SECTION 7 DISASSEMBLY AND ASSEMBLY

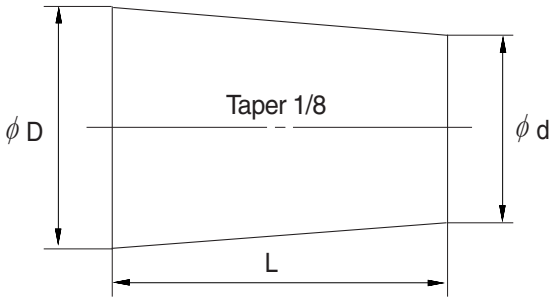
SECTION 7 DISASSEMBLY AND ASSEMBLY

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)	M12 × 1.75	11.5±1.0	83.2±7.2
2		Engine mounting bolt (rubber, 4EA)	M14 × 2.0	18.3±2.0	132±14.5
3		Radiator mounting bolt, nut	M12 × 1.75	12.8±3.0	92.5±21.7
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79.6±7.2
5		Fuel tank mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
6	Hydraulic system	Main pump mounting bolt Main pump housing mounting bolt	M12 × 1.75 M10 × 1.5	12.8±3.0 6.9±1.4	92.5±21.7 49.9±10.1
7		Main control valve mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
8		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
9		Turning joint mounting bolt, nut	M12 × 1.75	12.8±3.0	92.5±21.7
10	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
11		Swing bearing upper mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
12		Swing bearing lower mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
13		Travel motor mounting bolt	M14 × 2.0	20±2.0	145±14.5
14	Under carriage	Sprocket mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
15		Carrier roller mounting bolt, nut	M18 × 2.5	41.3±4.0	299±28.9
16		Track roller mounting bolt	M18 × 2.5	41.3±4.0	299±28.9
17		Track tension cylinder mounting bolt	M12 × 1.75	12.8±3.0	92.5±21.7
18		Track shoe mounting bolt, nut	1/2-20UNF	19.6±2.0	142±14.5
19		Track guard mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
20	Others	Counterweight mounting bolt	M20 × 2.5	57.8±6.4	418±46.3
21		Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92.5±21.7
22		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.1	8.5±0.7
23		Under cover mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1

※ For tightening torque of engine and hydraulic components, see engine maintenance guide and service manual.

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

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

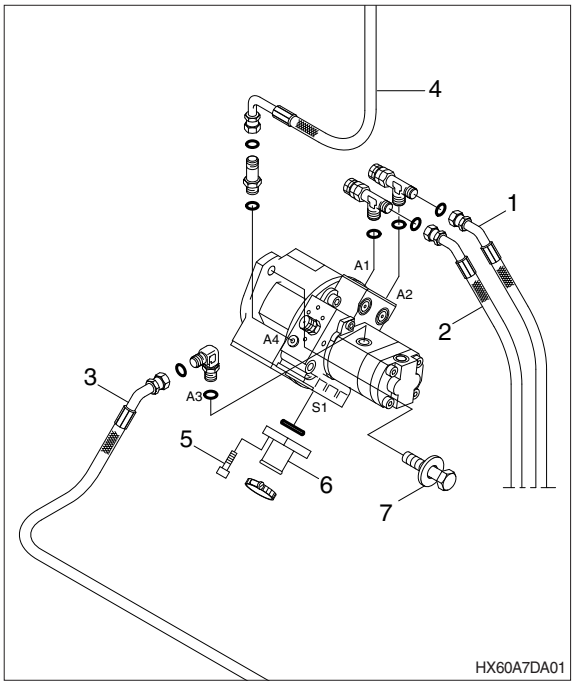
(2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping

(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 : 70 ℓ (18.5 U.S.gal)



(5) Disconnect hydraulic hoses (1, 2, 3, 4).

(6) Remove socket bolts (5) and disconnect pump suction pipe (6).

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

(7) Sling the pump assembly and remove the pump mounting bolts.

· Weight : 34 kg (74 lb)

· Tightening torque : 12.8 ± 3.0 kgf · m (92.5 ± 21.7 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.

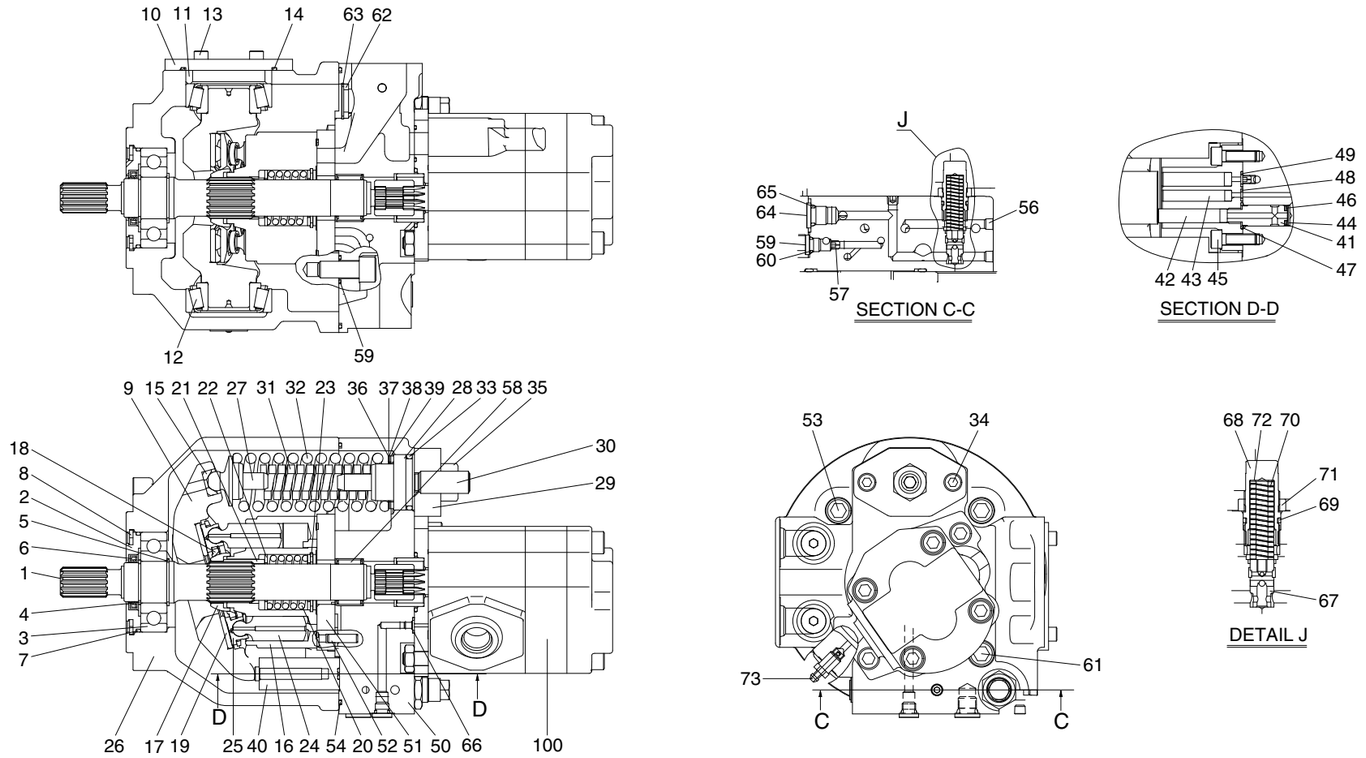
(6) Bleed the air from the hydraulic pump.
① Loosen the air vent plug.
② Start the engine, run at low idling, and check oil come out from plug.
③ Tighten plug.

(7) Start the engine, run at low idling (3~5 minutes) to circulate the oil through the system.

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

2. MAIN PUMP

1) STRUCTURE



555C92SF06

1	Drive shaft	14	O-ring	27	Spring seat (1)	39	Shim	51	Valve plate	63	Snap ring
2	Seal cover	15	Pivot	28	Spring seat (2)	40	Control cylinder	52	Parallel pin	64	RO plug
3	Ball bearing	16	Cylinder block	29	Spring cover	41	Control piston	53	Socket bolt	65	O-ring
4	Snap ring	17	Bushing	30	Adjusting screw	42	Control push-rod (1)	54	O-ring	66	O-ring
5	Snap ring	18	Push plate	31	Spring	43	Control push-rod (2)	55	O-ring	67	Spool
6	Oil seal	19	Shoe plate	32	Spring	44	Spring seat (1)	56	Plug	68	Adjusting screw
7	O-ring	20	Spring	33	O-ring	45	Socket bolt	57	Orifice	69	O-ring
8	Snap ring	21	Parallel pin	34	Socket bolt	46	Conical spring washer	58	Needle bearing	70	Spring
9	Swash plate	22	Spring seat	35	Hex nut	47	O-ring	59	RP plug	71	Hex nut
10	Plate	23	Snap ring	36	Shim	48	O-ring	60	O-ring	72	Shim
11	Bearing spacer	24	Piston	37	Shim	49	O-ring	61	Socket bolt	73	Air breather
12	Roller bearing	25	Shoe	38	Shim	50	Valve block	62	Filter	100	Gear pump assy
13	Socket bolt	26	Pump casing								

2) TOOLS AND TIGHTENING TORQUE

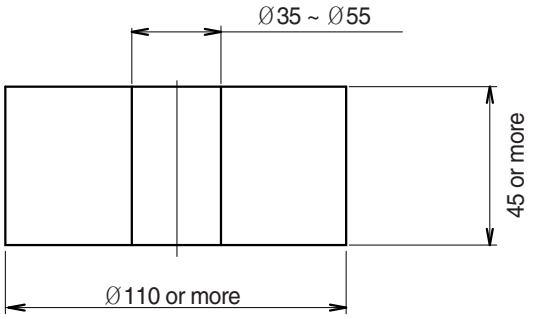
(1) Tools

The tools necessary to disassemble/reassemble the pump are shown in the follow list.

Name	Quantity	Size (nominal)
Hexagonal bar spanner	One each	5, 6, 8, 10
Spanner	1	17, 24
Plastic hammer	1	Medium size
Snap ring pilers	1	For hole (stop ring for 72)
Snap ring pilers	1	For shaft (stop rings for 28 and 30)
Standard screw-driver	2	Medium size
Torque wrench	-	Wrench which can tighten at the specified torque
Grease	Small	-
Adhesives	Small	LOCTITE #270

(2) Jigs

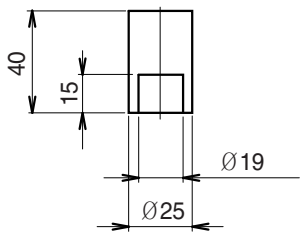
① Disassembling table



R55NM7HP01

This is plate to stand the pump facing downward.
A square block may be used instead if the shaft end does not contact.

② Bearing assembling jig



R55NM7HP02

(3) Tightening torque

Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M12	10.0	72.3	0.39	10
	M16	24.0	174	0.55	14
	M18	34.0	246	0.55	14
PT Plug	PT 1/16	0.9	6.5	0.16	4
PF Plug	PF 1/8	1.5	10.8	0.20	5
	PF 1/4	3.0	21.7	0.24	6

3. DISASSEMBLY PROCEDURE

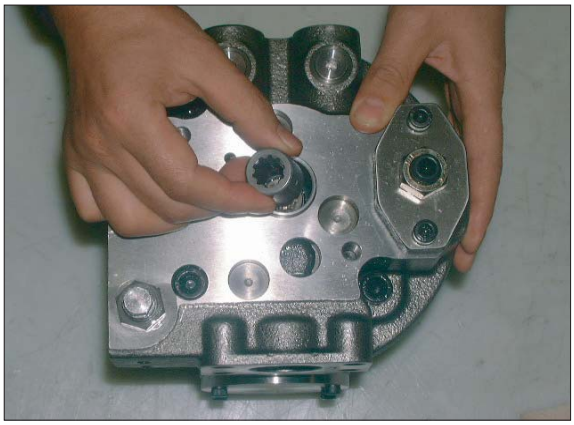
1) DISASSEMBLING THE GEARED PUMP

① Remove the hexagonal socket headed bolts (M10 × 25, 2 pieces).
Hexagonal bar spanner
(Hex. side distance : 8 mm)

※ Be careful because the O-ring and filter are provided to the match surface of the geared pump.

R55NM7HP03

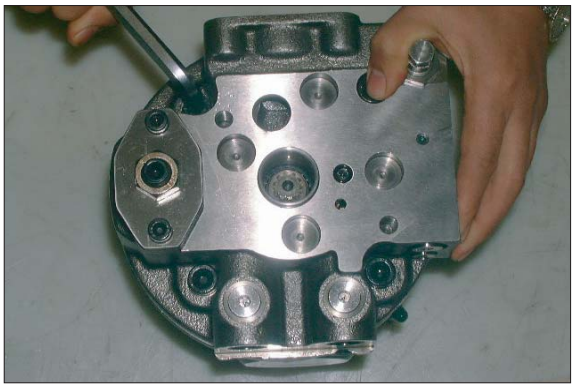
② Remove the coupling.



R55NM7HP04

2) DISASSEMBLING THE MAIN PUMP

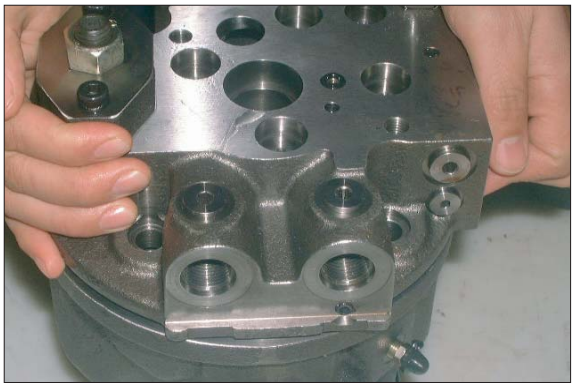
① Remove the cover.
Remove the hexagonal socket headed bolts. (M12 × 30, 3 pieces) and (M12× 55, 1 piece).
Hexagonal bar spanner
(Hex. side distance : 10 mm)



R55NM7HP05

② Remove the cover in a horizontal condition.
Connect motor to work table.

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

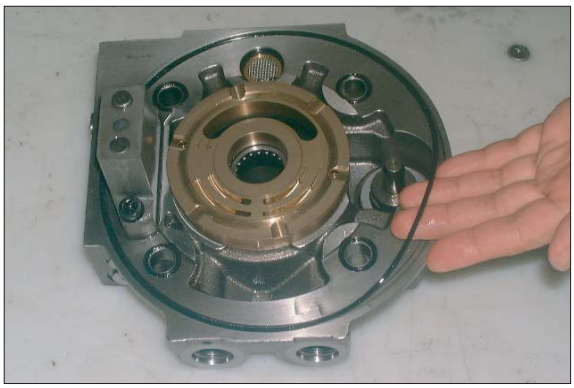


R55NM7HP06

③ This photo shows the state with the cover removed.

R55NM7HP07

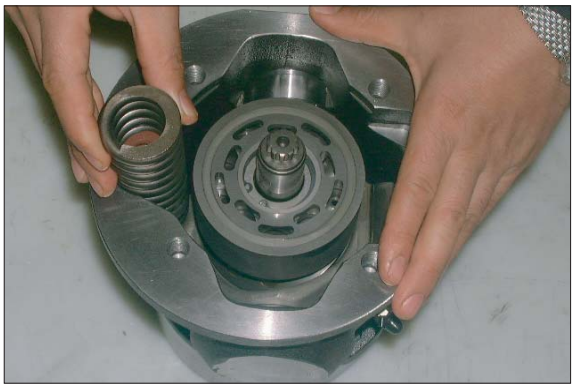
④ Remove the O-ring from the cover.



R55NM7HP08

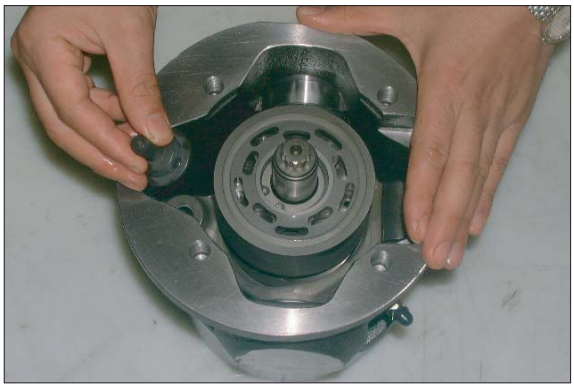
(1) The removal of the control spring

① Remove 2 springs (inner and outer).



R55NM7HP09

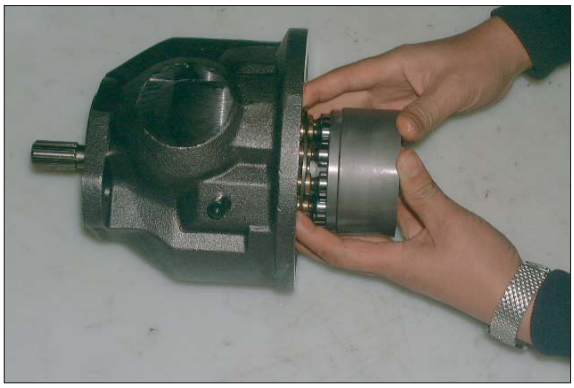
② Remove the spring seat.



R55NM7HP10

(2) The removal of rotary group

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



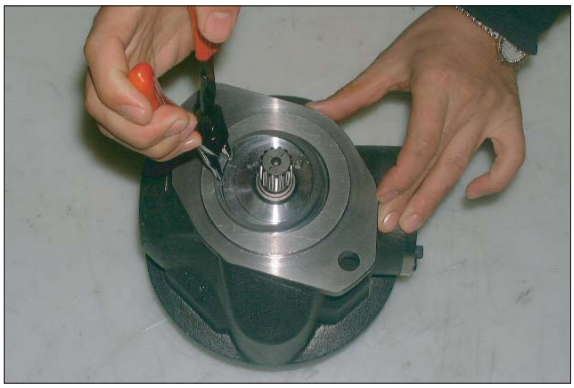
R55NM7HP11

② Remove the plate.

R55NM7HP12

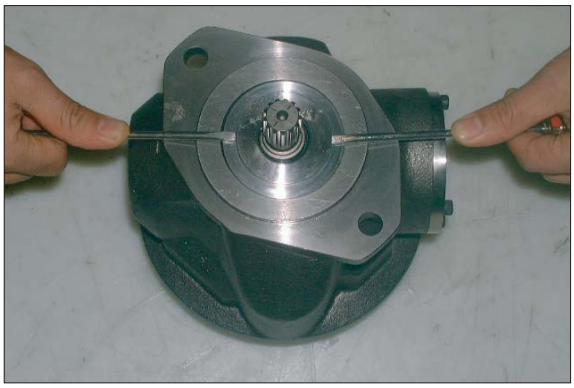
(3) The removal of the shaft

① Remove the C-type stop ring.
(snap ring pliers for hole)



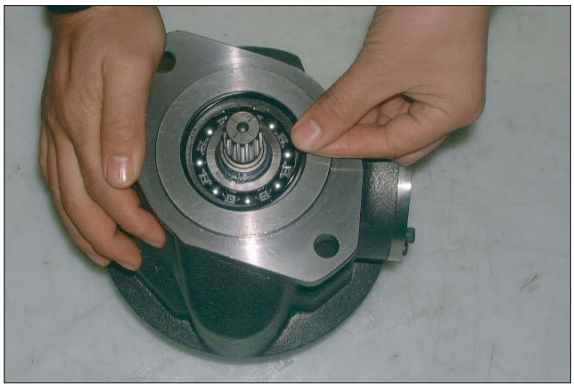
R55NM7HP13

② Use two standard screw-drivers to remove the oil seal case.



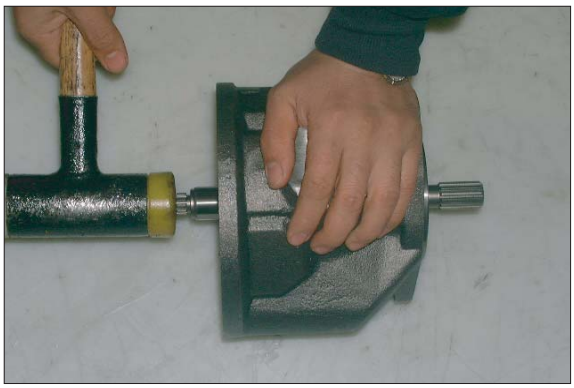
R55NM7HP14

③ Remove the O-ring.



R55NM7HP15

④ Remove it while knocking the shaft rear and lightly with a plastic hammer.



R55NM7HP16

(4) The removal of the hanger

① Remove the hexagonal socket headed bolts (M6 × 16, 4 pieces) and plate.
Hexagonal bar spanner
(Hex. side distance : 5 mm)

R55NM7HP17

② Remove the distance piece.

R55NM7HP18

③ Remove the bearing.

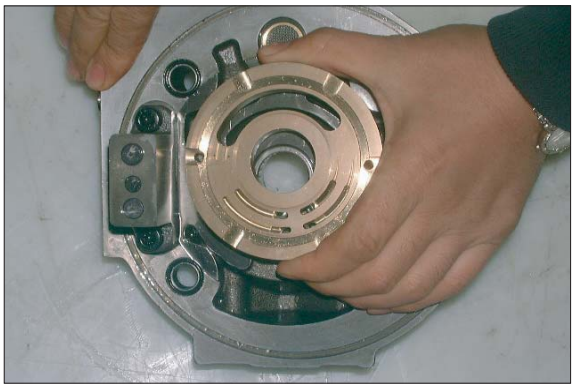
R55NM7HP19

④ Remove the hanger.

R55NM7HP20

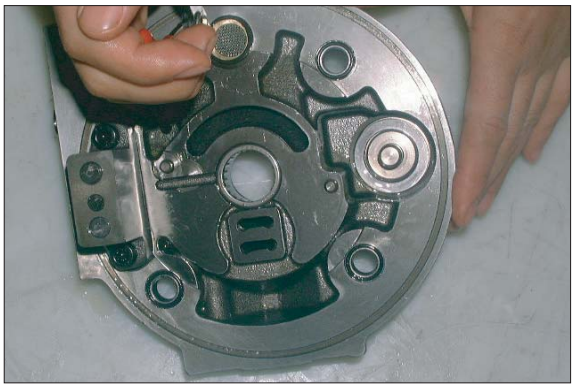
(5) The removal of the cover

① Remove the control plate.



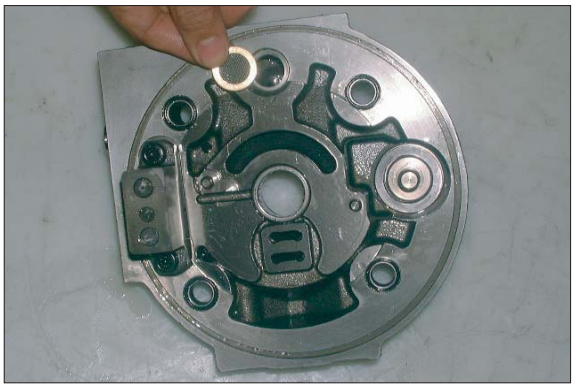
R55NM7HP21

② Remove the C-type stop ring.



R55NM7HP22

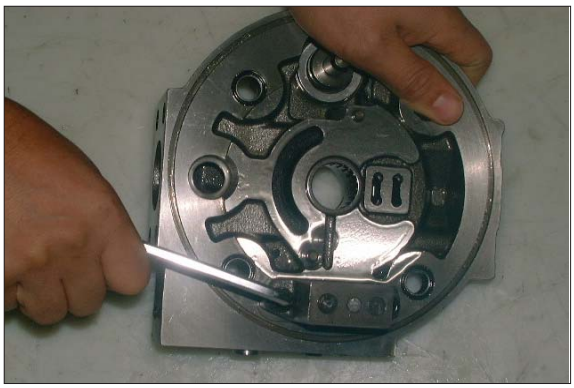
③ Remove the filter.



R55NM7HP23

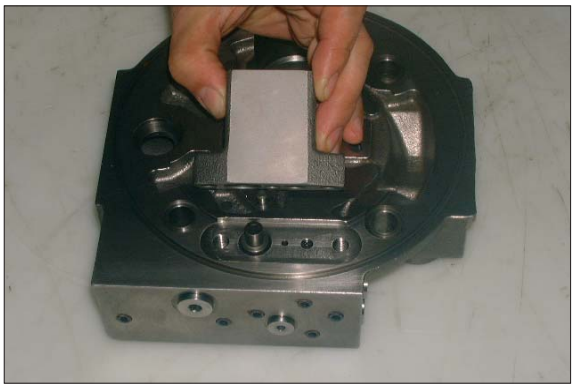
(6) The removal of the control piston

① Remove the hexagonal socket headed bolts. (M8 × 25, 2 pieces)
Hexagonal bar spanner
(Hex. side distance : 6 ㎜)
The threaded portion of the bolt is coated with LOCTITE #270.
This disassembly must therefore be made only when necessary.



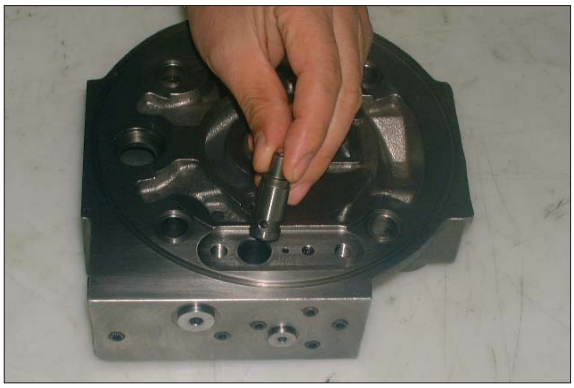
R55NM7HP24

② Remove the cylinder and parallel pin.
※ Be careful because 3 O-rings are provided to the cylinder.



R55NM7HP25

③ Take out the piston.



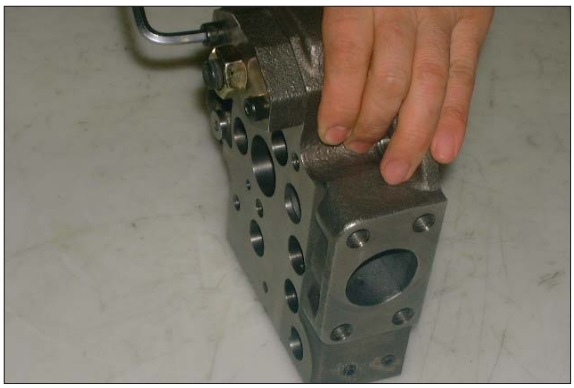
R55NM7HP26

④ Take out three caned disk springs and spring seats.

R55NM7HP27

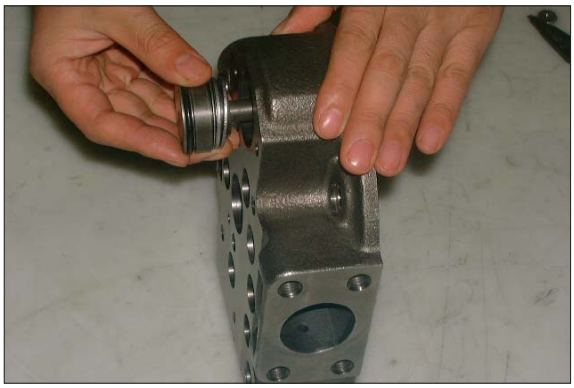
(7) The removal of the control spring

① Remove the hexagonal socket headed bolts (M8×30, 2 pieces) and remove the cover.
Hexagonal bar spanner
(Hex. side distance : 6 ㎜).



R55NM7HP28

② Remove the spring seat.

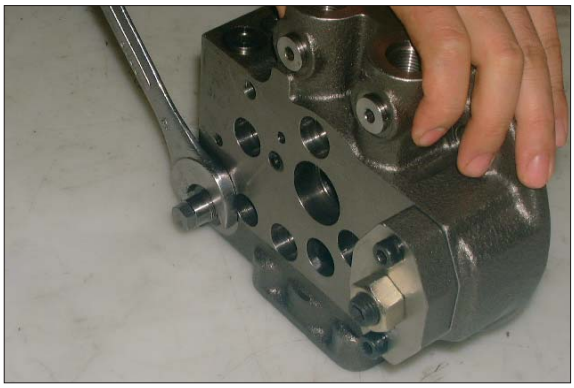


R55NM7HP29

(8) The removal of the relief valve

① Remove the hexagonal nuts.

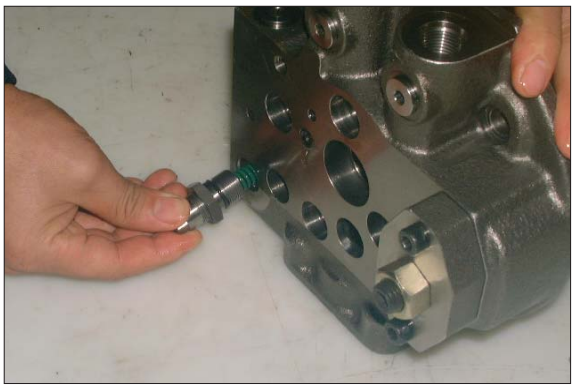
※ Since the pressure has been set, this assembly must be made only when necessary.
Spanner (Hex. side distance : 24 ㎜).



R55NM7HP30

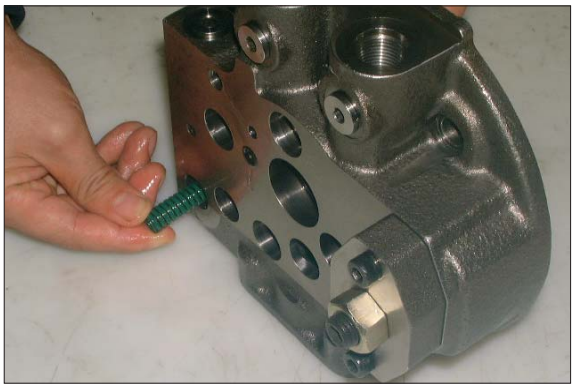
② Remove the adjusting screw.

※ Be careful because the shim is inserted.



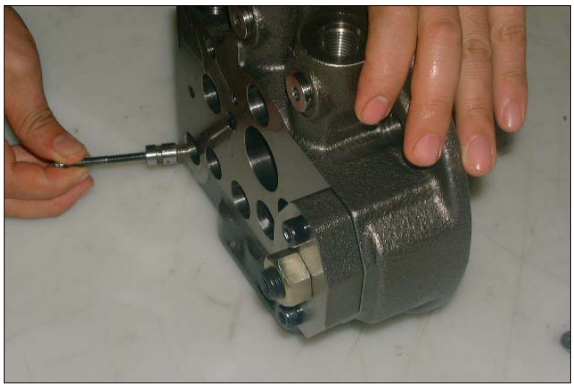
R55NM7HP31

③ Remove the spring.



R55NM7HP32

④ Remove the spool.



R55NM7HP33

(9) Disassembly of the shaft

① Remove the bearing.
Remove the C-type stop ring.
Snap ring pliers for shaft.

R55NM7HP34

② Remove it while knocking the rear end of shaft lightly with a plastic hammer.

R55NM7HP35

3) DISASSEMBLING THE GEARED PUMP

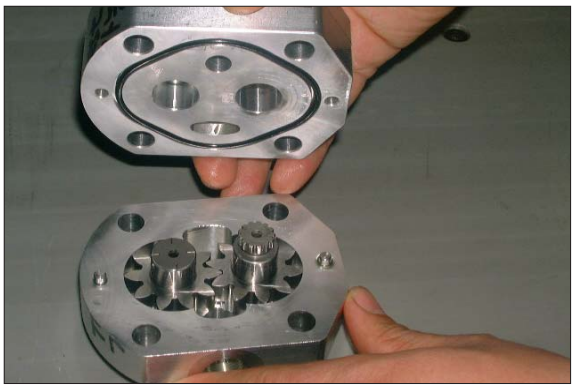
(1) Disassembling the P3 and P4 pump

① Removed hexagonal socket head bolt and nut.
Hexagonal socket wrench (8 ㎜).
Hexagonal bar spanner (17 ㎜).

R55NM7HP209

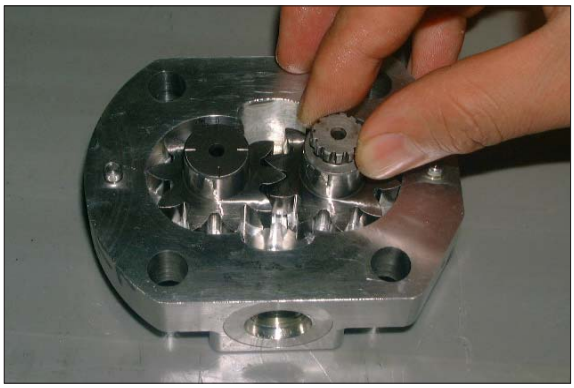
(2) Disassembling the geared pump (P4)

① Remove the geared pump (P4) from the center frame.



R55NM7HP208

② Pulling out the drive gear and the idle gear.



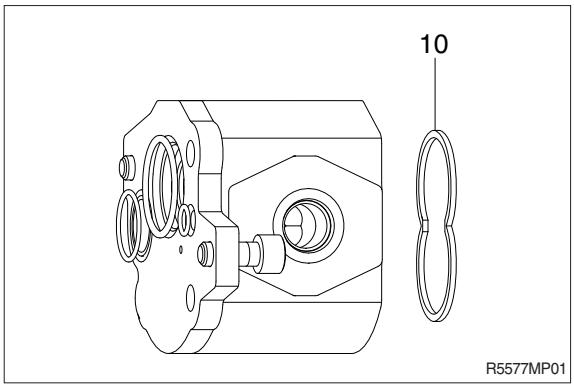
R55NM7HP207

③ Remove the O-ring from the center frame.

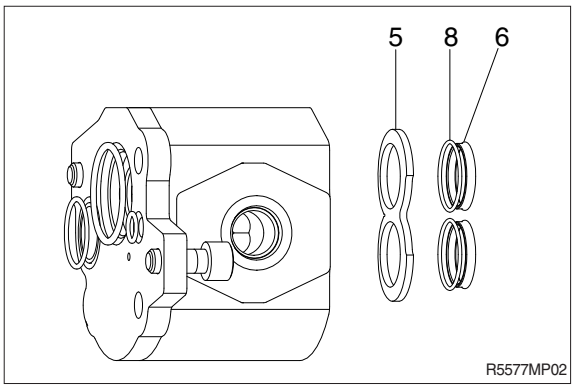
R55NM7HP206

(3) Disassembling the geared pump (P3)

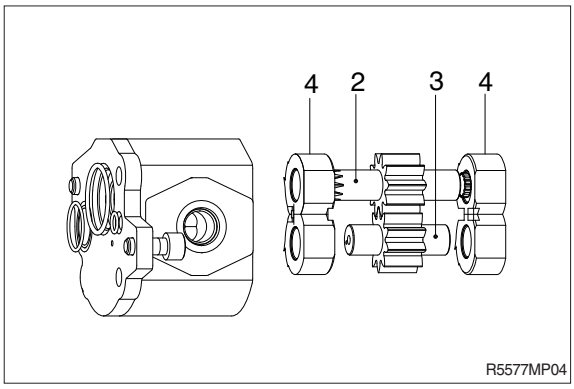
① Remove the square ring (10).



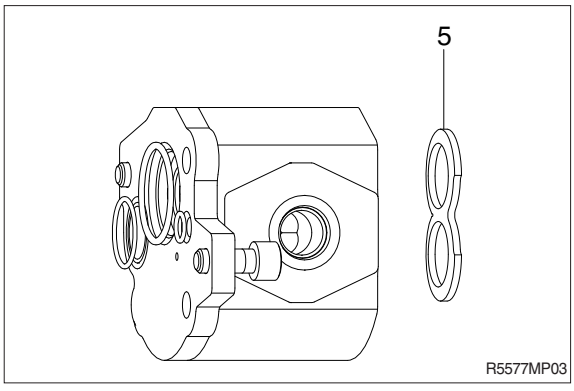
② Remove the plate (5) and the guide ring (pieces). With O-ring (6, 8).
Remove the O-ring (8) from guide ring (6).



③ Remove the drive and idle gear (2, 3) and the side plate (4) assembly.



④ Remove the plate



4. ASSEMBLING PROCEDURE

1) ASSEMBLING THE MAIN PUMP

(1) Assembling the hanger.

R55NM7HP50

(2) Install the bearing.

R55NM7HP50A

(3) Install the distance piece.
Confirm that pre-load is 0.1 ~ 0.2 kgf.

R55NM7HP51

(4) Fix the plate with the hexagonal socket headed bolts (M6 × 16, 4 pieces).
Hexagonal bar spanner
(Hex. side distance : 5 mm)
Tightening torque : 1.2 ~ 1.5 kgf · m
(8.7 ~ 10.8 lbf · ft)

R55NM7HP52

(5) Assembling the shaft

① Fit the shaft into the bearing (with the bearing in the bottom) by using the press machine and jig. If the press is not available, use the jig in the similar manner and drive the shaft into the bearing by knocking with a plastic hammer.

R55NM7HP53

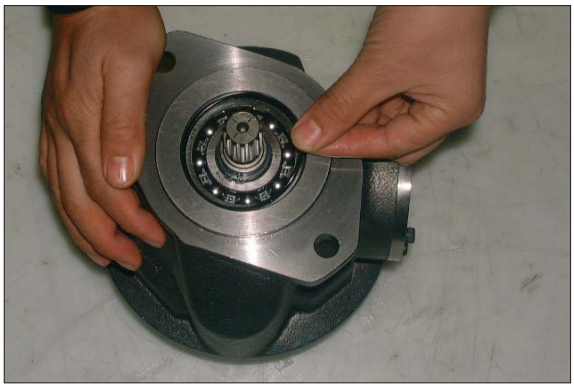
② Install the C-type stop ring to fix the bearing.

R55NM7HP54

③ Assembling the shaft.
Assemble the shaft into the housing.
Knock the spline end lightly with a plastic hammer and fix the bearing outer ring firmly into the housing hole.

R55NM7HP55

(6) Apply grease to the O-ring for assembling.



R55NM7HP56

(7) Install the case with oil seal vertically without tilting.

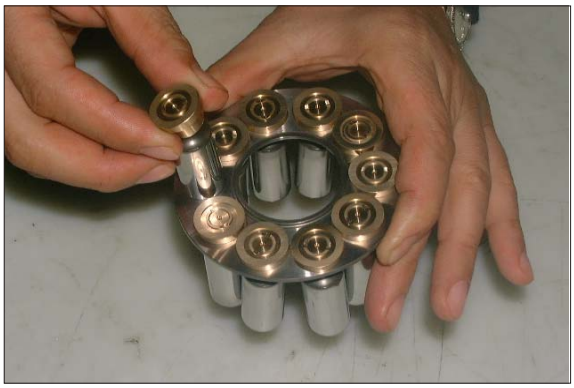
※ Apply grease to the oil seal lip beforehand.

R55NM7HP57

(8) Install the C-type stop ring to fix the shaft.

R55NM7HP58

(9) Assembling the rotary group.
Install 10 (ten) pistons into the retainer.

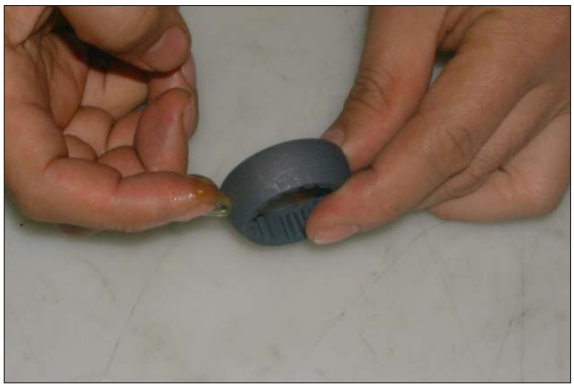


R55NM7HP59

(10) Apply grease to 3 parallel pins and assemble them to the cylinder block.

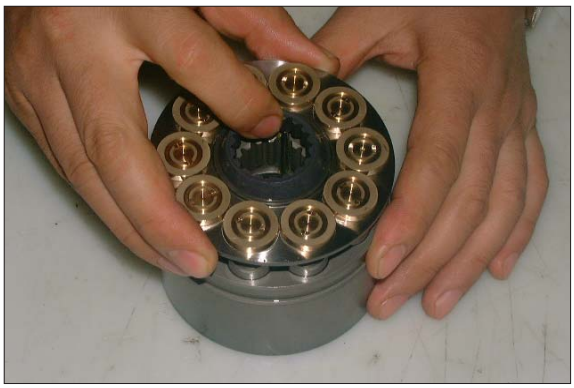
R55NM7HP60

(11) Apply grease to the spherical portion of the guide.



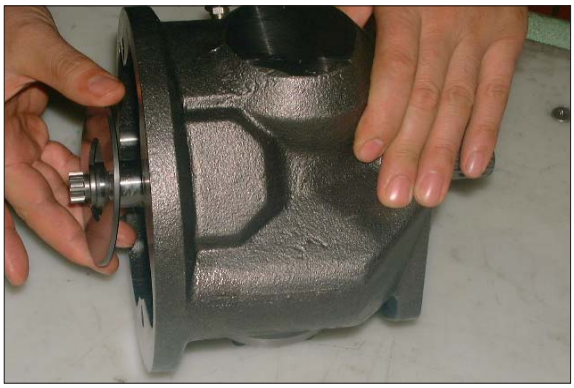
R55NM7HP61

(12) Insert the guide between the retainer and cylinder block and assemble the piston into the hole of cylinder block.



R55NM7HP62

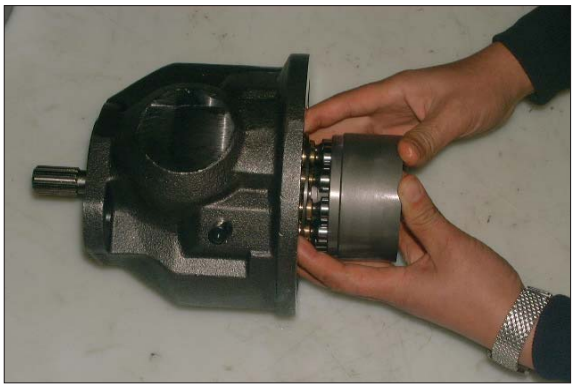
(13) Assembling the rotary group.
To prevent dislodgement, apply grease to the back side of the plate and assemble it to the hanger.



R55NM7HP63

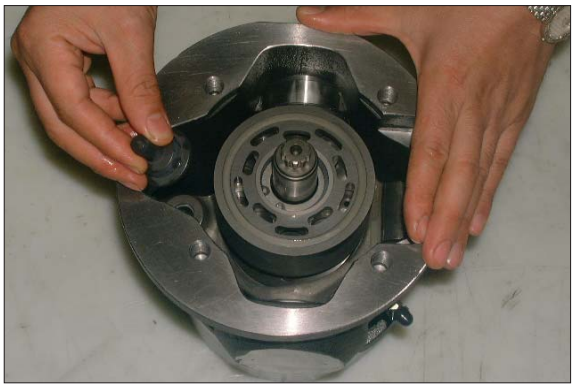
(14) Assemble the rotary group along the shaft spline.

※ During assembly, apply grease to the slide surface of piston shoe and to the slide surface of the cylinder block relative to the control plate.



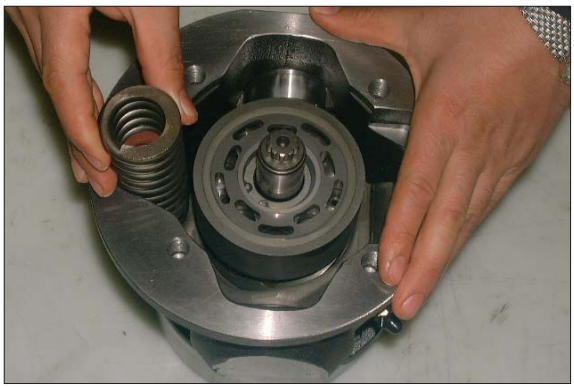
R55NM7HP64

(15) Assembling the control spring.
Apply grease to the spherical portion of the spring seat before assembling.



R55NM7HP65

(16) Assemble 2 springs (inner and outer).

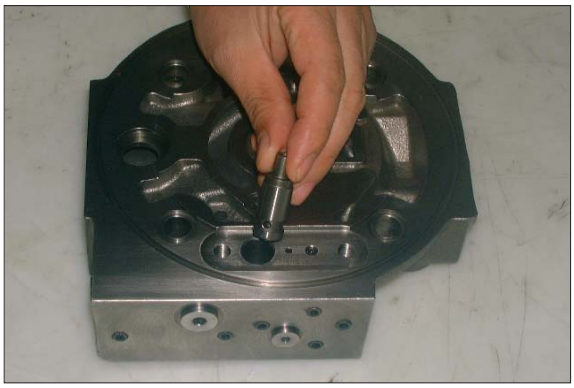


R55NM7HP66

(17) Assembling the cover.
Assemble the spring seats and coned disk springs (3 pieces).

R55NM7HP67

(18) Assembling the control piston.



R55NM7HP68

(19) Apply grease to the O-rings (5.28×1.78, 1piece), (7.65×1.78, 1 piece) and (15.6×1.78, 1 piece) and assemble them to the cylinder.

R55NM7HP69

(20) Apply grease to 3 parallel pins and assemble 3 pins into the cylinder.

R55NM7HP70

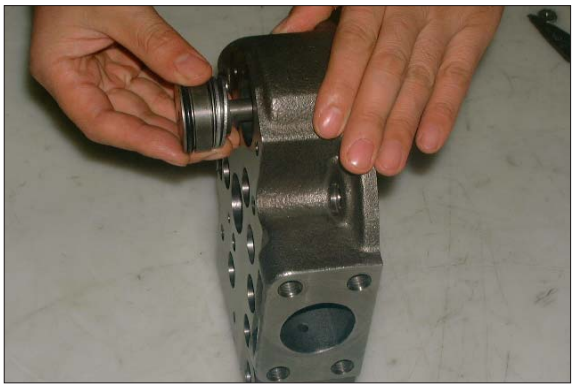
(21) Fix the cylinder with the hexagonal socket headed bolts (M8×25, 2 pieces).

※ Apply LOCTITE #270 to the threaded portion of bolt.

Hexagonal bar spanner
(Hex. side distance : 6 ㎜)
Tightening torque : 2.9 ~ 3.5 kgf · m
(21 ~ 25.3 lbf · ft)

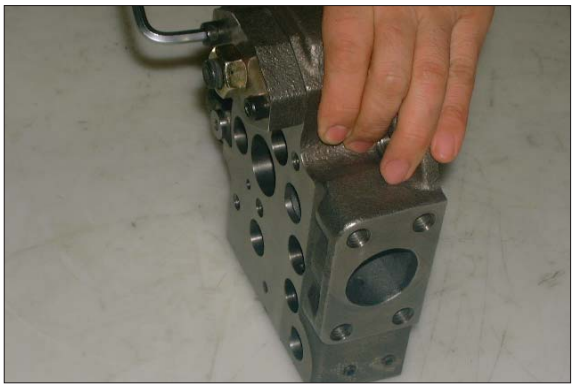
R55NM7HP71

(22) Assembling the control spring.
Install the spring seat.



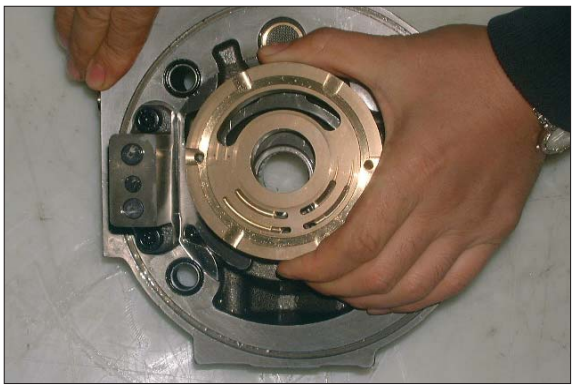
R55NM7HP72

(23) Fix the cover with the hexagonal socket headed bolts (M8×30, 2 pieces)
Hexagonal bar spanner
(Hex. side distance : 6 mm)
Tightening torque : 2.9 ~ 3.5 kgf · m
(21 ~ 25.3 lbf · ft)



R55NM7HP73

(24) Apply grease to the back side of the control plate and assemble it to the cover while matching knock holes.

