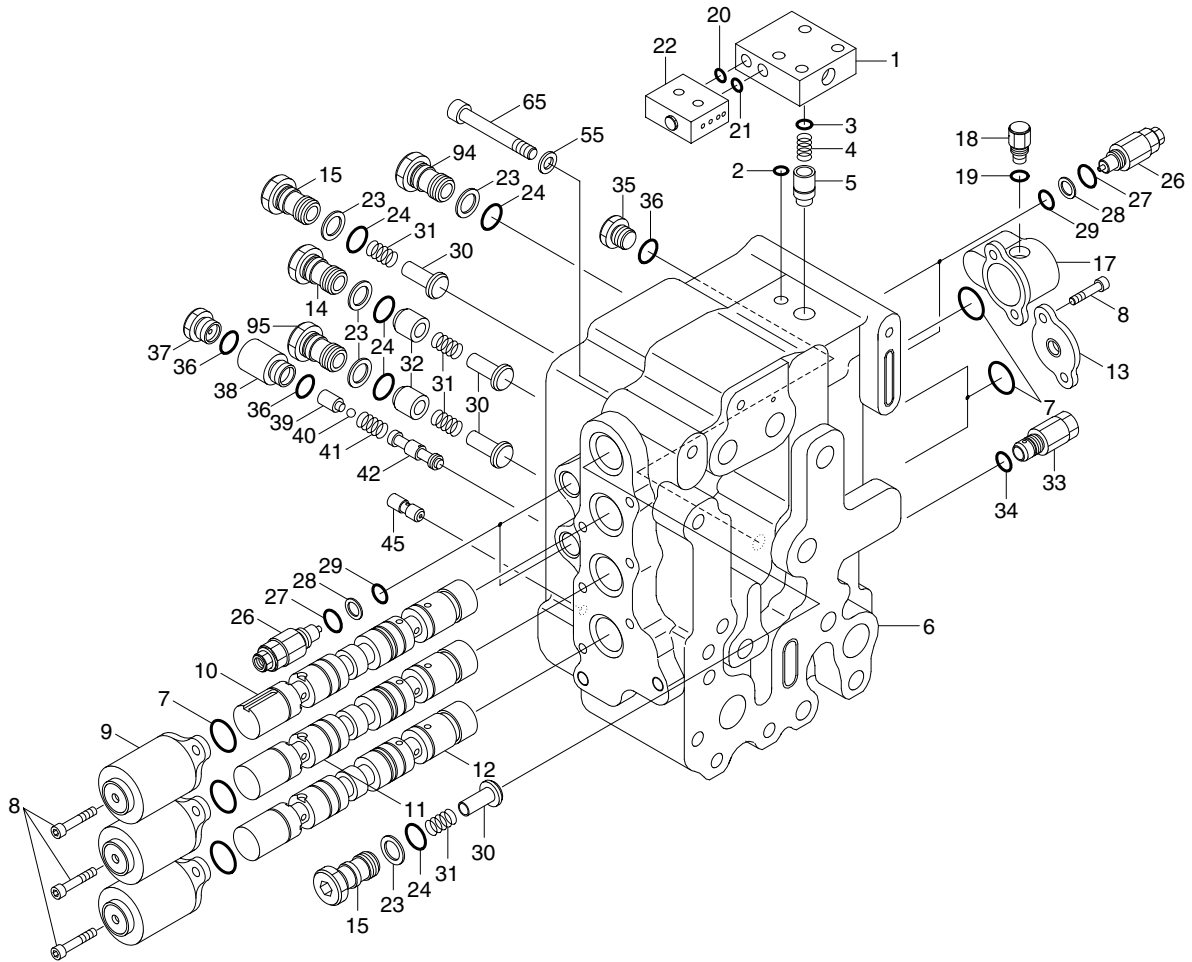


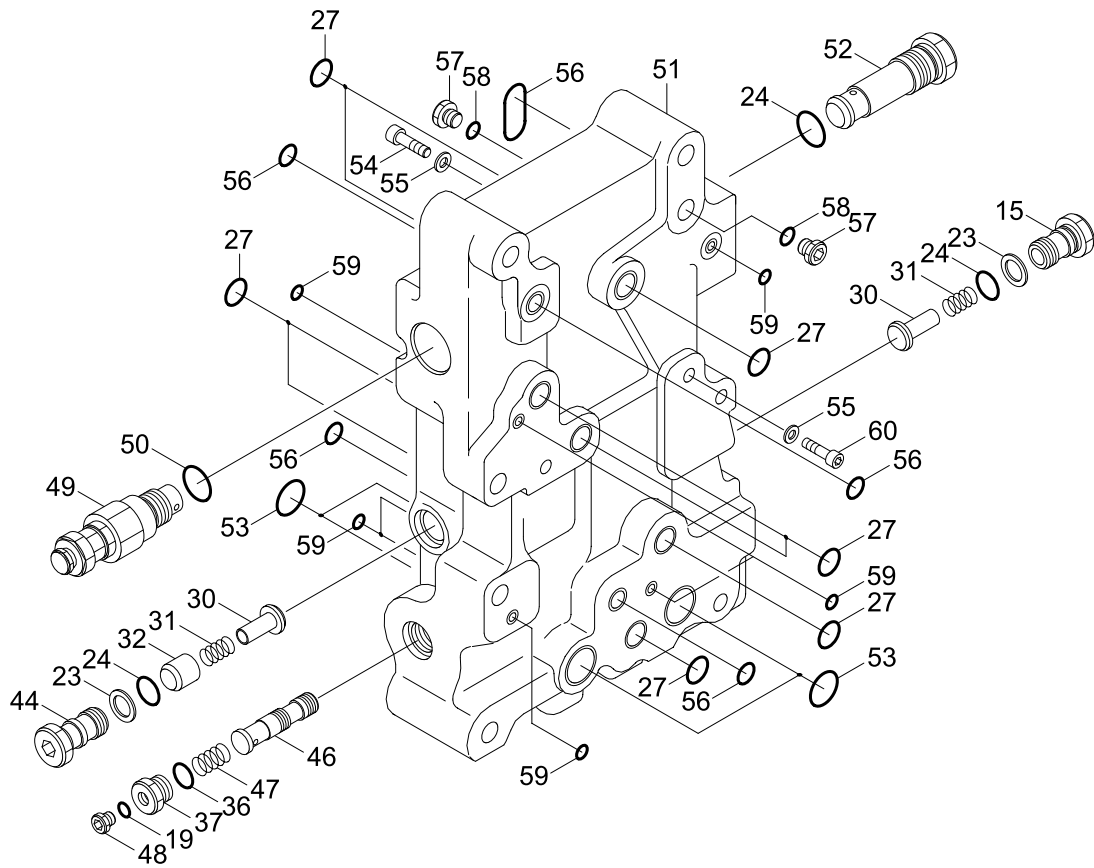
2. STURCTURE (1/3)



3607A8MC02

1	Cover assy	17	Cover	33	Foot relief valve
2	O-ring	18	Plug	34	O-ring
3	O-ring	19	O-ring	35	Cap
4	Spring	20	O-ring	36	O-ring
5	Poppet	21	O-ring	37	Cap
6	Housing	22	Selector assy	38	Cap
7	O-ring	23	Back up ring	39	Piston
8	Socket bolt	24	O-ring	40	Steel ball
9	Cover	26	Overload relief valve	41	Spring
10	Boom plunger assy	27	O-ring	42	Spool
11	Bucket plunger assy	28	Back up ring	45	Orifice
12	Travel plunger assy	29	O-ring	55	Washer
13	Cover	30	Check	65	Socket bolt
14	Cap	31	Spring	94	Cap
15	Cap	32	Check	95	Cap

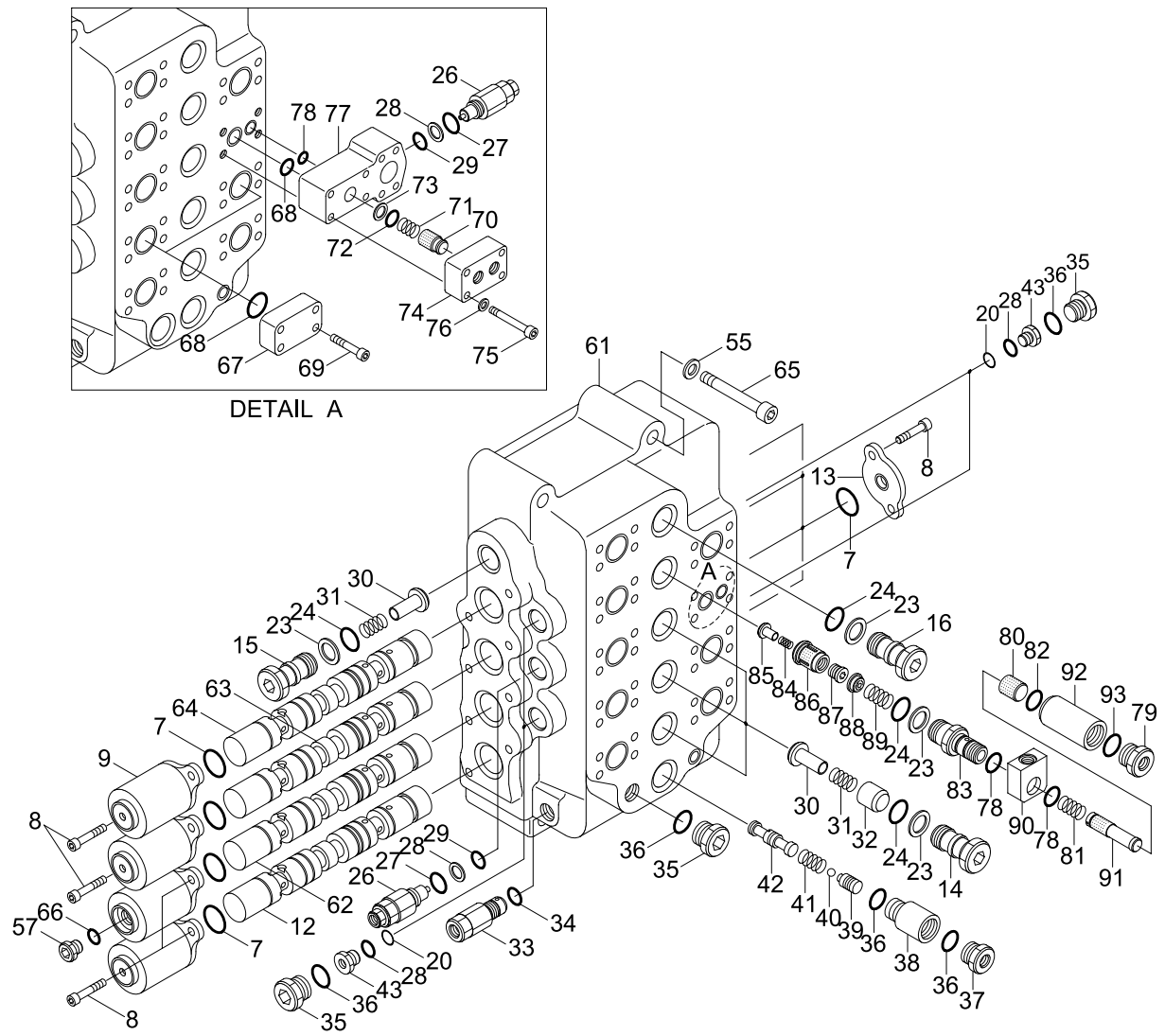
STURCTURE (2/3)



36078MC03

15	Cap	37	Cap	53	O-ring
19	O-ring	44	Cap	54	Socket bolt
23	Back up ring	46	Spool	55	Washer
24	O-ring	47	Spring	56	O-ring
27	O-ring	48	Cap	57	Cap
30	Check	49	Main relief valve	58	O-ring
31	Spring	50	O-ring	59	O-ring
32	Check	51	Manifold	60	Socket bolt
36	O-ring	52	Logic check valve		

STURCTURE (3/3)



36078MC04

7	O-ring	31	Spring	62	Option plunger assy	78	O-ring
8	Socket bolt	32	Check	63	Arm plunger assy	79	Cap
9	Cover	33	Foot relief valve	64	Swing plunger assy	80	Piston
12	Travel plunger assy	34	O-ring	65	Socket bolt	81	Spring
13	Cover	35	Cap	66	O-ring	82	O-ring
14	Cap	36	O-ring	67	Flange	83	Sleeve
15	Cap	37	Cap	68	O-ring	84	Spring
16	Cap	38	Cap	69	Socket bolt	85	Check
20	O-ring	39	Piston	70	Poppet	86	Poppet
23	Back up ring	40	Steel ball	71	Spring	87	Cap
24	O-ring	41	Spring	72	O-ring	88	Spring guide
26	Overload relief valve	42	Spool	73	Back up ring	89	Spring
27	O-ring	43	Plug	74	Cover assy	90	Union
28	Back up ring	55	Washer	75	Socket bolt	91	Piston
29	O-ring	57	Cap	76	Lock washer	92	Cap
30	Check	61	Housing	77	Manifold	93	O-ring

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL PRECAUTIONS

(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 re-assembled 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.

2) TOOLS

Before disassembling the control valve, prepare the following tools beforehand.

Name of tool	Quantity	Size(mm)
Vice mounted on bench(Soft jaws)	1 unit	
Hexagon wrench	Each 1 piece	6, 8, 10, 12, 14 and 17
Socket wrench	Each 1 piece	19, 30, 36, 41 and 46

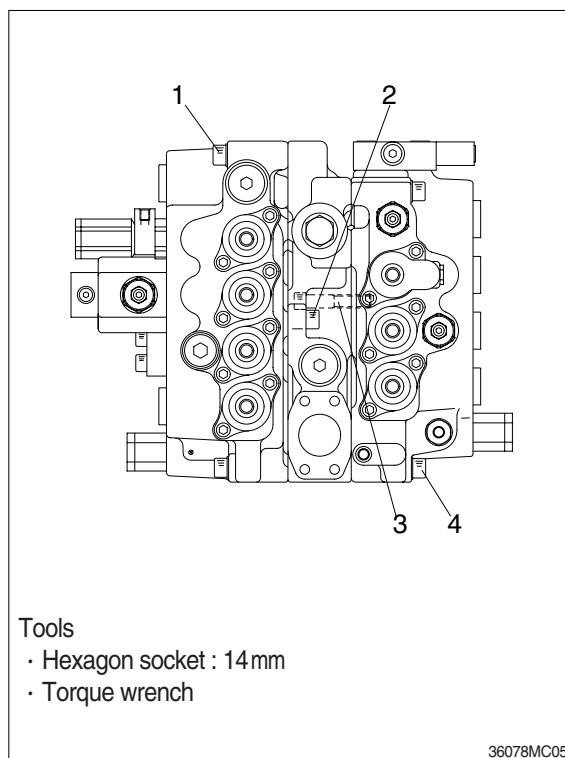
3) MOUNTING AND DISMOUNTING VALVES

(1) Disassembly

4 spool valve can be removed by loosening socket bolts (1,2), while 3 spool valve can be removed by loosening socket bolts (3,4).

