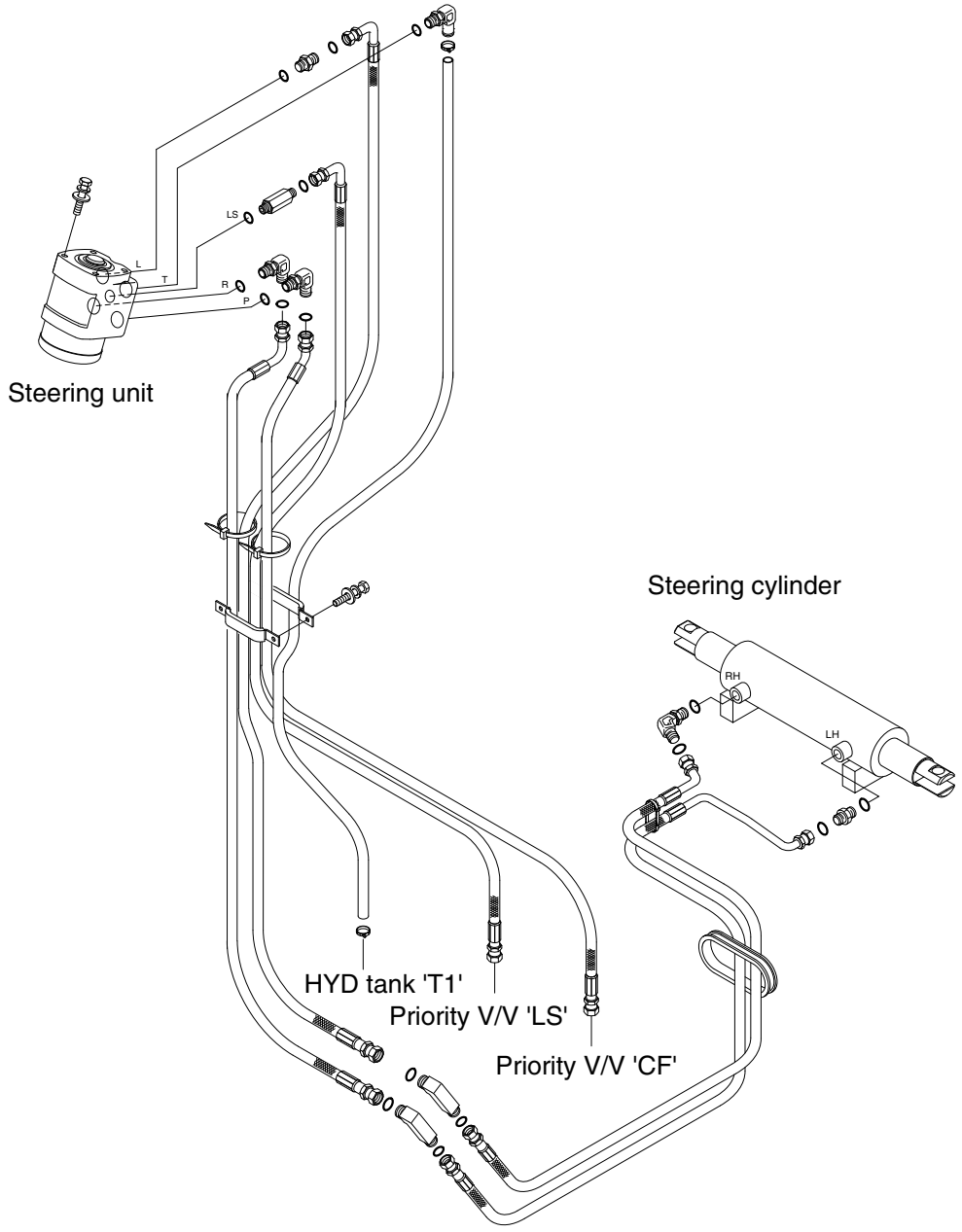
SECTION 5 STEERING SYSTEM

GROUP 1 STRUCTURE AND FUNCTION

1. OUTLINE

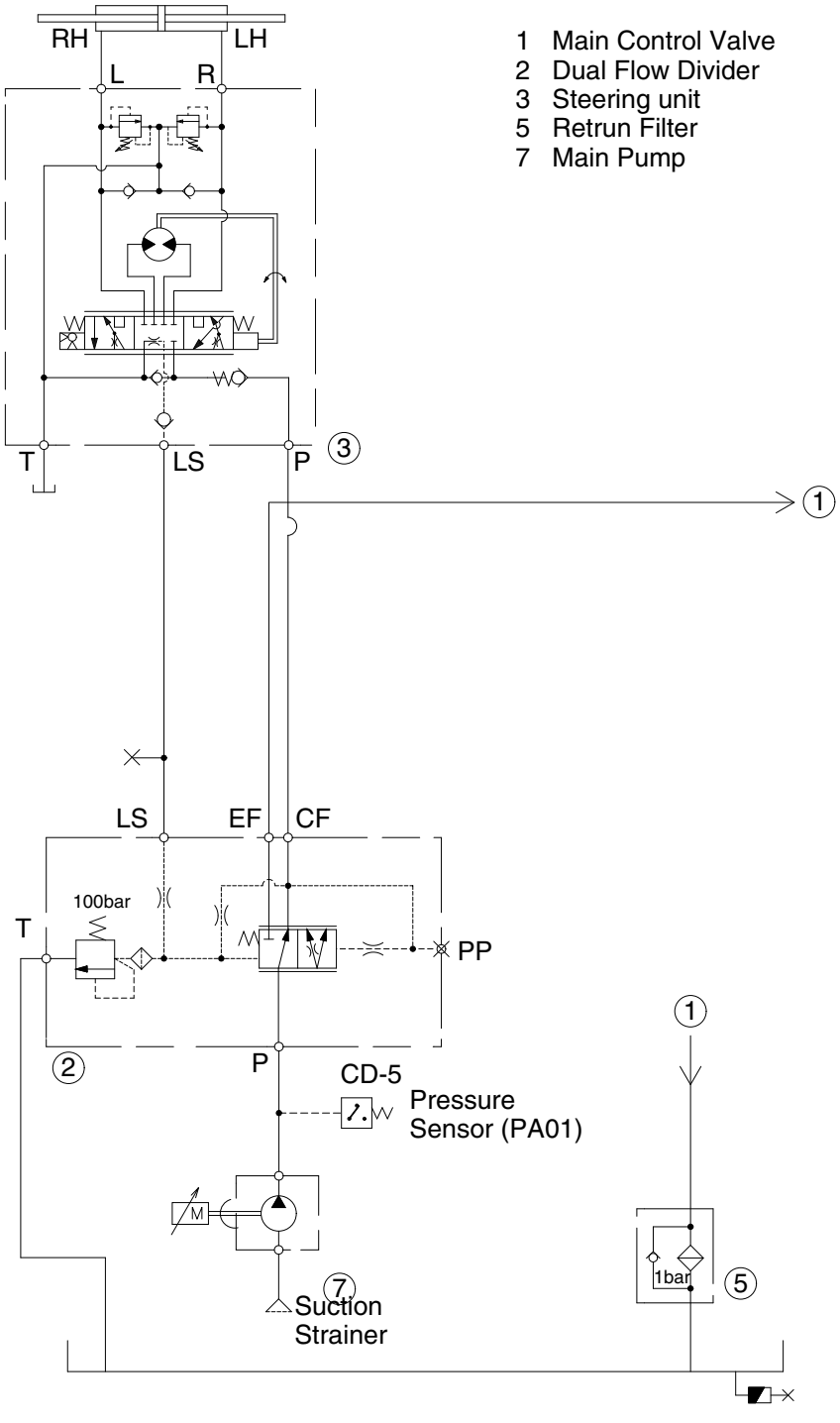


25D9V5SS01

The steering system for this truck is composed of pump, steering wheel assembly, steering unit, priority valve (or dual flow divider), steering cylinders, steering axle and piping. The steering axle supports the forklift weight with the rear axle, contains a cylinder and controls the position of the rear tires. The steering axle body is unit structure having steering knuckles installed to its both ends by means of king pins. Hub and wheel are mounted through bearing to spindle of knuckle. When the steering wheel is turned, the rotation torque is transmitted to the steering unit, and the hydraulic oil in the steering unit is transmitted to the steering axle hydraulic cylinder through the hose, so that the forklift moves left and right. The force produced by the steering cylinders moves the knuckle of rear tires through the intermediate link. Refer to the illustration for the location of the steering system components.

2. HYDRAULIC CIRCUIT

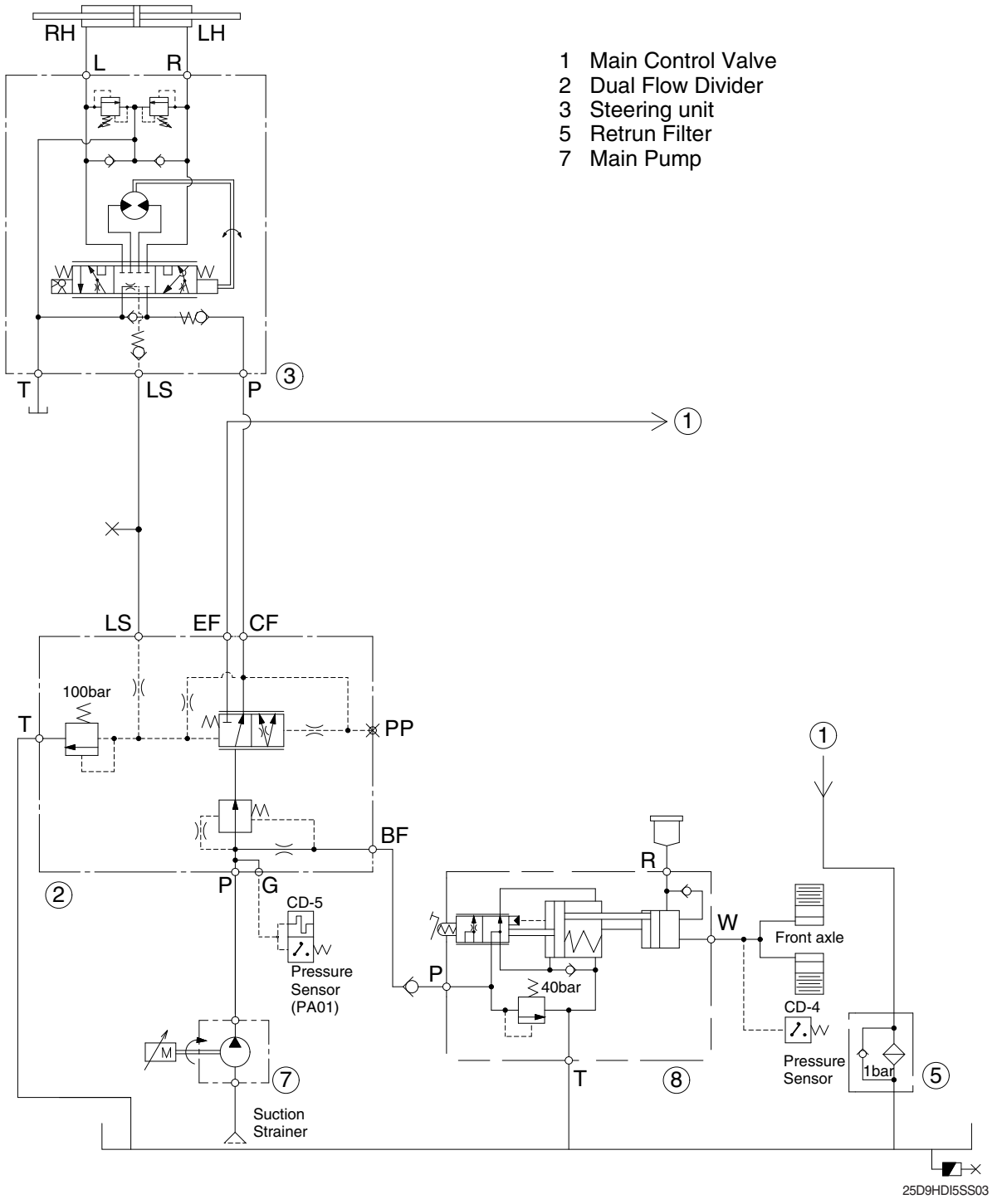
· NON-BOOSTER TYPE BRAKE



1 Main Control Valve
2 Dual Flow Divider
3 Steering unit
5 Retrun Filter
7 Main Pump

The hydraulic oil discharged from the pump flows to the dual flow divider (2). When the driver operates the steering wheel, the steering unit (3) is supplied with pressure oil preferentially by the dual flow divider operation circuit. The oil passages in the steering unit are changed over to direct the hydraulic pressure from the dual flow divider to the steering cylinder, which extends or contracts depending on the hydraulic pressure, thereby steering the truck. The excess flow of the pump generated at this time flows to the MCV and the tank through the dual flow divider EF flow path.

· BOOSTER TYPE BRAKE (OPTION)



