

GROUP 4 MAIN CONTROL VALVE

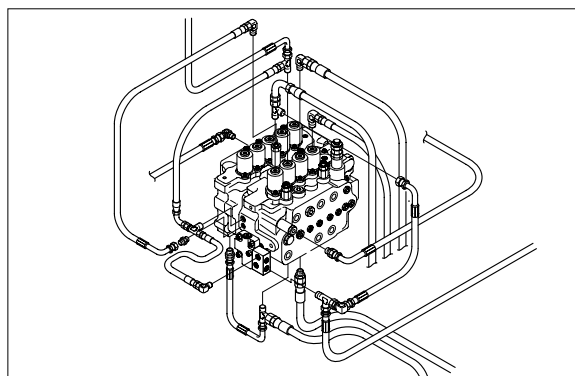
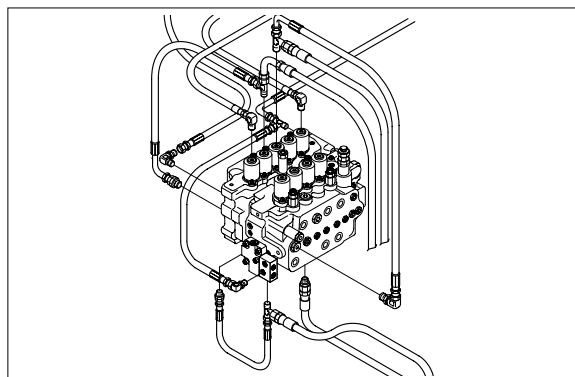
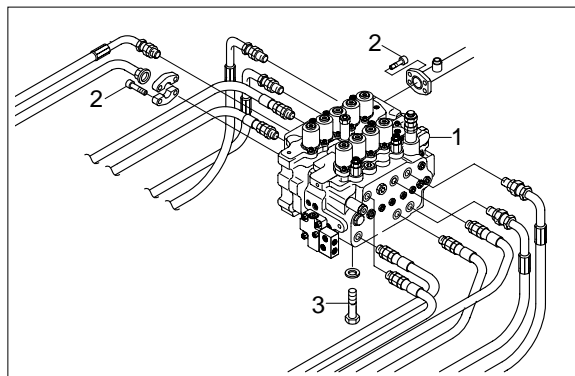
1. REMOVAL AND INSTALL

1) REMOVAL

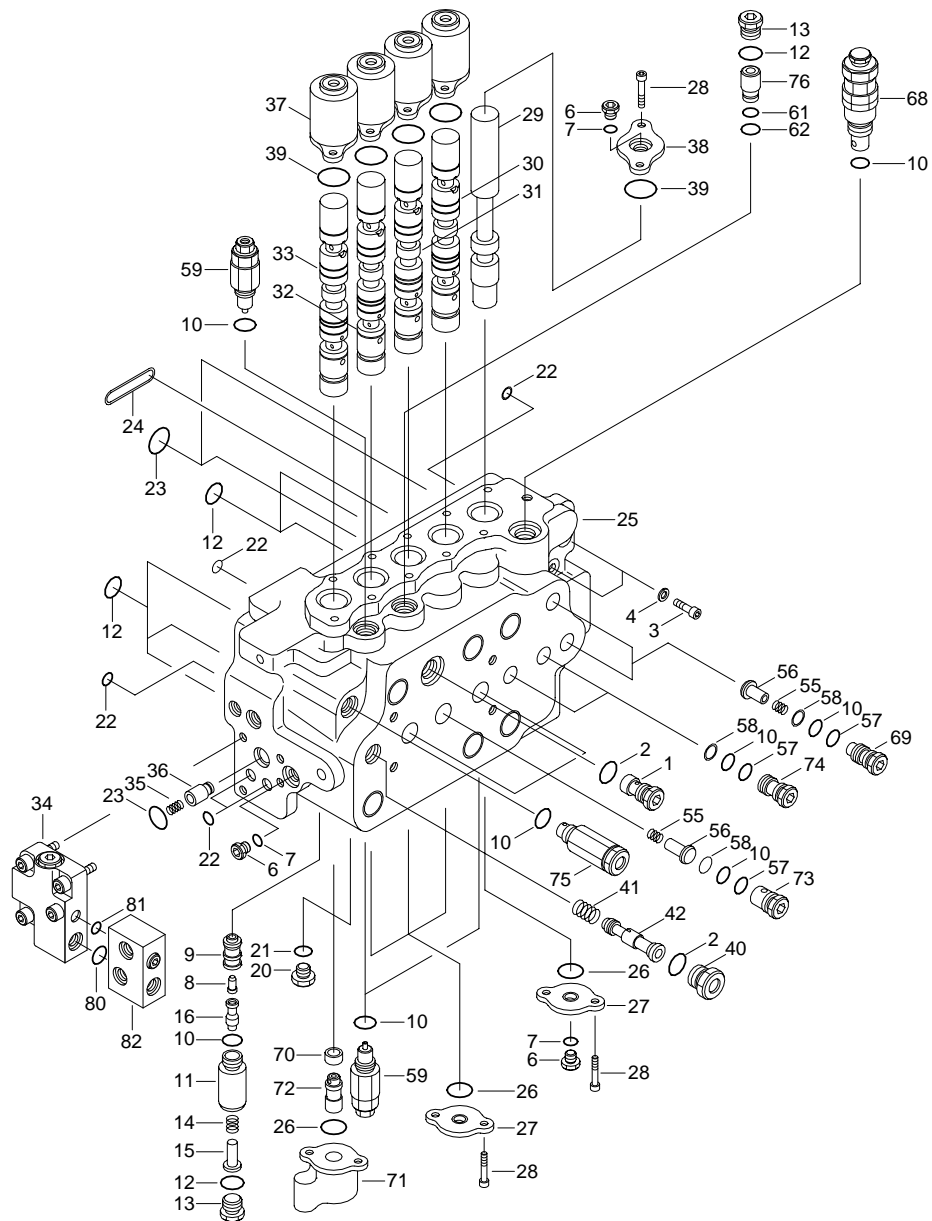
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
- ▲ Escaping fluid under pressure 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, dozer)
 - ② Swing motor
 - ③ Travel motor
 - ④ Transmission
 - ⑤ Front axle
 - ⑥ Rear axle
 - ※ See each item removal and install.
- (3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

