

TORQUE SPECIFICATIONS - DECIMAL HARDWARE

Use the torques in this chart when special torques are not given. These torques apply to fasteners with both UNC and UNF threads as received from suppliers dry, or when lubricated with engine oil. Not applicable if special graphities, Molydisulfide greases, or other extreme pressure lubricants are used.

Grade 5 Bolts, Nuts, and Studs



Size	Newton metres
1/4 inch	10 to 12
5/16 inch	21 to 24
3/8 inch	38 to 43
7/16 inch	61 to 69
1/2 inch	94 to 104
9/16 inch	132 to 149
5/8 inch	183 to 210
3/4 inch	325 to 370
7/8 inch	530 to 595
1.0 inch	790 to 890
1-1/8 inch	980 to 1100
1-1/4 inch	1385 to 1555
1-3/8 inch	1810 to 2030
1-1/2 inch	2400 to 2700

Grade 8 Bolts, Nuts, and Studs



Size	Newton metres
1/4 inch	15 to 16
5/16 inch	30 to 34
3/8 inch	54 to 60
7/16 inch	86 to 97
1/2 inch	132 to 149
9/16 inch	191 to 213
5/8 inch	260 to 293
3/4 inch	480 to 515
7/8 inch	745 to 835
1.0 inch	1120 to 1280
1-1/8 inch	1585 to 1785
1-1/4 inch	2215 to 2235
1-3/8 inch	2930 to 3295
1-1/2 inch	3895 to 4375

NOTE: Use thick nuts with Grade 8 bolts.

ENGINE REMOVAL

STEP 1

Start and run the engine at idle.

STEP 2

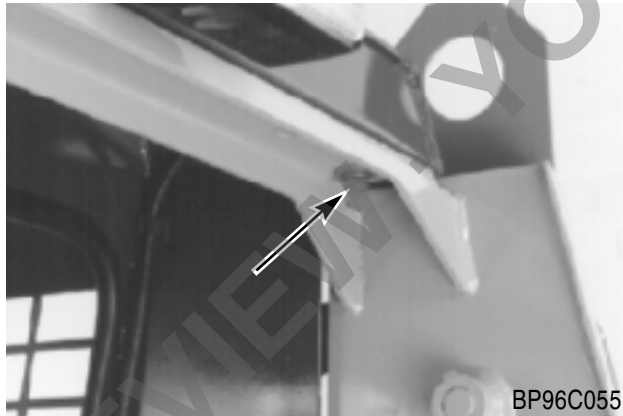


Raise the loader lift arms to full height and have another person install the support strut.

STEP 3

Stop the engine and raise the seat bars.

STEP 4



Loosen and remove the bolts, lock washers and flat washers that fasten the operators compartment to the posts at the rear of the machine.

STEP 5



Disconnect the seat bar locking mechanism on each side.

STEP 6



Use the grab handles and pull the operators compartment all the way forward.

STEP 7

Open the rear door.

STEP 8

Remove the radiator according to the instructions in this section.

