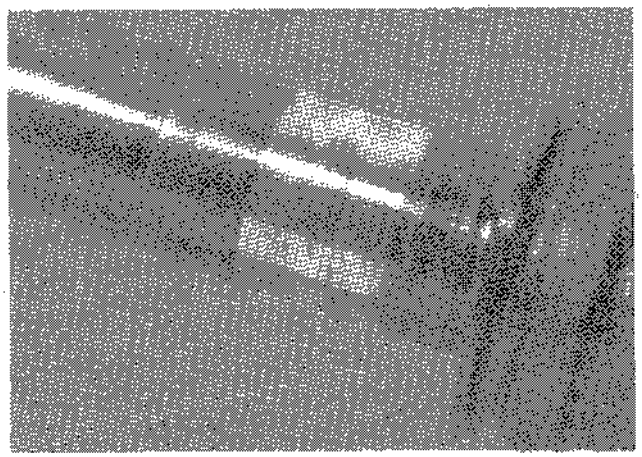
NOTE: *Lubricate all bearings, seals and the turbine shaft with clean engine oil before assembly.*

Coked Center Housing



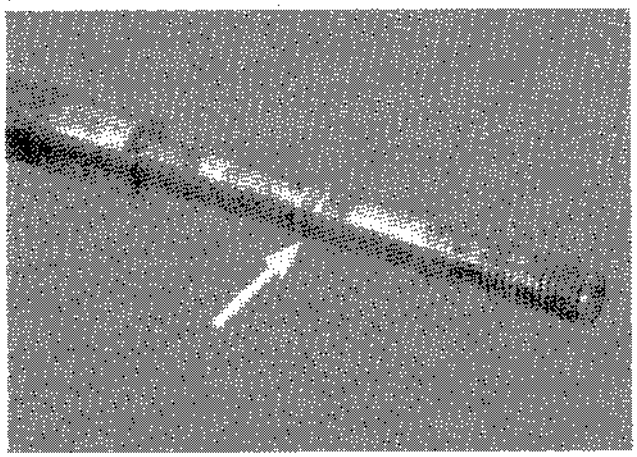
Coked (sludged) center housing failures are generally caused by high exhaust temperatures due to over-fueling, over-loading the engine, dirty engine oil, or plugged oil return. Also examine bearings for sludge.

Scored Bearing Surface



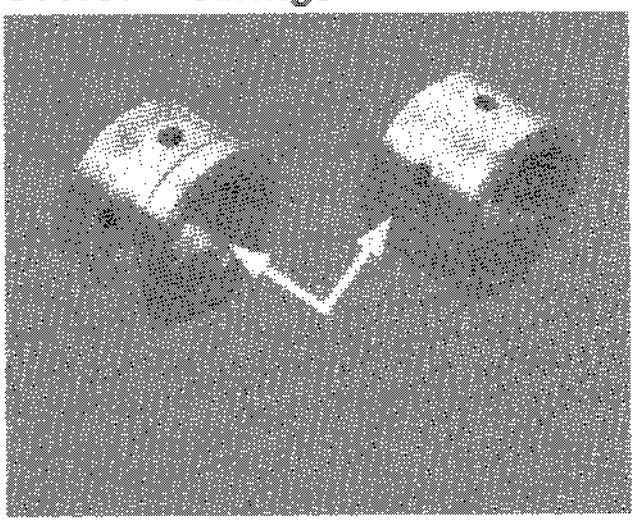
The bearing surfaces of this shaft were scored due to dirty engine oil. Evidence of a contaminated oil failure calls for careful, thorough examination of engine lube system.

Scored Turbine Shaft



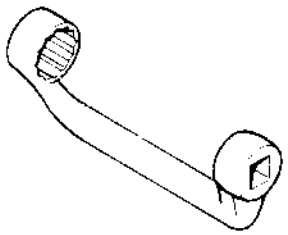
The scoring of this shaft was caused by a loose compressor wheel lock nut.

Scored Bearings

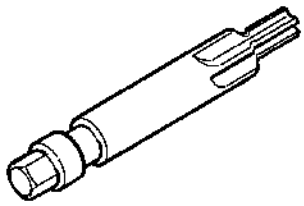


Scoring on the inside and outside surfaces of the bearings is definitely attributed to dirty engine oil.

SPECIAL TOOLS



1. CAS-1066A WRENCH
   SEE PAGE 7



2. CAS-1694 9 mm INJECTOR BORE CLEANING TOOL
3. CAS-2155 7 mm INJECTOR BORE CLEANING TOOL
   SEE PAGE 7

SPECIAL TORQUES

Injector Retaining Nut	55 to 65 Nm
Leak Off Bolt	8 Nm
Nozzle Cap Nut	55 Nm

GENERAL INFORMATION

The fuel injector sends a measured amount of fuel to the combustion chamber from the injection pump. Each quantity of fuel must be sent to the combustion chamber in the form of fine particles. This will make sure that there is complete combustion and efficient engine performance.

IMPORTANT: *The injector tip end and the injector valve are a matched assembly. The two parts are made smooth to fit together with accuracy. The injector tip or the injector valve cannot be replaced separately for service. If it is necessary to replace either the valve or tip, replace the complete tip assembly.*

IMPORTANT: *Do not mix tip assemblies and bodies while the injectors are being disassembled.*

INJECTOR BODY - The body holds the injector parts in the correct position in the cylinder head. The body has a high pressure channel and a leak off channel. The lower face of the body has a finished surface and has two holes in the surface for locating dowel pins.

INJECTOR VALVE - The valve controls the flow of the fuel from the injector.

VALVE STOP - The valve stop has two dowel pins which hold the valve tip to the body. This will make a spray pattern that is correct. Both faces of the valve stop have a fine surface finish. The valve stop controls the distance that the valve will move.

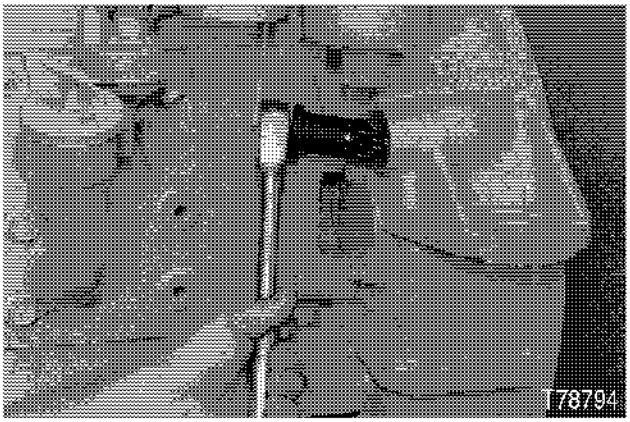
OPENING PRESSURE CONTROL SPRING - The spring controls the fuel pressure that is necessary to lift the valve from the seat.

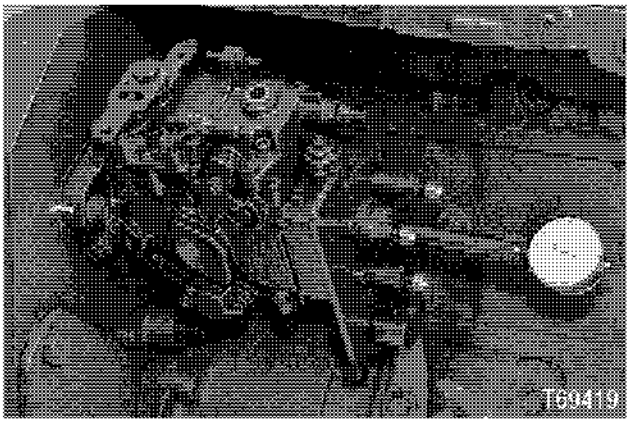
SHIMS - The shims push down on the spring to keep a given pressure on the valve.

INJECTOR TIP - The valve and the valve seat are in the injector tip. There are orifices in the injector tip that atomize the fuel for better combustion and separate the fuel spray to mix the fuel spray with air.

NOZZLE SEAL - The seal is under the cap nut and stops engine compression leakage.

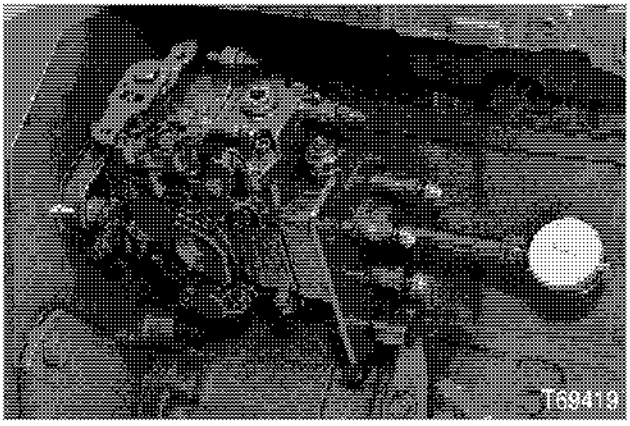
STEP 48





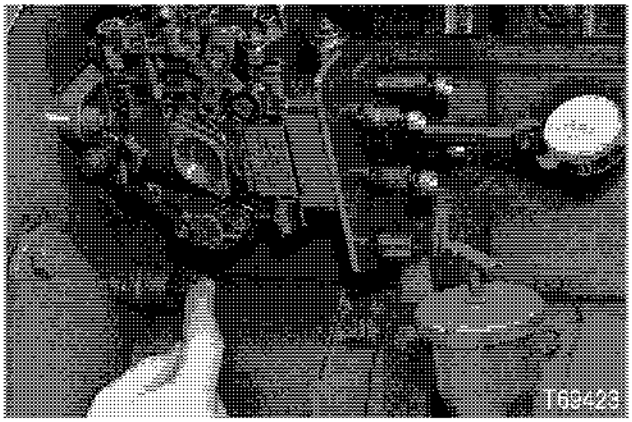
Install the engine turn over tool into the flywheel housing. Turn the engine counterclockwise until there is no movement in the dial indicator.

STEP 49



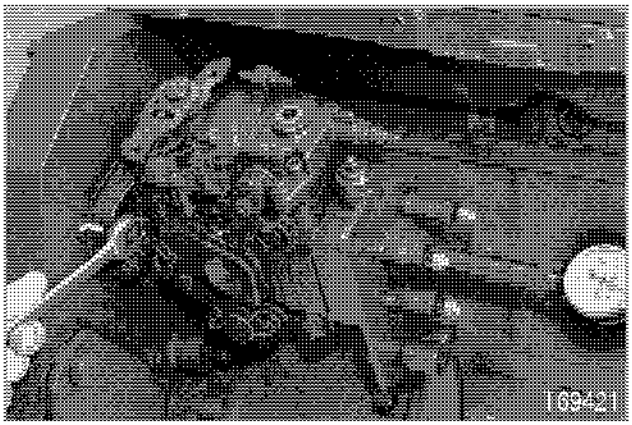
Turn the dial indicator dial to zero.

STEP 50



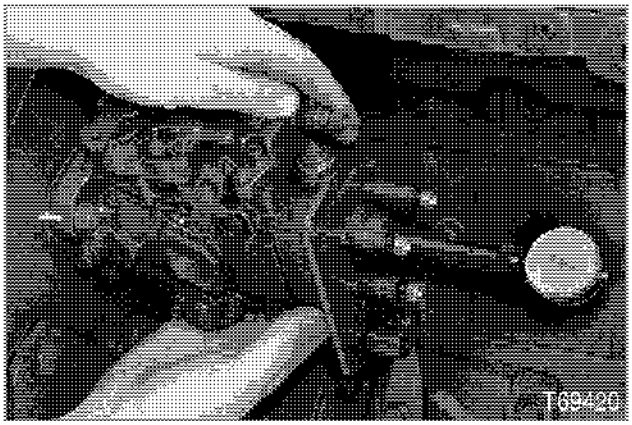
Push in on to the locking pin and turn the engine clockwise until the lock pin engages in the camshaft gear. The dial indicator must read 2.0 mm. If the reading is correct go to Step 53.

STEP 51



Loosen the bracket bolt and the nuts that hold the injection pump to the front cover.

STEP 52



Rotate the injection pump until the dial indicator reading is 2.0 mm.

NOTE: *If 2.0 mm can not be reached go to Step 44 in this section.*

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INTERLOCK SYSTEM

The XT Line of Skid Steers have an interlock system that requires the operator to be in the seat with the lap bar in the operating position and the ROPS latched before the loader controls can be activated and the parking brake releases.

This interlock consists of a power feed through a 10 amp fuse in the fuse block (8) to a seat switch (26) beneath the seat. This power feed flows to the right cluster terminal (31) to illuminate the operator presence lamp and also to the left cluster 6 pin connector (25), pin number 4 (cavity F) supplying input signal power to the seat timer.

When the seat switch closes, the seat timer powers the left cluster 6 pin connector, pin number 4 (cavity F) supplying power to the remainder of the interlock circuit. The seat timer maintains power at the seat timer output, pin number 3, for 2 seconds after the seat switch opens to allow the operator to momentarily rise from the seat while still maintaining control function.

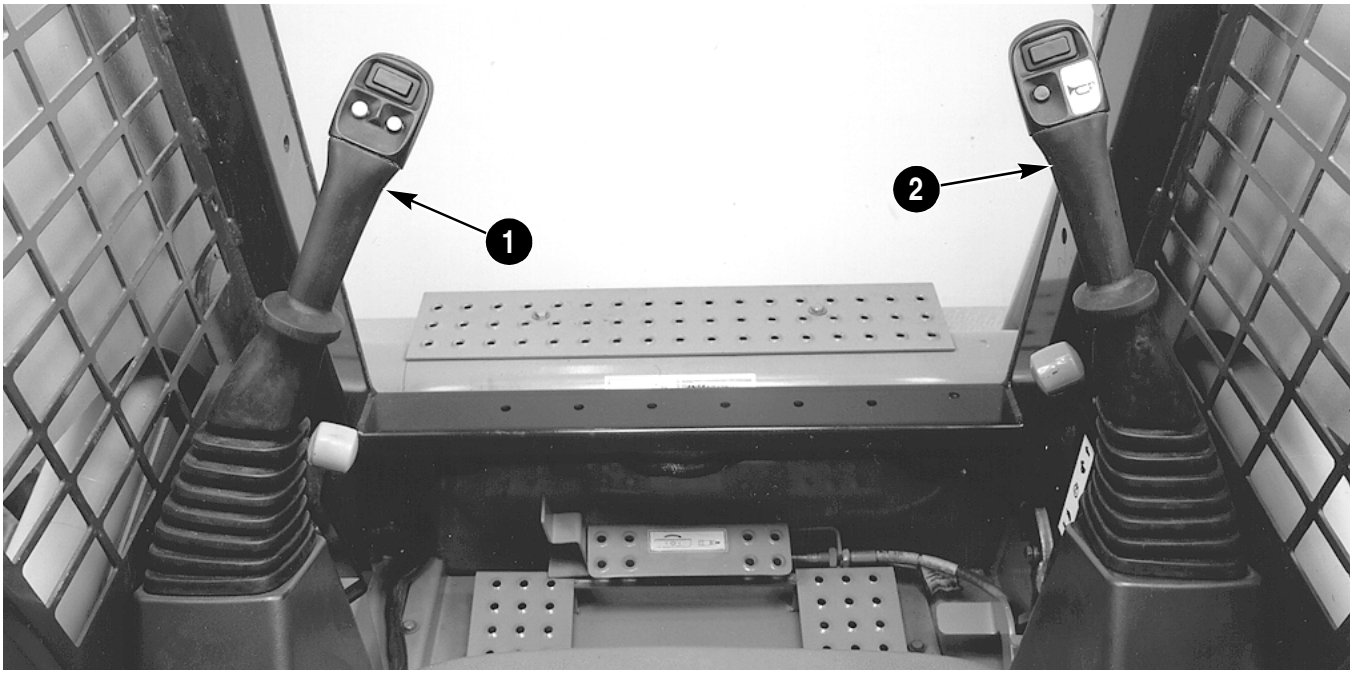
Power output from the left cluster 6 pin connector, pin number 3 travels to the seat plate switch (26A) then to the seat bar switch (27). With the ROPS latched (ROPS interlock switch plunger depressed), and the seat bar in the down position, power flows through the seat bar switch (27) to the right cluster to illuminate the seat bar indicator lamp and also to the control coil, terminal 85 of the interlock relay. This power feed to the control coil causes the interlock relay (7) to interconnect terminal 30 and terminal 87. Terminal 30 of the interlock relay receives power from the same 10 amp fuse that powers the seat switch.

The interlock system secures the loader control valve in neutral unless the operator is in the seat with the lap bar in the operating position and the ROPS is latched. There are solenoid valves (9) in the loader control valve that, when activated, release a plunger securing the spools in neutral. When the interlock relay closes, power flows to the loader valve solenoids. Between the interlock relay and the loader valve solenoids, the power flows through a diode (10) in a harness connector. This connector is in the harness to provide for a front door switch option and the diode acts only as a jumper across the terminals.

The interlock system also engages the parking brake. There is also a push-button control brake button (46) in the left hand control that can also engage the parking brake. Power for this circuit begins at terminal 87 of the interlock relay. Power then flows to the parking brake switch in the left hand control. Power then flows to the brake solenoid. The brake solenoid controls the release of the spring applied, hydraulically released parking brake.

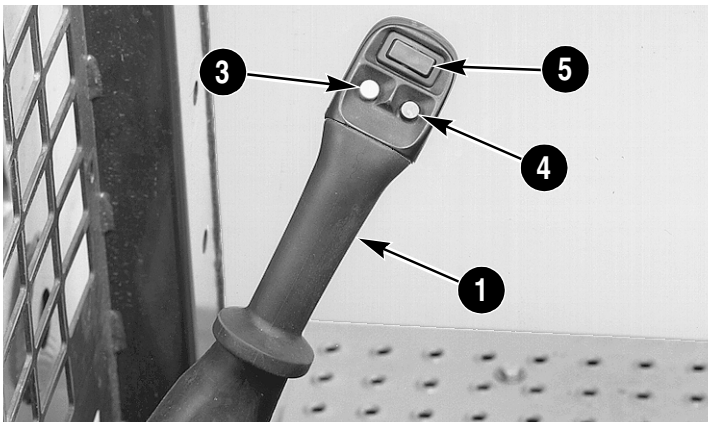
There is a parking brake indicator lamp in the left hand instrument cluster that requires a power feed to illuminate. This power flows through a normally closed pressure switch (24) in the brake disengage hydraulic line. This switch opens when the charge pressure is ported to the parking brake from the brake solenoid. Power for the brake pressure switch comes from the same 10 amp fuse that feeds the seat switch and the interlock relay. When the parking brake is engaged, power then flows to the left cluster, 6 pin connector, pin number 5 (cavity D), to illuminate the park brake indicator.

CONTROL LEVERS



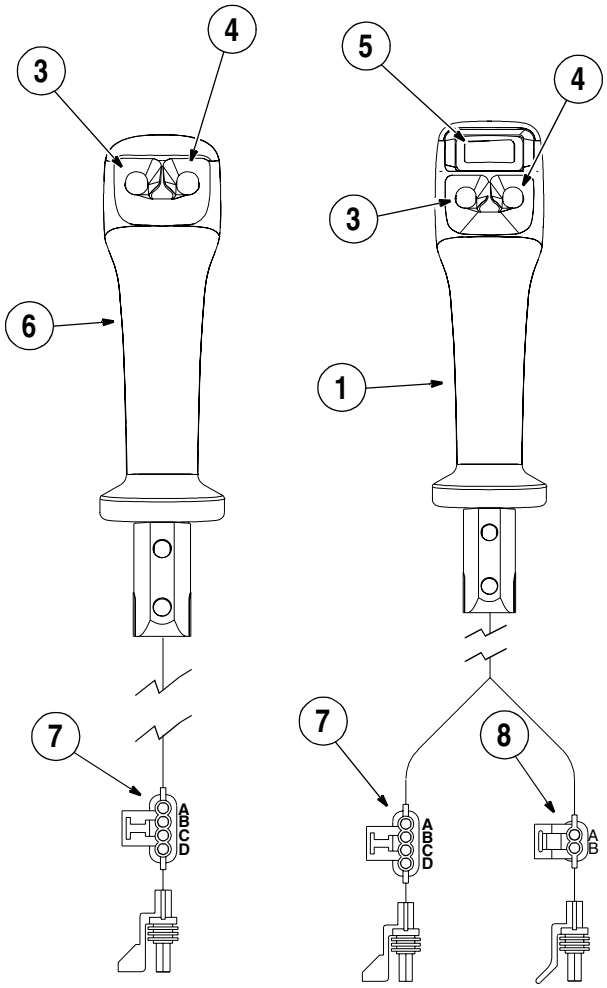
BP97B011

Left Hand Control Lever



BP97B012

1. LEFT HAND CONTROL LEVER (WITH HI-FLOW SWITCH)
2. RIGHT HAND CONTROL LEVER (WITH TURN SIGNAL OR AUXILIARY CONTROLS SWITCH)
3. BRAKE SWITCH, RED (PUSH BUTTON, ALTERNATE ACTION)
4. TWO SPEED SWITCH, BLACK (PUSH BUTTON, MOMENTARY ACTION)
5. HI-FLOW SWITCH (ROCKER SWITCH, MOMENTARY-OFF-DETENT)
6. LEFT HAND CONTROL LEVER (WITHOUT HI-FLOW SWITCH)
7. CONNECTOR G
8. CONNECTOR F



22 Brake Pressure Switch

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Turn the key switch to ON. Disconnect the wires from the brake pressure switch.*		
㉚ Terminal for wire 300A3 to ground	12 volts	Check the circuit between the brake pressure switch and the 10 ampere fuse in the fuse block (9). Also check the 10 ampere fuse and the fuse block (9).
NOTE: *Turn the key switch to OFF.*		
㉛ Between the terminals of the brake pressure switch.	Continuity	Bad brake pressure switch.

23 LH Instrument Panel (6 Pin Connector)

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Disconnect the connector from the instrument panel. Make sure the ROPS is latched. Have another person sit in the operators seat. Put the seat bar in the down position. Turn the key switch to ON.*		
㉜ Terminal C (303A) in connector to ground	80 to 95 ohms	Check the circuit between the connector and the seat bar switch (25). Also check the seat bar switch (25).
NOTE: *Have another person sit in the operator's seat.*		
㉝ Terminal F (303) in connector to ground	12 volts	Check the circuit between the connector and the seat switch (24). Also check the seat switch (24).
㉞ Terminal D (258 in connector to ground	12 volts	Check the circuit between the connector and the brake pressure switch (22). also check the brake pressure switch (22).

53 LT Indicator Diode

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Disconnect the diode from the connector.*		
㉒ Between the terminals of the diode	Continuity in one direction only.	Bad diode

54 RT Indicator Diode

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Disconnect the diode from the connector.*		
㉓ Between the terminals of the diode	Continuity in one direction only.	Bad diode

55 Turn Signal Switch or Auxiliary Control Switch

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Turn the key switch to ON. Disconnect the connector from the RH handle.*		
㉔ Terminal for wire 890 to ground	12 volts	Check the circuit between the turn signal switch or auxiliary control switch and the 10 ampere fuse in the fuse block (9). Also check the fuse block (9).
NOTE: *Re-connect the connector. Put the turn signal switch in the left turn position*		
㉕ Terminal for wire 756 to ground	12 volts	Bad turn signal switch or auxiliary control switch.
NOTE: *Put the turn signal switch in the right turn position*		
㉖ Terminal for wire 757 to ground	12 volts	Bad turn signal switch or auxiliary control switch.

NOTE: *If the readings are good, the problem is elsewhere.*

73 Air Conditioner Control Relay

Check Points	Reading	Possible Cause of Bad Readings
㉕ Terminal for wire 178A8 to ground	Continuity	Bad ground circuit.

NOTE: *Turn the key switch to ON. Turn the blower switch to LOW. Turn the air conditioner switch to ON. Set thermostat switch to coldest temperature setting.*

㉖ Terminal for wire 802 to ground	12 volts	Check the circuit between the air conditioner control relay and the thermostat switch (78). Also check the thermostat switch (78).
㉗ Terminal for wire 804C to ground	12 volts	Check the circuit between the air conditioner control relay and the low pressure switch (72). Also check the low pressure switch (72).
㉘ Terminal for wire 804 to ground	12 volts	Bad air conditioner control relay.

NOTE: *If the readings are not correct, replace the air conditioner control relay.*

74 Air Conditioner Switch

Check Points	Reading	Possible Cause of Bad Readings

NOTE: *Turn the key switch to ON. Turn the blower switch to LOW. Turn the air conditioner switch to ON. Set thermostat switch to coldest temperature setting.*

㉙ Terminal for wire 800 to ground	12 volts	Check the circuit between the air conditioner switch and the fan speed switch (71). Also check the fan speed switch (71).

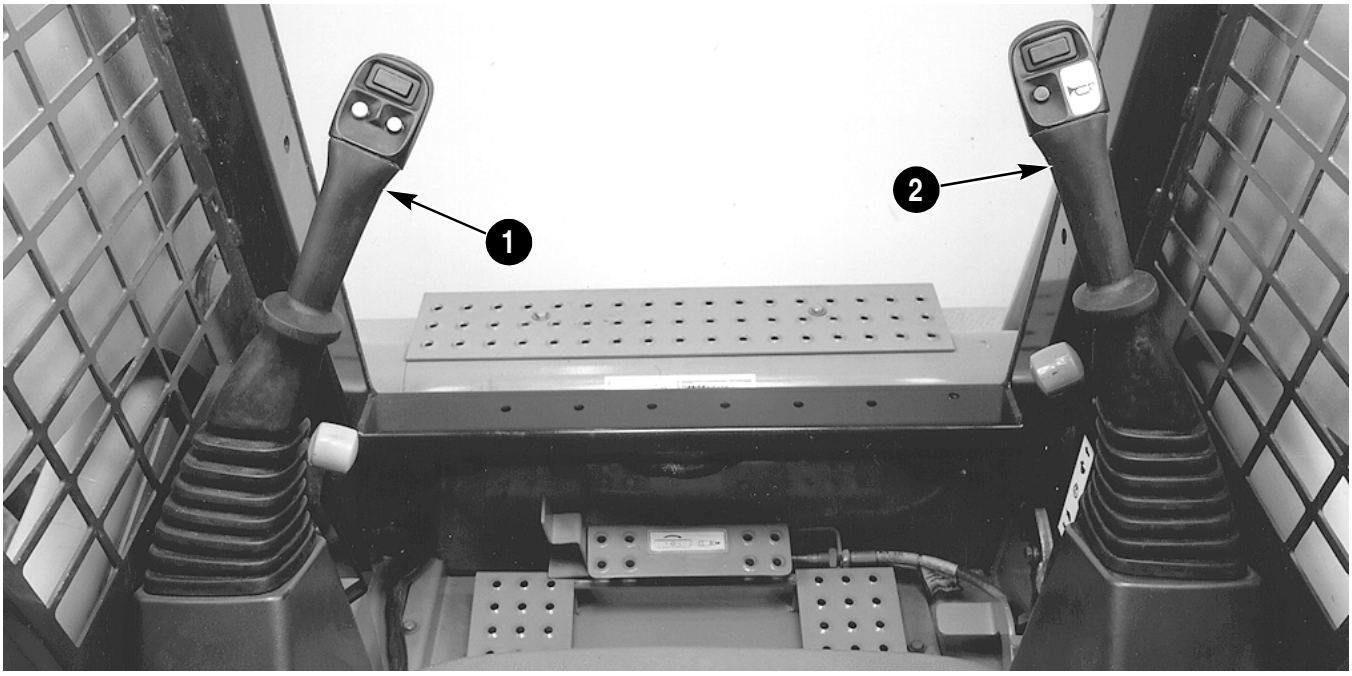
NOTE: *Turn the key switch to OFF. Disconnect the connector from the air conditioner switch. Put the air conditioner switch in the OFF position.*

㉚ Between the terminals of the air conditioner switch	Open	Bad air conditioner switch.

NOTE: *Put the air conditioner switch in the ON position.*

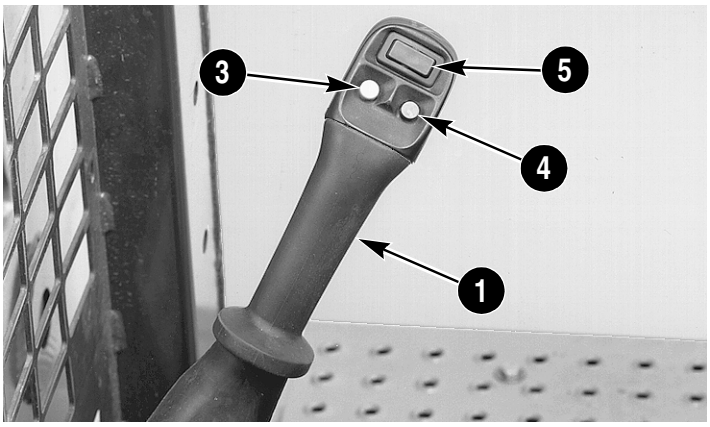
㉛ Between the terminals of the air conditioner switch	Continuity	Bad air conditioner switch.

