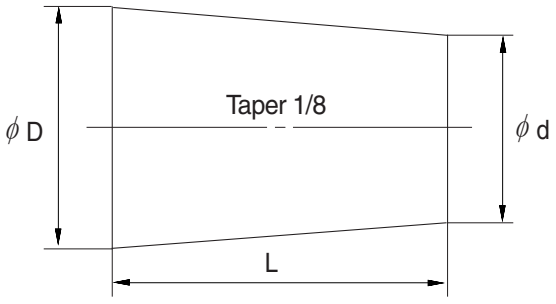
SECTION 7 DISASSEMBLY AND ASSEMBLY

GROUP 1 PRECAUTIONS

1. REMOVAL WORK

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

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



2. INSTALL WORK

1) Tighten all bolts and nuts(Sleeve nuts) to the specified torque.
2) Install the hoses without twisting or interference.
3) Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
4) Bend the cotter pin or lock plate securely.
5) When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2-3 drops of adhesive.
6) When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
7) Clean all parts, and correct any damage, dents, burrs, or rust.
8) Coat rotating parts and sliding parts with engine oil.
9) When press fitting parts, coat the surface with antifriction compound(LM-P).
10) After installing snap rings, check that the snap ring is fitted securely in the ring groove(Check that the snap ring moves in the direction of rotation).
11) When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
12) When using eyebolts, check that there is no deformation or deterioration, and screw them in fully.
13) When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
14) When operating the hydraulic cylinders for the first time after repairing and reassembling the hydraulic cylinders, pumps, or other hydraulic equipment or piping, always bleed the air from the hydraulic cylinders as follows:

(1) Start the engine and run at low idling.
(2) Operate the control lever and actuate the hydraulic cylinder 4-5 times, stopping 100㎜ 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	12.8±3.0	93±22.0
4		Engine mounting bolt (Bracket-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	12.8±3.0	93±22.0
9		Main pump housing mounting bolt	M10 × 1.5	6.63±1.0	48±7.2
10		Main control valve mounting bolt	M10 × 1.5	6.9±1.4	50±10.0
11		Hydraulic oil tank mounting bolt	M12 × 1.75	12.3±2.5	89±18.1
12		Turning joint mounting bolt, nut	M10 × 1.5	6.9±1.4	50±10.0
13		Swing motor mounting bolt	M14 × 2.0	19.6±2.9	142±21.0
14	Power train system	Swing bearing upper mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
15		Swing bearing lower mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
16		Travel motor mounting bolt	M12 × 1.75	13.8±1.0	100±7.2
17		Sprocket mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
18	Under carriage	Upper roller mounting bolt, nut	M16 × 2.0	29.7±3.0	215±32.5
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
		Counterweight mounting bolt-add type	M24 × 3.0	100±15	723±108
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 (13) and loosen bolt (18) and remove pipe (4).

(6) Disconnect pilot line hoses (14, 66, 67) and remove connectors (48, 56, 64).

(7) Remove socket bolts (20) and disconnect pump suction tube (2).

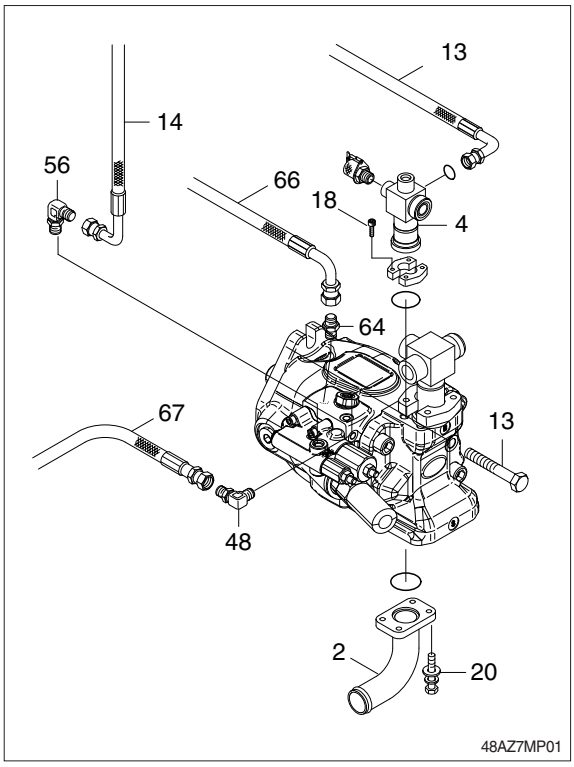
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

(8) Sling the pump assembly and remove the pump mounting bolts (13).

· Weight : 25 kg (54 lb)

· Tightening torque : 12.8±3.0 kgf·m
(93±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.

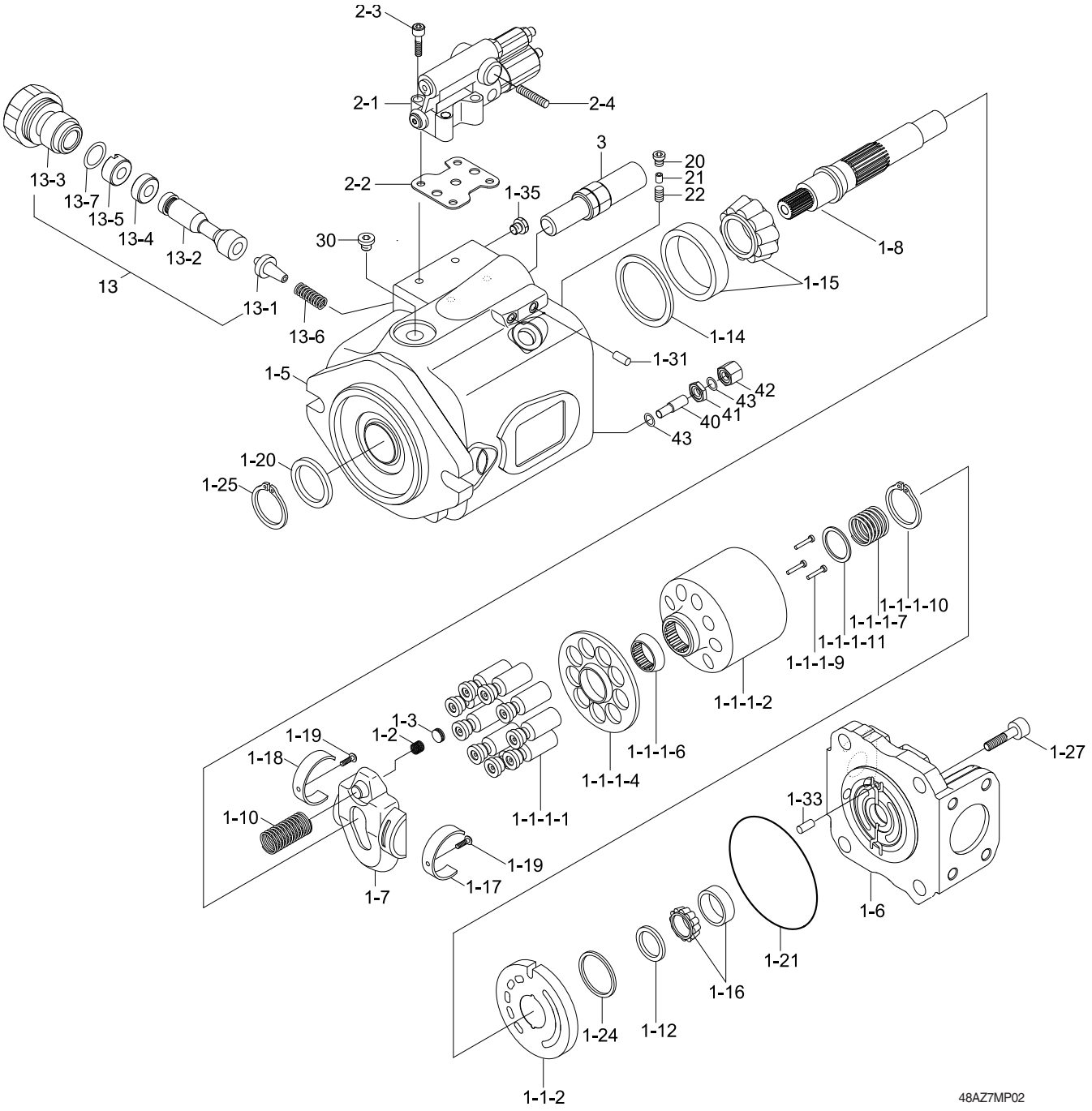
(5) After adding oil to the hydraulic tank to the specified level.

(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.

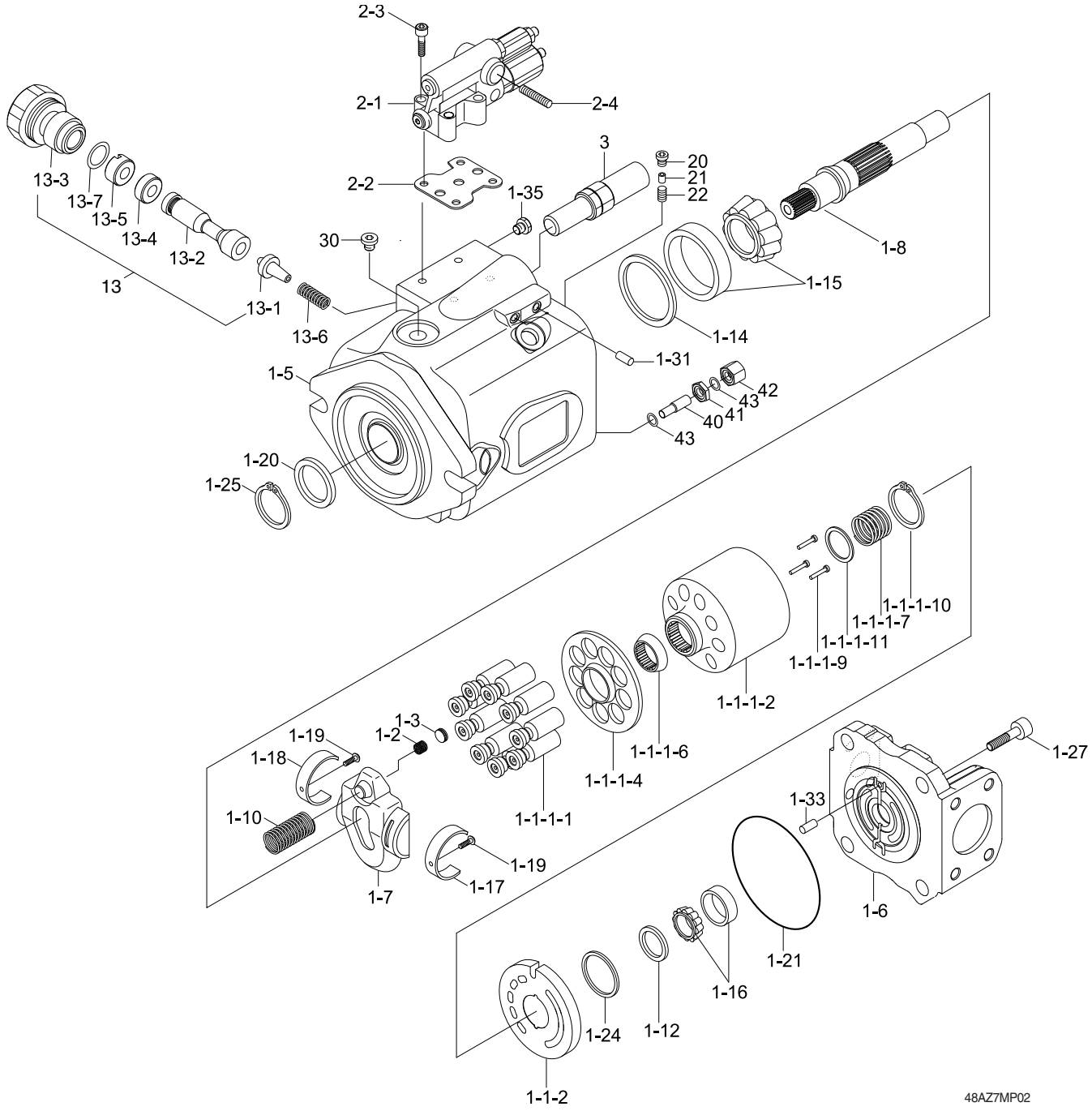
(8) Confirm the hydraulic oil level and check the hydraulic oil leak or not.

2. STRUCTURE (1/2)



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

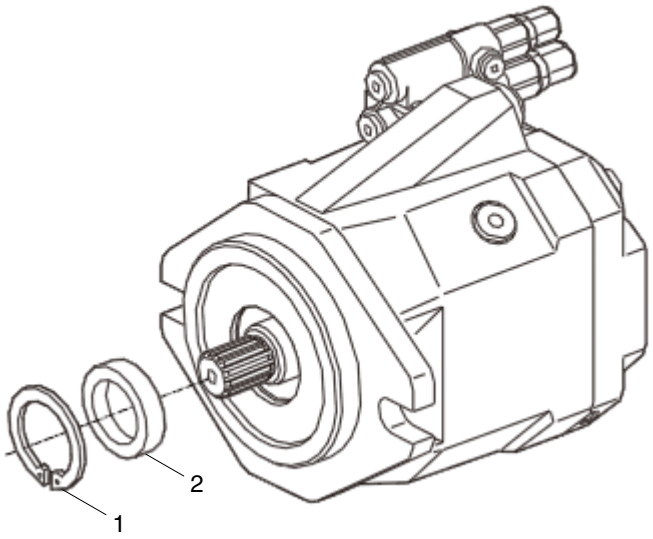
STRUCTURE (2/2)



1-25	Retainer ring	3	Control valve	20	Throttle screw
1-27	Socket screw	13	Control valve	21	Throttle pin
1-31	Pin	13-1	Valve cone	22	Throttle screw
1-33	Straight pin	13-2	Valve seat	30	Lock screw
1-35	Lock screw	13-3	Screw plug	40	Stop screw
2-1	Control valve	13-4	Adjust screw	41	Nut
2-2	Gasket	13-5	Nut	42	Cap nut
2-3	Socket screw	13-6	Compression spring	43	O-ring
2-4	Lock screw	13-7	O-ring		

3. DISASSEMBLY AND ASSEMBLY

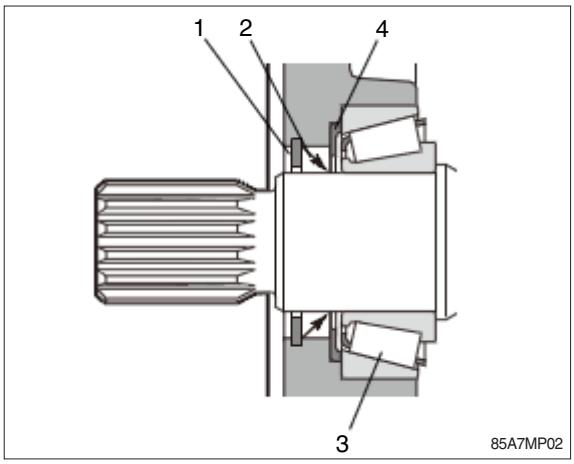
1) SEALING OF THE DRIVE SHAFT



85A7MP01

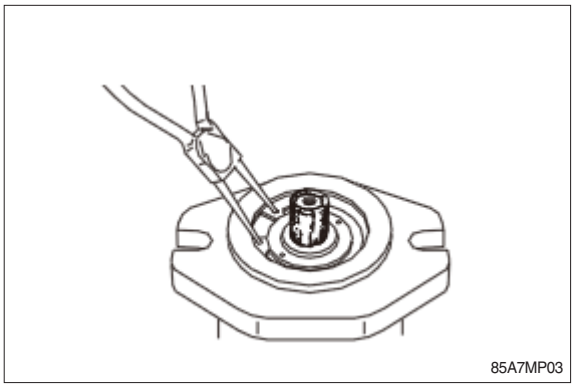
(1) Components

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



85A7MP02

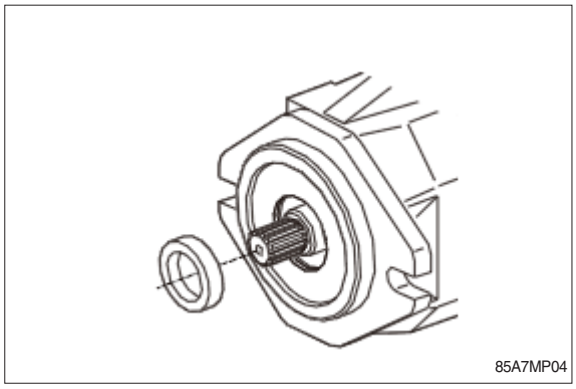
(2) Protect the drive shaft.
(3) Remove the circlip.
(4) Remove shaft seal to front.



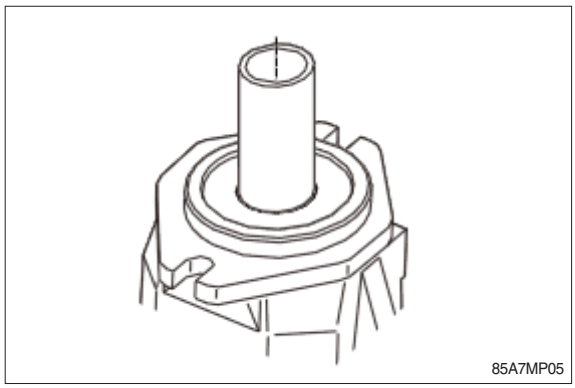
85A7MP03

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

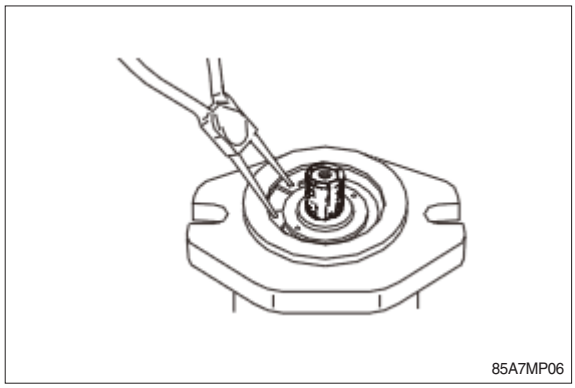
※ Visual check shaft seal and housing.



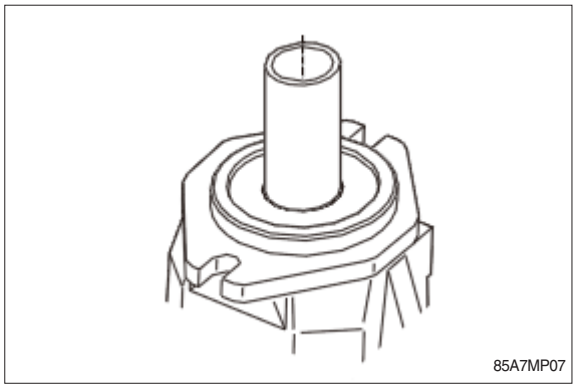
(5) Assembling of the sealing ring carefully down to the distance ring.



(6) Assemble the snap ring.

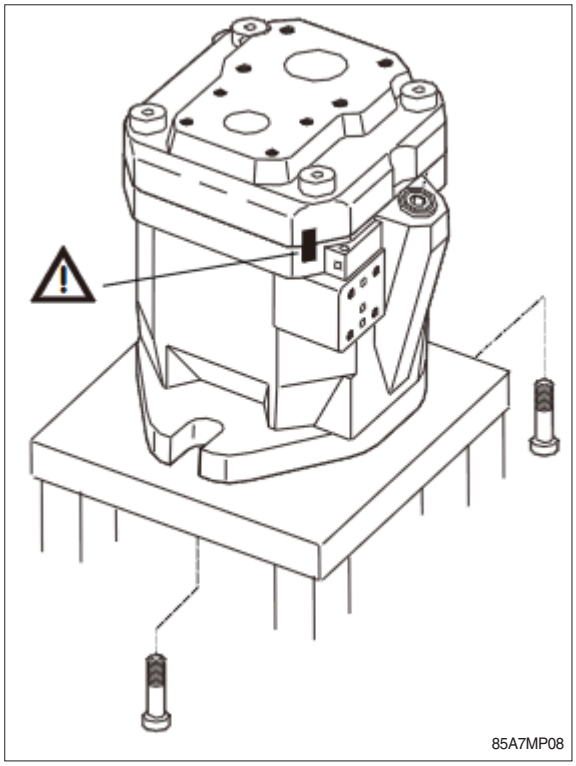


※ Visual check to ensure that the circlip is correctly located in the groove.

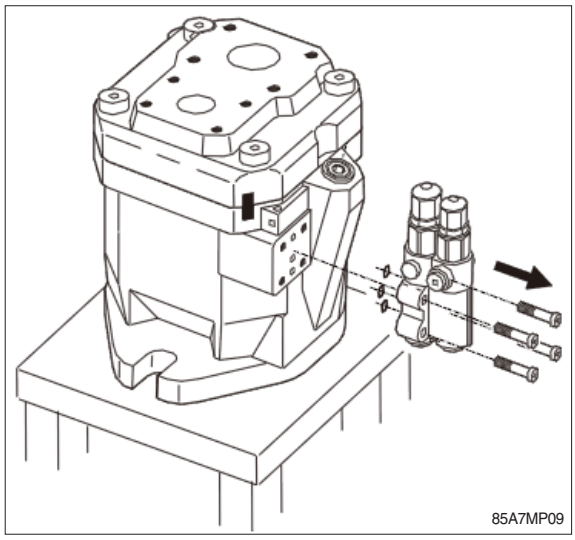


2) DISSAMBLE THE PUMP

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



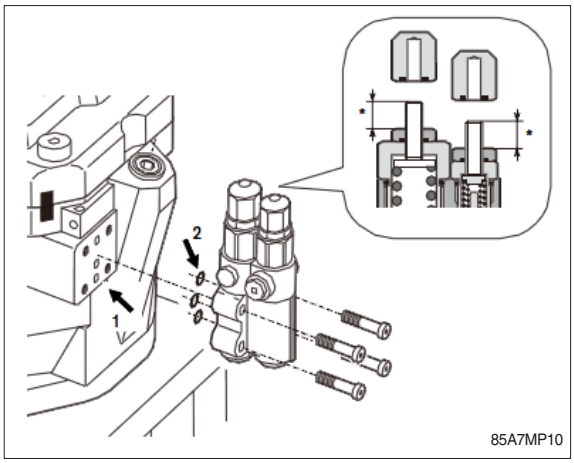
(1) Remove the control valve.



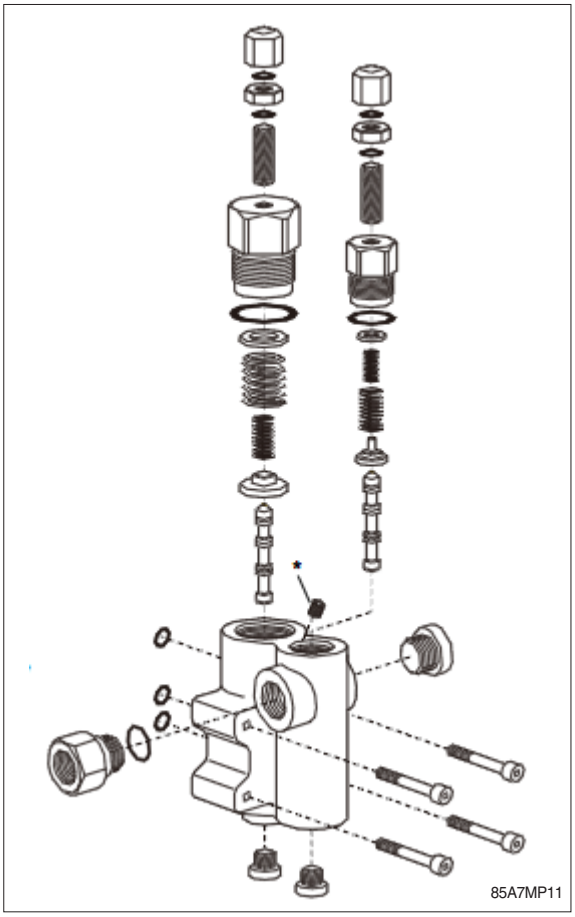
(2) Remove the control valve

※ Measure dimension * and note down.

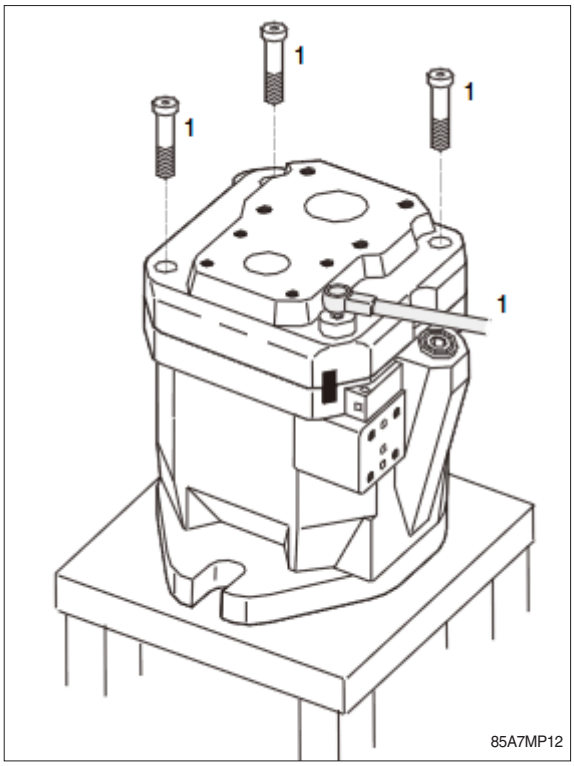
※ Check sealing surface (1) and O-rings (2).



※ Only DFR with orifice

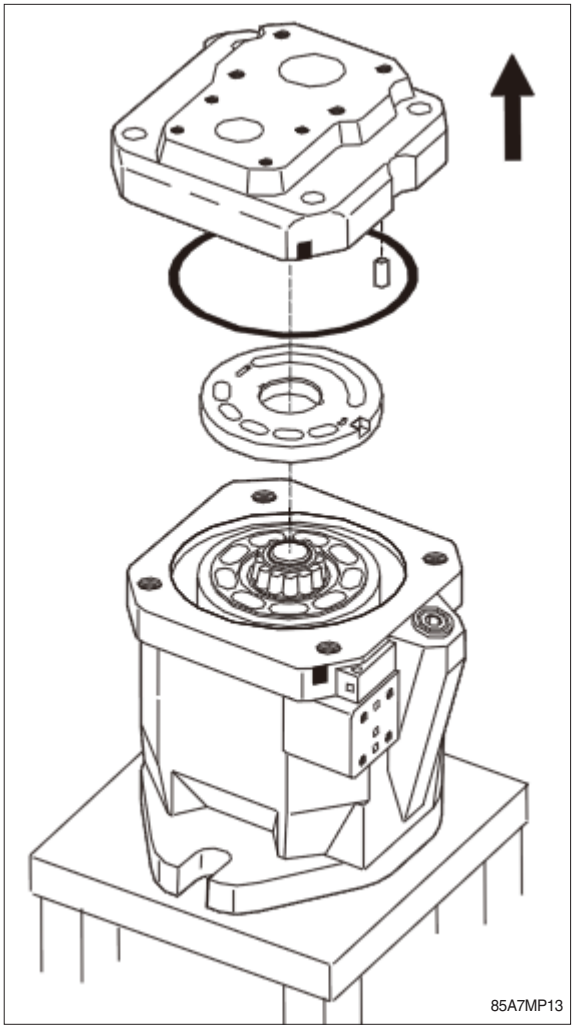


(2) Remove the socket screws (1).



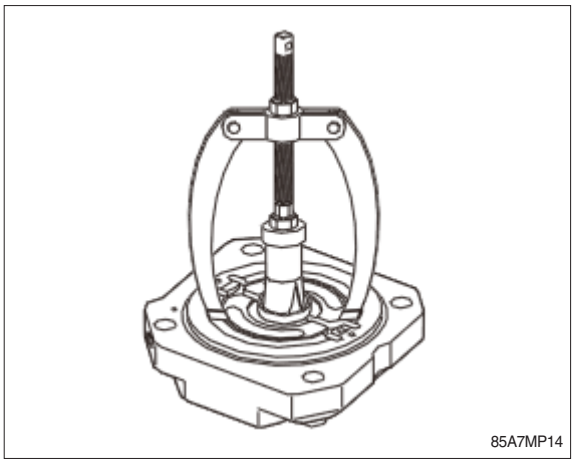
(4) Remove connection plate.

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



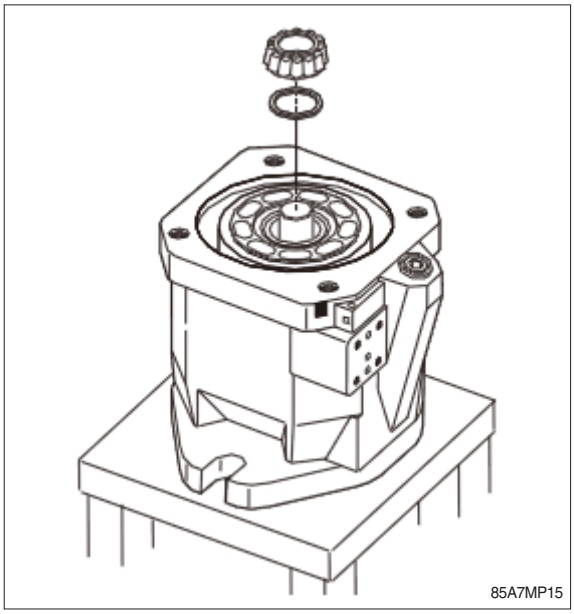
(5) Pull bearing of the connection plate out using a bearing puller.

※ Do not damage the sealing surface.

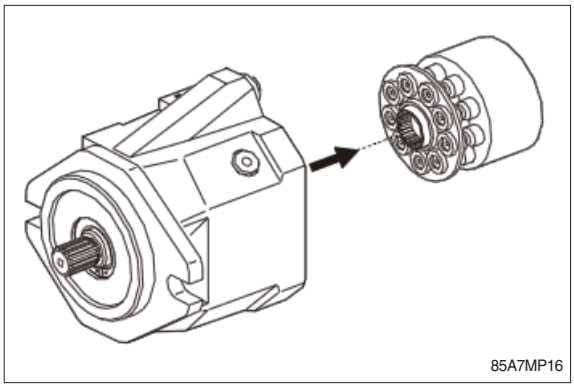


(6) Remove bearing and shim.

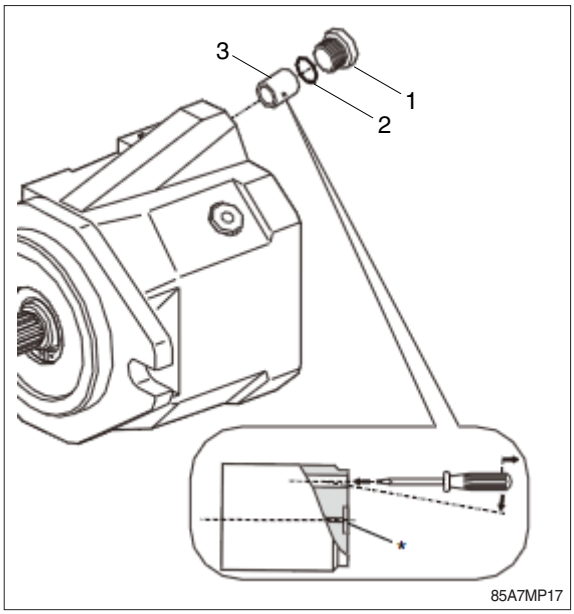
※ Do not damage the sealing surface.



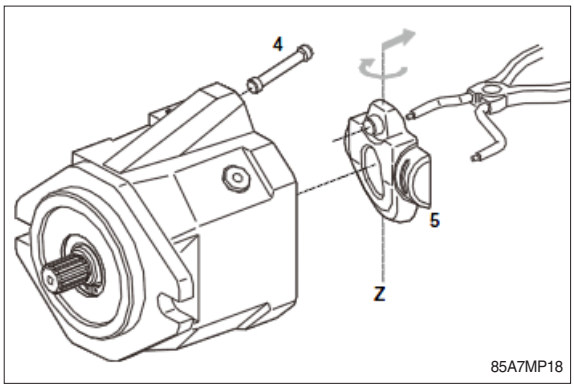
(7) Remove the rotary group in a horizontal position.



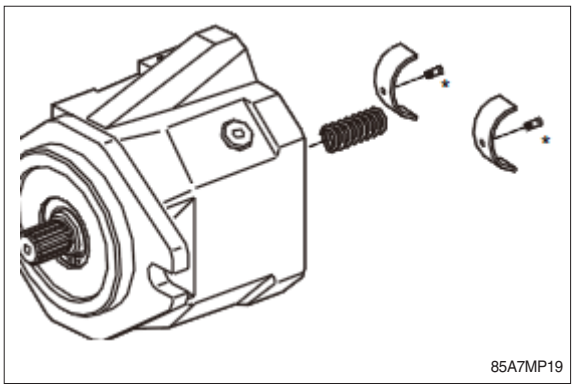
(8) Remove plug (1) with seal (2).
(9) Pull out control piston (3) (- flat surface *-) with tool.



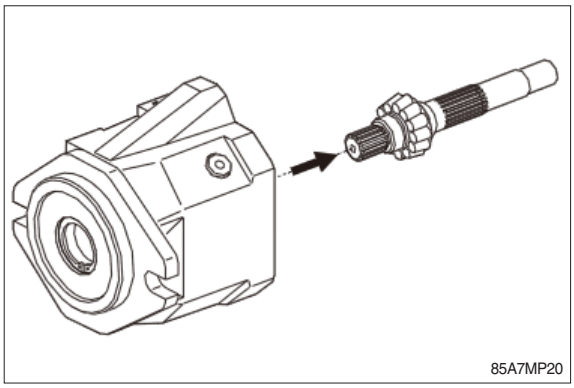
(10) Remove piston rod and swash plate.
Turn swash plate (5) inside of the housing slightly along Z-axis with tool. Remove piston rod (4). Remove swash plate (5).
Do not damage the piston rod and swash plate.



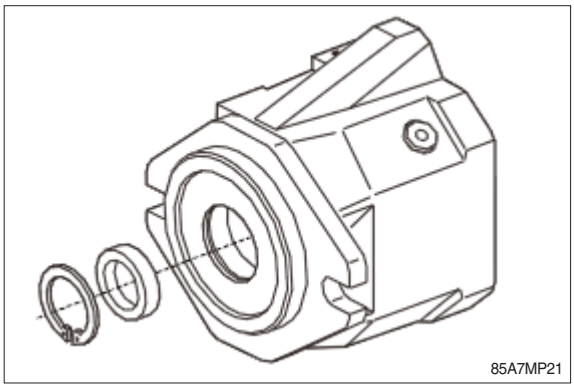
(11) Remove bearing shells and bearing.
※ Attention for position.
Only size 60~85



(12) Remove drive shaft with bearing.



(13) Remove circlip and shaft seal.

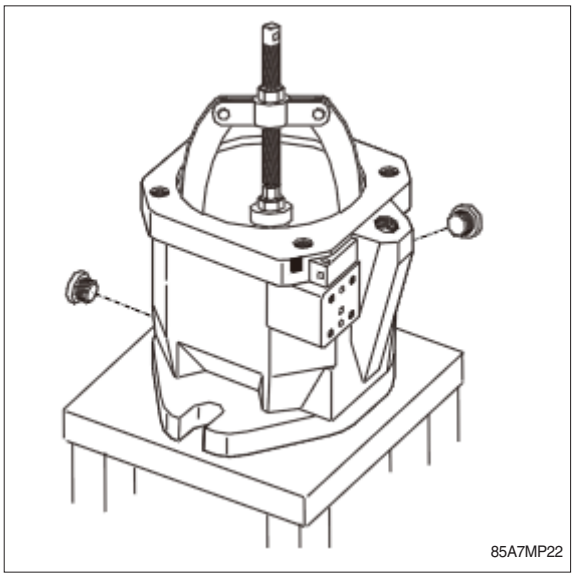


(14) Pull out outer race of tapered bearing out of housing press seat.

※ Use bearing puller.

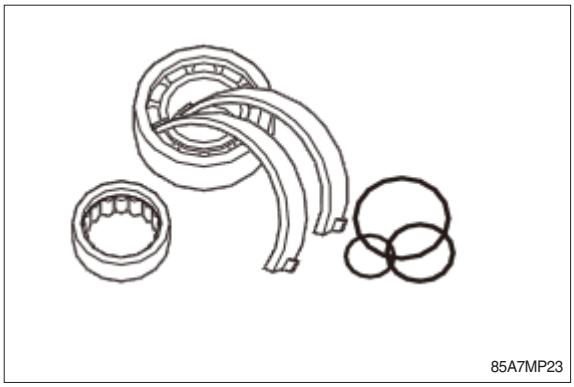
(15) Remove all plugs.

(16) Remove stop ring.

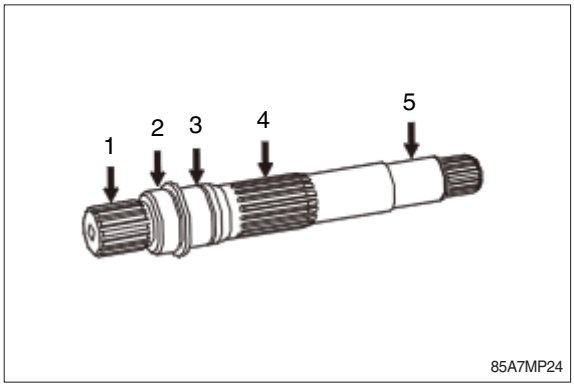


3) INSPECTION

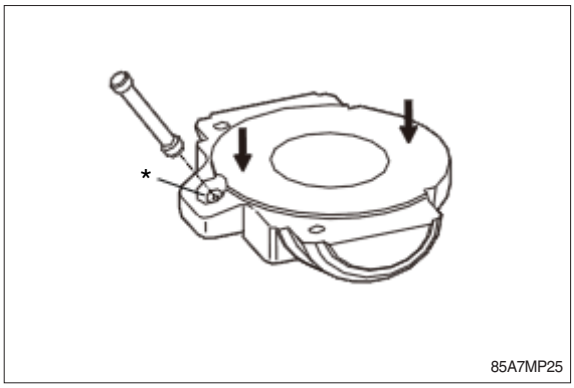
(1) Renew all bearings and seals.



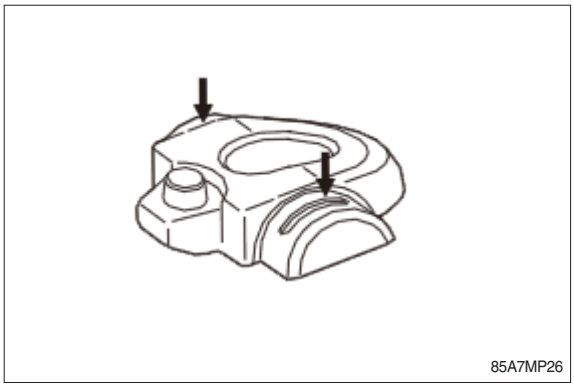
(2) Check below items
① Wear on slines, fretting
② Drive shaft seal wear grooves
③ Bearing seat
④ Splines for cylinder drive
⑤ Bearing seat



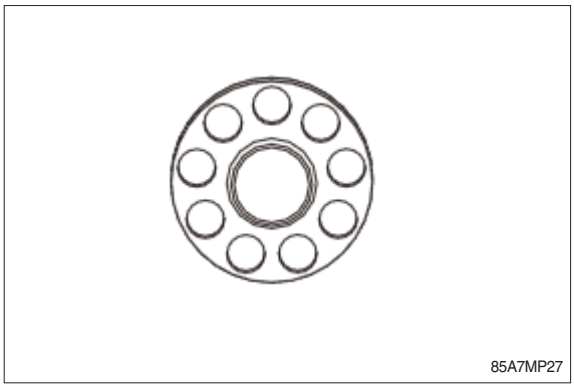
(3) Sliding surface free of grooves.
* Check for freedom of piston rod movement.



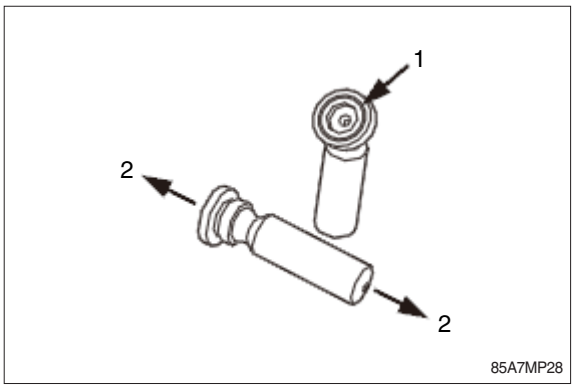
(4) Bearing surfaces



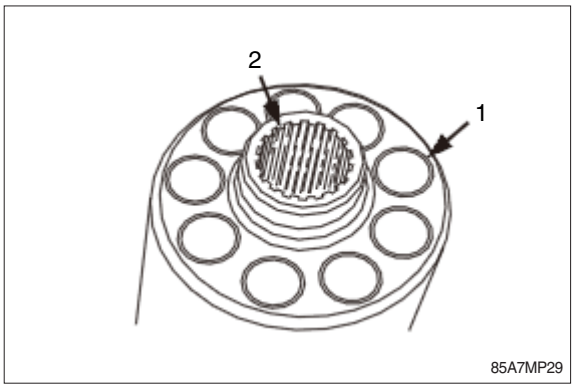
(5) That the retaining plate is free of grooves and that there is no wear in the slipper pad area.



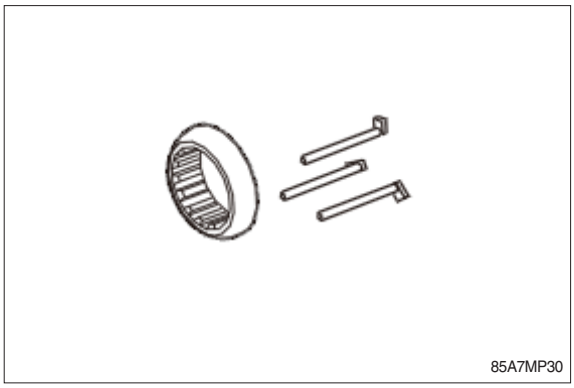
(6) Check to see that there are no scratches or metal deposits on the sliding surface (1), and that there is no axial play (2), (pistons must only be replaced as a set).



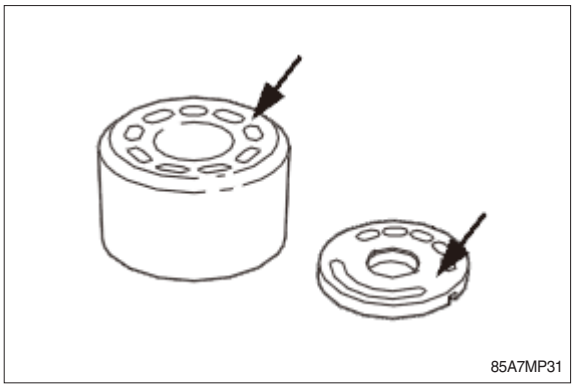
(7) Cylinder bores (1), splines (2).



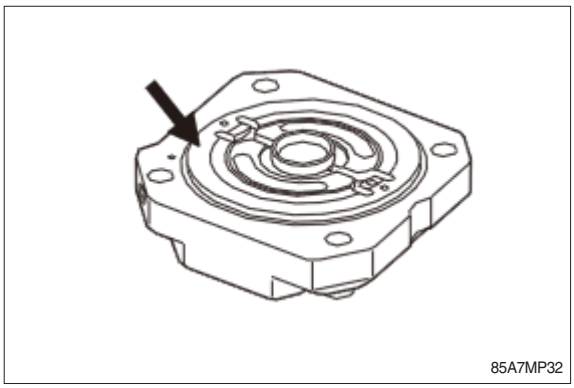
(8) Free of grooves, no signs of wear.