(2) Assembly

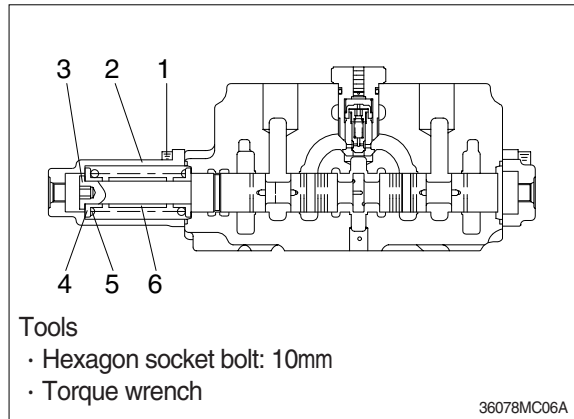
- ※ Valves should be mounted after making sure that all O-rings and cap are placed on the assembling faces and check spacer is placed on assembling faces of 3-plunger valve.
- Place the valve assembly on plane surface and assemble 3 spool valve to manifold and then assemble 4 spool valve.
- Tighten the socket bolts at specified torque after making sure that the assembly is leveled.
- Tightening torque : 25 kgf · m (181 lbf · ft)



4) OPERATING SECTION OF HYDRAULIC PACK

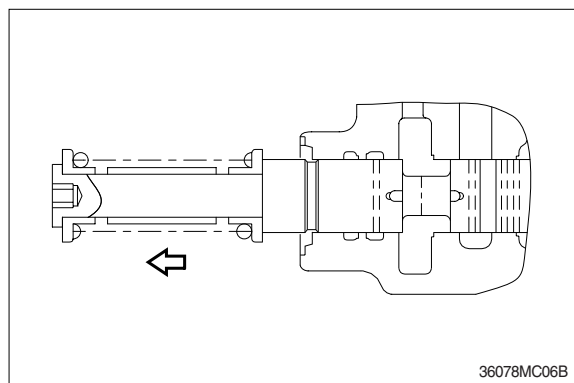
(1) Loosen socket bolt (1) to remove cover (2).

※ 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.

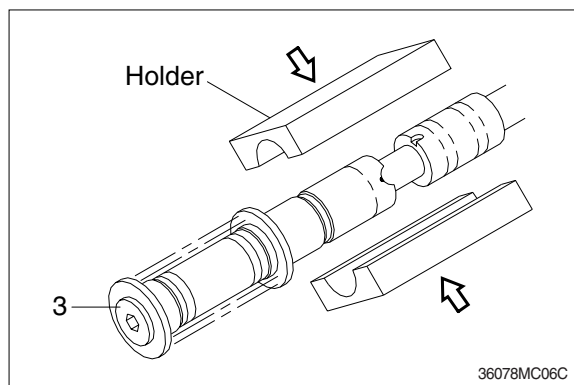


(3) Place the plunger between holders and loosen plunger cap (3) by using a vise.

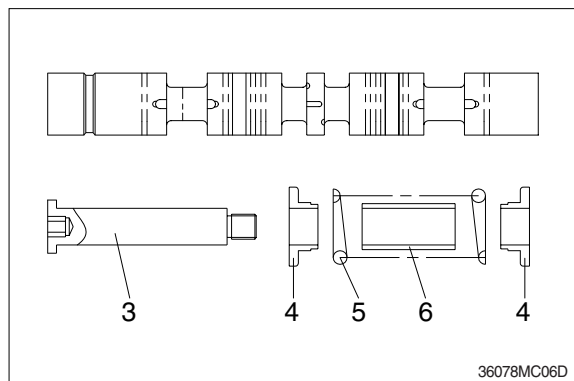
• Plunger cap

Hexagon socket : 10 mm

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



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



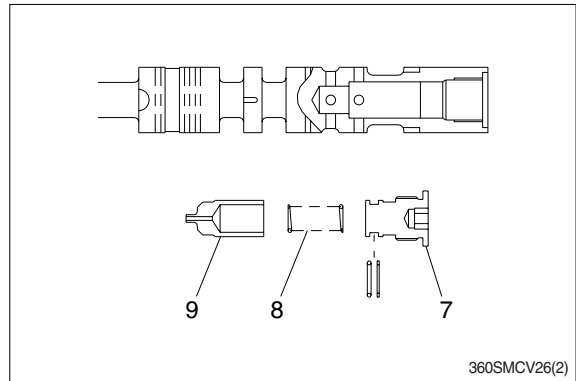
(5) Arm plunger only (Remove check)

Remove cap (7) and disassemble spring (8) and check (9).

- Plunger cap

Hexagon socket : 10 mm

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



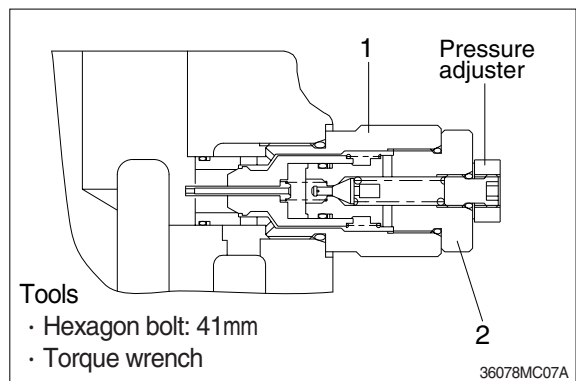
5) OVERLOAD RELIEF ASSEMBLY

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.

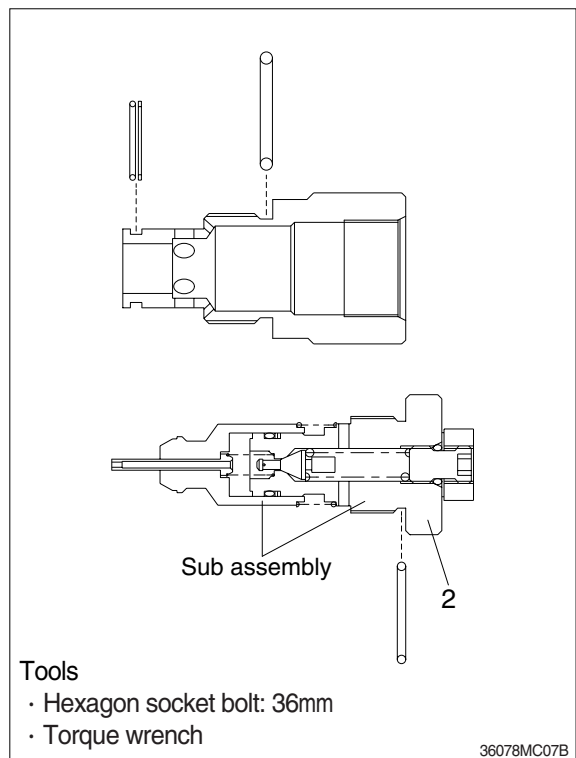
Tightening torque : 10 kgf · m (72.3 lbf · ft)

- ※ Record original position for reassembly.

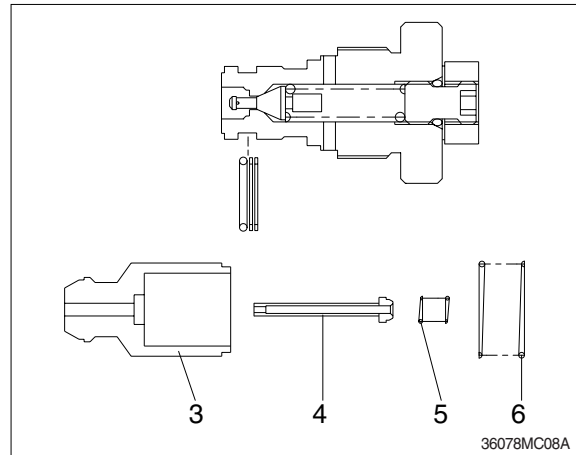


- (2) Loosen the relief seat(2) and remove the sub assembly.

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



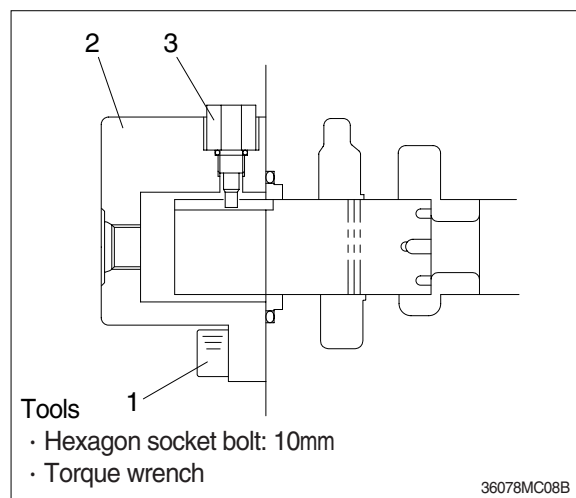
(3) Pull out the poppet(3) and take off the piston(4) and springs(5,6).



6) COVER ASSEMBLY(BOOM PLUNGER)

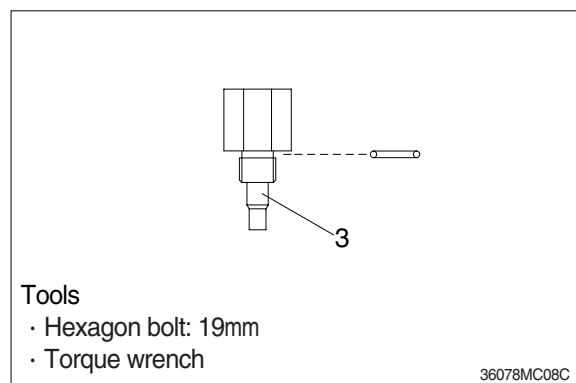
(1) Loosen socket bolt(1) to remove cover(2).
 ※ Install cover(2) after making sure that O-ring is placed on the edge of the valve hole.

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



(2) Remove plug(3).

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

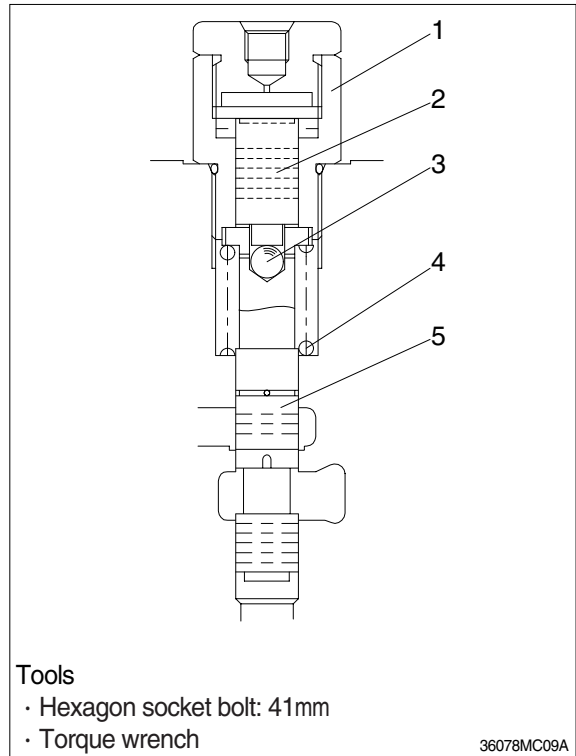


7) CENTER BYPASS VALVE ASSEMBLY

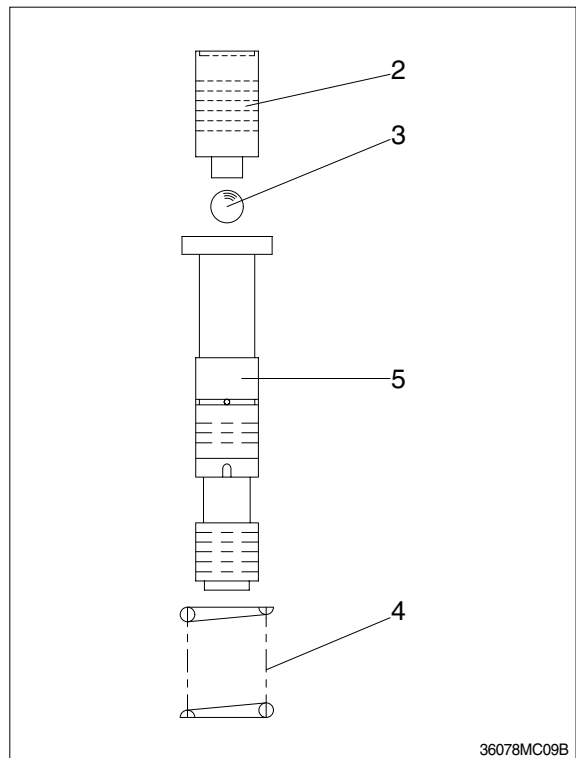
(1) Remove cap(1).

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

※ Record original position for reassembly.



(2) Remove piston(2), steel ball(3), spool(5) and spring(4).