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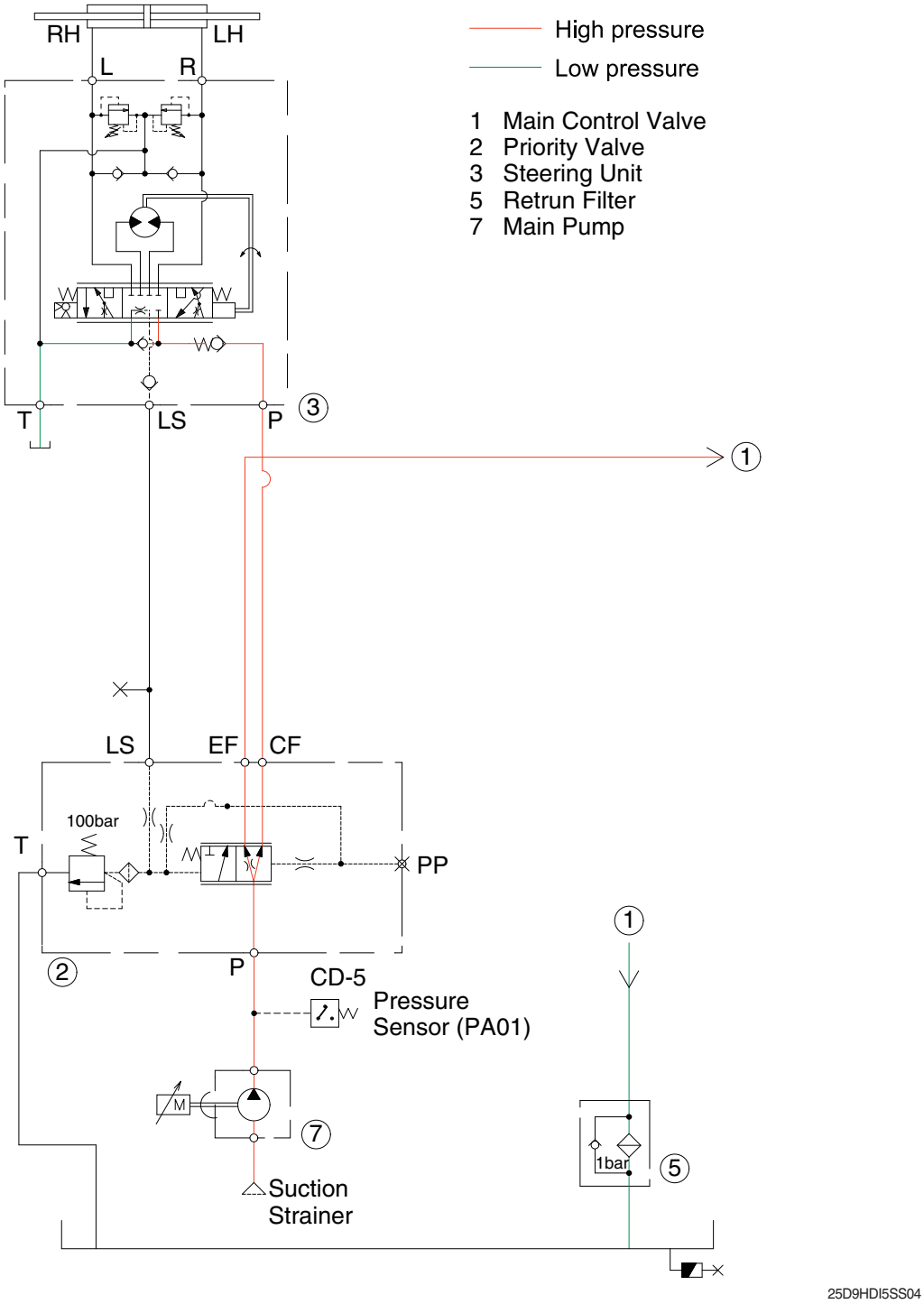
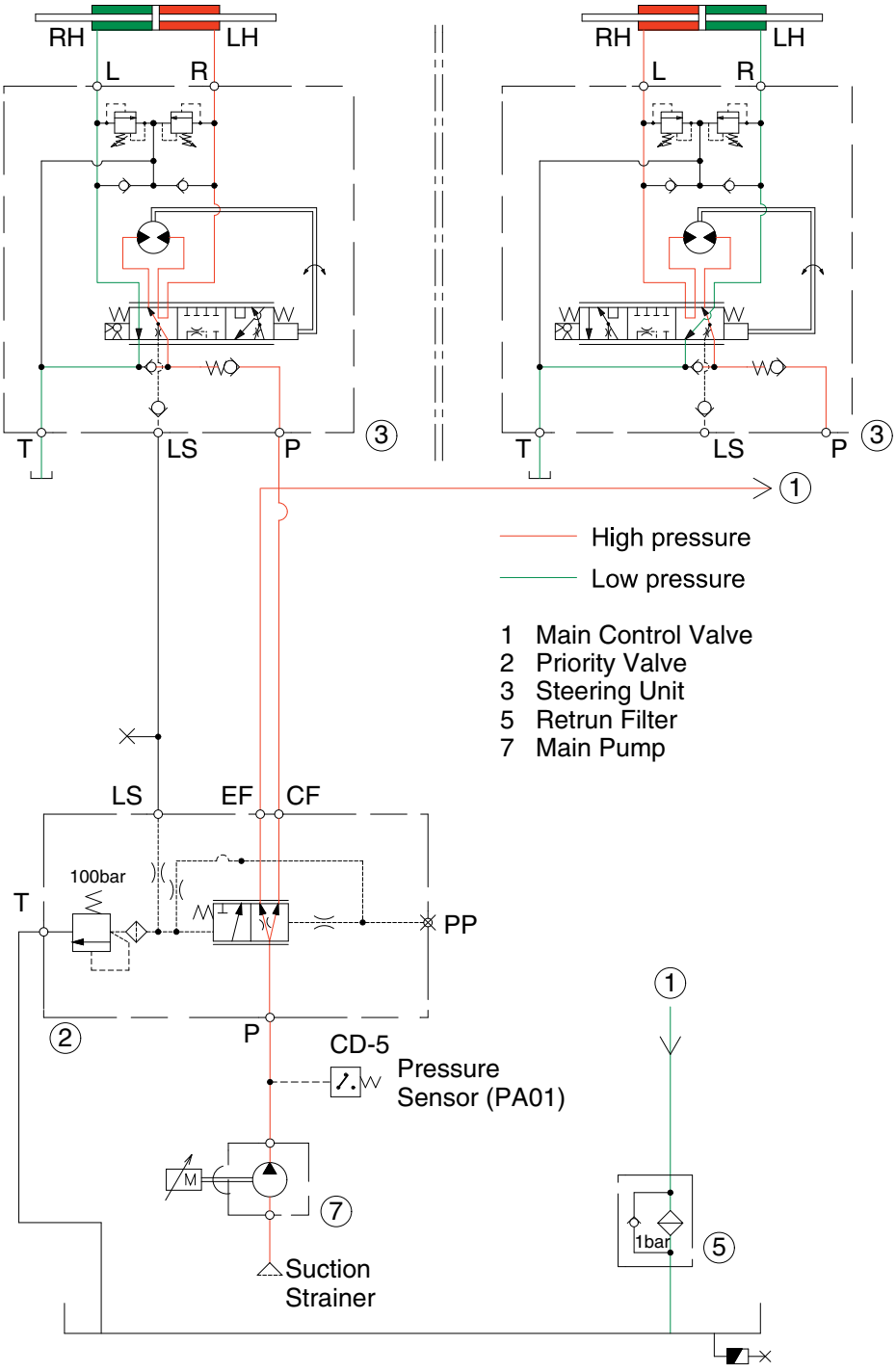
1) NEUTRAL



When the engine is running and the steering wheel is not being turned, the steering unit spool and sleeve set are aligned (neutral position). Oil flow through the valve is blocked from entering the left or right steering ports. The pressure on the pilot side of the dual flow divider spool controls the spool to move in the opposite direction (spring direction). This movement causes the pump discharge flow to flow to the MCV through the EF passage. In this neutral position, a small amount of oil is constantly bled through the dynamic orifice. The oil then flows into the LS hose piping and returns to the tank through the steering unit spool and sleeve set. This dynamic flow prevents initial hard spot when steering is turned rapidly or abruptly.

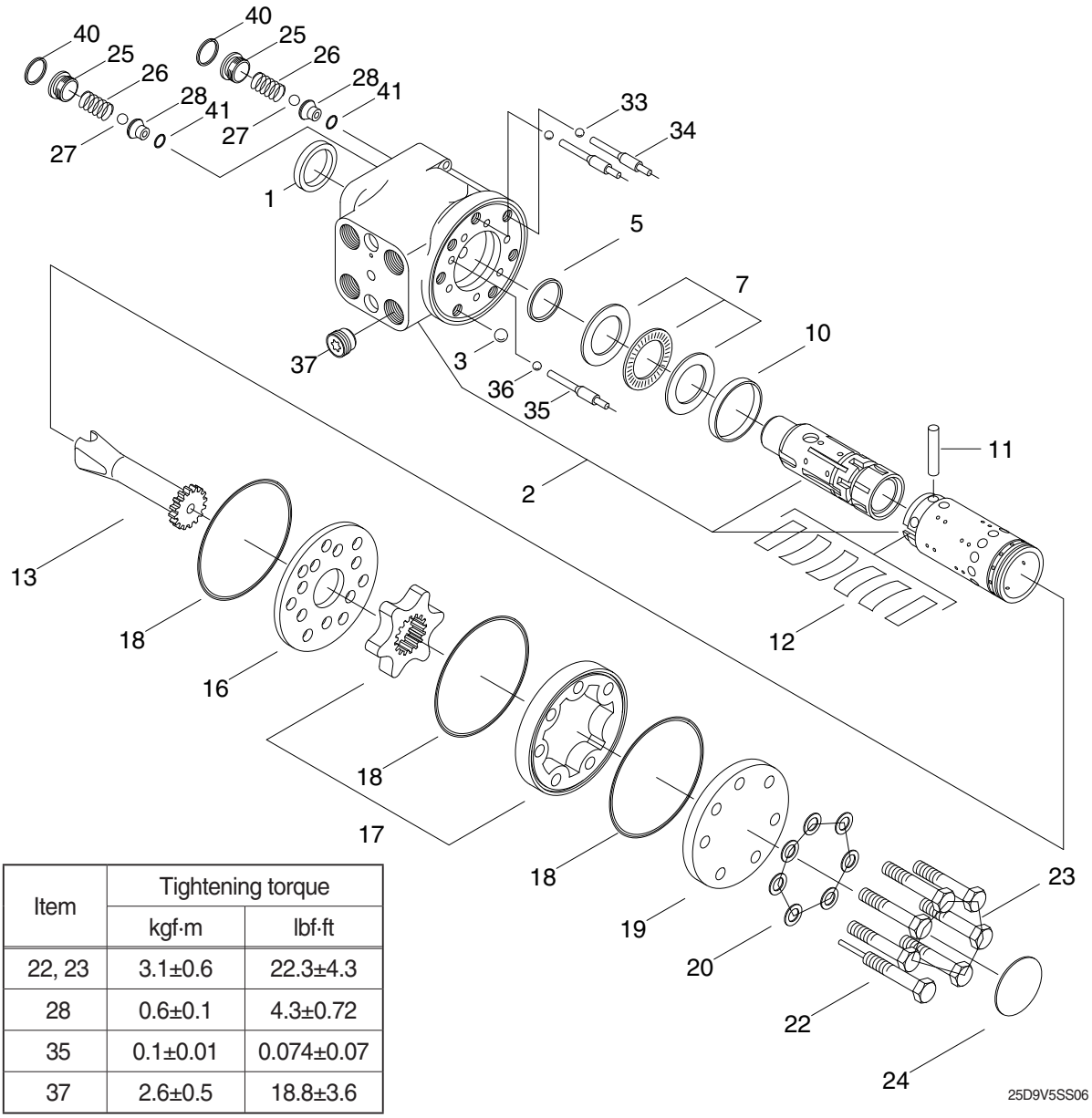
2) LEFT OR RIGHT TURN



When the engine is running and the steering wheel is being turned, the steering unit spool and sleeve set rotates. The passage opens to allow oil to flow into the internal gerotor gear of the steering unit. The oil flow causes the gerotor pump to rotate. Oil flows back into the steering valve spool and sleeve set and out to the left or right steering ports depending on the direction of steering wheel rotation. At the same time, the LS circuit blocks the return to the hydraulic tank and is connected to the CF port to sense the pressure required to turn the steering wheel. As the required pressure increases or decreases in the LS circuit, the dual flow divider spool moves to meet the flow and pressure required to rotate the tire. When the steering cylinder reaches the end of the stroke, a relief valve in the steering circuit releases LS pressure into the hydraulic tank. The dual flow divider spool moves and directs the pump flow through the EF passage to the MCV.

3. STEERING UNIT

1) STRUCTURE

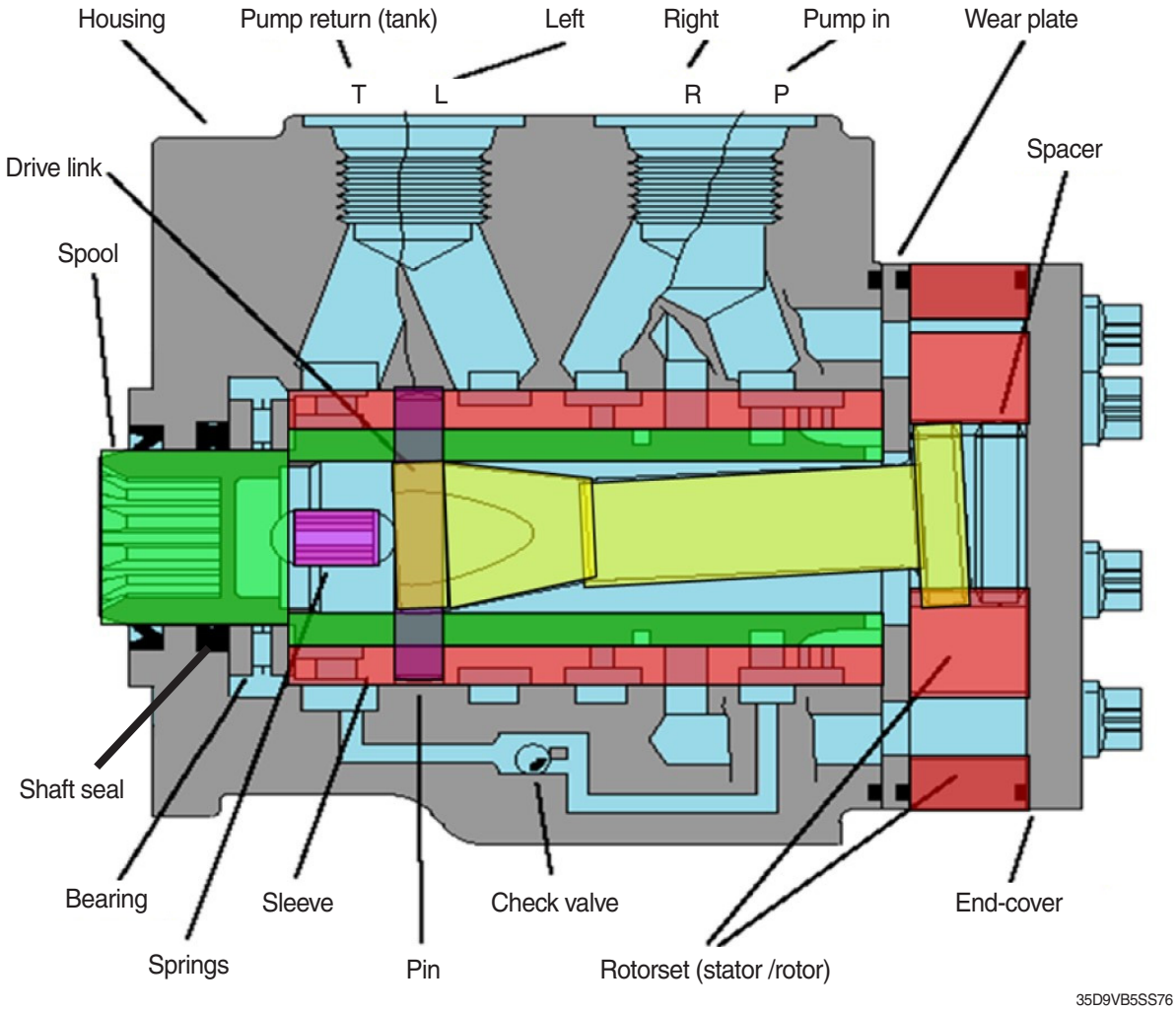


Item	Tightening torque	
	kgf·m	lbf·ft
22, 23	3.1±0.6	22.3±4.3
28	0.6±0.1	4.3±0.72
35	0.1±0.01	0.074±0.07
37	2.6±0.5	18.8±3.6

1	Dust seal ring	18	O-ring	31	Spring
2	Housing and spool/sleeve	19	End over	32	Piston
3	Ball	20	Washer	33	Ball
5	Shaft seal	22	Pin bolt screw	34	Bushing
7	Bearing assembly	23	Screw	35	Ball
10	Ring	24	Model / Code label	36	Ball
11	Cross pin	25	Adjusting screw	37	Check valve
12	Set of springs	26	Spring	40	O-ring
13	Cardan shaft	27	Ball	41	O-ring
16	Distributor plate	28	Seat	42	Plug
17	Gearwheel set	30	Adjusting screw		

※ Seal kit (EA) : 1 (1), 5 (1), 18 (3), 20 (7), 40 (2), 41 (2)

