

GROUP 4 MAIN CONTROL VALVE

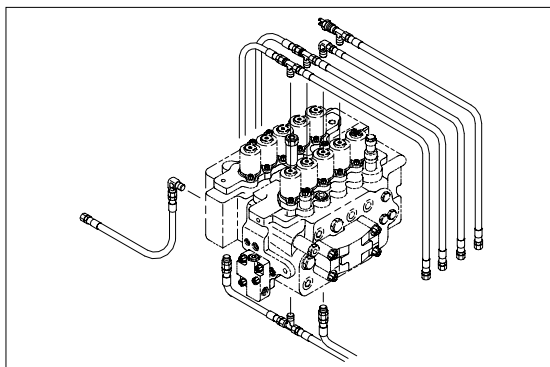
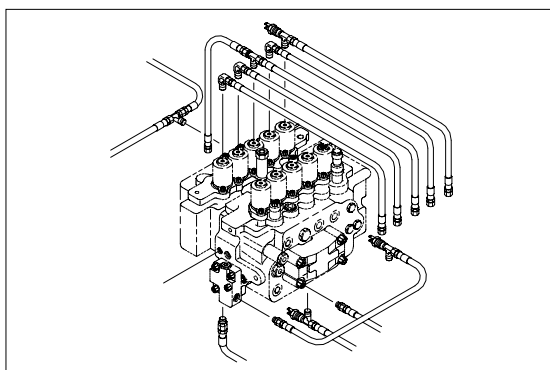
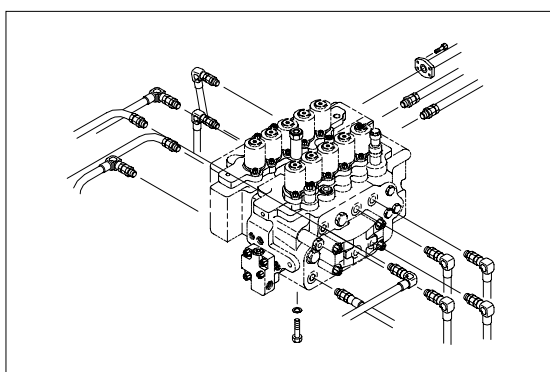
1. REMOVAL AND INSTALL

1) REMOVAL

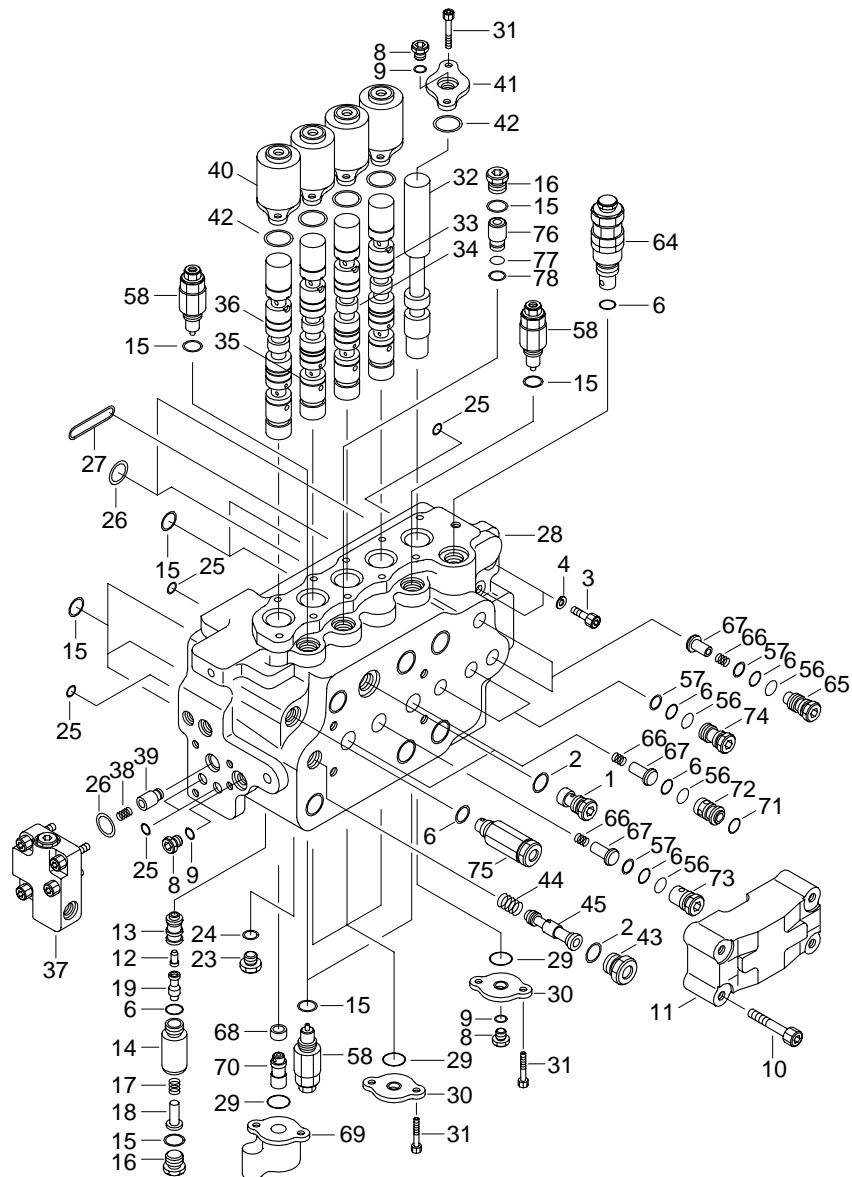
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
 - ▲ Escaping fluid under pressure can penetrate the skin causing serious injury.
 - ※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.
- (4) Remove bolts and disconnect pipe.
- (5) Disconnect pilot line hoses.
- (6) Disconnect pilot piping.
- (7) Sling the control valve assembly and remove the control valve mounting bolt.
 - Weight : 135kg(298lb)
- (8) Remove the control valve assembly.
 - ※ When removing the control valve assembly, check that all the piping have been disconnected.