STEP 9

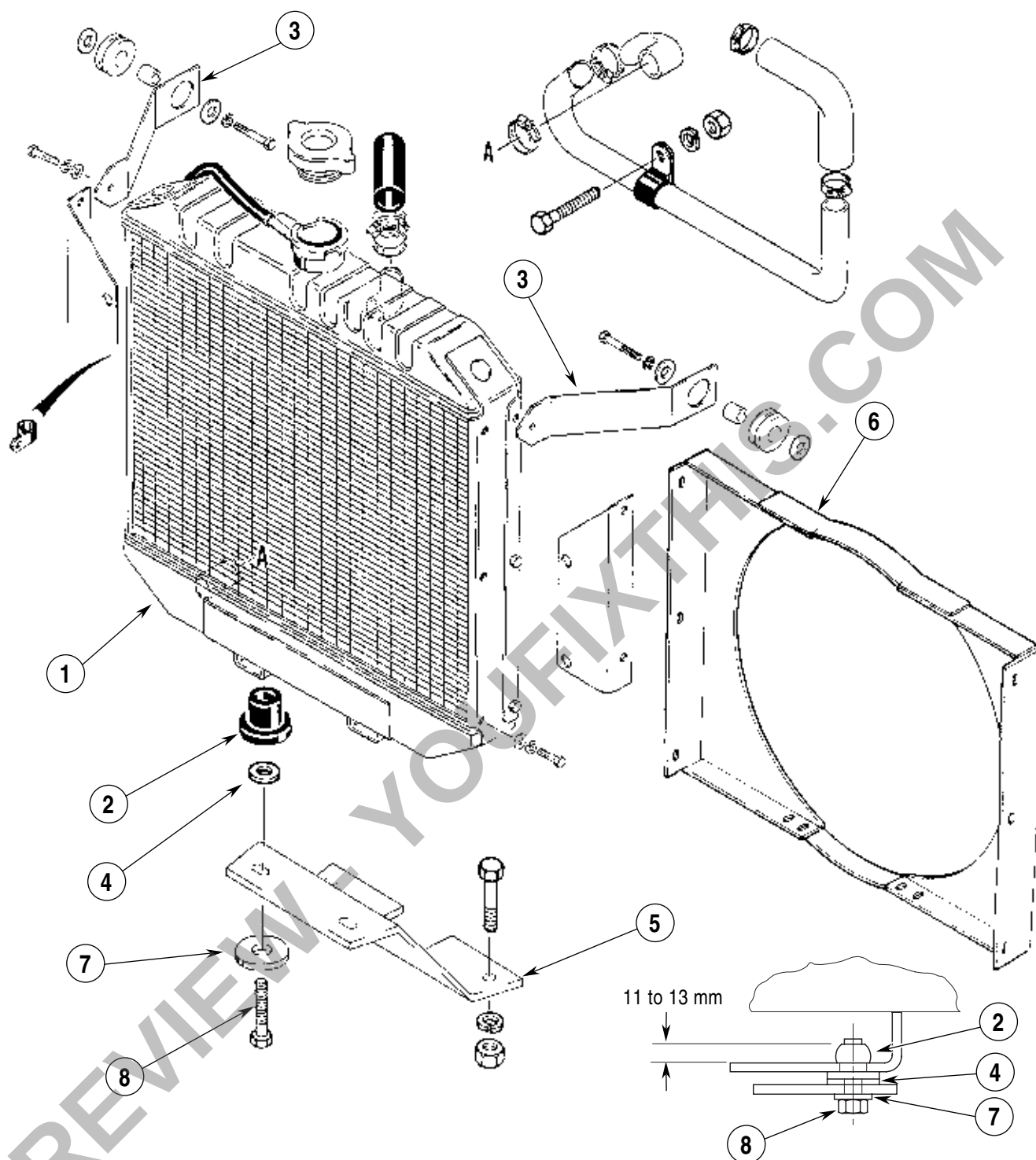
Remove the radiator mounting bracket from the machine.

STEP 10

Disconnect the electrical connectors from the air restriction indicator at the air cleaner. Move the wires out of the way.

STEP 11

Disconnect the hose for the air cleaner from the engine.