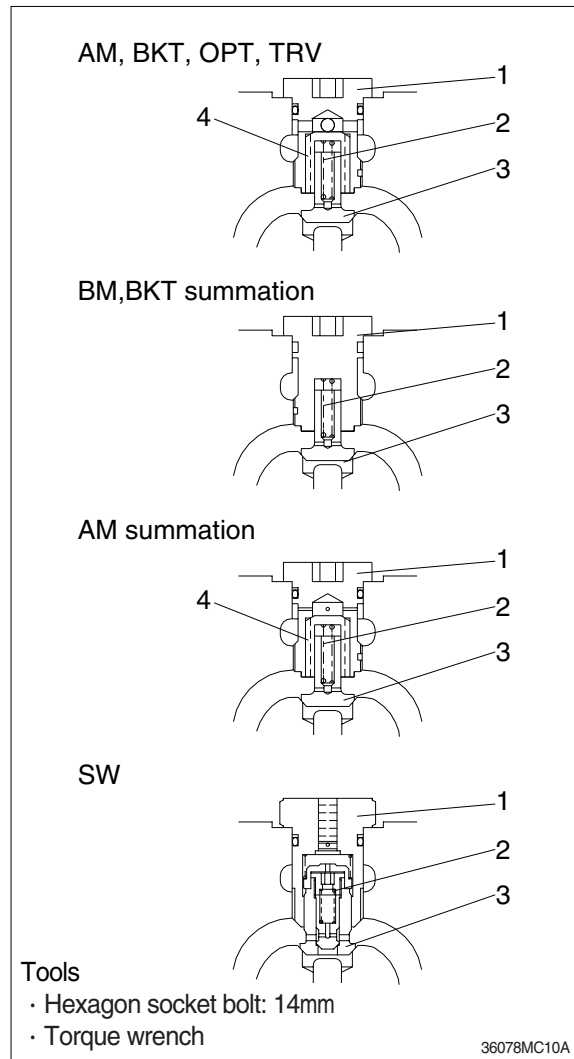


8) LOAD CHECK ASSEMBLY

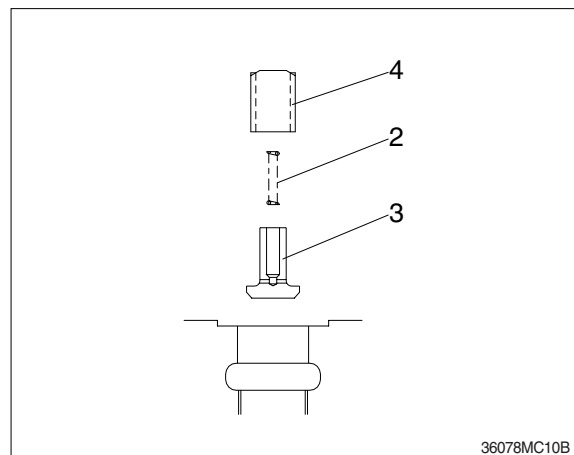
(1) Remove cap(1).

Tightening torque : 35kgf · m (253.2lbf · ft)

※ Record original position of arm summation cap for reassembly.



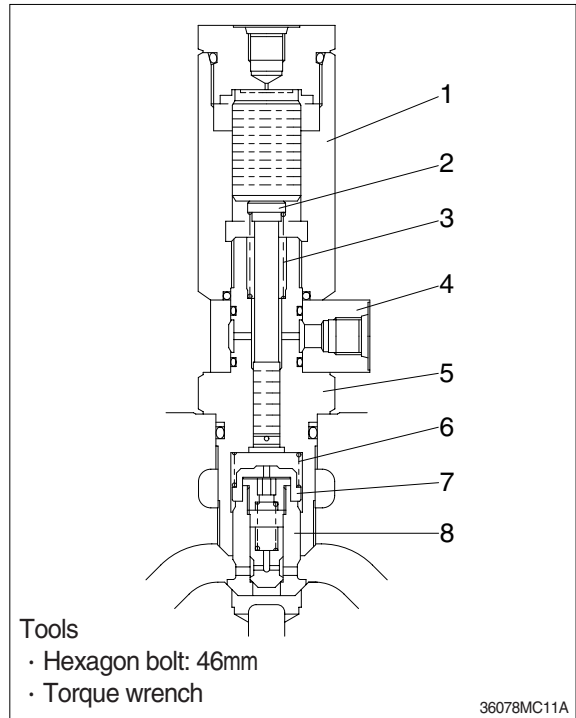
(2) Remove check valve(4), spring(2) and check valve(3).



9) BOOM PRIORITY ASSEMBLY

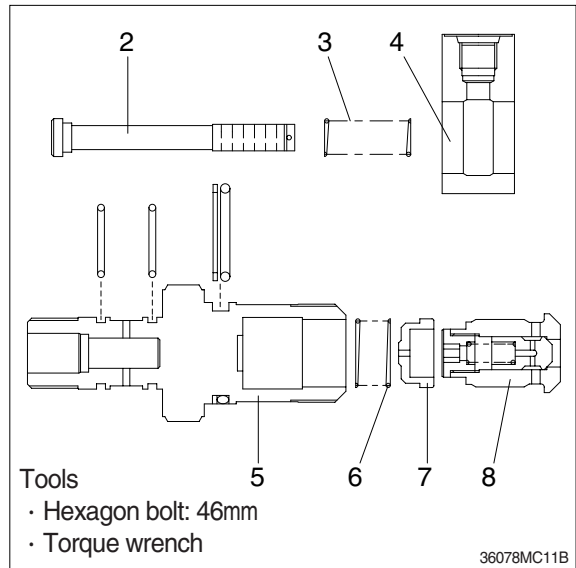
- (1) Remove cap(1), piston(2), spring(3) and union(4).

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



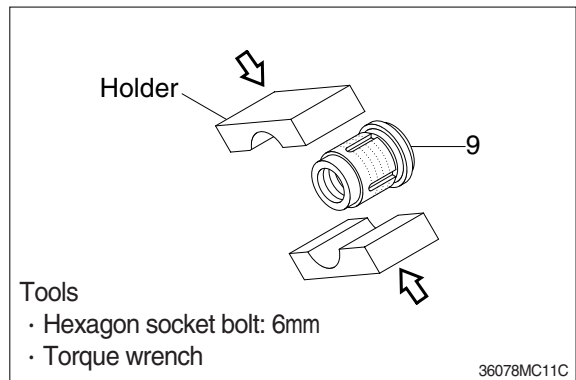
- (2) Remove sleeve(5), spring(6), spring guide(7) and poppet sub assembly(8).

Tightening torque : 35kgf · m (253.2lbf · ft)



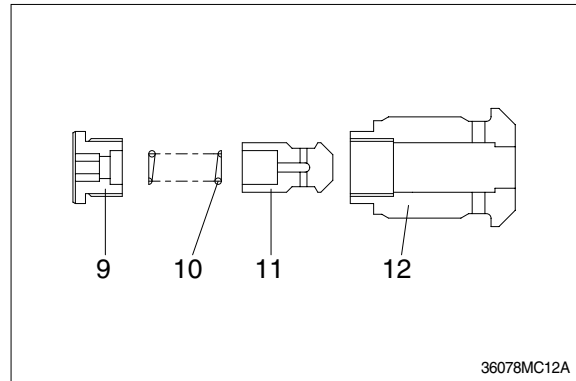
- (3) Place the poppet sub assembly(8) between holders and cap(9) by using a vise.

Tightening torque : 3.5kgf · m (25.3lbf · ft)



(4) Remove cap(9).

Take off spring(10), check valve(11) and poppet(12).

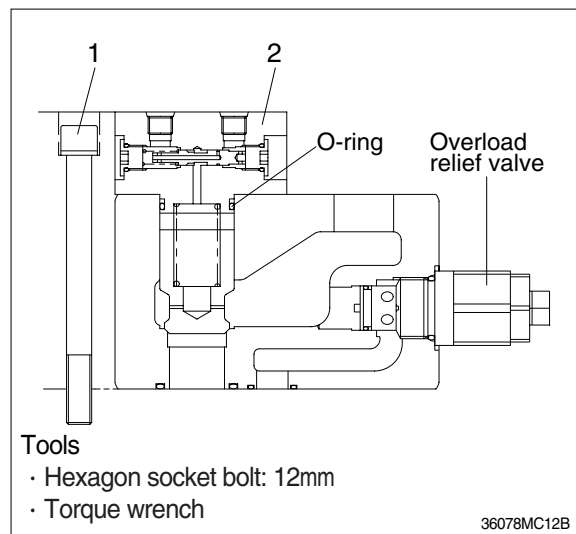


10) ARM LOAD HOLDING VALVE

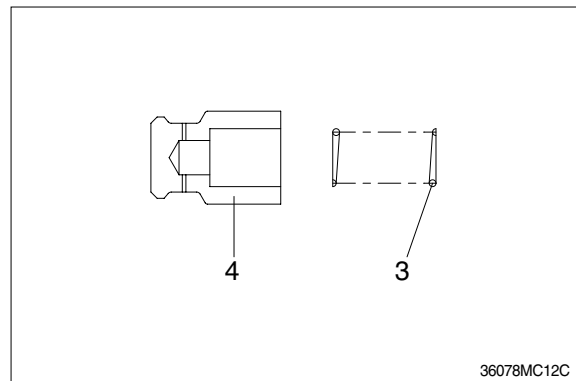
(1) Loosen socket bolt(1) to remove cover(2) from housing.

Tightening torque : 18kgf · m (130.2lbf · ft)

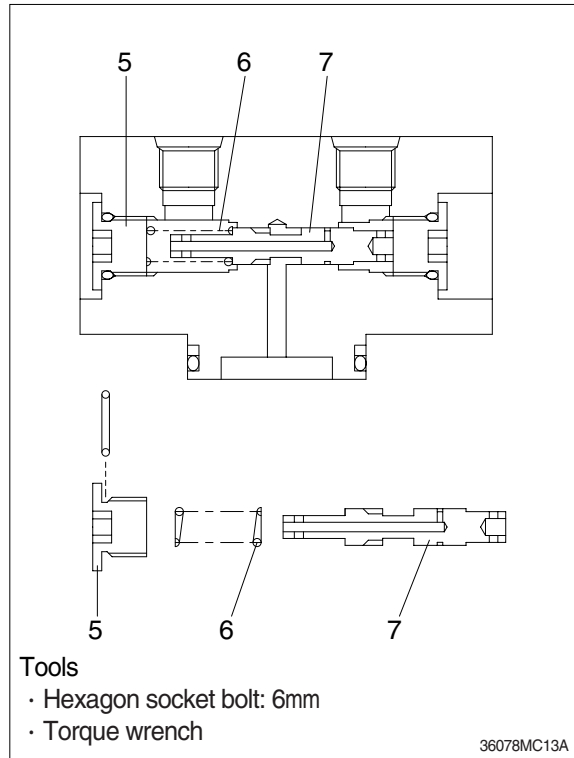
※ Install cover(2) after making sure that O-ring is placed on the edge of the bore.



(2) Remove spring(3) and poppet(4).

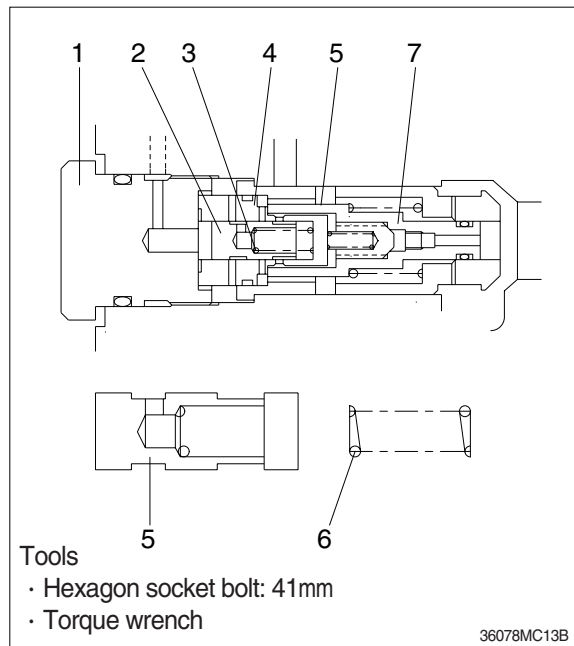


- (3) Remove cap(5).
 Take off spring(6) and spool(7).
 Tightening torque : 3kgf · m (21.7lbf · ft)

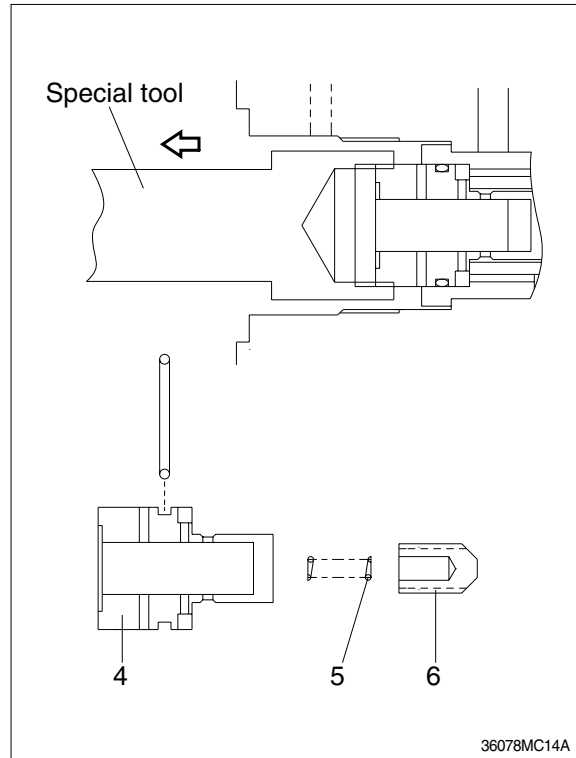


11) LOGIC VALVE(FOR BOOM SUMMATION)

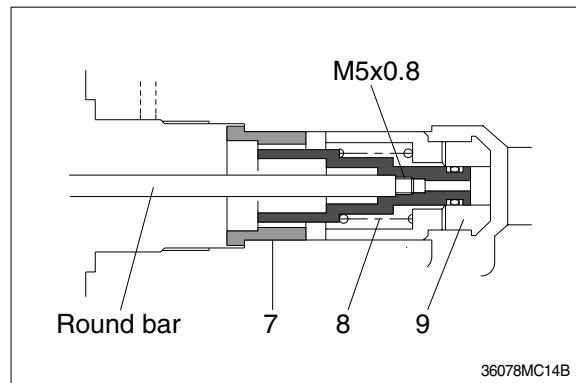
- (1) Remove cap(1).
 Take off piston(2) and spring(3).
 Tightening torque : 10kgf · m (72.3lbf · ft)



- (2) Pull out sleeve(4) by inner-threaded special tool.
Take off spring(5) and check valve(6).



- (3) Pull out sleeve(7) by threaded round bar.
Take off spring(8) and check(9).