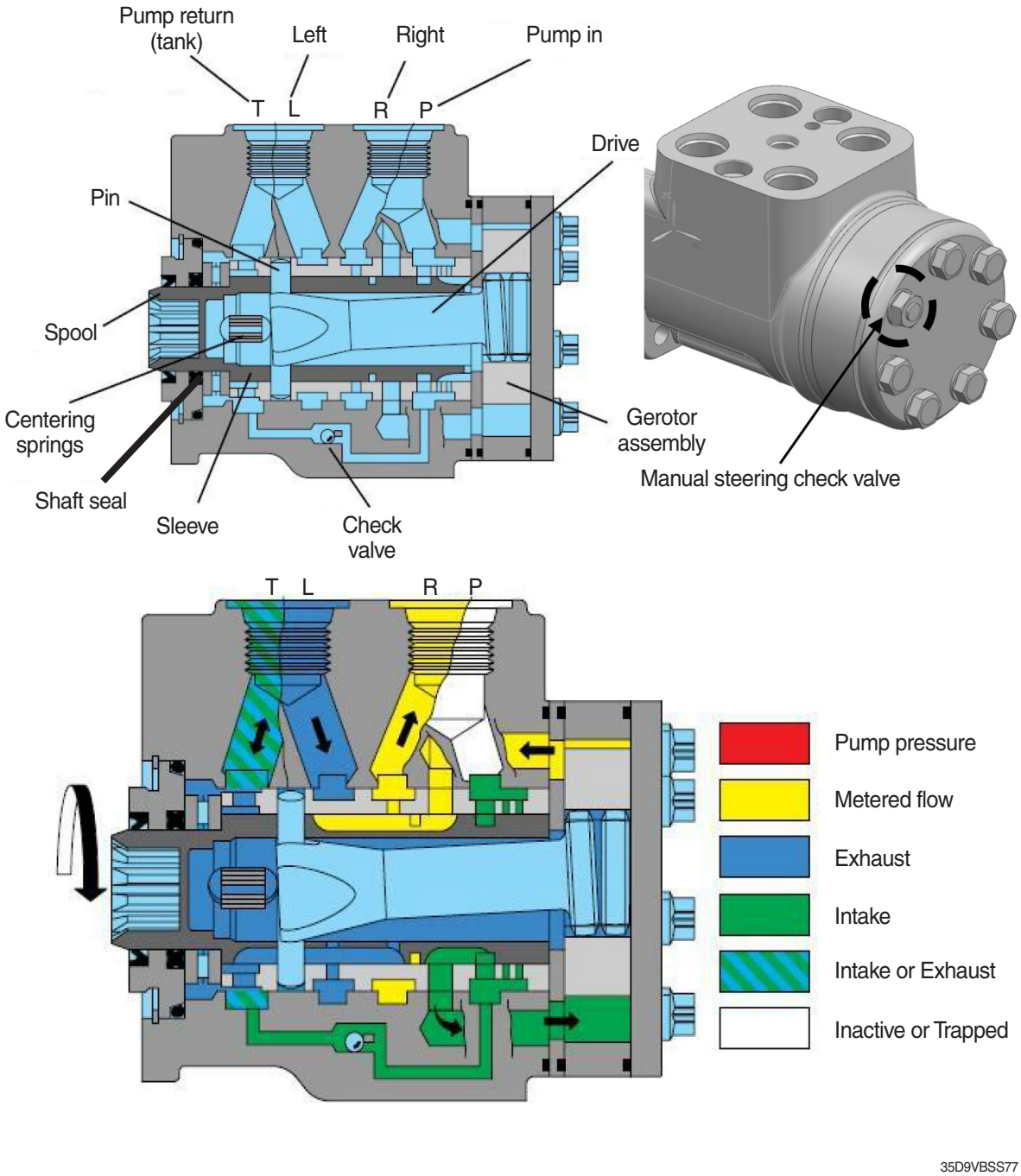
2) OPERATION



The steering unit is a closed center circuit and consists of a rotary valve (spool + sleeve set) and a metering gear set. With a LS (load sensing) dynamic circuit, even when the viscosity of the oil is low in winter, it operates smoothly without jamming the steering wheel and reduces the impact of the steering wheel due to rapid rotation or kickback of the tire. The LS circuit in the valve is used to control the operation of the priority valve spool. Steering relief valve oil flows through an internal flow path to the tank return line. The relief valve is set lower than the AUX relief valve set pressure in the MCV.

- Manual steering check valve : converts unit to hand operated pump for limited manual steering.
- Inlet check valve (P port) : Prevents oil from returning through the steering unit when pressure on the cylinder side is greater than pressure on the inlet side to prevent steering wheel kick.
- LS relief valve : Limits maximum pressure in the steering circuit.
- Anti-cavitation valve for cylinder ports : (R & L) protects steering circuit against vacuum (cavitation) conditions.
- Shock valve for cylinder ports : (R & L) protects hoses against pressure surge created by ground forces on the steering axle.

3) MANUAL STEERING (EMERGENCY)



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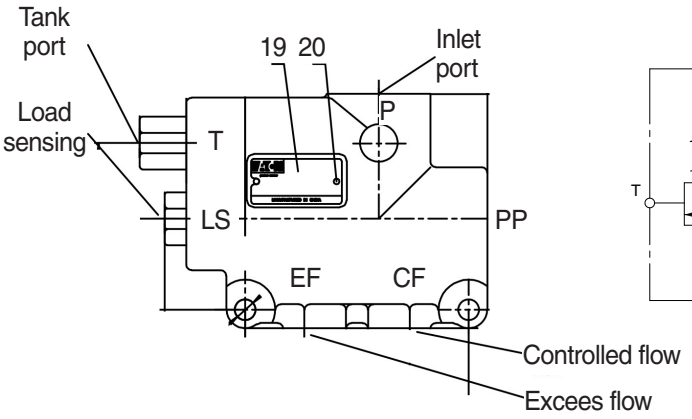
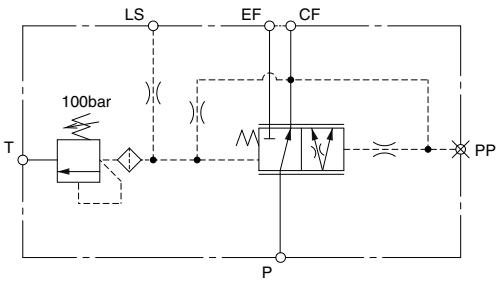
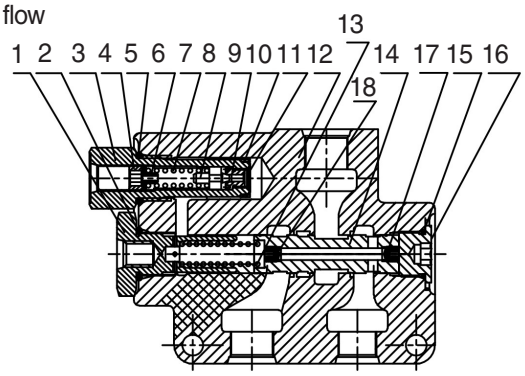
When the engine is not running and the steering wheel is being turned, the priority divider valve spool is pushed against the end stop by spring force. In this position, oil flow opens to the spool and sleeve set and the EF port closes. As the steering wheel turns, a vacuum is created in the supply line between the priority valve and the steering unit spool and sleeve set. As the spool and sleeve set rotates, a passage opens to allow oil to flow to the inner gerotor gear set of the steering unit. Oil trapped in the steering port passes through the manual steering check valve and feeds through the gerotor gear to the opposite side of the steering cylinder, enabling manual steering.

4. PRIORITY VALVE





Item/Port	Port size	Tightening torque	
		kgf·m (±0.5)	lbf·ft (±3.7)
1 (LS) 3 (T) 16 (PP)	-	5.1	36.9
LS, T	7/16-20UNF	2.5	18
CF	3/4-16 UNF	6	43.4
EF, P	1-1/16-12 UN	9.5	68.7



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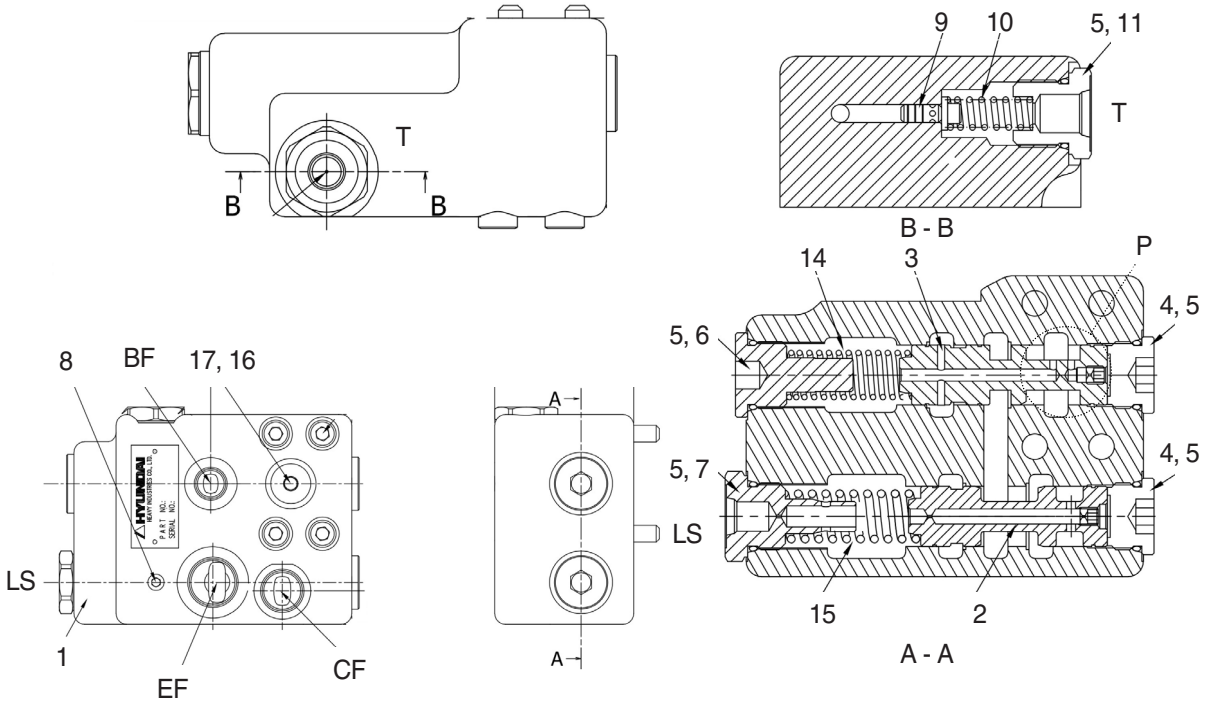
1	Plug	8	Seat-valve	15	O-ring
2	O-ring	9	Poppet	16	Plug
3	Plug	10	Sleeve	17	Orifice
4	Screw-seat	11	Filter	18	Orifice
5	O-ring	12	Housing	19	Name plate
6	Seat-spring	13	Spring	20	Rivet
7	Spring	14	Spool		

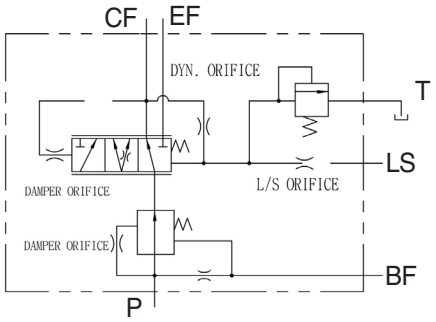
※ Relief valve kit : 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

The priority valve is located on the top of the pump and is influenced by the LS signal from the steering unit to ensure that the steering circuit receives sufficient feed. This valve always keeps the steering force and speed constant against changes in the pump discharge flow rate, and gives priority to hydraulic oil to the steering circuit.

5. DAUL FLOW DIVIDER (BRAKE BOOSTER TYPE, OPTION)



Item/Port	Port size	Tightening torque	
		kgf·m (±0.5)	lbf·ft (±3.7)
4, 6, 7, 11	-	7	516
8	-	0.45±0.05	3.3±0.37
LS, T, BF	9/16-18 UNF	3	21.7
CF	3/4-16 UNF	6	43.4
EF	7/8-14 UNF	9.5	68.7



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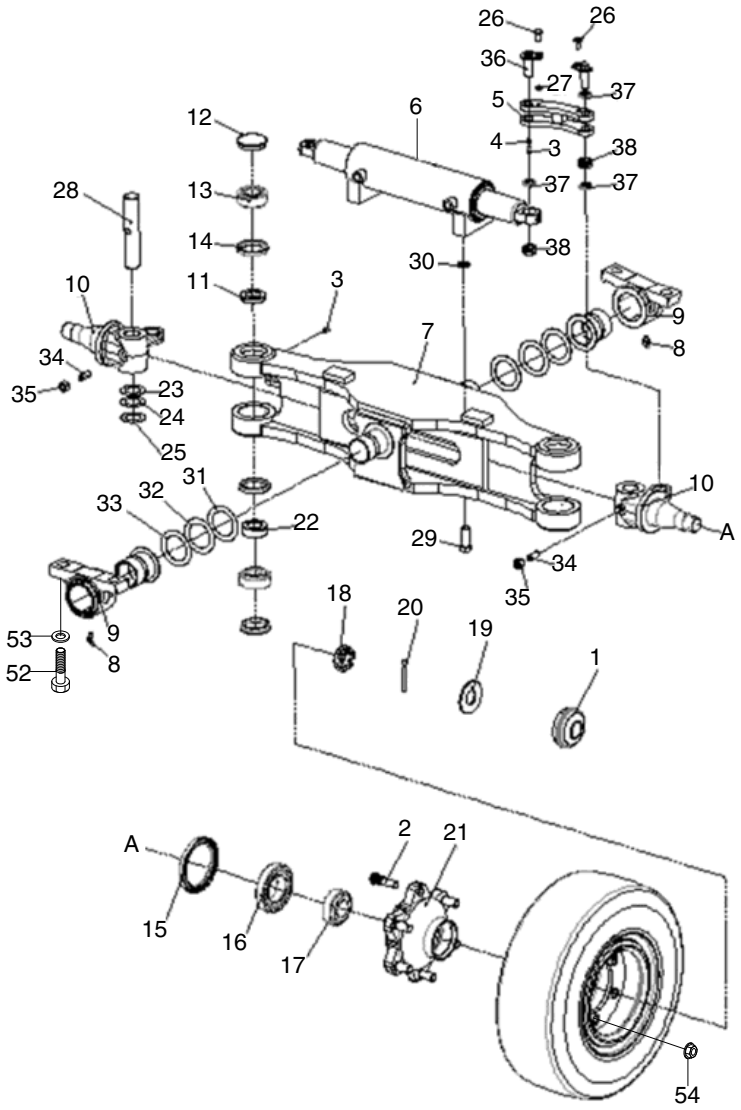
1	Block	6	Plug-BF	11	Plug-relief
2	Spool-CF	7	Plug-LS	14	Sping-BF
3	Spool-BF	8	Plug	15	Spring-CF
4	Plug	9	Poppet-relief	16	Plug
5	O-ring	10	Spring-relief	17	O-ring

This dual flow divider is one of the spool-type flow dividers that split flow through pressure-compensated fixed orifices. The pressure-compensation feature ensures near-equal flow through the orifices - even when inlet and/or outlet pressures fluctuate. The flow of port CF (controlled flow) is delivered into the steering unit, and port CF always has the same flow when the pump is producing that flow or more. Excess pump flow goes through port EF (excess flow) to actuators via the directional control valves. Therefore this dual flow divider maintains constant flow from the CF port. Any additional flow passes out the EF port.

