SECTION 6 WORK EQUIPMENT

GROUP 1 STRUCTURE AND FUNCTION

1. HYDRAULIC SYSTEM OUTLINE

The loader hydraulic system is a pilot operated, open center system which is supplied with flow from the fixed displacement main hydraulic pump.
The pilot control system is a low pressure, closed center hydraulic system which is supplied with flow from the first(Steering) pump.

The loader system components are :

- Main pump
- Main control valve
- Bucket cylinder
- Boom cylinders
- Pilot supply unit
- Remote control valve(Pilot control valve)
- Safety valve

The pilot supply unit consists of the pressure reducing valve, relief valve and accumulator.

Flow from the main hydraulic pump not used by the steering system leaves the priority valve EF port. It flows to the inlet port plate of four blocks type main control valve.

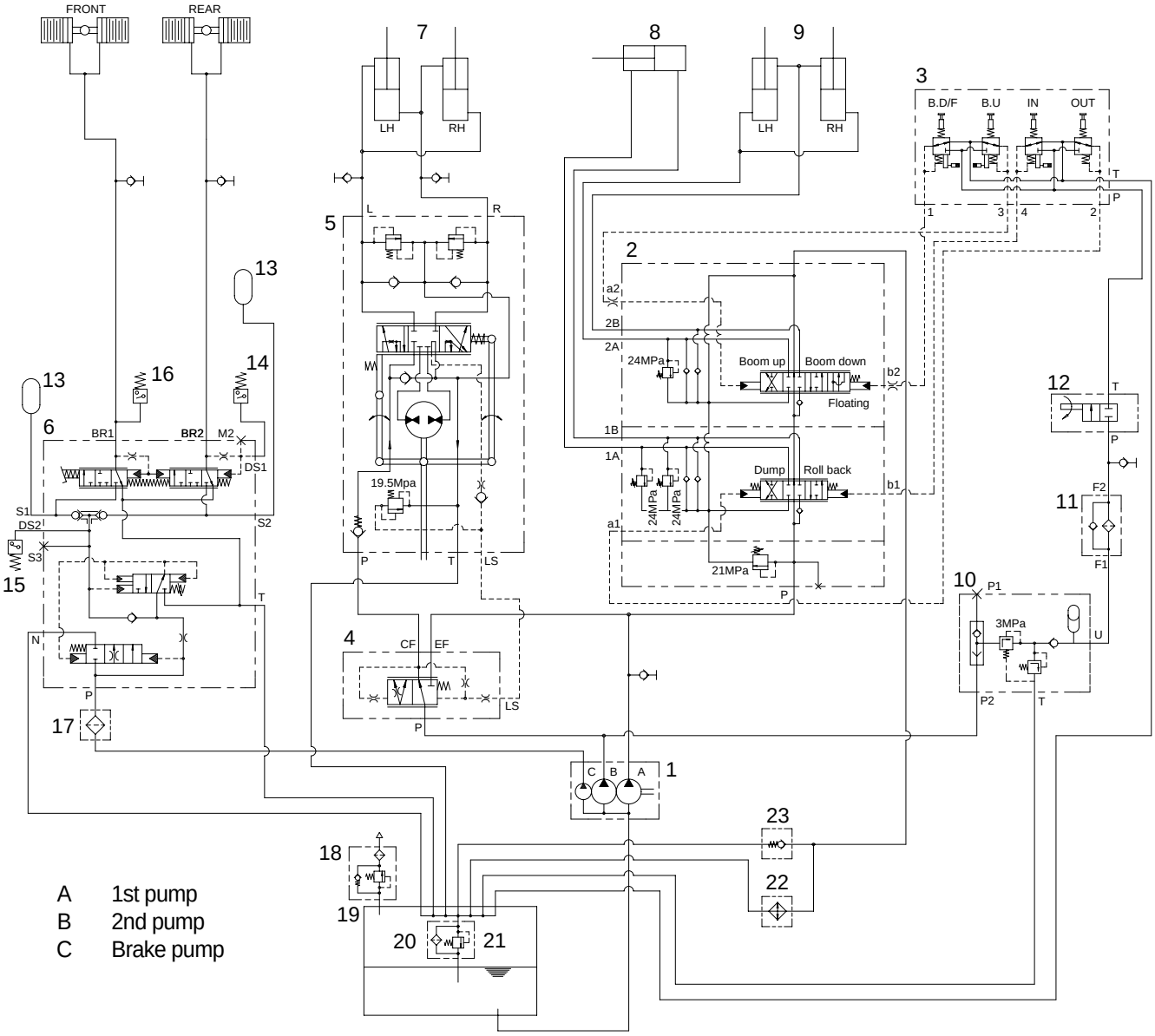
The main control valve is a tandem version spool type, open center valve which routes flow to the boom, bucket or auxiliary cylinders(Not shown) when the respective spools are shifted.

Flow from the steering pump(The first pump) is routed to the pilot supply unit where the steering pump outlet pressure is reduced to pilot circuit pressure. The pilot supply unit flow to the remote control valve.
The remote control valve routed flow to either end of each spool valve section in the main control valve to control spool stroke.

A accumulator mounted on pilot supply unit supplies a secondary pressure source to operated remote control valve so the boom can be lowered if the engine is off.

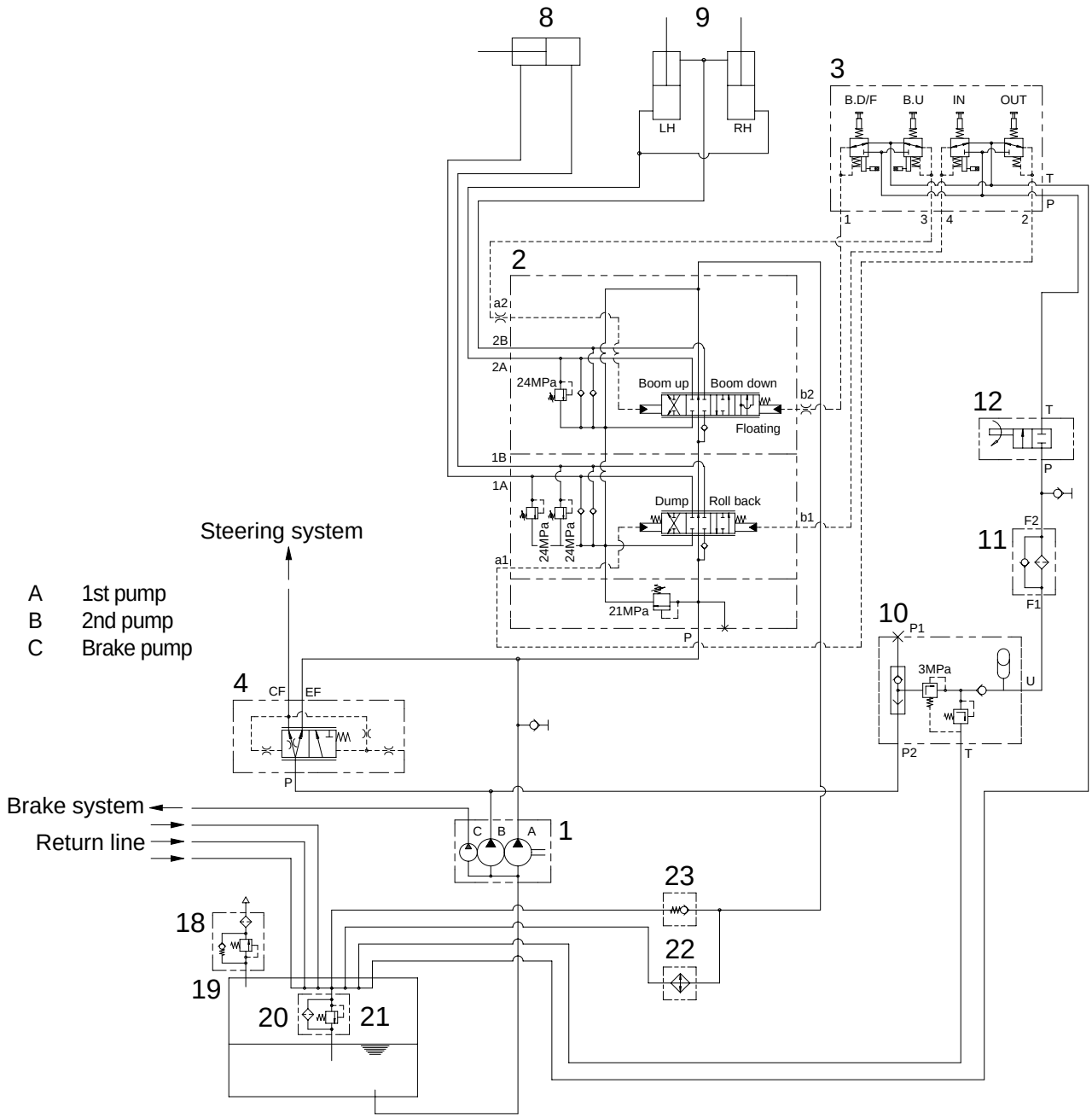
The return circuit for the main hydraulic system have return filter inside the hydraulic tank. The return filter uses a filter element and a bypass valve. The bypass valve is located in the upside of filter.

2. HYDRAULIC CIRCUIT



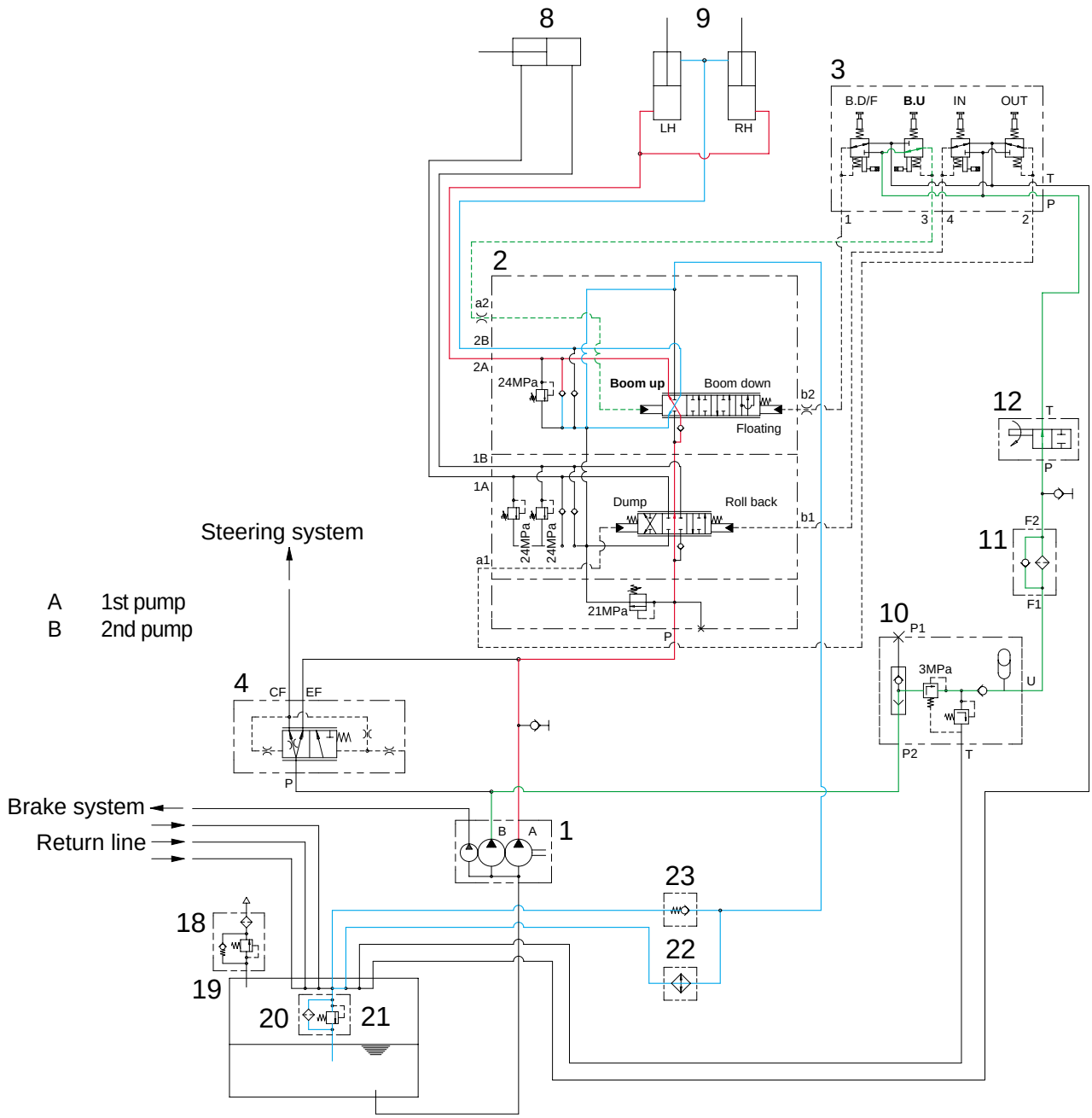
1	Main pump	9	Boom cylinder	17	Line filter
2	Main control valve	10	Pilot supply unit	18	Air breather
3	Remote control valve	11	Line filter	19	Hydraulic tank
4	Priority valve	12	Safety valve	20	Return filter
5	Steering unit	13	Accumulator	21	By pass valve
6	Brake valve	14	Pressure switch	22	Oil cooler(Option)
7	Steering cylinder	15	Pressure switch	23	Check valve(Option)
8	Bucket cylinder	16	Pressure switch		

3. WORK EQUIPMENT HYDRAULIC CIRCUIT



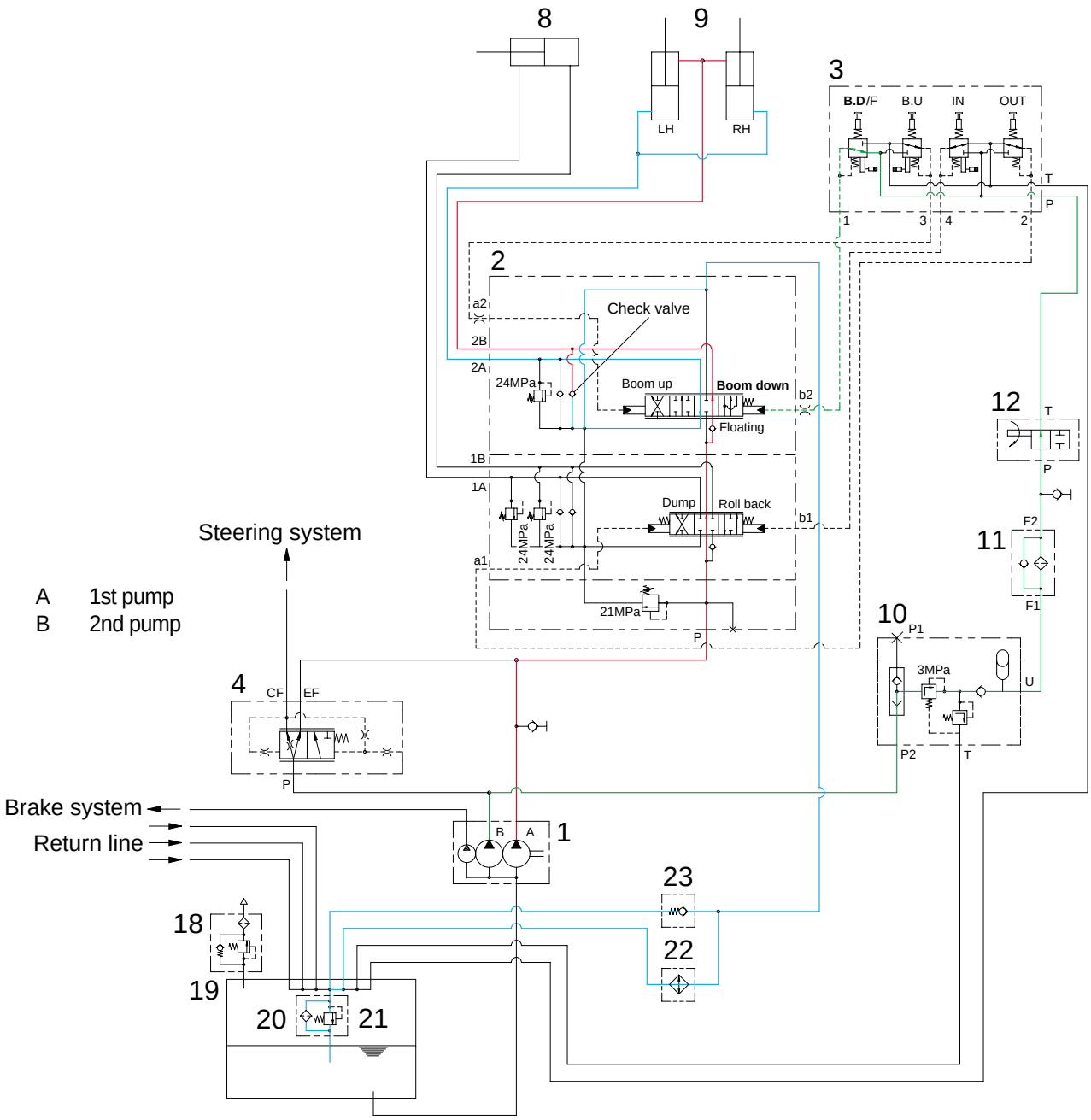
1	Main pump	9	Boom cylinder	19	Hydraulic tank
2	Main control valve	10	Pilot supply unit	20	Return filter
3	Remote control valve	11	Line filter	21	By pass valve
4	Priority valve	12	Safety valve	22	Oil cooler(Option)
8	Bucket cylinder	18	Air breather	23	Check valve(Option)

1) WHEN THE RCV LEVER IS IN THE RAISE POSITION



- When the RCV lever(3) is pulled back, the boom spool on the second block is moved to raise position by pilot oil pressure from port 3 of RCV.
- The oil from main pump(1) flows into main control valve(2) and then goes to the large chamber of boom cylinder(9) by pushing the load check valve of the boom spool through center bypass circuit of the bucket spool.
- The oil from the small chamber of boom cylinder(9) returns to hydraulic oil tank(19) through the boom spool at the same time.
- When this happens, the boom goes up.