CONTROL LEVERS



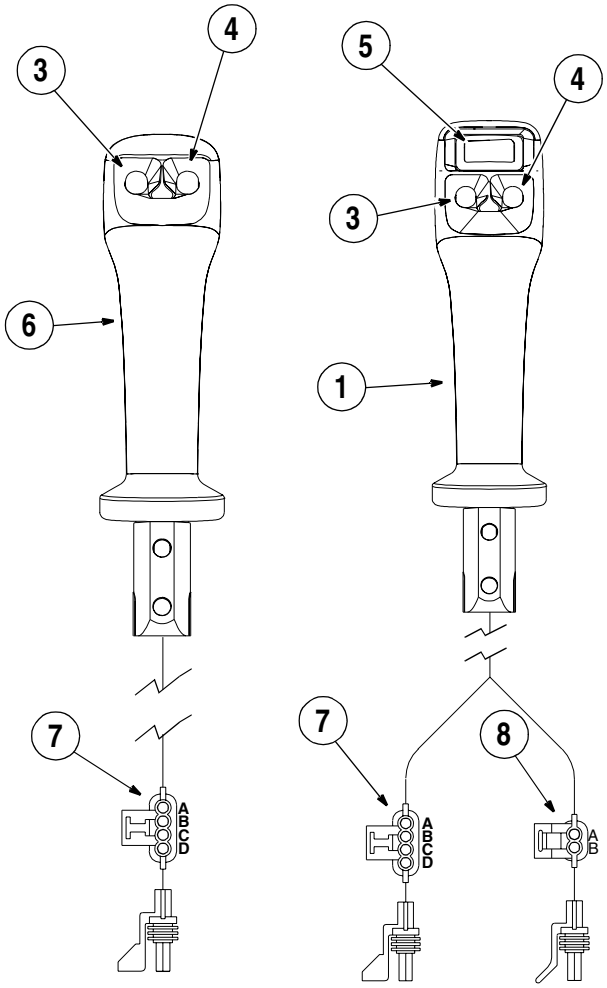
BP97B011

Left Hand Control Lever



BP97B012

1. LEFT HAND CONTROL LEVER (WITH HI-FLOW SWITCH)
2. RIGHT HAND CONTROL LEVER (WITH TURN SIGNAL OR AUXILIARY CONTROLS SWITCH)
3. BRAKE SWITCH, RED (PUSH BUTTON, ALTERNATE ACTION)
4. TWO SPEED SWITCH, BLACK (PUSH BUTTON, MOMENTARY ACTION) (90XT and 95XT)
5. HI-FLOW SWITCH (ROCKER SWITCH, MOMENTARY-OFF-DETENT)
6. LEFT HAND CONTROL LEVER (WITHOUT HI-FLOW SWITCH)
7. CONNECTOR G
8. CONNECTOR F



22 Brake Pressure Switch

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Turn the key switch to ON. Disconnect the wires from the brake pressure switch.*		
㉚ Terminal for wire 300A3 to ground	12 volts	Check the circuit between the brake pressure switch and the 10 ampere fuse in the fuse block . Also check the 10 ampere fuse and the fuse block .
NOTE: *Turn the key switch to OFF.*		
㉛ Between the terminals of the brake pressure switch.	Continuity	Bad brake pressure switch.

23 LH Instrument Panel (6 Pin Connector)

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Disconnect the connector from the instrument panel. Make sure the ROPS is latched. Have another person sit in the operators seat. Put the seat bar in the down position. Turn the key switch to ON.*		
㉜ Terminal F (303A) in connector to ground	80 to 95 ohms	Check the circuit between the connector and the ROPS switch (24A). Also check the ROPS switch (24A).
NOTE: *Have another person sit in the operator's seat.*		
㉝ Terminal C (303) in connector to ground	12 volts	Check the circuit between the connector and the seat switch . Also check the seat switch .
㉞ Terminal A (258 in connector to ground	12 volts	Check the circuit between the connector and the brake pressure switch . also check the brake pressure switch .

53 LT Indicator Diode

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Disconnect the diode from the connector.*		
㉒ Between the terminals of the diode	Continuity in one direction only.	Bad diode

54 RT Indicator Diode

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Disconnect the diode from the connector.*		
㉓ Between the terminals of the diode	Continuity in one direction only.	Bad diode

55 Turn Signal Switch or Auxiliary Control Switch

Check Points	Reading	Possible Cause of Bad Readings
NOTE: *Turn the key switch to ON. Disconnect the connector from the RH handle.*		
㉔ Terminal for wire 890 to ground	12 volts	Check the circuit between the turn signal switch or auxiliary control switch and the 10 ampere fuse in the fuse block (9). Also check the fuse block (9).
NOTE: *Re-connect the connector. Put the turn signal switch in the left turn position*		
㉕ Terminal for wire 756 to ground	12 volts	Bad turn signal switch or auxiliary control switch.
NOTE: *Put the turn signal switch in the right turn position*		
㉖ Terminal for wire 757 to ground	12 volts	Bad turn signal switch or auxiliary control switch.

NOTE: *If the readings are good, the problem is elsewhere.*

73 Air Conditioner Control Relay

Check Points	Reading	Possible Cause of Bad Readings
㉕ Terminal for wire 178A8 to ground	Continuity	Bad ground circuit.

NOTE: *Turn the key switch to ON. Turn the blower switch to LOW. Turn the air conditioner switch to ON. Set thermostat switch to coldest temperature setting.*

㉖ Terminal for wire 802 to ground	12 volts	Check the circuit between the air conditioner control relay and the thermostat switch (78). Also check the thermostat switch (78).
㉗ Terminal for wire 804C to ground	12 volts	Check the circuit between the air conditioner control relay and the low pressure switch (72). Also check the low pressure switch (72).
㉘ Terminal for wire 804 to ground	12 volts	Bad air conditioner control relay.

NOTE: *If the readings are not correct, replace the air conditioner control relay.*

74 Air Conditioner Switch

Check Points	Reading	Possible Cause of Bad Readings

NOTE: *Turn the key switch to ON. Turn the blower switch to LOW. Turn the air conditioner switch to ON. Set thermostat switch to coldest temperature setting.*

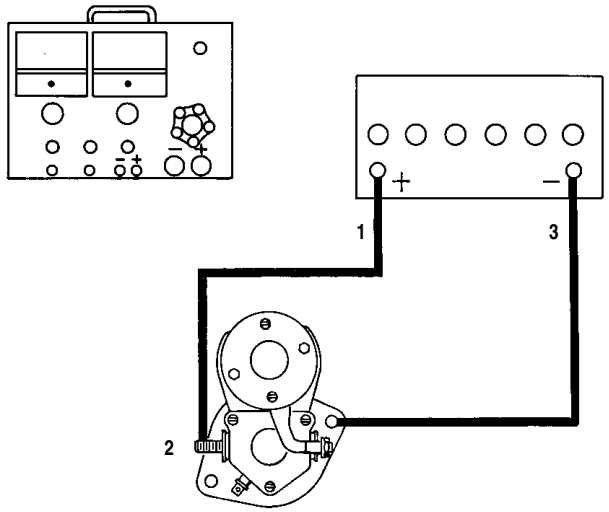
㉙ Terminal for wire 800 to ground	12 volts	Check the circuit between the air conditioner switch and the fan speed switch (71). Also check the fan speed switch (71).

NOTE: *Turn the key switch to OFF. Disconnect the connector from the air conditioner switch. Put the air conditioner switch in the OFF position.*

㉚ Between the terminals of the air conditioner switch	Open	Bad air conditioner switch.

NOTE: *Put the air conditioner switch in the ON position.*

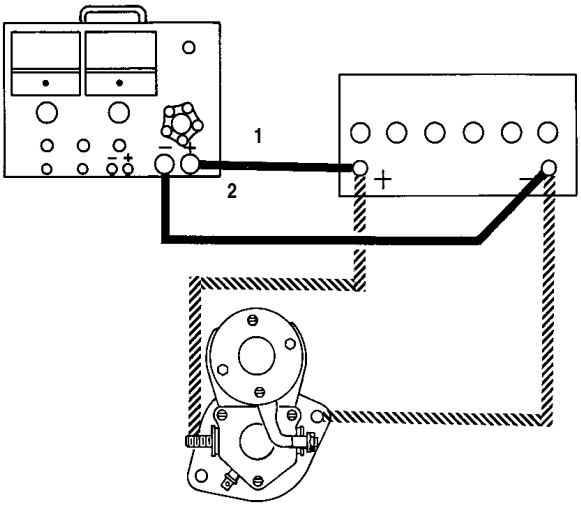
㉛ Between the terminals of the air conditioner switch	Continuity	Bad air conditioner switch.



B831430J

1. 1. POSITIVE BATTERY CABLE
2. 2. BATTERY TERMINAL
3. 3. NEGATIVE BATTERY CABLE

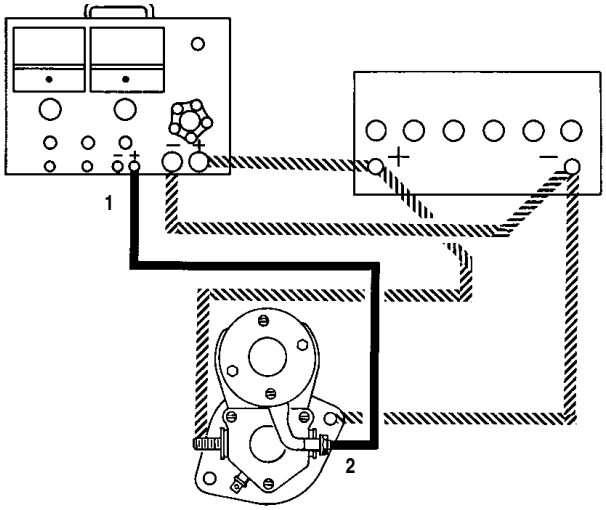
4. Connect the positive load cable to the positive post of the battery. Connect the negative load cable to the negative post.



B831431J

1. 1. POSITIVE LOAD CABLE
2. 2. NEGATIVE LOAD CABLE

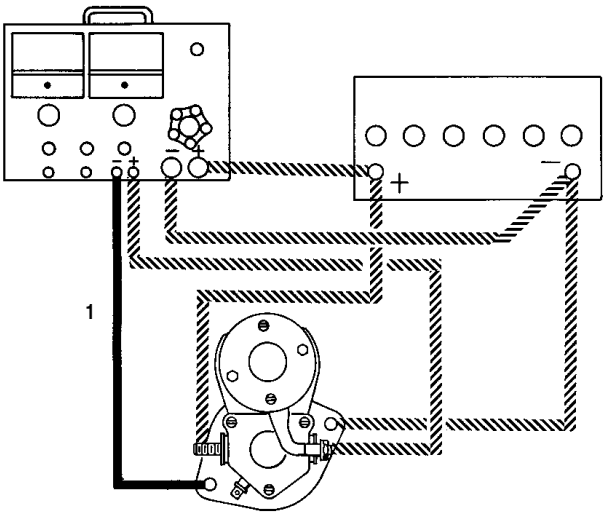
5. Connect the red voltmeter lead to the motor terminal on the starter solenoid.



B831432J

1. 1. RED VOLTMETER LEAD
2. 2. MOTOR TERMINAL

6. Connect the black voltmeter lead to the mounting flange on the starter.



B831433J

1. 1. BLACK VOLTMETER LEAD

7. Fasten the ammeter clamp around the positive battery cable so that the tip of the arrow is toward the starter.

STEP 54

B330731M

Install the cable, lock washer, and nut on the motor terminal. Tighten the nut.

STEP 55

Pull the boot over the motor terminal.

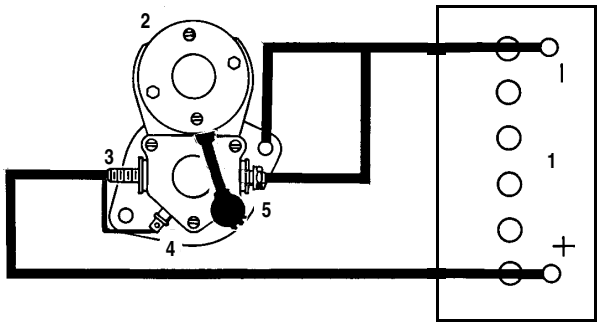
STARTER SOLENOID TEST

This test will check the condition of the pull-in winding and the hold-in winding in the starter solenoid.

The jumper cable connected to the starter mounting flange and the motor terminal must have a common connection at the negative battery post.

Starter Solenoid Test Procedure

1. Remove the rubber boot from the motor terminal. Remove the nut and lock washer from the motor terminal. Then remove the wire from the motor terminal.
2. Connect a jumper cable to the positive battery post of a fully charged 12 volt battery. Connect the other end of the jumper cable to the battery terminal in the starter solenoid housing.



B831438R

1. 12 VOLT BATTERY
2. STARTER
3. BATTERY TERMINAL
4. SWITCH TERMINAL
5. MOTOR TERMINAL

3. Connect a jumper wire to the battery terminal and the switch terminal in the starter solenoid housing. The jumper wire must be made from No. 10 or larger wire.
4. Connect the jumper cable with the common connection to the starter mounting flange and the motor terminal in the starter solenoid housing.

NOTE: *Steps 5 and 7 must be done in a maximum of 15 seconds to prevent damage to the pull-in winding and the hold-in winding.*

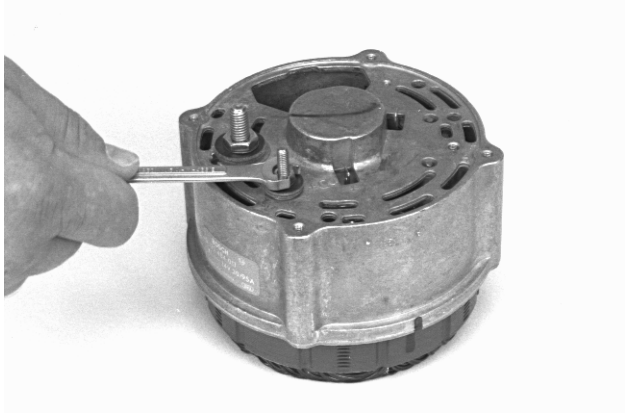
5. Connect the jumper cable with the common connection to the negative battery post. The pinion gear on the starter drive must come all the way out rapidly and with force.
6. If the pinion gear did not come out rapidly and with force, the pull-in winding is damaged. The complete starter solenoid housing assembly must be replaced.
7. Disconnect the jumper cable from the motor terminal in the starter solenoid housing. The pinion gear on the starter drive must not move toward the starter drive housing.
8. If the pinion gear started to move toward the starter drive housing, the hold-in winding is damaged. The complete starter solenoid housing assembly must be replaced.

STEP 44

B8971607M

Check for a short circuit between the B+ terminal and the housing. If there is continuity, the insulator is bad.

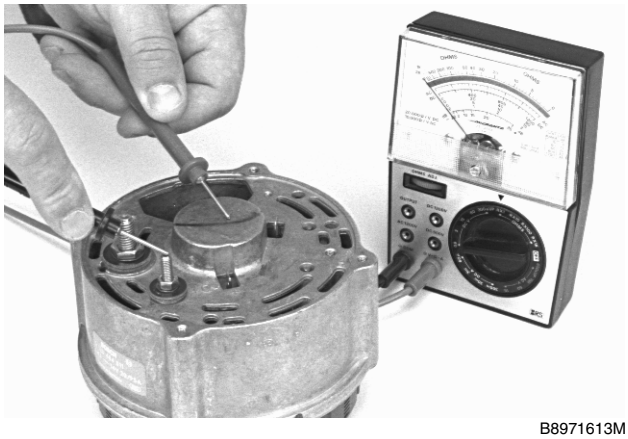
STEP 45



B8971610M

Install the fiber washers, flat washer, and nut on the D+ terminal.

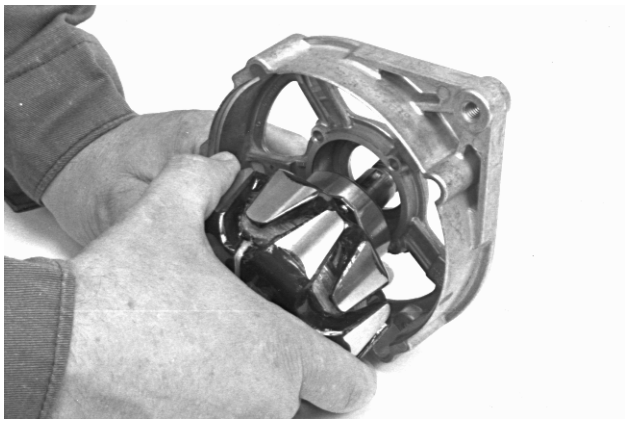
STEP 46



B8971613M

Check for a short circuit between the D+ terminal and the housing. If there is continuity, the insulator is bad.

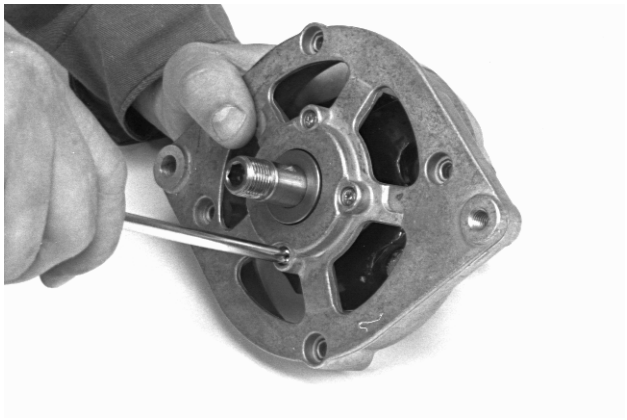
STEP 47



B8971301M

Install the rotor in the cover.

STEP 48



B8971508M

Install and tighten the screws that fasten the bearing retainer and rotor to the cover.

STEP 49

B8971231M

Make sure the marks are in alignment and install the cover and rotor in the stator and housing.

Hydraulic Pump / Constant Pressure Priority Valve

A Sauer / Sundstrand gear pump, supplies oil for the hydraulic and hydrostatic systems. Full pump flow enters an integral constant pressure priority valve, sending priority flow of approximately (4.8 to 6) gpm to the charge port, supplying make-up oil to the closed-loop of the hydrostatic system, when the unit is in motion. When the hydrostatic system is in neutral, very little oil will flow to the hydrostatic system. The remaining pump flow is then diverted to the equipment port for use in the hydraulic system, for loader, bucket, auxiliary and power beyond circuits. Return oil from the hydraulic system passes through the filter and cooler before returning to the reservoir.

The hydraulic pump is mounted to the hydrostatic tandem pump. The hydrostatic tandem pump is coupled directly to the engine and driven by the flywheel.

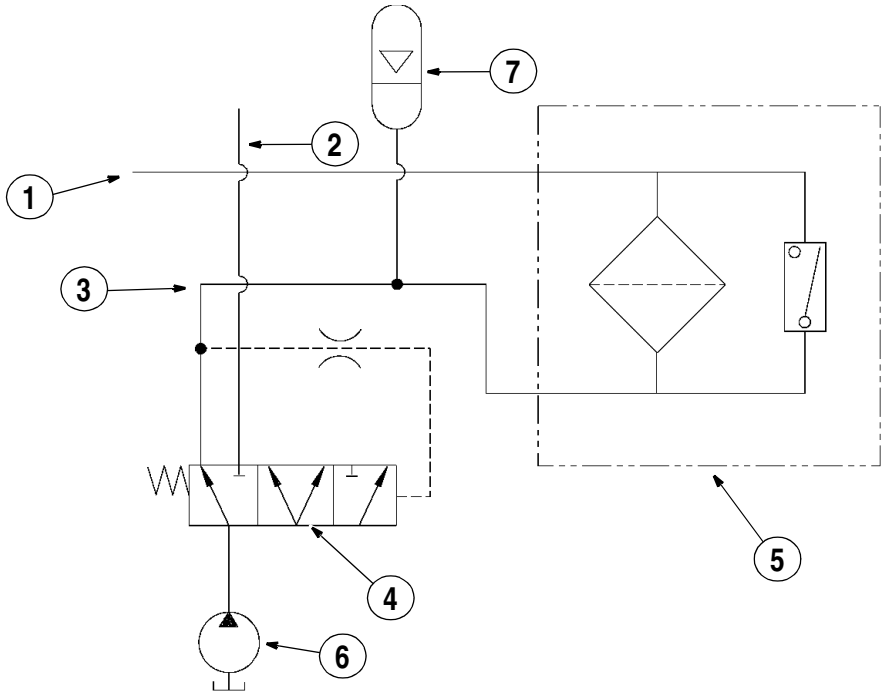
Constant Pressure Priority Valve

The constant pressure priority valve assembly receives all flow from the hydraulic pump mounted on the rear of the hydrostatic tandem pump assembly. A flow of up to approximately (4.8 to 6) gpm at 24 bar (350 psi) is sent through the priority port to charge the tandem pump assembly when the unit is in motion. The remaining pump flow is sent to the non-priority port for use in the hydraulic system.

Operation: Hydraulic pump flow enters the center section of the flow divider assembly between the priority and non-priority ports. The priority port will be called the charge port and the non-priority port will be called the equipment port. The priority spool is shifted to the left by the pressure regulator spring. At start-up, all of the pump flow is available to enter the charge port. As pressure builds in the charge port, the same pressure is sensed in the drilled passage of the priority spool. Oil pressure builds in the drilled passage, moving the priority spool against spring force to regulate charge port pressure.

Charge flow supplies oil to make-up for internal leakage from the closed-loop of the hydrostatic pump, release vehicle brakes, change vehicle speed range and release the loader control valve spool lock rod.

Remaining flow not used to maintain the charge circuit is directed to the equipment port, for use in the hydraulic system.



BT99F007

1. CHARGE FLOW TO TANDEM PUMP
2. EQUIPMENT CIRCUIT FLOW
3. CHARGE FLOW TO FILTER
4. CONSTANT PRESSURE PRIORITY VALVE
5. CHARGE FILTER
6. CHARGE HYDRAULIC PUMP/LOADER PUMP
7. ACCUMULATOR

90XT and 95XT Planetary Gear Reducer

On 90XT and 95XT units, the hydrostatic drive motor is of piston design with virtually the same internal rotating components as the pump. To provide increased drive torque to the chain drive system, a planetary gear drive assembly is positioned between the motor and the chain system.

The planetary assembly is self contained and mounts to the inside surface of the chain case. The planetary assembly has an output shaft which is supported with tapered roller bearings. The ring gear and the motor mounting cover are attached to the output housing with ten bolts. Because of the orientation of the motor mounting housing to the output housing, it is necessary to mark their positions prior to disassembly.

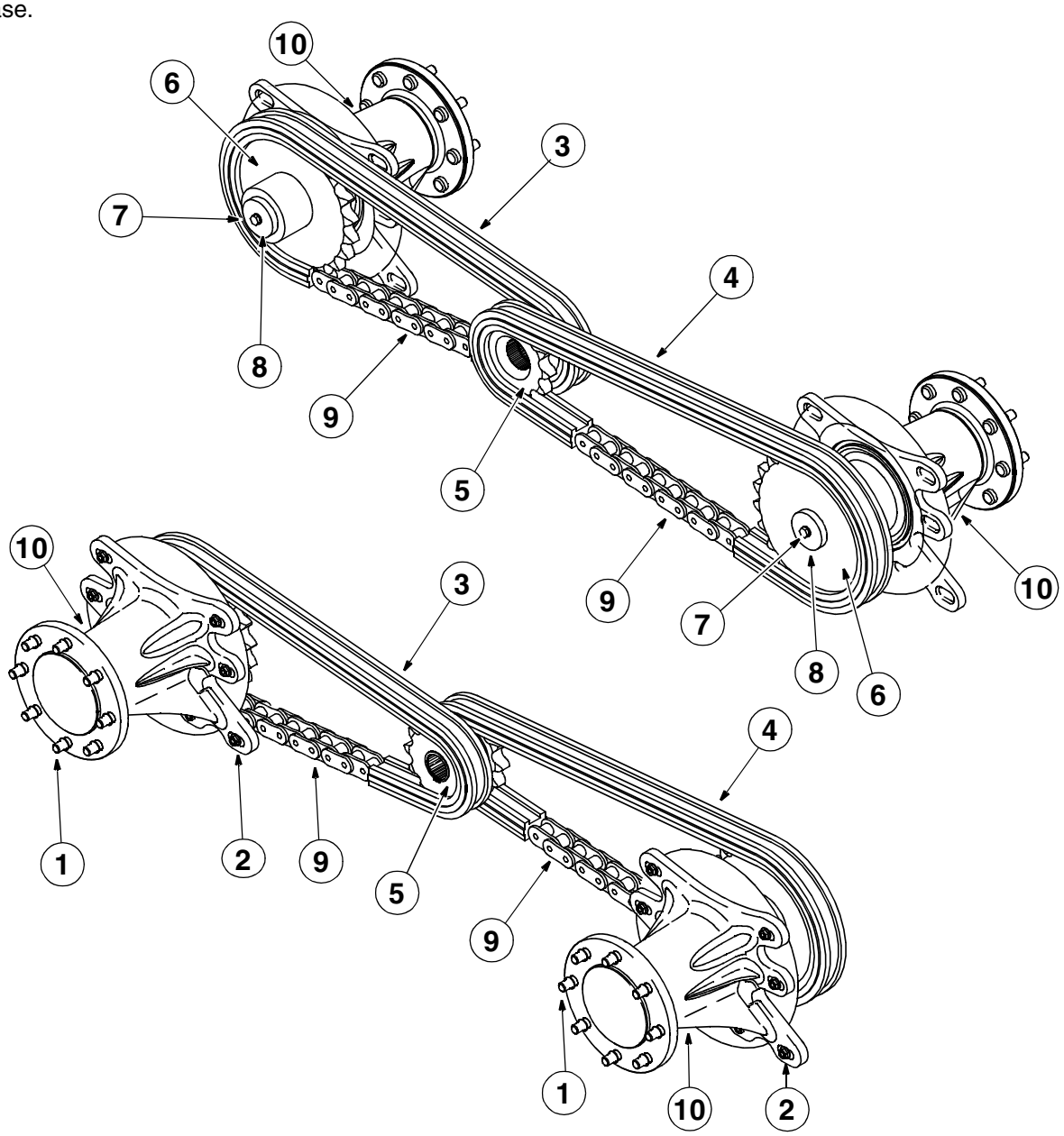
The case drain flow from the motor flows through the front motor bearing and into the planetary gear reducer before returning to tank. This provides a continuous supply and exchange of lubrication oil.

Chain Drive System

The chain drive system on the Case XT Skid Steers is very similar. The 90XT and 95XT units use 120 size drive chain. The 85XT uses 100 size drive chain. On these units, the hydrostatic drive system is mounted to the inside face of the chain tank, approximately midway between the drive axles. A smaller dual drive sprocket is splined to the motor drive shaft, which in turn drives a large sprocket at each axle through the drive chain. The axle housing supports the axle assembly to the chassis. An O-ring is used to seal between the axle housing and the chain case.