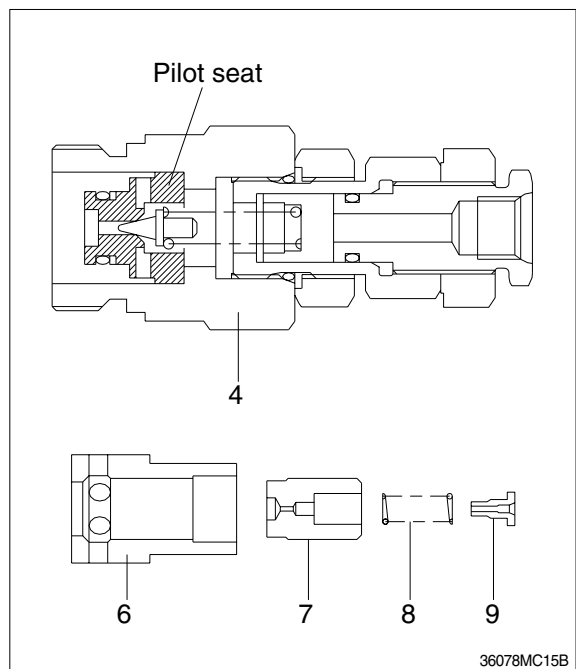
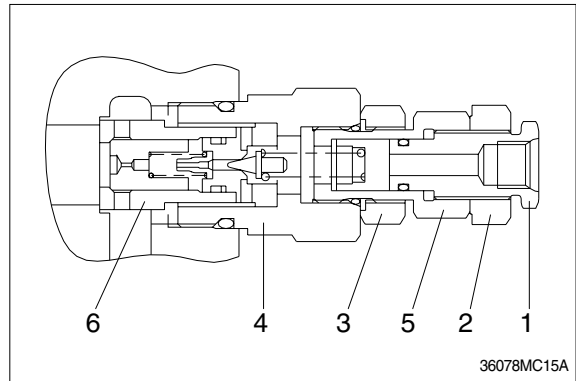


12) MAIN RELIEF ASSEMBLY

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

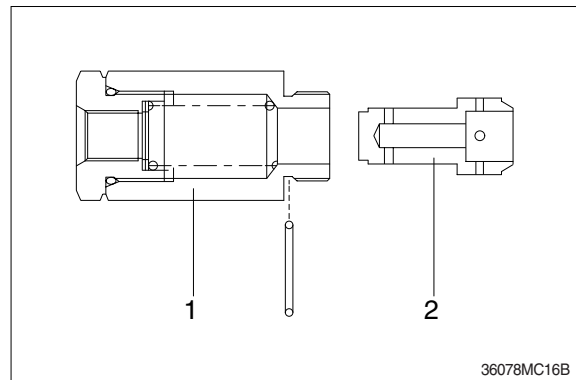
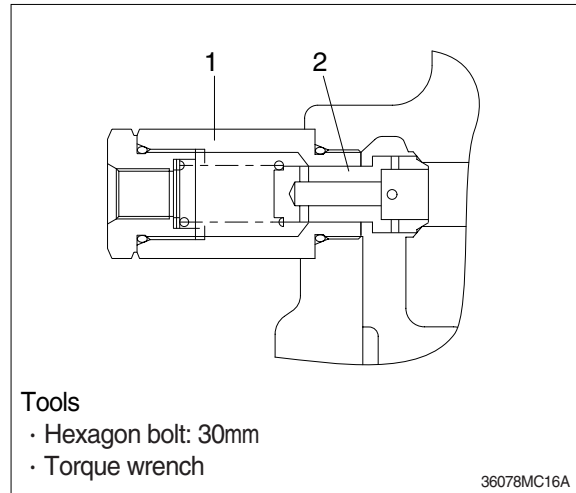
- (1) Loosen the hexagon nut(2) with a holding adjust screw(1).
- (2) Loosen the hexagon nut(3) with a holding cap(4).
- (3) Loosen the cap(4) and remove the cartridge.
- (4) Pull out the sleeve(6) and take off the main piston(7), spring(8) and orifice(9).
 - ※ Can't remove the pilot seat from the cap(4), 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	41mm
6	Sleeve	27mm



13) FOOT RELIEF ASSEMBLY

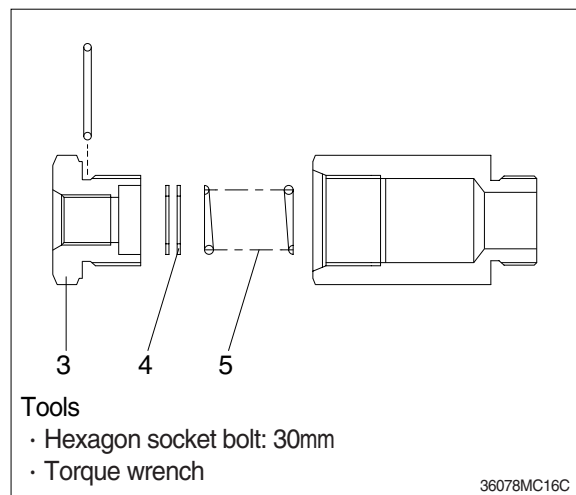
- (1) Loosen cap(1) and remove poppet(2).
Tightening torque : 6kgf · m (43.4lbf · ft)



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

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

※ Make sure adjust shim quantity.



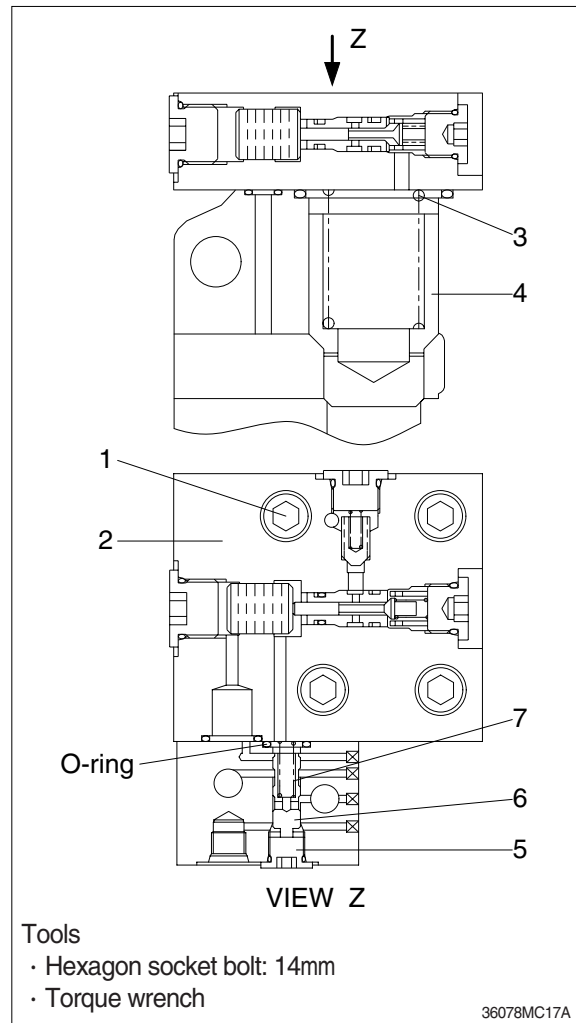
14) BOOM LOAD HOLDING VALVE

(1) Basic unit

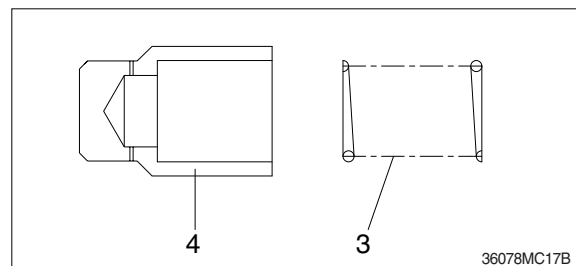
- ① Loosen socket bolt (1) to remove cover assembly (2).

Tightening torque : 25 kgf · m
(180.8 lbf · ft)

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



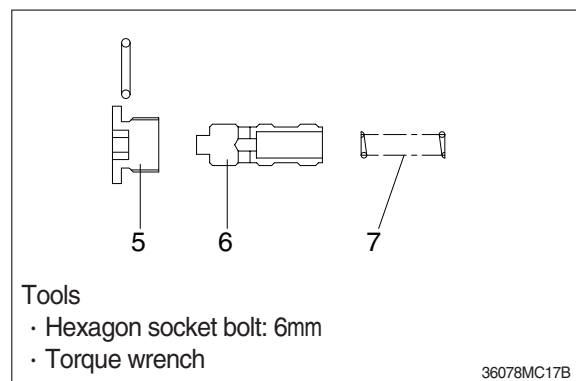
- ② Take off spring (3) and check valve (4).



(2) Selector unit

- ① Remove the cap(5), piston(6) and spring(7).

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

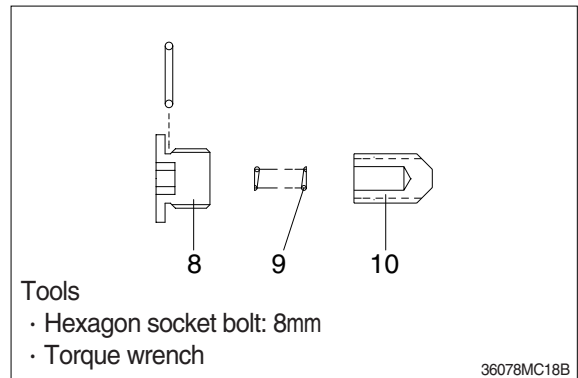
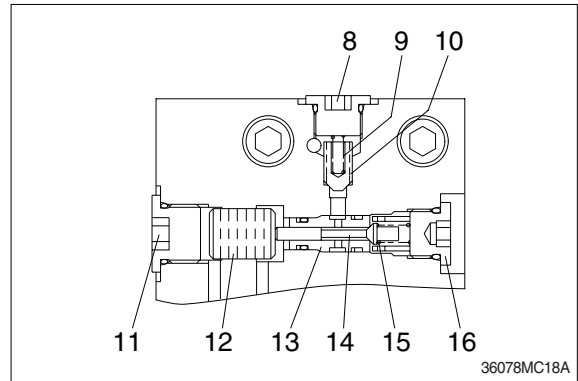


(3) Cover assembly

- ① Remove cap (8).

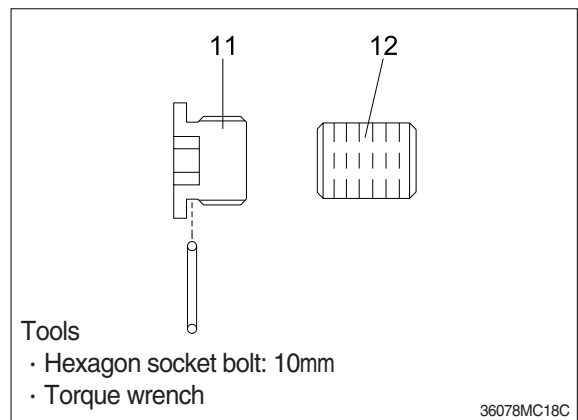
Take off spring (9) and check valve (10).

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



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

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



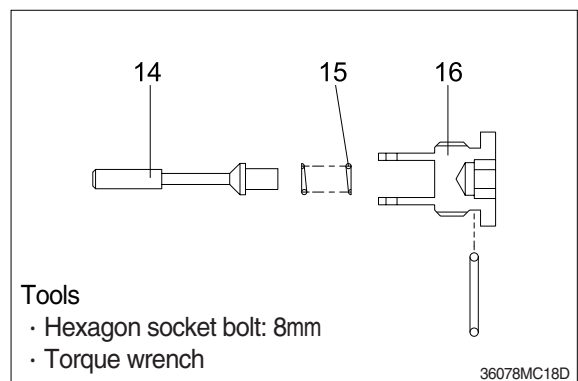
- ③ Remove cap (16).

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

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

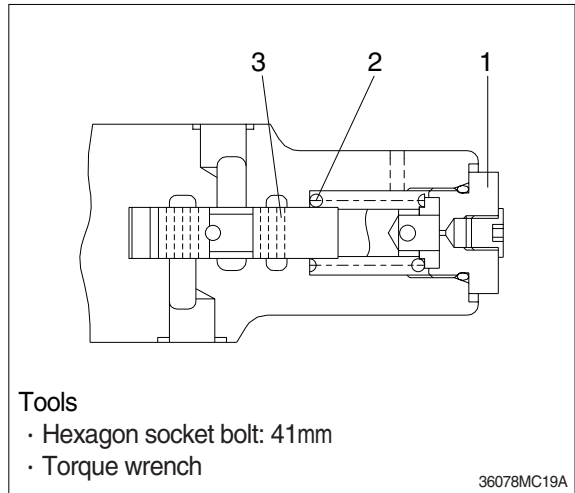
- ④ Push sleeve (13) out with a rod or the like through the hole of cap (11).

※ Be careful not to damage the guideway of the sleeve.



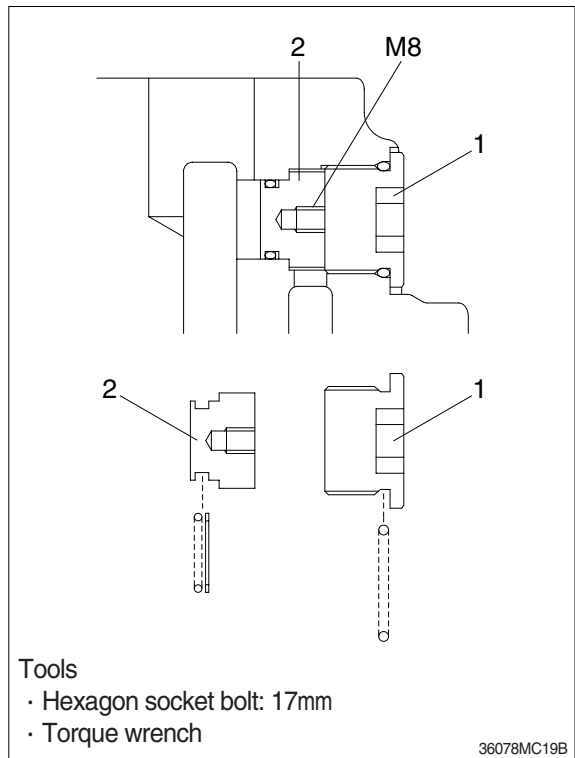
15) TRAVEL STRAIGHT VALVE

- (1) Remove cap(1).
- Take off spool(3) and spring(2).
- Tightening torque : 10kgf · m (72.3lbf · ft)

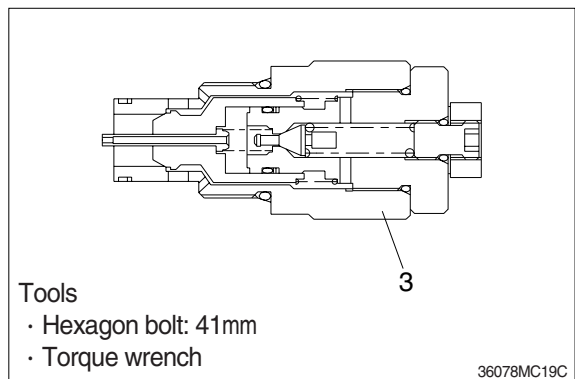


16) OVER LOAD PLUG(OPTION)

- (1) Remove cap(1).
- Take off spool(2) by M8 tap.



