

## SECTION 8 DISASSEMBLY AND ASSEMBLY

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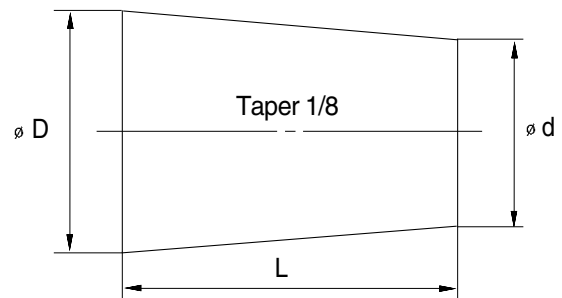
# SECTION 8 DISASSEMBLY AND ASSEMBLY

## GROUP 1 PRECAUTIONS

### 1. REMOVAL WORK

- 1) Lower the work equipment completely to the ground.  
If the coolant contains antifreeze, dispose of it correctly.
- 2) After disconnecting hoses or tubes, cover them or fit blind plugs to prevent dirt or dust from entering.
- 3) When draining oil, prepare a container of adequate size to catch the oil.
- 4) Confirm the match marks showing the installation position, and make match marks in the necessary places before removal to prevent any mistake when assembling.
- 5) To prevent any excessive force from being applied to the wiring, always hold the connectors when disconnecting the connectors.
- 6) Fit wires and hoses with tags to show their installation position to prevent any mistake when installing.
- 7) Check the number and thickness of the shims, and keep in a safe place.
- 8) When raising components, be sure to use lifting equipment of ample strength.
- 9) When using forcing screws to remove any components, tighten the forcing screws alternately.
- 10) Before removing any unit, clean the surrounding area and fit a cover to prevent any dust or dirt from entering after removal.
- 11) When removing hydraulic equipment, first release the remaining pressure inside the hydraulic tank and the hydraulic piping.
- 12) If the part is not under hydraulic pressure, the following corks can be used.

Nominal number	Dimensions		
	D	d	L
06	6	5	8
08	8	6.5	11
10	10	8.5	12
12	12	10	15
14	14	11.5	18
16	16	13.5	20
18	18	15	22
20	20	17	25
22	22	18.5	28
24	24	20	30
27	27	22.5	34



## 2. INSTALL WORK

- 1) Tighten all bolts and nuts(Sleeve nuts) to the specified torque.
- 2) Install the hoses without twisting or interference.
- 3) Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
- 4) Bend the cotter pin or lock plate securely.
- 5) When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2-3 drops of adhesive.
- 6) When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
- 7) Clean all parts, and correct any damage, dents, burrs, or rust.
- 8) Coat rotating parts and sliding parts with engine oil.
- 9) When press fitting parts, coat the surface with antifriction compound(LM-P).
- 10)After installing snap rings, check that the snap ring is fitted securely in the ring groove(Check that the snap ring moves in the direction of rotation).
- 11)When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
- 12)When using eyebolts, check that there is no deformation or deterioration, and screw them in fully.
- 13)When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
- 14)When operating the hydraulic cylinders for the first time after repairing and reassembling the hydraulic cylinders, pumps, or other hydraulic equipment or piping, always bleed the air from the hydraulic cylinders as follows:
  - (1) Start the engine and run at low idling.
  - (2) Operate the control lever and actuate the hydraulic cylinder 4-5 times, stopping 100mm before the end of the stroke.
  - (3) Next, operate the piston rod to the end of its stroke to relieve the circuit. (The air bleed valve is actuated to bleed the air.)
  - (4) After completing this operation, raise the engine speed to the normal operating condition.
    - ※ If the hydraulic cylinder has been replaced, carry out this procedure before assembling the rod to the work equipment.
    - ※ Carry out the same operation on machines that have been in storage for a long time after completion of repairs.

### **3. COMPLETING WORK**

- 1) If the coolant has been drained, tighten the drain valve, and add water to the specified level. Run the engine to circulate the water through the system. Then check the water level again.
- 2) If the hydraulic equipment has been removed and installed again, add engine oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.
- 3) If the piping or hydraulic equipment, such as hydraulic cylinders, pumps, or motors, have been removed for repair, always bleed the air from the system after reassembling the parts.
- 4) Add the specified amount of grease(Molybdenum disulphied grease) to the work equipment related parts.



## GROUP 2 TIGHTENING TORQUE

### 1. MAJOR COMPONENTS

No.	Descriptions	Bolt size	Torque		
			kgf · m	lbf · ft	
1	Engine	Engine mounting bolt(Engine-Bracket)	M10 × 1.5	7±1.5	50.6±10.9
2		Engine mounting bolt(Bracket-Frame)	M16 × 2.0	25±0.5	181±3.6
3		Radiator mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
4		Coupling mounting bolt	M14 × 2.0	14±1.0	101±7.2
5	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12±1.0	86.8±7.2
6		Main control valve mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1
7		Fuel tank mounting bolt	M16 × 2.0	25±2.5	181±18.1
8		Hydraulic oil tank mounting bolt	M16 × 2.0	25±2.5	181±18.1
9		Turning joint mounting bolt, nut	M12 × 1.75	12.3±1.3	88.2±9.4
10	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±3.2	215±23.1
11		Swing bearing upper mounting bolt	M16 × 2.0	29.7±5	215±36.2
12		Swing bearing lower mounting bolt	M16 × 2.0	29.7±5	215±36.2
13		Travel motor mounting bolt	M16 × 2.0	23±2.5	166±18.1
14	Under carriage	Sprocket mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
15		Carrier roller mounting bolt, nut	M16 × 2.0	29.7±4.5	215±32.5
16		Track roller mounting bolt	M14 × 2.0	19.6±2.5	142±18
17		Track tension cylinder mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
18		Track shoe mounting bolt, nut	M14 × 1.5	25.5±2.5	184±18.1
19	Others	Counter weight mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
20		Cab mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
21		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.1	8.5±0.7

※ For tightening torque of engine and hydraulic components, see each component disassembly and assembly.

## 2. TORQUE CHART

Use following table for unspecified torque.

### 1) BOLT AND NUT - Coarse thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.73 ~ 4.12	19.7 ~ 29.8
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 79.5	9.8 ~ 15.8	71 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 167
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 343
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	350 ~ 457	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.5	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1655
M36 × 4.0	174 ~ 236	1261 ~ 1703	250 ~ 310	1808 ~ 2242

### 2) BOLT AND NUT - Fine thread

Bolt size	8T		10T	
	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8 × 1.0	2.17 ~ 3.37	15.7 ~ 24.3	3.04 ~ 4.44	22.0 ~ 32.0
M10 × 1.25	4.46 ~ 6.66	32.3 ~ 48.2	5.93 ~ 8.93	42.9 ~ 64.6
M12 × 1.25	7.78 ~ 11.58	76.3 ~ 83.7	10.6 ~ 16.0	76.6 ~ 115
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 130	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 194	26.6 ~ 36.0	193 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 390	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 515	70.7 ~ 95.7	512 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 664	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1338	182 ~ 248	1314 ~ 1795
M36 × 3.0	192 ~ 260	1389 ~ 1879	262 ~ 354	1893 ~ 2561

### 3) PIPE AND HOSE

Thread size	Width across flat(mm)	kgf · m	lbf · ft
1/4"	19	3	21.7
3/8"	22	4	28.9
1/2"	27	5	36.2
3/4"	36	12	86.8
1"	41	14	101

### 4) FITTING

Thread size	Width across flat(mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	6	43.4
3/4"	36	13	94.0
1"	41	15	109

## GROUP 3 PUMP DEVICE

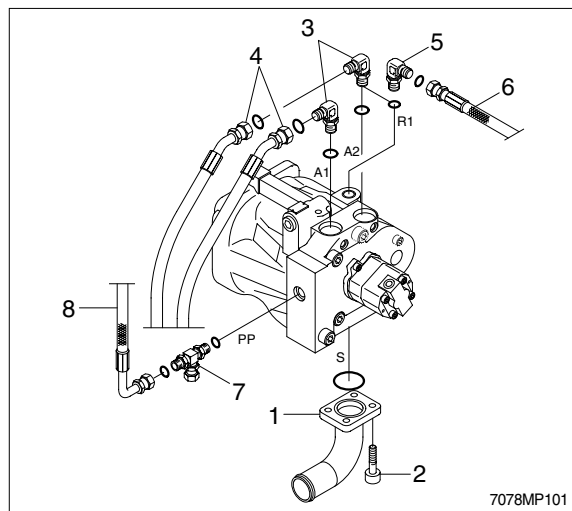
### 1. REMOVAL AND INSTALL

#### 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.**

- (4) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.
  - Hydraulic tank quantity : 75 l
- (5) Disconnect hoses(4) and remove connectors(3).
- (6) Disconnect pilot line hoses(6,8) and remove connectors(5,7).
- (7) Remove socket bolts(2) and disconnect pump suction tube(1).
  - ※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.
- (8) Sling the pump assembly and remove the pump mounting bolts.
  - Weight : 50kg(110lb)
  - ※ Pull out the pump assembly from housing. When removing the pump assembly, check that all the hoses have been disconnected.

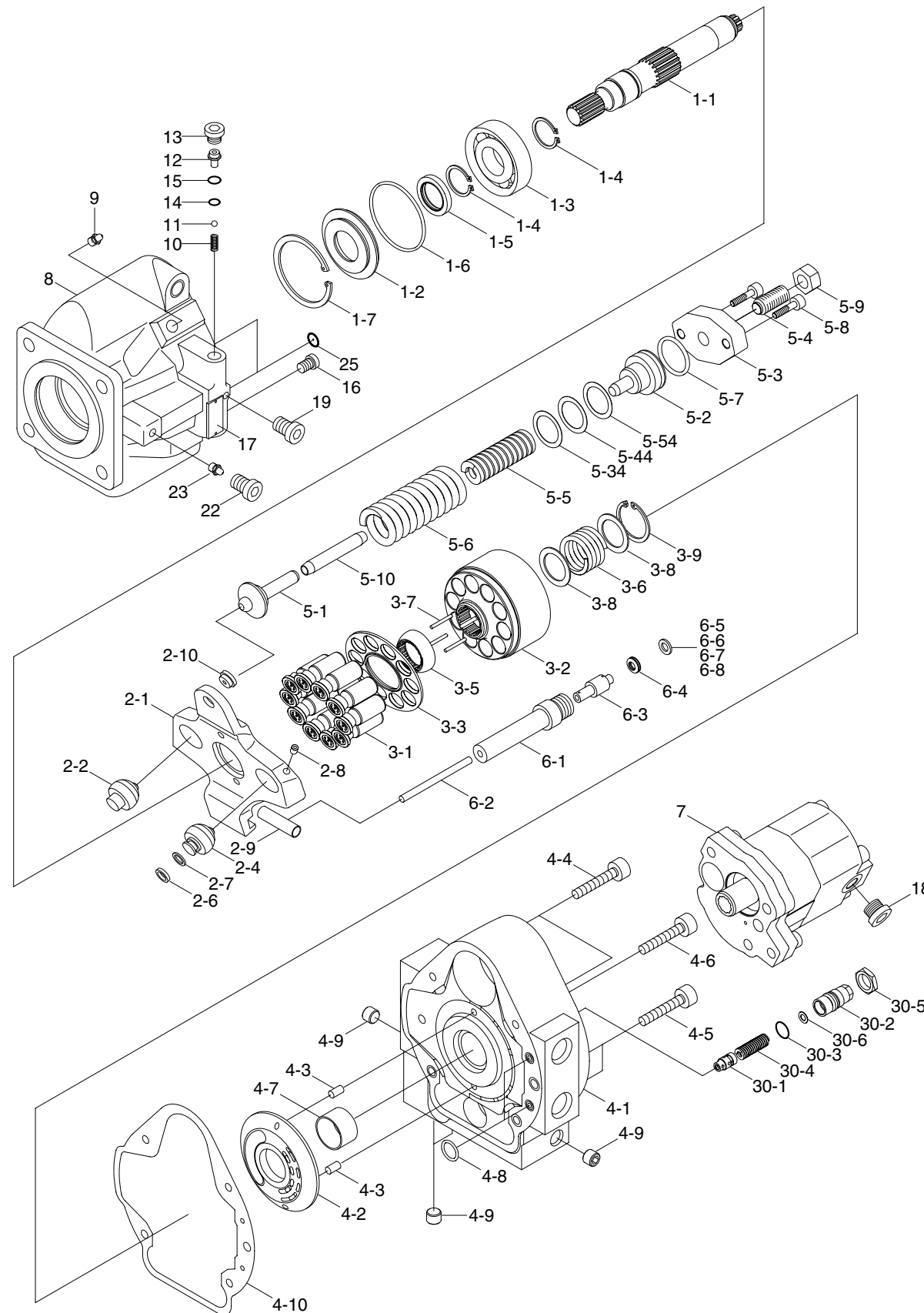


## 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Remove the suction strainer and clean it.
- (3) Replace return filter with new one.
- (4) Remove breather and clean it.
- (5) After adding oil to the hydraulic tank to the specified level.
- (6) Bleed the air from the hydraulic pump.
  - ① Remove the air vent plug(1EA).
  - ② Tighten plug lightly.
  - ③ Start the engine, run at low idling, and check oil come out from plug.
  - ④ Tighten plug.
- (7) Start the engine, run at low idling(3~5 minutes) to circulate the oil through the system.
- (8) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

## 2. MAIN PUMP(1/2)

### 1) STRUCTURE



- |      |                         |      |                         |
|------|-------------------------|------|-------------------------|
| 1    | Shaft assembly          | 5-5  | Spring                  |
| 1-1  | Shaft                   | 5-6  | Spring                  |
| 1-2  | Seal retainer           | 5-7  | O-ring                  |
| 1-3  | Bearing                 | 5-8  | Bolt                    |
| 1-4  | Retaining ring          | 5-9  | Nut                     |
| 1-5  | Oil seal                | 5-10 | Guide                   |
| 1-6  | O-ring                  | 5-34 | Shim                    |
| 1-7  | Retaining ring          | 5-44 | Shim                    |
| 2    | Swash plate assembly    | 5-54 | Shim                    |
| 2-1  | Hanger                  | 6    | Control spring assembly |
| 2-2  | Guide                   | 6-1  | Cylinder                |
| 2-4  | Guide                   | 6-2  | Piston                  |
| 2-6  | O-ring                  | 6-3  | Piston                  |
| 2-7  | Back up ring            | 6-4  | Plate spring            |
| 2-8  | Plug                    | 6-5  | Spacer                  |
| 2-9  | Pin                     | 6-6  | Spacer                  |
| 2-10 | Bush                    | 6-7  | Spacer                  |
| 3    | Rotary group            | 6-8  | Spacer                  |
| 3-1  | Piston                  | 7    | Gear pump               |
| 3-2  | Cylinder block          | 8    | Housing                 |
| 3-3  | Retainer                | 9    | Air vent valve          |
| 3-5  | Guide                   | 10   | Bush                    |
| 3-6  | Spring                  | 11   | Steel ball              |
| 3-7  | Parallel pin            | 12   | Plug                    |
| 3-8  | Spring spacer           | 13   | Plug                    |
| 3-9  | Retaining ring          | 14   | Packing                 |
| 4    | Port plate assembly     | 15   | Shim                    |
| 4-1  | Cover                   | 16   | Plug                    |
| 4-2  | Control plate           | 17   | Name plate assembly     |
| 4-3  | Parallel pin            | 18   | Plug                    |
| 4-4  | Bolt                    | 19   | Plug                    |
| 4-5  | Bolt                    | 22   | Plug assembly           |
| 4-6  | Bolt                    | 23   | Orifice                 |
| 4-7  | Bearing                 | 25   | Square ring             |
| 4-8  | Square ring             | 30   | Relief valve            |
| 4-9  | Plug                    | 30-1 | Spool                   |
| 4-10 | Packing                 | 30-2 | Adjust screw            |
| 5    | Control spring assembly | 30-3 | O-ring                  |
| 5-1  | Spring spacer           | 30-4 | Spring                  |
| 5-2  | Spring spacer           | 30-5 | Nut                     |
| 5-3  | Cover                   | 30-6 | Shim                    |
| 5-4  | Adjust screw            |      |                         |

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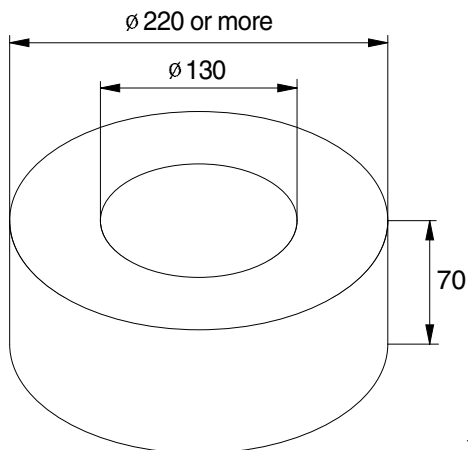
## 2) NECESSARY TOOLS AND JIGS

The following tools and jigs are necessary to disassemble and assemble the pump.

### (1) Tools

Name	Size(nominal)
Hexagon socket screw keys	6, 8, 10, 12mm
Spanner	14, 17, 24, 27
Screwdrivers for slotted-head screws	Middle
Pliers for retaining rings	Bore use 80
Grease	-
Adhesive	Three Bond #1305
Plastic hammer	Medium size

### (2) Jigs



7078MP50

This is a table to stand the pump facing downward

## 3) CAUTIONS DURING DISASSEMBLING AND ASSEMBLING

### (1) Cautions for disassembling

- ① Never attempt operating the adjusting screws unless absolutely necessary.
- ② Take utmost care during disassembly not to knock or drop each part.

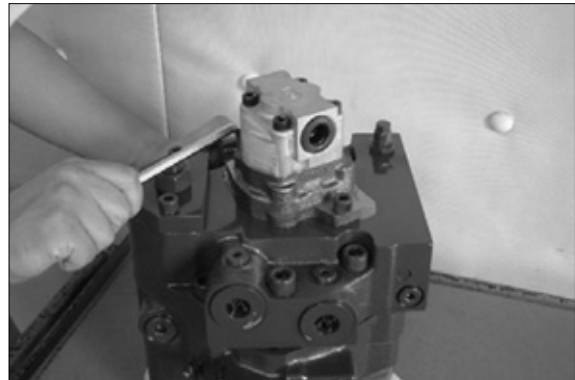
### (2) Cautions for assembling

- ① Wash each part thoroughly.
- ② During assembling take utmost care not to damage the part or allow foreign materials to enter.
- ③ As a rule the O-ring and oil seal should not be reused.
- ④ In our assembly work the torque wrench is used to control the torque.  
Be sure to use the torque wrench.

### 3. DISASSEMBLING

#### 1) DISASSEMBLING THE GEAR PUMP

- (1) Remove the hexagon socket head cap screws. (M10×25, 2pcs)  
L-wrench(8)
- (2) Remove the coupling and bush.

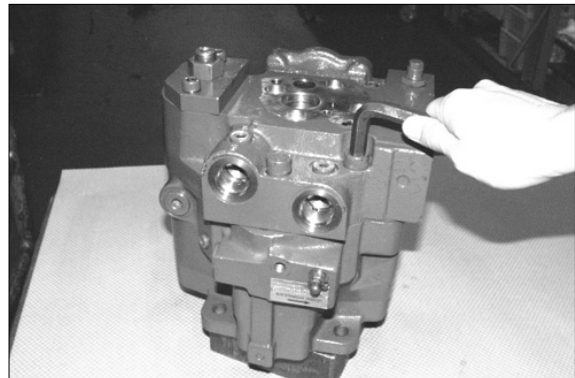


7078MP01

#### 2) DISASSEMBLING THE MAIN PUMP

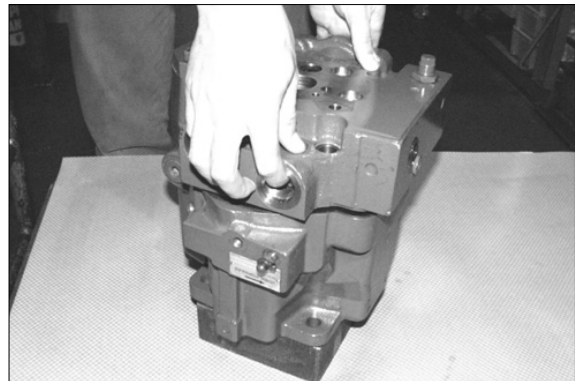
##### (1) Removing of the cover

- ① Remove the hexagon socket head cap screws.  
(M14×40, 2 pieces)  
(M14×65, 2 pieces)  
(M14×75, 1 pieces)  
L-wrench(12)



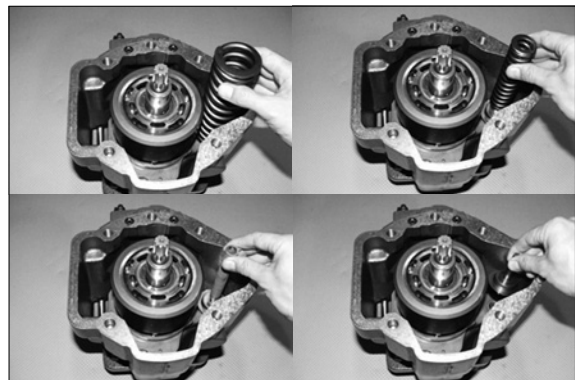
7078MP02

- ② Removing the cover.
  - ※ Be careful because the control plate is provided to the backside.
  - ※ When the cover is difficult to remove, knock lightly with a plastic hammer.



7078MP03

- ③ Removing of the spring and the guide and the spring seat.

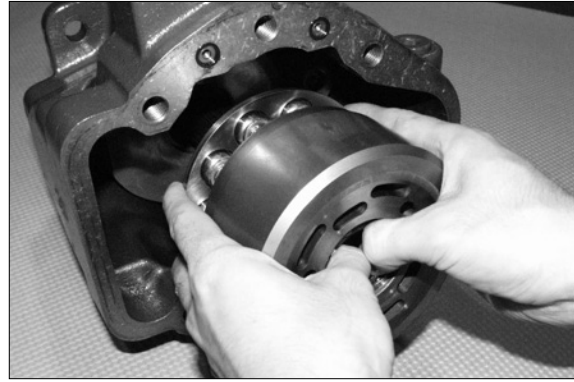


7078MP04-04C



## (2) Removing of the rotary group

- ① Lay the pump on the side and take out the rotary group from the shaft.



7078MP05

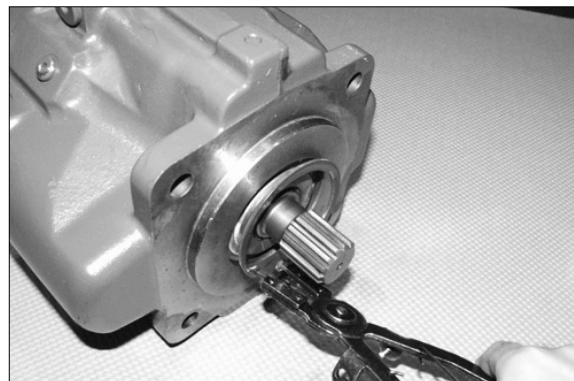
- ② 3 Parallel pins may remain in the housing when removing rotary group. Please take out 3 parallel pins when they were left in the housing.



7078MP06

## (3) Removing of the shaft

- ① Removing the retaining ring.  
(Pliers for retaining rings, Bore use 80)



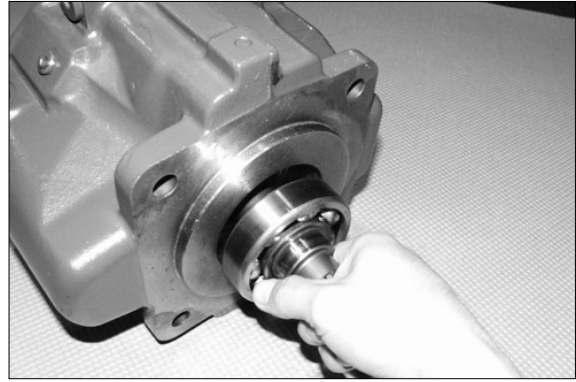
7078MP07

- ② Removing the oil seal case.  
(Two screwdrivers)
- ③ Remove the O-ring.



7078MP08

④ Remove the shaft



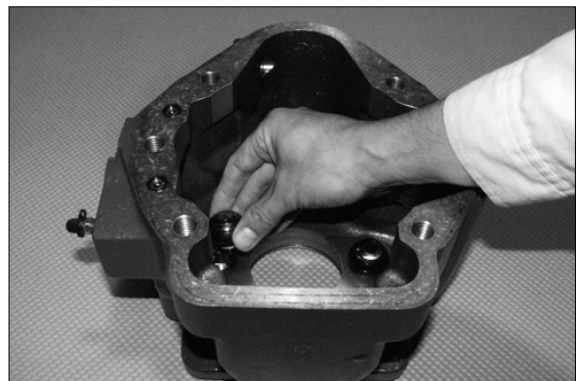
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⑤ Removing the swash plate.



7078MP10

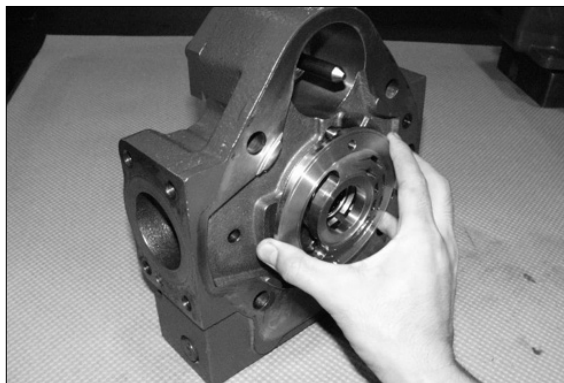
⑥ Removing the guides.



7078MP11

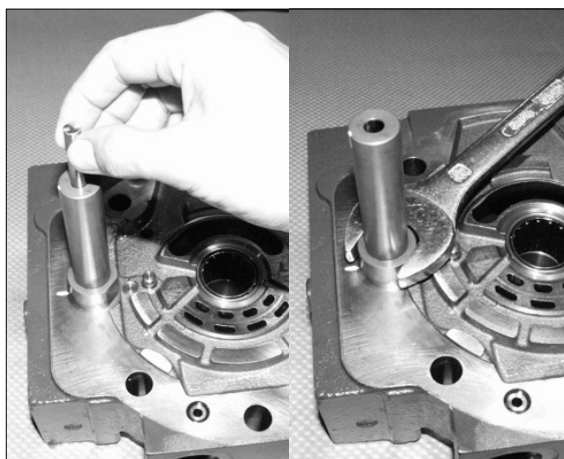
**(4) Disassembling of the cover**

- ① Removing the control plate.



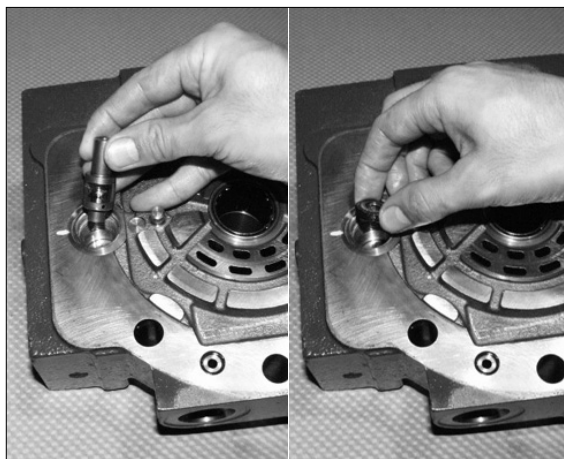
7078MP12

- ② Remove the piston and cylinder.  
Spanner (27)



7078MP13/13A

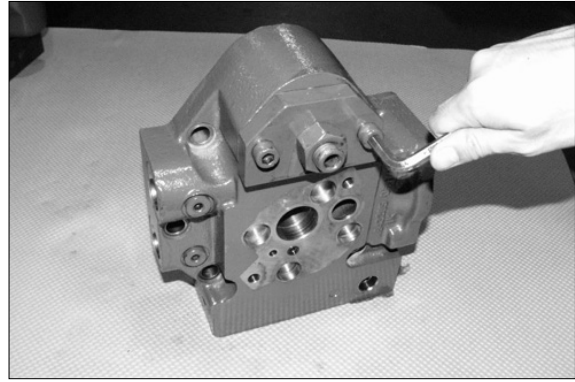
- ③ Remove the piston.  
④ Remove the coned disk springs and distance piece.



7078MP14/14A

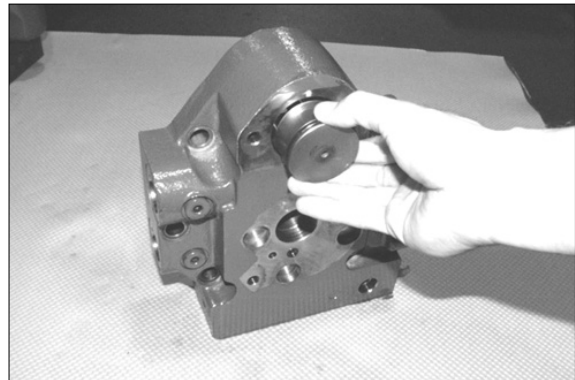
**(5) Removing the cover**

- ① Remove the hexagon socket head cap screws. (M10 × 30, 2 pieces)  
L-wrench(8)



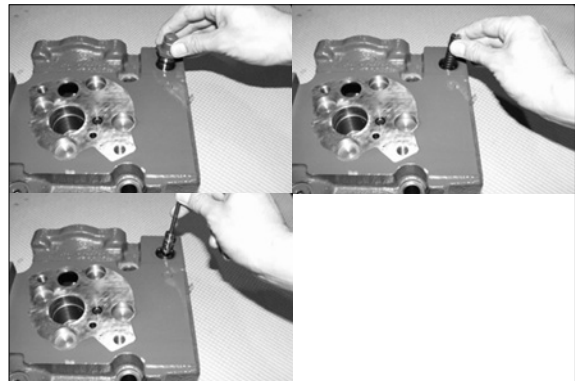
7078MP15

- ② Remove the spring seat.



7078MP16

- ③ Removing the relief valve.  
Removing the hexagon nut.  
Since the pressure has been set, this assembly must be made only when necessary.  
Spanner (24)



7078MP17-17B

- ④ Remove the adjusting screw.  
Be careful because the shim is inserted.  
Spanner (14)

- ⑤ Remove the spring and spool.

## 4. ASSEMBLING

### (1) Assembling of the cover

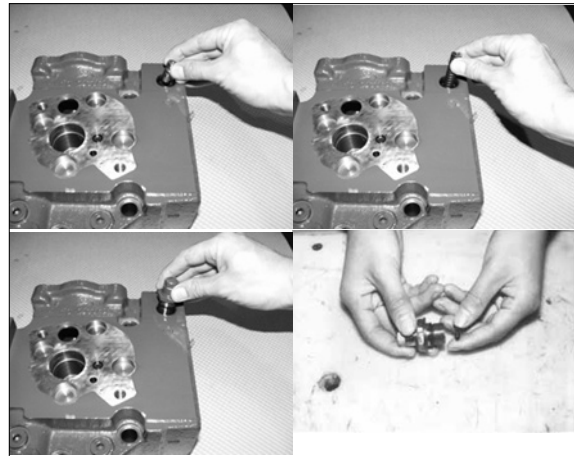
- ① Assembling the relief valve.
- ② Install the spool and spring.
- ③ Install the shim into the adjusting screw.

Tighten the hexagonal nut.  
After assembling, set the pressure and  
tighten the nuts.

Tightening torque  $9.8\text{N} \cdot \text{m}$  ( $7.2\text{lb} \cdot \text{ft}$ )

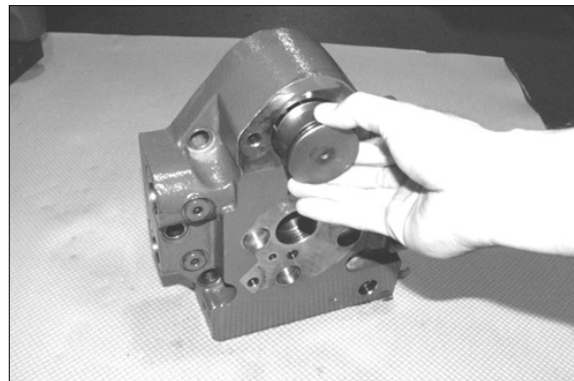
Spanner(24)

Spanner(14)



7078MP18-18C

- ④ Install the spring seat into the cover.



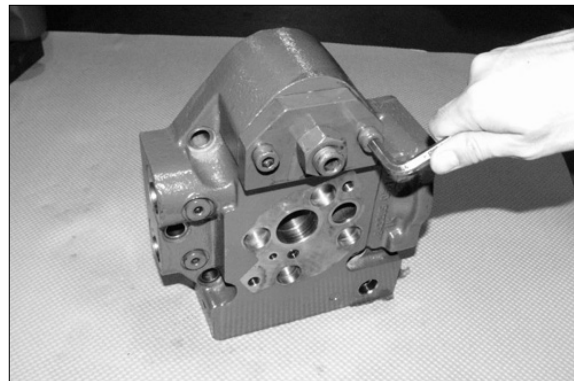
7078MP19

### (2) Assemble the cover

- ① Fix the hexagon socket head cap screws.  
( $\text{M}10 \times 30$ , 2 pieces)

L-wrench(8)

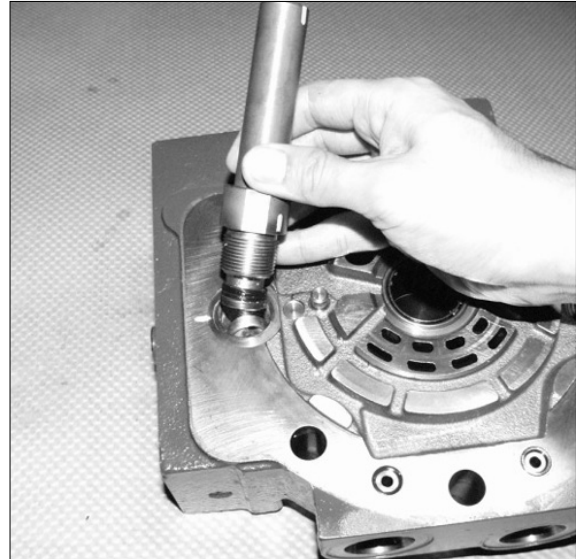
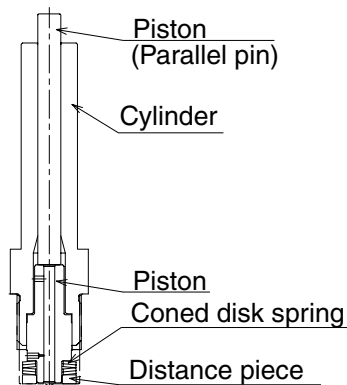
- Tightening torque  $55\sim 69\text{N} \cdot \text{m}$   
( $41\sim 51\text{lb} \cdot \text{ft}$ )



7078MP20

② Assemble the control piston.

※ Apply three bond #1305 to the thread of the cylinder.



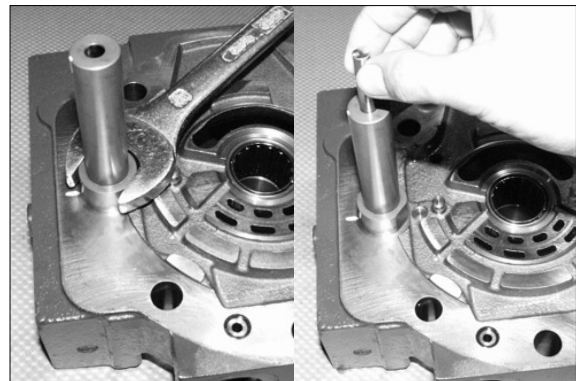
7078MP21A/21

③ Assemble the control piston.

Spanner (27)

· Tightening torque 126~157N · m  
(93~116lb · ft)

④ Install the piston.

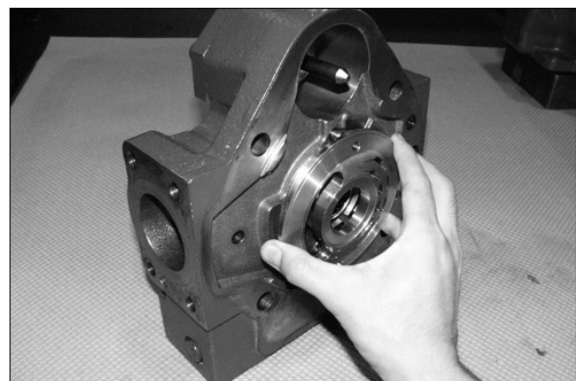


7078MP22/22A

⑤ Apply grease to the back side of the control plate.

(To prevent dislodgement)

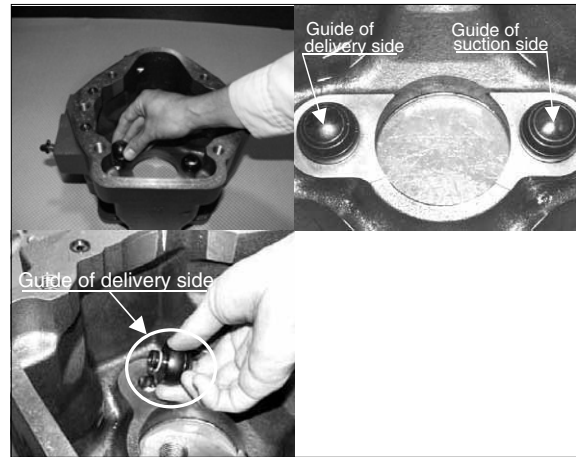
And assemble it to the cover while matching knock holes.



7078MP23

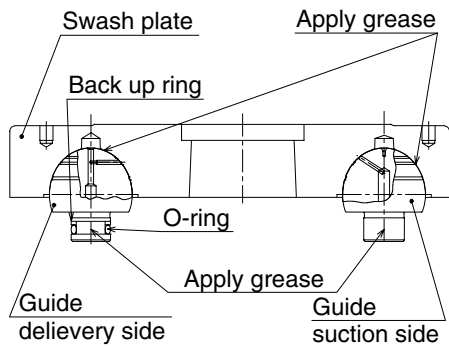
### (3) Assembling of the swash plate

- ① Install the guides into the housing.



7078MP24-24B

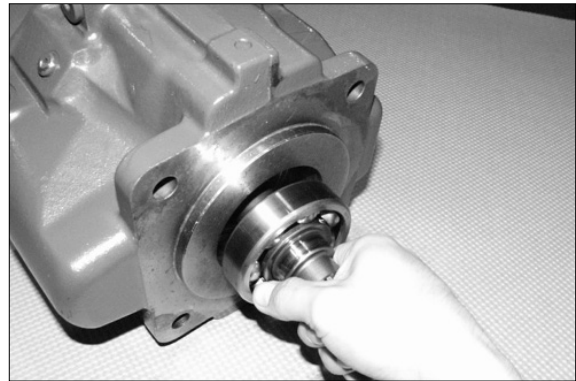
- ② Install the swash plate into the housing.



7078MP25A/25

### (4) Assembling of the shaft

- ① Install the shaft into the housing.  
Fix the bearing outer ring firmly into the housing hole.



7078MP26

- ② Apply grease to the O-ring for assembling.



7078MP27

- ③ Install the oil seal case into the shaft.  
Apply grease to the oil seal lip beforehand.



7078MP28

- ④ Install the retaining ring to fix the shaft.  
(Pliers for retaining rings, bore use 80)



7078MP29

**(5) Assembling of the rotary group**

- ① Apply grease to 3 parallel pins.  
Install 3 parallel pins into the cylinder block.



7078MP30

- ② Apply grease to the guide.  
Install the guide on 3 parallel pins



7078MP30A



③ Install the piston(10 pistons) into the retainer.

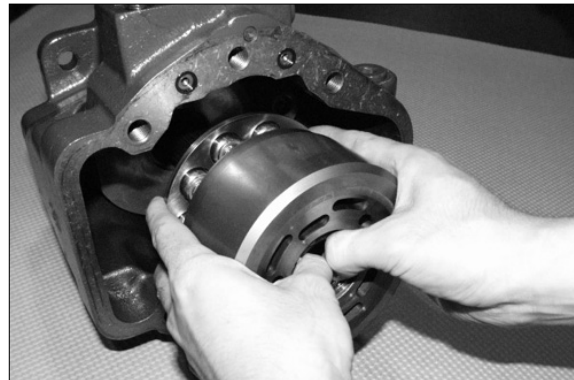
④ Apply grease to the piston.  
Install the piston and the retainer into the hole of cylinder block.



7078MP31

⑤ Install the rotary group into the housing.  
(Along the shaft spline)

⑥ Apply grease to slide surface of the piston shoe and to the slide surface of the cylinder block relative to the control plate.

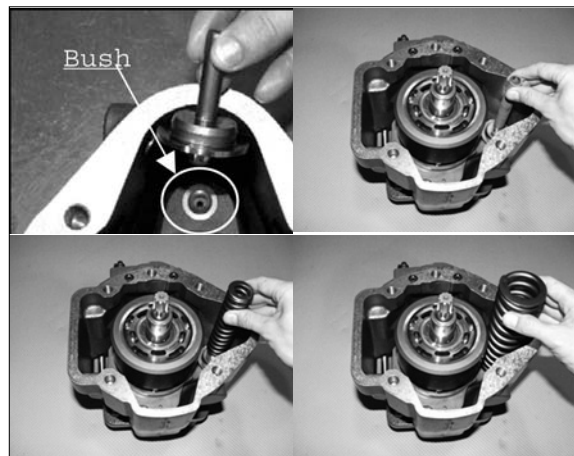


7078MP32

#### (5) Assembling of the spring seat

① Apply grease to the spherical portion of the spring seat.  
Install the spring seat into the bush.

② Install the spring guide and springs into the housing.



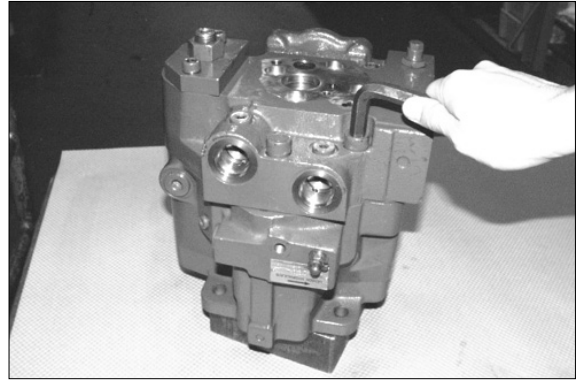
7078MP33-33C

③ Install the packing.



7078MP34

- ④ Join together housing and cover.  
Fix the hexagon socket head cap screws.  
(M14×40, 2 pieces)  
(M14×65, 2 pieces)  
(M14×75, 1 pieces)
- L-wrench(12)  
· Tightening torque 150~180N·m  
(111~133lbf·ft)



7078MP34

## 5. DISASSEMBLING

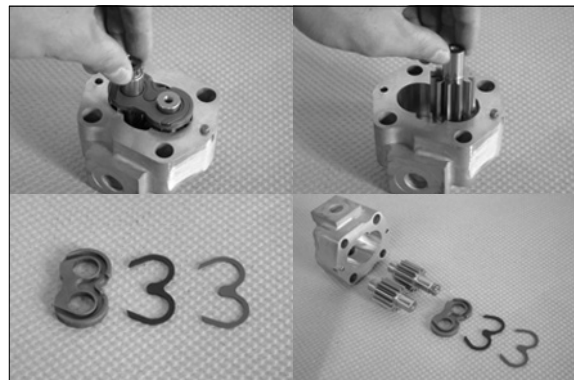
### (1) Disassembling the gear pump

- ① Remove the hexagon socket head cap screws. (M8×50, 4pcs)



7078MP38

- ② Remove the side plate, backup ring, square ring and gears while pulling out the drive gear and idle gear.