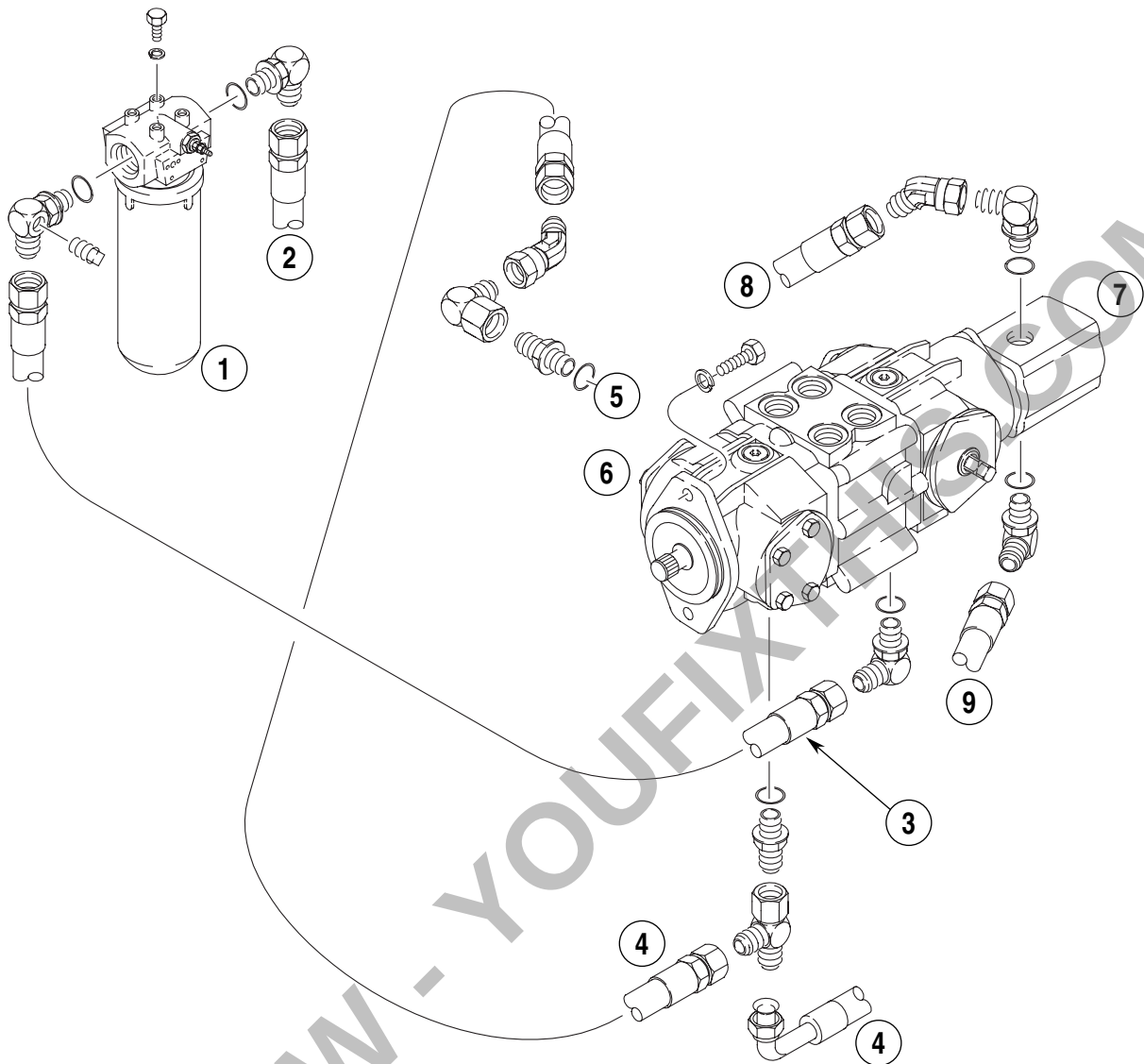


BS96F209

1. Radiator - Position to maintain equal clearance between fan and shroud all the way around.
2. Rubber Mount - Lubricate with water for easier installation.
3. Radiator Mounting Bracket
4. Washer

5. Radiator Support
6. Shroud
7. Washer
8. Cap Screw - Tighten until the rubber mount is compressed to 11 to 13 mm

Radiator Installation



BT96F190

- | | | |
|---------------------|---------------------------|-----------------------------|
| 1. Hydraulic Filter | 4. Case Drain Hose | 7. Gear Pump |
| 2. From Oil Cooler | 5. To Hydraulic Reservoir | 8. To Loader Control Valve |
| 3. Charge Oil Hose | 6. Tandem Piston Pumps | 9. From Hydraulic Reservoir |