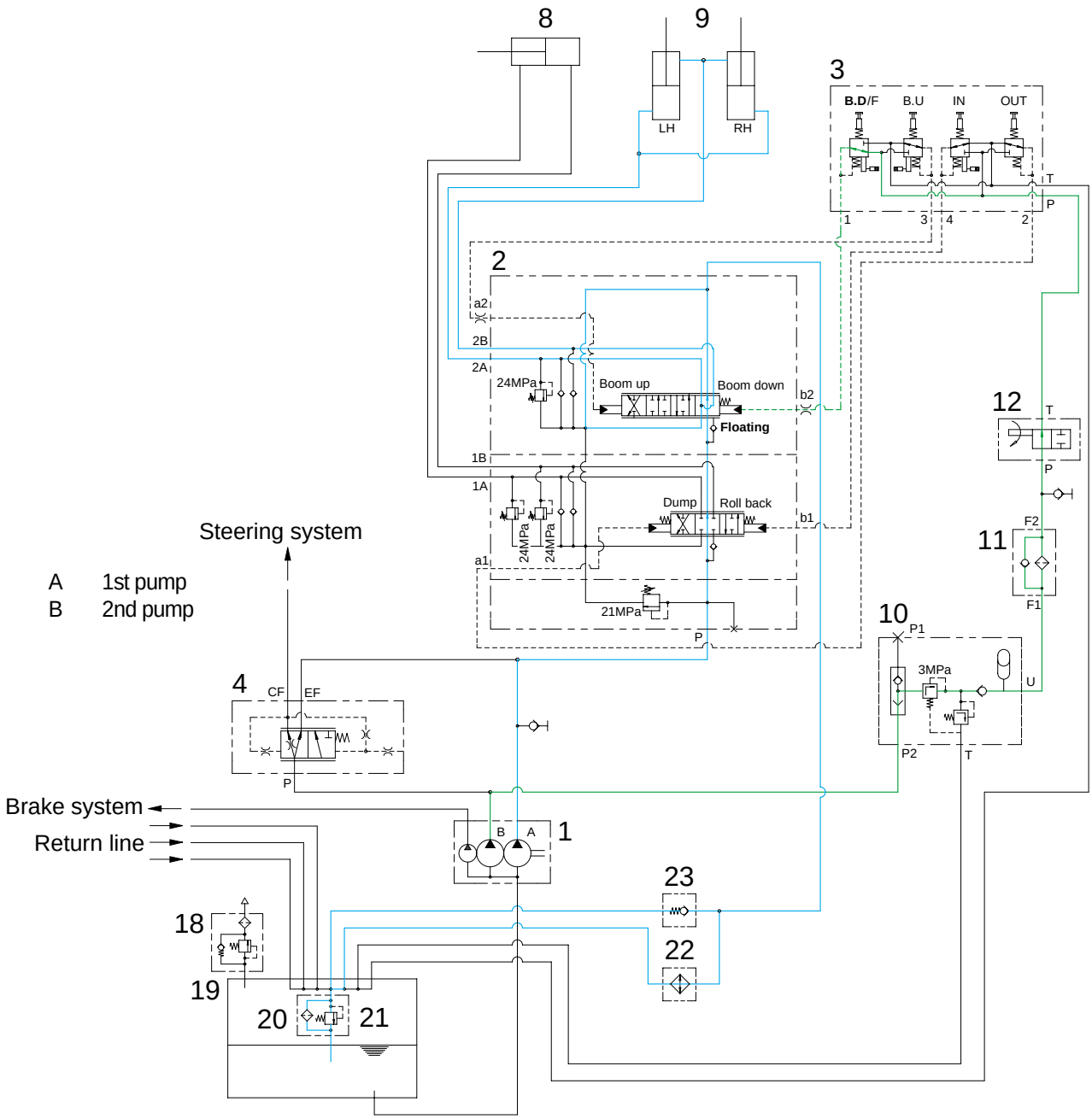
2) WHEN THE RCV LEVER IS IN THE LOWER POSITION



- When the RCV lever(3) is pushed forward, the boom spool on the second block is moved to lower position by pilot pressure from port 1 of RCV.
- The oil from main pump(1) flows into main control valve and then goes to small chamber of boom cylinder(9) by pushing the load check valve of the boom spool through center bypass circuit of the bucket spool.
- The oil returned from large chamber of boom cylinder(9) returns to hydraulic tank(19) through the boom spool at the same time.
- When the lowering speed of boom is faster, the return oil from the large chamber of boom cylinder combines with the oil from the pump through the check valve, and flows into the small chamber of the cylinder.

  This prevents cylinder cavitation by the negative pressure when the pump flow cannot match the boom down speed.

3) WHEN THE RCV LEVER IS IN THE FLOAT POSITION

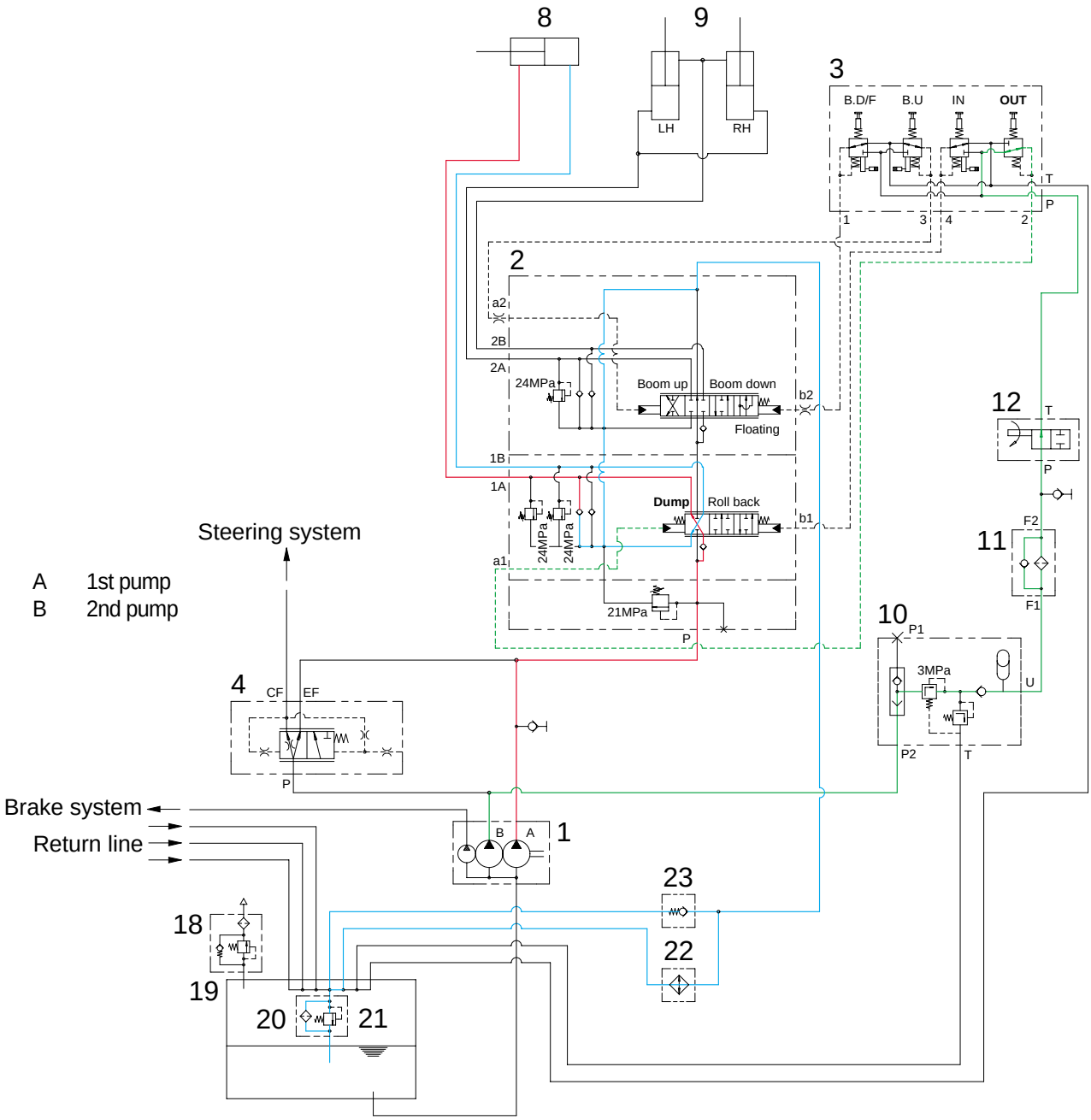


· When the RCV lever(3) is pushed further forward from the lower position, the pilot pressure reaches to 13-15 bar, then the boom spool on the second block is moved to floating position.

· The work ports(2A), (2B) and the small chamber and the large chamber are connected to the return passage, so the boom will be lowered due to it's own weight.

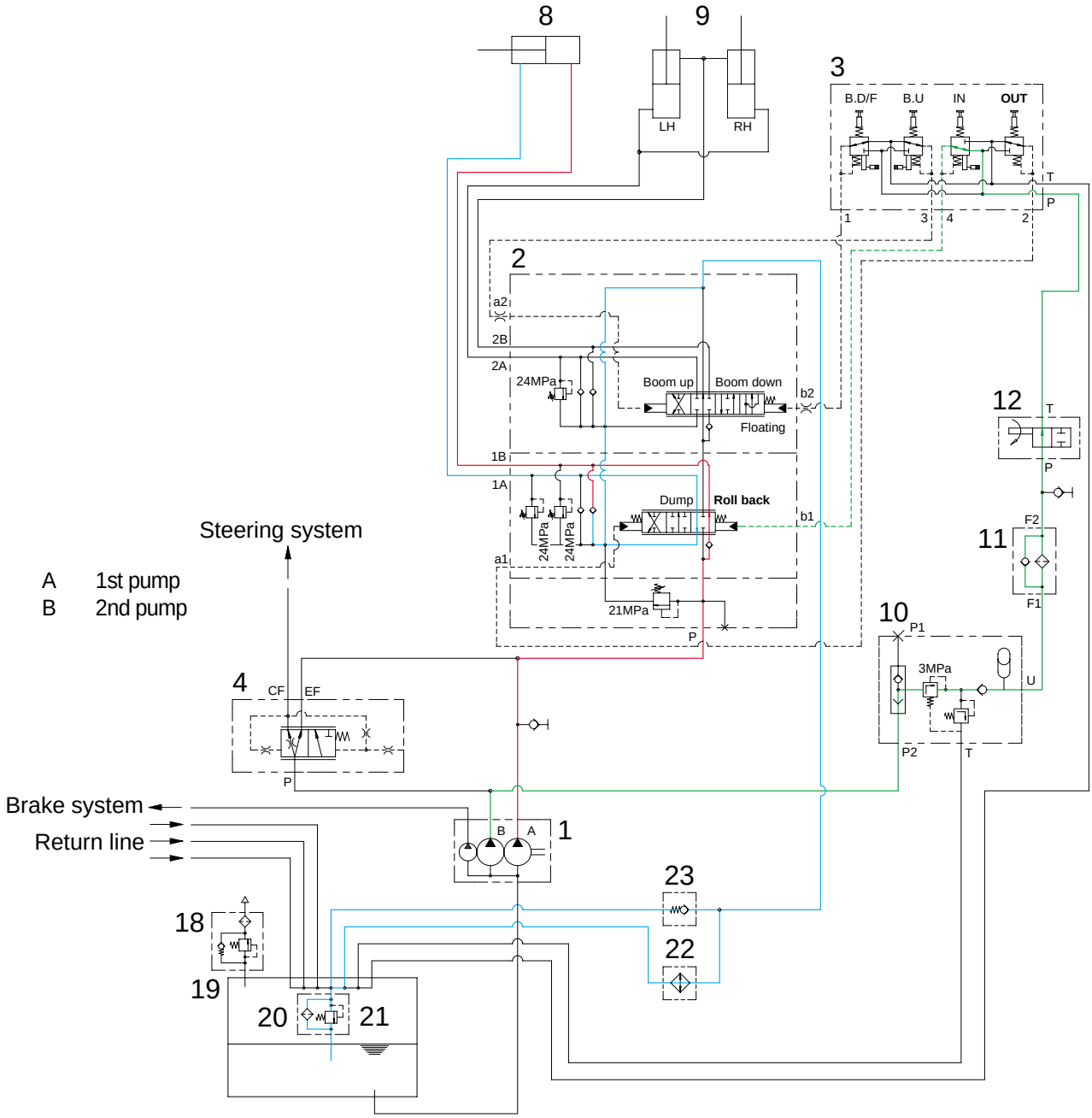
· In this condition, when the bucket is in contact with the ground, it can be move up and down in accordance with the shape of the ground.

4) WHEN THE RCV LEVER IS IN THE DUMP POSITION



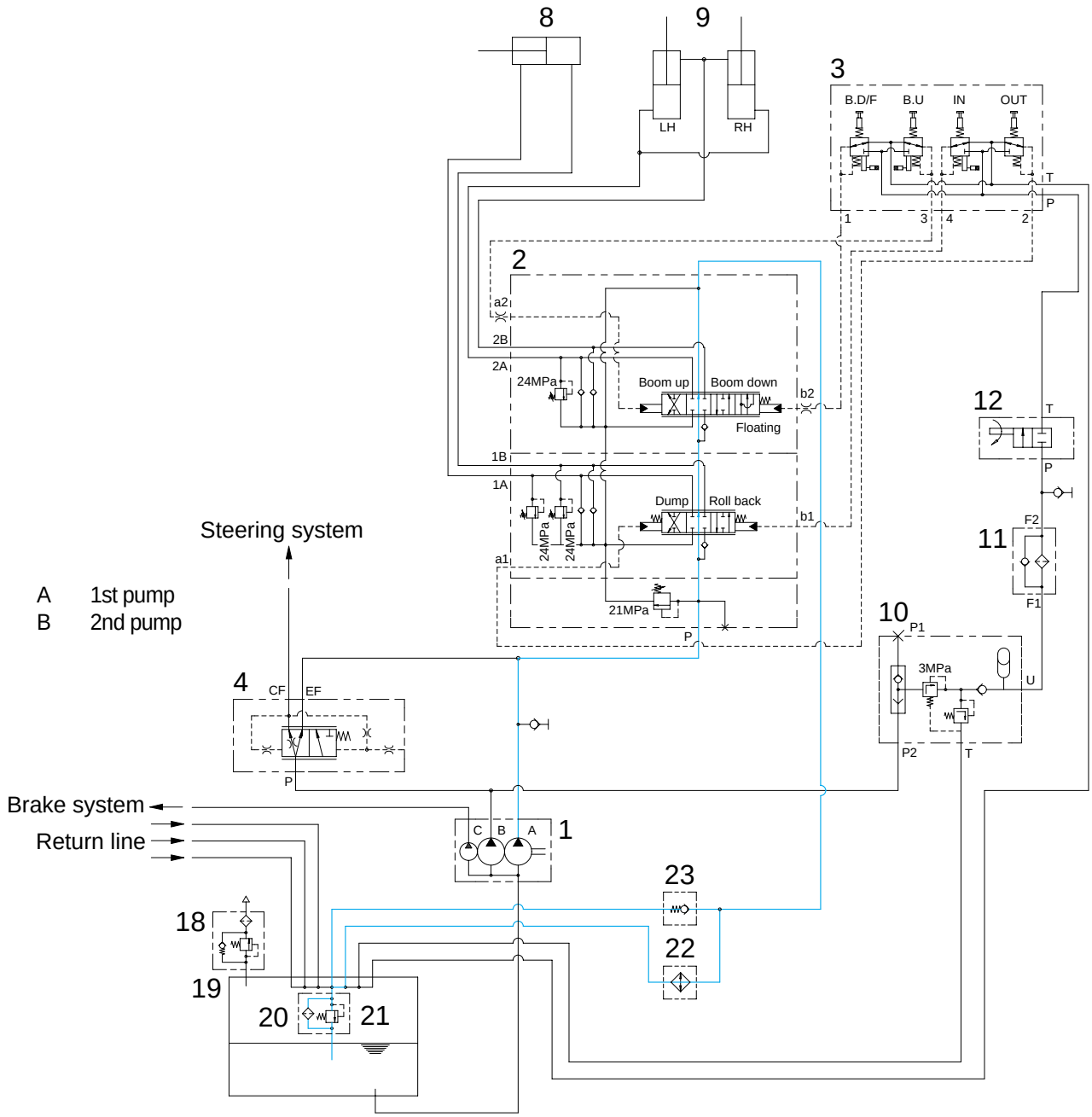
- If the RCV lever(3) is pushed right, the bucket spool on the first block is moved to dump position by pilot oil pressure from port 2 of RCV.
- The oil from main pump(1) flows into main control valve(2) and then goes to the small chamber of bucket cylinder(8) by pushing the load check valve of the bucket spool.
- The oil at the large chamber of bucket cylinder(8) returns to hydraulic tank(19) through the bucket spool.
- When this happens, the bucket is dumped.
- When the dumping speed of bucket is faster, the oil returned from the large chamber of bucket cylinder combines with the oil from the pump, and flows into the small chamber of the cylinder.
  This prevents cylinder cavitation by the negative pressure when the pump flow cannot match the bucket dump speed.

