

## SECTION 7 DISASSEMBLY AND ASSEMBLY

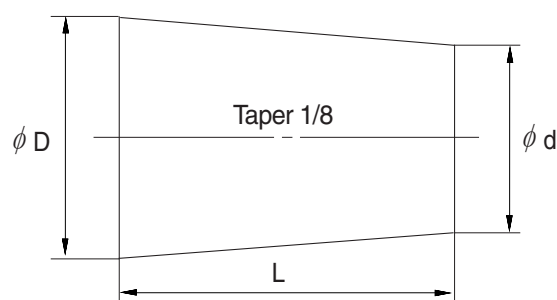
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## GROUP 1 PRECAUTIONS

### 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)-LH	M10 × 1.5	6.63±1.0	48±7.2
2		Engine mounting bolt (Engine-Bracket)-RH	M10 × 1.5	6.63±1.0	48±7.2
3		Engine mounting bolt (Bracket-Frame)	M12 × 1.75	11.0±2.25	97.6±16.3
4		Engine mounting bolt (Frame-Pump housing)	M12 × 1.75	12.8±3.0	93±22.0
5		Radiator mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
6		Coupling mounting bolt	M12 × 1.75	10±1.0	72.3±7.2
7		Fuel tank mounting bolt	M10 × 1.5	6.9±1.4	50±10.0
8	Hydraulic system	Main pump mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
9		Main pump housing mounting bolt	M10 × 1.5	6.63±1.0	48±7.2
10		Main control valve mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
11		Hydraulic oil tank mounting bolt	M12 × 1.75	12.3±2.5	89±18.1
12		Turning joint mounting bolt, nut	M12 × 1.75	12.8±3.0	93±22.0
13		Swing motor mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
14	Power train system	Swing bearing upper mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
15		Swing bearing lower mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
16		Travel motor mounting bolt	M12 × 1.75	14.4±2.1	104±15.2
17		Sprocket mounting bolt	M12 × 1.75	12.3±1.2	89±8.7
18	Under carriage	Upper roller mounting bolt, nut	M14 × 2.0	19.6±2.9	142±21.0
19		Lower roller mounting bolt	M16 × 1.5	31.3±3.0	226±21.7
20	Others	Counterweight mounting bolt	M20 × 2.5	57.9±8.7	419±62.9
21		Cab mounting bolt, nut	M 8 × 1.25	2.5±0.5	18.1±3.6
22		Operator's seat mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
23		Under cover mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
24		Swing post pin mounting bolt, nut	M12 × 1.75	12.8±3.0	93±22.0

## 2. TORQUE CHART

Use following table for unspecified torque.

### 1) BOLT AND NUT

#### (1) Coarse thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · 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	2.7 ~ 4.1	19.5 ~ 29.7
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 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
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 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

#### (2) Fine thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562

**2) PIPE AND HOSE (FLARE type)**

Thread size (PF)	Width across flat (mm)	kgf · m	lbf · ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

**3) PIPE AND HOSE (ORFS type)**

Thread size (UNF)	Width across flat (mm)	kgf · m	lbf · ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130
1-7/16-12	41	21	152
1-11/16-12	50	35	253

**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	9.5	68.7
3/4"	36	18	130
1"	41	21	152
1-1/4"	50	35	253

## 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.**

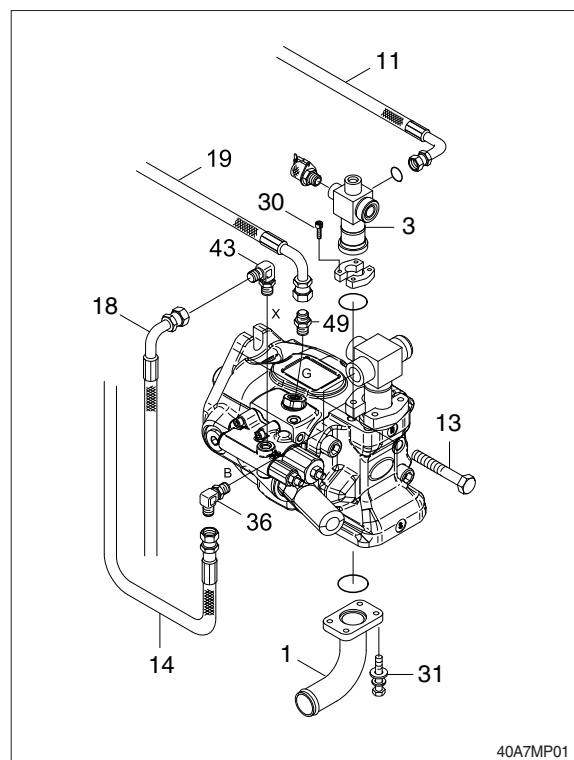
- (4) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.

· Hydraulic tank quantity : 44 ℓ  
(11.6 U.S.gal)

- (5) Disconnect hoses (11) and loosen bolt (30) and remove pipe (3).
- (6) Disconnect pilot line hoses (14, 18, 19) and remove connectors (36, 43, 49).
- (7) Remove socket bolts (31) 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 (13).
  - Weight : 25 kg (54 lb)
  - Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $93 \pm 22$  lbf·ft)

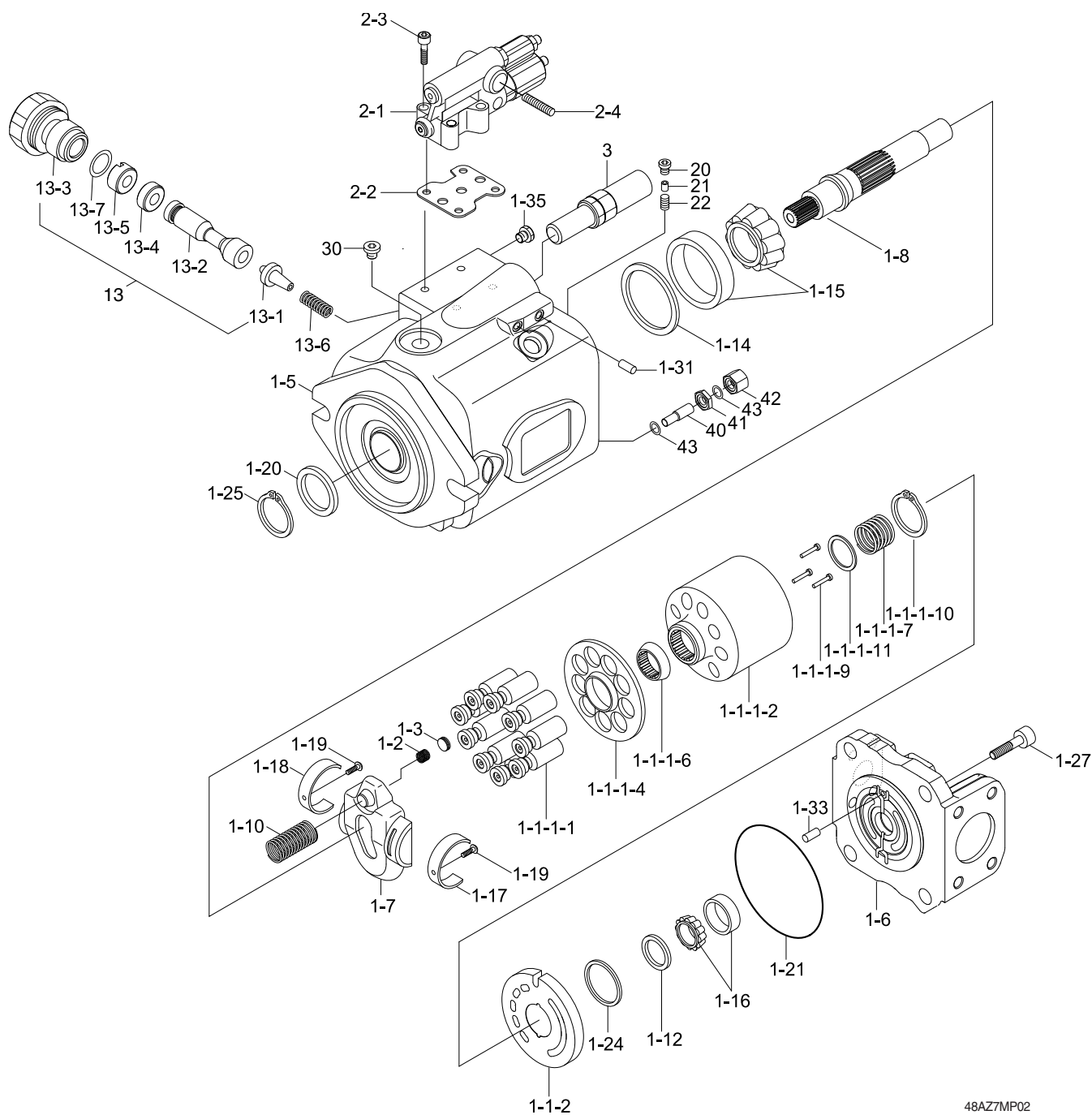
※ Pull out the pump assembly from housing. When removing the pump assembly, check that all the hoses have been disconnected.



## 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. STRUCTURE (1/2)



48AZ7MP02

1-1-1	Rotary assy	1-1-2	Control plate	1-14	Stop ring
1-1-1-1	Piston and shoe	1-2	Pressure spring	1-15	Taper roller bearing
1-1-1-2	Block	1-3	Stopper	1-16	Taper roller bearing
1-1-1-4	Retaining plate	1-5	Pump housing	1-17	Liner bearing
1-1-1-6	Retainer ball	1-6	Connection plate	1-18	Liner bearing
1-1-1-7	Spring	1-7	Swing cradle	1-19	Flat screw
1-1-1-9	Pressure pin	1-8	Drive shaft	1-20	Shaft seal
1-1-1-10	V ring	1-10	Spring	1-21	O-ring
1-1-1-11	Back up plate	1-12	Adjust shim	1-24	Seat

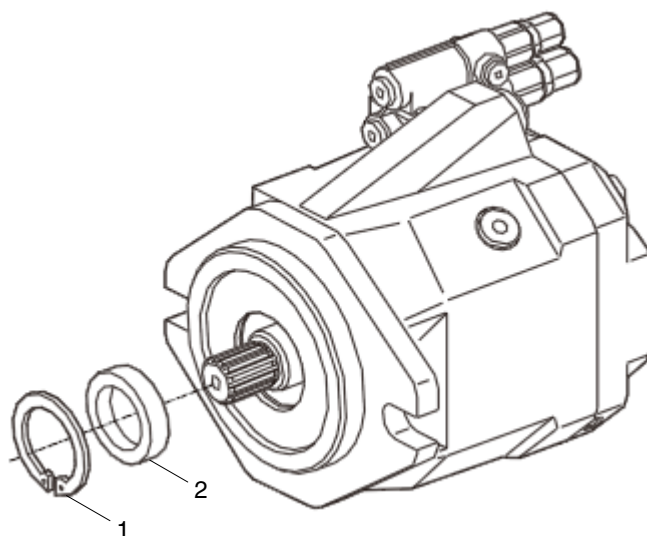
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48AZ7MP02

7-10

### 3. DISASSEMBLY AND ASSEMBLY

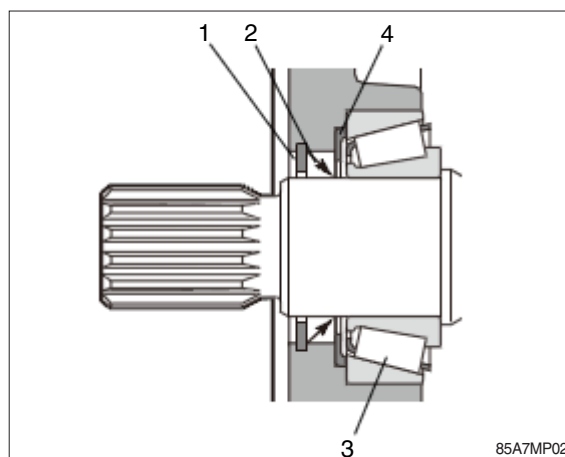
#### 1) SEALING OF THE DRIVE SHAFT



85A7MP01

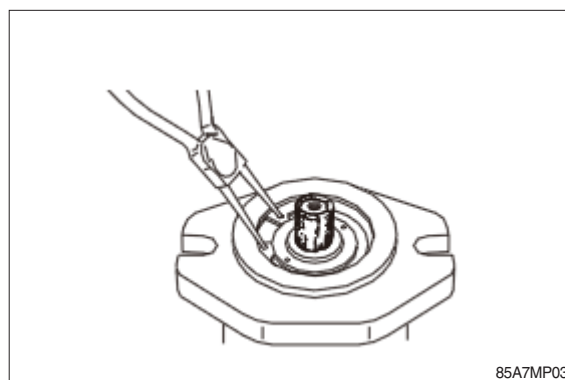
#### (1) Components

- ① Circlip
- ② Shaft seal
- ③ Bearing
- ④ Stop ring



85A7MP02

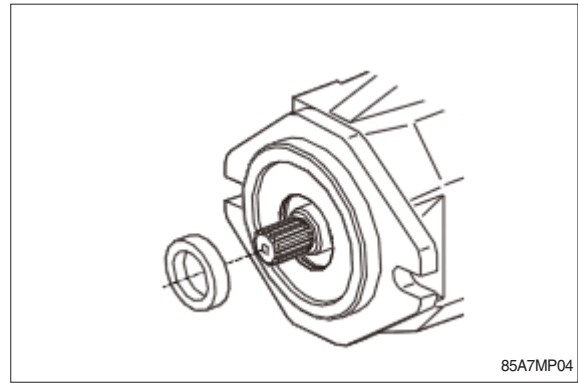
- (2) Protect the drive shaft.
- (3) Remove the circlip.
- (4) Remove shaft seal to front.



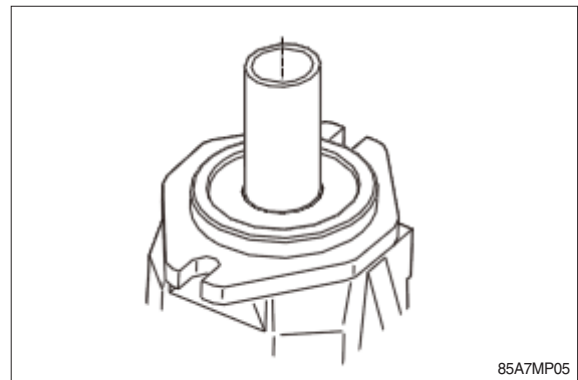
85A7MP03



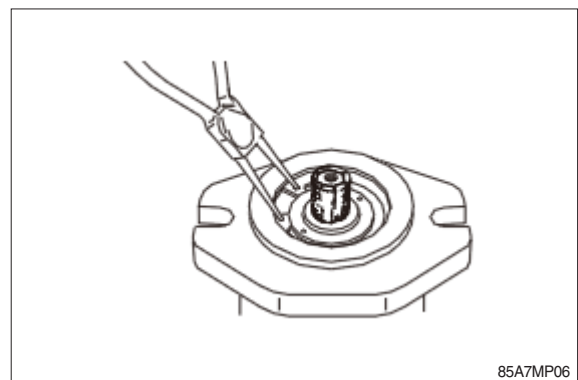
- ※ Change the shaft seal and check its sliding surface (drive shaft) and housing and grease the sealing ring.
- ※ Visual check shaft seal and housing.



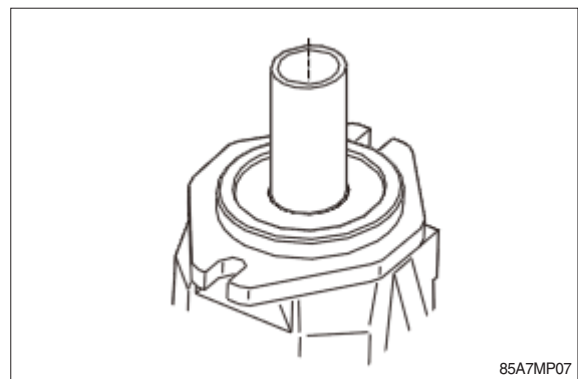
- (5) Assembling of the sealing ring carefully down to the distance ring.



- (6) Assemble the snap ring.

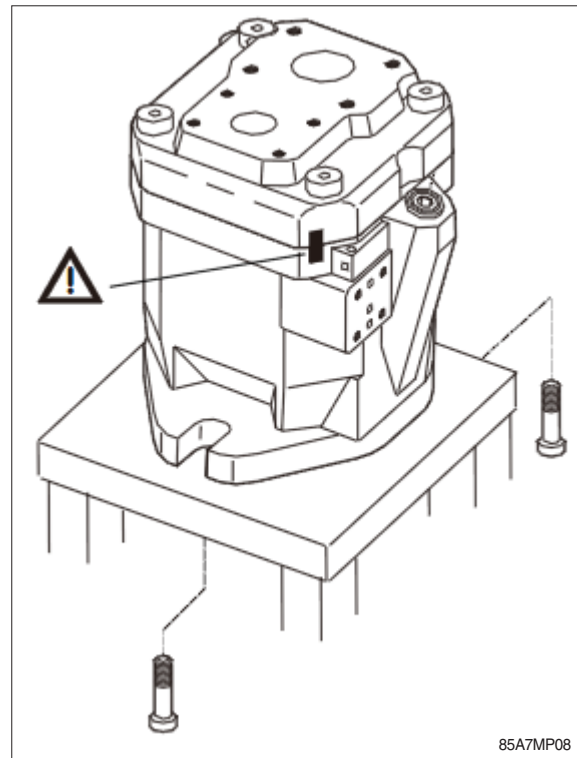


- ※ Visual check to ensure that the circlip is correctly located in the groove.

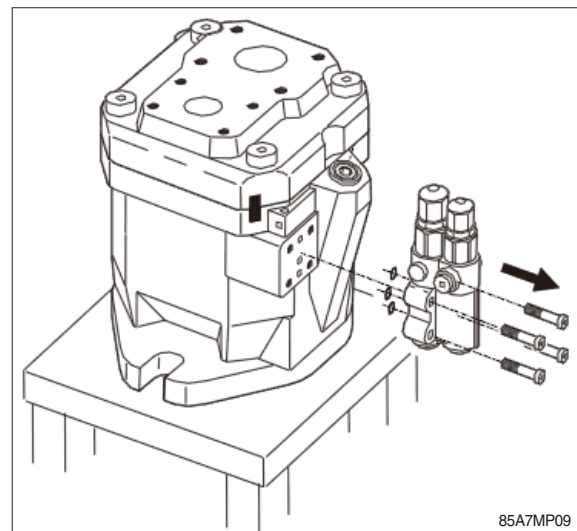


## 2) DISSAMBLE THE PUMP

- ※ Disassembly position  
Mark the location of the connection plate  
on the housing of pump.



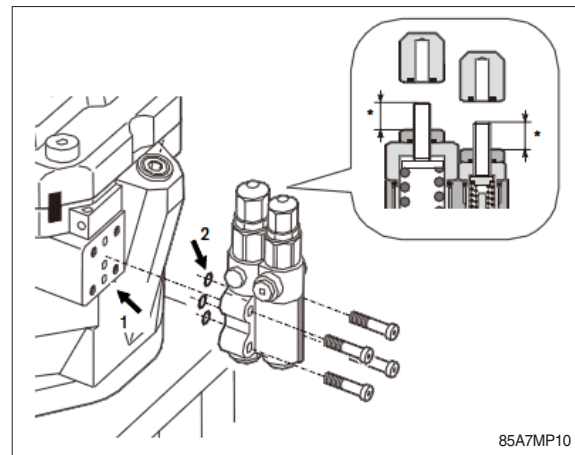
- (1) Remove the control valve.



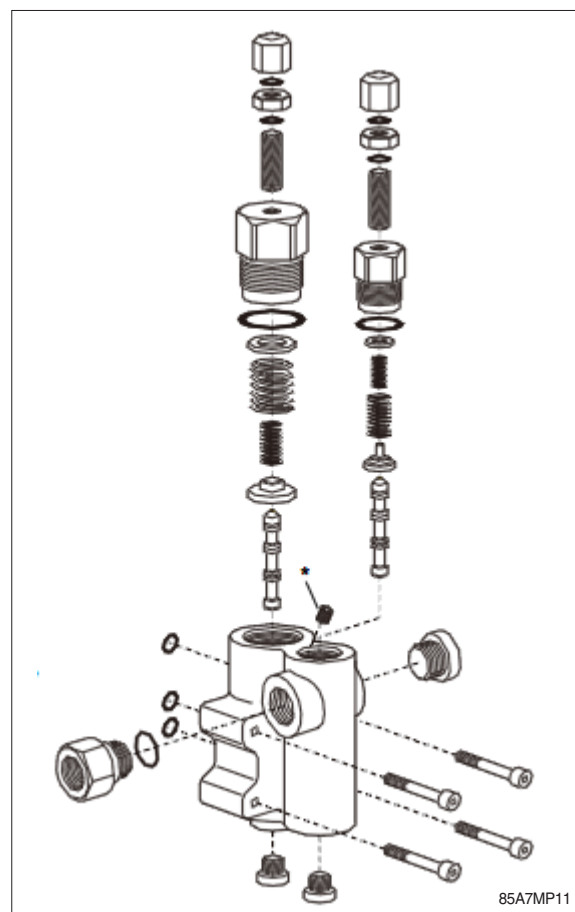
(2) Remove the control valve

※ Measure dimension \* and note down.

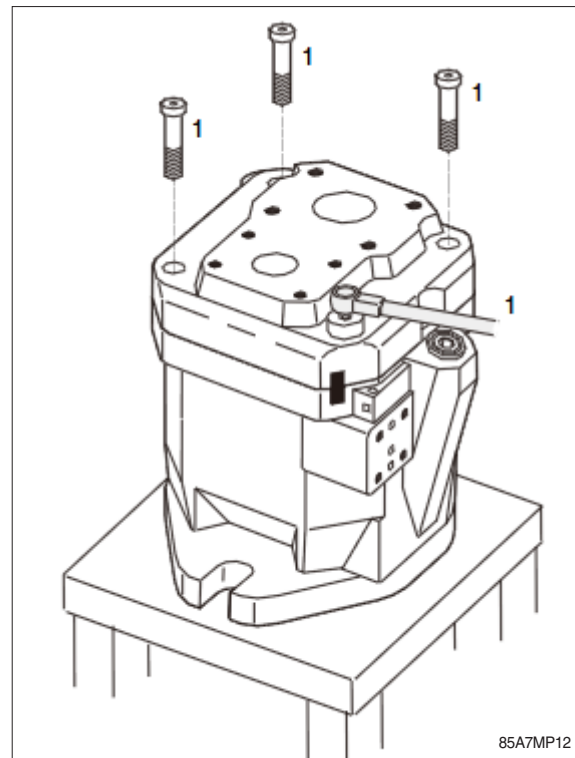
※ Check sealing surface (1) and O-rings (2).



※ Only DFR with orifice

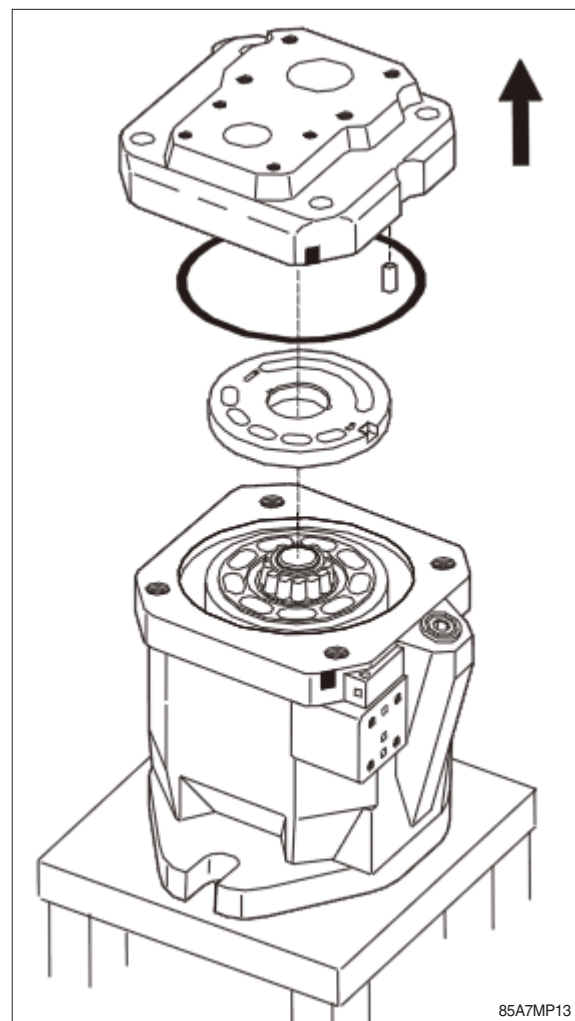


(3) Remove the socket screws (1).

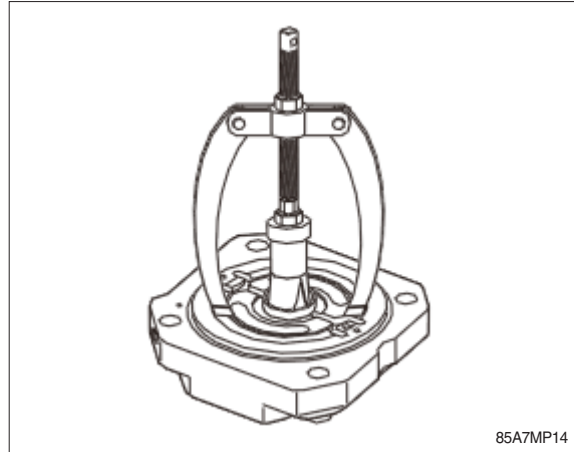


(4) Remove connection plate.

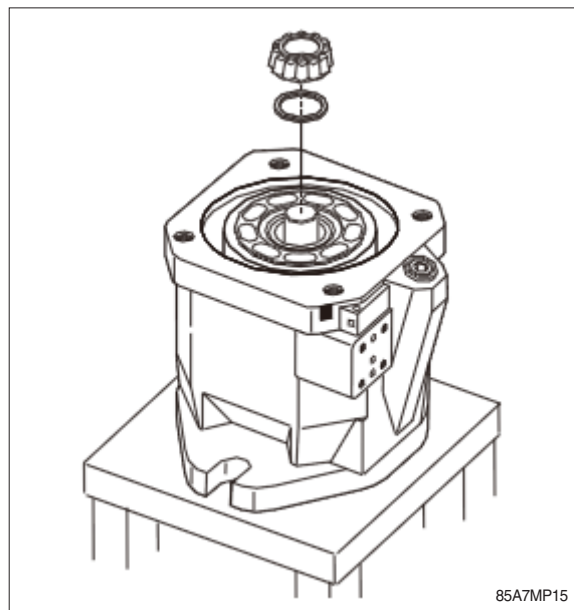
※ Control plate can drop down - keep tight while removing connection plate.



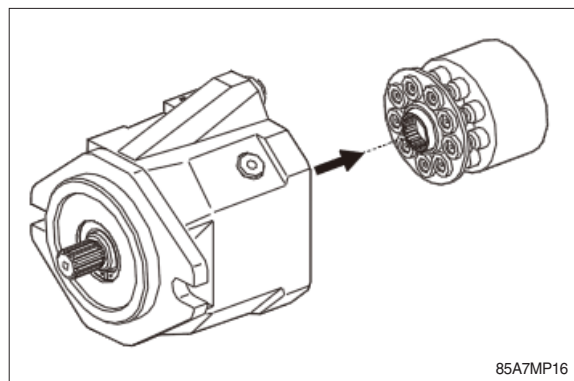
- (5) Pull bearing of the connection plate out using a bearing puller.  
※ Do not damage the sealing surface.



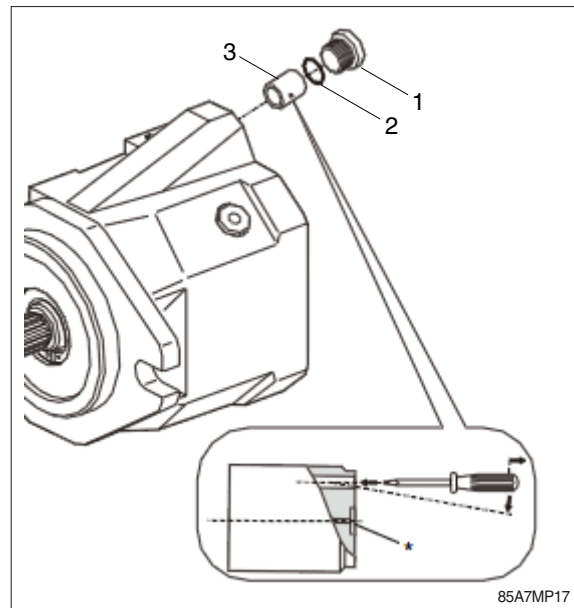
- (6) Remove bearing and shim.  
※ Do not damage the sealing surface.



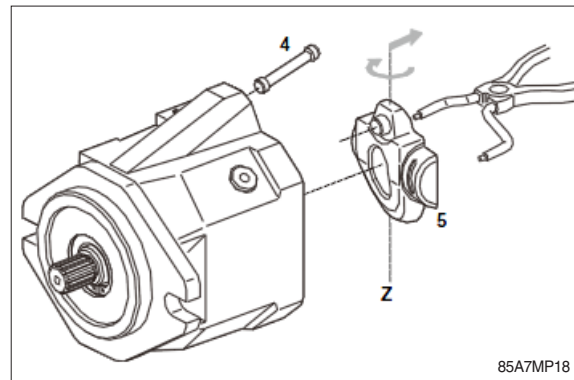
- (7) Remove the rotary group in a horizontal position.



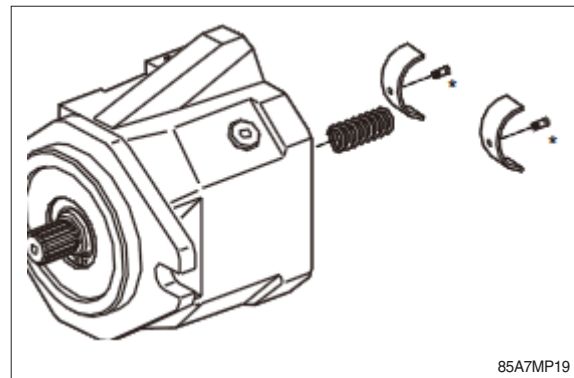
- (8) Remove plug (1) with seal (2).  
 (9) Pull out control piston (3) (- flat surface \*-)  
 with tool.



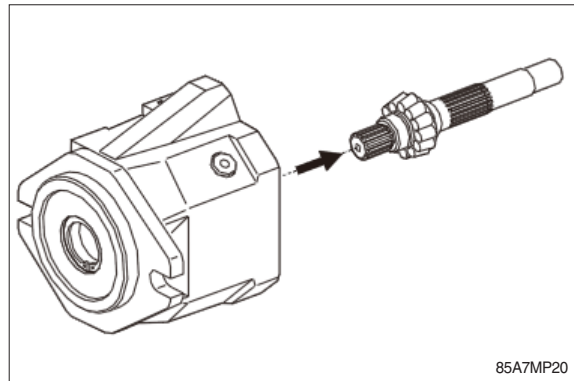
- (10) Remove piston rod and swash plate.  
 Turn swash plate (5) inside of the housing  
 slightly along Z-axis with tool. Remove  
 piston rod (4). Remove swash plate (5).  
 Do not damage the piston rod and swash  
 plate.



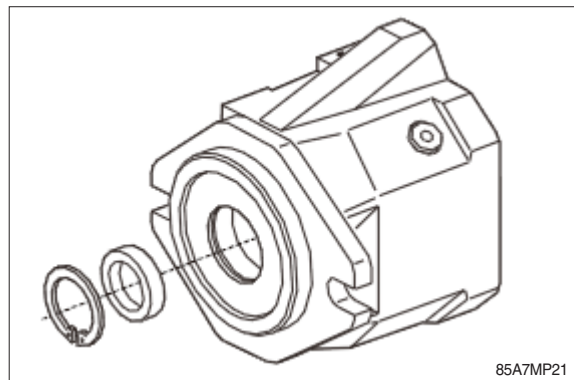
- (11) Remove bearing shells and bearing.  
 ※ Attention for position.  
 Only size 60~85



(12) Remove drive shaft with bearing.



(13) Remove circlip and shaft seal.

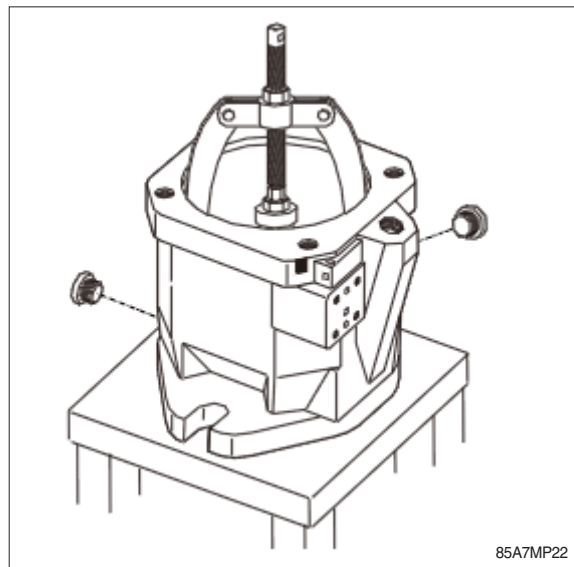


(14) Pull out outer race of tapered bearing out of housing press seat.

※ Use bearing puller.

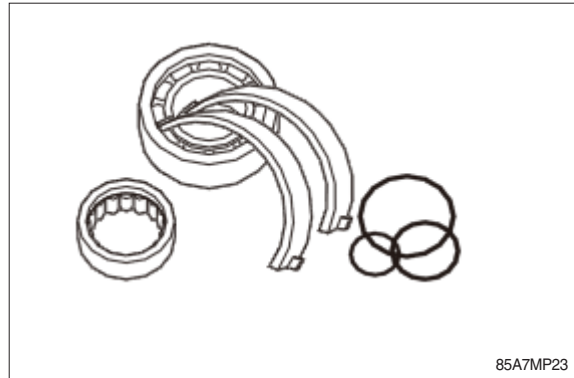
(15) Remove all plugs.

(16) Remove stop ring.



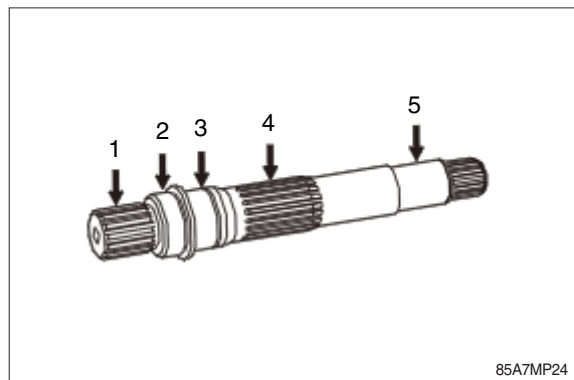
### 3) INSPECTION

(1) Renew all bearings and seals.



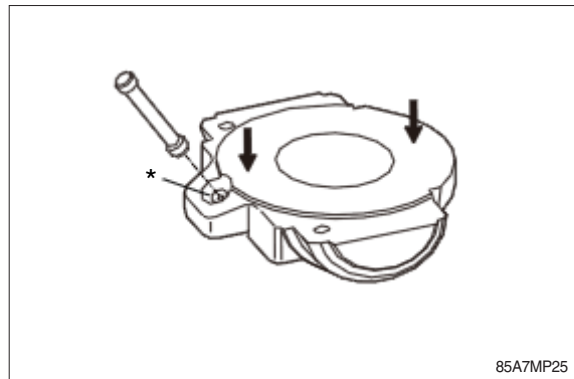
(2) Check below items

- ① Wear on splines, fretting
- ② Drive shaft seal wear grooves
- ③ Bearing seat
- ④ Splines for cylinder drive
- ⑤ Bearing seat

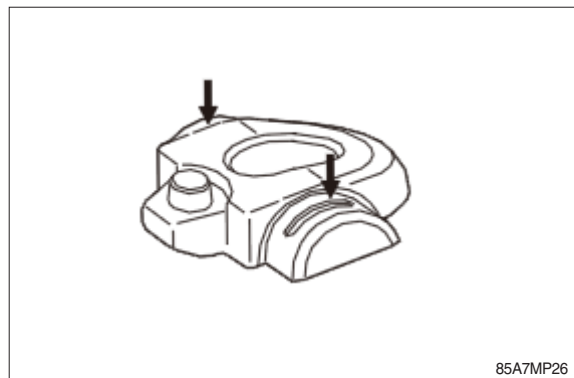


(3) Sliding surface free of grooves.

\* Check for freedom of piston rod movement.

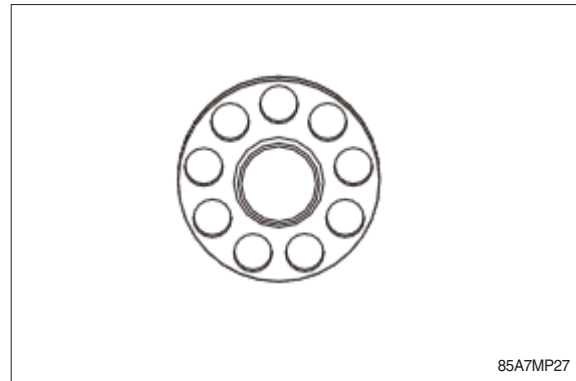


(4) Bearing surfaces

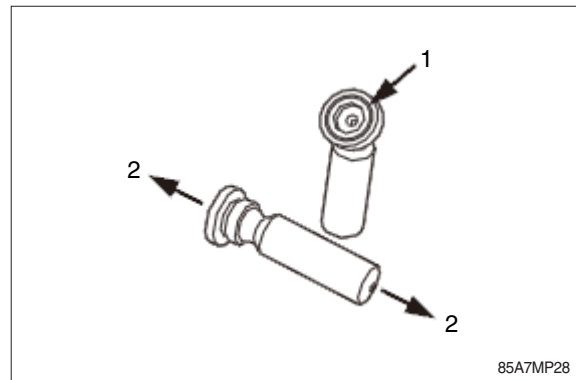




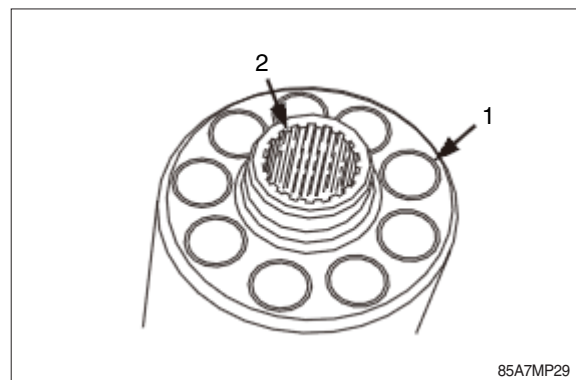
- (5) That the retaining plate is free of grooves and that there is no wear in the slipper pad area.



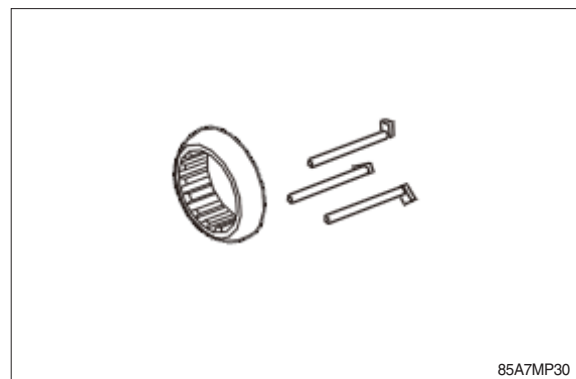
- (6) Check to see that there are no scratches or metal deposits on the sliding surface (1), and that there is no axial play (2), (pistons must only be replaced as a set).



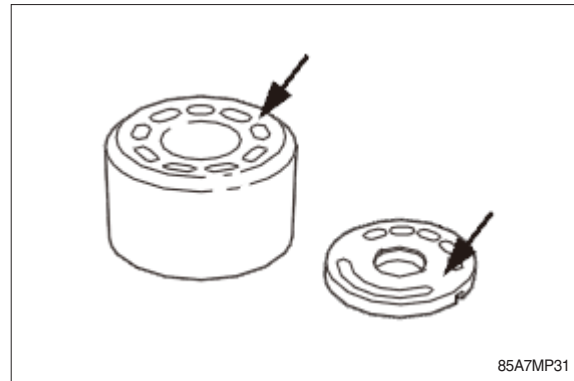
- (7) Cylinder bores (1), splines (2).



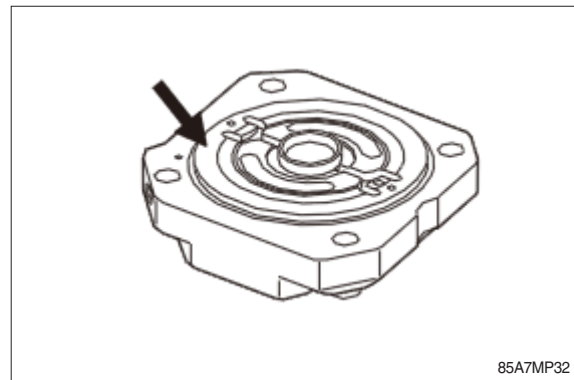
- (8) Free of grooves, no signs of wear.



- (9) Cylinder sliding surface free of grooves, no wear, no embedded foreign particles. That there are no scratches on the control plate. (Only replace them as a set).

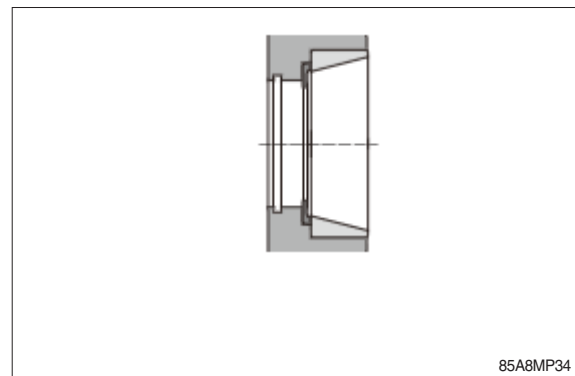
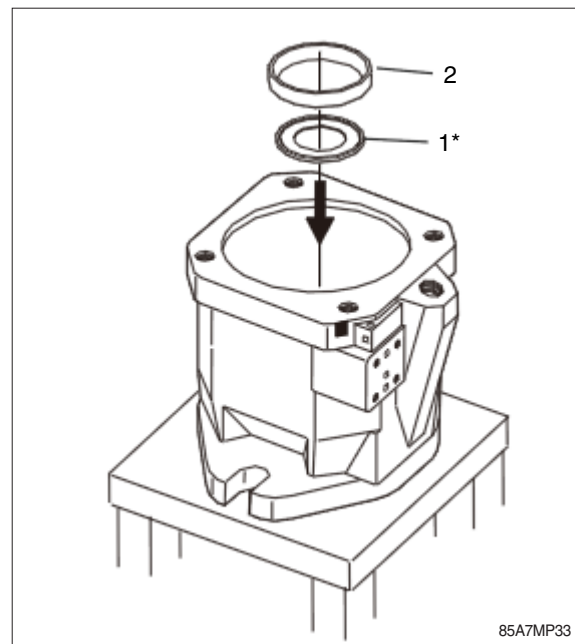


- (10) Mounting surface - control plate undamaged

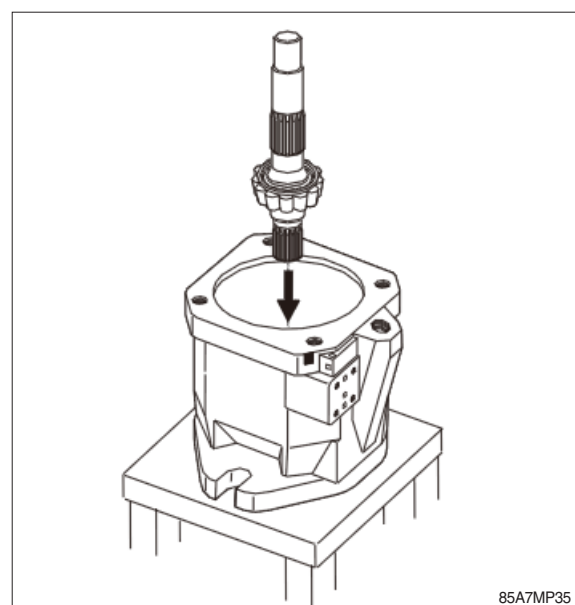


#### 4) ASSEMBLY

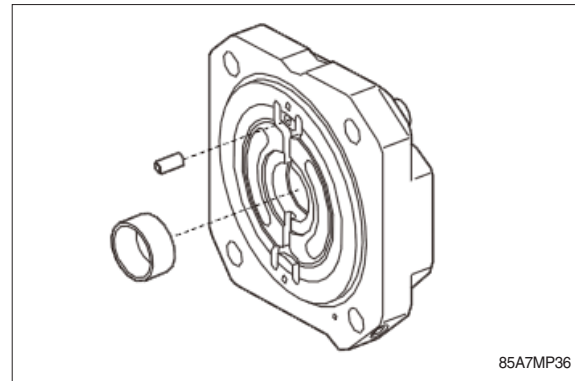
- (1) Assemble stop ring (1, \* see also below spare part list).
- (2) Press-in distance ring (2) with tool.



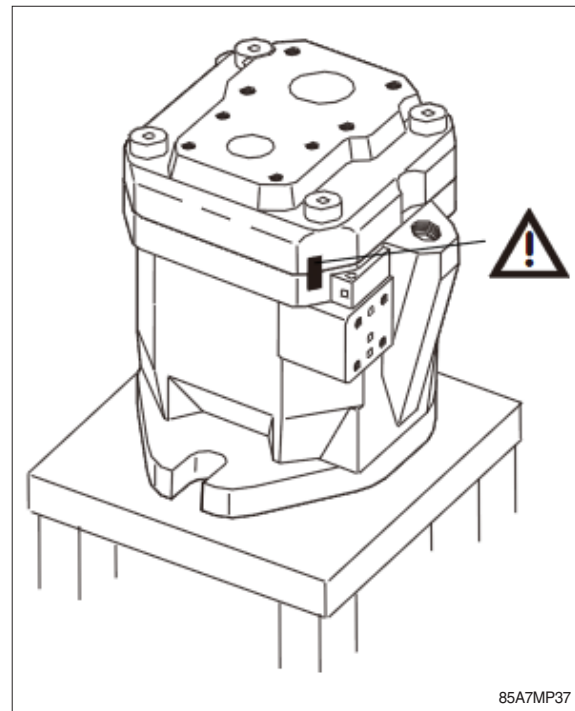
- (3) Assemble shaft in correct position.  
※ Do not cut shaft seal.



