

SECTION 7 DISASSEMBLY AND ASSEMBLY

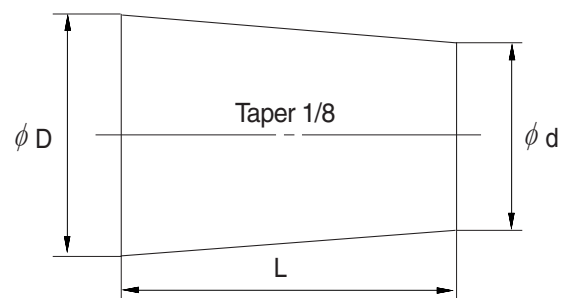
Group 1	Precaution	7-1
Group 2	Tightening Torque	7-4
Group 3	Pump Device	7-7
Group 4	Main Control Valve	7-21
Group 5	Swing Device	7-35
Group 6	Travel Device	7-58
Group 7	RCV Lever	7-90
Group 8	Turning Joint	7-106
Group 9	Boom, Arm and Bucket Cylinder	7-111
Group 10	Undercarriage	7-130
Group 11	Work Equipment	7-143

GROUP 1 PRECAUTIONS

1. REMOVAL WORK

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

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



2. INSTALL WORK

- 1) Tighten all bolts and nuts (sleeve nuts) to the specified torque.
- 2) Install the hoses without twisting or interference.
- 3) Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
- 4) Bend the cotter pin or lock plate securely.
- 5) When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2-3 drops of adhesive.
- 6) When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
- 7) Clean all parts, and correct any damage, dents, burrs, or rust.
- 8) Coat rotating parts and sliding parts with engine oil.
- 9) When press fitting parts, coat the surface with antifriction compound (LM-P).
- 10) After installing snap rings, check that the snap ring is fitted securely in the ring groove (Check that the snap ring moves in the direction of rotation).
- 11) When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
- 12) When using eyebolts, check that there is no deformation or deterioration, and screw them in fully.
- 13) When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
- 14) When operating the hydraulic cylinders for the first time after repairing and reassembling the hydraulic cylinders, pumps, or other hydraulic equipment or piping, always bleed the air from the hydraulic cylinders as follows:
 - (1) Start the engine and run at low idling.
 - (2) Operate the control lever and actuate the hydraulic cylinder 4-5 times, stopping 100 mm 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 disulphide grease) to the work equipment related parts.

GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-bracket)	M10 × 1.25	6.9±1.4	49.9±10.1
2		Engine mounting bolt (bracket-frame)	M12 × 1.75	13.0±1.0	94±7.2
3		Radiator mounting bolt, nut	M12 × 1.75	12.8±3.0	92.6±21.7
4		Coupling mounting bolt	M12 × 1.75	9.3±0.5	67.3±3.6
5		Flywheel housing mounting bolt, nut	M10 × 1.5	6.9±1.4	49.9±10.1
6		Fuel tank mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1
7	Hydraulic system	Main pump mounting bolt	M12 × 1.75	13.0±1.0	94±7.2
8		Main control valve mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1
9		Hydraulic oil tank mounting bolt	M12 × 1.75	12.8±3.0	92.6±21.7
10		Turning joint mounting bolt, nut	M10 × 1.5	6.9±1.4	49.9±10.1
11	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
12		Swing bearing upper mounting bolt	M12 × 1.75	12.8±3.0	92.6±21.7
13		Swing bearing lower mounting bolt	M12 × 1.75	12.8±3.0	92.6±21.7
14		Travel motor mounting bolt	M12 × 1.75	12.8±3.0	92.6±21.7
15		Sprocket mounting bolt	M12 × 1.75	12.3±1.2	89±8.7
16	Under carriage	Upper roller mounting bolt, nut	M12 × 1.75	12.3±1.2	89±8.7
17		Lower roller mounting bolt	M16 × 1.5	31.3±3.0	226±21.7
18	Others	Counterweight mounting bolt	M20 × 2.5	59.7±8.7	419±62.9
19		Canopy/Cab mounting bolt, nut	M12 × 1.75	12.8±3.0	92.6±21.7
20		Operator's seat mounting bolt	M 8 × 1.25	2.5±0.5	18.1±3.6
21		Lower frame lower cover mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1
22		Travel motor cover mounting bolt	M10 × 1.5	6.9±1.4	49.9±10.1

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
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

(2) Fine thread

Bolt size	8T		10T	
	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
1"	41	21	152
1-1/4"	50	35	253

3) PIPE AND HOSE (ORFS type)

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

4) FITTING

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

GROUP 3 PUMP DEVICE

1. REMOVAL AND INSTALL

1) REMOVAL

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

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

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

· Hydraulic tank quantity : 27 ℓ
(7.1 U.S.gal)

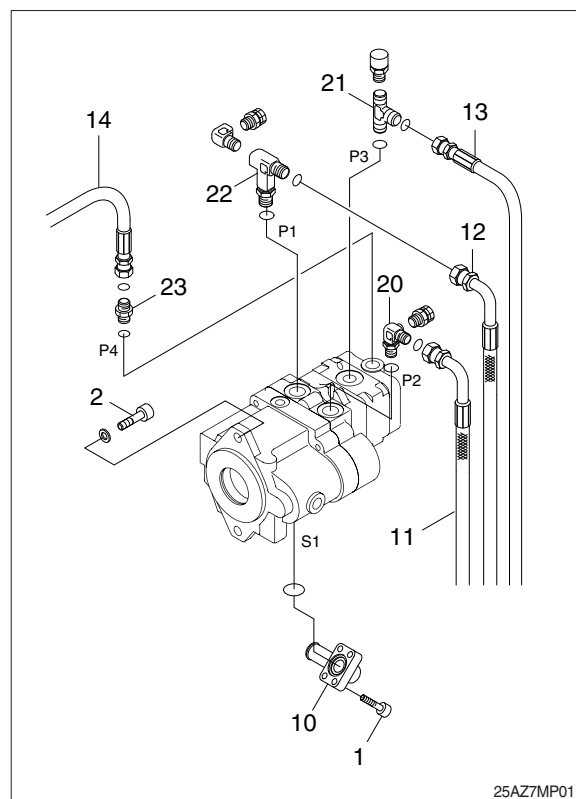
- (5) Disconnect hoses (11, 12, 13) and remove connectors (20, 21, 22).
- (6) Disconnect pilot line hoses (14) and remove connectors (23).
- (7) Remove socket bolts (1) and disconnect pump suction tube (10).

· Tightening torque : 8.27 ± 1.7 kgf·m
(59.8 ± 12.3 lbf·ft)

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

- (8) Sling the pump assembly and remove the pump mounting bolts (2).
 - Weight : 19 kg (42 lb)
 - Tightening torque : 13.0 ± 1.0 kgf·m
(94 ± 7.2 lbf·ft)

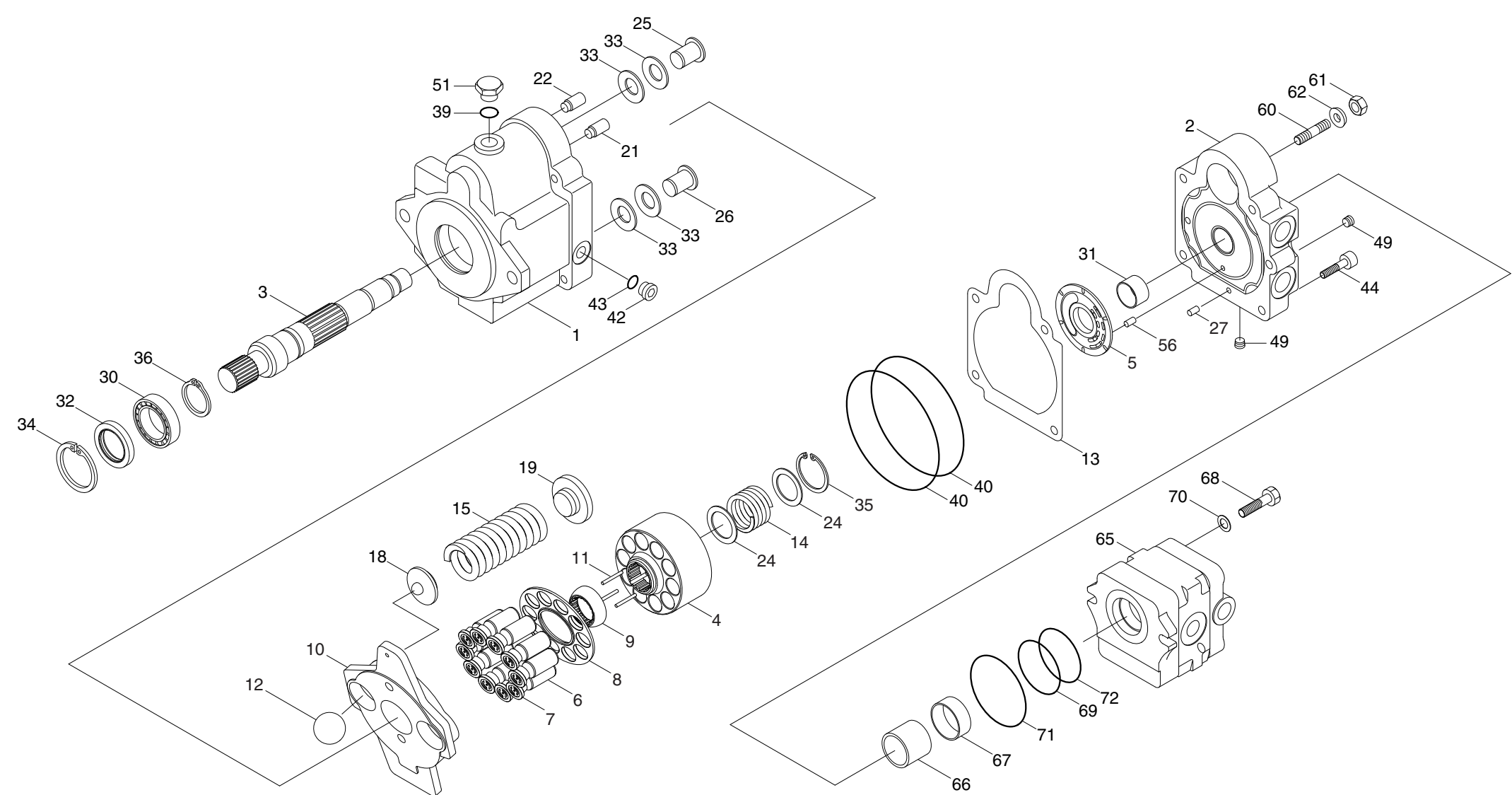
※ Pull out the pump assembly from housing. When removing the pump assembly, check that all the hoses have been disconnected.