5) WHEN THE RCV LEVER IS IN THE ROLL BACK(Retract) POSITION



- If the RCV lever(3) is pulled left, the bucket spool on the first block is moved to roll back position by pilot oil pressure from port 4 of RCV.
- The oil from main pump(1) flows into main control valve(2) and then goes to the large chamber of bucket cylinder by pushing the load check valve of the bucket spool.
- The oil at the chamber of bucket cylinder(8) returns to hydraulic tank(19) through the bucket spool.
- When this happens, the bucket roll back.
- When the rolling speed of bucket is faster, the return oil from the small chamber of bucket cylinder combines with the oil from the pump, and flows into the large chamber of the cylinder.
  This prevents cylinder cavitation by the negative pressure when the pump flow cannot match the bucket rolling speed.

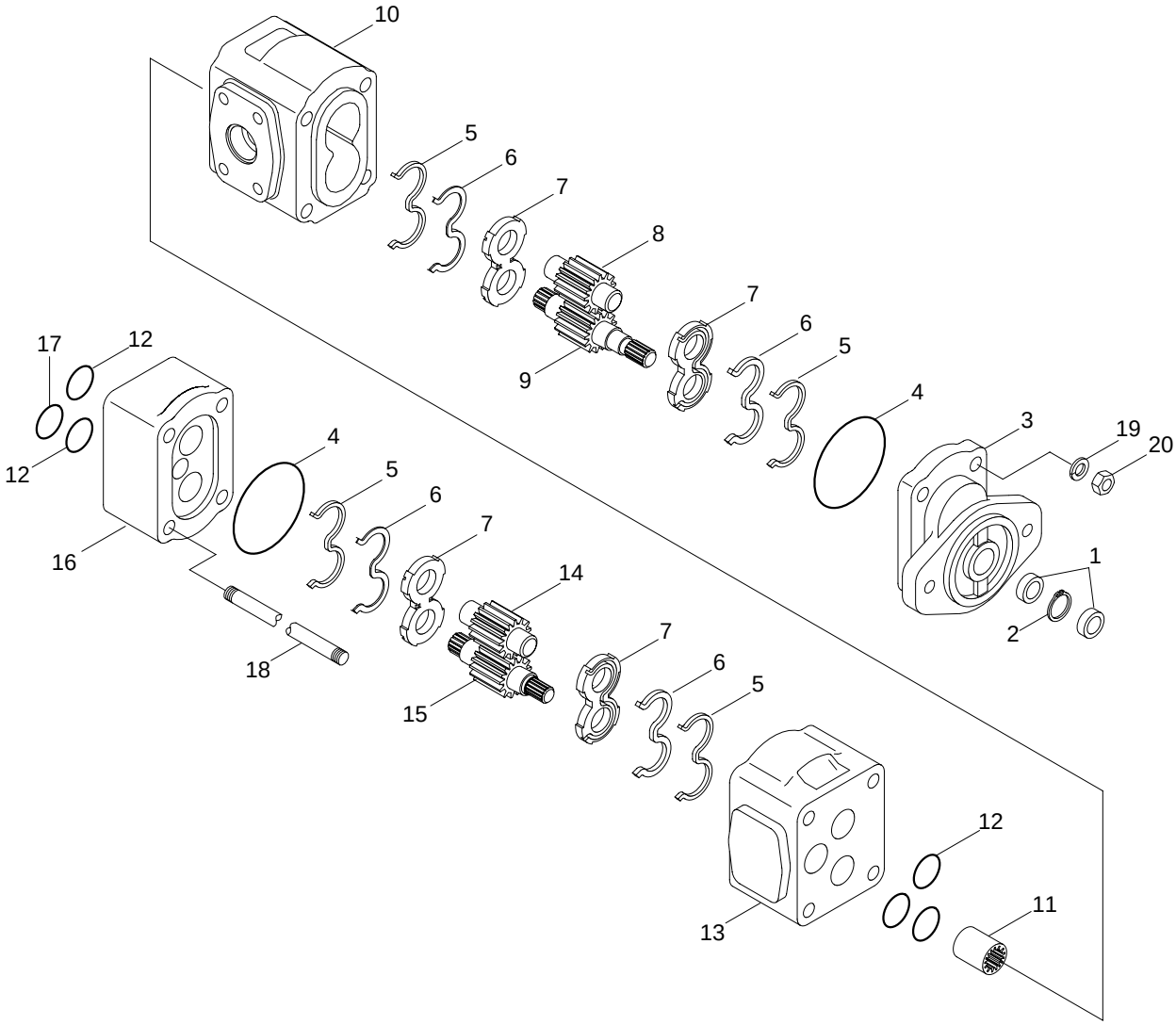
6) WHEN THE RCV LEVER IS IN THE HOLD POSITION



- The oil from main pump(1) flows into main control valve(2).
- In this time, the bucket spool and the boom spool are in neutral position, then the oil supplied to main control valve(2) returns into hydraulic tank(19) through center bypass circuit of each spool.
- In this condition, each cylinder keeps the neutral position, so the boom and the bucket is holded.

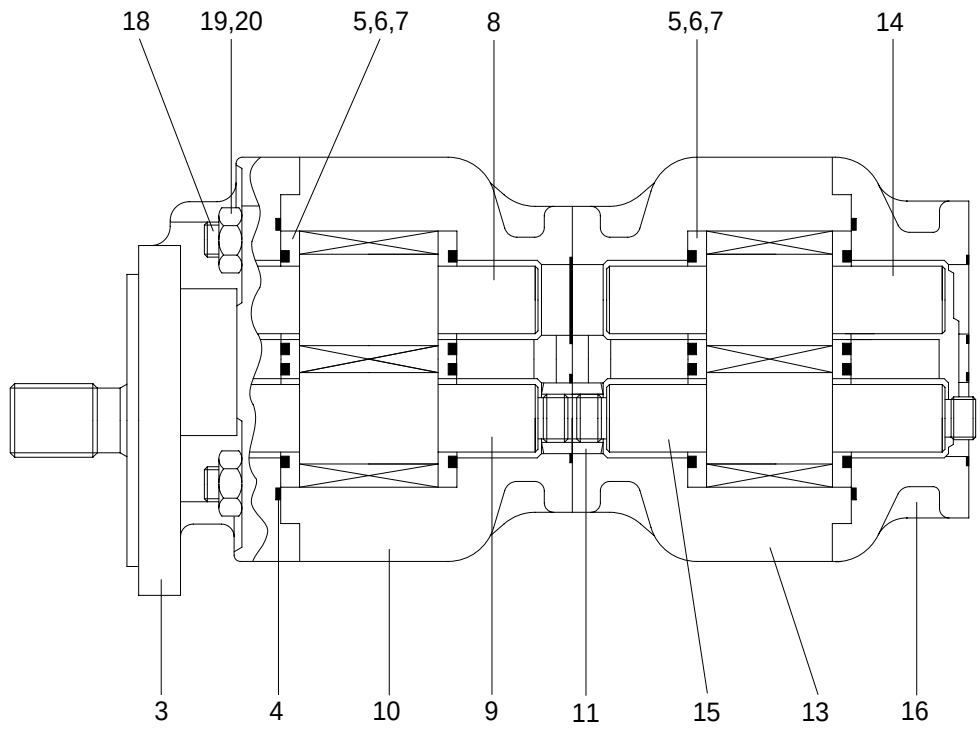
3. MAIN PUMP OPERATION

1) STRUCTURE



1	Shaft seal	8	Driven gear	15	Drive shaft
2	Circlip	9	Drive gear	16	Cover
3	Flange	10	Front body	17	O-ring
4	O-ring	11	Splined coupling	18	Stud assy
5	Seal	12	O-ring	19	Serrated washer
6	Seal	13	Center body	20	Nut
7	Balance plate	14	Driven gear		

2) OPERATION



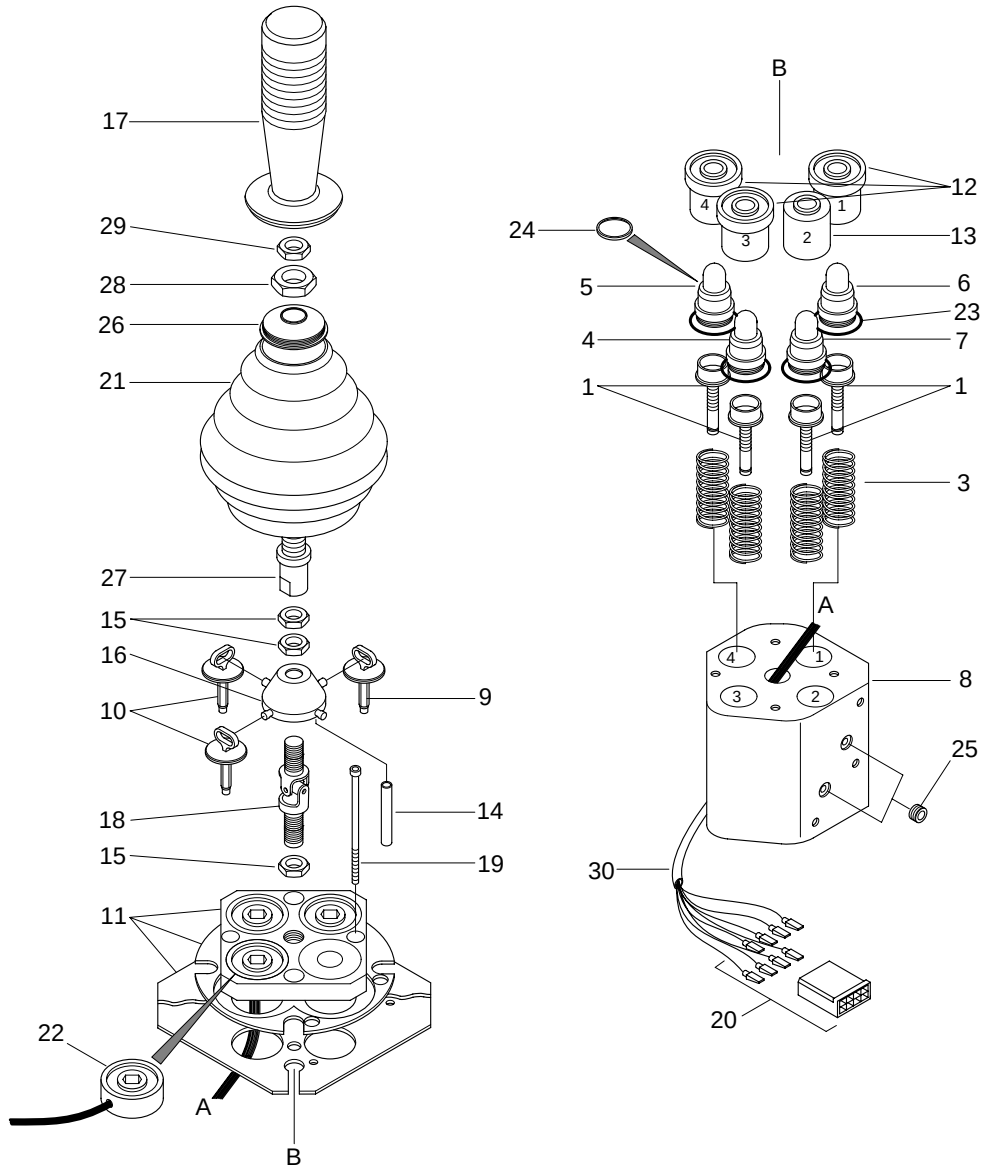
The main hydraulic pump is a fixed displacement gear type pump. The pump is drive at engine speed by the transmission. The pump shafts are supported by balance plates(7), flange(3), front body(10), center body(13) and cover(16).

As the drive gear(9) and (15) turns the driven gears(8, 14), the gear teeth come out of mesh. Oil flows from the hydraulic tank through the inlet into the cavity between the gear teeth. As the gears continue to rotate, the oil becomes trapped between the gear teeth and the balance plates(7).
The trapped oil is then carried to the pump outlet. Oil is forced out the outlet to supply the hydraulic function. As the gears re-mesh, they form a seal to prevent oil from flowing between the gears and back to the inlet.

The pump uses outlet pressure oil to load the balance plates(7) against the gear faces. This controls internal leakage to maintain pump displacement.
Outlet pressure fills the area bounded by the seals(5, 6) to force the pressure plate against the high pressure area or the gear faces. Pump shaft lubrication is achieved by routing outlet pressure oil into the area between the gear shafts and the balance plates. The oil is collected at the end of the shafts in the hollow areas in the port and flange plates and routed back to return.

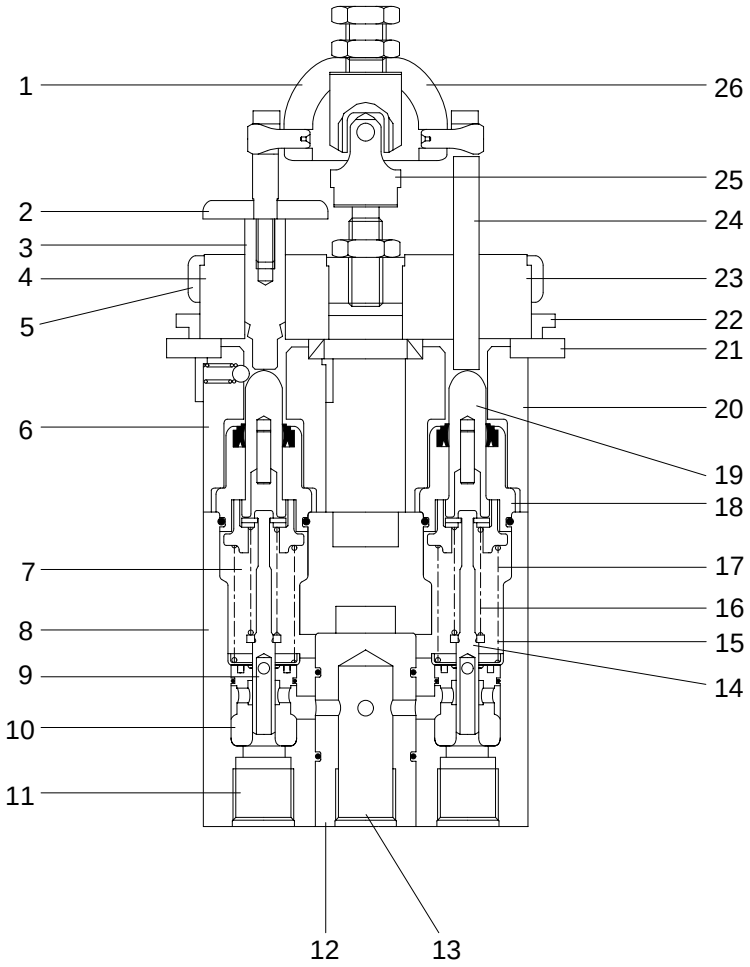
4. REMOTE CONTROL VALVE

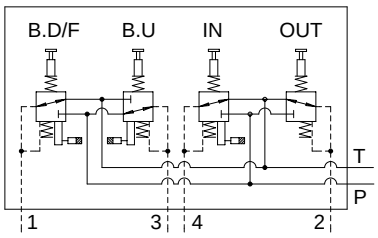
1) STRUCTURE



1	Spring pack	12	Prefeel cage assy	22	Hand coil
3	Spring	13	Spindle retainer	23	O-ring
4	Plunger assy	14	Spindle	24	Wiper seal
5	Plunger assy	15	Nut	25	Plug
6	Plunger assy	16	Lever assy	26	Boot retainer collar
7	Plunger assy	17	Handle assy	27	Handle adapter
8	Body kit	18	Lever assy	28	Nut
9	Prefeel kit	19	Socket screw	29	Nut
10	Prefeel kit	20	Connector assy	30	Insulation tube
11	Detent kit	21	Rubber boot		