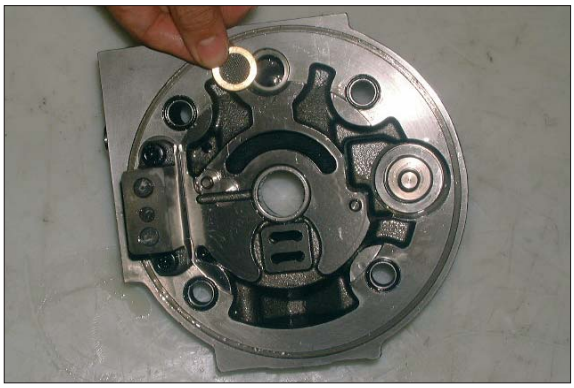


R55NM7HP74

(25) Install the O-ring.
Assemble the spring seats and coned disk springs (3 pieces).

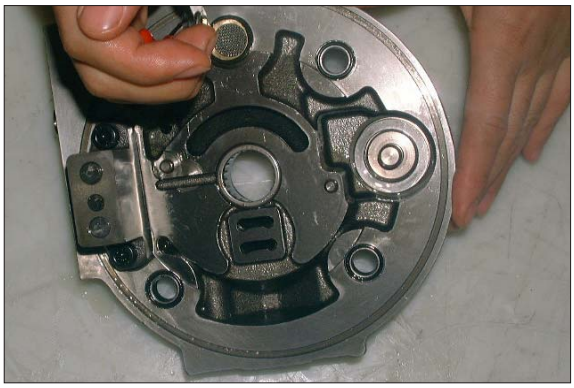
R55NM7HP75

(26) Install the filter into the cover.



R55NM7HP76

(27) Fix the filter with the C-type stop ring.

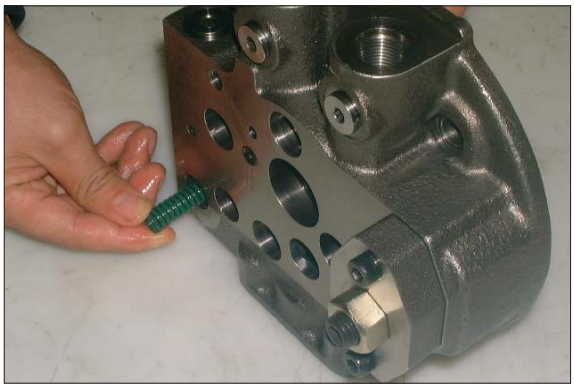


R55NM7HP77

(28) Assembling the relief valve.
Assemble the spool.

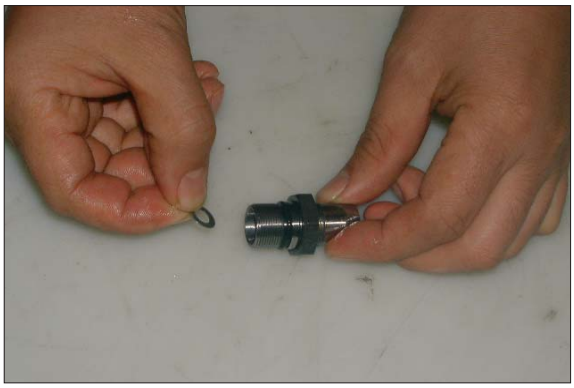
R55NM7HP78

(29) Assemble the spring.



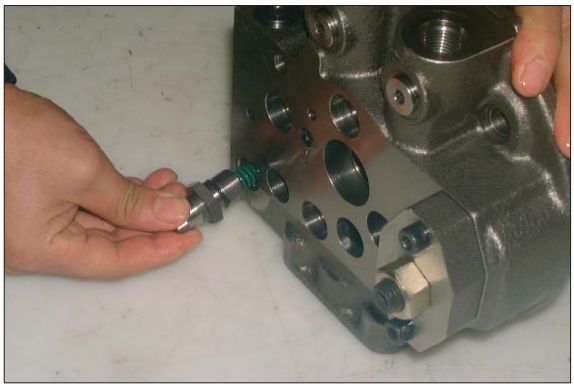
R55NM7HP79

(30) Insert the shim into the adjusting screw.



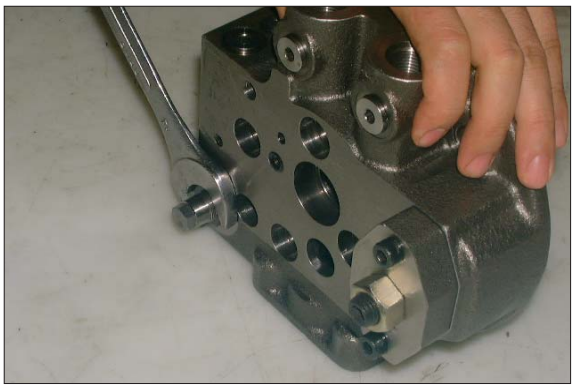
R55NM7HP80

(31) Assemble the adjusting screw.



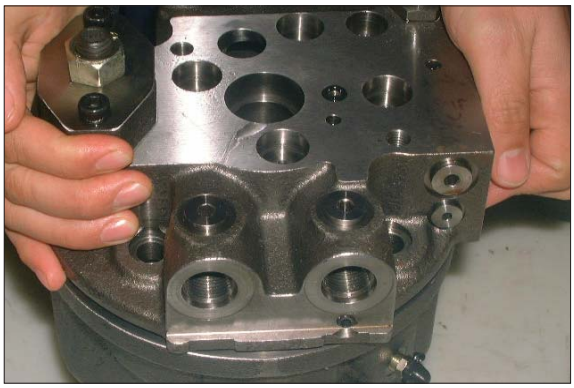
R55NM7HP81

(32) Tighten the hexagonal nuts.
After assembling, set the pressure and tighten the nuts.
1 kgf · m (7.2 lbf · ft)
Spanner (Hex. side distance : 24)



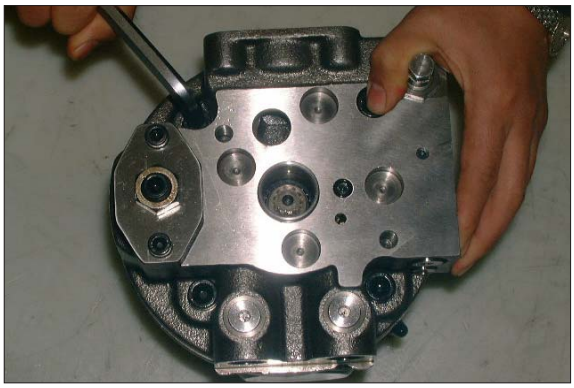
R55NM7HP82

(33) Install the cover in a parallel direction to the housing mounting surface.



R55NM7HP83

(34) Fix the cover with the hexagonal socket headed bolts (M12×30, 3 pieces) and (M12×55, 1 piece)
Hexagonal bar spanner
(Hex. side distance : 10 mm)
Tightening torque : 10 ~ 12.5 kgf · m
(72.3 ~ 90.4 lbf · ft)



R55NM7HP84

(35) Install the O-ring into the cover.

R55NM7HP85

(36) Install the coupling to the shaft end of the main pump.

R55NM7HP86

(37) Connect the main and geared pump.

R55NM7HP87

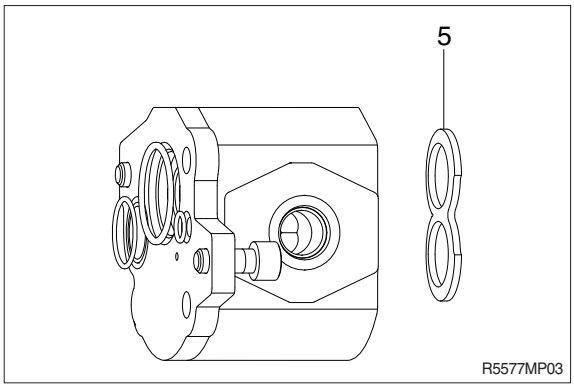
(38) Fix the geared pump with the hexagonal socket headed bolts (M10×25, 2 pieces).
Hexagonal bar spanner
(Hex. side distance : 8 mm)
Tightening torque : 5.6 ~ 7.0 kgf · m
(40.5 ~ 50.6 lbf · ft)

R55NM7HP88

2) REASSEMBLING THE GEARED PUMP

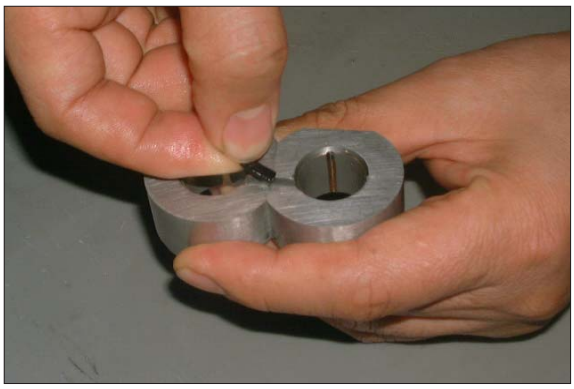
(1) Reassembling the geared pump (P3)

① Insert the plate (5) to the pump housing.



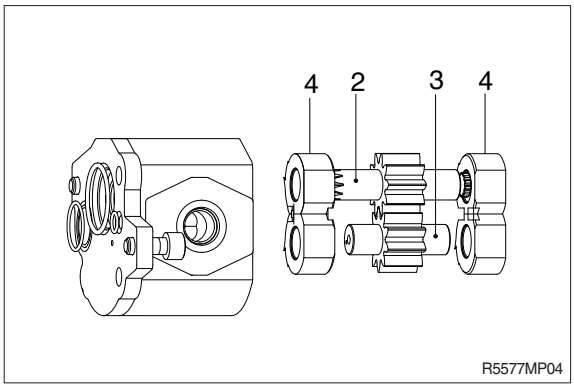
② Insert the square ring into the side plate.

※ Be careful to suction and discharge side.



③ Assemble the side plate to the drive and idle gear.

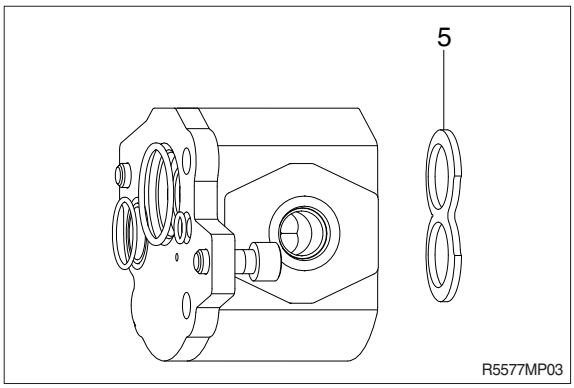
④ Assemble the gear assembly into the gear casing.



⑤ Assemble the O-ring to the guide ring and assemble them to the plate.

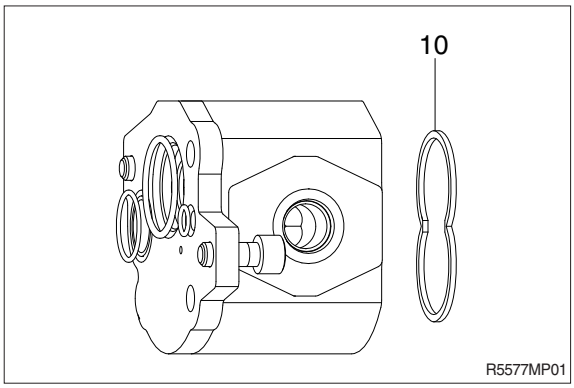
R55NM7HP213

⑥ Assemble the guide ring assembly (6, 8) and plate (5) to the gear casing.



R5577MP03

⑦ Assemble the square ring (10) to the gear casing.



R5577MP01

(2) Reassembling the geared pump (P4)

① Insert the drive gear into the gear casing.

R55NM7HP219

② Insert the idle gear to into the gear casing.

R55NM7HP220

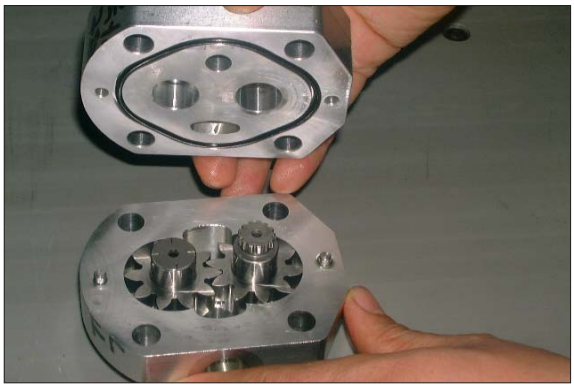
③ Insert the pins (2-pieces) to the center frame.

R55NM7HP221

④ Assemble the O-ring to the center frame.

R55NM7HP222

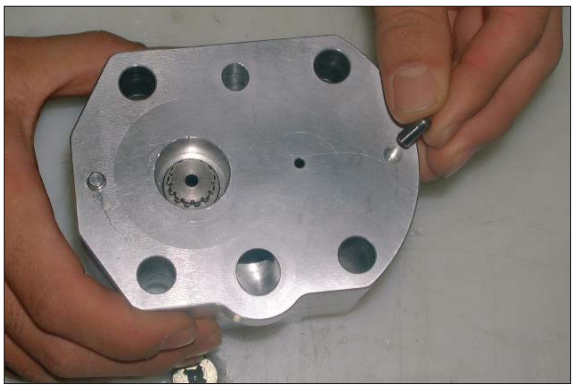
⑤ Assemble the center frame sub-assemble to the gear casing sub-assembly.



R55NM7HP223

(3) Reassembling the P3 and P4 pumps

① Insert the pins (2-pieces) into the center frame.



R55NM7HP224

② Insert coupling to the P3 geared pump.

R55NM7HP225

③ Assemble the P3 and P4 geared pumps.

R55NM7HP226

④ Assemble the hexagonal socket bolts and nuts.

- Size : M10×65L, 4 pieces
- Allen wrench : 8 mm
- Spanner : 17 mm
- Tightening torque : 5.8 kgf · cm (42.0 lbf · ft)

R55NM7HP227

⑤ Assemble the O-ring to the pump housing.

R55NM7HP228

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 pipe.

(5) Disconnect pilot line hoses.

(6) Remove links.

(7) Sling the control valve assembly and remove the control valve mounting bolt.
- Weight : 40 kg (90 lb)
- Tightening torque : 2.5 ± 0.5 kgf·m (18.1 ± 3.6 lbf·ft)

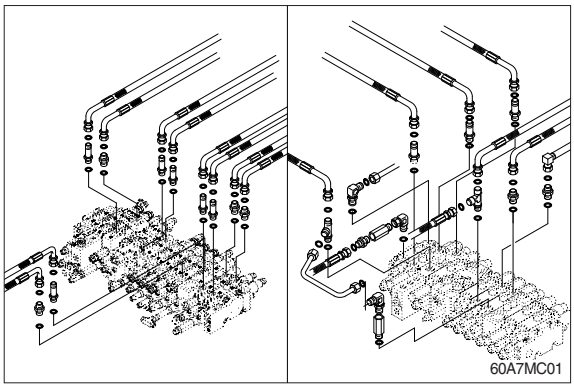
(8) Remove the control valve assembly.
When removing the control valve assembly, check that all the piping have been disconnected.

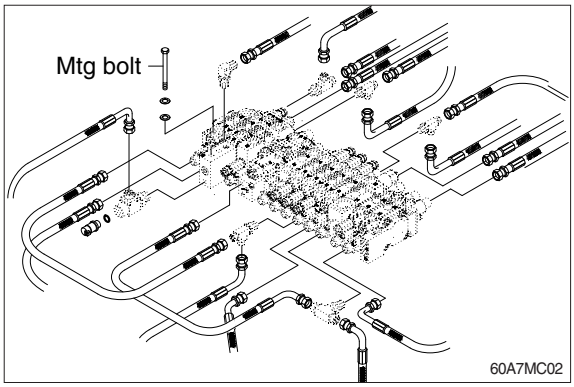
2) INSTALL

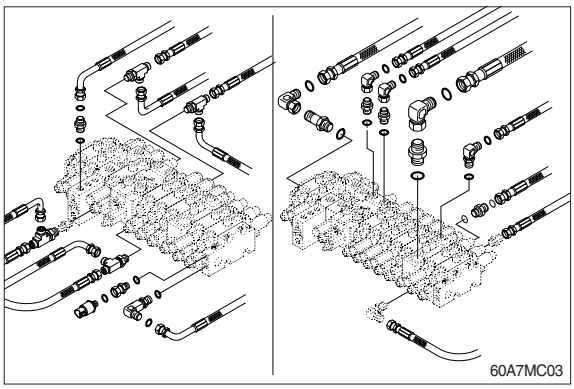
(1) Carry out installation in the reverse order to removal.

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

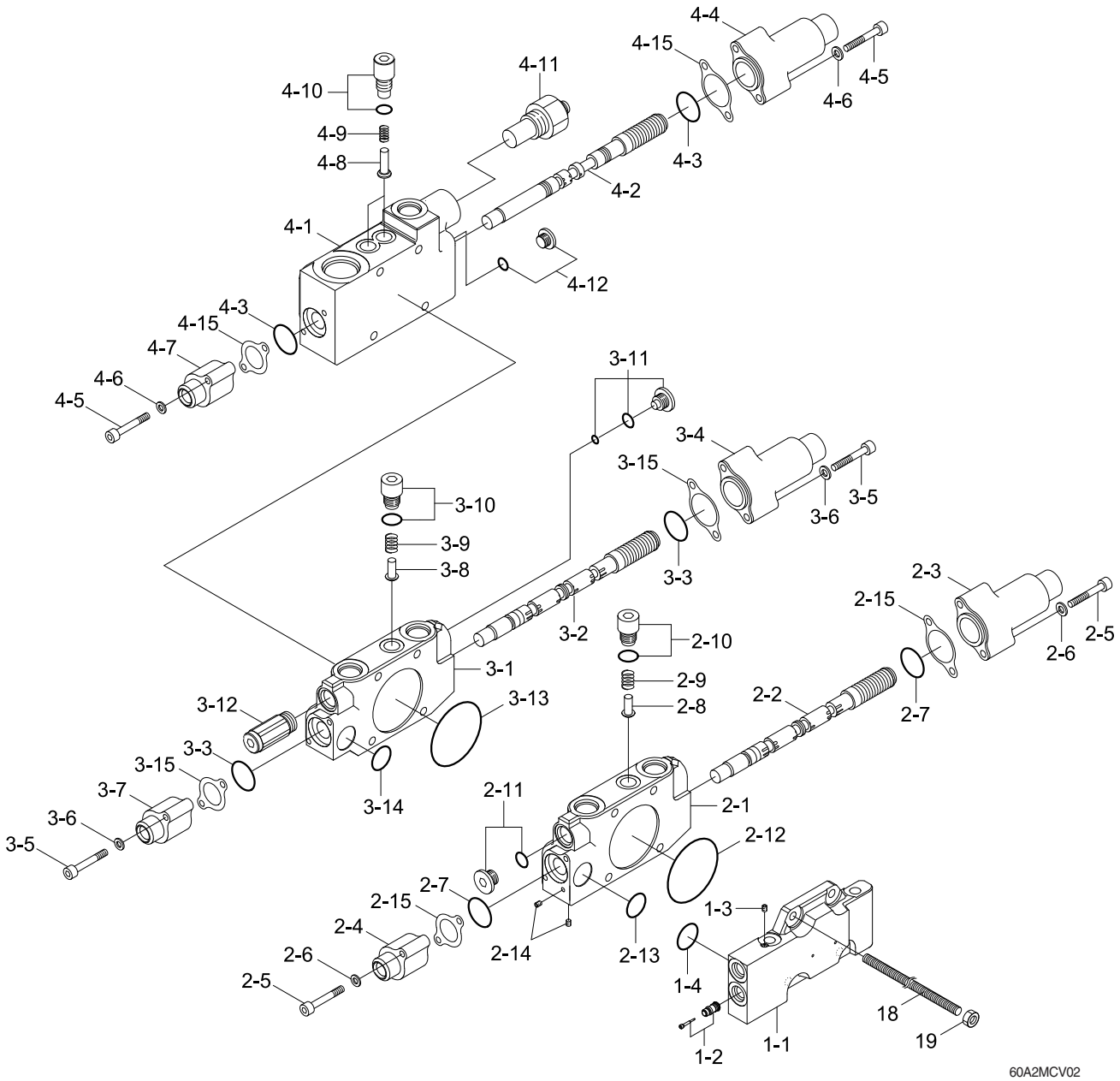
(3) Confirm the hydraulic oil level and recheck the hydraulic oil leak or not.





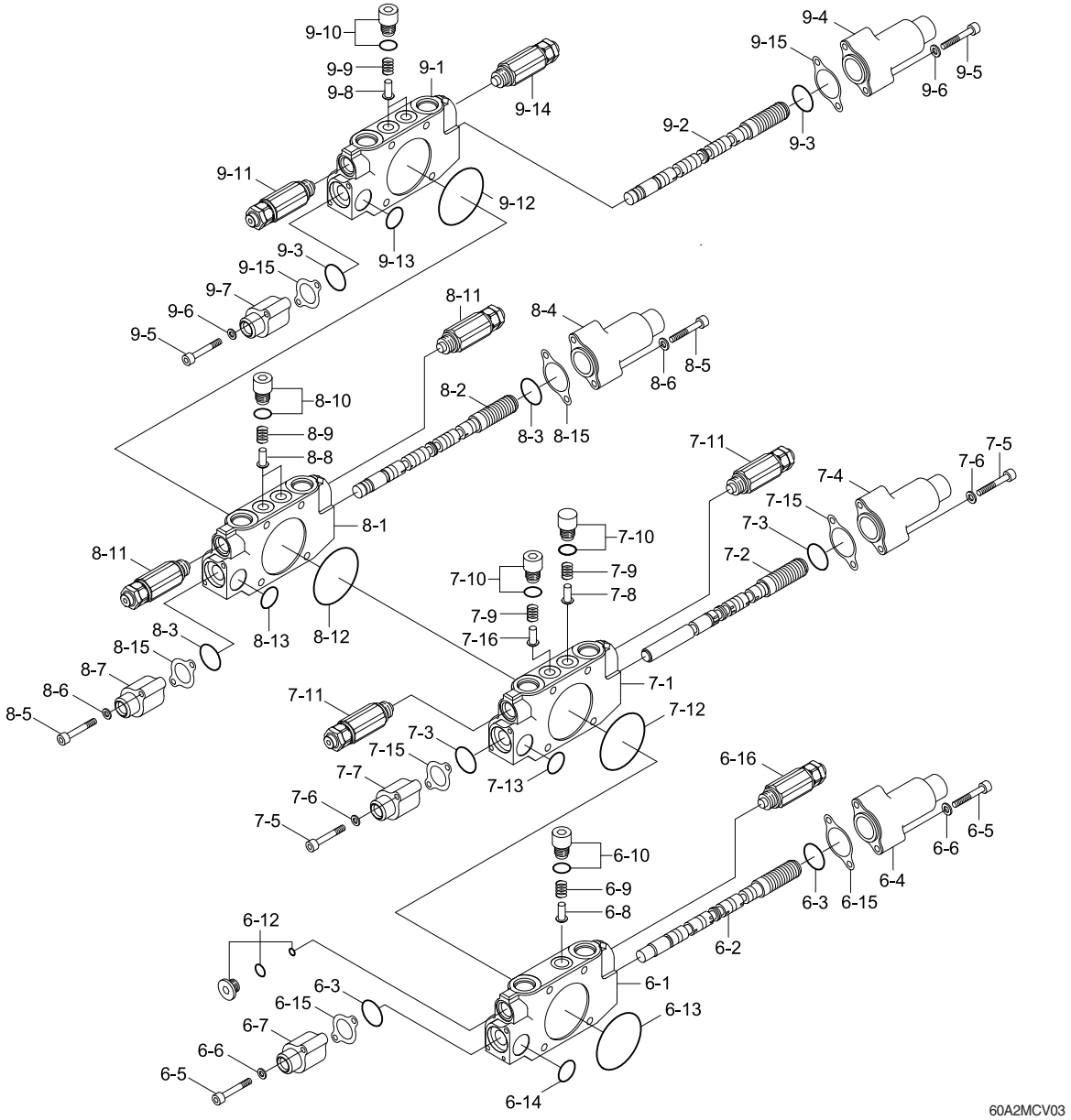


2. STRUCTURE (1/4)



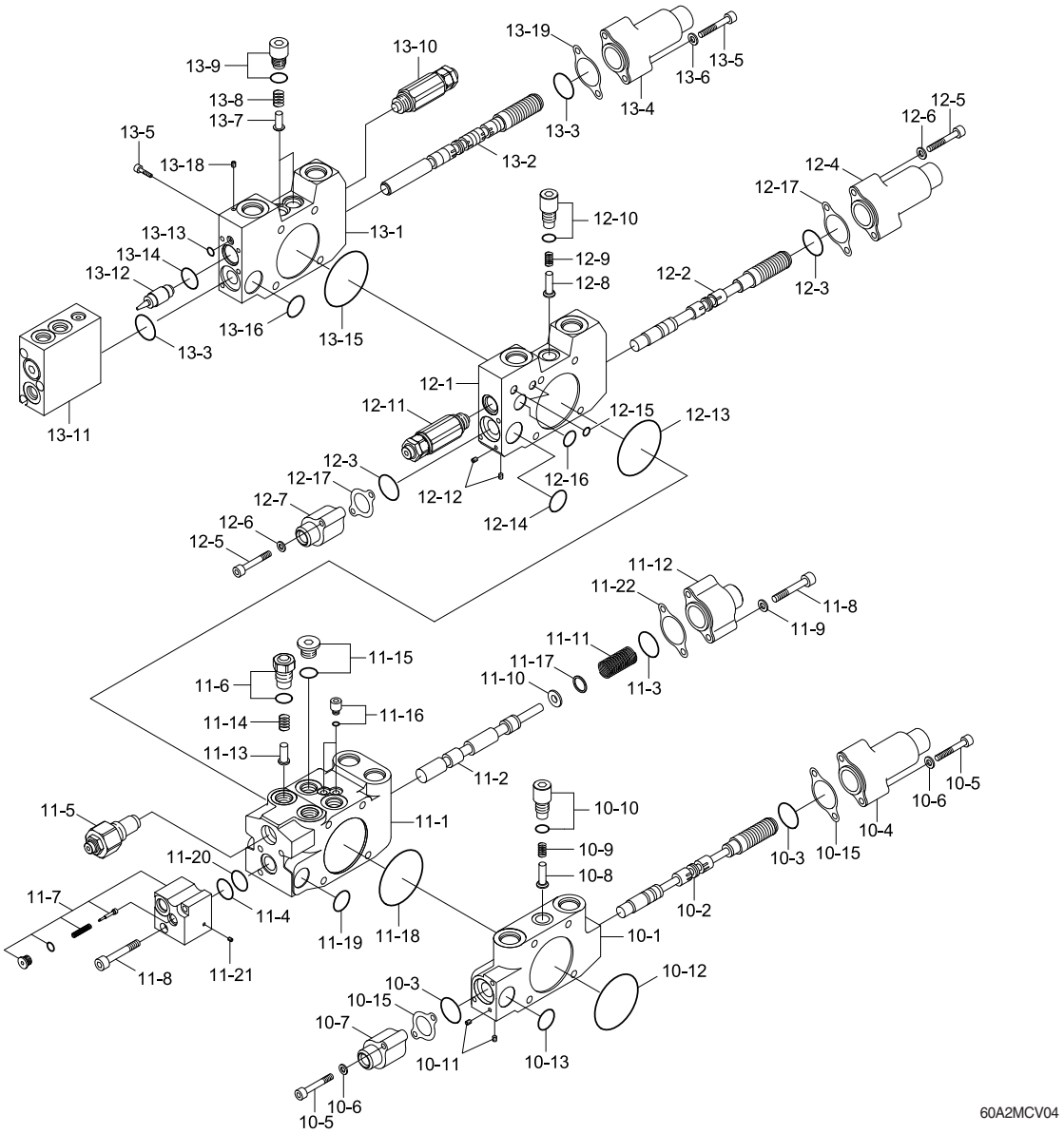
1	Port cover assy	2-9	Check spring	3-7	Pilot cap B1	4-4	Pilot cap A
1-1	Autoidle cover	2-10	Plug assy	3-8	Check poppet	4-5	Wrench bolt
1-2	Filter assy	2-11	Plug assy	3-9	Check spring	4-6	Washer
1-3	Set screw	2-12	O-ring	3-10	Plug assy	4-7	Pilot cap B1
1-4	O-ring	2-13	O-ring	3-11	Plug assy	4-8	Check poppet
2	Swing section assy	2-14	Set screw	3-12	Check valve	4-9	Check spring
2-1	Work block	2-15	Gasket	3-13	O-ring	4-10	Plug assy
2-2	Swing spool assy	3	Dozer section assy	3-14	O-ring	4-11	Relief valve assy
2-3	Pilot cap A1	3-1	Work block	3-15	Gasket	4-12	Plug cap assy
2-4	Pilot cap B1	3-2	Dozer spool assy	4	Inlet section assy	4-15	Gasket
2-5	Wrench bolt	3-3	O-ring	4-1	Work block	18	Tie bolt
2-6	Washer	3-4	Pilot cap A	4-2	Selector spool assy	19	Nut
2-7	O-ring	3-5	Wrench bolt	4-3	O-ring		
2-8	Check poppet	3-6	Washer				

STRUCTURE (2/4)



6	Boom 2 section assy	7	Arm 1 section assy	8-1	Work block	9-2	Rotator spool assy
6-1	Work block	7-1	Work block	8-2	B/swing spool assy	9-3	O-ring
6-2	Boom 2 spool assy	7-2	Arm 1 spool assy	8-3	O-ring	9-4	Pilot cap A
6-3	O-ring	7-3	O-ring	8-4	Pilot cap A	9-5	Wrench bolt
6-4	Pilot cap A	7-4	Pilot cap A	8-5	Wrench bolt	9-6	Washer
6-5	Wrench bolt	7-5	Wrench bolt	8-6	Washer	9-7	Pilot cap B1
6-6	Washer	7-6	Washer	8-7	Pilot cap B1	9-8	Check poppet
6-7	Pilot cap B1	7-7	Pilot cap B1	8-8	Check poppet	9-9	Check spring
6-8	Check poppet	7-8	Check poppet	8-9	Check spring	9-10	Plug assy
6-9	Check spring	7-9	Check spring	8-10	Plug assy	9-11	Relief valve assy
6-10	Plug assy	7-10	Plug assy	8-11	Relief valve assy	9-12	O-ring
6-12	Plug assy	7-11	Relief valve assy	8-12	O-ring	9-13	O-ring
6-13	O-ring	7-12	O-ring	8-13	O-ring	9-14	Relief valve assy
6-14	O-ring	7-15	Gasket	8-15	Gasket	9-15	Gasket
6-15	Gasket	7-16	Check poppet	9	Option section assy		
6-16	Relief valve assy	8	B/swing section assy	9-1	Work block		

STRUCTURE (3/4)



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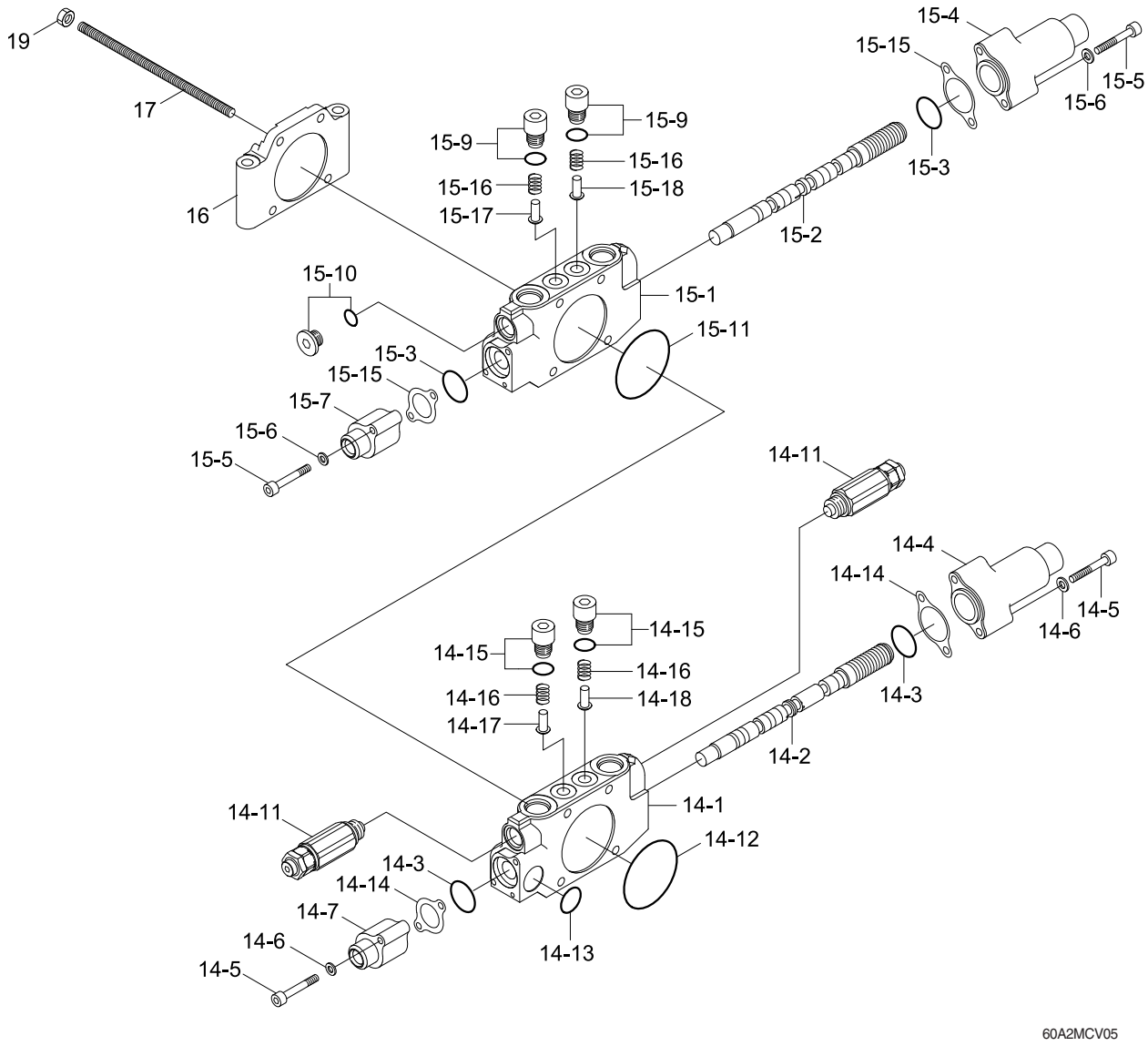
10	LH travel section assy	11-4	O-ring	12	RH travel section assy	13-1	Work block
10-1	Work block	11-5	Relief valve assy	12-1	Work block	13-2	Boom 1 spool assy
10-2	LH travel spool assy	11-6	Plug assy	12-2	RH travel spool assy	13-3	O-ring
10-3	O-ring	11-7	Check cap assy	12-3	O-ring	13-4	Pilot cap A
10-4	Pilot cap A	11-8	Wrench bolt	12-4	Pilot cap A	13-5	Wrench bolt
10-5	Wrench bolt	11-9	Washer	12-5	Wrench bolt	13-6	Washer
10-6	Washer	11-10	Spring seat	12-6	Washer	13-7	Check poppet
10-7	Pilot cap B1	11-11	Pilot spring	12-7	Pilot cap B1	13-8	Check spring
10-8	Check poppet	11-12	Pilot cap B2	12-8	Check poppet	13-9	Plug assy
10-9	Check spring	11-13	Check poppet	12-9	Check spring	13-10	O-ring
10-10	Plug assy	11-14	Check spring	12-10	Plug assy	13-11	Holding valve assy
10-11	Set screw	11-15	Plug assy	12-11	Relief valve assy	13-12	Holding valve assy
10-12	O-ring	11-16	Plug assy	12-12	Set screw	13-13	O-ring
10-13	O-ring	11-17	Spring shim	12-13	O-ring	13-14	O-ring
10-15	Gasket	11-18	O-ring	12-14	O-ring	13-15	O-ring
11	Inlet section assy	11-19	O-ring	12-15	O-ring	13-16	O-ring
11-1	Work block	11-20	O-ring	12-16	O-ring	13-18	Set screw
11-2	Track spool	11-21	Set screw	12-17	Gasket	13-19	Gasket
11-3	O-ring	11-22	Gasket	13	Boom 1 section assy		

STRUCTURE (4/4)



14	Bucket section assy	12-15	Plug assy	15-7	Pilot cap B1
14-1	Work block	12-16	Check spring	15-9	Plug assy
14-2	Bucket spool assy	12-17	Check poppet	15-10	Plug assy
14-3	O-ring	12-18	Check poppet	15-11	O-ring
14-4	Pilot cap A	15	Arm 2 section assy	15-15	Gasket
14-5	Wrench bolt	15-1	Work block	15-16	Check spring
14-6	Washer	15-2	Arm 2 spool assy	15-17	Check poppet
12-7	Pilot cap B1	15-3	O-ring	15-18	Check poppet
12-11	Relief valve assy	15-4	Pilot cap A	16	End cover
12-12	O-ring	15-5	Wrench bolt	17	Tie bolt
12-13	O-ring	15-6	Washer	18	Nut
12-14	Gasket				

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL PRECAUTIONS

(1) All hydraulic components are manufactured to a high precision. Consequently, before disassembling and assembling them, it is essential to select an especially clean place.

(2) In handling a control valve, pay full attention to prevent dust, sand, etc. from entering into it.

(3) When a control valve is to be remove from the machine, apply caps and masking seals to all ports. Before disassembling the valve, recheck that these caps and masking seals are fitted completely, and then clean the outside of the assembly. Use a proper bench for working. Spread paper or a rubber mat on the bench, and disassemble the valve on it.

(4) Support the body section carefully when carrying or transferring the control valve. Do not lift by the exposed spool, end cover section etc.

(5) After disassembling and assembling of the component it is desired to carry out various tests (for the relief characteristics, leakage, flow resistance, etc.), but hydraulic test equipment is necessary for these tests. Therefore, even when its disassembling can be carried out technically, do not disassemble such components that cannot be tested, adjusted, and so on. Additionally one should always prepare clean cleaning oil, hydraulic oil, grease, etc. beforehand.

2) TOOLS

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

Name of tool	Quantity	Size (mm)
Vice mounted on bench (soft jaws)	1 unit	
Hexagon wrench	Each 1 piece	5, 6, 10, 12 and 14
Socket wrench	Each 1 piece	5 and 6
Spanner	Each 1 piece	13, 21 and 30
Rod	1 piece	Less than 10×250

3) DISASSEMBLY

(1) Disassembly of spools (pilot type)

① Loosen hexagon socket head bolts (5) with washer (6).
(Hexagon wrench : 5 mm)

② Remove the pilot cover (3).

※ Pay attention not to lose the O-ring (7) under the pilot cover.

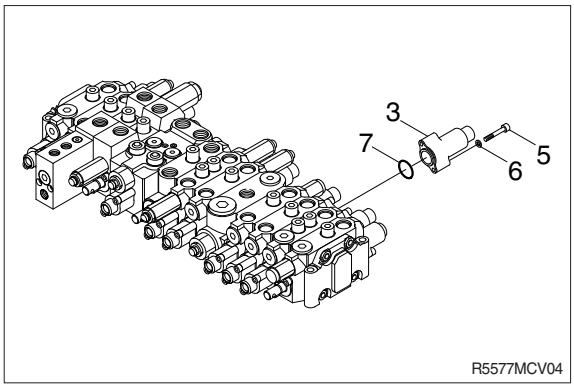
③ Remove the spool assembly (2) from the body by hand slightly.

※ When extracting each spool from its body, pay attention not to damage the body.

※ When extracting each spool assembly, it must be extracted from spring side only.

※ When any abnormal parts are found, replace it with completely new spool assembly.

※ When disassembled, tag the components for identification so that they can be reassembled correctly.



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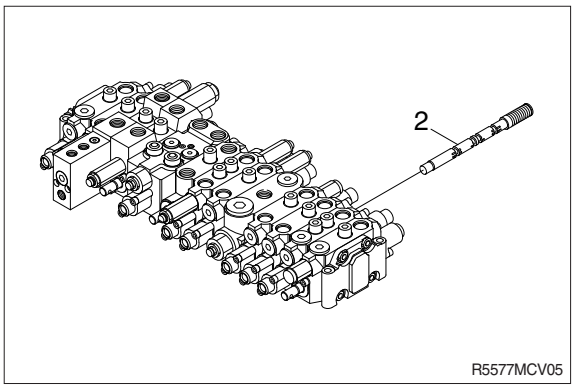


R5577MCV05

(2) Disassembly of holding valve (boom 1)

① Loosen hexagon socket head bolts (7).
(Hexagon wrench : 5 mm)

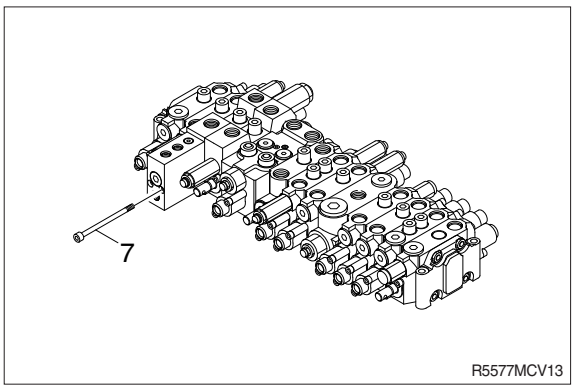
② Remove the holding valve.

※ Pay attention not to lose the O-ring and the poppet under the pilot cover.

※ Pay attention not to damage the "piston A" under pilot cover.

※ When any abnormal parts are found, replace it with completely new holding valve assembly.

※ When disassembled, tag the components for identification so that they can be reassembled correctly.



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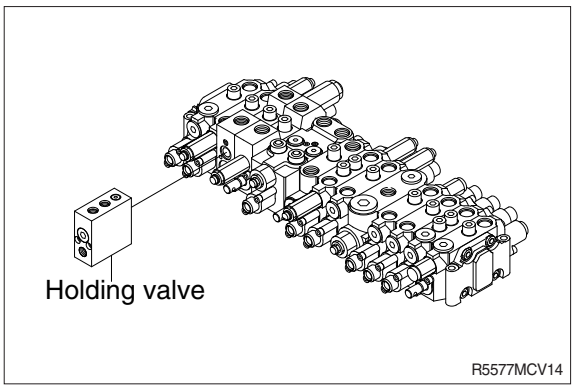

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(3) Disassembly of the load check valve and the negative relief valve

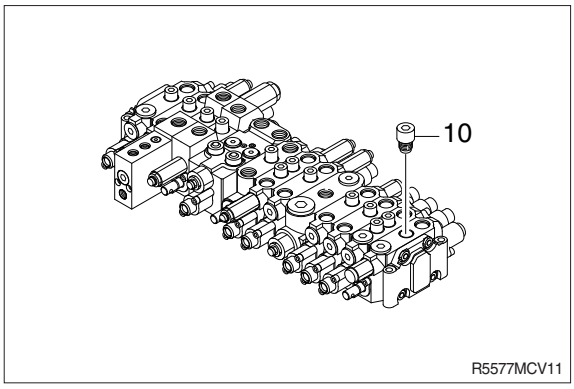
① The load check valve

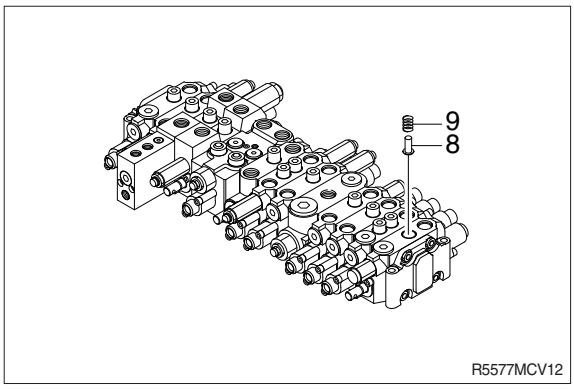
a. Fix the body to suitable work bench.

※ Pay attention not to damage the body.

b. Loosen the plug (10)
(Hexagon wrench : 10 ㎜).

c. Remove the spring (9) and the load check valve (8) with pincers or magnet.





(4) Disassembly of the main and overload relief valve

① Fix the body to suitable work bench.

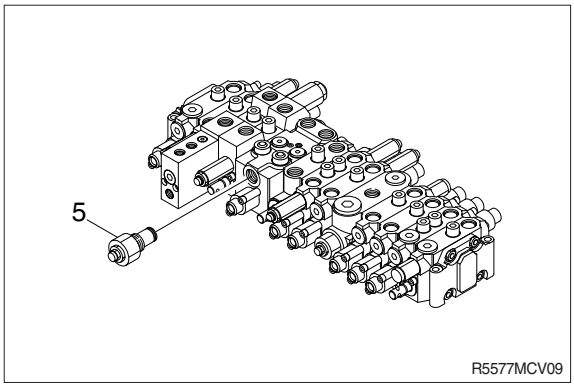
② Remove the main relief valve (5).
(Spanner : 30 ㎜)

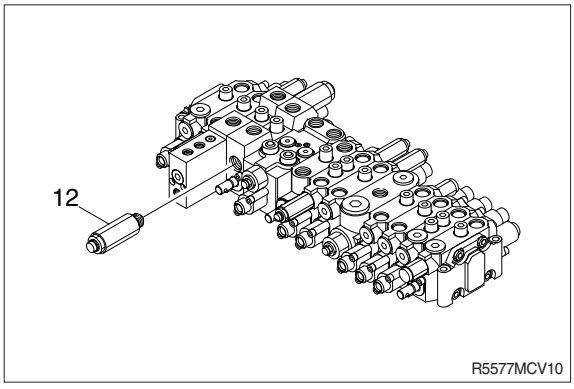
③ Remove the overload relief valve (12).
(Spanner : 22 ㎜)

※ When disassembled, tag the relief valve for identification so that they can be reassembled correctly.

※ Pay attention not to damage seat face.

※ When any abnormal parts are found, replace it with completely new relief valve assembly.





(5) Disassembly of the block assembly

① Fix the body to suitable work bench.

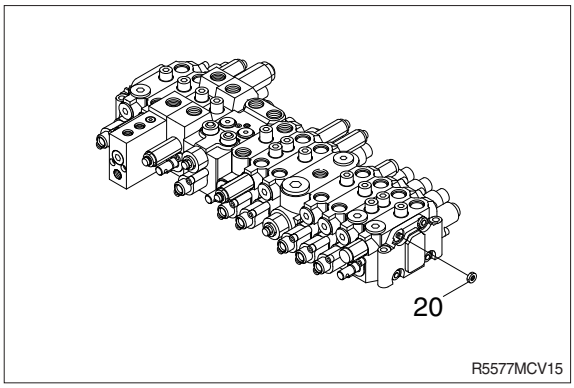
② Remove the nut (20).
(Spanner : 13 ㎜)

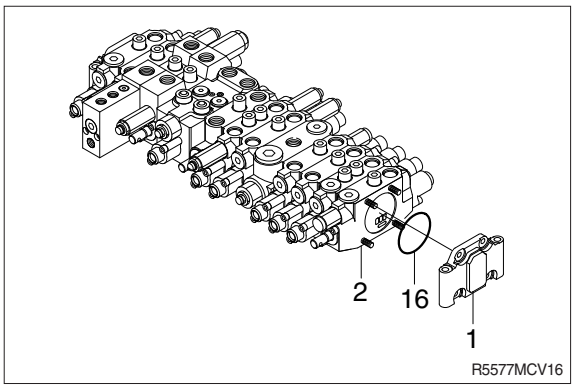
※ The work block is assembled by two sets of tie-bolts.

③ Remove the end cover (1) and the work blocks.

※ Do not removed the tie bolt.

※ Pay attention not to lose the O-ring (16).





(6) Inspection after disassembly

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

① Control valve

a. Check whole surfaces of all parts for burrs, scratches, notches and other defects.
b. Confirm that seal groove faces of body and block are smooth and free of dust, dent, rust etc.
c. Correct dents and damages and check seat faces within the body, if any, by lapping.
※ Pay careful attention not to leave any lapping agent within the body.
d. Confirm that all sliding and fitting parts can be moved manually and that all grooves and path's are free foreign matter.
e. If any spring is broken or deformed, replace it with new one.
f. When a relief valve does not function properly, repair it, following it's the prescribed disassembly and assembly procedures.
g. Replace all seals and O-rings with new ones.