2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from below items.
 - ① Cylinder (boom, arm, bucket).
 - ② Swing motor.
 - ③ Travel motor.
 - ※ See each item removal and install.
- (3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

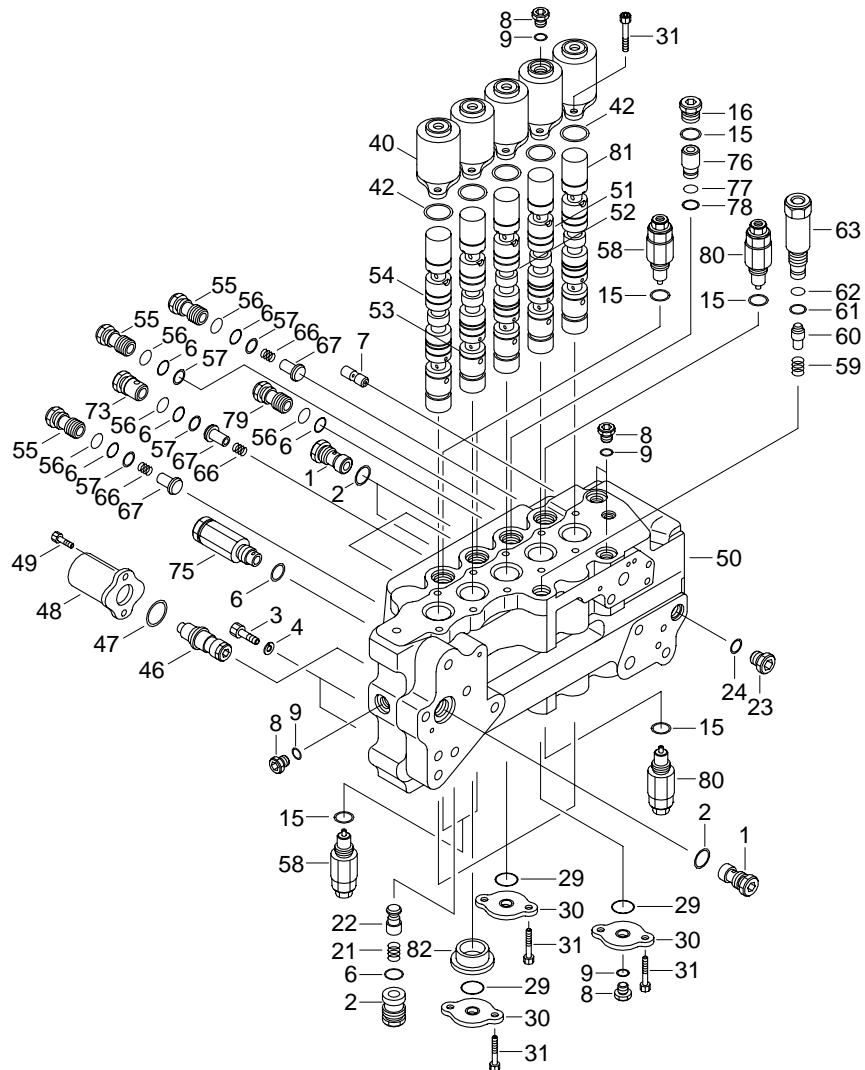


2. STRUCTURE(1/2)



1	Cap	14	Cap	26	O-ring
2	O-ring	15	O-ring	27	O-ring
3	Socket bolt	16	Cap	28	Housing
4	Spring washer	17	Spring	29	O-ring
6	O-ring	18	Spring guide	30	Retainer
7	Orifice	19	Spool	31	Socket bolt
8	Cap	20	Cap	32	Plunger assy
9	O-ring	21	Spring	33	Plunger assy(Dozer)
10	Cover	22	Check	34	Plunger assy(SW)
11	Socket bolt	23	Cap	35	Plunger assy(BM2)
12	Piston	24	O-ring	36	Plunger assy(AM1)
13	Sleeve	25	O-ring	37	Cover assy

STRUCTURE(2/2)



38	Spring	53	Plunger assy(BM1)	68	Spacer
39	Poppet	54	Plunger assy(AM2)	69	Cover
40	Cover	55	Cap	70	Piston
41	Retainer	56	Back up ring	71	O-ring
42	O-ring	57	Nylon chip	72	Sleeve
43	Cap	58	Overload assy	73	Cap
44	Spring	59	Spring	74	Cap
45	Spool	60	Check	75	Foot relief assy
46	Spool	61	O-ring	76	Plug
47	O-ring	62	Back up ring	77	Back up ring
48	Cover	63	Cap	78	O-ring
49	Socket bolt	64	Main relief assy	79	Cap
50	Housing	65	Cap	80	Make up assy
51	Plunger assy(OPT)	66	Spring	81	Plunger(TR)
52	Plunger assy(BKT)	67	Check	82	Stopper

3. DISASSEMBLY AND ASSEMBLY

1) PRECAUTION

(1) Disassembly

- ① Handle the components carefully not to drop them or bump them with each other as they are made with precision.
- ② Do not force the work by hitting or twisting as burred or damaged component may not be assembled or result in oil leakage or low performance.
- ③ When disassembled, tag the components for identification so that they can be reassembled correctly.
- ④ Once disassembled, O-rings and backup rings are usually not to be used again. (Remove them using a wire with its end made like a shoehorn. Be careful not to damaged the slot.)
- ⑤ If the components are left disassembled or half-disassembled, they may get rust from moisture or dust. If the work has to be interrupted, take measures to prevent rust and dust.

(2) Assembly

- ① Take the same precautions as for disassembly.
- ② When assembling the components, remove any metal chips or foreign objects and check them for any burrs or dents. Remove burrs and dents with oil-stone, if any.
- ③ O-rings and backup rings are to be replaced with new ones, as a rule.
- ④ When installing O-rings and backup rings, be careful not to damage them. (Apply a little amount of grease for smoothness.)
- ⑤ Tighten the bolts and caps with specified torque. (See **Disassembly/Assembly**.)

2) MOUNTING AND DISMOUNTING VALVES

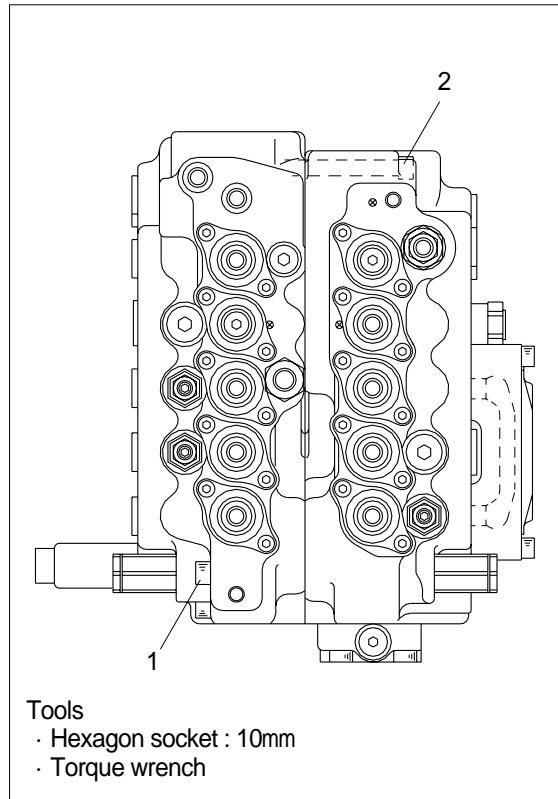
(1) Disassembly

- ① Remove socket bolts(1, 2) and separate 4 spool valve and 5 spool valve.