5. STEERING AXLE

1) STRUCTURE



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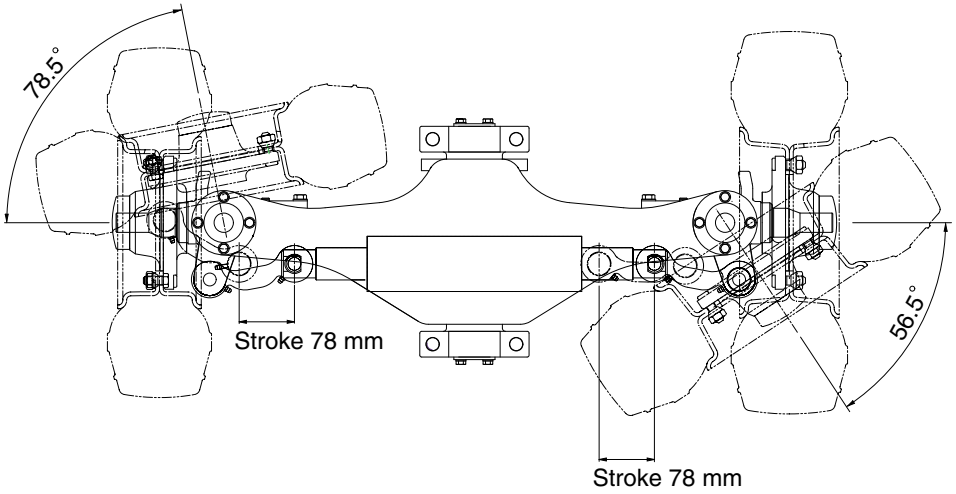
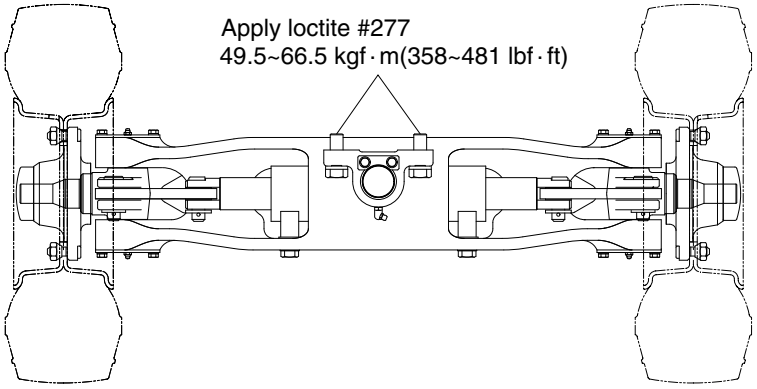
1	Hub cap	15	Oil seal	29	Bolt
2	Hub bolt	16	Bearing	30	Washer
3	Grease nipple	17	Bearing	31	Adjusting shim kit
4	Dust cap	18	Nut	32	Adjusting shim kit
5	Steering link	19	Washer	33	Bushing
6	Steering cylinder assy	20	Cotter pin	34	Screw
7	Steering axle center	21	Wheel hub	35	Nut
8	Grease nipple	22	Rod ring	36	Sterring link pin
9	Trunnion block	23	Shim (0.2t)	37	Bushing
10	Steering knuckle	24	Shim (0.1t)	38	Oscillating bearing
11	Rod ring	25	Shim (0.5t)	52	Hex bolt
12	Upper cover	26	Bolt	53	Harden washer
13	Bearing	27	Washer	54	Wheel nut
14	Oil seal	28	King pin		

2) TIGHTENING TORQUE AND SPECIFICATION





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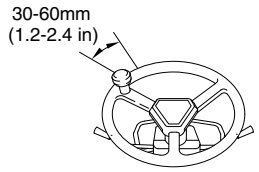
Type	Unit	Center pin support single shaft
Structure of knuckle	-	Elliott type
Toe-in	degree	0
Camber	degree	0
Caster	degree	0
King pin angle	degree	0
Max steering angle of wheels(Inside/Outside)	degree	78.5/56.5
Tread	mm (in)	980 (38.6)

GROUP 2 OPERATIONAL CHECKS AND TROUBLESHOOTING

1. OPERATIONAL CHECKS

Check item	Checking procedure
Steering wheel 	· Set rear wheels facing straight forward, then turn steering wheel to left and right. Measure range of steering wheel movement before rear wheel starts to move. Range should be 30~60 mm at rin of steering wheel. If play is too large, adjust at gear box. Test steering wheel play with engine at idling.
Knuckle	· Check knuckle visually or use crack detection method. If the knuckle is bent, the tire wear is uneven, so check tire wear.
Steering axle	· Put camber gauge in contact with hub and measure camber. If camber is not within 0±0.5° ; rear axle is bent. · Ask assistant to drive truck at minimum turning radius. · Fit bar and a piece of chalk at outside edge of counterweight to mark line of turning radius. · If minimum turning radius is not within±100 mm (±4 in) of specified value, adjust turning angle stopper bolt. Min turning radius (Outside) - 25D-9V : 2352 mm (93 in) - 30D-9V : 2427 mm (96 in) - 35DN-9V : 2480 mm (98 in)
Hydraulic pressure of power steering	Remove screw coupling from CF port of priority valve and install oil pressure gauge. Turn steering wheel fully and check oil pressure. ※ Oil pressure : 100 bar (1450 psi)

2. TROUBLESHOOTING

1) STEERING UNIT

Problem	Cause	Remedy
The steering wheel cannot be rotated.	· The steering unit column shaft is installed incorrectly or damaged. · The oil pressure does not rise. · The relief valve is faulty or not closed. · LS line (Hose) incorrectly connected. · The piping is damaged.	· Inspect and correct or replace. · Inspect and adjust the relief set pressure. · Inspect and correct. · Inspect and correct. · Replace.
The steering wheel is heavy.	· The tire inflating pressure is low. · The oil pressure does not rise. · The high and low pressure hoses are connected reversely. · The power steering cylinder rod is bent or the piston is sticking.	· Adjust the inflating pressure. · Inspect and adjust the relief set pressure. · Inspect and correct. · Inspect and correct or replace.
The oil pressure does not rise.	· The high and low pressure hoses are connected reversely. · The relief valve is faulty or not closed. · The oil pump function is degraded or the oil volume is insufficient. · The power steering cylinder piston packing is damaged.	· Inspect and correct. · Inspect and correct. · Inspect and correct or replace. · Replace.
The steering wheel does not return properly.	· The tire inflating pressure is low. · The steering unit spool does not move smoothly. · The steering knuckle sliding motion is improper.	· Adjust the inflating pressure. · Correct or replace the steering unit · Add the lubricant or correct.
The steering wheel does not return (lateness) to the neutral position when released.	· The steering unit spool does not move smoothly. · The steering unit column shaft is damaged. · The centering spring is damaged. · The piping is blocked (crushed or clogged).	· Correct or replace the steering unit. · Replace the steering unit · Replace. · Inspect and correct or replace.
The play is excessive and the vehicle wobbles.	· Oil moves in the steering unit. · The steering unit spool is not moving correctly. · Air is sucked from the piping. · The steering unit column shaft is defective.	· Replace the steering unit. · Correct or replace the steering unit. · Inspect and correct or replace. · Inspect and correct or replace.
The tires are steered opposite to the steering wheel operated direction.	· The cylinder piping is connected reversely.	· Inspect and correct.

Problem	Cause	Remedy
The steering wheel in the idling state is heavy.	· Oil moves in the steering unit. · The relief valve is not functioning correctly. · Air is sucked from the piping. · The piping is blocked (crushed or clogged). · The end cap set screw is tightened to an excessive torque.	· Replace the steering unit. · Inspect and correct. · Inspect and correct or replace. · Inspect and correct or replace. · Tighten uniformly to the specified torque.
Abnormal noise is generated.	· The relief valve is defective. · Air is sucked from the piping. · The piping is blocked (crushed or clogged).	· Correct, inspect the pressure, and adjust. · Inspect and correct or replace. · Inspect and correct or replace.

2) PRIORITY VALVE

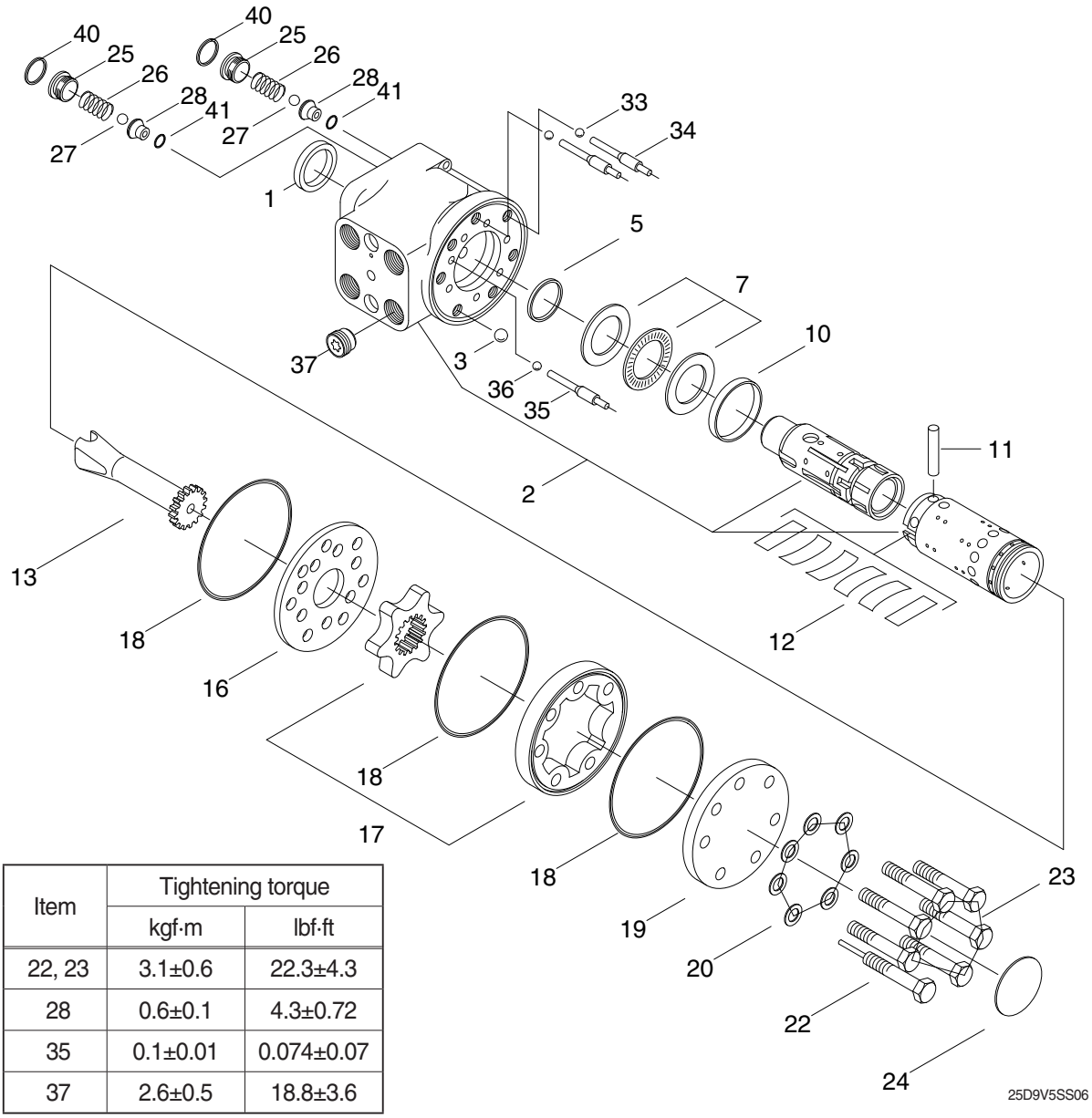
Problem	Check point	Remedy
Springs scratche, wear or fall.	· Those of having critical scratches or wear and those of below the repair limit must be replaced with a new one.	· Replace.
Spools scratche or wear on sliding surface.	· Extremely small scratches must be removed with sandpaper. · Those of having critical scratches or wear must be replaced with a new one.	· Replace.
O-ring	· Those of having scratches on the seal or having critical wear must be replaced with a new one.	· Replace.

3) DAUL FLOW DIVIDER (BRAKE BOOSTER TYPE, OPTION)

Problem	Check point
BF flow is out of specification	· Check the other material (chip, particles, …) is in the bore and on the spool and in orifices. · Check the orifices' sizes in the spool (3).
CF flow is out of specification	· If it flow too much and EF too less or not, check the other material (chip, particles, …) is stuck in the block land into CF · Check the orifices' sizes in the spool (2).
EF flow is out of specification	· If there is hydraulic shock in actuators while on/off(or push/pull) operation switching, check the orifices' sizes in the spool (2).
LS flow is out of specification	· Check the clearance of the Bore and Spool (2). · Check the orifices' sizes in the spool (2), plug orifice (7) and spring (15).
Pressure Engagement is out of specification	· Check the parts of LS relief valve and its inserted direction is in normal. · Check the other material (chip, particles, …) is in the long drill holes and on the poppet (9).

1. STEERING UNIT

1) STRUCTURE



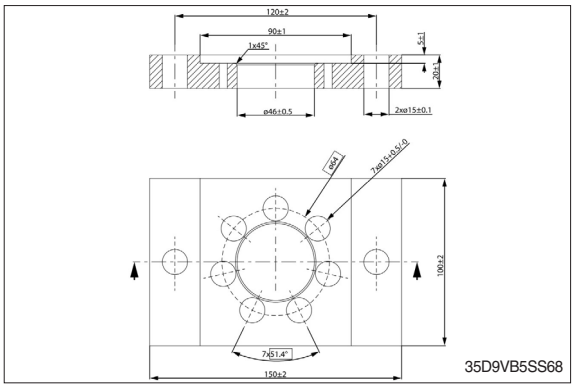
Item	Tightening torque	
	kgf·m	lbf·ft
22, 23	3.1±0.6	22.3±4.3
28	0.6±0.1	4.3±0.72
35	0.1±0.01	0.074±0.07
37	2.6±0.5	18.8±3.6

1	Dust seal ring	18	O-ring	31	Spring
2	Housing and spool/sleeve	19	End over	32	Piston
3	Ball	20	Washer	33	Ball
5	Shaft seal	22	Pin bolt screw	34	Bushing
7	Bearing assembly	23	Screw	35	Ball
10	Ring	24	Model / Code label	36	Ball
11	Cross pin	25	Adjusting screw	37	Check valve
12	Set of springs	26	Spring	40	O-ring
13	Cardan shaft	27	Ball	41	O-ring
16	Distributor plate	28	Seat	42	Plug
17	Gearwheel set	30	Adjusting screw		

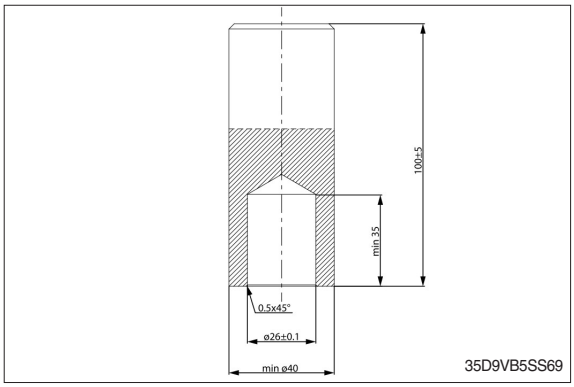
※ Seal kit (EA) : 1 (1), 5 (1), 18 (3), 20 (7), 40 (2), 41 (2)

2) TOOLS

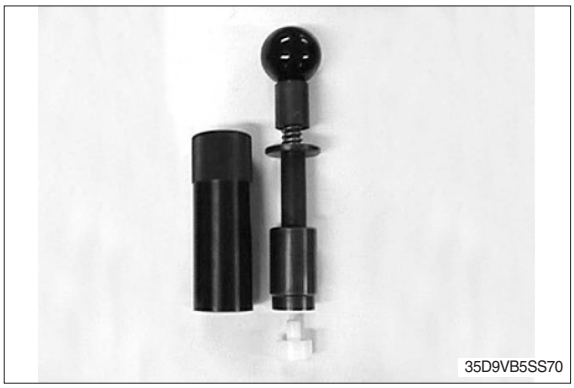
(1) Holding tool for the entire steering unit.
Material: Appropriate metal or hard plastic.



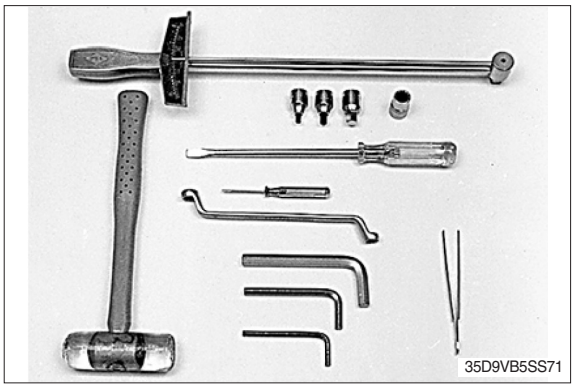
(2) Assembly tool for dust seal.
Material: Free cutting steel.



(3) Assembly tool for shaft seal, O-ring/Roto Glyd type:
Code number: 11092408.