② Relief valve

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

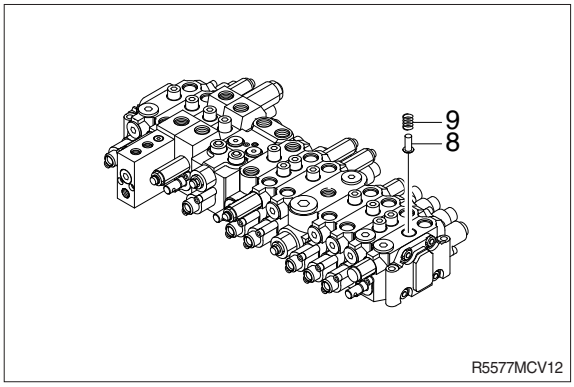
4) ASSEMBLY

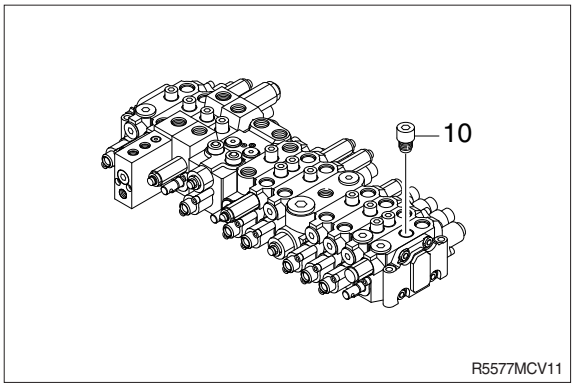
(1) General precaution

① In this assembly section, explanation only is shown.
For further understanding, please refer to the figures shown in the previous structure & disassembly section.
② Pay close attention to keeping all seals free from handling damage and inspect carefully for damage before using them.
③ Apply clean grease or hydraulic oil to the seal so as to ensure it is fully lubricated before assembly.
④ Do not stretch seals so much as to deform them permanently.
⑤ In fitting O-rings, pay close attention not to roll them into their final position in addition, a twisted O-ring cannot easily untwist itself naturally and could thereby cause inadequate sealing and thereby both internal and external oil leakage.
⑥ Tighten fitting bolts for all sections with a torque wrench adjusted to the respective tightening torque.
⑦ Do not reuse removed O-rings and seals.

(2) Load check valve

① Assemble the load check valve (8) and spring (9).
② Put O-rings on to plug (10).
③ Tighten plug to the specified torque.
· Hexagon wrench : 8 mm
· Tightening torque : 3.7 kgf · m
(26.7 lbf · ft)

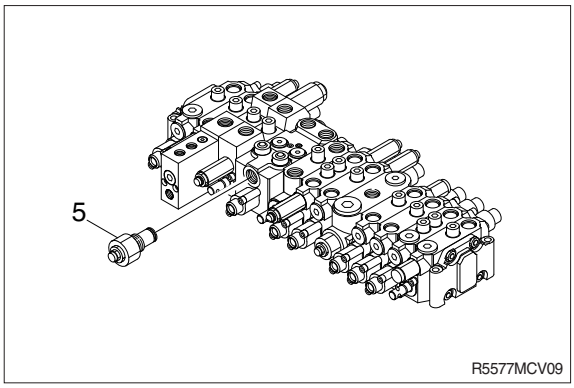


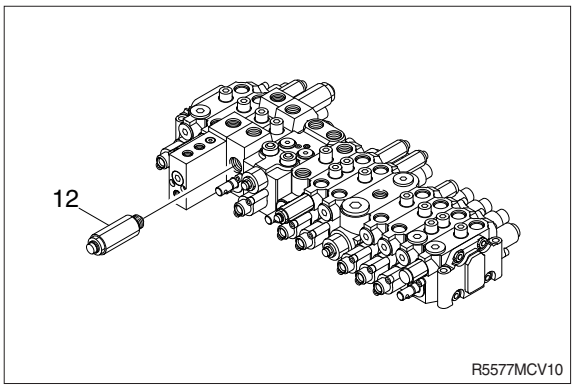


(3) Main relief, port relief valves

① Install the main relief valve (5).
- · Spanner : 30 mm
- · Tightening torque : 6 kgf · m (43.4 lbf · ft)

② Install the over load relief valve (12).
- · Spanner : 22 mm
- · Tightening torque : 4 kgf · m (28.9 lbf · ft)

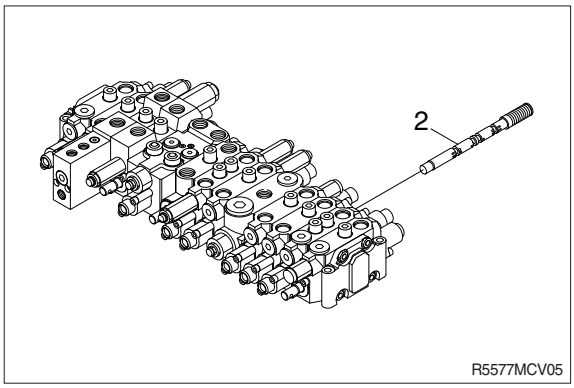




(4) Main spools

① Carefully insert the previously assembled spool assemblies into their respective bores within of body.

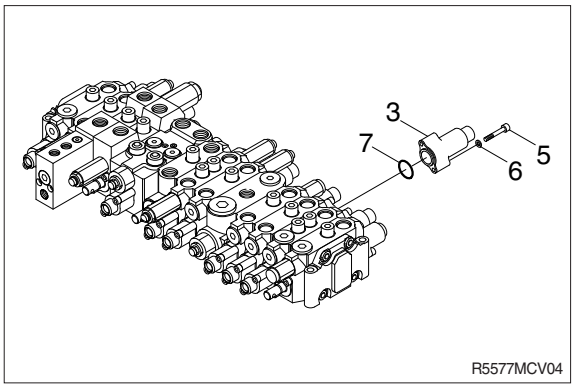
※ Fit spool assemblies into body carefully and slowly. Do not under any circumstances push them forcibly in.



(5) Covers of pilot type

① Fit spool covers (3) tighten the hexagonal socket head bolts (5) to the specified torque.
- · Hexagon wrench : 5 mm
- · Tightening torque : 1~1.1 kgf · m (7.2~7.9 lbf · ft)

※ Confirm that O-rings (7) have been fitted.

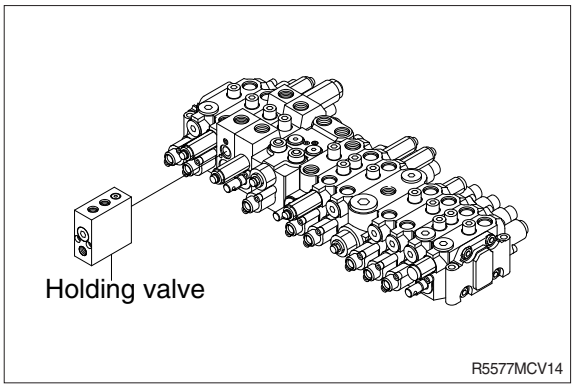


(6) Holding valve

① Fit the holding valve to the body and tighten hexagon socket head bolt (7) to specified torque.

· Hexagon wrench : 5 mm

· Tightening torque : 1.1 kgf · m
(7.9 lbf · ft)



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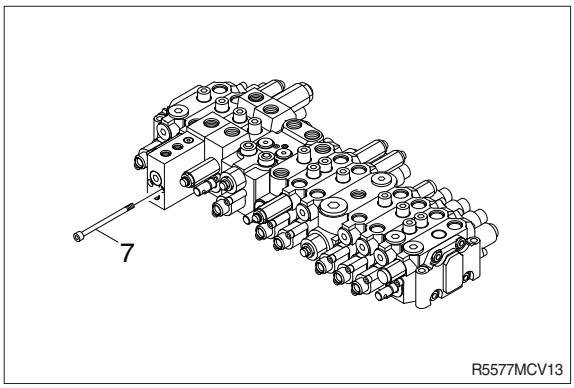


R5577MCV13

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

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

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

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

(4) Disconnect hose assembly (2, 3).

(5) Disconnect pilot line hoses (4, 5, 6, 7, 8).

(6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (9).

- Motor device weight : 23 kg (51 lb)
- Tightening torque :
  11 ± 0.5 kgf · m (79.6 ± 3.6 lbf · ft)

(7) Remove the swing motor assembly.

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

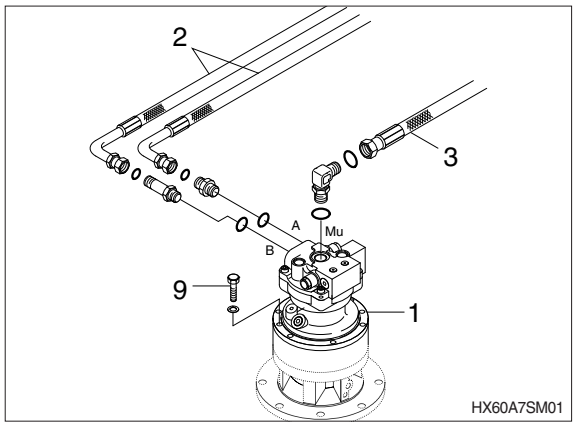
2) INSTALL

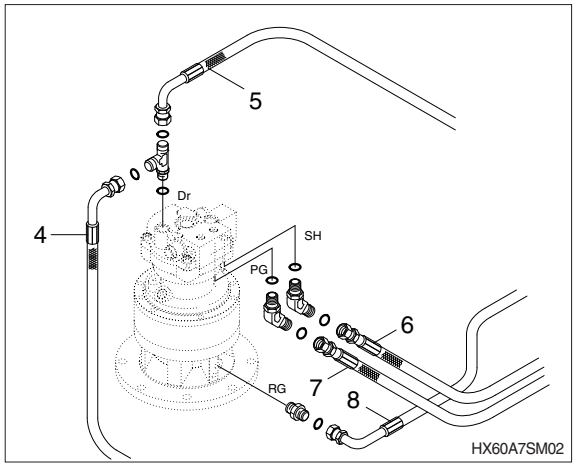
(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from the swing motor.

① Remove the air vent plug.
② Pour in hydraulic oil until it overflows from the port.
③ Tighten plug lightly.
④ Start the engine, run at low idling and check oil come out from plug.
⑤ Tighten plug fully.

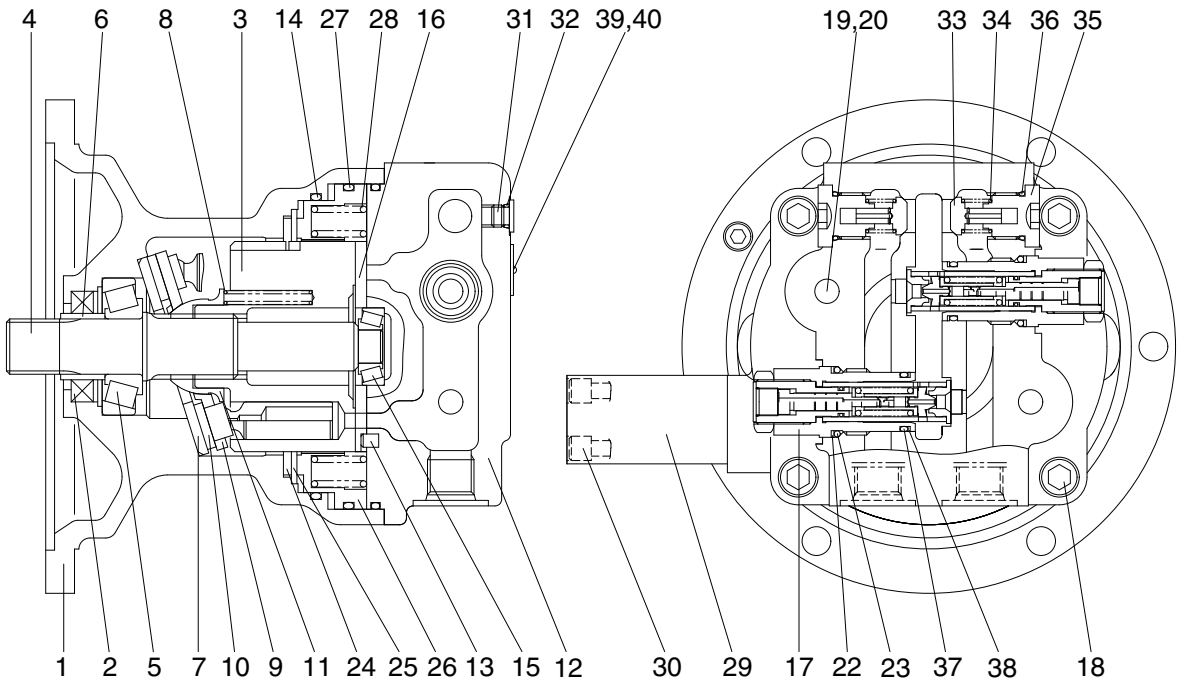
(3) Confirm the hydraulic oil level and check the hydraulic oil leak or not.





2. DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

1) STRUCTURE



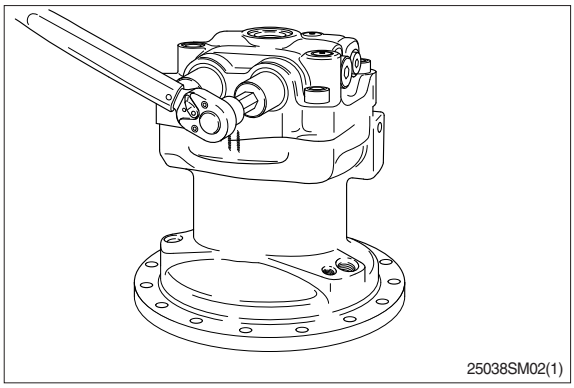
HX60A2SM03

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

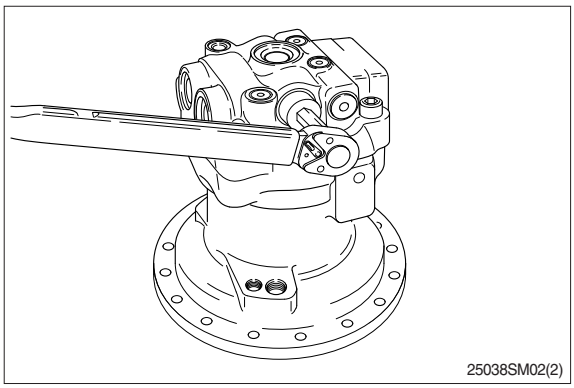
2) DISASSEMBLY

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

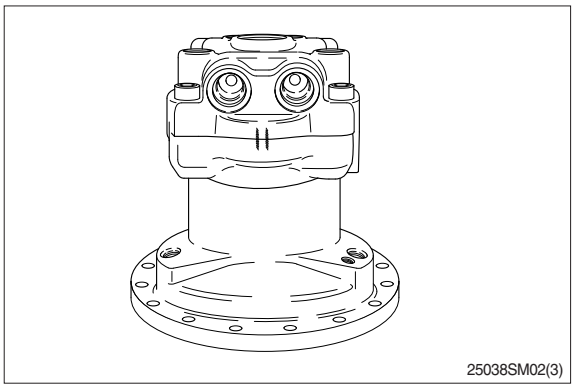
※ Assemble removed relief valve assembly (17) to original state when reassembling.


25038SM02(1)

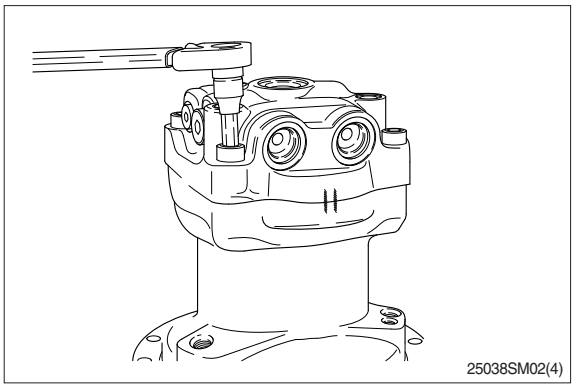
(2) Removal of make up valve and bypass valve assembly
Loosen plug (35) with 14 ㎜ hexagonal wrench, and remove check valve (33) and spring (34).


25038SM02(2)

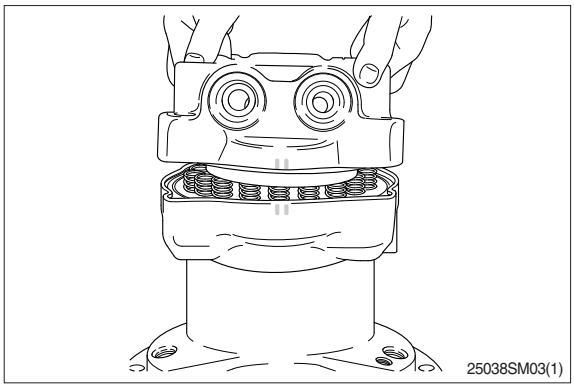
(3) Marking at swing motor
Before disassembling motor, make a matching mark between rear cover (12) and body (1) for easy reassembling.


25038SM02(3)

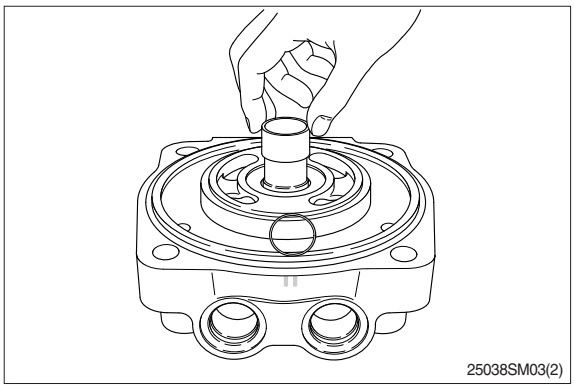
(4) Remove mounting bolts of rear cover
Loosen hexagon socket bolt (18) with 12 ㎜ hexagonal wrench.


25038SM02(4)

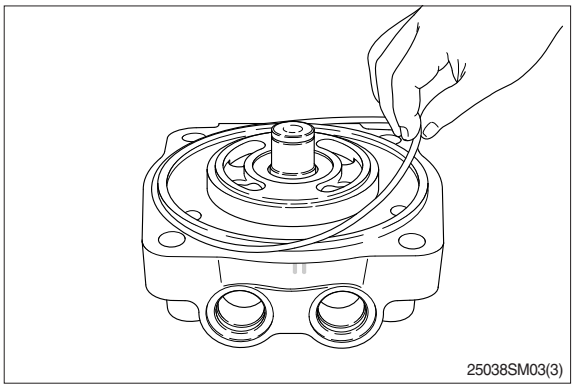
(5) Removal rear of cover assembly
Place shaft of motor assembly to downward and take rear cover (12) out.



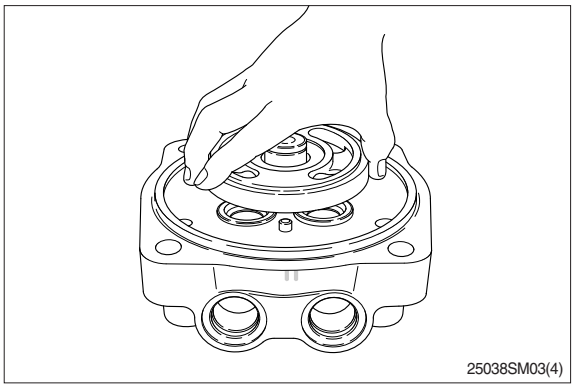
(6) Remove inner race of needle bearing (15) by bearing puller.



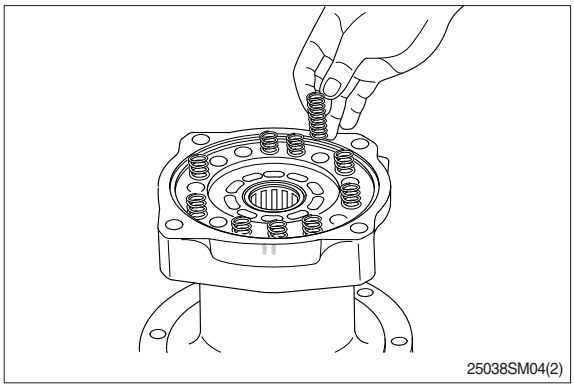
(7) Remove O-ring (27) from cover.



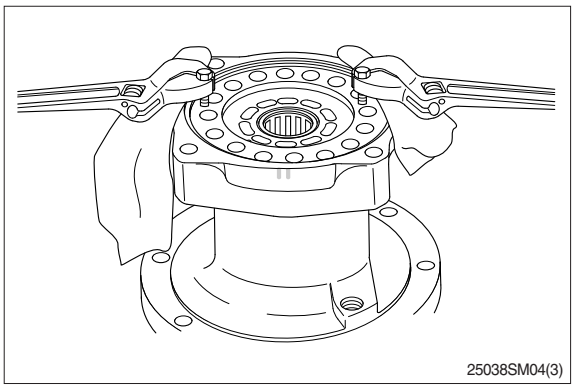
(8) Remove valve plate (16)
Valve plate (16) is adhered on end surface of cylinder block (3) by oil viscosity. Take off valve plate (16) with hands.
Assembling method of valve plate (16) depends on rear cover (12).
(Band groove and round groove of high · low pressure transmission area)
Before removing, check and record location of valve plate (16) to prevent misassembling.



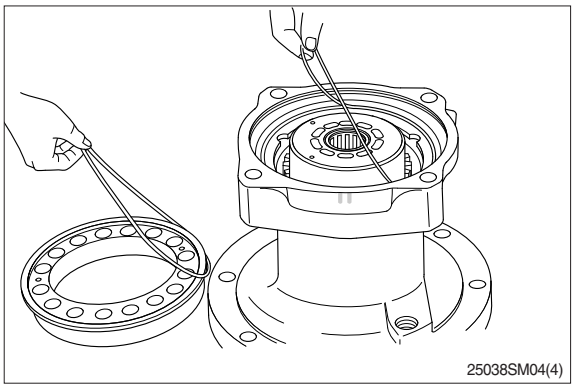
(9) Removal of spring (28, brake area)
Remove spring (28) from piston (26).
Check and record original position of each spring (28) for correct assembling.


25038SM04(2)

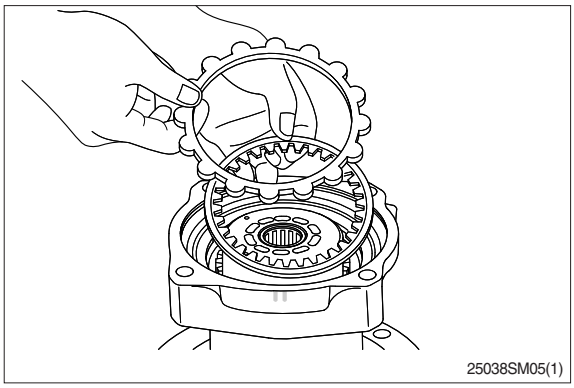
(10) Removal of parking piston
When removing piston (26) from body (1), there is a sliding resistance against tightening of O-rings (14, 27). Use tap hole on piston (26) as shown in the picture.


25038SM04(3)

(11) Remove O-rings (14, 27) from piston (28) and body (1).


25038SM04(4)

(12) Remove friction plate (24) and lining plate (25) from body (1).


25038SM05(1)

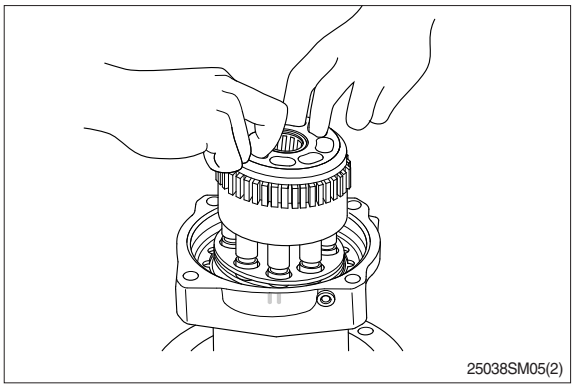
(13) Removal of cylinder assembly

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

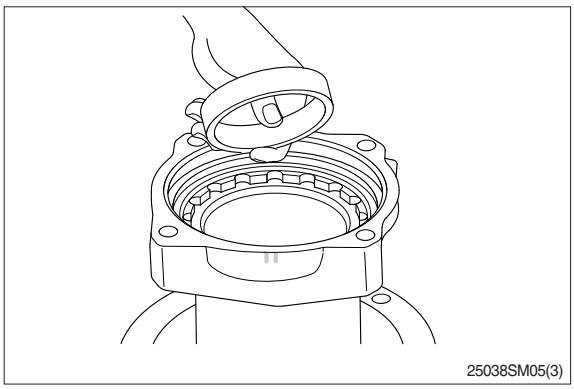
※ Oil seal (2) and outer race of taper roller bearing (15) are left inside of body.

※ End surface of cylinder (3) is sliding face. So, protect the surface with a scrap of cloth against damage.

※ Make a matching mark on piston hole of cylinder (3) and piston and shoe assembly (10) to fit piston into the same hole when reassembling.


25038SM05(2)

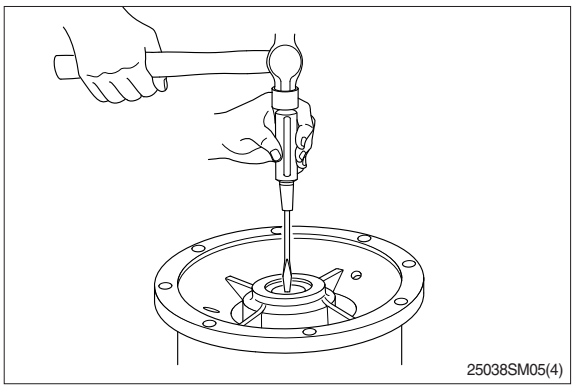
(14) Separate outer race of taper roller bearing (5) from housing.


25038SM05(3)

(15) Removal of oil seal

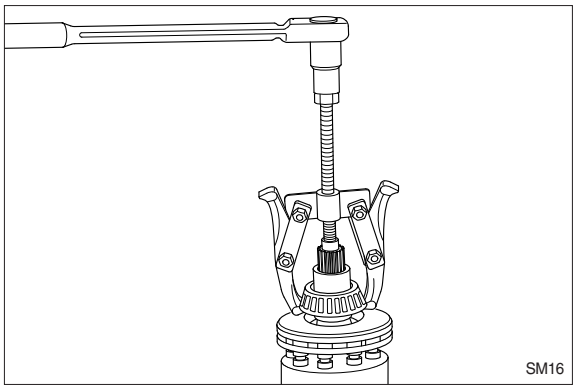
Remove oil seal (2) from body (1) with driver and hammer.

※ **Do not reuse oil seal after removal.**

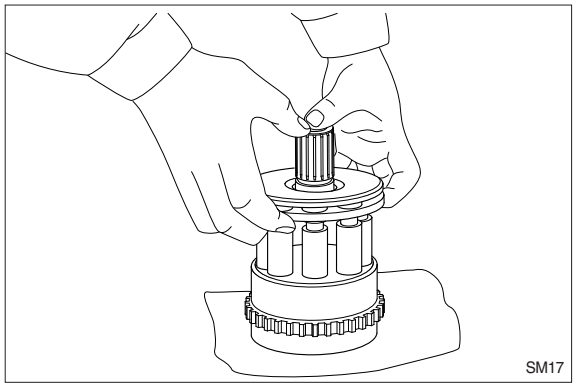

25038SM05(4)

(16) Disassembly of cylinder assembly

① Removal of inner race of taper roller bearing (5).
Lift out cylinder block (3) with 2 inner race of taper roller bearing (5) by applying gear puller at the end of spline in the cylinder.

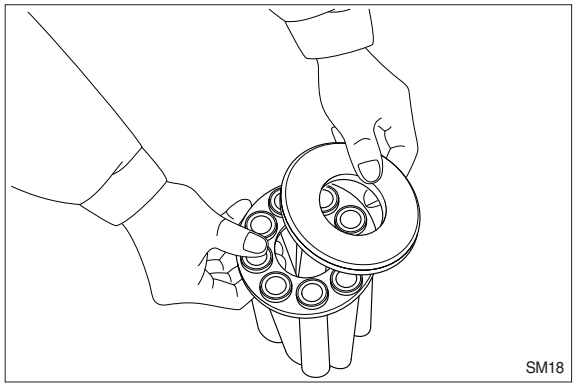

SM16

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

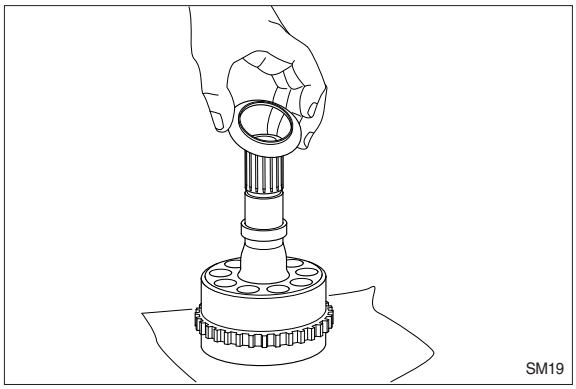

SM17

③ Get shoe plate (7) slide on sliding face of piston and shoe assembly (10) and remove it.

※ Be cautious not to damage on sliding face of cam plate.


SM18

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


SM19

This completes disassembly.

3) ASSEMBLY

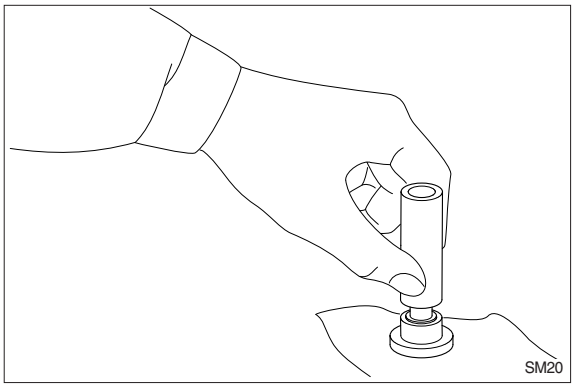
(1) Preparation

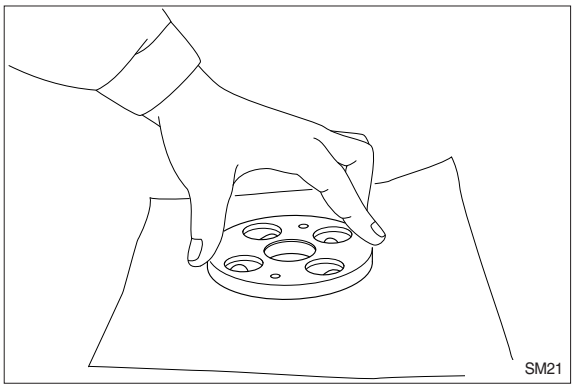
Before reassembling, perform below procedure.

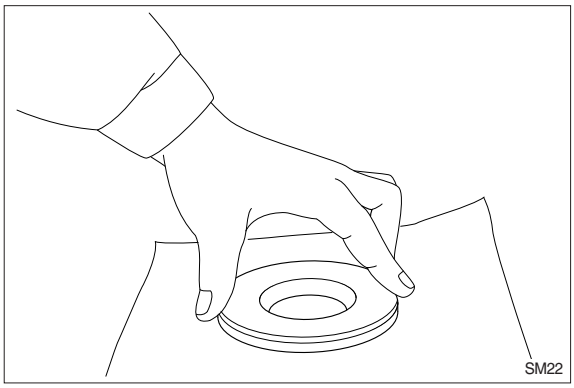
① Check each part for damage caused by using or disassembling. If damaged, eliminate damage by grinding with proper sandpaper, wash them with cleaning oil and dry with compressed air.

② Replace seal with new one.

③ Grind sliding face of piston and shoe assembly (10), valve plate (16) and shoe plate (7) with sandpaper #2000.


SM20


SM21

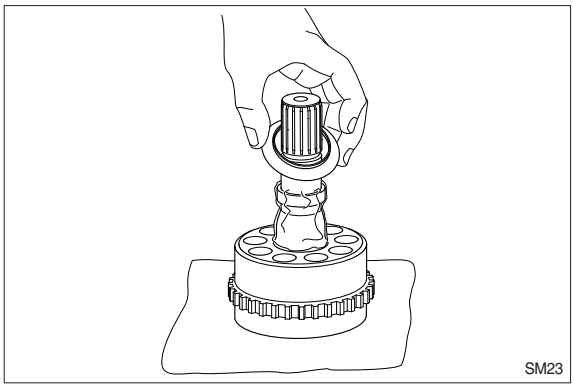

SM22

④ When assembling, lubricate with specified clean hydraulic oil.

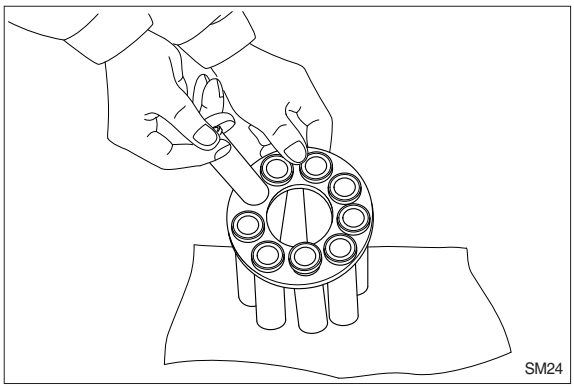
⑤ When assembling piston and shoe assembly (10) to piston hole of cylinder block (3), check matching mark between them.

(2) Cylinder assembly

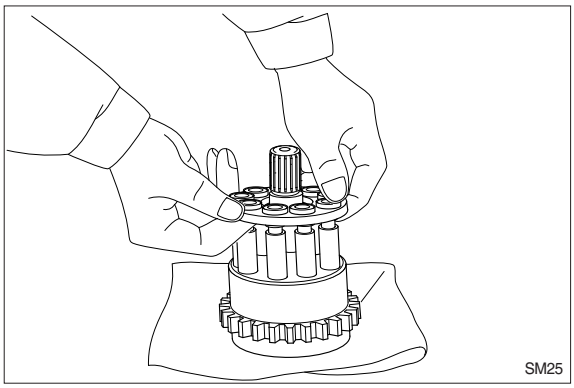
① Lubricate grease on round area (Contacting area with ball guide (11)) of cylinder block (3) and assemble spring (8).



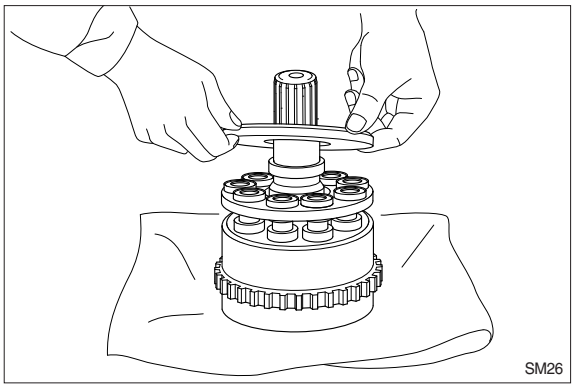
② Insert piston and shoe assembly (10) in hole of set plate (9).



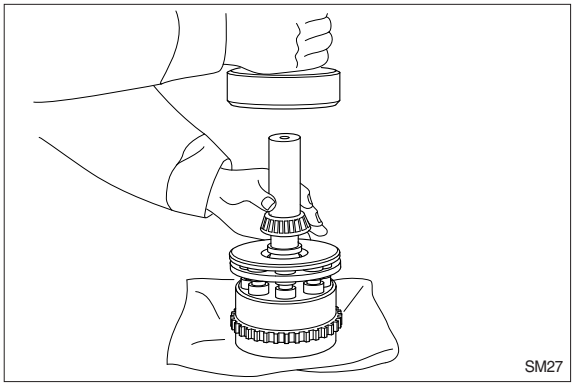
③ Assemble piston and shoe assembly (10) and set plate (9) to cylinder block (3). When assembling, check matching mark between them. Before assembling, lubricate specified hydraulic oil in piston hole of cylinder block (3).



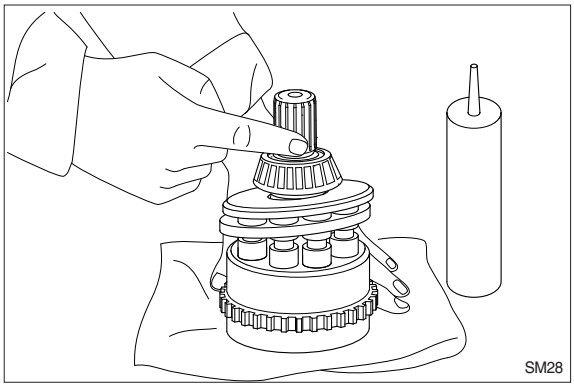
④ Lubricate specified hydraulic oil on shoe sliding face of piston and shoe assembly (10) and assemble shoe plate (7).



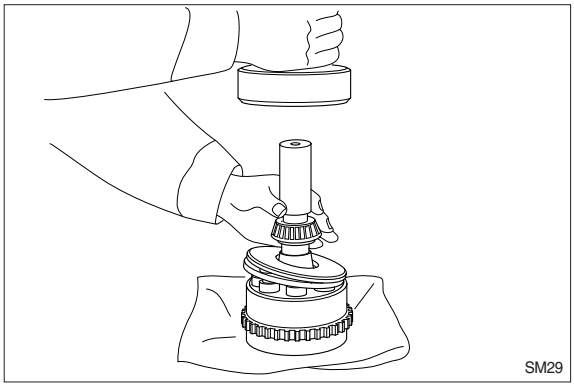
⑤ Assemble inner race of taper roller bearing (5) to cylinder block (3).



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



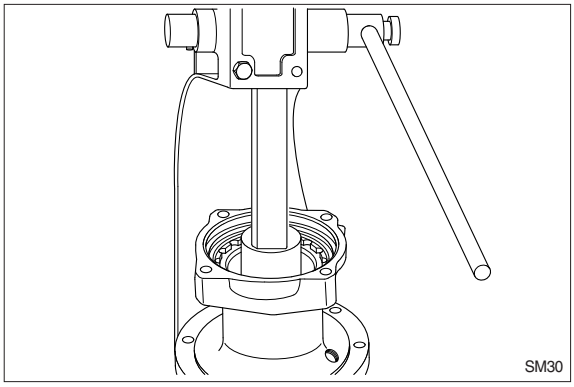
⑦ Assemble bushing (6) to cylinder block (3).



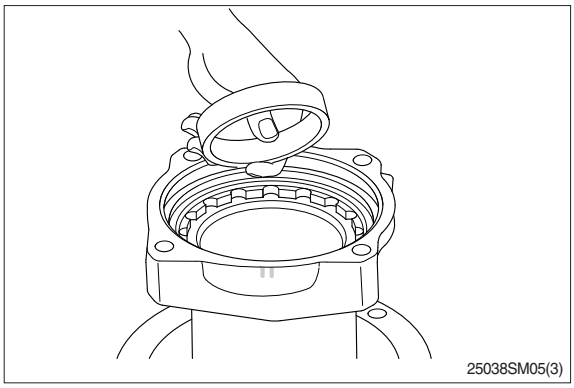
(3) Oil seal

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

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



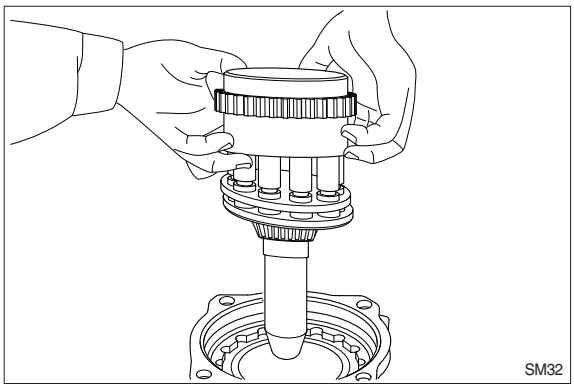
(4) Assemble outer race of taper roller bearing (5) to motor body (1).



(5) Cylinder assembly

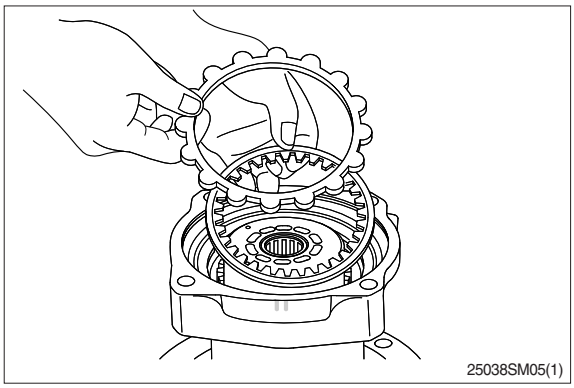
Hold end of cylinder assembly (3) with hands and assemble cylinder assembly to body (1). Be careful to prevent damage of seal by spline of shaft.

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



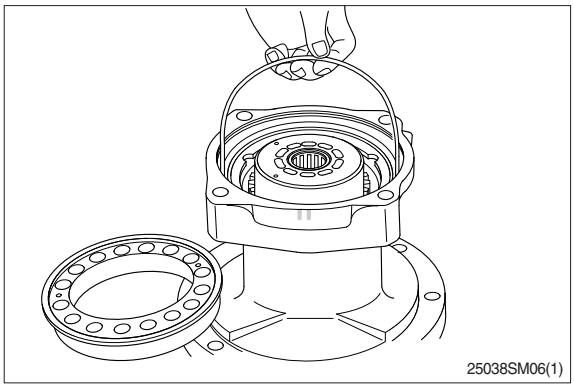
(6) Assemble friction plate (24) and lining plate (25).

※ Lubricate specified hydraulic oil on each side.



(7) Insert O-rings (14, 27) into body (1) and piston (26).

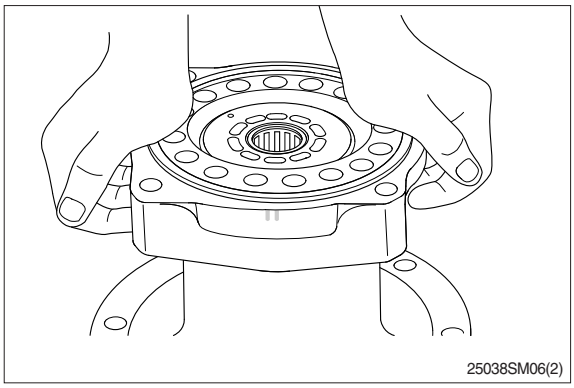
※ Lubricate O-ring with grease.



(8) Parking piston

Lubricate specified hydraulic oil on outer sliding face of piston (26) and assemble brake piston to body (1).

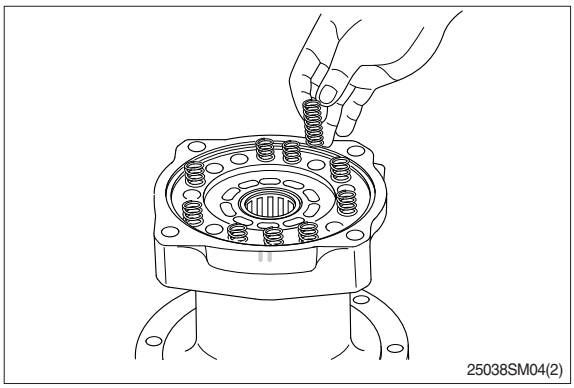
※ It is too tight to assemble piston and shoe assy (10) because O-rings (14, 27) are fitted, therefore it is recommended to push piston (26) horizontally by hands at once.



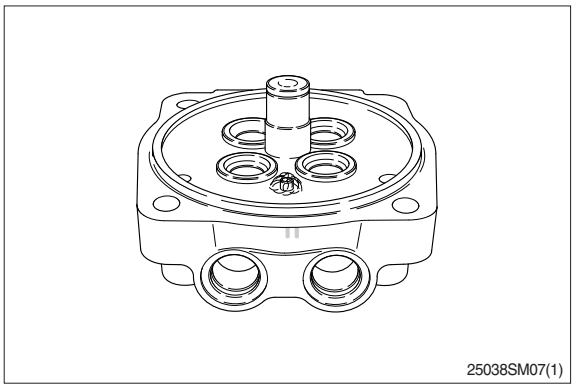
(9) Spring (28, brake unit)

Assemble spring (28) to piston (26) of brake unit.

※ Insert spring (28) into original position.



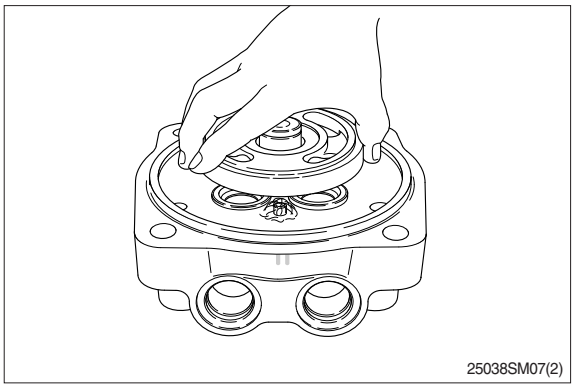
(10) Lubricate locating pin for antirotation of valve plate (16) of rear cover (12) with grease sufficiently and install locating pin to housing.



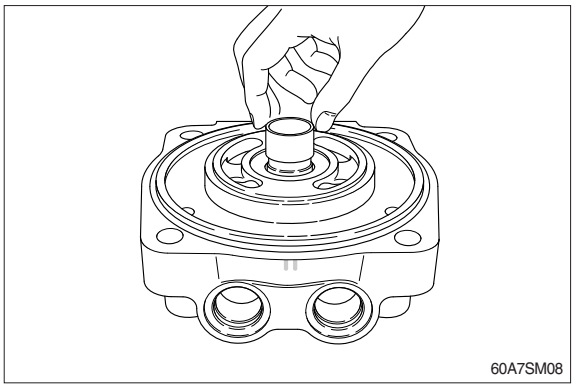
(11) Valve plate

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

※ Be cautious of assembling direction.

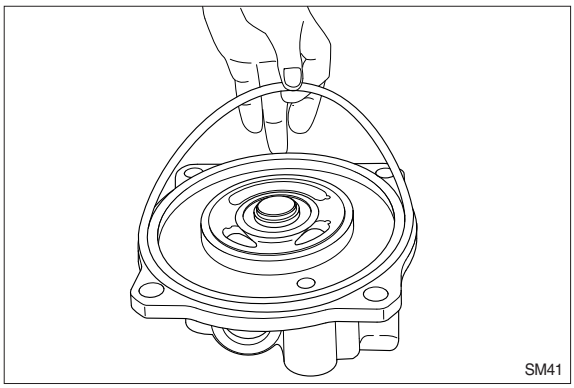


(12) Assemble inner race of taper roller bearing (15) to cover (12).

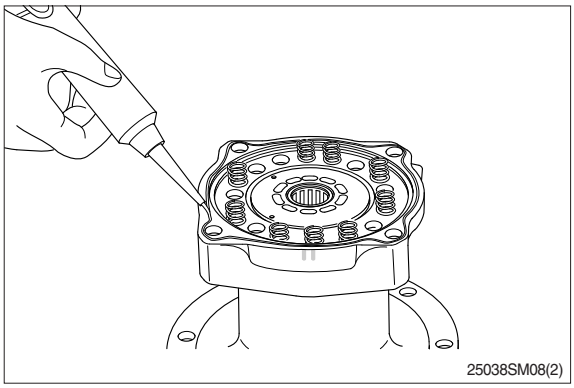


(13) Assemble O-ring (27) to rear cover (12).

※ Lubricate O-ring with grease.



