GROUP 4 MAIN CONTROL VALVE

1. REMOVAL AND INSTALL

1) REMOVAL

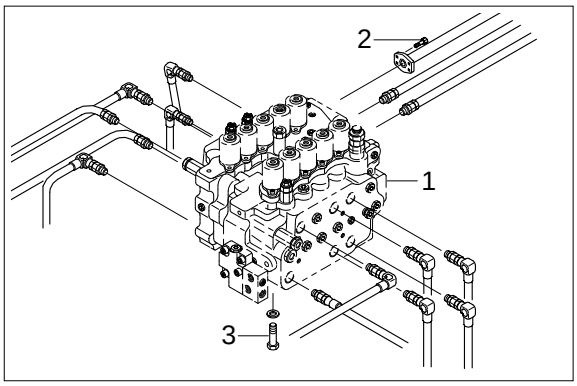
(1) Lower the work equipment to the ground and stop the engine.

(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.

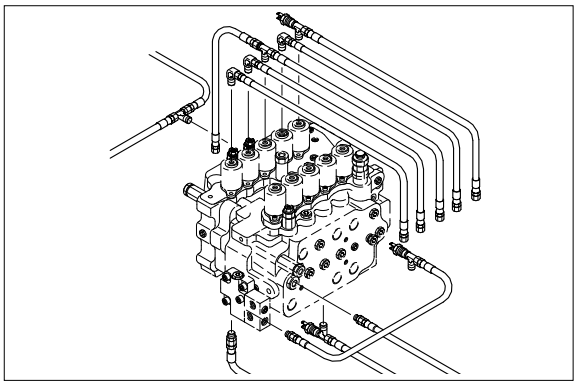


(4) Remove bolts(2) and disconnect pipe.

(5) Disconnect pilot line hoses.

(6) Disconnect pilot piping.

(7) Sling the control valve assembly(1) and remove the control valve mounting bolt(3).
・Weight : 135kg(298lb)

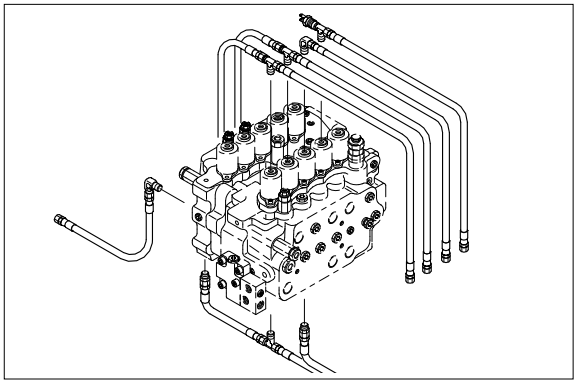


(8) Remove the control valve assembly(1).

※ When removing the control valve assembly, check that all the piping have been disconnected.

2) INSTALL

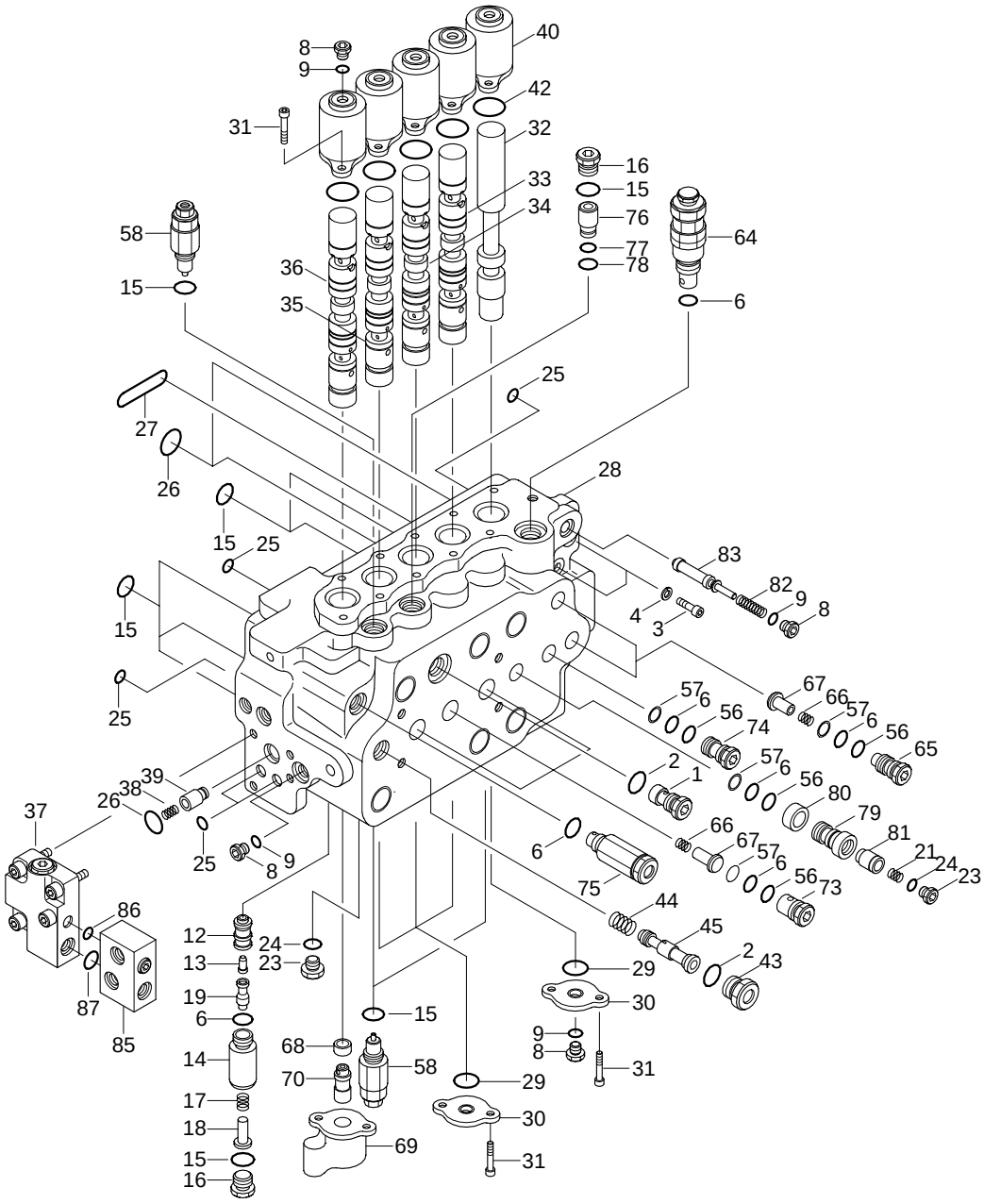
(1) Carry out installation in the reverse order to removal.