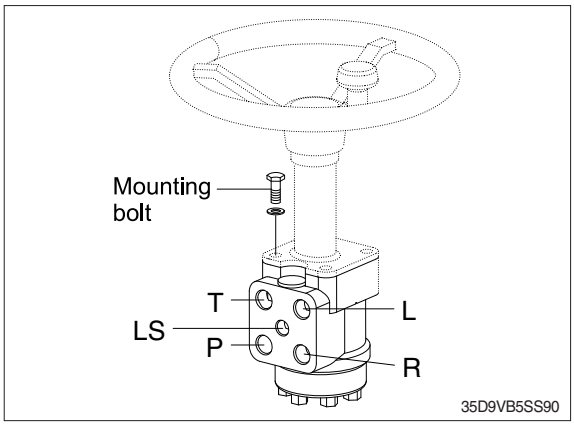


(4) Torque wrench
- 13 mm socket spanner
- 2 mm, 7/64 inch (2.75 mm) Allen key
- Torx Bit size T50
- 12 mm screwdriver
- 2 mm screwdriver
- 13 mm ring spanner
- Plastic hammer
- Tweezers



3) TIGHTENING TORQUE

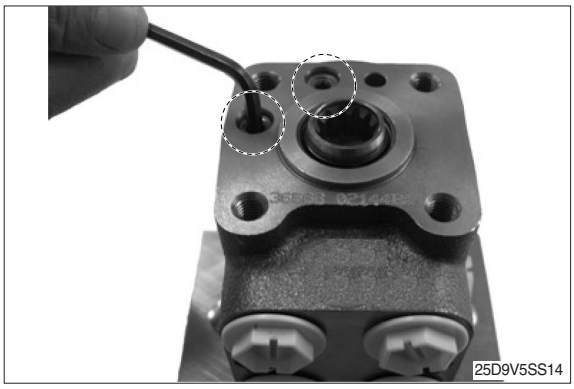
L : Left port
R : Right port
T : Tank port
P : Pump port
LS : Load sensing port



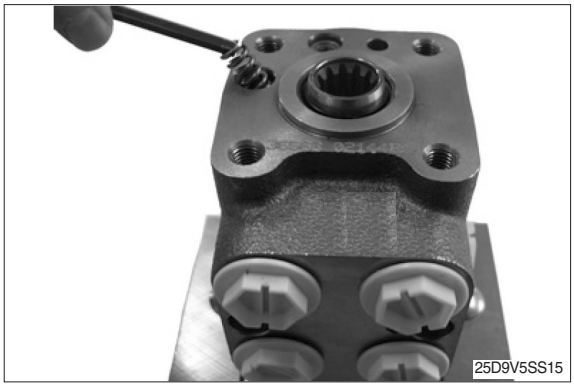
Port	Port size	Tightening torque	
		kgf·m	lbf·ft
L, R, T, P	3/4-16 UNF	6	43.4
LS	7/16-20UNF	2.5	18.4
Mounting bolt	M10×30 mm	4	28.9

4) DISASSEMBLY

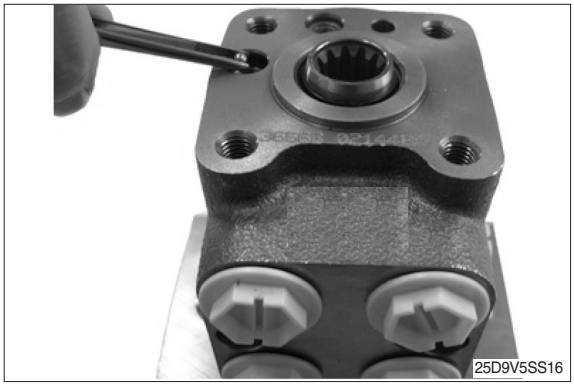
(1) Arise off the plastic protection plugs from the two shock valves. Screw out the adjusting screw for shcok valves (25) using a 5 mm allen key. O-ring (40) is fitted on adjusting screw (25).



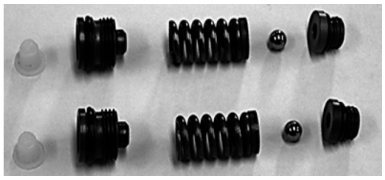
(2) Remove the springs (26) with trust pads for shock valves.

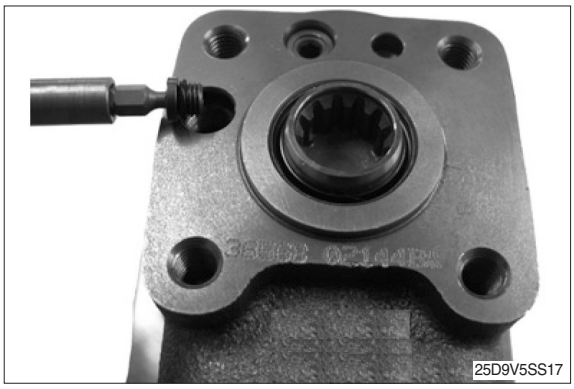


(3) Remove the balls (27) for shock valves.



(4) Screw out the seats (28) for shock valves using a 7/64 inch (2.75 mm) allen key. O-ring (41) is fitted on seat (28).
The shock valves are now dismantled.



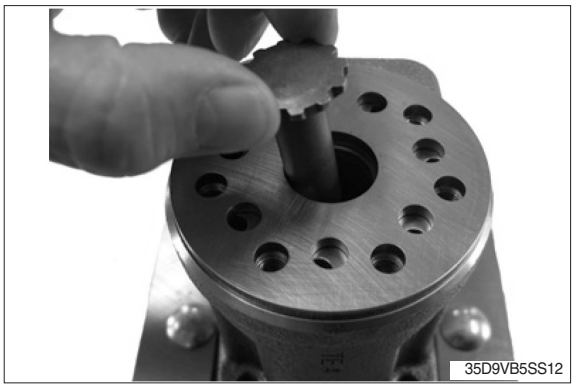


(5) Replace the unit in the holding tool on steering column end.
Remove the screws (22 and 23) with washers (20) using a 13 mm ring spanner or top wrench.

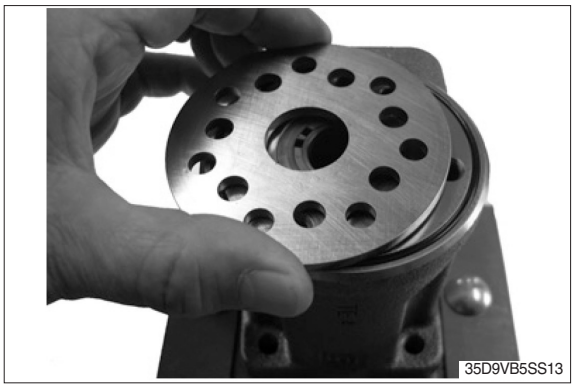
(6) Remove the end cover (19), sideways.

(7) Lift the gearwheel set (17) off the unit. Remove the two o-rings (18).

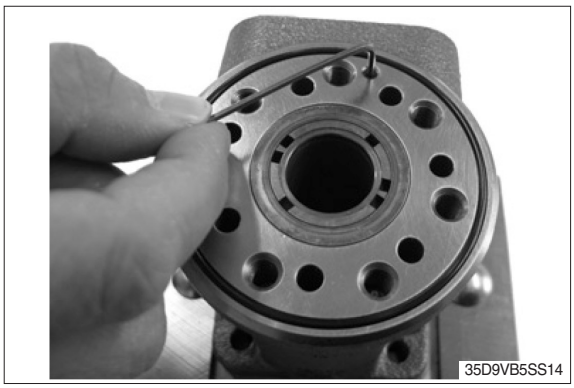
(8) Remove the cardan shaft (13).



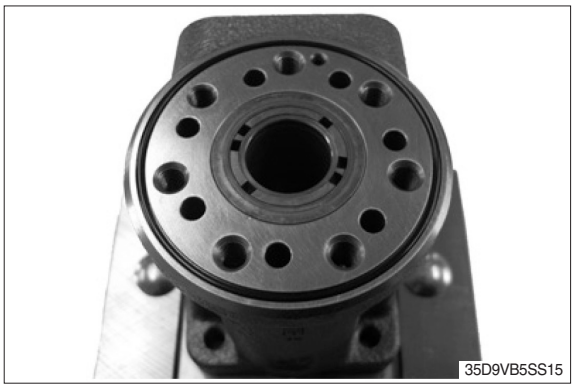
(9) Remove the distributor plate (16).



(10) Screw out the ball stop (35) using a 2 mm allen key.

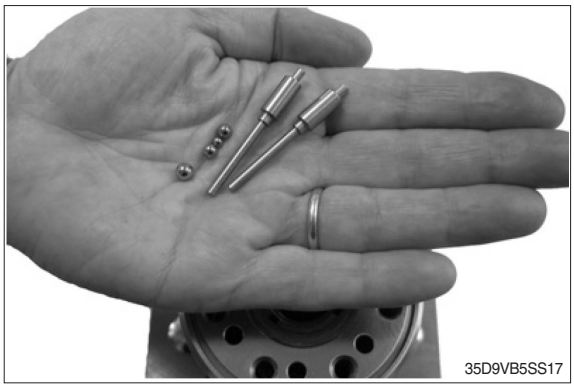


(11) Remove the o-ring (18) from housing.

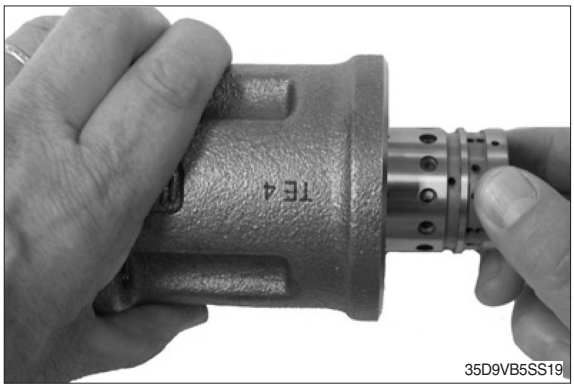


(12) Remove the check valve (37) using a torx bit size T50.

(13 Shake out the check valve ball (3), suction valve pins (34), balls (33 and 36).



(14) Place the housing with the ports facing down on the work bench. Ensure that the cross pin (11) in the spool and sleeve set (2) is in the horizontal position. The pin (11) can be observed through the open end of the spool. Press the spool (2) inwards (from the housing mounting face end) and the sleeve (2), ring (7) and bearing assembly (6) will be pushed out of the housing together.

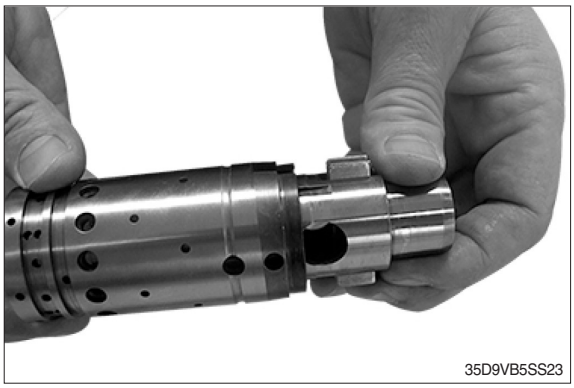


(15) Take the bearing races and needle bearing (7) from the spool and sleeve set (2). The outer bearing (7) race can sometimes “stick” in the housing, therefore check that it has come out.

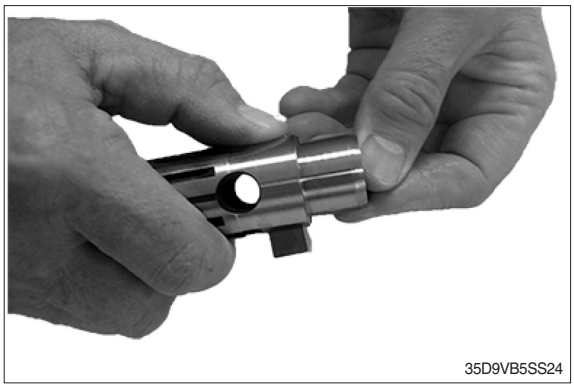
(16) Press out the cross pin (11).

(17) Remove the ring (10).

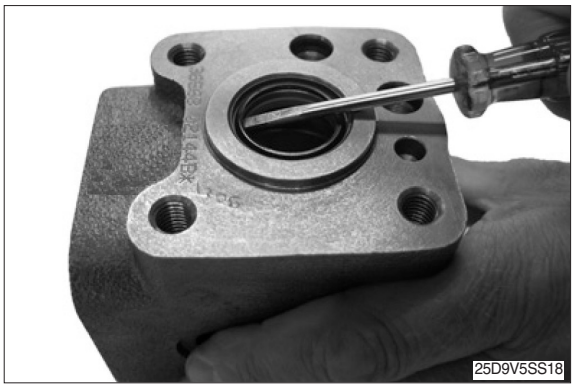
(18) Carefully press the spool out of the sleeve.



(19) Press the neutral position springs (12) out of the slot of the spool.



(20) Remove dust seal (1) and shaft seal (Roto Glyd) (5) carefully with a screw driver or similar tool.



(21) The steering unit is now completely dismantled.

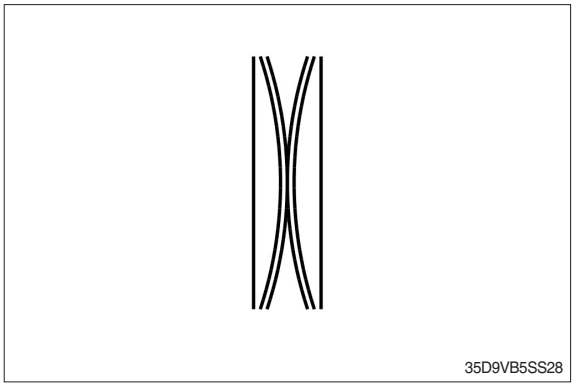
※ **Clean all parts carefully in shellsol K or similar cleaner fluid.**

※ **Inspection and replacement Replace all seals and washers. Check all parts carefully and make any replacements as is necessary.**

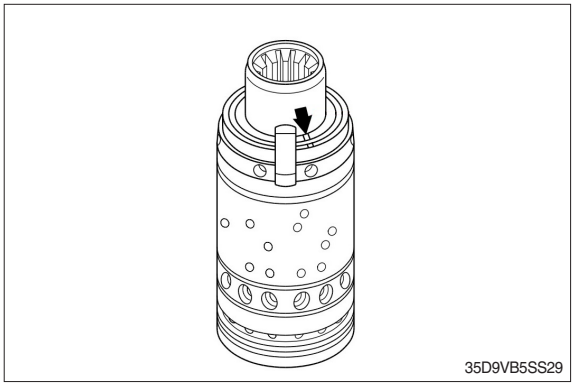
5) ASSEMBLY

(1) Place the two flat neutral position springs in the slot. Place the curved springs between the flat ones and press them into place.

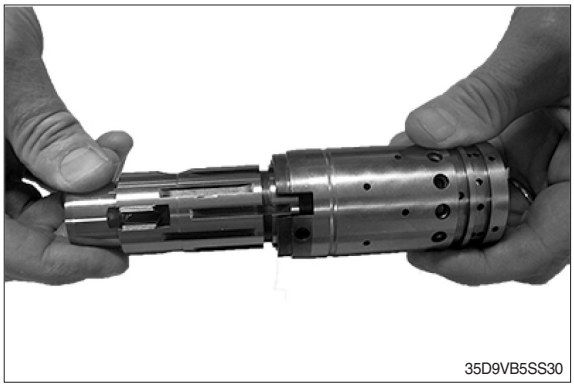
(2) Configuration of spring set (12). There can be different numbers of curved springs depending on configuration of spring set. There can be 2, 4 or 6 curved springs.



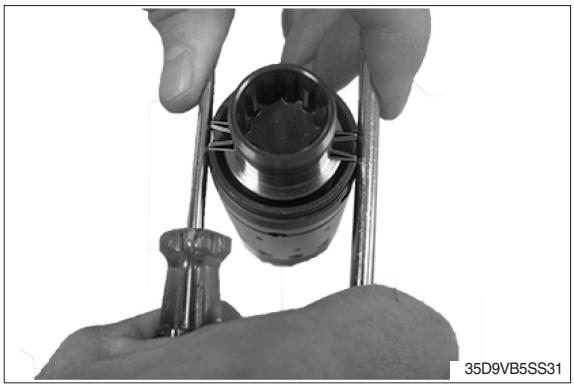
(3) Some spool and sleeve sets for steering unit must be positioned correctly relatively to each other. Small marks are present on both spool and sleeve close to one of the slots for the spring set. Most spool and sleeve sets for steering unit have no marks, so those can be positioned relatively to each other in any of the 2 positions possible.



(4) Guide the spool into the sleeve (2). Make sure the centering springs (12) are placed into the slot.



(5) Line up the spring set (12).

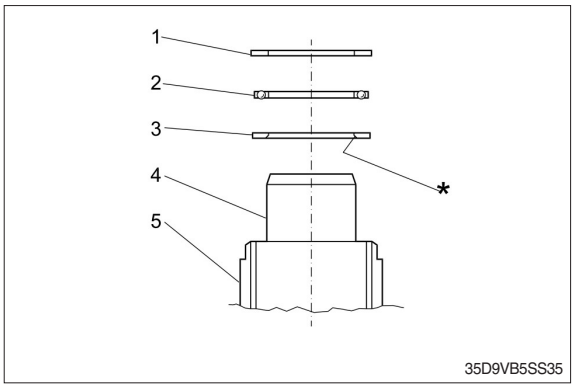


(6) Guide the ring (10) down over the sleeve. The ring should be able to move free of the springs.

