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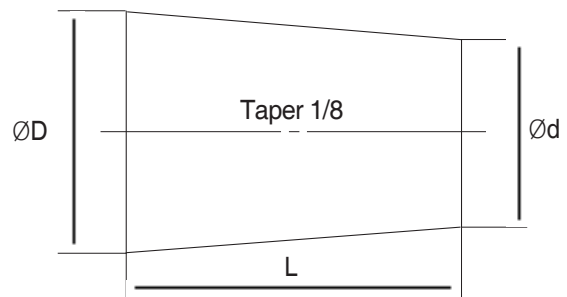
SECTION 8 DISASSEMBLY AND ASSEMBLY

GROUP 1 PRECAUTIONS

1. REMOVAL WORK

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

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



2. INSTALL WORK

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

3. COMPLETING WORK

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

GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

No.	Descriptions		Bolt size	Torque	
				kgf·m	lbfft
1	Engine	Engine mounting bolt (engine-bracket)	M14 × 2.0	10 ± 1.0	72.3 ± 7.2
2		Engine mounting bolt (bracket-frame)	M22 × 2.5	90 ± 7.0	651 ± 51
3		Radiator mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
4		Coupling mounting socket bolt	M20 × 2.5	46.5 ±2.5	336 ±18.1
5		Fuel tank mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
6	Hydraulic system	Main pump housing mounting bolt	M10 × 1.5	6.9 ± 0.3	49.9 ± 2.2
7		Main pump mounting socket bolt	M20 × 2.5	42 ± 4.5	304 ± 32.5
8		Main control valve mounting nut	M12 × 1.75	12.3 ± 1.3	89.0 ± 9.4
9		Hydraulic oil tank mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
10		Turning joint mounting bolt, nut	M12 × 1.75	12.3 ± 1.3	89.0 ± 9.4
11	Power train system	Swing motor mounting bolt	M20 × 2.5	58.4 ± 6.4	422 ± 46.3
12		Swing bearing upper part mounting bolt	M24 × 3.0	97.8 ± 10	707 ± 72.3
13		Swing bearing lower part mounting bolt	M24 × 3.0	97.8 ± 10	707 ± 72.3
14		Travel motor mounting bolt	M24 × 3.0	84 ± 8.0	608 ± 57.8
15		Sprocket mounting bolt	M20 × 2.5	57.9 ± 6.0	419 ± 43.4
16	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7± 3.0	215 ± 21.7
17		Track roller mounting bolt	M20 × 2.5	57.9 ± 6.0	419 ± 43.4
18		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
19		Track shoe mounting bolt, nut	M20 × 1.5	115 ± 5.0	831 ± 36
20		Track guard mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
21	Others	Counterweight mounting bolt	M36 × 3.0	337 ± 33	2440 ± 72.3
22		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
23		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

※ 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	
	kgf·m	lbf·ft	kgf·m	lbf·ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60.0
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 × 2.0	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	
	kgf·m	lbf·ft	kgf·m	lbf·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	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

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	130.2
1-7/16-12	41	21	151.9
1-11/16-12	50	35	253.2

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	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

GROUP 3 PUMP DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

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

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

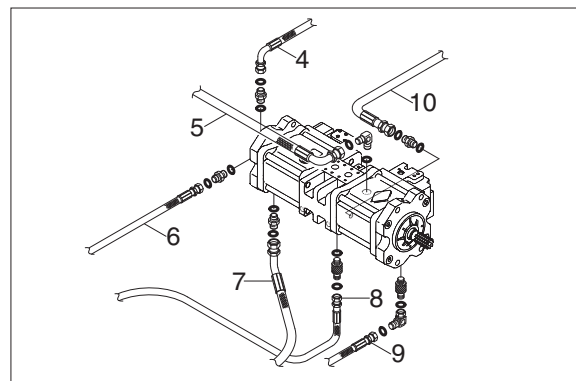
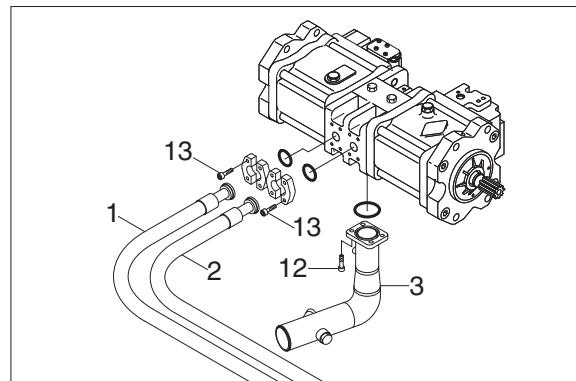
- (4) Remove the wirings for the pressure sensors and so on.
- (5) Loosen the drain plug under the hydraulic tank and drain the oil from the hydraulic tank.
 - Hydraulic tank quantity : 190 ℓ
- (6) Remove bolts (13) and disconnect pipe (1,2).
- (7) Disconnect pilot line hoses (4, 5, 6, 7, 8, 9, 10).

- (8) Remove bolts(12) and disconnect pump suction tube (3).

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

- (9) Sling the pump assembly and remove the pump mounting bolts.
 - Weight : 140 kg (310 lb)

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

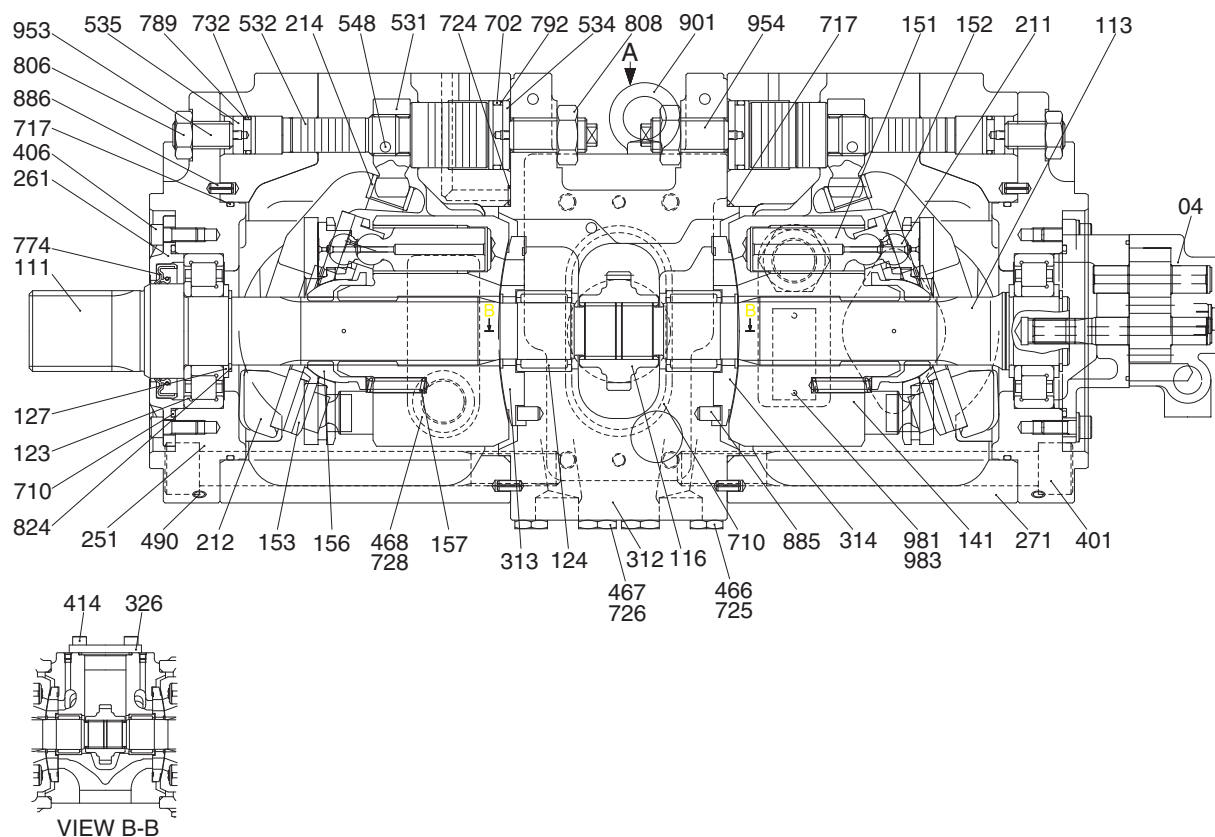


2) INSTALL

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

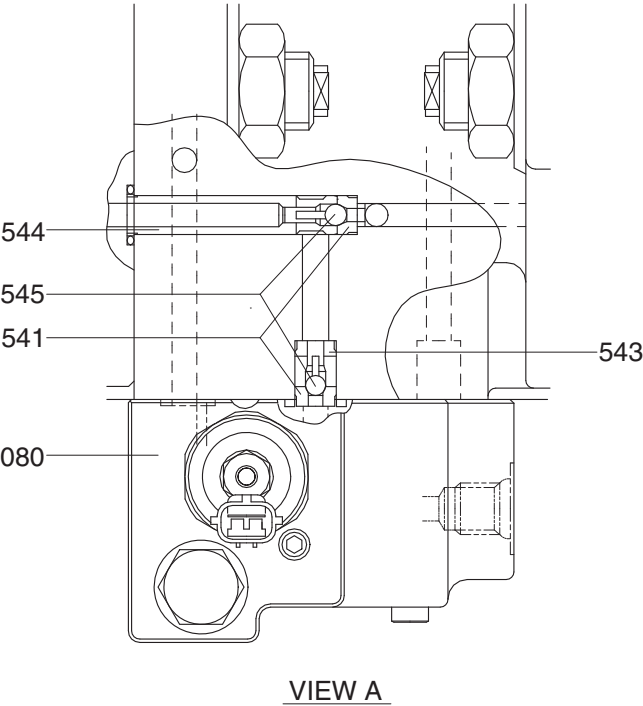
2. MAIN PUMP (1/2)

1) STRUCTURE



04	Gear pump	271	Pump casing	710	O-ring
111	Drive shaft (F)	312	Valve block	717	O-ring
113	Drive shaft (R)	313	Valve plate (R)	724	O-ring
116	Gear	314	Valve plate (L)	725	O-ring
123	Roller bearing	326	Cover	728	O-ring
124	Needle bearing	401	Hexagon socket bolt	732	O-ring
127	Bearing spacer	406	Hexagon socket bolt	774	Oil seal
141	Cylinder block	414	Hexagon socket bol	789	Back up ring
151	Piston	466	VP plug	792	Back up ring
152	Shoe	467	VP plug	806	Hexagon head nut
153	Set plate	468	VP plug	808	Hexagon head nut
156	Spherical bushing	490	VP plug	824	Snap ring
157	Cylinder spring	531	Tilting pin	885	Pin
211	Shoe plate	532	Servo piston	886	Spring pin
212	Swash plate	534	Stopper (L)	901	Eye bolt
214	Bushing	535	Stopper (S)	953	Set screw
251	Swash plate support	548	Feedback pin	954	Set screw
261	Seal cover (F)	702	O-ring		

MAIN PUMP (2/2)

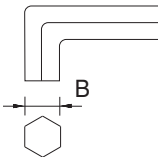



- | | | | | | |
|-----|-----------------------------|-----|-----------|-----|------------|
| 080 | Proportional reducing valve | 543 | Stopper 1 | 545 | Steel ball |
| 541 | Seat | 544 | Stopper 2 | | |

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

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

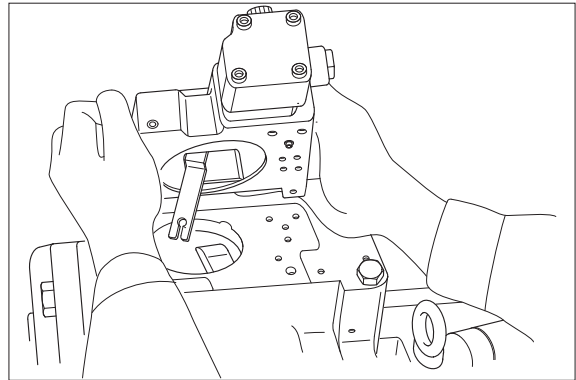
Tool name & size		Part name			
<div>Allen wrench</div> 	B	Hexagon socket head bolt	PT plug (PT thread)	PO plug (PF thread)	Hexagon socket head setscrew
	4	M 5	BP-1/16	-	M 8
	5	M 6	BP1/ 8	-	M10
	6	M 8	BP-1/ 4	PO-1/4	M12, M14
	8	M10	BP-3/ 8	PO-3/8	M16, M18
	17	M20, M22	BP-1	PO-1, 1 1/4, 1 1/2	-
<div>Double ring spanner, socket wrench, double (single) open end spanner</div> 	-	Hexagon head bolt	Hexagon head bolt	VP plug (PF thread)	
	19	M12	M12	VP-1/4	
	24	M16	M16	-	
	27	M18	M18	VP-1/2	
	30	M20	M20	-	
	36	-	-	VP-3/4	
Adjustable angle wrench		Medium size, 1 set			
Screw driver		Minus type screw driver, Medium size, 2 sets			
Hammer		Plastic hammer, 1 set			
Pliers		For snap ring, TSR-160			
Steel bar		Steel bar of key material approx. 10×8×200			
Torque wrench		Capable of tightening with the specified torques			

(2) Tightening torque

Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt (material : SCM435)	M 5	0.7	5.1	0.16	4
	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M10	5.8	42.0	0.31	8
	M12	10.0	72.3	0.39	10
	M14	16.0	115.7	0.47	12
	M16	24.0	173.6	0.55	14
	M18	34.0	245.9	0.55	14
	M20	44.0	318.3	0.67	17
PT plug (material : S45C) ※ Wind a seal tape 1 1/2 to 2 turns round the plug	PT 1/16	0.7	5.1	0.16	4
	PT 1/ 8	1.05	7.59	0.20	5
	PT 1/ 4	1.75	12.66	0.24	6
	PT 3/ 8	3.5	25.3	0.31	8
	PT 1/ 2	5.0	36.2	0.39	10
PF plug (material : S45C)	PF 1/ 4	3.0	21.7	0.24	6
	PF 1/ 2	10.0	72.3	0.39	10
	PF 3/ 4	15.0	108.5	0.55	14
	PF 1	19.0	137.4	0.67	17
	PF 1 1/4	27.0	195.3	0.67	17
	PF 1 1/2	28.0	202.5	0.67	17

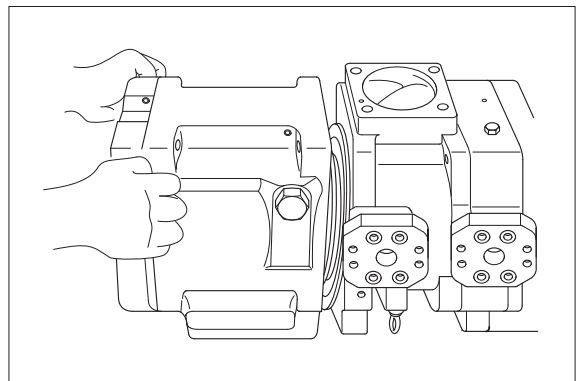
3) DISASSEMBLY

- (1) Select place suitable to disassembling.
 - ※ Select clean place.
 - ※ Spread rubber sheet, cloth or so on, on overhaul workbench top to prevent parts from being damaged.
- (2) Remove dust, rust, etc, from pump surfaces with cleaning oil or so on.
- (3) Remove drain port plug (468) and let oil out of pump casing. (front and rear pump).
- (4) Remove hexagon socket head bolts (412, 413) and remove regulator.
Remove hexagon socket head bolts (416) and remove gear pump.



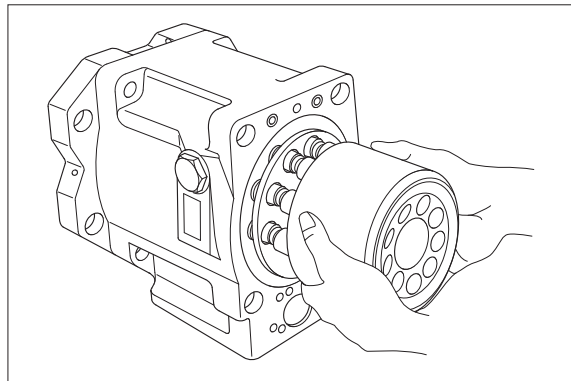
- (5) Loosen hexagon socket head bolts (401) fixing swash plate support (251), pump casing (271) and valve block (312).

- (6) Place pump horizontally on workbench with its regulator-fitting surface down, and separate pump casing (271) from valve block (312).
 - ※ Before bringing this surface down, spread rubber sheet on workbench without failing to prevent this surface from being damaged.



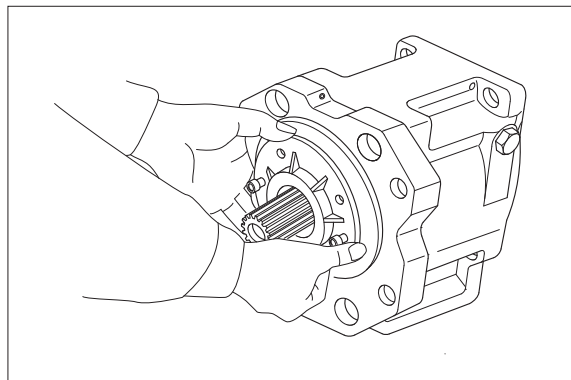
- (7) Pull cylinder (141) out of pump casing (271) straightly over drive shaft (111). Pull out also pistons (151), set plate (153), spherical bush (156) and cylinder springs (157) simultaneously.

※ Take care not to damage sliding surfaces of cylinder, spherical bushing, shoes, swash plate, etc.



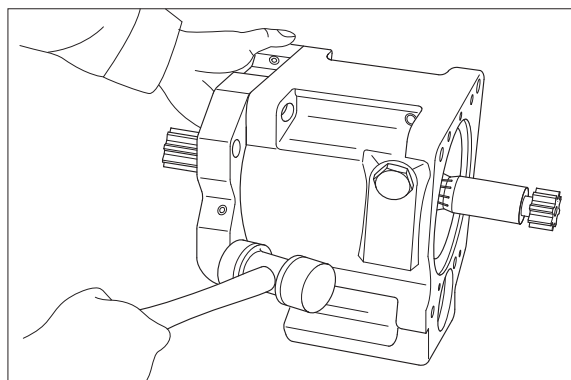
- (8) Remove hexagon socket head bolts (406) and then seal cover (F) (261). Fit bolt into pulling out tapped hole of seal cover (F), and cover can be removed easily.

※ Since oil seal is fitted on seal cover (F), take care not to damage it when removing cover.

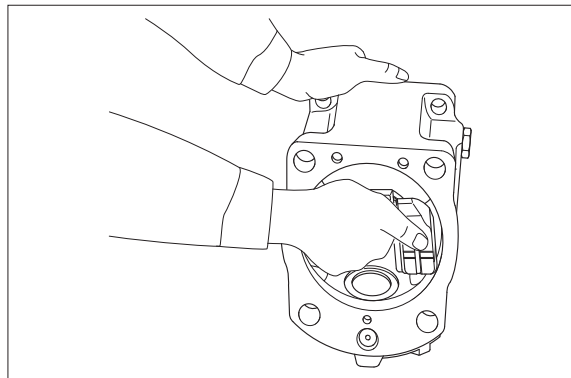


- (9) Remove hexagon socket head bolts (408) and then seal cover (R, 262). In case of fitting a gear pump, first, remove gear pump.

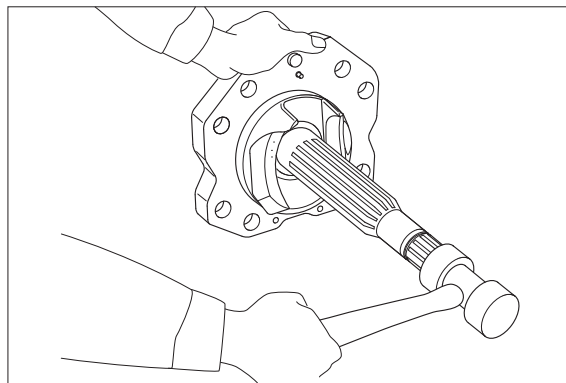
- (10) Tapping lightly fitting flange section of swash plate support (251) on its pump casing side, separate swash plate support from pump casing.



- (11) Remove shoe plate (211) and swash plate (212) from pump casing (271).

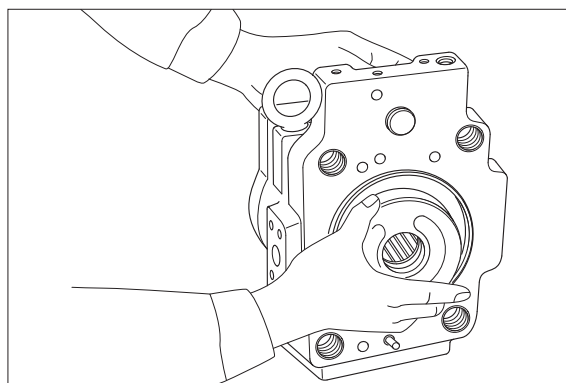


- (12) Tapping lightly shaft's end of drive shafts (111, 113) with plastic hammer, take out drive shafts from swash plate supports.



- (13) Remove valve plates (313, 314) from valve block (312).

※ These may be removed in work 6.



- (14) If necessary, remove stopper (L, 534), stopper (S, 535), servo piston (532) and tilting pin (531) from pump casing (271), and needle bearing (124) and gear (116) from valve block (312).

- ※ In removing tilting pin, use a protector to prevent pin head from being damaged.
- ※ Since loctite is applied to fitting areas of tilting pin and servo piston, take care not to damage servo piston.
- ※ Do not remove needle bearing as far as possible, except when it is considered to be out of its life span.
- ※ Do not loosen hexagon nuts of valve block and swash plate support.
Once loosened, flow setting will be changed.

4) ASSEMBLY

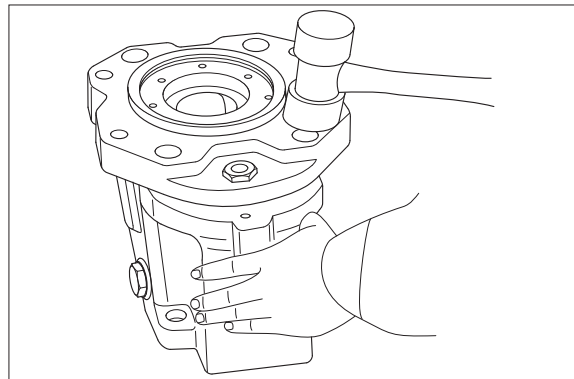
(1) For reassembling reverse the disassembling procedures, paying attention to the following items.

- ① Do not fail to repair the parts damaged during disassembling, and prepare replacement parts in advance.
- ② Clean each part fully with cleaning oil and dry it with compressed air.
- ③ Do not fail to apply clean working oil to sliding sections, bearings, etc. before assembling them.
- ④ In principle, replace seal parts, such as O-rings, oil seals, etc.
- ⑤ For fitting bolts, plug, etc., prepare a torque wrench or so on, and tighten them with torques shown in Section 2-3.
- ⑥ For the double-pump, take care not to mix up parts of the front pump with those of the rear pump.

(2) Fit swash plate support (251) to pump casing (271), tapping the former lightly with a hammer.

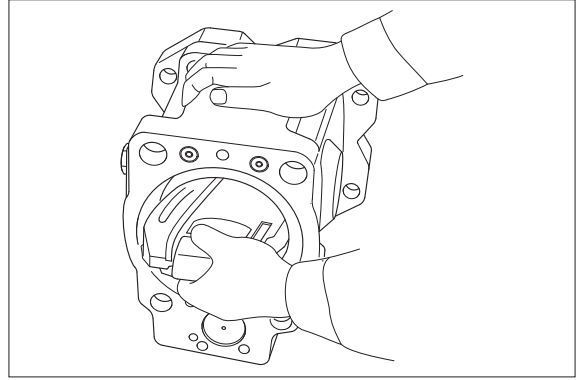
- ※ After servo piston, tilting pin, stopper (L) and stopper (S) are removed, fit them soon to pump casing in advance for reassembling.

In tightening servo piston and tilting pin, use a protector to prevent tilting pin head and feedback pin from being damaged. In addition, apply lock-tight (medium strength) to their threaded sections.



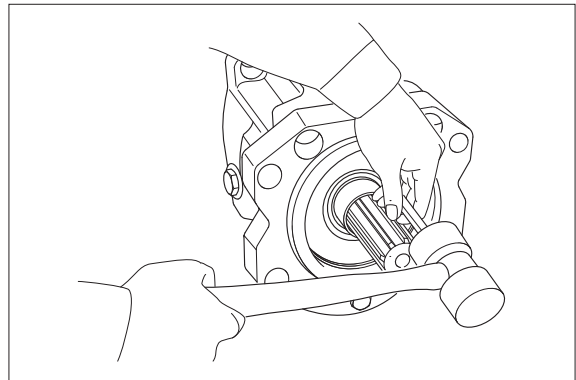
- (3) Place pump casing with its regulator fitting surface down, fit tilting bush of swash plate to tilting pin (531), and fit swash plate (212) to swash plate support (251) correctly.

- ※ Confirm with fingers of both hands that swash plate can be removed smoothly.
- ※ Apply grease to sliding sections of swash plate and swash plate support, and drive shaft can be fitted easily.



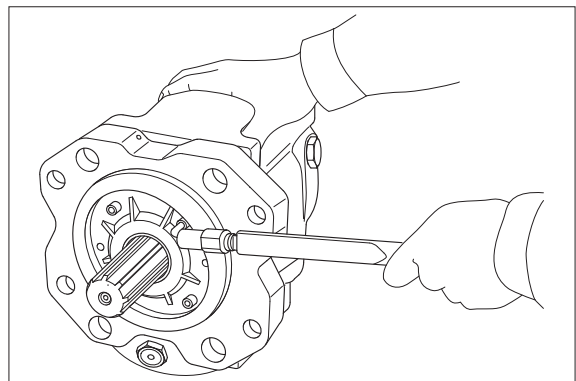
- (4) To swash plate support (251), fit drive shaft (111) set with bearing (123), bearing spacer (127) and snap ring (824).

- ※ Do not tap drive shaft with hammer or so on.
- ※ Assemble them into support, tapping outer race of bearing lightly with plastic hammer.
- ※ Fit them fully, using steel bar or so on.



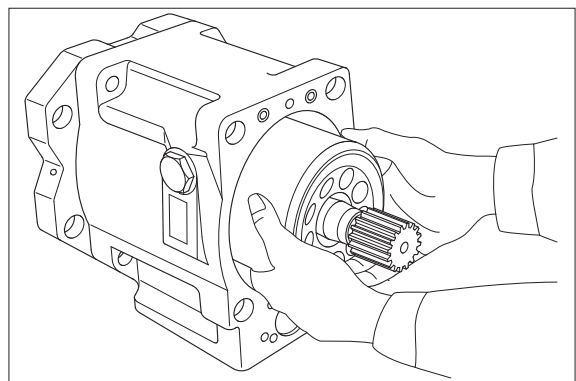
- (5) Assemble seal cover (F, 261) to pump casing (271) and fix it with hexagon socket head bolts (406).

- ※ Apply grease lightly to oil seal in seal cover (F).
- ※ Assemble oil seal, taking full care not to damage it.
- ※ For tandem type pump, fit rear cover (263) and seal cover (262).



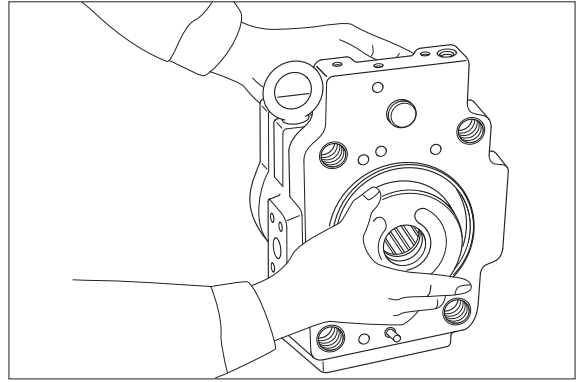
- (6) Assemble piston cylinder subassembly [Cylinder (141), piston subassembly (151, 152), set plate (153), spherical bush (156), spacer (158) and cylinder spring (157).]

Fit spline phases of retainer and cylinder.
Then, insert piston cylinder subassembly into pump casing.



- (7) Fit valve plate (313) to valve block (312), entering pin into pin hole.

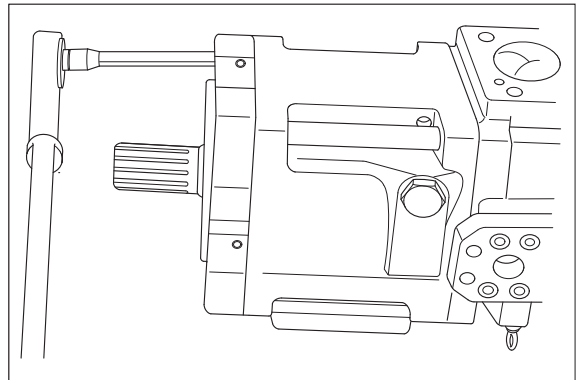
※ Take care not to mistake suction / delivery directions of valve plate.



- (8) Fit valve block (312) to pump casing (271) and tighten hexagon socket head bolts (401).

※ At first assemble this at rear pump side, and this work will be easy.

※ Take care not to mistake direction of valve block.

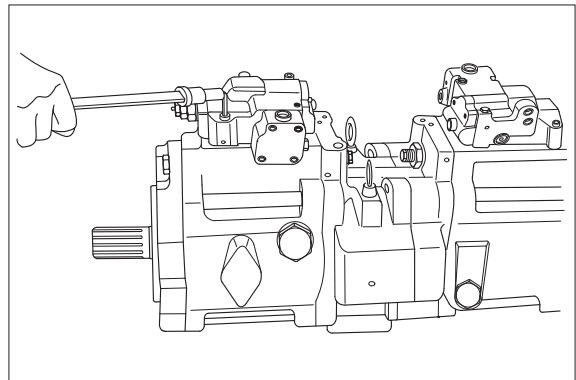


※ Clockwise rotation (viewed from input shaft side)

※ Fit block with regulator up and with delivery flange left, viewed from front side.

- (9) Putting feedback pin of tilting pin into feedback lever of regulator, fit regulator and tighten hexagon socket head bolts (412, 413).

※ Take care not to mistake regulator of front pump for that of rear pump.

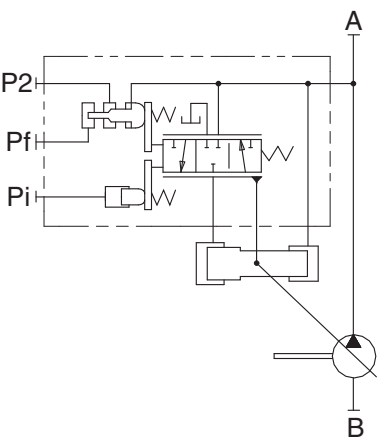
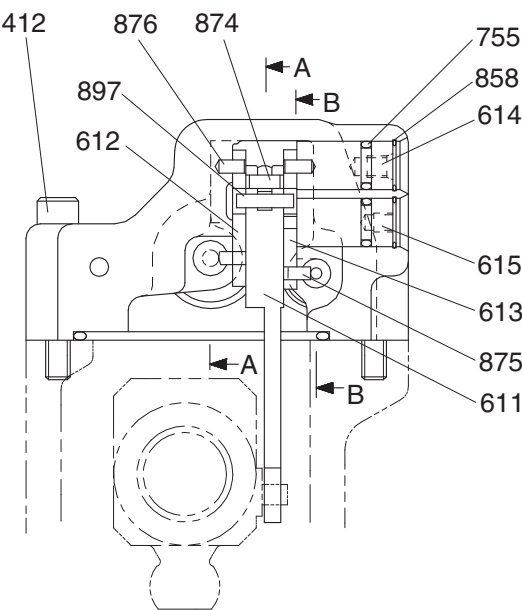


- (10) Fit drain port plug (468).

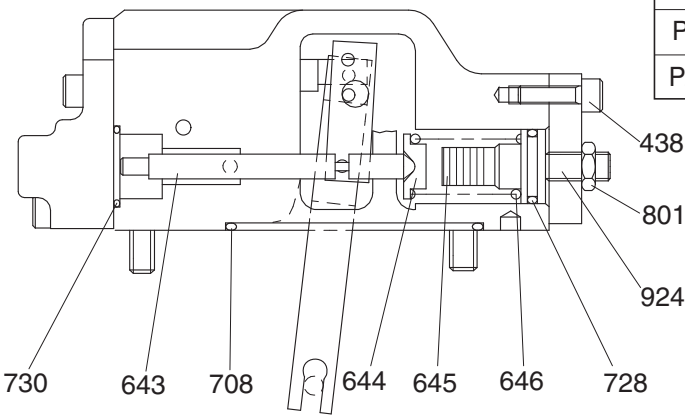
This is the end of reassembling procedures.

3. REGULATOR

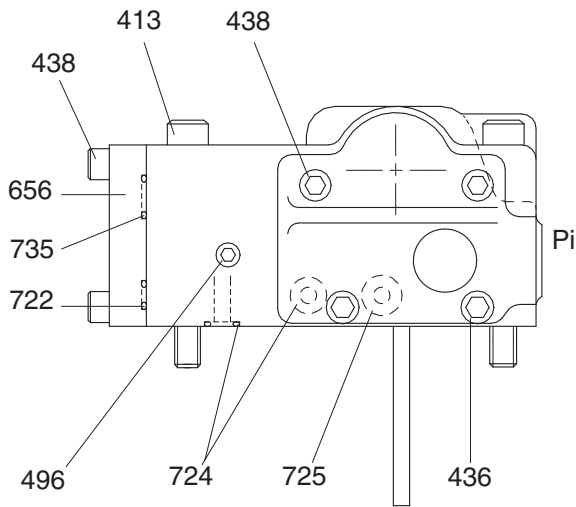
1) STRUCTURE(1/2)



Port	Port name	Port size
A	Delivery port	1"
B	Suction port	2 1/2"
Pi	Pilot port	PF 1/4-15
Pf	Power shift pressure	-
P2	Companion delivery pressure	-

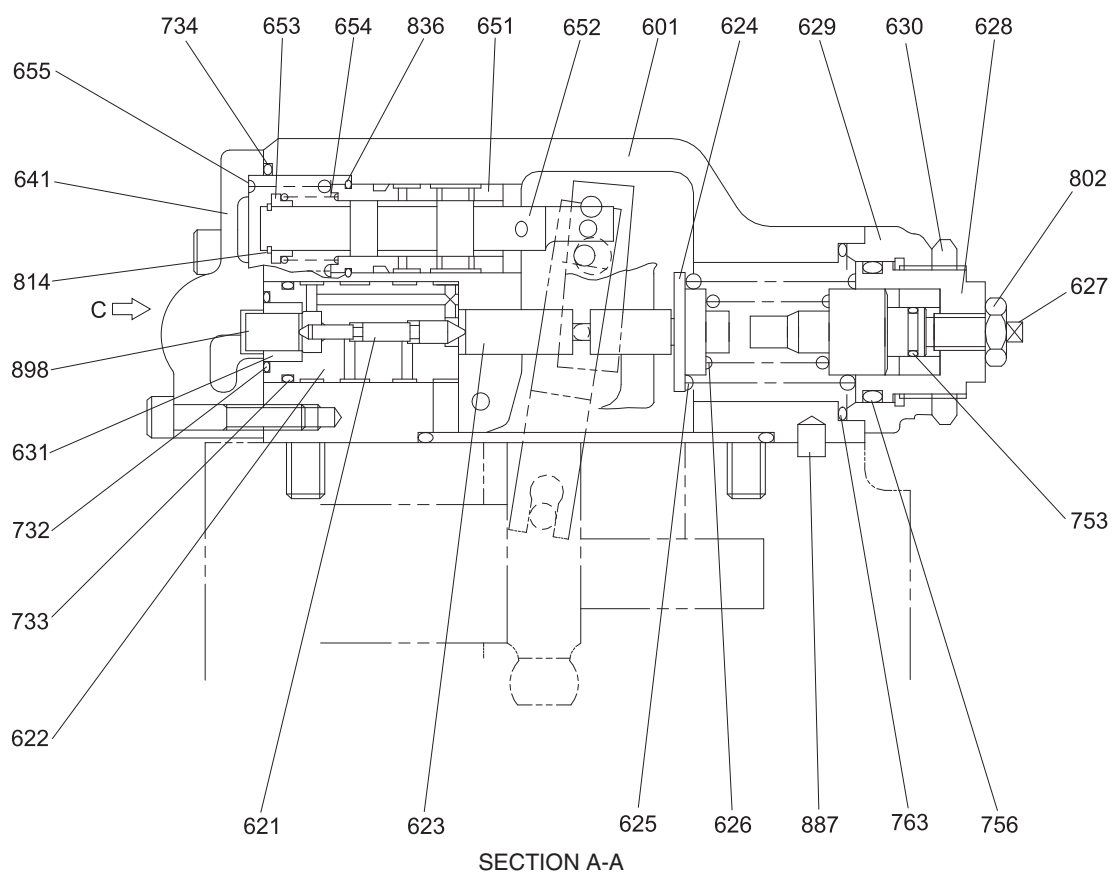


SECTION B-B



VIEW C

REGULATOR (2/2)

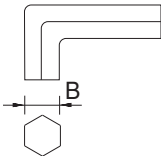



412 Hexagon socket screw	630 Lock nut	733 O-ring
413 Hexagon socket screw	631 Sleeve, pf	734 O-ring
436 Hexagon socket screw	641 Pilot cover	735 O-ring
438 Hexagon socket screw	643 Pilot piston	753 O-ring
496 Plug	644 Spring seat (Q)	755 O-ring
601 Casing	645 Adjust stem (Q)	756 O-ring
611 Feed back lever	646 Pilot spring	763 O-ring
612 Lever (1)	651 Sleeve	801 Nut
613 Lever (2)	652 Spool	802 Nut
614 Fulcrum plug	653 Spring seat	814 Snap ring
615 Adjust plug	654 Return spring	836 Snap ring
621 Compensator piston	655 Set spring	858 Snap ring
622 Piston case	656 Block cover	874 Pin
623 Compensator rod	708 O-ring	875 Pin
624 Spring seat (C)	722 O-ring	876 Pin
625 Outer spring	724 O-ring	887 Pin
626 Inner spring	725 O-ring	897 Pin
627 Adjust stem (C)	728 O-ring	898 Pin
628 Adjust screw (C)	730 O-ring	924 Set screw
629 Cover (C)	732 O-ring	

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

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

Tool name & size		Part name			
<div>Allen wrench</div> 	B	Hexagon socket head bolt	PT plug (PT thread)	PO plug (PF thread)	Hexagon socket head setscrew
	4	M 5	BP-1/16	-	M 8
	5	M 6	BP1/ 8	-	M10
	6	M 8	BP-1/ 4	PO-1/4	M12, M14
<div>Socket wrench, double (single) open end</div> 	-	Hexagon head bolt	Hexagon nut		VP plug (PF thread)
	6	M 8	M 8		-
Adjustable angle wrench		Small size, Max 36 mm			
Screw driver		Minus type screw driver, Medium size, 2 sets			
Hammer		Plastic hammer, 1 set			
Pliers		For snap ring, TSR-160			
Steel bar		Steel bar of key material approx. 10×8×200			
Torque wrench		Capable of tightening with the specified torques.			
Pincers		-			
Bolt		M4, Length : 50 mm			

(2) Tightening torque

Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt (material : SCM435)	M 5	0.7	5.1	0.16	4
	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M10	5.8	42.0	0.31	8
	M12	10.0	72.3	0.39	10
	M14	16.0	115.7	0.47	12
PT plug (material : S45C) ※ Wind a seal tape 1 1/2 to 2 turns round the plug	PT 1/16	0.7	5.1	0.16	4
	PT 1/ 8	1.05	7.59	0.20	5
	PT 1/ 4	1.75	12.66	0.24	6
PF plug (material : S45C)	PT 1/ 4	3.0	21.7	0.24	6

3) DISASSEMBLY

Since the regulator consists of small precision finished parts, disassembly and assembly are rather complicated.

For this reason, replacement of a regulator assembly is not recommended, unless there is a special reason, but in case disassembly is necessary for an unavoidable reason, read through this manual to the end before starting disassembly.

(1) Choose a place for disassembly.

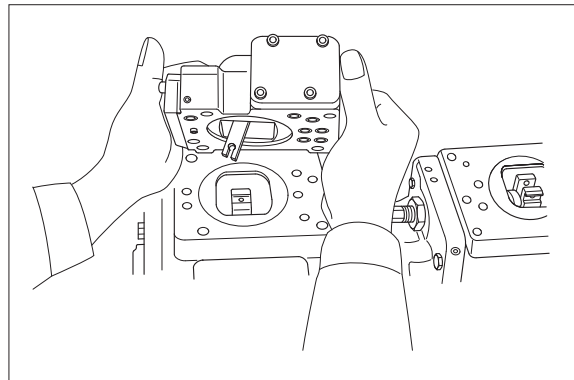
※ Choose a clean place.

※ Spread rubber sheet, cloth, or so on on top of work-bench to prevent parts from being damaged.

(2) Remove dust, rust, etc. from surfaces of regulator with clean oil.

(3) Remove hexagon socket head screw (412, 413) and remove regulator main body from pump main body.

※ Take care not to lose O-ring.

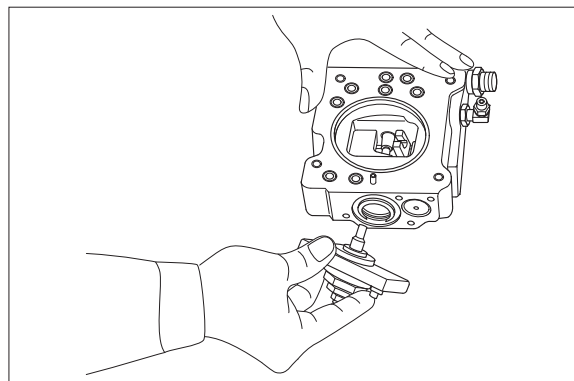


(4) Remove hexagon socket head screw (438) and remove cover (C, 629).