(2) Bleed the air from below items.
① Cylinder(Boom, arm, bucket).
② Swing motor.
③ Travel motor.
※ See each item removal and install.

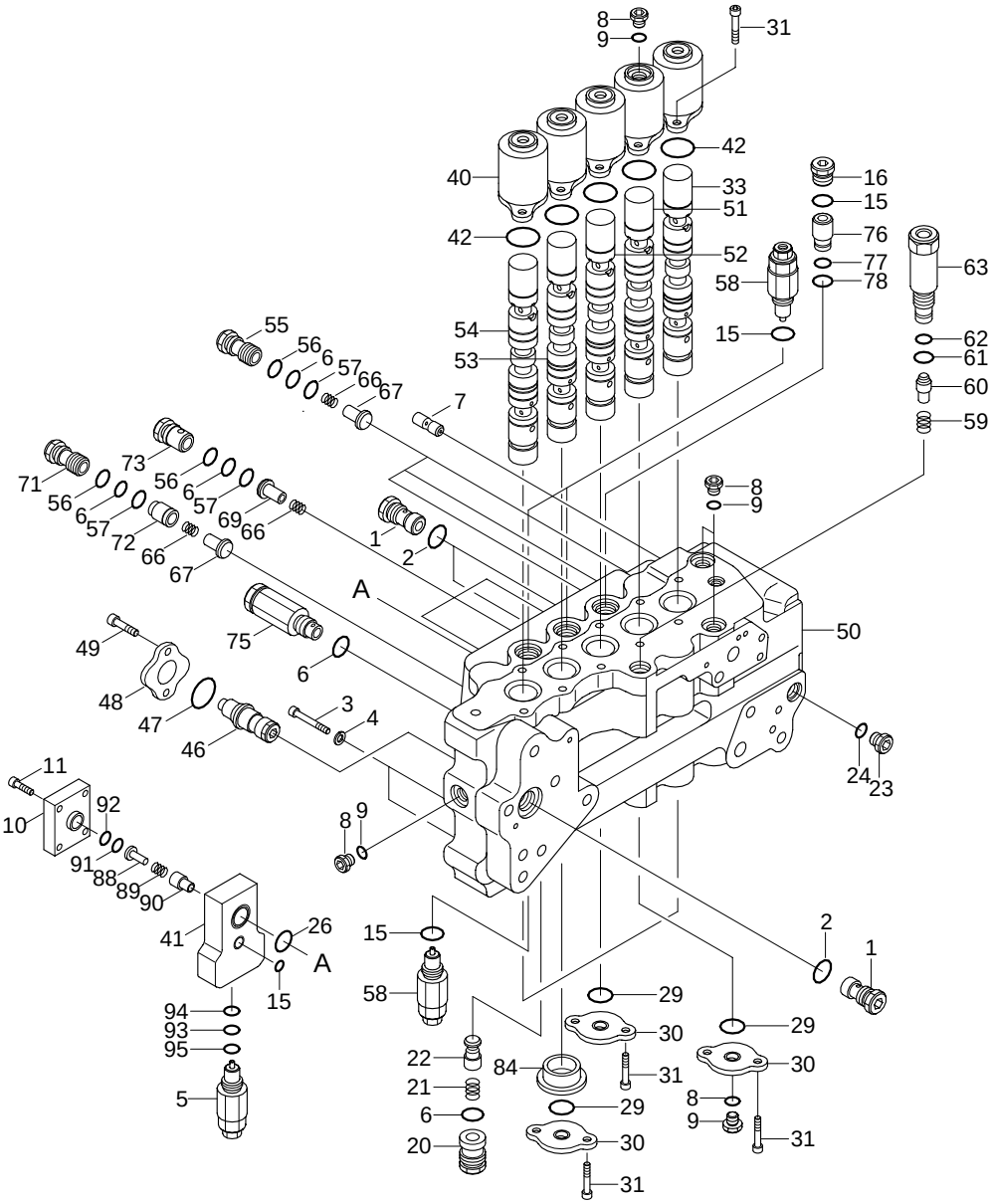
(3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. STRUCTURE(1/2)