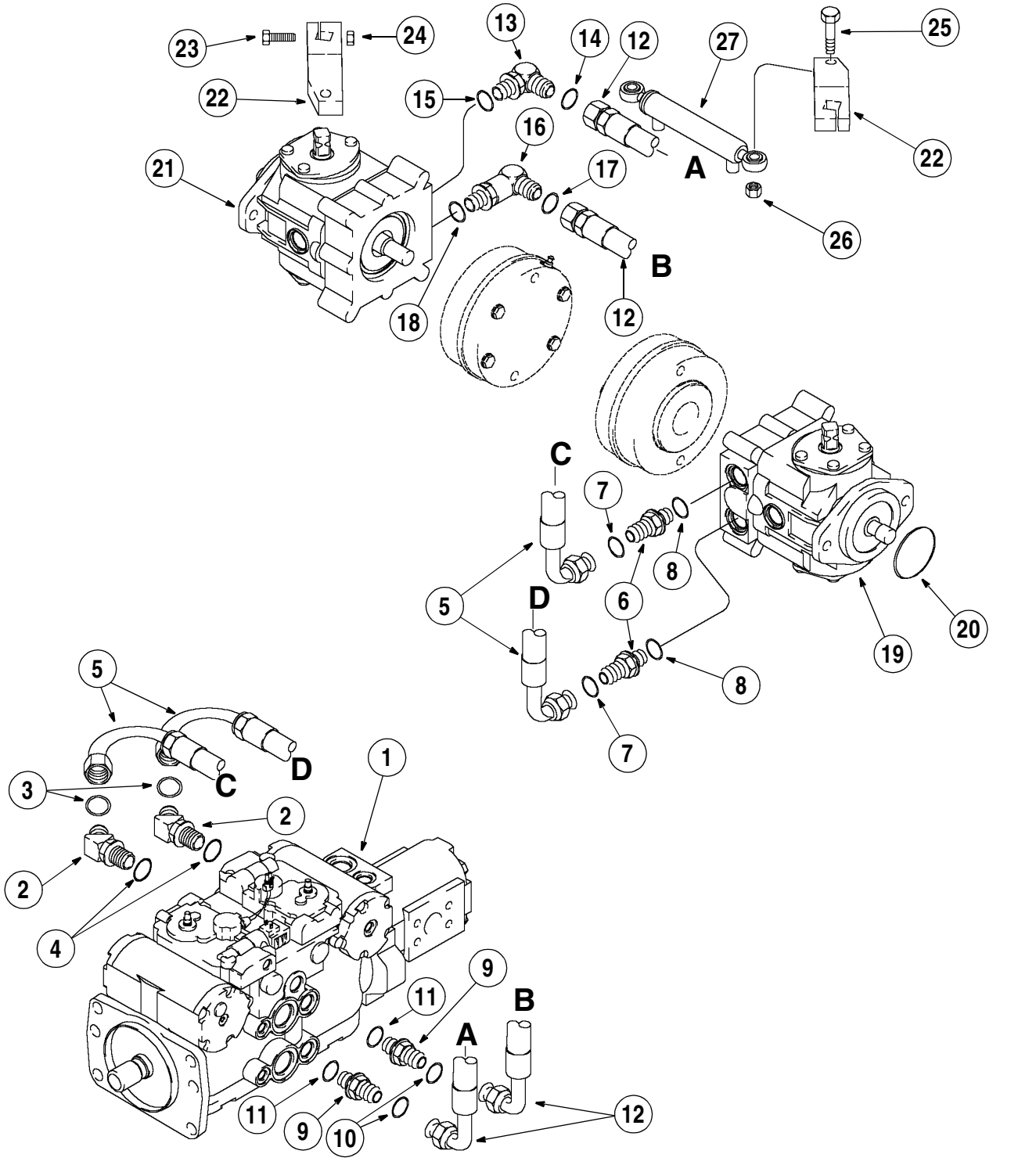
The O-ring may be retained in the groove with a small amount of grease. Do not lubricate the surface between one housing and chain case, as this may cause the axle to slide inward under heavy load.

The drive systems are mounted stationary between the drive axles, and the axle housings have slotted holes where they are mounted to the chassis. The slotted holes allow movement of the axle assembly to adjust the chain tension.



BT96M075

1. WHEEL NUTS/STUDS
2. AXLE HOUSING NUTS
3. REAR ROLLER CHAIN
4. FRONT ROLLER CHAIN
5. DRIVE SPROCKET
6. DRIVEN SPROCKET
7. CAP SCREW
8. WASHER
9. CENTER OF SLACK SIDE OF CHAIN
10. AXLE HOUSING



GS99J610

1. TANDEM PUMP
2. ELBOW
3. O-RING
4. O-RING
5. HOSE
6. ADAPTER
7. O-RING
8. O-RING
9. ADAPTER
10. O-RING
11. O-RING
12. HOSE
13. ELBOW
14. O-RING
15. O-RING
16. ELBOW
17. O-RING
18. O-RING
19. RH HYDRAULIC MOTOR
20. O-RING
21. LH HYDRAULIC MOTOR
22. SHIFT ARM
23. BOLT
24. LOCK NUT
25. BOLT
26. LOCK NUT
27. CYLINDER

90XT/95XT - TANDEM (HYDROSTATIC) PUMP AND (TWO SPEED) HYDRAULIC (DRIVE) MOTOR

HYDRAULIC SYSTEM TROUBLESHOOTING

Checking Charge Pressure/Flow

Charge Pressure Test Readings (In Neutral)

Rated RPM Charge Pressure _____

Rated RPM Left Side Drive Pump Forward Direction Flow Test

Drive System Neutral Auxiliary Hydraulic Flow _____
Forward Direction Minimum Load Auxiliary Hydraulic Flow _____
Forward Direction Full Load Auxiliary Hydraulic Flow _____
Difference between minimum and full load flow _____

Rated RPM Left Side Drive Pump Reverse Direction Flow Test

Drive System Neutral Auxiliary Hydraulic Flow _____
Reverse Direction Minimum Load Auxiliary Hydraulic Flow _____
Reverse Direction Full Load Auxiliary Hydraulic Flow _____
Difference between minimum and full load flow _____

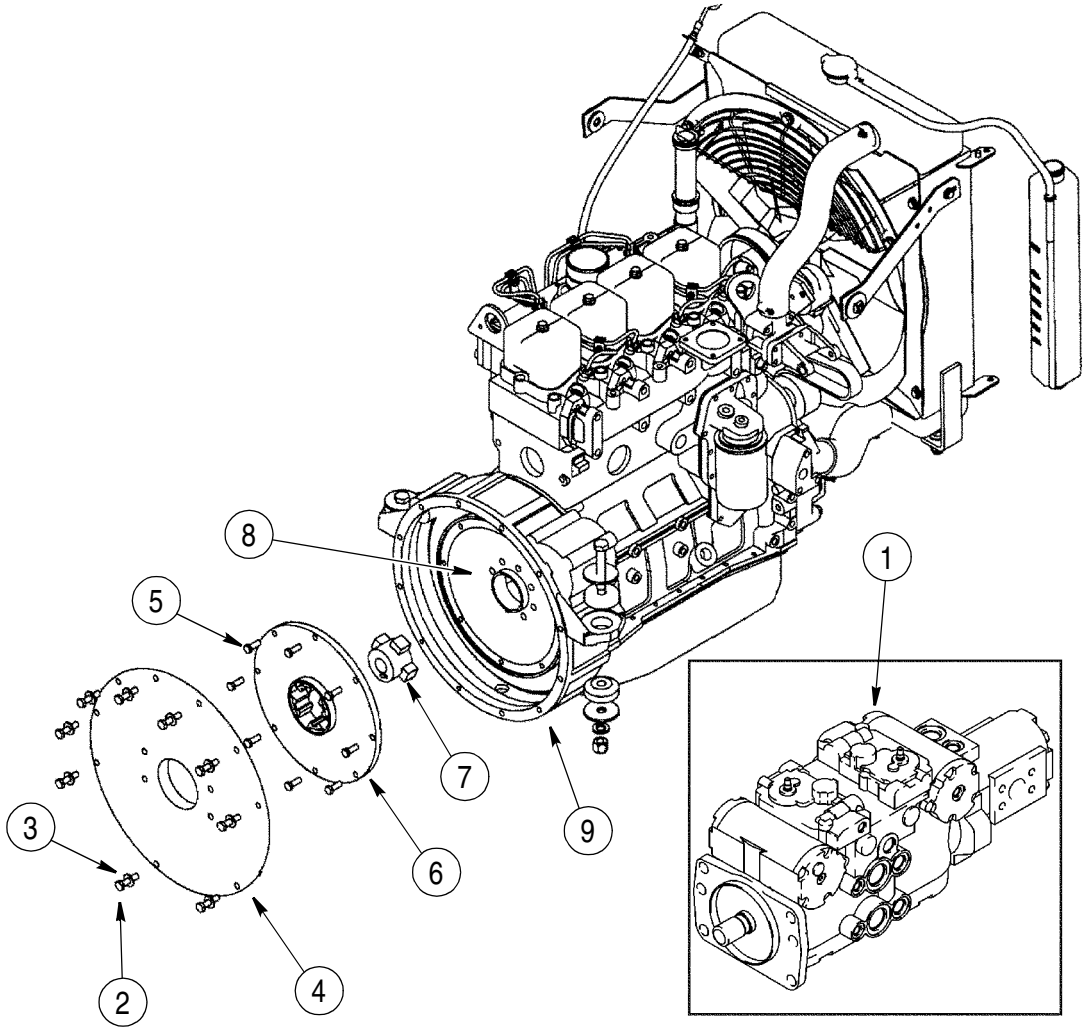
Rated RPM Right Side Drive Pump Forward Direction Flow Test

Drive System Neutral Auxiliary Hydraulic Flow _____
Forward Direction Minimum Load Auxiliary Hydraulic Flow _____
Forward Direction Full Load Auxiliary Hydraulic Flow _____
Difference between minimum and full load flow _____

Rated RPM Right Side Drive Pump Reverse Direction Flow Test

Drive System Neutral Auxiliary Hydraulic Flow _____
Reverse Direction Minimum Load Auxiliary Hydraulic Flow _____
Reverse Direction Full Load Auxiliary Hydraulic Flow _____
Difference between minimum and full load flow _____

Rated RPM: 7.57 litre/min (2gpm) maximum flow loss allowed, between minimum load flow reading and system loaded reading in either direction of travel.



BS03H016

1. TANDEM PUMP
2. BOLT
3. WASHER
4. PUMP MOUNTING PLATE
5. BOLT
6. PUMP DRIVE FLANGE
7. PUMP DRIVE COUPLER HUB
8. FLYWHEEL
9. HOUSING

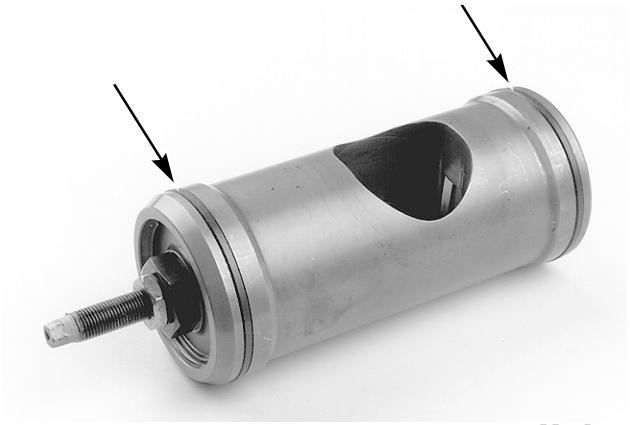
DRIVE COUPLING
(85XT MACHINES WITH P.I.N. JAF0352525 AND AFTER)
(90XT MACHINES WITH P.I.N. JAF0353008 AND AFTER)
(95XT MACHINES WITH P.I.N. JAF0342625 AND AFTER)

STEP 49

BP97D125

If the needle bearing for the cam follower is to be removed, use an acceptable driver to drive the needle bearing out of the cam follower.

STEP 50



BP97D197

Remove the piston rings from the servo piston.

STEP 51

BP97D130

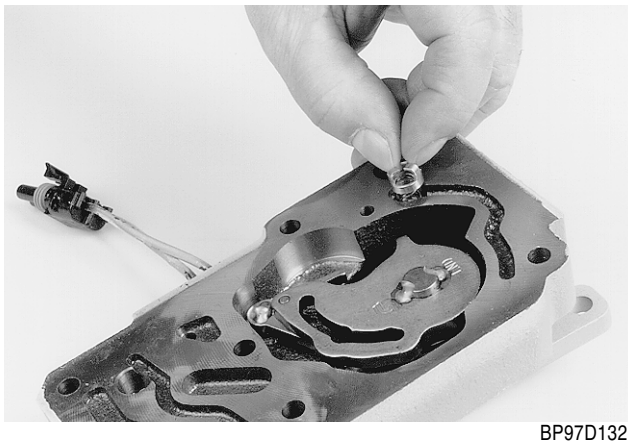
Loosen one of the check ball retainers in the control housing.

STEP 52

BP97D131

Remove the check ball retainer, the spring, and the ball from the control housing.

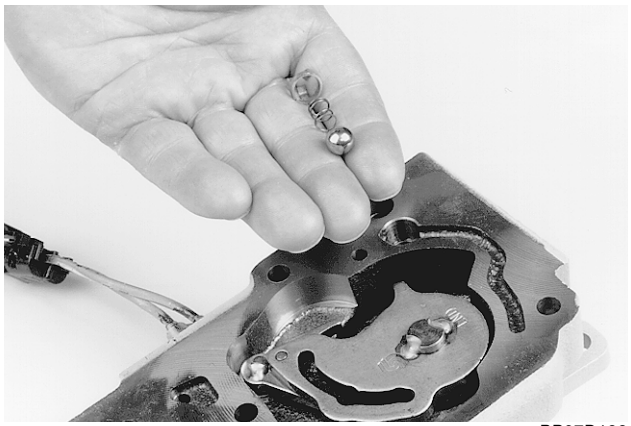
STEP 53



BP97D132

Loosen the other check ball retainer.

STEP 54



BP97D133

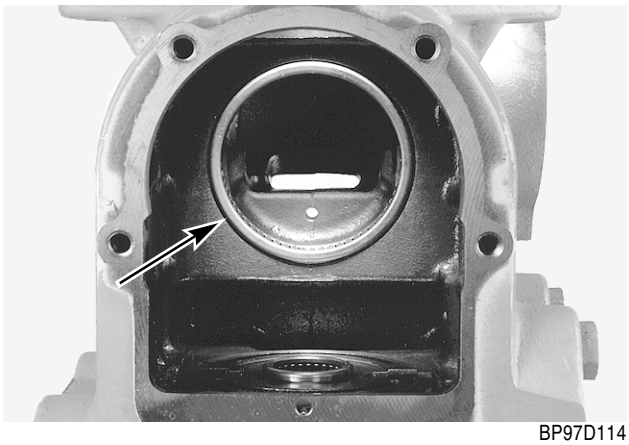
Remove the other check ball retainer, the spring, and the ball from the control housing.

STEP 96

BP97D117

Install the pistons and the guide plate on the cylinder block assembly.

STEP 97



BP97D114

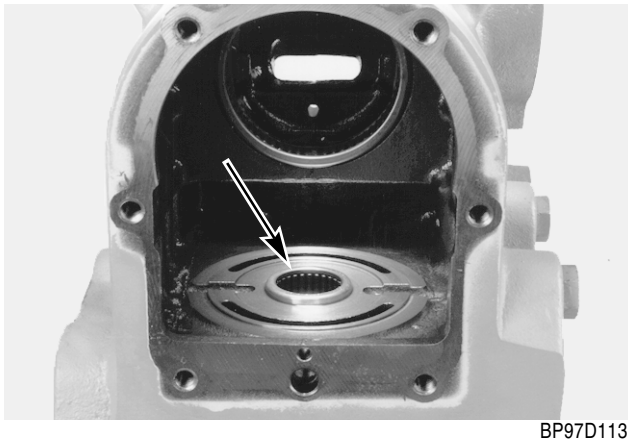
If the needle bearing for the swash plate was removed, use an acceptable driver to press a new needle bearing into position in the housing.

STEP 98

BP97D115

If the needle bearing for the drive shaft was removed, install the drive coupling in the bore between the two pumps.

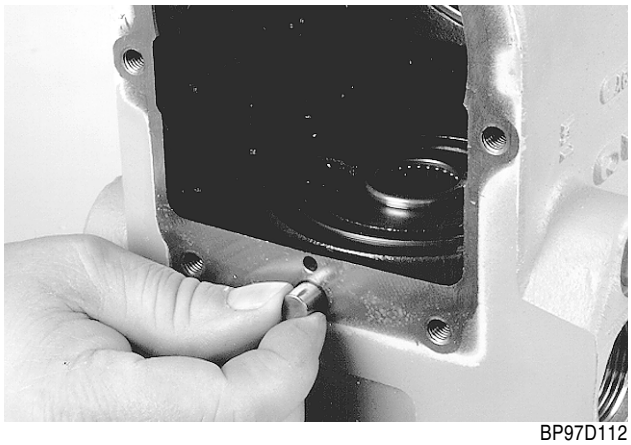
STEP 99



BP97D113

Install the needle bearing so that it protrudes 2 to 2.5 mm (0.08 to 0.10 inch) above the surface of the housing.

STEP 100



BP97D112

If the locating pin for the bottom cover was removed, install the locating pin in the housing.

STEP 171

BP97D117

Remove the pistons and the guide plate from the cylinder block assembly.

STEP 172

BP97D118

Remove the guide support from the cylinder block assembly.

NOTE: *The cylinder block shown in steps 173 through 176 is different than your cylinder block. The procedure is the same.*

STEP 173

BP97C050

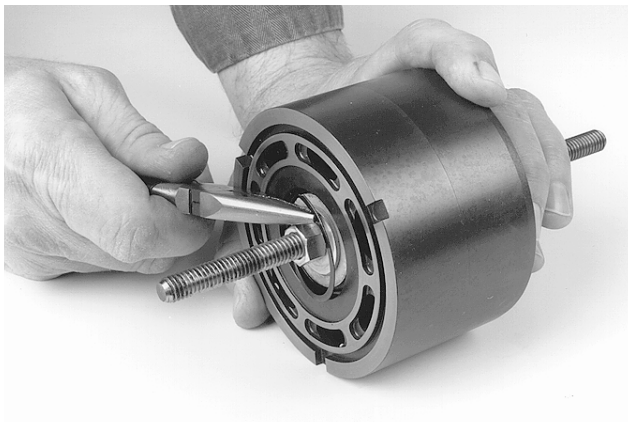
Remove the pins and the pin retainer from the cylinder block.

STEP 174

BP97C051

Install a threaded rod through the cylinder block assembly. Install a washer and a nut on each end of the threaded rod. Tighten the nuts to compress the spring inside the cylinder block until the retaining ring can be removed.

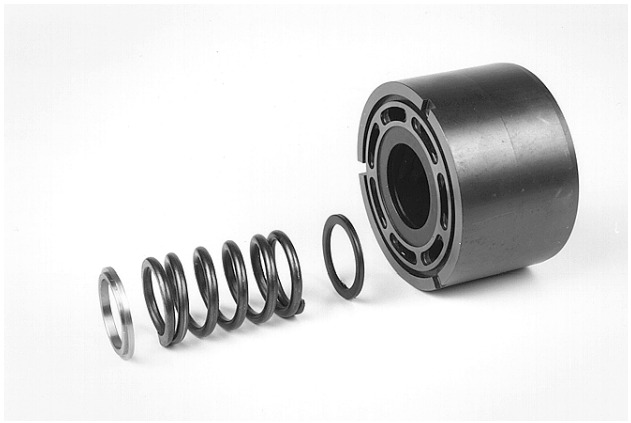
STEP 175



BP97C052

Remove the retaining ring.

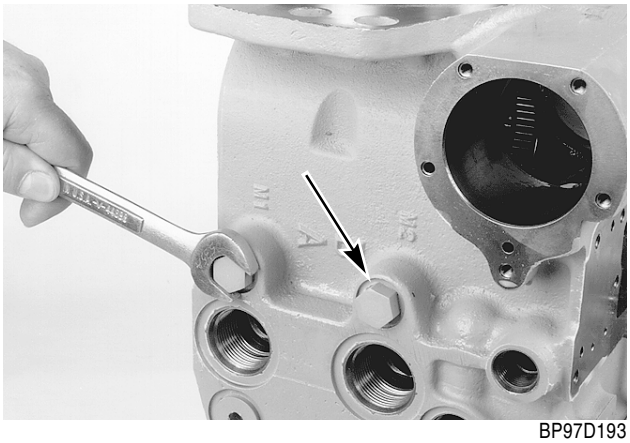
STEP 176



BP97C053

Loosen the nuts and remove the thrust washer, the spring, and the spring seat from the cylinder block.

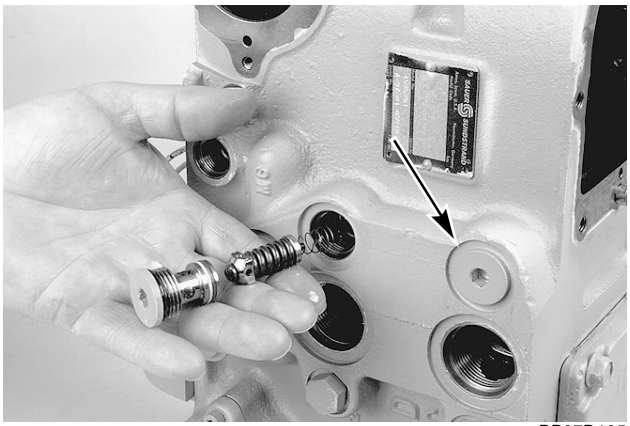
STEP 223



BP97D193

If the two hex head plugs were removed, install new O-rings on the hex head plugs. Tighten the hex head plugs to a torque of 27 to 47 Nm (20 to 35 pound-feet).

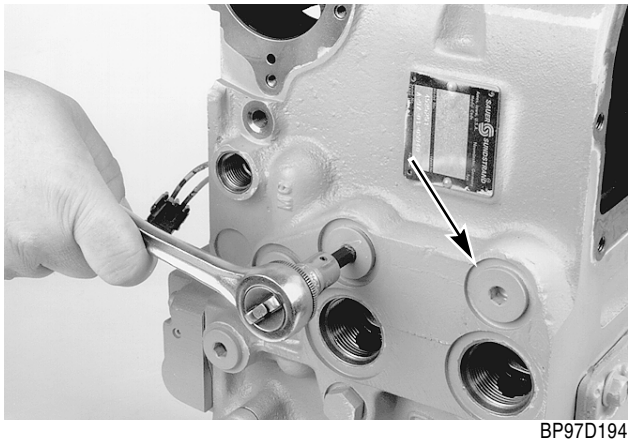
STEP 224



BP97D195

Install a new inner O-ring, a backup ring, and an outer O-ring on each relief valve plug. Install the springs, the combination relief and check valves, and the relief valve plugs in the bores.

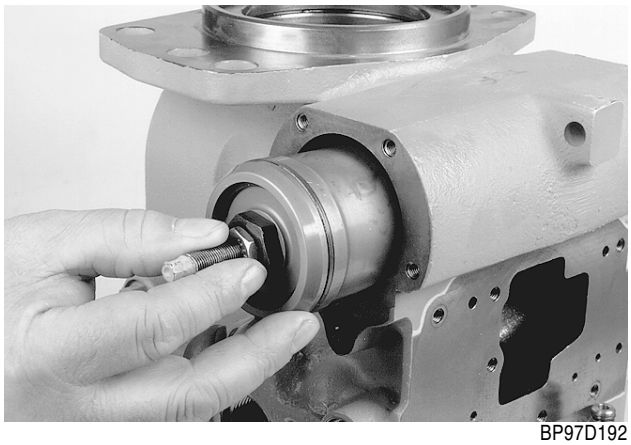
STEP 225



BP97D194

Tighten the two relief valve plugs to a torque of 40 to 95 Nm (30 to 70 pound-feet).

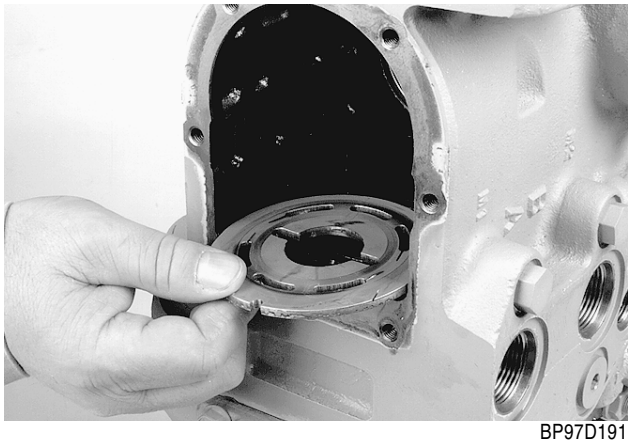
STEP 226



BP97D192

Use clean hydraulic oil to lubricate the servo piston and the piston rings. Install the servo piston in the housing. Be careful so that you do not damage the piston rings.

STEP 227



BP97D191

Install the valve plate so that the bronze surface is up.

INSPECTION

1. Clean all parts in cleaning solvent. Use a lint free cloth, or air dry the parts.

NOTE: *The parts must be clean and free of contamination before assembly.*

2. Replace all O-rings, seals and gaskets. Lubricate all O-rings and seals with clean hydraulic oil prior to assembly. All gasket sealing surfaces must be clean before installing new gaskets.

3. Inspect the splines on the shaft. If the splines are worn or damaged, use new parts as required.

4. Inspect both sides of the thrust plate and valve plate. Make sure the thrust plate and valve plate are flat. If the surfaces have pitting or scoring, use new parts as required.

5. Inspect the area of the cylinder block that touches the valve plate. This area must be smooth and free of grooves or metal deposits. Use new parts as required.

6. Inspect the pistons and make sure they move freely in the cylinder block. Check for scoring and wear in the cylinder block. Use new parts as required.

7. Inspect the outer surfaces of the pistons. The piston shoes must be flat, smooth and free of metal deposits. Use new parts as required.

8. Inspect the slipper retainer. It must be flat and free of cracks. Use new parts as required.

9. Inspect the slipper retainer guide, thrust washer, slipper retainer pins and pin retainer. If there is any damage, use new parts as required.

10. Inspect the cylinder block. If the spring is broken, make sure there is no damage to the inside of the cylinder block. Use new parts as required.

11. Inspect the swash plate, bearings and bearing cups for flat areas, pitting, scoring or other damage. Use new parts as required.

12. Inspect the shaft roller bearing and the needle bearing in the end cap. If there is any damage, use new parts as required.

13. Inspect the shuttle spool, spring and spring guide in the end cap. If there is any damage, use new parts as required.

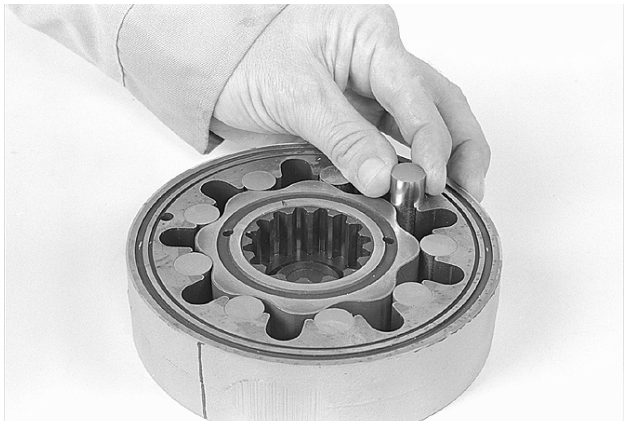
14. Inspect the orifice plug in the end cap. It must be free of obstructions. Use new parts as required.

STEP 18

BK97K035

Turn the gear assembly over and remove and discard the seal from the groove in the gear assembly.

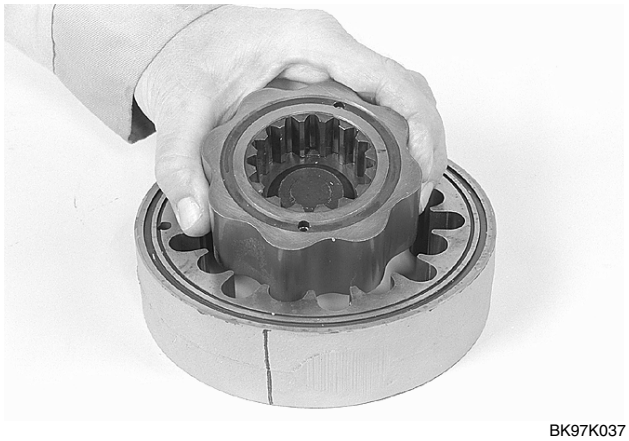
STEP 19



BK97K036

Remove the rollers from the gear assembly.

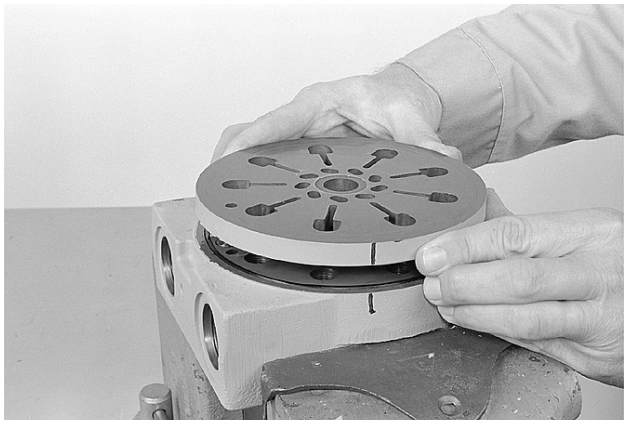
STEP 20



BK97K037

Remove the inner gear from the gear assembly.

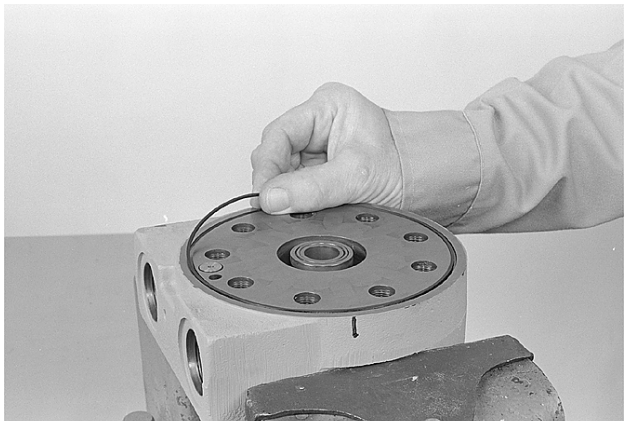
STEP 21



BK97K031

Remove the valve plate from the end cap. Note the position of the valve plate on the end cap for use during assembly.