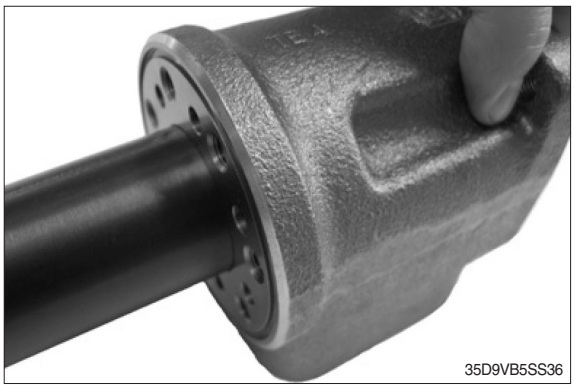
(7) Fit the cross pin (11) into the spool/sleeve.

(8) Fit bearing races and needle bearing (7) as shown on the drawing below.

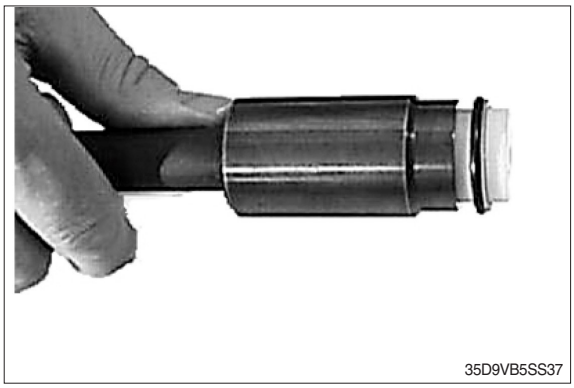
(9) Assembly pattern for standard bearing 1 Outer bearing race → 2 Needlebearing → 3 Inner bearing race → 4 Spool → 5 Sleeve.
The inside chamfer on the inner bearing race must face the chest of the inner spool.



(11) Place the steering unit housing with the port face down on the work bench. Guide the outer part of the assembly tool for shaft seal into the bore for the spool/ sleeve set (2).

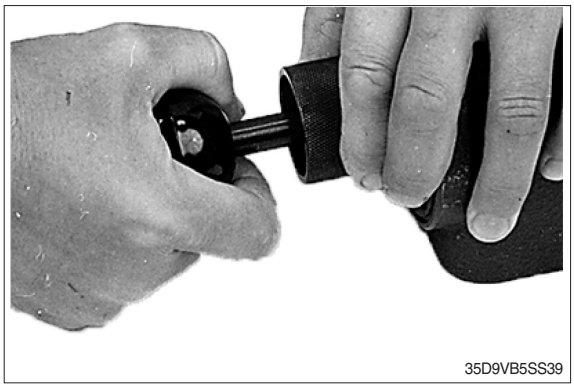


(10) Grease the shaft seal (Roto Glyd, 5) with hydraulic oil and place them on the tool. Ensure that the Roto Glyd seal is placed on the insertion tool as per the photograph.

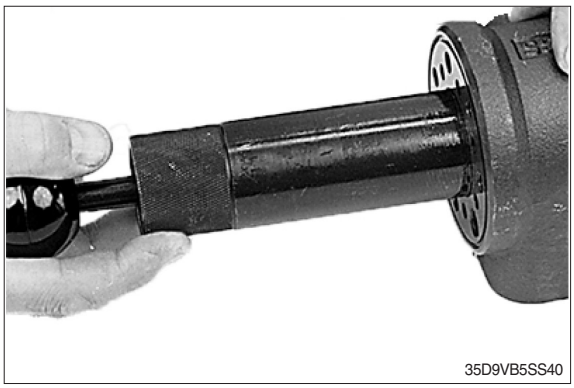


(13) Hold the outer part of the assembly tool in the bottom of the steering unit housing and guide the inner part of the tool right to the bottom.

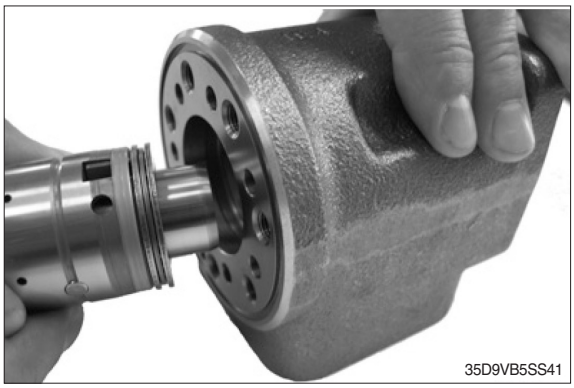
(14) Press and turn the shaft seal (5) into position in the housing.



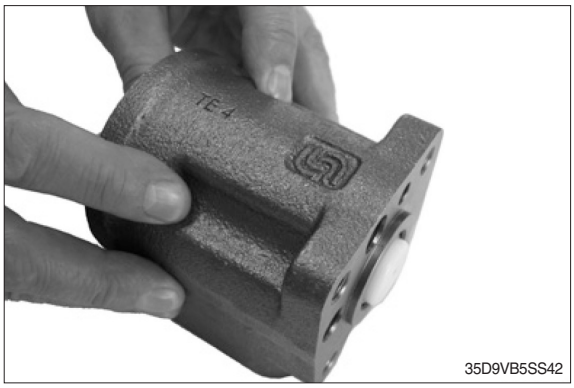
(15) Draw the inner and outer parts of the assembly tool out of the steering unit bore, leaving the guide from the inner part in the bore.



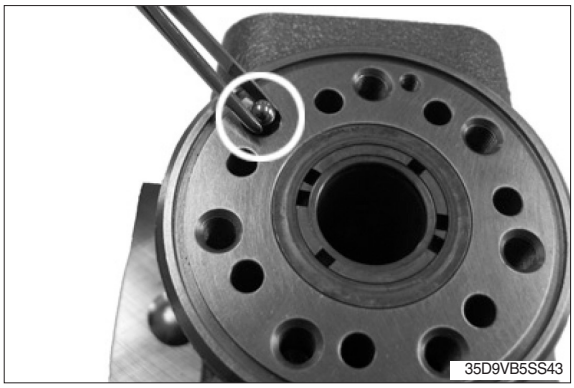
(16) With a light turning movement, guide the spool and sleeve into the bore.
Fit the spool set holding the cross pin (11) horizontal.



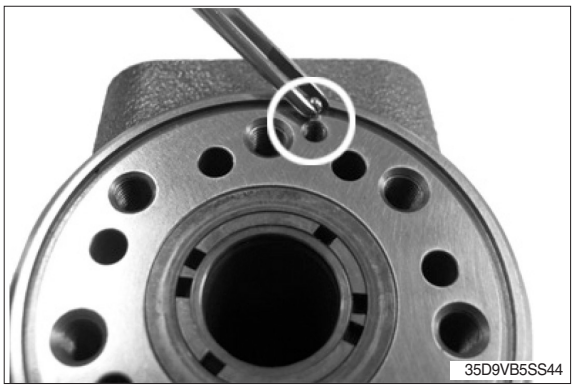
(17) The spool set will push out the assembly tool guide. The shaft seal (5) are now installed.



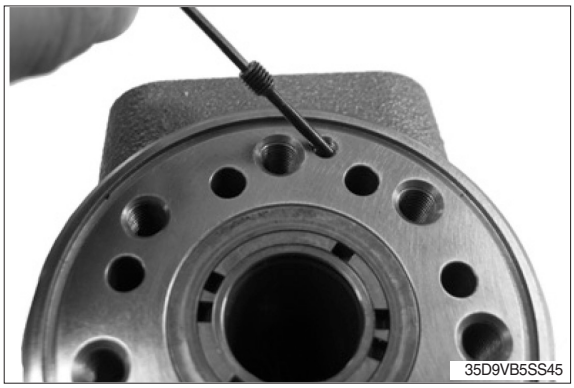
(18) Place the steering unit housing on the holding tool on the steering column end. Put the check valve ball (3) into the hole indicated by the circle.



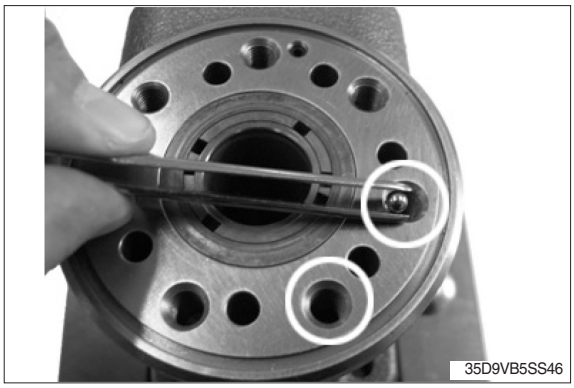
(19) Place the ball for LS check valve (36) into the hole indicated by the circle.



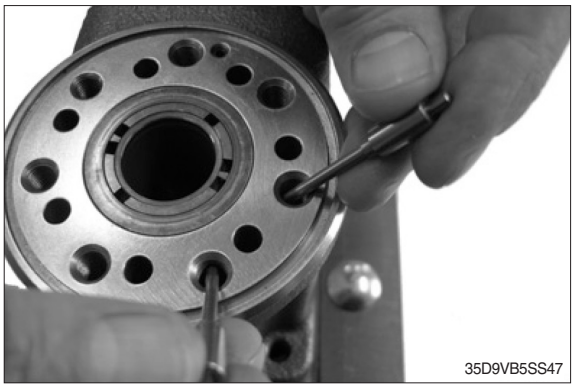
(20) Screw the ball stop (35) into the LS check valve bore using a 2 mm allen key.
· Tightening torque : 0.1±0.01 kgf·m
(0.72±0.072 lbf·ft)



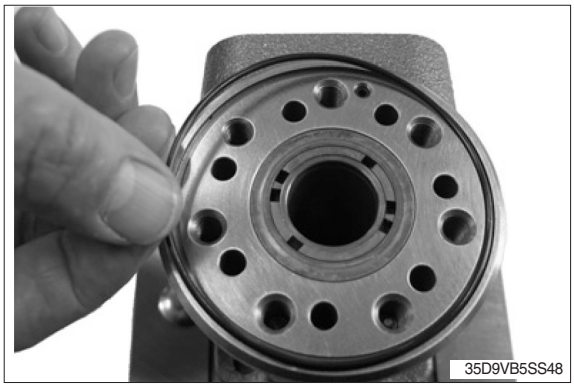
(21) Place a ball (33) in the two bolt holes indicated by the circles.



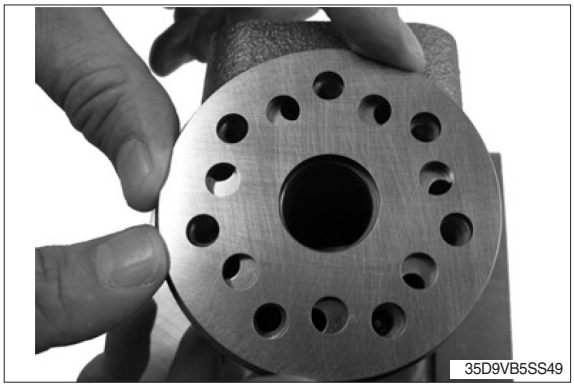
(22) Place the pins (34) in the same two bolt holes.



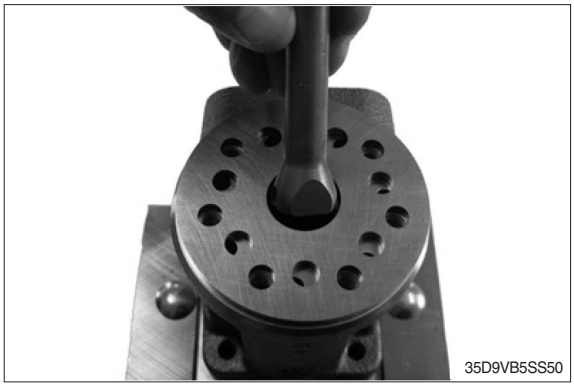
(23) Insert the O-ring (18) in the grove on the housing.



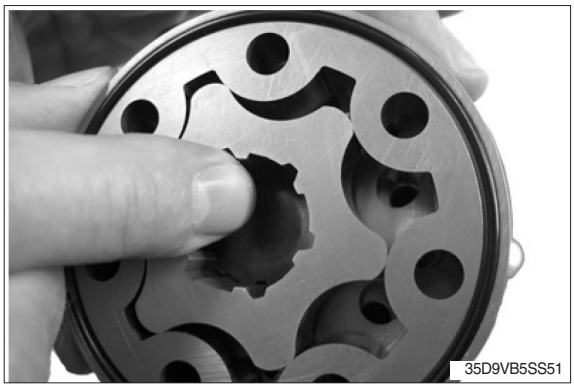
(24) Place the distributor plate (16) so that the channel holes match the thread holes in the housing.



(25) Guide the cardan shaft (13) down into the bore so that the slot is parallel with the connection flange ports and lines up with the cross pin (11).



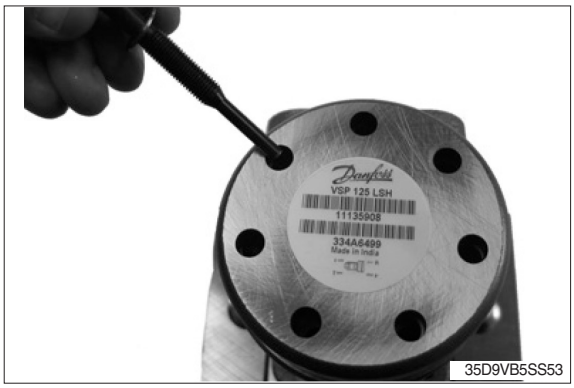
(26) Place the 2 o-rings (18) in the two groves in the gear rim. Fit the gearwheel and rim (17) on the cardan shaft (13).
Place the gear wheel side with all the deeper splines facing downwards. Only this side will fit on the cardan shaft due to all gear sets used in steering unit have timing securing: splines of gear wheel and cardan shaft can only be assembled with correct timing. Line up the gear rim holes to match the thread holes of the housing.


35D9VB5SS51

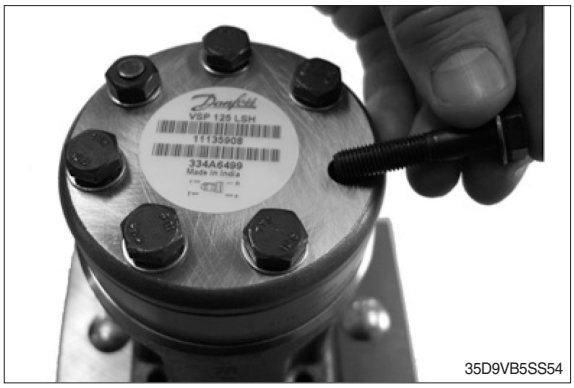
(27) Place the end cover (19) in position. Ensure that the bar codes and writing are parallel with port face.

35D9VB5SS52

(28) Fit the pin bolt screw (22) with washer (20) and place it in the hole shown.