(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).

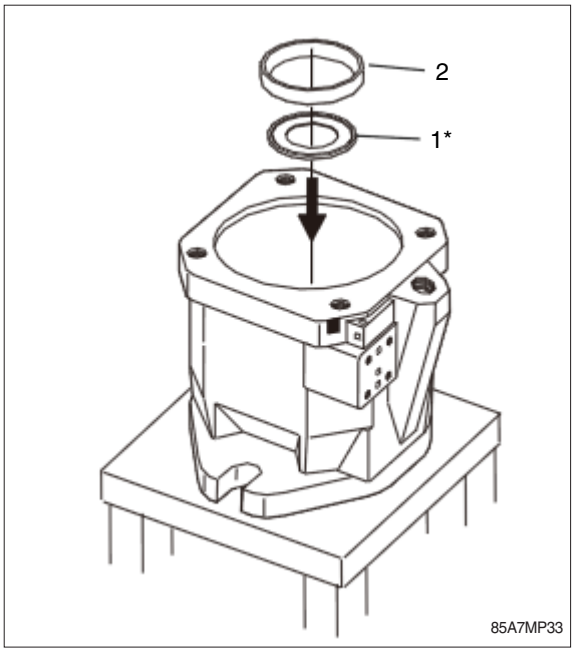


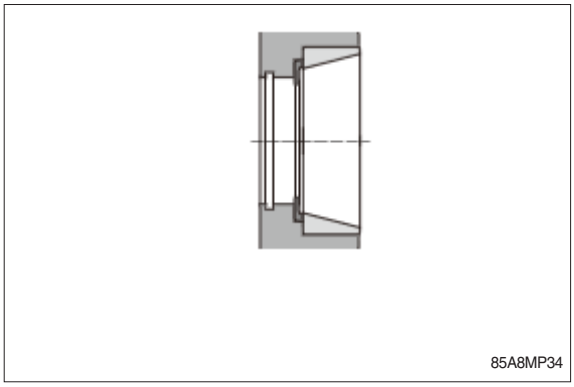
(10) Mounting surface - control plate undamaged



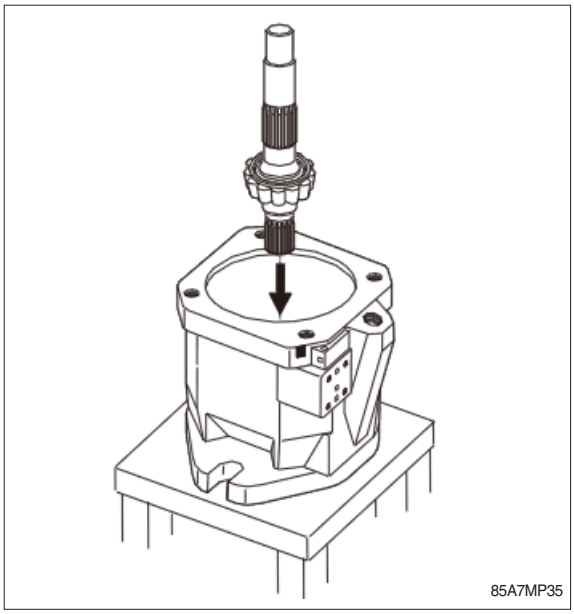
4) ASSEMBLY

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

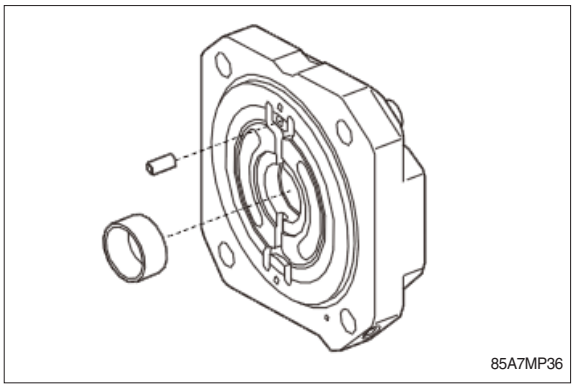




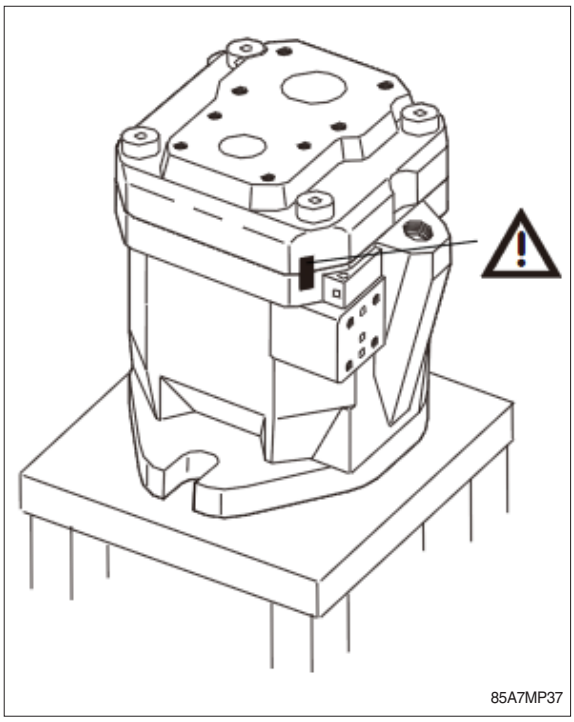
(3) Assemble shaft in correct position.
※ Do not cut shaft seal.



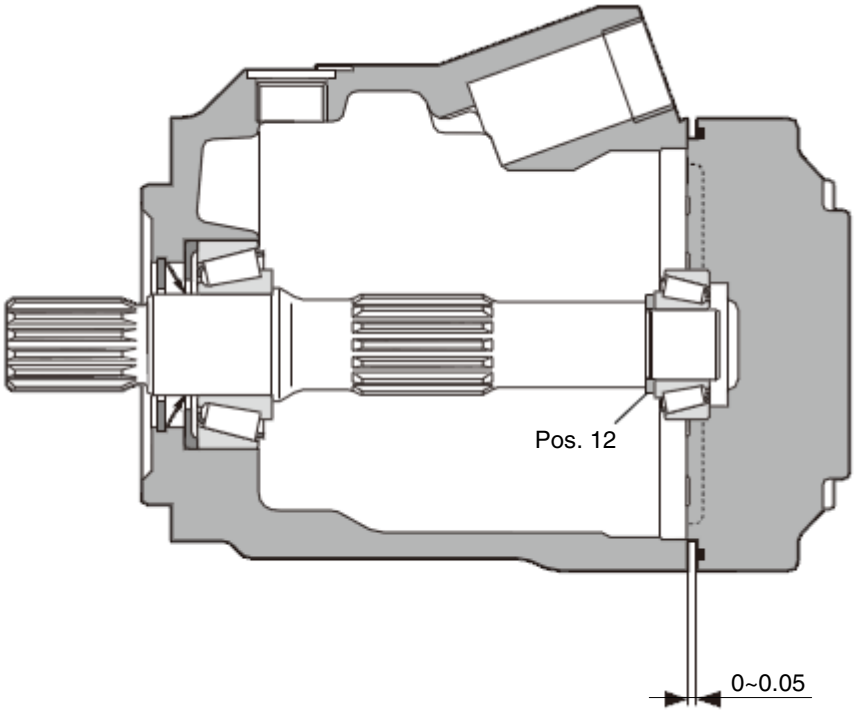
(4) Press-in outer racer of rear bearing into connection plate.



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



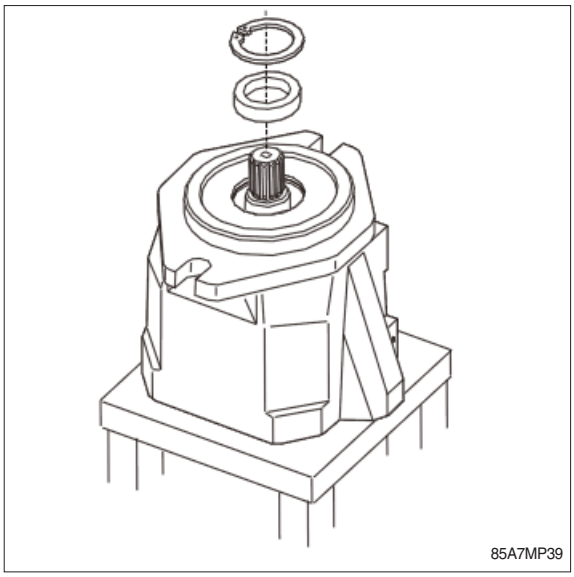
② Taper roller bearing initial tension



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.

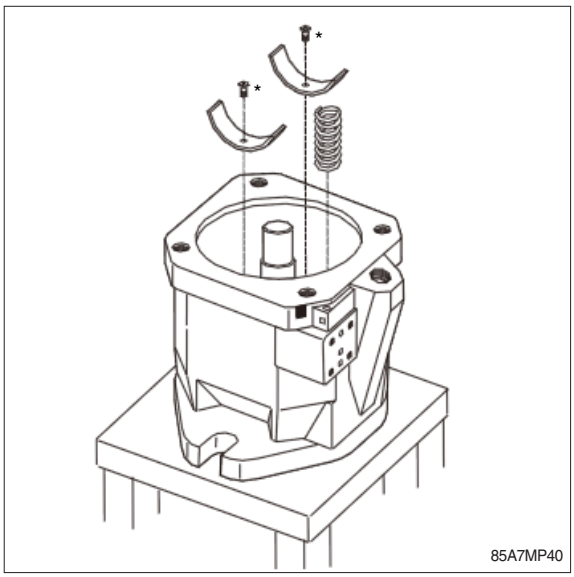
(8) Assembly instruction shaft seal see page 6.



(9) Fit in bearing shells and spring.

※ Fix with grease.

* Only size 60~85

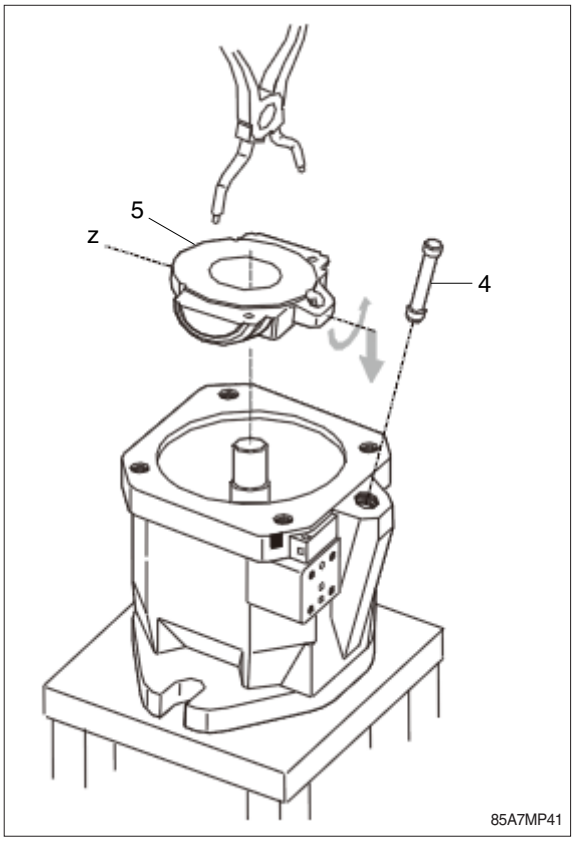


(10) Assemble swash plate (5) and piston rod (4) into pump.

※ Spring guide pin in correct position.

※ Check correct position of the spring.

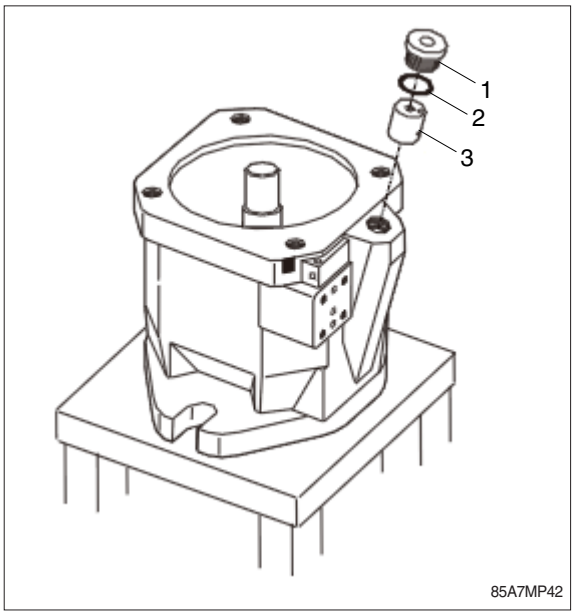
(11) Assemble piston rod (4), control piston (3), seal (2), and plug (1).



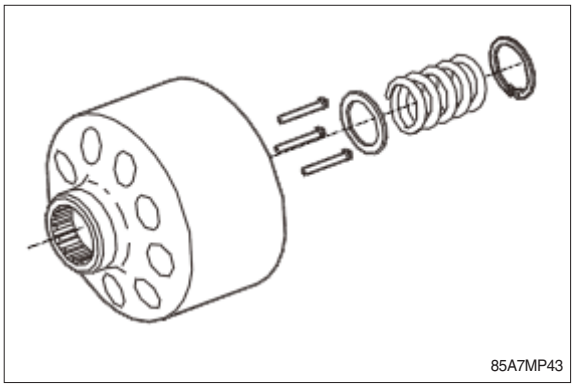
(12) Assemble piston rod (4), control piston (3),seal (2) and plug (1).

※ Plug tighten torque.

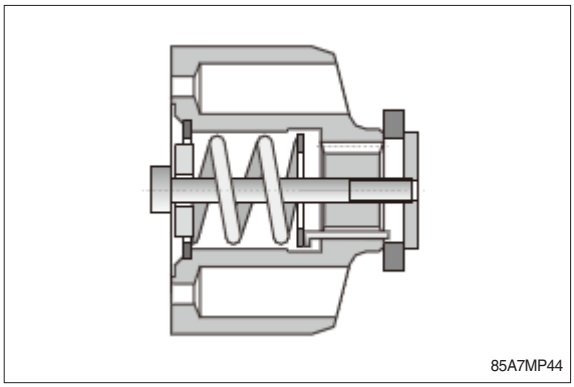
- Size 28, 45, 60
  19.4±2.0 kgf·m (140+14.5 lbf·ft)
- Size 85
  32.6±2.0 kgf·m (236+14.5 lbf·ft)



(13) Fit pressure pins using an assembly aid.

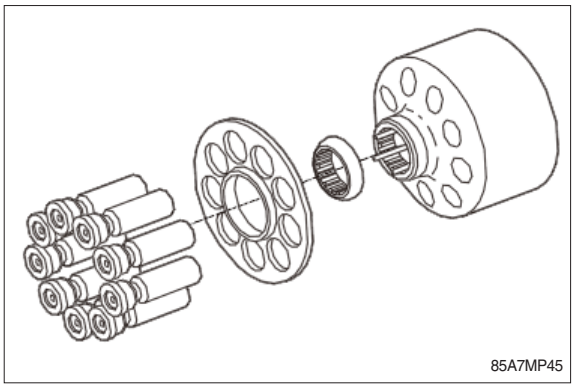


(14) Pre-tension the spring using a suitable device.

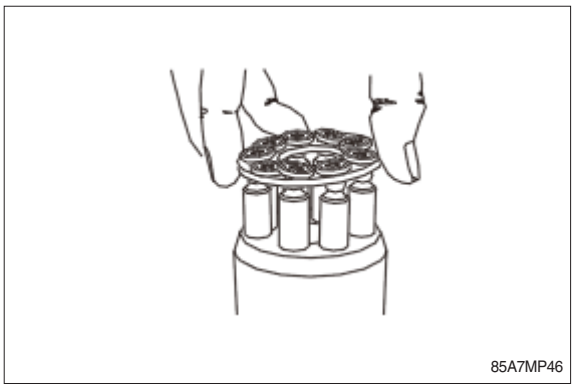


(15) Assemble piston with retaining plate.

※ Oil piston and slipper pad.

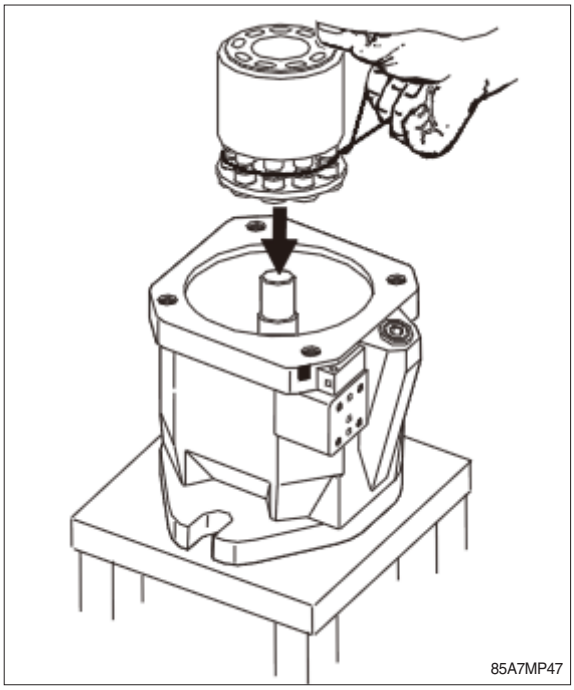


(16) Assemble piston with retaining plate.

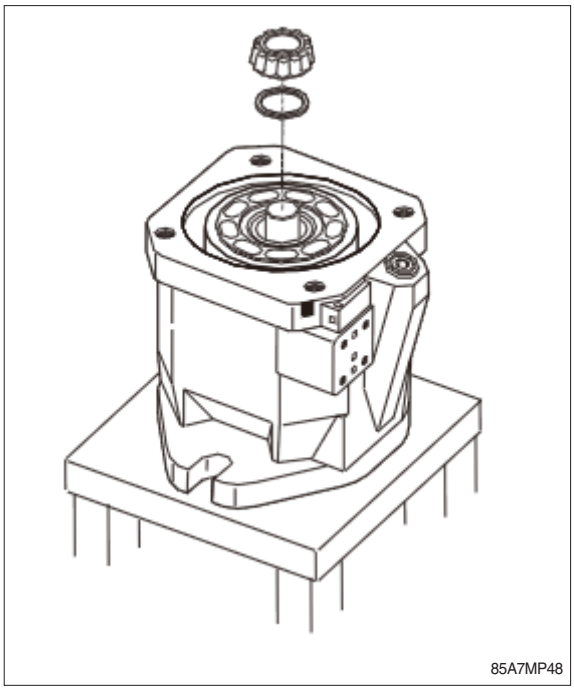


(17) Fit rotary group

※ Assembly aid
Hold the pistons by using an O-ring.



(18) Assemble bearing and adjustment shim to shaft.



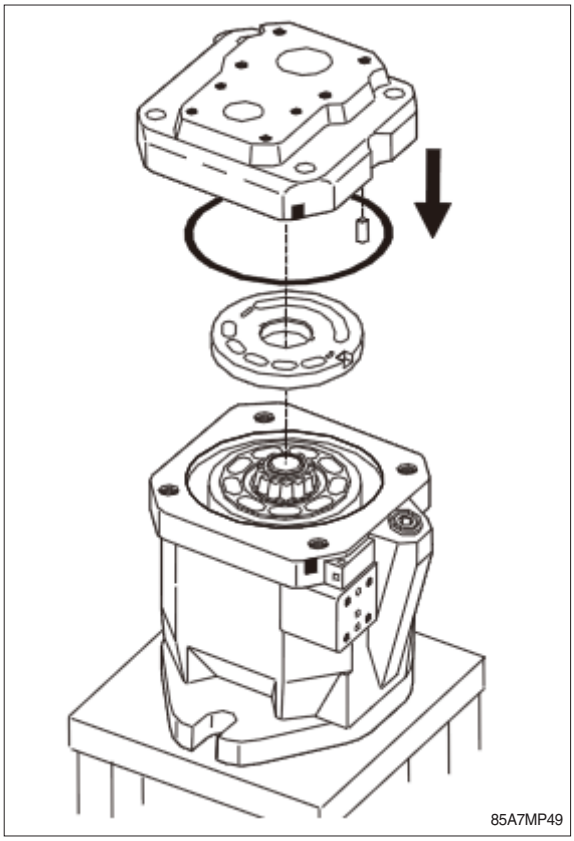
(19) Fit O-ring.

※ Fix with grease.

(20) Fit control plate.

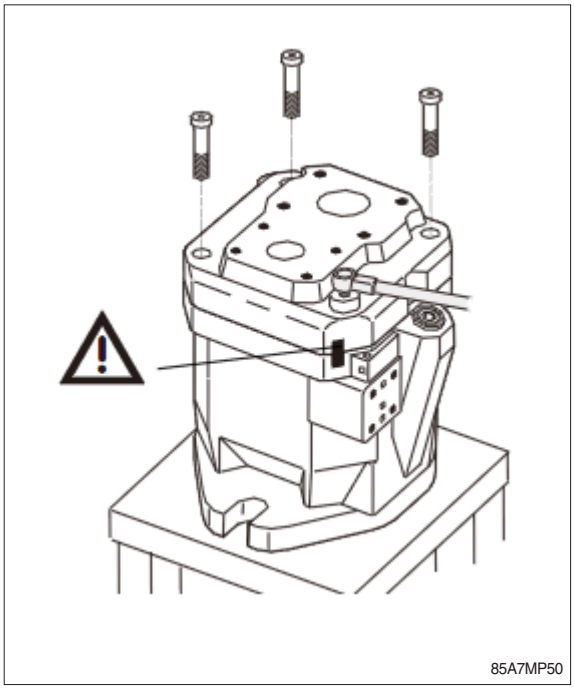
※ Fix with grease.

※ Check correct position to pin.

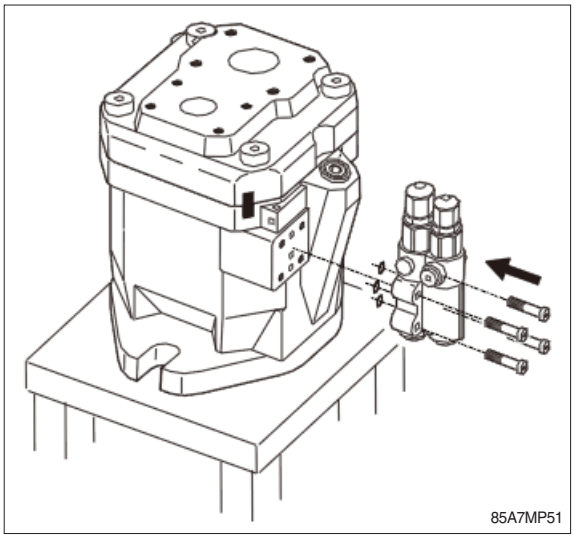


(21) Assemble connection plate.

※ Check the correct position to housing.

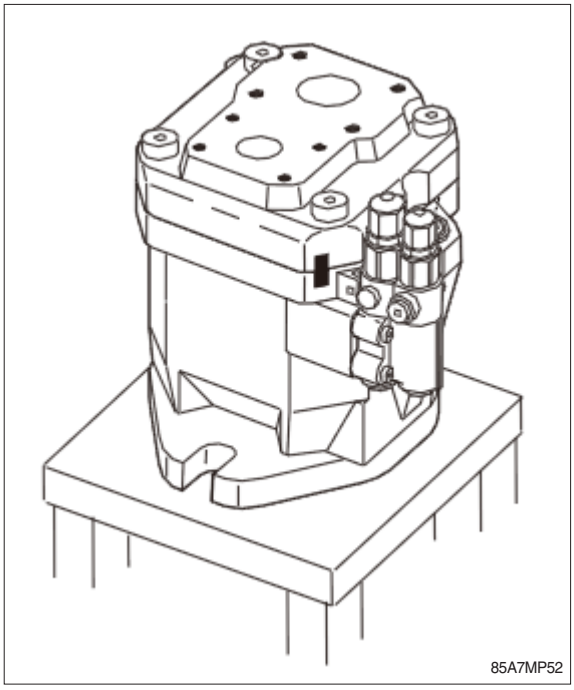


(22) Assemble control valve.



(23) Final pump assembly

※ Double check of the housing signs.



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±1.4 kgf·m (50±10.0 lbf·ft)

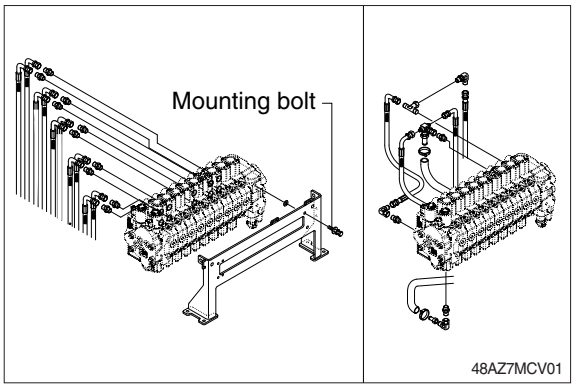
(7) Remove the control valve assembly.
When removing the control valve assembly, check that all the piping have been disconnected.

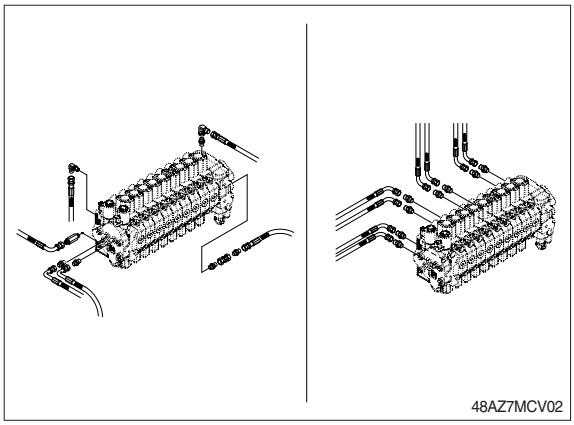
2) INSTALL

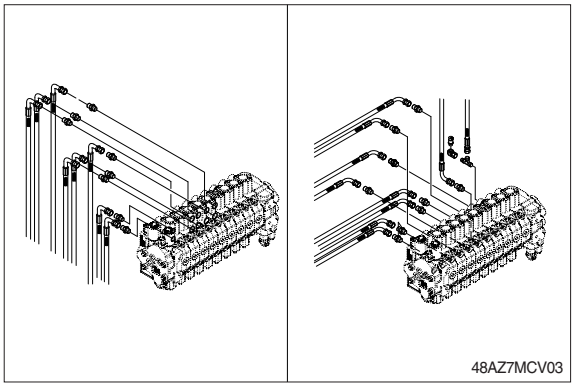
(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from below items.
① Cylinder (boom, arm, bucket)
② Swing motor
③ Travel motor
※ See each item removal and install.

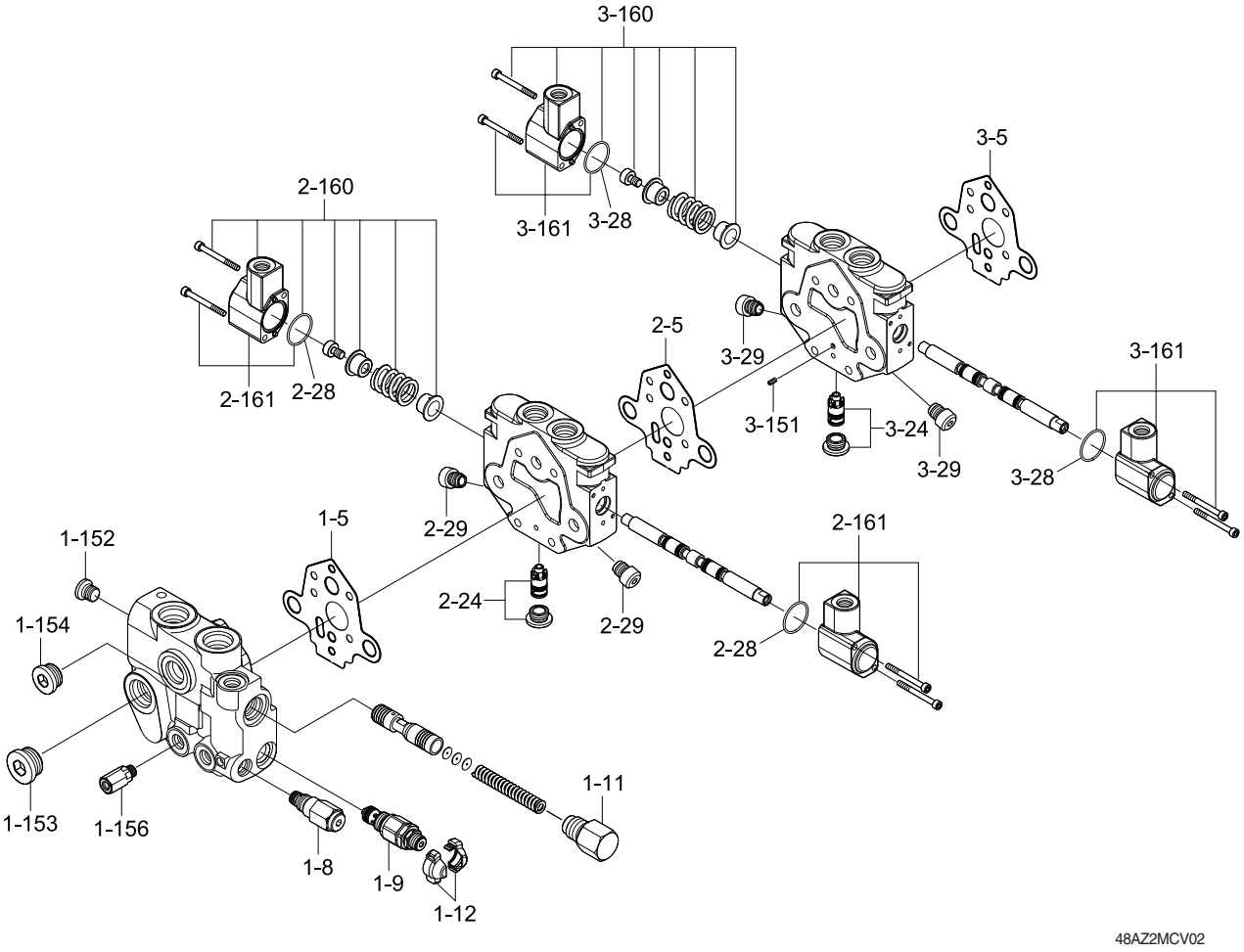
(3) Confirm the hydraulic oil level and recheck the hydraulic oil leak or not.





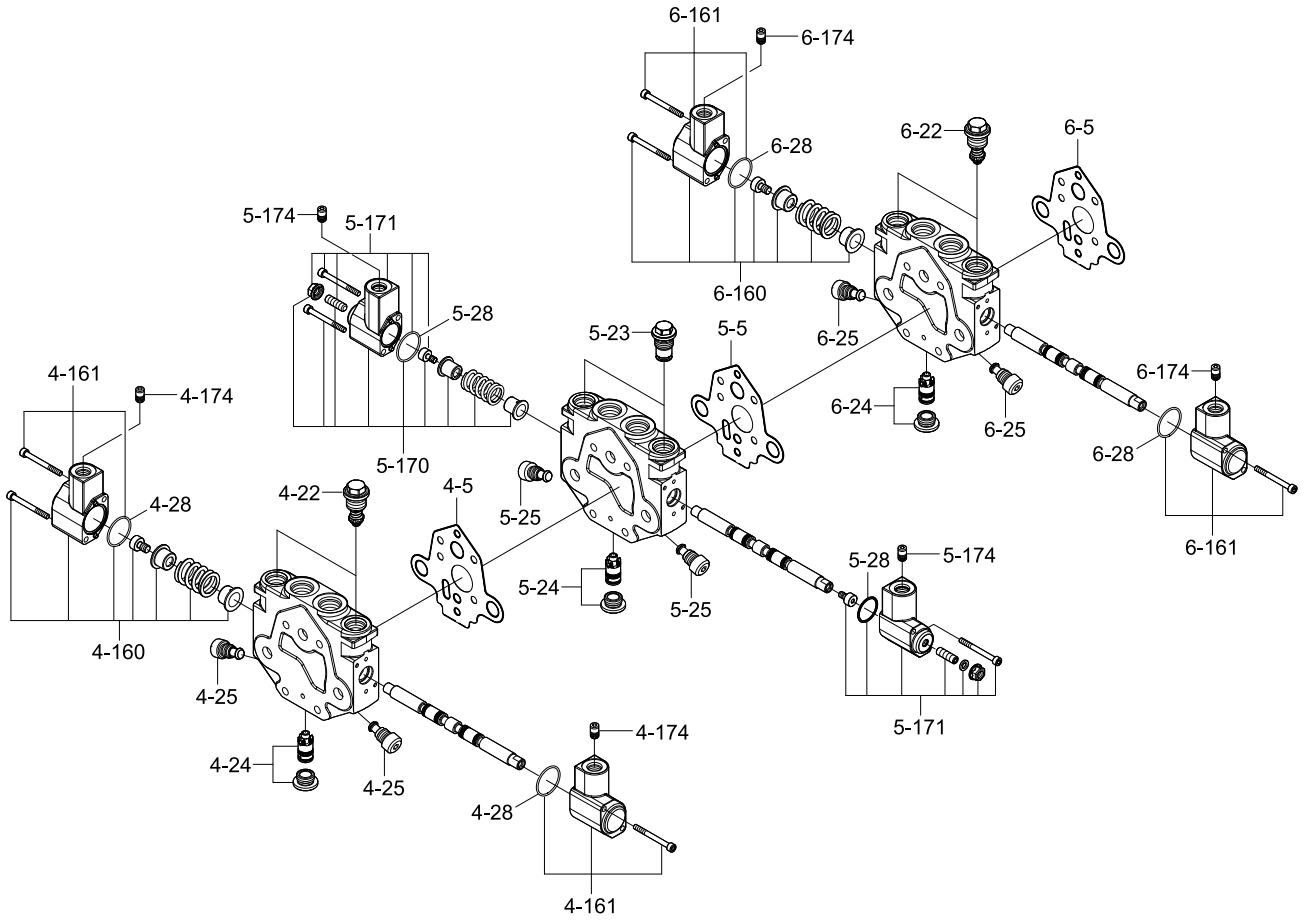


2. STRUCTURE (1/4)



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		

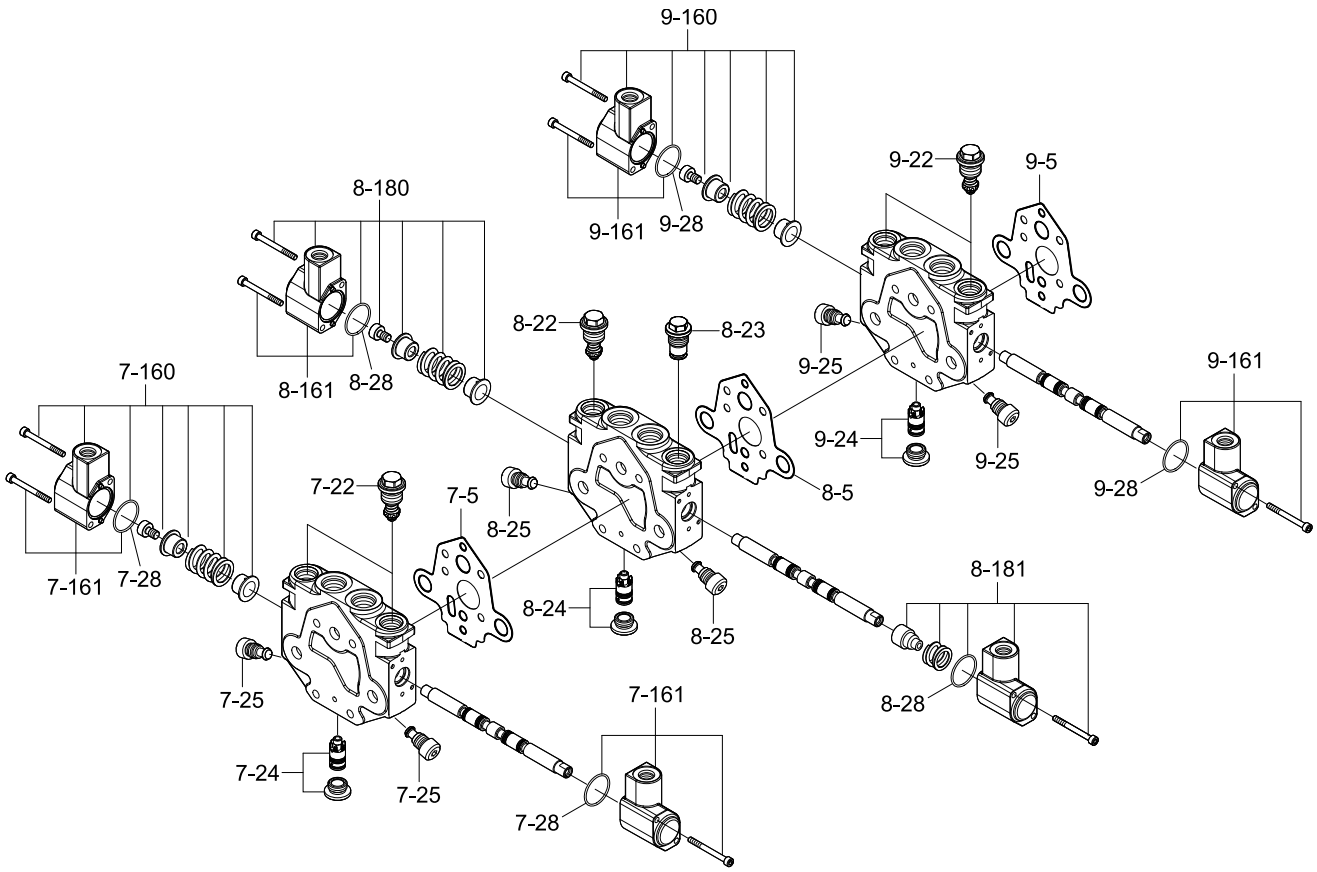
STRUCTURE (2/4)



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

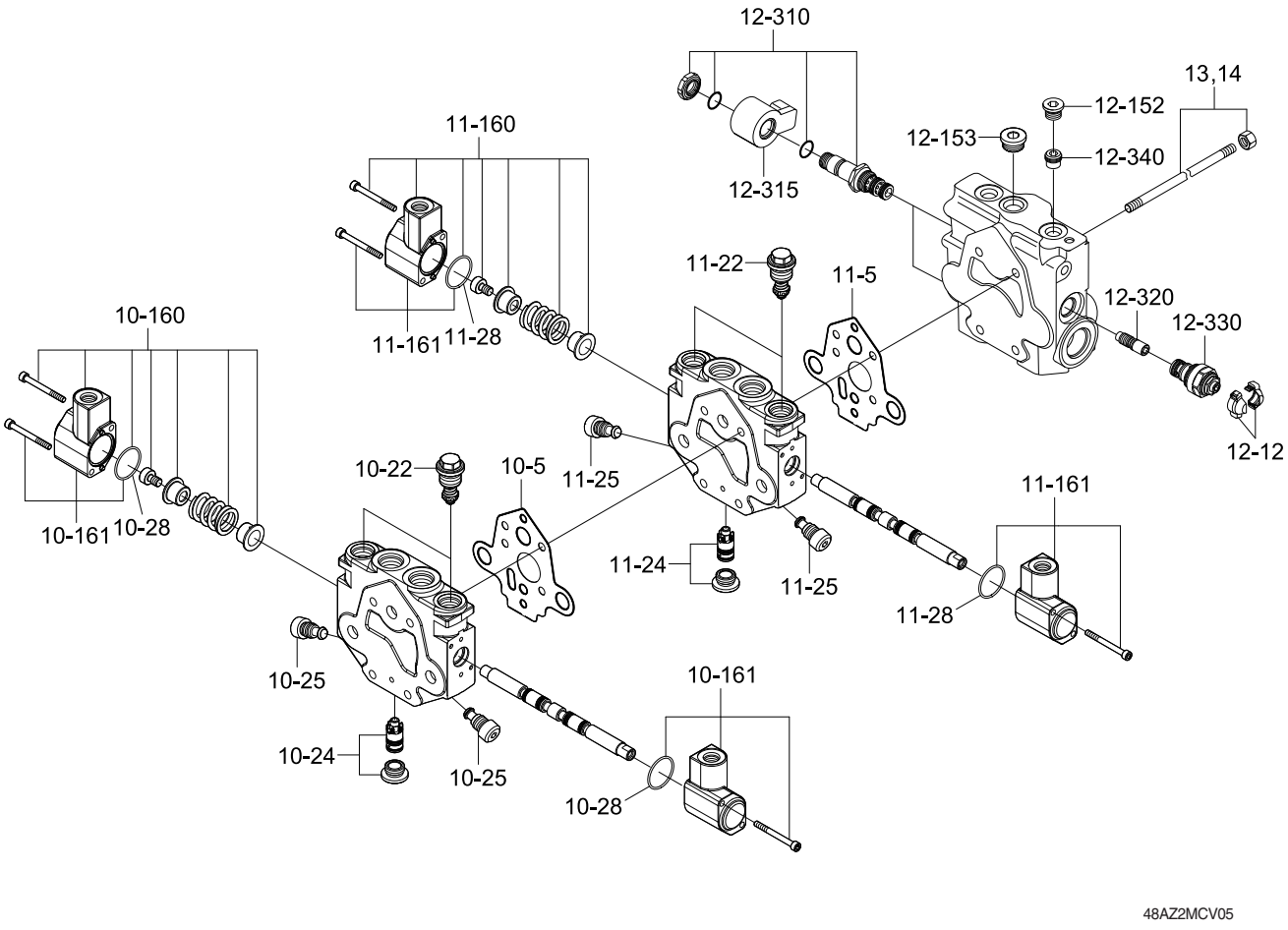
STRUCTURE (3/4)



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)

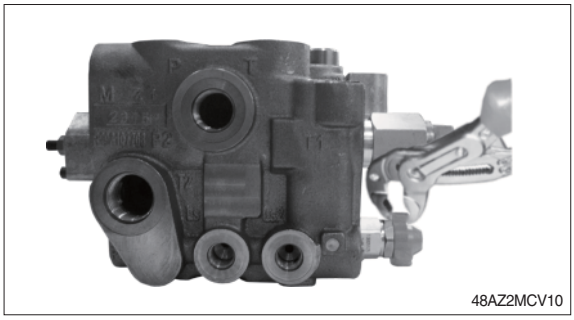


10	Aux 1 block assy	11-5	Plate seal	12-152	Sealing plug
10-5	Plate seal	11-22	Relief valve	12-153	Sealing plug
10-22	Relief valve	11-24	Compensator kit	12-310	Valve kit
10-24	Compensator kit	11-25	Check valve	12-315	Solenoid
10-25	Check valve	11-28	Seal kit	12-320	Shuttle
10-28	Seal kit	11-160	W/spool 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.

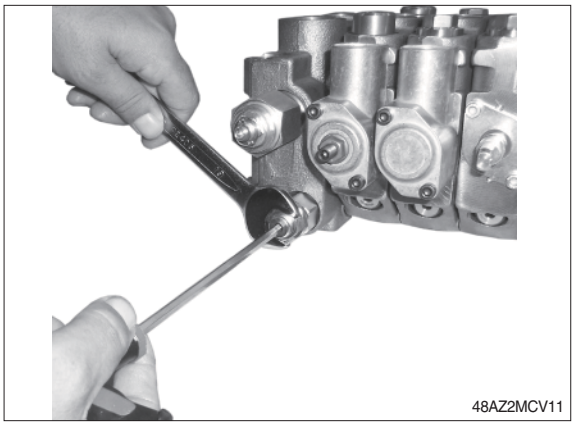

48AZ2MCV10

※ 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±0.2 kgf · m (14.8±1.5 lbf·ft)

Protect the setting by putting a new locking cover.
Fit together two half covers.