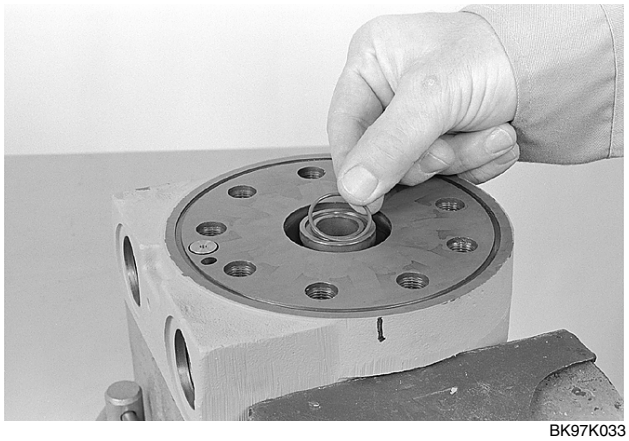
STEP 22



BK97K032

Remove and discard the seal from the groove in the end cap.

STEP 23

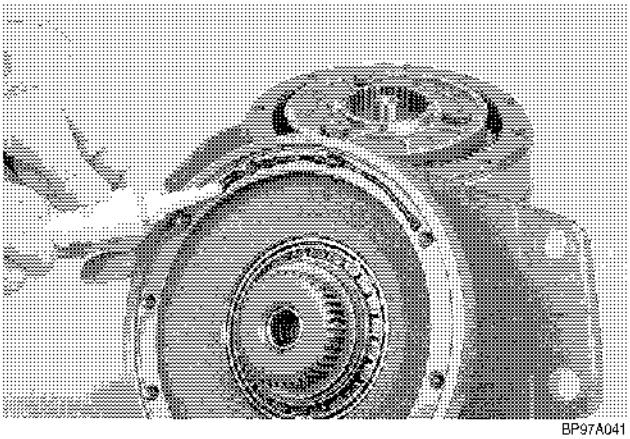


BK97K033

Remove and discard the O-ring from the groove in the end cap.

NOTES

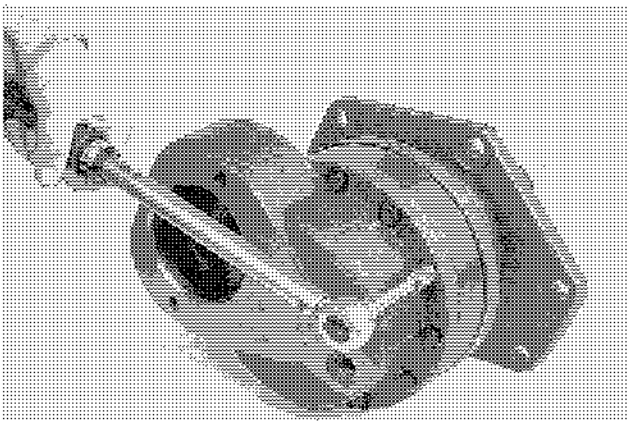
STEP 58



BP97A041

Place a bead of RTV sealing compound around the sealing surface of the hub assembly. Using the reference marks made during disassembly, install the hub assembly onto the ring gear.

STEP 59



BP97A042

Install the 10 cap screws and flat washers into the hub assembly. Tighten the cap screws to a torque of 67 to 74 Nm (50 to 55 pound-feet).

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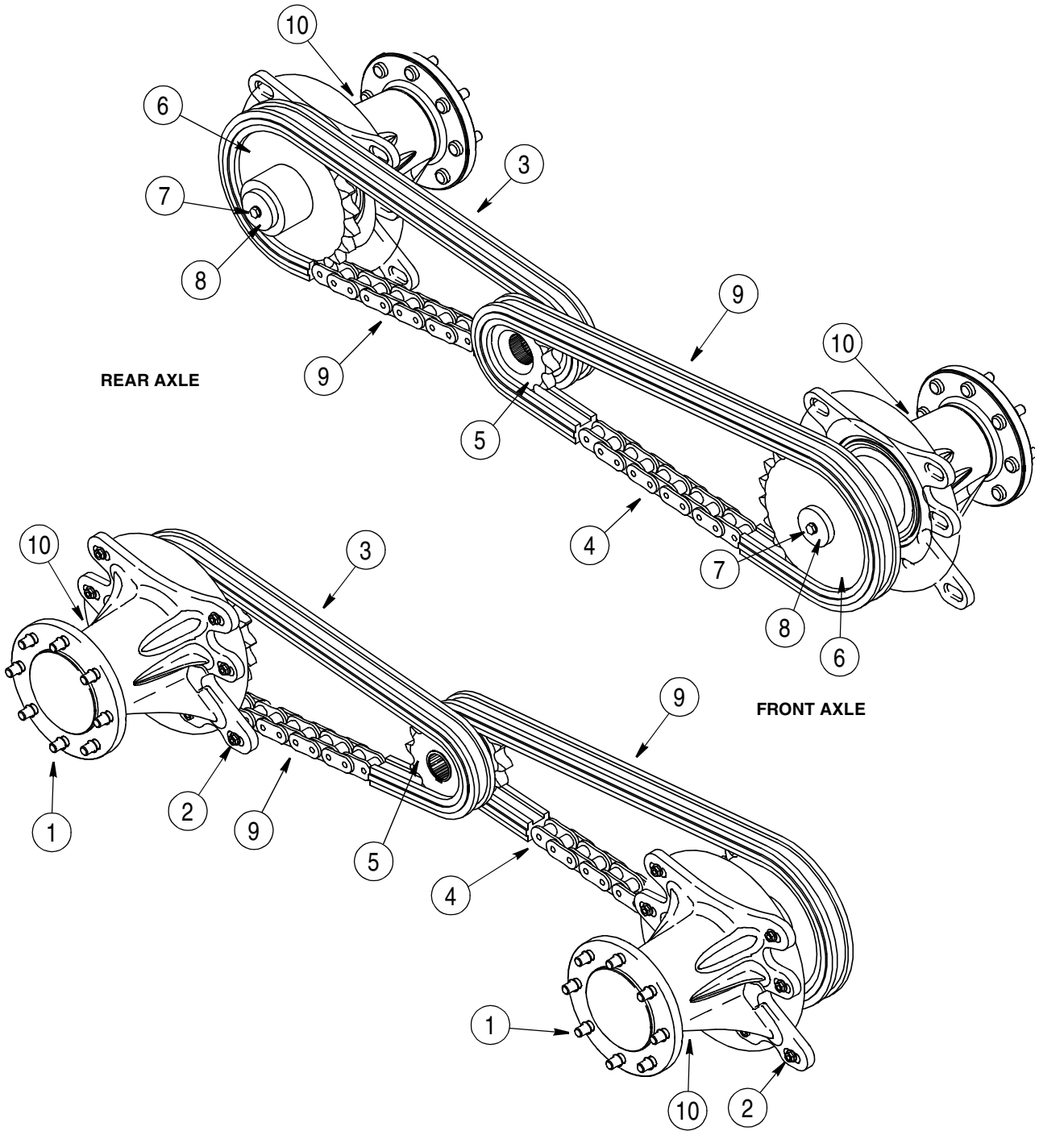


1. WHEEL NUTS
2. AXLE HOUSING NUTS
3. ROLLER CHAIN (120/48P)
4. ROLLER CHAIN (120/54P)
5. DRIVE SPROCKET
6. DRIVEN SPROCKET
7. CAP SCREW (DRIVEN SPROCKET)
8. WASHER
9. CENTER OF SLACK SIDE OF CHAIN
10. AXLE HOUSING

ILLUSTRATION OF SPROCKETS, CHAINS AND AXLE ASSEMBLIES

NOTES

Moving a Disabled Machine Not Equipped with a Brake Release System

CAUTION: *Do not tow the machine if it is disabled. The machine is not equipped with a brake release system and damage to the hydrostatic system will result.*

1. If repairs cannot be made on the job site, lift the machine onto a trailer or truck.

Moving a Disabled Machine Equipped with a Brake Release System

NOTE: *A machine equipped with a brake release system can be towed at a very low rate of speed (0.5 m.p.h. or less) for a short distance.*

1. Block the tires.
2. Raise the operators compartment.

NOTE: *The brake release valve is located on the right side of the engine, beside the fuel filter.*

3. Push the BLACK knob IN. Oil will pass through the brakes.
4. Stroke the RED knob 10 to 15 times. Brakes will release.
5. Push all 4 tandem pump valves IN. Oil will circulate without rotating the pumps.
6. Lower the operators compartment and engage the cab locks.
7. Fasten a rigid drawbar to the machine.
8. Connect a tow vehicle to the disabled machine.
9. Remove the blocks.
10. Tow the machine to an area for repair.
11. Block the tires.
12. Raise the operators compartment.
13. Reset the brake before starting repair.

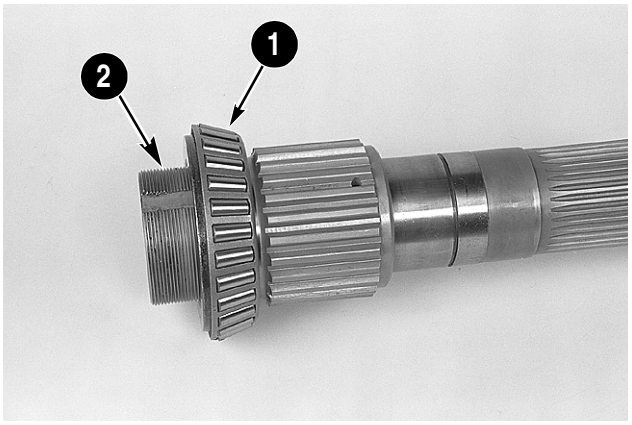
IMPORTANT: *This procedure is to be used only to move a machine a very short distance at a very low rate of speed (0.5 m.p.h. or less).*

14. Lower the operators compartment.
15. Manually reset the brakes for hauling, by pulling the BLACK knob OUT.

NOTE: *The system will reset automatically when the engine is started.*

ASSEMBLY

STEP 27

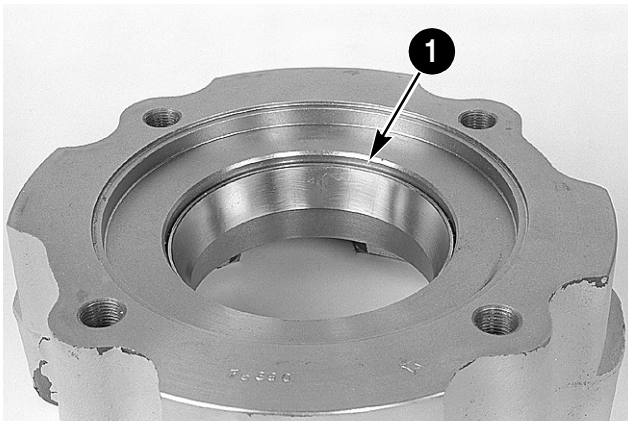


BK97K112

1. BEARING CONE
2. 33.32 MM (1.312 INCHES)

If the bearing cone was removed from the shaft, press the new bearing cone onto the shaft to the dimension shown. This is the preliminary setting. The bearing cone will be seated later in this procedure.

STEP 28

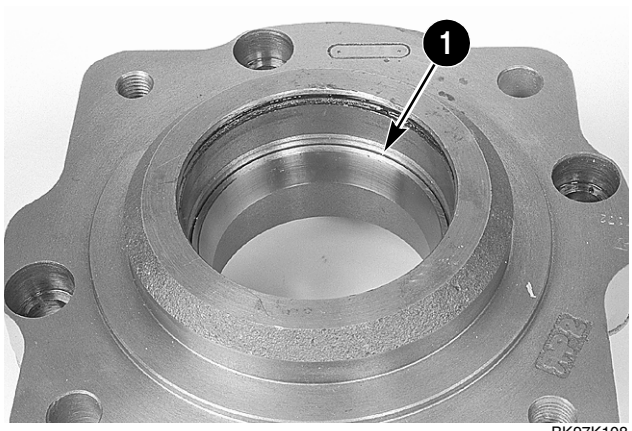


BK97K111

1. BEARING CUP

If the bearing cup was removed from the housing, install a new bearing cup.

STEP 29

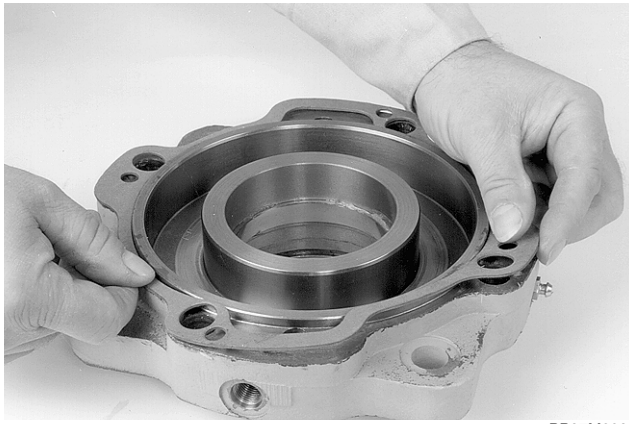


BK97K108

1. BEARING CUP

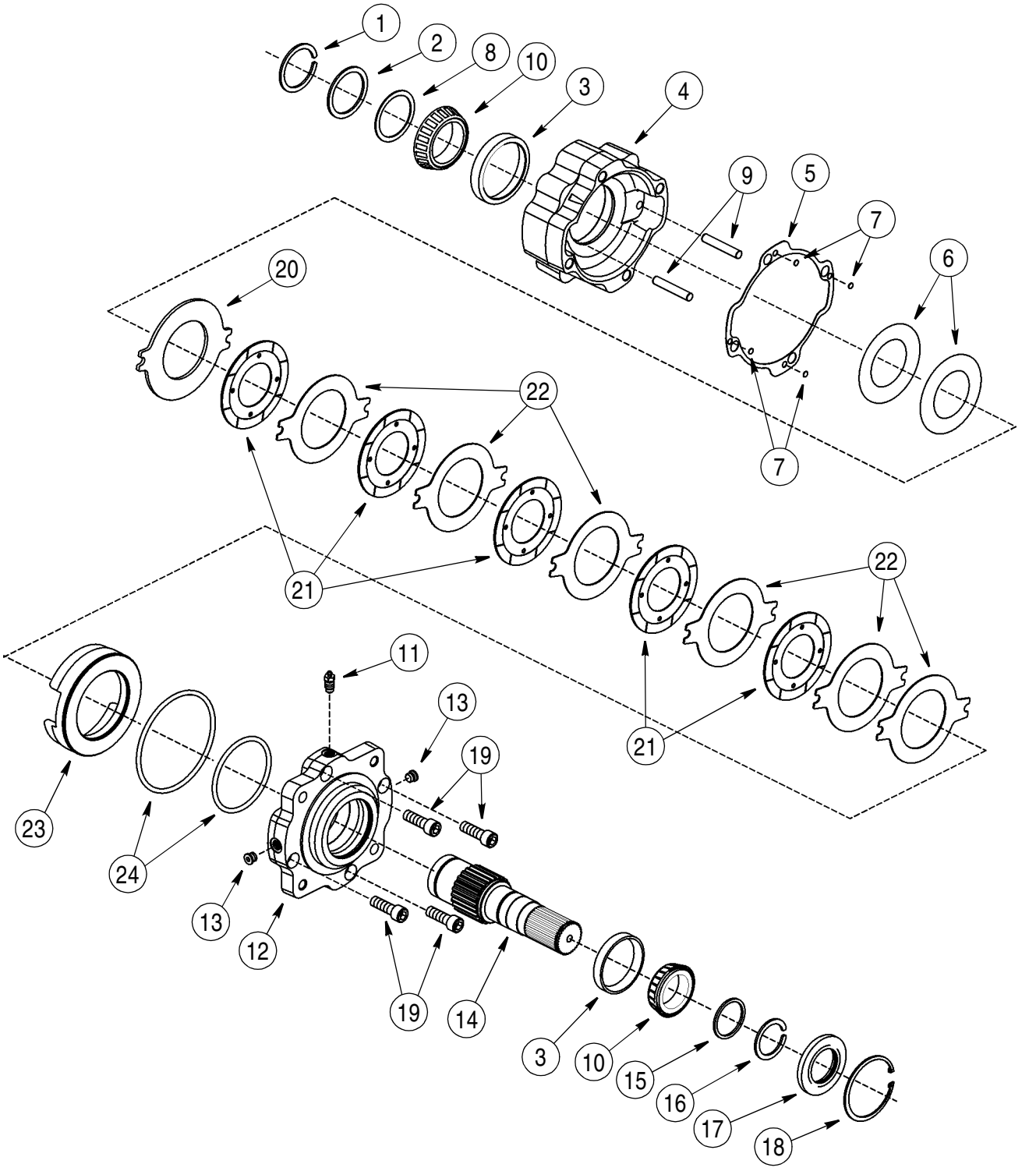
If the bearing cup was removed from the end plate, install a new bearing cup.

STEP 30



BP97M009

Install a new gasket on the end plate. Use gasket sealer or clean hydraulic fluid to hold the gasket in position.

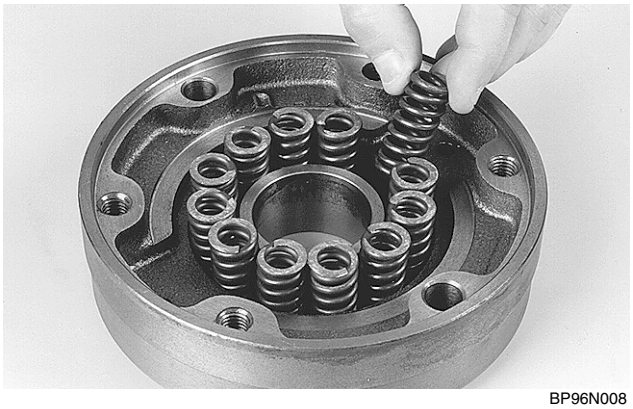


BC00K213

1. SNAP RING
2. WASHER
3. BEARING CUP
4. HOUSING
5. GASKET
6. DISC SPRING
7. SHIM (CRUSH PINS)
8. SHIM(S)
9. PINS
10. BEARING CONE
11. BLEEDER
12. END PLATE
13. PLUG
14. SHAFT
15. WASHER
16. SNAP RING
17. SEAL
18. SNAP RING
19. ALLEN HEAD SCREWS
20. PRIMARY DISC
21. FRICTION DISC
22. BRAKE DISC
23. PISTON
24. O-RING

85XT BRAKE ILLUSTRATION (MACHINES WITH PIN JAF0273132 AND AFTER)

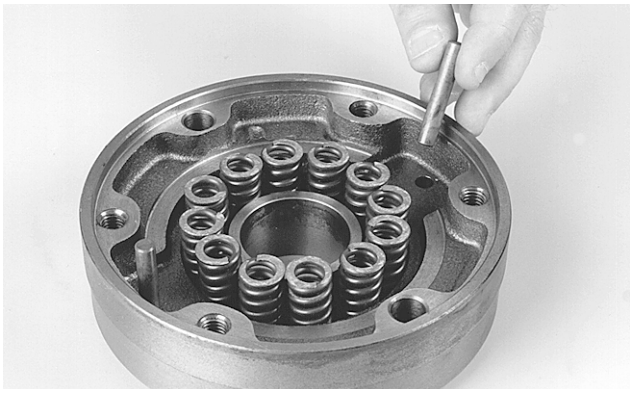
STEP 17



BP96N008

Install the compression springs.

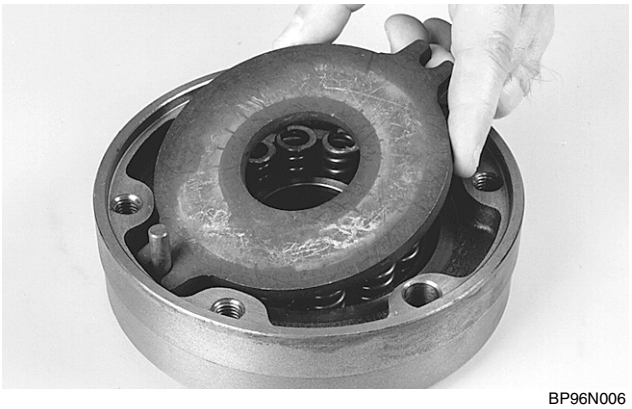
STEP 18



BP96N007

Install the torque pins into the brake housing.

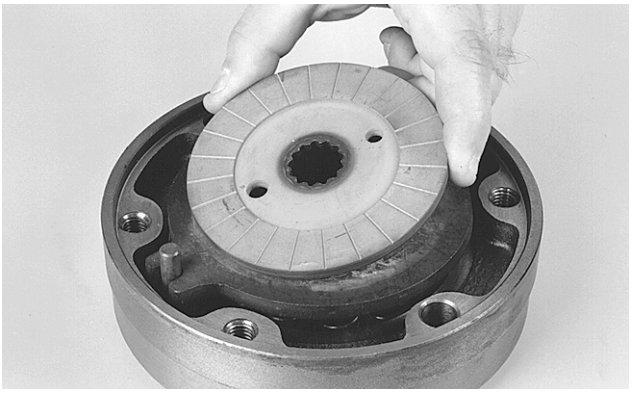
STEP 19



BP96N006

Install the primary disc. The disc must be clean and free of any traces of oil.

STEP 20



BP96N005

Install the rotating disc. The disc must be clean and dry.

IMPORTANT: *If the disc is worn or heavily scored, it must be replaced.*

HYDRAULIC COMPONENTS

Components Defined

Reservoir - Located in the left rear of chassis. Pressurized to 34.5 kpa (5 psi), with a -3.5 kpa (- 0.5 psi) vacuum breaker. A 100 mesh suction screen is located near the bottom of the reservoir to supply filtered oil to the hydraulic gear pump.

Hydraulic gear pump - Supplies flow to charge the hydrostatic tandem pump assembly and operate the hydraulic system.

Constant pressure priority valve - Integrated with the hydraulic gear pump to provide priority oil flow to charge the hydrostatic tandem pump assembly, with remaining flow supplying the hydraulic system.

Loader control valve - Is a three spool valve controlling the loader, bucket and auxiliary circuits. The main relief valve is also part of the valve assembly.

Bucket cylinders - Used to control the movement of the bucket with cushioning employed at the rod end of the cylinder.

Loader lift cylinders - Used to raise and lower the loader frame with cushioning employed at the base end of the cylinder.

Auxiliary disconnects -Located on the left loader frame for the purpose of auxiliary hydraulic power to attachments.

Return filter - Provides 2 Micron filtration for return oil from the hydraulic system.

Charge filter - Filters charge oil prior to entering the hydrostatic tandem pump assembly. Provides 2 Micron filtration.

Oil cooler - Cools hydraulic system return oil and hydrostatic drains.

Self Leveling Valve - Used to maintain a level bucket position as the loader frame is raised.

Reservoir

The hydraulic system begins at the reservoir located in the left rear frame. The reservoir has a capacity of 66.2 litres (17.5 U.S. gallons) and is pressurized to 34.5 kPa (5 psi). Pressure is controlled by the relief in the reservoir cap. A vacuum breaker is also employed in the cap to open at -3.5 kPa, (-0.5 psi) allowing air to enter the reservoir. A 100 mesh strainer is located in the outlet port of the reservoir to assure that contamination larger than 150 Microns does not enter the inlet of the hydraulic gear pump. The strainer can be removed for cleaning.

Hydraulic Pump/Priority Valve

A Sauer/Sundstrand gear pump, supplies oil for the hydraulic and hydrostatic systems. Pump flow enters an **integral priority flow divider**, sending priority flow 18.0 litres/min. (4.8 gpm) to the charge port, supplying charge oil to the closed-loop of the hydrostatic system. Remaining pump flow is diverted to the equipment port for use in the hydraulic system, for loader, bucket, auxiliary and power beyond circuits. Return oil from the hydraulic system passes through the filter and cooler before returning to the reservoir.

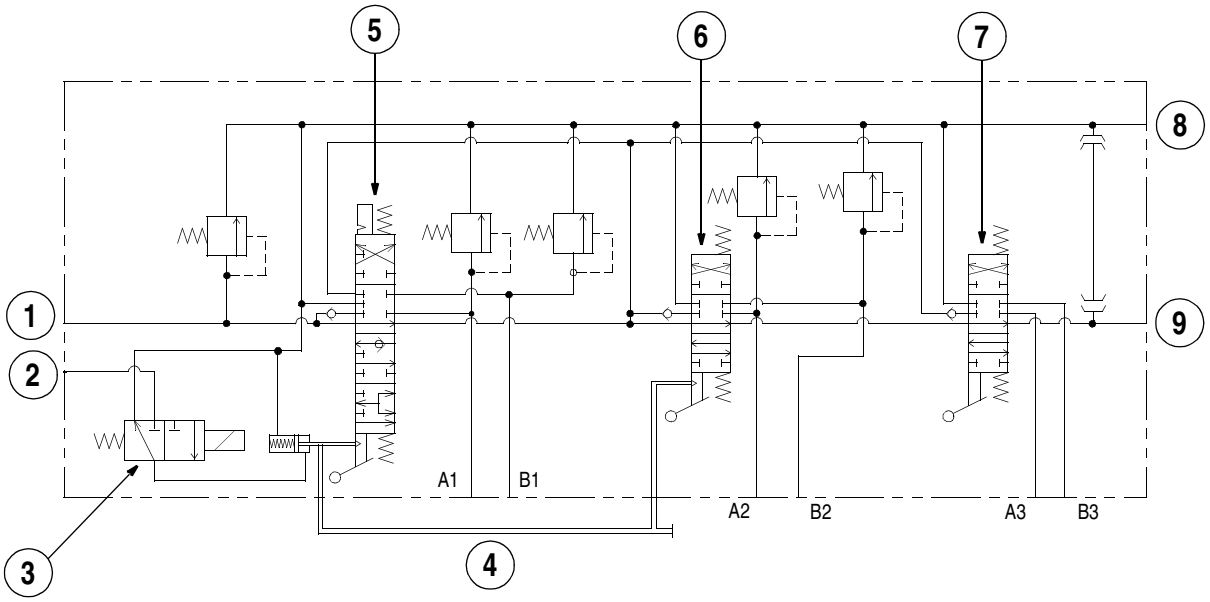
The hydraulic pump is mounted to and driven by hydrostatic tandem pump. The hydrostatic tandem pump is directly coupled to the engine and driven from the flywheel end.

Control Valve

Oil flow from the equipment port of the constant pressure priority valve is sent to the loader control valve. Oil flow enters the control valve at the inlet port to the open center passage. The open center passage is connected to the main relief valve. The control valve is a three spool valve with the loader spool receiving oil first. With all spools in neutral, oil flows through the open center and out the return port. If a power beyond circuit is required, a 3/8 NPT pipe plug is installed through the return port. This blocks the open center flow from entering the return passage. Power beyond flow is then ported out the 7/8-14 UNF-28 thread port, in the top of the control valve.

Loader Spool Actuated to Raise Loader

Shifting the loader spool outward blocks the pump flow through the open center, sending pump flow through the load check valve and on to the B1 port. Oil from the B1 port enters the base end of the loader cylinders raising the loader frame. Oil returning from the rod end of the loader cylinders enters the control valve at the A1 port, and flows to the open center passage for use by the bucket or auxiliary circuits. If the bucket or auxiliary circuit is actuated, the circuit will function until the loader cylinders come to the end of their travel. If the loader cylinders reach the end of their travel, oil flow is diverted to the main relief valve and all functions stop. At this point the loader spool must be returned to the neutral position, allowing pump flow to enter the open center passage.



BT97E013

1. INLET
2. CHARGE PRESSURE
3. SPOOL LOCK SOLENOID
4. SPOOL LOCK ROD
5. LOADER SPOOL
6. BUCKET SPOOL
7. AUXILIARY SPOOL
8. TANK
9. POWER BEYOND

LOADER VALVE SCHEMATIC

Spool Lock Solenoid Valve

The spool lock solenoid valve is a two position, normally closed valve, energized to open. The valve is used to supply hydraulic pressure to unlock the loader and bucket spools in the control valve. Charge pressure from the hydrostatic tandem pump assembly is used as the hydraulic source. Charge pressure enters the control valve through a special fitting equipped with a check valve. The check valve assures that variations in charge pressure do not affect the position of the spool lock rod. Electrical power to energize the solenoid comes from the interlock relay when the operator is in the seat with the seat bar in the down position.

Solenoid energized: Charge pressure is ported to the top of the control valve at the inlet to the solenoid valve. When the solenoid is energized, the inlet port of the solenoid valve is opened, and the return port is closed. Charge pressure entering the inlet port forces the lock rod against spring pressure, unlocking the loader spools.

Solenoid de-energized: When the control valve is de-energized, the inlet port is closed, stopping the flow of charge oil. At the same time return porting is opened, allowing spring action to return the lock rod to the locked position. Charge pressure relieved from the lock rod enters the return passage of the control valve.