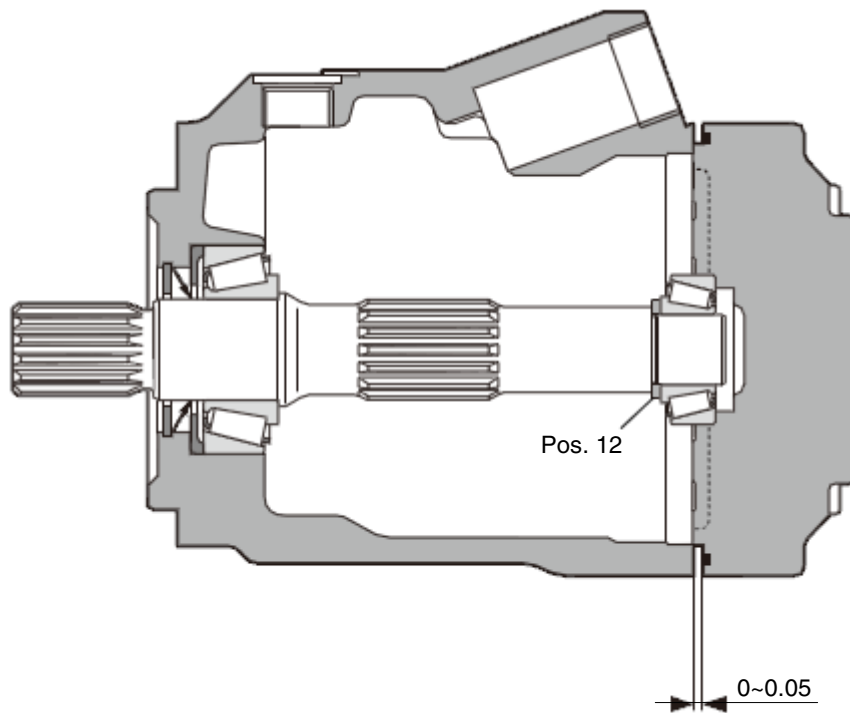
- (4) Press-in outer racer of rear bearing into connection plate.



- (5) Assemble connection plate to pump acc. sign.  
(6) Tighten the 4 socket screws.  
(7) Adjustment of taper roller bearing  
① Disassemble connection plate.



② Taper roller bearing initial tension

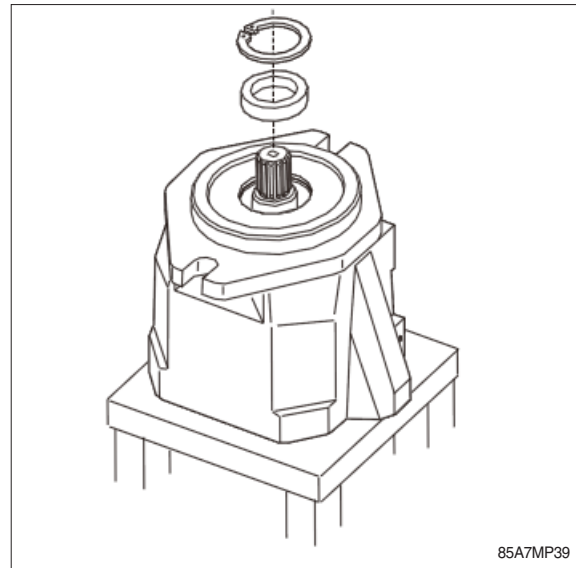


85A7MP38

※ Adjustment of taper roller bearing set

Cast iron housing must have initial tension of the bearings :  
0~0,05 mm, grind position 12 if necessary.

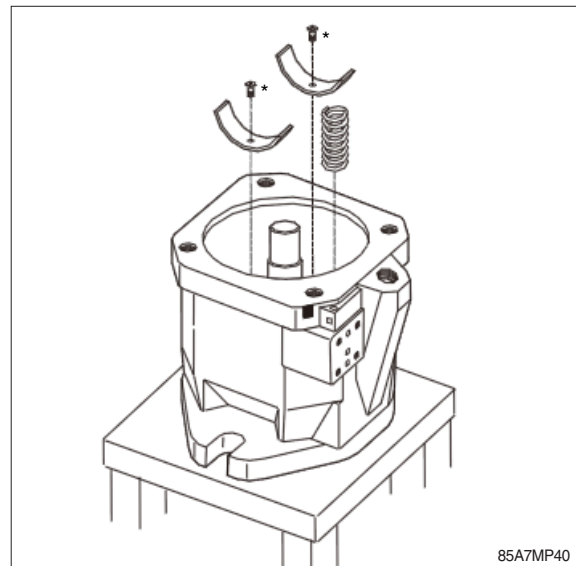
(8) Assembly instruction shaft seal see page 6.



(9) Fit in bearing shells and spring.

※ Fix with grease.

\* Only size 60~85

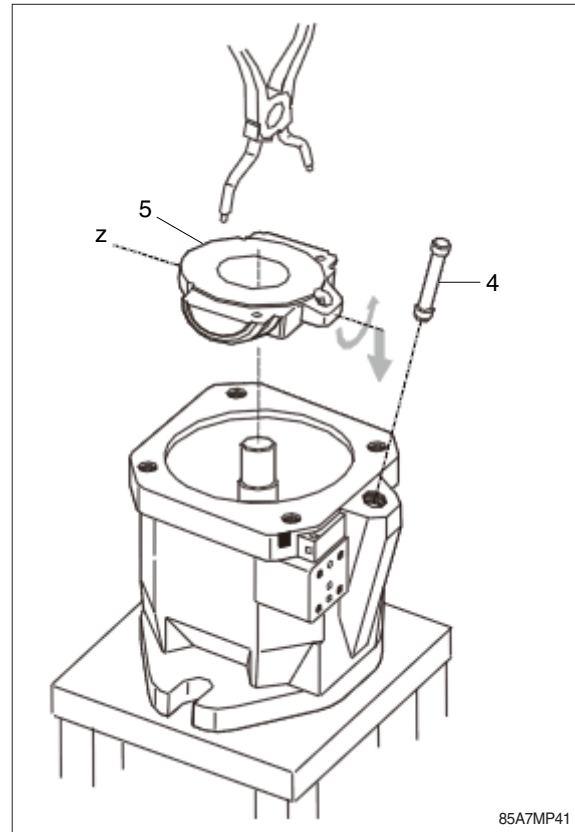


(10) Assemble swash plate (5) and piston rod (4) into pump.

※ Spring guide pin in correct position.

※ Check correct position of the spring.

(11) Assemble piston rod (4), control piston (3), seal (2), and plug (1).



(12) Assemble piston rod (4), control piston (3), seal (2) and plug (1).

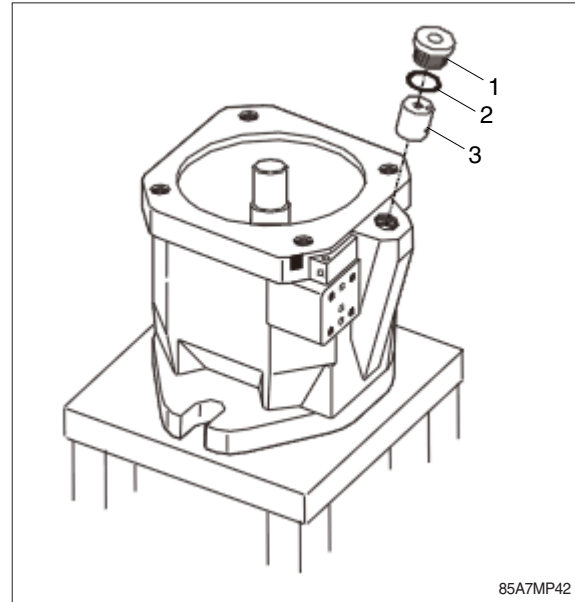
※ Plug tighten torque.

- Size 28, 45, 60

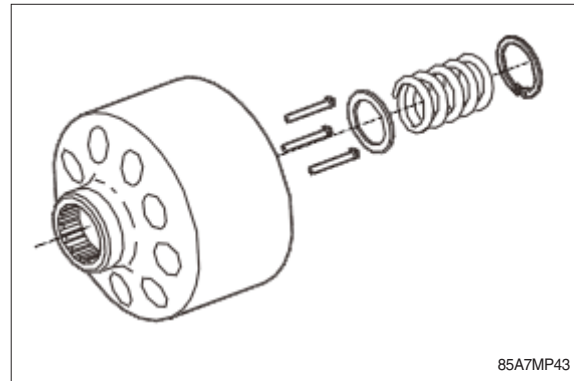
$19.4 \pm 2.0 \text{ kgf} \cdot \text{m}$  ( $140 \pm 14.5 \text{ lbf} \cdot \text{ft}$ )

- Size 85

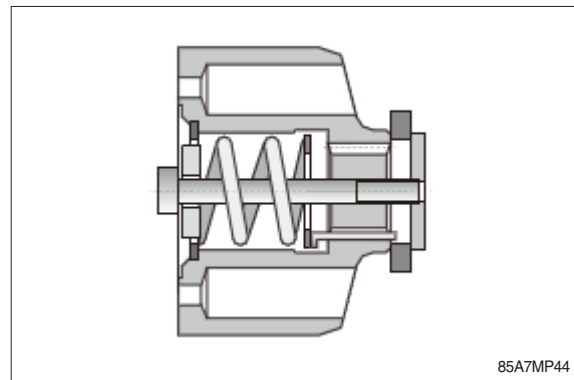
$32.6 \pm 2.0 \text{ kgf} \cdot \text{m}$  ( $236 \pm 14.5 \text{ lbf} \cdot \text{ft}$ )



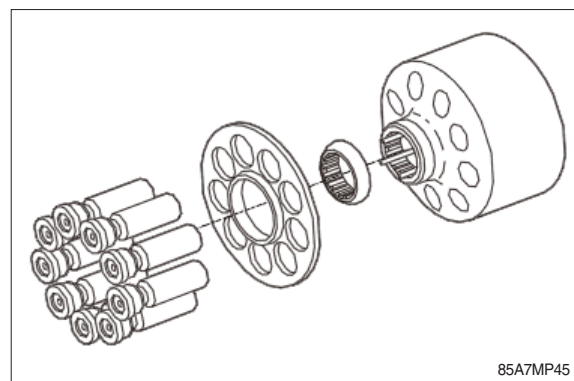
(13) Fit pressure pins using an assembly aid.



(14) Pre-tension the spring using a suitable device.



(15) Assemble piston with retaining plate.  
※ Oil piston and slipper pad.



(16) Assemble piston with retaining plate.

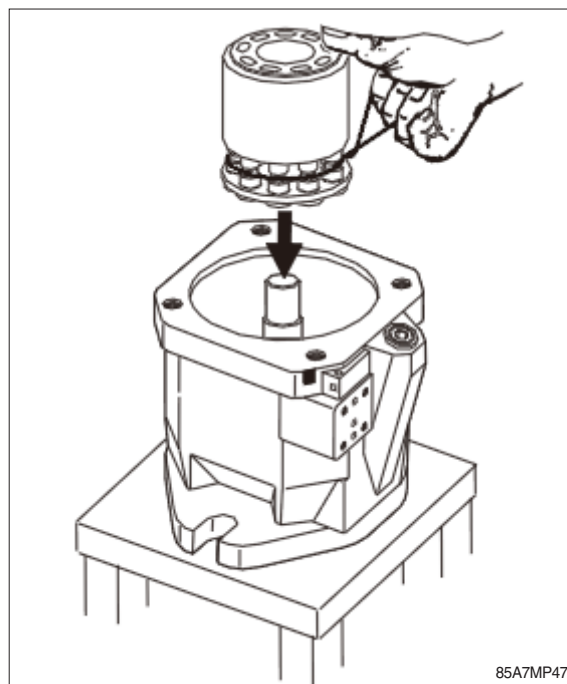




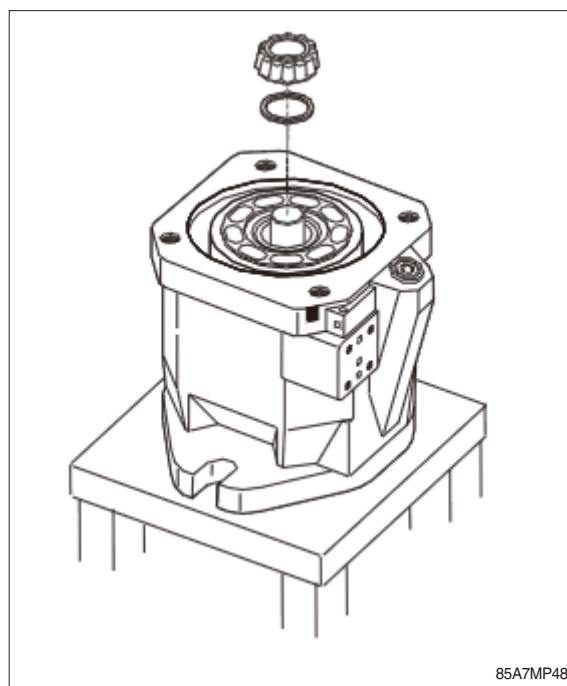
(17) Fit rotary group

※ Assembly aid

Hold the pistons by using an O-ring.



(18) Assemble bearing and adjustment shim to shaft.



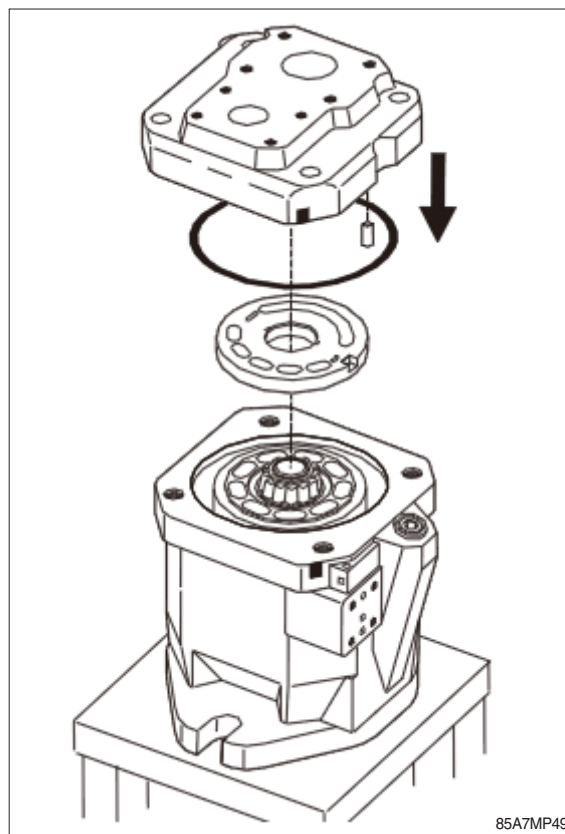
(19) Fit O-ring.

※ Fix with grease.

(20) Fit control plate.

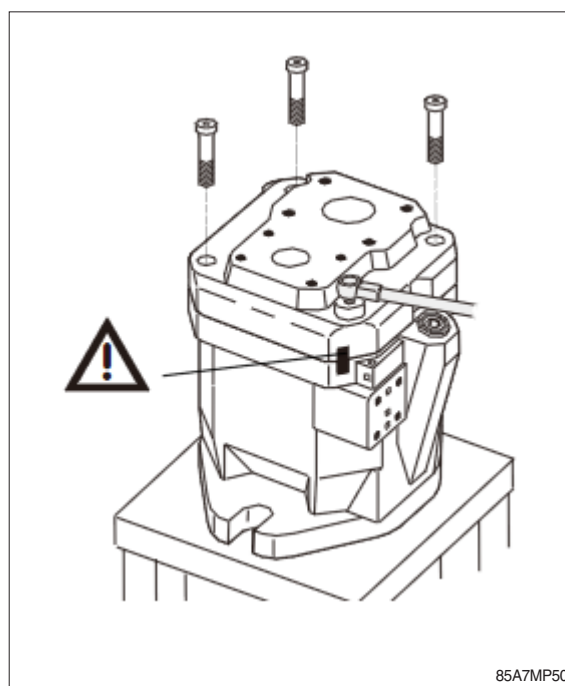
※ Fix with grease.

※ Check correct position to pin.

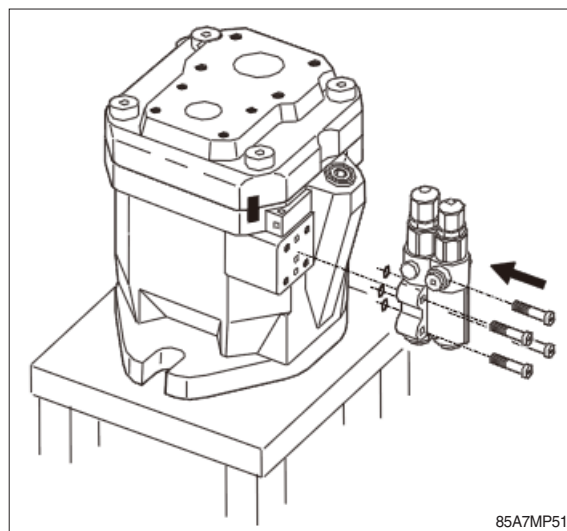


(21) Assemble connection plate.

※ Check the correct position to housing.

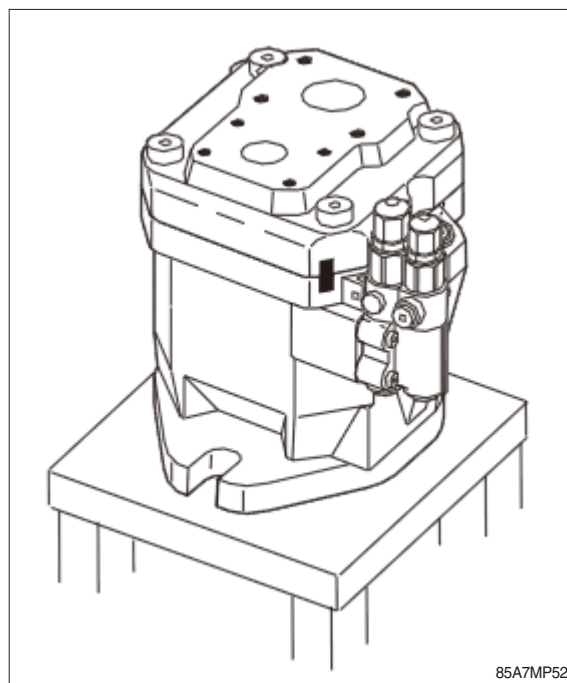


(22) Assemble control valve.



(23) Final pump assembly

※ Double check of the housing signs.



## GROUP 4 MAIN CONTROL VALVE

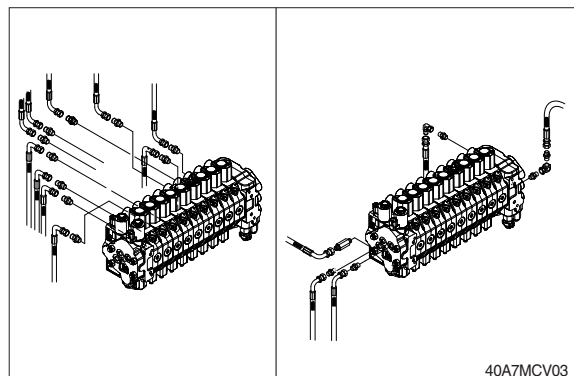
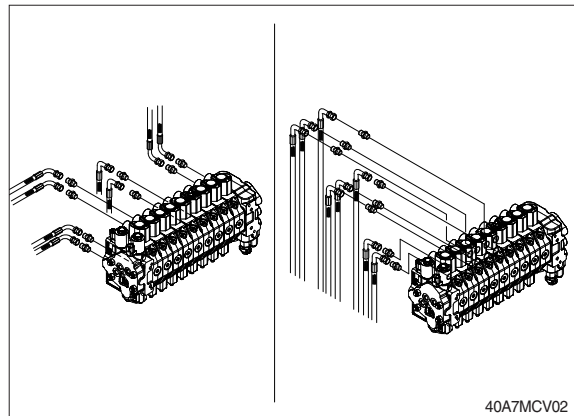
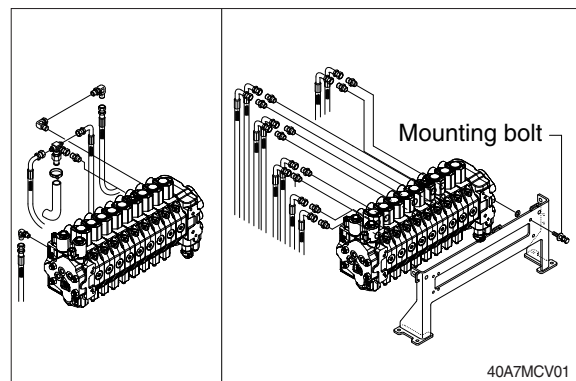
### 1. REMOVAL AND INSTALL OF MOTOR

#### 1) REMOVAL

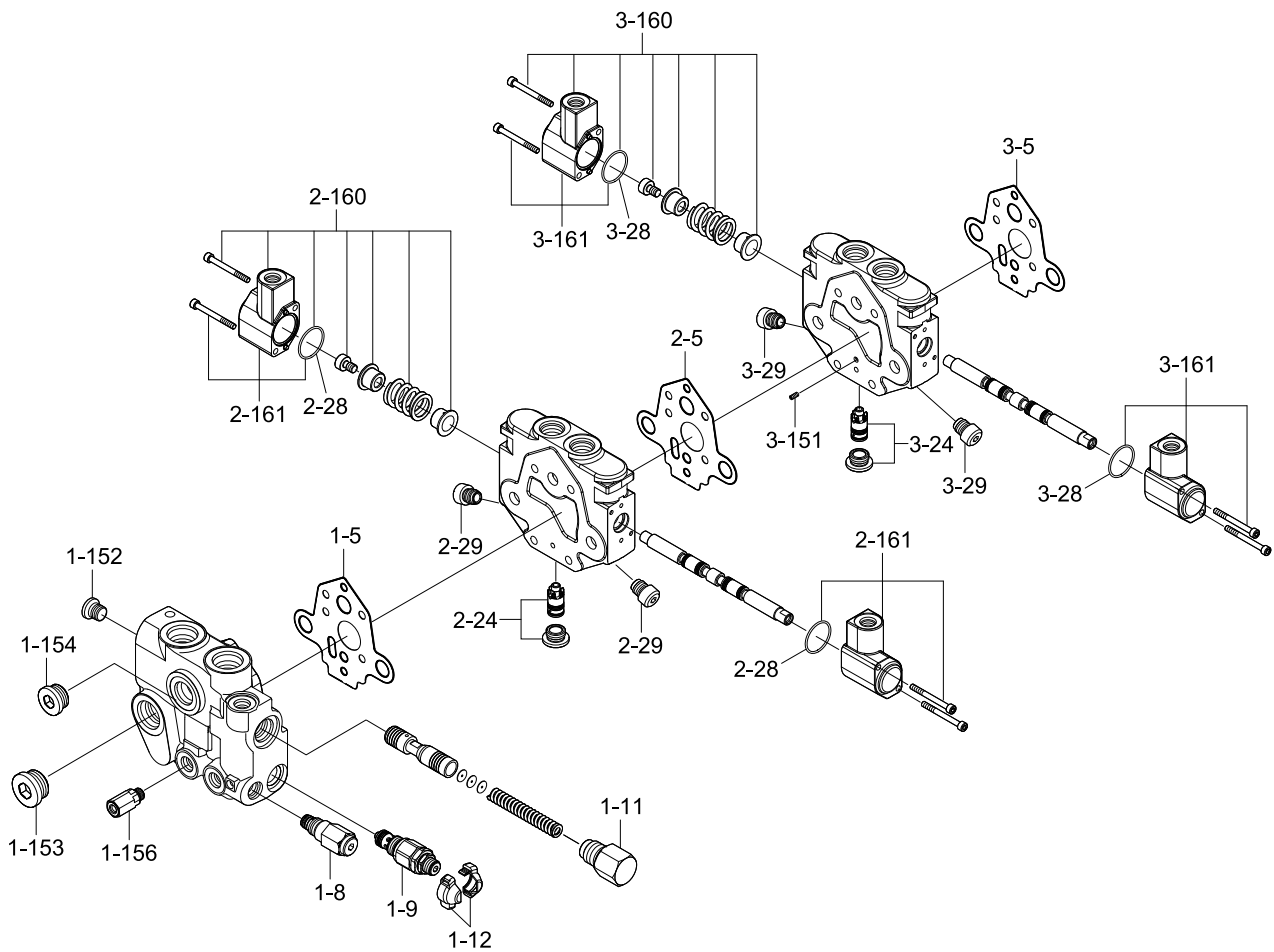
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
- ▲ Escaping fluid under pressure 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) Disconnect hydraulic hose.
- (5) Disconnect pilot line hoses.
- (6) Sling the control valve assembly and remove the control valve mounting bolt.
  - Weight : 55 kg (121 lb)
  - Tightening torque :  $6.9 \pm 1.4$  kgf·m  
( $50 \pm 10.0$  lbf·ft)
- (7) 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.



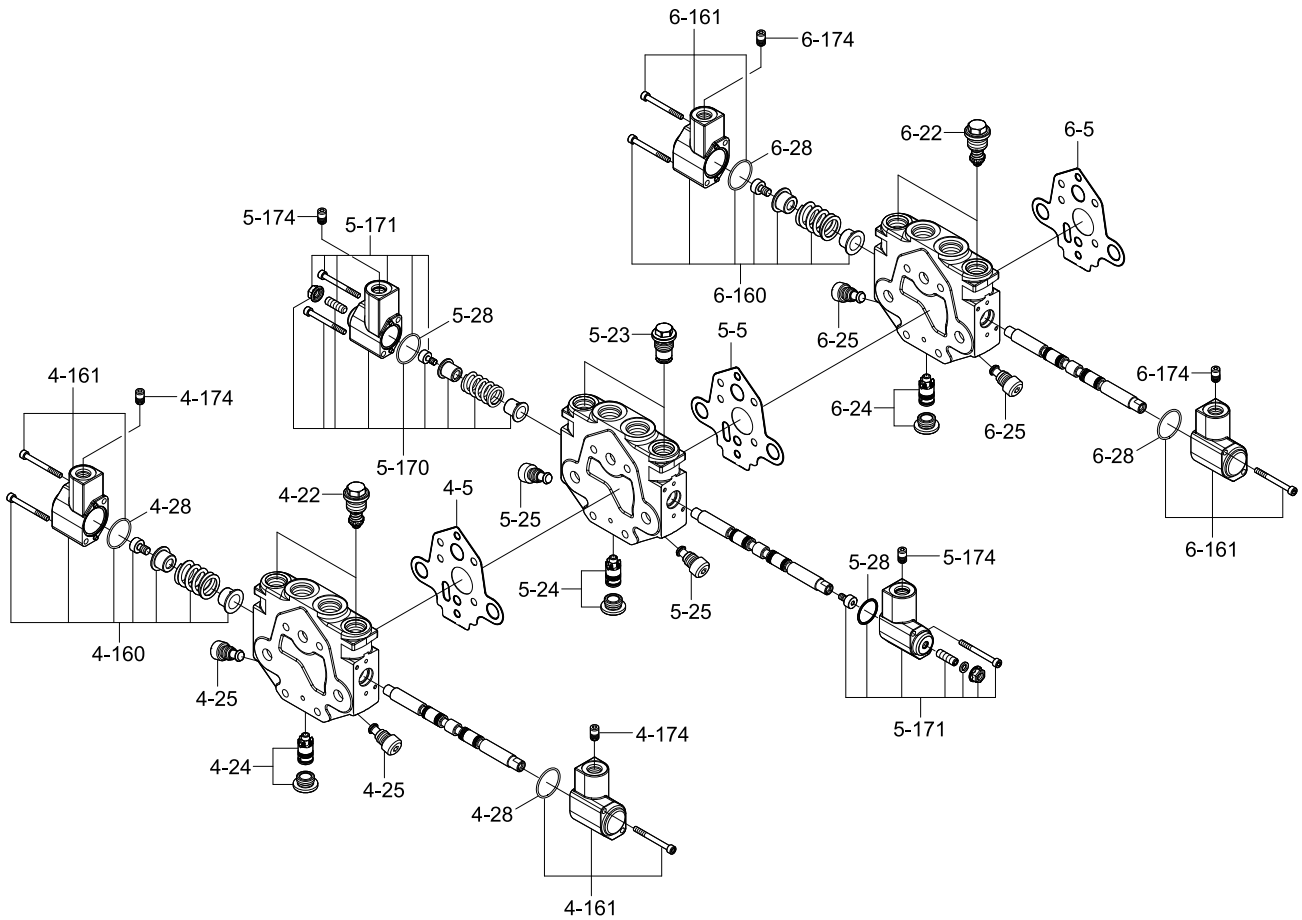
## 2. STRUCTURE (1/4)



48AZ2MCV02

1	Inlet block assy	1-154	Sealing plug	3	Travel block assy
1-5	Plate seal	1-156	Shuttle valve	3-5	Plate seal
1-8	Flow regulator	2	Travel block assy	3-24	Compensator kit
1-9	Relief valve	2-5	Plate seal	3-28	Seal kit
1-11	Plug	2-24	Compensator kit	3-29	Orifice plug
1-12	Locking cover	2-28	Seal kit	3-151	Throttle screw
1-12	Locking cover	2-29	Orifice plug	3-160	W/spool cover kit
1-152	Sealing plug	2-160	W/spool cover kit	3-161	Cover kit
1-153	Sealing plug	2-161	Cover kit		

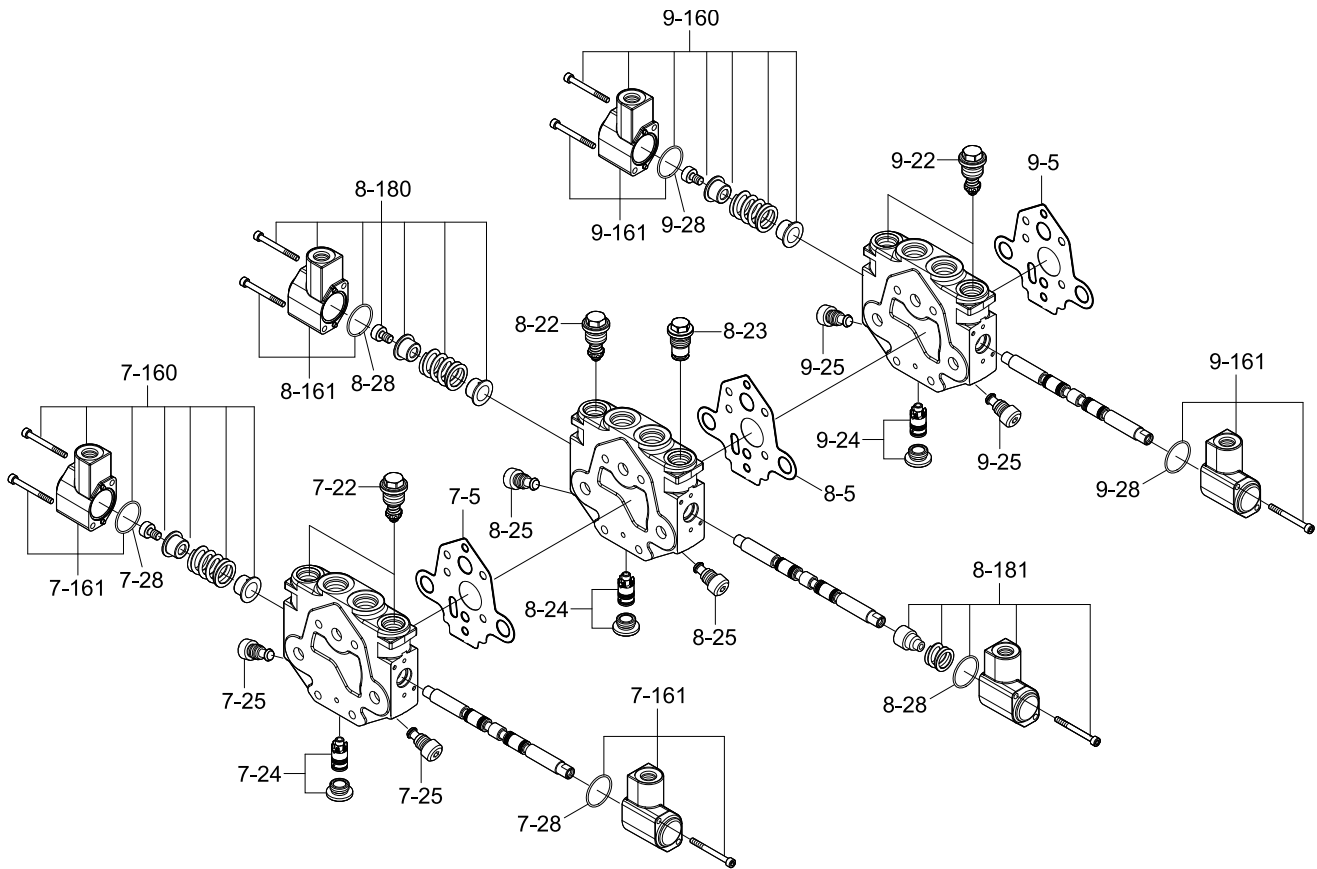
## STRUCTURE (2/4)



48AZ2MCV03

4	Boom block assy	5	Swing block assy	6	Arm block assy
4-5	Plate seal	5-5	Plate seal	6-5	Plate seal
4-22	Relief valve	5-23	Plug	6-22	Relief valve
4-24	Compensator kit	5-24	Compensator kit	6-24	Compensator kit
4-25	Check valve	5-25	Check valve	6-25	Check valve
4-28	Seal kit	5-28	Seal kit	6-28	Seal kit
4-160	W/spool cover kit	5-170	W/spool cover kit	6-160	W/spool cover kit
4-161	Cover kit	5-171	Cover kit	6-161	Cover kit
4-174	Snubber	5-174	Snubber	6-174	Snubber

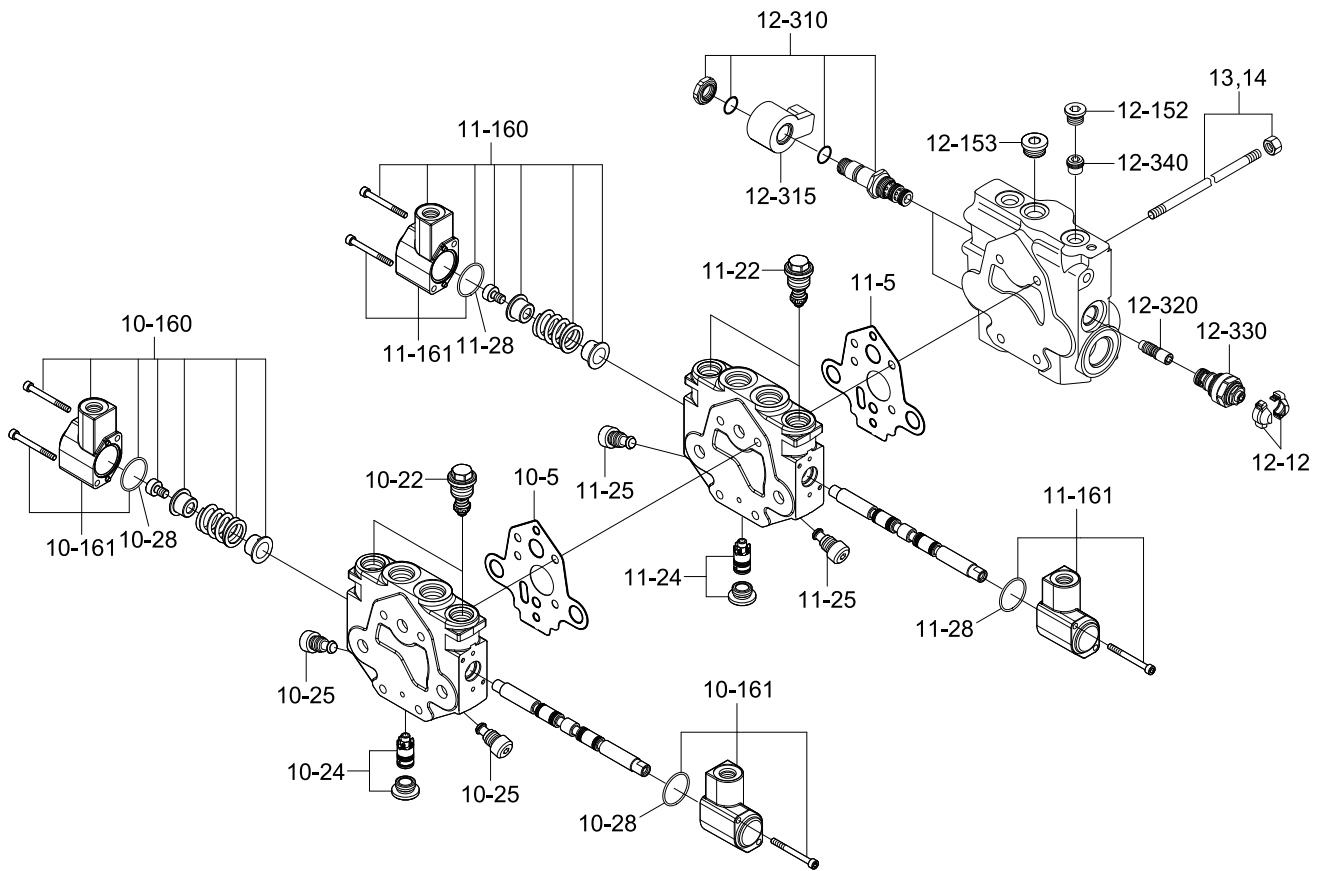
## STRUCTURE (3/4)



48AZ2MCV04

7	Bucket block assy	8-5	Plate seal	9	Boom swing block assy
7-5	Plate seal	8-22	Anticavitation valve	9-5	Plate seal
7-22	Relief valve	8-23	Plug	9-22	Relief valve
7-24	Compensator kit	8-24	Compensator kit	9-24	Compensator kit
7-25	Check valve	8-25	Check valve	9-25	Check valve
7-28	Seal kit	8-28	Seal kit	9-28	Seal kit
7-160	W/spool cover kit	8-161	Cover kit	9-160	W/spool cover kit
7-161	Cover kit	8-180	W/spool cover kit	9-161	Cover kit
8	Dozer block assy	8-181	W/spool cover kit		

## STRUCTURE (4/4)



48AZ2MCV05

10	Aux 1 block assy	11-5	Plate seal	12-152	Sealing plug
10-5	Plate seal	11-22	Relief valve	12-153	Sealing plug
10-22	Relief valve	11-24	Compensator kit	12-310	Valve kit
10-24	Compensator kit	11-25	Check valve	12-315	Solenoid
10-25	Check valve	11-28	Seal kit	12-320	Shuttle
10-28	Seal kit	11-160	W/spool cover kit	12-330	Pressure relief valve
10-160	W/spool cover kit	11-161	Cover kit	12-340	Filter
10-161	Cover kit	12	Outlet block assy	13	Tie rod
11	Aux 1 block assy	12-12	Locking cover	14	Tie rod



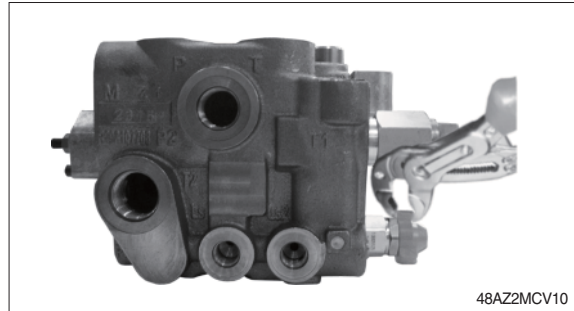
### 3. DISASSEMBLY AND ASSEMBLY

#### 1) STARTING, MAXIMAL PRESSURE SET UP

- (1) Break the locking cover with a pair of pliers.

Decalibrate the LS pressure relief valve (17 mm open end spanner on counternut ; 6 mm socket wrench) before starting the machine.

Maintain one of the control block spool valve in action before the linked hydraulic receiver is at the end of stroke.



- ※ On the spool valve, the value of the secondary valve pressure must be greater than that of the LS pressure relief valve to adjust.

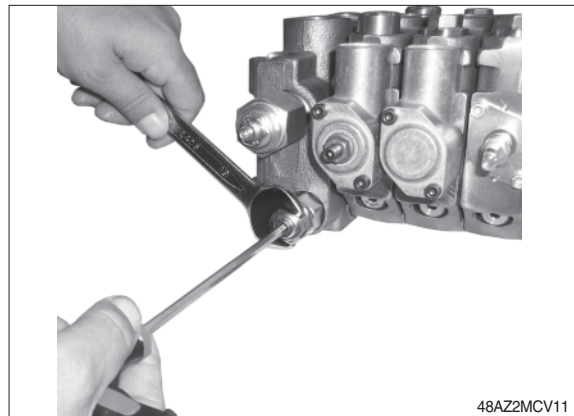
- (2) Adjust the maximum pressure measured in M using the LS pressure relief valve (17 mm open end spanner on counternut ; 6 mm socket wrench).

Tighten the counternut of the adjusting screw to the torque :

-  $2.0 \pm 0.2 \text{ kgf} \cdot \text{m}$  ( $14.8 \pm 1.5 \text{ lbf} \cdot \text{ft}$ )

Protect the setting by putting a new locking cover.

Fit together two half covers.



## 2) LS PRESSURE RELIEF VALVE REPLACEMENT

The control block does not need to be removed from the machine to perform this operation.

- ▲ Place all of the machine's actuators connected to the control block in neutral position. Release stored pressure by operating all the spools.

- (1) On the inlet element, unscrew the LS pressure relief valve (24 mm open end spanner).

※ Reassembly

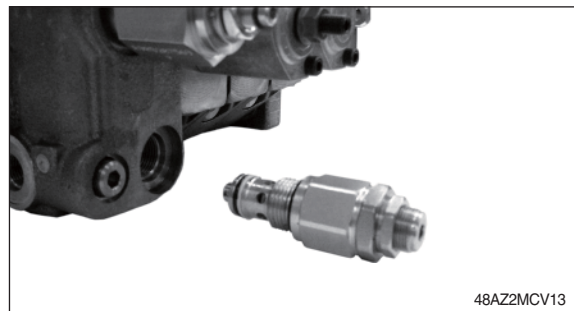
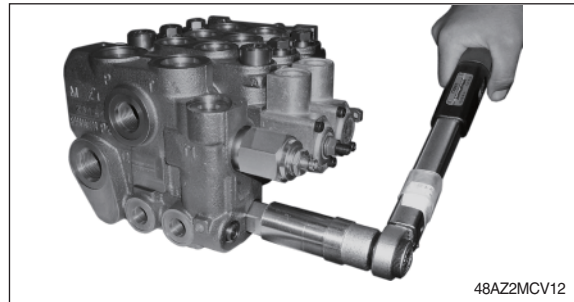
Install the LS pressure relief valve on the inlet element.

- Torque :

$4.1 \pm 0.4 \text{ kgf} \cdot \text{m}$  ( $29.5 \pm 3.0 \text{ lbf} \cdot \text{ft}$ )

Set the LS pressure relief valve to the specified value

Fit a new appropriate locking cover



## 3) REGULATING UNIT REPLACEMENT

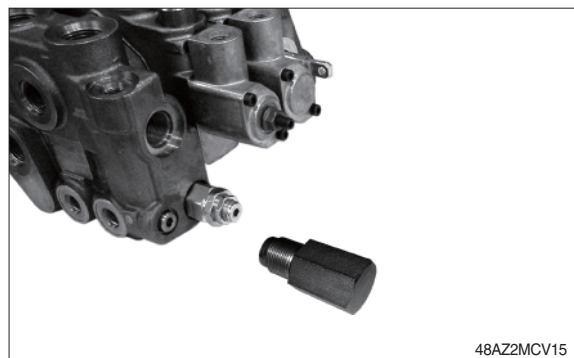
- (1) Unscrew the plug (27 mm socket wrench).

※ Reassembly

Install the plug on the inlet element.

- Torque :

$10.5 \pm 1.1 \text{ kgf} \cdot \text{m}$  ( $76.0 \pm 7.6 \text{ lbf} \cdot \text{ft}$ )



#### 4) FLOW REGULATOR REPLACEMENT

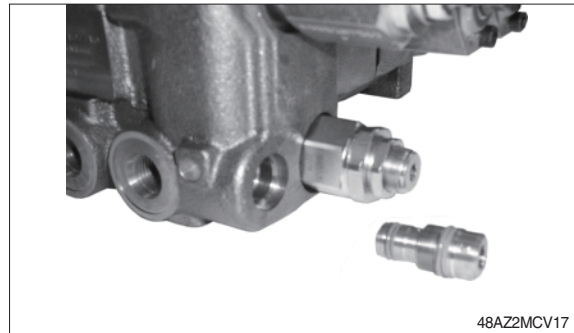
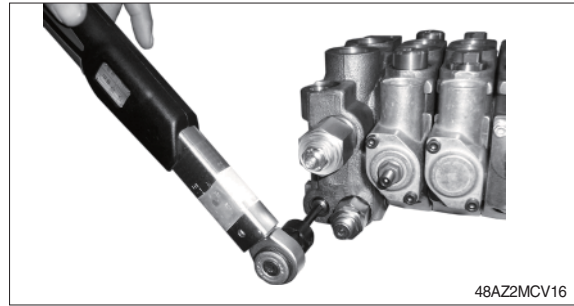
- (1) Unscrew the flow regulator (6 mm socket wrench).

※ Reassembly

Install the flow regulator on the inlet element.

- Torque :

$2.3 \pm 0.2 \text{ kgf} \cdot \text{m}$  ( $16.6 \pm 1.7 \text{ lbf} \cdot \text{ft}$ )



#### 5) PRESSURE COMPENSATOR REPLACEMENT

- (1) Unscrew the compensator plug (8 mm socket wrench).

- (2) Remove the compensator piston using a magnet to extract it from its bore.

※ Clean parts to remove any attracted metal particle.

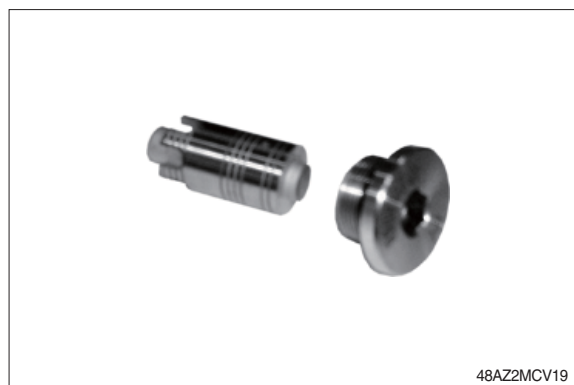
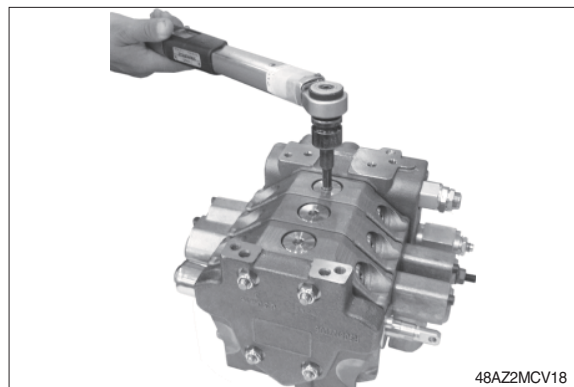
Do not use magnet for reassembly.