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

STRUCTURE(2/2)



38	Spring	53	Plunger assy(BM1)	68	Spacer	83	Spool
39	Poppet	54	Plunger assy(AM2)	69	Cover	84	Stopper
40	Cover	55	Cap	70	Piston	85	Selector assy
41	Manifold	56	Back up ring	71	Cap	86	O-ring
42	O-ring	57	Nylon chip	72	Check	87	O-ring
43	Cap	58	Overload assy	73	Cap	88	Spring guide
44	Spring	59	Spring	74	Cap	89	Spring
45	Spool	60	Check	75	Foot relief assy	90	Poppet
46	Plug	61	O-ring	76	Plug	91	O-ring
47	O-ring	62	Back up ring	77	Back up ring	92	Back up ring
48	Retainer	63	Cap	78	O-ring	93	O-ring
49	Socket bolt	64	Main relief assy	79	Cap	94	Back up ring
50	Housing	65	Cap	80	Spacer	95	O-ring
51	Plunger assy(OPT)	66	Spring	81	Check		
52	Plunger assy(BKT)	67	Check	82	Spring		

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 leakaged 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 then.(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 and separate 4 spool valve and 5 spool valve.

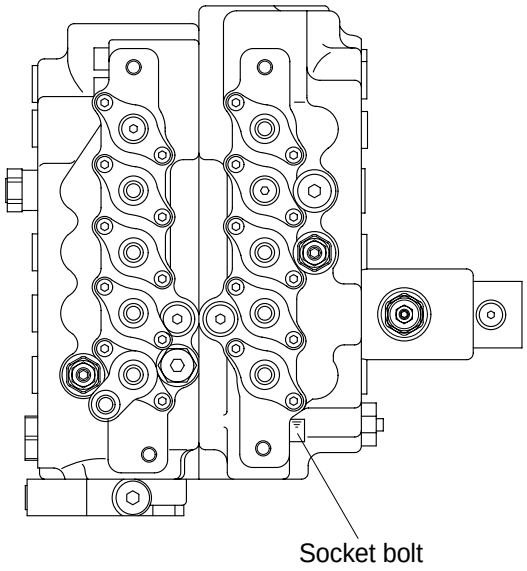
(2) Assembly

※ 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)

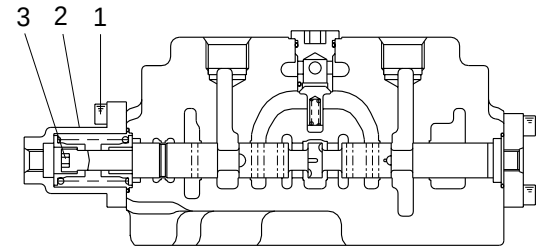


Tools
· Hexagon socket : 10mm
· Torque wrench

3) PLUNGER

(1) Loosen socket bolt(1) and remove cover (2).
- Tightening torque : 3kgf · m(21.7lbf · ft)

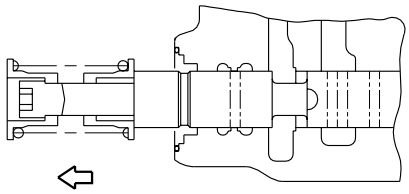
※ Install cover (2) after making sure that O-ring is placed on the edge of the valve hole.



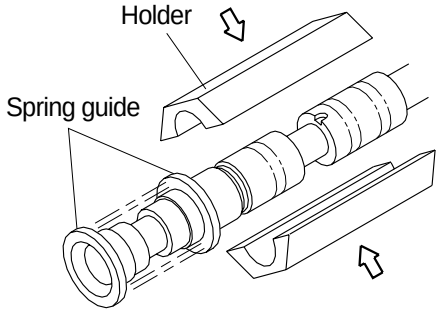
Tools
- Hexagon socket : 6mm
- Torque wrench

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

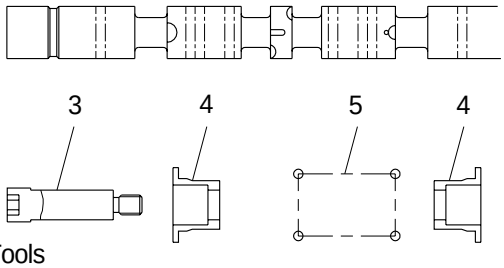
※ Do not pull it out violently, but draw it out gently while making sure of its contact with housing hole.