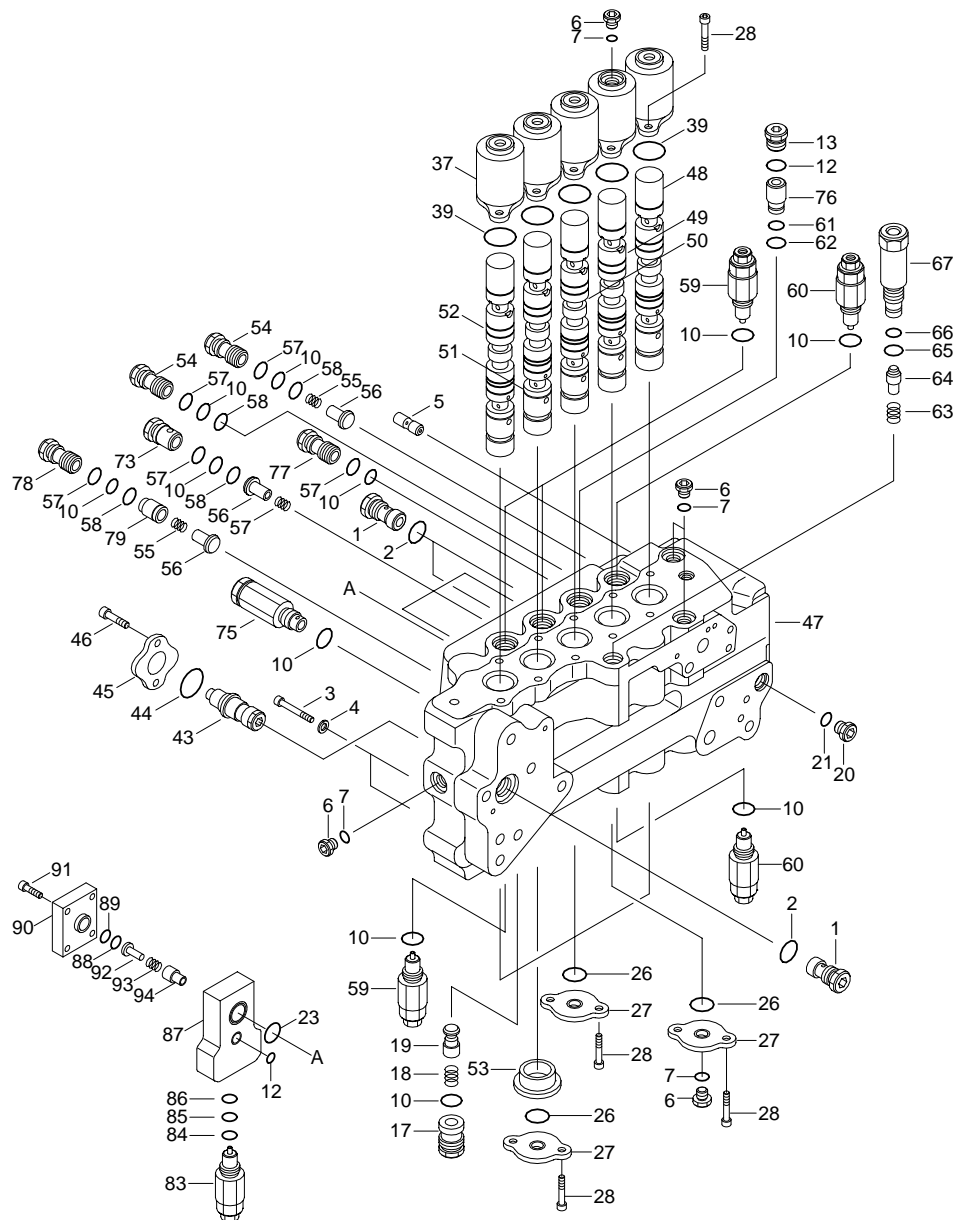


2. STRUCTURE(1/2)



- | | | | | | |
|----|---------------|----|--------------|----|--------------|
| 1 | Cap | 14 | Spring | 27 | Retainer |
| 2 | O-ring | 15 | Spring guide | 28 | Socket bolt |
| 3 | Socket bolt | 16 | Spool | 29 | Spool |
| 4 | Spring washer | 17 | Cap | 30 | Plunger assy |
| 5 | Orifice | 18 | Spring | 31 | Plunger(SW) |
| 6 | Cap | 19 | Check | 32 | Plunger(BM2) |
| 7 | O-ring | 20 | Cap | 33 | Plunger(AM1) |
| 8 | Piston | 21 | O-ring | 34 | Cover assy |
| 9 | Sleeve | 22 | O-ring | 35 | Spring |
| 10 | O-ring | 23 | O-ring | 36 | Poppet |
| 11 | Cap | 24 | O-ring | 37 | Cover |
| 12 | O-ring | 25 | Housing | 38 | Retainer |
| 13 | Cap | 26 | O-ring | 39 | O-ring |

STRUCTURE(2/2)



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

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 damage 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**.)

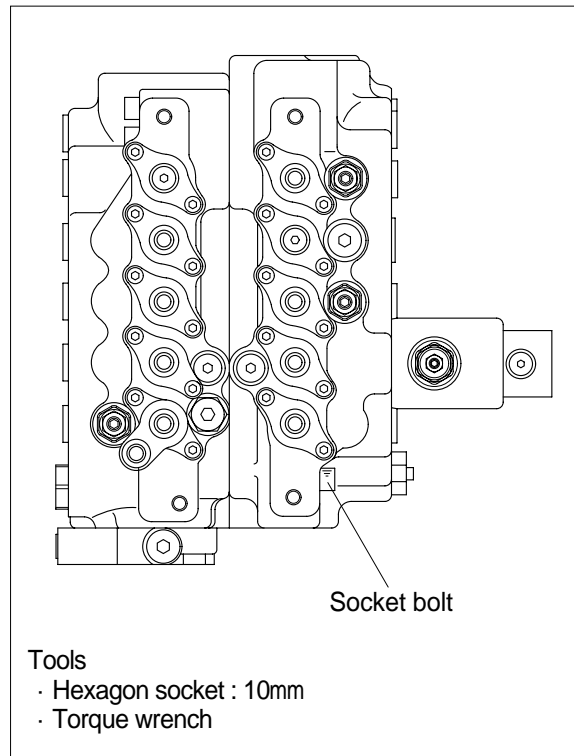
2) MOUNTING AND DISMOUNTING VALVES

(1) Disassembly

- ① Remove socket bolts 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)

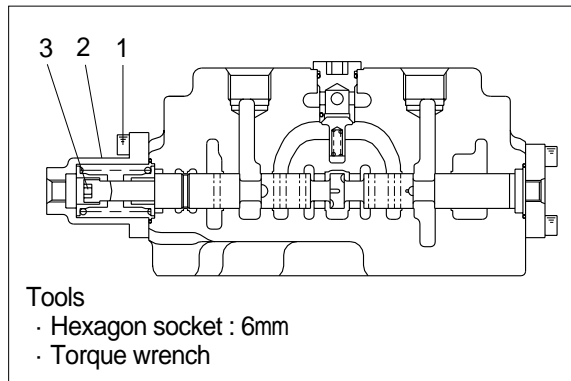


3) PLUNGER

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

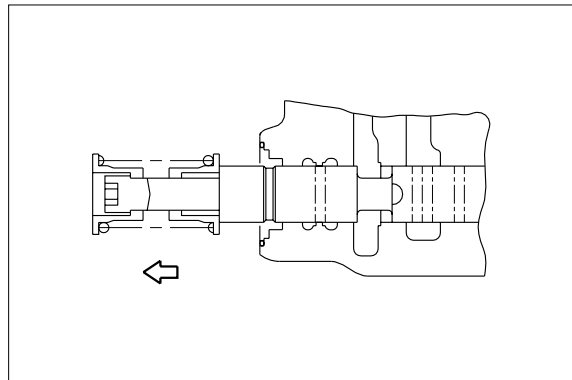
· Tightening torque : 3kgf · m(21.7lbf · ft)

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



- (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.