- (2) Install overload relief valve(3) to valve hole.
- Tightening torque : 10kgf · m (72.3lbf · ft)



GROUP 4 MAIN CONTROL VALVE (#0170-)

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.

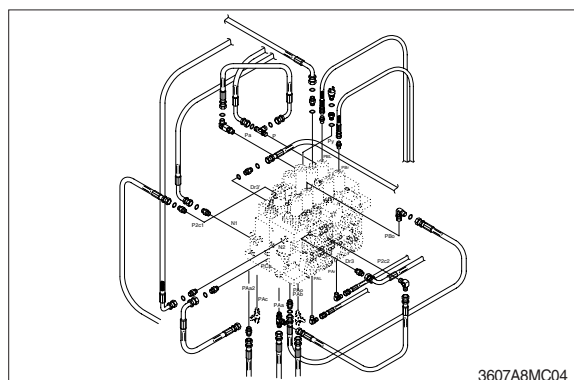
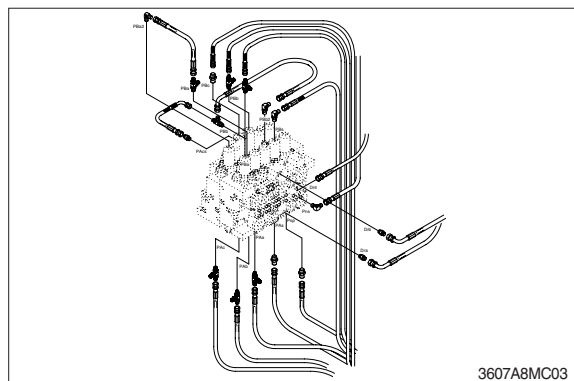
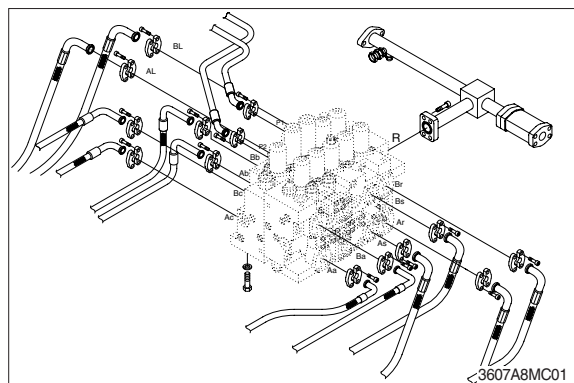
▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

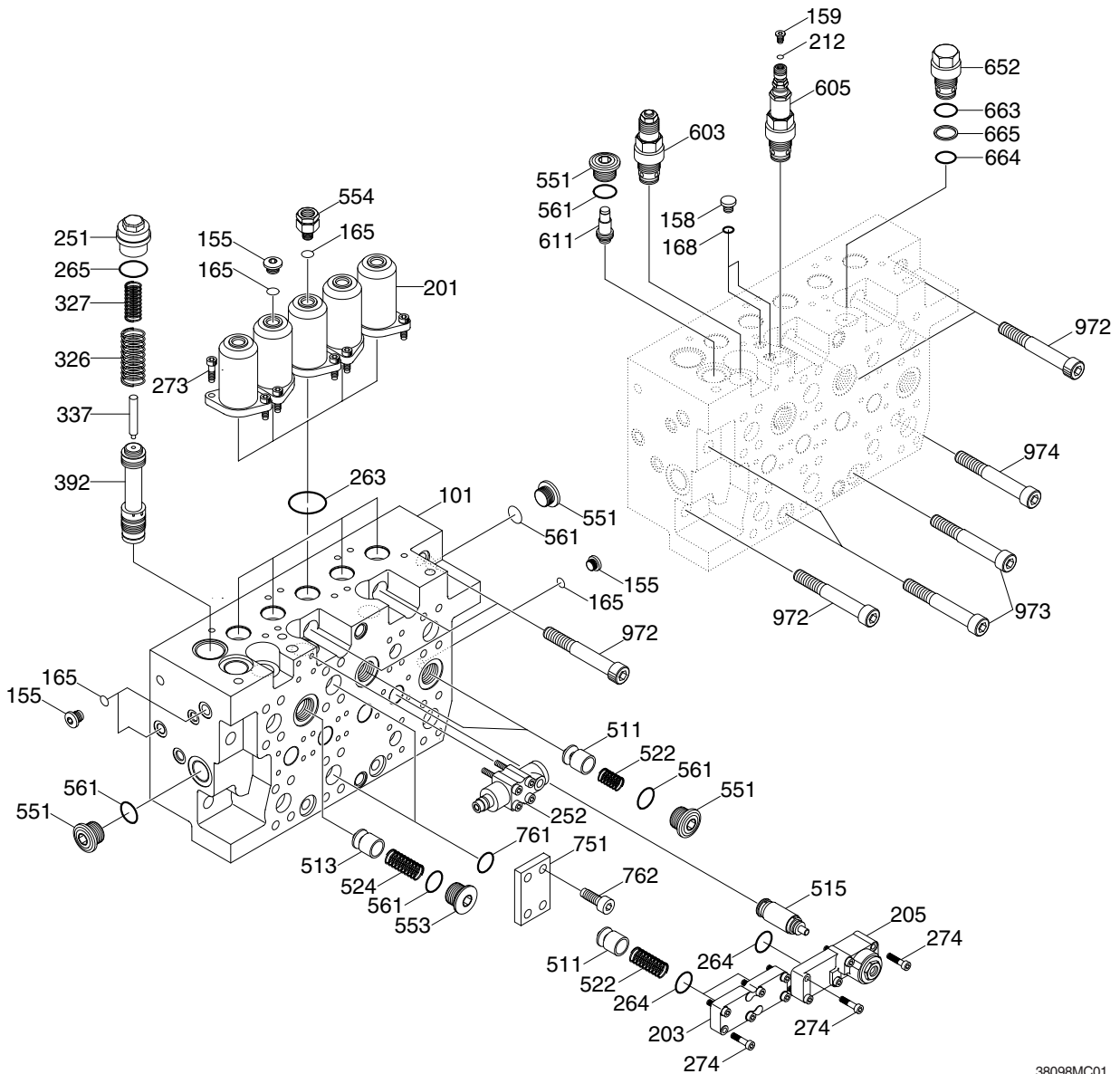
- (4) Remove bolts and disconnect pipes.
- (5) Disconnect pilot line hoses.
- (6) Disconnect pilot pipes.
- (7) Sling the control valve assembly and remove the control valve mounting bolts.
· Weight : 340 kg (750 lb)
- (8) Remove the control valve assembly.
When removing the control valve assembly, check 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 recheck the hydraulic oil leak or not.



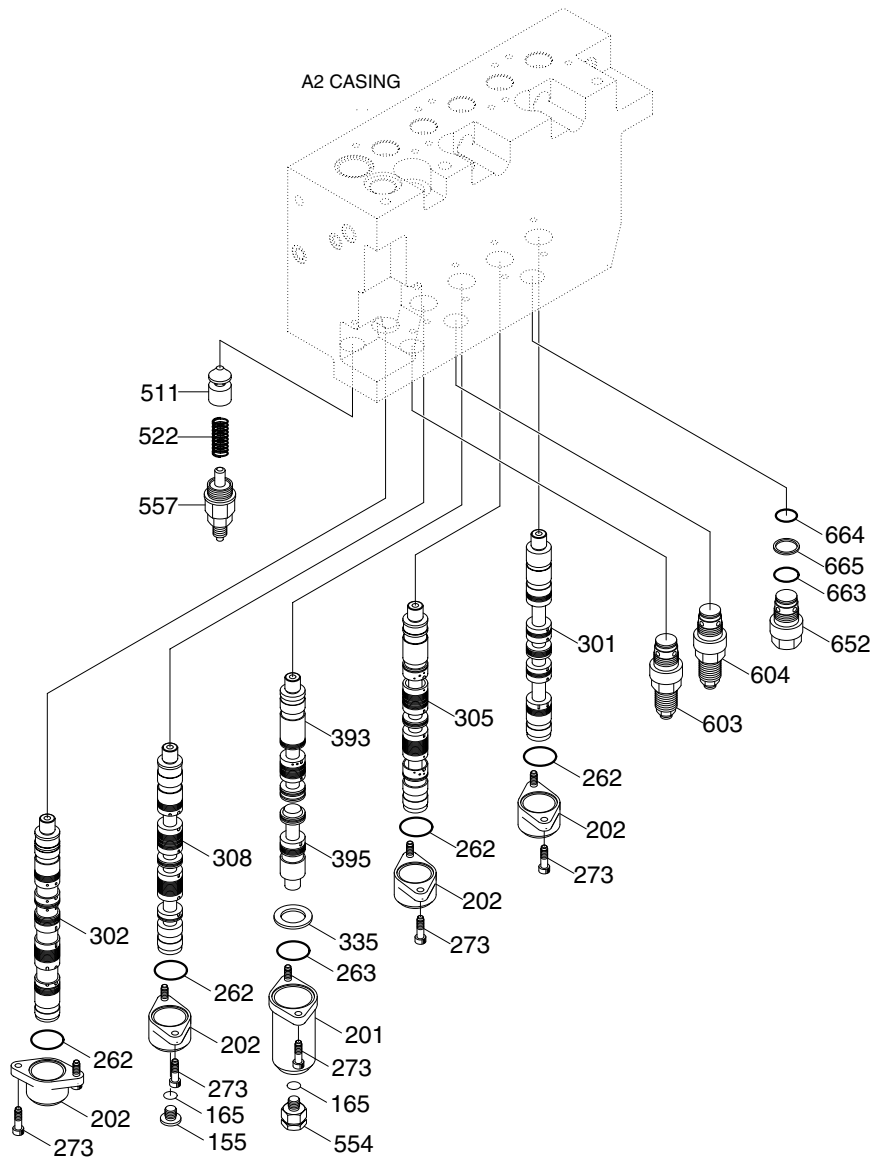
2. STRUCTURE (1/4)



38098MC01

101	A2 Casing A	264	O-ring	561	O-ring
155	Plug	265	O-ring	562	O-ring
158	Plug	274	Socket bolt	603	Port relief assy
159	Plug	326	Spring	605	Port relief assy
161	O-ring	327	Spring	611	Negative relief valve assy
162	O-ring	335	Shim	652	Plug
163	O-ring	337	Rod	663	O-ring
165	O-ring	392	By pass cut spool	664	O-ring
168	O-ring	511	Poppet	665	Back-up ring
201	Spring cover	513	Poppet	751	Flange
203	Spring cover	515	Boom priority valve assy	761	O-ring
205	Cover sub-B/Priority	522	Spring	762	Screw
212	O-ring	524	Spring	972	Screw
251	Plug	551	Plug	973	Screw
252	Lock valve assy	553	Plug	974	Screw
263	O-ring	554	Stopper plug		

STRUCTURE (2/4)



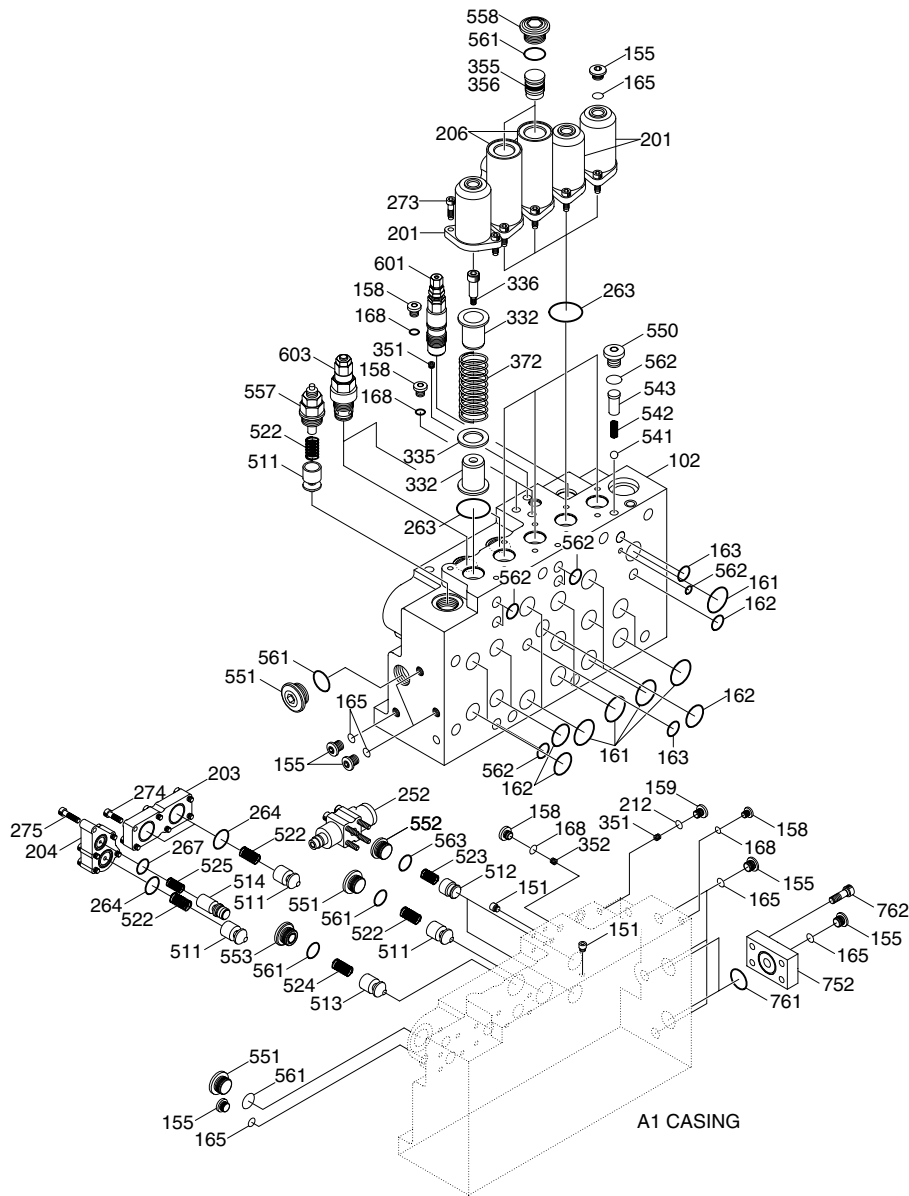
- 155 Plug
- 165 O-ring
- 201 Spring cover
- 202 Spring cover
- 262 O-ring
- 263 O-ring
- 273 Hex screw
- 301 Travel spool kit

