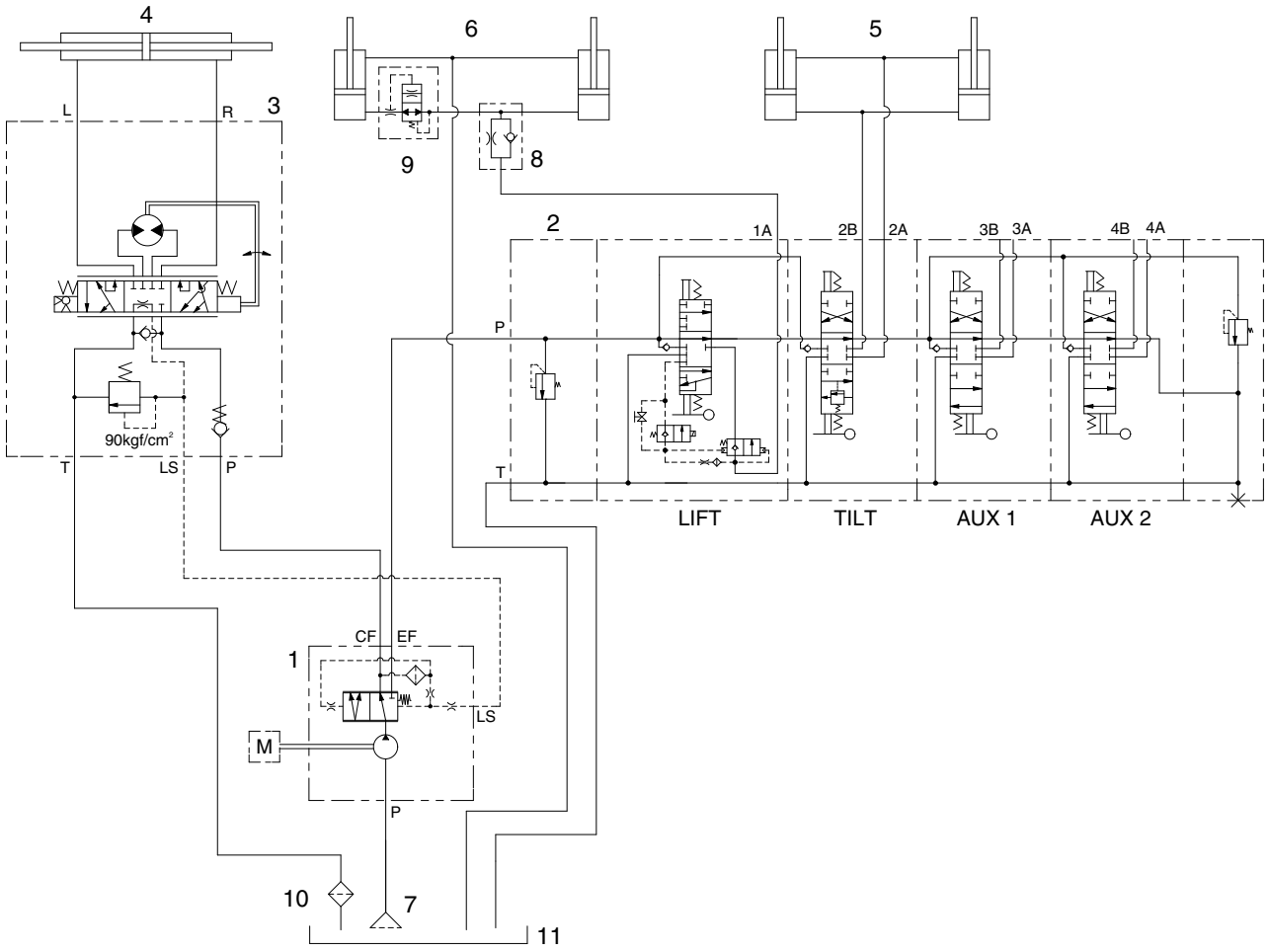
SECTION 6 HYDRAULIC SYSTEM

GROUP 1 STRUCTURE AND FUNCTION

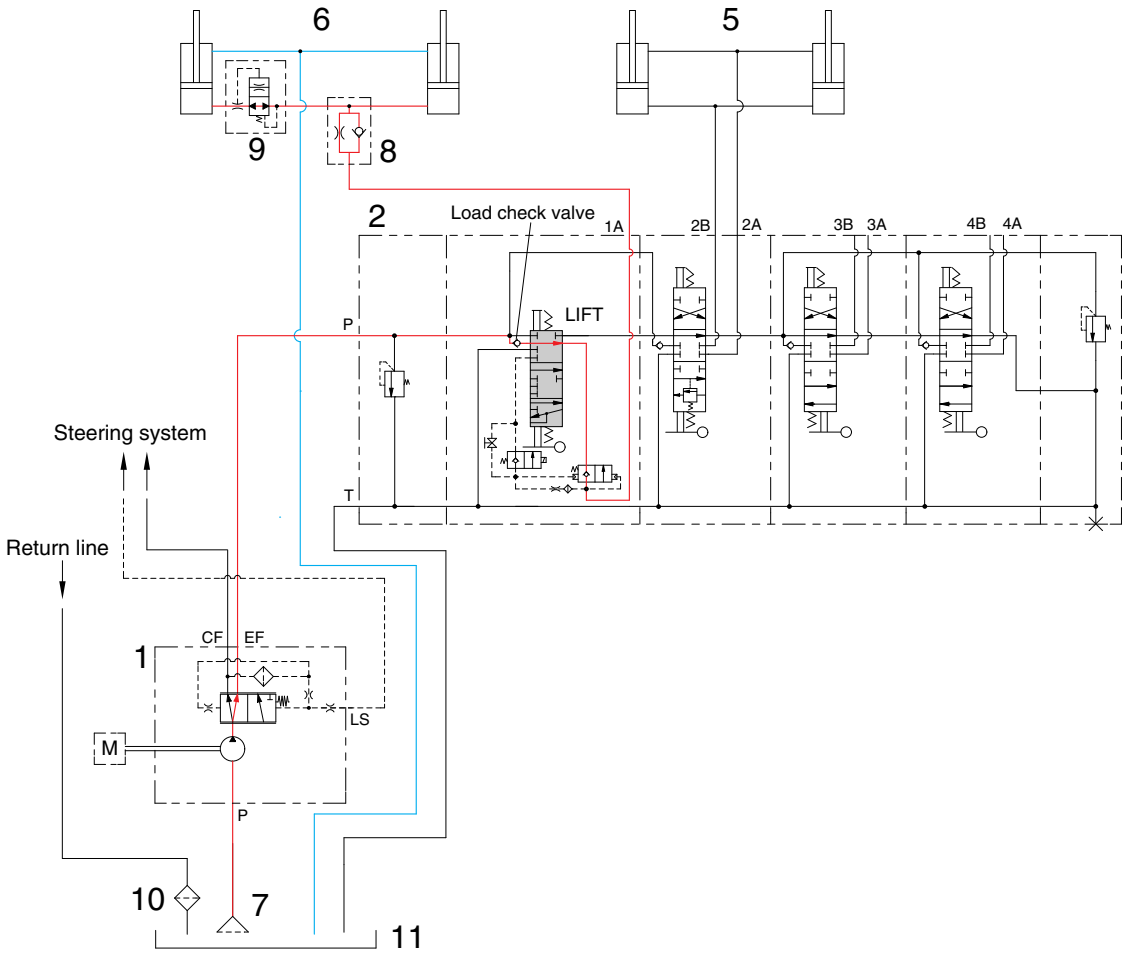
1. HYDRAULIC CIRCUIT



22B9HS01

1 Hydraulic gear pump with priority valve
2 Main control valve
3 Steering unit
4 Steering cylinder
5 Tilt cylinder
6 Lift cylinder
7 Suction strainer
8 Down control valve
9 Down safety valve
10 Return filter
11 Hydraulic oil tank

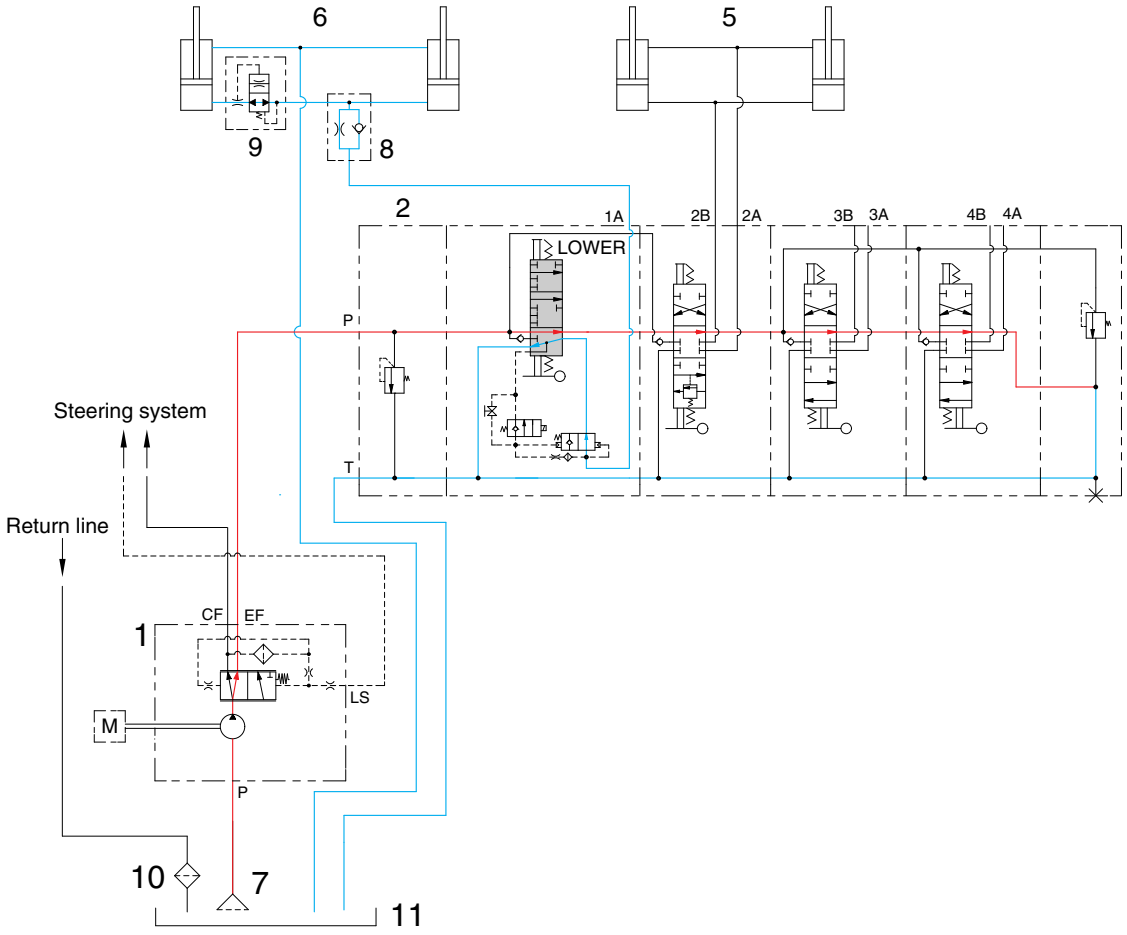
1) WHEN THE LIFT CONTROL LEVER IS IN THE LIFT POSITION



22B7HS02

When the lift control lever is pulled back, the spool on the first block is moves to lift position.
The oil from hydraulic gear pump (1) flows into main control valve (2) and then goes to the large chamber of lift cylinder (6) by pushing the load check valve of the spool.
The oil from the small chamber of lift cylinder (6) returns to hydraulic oil tank (11) at the same time.
When this happens, the forks go up.