※ Cover (C) is fitted with adjusting screw (C, 628), adjusting stem (C, 627), lock nut (630), hexagon nut (801) and adjusting screw (924).

Do not loosen these screws and nuts.

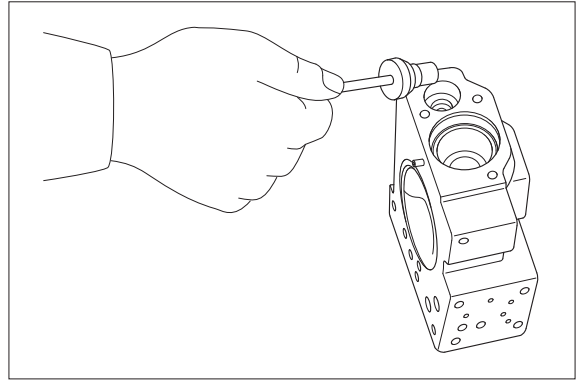
If they are loosened, adjusted pressure-flow setting will vary.



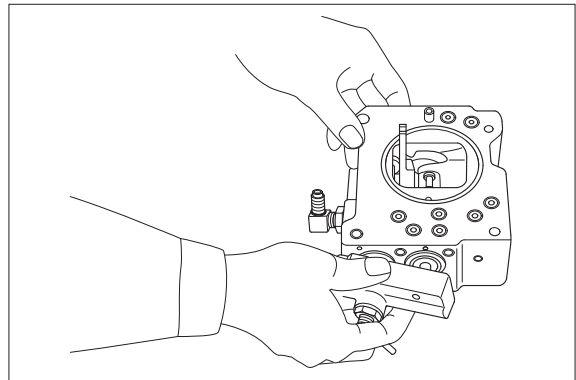
- (5) After removing cover (C, 629) subassembly, take out outer spring (625), inner spring (626) and spring seat (C, 624) from compensating section.

Then draw out adjusting stem (Q, 645), pilot spring (646) and spring seat (644) from pilot section.

- ※ Adjusting stem (Q, 645) can easily be drawn out with M4 bolt.



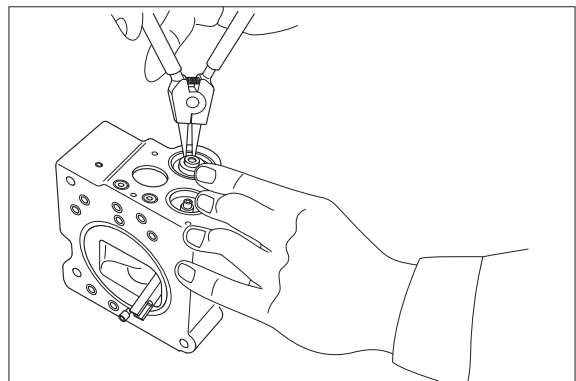
- (6) Remove hexagon socket head screws (436, 438) and remove pilot cover (641). After removing pilot cover, take out set spring (655) from pilot section.



- (7) Remove snap ring (814) and take out spring seat (653), return spring (654) and sleeve (651).

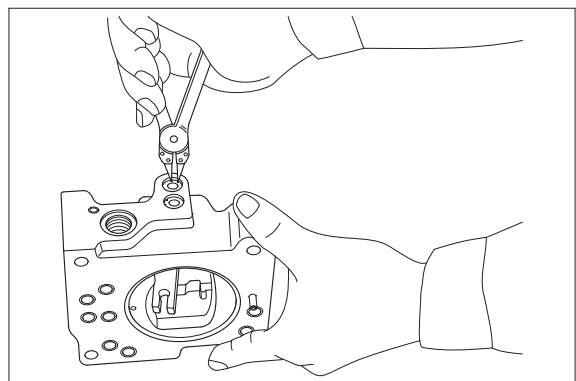
Sleeve (651) is fitted with snap ring (836).

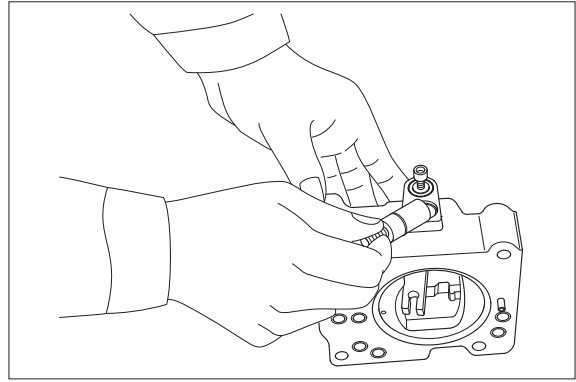
- ※ When removing snap ring (814), return spring (654) may pop out.
- ※ Take care not to lose it.



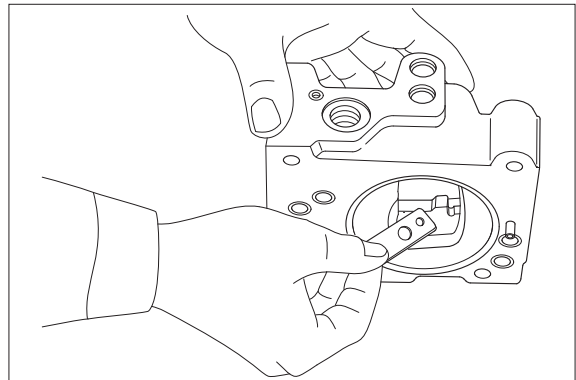
- (8) Remove locking ring (858) and take out fulcrum plug (614) and adjusting plug (615).

- ※ Fulcrum plug (614) and adjusting plug (615) can easily be taken out with M6 bolt.

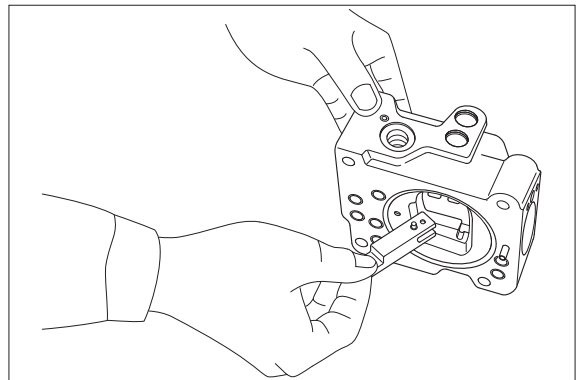
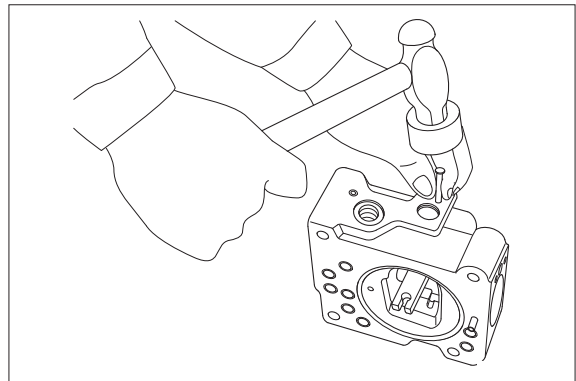




- (9) Remove lever (2, 613). Do not draw out pin (875).
- ※ Work will be promoted by using pincers or so on.



- (10) Draw out pin (874) and remove feedback lever (611).
- ※ Push out pin (874, 4 mm in dia.) from above with slender steel bar so that it may not interfere with lever (1, 612).



- (11) Remove lever (1, 612). Do not draw out pin (875).
- (12) Draw out pilot piston (643) and spool (652).
- (13) Draw out piston case (622), compensating piston (621) and compensating rod (623).
- ※ Piston case (622) can be taken out by pushing compensating rod (623) at opposite side of piston case.

This completes operation.

4) ASSEMBLY

(1) For assembly, reverse disassembly procedures, but pay attention to the following items.

① Always repair parts that were scored at disassembly.

Get replacement parts ready beforehand.

② Mixing of foreign matter will cause malfunction.

Therefore, wash parts well with cleaning oil, let them dry with jet air and handle them in clean place.

③ Always tighten bolts, plugs, etc. to their specified torques.

④ Do not fail to coat sliding surfaces with clean hydraulic oil before assembly.

⑤ Replace seals such as O-ring with new ones as a rule.

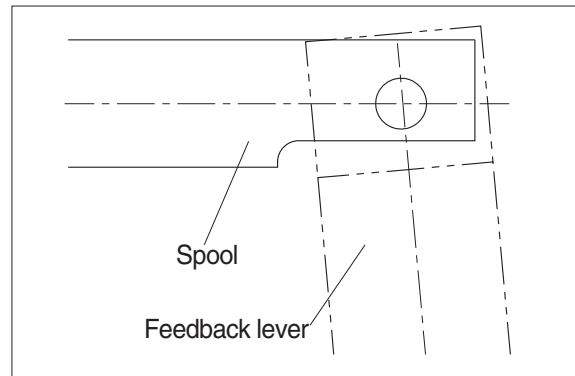
(2) Put compensating rod (623) into compensating hole of casing (601).

(3) Put pin force-fitted in lever (1, 612) into groove of compensating rod and fit lever (1) to pin force-fitted in casing.

(4) Fit spool (652) and sleeve (651) into hole in spool of casing.

※ Confirm that spool and sleeve slide smoothly in casing without binding.

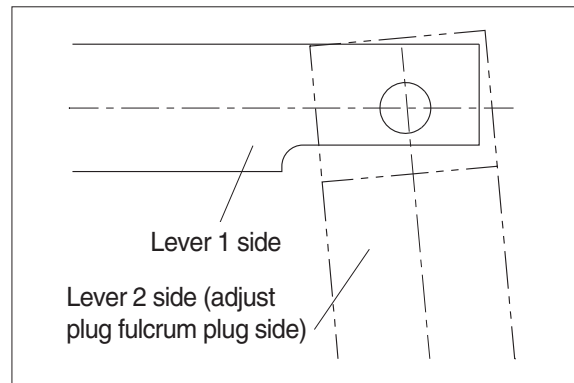
※ Pay attention to orientation of spool.



(5) Fit feedback lever (611), matching its pin hole with pin hole in spool.
Then insert pin (874).

※ Insert pin in feedback lever a little to ease operation.

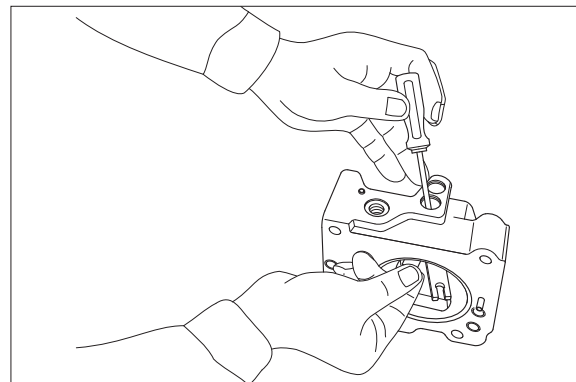
※ Take care not to mistake direction of feedback lever.



(6) Put pilot piston (643) into pilot hole of casing.

※ Confirm that pilot piston slides smoothly without binding.

(7) Put pin force-fitted in lever (2, 613) into groove of pilot piston.
Then fix lever (2).

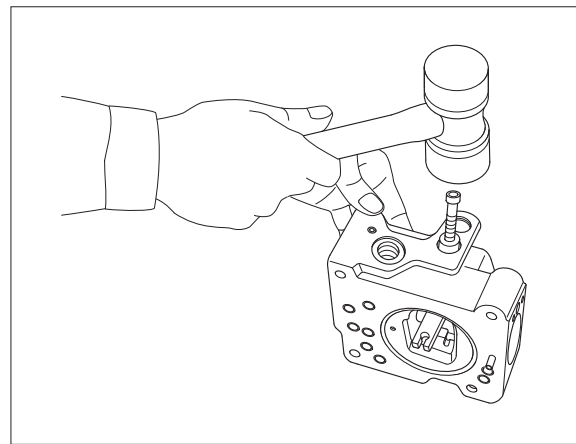


(8) Fit fulcrum plug (614) so that pin force-fitted in fulcrum plug(614) can be put into pin hole of lever (2).
Then fix locking ring (858).

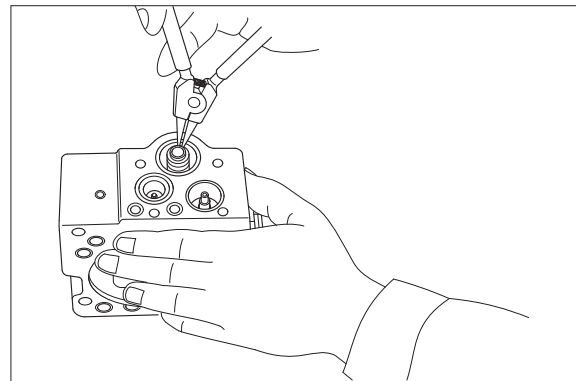
(9) Insert adjusting plug (615) and fit locking ring.

※ Take care not to mistake inserting holes for fulcrum plug and adjusting plug.

At this point in time move feedback lever to confirm that it has no large play and is free from binding.

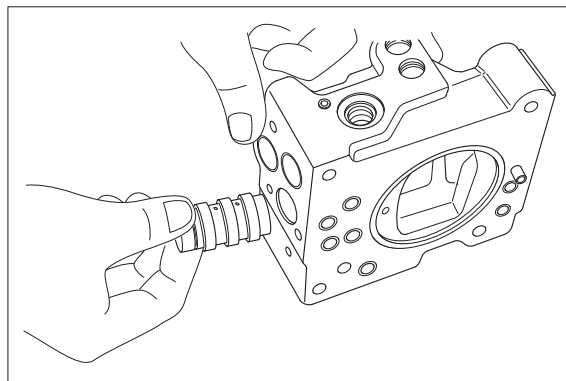


(10) Fit return spring (654) and spring seat (653) into spool hole and attach snap ring (814).



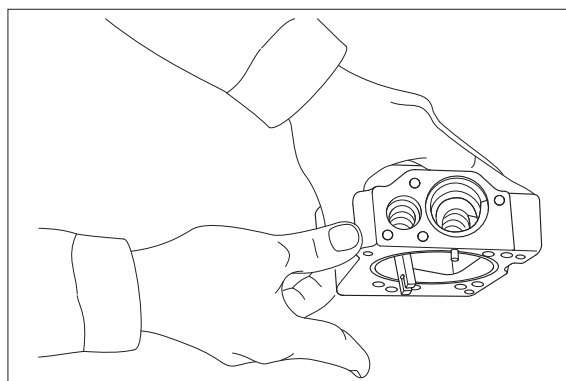
- (11) Fit set spring (655) to spool hole and put compensating piston (621) and piston case (622) into compensating hole.

Fit pilot cover (641) and tighten it with hexagonal socket head screws (436, 438).



- (12) Put spring seat (644), pilot spring (646) and adjusting stem (Q, 645) into pilot hole. Then fix spring seat (624), inner spring (626) and outer spring (625) into compensating hole.

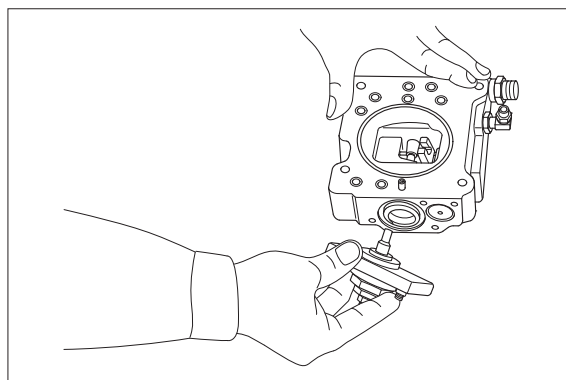
※ When fitting spring seat, take care not to mistake direction of spring seat.



- (13) Install cover (C, 629) fitted with adjusting screws (628), adjusting stem (C, 627), lock nut (630), hexagon nut (802) and adjusting screw (924).

Then tighten them with hexagonal socket head screws (438).

This completes assembly.



GROUP 4 MAIN CONTROL VALVE

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

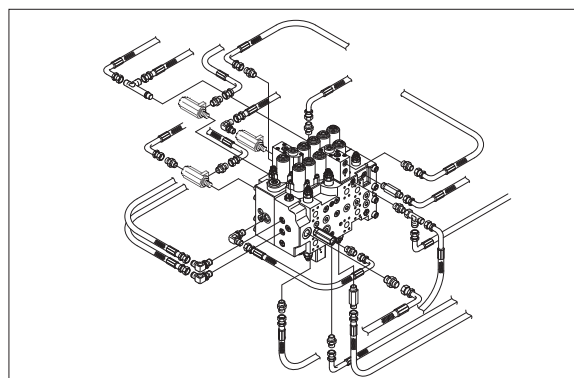
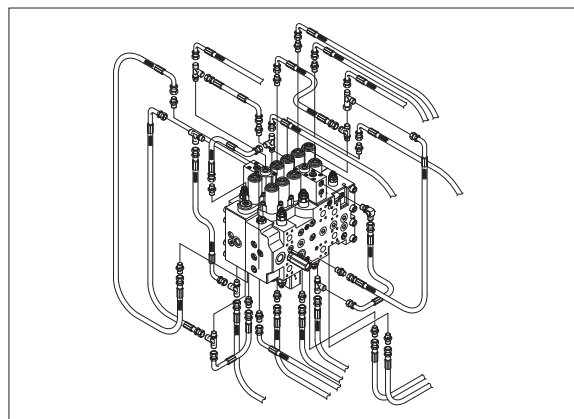
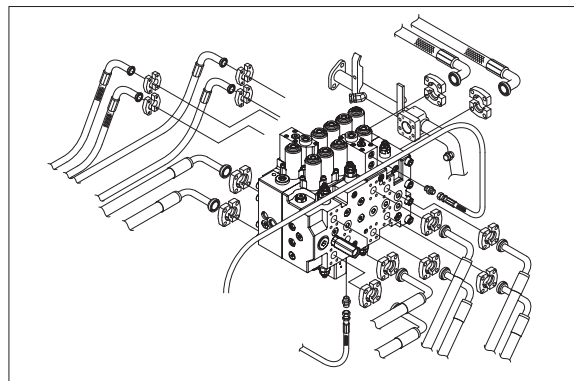
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

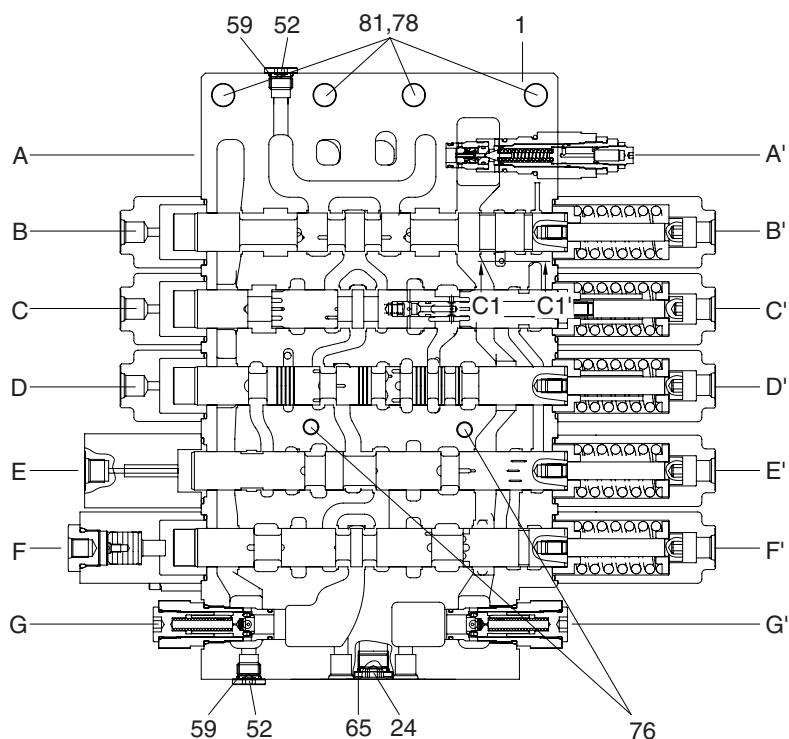
- ※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.
- (4) Remove the wirings for the pressure sensor and so on.
 - (5) Remove bolts and disconnect pipe.
 - (6) Disconnect pilot line hoses.
 - (7) Disconnect pilot piping.
 - (8) Sling the control valve assembly and remove the control valve mounting bolt.
· Weight : 200 kg (441lb)
 - (9) Remove the control valve assembly.
When removing the control valve assembly, check that all the piping have been disconnected.

2) INSTALL

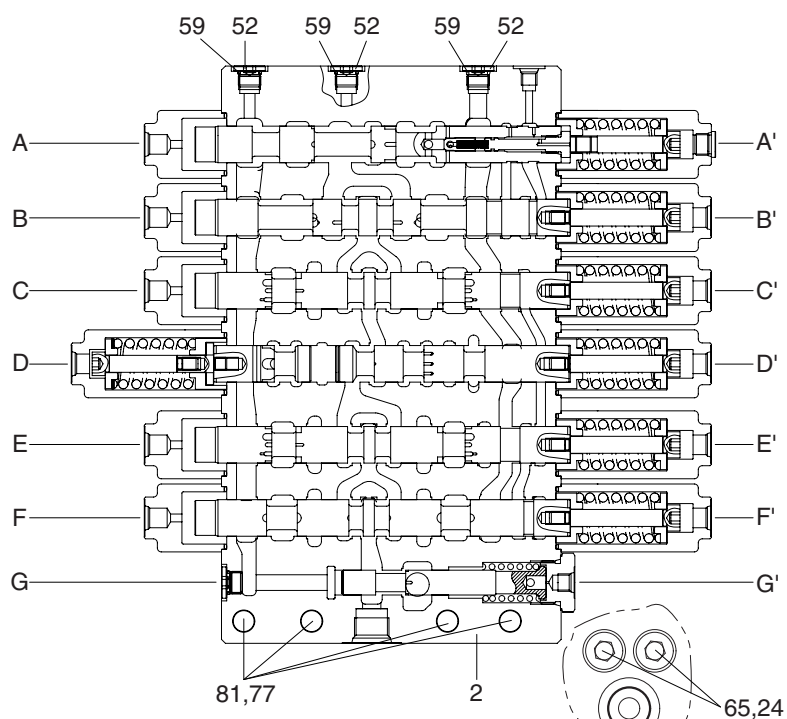
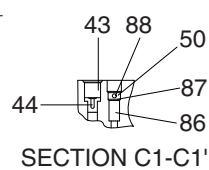
- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from below items.
 - ① Cylinder (boom, arm, bucket)
 - ② Swing motor
 - ③ Travel motor
- ※ See each item removal and install.
- (3) Confirm the hydraulic oil level and recheck the hydraulic oil leak or not.



2. STRUCTURE

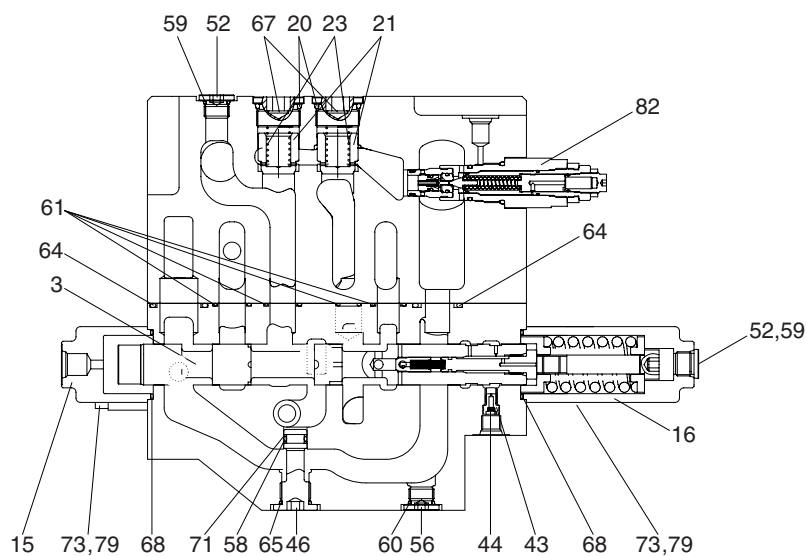


P1 BLOCK SPOOL SECTION

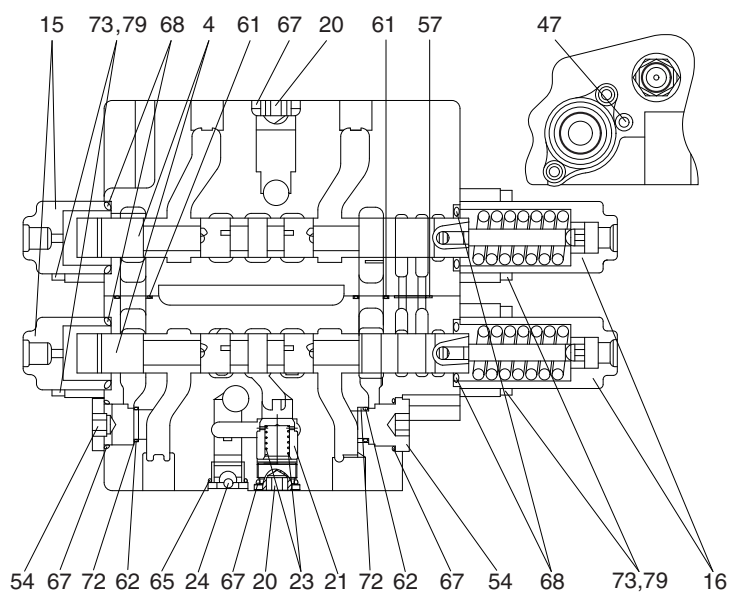


P2 BLOCK SPOOL SECTION

- 1 Housing (P1)
- 2 Housing (P2)
- 24 Plug
- 43 Orifice-signal
- 44 Coin type filter
- 50 O-ring
- 52 Plug
- 59 O-ring
- 65 O-ring
- 76 Hex socket head bolt
- 77 Hex socket head bolt
- 78 Hex socket head bolt
- 81 Spring washer
- 86 Poppet
- 87 Check spring
- 88 Plug

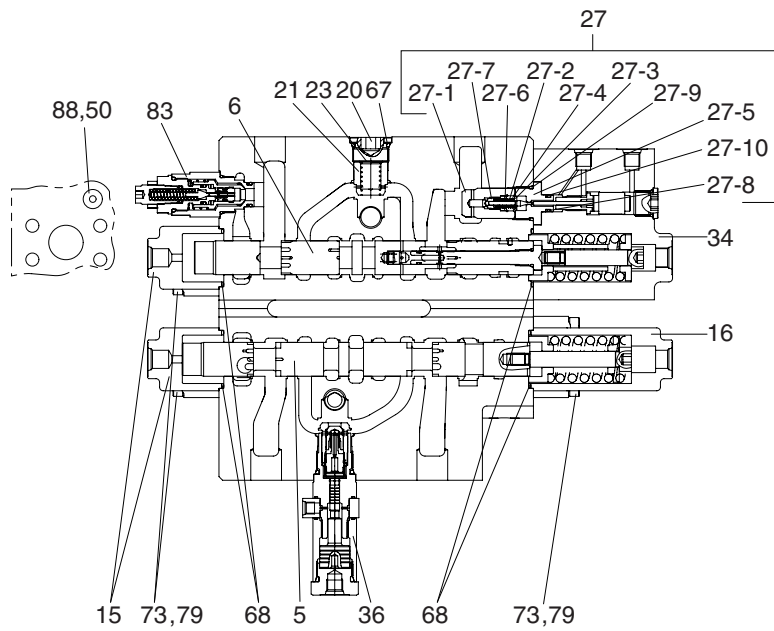


A-A' (STRAIGHT-TRAVEL & SUPPLY)

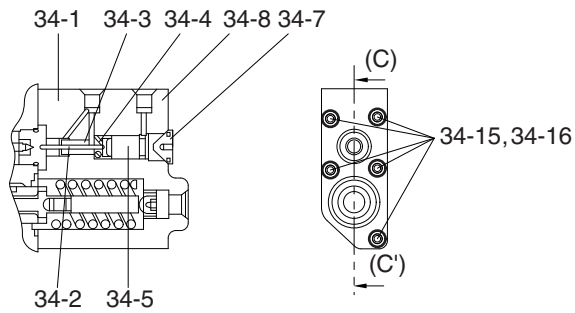


B-B' (TRAVEL RIGHT & LEFT)

- 3 Spool-straight
- 4 Spool-travel
- 15 Cover A-pilot
- 16 Cover B1-pilot
- 20 Plug
- 21 Poppet 1-check valve
- 23 Spring 1-check valve
- 24 Plug
- 43 Orifice-signal
- 44 Coin type filter
- 46 Plug
- 47 Plug
- 52 Plug
- 54 Plug
- 56 Plug
- 57 O-ring
- 58 O-ring
- 59 O-ring
- 60 O-ring
- 61 O-ring
- 62 O-ring
- 64 O-ring
- 65 O-ring
- 67 O-ring
- 68 O-ring
- 71 Back-up ring
- 72 Back-up ring
- 73 Hex socket head bolt
- 79 Washer
- 82 Main relief valve

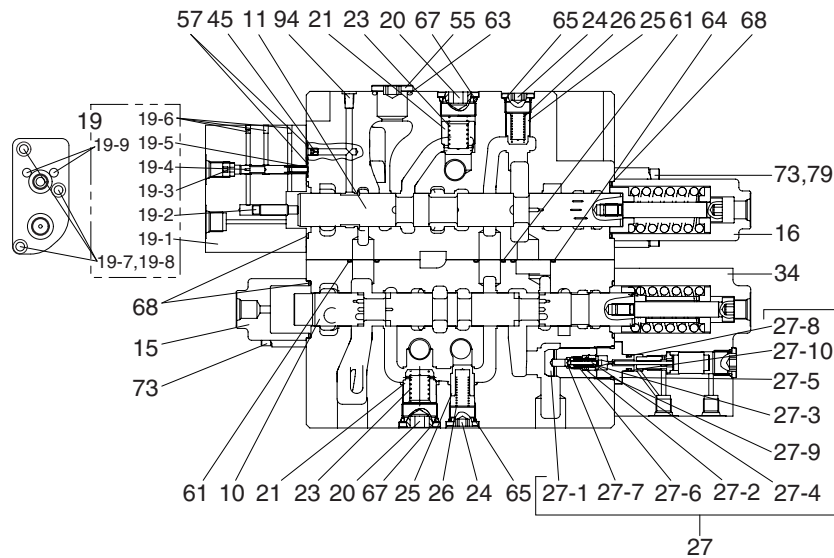


C-C' (SWING & BOOM 1)

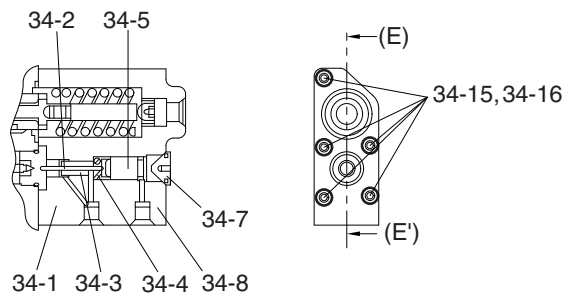


34 DETAIL (HOLDING ASSY)

5	Spool-swing	27-5	Poppet seat	34-7	Plug
6	Spool-boom	27-6	C-ring	34-8	Plug
15	Cover A-pilot	27-7	Restrictor-lock valve	34-15	Socket bolt
16	Cover B1-pilot	27-8	O-ring	34-16	Spring washer
20	Plug	27-9	O-ring	36	Logic valve
21	Poppet 1-check valve	27-10	Back up ring	50	O-ring
23	Spring 1-check valve	34	Holding kit A1	67	O-ring
27	Holding kit B	34-1	Block-holding P1	68	O-ring
27-1	Poppet	34-2	Piston 1-holding	73	Hex socket head bolt
27-2	Spring	34-3	Guide piston-holding	79	Washer
27-3	Poppet guide	34-4	Spring 1-lock valve	83	Overload relief valve
27-4	Pilot poppet	34-5	Piston 2-holding	88	Plug

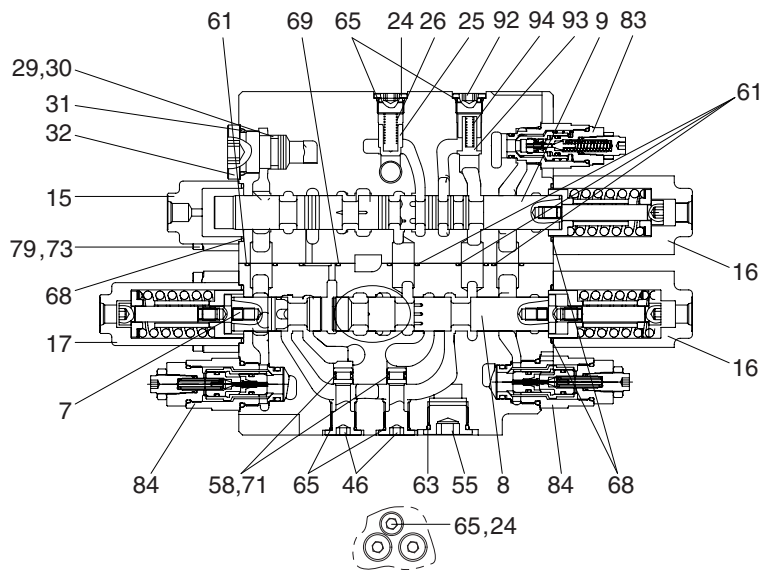


E-E' (ARM & ARM REGENERATION)

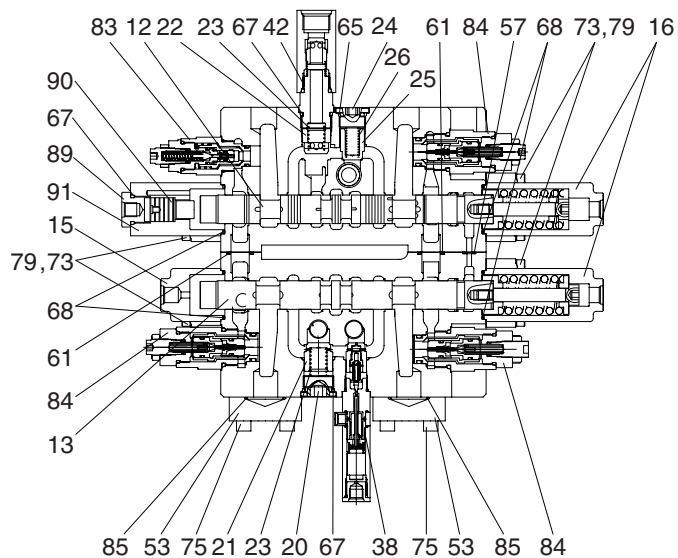


34 DETAIL (HOLDING ASSY)

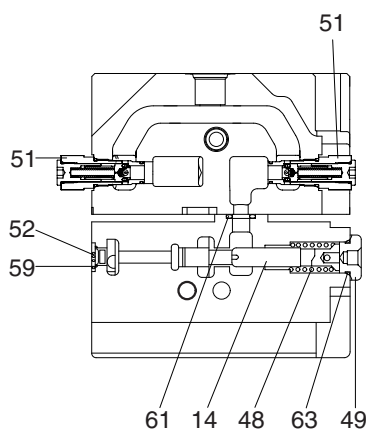
10	Spool-arm 1	25	Poppet 2-check valve	34-5	Piston 2-holding
11	Spool-arm regeneration	26	Spring 2-check valve	34-7	Plug
15	Cover A-pilot	27	Poppet-lock valve	34-8	Plug
16	Cover B1-pilot	27-1	Poppet	34-15	Socket bolt
19	Arm-regeneration	27-2	Spring	34-16	Spring washer
19-1	Block-regeneration	27-3	Poppet guide	45	Orifice-plug
19-2	Piston-cut off	27-4	Pilot poppet	55	Plug
19-3	Stopper-regeneration	27-5	Poppet seat	57	O-ring
19-4	Spool-regeneration	27-6	C-ring	61	O-ring
19-5	Spring-regeneration	27-7	Restrictor-lock valve	63	O-ring
19-6	Plug	27-8	O-ring	64	O-ring
19-7	Socket bolt	27-9	O-ring	65	O-ring
19-8	Spring wahser	27-10	Back up ring	67	O-ring
19-9	Pin-regeneration	34	Holding kit A1	68	O-ring
20	Plug	34-1	Block-holding P1	73	Hex socket head bolt
21	Poppet 1-check valve	34-2	Piston 1-holding	79	Washer
23	Spring 1-check valve	34-3	Guide piston-holding	94	Plug
24	Plug	34-4	Spring 1-lock valve		



D-D' (SWING PRIORITY-BOOM2 & ARM2)



F-F' (OPTION & BUCKET)



G-G' (CENTER BYPASS CUT-OFF
& NEGATIVE CONTROL)

- 7 Spool-swing priority
- 8 Spool-boom 2
- 9 Spool-arm 2
- 12 Spool-bucket
- 13 Spool-option
- 14 Spool-bypass cut
- 15 Cover A-pilot
- 16 Cover B1-pilot
- 17 Cover B2-pilot
- 20 Plug
- 21 Poppet 1-check valve
- 22 Poppet-L/C bucket
- 23 Spring 1-check valve
- 24 Plug
- 25 Poppet 2-check valve
- 26 Spring 2-check valve
- 29 Back up ring
- 30 O-ring
- 31 O-ring
- 32 Plug
- 38 Load check valve assy
- 42 Check valve
- 46 Plug
- 48 Spring-bypass cut spool
- 49 Plug-bypass cut spool
- 51 Negative control valve
- 52 Plug
- 53 Flange
- 55 Plug
- 57 O-ring
- 58 O-ring
- 59 O-ring
- 61 O-ring
- 63 O-ring
- 65 O-ring
- 67 O-ring
- 68 O-ring
- 69 O-ring
- 71 Back-up ring
- 73 Hex socket head bolt
- 75 Socket bolt
- 79 Washer
- 83 Overload relief valve
- 84 Overload relief valve
- 85 O-ring
- 89 Plug
- 90 Piston
- 91 Pilot cover C1
- 92 Plug
- 93 Poppet
- 94 Spring

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL PRECAUTIONS

- (1) As hydraulic equipments, not only this valve are constructed precisely with very small clearances, disassembling and assembling must be carefully done in a clean place with preventing dusts and contaminants from entering.
- (2) Prepare the section drawing and study the structure of MCV and then start disassembly work.
- (3) When removing the control valve from the machine, install caps on every ports, and wash the outside of the assembly with confirming the existence of caps before disassembling.
Prepare a suitable table and some clean papers or rubber mat on the table for disassembling.
- (4) If the components are left disassembled, they may get rust. Make sure to measure the greasing and sealing.
- (5) For carrying the control valve, never hold with pilot cover or relief valve and overload relief valve and carefully treat the valves.
- (6) Do not tap the valve even if the spool movement is not smooth.
- (7) Several tests for such as relief characteristics, leakage, overload relief valve setting and flow resistance are required after re-assembling, and the hydraulic test equipments for those tests are needed.
Therefore, do not disassemble what cannot perform test adjustment, even if it can disassemble.

※ Be sure to observe the mark (※) description in the disassembly and assembly procedures.

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	27 and 32
Spanner	Each 1 piece	26 and 32 (main relief valve)

3) DISASSEMBLY

(1) Removing spool

① The case of the section without holding valve

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

Remove two hex socket bolts by 5 mm allen key wrench, then remove pilot cover.

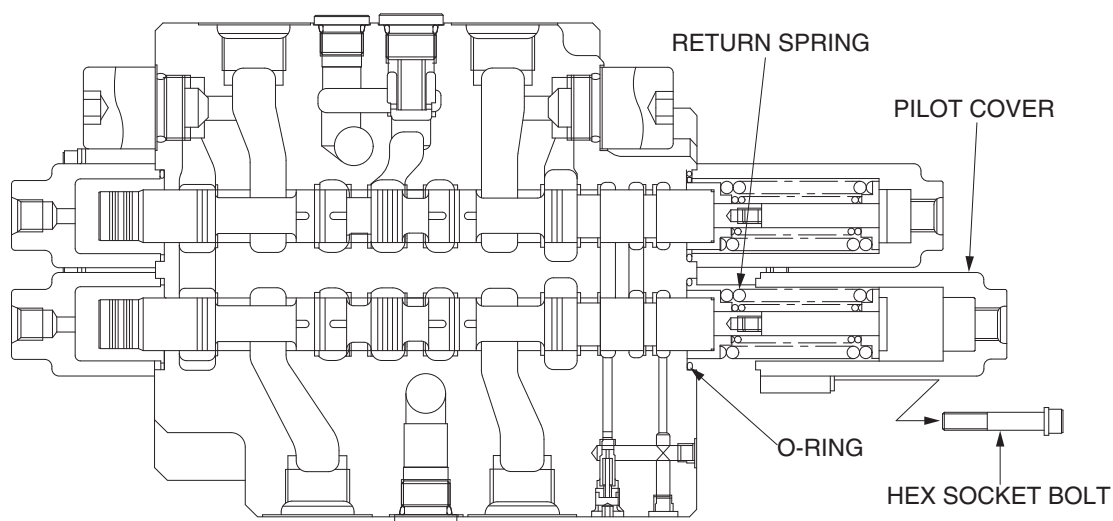
- ※ Pay attention not to lose the O-ring under the pilot cover.

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

- ※ The spools have to remove from the spring side.

Other spools (no lock valve type) can be removed in the same manner but the swing priority spool is reversed.