※ Reassembly

Reassemble parts in reverse order.

- Torque :

$5.1 \pm 0.5 \text{ kgf} \cdot \text{m}$  ( $36.9 \pm 3.7 \text{ lbf} \cdot \text{ft}$ )



## 6) CHECK VALVE REPLACEMENT

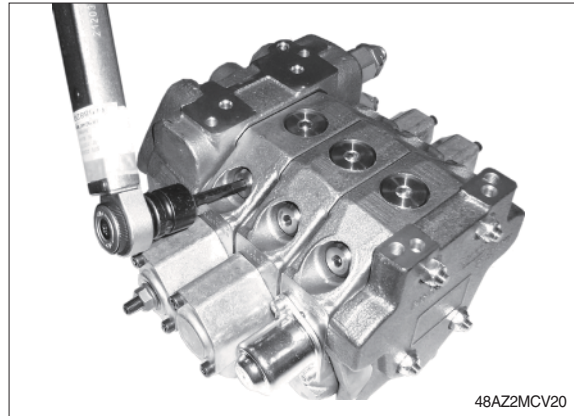
- (1) Unscrew one of the check valves (6 mm socket wrench).

※ Reassembly

Install the check valve on the distribution element.

- Torque :

$4.1 \pm 0.4 \text{ kgf} \cdot \text{m}$  ( $29.5 \pm 3.0 \text{ lbf} \cdot \text{ft}$ )



## 7) REMOVAL OF THE HYDRAULIC COVER

- (1) Remove the 2 mounting screws (4 mm socket wrench).

- (2) Remove the cover and O-ring.

※ Reassembly

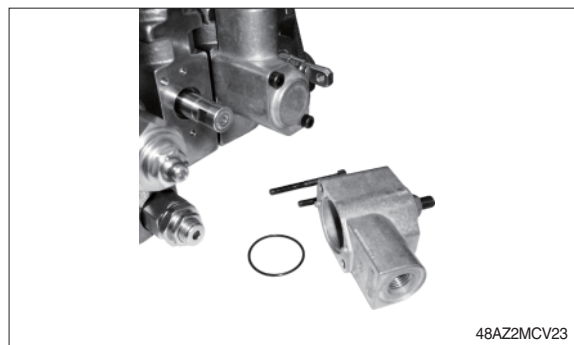
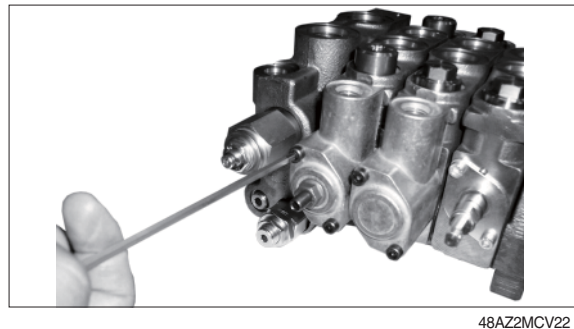
Replace the cover O-ring.

Reassemble parts in reverse order.

Torque for the 2 mounting screws.

- Torque :

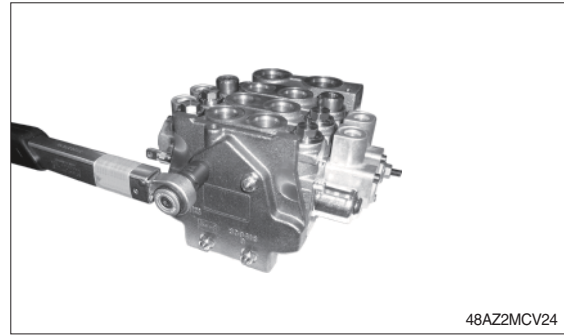
$0.5 \pm 0.05 \text{ kgf} \cdot \text{m}$  ( $3.7 \pm 0.4 \text{ lbf} \cdot \text{ft}$ )



## 8) COMPLET CONTROL BLOCK DISASSEMBLY/ASSEMBLY

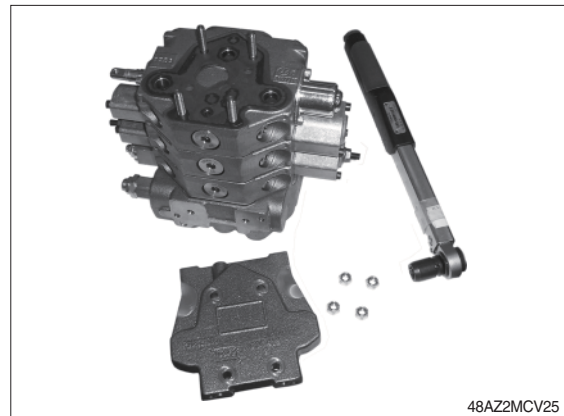
- (1) Remove the control block from the machine.

Remove the 4 nuts (13 mm ring wrench).



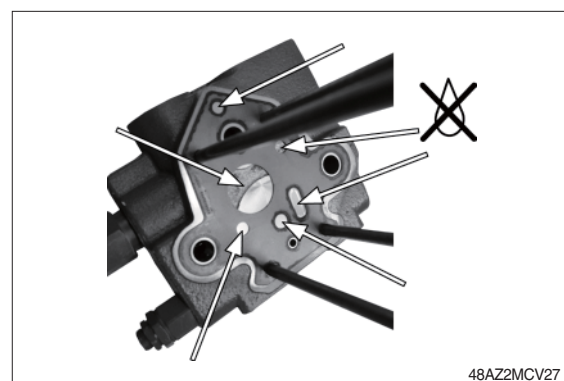
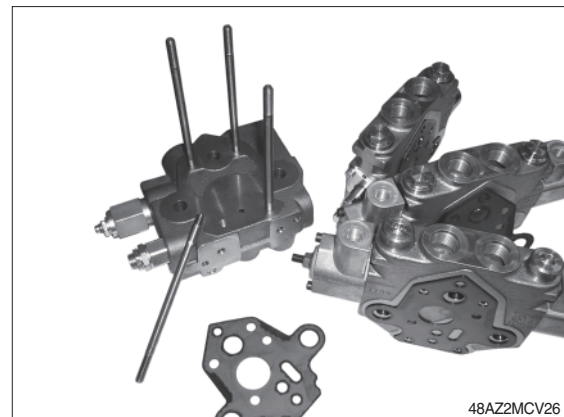
- (2) Remove the outlet element.

Separate the distribution elements with the seal plates from the inlet element.



- (3) Reassembly

- Replace the seal plates between distribution elements, initial element and outlet element.
- Check the cleanliness of the element faces.
- ※ When reassembling, make sure the seals plates are correctly positioned so that seals location fit with the canals.
- Carefully wipe oil traces of no-opening cavities between element face and seal plate.
- Torque for the 4 tie rods :  
 $3.1 \pm 0.3 \text{ kgf} \cdot \text{m}$  ( $22.1 \pm 0.2 \text{ lbf} \cdot \text{ft}$ )
- Reassemble elements in reverse order  
Place the control block horizontally on an even support area to tight the nuts.
- Torque for the 4 nuts :  
 $2.7 \pm 0.3 \text{ kgf} \cdot \text{m}$  ( $19.2 \pm 0.2 \text{ lbf} \cdot \text{ft}$ )
- ※ Make sure the elements are correctly positioned (engravings A and B downward)



## 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 (13, 14, 30, 33).
- (5) Disconnect pilot line hoses (17, 23).
- (6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (26).

※ Motor device weight : 39 kg (86 lb)

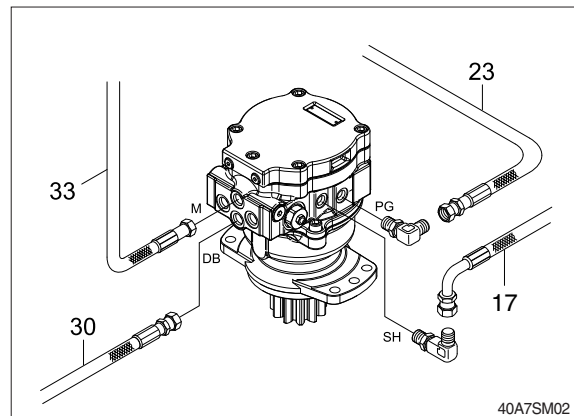
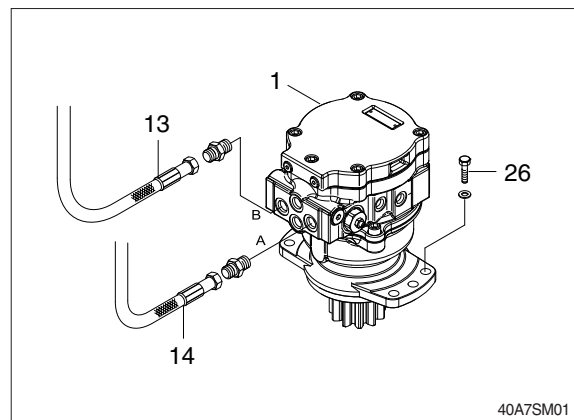
· Tightening torque :  $19.6 \pm 2.9$  kgf·m  
( $142 \pm 21.0$  lbf·ft)

- (7) Remove the swing motor assembly.

※ When removing the swing motor assembly, check that all the piping have been disconnected.

#### 2) INSTALL

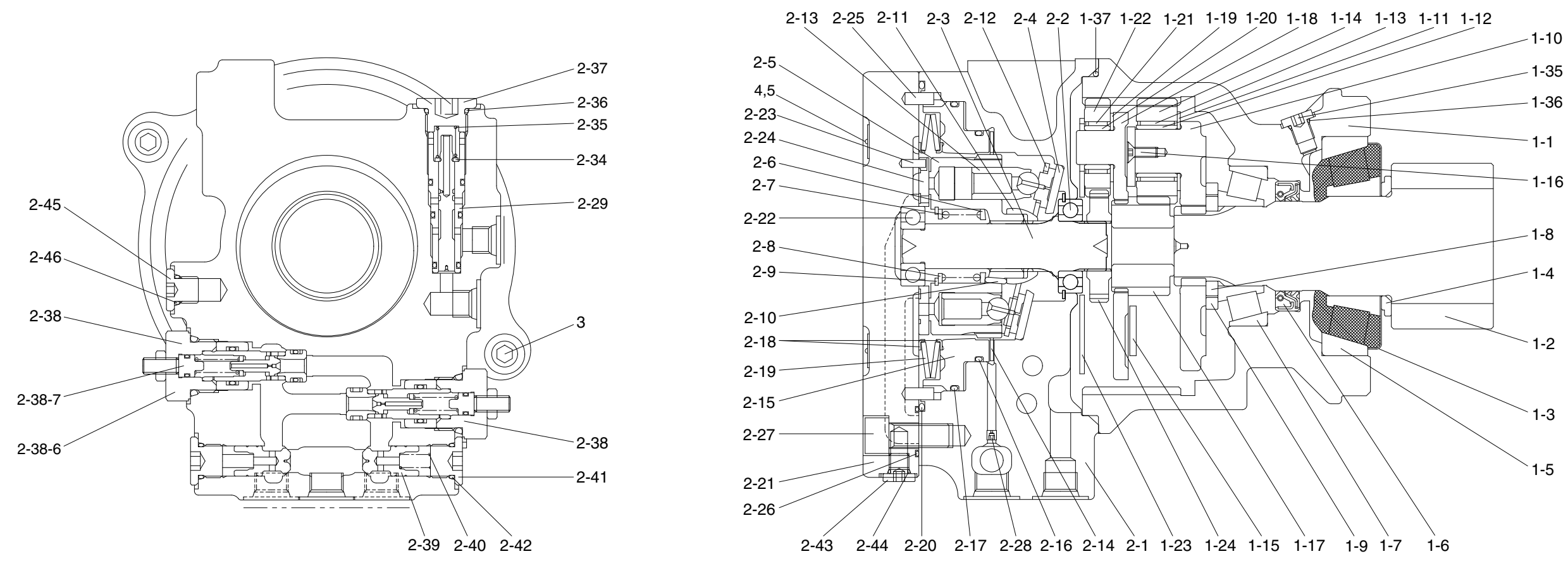
- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from the swing motor.
  - ① Remove the air vent plug.
  - ② Pour in hydraulic oil until it overflows from the port.
  - ③ Tighten plug lightly.
  - ④ Start the engine, run at low idling and check oil come out from plug.
  - 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



40A2SM02

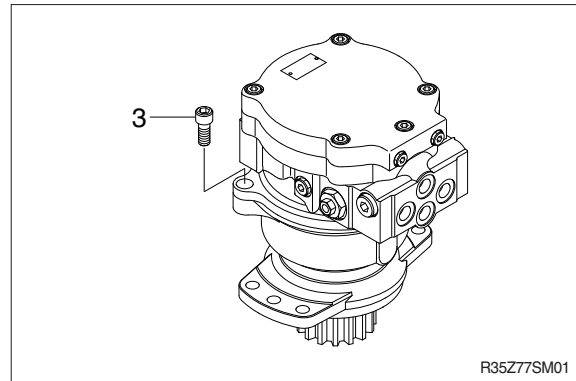
1 Gear box	1-13 Needle bearing	1-36 O-ring	2-11 Retainer holder	2-24 Valve plate	2-39 Check valve
1-1 Housing	1-14 Planetary gear B	1-37 O-ring	2-12 Retainer plate	2-25 Pin	2-40 Spring
1-2 Pinion shaft	1-15 Thrust plate	2 Axial piston motor	2-13 Piston assy	2-26 O-ring	2-41 Plug
1-3 Plate	1-16 Screw	2-1 Case	2-14 Disc	2-27 Socket head bolt	2-42 O-ring
1-4 Collar	1-17 Sun gear B	2-2 Ball bearing	2-15 Brake piston	2-28 Orifice	2-43 Plug
1-5 Tapper roller bearing	1-18 Holder	2-3 Shaft	2-16 O-ring	2-29 Valve assy	2-44 O-ring
1-6 Oil seal	1-19 Thrust washer	2-4 Thrust plate	2-17 O-ring	2-34 Washer	2-45 Plug
1-7 Tapper roller bearing	1-20 Inner race	2-5 Cylinder block	2-18 Spring seat	2-35 Spring	2-46 O-ring
1-8 Plate	1-21 Needle bearing	2-6 Collar	2-19 Spring	2-36 O-ring	3 Socket head bolt
1-9 Collar	1-22 Planetary gear	2-7 Spring	2-20 O-ring	2-37 Plug	4 Name plate
1-10 Holder	1-23 Thrust plate	2-8 Washer	2-21 Cover	2-38 Relief valve assy	5 Screw
1-11 Thrust washer	1-24 Drive gear	2-9 Ring-snap	2-22 Ball bearing	2-38-6 Plug	
1-12 Inner race	1-35 Plug	2-10 Pin	2-23 Pin	2-38-7 Adjust kit	

## 2) DISASSEMBLY

Disassemble the parts by the following procedure.

### (1) Separating the motor and the reduction gear

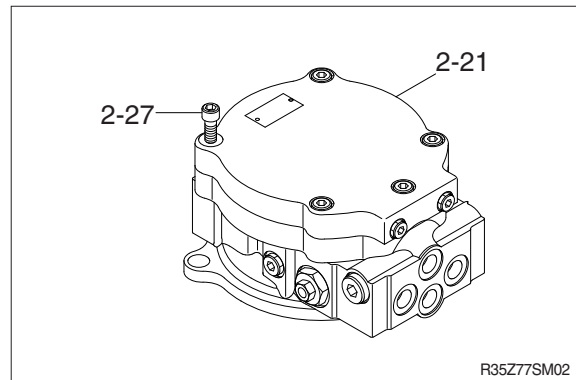
Secure the motor assembly in a vice and remove the socket head bolt (3).



### (2) Disassembling the motor

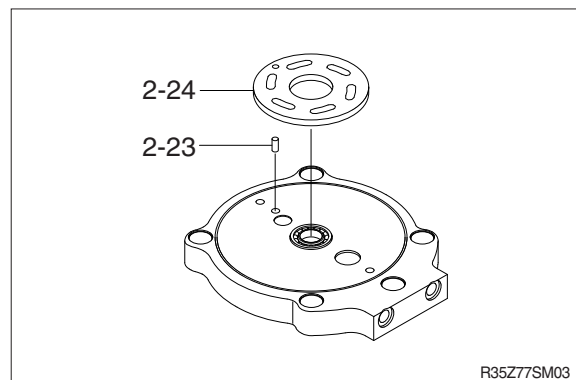
- ① Secure the motor assembly in a vice.  
Remove the socket head bolts (2-27) and separate the cover (2-21).

※ When separating the cover (2-21), be careful not to drop the valve plate (2-24).

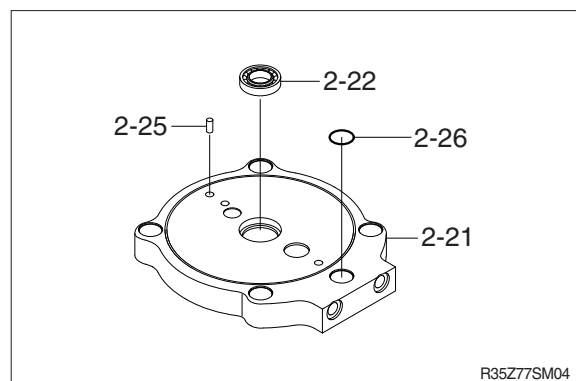


- ② Remove the valve plate (2-24) and the pin (2-23).

※ The valve plate (2-24) may remain on the motor side.



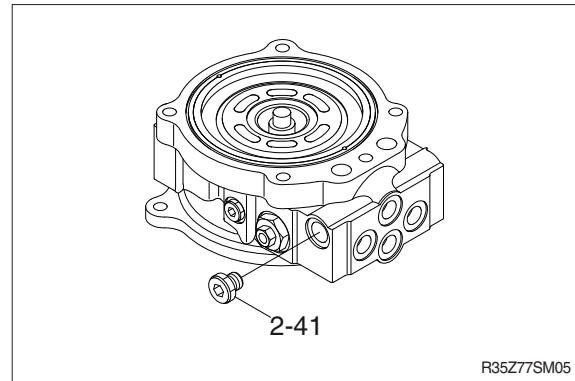
- ③ Remove the bearing (2-22). Remove the O-ring (2-26).



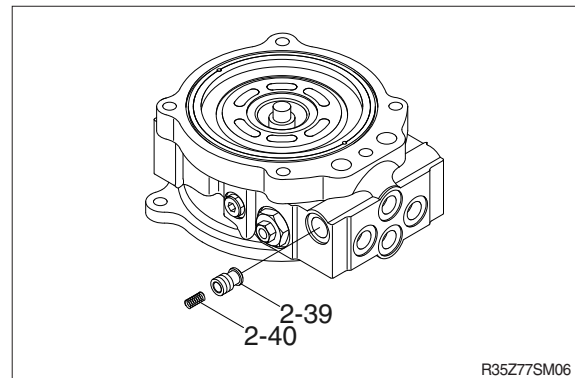


④ Disassemble the check valve.

- a. Loosen to remove the plug (2-41).



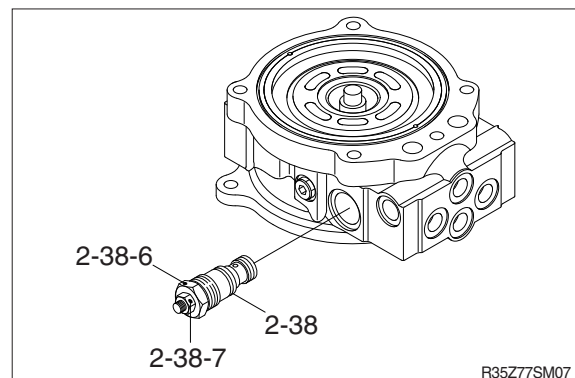
- b. Remove the spring (2-40) and the check valve (2-39).



⑤ Remove the relief valve.

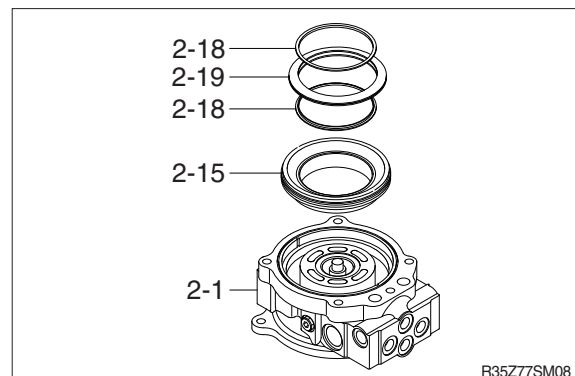
- a. Loosen the plug (2-38-6) to remove the relief valve assembly (2-38).

- ※ Do not move the adjuster kit (2-38-7). Otherwise, the set pressure will change.
- ※ Do not disassemble the relief valve assembly (2-38) because it is a functional component.



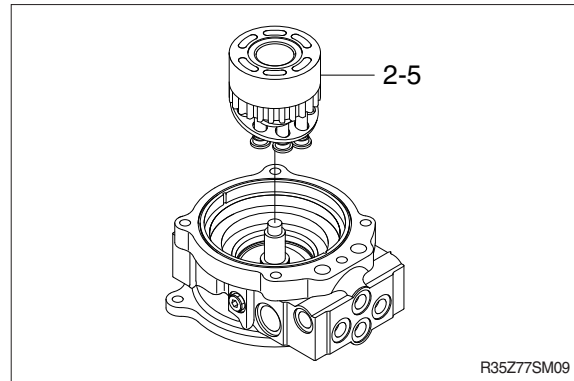
- ⑥ Remove the disc spring assembly (2-19) and the spring seat (2-18), and utilizing the gage port of the case (2-1), remove the parking brake piston (2-15).

- ※ The piston may be ejected by the air pressure. Exercise sufficient care during removal. At the beginning of the work, set a lower air pressure and adjust it while checking the piston for ejection.

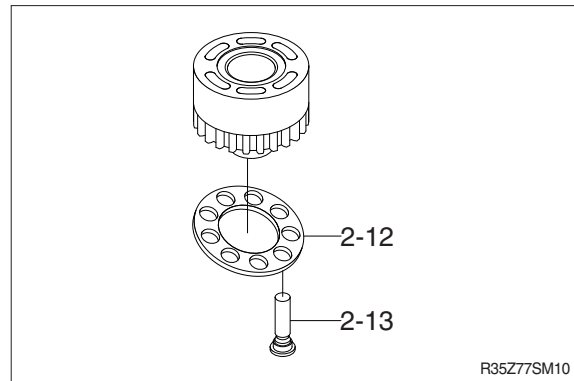


- ⑦ Remove the cylinder block and other associated parts.

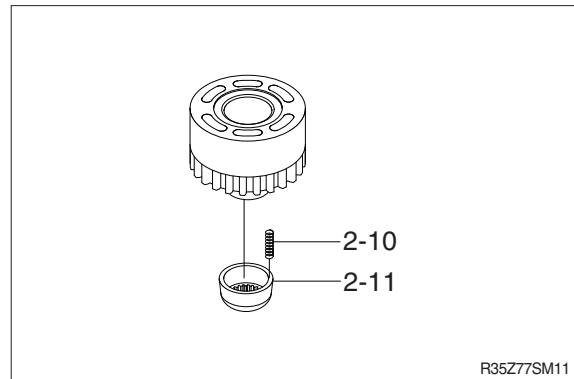
- (2-5) Cylinder block
- (2-6) Collar
- (2-7) Spring
- (2-8) Washer
- (2-9) Snap ring
- (2-10) Pin
- (2-11) Retainer holder
- (2-12) Retainer plate
- (2-13) Piston assembly
- (2-14) Disc (parking brake spec. only)



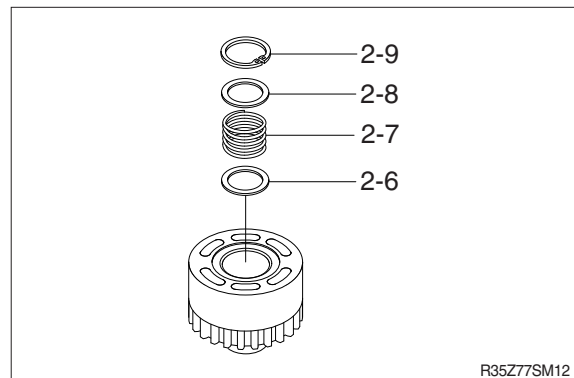
- ⑧ Remove the retainer plate (2-12) and the piston assembly (2-13).



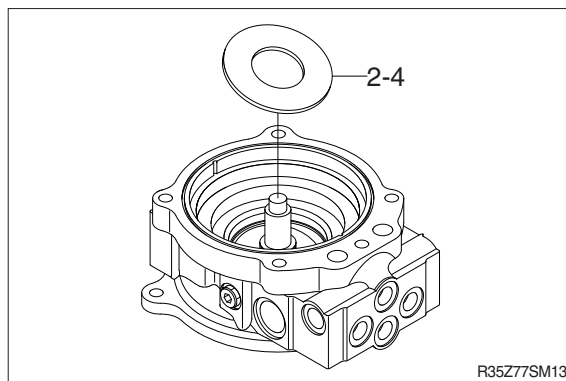
- ⑨ Remove the pin (2-10) and the retainer holder (2-11).



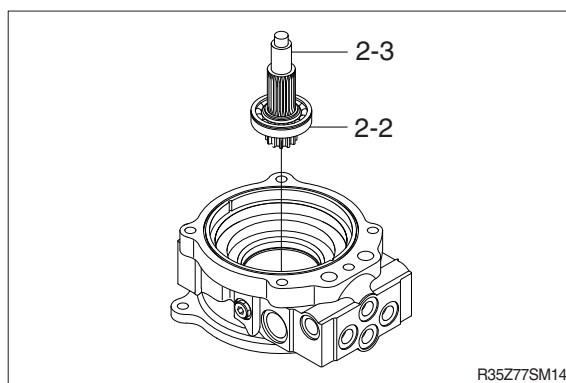
- ⑩ While pushing the washer (2-8), remove the snap ring (2-9).
- ⑪ Remove the collar (2-6), the spring (2-7) and the washer (2-8).



- ⑫ Remove the thrust plate (2-4).

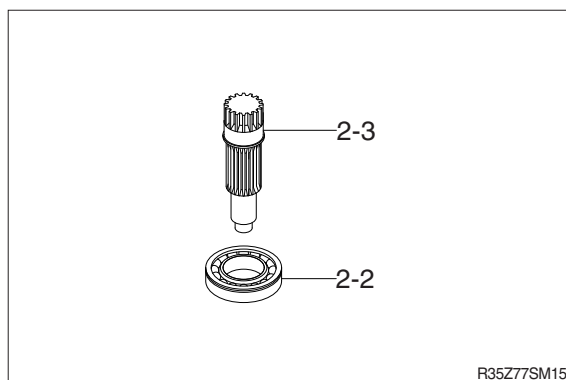


- ⑬ Lightly strike the end of the shaft (2-3) with a plastic hammer to remove the shaft.



- ⑭ Disassemble the ball bearing (2-2) and the shaft (2-3).

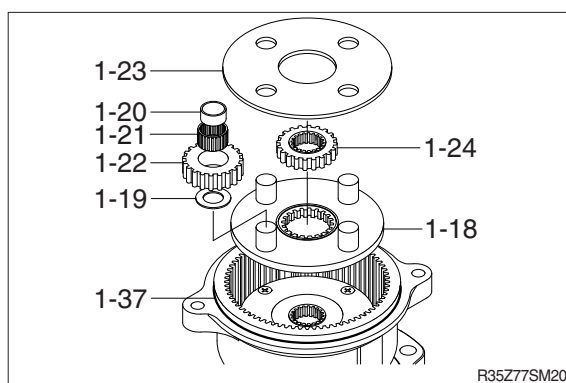
※ The disassembled bearing must not be used.



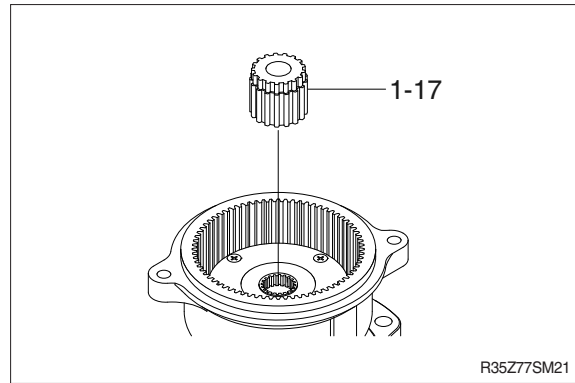
### (3) Disassembling the reduction gear

- ① Remove the following parts.

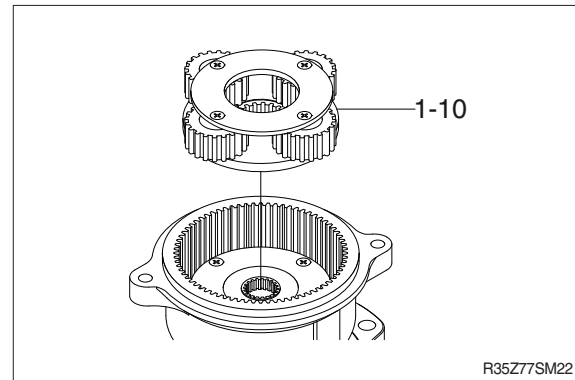
- (1-37) O-ring
- (1-24) Drive gear
- (1-23) Thrust plate
- (1-22) Planetary gear
- (1-21) Needle bearing
- (1-20) Inner race
- (1-19) Thrust washer
- (1-18) Holder



- ② Remove the sun gear (1-17).



- ③ Remove the holder (1-10) and other associated parts.

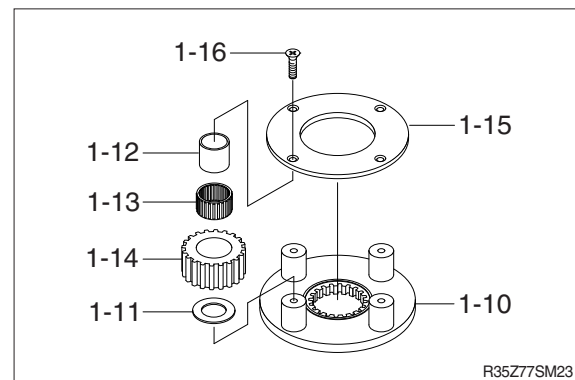


- ④ Secure the holder (1-10) in a vice and loosen the screw (1-16) to remove the thrust plate (1-15).

※ The screw is hard to remove because loctite was used during assembly. To facilitate the removal of the screw, warm the screw with a drier.

- ⑤ Remove the following parts.

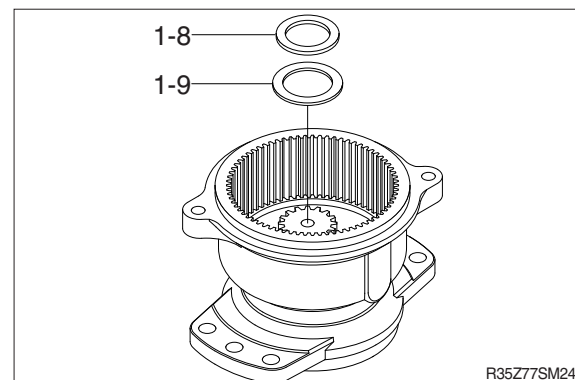
(1-14) Planetary gear  
(1-13) Needle bearing  
(1-12) Inner race



※ When replacing the taper roller bearings (1-5) and (1-7), the collar (1-9) and the plate (1-8), they are to be replaced by the body assembly.

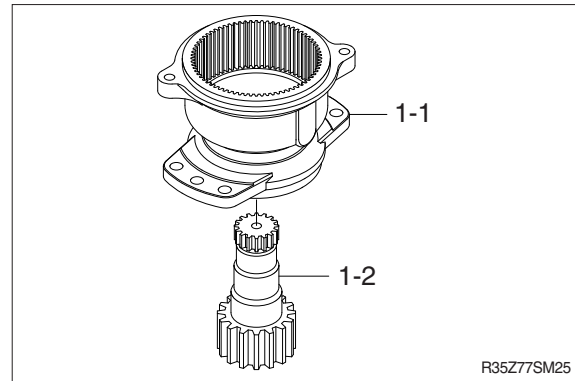
- ⑥ Remove the following parts.

(1-8) Plate  
(1-9) Collar

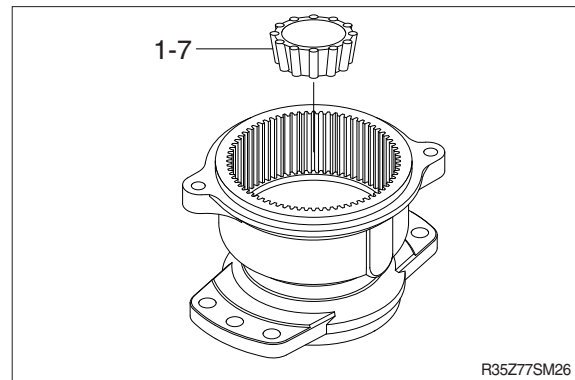


⑦ Remove the pinion shaft (1-2)

- ※ When removing the shaft, be careful not to drop it. If it is hard to remove, lightly strike it with a plastic hammer.

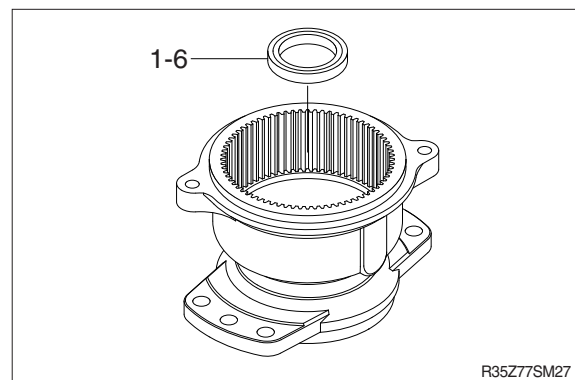


⑧ Remove the inner race of the taper roller bearing (1-7).

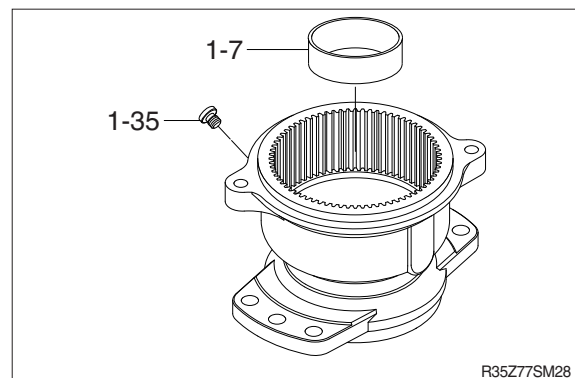


⑨ Break the oil seal (1-6) to remove it.

- ※ The removed oil seal must not be used again.
- When removing it, exercise care to prevent damage to the outer races of the taper roller bearing (1-8) and (1-6).



⑩ Remove the outer race of the taper roller bearing (1-7) and the plug (1-35).



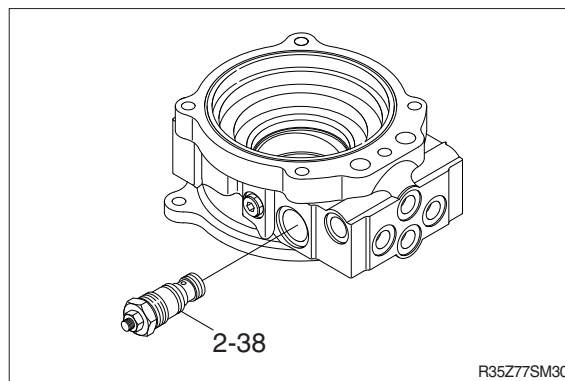
### 3) ASSEMBLY

Assemble the parts by the following procedure.

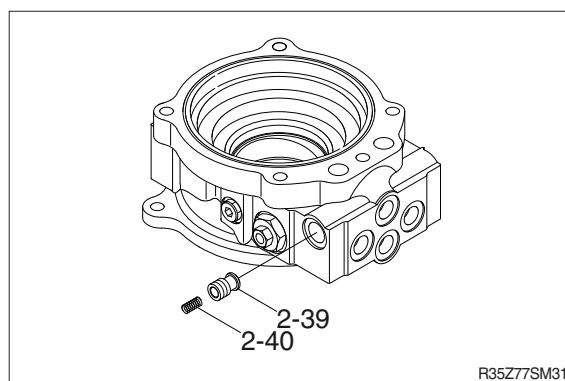
#### (1) Assembling the motor

- ① Install the relief valve assembly (2-38).

· Tightening torque :  $16.0 \pm 1.0$  kgf·m  
 $116 \pm 7.4$  lbf·ft

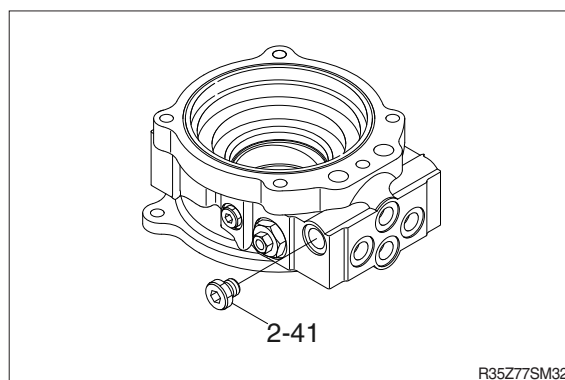


- ② Assemble the check valve (2-39) and the spring (2-40).



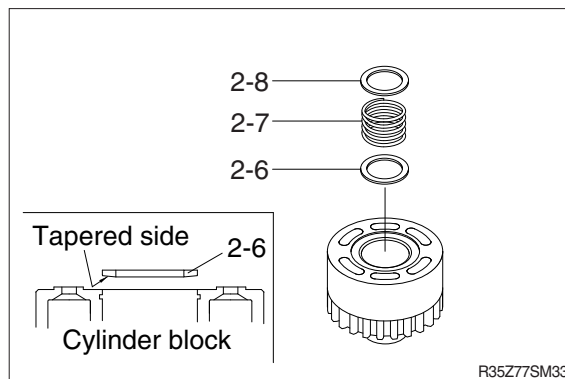
- ③ Install the plug (2-41).

· Tightening torque :  $4.0 \pm 0.2$  kgf · m  
( $28.9 \pm 1.5$  lbf·ft)

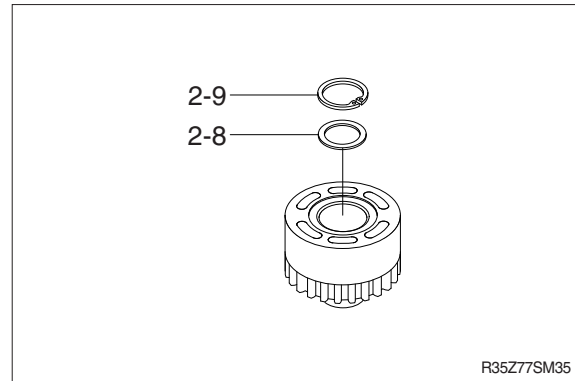


- ④ Assemble the collar (2-6), the spring (2-7) and the washer (2-8) in the cylinder block (2-5).

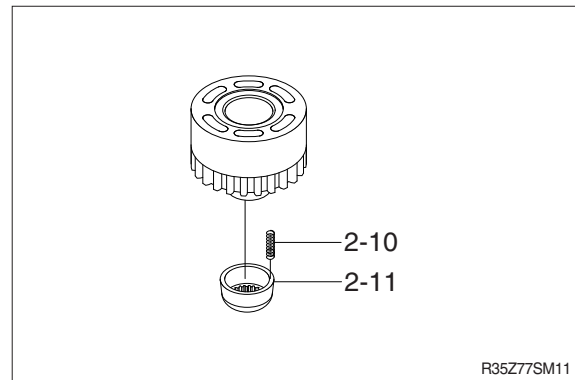
※ Be sure to assemble the collar (2-6) in the correct direction.



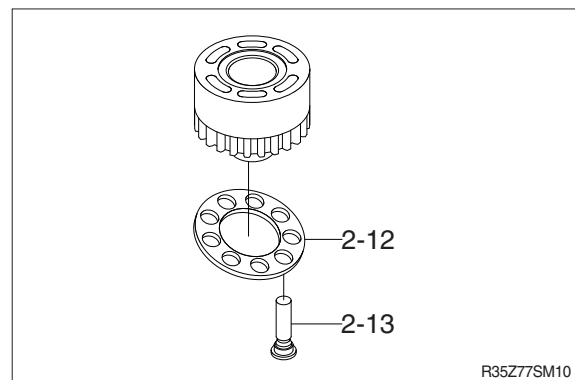
- ⑤ While pushing the washer (2-8), assemble the snap ring (2-9).



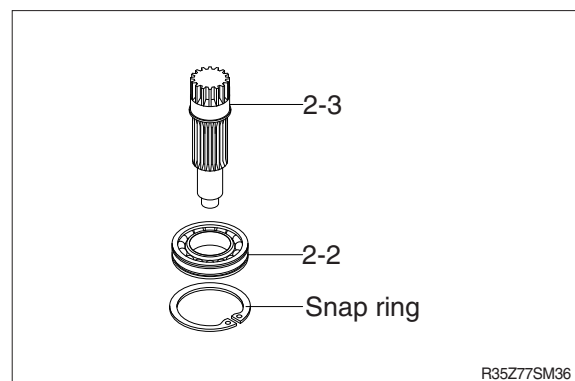
- ⑥ Apply grease to the pin (2-10) and assemble it in the cylinder block (2-5).
- ⑦ Assemble the retainer holder (2-11).



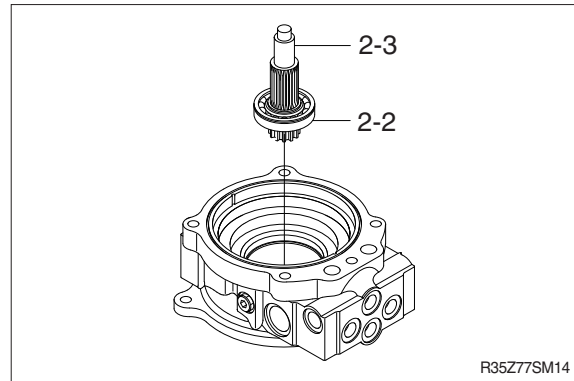
- ⑧ Set the piston assembly (2-13) on the retainer plate (2-12) and assemble it in the cylinder block (2-5).
- ※ Apply an ample amount of hydraulic fluid to the sliding part before assembly.



- ⑨ Press-fit the ball bearing (2-2) on the shaft (2-3).
- ※ Press-fit the ball bearing (2-2) with the attached snap ring facing as shown in the figure.

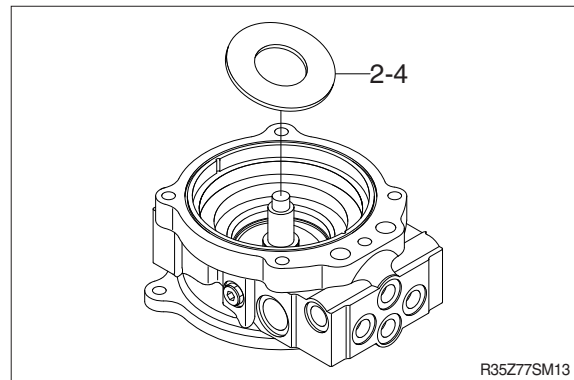


- ⑩ Press-fit the shaft (2-3) and the ball bearing (2-2) in the case (2-1).



- ⑪ Apply grease to the back side of the thrust plate (2-4) and assemble it.

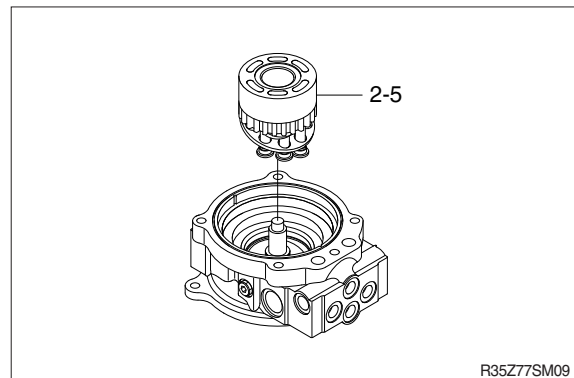
※ The thrust plate must be assembled in the correct direction.



- ⑫ Assemble the cylinder block (2-5) and other associated parts.

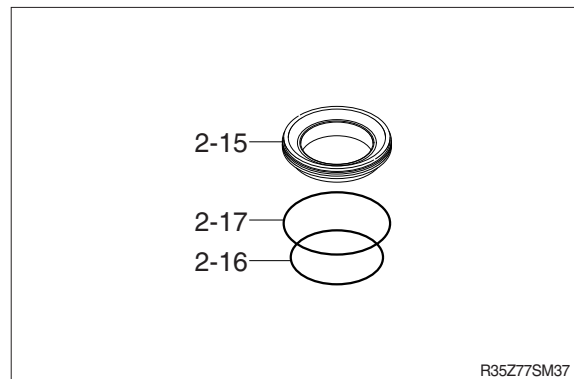
※ During assembly, be sure that the pin (2-10) will not come out.

※ The disc (2-14) is assembled only for the parking brake spec only.



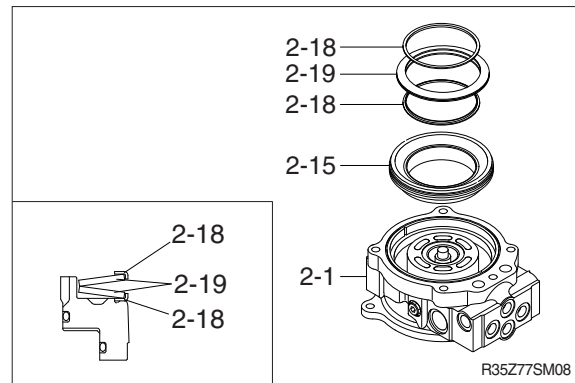
- ⑬ Apply grease to the O-ring (2-16) and the O-ring (2-17) and assemble them on the brake piston (2-15).

- ⑭ While paying attention to the location of the hole of the pin (2-25), assemble the brake piston (2-15) in the case (2-1).



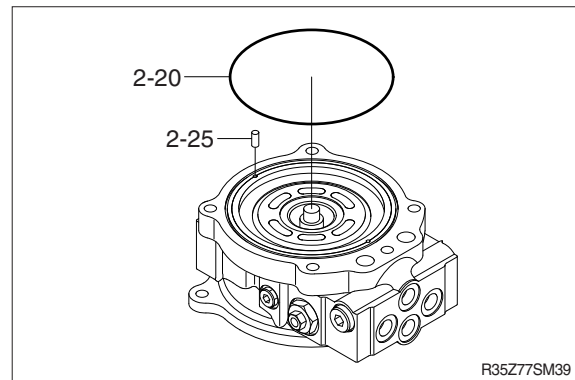


- ⑮ Assemble the spring seat (2-18) and the disc spring (2-19) in the correct direction.

