

3. ASSEMBLY

1) PRECAUTION

- (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.

2) ASSEMBLY OF SUB ASSEMBLY

(1) Spool

- ① Apply sealant to thread of spools (3, 4, 5, 6) and assemble spring seat (17), springs (19, 18) and spool end (20).
Assemble spool to spool end after fixing spool end with a vise attached wood.
 - Tightening torque : $24\sim 26\text{N} \cdot \text{m}$
($2.4\sim 2.7\text{kgf} \cdot \text{m}$)



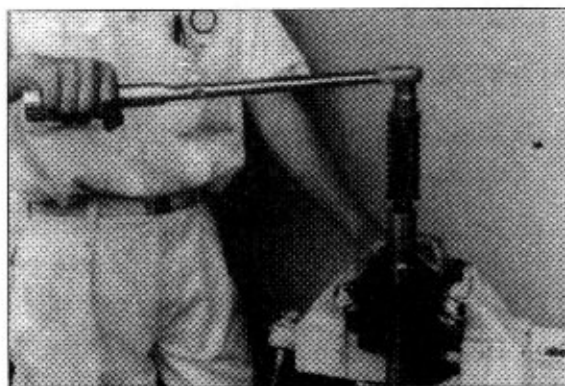
- ② Assemble poppet (2-3) and spring (2-4) into spool (2-2), and then apply sealant to thread.



- ③ Apply sealant to thread of plugs (2-12) after inserting O-ring and assemble spring seat (2-10), spring (2-9) and spool end (2-11) with plug (2-12).

· Tightening torque : $9.8\sim 12\text{N}\cdot\text{m}$
($1\sim 1.2\text{kgf}\cdot\text{m}$)

- ※ Be careful not to flow into spool by applying sealant too much.
Do not overtighten spool.
It can cause deformation of spool.



(2) Assembly of boom priority valve poppet

- ① Insert poppet (23-2) and spring (23-3) to poppet (23-1) and tighten plug (23-4).

- ※ Assemble large diameter side of spring toward seat.



- ② Fix plug and tighten poppet.

· Tightening torque : $41\pm 2\text{N}\cdot\text{m}$
($4.2\pm 0.2\text{kgf}\cdot\text{m}$)



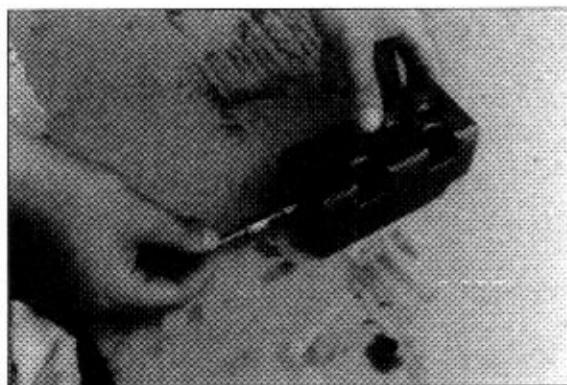
(3) Assembly of straight travel pilot valve

- ① Assemble plug (67-3) after inserting O-ring (67-8).

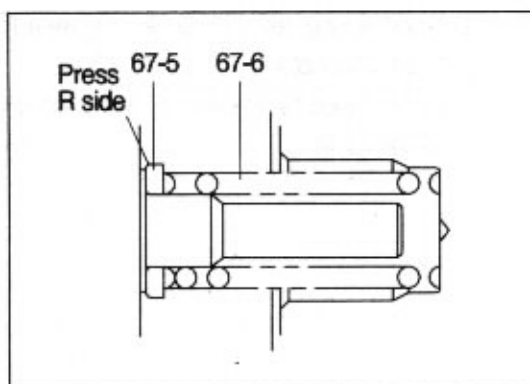
· Tightening torque : $39\pm 2\text{N}\cdot\text{m}$
($4\pm 0.2\text{kgf}\cdot\text{m}$)



- ② Insert spool (67-2) to body with direction consider.
- * Confirm the spool slides smoothly by hand.



- ③ Assemble spring seat (67-5) and spring (67-6).
- * Be careful not to assemble spring seat to reverse direction. It can cause malfunction of spool.

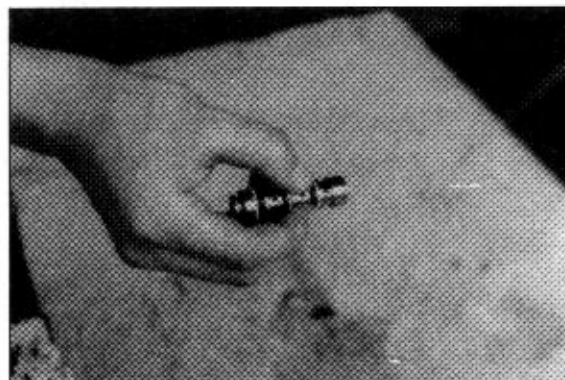


- ④ Assemble plug (67-4) after inserting O-ring (67-6).
 - Tightening torque : $157 \pm 8 \text{ N} \cdot \text{m}$
($16 \sim 0.8 \text{ kgf} \cdot \text{m}$)
- ⑤ Insert O-rings (67-9 : 2 place) at hole of mating face.

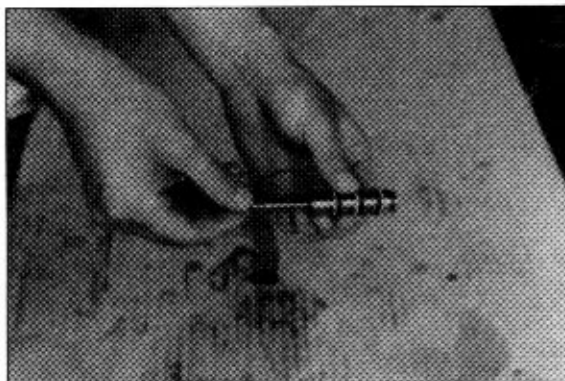


(4) Assembly of antidrift valve(boom section)

- ① Assemble O-rings (66-3, 4, 5) and backup ring (66-6, 7, 8) into groove of sleeve (66-5-1).
- * Be careful not to change assembling positing of O-ring and backup ring. It can cause tearing of O-ring.