2) INSTALL

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

2. MAIN PUMP
1) STRUCTURE



1	Body S	10	Swash plate	21	Rod G	33	Dish spring	49	Plug	68	Screw
2	Body H	11	Needle	22	Rod C	34	Snap ring	51	Plug	69	O-ring
3	Shaft	12	Ball	24	Retainer	35	Snap ring	56	Spring pin	70	Washer
4	Cylinder barrel	13	Packing	25	Stopper pin A	36	Snap ring	60	Screw	71	O-ring
5	Valve plate	14	Spring C	26	Stopper pin B	39	O-ring	61	Nut	72	O-ring
6	Piston	15	Spring T	27	Pin	40	O-ring	62	Seal washer		
7	Shoe	18	Spring holder	30	Ball bearing	42	Plug	65	Gear pump		
8	Shoe holder	19	Spring guide	31	Needle bearing	43	O-ring	66	Coupling		
9	Barrel holder	20	Pin	32	Oil seal	44	Screw	67	Collar		

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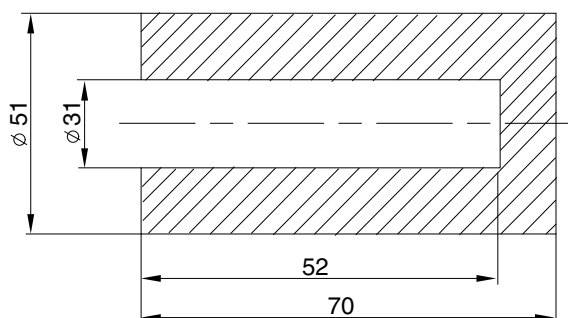
3. ASSEMBLE AND DISASSEMBLE

1) General precautions

- (1) Before disassembling, it is important to have fully understood the internal structure of the pump.
- ※ The gasket (13), oil seal (32) and O-rings will be probably damaged when you disassemble it, so be sure to have prepared spares.
- (2) After having drained oil inside the pump, wash the pump and put it on a working bench covered with clean paper, cloth, or rubber mat for disassembling and assembling. Then, disassemble and assemble the pump slowly and carefully with necessary tools. Use care not to scratch even slightly, and take proper measures to prevent foreign matters from entering the assembly.

2) Tools

Tool name	Size	Quantity
Hexagon wrench	4, 6, 8 mm	1 each
Circlip player	For hole	1
Spanner wrench	13 mm	1
Torque wrench	45N (JIS B 4650) 90N (JIS B 4650)	1 1
Resin hammer	-	1
Special tooling for oil seal	See below	1
Seal kit	-	1 set
Grease	-	Small amount



Special tooling for oil seal

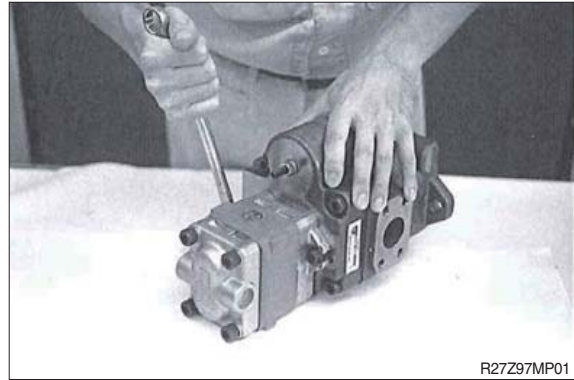
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3) DISASSEMBLING

(1) Disassembling of gear pump

Remove two screws (68) with spanner wrench 13 mm, and after that remove gear pump (65), collar (67) and coupling (66).

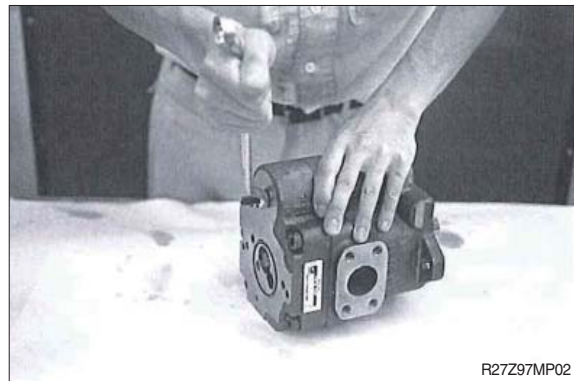
- ※ Coupling (66) and collar (67) may be attached with gear pump kit (65).



(2) Remove the adjustment screw

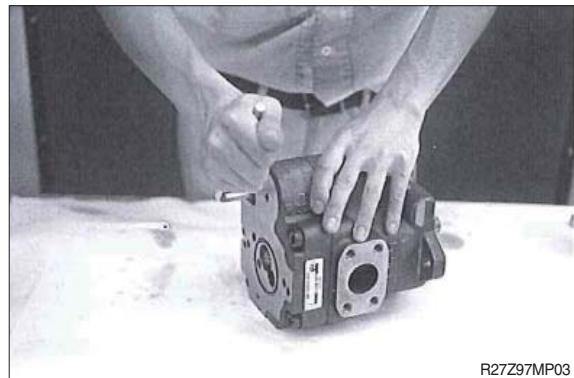
Loose hexagon nut (61) with spanner wrench 13 mm, then remove the adjustment screw (60) with hexagon wrench 4 mm.

- ※ Suggest you to measure the outside length of the adjustment screw. Because it is a good help when you readjust it after reassembling.



(3) Separation of body S and body H

Remove five screws (44) with hexagon wrench 8 mm.

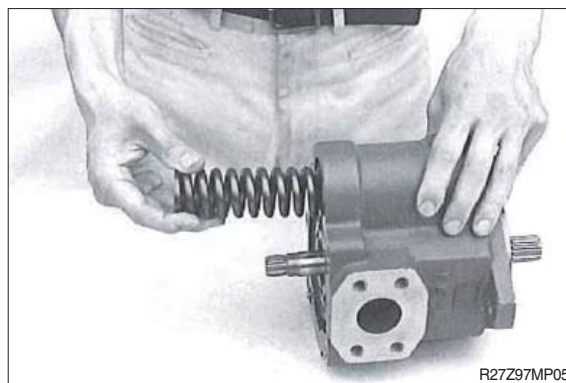


- ※ If you tap the part of inserted spring of body H with hummer softly, it is easy for separation.



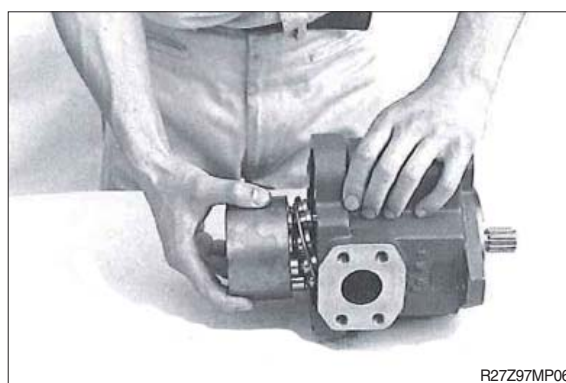
(4) Disassembling of body S kit

Remove spring T (15) from body S kit, then take off spring holder (18).



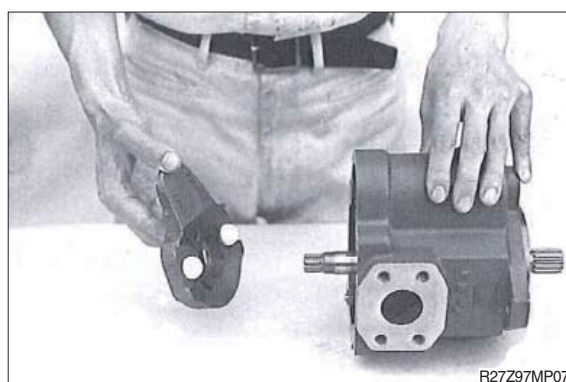
(5) Disassembling of body S kit

Remove cylinder barrel kit.



(6) Disassembling of body S kit

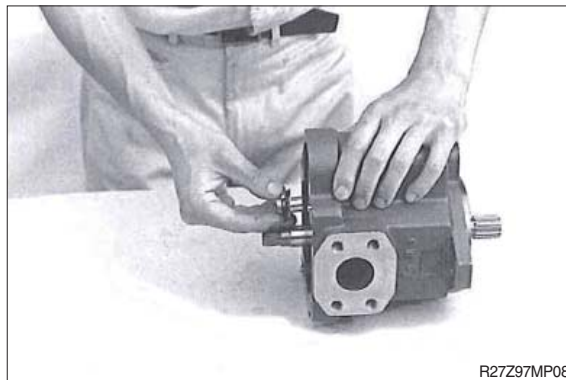
Remove swash plate (10) and two balls (12).



(7) Disassembling of body S kit

Remove stopper pin A (25), stopper pin B (26), dish springs (33), rod G (21) and rod C (22).

- ※ The length of the stopper pin A and B is different. Pay attention not to swap when reassembling.



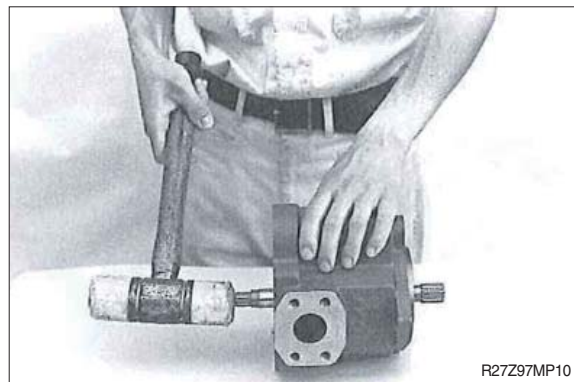
(8) Disassembling of body S kit

Remove snap ring (34) from body S (1).



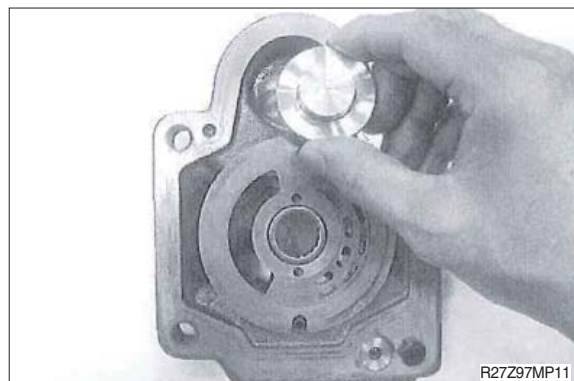
(9) Disassembling of body S kit

Tap the end of shaft (3) with hammer, then oil seal (32) and shaft with bearing (30) come off.



(10) Disassembling of body H kit

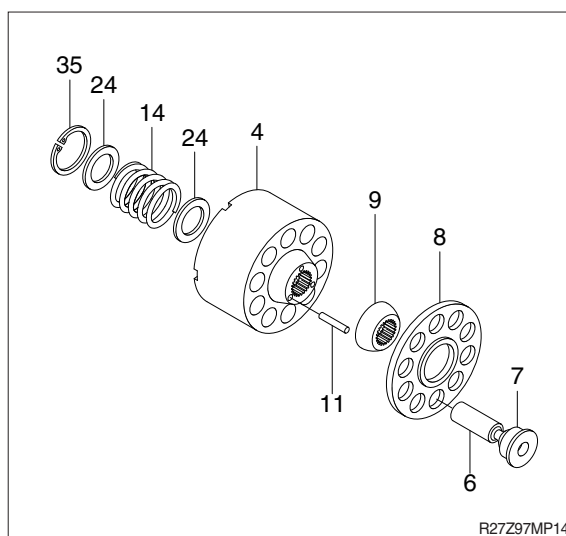
Remove spring guide (19) and valve plate (5) from body H.