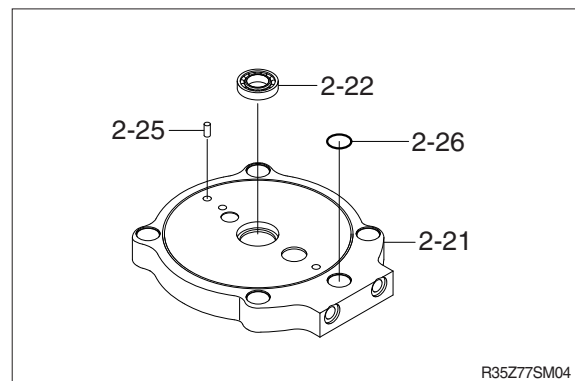


- ⑯ Apply grease to the O-ring (2-20) and assemble it in the case (2-1).  
Check to see if the pin (2-25) can be assembled in the brake piston and case hole. If not, remove the brake piston (2-15) and re-orient it, then reassemble.

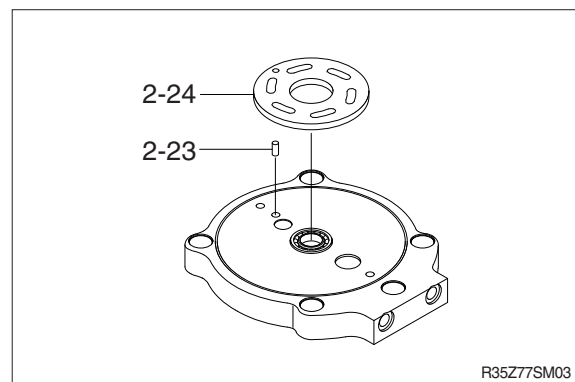
※ Assemble the pin (2-25) while being attached on the cover.



- ⑰ Apply grease to the O-ring (2-26) and the pin (2-25), then assemble them in the cover (2-21).  
Press-fit the ball bearing (2-22).



- ⑱ Install the pin (2-23), then install the valve plate (2-24).  
To prevent it from falling, apply grease to the back side.

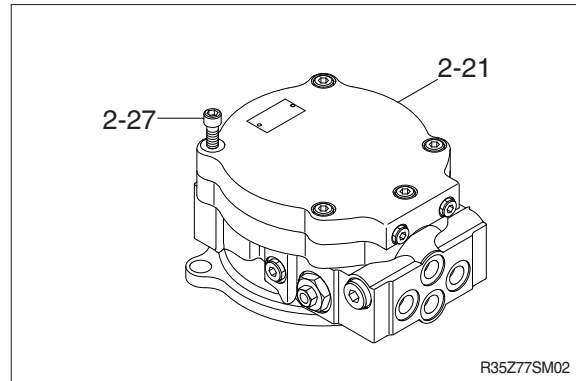


- ⑩ While paying attention to the location of the pin (2-25), install the cover (2-21) and other associated parts to the case (2-1).

Exercise care so that the pin (2-25) and  
※ the valve plate (2-24) will not fall.

- ⑪ Loosely tighten the socket head bolts (2-27), then using a torque wrench, tighten them to the specified torque.

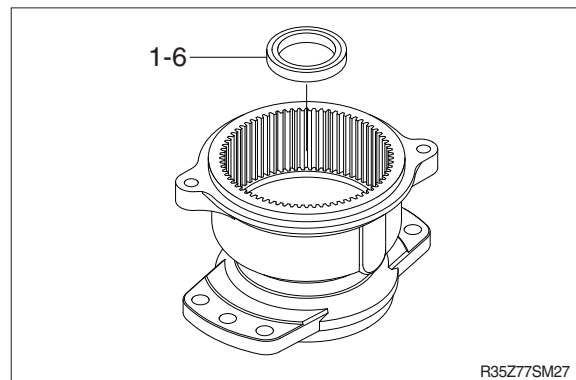
· Tightening torque :  $13 \pm 0.7$  kgf · m  
( $94.4 \pm 5$  lbf · ft)



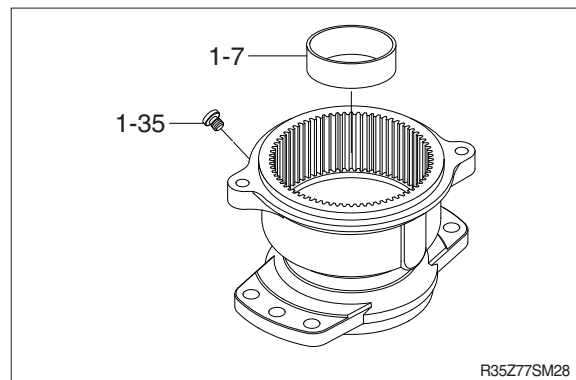
## (2) Assembling the reduction gear

- ① Press-fit the oil seal (1-6).

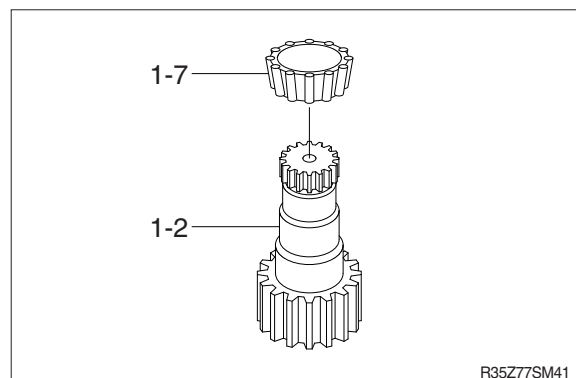
※ Prior to press-fit, apply grease to the oil seal mounting area of the housing and the periphery of the oil seal.



- ② Press-fit the taper roller bearing (1-7) and install the plug (1-35).

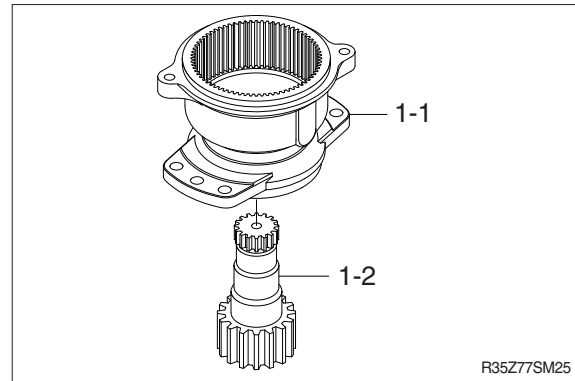


- ③ Apply grease to the inner race of the taper roller bearing (1-7) assembled on the pinion shaft (1-2).

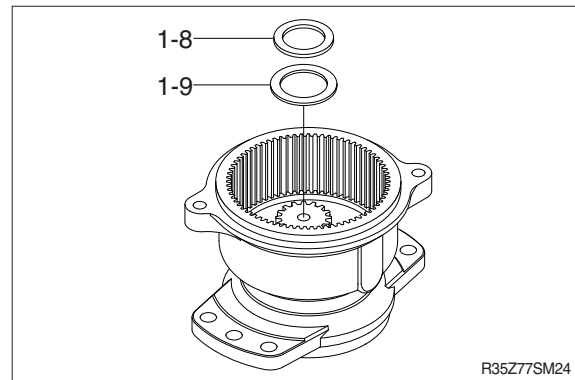


- ④ Install the pinion shaft (1-2) and other associated parts. Install the taper roller bearing inner race (1-7).

※ Prior to assembling the pinion shaft (1-2), etc. apply grease to the lip of the oil seal (1-6).

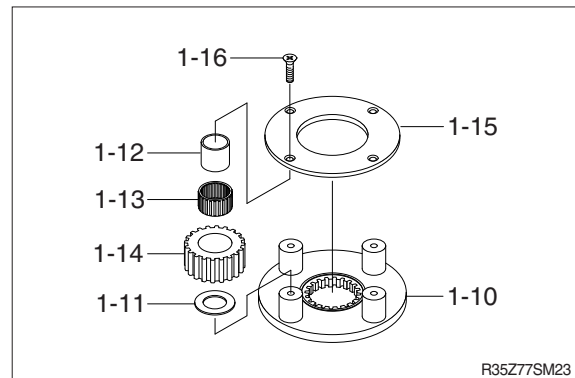


- ⑤ Install the collar (1-9) and the plate (1-8).



- ⑥ Install the following parts on the holder.

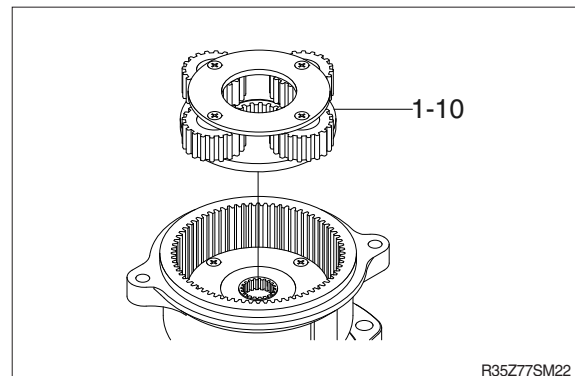
- (1-10) Holder
- (1-11) Thrust washer
- (1-12) Inner race
- (1-13) Needle bearing
- (1-14) Planetary gear B
- (1-15) Thrust plate
- (1-16) Screw



※ Apply loctite 242 to the screw prior to tightening it.

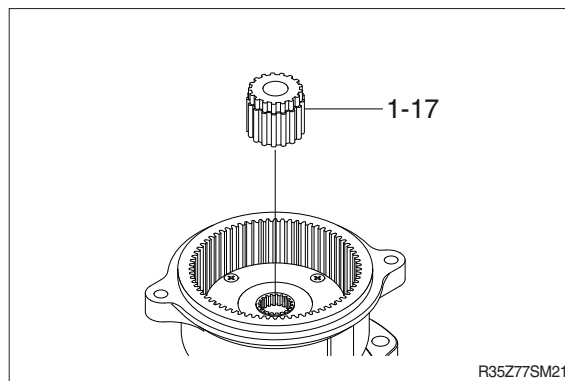
· Tightening torque :  $0.4 \pm 0.05 \text{ kgf} \cdot \text{m}$   
 $(2.9 \pm 0.3 \text{ lbf} \cdot \text{ft})$

- ⑦ Install the holder (1-10) and other associated parts.

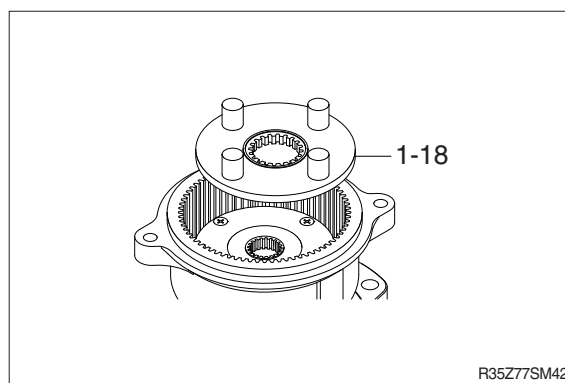


⑧ Install the sun gear (1-17).

※ Install the sun gear (1-17) with the snap ring facing as shown in the figure.

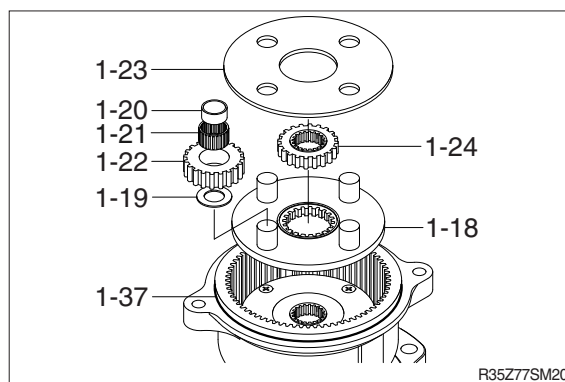


⑨ Install the holder (1-18).



⑩ Install the following parts.

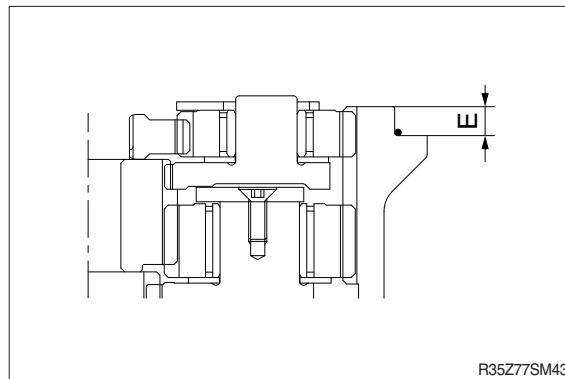
- (1-19) Thrust washer
- (1-20) Inner race
- (1-21) Needle bearing
- (1-22) Planetary gear A
- (1-23) Thrust plate
- (1-24) Drive gear
- (1-37) O-ring



※ Selection for thrust plate (1-15).

When any consisting parts of reduction unit were changed, select and install thrust plate corresponding to the measured value "E" referring to the below table.

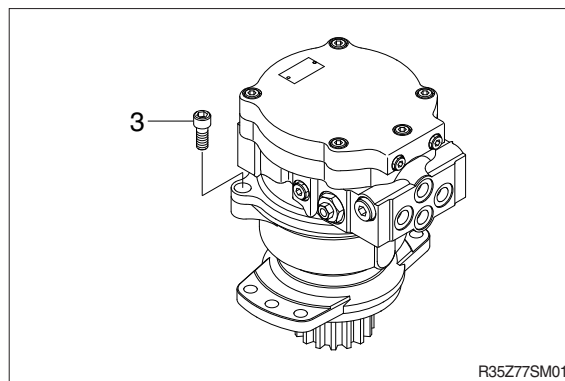
E dimension (measured value)	Less than 6.6	6.6~7.2	More than 7.2
Part no. of thrust plate 1-23 (plate thickness)	XJBV-00129 (3.2 mm)	XJBV-00130 (2.8 mm)	XJBV-00131 (2.3 mm)



### (3) Assembling the whole motor assembly

Place the reduction gear assembly on the motor assembly and loosely tighten the socket head bolt (3), then tighten it to the specified torque.

- Tightening torque :  $13 \pm 0.7 \text{ kgf} \cdot \text{m}$   
( $94.4 \pm 5 \text{ lbf} \cdot \text{ft}$ )



## GROUP 6 TRAVEL DEVICE

### 1. REMOVAL AND INSTALL

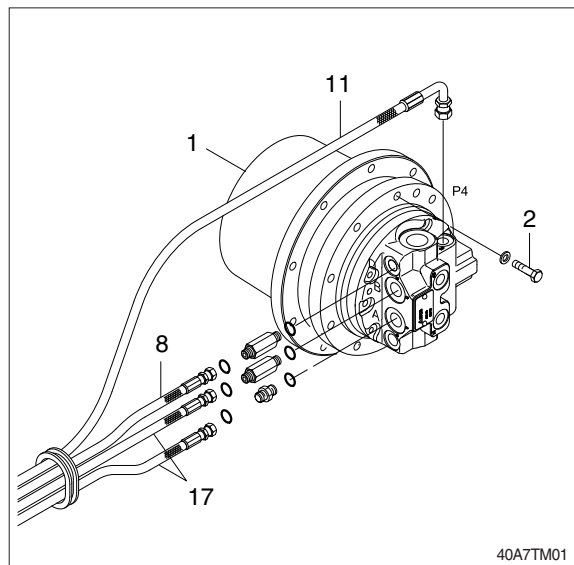
#### 1) REMOVAL

- (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.

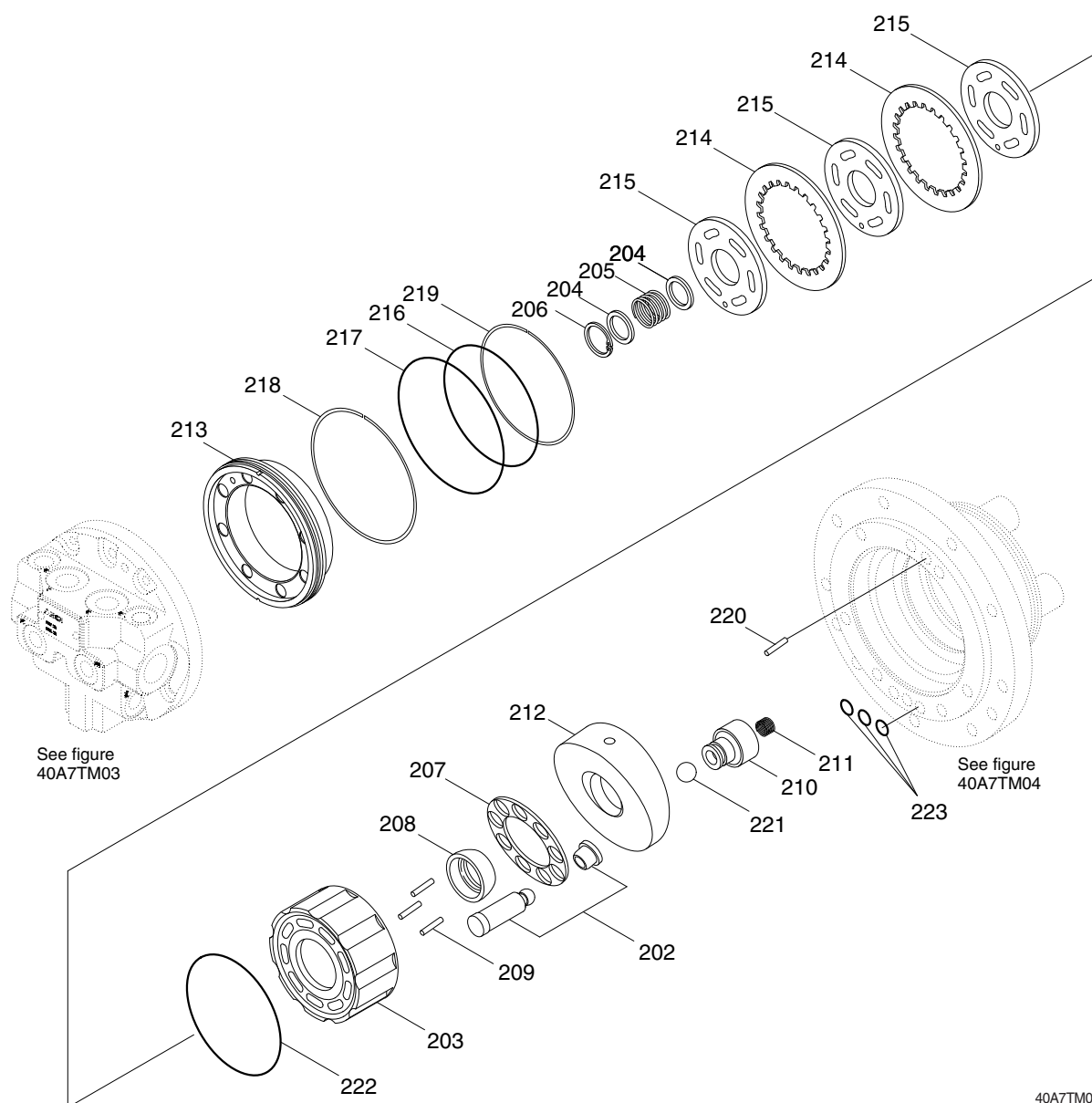
- (4) Remove the track shoe assembly.  
For details, see **removal of track shoe assembly**.
- (5) Remove the cover.
- (6) Remove the hose.  
※ Fit blind plugs to the disconnected hoses (8, 11, 17).
- (7) Remove the bolts and the sprocket.
- (8) Sling travel device assembly (1).
- (9) Remove the mounting bolts (2), then remove the travel device assembly.
  - Weight : 37 kg (82 lb)
  - Tightening torque :  $14.4 \pm 2.1$  kgf·m  
( $104 \pm 15.2$  lbf·ft)



#### 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. STRUCTURE (1/3)



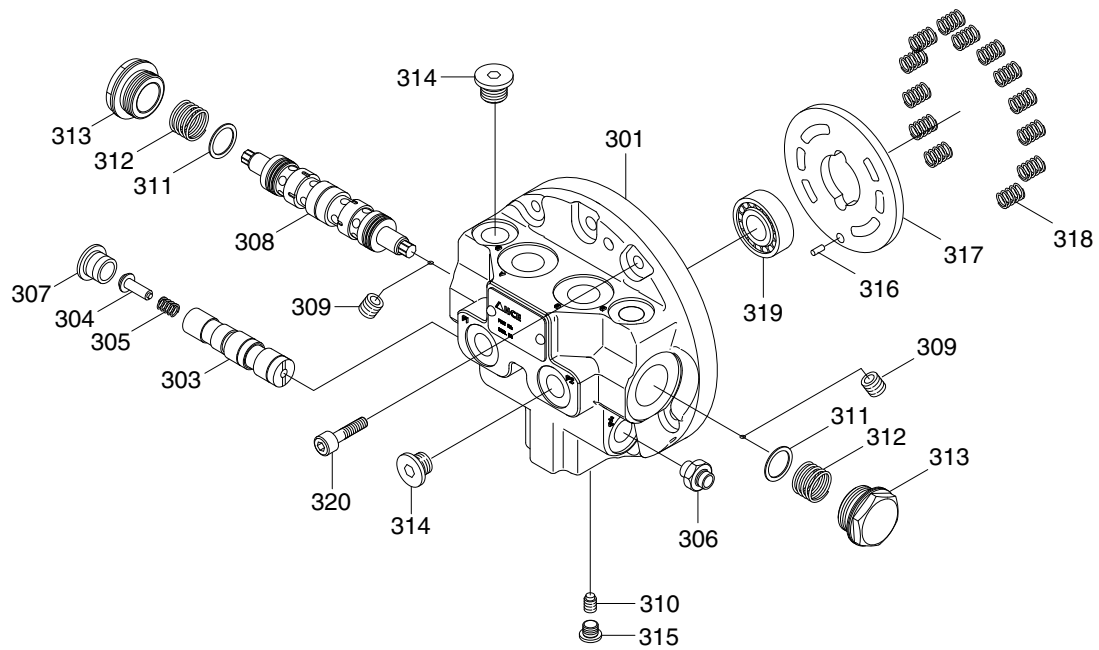
40A7TM02

202 Piston assy  
203 Cylinder block  
204 Washer  
205 Spring  
206 Snap ring  
207 Retainer plate  
208 Thrust ball  
209 Roller

210 Piston assy  
211 Spring  
212 Swash plate  
213 Parking piston  
214 Friction plate  
215 Separation plate  
216 O-ring

217 O-ring  
218 Back up ring  
219 Back up ring  
220 Parallel pin  
221 Steel ball  
222 O-ring  
223 O-ring

## STRUCTURE (2/3)

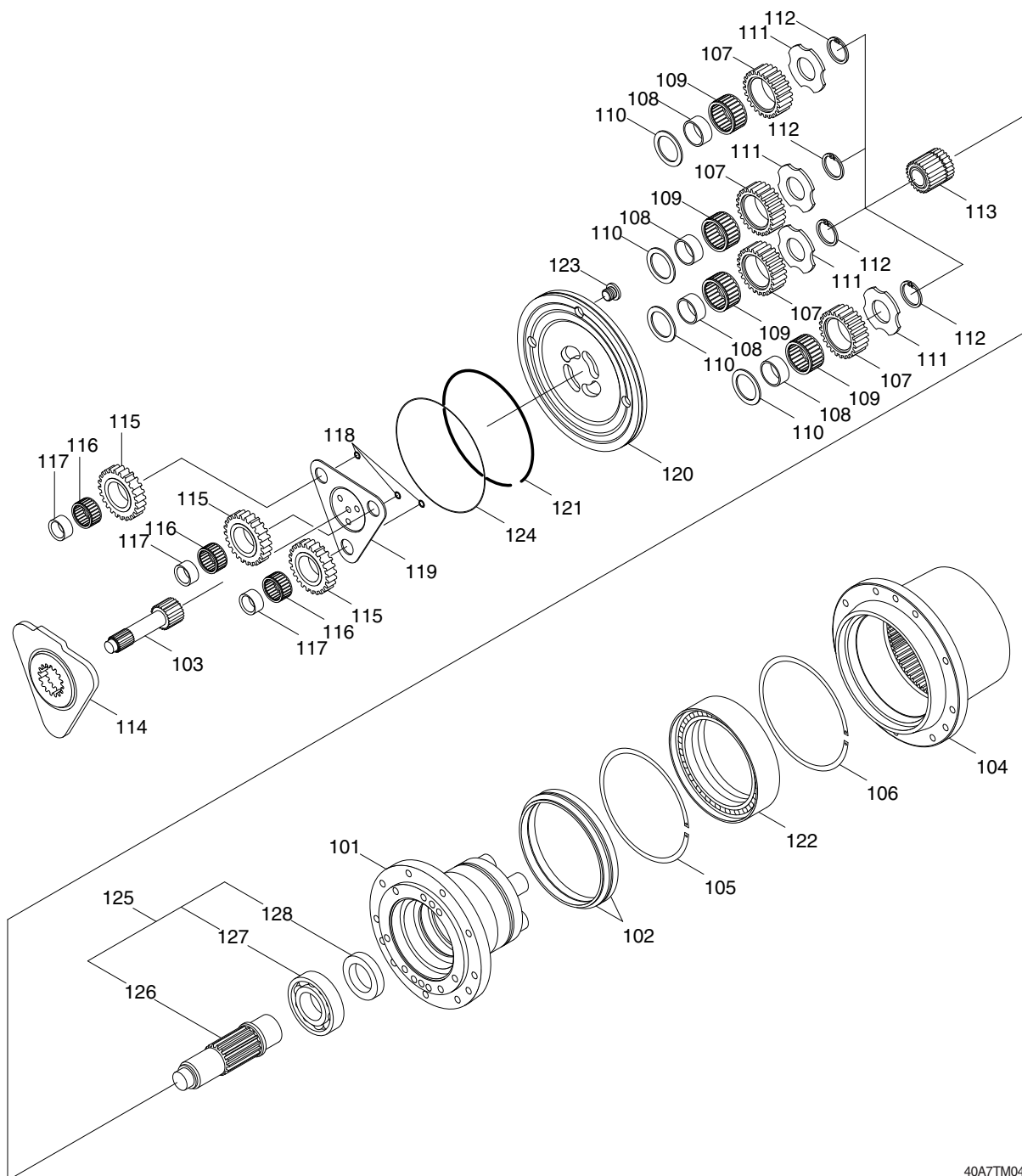


40A7TM03

301	Valve casing	309	Orifice	316	Parallel pin
303	2-speed spool	310	Orifice	317	Timing plate
304	2-speed spool guide	311	Washer	318	Spring
305	Spring	312	Spring	319	Ball bearing
306	Plug assy	313	Main plug assy	320	Socket bolt
307	Plug assy	314	Plug assy		
308	CB spool assy	315	Plug assy		



### STRUCTURE (3/3)

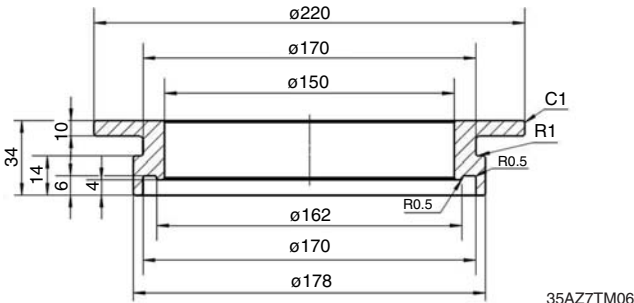
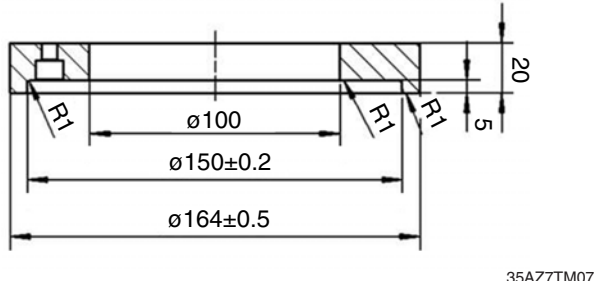
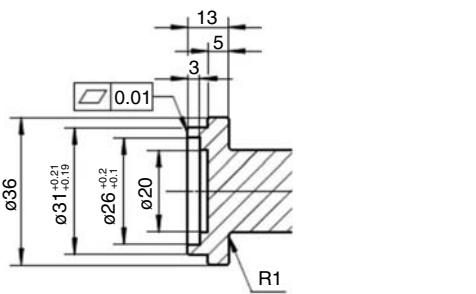


40A7TM04

- |                      |                       |                  |
|----------------------|-----------------------|------------------|
| 101 Spindle          | 111 Thrust washer     | 121 Clip         |
| 102 Floating seal    | 112 Snap ring         | 122 Ball bearing |
| 103 Sun gear No.1    | 113 Sun gear No.2     | 123 Plug         |
| 104 Hub              | 114 1st carrier       | 124 O-Ring       |
| 105 Snap ring        | 115 Planet gear No.1  | 125 Drive shaft  |
| 106 Shim plate       | 116 Needle bearing    | 126 Drive shaft  |
| 107 Planet gear No.2 | 117 Inner race        | 127 Ball bearing |
| 108 Inner race       | 118 Snap ring         | 128 Oil seal     |
| 109 Needle bearing   | 119 Thrust plate No.1 |                  |
| 110 Washer           | 120 Cover             |                  |

### 3. DISASSEMBLY AND ASSEMBLY

#### 1) REQUIRED TOOLS

Tool name	Tool number	Specification
Torque wrench	T1	3~36 kgf·m (21.7~260 lbf·ft)
Hex bit	T2	6 mm
	T3	8 mm
Hex socket	T4	22 mm
	T5	36 mm
Plastic hammer	T6	Head material : Soft plastic
Plier	T7	Snap ring, general type, tip thickness $\varnothing 1.3$ , length 25 mm
	T8	Snap ring, gear type tip thickness $\varnothing 3.8$ , length 165 mm
Driver	T9	Flat-head, small
	T10	Flat-head, large (2 EA)
Round bar	T11	O.D. $\varnothing 25$ , length 130 mm
Air gun	T12	Nozzle type
Eye bolt	T13	M14 $\times$ 1.5 (2 EA)
Ball bearing disassembly/ press-fit jig	T14	O.D. $\varnothing 27$ , I.D. $\varnothing 24$ , length 110 mm hollow cylinder
Guide pin	T15	M10 $\times$ 1.5 $\times$ 50
Floating seal assembly jig	T16	
Angular bearing press-fit jig	T17	
Shaft seal press-fit jig	T18	

## 2) TIGHTENING TORQUE

Item no.	Size	Tightening torque	
		kgf·m	lbf·ft
24	M14 x 1.5	4.0±0.5	28.9±3.6
57	M 5 x 0.8	0.18±0.02	1.3±0.14
60	M30 x 1.5	36.0±4.0	260±28.9
62	PF 3/8	6.0±1.0	43.4±7.2
67	PF 3/8	6.0±1.0	43.4±7.2
71	M 6 x 1.0	0.28±0.02	2.0±0.14
72	PF 1/8	1.9±0.2	13.7±1.15
74	PF 1/4	4.3±0.3	31.1±2.17
78	M10 x 1.5	5.9±1.0	42.7±7.2
82	PF 1/4	3.0±0.5	21.7±3.6

## 3) PRECATIONS

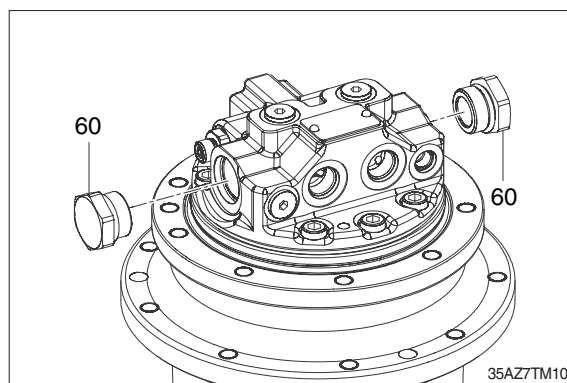
- (1) Be careful not to damage the seal contact surface of the floating seal, O-ring, shaft seal, etc. and the contact surface of the gear, pin, bearing.
- (2) When disassembling after mounted on the equipment, make sure no foreign substances enter the equipment.
- (3) Clean each part with oil sufficiently and dry it with the compressed air before assembly.
- (4) When using oil absorbent or oil mop, be careful not to scratch the parts. Clean it thoroughly with lint-free cloths before assembly.
- (5) When tightening the bolt and plug, use a torque wrench and tighten the bolt and plug to the specified tightening torque.
- (6) Use a plastic hammer to tap the non-functional parts.
- (7) Replace the floating seal, O-ring, shaft seal with a new one when disassembly.
- (8) For the assembly of bearing preload, floating seal, please contact us for the detailed assembly method.

#### 4) DISASSEMBLY PROCEDURES

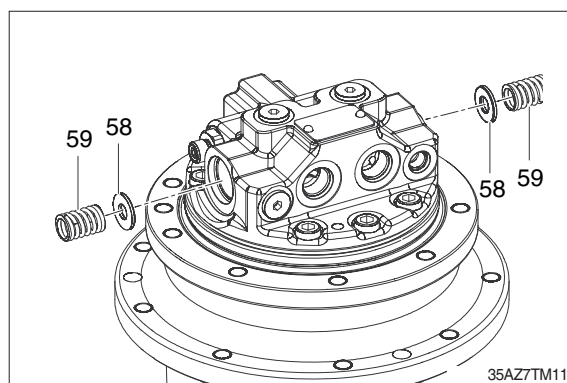
(1) Disassemble plug (60).

※ Required tools :

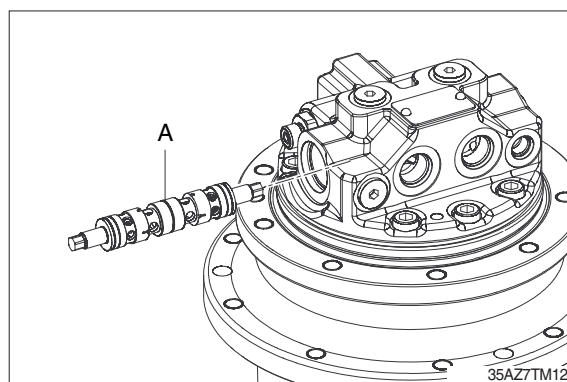
Torque wrench (T1), hex. socket (T5).



(2) Disassemble spring (59) and washer (58).



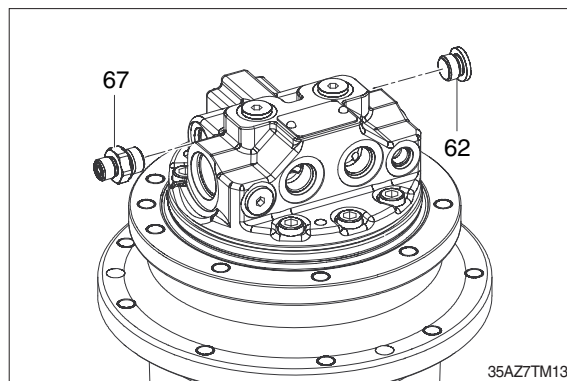
(3) Turn the spool assembly (A) slowly to disassemble. Be careful not to damage the spool O.D.



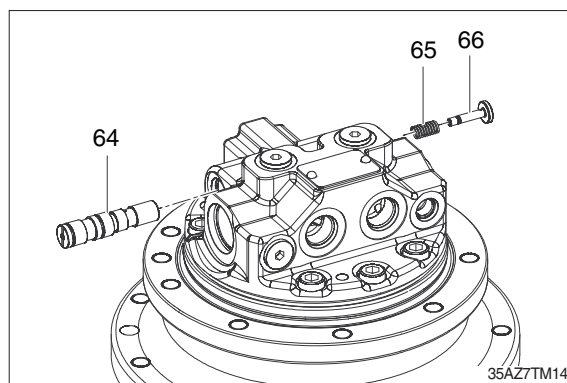
(4) Disassemble plug (62), (67).

※ Required tools :

Torque wrench (T1), hex. socket (T4), hex bit (T3).

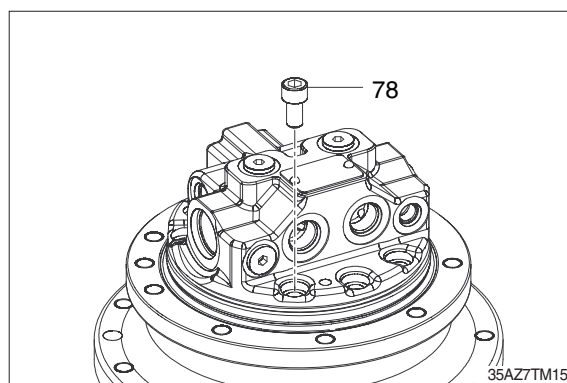


- (5) Disassembly spool (64), spring (65), and guide (66). Be careful not to damage the surface of the spool and guide.

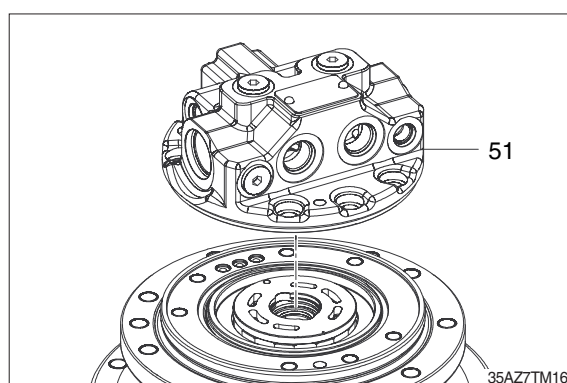


- (6) Loosen each socket bolt (78) evenly to disassemble.

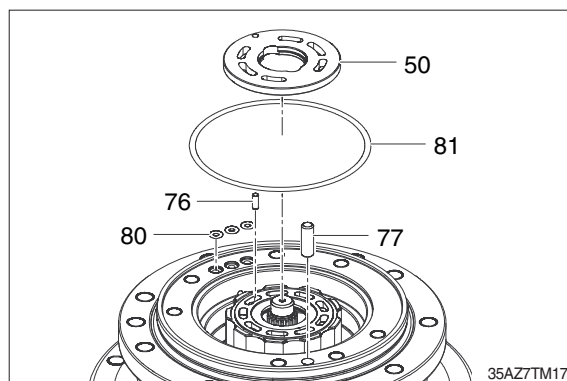
※ Required tools :  
Torque wrench (T1), hex. bit (T3).



- (7) Disassemble valve casing (51).

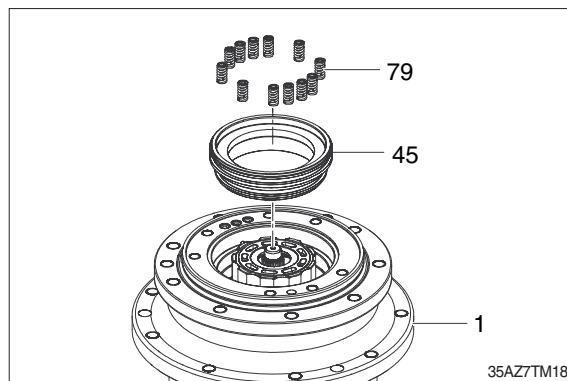


- (8) Disassemble pin (76), (77), O-ring (80), (81) and valve plate (50).

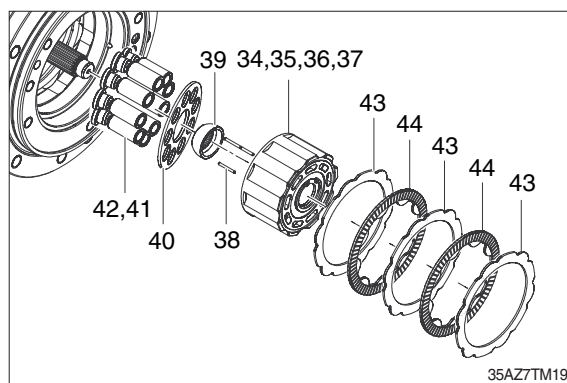


(9) Disassemble spring (79). Cover the top of a motor with cloths and disassemble the brake piston (45) by blowing compressed air into the brake releasing line of the motor casing (1).

※ Required tools :  
Compressed air, air gun (T12).

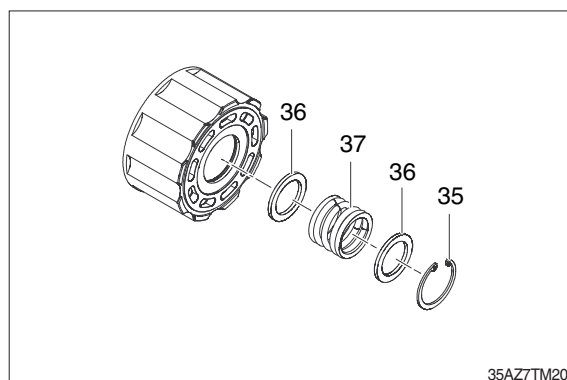


(10) Disassemble cylinder block assembly (34)~(37), roller (38), thrust ball (39), retainer plate (40), piston assembly (41)~(42), separation plate (43), and friction plate (44).

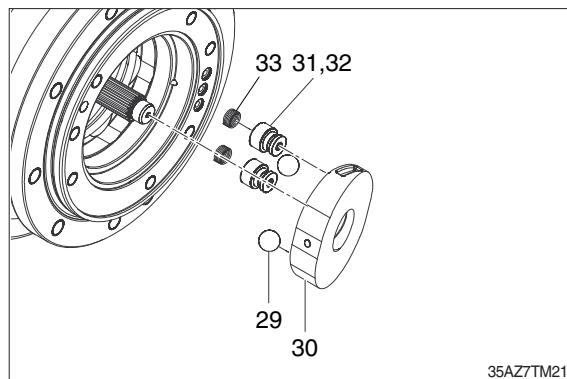


(11) Disassemble snap ring (35), washer (36) and spring (37).

※ Required tools : Plier (T7)

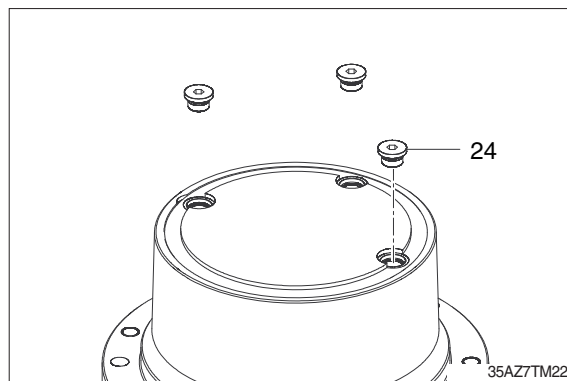


(12) Disassemble swash plate (30), steel ball (29), transmission piston assembly (31)~(32), and spring (33).



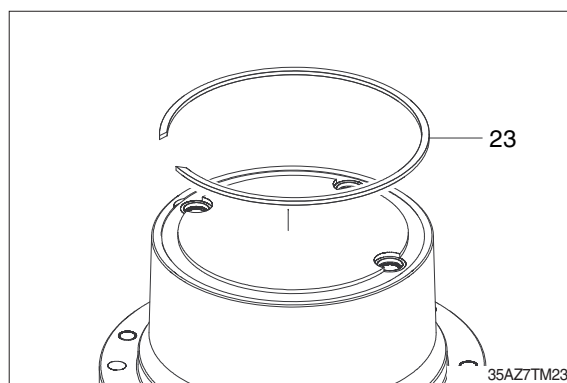
(13) Disassemble plug (24) and discharge the reduction gear oil.

- ※ Required tools :  
Torque wrench (T1), hex bit (T12).



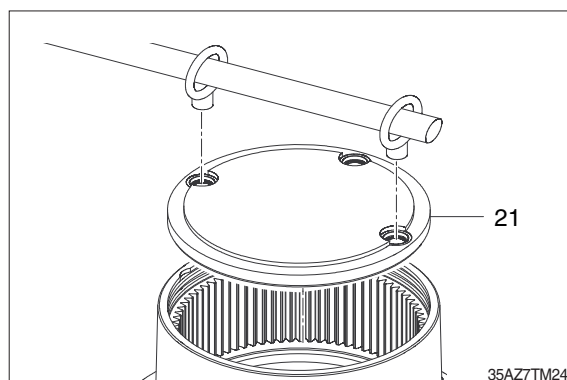
(14) Disassemble clip (23).

- ※ Required tools : Screwdriver (T9).



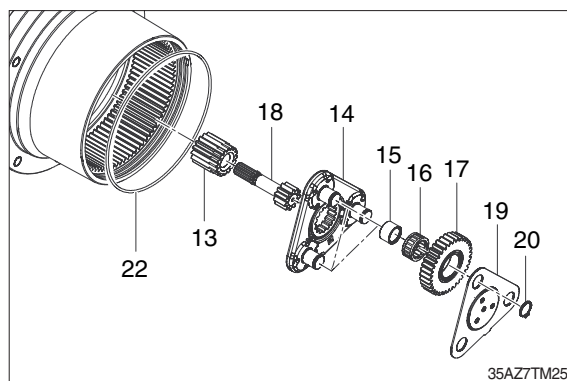
(15) Assemble two eye bolts into the plug hole in the opposite direction and hang the round bar to disassemble the cover (21).

- ※ Required tools :  
Eye bolt (T13), round bar (T11).



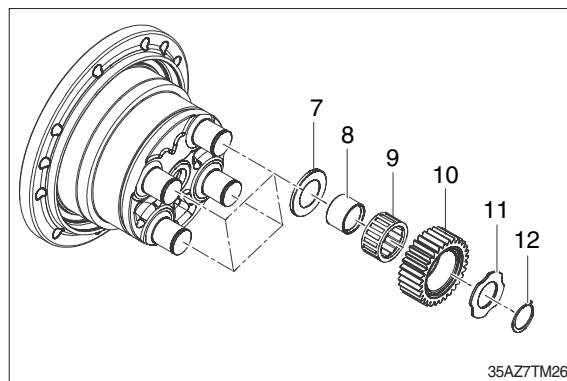
(16) Disassemble O-ring (22), the first stage sun gear (18), the first stage carrier (14), snap ring (20), thrust plate (19), the first stage planet gear (17), needle bearing (16), inner race (15), and the second stage sun gear (13).

- ※ Required tools : Plier (T7).



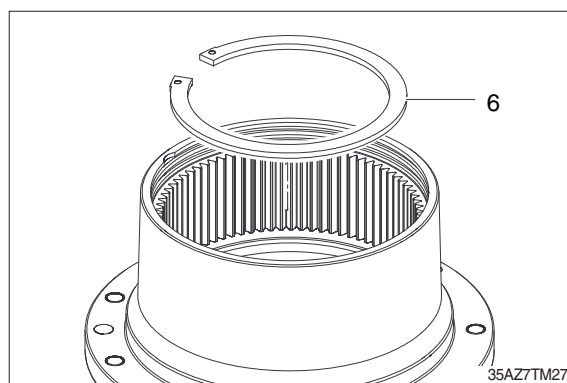
(17) Disassemble snap ring (12), washer (11), the second stage planet gear (10), needle bearing (9), inner race (8), and washer (7).