- ② Insert spool (66-5-2) into hole of sleeve.



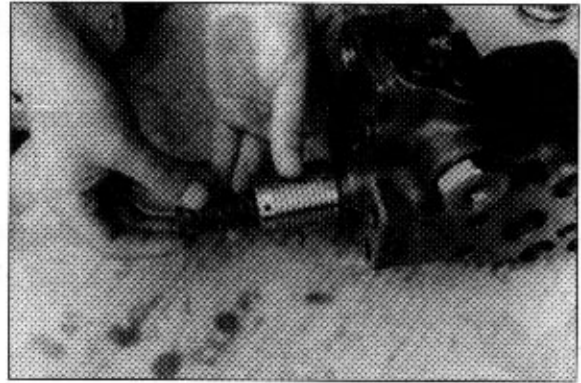
- ③ Insert spring (66-6) with spring seat (66-7) into hole of valve housing (66-1).
* Apply grease to spring seat for easy assembling.



- ④ Assemble plug (66-8) after inserting O-ring.
· Tightening torque : $157 \pm 7.8 \text{ N} \cdot \text{m}$
($16 \pm 0.8 \text{ kgf} \cdot \text{m}$)
- ⑤ Assemble plug (66-16, 5 places) after inserting O-rings.
· Tightening torque : $16 \pm 2 \text{ N} \cdot \text{m}$
($1.6 \pm 0.2 \text{ kgf} \cdot \text{m}$)
- ⑥ Assemble plug (66-17) after inserting O-ring.
· Tightening torque : $73 \pm 10 \text{ N} \cdot \text{m}$
($7.4 \pm 1 \text{ kgf} \cdot \text{m}$)
- ⑦ Assemble plug (66-10) after inserting O-ring.
· Tightening torque : $29 \pm 1 \text{ N} \cdot \text{m}$
($3 \pm 0.1 \text{ kgf} \cdot \text{m}$)



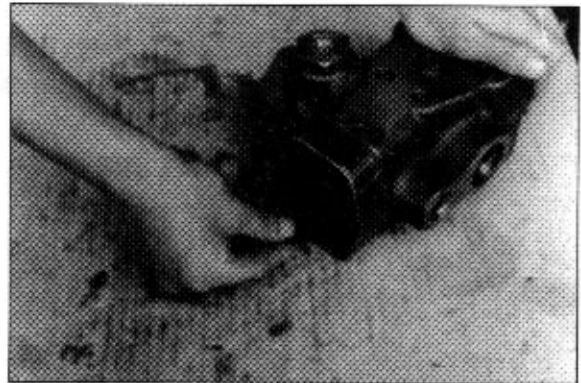
- ⑧ Insert poppet (66-2) and spring (66-3) into valve housing.



- ⑨ Assemble spacer (66-4) after inserting O-ring (66-13) and backup ring (66-15).
* Assemble spring on the spacer with care.



- ⑩ Assemble flange (66-9) after inserting O-ring (66-12), and then tighten socket bolt (66-18).
• Tightening torque : 118~127N · m
(12~13kgf · m)



- ⑪ Assemble overload relief valve (66-11).
• Tightening torque : 78~88N · m
(8~9kgf · m)
- ⑫ Mount O-ring (66-14) to mating groove with body.



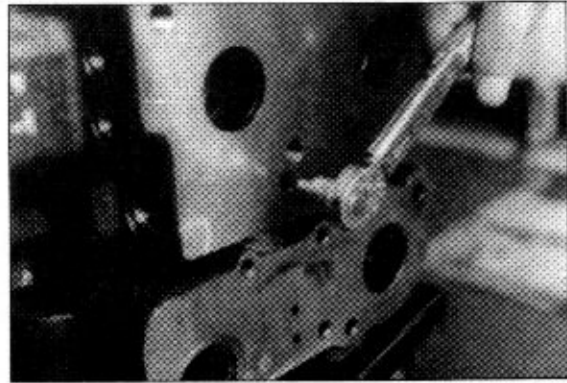
3) ASSEMBLY OF CONTROL VALVE ASSEMBLY

(1) Assembly of plug (PF 1/8)

Tighten plug (61) after winding seal tape.

- Tightening torque : 8.8~9.8N · m
(0.9~1kgf · m)

- ※ Wind plug with double turn of seal tape and tighten it, and then remove rest of seal tape.



(2) Assembly of side body

- ※ Confirm that there is no paint or protrusion at mating face of side body.

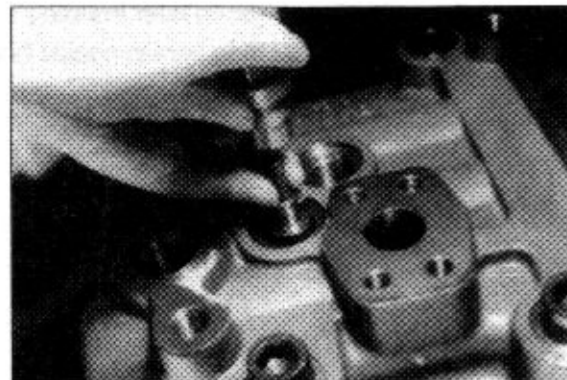
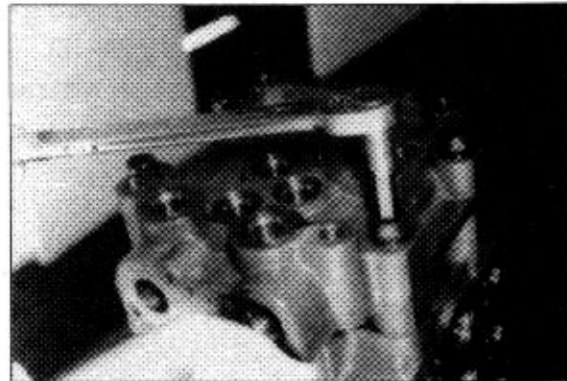
- ① Mount O-rings (62 : 5 places, 63 : 2 places, 64 : 1 place, 65 : 2 places) at groove of mating face of control valve.
- ② Mount side body (2-1) to valve body and tighten socket bolt (79).