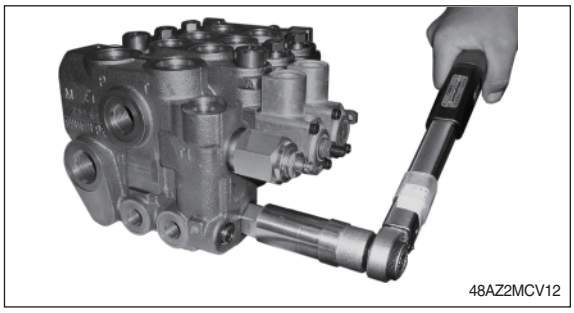

48AZ2MCV11

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.

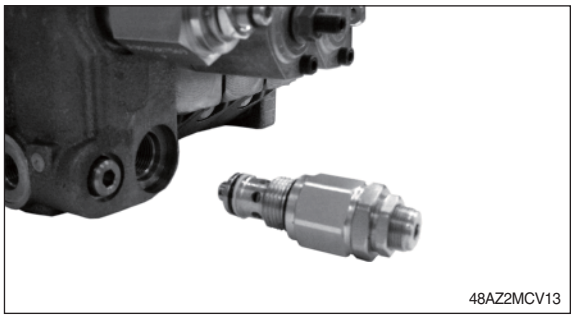
(1) On the inlet element, unscrew the LS pressure relief valve (24 mm open end spanner).


48AZ2MCV12

※ Reassembly
Install the LS pressure relief valve on the inlet element.
- Torque :
4.1±0.4 kgf · m (29.5±3.0 lbf·ft)

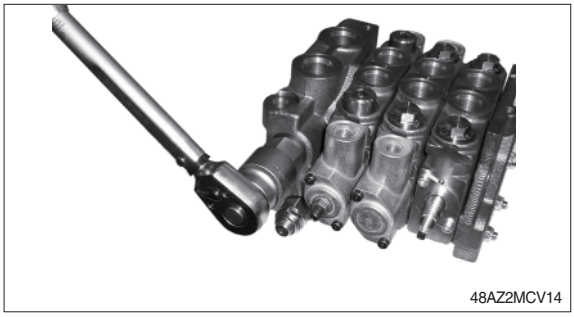
Set the LS pressure relief valve to the specified value

Fit a new appropriate locking cover

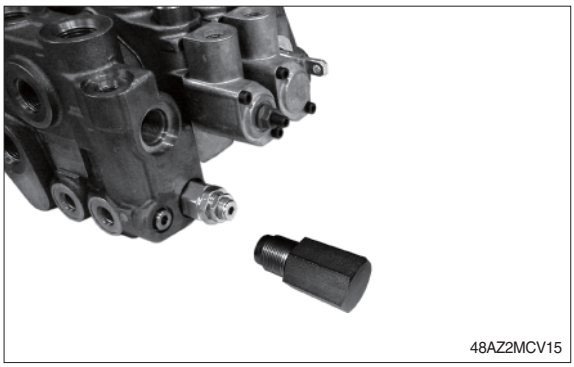

48AZ2MCV13

3) REGULATING UNIT REPLACEMENT

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


48AZ2MCV14

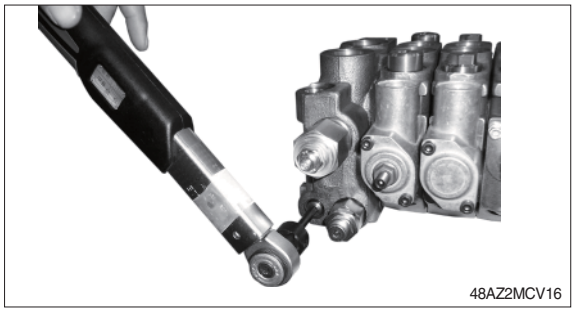
※ Reassembly
Install the plug on the inlet element.
- Torque :
10.5±1.1 kgf · m (76.0±7.6 lbf·ft)

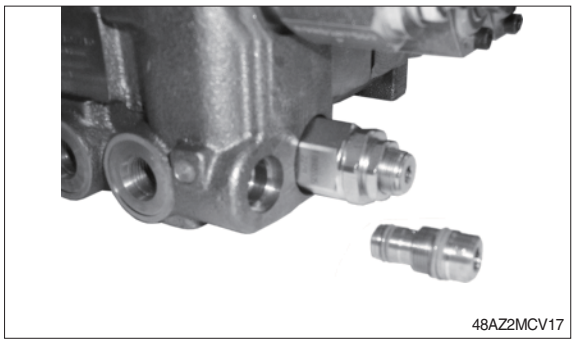

48AZ2MCV15

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±0.2 kgf · m (16.6±1.7 lbf·ft)


48AZ2MCV16


48AZ2MCV17

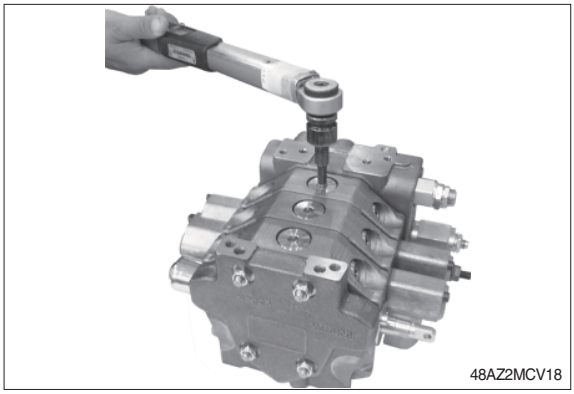
5) PRESSURE COMPENSATOR REPLACEMENT

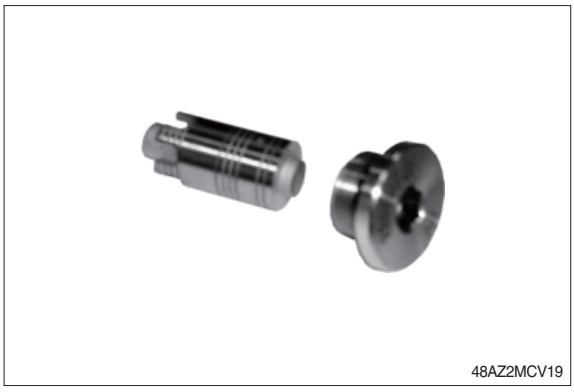
(1) Unscrew the compensator plug (8 mm socket wrench).

(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±0.5 kgf · m (36.9±3.7 lbf·ft)

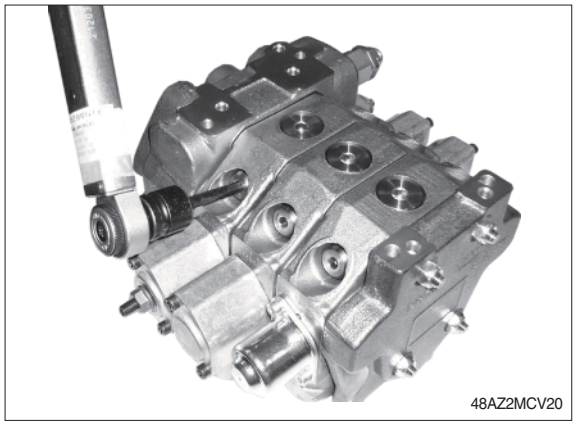

48AZ2MCV18


48AZ2MCV19

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±0.4 kgf · m (29.5±3.0 lbf·ft)


48AZ2MCV20

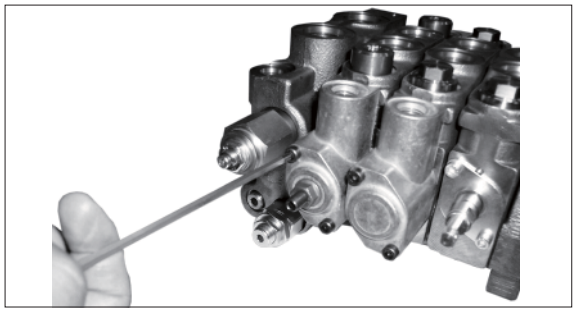

48AZ2MCV21

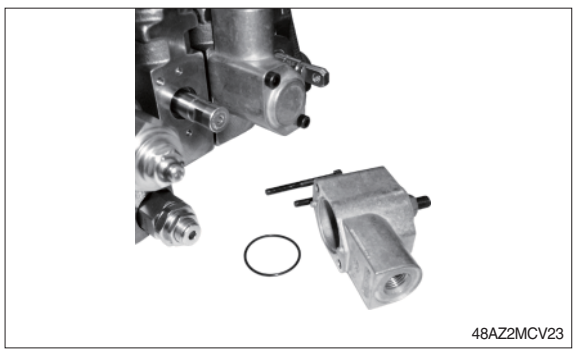
7) REMOVAL OF THE HYDRAULIC COVER

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

(2) Remove the cover and O-ring.

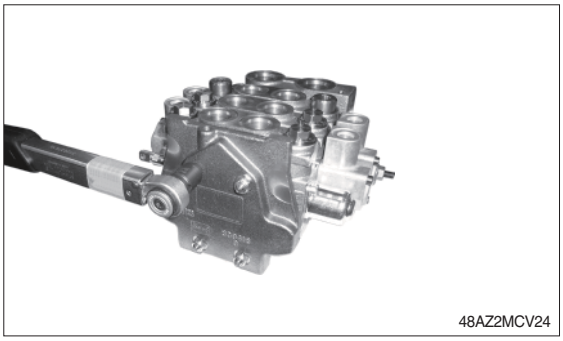
※ Reassembly
Replace the cover O-ring.
Reassemble parts in reverse order.
Torque for the 2 mounting screws.
- Torque :
  0.5±0.05 kgf · m (3.7±0.4 lbf·ft)


48AZ2MCV22

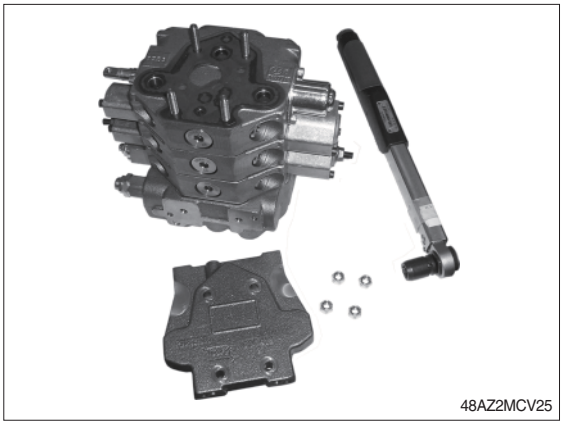

48AZ2MCV23

8) COMPLET CONTROL BLOCK DISASSEMBLY/ASSEMBLY

(1) Remove the control block from the machine.
Remove the 4 nuts (13 mm ring wrench).


48AZ2MCV24

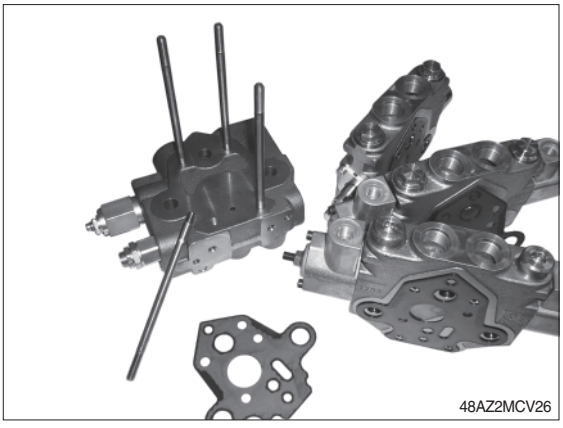
(2) Remove the outlet element.
Separate the distribution elements with the seal plates from the inlet element.

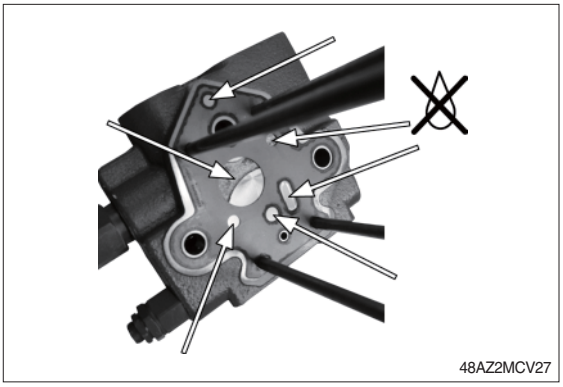

48AZ2MCV25

(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±0.3 kgf · m (22.1±0.2 lbf·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±0.3 kgf · m (19.2±0.2 lbf·ft)

※ Make sure the elements are correctly positioned (engravings A and B downward)


48AZ2MCV26


48AZ2MCV27

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 hose assembly (12, 13).

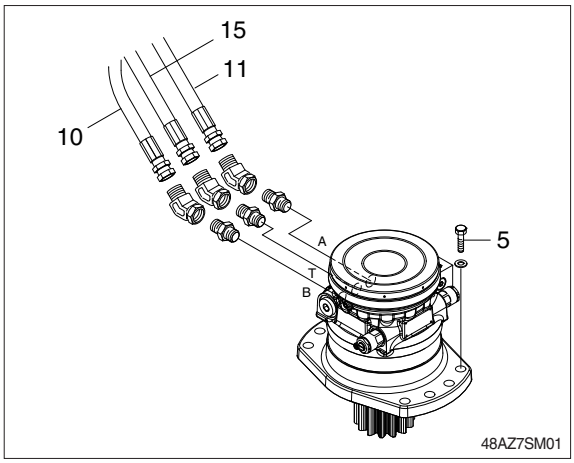
(5) Disconnect pilot line hoses (15, 29, 32, 33).

(6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (21).

※ Motor device weight : 46 ㎏ (111 ㏪)
· Tightening torque : 19.6±2.9 kgf·m
(142±21.0 lbf·ft)

(7) Remove the swing motor assembly.

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

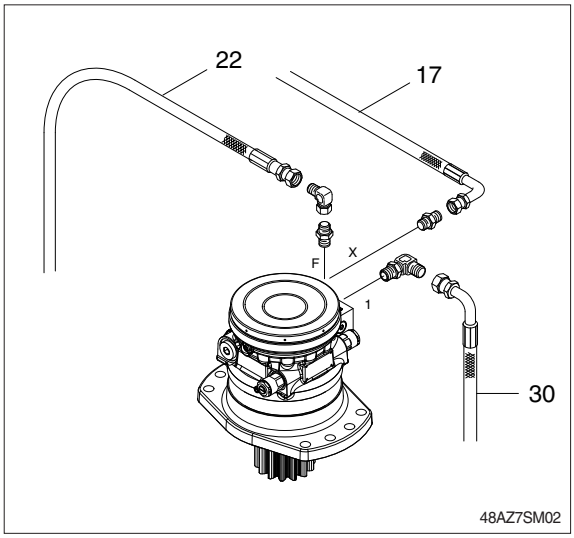


2) INSTALL

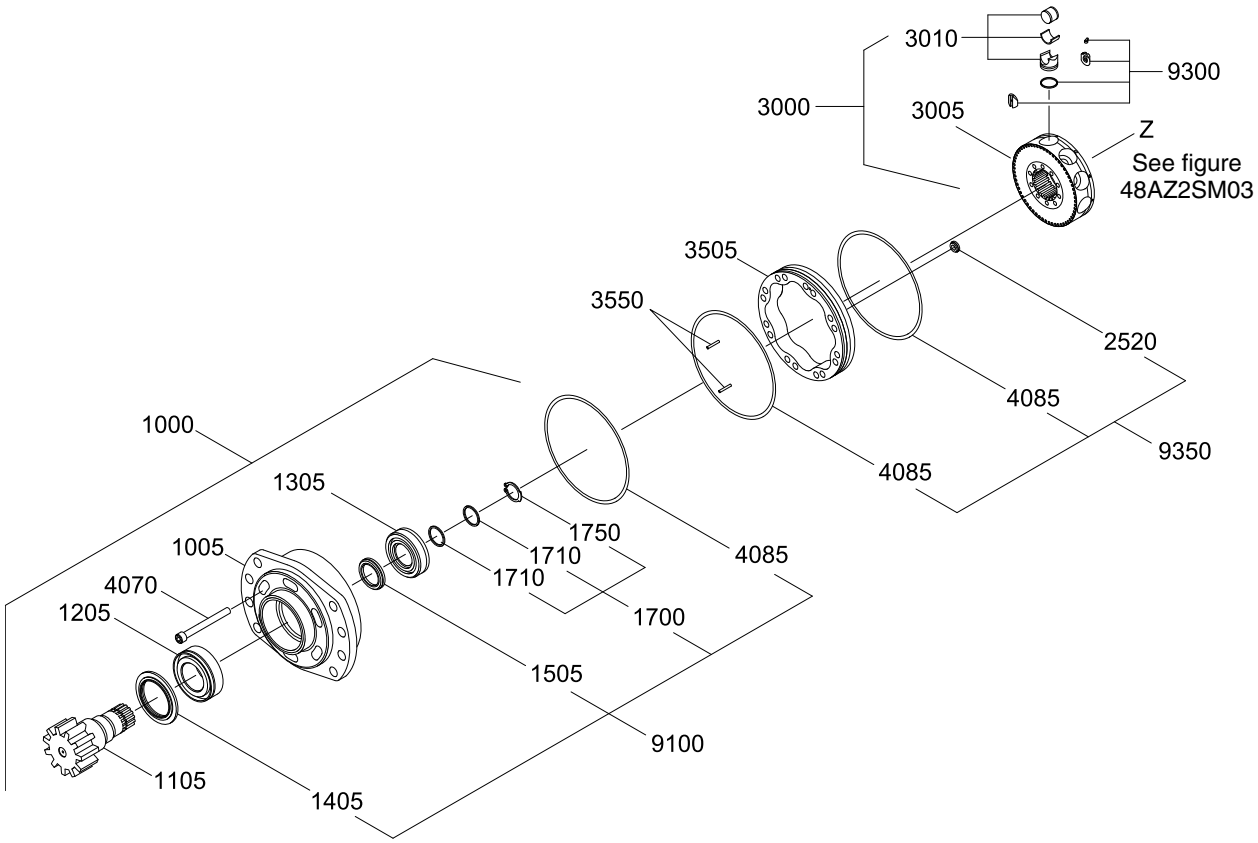
(1) Carry out installation in the reverse order to removal.

(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.



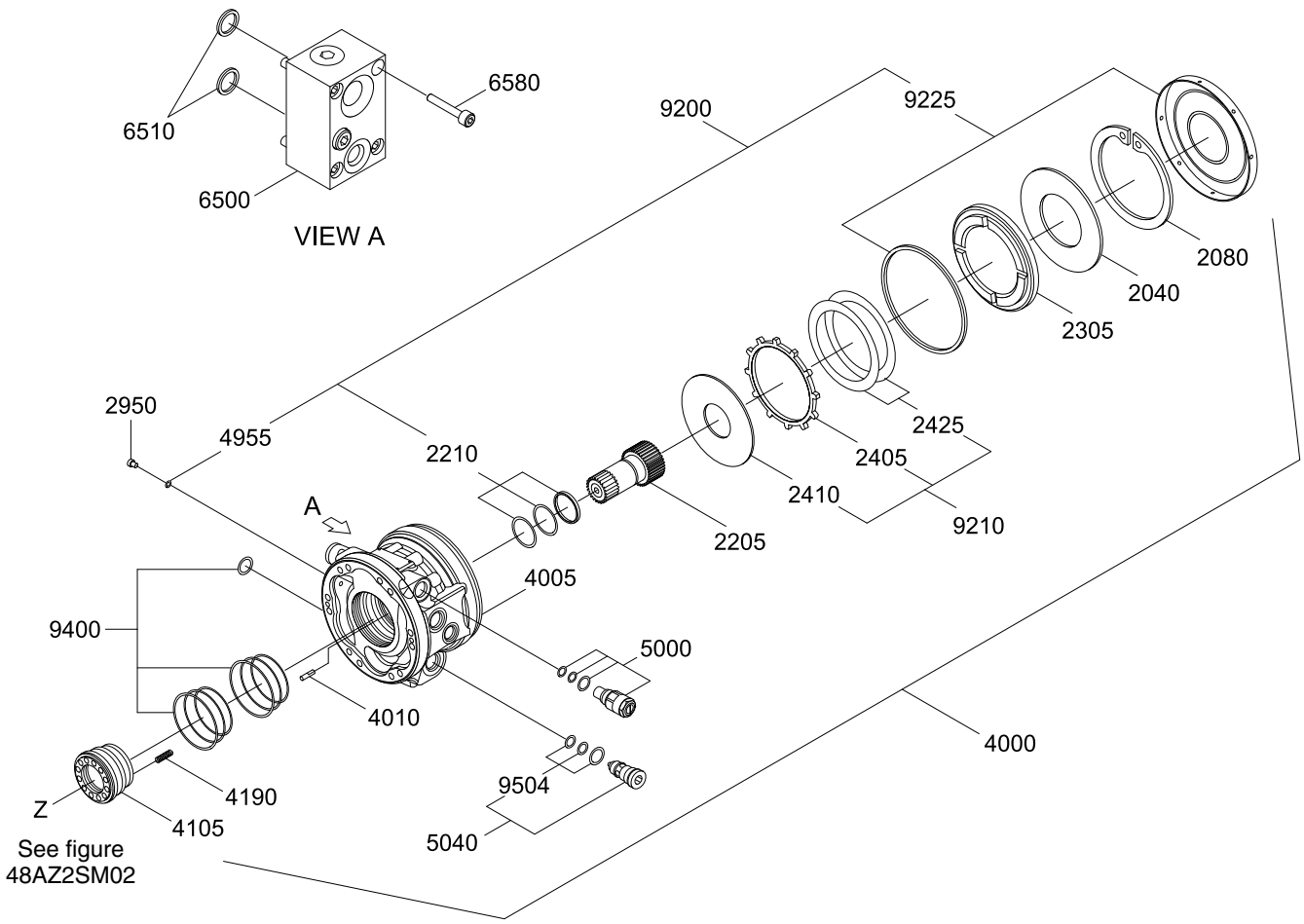
2. COMPONENTS (1/2)



48AZ2SM02

1000	Bearing support assy	1700	Shim kit	3505	Cam ring
1005	Support	1710	Shim	3550	Spring pin
1105	Shaft	1750	Snap ring	4070	Screw
1205	Taper roller bearing	2520	Plug	4085	O-ring
1305	Taper roller bearing	3000	Cylinder block assy	9100	Seal kit
1405	Seal ring	3005	Block	9300	Piston service kit
1505	Oil seal	3010	Piston kit	9350	Seal kit

COMPONENTS (2/2)

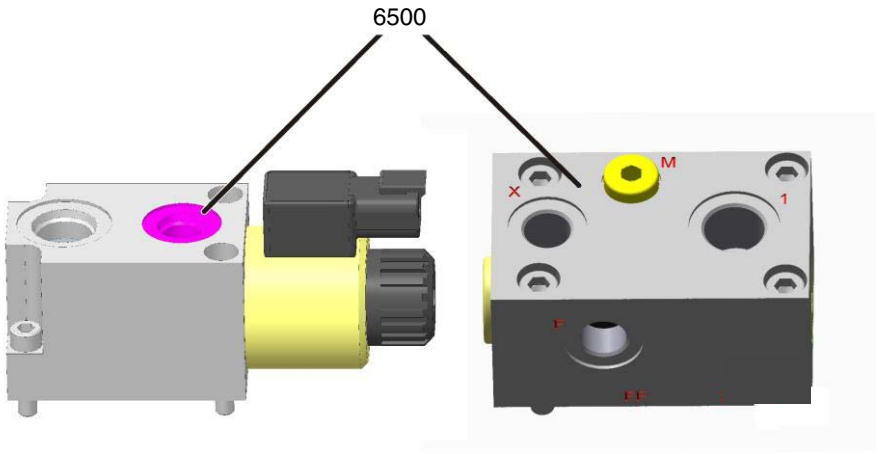


48AZ2SM03

2040	Spring washer	4000	Brake valve housing assy	6500	Brake valve
2080	Snap ring	4005	Housing	6510	O-ring
2205	Brake shaft	4010	Roll pin	6580	Screw
2210	Seal kit	4105	Brake valve	9200	Brake service kit
2305	Brake piston	4190	Spring	9210	Brake service kit
2405	External disc	4955	O-ring	9225	Brake cover kit
2410	Internal disc	5000	Release valve	9400	Seal kit
2425	Shim kit	5040	Check valve	9504	Seal kit
2950	Screw				

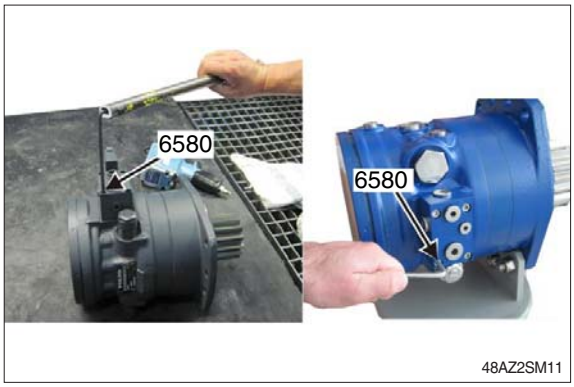
3. DISASSEMBLY AND ASSEMBLY

1) BRAKE RELEASE VALVE



(1) Disassembly

① Unscrew 4 screws (6580) from electronic/hydraulics brake release valve (6500).



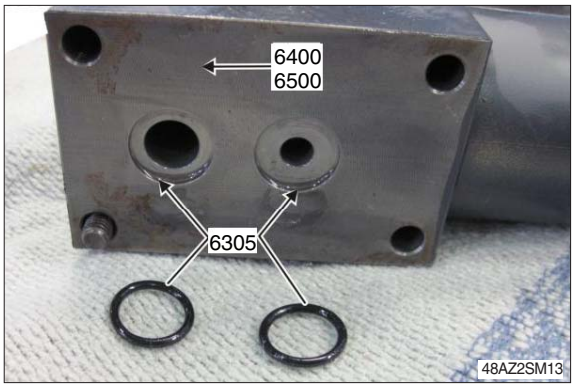
② Remove the brake release valve (6500).

③ Remove and discard two O-rings (6510).

(2) Assembly

※ All matting surfaces must be cleaned and degreased before installation.

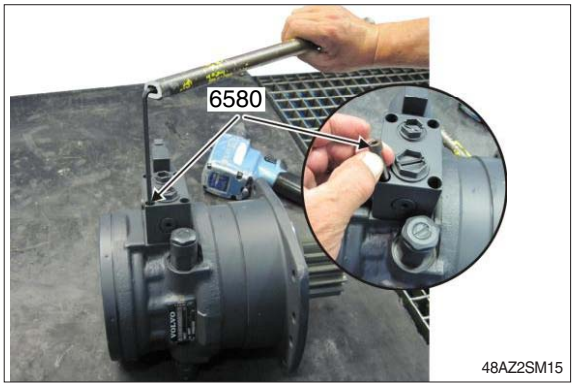
① Install the both O-rings (6510) on the brake release valve (6500).



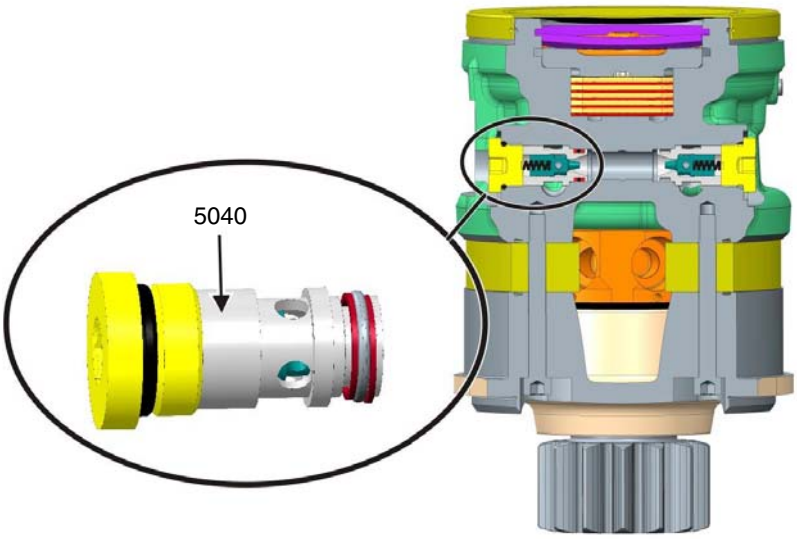
② Install the brake release valve (6500) on the valving/brake body (4005).

③ Install and tighten the brake release valve with all the screws (6580).

· Tightening torque : 1.5±0.15 kgf·m
(11.1±1.11 lbf·ft)



2) CHECK VALVE

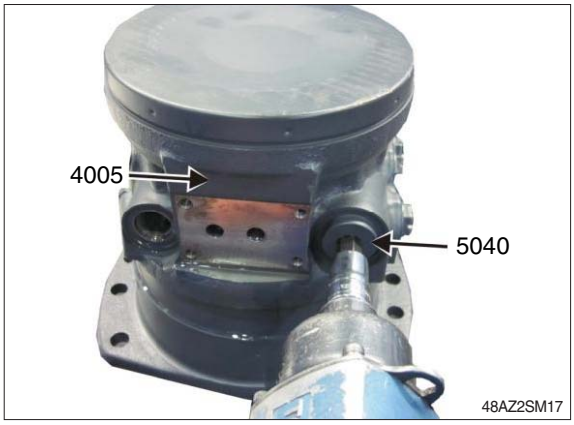


48AZ2SM16

(1) Disassembly

① Unscrew the plugs of the 2 check valves (5040).

※ Be careful to the small spring under the plug.



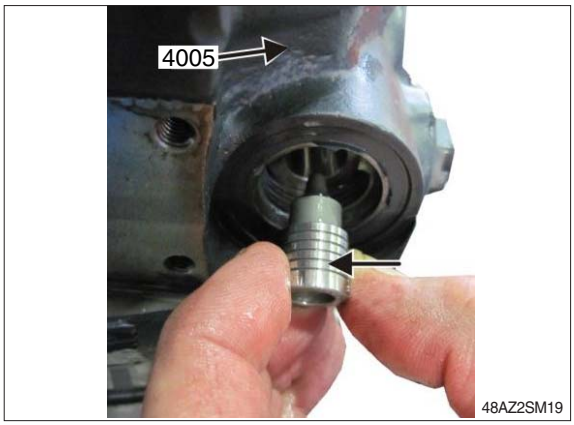
48AZ2SM17

② Remove the spring.

③ Remove and discard the O-ring.

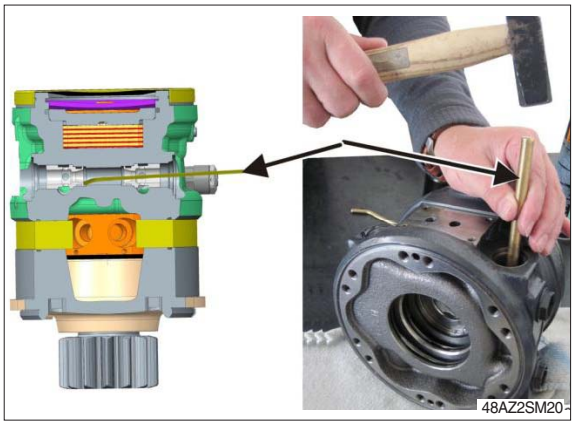
48AZ2SM18

④ Remove the check valve poppet.



⑤ Use a brazen bar tool to remove the check valve body.

- Insert the brazen bar to extract the check valve body as shown on the picture and hit it very lightly with a hammer.
- Do the same on the other side.



(2) Assembly

※ All matting surfaces must be cleaned and degreased before installation.

① Use the check valve seal kit (9504).

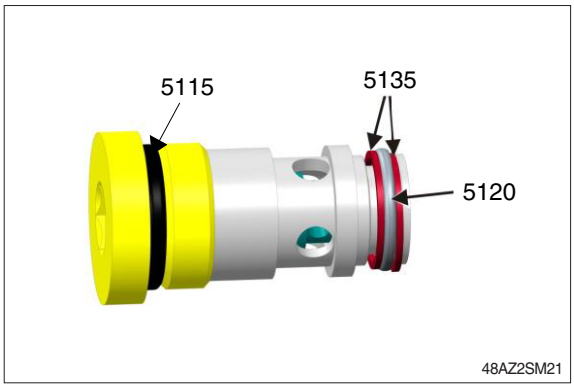
② Oil the O-ring and the back-up rings.

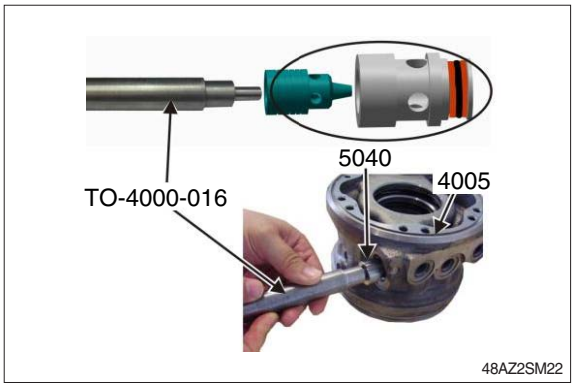
③ Install them in the check valve groove as shown in the picture. The O-ring must be installed between the back-up rings.

④ Oil the check valve and install it into the valving/brake body (4005).

⑤ With the special centering tool lightly push the poppet into the check valve body.

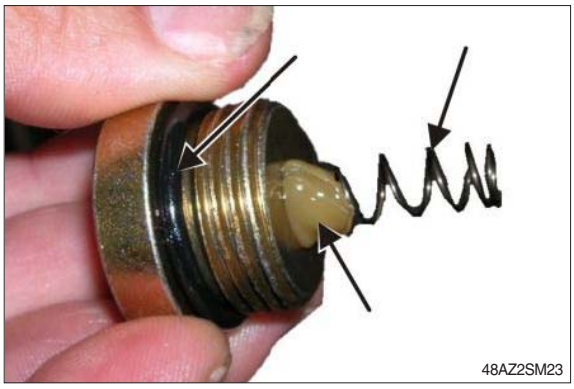
※ Special tool : TO-4000-016-001





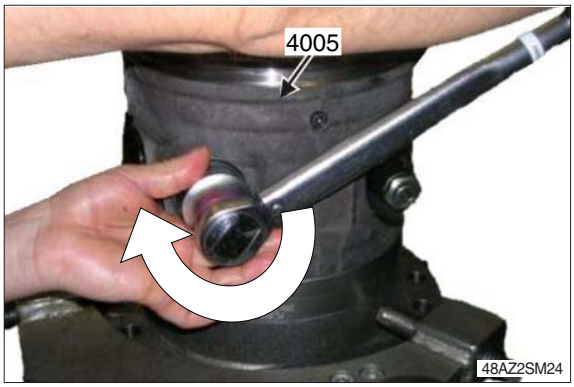
⑥ Insert the O-ring on the plug.

⑦ Apply a small amount of grease to hold spring inside the plug during the assembly into the valving/brake body (4005).



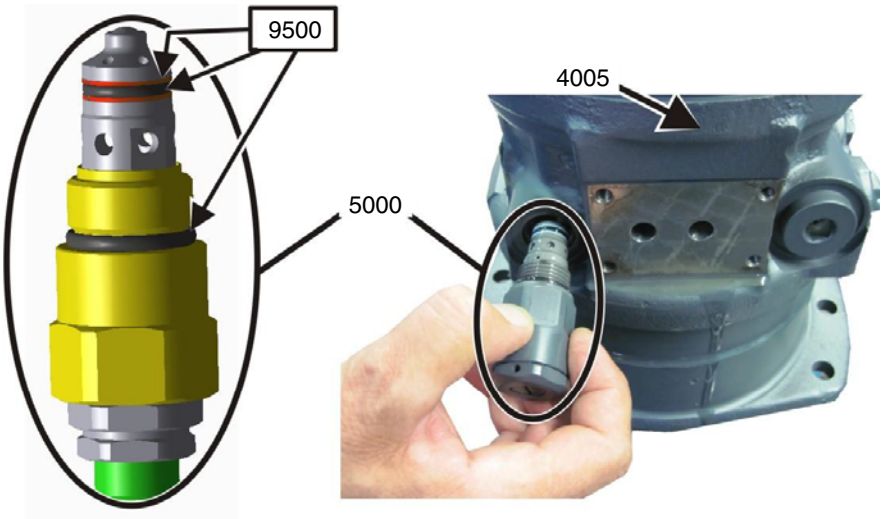
⑧ Carefully screw the check valve plug and respect the tightening torque.

· Tightening torque : 12.2±1.2 kgf·m
(88.5±8.6 lbf·ft)



3) PRESSURE RELIEF VALVE

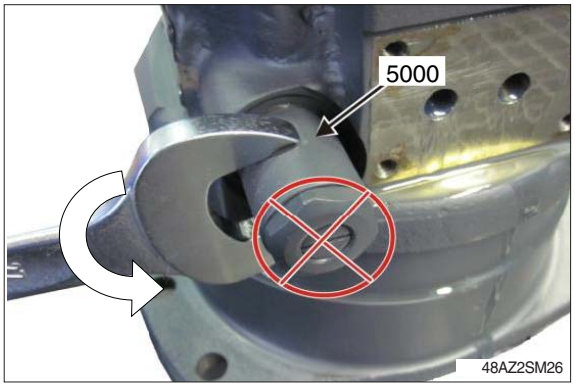
(1) Disassembly



48AZ2SM25

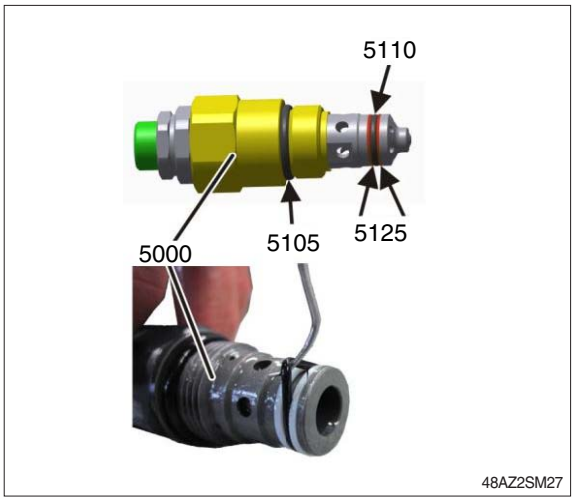
① Unscrew the both pressure relief valves (5000) with the key as shown in the picture.

※ Never unscrew or loose the bolt on the top of the pressure relief valve.



48AZ2SM26

② Remove and discard all O-rings and back-up rings from the pressure relief valve (5000).



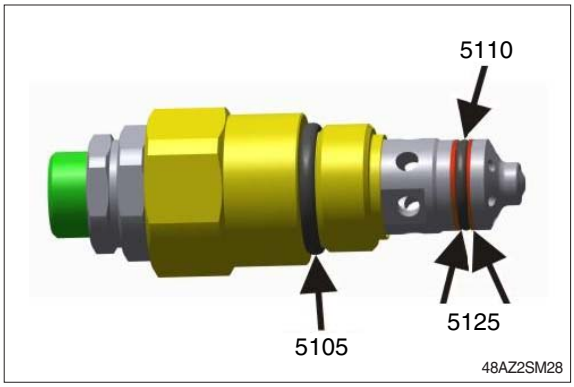
48AZ2SM27

(2) Assembly

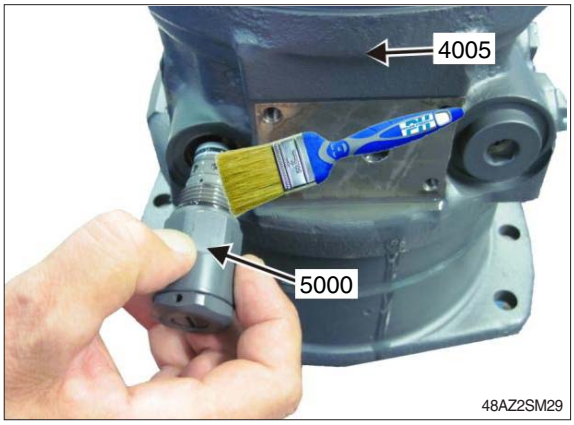
All matting surfaces must be cleaned and degreased before installation

① Install the O-ring (5110) and back up rings (5125) in the pressure relief valve groove as shown on the picture. The O-ring must be installed between the back-up rings.

② Install the biggest O-ring (5105) on the pressure relief valve cartridge.

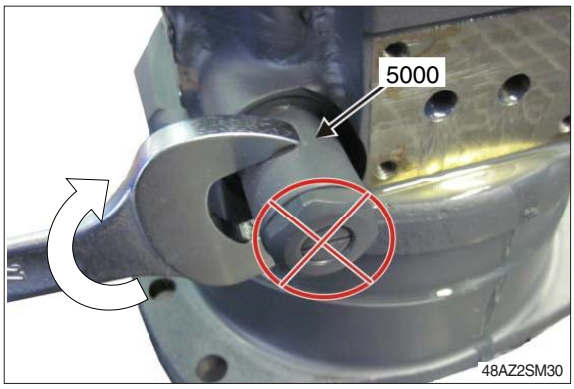


③ Before inserting the pressure relief valve (5000) oil the O-rings and back up rings with hydraulic oil.

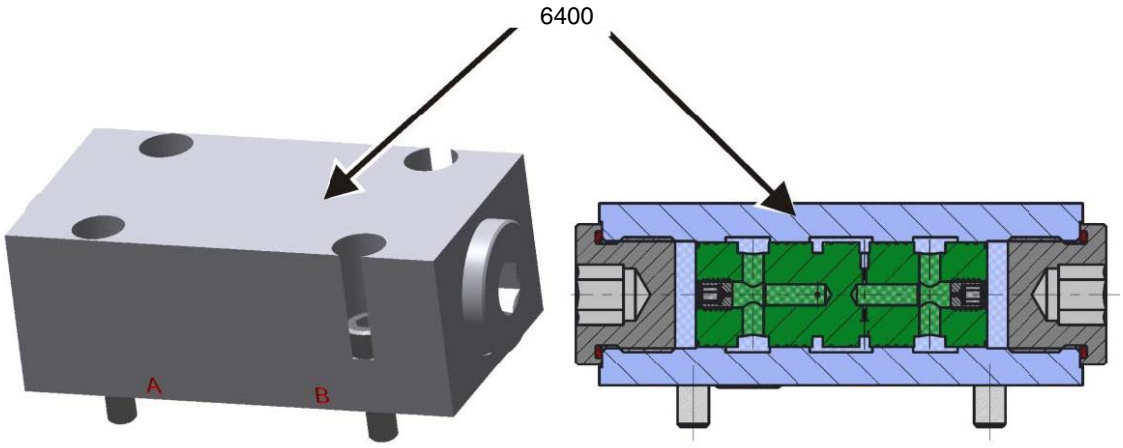


④ Install and tighten the pressure relief valve (5000).

· Tightening torque
- H=27 mm : 5.1±0.5 kgf·m (36.9±3.7 lbf·ft)
- H=32 mm : 8.2±0.8 kgf·m (59.0±5.9 lbf·ft)



4) ANTI-BOUNCING VALVE



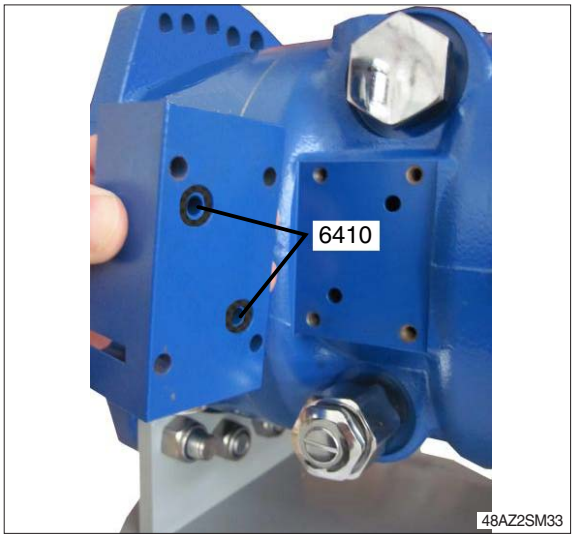
48AZ2SM31

① Unscrew all screws (6480) from the anti-bouncing valve (6400).