- 302 Arm spool kit
- 305 Swing spool kit
- 308 Option spool kit
- 335 Shim
- 393 Boom spool kit
- 395 Swing priority spool kit
- 511 Poppet
- 522 Spring

- 554 Stopper plug
- 557 Plug
- 603 Port relief assy
- 652 Plug
- 663 O-ring
- 664 O-ring
- 665 Back-up ring

38098MC02

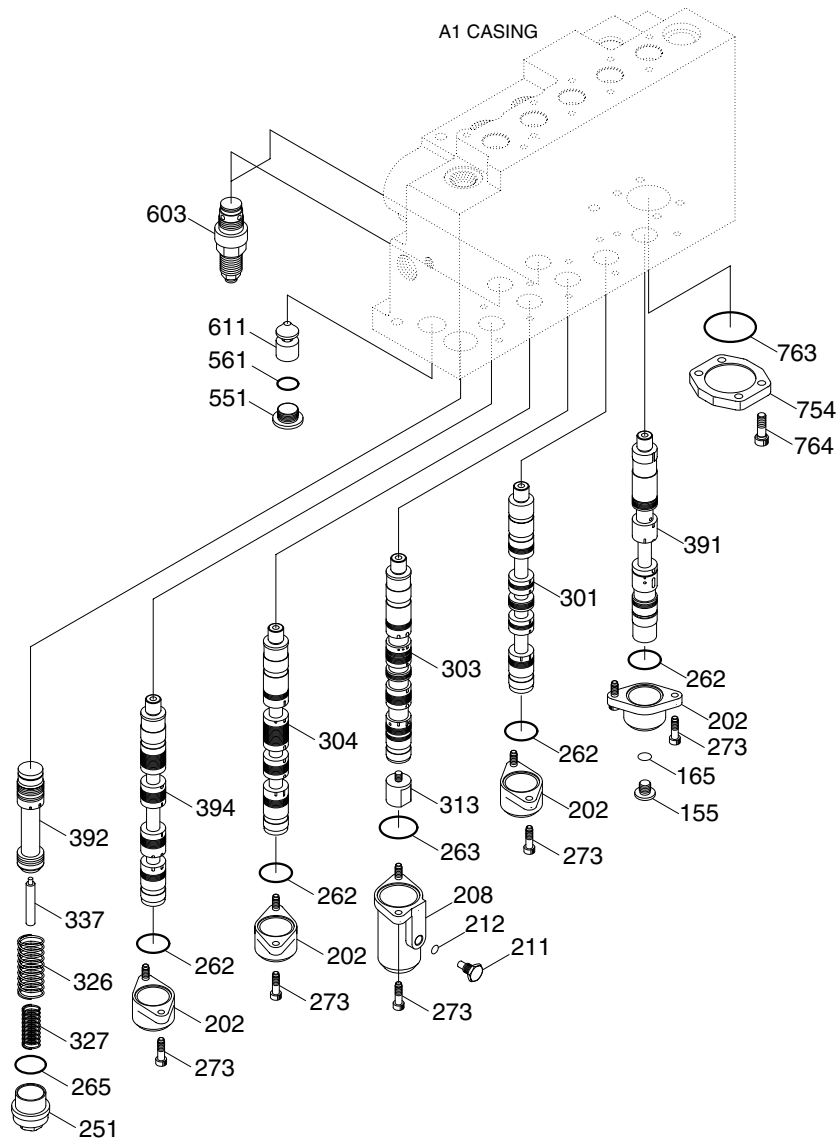
STRUCTURE (3/4)



38098MC03

- | | | |
|------------------|-----------------|----------------------|
| 102 Casing-B | 264 O-ring | 542 Spring seat |
| 151 Plug | 267 O-ring | 543 Spring |
| 155 Plug | 274 Socket bolt | 550 Plug |
| 158 Plug | 275 Screw | 551 Plug |
| 159 Plug | 335 Shim | 552 Plug |
| 161 O-ring | 351 Orifice | 557 Plug |
| 162 O-ring | 352 Orifice | 558 Plug |
| 163 O-ring | 355 Piston | 561 O-ring |
| 165 O-ring | 356 Piston | 562 O-ring |
| 168 O-ring | 511 Poppet | 563 O-ring |
| 201 Spring cover | 512 Poppet | 601 Main relief assy |
| 203 Spring cover | 514 Poppet | 603 Port relief assy |
| 204 Cover | 522 Spring | 752 Blank flange |
| 206 Spring cover | 523 Spring | 761 O-ring |
| 212 O-ring | 525 Spring | 762 Screw |
| 263 O-ring | 541 Steel ball | |

STRUCTURE (4/4)



38098MC04

- | | | |
|------------------|-------------------------------|--------------------------------|
| 155 Plug | 273 Hex screw | 394 A/Confluence spool kit |
| 165 O-ring | 301 Travel spool kit | 551 Plug |
| 202 Spring cover | 303 Boom spool kit | 561 O-ring |
| 208 Spool cover | 304 Bucket spool kit | 603 Port relief assy |
| 211 Plug | 313 Plug | 604 Port relief assy |
| 212 O-ring | 326 Spring | 611 Negative relief valve assy |
| 251 Plug | 327 Spring | 754 Flange |
| 262 O-ring | 337 Rod | 763 O-ring |
| 263 O-ring | 391 Travel straight spool kit | 764 Socket screw |
| 265 O-ring | 392 By pass cut spool | |

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL PRECAUTIONS

- (1) All hydraulic components must be worked with precision working. Then, before disassembling and assembling them, it is essential to select an especially-clean place.
- (2) In handling a control valve, pay full attention to prevent dust, sand, etc. from entering into it.
- (3) When a control valve is to be removed from the machine, apply caps and masking seals to all ports. Before disassembling the valve, re-check that these caps and masking seals are fitted completely, and then clean the outside of the assembly. Use a proper bench for working, spread a paper or rubber mat on the bench, and disassemble the valve on it.
- (4) Support the body section carefully in carrying, transferring and so on of the control valve. Do not support the lever, exposed spool, end cover section or so on without fail.
- (5) After disassembling and assembling of the component, it is desired to carry out various tests (for the relief characteristics, leakage, flow resistance, etc.), but the hydraulic test equipment is necessary to these tests.
Therefore, even when its disassembling can be carried out technically, do not disassemble such component that cannot be tested, adjusted, and so on.
Besides, prepare clean cleaning oil, hydraulic oil, grease, etc. beforehand.

2) TOOLS

Before disassembling the control valve, prepare the following tools beforehand.

Name of tool	Quantity	Size (mm)
Vise bench	1 unit	-
Box wrench	Each 1 piece	22, 27, 32 & 36
Hexagon key wrench	Each 1 piece	5, 8, 12 & 17
Loctite #262	1 pc	-
Spanner	1 pc	10, 22, 24, 32 (Main relief valve), 36

3) DISASSEMBLING

(1) Place control valve on working bench.

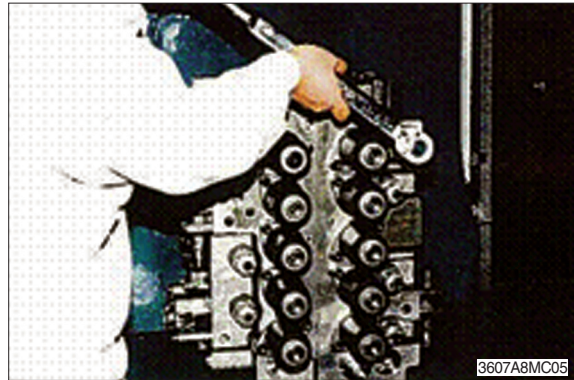
※ Disassemble it in clean place and pay attention not to damage flange face.

(2) Disassembling of main spool (travel, bucket, swing, option, arm 2, boom 2, swing priority):

- ① Loosen hexagon socket head bolts (273) and remove spring cover (201), (206).
· Hexagon key wrench : 8 mm

In removing bucket spring cover (206), at first remove plug (558) and piston (356).

· Hexagon key wrench : 17 mm



- ② Remove spool, spring, spring seats (shim) and spacer bolt in spool assembly condition from casing.

※ When pulling out spool assembly from casing, pay attention not to damage casing.



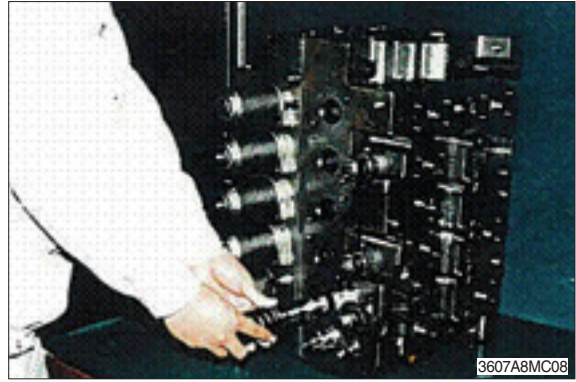
- ③ Hold spool in mouthpiece-attached vise. Remove spacer bolt (336) and disassemble spring (, shim) and spring seats.

· Hexagon key wrench : 12 mm



(3) Disassembling of arm 1 spool :

- ① Loosen hexagon socket head bolts (273) and remove spring cover (201).
 - Hexagon key wrench : 8 mm
 - ② Remove arm 1 spool (302), spring (371), spring seat (332) and spacer bolt (336) in spool assembly condition from casing.
- ※ When pulling out spool assembly from casing, pay attention not to damage casing.
- ③ Hold arm 1 spool (302) in mouthpiece-attached vise. Remove spacer bolt (336) and disassemble spring (371) and spring seats (332).
 - Hexagon key wrench : 12 mm
 - ④ Do not disassemble arm 1 spool (302) more than these conditions.



(4) Disassembling of travel straight spool :

- ① Loosen hexagon socket head bolts (273), remove spring cover, and pull out travel straight spool (391), spring (373), spring seat (332) and spacer bolt (336) in spool assembly condition from casing.
 - Hexagon key wrench : 8 mm
- ※ When pulling out spool assembly from casing, pay attention not to damage casing.
- ② Hold travel straight spool (391) in mouthpiece-attached vise, remove spacer bolt (336) and disassemble spring (373) and spring seats (332).
 - Hexagon key wrench : 12 mm
 - ③ Do not disassemble travel straight spool (391) more than these conditions.

(5) Disassembling of boom 1 spool :

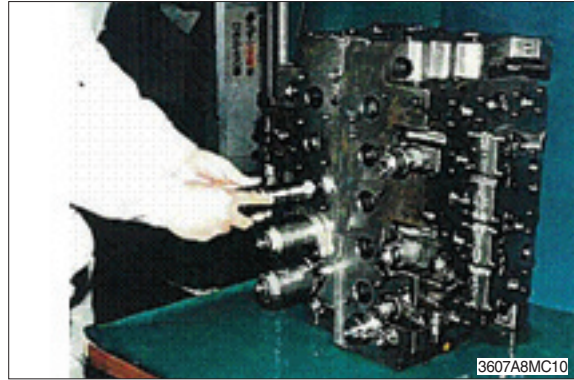
- ① In removing boom1 spring cover (206), at first remove plug (558) and piston (355).

· Hexagon key wrench : 17 mm

Loosen hexagon socket head bolts (273), remove spring cover (206) and pull out boom1 spool (303), plug (313), spring (371), spring seats (332) and spacer bolt(336) in spool assembly condition from casing.

· Hexagon key wrench : 8 mm

- ※ When pulling out spool assembly from casing, pay attention not to damage casing.



- ② Hold boom1 spool (303) in mouthpiece-attached vise, remove spacer bolt (336), and disassemble spring (371) and spring seats (332).

· Hexagon key wrench : 12 mm

Remove plug (313).

· Spanner : 27 mm

- ③ Do not disassemble boom1 spool (303) more than these conditions.



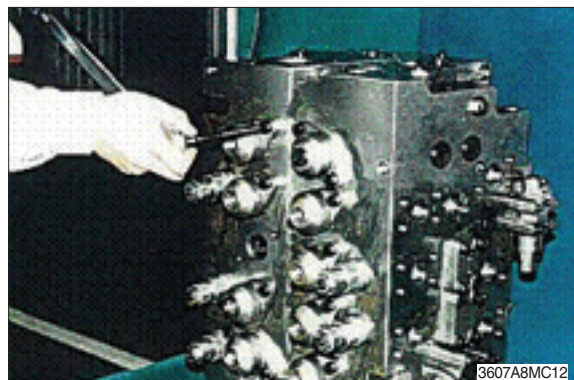
(6) Disassembly of covers :

- ① Remove hexagon socket head bolts (273), and remove spool cover (202) and (208).

· Hexagon key wrench : 8 mm

In removing boom1 spool cover (208), at first remove plug (211).

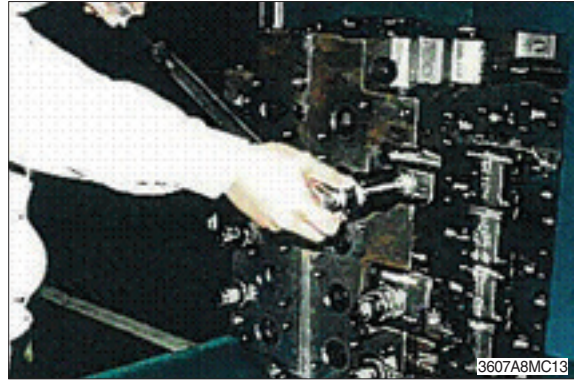
· Box wrench : 22mm



(7) Removal of main relief valve and port relief valves :

- ① Remove main relief valve (601) and port relief valve (603), (604), (605) from casing.