(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)

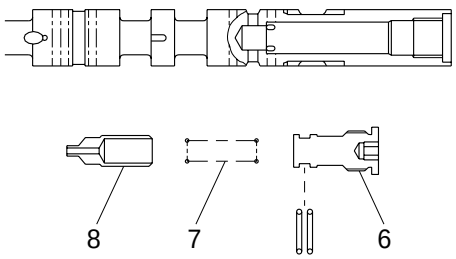


(4) Remove plunger cap(3), spring guide(4) and spring(5) in this order.



Tools
- Hexagon socket : 8mm
- Torque wrench

(5) Arm plunger only (Remove check).
Remove cap(6) and disassemble spring (7) and check(8).
· Tightening torque : 3kgf · m(21.7lbf · ft)



Tools
· Hexagon socket : 6mm
· Torque wrench

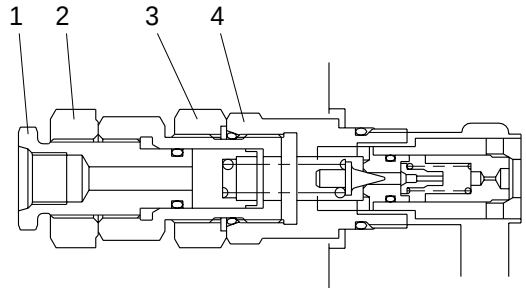
4) MAIN RELIEF ASSEMBLY

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.

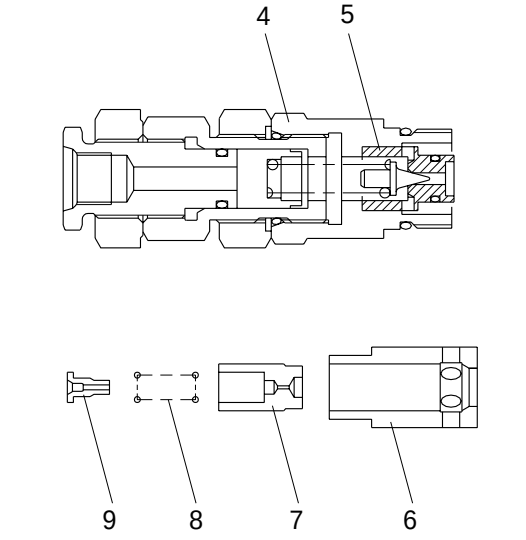


(4) Pull out the sleeve(6) and take off the main poppet(7), spring(8) and orifice(9).

※ 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

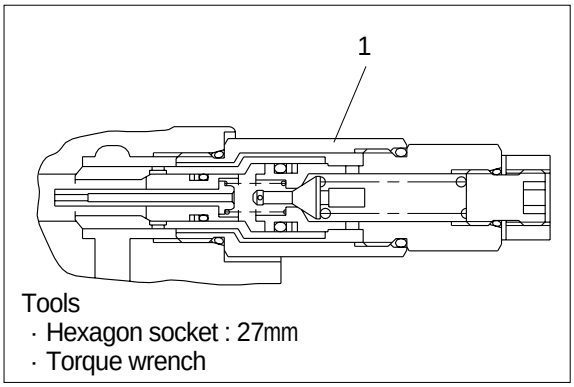


5) OVERLOAD RELIEF VALVE ASSEMBLY

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.

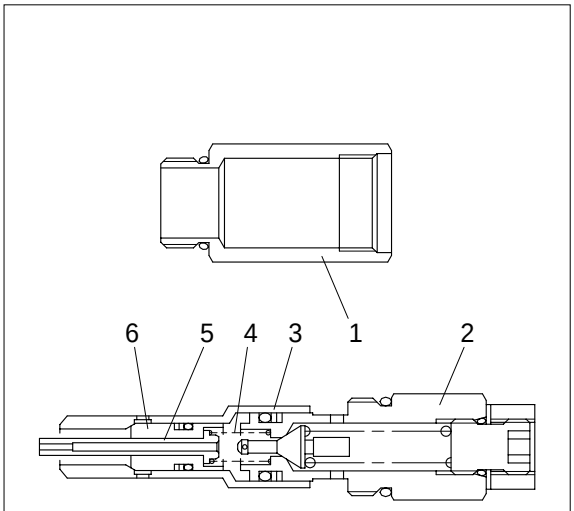
· Tightening torque : 4kgf · m(29lbf · ft)



Tools
· Hexagon socket : 27mm
· Torque wrench

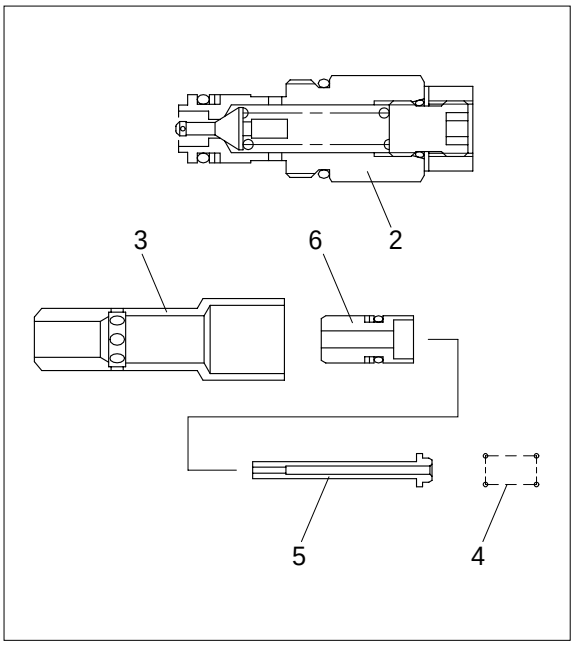
(2) Loosen the relief seat (2) and remove the subassembly.