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



② The case of the section with holding valve

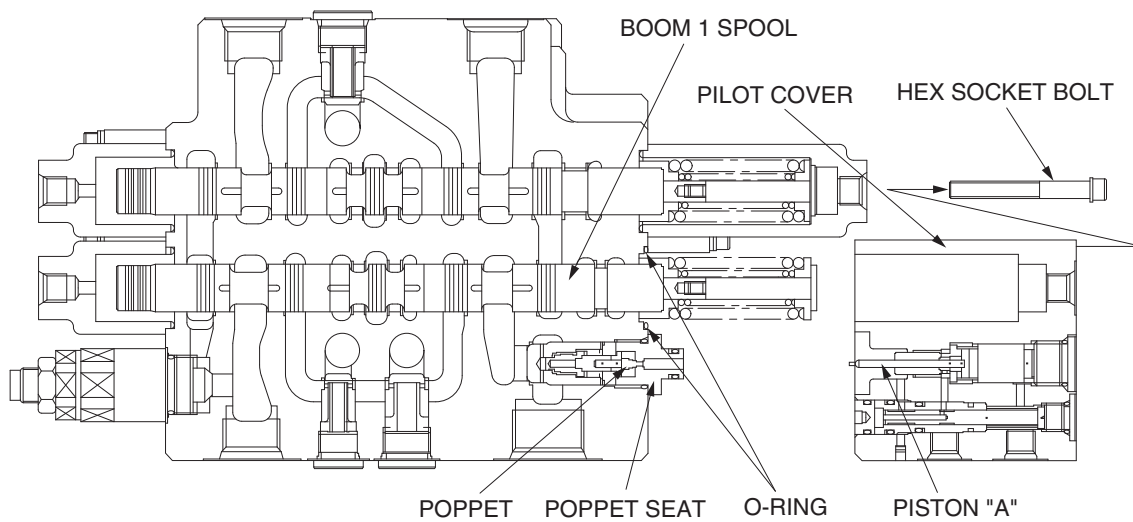
Instruction for removing the boom spool (for instance) is follows :

Remove five hex socket bolts with washer by 5 mm allen key wrench. Then remove pilot cover with internal parts below figure.

- ※ Be careful not to separate O-ring and poppet under pilot cover.
- ※ Pay attention not to damage the exposed piston A under pilot cover.

As the return spring portion of boom 1 spool comes out, pull the spring straight slowly, by which spool assembly is removed.

- ※ The spools have to remove form the spring side.
- ※ When spool replace, do not disassemble of a spool by any cases, please replace by spool assembly.



(2) Removing holding valve

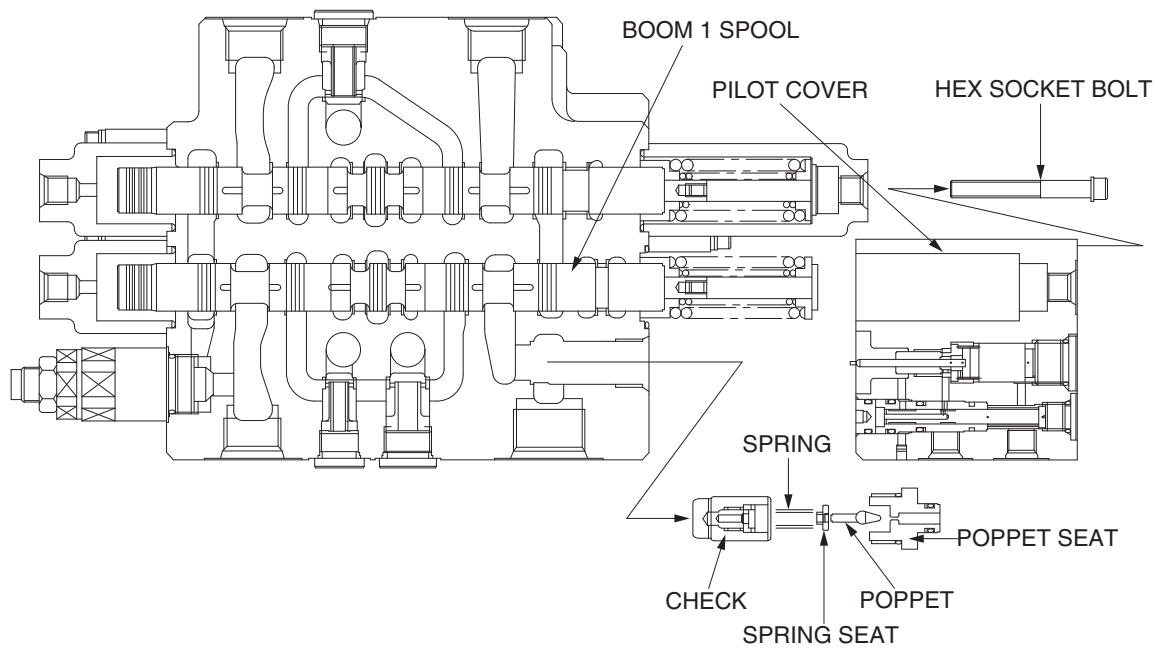
Remove the pilot cover with the holding valve as described on previous page.

※ Do not disassembled internal parts of the pilot cover.

Loosen the poppet seat by 26 mm spanner and remove the poppet, the spring seat, the spring and the check in order.

※ Pay attention not to lose the poppet.

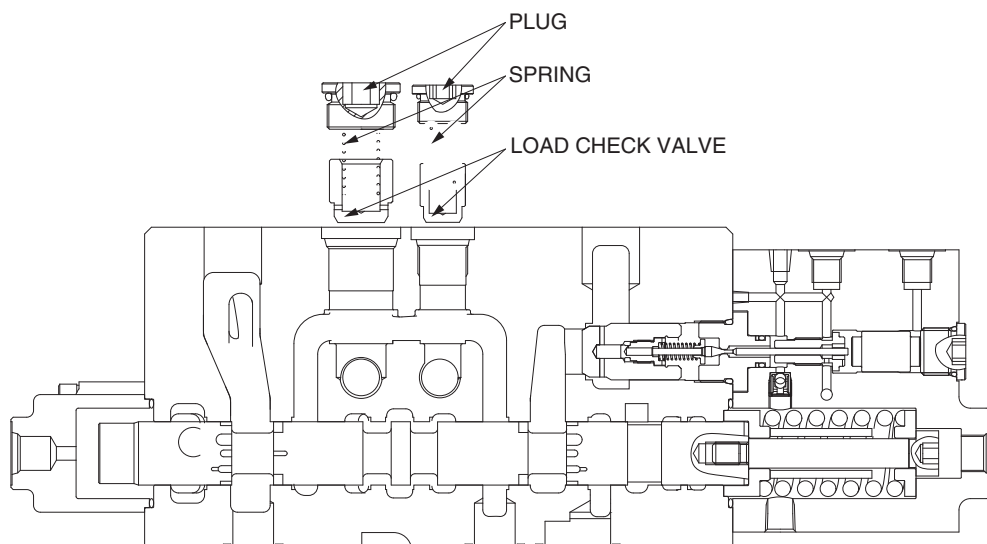
※ Do not disassembled internal parts of the check because the plug, functioning orifice, can damage easily.



(3) Removing load check valve and negative relief valve

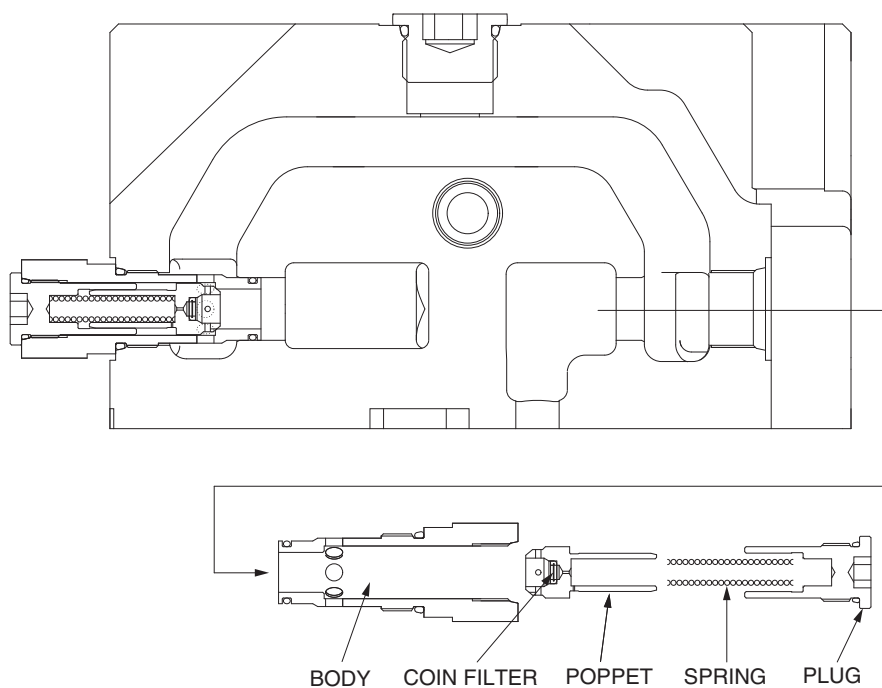
① The load check valve

- Fix the body to suitable work bench. Loosen the plug by 10 mm allen key wrench.
- Remove the spring and the load check valve with pincers or magnet.



② The negative relief valve

- Loosen the socket by 12 mm allen key wrench.
- Remove the spring, the spring holder, the piston and the negative control poppet.

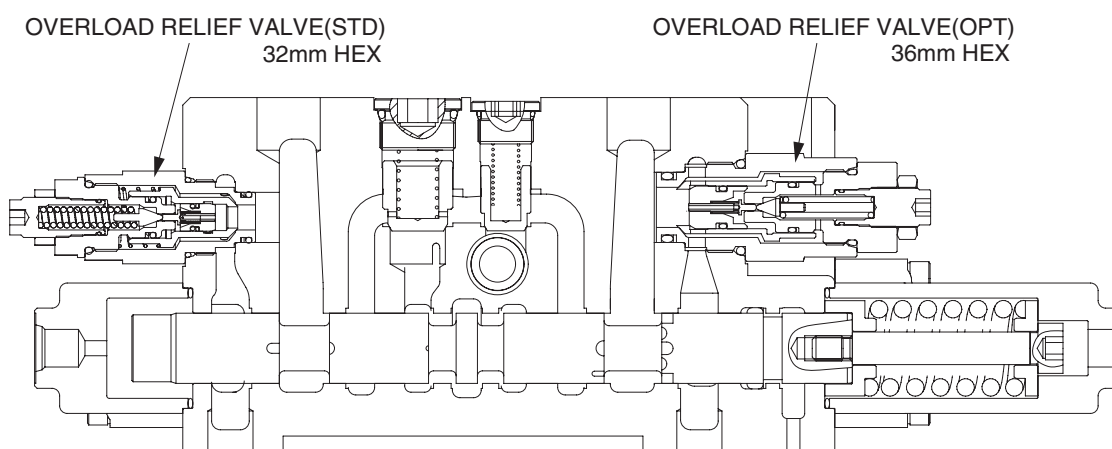
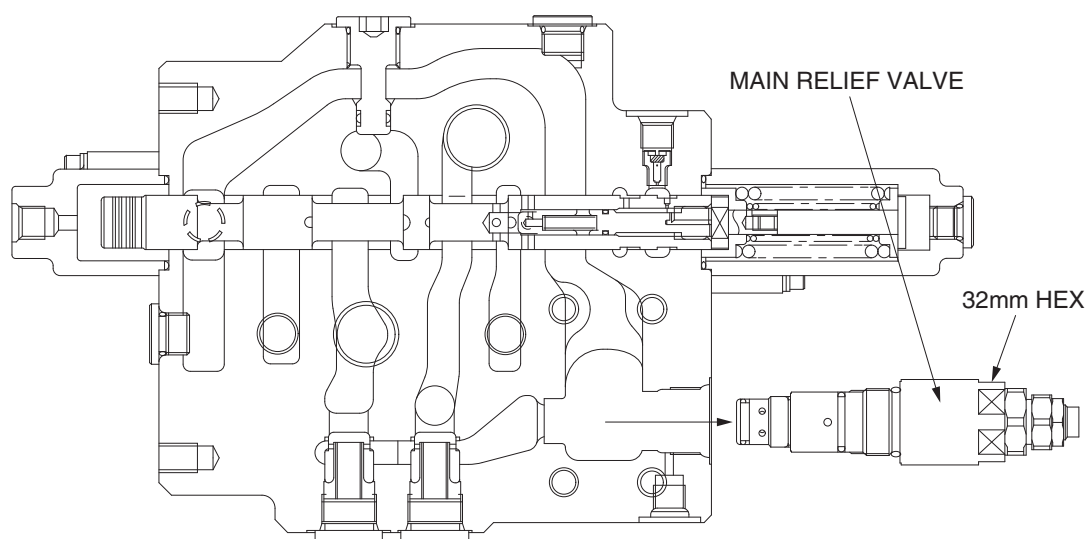


※ Do not disassemble the coin filter inside the negative control poppet because of forced fit.

(4) Removing main relief valve and overload relief valve

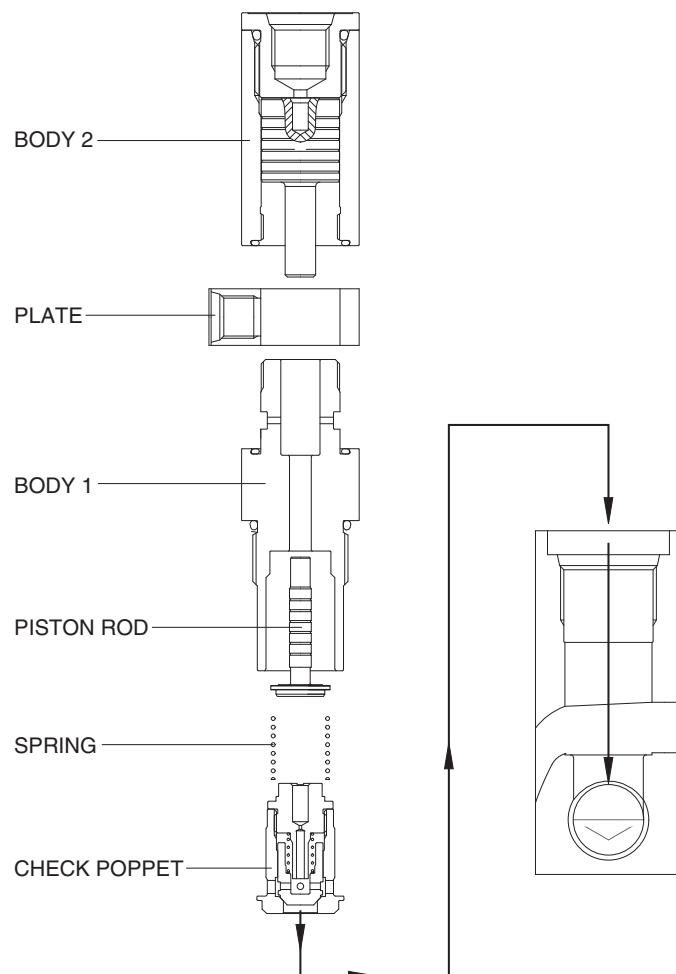
Fix the valve body to suitable work bench. Remove the main relief valve by 32 mm spanner and remove the overload relief valve 32 mm spanner (standard) or 36 mm spanner (optional).

- ※ When disassembled, tag the relief valve for identification so that they can be reassembled correctly.
- ※ Pay attention not to damage seat face of disassembled main relief and overload relief valve.
- ※ Main relief and overload relief valve are very critical parts for performance and safety of the machine. Also, the pressure set is very difficult. Therefore, any abnormal parts are found, replace it with completely new relief valve assembly.



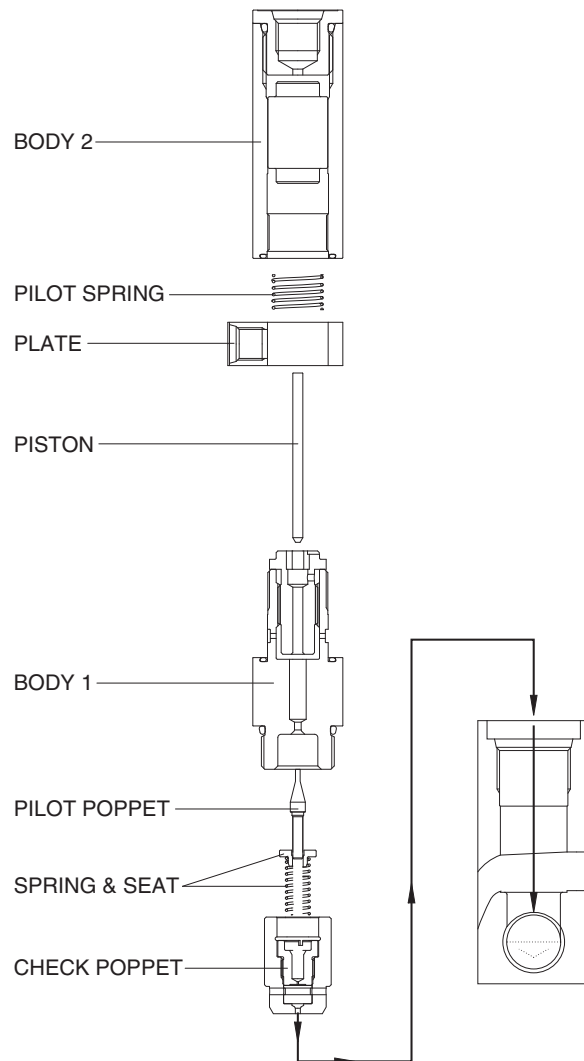
(5) Removing the swing logic valve and bucket logic valve

- Fix the valve body to suitable work bench.
 - Loosen the body 2 by 32 mm spanner (swing logic valve) or 24 mm spanner (bucket logic valve) and remove it.
 - Remove the banjo plate.
 - Loosen the body 1 as the same spanner of body 2 and remove it.
 - Remove the check poppet and spring.
- ※ Pay attention not to damage seat face of removed check poppet.
- ※ Do not disassemble the check poppet and replace it with a assembly in case any abnormal parts are found.
- ※ Pay attention not to lose and separation while disassembling and assembling.



(6) Removing the option ON/OFF valve

- Fix the valve body to suitable work bench.
- Loosen the body 2 by 24 mm spanner and remove it.
- Remove the banjo plate.
- Loosen the body 1 as the same spanner of body 2 and remove it.
- Remove the pilot poppet, spring and seat.
- Remove the check poppet.



4) ASSEMBLY

(1) Precaution

- ① When you assemble, please wash all parts by pure cleaning liquid.
- ② For re-assembling, basically use only bland new seals for all portions.
- ③ Apply grease or hydraulic oil to the seals and seal fitting section to make the sliding smooth, unless otherwise specified.
- ④ Pay attention not to roll the O-ring when fitting and it may cause oil leakage.
- ⑤ Do not tap the valve even if the spool movement is not smooth.
- ⑥ Prepare the section drawing and study the structure of MCV and then start disassembly work.
- ⑦ Tighten bolt and parts with thread for all section by torque wrench to the respective tightening torque.

(2) Assembly

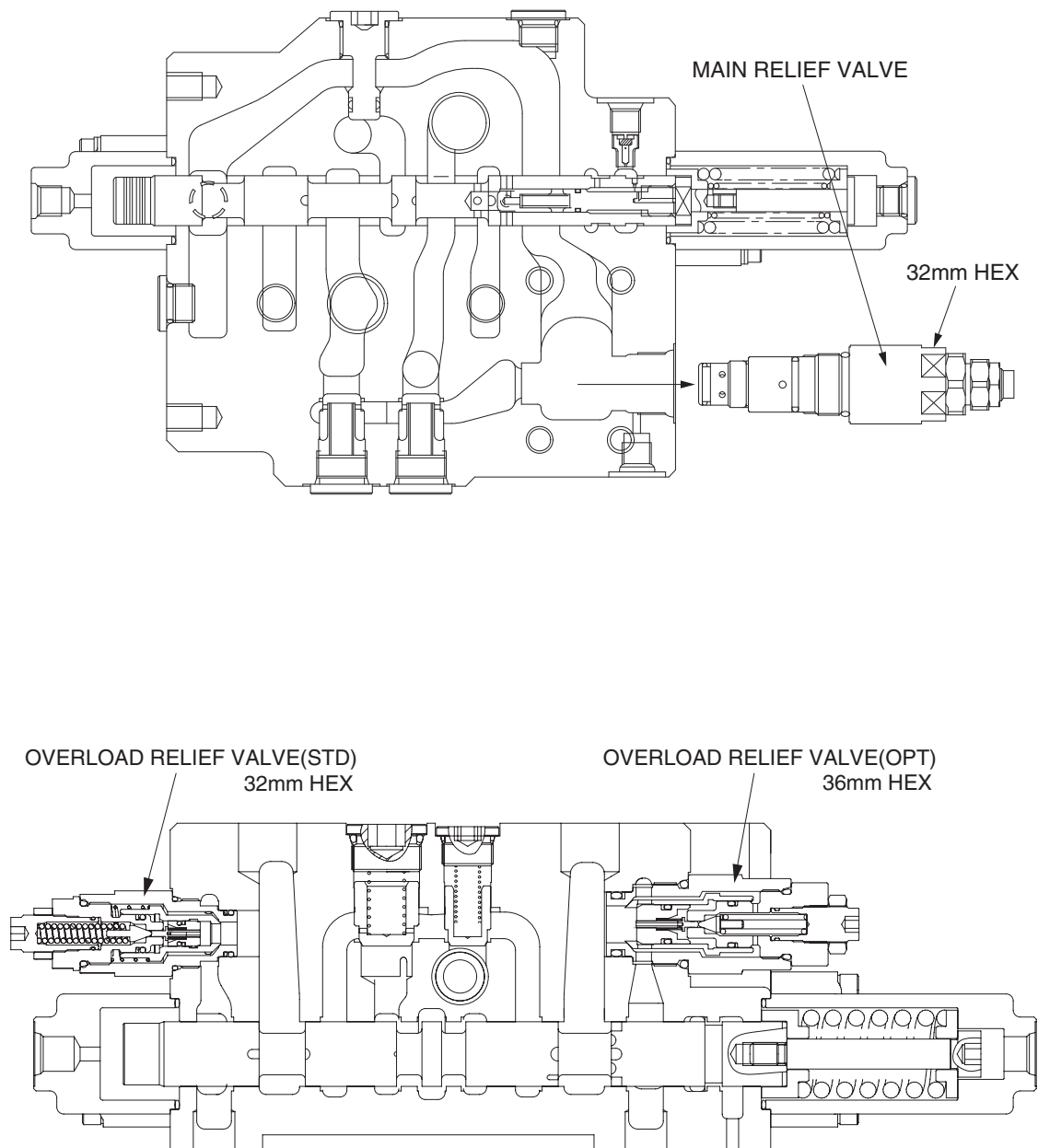
Explanation only is shown for the assembly, refer to the figures shown in the previous disassembly section.

① Main relief and overload relief valve

Fix the valve body to suitable work bench.

Install main relief valve and overload relief valve into the body and tighten to the specified torque by 32 mm torque wrench.

· Tightening torque : 8~9 kgf·m (57.8~65.1 lbf·ft)

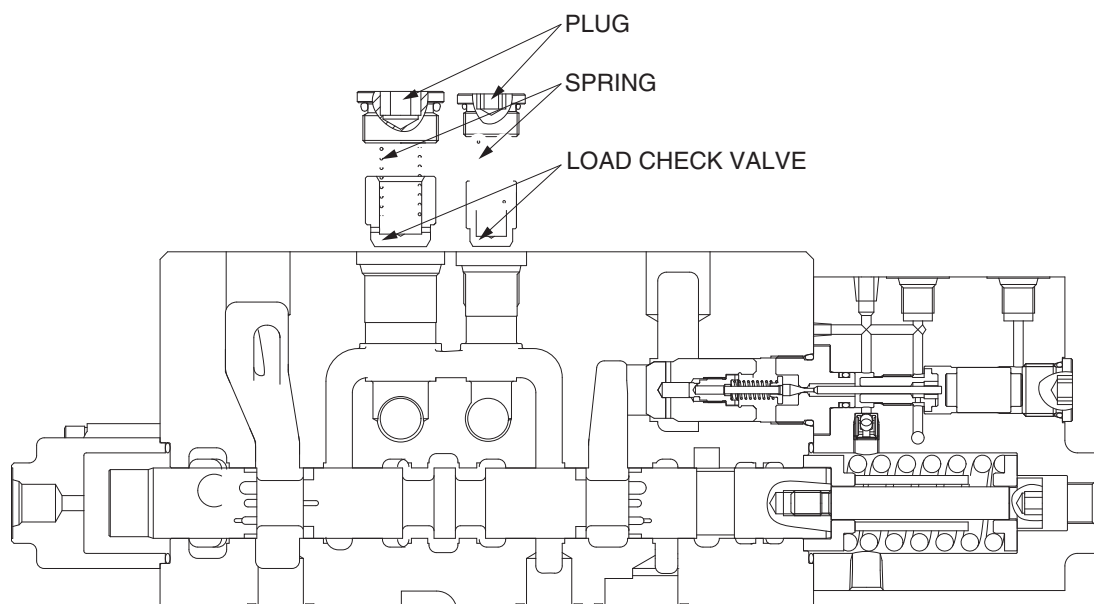


② Load check valve

Assemble the load check valve and spring.

Put O-rings on to plug and tighten plug to the specified torque by 10 mm torque wrench.

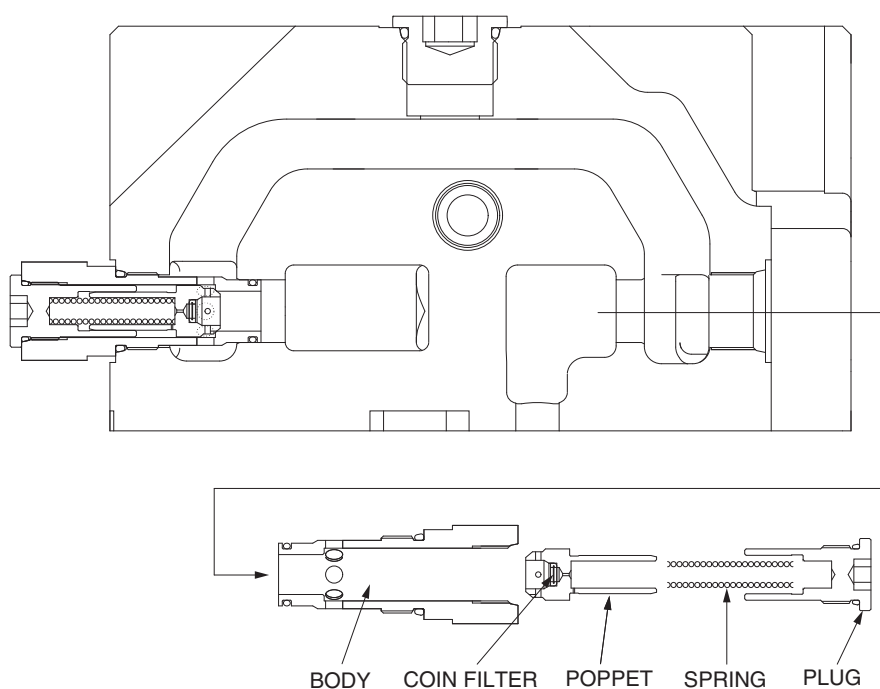
· Tightening torque : 6~7 kgf·m (43.4~50.6 lbf·ft)



③ Negative control relief valve

Assemble the nega-con poppet, piston, spring holder and spring into body in order and tighten the socket to the specified torque by 12 mm torque wrench.

· Tightening torque : 8~9 kgf·m (57.8~65.1 lbf·ft)



④ Holding valves

Assemble the check, spring seat and poppet into the hole of valve body in order.

Tighten the poppet seat to the specified torque by 25 mm torque wrench.

· Tightening torque : 6~7 kgf·m (43.4~50.6 lbf·ft)

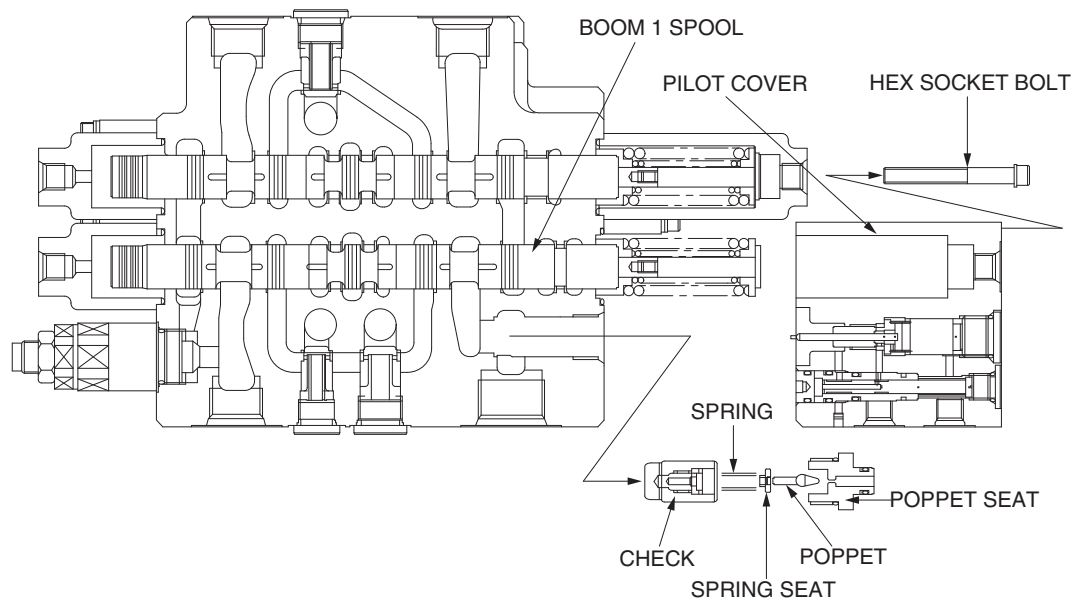
Fit the "piston A" under pilot cover with internal parts into hole on the poppet seat.

Tighten hexagon socket head bolt to specified torque by 5 mm torque wrench.

· Tightening torque : 1~1.1 kgf·m (7.23~7.96 lbf·ft)

※ Pay attention poppet not to separation.

※ Confirm that O-rings have been well fitted on the groove of body. (apply grease on O-ring)



⑤ Main spool

Put the spool position upward and fix it to the vise. Carefully insert the previously assembled spool assemblies into their respective bores within of body.

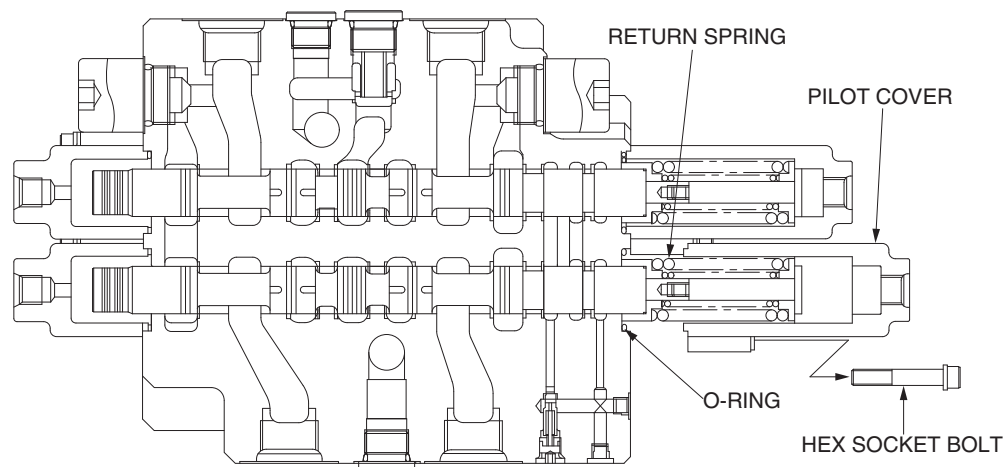
Fit spool assemblies into body carefully and slowly. Do not under any circumstances push them forcibly in.

Fit the pilot cover to the groove of the valve body.

Confirm that O-rings have been fitted on the groove of body. (apply grease on O-ring)

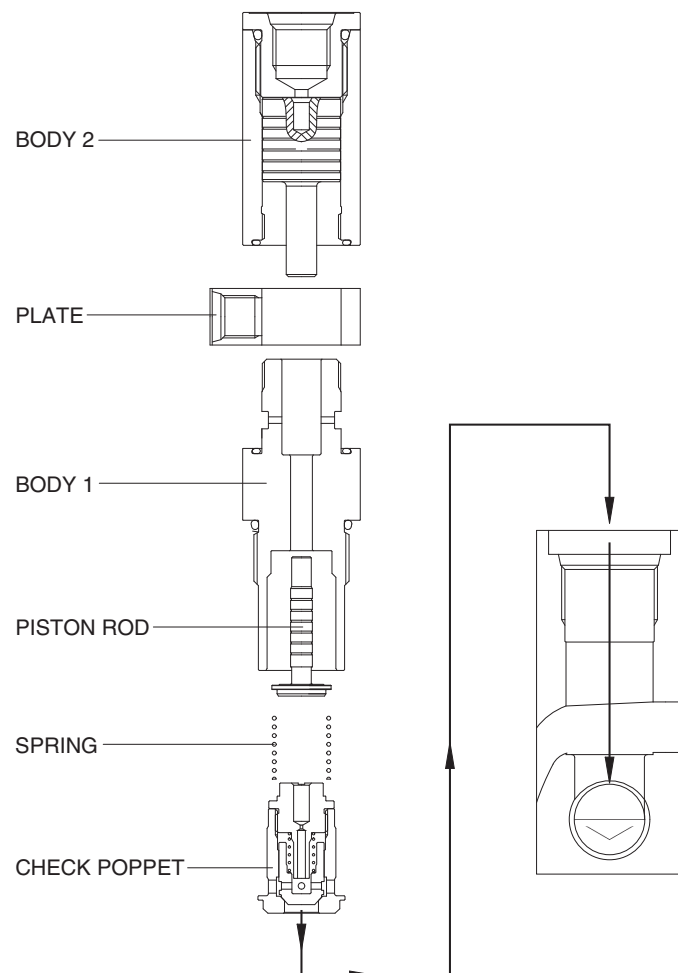
Tighten the two socket bolt to the specified torque by 5 mm torque wrench.

· Tightening torque : 1~1.1 kgf·m (7.23~7.96 lbf·ft)



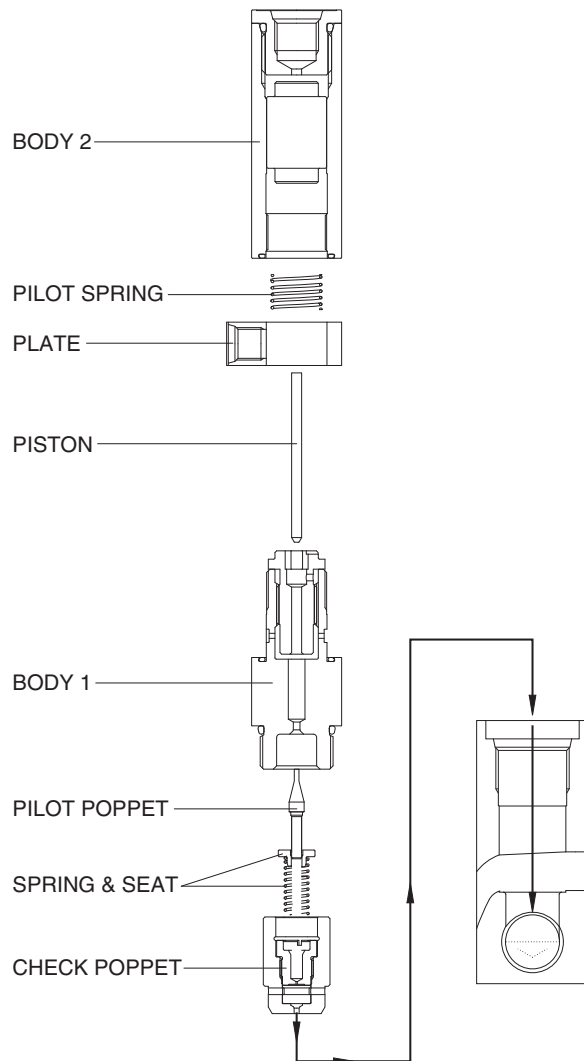
⑥ The swing logic valve and bucket logic valve

- Assemble the piston rod, spring and check poppet into the body 1 in order.
 - Install the body 1 assembly into valve body and tighten to the specified torque.
 - Tightening torque : 2.9 kgf·m (21.0 lbf·ft)
 - Assemble the banjo plate.
- ※ Confirm O-ring has been seated on the groove of banjo plate.
- Tighten the body 2 to the specified torque.
 - Tightening torque : 1.5 kgf·m (10.8 lbf·ft)



⑦ Option ON/OFF valve

- Assemble the check poppet into the valve body.
- ※ Push the check poppet about half of hole.
- Assemble the pilot poppet, spring and seat into check poppet.
- ※ As it can not be fixed, hang it diagonally.
- Insert the end of pilot poppet into the machined center hole of body 1 and push it complete
- slowly. Then tighten to the specified torque.
 - Tightening torque : 2.9 kgf·m (21.0 lbf·ft)
- ※ Tighten socket piston.
- When push the piston to the end, confirm the repulsive spring force.
- Assemble the banjo plate.
- Put the pilot spring into body 2 and assemble it into body 1 and then tighten to the specified torque.
 - Tightening torque : 1.5 kgf·m (10.8 lbf·ft)



GROUP 5 SWING DEVICE

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

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

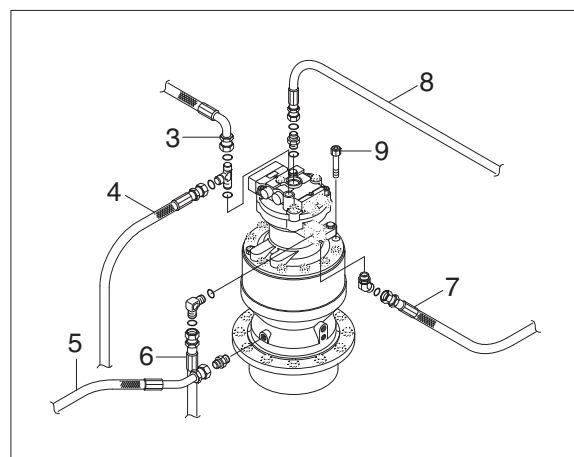
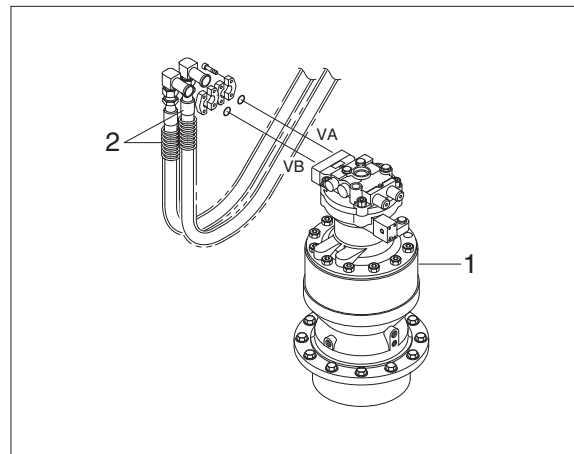
▲ Escaping fluid under pressure can penetrate the skin causing serious injury.

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

- (4) Disconnect hose assembly (2).
- (5) Disconnect pilot line hoses (3, 4, 5, 6, 7, 8).
- (6) Sling the swing motor assembly (1) and remove the swing motor mounting socket bolts (9).

· Motor device weight : 61 kg (135 lb)

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

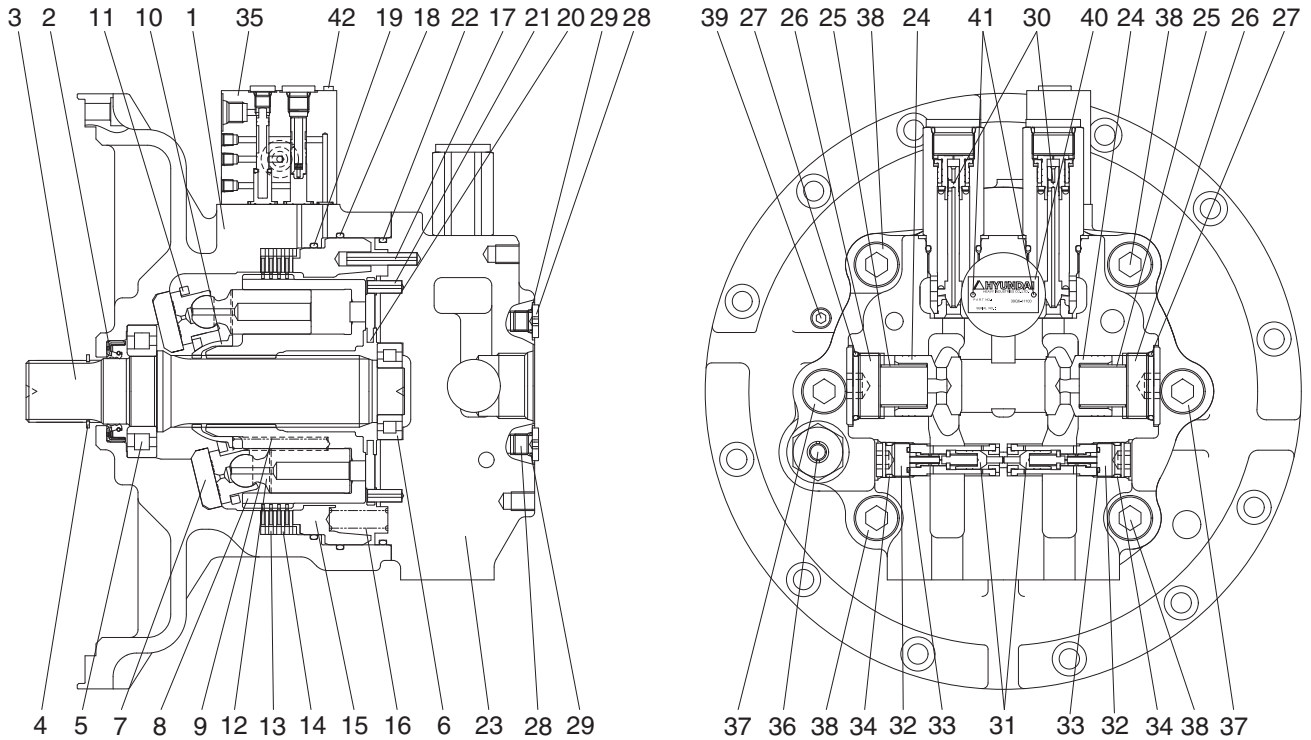


2) INSTALL

- (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



- | | | |
|-------------------|-------------------|----------------------------|
| 1 Casing | 15 Parking piston | 29 O-ring |
| 2 Oil seal | 16 Brake spring | 30 Relief valve assy |
| 3 Shaft | 17 Spring pin | 31 Reactionless valve assy |
| 4 Snap ring | 18 O-ring | 32 Plug |
| 5 Roller bearing | 19 O-ring | 33 O-ring |
| 6 Needle bearing | 20 Valve plate | 34 O-ring |
| 7 Swash plate | 21 Spring pin | 35 Time delay valve assy |
| 8 Cylinder block | 22 O-ring | 36 Level gauge |
| 9 Spring | 23 Valve casing | 37 Socket bolt |
| 10 Ball guide | 24 Check valve | 38 Socket bolt |
| 11 Retainer plate | 25 Spring | 39 Plug |
| 12 Piston assy | 26 Plug | 40 Name plate |
| 13 Friction plate | 27 O-ring | 41 Rivet |
| 14 Separate plate | 28 Plug | 42 Socket bolt |

2) DISASSEMBLY

(1) Disassemble drive shaft

- ① Unloosing socket bolt (time delay valve, 42) and disassemble time delay valve assy (35) from casing (1).