48AZ2SM32

② Remove the anti-bouncing valve.

③ Remove and discard two O-rings (6410).

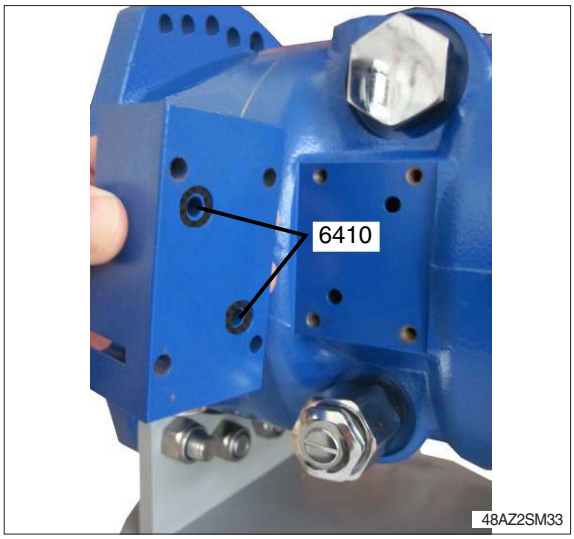


48AZ2SM33

(2) Assembly

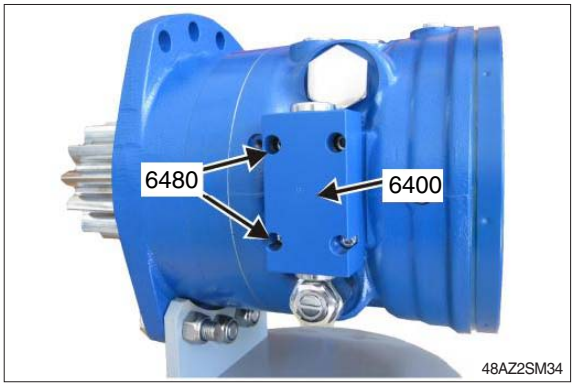
※ All matting surfaces must be cleaned and degreased before installation

① Install the two O-rings (6410) into the anti-bouncing valve.



② Install all 4 screws (6480) into the valving and tight them.

· Tightening torque : 1.5±0.15 kgf·m
(11.1±1.11 lbf·ft)



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.

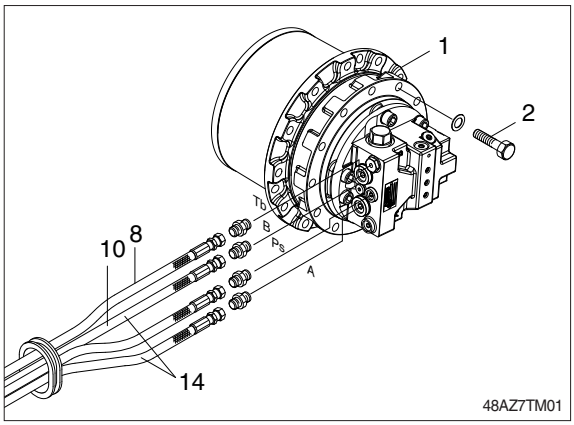
(6) Remove the hose (8, 10, 12).

※ **Fit blind plugs to the disconnected hoses.**

(7) Remove the bolts and the sprocket.

(8) Sling travel device assembly (1).

(9) Remove the mounting bolts (2), then remove the travel device assembly.
- Weight : 80 kg (180 lb)
- Tightening torque : 13.8±1.0 kgf·m (100±7.2 lbf·ft)



2) INSTALL

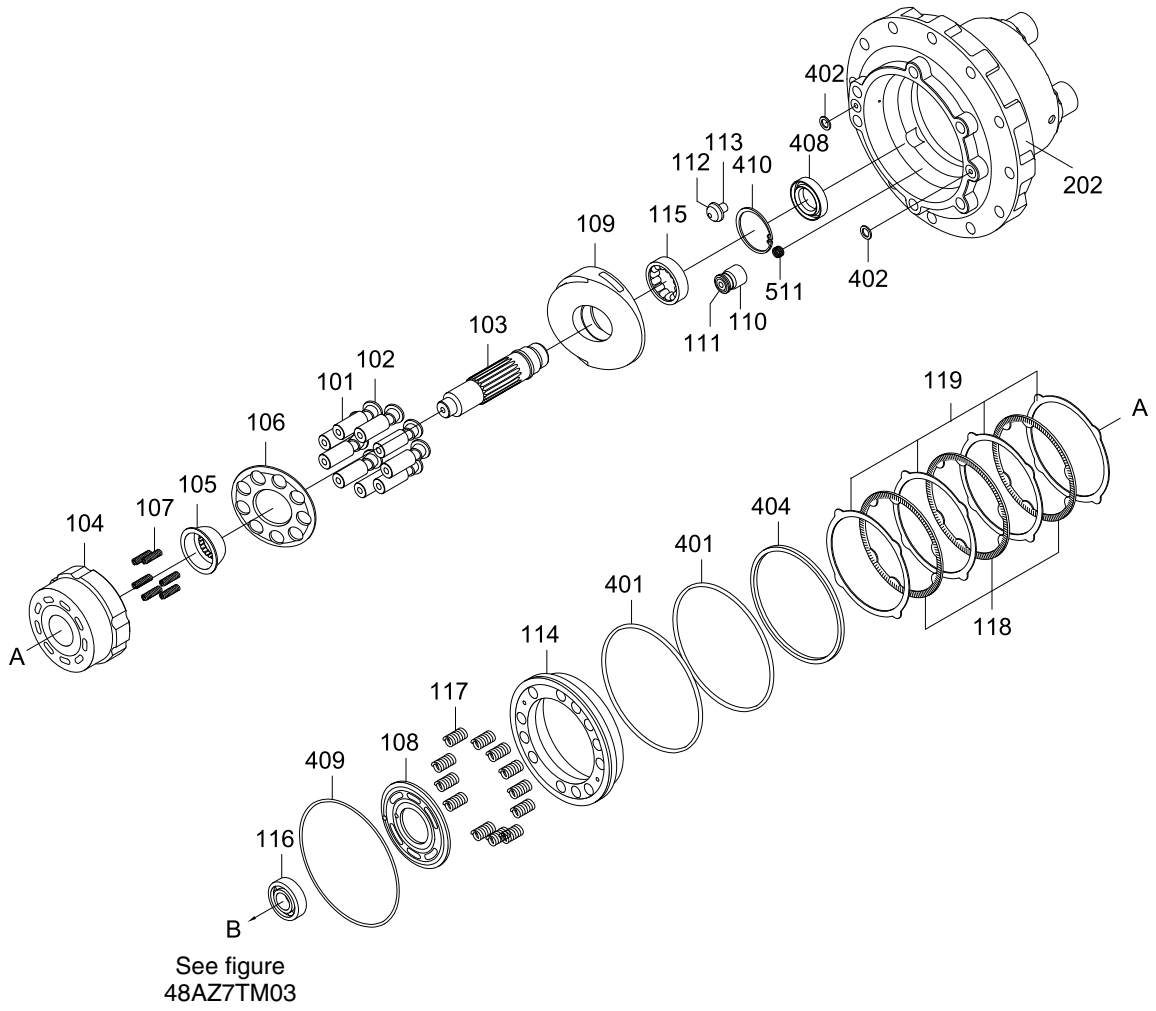
(1) Carry out installation in the reverse order to removal.

(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. DISASSEMBLY AND ASSEMBLY OF MOTOR UNIT

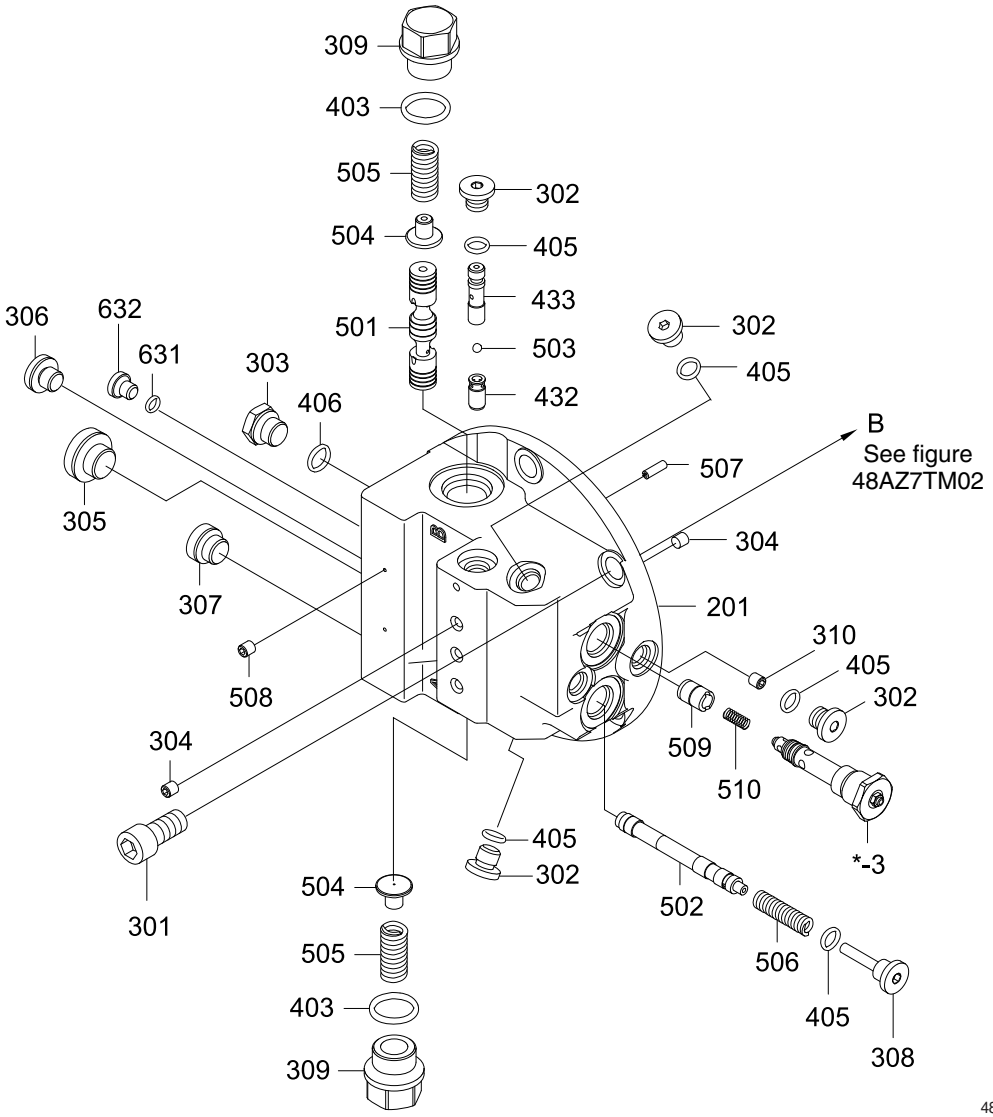
1) PARTS LIST (1/2)



48AZ7TM02

101	Piston	111	Swash shoe	202	Casing
102	Shoe	112	Pivot	401	O-ring
103	Drive shaft	113	Pivot pin	402	O-ring
104	Cylinder block	114	Brake piston	404	O-ring
105	Spherical bushing	115	Roller bearing	408	Oil seal
106	Set plate	116	Ball bearing	409	Back up ring
107	Cylinder spring	117	Brake spring	410	Snap ring
108	Valve plate	118	Friction plate	511	Swash piston spring
109	Swash plate	119	Separator plate		
110	Swash piston	201	Valve casing		

PARTS LIST (2/2)



*-3	Relief valve assy	309	Set plug	504	Plunger
201	Valve casing	310	Restrictor	505	Main spool spring
301	Screw	403	O-ring	506	2 speed spool spring
302	Plug	405	O-ring	507	Spring pin
303	Drain plug	406	O-ring	508	Rivet screw
304	Plug	432	Seat	509	Cap
305	Dust plug	433	Seat casing	510	Spring cap
306	Dust plug	501	Main spool	631	O-ring
307	Dust plug	502	2 speed spool	632	Plug
308	2 speed plug	503	Steel ball		

2) TOOLS AND TIGHTENING TORQUE

(1) Tightening torque

This table shows the typical screw sizes and tightening torques used in the motor

Item	Part name	Size	Tightening torque	
			kgf · m	lbf · ft
*-3	Relief valve assy	G 1/2	11.2	81.0
301	Screw	M14	16.3	118
302	Plug	G 1/4	3.6	26.0
303	Drain plug	G 3/8	7.5	54.2
304	Plug	NPTF 1/16	1.1	8.0
308	2 speed plug	G 1/4	3.6	26.0
309	Set plug	G 3/4	17.3	125
310	Restrictor	NPTF 1/16	1.1	8.0
626	Pipe plug	RC 1/8	1.2	8.7
632	Plug	G 1/8	1.5	10.8

(2) Tools

① Hexagon and socket wrench

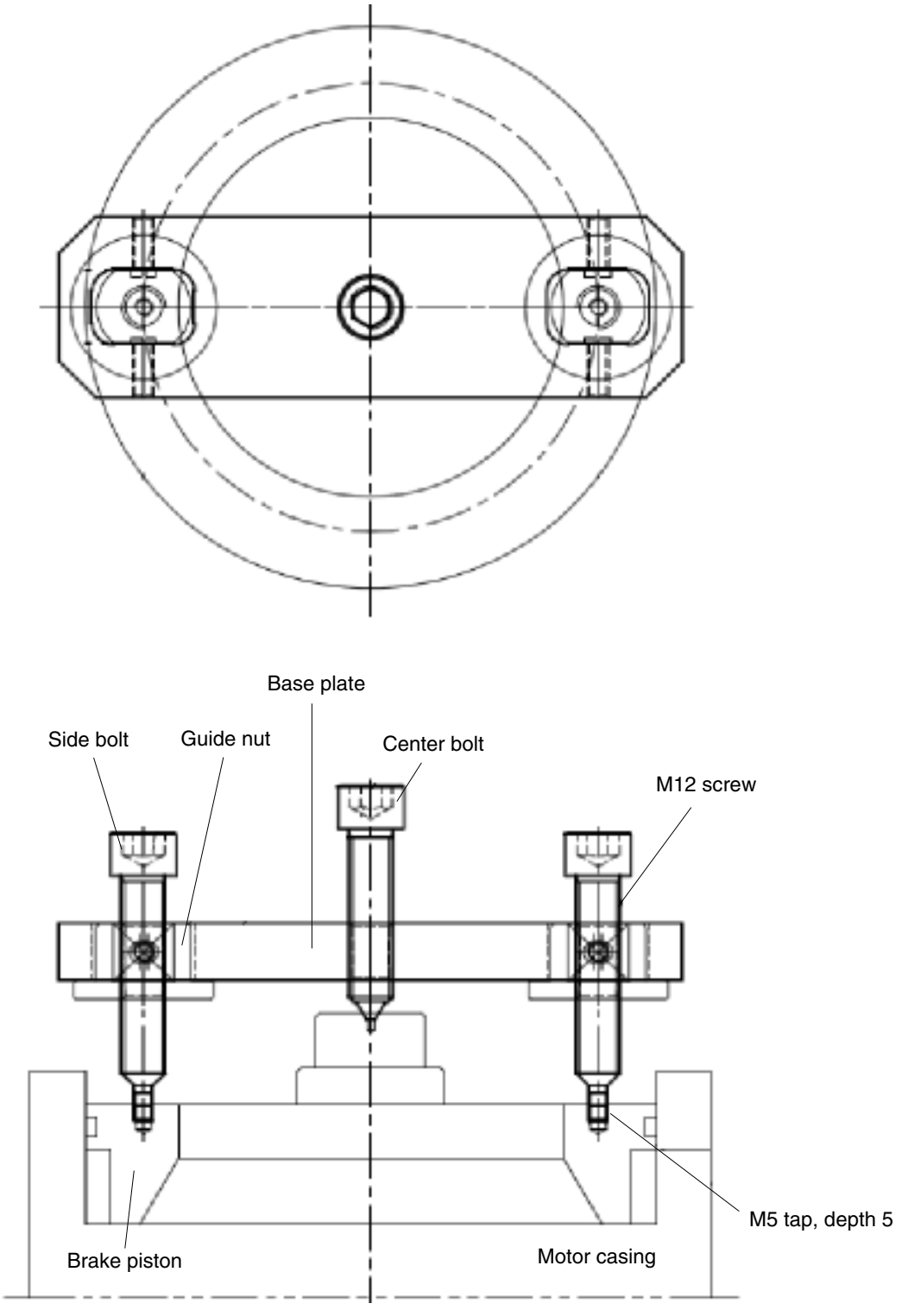
Tools	Item	Part name	B size	Screw size
Hexagon wrench	304, 310	Plug, Restrictor	4	R 1/16
	626, 632	Pipe plug, Plug	5	R 1/8
	302, 308	Plug, 2 speed plug	6	G 1/4
	301	Screw	12	M14
Socket wrench	303	Drain plug	22	G 3/8
	*-3	Relief valve assy	27	G 1/2
	309	Set plug	30	G 3/4
	*-3	Relief valve assy	8	M5

② Others

Tools	Specification
Driver	Screw driver (small, medium)
Hammer	Rubber or plastic hammer, iron hammer
	Round bar : about Ø45 mm x 150 mm
Bearing press jig	Round bar : about Ø60 mm x 150 mm
Torque wrench	Torque adjustment range
	- For 4~20 Nm
	- For 20~100 Nm
	- For 40~200 Nm
Slide hammer bearing puller	-
Brake piston disassembly jig	-
Brake piston press jig	-
Snap ring plier	Inner diameter

(3) Special tools

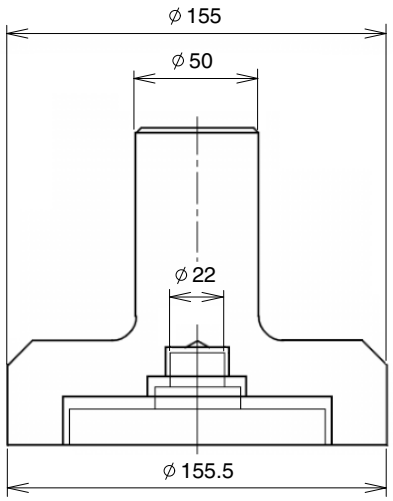
① Brake piston disassembly jig



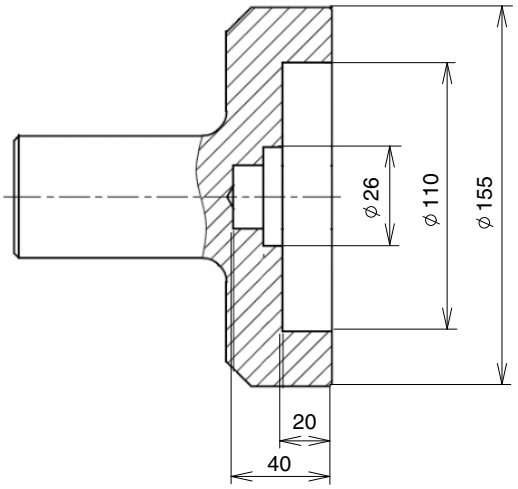
559A7TM05

② Brake piston press jig

The below dimensions are the reference dimensions.



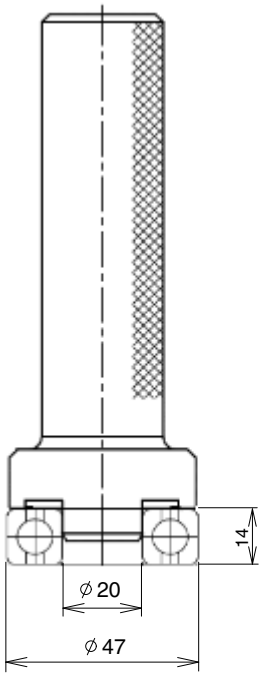
Assembled status



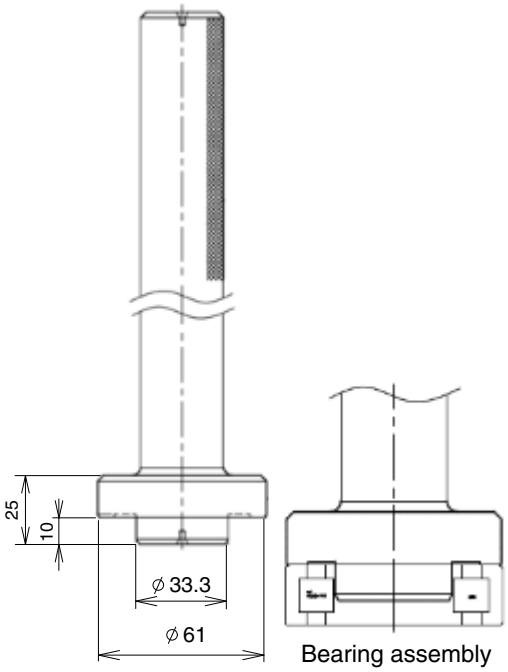
559A7TM10

③ Bearing press jig

The below dimensions are the reference dimensions.



Bearing pressing jig for valve casing



Roller bearing pressing jig for casing

559A7TM11

3) DISASSEMBLY

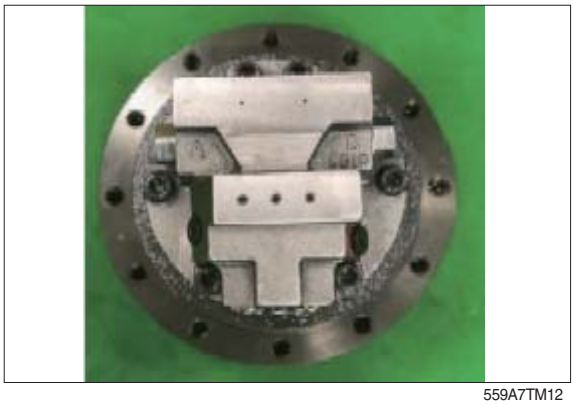
When disassembling the motor, disassemble in the order shown below. The number in brackets after part name means item number of section drawing.

(1) Wrap a wire rope around the outer periphery of the motor, lift it with a crane, and wash it with white kerosene. After washing, dry with compressed air.

※ The motor can be disassembled into an mounted state on the excavator. In this case, disassemble not to be got foreign materials: dust, mud, etc.

(2) Remove the oil in the casing (202) from the drain plug.

※ In the case of automatic 1-speed specification, 2 speed spool (502) may drop out during operation. Block pilot port with dust plug (306).



559A7TM12

(3) **Disassembly is easily fixed to the workstation.**
Place the shaft end of the drive shaft (103) facing down.
Mark the joint mark at the junction point of casing (202) and valve casing (201).

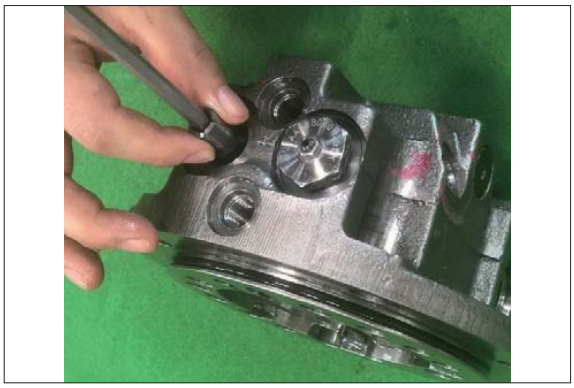
※ **Choose a clean place.**
Spread a rubber plate or cloth on the workbench to prevent friction and damage of the parts.

■ **Disassembly of valve casing kit**

(4) **Loosen the relief valve assy (*-3) and remove it from the valve casing (201).**

559A7TM13

(5) Disassemble the spring cap (510) → cap (509).

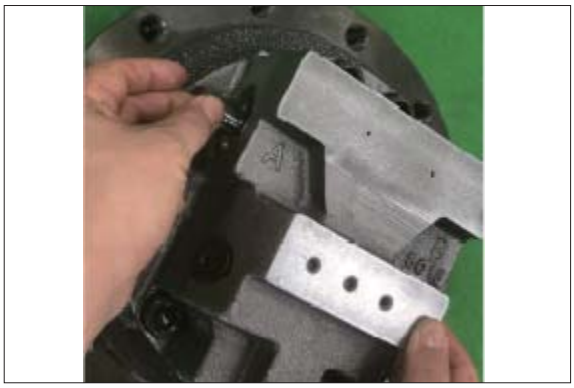


559A7TM14

(6) Loosen the set plug (309), remove the plunger (504) and the main spool spring (505).
Then take out the main spool (501).

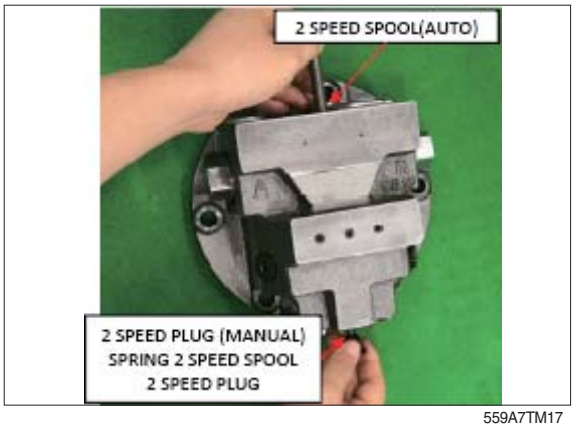
※ Main spool is disassembled in the horizontal direction with the hole. Be careful not to scratch the sliding surface of the main spool.

559A7TM15



559A7TM16

(7) Loosen the 2 speed plug (308), take out the 2 speed plug spring (506) and the 2 speed spool (502).

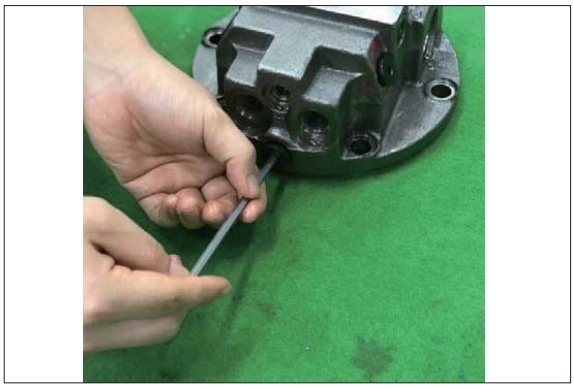


559A7TM17

(8) The following operations should be carried out if necessary.

① Loosen the plug (302) and remove the restrictor (310).

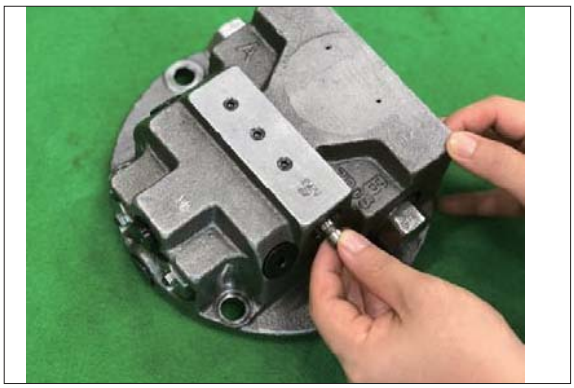
※ If there is no problem with the 1st / 2nd speed switching, no special disassembly is required.



559A7TM18

② Release plug (302) and disassemble in the following order: Seat casing (433) → steel ball (503) → seat (432).

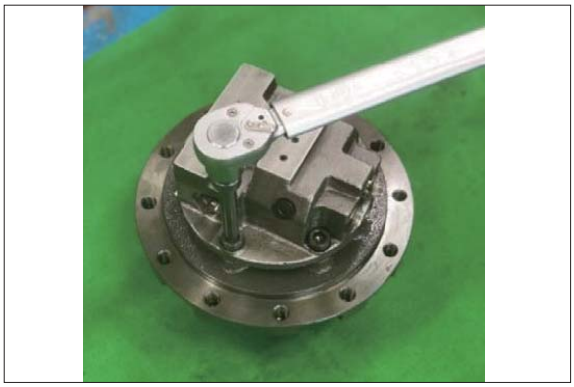
※ If there is no problem with the 1st / 2nd speed switching, no special disassembly is required. Please be careful about the loss of the steel ball. Please be careful not to damage the inner diameter of the seat casing and seat.



559A7TM19

(9) Loosen screw (301) and remove valve casing (201) from casing (202).

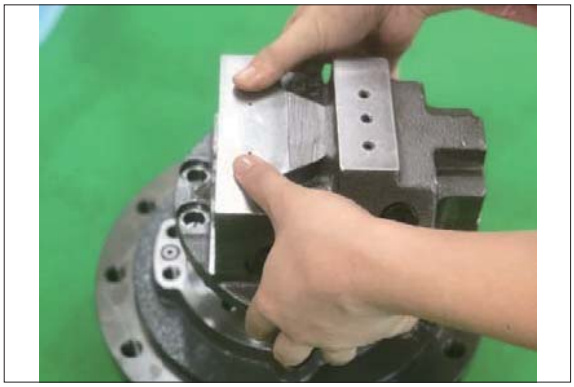
※ (Due to the force of the brake spring E (117), when the screw (301) is unscrewed, the valve casing (201) is raised from the casing (202). Further, remove the valve plate (108) from the valve casing (201).



559A7TM20

Carefully work so that the valve plate does not fall off the valve casing.

※ In some cases, the valve plate is attached to the cylinder block.
Be careful not to scratch the sliding surface and mating surface when you disassemble the mating surface with a screwdriver or the like.



559A7TM21

559A7TM22

■ DISASSEMBLY OF MOTOR BODY

(10) Remove the brake spring (117) from the brake piston (114).

559A7TM25

(11) Using the jig, remove the brake piston (114) from the casing (202). No.16

※ If you need to disassemble without jig, Fill the brake flow path hole with compressed air.

If you blow compressed air suddenly brake piston can jump out of casing.

There is a risk of damage or injury to the part;

Please follow the directions below.

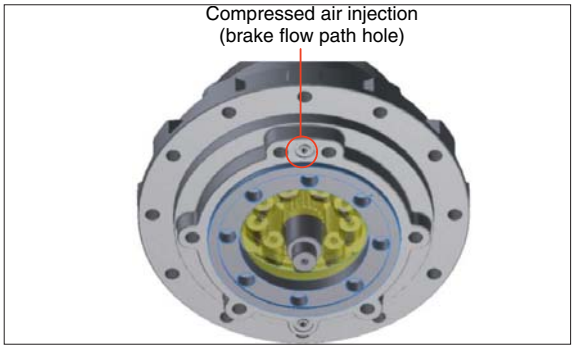
① Cover the casing with a clean cloth.

② Press the cloth lightly with your hand to prevent the brake piston from jumping out.

③ Fill the brake flow path hole with compressed air.

559A7TM26

※ Both ends of the jig are hooked to the groove of the brake piston. The center of the jig is hooked to the center of the drive shaft and makes the jig and brake piston parallel.



559A7TM40

(12) Put the motor horizontally.
Disassemble cylinder block (104) from drive shaft (103).
Also, disassemble piston assy (10), set plate (106), spherical bush (105), cylinder spring (107).


559A7TM31

※ Mark each cylinder block bore, piston assy, and set plate bore in the assembled position so that the assembled position does not change.
Be careful not to scratch the sliding surface of cylinder block, piston, shoe, etc.


559A7TM32


559A7TM33


559A7TM34

(13) Disassemble friction plate (118) and separator plate (119) in casing (202).

559A7TM35

(14) Disassemble the drive shaft (103) and swash plate (109).

559A7TM37

(15) Disassemble swash piston assy (20), swash piston spring (511), pivot (112), pivot pin (113).

559A7TM38

(16) Do not disassemble any further unless there is a specific problem. At this state, check bearing according to the following inspection instructions.

① Check the raceway surface, rollers or balls in the visible range, and make sure there are no pittings or cracks.

② Check for local corrosion and wear on the ball or roller.

③ Make sure that there is excessive wear powder between the ball or roller and cage.

④ When turning lightly by hand, check that it rotates smoothly.

If there is no problem after checking in this step, the following disassembly is not necessary.

559A7TM41

(17) The following operations should be carried out if necessary.

From the casing (202), the outer ring of the cylindrical roller bearing (115) is tapped lightly from the housing part side of the oil seal (408) via the steel bar and is pulled out.

※ Do not reuse the removed roller bearing.

(18) Disassemble the snap ring (410) using a snap ring plier (inner diameter) in casing (202).

(19) From the casing (202), the gently tap out the housing side of the oil sea (408) is tapped lightly from the rear of the casing (202) via the steel bar and is pulled out.

※ Do not reuse the removed oil seal.

(20) Remove the cylindrical ball bearing (116) from the valve casing (201) using the slide hammer bearing puller.

※ Do not reuse the removed ball bearing.

※ The disassembly operation is finished. Please check that there is no problem in each part.

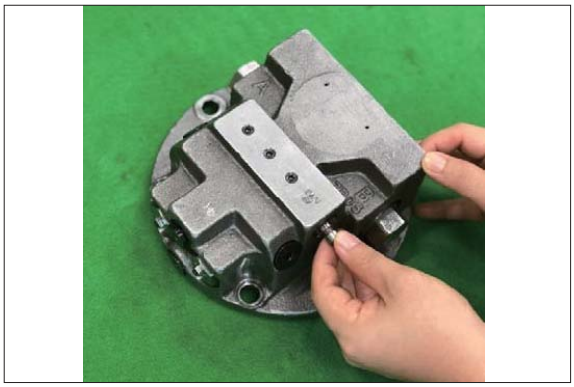
4) ASSEMBLY

(1) The assembly way is the reverse of the disassembly way, but be careful of the following items.
① Be sure to repair damaged parts during disassembly. Please prepare replacement parts in advance.
② Wash each part thoroughly with wash liquid and dry with compressed air.
③ Be sure to coating clean hydraulic oil to sliding parts, bearings, etc. and assemble them.
④ In principle, should replace seal parts such as O ring and oil seal.
⑤ Use the torque wrench to tighten the mounting bolts and plugs of each part, and tighten with the torque shown in page 7-56.

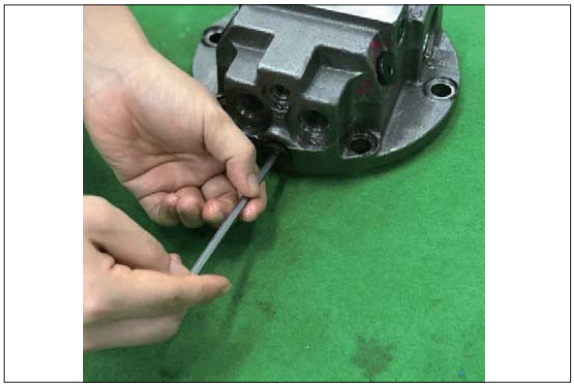
■ ASSEMBLY OF VALVE CASING KIT

(2) This operation is necessary only when the seat assy is removed.
Assemble seat (432) → steel ball (503) → seat casing (433) → plug (302) in this order.

※ Please pay attention to the assembly sequence.
Refer to section drawing.


559A7TM19

(3) This operation is necessary only when the restrictor is removed.
Apply loctite on the restrictor (310) and assemble to casing (201). And tighten plug (302) with specified torque.

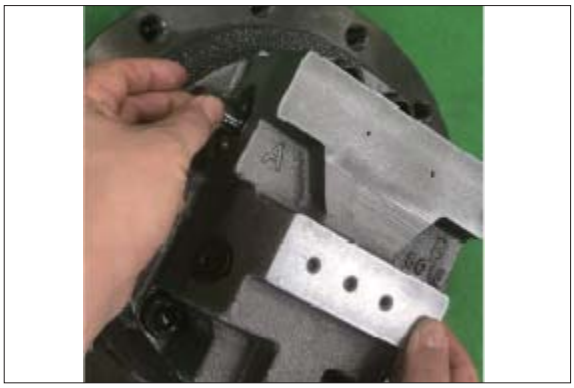

559A7TM18

(4) Assemble the 2 speed spool (502), the 2 speed spool spring (506), the 2 speed plug (308).

559A7TM17

(5) Assemble main spool (501), Plunger (504) → main spool spring (505) → O-ring (403) → Assemble set plug (309) in order.

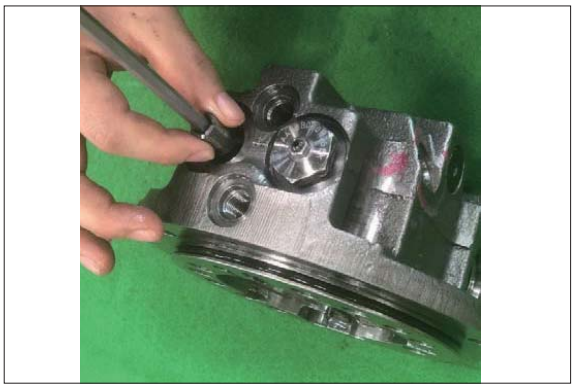
※ Make sure the main spool moves smoothly.



559A7TM16

559A7TM15

(6) Assemble the cap (509).



559A7TM14

(7) Assemble the spring cap (510) to the relief valve assy (*-3). Attach the relief valve to the valve casing (201).

※ It is advisable to apply grease thinly on the mating surface of spring cap to prevent falling off.

559A7TM13

■ ASSEMBLY OF MOTOR BODY

(8) **Place the casing (202) on the work surface with the valve casing (201) assembly surface facing up.**

(9) **Insert the oil seal (408) into the casing (202) using a jig.**

※ **Pay attention to the direction of the oil seal. (refer to cross-section drawing) Apply grease thinly to the lip portion of the oil seal.**
Hit it uniformly and be careful not to scratch the outer circumference.

(10) Assemble the snap ring (410) using the snap pliers (internal diameter) on the casing (202).

※ The snap ring "R" faces the oil seal.

(11) The outer ring of the cylindrical roller bearing (115) is tapped lightly on the casing (202) via the bearing press jig and incorporated.

559A7TM39

(12) Assemble pivot pin (113), pivot (112) to casing (202).

559A7TM38

(13) Assemble swash piston spring (511) and swash piston assy (20) to casing (202).

※ It is advisable to apply grease thinly on the mating surface of swash piston spring to prevent falling off.
When assembled normally, the pushed swash piston assy goes deeper than the casing stage.
Make sure the swash piston assy moves smoothly.

559A7TM38

(14) Place casing (202) horizontally and insert swash plate (109).

※ Make sure the swash plate moves smoothly.

559A7TM37

(15) The drive shaft (103) is attached to the casing (202).

※ Carefully insert so that the lip of the oil seal will not be scratched.
Assemble by applying oil to the oil seal assembly of drive shaft.
When assembled normally, the pushed swash piston assy goes deeper than the casing stage.
Make sure the swash piston assy moves smoothly.

559A7TM36

(16) Set the cylinder spring (107) and the spherical bush (105) into the cylinder block (107). and insert the piston assy. (10) to the bore of set plate (106).

※ Assemble the Larger outer diameter face of set plate and the sliding movement face of shoe in the same direction. (Refer to section drawing)

559A7TM34

559A7TM33

(17) The piston assy (101) set on the set plate (106) is assembled in the cylinder block (104).
And the cylinder block sub assembled is inserted in accordance with the spline of the drive shaft (103) to casing (202).

※ Before assembly, apply oil to the surface of cylinder bore or piston.

※ It is easy to insert into drive shaft by matching spline of cylinder block and the spherical bush.

※ After assembly, try rotating the cylinder block lightly in the forward and reverse directions by hand.

559A7TM32

(18) Place casing (202) with the valve casing (201) assembly surface of casing (202) facing up.
Separator plate (119) and friction plate (118) are alternately assembled to casing (202).

※ Put the separator plate in arc groove of casing.

※ Please refer to the assembly drawing for the number of assembly of the separator plate and friction plate.

559A7TM30

559A7TM29

(19) Install the O-ring (118, 401) and the back up ring (409) on the brake piston (114).

※ Back up ring is installed to the valve casing direction.

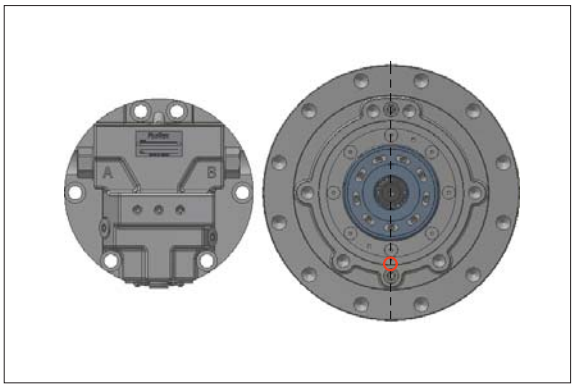
※ If the grease is lightly applied to the O-ring, it will not be cut when the brake piston is inserted.

559A7TM28

(20) The brake piston (114) is tapped lightly via the brake piston press jig and pressed into casing (202).

559A7TM27

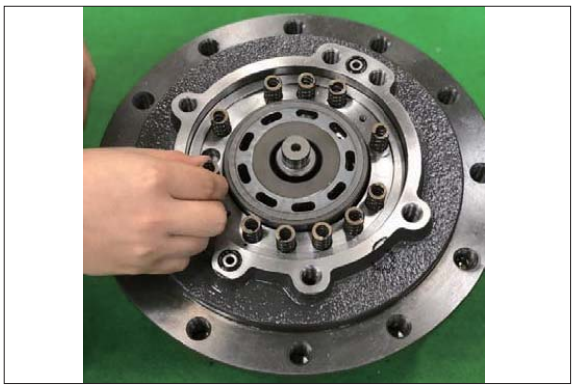
※ Pay attention to the assembly direction of the brake piston. The orifice of the brake piston is located downward on the same vertical line as the flow hole in casing.



559A7TM42

(21) Attach the brake spring (117) to the brake piston (114).

(22) Attach the O-ring (402) to the casing (202).



559A7TM25

(23) This term is necessary only when the cylindrical ball bearing (116) is removed. The outer ring of the cylindrical ball bearing (116) is tapped lightly on the valve casing (201) via the bearing press JIG and incorporated.

559A7TM24

(24) The valve plate (108) is installed in the valve casing (202) and the O-ring (401) is mounted.

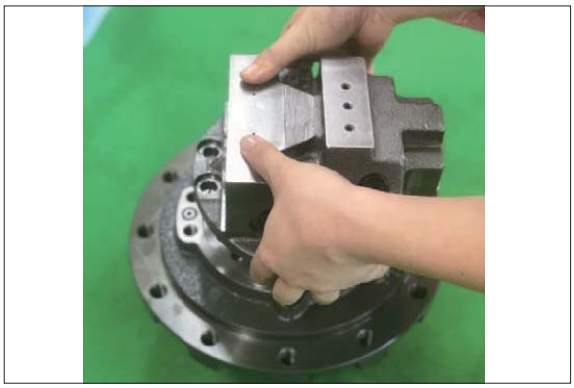
※ Apply grease thinly to the joint surface of the valve plate. (prevention of dropout)

559A7TM23

559A7TM22

(25) Attach the valve casing (201) to the casing (202) and fasten it with a screw (301).

※ Be careful not to remove the valve plate.
Be careful not to tilt the brake spring.
Tighten the socket bolt evenly until specified torque.