7078MP39-39C

- ③ Removing the front frame.

Remove the hexagon head bolts,  
(M10×2, 4pcs)

Spanner (17)

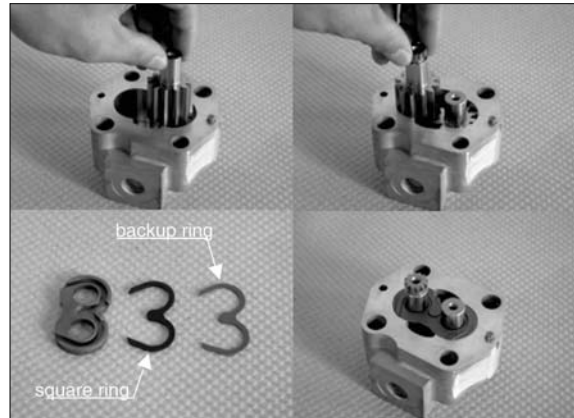


7078MP40

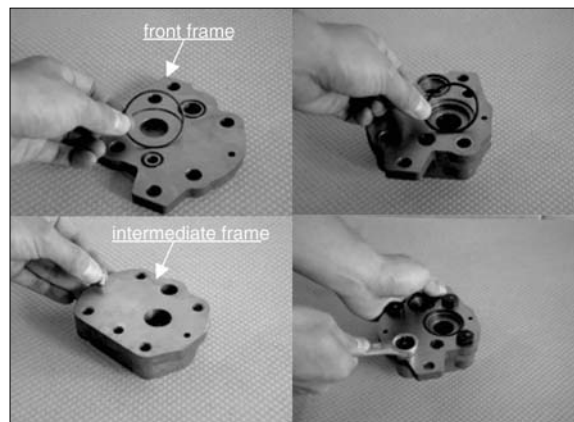
## 6. ASSEMBLING

### (1) Assembling the gear pump

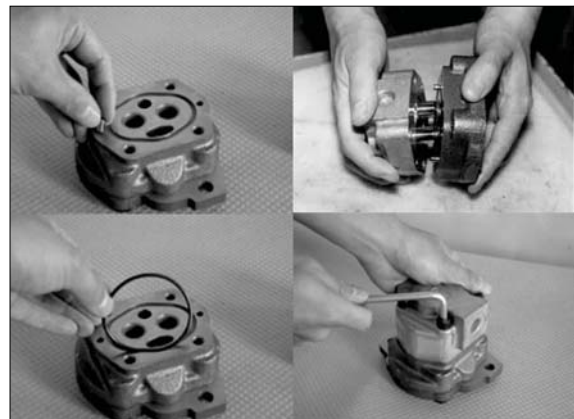
- ① Assemble the idle and drive gear into the housing.
- ② Assemble the side plate assy.  
Apply grease to the square ring and backup ring to prevent dislodgment and assemble them in this order.
- ③ Assembled in side plate assy.  
Above into the housing.



- ④ Assemble the front frame.
- ⑤ Install the O-rings into the front frame.
- ⑥ Install the two parallel pins into the front frame.
- ⑦ Join together intermediate frame.  
Fix the hexagon head bolts,  
(M10×25, 4pcs)  
Spanner (17)  
· Tightening torque 59N · m (44lbf · ft)

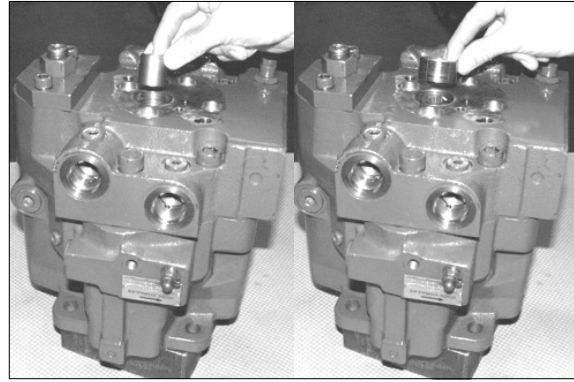


- ⑧ Assemble the intermediate frame.
- ⑨ Install two parallel pins and O-ring.  
Fix the hexagon socket head cap screws.  
(M8×50, 4pcs)  
L-wrench(6)  
· Tightening torque 29.4N · m (21.4lbf · ft)



## (2) Assembling the gear pump

- ① Install the coupling to the shaft end of the main pump.

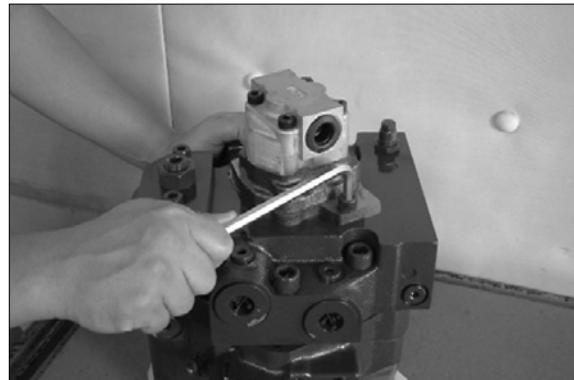


7078MP36/36A

- ② Fix the gear pump with the hexagon socket head cap screws.  
(M10 × 25, 2 pieces)

L-wrench(8)

- Tightening torque 55~69N · m  
(40~50lbf · ft)



7078MP37

## GROUP 4 MAIN CONTROL VALVE

### 1. REMOVAL AND INSTALL OF MOTOR

#### 1) REMOVAL

- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

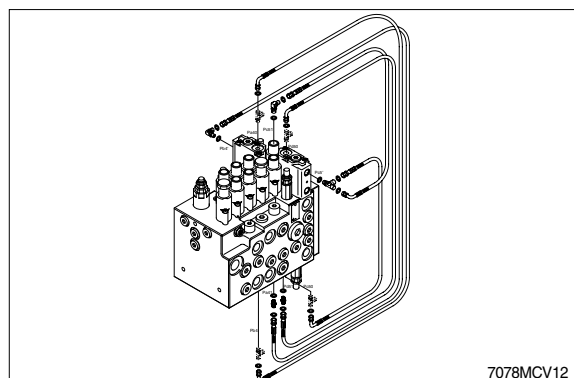
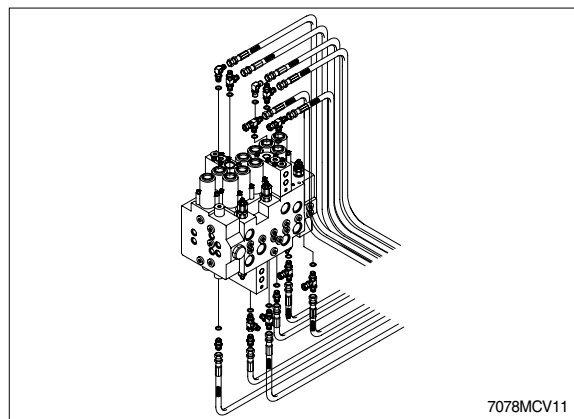
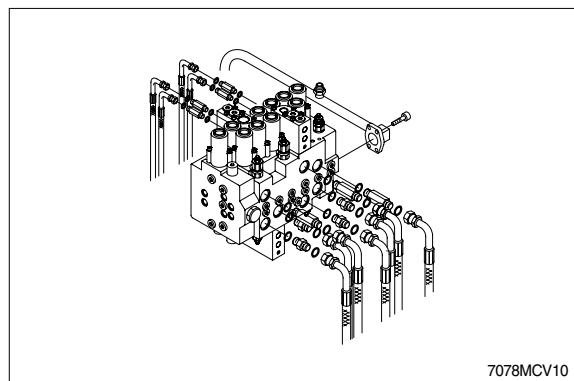
**▲ Escaping fluid under pressure can penetrate the skin causing serious injury.**

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

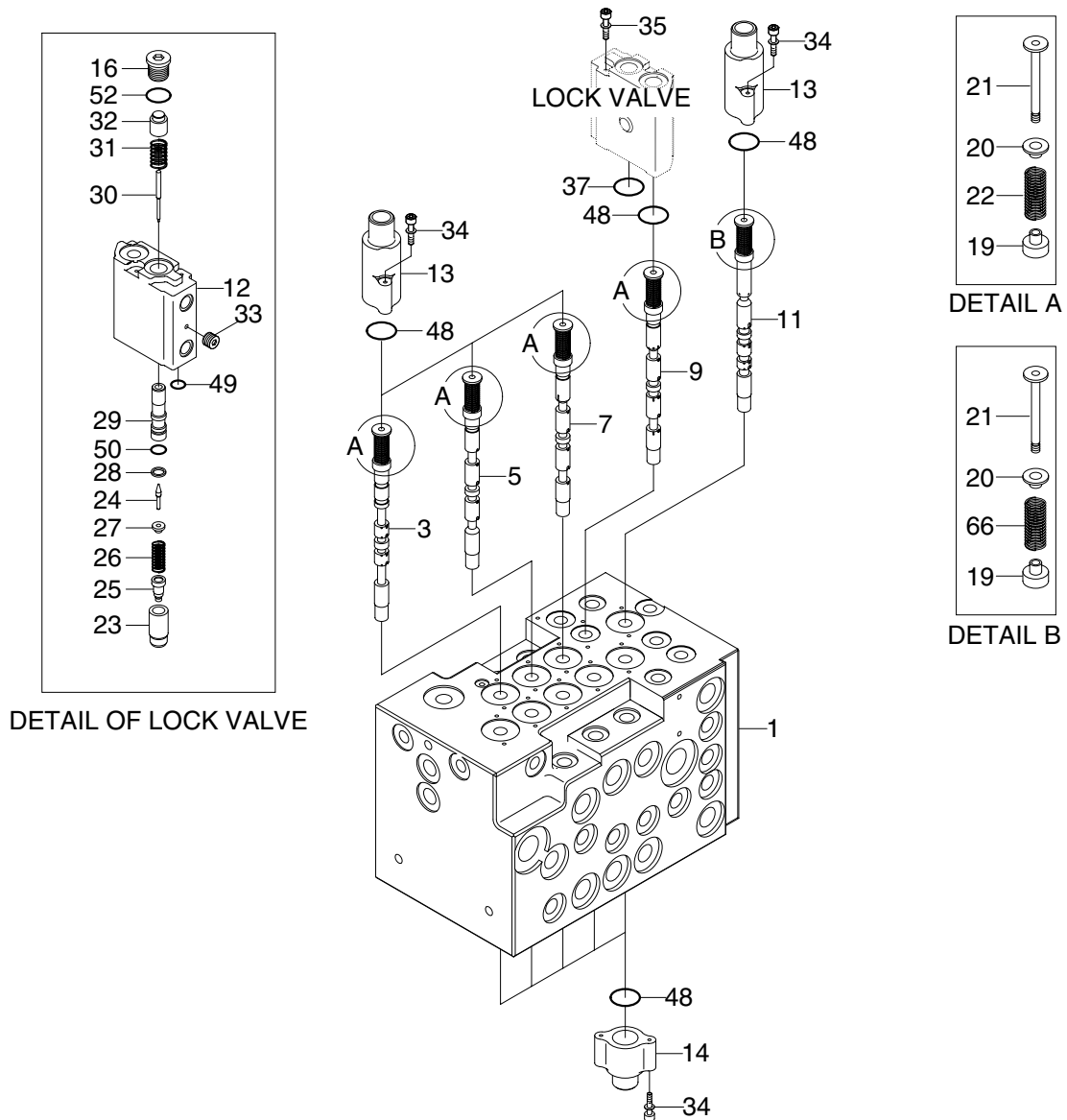
- (4) Remove bolts and disconnect pipe.
- (5) Disconnect pilot line hoses.
- (6) Disconnect pilot piping.
- (7) Sling the control valve assembly and remove the control valve mounting bolt.  
· Weight : 60kg(130lb)
- (8) Remove the control valve assembly.  
When removing the control valve assembly, check 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.



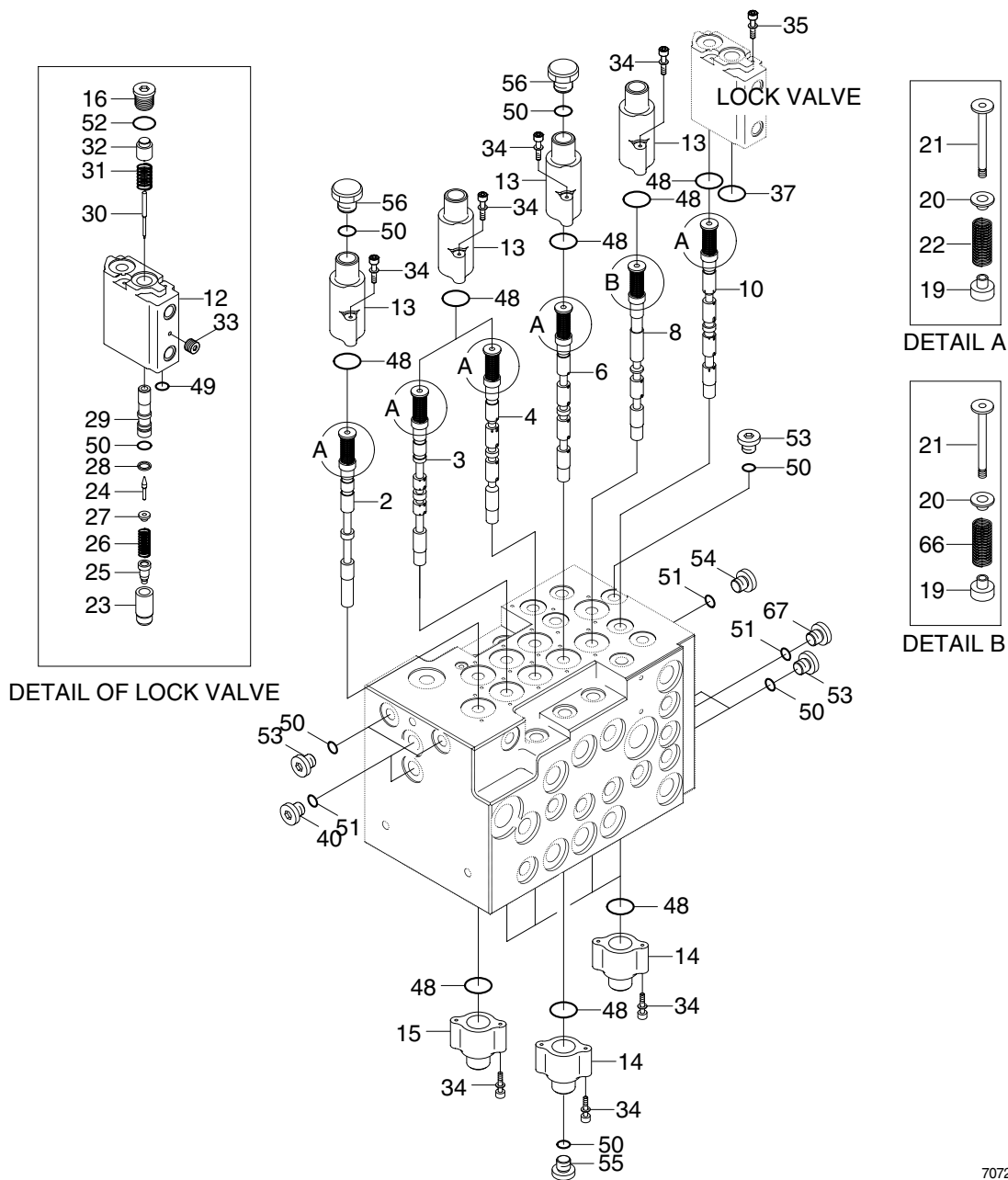
## 2. STRUCTURE(1/4)



- |    |                  |    |                       |    |                   |
|----|------------------|----|-----------------------|----|-------------------|
| 1  | Body             | 20 | Spring holder         | 31 | Lock valve spring |
| 3  | Spool-Travel(LH) | 21 | Spool end             | 32 | Piston            |
| 5  | Spool-Swing      | 22 | Spring                | 33 | Plug              |
| 7  | Spool-Option     | 23 | Lock valve            | 34 | Socket head bolt  |
| 9  | Spool-Boom 2     | 24 | Poppet                | 35 | Socket head bolt  |
| 11 | Spool-Arm        | 25 | Lock valve restrictor | 37 | O-ring            |
| 12 | Pilot-Cover      | 26 | Lock valve spring     | 48 | O-ring            |
| 13 | Pilot-Cover      | 27 | Spring holder         | 49 | O-ring            |
| 14 | Pilot-Cover      | 28 | Retaining ring        | 50 | O-ring            |
| 16 | Plug             | 29 | Piston guide          | 52 | O-ring            |
| 19 | Spring holder    | 30 | Piston                | 66 | Spring            |

7072MCV31

# STRUCTURE(2/4)



- 2 Spool-Travel straight
- 4 Spool-Travel(RH)
- 6 Spool-Dozer
- 8 Spool-Boom
- 10 Spool-Arm 2
- 12 Pilot-Cover
- 13 Pilot-Cover
- 14 Pilot-Cover
- 15 Pilot-Cover
- 16 Plug
- 19 Spring holder
- 20 Spring holder
- 21 Spool end
- 22 Spring

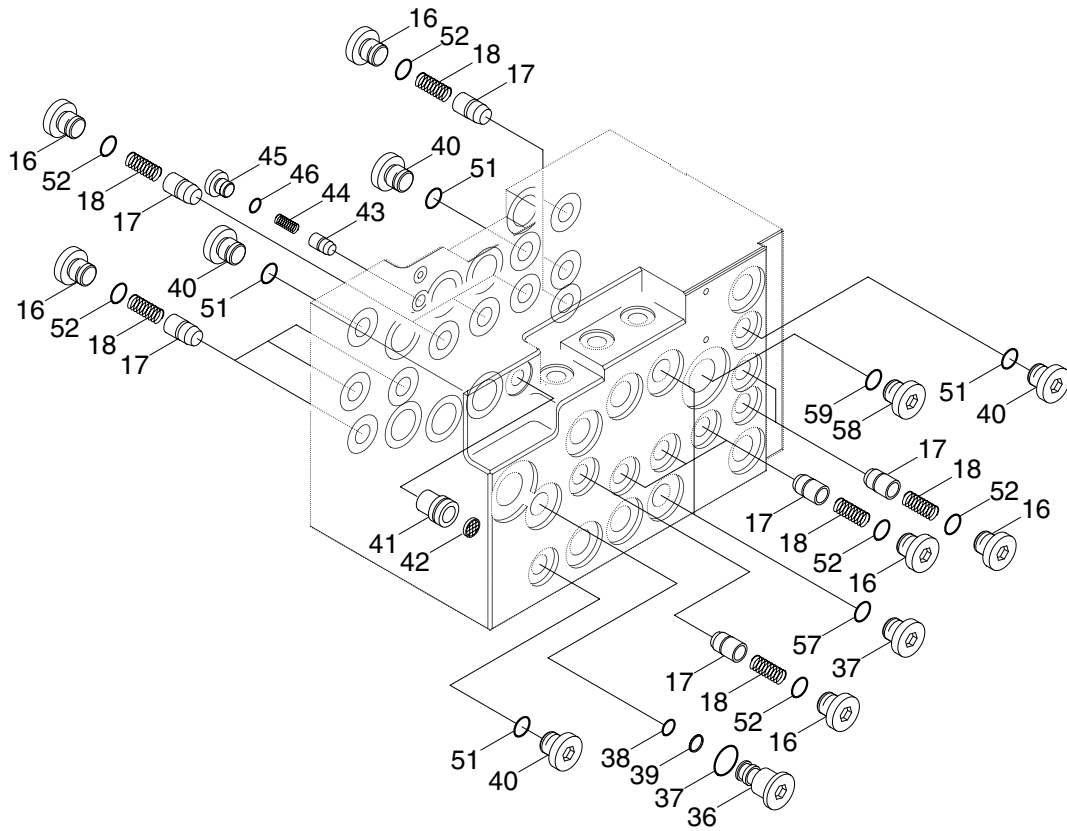
- 23 Lock valve
- 24 Poppet
- 25 Lock valve restrictor
- 26 Lock valve spring
- 27 Spring holder
- 28 Retaining ring
- 29 Piston guide
- 30 Piston
- 31 Lock valve spring
- 32 Piston
- 33 Plug
- 34 Socket head bolt
- 35 Socket head bolt
- 37 O-ring

- 40 Plug
- 48 O-ring
- 49 O-ring
- 50 O-ring
- 51 O-ring
- 52 O-ring
- 53 Plug
- 54 Restrictor plug
- 55 Plug
- 56 Plug
- 66 Spring
- 67 Restrictor plug

7072MCV32



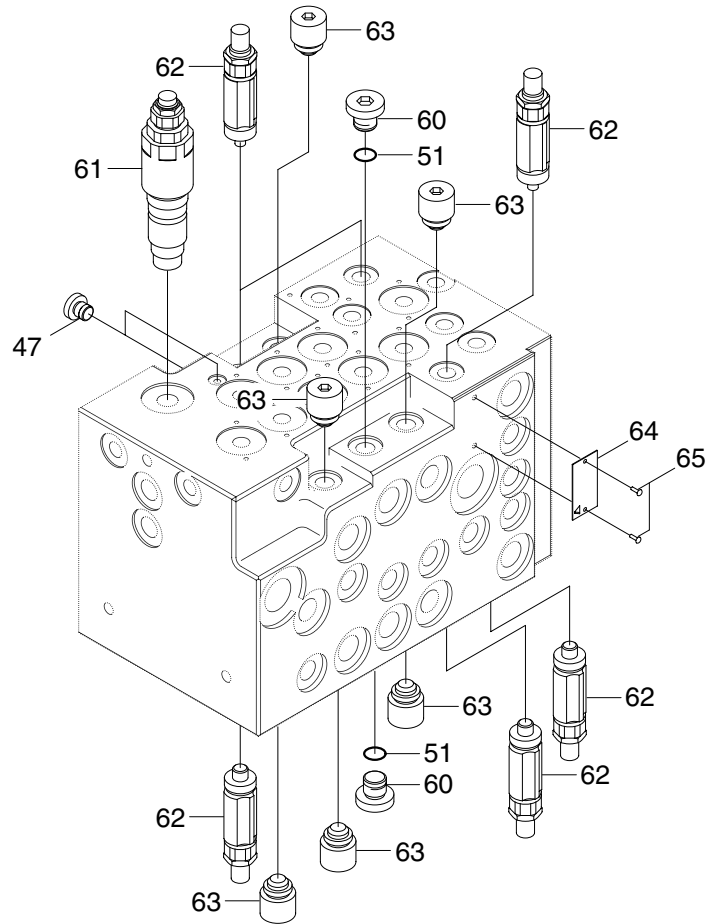
# STRUCTURE(3/4)



7072MCV33

- |                       |                       |           |
|-----------------------|-----------------------|-----------|
| 16 Plug               | 40 Plug               | 51 O-ring |
| 17 Check valve        | 41 Restrictor plug    | 52 O-ring |
| 18 Check valve spring | 42 Coin type filter   | 57 Plug   |
| 36 Plug               | 43 Check valve        | 58 Plug   |
| 37 O-ring             | 44 Check valve spring | 59 O-ring |
| 38 O-ring             | 45 Plug               |           |
| 39 Back up ring       | 46 O-ring             |           |

# STRUCTURE(4/4)



7072MCV34

- |    |                   |    |                       |
|----|-------------------|----|-----------------------|
| 47 | Plug              | 62 | Overload relief valve |
| 48 | O-ring            | 63 | Relief valve plug     |
| 51 | O-ring            | 64 | Name plate            |
| 60 | Plug              | 65 | Pin                   |
| 61 | Main relief valve |    |                       |

### 3. DISASSEMBLY AND ASSEMBLY

#### 1) GENERAL CAUTIONS

Disassembling and assembling should be executed in maker's factory in principle. And, when be obliged to do them for some unavoidable reason, they must be executed in a factory of having enough skill for hydraulic equipment with keeping following cautions.

- (1) As hydraulic equipments, not only this valve are constructed precisely with very small clearances, disassembling and assembling must be carefully done in a clean place with preventing dusts and contaminants from entering.
- (2) When removing the control valve from the machine, install caps on every ports, and wash the outside of the assembly with confirming the existence of caps before disassembling.  
Prepare a suitable table and some clean papers or rubber mat on the table for disassembling.
- (3) For carrying the control valve, never hold with spool caps portion of switching portion, and carefully treat the valves.
- (4) Do not tap the valve even if the spool movement is not smooth.
- (5) Several tests for such as relief characteristics, leakage, overload relief valve setting and flow resistance are required after re-assembling, and the hydraulic test equipments for those tests are needed.  
Therefore, do not disassemble what cannot perform test adjustment, even if it can disassemble.  
Prepare clean washing solvent, hydraulic oil and grease in advance.

#### 2) TOOLS

Prepare following tools for disassembling the control valve.

Mark	Name	Qty	Description
1	Vise	1	
2	Pads	1	
3	Allen key wrench	Each 1	4mm, 6mm, 8mm
4	Spaner	Each 1	13mm, 19mm, 22mm, 32mm
5	Socket wrench	Each 1	13mm, 19mm
6	Tweezer	1	
7	Magnet	1	
8	Plier	1	
9	Torque wrench		Suitable for each torque or adjustable one

### 3) REMOVING SPOOL

#### (1) The case of the section without lock valve

Instruction for removing the travel spool(for instance) is follows :

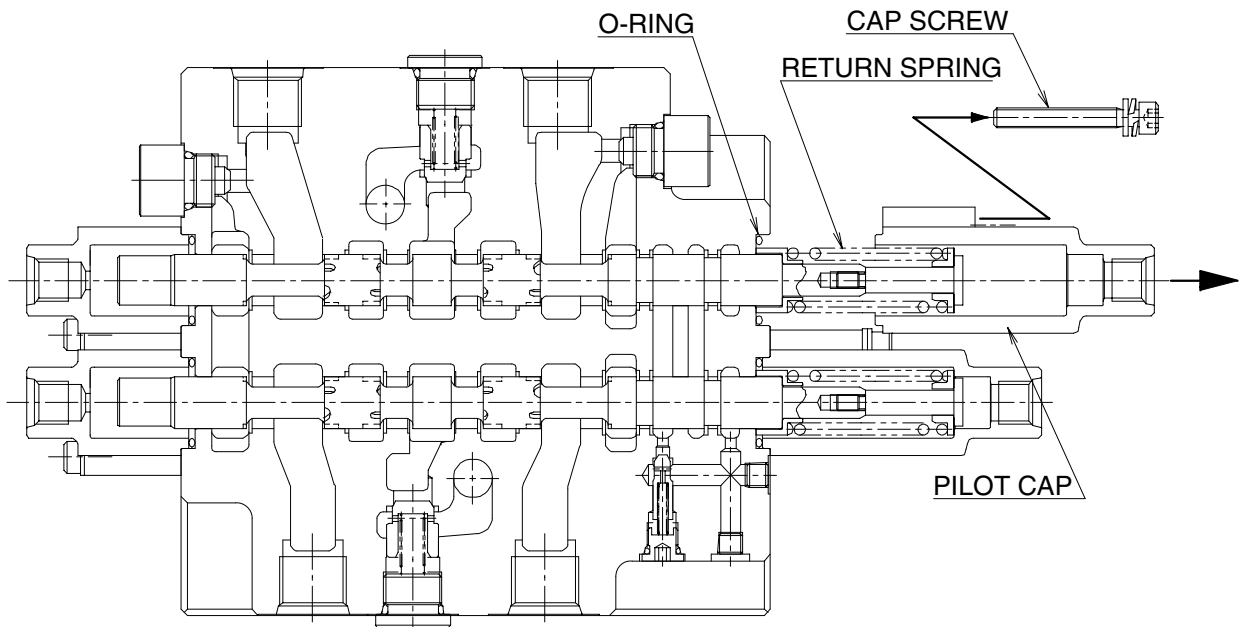
Remove two cap screws by 5mm allen key wrench, then remove pilot cover.

As the return spring portion of travel spool comes out, pull the spring straight slowly, by which spool assembly is removed.

Other spools(no lock valve type) can be removed in the same manner.

At this time confirm whether O-ring on the bottom of pilot cover mounting flange at body side has not fallen off.

- ※ In the case of spool replace, do not disassemble of a spool by any cases.  
Please replace by spool assembly.
- ※ Please attach using a tag etc. in the case of two or more kinds of spool replace, and understand a position.



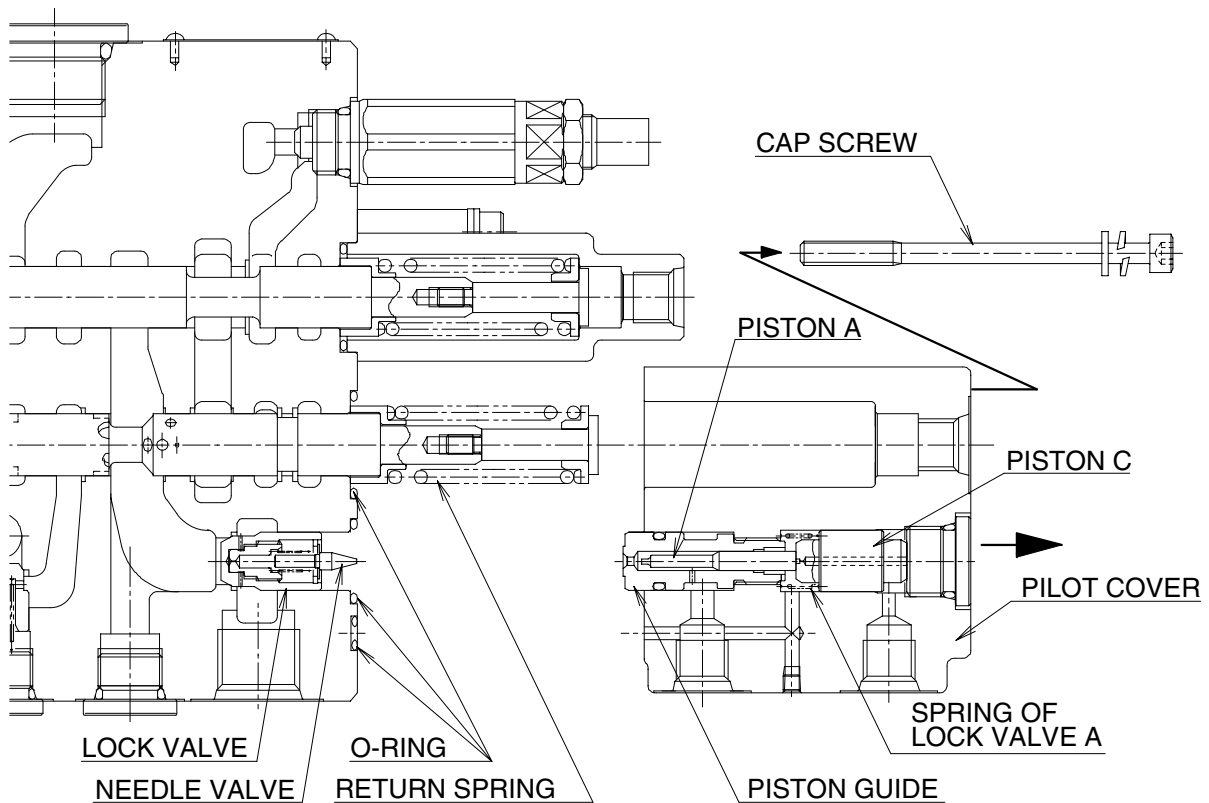
7078MCV01

## (2) The case of the section with lock valve(boom and arm)

Instruction for removing the boom spool(for instance) is follows :

Remove three cap screws by 5mm allen key wrench. Then remove pilot cover with piston guide, piston A, piston C, and spring of lock valve A.

- ※ At this time, be careful for O-ring on the bottom of pilot cover mounting flange at body side and needle valve not to separate, and remove the pilot cover.  
As the spring portion of the boom spool comes out, pull the spring straight slowly, by which spool assembly is removed.
- ※ Please treat it carefully so that a crack is not attached to the piston guide part exposed from the bottom of pilot cover.
- ※ In the case of spool replace, do not disassemble of a spool by any cases.  
Please replace by spool assembly.



7078MCV02

#### 4) REMOVING LOCK VALVE

First, a pilot cover is removed like a previous page.

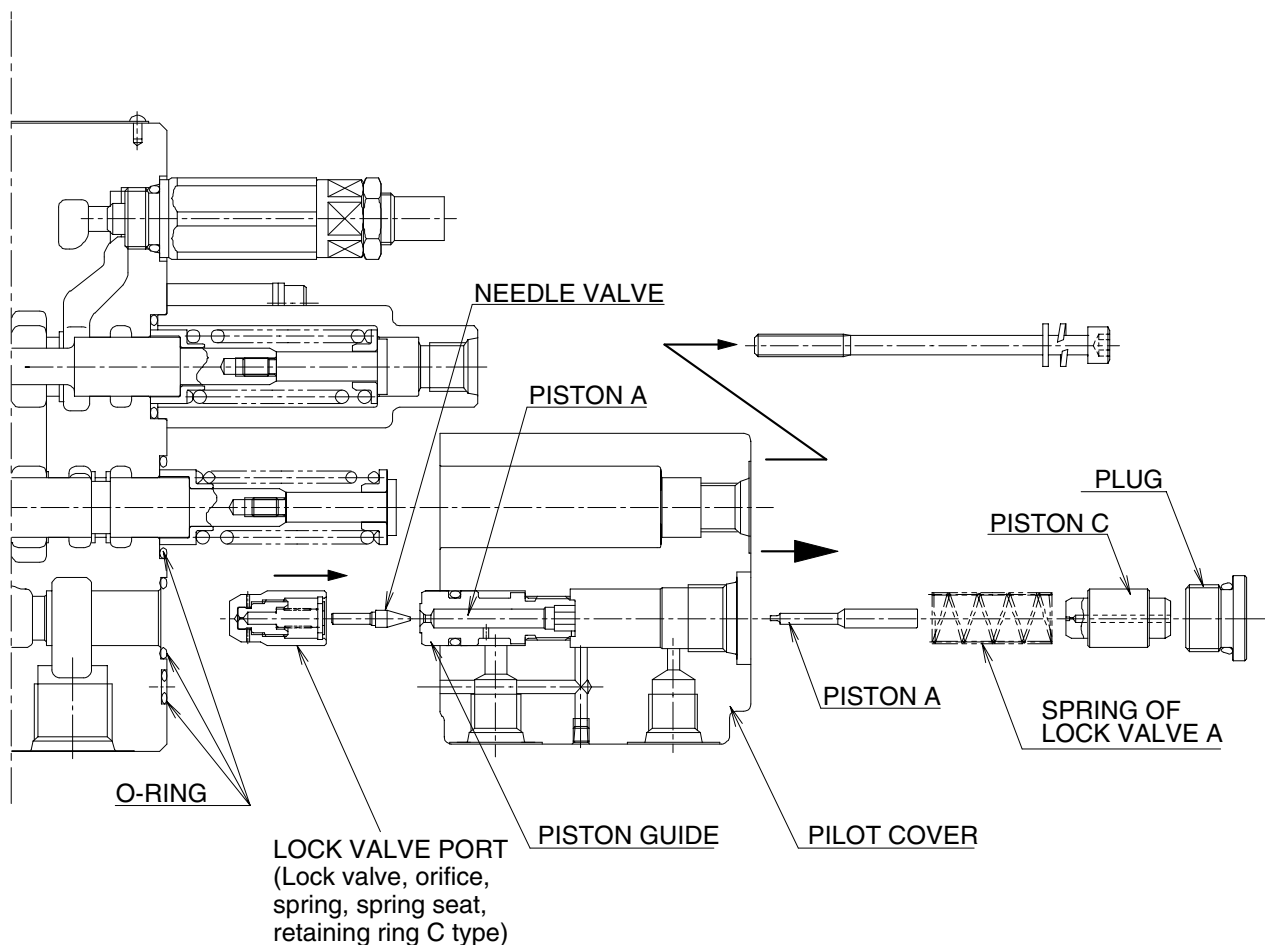
- ※ Since it is easy to separate from needle valve, please remove and keep it.
- Next, the pilot cover is fixed by vice, and the plug is loosened and removed by the 8mm allen wrench.
- ※ Please fix the sides other than a port side by vice.
- ※ Please treat it carefully so that a crack is not attached to the piston guide part exposed from the bottom of pilot cover.

From the hole which is removed the plug, piston C, spring of lock valve A, and piston A can be extracted using tweezers or a magnet.

- ※ The direction where piston C had put should be known.
- ※ Do not disassemble the piston guide. When fault arises, please replace for a pilot cover by the set.

Next, the lock valve part(lock valve, orifice of lock valve, spring of lock valve B, spring seat, retaining ring C-type) is removed from the body by the set using a magnet.

- ※ Do not disassemble the lock valve port. When fault arises, please replace by the set.

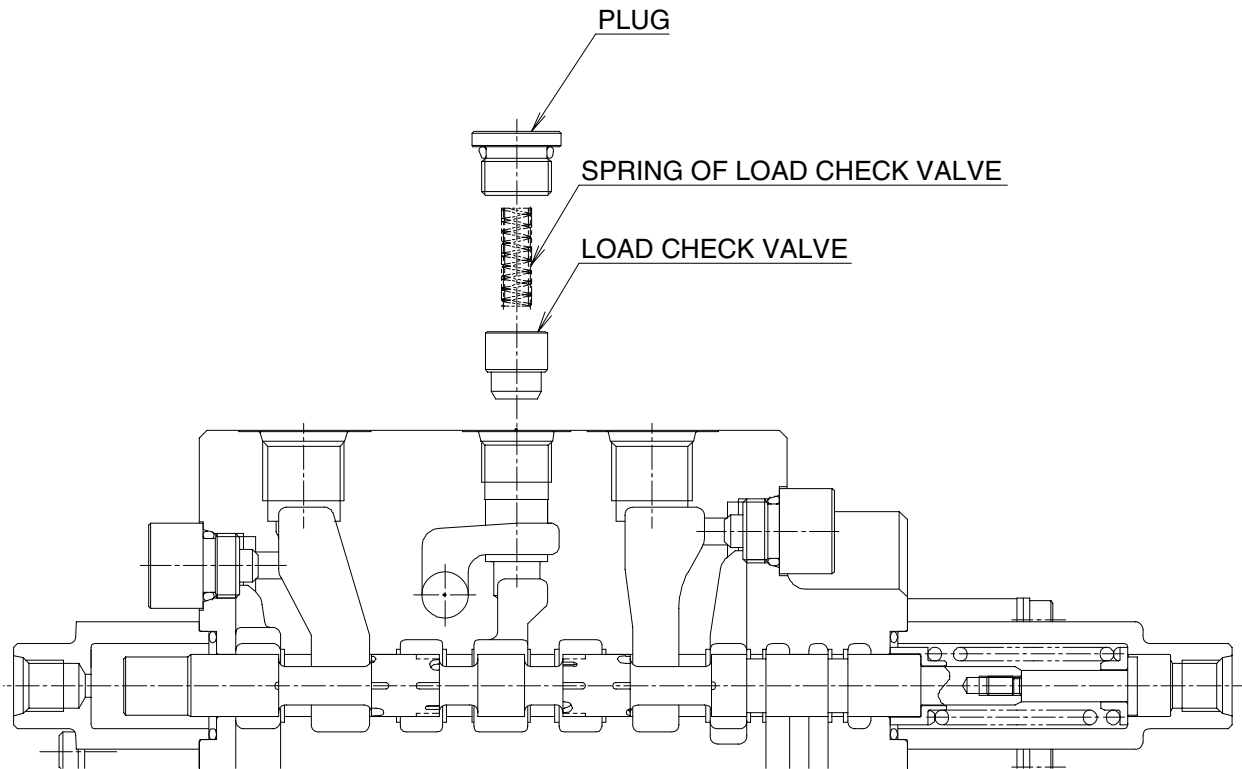


## 5) REMOVING LOAD CHECK VALVE

First, the valve body is fixed and it is made not to move.

A plug is removed using a 8mm allen wrench.

Next, spring of load check valve and load check valve are extracted using tweezers or a magnet.



7078MCV04

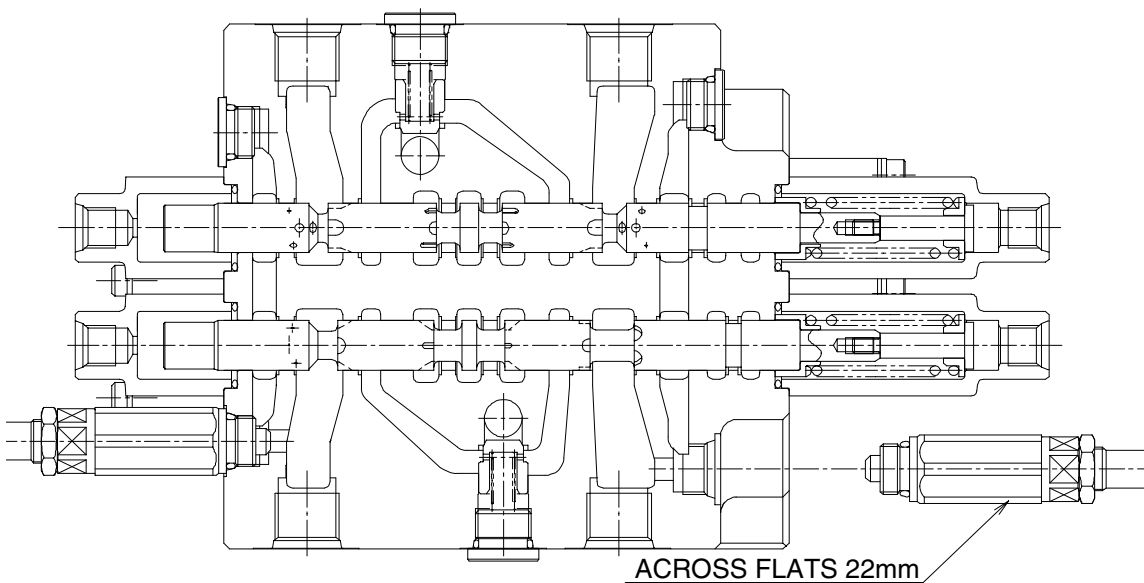
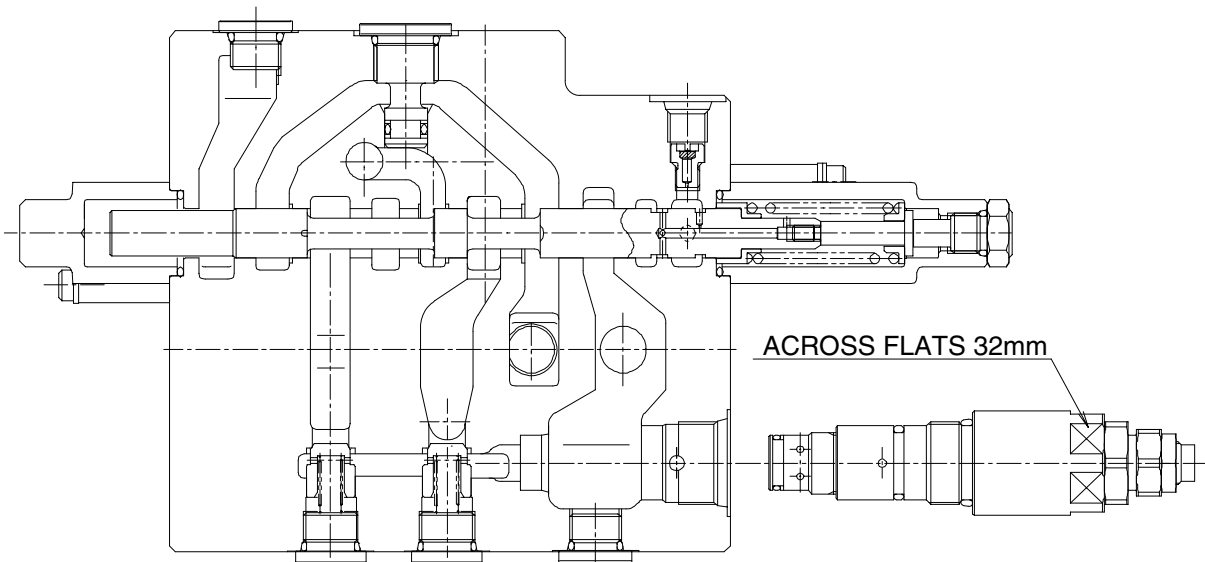
## 6) REMOVING MAIN RELIEF VALVE AND OVERLOAD RELIEF VALVE

First, the main valve body is fixed and it is made not to move.