(11) Disassembling of cylinder barrel kit

Remove shoe holder (8) on which piston shoe assemblies (6) and (7) are set and disassemble it in the order of barrel holder (9) and needle (11).

Also, take off snap ring (35), retainer (24), spring C (14) and retainer (24), which are set in the cylinder barrel (4) in this order.



4) ASSEMBLING

(1) Precautions during assembling

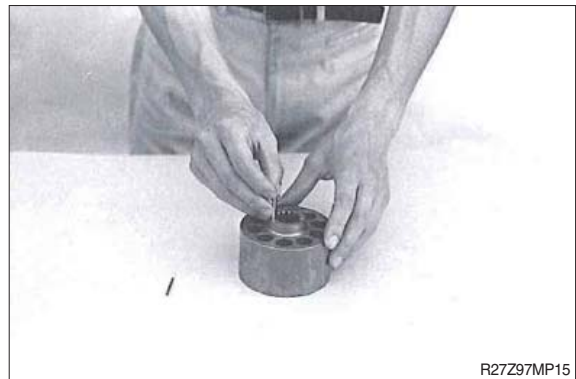
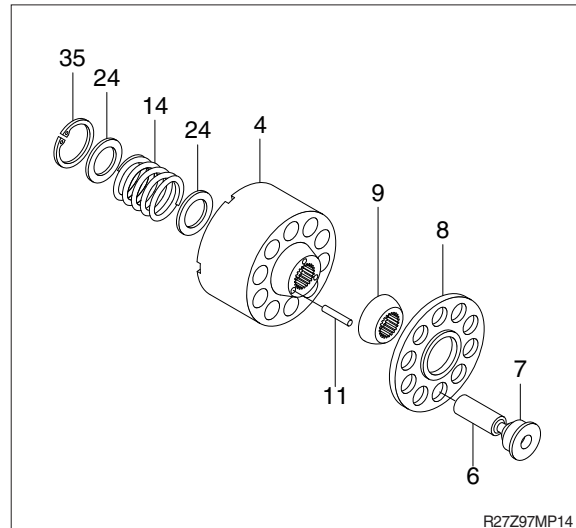
Reverse the above procedures for assembling.

When assembling, be very careful to wash parts in clean oil, to prevent dusts and water from adhering to parts entering assemblies and not to scratch on the sliding surfaces of all parts.

- ※ Apply small quantity of grease to the periphery of O-rings to be set in socket and spigot joints to prevent the O-rings from being damaged.

(2) Assembling of cylinder barrel kit

Set retainer (24), spring C (14), retainer (24) and snap ring (35) in the shaft center hole of cylinder barrel (4) in this order, and carefully set shoe holder (8), on which needle (11), barrel holder (9) and ten piston shoe assemblies have already been set, in cylinder barrel from the opposite side.



(3) Assembling of body S kit

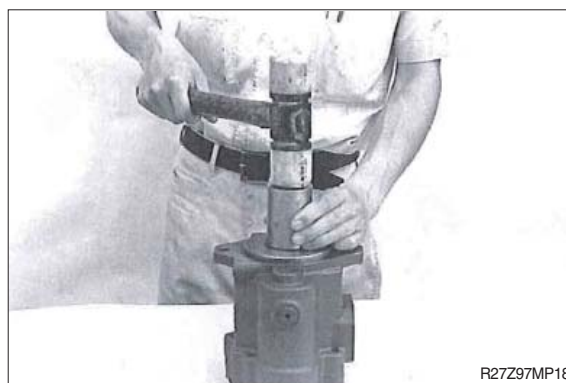
Set shaft (3) with bearing (30), oil seal (32) and snap ring (34) in this order into body S (1).

- ※ Use new oil seal for assembling. Before assembling, apply a small quantity of grease to the periphery of oil seal lip and tap it together with the special tooling with hammer.

When assembling, put body S (1) onto body H (2) tentatively for easy work.



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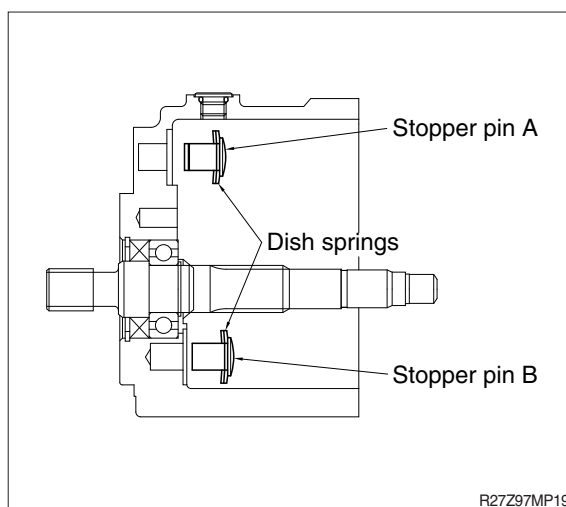


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(4) Assembling of body S kit

Set each four dish springs (33) to stopper pin A (25) and stopper pin B (26), then set them into body S (1).

- ※ Pay attention to the direction of the dish washer.
- ※ Pin A and pin B have different length. Set them to the original position. Otherwise, pump displacement changes, and engine stall or insufficient speed can occur.

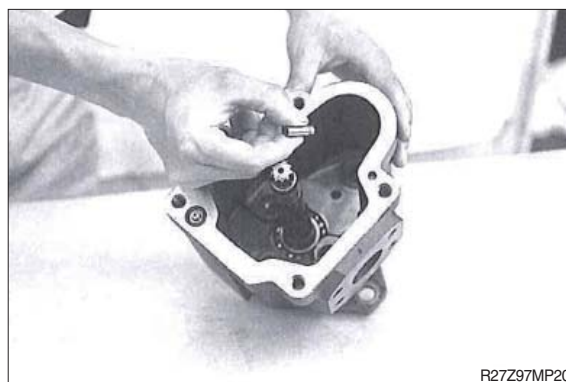


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(5) Assembling of body S kit

Set rod G (21) and rod C (22) into body S (1).

- ※ Pay attention to the direction of the rod G and rod C. (See cross section drawing for the direction.)

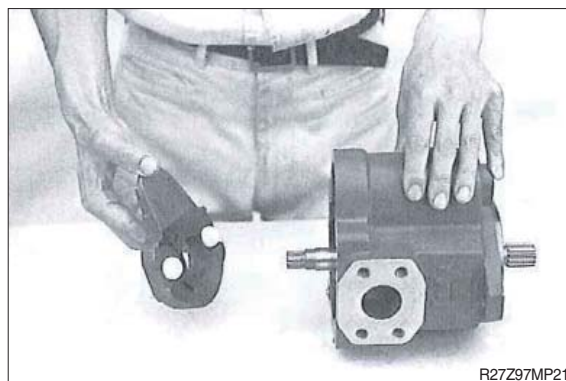


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(6) Assembling of body S kit

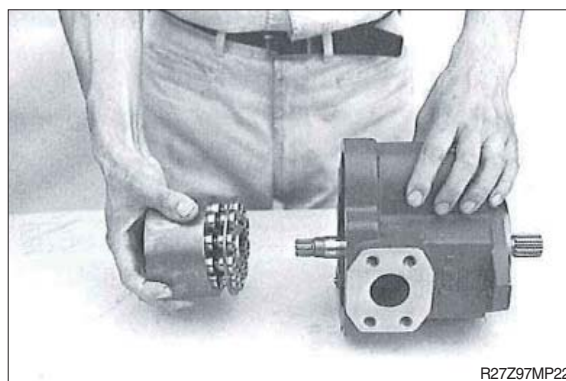
Put two balls (12) in the hole of swash plate (10) and install it in body S.

※ Apply grease on the balls if they drop out.



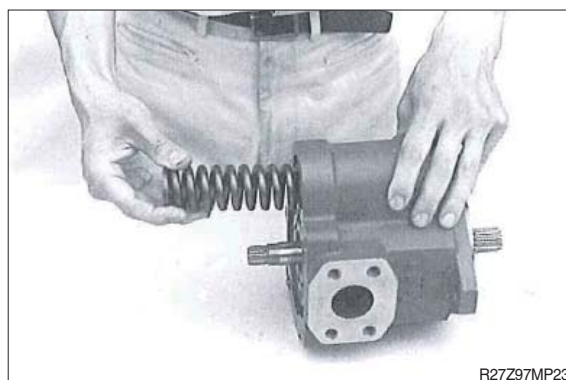
(7) Assembling of body S kit

Assemble cylinder barrel kit into the body S (1).



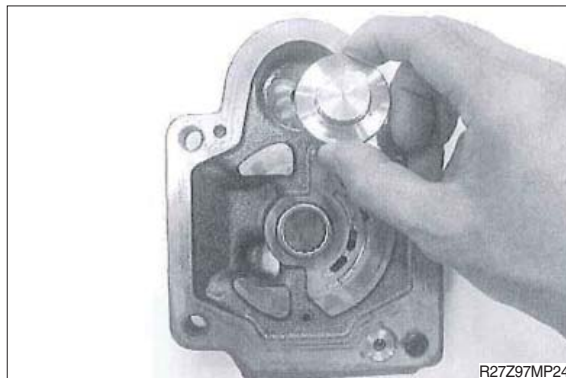
(8) Assembling of body S kit

Set spring T (15) to spring holder (18), then set them together into the hole on swash plate (10).



(9) Assembling of body H kit

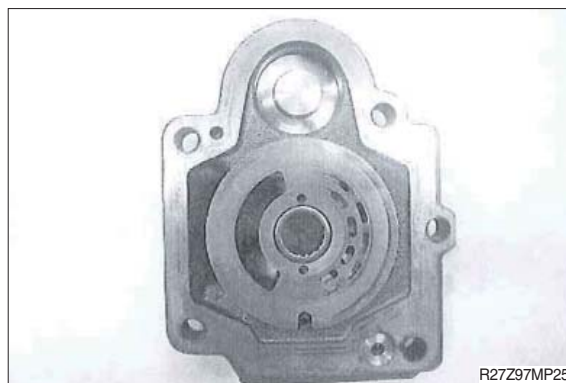
Set spring guide (19) in body H (2).



(10) Assembling of body H kit

Place valve plate (5) slowly on body H (2) by positioning it with spring pin (56).

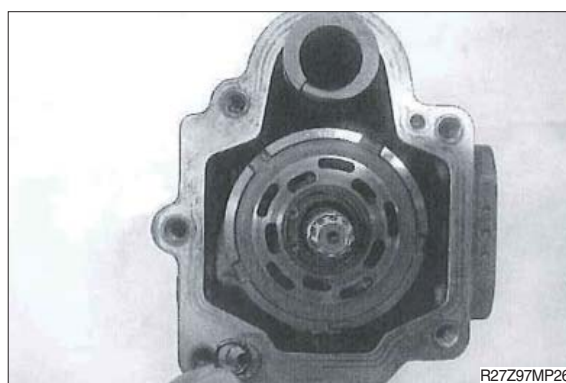
- ※ V notch copper alloy side of valve plate slides with cylinder barrel (4) and be careful not to set the valve plate to a wrong direction.