- Tightening torque : 353~382N · m
(36~39kgf · m)

- ※ Take care not to deform or separate O-ring from mating face.

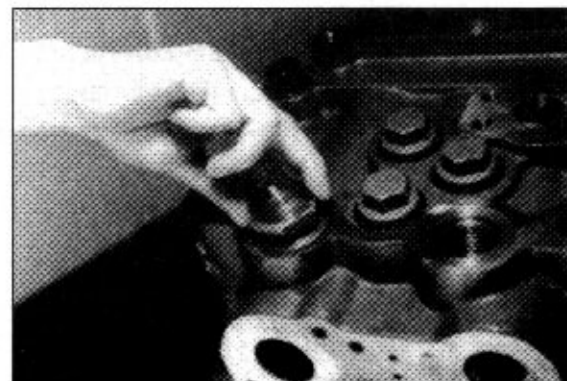
- ③ Mount poppet (2-16) and spring (2-15) and tighten plug (2-13) after inserting O-ring (2-14).

- Tightening torque : 265~275N · m
(27~28kgf · m)



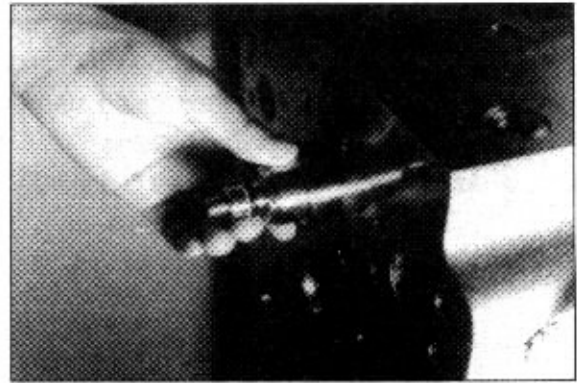
- ④ Assemble plug (2-21) after inserting O-ring.

- Tightening torque : 137~157N · m
(14~16kgf · m)

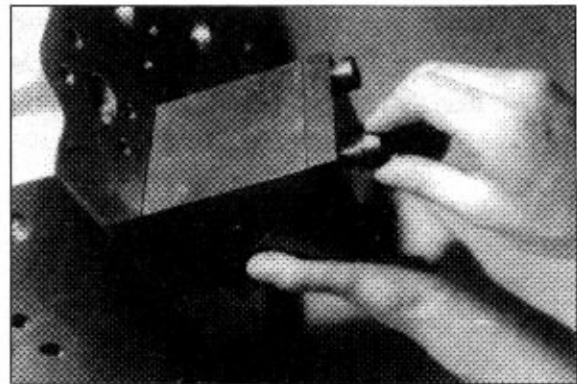


(3) Assembly of boom priority valve

- ① Mount O-ring (26) and backup ring (27) to sleeve (25).
- ② Assemble piston (28), spring (24) and poppet assembly(23) into sleeve(25) and then insert sleeve, into valve housing.



- ③ Position body (29) attached O-ring (32).
- ④ Mount piston (30), O-ring (88) and flange (31), and tighten socket head bolt.
 - Tightening torque : 69~78 N · m
(7~8kgf · m)

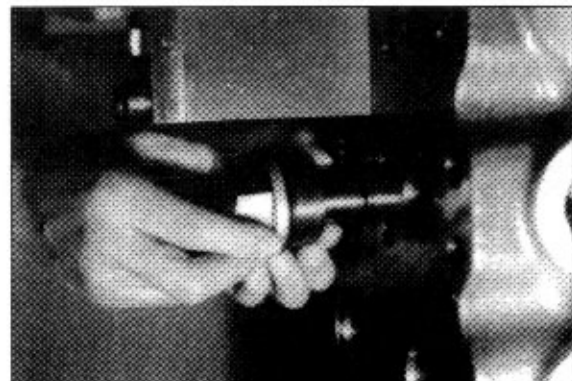


- ⑤ Assemble plug (15) attached O-ring.
 - Tightening torque : 49~59 N · m
(5~6kgf · m)

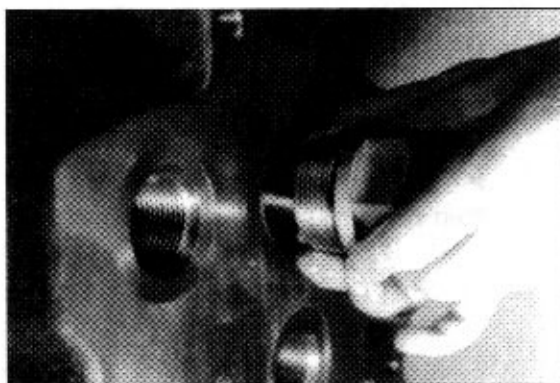


(4) Assembly of overload check valve

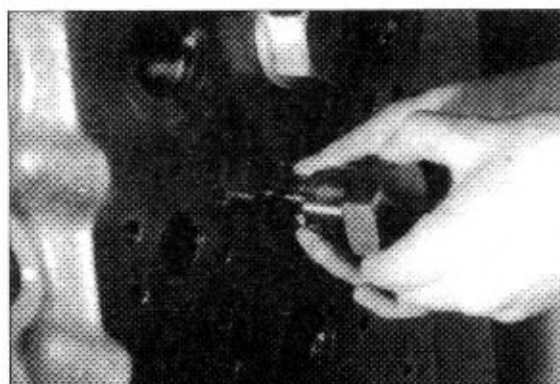
- ① Insert spring (46) and poppet (45) on sleeve (44) of arm 1 and spring (41) and poppet (40) into sleeve (44), and then insert sleeve assembly into valve housing.
- ② Assemble plug (42) attached O-ring.
 - Tightening torque : 735~785 N · m
(75~80kgf · m)