- Main relief valve : Spanner 32 mm
- Port relief valve : Box wrench 36 mm, Spanner 36mm



(8) Removal of lock valve assembly :

- ① Loosen hexagon socket head bolts and remove lock valve assembly (252).

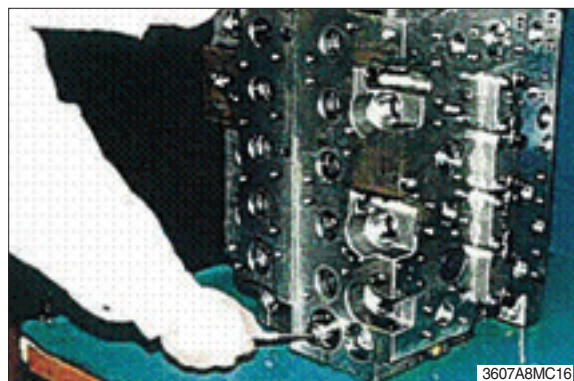
- Hexagon key wrench : 5 mm



(9) Removal of bypass cut spool :

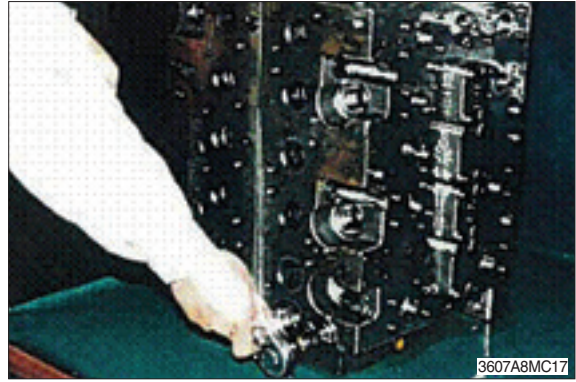
- ① Remove plug (251), spring (326 & 327), rod (337), and bypass cut spool (392).

- Box wrench : 27 mm

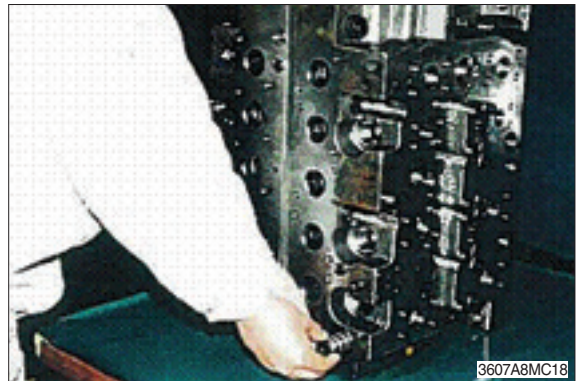


(10) Disassembly of negative control relief valve :

- ① Remove plug (551).
 - Hexagon key wrench : 17 mm

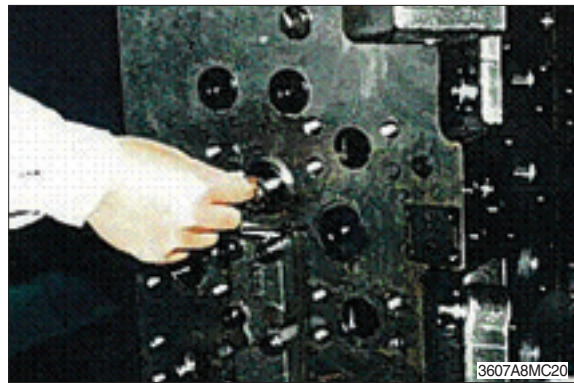


- ② Remove poppet (611), spring (621) and damping rod(631).



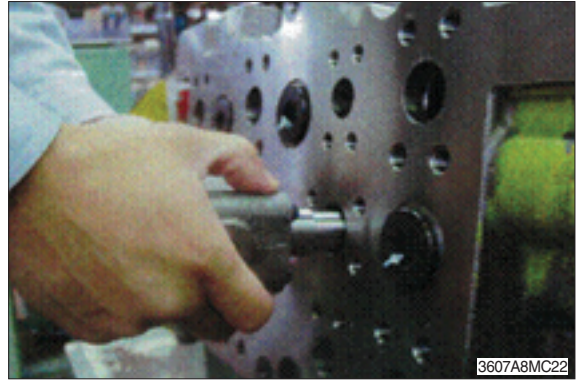
(11) Disassembly of check valve :

- ① Remove plug (551) and take out poppet (511) and spring (522).
 - Hexagon key wrench : 17 mm
- ② Loosen hexagon socket head bolts (274) and remove load check cover (203) and take out poppet (551) and spring (522).
 - Hexagon key wrench : 8 mm
- ③ Remove plug (553) and take out poppet (513) and spring (522).
 - Hexagon key wrench : 17 mm
- ④ Remove plug (552) and take out poppet (512) and spring (523).
 - Hexagon key wrench : 12 mm
- ⑤ Remove plug sub (557) and take out poppet (511) and spring (522).
 - Box wrench : 32 mm



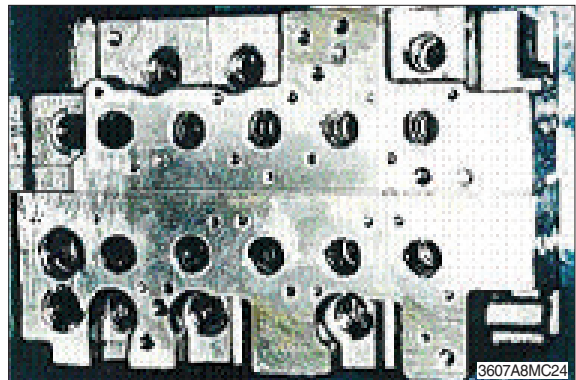
(12) Disassembly of boom priority valve :

- ① Loosen hexagon socket head bolts (276, 277) and remove cover sub (205) and poppet sub (515) of boom priority valve.
 - Hexagon key wrench : 8 mm
- ② Hold cover sub (205) in mouthpiece-attached vise, remove poppet sub (515).
- ③ Cover sub (205) :
Hold cover in mouthpiece-attached vise, Loosen plug (559), and remove piston (356).
 - Box wrench : 24 mm
- ④ Poppet sub (515) :
Remove ass'y of poppet (101, 102), plug (103) and spring (104) from bush (106).
- ⑤ Remove spring (105) and spool (107).
- ⑥ Do not disassemble ass'y in above
④ more than these conditions.



(13) Disassembly of casing :

- ① Except when required specially, do not disassemble tie bolts of casing A.
- ② Since plugs not described in above disassembling procedures are blind plugs for sacrifice holes and blind plugs for casing sanitation, do not disassemble them as far as not required specially.



(14) Inspection after disassembling :

Clean all disassembled parts with clean mineral oil fully, and dry them with compressed air. Then, place them on clean papers or cloths for inspection.

① Control valve:

- a. Check whole surfaces of all parts for burrs, scratches, notches and other defects.
- b. Confirm that seal groove faces of casing and block are smooth and free of dust, dent, rust etc.
- c. Correct dents and damages on check seat faces of casing, if any, by lapping.
※ Pay attention not to leave lapping agent in casing.
- d. Confirm that all sliding and fitting parts can be moved manually and that all grooves and paths are free from foreign matter.
- e. If any spring is broken or deformed, replace it with new one.
- f. When relief valve do not function properly, repair it, following its disassembling assembling procedures.
- g. Replace all seats and O-rings with new ones.

② Relief valve:

- a. Confirm that all seat faces at ends of all poppets and seats are free of defects and are uniform contact faces.
- b. Confirm manually that main poppet and seat can slide lightly and smoothly.
- c. Confirm that outside face of main poppet and inside face of seat are free from scratches and so on.
- d. Confirm that springs are free from breaking, deformation, and wear.
- e. Confirm that orifices of main poppet and seat section are not clogged with foreign matter.
- f. Replace all O-rings with new ones.
- g. When any light damage is found in above inspections, correct it by lapping.
- h. When any abnormal part is found, replace it with a relief valve assembly.

4) ASSEMBLING

(1) In this assembling section, explanation only is shown. Refer to figures and photographs shown in disassembling section.

(2) Figure in () shown after part name in explanation sentence shows number in construction figure.

(3) Cautions in assembling seals

- ① Pay attention to keep seals free from defects in its forming and damages in its handling.
- ② Apply grease, hydraulic oil or so on to seals and seal-fitting sections for full lubrication.
- ③ Do not stretch seals so much to deform them permanently.
- ④ In fitting O-ring, pay attention not to roll it into its position. In addition, twisted O-ring cannot remove its twisting naturally with ease after being fitted, and causes oil leakage.
- ⑤ Tighten fitting bolts at all sections with torque wrench to their respective tightening torques shown in "Maintenance Standards".

(4) Assembly of check valve :

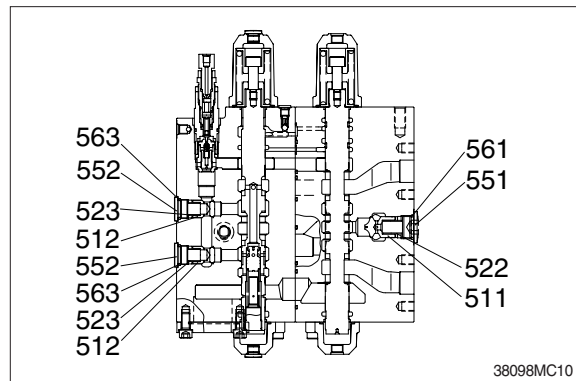
- ① Assemble poppets (511,513 & 512) and springs (522 & 523).

Put O-rings (561) onto plugs (551 & 553).

Put O-rings (563) onto plugs (552).

Put O-rings (264) on cover (203).

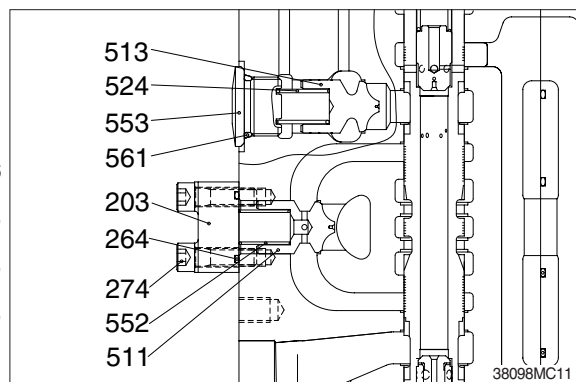
Tighten the latters with their specified torques.



※ Use poppets, springs and plugs in following groups.

Poppet	Spring	Plug or cover
511	522	203, 204, 551, 557
512	523	552
513	522	553
514	525	204

Remember that
 511 in 10 positions
 512 in 2 positions
 513 in 2 positions
 514 in 1 positions

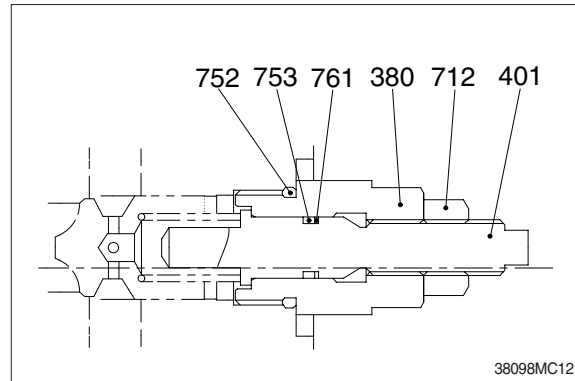


No.	Hexagon key wrench	Tightening torque	
		kgf · m	lbf · ft
(551)	17 mm	37.7~41.8	273~302
(274)	8 mm	5.3~6.3	38.3~45.6
(553)	17 mm	37.7~41.8	273~302
(552)	12 mm	23.5~27.5	170~197
(557)	(box wrench) 32 mm	20.4~25.5	148~184

- ② Bucket, option confluence plug sub :
- If you want bucket confluence or option confluence effective, loosen rod (401) and tighten lock nut (712).

If you want to cancel bucket confluence or option confluence, tighten rod (401) and lock nut (712).

- Spanner : 10 mm for (401)
- Tightening torque : 3.0~4.0 kgf · m
(21.7~28.9 lbf · ft)
- Spanner : 24 mm for (712)
- Tightening torque : 4.0~5.0 kgf · m
(28.9~36.2 lbf · ft)



(5) Assemble boom priority valve :

- ① Put O-ring (108) onto bush (106), and assemble spool (107) and spring (105).

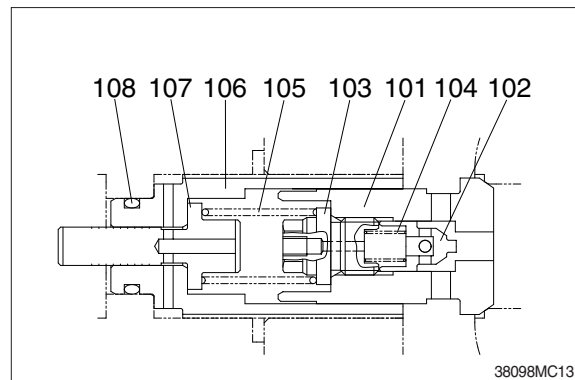
Assemble assy of poppet (101, 102), plug (103) and spring (104) into bush (106).

Assemble bush sub in above ② into cover (205) and assemble them into casing, and tighten hexagon socket head bolts (276, 277)

- Hexagon key wrench : 8mm
- Tightening torque : 5.3~6.3 kgf · m
(38.3~45.6 lbf · ft)

Assemble piston (356) in cover (205), and tighten plug (559)

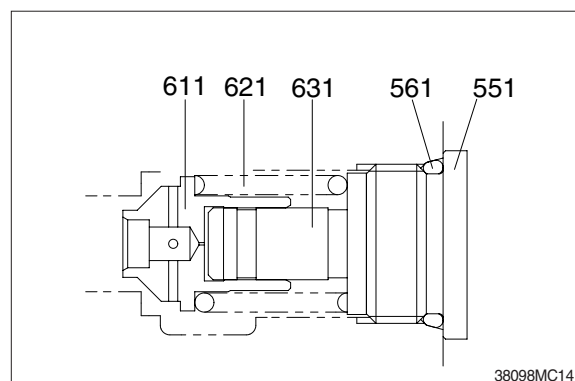
- Box wrench : 24mm
- Tightening torque : 20.4~25.5 kgf · m
(147.5~184.4 lbf · ft)



(6) Assembling of negative control relief valve

- ① Assemble poppet (611), spring (621), and damping rod (631) to casing A (101) & casing B(102). Put O-ring (561) onto plug (551) and tighten the latter with its specified torque.