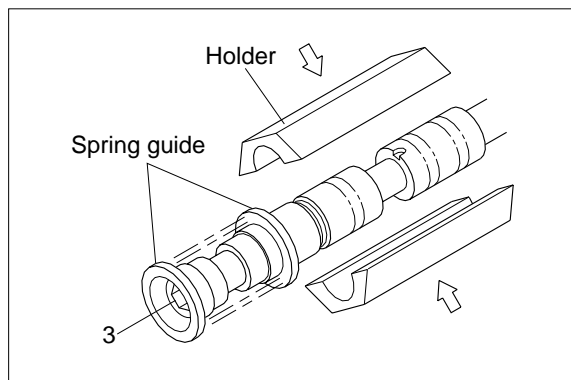


- (3) Place the plunger between holders and loosen plunger cap(3) by using a vise.

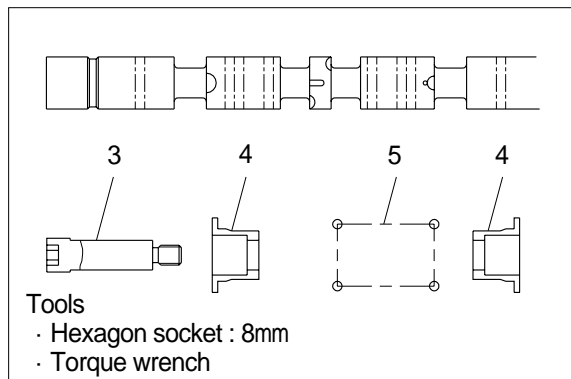
Plunger cap

· Hexagon socket : 8mm

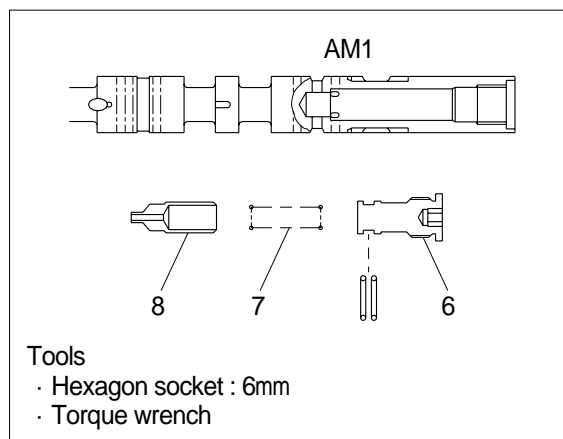
· Tightening torque : 6kgf · m(43.4lbf · ft)



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



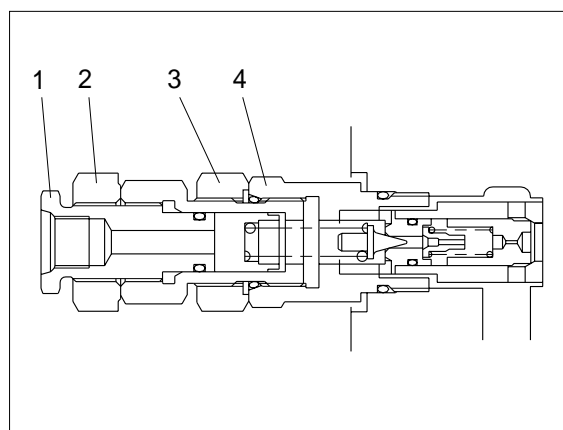
- (5) Arm plunger only (Remove check).
 Remove cap(6) and disassemble spring (7) and check(8).
 • Tightening torque : 3kgf · m(21.7lbf · ft)



4) MAIN RELIEF ASSEMBLY

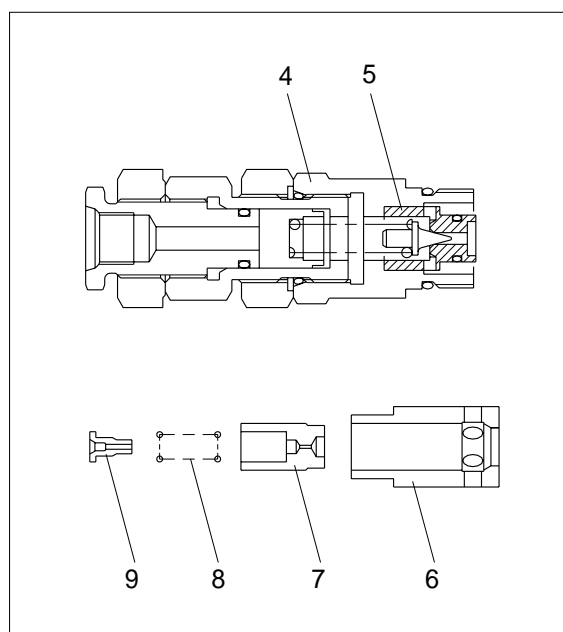
Relief assy is assembled into a single block as a cartridge. Do not disassemble the relief assembly as a rule.