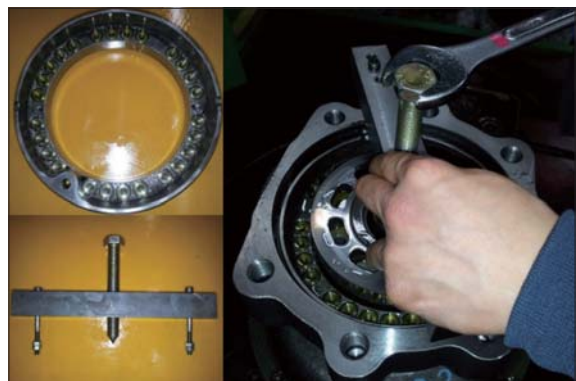
- ② Disassemble level gauge (36) from casing (1).



- ③ Hang valve casing (23) on hoist, unloose socket bolt (37, 38) and disassemble from casing (1).



- ④ Disassemble spring (16) and using a jig, disassemble parking piston (15) from casing (1).



- ⑤ Disassemble respectively cylinder block sub (8), friction plate (13), separate plate (14) from casing (1).



- ⑥ Disassemble swash plate (7) from casing (1).



- ⑦ Using a plier jig, disassemble snap ring (4) from casing (1).



- ⑧ Disassemble shaft assy (3), oil seal (2) and O-ring (18, 22) from casing (1).



(2) Disassemble cylinder block sub

- ① Disassemble piston assy (12) from cylinder block (8).



- ② Disassemble ball guide (10) and spring (cylinder block, 9) from cylinder block (8).
 - Ball guide × 1EA
 - Spring × 9EA



(3) Disassemble valve casing sub

- ① Disassemble spring pin (17, 21), valve plate (20), O-ring (22) from valve casing (23).



- ② Using a torque wrench, disassemble relief valve (30) from valve casing (23).



- ③ Using a torque wrench, disassemble plug (32) from valve casing (23) and disassemble O-ring (33, 34) and reaction-less valve assy (31).



- ④ Using a torque wrench, disassemble check valve (24) from valve casing (23).



- ⑤ Disassemble plug (28), O-ring (29) from valve casing (23).



3) ASSEMBLING

(1) Assemble shaft sub

- ① Put roller bearing (3) on preheater and provide heat to inner race.
(Temperature in conveyor : 120°C for 3~5 minutes)



- ② Using a robot machine, assemble and press preheated roller bearing (3) into shaft (5).



(2) Assemble cylinder block sub

- ① Assemble 9 springs (cylinder block, 9) into cylinder block (8).
 - Spring × 9EA



- ② Assemble ball guide (10) into cylinder block (8).
 - Ball guide × 1EA



- ③ Assemble 9 piston assy (12) into retainer plate (11).

- Piston assy × 9EA
- Retainer plate × 1EA



- ④ Assemble parts of procedure ② and ③.



(3) Assemble valve casing sub

- ① Assemble make up check valve sub

Assemble check valve (24), O-ring (27), plug (26) in that order and then screw it into torque wrench.

- Make up check valve × 2EA
- Spring × 2EA
- Plug × 2EA
- O-ring × 2EA
- Tightening torque : $38 \pm 3.8 \text{ kgf} \cdot \text{m}$
($275 \pm 27.5 \text{ lbf} \cdot \text{ft}$)



- ② Assemble reactionless valve assy

Assemble reactionless valve assy (31), plug (32), O-ring (33, 34) in that order and then screw it into a torque wrench.

- Reactionless valve assy (31) × 2EA
- Plug (32) × 2EA
- O-ring (33, 34) × 2EA
- Tightening torque : $22 \pm 1.5 \text{ kgf} \cdot \text{m}$
($159 \pm 11 \text{ lbf} \cdot \text{ft}$)



- ③ Using a torque wrench, assemble relief valve (30) 2 sets into valve casing (23).
- Relief valve (30) × 2EA
 - Tightening torque : $18 \pm 1.8 \text{ kgf} \cdot \text{m}$
($130 \pm 13 \text{ lbf} \cdot \text{ft}$)



- ④ Assemble plug (28) and O-ring (27) into valve casing (23).
- Plug (28) × 3EA
 - O-ring (27) × 3EA
 - Tightening torque : $4.5 \pm 0.4 \text{ kgf} \cdot \text{m}$
($32.5 \pm 2.9 \text{ lbf} \cdot \text{ft}$)



- ⑤ Assemble needle bearing (6) into valve casing (23) and assemble spring pin (17, 21) into valve casing (23).
- Needle bearing (6) × 1EA
 - Spring pin (17, 21) × 1EA



- ⑥ Apply some grease valve plate (20) and assemble it into valve casing (23).



(4) Assemble drive shaft sub

- ① Using a jig, assemble oil sealing (2) into casing (1).



- ② Fit shaft sub (shaft+roller bearing) into casing (1).



- ③ Using a plier jig, assemble snap ring (4) to shaft (3).
· Snap ring × 1EA



- ④ Apply some grease swash plate (7) and assemble it into casing (1).
· Swash plate × 1EA



⑤ Insert O-ring (18, 19) into casing (1).

- O-ring (18) × 1EA
- O-ring (19) × 1EA



⑥ Assemble cylinder block (8) into casing (1).



⑦ Assemble separate plate (14) and friction plate (13) 4 sets into casing (1) and fit parking piston (15) into casing (1) by a jig or a press.

- Separate plate × 4EA
- Friction plate × 4EA
- Parking piston × 1EA



⑧ Assemble spring (parking piston, 16) into parking piston (15).

- Spring × 26EA



- ⑨ Lift up valve casing (23) on casing (1) by a crane and assemble it with socket bolts (37, 38).

- Tightening torque : $33 \pm 3.3 \text{ kgf} \cdot \text{m}$
($239 \pm 23.9 \text{ lbf} \cdot \text{ft}$)



- ⑩ Assemble level gauge (36) and plug (39) into casing (1).

- Tightening torque (36) : $15 \pm 1.0 \text{ kgf} \cdot \text{m}$
($108.5 \pm 7.2 \text{ lbf} \cdot \text{ft}$)
- Tightening torque (39) : $3 \pm 0.3 \text{ kgf} \cdot \text{m}$
($21.7 \pm 2.2 \text{ lbf} \cdot \text{ft}$)



- ⑪ Assemble time delay valve assy (35) into valve casing (23) with socket bolt (42).

- Time delay valve $\times 1\text{EA}$
- Socket bolt $\times 3\text{EA}$
- Tightening torque (42) : $1.3 \pm 0.1 \text{ kgf} \cdot \text{m}$
($9.4 \pm 0.72 \text{ lbf} \cdot \text{ft}$)



- ⑫ **Air pressing test**

Be sure of leakage, after press air into assembled motor and put it in water for 1 minute (pressure : 2 kgf/cm^2).



⑬ **Leakage check**

Place motor on a bench tester and after cleaning motor by color check No.1, paint No.3 and be sure of leakage.



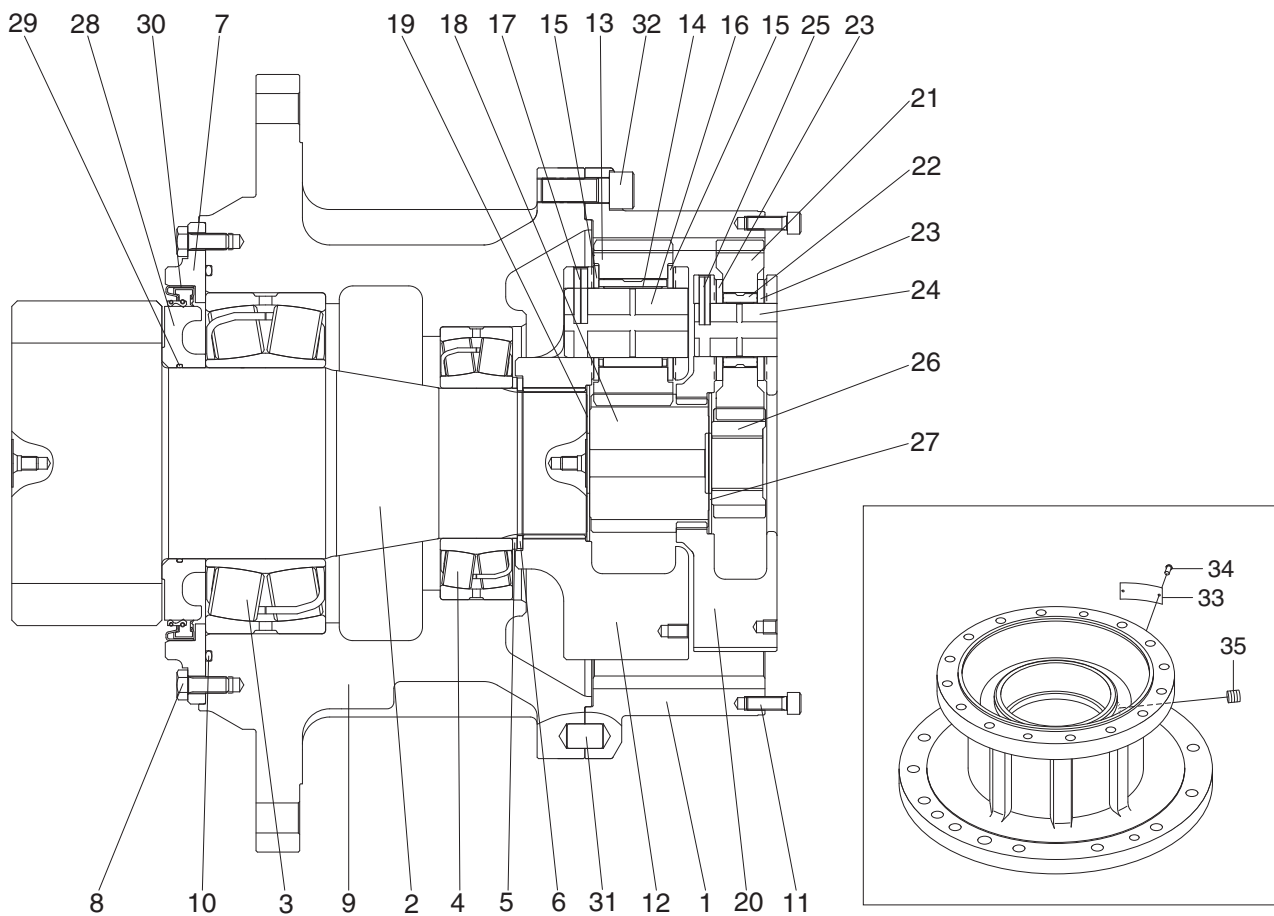
⑭ **Mount test bench**

Mounting motor a test bench, test the availability of each part.



3. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) STRUCTURE



- | | | |
|-------------------------|---------------------|-------------------------|
| 1 Ring gear | 13 Planetary gear 2 | 25 Spring pin 1 |
| 2 Drive shaft | 14 Needle bearing 2 | 26 Sun gear 1 |
| 3 Bearing | 15 Thrust washer 2 | 27 Thrust plate 1 |
| 4 Bearing | 16 Carrier pin 2 | 28 Sleeve |
| 5 Thrust plate | 17 Spring pin 2 | 29 O-ring |
| 6 Snap ring | 18 Sun gear 2 | 30 Oil seal |
| 7 Cover | 19 Thrust plate 2 | 31 Parallel pin |
| 8 Hex head bolt | 20 Carrier 1 | 32 Hex socket head bolt |
| 9 Casing | 21 Planetary gear 1 | 33 Name plate |
| 10 O-ring | 22 Needle bearing 1 | 34 Rivet |
| 11 Hex socket head bolt | 23 Thrust washer 1 | 35 Plug |
| 12 Carrier 2 | 24 Carrier pin 1 | |

2) DISASSEMBLY REDUCTION GEAR

(1) Preparation

- ① The reduction gear removed from machine is usually covered with mud.
Wash out side of reduction gear and dry it.
 - ② Setting reduction gear on work stand for disassembling.
 - ③ Mark for mating
Put marks on each mating parts when disassembling so as to reassemble correctly as before.
- ▲ Take great care not to pinch your hand between parts while disassembling not let fall parts on your foot while lifting them.

(2) Disassemble the swing motor

- ① Loosen the hex wrench bolt (11, M10), and remove the swing motor.



(3) Disassemble the carrier No.1 assy

- ① Disassemble gear-sun No.1 (26), tightening eye-bolt (M10) to screw holes for disassembly in carrier No.1 (20), then disassemble carrier No.1 assy.



(4) Disassemble the carrier No.2 assy

- ① Disassemble gear-sun No.2 (18), tighten eye-bolt (M10) to screw holes for disassembly in carrier No.2 (12), then disassemble carrier No.2 assy.



(5) Disassemble carrier No.1 assy

- ① Hold jig to spring pin No.1 (26), then tap jig with a hammer, so that place spring pin in the center of carrier pin No.1 (24).
 - ※ Do not reuse spring pin.
 - ※ Disassemble method of carrier No.2 assy is same.
- ② Disassemble carrier pin No.1 (24), then disassemble planetary gear No.1 (21), thrust washer No.1 (23) from the carrier No.1 (20).



(6) Disassemble the ring gear (1).

① Separate ring gear (1) from casing (9).

※ Separate casing (9) by using the groove area because loctite is spread on joining surface of ring gear (1) and casing (9) to prevent oil leakage.



(7) Disassemble the drive shaft (2).

① Using the snapping plier, disassemble snap ring (6), then disassemble thrust plate (5).



② Turn casing (9) over to face pinion gear upward. Then unscrew hex.head bolt (8) 12ea by using the tool.



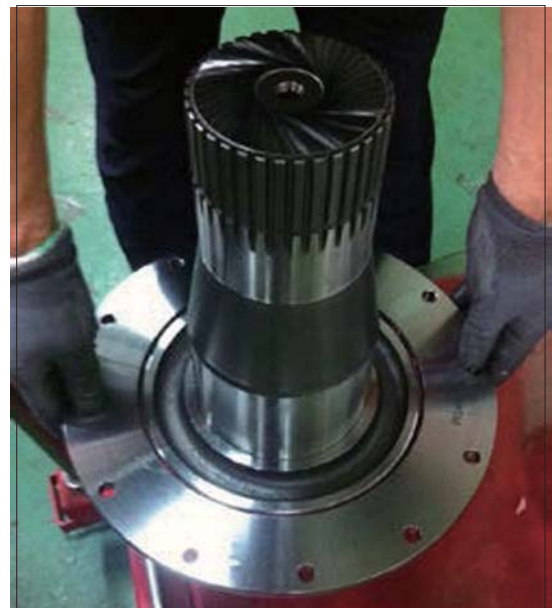
③ Disassemble drive shaft sub assy by using the press machine.

※ The drive shaft sub assy fall all together, so be careful when removing it.

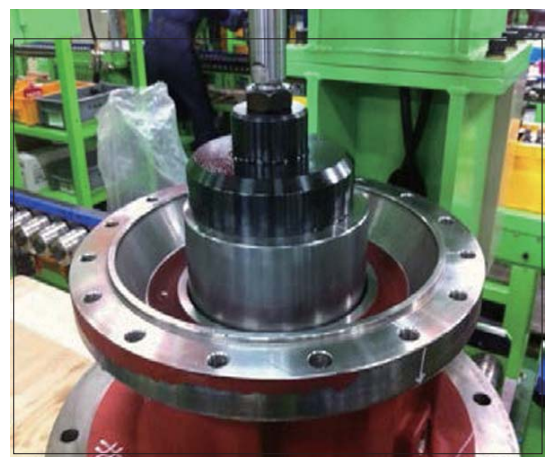


④ Disassemble sph. roller bearing (3), cover (7), oil seal (30), and sleeve (28) from the drive shaft (2).

※ Do not reuse oil seal (30).



(8) Separate sph. roller bearing (4) from casing (9) by using the press machine.



3) ASSEMBLY REDUCTION GEAR

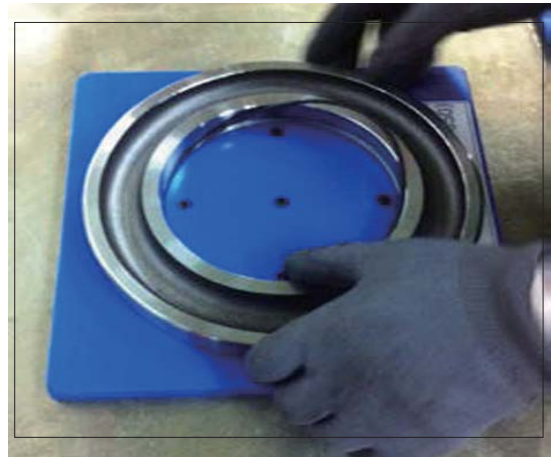
(1) Even though assembly is accomplished by reversing disassembly steps, be careful of the following.

- ① Repair the damaged part when disassembling, prepare parts for the exchange in advance.
- ② All parts should be cleaned with cleaner, and dried with compressed air.
- ③ Sliding surface, O-ring, bearing and oil seal should be lubricated with clean hydraulic oil, prior to final assembly.
- ④ Replacement O-ring and oil seal with new parts is generally recommended.
- ⑤ Use a torque wrench to make sure that assembly fasteners are tightened to specified values.
- ⑥ When assembling bolt, spread Loctite.

(2) Assemble drive shaft (2).

- ① After heating sleeve (28) for 5 minutes at 80 ~ 90°C, assemble O-ring (29).

※ Apply grease to the O-ring (29) to prevent damage.



- ② Apply grease to the oil seal (30), placed on the jig and then assemble it to cover (7) by using the press machine.

※ Apply grease to oil seal lip portion.
※ Be careful of damage of oil seal.



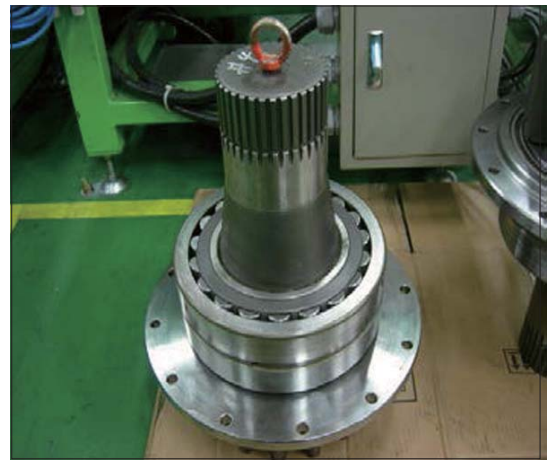
③ Assemble sleeve (28) and cover (7) to drive shaft (2).

※ Be careful of the direction of cover (7), sleeve (28).

※ Be careful of damage of oil seal.



④ After heating sph. roller bearing (3) for 13 minutes at 80~90°C and doing demagnetization, then assemble it to drive shaft (2).



⑤ After assembling O-ring (10) on casing (9), assemble drive shaft sub assy by using a press machine.



- ⑥ After spreading loctite #262 on hex.head bolt (8), screw them to fix casing (9) and cover (7).

※ Tightening torque : $8.8 \pm 0.9 \text{ kgf} \cdot \text{m}$
($63.7 \pm 6.51 \text{ lbf} \cdot \text{ft}$)

※ Screwing when rust inhibitor is not remove.



- (3) Assemble sph. roller bearing (4).

- ① Assemble sph. roller bearing (4) to casing (9) by using the press machine.



- ② After assembling thrust plate (5), assemble snap ring (6) to assembly groove of drive shaft (2).

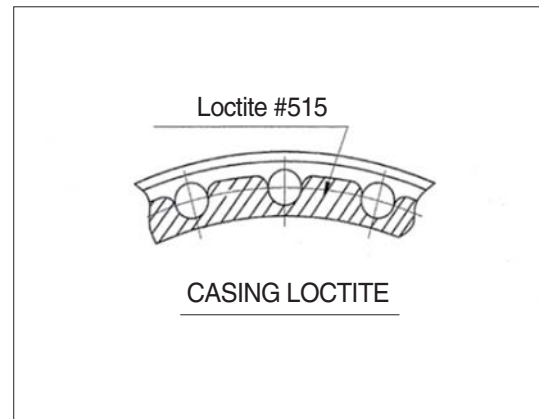
※ Assemble selected thrust plate (5) to make gap (0.1~0.3 mm) between snap ring (6) and sph. roller bearing (4).



(4) Assemble ring gear (1).

- ① Spread the loctite #515 on the casing (9) with reference to the right detail view.

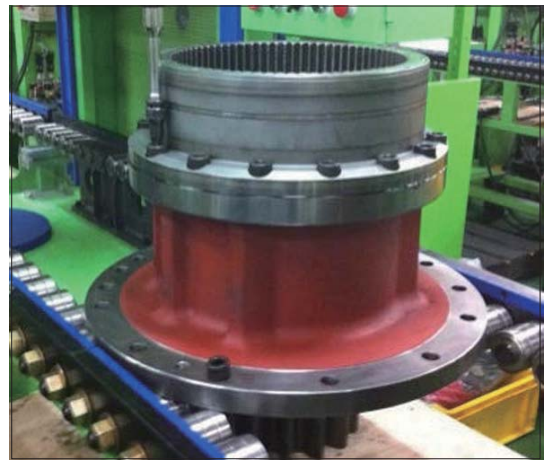
※ Loctite should not flow into casing (9).



- ② After press-fitting parallel pin (31) with a hammer on the casing (9). Then spreading loctite #262 on hex.head bolt (32), screw them.

※ Tightening torque : $33 \pm 3.3 \text{ kgf} \cdot \text{m}$
($239 \pm 23.9 \text{ lbf} \cdot \text{ft}$)

※ Screwing when rust inhibitor is not removed.



(5) Assemble carrier No.1 assy

- ① After assembling thrust plate No.1 (27) on carrier No.1 (20), assemble thrust washer No.1 (23), planetary gear No.1 (21), then assemble carrier pin No.1 (24) by using the hammer.

※ Assembly method of carrier No.2 assy is same.

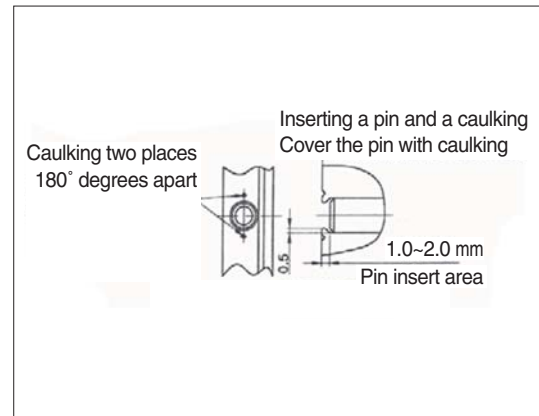


- ② Assemble spring pin No.1 (25) to fix carrier No.1 (20) and spring pin No.1 (25) by using the jig.



- ③ Caulking is performed on the assembled spring pin unit.

- ※ To cover pins, implement the caulking in two places that are located direction of 180 degrees around assembled spring pin No.1 (25).



(6) Assemble carrier No.2 assy

- ① Lift pre-assembled carrier No.2 assy.
Shaking it from side to side, assemble it to ring gear (1) to engage with ring gear (1).
Then, press-fit it with polyurethane hammer.
- ※ Check caulking and rotating state before assembly.



(7) Assemble sun gear No.2 (18).

- ① Shaking sun gear No.2 (18) from side to side, assemble it to carrier No.2 assy to engage with planetary gear No.2 (13).



(8) Assemble carrier No.1 assy.

Lift carrier No.1 assy. Shaking it from side to side, assemble it to ring gear (1) to engage with ring gear (1).

※ Check rotating state before assembly.



(9) Assemble sun gear No.1 (26).

① Shaking sun gear No.1 (26) from side to side, assemble it to engage planetary gear No.1 (21). Then fill with gear oil 11 liter.



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 : 305 kg (670 lb)

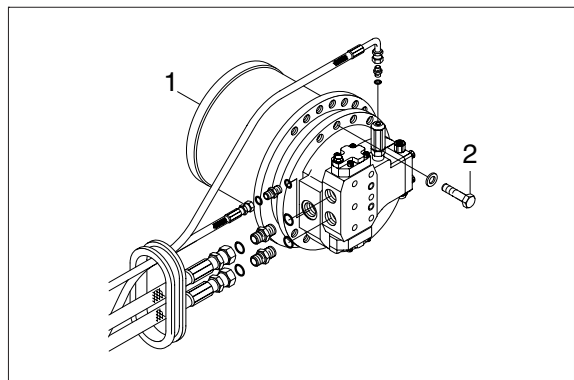
2) INSTALL

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

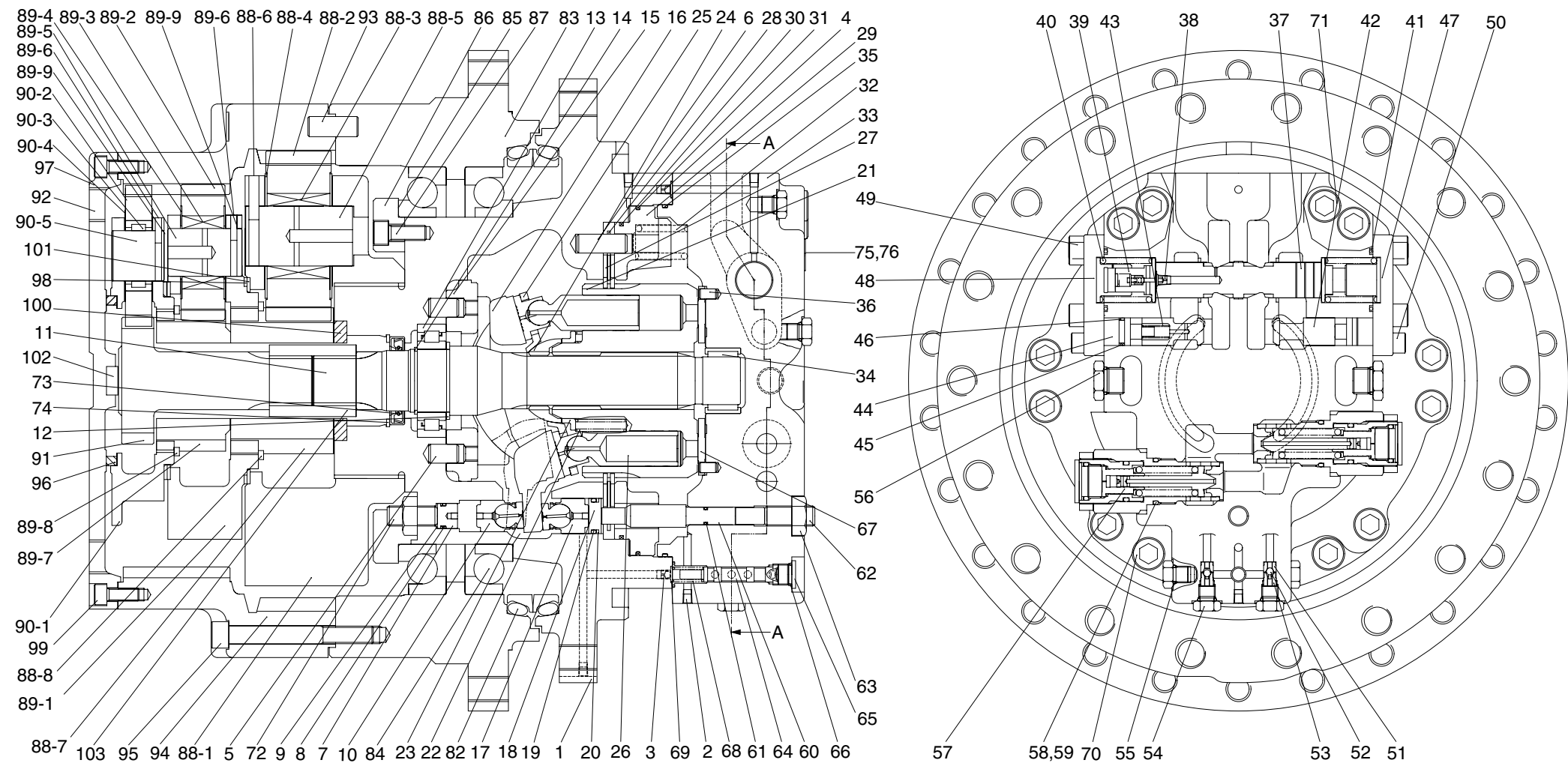
- (2) Bleed the air from the travel motor.

- 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. SPECIFICATION
1) TRAVEL MOTOR



SECTION A-A

1	Casing	16	Plate	31	Ring	46	Back up ring	61	O-ring	83	Housing	89-1	Carrier No.2	91	Sun gear No.1
2	Plug	17	Piston	32	Spring	47	Cap	62	Lock screw	84	Bearing	89-2	Planetary gear No.2	92	Plug
3	Screw	18	Stopper	33	Valve casing	48	Cap	63	Nut	85	Shim	89-3	Needle No.2	93	Lock pin
4	Screw	19	O-ring	34	Needle bearing	49	Bolt	64	Spool	86	Retainer	89-4	Thrust washer No.2	94	Ring gear
5	Pin	20	Back up ring	35	O-ring	50	Socket bolt	65	Plug	87	Bolt	89-5	Pin No.2	95	Bolt
6	Pin	21	Cylinder block	36	Pin	51	Seat	66	O-ring	88	Carrier No.3	89-6	Spring pin No.2	96	Thrust ring No.1
7	Stopper	22	Cylinder spring	37	Spool	52	Steel ball	67	Valve plate	88-1	Carrier No.3	89-7	Sun gear No.2	97	Cover
8	O-ring	23	Spacer	38	Screw	53	Stopper	68	Spring	88-2	Planetary gear No.3	89-8	Snap ring No.2	98	Thrust ring No.2
9	Back up ring	24	Guide	39	Damping check	54	Plug	69	O-ring	88-3	Needle No.3	89-9	Spring pin No.2	99	Bolt
10	Piston	25	Plate	40	Spring	55	O-ring	70	Socket bolt	88-4	Thrust washer No.3	90	Carrier No.1	100	Motor ring
11	Shaft	26	Piston & Shoe assy	41	O-ring	56	Plug	71	Socket bolt	88-5	Pin No.3	90-1	Carrier No.1	101	Thrust ring No.3
12	Spacer	27	Plate	42	Plunger	57	Relief valve	72	Lock screw	88-6	Spring pin No.3	90-2	Planetary gear No.1	102	Pad
13	Roller bearing	28	Plate	43	Spring	58	O-ring	73	Oil seal	88-7	Sun gear No.3	90-3	Needle bearing No.1	103	Coupling
14	Stop ring	29	Brake	44	Stopper	59	Back up ring	74	Lock ring	88-8	Snap ring No.3	90-4	Thrust washer No.1		
15	Support	30	Ring	45	O-ring	60	Rod	82	Floating Seal	89	Carrier No.2	90-5	Pin No.1		

2) TOOL AND TIGHTENING TORQUE

(1) Tools

Name of tools	B-size	Name of part applied
Hexagonal L-Wrench	4	Plug (2), Orifice screw (3, 4, 38)
	8	Hex socket bolt (50), Lock screw (62, 72), Plug (65)
	10	Hex socket bolt (49)
	46	Hex (57)
Socket wrench/ spanner	19	Hp plug (54)
	24	Hex nut (63)
	27	Hp plug (56)
Snap-ring plier (for holes, axis)		Ring stop (14), Ring lock (74)
Solder hammer		Needle bearing (34), Pin (5, 6, 36)
Torque wrench		Size : 500, 3000
Jig for assembling oil seal		Oil seal (73)
Induction heating apparatus for bearing		Roller bearing (13)

(2) Tightening torque

NO.	Part name	Standard	Size	Torque	
				kgf · m	lbf · ft
2	Plug	NPTF 1/16	4	0.9±0.2	6.51±1.45
3, 4, 38	Orifice screw	NPTF 1/16	4	0.7	5.06
49	Hex socket bolt	M12	10	10	72.33
50	Hex socket bolt	M10	8	6.7	48.46
54	Plug	PF 1/4	19	3.7	26.76
56	Plug	PF 1/2	27	11	79.56
57	Relief valve	HEX 46	46	18±1.0	130±7.0
63	Nut	M16	24	24	173.59
65	Plug	PF 3/8	8	7.5	54.25
70, 72	Hex socket bolt	M16	14	24	173.59
71	Hex socket bolt	M16	14	24	173.59

2. DISASSEMBLING

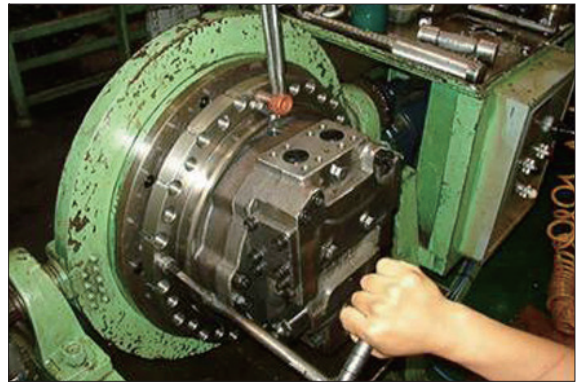
1) GENERAL INSTRUCTIONS

- (1) Generally, hydraulic equipment is precisely manufactured and clearances between each parts are very narrow. Therefore, disassembling and assembling works should be performed on the clean place where dusts hardly gather. Tools and kerosene to wash parts should also be clean and handled with great care.
 - (2) When motor is removed from the host machine, wash around the ports sufficiently and put the plugs so that no dust and/or water may invade. Take off these plugs just before the piping works when re-attach it to the host machine.
 - (3) Before disassembling, review the sectional drawing and prepare the required parts, depending on the purpose and the range of disassembling.
Seals, O-rings, etc., if once disassembled, are not reusable.
There are some parts that should be replaced as a subassembly.
Consult with the parts manual in advance.
 - (4) The piston can be inserted to whichever cylinder block for the initial assembling.
However, their combination should not be changed if they are once used. To reuse them, put the matching mark on both pistons and cylinder block before disassembling.
- ▲ Take great care not to pinch your hand between parts while disassembling nor let fall parts on your foot while lifting them.**

2) DISASSEMBLING TRAVEL MOTOR

(1) Fix a hydraulic motor on jig with four pieces of bolts (M16×60L).

※ When rotating jig up to 90° in disassembling and assembling, fix a motor making drain plug (56) faced to the bottom.



(2) After disassembling drain plug (56), let an oil in a case of a motor discharged.

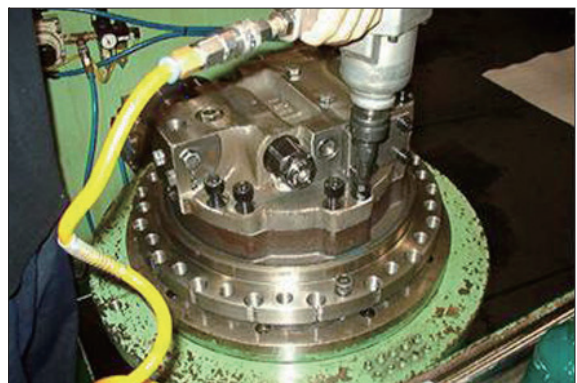
※ Check whether manufactured chips or metal dust are added in a drain oil.



(3) In order to making the out-put axis of a hydraulic motor faced upward, disassemble ring lock (74) with a plier after rotating jig up to 90° in disassembling and assembling.

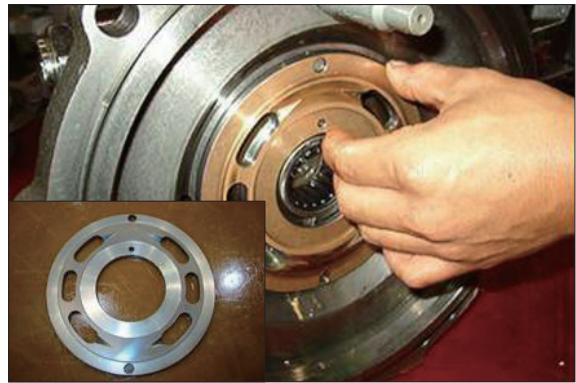


(4) Disassemble hexagon socket bolts (70, 71) holding valve casing.



(5) After detaching valve casing sub, disassemble valve plate (67).

※ In case of serious abrasion of valve plate, exchange it to a new one.



300072TM24A

(6) After taking brake spring (32) and then bonding two pieces of M16 bolts to brake piston (29), disassemble it pulling it upward.

※ There are 10 pieces of brake spring.

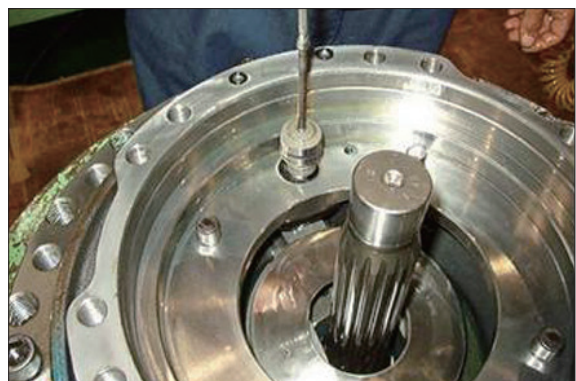


(7) First, rotate jig in disassembling and assembling up to 90° , then let a motor faced toward the horizon. then disassemble a cylinder and piston sub.



(8) disassemble stopper L (18) and piston swash (17).

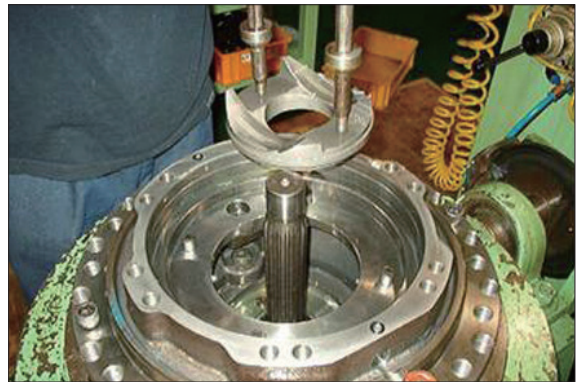
※ Piston swash : Use M5 bolt



(9) Disassemble swash plate (16).



(10) After put M12 into support (15), disassemble support.

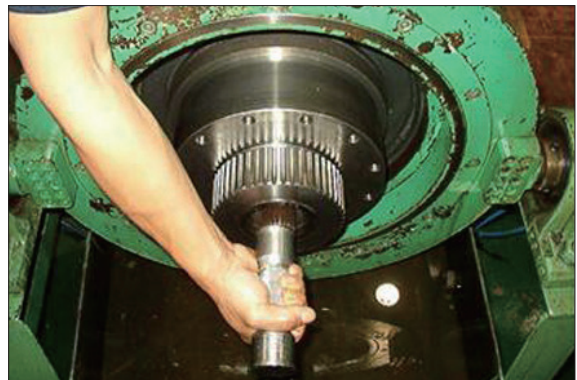


(11) disassemble piston swash (10) and stopper (7).



(12) In order to making the turning axis (11) faced upward, put it way from shaft casing tapping the bottom of the turning axis with hammer, after rotating jig up to 90° in disassembling and assembling.

※ Try to deal with roller bearing (13) without any damage.



(13) Disassemble valve casing sub.

- ※ Try to deal with needle bearing (3) without any damage.

① Disassemble plowing road (60), automatic changeover spring (68), and automatic changeover spool (64).

- ※ Do not touch hexagon nut (63) for controlling the amount of an oil and lock screw (62).

If there is any abnormality on plowing spool and spring, exchange them to new ones.



② After unloading hexagon socket bolts (49, 50) and taking caps (47,48) away, disassemble parts of counter balance valve (37~46).

- ※ In disassembling counter balance valve, be careful of figuring out the directions such as the right or the left of finger.

If there is any abnormality in spool spring check, exchange it to new one.



(14) Disassemble cylinder sub.

- ① Disassemble set plate (25) and piston (26) sub.



- ② Disassemble friction plate (27) and lee plate (28) in cylinder block (21).



- ③ Dismantle ball guide (24), spacer (23), and cylinder spring (22).



3) ASSEMBLING TRAVEL MOTOR

(1) Assemble the sub of a turning axis.

① After assembling bearing spacer (12) into a turning axis (11), have cylinder roller bearing (13) thermal-reacted.

a. In the thermal reaction of cylinder roller bearing, use an induction heating apparatus and adjust the temperature as about 100°C.

b. Deal moisturized copper part oil seal in a turning axis without any damage of it.



(2) Assemble ring stop (14) with a plier.

※ Be careful of the direction of ring stop.

(The direction of round is the side of bearing)



(3) Assemble valve casing sub.

① Bond seven pieces of plug (2) in valve casing (33) with standard torque.

② After taping plug with seal taper and spread rock tight, assemble it.

• Tightening torque : 7~11 kgf · m
(50.63~79.5 lbf · ft)



(4) Compress pin (36) into.

- ※ Using a hammer, make the height of pin 5mm from the a contact surface of valve plate.



(5) Assemble needle bearing (34).



(6) Assemble seat (51), ball (52), stopper (53), and hp plug (54) with O-ring (55), respectively.