Next, a 32mm spanner is hooked on hex. portion(across flats 32mm) of main relief valve, and it is loosened and removed.

And, a 22mm spanner is hooked on hex. portion(across flats 22mm) of overload relief valve, and it is loosened and removed.

- ※ Do not remove the main relief valve using the hexagon width portion 19, 22 or 27mm.  
Do not remove the overload relief valve using the hexagon width portion 19mm.
- ※ Please treat it carefully so that a crack is not attached to the seat part of removed main relief valve and overload relief valve.
- ※ As the main relief valve and overload relief valve are one of the most important components on the function and safety, and also, it is difficult to re-set the pressure, so replace them by assembly if any deficiency is found.





## 7) ASSEMBLING

(1) As the description on assembly is sentence only, refer to clause for disassembly for figures.

### (2) Cautions when assembling

- ① The unevenness of tightening torque and the contaminant during assembly may cause a failure.  
And observe the tightening torque specified in the description.
- ② When assembling, check up on the valve construction drawing, identify the number of part, and pay attention that there is no installation error and omission of part, etc.
- ③ When you assemble, please wash all parts by pure cleaning liquid, and immerse them in hydraulic oil as required, and assemble them.
- ④ Before applying loctite, clean and degrease the surface sufficiently, and apply it to two threads.  
(Overapplication may cause a malfunction due to the squeezing out)
- ⑤ For re-assembling, basically use only bland new seals for all portions.

### (3) Cautions when fitting seals

- ① For re-assembling, basically use only bland new seals for all portions.
- ② Pay attention to seals that they are free from deformation and flaw coming about when handling them.
- ③ Apply grease or hydraulic oil to the seals and seal fitting section to make the sliding smooth, unless otherwise specified.
- ④ Do not stretch the seals until it will be changed permanently.
- ⑤ Pay attention not to roll the O-ring when fitting. Because it is difficult for the twisted O-ring to be restored naturally after fitting, and it may cause oil leakage.

### (4) Installation of main relief valve and overload relief valve

The main body is fixed, and install main relief valve and overload relief valve on each port, and tighten them with regulation torque.

· Main relief valve : Tightening torque = 59~69N · m(6.0~7.0kgf · m)

· Overload relief valve : Tightening torque = 39~49N · m(4.0~5.0kgf · m)

※ Keep regulation torque at tightening, if not, distortion of body or oil leakage may be generated.

### (5) Instillation of spool assembly

Confirm whether dusts etc. are not sticking on the spool and spool cavity in the body. Also confirm whether O-rings are securely installed on the bottom of the body flanges. (2 places, front and back of the body)

Insert each spool assembly into each spool cavity of the body confirming the position and direction.

Prior to insert, apply small amount of hydraulic oil on spool.

※ Even if insert of spools is not easy, do not press them in force. It may bring some deficiencies in function.

Push and pull spools several times by hand and confirm that they move without excessive resistance or slip-sticking. If any of them does not move smoothly, replace spool assembly or the valve assembly.

Following above, install pilot cover to the body flange securely from the spring side of spool assy and install bolts on the body with the regulation tightening torque.

After confirming existence of O-ring on opposite side of the body flange, install pilot cover to the flange securely, and install bolts on the body with regulation tightening torque.

## GROUP 5 SWING DEVICE

### 1. REMOVAL AND INSTALL OF MOTOR

#### 1) REMOVAL

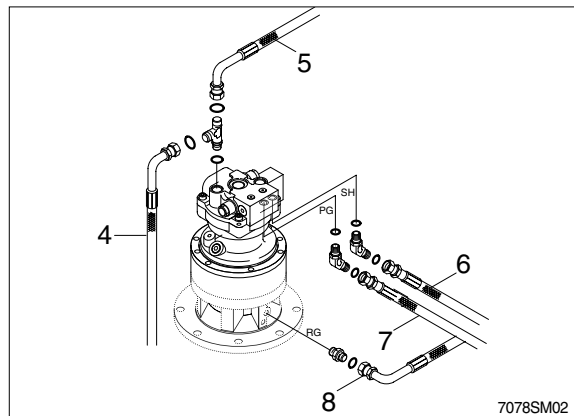
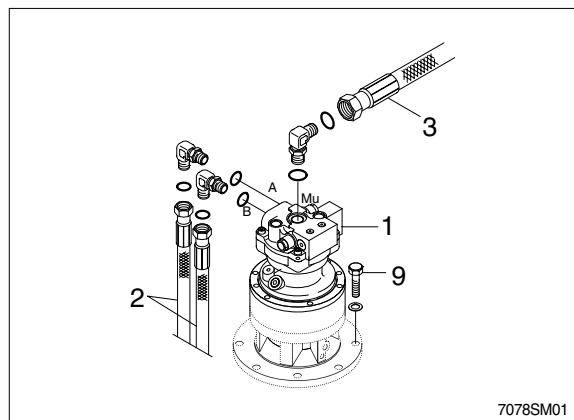
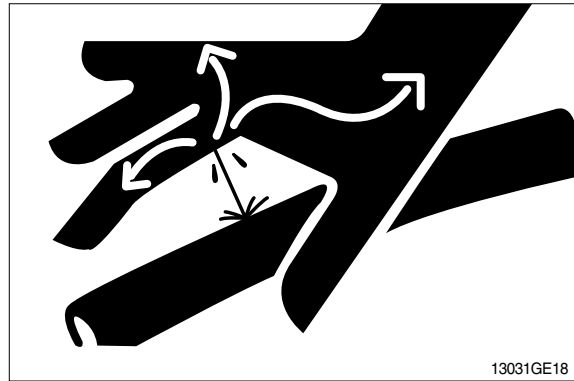
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
- ▲ Escaping fluid under pressure 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) Disconnect hose assembly(2, 3).
- (5) Disconnect pilot line hoses(4, 5, 6, 7, 8).
- (6) Sling the swing motor assembly(1) and remove the swing motor mounting bolts (9).

※ Motor device weight : 23kg(51lb)

- (7) Remove the swing motor assembly.
- ※ When removing the swing motor assembly, check that all the piping have been disconnected.

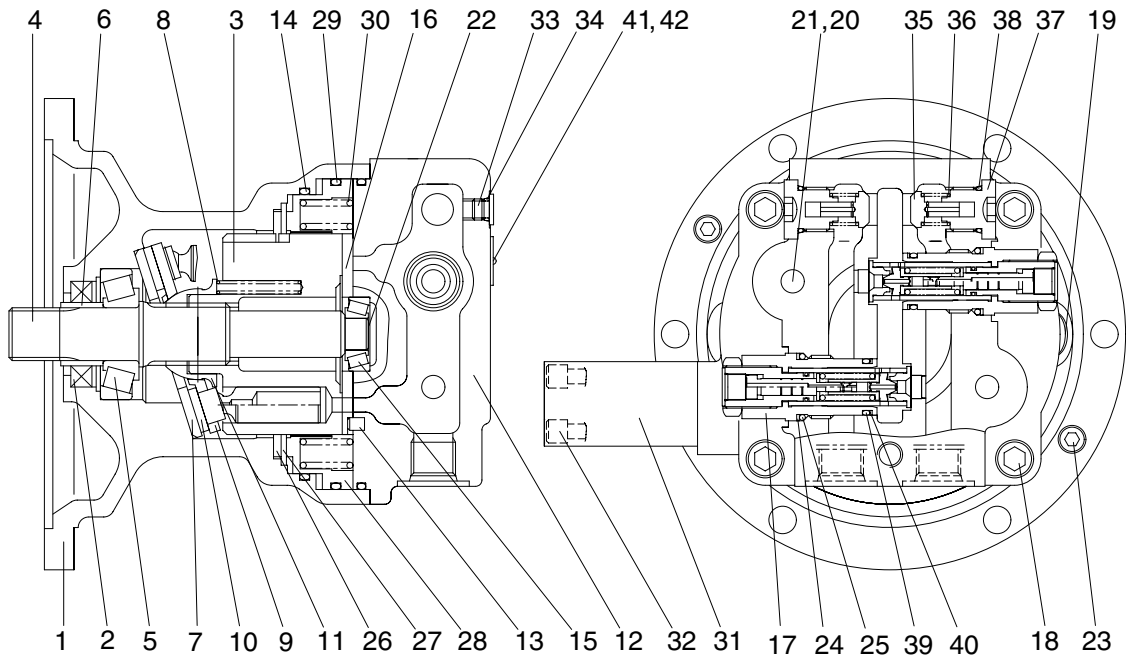
#### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from the swing motor.
  - ① Remove the air vent plug.
  - ② Pour in hydraulic oil until it overflows from the port.
  - ③ Tighten plug lightly.
  - ④ Start the engine, run at low idling and check oil come out from plug.
  - ⑤ Tighten plug fully.
- (3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.



## 2. DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

### 1) STRUCTURE



7072SM01

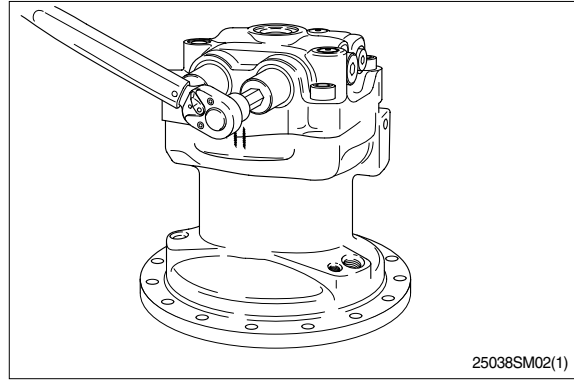
1	Body	15	Taper bearing	29	O-ring
2	Oil seal	16	Valve plate	30	Spring
3	Cylinder block	17	Relief valve assembly	31	Time delay valve
4	Shaft	18	Socket bolt	32	Socket bolt
5	Taper bearing	19	Plug	33	Plug
6	Bushing	20	Plug	34	O-ring
7	Shoe plate	21	O-ring	35	Valve
8	Spring	22	Shim	36	Spring
9	Set plate	23	Plug	37	Plug
10	Piston shoe assy	24	Back up ring	38	O-ring
11	Ball guide	25	O-ring	39	O-ring
12	Rear cover	26	Friction plate	40	Back up ring
13	Pin	27	Plate	41	Name plate
14	O-ring	28	Parking piston	42	Rivet

## 2) DISASSEMBLY

### (1) Removal of relief valve assembly

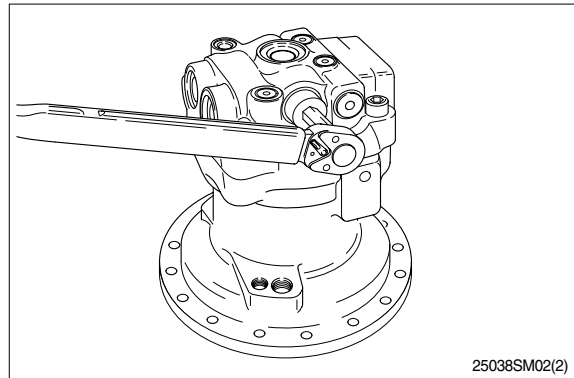
Remove cap of relief valve assembly(17) with 14mm hexagonal wrench.

- ※ Assemble removed relief valve assembly (17) to original state when reassembling.



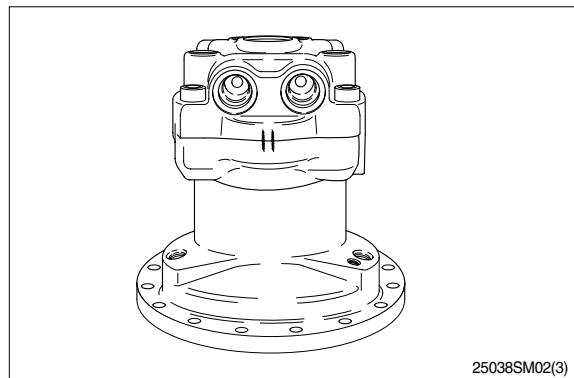
### (2) Removal of make up valve and bypass valve assembly

Loosen plug(37) with 14mm hexagonal wrench, and remove check valve(35) and spring(36).



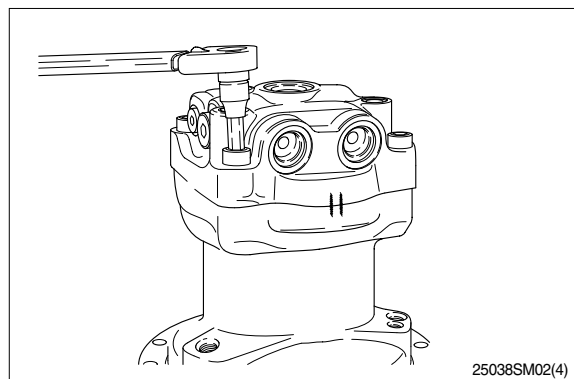
### (3) Marking at swing motor

Before disassembling motor, make a matching mark between cover(12) and housing(1) for easy reassembling.



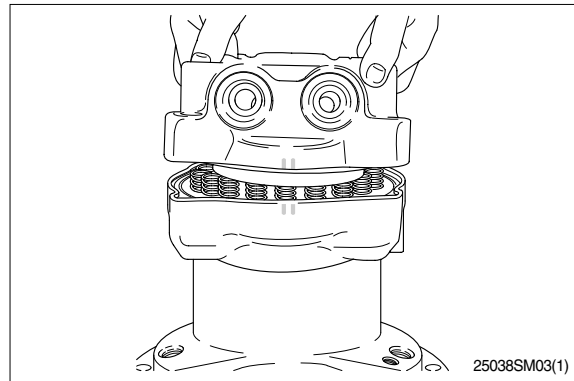
### (4) Remove mounting bolts of cover

Loosen hexagon socket bolt(18) with 12mm hexagonal wrench.

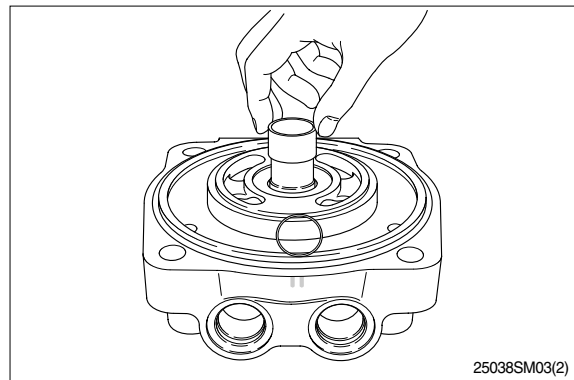


**(5) Removal of cover assembly**

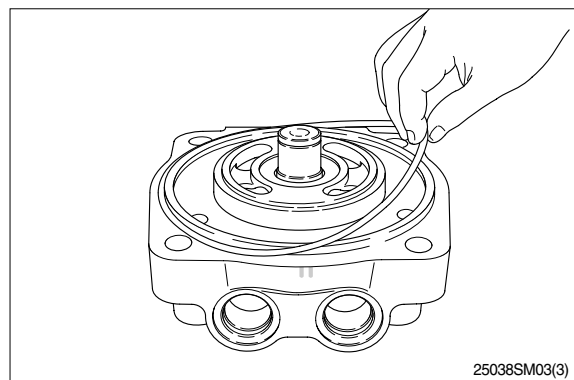
Place shaft of motor assembly to downward and take cover(12) out.



**(6) Remove shim(22) remove inner race of needle bearing(15) by bearing puller.**



**(7) Remove O-ring(29) from cover.**



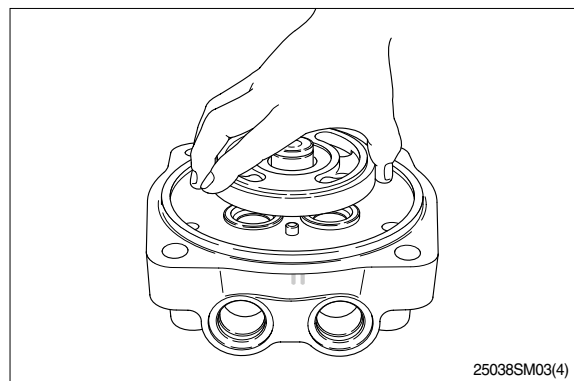
**(8) Remove balance plate**

Valve plate(16) is adhered on end surface of cylinder(3) by oil viscosity. Take off balance plate(16) with hands.

Assembling method of balance plate(16) depends on cover(12).

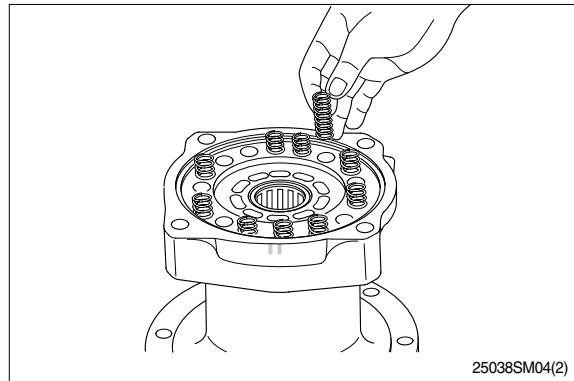
(Band groove and round groove of high - low pressure transmission area)

Before removing, check and record location of balance plate(16) to prevent misassembling.



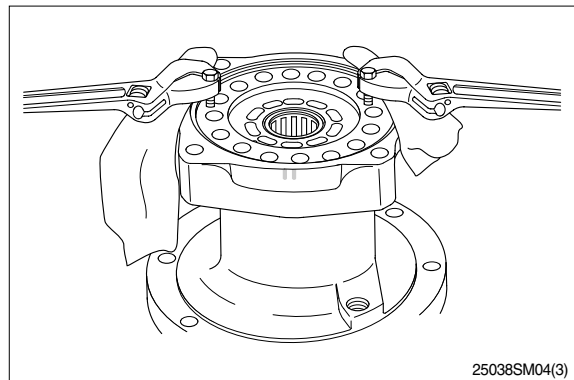
**(9) Removal of spring(30, brake area)**

Remove spring(30) from piston(28).  
Check and record original position of each  
spring(30) for correct assembling.

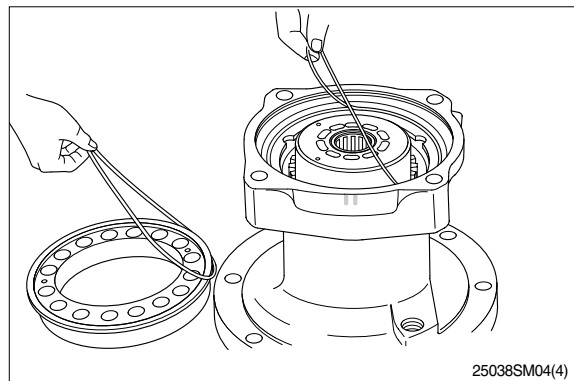


**(10) Removal of brake piston**

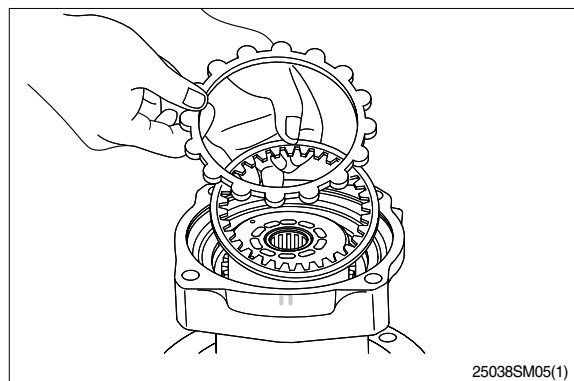
When removing piston(28) from housing  
(1), there is a sliding resistance against  
tightening of O-rings(14,29). Use tap hole  
on piston(28) as shown in the picture.



**(11) Remove O-rings(14,29) from piston(28)  
and housing(1).**



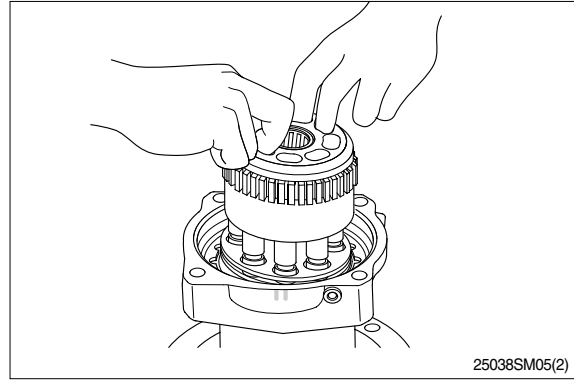
**(12) Remove friction plate(26) and lining plate  
(27) from housing(1).**



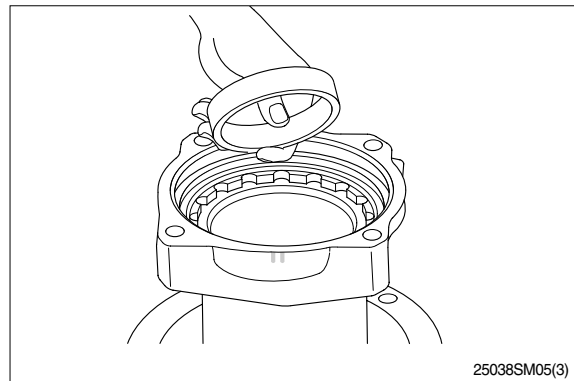
**(13) Removal of cylinder assembly**

Holding end of cylinder assembly(3) with hand, draw out cylinder assembly from housing.

- ※ Oil seal(2) and outer race of taper roller bearing(15) are left inside of housing.
- ※ End surface of cylinder(3) is sliding face . So, protect the surface with a scrap of cloth against damage.
- ※ Make a matching mark on piston hole of cylinder(3) and piston assembly(10) to fit piston into the same hole when reassembling.



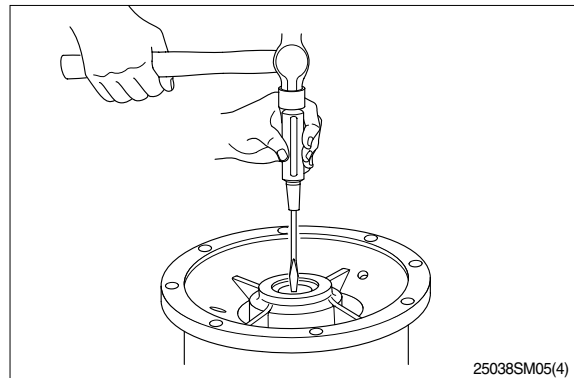
**(14) Separate outer race of taper roller bearing(5) from housing.**



**(15) Removal of oil seal**

Remove oil seal(2) from housing(1) with driver and hammer.

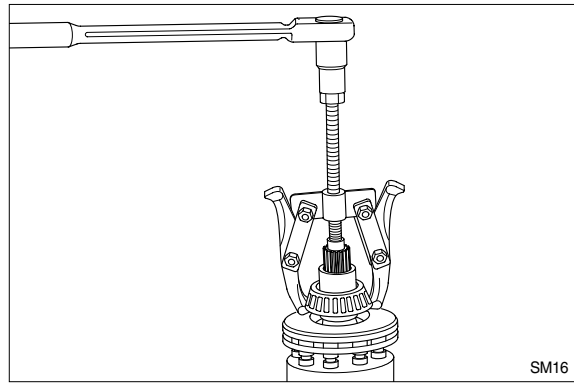
- ※ Do not reuse oil seal after removal.



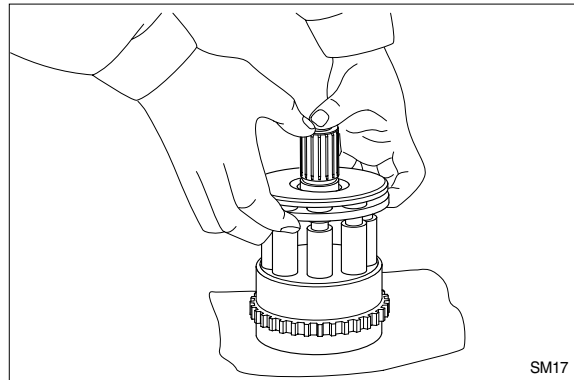
## (16) Disassembly of cylinder assembly

- ① Removal of inner race of taper roller bearing(5).

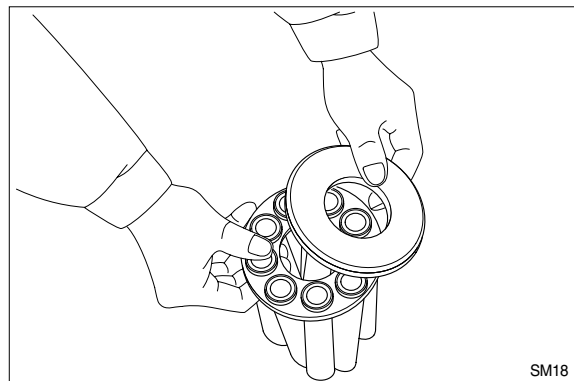
Lift out cylinder block(3) with 2 inner race of roller bearing(5) by applying gear puller at the end of spline in the cylinder.



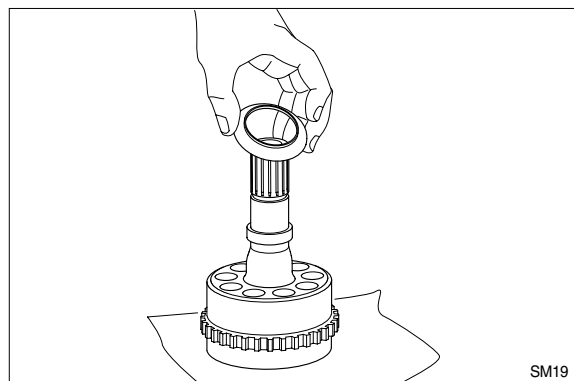
- ② Separate shoe plate(7), piston assembly (10), set plate(9) from cylinder block(3).



- ③ Get shoe plate(7) slide on sliding face of piston assembly(10) and remove it.  
※ Be cautious not to damage on sliding face of cam plate.



- ④ Remove ball guide(11) from cylinder block(3).



This completes disassembly.

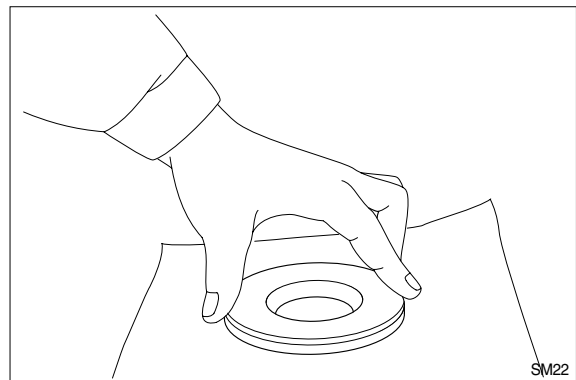
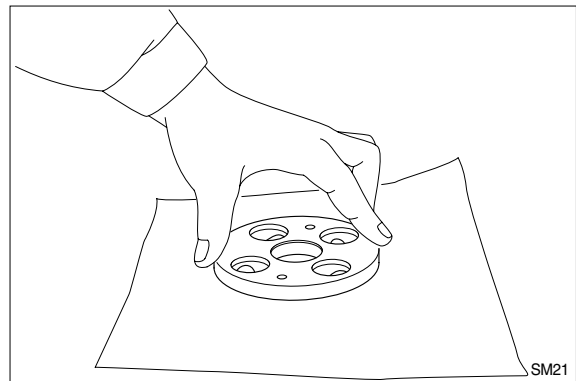
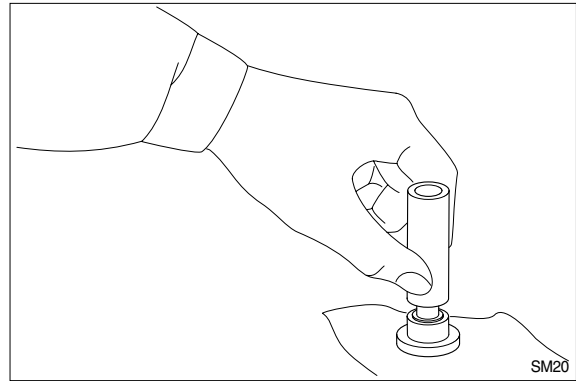


### 3) ASSEMBLY

#### (1) Preparation

Before reassembling, perform below procedure.

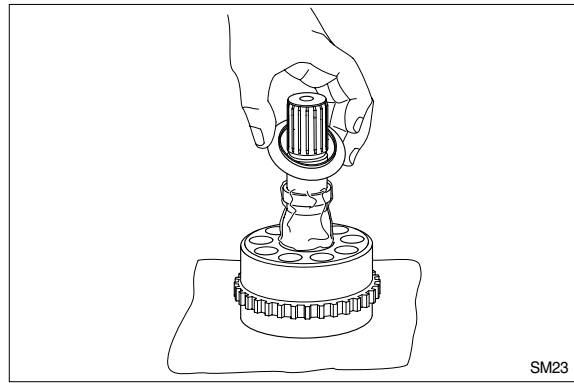
- ① Check each part for damage caused by using or disassembling. If damaged, eliminate damage by grinding with proper sandpaper, wash them with cleaning oil and dry with compressed air.
- ② Replace seal with new one.
- ③ Grind sliding face of piston assembly(10), balance plate(16) and shoe plate(7) with sandpaper #2000.



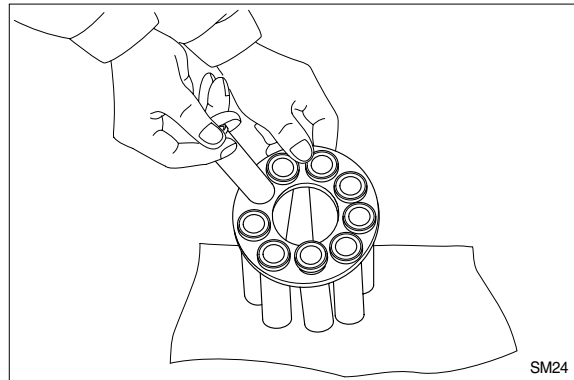
- ④ When assembling, lubricate with specified clean hydraulic oil.
- ⑤ When assembling piston assembly(10) to piston hole of cylinder block(3), check matching mark between them.

## (2) Cylinder assembly

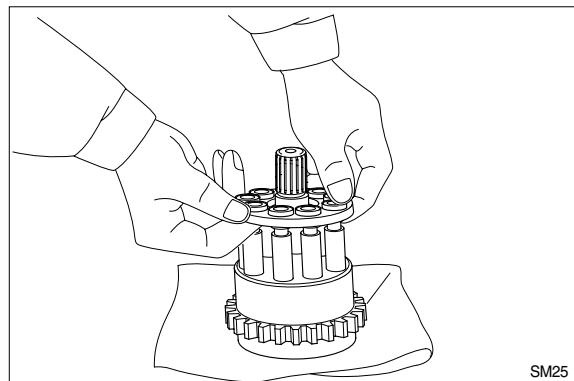
- ① Lubricate grease on round area (Contacting area with ball guide(11)) of cylinder block(3) and assemble spring(4).



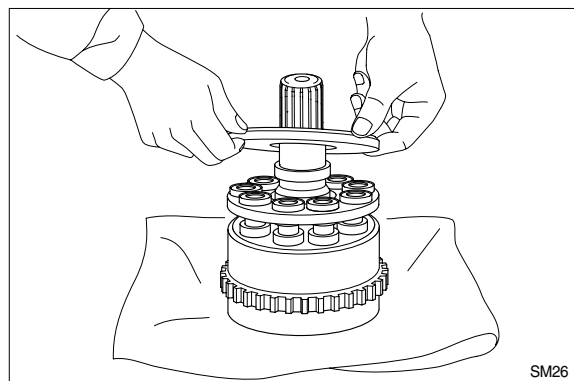
- ② Insert piston assembly(10) in hole of set plate(9).



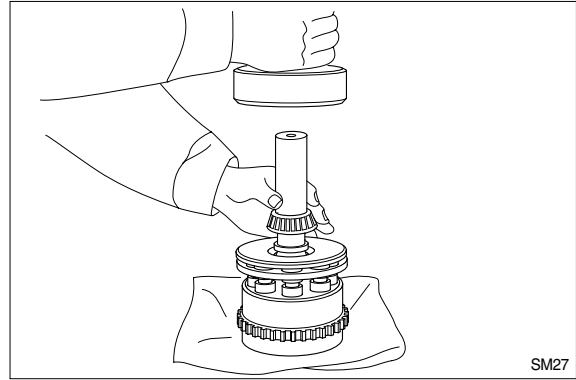
- ③ Assemble piston assembly(10) and set plate(9) to cylinder block(3). When assembling, check matching mark between them. Before assembling, lubricate specified hydraulic oil in piston hole of cylinder block(3).



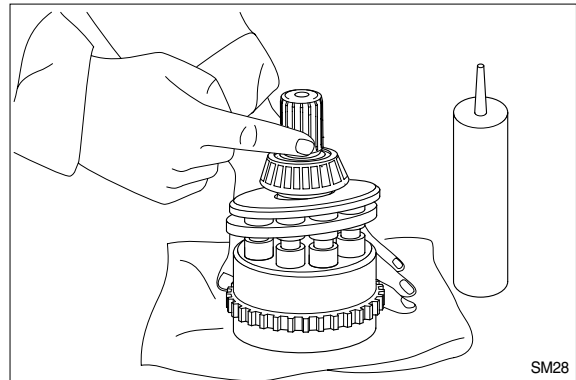
- ④ Lubricate specified hydraulic oil on shoe sliding face of piston assembly(10) and assemble shoe plate(7).



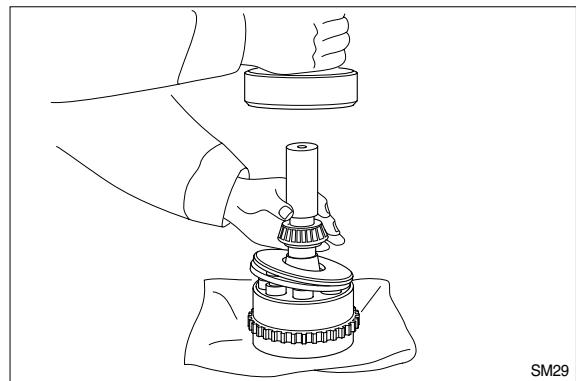
- ⑤ Assemble inner race of taper roller bearing(5) to cylinder block(3).



- ⑥ Apply loctite to bearing mounting area of inner race of cylinder block(3) lightly.



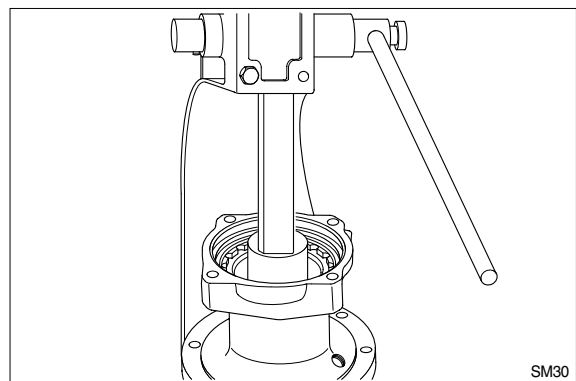
- ⑦ Assemble bushing(6) to cylinder block(3).



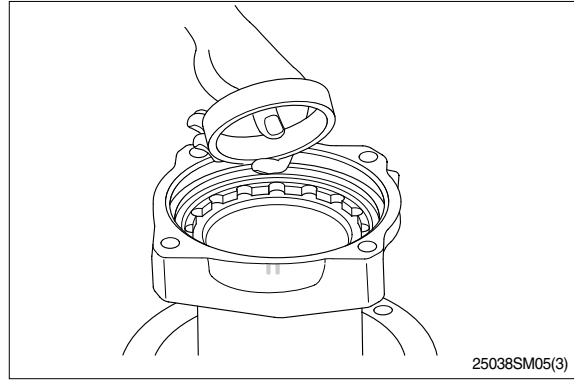
**(3) Oil seal**

Apply three bond of white color on outer surface of oil seal(2) and assemble and insert it.

- ※ Before assembling, lubricate lip of oil seal with grease.



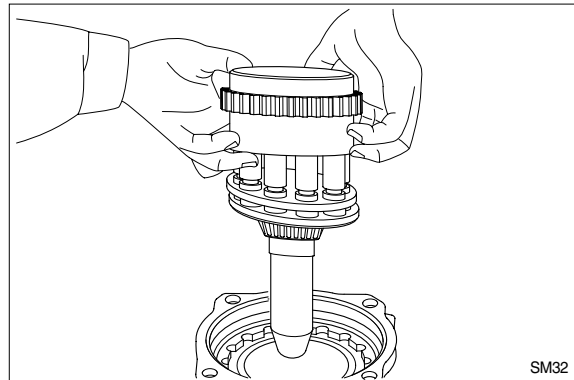
- (4) Assemble outer race of taper roller bearing(5) to motor housing(1).



**(5) Cylinder assembly**

Hold end of cylinder assembly(3) with hands and assemble cylinder assembly to housing(1). Be careful to prevent damage of seal by spline of shaft.

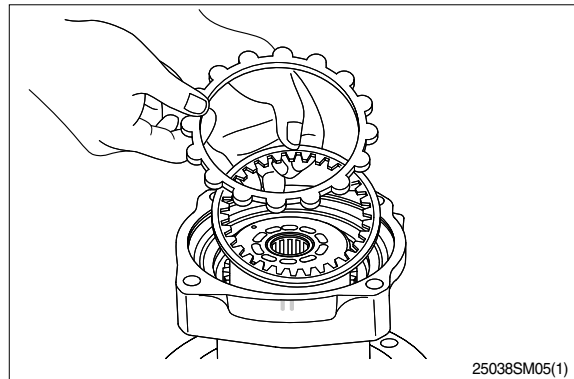
- ※ When assemble cylinder assembly, spline shaft of cylinder is protruded from end of housing, therefore put pads with length 30~50mm under bottom of housing.



- (6) Assemble friction plate(26) and lining

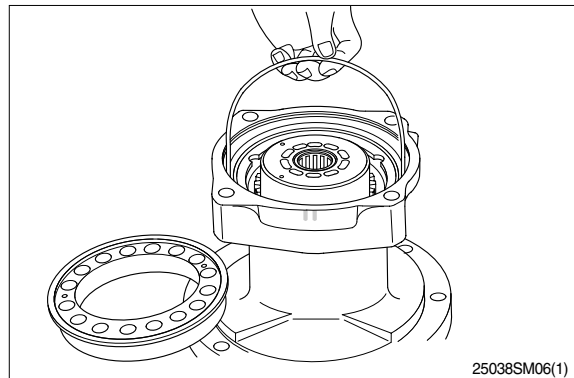
- ※ plate(27).

Lubricate specified hydraulic oil on each side.



- (7) Insert O-rings(14,29) into housing(1) and piston(28).

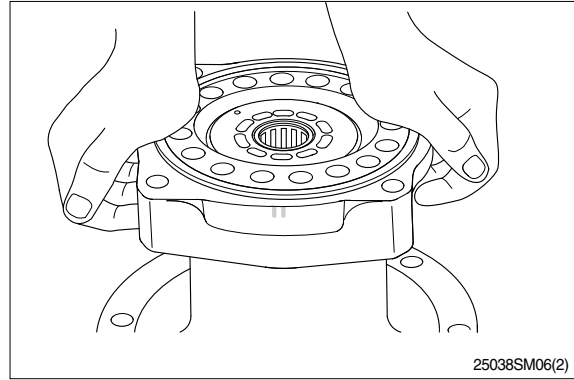
- ※ Lubricate O-ring with grease.



**(8) Brake piston**

Lubricate specified hydraulic oil on outer sliding face of piston(28) and assemble brake piston to housing(1).

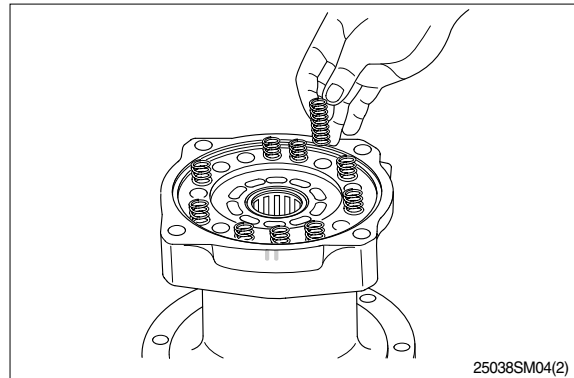
- ※ It is too tight to assemble piston(10) because O-rings(14,29) are fitted, therefore it is recommended to push piston(28) horizontally by hands at once.



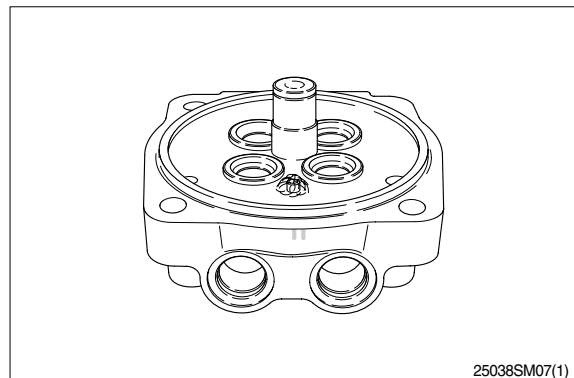
**(9) Spring(30, brake unit)**

Assemble spring(30) to piston(28) of brake unit.

- ※ Insert spring(30) into original position.



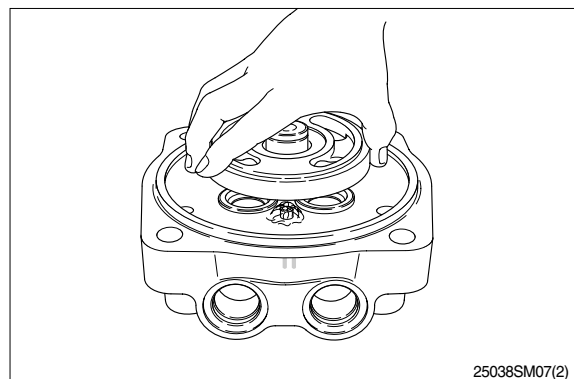
- (10) Lubricate locating pin for antirotation of valve plate(16) of cover(12) with grease sufficiently and install locating pin to housing.



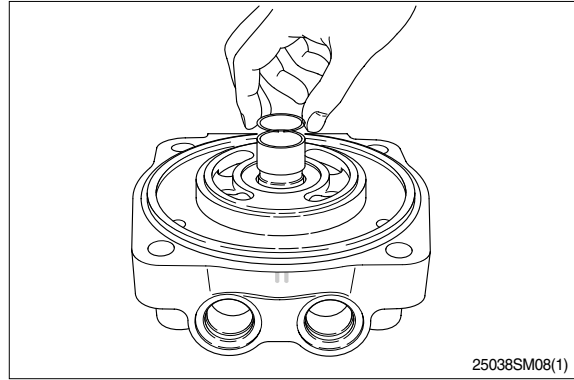
**(11) Balance plate**

Assemble valve plate(16) to cover(12).