2) HYDRAULIC OPERATION



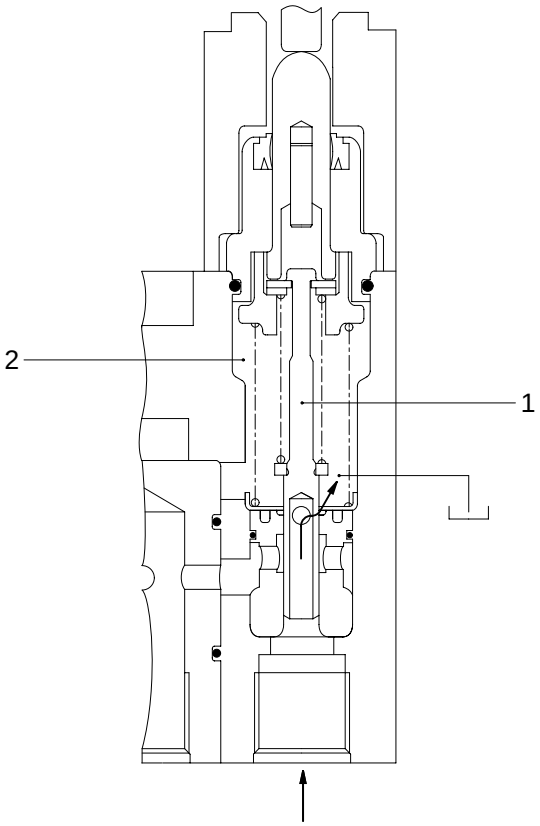


Hydraulic circuit

Port	Port name	Port size
1	Boom down	1/4 BSPP
2	Bucket dump	1/4 BSPP
3	Boom raise	1/4 BSPP
4	Bucket crowd	1/4 BSPP
P	Supply pressure	1/4 BSPP
T	Tank	1/4 BSPP

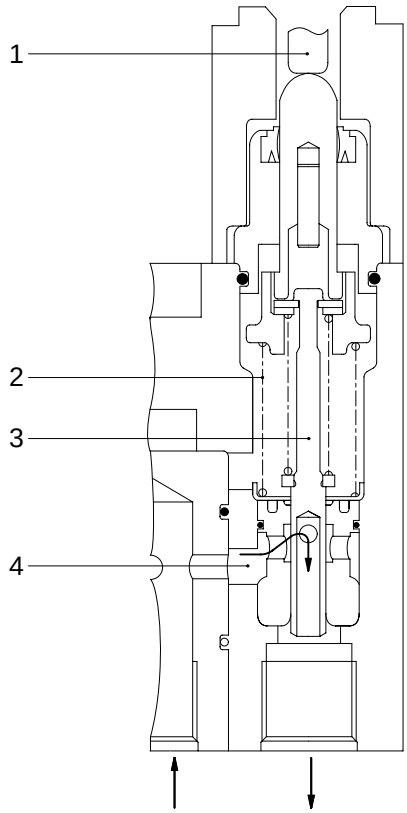
1	Piston attachment	10	Pressure reducing v/v housing	19	Spindle subassembly
2	Armature plate	11	Service port	20	Spindle guide retainer
3	Prefeel spindle	12	Inlet adapter	21	Mounting plate
4	Hold coil	13	Inlet port	22	Boot retaining plate
5	Retaining plate	14	Pressure reducing v/v piston	23	Guide
6	Prefeel cage assembly	15	Return spring	24	Spindle
7	Spring chamber	16	Spring pack subassembly	25	Universal joint
8	Body kit	17	Characteristic spring	26	Lever housing
9	Pressure chamber	18	Spindle guide subassembly		

(1) Neutral position



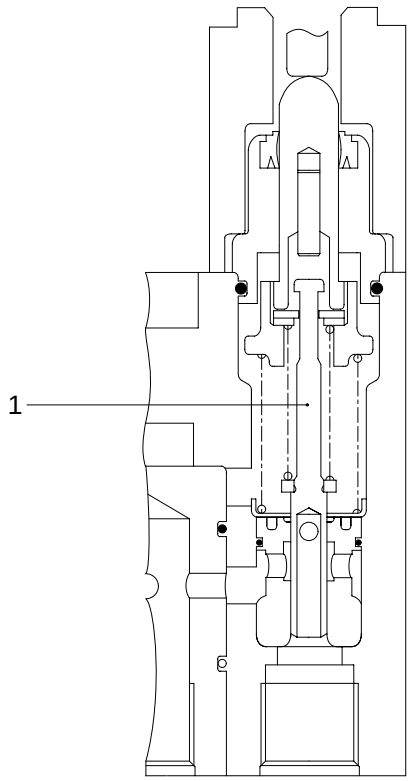
The spring pack subassembly contains the pressure reducing piston(1) which has a center hole machined from the service port end. This center hole links with a cross hole which in the normal condition, that is with the lever not selected, connects the service port to the spring chamber(2). This spring chamber(2) is in turn connected to tank and as such the pilot can on the MCV, to which this valve is connected, would be connected to tank and the MCV spool would therefore be in the neutral position.

(2) Metering position



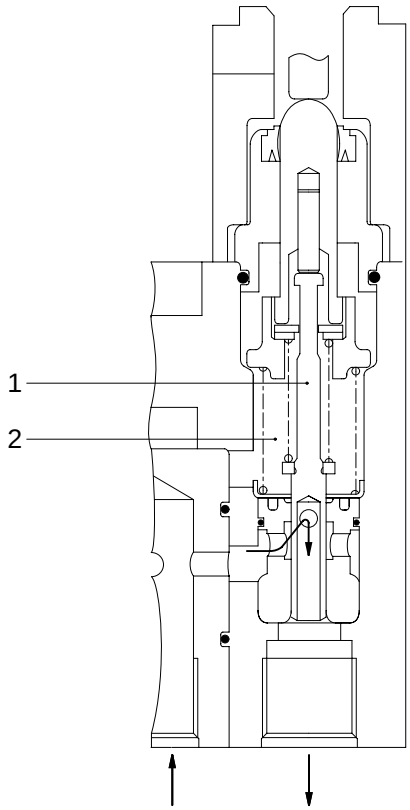
The lever housing is selected and this in turn operates the spindle(1) which in turn depresses the operating spindle. This operating spindle now compresses the return spring(2) and starts to select the characteristic spring. As there is currently no resistance, the pressure reducing valve piston(3) moves further down in its bore. As this pressure reducing piston moves lower in its bore this service port connection to tank, through the cross holes, is initially cut off as the cross hole pass under the land. As the pressure reducing piston moves further then the cross holes open into the pressure chamber(4), which is connected to the 30 bar supply, and so at that point the 30 bar supply is connected to the service port. This also connects to the pilot end cap on the MCV and so spool movement in the MCV occurs.

(3) End of metering



As the pressure builds up in the RCV service port and MCV pilot can, this same pressure acts on the end of the pressure reducing valve piston(1), which was initially moved by a force applied to the top of the characteristic spring. As this pressure increases it starts to react to the force in the characteristic spring. The piston begins to move back in its bore, and at some point a force balance will occur. When this happens, and the hydraulic force on the service port end of the piston just starts to exceed the spring force on the opposite end then the pressure reducing piston moves back in its bore until the cross hole moves back under the land and so the 30 bar supply to the port is cut off.

(4) Fully selected



If the operating lever is now selected further then the force balance on the pressure reducing valve piston(1) is upset and supply pressure is once again connected to the service port, until a force balance is restored.

Similarly, if the operating lever is moved back towards neutral then the force balance is once again upset, this time in the opposite direction and the service port hydraulic force now being greater than the characteristic spring force, the pressure reducing valve piston moves such that the cross holes open into the spring chamber(2) and some pressure is lost until the balance is once again restored when the cross hole moves back under the land.

In this way pressure supplied to the MCV pilot can, and so spool movement, is proportional to the lever movement of the RCV.

There is a point in the stroke of some of the RCV assemblies where progressive movement of the MCV spool is no longer necessary due to the spool position and flow/pressure characteristics and the pressure reducing valve piston is mechanically forced into a position where the cross holes are constantly held open to the pressure chamber. This happens when the pin fitted to the operating spindle contacts the top of the pressure reducing valve piston and this mechanical force overrides any hydraulic balancing forces.

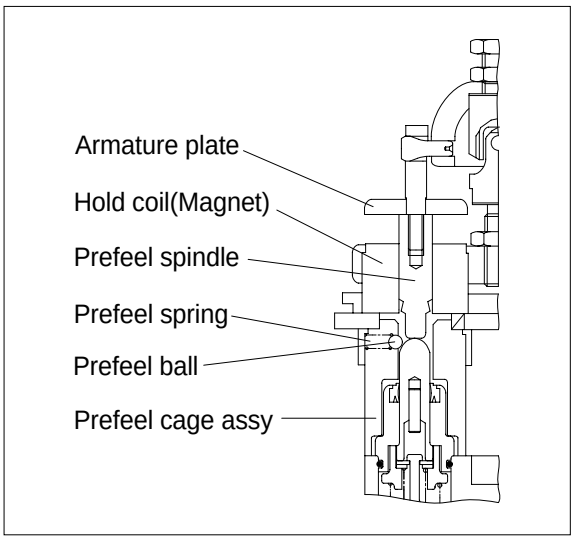
The ports controlling boom up and down and bucket roll back are also fitted with a magnetic detents and/or prefeel ramps.

The port controlling the power down function also controls the boom float function. A prefeel ramp is fitted at the point on the pilot valve stroke which controls the spool on the MCV to its power lower position. Moving the lever beyond this prefeel ramp position and to the end of its stroke gives an output pressure from the RCV which drives the spool in the MCV into a float position. Details on prefeel ramps can be seen in the next page.

3) MECHANICAL OPERATION

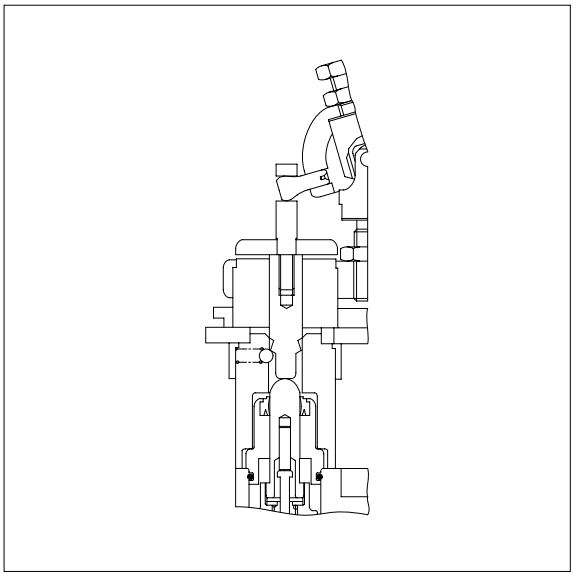
(1) The Bucket roll back and boom up and down functions are fitted with a magnetic detent.

To prevent accidental engagement of this magnetic detent each of these detent has a prefeel position just before the armature plate engages with the hold coil. The right figure shows the major components in this assembly.

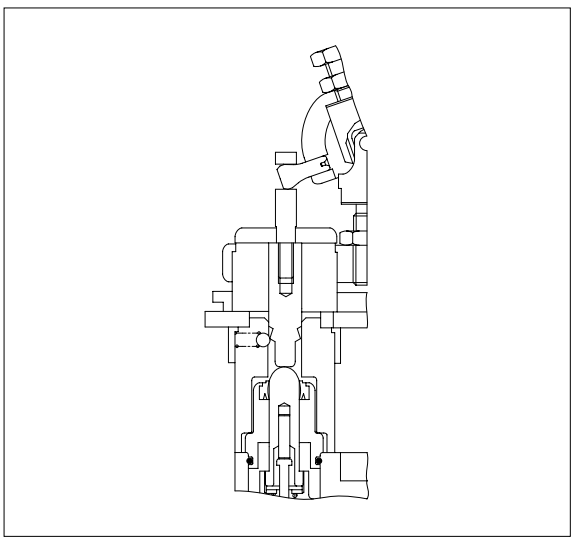


(2) As the lever is operated the prefeel spindle and armature plate are depressed in the bore and towards the end of the stroke, the prefeel ball, loaded by the prefeel spring, contacts the ramp on the prefeel spindle. This provides a physical restriction to further lever movement as a step increase in force is required to overcome the preload of the prefeel mechanism.

At this point there is still a gap between the armature plate and the hold coil, therefore the valve can be operated without accidentally engaging magnetic detent.

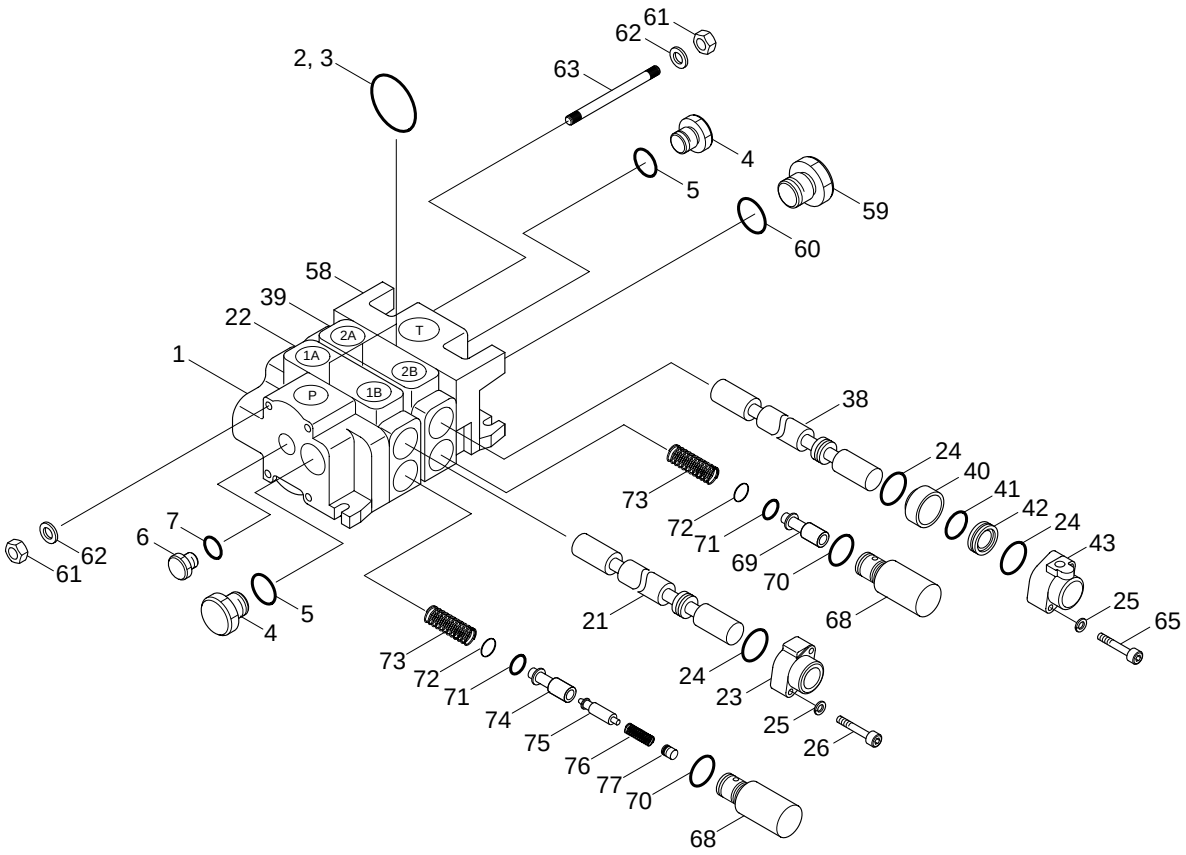


(3) If an extra amount of force is applied to the operating lever the force of the prefeel mechanism can be overcome and magnetic detent engaged. This allows the function to remain fully selected without further operator demand. The lever automatically returns to neutral when the electric current is switched off due to the position of the loader reaching proximity sensors. Manual override from magnetic detent is always possible.