(2) Assembly

※ Valves should be mounted after making sure that all O-rings and caps are placed on the assembling faces of 4 plunger valve.

- ① Carry out assembly in the reverse manner of disassembly.
- ② Tighten the bolts to the specified torque.
 - Tightening torque : 10kgf · m(72.3lbf · ft)

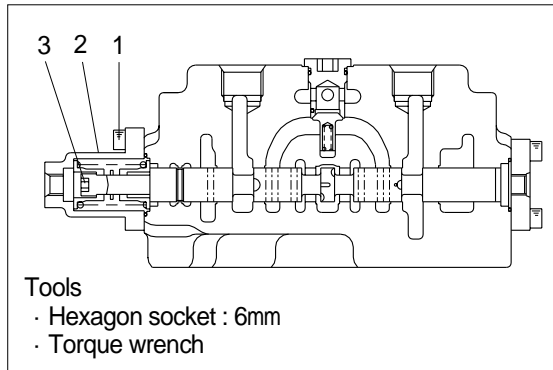


3) PLUNGER

- (1) Loosen socket bolt (1) to remove cover (2).

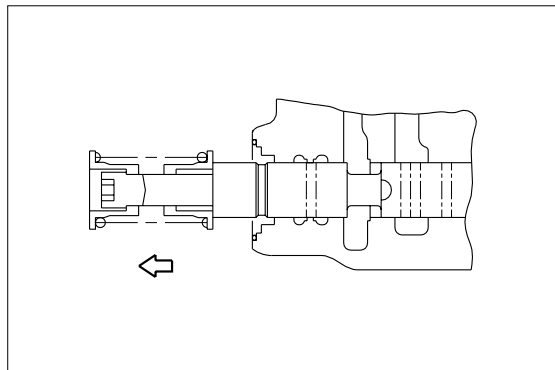
· Tightening torque : 3kgf · m(21.7lbf · ft)

- ※ Install cover (2) after making sure that O-ring is placed on the edge of the valve hole.



- (2) Pull the plunger out while holding the spring.

- ※ Do not pull it out violently, but draw it out gently while making sure of its contact with HG hole.

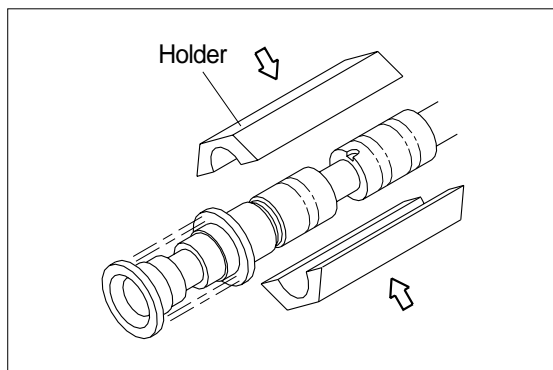


- (3) Place the plunger between holders and loosen plunger cap (3) by using a vise.

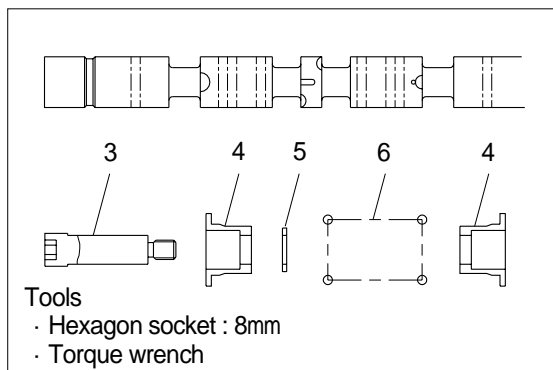
- Plunger cap

Hexagon socket : 8mm

Tightening torque : 6kgf · m(43.4lbf · ft)



- (4) Remove plunger cap (3), guide (4), sleeve (5) and spring (6) in this order.

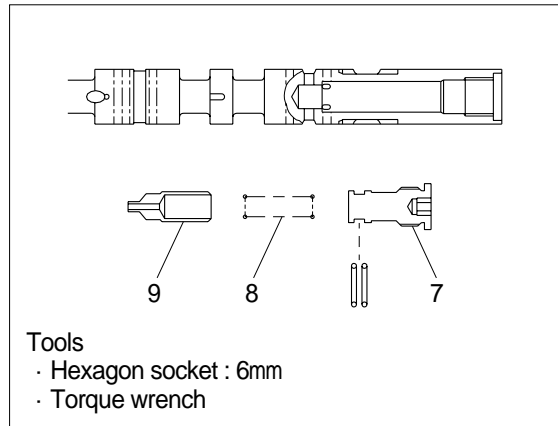


- (5) Arm plunger only (Remove check)
Remove cap (7) and disassemble spring (8) and check (9).

• Plunger cap

Hexagon socket : 6mm

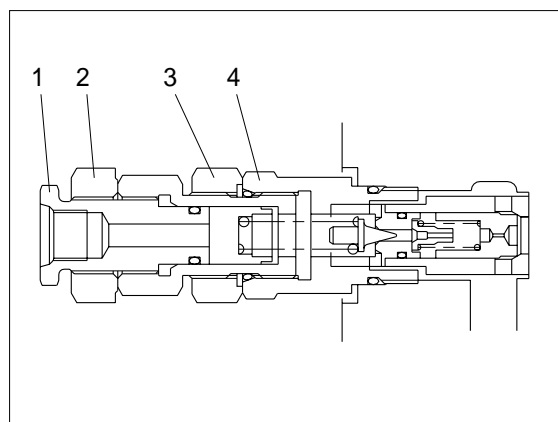
Tightening torque : 3kgf · m(21.7lbf · ft)



4) MAIN RELIEF ASSEMBLY

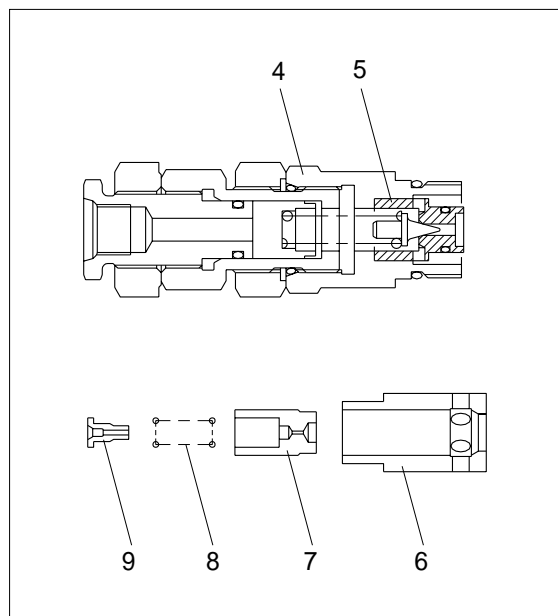
Relief assy is assembled into a single block as a cartridge. Do not disassemble the relief assembly as a rule.