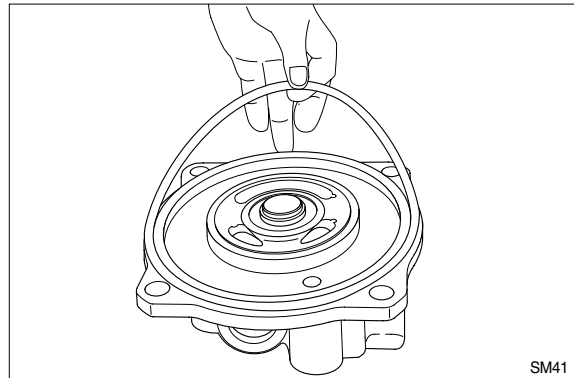
- ※ Be cautious of assembling direction.



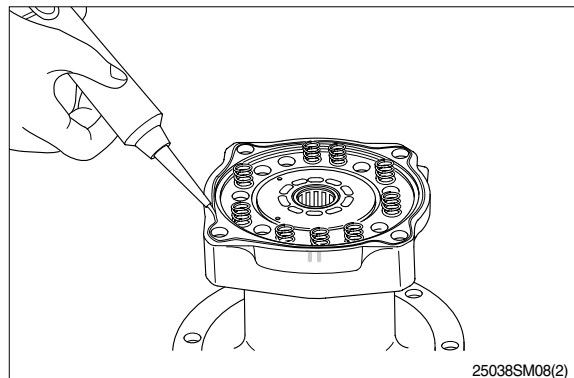
- (12) Assemble inner race of needle bearing (15) and shim(22) to cover(12).



- (13) Assemble O-ring(29) to cover(12).  
※ Lubricate O-ring with grease.



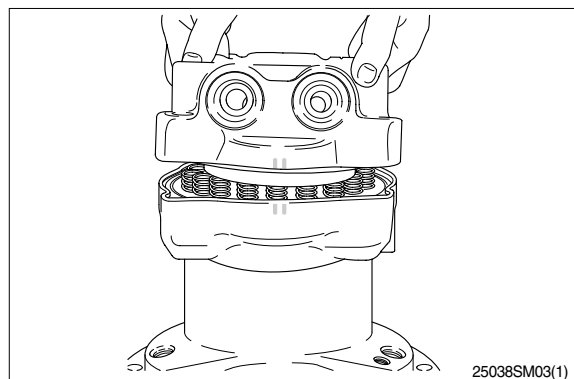
- (14) Apply three bond of white color to distinguish oil leakage from remaining oil in bolt hole of cover(12).



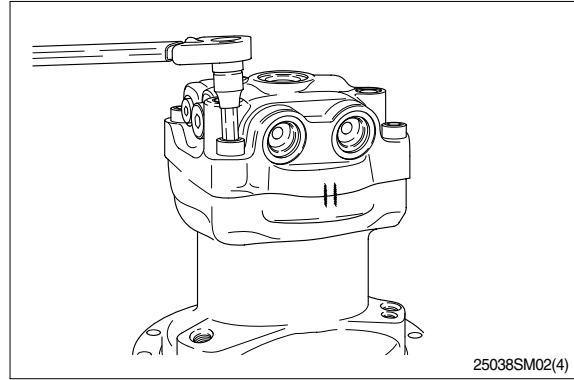
#### (15) Cover

Assemble cover(12) and valve plate(16) to housing(1) lightly, holding them up with hands.

- ※ When assembling, be careful not to detach valve plate(16) from cover(30).
- ※ Fit matching marks on housing(1) and cover(12) made before disassembling.

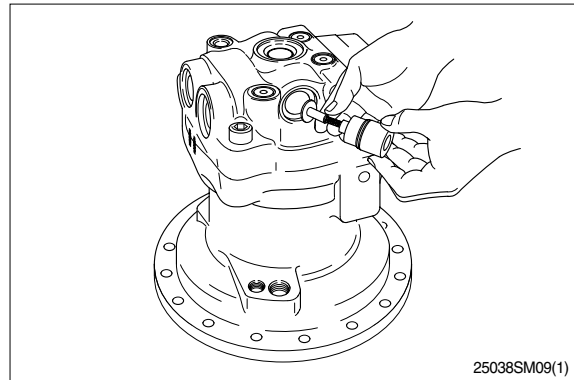


- (16) Tighten cover(12) and housing(1) with 12mm hexagonal socket bolt(18).  
· Tightening torque : 16kgf · m(116lbf · ft)



**(17) Make up valve**

- Assemble check(35) and spring(36) to cover(12) and tighten plug(37) with 14mm hexagonal socket bolt.  
· Tightening torque : 14kgf · m(101lbf · ft)

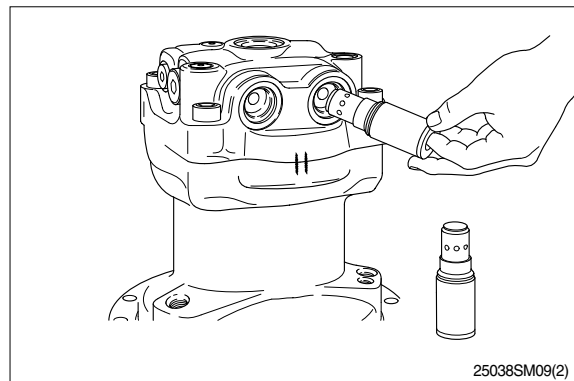


**(18) Relief assembly**

- Assemble relief valve assembly(17) to cover(12) with 14mm hexagonal socket bolt.

- Tightening torque : 8kgf · m(58lbf · ft)

※ Be cautious of assembling method.



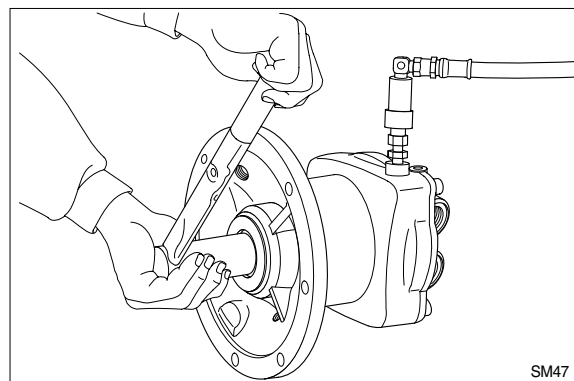
**(19) Check of assembly**

- Load pilot pressure of 20kgf/cm<sup>2</sup> to brake release port after opening inlet and outlet port.

Check if output shaft is rotated smoothly around torque of 0.5~1kgf · m.

If not rotated, disassemble and check.

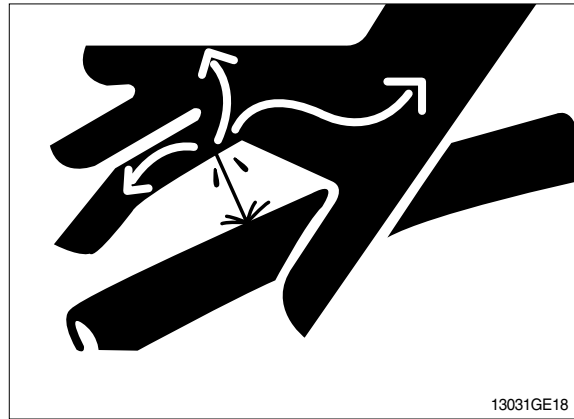
This completes assembly.



### 3. REMOVAL AND INSTALL OF REDUCTION GEAR

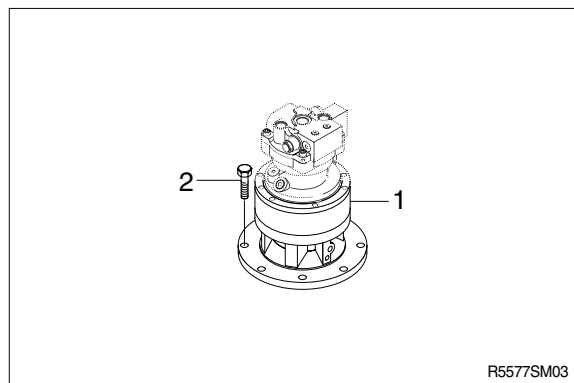
#### 1) REMOVAL

- (1) Remove the swing motor assembly.  
For details, see **removal of swing motor assembly**.
- (2) Sling reduction gear assembly(1) and remove mounting bolts(2).
- (3) Remove the reduction gear assembly.
  - Reduction gear device weight : 45kg  
(99lb)



#### 2) INSTALL

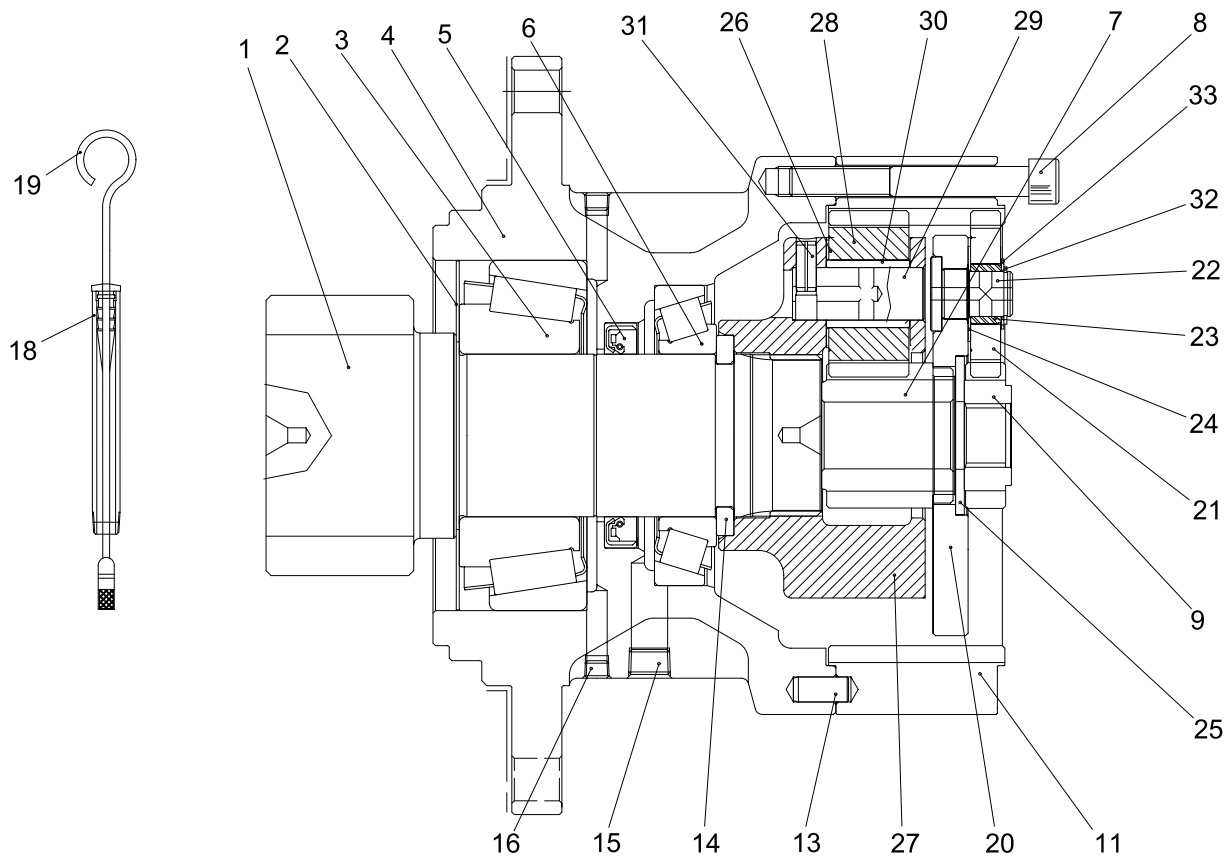
- (1) Carry out installation in the reverse order to removal.
  - Tightening torque :  $29.7 \pm 3.2$   
( $215 \pm 23.1$  lbf · ft)





## 4. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

### 1) STRUCTURE

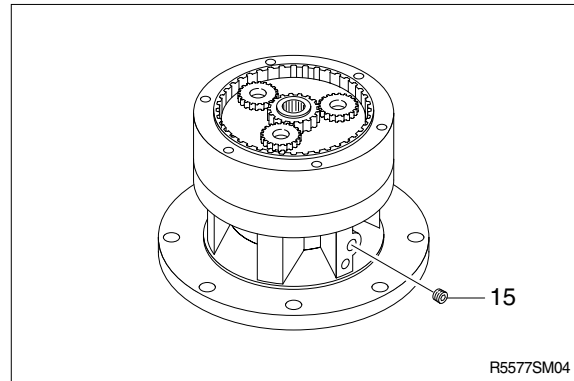


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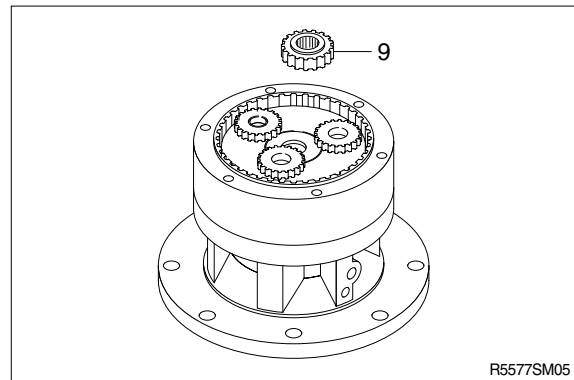
1	Drive shaft	13	Dowel pin	24	Thrust washer No.1
2	Bearing cover	14	Collar	25	Thrust washer No.3
3	Taper roller bearing	15	Plug	26	Thrust washer No.2
4	Case	16	Plug	27	Carrier No.2
5	Oil seal	18	Pipe	28	Planet gear No.2
6	Taper roller bearing	19	Level gauge	29	Pin No.2
7	Sun gear No.2	20	Carrier No.1	30	Bush No.2
8	Socket bolt	21	Planet gear No.1	31	Spring pin
9	Sun gear No.1	22	Pin No.1	32	Snap ring
11	Ring gear	23	Bush No.1	33	Thrust washer No.4

## 2) DISASSEMBLY

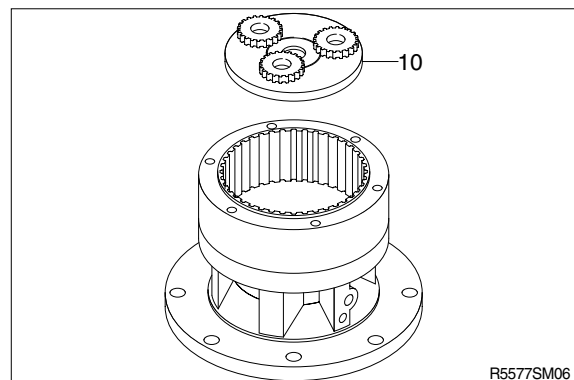
- (1) Remove the plug(15) and drain out gear oil.



- (2) Remove the No.1 sun gear(9).

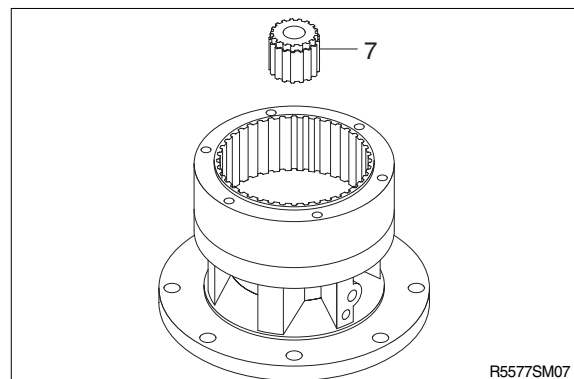


- (3) Remove the No.1 carrier sub-assembly (10) using the jig.

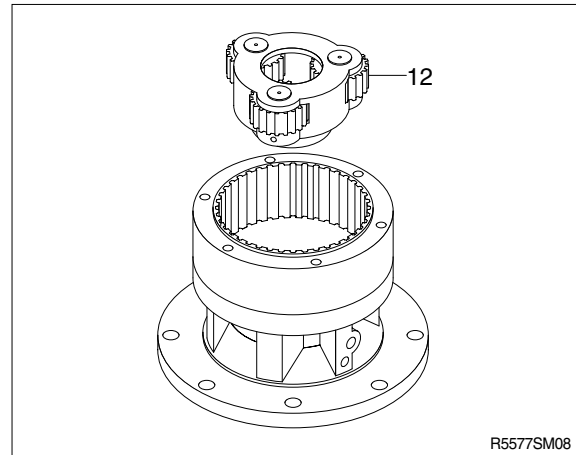


- (4) Remove the No.2 sun gear(7).

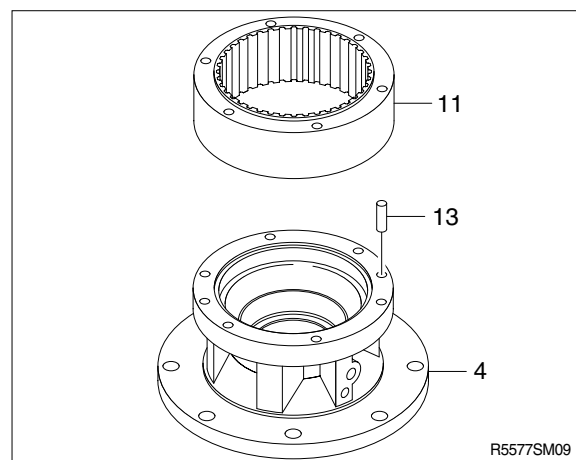
※ Pay attention to ensure the gear is not damaged during disassembling.



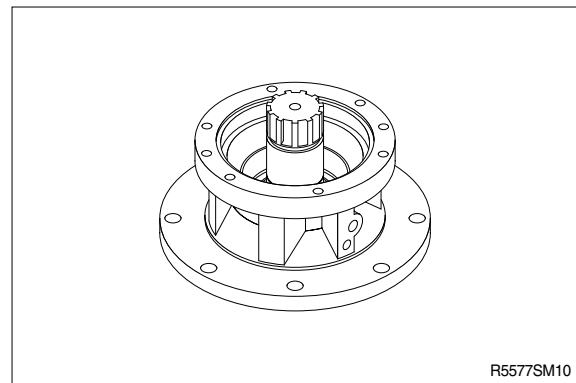
- (5) Remove the No.2 carrier sub assembly (12).



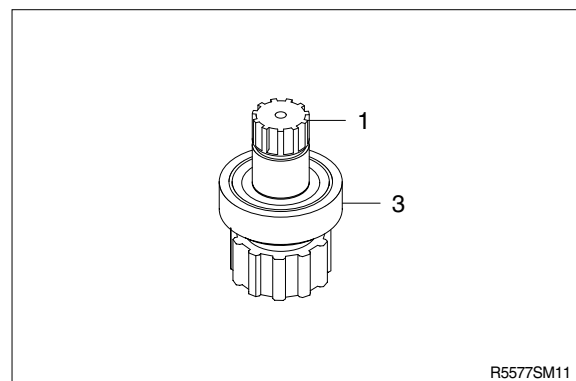
- (6) Remove the ring gear by the removal groove between the ring gear(11) and casing(4) by using jig.  
Full out the knock pin(13).  
Do not need to remove the knock pin(13) if it is not worn or damaged.



- (7) Put it on the working table with the drive shaft up.

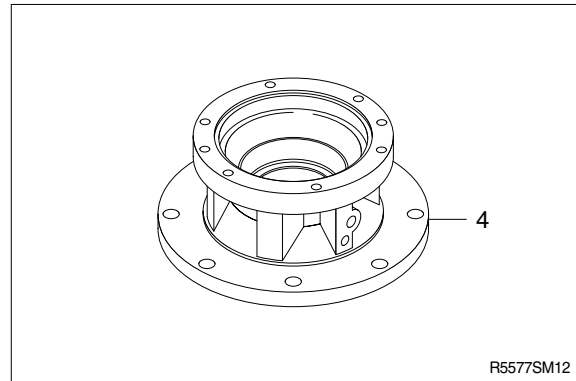


- (8) Disassemble the drive shaft(1) with bearing(3) by using jig.

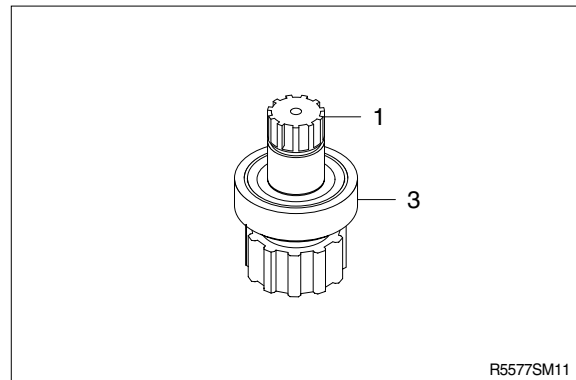


### 3) ASSEMBLING SWING REDUCTION GEAR

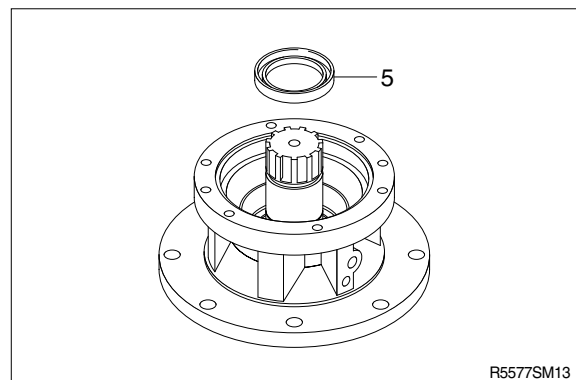
- (1) Place the case(4) on the reversing machine having the flange side of the case up.



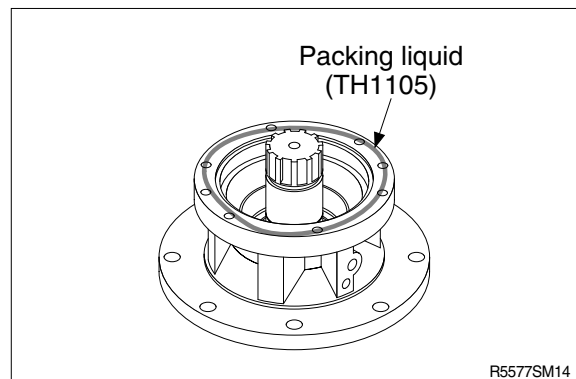
- (2) Install shaft assembly(1) into case(4).  
※ Be sure to clean the case before install, using washing machine with the temperature of 80°C.  
※ Do not install shaft assembly by force.



- (3) Reverse case and press to insert oil seal(5) by using pressing jig after spreading grease oil around the outside ring of the seal and bearing.  
Coat grease oil slightly on the lip surface to prevent any scratch when installing.  
※ Be sure to check by eye that the oil seal is seated completely after being installed.



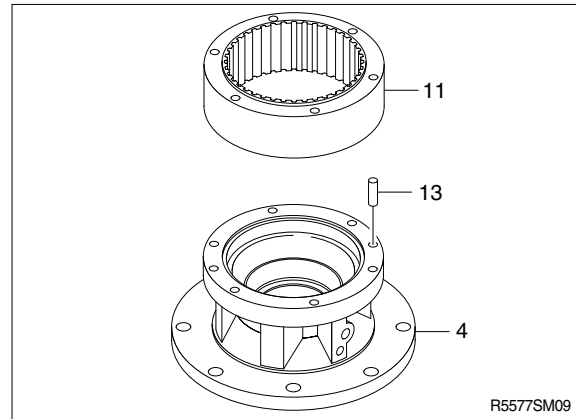
- (4) Clean the assembling surface of case and spread packing liquid(TH1105) as shown in figure.



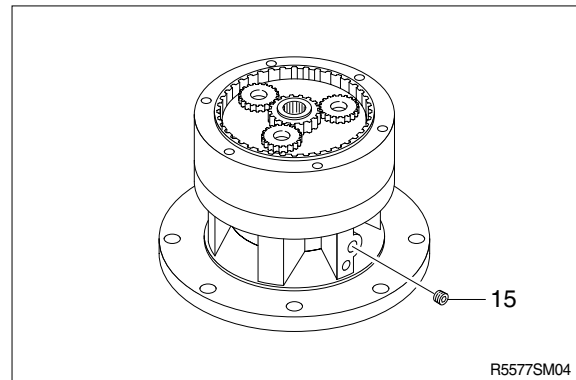
(5) Place ring gear on the case by matching it with knock pin hole.

(6) Insert 2 knock pins by using jig.

※ Be sure to check the hole location of oil gage before inserting.

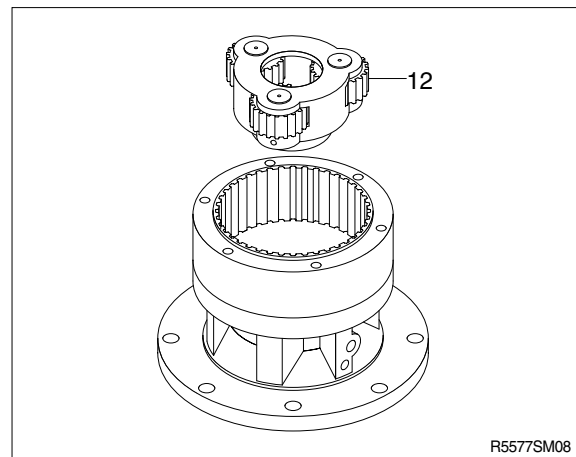


(7) Screw drain plug into drain plug(15) after winding sealing tape.



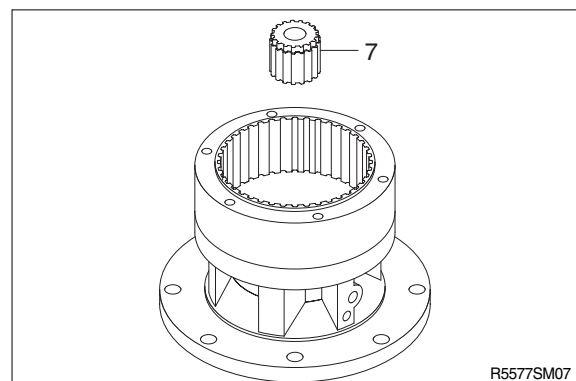
(8) Mount No.2 carrier assembly(12) in the case sub assembly and install bolts into 2 TAP holes(M6) as shown in figure.

※ Turn the carrier slowly by hand to adjust the matching holes when assembling.



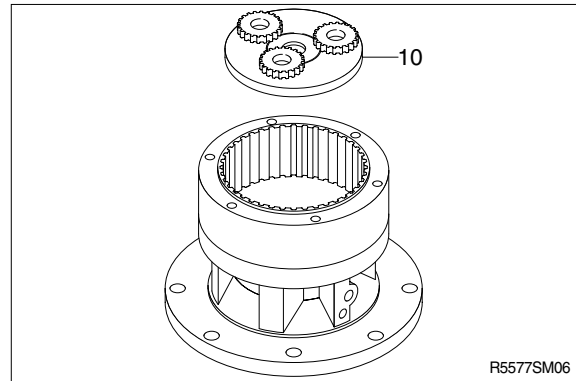
(9) Install No.2 sun gear(7).

※ Be sure to check the direction of sun gear(7) when assembling.

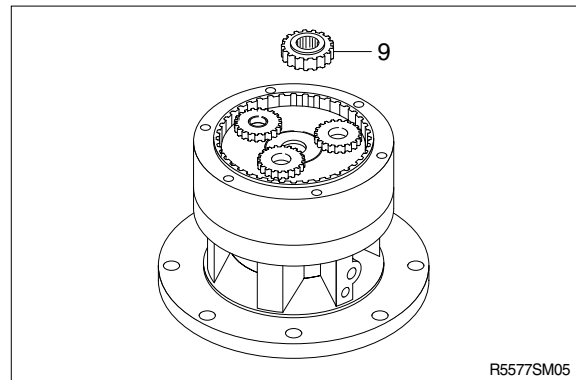


(10) Mount No.1 carrier assembly(10) in the case sub assembly and install bolts into 2 TAP holes(M6) as shown in figure.

※ Turn the carrier slowly by hand to adjust the matching holes when assembling.



(11) Assemble No.1 sun gear(9).



## GROUP 6 TRAVEL DEVICE

### 1. REMOVAL AND INSTALL

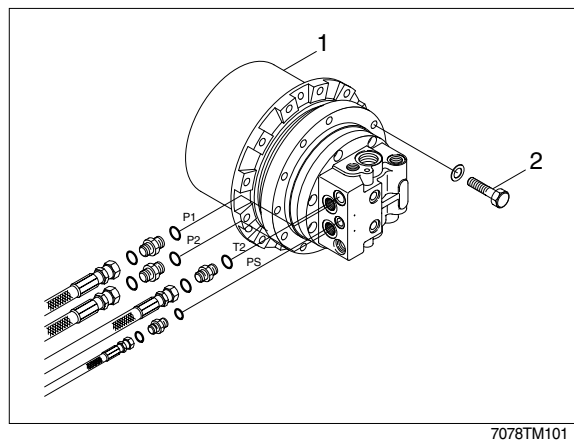
#### 1) REMOVAL

- (1) Swing the work equipment 90° and lower it completely to the ground.
- (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 the track shoe assembly.  
For details, see **removal of track shoe assembly**.
- (5) Remove the cover.
- (6) Remove the hose.  
※ Fit blind plugs to the disconnected hoses.
- (7) Remove the bolts and the sprocket.
- (8) Sling travel device assembly(1).
- (9) Remove the mounting bolts(2), then remove the travel device assembly.  
· Weight : 80kg(180lb)

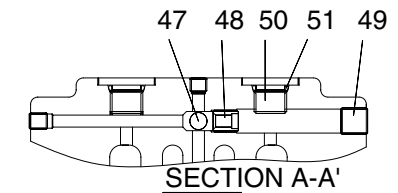
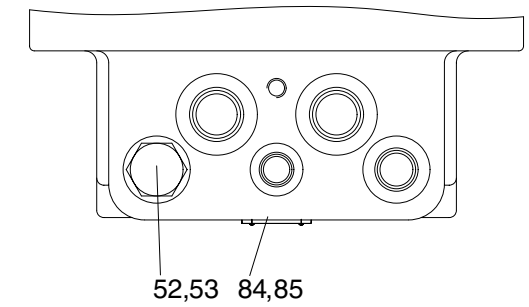
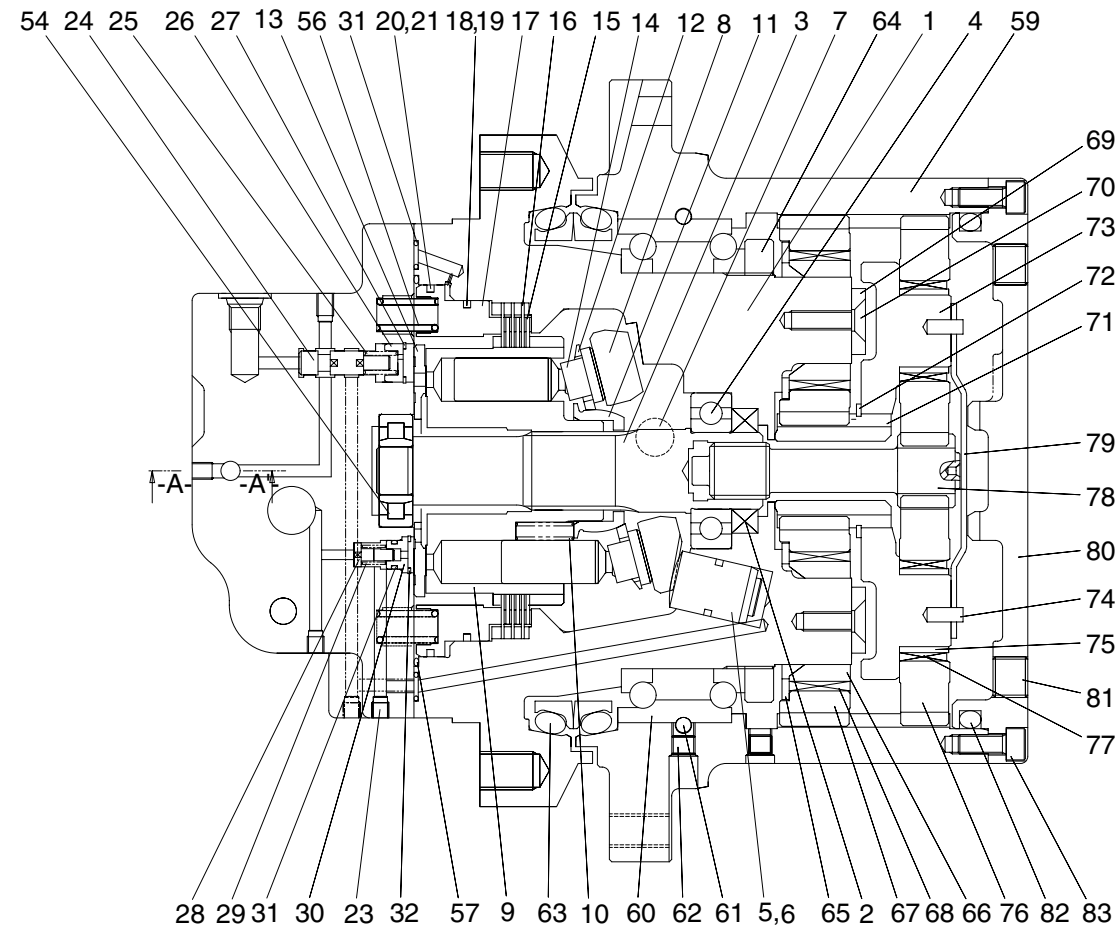
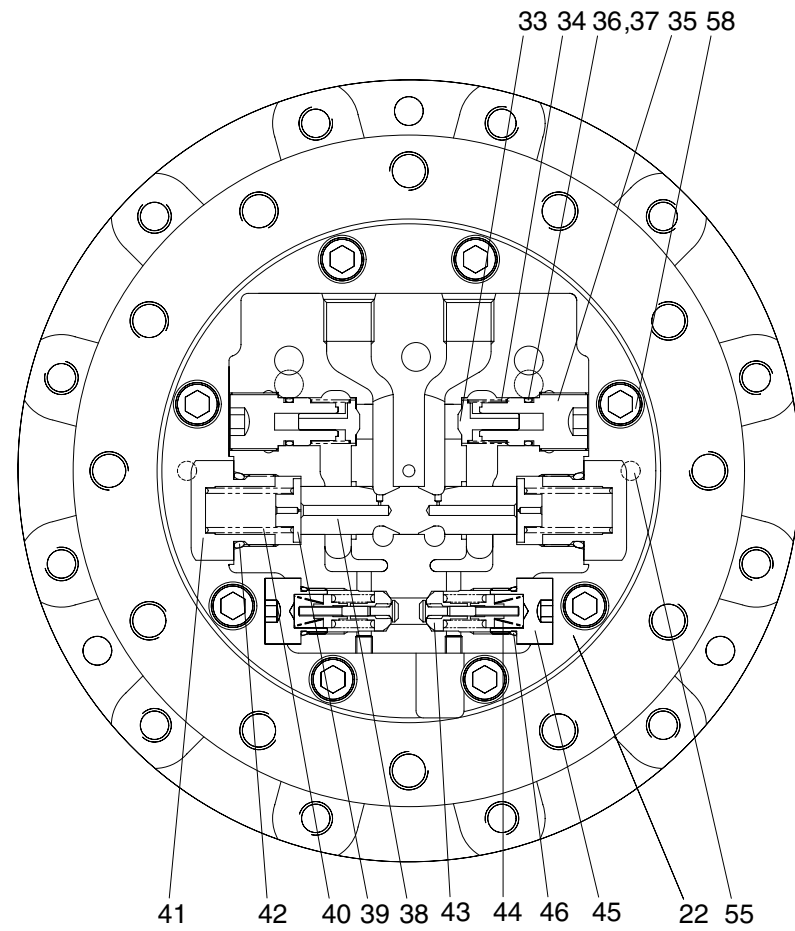


#### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from the travel motor.
  - ① Remove the air vent plug.
  - ② Pour in hydraulic oil until it overflows from the port.
  - ③ Tighten plug lightly.
  - ④ Start the engine, run at low idling, and check oil come out from plug.
  - ⑤ Tighten plug fully.
- (3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

## 2. TRAVEL MOTOR

### 2) STRUCTURE



1 Shaft casing	16 Parking plate	31 O-ring	45 Plug	59 Ring gear	73 Carrier
2 Oil seal	17 Parking piston	32 Snap ring	46 O-ring	60 Angular bearing	74 Spring pin
3 Shaft	18 O-ring	33 Check	47 Steel ball	61 Steel ball	75 Collar
4 Bearing	19 Back up ring	34 Spring	48 Check seat	62 Plug	76 Planetary gear(B)
5 Swash piston	20 O-ring	35 Plug	49 Plug	63 Floating seal	77 Needle bearing
6 Piston ring	21 Back up ring	36 O-ring	50 Plug	64 Nut	78 Drive gear
7 Swash steel ball	22 Rear cover	37 Back up ring	51 O-ring	65 Washer	79 Thrust plate
8 Swash plate	23 Plug	38 Main spool	52 Roller bearing	66 Collar	80 Ring gear cover
9 Cylinder block	24 Spool	39 Spring seat	53 O-ring	67 Planetary gear(A)	81 Plug
10 Spring	25 Spring	40 Spring	54 Hex plug	68 Needle bearing	82 O-ring
11 Ball guide	26 Stopper	41 Plug	55 Parallel pin	69 Plate	83 Wrench bolt
12 Set plate	27 Snap ring	42 O-ring	56 Spring	70 Bolt	84 Name plate
13 Valve plate	28 Check	43 Relief valve assembly	57 O-ring	71 Sun gear	85 Rivet
14 Piston assembly	29 Spring	44 Spring	58 Wrench bolt	72 Snap ring	86 Seal kit
15 Friction plate	30 Seat				

7072TM02



## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

Name of tools	Size	Name of applied parts
Hexagonal L-wrench	4	Plug(23)
	6	Plug(49), wrench bolt(70, 83)
	8	Plug(81)
	-	Relief valve assembly(46)
	-	Plug(38, 52, 50)
Socket wrench / spanner	27	Plug(41)
Snap-ring plier(for holes, axis)		Snap ring(27, 32, 72)
Solder hammer		Bearing(4), Pin(55, 74), Oil seal(2)
Torque wrench		Size : 500, 3000
Jig for assembling oil seal		Oil seal(2)
Induction heating apparatus for bearing		Bearing(4)

### (2) Tightening torque

No.	Name	Size	Torque	
			kgf · m	lbf · ft
23	Plug	NPT 1/16	0.7~1.1	5.1~7.9
49	Plug	PT 1/4	5	36.2
81	Plug	PT 3/8	8.5	61.5
58	Wrench bolt	M12×35L	10	72.3
70, 83	Wrench bolt	M8×20L	10	72.3

### 3. DISASSEMBLY

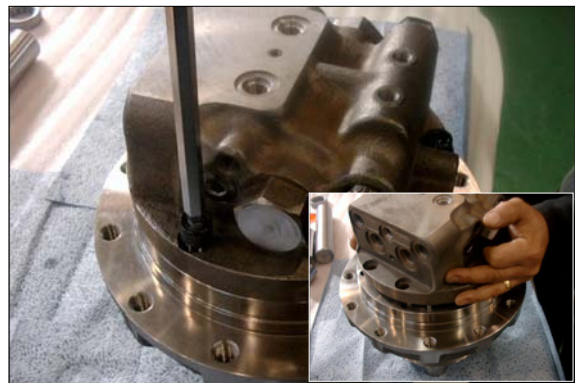
#### 1) GENERAL PRECAUTIONS

- (1) Select a clean place for disassembling.  
Spread a rubber plate on a working table in order to prohibit the damage of parts.
- (2) Clean a deceleration equipment and a motor part, washing out dirt and unnecessary substances.
- (3) Without any damage of O-ring, oil seal, the adhered surface of other seals, a gear, a pin, the adhered surface of other bearings, and the surface of moisturized copper, treat each parts.
- (4) Numbers written in the parenthesis, ( ), next to the name of a part represent the part numbers of a previous page.
- (5) The side of a pipe in a motor can be written as a rear side ; the side of out-put as a front side.
- (6) In case of bonding bolts, combine a standard torque by torque wrench after spraying loctite 262 on the tab parts. (It can be dealt as assembling NPTF screws and an acceleration equipment.)

#### 2) DISASSEMBLING

##### (1) Motor unit

- ① Put the motor assembly on the assemble table.  
Using L-Wrench, disassemble wrench bolt(58)-8EA and so respectively disassemble shaft casing assembly and rear cover assembly.



7078TM01/01A

- ② Disassemble spring(56)-8EA From shaft casing(1).



7078TM02

- ③ Using jig, disassemble parking piston(17) from shaft casing(1).



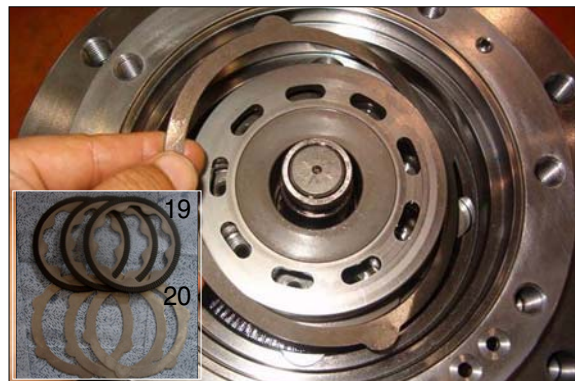
7078TM03

- ④ Disassemble O-ring(18, 20) and back up ring(19, 21) from parking piston(17)



7078TM04/04A

- ⑤ Respectively in order friction plate (15), parking plate(16) disassemble from shaft casing(1).



7078TM05/05A

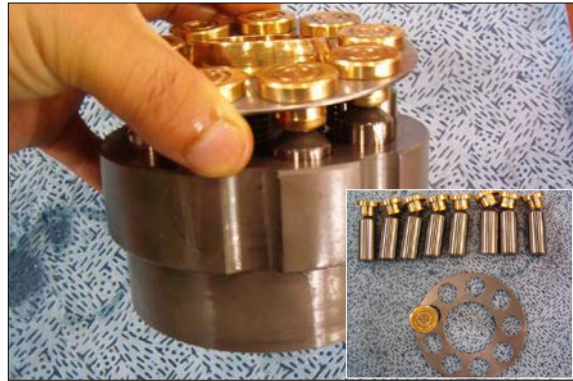
- ⑥ Disassemble cylinder block assembly(9) from shaft casing(1).



7078TM06

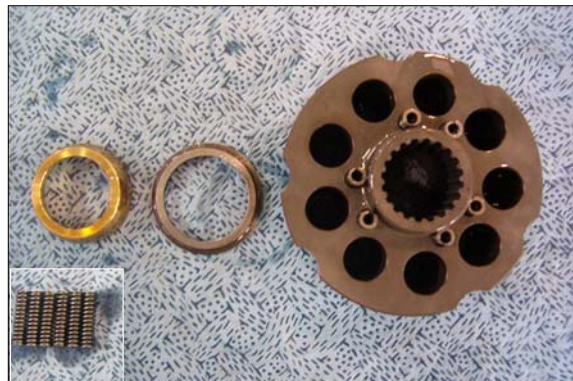
## (2) Cylinder block

- ① Disassemble set plate(12), piston assembly(14) from cylinder block assembly.



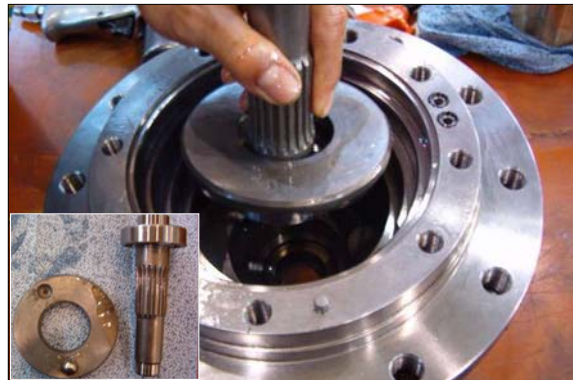
7078TM07/07A

- ② Disassembling in order cylinder block(9), ball guide(11) and spring(10).