Charge Oil, Case Drain, and Gear Pump Connections

ELECTRICAL CIRCUITS

NO.	GA.	COLOR	FROM:	TO:
1	18	Red	Key Switch	Instrument Panel T4
2	18	Black/White	Key Switch	Alternator
3	20	Yellow/Tan	Instrument Panel T11	Hydraulic Filter Switch
4	20	Yellow	Instrument Panel T1	Engine Oil Pressure Switch
5	20	Yellow/Green	Instrument Panel T8	Engine Temperature Switch
6	20	Yellow/Black	Instrument Panel T2	Hydraulic Oil Temperature Switch
7	10	Red	Connector E	Key Switch (Bat Terminal)
7A	10	Red	30 Ampere Fuse	Connector E
7B	10	Red	Alternator (Bat Terminal)	30 Ampere Fuse
8	20	Yellow/Gray	Instrument Panel T12	Air Filter Switch
9	20	Yellow/Pink	Instrument Panel T5	Transmission Charge Pressure Switch
10	14	Red	Key Switch	Starter Solenoid
11	20	Yellow/Brown	Instrument Panel T3	Fuel Level Sender
12	12	Black	Fuel Shutoff Solenoid	Ground
12A	14	Black	Work Lamps	Ground
12B	18	Black	LH Front Work Lamp and Air Filter Switch	Ground
12C	16	Black	RH Front Work Lamp	Ground
12D	18	Black	Instrument Panel	Ground
12E	18	Black	Glow Plug Indicator Lamp	Ground
13	14	White/Tan	Key Switch (Ign Terminal)	Connector E
13A	14	Red	Connector E	Fuel Shutoff Solenoid (Hold Terminal)
14	10	Red	Starter Solenoid	Alternator (Bat Terminal)
14A	16	Orange	Key Switch (Ign Terminal)	20 Amp Fuse
14B	16	Orange	Work Lamp Switch	LH Front Work Lamp
14C	18	Orange	LH Front Work Lamp	Connector
14D	16	Orange	Work Lamp Switch	RH Front Work Lamp
14E	16	Orange	20 Amp Fuse	Work Lamp Switch
15	14	Red	Key Switch (Heat Terminal)	Glow Plug Relay
16A	10	Red/Orange	Starter Solenoid	40 Ampere Circuit Breaker
16B	10	Red	40 Ampere Circuit Breaker	Glow Plug Relay
16C	10	Red	Glow Plug Relay	Glow Plugs
16D		Black	Road Lamp Switch Connector	Work Lamp Harness Connector
16E		Black	Rear Work Lamp	Connector for Front Work Lamps
16F	16	Pink	Junction Block (6)	Front Work Lamps
16G	16	Red	Positive Post of Battery	Rear Work Lamp Switch
16H	16	Red	Rear Work Lamp Switch	Rear Work Lamp
17	12	White	Starter Motor	Fuel Shutoff Solenoid (Pull Terminal)
22	18	Pink	Key Switch (Ign Terminal)	Connector A
22A	18	Pink	Connector A	Horn Button
22B	16	Red	Key Switch (Ign Terminal)	Backup Alarm Relay
22C	16	Red	Key Switch (Ign Terminal)	LH Proximity Switch
22D	16	Red	Key Switch (Ign Terminal)	RH Proximity Switch
22E	16	Red	Key Switch (Ign Terminal)	Backup Alarm (+)

TROUBLESHOOTING

1 RH Front Work Lamp

<u>Check Points</u>	<u>Reading</u>	<u>Possible Cause of Bad Readings</u>
Terminal for wire 12C to ground	Continuity	Bad ground circuit.
Bulb	Good	Bad bulb.
NOTE: Turn the key switch to ON. Turn the lamp switch to ON.		
Terminal for wire 14D to ground	12 volts	Check the circuit between the RH lamp and the lamp switch (4). Also check the lamp switch (4).

2 LH Front Work Lamp

<u>Check Points</u>	<u>Reading</u>	<u>Possible Cause of Bad Readings</u>
Terminal for wire 12B to ground	Continuity	Bad ground circuit.
Bulb	Good	Bad bulb.
NOTE: Turn the key switch to ON. Turn the lamp switch to ON.		
Terminal for wire 14B to ground	12 volts	Check the circuit between the LH lamp and the lamp switch (4). Also check the lamp switch (4).

3 Horn Button

<u>Check Points</u>	<u>Reading</u>	<u>Possible Cause of Bad Reading</u>
NOTE: Turn the key switch to ON.		
Terminal for wire 22 to ground	12 volts	Check the circuit between the horn button and the key switch (6). Also check the key switch (6).
NOTE: Have another person push down and hold the horn button.		
Terminal for wire 23A to ground	12 volts	Bad horn button.

SL30B Service Manual

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PRECAUTIONARY STATEMENTS PERSONAL SAFETY

Throughout this manual and on machine decals, you will find precautionary statements (“CAUTION”, “WARNING”, and “DANGER”) followed by specific instructions. These precautions are intended for the personal safety of you and those working with you. Please take the time to read them.



CAUTION: The word “CAUTION” is used where a safe behavioral practice according to operating and maintenance instructions and common safety practices will protect the operator and others from accident involvement.



WARNING: The word “WARNING” denotes a potential or hidden hazard which has a potential for serious injury. It is used to warn operators and others to exercise every appropriate means to avoid a surprise involvement with machinery.



DANGER: The word “DANGER” denotes a forbidden practice in connection with a serious hazard.

Failure to follow the “CAUTION”, “WARNING”, and “DANGER” instructions may result in serious bodily injury or death.

MACHINE SAFETY

Additional precautionary statements (“ATTENTION” and “IMPORTANT”) are followed by specific instructions. These statements are intended for machine safety.