- (1) Loosen the hexagon nut(2) with a holding adjust screw(1).
- (2) Loosen the hexagon nut(3) with a holding cap(4)
- (3) Loosen the cap(4) and remove the cartridge.



- (4) Pull out the sleeve(6) and take off the main poppet(7), spring(8) and orifice(9).
- ※ Can't remove the pilot seat(5) from the cap(4), because it was locked at the cap.
- (5) Loosen each screw and remove.

Item No.	Name	Socket
1	Adjust screw	22mm
2	Hexagon nut	30mm
3	Hexagon nut	30mm
4	Cap	30mm

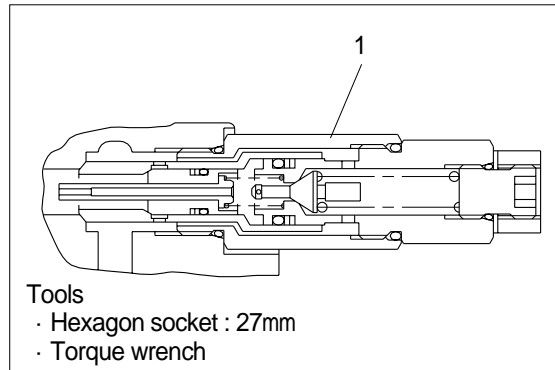


5) OVERLOAD RELIEF ASSEMBLY

Relief assembly is assembled into a single block as a cartridge. Do not disassemble the relief assembly as a rule.

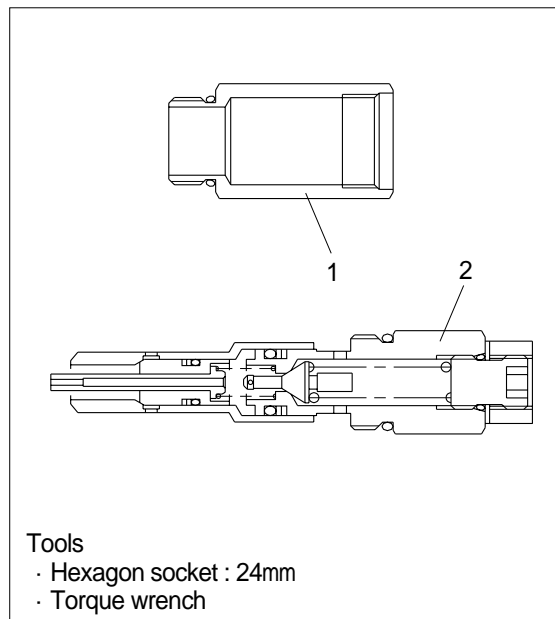
- (1) Loosen the relief sleeve (1) and remove the cartridge.

· Tightening torque : 4kgf · m(29lbf · ft)



- (2) Loosen the relief seat (2) and remove the subassembly.

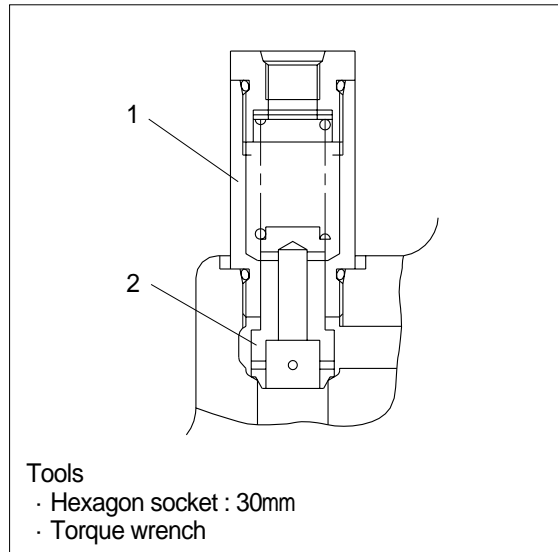
· Tightening torque : 6kgf · m(43.4lbf · ft)



6) FOOT RELIEF ASSEMBLY

- (1) Loosen socket bolt(1) and remove poppet (2).

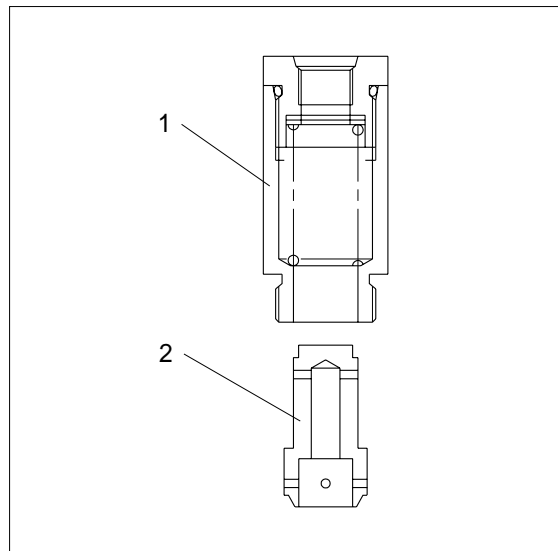
· Tightening torque : 6kgf · m(43.4lbf · ft)



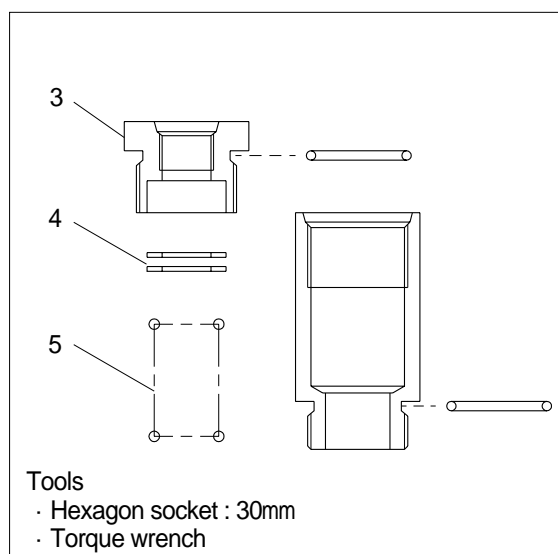
- (2) Remove cap (3) and take off shim (4) and spring (5).