- ① Be careful of the procedure and direction of assembling seat and stopper.
 - Tightening torque : 37 kgf · m
(267.6 lbf · ft)



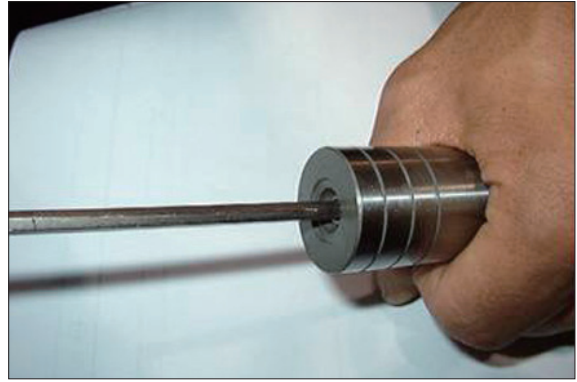
(7) Assemble hp plug (54) set up with O-ring (55).

- 5sites
- Tightening torque : 37 kgf · m
(267.6 lbf · ft)

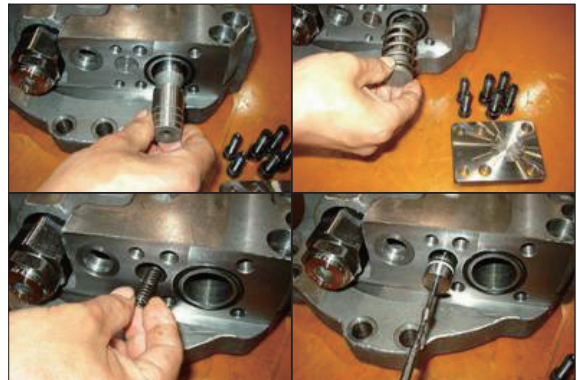


- (8) Bond orifice screw (38) on the right and left side of spool c.b (37) with a standard torque.

· Tightening torque : 7 kgf · m (50.63 lbf · ft)



- (9) Insert hold spool c.b (37) and damper check (39) into valve casing.



- (10) Bond cap R (47) and cap L (48) with hexagon socket bolts (49, 50).

- ① Remember not to exchange cap R, L each other in assembling.

Tightening torque

- M12 : 100 kgf · m (item 49)
- M10 : 67 kgf · m (item 50)



- (11) After fastening with torque, insert automatic plowing spool (04), spring (68) and O-ring (69).

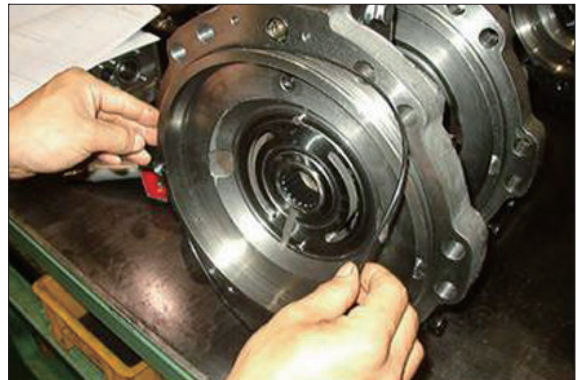
· Tightening torque : 75 kgf · m
(542.4 lbf · ft)



(12) Assemble swash road (60) inserted by O-ring (61).



(13) Insert O-ring (32) into valve casing.



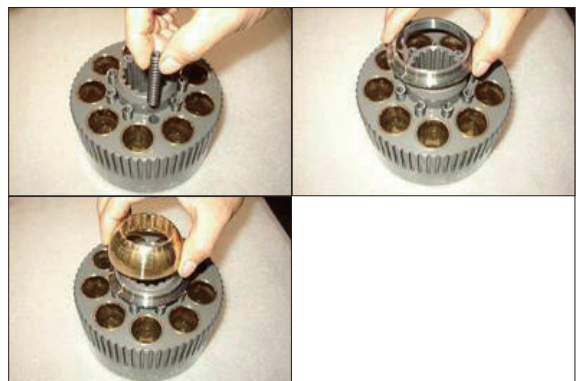
(14) Bond drain plug (30) inserted by O-ring (31) with standard torque.
· Tightening torque : 100 kgf · m
(723.3 lbf · ft)



(15) Assemble cylinder sub.

① Assemble cylinder spring (22), spacer (23), and spherical surface bush (24) into cylinder (21).

Set the position of spline of spherical surface bush and cylinder.



(16) Assemble friction plate (27) and separated plate (28) into cylinder.



(17) After insert piston shoe (26) into set plate (25), assemble it into cylinder.



(18) Using jig, compress oil seal (73) into shaft casing (01).



(19) Assemble the body of a motor.

① Bond seven piece of plug (02) in shaft casing plug with standard torque.

a. After taping plug with seal taper and spread rock tight, assemble it.

• Tightening torque : 7~11 kgf · m
(50.63~79.5 lbf · ft)



(20) Using a hammer and a handle, compress pin (5, 6).

① Pin(5) : Set the height as 10mm from the contact surface of a plate supporter. - 2pieces.

Pin(6) : Set the height as 19mm from the manufactured surface of shaft casing. - 4pieces.



(21) Assemble sub of a turning axis.



(22) Assemble plate supporter (15) with M12 bolt.

※ Be careful of the direction of plate supporter driven.



(23) Assemble plate (16) into plate supporter.

① Spread grease in moisturized copper part of plate.

② Confirm the soft movement of plate.



(24) Assemble stopper L (36) combined by plowing piston (35) and O-ring (42).



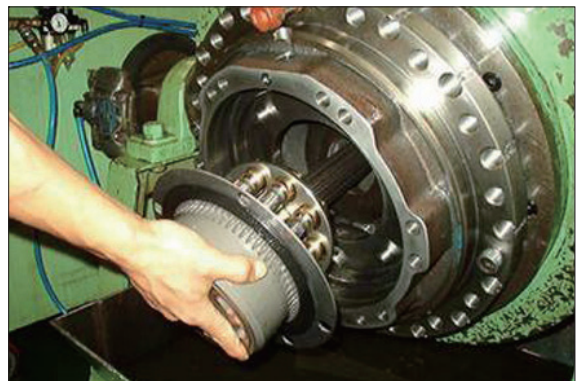
(25) Rotating dismantling and assembling jig up to 90° make shaft from perpendicular to horizontal.

※ Be careful that plate is not segregated from plate supporter.



(26) Assemble cylinder sub.

※ Adjusting pin into holes of separated plate, assemble it.



(27) Rotating dismantling and assembling jig up to 90°, make the direction of shaft from the horizon to the perpendicular.



A photograph showing a circular metal flange with six bolt holes. The flange is being held by a person's hands, one at the top and one at the bottom. The background is a solid orange color. The flange has a polished, reflective surface.

(32) After inserting valve plate (67) into valve casing, bond it into shaft casing with hexagon socket bolt (70).

- ① Spread grease on the back side of valve plate, in order for valve plate to be adhered well.
- ② Use a crane in assembling it into valve plate shaft casing.
- ③ Set holes, $\varnothing 5$, of valve plate heading toward the port of the inlet and outlet of valve casing.
- ④ Spread grease in the side of plowing spool of plowing spring in order that plowing spring can not be detached.
 - Tightening torque : $240 \text{ kgf} \cdot \text{m}$
($1736 \text{ lbf} \cdot \text{ft}$)
 - Tightening torque : $180 \pm 10 \text{ kgf} \cdot \text{m}$
($1302 \pm 72.3 \text{ lbf} \cdot \text{ft}$)



(33) Bond relief valve (57) with standard torque.



(34) Unloosen four pieces of bolts (M20 \times 50L) fixing a motor and remove the motor away from jig.



3. DISASSEMBLING REDUCTION UNIT

1) Preparation for disassembling

- (1) The reduction units removed from excavator are usually covered with mud. Wash outside of propelling unit and dry it.
- (2) Locate reducer in order for drain port to be at the lowest level loosen taper screw plug of drain port, and drain oil from reduction gear.

※ While oil is still hot, inside of the unit may be pressurized.

▲ Take care of the hot oil gushing out of the unit when loosening the plug.

- (3) Mark for mating

Put marks on each mating parts when disassembling so as to reassemble correctly as before.

2) Setting reduction unit (or whole propelling unit) on work stand for disassembling

- (1) Remove hexagon socket head bolts (M10, 19) at 3 places from cover (17) almost equally each other, and then install eye bolts (M10).

Lift up the unit using them and place it on work stand with cover upward.

※ Take great care not to pinch your hand between parts while disassembling nor let fall parts on your foot while lifting them.

3) Removing cover

- (1) Remove the rest of hexagon socket head bolts (M10, 19) that secure ring gear. Loosen all the socket bolts and then, disassemble cover.
- (2) As the cover (17) is adhered to ring gear (14), disassemble ring gear (14) and cover (17) by lightly hammering slantwise upward using sharpen punch inserted between the cover and ring gear.



4) Removing NO.1 carrier sub assy

(1) Remove No.1 sun gear

※ Be sure to maintain it vertical with the ground when disassembling No.1 sun gear.



(2) Screw three eye bolt (M10, 15) in No.1 carrier and lift up and remove No.1 carrier assy.



5) Removing No. 2 carrier sub assy

(1) Remove No.2 sun gear

※ Be sure to maintain it vertical with the ground when disassembling No.2 sun gear.

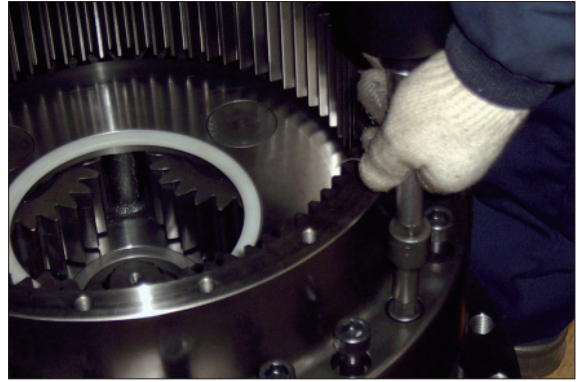


(2) Screw three M10 eye bolt in No.2 carrier and lift up and remove No.2 carrier assy.



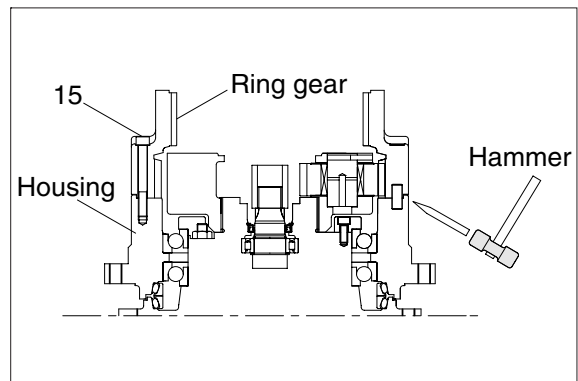
6) Removing ring gear

- (1) Remove hexagon socket head bolts (M14, 15) that secure ring gear and housing.

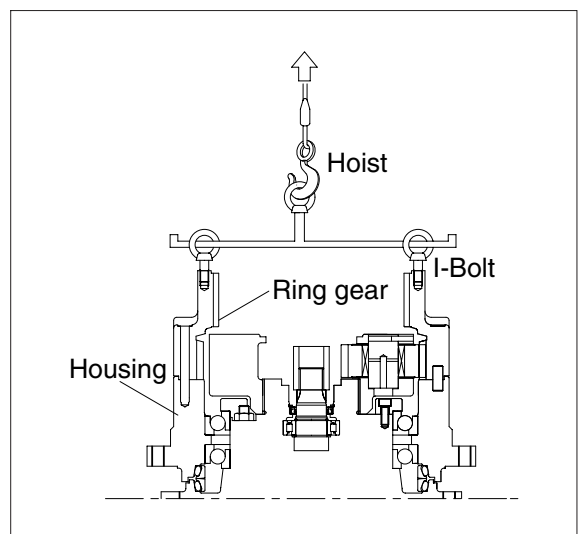


- (2) As the ring gear (14) is adhered to housing (3), disassemble ring gear (14) and housing (3) by lightly hammering slantwise upward using sharpen punch inserted between the ring gear and housing.

※ Carefully disassembling ring gear not to make scratch on it.



- (3) Screw three eye bolt (M10) in ring gear and lift up and remove it.



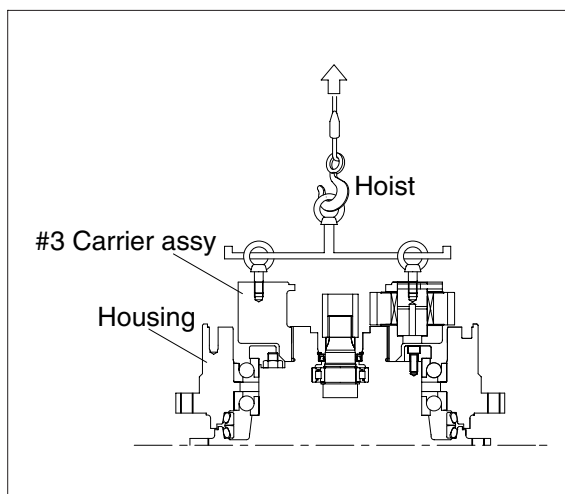
7) Remove No.3 carrier sub assy

(1) Removing No.3 sun gear

※ Be sure to maintain it vertical with the ground when disassembling No.3 sun gear.

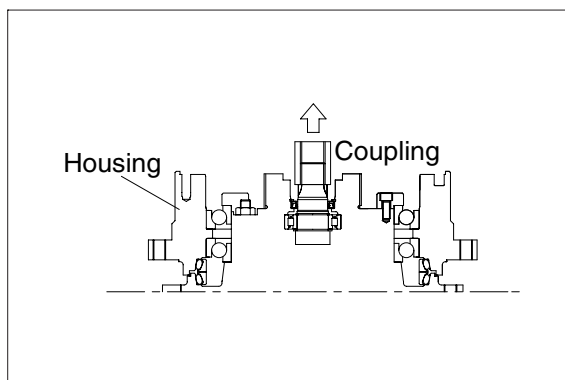


(2) Screw three eye bolt(M10) in No.3 carrier and lift up and remove No.3 carrier assy.



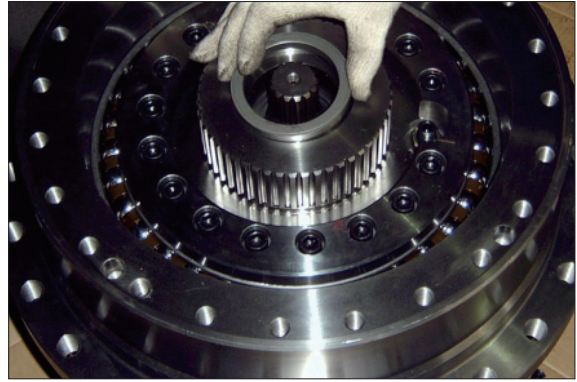
8) Remove coupling

(1) Remove coupling



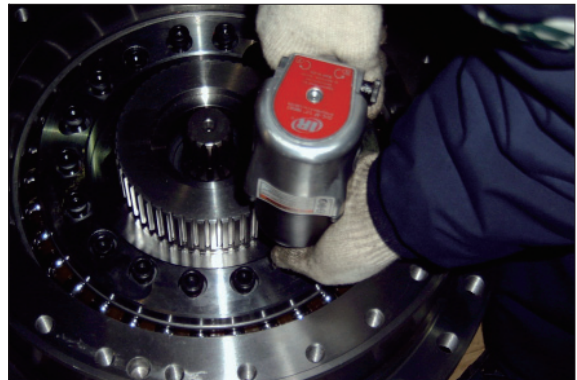
9) Remove motor ring

- (1) Remove motor ring using hand.



10) Removing retainer & shim

- (1) Remove hexagon socket (M12) head bolts that retainer and motor.
- (2) Remove retainer & shim.

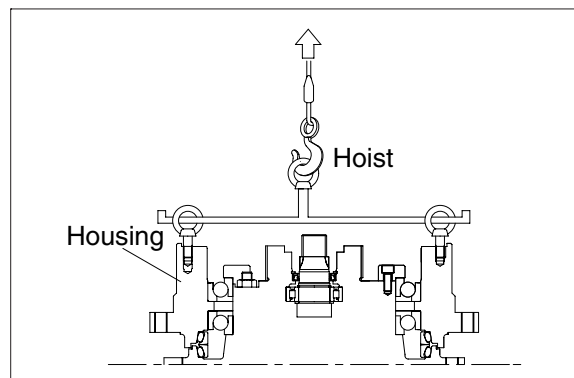


11) Removing housing sub assy

- (1) Screw eye bolt (M14) in housing and lift up housing assembly including angular bearing and floating seal.

12) Removing floating seal

- (1) Lift up a piece of floating seal of motor side.



13) Disassembling housing assembly

- (1) After turning housing, lift up a piece of floating seal from housing and then remove it.
- ※ Don't disassemble angular bearing.

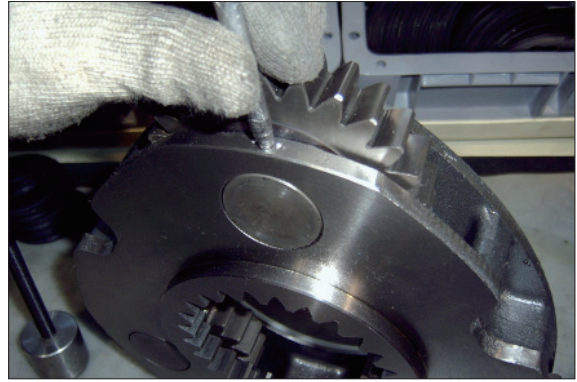


14) Disassembling No.1 carrier

- (1) Remove thrust ring (16) from carrier.
- (2) Knock spring pin (89-6) fully into No.1 pin (90-5).
- (3) Remove planetary, thrust washer, No.1 pin, bearing from carrier.

15) Disassembling No.2,3 carrier

- (1) Disassemble (14) carriers, using the same method for No.1 carrier assembly.



6. ASSEMBLING REDUCTION GEAR

- General precautions

Clean every part by kerosene and dry them by air blow.

Surfaces to be applied by locktite must be decreased by solvent.

Check every part for any abnormalities.

Each hexagon socket head bolt should be used with locktite No. 242 applied on its threads.

Apply gear oil slightly on each part before assembling.

Take great care not to pinch your hand between parts or tools while assembling nor let fall parts on your foot while lifting them.

Inspection before reassembling

Thrust washer

- Check if there are seizure, abnormal wear or uneven wear.
- Check if wear is over the allowable limit.

Gears

- Check if there are pitting or seizure on the tooth surface.
- Check if there are cracks on the root of tooth by die check.

Bearings

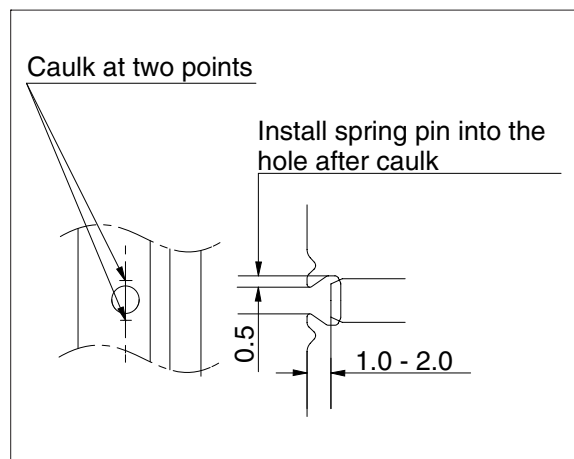
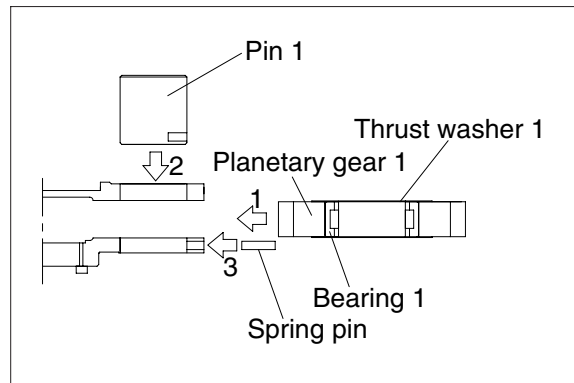
- Rotate by hand to see if there are something unusual such as noise or uneven rotation.

Floating seal

- Check flaw or score on sliding surface or on O-rings.

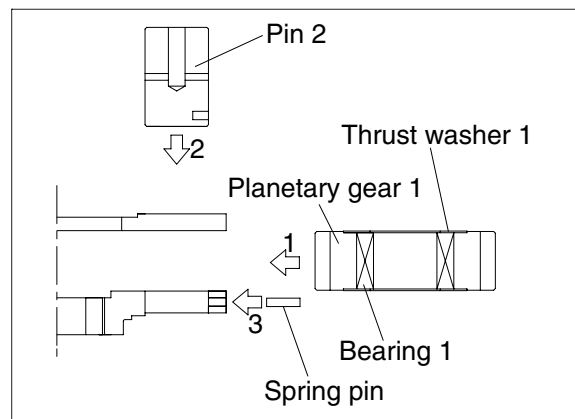
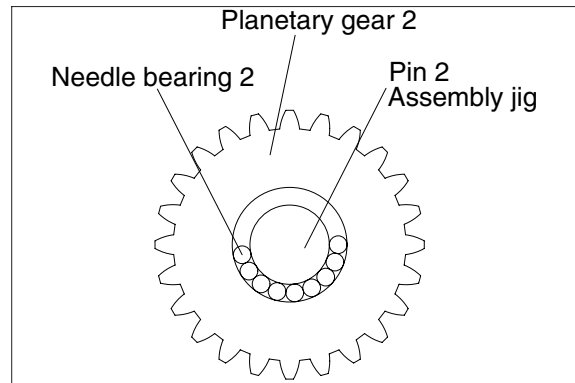
1) Assembling No.1 carrier

- (1) Put No.1 carrier (90-1) on a flat place.
- (2) Install No.1 needle bearing (90-3) into No.1 planetary gear (90-2), put 2 ea of No.1 thrust washer (90-4) on both sides of bearing, and then install it into carrier.
- (3) Install No.1 pin (90-5) into No.1 carrier where the holes for No.1 pin (90-5) are to be in line with those of No.1 carrier, and then, install spring pins into the holes.
- (4) Caulk carrier holes as shown on the picture.
- (5) Assembly ring thrust (96) into carrier.



2) Assembling No.2 carrier

- (1) Make No.2 planetary gear (89-2) vertical, assemble 8-9 ea of No.2 needle (89-3), and then, assemble the remaining No.2 needle by use of the assembly jig for No.2 pin (89-5).
- (2) Remove out the assembly jig for No.2 pin and assemble 2 ea of No.2 thrust washer (89-4) into No.2 carrier (89-1).
- (3) Insert No.2 pin (89-5) into carrier where the holes of No.2 pin (89-5) are in line with those of carrier.
- (4) Hammer spring pin (89-6) to insert into carrier hole and No.2 pin hole, and then, caulk. Assemble 2 sets using the same method.
- (5) Assemble ring thrust (98) into carrier.

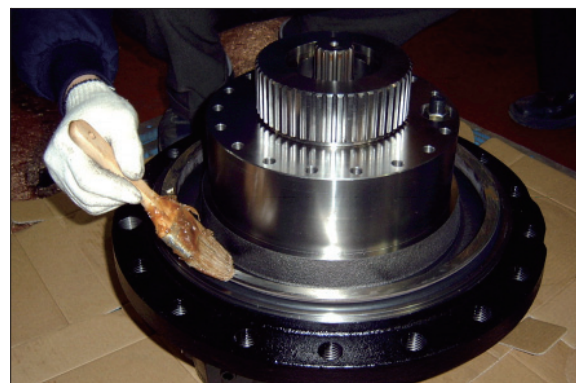
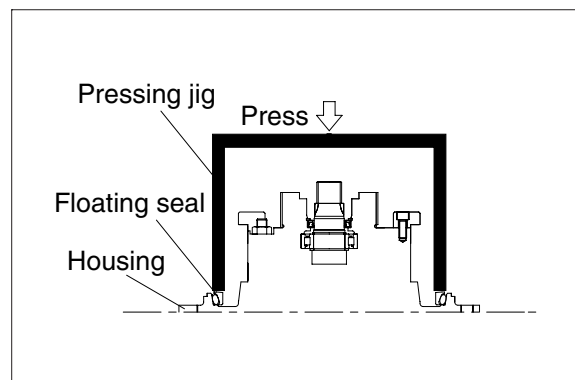


3) Assembling No.3 carrier

- (1) Assemble 4 sets, using the same method for assembly of No.2 carrier.

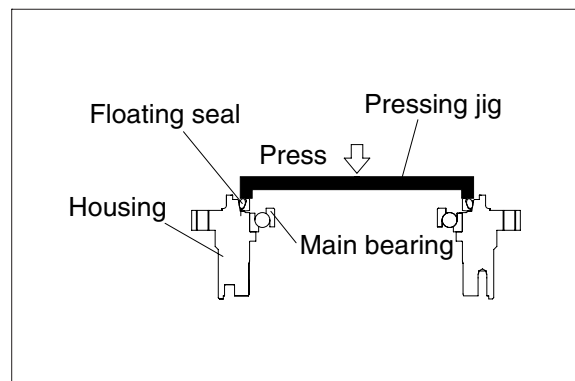
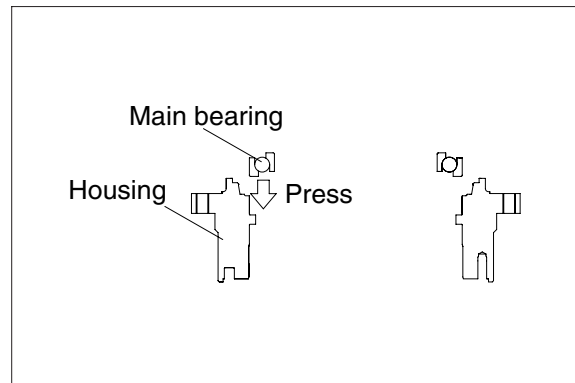
4) Installing floating seal

- (1) Assemble floating seal into motor by use of pressing jig.
- (2) Grease the contact parts for floating seal which is assembled into motor.



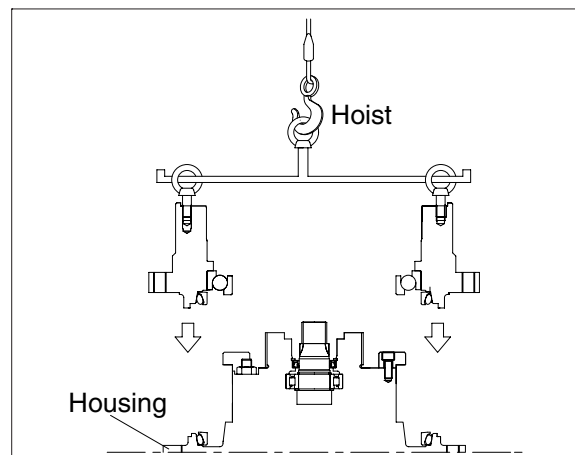
5) Assembling housing

- (1) Heat housing at 60~70° C while clearing it out and then, assemble bearing.
 - (2) Assemble floating seal into housing by use of pressing jig as shown on the picture.
- ※ Be sure to maintain it vertical with the ground when assembling bearing and floating seal.



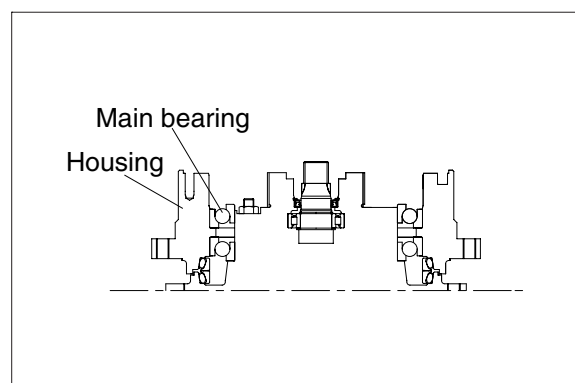
6) Installing housing assembly

- (1) Install 2 ea of eye bolt (M14) into housing assembly.
 - (2) Assemble housing into motor by use of hoist and eye bolt.
- ※ Be sure to tighten eye bolt deep enough.



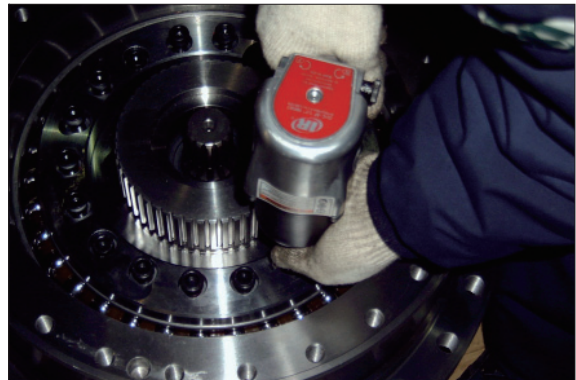
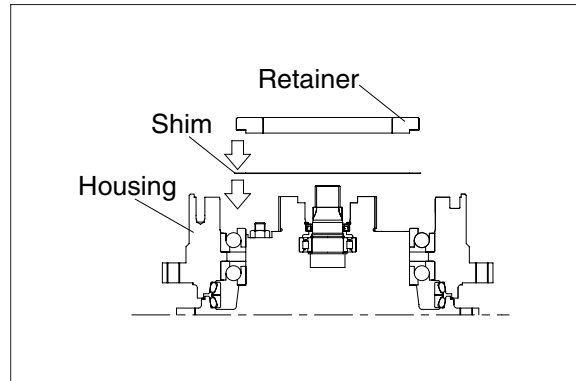
7) Installing main bearing

- (1) Heat main bearing at 60~70°C and then, install.
- ※ Be sure to maintain it vertical with the ground when assembling bearing.



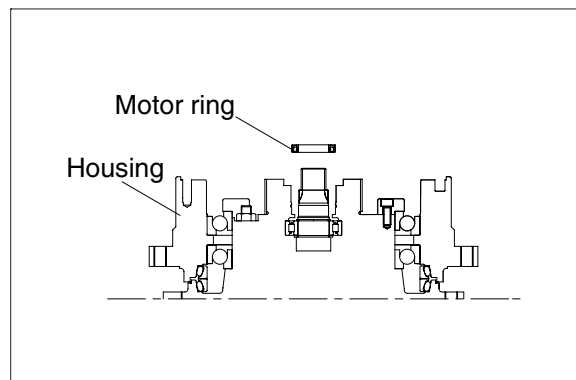
8) Installing retainer (86) and shim (85)

- (1) Measure clearance between main bearing and retainer by use of jig to decide the thickness of shim and select and appropriate shim, and then, assemble retainer.
- (2) Apply locktite (#242) on hexagon socket head bolt (M12), and then, bolt.



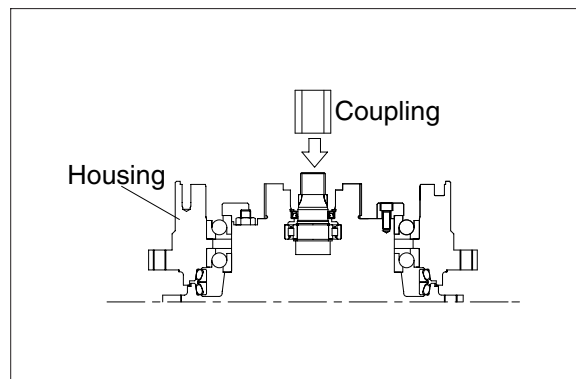
9) Installing motor ring

- (1) Insert motor ring into motor to install.



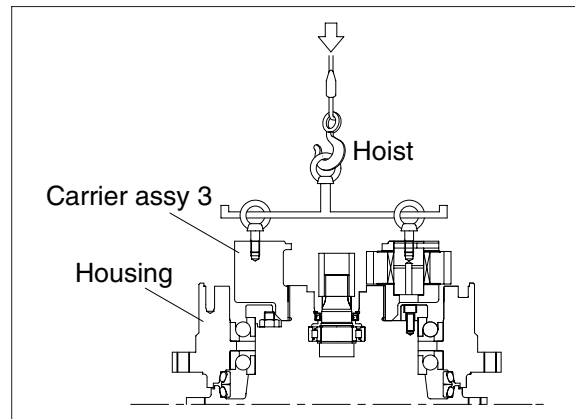
10) Installing coupling

- (1) Install coupling on spline of the motor.



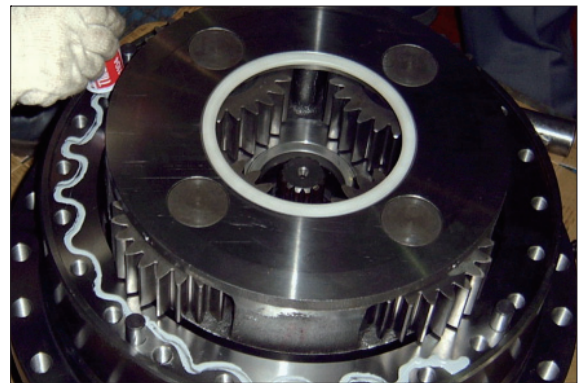
11) Installing No.3 carrier sub assy

- (1) Install eye bolt (M10) on No.3 carrier assembly.
- (2) Lift No.3 carrier assembly and then, assemble it into reducer.
- ※ Match it vertical with the spline of the motor and the, slowly lower.



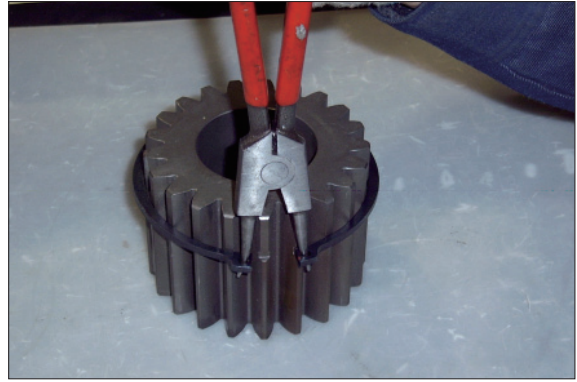
12) Installing ring gear

- (1) Apply three bond #1104 (Locktite #515) on housing for ring gear without gap.
- (2) Insert lock pin into housing hole.
- (3) Install eye bolt (M12) on the tap for cover of ring gear.
- (4) Lift ring gear and then, assemble into housing.
- (5) Apply locktite to hexagon socket bolt (M14) and then, bolt, having appropriate torque.



13) Installing No.3 sun gear (88-7)

- (1) Install snap ring (88-8) in No.3 sun gear (88-7) by use of snap ring plier.
- (2) Install No.3 sun gear on the spline of No.3 carrier, matching teeth of them.



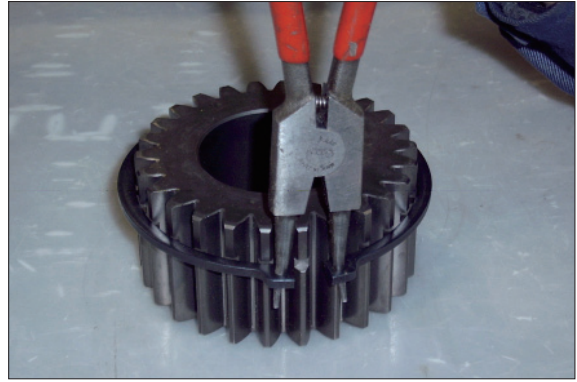
14) Installing No.2 carrier sub assy

- (1) Install eye bolt(M10) on No.2 carrier assembly.
- (2) Lift No.2 carrier assembly and then, slowly put it down on ring gear.
- (3) Rotate planetary gear by hands and install in ring gear.



15) Installing No.2 sun gear (89-7)

- (1) Install snap ring (89-8) on No.2 sun gear (89-7) by use of snap ring flier.
- (2) Install No.2 sun gear on the spline of No.2 carrier and No.2 planetary gear, matching teeth of them.



16) Installing No.1 carrier sub assy

- (1) Install eye bolt (M10) on No.1 carrier assembly.
- (2) Lift No.1 carrier assembly and then, put it down on ring gear slowly.
- (3) Rotate planetary gear by hands to install on ring gear, matching their teeth.



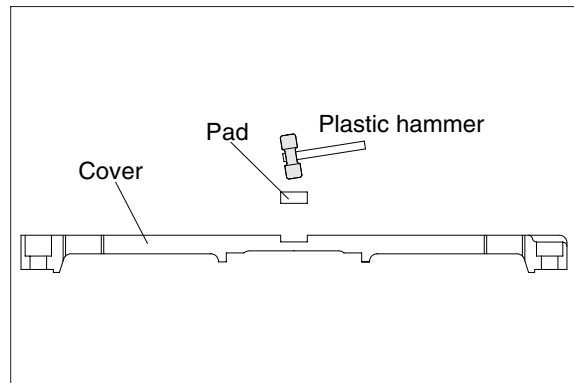
17) Installing No.1 sun gear (91)

- (1) Put down No.1 sun gear on No.1 carrier, maintaining it vertical with spline of coupling.
- (2) Install No.1 sun gear on No.1 planetary gear, matching their teeth.



18) Installing cover (97)

- (1) Beat pad with plastic hammer, and press it into the center of cover.
- (2) Apply three bond #104 (locktite #515) on the ring gear for without gap.
- (3) Put cover on ring gear, apply locktite (#242) in hexagon socket head bolt (M10), and then, bolt.
- (4) Fill gear oil (8L) into drain port.
- (5) Apply sealing tape (teflon) on PT3/4 plug and then, bolt.



GROUP 7 RCV LEVER

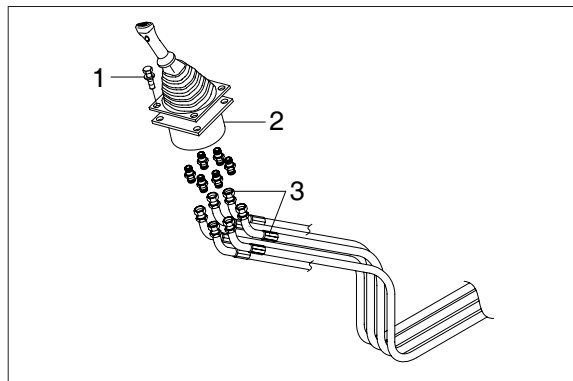
1. REMOVAL AND INSTALL

1) REMOVAL

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

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

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

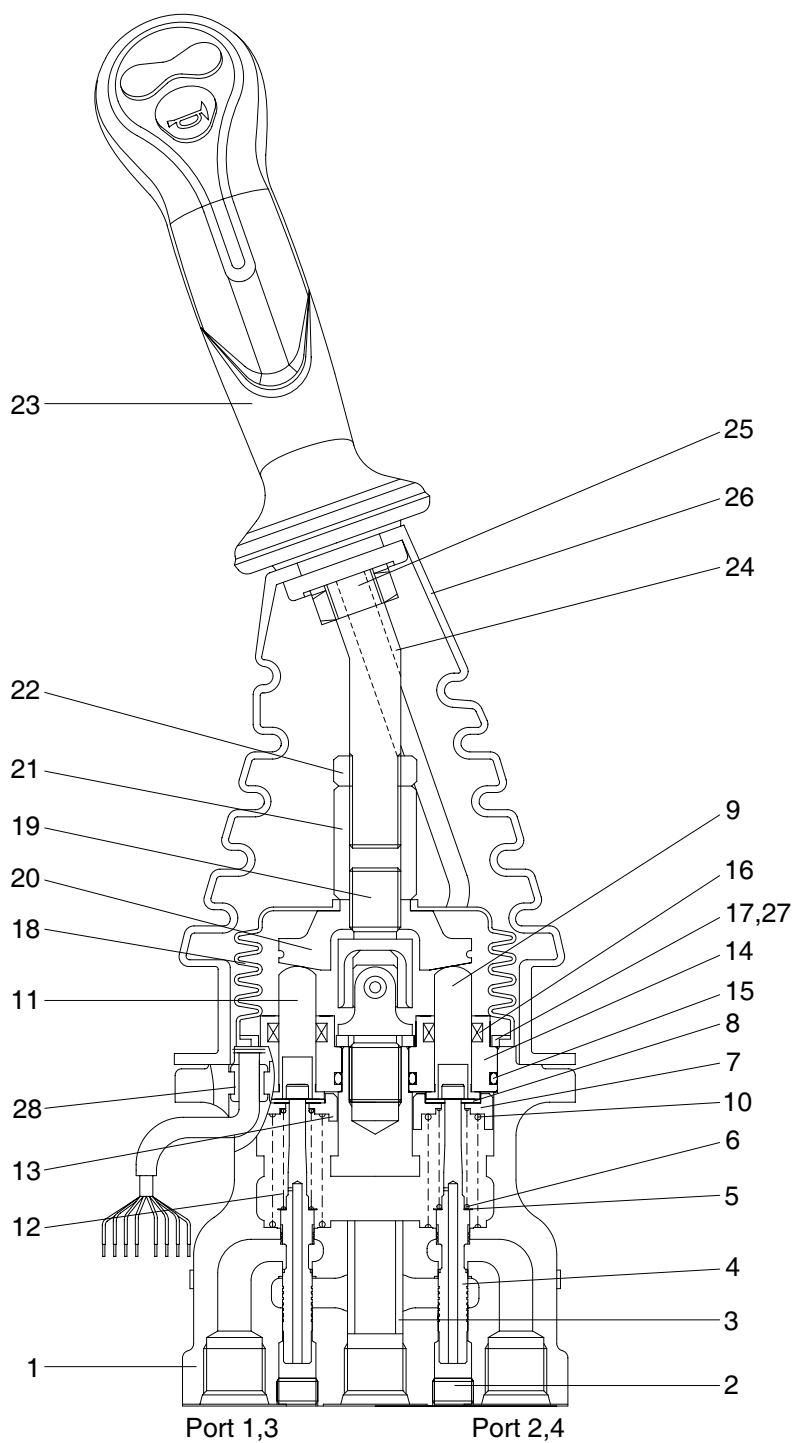


2) INSTALL

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

2. DISASSEMBLY AND ASSEMBLY

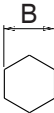
1) STRUCTURE



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

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

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

(2) Tightening torque

Part name	Item	Size	Torque	
			kgf·m	lbf·ft
Plug	2	PT 1/8	3.0	21.7
Joint	19	M14	3.5	25.3
Swash plate	20	M14	5.0±0.35	36.2±2.5
Adjusting nut	21	M14	5.0±0.35	36.2±2.5
Lock nut	22	M14	5.0±0.35	36.2±2.5

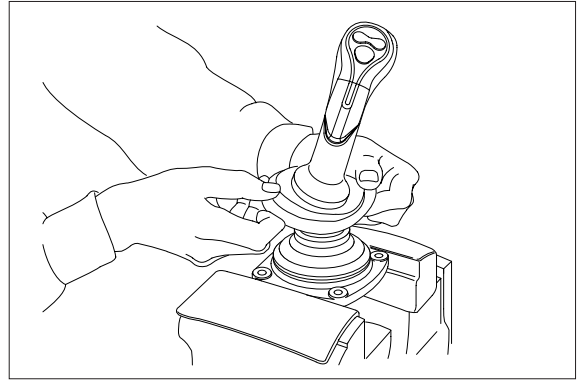
3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

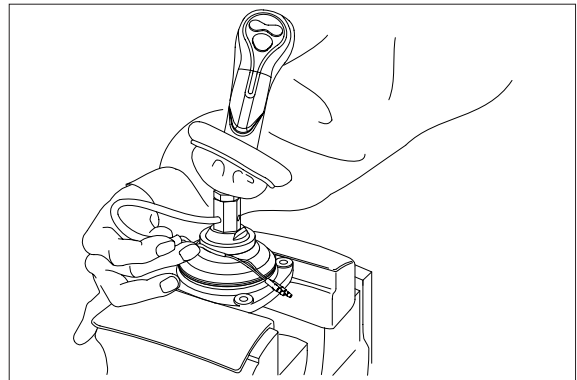
※ Put blind plugs into all ports

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

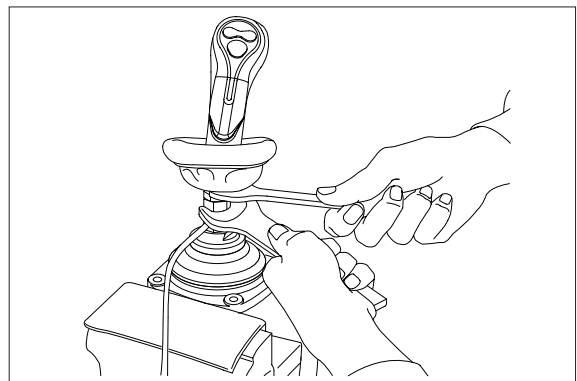
(3) Remove end of boot (26) from case (1) and take it out upwards.