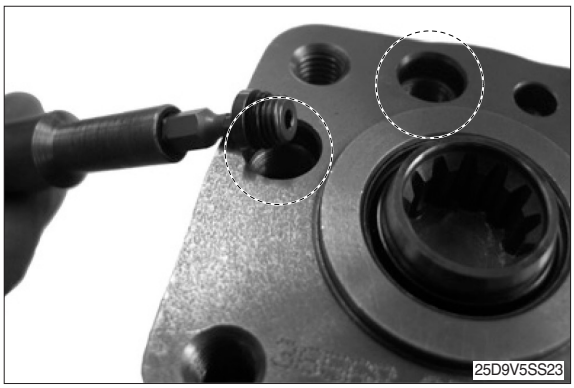

35D9VB5SS53

(29) Fit the six screws (23) with new washers (20) and insert them. Use a 13 mm top wrench. Cross-tighten all the screws (22 and 23) with a torque
· Tightening torque : 3.1±0.6 kgf·m
(22.4±4.3 lbf·ft)

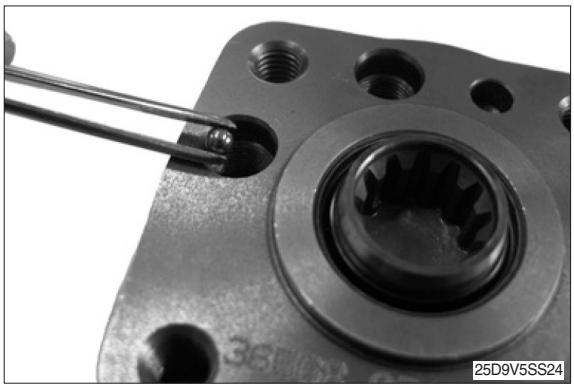

35D9VB5SS54

(30) Screw in the check valve (37) into the P-port using a Torx Bit size T50.
· Tightening torque : 2.6±0.5 kgf·m
(18.8±3.6 lbf·ft)

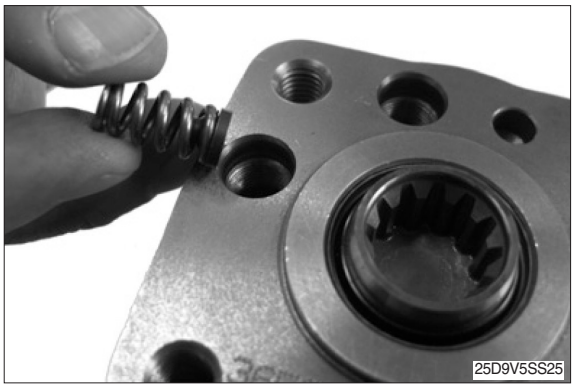
(31) Replace the unit in the holding tool on gear set end.
Place o-ring (41) on the shock valve seats (28). Screw in the seats (28) using a 7/64 inch (2.75 mm) mm Allen key into the cavities indicated by the circles.
· Tightening torque : 0.6±0.1 kgf·m
(4.3±0.72 lbf·ft)



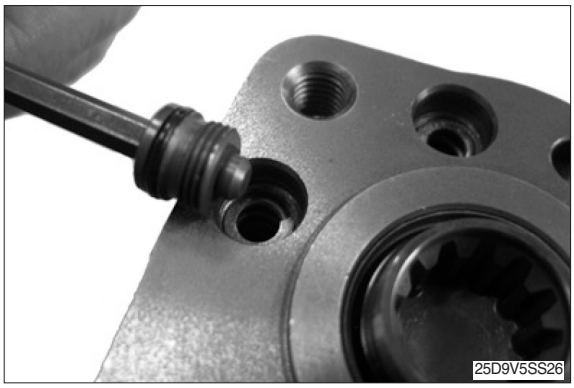
(32) Place one ball (27) in each of the shock valve cavities.



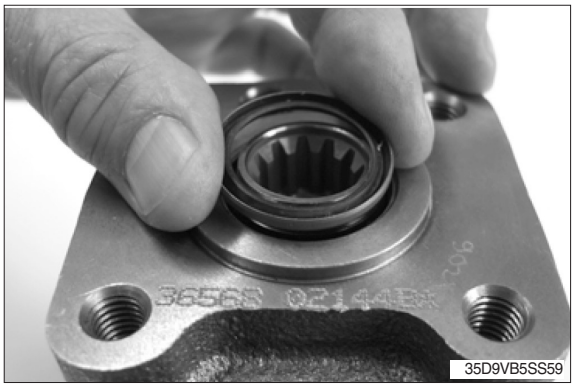
(33) Place springs with trust pads (26) over the two balls.



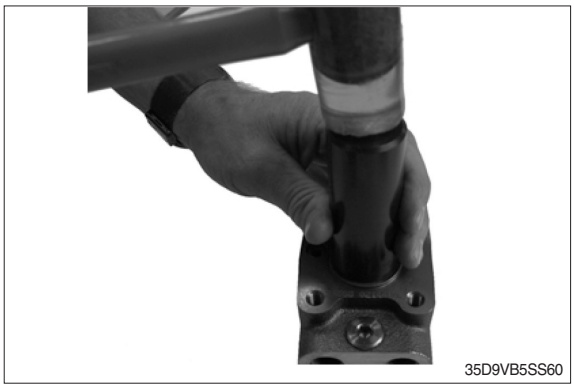
(34) Place o-rings (40) on adjusting screws (25). Screw in the two adjusting screws (25) using a 5 mm allen key. Make the pressure setting on a test panel according to valve setting specification.


25D9V5SS26

(35) Place the dust seal ring (1) in the housing.

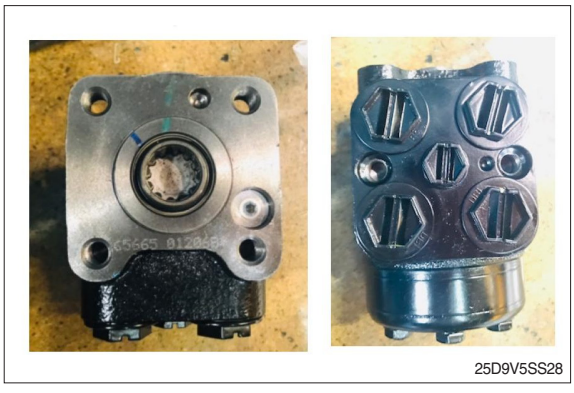

35D9VB5SS59

(36) Fit the dust seal ring in the housing using special tool for dust seal assembly and a plastic hammer.


35D9VB5SS60

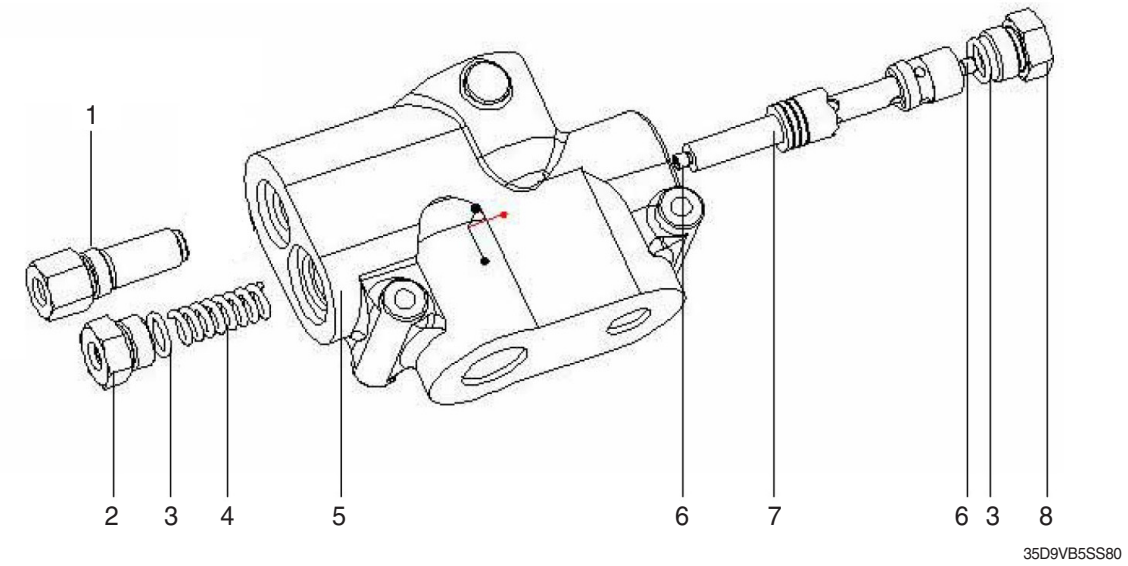
(37) After finalizing the entire assembly, screw in the plastic plugs into the connection ports to keep the ports clean during storage and transportation.

※ **Refer to the relief valve and LS port pressure test and adjustment.**


25D9V5SS28

2. PRIORITY VALVE

1) STRUCTURE



1	Relief valve kit	4	Spring compression	7	Spool
2	Plug	5	Housing	8	Plug
3	O-ring	6	Throttle		

2) DISASSEMBLY

※ Check that the priority valve has not been damaged during transportation.

※ Clean the working area before operation.

※ If needed, components must be replaced exclusively by serviceman.

(1) Clamp the unit in vice. Loosen the plug (using 27 mm wrench) and screw out. Be careful of the spring.

(2) Take out the spring vertically.

(3) Unscrew the plug in the opposite side using the 27mm wrench.

(4) Press out the spool by hand.

※ **It is strongly recommended that relief valve cartridge not be adjusted by customer. If necessary, it must be done by Eaton representative. Approximately 800psi per revolution of the adjusting screw.**

(5) Clean all metal parts in clean solvent. Blow dry with air. Do not wipe dry with cloth or paper towel because lint or other matter can get into the hydraulic system and cause damage.

3) ASSEMBLY

※ Before assembly, lubricate all parts with normal hydraulic oil.

(1) Position the valve horizontally and insert the spool into its bore. Pay attention to spool direction and ensure spool moves smoothly.

(2) Insert the spring into the bore.

(3) Screw in the two plugs and tighten.
· Tightening torque : 5.1±0.5 kgf·m
(36.9±3.7 lbf·ft)

3. DUAL FLOW DIVIDER (BRAKE BOOSTER TYPE, OPTION)

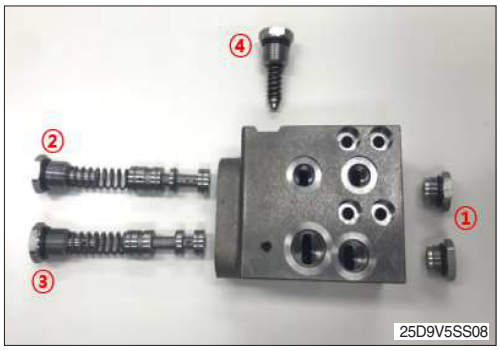
1) CAUTION FOR ASSEMBLY AND DISASSEMBLY

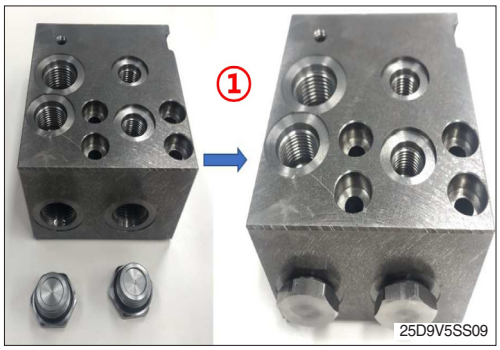
(1) Disassembly and assembly should be performed very carefully at a clean place so that any foreign material such as dust or sand can not intrude into the dual flow divider.
(2) For disassembly of the dual flow divider, you should start disassembly after fully understanding the structure of the valve with structural drawings and reference drawings.
(3) In case the dual flow divider needs to be placed unassembled for a while, it must be treated with rust prevent oil and sealed to prevent rusting.
(4) Even in case disassembly and assembly of the dual flow divider is not performed smoothly, do not hit or treat any part of the product roughly.
(5) After disassembly, attach ID tags to each part for accurate assembly.
(6) For o-rings and back up-rings, install new ones. And be sure not to damage one during assembly (Apply grease on the parts for smooth assembly).
(7) Fasten bolts, nipples and plugs with the specified standard torque.
(8) Be careful not to damage the o-ring contacting parts for preventing oil leakage.

2) ASSEMBLY

△ **When disassembling, avoid mis-assembly through marking work. Pay attention to the location of the BF and CF spools and the spool assembly direction. Pay attention to the shape and assembly position of the plug and spring.**

(1) Assemble the plugs into the port on the side of the block.
· Tightening torque : 7 kgf·m
(50.6 lbf·ft)

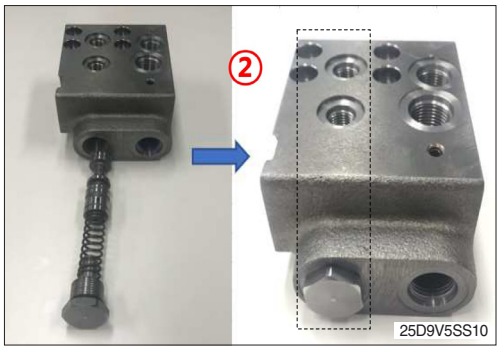




(2) Check the location of hole on the side. Assemble the spool, spring and plug into the left hole.

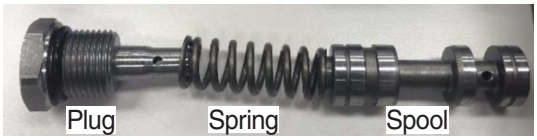
· Tightening torque : 7 kgf·m (50.6 lbf·ft)

<BF spool assembly>

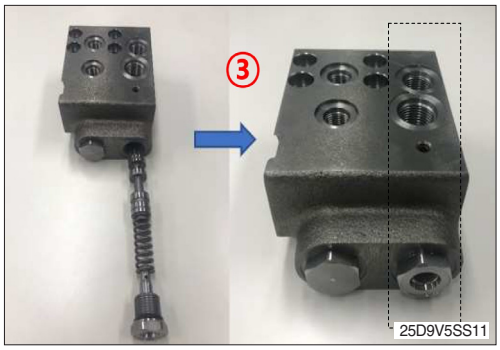


(3) Insert and assemble into the hole which is left in other side of the block with the spool, spring, plug. Notice that the parts are mixed with other locations.

· Tightening torque : 7 kgf·m (50.6 lbf·ft)

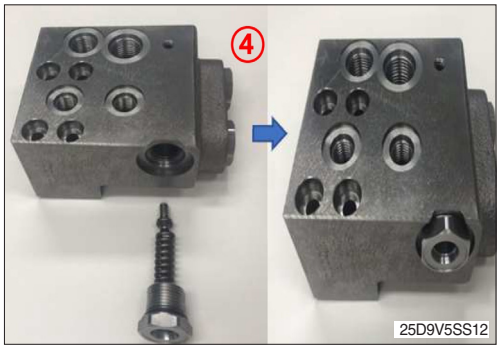


<CF spool assembly>



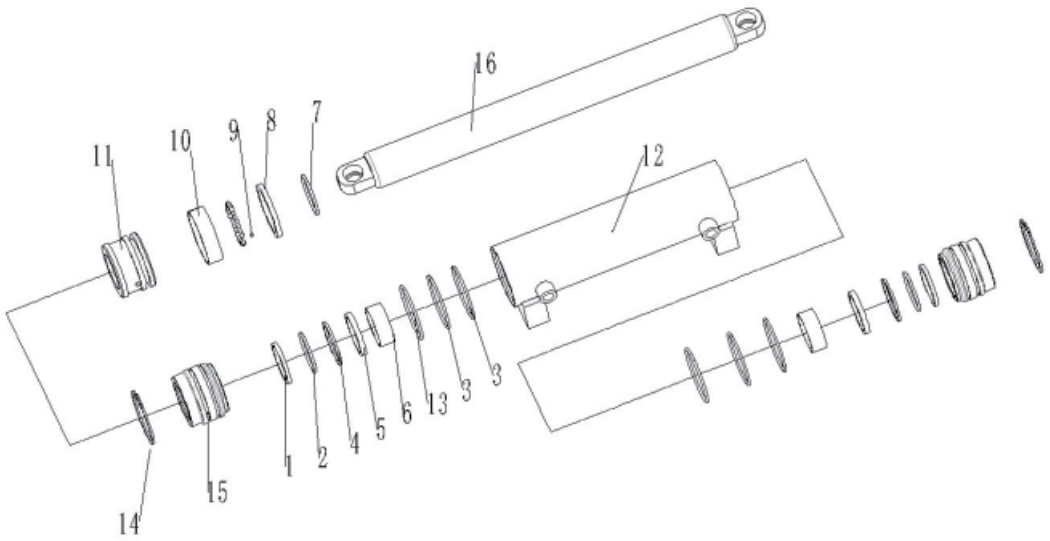
(4) Assemble the remaining relief valve in the hole located on the upper side.

· Tightening torque : 7 kgf·m (50.6 lbf·ft)



3. STEERING CYLINDER

1) STRUCTURE



25BX5SS14

1	Dust wiper	7	O-ring	13	Snap ring
2	O-ring	8	Piston	14	Circlip
3	O-ring	9	Ball	15	Rod cover
4	Shaft seal	10	Ring	16	Piston rod
5	Slice block	11	Piston		
6	Bearing	12	Tube assembly		

2) DISASSEMBLY

※ Before disassembling steering cylinder, release oil in the cylinder first.