- (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

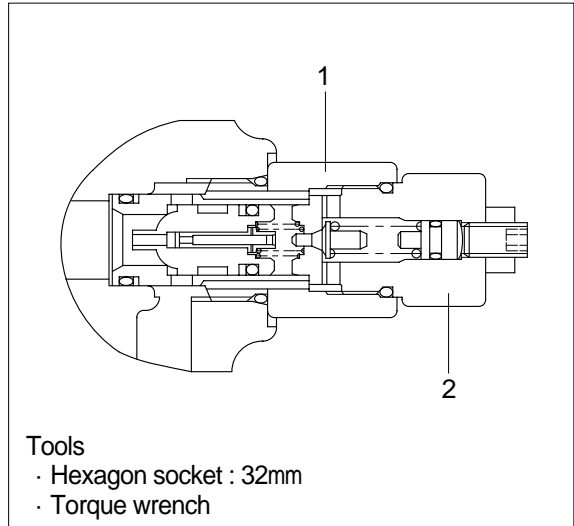


5) OVERLOAD RELIEF VALVE ASSEMBLY

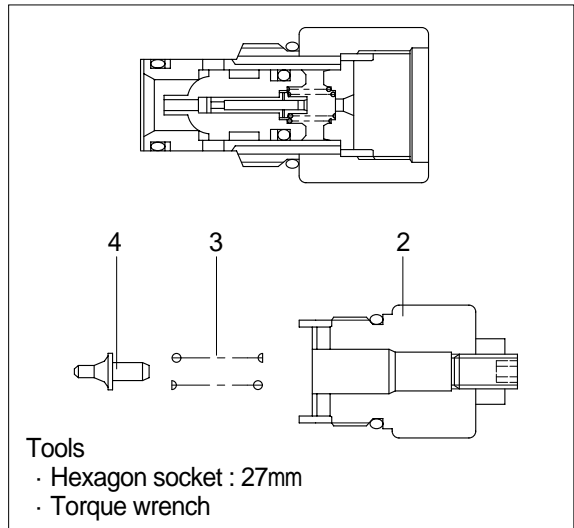
(Boom head side)

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

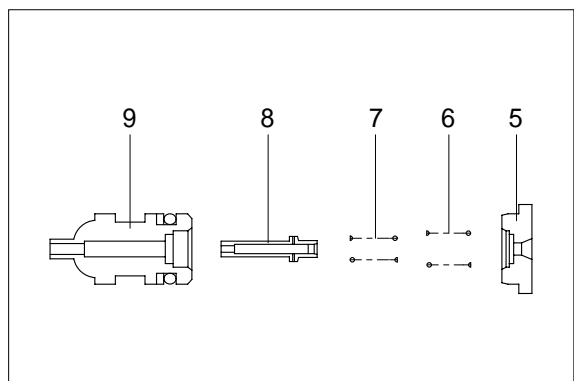
- (1) Loosen the relief sleeve(1) and remove the cartridge.
 - Tightening torque : 6kgf · m(43.4lbf · ft)



- (2) Loosen the cap(2) and remove the subassembly.
 - Tightening torque : 6kgf · m(43.4lbf · ft)
- (3) Remove the spring(3) and pilot poppet(4).



- (4) Pull out the pilot seat(5) and take off the spring(6,7), piston(8) and main poppet(9).



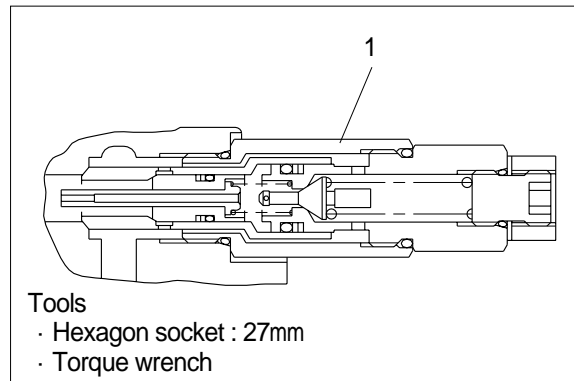
6) OVERLOAD RELIEF VALVE ASSEMBLY

(AM, BKT, MB Rod side)

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

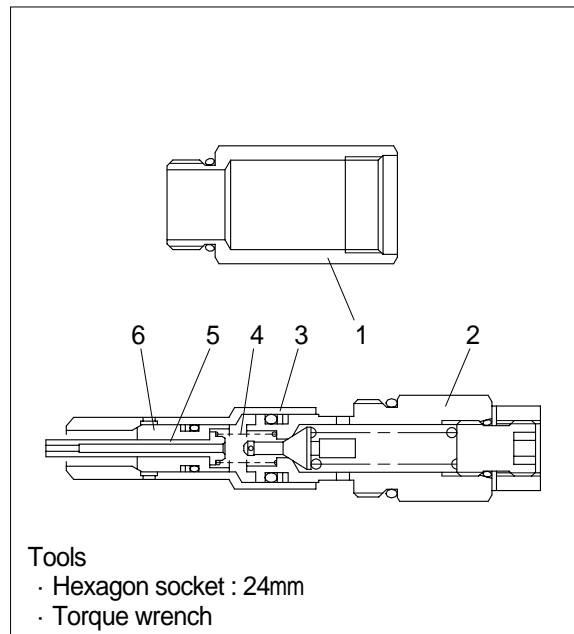
- (1) Loosen the relief sleeve (1) and remove the cartridge.

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

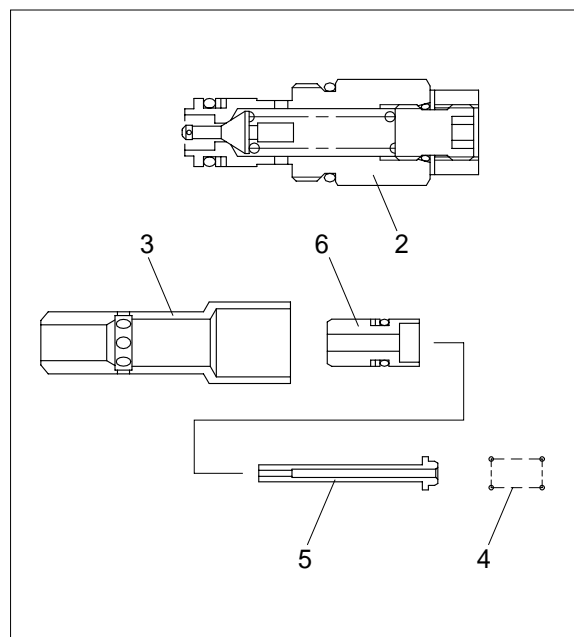


- (2) Loosen the relief seat (2) and remove the subassembly.