· Tightening torque : 6kgf · m(43.4lbf · ft)

※ Make sure adjust shim quantity.



- (3) Remove the poppet (3) and take off piston (4) and spring (5,6).

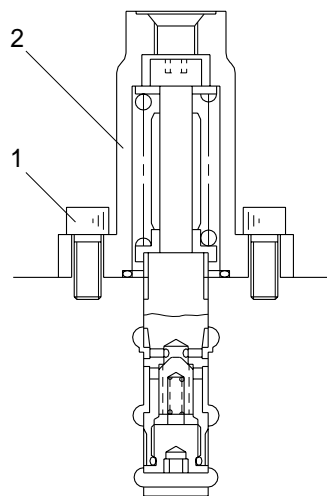


7) BP VALVE ASSEMBLY

(1) Loosen the socket bolt(1) and remove the cover(2).

· Tightening torque : 1.2kgf · m(8.7lbf · ft)

※ Install cover(2) after making sure that O-ring is placed on the edge of the valve hole.



Tools

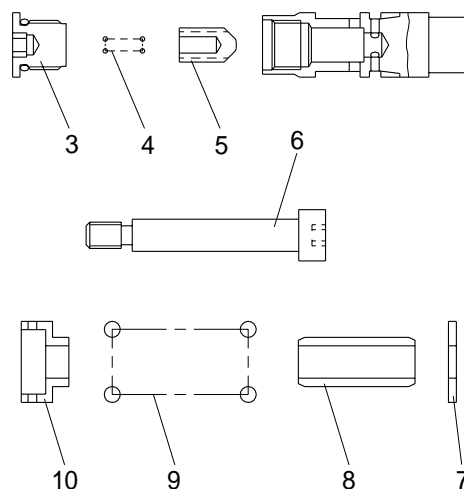
- Hexagon socket : 5mm
- Torque wrench

(2) Place the plunger between holders and remove the cap(3) by using a vise; take off spring(4) and check(5).

Loosen the socket bolt(6) and remove spring guide(7, 10), spacer(8) and spring(9).

· Tightening torque

Item No.	Part name	kgf · m	lbf · ft
3	Cap	3.5	25.3
6	Socket bolt	3	21.7



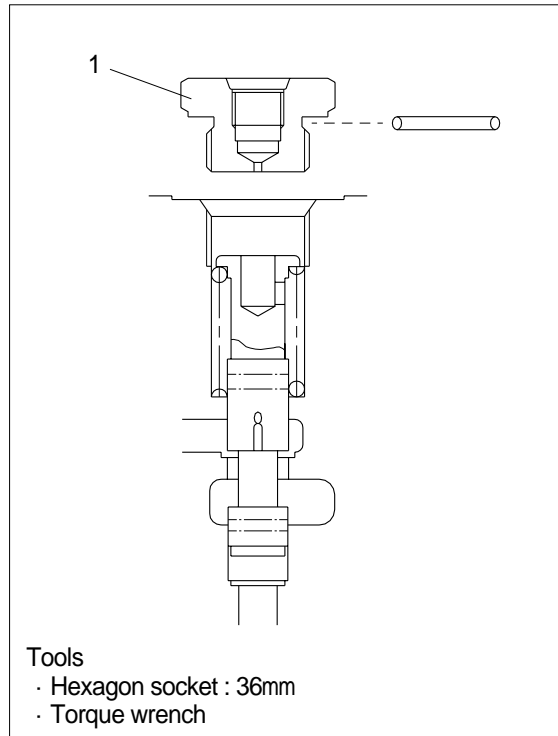
Tools

- Hexagon socket : 6mm
- Torque wrench

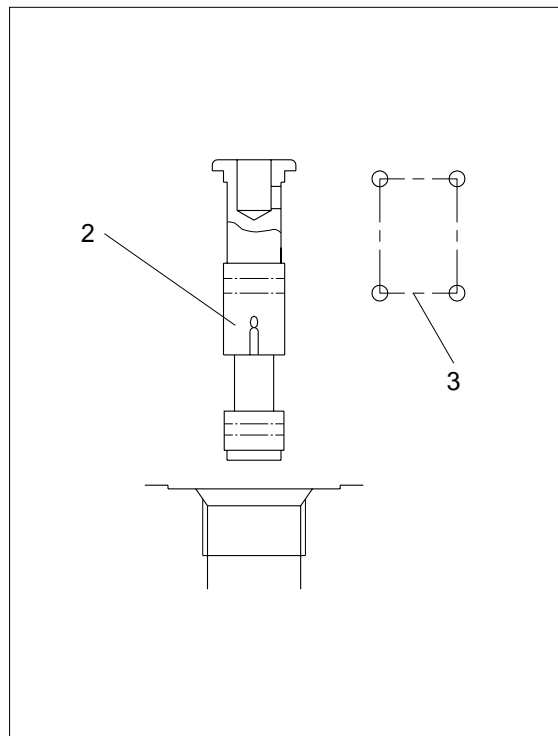
8) CENTER BYPASS VALVE ASSEMBLY

(1) Remove cap (1).

· Tightening torque : 8kgf · m(57.9lbf · ft)

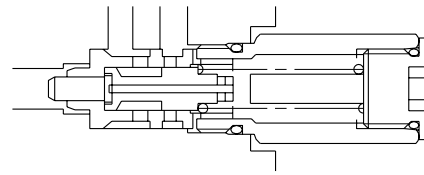


(2) Remove spool (2) and spring (3).



9) ARM REGENERATION VALVE

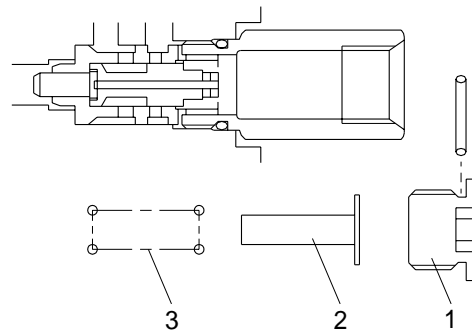
- (1) Remove cap (1) and take off spring guide (2) and spring(3).
· Tightening torque : 6kgf · m(43.4lbf · ft)



Tools

- Hexagon socket : 10mm
- Torque wrench

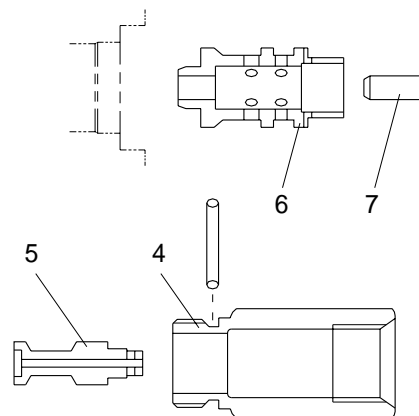
- (2) Remove cap(4) and take off spool(5).