FILTRATION AND COOLING

Filtration of hydraulic system oil starts in the reservoir. A 100 mesh suction screen keeps contaminants of 150 Micron or larger from entering the inlet of the hydraulic pump. Additional filtration occurs on the return side of the hydraulic system. Filtration is full flow with a rating of 2 Micron. The filter head incorporates a bypass for use during cold start-up or plugging of filter media. The bypass is designed to open with a 34.5 kPa (50 psi) differential pressure. A restriction switch is employed to warn the operator of a restricted filter and potential bypass. The bypass switch is set for a 276 kPa (40 psi) differential pressure.

Cooling of the hydraulic system oil is required. Cooling is accomplished using a tube and fin, oil to air cooler. The cooler is mounted to the radiator of the engine. A pusher type fan is engine mounted and provides the air circulation for the radiator and oil cooler. The cooler can be swung away from the radiator for cleaning. The oil cooler by-pass valve, located in the “Tee” at the outlet of the return filter, is set for a 862 kPa (125 psi) differential pressure.

LOADER CONTROL VALVE

Functional Overview of the Loader Control Valve

The control valve assembly is a two spool valve, open center configuration, with oil ported in a series flow path. The valve is Case manufactured, and has the following functions:

The **Loader lift circuit** controls raising, lowering, and the float position of the loader frame. The loader lift circuit is the first spool to receive oil flow from the inlet of the control valve. Shifting the loader spool outward sends oil out of the B1 port of the valve to the base end of the loader cylinders to raise the loader frame. Shifting the spool inward sends oil out of the A1 port of the valve to the rod end of the loader cylinders to lower the loader frame. In either position, the oil flow from the pump is ported to the loader cylinder rod or base end and blocked from the open center. The return oil flow from the loader cylinders is ported back to the open center passage on the downstream side of the loader spool, allowing oil flow to operate other functions as long as the loader lift cylinder is moving. If the loader spool is shifted inward past the lower position, it will enter the float position. A mechanical ball type detent holds the loader spool in float. Float position connects both ends of the loader cylinders to the return passage and allows pump flow to pass through the open center circuit.

The **Bucket circuit** controls the curl and dump positions of the bucket. This is the second spool to receive oil flow. The bucket circuit receives oil flow from the open center supplied by the pump or return flow from the loader lift circuit. If the bucket spool is shifted outward, the base end of the bucket cylinder receives flow, from the B2 port, to dump the bucket. Shifting the bucket spool inward sends oil from the A2 port to the rod end of the cylinder to curl the bucket back. Return oil from the bucket cylinders is ported to the return passage of the control valve.

Load check valves maintain cylinder position until the pressure under the load check is higher than the cylinder pressure above the load check when the control valve is feathered.

The **power beyond circuit** is ported to and receives oil from the open center circuit. The power beyond circuit allows pump flow to be used downstream from the control valve when all control spools are in neutral or if the loader lift circuit is actuated, with cylinders returning oil to the open center passage.

Component Overview of the Loader Control Valve

The **Main relief valve** controls the hydraulic system pressure when flow from the hydraulic pump is stopped. The relief valve is located in the inlet passage to the loader control valve. It is pilot operated and screw adjustable. Oil passing through the relief valve is ported to the return passage (low pressure side) of the control valve and on to the reservoir.

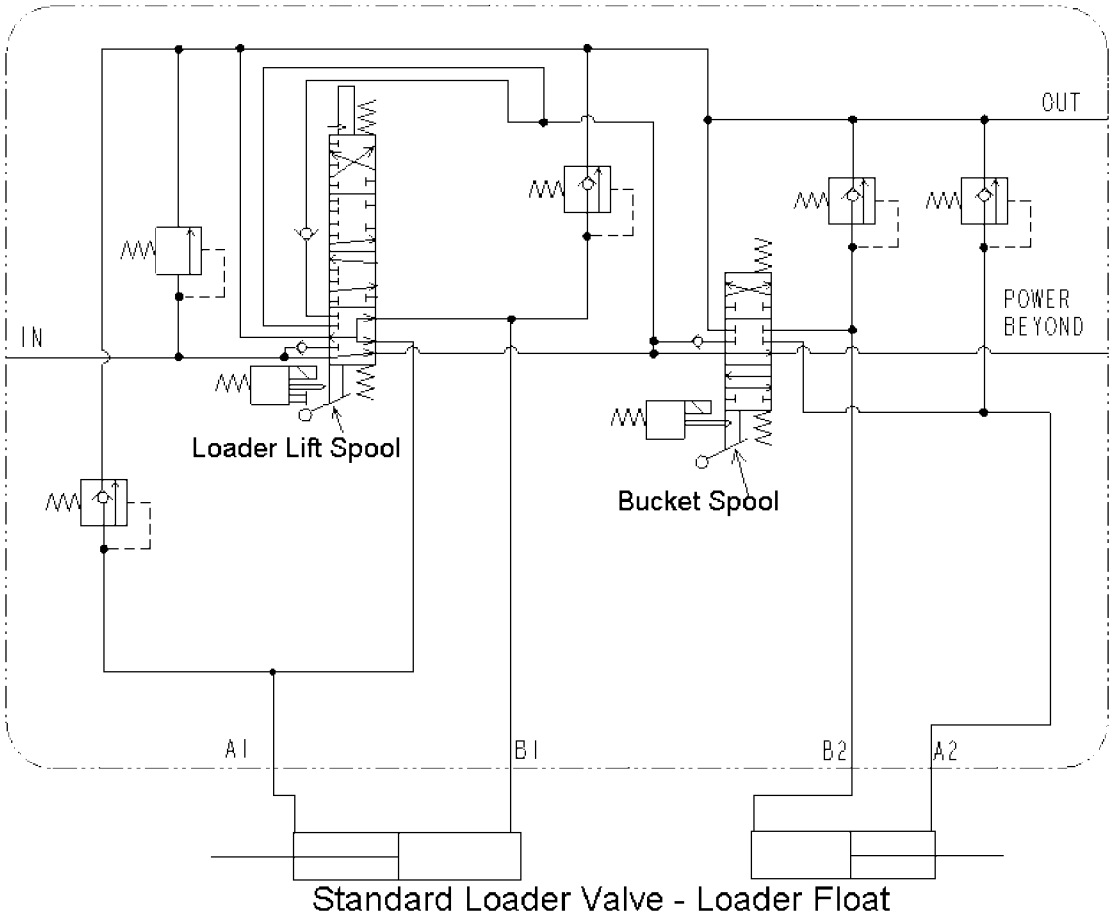
Circuit relief/Anti-cavitation check valves are used in both the A and B Ports of the loader and bucket circuits of control valves. Circuit relief valves protect cylinders and lines from being over-pressurized due to outside forces or shock loads when control valve spools are in neutral. The anti-cavitation check valve function allows make-up oil to enter each port as the circuit relief valve activates on the opposite port.

A **Circuit check valve** (used in the B1 circuit of the loader lift circuit) is used to block back pressure in the series passage when the bucket or power beyond circuit is operating at relief valve opening pressure and the loader lift circuit is feathered to the down position.

Spool lock solenoids secure the loader and bucket control spools in the neutral position unless the ROPS is in the locked position, the operator is seated in the operators seat with the lap bar in the lowered position. This is part of the loader interlock system. A mechanical release of the loader spool is possible if the machine is disabled.

Loader Spool Actuated To Float

In the float position the loader spool is shifted inward to the detent position. The loader spool is held in this position by a ball type detent assembly. The float position allows the rod end and base end of the loader cylinders to connect to the return passage of the control valve. The A1 and B1 ports are connected together by a drilled passage in the center of the loader spool. The same drilled passage connects the A1 and B1 ports to the return passage of the control valve. With the rod and base ends of the loader cylinders connected together, the loader frame and bucket can follow the contour of the ground (float). In the float position, oil from the hydraulic pump flows through the open center of the control valve and out the power beyond port to the auxiliary circuits. Oil leaving the control valve from the return port is sent to the filter, cooler, and reservoir.



Standard Loader Valve - Loader Float

HS01D085

High Flow - High Pressure Hydraulic System

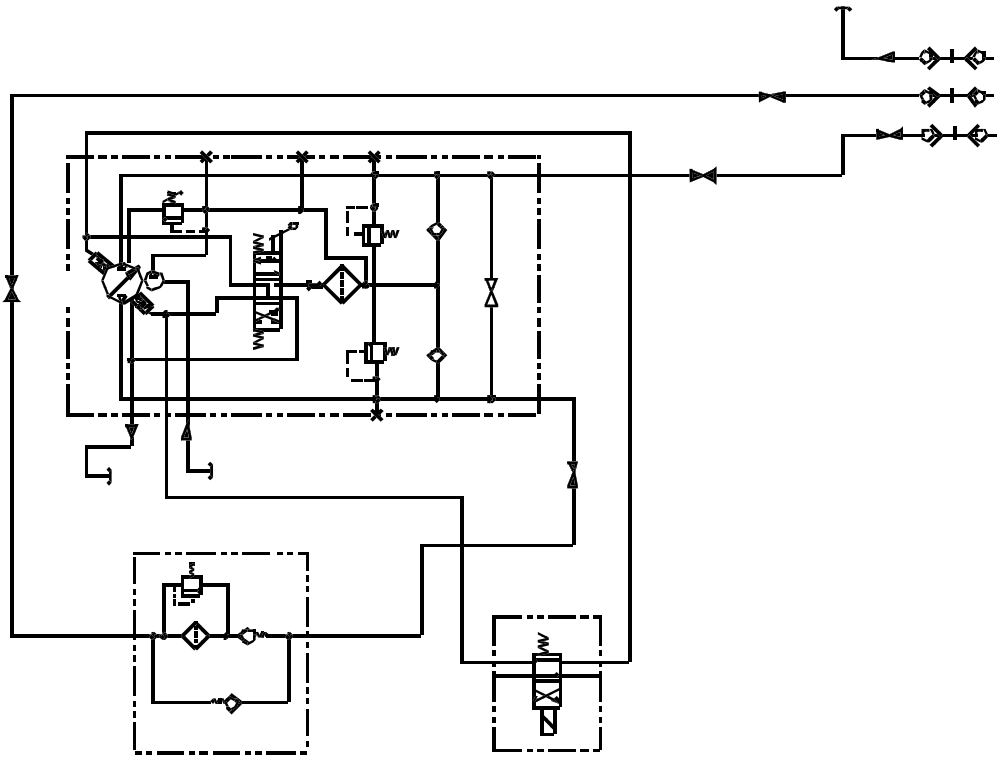
The high flow, high pressure, closed-loop hydraulic system is an optional hydraulic system, available on the 90XT and the 95XT, to power attachments up to 344.8 bar (5000 psi). The system has a flow rate of 113 L/min (30 gpm) at 34.5 bar (500 psi). This is a "stand alone" system. The system uses a Sundstrand M46, variable displacement, axial piston pump with servo control. An integral charge pump is used in the M46 to provide system replenishment, cooling oil flow, and servo control. The servo is used to control the direction as well as the quantity of oil flow. Full flow is available in the forward direction, while the reverse direction is limited to 1/4 flow.

The pump control lever with limit adjustment is mounted on the left side of the operator compartment. A cable connects the cab pump control lever to the pump servo control lever.

The pump is electrically controlled to maintain a neutral position when not in use. A two position solenoid valve is connected to the servo end cap ports. In the neutral position, the control valve is de-energized, connecting both servo ports together. This allows equal pressure to be applied to both sides of the servo piston, holding the swash plate in neutral. When the solenoid valve is energized, the servo ports are separated, and only one side of the servo piston is pressurized. This allows the servo to move the pump swash plate and produce flow in the forward or reverse direction, depending upon which side of the servo piston was pressurized. A rocker switch on the left control lever turns the solenoid valve on and off. In the on position an indicator light is illuminated at the pump control lever console.

The pump is remote mounted under the radiator, driven through a flexible coupling from the engine crankshaft.

Return oil on the reverse side of the closed loop passes through a 5 micron filter. High flow plumbing is incorporated into the right loader arm with flat faced male and female quick disconnects. The male flat coupler is the forward direction or oil flow out of the attachment.



BS97E048

HIGH FLOW/HIGH PRESSURE

BI-DIRECTIONAL SELF-LEVELING SYSTEM TROUBLESHOOTING

SYMPTOM	POSSIBLE CAUSE	POSSIBLE SOLUTION
Bucket does not self-level at all.	Cab On-Off switch turned to OFF position.	Turn On-Off switch to the ON position.
	Bad bucket spool microswitch or out of adjustment.	Adjust, repair or replace the bucket spool microswitch.
	Bad float switch in the end cover of the loader lift spool.	Repair or replace the float switch.
	On-Off Solenoid Valve stuck in the OFF (energized) position.	Disconnect the electrical connector from the solenoid. If self-leveling is still not functioning, replace the solenoid cartridge.
Bucket dumps when the loader is powered down against the mechanical stops.	The leakage across the flow divider builds pressure on both ends of the bucket cylinder. The displacement differences of the base and rod end of the bucket cylinders force the bucket to dump.	This is how the BDSL feature works. Do not hold loader power down while against the stops. Turn BDSL OFF.
Loader arms do not lower when powering down with the engine off (with- or without electrical power).	The lower counterbalance valve has no pilot pressure to open, so the loader cylinder base oil is blocked.	This is how the BDSL feature works. Move the lift spool to the float position.
Bucket self-levels when the ON/OFF switch is in the OFF position.	Bad ON/OFF switch or bad wiring.	Check power supply to the ON/OFF switch. Check the ON/OFF switch and the wiring between the switch and the ON/OFF solenoid in the loader valve.
	Bad ON/OFF solenoid valve in the loader valve.	Check function of the ON/OFF solenoid valve.
Bucket does not maintain level while raising or lowering at engines speeds other then high idle.	Bucket self-leveling is designed to work optimally at high-idle.	Run engine at high idle.
	Bucket self-leveling works best when lift spool is fully stroked.	Fully stroke the lift spool.
Bucket does not maintain level while raising at high idle.	Flow divider cartridge stuck.	Check flow divider cartridge for free operation.
	Incorrect flow divider cartridge installed.	Check flow divider cartridge for correct part number.
	Raise counterbalance valve stuck.	Check raise counterbalance valve for free operation.
Bucket does not maintain level while lowering at high idle.	Flow divider cartridge stuck.	Check flow divider cartridge for free operation.
	Incorrect flow divider cartridge installed.	Check flow divider cartridge for correct part number.
	Lower counterbalance valve stuck	Check lower counterbalance valve for free operation.

HIGH FLOW GEAR PUMP MAIN RELIEF (IF EQUIPPED)

NOTE: *Flat face couplers are not included with the CAS-1808 Flowmeter Fitting Kit or the CAS-1804 Pressure Test Fitting Kit. The part numbers for the high flow hydraulic couplers are 393402A1 (male coupler) and 393401A1 (female coupler).*

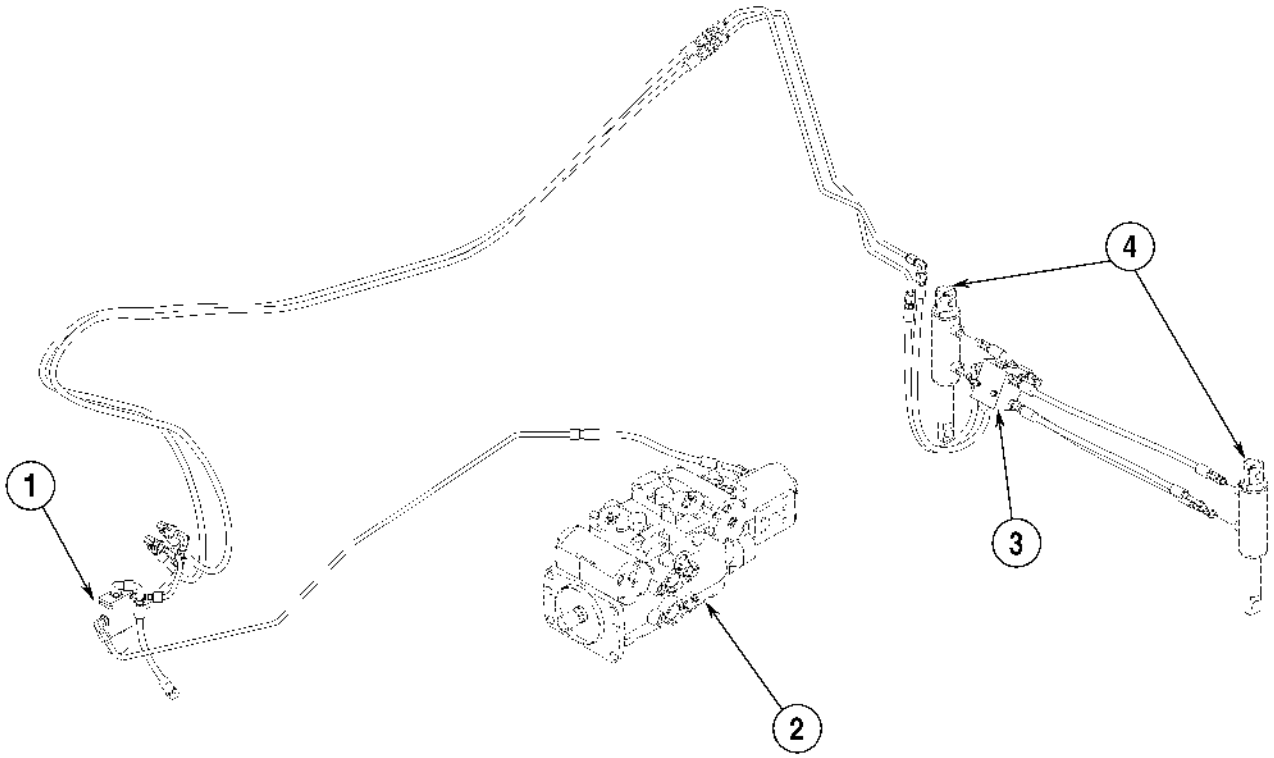
1. Park the machine on a level surface. Lower the loader bucket to the floor.
2. The oil must be at operating temperature. To heat the oil, do the following steps:
   A. With the engine running at full throttle, hold the bucket control lever in the ROLLBACK position for 10 seconds.
   B. Put the bucket control lever in the NEUTRAL position for 10 seconds.
   C. Repeat steps A and B until the temperature of the oil is 52°C (125°F) or the side of the reservoir is very warm.
3. Use a pressure gauge with a capacity of at least 276 bar (4000 psi). Connect the pressure gauge to the male high flow hydraulic coupler on the right hand loader arm.
4. Start the engine. Use the rocker switch on the left hand control lever to actuate the high flow system. Run the engine at full throttle. Hold the bucket control lever in the ROLLBACK position. Record the indication on the pressure gauge. Release the bucket control lever. Return the rocker switch to the OFF position and decrease the engine speed to low idle. Stop the engine.
5. Compare the indication with the specification on page 3. If the indication is not correct, see page 17 for the location of the main relief valve. Adjust the main relief valve. Then do the pressure check again to make sure that the setting is correct.

HIGH FLOW PISTON PUMP CIRCUIT RELIEFS (IF EQUIPPED)

NOTE: *Flat face couplers are not included with the CAS-1808 Flowmeter Fitting Kit or the CAS-1804 Pressure Test Fitting Kit. The part numbers for the high flow hydraulic couplers are 393402A1 (male coupler) and 393401A1 (female coupler*

1. Park the machine on a level surface. Lower the loader bucket to the floor.
2. The oil must be at operating temperature. To heat the oil, do the following steps:
   A. With the engine running at full throttle, hold the bucket control lever in the ROLLBACK position for 10 seconds.
   B. Put the bucket control lever in the NEUTRAL position for 10 seconds.
   C. Repeat steps A and B until the temperature of the oil is 52°C (125°F) or the side of the reservoir is very warm.
3. Use a pressure gauge with a capacity of at least 414 bar (6000 psi). Connect the pressure gauge to the male high flow hydraulic coupler on the right hand loader arm.
4. Start the engine. Use the rocker switch on the left hand control lever to actuate the high flow system. Run the engine at full throttle. Watch the pressure gauge carefully. Slowly push the high flow control lever forward until the pressure stops increasing. Record the indication on the pressure gauge. Then return the high flow control lever to the neutral position and decrease the engine speed to low idle. Put the rocker switch in the OFF position and stop the engine.
5. Connect the pressure gauge to the female high flow hydraulic coupler on the right hand loader arm.
6. Start the engine. Use the rocker switch on the left hand control lever to actuate the high flow system. Run the engine at full throttle. Watch the pressure gauge carefully. Slowly pull the high flow control lever to the rear until the pressure stops increasing. Record the indication on the pressure gauge. Then return the high flow control lever to the neutral position and decrease the engine speed to low idle. Put the rocker switch in the OFF position and stop the engine.
7. Compare the indications with the specification on page 3. The circuit relief valves are not adjustable. If either indication is not correct, see Section 8007 and replace the circuit relief valve. Then do the pressure check again to make sure that the setting is correct.

NOTES



GM99F047

1. SOLENOID VALVE
2. HYDROSTATIC TANDEM PUMP
3. CHECK VALVE
4. HYDRAULIC COUPLER CYLINDERS

85XT SKID STEER HYDRAULIC COUPLER COMPONENTS

HYDRAULIC LOADER CONTROL VALVE

Removal

1. Place a shop towel under the loader control valve.
2. Remove the cap from the hydraulic reservoir.
3. Connect a vacuum pump to the hydraulic reservoir.
4. Start the vacuum pump.
5. Tag and disconnect all hoses from the loader control valve (4).
6. Install plugs in the hoses and caps on the fittings.
7. Tag and disconnect any electrical connections from the loader control valve (4).
8. Remove the bolts (1), washers (2), square nuts (3), and loader control valve (4) from the chassis.
9. Stop the vacuum pump.

Installation

1. Apply Loctite 243 to the bolts (1). Install the loader control valve (4), square nuts (3), washers (2), and bolts (1) to the chassis.
2. Install all electrical connections to the loader control valve (4).
3. Start the vacuum pump.
4. Connect all hoses to the loader control valve (4).
5. Stop the vacuum pump. Disconnect the vacuum pump from the hydraulic reservoir.
6. Clean up any hydraulic fluid from equipment or floor.
7. Start and run the engine at idle.
8. Operate the loader controls to completely extend and retract the lift and bucket cylinders in order to remove any air from the hydraulic system.
9. Lower the loader bucket to the floor.
10. Stop the engine.
11. Check for oil leakage.
12. Check the level of the oil in the hydraulic reservoir. Add oil as required.
13. Install the cap on the hydraulic reservoir.

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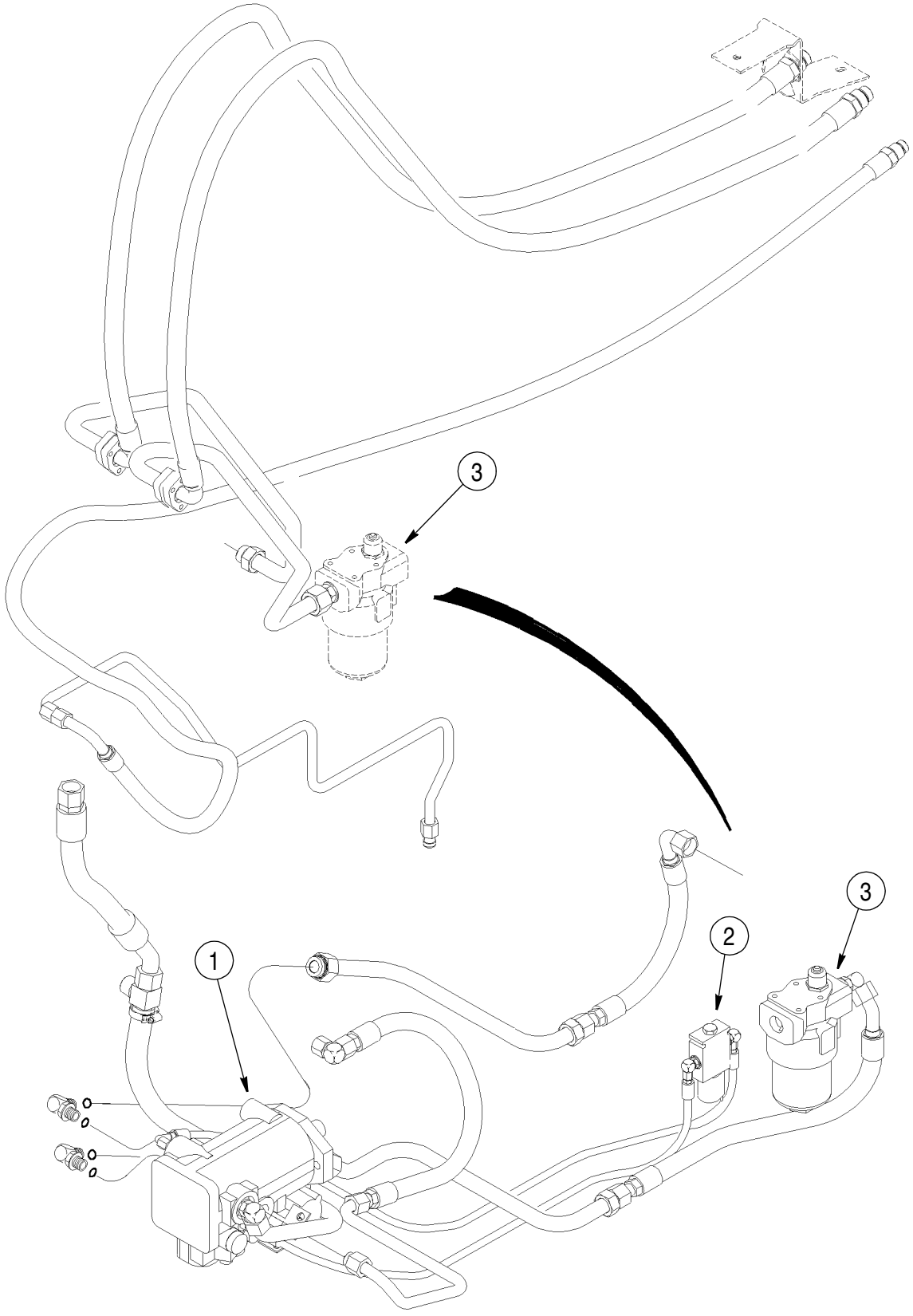


GM99F176

1. HIGH FLOW PISTON PUMP
2. SOLENOID VALVE
3. HIGH FLOW RETURN FILTER

95XT SKID STEER HIGH FLOW COMPONENTS WITH PISTON PUMP

PISTON PUMP HIGH FLOW RETURN FILTER

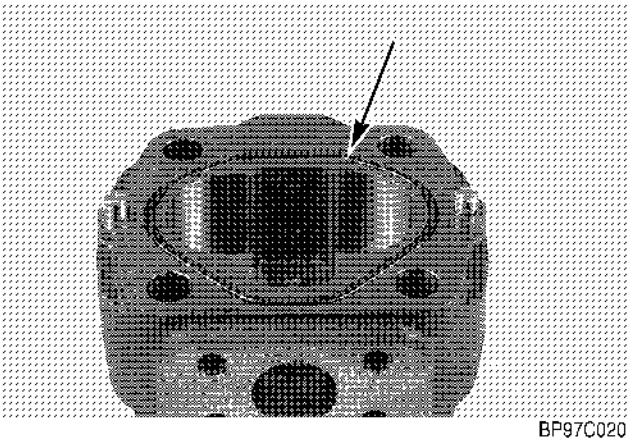
Removal

1. Place a shop towel under the high flow return filter (1).
2. Remove the cap from the hydraulic reservoir.
3. Connect a vacuum pump to the hydraulic reservoir.
4. Start the vacuum pump.
5. Tag and disconnect all hoses from the high flow return filter (1).
6. Install plugs in the hoses and caps on the fittings.
7. Remove the bolts (2), washers (3), and high flow return filter (1) from the bracket (4).
8. Stop the vacuum pump.

Installation

1. Install the high flow return filter (1), washers (3), and bolts (2) to the bracket (4).
2. Start the vacuum pump.
3. Connect all hoses to the high flow return filter (1).
4. Stop the vacuum pump. Disconnect the vacuum pump from the hydraulic reservoir.
5. Clean up any hydraulic fluid from equipment or floor.
6. Start and run the engine at idle.
7. Operate the loader controls to completely extend and retract the lift and bucket cylinders in order to remove any air from the hydraulic system.
8. Lower the loader bucket to the floor.
9. Stop the engine.
10. Check for oil leakage.
11. Check the level of the oil in the hydraulic reservoir. Add oil as required.
12. Install the cap on the hydraulic reservoir.