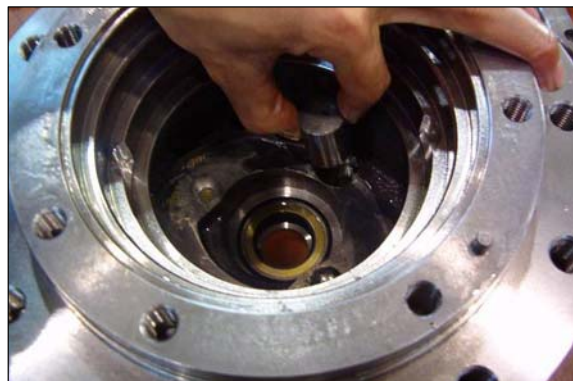
7078TM08/08A

- ③ Disassembling swash plate(8) and shaft(3) from shaft casing(1).



7078TM09/09A

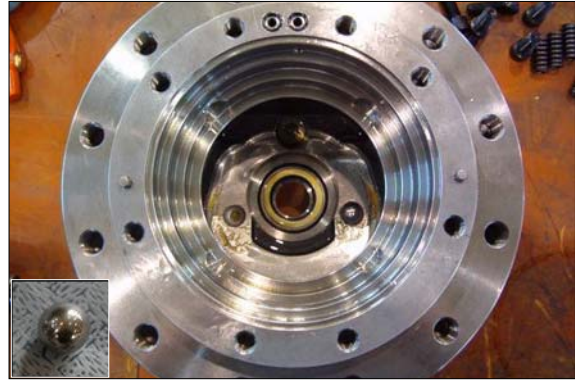
- ④ Disassembling swash piston(5) from shaft casing(1).



7078TM10



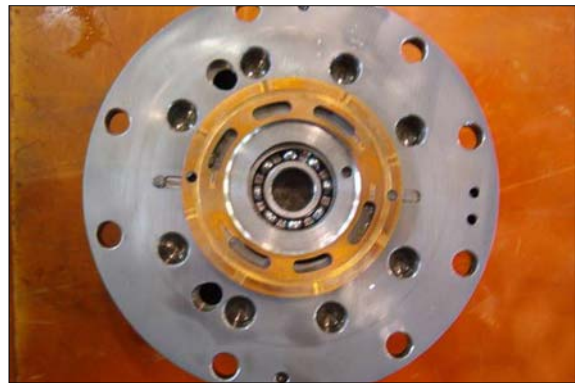
- ⑤ Disassembling steel ball(7) from shaft casing(1).



7078TM11/11A

### (3) Rear cover

- ① Disassembling valve plate(13) from rear cover(22).



7078TM12

- ② Using plier jig, disassembling in order snap ring(27), stopper(26), spring(25), spool(24) from rear cover(22) and then disassembling snap ring(32), seat(30), spring(29), check(28) same procedure.



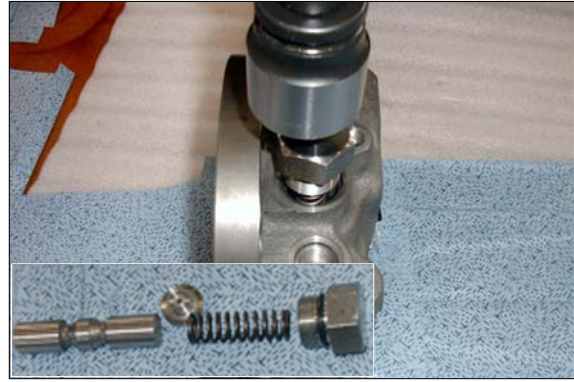
7078TM13

- ③ Using L-wrench, disassembling plug(45) from rear cover(22) and then relief valve assembly(43) (left, right is symmetry).



7078TM14/14A

- ④ Using torque wrench, disassembling plug (41) in order O-ring(42), spring(40), spring seat(39), main spool(38) from rear cover(22).



7078TM15/15A

- ⑤ Using L-wrench, disassembling plug(35) in order O-ring(36), back up ring(37), spring(34) and check(32) from rear cover(22).



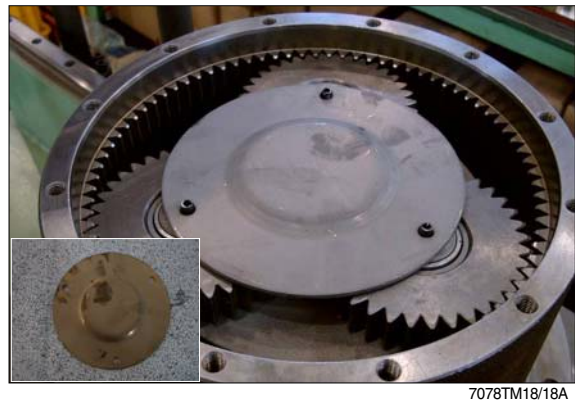
7078TM16/16A

#### (4) Reduction gear

- ① Using L-wrench, disassembling wrench bolt(83) and then ring gear cover(80), O-ring(82) from ring gear(59).



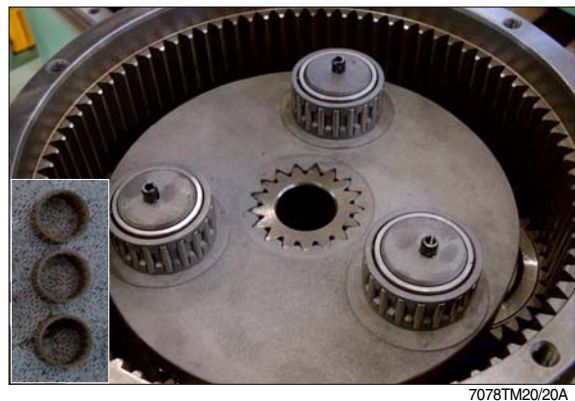
- ② Disassembling thrust plate(79) from ring gear(59).



- ③ Disassembling in order planetary gear(76), drive gear(78) from ring gear(59).

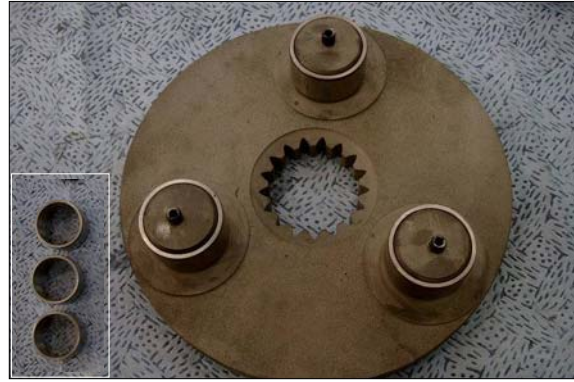


- ④ Disassembling needle bearing(77) from ring gear(59).



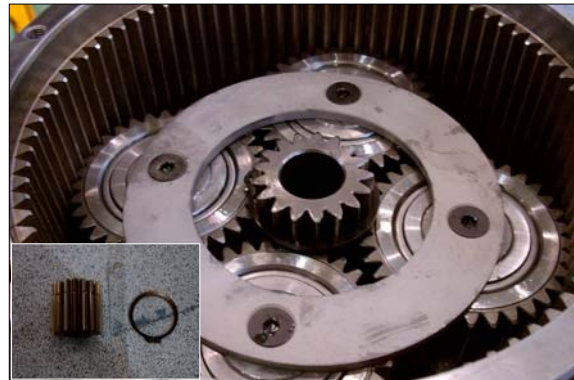


- ⑤ Disassembling in order collar(75), carrier(73) from ring gear(59).



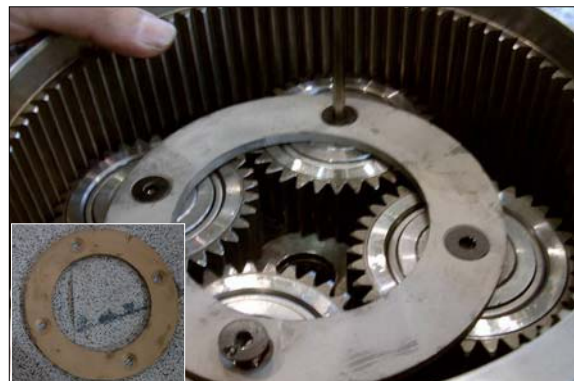
7078TM21/21A

- ⑥ Disassembling sun gear(71) from ring gear(59) and then disassembling snap ring(72) with plier jig.



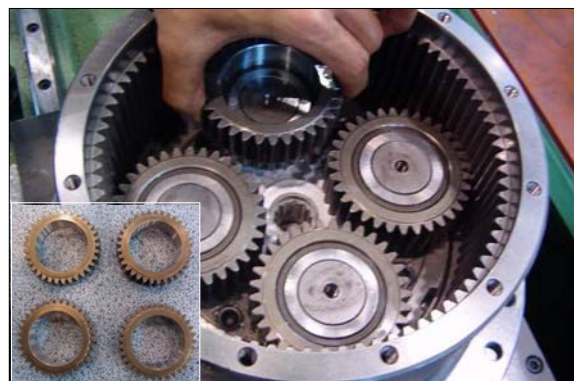
7078TM22/22A

- ⑦ Using L-wrench, disassembling plate head bolt(70)-4EA from ring gear(59) and then disassembling plate(69).



7078TM23/23A

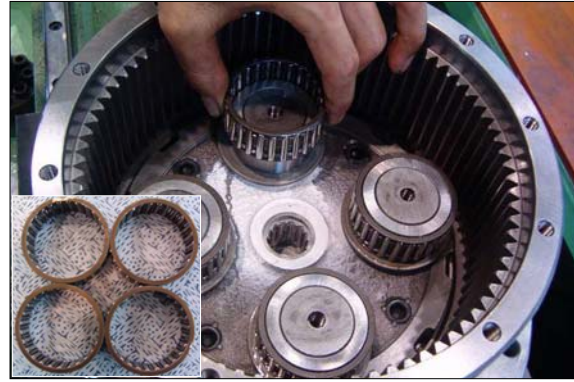
- ⑧ Disassembling planetary gear(67)-4EA from ring gear(59).



7078TM24/24A

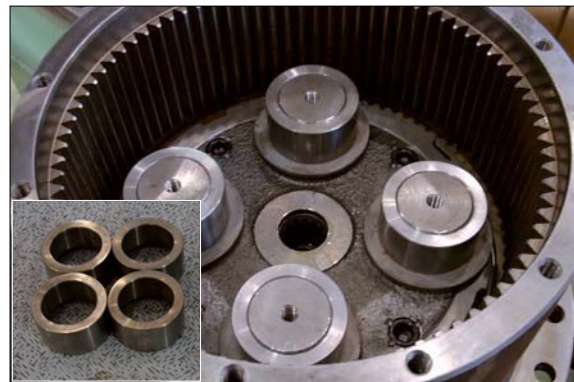


- ⑨ Disassembling needle bearing(68)-4EA from ring gear(59).



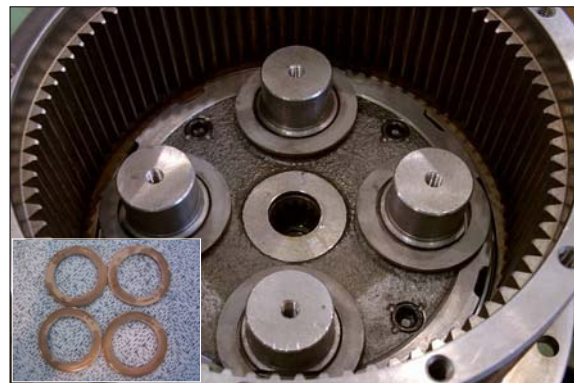
7078TM25/25A

- ⑩ Disassembling collar(66)-4EA from ring gear(59).



7078TM26/26A

- ⑪ Disassembling washer(65)-4EA from ring gear(59).



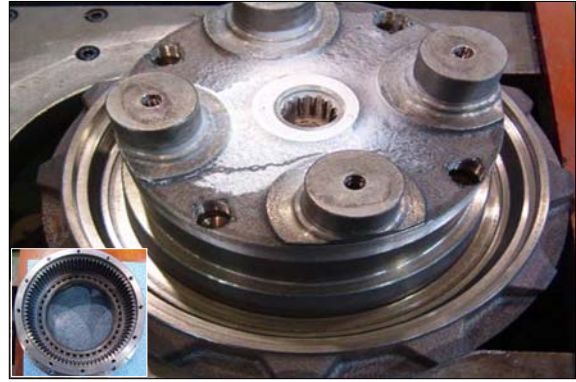
7078TM27/27A

- ⑫ Using jig, disassembling nut(64) when inner pressed state with L-wrench bolt from ring gear(59).



7078TM28/28A/B

- ⑬ Put the reduction gear on the assembling jig and then disassembling ring gear(59).



## 4. ASSEMBLY

### 1) GENERAL SUGGESTIONS

- (1) After washing each parts cleanly, dry it with compressed air.  
Provided that you do not wash friction plate with treated oil.
- (2) In bonding each part, fasten bond torque.
- (3) When using a hammer, do not forget to use a plastic hammer.

### 2) ASSEMBLING

#### (1) Sub of turning axis

- ① Using a jig, insert the steel ball(61) to the shaft casing(1) and then assemble plug(62).



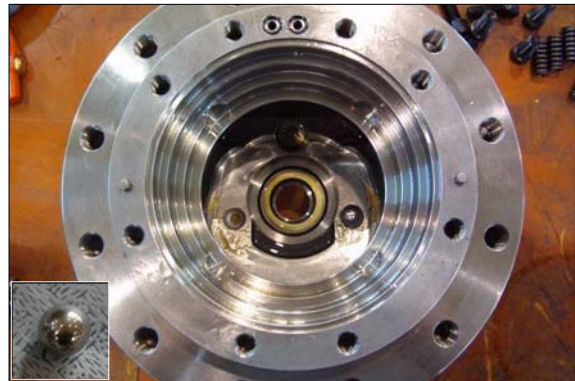
7078TM51

- ② Using a jig, assemble oil seal(2) to the shaft casing(1) and then inserting with solid hammer.



7078TM52

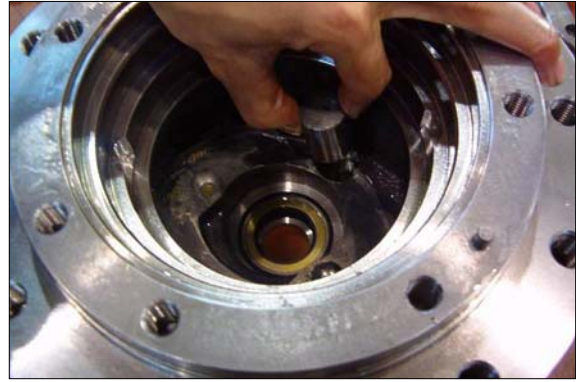
- ③ Assemble swash steel ball(7) to the shaft casing(1) with grease.



7078TM53/11A



- ④ Assemble swash piston(5) to the shaft casing(1).



7078TM54

- ⑤ Heat pressing bearing to the shaft(3).



7078TM55

- ⑥ Assemble bearing and heat pressed shaft(3) to the shaft casing(1).



7078TM56

## (2) Cylinder block sub assembly

- ① Assemble piston assembly(14) to the set plate(12, 9 set).



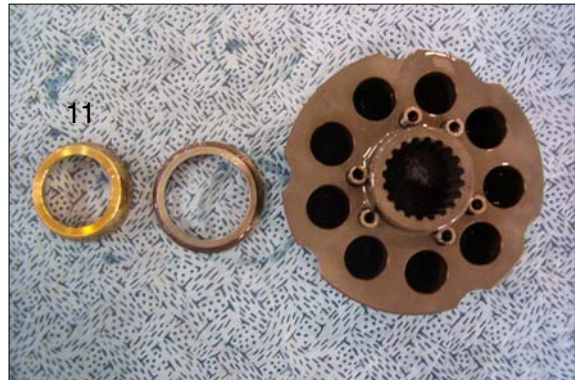
7078TM57

- ② Assemble spring(10) to the cylinder block(9, 6 set).



7078TM58

- ③ Assemble ball guide(11) to the cylinder block(9).



7078TM08/08A

- ④ Assemble sub-assembled piston(12,14) to the cylinder block(9).



7078TM60

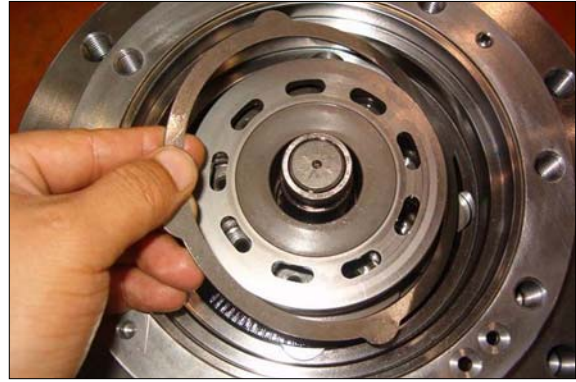
- ⑤ Assemble cylinder block(10) to the shaft casing(1).



7078TM06



- ⑥ Assembling friction plate(15), parking plate(16)(respectively 3EA assembling) to the shaft assing(1).



7078TM05

- ⑦ Assembling back up ring(19), O-ring(18, 20), back up ring(21) to the parking piston(17).



7078TM04/04A

- ⑧ Using a jig, insert the parking piston to the shaft casing(1) and assemble.



7078TM64/64A

- ⑨ Assemble spring(56) to the shaft casing(1) and then assemble O-ring(57).



7078TM02

### (3) Rear cover assembly

- ① Using a L-Wrench, assemble plug(23) 10EA to the rear cover(22).



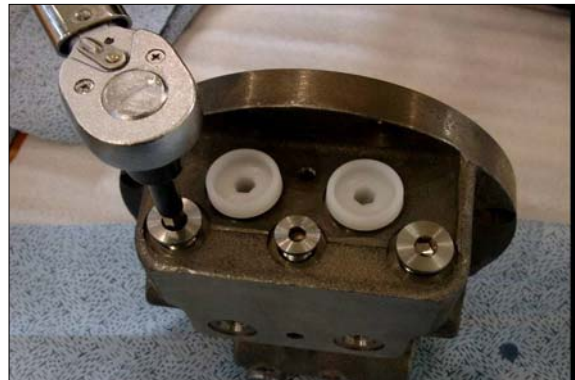
7078TM66

- ② Assemble in order steel ball(47), check-seat(48) and plug(49) to the rear cover (22).



7078TM67

- ③ Assemble plug(50, 52), O-ring(51, 53) to the rear cover(22).



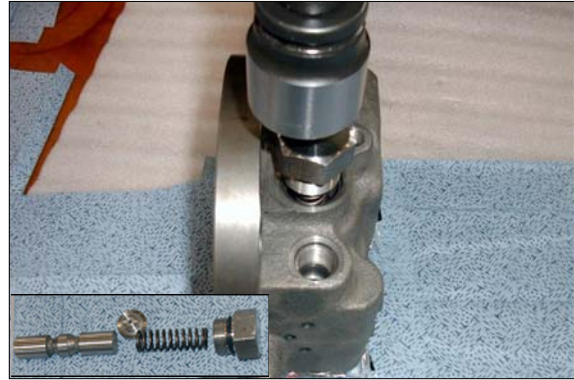
7078TM68

- ④ Assemble check(33), spring(34) to rear cover(22) and assemble back up ring(37), O-ring(36) to the plug(35) after then using L-Wrench.



7078TM16/16A

- ⑤ Insert main spool(38), spring-seat(39), spring(40) to the rear cover(22) and assemble plug(41) with L-wrench.



7078TM15/15A

- ⑥ Assemble relief valve assembly(43)(with left-ringt symmetry) to the rear cover(22) and then insert spring(44) and assemble plug(45) with torque-wrench.



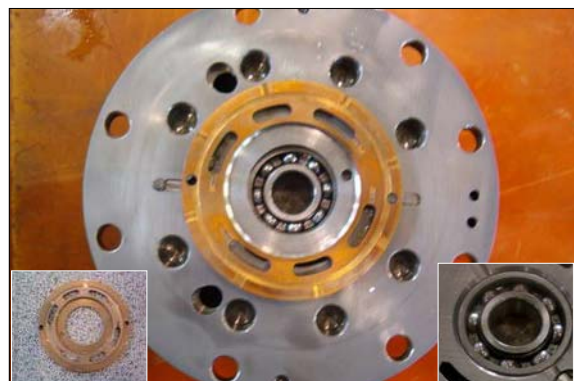
7078TM71/14A

- ⑦ Using a plier jig, assemble snap ring(27), stopper(26), spring(25), spool(24) to the rear cover.  
Same method assemble snap ring(32), seat(30), spring(29) and check(28).



7078TM13

- ⑧ Assemble roller bearing(54), pin(55) and valve plate(56) to the rear cover(22).



7078TM12/73/73A



- ⑨ Combine rear cover assembly and shaft casing assembly with bolt(58).



7078TM74

**(4) Travel reduction gear**

- ① Before assembling nut(64) to the motor.  
Eliminate burr and alien substances  
ready for assembling.



7078TM77/28A

- ② Insert ring gear(59) to the spray washing  
M/C and heat 69°C~70°C one minute.



7078TM78

- ③ Assembling angular bearing(60) to the  
ring gear(59).



7078TM79/79A

- ④ Insert steel ball(61) 105EA to the ring gear(59) with a jig after assembling plug(62) 2EA with L-Wrench.



7078TM80/80A

- ⑤ Assemble floating seal(63) to ring gear(59) and motor part with a jig.



7078TM81/81A/82

- ⑥ Upset the ring gear(59) and assemble with motor.



7078TM83

- ⑦ Combine nut(64) to the ring gear(59) and pressing use a jig and then assembling with torque-wrench.

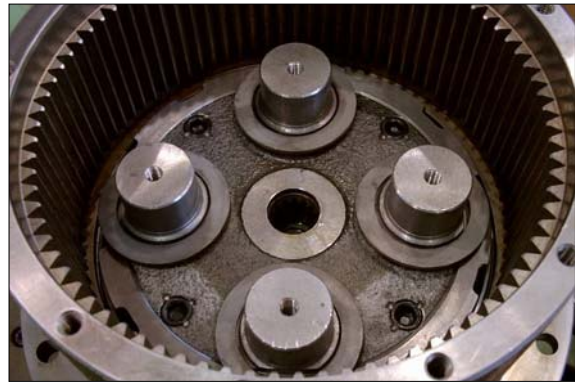


7078TM28/28B/28C

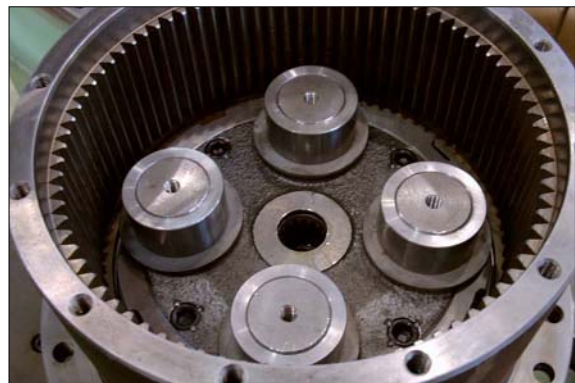
- ⑧ Using a L-wrench, assembling plug-4EA to the ring gear(59) and then cocking by a jig.



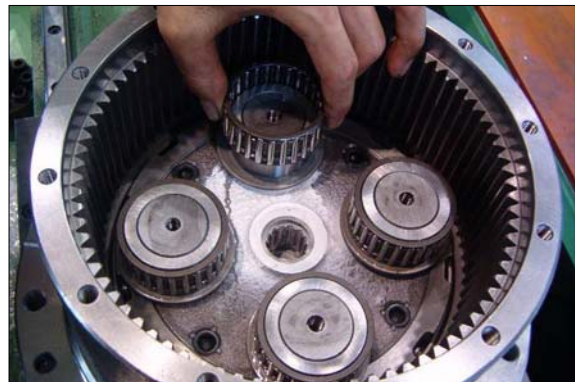
- ⑨ Assemble washer(65)-4EA the ring gear(59).



- ⑩ Assemble collar(66)-4EA to the ring gear(59).

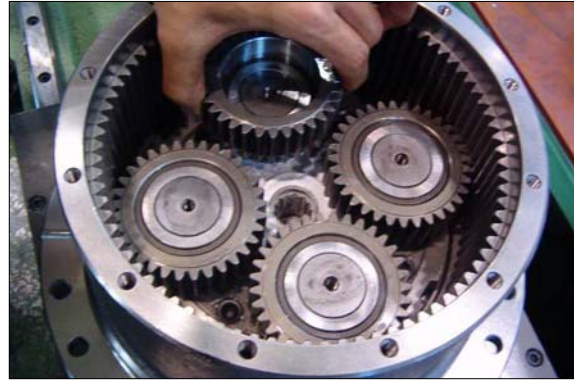


- ⑪ Assemble needle bearing(68)-4EA to the ring gear(59).





- ⑫ Assemble planetary gear(67)-4EA to the ring gear(59).



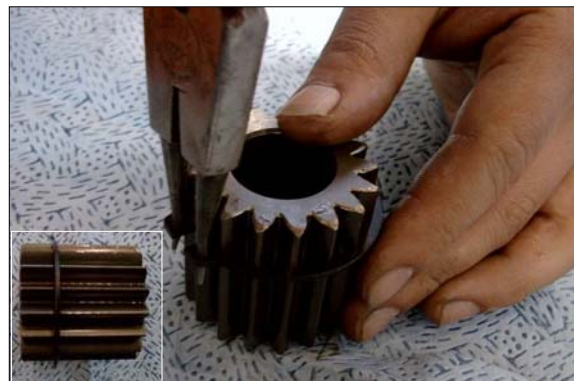
7078TM24

- ⑬ Assemble plate(69)-1EA to the ring gear(59) and then combine plate head bolt(70)-4EA with L-wrench. (after paste loctite and then combine the plate head bolt).



7078TM23

- ⑭ Assembling snap ring(72) to the sun gear(71) with a plier jig.



7078TM86/86A

- ⑮ Assemble sun gear with snap ring assembly to the ring gear(59).



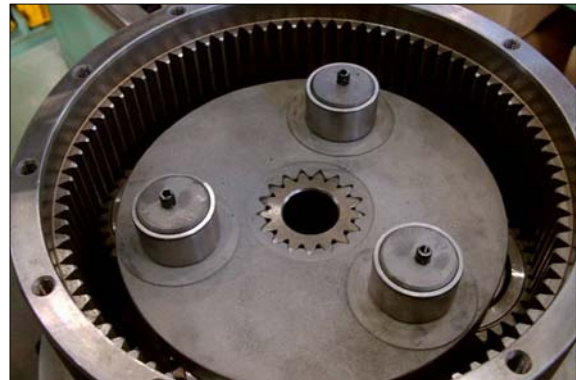
7078TM22

- Assemble in order collar(75), spring pin(74) to the carrier(73).



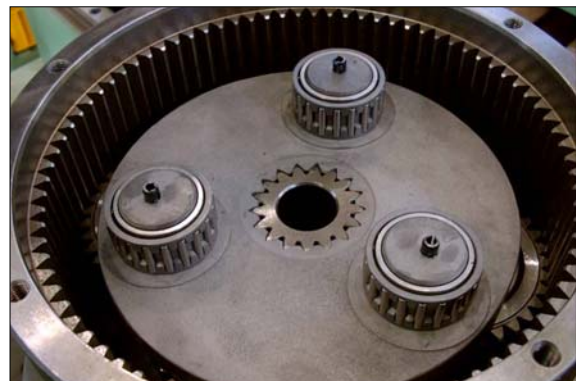
7078TM21

- Assemble carrier sub assembly to the ring gear(59).



7078TM87

- Assemble needle bearing(77)-3EA to the ring gear(59).



7078TM20

- Assemble in order planetary gear(76), drive gear(78) to the ring gear(59).



7078TM19

- Assemble thrust plate(79) to the ring gear(59).



7078TM18

Assemble in order ring gear cover(80) with O-ring(82) and then assemble wrench bolt(83) with torque-wrench.



7078TM17/17A

Roll the tapron tape to the ring gear(59) and then combine with L-wrench(after test of drain part water pressure and capacity and then assemble plug PT3/8 form).



7078TM88



**(5) Test**

**① Motor water pressure test**

-Check the oil leak for one minute by appearance test at air pressure 5kgf/cm<sup>2</sup>.



7078TM89

**② Performance test**

-Pour the gear oil(80W-90) by beaker at the reduction gear.



7078TM90

**③ Test bench mounting**

-Partially performance test by mounting motor test bench.



7078TM91

## GROUP 7 RCV LEVER

### 1. REMOVAL AND INSTALL

#### 1) REMOVAL

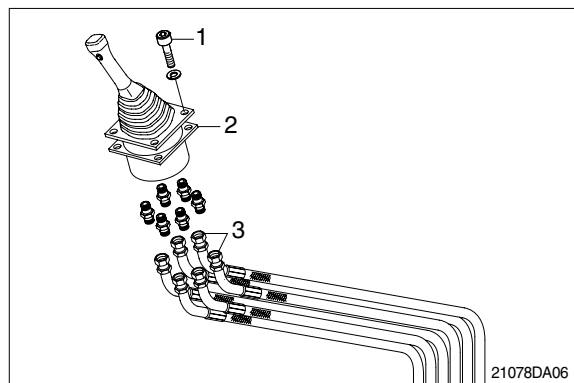
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

- (4) Loosen the socket bolt(2).
- (5) Remove the cover of the console box.
- (6) Disconnect pilot line hoses(3).
- (7) Remove the pilot valve assembly(1).  
※ When removing the pilot valve assembly, check that all the hoses have been disconnected.

#### 2) INSTALL

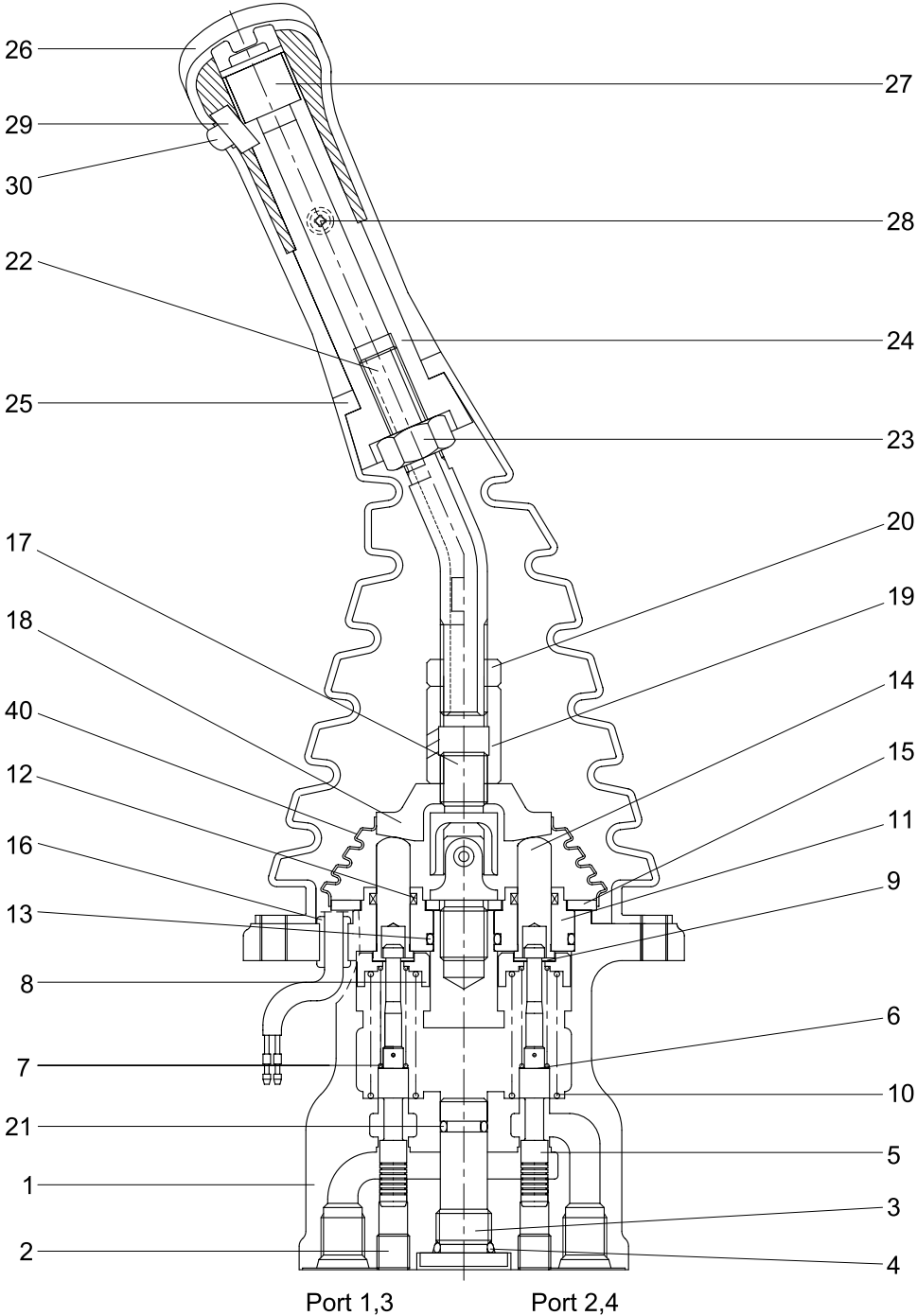
- (1) Carry out installation in the reverse order to removal.
- (2) Confirm the hydraulic oil level and check the hydraulic oil leak or not.





2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

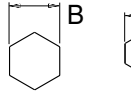


14072SF80

1	Case	12	Rod seal	22	Handle connector
2	Plug	13	O-ring	23	Nut
3	Plug	14	Push rod	24	Insert
4	O-ring	15	Plate	25	Boot
5	Spool	16	Bushing	26	Handle
6	Shim	17	Joint assembly	27	Switch assembly
7	Spring	18	Swash plate	28	Screw
8	Spring seat	19	Adjusting nut	29	Switch assembly
9	Stopper	20	Lock nut	30	Switch cover
10	Spring	21	O-ring	40	Boot
11	Plug				

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

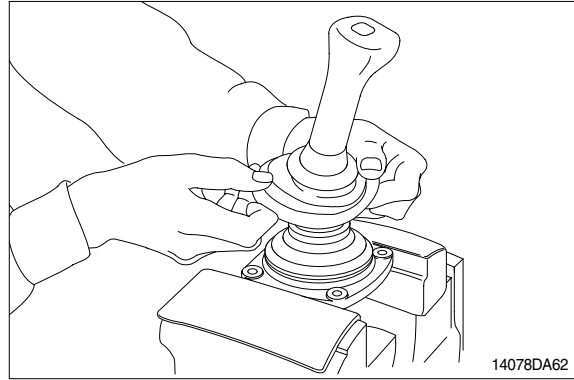
Tool name	Remark	
Allen wrench	6	
Spanner	22	
	27	
(+) Driver	Length 150	
(-) Driver	Width 4~5	
Torque wrench	Capable of tightening with the specified torques	

### (2) Tightening torque

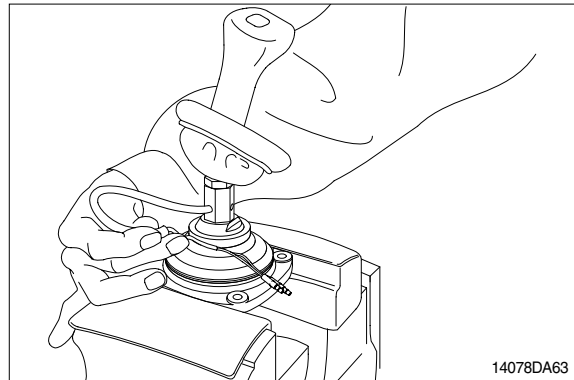
Part name	Item	Size	Torque	
			kgf · m	lbf · ft
Plug	2	PT 1/8	3.0	21.7
Joint	18	M14	3.5	25.3
Swash plate	19	M14	5.0±0.35	36.2±2.5
Adjusting nut	20	M14	5.0±0.35	36.2±2.5
Lock nut	21	M14	5.0±0.35	36.2±2.5
Screw	29	M 3	0.05	0.36

### 3) DISASSEMBLY

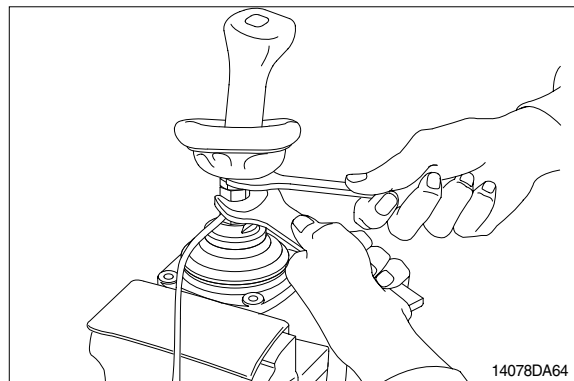
- (1) Clean pilot valve with kerosene.
  - ※ Put blind plugs into all ports
- (2) Fix pilot valve in a vise with copper(or lead) sheets.
- (3) Remove end of boot(26) from case(1) and take it out upwards.



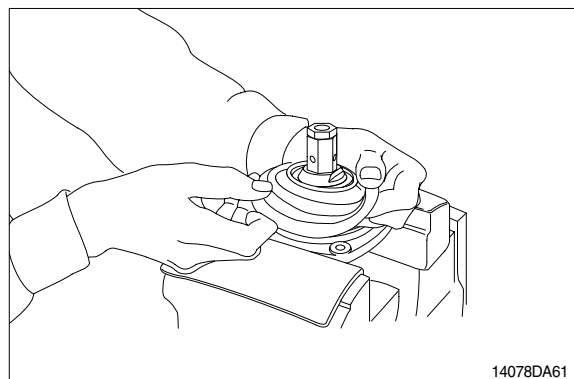
- ※ For valve with switch, remove cord also through hole of casing.



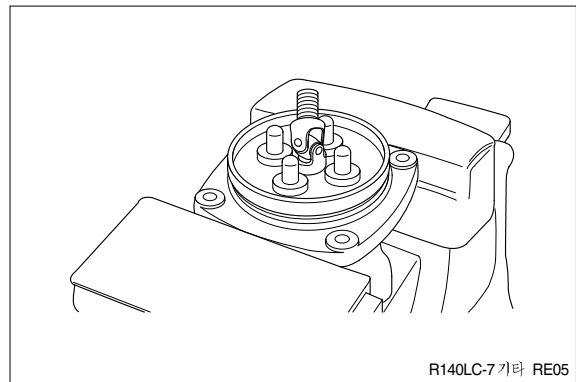
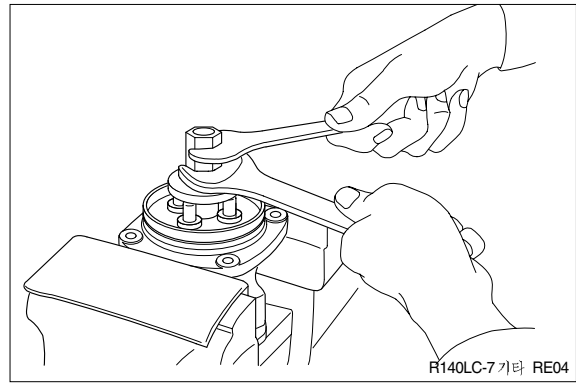
- (4) Loosen lock nut(21) and adjusting nut(20) with spanners on them respectively, and take out handle section as one body.



- (5) Remove the boot(40)

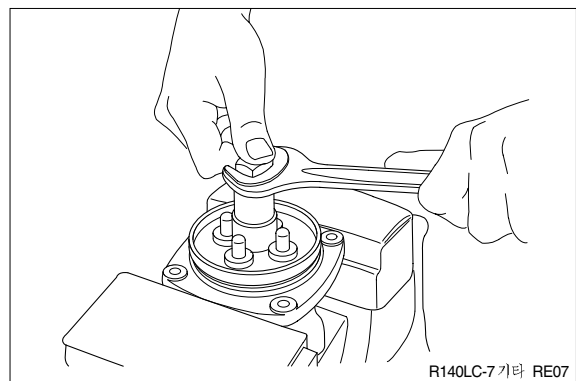
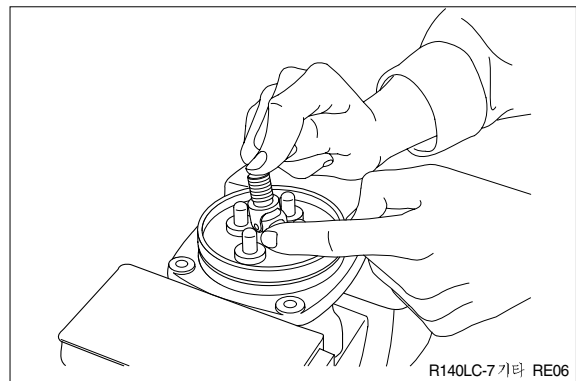


- (6) Loosen adjusting nut(20) and plate(19) with spanners on them respectively, and remove them.

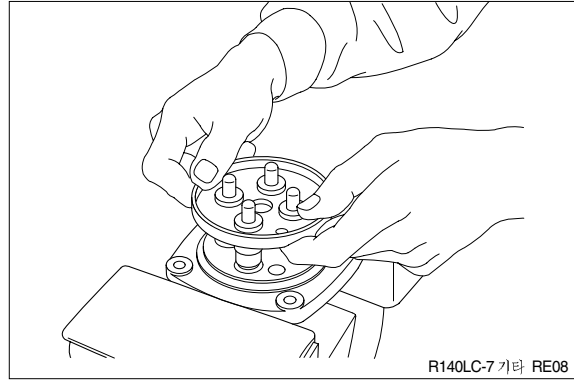


- (7) Turn joint anticlockwise to loosen it, utilizing jig(Special tool).

- ※ When return spring(10) is strong in force, plate(16), plug(11) and push rod(14, 15) will come up on loosening joint. Pay attention to this.



(8) Remove plate(16).



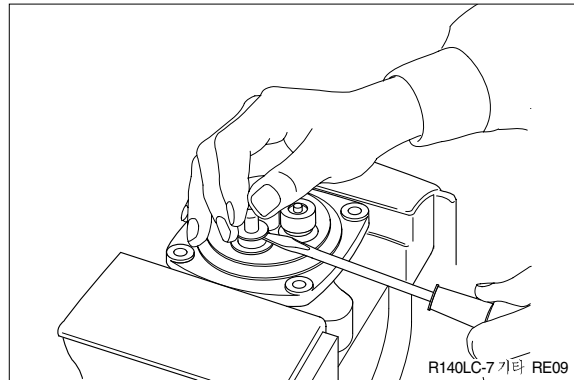
(9) When return spring(10) is weak in force, plug(11) stays in casing because of sliding resistance of O-ring.

※ Take it out with minus screwdriver.

Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.

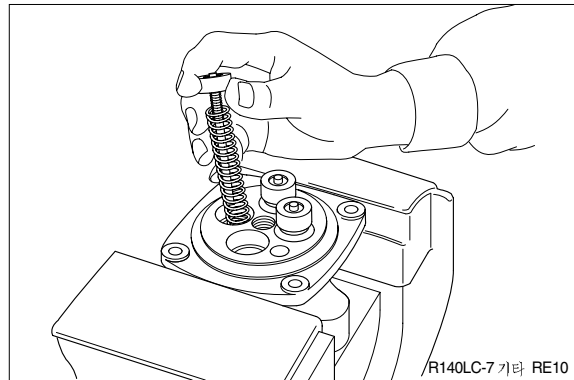
※ During taking out, plug may jump up due to return spring(10) force.