Tools

- Hexagon socket : 27mm
- Torque wrench

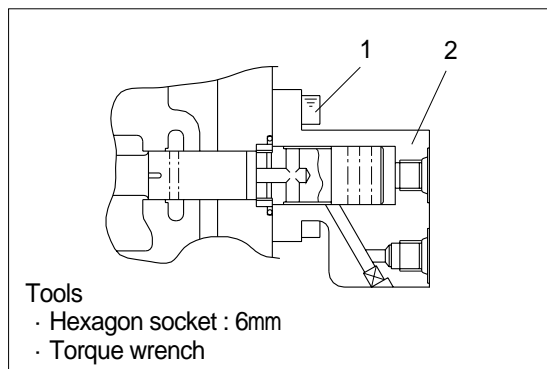
- (3) Take off sleeve(6) and piston(7).



10) ARM STROKE LIMIT ASSEMBLY

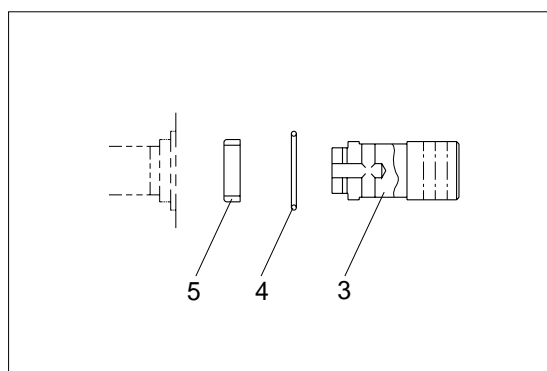
- (1) Loosen the socket bolt(1) and remove cover(2).

· Tightening torque : 3kgf · m(21.7lbf · ft)



- (2) Remove piston(3) and take off O-ring(4), spacer(5) from the valve hole.

※ Make sure inserting direction of the spacer.



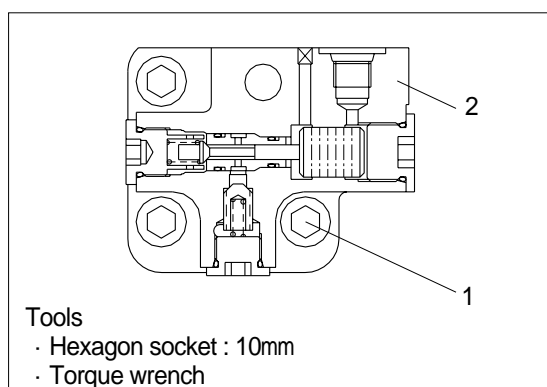
11) ARM LOAD HOLDING VALVE

(1) Basic unit

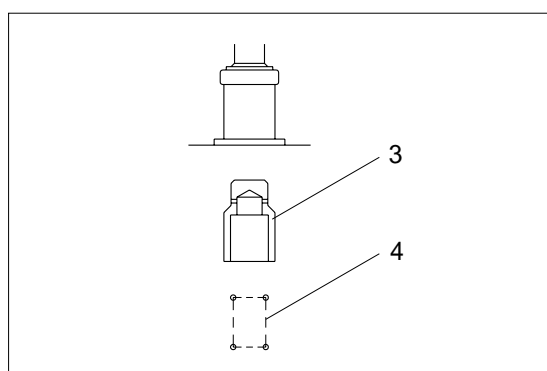
- ① Loosen socket bolt (1) and remove cover assembly (2).

· Tightening torque : 10kgf · m(72.3lbf · ft)

※ Install cover assembly (2) after making sure that O-ring is placed on the edge of the valve hole.



- ② Take off spring(3) and check valve(4).

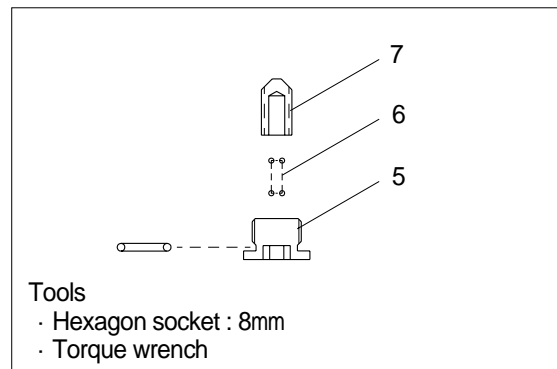
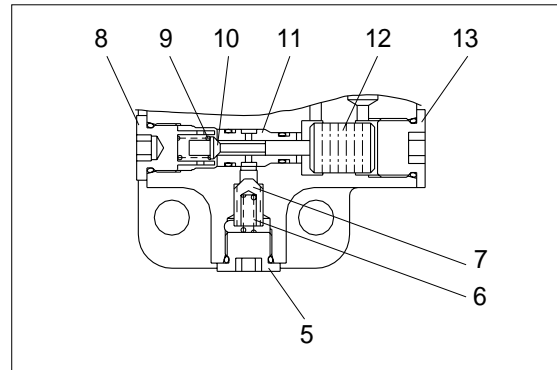


(2) Cover assembly

① Remove cap (5).

Take off spring (6) and check valve (7).

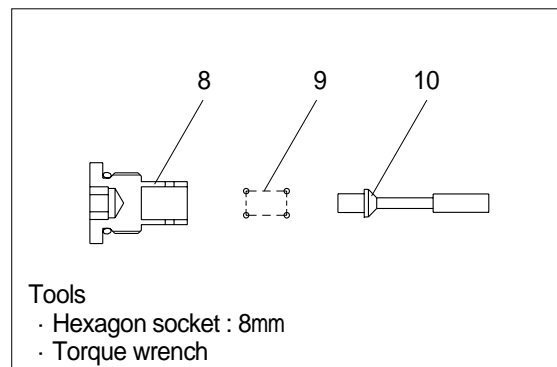
- Tightening torque : 5 kgf · m(36.2 lbf · ft)



② Remove cap (8).

Take off spring (9) and poppet (10).

- Tightening torque : 5 kgf · m(36.2 lbf · ft)

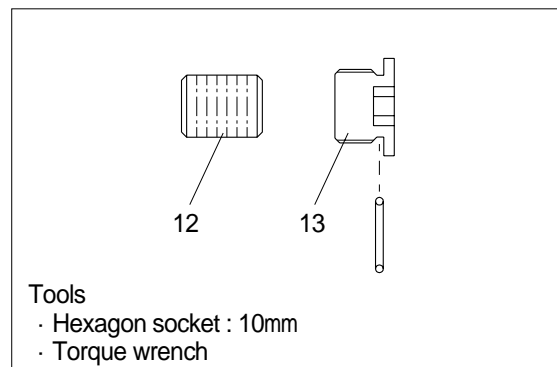


③ Remove cap (13) and take off piston (12).