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



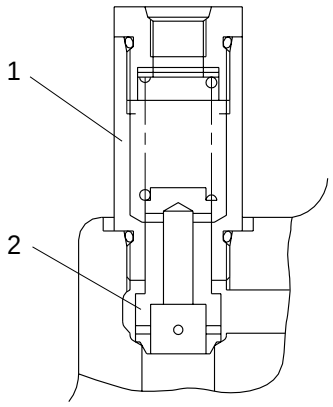
Tools
· Hexagon socket : 24mm
· Torque wrench

(3) Pull out the poppet(3) and take off the spring(4), piston(5) and main poppet(6).

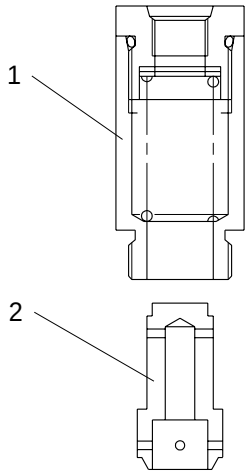


6) FOOT RELIEF ASSEMBLY

(1) Loosen cap(1) and remove poppet (2).
· Tightening torque : 6kgf · m(43.4lbf · ft)

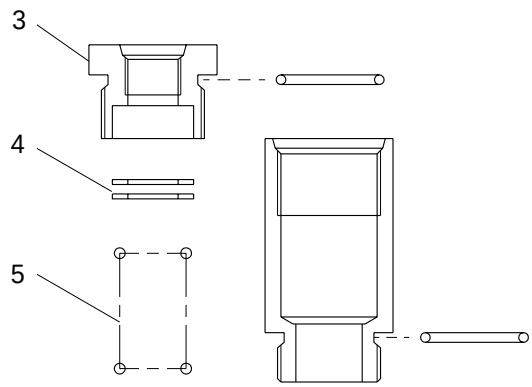


Tools
· Hexagon socket : 30mm
· Torque wrench



(2) Remove cap (3) and take off shim (4) and spring (5).
· Tightening torque : 6kgf · m(43.4lbf · ft)

※ Make sure adjust shim quantity.



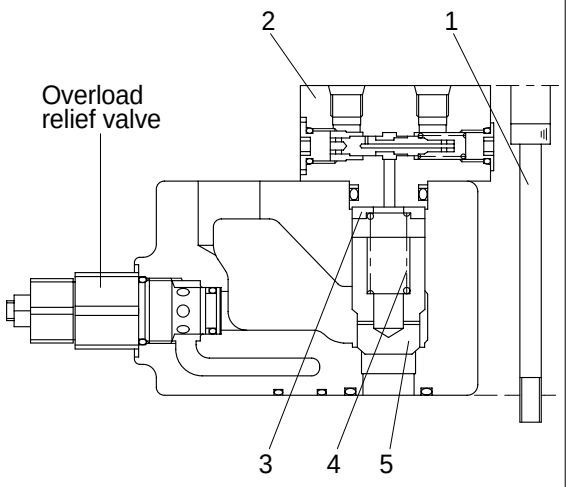
Tools
· Hexagon socket : 30mm
· Torque wrench

7) BOOM HOLDING VALVE ASSEMBLY

(1) Loosen the socket bolt(1) and remove the cover assy(2).
· Tightening torque : 5kgf · m(36.2lbf · ft)

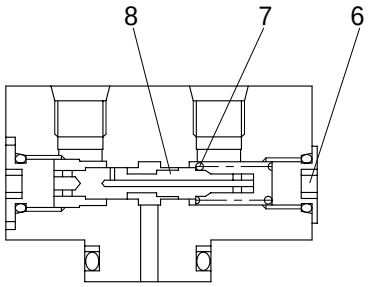
※ Install cover assy(2) after making sure that O-ring is placed on the edge of the valve hole.

(2) Remove the spring guide(3), spring(4) and poppet(5).



Tools
· Hexagon socket : 8mm
· Torque wrench

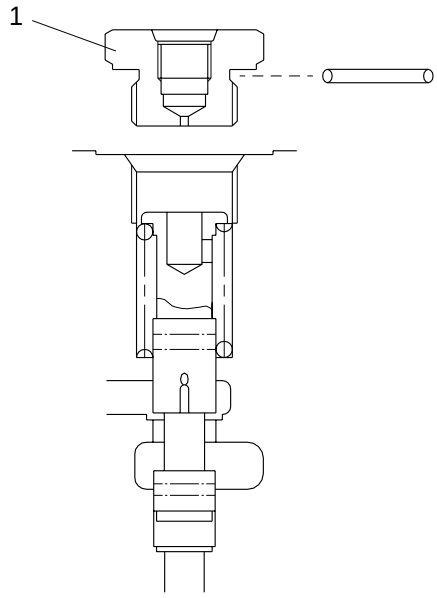
(3) Remove the cap(6), spring(7) and spool(8).
· Tightening torque : 3kgf · m(21.7lbf · ft)