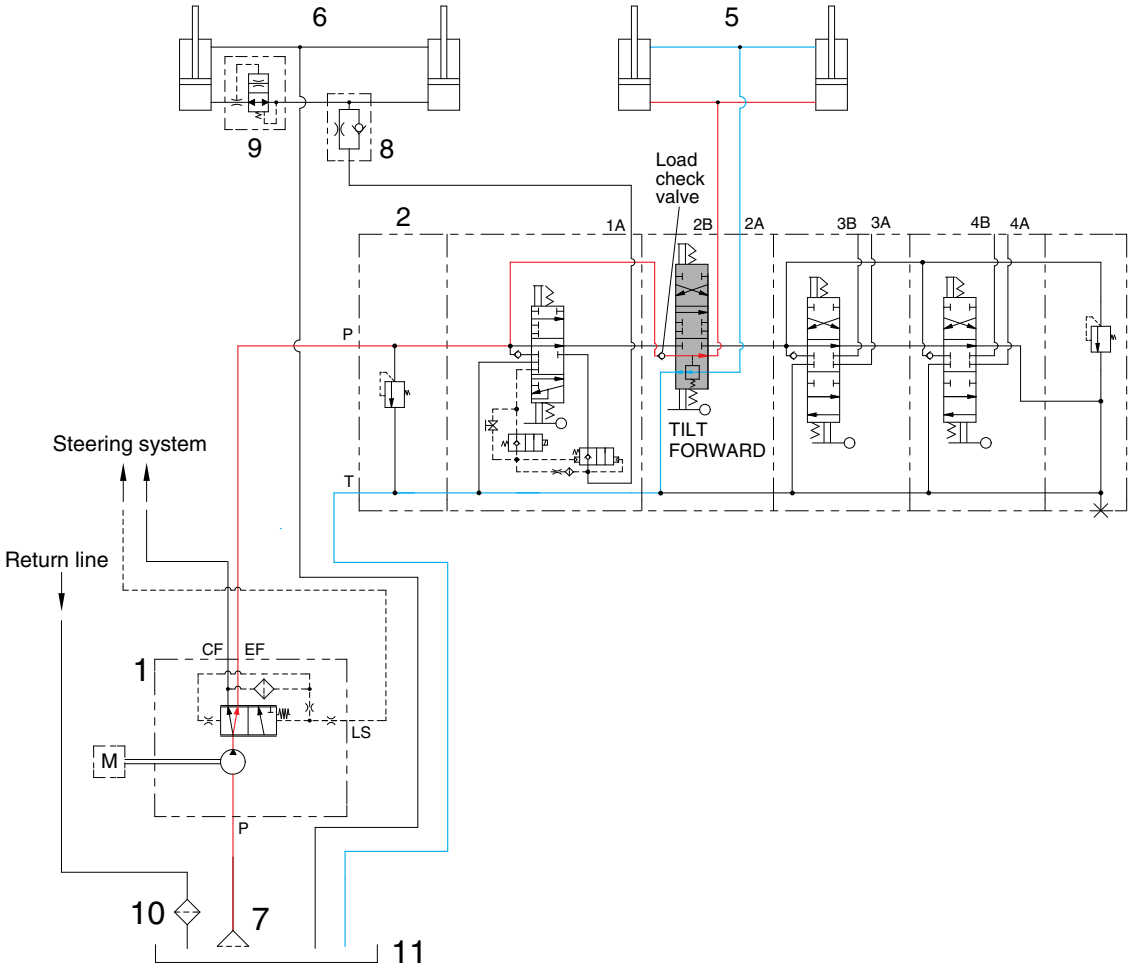
2) WHEN THE LIFT CONTROL LEVER IS IN THE LOWER POSITION



22B7HS03

When the lift control lever is pushed forward, the spool on the first block is moved to lower position. The work port(1A) and the small chamber and the large chamber are connected to the return passage, so the forks will be lowered due to its own weight.

3) WHEN THE TILT CONTROL LEVER IS IN THE FORWARD POSITION



22B7HS04

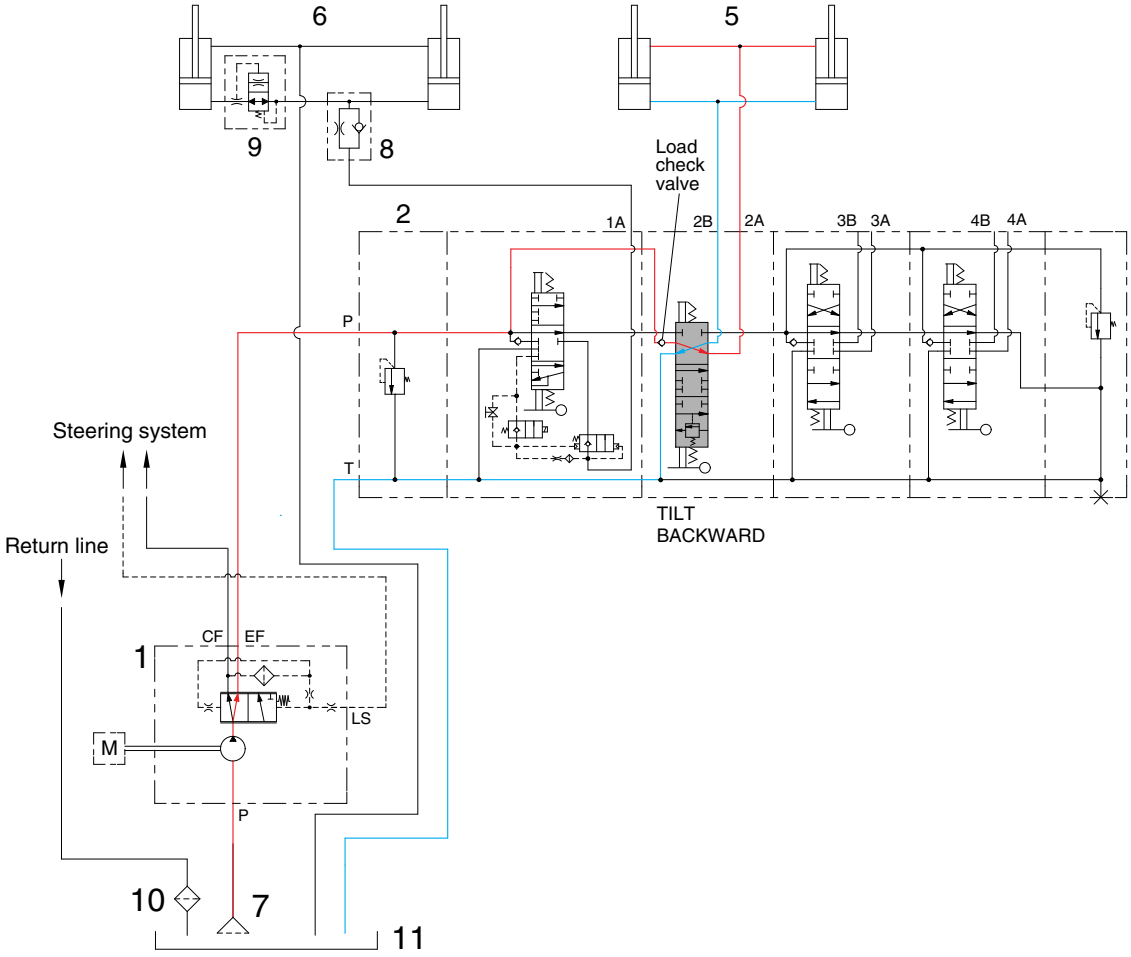
When the tilt control lever is pushed forward, the spool on the second block is moved to tilt forward position.

The oil from hydraulic gear pump(1) flows into main control valve (2) and then goes to the large chamber of tilt cylinder(5) by pushing the load check valve of the spool.

The oil at the small chamber of tilt cylinder(5) returns to hydraulic tank(11) at the same time.

When this happens, the mast tilt forward.

4) WHEN THE TILT CONTROL LEVER IS IN THE BACKWARD POSITION



22B7HS05

When the tilt control lever is pulled back, the spool on the second block is moved to tilt backward position.

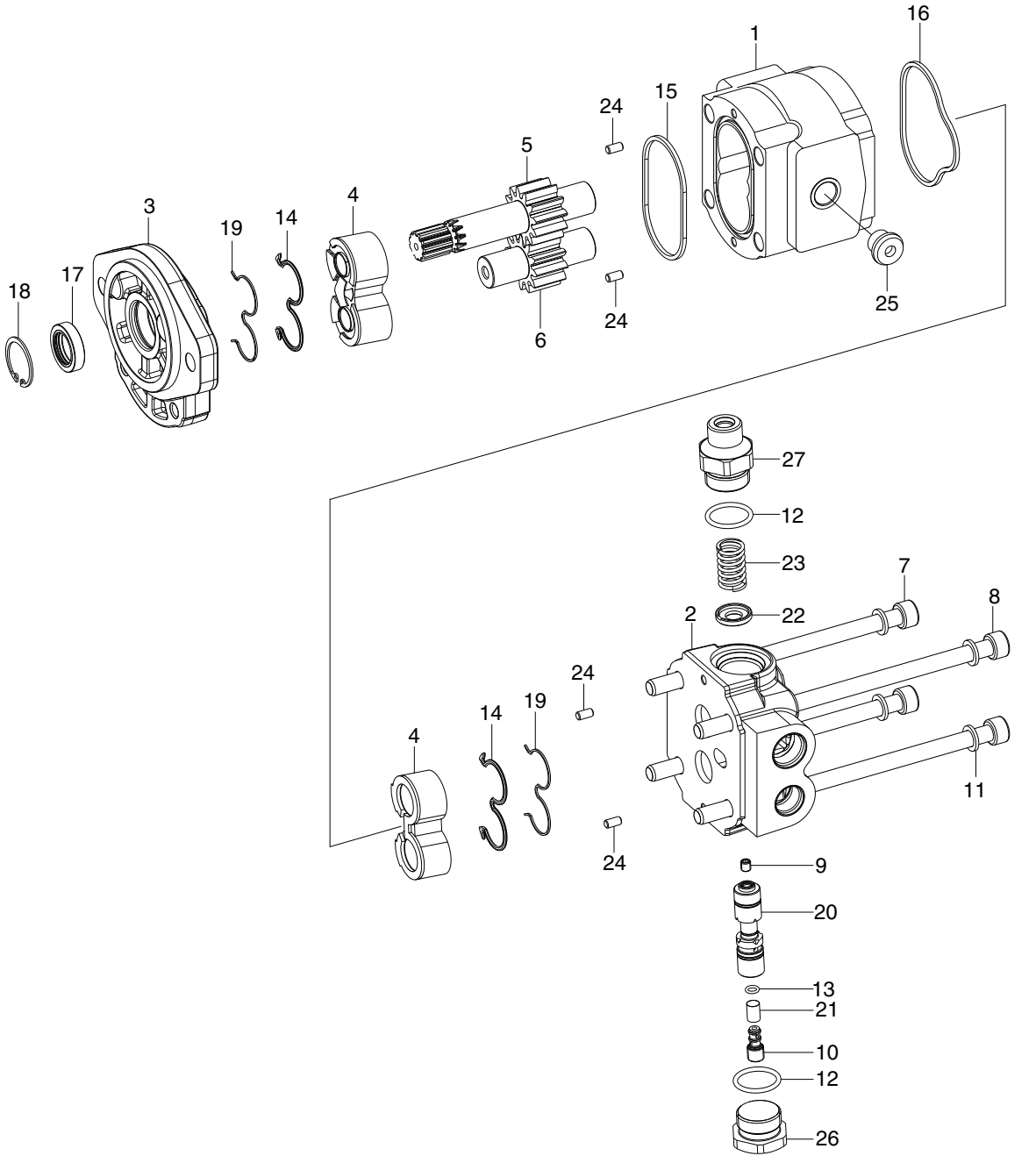
The oil from hydraulic gear pump (1) flows into main control valve (2) and then goes to the small chamber of tilt cylinder (5) by pushing the load check valve of spool.

The oil at the large chamber of tilt cylinder (5) returns to hydraulic tank (11) at the same time.

When this happens, the mast tilt backward.

2. HYDRAULIC GEAR PUMP

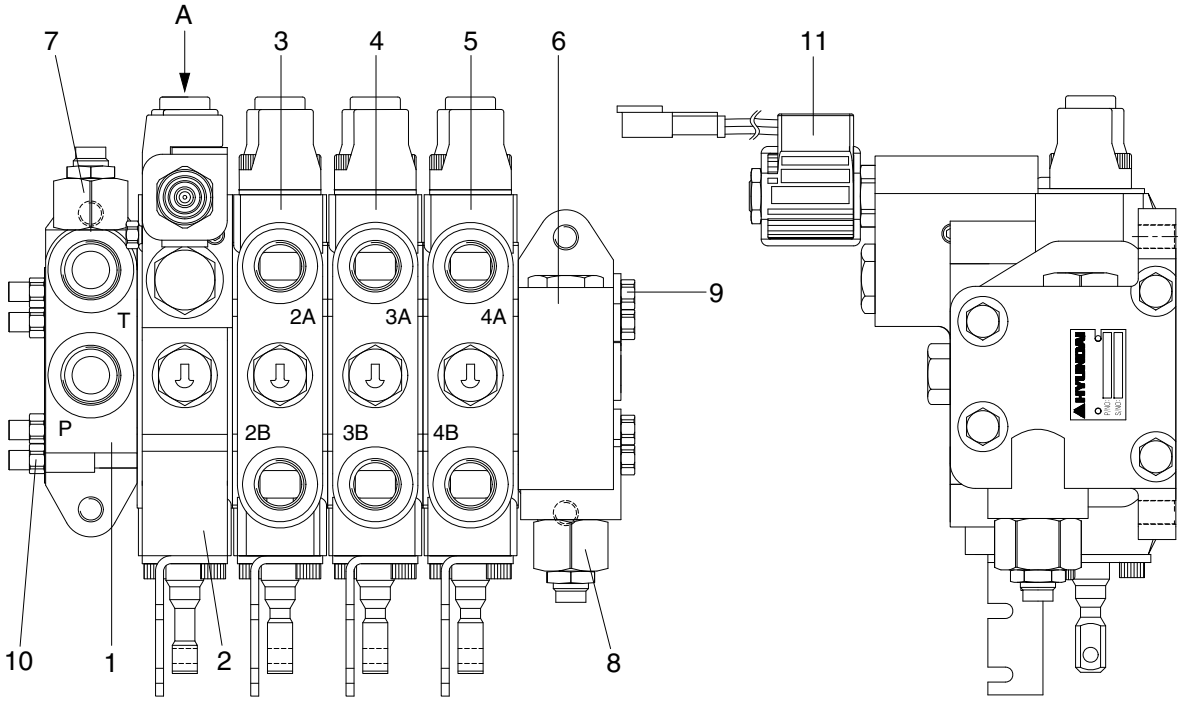
1) STRUCTURE

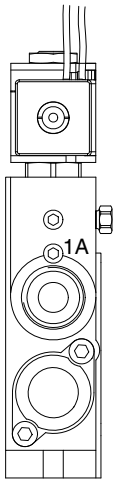


1	Housing	10	Throttling grub screw	19	Antiextrusion
2	Rear end cover	11	Washer	20	Spool
3	Front cover	12	Seal	21	Net tubular filter
4	Thrust plate	13	Seal	22	Pushing spring
5	Drive shaft	14	Seal	23	Main pilot spring
6	Driven gear	15	Seal	24	Dowel pin
7	Screw	16	Seal	25	Steel plug
8	Screw	17	Shaft seal	26	Plug
9	Grub screw	18	Ring	27	Spring plug