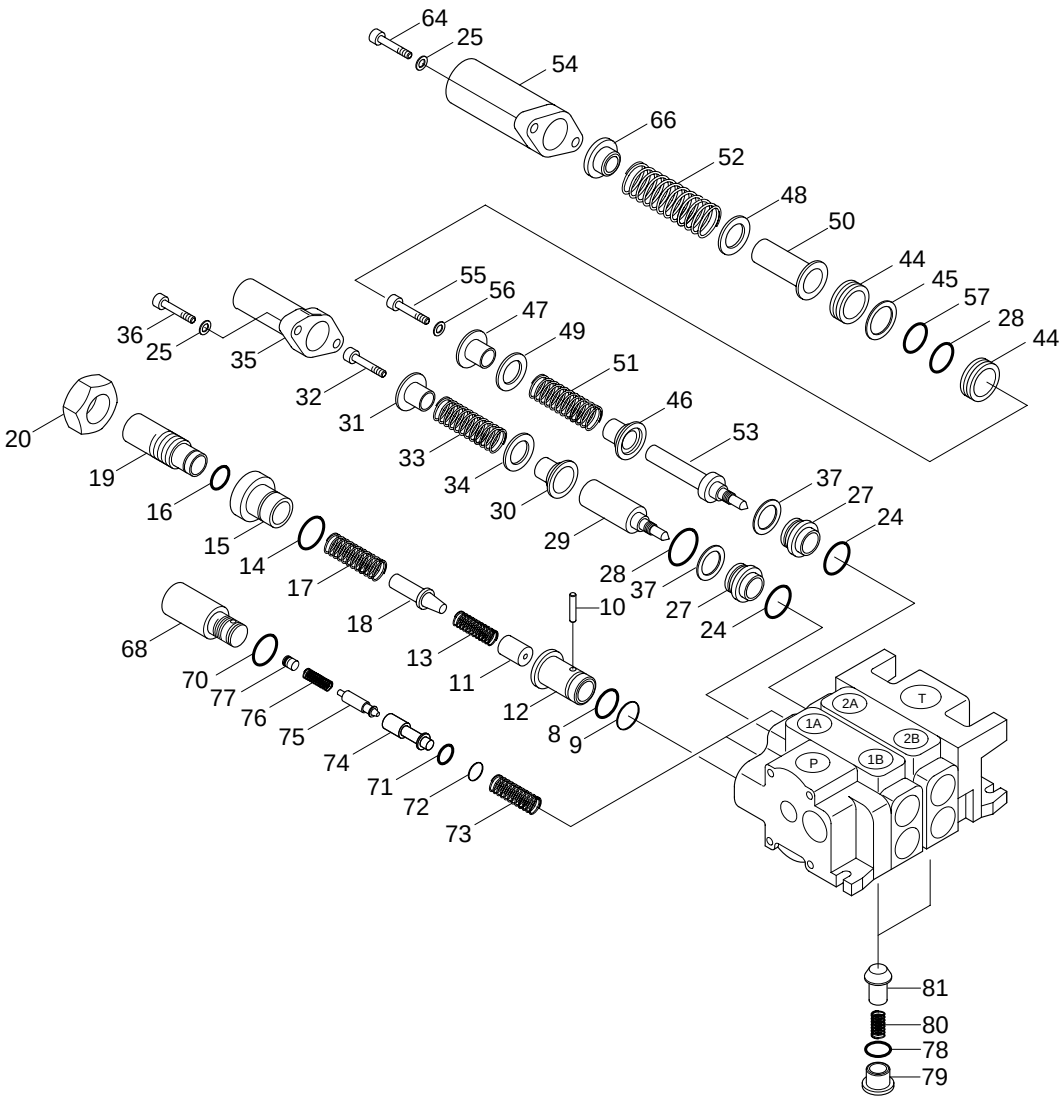
5. MAIN CONTROL VALVE

1) STRUCTURE(1/2)



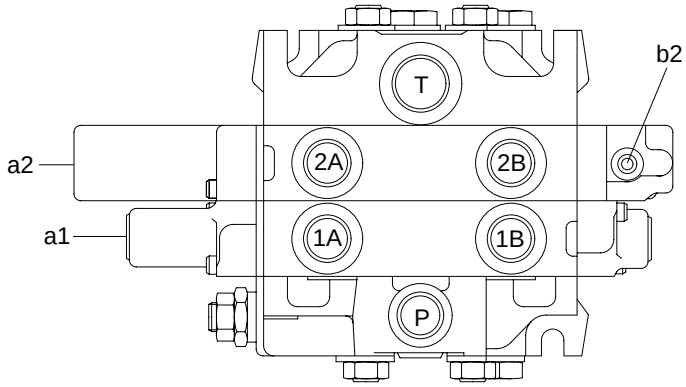
1	Inlet housing	26	Bolt	63	Tie stud
2	O-ring	38	Spool	65	Stop
3	O-ring	39	Spool section	68	Housing
4	Plug	40	Seal extension	69	Check valve
5	O-ring	41	O-ring	70	O-ring
6	Plug	42	Sleeve	71	Back up ring
7	O-ring	43	Cover	72	O-ring
21	Spool	58	Outlet housing	73	Spring
22	Spool section	59	Plug	74	Check valve
23	Cover	60	O-ring	75	Poppet
24	O-ring	61	Hexagon nut	76	Spring
25	Lock washer	62	Washer	77	Adjusting screw

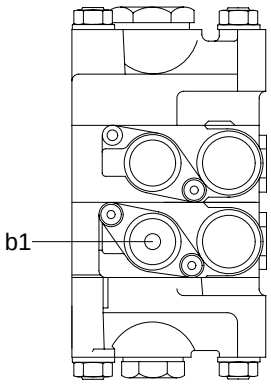
2) STRUCTURE(2/2)

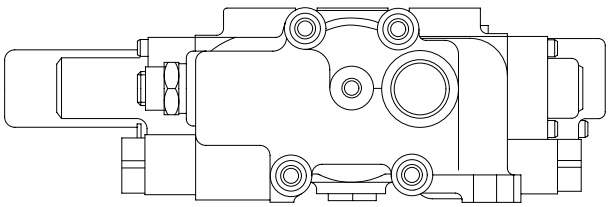


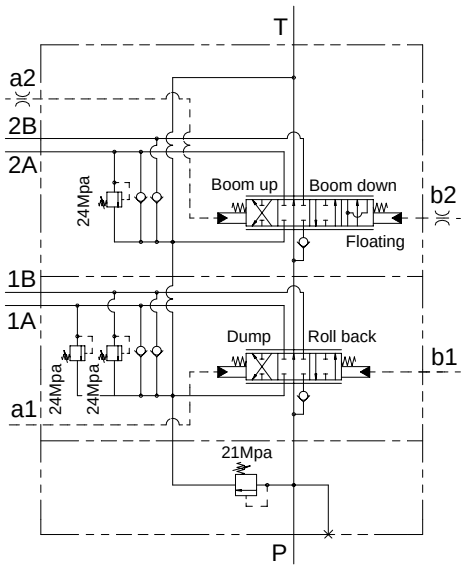
8	O-ring	25	Lock washer	46	Spring retainer	68	Housing
9	Back up ring	27	Seal retainer	47	Spring retainer	70	O-ring
10	Pin	28	O-ring	48	Shim	71	Back up ring
11	Plunger	29	Adapter	49	Shim	72	O-ring
12	Sleeve	30	Spring retainer	50	Spring retainer	73	Spring
13	Spring	31	Spring retainer	51	Spring	74	Check valve
14	O-ring	32	Screw	52	Spring	75	Poppet
15	Pilot housing	33	Spring	53	Spool cap	76	Spring
16	O-ring	34	Shim	54	Cover	77	Adjusting screw
17	Spring	35	Cover	55	Screw	78	O-ring
18	Poppet	36	Bolt	56	Washer	79	Cap
19	Adjusting screw	37	Shim	57	O-ring	80	Spring
20	Lock nut	44	Seal retainer	64	Screw	81	Check valve
24	O-ring	45	Circlip	66	Stop		

STRUCTURE





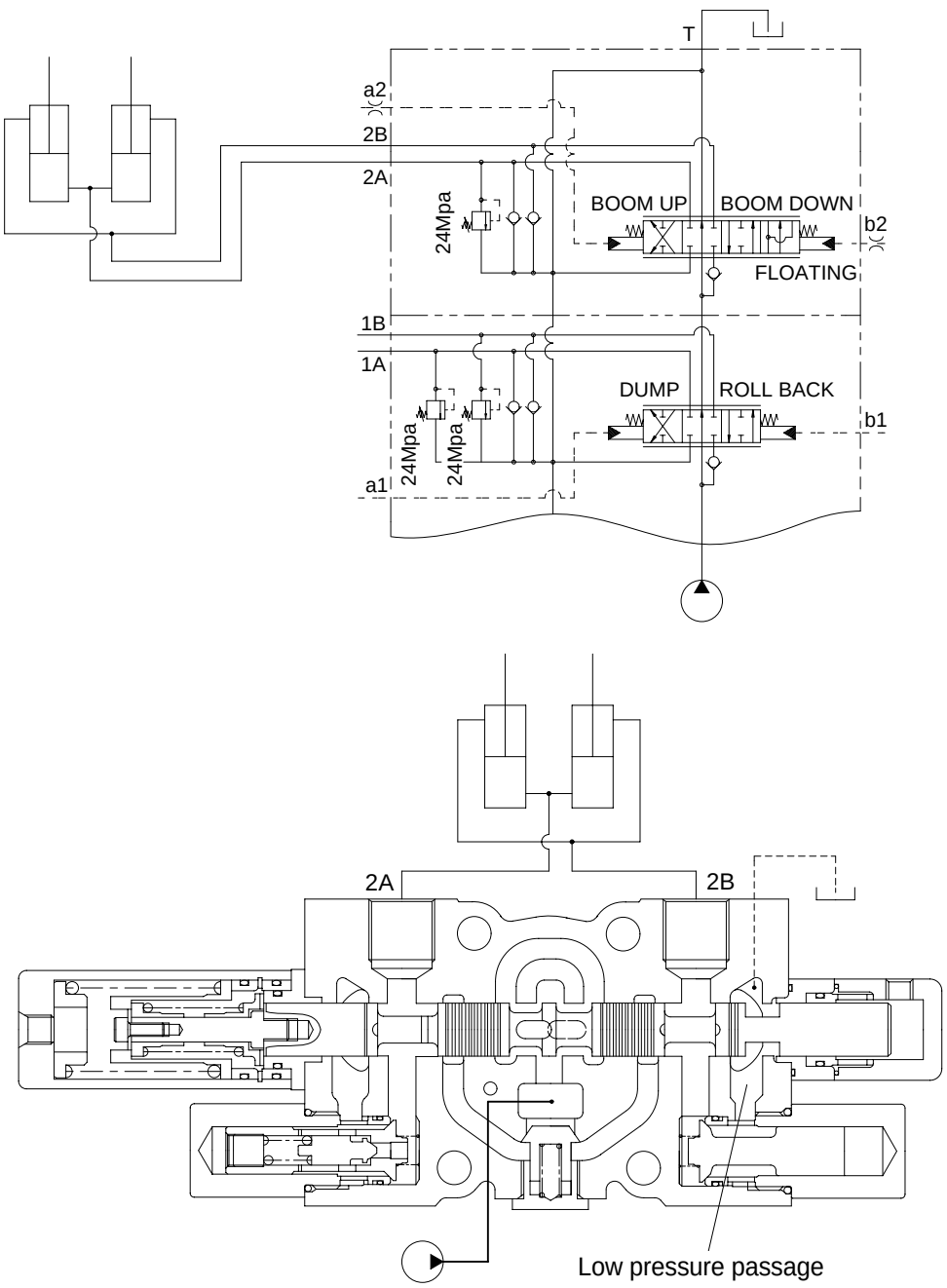




Port	Port name	Port size
P	From main pump	1 1/16UNF
T	To hydraulic tank	1 5/16UNF
1A, 1B	To bucket cylinder port	1 1/16UNF
2A, 2B	To boom cylinder port	1 1/16UNF
a_1, b_1	Bucket pilot port	7/16UNF
a_2, b_2	Boom pilot port	7/16UNF

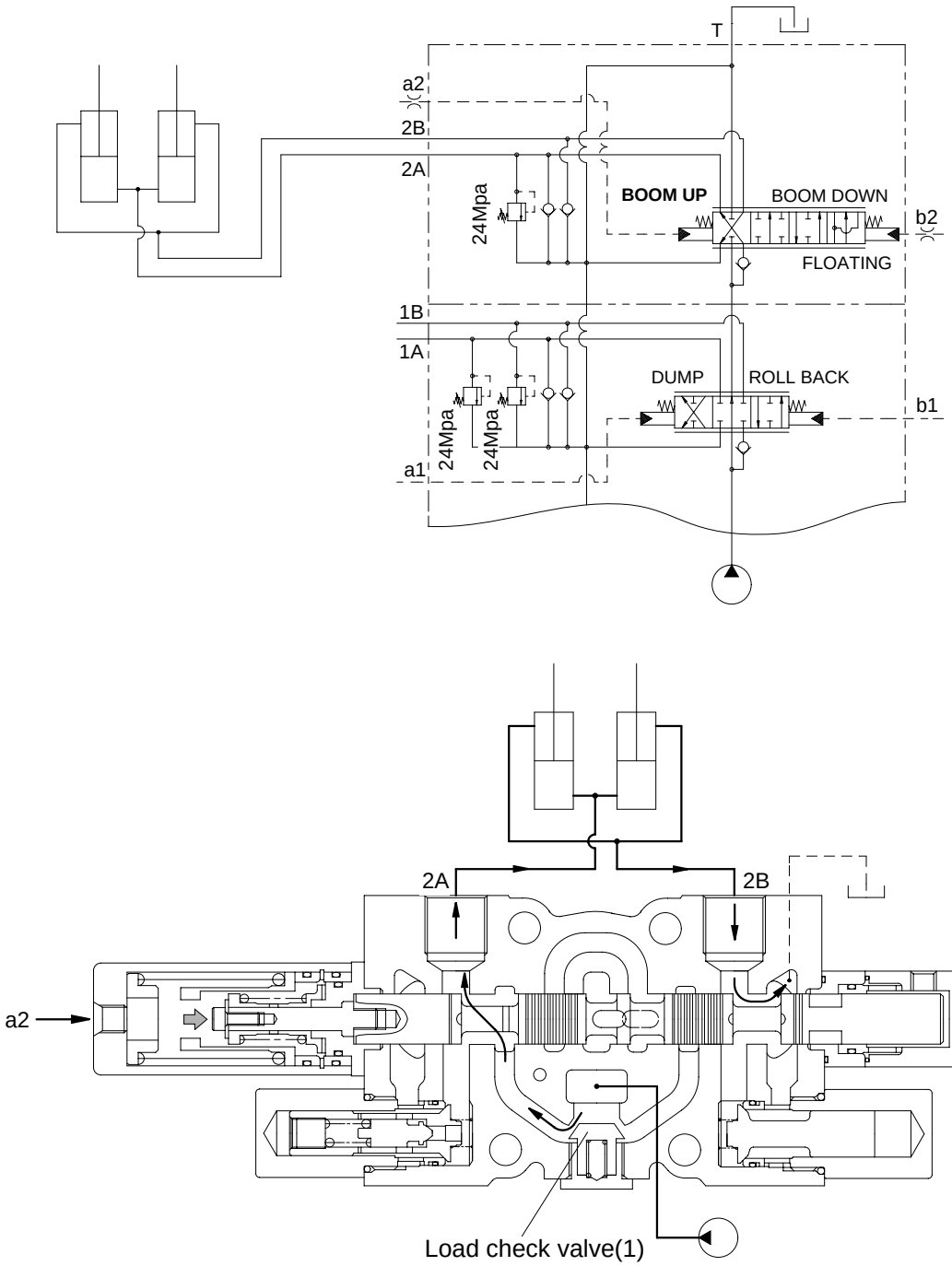
2) BOOM SECTION OPERATION

(1) Spool in neutral



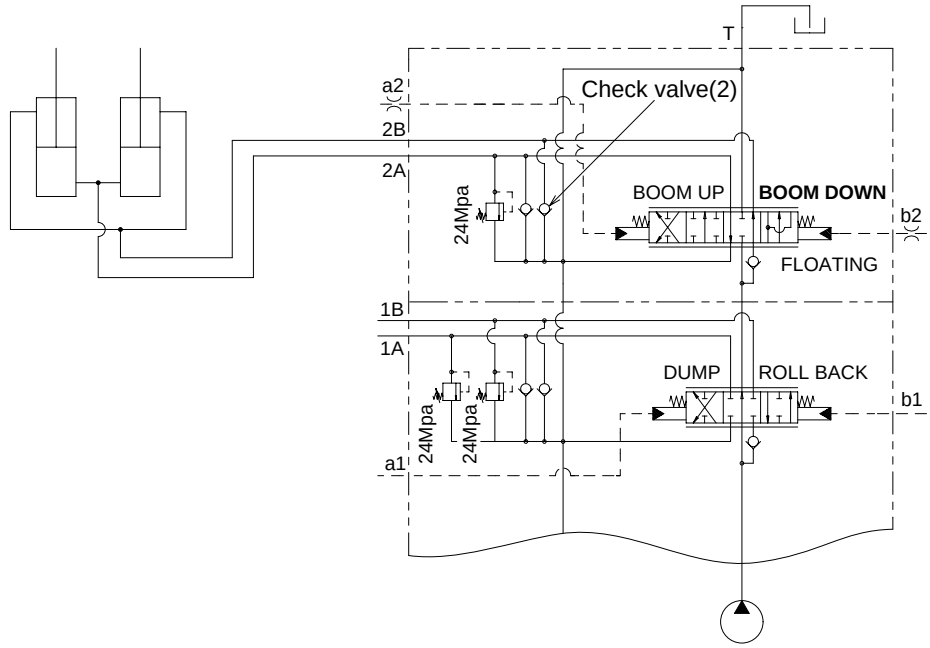
If the remote control valve is not operated, the oil supplied from the pump port passes through the neutral passage to the low pressure passage at the outlet section, and then returns to the tank port.