※ Required tools : Plier (T7).

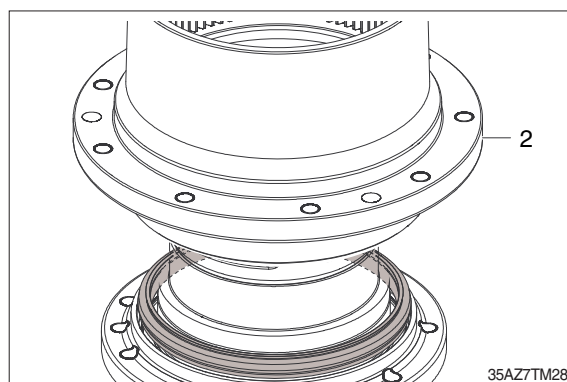


(18) Disassemble the shim plate (6).

※ Required tools : Plier (T8).

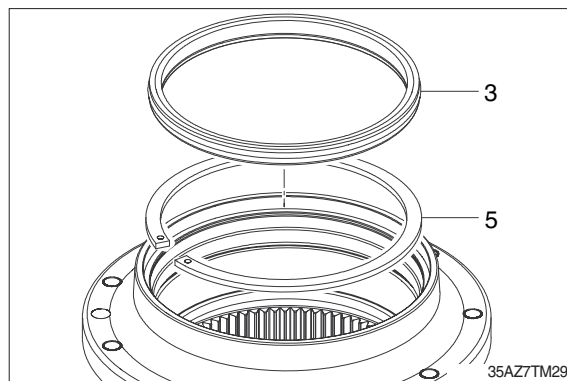


(19) Disassemble the hub (2).



(20) Disassemble the floating seat (3) and snap ring (5). Be careful not to damage the contact surface of the floating seal.

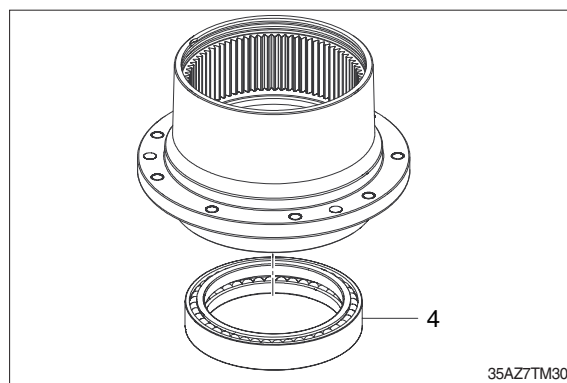
※ Required tools :  
Screwdriver (10), plier (T8).





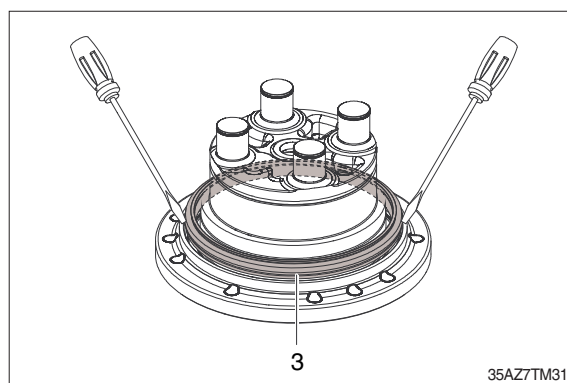
(21) Disassemble the angular ball bearing (4) by tapping the inner ring of the bearing with a plastic hammer and a bar.

※ Required tools :  
Round bar (T11), plastic hammer (T6).



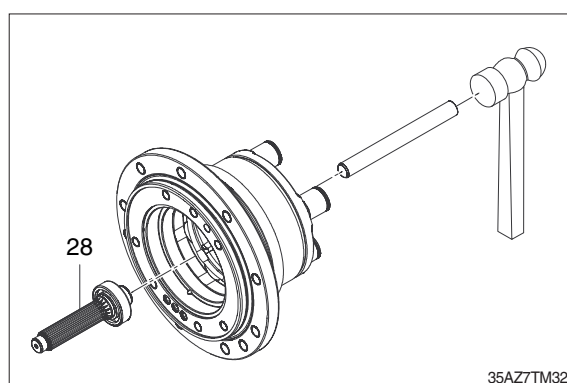
(22) Disassemble floating seal (3).

※ Required tools : Screwdriver (T10).



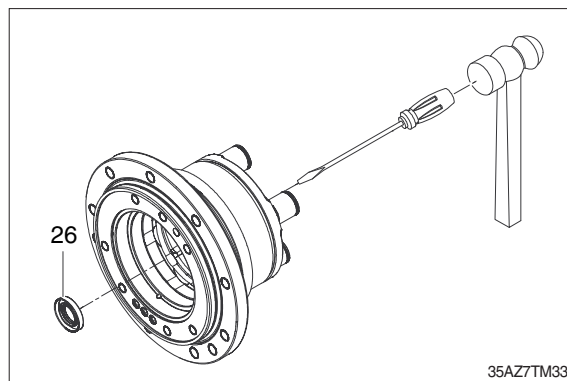
(23) Disassemble drive shaft (28) by tapping the spline hole with a bar and a plastic hammer.

※ Required tools :  
Round bar (T11), plastic hammer (T6).



(24) Disassemble shaft seal (26).

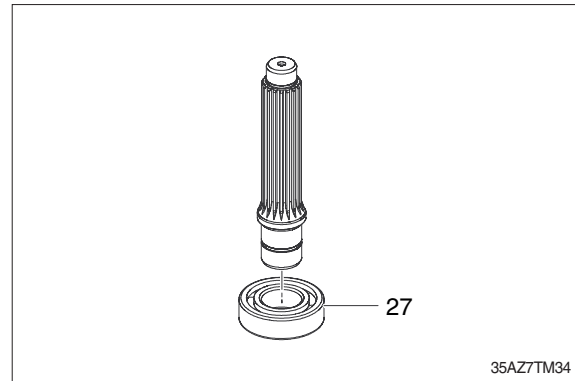
※ Required tools :  
Screwdriver (T9), plastic hammer (T6).



(25) Disassemble ball bearing (27).

※ Required tools :

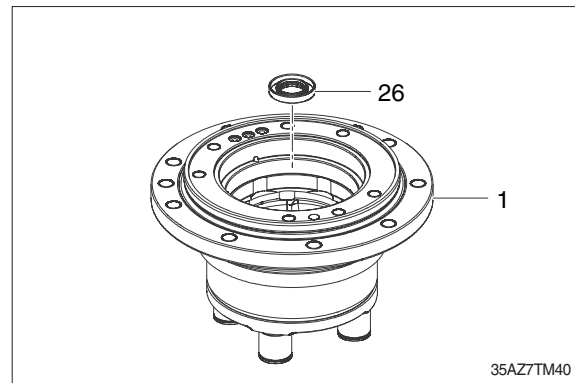
Ball bearing disassembly, press-fit jig  
(T14).



## 5) ASSEMBLY PROCEDURES

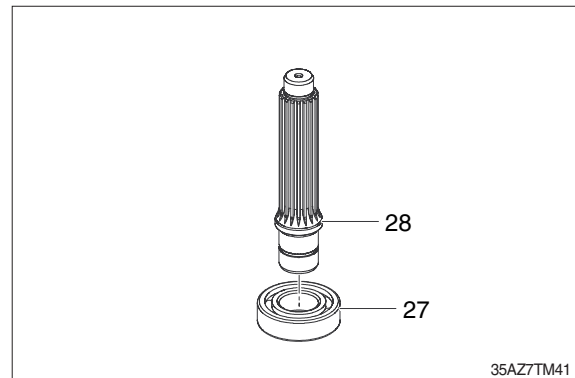
- (1) Apply a small amount of hydraulic fluid to the outer diameter of the shaft seal (26) and assemble it to the motor casing (1).

※ Required tools :  
Shaft seal press-fit jig (T18).

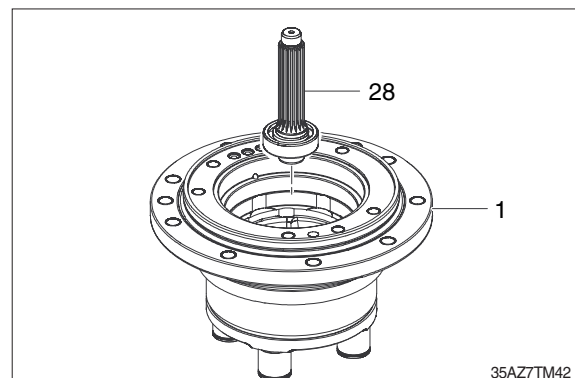


- (2) Assemble the ball bearing (27) to the drive shaft (28).

※ Required tools :  
Ball bearing disassembly, press-fit jig (T14).

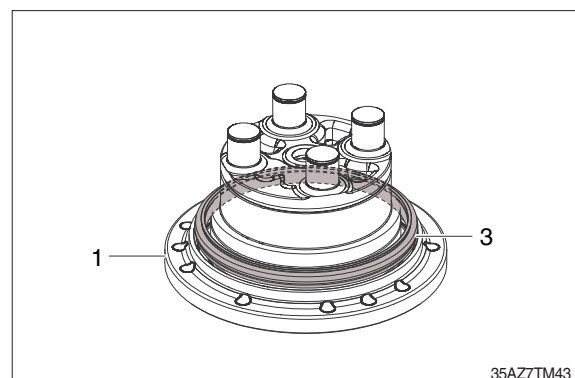


- (3) Assemble the drive shaft (28) to the motor casing (1).



- (4) Apply vaporizing lubricant to the O-ring outside of the floating seal (3) and assemble it to the motor casing (1) so that the parallelism can be 0.5 mm or less. After assembly, apply a small amount of hydraulic fluid to the polishing surface.

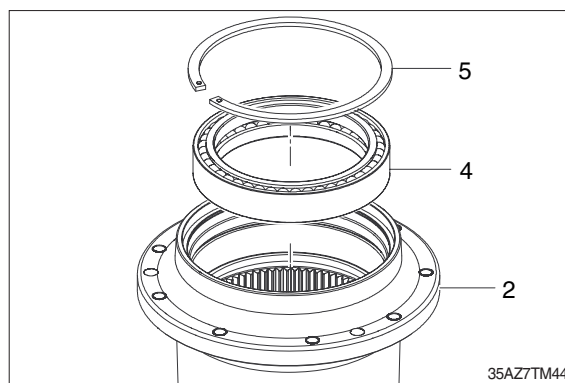
※ Required tools :  
Floating seal assembly jig (T16).



- (5) Insert angular ball bearing (4) into the hub (2) and then secure with a snap ring (5).

※ Required tools :

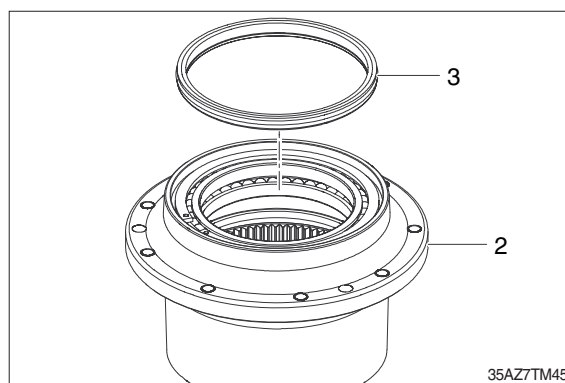
Angular gearing, press-fit jig (T17), Plier (T8).



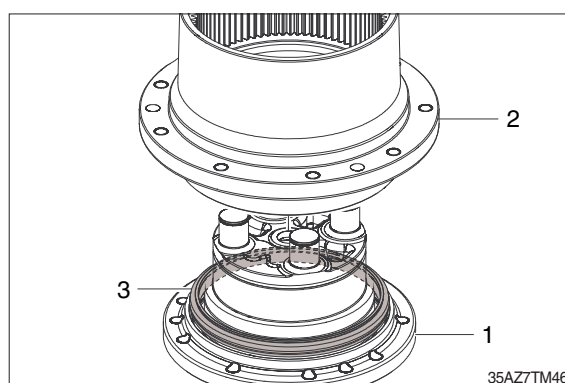
- (6) Apply vaporizing lubricant to the O-ring outside of the floating seal (3) and assemble it to the hub (1) so that the parallelism can be 0.5 mm or less. After assembly, apply a small amount of hydraulic fluid to the polishing surface.

※ Required tools :

Floating seal assembly jig (T16).

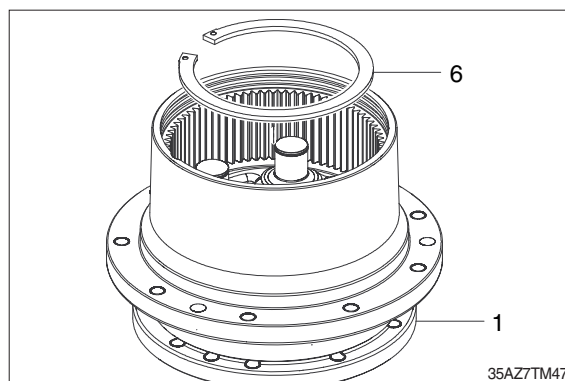


- (7) Assemble a hub (2) to motor casing (1). Be careful not to impact the floating seal (3).



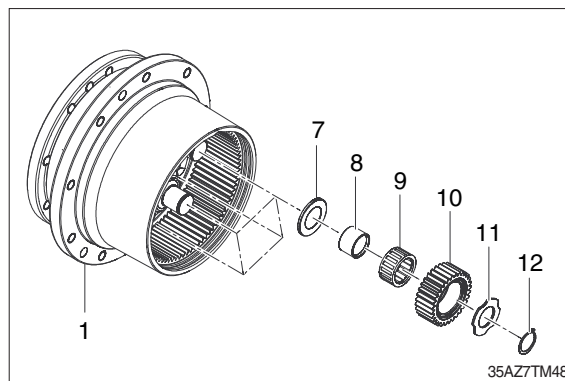
- (8) Assemble shim plate (6) to motor casing (1).

※ Required tools : Plier (T8).



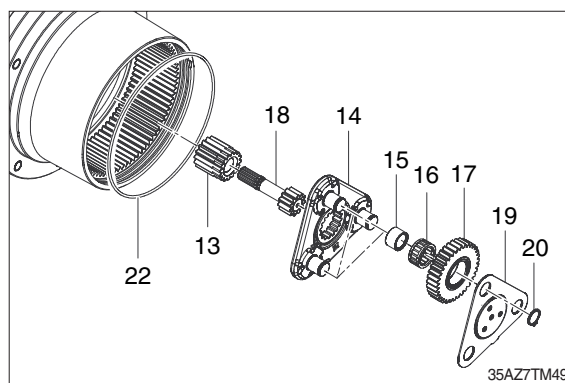
(9) Assemble washer (7), inner race (8), needle bearing (9), the second stage planet gear (10), washer (11), and snap ring (12) to motor casing (1).

※ Required tools : Plier (T7).



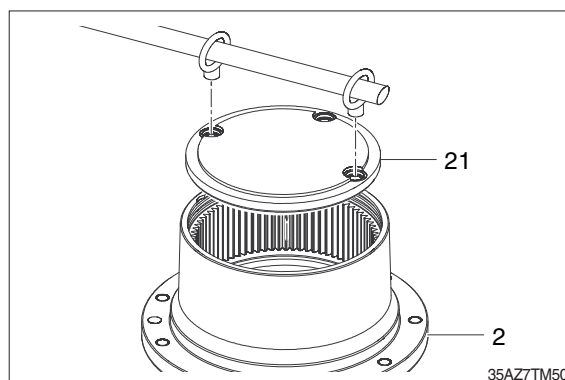
(10) Assemble in the order of the second stage sun gear (13), the first stage carrier (14), inner race (15), needle bearing (16), the first stage planet gear (17), the first stage sun gear (18), thrust plate (19), snap ring (20), and O-ring (22).

※ Required tools : Plier (T7).

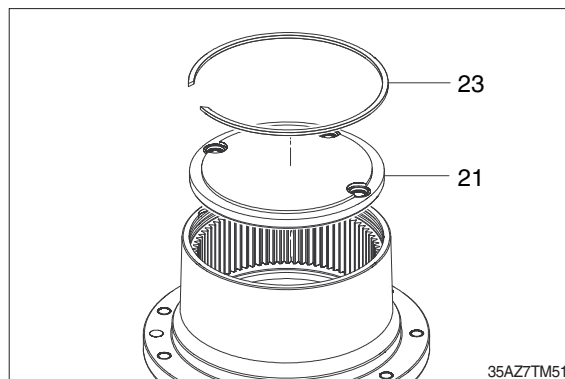


(11) Assemble cover (21) to hub (2).

※ Required tools :  
Eye bolt (T13), round bar (T11).



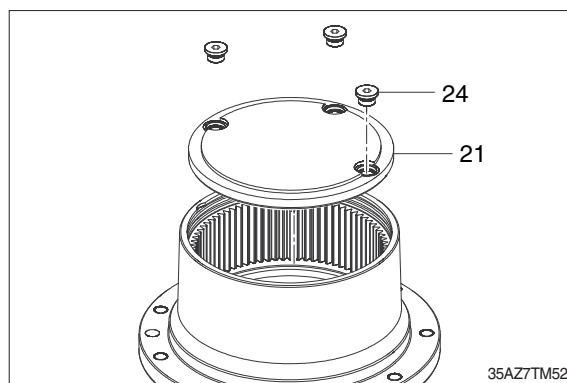
(12) Secure the cover (21) with clip (23).



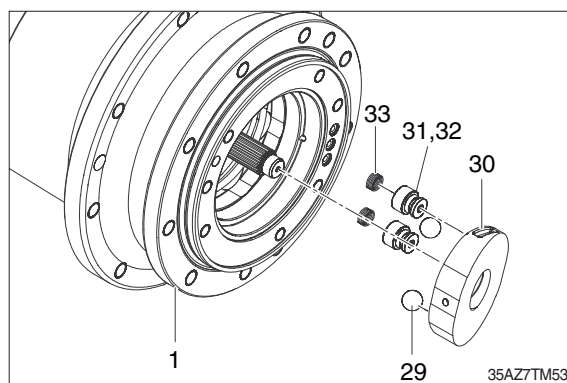
(13) Fill reduction gear oil of 0.6 liter and assemble plug (24) to cover (21).

※ Required tools :

Torque wrench (T1), hex bit (T2).

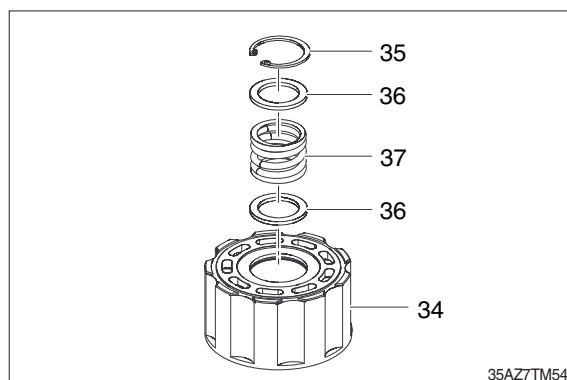


(14) Apply hydraulic fluid to the transmission piston outer diameter (31) and swash plate (30) polishing surface. Apply grease to spring (33) and assemble it to transmission piston assembly (31)~(32) and then to motor casing (1). Assemble steel ball (29) and swash plate (30) to motor casing (1).

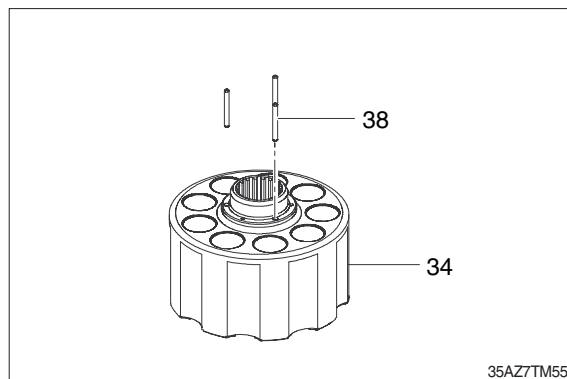


(15) Assemble washer (36), spring (37), snap ring (35) to cylinder block (34).

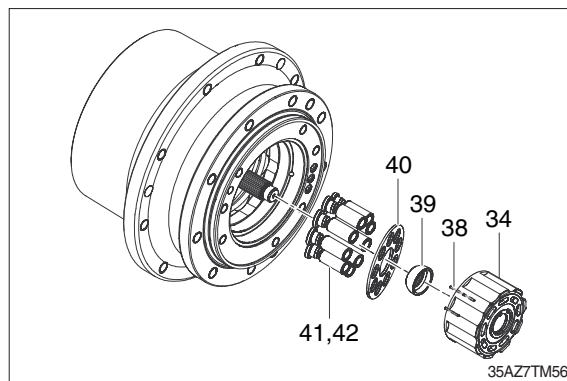
※ Required tools : Plier (T7).



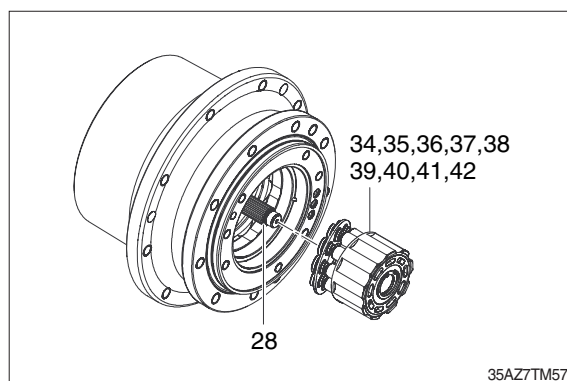
(16) Apply grease to roller (38) and assemble it to cylinder block (34).



- (17) Assemble thrust ball (39) to roller (38) and piston (41), shoe (42) to retainer plate (40) and then assemble them to cylinder block (34). Apply hydraulic fluid to the shoe (42).

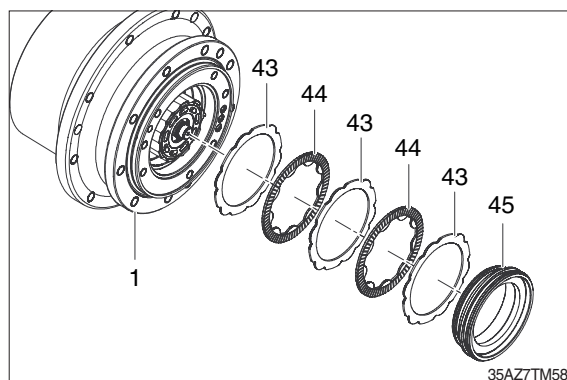


- (18) Assemble the cylinder block assembly (34)~(42) to drive shaft (28). Apply hydraulic fluid to cylinder block (34) polishing surface.

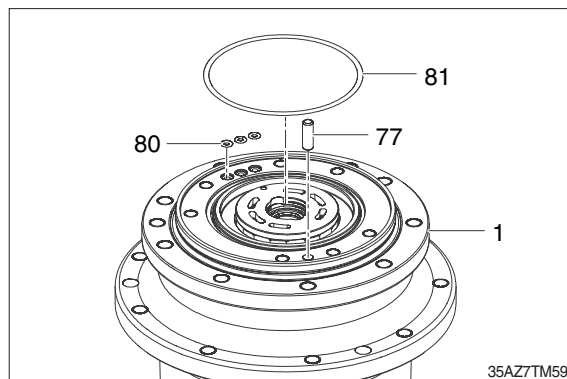


- (19) Assemble separation plate (43) and friction plate (44) to motor casing (1) in turn and then assemble brake piston (45) to a motor casing. Tap brake piston (45) evenly with a plastic hammer and check if it is assembled completely.

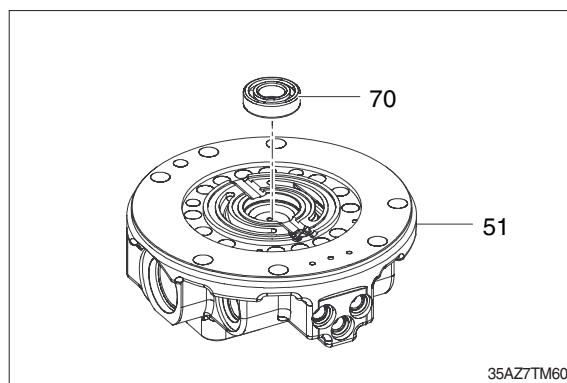
※ Required tools : Plastic hammer (T6).



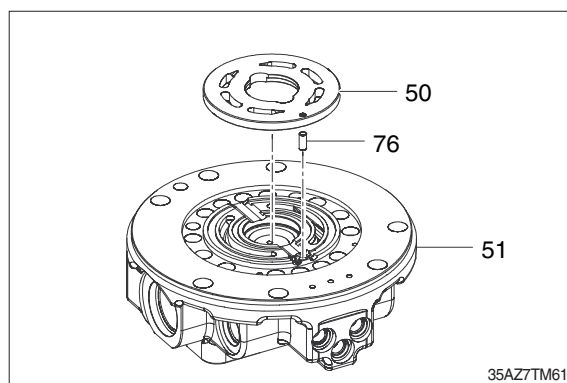
- (20) Assemble pin (77) and O-ring (80), (81) to motor casing (1).



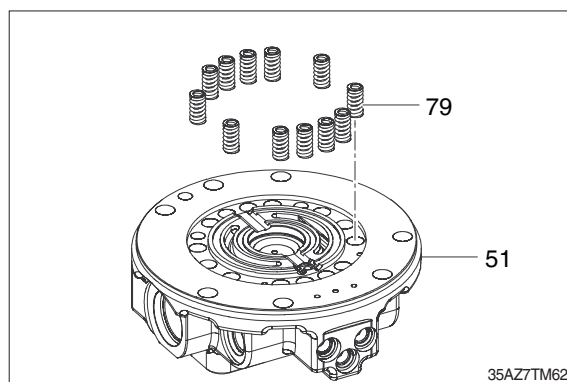
(21) Assemble ball bearing (70) to valve casing (51). Apply grease to the inner race of ball bearing (70).



(22) Apply grease to the other side of the valve plate (50) and assemble a valve plate (50) and pin (76) to valve casing (51).

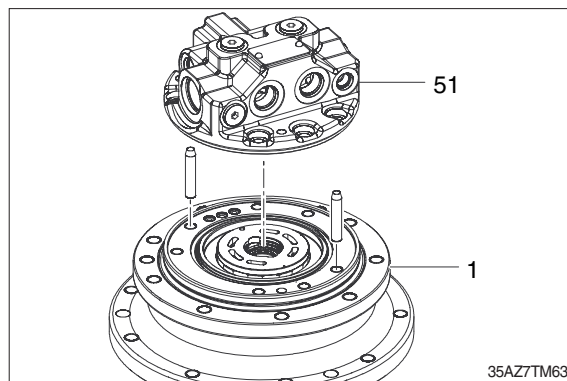


(23) Apply grease to spring (79) and assemble it to valve casing (51).



(24) Assemble valve casing (51) to motor casing (1).

※ Required tools : Guide pin (T15).

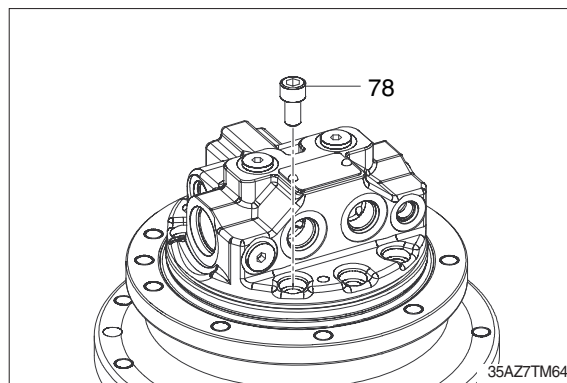




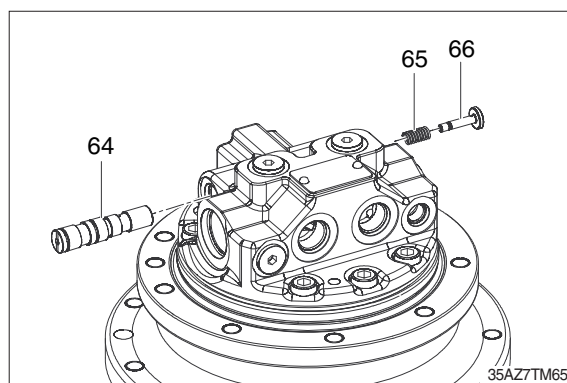
(25) Tighten each socket bolt (78) evenly to assemble.

※ Required tools :

Torque wrench (T1), hex bit (T3).



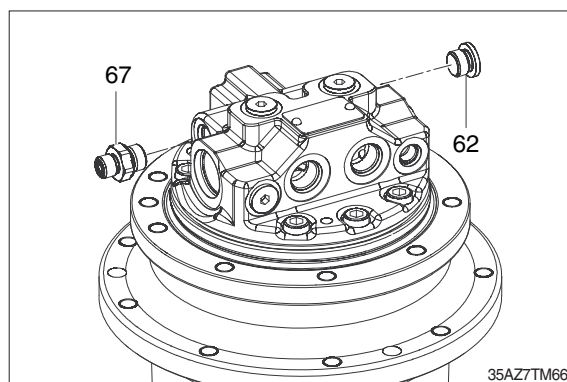
(26) Apply hydraulic fluid to spool (64) and the guide (66) outer diameter and assemble spool (64), spring (65), and guide (66). Be careful not to damage the surface of the spool and guide.



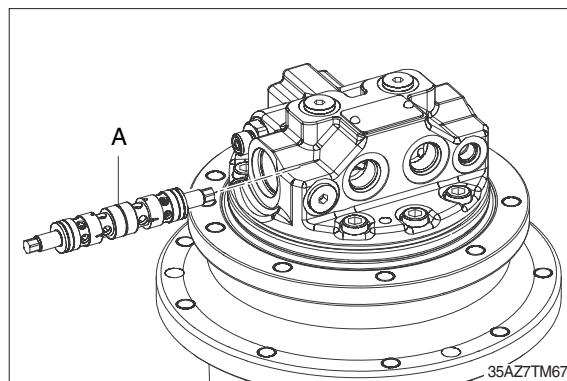
(27) Assemble plug (62), (67).

※ Required tools :

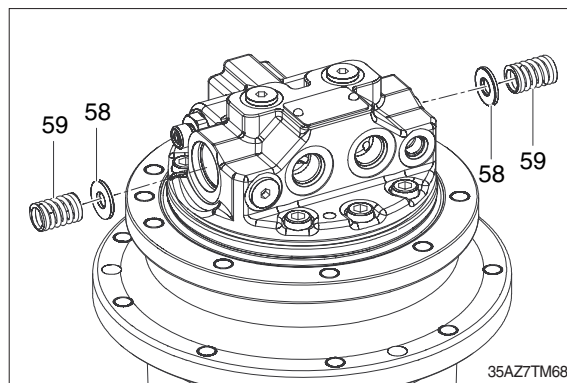
Torque wrench (T1), hex socket (T22), hex bit (T3).



(28) Apply hydraulic fluid to spool (52) outer diameter and turn the spool assembly (A) slowly to assemble. Be careful not to damage the outer diameter of the spool.

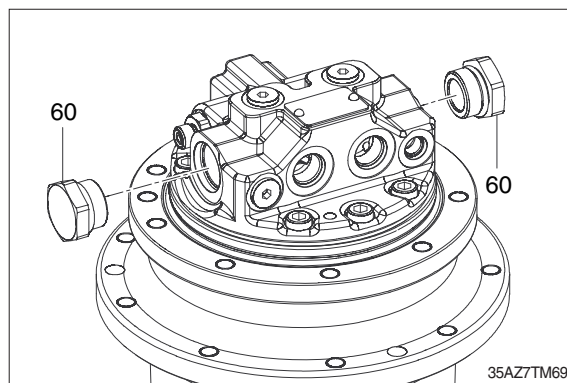


(29) Assemble spring (59) and washer (58).



(30) Assemble plug (60).

※ Required tools : Torque wrench (T1), hex. socket (T5).



## GROUP 7 RCV LEVER

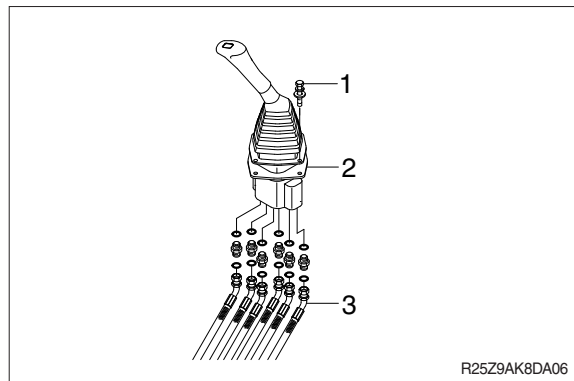
### 1. REMOVAL AND INSTALL

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

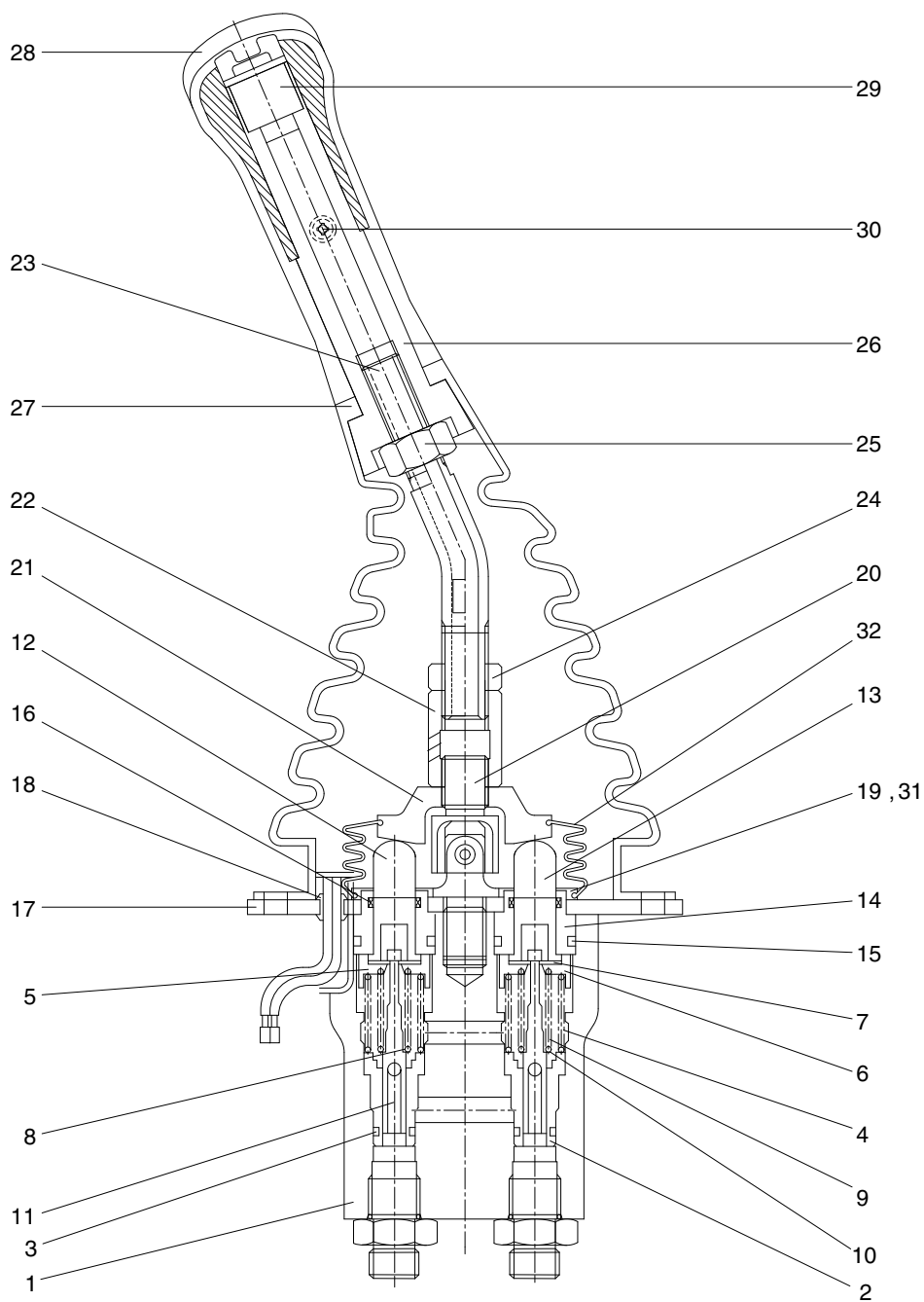


#### 2) INSTALL

- (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 (Type 1)

### 1) STRUCTURE




R25Z9A2RL02

1	Case	12	Push rod (1, 3)	23	Connector
2	Plug	13	Push rod (2, 4)	24	Nut
3	O-ring	14	Plug	25	Nut
4	Spring	15	O-ring	26	Insert
5	Spring seat (1, 3)	16	Rod seal	27	Boot
6	Spring seat (2, 4)	17	Plate (A)	28	Handle
7	Stopper	18	Bushing	29	Switch assembly
8	Spring (1, 3)	19	Machine screw	30	Screw
9	Spring (2, 4)	20	Joint assembly	31	Plate
10	Spring seat	21	Swash plate	32	Boot
11	Spool	22	Hex nut		

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

Tool name	Remark	
(L) Hexagonal wrench	10	
Spanner	22	
	27	
(+) Driver	Length 150	
(-) Driver	Width 4~5	
Torque wrench	Capable of tightening with the specified torques	

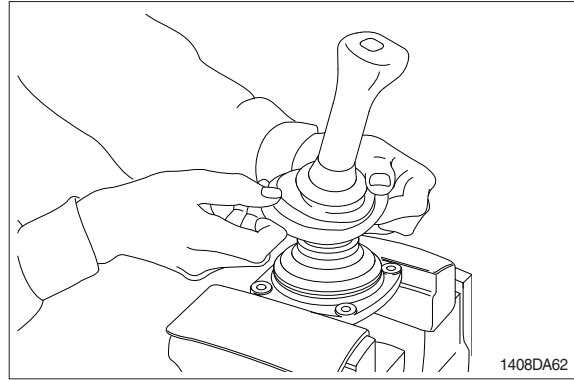
### 3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

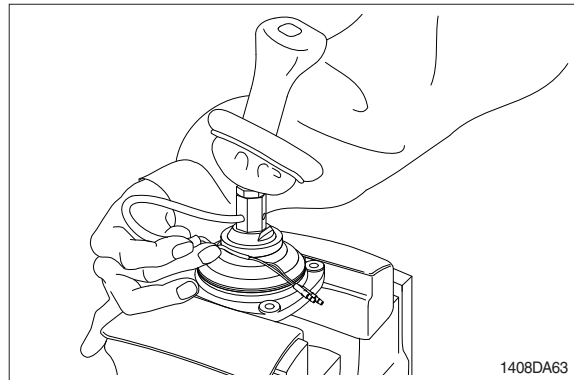
※ Put blind plugs into all ports.

(2) Fix pilot valve in a vise with copper (or lead) sheets.

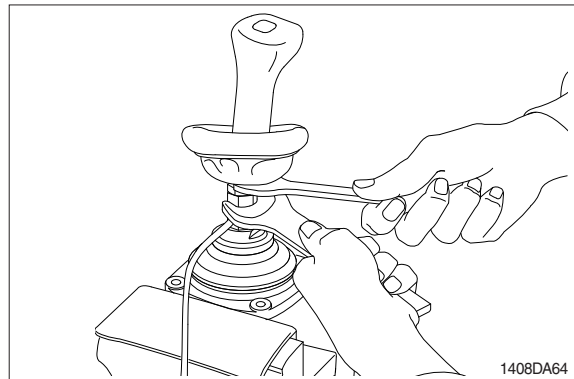
(3) Remove end of boot (32) from case (1) and take it out upwards.



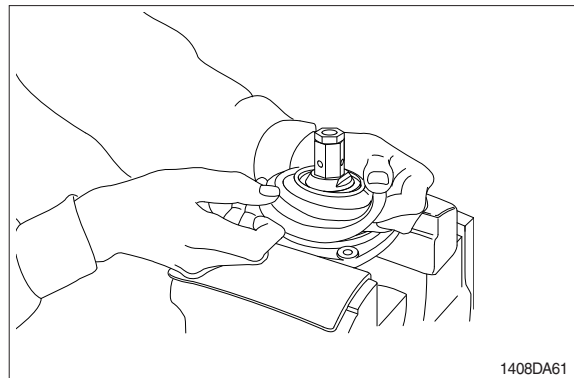
※ For valve with switch, remove cord also through hole of casing.



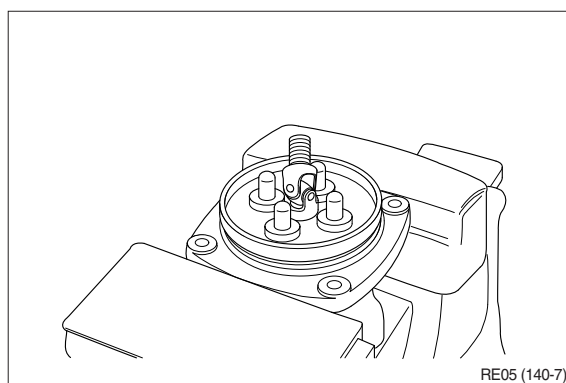
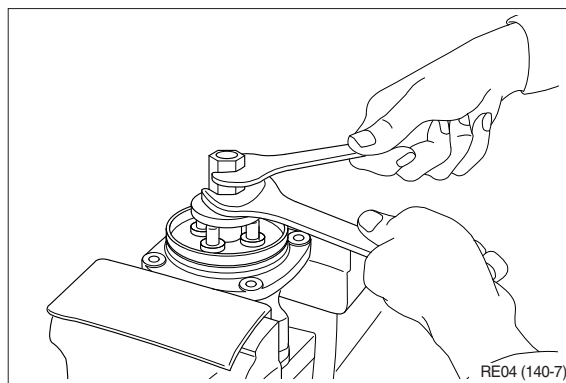
(4) Loosen lock nut (24) and adjusting nut (22) with spanners on them respectively, and take out handle section as one body.



(5) Remove the boot (32).



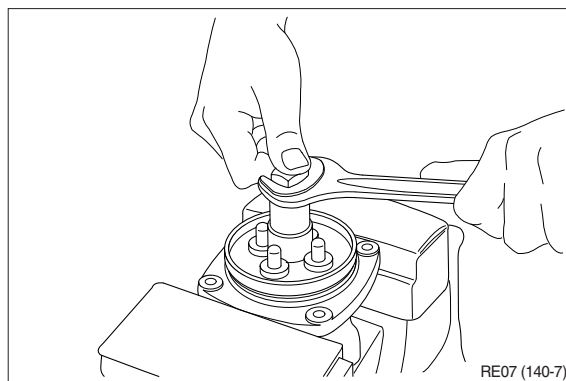
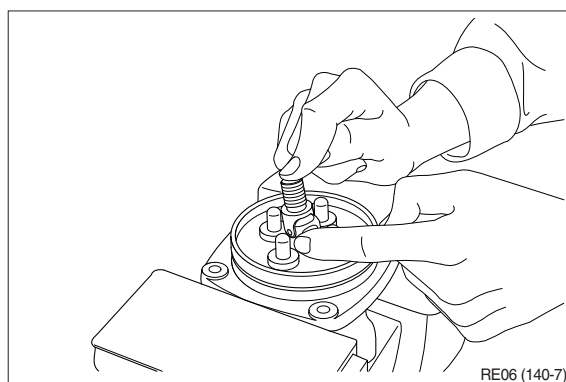
- (6) Loosen adjusting nut(22) and plate(31) with spanners on them respectively, and remove them.



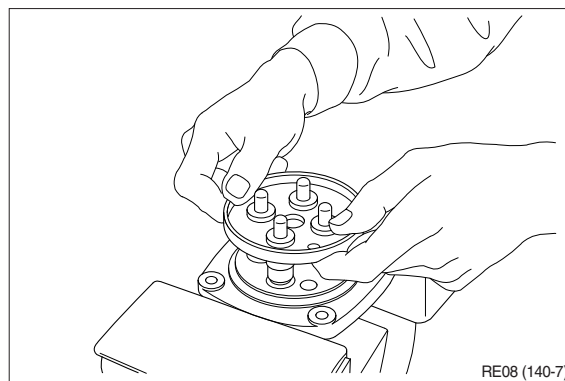
- (7) Turn joint anticlockwise to loosen it, utilizing jig (special tool).

※ When return spring(8, 9) is strong in force, plate(31), plug(14) and push rod(12, 13) will come up on loosening joint.

Pay attention to this.



(8) Remove plate (31).



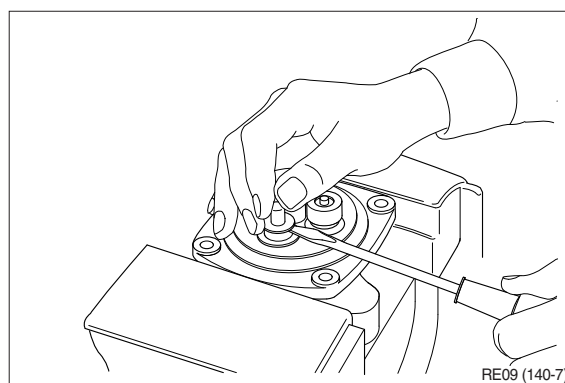
(9) When return spring (8, 9) is weak in force, plug (14) stays in casing because of sliding resistance of O-ring.

※ 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.

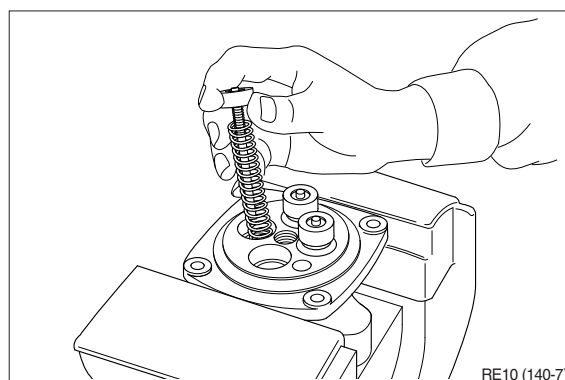
※ During taking out, plug may jump up due to return spring (8, 9) force.

Pay attention to this.

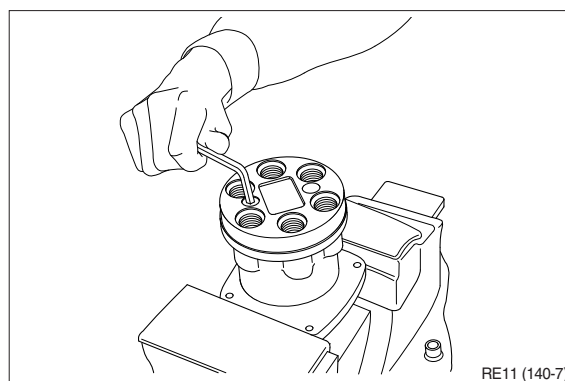


(10) Remove reducing valve subassembly and return spring (8, 9) out of casing.