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

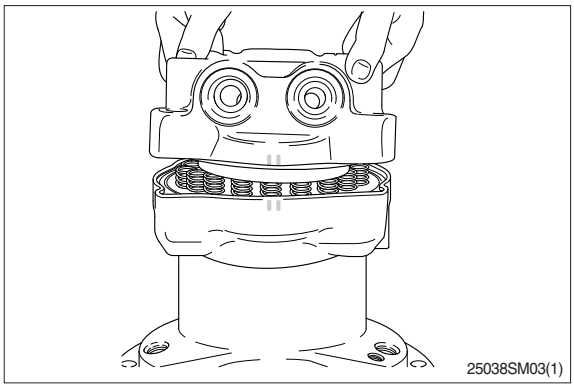


(15) Rear cover

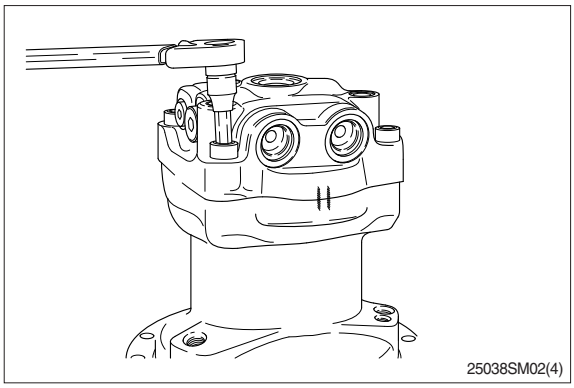
Assemble rear cover (12) and valve plate (16) to body (1) lightly, holding them up with hands.

※ When assembling, be careful not to detach valve plate (16) and bushing (6) from rear cover (12).

※ Fit matching marks on housing (1) and rear cover (12) made before disassembling.

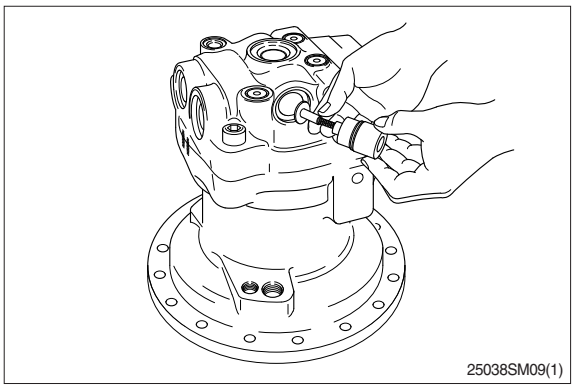


(16) Tighten rear cover (12) and body (1) with 12 mm hexagonal socket bolt (18).
· Tightening torque : 16 kgf · m
(116 lbf · ft)


25038SM02(4)

(17) Make up valve

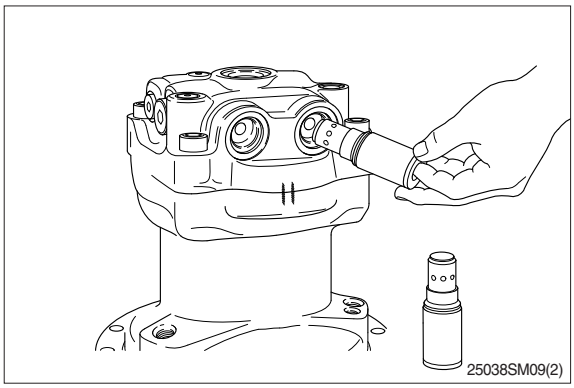
Assemble check valve (33) and spring (34) to rear cover (12) and tighten plug (35) with 14 mm hexagonal socket bolt.
· Tightening torque : 14 kgf · m
(101 lbf · ft)


25038SM09(1)

(18) Relief assembly

Assemble relief valve assembly (17) to rear cover (12) with 14 mm hexagonal socket bolt.
· Tightening torque : 8 kgf · m (58 lbf · ft)

※ Be cautious of assembling method.


25038SM09(2)

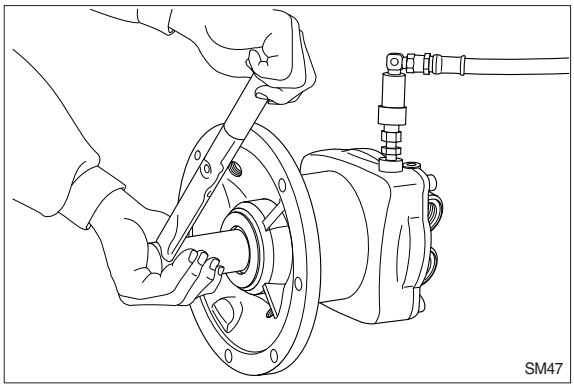
(19) Check of assembly

Load pilot pressure of 20 kgf/cm^2 to brake release port after opening inlet and outlet port.

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

If not rotated, disassemble and check.

This completes assembly.


SM47

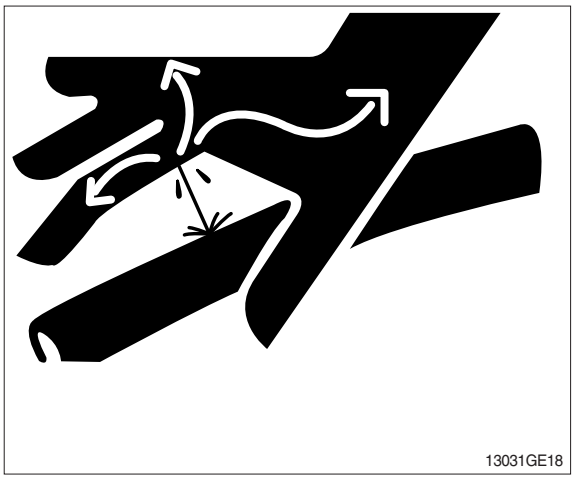
3. REMOVAL AND INSTALL OF REDUCTION GEAR

1) REMOVAL

(1) Remove the swing motor assembly.
For details, see removal of swing motor assembly.

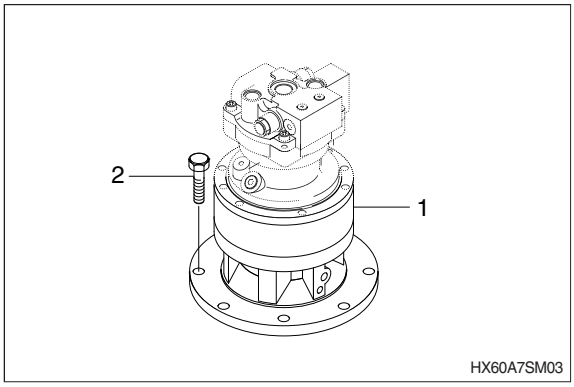
(2) Sling reduction gear assembly (1) and remove mounting bolts (2).

(3) Remove the reduction gear assembly.
· Reduction gear device weight : 45 kg (99 lb)


13031GE18

2) INSTALL

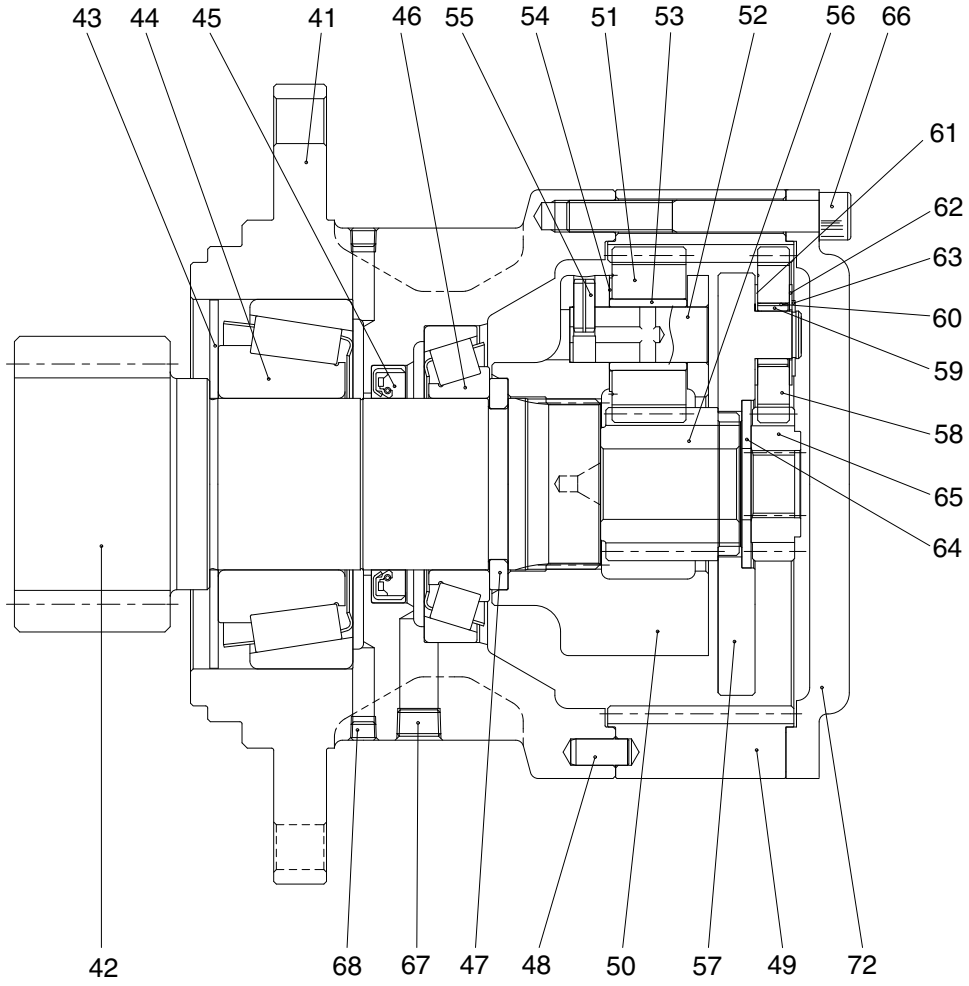
(1) Carry out installation in the reverse order to removal.
· Tightening torque :
29.7 ± 4.5 kgf · m (215 ± 32.5 lbf · ft)



HX60A7SM03

4. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) STRUCTURE

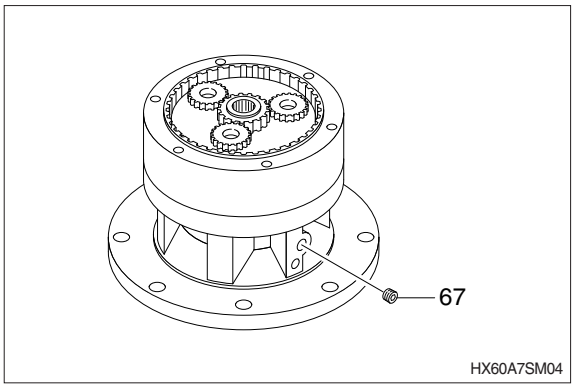


HX60A2SM02

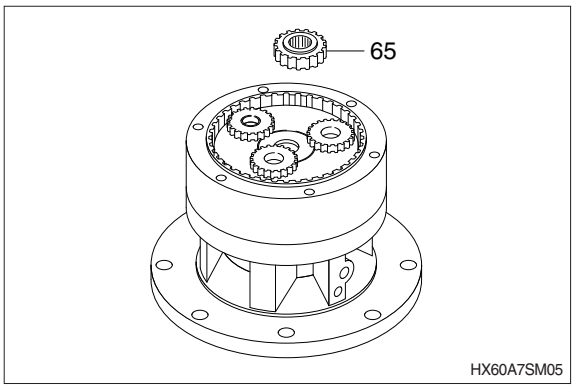
41	Case	52	Pin 2	63	Snap ring
42	Pinion gear	53	Needle roller bearing	64	Side plate
43	Bearing cover	54	Thrust washer 2	65	Sun gear 1
44	Taper roller bearing	55	Spring pin	66	Wrench bolt
45	Oil seal	56	Sun gear 2	67	Plug
46	Taper roller bearing	57	Carrier assy 1	68	Plug
47	Lock collar	58	Planet gear 1	69	Dipstick (not shown)
48	Pin	59	Needle roller bearing	70	Dipstick pipe (not shown)
49	Ring gear	60	Collar	71	Air breather (not shown)
50	Carrier assy 2	61	Thrust washer 1	72	Cover
51	Planet gear 2	62	Thrust washer 2		

2) DISASSEMBLY

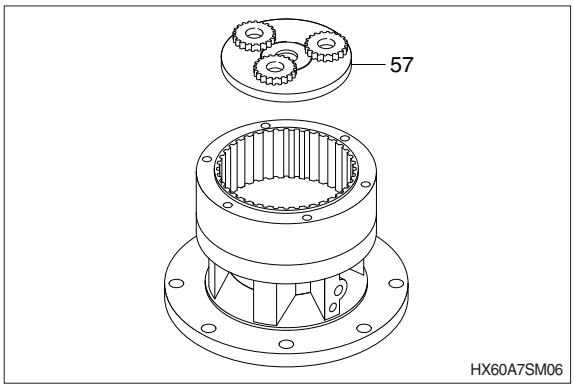
(1) Remove the plug (67) and drain out gear oil.



(2) Remove the No.1 sun gear (65).

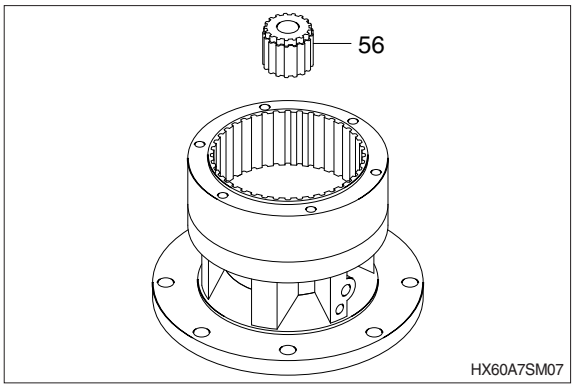


(3) Remove the No.1 carrier sub-assembly (57) using the jig.

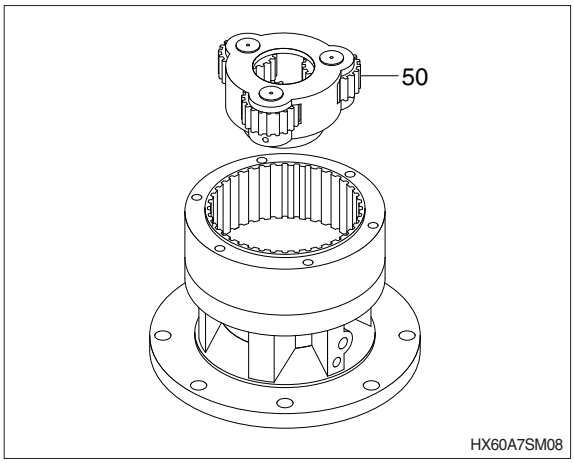


(4) Remove the No.2 sun gear (56).

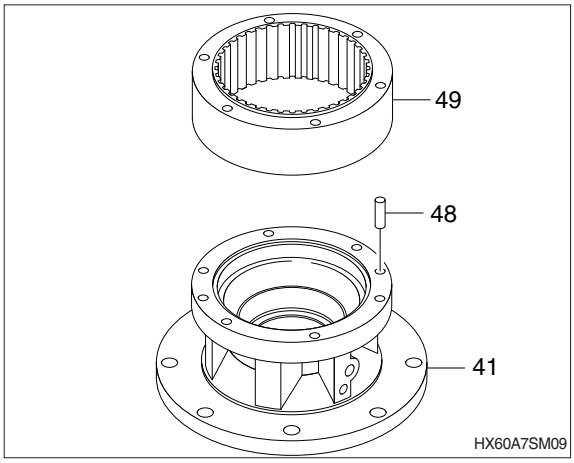
※ Pay attention to ensure the gear is not damaged during disassembling.



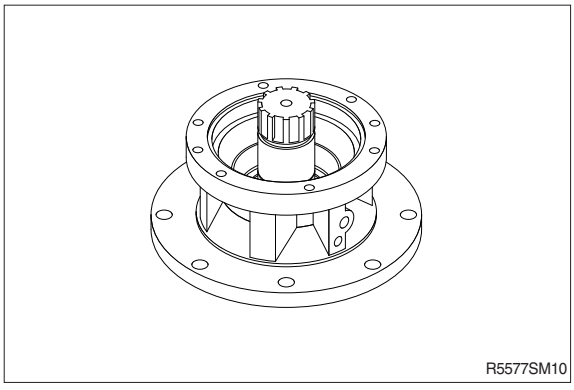
(5) Remove the No.2 carrier sub assembly (50).



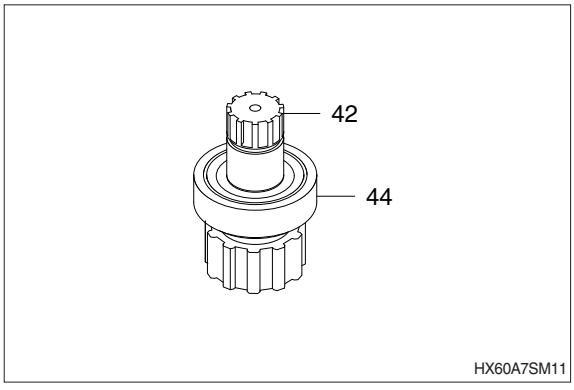
(6) Remove the ring gear by the removal groove between the ring gear (49) and casing (41) by using jig.
Full out the knock pin (48).
Do not need to remove the knock pin (48) if it is not worn or damaged.



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

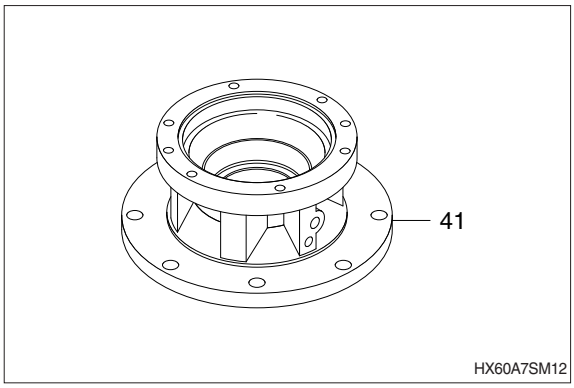


(8) Disassemble the drive shaft (42) with bearing (44) by using jig.



3) ASSEMBLING SWING REDUCTION GEAR

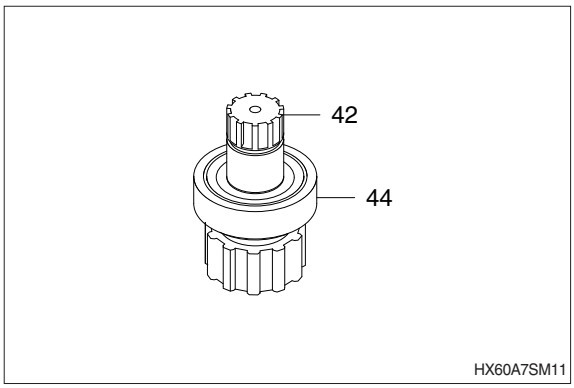
(1) Place the case (41) on the reversing machine having the flange side of the case up.



(2) Install shaft assembly (42) into case (41).

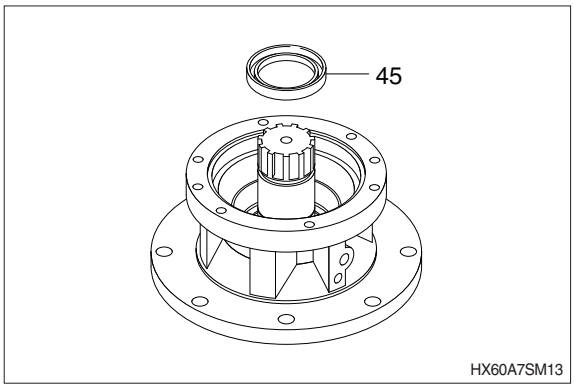
※ Be sure to clean the case before install, using washing machine with the temperature of 80°C

※ Do not install shaft assembly by force.

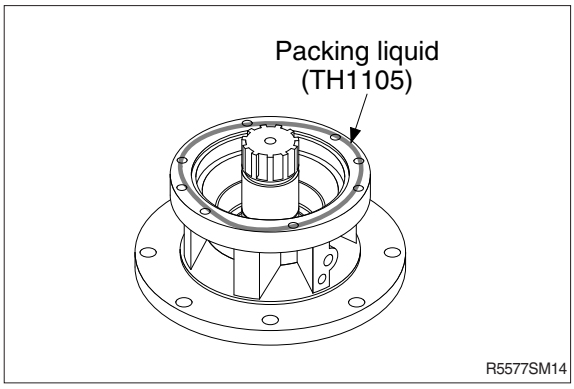


(3) Reverse case and press to insert oil seal (45) by using pressing jig after spreading grease oil around the outside ring of the seal and bearing.
Coat grease oil slightly on the lip surface to prevent any scratch when installing.

※ Be sure to check by eye that the oil seal is seated completely after being installed.



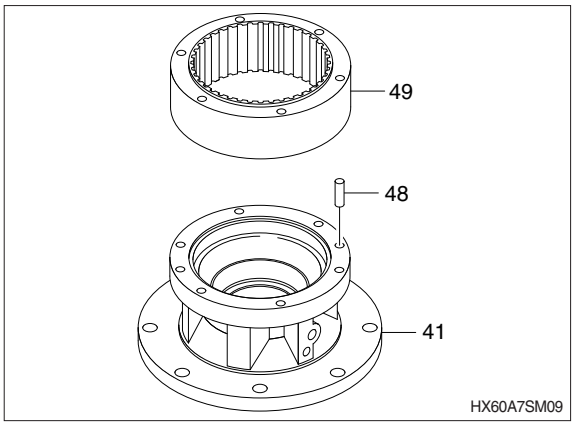
(4) Clean the assembling surface of case and spread packing liquid (TH1105) as shown in figure.



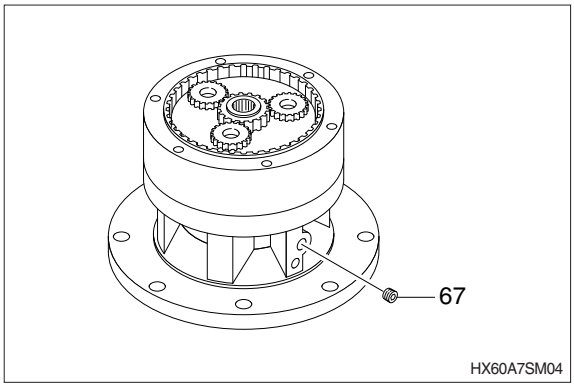
(5) Place ring gear (49) on the case by matching it with knock pin (48) hole.

(6) Insert 2 knock pins (48) by using jig.

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

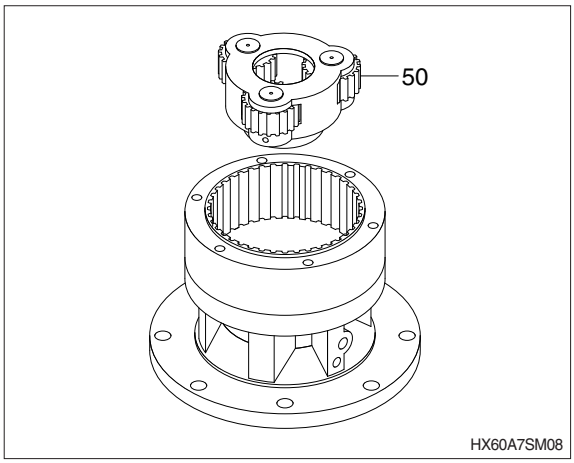


(7) Screw drain plug into drain plug (67) after winding sealing tape.



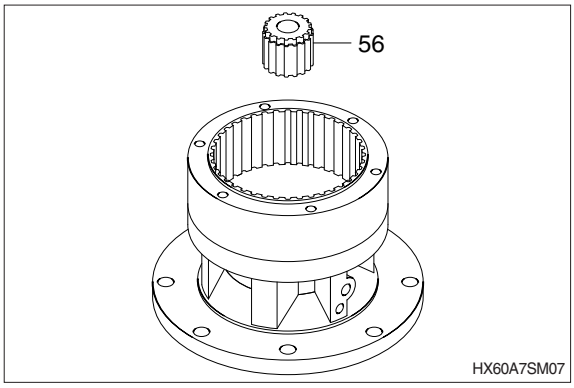
(8) Mount No.2 carrier assembly (50) in the case sub assembly and install bolts into 2 TAP holes (M6) as shown in figure.

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



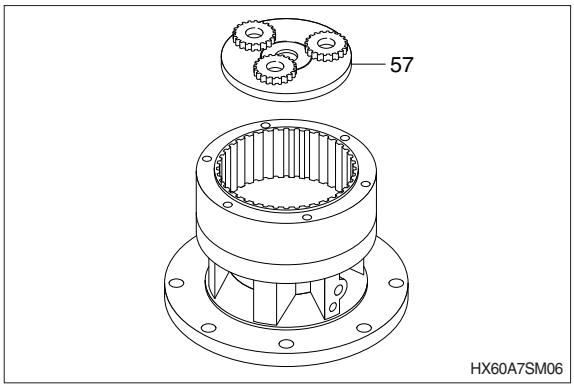
(9) Install No.2 sun gear (56).

※ Be sure to check the direction of sun gear (56) when assembling.

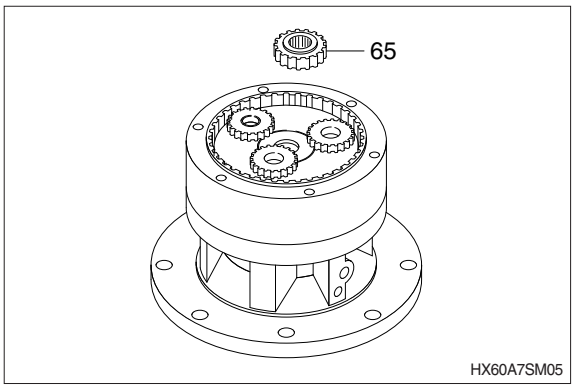


(10) Mount No.1 carrier assembly (57) in the case sub assembly and install bolts into 2 TAP holes (M6) as shown in figure.

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



(11) Assemble No.1 sun gear (65).



GROUP 6 TRAVEL DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Swing the work equipment 90 °and lower it completely to the ground.

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

(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

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

(4) Remove the track shoe assembly.
For details, see removal of track shoe assembly.

(5) Remove the cover.

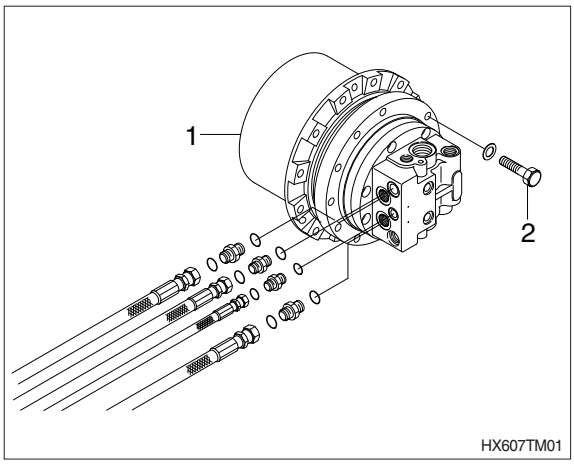
(6) Remove the hose.

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

(7) Remove the bolts and the sprocket.

(8) Sling travel device assembly(1).

(9) Remove the mounting bolts(2), then remove the travel device assembly.
- Weight : 76 kg (168 lb)
- Tightening torque : 20±2.0 kgf·m (145±14.5 lbf·ft)



2) INSTALL

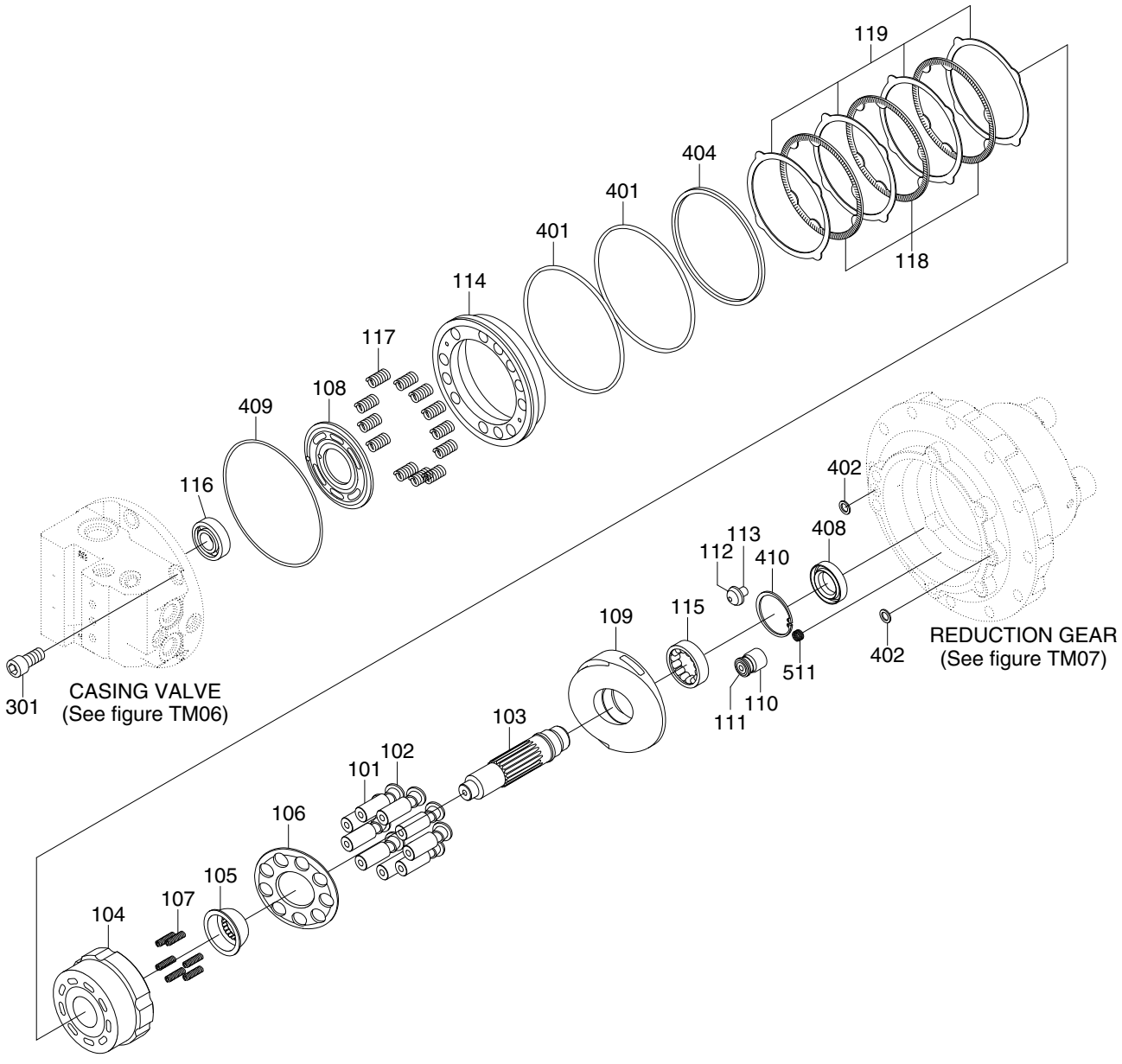
(1) Carry out installation in the reverse order to removal.

(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.

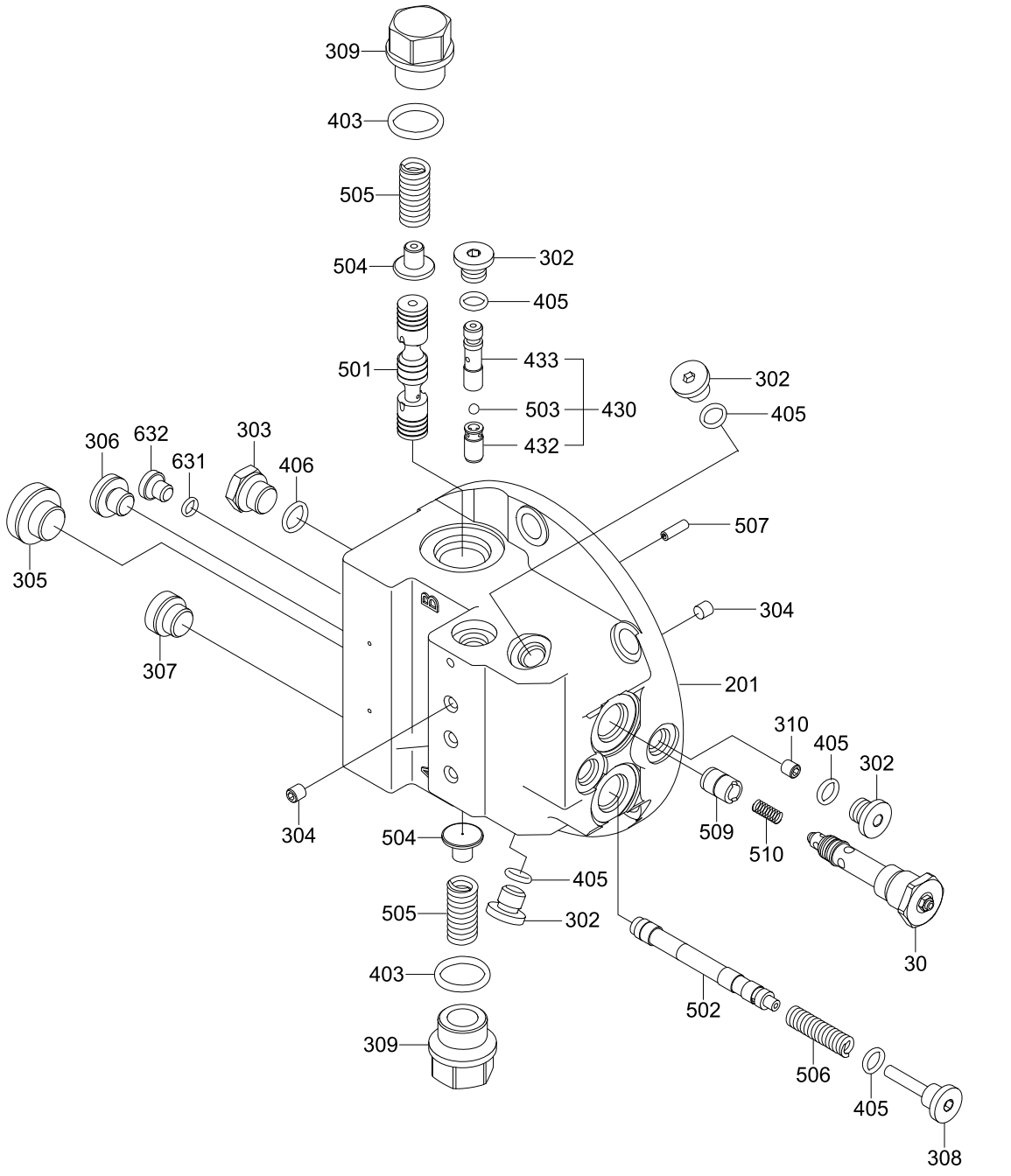
2. DISASSEMBLY AND ASSEMBLY OF MOTOR UNIT

1) PARTS LIST (1/2)



101	Piston	110	Swash piston	119	Separator plate
102	Shoe	111	Swash shoe	301	Screw
103	Drive shaft	112	Pivot	401	O-ring
104	Cylinder block	113	Pivot pin	402	O-ring
105	Spherical bushing	114	Brake piston	404	O-ring
106	Set plate	115	Roller bearing	408	Oil seal
107	Cylinder spring	116	Ball bearing	409	Back up ring
108	Valve plate	117	Brake spring	410	Snap ring
109	Swash plate	118	Friction plate	511	Swash piston spring

PARTS LIST (2/2)



30	Relief valve assy	309	Set plug	503	Steel ball
201	Valve casing	310	Restrictor	504	Plunger
301	Socket bolt	403	O-ring	505	Main spool spring
302	Plug	405	O-ring	506	2 speed spool spring
303	Drain plug	406	O-ring	507	Spring pin
304	NPTF plug	430	Shuttle valve assy	509	Spring cap
305	Dust plug	432	Seat	510	Spring
306	Dust plug	433	Seat casing	631	O-ring
307	Dust plug	501	Main spool	632	Plug
308	2 speed plug	502	2 speed spool		

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
30	Relief valve assy	G 1/2	11.2	81.0
301	Socket bolt	M14	16.3	118
302	ROH plug	G 1/4	3.6	26.0
303	Drain plug	G 3/8	7.5	54.2
304	NPTF 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	ROH plug	G 1/8	1.5	10.8

(2) Tools

① Hexagon and socket wrench

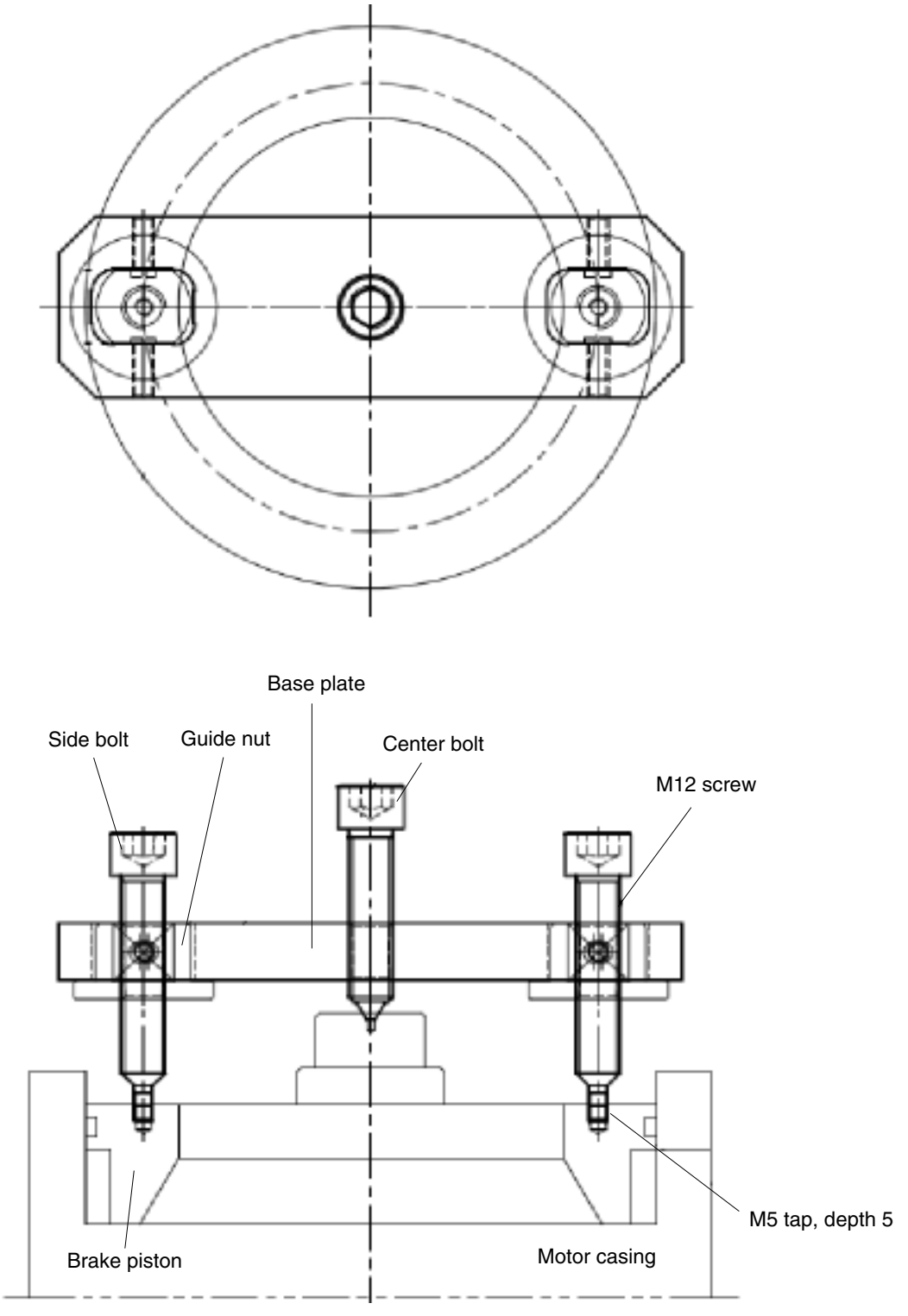
Tools	Item	Part name	B size	Screw size
Hexagon wrench	304, 310	NPTF plug, Restrictor	4	R 1/16
	626, 632	Pipe plug, ROH plug	5	R 1/8
	302, 308	ROH plug, 2 speed plug	6	G 1/4
	301	Socket bolt	12	M14
Socket wrench	303	Drain plug	22	G 3/8
	30	Relief valve assy	27	G 1/2
	309	Set plug	30	G 3/4
	30	Relief valve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

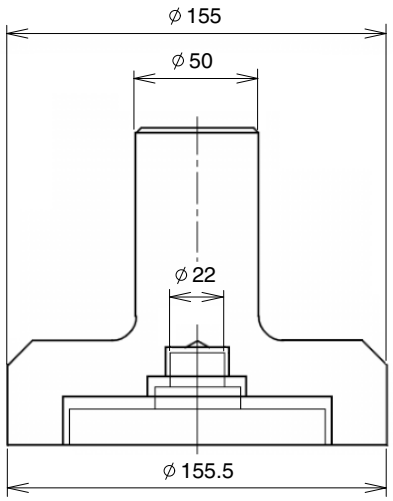
① Brake piston disassembly jig



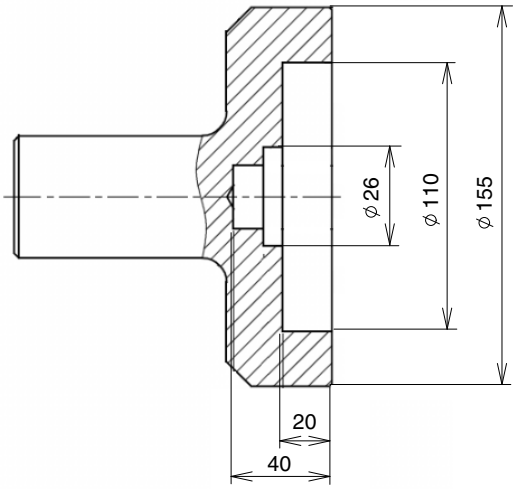
559A7TM05

② Brake piston press jig

The below dimensions are the reference dimensions.



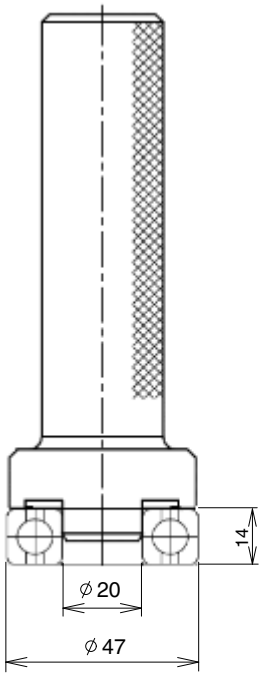
Assembled status



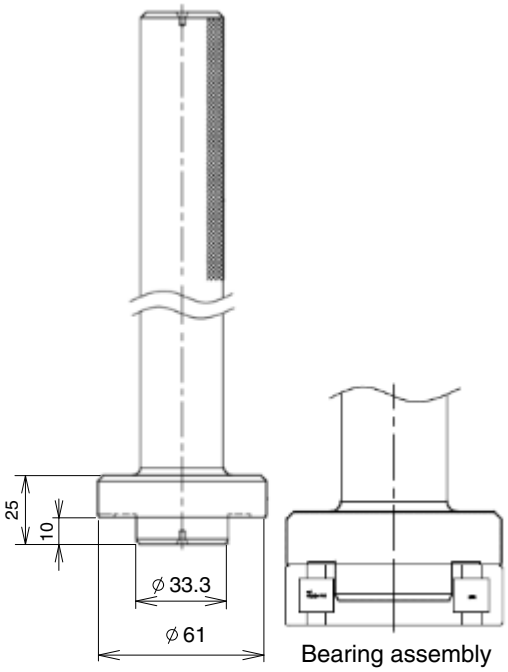
559A7TM10

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

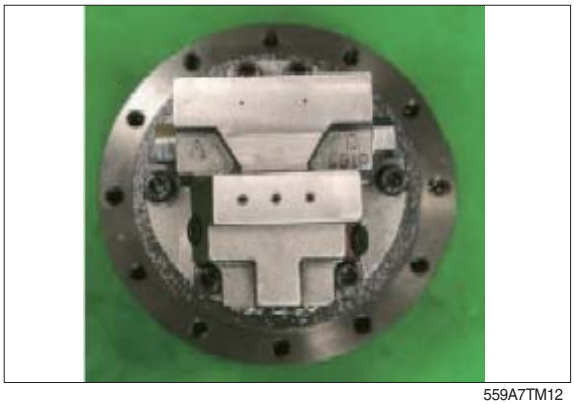
When disassembling the motor, disassemble in the order shown below. The number in brackets after part name means item number of section drawing.

(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).

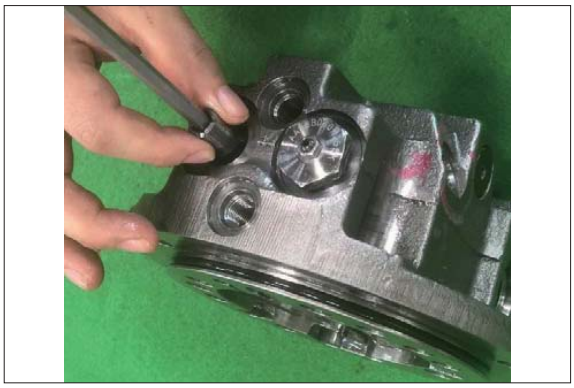
※ **Choose a clean place.**
Spread a rubber plate or cloth on the workbench to prevent friction and damage of the parts.

■ **Disassembly of valve casing kit**

(4) **Loosen the relief valve assy (30) and remove it from the valve casing (201).**

559A7TM13

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

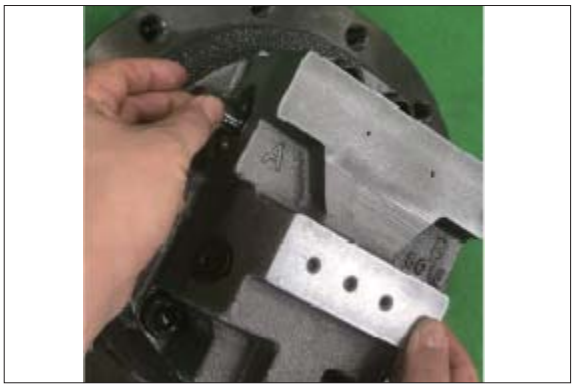


559A7TM14

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

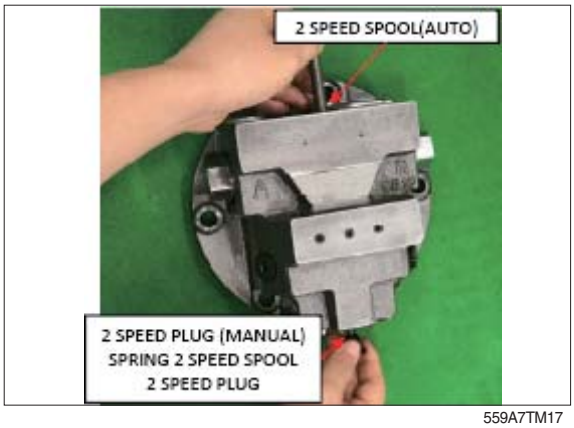
※ Main spool is disassembled in the horizontal direction with the hole. Be careful not to scratch the sliding surface of the main spool.

559A7TM15



559A7TM16

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

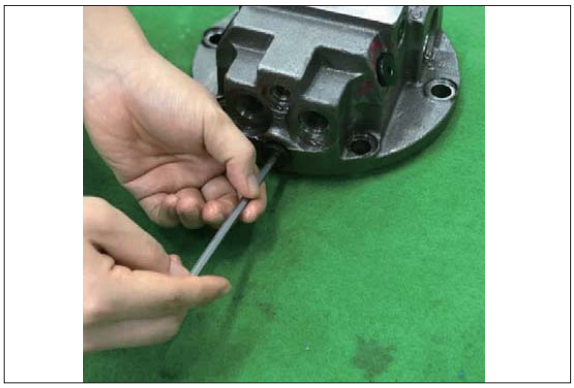


559A7TM17

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

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

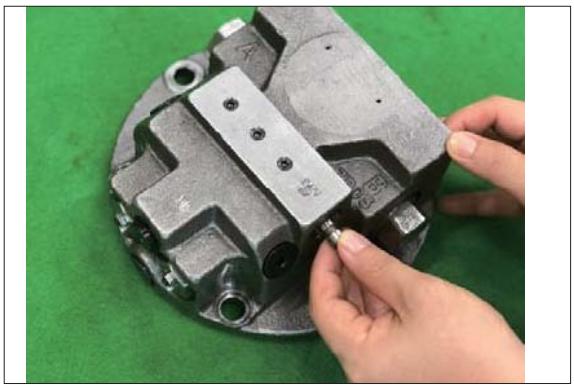
※ If there is no problem with the 1st / 2nd speed switching, no special disassembly is required.