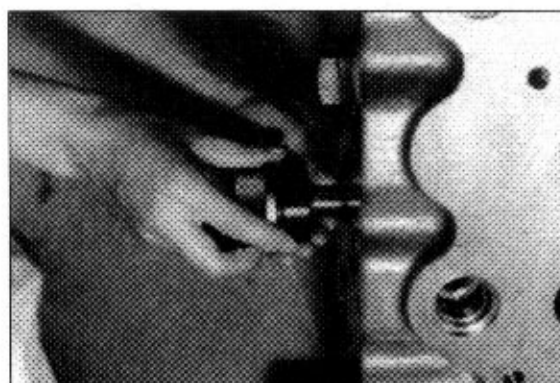
- ③ Insert spring (39) and poppet (38) on sleeve (37) of arm 2 and poppet (40) and spring (41) into and then insert sleeve assembly (37) into valve housing.
- ④ Assemble plug (42) attached O-ring (43).
- Tightening torque : 735~785N · m
(75~80kgf · m)



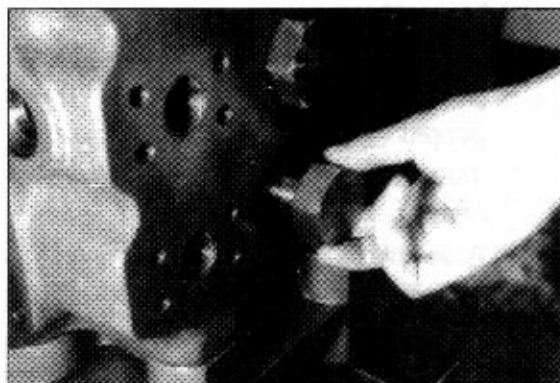
- ⑤ Insert poppet (52) and spring (53) into boom 1, 2 and bucket part and assemble plug (54) attached O-ring (33).
- Tightening torque : 588~618N · m
(60~63kgf · m)



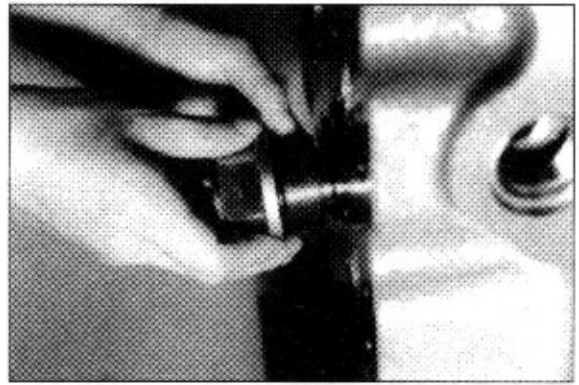
- ⑥ Insert sleeve (55) attached spring (46) and poppet (56) of service section part into valve housing.
- ⑦ Assemble plug (42) attached O-ring (43).
- Tightening torque : 735~785N · m
(75~80kgf · m)



- ⑧ Assemble plug (54) attached O-ring (33) to RH travel part.
- Tightening torque : 588~618N · m
(60~63kgf · m)

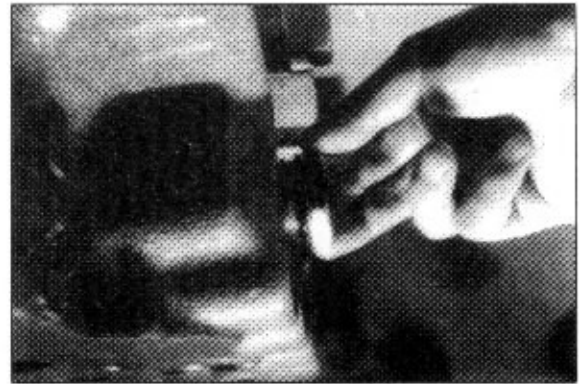


- ⑨ Insert sleeve (59) into LH travel part and assemble plug (42) attached O-ring (43).
- Tightening torque : 735~785 N · m
(75~80 kgf · m)

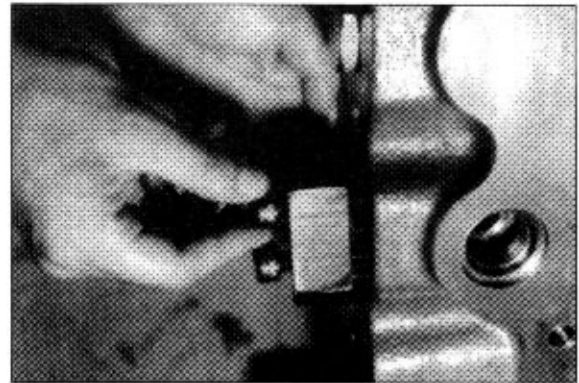


(5) Assembly of port plug, flange cap and antidrift valve

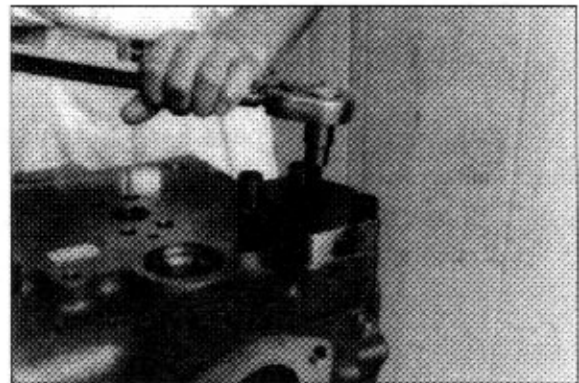
- ① Assemble plug assembly (36) attached O-ring to boom 1 and boom 2 part.
- Tightening torque : 137~157 N · m
(14~16 kgf · m)



- ② Mount flange cap (73) attached O-ring (74) to service port and tighten socket head bolt (77).
- Tightening torque : 39~44 N · m
(4~4.5 kgf · m)

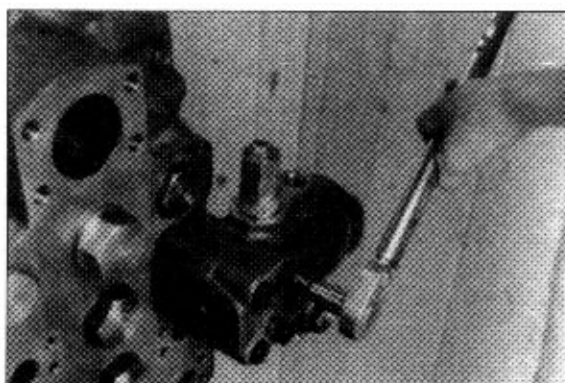


- ③ Mount flange cap (75) attached O-ring (76) to tank port and tighten socket head bolt (78).
- Tightening torque : 205 ± 10.5 N · m
(20.9 ± 1.1 kgf · m)



- ④ Mount antidrift valve (66) and tighten socket head bolt (82).