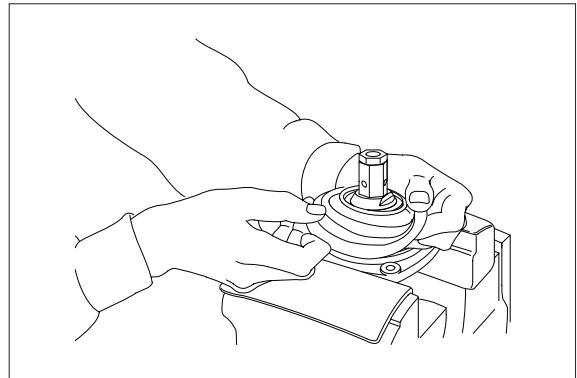
※ For valve with switch, remove cord also through hole of casing.



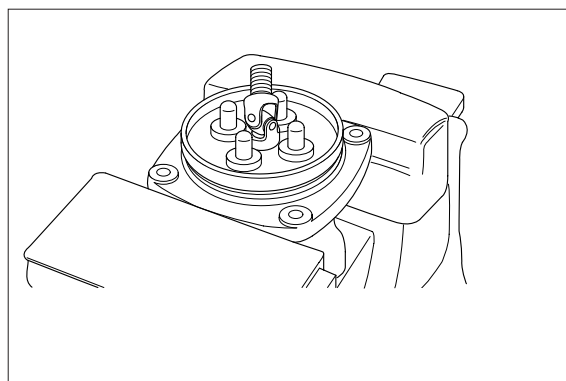
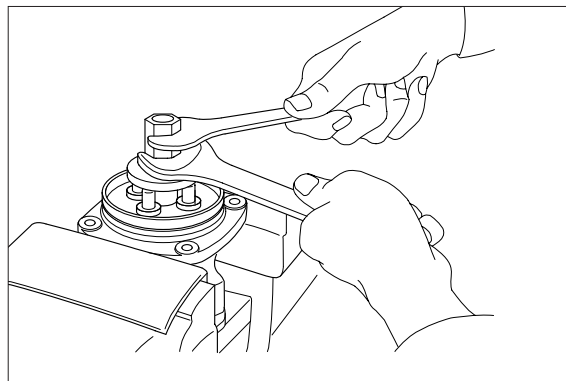
(4) Loosen lock nut (22) and adjusting nut (21) with spanners on them respectively, and take out handle section as one body.



(5) Remove the boot (18).

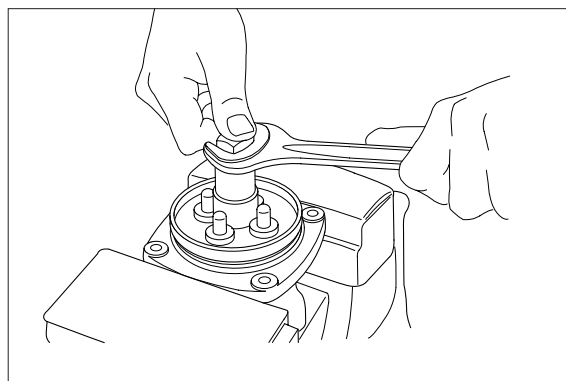
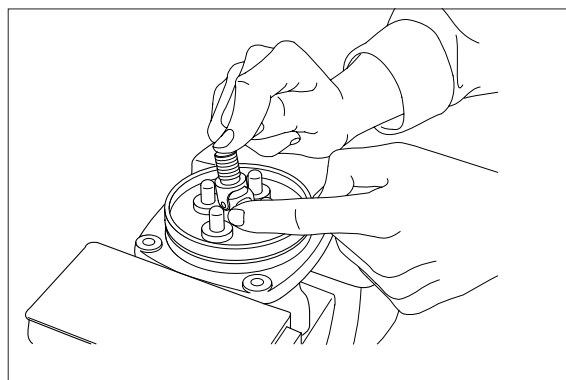


- (6) Loosen adjusting nut (21) and swash plate (20) with spanners on them respectively, and remove them.

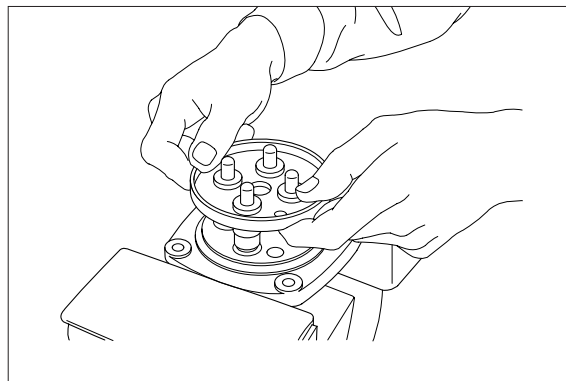


- (7) Turn joint anticlockwise to loosen it, utilizing jig (Special tool).

※ When return spring (10) is strong in force, plate (17), plug (14) and push rod (11) will come up on loosening joint. Pay attention to this.



(8) Remove plate (17).



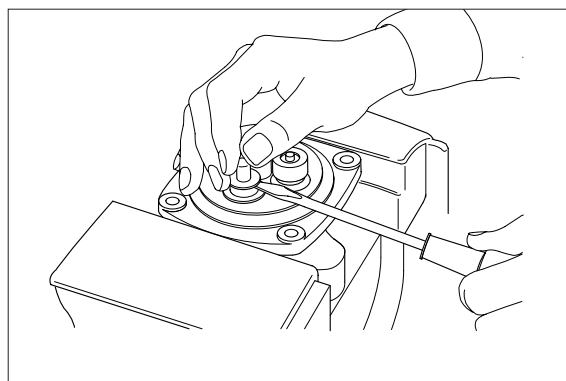
(9) When return spring (10) is weak in force, plug (14) stays in casing because of sliding resistance of O-ring.

※ Take it out with minus screwdriver.

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

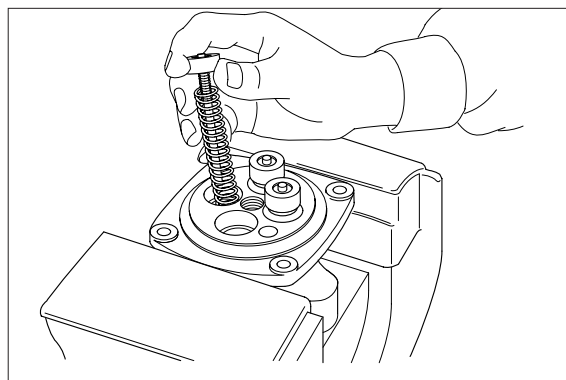
※ During taking out, plug may jump up due to return spring (10) force.

Pay attention to this.

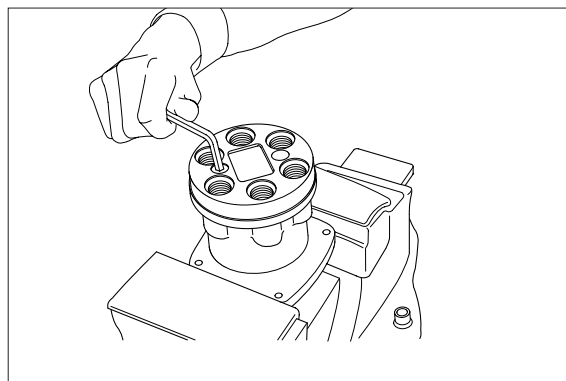


(10) Remove reducing valve subassembly and return spring (10) out of casing.

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

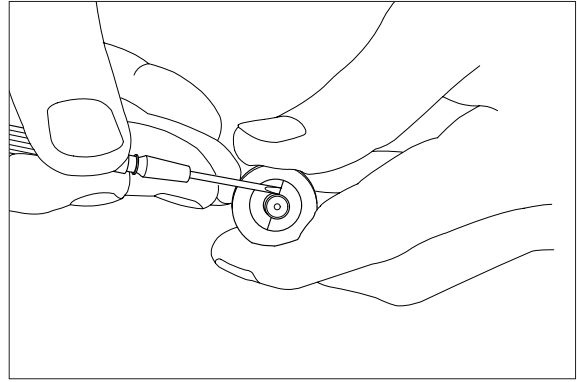


(11) Loosen hexagon socket head plug(2) with hexagon socket screw key.



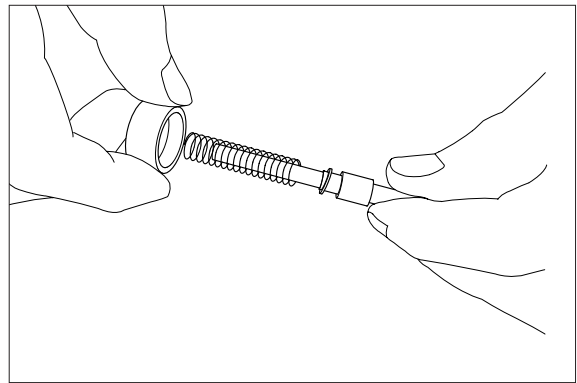
(12) For disassembling reducing valve section, stand it vertically with spool (4) bottom placed on flat workbench. Push down spring seat (7) and remove two pieces of semicircular stopper (8) with tip of small minus screwdriver.

- ※ Pay attention not to damage spool surface.
- ※ Record original position of spring seat (7).
- ※ Do not push down spring seat more than 6mm.

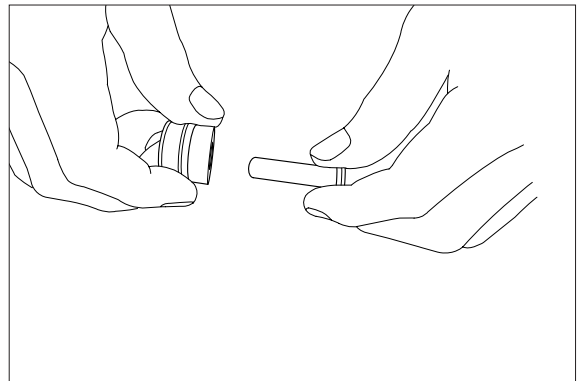


(13) Separate spool (4), spring seat (7), spring (6) and shim (5) individually.

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

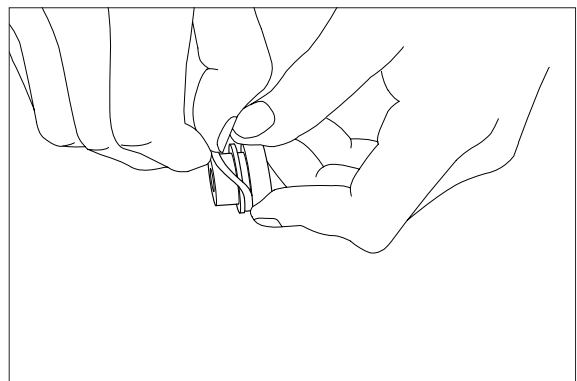


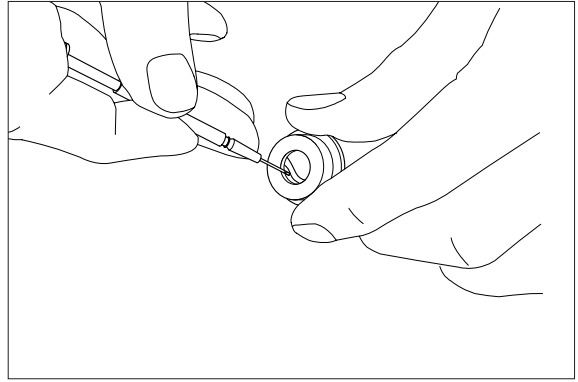
(14) Take push rod (11) out of plug (14).



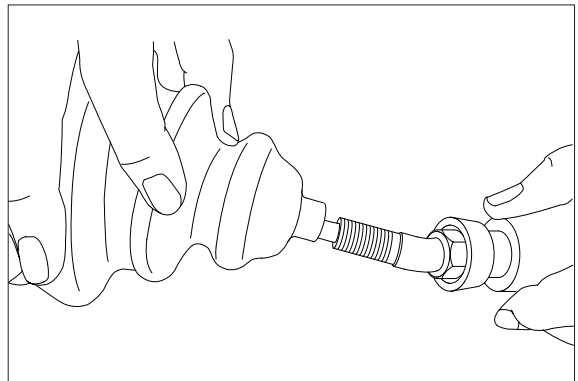
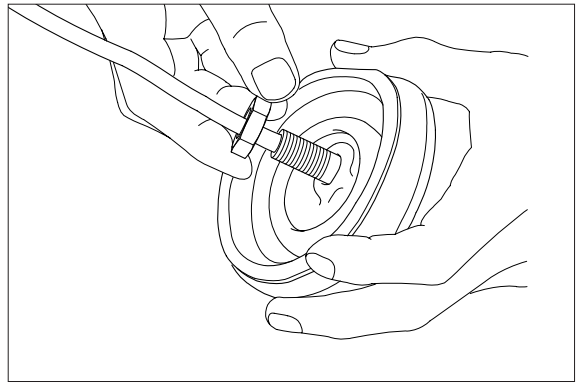
(15) Remove O-ring (15) and seal (16) from plug (14).

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





(16) Remove lock nut (22) and then boot (26).



(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.

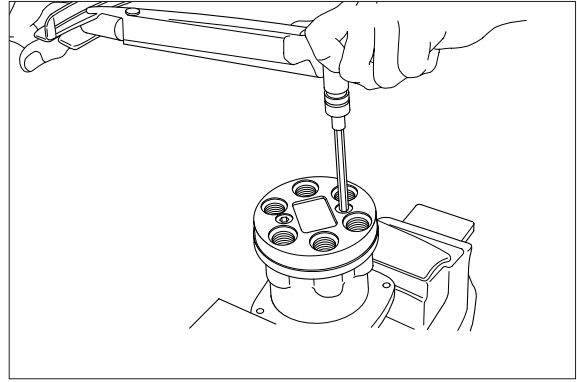
(17) Rust prevention of parts

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

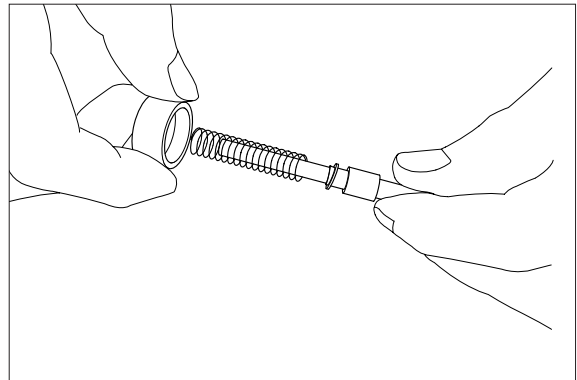
4) ASSEMBLY

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

※ Tighten two bolts alternately and slowly.

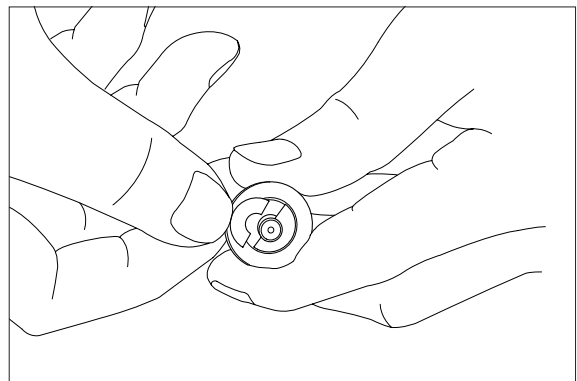


- (2) Put shim (5), springs (6) and spring seat (7) onto spool (4) in this order.



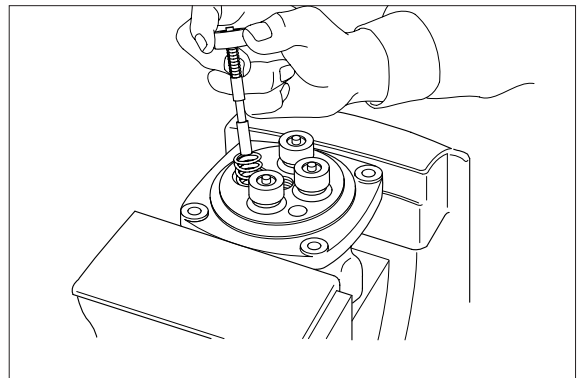
- (3) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper (8) on spring seat without piling them on.

※ Assemble stopper (8) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6mm.

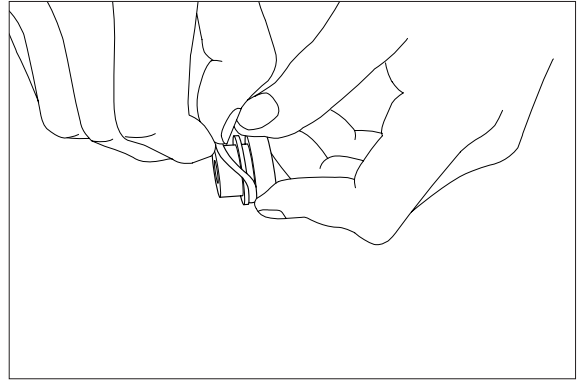


- (4) Assemble spring (10) into casing (1).
Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.

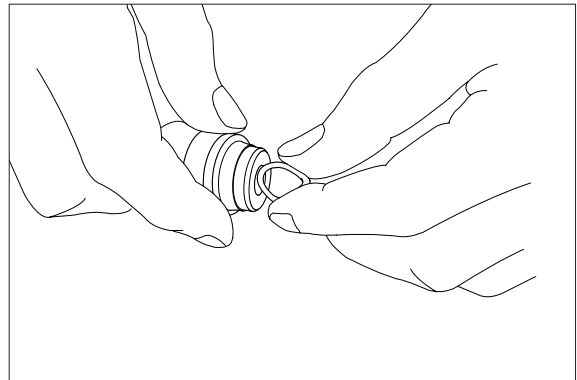


(5) Assemble O-ring (15) onto plug (14).



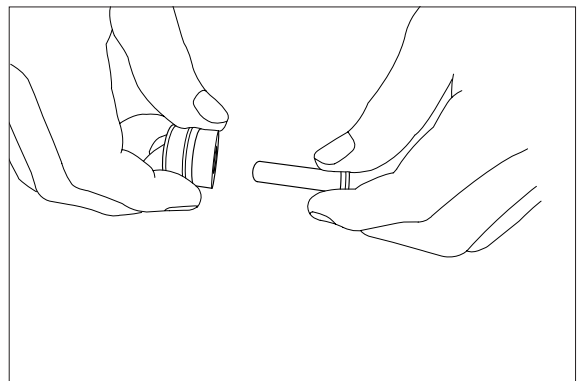
(6) Assemble seal (16) to plug (14).

※ Assemble seal in such lip direction as shown below.



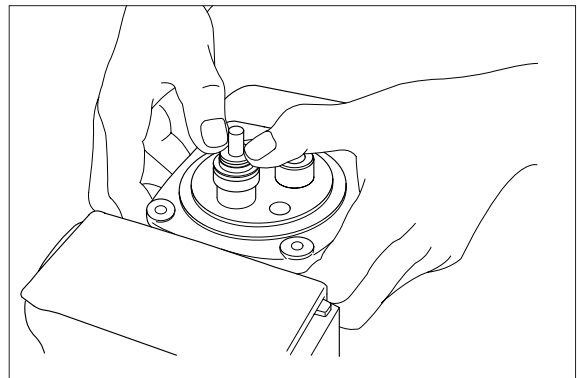
(7) Assemble push rod (11) to plug (14).

※ Apply working oil on push-rod surface.

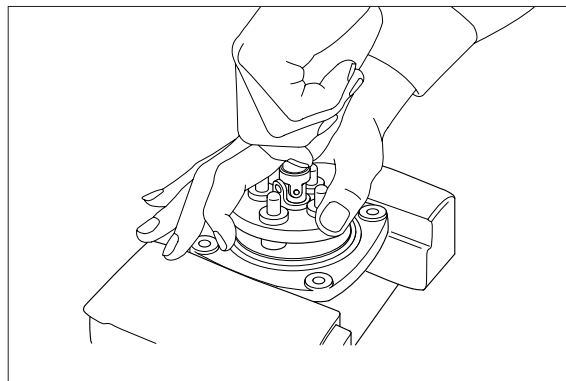


(8) Assemble plug subassembly to casing.

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

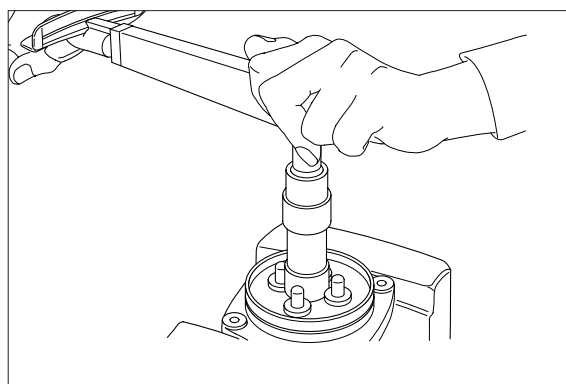


- (9) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (17), and tighten joint (19) temporarily.

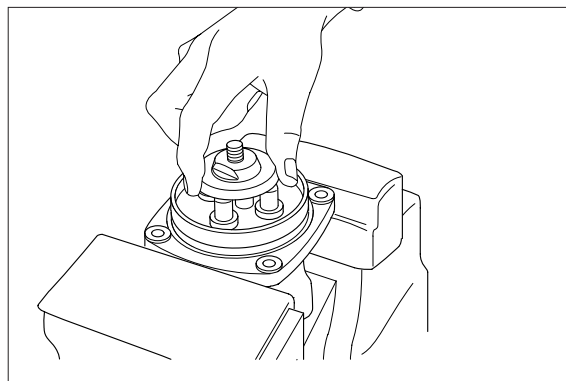


- (10) Fit plate (17).

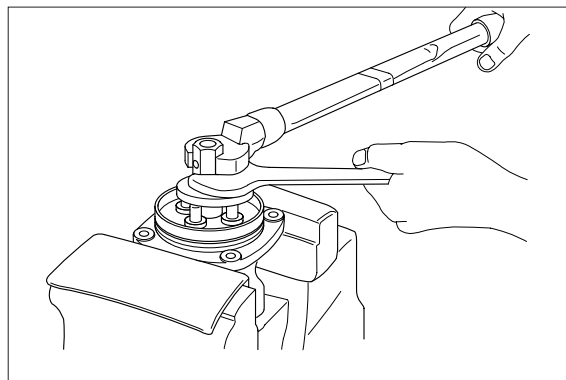
- (11) Tighten joint (19) with the specified torque to casing, utilizing jig.



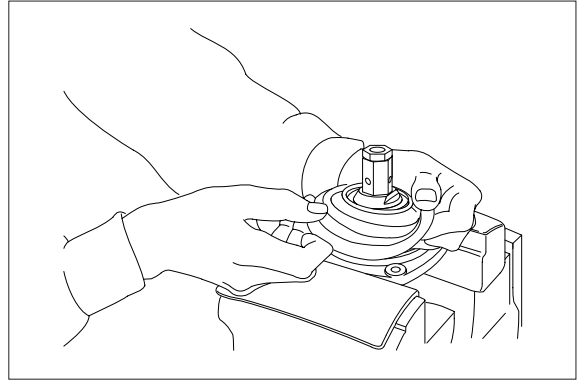
- (12) Assemble swash plate (20) to joint (19).
- ※ Screw it to position that it contacts with 4 push rods evenly.
 - ※ Do not screw it over.



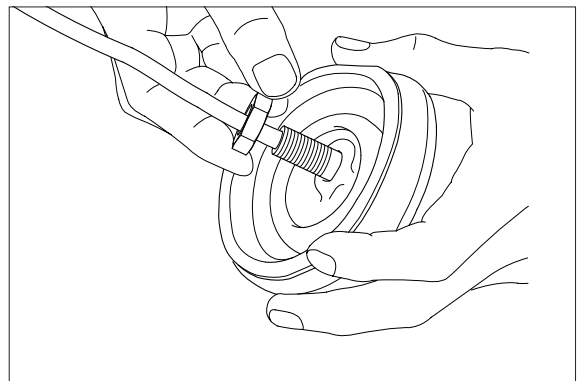
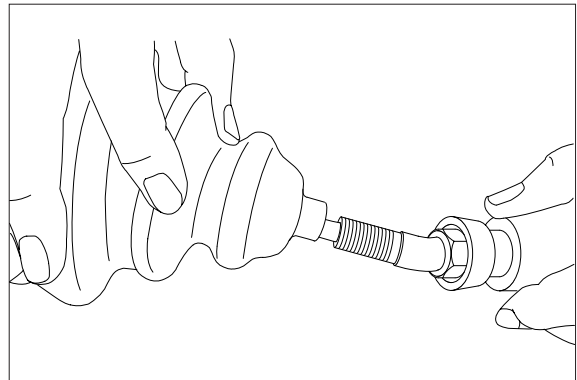
- (13) Assemble adjusting nut (21), apply spanner to width across flat of plate (20) to fix it, and tighten adjusting nut to the specified torque.
- ※ During tightening, do not change position of disk.



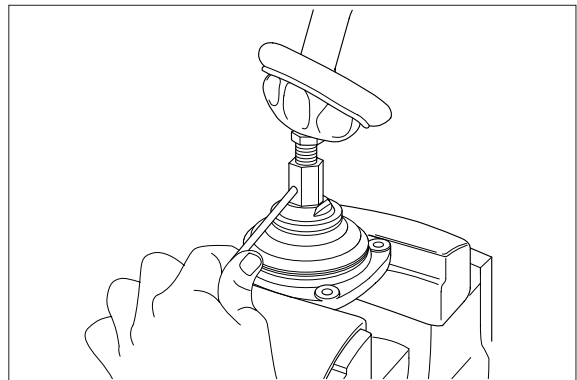
(14) Fit boot (18) to plate.



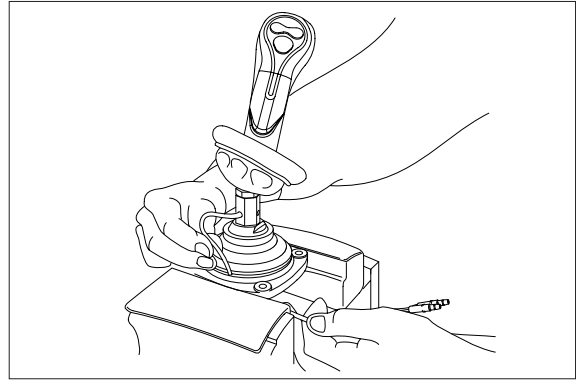
(15) Fit boot (26) and lock nut (22), and handle subassembly is assembled completely.



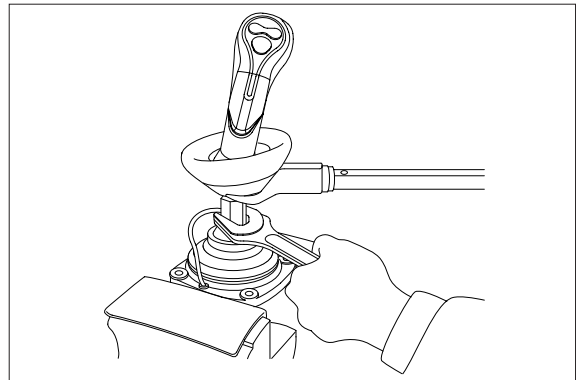
(16) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.



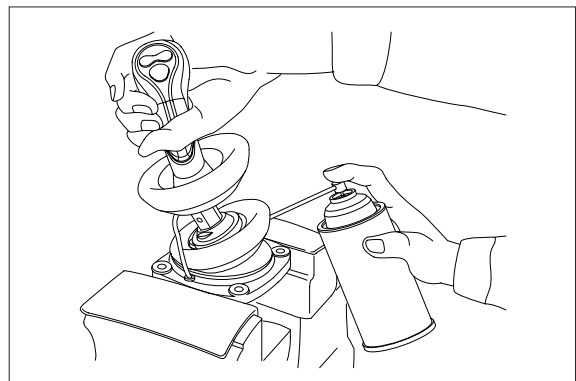
- (17) Assemble bushing (27) to plate and pass cord and tube through it.
※ Provide margin necessary to operation.



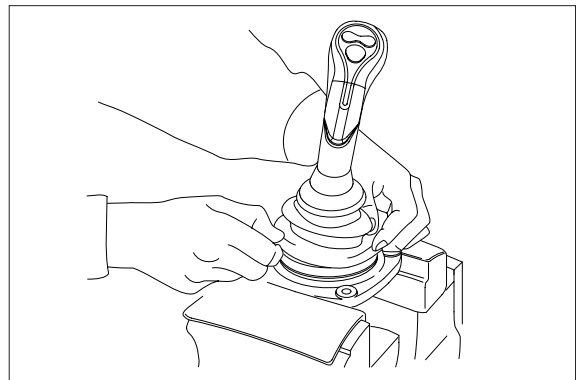
- (18) Determine handle direction, tighten lock nut (22) to specified torque to fix handle.



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



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



GROUP 8 TURNING JOINT

1. REMOVAL AND INSTALL

1) REMOVAL

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

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

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

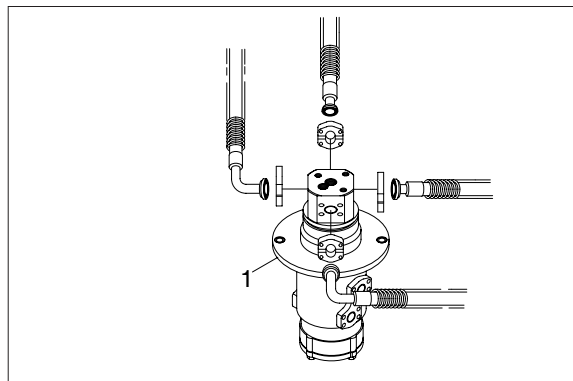
- (4) Disconnect all hoses.
- (5) Sling the turning joint assembly (1) and remove the mounting bolt (2).

Weight : 55 kg (120 lb)

Tightening torque : 12.31.3 kgfm
(899.4 lbfft)

- (6) Remove the turning joint assembly.

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



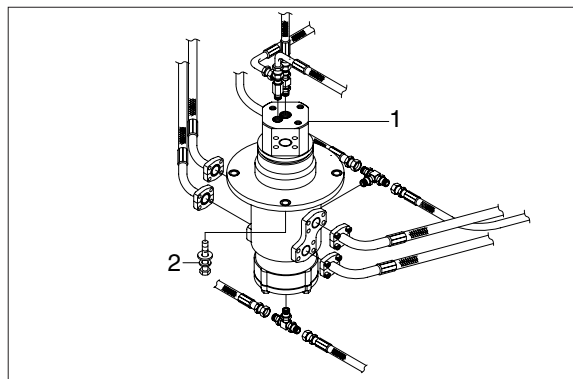
2) INSTALL

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

Take care of turning joint direction.

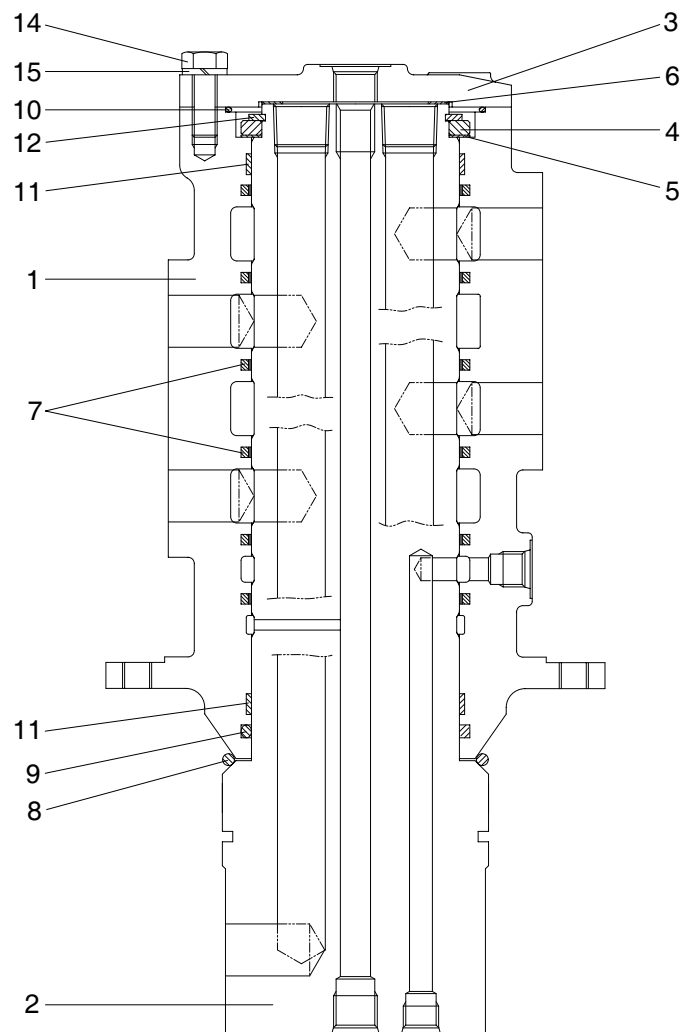
Assemble hoses to their original positions.

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



2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

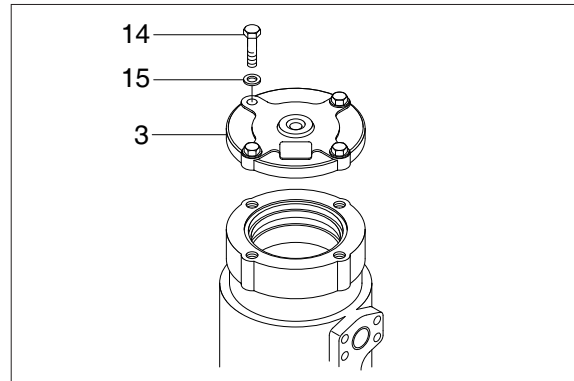


- | | | | | | |
|---|--------|----|--------------|----|---------------|
| 1 | Hub | 6 | Shim | 11 | Wear ring |
| 2 | Shaft | 7 | Slipper seal | 12 | Retainer ring |
| 3 | Cover | 8 | O-ring | 13 | Plug |
| 4 | Spacer | 9 | O-ring | 14 | Hexagon bolt |
| 5 | Shim | 10 | O-ring | 15 | Spring washer |

2) DISASSEMBLY

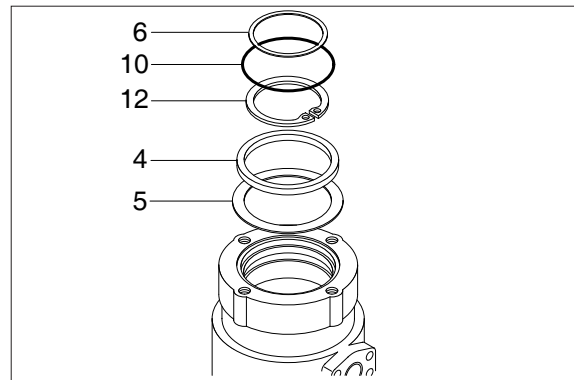
Before the disassembly, clean the turning joint.

- (1) Remove bolts (14), washer (15) and cover (3).



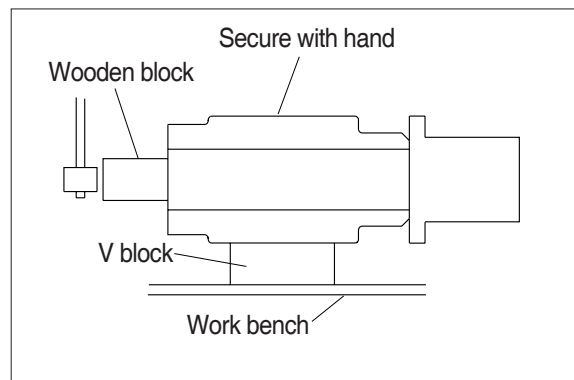
- (2) Remove shim (6) and O-ring (10).

- (3) Remove retainer ring (12), spacer (4) and shim (5).

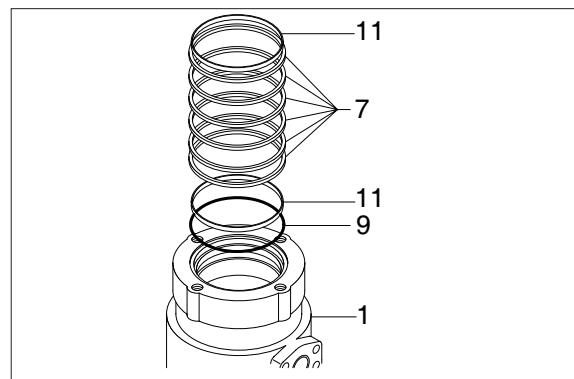


- (4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

- ※ Take care not to damage the shaft (2) when remove hub (1) or rest it sideways.
- ※ Put a fitting mark on hub (1) and shaft (2).



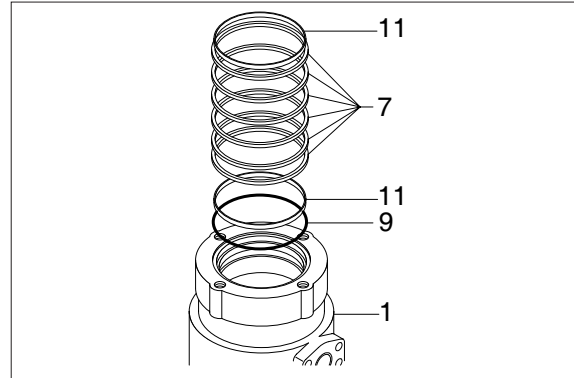
- (5) Remove six slipper seals (7) and O-ring (9), two wear ring (11) from hub (1).



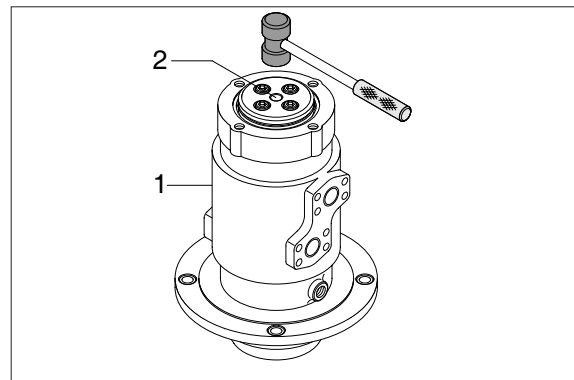
3) ASSEMBLY

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

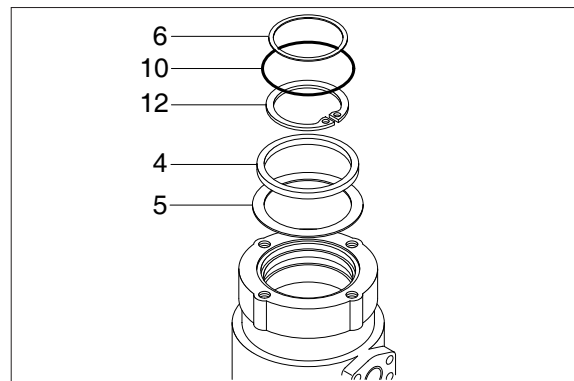
- (1) Fix seven slipper seal (7) and O-ring (9), two wear ring (11) to hub (1).
- (2) Fit O-ring (8) to shaft (2).



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

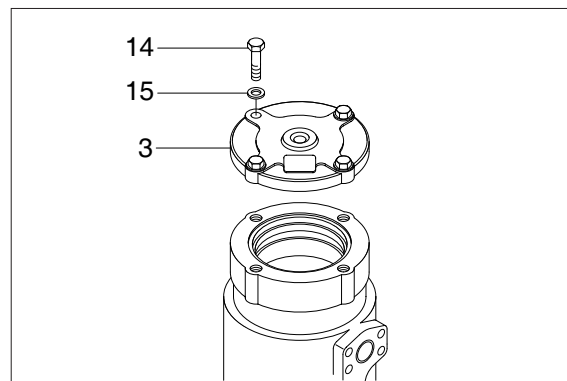


- (4) Fit shim (5), spacer (4) and retainer ring (12) to shaft (2).
- (5) Fit O-ring (10) to hub (1).
- (6) Fit shim (6) to shaft (2).