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

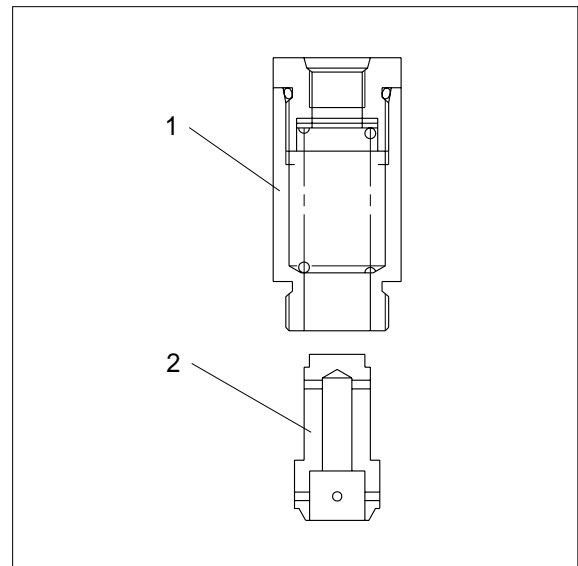
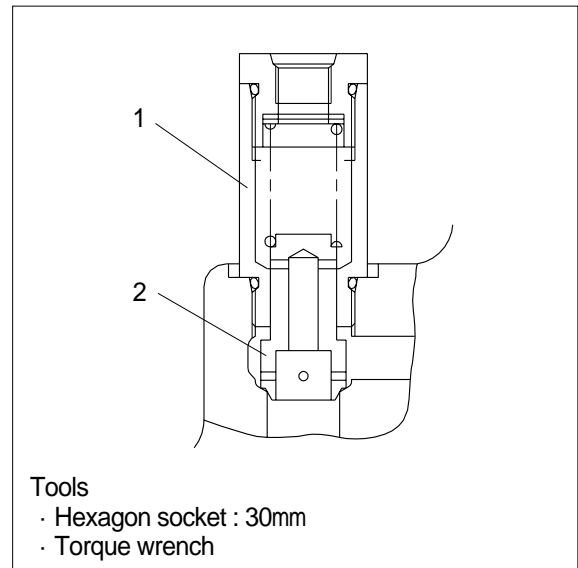


- (3) Pull out the poppet(3) and take off the spring(4), piston(5) and main poppet(6).

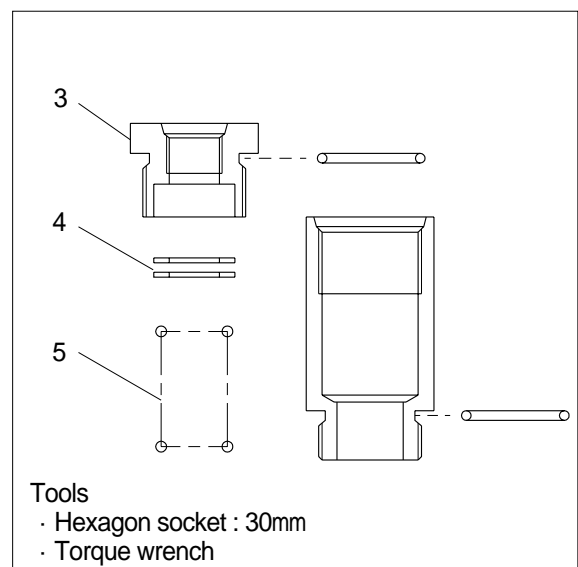


7) FOOT RELIEF ASSEMBLY

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

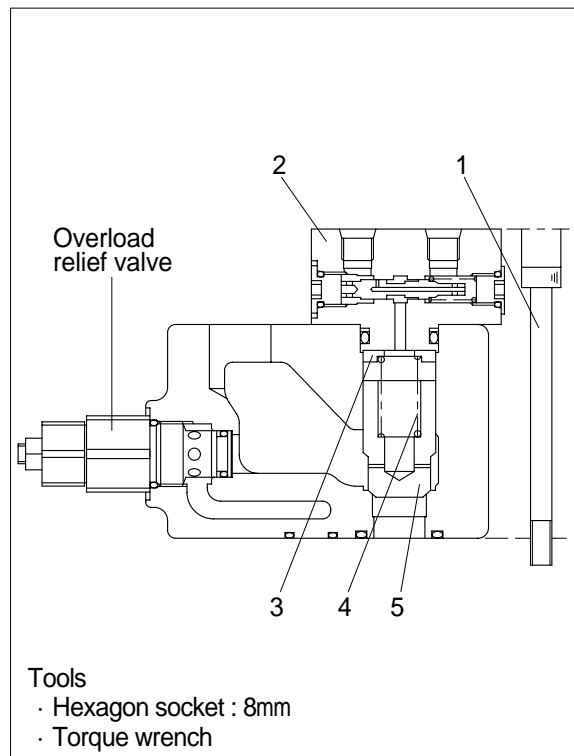


- (2) Remove cap(3) and take off shim(4) and spring(5).
- Tightening torque : 6kgf · m(43.4lbf · ft)
- ※ Make sure adjust shim quantity.

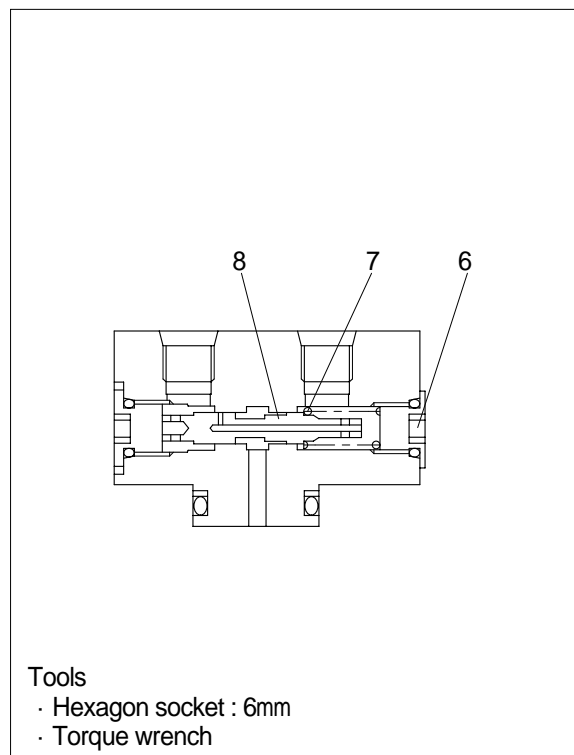


8) BOOM HOLDING VALVE ASSEMBLY

- (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).