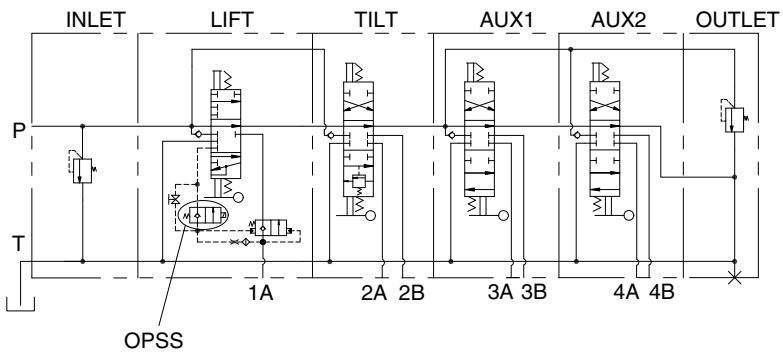
3. MAIN CONTROL VALVE

1) STRUCTURE (4 Spool, with mast tilting, lifting and lowering OPSS)





VIEW A



Port name	Size	Port
Inlet port	7/8-14UNF	P
Outlet port	7/8-14UNF	T
Work port	7/8-14UNF	1A
Work port	3/4-16UNF	2A, 2B, 3A, 3B, 4A, 4B

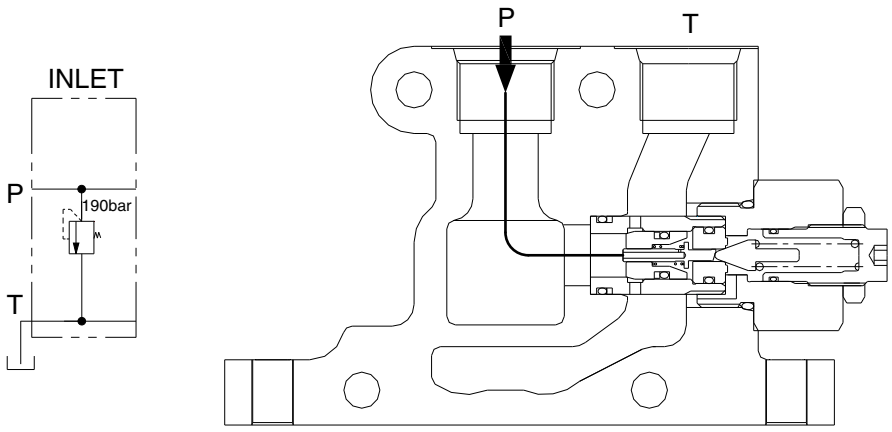
22B9HS08

1 Inlet block assy
2 Lift block assy
3 Tilt block assy
4 Aux 1 block assy
5 Aux 2 block assy
6 Outlet block assy
7 Main relief valve assy
8 Auxiliary relief valve assy
9 Long bolt
10 Nut
11 Solenoid valve

2) INLET SECTION

(1) Operation

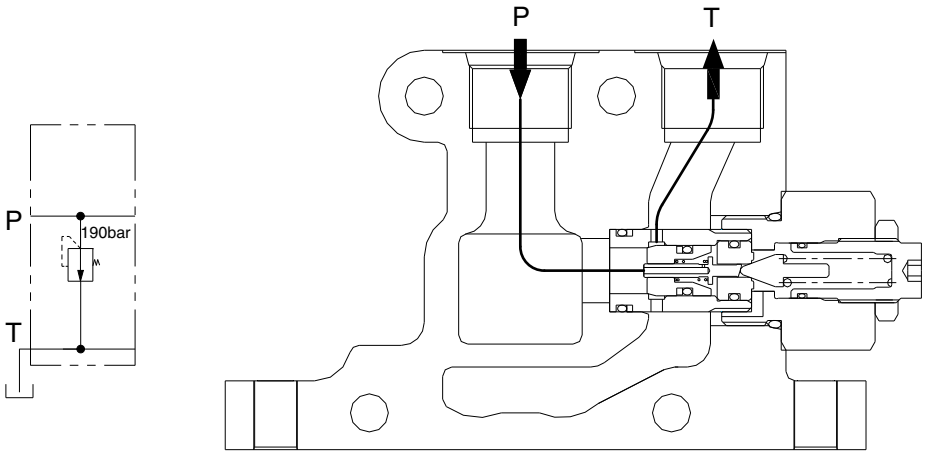
The inlet section contains the pump inlet connection and main relief valve.



22B7HS09

(2) Operation of relief valve at setting pressure

When the pressure at inlet reaches to setting pressure, the pilot poppet which is in the main relief valve is opened by pressure. At this condition the flow divert from the pump directly to the outlet tank.



22B7HS10

3) LIFT SECTION

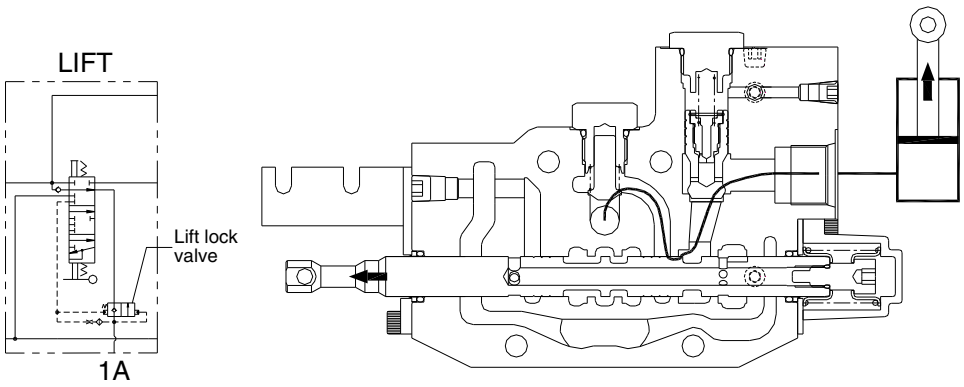
(1) Operation

The lift section has a single work port to direct flow to the lift cylinder. Only one work port is used, because the lift cylinder is single-acting (gravity returns the mast to the lowered position).

The lift section also contains part of the components which comprise the safety features. There is a lift lock check valve. At the neutral position, pressures in the lock valve are equalized across the lift lock poppet. In this manner, the spring bias keeps the lift lock valve closed and prevents lowering of the mast.

① Lifting

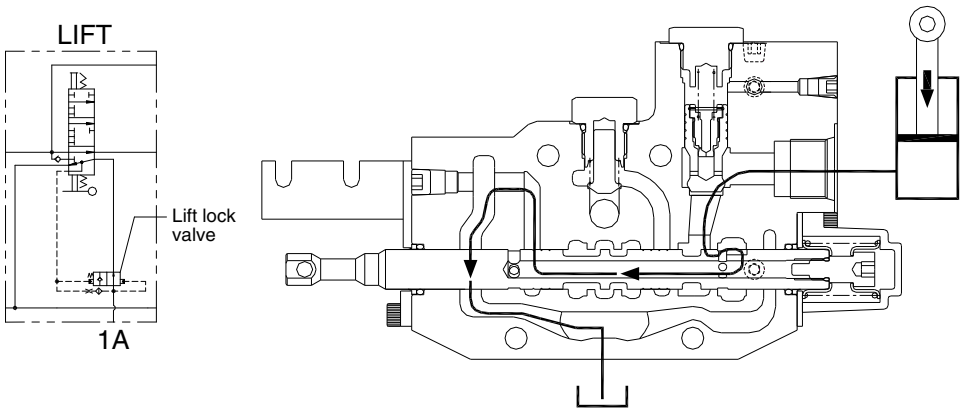
When the operator shifts the lever backwards, the spool is extended out of the valve, and this opens the internal fluid passages that lift the mast. Oil flows through the high pressure parallel cavity, past the load check valve, through the spool metering notches, past the lift lock check valve, and to the head side of the lift cylinder.



22B7HS11

② Lowering

When the seated operator shifts the lever forwards, the spool retracts into the valve, and the oil is directed from the cylinder, past the lift lock check valve, past the spool metering notches, and to the common tank cavity.



22B7HS12

Pressure is limited by the main relief valve.

4) TILT SECTION

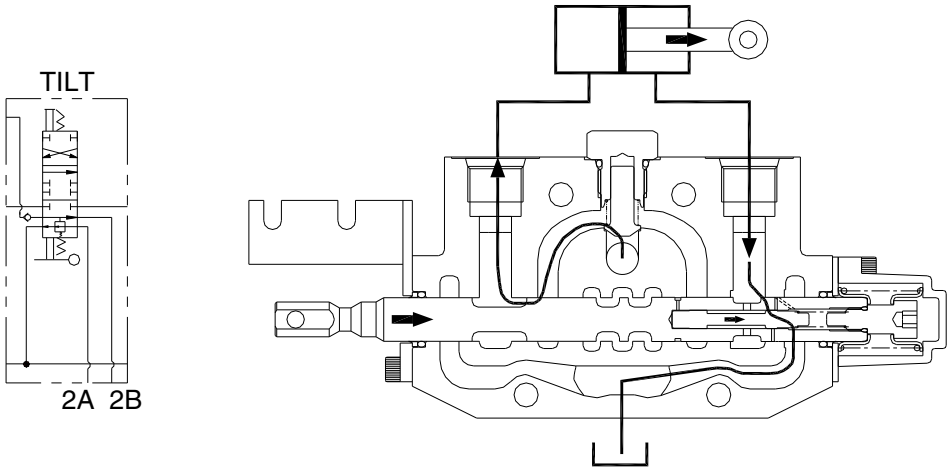
(1) Operation

The tilt spool contains an internal plunger which acts to stop tilt forward actuation when the battery power is off.

① Tilt forward

When the seated operator shifts the lever forward, pressure is applied to the head of the tilt cylinder, and the forks tilt forward. Oil is directed from the high pressure parallel passage past the load check valve, past the spool metering notches, and towards the cylinder head.

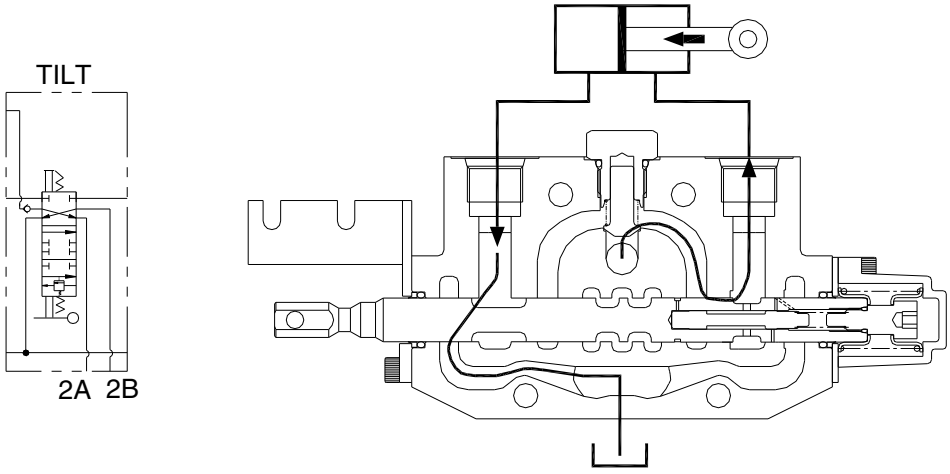
Simultaneously, the high pressure acts upon the end of the tilt lock plunger to move it towards the spring end of the spool. This plunger movement opens additional spool metering notches which control oil flow from the rod end of the cylinder to the tank return line.



22B7HS13

② Tilt Back

When the seated operator shifts the lever back, the high pressure oil from the parallel passage is directed past the load check valve, past the spool metering notches, and to the rod side of the cylinder. Exhaust oil from the head side of the cylinder is directed past the spool metering notches to tank.