Pay attention to this.

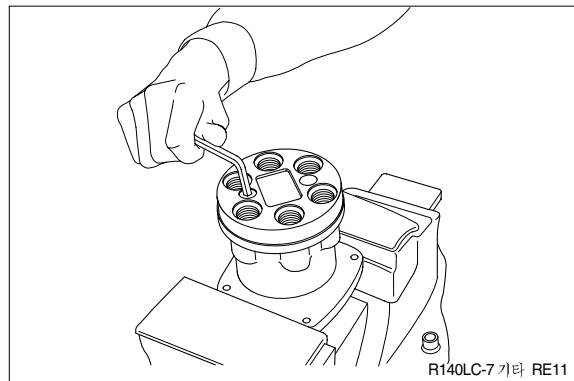


(10) Remove reducing valve subassembly and return spring(10) out of casing.

※ Record relative position of reducing valve subassembly and return springs.

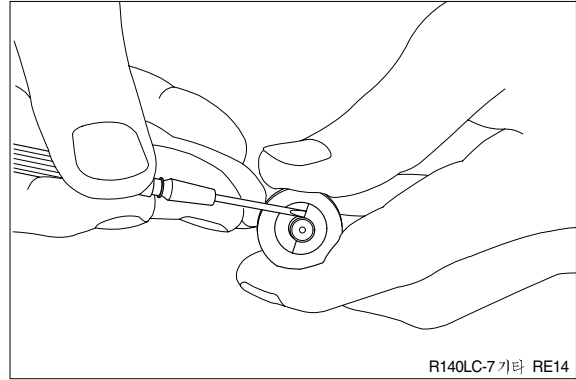


(11) Loosen hexagon socket head plug(2) with hexagon socket screw key.



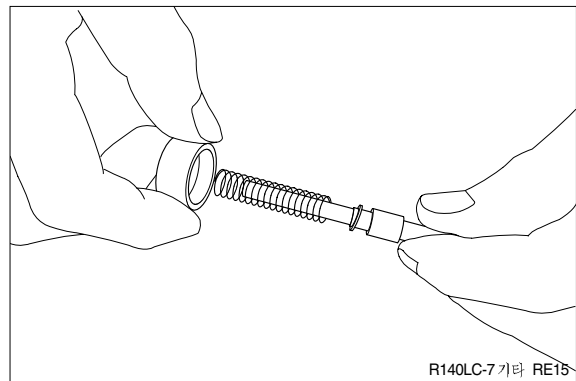
(12) For disassembling reducing valve section, stand it vertically with spool(5) bottom placed on flat workbench. Push down spring seat(8, 31) and remove two pieces of semicircular stopper(9) with tip of small minus screwdriver.

- ※ Pay attention not to damage spool surface.
- ※ Record original position of spring seat(8, 31).
- ※ Do not push down spring seat more than 6mm.

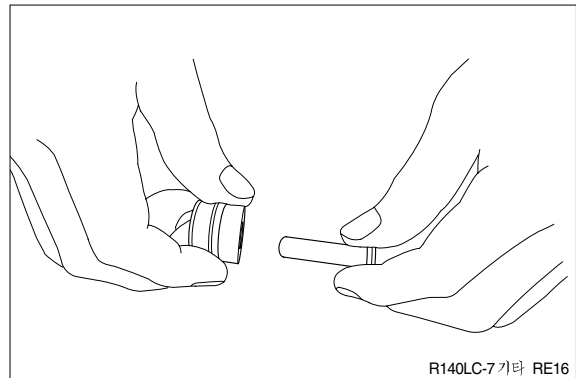


(13) Separate spool(5), spring seat(8, 31), spring(7, 30) and shim(6) individually.

- ※ Until being assembled, they should be handled as one subassembly group.

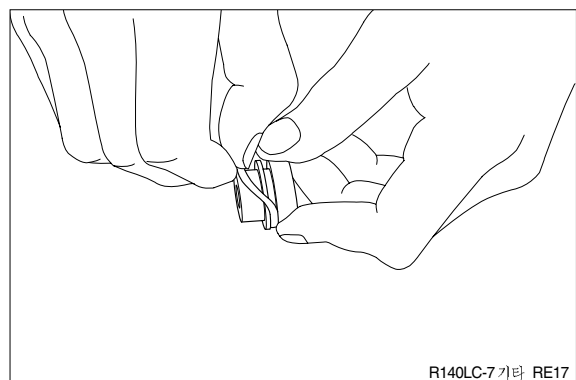


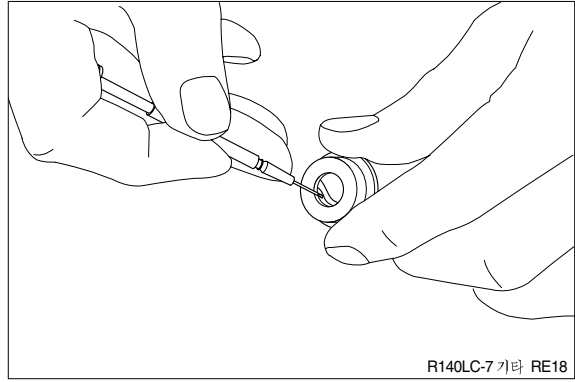
(14) Take push rod(14, 15) out of plug(11).



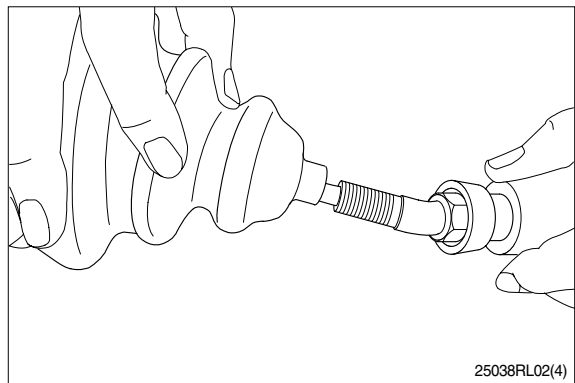
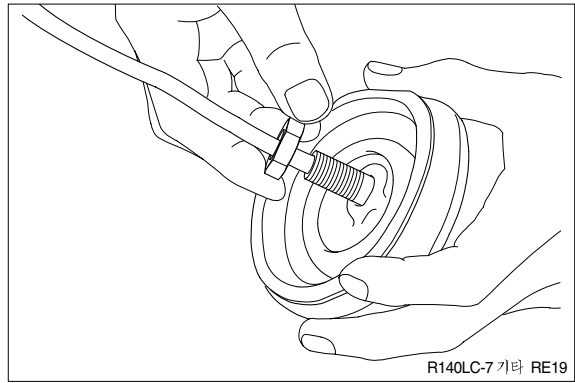
(15) Remove O-ring(13) and seal(12) from plug(11).

Use small minus screwdriver or so on to remove this seal.





(16) Remove lock nut(21) and then boot(26).





### **(17) Cleaning of parts**

- ① Put all parts in rough cleaning vessel filled with kerosene and clean them (Rough cleaning).
  - ※ If dirty part is cleaned with kerosene just after putting it in vessel, it may be damaged. Leave it in kerosene for a while to loosen dust and dirty oil.
  - ※ If this kerosene is polluted, parts will be damaged and functions of reassembled valve will be degraded.  
Therefore, control cleanliness of kerosene fully.
- ② Put parts in final cleaning vessel filled with kerosene, turning it slowly to clean them even to their insides (Finish cleaning).
  - ※ Do not dry parts with compressed air, since they will be damaged and/or rusted by dust and moisture in air.

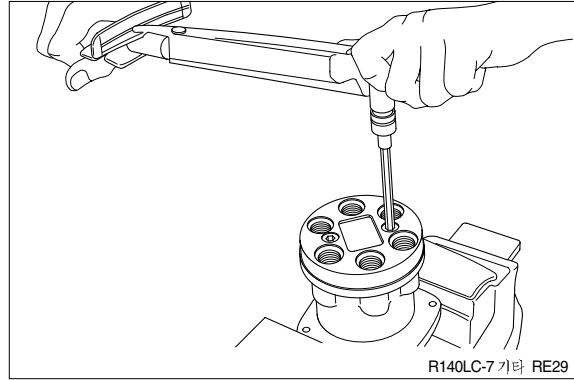
### **(18) Rust prevention of parts**

- Apply rust-preventives to all parts.
- ※ If left as they are after being cleaned, they will be rusted and will not display their functions fully after being reassembled.

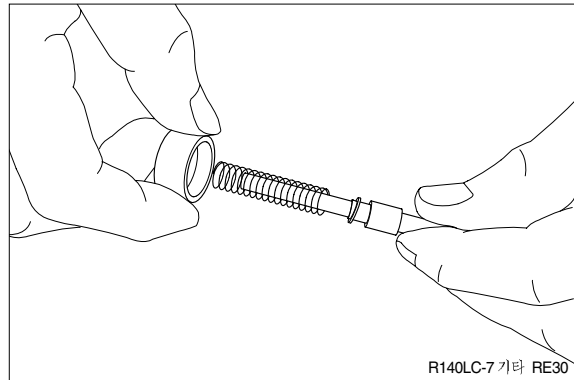
#### 4) ASSEMBLY

(1) Tighten hexagon socket head plug(2) to the specified torque.

※ Tighten two bolts alternately and slowly.

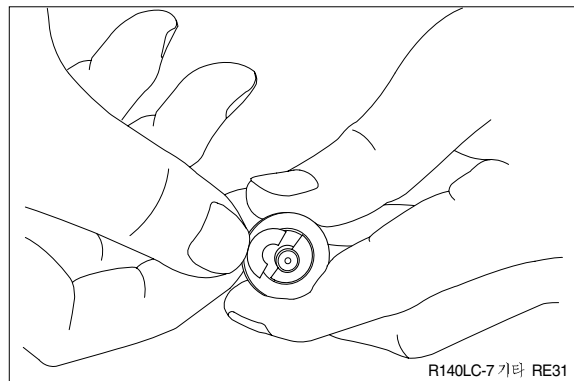


(2) Put shim(6), springs(7, 30) and spring seat(8, 31) onto spool(5) in this order.



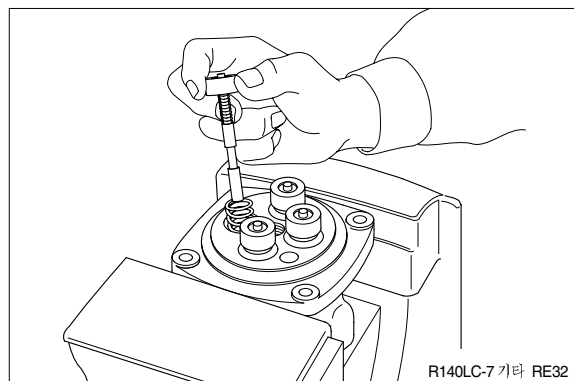
(3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper(9) on spring seat without piling them on.

※ Assemble stopper(9) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6mm.

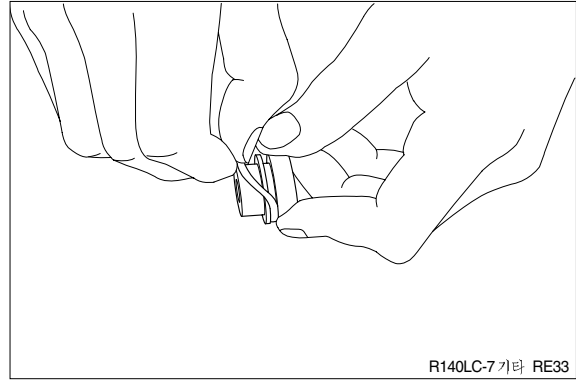


(4) Assemble spring(10) into casing.  
Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.

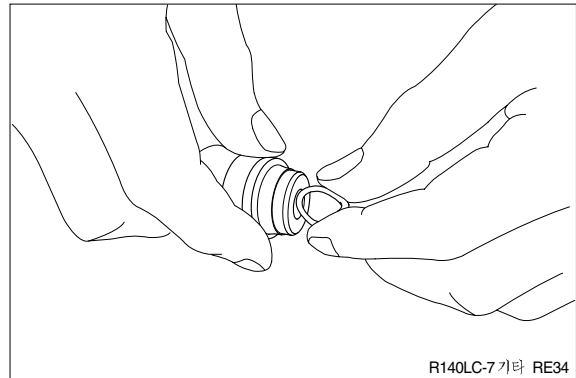


(5) Assemble O-ring(13) onto plug(11).



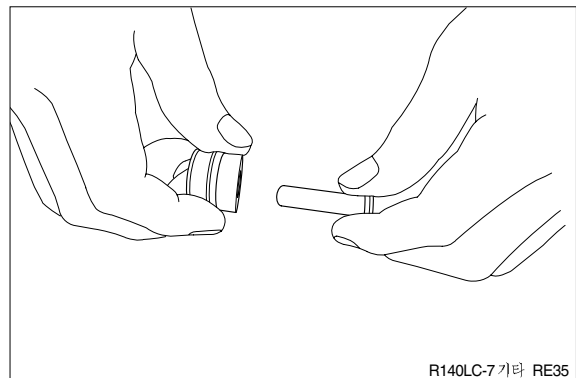
(6) Assemble seal(12) to plug(11).

※ Assemble seal in such lip direction as shown below.



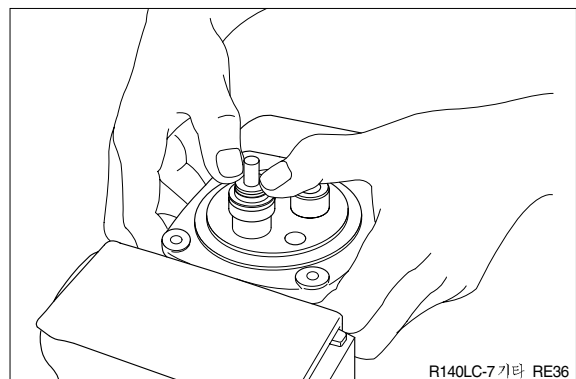
(7) Assemble push rod(14, 15) to plug(11).

※ Apply working oil on push-rod surface.

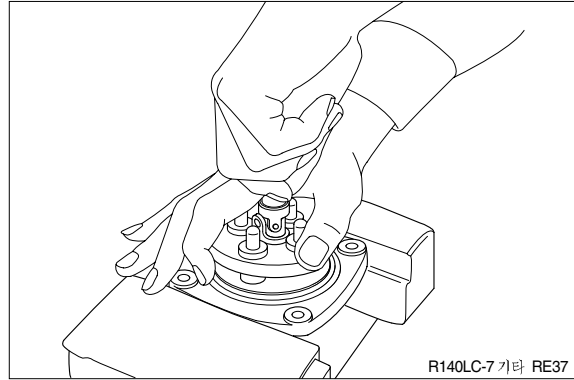


(8) Assemble plug subassembly to casing.

※ When return spring is weak in force, subassembly stops due to resistance of O-ring.

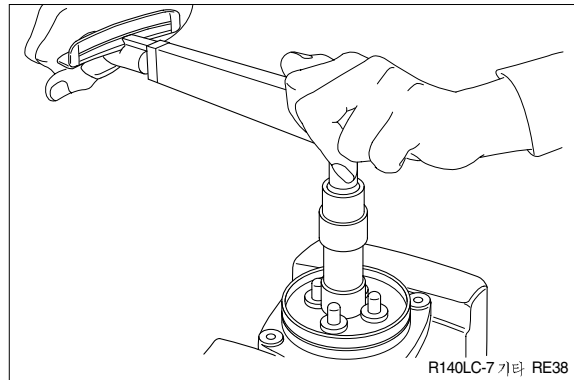


- (9) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate(16), and tighten joint(18) temporarily.



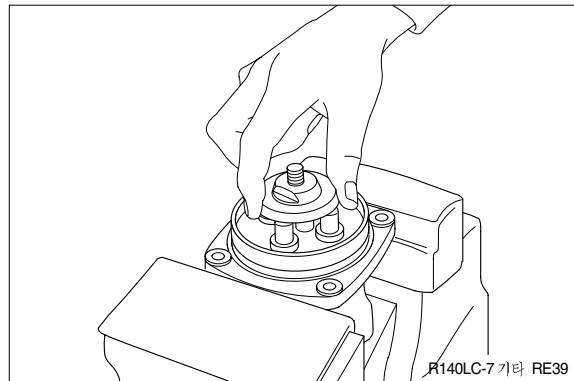
- (10) Fit plate(16).

- (11) Tighten joint(18) with the specified torque to casing, utilizing jig.



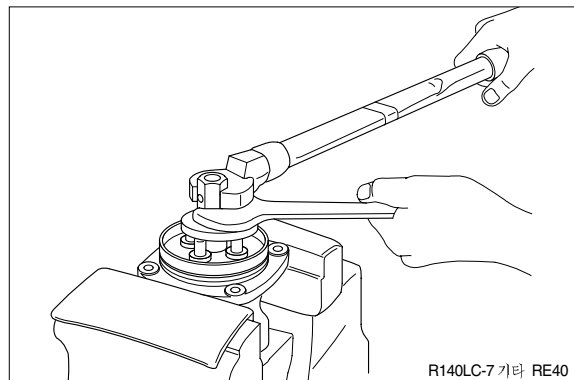
- (12) Assemble plate(19) to joint(18).

- ※ Screw it to position that it contacts with 4 push rods evenly.
- ※ Do not screw it over.

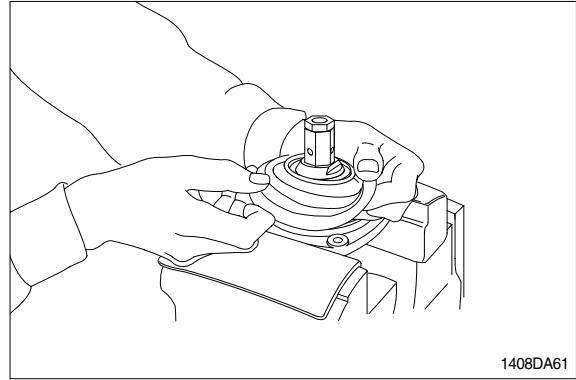


- (13) Assemble adjusting nut(20), apply spanner to width across flat of plate(19) to fix it, and tighten adjusting nut to the specified torque.

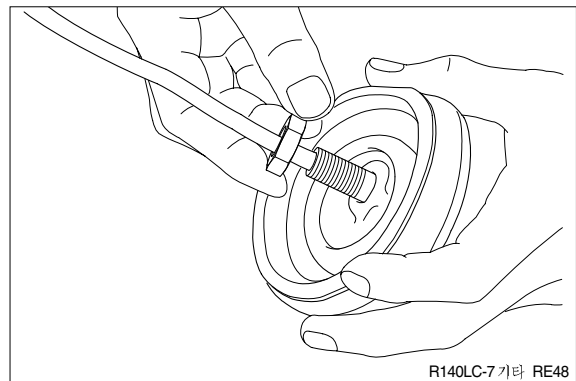
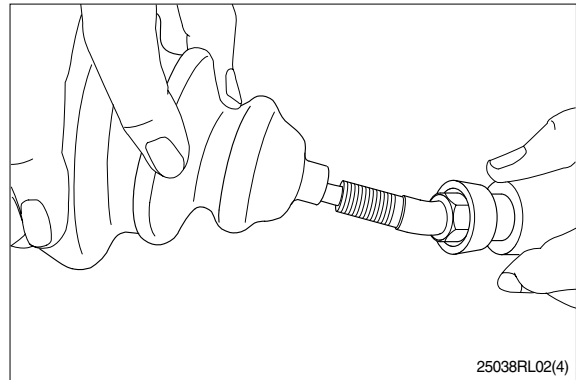
- ※ During tightening, do not change position of disk.



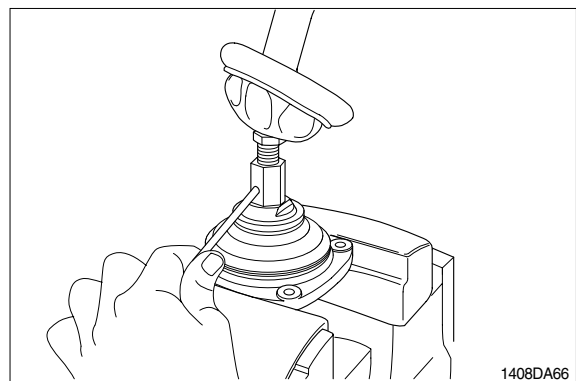
(14) Fit boot(40) to plate.



(15) Fit boot(26) and lock nut(21), and handle subassembly is assembled completely.

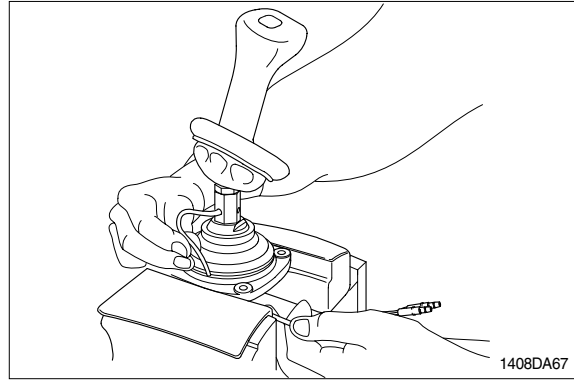


(16) Pull out cord and tube through adjusting nut hole provided in direction  $60^{\circ}$  to  $120^{\circ}$  from casing hole.

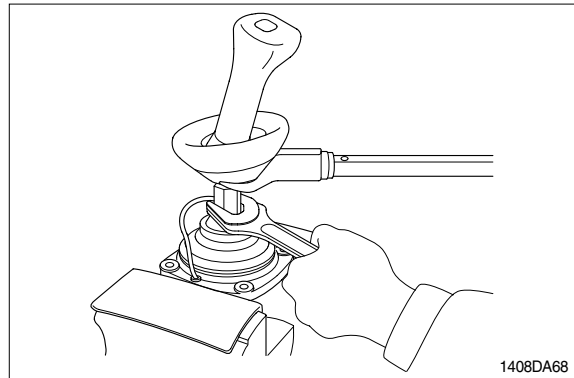


(17) Assemble bushing(17) to plate and pass cord and tube through it.

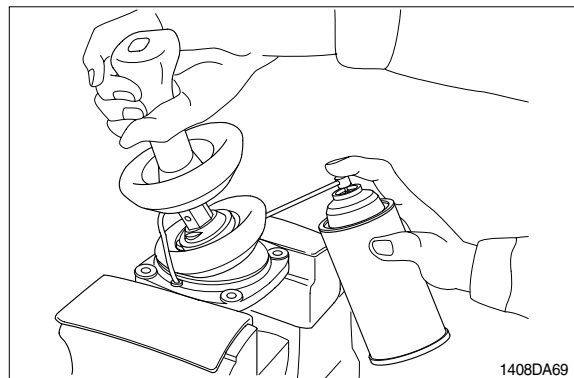
※ Provide margin necessary to operation.



(18) Determine handle direction, tighten lock nut(21) to specified torque to fix handle.

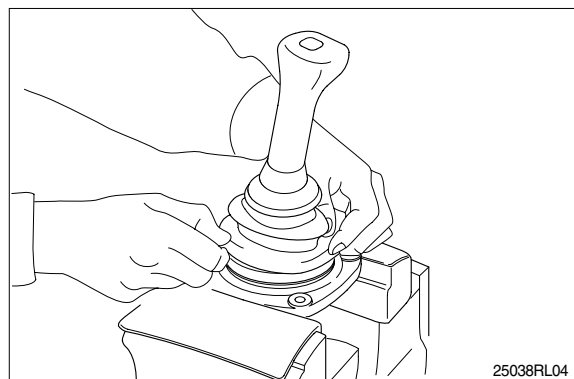


(19) Apply grease to rotating section of joint and contacting faces of disk and push rod.



(20) Assemble lower end of bellows to casing.

(21) Inject volatile rust-preventives through all ports and then put blind plugs in ports.



## GROUP 8 TURNING JOINT

### 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.

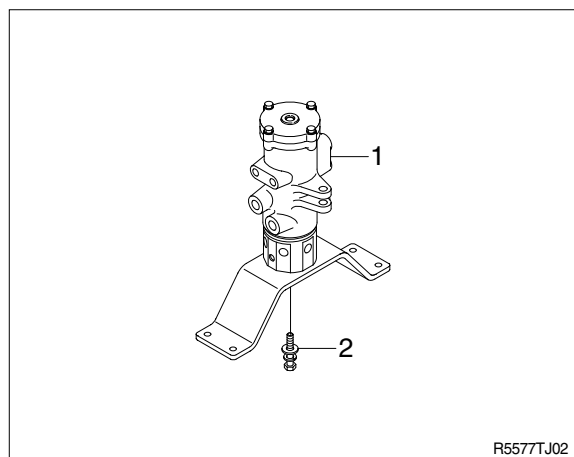
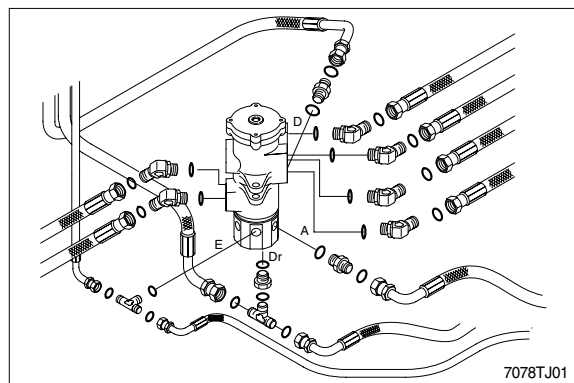
**▲ Escaping fluid under pressure can penetrate the skin causing serious injury.**

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

- (4) Disconnect all hoses.
- (5) Sling the turning joint assembly (1) and remove the mounting bolt(2).
  - Weight : 30kg(70lb)
  - Tightening torque :  $12.3 \pm 1.3 \text{kgf} \cdot \text{m}$   
( $88.2 \pm 9.4 \text{lb} \cdot \text{ft}$ )
- (6) Remove the turning joint assembly.
  - ※ When removing the turning joint, check that all the hoses have been disconnected.

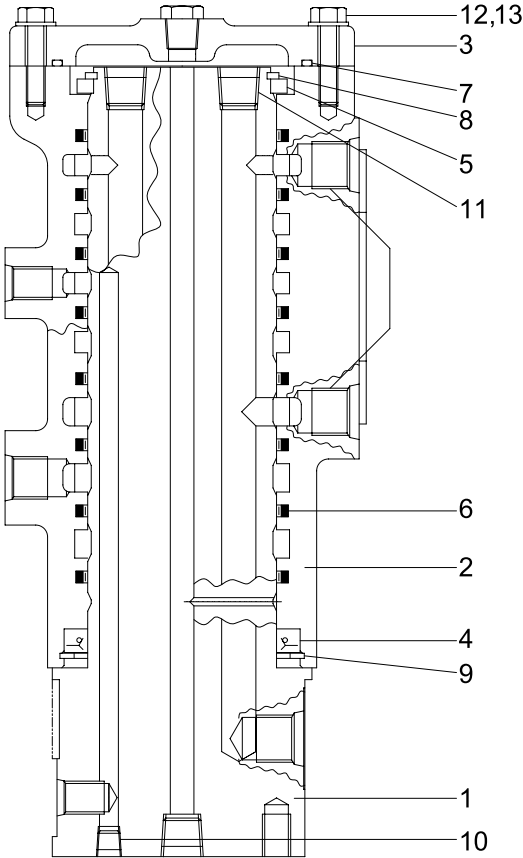
#### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
  - ※ Take care of turning joint direction.
  - ※ Assemble hoses to their original positions.
  - ※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.



## 2. DISASSEMBLY AND ASSEMBLY

### 1) STRUCTURE



R55NM7TJ01

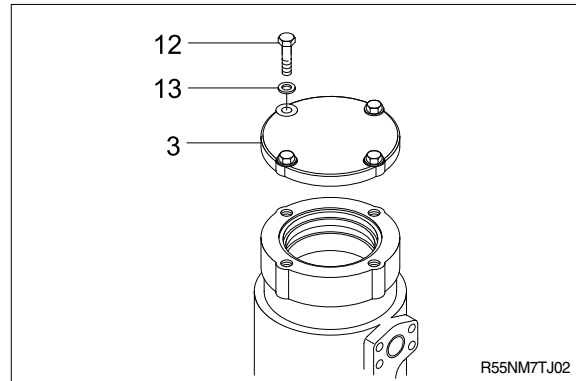
- |   |          |   |               |    |               |
|---|----------|---|---------------|----|---------------|
| 1 | Hub      | 6 | Slipper seal  | 10 | Plug          |
| 2 | Shaft    | 7 | O-ring        | 11 | Plug          |
| 3 | Cover    | 8 | Retainer ring | 12 | Hexagon bolt  |
| 4 | Oil seal | 9 | Retainer ring | 13 | Spring washer |
| 5 | Ring     |   |               |    |               |



## 2) DISASSEMBLY

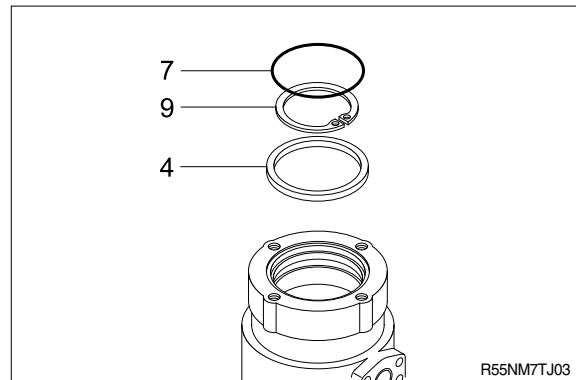
※ Before the disassembly, clean the turning joint.

(1) Remove bolts(12), washer(13) and cover(3).



(2) Remove O-ring(7).

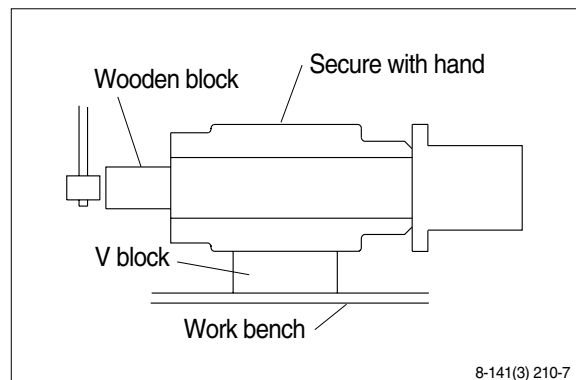
(3) Remove retainer ring(9) and spacer(4).



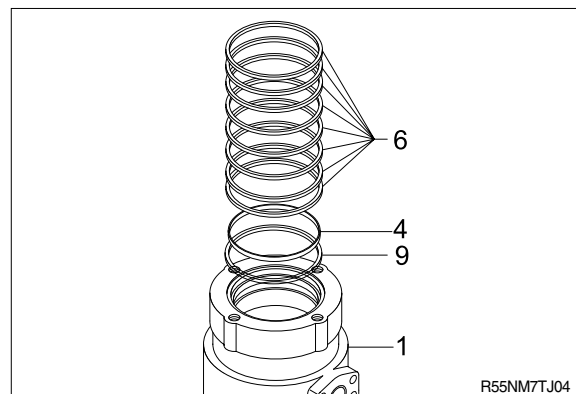
(4) Place hub(1) on a V-block and by using a wood buffer at the shaft end, hit out shaft(2) to about 1/2 from the body with a hammer.

※ Take care not to damage the shaft(2) when remove hub(1) or rest it sideways.

※ Put a fitting mark on hub(1) and shaft(2).



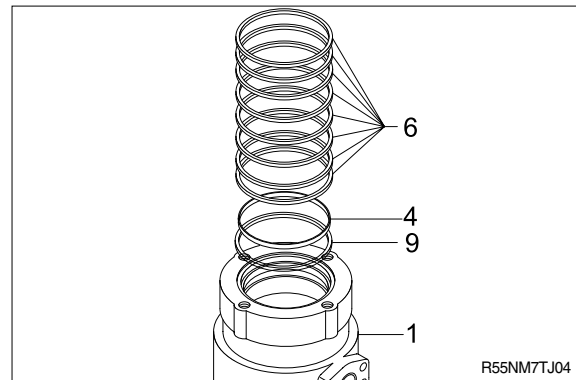
(5) Remove eight slipper seals(6) and oil seal(4), retainer ring(9) from hub(1).



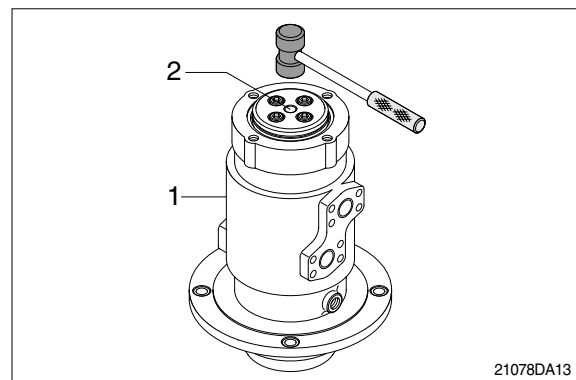
### 3) ASSEMBLY

- ※ Clean all parts.
- ※ As a general rule, replace oil seals and O-ring.
- ※ Coat the sliding surfaces of all parts with engine oil or grease before installing.

(1) Fix eight slipper seal(6) and oil seal(4), retainer ring(9) to hub(1).

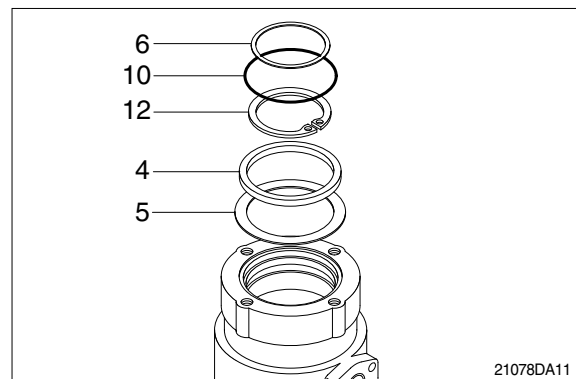


(2) Set shaft(2) on block, tap hub(1) with a plastic hammer to install.



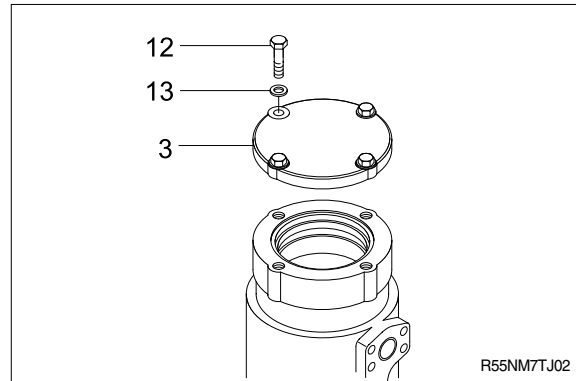
(3) Fit spacer(4) and retainer ring(9) to shaft(2).

(4) Fit O-ring(7) to hub(1).



(5) Install cover(3) to body(1) and tighten bolts(12).

- Tightening torque :  $12.3 \pm 1.3 \text{kgf} \cdot \text{m}$   
( $88.2 \pm 9.4 \text{lb} \cdot \text{ft}$ )



## GROUP 9 BOOM, ARM AND BUCKET CYLINDER

### 1. REMOVAL AND INSTALL

#### 1) BUCKET CYLINDER

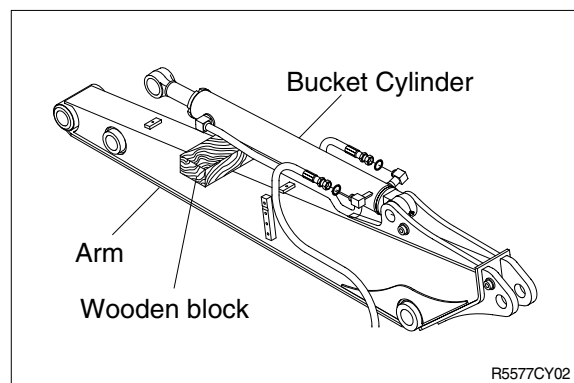
##### (1) Removal

- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

##### ▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.

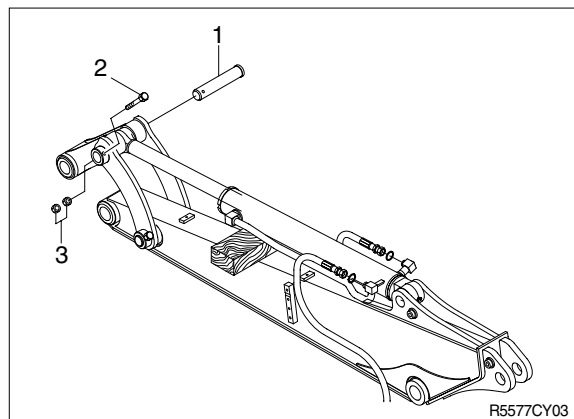
- ※ Escaping fluid under pressure can penetrate the skin causing serious injury. Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

- ① Set block between bucket cylinder and arm.

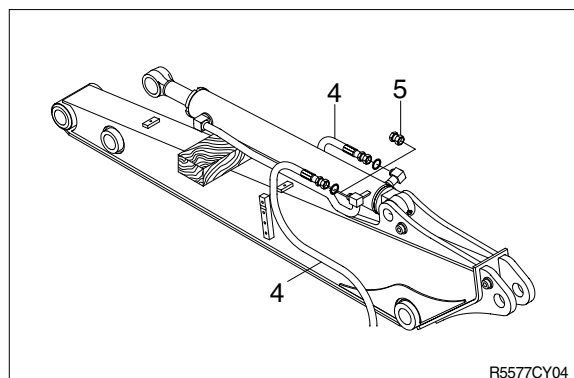


- ② Remove bolt(2), nut(3) and pull out pin (1).

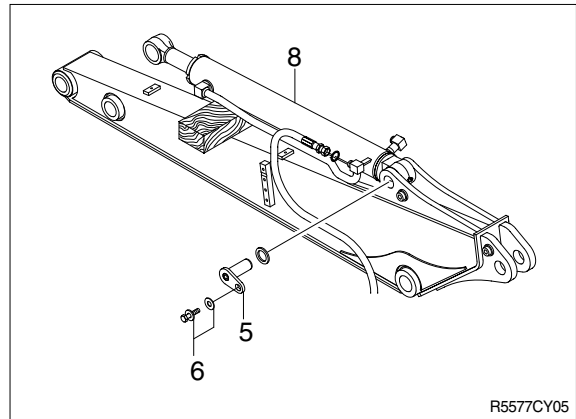
- ※ Tie the rod with wire to prevent it from coming out.



- ③ Disconnect bucket cylinder hoses(4) and put plugs(5) on cylinder pipe.



- ④ Sling bucket cylinder assembly(8) and remove bolt(6) then pull out pin (5).
- ⑤ Remove bucket cylinder assembly(8).
  - Weight : 50kg(110lb)



## (2) Install

- ① Carry out installation in the reverse order to removal.
- ▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**
- ※ Bleed the air from the bucket cylinder.
  - ※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

## 2) ARM CYLINDER

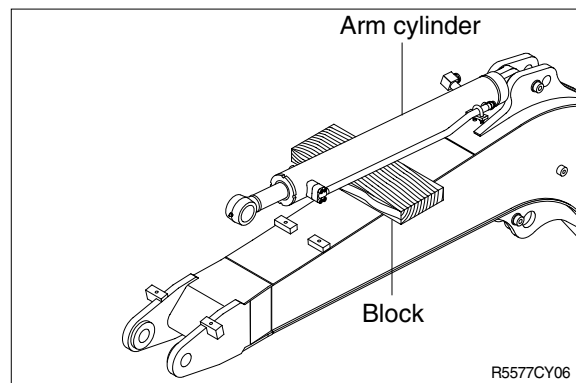
### (1) Removal

- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

### ▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.

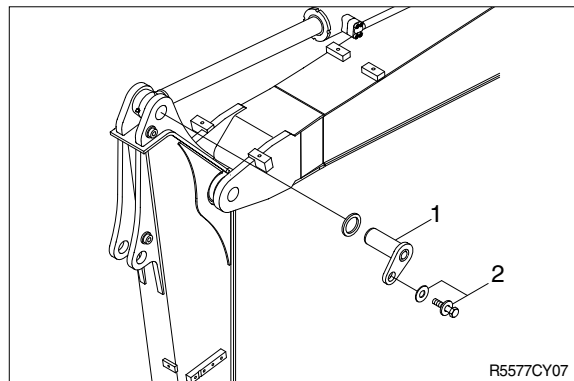
- ※ Escaping fluid under pressure can penetrate the skin causing serious injury. Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

- ① Set block between arm cylinder and boom.



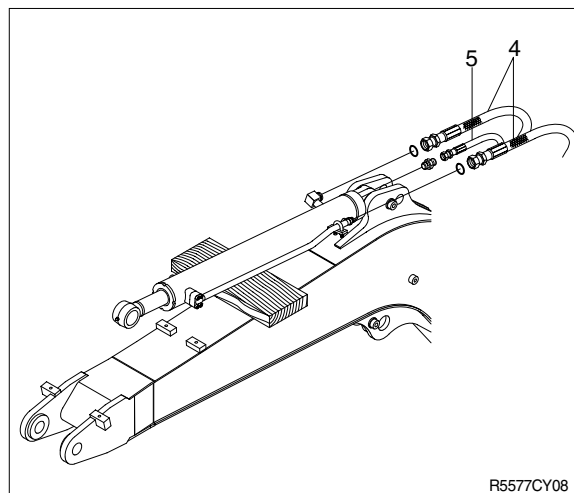
- ② Remove bolt(2) and pull out pin(1).

- ※ Tie the rod with wire to prevent it from coming out.

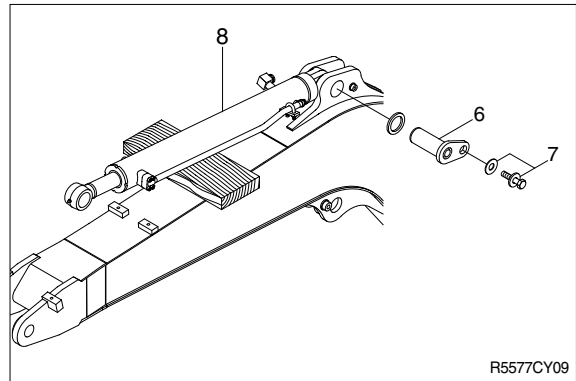


- ③ Disconnect arm cylinder hoses(3) and put plugs on cylinder pipe.

- ④ Disconnect greasing pipings(4).



- ⑤ Sling arm assembly(7) and remove bolt (6) then pull out pin(5).
- ⑥ Remove arm cylinder assembly(7).
  - Weight : 80kg(180lb)



## (2) Install

- ① Carry out installation in the reverse order to removal.
- ▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**
- ※ Bleed the air from the arm cylinder.
  - ※ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

### 3) BOOM CYLINDER

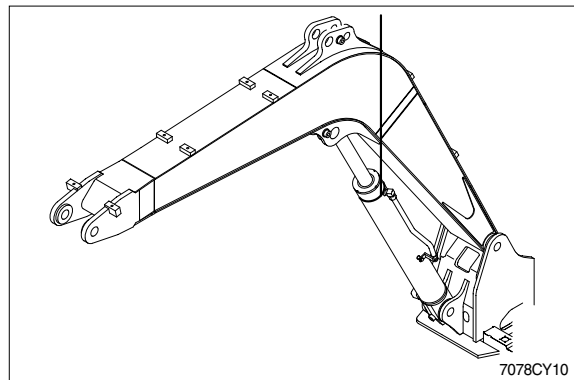
#### (1) Removal

- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

**▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.**

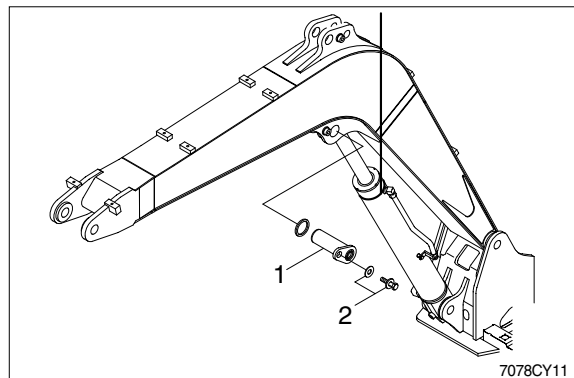
- ※ Escaping fluid under pressure can penetrate the skin causing serious injury. Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Sling boom cylinder assembly.