- Hexagon key wrench : 17 mm
- Tightening torque : 37.7~41.8 kgf · m
(272.7~302.3 lbf · ft)

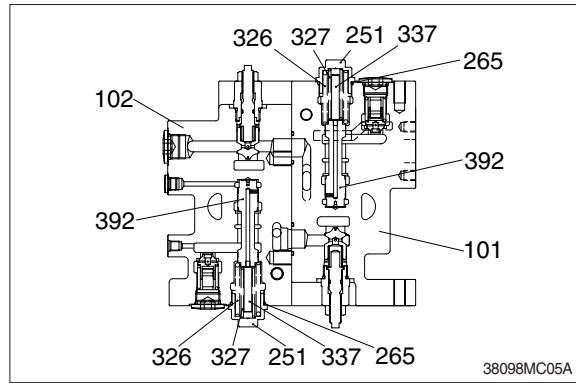


(7) Assembly of bypass cut valve

① Assemble bypass cut spool (392), spring (326 & 327) and rod (337) into casing A (101) & casing B(102).

Put O-ring (265) onto plug (251) and tighten the latter with its specified torque.

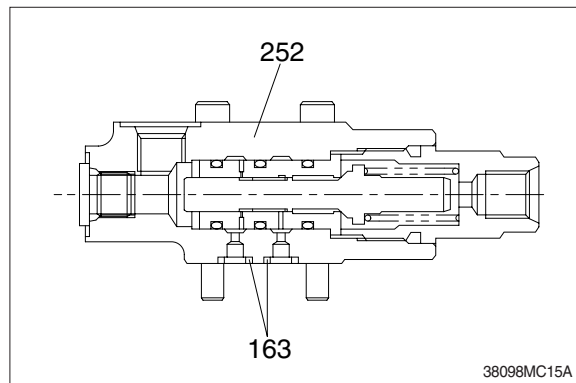
- Box wrench : 27 mm
- Tightening torque : 7.95~10.0 kgf · m
(57.5~72.3 lbf · ft)



(8) Assembling of lock valve assembly

① Fit O-ring (163) to lock valve assembly (252) and tighten hexagon socket head bolts with specified torque.

- Hexagon key wrench : 5 mm
- Tightening torque : 1.0~1.42 kgf · m
(7.2~10.2 lbf · ft)

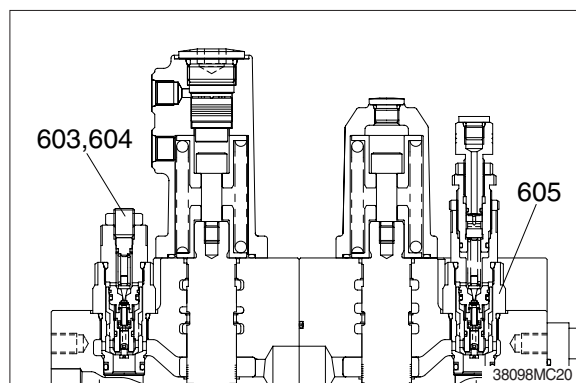
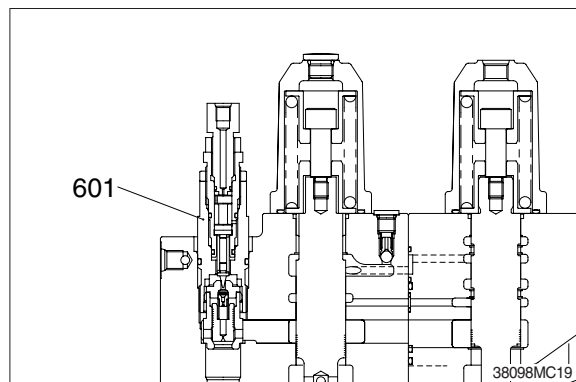


(9) Assembling of main relief valve and port

① relief valve :

Assemble main relief valve (601) and port relief valves (603, 604, & 605) to casing and tighten it with specified torque.

Item	Size	Tightening torque	
		kgf · m	lbf · ft
Main relief valve	Spanner 32 mm	12.2~14.3	88.2~103
Port relief valve	Spanner 36 mm Box wrench 36 mm		



(10) Assembling of travel straight spool :

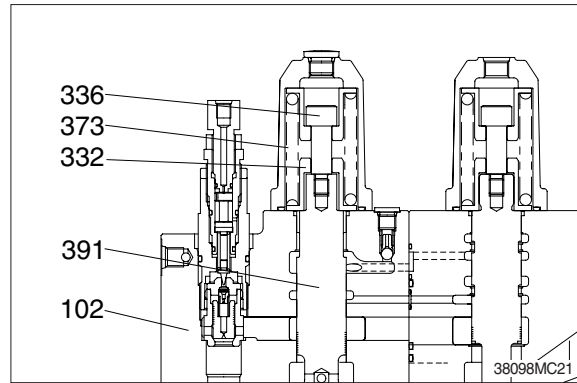
① Hold end of travel straight spool (391) in mouthpiece-attached vise, set spring seat (332) and spring (373) and tighten spacer bolt (336) with specified torque.

※ Before tightening spacer bolt (336), apply Loctite #262 to it.

- Hexagon key wrench : 12 mm
- Tightening torque : 3.77~4.18 kgf · m
(27.2~30.2 lbf · ft)

② Fit spool assemblies of items ① above into casing B (102).

※ Fit spool assemblies into casing B (102) carefully and slowly. Do not push them forcibly without fail.



(11) Assembling of boom1 spool :

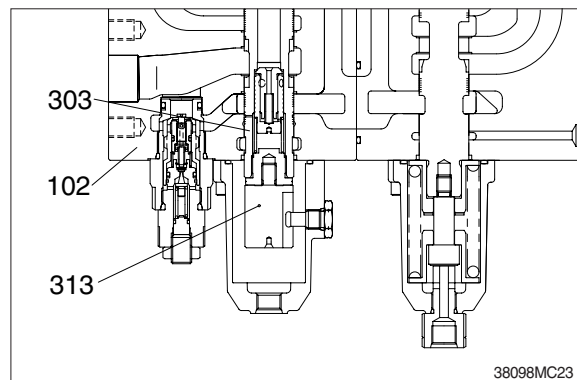
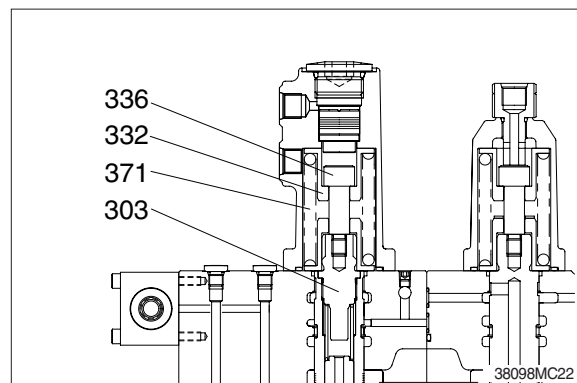
① Hold the middle of boom 1 spool (303) in mouthpiece-attached vise, set spring seat (332) and spring (371) and tighten spacer bolt (336) with specified torque, and tighten plug (313) with specified torque.

※ Before tightening spacer bolt (336) and plug (313), apply Loctite #262 to them.

- Spacer bolt (336) : Hexagon key wrench 12 mm
- Tightening Torque : 3.77~4.18 kgf · m
(27.2~30.2 lbf · ft)
- Plug (313) : Spanner 27mm
- Tightening Torque : 3.77~4.18 kgf · m
(27.2~30.2 lbf · ft)

② Fit spool assemblies of items ① above into casing B (102).

※ Fit spool assemblies into casing B (102) carefully and slowly. Do not push them forcibly without fail.



(12) Assembling of arm1 spool :

① Hold end of arm1 spool (302) in mouthpiece-attached vise, set spring seats (332) and spring (371) and tighten spacer bolt (336) with specified torque.

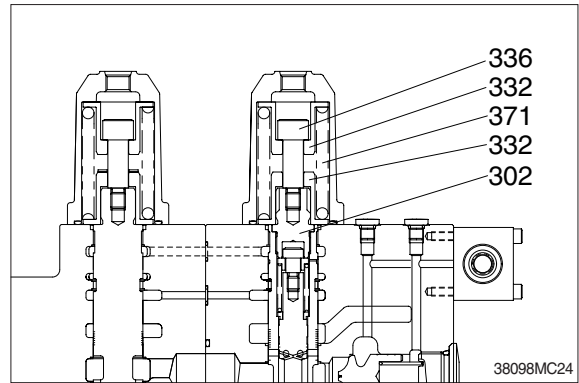
※ Before tightening spacer bolt (336), apply Loctite #262 to it.

- Hexagon key wrench : 12 mm
- Tightening Torque : 3.77~4.18 kgf · m
(27.2~30.2 lbf · ft)

② Fit spool assemblies of Items ① above into casing A (101).

※ Fit spool assemblies into casing A (101) carefully and slowly.

Do not push them forcibly without fail.



(13) Assembling of main spool (travel (301), bucket (304), swing (305), option (308), arm 2 (394), boom 2 (393), swing priority (395))

① Hold end of each spool in mouthpiece-attached vise, set spring seats, springs (,shim(335) for arm 2, boom 2 and swing priority spool) and tighten spacer bolt (336) with specified torque.

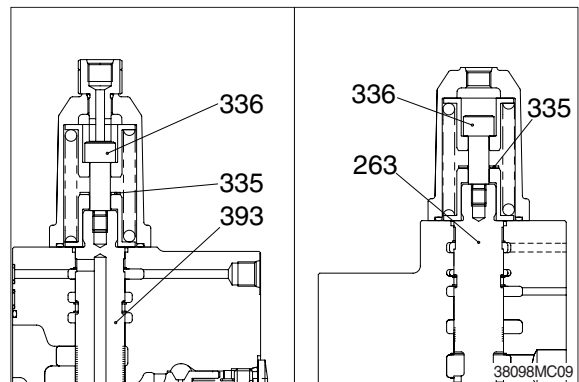
※ Before tightening spacer bolt (336), apply Loctite #262 to it.

- Hexagon key wrench : 12 mm
- Tightening Torque : 3.77~4.18 kgf · m
(27.2~30.2 lbf · ft)

② Insert spool assemblies of Items ① above into casing.

※ Fit spool assemblies into casing A (101) and casing B (102) carefully and slowly.

Do not push them forcibly without fail.

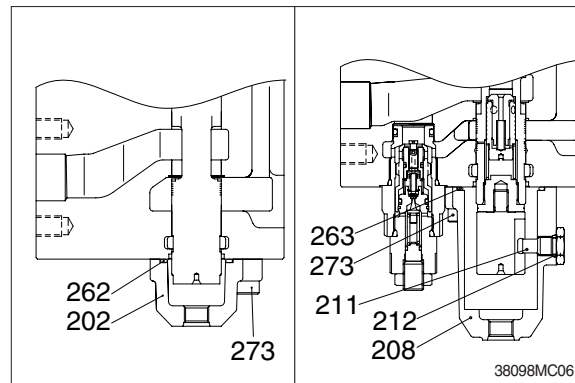


(14) Assembling of cover :

① Fit spool covers (202) and (208) to sides reverse to spring sides spools, and tighten hexagon socket head bolts (273) with specified torque.

※ Confirm that O-rings (262) have been fitted to spool cover (202), O-ring (263) to boom 1 spool cover (208).

- Hexagon key wrench : 8 mm
- Tightening torque : 5.3~6.3 kgf · m
(38.3~45.6 lbf · ft)



② Boom1 spool cover :

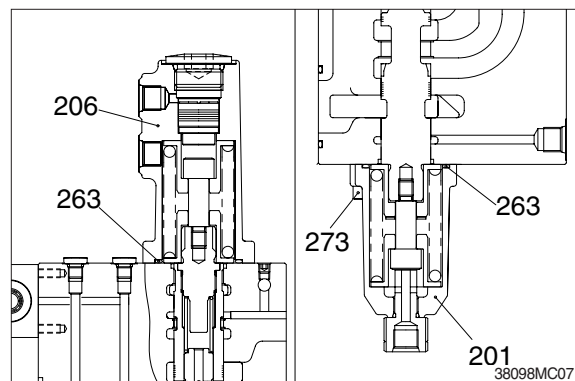
Put O-ring (212) onto plug (211) and tighten the latter onto boom 1 spool cover (208) with its specified torque.

- Box wrench : 22 mm
- Tightening torque : 3.5~4.0 kgf · m
(25.3~29 lbf · ft)

③ Fit spring covers (201), (206) to spring sides of spools, and tighten hexagon socket head bolts (273) with specified torque.

※ Confirm that O-rings (263) have been fitted.

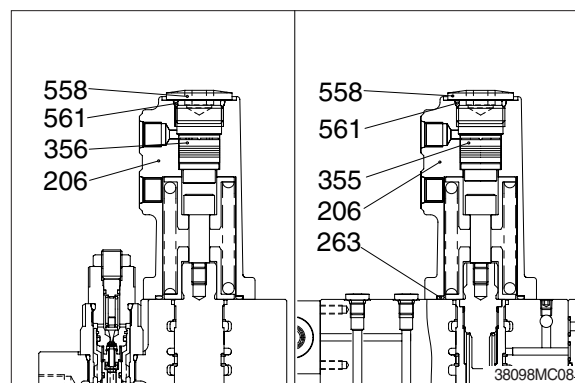
- Hexagon key wrench : 8mm
- Tightening torque : 5.3~6.3 kgf · m
(38.3~45.5 lbf · ft)



④ Bucket spring cover :

Assemble piston (356) to bucket spring cover (206). Put O-ring (561) onto plug (558) and tighten the latter with specified torque.

- Hexagon key wrench : 17mm
- Tightening torque : 20.1~25.1 kgf · m
(144.6~180.8 lbf · ft)



⑤ Boom spring cover:

Assemble piston (355) to boom1 spring cover (206). Put O-ring (561) onto plug (558) and tighten the latter with specified torque.

- Hexagon key wrench : 17mm
- Tightening torque : 20.1~25.1 kgf · m
(144.6~180.8 lbf · ft)