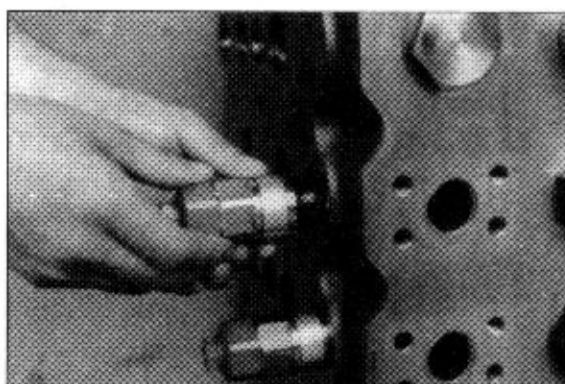
· Tightening torque : $205 \pm 10.5 \text{ N} \cdot \text{m}$
($20.9 \pm 1.1 \text{ kgf} \cdot \text{m}$)



(6) Assembly of relief valve

- ① Assemble overload relief valve (68 : boom 1 down, 89 : others)

· Tightening torque : $78 \sim 88 \text{ N} \cdot \text{m}$
($8 \sim 9 \text{ kgf} \cdot \text{m}$)



- ② Assemble plug assembly (69).

· Tightening torque : $78 \sim 88 \text{ N} \cdot \text{m}$
($8 \sim 9 \text{ kgf} \cdot \text{m}$)

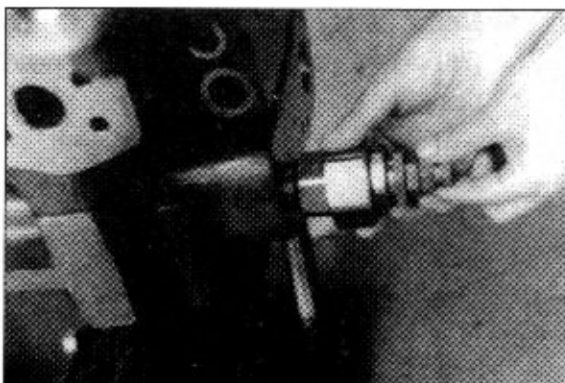


- ③ Assemble main relief valve (2-17).

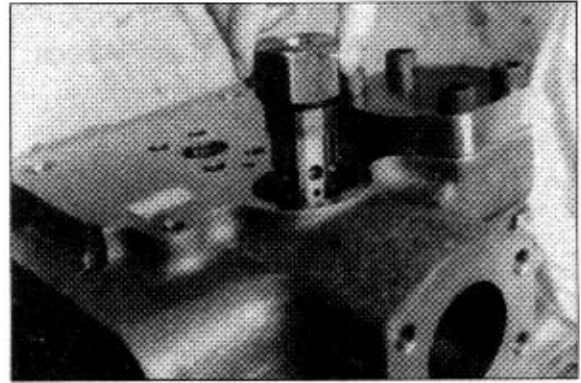
· Tightening torque : $93 \sim 108 \text{ N} \cdot \text{m}$
($9.5 \sim 11 \text{ kgf} \cdot \text{m}$)

※ Use this plug (8, page 8-69) to tighten main relief valve.

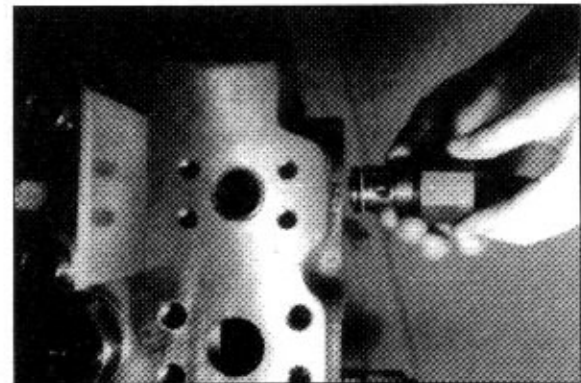
If use other plugs, setting pressure is changed.



- ④ Assemble relief valve (22).
• Tightening torque : 98~118N · m
(10~12kgf · m)

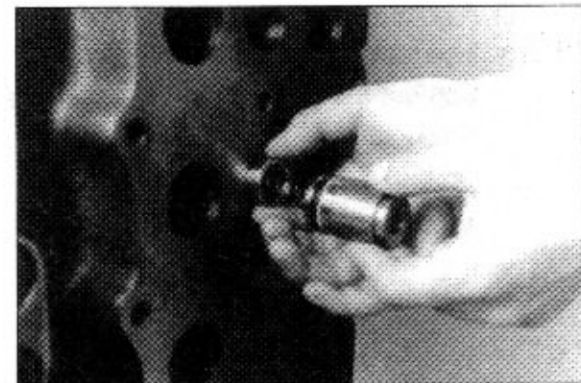


- ⑤ Assemble antivoid valve (87).
• Tightening torque : 78~88N · m
(8~9kgf · m)