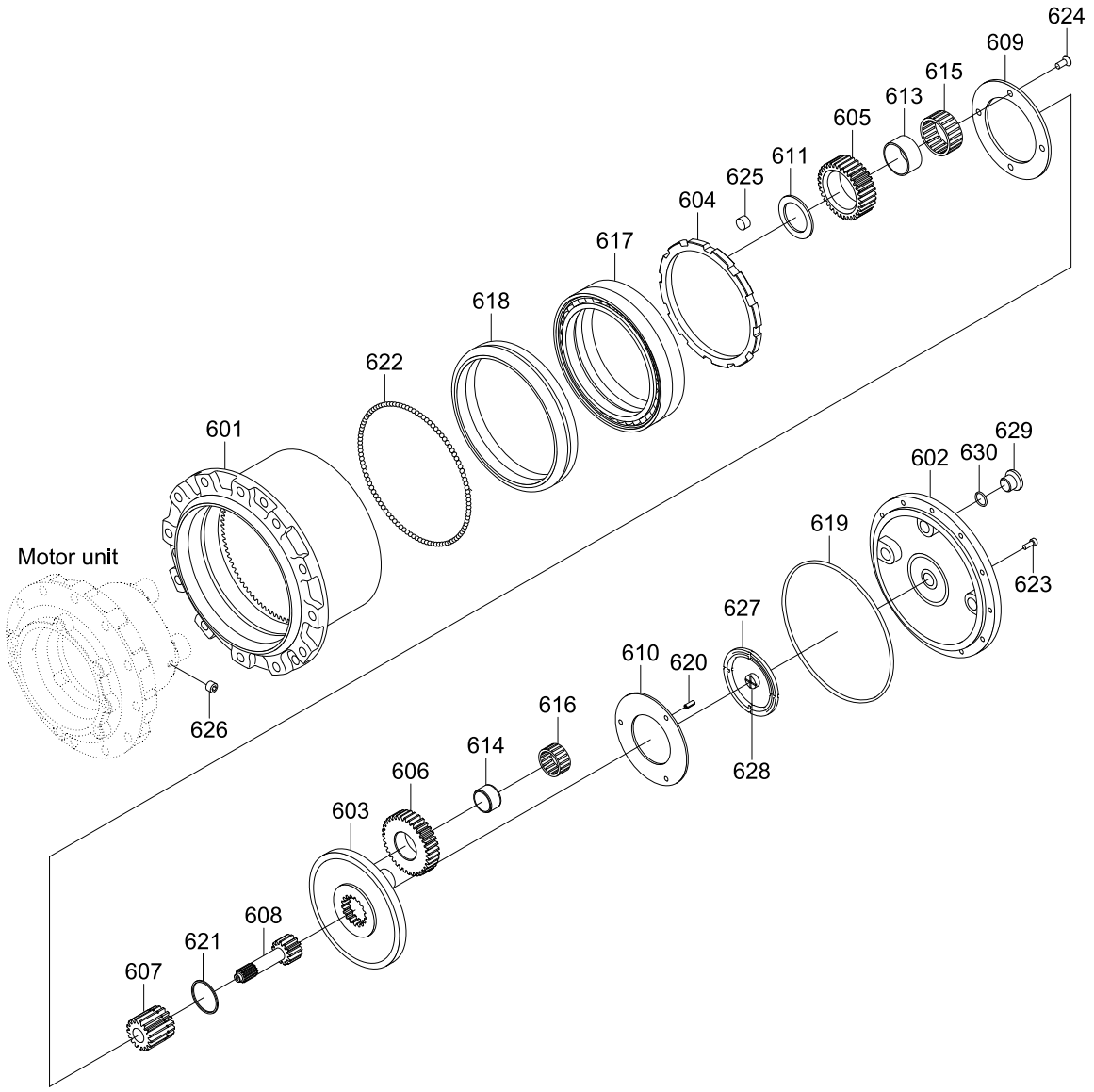
559A7TM21

559A7TM20

※ Assembly is completed with the above.

3. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) PARTS LIST



601	Housing	611	Thrust washer	622	Steel ball
602	Cover	613	Collar	623	Socket bolt
603	Holder	614	Inner race	624	Bolt
604	Ring nut	615	Needle bearing	625	Plug
605	Planetary gear F	616	Needle bearing	626	Plug
606	Planetary gear R	617	Angular bearing	627	Side plate A
607	Sun gear	618	Floating seal kit	628	Side plate B
608	Drive gear	619	O-ring	629	Plug
609	Thrust plate F	620	Spring pin	630	O-ring
610	Thrust plate R	621	Snap ring		

2) GENERAL PRECAUTIONS

This reduction gear is designed to reduce the number of parts and balance the life of the parts. Therefore, all parts can be supplied separately, but when replacing, it is often necessary to replace them both structurally and functionally.

			Parts to be replaced at the same time													
	Part number		617	618	611	613	615	605	612	609	624	603	620	614	616	606
	Name of part		Angular bearing	Floating seal	Thrust washer	Collar	Needle bearing	Planetary gear F	Thrust washer	Thrust plate F	Ext. flush bolt	Holder	Spring pin	Inner race	Needle bearing	Planetary gear R
Replace-ment parts	617	Angular bearing	—	○												
	618	Floating seal	△	—												
	611	Thrust washer			—	△	△	△	△	○	○					
	613	Collar			△	—	○	○	△	○	○					
	615	Needle bearing			△	○	—	○	△	○	○					
	605	Planetary gear F			△	△	△	—	△	○	○					
	612	Thrust washer			△	△	△	△	—	○	○					
	609	Thrust plate F			△	△	△	△	△	—	○					
	624	Ext. flush bolt			△	△	△	△	△	○	—					
	603	Holder														
	620	Spring pin											No disassembly			
	614	Inner race										Please replace the entire No.1 holder assy.				
	616	Needle bearing														
	606	Planetary gear R														

○ Indicates parts that must be replaced at the same time.

⚠ Indicates parts that is desirable to be replaced at the same time.

※ Be sure to replace the bearing inner and outer rings at the same time.

3) TOOLS AND TIGHTENING TORQUE

(1) Tightening torque

This table shows the typical screw sizes and tightening torques used in the reduction gear.

Item	Part name	Size	Tightening torque	
			kgf · m	lbf · ft
604	Ring nut	M165	18	130
623	Socket bolt	M6	1.2	8.7
624	Ext flush bolt	M8	3	21.7
625	Pipe plug	RC 3/8	10	72.3
626	Pipe plug	RC 1/8	1.2	8.7
629	RO plug	G 1/2	8.4	60.8
632	ROH plug	G 1/8	1.5	10.8

(2) Tools

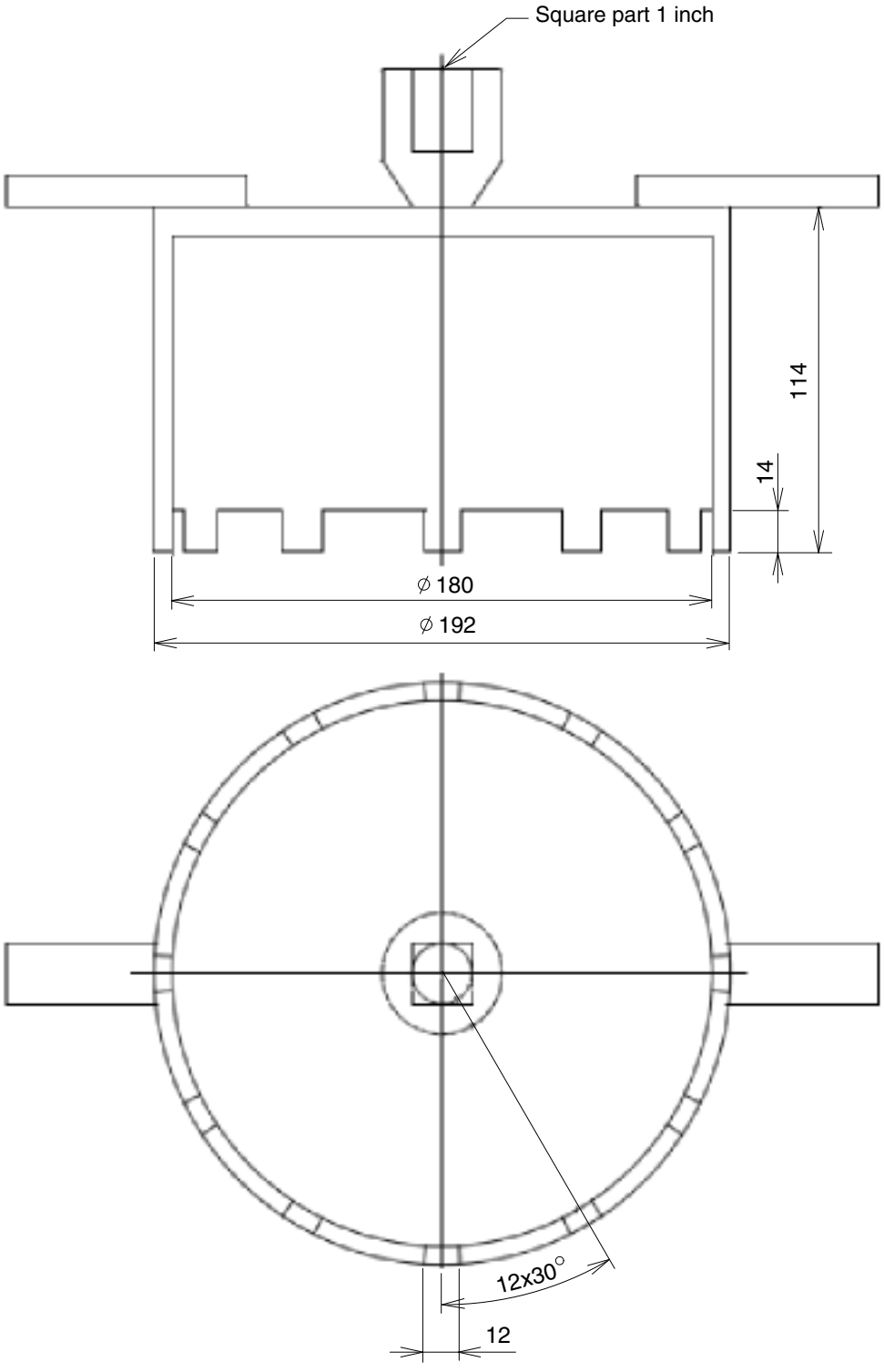
① Hexagon wrench and exclusive jig

Tools	Item	Part name	B size	Screw size
Hexagon wrench	626	Pipe plug	5	R 1/8
	625	Pipe plug	8	R 3/8
	629	RO plug	10	G 1/2
	623	Socket bolt	5	M6
	624	Ext flush bolt	6	M8
Exclusive jig	604	Nut ring	-	M165

② Others

Tools	Specification
Driver	Screw driver (small, medium)
Hammer	Rubber or plastic hammer, iron hammer
Torque wrench	Torque adjustment range
	- For 4~20 Nm
	- For 20~100 Nm
	- For 40~200 Nm
Snap ring plier	Outer diameter
Nut ring disassembly and assembly jig	-

(3) Special tools



559A7TM50

4) ASSEMBLY

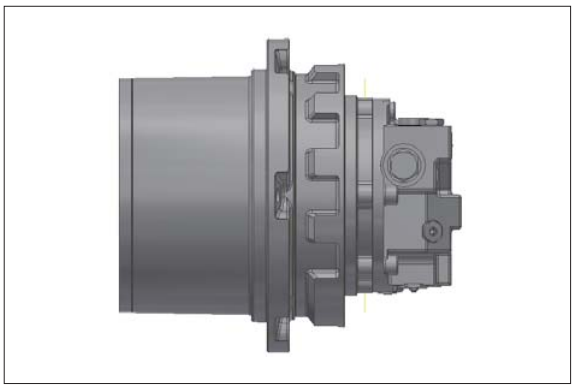
(1) Disassembly and assembly tips

① When disassembling, be careful not to damage the parts.

② Wash each part with washing oil and dry it with compressed air.

③ The numbers in parentheses after the part name represent the symbols of the cross-sectional drawing.

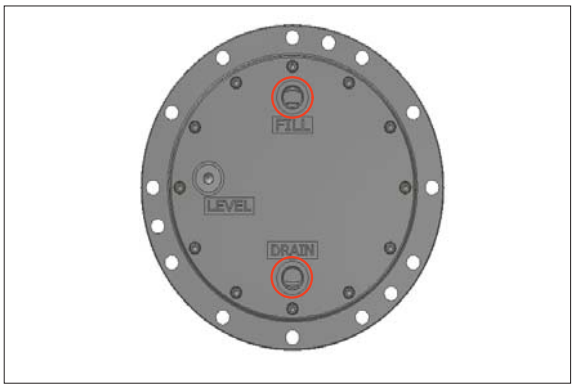
(2) Wrap a wire rope around the outside of the traveling device to lift it with a crane. Then wash with white kerosene. After washing, dry with compressed air.



559A7TM51

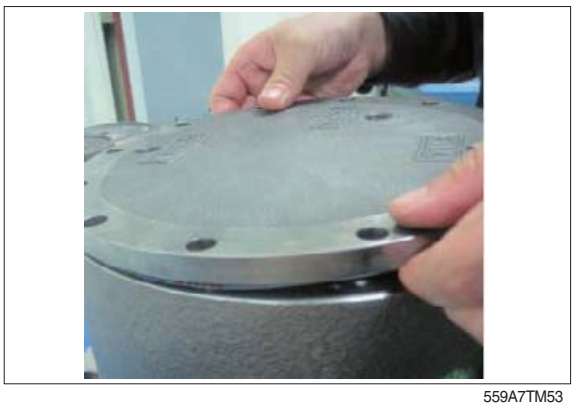
(3) Make sure that the fill plug (629) and drain plug (629) shown in the dimensional installation drawing are perpendicular to the horizontal plane.
Unplug both ports and remove the gear oil.
Place it on a suitable base.

※ Receive the gear oil in a clean container and inspect the presence and presence of wear powder.



559A7TM52

(4) Loosen the socket bolt (623) and disassemble the cover (602).



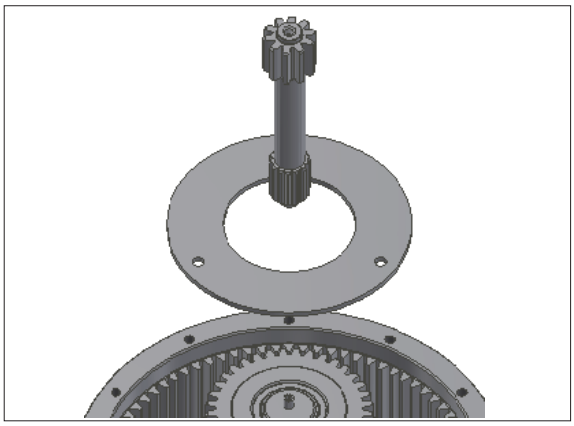
559A7TM53

※ Be careful not to damage the O-ring (619) of the cover during disassembly.

559A7TM54

(5) Disassemble thrust plate R (610), drive gear (608).

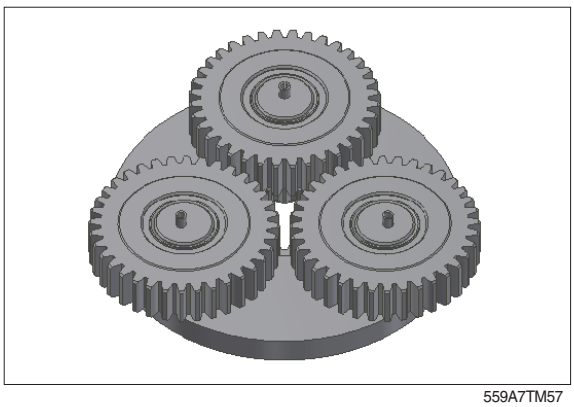
559A7TM55



559A7TM56

(6) Disassemble the No.1 holder assembly with the planetary gear R (606) attached.

※ No. 1 holder assy components are as follows.
- Holder (603)
- Spring pin (620)
- Planetary gear R (606)
- Needle bearing (616)
- Inner race (614)



559A7TM57

(7) Disassembly of No.1 holder assy

Do not disassemble the No.1 holder assy further.
In this state, check the parts according to the inspection instructions shown in section 6.
As mentioned above, it is recommended to exchange No.1 holder assy as a set as much as possible.
Please follow the instructions below when you are forced to exchange parts.

559A7TM58

① Disassemble in the order of planetary gear R (606) → Needle bearing (616) → Inner race (614).

② Unplug the spring pin.

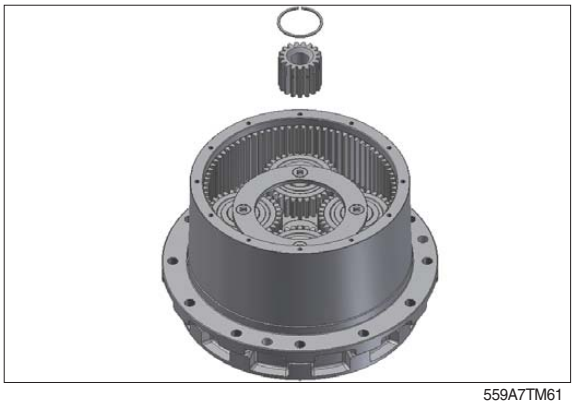
※ Mark each planetary gear, needle bearing, and inner race in the assembled position so that each combination and assembly position does not change.

※ When disassembling the spring pin, do not reuse it.

559A7TM59

(8) Disassemble the sun gear (607).
Then, the snap ring (621) is separated from the sun gear (607) using a snap ring pliers.

559A7TM60



559A7TM61

(9) Disassemble the No.2 holder assy.

(10) Disassembly of No.2 holder assy

Do not disassemble any more No.2 holder assy unless otherwise specified.

In this state, check the parts according to the inspection instructions shown in section 6.

As mentioned above, it is recommended to exchange No.2 holder assy as a set as much as possible.

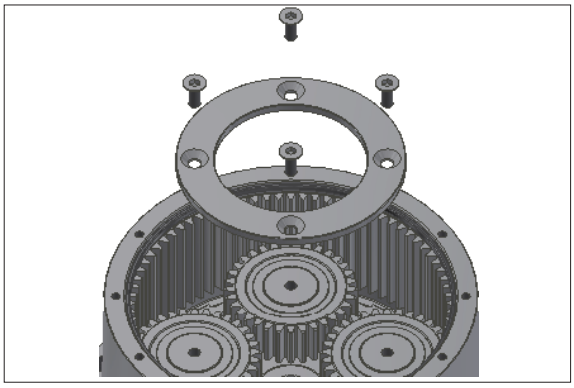
Please follow the instructions below when you are forced to exchange parts.

559A7TM62

① Apply enough heat to ext flush bolt(624)

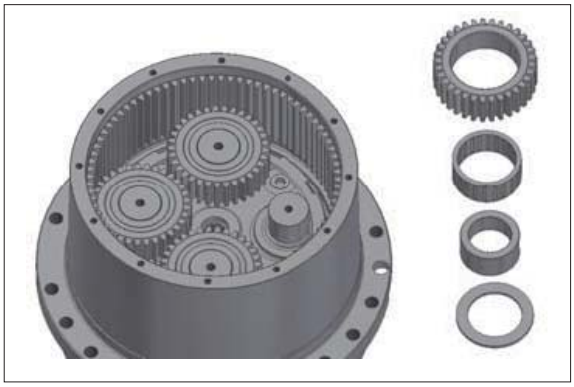
② Disassemble thrust plate F (609).

③ Disassemble in the order of thrust plate F (609) → Planetary gear F (605) → Needle bearing (615) → Collar (613) → Thrust washer (611)



559A7TM63

※ Mark each planetary gear, needle bearing, and inner race in the assembled position so that each combination and assembly position does not change.



559A7TM64

(11) Do not disassemble any further unless there is a specific problem.

In this condition, check the parts according to the inspection instructions shown in Section 1-2.

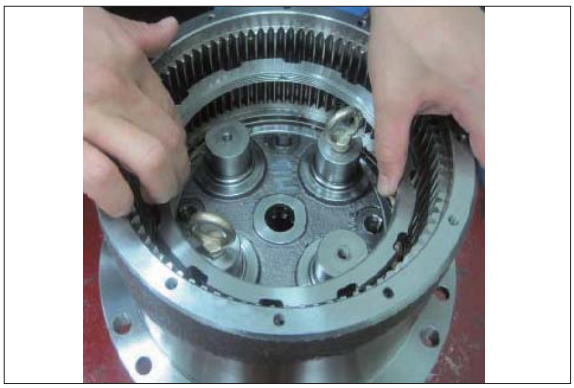
※ If there is no problem after checking in this step, the following disassembly is not necessary.

(12) Disassemble pipe plug (625).

※ When disassembling the pipe plug (625), Do not reuse.

559A7TM65

(13) Disassemble the nut ring (604).



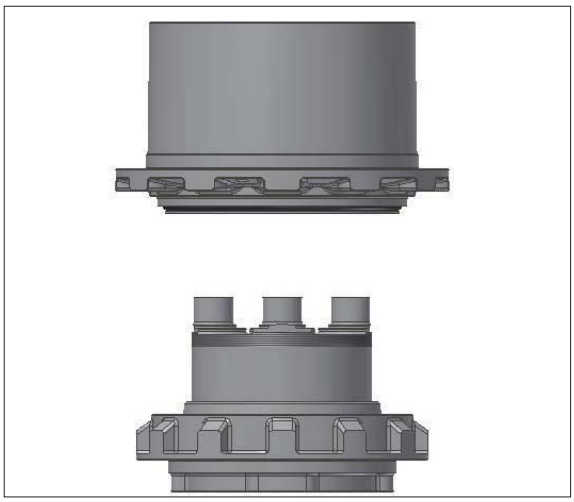
559A7TM66

※ Please disassemble the nut ring using the dedicated jig referring to the attachment.

559A7TM67

(14) Disassemble casing (202) from housing (601).

559A7TM68



559A7TM69

(15) After disassembling the pipe plug (626), remove the steel ball (622).

※ The number of steel ball is 105.
When disassembling, be sure to check the number of balls.

559A7TM70

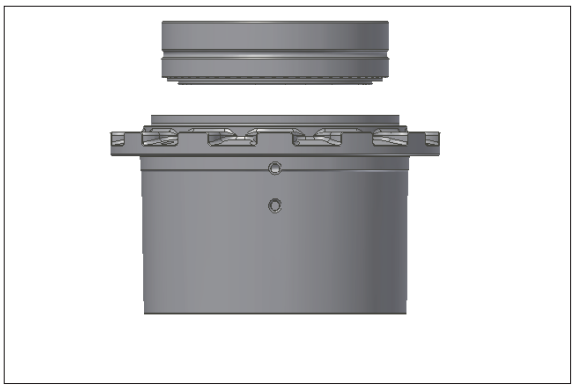
(16) Disassemble the floating seal kit (618).

559A7TM71

(17) Disassemble angular bearing (617).

559A7TM72

※ Use a press for disassembly.



559A7TM73

※ The disassembly process is finished.

5) ASSEMBLY

(1) After placing angular bearing (617) on housing (601), press the angular bearing (617) using a press.

559A7TM72

※ Assemble the protrusion of the inner ring face down.

559A7TM73

(2) Insert 105ea steel ball (622) into housing (601) and tighten the pipe plug (626).

※ Pipe plug is assembled by wrapping Teflon tape.
After assembling the pipe plug, check if the cloud condition of the angular bearing is smooth.

(3) Assemble the floating seal kit (618) using dedicated jig for casing (202) and housing (601).

559A7TM74

※ Before assembling, check the metal surface of the floating seal for cracks, dents, and O-ring damage.
Do not apply oil to the floating seal rubber part.
After assembling the floating seal, check if there are any deviations.

559A7TM75

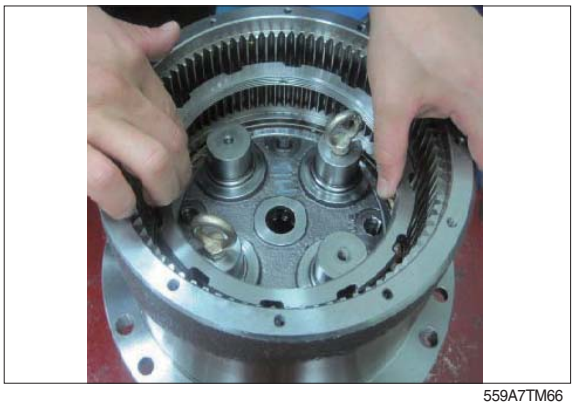
(4) Using a press, assemble the housing sub on the casing (202).

※ Floating seal are located on the same circumference.
Rotate so that the floating seal is in place.

559A7TM68

(5) Use the nut ring disassembly jig to assemble the nut ring (604).

※ After tightening, check the gap between casing and housing (0.5 ~1.5 mm) with a gauge.

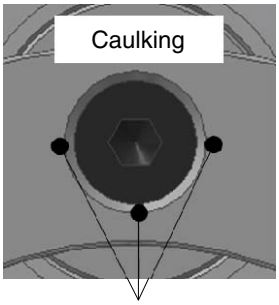


559A7TM66

(6) Tighten pipe plug (625).

559A7TM65

※ Caulking is performed to prevent loosening around the assembly.

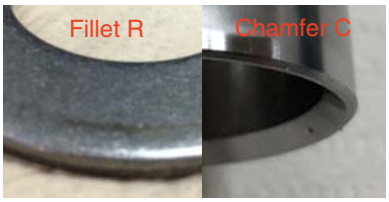


559A7TM76

(7) Assemble the No. 2 holder assy
Assemble in the order of thrust washer (611) → Collar (613) → Needle bearing (615) → Planetary gear F (605)

559A7TM64

※ The thrust washer R part is assembled in the bearing direction and the chamfered part of the collar is assembled in the casing direction.



559A7TM77

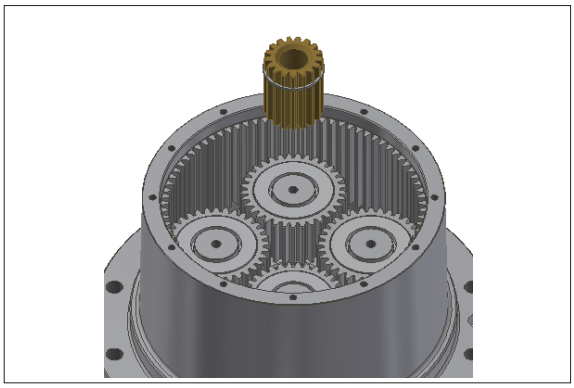
(8) Assemble the thrust plate F (609), ext flush bolt (624).

※ Assemble ext flush bolt by applying loctite in the axial direction.

559A7TM60

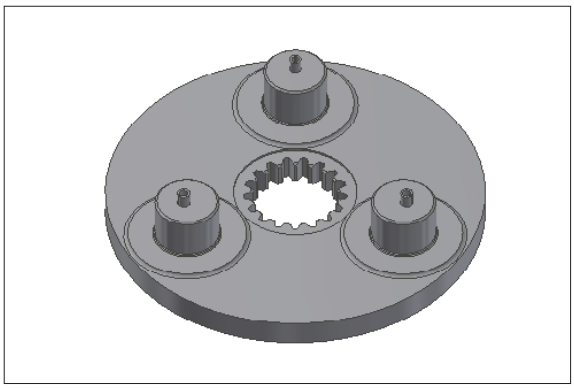
(9) Fasten snap ring (621) to sun gear (607) using snap ring pliers. And assemble in the center of planetary gear F.

※ Assemble R part of snap ring toward cover.
Sun gear is assembled with the long end facing toward casing.



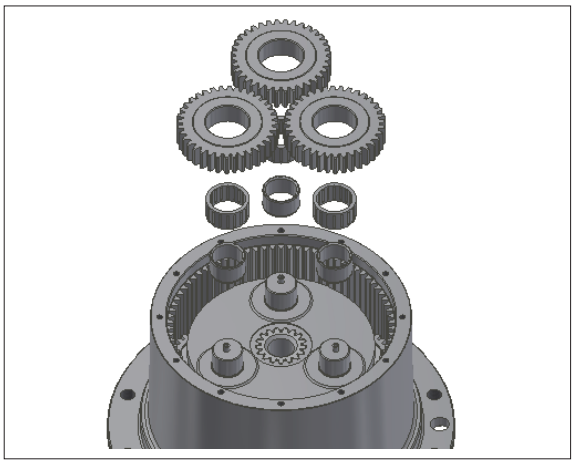
559A7TM78

(10) Assemble the No.1 holder assy.
Assemble spring pin (620) to holder (603).



559A7TM79

(11) Assemble the holder sub to the sun gear (607).
Then, assemble inner race (614) → Needle bearing (616) → planetary gear R.



559A7TM80

※ When assembling planetary gear R, assemble the convex part in the direction of thrust plate R.

※ Check the rotation status.

559A7TM81

(12) Assemble drive gear (608) and thrust plate R (610).

559A7TM55

(13) Assemble the O-ring (619), side plate A (627) and side plate B (628) on the cover (602).

※ After assembling the side plate B, remove any debris from the side.

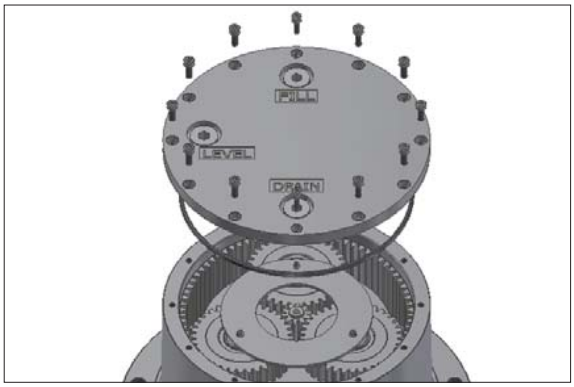
559A7TM82

(14) Assemble cover sub to housing.

559A7TM53

(15) Assemble the socket bolt (623).

※ Assemble by applying loctite in the direction of the socket bolt axis.



559A7TM54

※ The assembly process is finished.

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.**

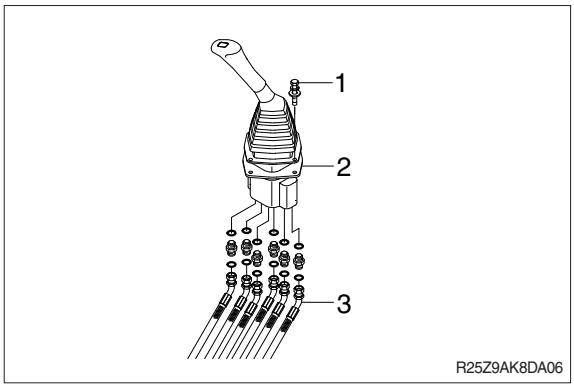
(4) Loosen the socket bolt(1).

(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.



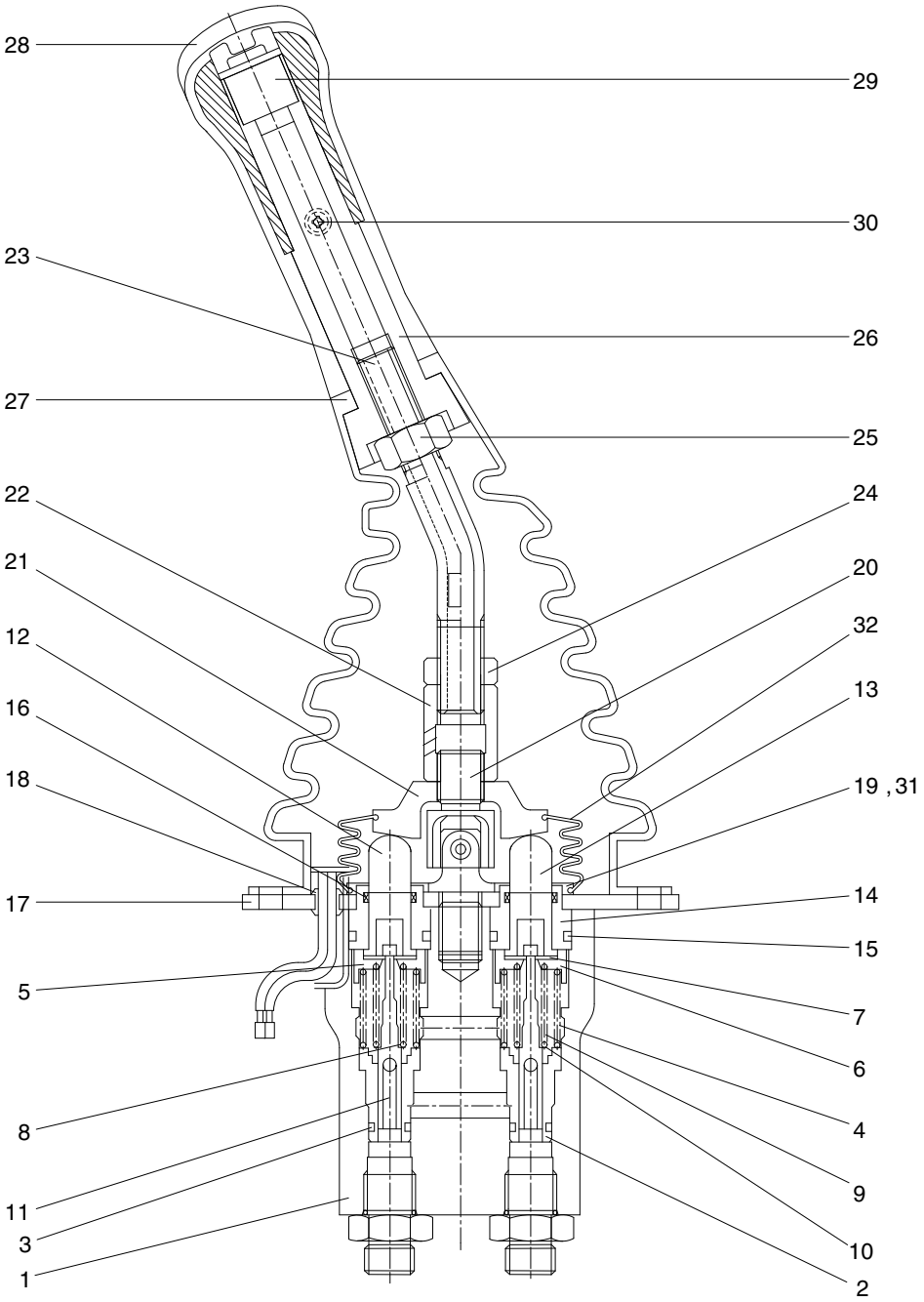
2) INSTALL

(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)

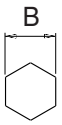
1) STRUCTURE



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	

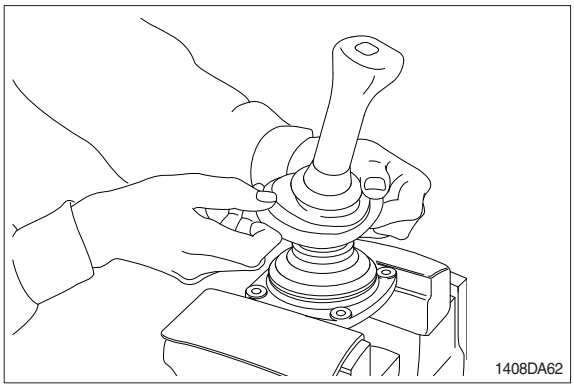
3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

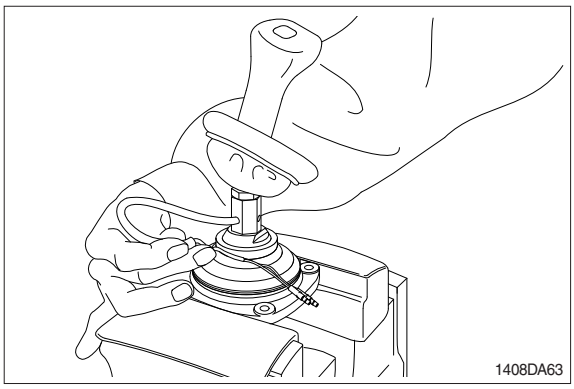
※ Put blind plugs into all ports.

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

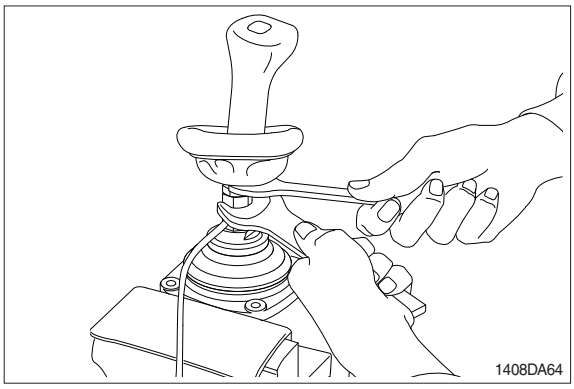
(3) Remove end of boot (32) from case (1) and take it out upwards.



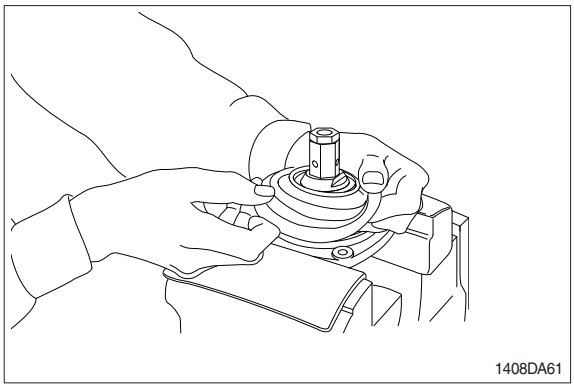
※ For valve with switch, remove cord also through hole of casing.



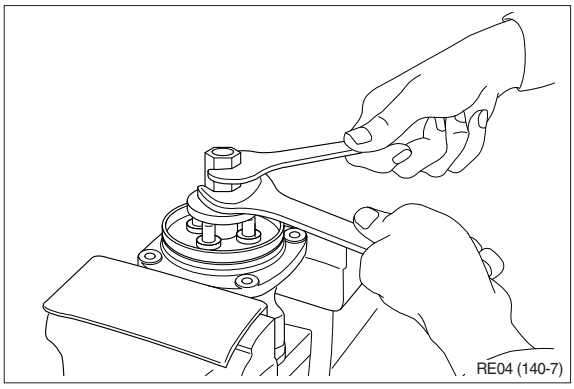
(4) Loosen lock nut (24) and adjusting nut (22) with spanners on them respectively, and take out handle section as one body.

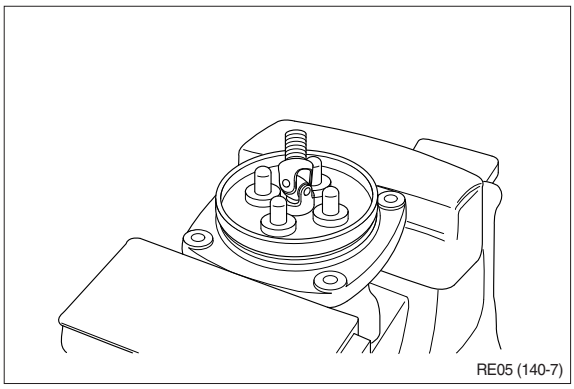


(5) Remove the boot (32).



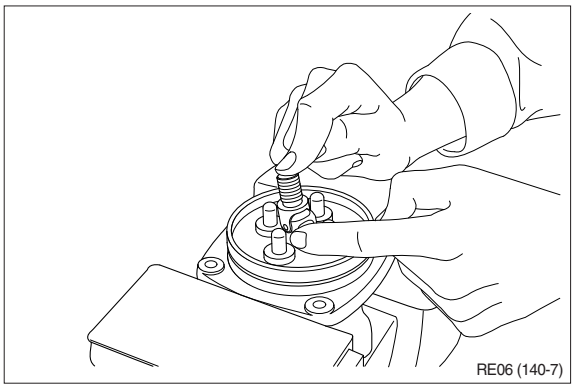
(6) Loosen adjusting nut(22) and plate(31) with spanners on them respectively, and remove them.

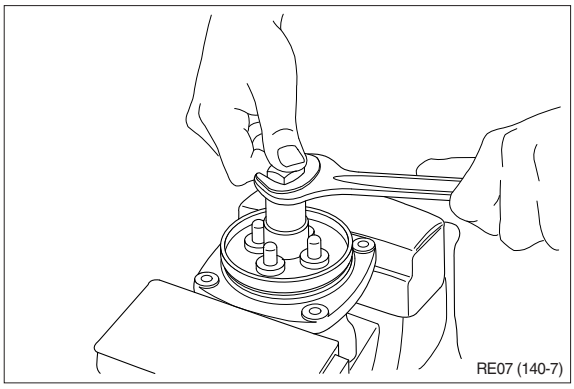

RE04 (140-7)


RE05 (140-7)

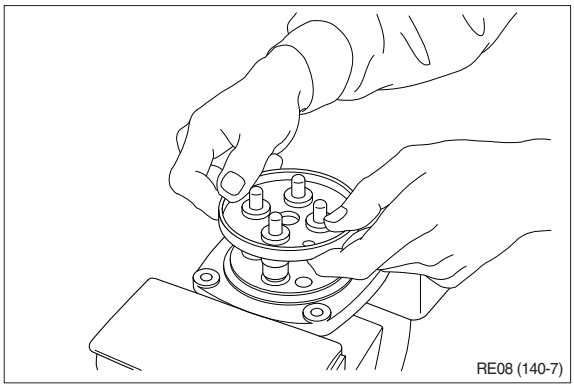
(7) Turn joint anticlockwise to loosen it, utilizing jig (special tool).

※ 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.


RE06 (140-7)


RE07 (140-7)

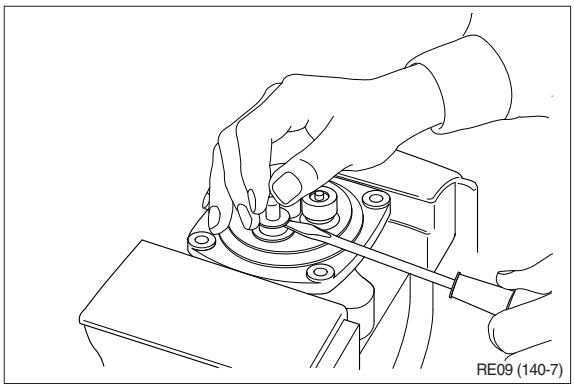
(8) Remove plate (31).


RE08 (140-7)

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

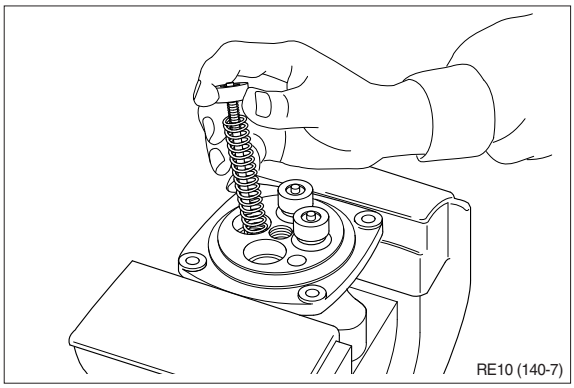
※ Take it out with minus screwdriver.
Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.