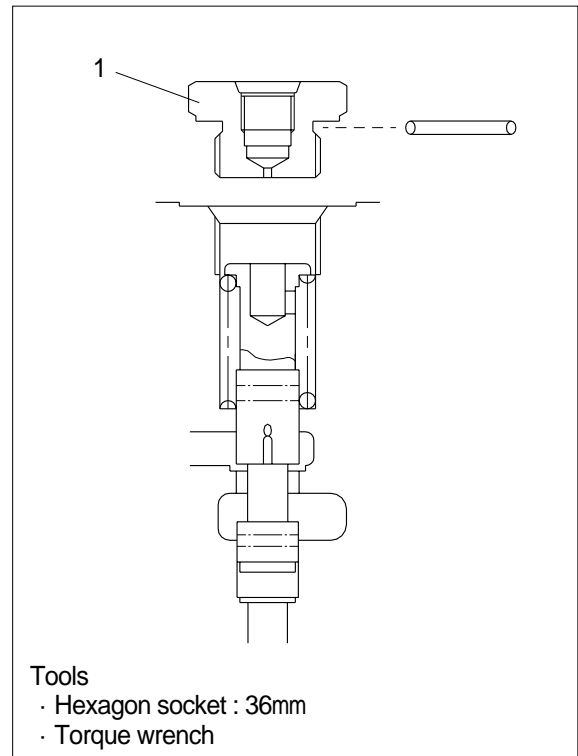
- (3) Remove the cap(6), spring(7) and spool(8).
- Tightening torque : 3kgf · m(21.7lbf · ft)



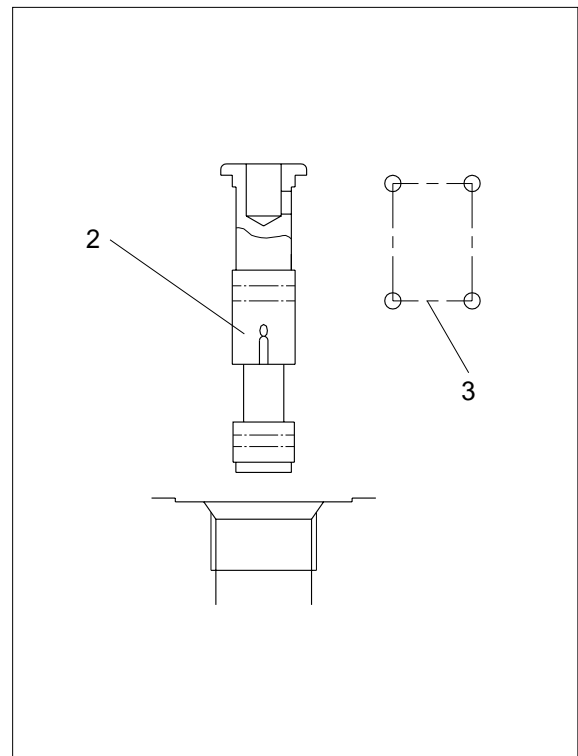
9) CENTER BYPASS VALVE ASSEMBLY

(1) Remove cap(1).

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



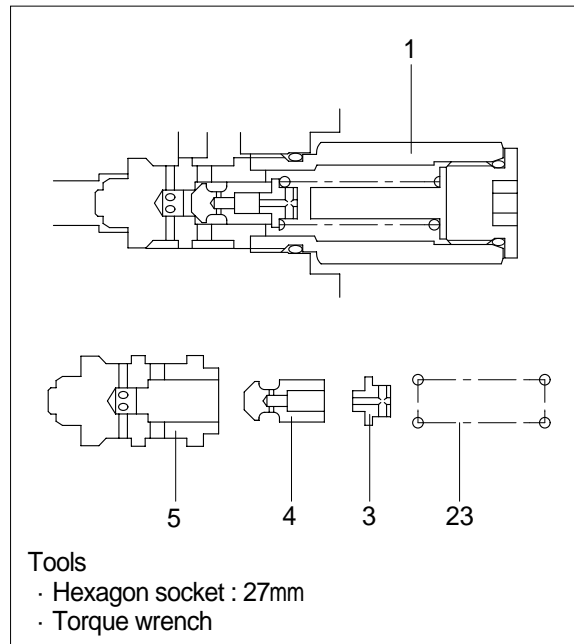
(2) Remove spool(2) and spring(3).



10) ARM REGENERATION VALVE

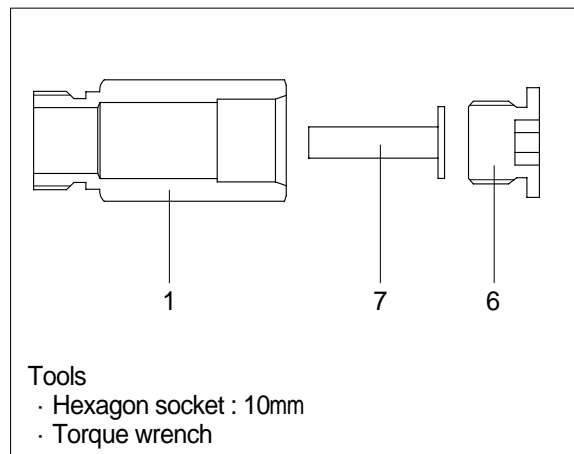
- (1) Remove cap(1) and take off spring(2), spring guide(3), check(4) and sleeve(5).

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



- (2) Remove cap(6) and spring guide(7).

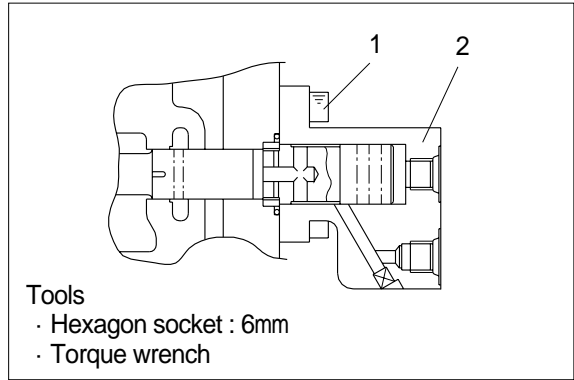
· Tightening torque : 6kgf · m(43.4lbf · ft)



11) ARM STROKE LIMIT ASSEMBLY

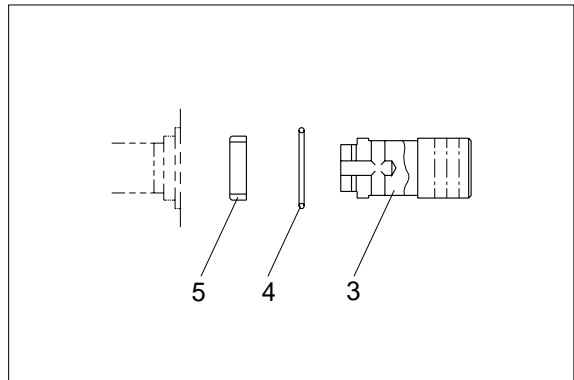
- (1) Loosen the socket bolt(1) and remove cover(2).

· 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.