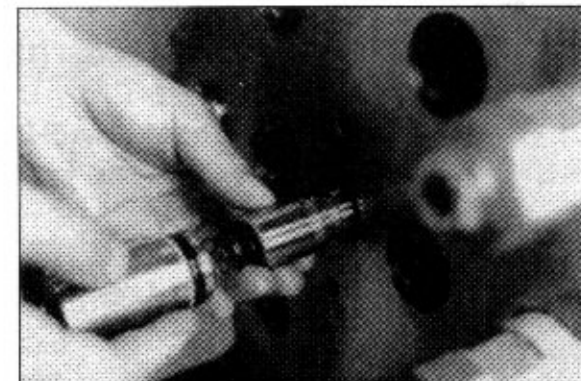


(7) Assemble of parts between cap and valve housing

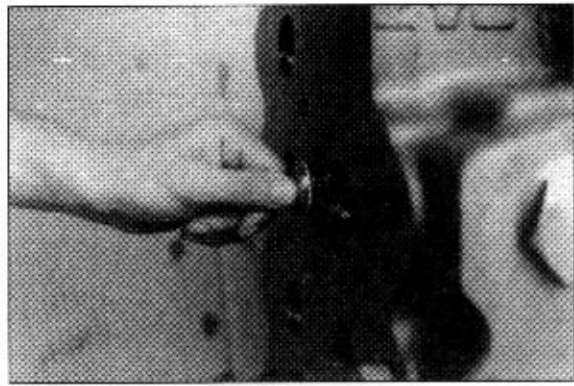
- ① Assemble poppet (47) and spring (41) into boom 4B3 port and boom 5B2 port.
② Insert plug (47) attached O-ring (49) and backup ring (50).



- ③ Assemble poppet (57), spring (41), O-ring (49), backup ring (50) and plug (58) into bucket 4A2 port.

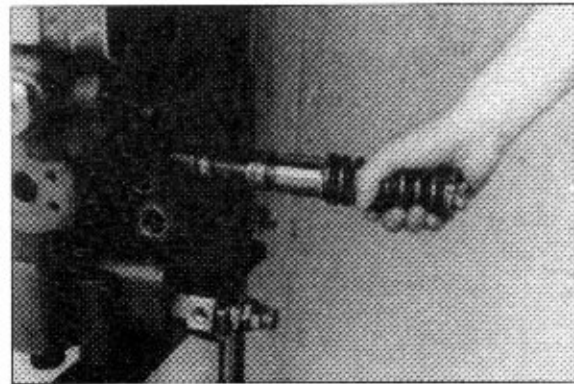


- ④ Assemble plug (51) attached O-ring (49) and backup ring (50) into arm 5A2 port.

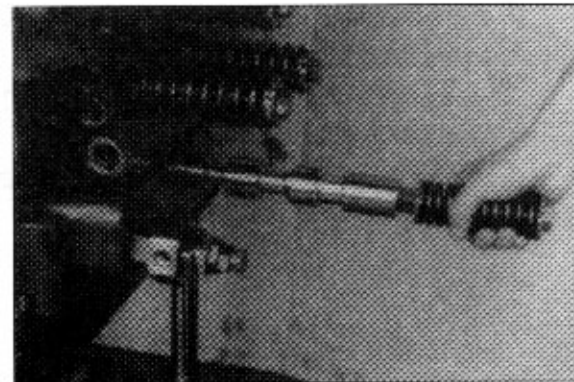


(8) Assembly of spool

- ① Assemble spool (3, 4, 5, 6, 7) sub assembly into 5 spool sides and spool (8, 9, 10, 11) sub assembly into 4 spool sides of the same place as disassembling.

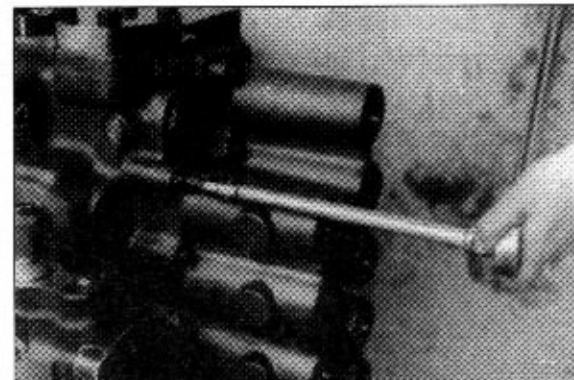


- ② Assemble spool (2-2) into side body.
* Insert spool into hole slowly.
Confirm the spool slides smoothly by hand.



(9) Assembly of cap

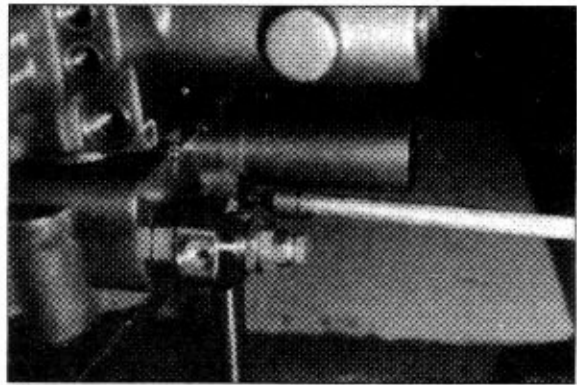
- ① Mount O-ring (16) into hole for cap (12, 13, 14).
Mount O-ring (2-6) into hole for cap (2-8).
② Insert cap (12, 13, 14) and tighten socket head bolt (81, 82).
· Tightening torque : 69~78 N · m
(7~8 kgf · m)



- ③ Insert cap (2-8) and tighten socket head bolt (2-7).

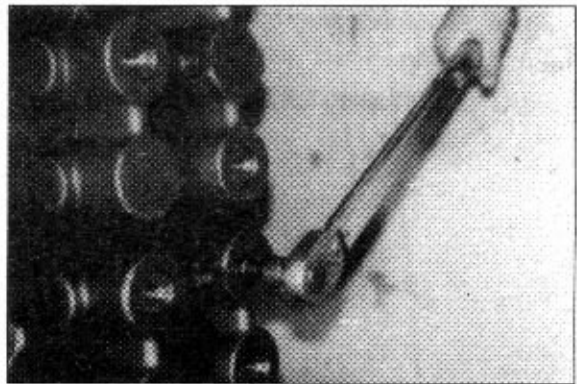
• Tightening torque : $34\sim39\text{N}\cdot\text{m}$
($3.5\sim4\text{kgf}\cdot\text{m}$)

- ※ When assembling cab, be careful not to separate O-ring of mating face.



- ④ Tighten plug assembly (15) attached O-ring to service pilot port.