(11) Assembling of body S kit with body H kit

Place O-ring (40) on body S.

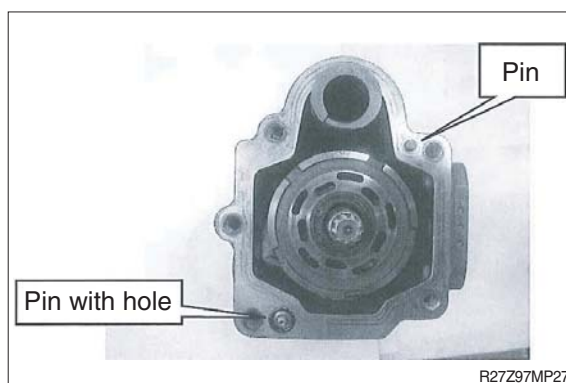
- ※ Use new O-ring for assembling.



(12) Assembling of body S kit with body H kit

Set pin (20) and pin (27) on body S.

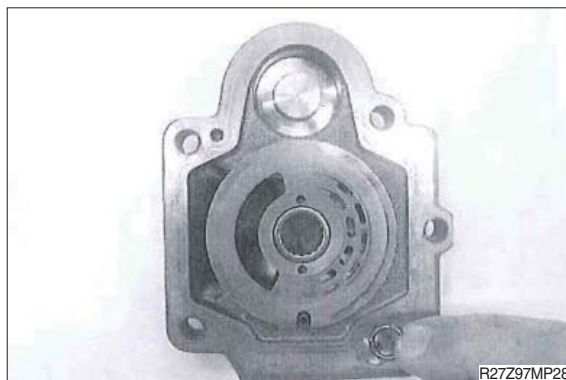
- ※ Pay attention to the position of each pin. Pin (27) has a hole.



(13) Assembling of body S kit with body H kit

Place O-ring (40) on body H.

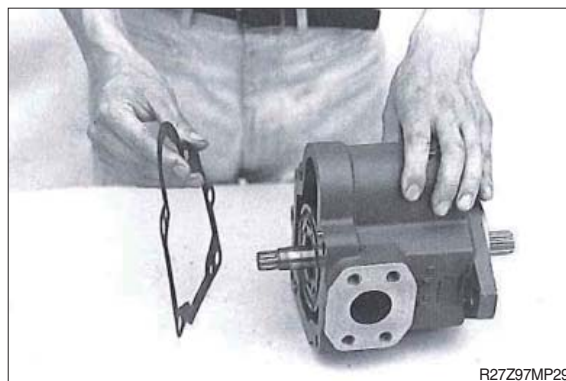
- ※ Use new O-ring for assembling.



(14) Assembling of body S kit with body H kit

Place packing (13), position it with locating pin (27) on body S.

※ Use new packing for assembling.



(15) Assembling of body S kit with body H kit

Set two screws (M10×65) into the upper side two screw holes, and tighten them until the distance between body S and body H comes to 5 to 10 mm.

Then set three screws (44) into the three screw holes, after that, replace the upper side two screws (M10×65) to the regular size screws (44) and fix them.

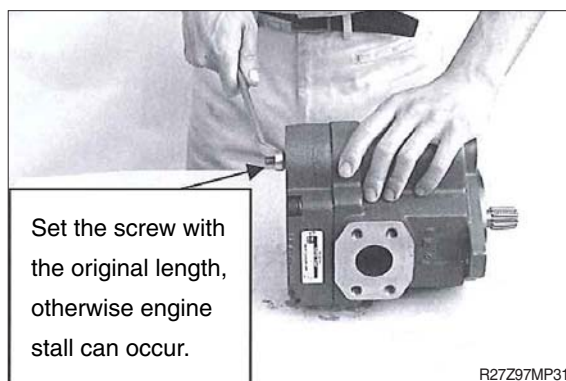
· Tightening torque : 5.2~6.6 kgf · m
(37.6~47.7 lbf · ft)



(16) Installation of the adjusting screw

Fasten the adjusting screw (60) with hexagon wrench 4 mm, then adjust the outside length of adjusting screw and fix locknut (61) with spanner wrench 13 mm. At that time, change the seal washer (62) to new one.

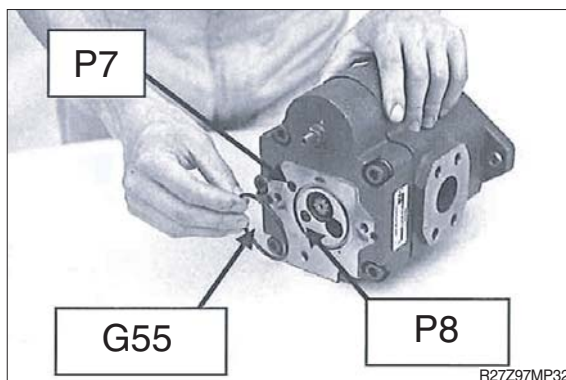
· Tightening torque : 1.5~2.0 kgf · m
(10.8~14.5 lbf · ft)



(17) Installation of gear pump kit

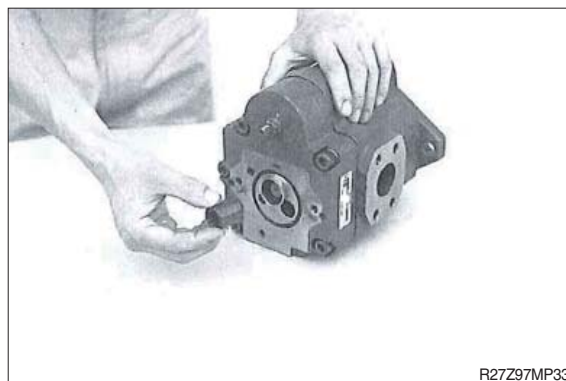
Place O-ring (69, 71, 72) on the installation side of body H.

※ Use new O-ring for assembling.



(18) Installation of gear pump kit

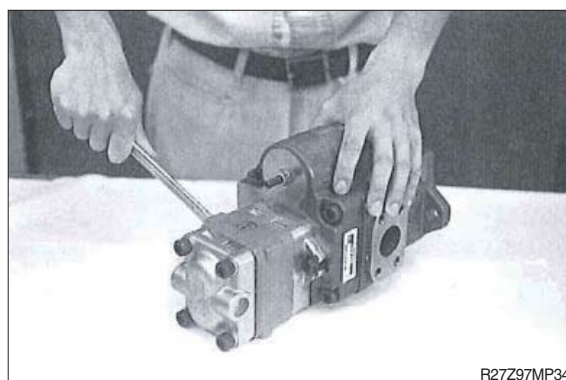
Set collar (67) and coupling (66).



(19) Installation of gear pump kit

Install gear pump kit (65) and fix it by two screws (68) and washers (70) with spanner wrench 13 mm.

- Tightening torque : 2.0~2.4 kgf · m
(14.5~17.3 lbf · ft)



(20) Inspection of assembling

After completed the assembling of pump, make sure that pump shaft rotates smoothly by hand.

GROUP 4 MAIN CONTROL VALVE

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

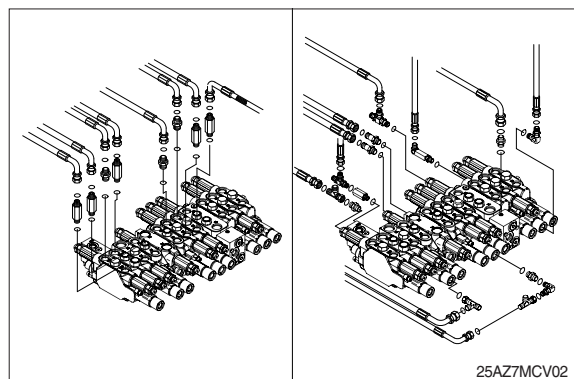
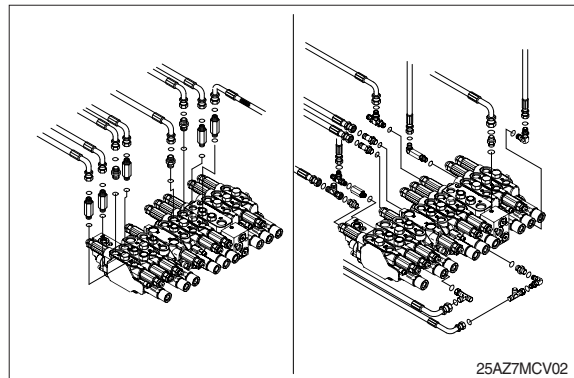
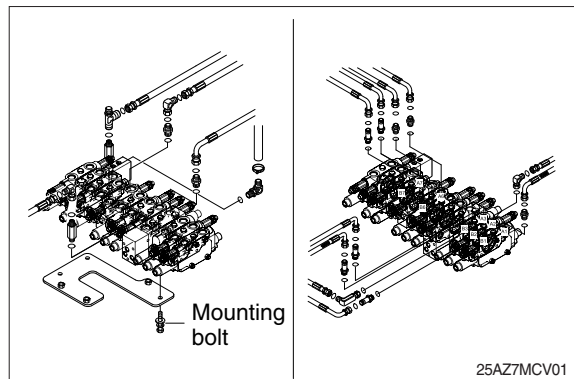
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
- ▲ **Escaping fluid under pressure can penetrate the skin causing serious injury.**
- ※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.
- (4) Disconnect hydraulic hose.
- (5) Disconnect pilot line hoses.
- (6) Sling the control valve assembly and remove the control valve mounting bolt.