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

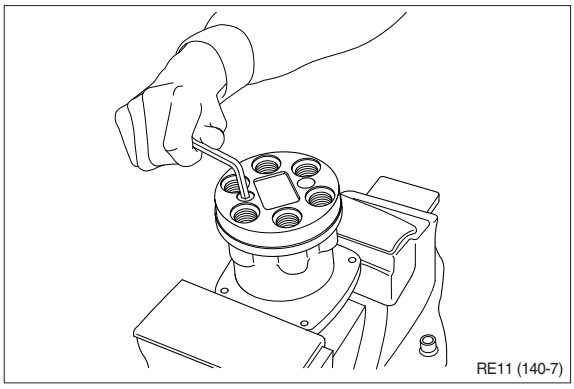

RE09 (140-7)

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

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


RE10 (140-7)

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

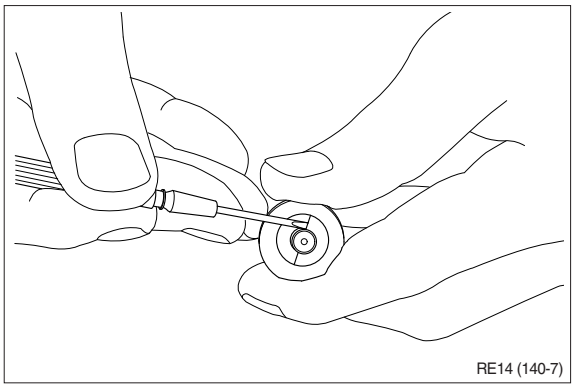

RE11 (140-7)

(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.

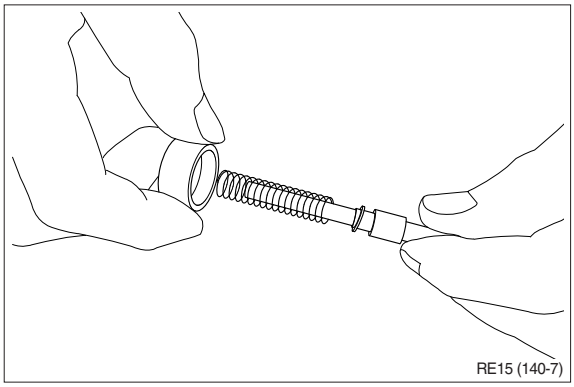
※ Record original position of spring seat (5, 6).

※ Do not push down spring seat more than 6 mm.

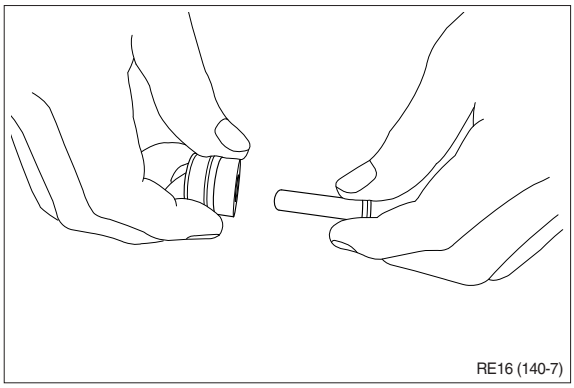

RE14 (140-7)

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

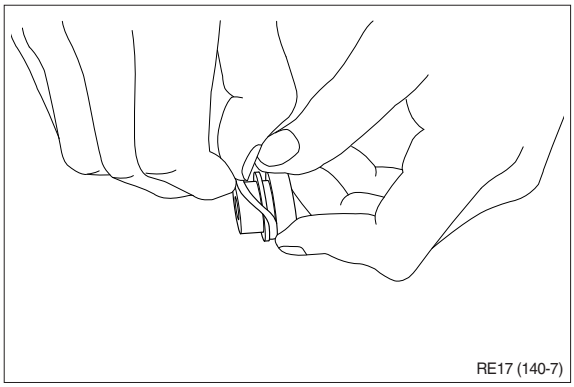
※ Until being assembled, they should be handled as one subassembly group.

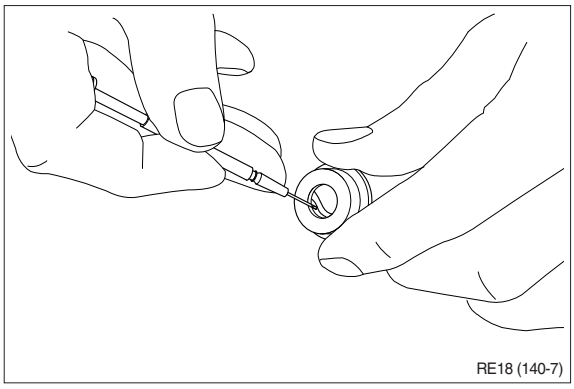

RE15 (140-7)

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

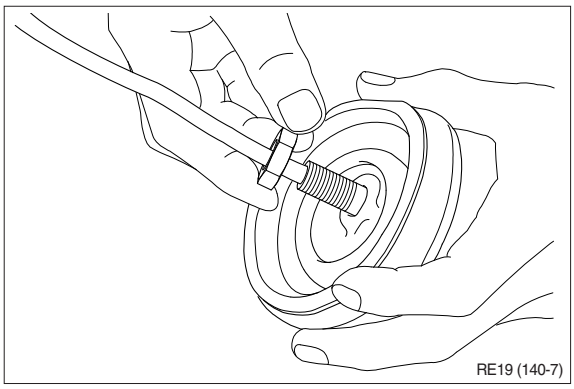

RE16 (140-7)

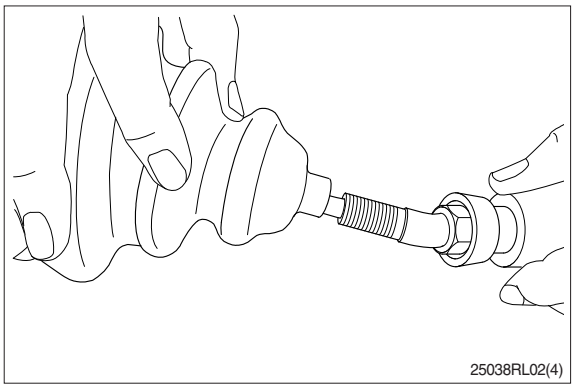
(15) Remove O-ring (15) and seal (16) from plug (14).
Use small minus screwdriver or so on to remove this seal.


RE17 (140-7)



(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.

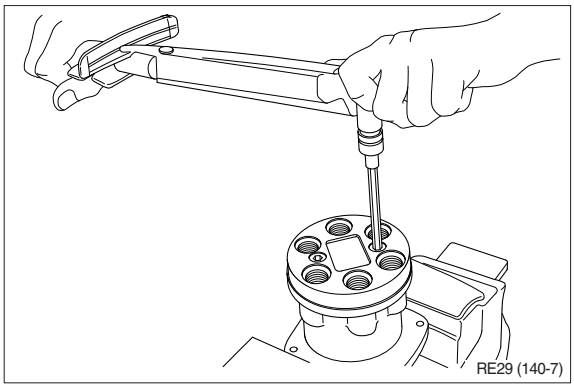
(18) Rust prevention of parts.
Apply rust-preventives to all parts.

※ If left as they after being cleaned, they will be rusted and will not display their functions fully after being reassembled.

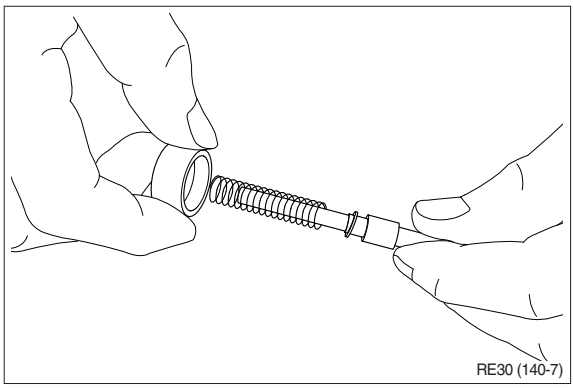
4) ASSEMBLY

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

※ Tighten two bolts alternately and slowly.

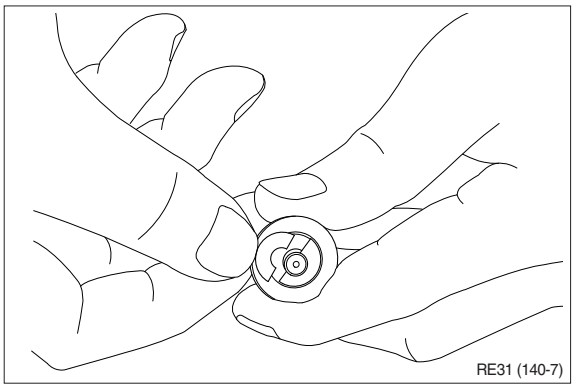

RE29 (140-7)

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


RE30 (140-7)

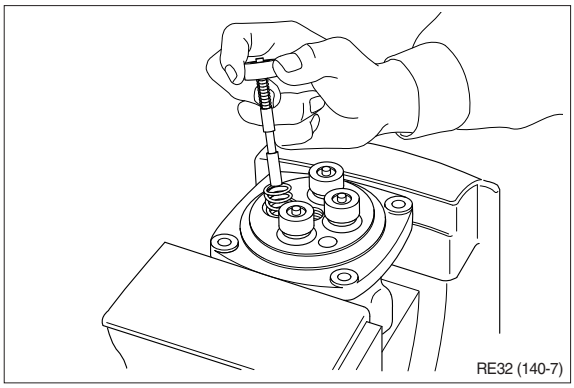
(3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper (7) on spring seat without piling them on.

※ 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.

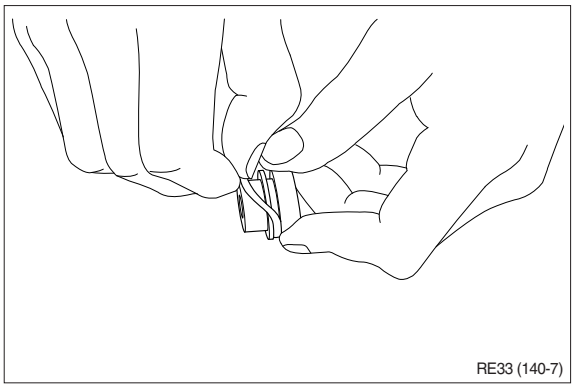

RE31 (140-7)

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

※ Assemble them to their original positions.

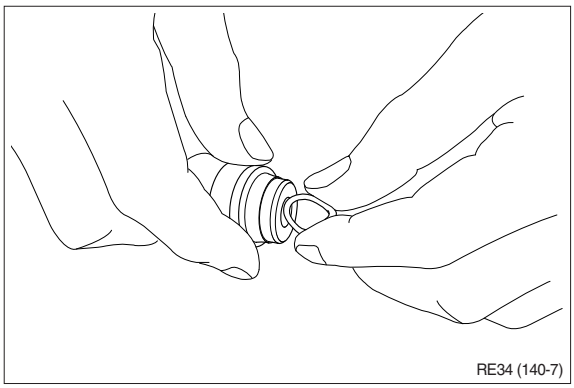

RE32 (140-7)

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


RE33 (140-7)

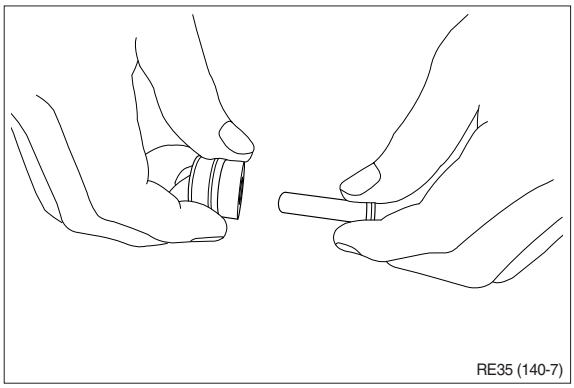
(6) Assemble seal (16) to plug (14).

※ Assemble seal in such lip direction as shown below.


RE34 (140-7)

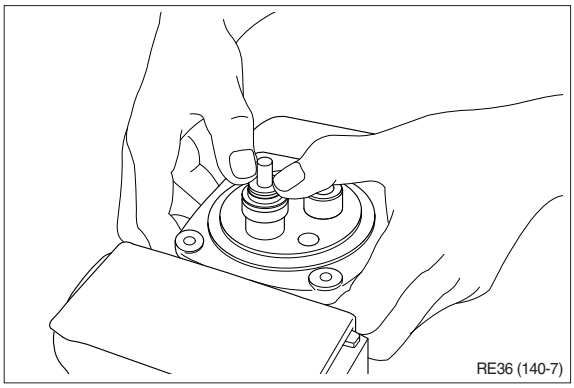
(7) Assemble push rod (12, 13) to plug (14).

※ Apply working oil on push-rod surface.


RE35 (140-7)

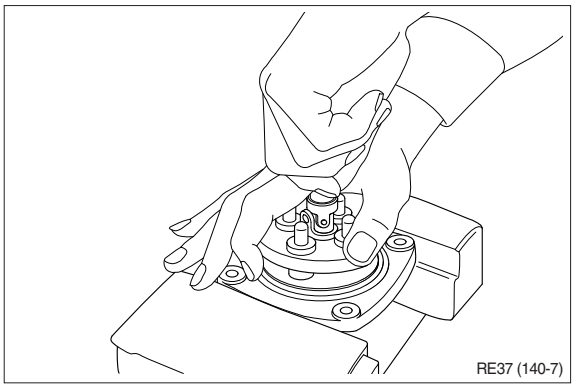
(8) Assemble plug subassembly to casing.

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

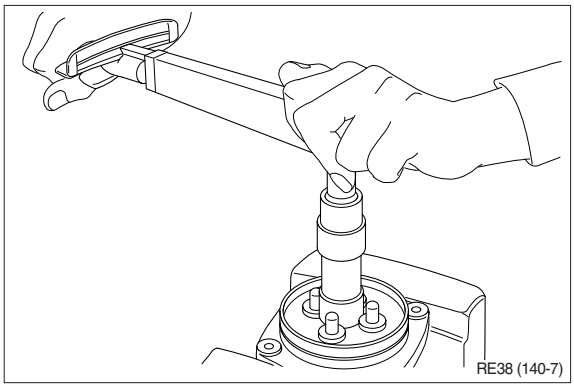

RE36 (140-7)

(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).


RE37 (140-7)

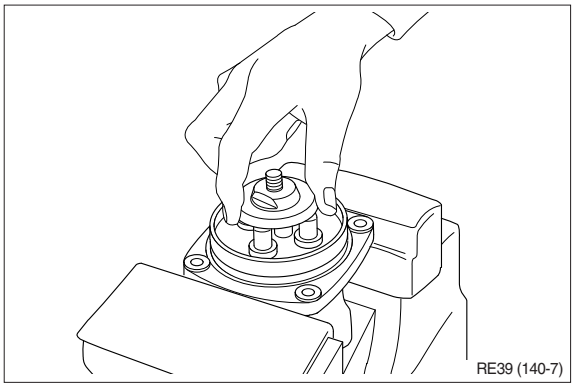
(11) Tighten joint (20) with the specified torque to casing, utilizing jig.


RE38 (140-7)

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

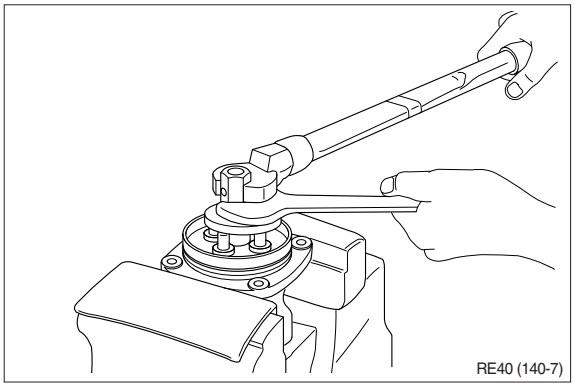
※ Screw it to position that it contacts with 4 push rods evenly.

※ Do not screw it over.

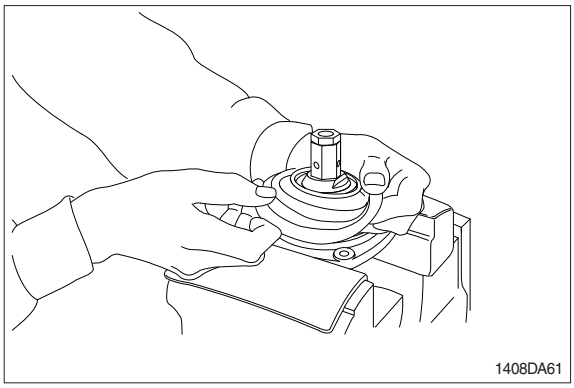

RE39 (140-7)

(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.

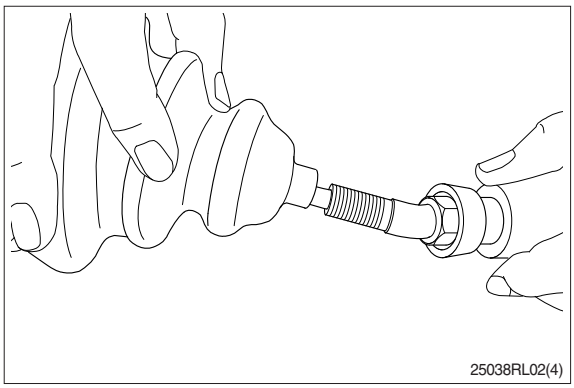
※ During tightening, do not change position of disk.

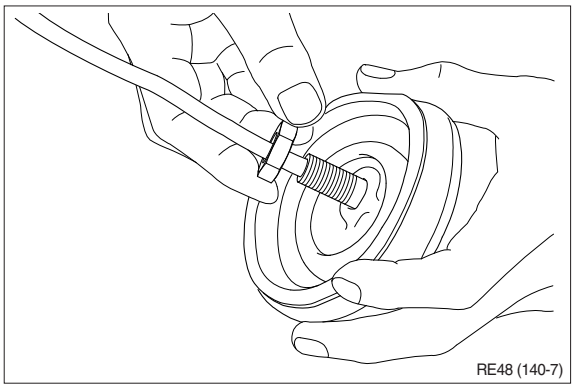

RE40 (140-7)

(14) Fit boot (32) to plate.

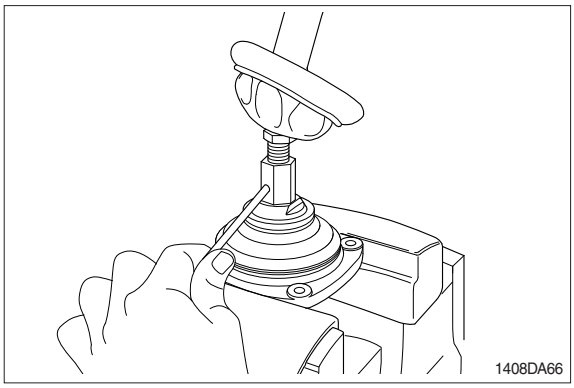


(15) Fit boot (27) and lock nut (24), and handle subassembly is assembled completely.



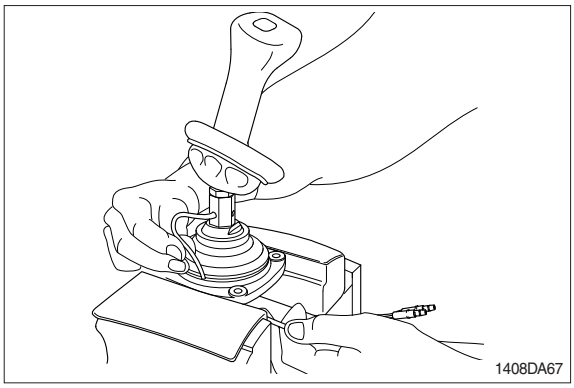


(16) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.

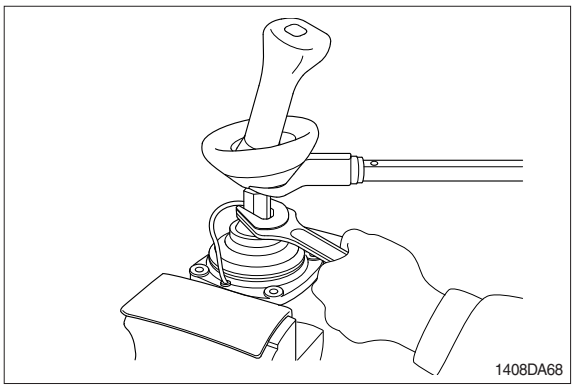


(17) Assemble bushing (18) to plate and pass cord and tube through it.

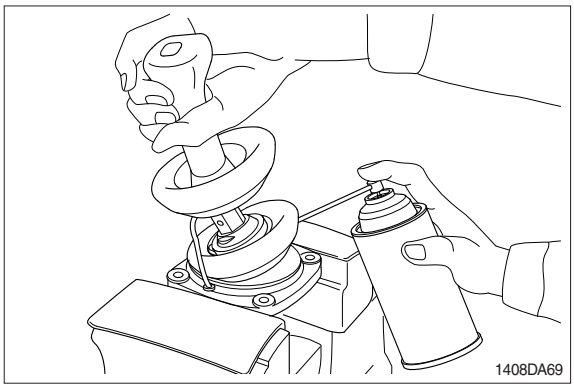
※ Provide margin necessary to operation.



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

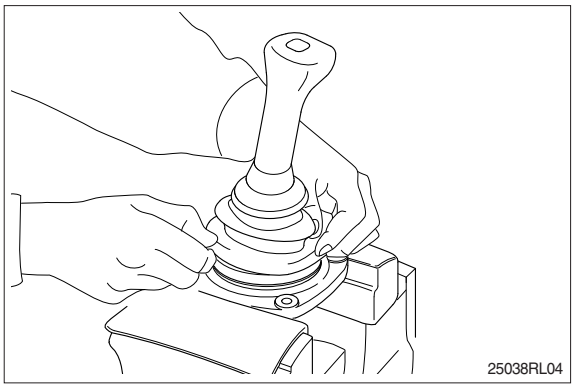


(19) Apply grease to rotating section of joint and contacting faces of disk and push rod.



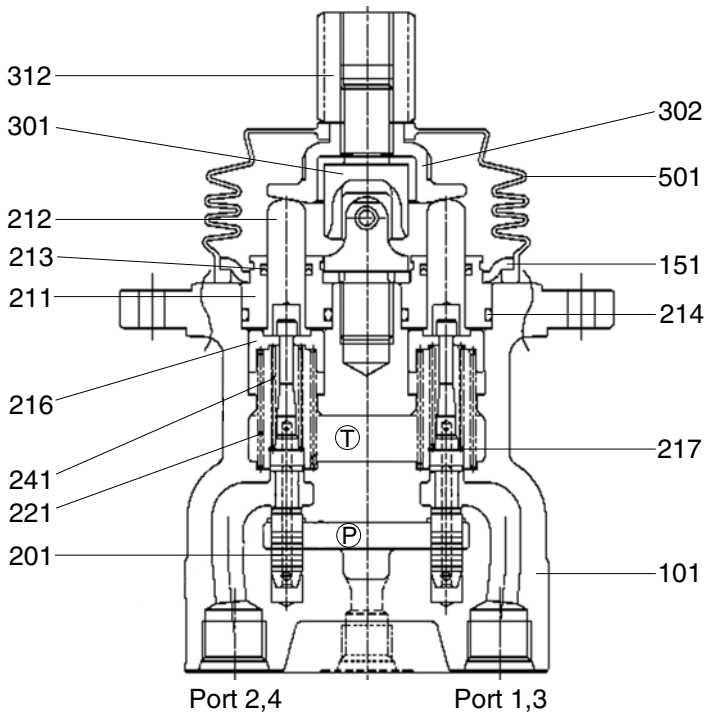
(20) Assemble lower end of bellows to casing.

(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.

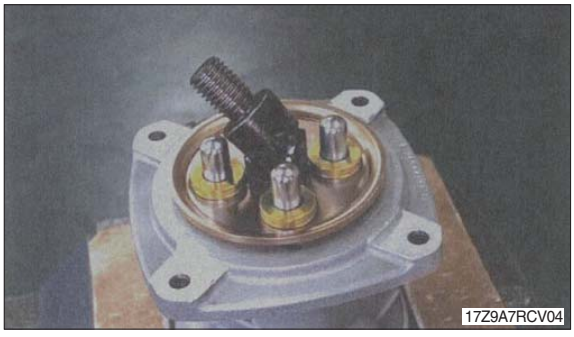
※ Place blind plug in all ports.

(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).

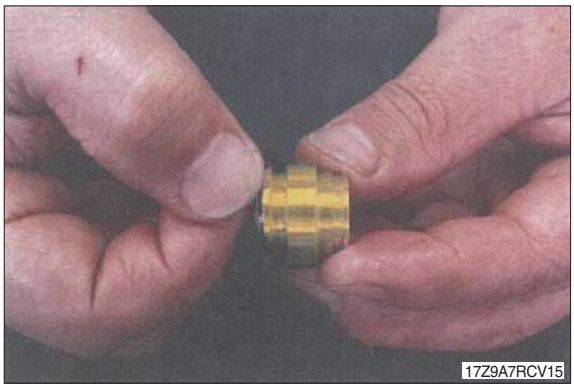
(10) Take the spool (201), spring seat (216), secondary pressure spring (241) and washer #2 (217) apart.

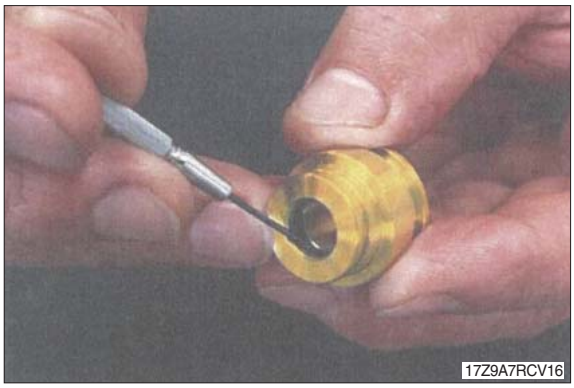
※ Take care not to damage the surface of the spool (201).

※ 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 that 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.

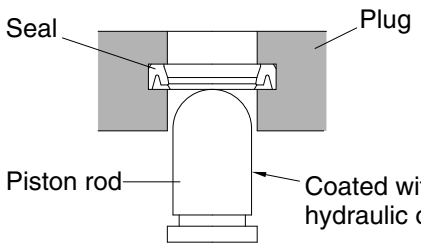
(4) Fit the O-ring (214) into the plug (221).

(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.



Push rod, plug & seals

17Z9A7RCV32

⚠ **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 mishandling. 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, 14, 16, 26, 50, 51, 52).

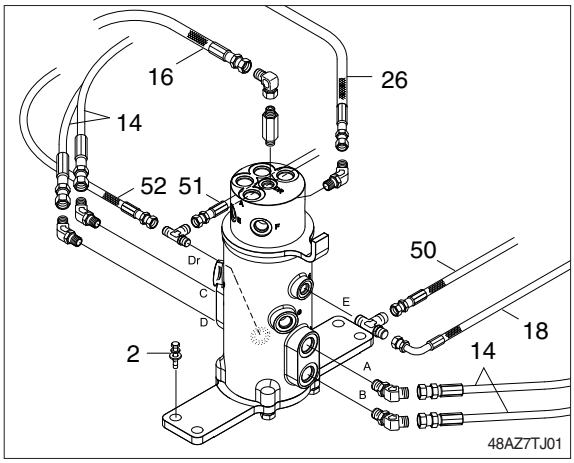
(5) Sling the turning joint assembly (1) and remove the mounting bolt (2).

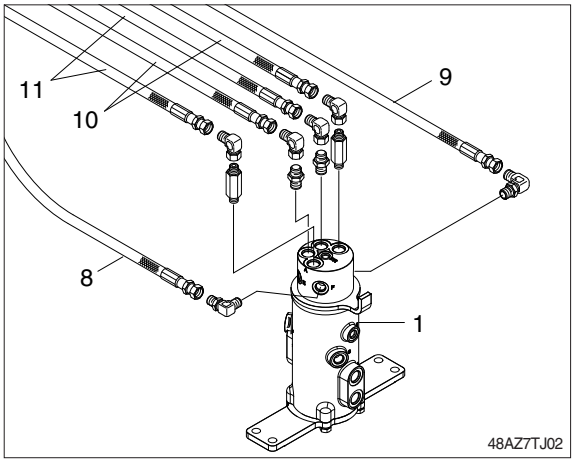
· Weight : 26 kg (57 lb)

· Tightening torque : 6.9 ± 1.4 kgf · m (49.9 ± 10.1 lbf · 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.

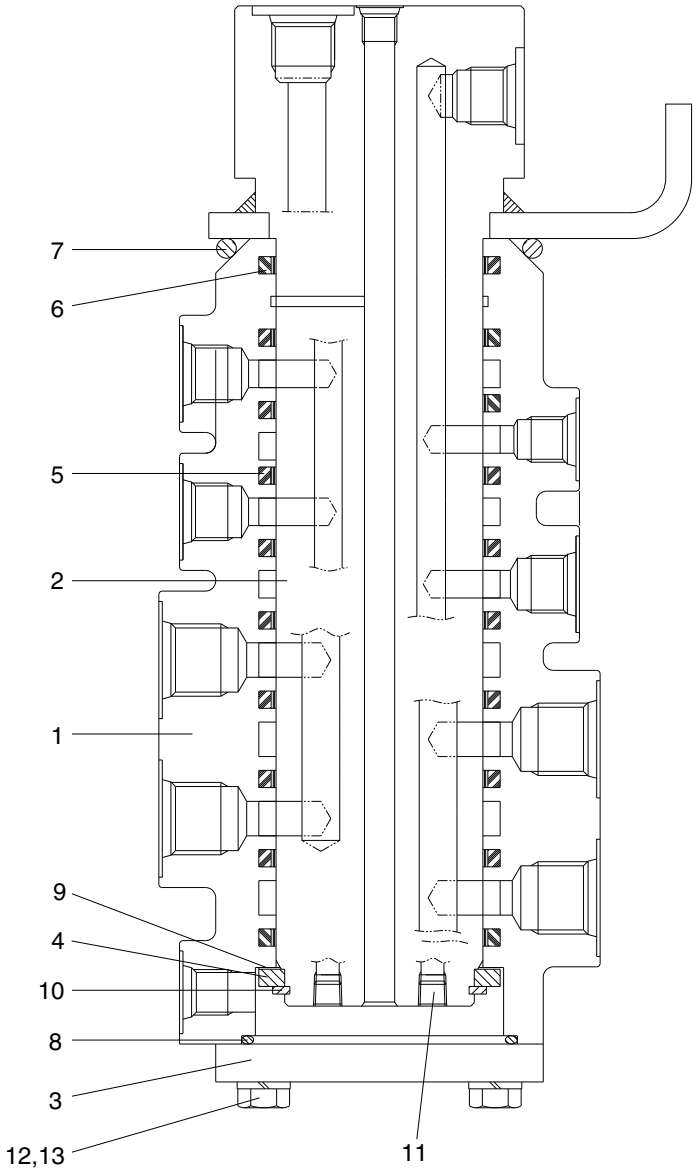
※ Take care of turning joint direction.

※ 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



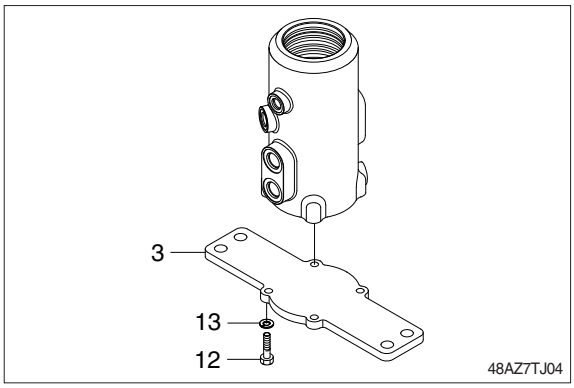
31MT-40051

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

2) DISASSEMBLY

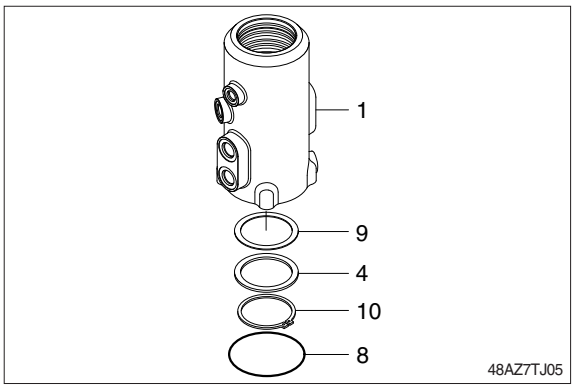
※ Before the disassembly, clean the turning joint.

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



(2) Remove O-ring (8).

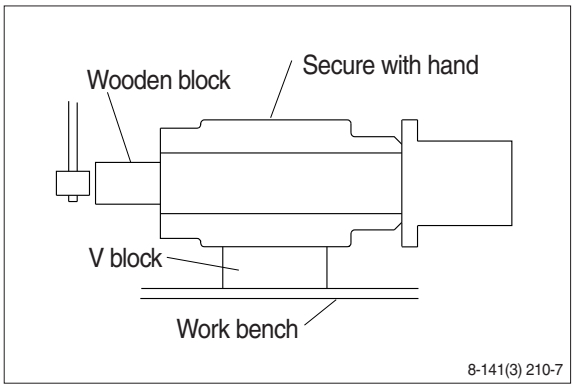
(3) Remove retainer ring (10), ring (4) and shim (9).



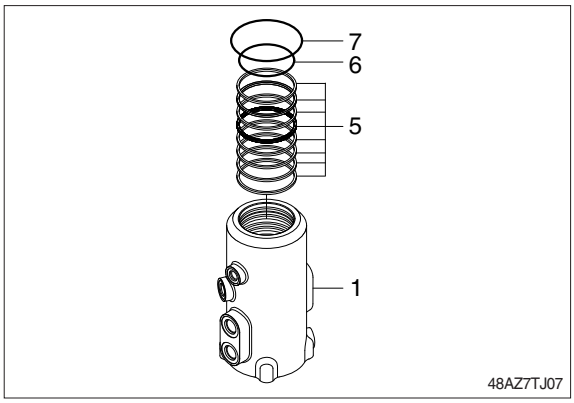
(4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

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

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



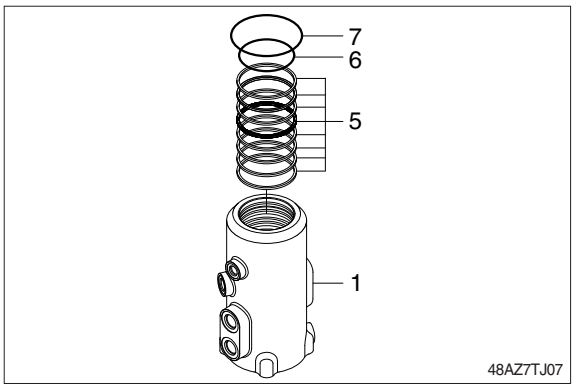
(5) Remove eight slipper seals (5) and O-ring (6, 7) from hub (1).



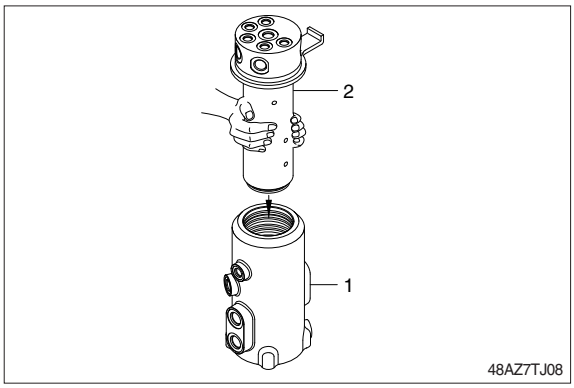
3) ASSEMBLY

※ 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).

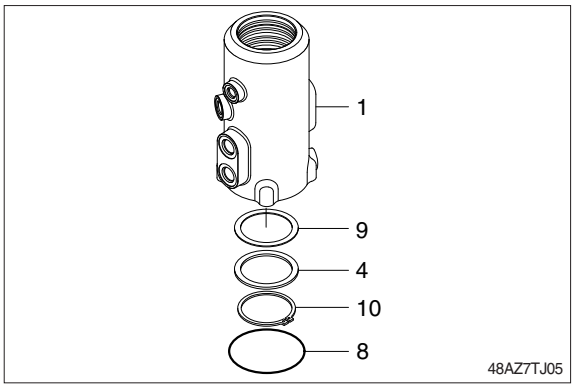


(2) Set hub (1) on block, install shaft (2) into hub (1) by hand.

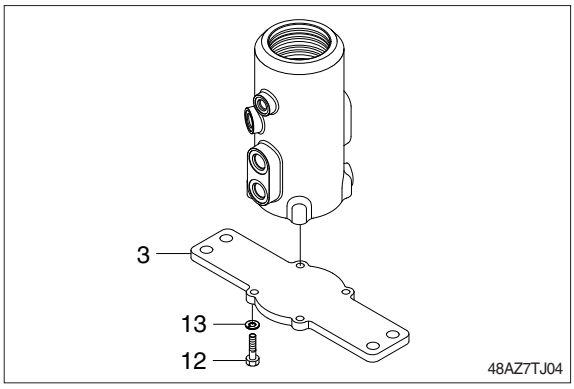


(3) Fit ring (4), shim (9) and retainer ring (10) to shaft (2).

(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)



1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

(1) Removal

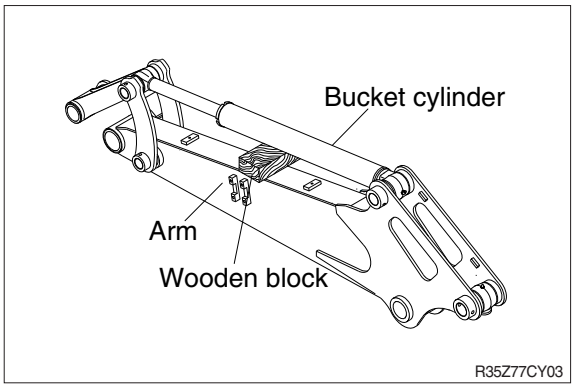
※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

※ 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.

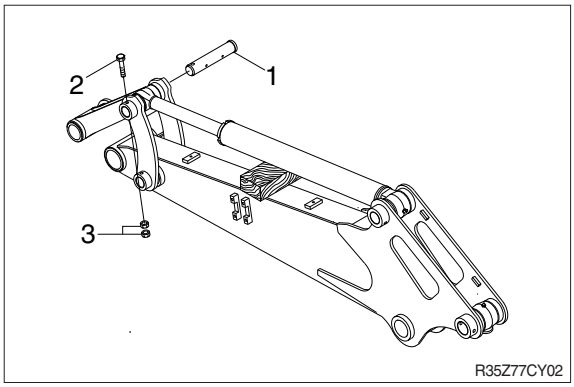
① Set block between bucket cylinder and arm.



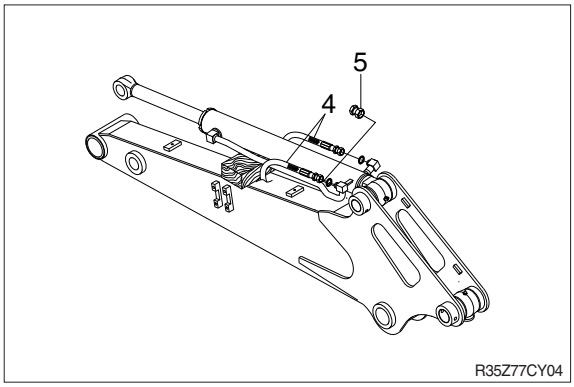
② Remove bolt (2), nut (3) and pull out pin (1).

· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

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

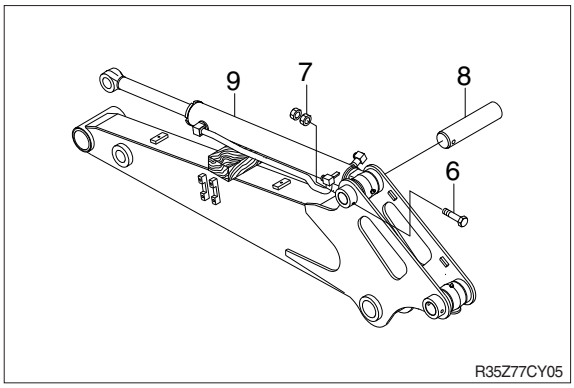


③ Disconnect bucket cylinder hoses (4) and put plugs (5) on cylinder pipe.



④ Sling bucket cylinder assembly (9) and remove bolt (6) and nut (7) then pull out pin (8).
· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

⑤ Remove bucket cylinder assembly (9).
· Weight : 32 kg (71 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.

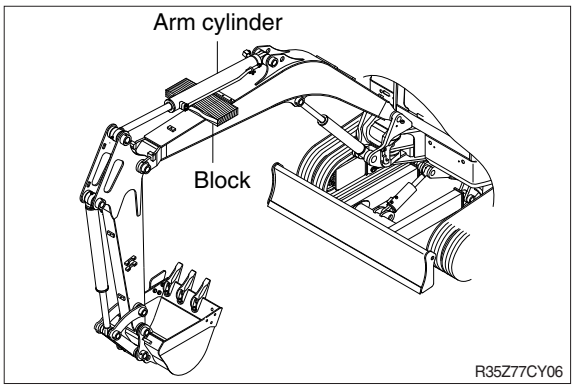
※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

⚠ 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.

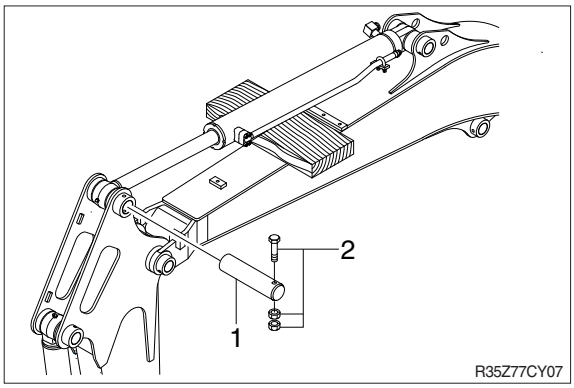
① Set block between arm cylinder and boom.



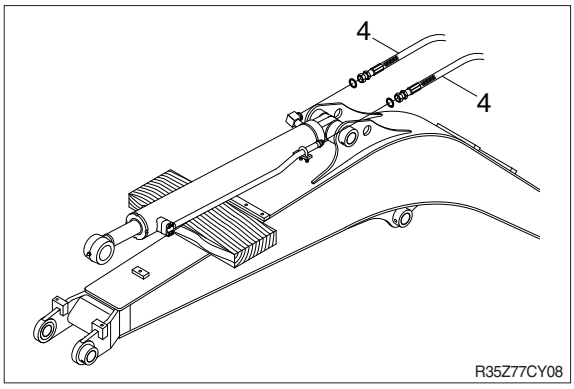
② Remove bolt and nut (2) and pull out pin (1).

· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

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

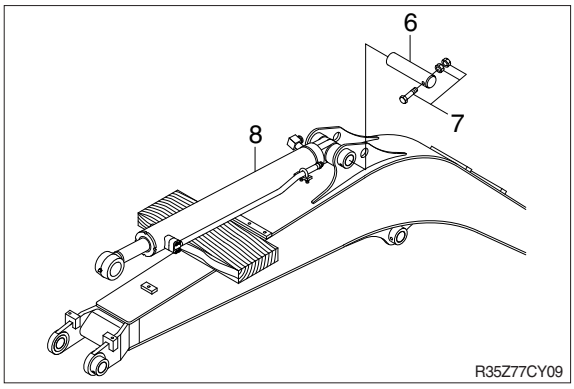


③ Disconnect arm cylinder hoses (4) and put plugs on cylinder pipe.



⑤ Sling arm assembly (8) and remove bolt and nut (7) then pull out pin (6).
· Tightening torque : 12.8±3.0 kgf·m
(92.6±21.7 lbf·ft)

⑥ Remove arm cylinder assembly (8).
· Weight : 43 kg (95 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.

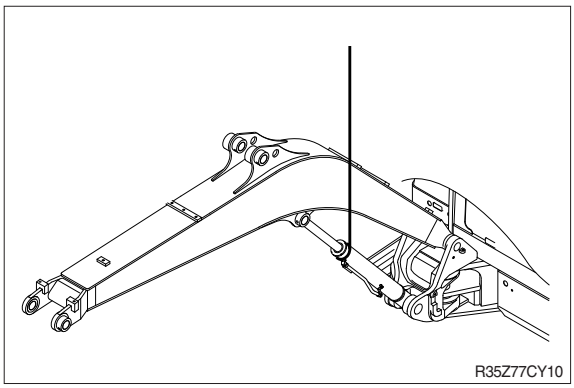
※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

⚠ 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.