(1) First remove the external circlips (14).

(2) Tap the rod cover (15) into the tube (12) and remove the snap rings (13).

(3) Remove the rod cover (15).

(4) Repeat steps 1-3, disassembly the other rod cover.

(5) Remove the piston rod (16) and piston (11) from the tude (12).

(6) Check wear condition of the sealing parts. If there are some damage, replace with new parts.

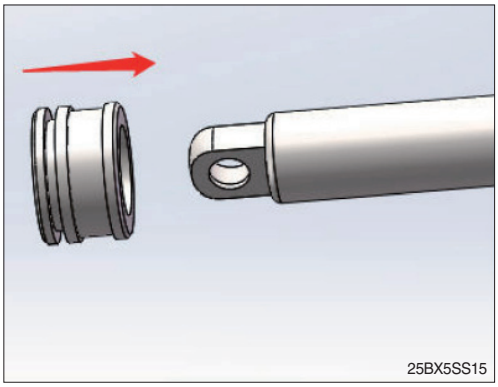
3) CHECKING AND INSPECTION

mm (in)

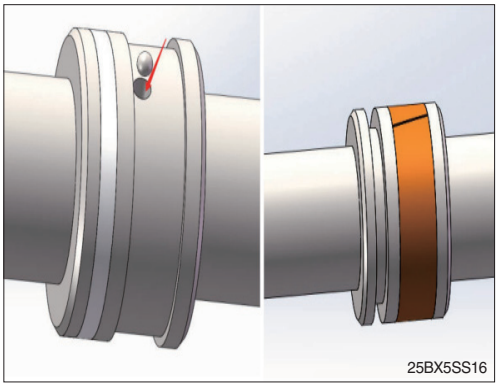
Check item	Criteria		Remedy
	Standard size	Repair limit	
Clearance between piston & cylinder tube	0.08~0.22 (0.003~0.009)	0.3 (0.012)	Replace piston seal
Clearance between cylinder rod & bushing	0.024~0.174 (0.0009~0.007)	0.2 (0.008)	Replace bushing
Seals, O-ring	Damage		Replace
Cylinder rod	Dents		Replace
Cylinder tube	Biting		Replace

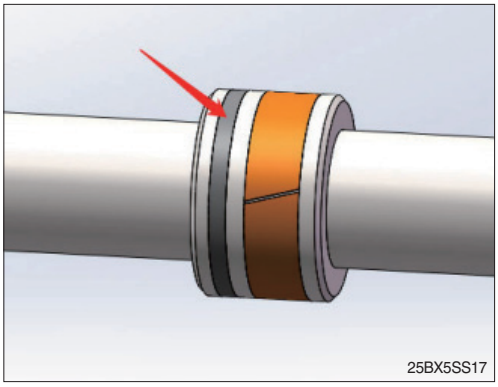
4) ASSEMBLY

(1) Put the piston (11) into the piston rod (16)

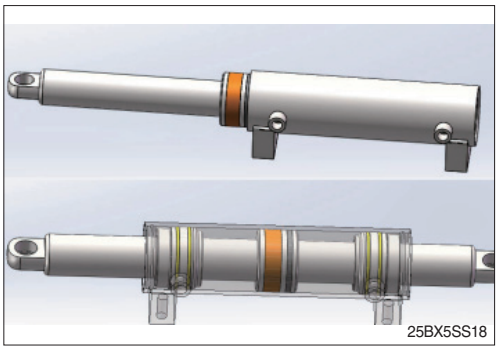


(2) Put the steel ball (9) into the piston (11) until it is s full,and then install the support ring (10) to the groove on the piston,last install the piston sealing (8).

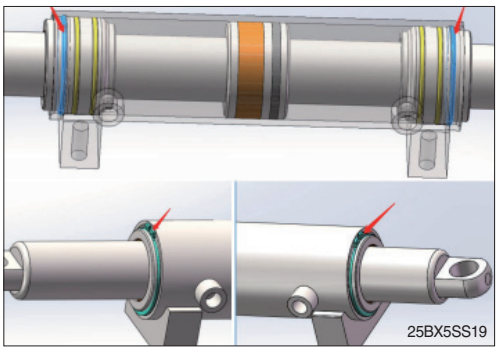




(3) Set a special tool on the piston rod (16), then put the piston rod into the tube (12), last put the rod cover (15) into both side of the tube (12).



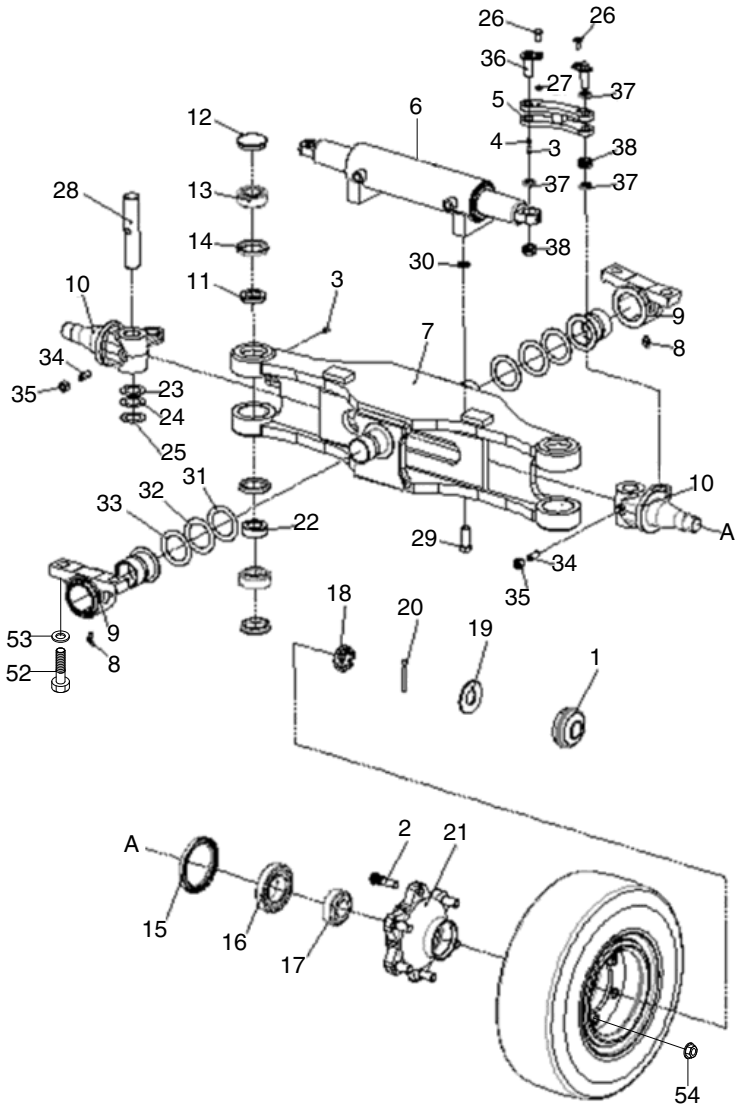
(4) Install the roundwire snap rings (13) to the groove on the tube. Then move the piston rod (16) to the limit position, last install the external circlips (14).



(5) Move the piston rod (16) back and forth several times for the full distance of its stroke. This helps to seat the O-ring and seals before applying full hydraulic pressure to the cylinder. Install cylinder into trail axle.

4. STEERING AXLE

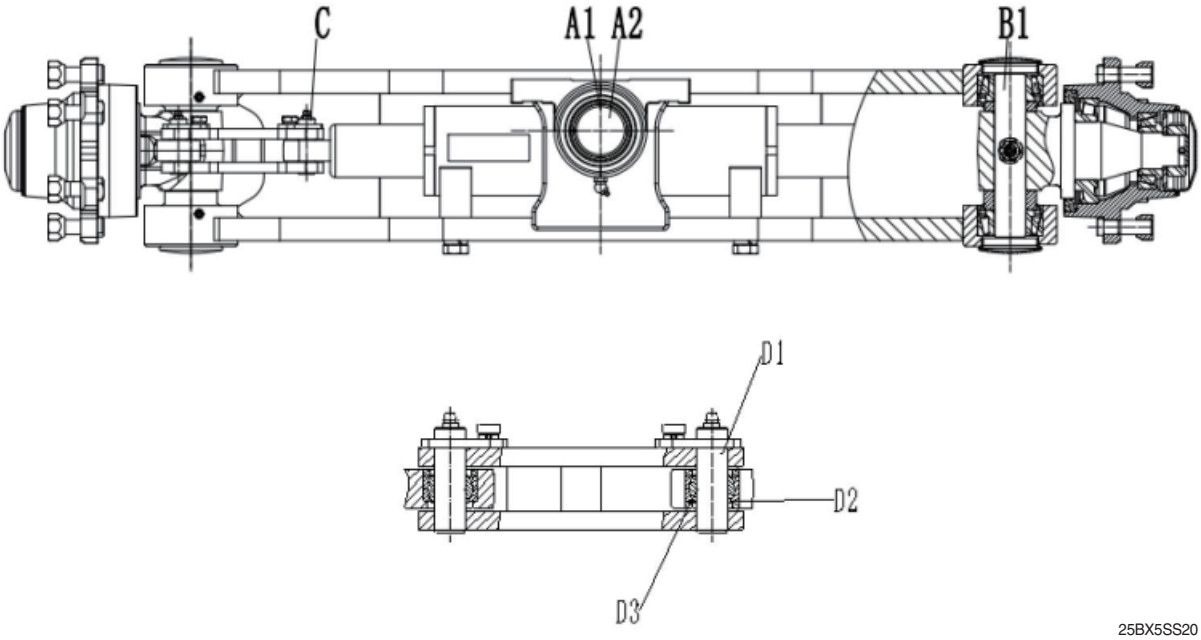
1) STRUCTURE



25D9HDI5SS01

1	Hub cap	15	Oil seal	29	Bolt
2	Hub bolt	16	Bearing	30	Washer
3	Grease nipple	17	Bearing	31	Adjusting shim kit
4	Dust cap	18	Nut	32	Adjusting shim kit
5	Steering link	19	Washer	33	Bushing
6	Steering cylinder assy	20	Cotter pin	34	Screw
7	Steering axle center	21	Wheel hub	35	Nut
8	Grease nipple	22	Rod ring	36	Sterring link pin
9	Trunnion block	23	Shim (0.2t)	37	Bushing
10	Steering knuckle	24	Shim (0.1t)	38	Oscillating bearing
11	Rod ring	25	Shim (0.5t)	52	Hex bolt
12	Upper cover	26	Bolt	53	Harden washer
13	Bearing	27	Washer	54	Wheel nut
14	Oil seal	28	King pin		

2) CHECK AND INSPECTION



unit : mm (in)

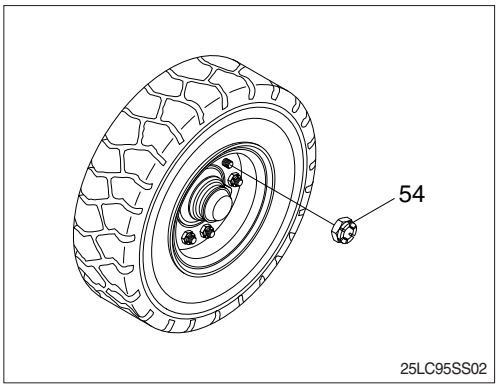
No.	Check item			Criteria		Remedy
				Standard size	Repair limit	
A	Shaft	A1	OD of shaft	Ø50 (1.97)	Ø49.5 (1.95)	Replace
		A2	ID of bushing	Ø50 (1.97)	Ø49.5 (1.95)	
B	OD of king pin			Ø30 (1.18)	Ø29.8 (1.17)	
C	OD of steering cylinder pin			Ø16 (0.63)	Ø15.8 (0.62)	
D	Knuckle	D1	OD of pin	Ø16 (0.63)	Ø15.8 (0.62)	
		D2	Verical play	-	-	Adjust with shims
		D3	ID of bushing	Ø16 (0.63)	Ø16.2 (0.64)	Replace

· OD : Outer diameter
· ID : Inner diameter

3) DISASSEMBLY

※ Servicing work on the knuckle part can be carried out without removing the axle assy from chassis. The work can be done by jacking up the counter weight part of the truck.

(1) Loosen the wheel nut (54) and take off the steering wheel tire.



(2) Remove the hub cap (1).

(3) Pull out the split pin (20) and remove the slotted nut (18).

(4) Using the puller, take off the hub (21) together with the taper roller bearing (16, 17).

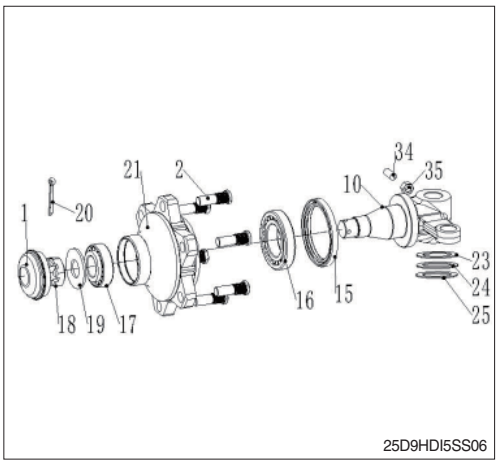
※ **Be very careful because just before the hub comes off, taper roller bearings will fall out.**

(5) After the hub (21) is removed take off the inner race of the taper roller bearing (16).

(6) Pull out the oil seal (15).

※ **Do not use same oil seal twice.**

(7) Repeat the same procedure for the other side. Moreover, when the disassembling is completed, part the slotted nut (18) in the knuckle (10) to protect the threaded portion.



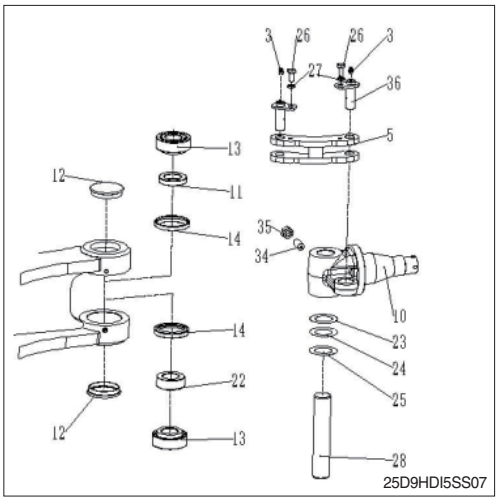
(8) Loosen the screw (34) and the nut (35).

(9) Remove the upper cover (12).

(10) Push out the king pin (28) without damaging the knuckle (10).

(11) If a defect is observed in taper roller bearing (13), pull it out by using extractor.

(12) Loosen the bolt (26). Remove the link pin (36) and the washer spring (27).



4) ASSEMBLY

※ In reassembling, have all parts washed, grease applied to lubricating parts, and all expendable items such as oil seal and spring washers replaced by new ones. Perform the disassembly in reverse order.

(1) Tighten the screw (34) and the nut (35) of the king pin (28).

(2) There is a notch in the middle of the king pin (28), make sure that this notch is on the screw (34) side.

(3) Do not hammer to drive in the bearing (13) because it will break.

※ Always use drive-in tool. Be sure that the fixed ring of the bearing is placed in position facing the knuckle (10).

(4) Hub

① Press the bolt (2) into the hub mating hole with special tools.

② Press the outer ring of large (16) and small (17) bearing into the hub (21) mating hole respectively with special tools to ensure that the outer ring and the hub are in place.

③ Install hub bearing and fill the hub with grease.

※ The amount of which is 1/3~1/2 of the hub's inner cavity

④ Apply grease to the working surface of the oil seal (15), then install it into the hub mating hole.

⑤ Install hub assembly on the knuckle (10), set into the washer (19), tighten the soltted nut (18) of the hub with the torque, then loose it, adjust the starting force of the wheel hub until 40-70N, last install the pin cotter (20). Finally install hub cap (1) with special tooling.

· Tightening torque : 15.3±5.1 kgf·m
(111±36.9 lbf·ft)