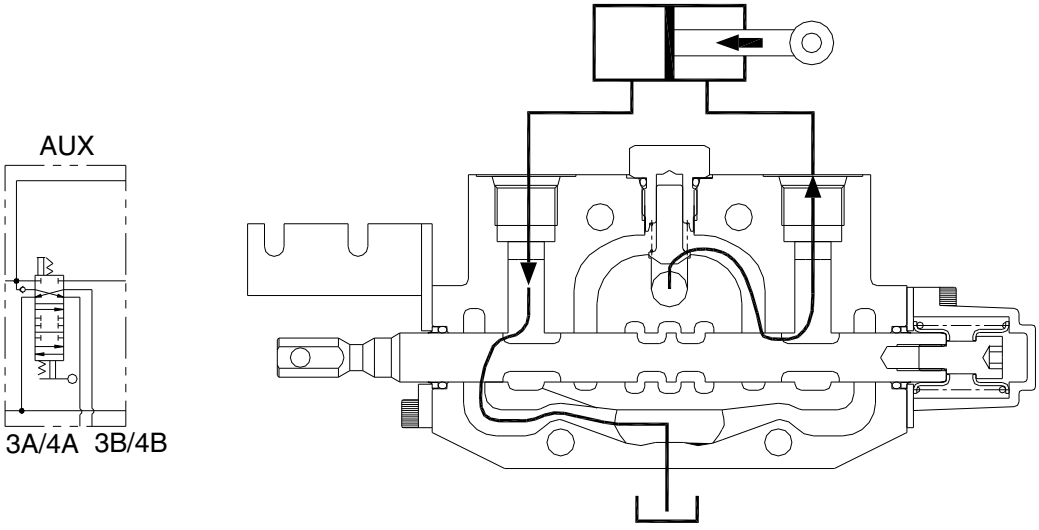
22B7HS14

Pressure is limited by the main relief valve.

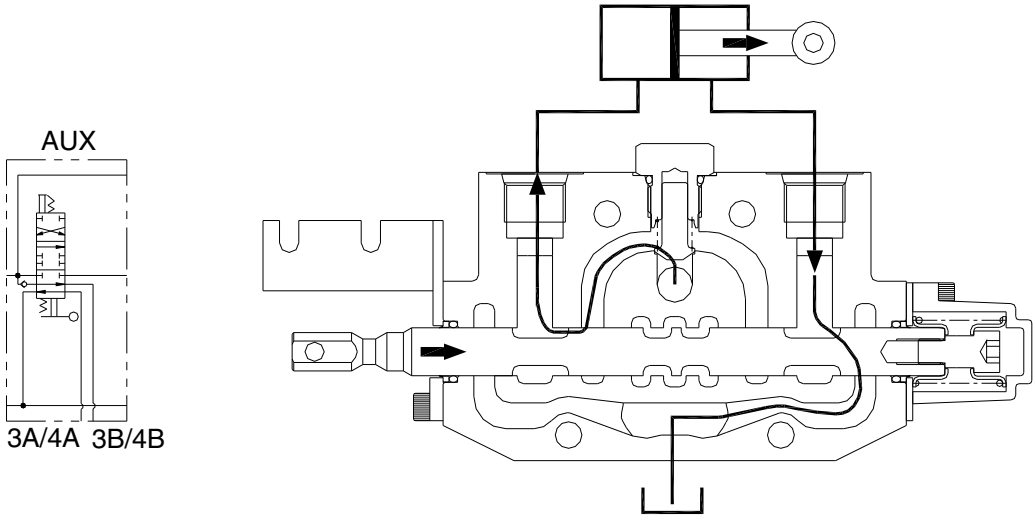
5) AUXILIARY SECTIONS

(1) Operation

Many different functions can be controlled by the auxiliary spool sections. In general, one work port is pressurized by high pressure oil from the parallel passage, past the load check valve, past the metering notches, and to the cylinder. Simultaneously, oil from the other work port is directed across the spool metering notches to tank.



22B7HS15



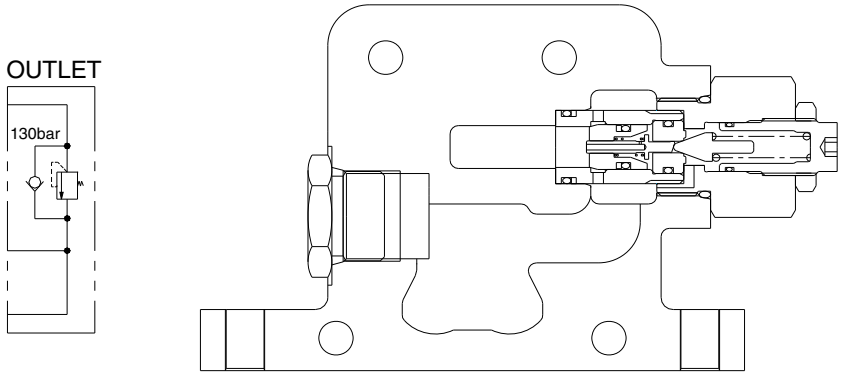
22B7HS16

Pressure is limited by the secondary main relief valve.

6) OUTLET SECTION

(1) Operation

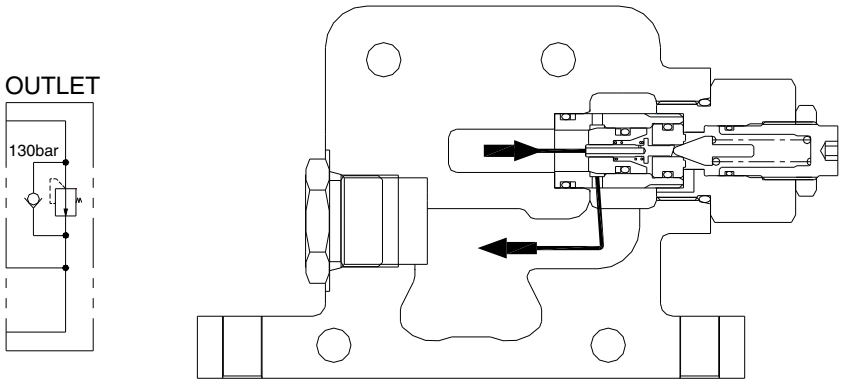
The outlet section contains the tank port and the secondary relief valve (with built-in anti-cavitation feature).



22B7HS17

(2) Operation of relief valve at setting pressure

When the pressure at outlet reaches to setting pressure, the pilot poppet which is in the main relief valve is opened by pressure. At this condition the flow divert from the pump directly to the tank line.

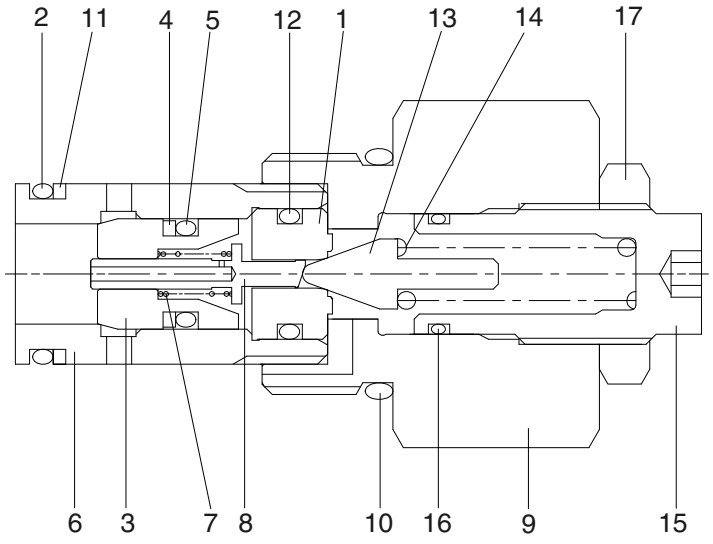


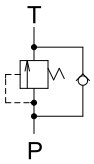
22B7HS18

7) MAIN RELIEF VALVE

This valve is a type of pilot piston to prevent hydraulic components and pipes from being broken by high pressure so, it keeps under pressure limited.

Relief valve pressure varies by 130 kgf/cm^2 in accordance with 1 revolution of adjust bolt.





· Main relief valve : 190 kgf/cm^2

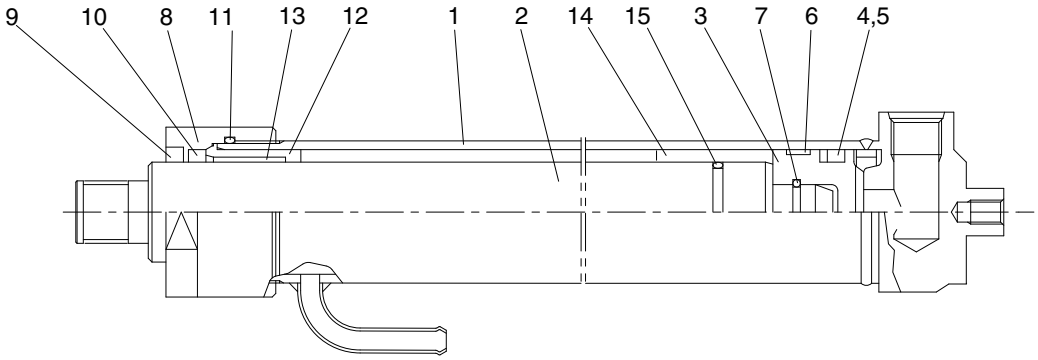
· Secondary main relief valve : 130 kgf/cm^2
(For 3,4 spool only)

· NOTE : 1) Max. pressure of relief valve : 250 kgf/cm^2
2) Used pressure of hyd control valve : 190 kgf/cm^2

22B7HS20

1	Pilot seat	7	Main spring	13	Pilot poppet
2	O-ring	8	Piston	14	Pilot spring
3	Main poppet	9	Body	15	Adjust screw
4	Back up ring	10	O-ring	16	O-ring
5	O-ring	11	Back up ring	17	Lock nut
6	Socket	12	O-ring		

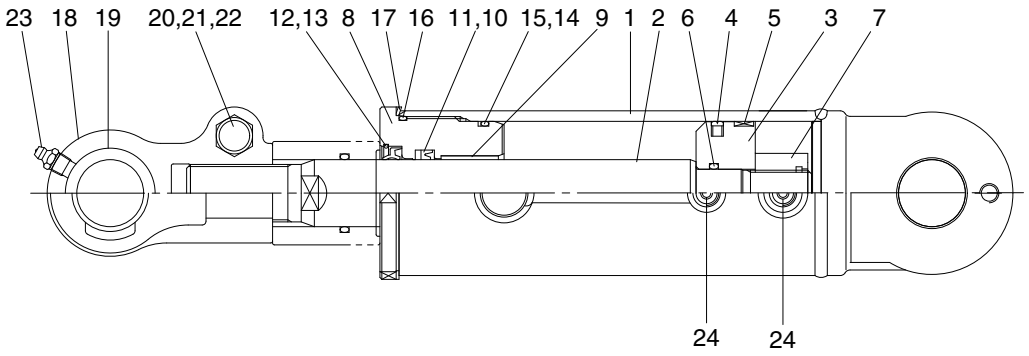
4. LIFT CYLINDER



D255HS18

1	Tube assembly	6	Wear ring	11	O-ring
2	Rod	7	Retaining ring	12	Guide
3	Piston	8	Gland	13	DU bushing
4	Piston seal	9	Dust wiper	14	Spacer
5	Back up ring	10	Rod seal	15	O-ring

5. TILT CYLINDER



22B7HS24

1	Tube assembly	9	Du bushing	17	Lock washer
2	Rod	10	Rod seal	18	Rod eye
3	Piston	11	Back up ring	19	Spherical bearing
4	Glyd ring	12	Dust wiper	20	Hexagon bolt
5	Wear ring	13	Snap ring	21	Spring washer
6	O-ring	14	O-ring	22	Lock nut
7	Nylon nut	15	Back up ring	23	Grease nipple
8	Gland	16	O-ring	24	O-ring

GROUP 2 OPERATIONAL CHECKS AND TROUBLESHOOTING

1. OPERATIONAL CHECKS

1) CHECK ITEM

(1) Check visually for deformation, cracks or damage of rod.

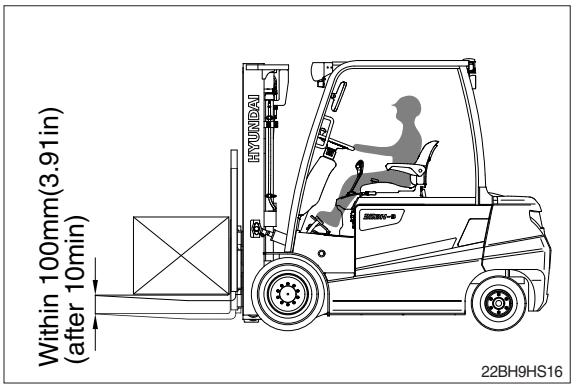
(2) Set mast vertical and raise 1 m from ground. Wait for 10 minutes and measure hydraulic drift (amount forks move down and amount mast tilts forward).