559A7TM18

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

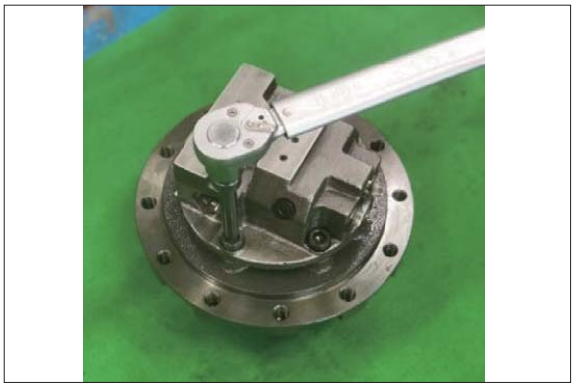
※ If there is no problem with the 1st / 2nd speed switching, no special disassembly is required. Please be careful about the loss of the steel ball. Please be careful not to damage the inner diameter of the seat casing and seat.



559A7TM19

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

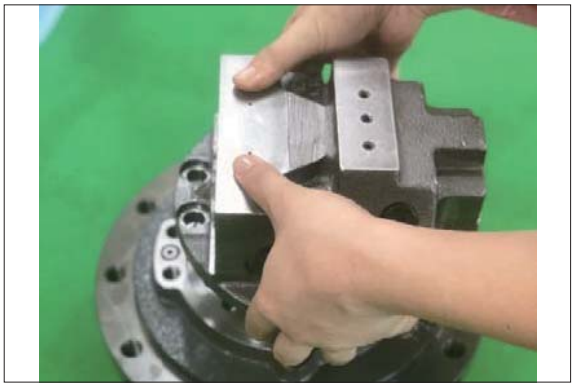
※ (Due to the force of the brake spring E (117), when the socket bolt (301) is unscrewed, the valve casing (201) is raised from the casing (202). Further, remove the valve plate (108) from the valve casing (201).



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.

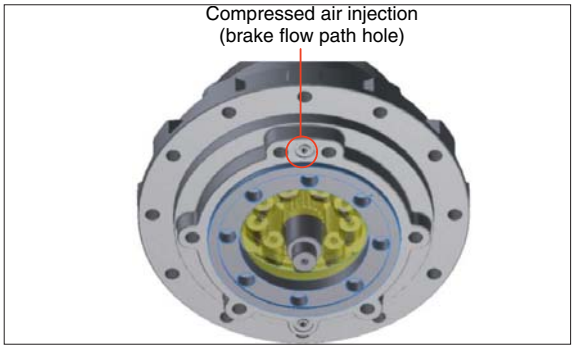
① Cover the casing with a clean cloth.

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.

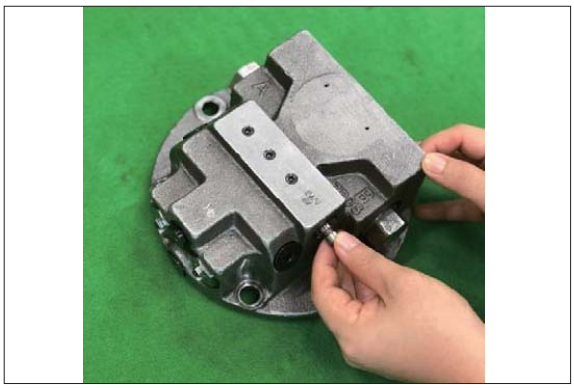
4) ASSEMBLY

(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 7-75.

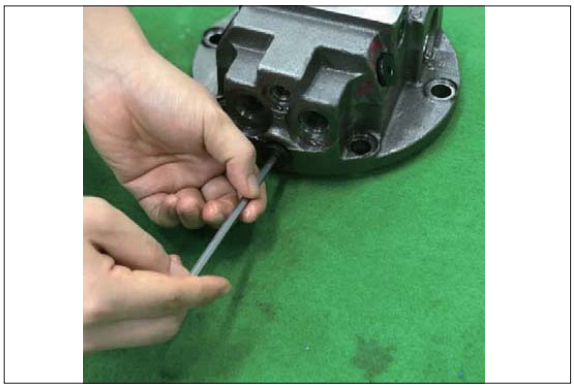
■ ASSEMBLY OF VALVE CASING KIT

(2) This operation is necessary only when the seat assy is removed.
Assemble seat (432) → steel ball (503) → seat casing (433) → ROH 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 (21). And tighten ROH plug (302) with specified torque.

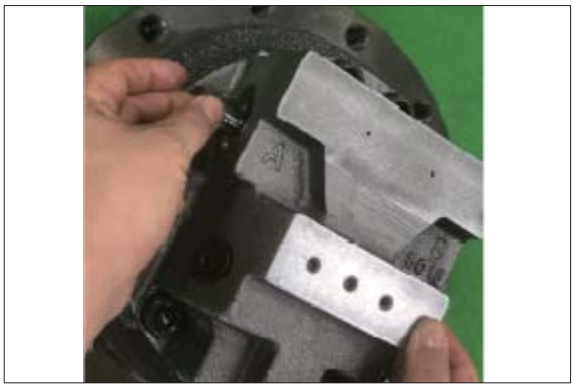

559A7TM18

(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 (411) → Assemble set plug (309) in order.

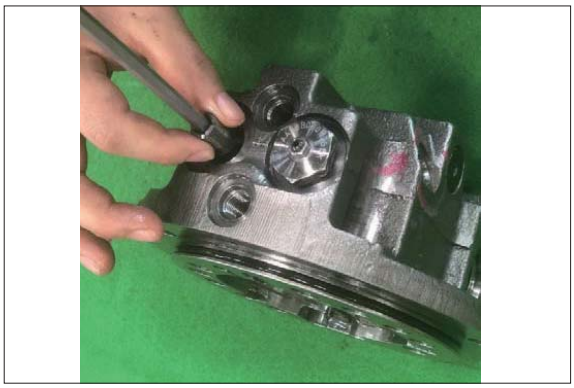
※ Make sure the main spool moves smoothly.



559A7TM16

559A7TM15

(6) Assemble the cap (509).



559A7TM14

(7) Assemble the spring cap (510) to the relief valve assy (30). 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.

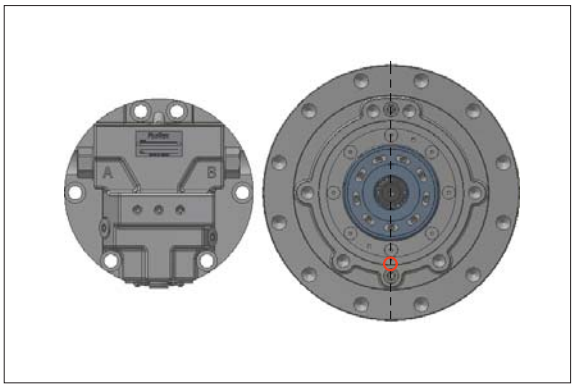
※ If the grease is lightly applied to the O-ring, it will not be cut when the brake piston is inserted.

559A7TM28

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

559A7TM27

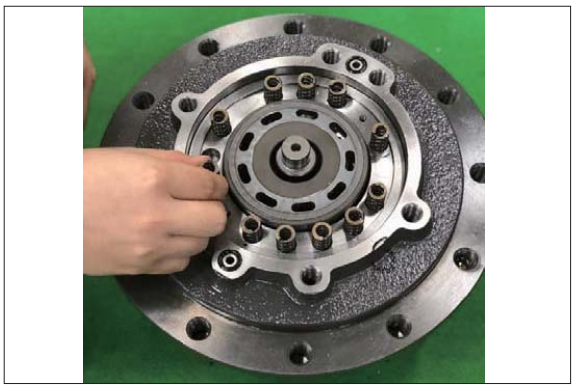
※ Pay attention to the assembly direction of the brake piston. The orifice of the brake piston is located downward on the same vertical line as the flow hole in casing.



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.

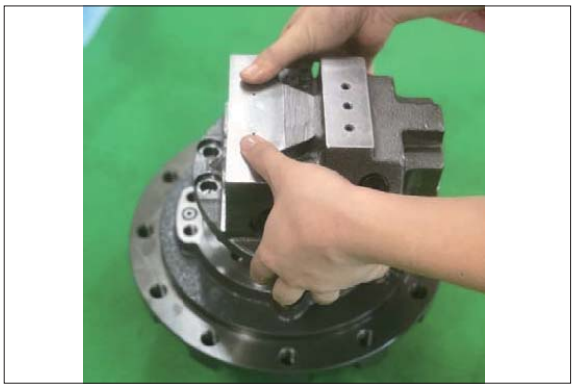
※ Apply grease thinly to the joint surface of the valve plate. (prevention of dropout)

559A7TM23

559A7TM22

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



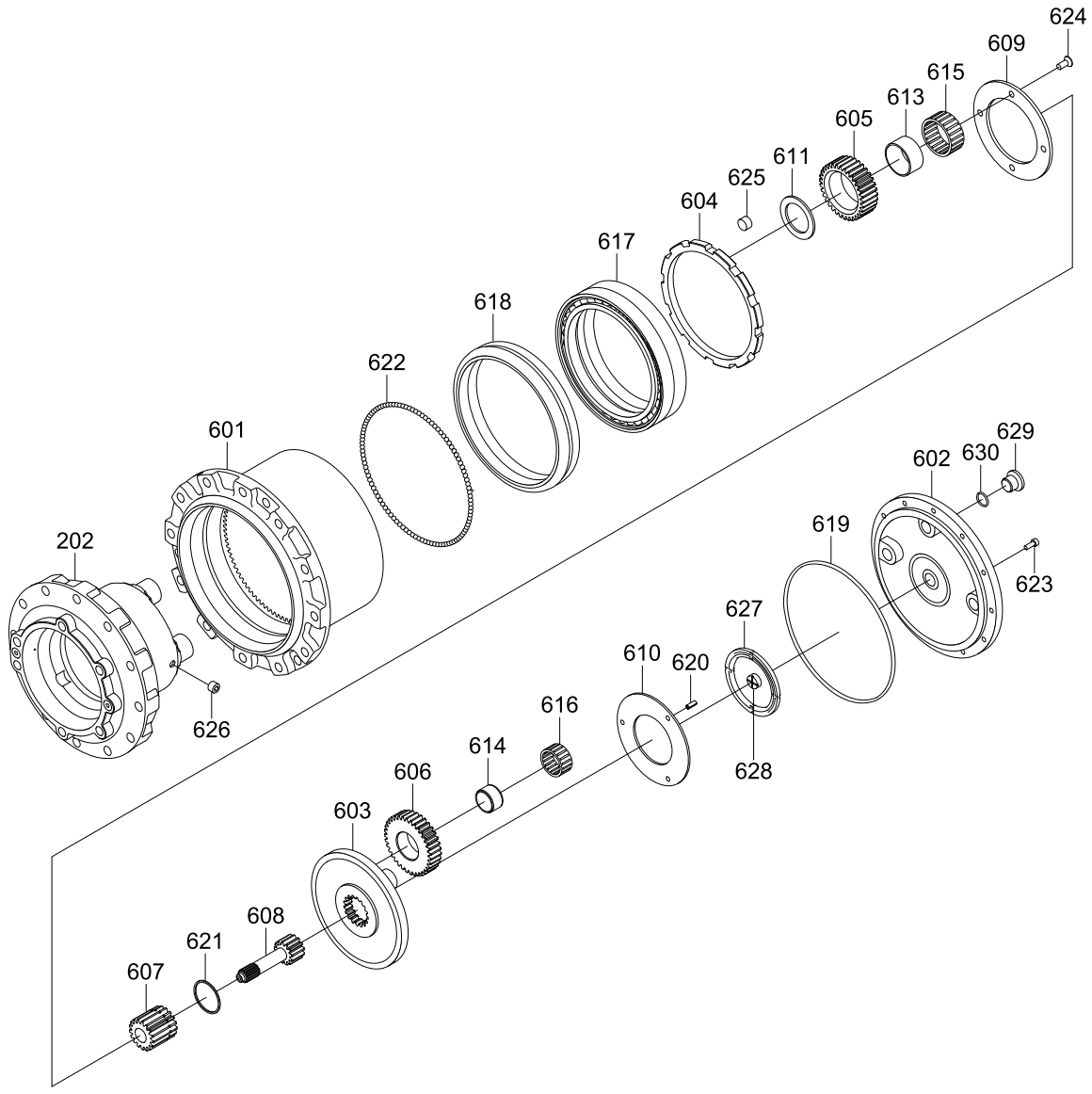
559A7TM21

559A7TM20

※ Assembly is completed with the above.

3. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) PARTS LIST



60A7TM07

202	Reducer casing	610	Thrust plate R	621	Snap ring
601	Housing	611	Thrust washer	622	Steel ball
602	Cover	613	Collar	623	Socket bolt
603	Holder	614	Inner race	624	Ext. flush 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

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

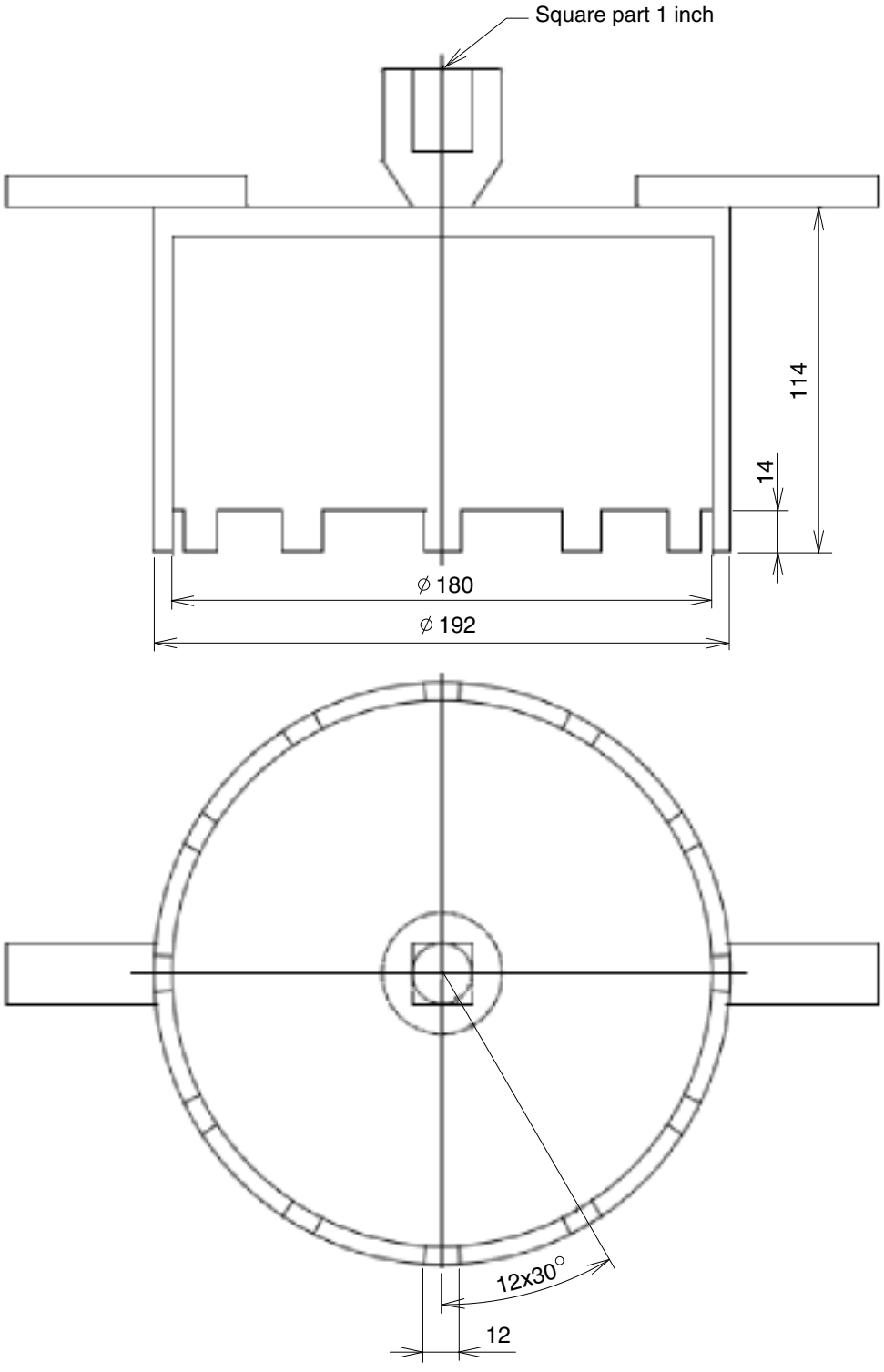
① Hexagon wrench and exclusive jig

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

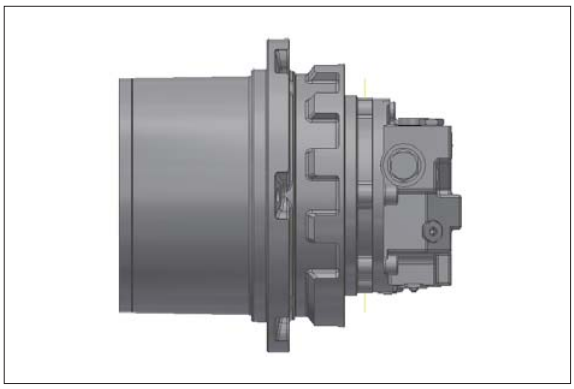
(1) Disassembly and assembly tips

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.

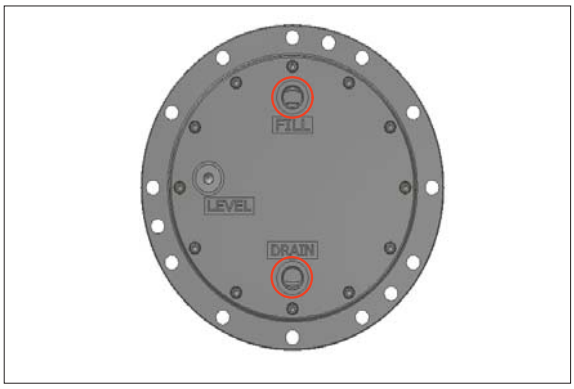
(2) Wrap a wire rope around the outside of the traveling device to lift it with a crane. Then wash with white kerosene. After washing, dry with compressed air.



559A7TM51

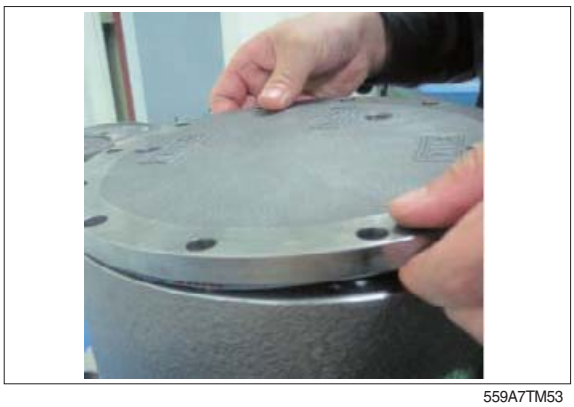
(3) Make sure that the fill plug (629) and drain plug (629) shown in the dimensional installation drawing are perpendicular to the horizontal plane.
Unplug both ports and remove the gear oil.
Place it on a suitable base.

※ 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).



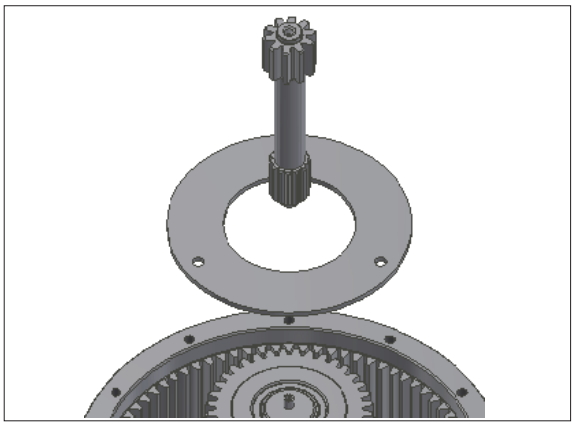
559A7TM53

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

559A7TM54

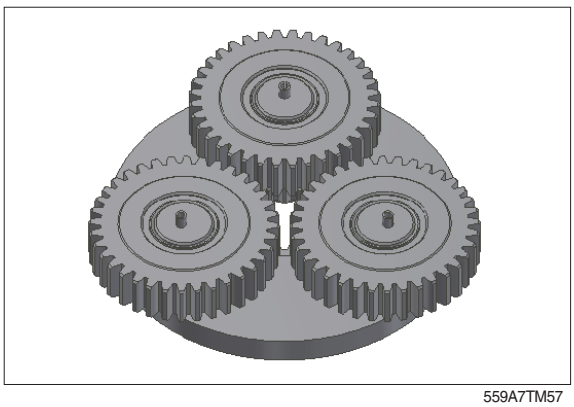
(5) Disassemble thrust plate R (610), drive gear (608).


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.

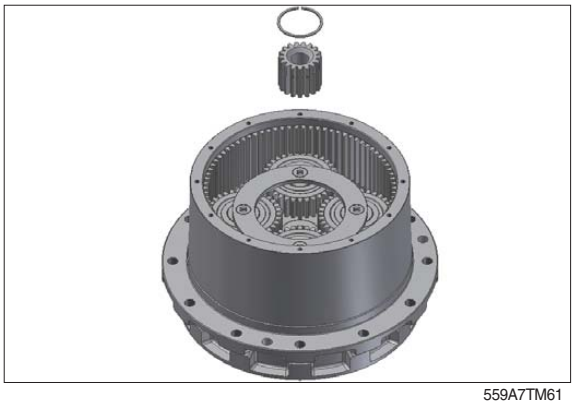
※ Mark each planetary gear, needle bearing, and inner race in the assembled position so that each combination and assembly position does not change.

※ 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.

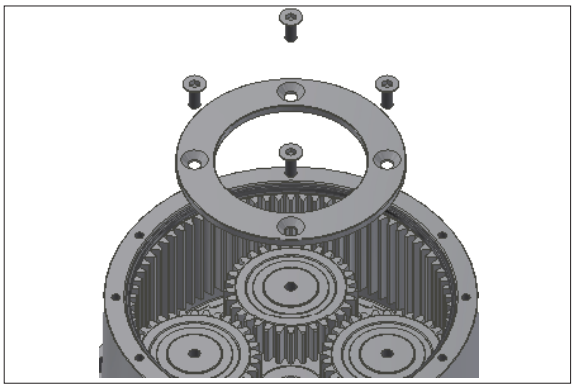
Please follow the instructions below when you are forced to exchange parts.

559A7TM62

① Apply enough heat to ext flush bolt(624)

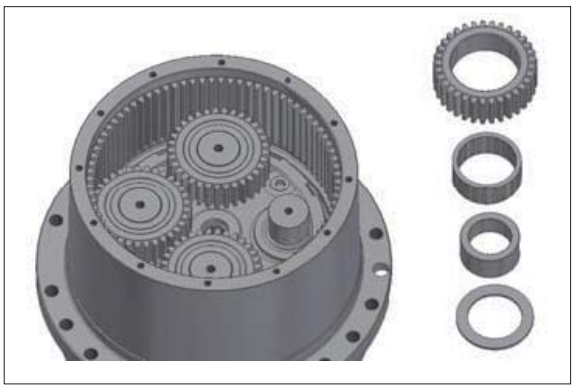
② Disassemble thrust plate F (609).

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.

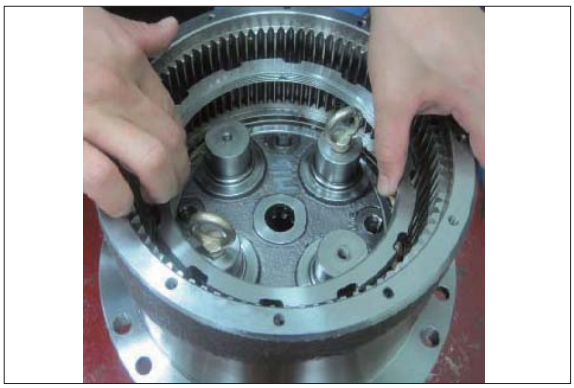
※ If there is no problem after checking in this step, the following disassembly is not necessary.

(12) Disassemble pipe plug (625).

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

559A7TM65

(13) Disassemble the nut ring (604).



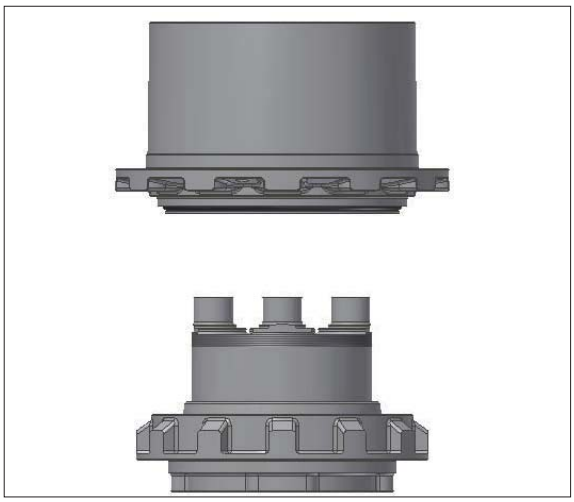
559A7TM66

※ 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

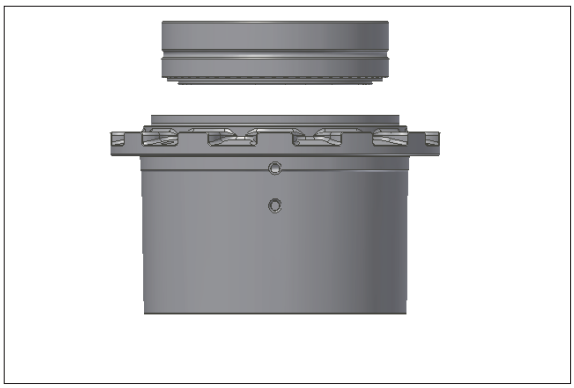
(16) Disassemble the floating seal kit (618).

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

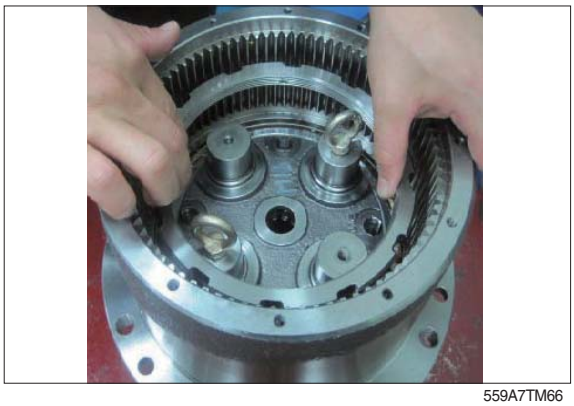
(4) Using a press, assemble the housing sub on the casing (202).

※ 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.

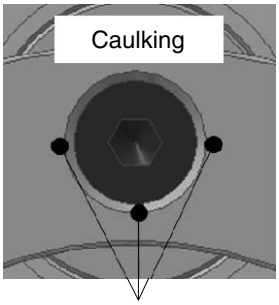


559A7TM66

(6) Tighten pipe plug (625).

559A7TM65

※ Caulking is performed to prevent loosening around the assembly.

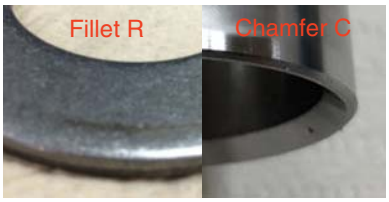


559A7TM76

(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

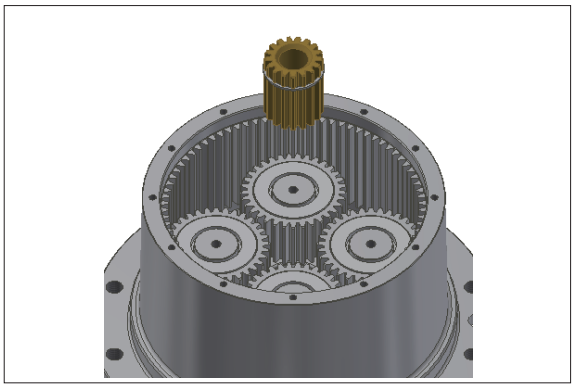
(8) Assemble the thrust plate F (609), ext flush bolt (624).

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

559A7TM60

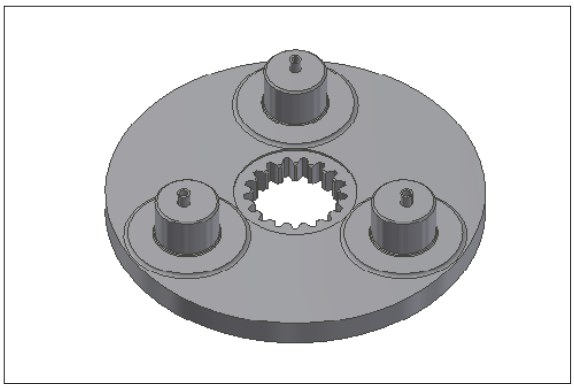
(9) Fasten snap ring (621) to sun gear (607) using snap ring pliers. And assemble in the center of planetary gear F.

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



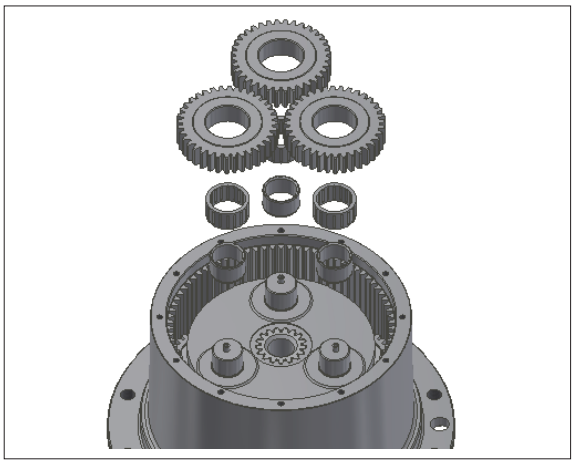
559A7TM78

(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.

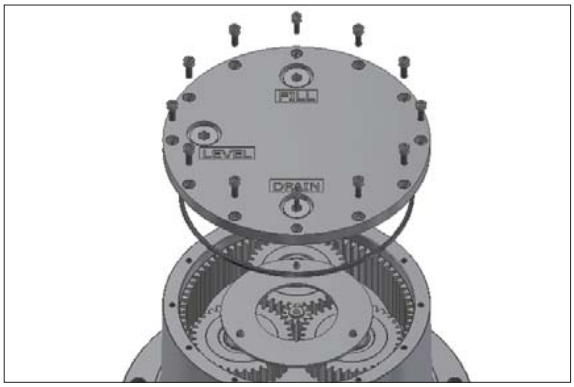
559A7TM82

(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.

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.**

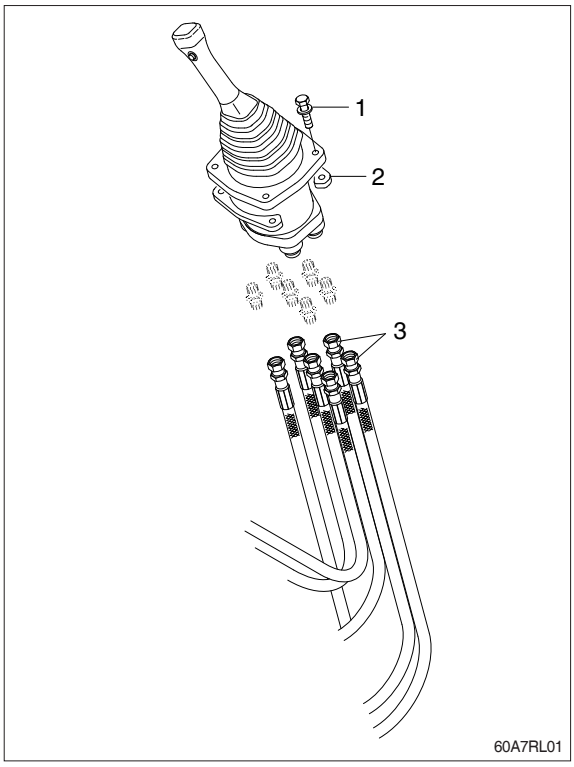
(4) Loosen the washer with bolt (1).

(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.



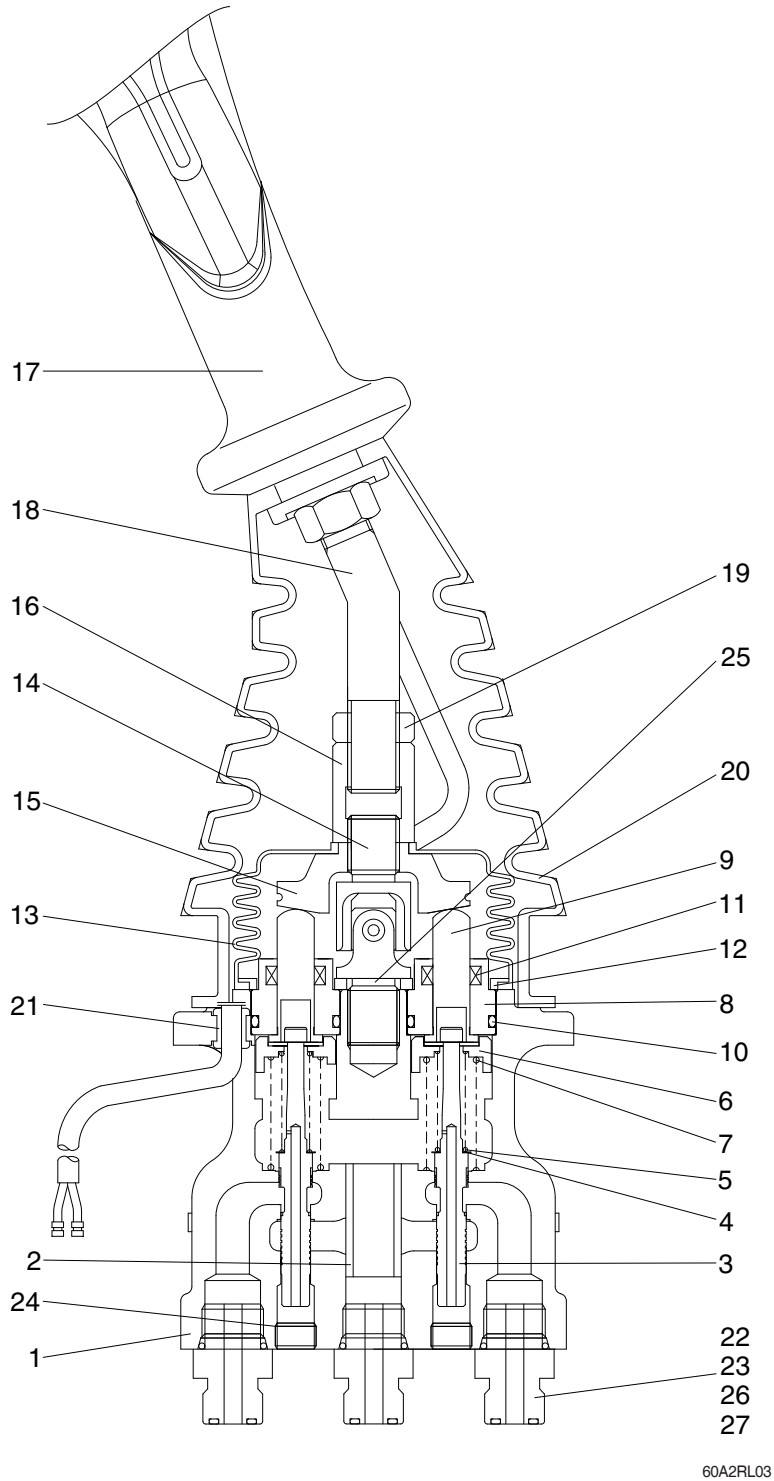
2) INSTALL

(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

1) STRUCTURE



1 Case
2 Bushing
3 Spool
4 Shim
5 Spring
6 Spring seat
7 Spring
8 Plug
9 Push rod
10 O-ring
11 Rod seal
12 Plate
13 Inner boot
14 Joint assembly
15 Swash plate
16 Adjusting nut
17 Handle assembly
18 Handle bar
19 Nut
20 Boots
21 Bushing
22 Last guard filter
23 Connector
24 Plug
25 Spacer
26 Connector
27 Connector

2) TOOLS

(1) Tools

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

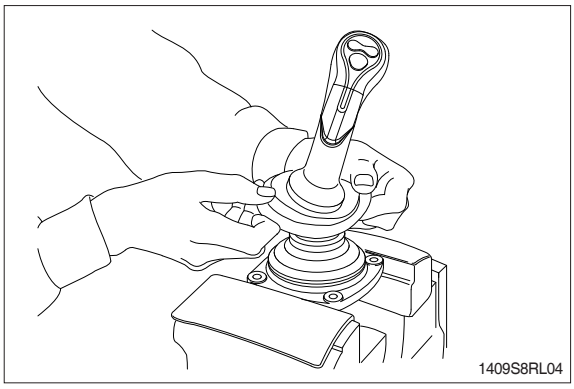
3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

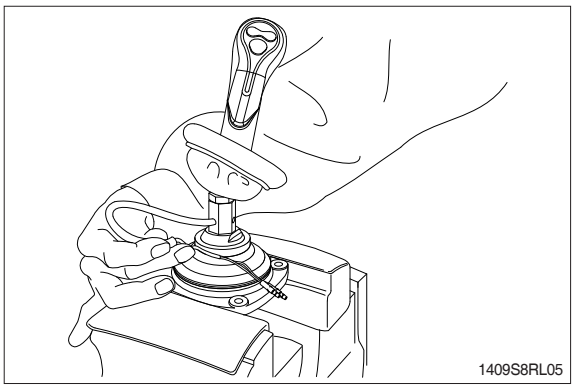
※ Put blind plugs into all ports

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

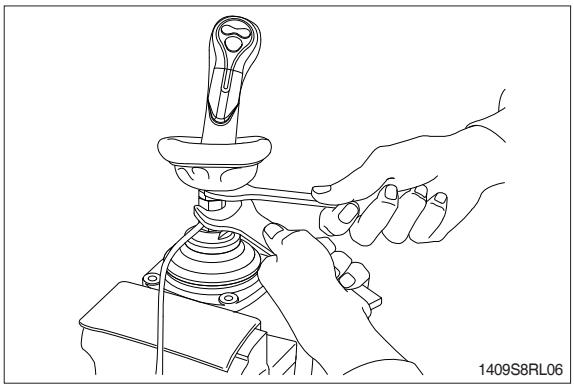
(3) Remove end of boot (23) from case (1) and take it out upwards.



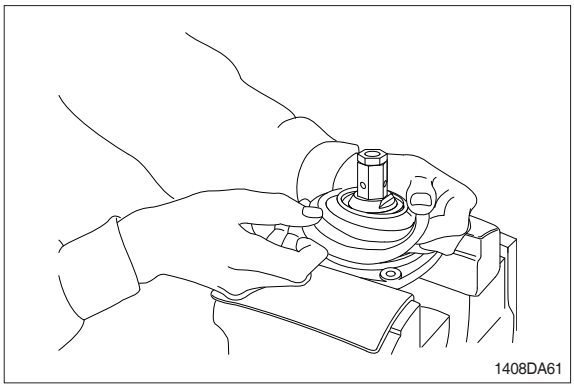
※ For valve with switch, remove cord also through hole of casing.



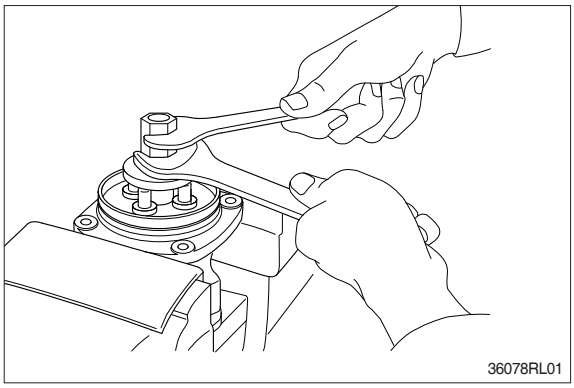
(4) Loosen lock nut (22) and adjusting nut (17) with spanners on them respectively, and take out handle section as one body.

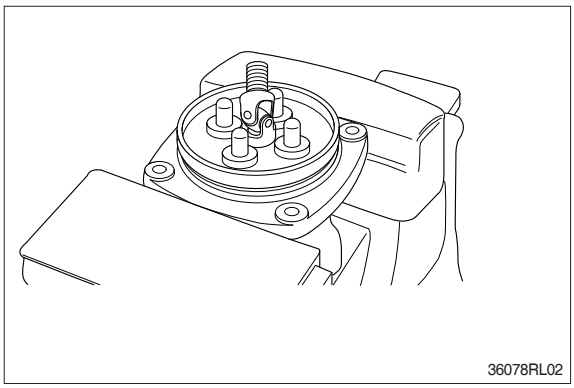


(5) Remove the boot (17).



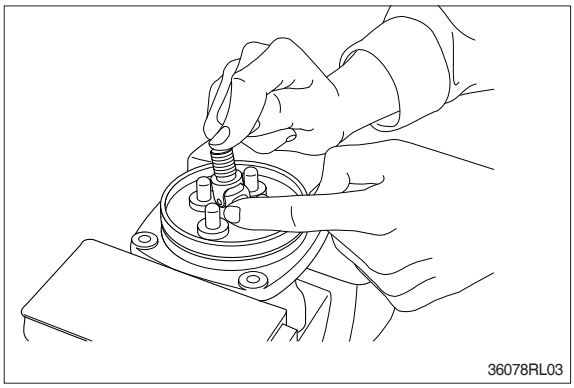
(6) Loosen adjusting nut (17) and swash plate (16) with spanners on them respectively, and remove them.

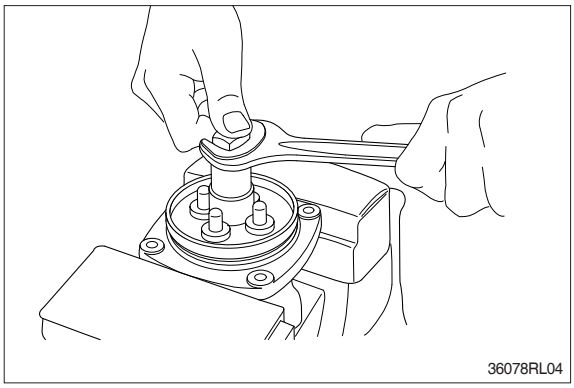




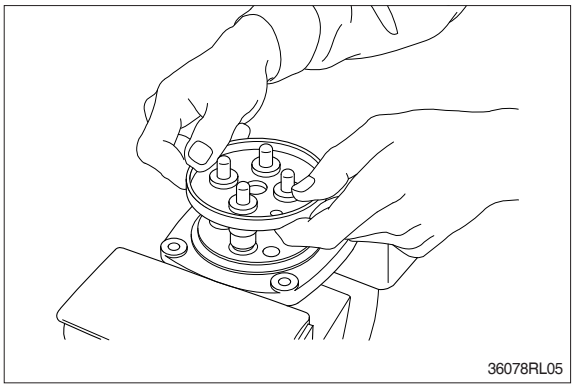
(7) Turn joint anticlockwise to loosen it, utilizing jig (Special tool).

※ When return spring (7) is strong in force, plate (12), plug (8) and push rod (9) will come up on loosening joint.
Pay attention to this.





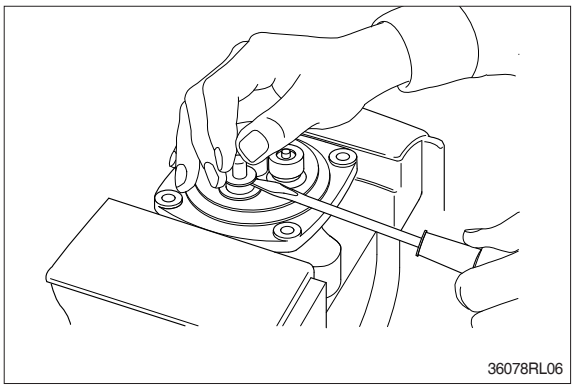
(8) Remove plate (12).



(9) When return spring (7) is weak in force, plug (12) stays in casing because of sliding resistance of O-ring.

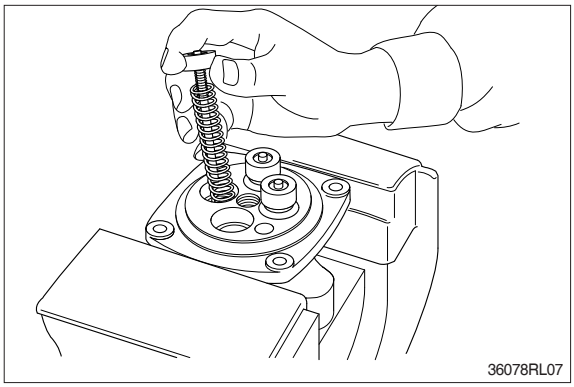
※ Take it out with minus screwdriver.
Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.

※ During taking out, plug may jump up due 7to return spring (9) force.
Pay attention to this.



(10) Remove reducing valve subassembly and return spring (7) out of casing.

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

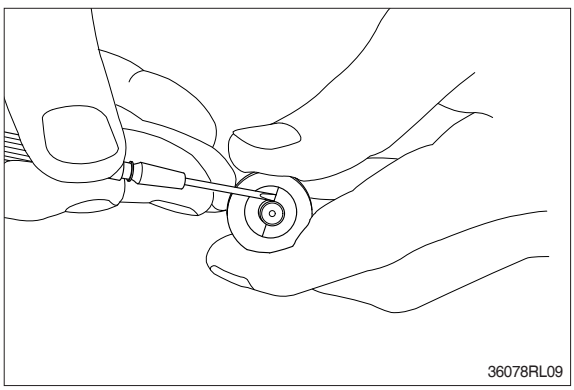


(11) For disassembling reducing valve section, stand it vertically with spool (3) bottom placed on flat workbench. Push down spring seat (6) and remove two pieces of semicircular stopper with tip of small minus screwdriver.

※ Pay attention not to damage spool surface.

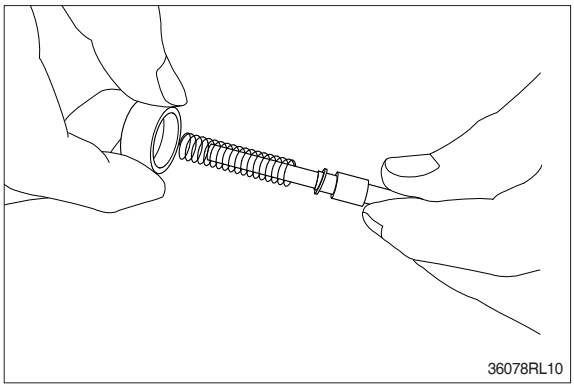
※ Record original position of spring seat (6).

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

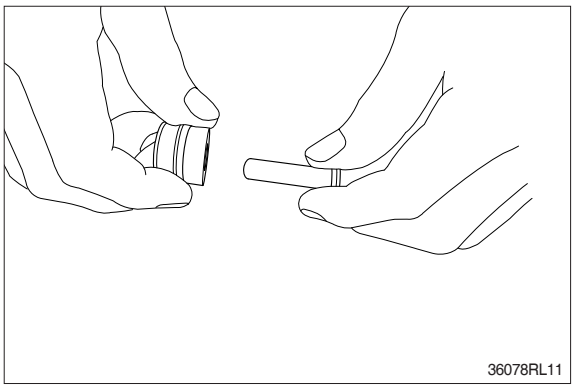


(12) Separate spool (3), spring seat (6), spring (5) and shim (4) individually.