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



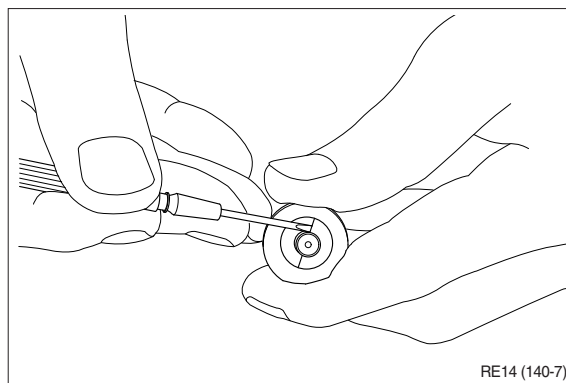
(11) Loosen hexagon socket head plug (2) with hexagon socket screw key.





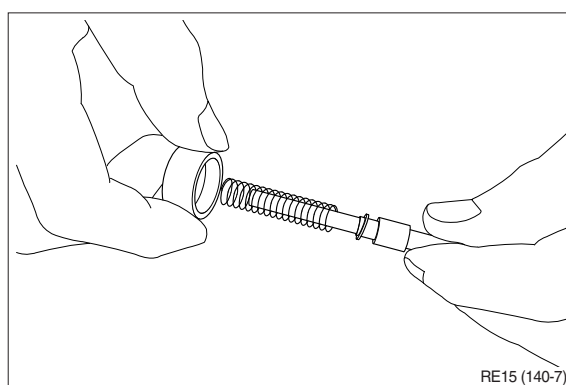
(12) For disassembling reducing valve section, stand it vertically with spool (11) bottom placed on flat workbench. Push down spring seat (5, 6) and remove two pieces of semicircular stopper (7) with tip of small minus screwdriver.

- ※ Pay attention not to damage spool surface.
- ※ Record original position of spring seat (5, 6).
- ※ Do not push down spring seat more than 6 mm.

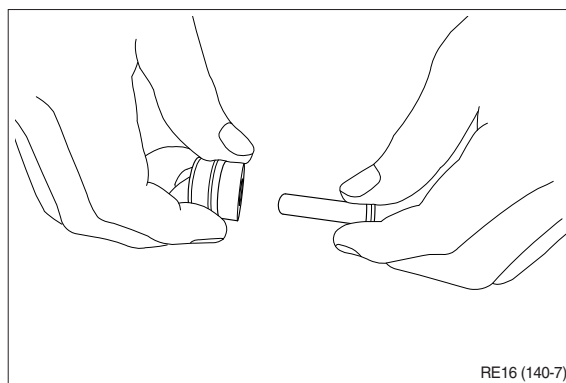


(13) Separate spool (11), spring seat (5, 6), spring (8, 9) and spring seat (10) individually.

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

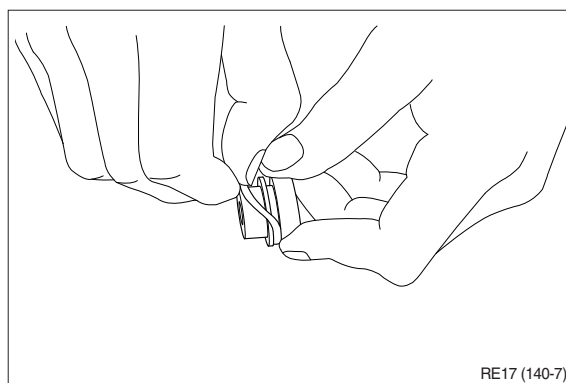


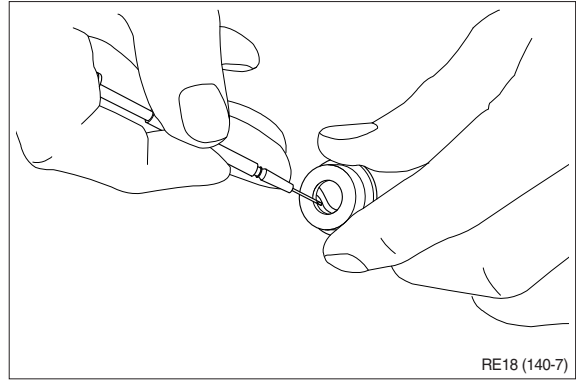
(14) Take push rod (12, 13) out of plug (14).



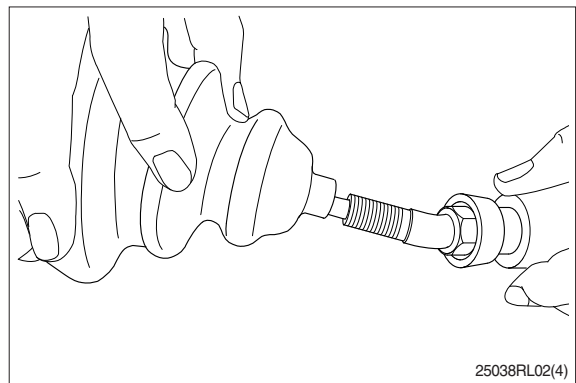
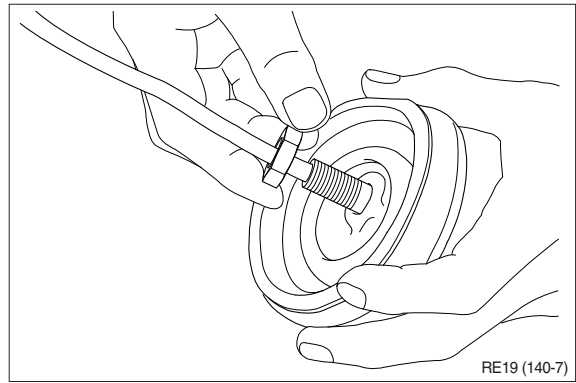
(15) Remove O-ring (15) and seal (16) from plug (14).

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





(16) Remove lock nut (24) and then boot (27).



### **(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.

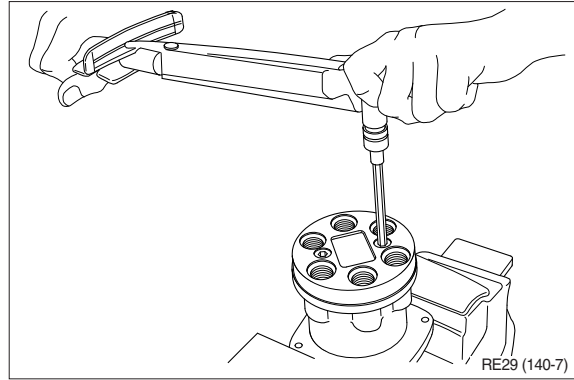
### **(18) Rust prevention of parts.**

- 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.

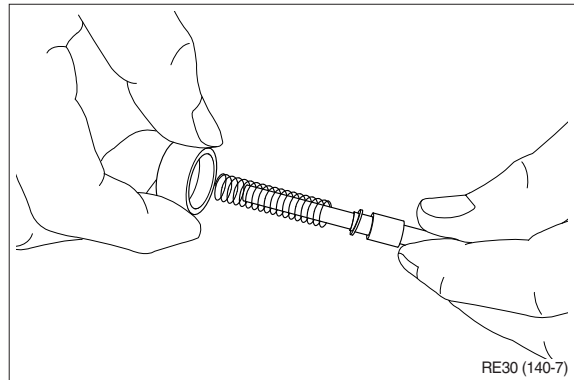
#### 4) ASSEMBLY

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

※ Tighten two bolts alternately and slowly.

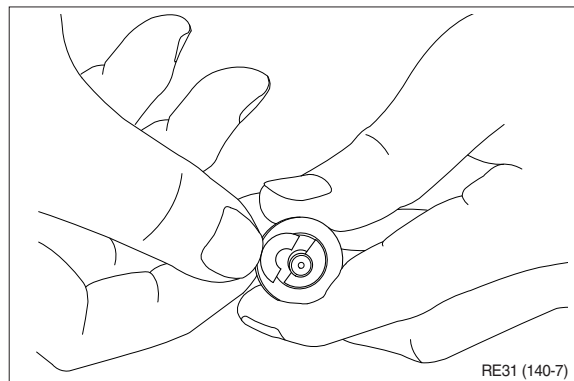


- (2) Put spring seat (10), springs (8, 9) and spring seat (5, 6) onto spool (11) in this order.



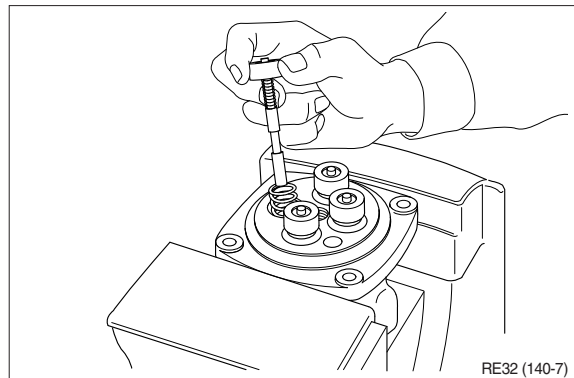
- (3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper (7) on spring seat without piling them on.

※ Assemble stopper (7) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6 mm.

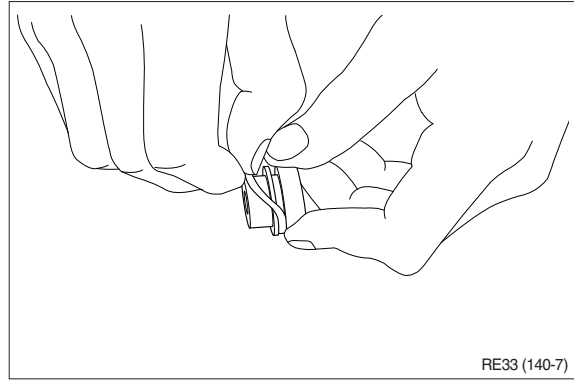


- (4) Assemble spring (8, 9) into casing.  
Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.

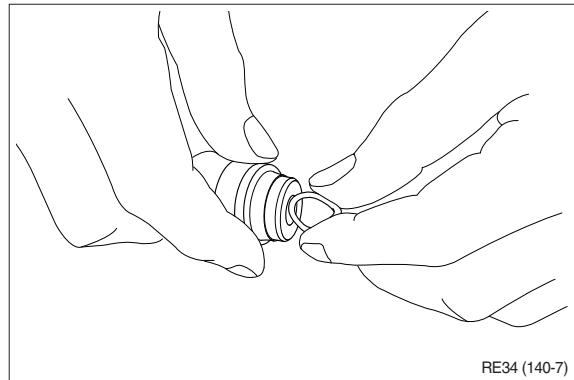


(5) Assemble O-ring (15) onto plug (14).



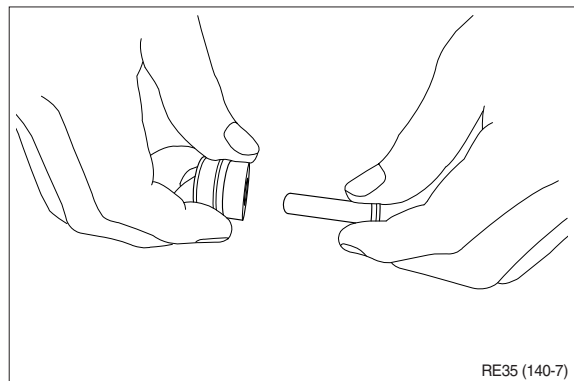
(6) Assemble seal (16) to plug (14).

※ Assemble seal in such lip direction as shown below.



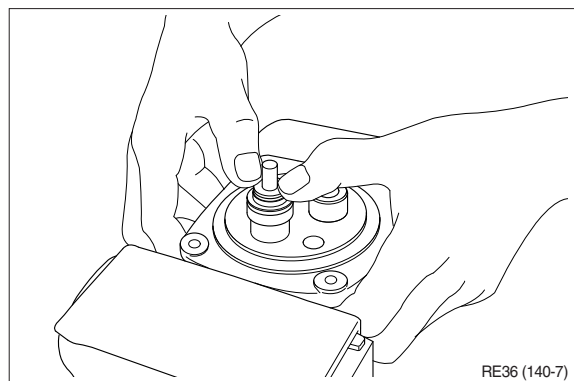
(7) Assemble push rod (12, 13) to plug (14).

※ Apply working oil on push-rod surface.



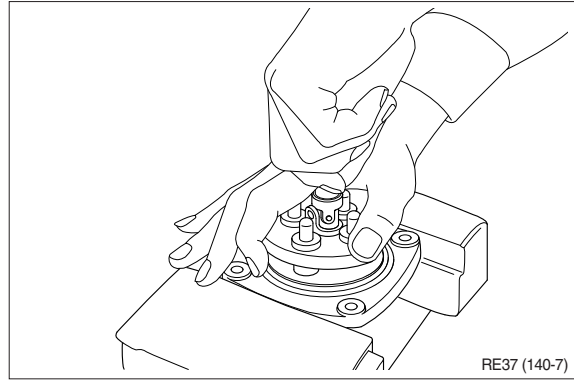
(8) Assemble plug subassembly to casing.

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

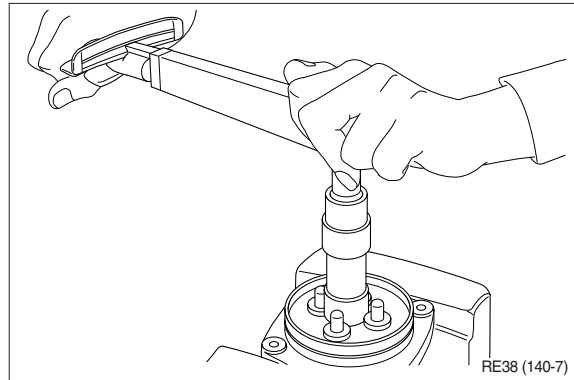


(9) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (31), and tighten joint (20) temporarily.

(10) Fit plate (31).

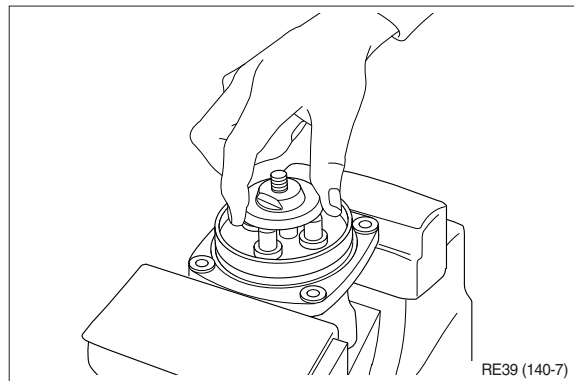


(11) Tighten joint (20) with the specified torque to casing, utilizing jig.



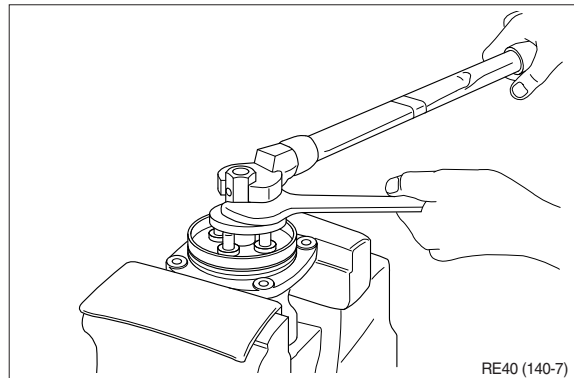
(12) Assemble plate (21) to joint (20).

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

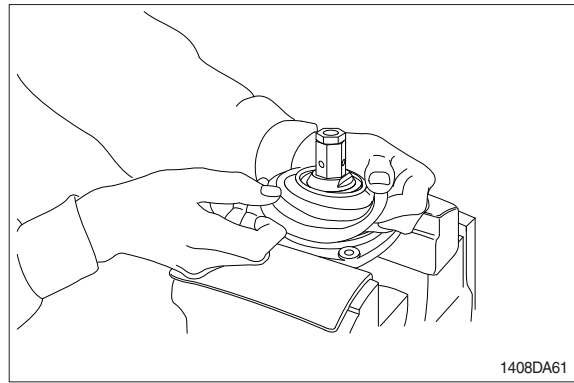


(13) Assemble adjusting nut (22), apply spanner to width across flat of plate (21) to fix it, and tighten adjusting nut to the specified torque.

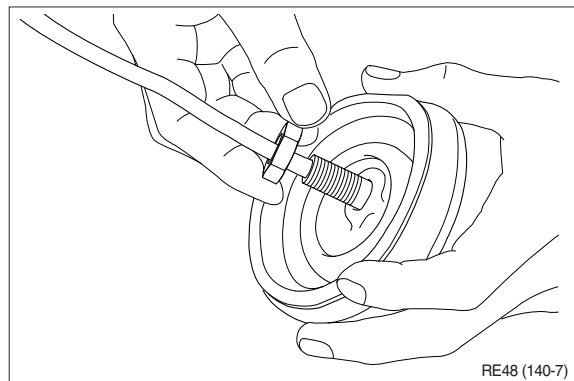
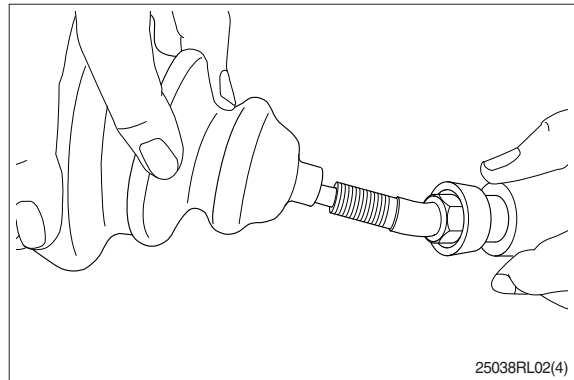
- ※ During tightening, do not change position of disk.



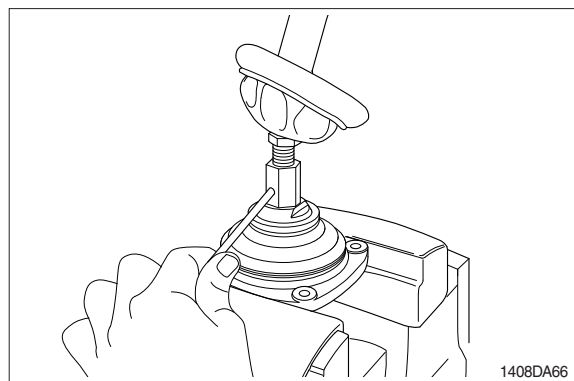
(14) Fit boot (32) to plate.



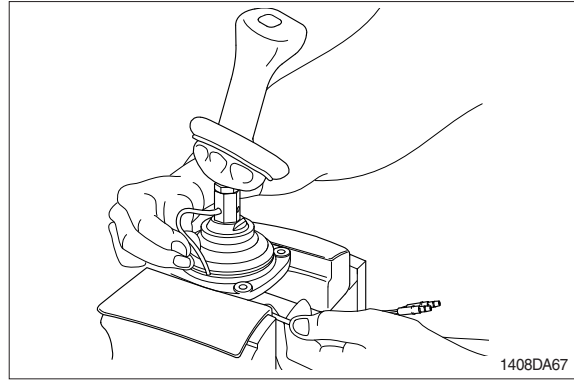
(15) Fit boot (27) and lock nut (24), and handle subassembly is assembled completely.



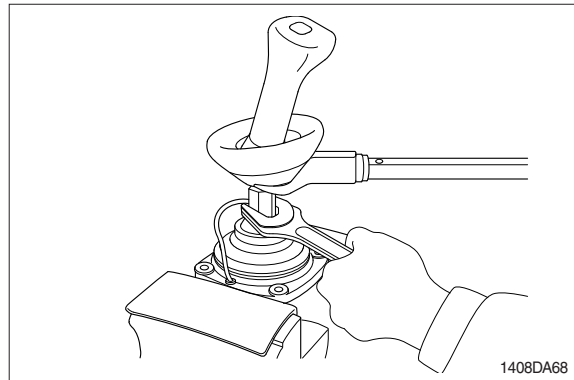
(16) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.



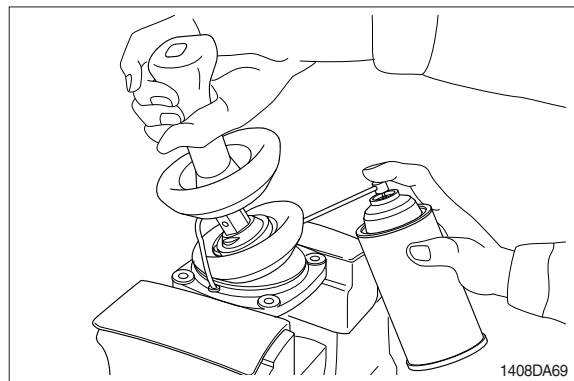
- (17) Assemble bushing (18) to plate and pass cord and tube through it.  
※ Provide margin necessary to operation.



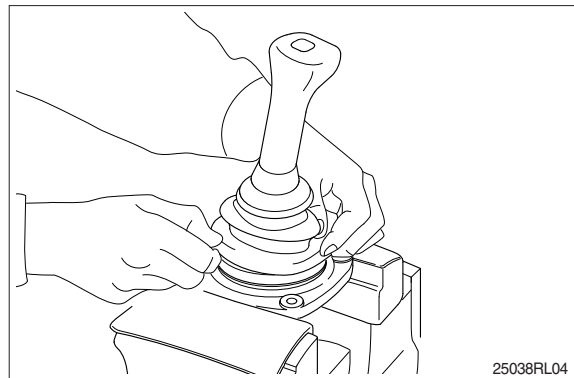
- (18) Determine handle direction, tighten lock nut (21) to specified torque to fix handle.



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



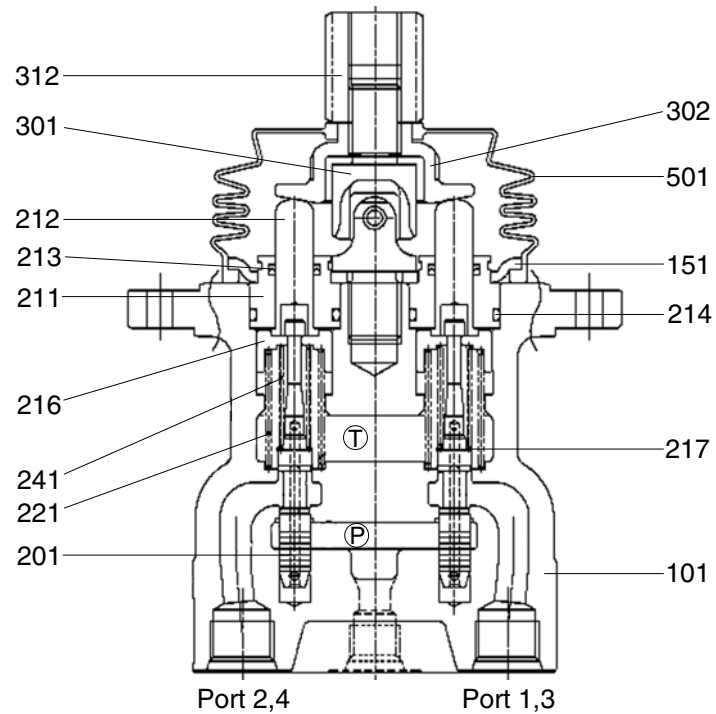
- (20) Assemble lower end of bellows to casing.  
(21) Inject volatile rust-preventives through all ports and then put blind plugs in ports.





### 3. DISASSEMBLY AND ASSEMBLY (Type 2)

#### 1) STRUCTURE



17Z9A7RCV50

101	Casing	213	Seal	241	Spring
151	Plate	214	O-ring	301	Joint
201	Spool	216	Spring seat	302	Disc
211	Plug	217	Washer	312	Nut
212	Push rod	221	Spring	501	Bellows

## 2) DISASSEMBLY AND ASSEMBLY

- (1) Rinse the pilot valve in paraffin.
  - ※ Place blind plug in all ports.
- (2) Secure the pilot valve in a vice using a copper or aluminium faced jaws.
- (3) Detach the bellows (501) (If outer bellows is attached, then this bellows may not be attached).
  - ※ Take care not to damage the bellows (501).



- (4) Use a spanner applied to both the adjustment nut (312) and disc (302) and loosen and then remove them.



**⚠ Items under tension. The return spring (221), plate (151) and push-rod (212) will rise as joint (301) is loosened. Make sure the items do not fly out and damage personnel in the vicinity.**

- (5) Using the jig, turn the joint (301) counter-clockwise to loosen it.  
The right illustration shows the jig attached.



- (6) Remove the plate (151).  
- When the return spring (221) is strong



- When the return spring (221) is weak



**▲ Items under tension. The return spring (221) tension will be released when plug (211) is removed. Make sure the item does not fly out and damage personnel in the vicinity.**

(7) When the return spring (221) is weak, the plug (211) is held in the casing (101) by the friction of the O-ring. Remove this using a screwdriver.

※ Use the groove around the plug and take care to apply force evenly to avoid damage.



(8) Remove the push-rod (212), plug (211), reduction valve assembly and return spring (221) from the casing (101).

※ The location in relationship with the casing aperture.



※ The surface of the spool (201) and the spring seat (216) can be damaged by mis-handling. Take care not to damage the surface of the spool during removal and do not push the spring seat down more than 6 mm.

(9) The reduction valve is disassembled by pressing down the spring seat (216) and flexing the secondary pressure spring (241), sliding the spring seat (216) sideways and removing it from the spool (201) via the larger aperture.

※ Take care not to damage the surface of the spool (201).





(10) Take the spool (201), spring seat (216), secondary pressure spring (241) and washer #2 (217) apart.

- ※ Take care not to damage the surface of the spool (201).
- ※ Keep these parts together until reassembly.



(11) Extract the push-rod (212) from the plug (211).



(12) Detach the O-ring (214) and seal (213) from the plug (211). Detach the seal (213) using a small screwdriver.



### **(13) CLEANING OF PARTS**

- ① Wash the parts by placing in an initial bath containing paraffin oil (or similar cleaning fluid).
  - ※ To reduce the risk of damage if dirty parts are initially washed in oil. To remove the dirt and oil, soak thoroughly so that dirt and oil float to the surface.
  - ※ Dirty paraffin could result in damage to the parts, and deterioration in performance after reassembly. Ensure the contamination of the paraffin is thoroughly monitored and controlled.
- ② Place the parts in a finish wash container, rotate this slowly until even the inner areas of the parts are clean (Finish wash).
  - Wipe of the paraffin oil on the parts using clean cloth.
  - ※ If compressed air is used for drying, dust and moisture in the compressed air may damage the parts and make corrosion more likely.

### **(14) PREVENTION OF CORROSION OF PARTS**

- Coat the parts with the anti-corrosion preparation.
- ※ If the parts are left to stand for some time after cleaning, they may start to corrode and the performance after reassembly will be impaired.

### 3) ASSEMBLY

- ※ The surface of the spool (201) and the spring seat (216) can be damaged by mis-handling. Take care not to damage the surface of the spool during assembly and do not push the spring seat down more than 6 mm.

- (1) Insert, in this order, the washer #2 (217), secondary spring (241) and spring seat (216) onto the spool (201).



- (2) Press down the spring seat (216) to flex the secondary pressure spring (241) while sliding the spring sideways through the larger aperture to attach it to the spool (201).

Fit the return spring (221) into the casing (101).

- ※ Do not press the spring seat down more than 6mm.



- (3) Fit the reduction valve assembly into the casing (101).

- ※ Fit in the locations noted in step 8 of the disassembly procedure.



(4) Fit the O-ring (214) into the plug (221).



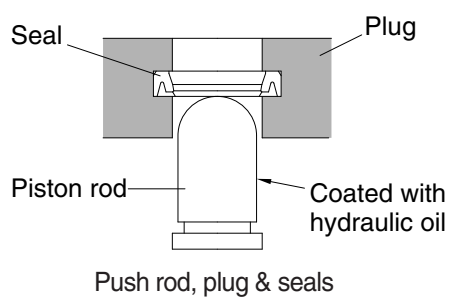
(5) Fit the seal (213) into the plug (211).

※ Fit the lip of the seal (213) as shown right.



(6) Fit the push-rod (212) into the plug (211).

※ Apply hydraulic oil to the surface of the push rod.





**⚠ Items under tension. The plug assembly and plate (151) have to be assembled against spring tension. Make sure the item does not fly out and damage personnel in the vicinity.**

※ The surface of the spool (201) and aperture (101) can be damaged by mis-handling. Take care not to damage the surface of either during assembly.

(7) Fit the plug assembly into the casing (101). When the return spring (221) is weak, it is held in place by the friction of the O-ring (214).

When the return spring (221) is strong, use the plate (151) to insert all four simultaneously and temporarily secure them with the joint (301).

(8) Attach the plate (151).

(9) Tighten the joint (301) to the casing (101) to the specified torque using the special jig.

※ The right figure shows the jig attached. Screw down to a position where the four push rods (212) are in contact equally.



- ※ Excessive tightening or wrong positioning of the disc can cause the valve to malfunction.

(10) Attach the disc (302) onto the joint (301).



(11) Install the adjustment nut (312), tighten up the discs (302) with a spanner on both and tighten the adjustment nut to the specified torque.

- ※ Do not allow the position of the disc (302) to shift during tightening.



(12) Apply grease to the rotating part of the joint (301) and end of the push-rod (212).



(13) Attach the bellows (501).

If outer bellows is attached, then this bellows may not be attached.

- ※ Take care not to tear the bellows.

(14) Fit the handle assembly into the valve.

(15) Spray anti-corrosion preparation into each port and insert blind plugs.



## 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.

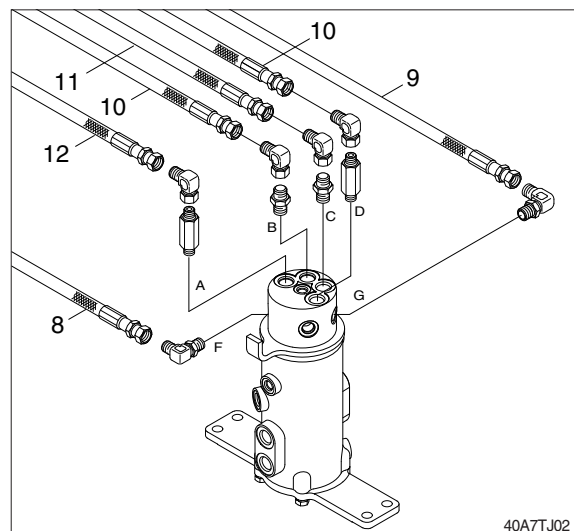
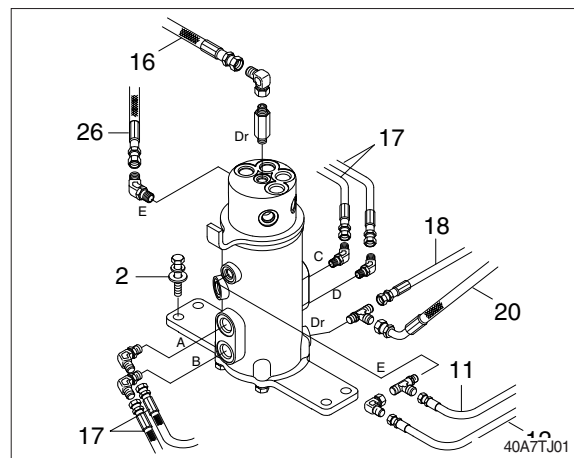
- (4) Disconnect all hoses (8, 9, 10, 11, 12, 16, 17, 18, 20, 26).
- (5) Sling the turning joint assembly (1) and remove the mounting bolt (2).
  - Weight : 26 kg (57 lb)
  - Tightening torque :  $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$   
( $49.9 \pm 10.1 \text{ lbf} \cdot \text{ft}$ )

Remove the turning joint assembly.

- (6) When removing the turning joint, check
  - ※ that all the hoses have been disconnected.

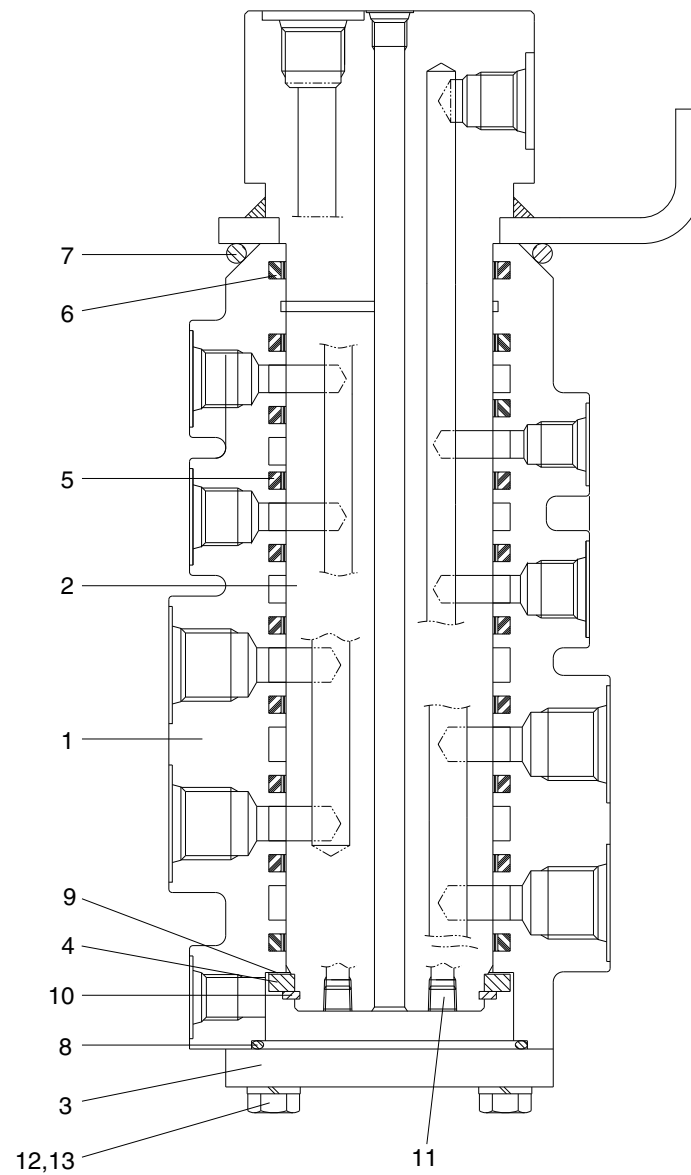
#### 2) INSTALL

- (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



31MT-40051

- 1 Hub
- 2 Shaft
- 3 Cover
- 4 Ring
- 5 Slipper seal

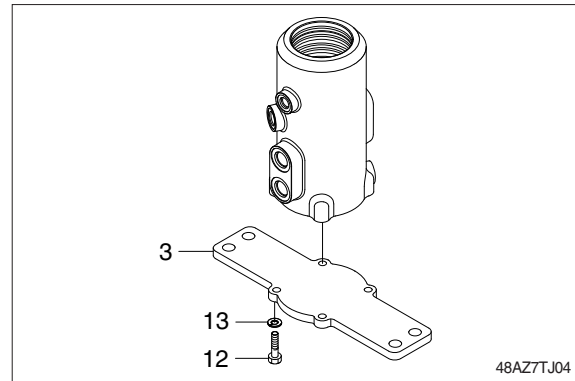
- 6 O-ring
- 7 O-ring
- 8 O-ring
- 9 Shim
- 10 Retainer ring

- 11 Plug
- 12 Hexagon bolt
- 13 Spring washer

## 2) DISASSEMBLY

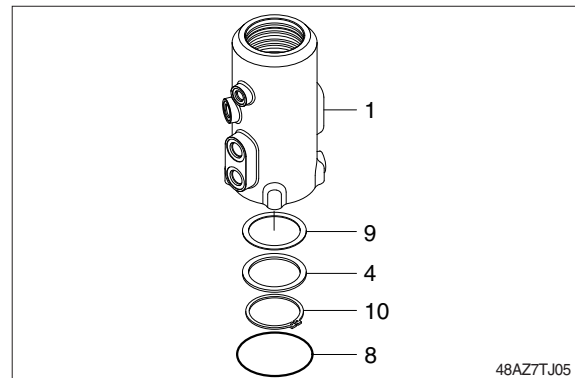
※ Before the disassembly, clean the turning joint.

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



- (2) Remove O-ring (8).

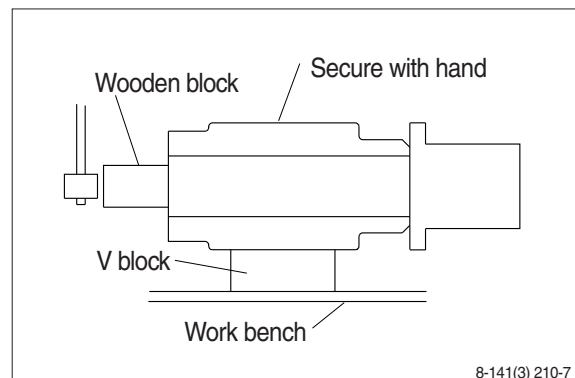
- (3) Remove retainer ring (10), ring (4) and shim (9).



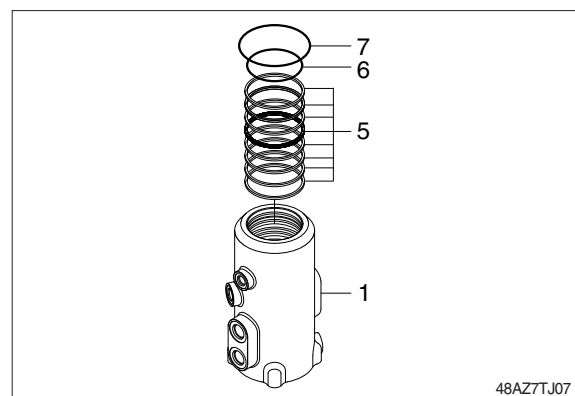
- (4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

※ 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).



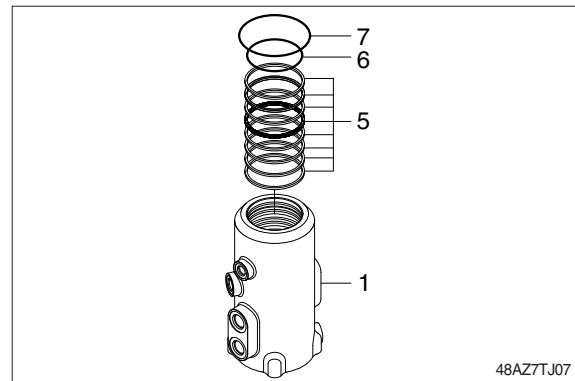
- (5) Remove eight slipper seals (5) and O-ring (6, 7) from hub (1).



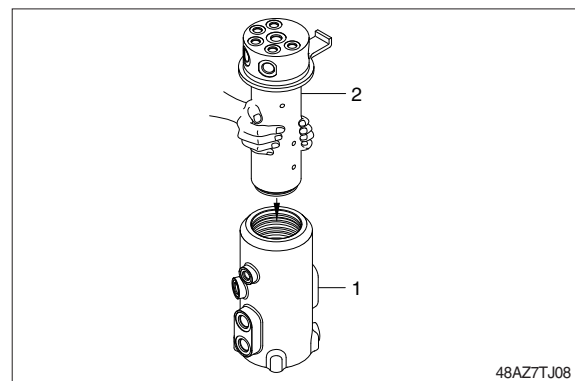
### 3) ASSEMBLY

- ※ 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 (5) and O-ring (6, 7) to hub (1).

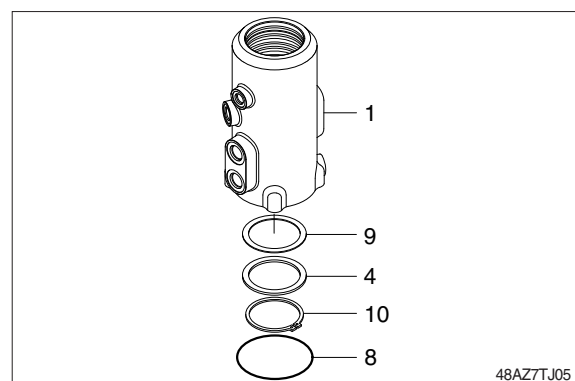


- (2) Set hub (1) on block, install shaft (2) into hub (1) by hand.

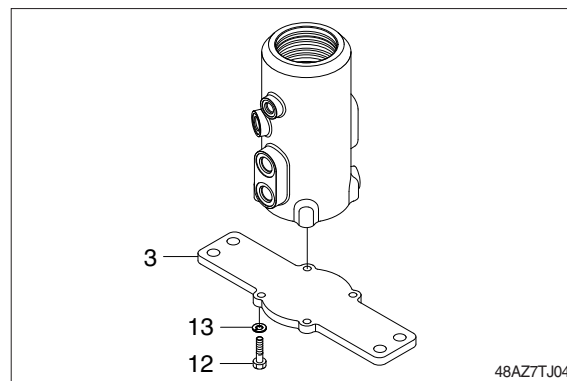


- (3) Fit ring (4), shim (9) and retainer ring (10) to shaft (2).

- (4) Fit O-ring (8) to hub (1).



- (5) Install cover (3) to hub and tighten bolts (12).
- Tightening torque : 5~6 kgf·m  
(36.2~43.4 lbf·ft)





## GROUP 9 BOOM, ARM AND BUCKET CYLINDERS

### 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.

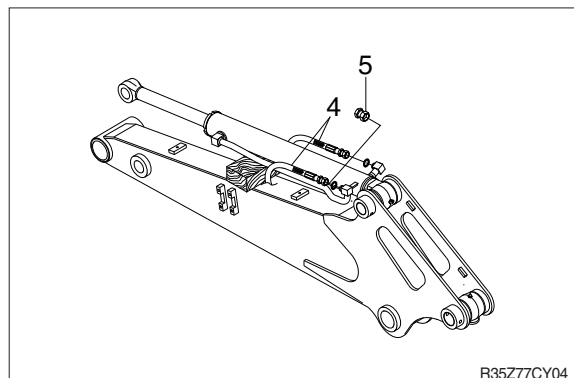
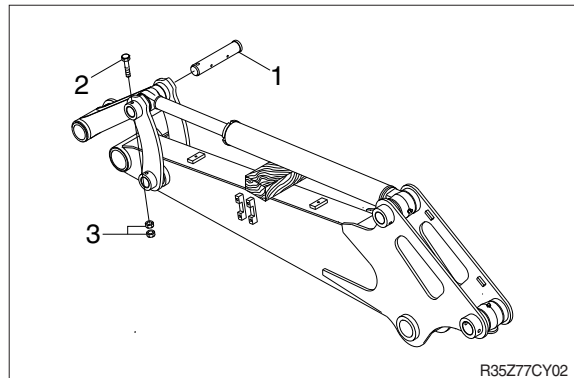
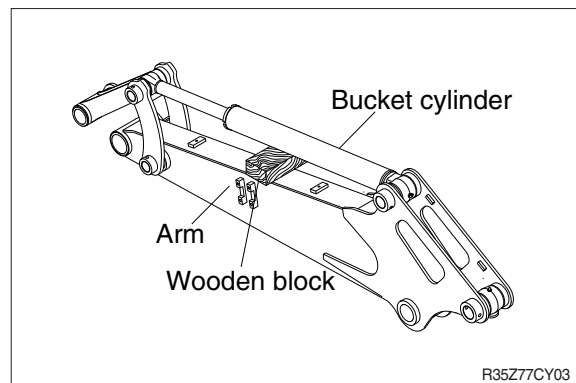
① Set block between bucket cylinder and arm.

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

· Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)

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

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



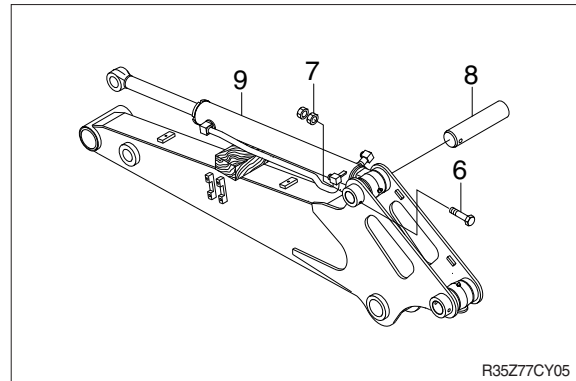


- ④ Sling bucket cylinder assembly (9) and remove bolt (6) and nut (7) then pull out pin (8).

· Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)

- ⑤ Remove bucket cylinder assembly (9).

· Weight : 24 kg (53 lb)



## (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

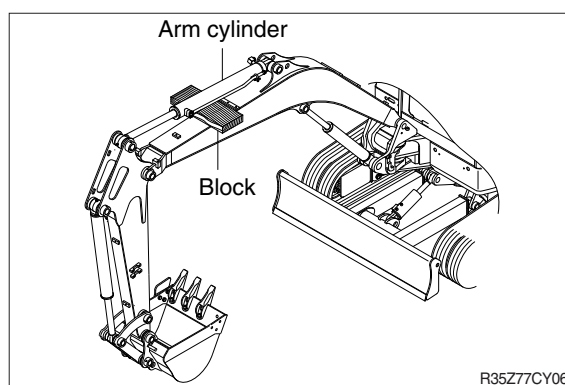
- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

**▲ 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.

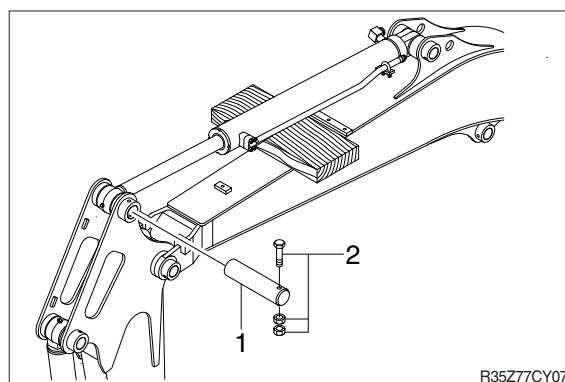
- ① Set block between arm cylinder and boom.



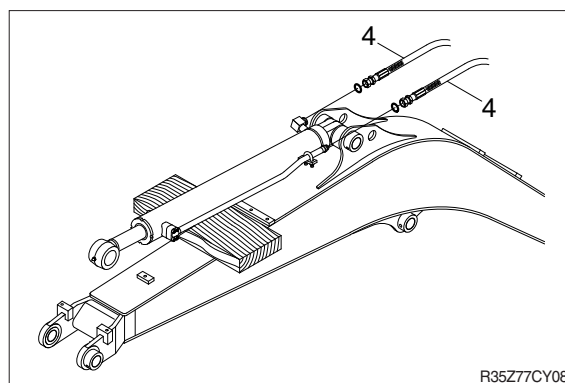
- ② Remove bolt and nut (2) and pull out pin (1).

· Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)

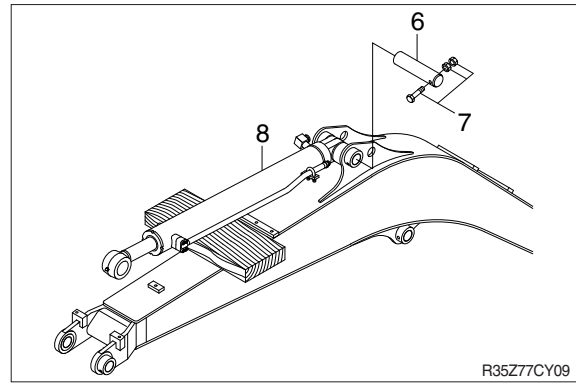
- ※ Tie the rod with wire to prevent it from coming out.



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



- ⑤ Sling arm assembly (8) and remove bolt and nut (7) then pull out pin (6).
  - Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)
- ⑥ Remove arm cylinder assembly (8).
  - Weight : 45 kg (99 lb)



## (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

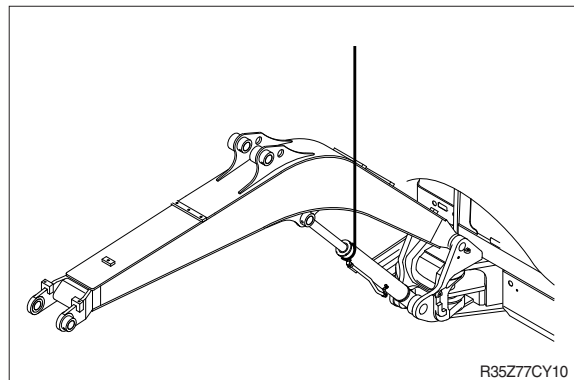
- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

▲ 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.

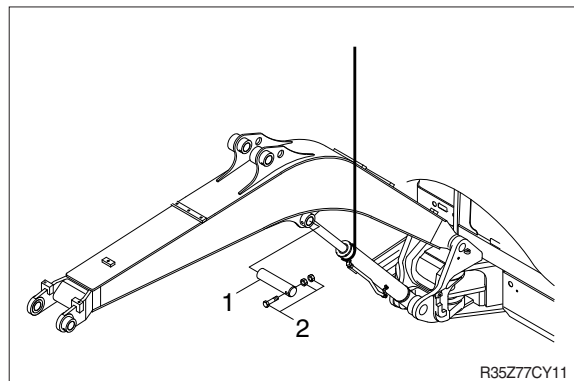
① Sling boom cylinder assembly.



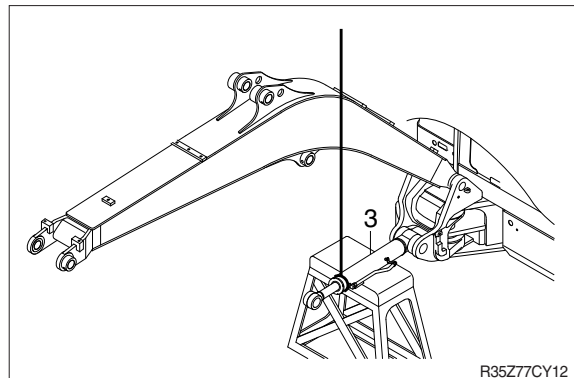
③ Remove bolt and nut (2) and pull out pin (1).

- Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)

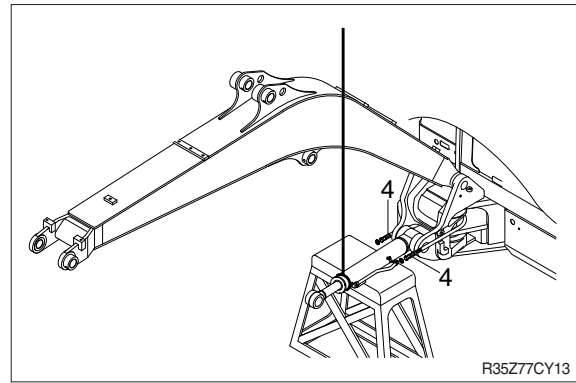
- ※ Tie the rod with wire to prevent it from coming out.



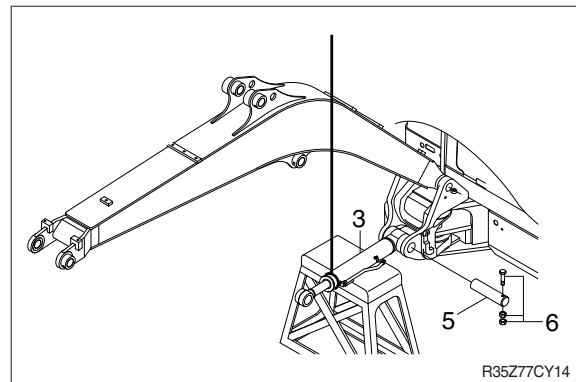
④ Lower the boom cylinder assembly (3) on a stand.



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



- ⑥ Remove bolt (6) and pull out pin (5).  
· Tightening torque :  $6.9 \pm 1.4$  kgf·m  
( $49.9 \pm 10.1$  lbf·ft)
- ⑦ Remove boom cylinder assembly (3).  
· Weight : 52 kg (115 lb)



## (2) Install

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

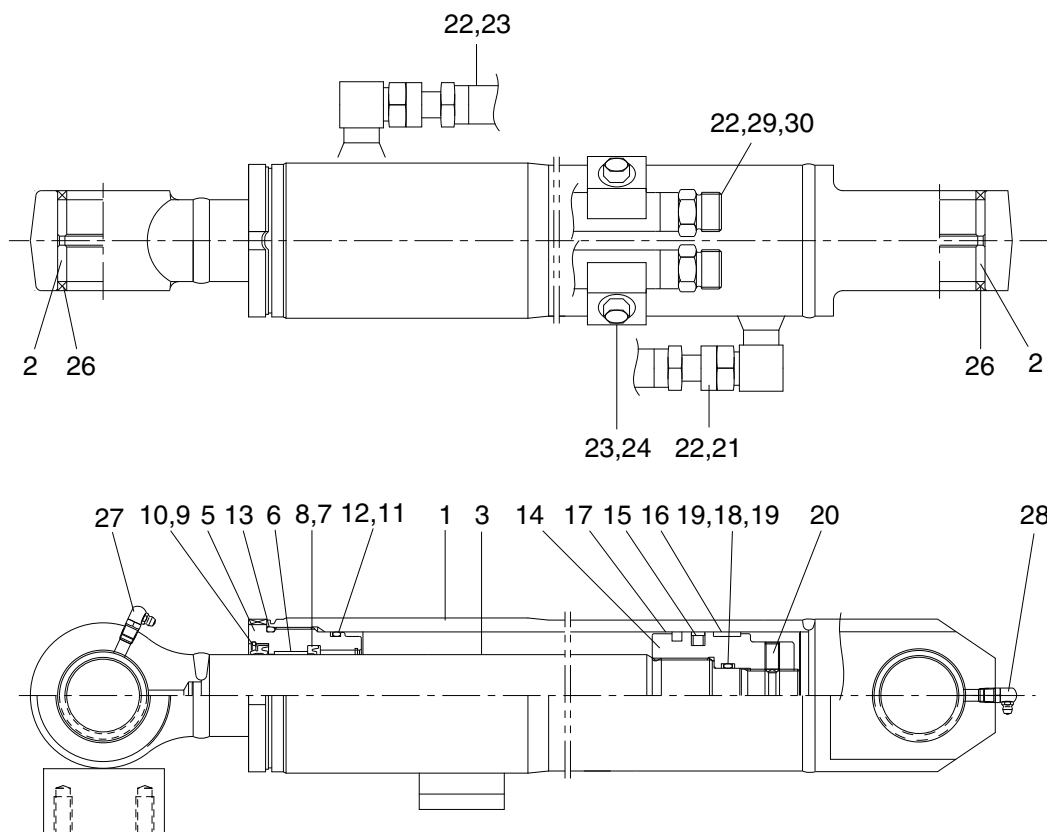
**▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

- ※ 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

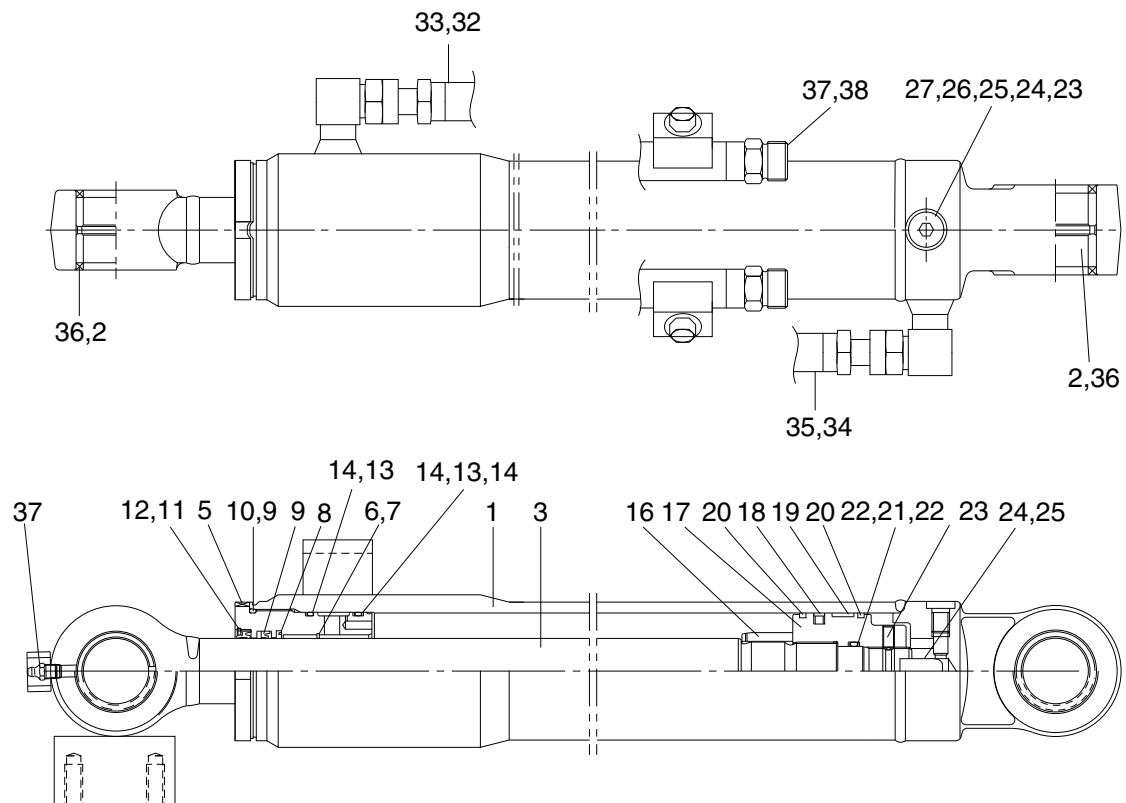
#### (1) Bucket cylinder



37MT-60111

1	Tube assembly	12	Back up ring	22	O-ring
2	Pin bushing	13	O-ring	23	Pipe assy
3	Rod assembly	14	Piston	24	Washer
5	Rod cover	15	Piston seal	25	Hex bolt
6	Rod bushing	16	Wear ring	26	Pin wiper
7	U-packing	17	Dust ring	27	Grease nipple
8	Back up ring	18	O-ring	28	Grease nipple
9	Dust wiper	19	Back up ring	29	O-ring
10	Retainer ring	20	Set screw	30	Dust cap
11	O-ring	21	Pipe assy		

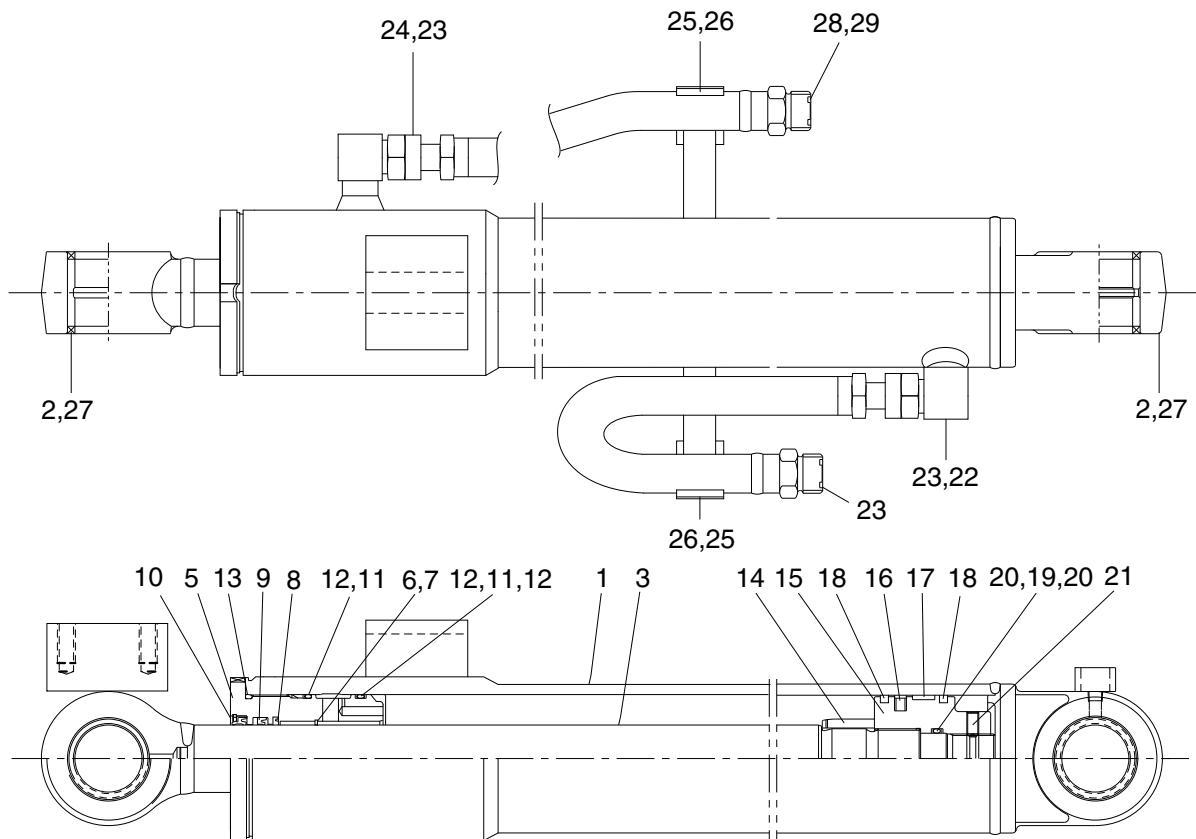
## (2) Arm cylinder



37MT-50210

1	Tube assembly	15	O-ring	28	Support ring
2	Pin bushing	16	Cushion ring	29	O-ring
3	Rod assembly	17	Piston	30	Plug
5	Rod cover	18	Piston seal	31	Pipe assy
6	Rod bushing	19	Wear ring	32	O-ring
7	Retainer ring	20	Dust ring	33	Pipe assy
8	Buffer ring	21	O-ring	34	Washer
9	U-packing	22	Back up ring	35	Hex bolt
10	Back up ring	23	Set screw	36	Dust wiper
11	Wiper ring	24	Cushion plunger	37	O-ring
12	Retainer ring	25	Stop ring	38	Dust cap
13	O-ring	26	Check valve		
14	Back up ring	27	Spring		

### (3) Boom cylinder

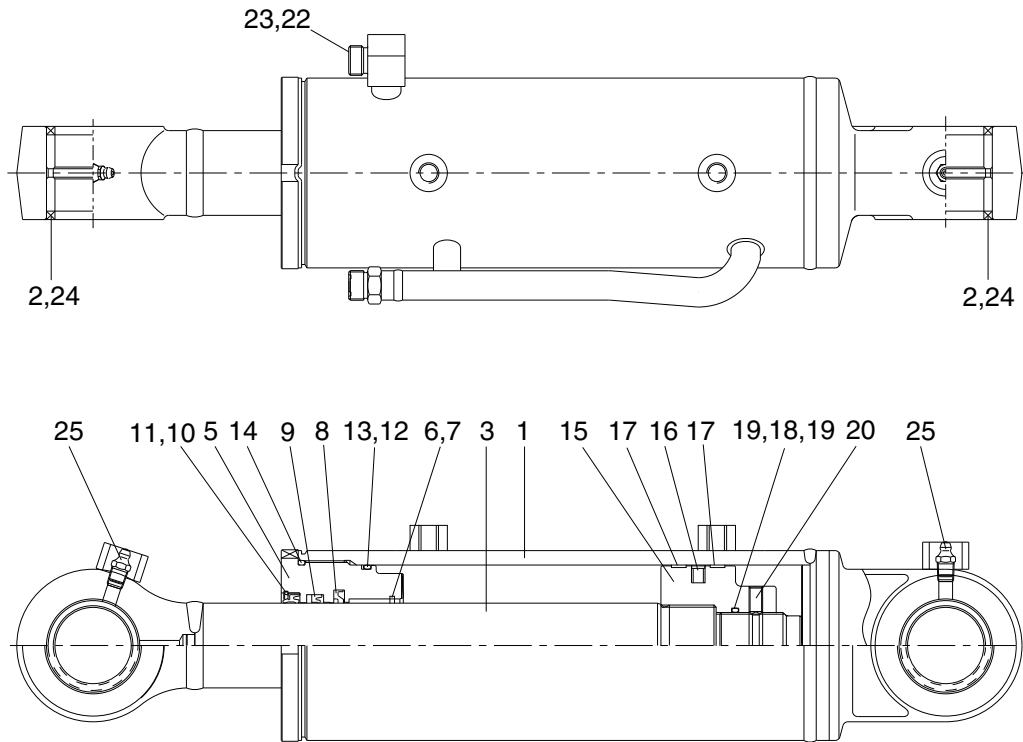


37MT-50110

- |    |               |    |              |    |            |
|----|---------------|----|--------------|----|------------|
| 1  | Tube assembly | 12 | Back up ring | 21 | Set screw  |
| 2  | Pin bushing   | 13 | O-ring       | 22 | Pipe assy  |
| 3  | Rod assembly  | 14 | Cushion ring | 23 | O-ring     |
| 5  | Rod cover     | 15 | Piston       | 24 | Pipe assy  |
| 6  | Rod bushing   | 16 | Piston seal  | 25 | Washer     |
| 7  | Retainer ring | 17 | Wear ring    | 26 | Hex bolt   |
| 8  | Buffer seal   | 18 | Dust ring    | 27 | Dust wiper |
| 9  | U-packing     | 19 | O-ring       | 28 | O-ring     |
| 10 | Wiper ring    | 20 | Back up ring | 29 | Dust cap   |
| 11 | O-ring        |    |              |    |            |



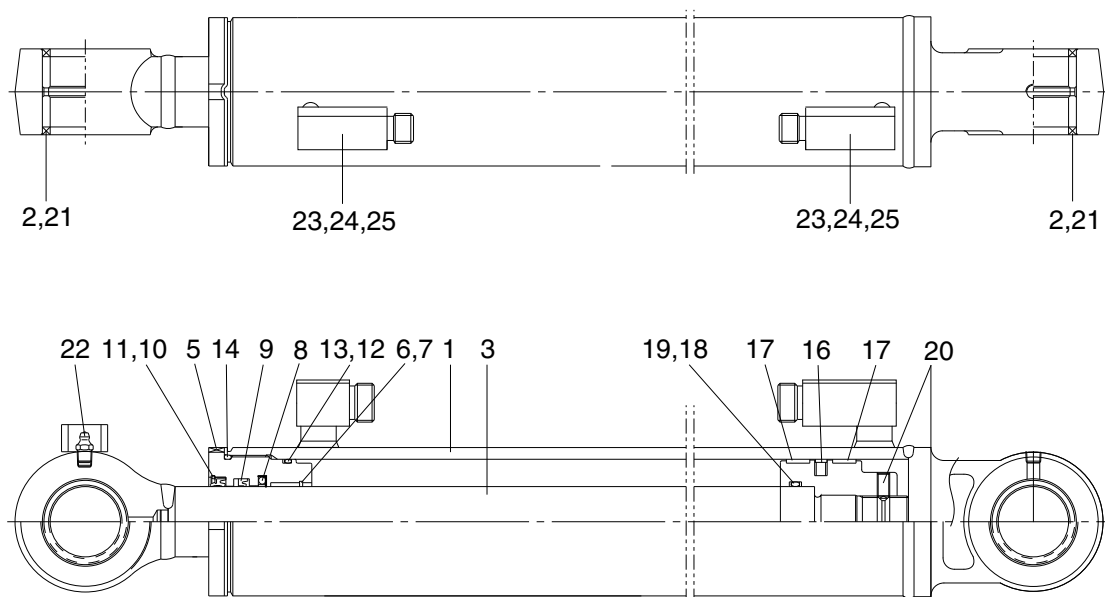
#### (4) Dozer cylinder



37MT-40110

- |   |               |    |               |    |               |
|---|---------------|----|---------------|----|---------------|
| 1 | Tube assembly | 10 | Dust seal     | 18 | O-ring        |
| 2 | Pin bushing   | 11 | Retainer ring | 19 | Back up ring  |
| 3 | Rod assembly  | 12 | O-ring        | 20 | Set screw     |
| 5 | Rod cover     | 13 | Back up ring  | 21 | O-ring        |
| 6 | Rod bushing   | 14 | O-ring        | 22 | Dust cap      |
| 7 | Retainer ring | 15 | Piston        | 23 | O-ring        |
| 8 | Buffer seal   | 16 | Piston seal   | 24 | Dust wiper    |
| 9 | U-packing     | 17 | Wear ring     | 25 | Grease nipple |

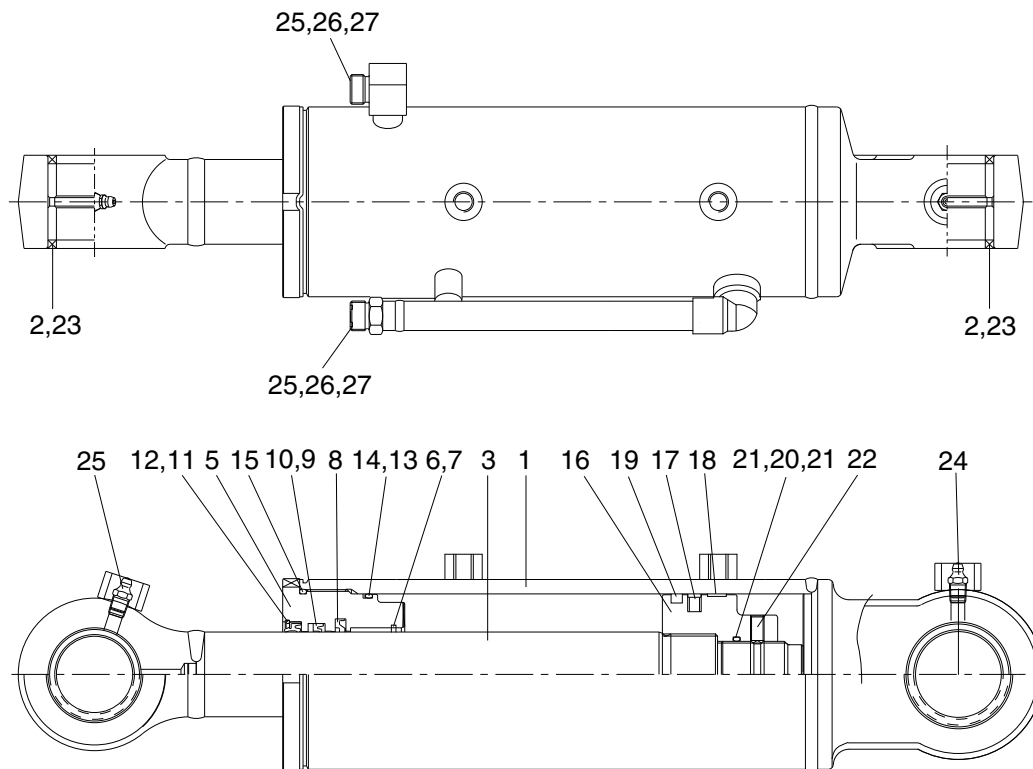
## (5) Boom swing cylinder



37MT-10110

- |   |                |    |               |    |               |
|---|----------------|----|---------------|----|---------------|
| 1 | Tube assembly  | 10 | Wiper ring    | 18 | O-ring        |
| 2 | Dimple bushing | 11 | Retainer ring | 19 | Back up ring  |
| 3 | Rod assembly   | 12 | O-ring        | 20 | Set screw     |
| 5 | Rod cover      | 13 | Back up ring  | 21 | Dust wiper    |
| 6 | Rod bushing    | 14 | O-ring        | 22 | Grease nipple |
| 7 | Retainer ring  | 15 | Piston        | 23 | Dust cap      |
| 8 | Buffer ring    | 16 | Piston seal   | 24 | O-ring        |
| 9 | U-packing      | 17 | Wear ring     | 25 | O-ring        |

## (6) Angle dozer cylinder

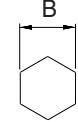


37MT-40210

- |    |               |    |               |    |               |
|----|---------------|----|---------------|----|---------------|
| 1  | Tube assembly | 11 | Dust seal     | 20 | O-ring        |
| 2  | Pin bushing   | 12 | Retainer ring | 21 | Back up ring  |
| 3  | Rod assembly  | 13 | O-ring        | 22 | Set screw     |
| 5  | Rod cover     | 14 | Back up ring  | 23 | Dust wiper    |
| 6  | Pin bushing   | 15 | O-ring        | 24 | Grease nipple |
| 7  | Retainer ring | 16 | Piston        | 25 | Dust cap      |
| 8  | Buffer seal   | 17 | Piston seal   | 26 | O-ring        |
| 9  | U-packing     | 18 | Wear ring     | 27 | O-ring        |
| 10 | Back up ring  | 19 | Dust ring     |    |               |

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

Tool name	Remark	
Allen wrench	8	
	3	
Spanner	22	
Hook spanner	Suitable size (80~120 mm)	
(-) 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	Boom cylinder	5	M95	75±7.5	542±54.2
	Arm cylinder	5	M90	75±7.5	542±54.2
	Bucket cylinder	5	M85	75±7.5	542±54.2
	Dozer cylinder	5	M100	70±7.0	506±50.6
	Boom swing cylinder	5	M85	70±7.0	506±50.6
	Angle dozer cylinder	5	M105	75±7.5	542±54.2
Piston	Boom cylinder	15	M42	120±12	868±86.8
	Arm cylinder	17	M42	120±12	868±86.8
	Bucket cylinder	14	M38	80±8.0	579±57.9
	Dozer cylinder	15	M48	75±7.5	542±54.2
	Boom swing cylinder	15	M48	160±16	1157±116
	Angle dozer cylinder	16	M52	180±18	1302±130
Set screw	Boom cylinder	21	M12	5.0	362
	Arm cylinder	23	M12	5.0	362
	Bucket cylinder	20	M10	3~3.5	21.7~25.3
	Dozer cylinder	20	M12	4~5	28.9~36.2
	Boom swing cylinder	20	M12	5.0	36.2
	Angle dozer cylinder	22	M12	5.0	36.2

### 3) DISASSEMBLY

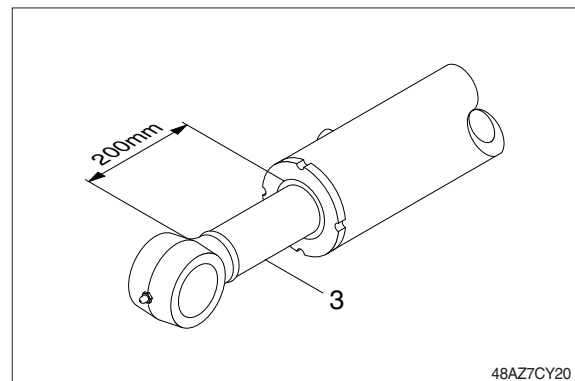
※ Procedures are based on the boom cylinder.

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

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

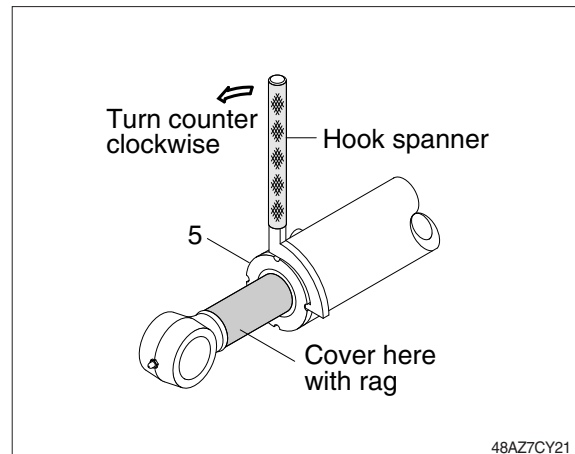
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

② Pull out rod assembly (3) about 200 mm (7.1 in). Because the rod assembly is rather heavy, finish extending it with air pressure after the oil draining operation.



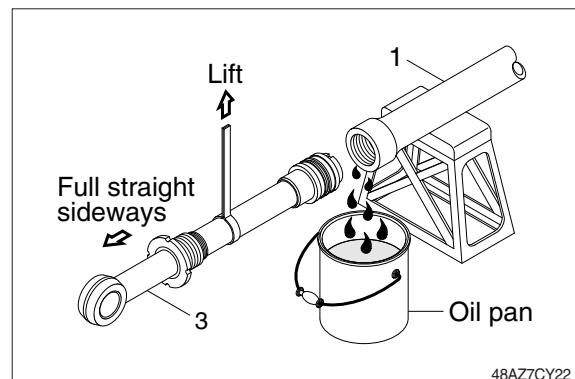
③ Loosen and remove the rod cover (5) by hook spanner.

※ Cover the extracted rod assembly (3) with rag to prevent it from being accidentally damaged during operation.



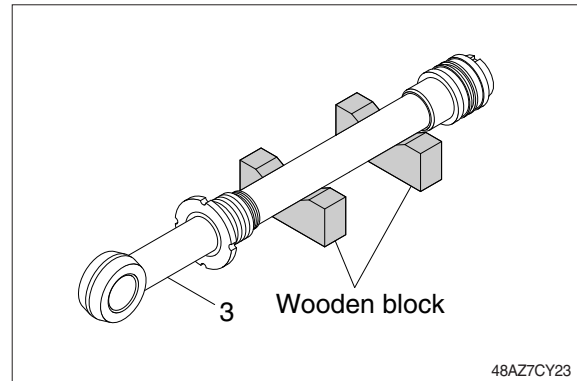
④ Draw out cylinder head and rod assembly together from tube assembly (1).

※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly (3) with a crane or some means and draw it out. However, when rod assembly (3) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



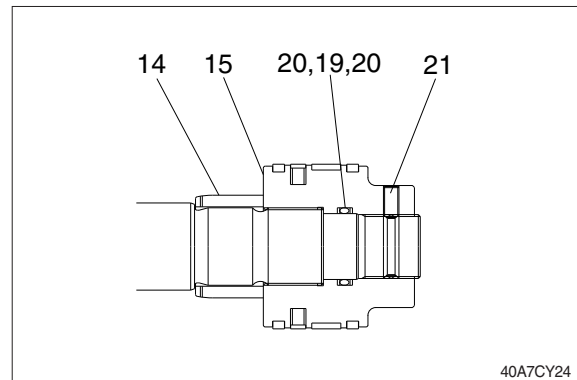
Note that the plated surface of rod assembly (3) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

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

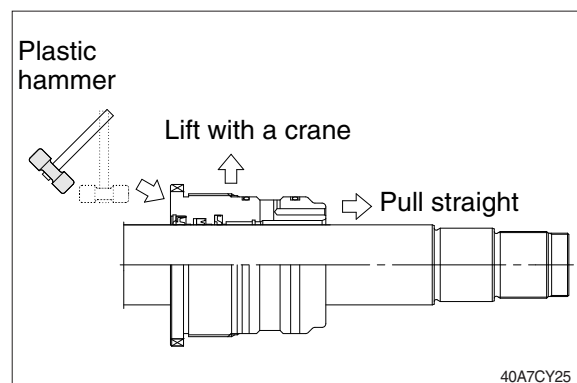


## (2) Remove piston and rod cover

- ① Remove set screw (21)
- ② Remove piston assembly (15), back up ring (20), O-ring (19) and cushion ring (14).

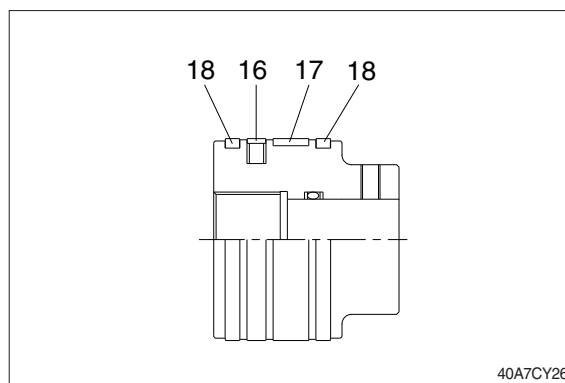


- ③ Remove the rod cover assembly from rod assembly (3).
  - ※ If it is too heavy to move, move it by striking the flanged part of rod cover with a plastic hammer.
  - ※ Pull it straight with rod cover assembly lifted with a crane.
- Exercise care so as not to damage the lip of rod bushing (6) and packing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



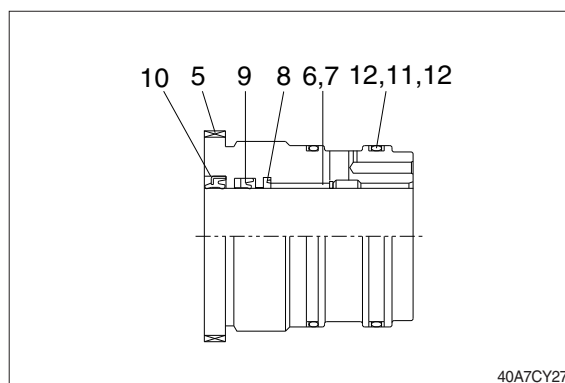
### (3) Disassemble the piston assembly

- ① Remove wear ring (17) and dust ring (18).
  - ② Remove piston seal (16).
- ※ Exercise care in this operation not to damage the grooves.



### (4) Disassemble rod cover assembly

- ① Remove back up ring (12) and O-ring (11).
  - ② Remove wiper ring (10)
  - ③ Remove U-packing (9).
  - ④ Remove back up ring (7) and rod bushing (6).
- ※ Exercise care in this operation not to damage the grooves.
- ※ Do not remove seal and ring, if does not damaged.

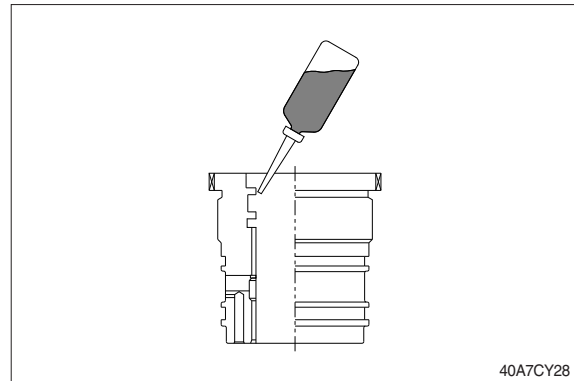


#### 4) ASSEMBLY

##### (1) Assemble cylinder head assembly

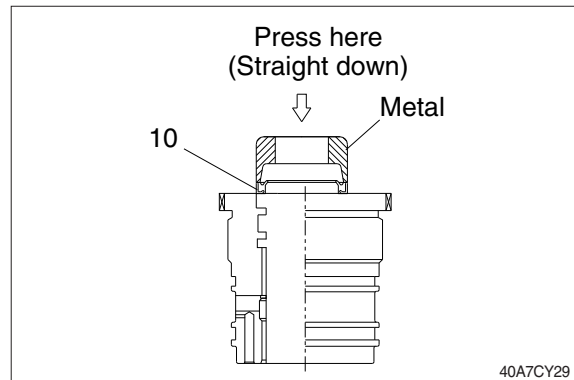
- ※ Check for scratches or rough surfaces if found smooth with an oil stone.

- ① Coat the inner face of rod cover (5) with hydraulic oil.



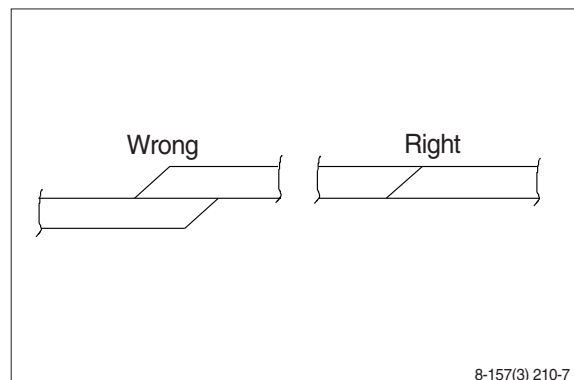
- ② Coat dust seal (10) with grease and fit wiper ring (10) to the bottom of the hole of wiper ring.

At this time, press a pad metal to the metal ring of wiper ring (10).

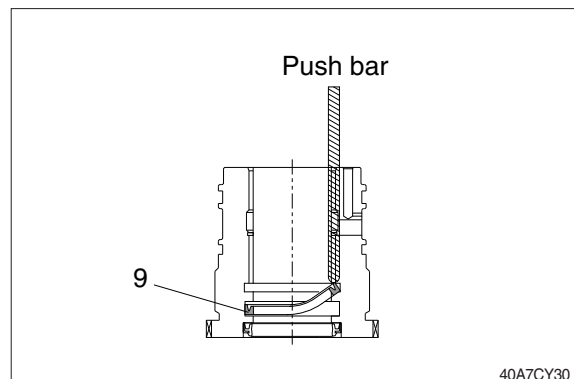


- ③ Fit U-packing (9) to the groove..

- ※ Coat each packing with hydraulic oil before fitting it.
- ※ Insert the backup ring until one side of it is inserted into groove.

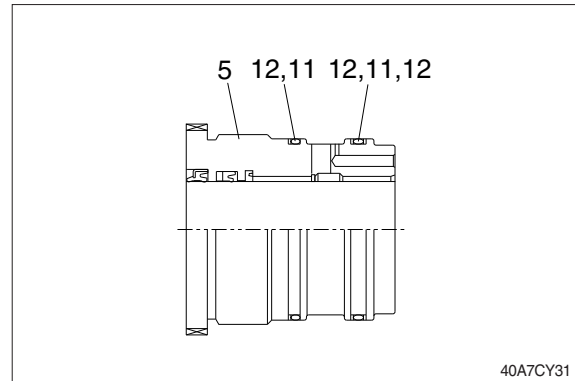


- ※ U-packing (9) has its own fitting direction. Therefore, confirm it before fitting them.
- ※ Fitting U-packing (9) upside down may damage its lip. Therefore check the correct direction that is shown in fig.



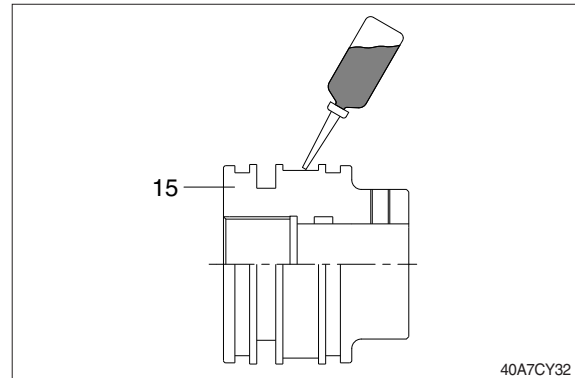


- ④ Fit back up ring (12) to rod cover (5).
- ※ Put the backup ring in the warm water of 30~50°C .
- ⑤ Fit O-ring (11) to rod cover (5).

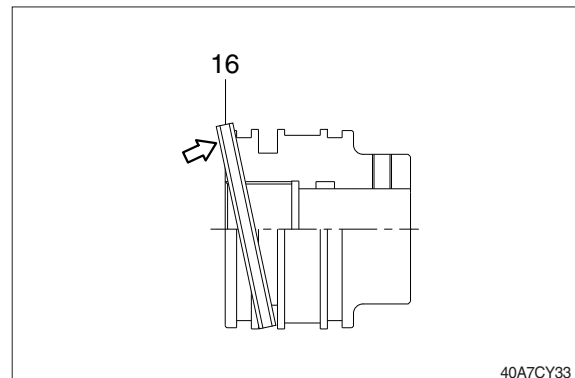


## (2) Assemble piston assembly

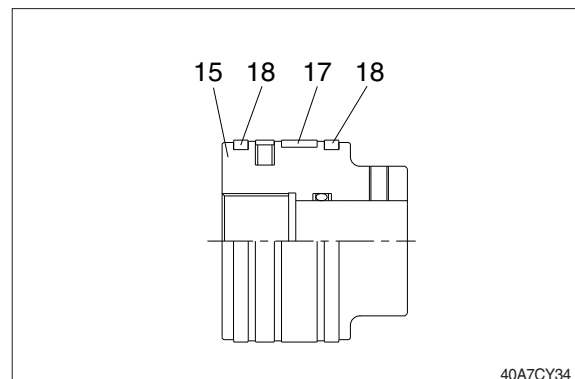
- ※ Check for scratches or rough surfaces.  
If found smooth with an oil stone.
- ① Coat the outer face of piston (15) with hydraulic oil.



- ② Fit piston seal (16) 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.

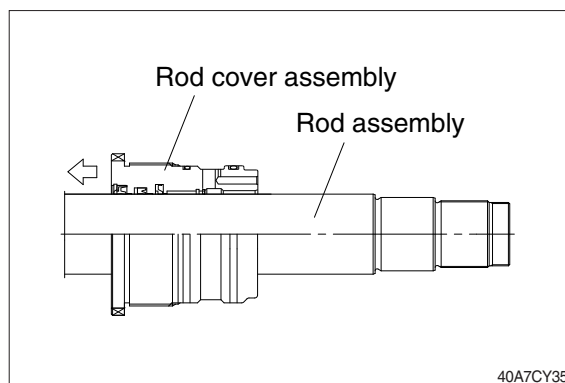


- ③ Fit wear ring (17) and dust ring (18) to piston (15).

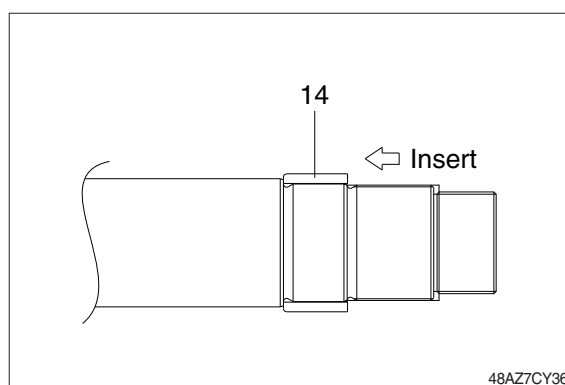


### (3) Install piston and cylinder head

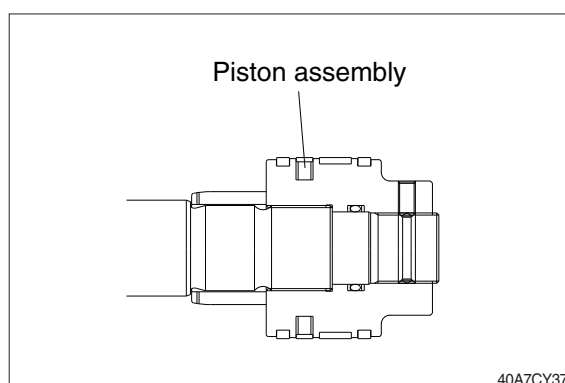
- ① Fix the rod assembly to the work bench.
- ② Apply hydraulic oil to the outer surface of rod assembly (3), the inner surface of piston and gland.
- ③ Insert rod cover assembly to rod assembly.



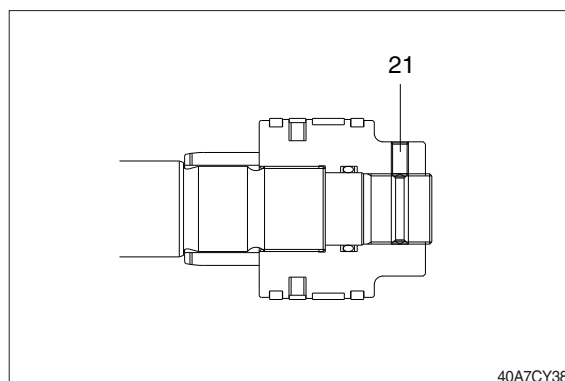
- ④ Insert cushion ring (14) to rod assembly.
- ※ Note that cushion ring (14) has a direction in which it should be fitted.



- ⑤ Fit piston assembly to rod assembly.
- ※ Tightening torque : refer to page 7-119

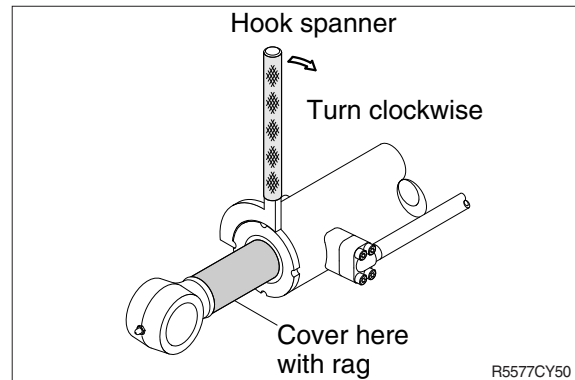
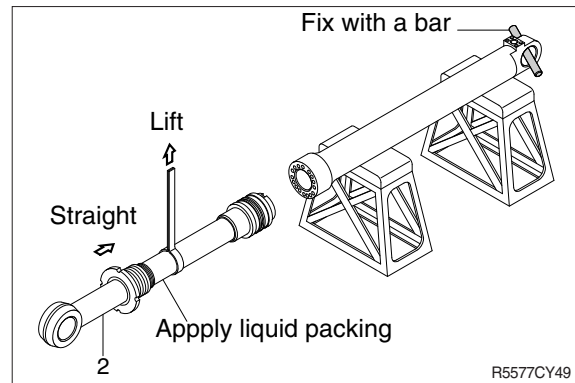


- ⑥ Tighten set screw (21).
- Tightening torque : refer to page 7-119



### (3) 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.

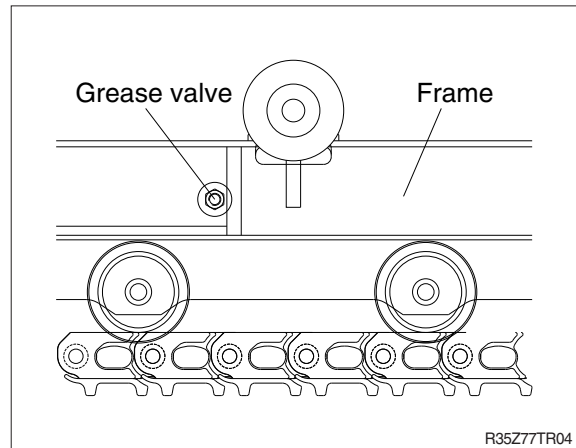


## GROUP 10 UNDERCARRIAGE

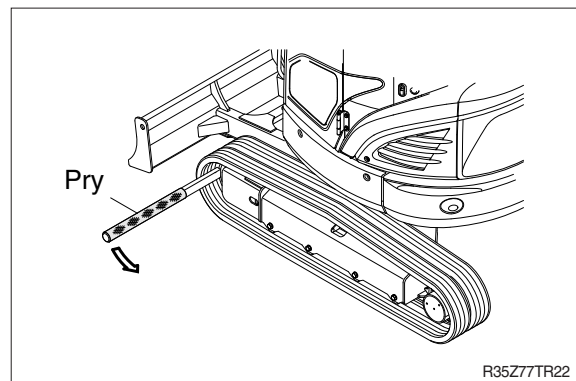
### 1. RUBBER TRACK

#### 1) REMOVAL

- (1) Loosen tension of the rubber track.
  - ※ If track tension is not relieved when the grease valve is loosened, move the machine backwards and forwards.