- Tightening torque : 6 kgf · m(43.4 lbf · ft)

④ Push sleeve (11) out with a rod or the like through the hole of cap (13).

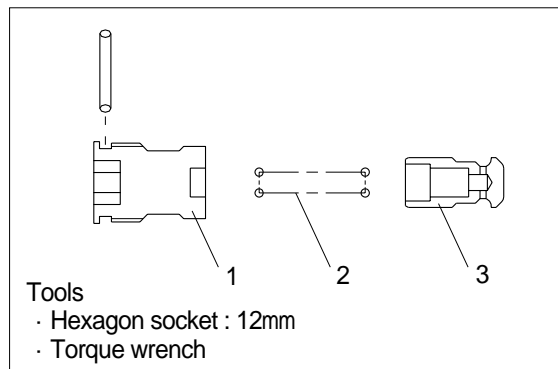
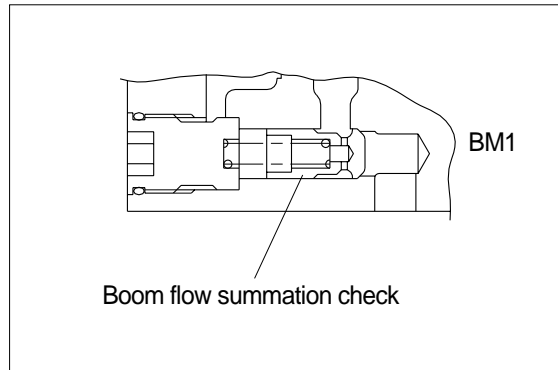
- ※ Be careful not to damage the guideway ($\varnothing 5$) of the sleeve.



12) BOOM FLOW SUMMATION CHECK

- (1) Remove the cap(1) and take off spring(2) and check(3).

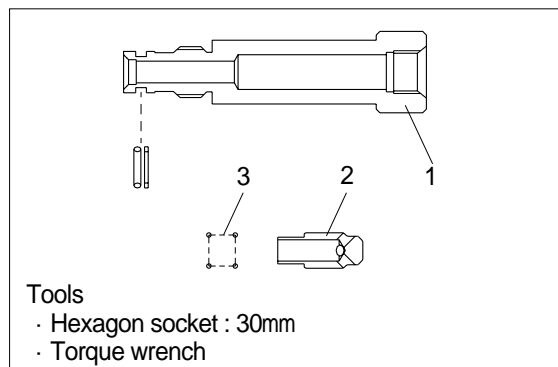
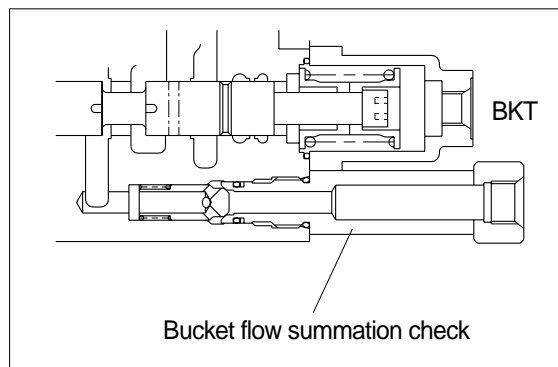
· Tightening torque : 10kgf · m(72.3lbf · ft)



13) BUCKET FLOW SUMMATION CHECK

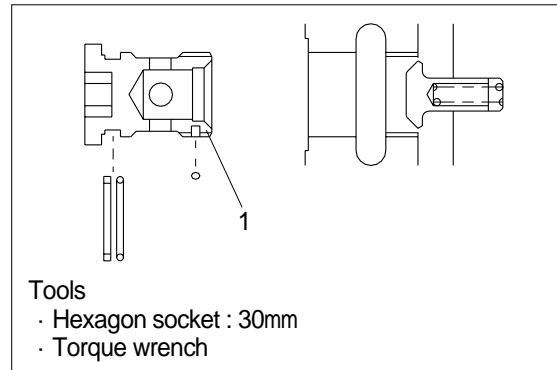
- (1) Remove the cap(1) and take off check(2) and spring(3).

· Tightening torque : 6kgf · m(43.4lbf · ft)



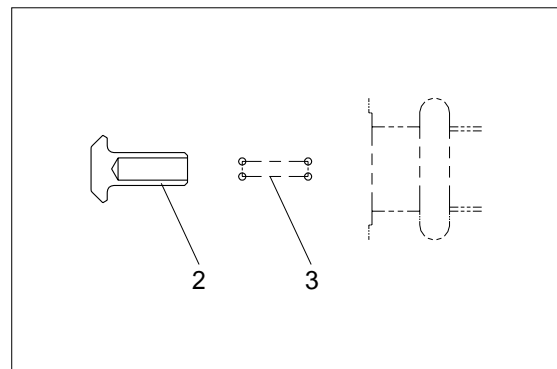
14) CHECK ASSEMBLY(BOOM, BUCKET, OPT)

(1) Remove cap(1).



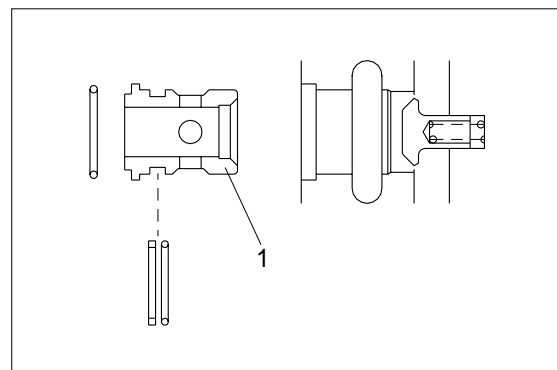
(2) Remove spring(2) and check valve(3).

· Tightening torque : 15kgf · m(108.5lbf · ft)

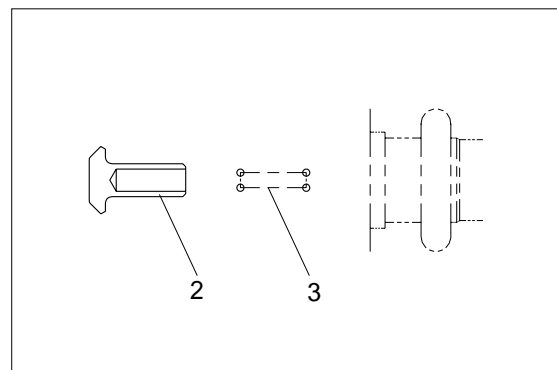


15) CHECK ASSEMBLY(SWING, ARM 1)

(1) Remove sleeve(1).