• Tightening torque : $49\sim59\text{N}\cdot\text{m}$
($5\sim6\text{kgf}\cdot\text{m}$)

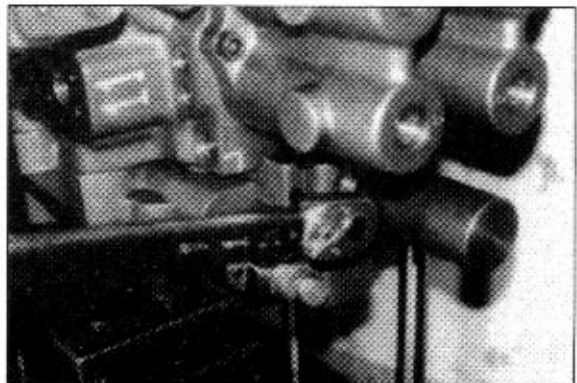


(10) Assembly of straight travel pilot valve

- ① Insert straight travel pilot valve and tighten socket head bolt (84).

• Tightening torque : $36.9\pm2\text{N}\cdot\text{m}$
($3.8\pm0.2\text{kgf}\cdot\text{m}$)

- ※ Be careful not to separate O-ring of mating face.

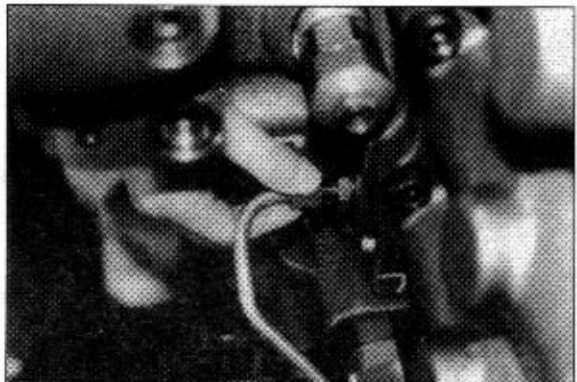


- ② Mount O-ring (35) to fitting (70) and assemble it to body.

• Tightening torque : $34\pm36\text{N}\cdot\text{m}$
($3.5\pm4\text{kgf}\cdot\text{m}$)

- ③ Assemble pipes (71, 72).

• Tightening torque : $34\pm36\text{N}\cdot\text{m}$
($3.5\pm4\text{kgf}\cdot\text{m}$)

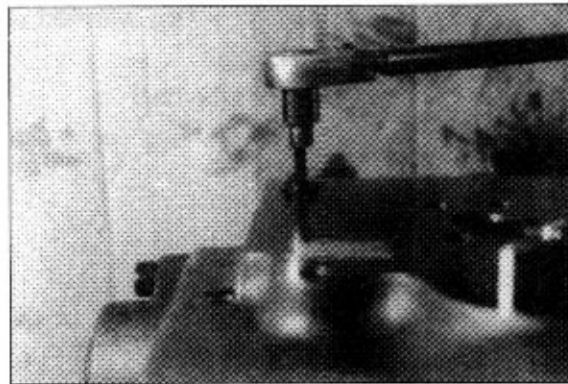


(11) Assembly of others plug

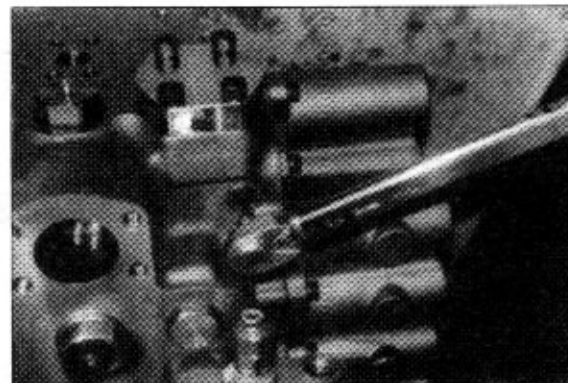
- ① Assemble plug assembly (60) attached O-ring.
· Tightening torque : 59~69N · m
(6~7 kgf · m)



- ② Assemble plug assembly (34) attached O-ring.
· Tightening torque : 34~39N · m
(3.5~4 kgf · m)



- ③ Assemble plug assembly (21) attached O-ring.
· Tightening torque : 78~88N · m
(8~9 kgf · m)

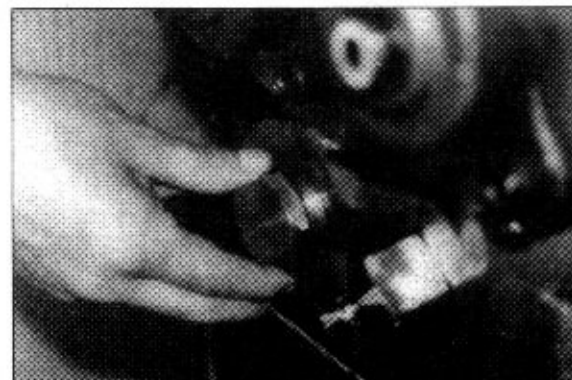


- ④ Assemble plug assembly (2-20) attached O-ring.
· Tightening torque : 99~118N · m
(10~12 kgf · m)

※ After finishing assembly, recheck that assembly and tightening of parts is omitted.

If tightening is omitted, it can cause leakage of oil.

The tightening torque value is all wet condition(adhesion state of hydraulic oil).



4. DISASSEMBLY AND ASSEMBLY OF RELIEF VALVE

1) MAIN RELIEF VALVE

(1) Disassembly

Replace this main relief valve to assembly.
Loosen cap (8) with spanner and disassemble O-ring (1).
When oil leaked from nut (3), loosen plug (4) and nut (3), and then replace O-ring and backup ring.

(2) Assembly

Remove dust or paint segment of thread of plug (2, 4) and nut (3), and then O-ring and backup ring with new ones.