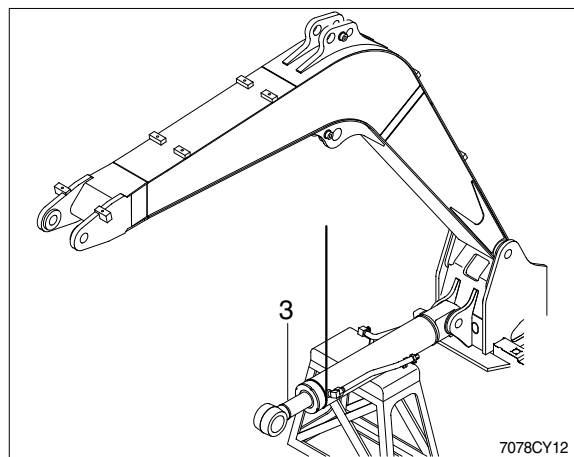


② Remove bolt(2), pull out pin(1).

- ※ Tie the rod with wire to prevent it from coming out.

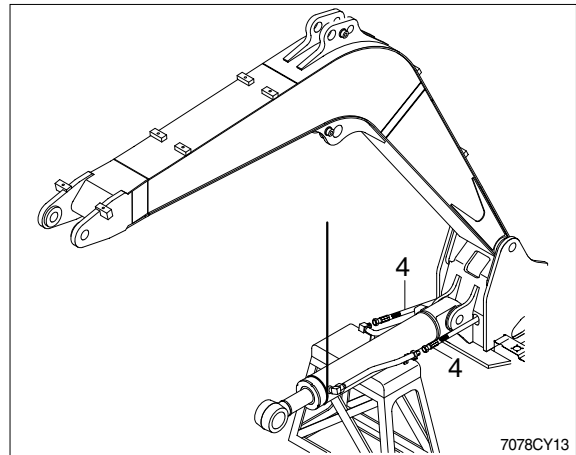


③ Lower the boom cylinder assembly(3) on a stand.

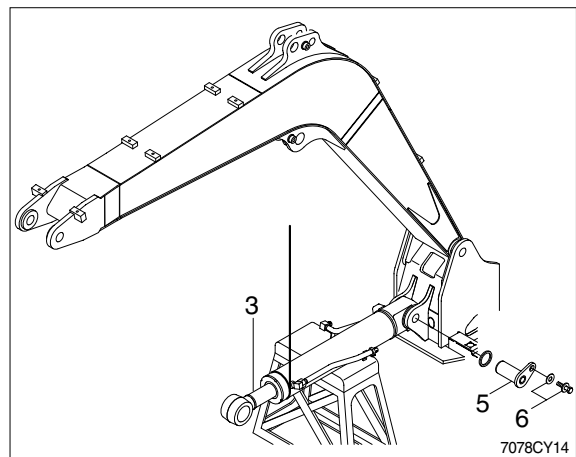




- ④ Disconnect boom cylinder hoses(4) and put plugs on cylinder pipe.



- ⑤ Remove bolt(6) and pull out pin(5).  
⑥ Remove boom cylinder assembly(6).  
· Weight : 120kg(260lb)



## (2) Install

- ① Carry out installation in the reverse order to removal.

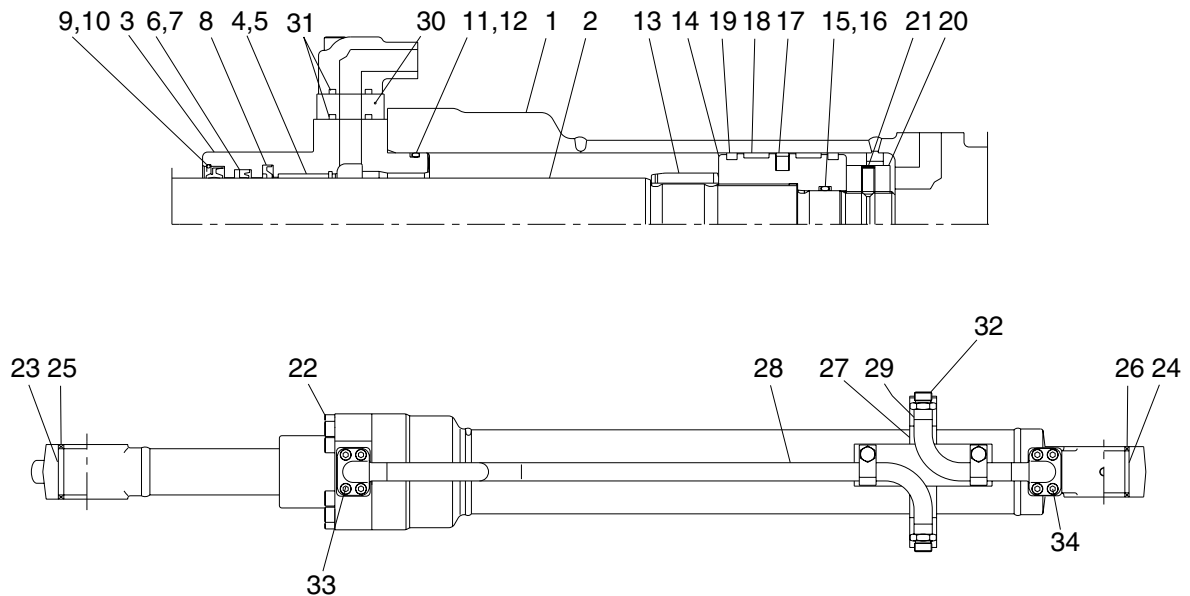
**▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

- ※ Bleed the air from the boom cylinder.
- ※ Confirmed the hydraulic oil level and check the hydraulic oil leak or not.

## 2. DISASSEMBLY AND ASSEMBLY

### 1) STRUCTURE

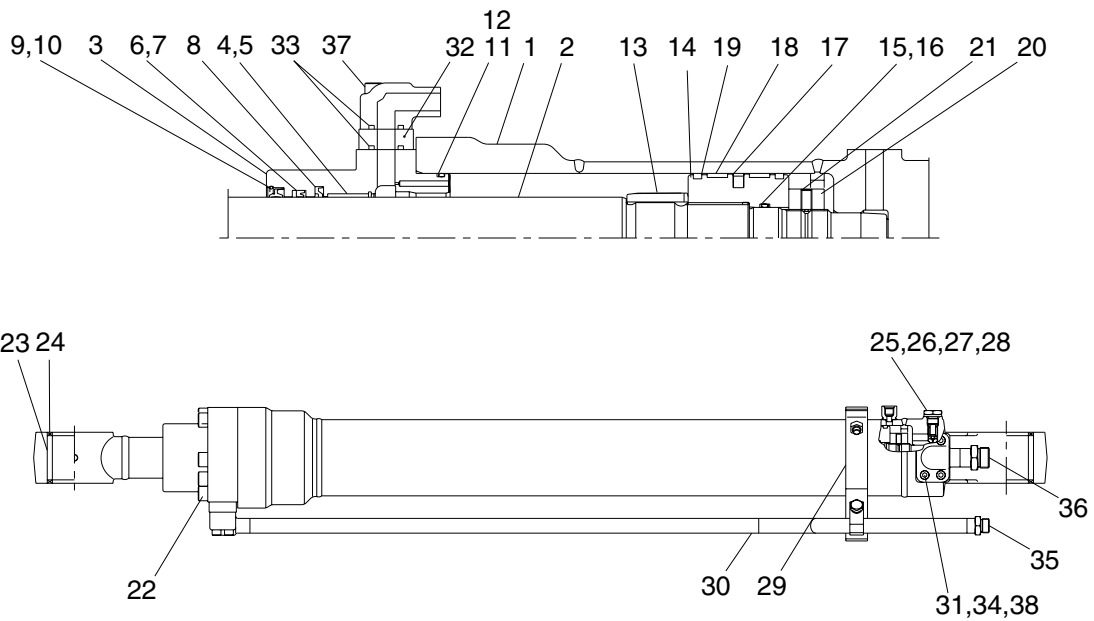
#### (1) Bucket cylinder



7078CY03

1	Tube assembly	13	Cushion ring	24	Pin bush
2	Rod assembly	14	Piston	25	Dust seal
3	Gland	15	O-ring	26	Dust seal
4	DD2 bush	16	Back up ring	27	Band assembly
5	Snap ring	17	Piston seal	28	Pipe assembly(R)
6	Rod seal	18	Wear ring	29	Pipe assembly(B)
7	Back up ring	19	Dust ring	30	Flange
8	Buffer ring	20	Lock nut	31	O-ring
9	Dust wiper	21	Screw	32	O-ring
10	Snap ring	22	Hexagon socket head bolt	33	Hexagon socket head bolt
11	O-ring	23	Pin bush	34	Hexagon socket head bolt
12	Back up ring				

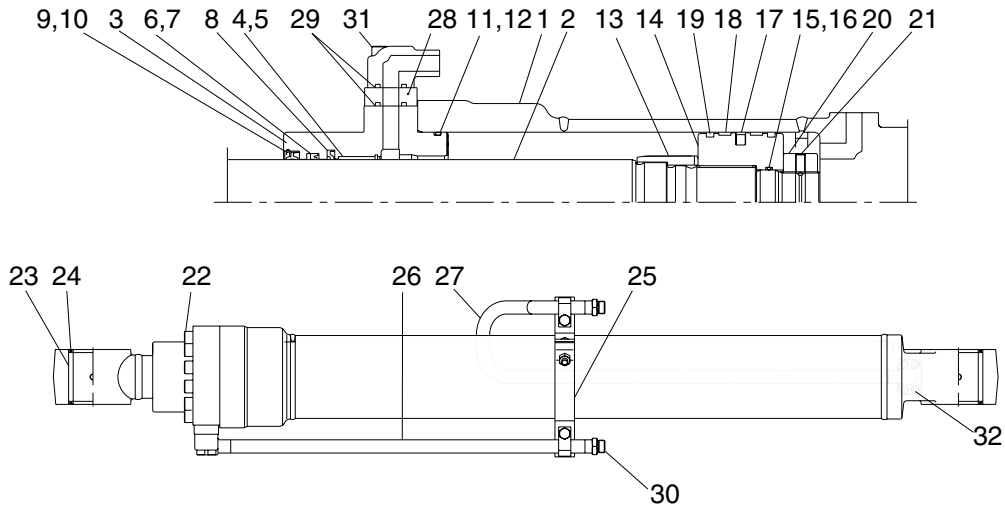
**(2) Arm cylinder**



7078CY02

- |    |               |    |                          |    |                          |
|----|---------------|----|--------------------------|----|--------------------------|
| 1  | Tube assembly | 14 | Piston                   | 27 | O-ring                   |
| 2  | Rod assembly  | 15 | O-ring                   | 28 | Plug                     |
| 3  | Gland         | 16 | Back up ring             | 29 | Band assembly            |
| 4  | DD2 Bush      | 17 | Piston seal              | 30 | Pipe assembly(R)         |
| 5  | Snap ring     | 18 | Wear ring                | 31 | Pipe assembly(L)         |
| 6  | Rod seal      | 19 | Dust ring                | 32 | Flange                   |
| 7  | Back up ring  | 20 | Lock nut                 | 33 | O-ring                   |
| 8  | Buffer ring   | 21 | Screw                    | 34 | O-ring                   |
| 9  | Dust wiper    | 22 | Hexagon socket head bolt | 35 | O-ring                   |
| 10 | Snap ring     | 23 | Pin bush                 | 36 | O-ring                   |
| 11 | O-ring        | 24 | Dust seal                | 37 | Hexagon socket head bolt |
| 12 | Back up ring  | 25 | Check valve              | 38 | Hexagon socket head bolt |
| 13 | Cushion ring  | 26 | Coil spring              |    |                          |

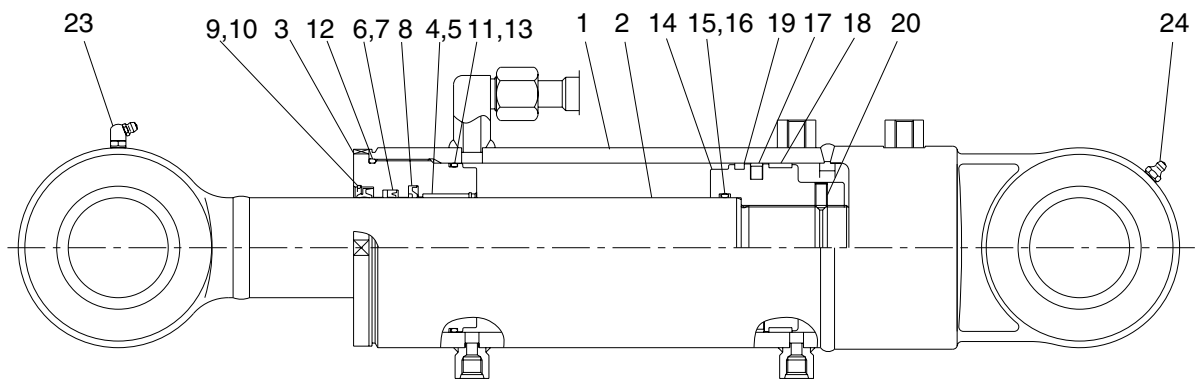
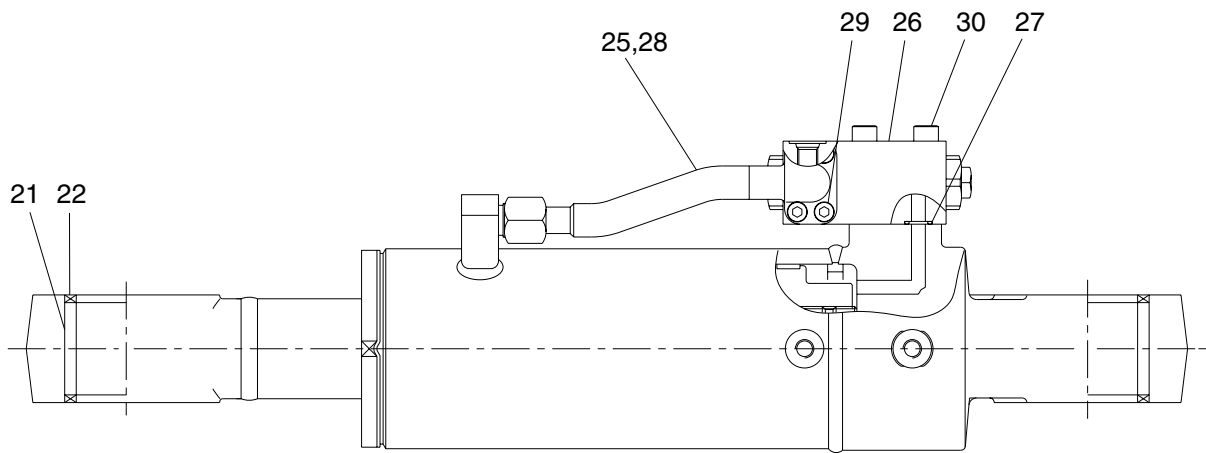
(3) Boom cylinder



7078CY01

- |    |               |    |                          |    |                         |
|----|---------------|----|--------------------------|----|-------------------------|
| 1  | Tube assembly | 12 | Back up ring             | 23 | Pin bush                |
| 2  | Rod assembly  | 13 | Cushion ring             | 24 | Dust seal               |
| 3  | Gland         | 14 | Piston                   | 25 | Band assembly           |
| 4  | DD2 bush      | 15 | O-ring                   | 26 | Pipe assembly(R, LH/RH) |
| 5  | Snapring      | 16 | Back up ring             | 27 | Pipe assembly(L, LH/RH) |
| 6  | Rod seal      | 17 | Piston seal              | 28 | Flange                  |
| 7  | Back up ring  | 18 | Wear ring                | 29 | O-ring                  |
| 8  | Buffer ring   | 19 | Dust ring                | 30 | O-ring                  |
| 9  | Dust wiper    | 20 | Lock nut                 | 31 | Hexagon head bolt       |
| 10 | Snap ring     | 21 | Screw                    | 32 | Hexagon head bolt       |
| 11 | O-ring        | 22 | Hexagon socket head bolt |    |                         |

#### (4) Dozer cylinder

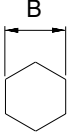


7078CY04

- |    |               |    |              |    |                          |
|----|---------------|----|--------------|----|--------------------------|
| 1  | Tube assembly | 11 | O-ring       | 21 | Pin bush                 |
| 2  | Rod assembly  | 12 | O-ring       | 22 | Dust seal                |
| 3  | Gland         | 13 | Buck-up ring | 23 | Grease nipple            |
| 4  | Du bushing    | 14 | Piston       | 24 | Grease nipple            |
| 5  | Snap ring     | 15 | O-ring       | 25 | Pipe assy-R              |
| 6  | Rod seal      | 16 | Back up ring | 26 | Double check valve       |
| 7  | Buck-up ring  | 17 | Piston seal  | 27 | O-ring                   |
| 8  | Buffer ring   | 18 | Wear ring    | 28 | O-ring                   |
| 9  | Dust wiper    | 19 | Dust ring    | 29 | Hexagon socket head bolt |
| 10 | Snap ring     | 20 | Screw        | 30 | Hexagon socket head bolt |

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

Tool name	B	Remark
Allen wrench	8	
	10	
Spanner	M22	
Hook spanner	Suitable size	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

### (2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Gland, Gland mounting bolt (Socket head bolt)	Boom cylinder	22	M14×2.0	15±1.5	109±11
	Arm cylinder	22	M14×2.0	15±1.5	109±11
	Bucket cylinder	22	M12×1.75	9.4±1	68±7
	Dozer cylinder	3	M115×2.0	70±7.0	510±51
Lock nut	Boom cylinder	20	M50×2.0	190±19	1375±138
	Arm cylinder	20	M42×2.0	180±18	1302±130
	Bucket cylinder	20	M39×2.0	170±17	1230±123
Piston	Boom cylinder	14	M60×3.0	100±10	723±72
	Arm cylinder	14	M52×3.0	150±15	1085±109
	Bucket cylinder	14	M48×2.0	100±10	723±72
	Dozer cylinder	14	M55×2.0	140±14	1013±101

### 3) DISASSEMBLY

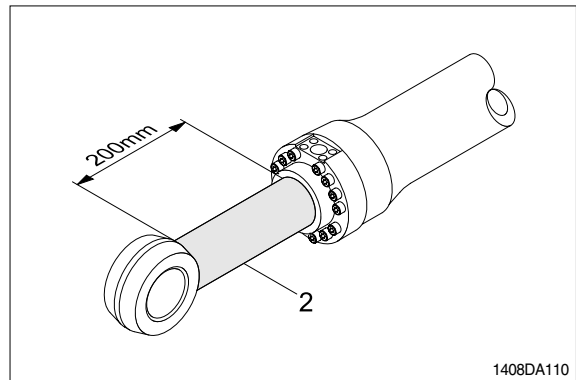
#### (1) Remove cylinder head and piston rod

※ Procedures are based on the bucket cylinder.

① Hold the clevis section of the tube in a vise.

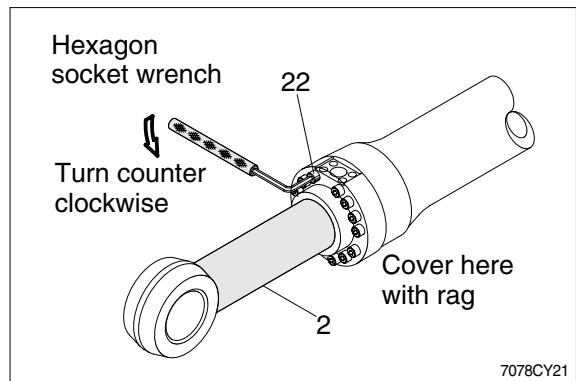
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

② Pull out rod assembly(2) about 200mm (7.1in). Because the rod assembly is rather heavy, finish extending it with air pressure after the oil draining operation.



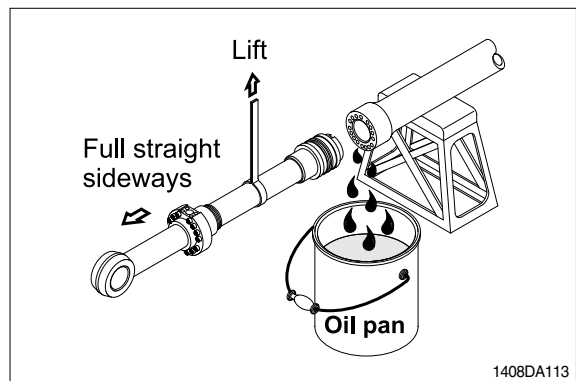
③ Loosen and remove socket bolts(22) of the gland in sequence.

※ Cover the extracted rod assembly(2) with rag to prevent it from being accidentally damaged during operation.



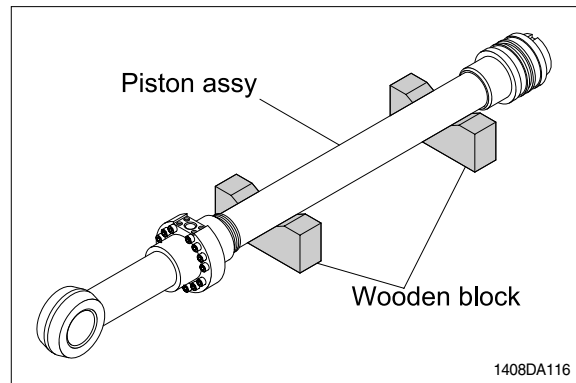
④ Draw out cylinder head and rod assembly together from tube assembly(1).

※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly(2) with a crane or some means and draw it out. However, when rod assembly(2) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



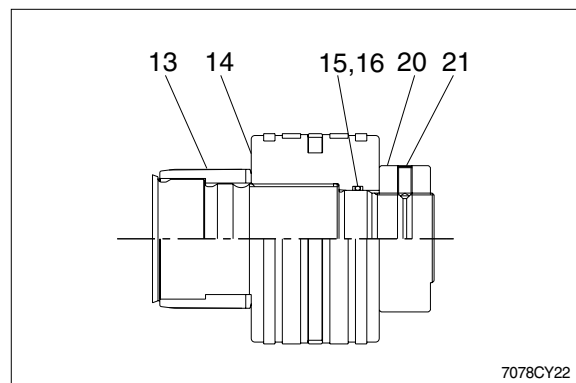
Note that the plated surface of rod assembly(2) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

- ⑤ Place the removed rod assembly on a wooden V-block that is set level.
- ※ Cover a V-block with soft rag.

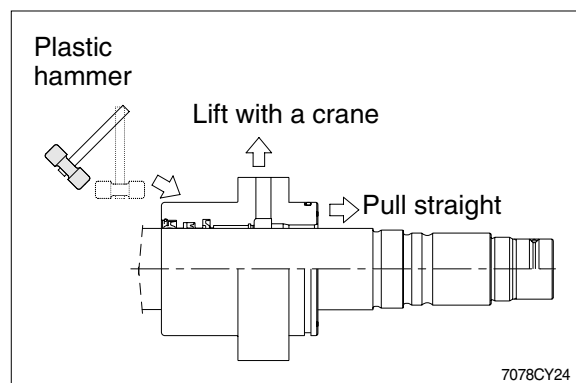


**(2) Remove piston and cylinder head**

- ① Remove screw(21).
- ② Remove lock nut(20).
- ※ Since lock nut(20) is tightened to a high torque, use a hydraulic and power wrench that utilizes a hydraulic cylinder, to remove the lock nut(20).
- ③ Remove piston assembly(14), back up ring(16), and O-ring(15).



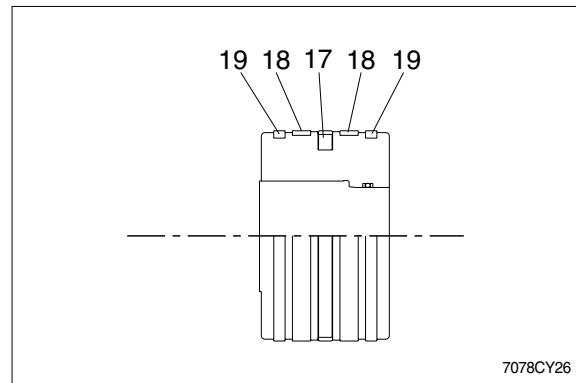
- ③ Remove the cylinder head assembly from rod assembly(2).
  - ※ If it is too heavy to move, move it by striking the flanged part of cylinder head with a plastic hammer.
  - ※ Pull it straight with cylinder head assembly lifted with a crane.
- Exercise care so as not to damage the lip of rod bushing(4) and packing (5,6,7,8,9,10) by the threads of rod assembly(2).





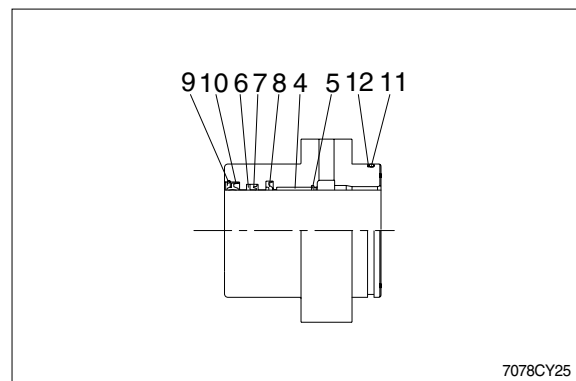
### (3) Disassemble the piston assembly

- ① Remove wear ring(18).
  - ② Remove dust ring(19) and piston seal (17).
- ※ Exercise care in this operation not to damage the grooves.



### (4) Disassemble cylinder head assembly

- ① Remove back up ring(11) and O-ring (12).
  - ② Remove snap ring(10), dust wiper(9).
  - ③ Remove back up ring(7), rod seal(6) and buffer ring(8).
- ※ Exercise care in this operation not to damage the grooves.
- ※ Do not remove seal and ring, if does not damaged.

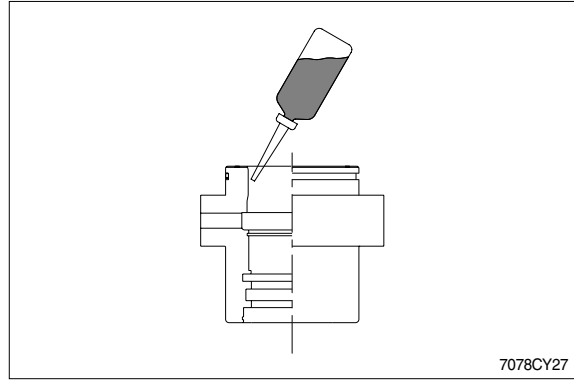


### 3) ASSEMBLY

#### (1) Assemble cylinder head assembly

- ※ Check for scratches or rough surfaces if found smooth with an oil stone.

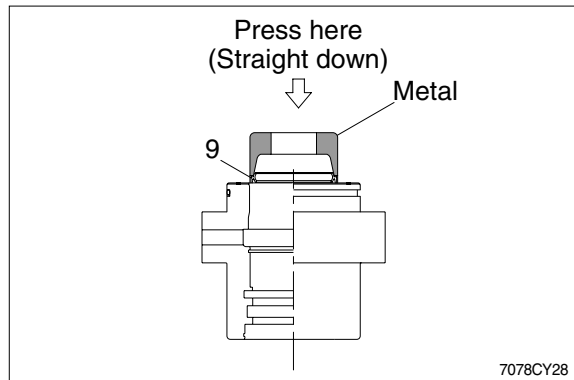
① Coat the inner face of gland(3) with hydraulic oil.



② Coat dust wiper(9) with grease and fit dust wiper(9) to the bottom of the hole of dust seal.

At this time, press a pad metal to the metal ring of dust seal.

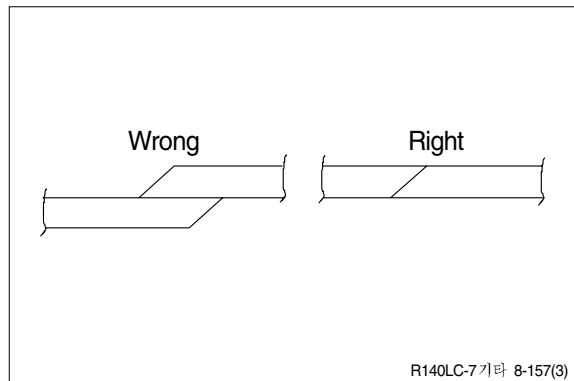
③ Fit snap ring(10) to the stop face.



④ Fit back up ring(7), rod seal(6) and buffer ring(8) to corresponding grooves, in that order.

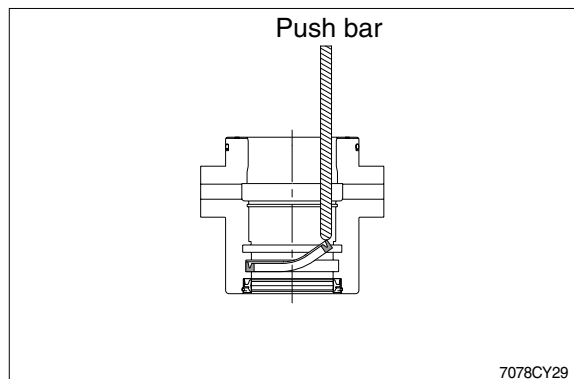
- ※ Coat each packing with hydraulic oil before fitting it.

- ※ Insert the backup ring until one side of it is inserted into groove.

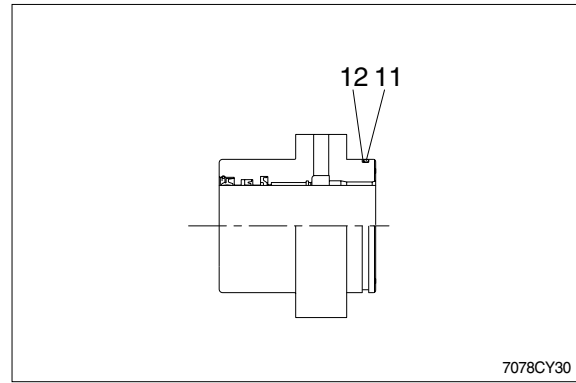


- ※ Rod seal(6) has its own fitting direction. Therefore, confirm it before fitting them.

- ※ Fitting rod seal(6) upside down may damage its lip. Therefore check the correct direction that is shown in fig.

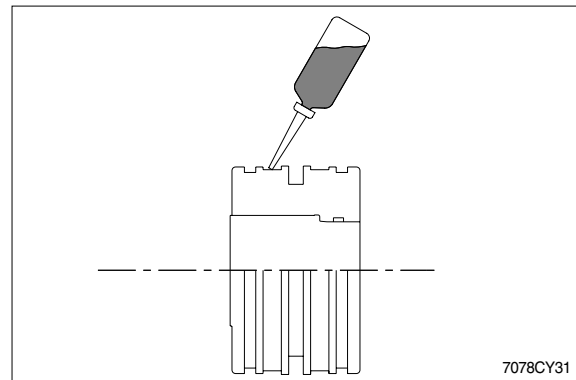


- ⑤ Fit back up ring(12) to gland(3).
- ※ Put the backup ring in the warm water of 30~50°C.
- ⑥ Fit O-ring(11) to gland(3).

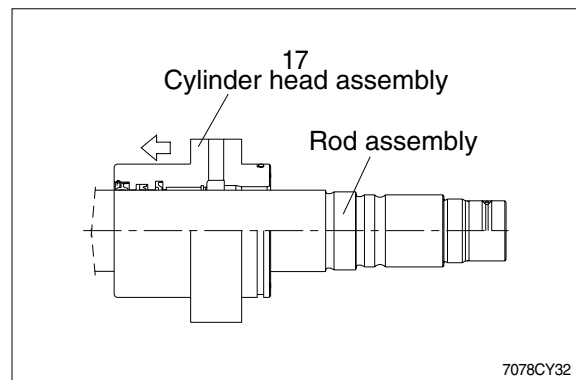


**(2) Assemble piston assembly**

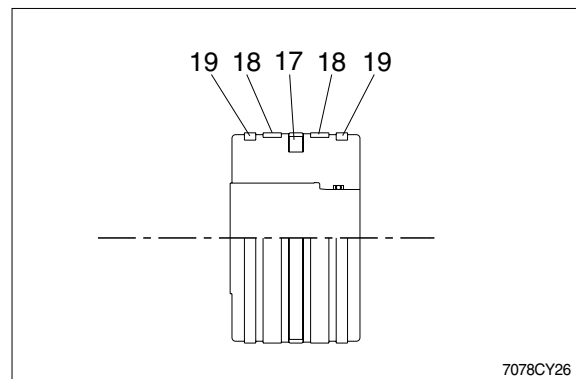
- ※ Check for scratches or rough surfaces.  
If found smooth with an oil stone.
- ① Coat the outer face of piston(14) with hydraulic oil.



- ② Fit piston seal(17) to piston.
- ※ Put the piston seal in the warm water of 60~100°C for more than 5 minutes.
- ※ After assembling the piston seal, press its outer diameter to fit in.

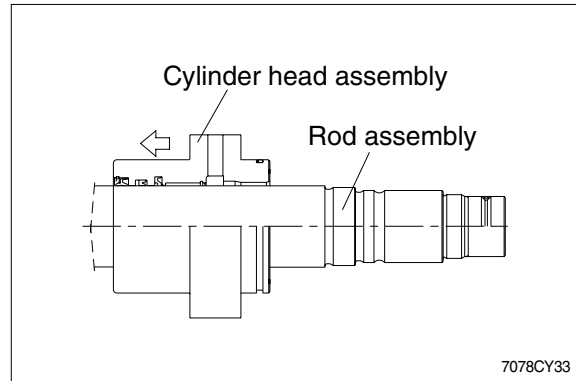


- ③ Fit wear ring(18) and dust ring(19) to piston(14).

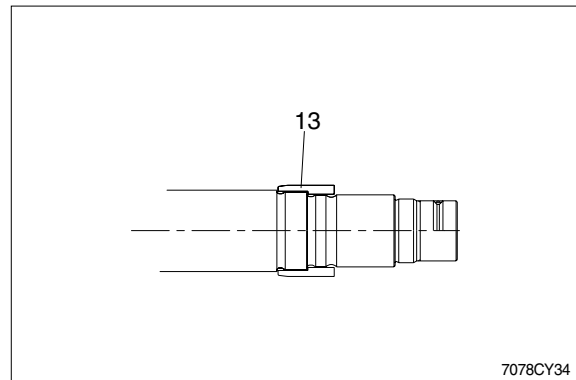


### (3) Install piston and cylinder head

- ① Fix the rod assembly to the work bench.
- ② Apply hydraulic oil to the outer surface of rod assembly(2), the inner surface of piston and cylinder head.
- ③ Insert cylinder head assembly to rod assembly.

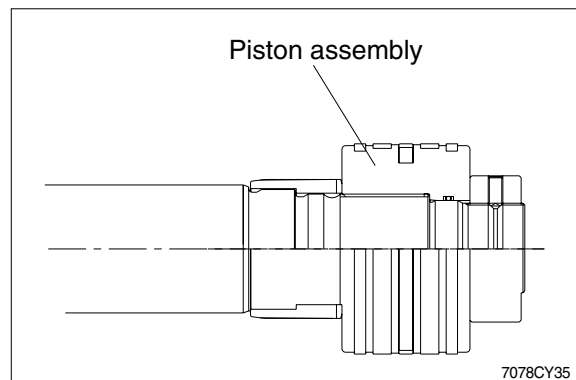


- ④ Insert cushion ring(13) to rod assembly.
- ※ Note that cushion ring(13) has a direction in which it should be fitted.



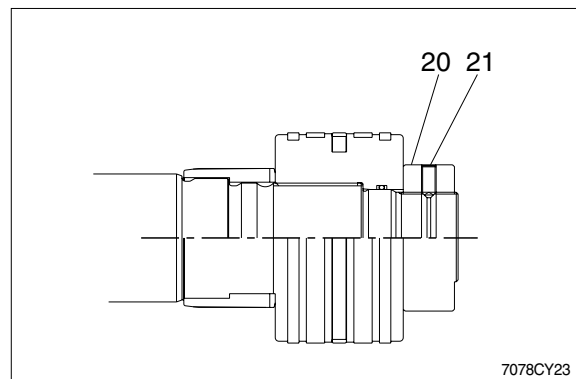
- ⑤ Fit piston assembly to rod assembly.
- Tightening torque :

Item		kgf · m	lbf · ft
Boom	14	100 ± 10	723 ± 72
Arm	14	150 ± 15	1085 ± 109
Bucket	14	100 ± 10	723 ± 72
Dozer	14	140 ± 14	1013 ± 101



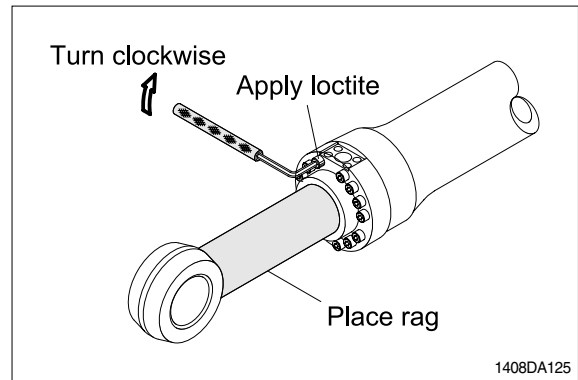
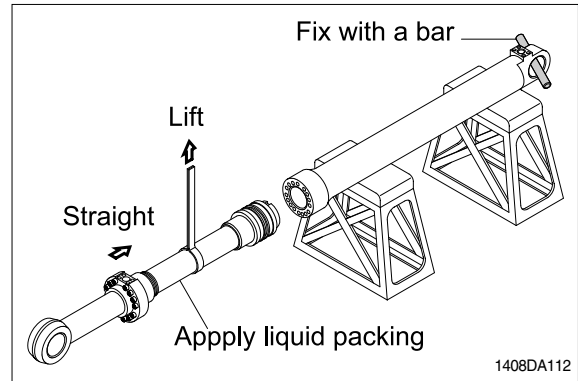
- ⑥ Fit lock nut(20) to piston and screw(21).
- Tightening torque :

Item		kgf · m	lbf · ft
Boom	20	190 ± 19	1375 ± 138
Arm	20	180 ± 18	1302 ± 130
Bucket	20	170 ± 17	1230 ± 123



#### (4) Overall assemble

- ① Place a V-block on a rigid work bench.  
Mount the tube assembly(1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.
- ② Insert the rod assembly in to the tube assembly, while lifting and moving the rod assembly with a crane.
  - ※ Be careful not to damage piston seal by thread of tube assembly.
- ③ Match the bolt holes in the cylinder head flange to the tapped holes in the tube assembly and tighten socket bolts to a specified torque.
  - ※ Refer to the table of tightening torque.

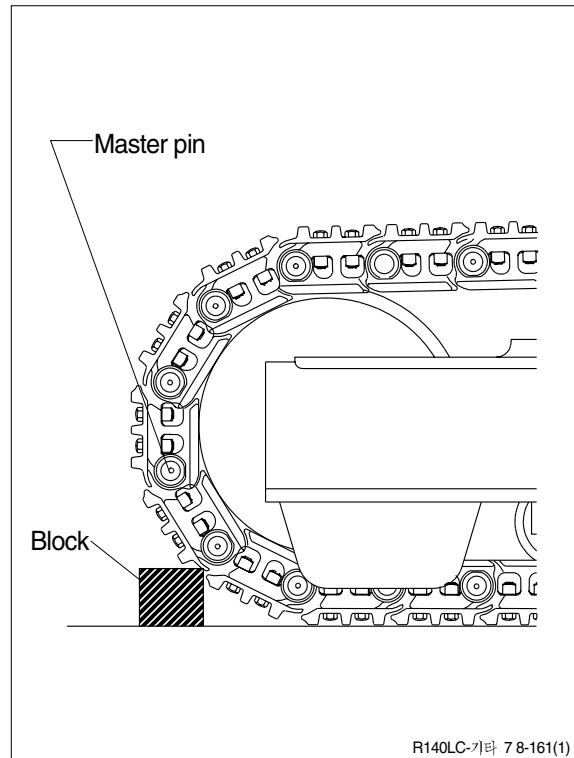


## GROUP 10 UNDERCARRIAGE

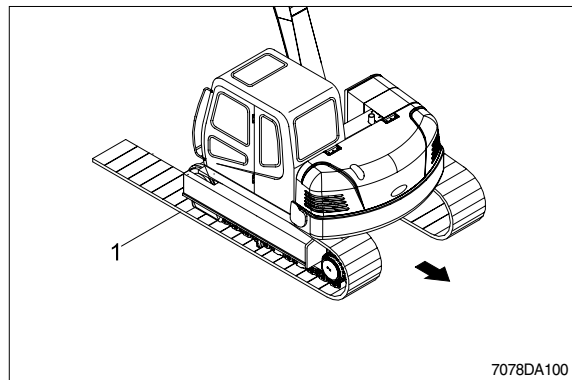
### 1. TRACK LINK

#### 1) REMOVAL

- (1) Move track link until master pin is over front idler in the position put wooden block as shown.
- (2) Loosen tension of the track link.
  - ※ If track tension is not relieved when the grease valve is loosened, move the machine backwards and forwards.
- (3) Push out master pin by using a suitable tool.

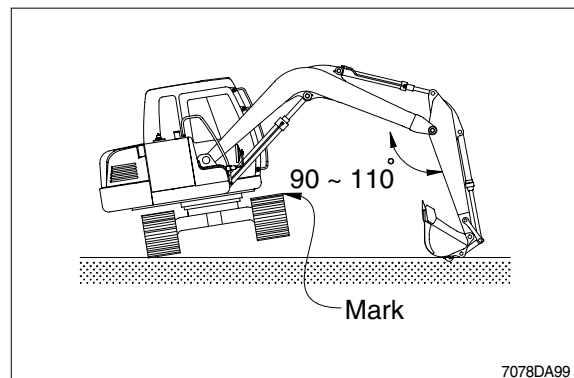


- (4) Move the machine slowly in reverse, and lay out track link assembly (1).
  - ※ Jack up the machine and put wooden block under the machine.
  - ※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



#### 2) INSTALL

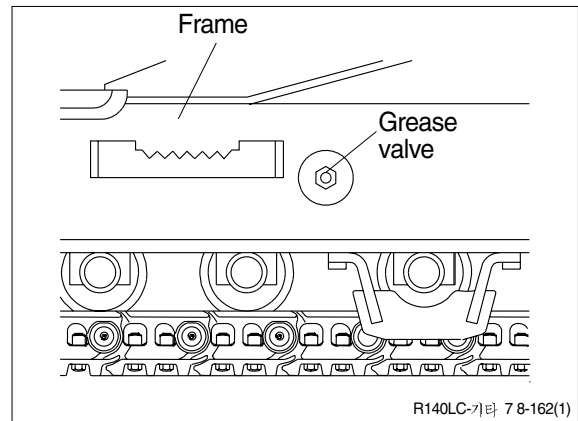
- (1) Carry out installation in the reverse order to removal.
  - ※ Adjust the tension of the track link.