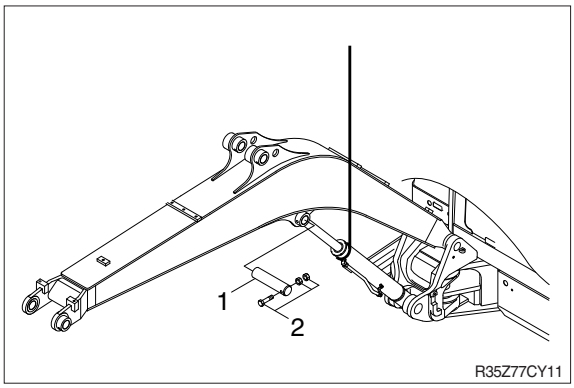
① Sling boom cylinder assembly.



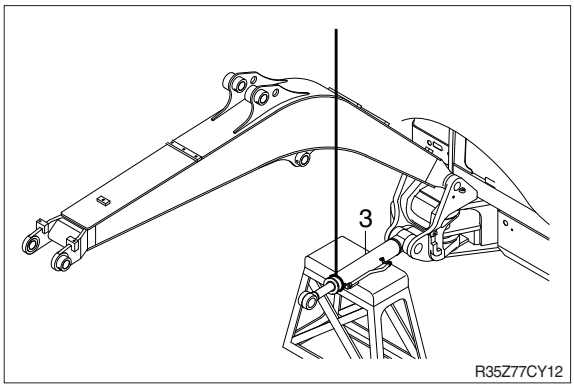
③ Remove bolt and nut (2) and pull out pin (1).

· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

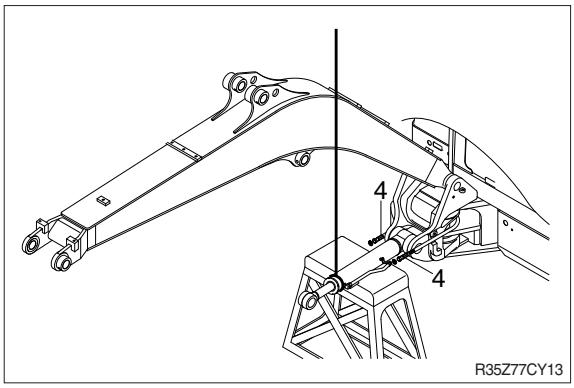
※ Tie the rod with wire to prevent it from coming out.



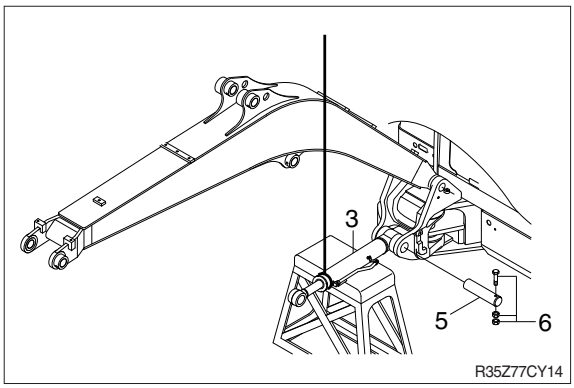
④ Lower the boom cylinder assembly (3) on a stand.



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±1.4 kgf·m
(49.9±10.1 lbf·ft)
⑦ Remove boom cylinder assembly (3).
· Weight : 49 kg (108 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.

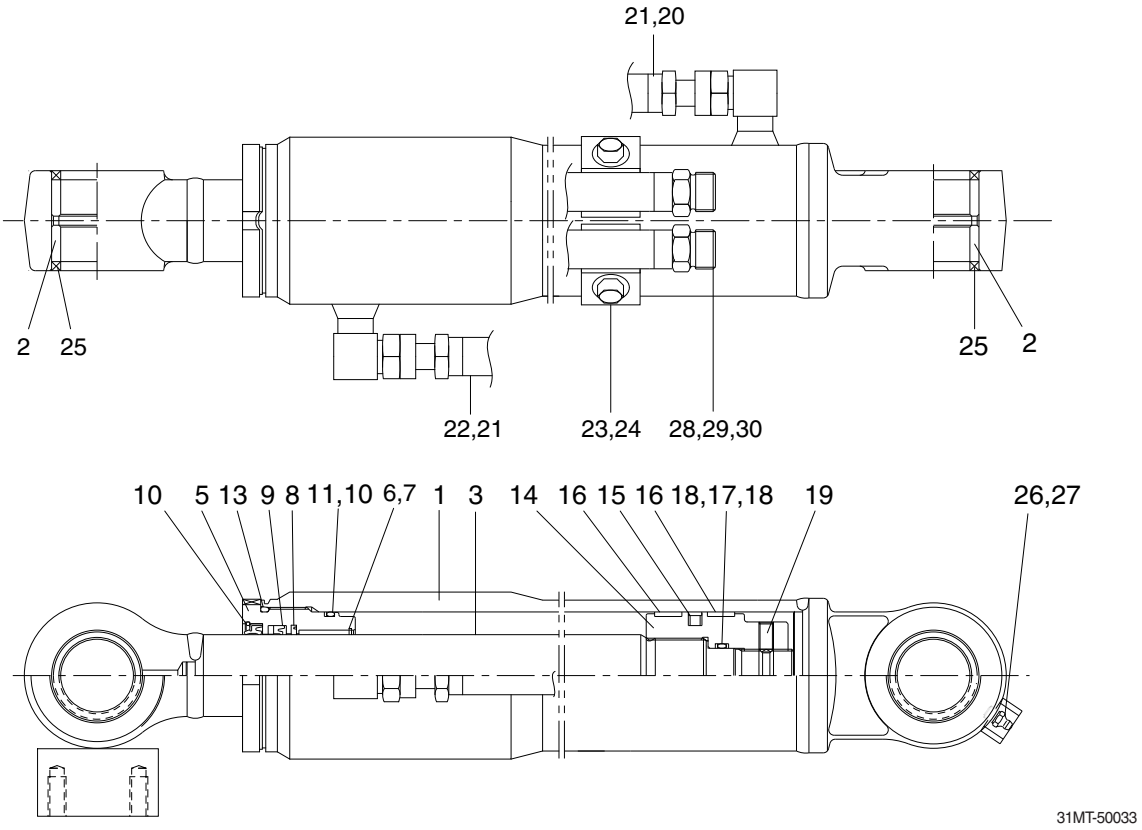
※ Bleed the air from the boom cylinder.

※ Conformed the hydraulic oil level and check the hydraulic oil leak or not.

2. DISASSEMBLY AND ASSEMBLY

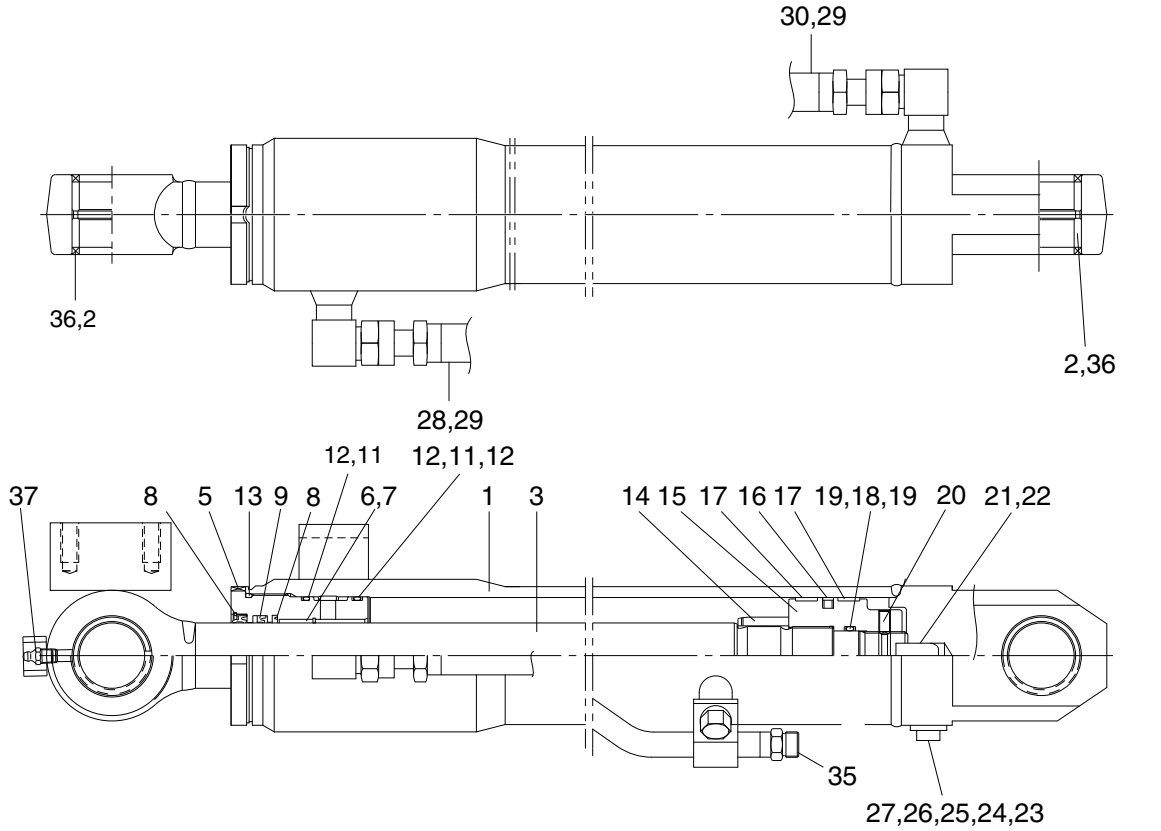
1) STRUCTURE

(1) Bucket cylinder



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

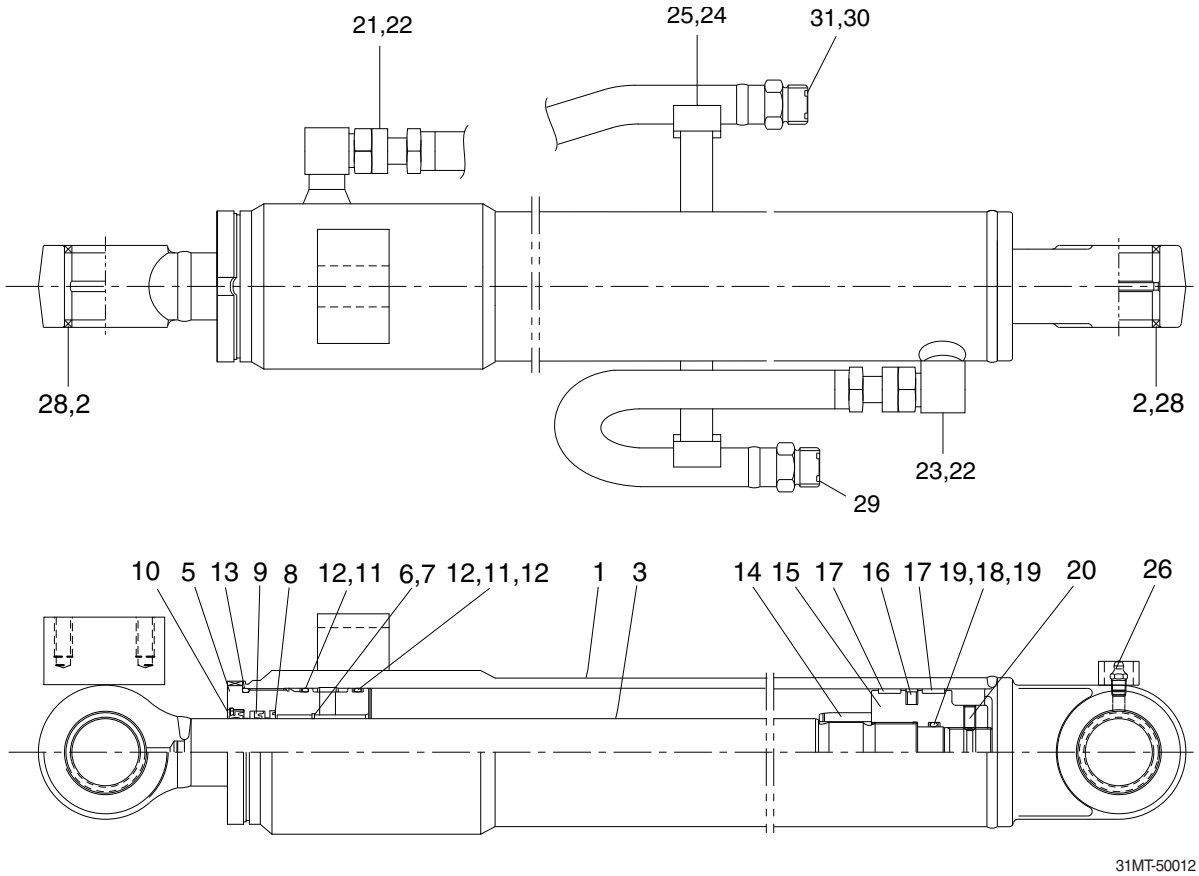
(2) Arm cylinder



31MT-50023

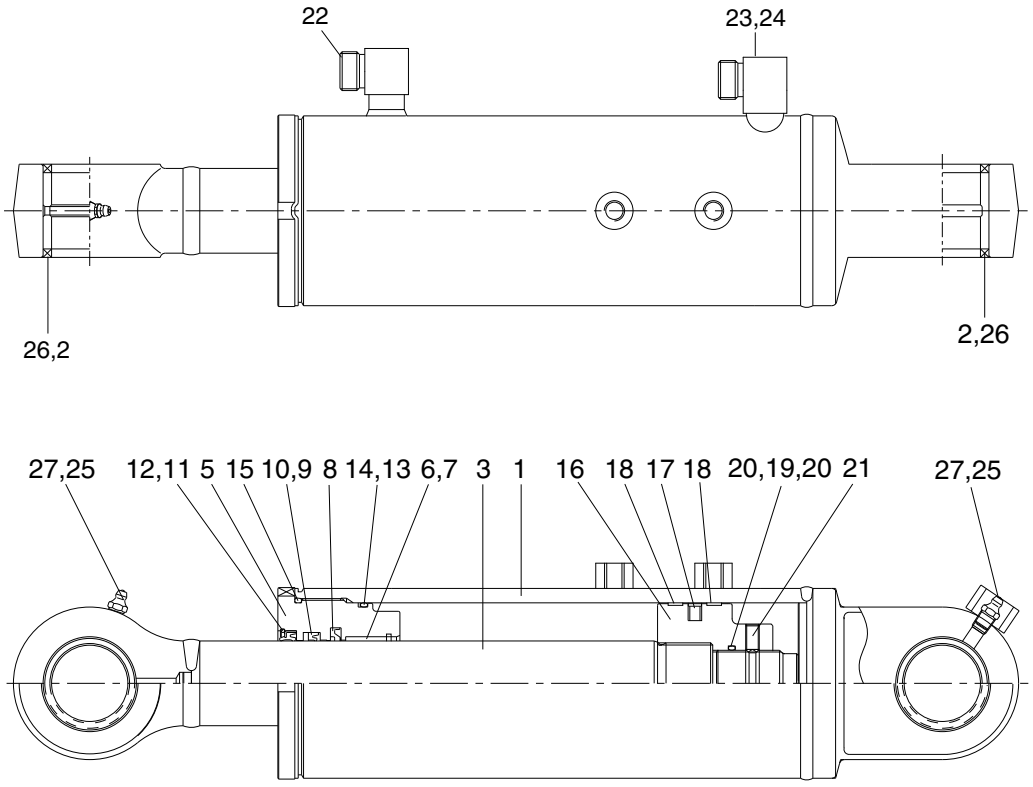
1	Tube assembly	14	Cushion ring	27	Plug
2	Pin bushing	15	Piston	28	Pipe assy
3	Rod assembly	16	Piston seal	29	O-ring
5	Rod cover	17	Wear ring	30	Pipe assy
6	Rod bushing	18	O-ring	31	Washer
7	Retainer ring	19	Back up ring	32	Hex bolt
8	Buffer seal	21	Cushion plunger	33	Dust cap
9	U-packing	22	Stop ring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

(3) Boom cylinder



1	Tube assembly	12	Back up ring	22	O-ring
2	Pin bushing	13	O-ring	23	Pipe assy
3	Rod assembly	14	Cushion ring	24	Washer
5	Rod cover	15	Piston	25	Hex bolt
6	Rod bushing	16	Piston seal	26	Grease nipple
7	Retainer ring	17	Wear ring	27	Cap
8	Buffer seal	18	O-ring	28	Dust seal
9	U-packing	19	Back up ring	30	Dust cap
10	Dust wiper	20	Set screw	31	O-ring
11	O-ring	21	Pipe assy		

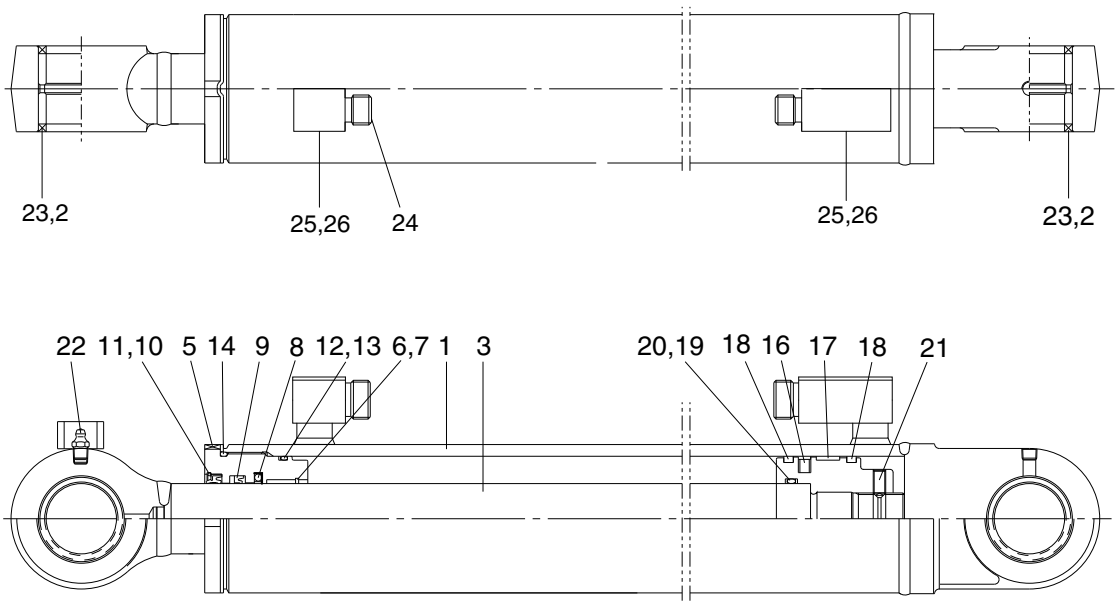
(4) Dozer cylinder



31M9-42820

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

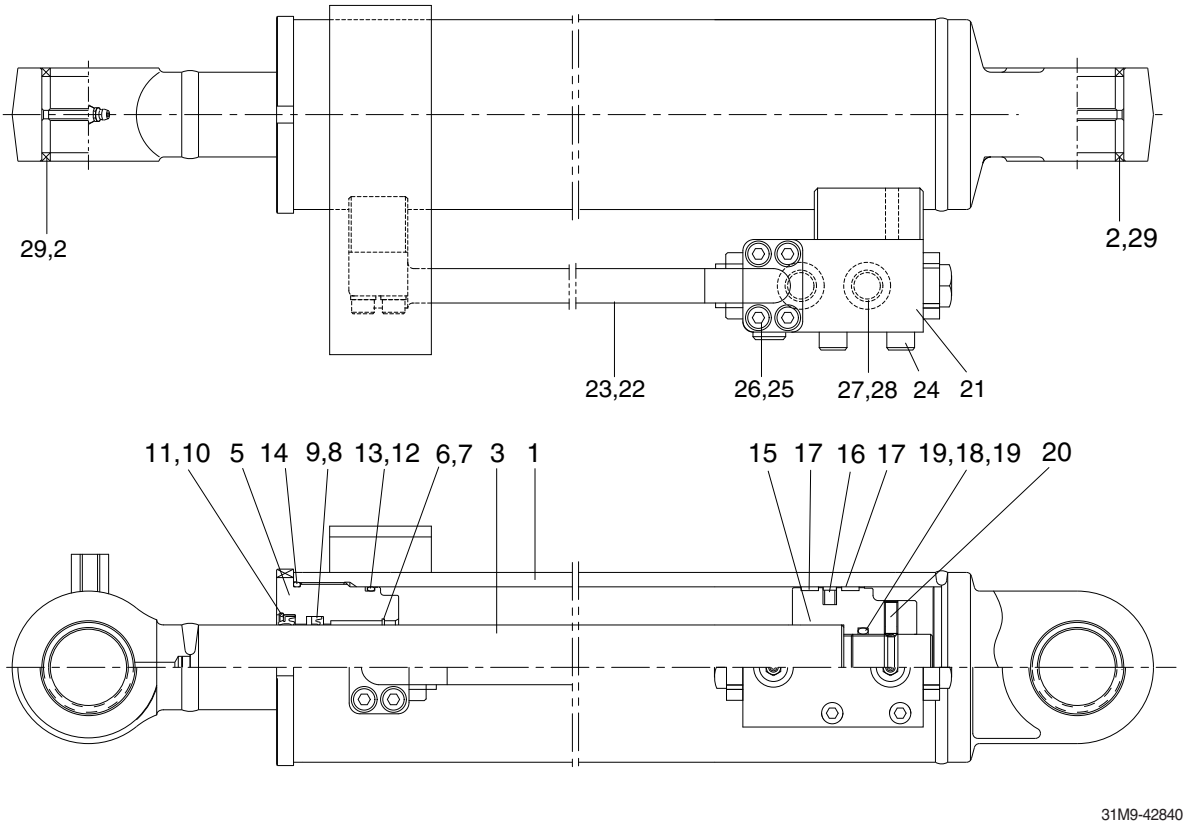
(5) Boom swing cylinder



31MT-11211

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

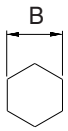
(6) Angle dozer cylinder



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

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	M100	70±7.0	506±50.6
	Arm cylinder	5	M85	70±7.0	506±50.6
	Bucket cylinder	5	M80	75±7.5	542±54.2
	Dozer cylinder	5	M120	95±9.5	687±68.7
	Boom swing cylinder	5	M85	75±7.5	542±54.2
	Angle dozer cylinder	5	M100	70±7.0	506±50.6
Piston	Boom cylinder	15	M48	75±7.5	542±54.2
	Arm cylinder	15	M42	160±16	1157±116
	Bucket cylinder	14	M42	160±16	1157±116
	Dozer cylinder	16	M58	100±10	723±72.3
	Boom swing cylinder	15	M42	75±7.5	542±54.2
	Angle dozer cylinder	15	M42	75±7.5	542±54.2
Set screw	Boom cylinder	20	M8	1.5	10.8
	Arm cylinder	20	M8	1.5	10.8
	Bucket cylinder	19	M8	1.5	10.8
	Dozer cylinder	21	M12	4~5	28.9~36.2
	Boom swing cylinder	21	M8	1.5	10.8
	Angle dozer cylinder	20	M12	4~5	28.9~36.2

3) DISASSEMBLY

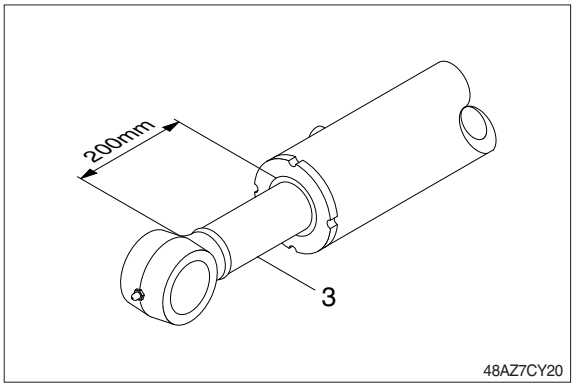
※ Procedures are based on the boom cylinder.

(1) Remove cylinder head and piston rod

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

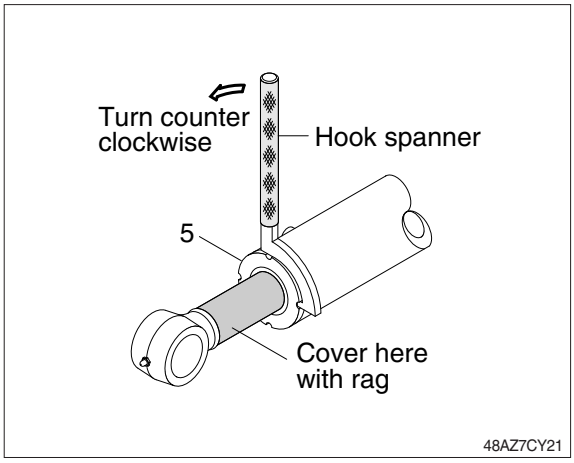
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

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.



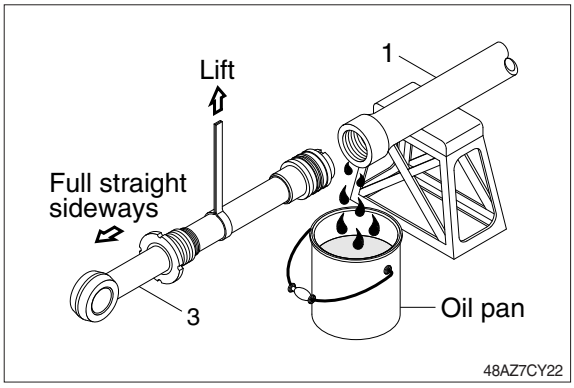
③ Loosen and remove the rod cover (5) by hook spanner.

※ 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).

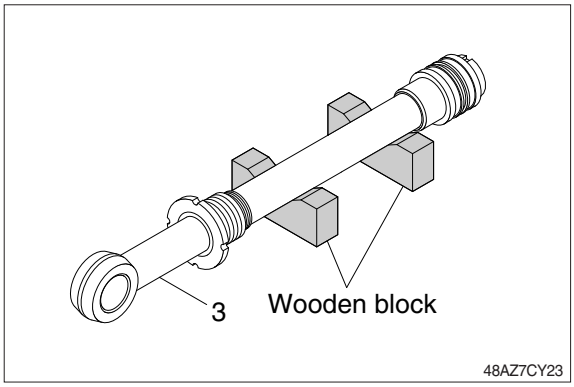
※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly (3) with a crane or some means and draw it out. However, when rod assembly (3) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



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.

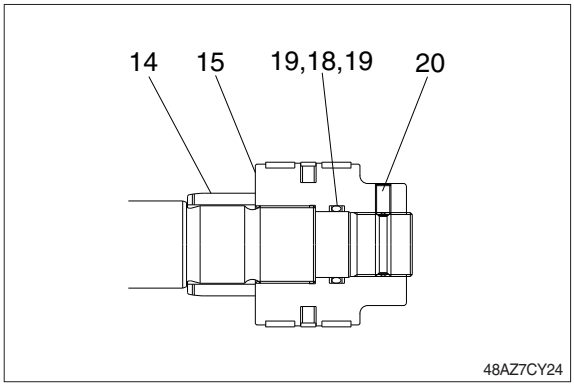
※ Cover a V-block with soft rag.



(2) Remove piston and rod cover

① Remove set screw (20)

② Remove piston assembly (15), back up ring (19), O-ring (18) and cushion ring (14).

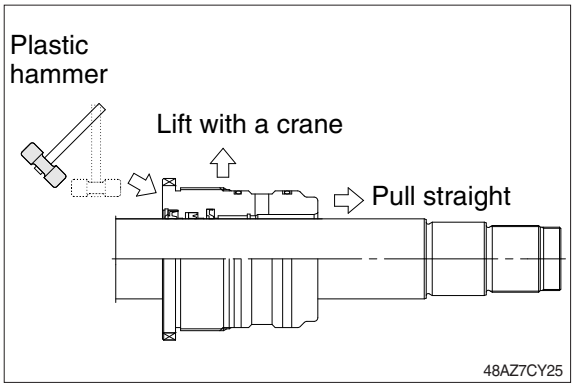


③ Remove the rod cover assembly from rod assembly (3).

※ If it is too heavy to move, move it by striking the flanged part of rod cover with a plastic hammer.

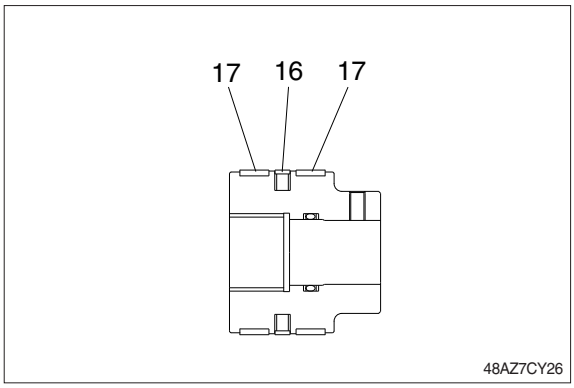
※ Pull it straight with rod cover assembly lifted with a crane.

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).



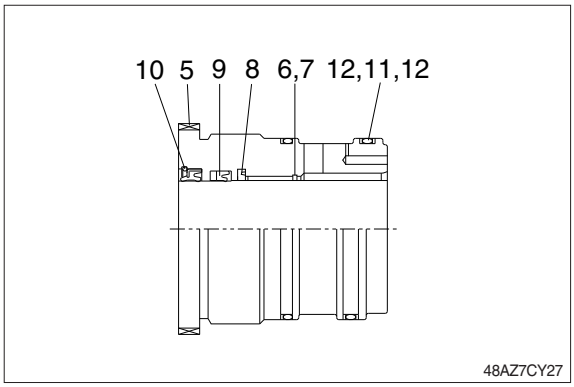
(3) Disassemble the piston assembly

① Remove wear ring (17).
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 dust seal (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.

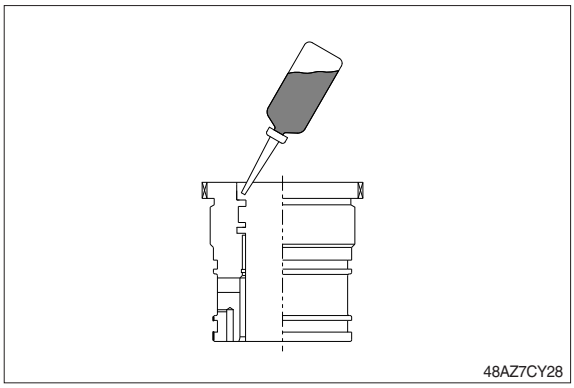


4) ASSEMBLY

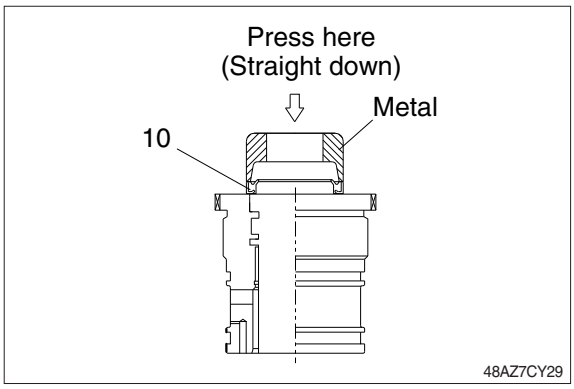
(1) Assemble cylinder head assembly

※ 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.



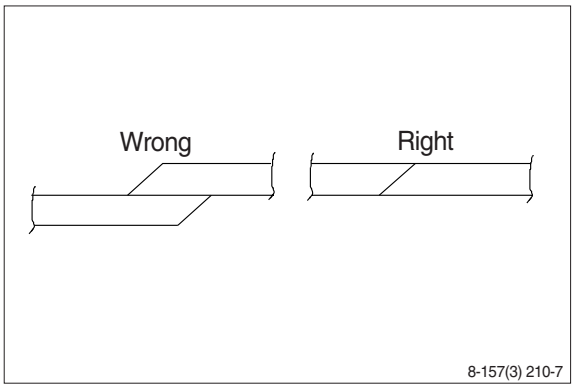
② Coat dust seal (10) with grease and fit dust seal (10) to the bottom of the hole of dust seal.
At this time, press a pad metal to the metal ring of dust seal.



③ Fit U-packing (9) to the groove..

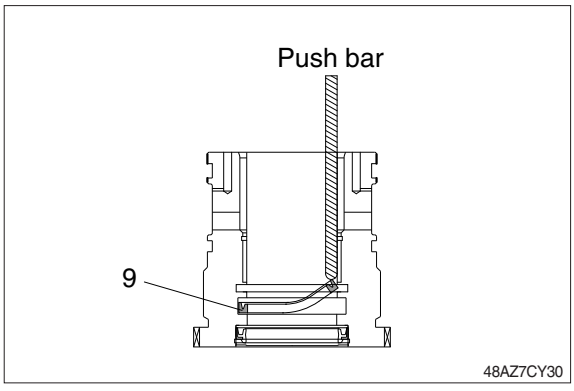
※ Coat each packing with hydraulic oil before fitting it.

※ 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.

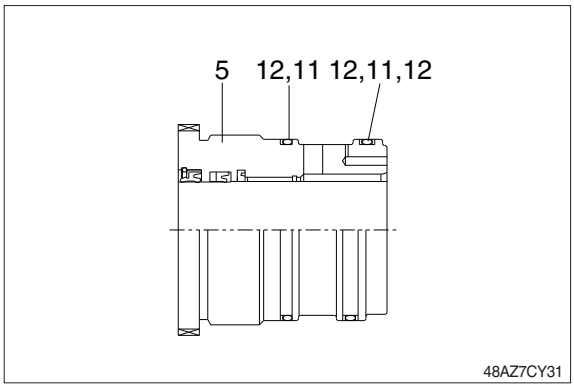
※ Fitting U-packing (9) upside down may damage its lip. Therefore check the correct direction that is shown in fig.



④ Fit back up ring (12) to rod cover (5).

※ Put the backup ring in the warm water of 30~50°C .

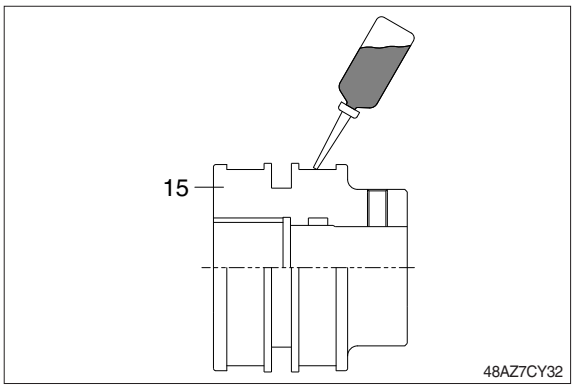
⑤ Fit O-ring (11) to rod cover (5).



(2) Assemble piston assembly

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

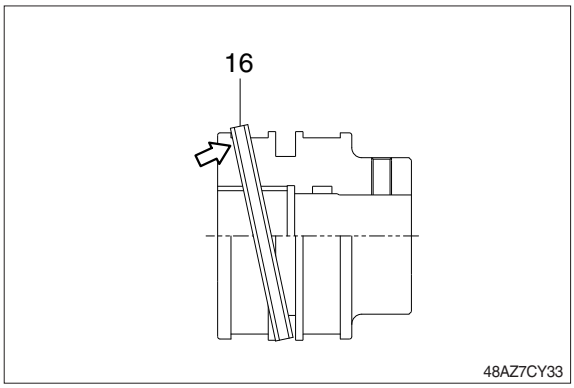
① Coat the outer face of piston (15) with hydraulic oil.



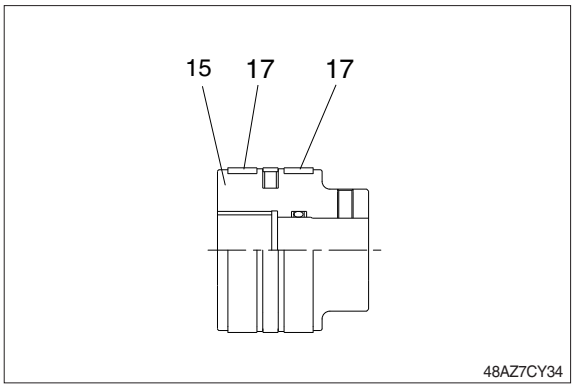
② Fit piston seal (16) to piston.

※ 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) to piston (15).

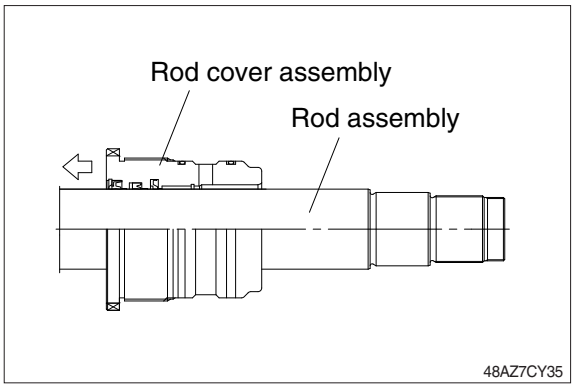


(3) Install piston and cylinder head

① Fix the rod assembly to the work bench.

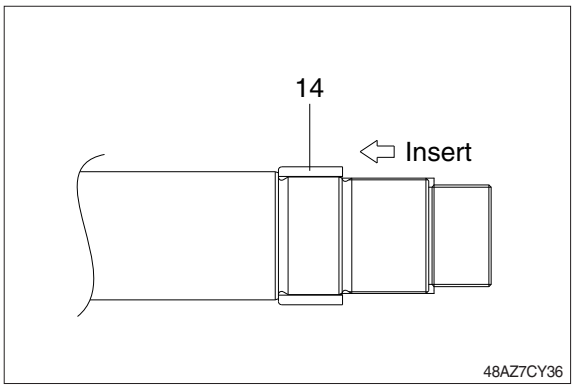
② Apply hydraulic oil to the outer surface of rod assembly (3), the inner surface of piston and gland.

③ Insert rod cover assembly to rod assembly.



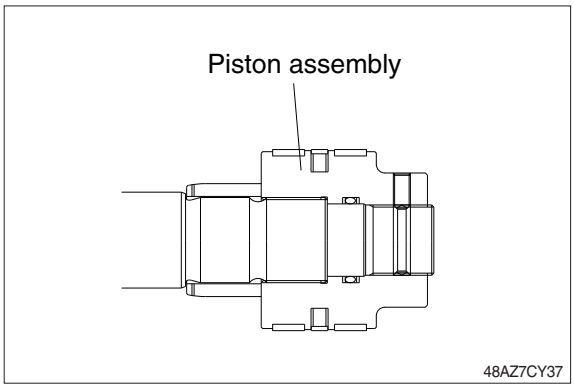
④ Insert cushion ring (14) to rod assembly.

※ Note that cushion ring (14) has a direction in which it should be fitted.



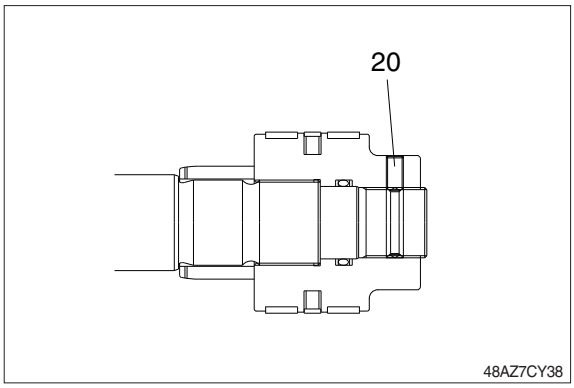
⑤ Fit piston assembly to rod assembly.

※ Tightening torque : refer to page 7-132



⑥ Fit piston nut (18) and set screw (20).

· Tightening torque : refer to page 7-132



(3) Overall assemble

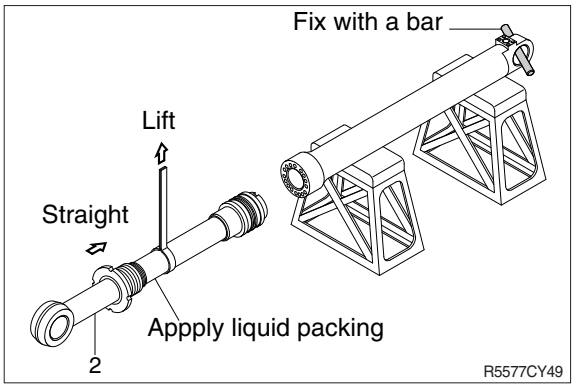
① Place a V-block on a rigid work bench. Mount the tube assembly (1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.

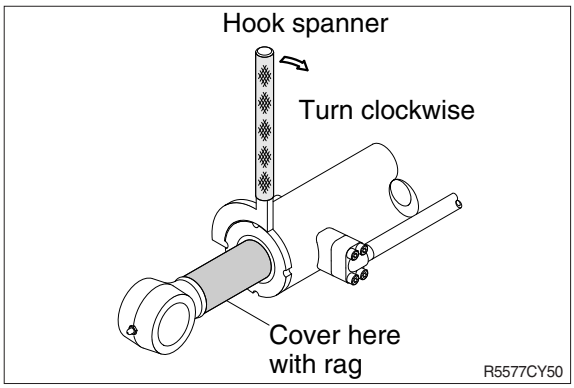
② Insert the rod assembly in to the tube assembly, while lifting and moving the rod assembly with a crane.

※ 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.



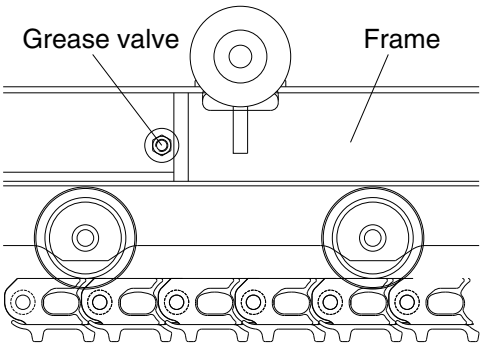


1. RUBBER TRACK

1) REMOVAL

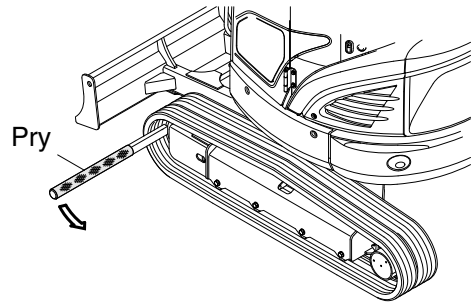
(1) Loosen tension of the rubber track.

※ If track tension is not relieved when the grease valve is loosened, move the machine backwards and forwards.



R35Z77TR04

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

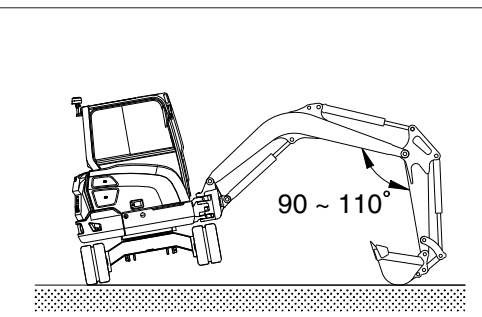


R35Z77TR22

2) INSTALL

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

※ Adjust the tension of the rubber track.