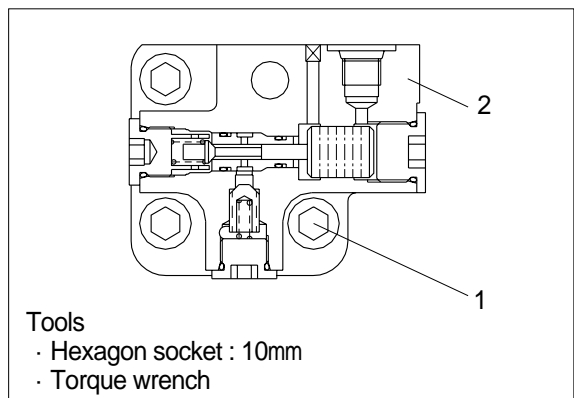
12) ARM LOAD HOLDING VALVE

(1) Basic unit

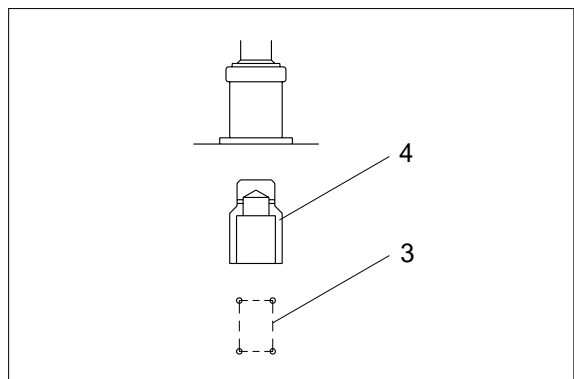
- ① Loosen socket bolt(1) and remove cover assembly(2).

· 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).

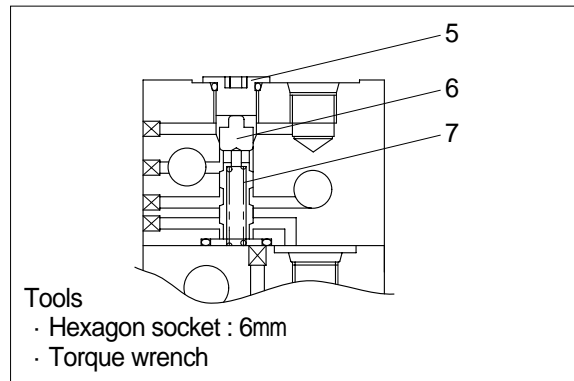


(2) Selector unit

① Remove cap(5).

Take off piston(6) and spring(7).

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

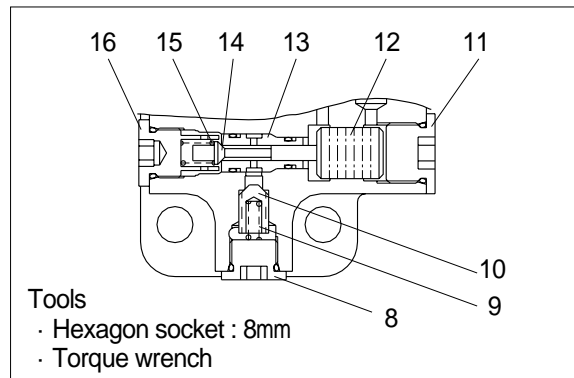


(3) Cover assembly

① Remove cap(8).

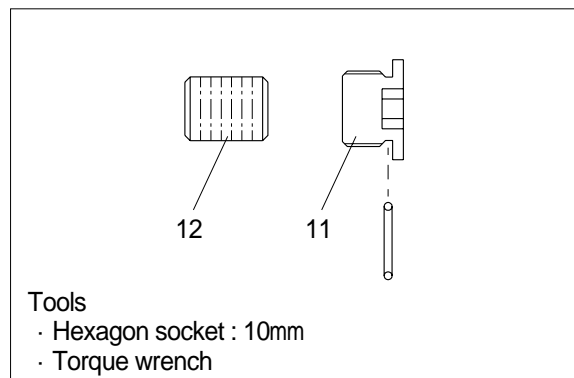
Take off spring(9) and check valve(10).

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



② Remove cap(11) and take off piston(12).

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



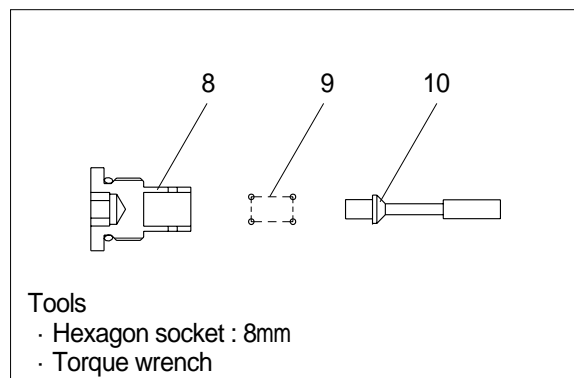
③ Remove cap(16).

Take off spring(15) and poppet(14).

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

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

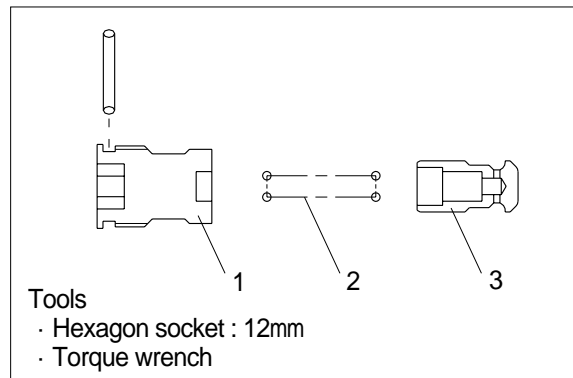
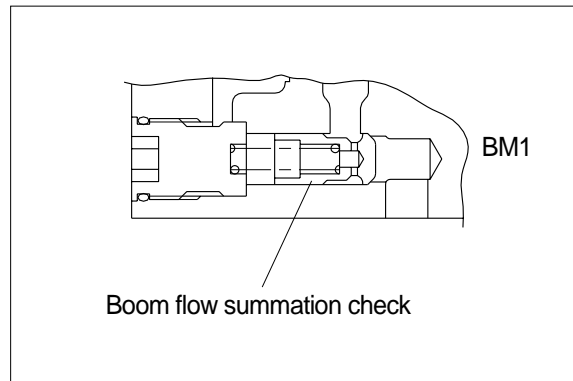
- ※ Be careful not to damage the guideway (\varnothing 5) of the sleeve.