ATTENTION: The word “ATTENTION” is used to warn the operator of potential machine damage if a certain procedure is not followed.

IMPORTANT: The word “IMPORTANT” is used to inform the reader of something he needs to know to prevent minor machine damage if a certain procedure is not followed.

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 Tandem Pump Installation 10

STEP 9

Disconnect the wires from the starter.

STEP 10

Hold the starter in place and remove the cap screws and lock washers that fasten the starter to the engine. Remove the starter from the engine.

Installation

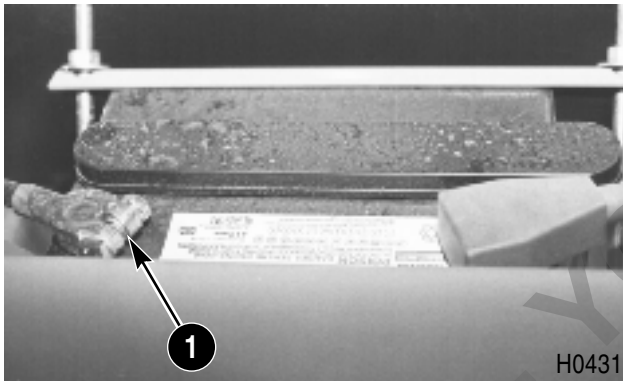
STEP 1

Put the starter in position on the engine. Install the cap screws and lock washers that fasten the starter to the engine.

STEP 2

Connect the wires to the starter.

STEP 3



1. Negative Battery Cable

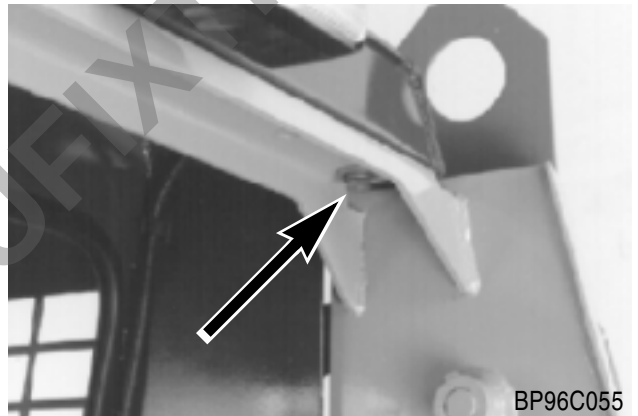
Connect the negative battery cable (1) to the battery.

STEP 4



Use the grab handles and push the operators compartment up and back to the rear of the machine. Carefully lower the ROPS canopy into position.

STEP 5



Install the bolts, lock washers and flat washers that fasten the operators compartment to the posts on the rear of the machine. Tighten the bolts to 60 to 70 Nm.

STEP 6



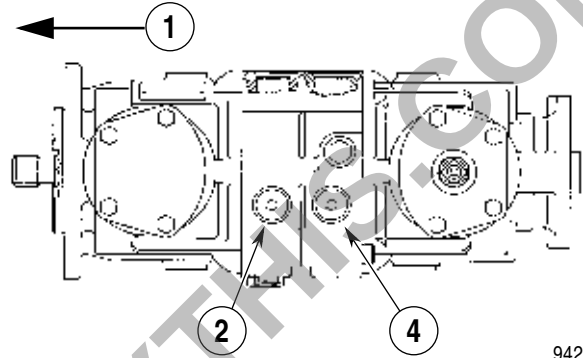
Connect the seat bar locking mechanism on each side.

**50 RH Rear Road Lamp and
RH Brake Lamp (Italian Machines Only)**

<u>Check Points</u>	<u>Reading</u>	<u>Possible Cause of Bad Readings</u>
Bulb	Good	Bad bulb.
Terminal for black wire to ground	Continuity	Bad ground circuit.
NOTE: <i>Put the road lamp switch in the ON position.</i>		
Terminal for red wire to ground	12 volts	Bad 7.5 ampere fuse. Bad circuit between the RH rear road lamp and the road lamp switch (36). Also check the road lamp switch (36).
For Italian Machines Only:		
NOTE: <i>Move the control levers all the way forward and then to the NEUTRAL position.</i>		
Terminal for wire 46 to ground	12 volts for approximately 30 seconds	Bad circuit between the RH brake lamp and the brake lamp time delay relay (48). Also check the brake lamp time delay relay (48).