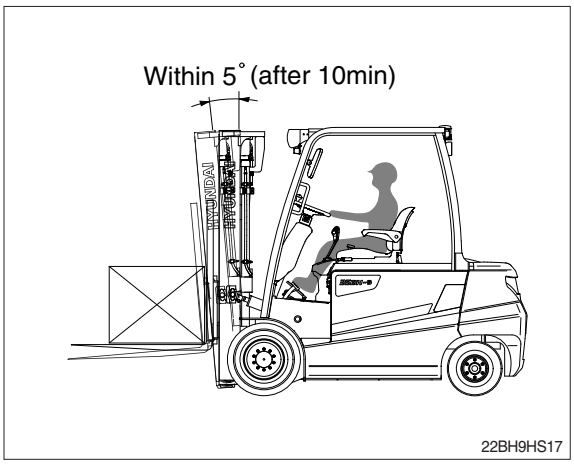
· **Check condition**

- Hydraulic oil : Normal operating temp (50°C)
- Mast substantially vertical.
- Rated capacity load.

· **Hydraulic drift**

- Down (Downward movement of forks)
: Within 100mm (3.9in)
- Forward (Extension of tilt cylinder)
: Within 5°





(3) If the hydraulic drift is more than the specified value, replace the control valve or cylinder packing.
Check that clearance between tilt cylinder bushing and mounting pin is within standard range.

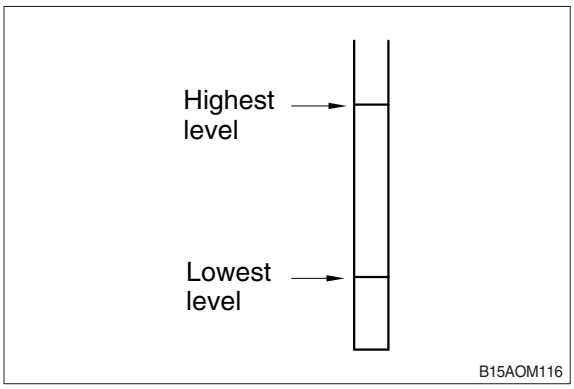
mm (in)

Standard	Under 0.6 (0.02)

2) HYDRAULIC OIL

(1) Using dipstick, measure oil level, and oil if necessary.

(2) When changing hydraulic oil, clean suction strainer(screwed into outlet port pipe) and line filter(screwed into inlet pipe). Line filter uses paper element, so replace periodically(every 6 months or 1000 hours)



3) CONTROL VALVE

(1) Raise forks to maximum height and measure oil pressure.
Check that oil pressure is 190 kgf/cm^2 (2700 psi).

2. TROUBLESHOOTING

1) SYSTEM

Problem	Cause	Remedy
Large fork lowering speed	· Seal inside control valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Replace spool or valve body. · Replace. · Replace packing.
Large spontaneous tilt of mast	· Tilting backward : Check valve defective. · Tilting forward : tilt lock valve defective. · Oil leaks from joint or hose. · Seal inside cylinder defective.	· Clean or replace. · Clean or replace. · Replace. · Replace seal.
Slow fork lifting or slow mast tilting	· Lack of hydraulic oil. · Hydraulic oil mixed with air. · Oil leaks from joint or hose. · Excessive restriction of oil flow on pump suction side. · Relief valve fails to keep specified pressure. · Poor sealing inside cylinder. · High hydraulic oil viscosity. · Mast fails to move smoothly. · Oil leaks from lift control valve spool. · Oil leaks from tilt control valve spool.	· Add oil. · Bleed air. · Replace. · Clean filter. · Adjust relief valve. · Replace packing. · Change to ISO VG46. · Adjust roll to rail clearance. · Replace spool or valve body. · Replace spool or valve body.
Hydraulic system makes abnormal sounds	· Excessive restriction of oil flow pump suction side. · Gear or bearing in hydraulic pump defective.	· Clean filter. · Replace gear or bearing.
Control valve lever is locked	· Foreign matter jammed between spool and valve body. · Valve body defective.	· Clean. · Tighten body mounting bolts uniformly.
High oil temperature	· Lack of hydraulic oil. · High oil viscosity. · Oil filter clogged.	· Add oil. · Change to ISO VG46. · Clean filter.

2) HYDRAULIC GEAR PUMP

Problem	Cause	Remedy
Pump does not develop full pressure	· System relief valve set too low or leaking. · Oil viscosity too low. · Pump is worn out.	· Check system relief valve for proper setting. · Change to proper viscosity oil. · Repair or replace pump.
Pump will not pump oil	· Reservoir low or empty. · Suction strainer clogged.	· Fill reservoir to proper level. · Clean suction strainer.
Noisy pump caused by cavitation	· Oil too thick. · Oil filter plugged. · Suction line plugged or too small.	· Change to proper viscosity. · Clean filters. · Clean line and check for proper size.
Oil heating	· Oil supply low. · Contaminated oil. · Setting of relief valve too high or too low. · Oil viscosity too low.	· Fill reservoir to proper level. · Drain reservoir and refill with clean oil. · Set to correct pressure. · Drain reservoir and fill with proper viscosity.
Foaming oil	· Low oil level. · Air leaking into suction line. · Wrong kind of oil.	· Fill reservoir to proper level. · Tighten fittings, check condition of line. · Drain reservoir, fill with non-foaming oil.
Shaft seal leakage	· Worn shaft seal. · Worn shaft in seal area.	· Replace shaft seal. · Replace drive shaft and seal.

3) MAIN RELIEF VALVE

Problem	Cause	Remedy
Can't get pressure	· Poppet D, E or K stuck open or contamination under seat.	· Check for foreign matter between poppets D, E or K and their mating parts. Parts must slide freely.
Erratic pressure	· Pilot poppet seat damaged. · Poppet C sticking in D.	· Replace the relief valve. · Clean and remove surface marks for free movement.
Pressure setting not correct	· Normal wear. Lock nut & adjust screw loose.	· See *Test of main control valve.
Leaks	· Damaged seats. · Worn O-rings. · Parts sticking due to contamination.	· Replace the relief valve. · Install seal and spring kit. · Disassemble and clean.

★ A good pressure gauge must be installed in the line which is in communication with the main relief. A load must be applied in a manner to reach the set pressure of the main relief unit.
Then, follow these steps :

- Loosen lock nut.
- Set adjusting nut to desired pressure setting.
- If desired pressure setting cannot be achieved, tighten or loosen the adjusting screw as required.
- Tighten lock nut.
- Retest in similar manner as above.

4) LIFT CYLINDER

Problem	Cause	Remedy
Oil leaks out from rod cover through rod	· Foreign matters on packing. · Unallowable score on rod. · Unusual distortion of dust seal. · Chrome plating is striped.	· Replace packing. · Smooth rod surface with an oil stone. · Replace dust seal. · Replace rod.
Oil leaks out from cylinder rod cover thread	· O-ring damaged.	· Replace O-ring.
Rod spontaneously retract	· Scores on inner surface of tube. · Unallowable score on the inner surface of tube. · Foreign matters in piston seal.	· Smooth rod surface with an oil stone. · Replace cylinder tube. · Replace piston seal.
Wear (clearance between cylinder tube and wear ring)	· Excessive clearance between cylinder tube and wear ring.	· Replace wear ring.
Abnormal noise is produced during tilting operation	· Insufficient lubrication of anchor pin or worn bushing and pin. · Bent tilt cylinder rod.	· Lubricate or replace. · Replace.

GROUP 3 DISASSEMBLY AND ASSEMBLY

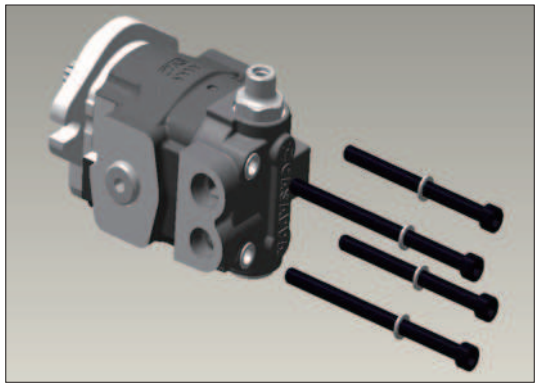
Check immediately that any spare parts you receive have not been damaged in shipment.
Always work in a clean environment.
Wash all components in solvent and blow dry with compressed air before refitting.
Take care not to damage rubber seals.
Avoid damaging precision machined surfaces.
Components should fit into their housings without excessive force. If force is necessary, this normally means that the component does not have the correct dimensional tolerances of is aligned incorrectly.
When hand pressure is insufficient, only use press or rubber hammer to fit components.
Never strike components with steel hammers.
Steel bush must be fitted only with a suitable press.
Do not use hammers to fit bearings.
Always respect the direction of rotation when assembling components.

1. HYDRAULIC GEAR PUMP

1) DISASSEMBLY

(1) Mounting flange

① Loosen and remove the assembling bolts and washers from the pump.



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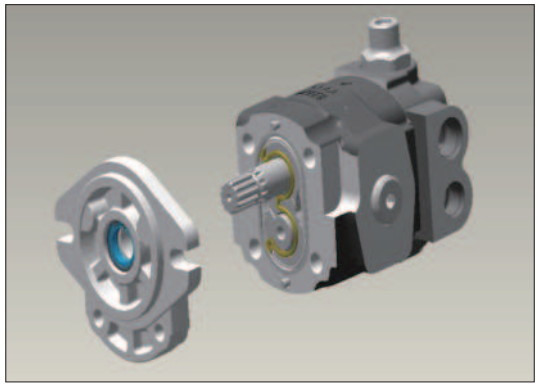
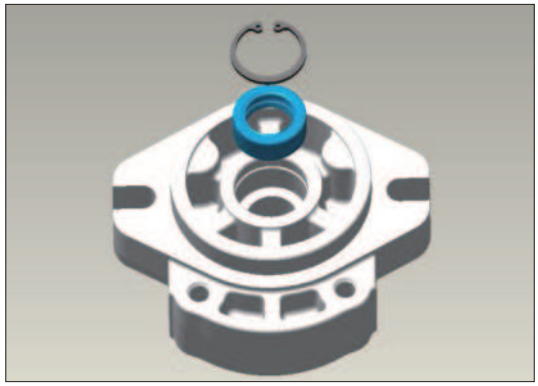
② Remove mounting flange from the body.



22B9GP02

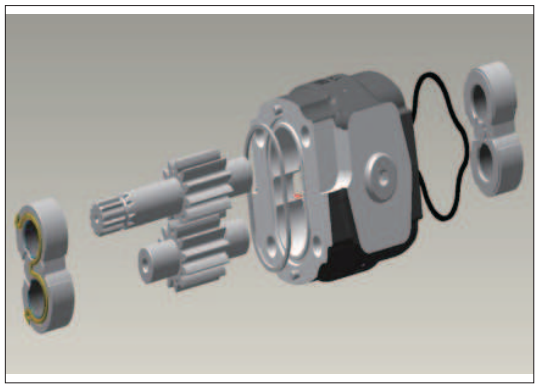
③ Remove the snap-ring with proper tool (only when it is needed to replace shaft seal).
Remove the shaft seals taking care not to give any damage on the surface of shaft hole (only when it is needed to replace shaft seal.).
Replace the shaft seal if damaged.



22B9GP03

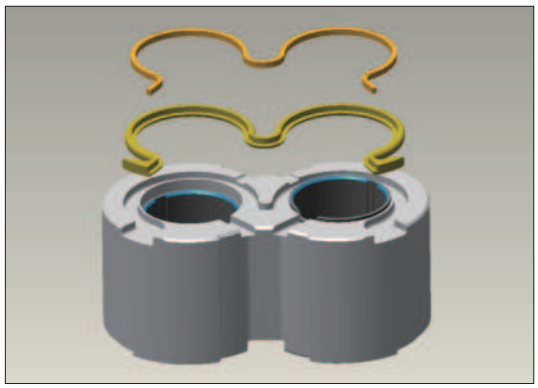
(2) Working section

① Remove the pressure plate with prearranged parts, O-ring & back up ring from the working section and examine it carefully.
② Remove square ring posited on the groove of body.
③ Pull out driving gear & driven gear keeping gears as straight as possible.
④ Change damaged seals into new one.


22B9GP04

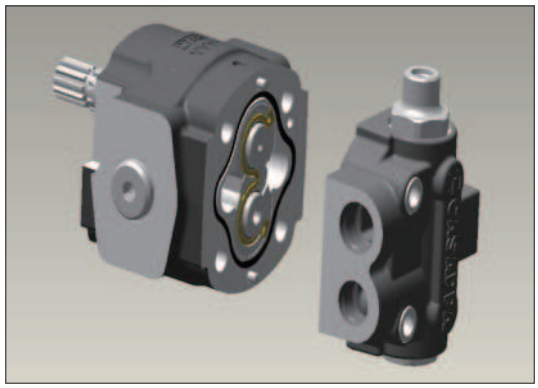
⑤ Replace the O-ring & back-up ring on the thrust plates.