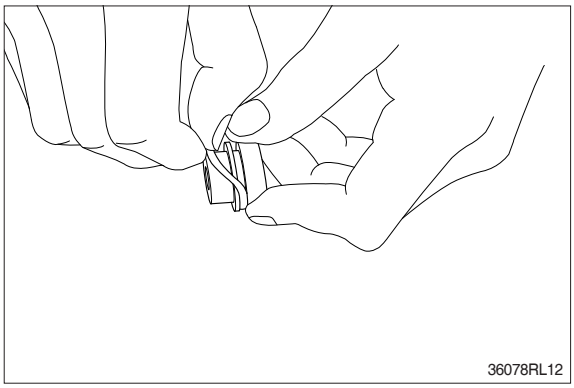
※ Until being assembled, they should be handled as one subassembly group.

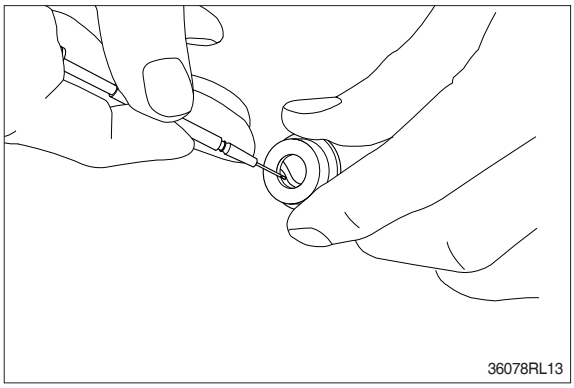


(13) Take push rod (9) out of plug (8).

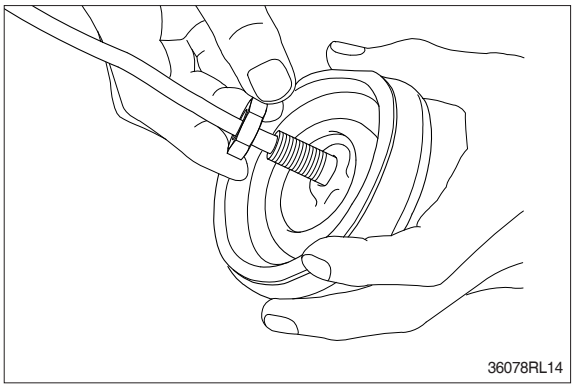


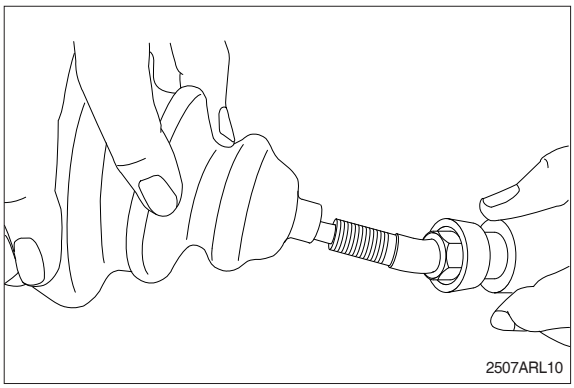
(14) Remove O-ring (10) and seal (11) from plug (8).
Use small minus screwdriver or so on to remove this seal.





(15) Remove lock nut (22) and then boot (14).





(16) 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.

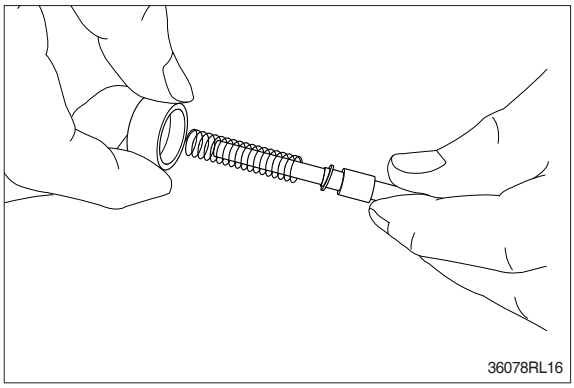
(17) Rust prevention of parts.

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.

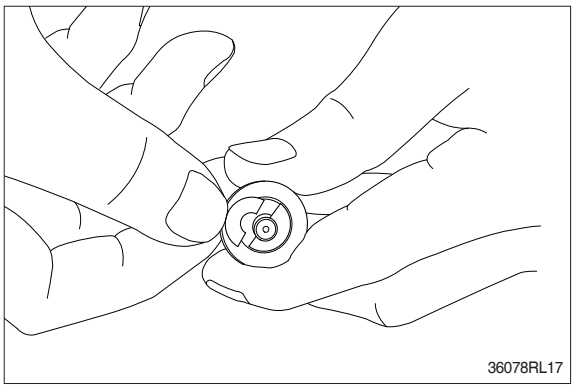
4) ASSEMBLY

(1) Put shim (4), springs (5) and spring seat (6) onto spool (3) in this order.



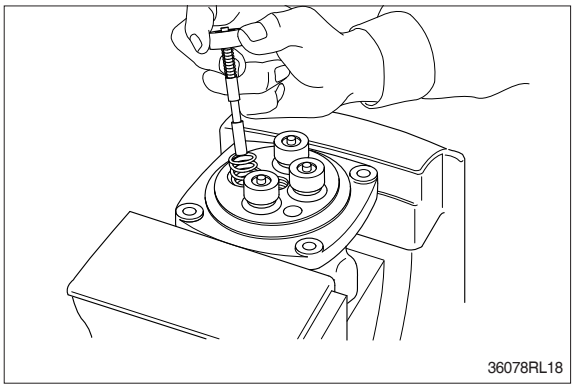
(2) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper on spring seat without piling them on.

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

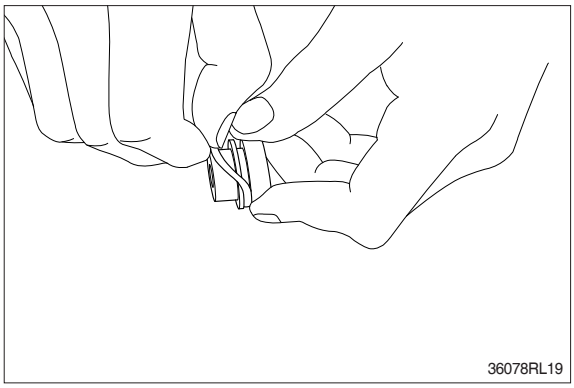


(3) Assemble spring (7) into casing (1).
Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.

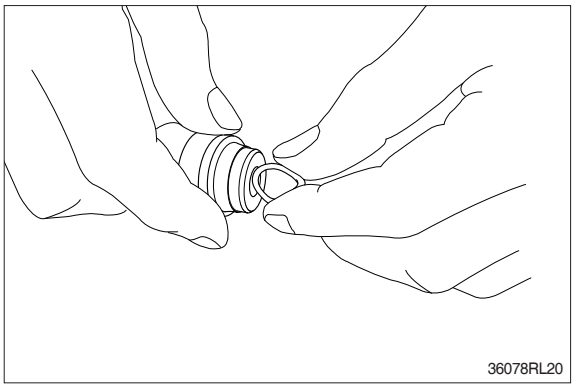


(4) Assemble O-ring (10) onto plug (8).



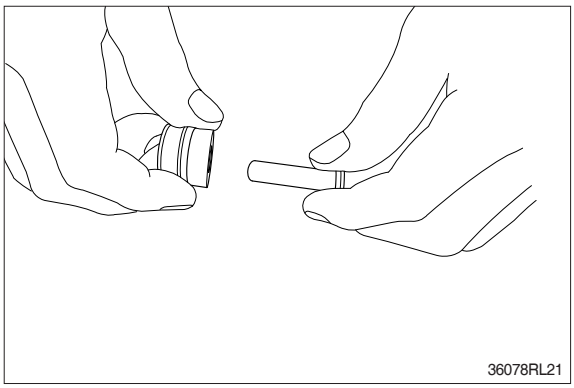
(5) Assemble seal (11) to plug (8).

※ Assemble seal in such lip direction as shown below.



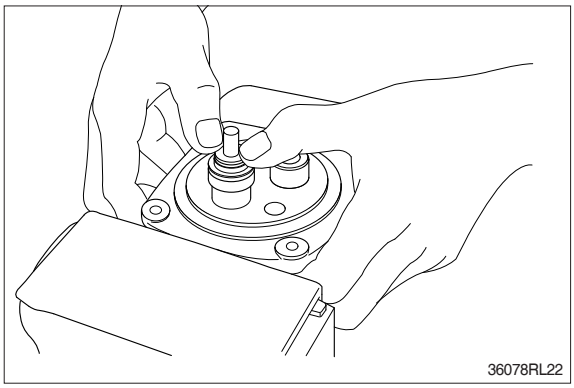
(6) Assemble push rod (9) to plug (8).

※ Apply working oil on push-rod surface.

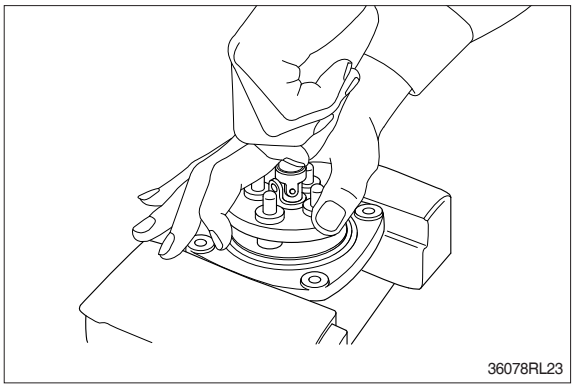


(7) Assemble plug subassembly to casing.

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

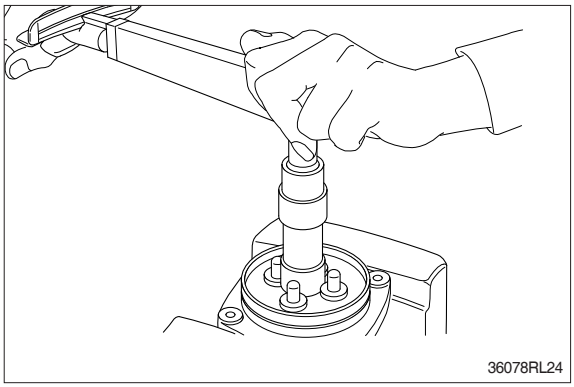


(8) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (12), and tighten joint (15) temporarily.



(9) Fit plate (12).

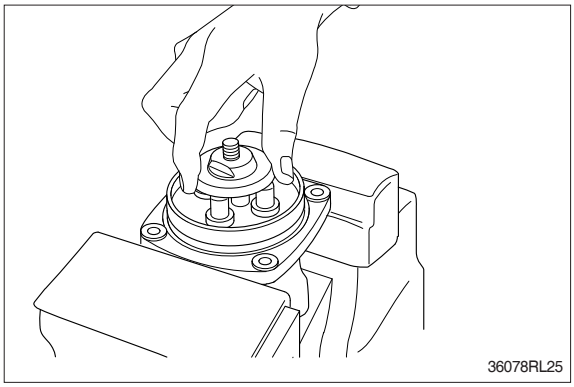
(10) Tighten joint (15) with the specified torque to casing, utilizing jig.



(11) Assemble swash plate (16) to joint (15).

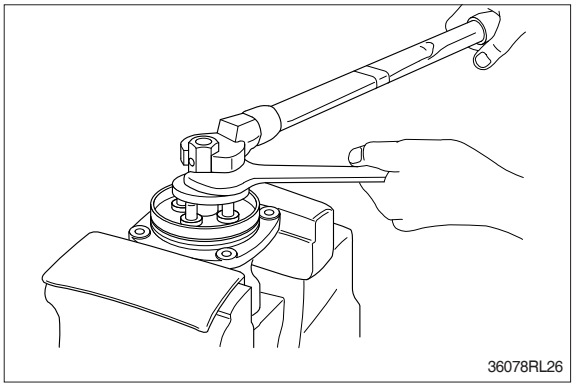
※ Screw it to position that it contacts with 4 push rods evenly.

※ Do not screw it over.

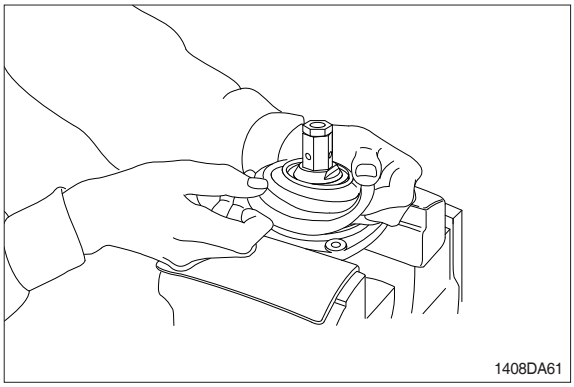


(12) Assemble adjusting nut (22), apply spanner to width across flat of plate (16) to fix it, and tighten adjusting nut to the specified torque.

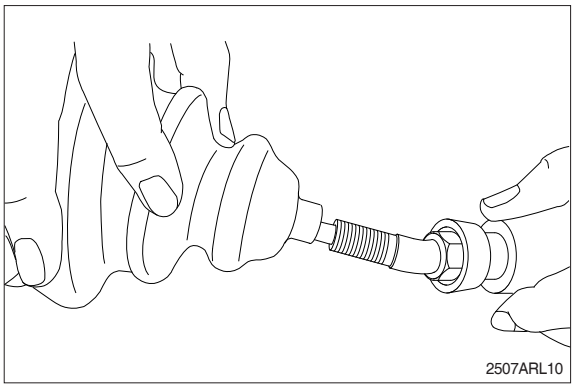
※ During tightening, do not change position of disk.

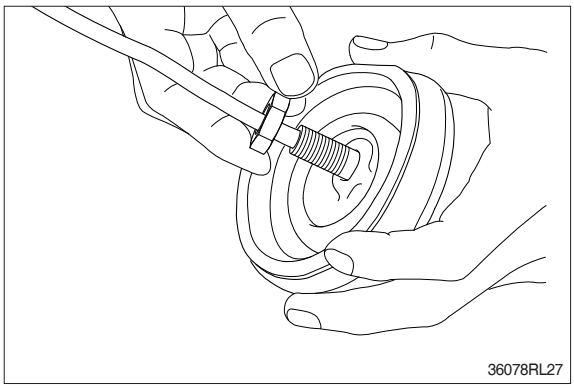


(13) Fit boot (23) to plate.

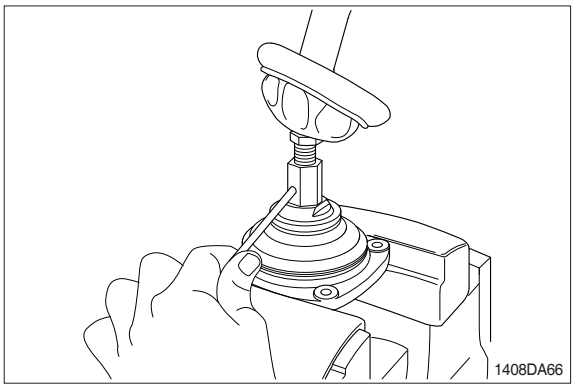


(14) Fit boot (23) and lock nut (22), and handle subassembly is assembled completely.



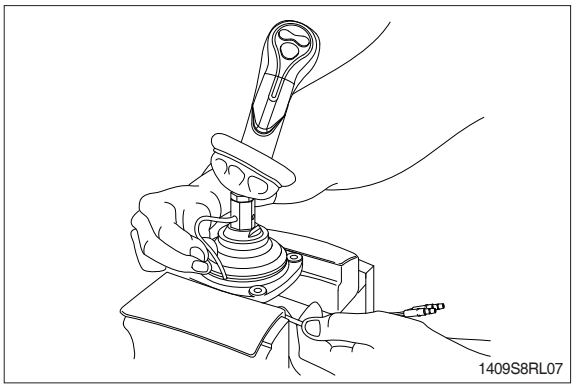


(15) Pull out cord and tube through adjusting nut hole provided in direction 60˚ to 120˚ from casing hole.

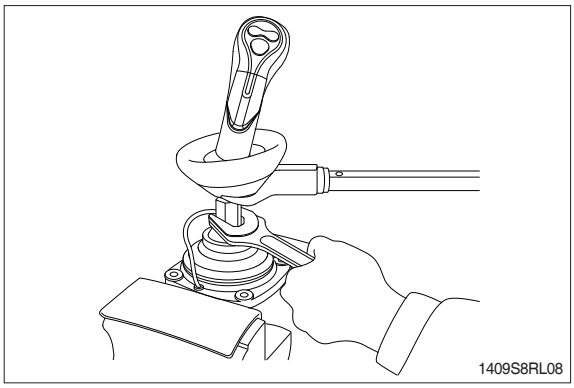


(16) Assemble bushing (18) to plate and pass cord and tube through it.

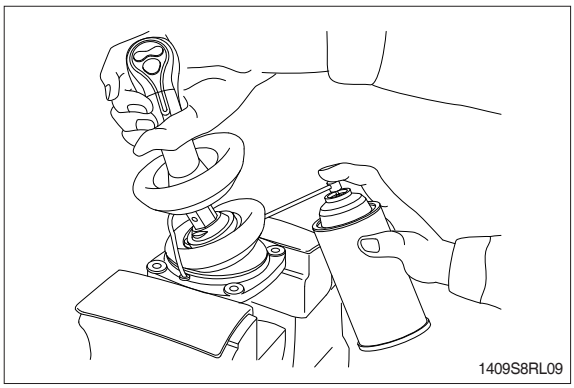
※ Provide margin necessary to operation.



(17) Determine handle direction, tighten lock nut (22) to specified torque to fix handle.

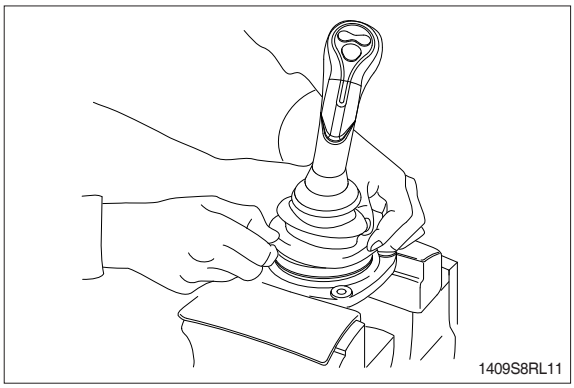


(18) Apply grease to rotating section of joint and contacting faces of disk and push rod.



(19) Assemble lower end of bellows to casing.

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



1. REMOVAL AND INSTALL

1) REMOVAL

(1) Lower the work equipment to the ground and stop the engine.

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

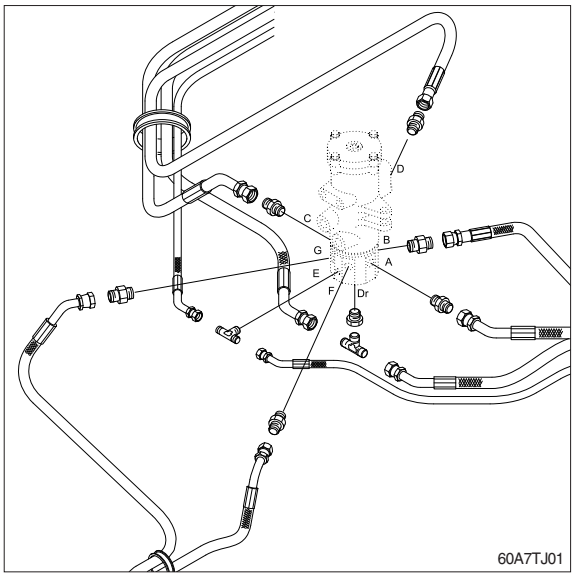
(3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

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

(4) Disconnect all hoses.

(5) Sling the turning joint assembly (1) and remove the mounting bolt (2).
- Weight : 30 kg (70 lb)
- Tightening torque : 12.8 ± 3.0 kgf · m (92.6 ± 21 lbf · ft)



(6) Remove the turning joint assembly.

※ When removing the turning joint, check that all the hoses have been disconnected.

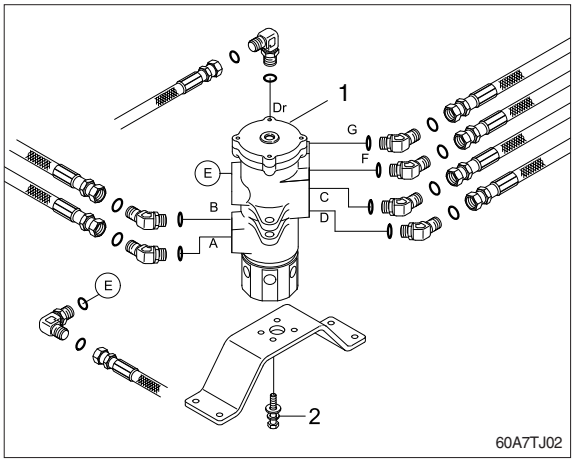
2) INSTALL

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

※ Take care of turning joint direction.

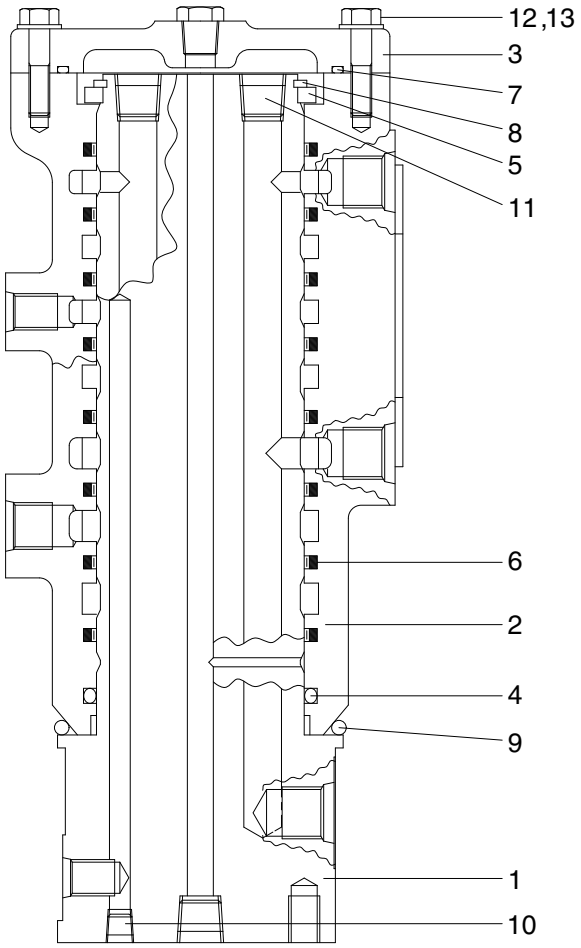
※ Assemble hoses to their original positions.

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



2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE



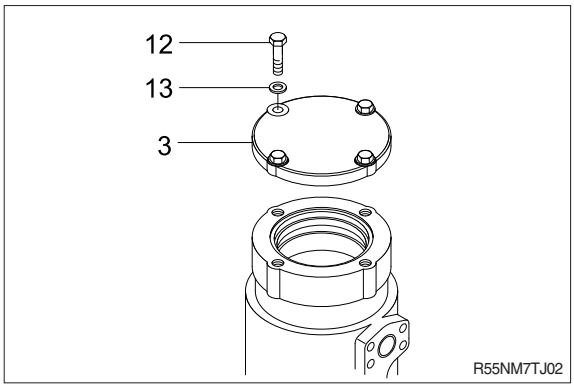
HX60A7TJ03

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

2) DISASSEMBLY

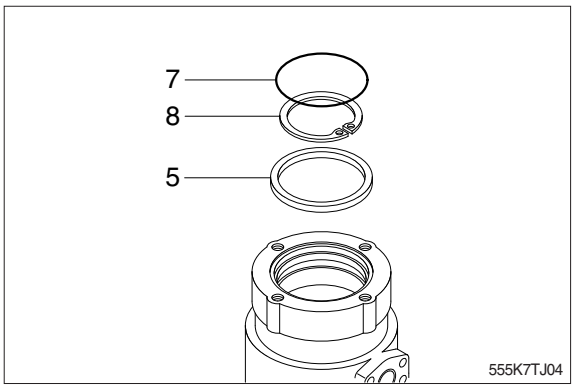
※ Before the disassembly, clean the turning joint.

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



(2) Remove O-ring (7).

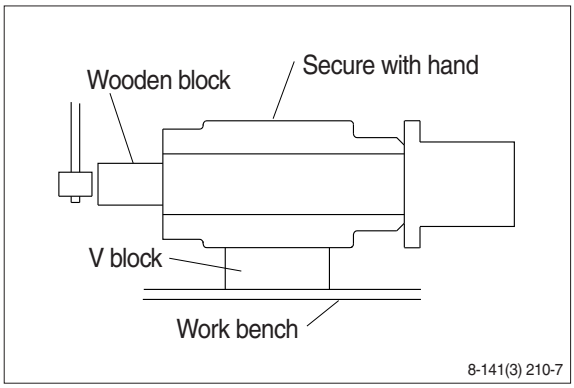
(3) Remove retainer ring (8) and ring (5).



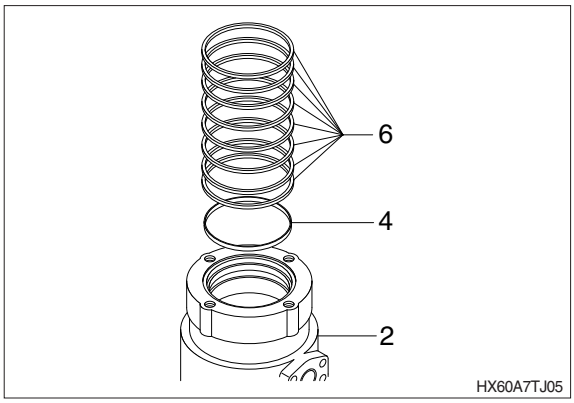
(4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

※ 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).



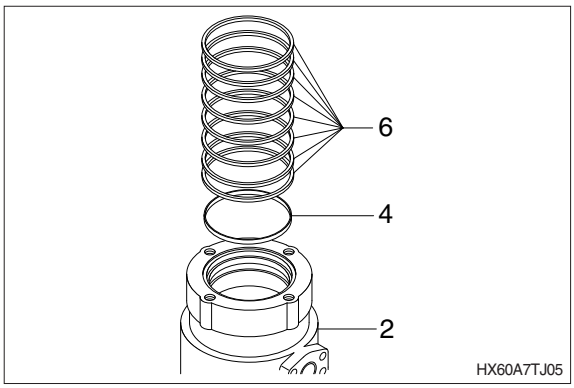
(5) Remove eight slipper seals (6) and O-ring (4) from rotor (2).



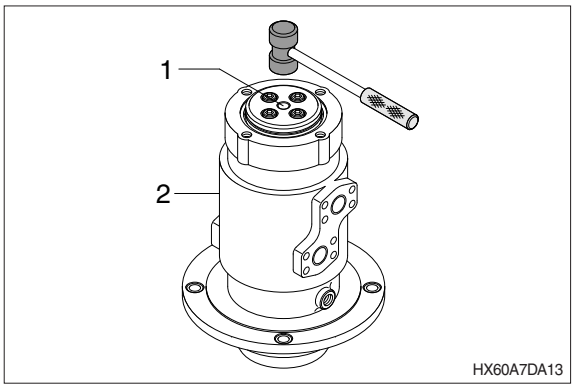
3) ASSEMBLY

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

(1) Fix eight slipper seal (6) and O-ring (4) to rotor (2).

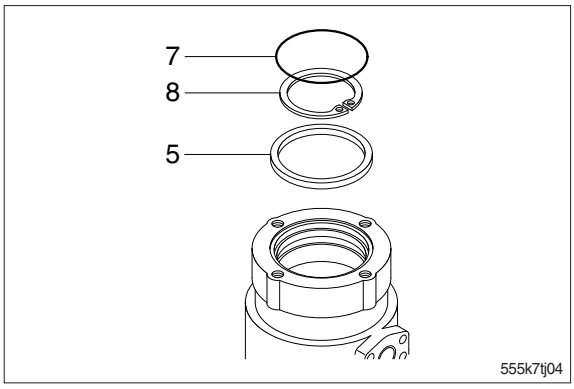


(2) Set shaft (1) on block, tap rotor (2) with a plastic hammer to install.

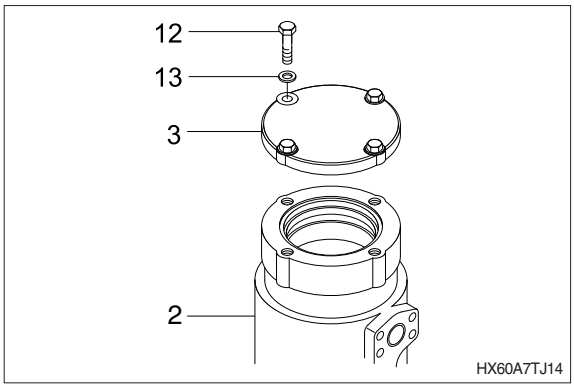


(3) Ring (5) and retainer ring (8) to shaft (1).

(4) Fit O-ring (7) to rotor (2).



(5) Install cover (3) to rotor (2) and tighten bolts (12) with washer (13).
· Tightening torque : 3.4 ± 0.7 kgf · m
(24.6 ± 5.1 lbf · ft)



1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

(1) Removal

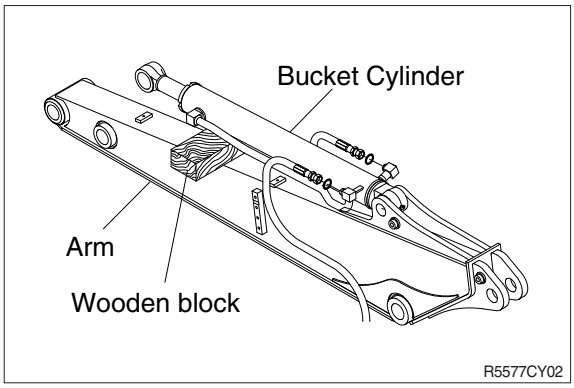
※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

※ 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.

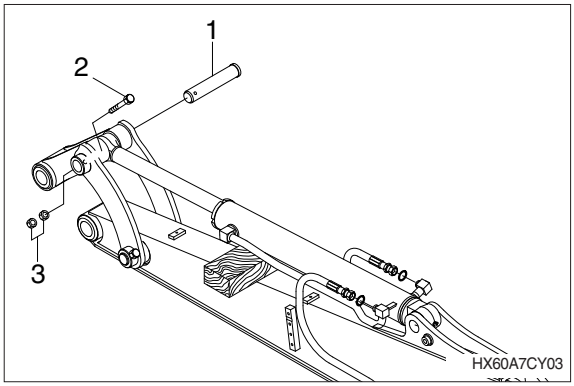
① Set block between bucket cylinder and arm.



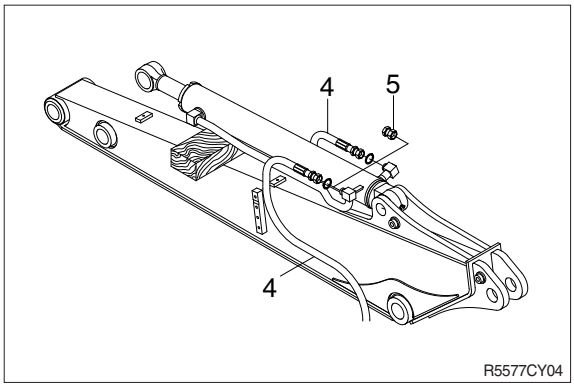
② Remove bolt (2), nut (3) and pull out pin (1).

· 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.

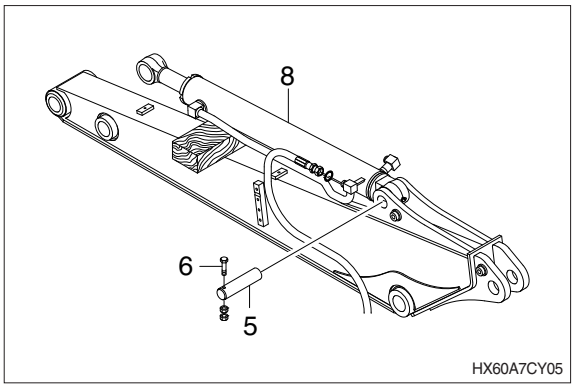


④ Sling bucket cylinder assembly (8) and remove bolt (6) then pull out pin (5).

⑤ Remove bucket cylinder assembly (8).

· Weight : 37 kg (82 lb)

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



(2) Install

① Carry out installation in the reverse order to removal.

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

※ Bleed the air from the bucket cylinder.

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

2) ARM CYLINDER

(1) Removal

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

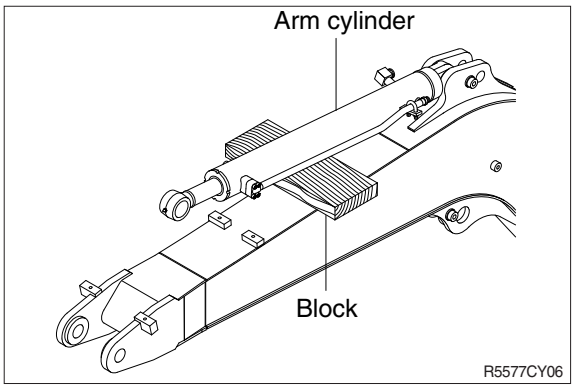
※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

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

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

※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

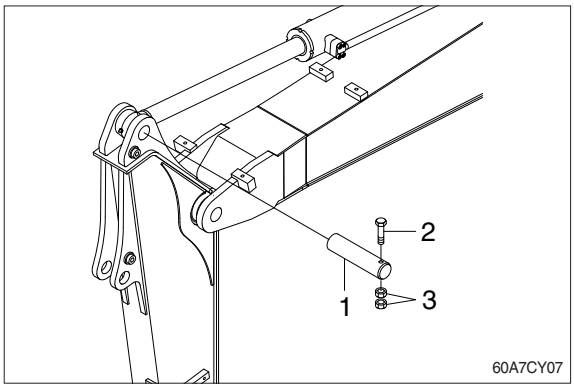
① Set block between arm cylinder and boom.



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

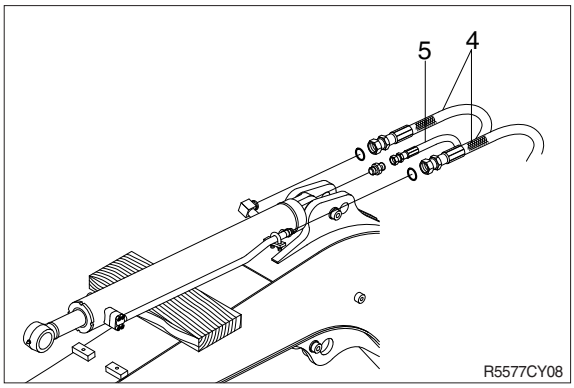
※ Tie the rod with wire to prevent it from coming out.

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



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

④ Disconnect greasing pipings (5).

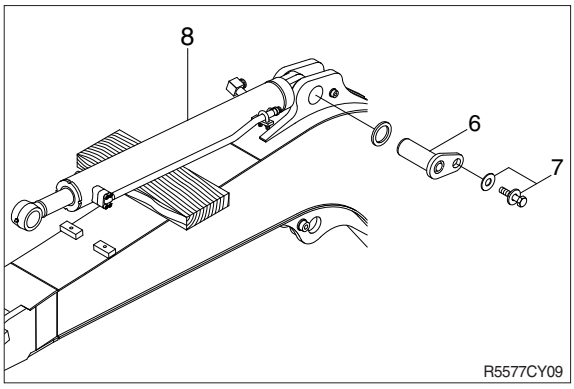


⑤ Sling arm assembly (8) and remove bolt (7) then pull out pin (6).

⑥ Remove arm cylinder assembly (8).

· Weight : 65 kg (143 lb)

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



(2) Install

① Carry out installation in the reverse order to removal.

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

※ 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

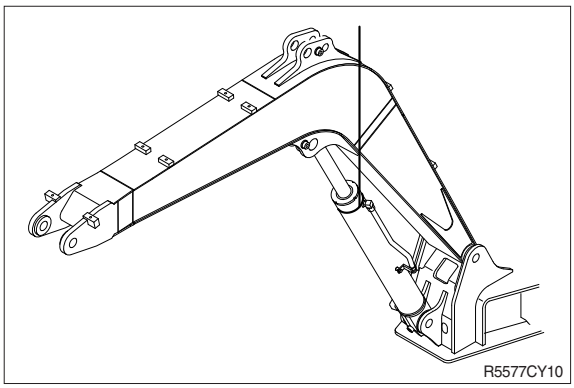
※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

※ 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.



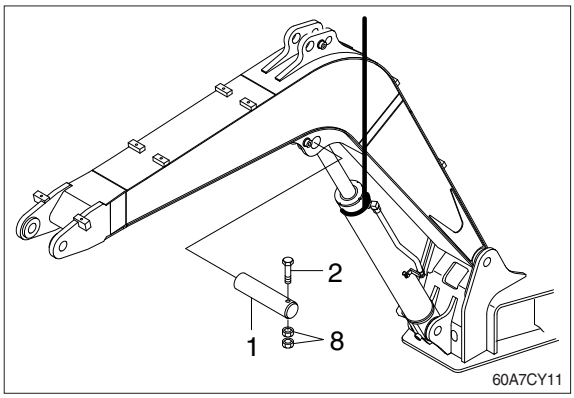
① Disconnect greasing hoses.

② Sling boom cylinder assembly.

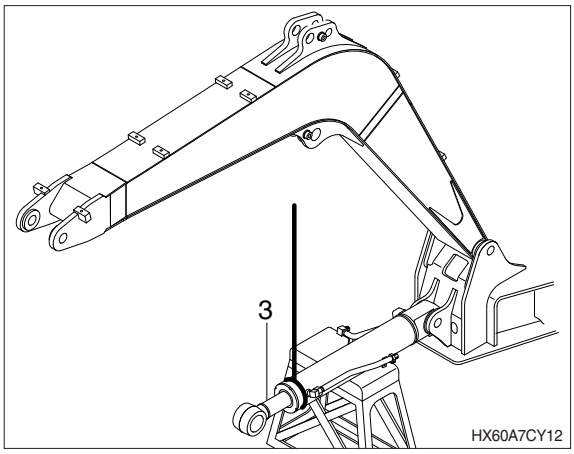
③ Remove bolt (2), nut (8) and pull out pin (1).

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

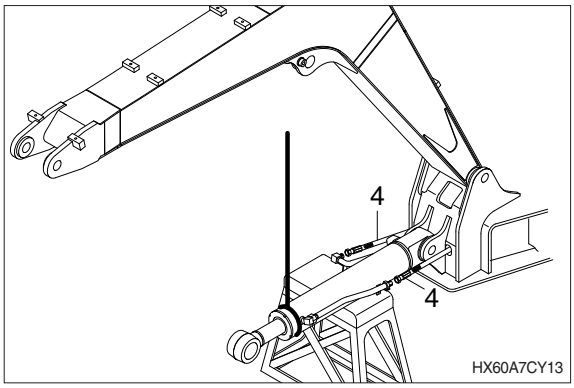
· Tightening torque : 12.8± 3.0 kgf · m (92.6± 21.7 lbf · ft)



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



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

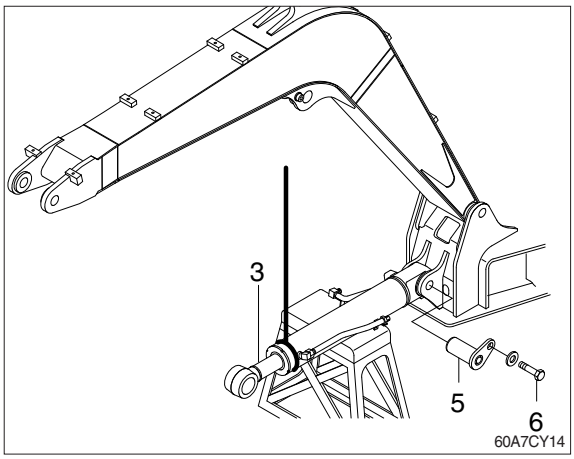


⑥ Remove bolt (6) and pull out pin (5).

⑦ Remove boom cylinder assembly (3).

· Weight : 64 kg (141 lb)

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



(2) Install

① Carry out installation in the reverse order to removal.

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

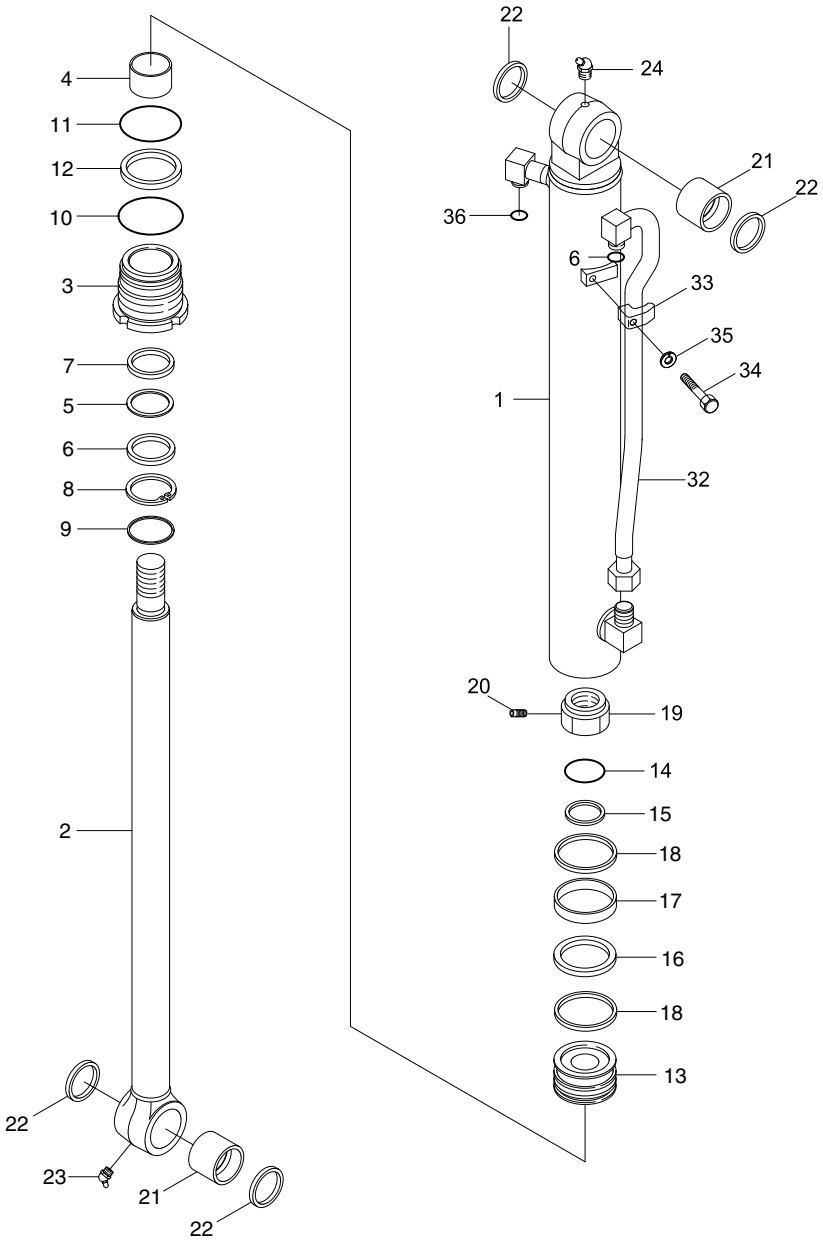
※ Bleed the air from the boom cylinder.