(7) Install cover (3) to body (1) and tighten bolts (14).

Torque : 10~12.5 kgfm
(72.3~90.4 lbfft)



GROUP 9 BOOM, ARM AND BUCKET CYLINDER

1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

(1) Removal

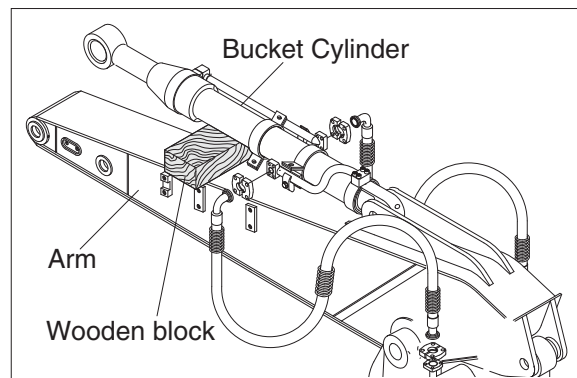
※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

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

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

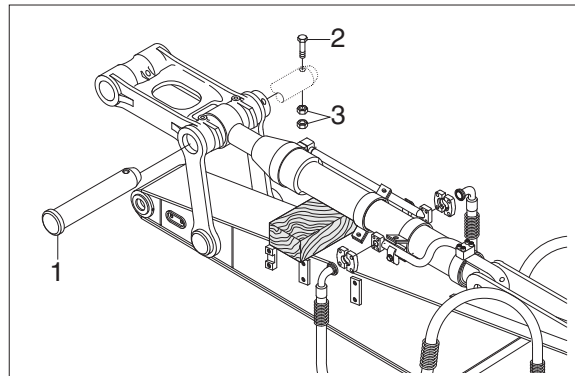
※ Escaping fluid under pressure can penetrate the skin causing serious injury. Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between bucket cylinder and arm.

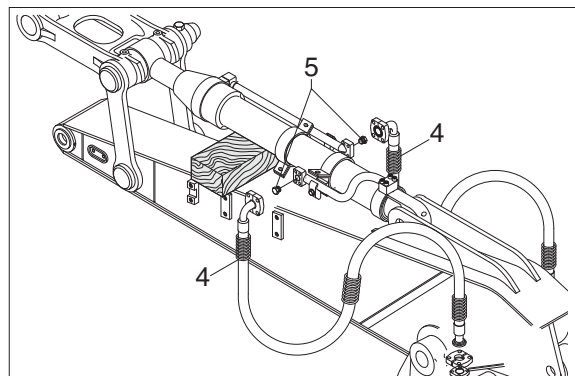


② Remove bolt (2), nut (3) and pull out pin (1).

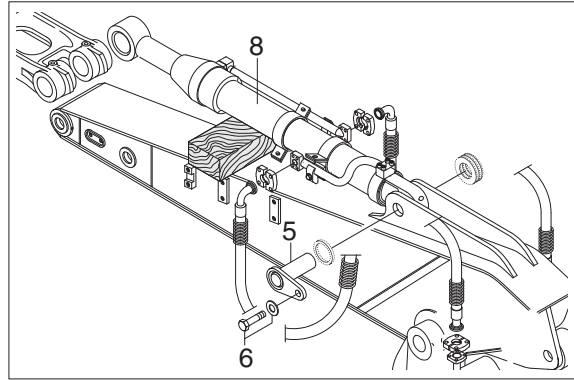
※ Tie the rod with wire to prevent it from coming out.



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



- ④ Sling bucket cylinder assembly (8) and remove bolt (6) then pull out pin (5).
- ⑤ Remove bucket cylinder assembly (8).
 - Weight : 220 kg (485 lb)



(2) Install

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

2) ARM CYLINDER

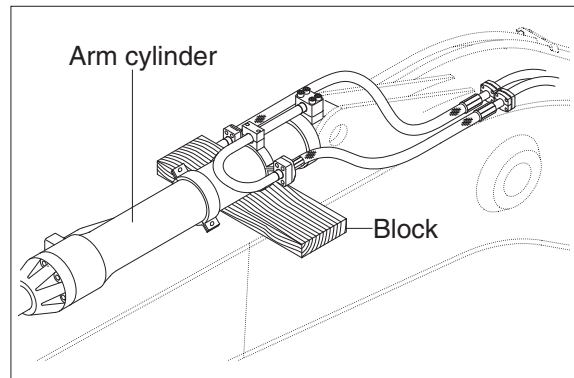
(1) Removal

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

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

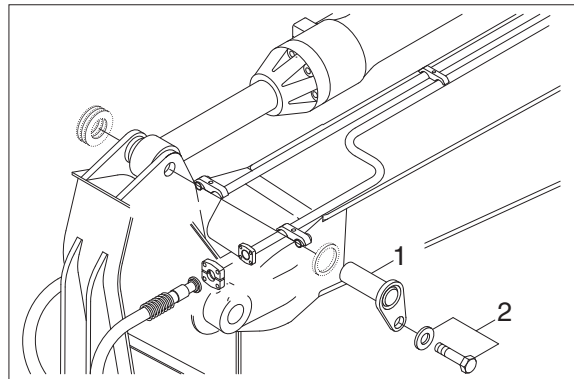
- ※ Escaping fluid under pressure can penetrate the skin causing serious injury. Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

- ① Set block between arm cylinder and boom.



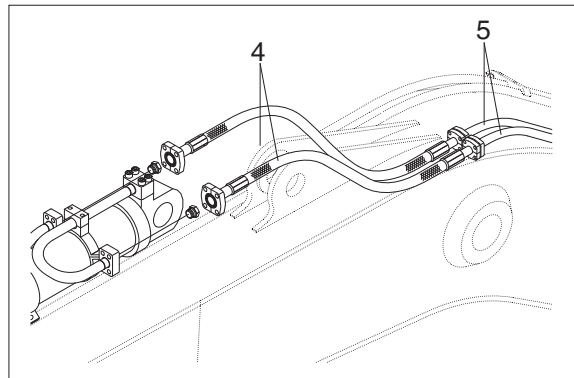
- ② Remove bolt (2) and pull out pin (1).

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

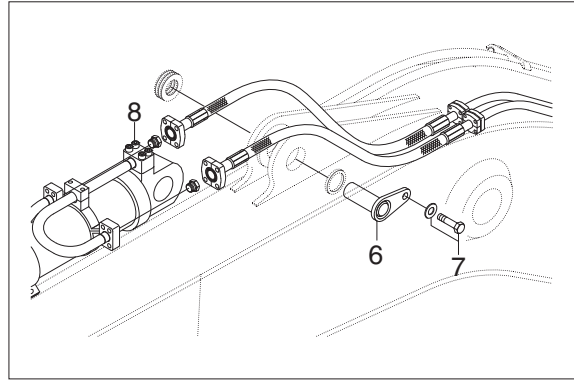


- ③ Disconnect arm cylinder hoses (4) and put plugs on cylinder pipe.

- 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 : 360 kg (790 lb)



(2) Install

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

3) BOOM CYLINDER

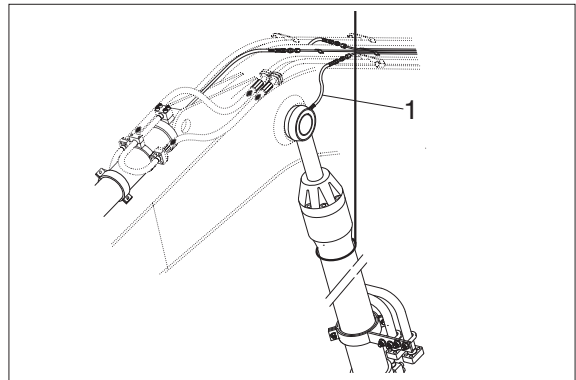
(1) Removal

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

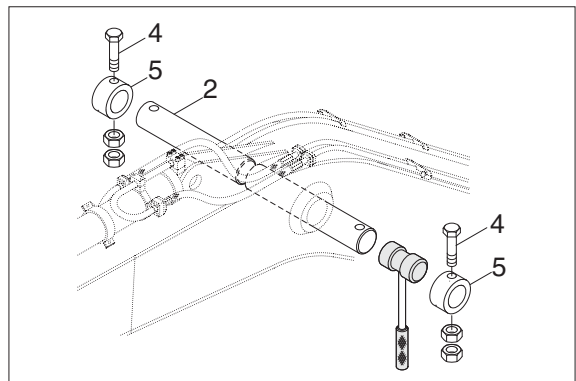
▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

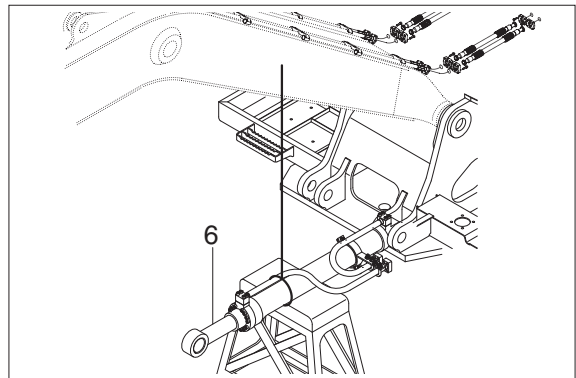
- ① Disconnect greasing hoses (1).
- ② Sling boom cylinder assembly.



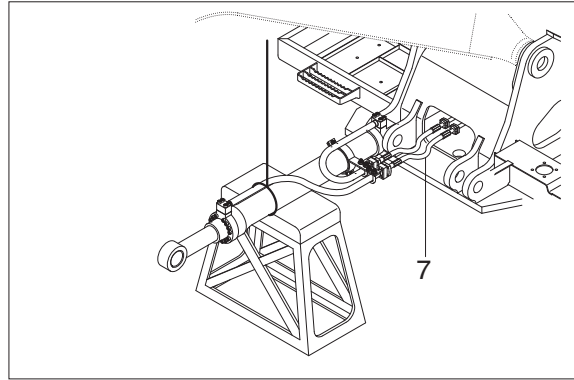
- ③ Remove bolt (4), pin stopper (5) and pull out pin (2).
- ※ Tie the rod with wire to prevent it from coming out.



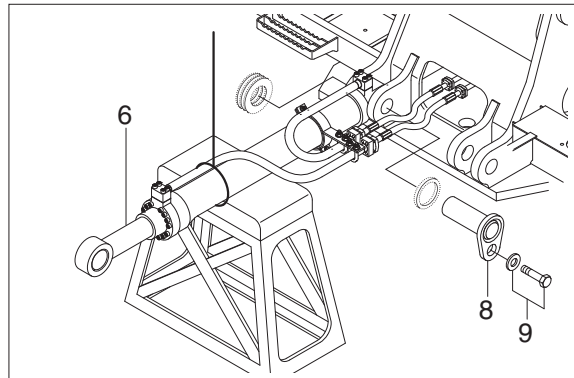
- ④ Lower the boom cylinder assembly (6) on a stand.



- ⑤ Disconnect boom cylinder hoses (7) and put plugs on cylinder pipe.



- ⑥ Remove bolt (9) and pull out pin (8).
⑦ Remove boom cylinder assembly (6).
· Weight : 270 kg (600 lb)



(2) Install

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

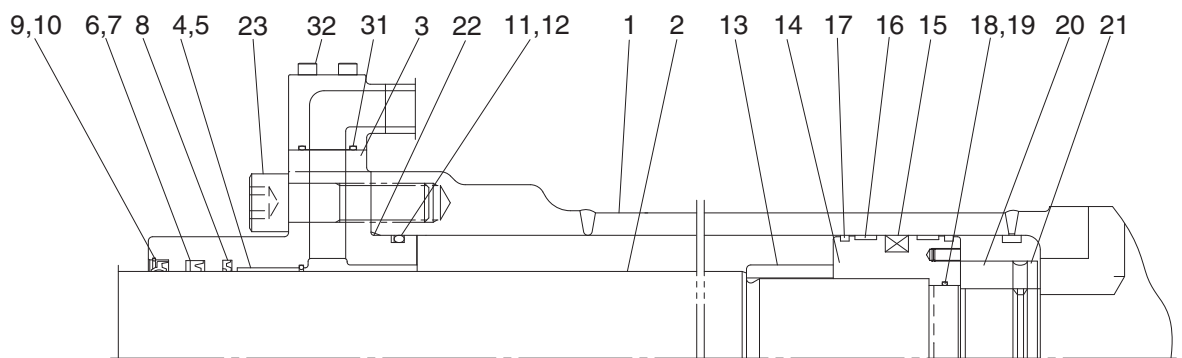
▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.

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

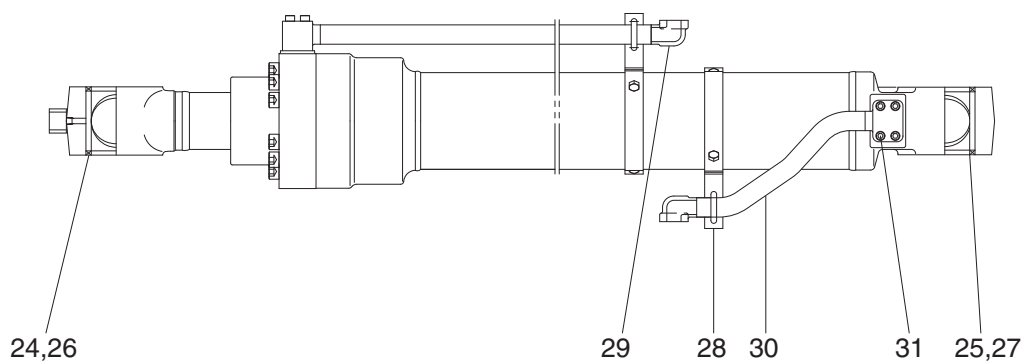
2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

(1) Bucket cylinder

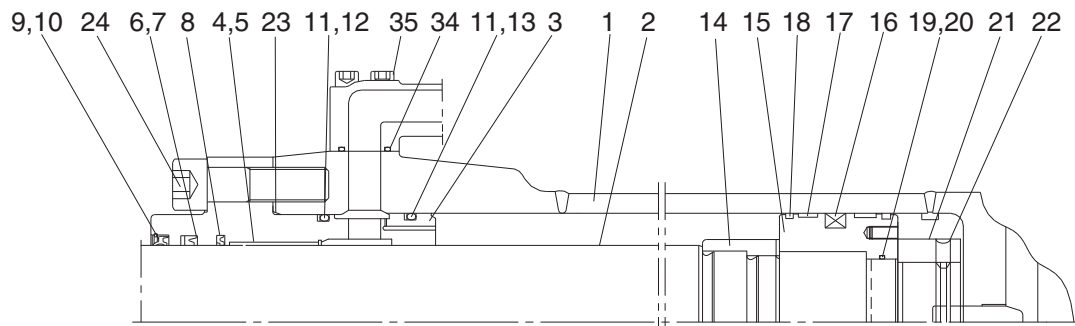


Internal detail

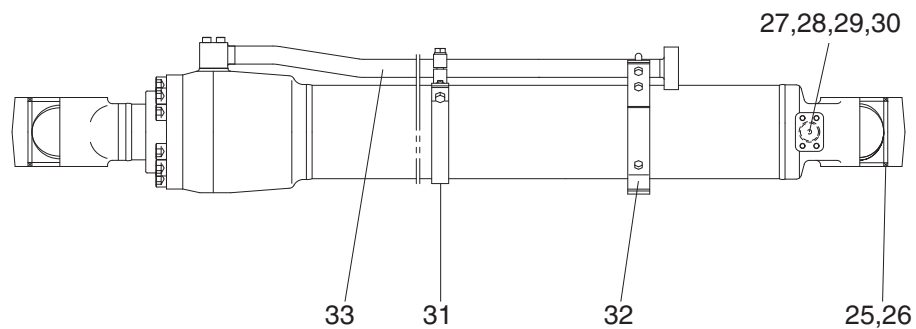


1	Tube assembly	12	Back up ring	23	Hexagon socket head bolt
2	Rod assembly	13	Cushion ring	24	Pin bushing
3	Gland	14	Piston	25	Pin bushing
4	DD2 bushing	15	Piston seal	26	Dust seal
5	Snap ring	16	Wear ring	27	Dust seal
6	Rod seal	17	Dust ring	28	Band assembly
7	Back up ring	18	O-ring	29	Pipe assembly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

(2) Arm cylinder

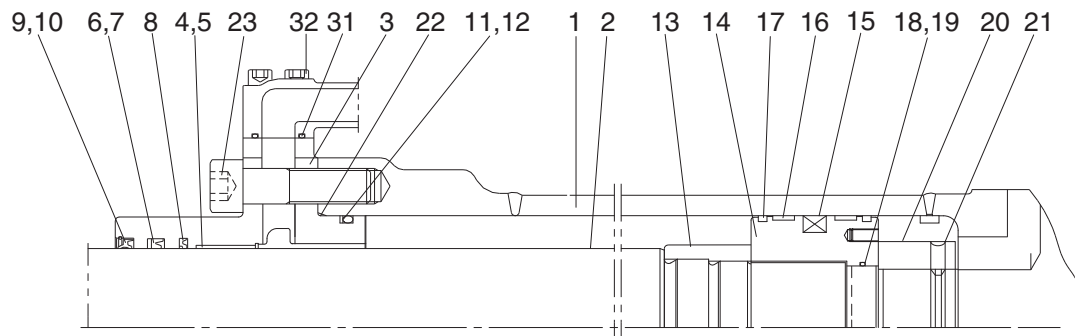


Internal detail

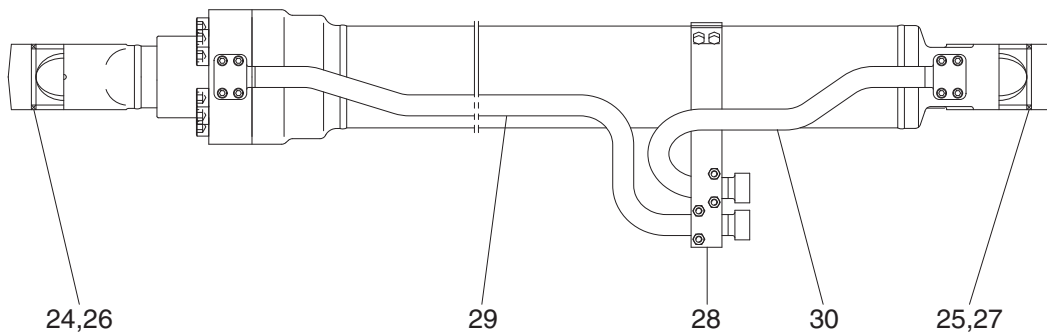


1	Tube assembly	13	Back up ring	25	Pin bushing
2	Rod assembly	14	Cushion ring	26	Dust seal
3	Gland	15	Piston	27	Check valve
4	DD2 bushing	16	Piston seal	28	Coil spring
5	Snap ring	17	Wear ring	29	O-ring
6	Rod seal	18	Dust ring	30	Plug
7	Back up ring	19	O-ring	31	Band assembly
8	Buffer ring	20	Back up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

(3) Boom cylinder



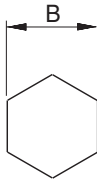
Internal detail



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

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tools	Remark	
Allen wrench	6	
	8	
	14	
	17	
Spanner	7	
	8	
(-) 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
Socket head bolt	Bucket cylinder	23	M18	32.0 ± 3.0	232 ± 21.7
		32	M12	9.4 ± 1.0	68.0 ± 7.2
	Boom cylinder	23	M18	32.0 ± 3.0	232 ± 21.7
		32	M12	9.4 ± 1.0	68.0 ± 7.2
	Arm cylinder	24	M18	32.0 ± 3.0	232 ± 21.7
		35	M12	9.4 ± 1.0	68.0 ± 7.2
Lock nut	Bucket cylinder	20	-	100 ± 10.0	723 ± 72.3
	Boom cylinder	20	-	100 ± 10.0	723 ± 72.3
	Arm cylinder	21	-	150 ± 15.0	1085 ± 108
Piston	Bucket cylinder	14	-	150 ± 15.0	1085 ± 108
	Boom cylinder	14	-	150 ± 15.0	1085 ± 108
	Arm cylinder	15	-	200 ± 20.0	1447 ± 145

3) DISASSEMBLY

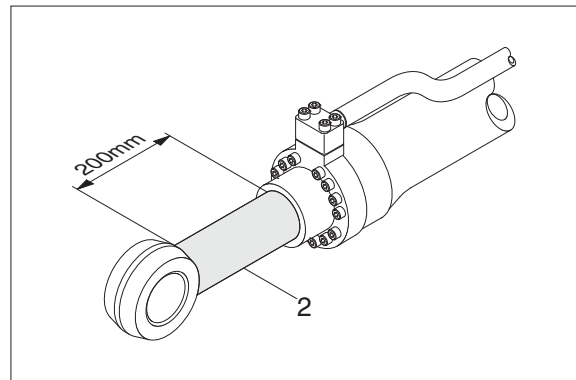
(1) Remove cylinder head and piston rod

※ Procedures are based on the bucket cylinder.

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

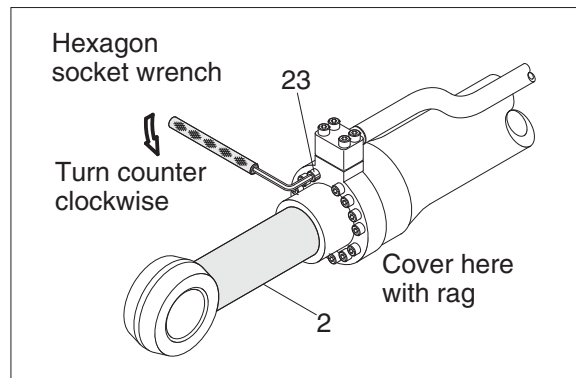
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

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



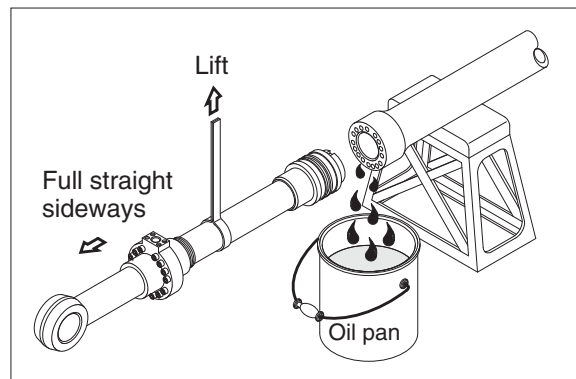
③ Loosen and remove socket bolts (23) of the gland in sequence.

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



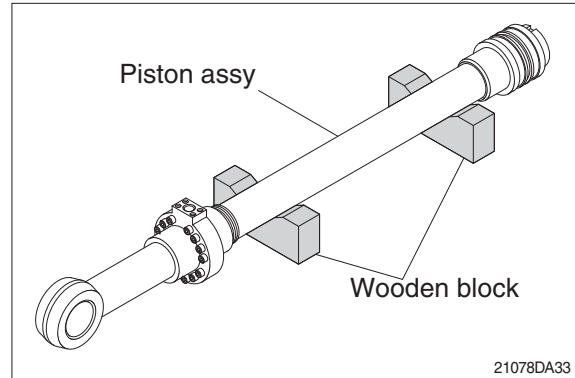
④ Draw out cylinder head and rod assembly together from tube assembly (1).

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



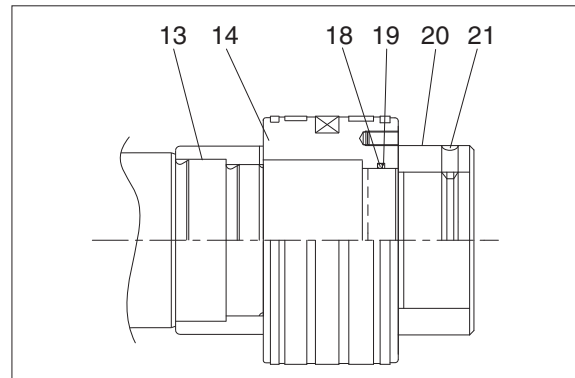
Note that the plated surface of rod assembly (2) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

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

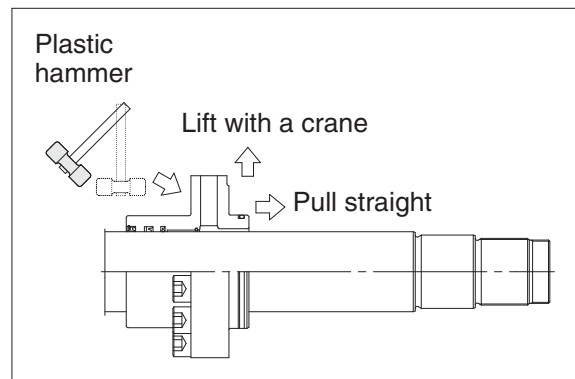


(2) Remove piston and cylinder head

- ① Remove set screw (21).
- ※ Since set screw (21) and lock nut (20) is tightened to a high torque, use a hydraulic and power wrench that utilizes a hydraulic cylinder, to remove the set screw (21) lock nut (20).
- ② Remove piston assembly (14), back up ring (19), and O-ring (18).

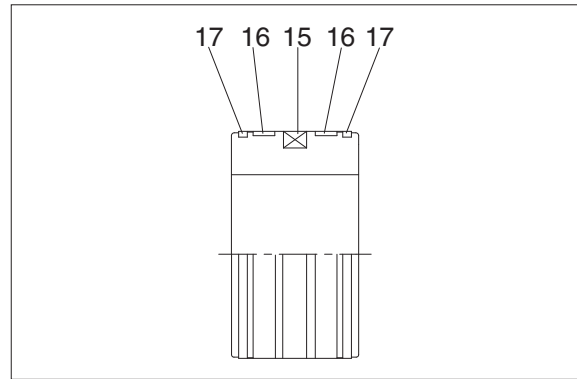


- ③ Remove the cylinder head assembly from rod assembly (2).
 - ※ If it is too heavy to move, move it by striking the flanged part of cylinder head with a plastic hammer.
 - ※ Pull it straight with cylinder head assembly lifted with a crane.
- Exercise care so as not to damage the lip of rod bushing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



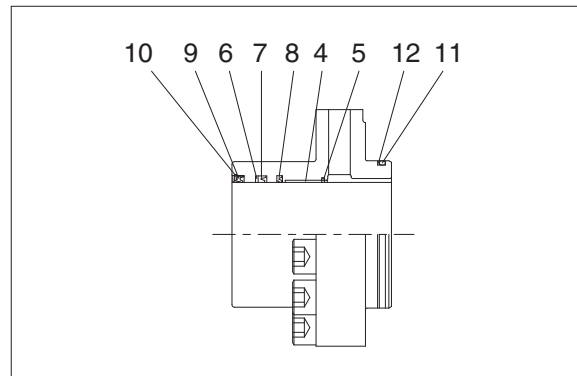
(3) Disassemble the piston assembly

- ① Remove wear ring (16).
 - ② Remove dust ring (17) and piston seal (15).
- ※ Exercise care in this operation not to damage the grooves.



(4) Disassemble cylinder head assembly

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

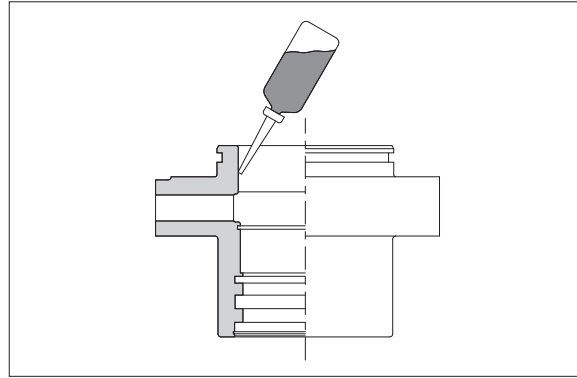


3) ASSEMBLY

(1) Assemble cylinder head assembly

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

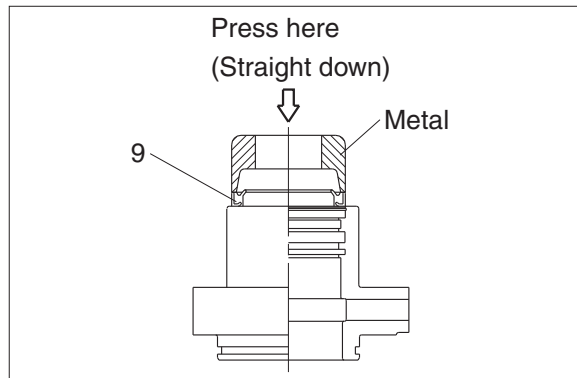
- ① Coat the inner face of gland (3) with hydraulic oil.



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

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

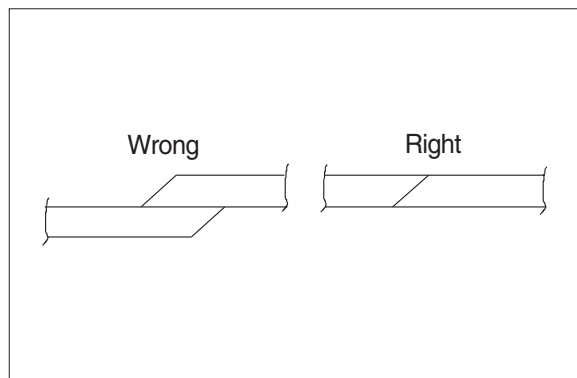
- ③ Fit snap ring (10) to the stop face.



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

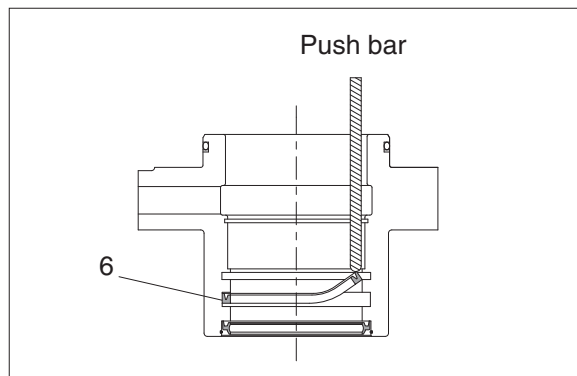
- ※ Coat each packing with hydraulic oil before fitting it.

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

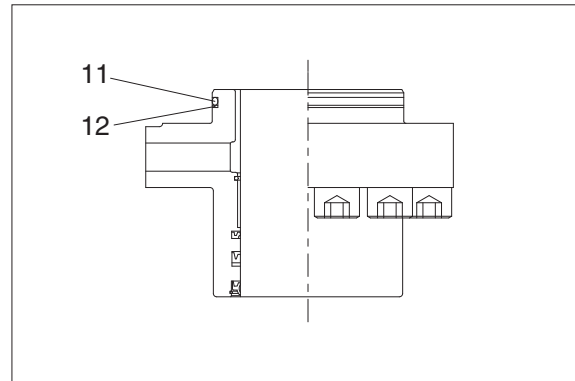


- ※ Rod seal (6) has its own fitting direction. Therefore, confirm it before fitting them.

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

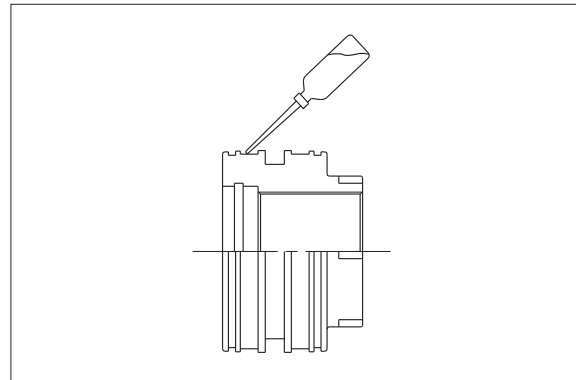


- ⑤ Fit back up ring (12) to gland (3).
- ※ Put the backup ring in the warm water of 30~50°C.
- ⑥ Fit O-ring (11) to gland (3).

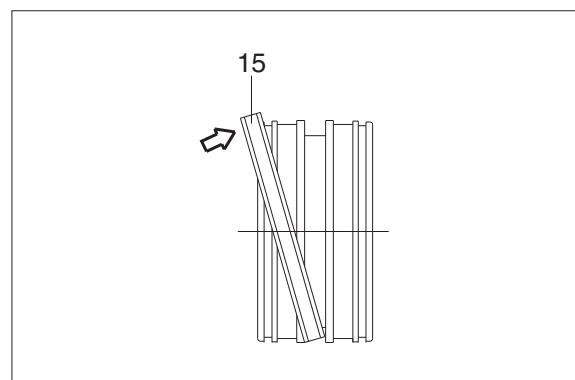


(2) Assemble piston assembly

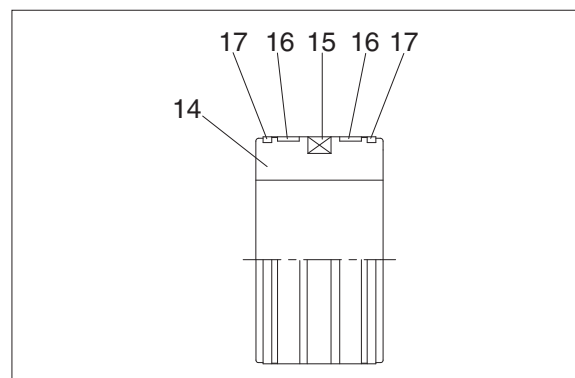
- ※ Check for scratches or rough surfaces.
If found smooth with an oil stone.
- ① Coat the outer face of piston (14) with hydraulic oil.



- ② Fit piston seal (15) 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.

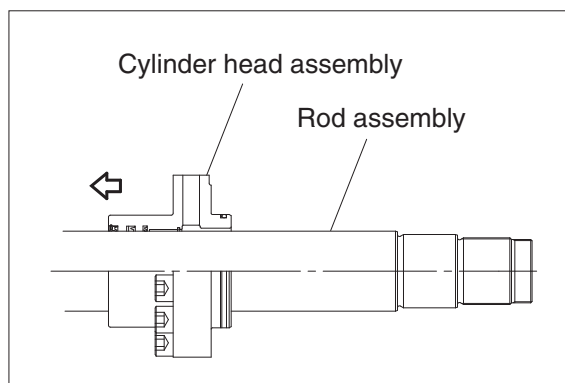


- ③ Fit wear ring (16) and dust ring (17) to piston (14).

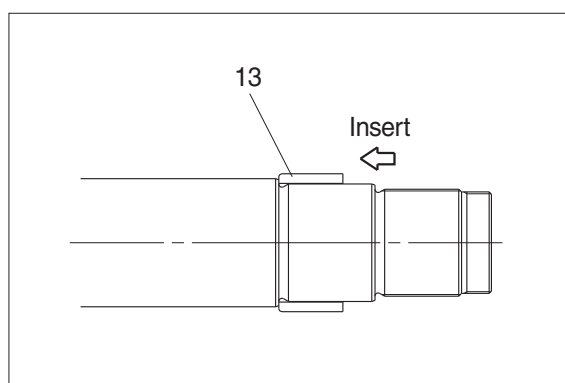


(3) Install piston and cylinder head

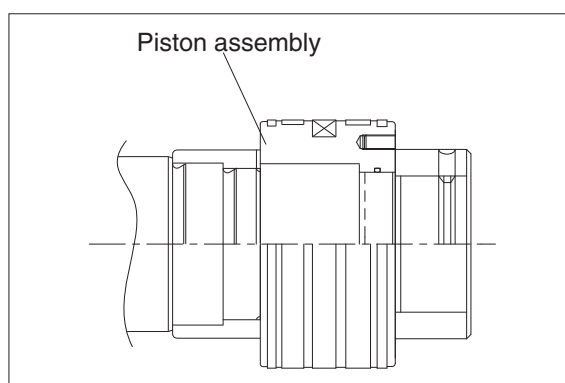
- ① Fix the rod assembly to the work bench.
- ② Apply hydraulic oil to the outer surface of rod assembly (2), the inner surface of piston and cylinder head.
- ③ Insert cylinder head assembly to rod assembly.



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

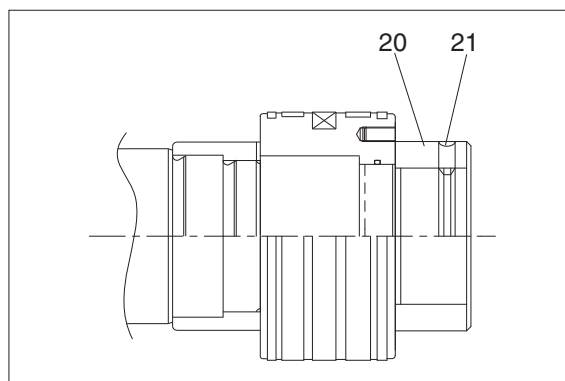


- ⑤ Fit piston assembly to rod assembly.
- Tightening torque : $100 \pm 10.0 \text{ kgf} \cdot \text{m}$
 $(723 \pm 72.3 \text{ lbf} \cdot \text{ft})$



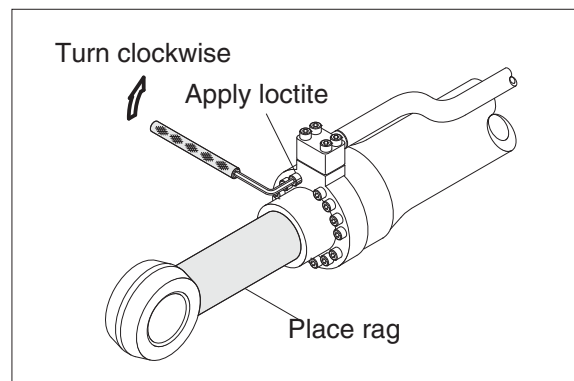
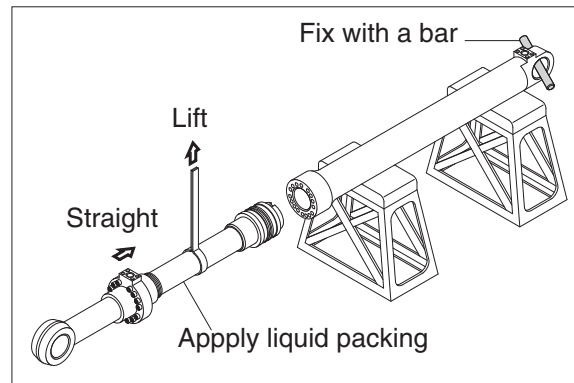
- ⑥ Fit lock nut (20) and tighten the screw (21).
- Tightening torque :

Item		kgf · m	lbf · ft
Bucket Boom	20	100 ± 10	723 ± 72.3
	21	5.4 ± 0.5	39.1 ± 3.6
Arm	20	150 ± 15	1085 ± 108
	21	5.4 ± 0.5	39.1 ± 3.6



(3) Overall assemble

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



GROUP 10 UNDERCARRIAGE

1. 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.

※ Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.

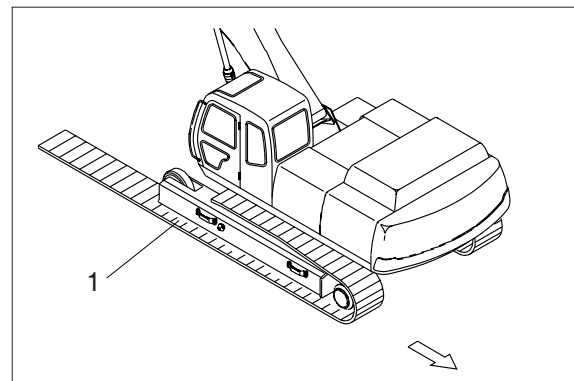
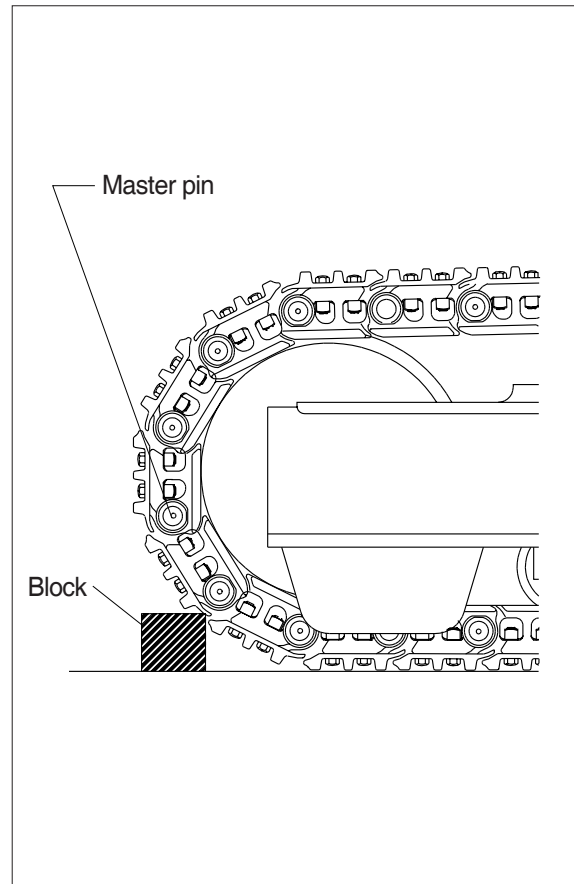
Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

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

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

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

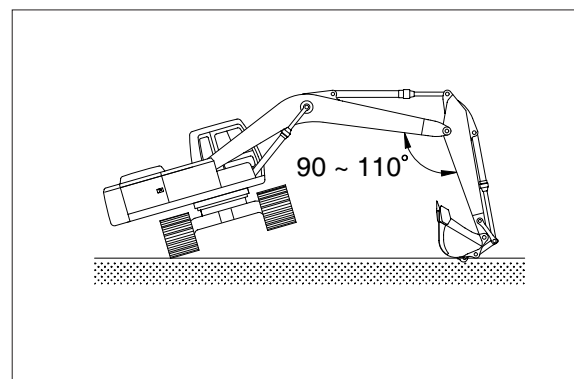
※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



2) INSTALL

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

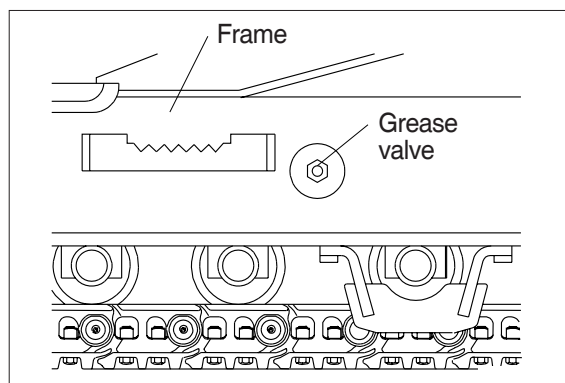
Adjust the tension of the track link.