Tools
· Hexagon socket : 6mm
· Torque wrench

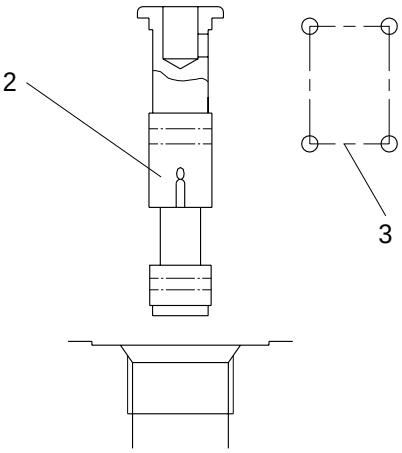
8) CENTER BYPASS VALVE ASSEMBLY

(1) Remove cap (1).
· Tightening torque : 8kgf · m(57.9lbf · ft)



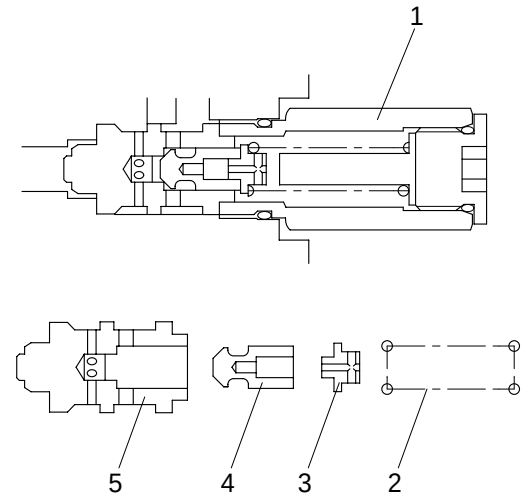
Tools
· Hexagon socket : 36mm
· Torque wrench

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



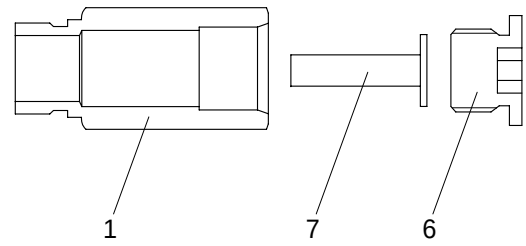
9) ARM REGENERATION VALVE

(1) Remove cap(1) and take off spring(2), spring guide(3), check(4) and sleeve(5).
· Tightening torque : 10kgf · m(72.3lbf · ft)



Tools
· Hexagon socket : 27mm
· Torque wrench

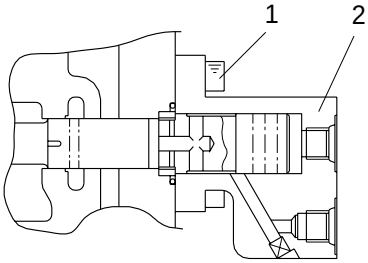
(2) Remove cap(6) and spring guide(7).
· Tightening torque : 6kgf · m(43.4lbf · ft)



Tools
· Hexagon socket : 10mm
· Torque wrench

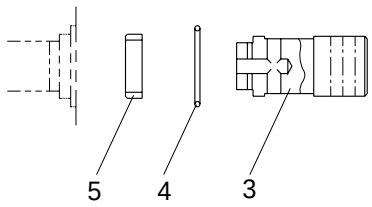
10) ARM STROKE LIMIT ASSEMBLY

(1) Loosen the socket bolt(1) and remove cover(2).
· Tightening torque : 3kgf · m(21.7lbf · ft)



Tools
· Hexagon socket : 6mm
· Torque wrench

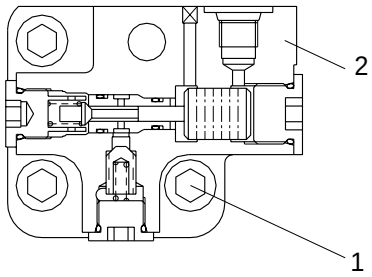
(2) Remove piston(3) and take off O-ring(4), spacer(5) from the valve hole.
※ Make sure inserting direction of the spacer.



11) ARM LOAD HOLDING VALVE

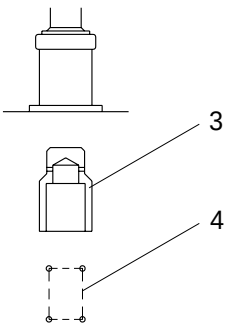
(1) Basic unit

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.