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

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

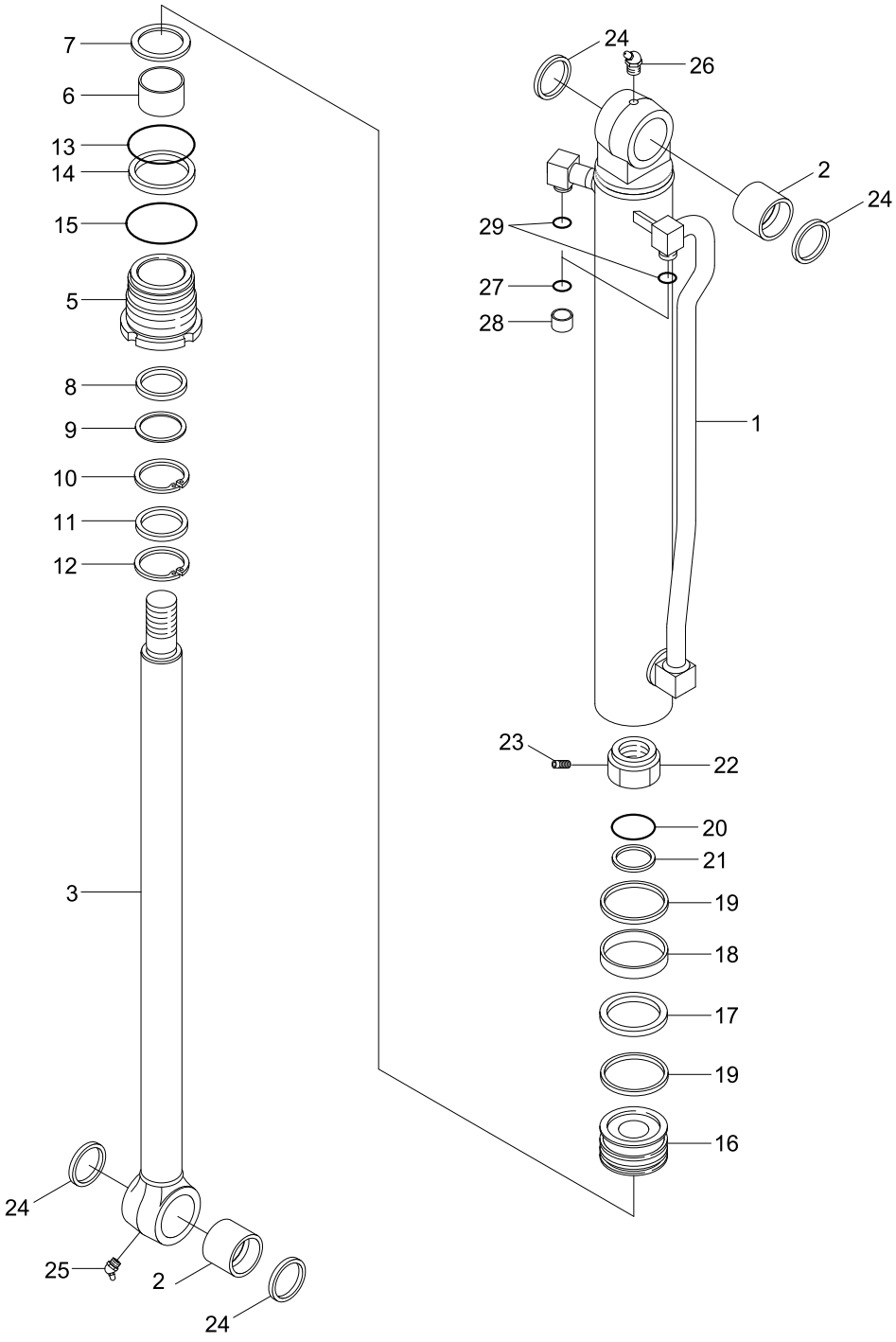
(1) Bucket cylinder (CHANGZHOU)



31M9-50133CGG

1	Tube assembly	11	O-ring	21	Dimple bushing
2	Rod assy	12	Back-up ring	22	Dust seal
3	Grand	13	Piston	23	Grease nipple
4	Du bushing	14	O-ring	24	Grease nipple
5	Rod seal	15	Back-up ring	32	Pipe assy
6	Back-up ring	16	Piston seal	33	Clamp
7	Buffer ring	17	Wear ring	34	Bolt
8	Dust wiper	18	Dust ring	35	Spring washer
9	Snap ring	19	Lock nut	36	O-ring
10	O-ring	20	Set screw		

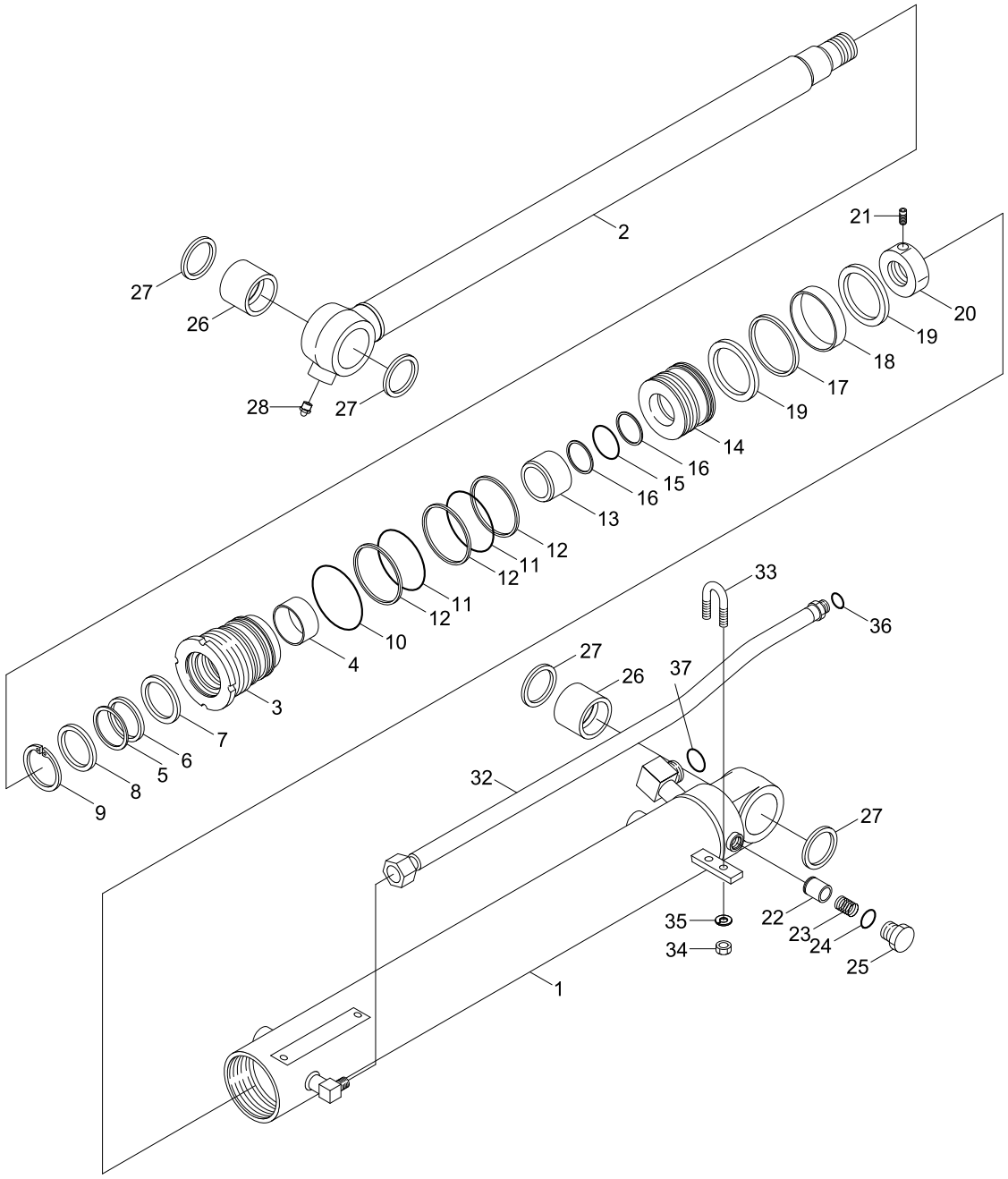
Bucket cylinder



31M9-50134GG

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

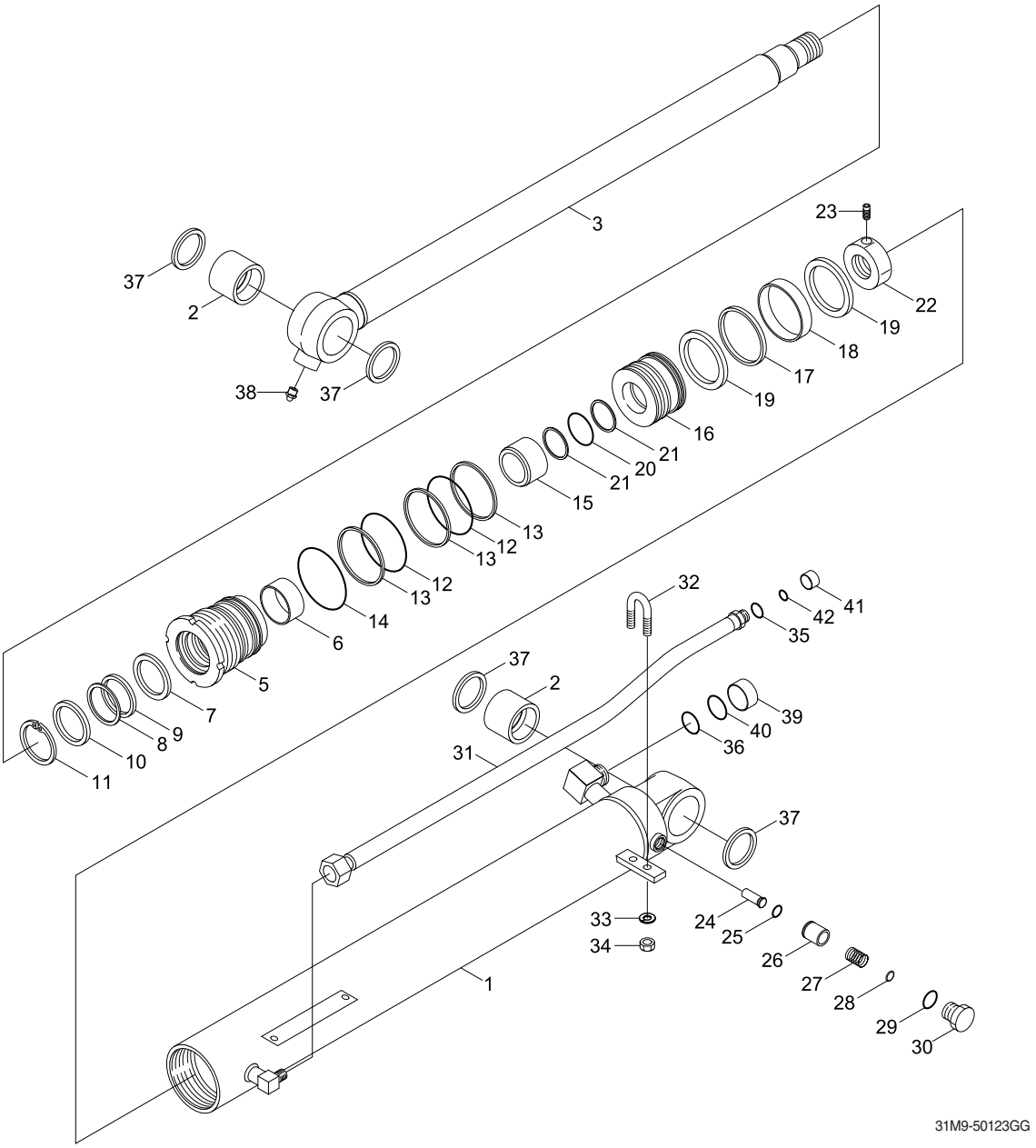
(2) Arm cylinder (CHANGZHOU)



31M9-50122CGG

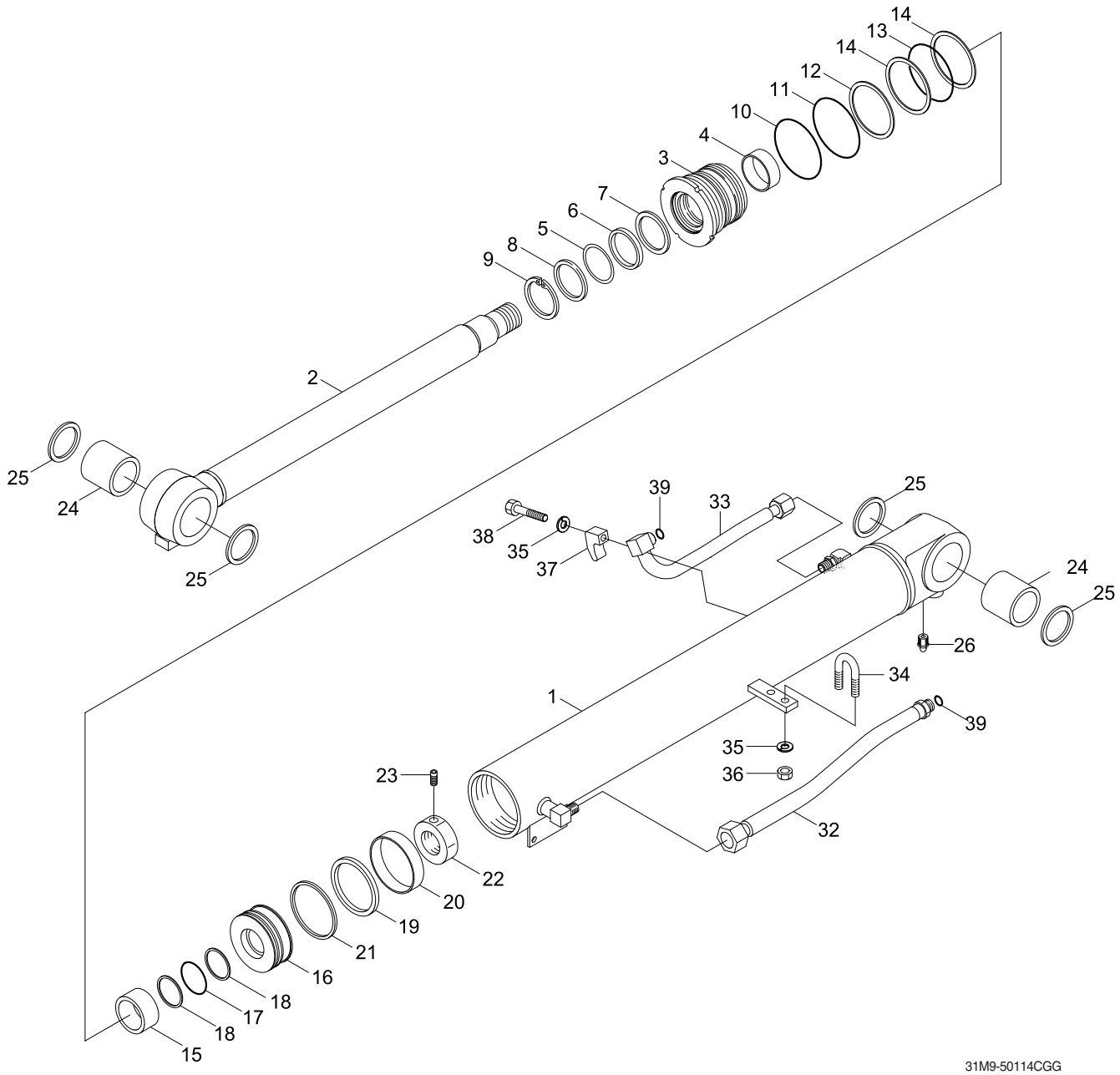
1	Tube assembly	13	Cushion ring	25	Plug
2	Rod assy	14	Piston	26	Dimple bushing
3	Grand	15	O-ring	27	Dust seal
4	Du bushing	16	Back-up ring	28	Grease nipple
5	Rod seal	17	Piston seal	32	Pipe (R)
6	Back-up ring	18	Wear ring	33	U-bolt
7	Buffer ring	19	Dust ring	34	Nut
8	Dust wiper	20	Lock nut	35	Spring washer
9	Snap ring	21	Set screw	36	O-ring seal
10	O-ring	22	Check valve	37	O-ring seal
11	O-ring	23	Coil spring		
12	Back-up ring	24	O-ring		

Arm cylinder (SH PAC)



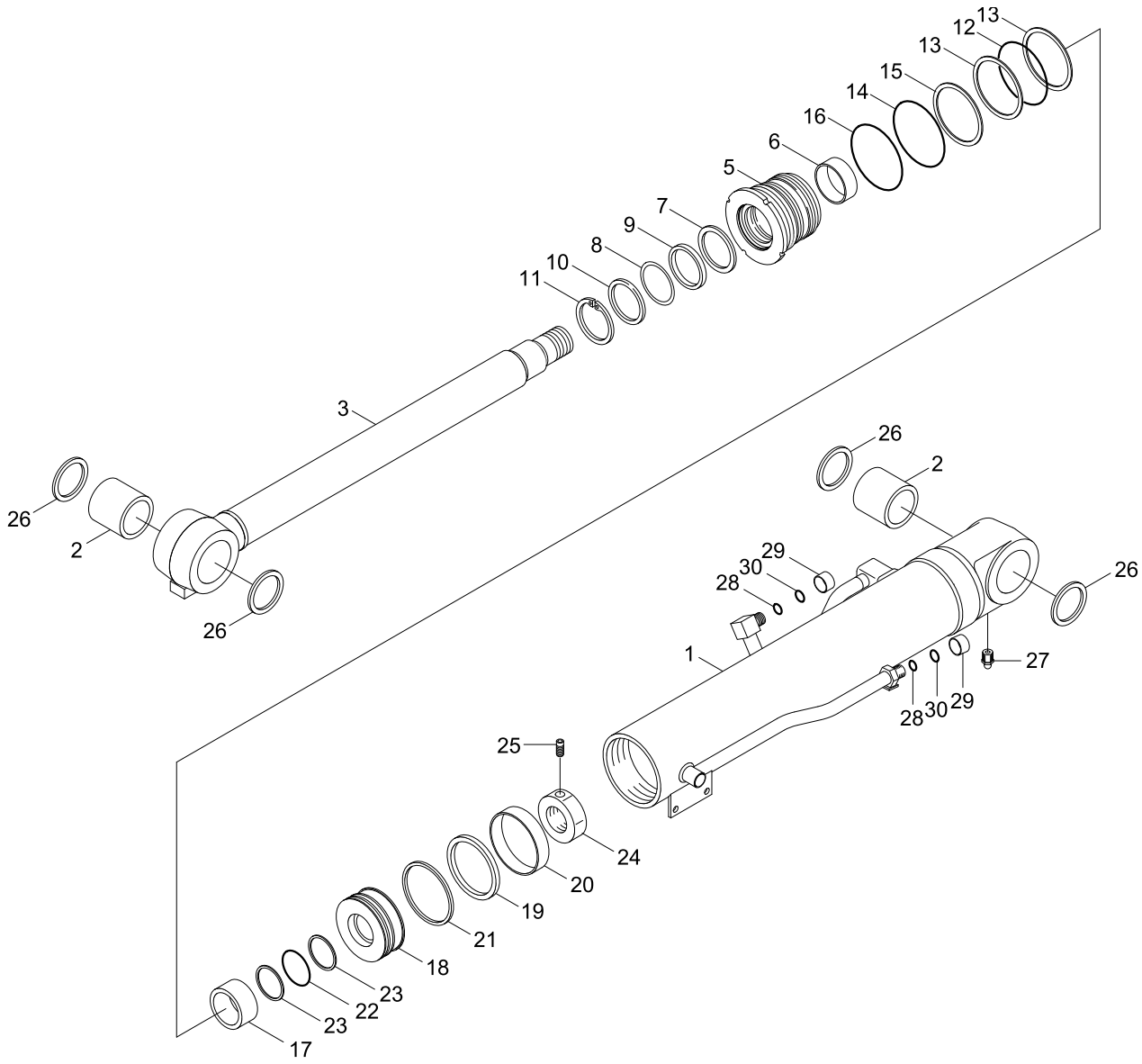
1	Tube assembly	16	Piston	30	Plug
2	Dimple bushing	17	Piston seal	31	Pipe (R)
3	Rod assembly	18	Wear ring	32	U-bolt
5	Rod cover	19	Dust ring	33	Spring washer
6	Pin bushing	20	O-ring	34	Hex nut
7	Buffer seal	21	Back up ring	35	O-ring
8	U-packing	22	Nut	36	O-ring
9	Back up ring	23	Set screw	37	Dust seal
10	Dust seal	24	Cushion plunger	38	Grease nipple
11	Retainer ring	25	Stop ring	39	Dust cap
12	O-ring	26	Check valve	40	O-ring
13	Back up ring	27	Spring	41	Dust cap
14	O-ring	28	Support spring	42	O-ring
15	Cushion ring	29	O-ring		

(3) Boom cylinder (CHANGZHOU)



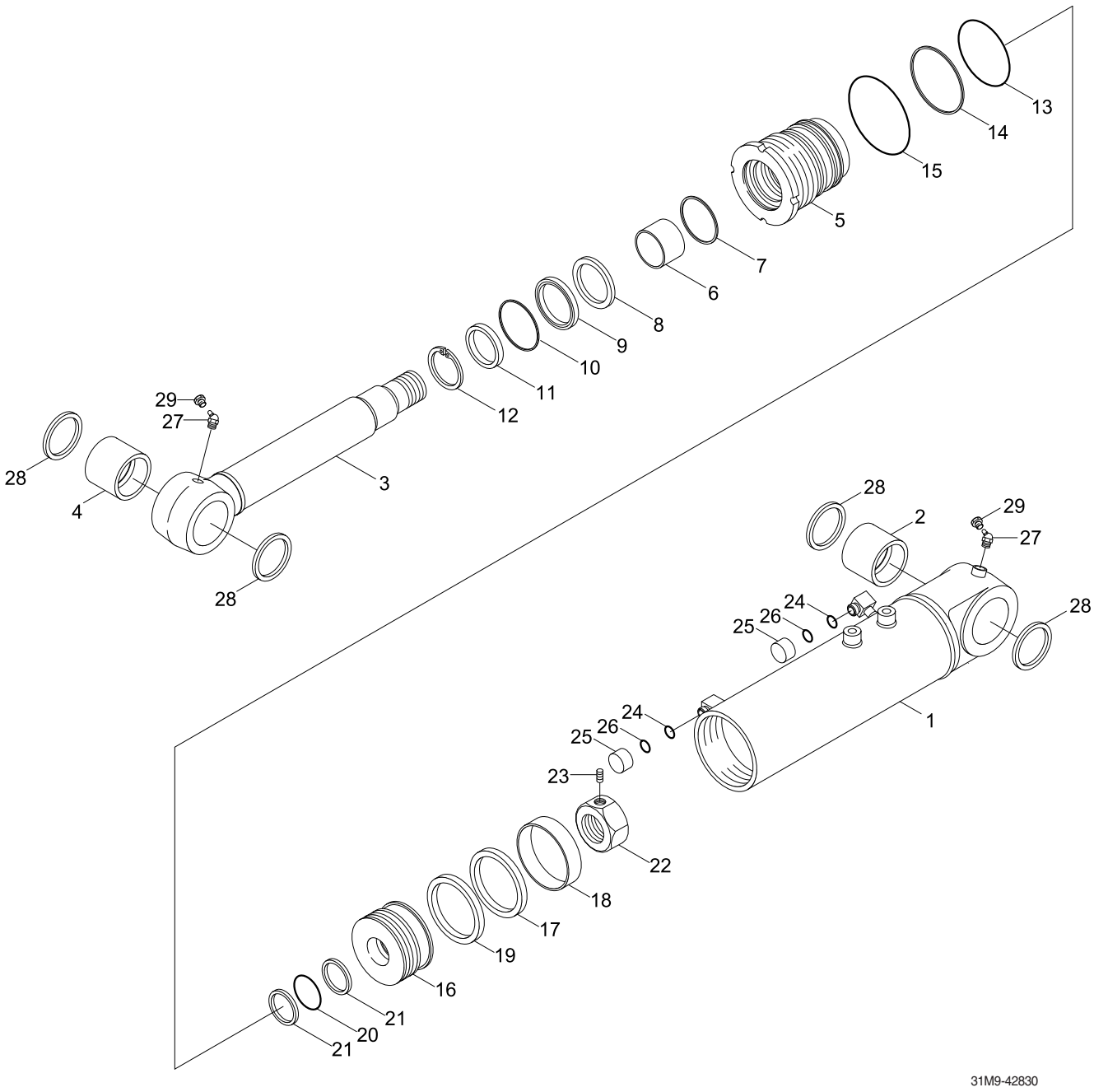
1	Tube assembly	13	O-ring	25	Dust seal
2	Rod	14	Back up ring	26	Grease nipple
3	Grand	15	Cushion ring	32	Pipe (R)
4	DU bushing	16	Piston	33	Pipe (B)
5	Rod seal	17	O-ring	34	U-bolt
6	Back up ring	18	Back up ring	35	Spring washer
7	Buffer ring	19	Piston seal	36	Hex nut
8	Dust wiper	20	Wear ring	37	Clamp
9	Snap ring	21	Dust ring	38	Bolt
10	O-ring	22	Lock nut	39	O-ring
11	O-ring	23	Set screw		
12	Back up ring	24	Pin bushing		

Boom cylinder (SH PAC)



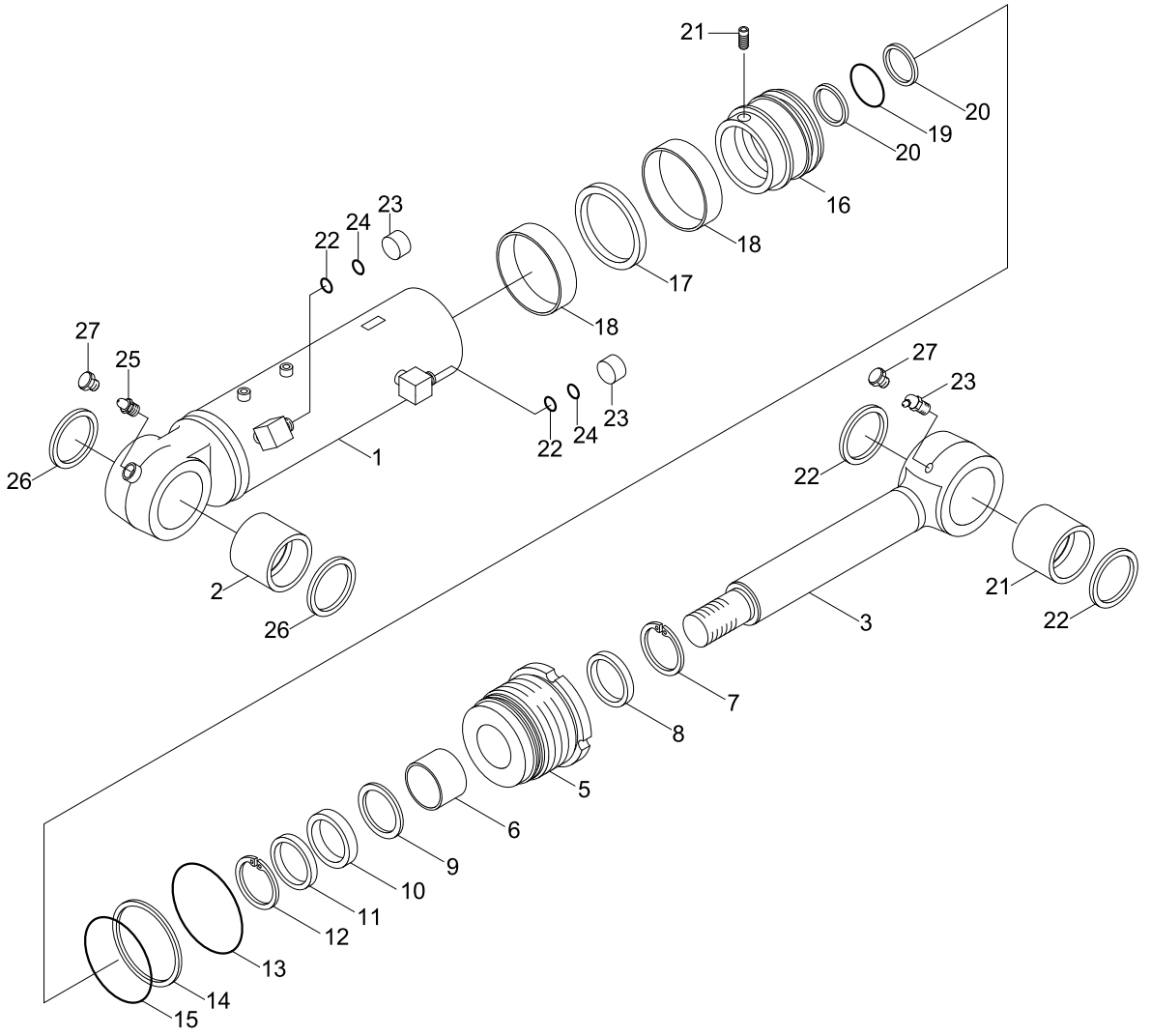
1	Tube assembly	12	O-ring	22	Back up ring
2	Dimple bushing	13	Back up ring	23	Back up ring
3	Rod assembly	14	O-ring	24	Nut
5	Rod cover	15	Back up ring	25	Set screw
6	Pin bushing	16	O-ring	26	Dust seal
7	Buffer seal	17	Cushion ring	27	Grease nipple
8	U-packing	18	Piston	28	O-ring
9	Back up ring	19	Piston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

(4) Dozer cylinder



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

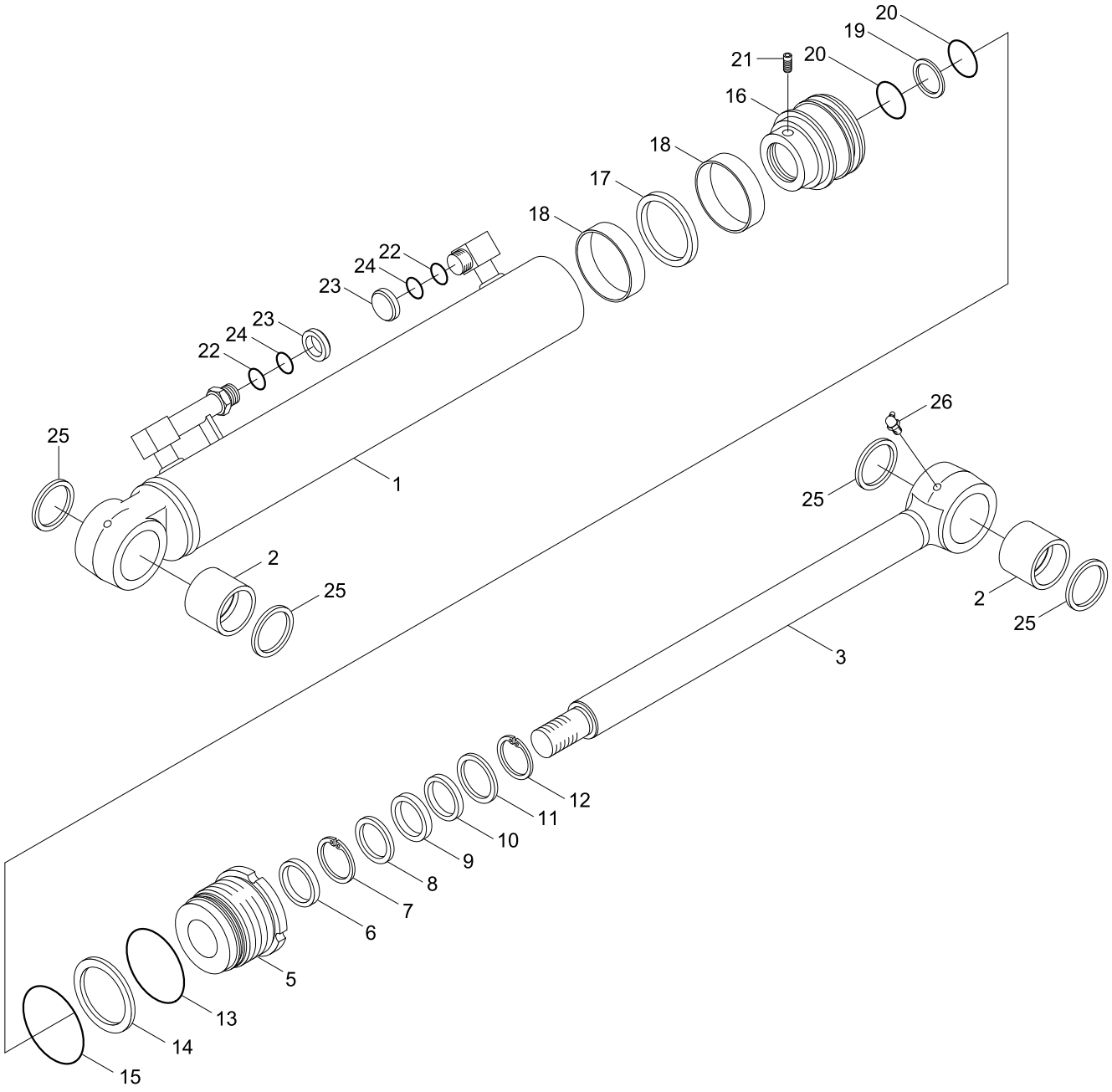
(5) Angle dozer cylinder



31M9-42850

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	Pin 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	Back up ring		

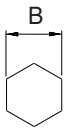
(6) Boom swing cylinder



1	Tube assembly	11	Dust seal	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	Pin wiper
8	Buffer seal	17	Piston seal	26	Grease nipple
9	U-packing	18	Wear ring		
10	Back up ring	19	O-ring		

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Name	Specification	
Allen wrench	8	
	10	
Spanner	22	
Hook spanner	Suitable size	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

(2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Rod cover (Grand)	Boom cylinder(CHANGZHOU) Boom cylinder(DY POWER)	3 5	M115 M115	70±7.0 70±7.0	506±50.6 506±50.6
	Arm cylinder(CHANGZHOU) Arm cylinder(DY POWER)	3 5	M115 M95	95±9.5 70±7.0	687±68.7 506±50.6
	Bucket cylinder(CHANGZHOU) Bucket cylinder(DY POWER)	3 5	M85 M85	70±7.0 75±7.5	506±50.6 542±54.2
	Dozer cylinder	5	M115	95±9.5	687±68.7
	Angle dozer cylinder	5	M120	95±9.5	687±68.7
	Boom swing cylinder	5	M100	70±7.0	506±50.6
Piston nut (Lock nut)	Boom cylinder(CHANGZHOU) Boom cylinder(DY POWER)	22 24	- M42	75±7.5 75±7.5	542±54.2 542±54.2
	Arm cylinder(DY POWER)	22	M39	75±7.5	542±54.2
	Bucket cylinder(CHANGZHOU)	19	-	75±7.5	542±54.2
Piston	Boom cylinder(CHANGZHOU) Boom cylinder(DY POWER)	16 18	- M52	50±5.0 50±5.0	362±36.2 362±36.2
	Arm cylinder(CHANGZHOU) Arm cylinder(DY POWER)	13 16	M45 M39	113±11.3 50±5.0	817±81.7 362±36.2
	Bucket cylinder(CHANGZHOU) Bucket cylinder(DY POWER)	13 16	- M36	50±5.0 75±7.5	362±36.2 542±54.2
	Dozer cylinder	16	M50	80±8.0	579±57.9
	Angle dozer cylinder	16	M48	75±7.5	542±54.2
	Boom swing cylinder	16	M48	75±7.5	542±54.2
Set screw	Boom cylinder(CHANGZHOU) Bucket cylinder(DY POWER)	23 25	M8 M8	2.7±0.3 1.5	19.5±2.2 10.8
	Arm cylinder(CHANGZHOU) Arm cylinder(DY POWER)	21 23	- M8	2.0±0.2 1.5	14.5±1.4 10.8
	Bucket cylinder(CHANGZHOU) Bucket cylinder(DY POWER)	20 23	M8 M8	2.7±0.3 1.5	19.5±2.2 10.8
	Dozer cylinder	23	M8	1.5	10.8
	Angle dozer cylinder	21	M12	4~5	28.9~36.2
	Boom swing cylinder	21	M12	4~5	28.9~36.2

3) DISASSEMBLY

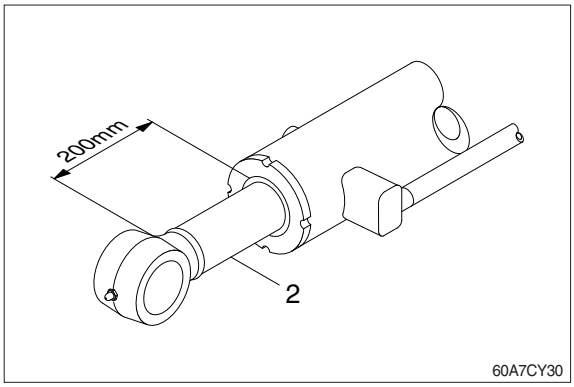
(1) Remove cylinder head and piston rod

※ Procedure are based on the bucket cylinder (CHANGZHOU).

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

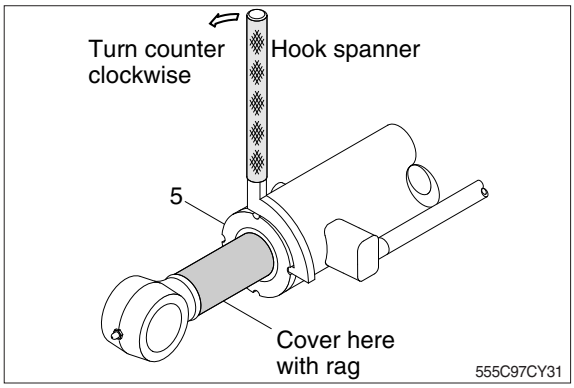
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

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



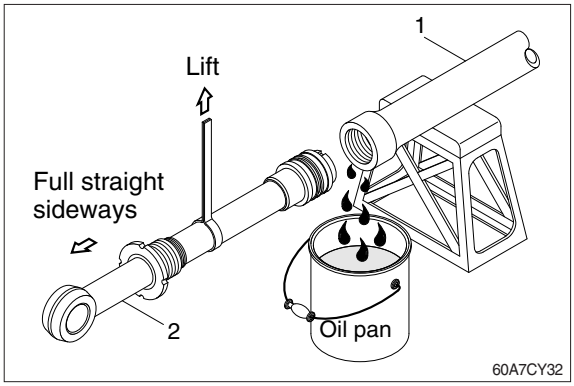
③ Remove gland (5) by hook spanner.

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



④ Draw out cylinder head and rod assembly (2) together from tube assembly (1).

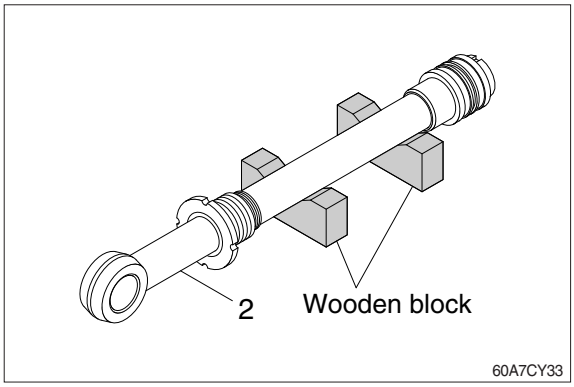
※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly (2) with a crane or some means and draw it out. However, when rod assembly (2) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



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

⑤ Place the removed rod assembly on a wooden V-block that is set level.

※ Cover a V-block with soft rag.

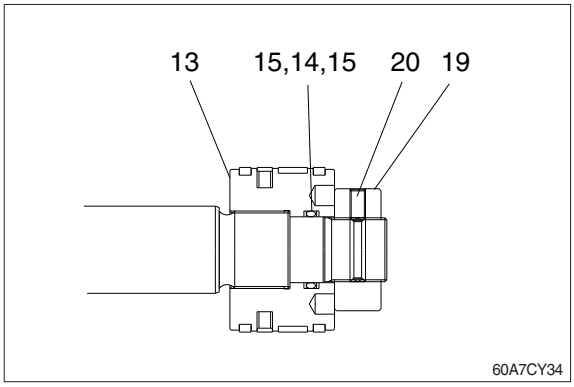


(2) Remove piston and rod cover

① Loosen set screw (20) and remove piston nut (19).

※ Since piston nut (19) is tightened to a high torque, use a hydraulic and power wrench that utilizers a hydraulic cylinder, to remove the piston nut (19).

② Remove piston assembly (13), back up ring (15), and O-ring (14).

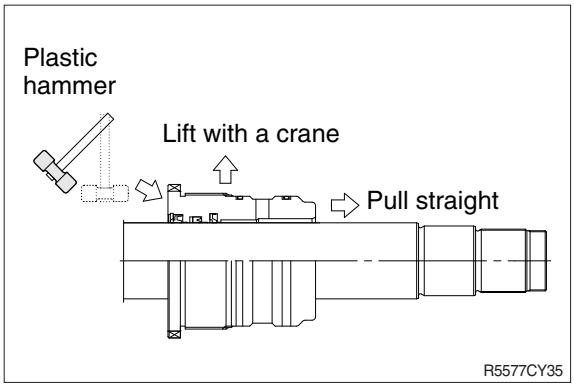


③ Remove the rod cover from rod assembly (2).

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

※ Pull it straight with cylinder head assembly lifted with a crane.

Exercise care so as not to damage the lip of Du bushing (4) and packing (4, 5, 6, 7, 8, 9) by the threads of rod assembly (2).

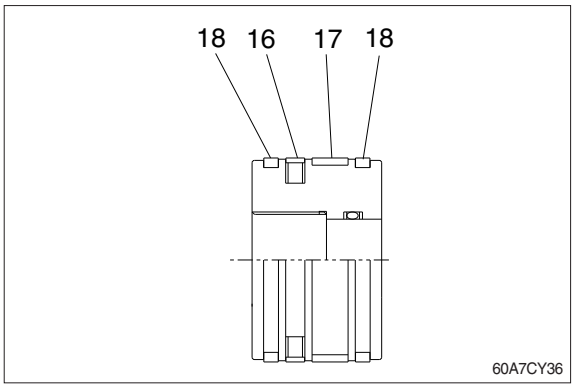


(3) Disassemble the piston assembly

① Remove wear ring (17).

② Remove dust ring (18) and piston seal (16).

※ Exercise care in this operation not to damage the grooves.



(4) Disassemble gland assembly

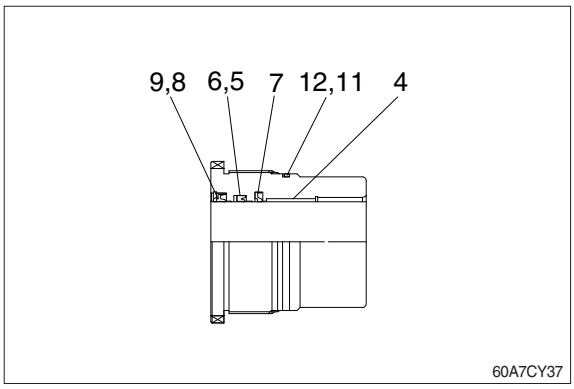
① Remove back up ring (12) and O-ring (11).

② Remove snap ring (9), dust seal (8).

③ Remove back up ring (6), rod seal (5) and buffer seal (7).

※ Exercise care in this operation not to damage the grooves.

※ Do not remove seal and ring, if does not damaged.

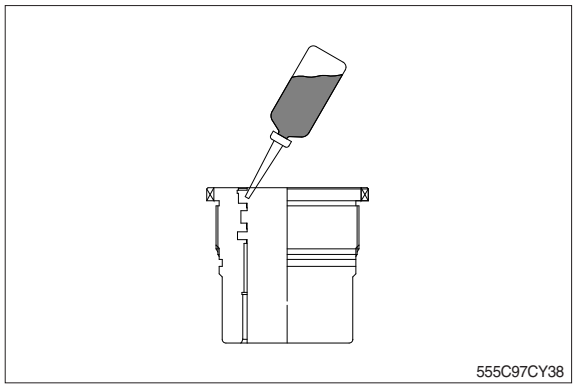


4) ASSEMBLY

(1) Assemble cylinder head assembly

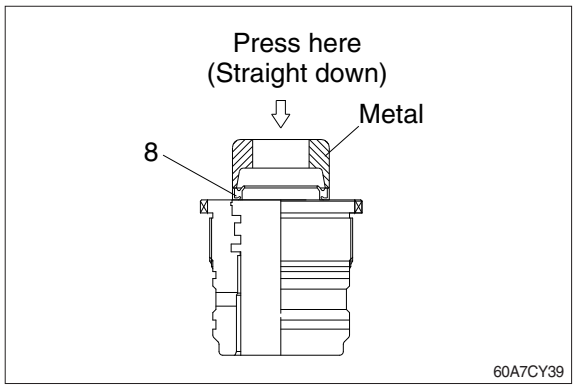
※ Check for scratches or rough surfaces if found smooth with an oil stone.

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



② Coat dust wiper (8) with grease and fit dust wiper (8) to the bottom of the hole of dust wiper.
At this time, press a pad metal to the metal ring of dust wiper.

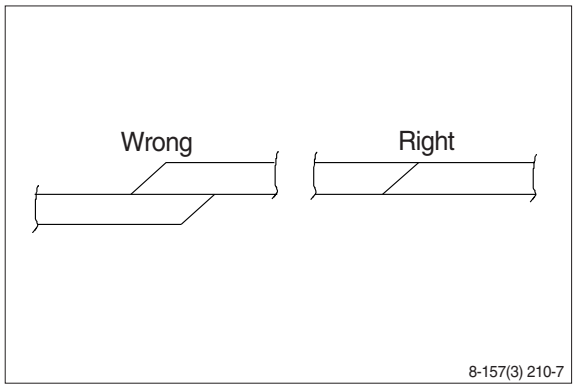
③ Fit snap ring (9) to the stop face.



④ Fit rod seal (5) and buffer ring (7) to corresponding grooves, in that order.

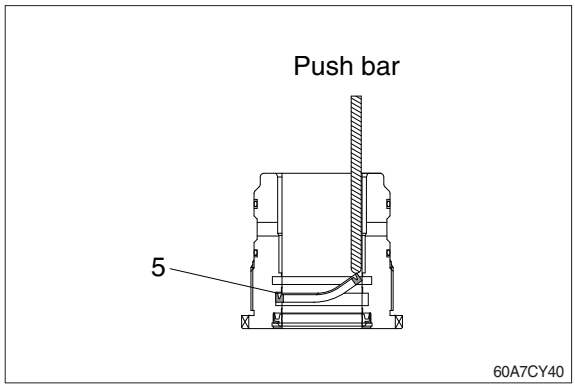
※ Coat each packing with hydraulic oil before fitting it.

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



※ Rod seal (5) has its own fitting direction. Therefore, confirm it before fitting them.

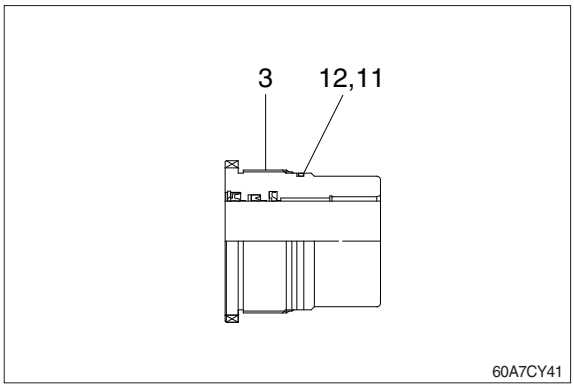
※ Fitting rod seal (5) upside down may damage its lip. Therefore check the correct direction that is shown in fig.



⑤ Fit back up ring (12) to gland (3).

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

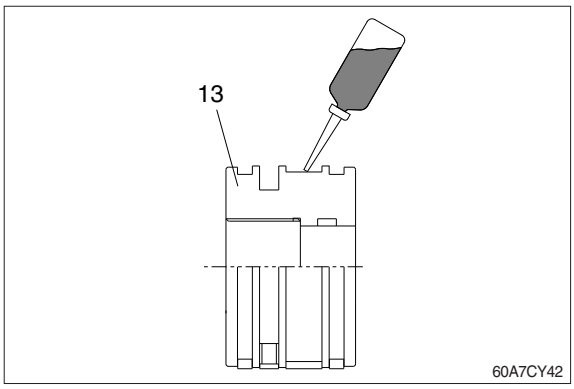
⑥ Fit O-ring (11) to gland (3).



(2) Assemble piston assembly

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

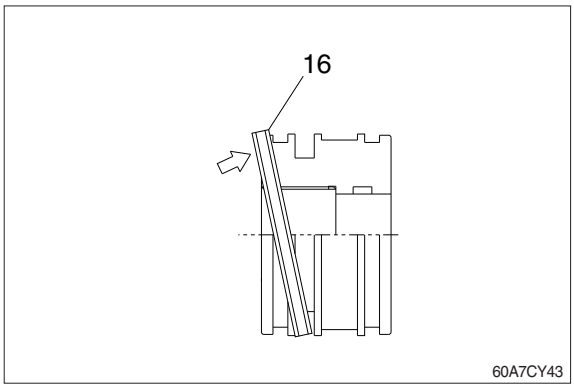
① Coat the outer face of piston (13) with hydraulic oil.



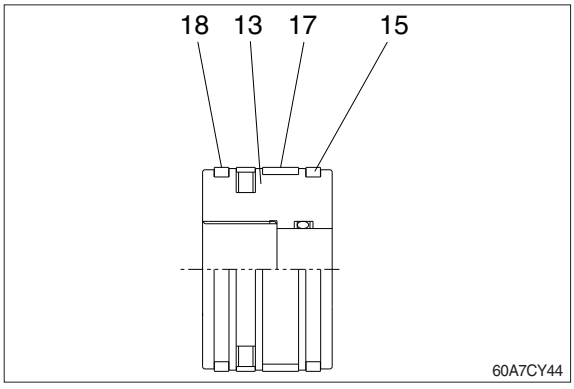
② Fit piston seal (16) to piston.

※ Put the piston seal in the warm water of 60~100˚C for more than 5 minutes.

※ After assembling the piston seal, press its outer diameter to fit in.



③ Fit wear ring (17) and dust ring (18) to piston (13).

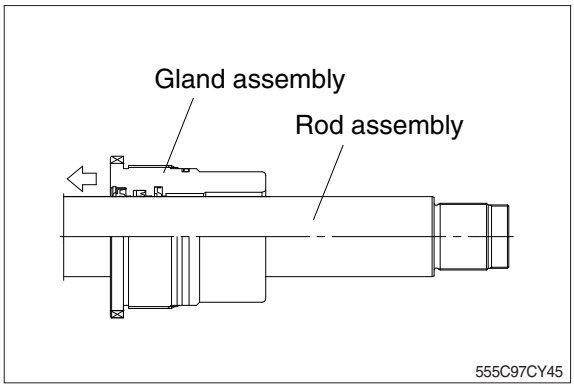


(3) Install piston and cylinder head

① Fix the rod assembly to the work bench.

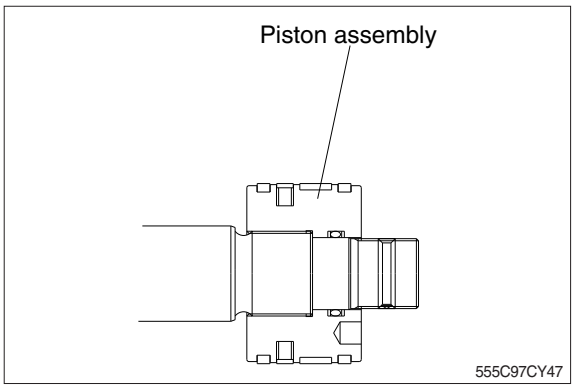
② Apply hydraulic oil to the outer surface of rod assembly, the inner surface of piston and cylinder head.

③ Insert gland assembly to rod assembly.



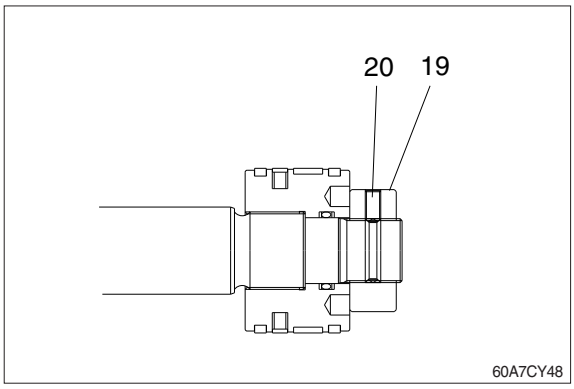
⑤ Fit piston assembly to rod assembly.

· Tightening torque : refer to page 7-144.



⑥ Fit lock nut (19) and tighten the set screw (20).

· Tightening torque : refer to page 7-144.