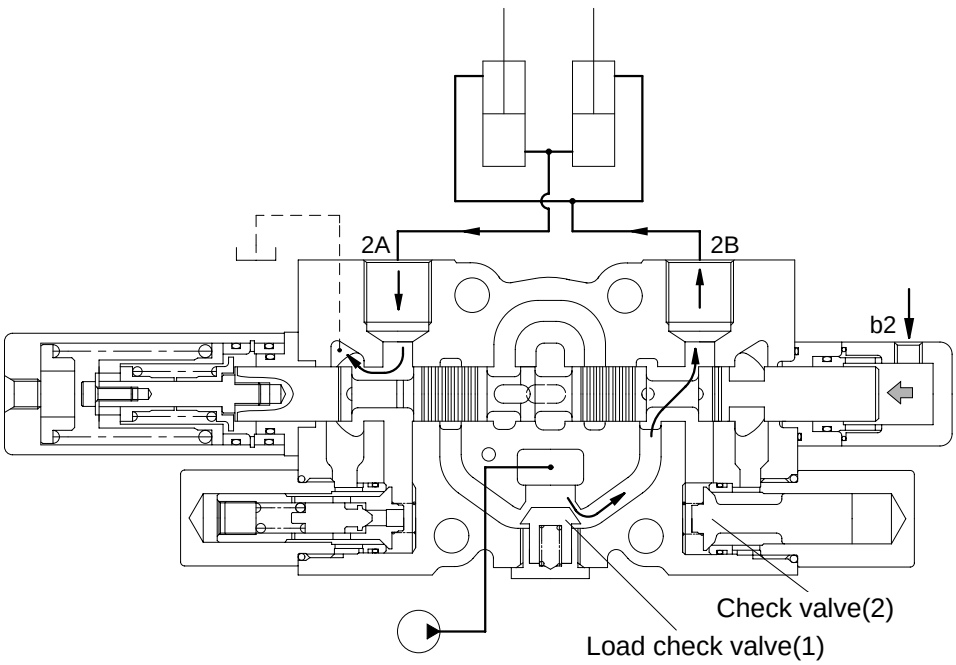
(2) Boom raise position



When the pilot pressure from remote control valve is supplied to the pilot port(a2), the spool moves to the right and the neutral passage is closed.
The oil supplied from the pump pushes up the load check valve(1) and flow into boom cylinder port(2A).
The pump pressure reaches proportionally the load of cylinder and fine control finished by shut off of the neutral passage.
The return oil from cylinder port(2B) flows into the tank via the low pressure passage.

(3) Boom lower position





When the pilot pressure from remote control valve is supplied to the pilot port(b2), the spool moves to the left and the neutral passage is closed.

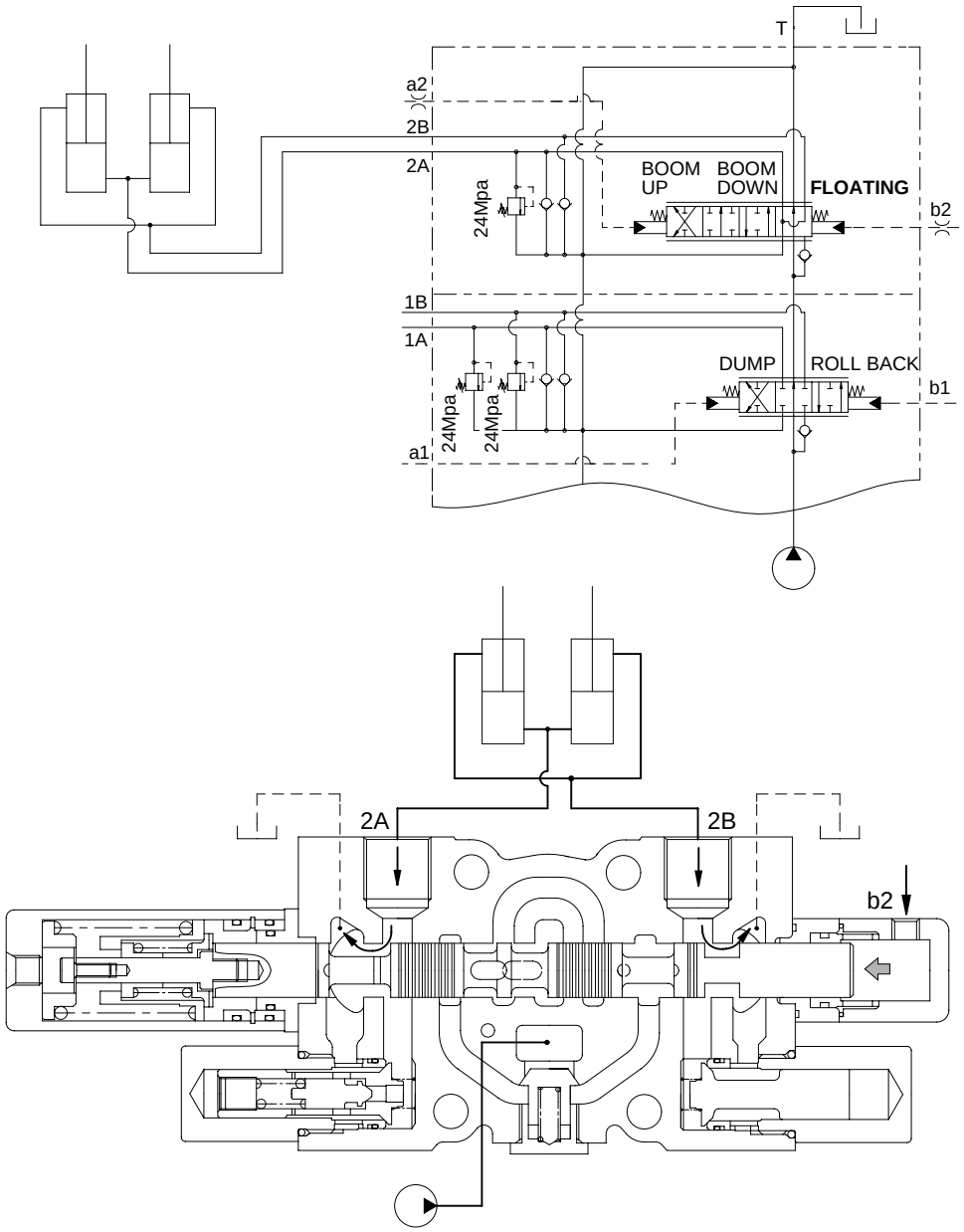
The oil supplied from the pump pushes up the load check valve(1) and flow into boom cylinder port(2B).

The pump pressure reaches proportionally the load of cylinder and fine control finished by shut off of the neutral passage.

The return oil from cylinder port(2A) flows into the tank via the low pressure passage.

When the lowering speed of boom is faster, the return oil from the large chamber of boom cylinder combines with the oil from the pump through the check valve(2), and flows into the small chamber of cylinder. This prevents cylinder cavitation by the negative pressure when the pump flow cannot match the boom lowering speed.

(4) Boom float position



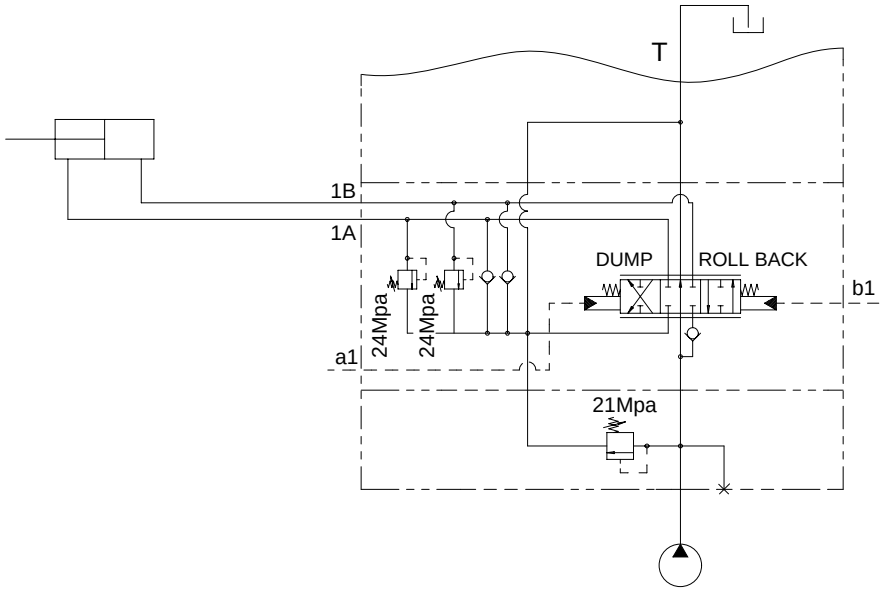
If the remote control lever pushes further more, the pilot pressure from remote control valve rises over 13-15bar and then the boom lowering spool is pushed to the boom floating position, opening up the neutral passage to tank and simultaneously(2A), (2B) → T.

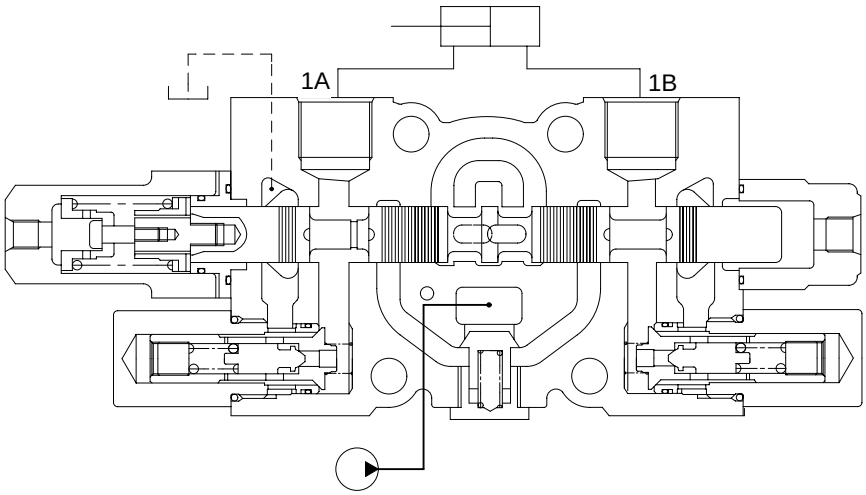
In float position the boom drops quickly due to its own weight.

When the bucket touches the ground and the wheeled loader is moving, the bucket raised or lowered following the unevenness of the ground due to the (2A), (2B) → T connecting.

3) BUCKET SECTION OPERATION

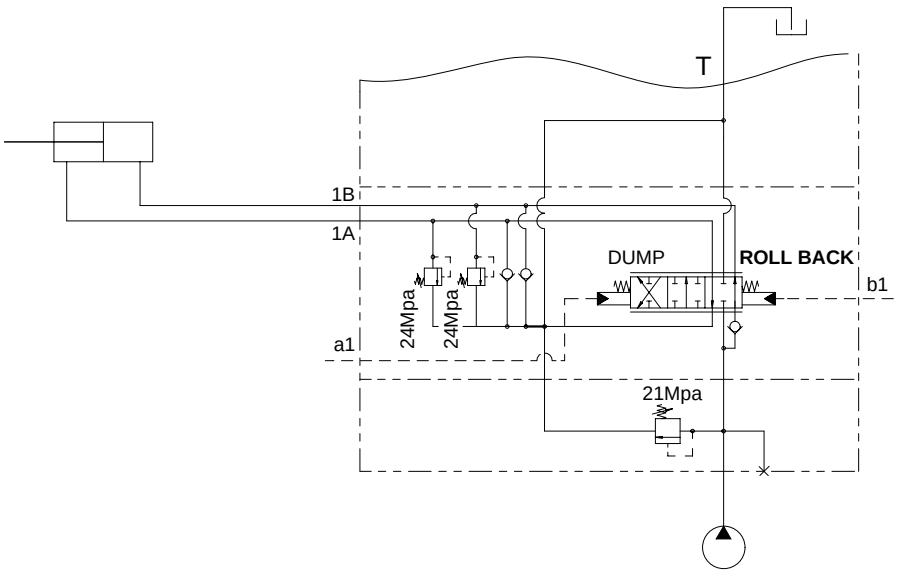
(1) Spool in neutral

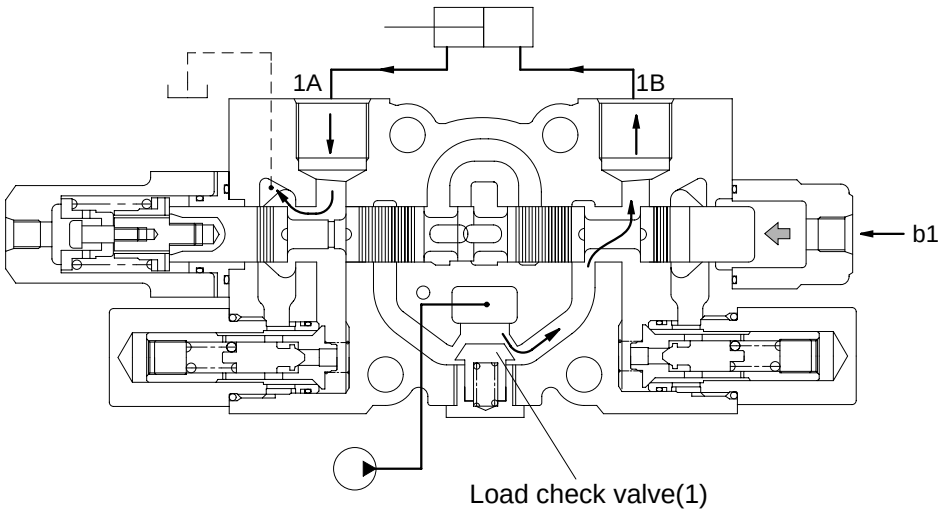




If the remote control valve is not operated, the oil supplied from the pump port passage through the neutral passage to the low pressure passage at the outlet section, and then return to the tank port.

(2) Retract(Roll back) position





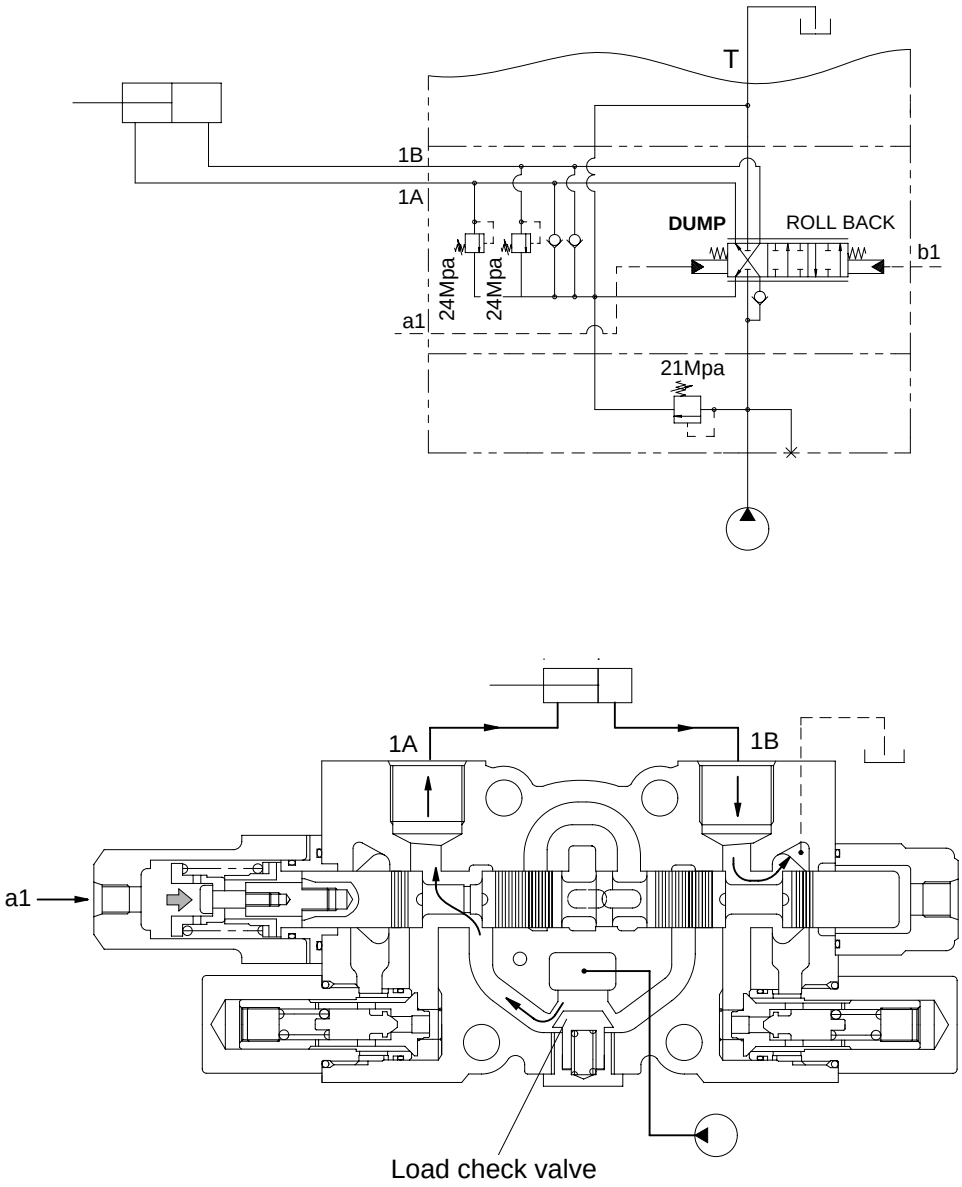
When the pilot pressure from remote control valve is supplied to the pilot port(b1), the spool moves to the left and the neutral passage is closed.

The oil supplied from the pump pushes up the load check valve(1) and flow into bucket cylinder port(1B).

The pump pressure reaches proportionally the load of cylinder and fine control finished by shut off of the neutral passage.

The return oil from cylinder port(1A) flows into the tank via the low pressure passage.