※ Locate O-ring on the groove of thrust plage & back-up ring upon the O-ring and fix them in their position with some grease.

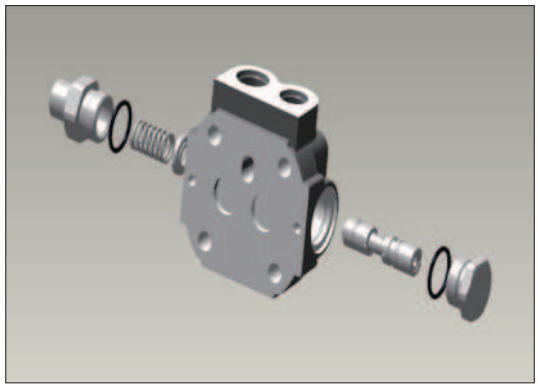

22B9GP05

(3) Priority valve block

① Remove priority valve block from the body.

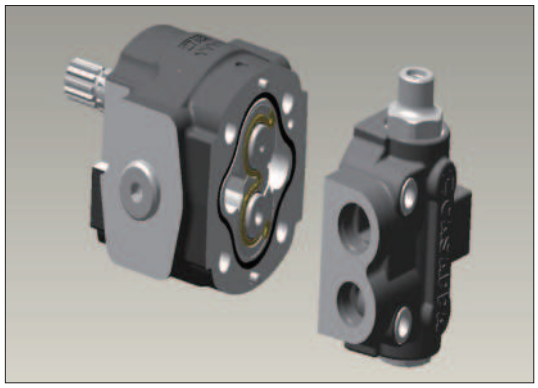

22B9GP06

② Change damaged O-ring or damaged parts.


22B9GP07

2) ASSEMBLING

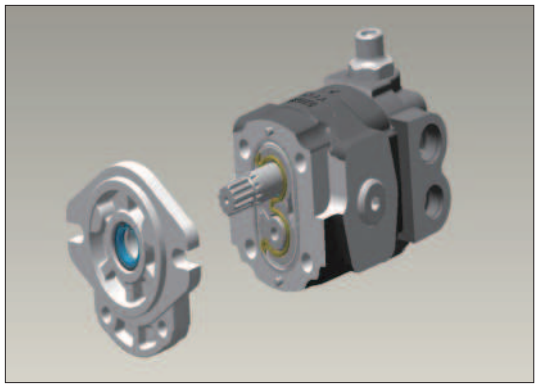
(1) Assembled priority valve block to the working section.



22B9GP08

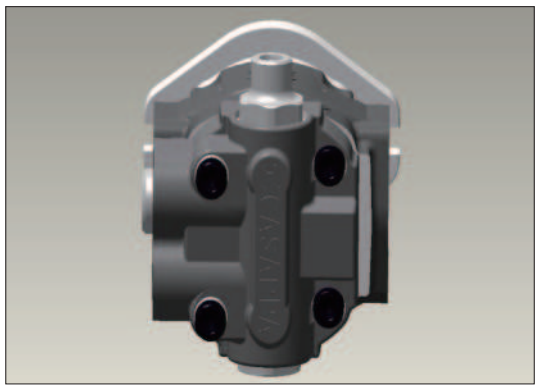
(2) Assemble mounting flange to the working section.

※ Locate mounting flange as straight as possible, in order to avoid any damage to the shaft seal by shaft.



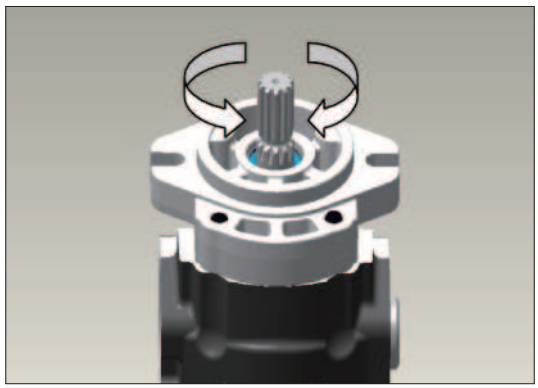
22B9GP09

(3) Tighten the bolts with in a crisscross pattern to a torque value of 45 Nm.



22B9GP10

(4) Check that the pump rotates freely when the drive shaft is turned by hand, if not a possible, plate seal may be pinched.



22B9GP11

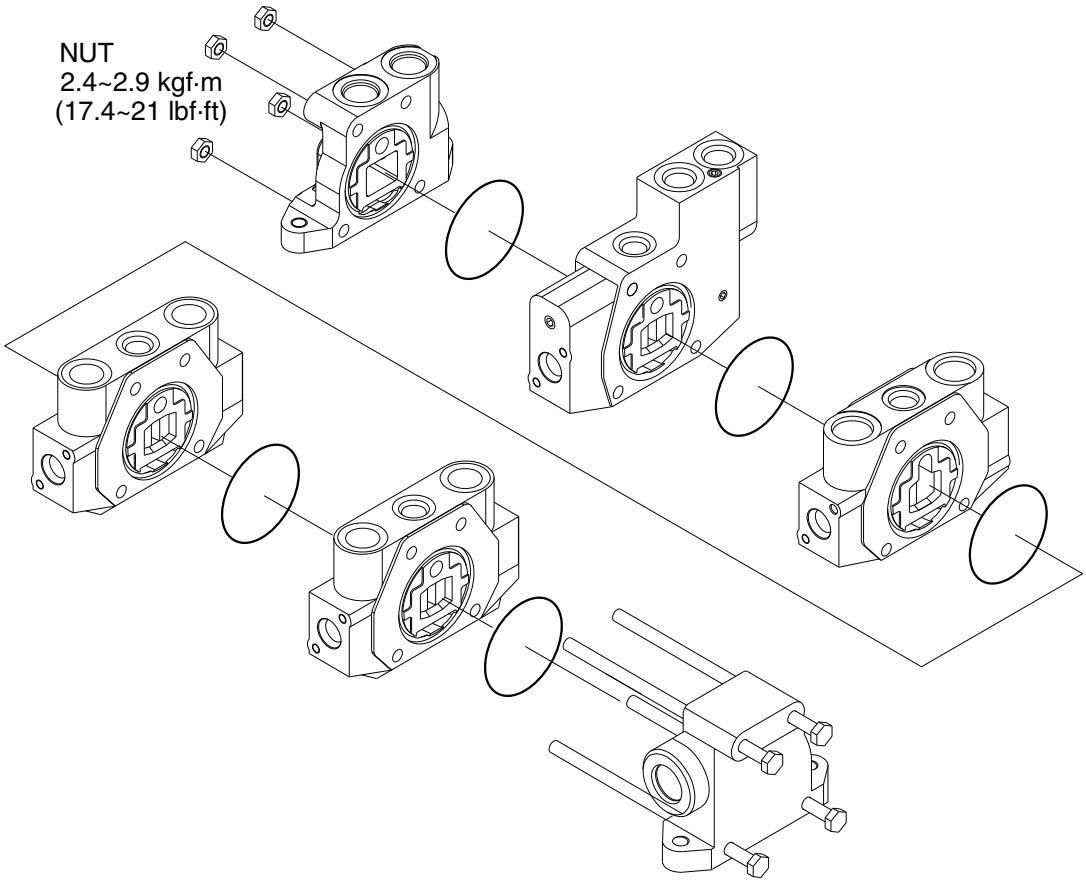
2. MAIN CONTROL VALVE (with OPSS)

1) ASSEMBLY

(1) General

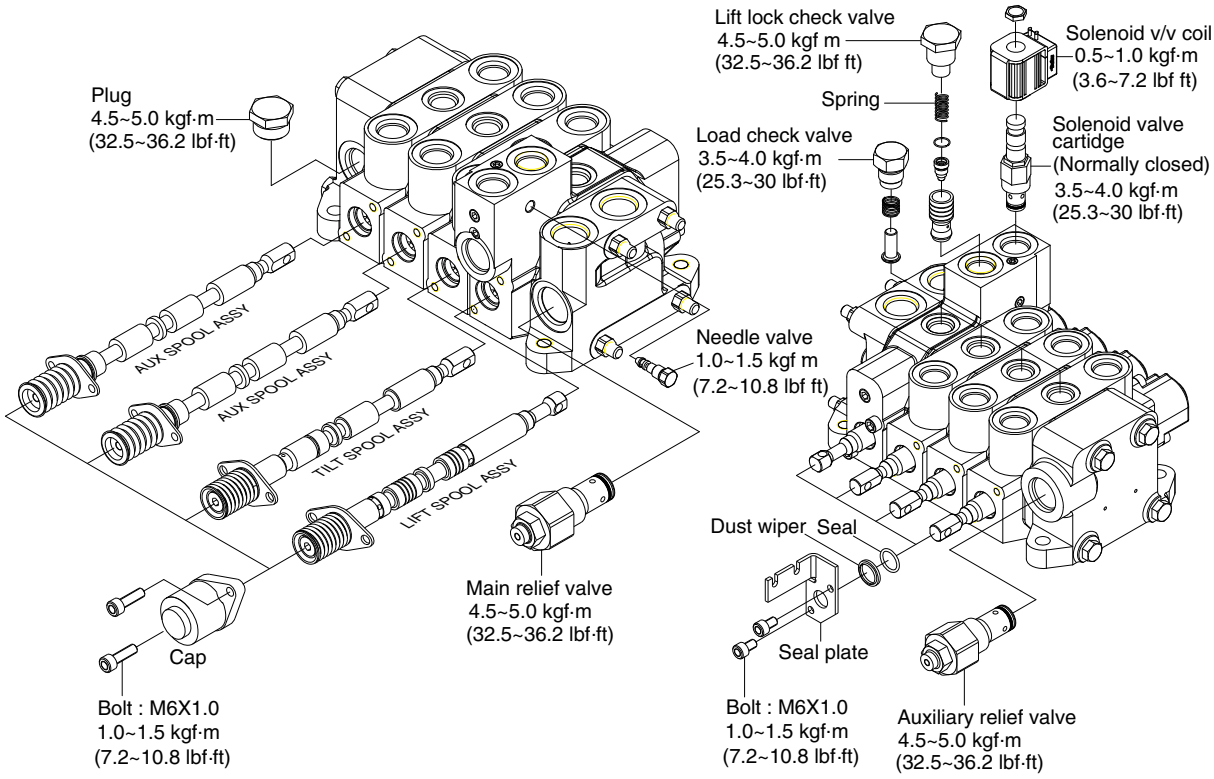
① Ensure that the assembly area will be clean and free of contamination.
② Use a flat (within 0.2 ㎜) work surface when bolting the valve sections together.
③ Use calibrated torque wrenches and instrumentation.
④ Additional auxiliary valve sections may be added to the main control valve in a similar manner as indicated below.

(2) Block sub assembly



22B7HS21

① Attach all the O-rings to the appropriate grooves between the spool sections.
② Stack the valve sections such that all the work ports are facing up, the spool ends are all in the
③ same direction, and they are resting on a flat (within 0.2 ㎜), uniform surface.
④ Insert all the tie rods through the drilled holes in each of the housings.
Press the sections together, being carefully not to damage sealing surfaces or seals.
⑤ Install nuts to both ends of all tie rods and progressively torque in a circular pattern until reaching a torque of 2.4~2.9 ㎏f · ㎞ (17.4~21 lbf · ft) on all tie rods. Periodically, make sure that the valve remains flat while applying torque.



15BT9HS25S

(3) Inlet section

① Install the main relief valve assembly into the lower side cavity of the inlet section, as illustrated. Torque to 4.5~5.0 kgf · m (32.5~36.2 lbf · ft).

② Install the plug assembly in the tank port of the inlet section. Torque to 4.5~5.0 kgf · m (32.5~36.2 lbf · ft)

(4) Lift section

① The spool assembly should already consist of the lift spool, the return spring, one spring seat on either end of the spring, the seal plate, a spool seal, and a dust wiper. All of these are assembled on the end of the spool opposite the clevis.

② Insert the clevis end of the spool into the right-hand side of the spool bore(the tallest end of the housing). Place the spool cap over the spool and spring assembly and connect the cap to the housing using two bolts. Torque both bolts alternatively until a torque of 1.0~1.5 kgf · m (7.2~10.8 lbf · ft) is reached on both bolts.