(4) Overall assemble

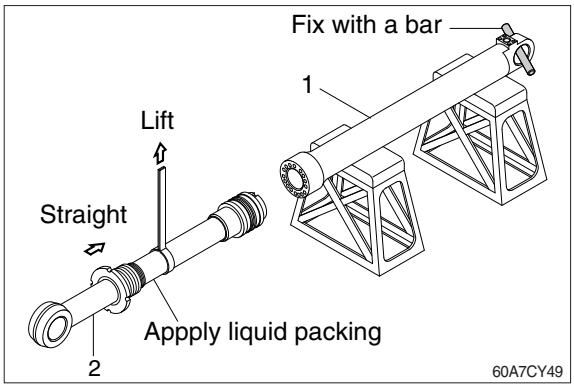
① Place a V-block on a rigid work bench. Mount the tube assembly (1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.

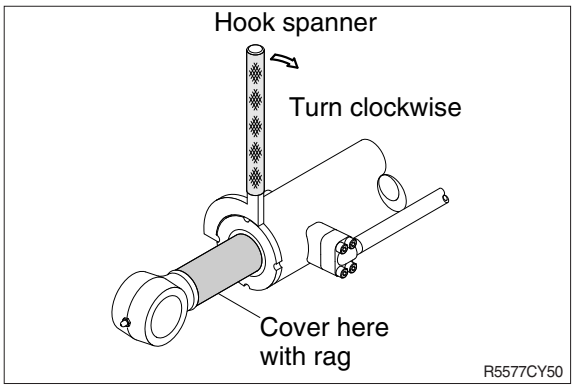
② Insert the rod assembly (2) in to the tube assembly, while lifting and moving the rod assembly with a crane.

※ 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. TRACK LINK

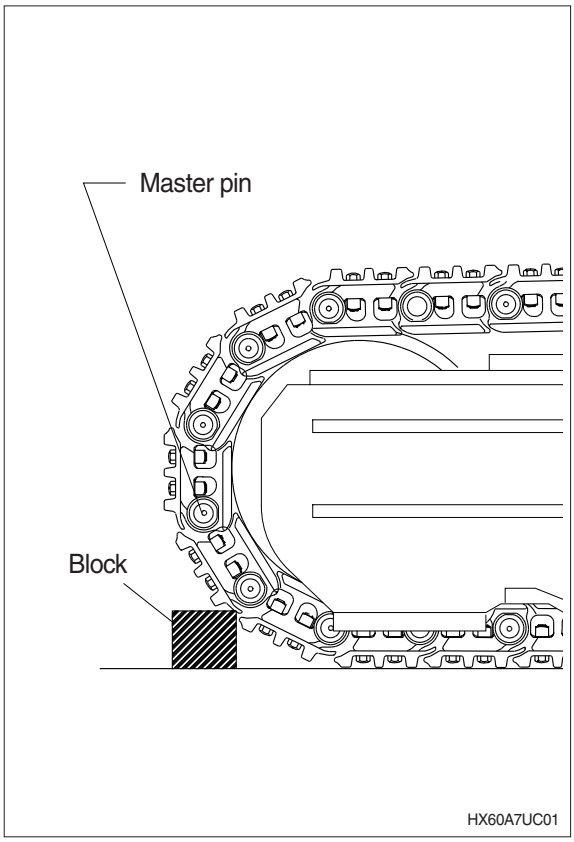
1) REMOVAL

(1) Move track link until master pin is over front idler in the position put wooden block as shown.

(2) Loosen tension of the track link.

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

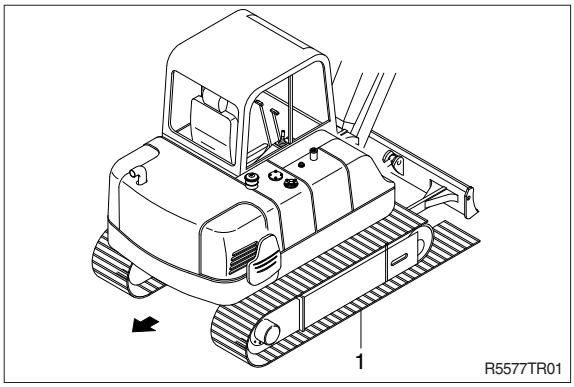
(3) Push out master pin by using a suitable tool.



(4) Move the machine slowly in reverse, and lay out track link assembly (1).

※ Jack up the machine and put wooden block under the machine.

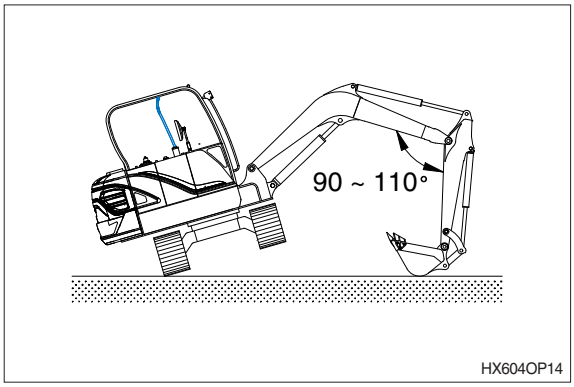
※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



2) INSTALL

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

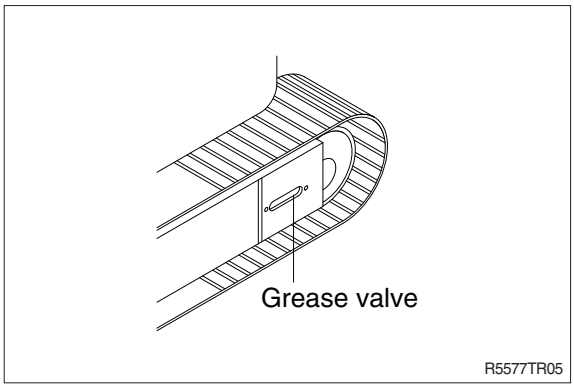
※ Adjust the tension of the track link.



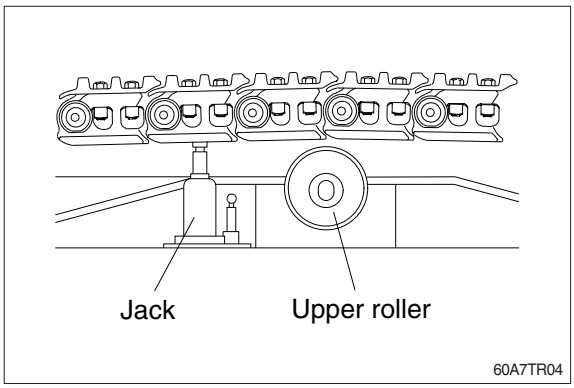
2. UPPER ROLLER

1) REMOVAL

(1) Loosen tension of the track link.

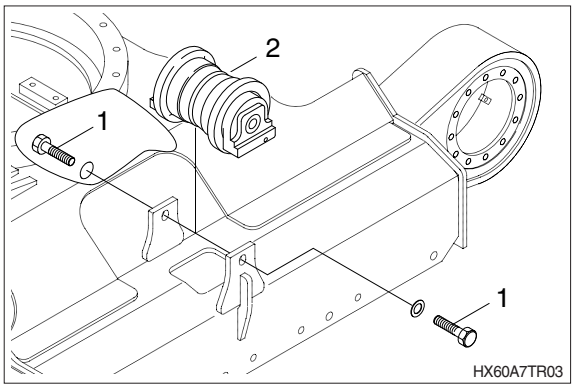


(2) Jack up the track link height enough to permit upper roller removal.



(3) Remove bolt (1) at both side.

(4) Remove upper roller (2).
- Weight : 11 kg (24.3 lb)
- Tightening torque : 41.3 ± 4.0 kgf · m (299 ± 28.9 lbf · ft)



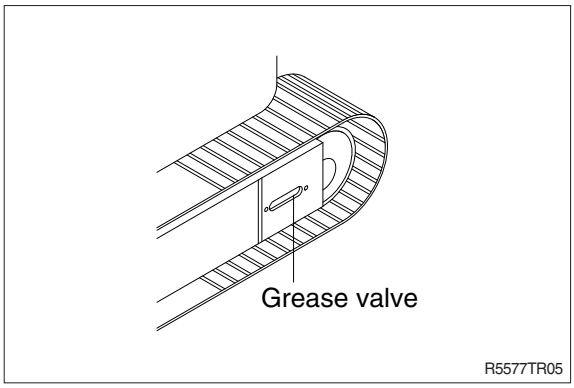
2) INSTALL

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

3. LOWER ROLLER

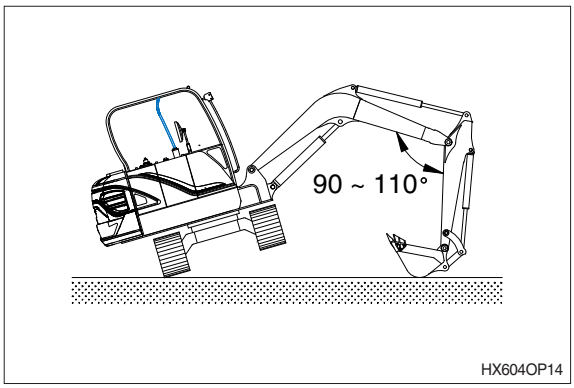
1) REMOVAL

(1) Loosen tension of the track link.



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

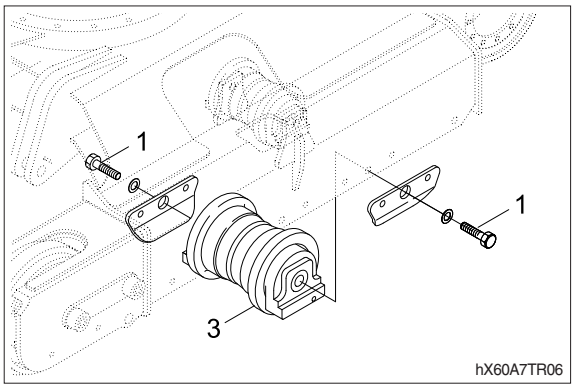
※ After jack up the machine, set a block under the unit.



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

· Weight : 11.2 kg (24.7 lb)

· Tightening torque : 41.3 ± 4.0 kgf · m (299 ± 28.9 lbf · ft)



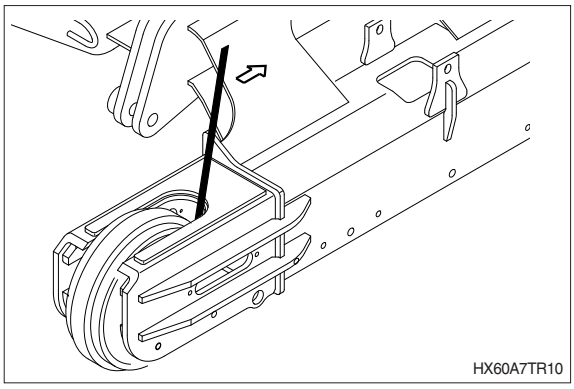
2) INSTALL

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

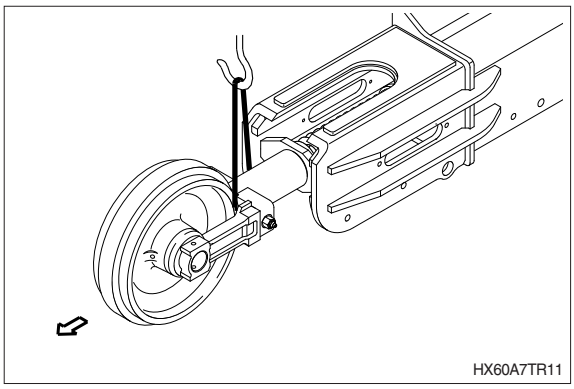
4. IDLER AND RECOIL SPRING

1) REMOVAL

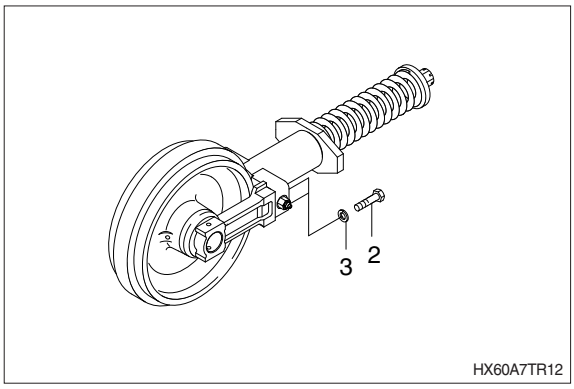
(1) Remove the track link.
For detail, see removal of track link.


HX60A7TR10

(2) Sling the recoil spring (1) and pull out idler and recoil spring assembly from track frame, using a pry.
· Weight : 73.5 kg (162 lb)


HX60A7TR11

(3) Remove the bolts (2), spring washers (3) and separate idler from recoil spring.
· Tightening torque : 12.8 ± 3.0 kgf · m
(92.6 ± 21.7 lbf · ft)

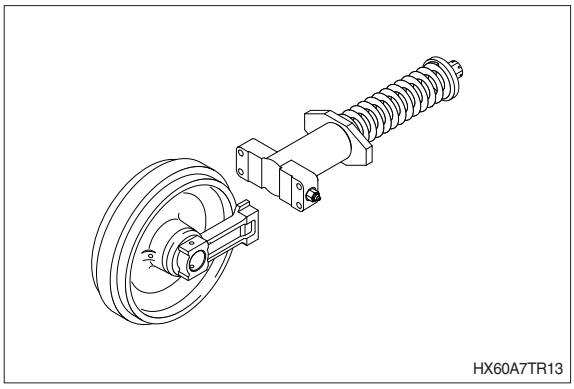


HX60A7TR12

2) INSTALL

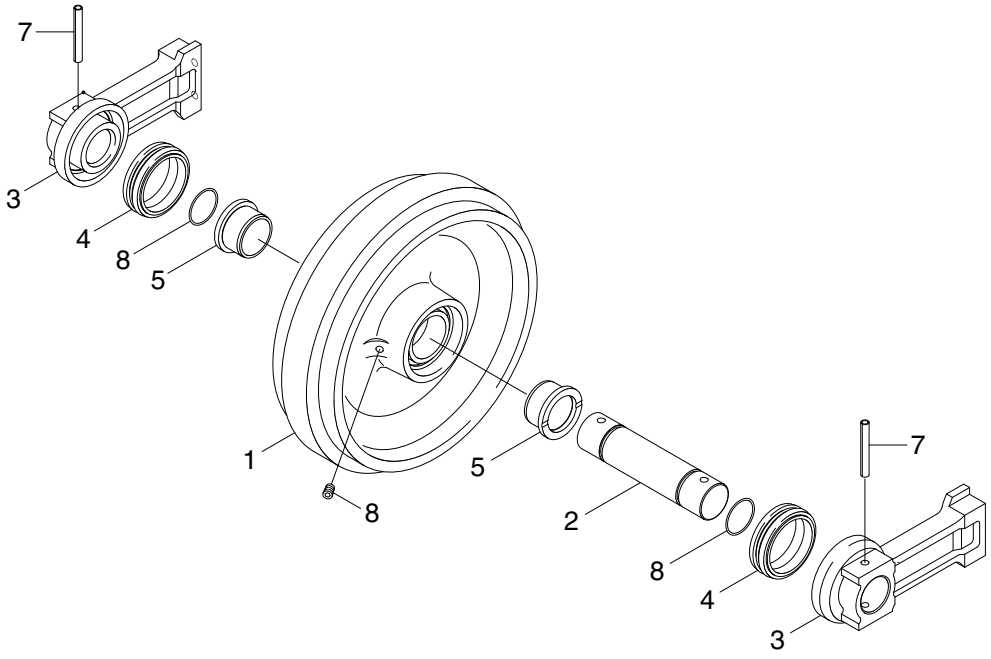
(1) Carry out installation in the reverse order to removal.

※ Make sure that the boss on the end face of the recoil cylinder rod is in the hole of the track frame.


HX60A7TR13

3) DISASSEMBLY AND ASSEMBLY OF IDLER

(1) Structure



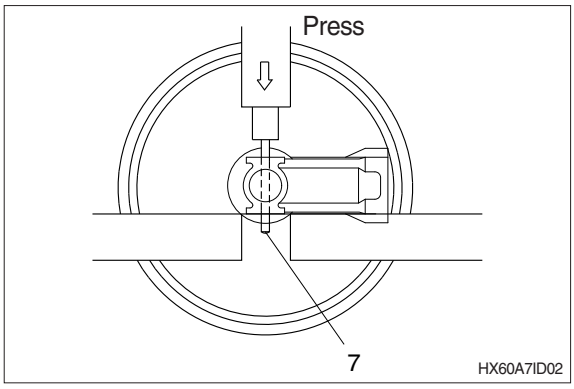
HX60A7ID01

1	Shell	4	Seal set	7	Spring pin
2	Shaft	5	Bushing	8	O-ring
3	Bracket	6	Piug		

(2) Disassembly

① Remove plug and drain oil.

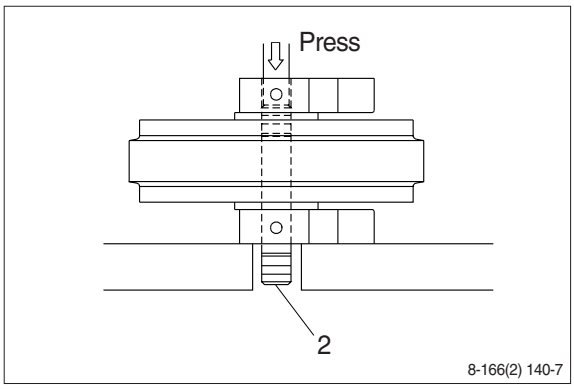
② Draw out the spring pin (7), using a press.



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

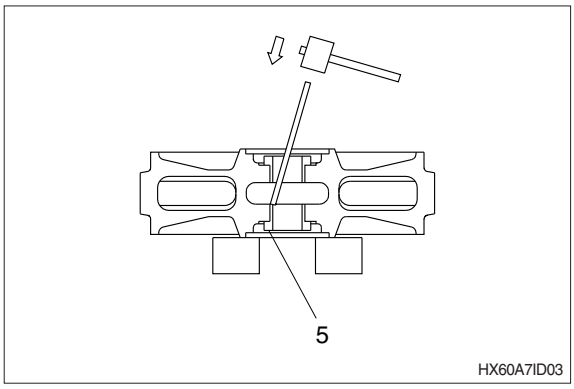
④ Remove seal set (4) from idler (1) and bracket (3).

⑤ Remove O-ring (8) from shaft.



⑥ Remove the bushing (5) from idler, using a special tool.

※ Only remove bushing if replacement is necessity.

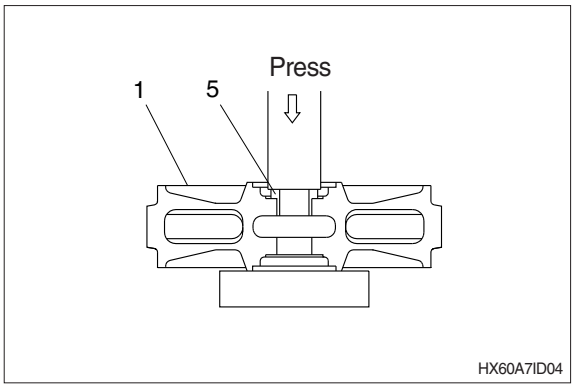


(3) **Assembly**

※ Before assembly, clean the parts.

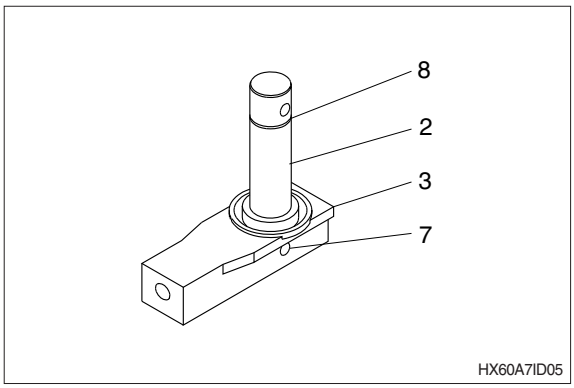
※ Coat the sliding surfaces of all parts with oil.

① Cool up bushing (5) fully by some dry ice and press it into shell (1).
Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.

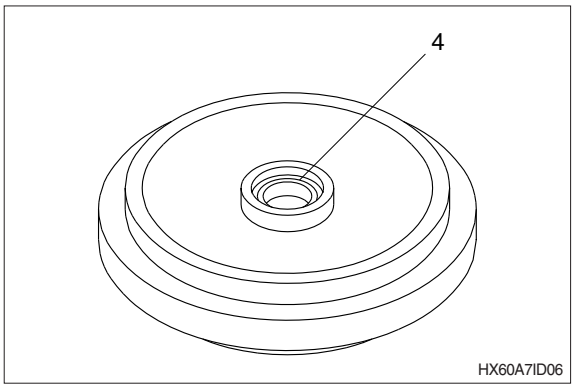


② Coat O-ring (8) with grease thinly, and install it to shaft (2).

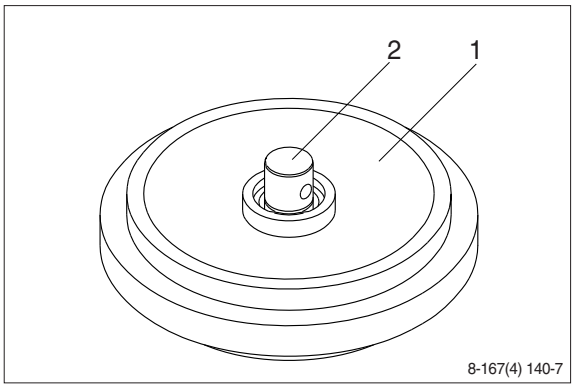
③ Insert shaft (2) into bracket (3) and drive in the spring pin (7).



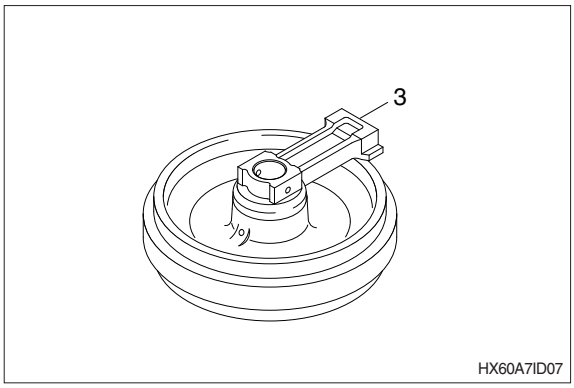
④ Install seal set (4) to shell (1) and bracket (3).



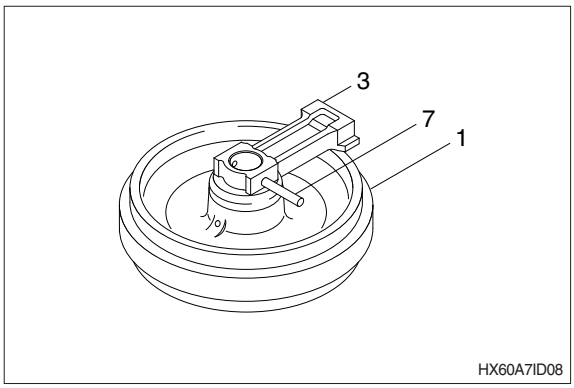
⑤ Install shaft (2) to shell (1).



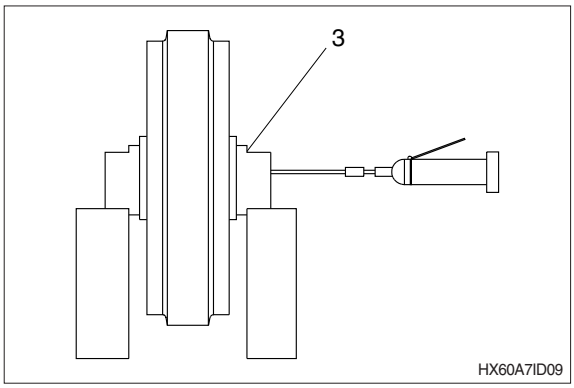
⑥ Install bracket (3) attached with seal set (4).



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

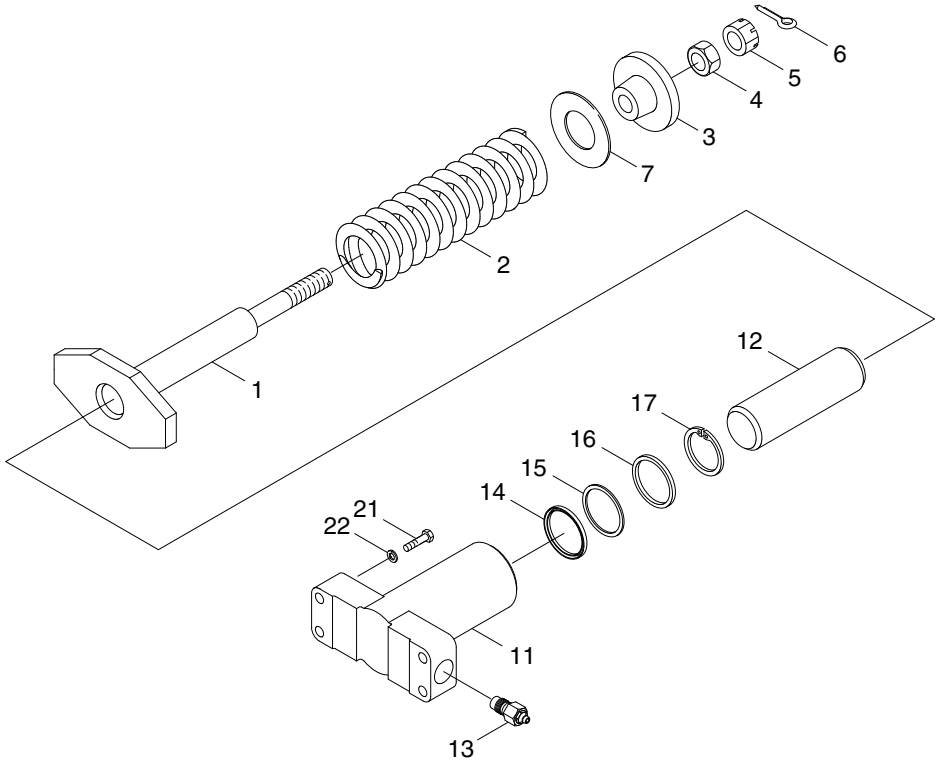


⑧ Lay bracket (3) on its side.
Supply engine oil to the specified level, and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure



HX60ARS01

1	Rod	7	Spacer	16	Dust seal
2	Spring	11	Bracket	17	Retaining ring
3	Lock washer	12	Piston	21	Hex bolt
4	Hex nut	13	Grease valve	22	Spring washer
5	Slotted hex nut	14	U-packing		
6	Split pin	15	Back up ring		

(2) Disassembly

① Apply pressure on spring (3) with a press. The spring is under a large installed load.

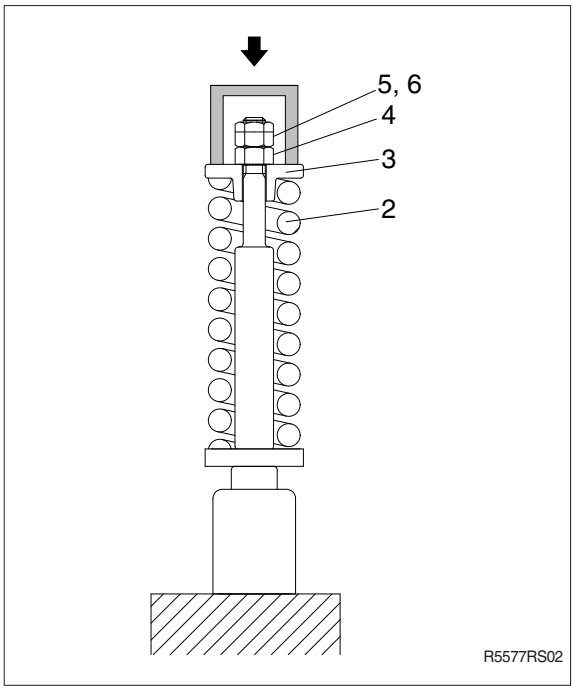
※ This is dangerous, so be sure to set properly.

· Spring set load : 3900 kg (8600 lb)

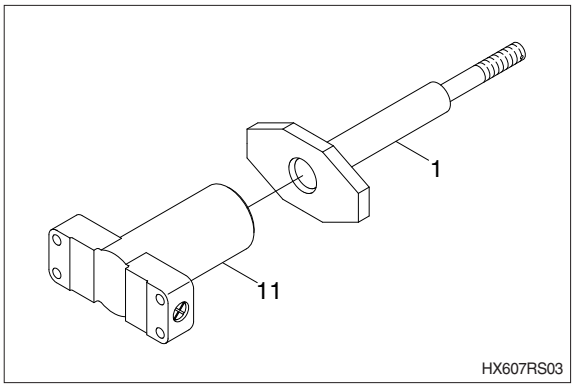
② Remove split pin (6) and slotted nut (5).

③ Remove lock nut (4).
Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.

④ Lighten the press load slowly and remove lock washer (3) and spring (2).

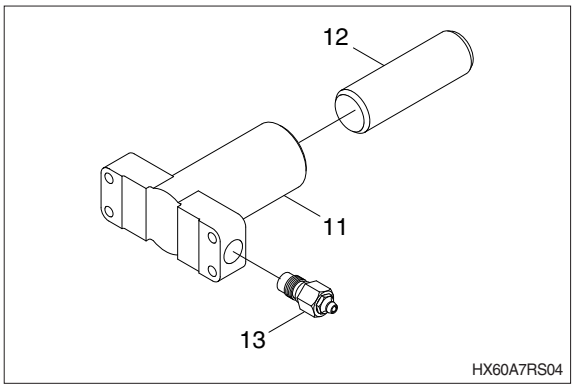


⑤ Remove rod (1) from bracket (11).

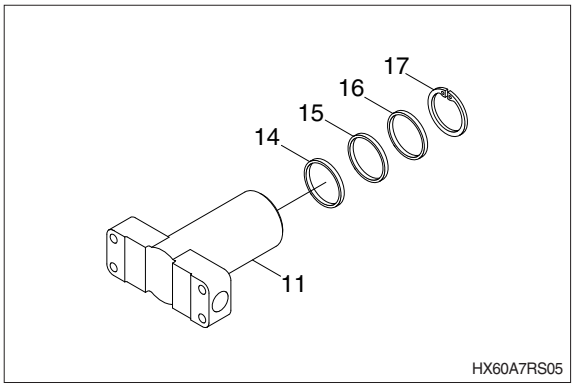


⑥ Remove grease valve (13) from bracket (11).

⑦ Remove piston (12) from bracket (11).



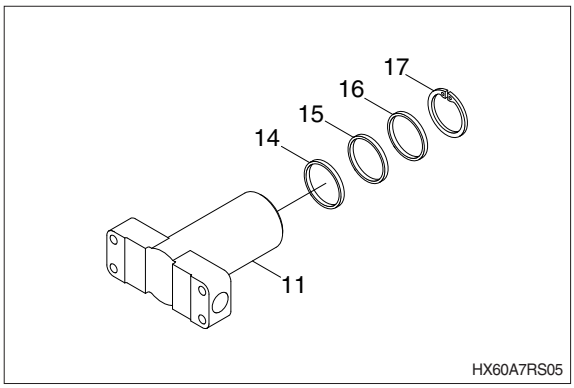
⑧ Remove retaining ring (17), dust seal (16), back up ring (15) and dust seal (14).



(3) Assembly

① Install U-packing (14), back up ring (15), dust seal (16), and retaining ring (17) to bracket (11).

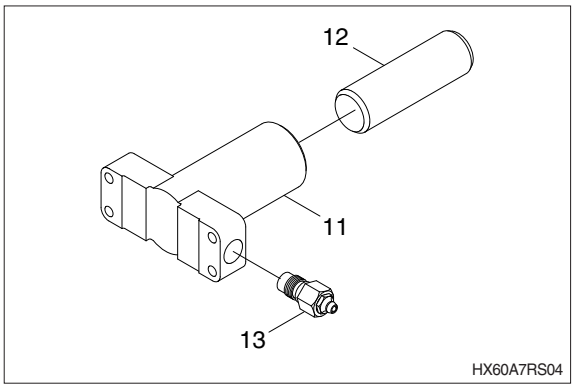
※ When installing U-packing (14), dust seal (16) take full care so as not to damage the lip.



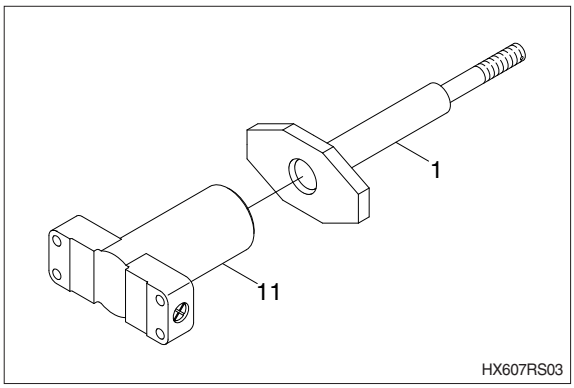
② Pour grease into bracket (11), then push in piston (12) by hand.
After take grease out of grease valve mounting hole, let air out.

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

③ Fit grease valve (13) to bracket (11).
· Tightening torque : 8±1.0 kg · m
(57.9±7.2 lb · ft)



④ Install rod (1) to bracket (11).



⑤ Install spring (2) and lock washer (3) .

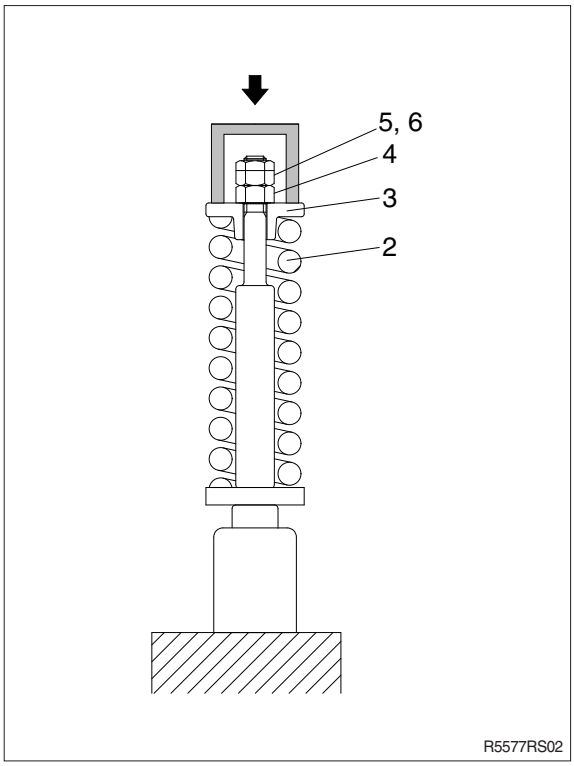
⑥ Apply pressure to spring (2) with a press and tighten nut (4).

※ Apply sealant before assembling.

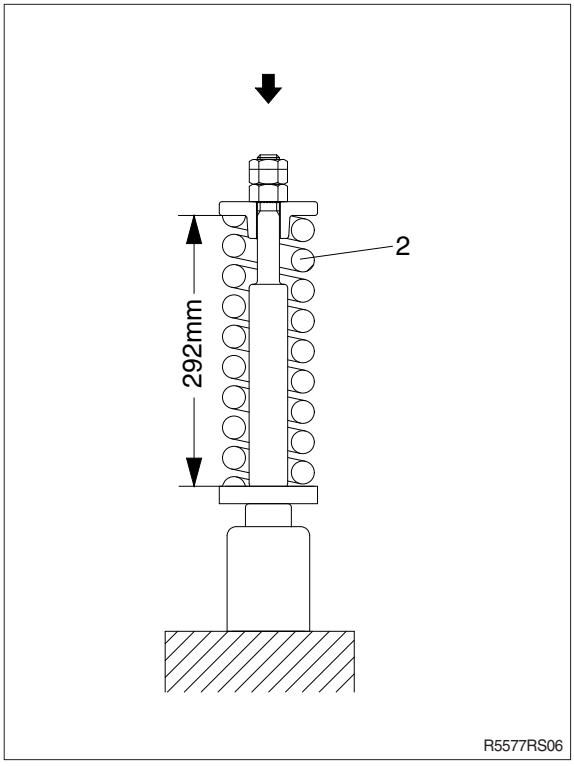
※ During the operation, pay attention specially to prevent the press from slipping out.

· Tightening torque : 30±3 kgf · m
(217±21 lbf · ft)

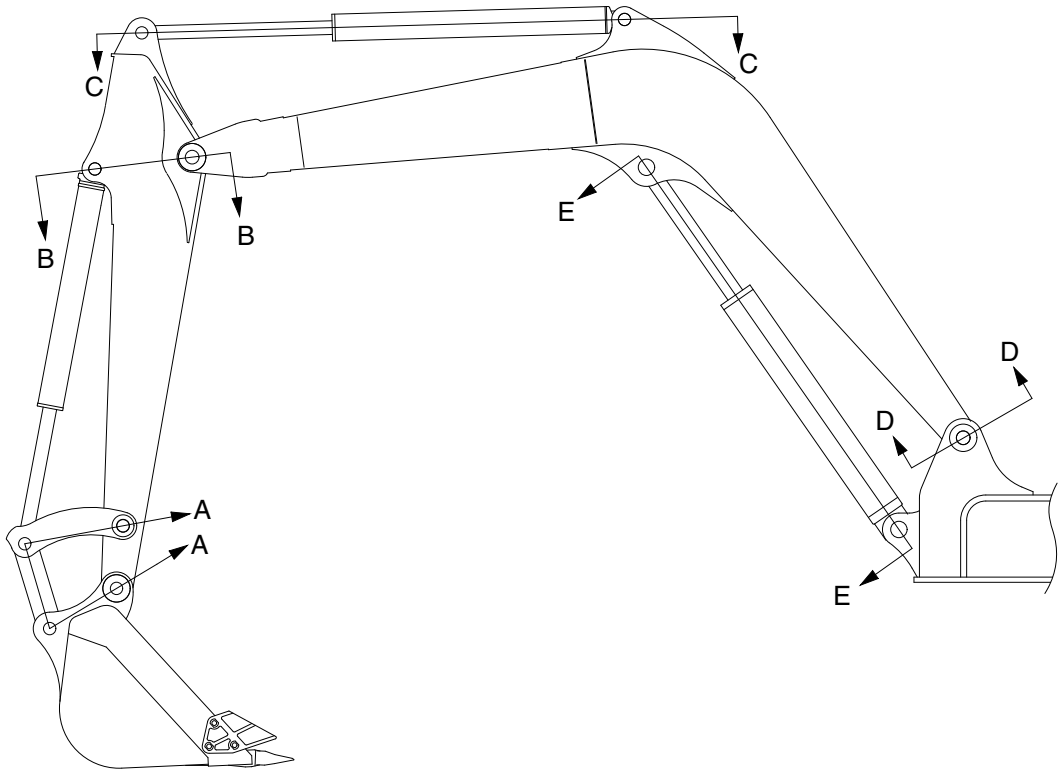
⑦ Tighten slotted nut (5) and insert split pin (6).

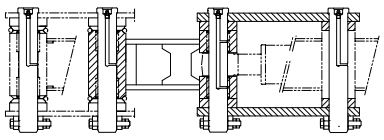


⑧ Lighten the press load and confirm the set length of spring (2).

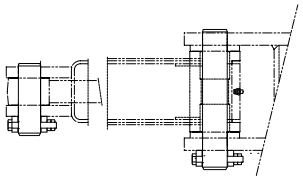


1. STRUCTURE

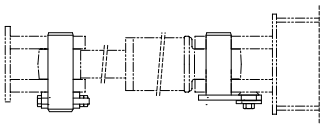




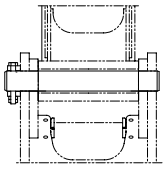
SECTION A-A



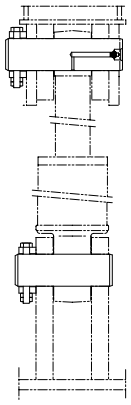
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

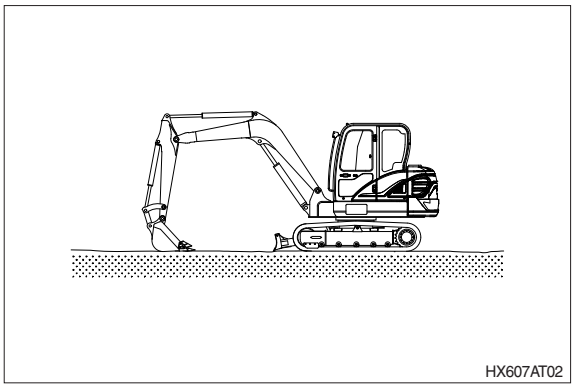
R5577AT01

2. REMOVAL AND INSTALL

1) BUCKET ASSEMBLY

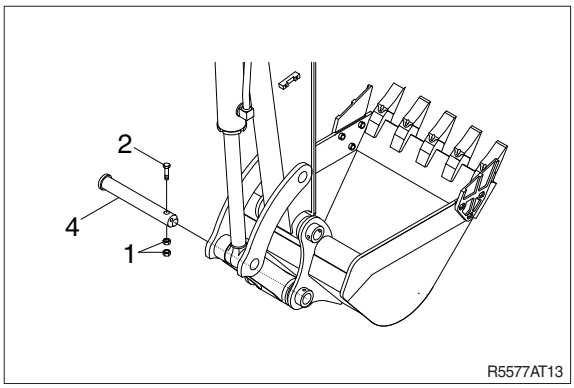
(1) Removal

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



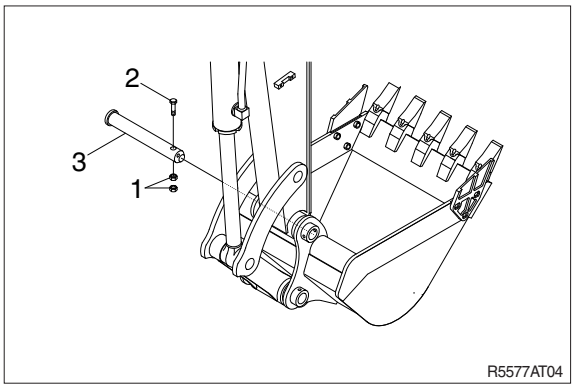
② Remove nut (1), bolt (2) and draw out the pin (4).

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



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

· Weight (0.18 m^3) : 163 kg (360 lb)
· Tightening torque : 12.8±3.0 kgf·m
(92.6±21.7 lbf·ft)

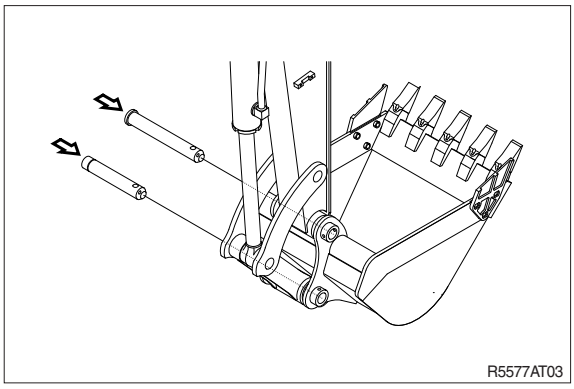


(2) Install

① Carry out installation in the reverse order to removal.

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

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



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.

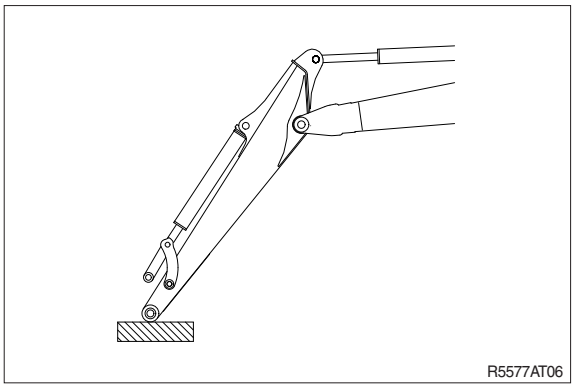
③ Sling arm cylinder assembly, remove spring, pin stopper and pull out pin.

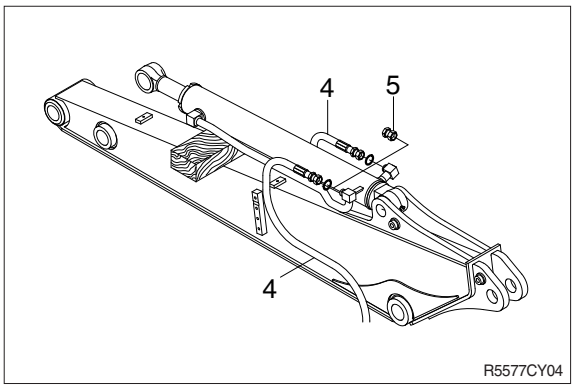
※ Tie the rod with wire to prevent it from coming out.

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.
- Weight (1.6 m) : 130 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



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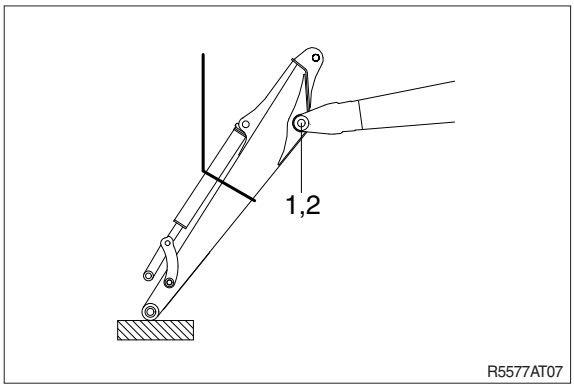


R5577AT07

(2) Install

① Carry out installation in the reverse order to removal.

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

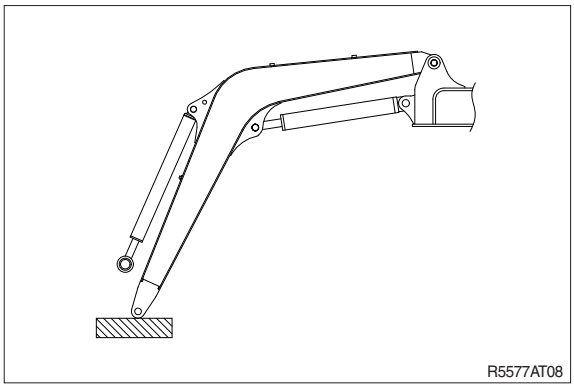
※ Bleed the air from the cylinder.

3) BOOM ASSEMBLY

(1) Removal

① Remove arm and bucket assembly.

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

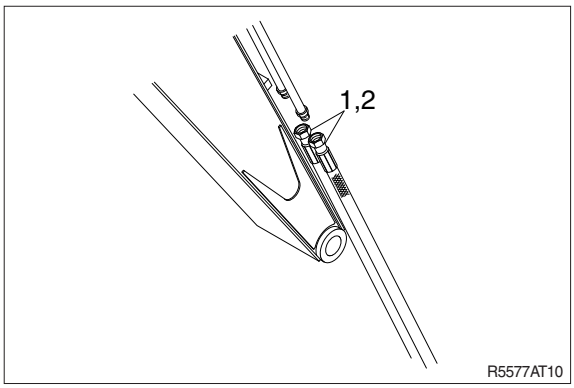


③ Disconnect head lamp wiring.

④ Disconnect bucket cylinder hose (2) and arm cylinder hos e(1).

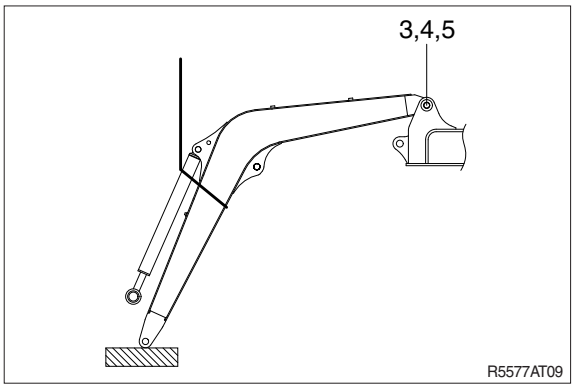
※ When the hose are disconnected, oil may spurt out.

⑤ Sling boom assembly (3).



⑥ Remove bolt (3), washer (4) and pull out the pin (5) then remove boom assembly.
- Weight (3.0 m) : 248 kg (550 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.



(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.