- Weight : 25 kg (55 lb)
- Tightening torque : 6.9 ± 1.4 kgf·m
(49.9 ± 10.1 lbf·ft)

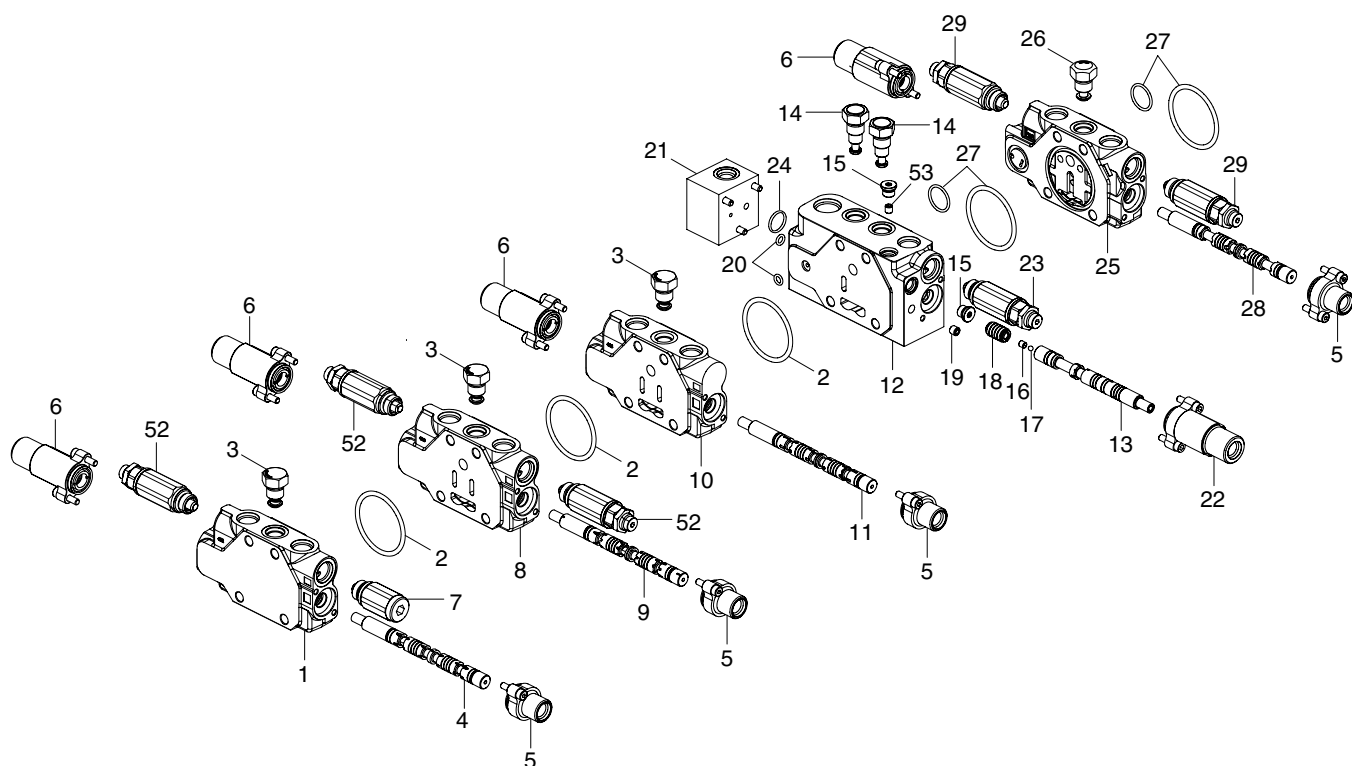
- (7) Remove the control valve assembly.
When removing the control valve assembly, check that all the piping have been disconnected.

2) INSTALL

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



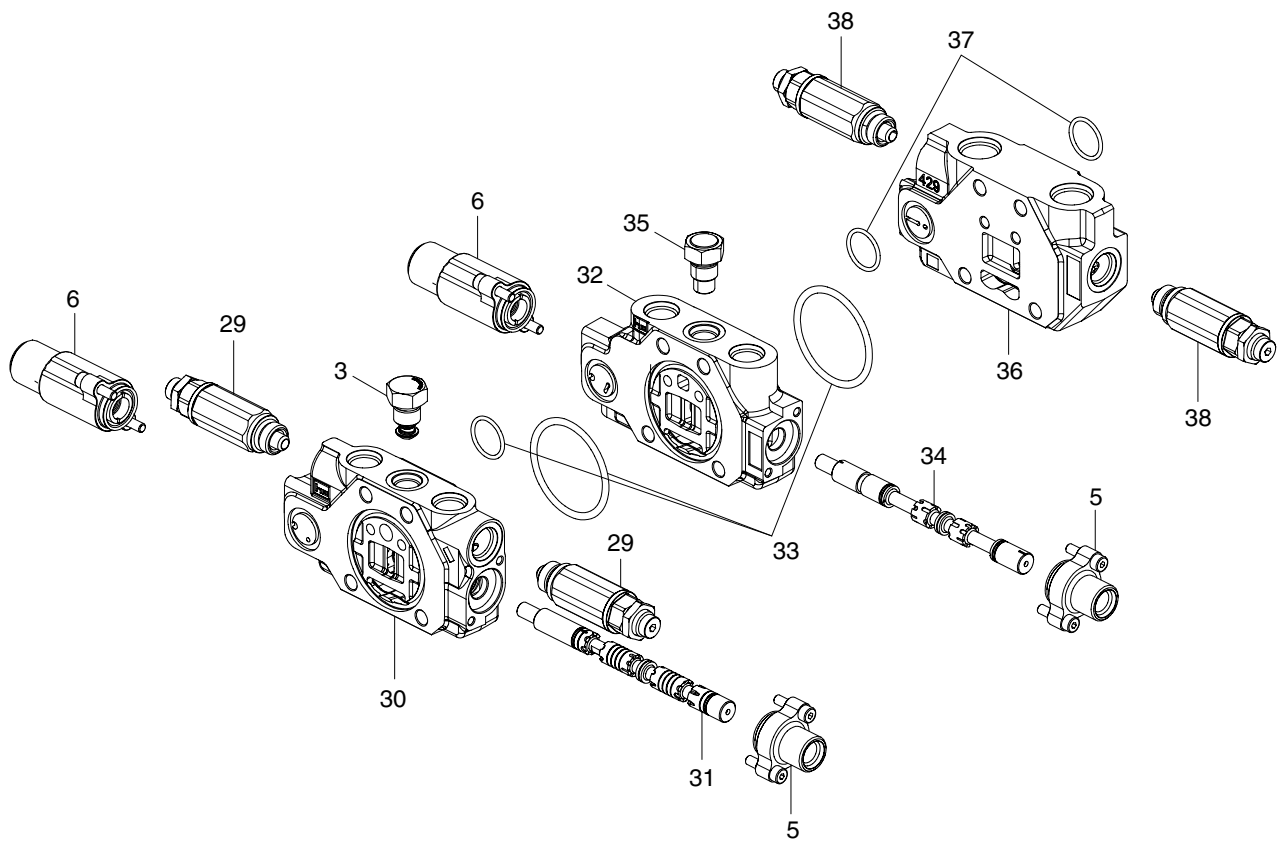
2. STRUCTURE (1/3)



25AZ2MCV02

- | | | |
|-------------------------|--------------------------|----------------------|
| 1 Dozer block assy | 11 Swing spool assy | 21 Pilot body |
| 2 O-ring | 12 Confluence block body | 22 Pilot cover |
| 3 Plug | 13 Confluence spool assy | 23 Relief valve assy |
| 4 Dozer spool assy | 14 Plug | 24 O-ring |
| 5 Pilot cover | 15 Plug | 25 PTO block body |
| 6 Pilot cover | 16 Piston | 26 Plug |
| 7 Relief valve assy | 17 Ball | 27 O-ring |
| 8 Boom swing block | 18 Spring | 28 PTO 1 spool assy |
| 9 Boom swing spool assy | 19 Piston | 29 Relief valve assy |
| 10 Swing block assy | 20 O-ring | 52 Relief valve assy |

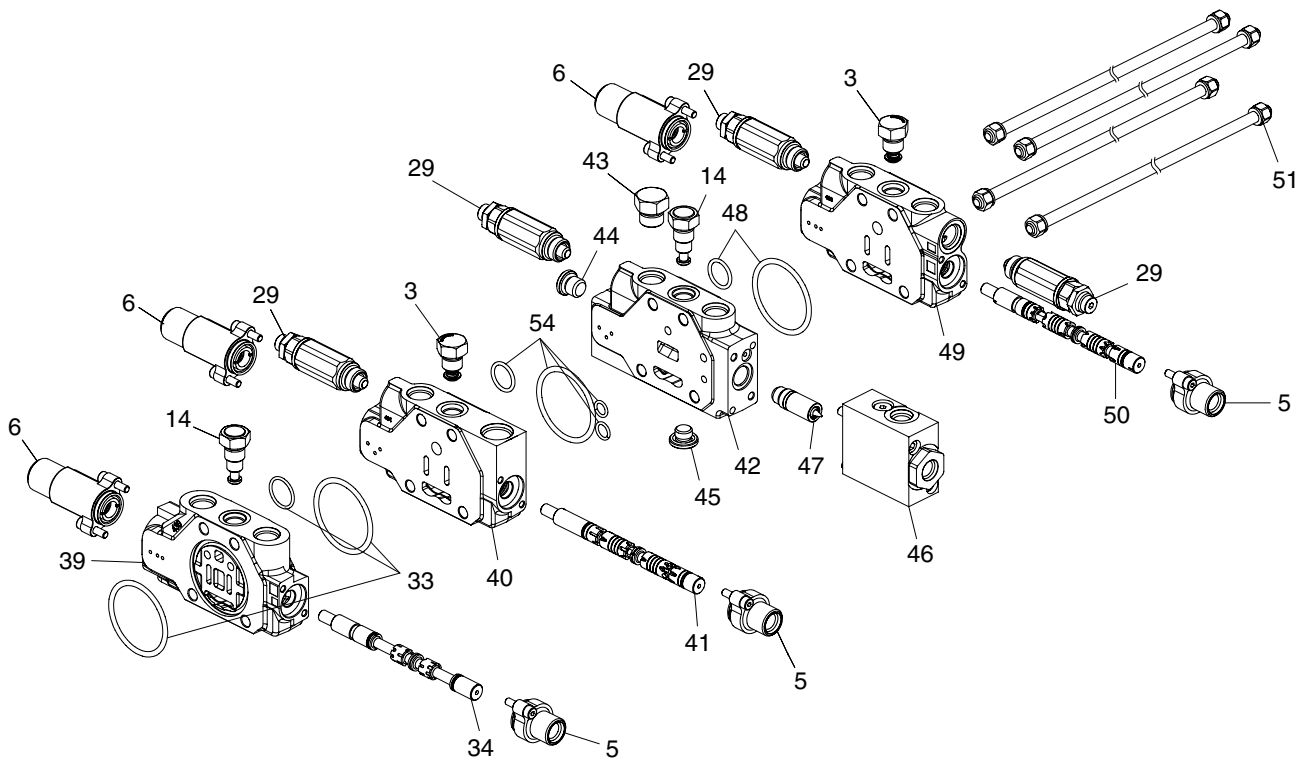
STRUCTURE (2/3)



25AZ2MCV03

- | | | | | | |
|----|-------------------|----|----------------------|----|-------------------|
| 3 | Plug | 31 | Arm spool assy | 35 | Plug |
| 5 | Pilot cover | 32 | LH travel block assy | 36 | Inlet block assy |
| 6 | Pilot cover | 33 | O-ring | 37 | O-ring |
| 29 | Relief valve assy | 34 | Travel spool assy | 38 | Relief valve assy |
| 30 | Arm block assy | | | | |

STRUCTURE (3/3)



25AZ2MCV04

3	Plug	39	RH travel block assy	46	Lock valve cover
5	Pilot cover	40	Boom block body	47	Lock valve
6	Pilot cover	41	Boom spool assy	48	O-ring
14	Plug	42	Boom lock block assy	49	Bucket block assy
29	Relief valve assy	43	Plug	50	Bucket spool assy
33	O-ring	44	Plug	51	Socket bolt
34	Travel spool assy	45	Plug	54	O-ring

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL PRECAUTIONS

- (1) All hydraulic components are manufactured to a high precision. Consequently, before disassembling and assembling them, it is essential to select an especially clean place.
- (2) In handling a control valve, pay full attention to prevent dust, sand, etc. from entering into it.
- (3) When a control valve is to be removed from the machine, apply caps and masking seals to all ports. Before disassembling the valve, recheck that these caps and masking seals are fitted completely, and then clean the outside of the assembly. Use a proper bench for working. Spread paper or a rubber mat on the bench, and disassemble the valve on it.
- (4) Support the body section carefully when carrying or transferring the control valve. Do not lift by the exposed spool, end cover section etc.
- (5) After disassembling and assembling of the component it is desired to carry out various tests (for the relief characteristics, leakage, flow resistance, etc.), but hydraulic test equipment is necessary for these tests. Therefore, even when its disassembling can be carried out technically, do not disassemble such components that cannot be tested, adjusted, and so on. Additionally one should always prepare clean cleaning oil, hydraulic oil, grease, etc. beforehand.