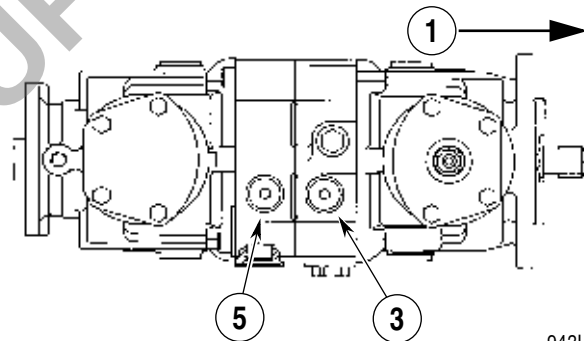
CIRCUIT RELIEF PRESSURE TEST

1. Raise the machine until the tires are off the floor. Use acceptable supports to hold the machine off the floor.
2. See the illustration on page 12 (not the illustrations on this page) for the locations of the ports in steps A and B, below:
 - A. If you are testing the circuit relief valves for the left motor circuits, disconnect the hoses from the elbows at the **LEFT MOTOR FORWARD** port and the **LEFT MOTOR REVERSE** port (the ports closest to the rear of the machine). The elbows are 1-1/16 - 12 JIC. Install a reducer and a 414 bar pressure gauge on the elbow for the circuit to be tested. Install a steel cap on the other elbow.
 - B. If you are testing the circuit relief valves for the right motor circuits, disconnect the hoses from the elbows at the **RIGHT MOTOR REVERSE** port and the **RIGHT MOTOR FORWARD** port (the ports closest to the front of the machine). The elbows are 1-1/16 - 12 JIC. Install a reducer and a 414 bar pressure gauge on the elbow for the circuit to be tested. Install a steel cap on the other elbow.
3. 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 or the side of the reservoir is very warm.
4. Run the engine at full throttle. Move the direction control lever for the circuit being tested approximately half stroke while you watch the pressure gauge. Continue to move the direction control lever until the pressure stops increasing. Record the pressure. Repeat this procedure several times to be sure of the reading.
5. Decrease the engine speed to low idle and stop the engine.
6. See Specifications on page 3 for the correct pressure. If the pressure is not correct, use a new circuit relief valve. See the illustrations on this page for the correct locations of the circuit relief valves. You can temporarily repair a forward circuit by interchanging the reverse circuit relief valve with the forward circuit relief valve.



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Right Side View

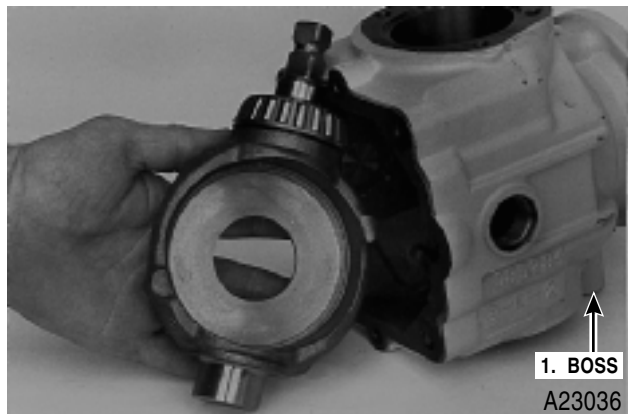


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Left Side View

1. Toward Engine
2. Circuit Relief Valve - Left Motor Forward
3. Circuit Relief Valve - Left Motor Reverse
4. Circuit Relief Valve - Right Motor Reverse
5. Circuit Relief Valve - Right Motor Forward

FOR EUROPEAN MACHINES ONLY

STEP 66

Install swash plate into housing. Shaft comes out opposite side from boss for mounting bracket.

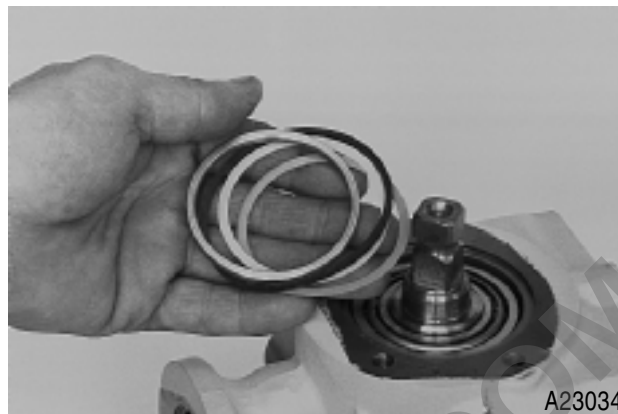
STEP 67

Install the bearing, the original shims, the spacers, a new quad ring, and the blank trunnion cap.