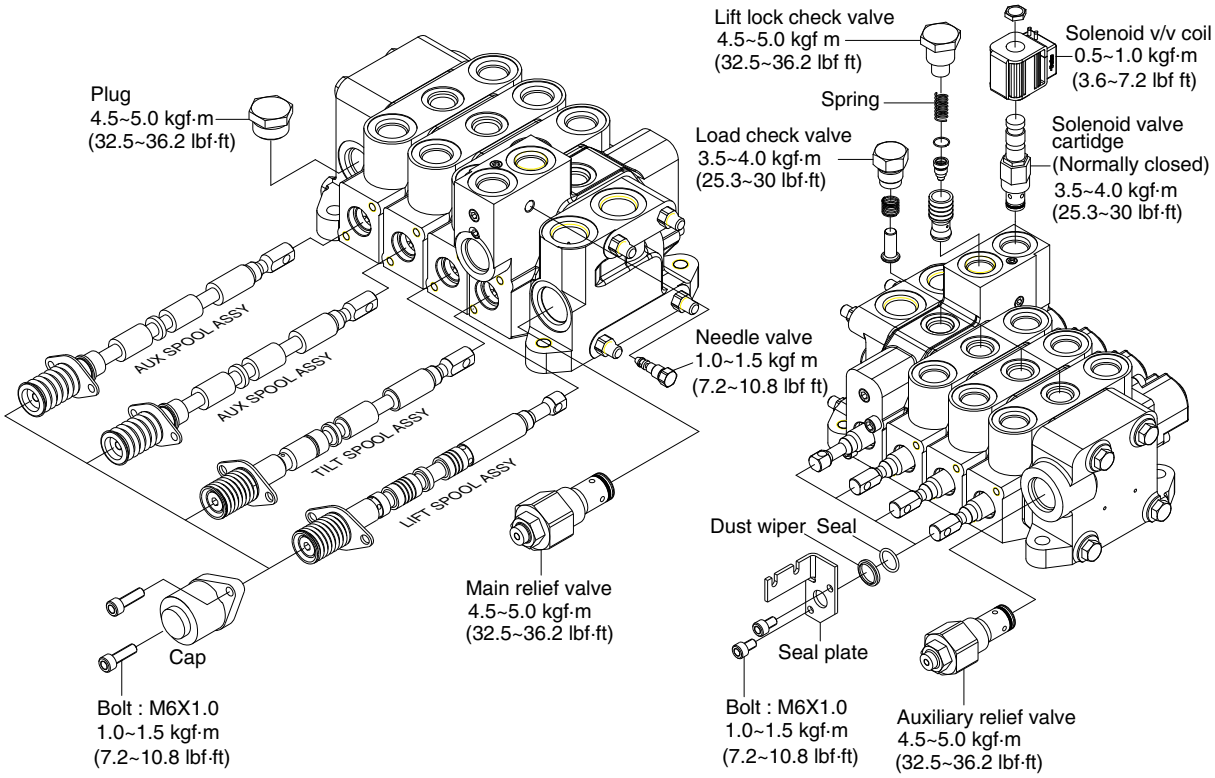
③ Install the second spool seal and dust wiper over the clevis end of the spool and retain with a seal plate and two bolts. Torque both bolts alternatively until a torque of 1.0~1.5 kgf · m (7.2~10.8 lbf · ft) is reached on both bolts.

④ The load check assembly is inserted into the top center cavity. Torque to 3.5~4.0 kgf · m (25.3~30 lbf · ft)

⑤ The normally closed solenoid is installed in the rightmost cavity on the top of the section. Torque to 3.5~4.0 kgf · m (25.3~30 lbf · ft)

⑥ Install the lift lock check valve assembly in the remaining open cavity in the top of the housing. Torque to 4.5~5.0 kgf · m(32.5~36.2 lbf · ft)

⑦ Install the needle valve subassembly in the cavity on the inlet-facing surface of the housing. Torque to 1.0~1.5 kgf · m (7.2~10.8 lbf · ft)



15BT9HS25S

(5) Tilt section

① The spool assembly should already consist of the tilt spool(with tilt plunger and spring inserted into the bore on the spring end), the return spring, one spring seat on either end of the spring, the seal plate, a spool seal, and a dust wiper. All of these are assembled on the end of the spool opposite the clevis.

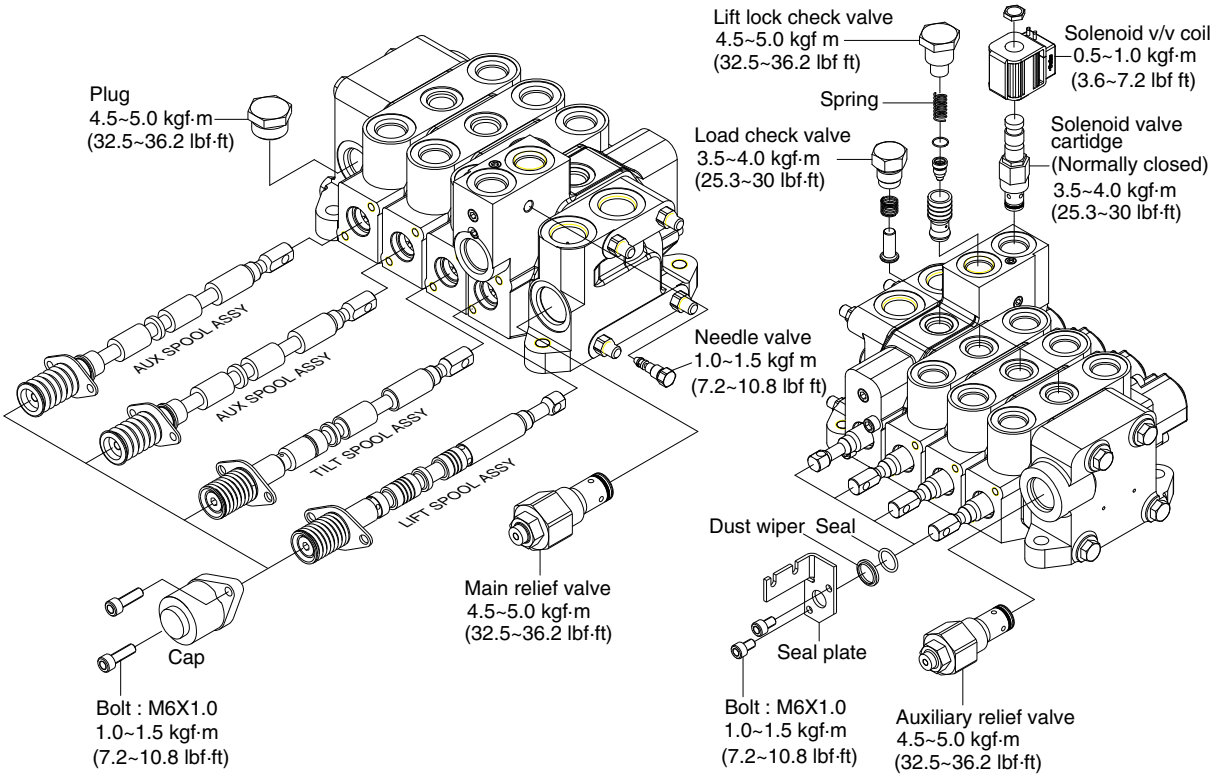
② Insert the clevis end of the spool into the right-hand side of the spool bore(the tallest end of the housing). Place the spool cap over the spool and spring assembly and connect the cap to the housing using two bolts. Torque both bolts alternatively until a torque of 1.0~1.5 kgf · m (7.2~10.8 lbf · ft) is reached on both bolts.

③ Install the second spool seal and dust wiper over the clevis end of the spool and retain with a seal plate and two bolts. Torque both bolts alternatively until a torque of 1.0~1.5kgf · m(7.2~10.8lbf · ft) is reached on both bolts.

④ The load check assembly is inserted into the top center cavity. Torque to 3.5~4.0 kgf · m (25.3~30 lbf · ft).

⑤ Install the anti-cavitation check valve in the housing cavity on the clevis end directly above the spool assembly. Torque to 4.5~5.0 kgf · m (32.5~36.2 lbf · ft).

⑥ Install the plug in the housing cavity above the spool assembly. Torque to 3.5~4.0 kgf · m (25.3~30 lbf · ft).



15BT9HS25S

(6) Auxiliary section

※ Same procedure for all aux sections, but spool assembly components may vary.

① The spool assembly should already consist of the proper aux spool, the return spring, one spring seat on either end of the spring, the seal plate, a spool seal, and a dust wiper. All of these are assembled on the end of the spool opposite the clevis.

② Insert the clevis end of the spool into the right-hand side of the spool bore (the tallest end of the housing). Place the spool cap over the spool and spring assembly and connect the cap to the housing using two bolts. Torque both bolts alternatively until a torque of 1.0~1.5 kgf · m (7.2~10.8 lbf · ft) is reached on both bolts.

③ Install the second spool seal and dust wiper over the clevis end of the spool and retain with a seal plate and two bolts. Torque both bolts alternatively until a torque of 1.0~1.5 kgf · m(7.2~10.8 lbf · ft) is reached on both bolts.

④ The load check assembly is inserted into the top center cavity. Torque to 3.5~4.0 kgf · m (25.3~30 lbf · ft).

(7) Outlet section

① Install the secondary main relief valve into the cavity on the clevis end of the housing. Torque to 4.5~5.0 kgf · m (32.5~36.2 lbf · ft)

2) DISASSEMBLY

(1) General

① Subassemblies (such as relief valves, check valves, and spools) may be removed without having to loosen the tie rods and disassembling the entire valve.

② Disassemble the valve sections on a flat working surface.

③ Ensure that the disassembly area will be clean and free of contamination.

④ Keep the disassembly area neat to avoid loss or damage of parts.

(2) Disassembly

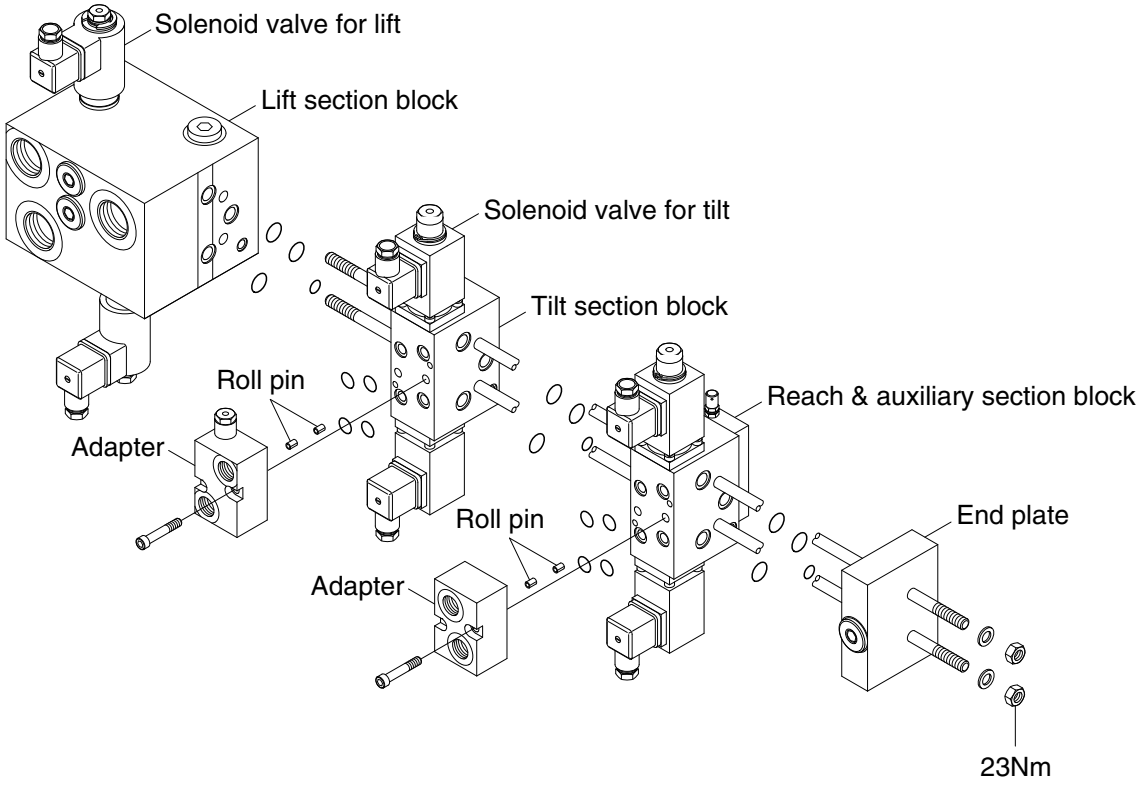
① Loosen the tie rod nuts and remove the tie rods from the valve sections.

② Remove O-rings between valve sections and set aside to avoid damage.

③ Spools, relief valves, load check valves, lift lock poppet, solenoid valves, and plugs can all be removed from the valve sections. Refer to the associated assembly procedures, above, for specific torque and handling details. Inspect and repair or replace the assemblies as complete units, as may be necessary.

④ Valve components are precision items, and care must be taken when handing them to avoid damage or the introduction of contamination that could adversely affect performance.

3. MAIN CONTROL VALVE (Fingertip)



15BT9HS34

1) ASSEMBLY INSTRUCTION

(1) General

① Ensure that the assembly area will be clean and free of contamination.
② Use a flat (within 0.5 ㎜) work surface when bolting the valve sections together.
③ Use calibrated torque wrenches and instrumentation.