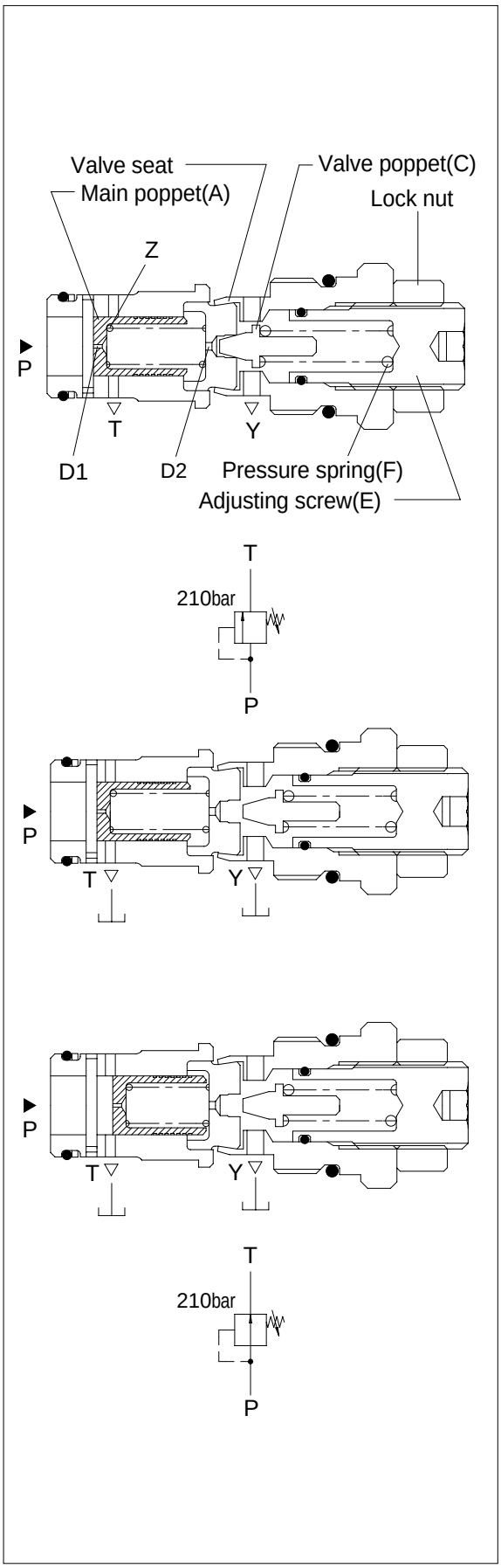
(3) Dump position



When the pilot pressure from remote control valve is supplied to the pilot port(a1), the spool moves to the right and the neutral passage is closed.
The oil supplied from the pump pushes up the load check valve(1) and flow into bucket cylinder port(1A).
The pump pressure reaches proportionally the load of cylinder and fine control finished by shut off of the neutral passage.
The return oil from cylinder port(1B) flows into the tank via the low pressure passage.

4) MAIN RELIEF VALVE

- The main relief valve is installed at the inlet of the main control valve. When the oil goes above the set pressure, the relief valve drains the oil to the tank.
  In this way, it sets the maximum pressure in the hydraulic circuit and protects the circuit.
- The valve poppet(C) is connected via the throttle drillings(D1) and (D2) with the P port.
  If static pressure increases above the set pressure valve, the valve poppet(C) opens and allows oil to flow freely to tank(Y). This oil generates a pressure drop in the spring chamber of the main poppet, the closing force of the spring(Z) is cancelled, and the main poppet(A) opens to allow the pump flow to flow to tank(T).
  Damped opening and closing is obtained by the throttled volumetric change.



5) PORT RELIEF VALVE

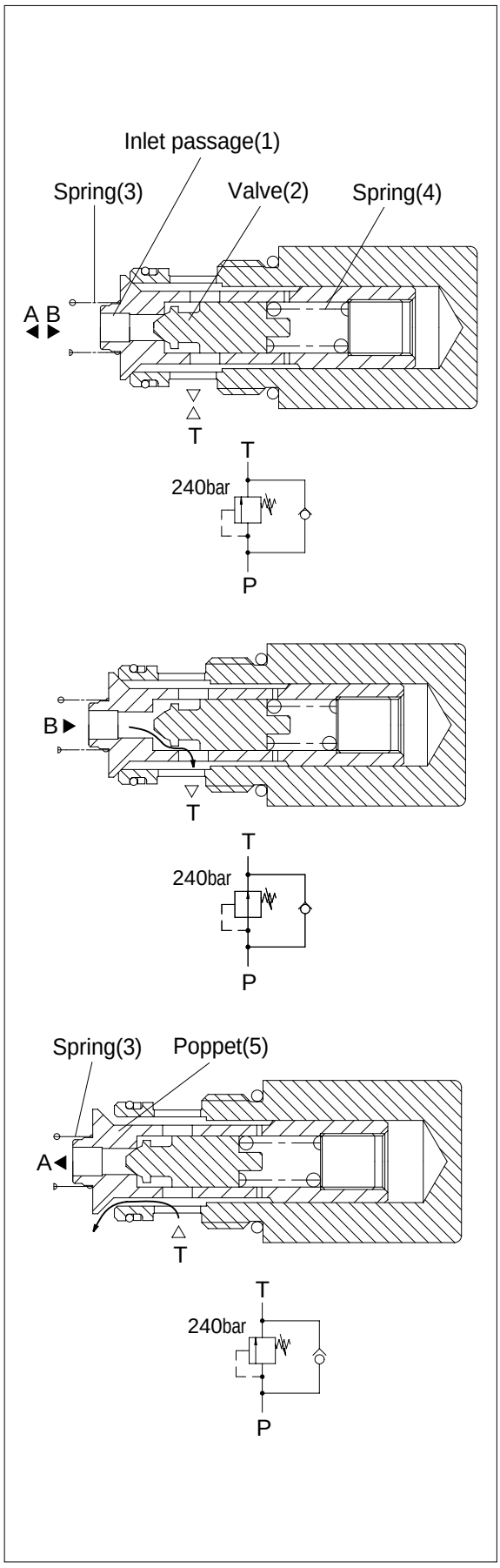
- The overload relief valve(Combined relief/anticavitation valve) is in the boom cylinder and bucket cylinder circuit in the main control valve.
  If shock causes any abnormally high pressure in the cylinder when the main valves is at neutral, the overload relief valve releases the abnormal pressure and protects the cylinder from damage.
- Pressure oil flows into passage(1). The oil acts against the left side of valve(2), when is held closed by spring(4).

  When a shock causes pressure in any of the cylinders to rise, the increase in pressure is also sensed in passage(1). As the pressure rises above the pressure setting, the oil overcomes the force of spring(4) and valve(2) will move to the right.

  Oil in passage(1) then flows past the open valve, through passage, and back to the hydraulic oil tank.

  When oil pressure returns to a level below the pressure setting, spring(4) moves valve(2) to the left and onto the seat.
- If cavitation in the workport occurs, the oil pressure in the workport drop below return pressure.

  With the workport pressure below return pressure, the return pressure works against the shoulder of the poppet(5), causing it to open against the spring(3). Return pressure oil flows into the workport to prevent cylinder cavitation.

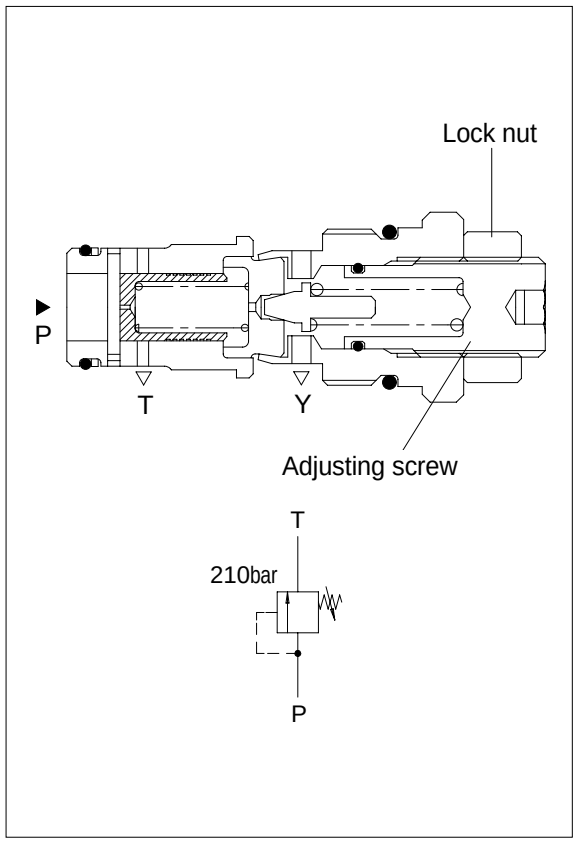


6) PRESSURE SETTING

A good pressure gage must be installed in the line which is in communication with the work port relief. A load must be applied in a manner to reach the set pressure of the relief unit.

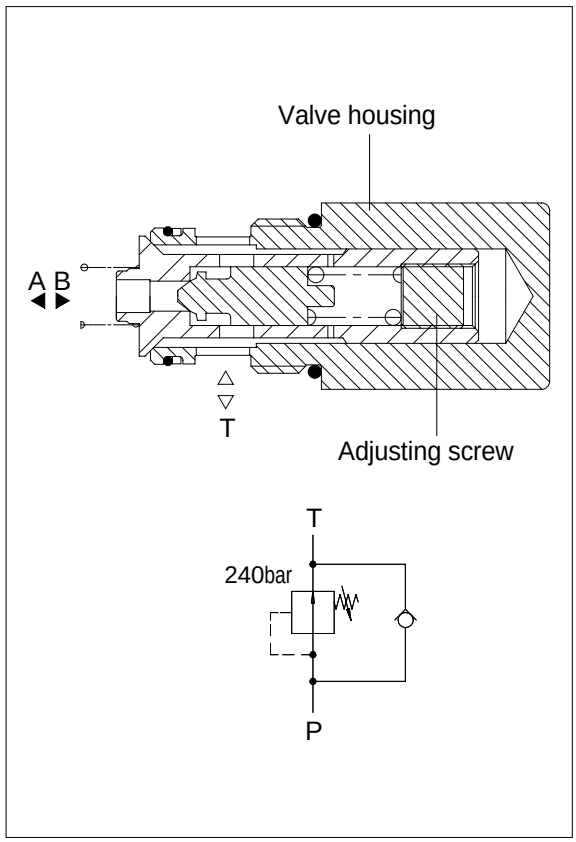
(1) Main relief valve

① Loosen lock nut.
② Set adjusting screw to desired pressure setting.
③ Tighten lock nut.
④ Retest in similar manner as above.



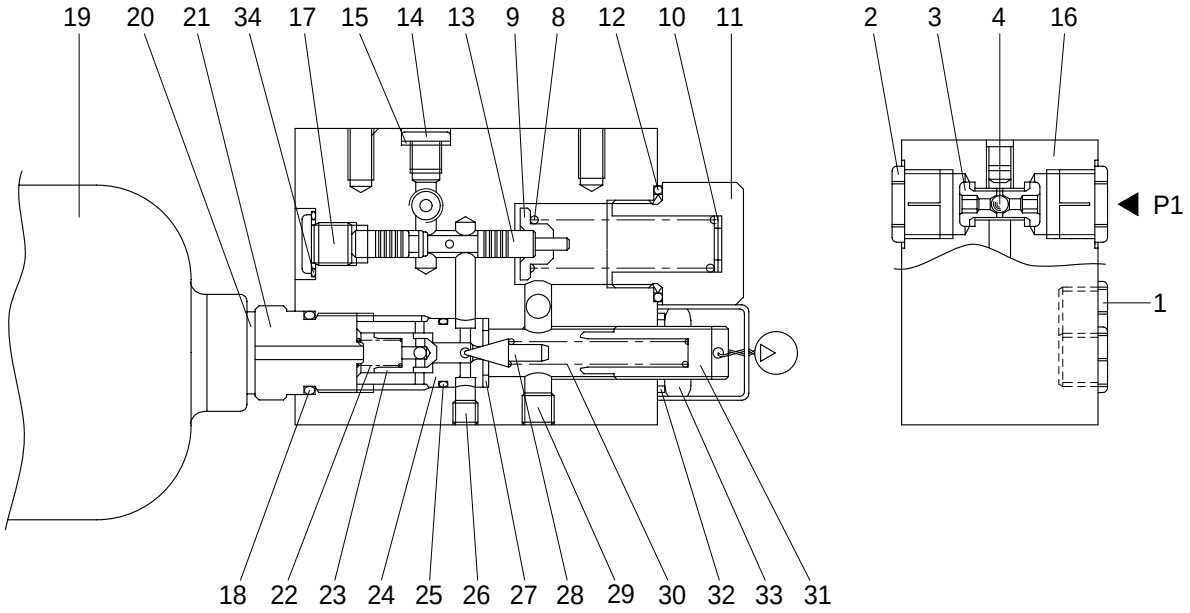
(2) Port relief valve

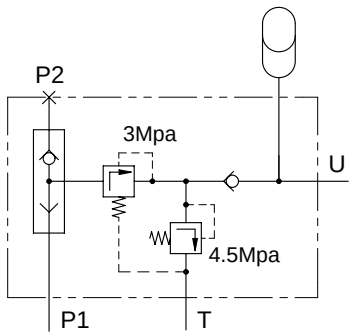
① Loosen valve housing.
② Set adjusting screw to desired pressure setting.
③ Tighten valve housing.
④ Retest in similar manner as above.



6. PILOT OIL SUPPLY UNIT

1) STRUCTURE



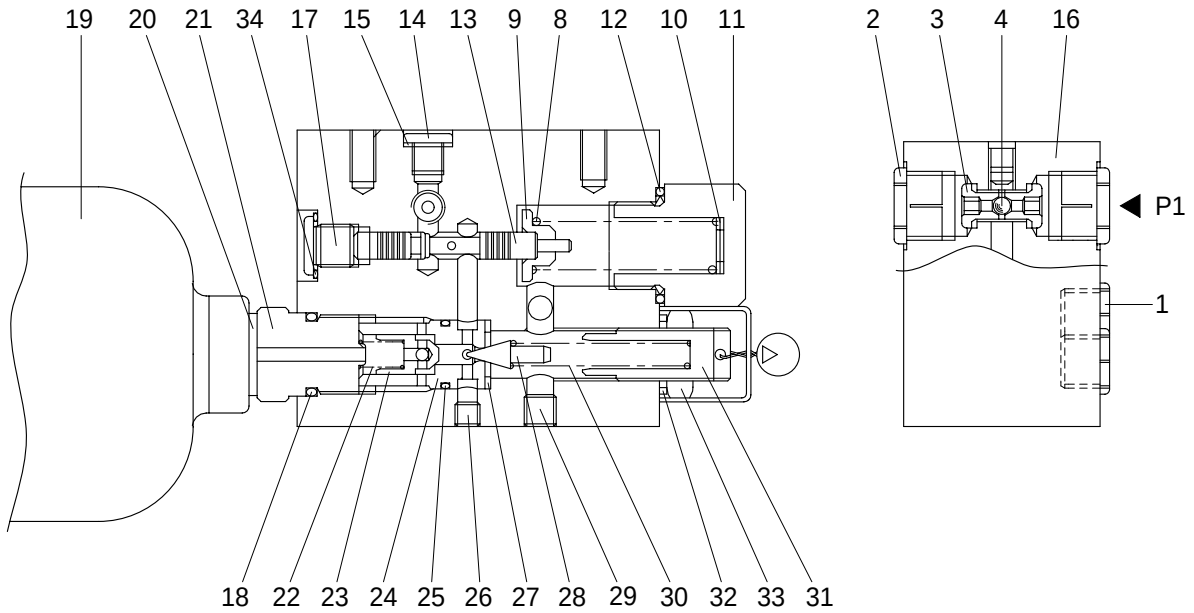


HYDRAULIC CIRCUIT

Port	Port name	Port size
P1	From main pump	3/4 UNF
P2	Pluging	3/4 UNF
U	Supply to RCV lever	9/16 UND
T	To hydraulic tank	9/16 UND

1	Plug	14	Plug	24	Valve seat
2	Plug	15	Copper washer	25	O-ring
3	Seat	16	Housing	26	Plug
4	Ball	17	Plug	27	Copper washer
8	Spring	18	O-ring	28	Valve poppet
9	Spring guide	19	Accumulator	29	Plug
10	Shim	20	Seal	30	Spring
11	Plug	21	Adapter	31	Adjusting screw
12	Seal	22	Spring	32	Washer
13	Spool	23	Check valve	33	Nut

2) OPERATION



Pilot oil supply unit are a combination of valves which reduce the pressure of medium and high pressure circuits in order to supply remote control valve with a low pressure supply of oil. They basically consist of the accumulator(19), the housing(16), a seat(3), a direct operated pressure relief valve(28) and a check valve(23).

Fluid flows from the high pressure via the shuttle valve(4) through port P1 into the unit and then to the secondary circuit. The pressure is reduced to the required level by means of spool(13) and passes via the check valve(23) into the accumulator(19) thus ensuring though port U greater control power and-when necessary-emergency operation should the main circuit be switched off or become defective.