13) BOOM FLOW SUMMATION CHECK

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

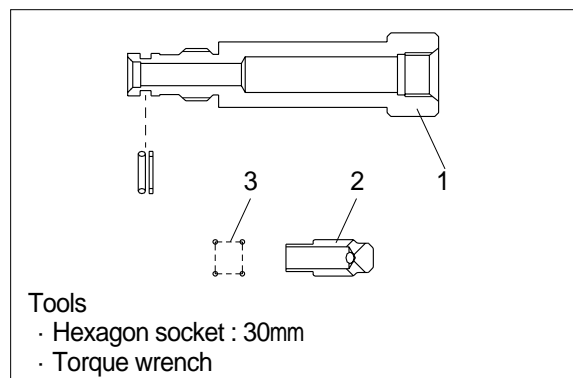
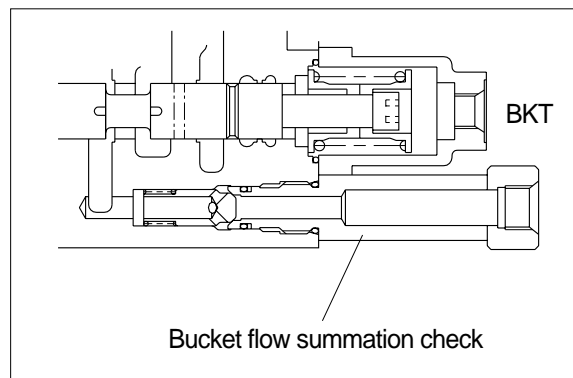
· Tightening torque : 10kgf · m(72.3lbf · ft)



14) BUCKET FLOW SUMMATION CHECK

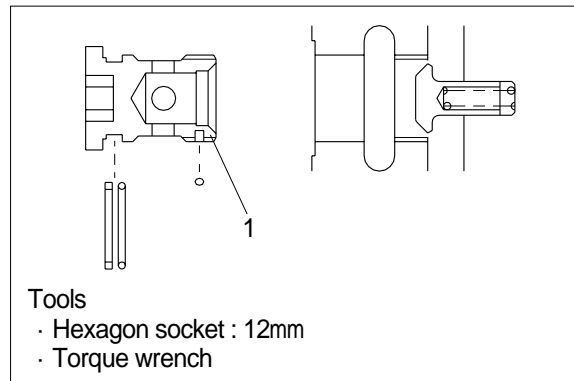
- (1) Remove the cap(1) and take off check(2) and spring(3).

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



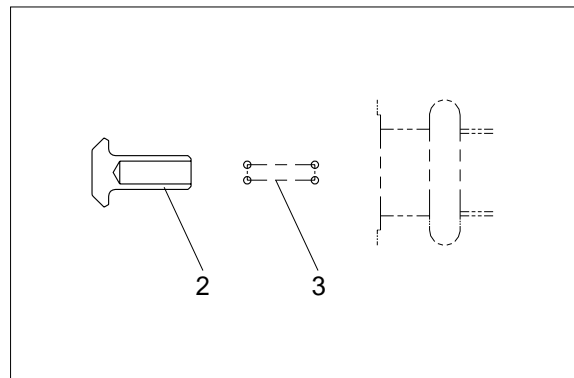
15)CHECK ASSEMBLY(BOOM1, 2, BUCKET, OPT, SWING, ARM 1)

(1) Remove cap(1).



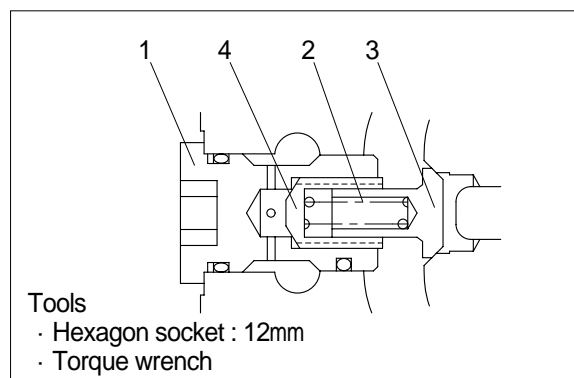
(2) Remove spring(2) and check(3).

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



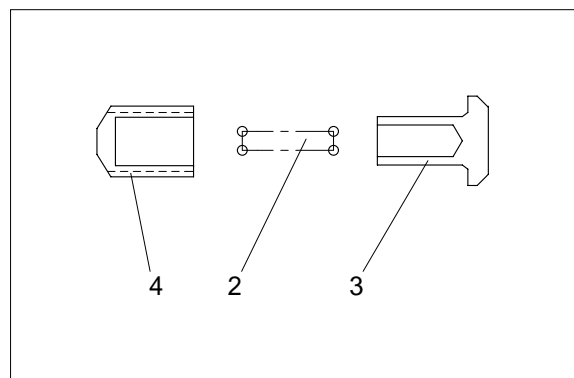
16)CHECK ASSEMBLY(ARM 2)

(1) Remove cap(1).



(2) Remove spring(2) and check(3, 4).

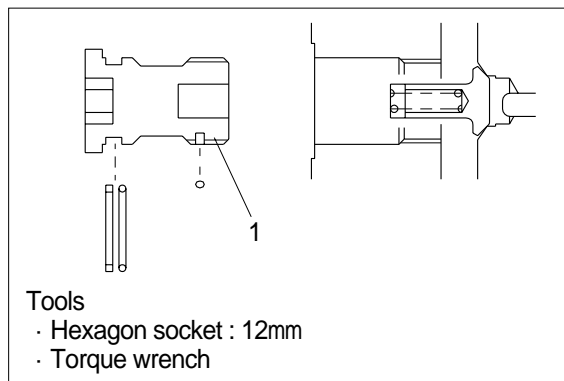
· Tightening torque : 10kgf · m(72.3lbf · ft)



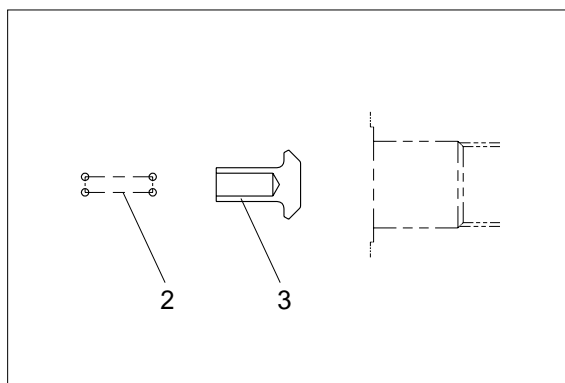
17) CHECK ASSEMBLY

(1) Remove cap(1).

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



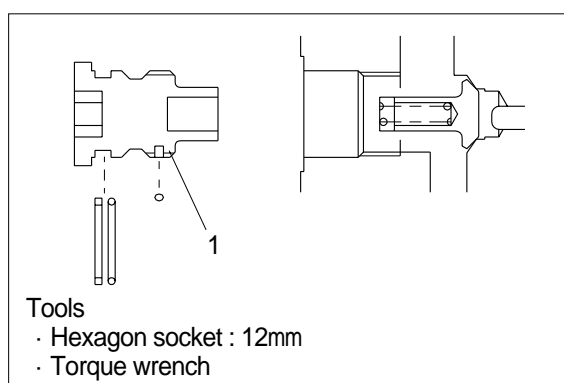
(2) Take off spring(2) and check(3).



18) CHECK ASSEMBLY(P1)

(1) Remove cap(1).

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



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