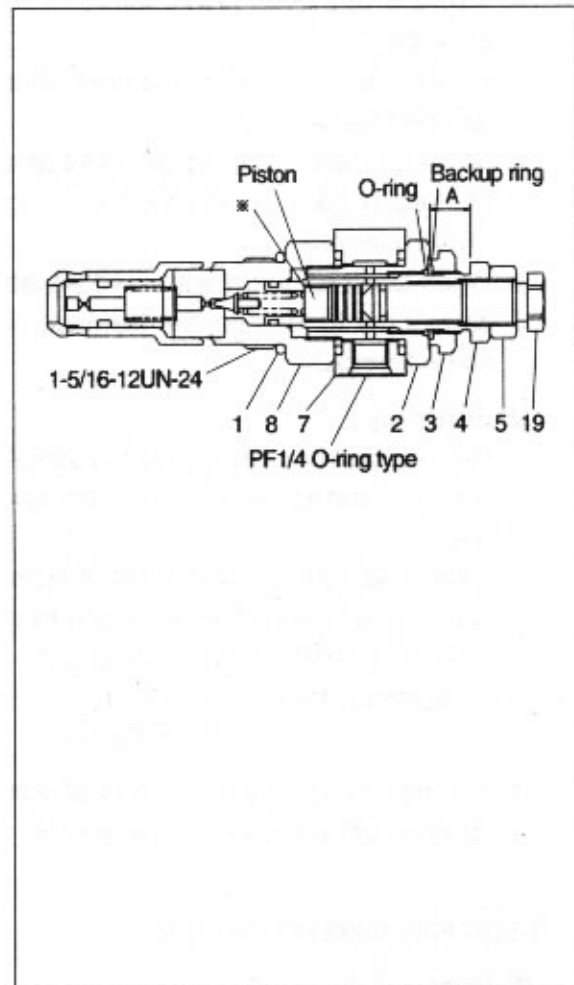
Clean relief valve mounting part of valve housing and insert relief valve and then tighten cap (8) with the specified torque.

- Tightening torque : 93~108N · m
(9.5~11 kgf · m)

Before setting pressure, adjust position of pi port. Loosen plug (2) to move cap (7) and adjust position.

- Tighten torque : 78~88N · m
(8~9 kgf · m)

- * The tightening torque value is all wet condition (adhesion state of hydraulic oil).



2) OVERLOAD RELIEF VALVE

(1) Disassembly

Replace this overload relief valve to assembly.

Loosen cap (1) with spanner and disassemble O-ring (2).

When oil leaked from adjusting kit part (3), loosen adjust kit and replace O-ring (4) with new one.

- ※ When disassembling adjusting kit (4), be careful not to lose poppet because of spring bounce.

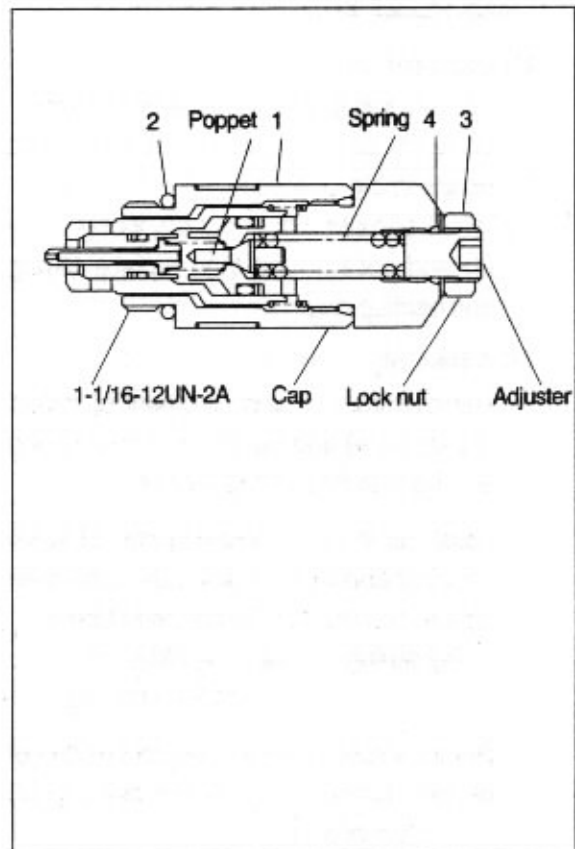
(2) Assembly

Remove dust or paint segment of thread of cap (1) and replace O-ring (2) with new one.

Clean relief valve mounting part of valve housing and insert relief valve and then tighten cap (1) with the specified torque.

- Tightening torque : $78\text{--}88\text{N} \cdot \text{m}$
($8.0\text{--}9.0\text{kgf} \cdot \text{m}$)

- ※ The tightening torque value is all wet condition (adhesion state of hydraulic oil).



3) LOW PRESSURE RELIEF VALVE

(1) Disassembly

Replace this low pressure relief valve to assembly because D point is tight fitted.

(2) Assembly

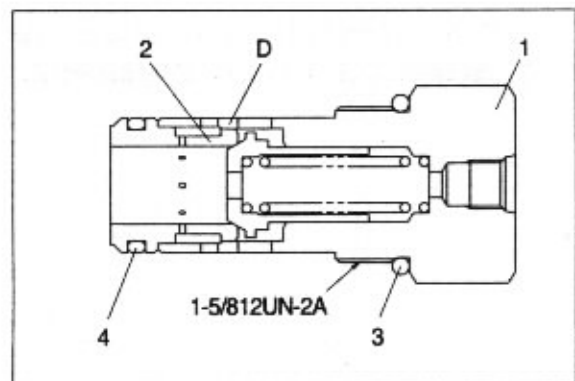
Remove dust or paint segment of thread of plug (1), replace O-ring (3) of plug (1) and O-ring (4) of sleeve (2) with new one.

Assemble plug (1) attached O-ring (3).

- Tightening torque : $98\text{--}118\text{N} \cdot \text{m}$
($10\text{--}12\text{kgf} \cdot \text{m}$)

Clean relief valve mounting part of valve housing and insert relief valve assembly.

- ※ The tightening torque valve is all wet condition (adhesion state of hydraulic oil).



4) ANTIVOID VALVE

(1) Disassembly

Replace this antvoid valve to assembly because D point is fitted tightly.

(2) Assembly

Remove dust or paint segment of thread of plug (1), replace O-ring (2) of plug (1) and O-ring (3) and backup ring (4) of sleeve (5) with new one.

- Tightening torque : 78~88N · m
(8~9kgf · m)

Clean relief valve mounting part of valve housing, insert relief valve.

- * The tightening torque value is all wet condition (adhesion state of hydraulic oil).