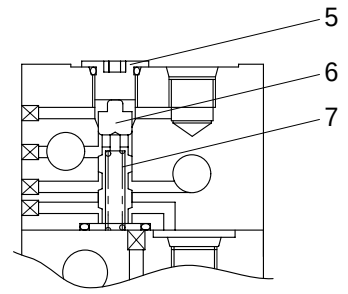
Tools
· Hexagon socket : 10mm
· Torque wrench

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



(2) Selector unit

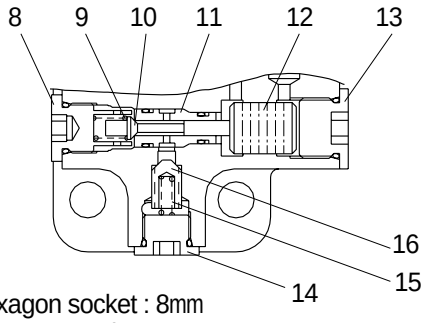
① Remove cap (5).
Take off piston(6) and spring(7).
· Tightening torque : 3kgf · m(21.7lbf · ft)



Tools
· Hexagon socket : 6mm
· Torque wrench

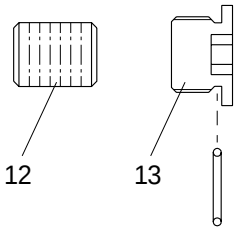
(3) Cover assembly

① Remove cap(14).
Take off spring(15) and check valve(16).
· Tightening torque : 5kgf · m(36.2lbf · ft)



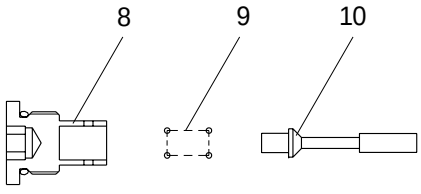
Tools
· Hexagon socket : 8mm
· Torque wrench

② Remove cap (13) and take off piston (12).
· Tightening torque : 6 kgf · m(43.4 lbf · ft)
③ Push sleeve (11) out with a rod or the like through the hole of cap (13).
※ Be careful not to damage the guideway (ø 5) of the sleeve.



Tools
· Hexagon socket : 10mm
· Torque wrench

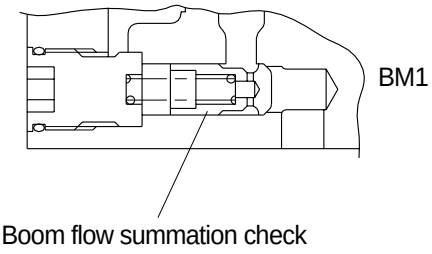
④ Remove cap (8).
Take off spring (9) and poppet (10).
· Tightening torque : 5kgf · m(36.2 lbf · ft)

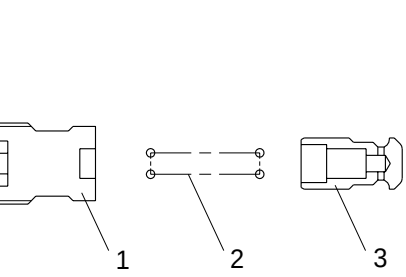


Tools
· Hexagon socket : 8mm
· Torque wrench

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)

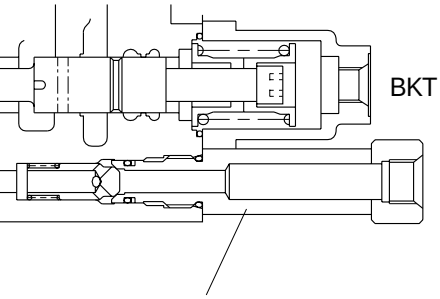


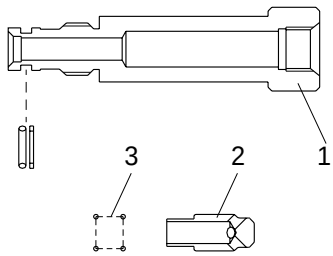


Tools
· Hexagon socket : 12mm
· Torque wrench

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)

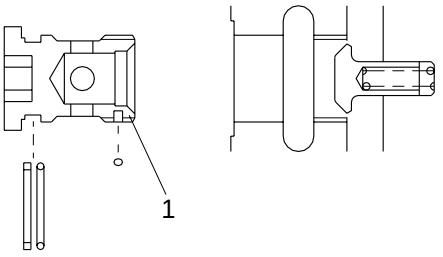




Tools
· Hexagon socket : 30mm
· Torque wrench

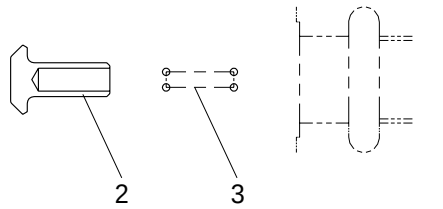
14) CHECK ASSEMBLY(BOOM1, 2, BUCKET, OPT, SWING, ARM-1)

(1) Remove cap(1).



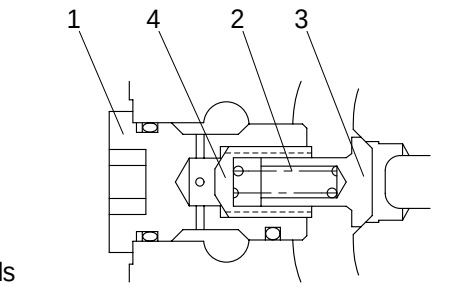
Tools
· Hexagon socket : 12mm
· Torque wrench

(2) Remove spring(2) and check(3).
· Tightening torque : 10kgf · m(72.3lbf · ft)



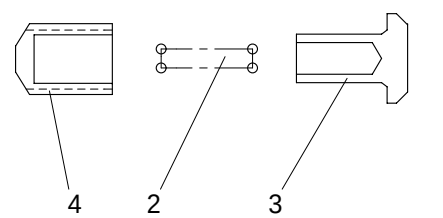
15) CHECK ASSEMBLY(ARM 2)

(1) Remove cap(1).