2) TOOLS

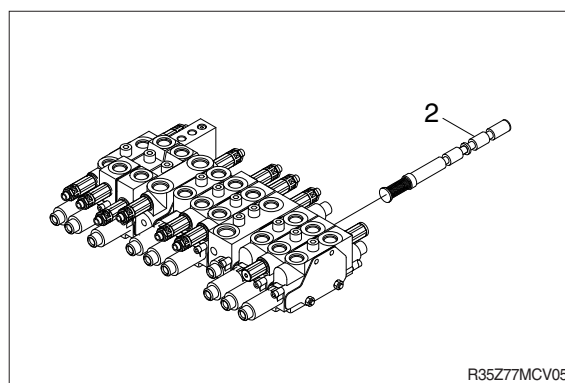
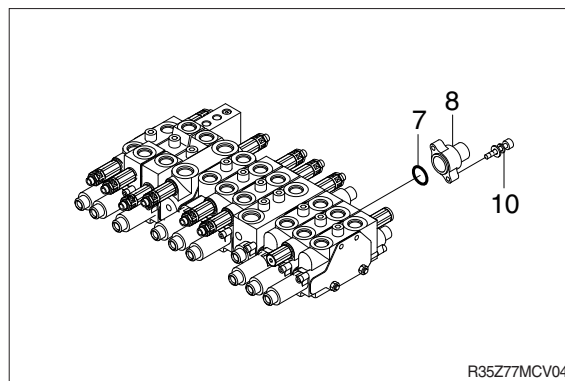
Before disassembling the control valve, prepare the following tools beforehand.

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

3) DISASSEMBLY

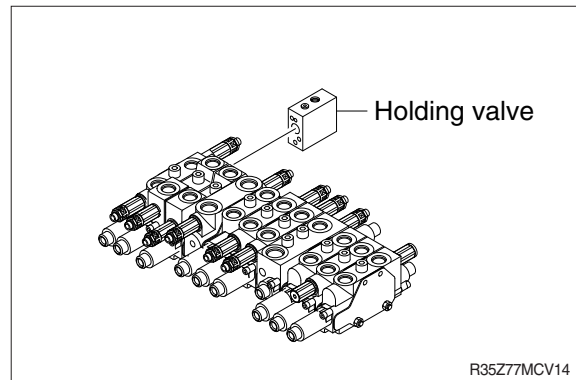
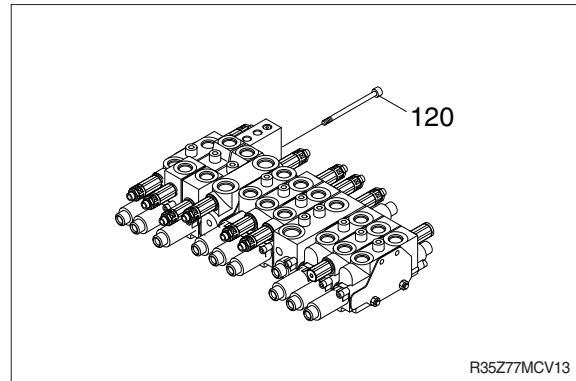
(1) Disassembly of spools (pilot type)

- ① Loosen hexagon socket head bolts (10) with washer.
(Hexagon wrench : 5 mm)
 - ② Remove the pilot cover (8).
- ※ Pay attention not to lose the O-ring (7) under the pilot cover.
- ③ Remove the spool assembly (2) from the body by hand slightly.
- ※ When extracting each spool from its body, pay attention not to damage the body.
 - ※ When extracting each spool assembly, it must be extracted from spring side only.
 - ※ When any abnormal parts are found, replace it with completely new spool assembly.
 - ※ When disassembled, tag the components for identification so that they can be reassembled correctly.



(2) Disassembly of holding valve (boom 1)

- ① Loosen hexagon socket head bolts(120).
(Hexagon wrench : 5 mm)
- ② Remove the holding valve.
 - ※ Pay attention not to lose the O-ring and the poppet under the pilot cover.
 - ※ Pay attention not to damage the "piston A" under pilot cover.
 - ※ When any abnormal parts are found, replace it with completely new holding valve assembly.
 - ※ When disassembled, tag the components for identification so that they can be reassembled correctly.



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

① The load check valve

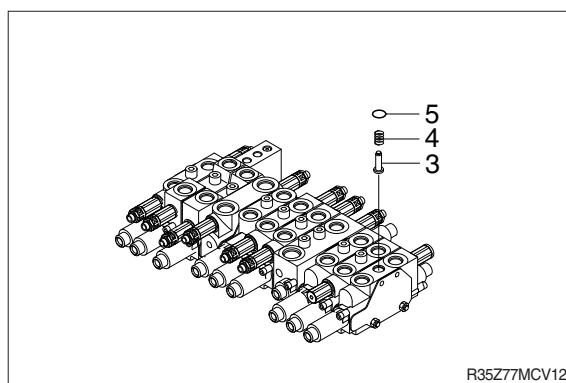
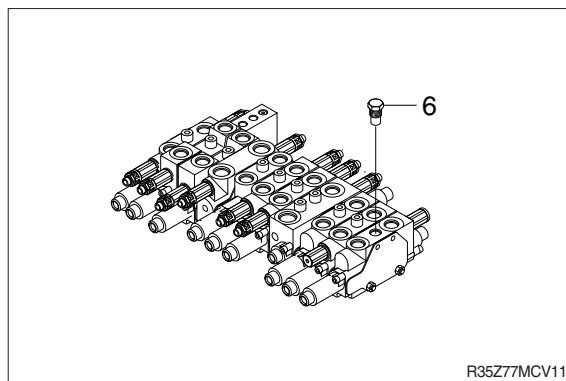
a. Fix the body to suitable work bench.

※ Pay attention not to damage the body.

b. Loosen the plug (6)

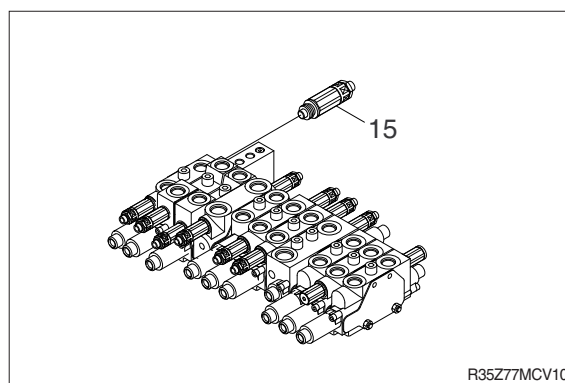
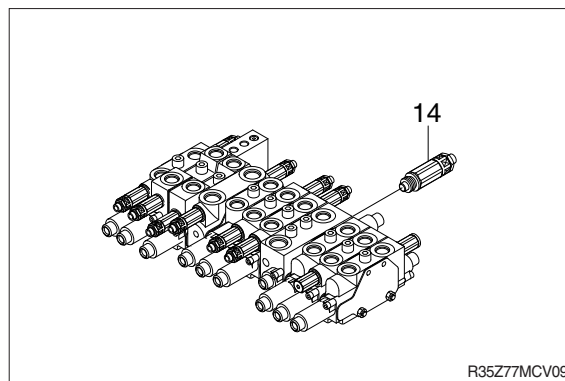
(Hexagon wrench : 10 mm).

c. Remove the O-ring (5), spring (4) and the load check valve (3) with pincers or magnet.



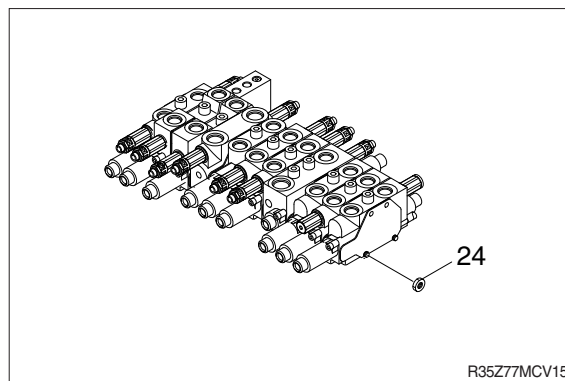
(4) Disassembly of the main and overload relief valve

- ① Fix the body to suitable work bench.
 - ② Remove the main relief valve (14).
(Spanner : 30 mm)
 - ③ Remove the overload relief valve (15).
(Spanner : 22 mm)
- ※ When disassembled, tag the relief valve for identification so that they can be reassembled correctly.
 - ※ Pay attention not to damage seat face.
 - ※ When any abnormal parts are found, replace it with completely new relief valve assembly.

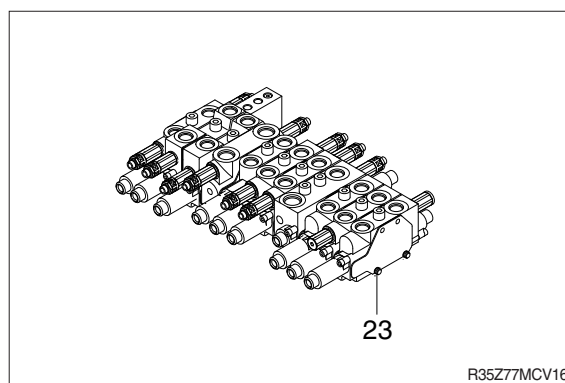


(5) Disassembly of the block assembly

- ① Fix the body to suitable work bench.
- ② Remove the nut (24).
(Spanner : 13 mm)



※ Do not removed the tie bolt (23).