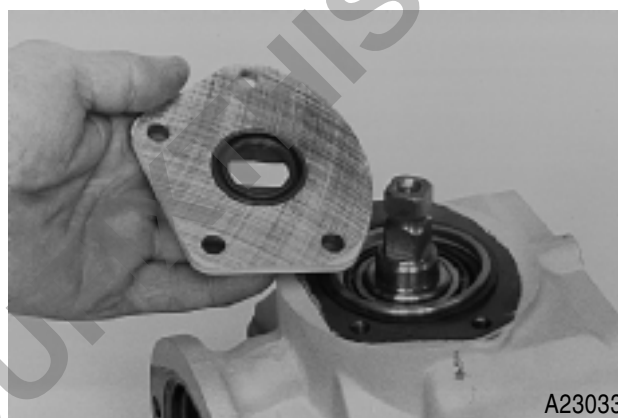
NOTE: If the housing, the swash plate, or the swash plate bearings were not replaced, use the original shims. If one or more of these items were replaced, see Step 71.

STEP 68

Install the bearing cup.

STEP 69

Install the original shims, spacer, and new quad ring.

STEP 70

Install the trunnion cap. Tighten the bolts to a torque of 24 to 30 Nm.

NOTE: Be careful not to damage the seal during installation. Wrap a thin sheet of plastic over the swash plate control arm to protect the seal.

INSTALLING A CHAIN OR AXLE HOUSING

NOTE: If both chains are being installed on the same side, the rear chain must be installed first.

STEP 40

Check the condition of the O-ring in the groove in the axle housing. If the O-ring is damaged, install a new O-ring.

STEP 41

Install Permatex No. 2 sealer to the frame side of the seal plate.

STEP 42

Install the chain on the motor sprocket.

STEP 43

If you are installing a front chain, put the top part of the chain over the tube for the parking latch. (This tube is present even on machines which do not use the parking latch system).

STEP 44

Turn the axle housing so that the long side is vertical. Install the axle sprocket into the chain compartment.

STEP 45

Move the axle housing as far as possible toward the motor sprocket. Reach through the opening for the axle sprocket and install the chain on the axle sprocket.

STEP 46

Align the axle housing with the frame and install the cap screws and the flat washers. Tighten the cap screws just enough so that the adjusting screw can still be used to move the axle housing.

STEP 47

Turn the adjusting screw to move the axle housing away from the motor sprocket until the chain is too tight to let the axle housing move any farther.

STEP 48

Tighten the cap screws that hold the axle housing to a torque of 7 to 8 Nm.

STEP 49

Loosen the adjusting screw until there is approximately 6 mm clearance between the end of the adjusting screw and the axle housing.

STEP 50

Sit in the operators seat, pull down the seat bar, and start the engine. Run the engine at low idle.

STEP 51

Hold the direction control levers in the FORWARD position for 5 seconds.

STEP 52

Stop the engine.

STEP 53

Check the deflection of the chain. The chain is correctly adjusted when the deflection is 6 to 25 mm. If necessary, tighten or loosen the chain to get the correct deflection.

STEP 54

When the deflection is correct, tighten the cap screws that hold the axle housing to a torque of 108 to 136 Nm.

STEP 55

Tighten the adjusting screw against the axle housing and tighten the nuts to lock the adjusting screw into position.

STEP 56

If thrust washers were removed from the motor shaft, install the thrust washers.

STEP 57

Install the gasket for the cover. Use a new gasket if the old one was damaged.

STEP 58

Install the cover, the flat washers, the lock washers, and the nuts. The cover can be difficult to install because of the self-aligning bushing that holds the needle bearing. DO NOT use force to install the cover.

STEP 59

Install the wheels and the wheel nuts. DO NOT use an impact wrench to install the wheel nuts. Tighten the wheel nuts to a torque of 81 to 95 Nm.

STEP 60

Remove the blocks and lower the wheels to the floor.