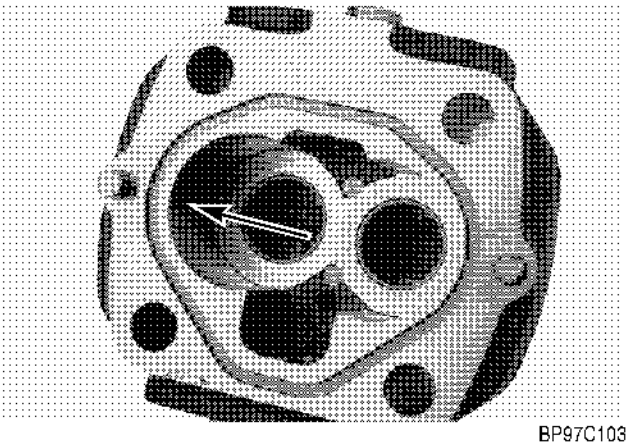
STEP 19



BP97C020

Remove and discard the O-ring from the pump body.

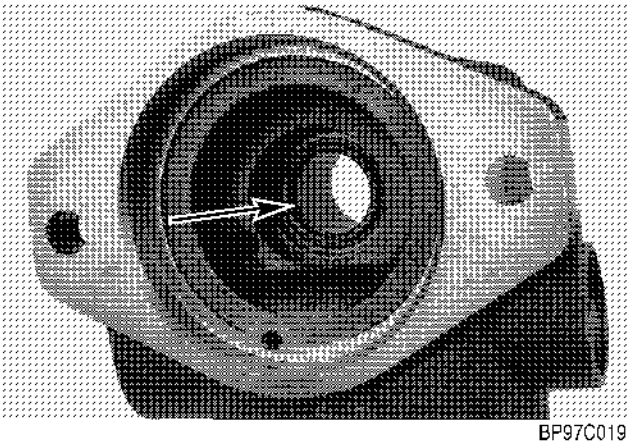
STEP 20



BP97C103

Inspect the bore for the drive and driven gear in the pump body.

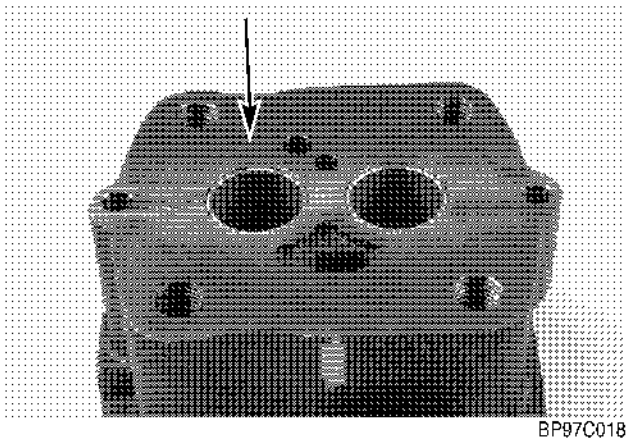
STEP 21



BP97C019

Replace the lip seal in the cover.

STEP 22

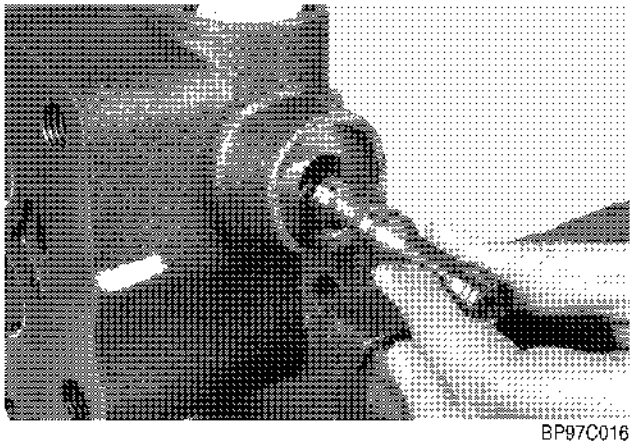


BP97C018

Inspect the bushing and machine surfaces.

Assembly

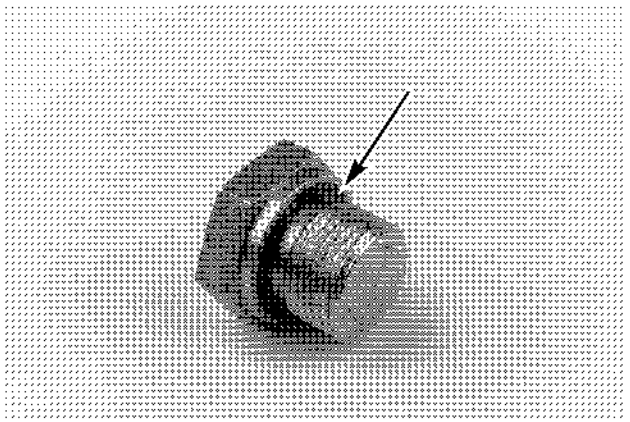
STEP 23



BP97C016

Lubricate the spool with clean hydraulic oil. Install the spool in the valve body.

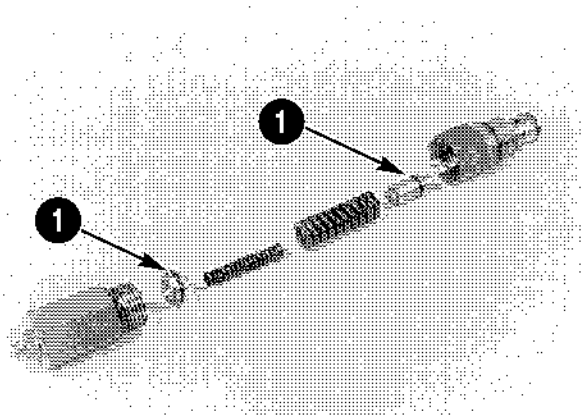
STEP 24



BP97C027

Install a new O-ring on the plug.

STEP 41

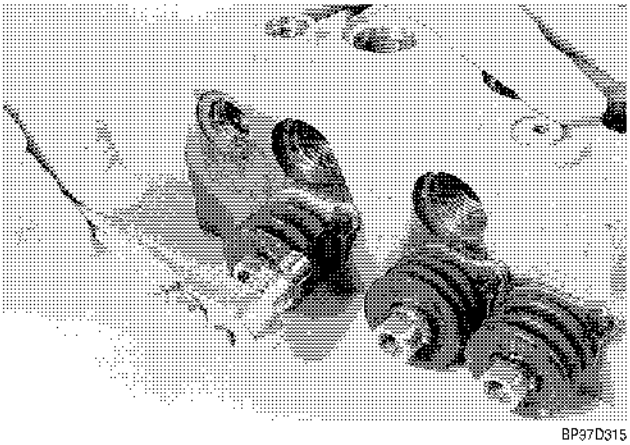


BP97D314

1. O-RING

Remove the piston, springs and poppet from the valve body. Remove and discard the O-ring from the piston and poppet.

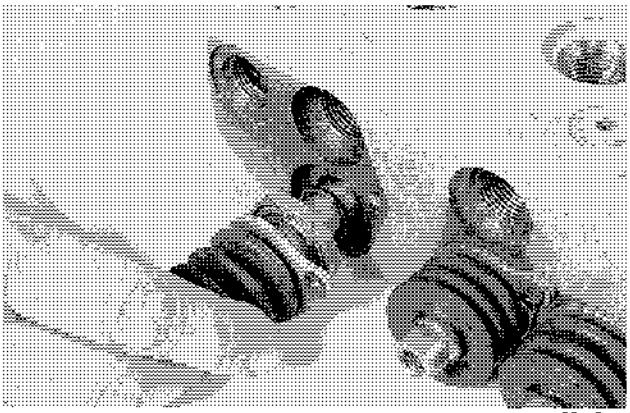
STEP 42



BP97D315

Loosen and remove the 2 socket head cap screws from the plate.

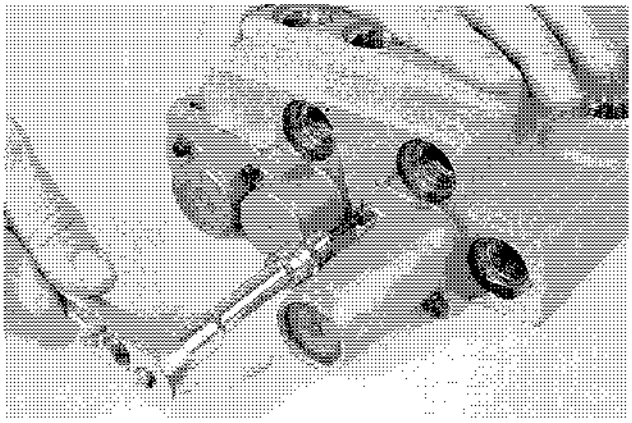
STEP 43



BP97D316

Remove the boot, plate and retainer from the valve body. Remove and discard the O-ring from spool.

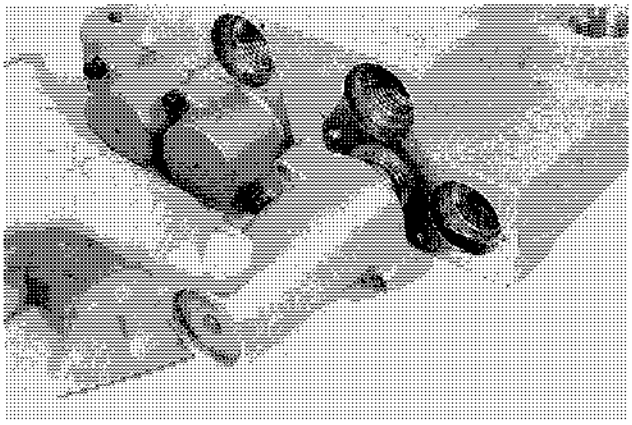
STEP 44



BP97D317

Loosen and remove the 2 socket head cap screws from the detent assembly.

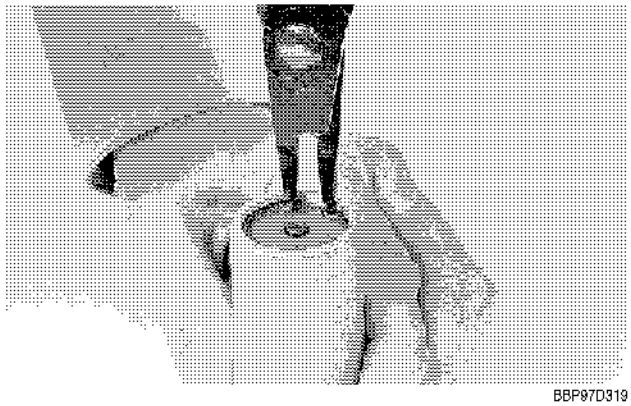
STEP 45



BP97D318

Remove the detent assembly from the valve body.

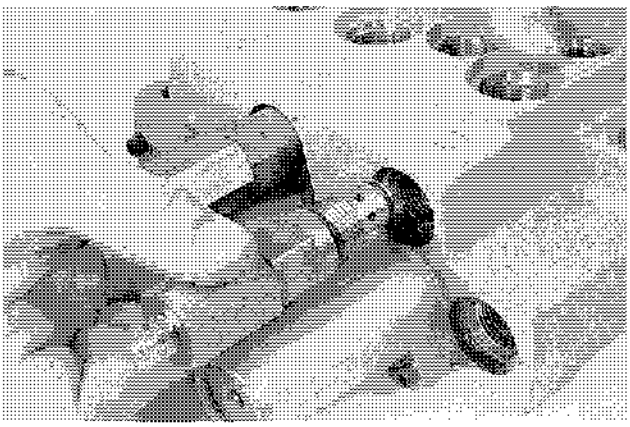
STEP 46



BBP97D319

Place detent assembly on the bench. Hold tension against the spring and remove the retaining ring from the groove.

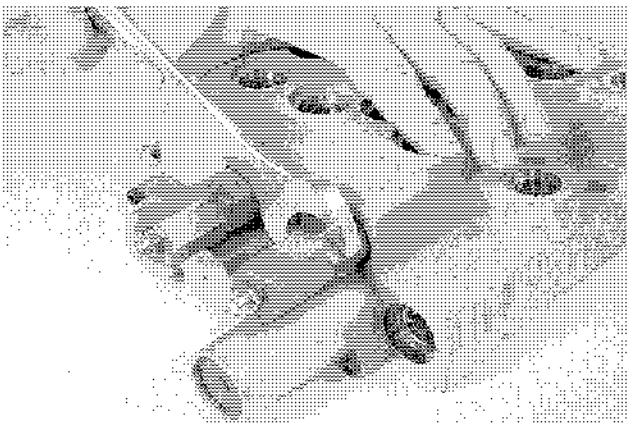
STEP 102



BBP97D310

Install the relief valve into the B1 port.

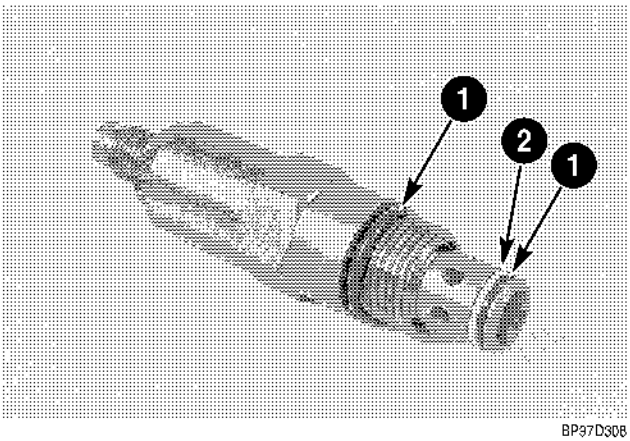
STEP 103



BP97D309

Tighten the relief valve to a torque of 47 to 54 Nm (35 to 40 pound-feet).

STEP 104

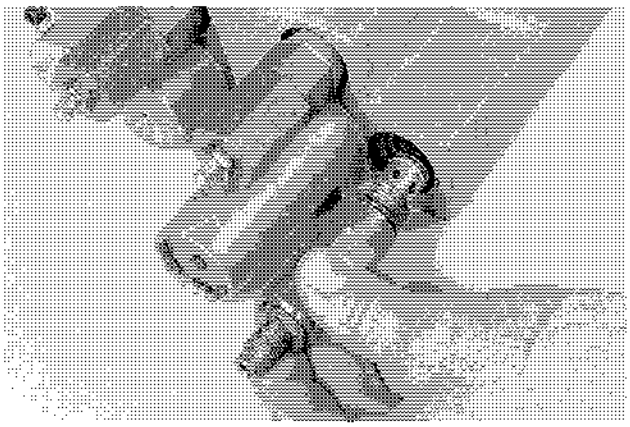


BP97D308

1. O-RING 2. BACKUP RING

Lubricate new O-rings and backup ring with clean hydraulic oil and install on the pilot operated relief valve.

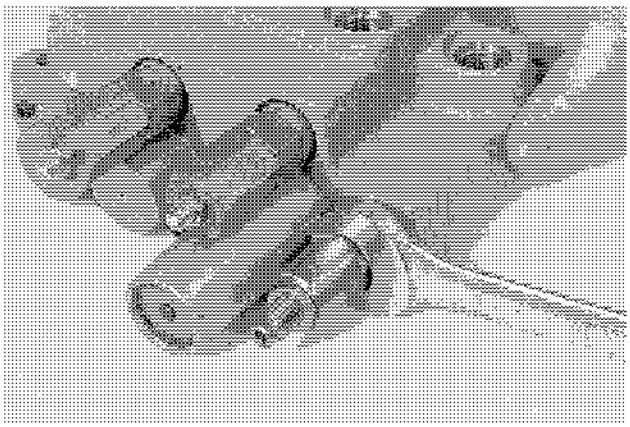
STEP 105



BP97D307

Install the pilot operated relief valve into the port.

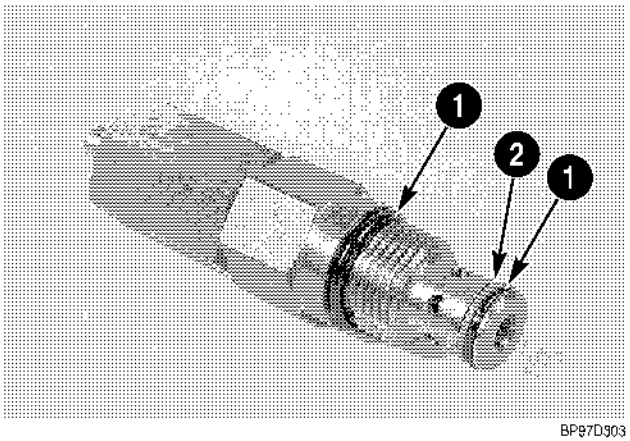
STEP 106



BP97D306

Tighten the pilot operated relief valve to a torque of 47 to 54 Nm (35 to 40 pound-feet).

STEP 107



BP97D303

1. O-RING 2. BACKUP RING

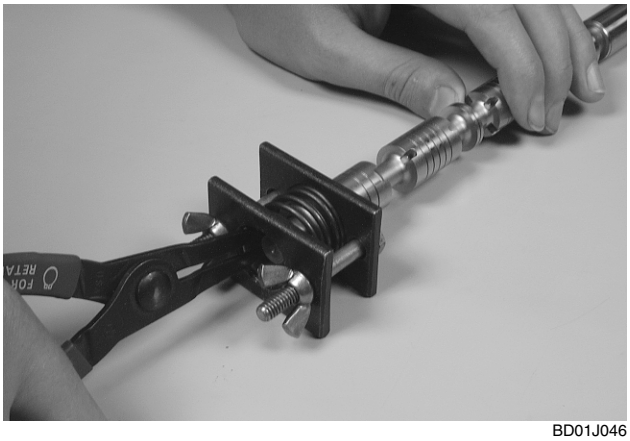
Lubricate new O-rings and backup ring with clean hydraulic oil and install on the relief valves for the A1 and A2 ports.

STEP 25

BD01J045

Remove the retainer and O-ring from the bucket spool.

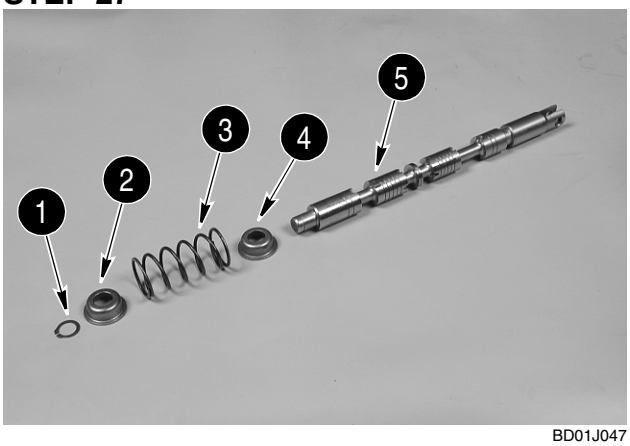
STEP 26



BD01J046

Using CAS-1147-2 compress the spring and remove the snap ring from the bucket spool.

STEP 27

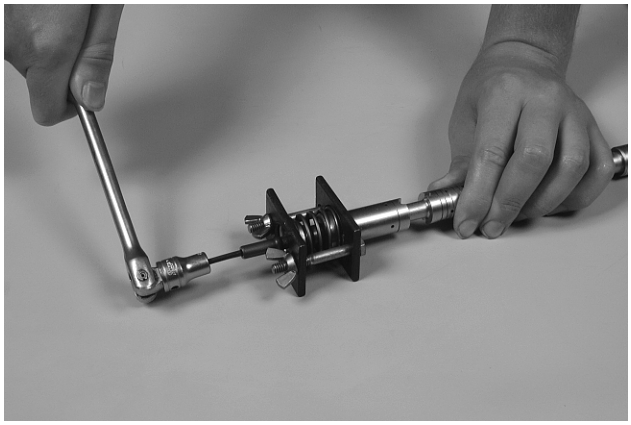


BD01J047

1. SNAP RING
2. RETAINER
3. SPRING
4. RETAINER
5. SPOOL

Remove the first retainer, spring, and second retainer from the bucket spool.

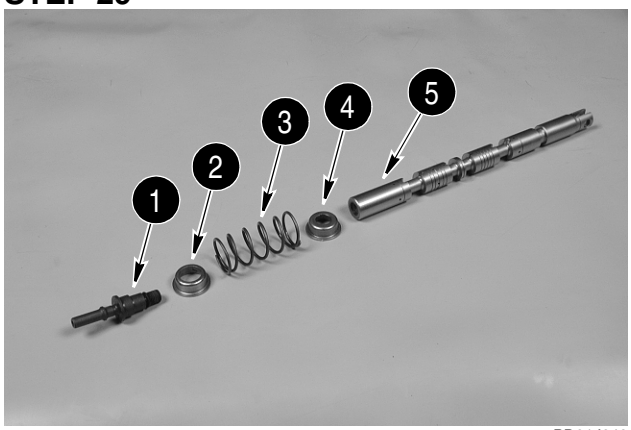
STEP 28



BD01J048

Install the CAS-1147-2 and compress the loader spool spring. Remove the detent stud from the loader spool.

STEP 29



BD01J049

1. STUD
2. RETAINER
3. SPRING
4. RETAINER
5. SPOOL

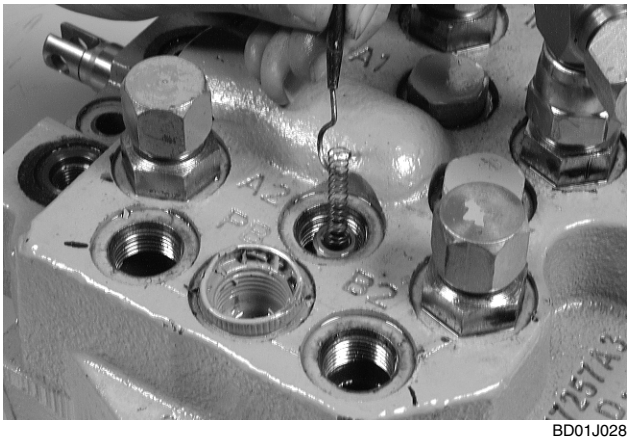
Remove the first spring retainer, spring, and the second spring retainer from the loader lift spool.

STEP 19

BD01J027

Remove the check valve plug from the valve body.

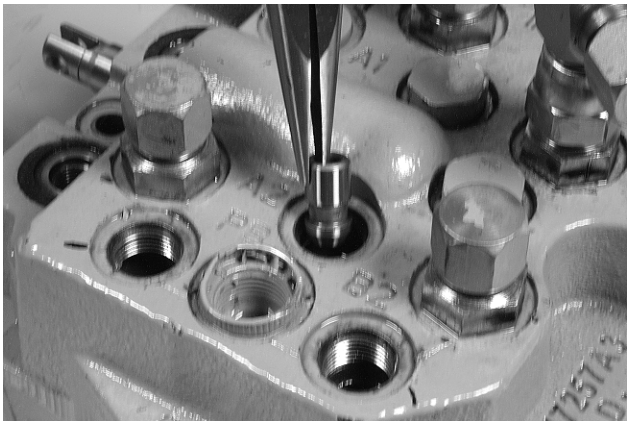
STEP 20



BD01J028

Remove the spring from the valve port.

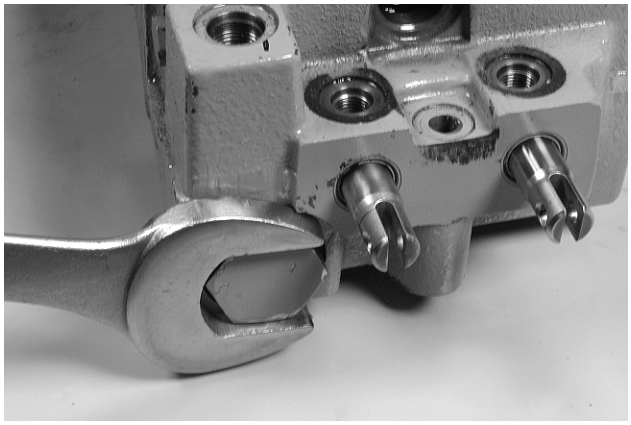
STEP 21



BD01J029

Remove the poppet from the valve port.

STEP 22



BD01J030

Loosen the flow divider cartridge.

STEP 23

BD01J031

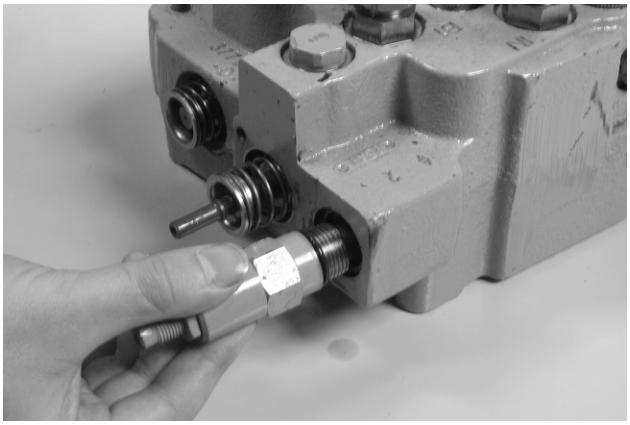
Remove the flow divider cartridge from the valve body.

STEP 24

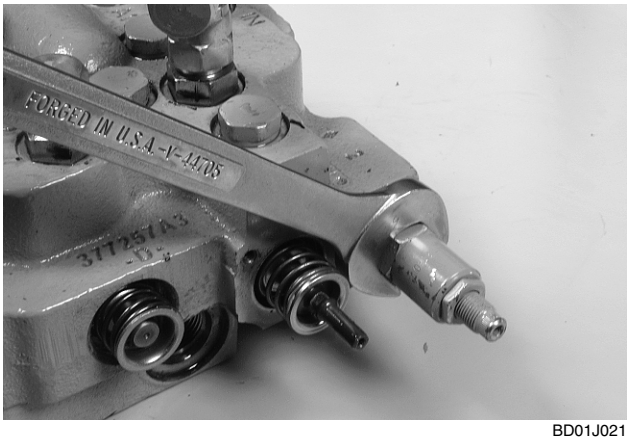
BD01J032

Loosen the plug assembly.

STEP 82



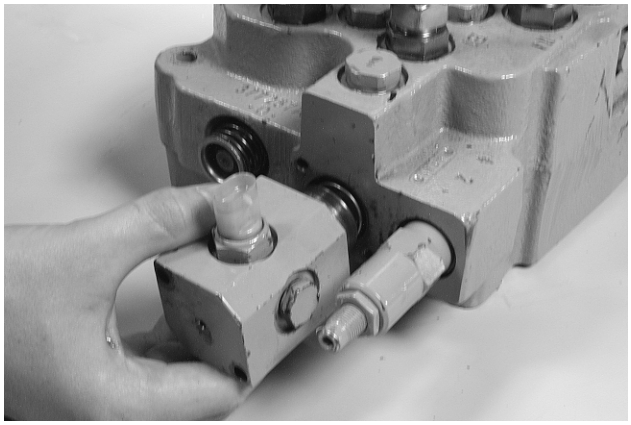
BD01J022



BD01J021

Install the relief valve onto the valve body. Tighten the relief valve 47 to 54 Nm (416 to 478 pound-inches).

STEP 83



BD01J020

BD01J019

Install the float spool cover. Install the bolts.

8. Lubricate the bore of the gland (7) with clean hydraulic oil.

9. Push the gland (7) onto the piston rod (3). If the gland (7) will not slide easily onto the piston rod (3), use a soft hammer to drive the gland (7) onto the piston rod (3).

10. Place a support below and near the end of the piston rod (3) to prevent damage to the piston rod (3).

11. Install the piston (8) onto the end of the piston rod (3).

12. Install the hardened washer (4) onto the cap screw (5).

13. Clean the threads on the end of the piston rod (3) and the threads of the cap screw (5) using Loctite cleaning solvent. Allow all the parts to dry. Apply Loctite 242 to the piston rod (3) threads, 1/4 inch from the open end of the piston rod (3). Apply 1/2 inch of Loctite 242 on the piston rod (3) threads.

NOTE: *Do not apply Loctite 242 to the first 1/4 inch of the piston rod (3) threads.*

14. Install the cap screw (5) and tighten to 400 to 460 Nm (295 to 340 pound-feet). A torque multiplier can be used to tighten the cap screw (5).

15. Lubricate a new ring (17) with clean hydraulic oil and install in the end groove on the outside of the piston (8).

16. Lubricate a new ring (15) with clean hydraulic oil and install in the center groove on the outside of the piston (8).

17. Lubricate a new seal (14) with clean hydraulic oil and install on top of the ring (15) on the outside of the piston (8).

18. Lubricate a new wear ring (16) with clean hydraulic oil and install in the end groove on the opposite end of the piston (8).

19. Lubricate the inside of the tube (1) and the piston (8) with clean hydraulic oil.

20. Start the tube (1) onto the piston rod (3) assembly. Be careful not to damage the wear ring (16) and the seal (14).

21. When the piston (8) is in the smooth part of the tube (1), start the gland (7) into the tube (1).

22. Lubricate the new O-ring (12) on the gland (7) with clean hydraulic oil.

23. Tighten the gland (7) to 407 Nm ± 68 Nm (300 pound-feet ± 50 pound-feet).

24. 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.

3. Lubricate a new wiper (2) with clean hydraulic oil and install in the gland (5). The lips of the wiper (2) must be toward the large end of the gland (5).