(6) Inspection after disassembly

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

① Control valve

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

② Relief valve

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

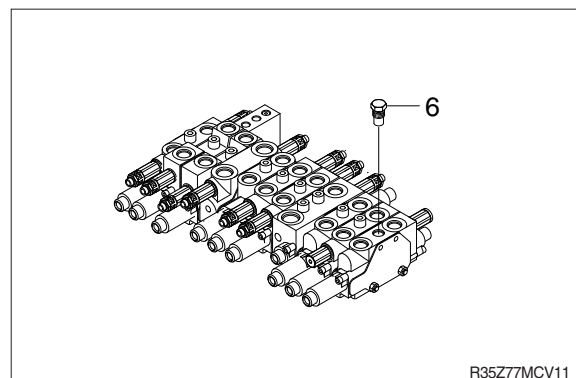
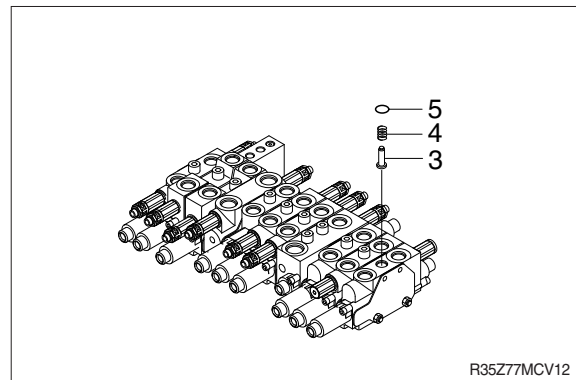
4) ASSEMBLY

(1) General precaution

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

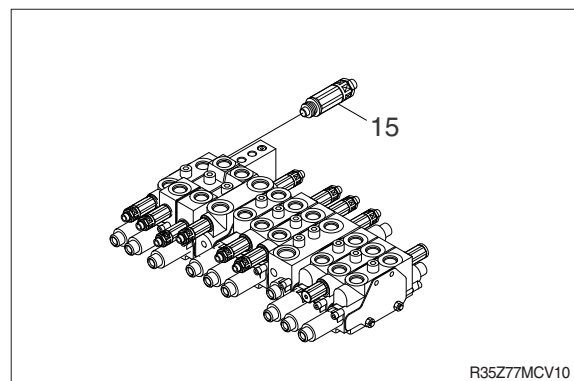
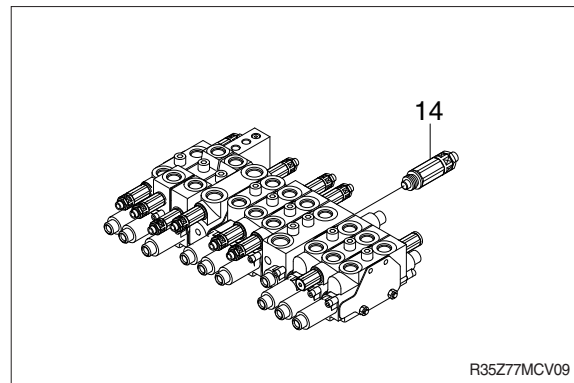
(2) Load check valve

- ① Assemble the load check valve (3) and O-ring (5), spring (4).
- ② Put O-rings on to plug (6).
- ③ Tighten plug to the specified torque.
 - Hexagon wrench : 8 mm
 - Tightening torque : 3.7 kgf · m
(26.7 lbf · ft)



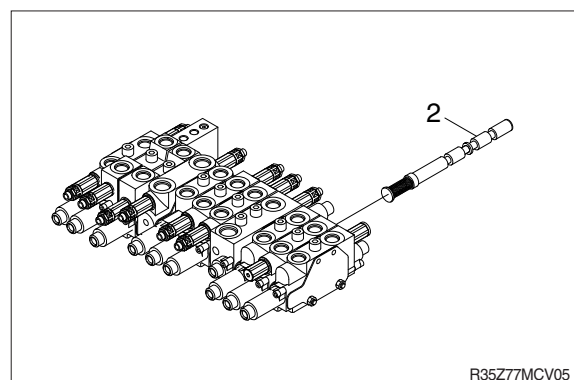
(3) Main relief, port relief valves

- ① Install the main relief valve (14).
 - Spanner : 30 mm
 - Tightening torque : 6 kgf · m (43.4 lbf · ft)
- ② Install the over load relief valve (15).
 - Spanner : 22 mm
 - Tightening torque : 4 kgf · m (28.9 lbf · ft)



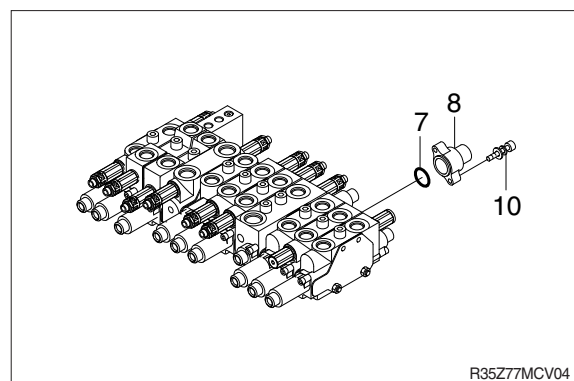
(4) Main spools

- ① Carefully insert the previously assembled spool assemblies into their respective bores within of body.
- ※ Fit spool assemblies into body carefully and slowly. Do not under any circumstances push them forcibly in.



(5) Covers of pilot type

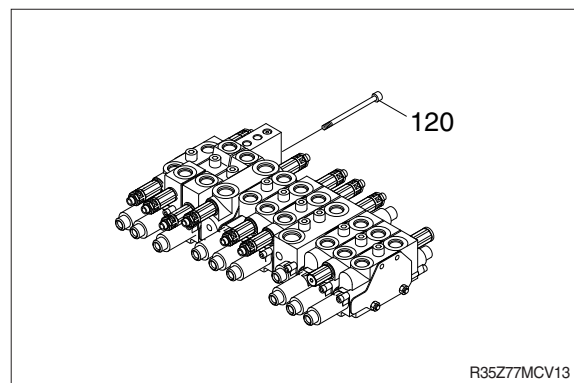
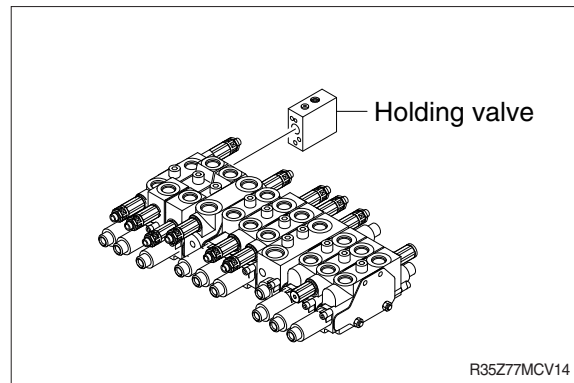
- ① Fit spool covers (8) tighten the hexagonal socket head bolts (10) with washer to the specified torque.
- Hexagon wrench : 5mm
 - Tightening torque : 1~1.1kgf · m (7.2~7.9lbf · ft)
- ※ Confirm that O-rings (7) have been fitted.



(6) Holding valve

- ① Fit the holding valve to the body and tighten hexagon socket head bolt (120) to specified torque.

- Hexagon wrench : 5 mm
- Tightening torque : 1.1 kgf · m (7.9 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.

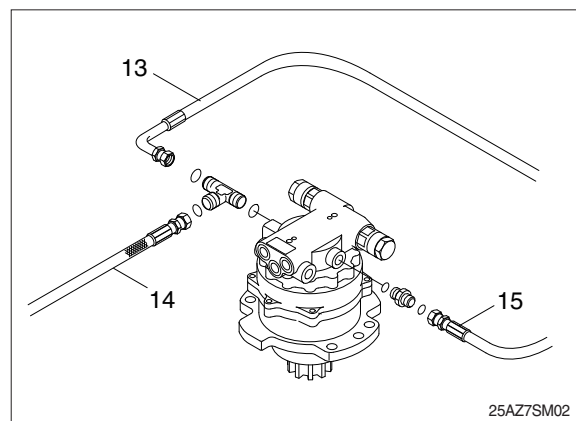
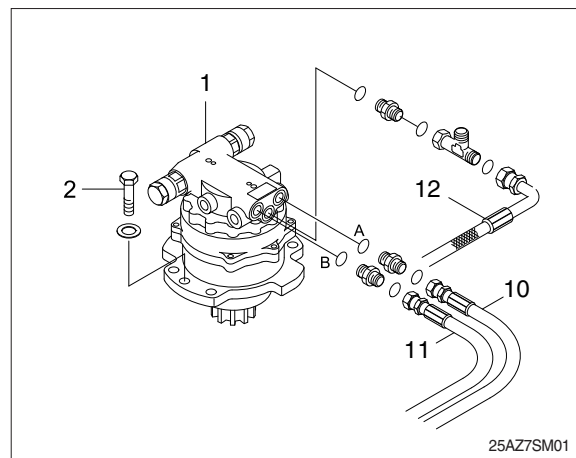
- (4) Disconnect hose assembly (10, 11, 12, 13, 14).
- (5) Disconnect pilot line hoses (15).
- (6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (2).

※ Motor device weight : 34 kg (75 lb)
 · Tightening torque : 19.6 ± 2.9 kgf·m
 (142 ± 21.0 lbf·ft)

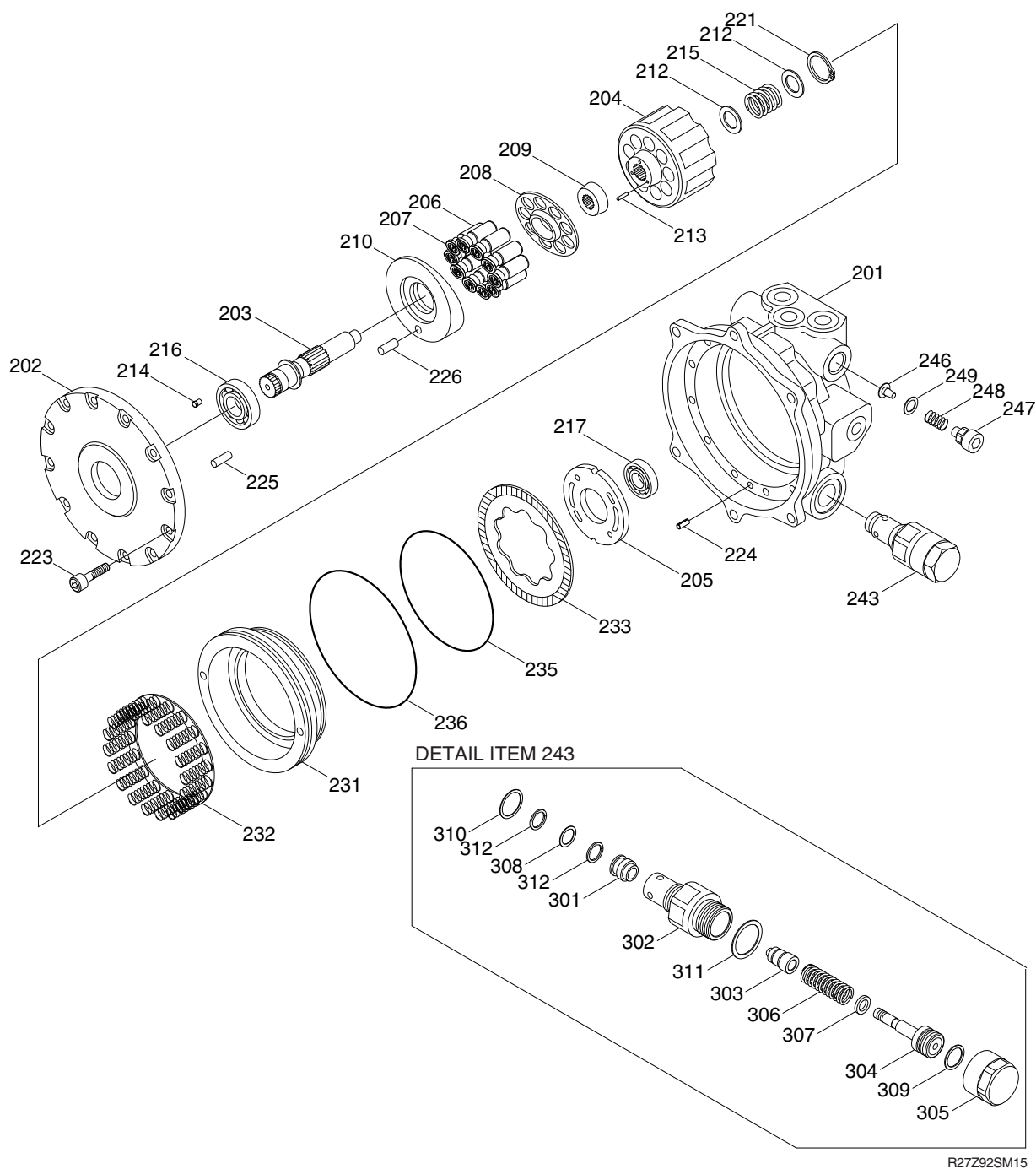
- (7) Remove the swing motor assembly.
- ※ When removing the swing motor assembly, check that all the piping have been disconnected.