(2) Block subassembly

① Attach all the O-rings to the appropriate grooves between the spool sections.
② Stack the valve sections as below picture on a flat surface.
③ Insert all the tie rods through the drilled holes in each of the housings.
④ Press the sections together being careful not to damage sealing surfaces or seals.
⑤ Install nuts to tie rods and progressively torque in a circular pattern until reaching a torque of 2.3 ㎏f · ㎝² (23 Nm) on all tie rods.

(3) Lift block solenoid assembly

① The solenoide is installed upper side and below side cavities in lift block. Torque to 4.1 kgf · cm^2
② (40 Nm)
③ Install the O-ring, coil, O-ring and washer to the assemblied cartridge.
Insert the lock washer to the groove of the cartridge.

(4) Tilt & Auxiliary section assembly

① The solenoid is installed upper side and below side in tilt & auxiliary block with bolts.
Torque to 1 kgf · m (10 Nm)
② Install the coil, O-ring and washer to the assemblied cartridge.
③ Insert the snap ring to the groove of the cartridge.
④ Insert the roll pin to the pin hole on the front side of each block.
⑤ Place the O-rings in the O-ring grooves.
⑥ Insert the ancillary blocks to the each body with bolts.

2) DISASSEMBLY INSTRUCTION

(1) General

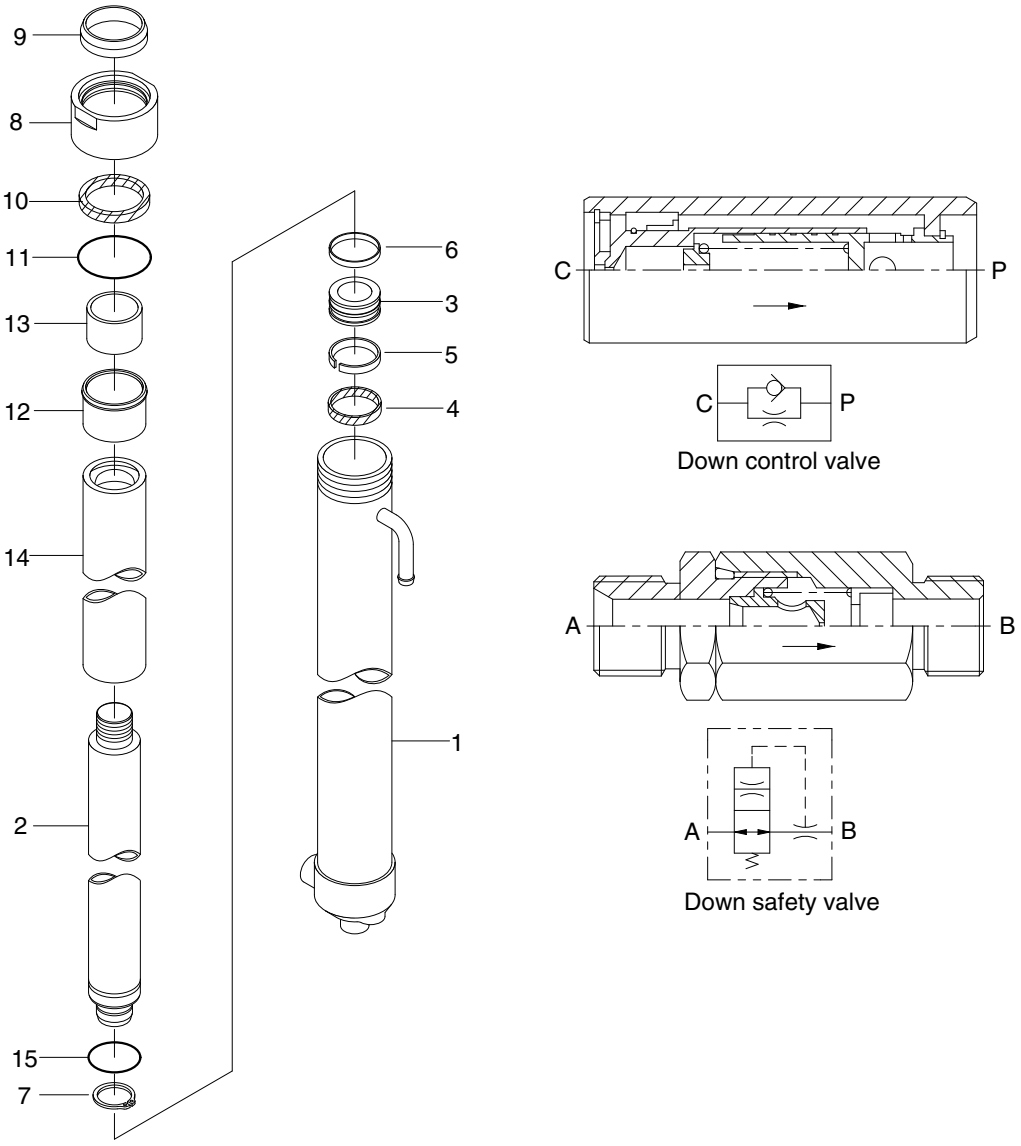
① Disassemble the valve sections on a flat working surface.
② Ensure that the disassembly area will be clean and free of contamination.
③ Keep the disassembly area neat to avoid loss or damage of parts.

(2) Perform the assembly in reverse order

① Remove the solenoid valves and ancillary blocks from the main blocks.
② Loosen the tie-rods from the valve section.
③ Remove the seals between valve section.
④ Valve components are precision items, and care must be taken when handing them to avoid damage or the introduction of contamination that could adversely affect performance.

4. LIFT CYLINDER

1) STRUCTURE

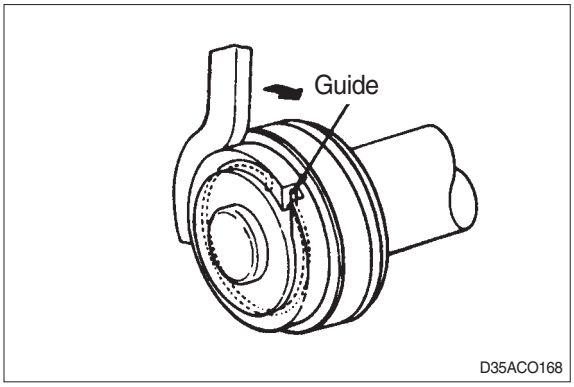


22B7HS26

1	Tube assy	6	Wear ring	11	O-ring
2	Rod assy	7	Retaining ring	12	Guide
3	Piston	8	Gland	13	Du bushing
4	Piston seal	9	Dust wiper	14	Spacer
5	Back up ring	10	Rod seal	15	O-ring

2) DISASSEMBLY

(1) Hold the cylinder tube in a vice, loosen the cylinder head and remove it.
Remove the spacer from the cylinder tube and knock out the bushing. Hook a wrench in the hole in the retainer at the piston end and turn. Lever up the edge of the guide, then turn the guide in again and the guide can be removed.



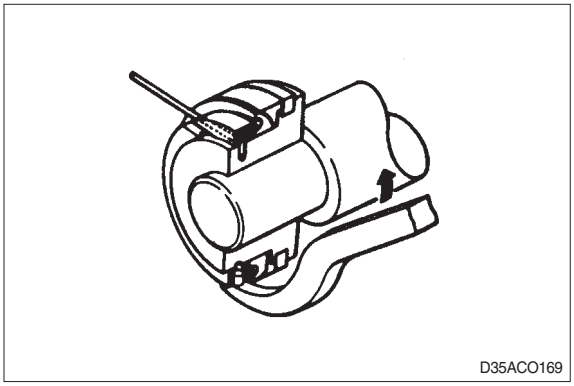
3) CHECK AND INSPECTION

mm (in)

Check item	Standard size	Repair limit	Remedy
Clearance between cylinder rod & bushing	0.072~0.288 (0.003~0.011)	0.5 (0.020)	Replace bushing
Clearance between piston ring & tube	0.05~0.030 (0.002~0.012)	0.5 (0.020)	Replace piston ring

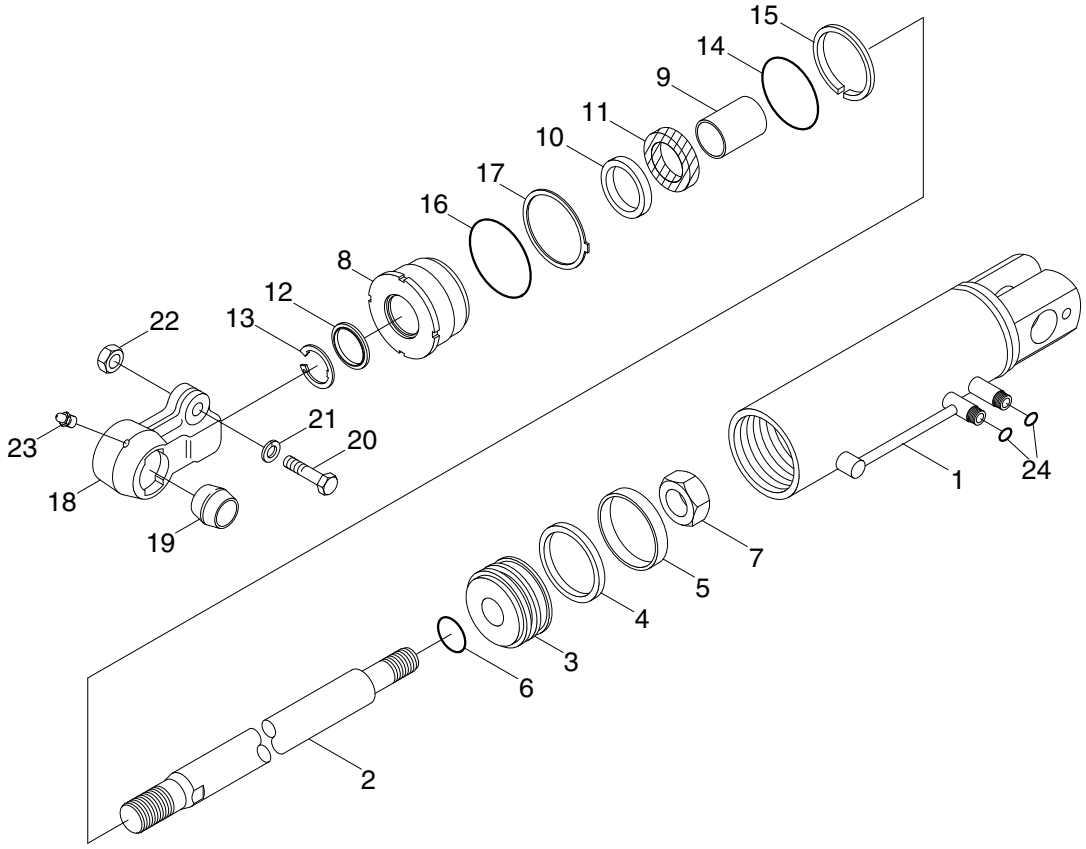
4) ASSEMBLY

(1) Soak the piston ring in hydraulic oil at a temperature of 40 to 50°C, expand the inside diameter and assemble on the piston. Install a piston seal.
Bend the edge of the guide and rotate it to install the guide completely.



5. TILT CYLINDER

1) STRUCTURE

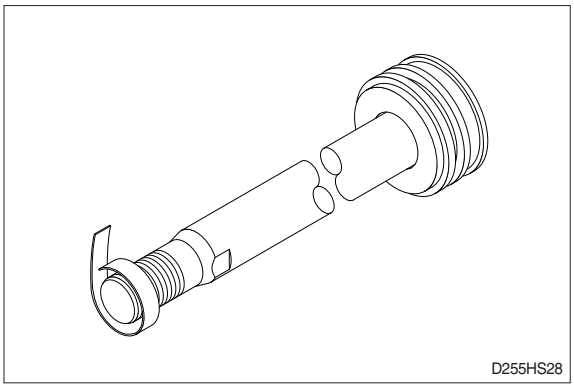


22B7HS23

1	Tube assy	9	Du bushing	17	Lock washer
2	Rod	10	Rod seal	18	Rod eye
3	Piston	11	Back up ring	19	Spherical bearing
4	Piston seal	12	Dust wiper	20	Hexagon bolt
5	Wear ring	13	Snap ring	21	Spring washer
6	O-ring	14	O-ring	22	Hexagon nut
7	Nylon nut	15	Back up ring	23	Grease nipple
8	Gland	16	O-ring	24	O-ring (seal lock type)

2) DISASSEMBLY

(1) Hold the parallel parts of the cylinder tube bottom in a vice and mark the rod head end to show how much it is screwed in, then remove the rod head. Next, hook a wrench into the notch at the cylinder head and remove the cylinder head from cylinder tube.
When doing this, wind tape round the threaded part of the rod and be careful not to damage the dust seal and rod seal inside cylinder head.



3) CHECK AND INSPECTION

mm (in)

Check item	Standard size	Repair limit	Remedy
Clearance between cylinder rod & bushing	0.072~0.288 (0.003~0.011)	0.5 (0.020)	Replace bushing
Clearance between rod head bushing & pin	0.10~0.35 (0.004~0.014)	0.6 (0.024)	Replace bushing