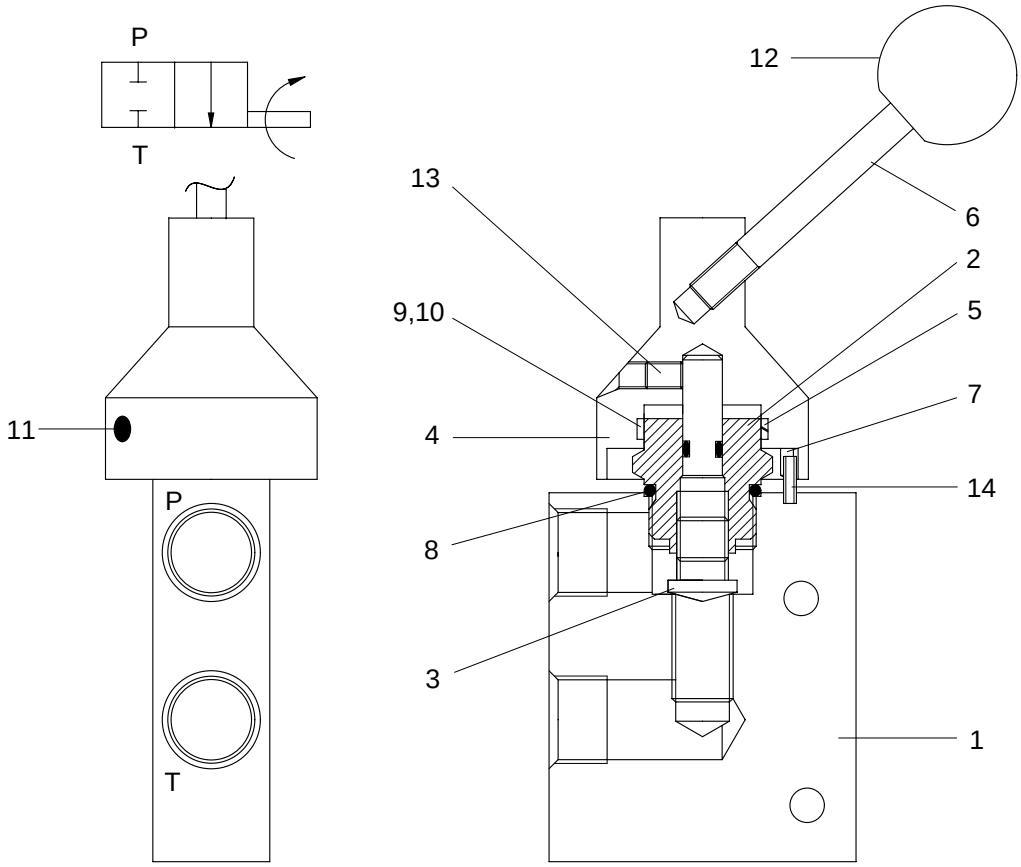
Pressure relief valve(28) protects the pilot circuit should the spool(13) fail to operate. Check valve(23) prevents the accumulator emptying into the primary circuit.

Accumulator satisfies short term peak power demands and is a source of emergency power should the main circuit pressure fail.

7. SAFETY VALVE UNIT

1) STRUCTURE

The safety valve locks or permits pilot oil flew to the main control valve operation.

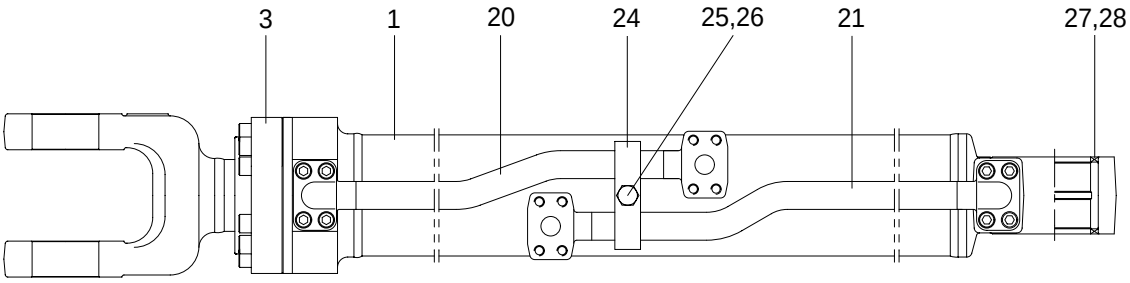


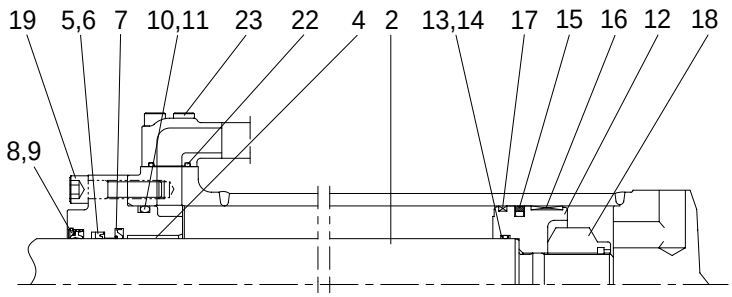
1	Body	6	Handle	11	Spring plunger
2	Retainer	7	Spring pin	12	Knob
3	Adjust stem	8	O-ring	13	Socket set screw
4	Housing	9	O-ring	14	Spring pin
5	Clutch ring	10	Back up ring		

8. BOOM AND BUCKET CYLINDER

The boom cylinders are two unit and the bucket cylinder is one unit. They use a bolt on rod guide.
The piston(12) threads on to the rod(2) and is retained by a nylon nut(18).
The piston seals(15) against the tube(1) with dust ring(17). Two wear rings(16) are located on each side of the piston seal.
The gland(3, the rod guide) seals against the tube with an O-ring(10). The cylinder thread seals against the rod with a lip type buffer ring(7) and a rod seal(5). A dust wiper(8) cleans the rod when it is retracted.

1) BOOM CYLINDER

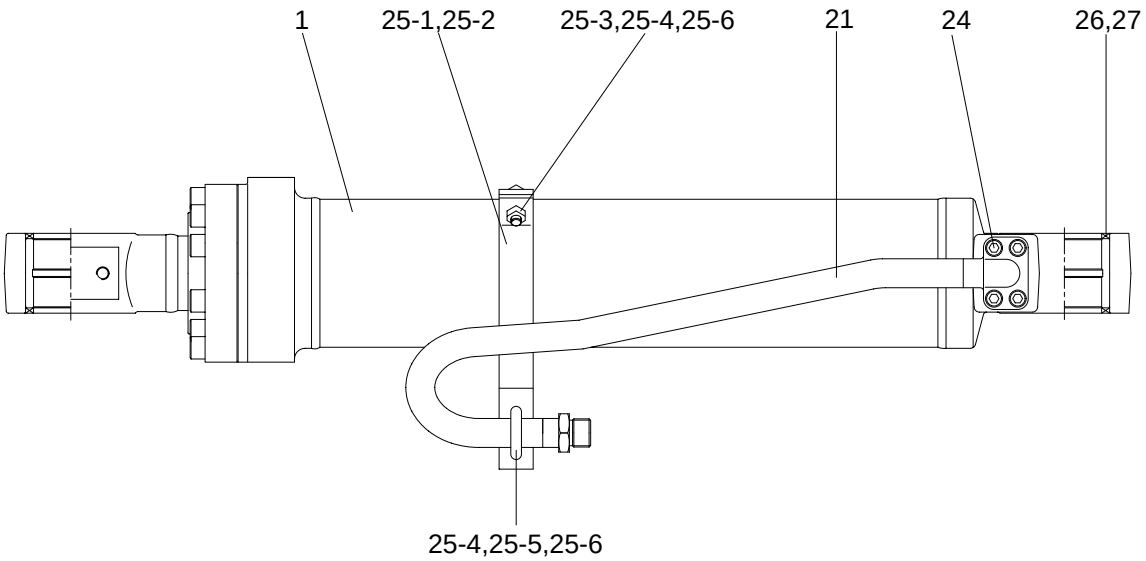


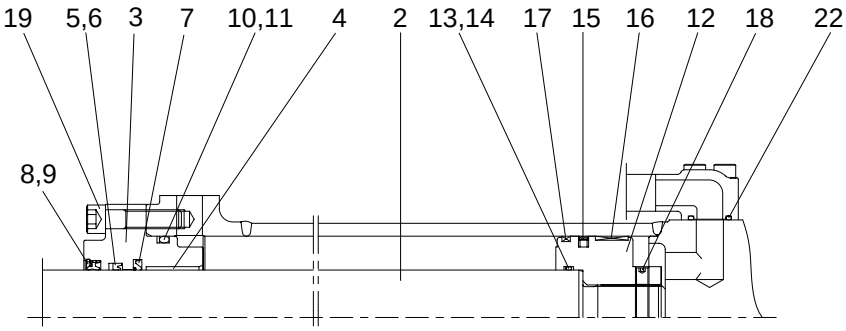


INTERNAL DETAIL

1	Tube assy	11	Back up ring	21	Pipe assy
2	Rod assy	12	Piston	22	O-ring
3	Gland	13	O-ring	23	Socket bolt
4	Bushing	14	Back up ring	24	Pipe clamp
5	Rod seal	15	Piston seal	25	Hexagon bolt
6	Back up ring	16	Wear ring	26	Spring washer
7	Buffer ring	17	Dust ring	27	Bushing
8	Dust wiper	18	Nylon nut	28	Dust seal
9	Snap ring	19	Socket bolt		
10	O-ring	20	Pipe assy		

2) BUCKET CYLINDER





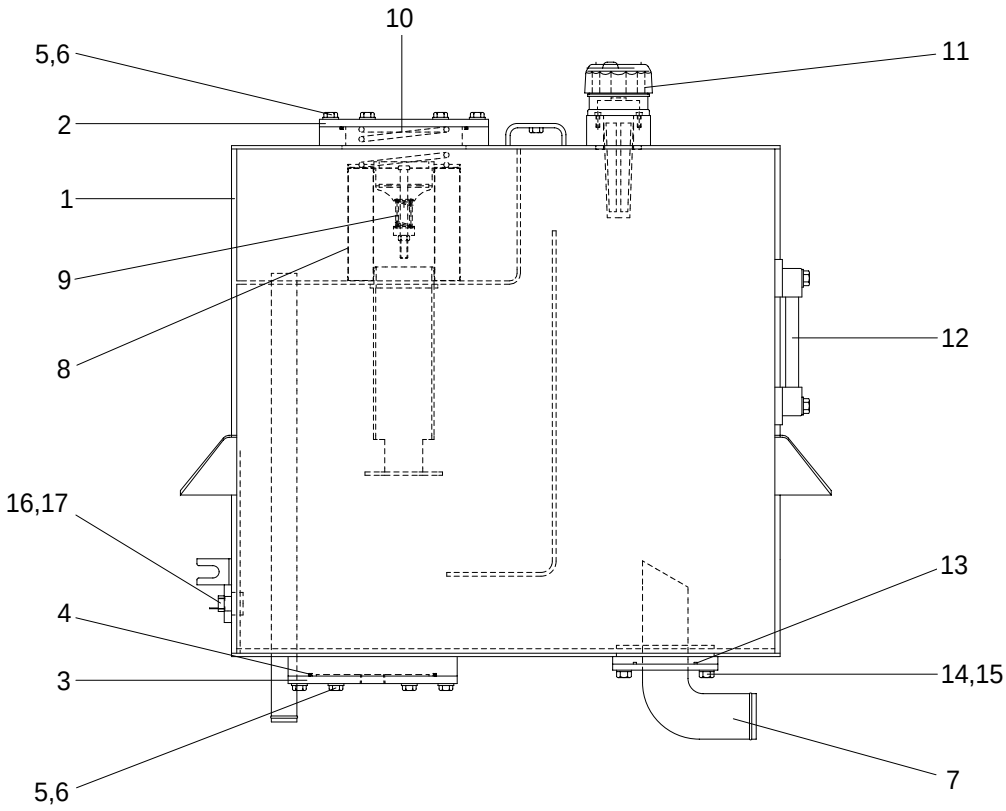
INTERNAL DETAIL

1	Tube assy	12	Piston	25	Band assy
2	Rod assy	13	O-ring	25-1	Band sub assy
3	Gland	14	Back up ring	25-2	Band
4	Bushing	15	Piston seal	25-3	Hexagon bolt
5	Rod seal	16	Wear ring	25-4	Spring washer
6	Back up ring	17	Dust ring	25-5	U-bolt
7	Buffer ring	18	Set screw	25-6	Hexagon nut
8	Dust wiper	19	Socket bolt	26	Bushing
9	Snap ring	21	Pipe assy	27	Dust seal
10	O-ring	22	O-ring		
11	Back up ring	24	Socket bolt		

9. HYDRAULIC OIL TANK

1) STRUCTURE

- The oil from the hydraulic tank is sent from the pump through control valve to the cylinders. In the return circuit, the oil from various parts merges.
- A part of oil is cooled in the oil cooler(If equipped), passes through the hydraulic filter and returns to the hydraulic tank(1).
- If the hydraulic return oil filter becomes clogged, return filter bypass valve(9) acts to allow the oil to return directly to the hydraulic tank(1). This prevents damage to the hydraulic filter(8). The bypass valve(9) is also actuated when negative pressure is generated in the circuit.



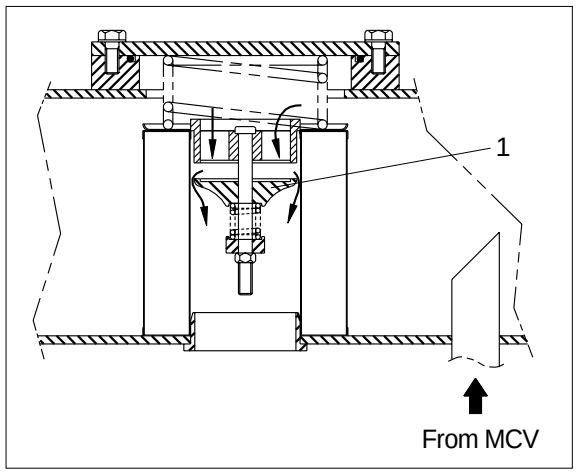
1	Hydraulic tank	7	Pipe	13	O-ring
2	Cover	8	Element	14	Bolt
3	Cover	9	Bypass valve	15	Hardened washer
4	O-ring	10	Spring	16	Overheat switch
5	Bolt	11	Air breather	17	O-ring
6	Hardened washer	12	Level gauge		

2) RETURN OIL FILTER BYPASS VALVE

(1) When the filter is clogged

Bypass valve(1) is opened and the oil returns directly to the tank without passing through the filter.

Bypass valve set pressure : 1.36kgf/cm^2 (19.3psi)



3) AIR BREATHER

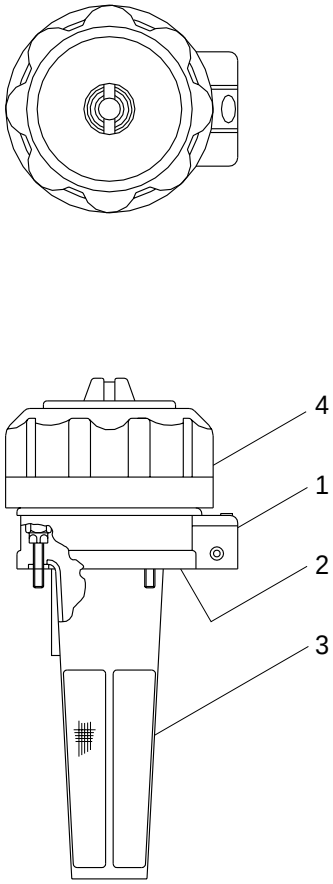
The air breather is equipped with the capacity to perform three functions simultaneously-as an air filter, breathing valve, and as a lubrication opening.

(1) Preventing negative pressure inside the tank

The tank is a pressurized sealed type, so negative pressure is formed inside the hydraulic tank when the oil level drops during operations. When this happens, the difference in pressure between the tank and the outside atmospheric pressure opens the poppet in the breather, and air from the outside is let into the tank or prevent negative pressure.

(2) Preventing excessive pressure inside the tank

When the hydraulic cylinder is being used, the oil level in the hydraulic system increases and as temperature rises. If the hydraulic pressure rises above the set pressure, breather is actuated to release the hydraulic pressure inside the tank.

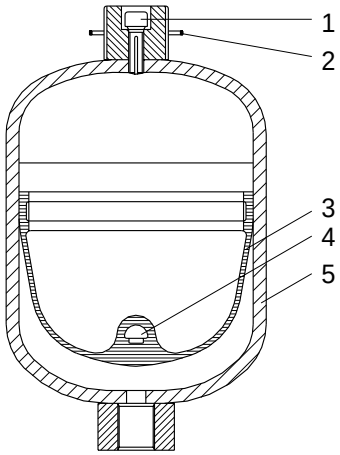


1	Body	3	Strainer
2	Element	4	Cap

10. ACCUMULATOR

The accumulator is installed at the pilot oil supply unit. When the boom is left the raised position, and the control levers are operated with the engine stopped the pressure of the compressed nitrogen gas inside the accumulator sends pilot pressure to the control valve to actuate it and allow the boom and bucket to come down under their own weight.

Type of gas	Nitrogen gas(N_2)
Volume of gas	0.75 ℓ (0.2 U.S.gal)
Charging pressure of gas	16kgf/cm^2(228psi)
Max actuating pressure	30kgf/cm^2(427psi)



1 Screw plug
2 Sealing ring
3 Diaphragm
4 Closure button
5 Steel pressure vessel