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2. TRACK LINK

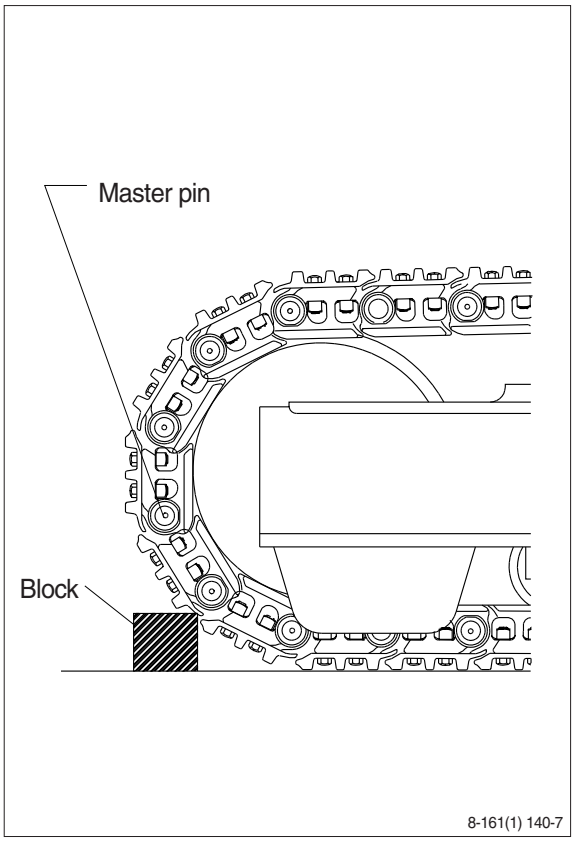
1) REMOVAL

(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.

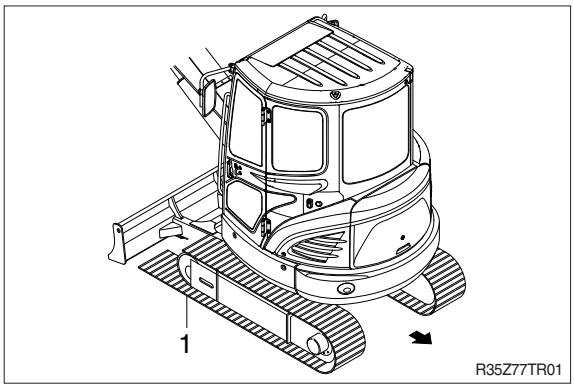
(3) Push out master pin by using a suitable tool.



(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.

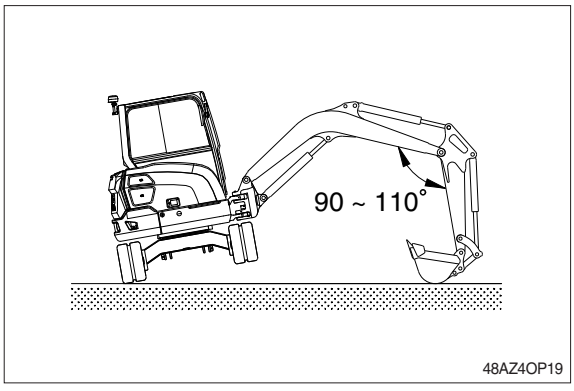
※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



2) INSTALL

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

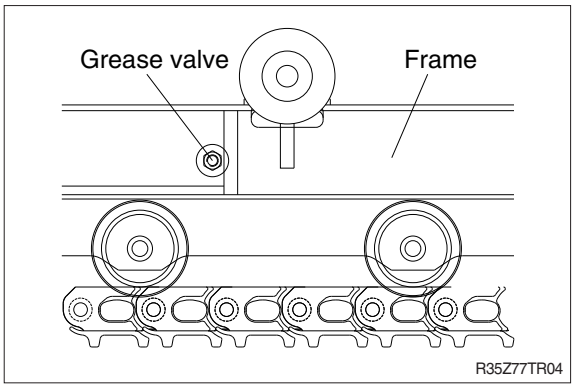
※ Adjust the tension of the track link.



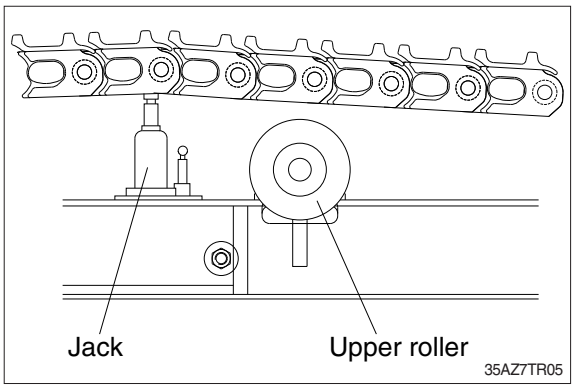
3. UPPER ROLLER

1) REMOVAL

(1) Loosen tension of the track link.

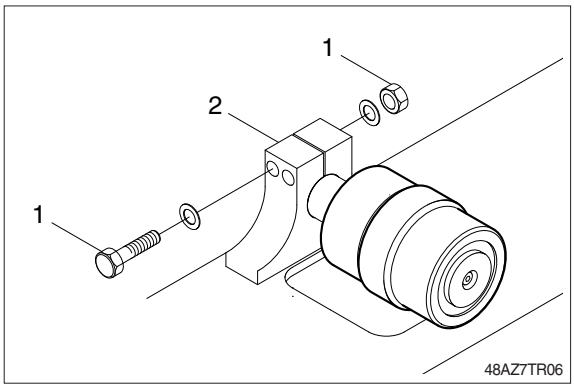


(2) Jack up the track link height enough to permit upper roller removal.



(3) Loosen the bolt and nut (1)
· Tightening torque : 29.7±3.0 kgf·m
(215±32.5 lbf·ft)

(4) Open bracket (2) with a screwdriver, push out from inside, and remove upper roller assembly.
· Weight : 5.5 kg (12 lb)



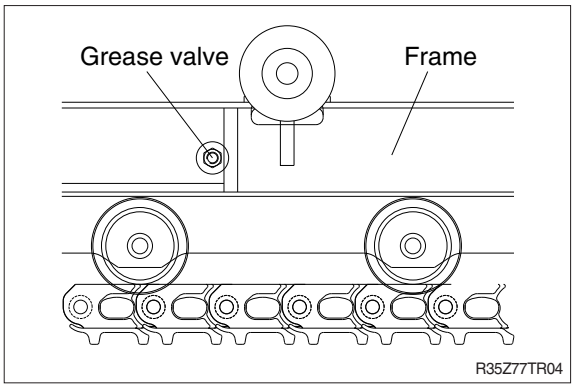
2) INSTALL

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

4. LOWER ROLLER

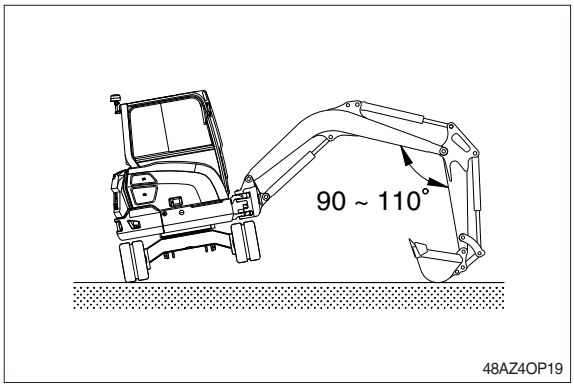
1) REMOVAL

(1) Loosen tension of the rubber track.



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

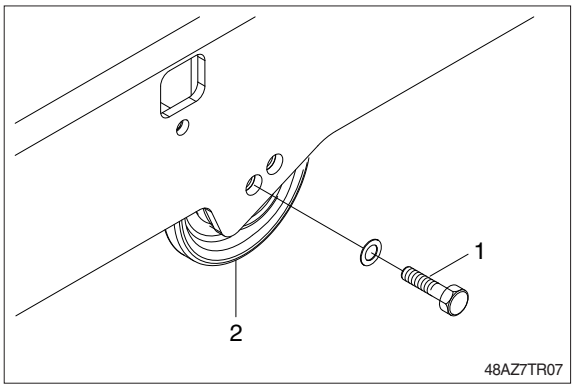
※ After jack up the machine, set a block under the unit.



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

· Weight : 12.4 kg (27.3 lb)

· Tightening torque : 31.3±3.0 kgf·m (226±21.7 lbf·ft)



2) INSTALL

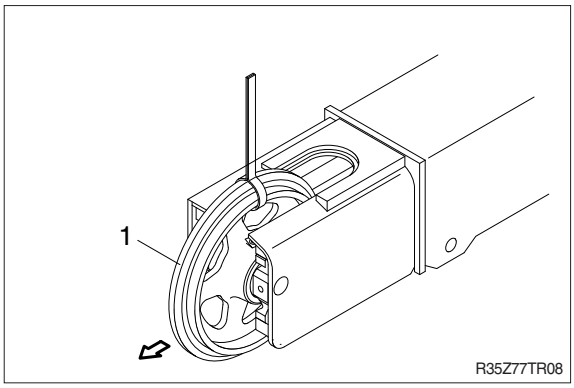
(1) Carry out installation in the reverse order to removal.

5. IDLER AND RECOIL SPRING

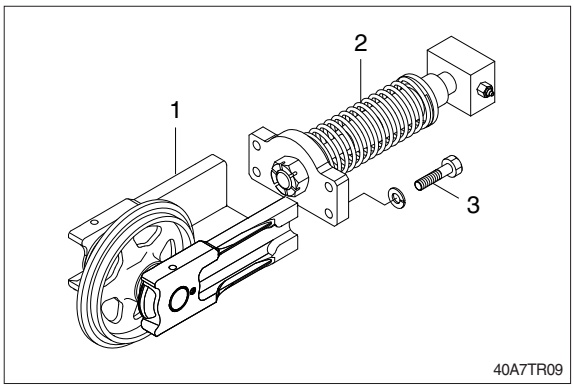
1) REMOVAL

(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 : 67.5 kg (149 lb)



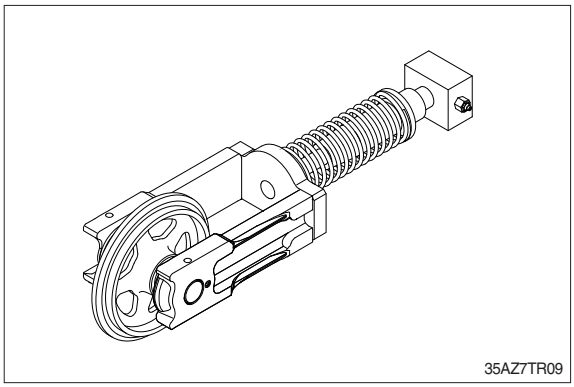
(3) Loosen the hexagon bolt (3) and remove the idler (1) from the recoil spring assembly (2).
· Tightening torque : 11.3±1.1 kgf·m
(81.9±8.0 lbf·ft)



2) INSTALL

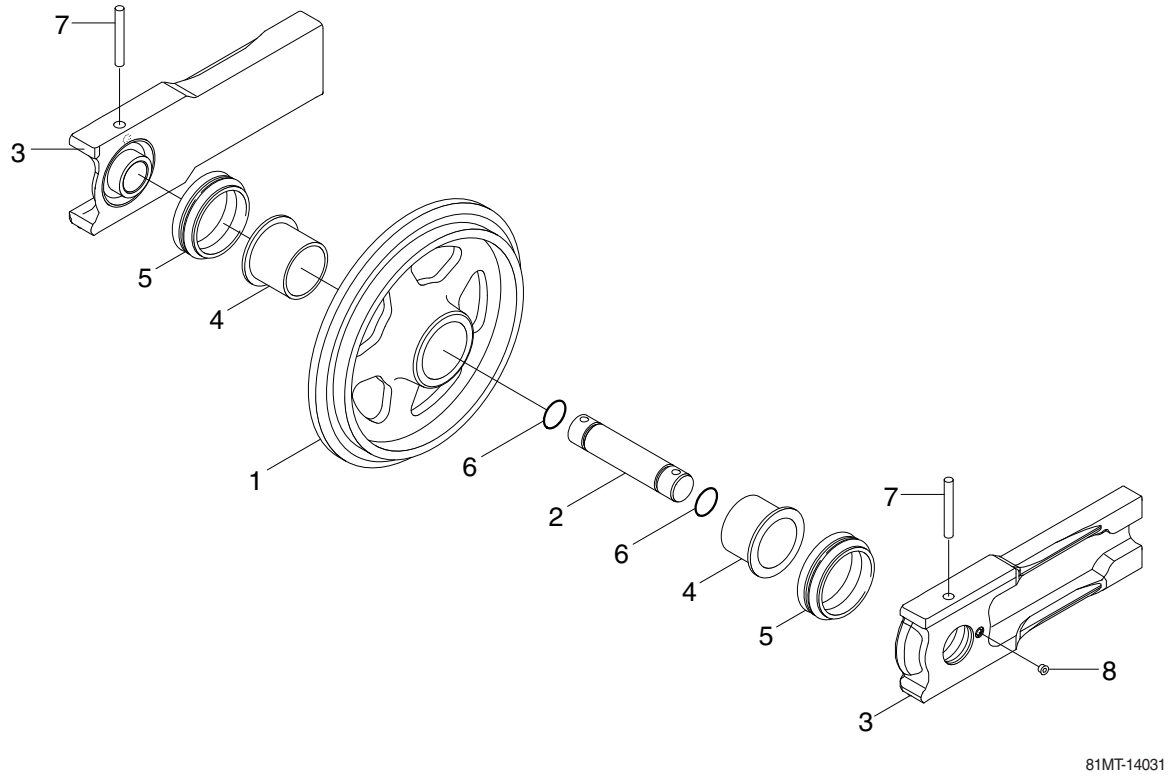
(1) Carry out installation in the reverse order to removal.

※ 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

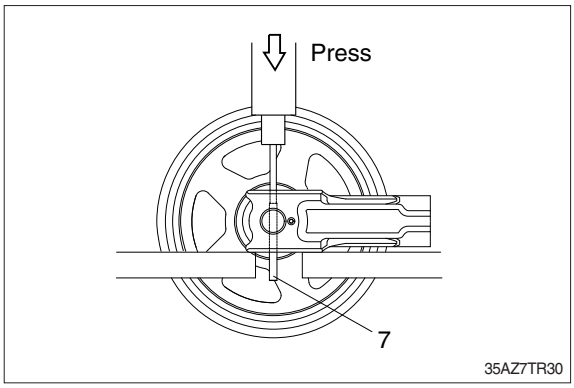


1	Idler shell	4	Bushing	7	Spring pin
2	Shaft	5	Floating seal	8	Plug
3	Bracket	6	O-ring		

(2) Disassembly

① Remove plug (8) and drain oil.

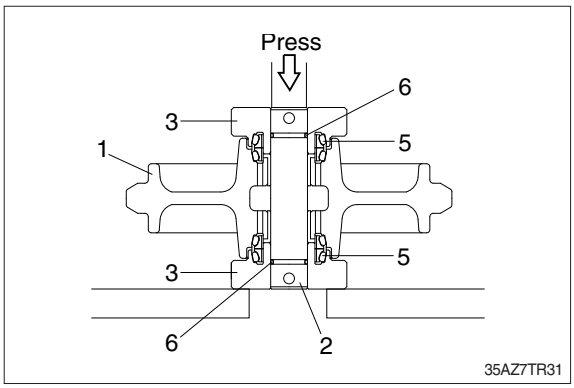
② Draw out the spring pin (7), using a press.



③ Pull out the shaft (2) with a press.

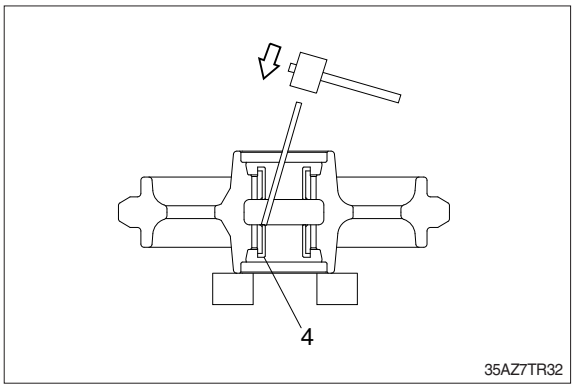
④ Remove floating seal (5) from idler shell (1) and bracket (3).

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.

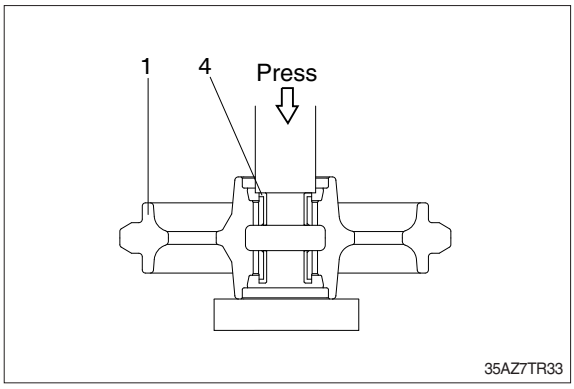


(3) **Assembly**

※ Before assembly, clean the parts.

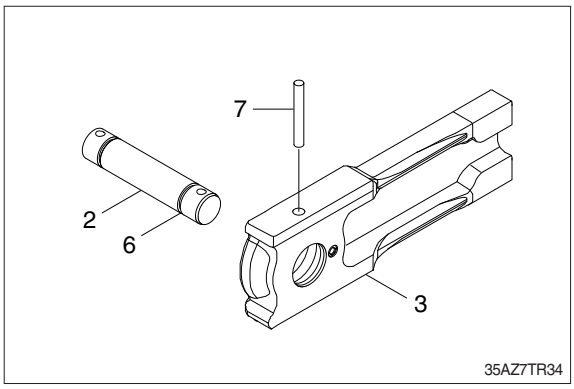
※ Coat the sliding surfaces of all parts with oil.

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.

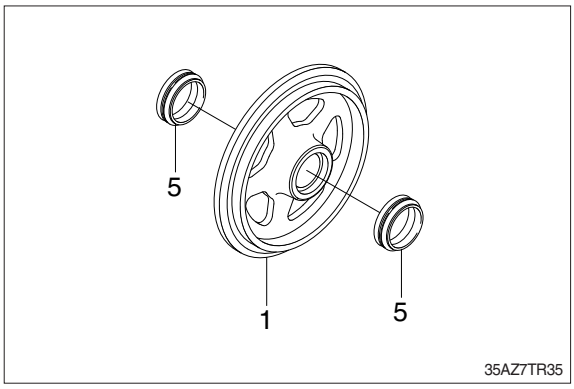


② Coat O-ring (6) with grease thinly, and install it to shaft (2).

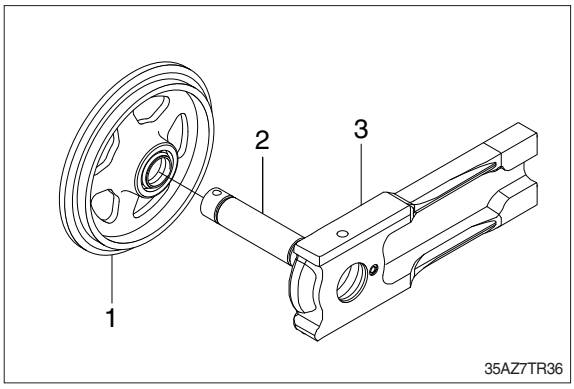
③ Insert shaft (2) into brakcet (3) and drive in the spring pin (7).



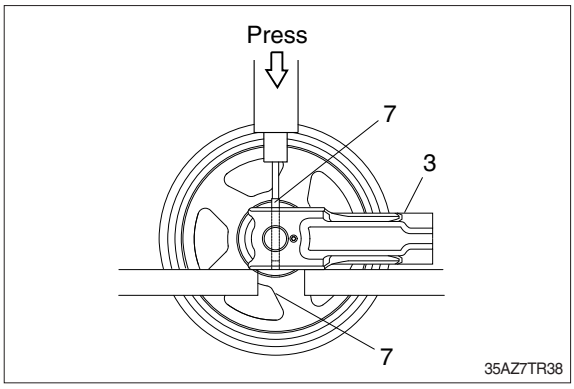
④ Install floating seal (5) to idler shell (1).



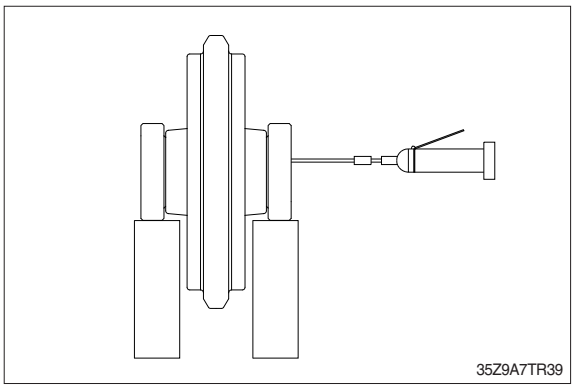
⑤ Install shaft (2) and bracket (3) to idler shell (1).



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

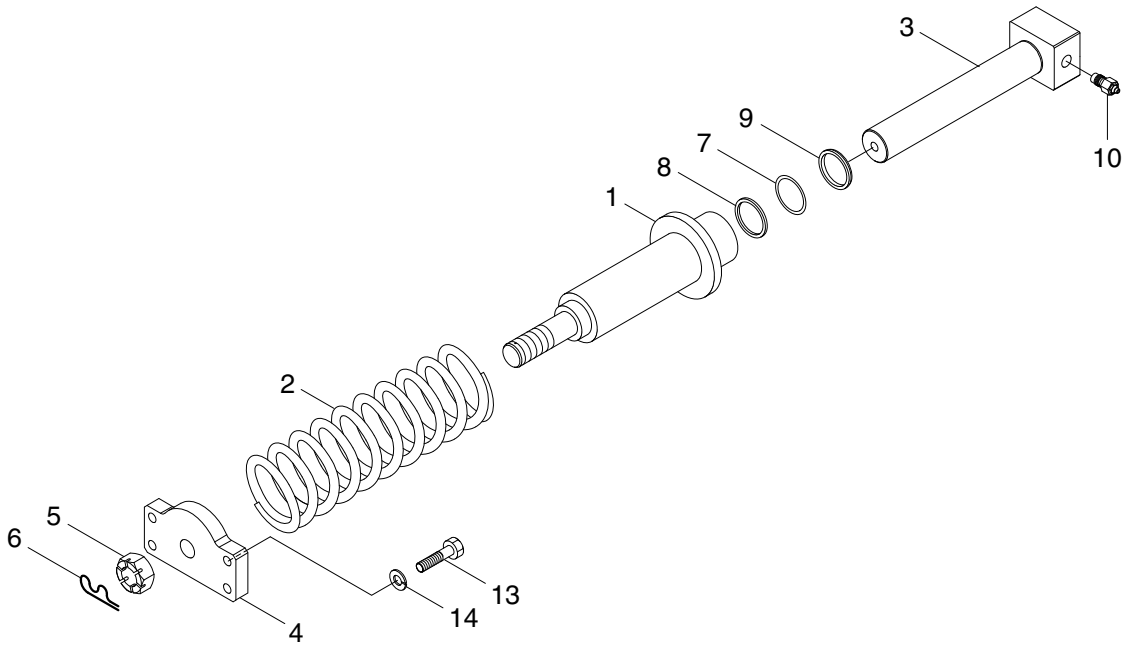


⑦ Supply engine oil to the specified level, and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure



81MT-15021

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

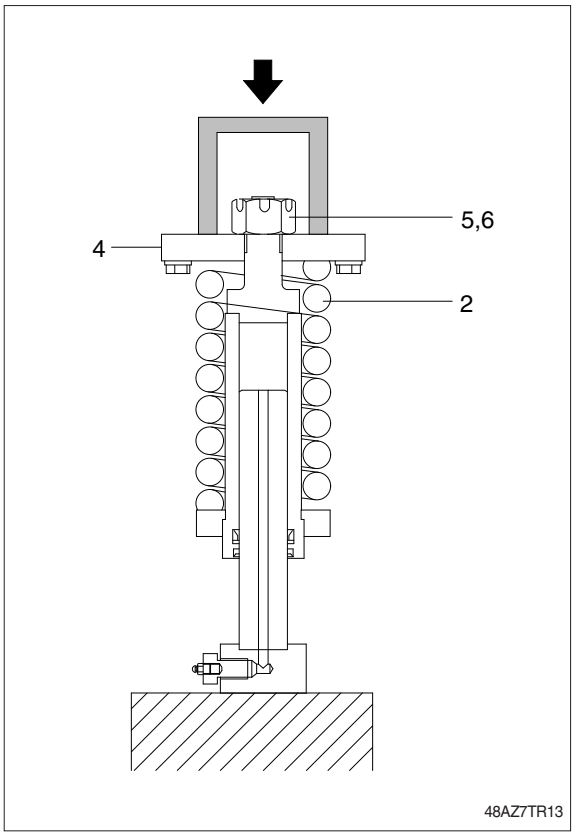
(2) Disassembly

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.

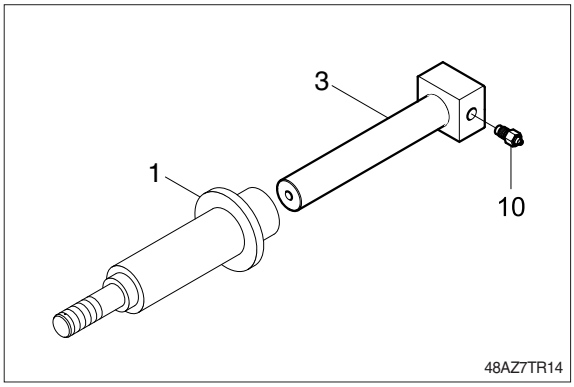
② Remove split pin (6) and castle nut (5). Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.

③ Lighten the press load slowly and remove yoke plate (4) and spring (2).

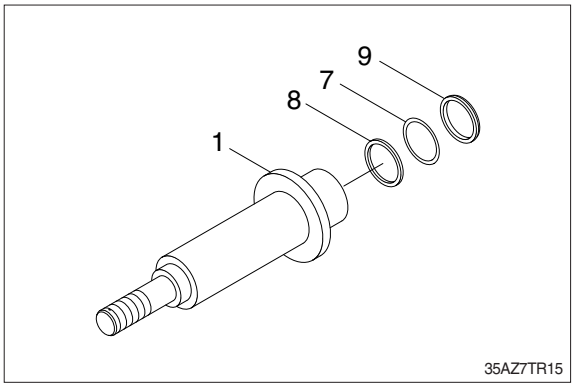


⑤ Remove piston (3) from tension cylinder (1).

⑥ Remove grease valve (10) from piston (3).

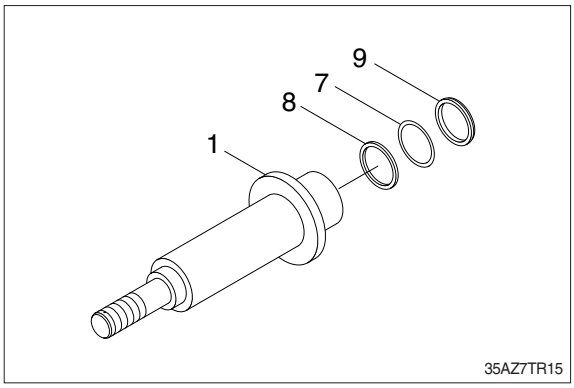


⑦ Remove dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).



(3) Assembly

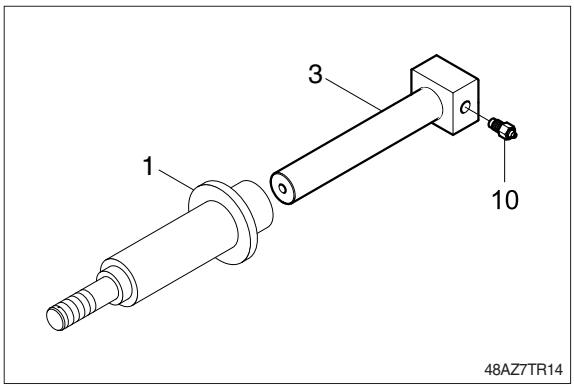
① Install dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).



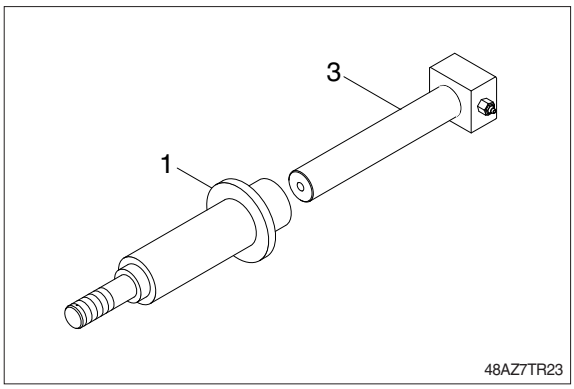
② Pour grease into tension cylinder (1), then push in piston (3) by hand.
After take grease out of grease valve mounting hole, let air out.

※ 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 (3) to tension cylinder (1).



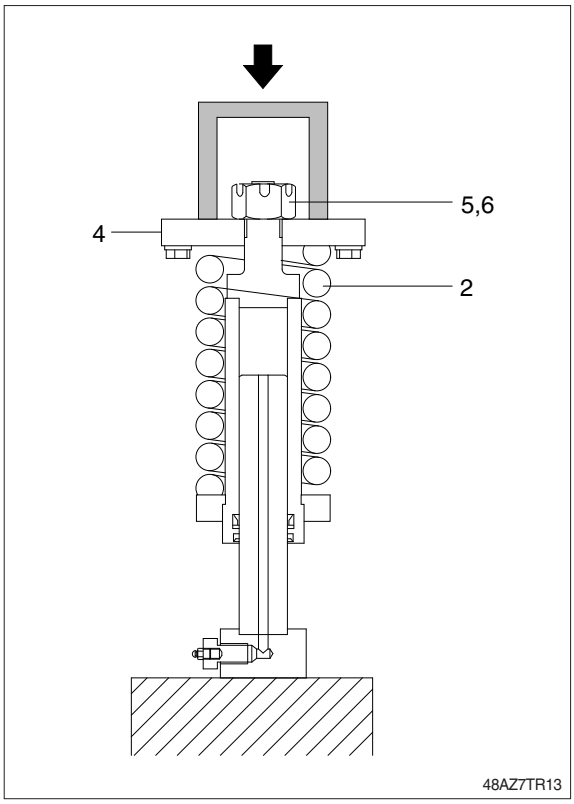
⑤ Install tension spring (2) and yoke plate (4) to tension cylinder (1).

⑥ Apply pressure to tension spring (2) with a press and tighten castle nut (5).

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

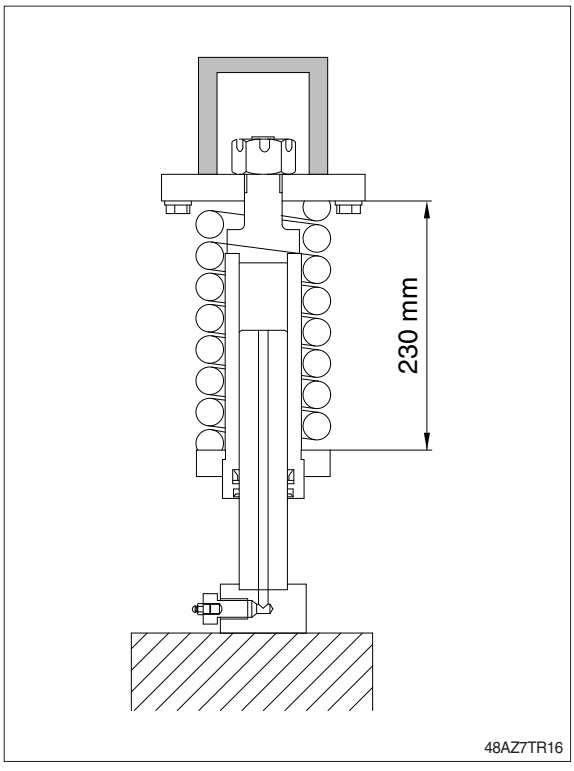
⑦ Tighten castle nut (5) and insert split pin (6).

· Tightening torque : 10.3±1.1 kgf·m
(74.5±8.0 lbf·ft)

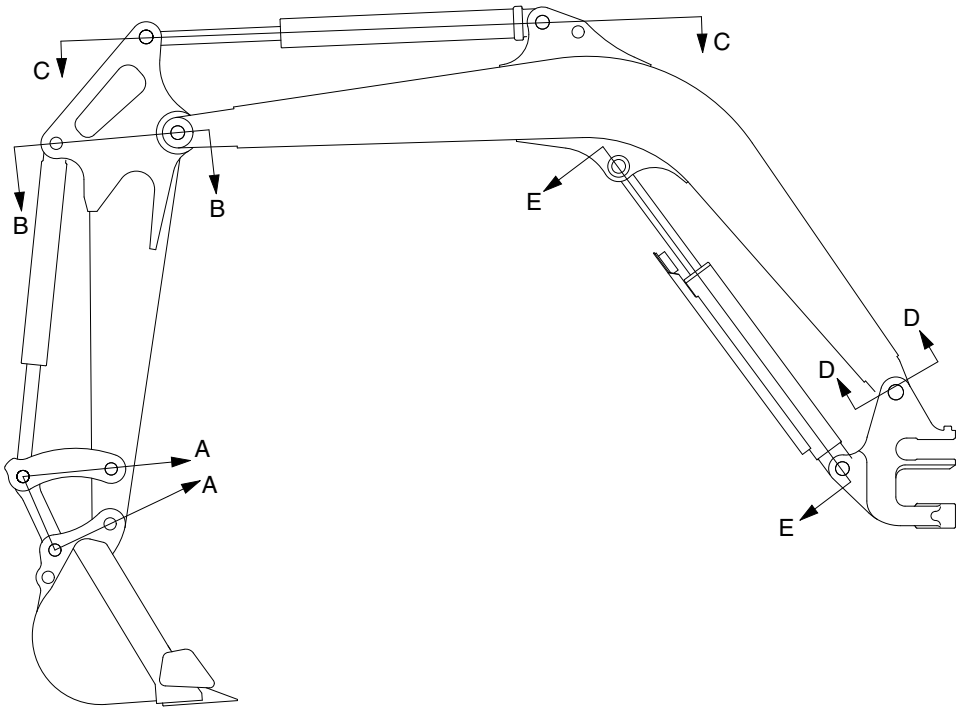


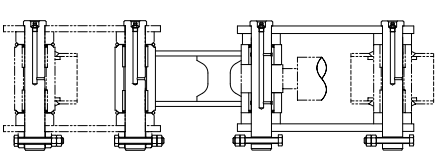
⑧ Lighten the press load and confirm the set length of tension spring (2).

· Spring length : 230 mm

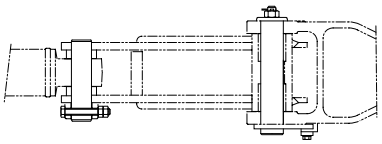


1. STRUCTURE

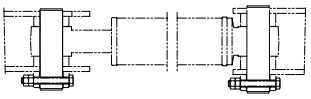




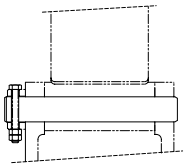
SECTION A-A



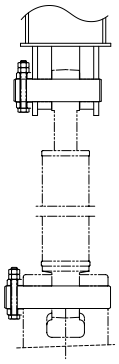
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

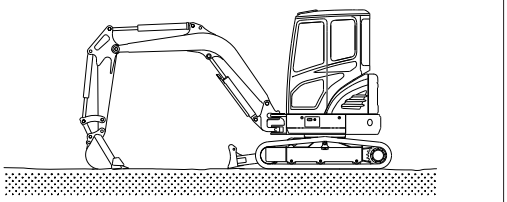
35Z9A7AT01

2. REMOVAL AND INSTALL

1) BUCKET ASSEMBLY

(1) Removal

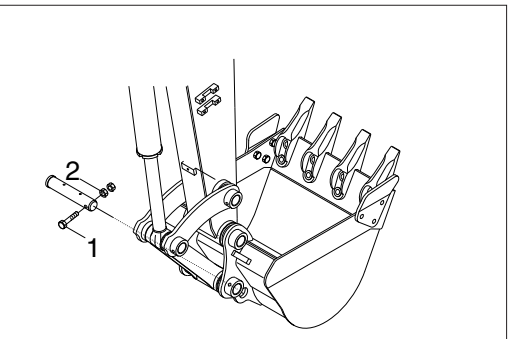
① Lower the work equipment completely to ground with back of bucket facing down.



R27Z97AT02

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

· Tightening torque : 12.8±3.0 kgf·m
(92.6±21.7 lbf·ft)

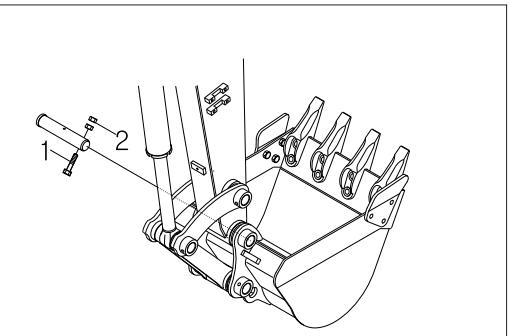


R35Z77AT03

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±3.0 kgf·m
(92.6±21.7 lbf·ft)



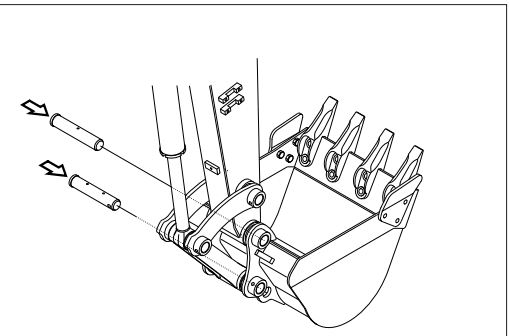
R35Z77AT04

(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.



R35Z77AT05

2) ARM ASSEMBLY

(1) Removal

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

⚠ Escaping fluid under pressure can penetrated 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.

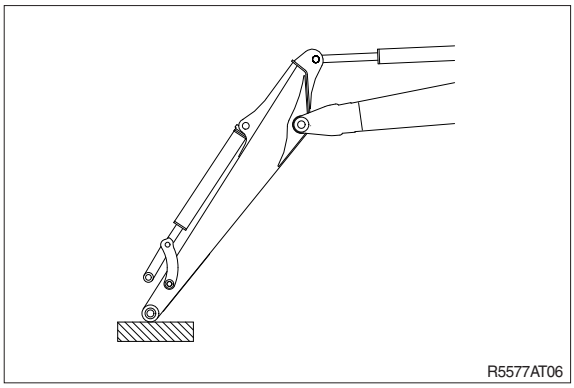
③ Sling arm cylinder assembly, remove spring, pin stopper and pull out pin.

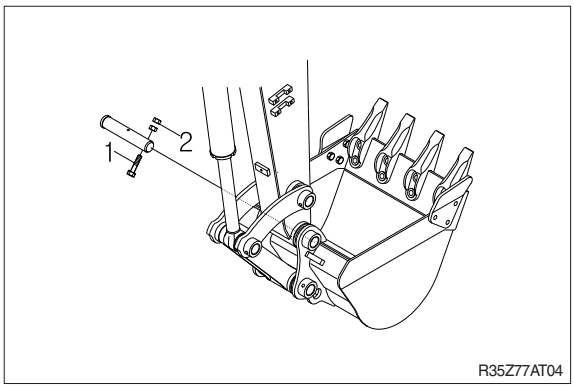
※ Tie the rod with wire to prevent it from coming out.

④ For details, see removal of arm cylinder assembly.
Place a wooden block under the cylinder and bring the cylinder down to it.

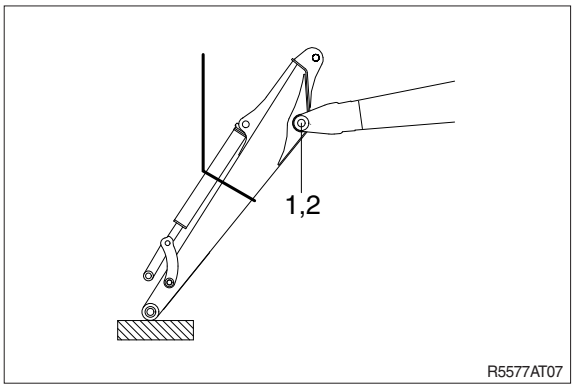
⑤ Remove bolt (1) and pull out the pin (2) then remove the arm assembly (1.3 m).
- Weight : 132 kg (290 lb)
- Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

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


R5577AT06



R35Z77AT04



R5577AT07

(2) Install

① Carry out installation in the reverse order to removal.

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

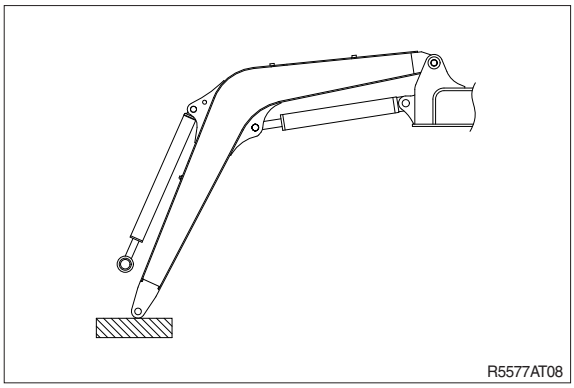
※ Bleed the air from the cylinder.

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.

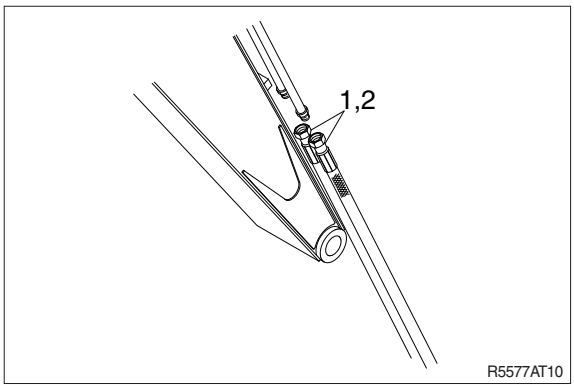

R5577AT08

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).



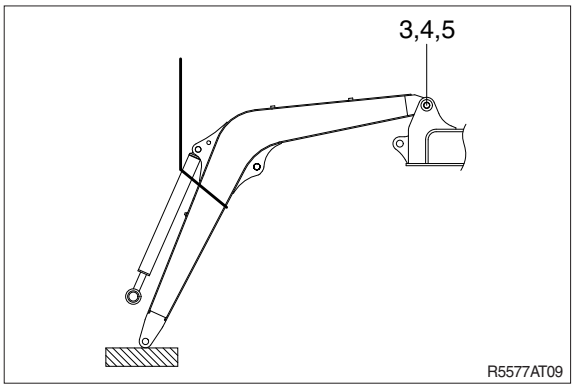
R5577AT10

⑥ Remove bolt (3), nut (4) and pull out the pin (5) then remove boom assembly (2.8 m).

· Weight : 269 kg (590 lb)

· Tightening torque : 12.8±3.0 kgf·m (92.6±21.7 lbf·ft)

※ When lifting the boom assembly always lift the center of gravity.



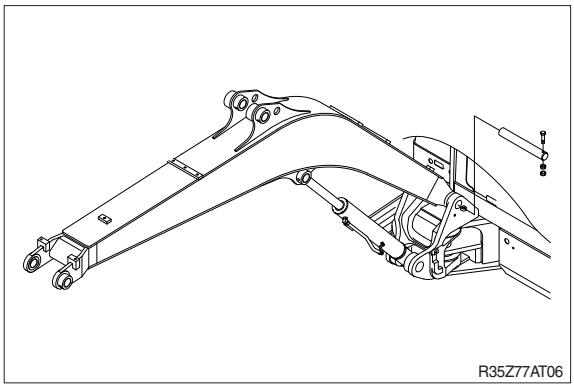
R5577AT09

(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.


R35Z77AT06