CYLINDERS

Lift Cylinder

Removal

1. Clean the lift cylinder and the fittings for the lift cylinder.
2. Start and run the engine at half throttle. Raise the loader completely.
3. Fasten a chain hoist to the loader bucket to support the loader while the lift cylinder is removed.
4. Stop the engine. Move the loader control levers in all directions to release any circuit pressure.
5. Fasten identification tags to the hoses that are connected to the lift cylinder.
6. Disconnect the hoses from the tubes at the lift cylinder. Install caps on the hoses and plugs in the tubes.
7. The weight of the lift cylinders is approximately 14.94 kg. Hold the lift cylinder in place and remove the pivot pin from the rod end of the lift cylinder. If you are removing the right lift cylinder, also remove the support strut.
8. Lower the rod end of the lift cylinder to the fender.
9. Remove the pivot pin from the closed end of the lift cylinder and remove the lift cylinder from the machine.

Installation

1. Hold the lift cylinder in place. Install the pivot pin at the closed end of the lift cylinder.
2. Connect the hoses to the tubes on the lift cylinder.
3. Start and run the engine at idle. Move the loader control lever to completely extend the lift cylinder.



WARNING: Do not use your fingers to check the alignment of the cylinder rod. Personal injury can be the result.

48-88

4. Have another person align the rod end of the lift cylinder with the loader frame. Install the pivot pin. If you are installing the right lift cylinder, also install the support strut.
5. Disconnect the chain hoist from the loader bucket. Operate the loader control levers to completely extend and retract the lift cylinders several times to remove any air from the hydraulic system.
6. Lower the loader bucket to the floor. Stop the engine.
7. Check for oil leakage. Check the oil level in the hydraulic reservoir. Add oil as required.

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LOADER BUCKET CYLINDER

Disassembly

1. Clean the outside of the cylinder.
2. Fasten the closed end of the cylinder in a vise or other holding equipment. Do not damage the tube (1).
3. Make an alignment mark on the gland (2) at the slot in the tube (1) so the cylinder can be assembled correctly. Use a marker that does not wash off.
4. Put the blade of a screwdriver under the lock wire (3) at the gland (2) end of the tube (1).
5. There are flats on the outside of the gland (2). Turn the gland (2) to push the lock wire out of the tube (1). Use the screwdriver to guide the lock wire (3) out of the tube (1).
6. Remove the lock wire (3) from the tube (1).
7. Pull the piston rod (4) straight out of the tube (1) until the piston (5) contacts the gland (2). DO NOT pull the piston rod (4) all the way out of the tube (1).
8. After the piston (5) contacts the gland (2), slowly pull the piston rod (4) straight out until the O-ring (6) and backup ring (7) are aligned with the slot in the tube (1) for the lock wire (3).
9. Use an O-ring hook tool to pull the O-ring (6) and backup ring (7) through the slot. Cut and remove the O-ring (6) and backup ring (7).
10. Pull the piston rod (4) straight out of the tube (1).
11. Fasten a 1 inch (25 mm) diameter steel rod, 8 inches (203 mm) long, in a vise in a vertical position. Install the piston rod eye over the steel rod. Put a support under the piston rod (4) near the piston (5). Put a shop cloth between the support and the piston rod (4) to prevent damage to the piston rod (4).
12. Loosen and remove the self-locking nut (8) that holds the piston (5).
13. Remove the piston (5) from the piston rod (4).
14. Remove the gland (2) from the piston rod (4).
15. Remove the O-ring (9) from the ID of the piston (5).
16. Remove the wear rings (10), piston seal (11), and O-ring (12) from the OD of the piston (5).
17. Remove the wiper (13) and wide seal (14) from the ID of the gland (5).

Inspection

1. Discard the parts that were removed from the piston (5) and gland (2). Discard the lock wire.
2. Clean all parts in cleaning solvent.
3. Check to be sure that the piston rod (4) is straight. If the piston rod (4) is not straight, install a new piston rod (4).
4. Illuminate the inside of the tube (1). Inspect the inside of the tube (1) for deep grooves and other damage. If there is any damage to the tube (1) a new tube (1) must be used.
5. Remove small scratches on the piston rod (4) or inside the tube (1) with emery cloth of medium grit. Use the emery cloth with a rotary motion.
6. Inspect the gland (2) for rust. Clean and remove the rust as required.
7. Inspect the end of the tube (1) for sharp edges that will cut the O-rings and backup rings. Remove as required.
8. Inspect the piston (5) for damage and wear. If the piston (5) is damaged or worn, a new piston (5) must be used.

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