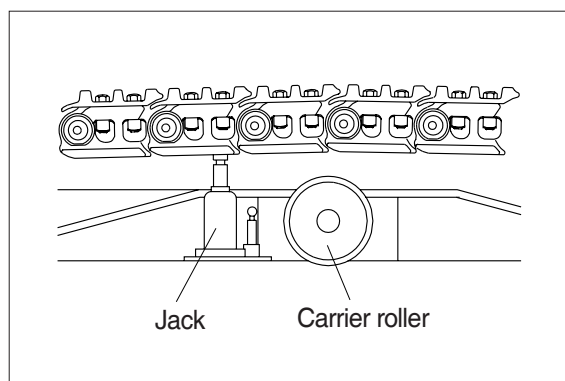
2. CARRIER ROLLER

1) REMOVAL

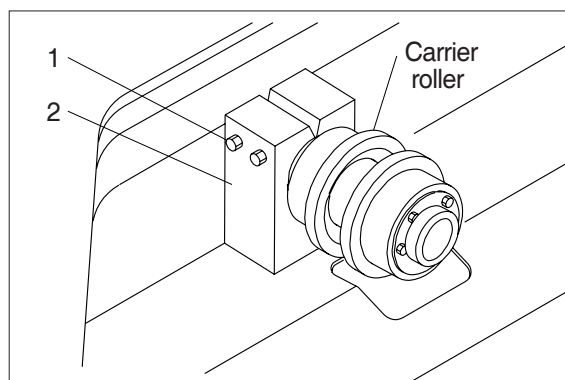
- (1) Loosen tension of the track link.



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



- (3) Loosen the lock nut (1).
 - (4) Open bracket (2) with a screwdriver, push out from inside, and remove carrier roller assembly.
- Weight : 48 kg (88 lb)



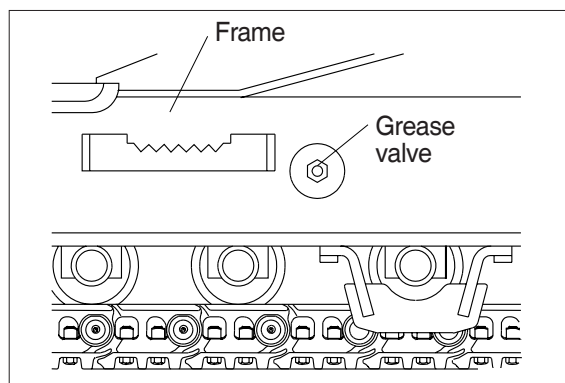
2) INSTALL

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

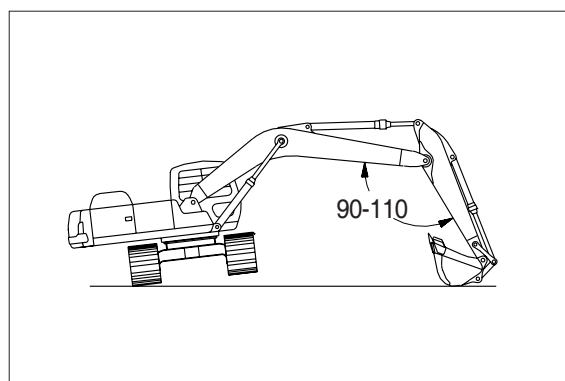
3. TRACK ROLLER

1) REMOVAL

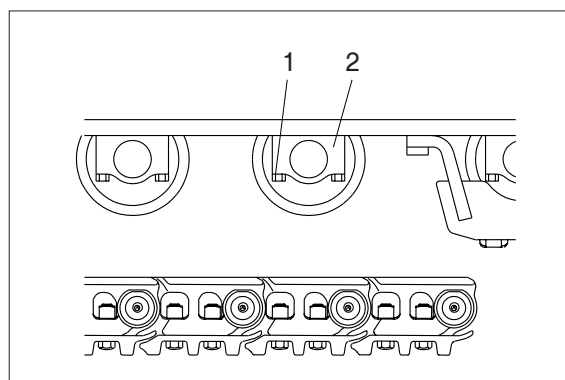
- (1) Loosen tension of the track link.



- (2) Using the work equipment, push up track frame on side which is to be removed.
※ After jack up the machine, set a block under the unit.



- (3) Remove the mounting bolt (1) and draw out the track roller (2).
·Weight : 54 kg (119lb)



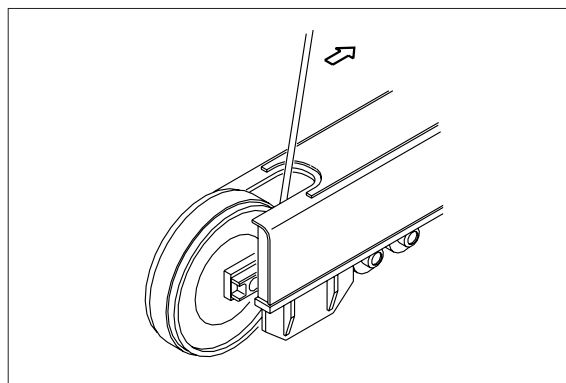
2) INSTALL

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

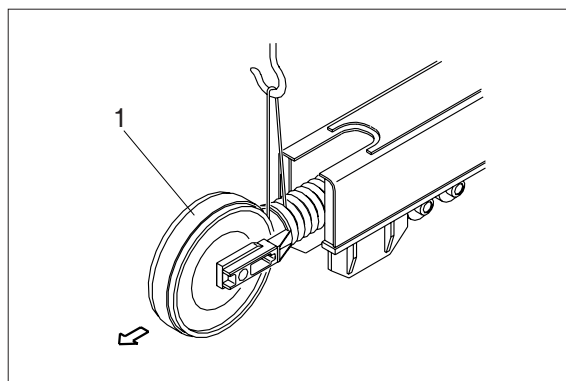
4. IDLER AND RECOIL SPRING

1) REMOVAL

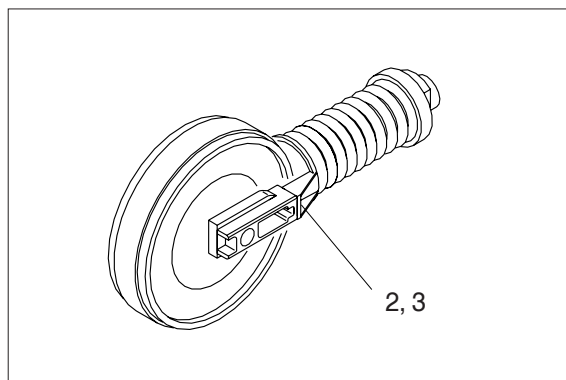
- (1) Remove the track link.
For detail, see **removal of track link**.



- (2) Sling the recoil spring (1) and pull out idler and recoil spring assembly from track frame, using a pry.
·Weight : 457 kg (1010 lb)

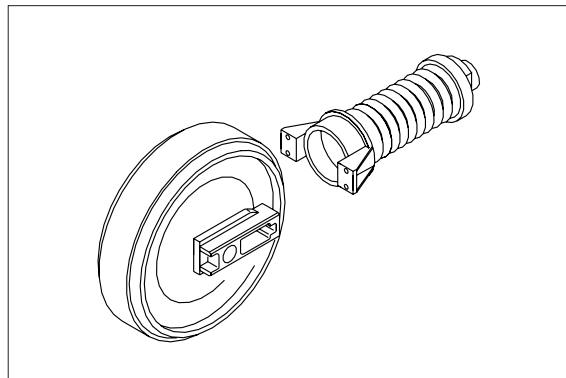


- (3) Remove the bolts (2), washers (3) and separate idler from recoil spring.



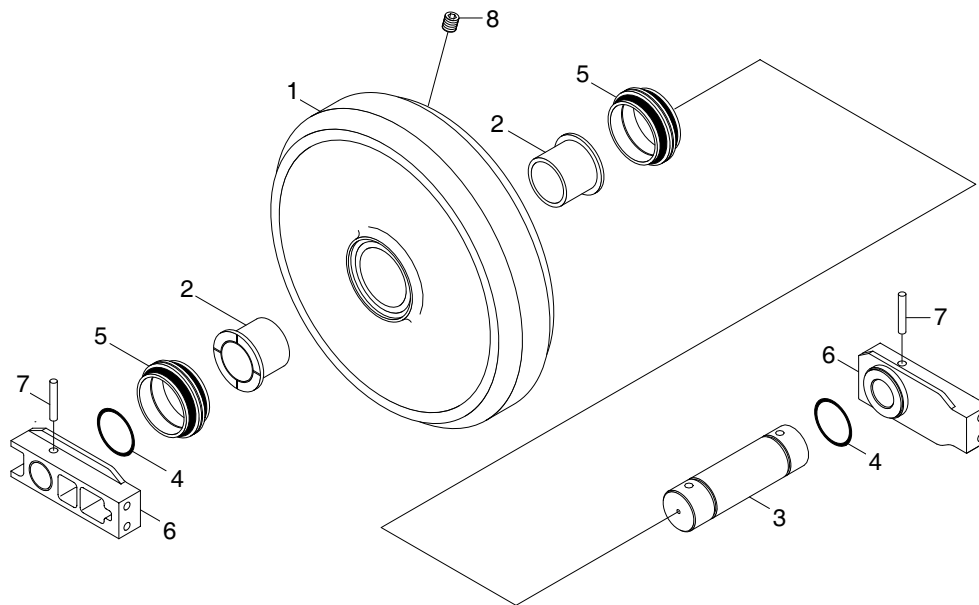
2) INSTALL

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



3) DISASSEMBLY AND ASSEMBLY OF IDLER

(1) Structure



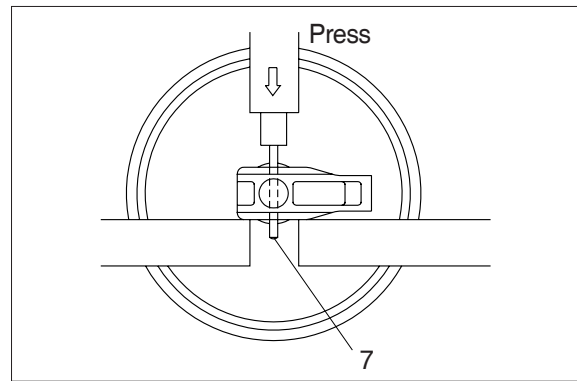
- 1 Shell
- 2 Bushing
- 3 Shaft

- 4 O-ring
- 5 Seal assembly
- 6 Bracket

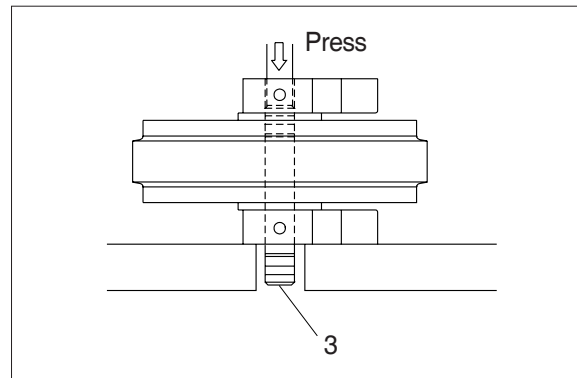
- 7 Spring pin
- 8 Plug

(2) Disassembly

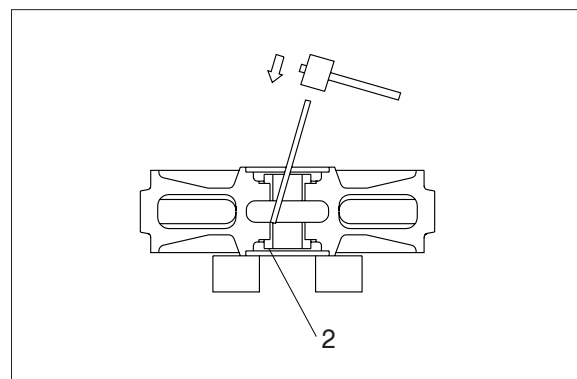
- ① Remove plug and drain oil.
- ② Draw out the spring pin (7), using a press.



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



- ⑥ Remove the bushing (2) from idler, using a special tool.
- ※ Only remove bushing if replacement is necessity.

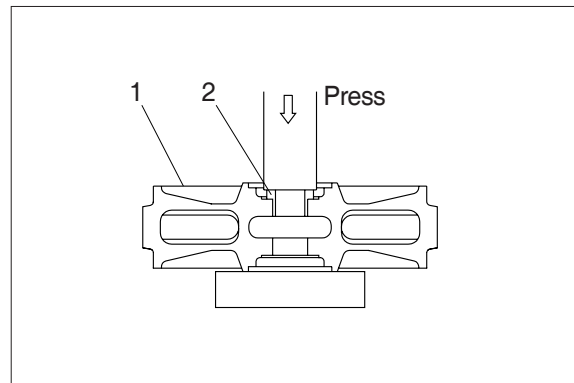


(3) Assembly

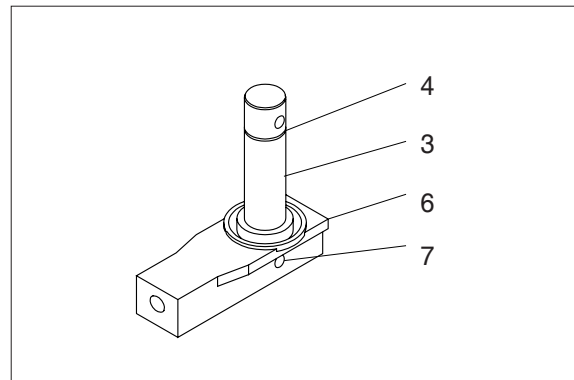
- ※ Before assembly, clean the parts.
- ※ Coat the sliding surfaces of all parts with oil.

- ① Cool up bushing (2) fully by some dry ice and press it into shell (1).

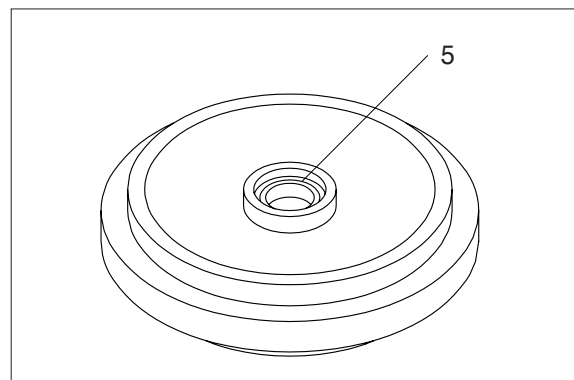
Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.



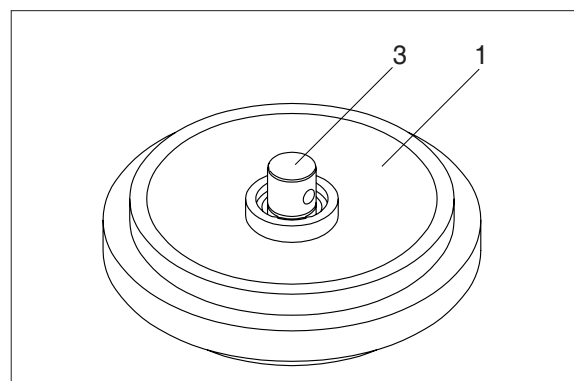
- ② Coat O-ring (4) with grease thinly, and install it to shaft (3).
- ③ Insert shaft (3) into bracket (6) and drive in the spring pin (7).



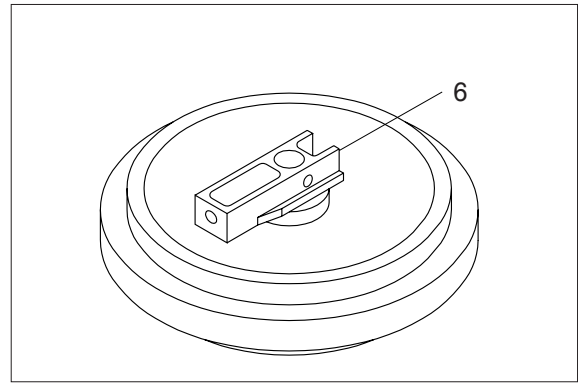
- ④ Install seal (5) to shell (1) and bracket (6).



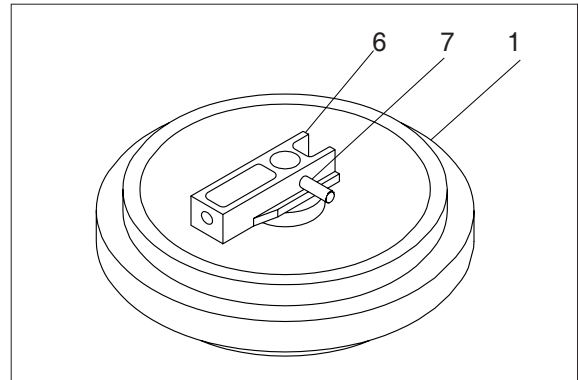
- ⑤ Install shaft (3) to shell (1).



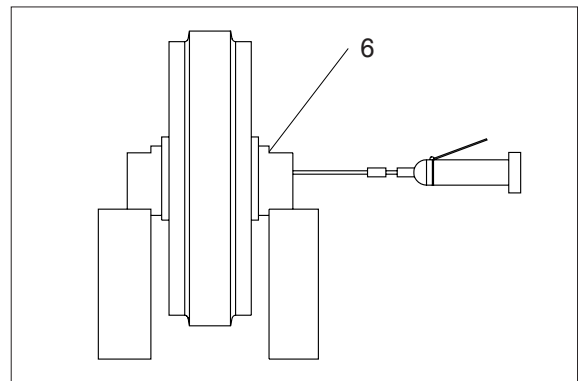
- ⑥ Install bracket (6) attached with seal (5).



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

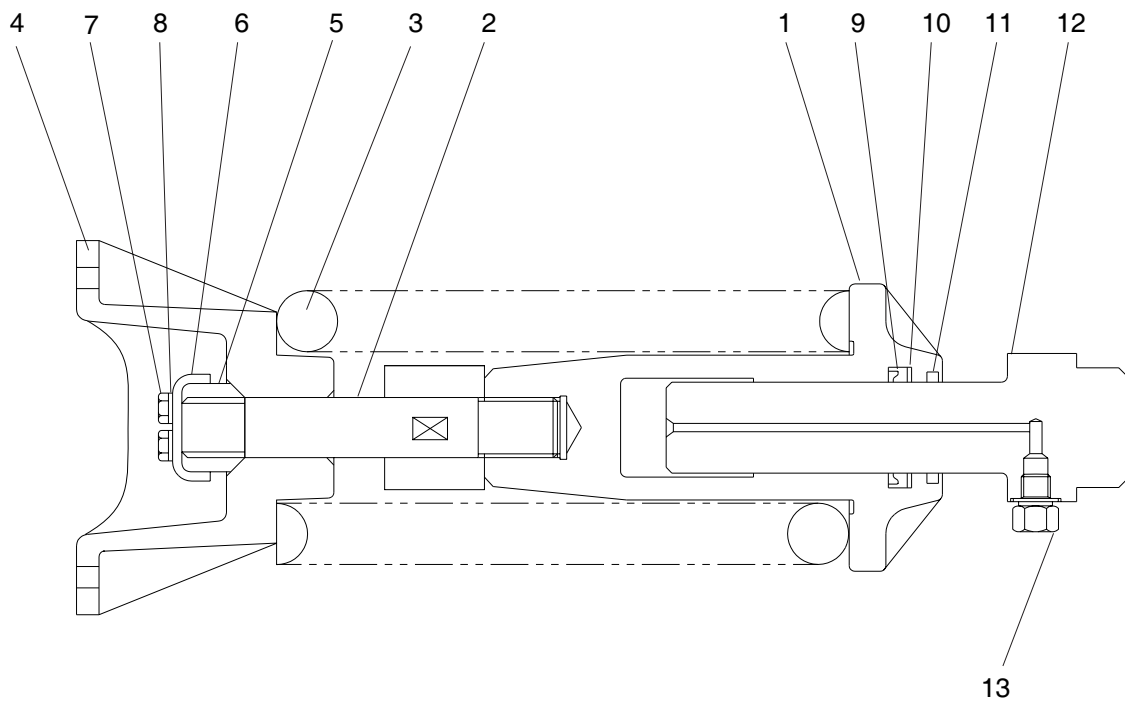


- ⑧ Lay bracket (6) on its side.
Supply engine oil to the specified level,
and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure



- 1 Body
- 2 Tie bar
- 3 Spring
- 4 Bracket
- 5 Lock nut

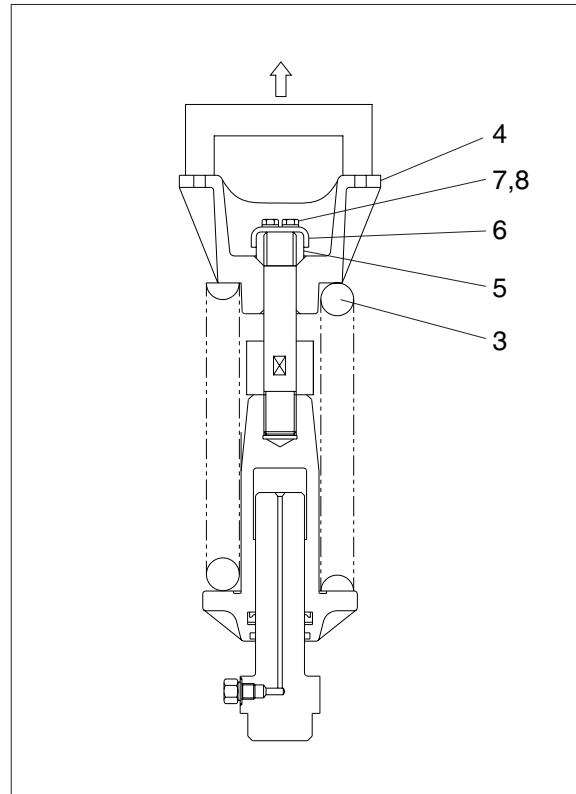
- 6 Lock plate
- 7 Bolt
- 8 Spring washer
- 9 Rod seal
- 10 Back up ring

- 11 Dust seal
- 12 Rod assembly
- 13 Grease valve
- 14 Stopper tube

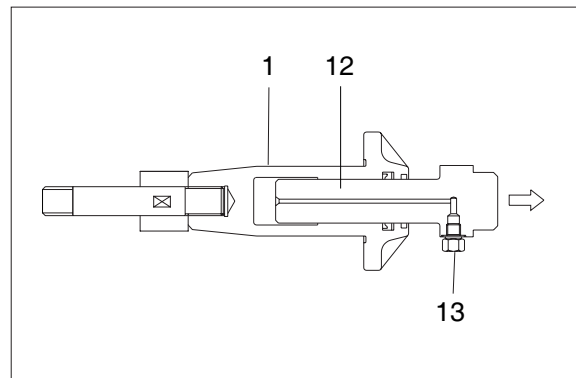
(2) Disassembly

- 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 : 19012 kg (41826 lb)
- ② Remove bolt (7), spring washer (8) and lock plate (6).
- ③ Remove lock nut (5).

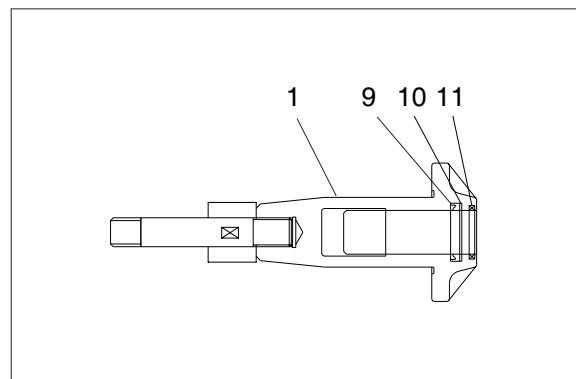
Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.
- ④ Lighten the press load slowly and remove bracket (4) and spring (3).



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



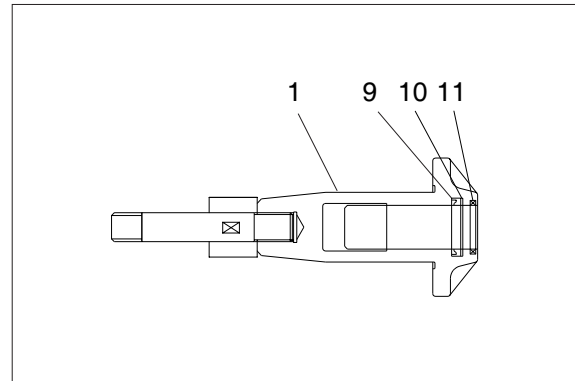
- ⑦ Remove rod seal (9), back up ring (10) and dust seal (11).



(3) Assembly

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

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



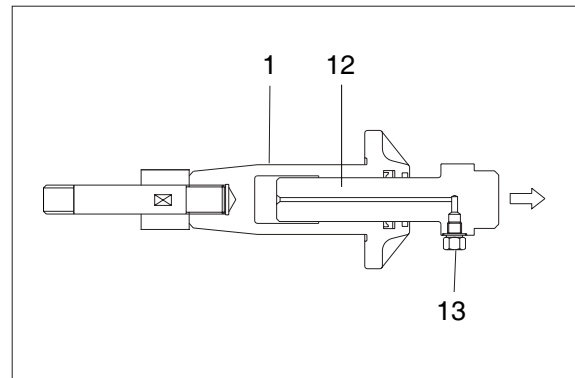
- ② Pour grease into body (1), then push in rod (12) by hand.

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

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

- ③ Fit grease valve (13) to rod (12).

·Tightening torque : $13.0 \pm 1.0 \text{ kgf}\cdot\text{m}$
($94 \pm 7.2 \text{ lbf}\cdot\text{ft}$)

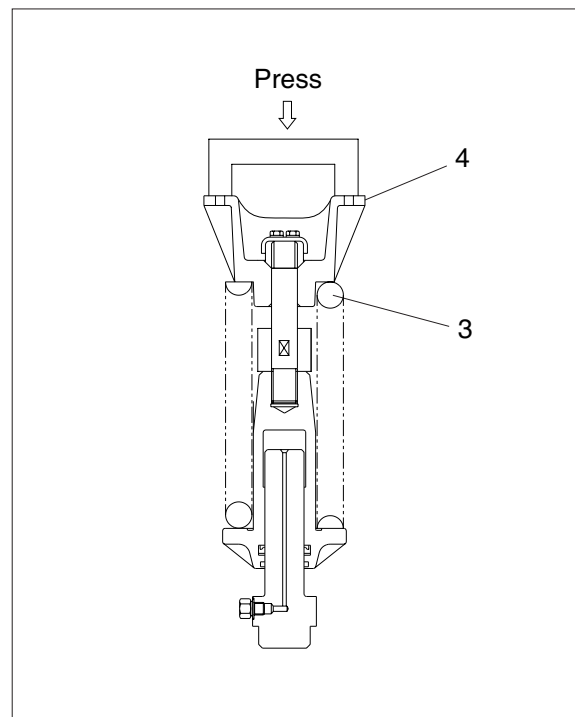


- ④ Install spring (3) and bracket (4) to body (1).

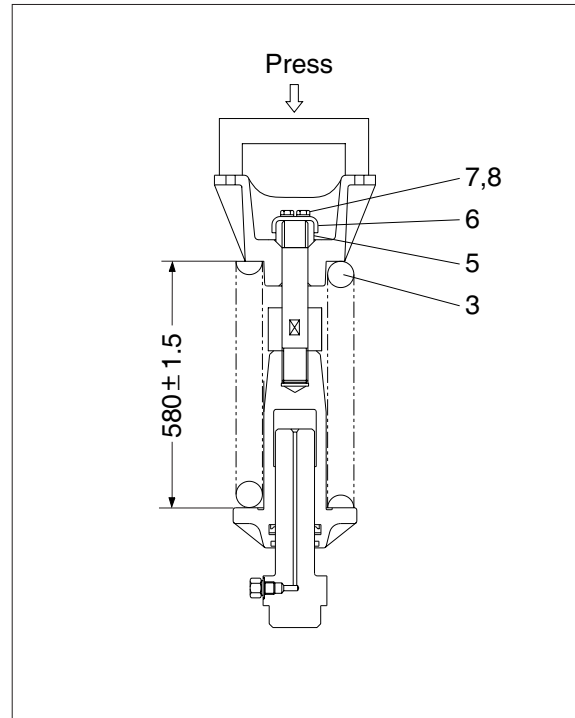
- ⑤ Apply pressure to spring (3) with a press and tighten lock nut (5).

※ Apply sealant before assembling.

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

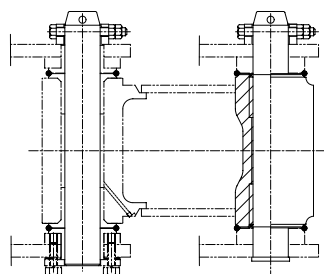
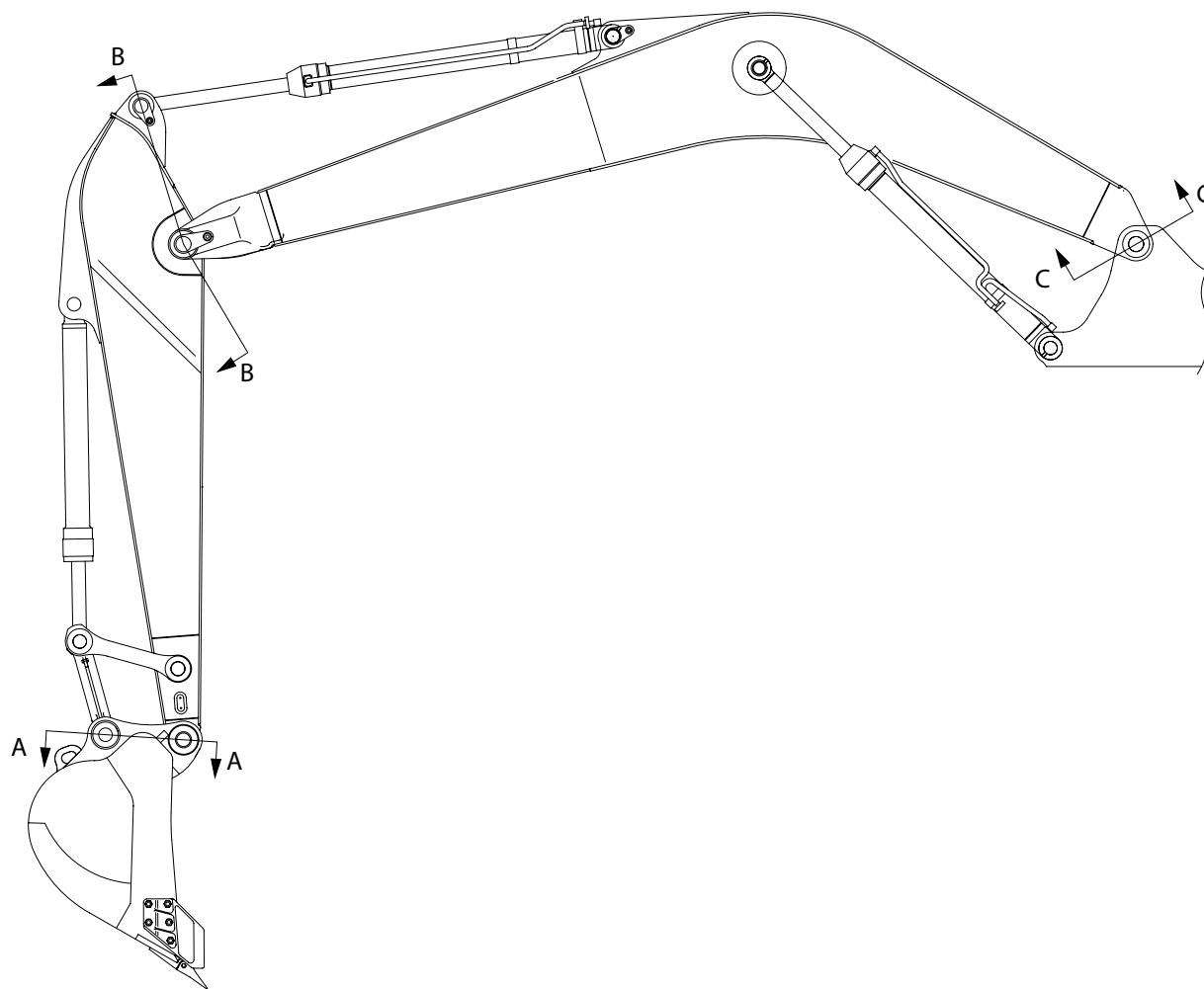


- ⑥ Lighten the press load and confirm the set length of spring (3).
- ⑦ After the setting of spring (3), install lock plate (6), spring washer (8) and bolt (7).

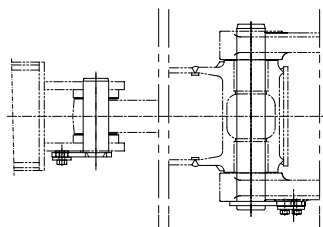


GROUP 11 WORK EQUIPMENT

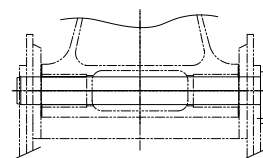
1. STRUCTURE



SECTION A



SECTION B



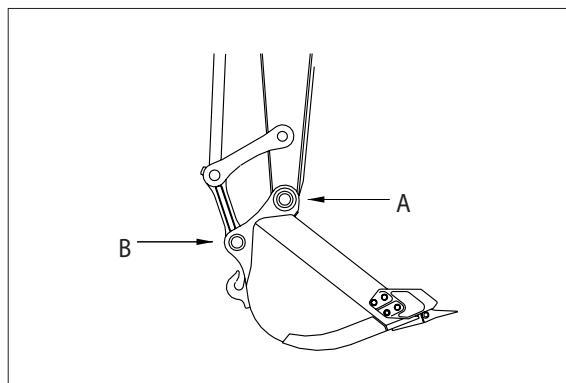
SECTION C

2. REMOVAL AND INSTALL

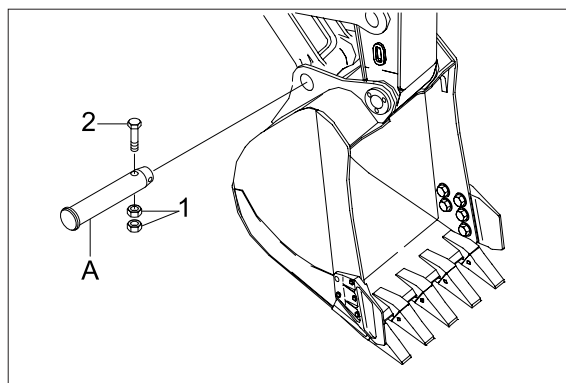
1) BUCKET ASSEMBLY

(1) Removal

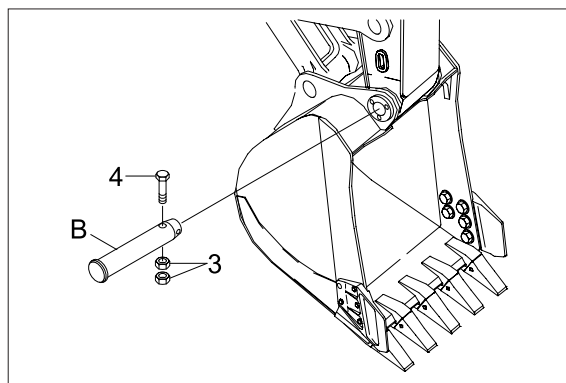
- ① Lower the work equipment completely to ground with back of bucket facing down.



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



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

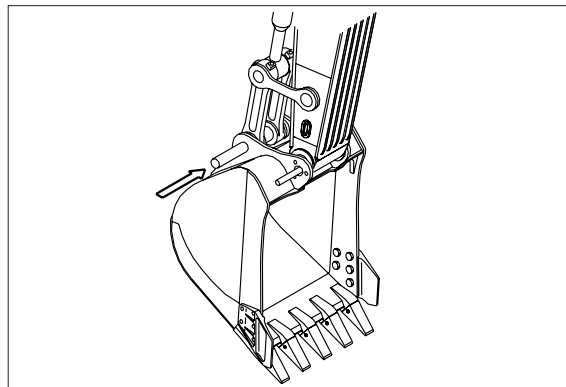


(2) Install

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

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

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



2) ARM ASSEMBLY

(1) Removal

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

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

- ① Remove bucket assembly.

For details, see **removal of bucket assembly**.

- ② Disconnect bucket cylinder hose (1).

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

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

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

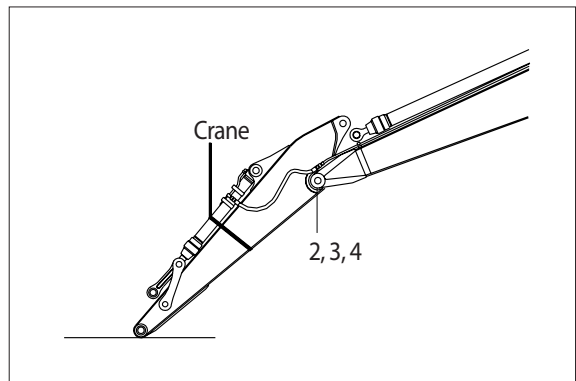
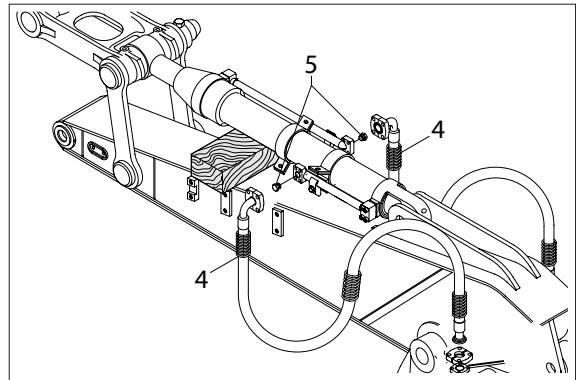
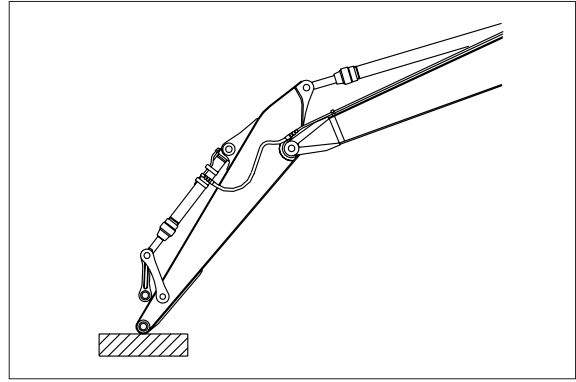
- ④ For details, see **removal of arm cylinder assembly**.

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

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

· Weight : 1025 kg (2260 lb)

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



(2) Install

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

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

- ※ Bleed the air from the cylinder.

3) BOOM CYLINDER

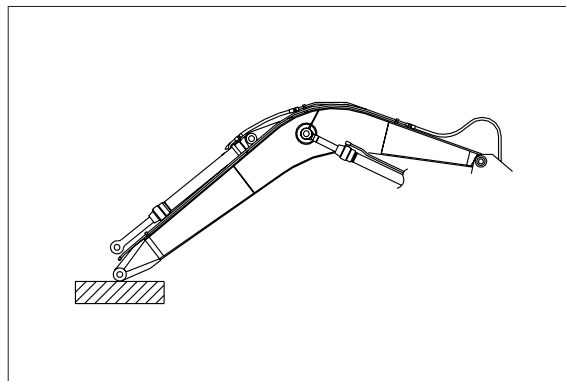
(1) Removal

- ① Remove arm and bucket assembly.

For details, see **removal of arm and bucket assembly**.

- ② Remove boom cylinder assembly from boom.

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

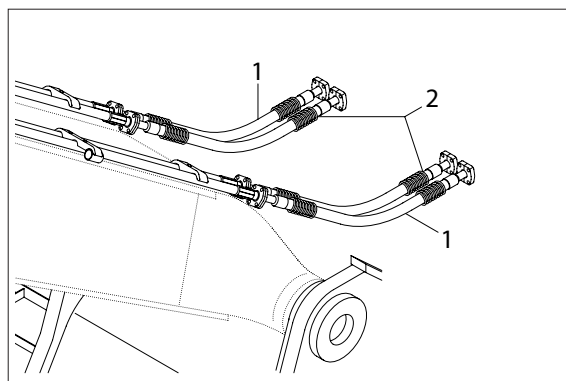


- ③ Disconnect head lamp wiring.

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

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

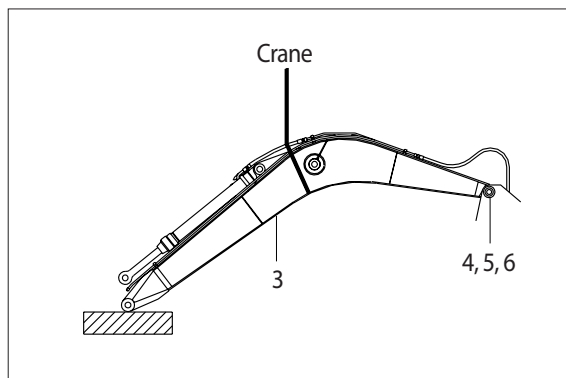
- ⑤ Sling boom assembly (3).



- ⑥ Remove bolt (4), plate (5) and pull out the pin (6) then remove boom assembly.

· Weight : 2200 kg (4860 lb)

※ 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.