Tools
· Hexagon socket : 12mm
· Torque wrench

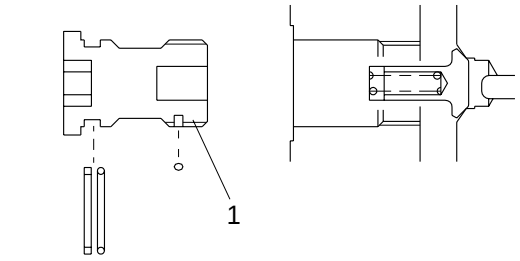
(2) Remove spring(2) and check(3, 4).
· Tightening torque : 10kgf · m(72.3lbf · ft)



16) CHECK ASSEMBLY(TR)

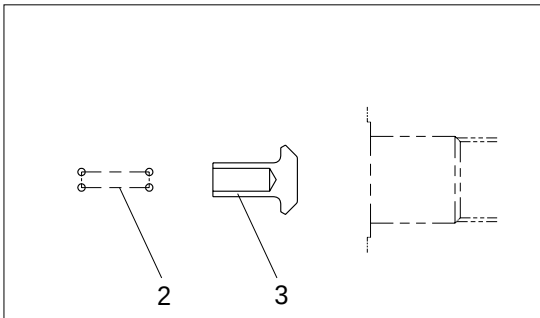
(1) Remove cap(1).

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



Tools
· Hexagon socket : 12mm
· Torque wrench

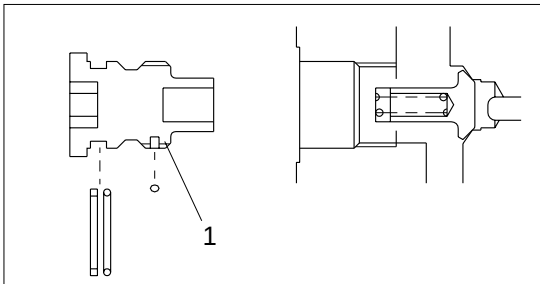
(2) Take off spring(2) and check(3).



17) CHECK ASSEMBLY(P1)

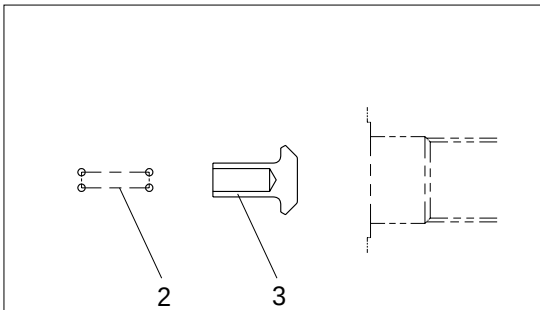
(1) Remove cap(1).

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



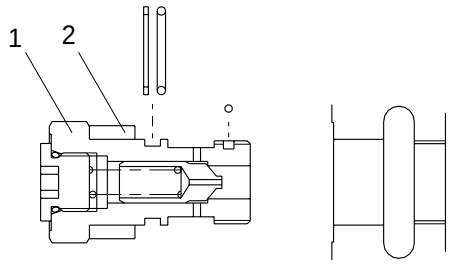
Tools
· Hexagon socket : 12mm
· Torque wrench

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



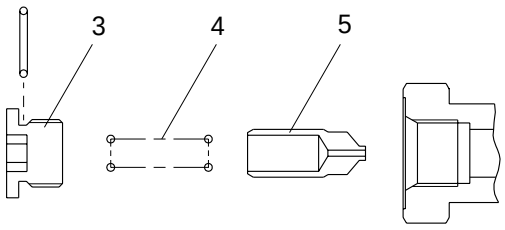
18) CHECK ASSEMBLY(TL)

(1) Remove cap(1) and spacer(2).
· Tightening torque : 10kgf · m(72.3lbf · ft)



Tools
· Hexagon socket : 32mm
· Torque wrench

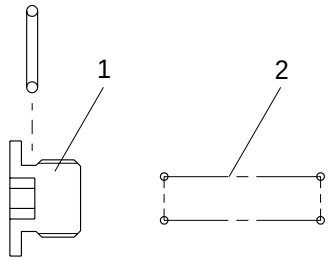
(2) Remove cap(3) and take off spring(4) and check(5).
· Tightening torque : 4kgf · m(29lbf · ft)



Tools
· Hexagon socket : 8mm
· Torque wrench

19) SELECTOR VALVE ASSEMBLY

(1) Remove cap(1) and take off spring(2) and spool(3).
· Tightening torque : 3kgf · m(21.7lbf · ft)



Tools
· Hexagon socket : 6mm
· Torque wrench