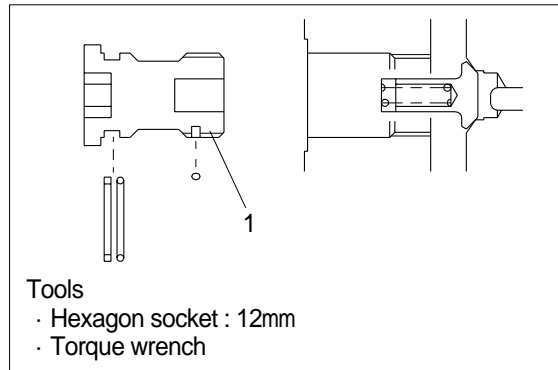
(2) Remove check valve(2) and spring(3).



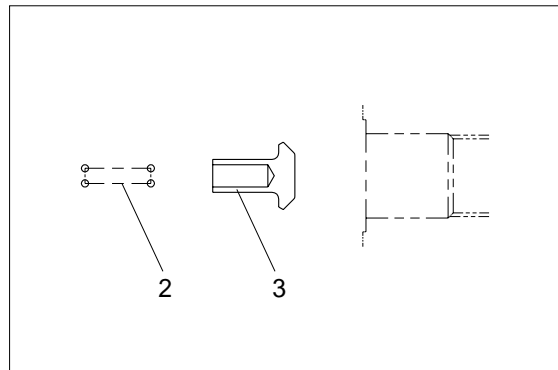
16) CHECK ASSEMBLY(ARM 2)

(1) Remove cap(1).

· Tightening torque : 15kgf · m(108.5lbf · ft)



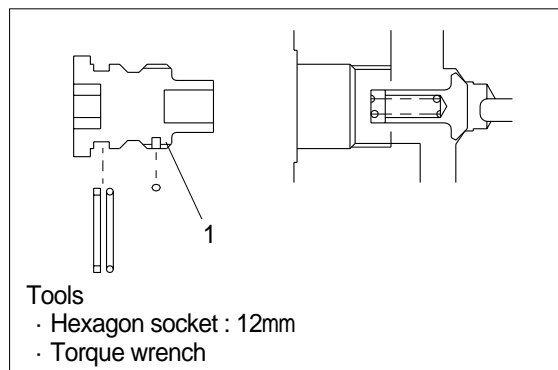
(2) Take off spring(2) and check valve(3).



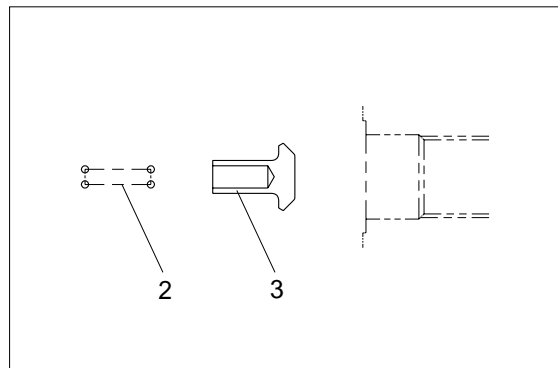
17) CHECK ASSEMBLY(P1)

(1) Remove cap(1).

· Tightening torque : 15kgf · m(108.5lbf · ft)



(2) Remove spring(2) and check valve(3).



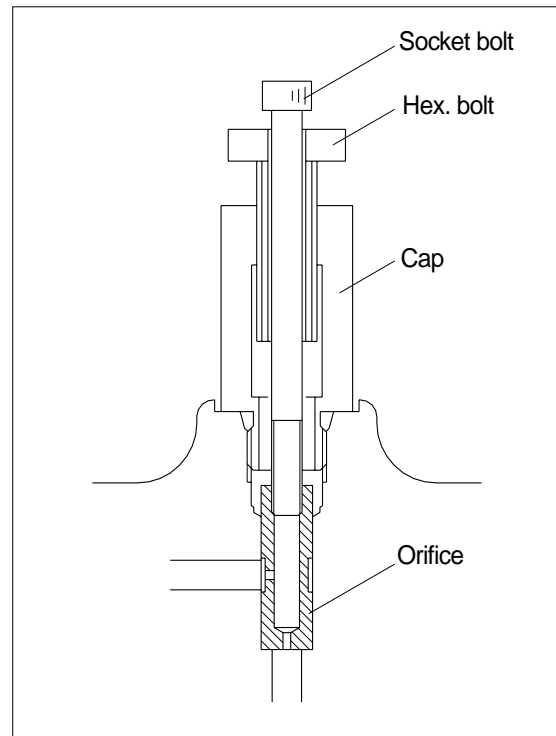
18) ORIFICE ASSEMBLY(P2 valve side)

(1) Remove cap

※ Install a suitable jig as shown fig and pull out the orifice by turning the hexagon bolt with holding socket bolt(M5 × 60).

(2) Assembly

Fit socket bolt to orifice and insert the orifice by tapping with a hammer.



19) PRESSURE SETTING OF MAIN RELIEF VALVE

- ※ Improper setting of relief pressure can be serious damage the hydraulic components.
- ※ Main relief valve pressure
 - High pressure(power boost) : 350kg/cm²
 - Low pressure : 320kg/cm²

(1) Pre setting

- ① Tight the adjust screw(1) until the piston(A) contacts the surface Z.
- ② Loosen and retight the sleeve(10) until the pilot poppet(B) contacts the poppet seat.
That is, adjust spring(C) is just compression point.
- ③ Assemble the pre-setted relief valve cartridge to main body and tight the cap(4).

(2) High pressure(power boost)

- ① Set the pressure gauge on the discharge port of main pump.
 - ② Start engine and run high rpm.
 - ③ Operate boom, arm or bucket control lever with full stroke.
 - ④ Adjust the pressure by turning the sleeve(10) while reading the gauge.
1/4 turn : About 40kg/cm²
- ※ Relief valve is very sensitive, therefore turn the sleeve(10) slowly.
 - ⑤ Confirm the relief pressure with spec and tight the hex head nut(3).
 - Tightening torque : 6kg · m(43.4lb · ft)
 - ※ Recheck the relief pressure.

(3) Low pressure

- ① After setting high pressure, adjust low pressure by loosen the adjust screw(1).
 - ② Confirm the low pressure, tight the hex head nut(2).
- ※ Recheck the relief pressure.