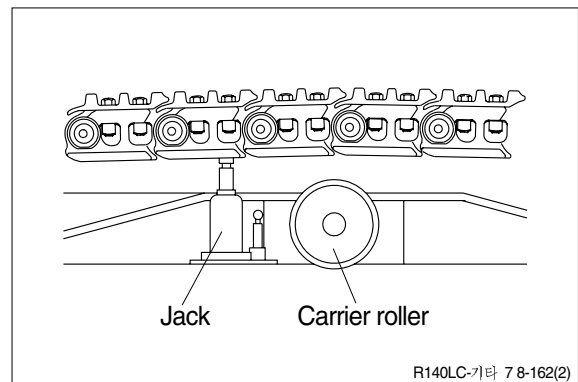
## 2. CARRIER ROLLER

### 1) REMOVAL

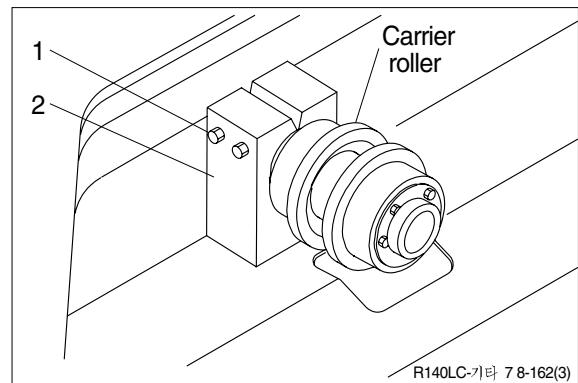
- (1) Loosen tension of the track link.



- (2) Jack up the track link height enough to permit carrier roller removal.



- (3) Loosen the lock nut (1).
- (4) Open bracket(2) with a screwdriver, push out from inside, and remove carrier roller assembly.
  - Weight : 13kg(29lb)



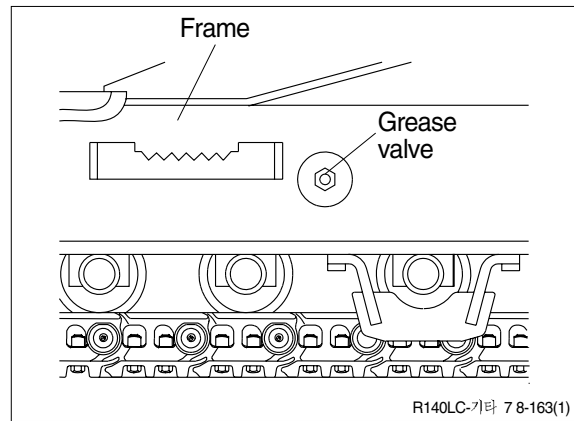
### 2) INSTALL

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

### 3. TRACK ROLLER

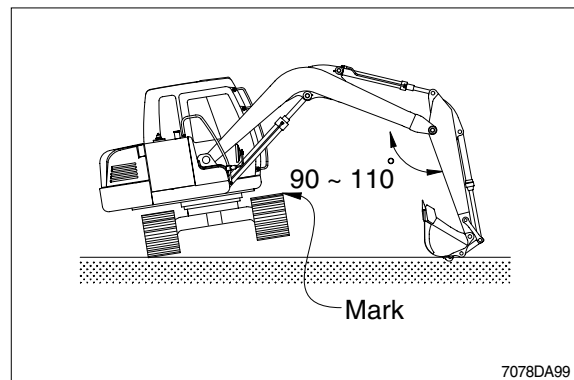
#### 1) REMOVAL

- (1) Loosen tension of the track link.



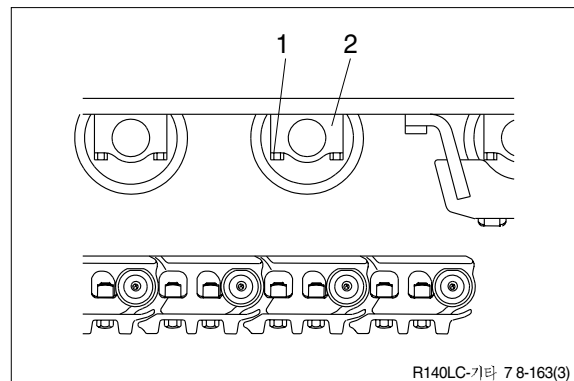
- (2) Using the work equipment, push up track frame on side which is to be removed.

※ After jack up the machine, set a block under the unit.



- (3) Remove the mounting bolt(1) and draw out the track roller(2).

· Weight : 16kg(36lb)



#### 2) INSTALL

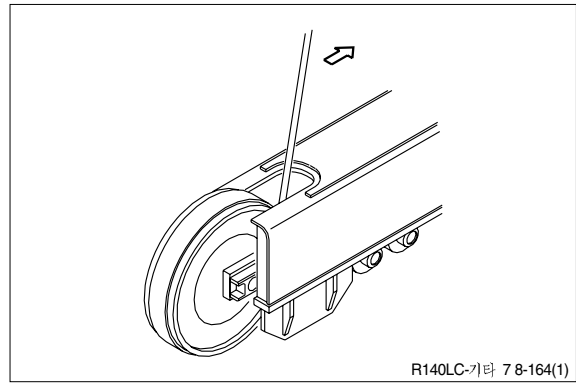
- (1) Carry out installation in the reverse order to removal.



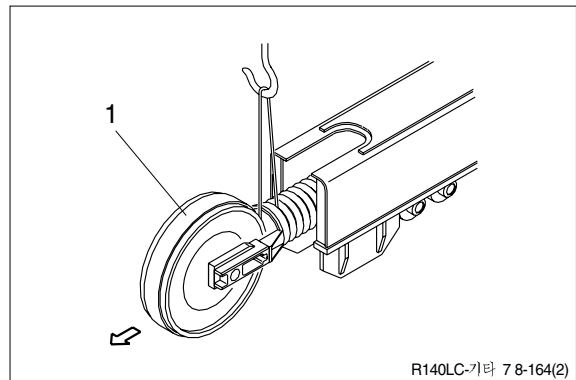
## 4. IDLER AND RECOIL SPRING

### 1) REMOVAL

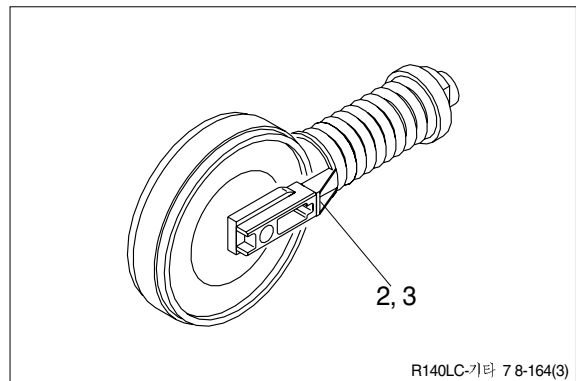
- (1) Remove the track link.  
For detail, see **removal of track link**.



- (2) Sling the recoil spring(1) and pull out idler and recoil spring assembly from track frame, using a pry.  
· Weight : 120kg(265lb)

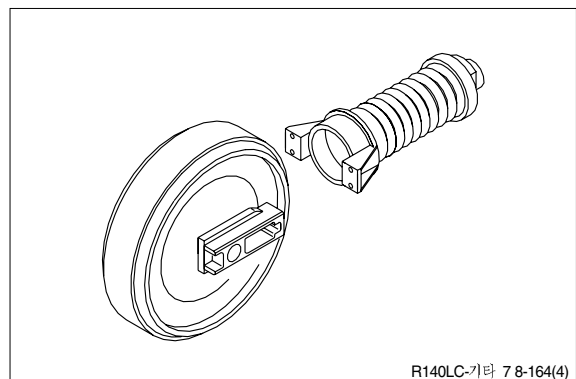


- (3) Remove the bolts(2), washers(3) and separate idler from recoil spring.



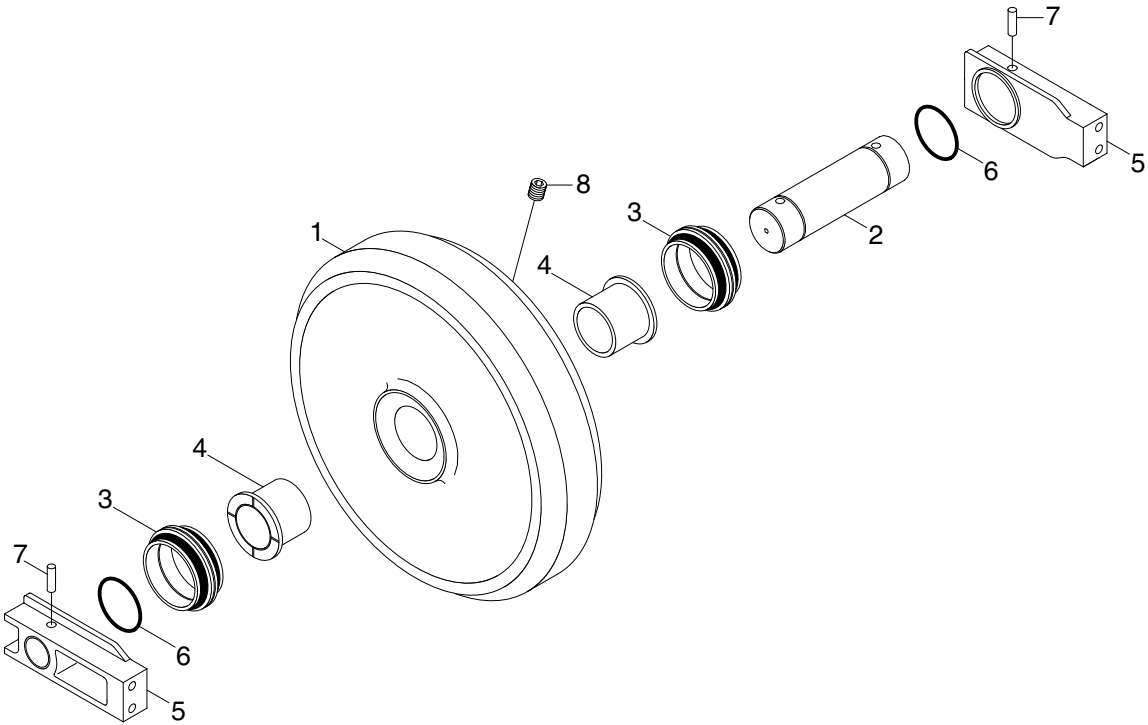
### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.  
※ Make sure that the boss on the end face of the recoil cylinder rod is in the hole of the track frame.



### 3) DISASSEMBLY AND ASSEMBLY OF IDLER

#### (1) Structure

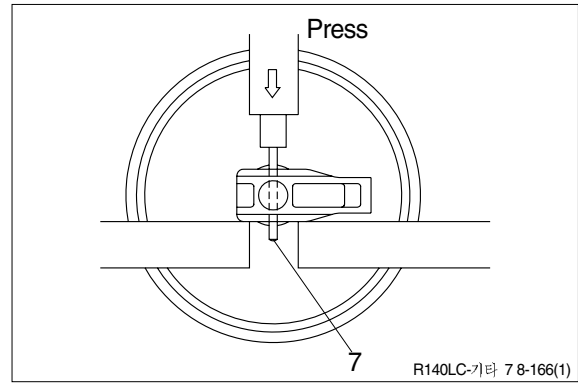


21078DA43

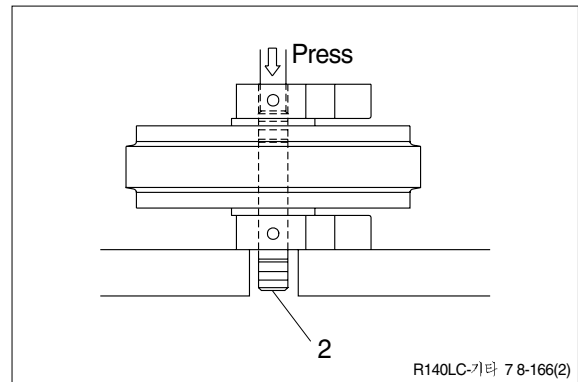
- |   |               |   |         |   |            |
|---|---------------|---|---------|---|------------|
| 1 | Shell         | 4 | Bushing | 7 | Spring pin |
| 2 | Shaft         | 5 | Bracket | 8 | Plug       |
| 3 | Seal assembly | 6 | O-ring  |   |            |

## (2) Disassembly

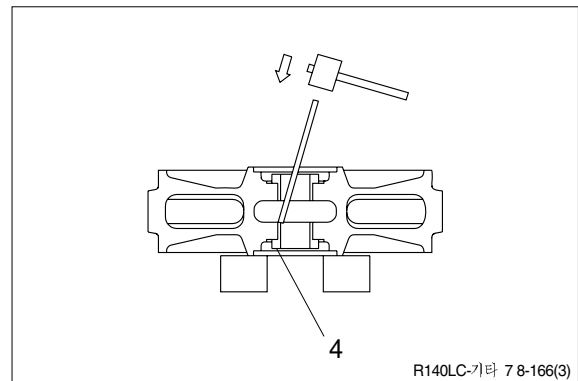
- ① Remove plug and drain oil.
- ② Draw out the spring pin(7), using a press.



- ③ Pull out the shaft(2) with a press.
- ④ Remove seal(3) from idler(1) and bracket (5).
- ⑤ Remove O-ring(6) from shaft.



- ⑥ Remove the bushing(4) from idler, using a special tool.
- ※ Only remove bushing if replacement is necessity.

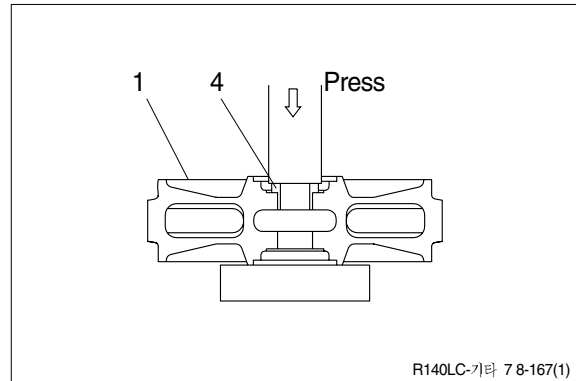


### (3) Assembly

- ※ Before assembly, clean the parts.
- ※ Coat the sliding surfaces of all parts with oil.

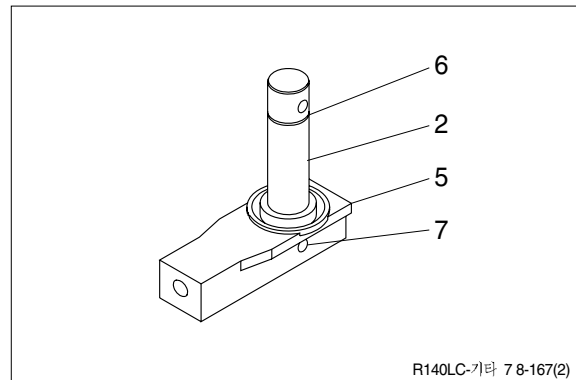
① Cool up bushing(4) fully by some dry ice and press it into shell(1).

Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.

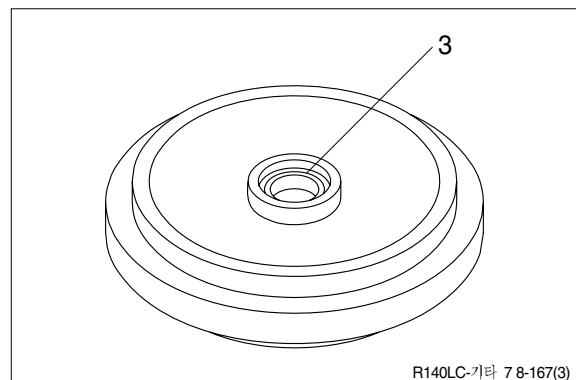


② Coat O-ring(6) with grease thinly, and install it to shaft(2).

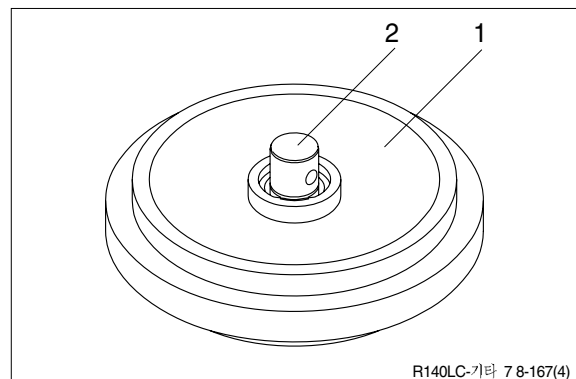
③ Insert shaft(2) into bracket(5) and drive in the spring pin(7).



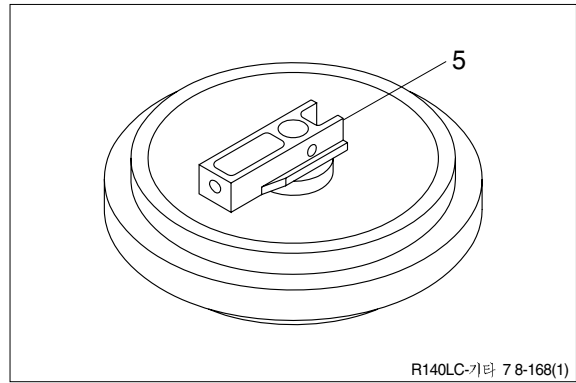
④ Install seal(3) to shell(1) and bracket(5).



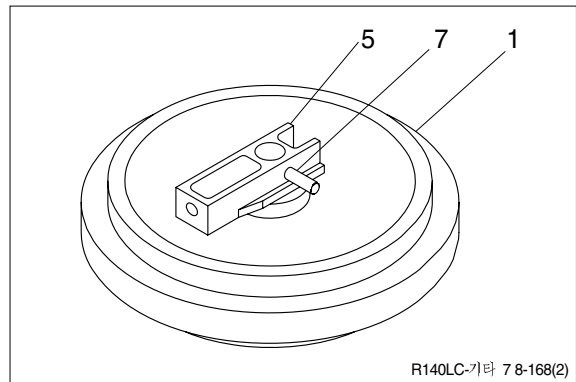
⑤ Install shaft(2) to shell(1).



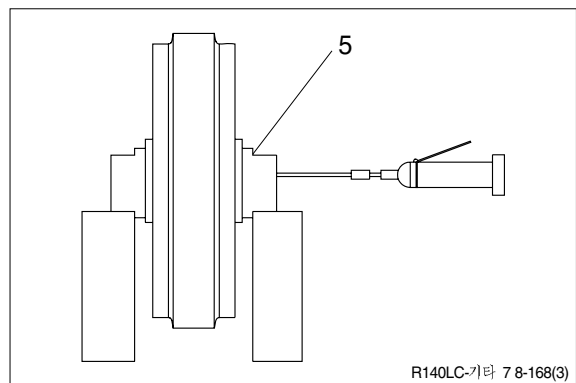
⑥ Install bracket(5) attached with seal(3).



⑦ Knock in the spring pin(7) with a hammer.

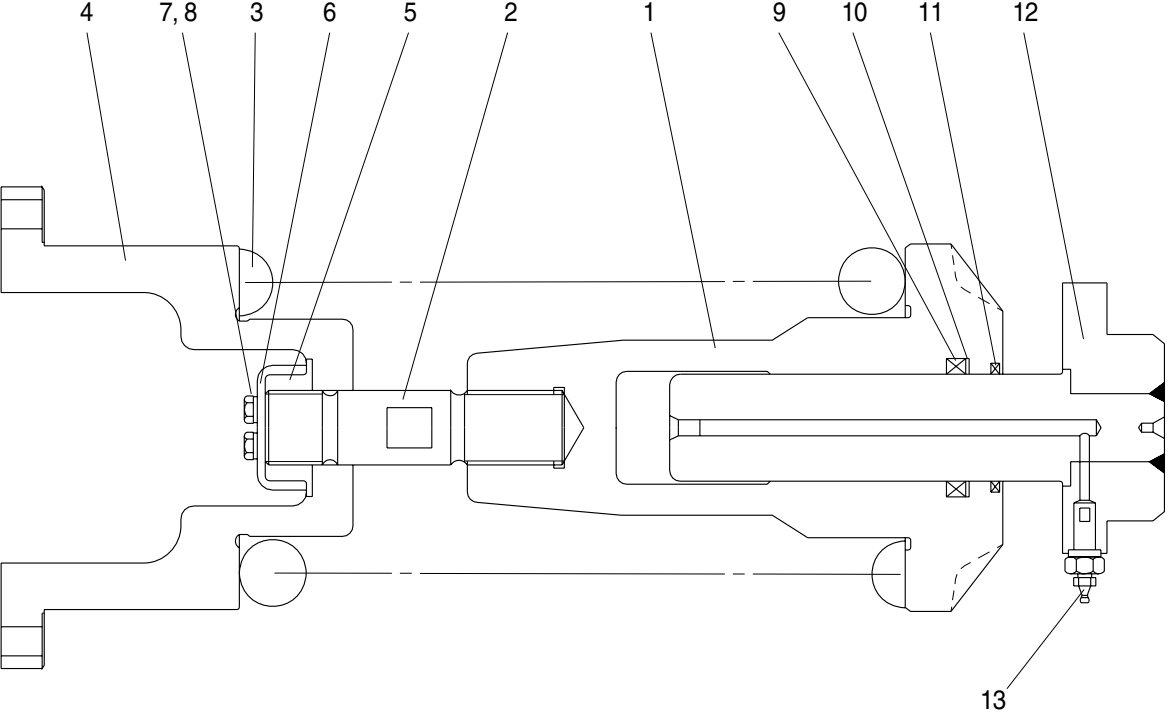


⑧ Lay bracket(5) on its side.  
Supply engine oil to the specified level,  
and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure



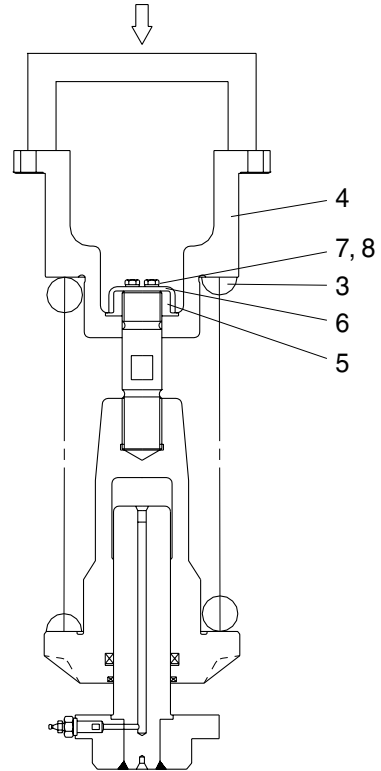
R210UCG1

- |   |          |    |               |    |              |
|---|----------|----|---------------|----|--------------|
| 1 | Body     | 6  | Lock plate    | 11 | Dust seal    |
| 2 | Tie bar  | 7  | Bolt          | 12 | Rod assembly |
| 3 | Spring   | 8  | Spring washer | 13 | Grease valve |
| 4 | Bracket  | 9  | Rod seal      |    |              |
| 5 | Lock nut | 10 | Back up ring  |    |              |

## (2) Disassembly

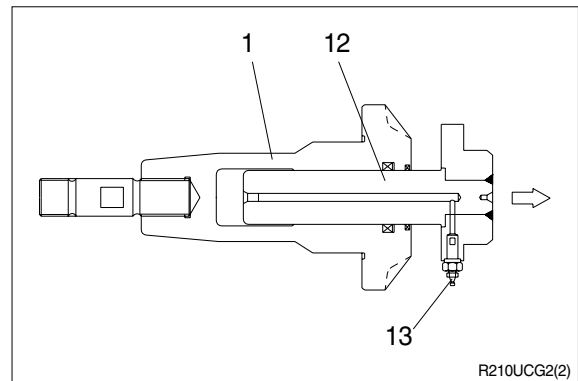
- ① Apply pressure on spring(3) with a press.
  - ※ The spring is under a large installed load. This is dangerous, so be sure to set properly.
    - Spring set load : 5083kg(11206lb)
- ② Remove bolt(7), spring washer(8) and lock plate(6).
- ③ Remove lock nut(5).

Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.
- ④ Lighten the press load slowly and remove bracket(4) and spring(3).



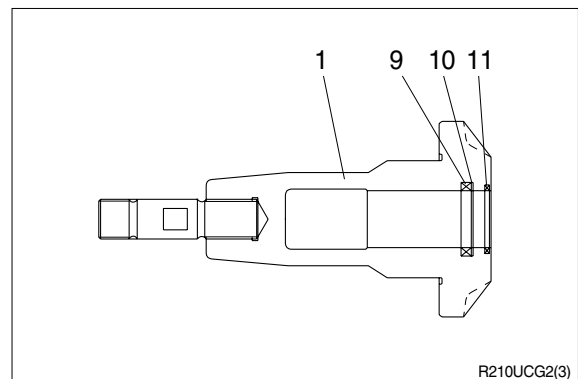
R210UCG2(1)

- ⑤ Remove rod(12) from body(1).
- ⑥ Remove grease valve(13) from rod(12).



R210UCG2(2)

- ⑦ Remove rod seal(9), back up ring(10) and dust seal(11).

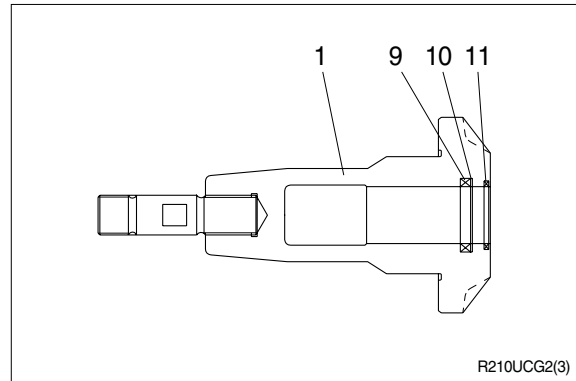


R210UCG2(3)

### (3) Assembly

① Install dust seal(11), back up ring(10) and rod seal(9) to body(1).

※ When installing dust seal(11) and rod seal(9), take full care so as not to damage the lip.



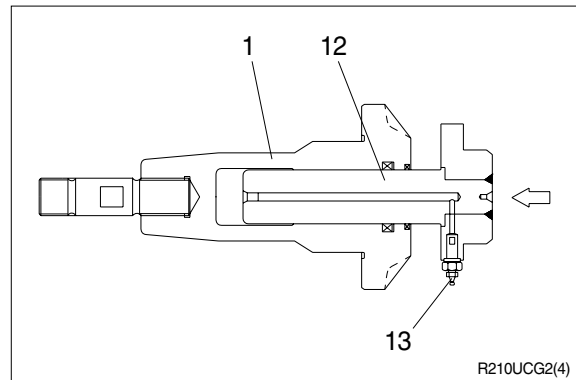
② Pour grease into body(1), then push in rod(12) by hand.

After take grease out of grease valve mounting hole, let air out.

※ If air letting is not sufficient, it may be difficult to adjust the tension of crawler.

③ Fit grease valve(13) to rod(12).

· Tightening torque :  $10 \pm 1 \text{ kg} \cdot \text{m}$   
( $72.4 \pm 7.2 \text{ lb} \cdot \text{ft}$ )

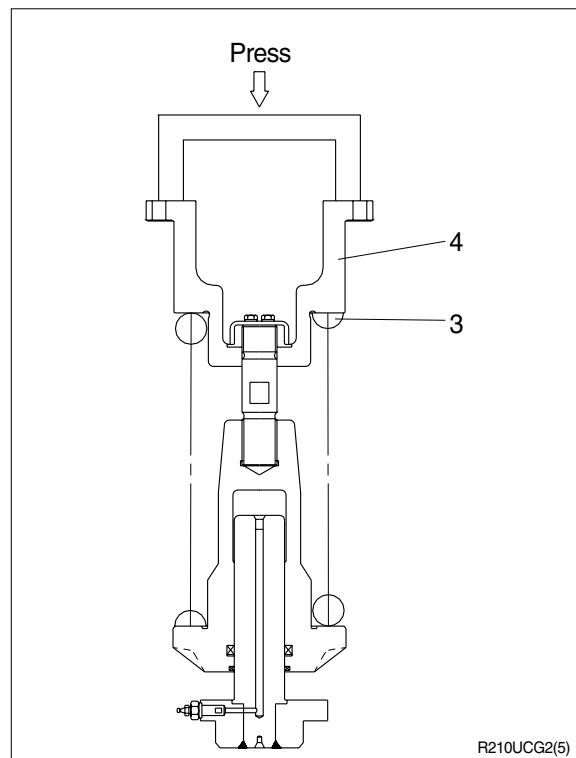


④ Install spring(3) and bracket(4) to body (1).

⑤ Apply pressure to spring(3) with a press and tighten lock nut(5).

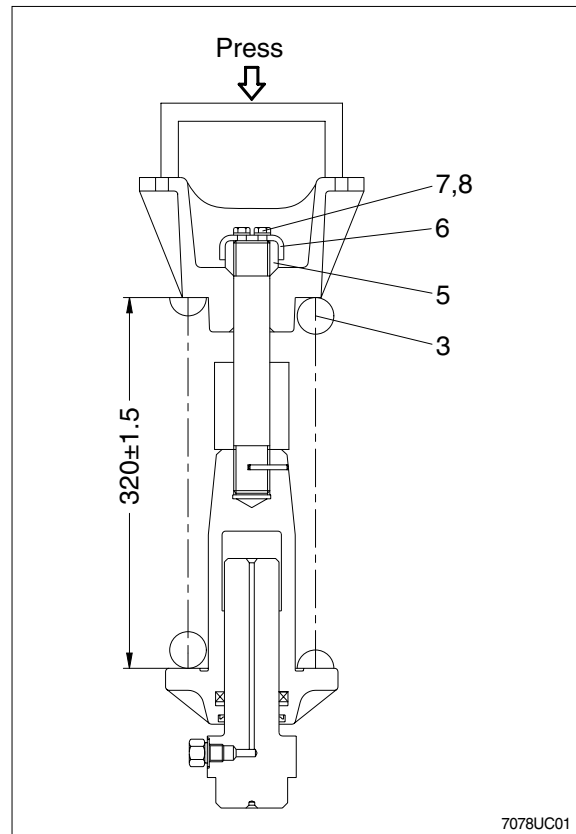
※ Apply sealant before assembling.

※ During the operation, pay attention specially to prevent the press from slipping out.





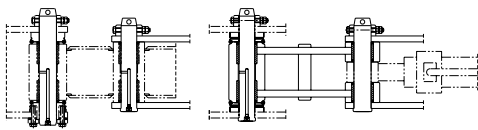
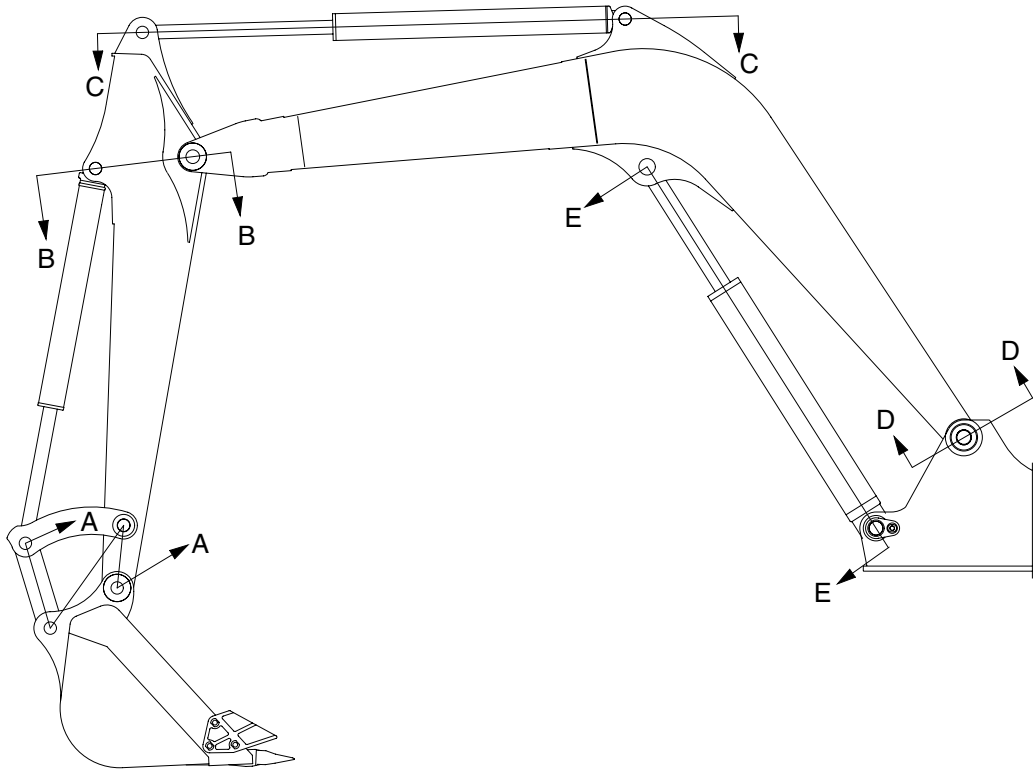
- ⑥ Lighten the press load and confirm the set length of spring(3).
- ⑦ After the setting of spring(3), install lock plate(6), spring washer(8) and bolt(7).



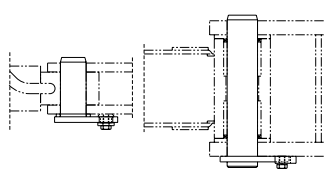
7078UC01

# GROUP 11 WORK EQUIPMENT

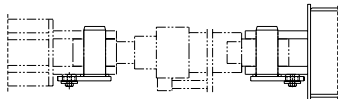
## 1. STRUCTURE



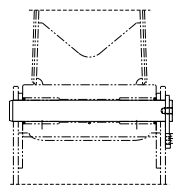
SECTION A-A



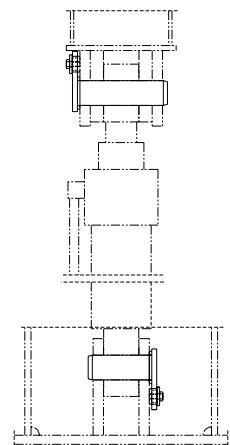
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

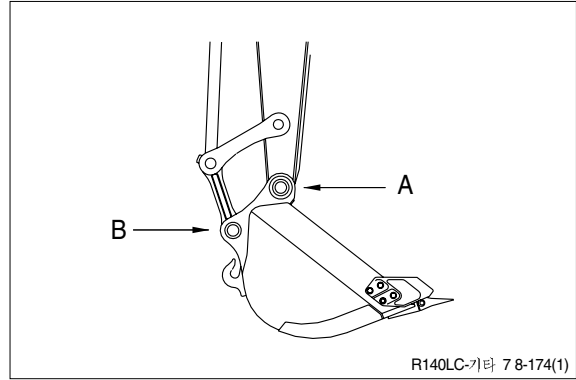
7078AT01

## 2. REMOVAL AND INSTALL

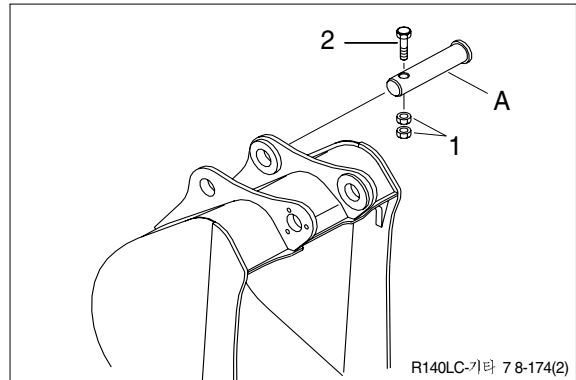
### 1) BUCKET ASSEMBLY

#### (1) Removal

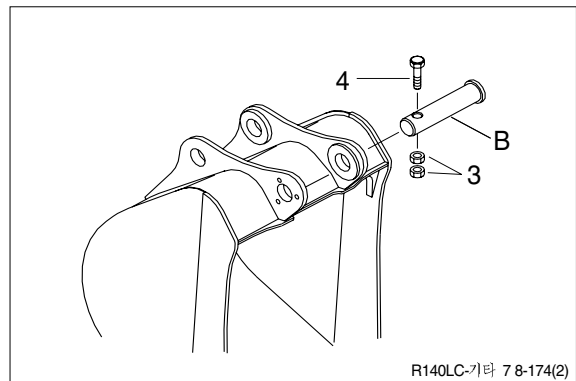
- ① Lower the work equipment completely to ground with back of bucket facing down.



- ② Remove nut(1), bolt(2) and draw out the pin(A).



- ③ Remove nut(3), bolt(4) and draw out the pin(B).

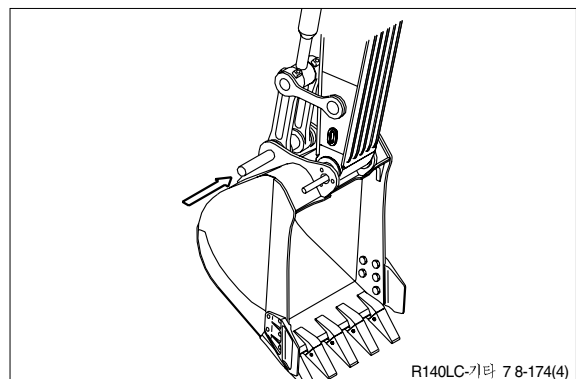


#### (2) Install

- ① Carry out installation in the reverse order to removal.

**▲** When aligning the mounting position of the pin, do not insert your fingers in the pin hole.

※ Adjust the bucket clearance.  
For detail, see **operation manual**.



## 2) ARM ASSEMBLY

### (1) Removal

- ※ Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

- ① Remove bucket assembly.  
For details, see **removal of bucket assembly**.

- ② Disconnect bucket cylinder hose(1).

**▲ Fit blind plugs(5) in the piping at the chassis end securely to prevent oil from spurting out when the engine is started.**

- ③ Sling arm cylinder assembly, remove spring, pin stopper and pull out pin.

- ※ Tie the rod with wire to prevent it from coming out.

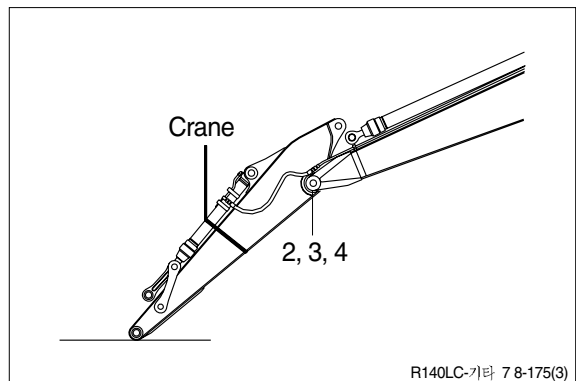
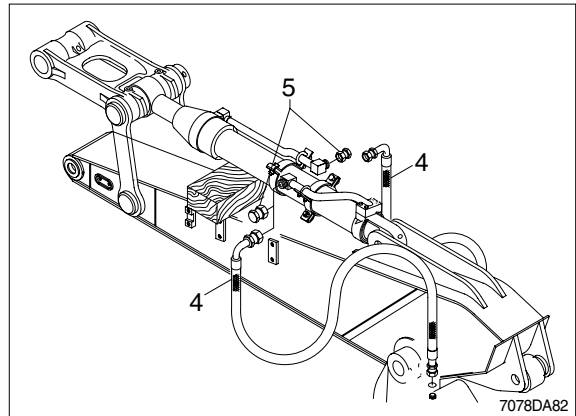
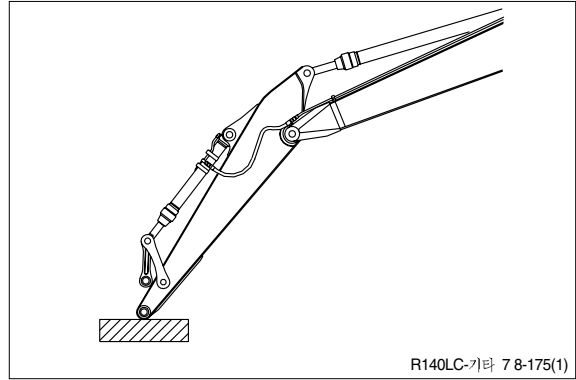
- ④ For details, see **removal of arm cylinder assembly**.

Place a wooden block under the cylinder and bring the cylinder down to it.

- ⑤ Remove bolt(2), plate(3) and pull out the pin(4) then remove the arm assembly.

· Weight : 250kg(550lb)

- ※ When lifting the arm assembly, always lift the center of gravity.



### (2) Install

- ① Carry out installation in the reverse order to removal.

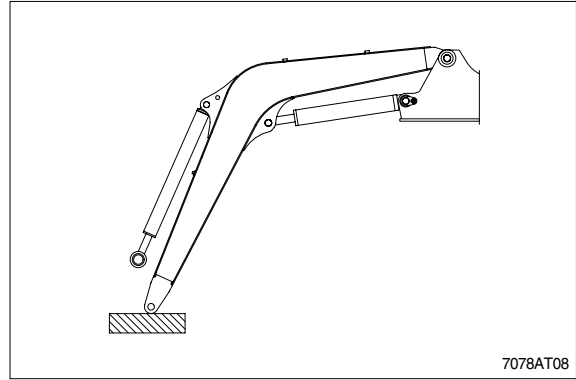
**▲ When lifting the arm assembly, always lift the center of gravity.**

- ※ Bleed the air from the cylinder.

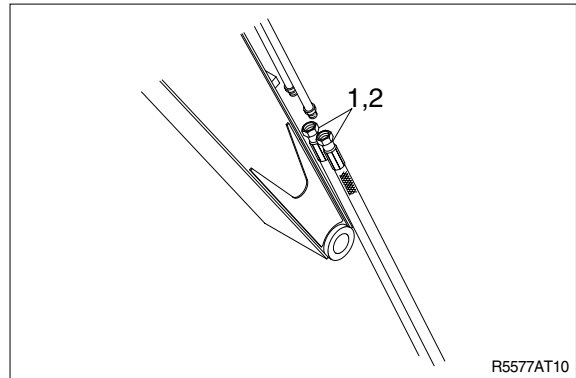
### 3) BOOM ASSEMBLY

#### (1) Removal

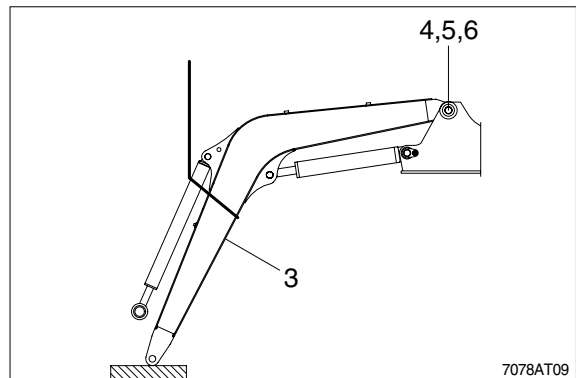
- ① Remove arm and bucket assembly.  
For details, see **removal of arm and bucket assembly**.
- ② Remove boom cylinder assembly from boom.  
For details, see **removal of boom cylinder assembly**.



- ③ Disconnect head lamp wiring.
- ④ Disconnect bucket cylinder hose(2) and arm cylinder hose(1).  
※ When the hose are disconnected, oil may spurt out.
- ⑤ Sling boom assembly(3).



- ⑥ Remove bolt(4), plate(5) and pull out the pin(6) then remove boom assembly.  
· Weight :570kg(1260lb)  
※ When lifting the boom assembly always lift the center of gravity.



#### (2) Install

- ① Carry out installation in the reverse order to removal.
- ▲ **When lifting the arm assembly, always lift the center of gravity.**
- ※ Bleed the air from the cylinder.