4. Lubricate a new backup ring (8) with clean hydraulic oil and install in the groove on the outside of the gland (5). Install the backup ring (8) with the flat side toward the large end if the gland (5).

5. Lubricate a new O-ring (7) with clean hydraulic oil and install in the groove next to the backup ring (8) on the outside of the gland (5). The O-ring (7) must be toward the small end of the gland (5).

6. Install a new bushing (6) in the inside diameter of the gland (5).

7. Fasten the piston rod eye in the vise.

8. Remove any marks and sharp edges on the chamfer at the end of the piston rod (15).

9. Lubricate the bore of the gland (5) and the piston rod (15) with clean hydraulic oil.

10. Push the gland (5) onto the piston rod (15). If the gland (5) will not slide easily onto the piston rod (15), use a soft hammer to drive the gland (5) onto the piston rod (15).

11. Place a support below and near the end of the piston rod (15) to prevent damage to the piston rod (15).

12. Install the piston (9) onto the end of the piston rod (15).

13. Install the hardened washer (14) onto the cap screw (13).

14. Clean the threads on the end of the piston rod (15) and the threads of the cap screw (13) using Loctite cleaning solvent. Allow all the parts to dry. Apply Loctite 242 to the first six threads on the cap screw (13).

15. Install the cap screw (13), refer to Specifications for the correct torque.

16. On the boom cylinder; lubricate a new wear ring (12) with clean hydraulic oil and install in the inner groove on the outside of the piston (9).

17. On the boom cylinder; lubricate a new ring (11) with clean hydraulic oil and install in the center groove on the outside of the piston (9).

18. On the boom cylinder; lubricate a new seal (10) with clean hydraulic oil and install on top of the ring (11) on the outside of the piston (9).

19. On the bucket and dipper cylinders; lubricate a new ring (12) with clean hydraulic oil and install in the inner groove on the outside of the piston (9).

20. On the bucket and dipper cylinders; lubricate a new seal (11) with clean hydraulic oil and install on top of the ring (12) on the outside of the piston (9).

21. On the bucket and dipper cylinders; lubricate a new wear ring (10) with clean hydraulic oil and install on the outer groove on the outside of the piston (9).

22. Lubricate the inside of the tube (1) and the piston (9) with clean hydraulic oil.

23. Start the tube (1) onto the piston rod (15) assembly. Push the tube (1) onto the piston rod (15).

24. When the piston (9) is in the smooth part of the tube (1), start the gland (5) into the tube (1).

25. Lubricate the new O-ring (7) on the gland (5) with clean hydraulic oil.

26. Tighten the gland (5), refer to Specifications for the correct torque.

27. See General for the tube to gland retaining screw procedure.

28. 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.

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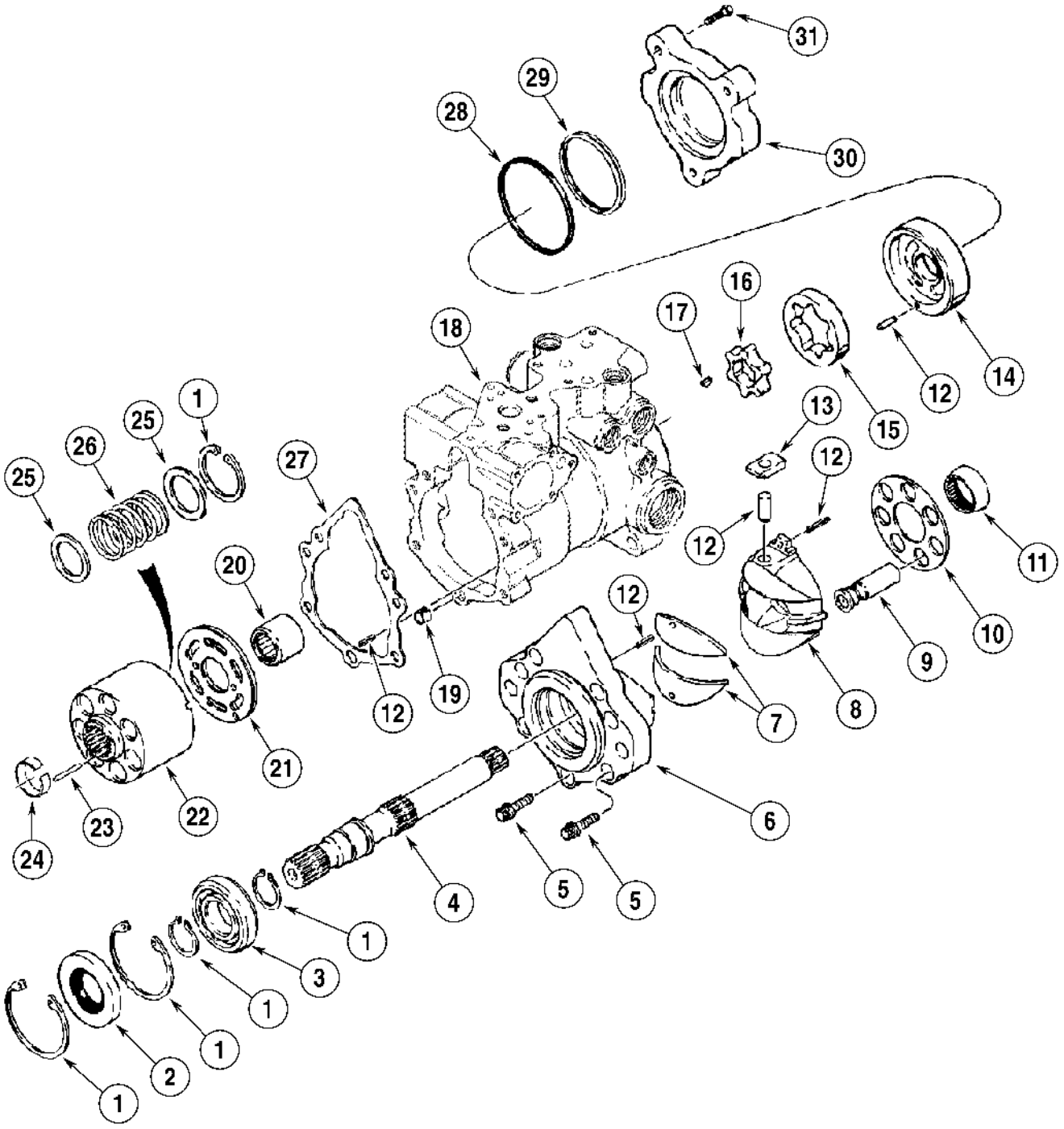

1. RETAINING RING
2. LIP SEAL
3. ROLLER BEARING
4. PUMP SHAFT
5. TORX CAP SCREW
6. FRONT COVER
7. JOURNAL BEARING
8. SWASH PLATE
9. PISTON
10. SLIPPER RETAINER
11. RETAINER GUIDE
12. PIN
13. BEARING SLEEVE
14. GEROTOR COVER
15. OUTER GEROTOR GEAR
16. INNER GEROTOR GEAR
17. WOODRUFF KEY
18. PUMP BODY
19. SPRING PIN
20. NEEDLE BEARING
21. VALVE PLATE
22. CYLINDER BLOCK
23. SLIPPER HOLD DOWN PINS
24. PIN RETAINER
25. WASHER
26. CYLINDER BLOCK SPRING
27. GASKET
28. O-RING
29. TEMPER LOAD RING
30. CHARGE PUMP COVER
31. CAP SCREW

EXPLODED VIEW OF HIGH PRESSURE HIGH FLOW PUMP

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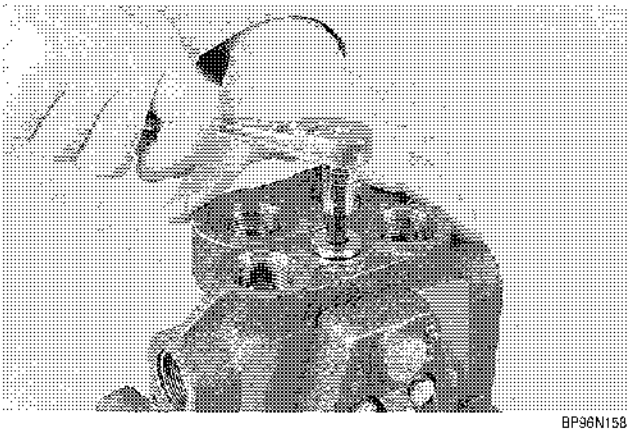
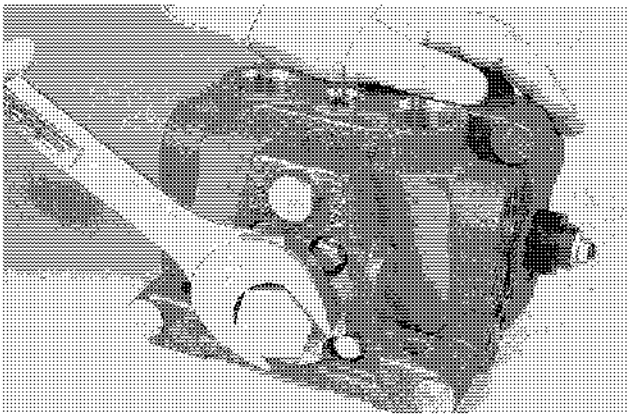
STEP 19



BP96N158

Loosen and remove the top plug from the valve body.

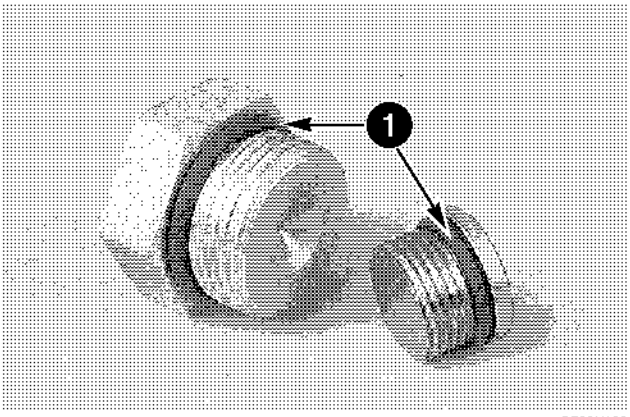
STEP 20



BP96N159

Loosen and remove the two port plugs from each side of the outlet and inlet cover housing.

STEP 21

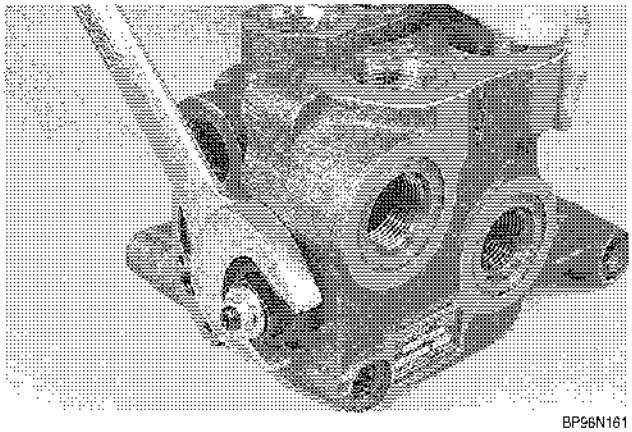


BP96N160

1. O-RING

Remove and discard the O-rings from all the plugs.

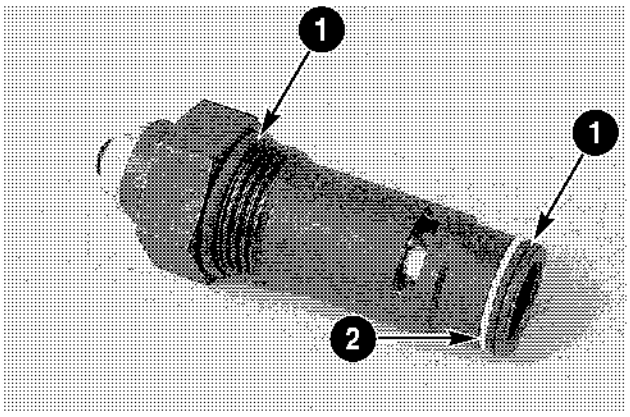
STEP 22



BP96N161

Loosen and remove the main relief valve cartridge.

STEP 23

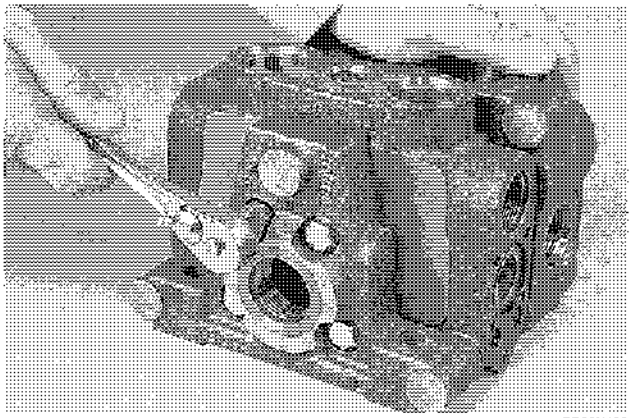


BP96N162

1. O-RING 2. BACKUP RING

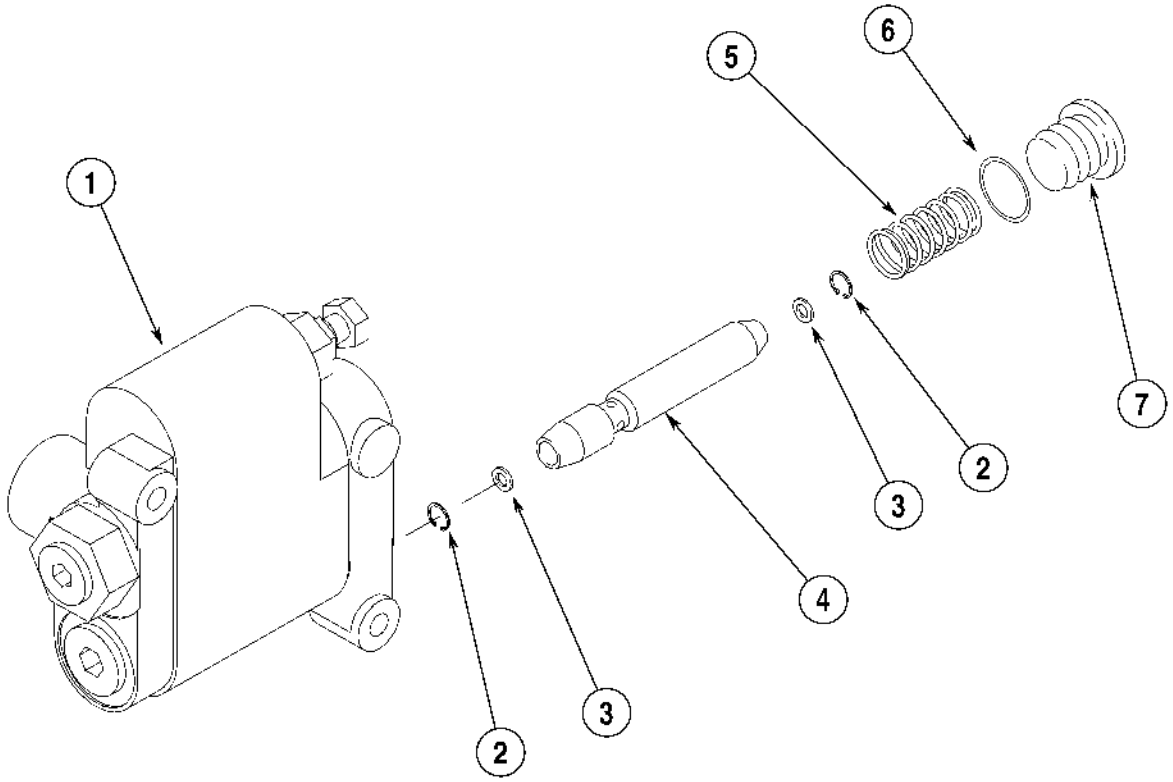
Remove and discard the O-rings and backup ring from the relief valve cartridge.

STEP 24



BP96N163

Loosen and remove the four cap screws which fasten the valve body sections together.



1. BODY
2. SNAP RING
3. ORIFICE
4. SPOOL
5. SPRING
6. O-RING
7. PLUG

Exploded View of Self Leveling Valve

STEP 7

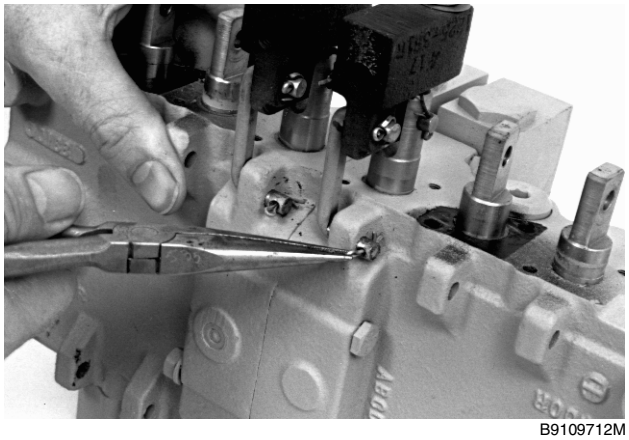
B9109711M

Remove the mounting plate and control lever assembly.

STEP 8

Repeat steps 2 through 7 to remove the control elver assembly from the other side of the backhoe control valve.

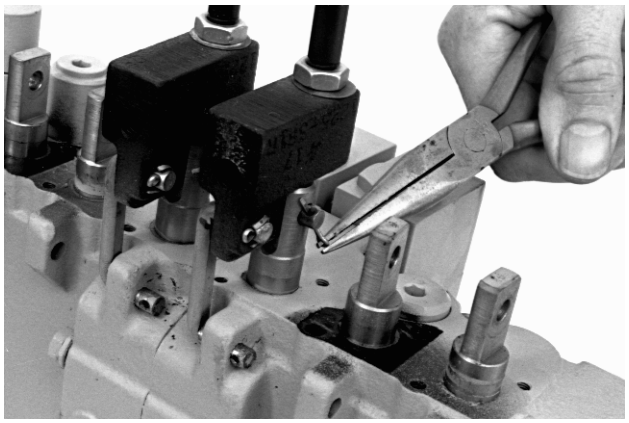
STEP 9



B9109712M

Remove the cotter pin from the bottom of the link.

STEP 10



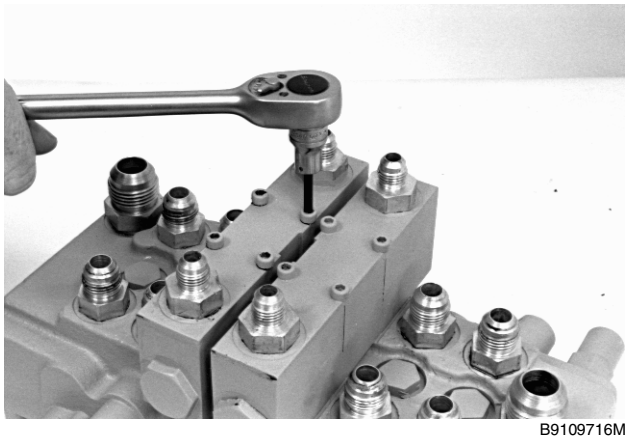
B9109713M

Remove the cotter pin and pin from the spool. Remove the stabilizer control lever from t he backhoe control valve.

STEP 11

Repeat steps 9 and 10 to remove the other stabilizer control lever.

STEP 12

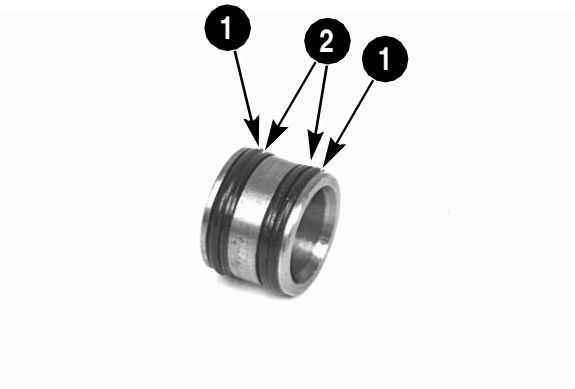


B9109716M

Loosen the Allen head screws from the check valve assemblies.

ASSEMBLING THE PARTS OF THE BACKHOE CONTROL VALVE

STEP 60

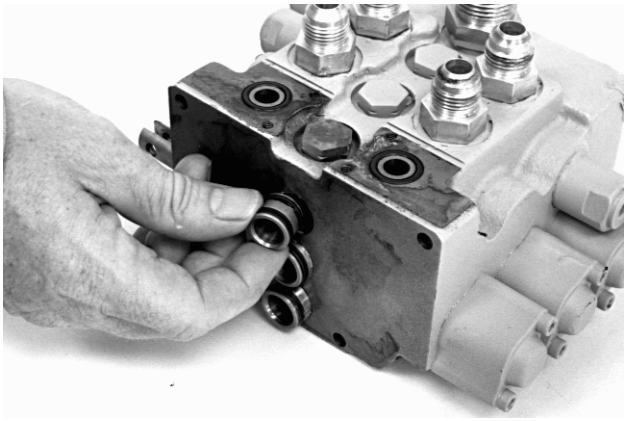


B9068824M

1. O-RING
2. BACKUP RING

Replace the O-rings and backup rings on the sleeves.

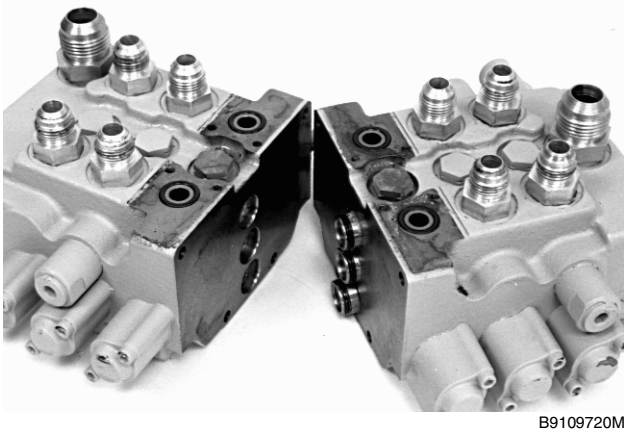
STEP 61



B9109721M

Lubricate the O-rings and backup rings on the sleeves with clean hydraulic oil. Install the sleeves in the housing.

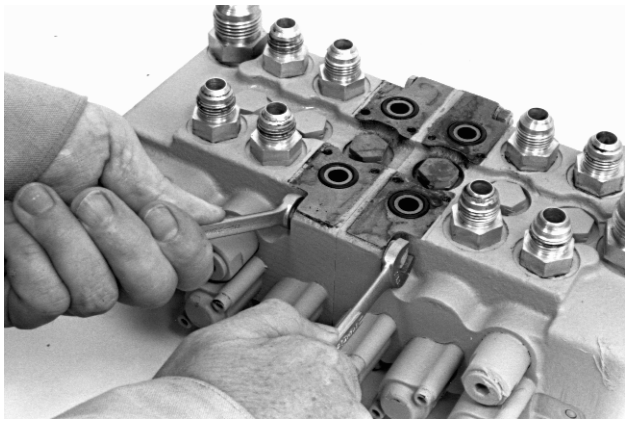
STEP 62



B9109720M

Put the two sections together.

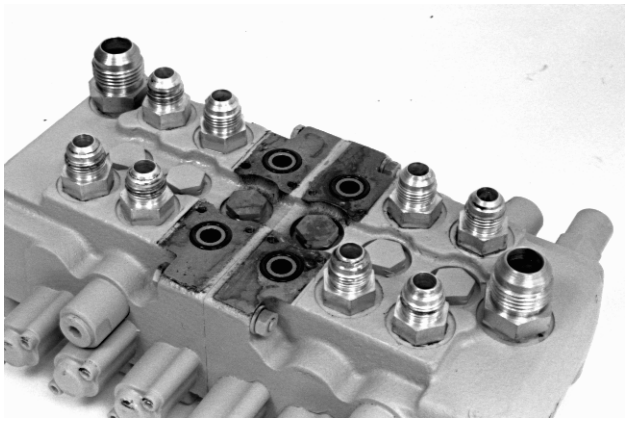
STEP 63



B9109719M

Install the bolts and nuts to fasten the sections together. Tighten to a torque of 11 to 14 Nm (96 to 120 pound-inches.

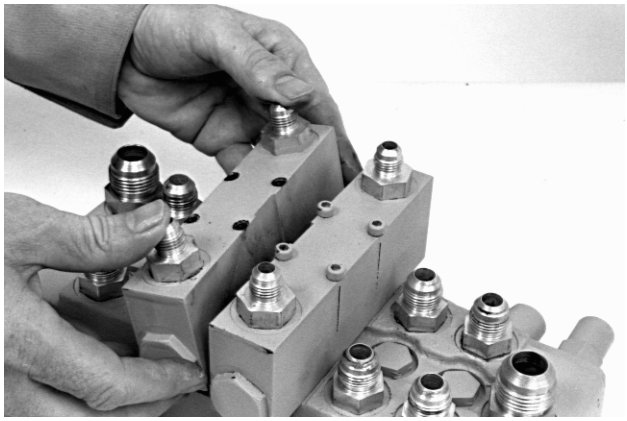
STEP 64



B9109718M

Install new O-rings for the check valve assemblies.

STEP 65



B9109717M

Install the check valve assemblies.