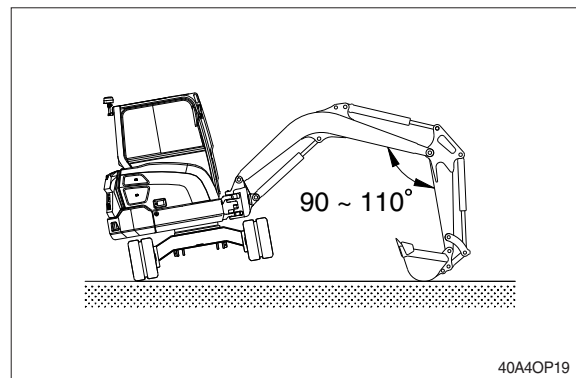


- (2) Remove the rubber track from lower frame using pry.



#### 2) INSTALL

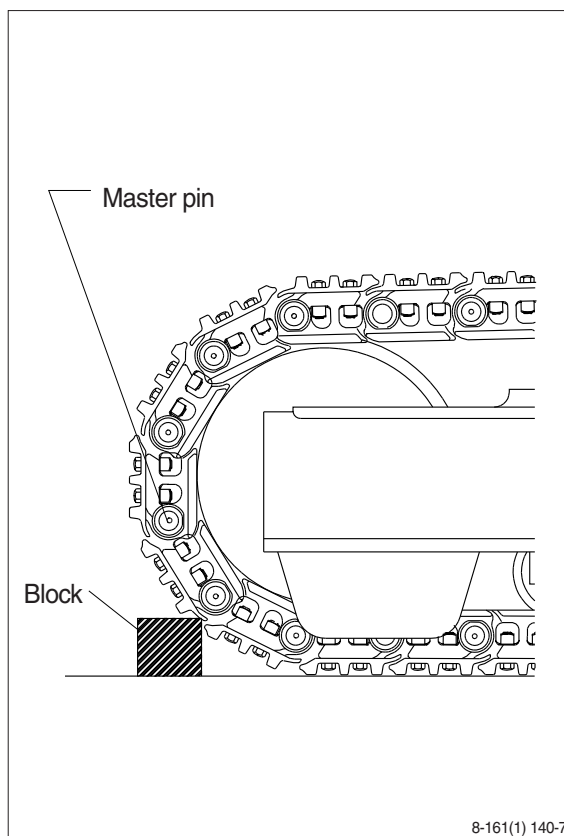
- (1) Carry out installation in the reverse order to removal.
  - ※ Adjust the tension of the rubber track.



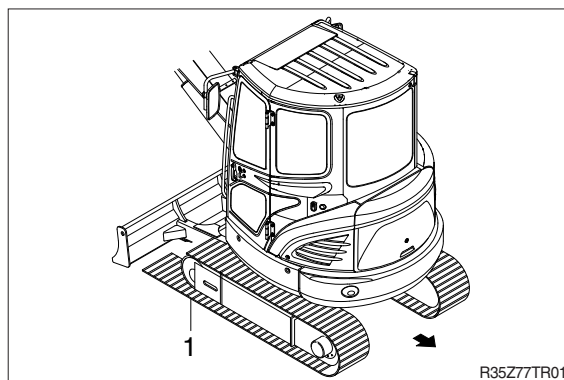
## 2. TRACK LINK

### 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.

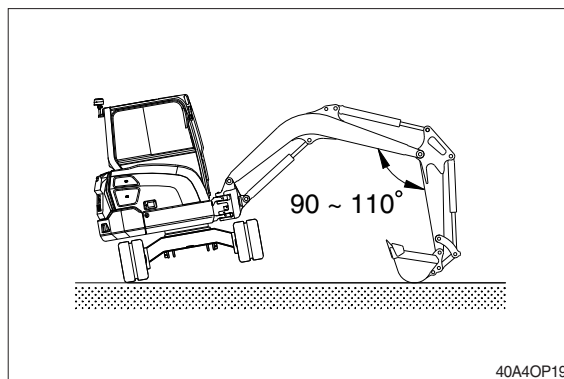


- (4) Move the machine slowly in reverse, and lay out track link assembly (1).
  - ※ Jack up the machine and put wooden block under the machine.
  - ※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



### 2) INSTALL

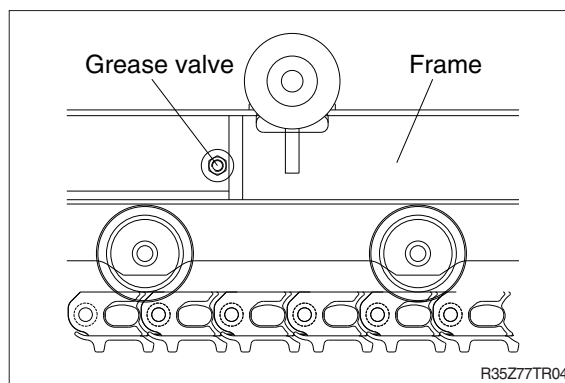
- (1) Carry out installation in the reverse order to removal.
  - ※ Adjust the tension of the track link.



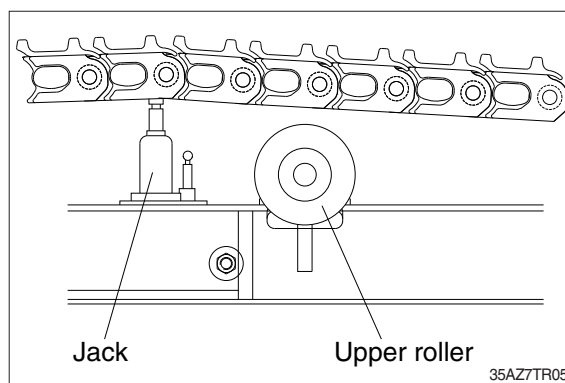
### 3. UPPER ROLLER

#### 1) REMOVAL

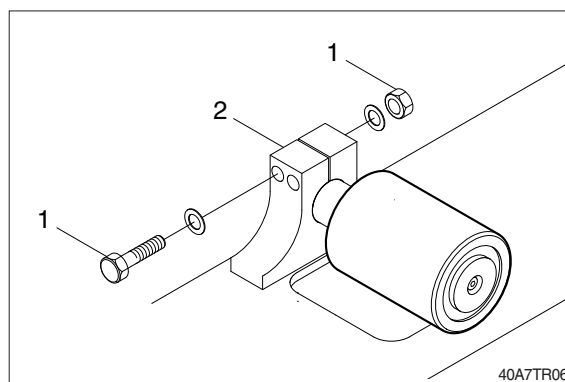
- (1) Loosen tension of the track link.



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



- (3) Loosen the bolt and nut (1)
- Tightening torque :  $9.6 \pm 2.9$  kgf·m  
( $142 \pm 21.0$  lbf·ft)
- (4) Open bracket (2) with a screwdriver, push out from inside, and remove upper roller assembly.
- Weight : 2.5 kg (5.0 lb)



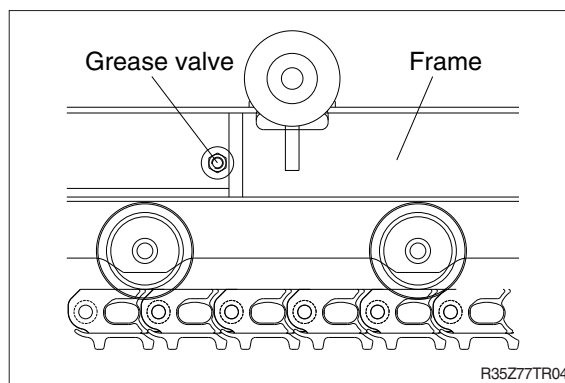
#### 2) INSTALL

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

## 4. LOWER ROLLER

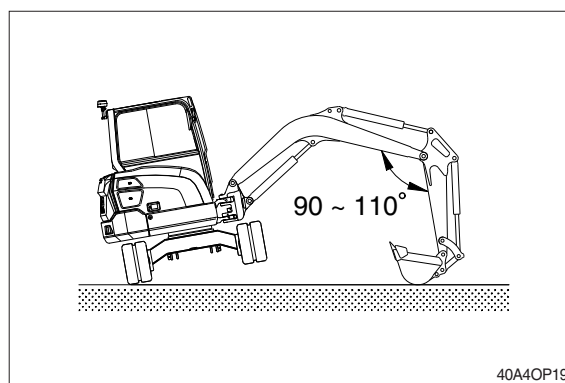
### 1) REMOVAL

- (1) Loosen tension of the rubber track.



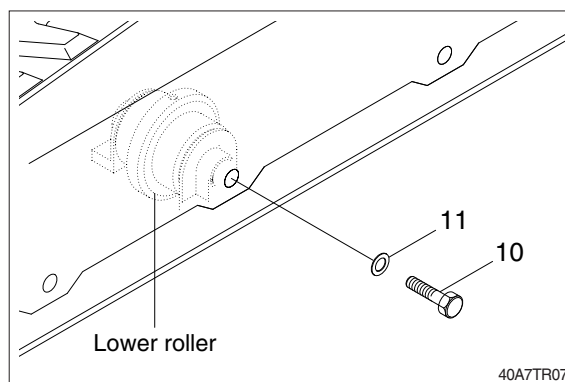
- (2) Using the work equipment, push up track frame on side which is to be removed.

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



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

- Weight : 7.25 kg (15.9 lb)
- Tightening torque :  $31.3 \pm 3.0$  kgf·m  
( $226 \pm 21.7$  lbf·ft)



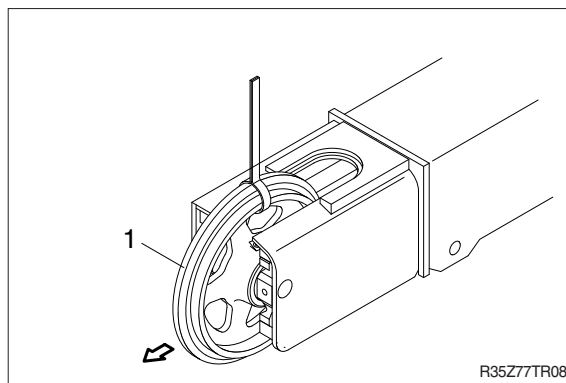
### 2) INSTALL

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

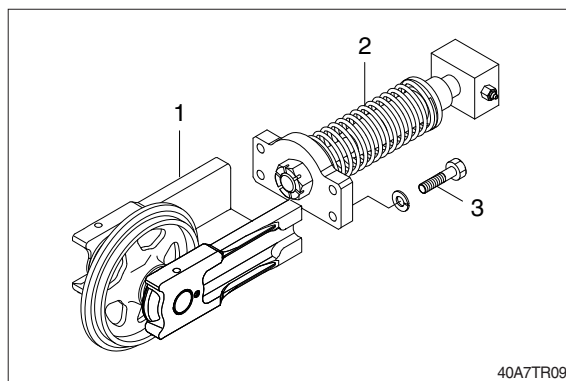
## 5. IDLER AND RECOIL SPRING

### 1) REMOVAL

- (1) Remove the track link.  
For detail, see **removal of track link**.
- (2) Sling the idler (1) and pull out idler and recoil spring assembly from track frame, using a pry.
  - Weight : 28.5 kg (63 lb)

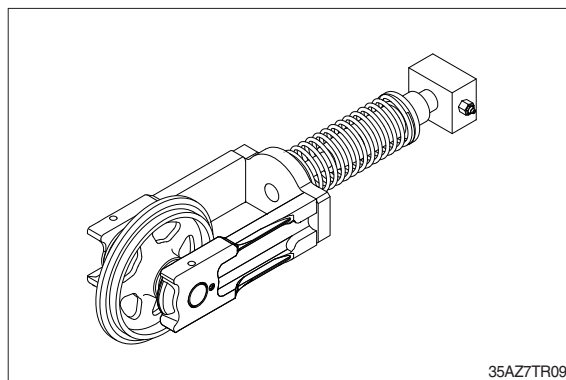


- (3) Loosen the hexagon bolt (3) and remove the idler (1) from the recoil spring assembly (3).
  - Tightening torque :  $11.3 \pm 1.1$  kgf·m  
( $81.9 \pm 8.0$  lbf·ft)



### 2) INSTALL

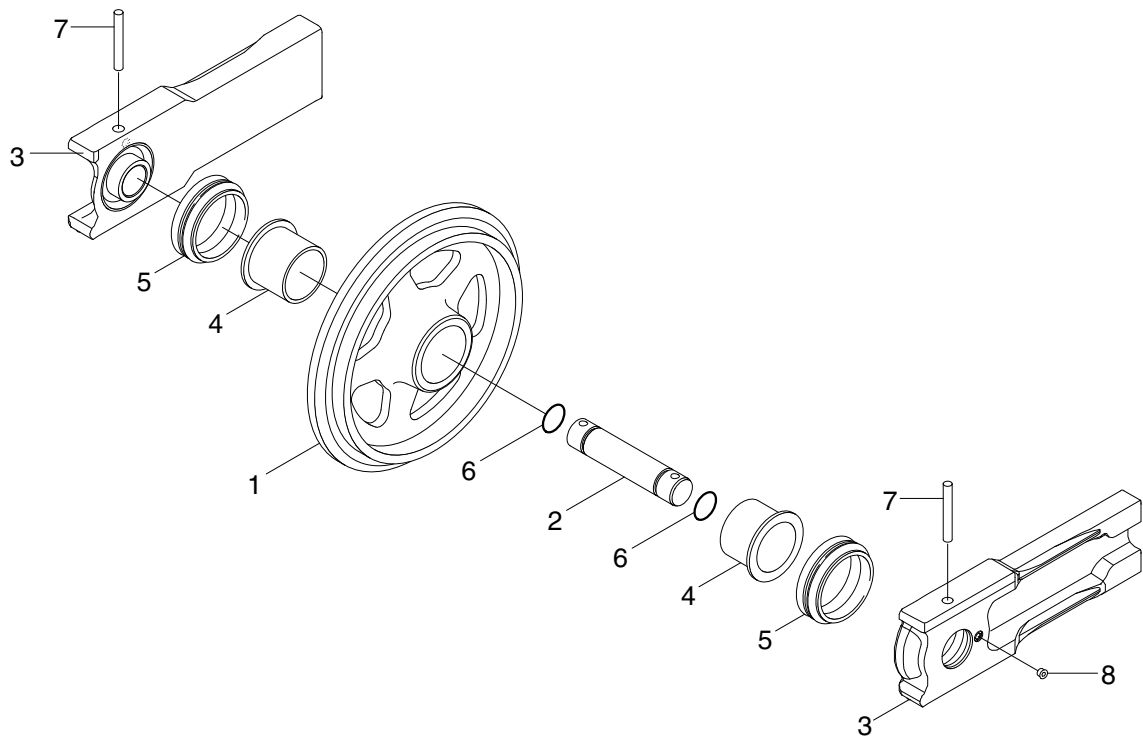
- (1) Carry out installation in the reverse order to removal.
- ※ Make sure that the boss on the end face of the recoil cylinder rod is in the hole of the track frame.





### 3) DISASSEMBLY AND ASSEMBLY OF IDLER

#### (1) Structure



81MT-13071

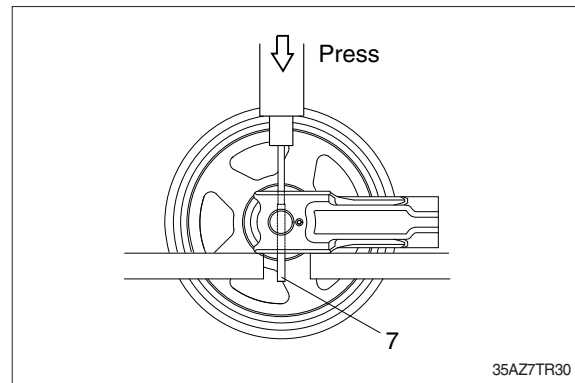
1 Idler shell  
2 Shaft  
3 Bracket

4 Bushing  
5 Floating seal  
6 O-ring

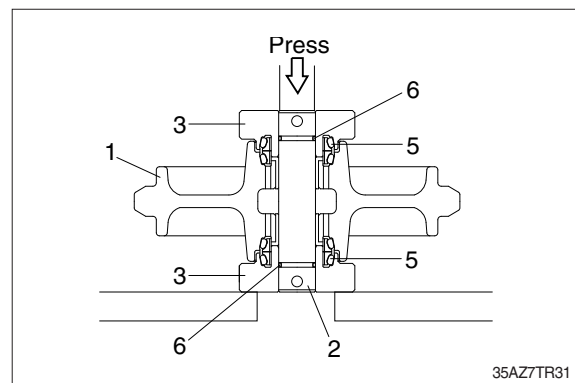
7 Spring pin  
8 Plug

## (2) Disassembly

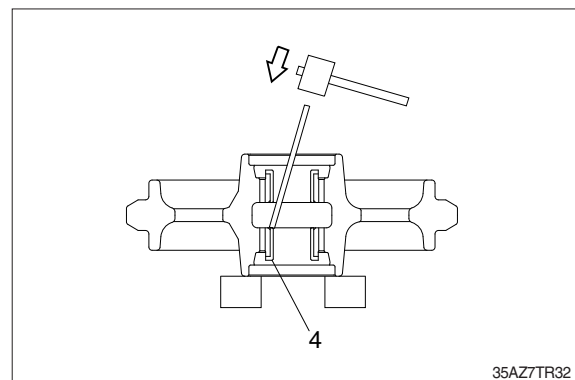
- ① Remove plug (8) and drain oil.
- ② Draw out the spring pin (7), using a press.



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

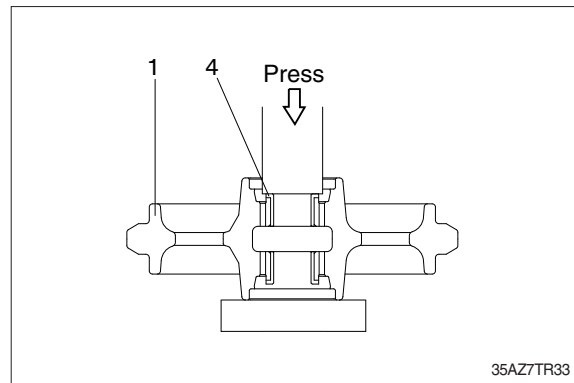


### (3) Assembly

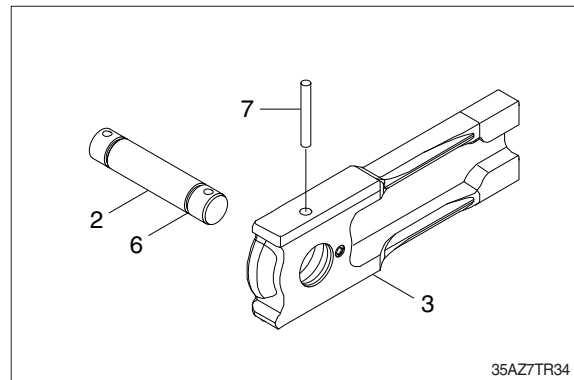
- ※ Before assembly, clean the parts.
- ※ Coat the sliding surfaces of all parts with oil.

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

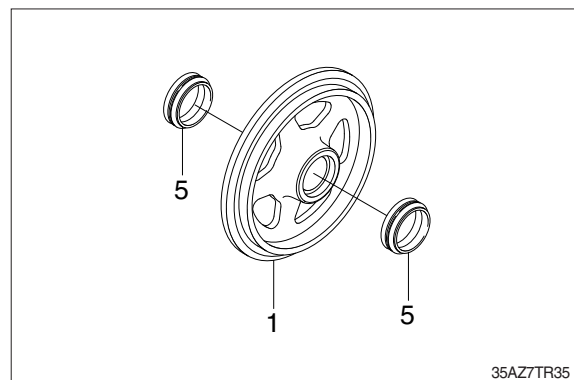
Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.



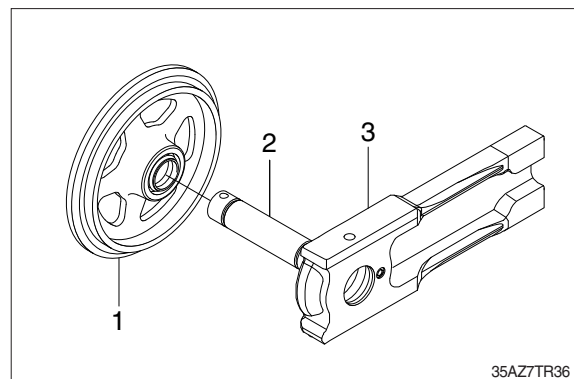
- ② Coat O-ring (6) with grease thinly, and install it to shaft (2).
- ③ Insert shaft (2) into bracket (3) and drive in the spring pin (7).



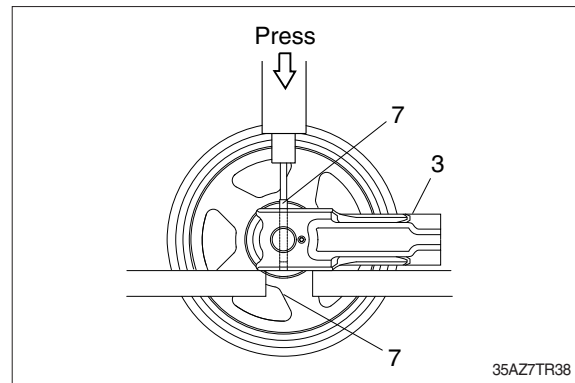
- ④ Install floating seal (5) to idler shell (1).



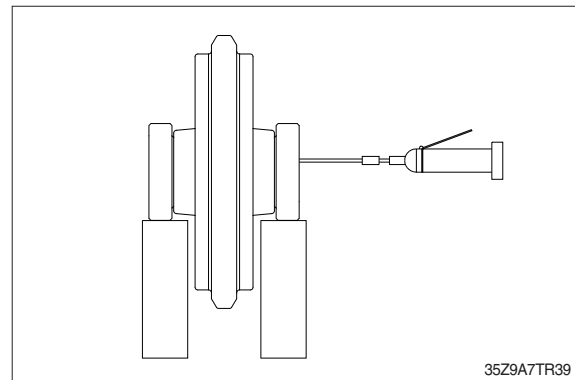
- ⑤ Install shaft (2) and bracket (3) to idler shell (1).



- ⑥ Lay bracket (3) on its side. Knock in the spring pin (7) with a hammer.

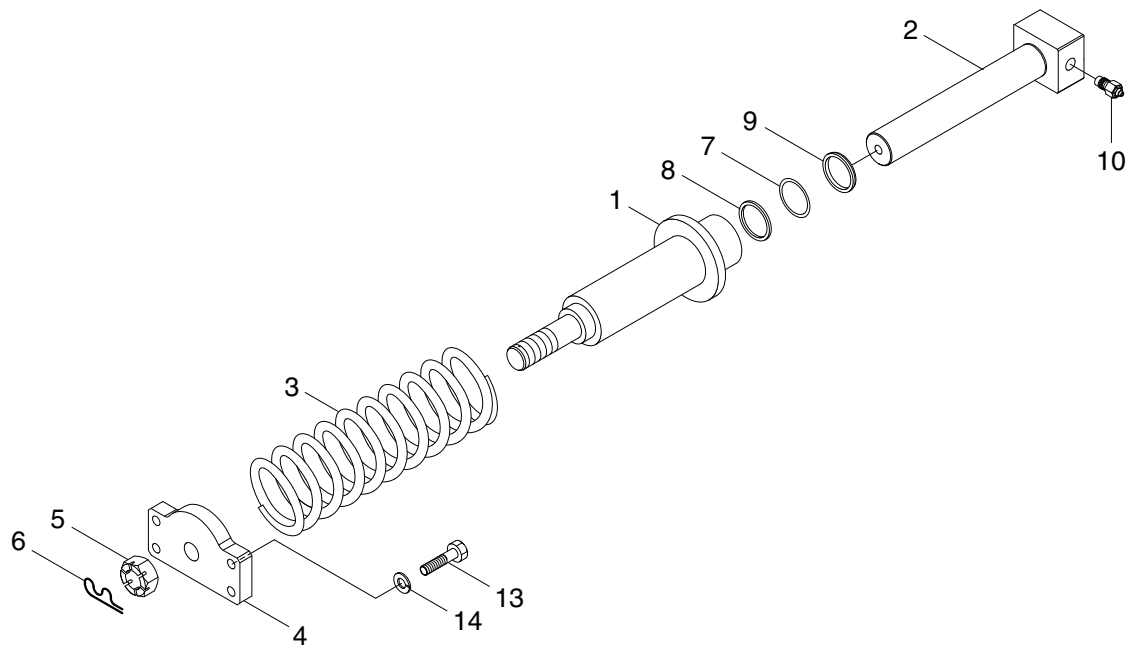


- ⑦ Supply engine oil to the specified level, and tighten plug.



#### 4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

##### (1) Structure

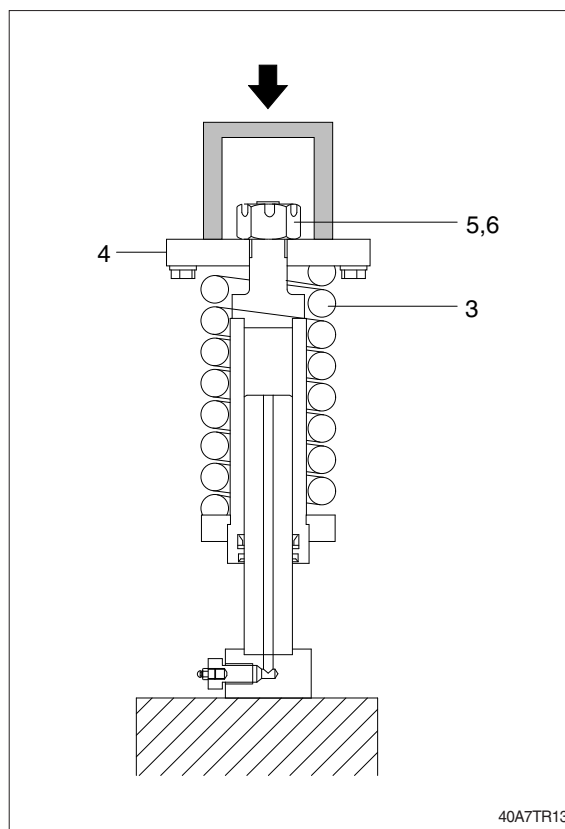


81MS-14011

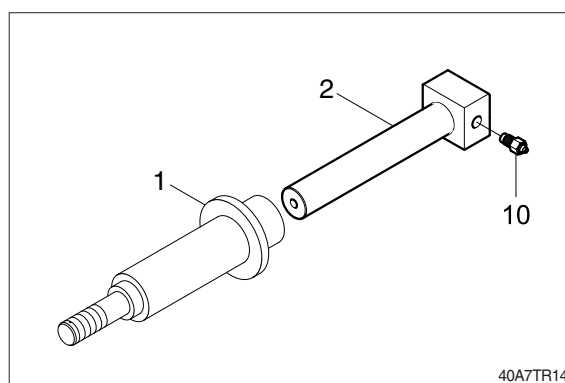
1	Tension cylinder	5	Castle nut	9	Dust seal
2	Piston	6	Split pin	10	Grease
3	Tension spring	7	Rod seal	13	Hexagon bolt
4	Yoke plate	8	Back up ring	14	Spring washer

## (2) Disassembly

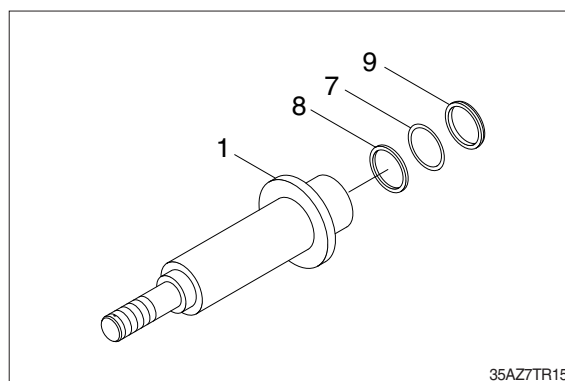
- ① Apply pressure on yoke plate (4) with a press.
  - ※ The spring is under a large installed load. This is dangerous, so be sure to set properly.
- ② Remove split pin (6) and castle nut (5). Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.
- ③ Lighten the press load slowly and remove yoke plate (4) and spring (3).



- ⑤ Remove piston (2) from tension cylinder (1).
- ⑥ Remove grease valve (10) from piston (3).

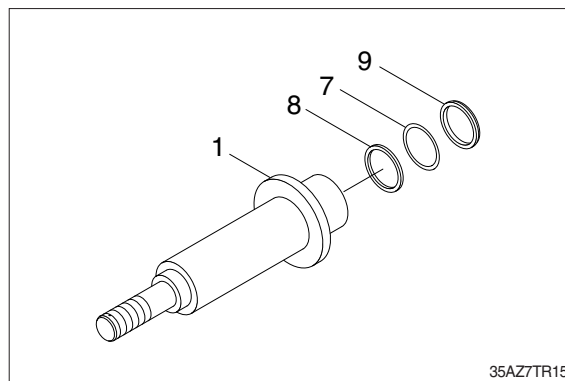


- ⑦ Remove dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).



### (3) Assembly

- ① Install dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).

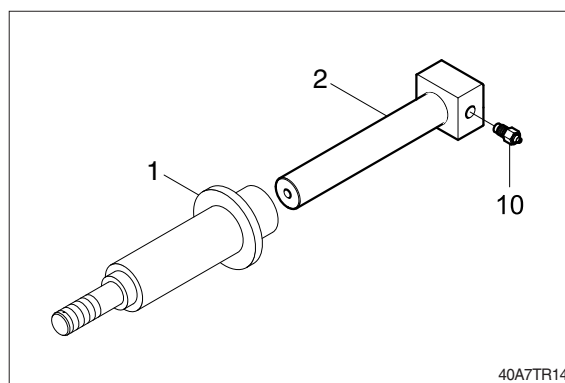


- ② Pour grease into tension cylinder (1), then push in piston (2) by hand.  
After take grease out of grease valve mounting hole, let air out.

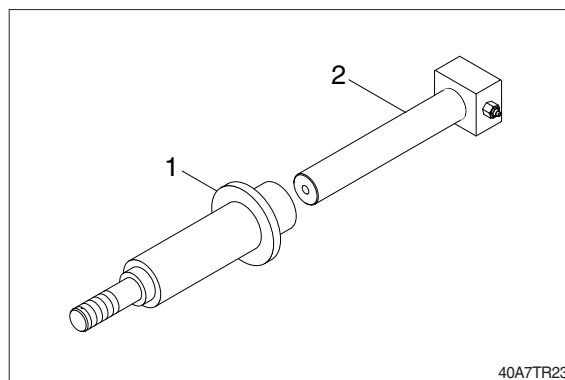
※ If air letting is not sufficient, it may be difficult to adjust the tension of crawler.

- ③ Fit grease valve (10) to piston (3).

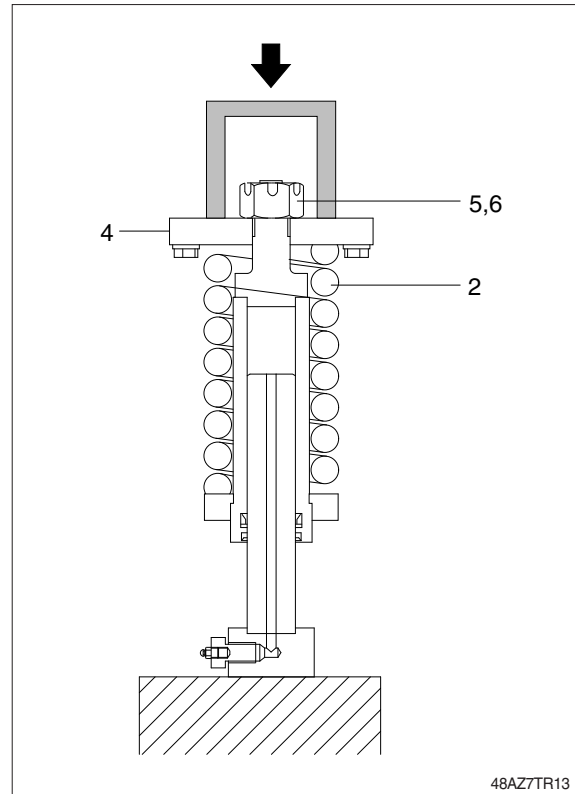
· Tightening torque : 8 kgf · m  
(57.9 lbf · ft)



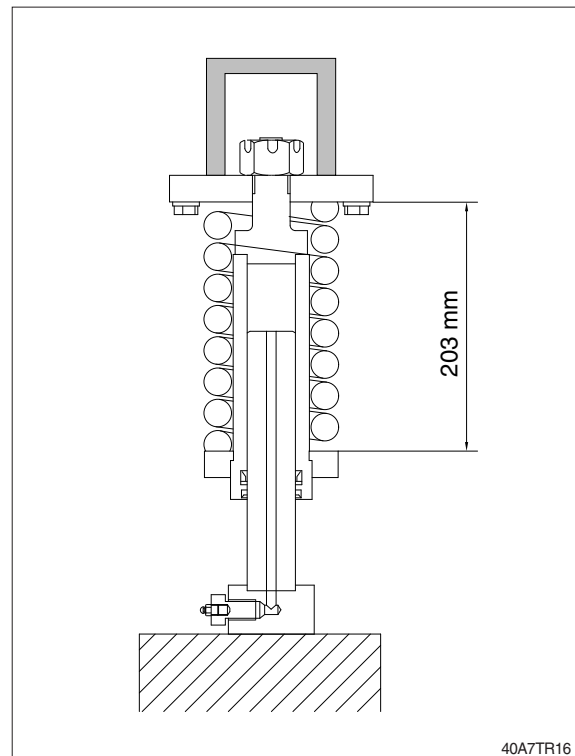
- ④ Install piston (2) to tension cylinder (1).



- ⑤ Install tension spring (3) and yoke plate (4) to tension cylinder (1).
  - ⑥ Apply pressure to tension spring (3) with a press and tighten castle nut (5).
  - ※ During the operation, pay attention specially to prevent the press from slipping out.
  - ⑦ Tighten castle nut (5) and insert split pin (6).
- Tightening torque :  $10.3 \pm 1.1$  kgf·m  
( $74.5 \pm 8.0$  lbf·ft)



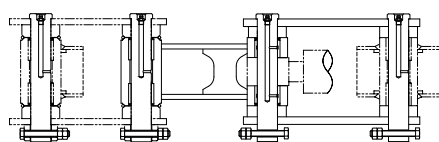
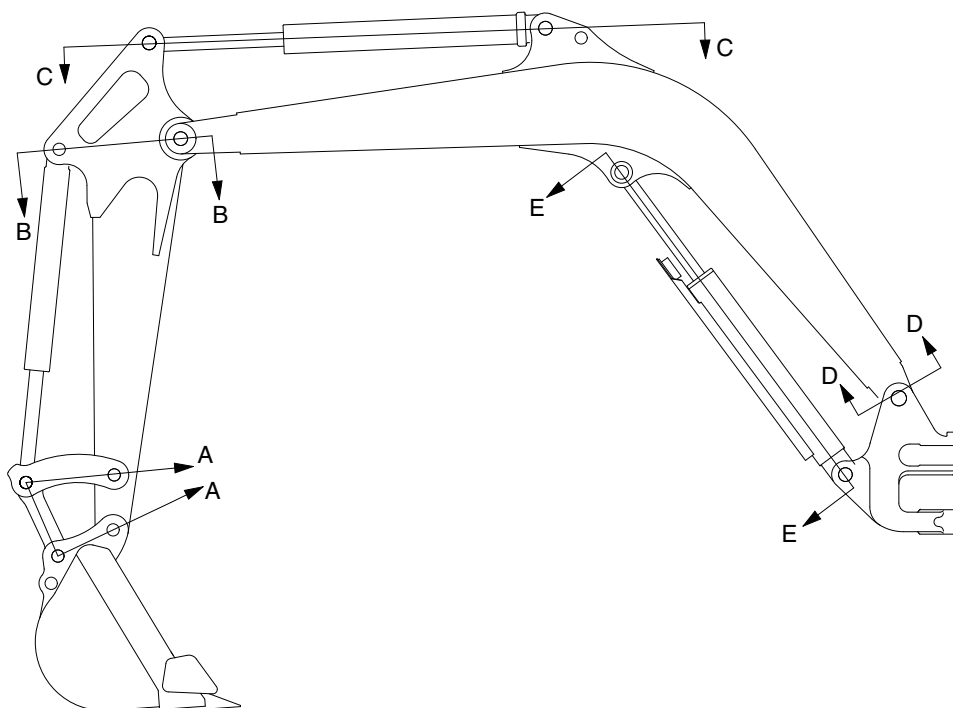
- ⑧ Lighten the press load and confirm the set length of tension spring (3).
- Spring length : 203 mm



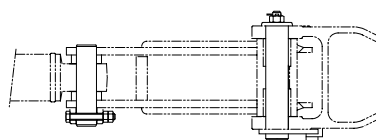


## GROUP 11 WORK EQUIPMENT

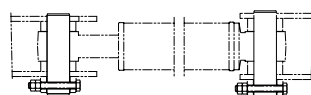
### 1. STRUCTURE



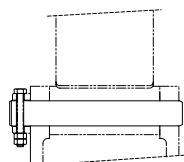
SECTION A-A



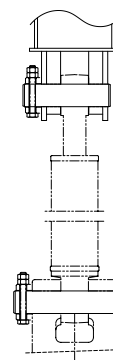
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

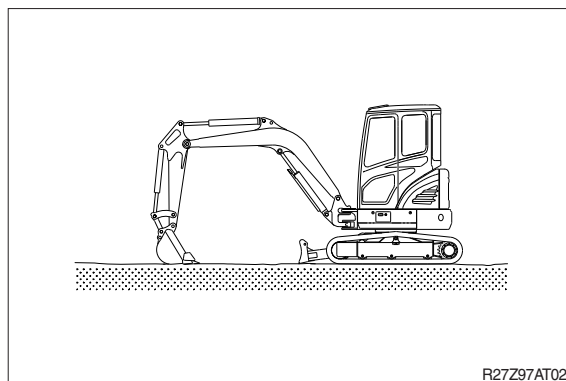
35Z9A7AT01

## 2. REMOVAL AND INSTALL

### 1) BUCKET ASSEMBLY

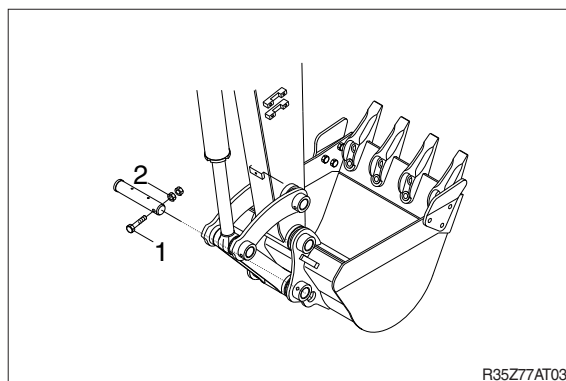
#### (1) Removal

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



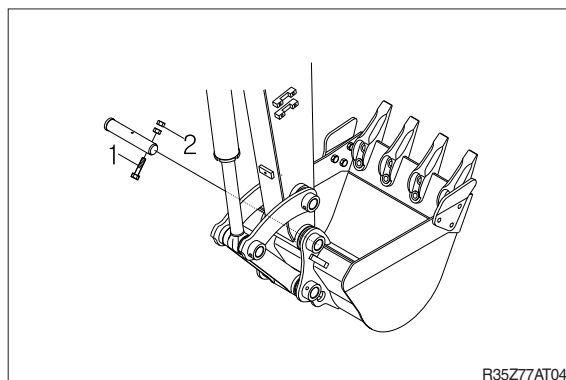
- ② Remove nut (1), bolt (2) and draw out the pin (4).

· Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)



- ③ Remove nut (1), bolt (2) and draw out the pin (3) then remove the bucket assembly (0.11 m³).

· Weight : 134 kg (290 lb)  
· Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)

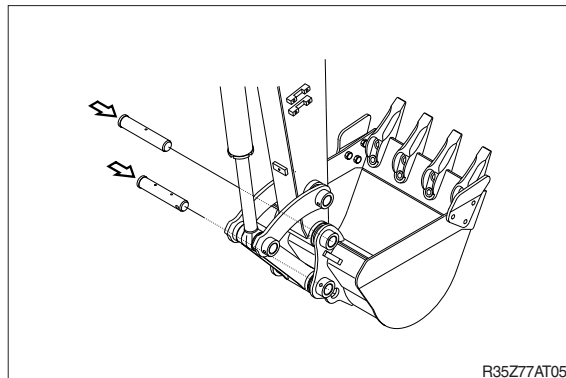


#### (2) Install

- 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 operator's 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 (4).

**▲ 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.

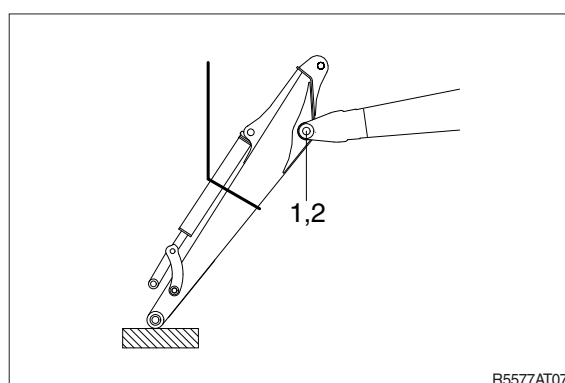
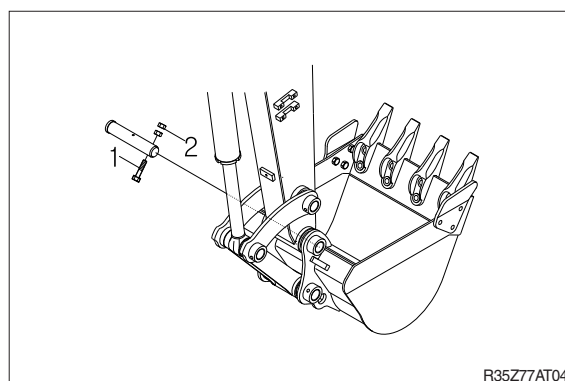
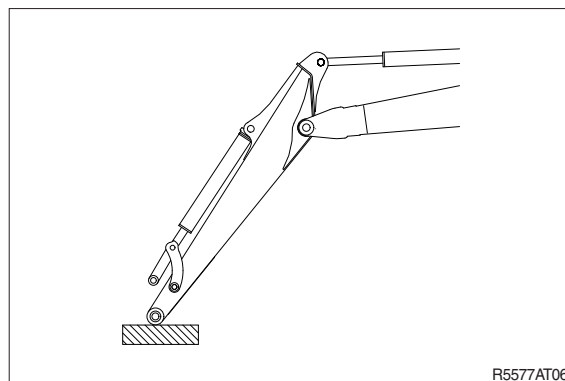
Place a wooden block under the cylinder and bring the cylinder down to it.

⑤ Remove bolt (1) and pull out the pin (2) then remove the arm assembly (1.3 m).

· Weight : 132 kg (290 lb)

· Tightening torque :  $12.8 \pm 3.0$  kgf·m  
( $92.6 \pm 21.7$  lbf·ft)

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



### (2) Install

① Carry out installation in the reverse order to removal.

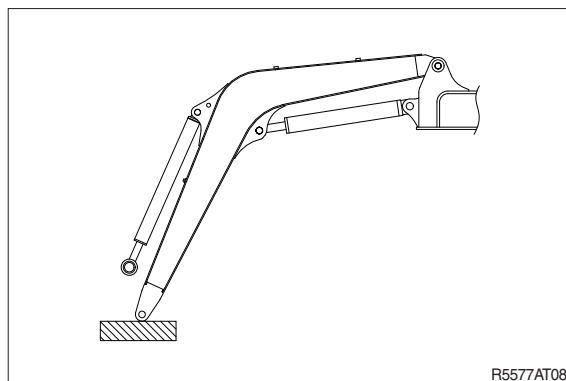
**▲ When lifting the arm assembly, always lift the center of gravity.**

※ Bleed the air from the cylinder.

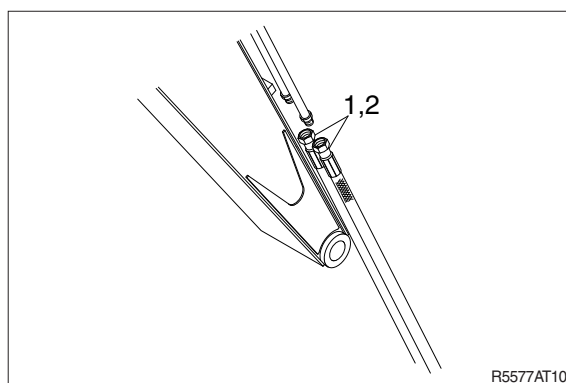
### 3) BOOM ASSEMBLY

#### (1) Removal

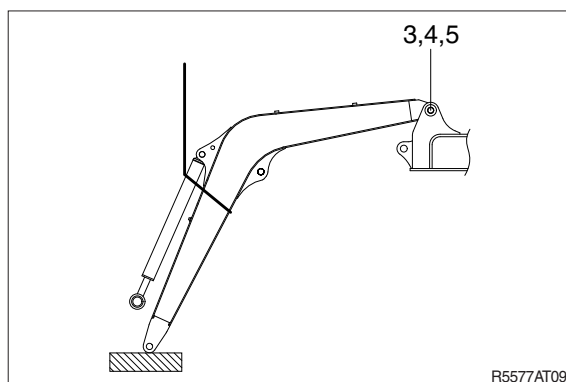
- ① Remove arm and bucket assembly.  
For details, see removal of arm and bucket assembly.
- ② Remove boom cylinder assembly from boom.  
For details, see removal of arm cylinder assembly.



- 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 (3), nut (4) and pull out the pin (5) then remove boom assembly (2.8 m).
  - Weight : 196 kg (430 lb)
  - Tightening torque :  $12.8 \pm 3.0$  kgf·m ( $92.6 \pm 21.7$  lbf·ft)
- ※ 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.