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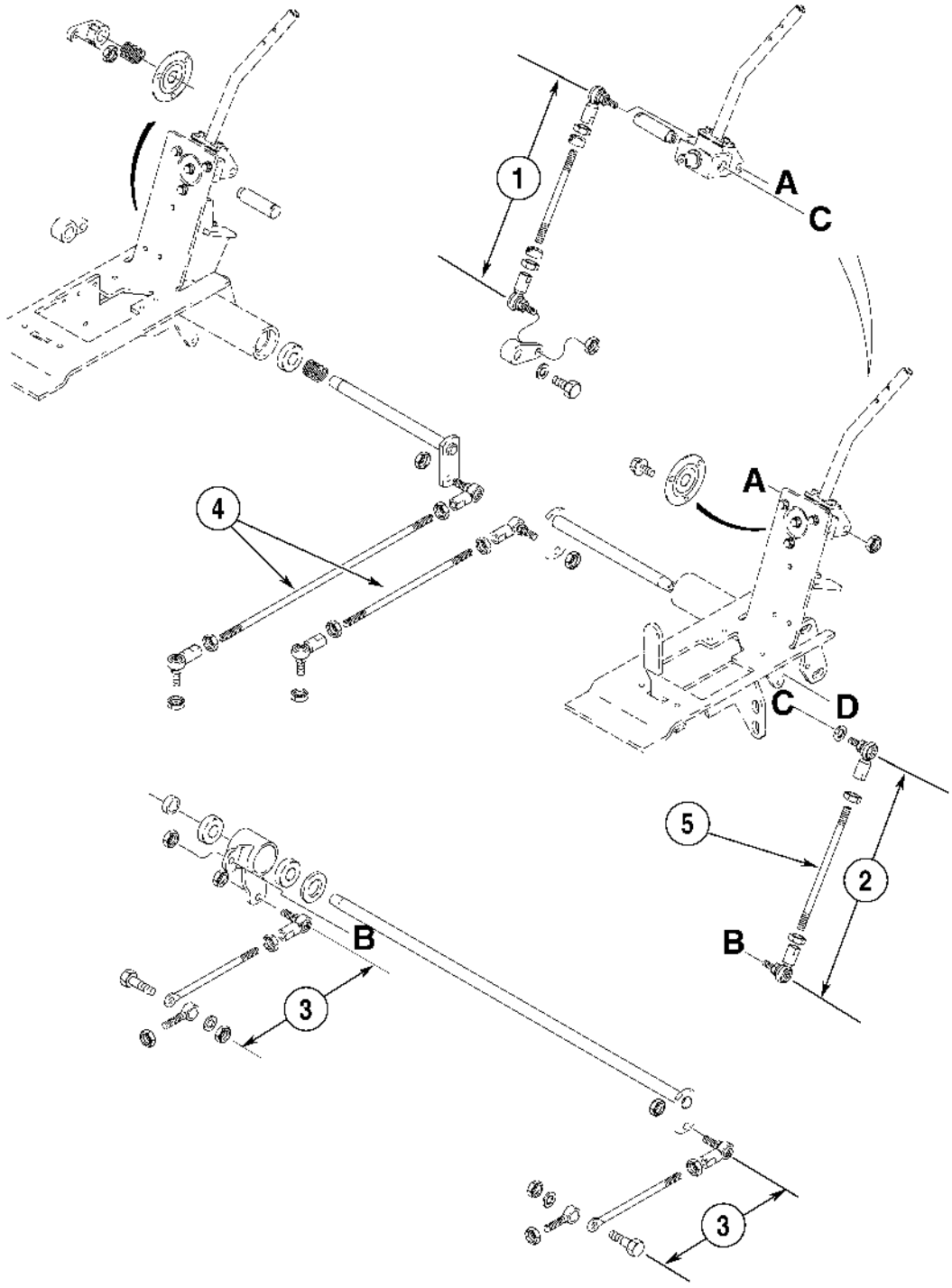
LOADER AND GROUND DRIVE LINKAGE WITHOUT FOOT CONTROLS



BT97H014

1. ROD LENGTH FROM CENTER LINE TO CENTER LINE OF BALL JOINTS, 185 MM (7.28 INCHES)
2. ROD LENGTH FROM CENTER LINE TO CENTER LINE OF BALL JOINTS, 233 MM (9.17 INCHES)
3. ROD LENGTH FROM CENTER LINE TO CENTER LINE OF BALL JOINTS, 198 MM (7.80 INCHES)
4. LINK FROM PUMP TRUNION TO FIRST CONTROL TRUNION
5. OUTER CONTROL ROD

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ATTACHMENT COUPLER (MECHANICAL)

Disassembly

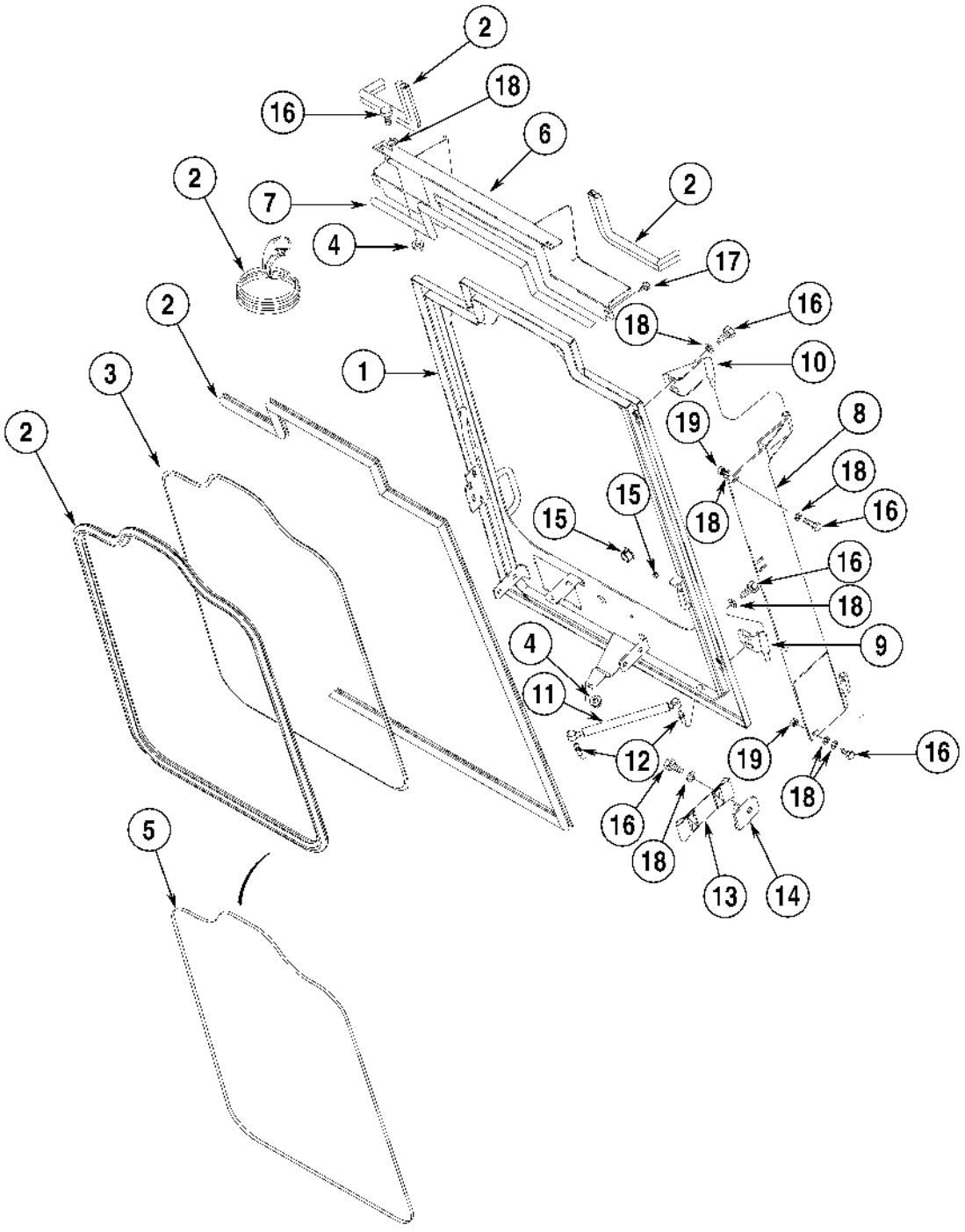
1. Loosen and remove the nut (20), bolt (17), 2 washers (19) and spacer (18) from the left and the right lower pins (16) of the coupler frame (1).
2. Use acceptable tools and remove the left and the right lower pins (16) from the coupler frame (1).
3. Loosen and remove the nut (20), bolt (17), 2 washers (19) and spacer (18) from the left and right upper pins (15) of the coupler frame (1).
4. Use acceptable tools and remove the left and right upper pins (15) from the coupler frame (1).
5. Remove the coupler frame (1) from the loader arms.
6. Place the coupler frame (1) on the work bench.
7. Remove the cotter pin (12) from the clevis pin (11). Remove the clevis pin (11) from the lock pin (14).
8. Remove the retaining ring (6) from the left handle (2). Lift the left handle (2) until the link rod (13) disengages the lock pin (14). Remove the left handle (2) and wave spring (5) from the coupler frame (1). Remove the lock pin (14) from the coupler frame (1).
9. Place the left handle (2) in a vise with soft jaws.
10. Prevent the link rod (13) from turning. Loosen and remove the lock nut (7) from the link rod (13). Remove the link rod (13), spring (10), spring guide (9) and trunnion (8) from the left handle (2).
11. Repeat steps 7 through 10 for the right handle (3).

Inspection

1. Inspect the coupler frame (1) to be sure it is free of cracks, corrosion, rust or any other damage. Use new parts as required.
2. Inspect the upper pins (15) and the lower pins (16) for wear, cracks, corrosion or any other damage. Use new parts as required.
3. Inspect the lock pins (14) for wear and damage. Use new parts as required.
4. Inspect the link rod (13), spring (10), spring guide (9) and trunnion (8) for wear and damage. Use new parts as required.
5. Inspect the left handle (2) and the right handle (3) for wear and damage. Use new parts as required.

Assembly

1. Place the left handle (2) in a vise with soft jaws.
2. Install the trunnion (8) into the left handle(2).
3. Install the link rod (13) through the spring (10) and the spring guide (8). Install the link rod (13) into the trunnion (8). Install the lock nut (7) onto the link rod (13). Tighten the lock nut (7) until the dimension (21) between the bottom of the lock nut (7) and the spring guide (9) on the link rod (13) equals 102.5 mm ± 1.5 mm (4.04 inch ± .06 inch). See dimension (21) on page 3.
4. Install the lock pin (14) into the coupler frame (1). Be sure the tapered side of the lock pin (14) faces the coupler frame(1). Install the wave spring (5) and left handle (2) onto the coupler frame (1). Install the retaining ring (6) onto the handle (2). Lift the handle (2) until the link rod (13) will engage the lock pin (14).
5. Install the clevis pin (11) through the lock pin (14). Install the cotter pin (12) into the clevis pin (11).
6. Repeat steps 1 through 5 for the right handle (3).
7. Install the coupler frame (1) onto the loader arms.
8. Install the left and right upper pins (15) into the coupler frame (1).
9. Install the bolts (17), spacers (18), 2 washers (19), and nuts (20) for the left and right upper pins(15). Tighten the nuts (20).
10. Install the left and right lower pins (16) into the coupler frame (1).
11. Install the bolts (17), spacers (18), 2 washers (19), and nuts (20) for the left and right lower pins (15). Tighten the nuts (20).



BT97H038

1. DOOR
2. SEAL
3. WINDSHIELD (TEMPERED GLASS OR LEXAN)
4. FLANGE NUT
5. FILLING STRIP
6. SHIELD
7. PROTECTION STRIP
8. HINGE
9. LOWER HINGE
10. UPPER HINGE
11. GAS STRUT CYLINDER
12. BALL STUD
13. STRAP
14. BRACKET
15. PLUG
16. CAP SCREW
17. SCREW
18. WASHER
19. LOCK NUT

ROPS CANOPY - FRONT DOOR MOUNTING AND FRAME (IF EQUIPPED)

DELUXE HEATER

Removal of Heater Core

STEP 1
Tilt the ROPS cab forward to access the engine compartment.

STEP 2
Open the heater shut-off valves for the heater supply and return hoses.

STEP 3
Install a hose on the radiator drain valve and drain the radiator coolant into a clean container.

STEP 4
Remove the fill cap on the radiator.

STEP 5
After the radiator is drained install the fill cap and close the drain valve.

STEP 6
Close the heater shut-off valves.

STEP 7
Loosen the hose clamps on the heater supply hose and the heater return hose.

STEP 8
Disconnect the heater supply hose and return hose from the heater shut-off valves and drain the coolant from the heater.

STEP 9

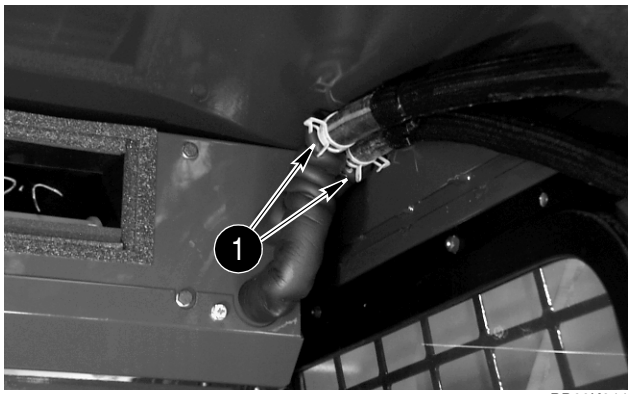

BD00K039

Loosen and remove the cap screws which fasten the right side air duct to the cab. Remove the air duct.

STEP 10


BD00K040

Loosen and remove the cap screws which fasten the left side air duct to the cab. Remove the air duct.

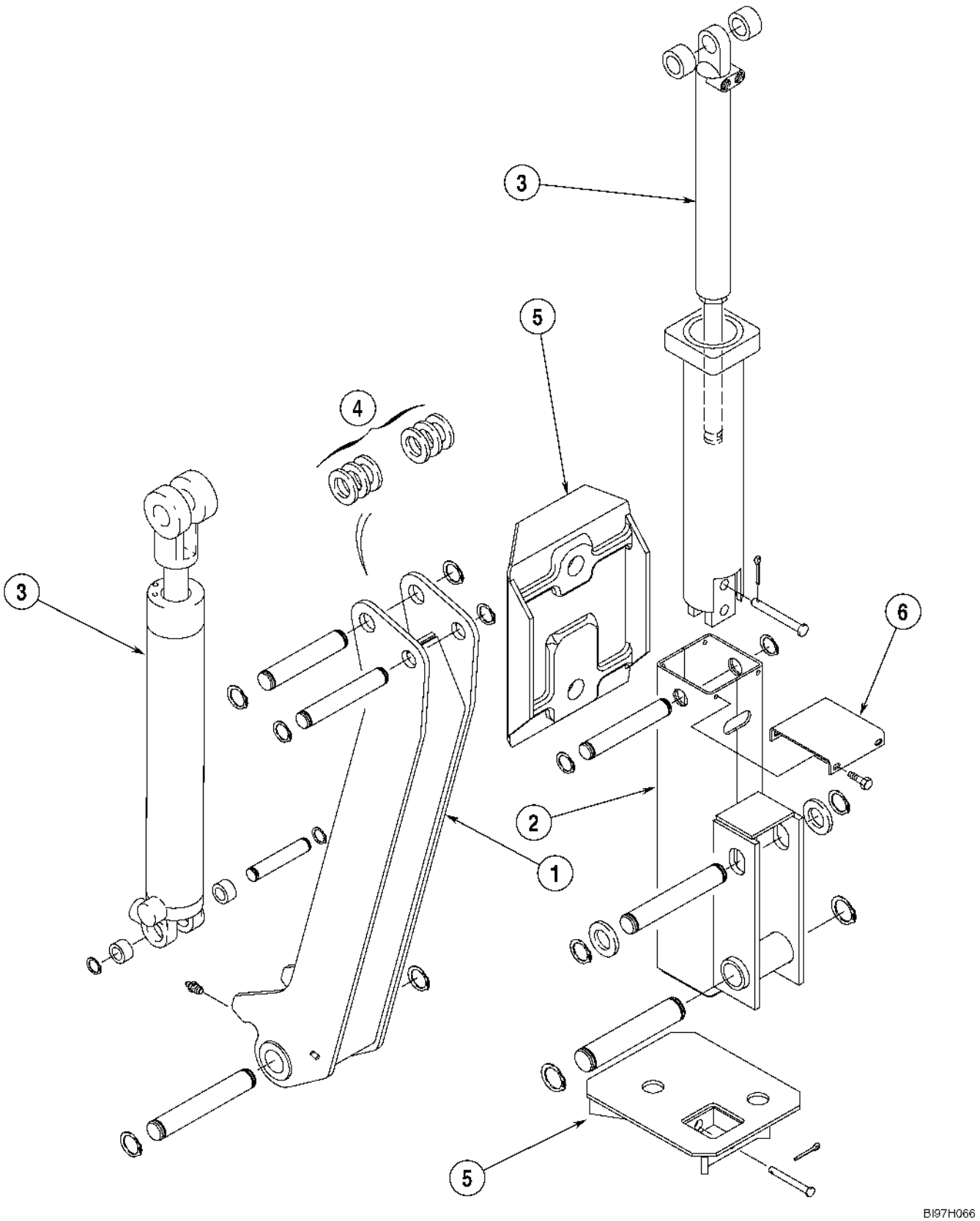
STEP 11


BD00K044

1. CLAMP

Mark the heater hoses and the heater connections for the supply and return locations for use during installation. Remove the clamps (1) from both hoses and remove the hoses from the heater connections.

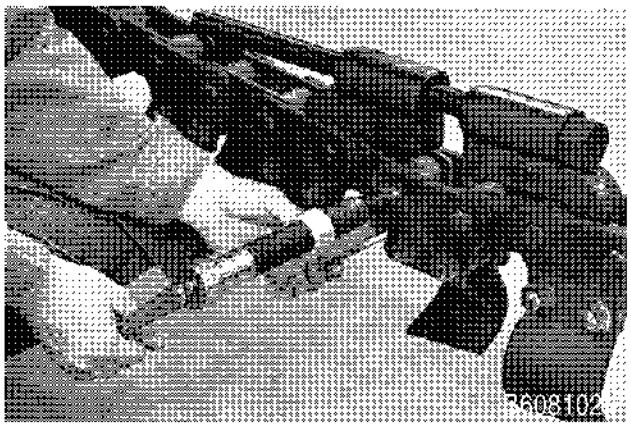
IMPORTANT: *Use care when removing the supply and return hose(s) from the heater connection(s). Twist the hose to break the seal between the hose and the connection. If the seal cannot be broken it may be necessary to cut the hose.*



1. STABILIZER (WING TYPE)
2. STABILIZER (VERTICAL)
3. STABILIZER CYLINDER
4. SPACERS (USE AS REQUIRED)
5. STABILIZER PAD
6. COVER

Backhoe Stabilizer Installation

STEP 10



Align the flat on the master pin with the hole, and use the pin press to install the master pin.

STEP 11

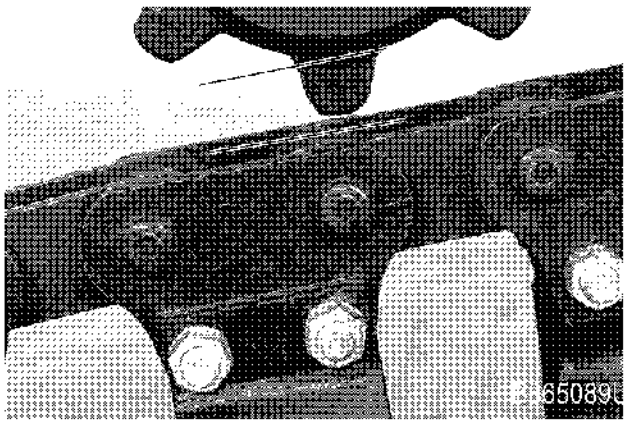
Remove the pin press and chain jack, and install a new retainer in the master pin. Bend the end of the retainer to keep the retainer in the master pin.

STEP 12

Adjust the chain as required.

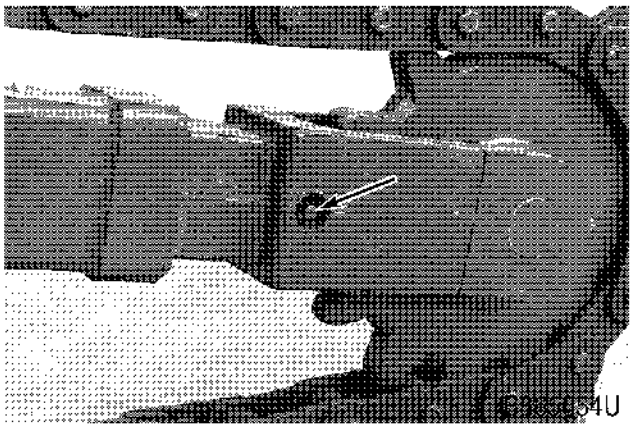
ADJUSTMENT OF CHAIN FOR STANDARD BOOM

STEP 1



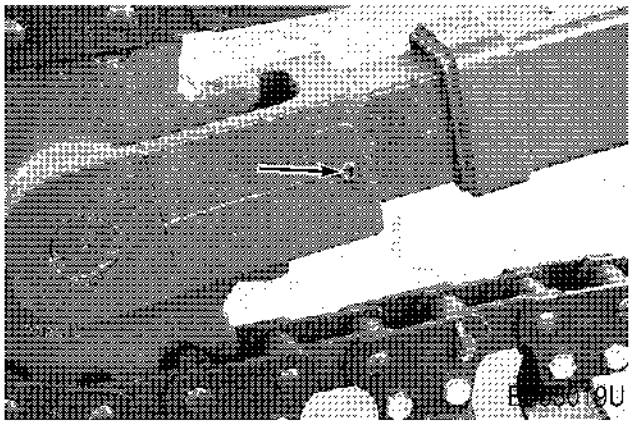
32 to 51 mm (1-1/4 to 2 inches)

STEP 3



Grease fitting. Add grease to tighten the chain.

STEP 2

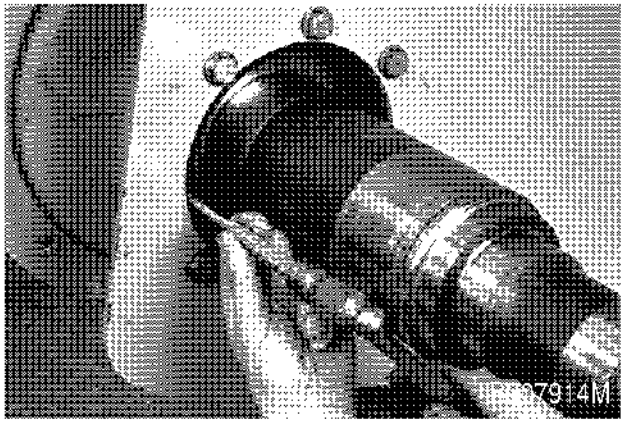


Loosen the plug to release grease and loosen the chain. Loosen the plug just enough to release the grease slowly.

INSTALLATION OF BOOM MOUNT

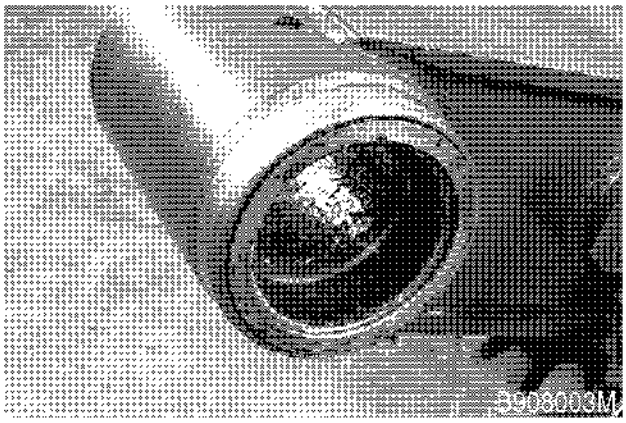
NOTE: *The machine shown in Step 3 may be different from the machine the trencher is mounted on. However, the removal, installation, and lifting equipment placement procedures are the same.*

STEP 1



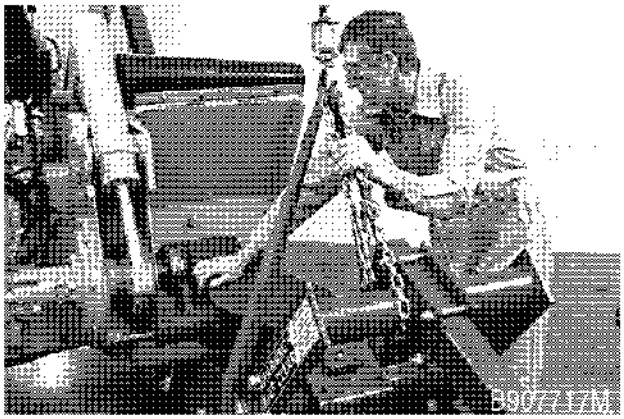
Install a new seal.

STEP 2



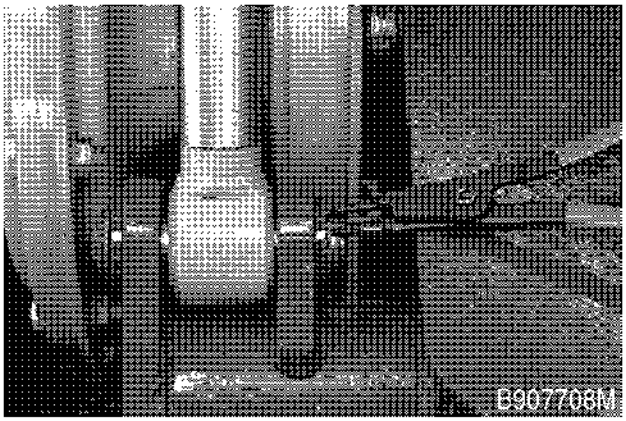
Use grease to hold the thrust washer on the boom mount.

STEP 3



Install the boom mount.

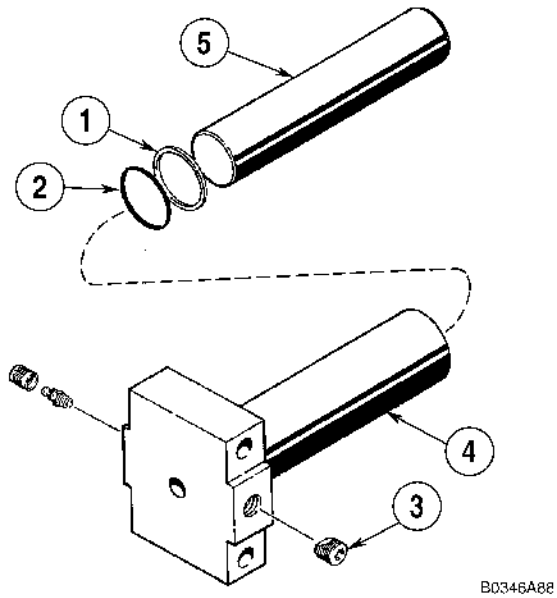
STEP 4



Install the pivot pin and snap ring.

ASSEMBLY AND INSTALLATION OF CHAIN ADJUSTER FOR ROCK BOOM

1. Install new snap rings in the groove in the housing (4).



1. BACKUP RING
2. O-RING
3. PLUG
4. HOUSING
5. PISTON

2. Install the backup ring (1) in the groove on the outside of the O-ring (2).

3. Lubricate the piston (5) and bore with clean oil, then push the piston (5) into the housing (4).

4. Install and tighten the plug (3).

5. Hold the chain adjuster in alignment with the rock boom. Install the bolts, hardened washers, and self-locking nuts.

6. Tighten the self-locking nuts to 109 to 130 Nm (80 to 96 pounds-feet).

7. Tighten the cap scews at the bottom to 47 to 57 Nm (420 to 504 pound-inches).

8. Tighten the four cap screws on the side of the rock boom.

9. Move the idler into alignment with the rock boom and install the shaft.

10. Start the shaft into the left side of the rock boom and install a spacer.

11. Align the idler with the shaft and push the shaft all the way into the rock boom.

12. Install the other spacer and push the shaft all the way into the rock boom.

13. Apply 271 Loctite to the threads in the shaft.

14. Install the cap screw and retainer. Tighten the cap screw to 230 to 257 Nm (170 to 190 pound-feet).

15. Install and adjust the chain according to instructions.

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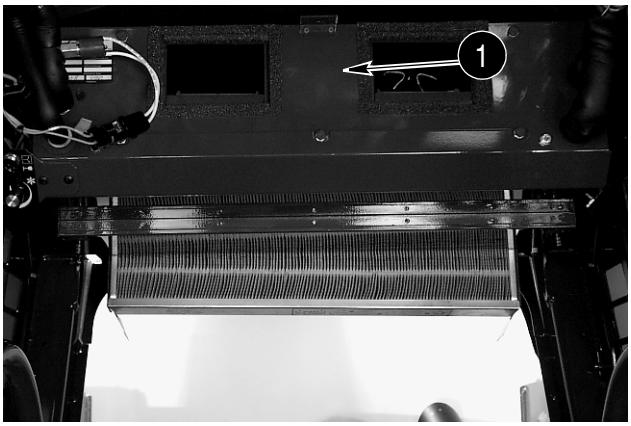
EVAPORATOR AND PLENUM CHECK

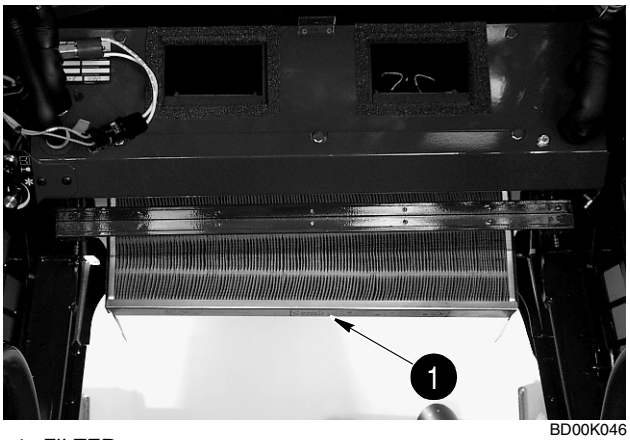
BD00K052

1. EVAPORATOR CORE



BD00K046

1. PLENUM



BD00K046

1. FILTER

Evaporator Core

Remove the headliner and remove the evaporator core.

Yes

Check the fins on the evaporator. All the fins that have bends or damage must be made straight.

Yes

Keep the evaporator core clean. If the core is dry, use compressed air or a vacuum. If the core is wet, flush the core with water using a hose without pressure.

Yes

If the evaporator core is extremely dirty, check the condition of the air filter. Also review the manner of operation of the machine. Do not operate the machine with doors and/or windows open and with the recirculation louver open. This can allow dirt to be sucked into the evaporator core and cause it to become plugged.

Plenum Sealing

Correct plenum sealing will permit air through the evaporator but not around the evaporator.

Yes

See Section 9014 in this manual for plenum sealing.

Filter

Keep the air filter element clean to provide maximum air flow into the operator cab.

PROBLEM - NOT ENOUGH COOLING (CONTINUED)

Expansion Valve not Operating - Indications:

Discharge air from evaporator warm or cool - not cold.

Condensation or frost on expansion valve inlet.

Inlet end of expansion valve is warm.

Yes →

1. Expansion valve inlet with condensation or frost is an indication of a restriction in the expansion valve.
   - A. Remove refrigerant from system. See Section 9013 in this manual.
   - B. Remove and replace expansion valve. See Section 9014 in this manual.
   - C. Remove air and moisture and charge the system. See Section 9013 in this manual.
   - D. Continue performance test for possible other problems.
2. Inlet end of expansion valve is cold - indication the valve is not completely open.
   - A. Disconnect the low pressure cutout switch with the engine running and the air conditioner on maximum cooling. Cool the top of the valve with ice and check for low pressure gauge decrease. The flow of air from the blower motor must continue through the evaporator core.
   - B. Allow the top of the expansion valve to warm. The valve should open and the pressure should rise at the low pressure gauge. Repeat Step A.
   - C. If little or no decrease is shown in the low pressure gauge reading, the expansion valve must be replaced.
   - D. Remove refrigerant from the system, replace the expansion valve, remove air and moisture and charge the system. See Section 9013 in this manual.
   - E. Connect the low pressure cutout switch. Replace all the insulation material.
   - F. Continue performance test for other possible problems.

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