2) INSTALL

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



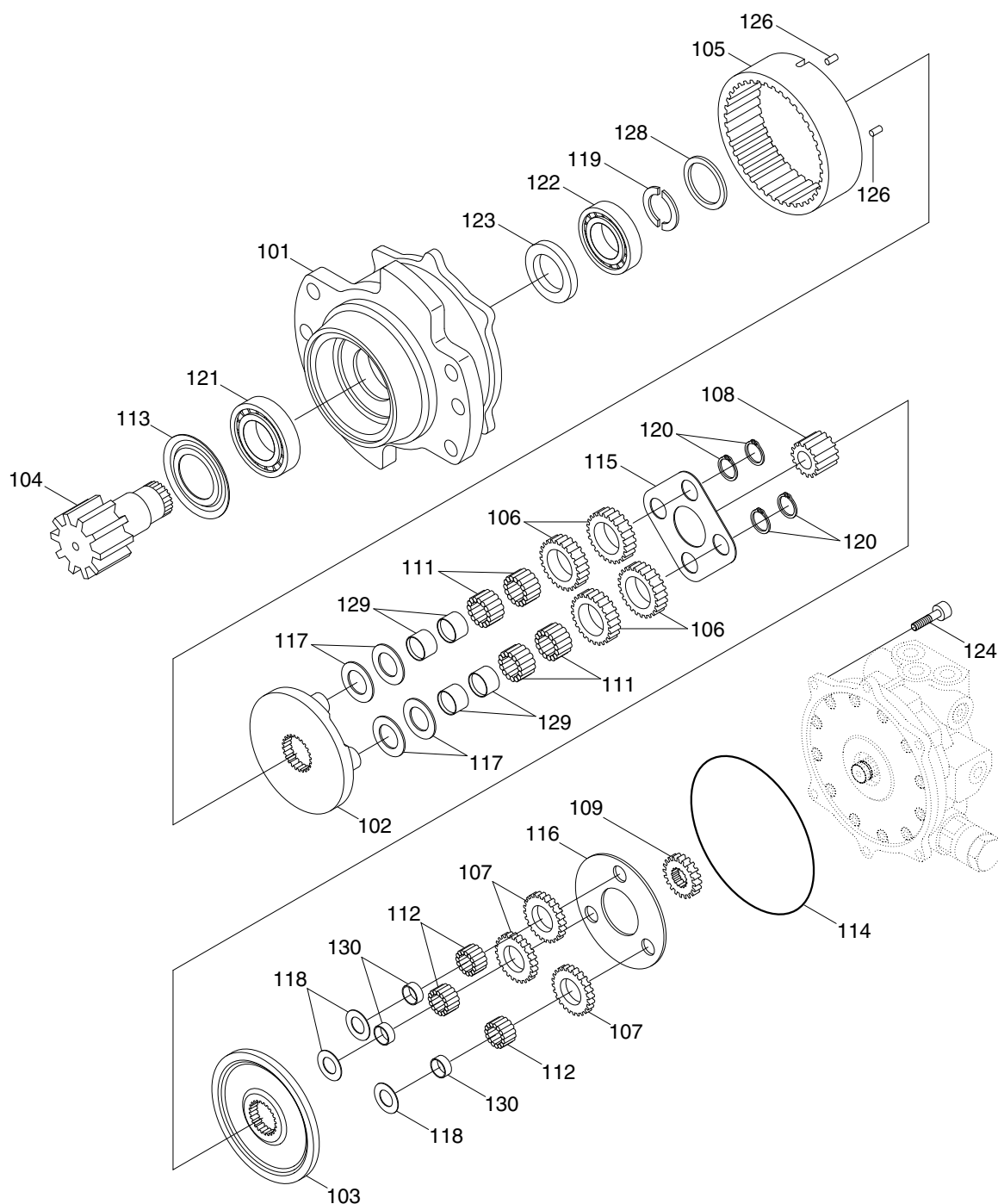
2. COMPONENTS (1/2)



R27Z92SM15

201	Body	213	Pin	232	Spring assy	303	Poppet
202	Plate	214	Filter	233	Disk plate	304	Piston
203	Shaft	215	Spring C	235	O-ring	305	Cap
204	Cylinder barrel	216	Bearing	236	O-ring	306	Spring
205	Valve plate	217	Bearing	243	Relief valve	307	Spacer
206	Piston	221	Snap ring	246	Check valve	308	O-ring
207	Shoe	223	Screw	247	Plug	309	O-ring
208	Shoe holder	224	Spring pin	248	Spring	310	O-ring
209	Barrel holder	225	Pin	249	O-ring	311	O-ring
210	Swash plate	226	Pin	301	Seat	312	Back up-ring
212	Retainer	231	Brake piston	302	Retainer		

COMPONENTS (2/2)



R27Z92SM16

101	Body	111	Needle	120	Snap ring
102	Carrier 1	112	Needle	121	Bearing
103	Carrier 2	113	Seal ring	122	Bearing
104	Pinion shaft	114	O-ring	123	Oil seal
105	Internal gear	115	Thrust plate 1	124	Screw
106	Gear B1	116	Thrust plate 2	126	Pin
107	Gear B2	117	Thrust washer 1	128	Ring
108	Gear S1	118	Thrust washer 2	129	Ring 1
109	Gear S2	119	Preload collar	130	Ring 2

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL ATTENTION

Please pay attention following points.

- (1) Working should be done at the clean place and pay attention not to attach dust, paint cake and water. And prepare the clean box to put into the disassembled parts.
- (2) Before disassembling, clean up the dust which is attached to the outside of the swing motor and take out paint which is attached to the binding parts by the wire brush.
- (3) To make the original position when assembling, make a marking before disassembling.
- (4) Give special care to protect parts from damage.
- (5) Wash parts with washing oil sufficiently.
- (6) Check parts whether there is friction loss or seize and take out burr with sand paper.
- (7) Change the seals and snap rings to new ones.

2) DISASSEMBLY AND ASSEMBLY PROCEDURE

As the swing motor composes 2 blocks (hydraulic motor and reduction gear), explain each block disassembly and assembly procedure.

And please refer to the page 7-36~37.

3) TOOLS FOR DISASSEMBLY AND ASSEMBLY

No.	Tool	
1	Preset type hand torque wrench	45 N (JIS B4650)
2		90 N (JIS B4650)
3	Hexagon bar bit for above wrench	Two-plane width 6
4		Two-plane width 8
5		
6	Single purpose type hand torque	$T = 15 \pm 1.5 \text{ kgf} \cdot \text{m}$ ($108 \pm 10.8 \text{ lbf} \cdot \text{ft}$) Two-plane 36
7	Hexagon bar wrench	Two-plane width 6
8		Two-plane width 8
9		
10	Spanner	Two-plane width 36
11	Minus driver	Width 6~10
12	Snap ring pliers	Ø28 For hole
13		Ø22 For shaft
14	Hammer	-
15	Plastic hammer	-
16	Other	Grease
17		(Oil designated hydraulic oil)
18		Wire brush
19		Sand paper
20		Anti-loose adhesive (three bond #1305)

4. DISASSEMBLY

1) HYDRAULIC MOTOR

- (1) Loose the hexagon socket head cap bolts (124), and take out the hydraulic motor assembly from the reduction gear body.

· Tools required :
Hexagon bar wrench : 6 mm

- ※ When taking out the hydraulic motor assembly from the reduction gear body, the drain port should be open.
When it is difficult to take out, insert the minus driver into the binding face to the body and take out the burr completely.



- (2) Take out the relief valve assembly.

· Tools required :
Spanner : 36 mm

- ※ Do not disassemble the relief valve assembly, unless it is necessary.



- (3) Loose the hexagon socket head cap bolts (223), and take out it.

· Tools required :
Hexagon bar wrench : 6 mm



- (4) Take out the plate S (202).

- ※ Pay attention not to drop off swash plate.



(5) Take out the swash plate (210) and the shaft kit from the plate S (202).

※ When it is difficult to take out the shaft, hit the opposite side slightly by the plastic hammer.

As the bearing (216) is pressed into the shaft, do not disassemble unless it is necessary to change the bearing.



(6) Take out the filter (214) and the parallel pin (225) from the plate S (202).

- Filter (214) : 1 pcs
- Parallel pin (225) : 3 pcs



(7) Take out the spring assembly (232) from the body H (201).



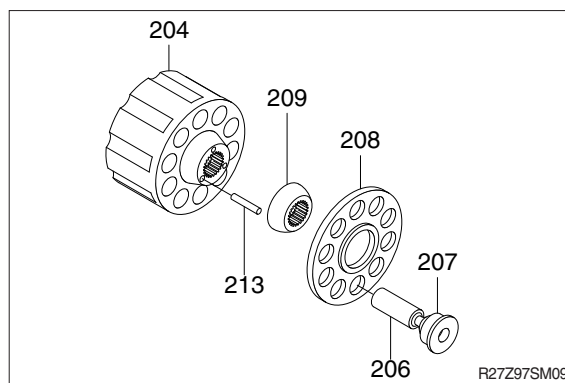
(8) Take out the cylinder barrel kit.

※ The small parts are easily dispersed, pay attention not to miss.

The valve plate (205) is sometime attached, pay attention not to drop out.



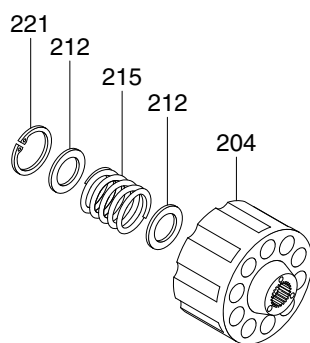
- (9) Take out the piston (206) and the shoe (207) assembly, the shoe holder (208), the barrel holder (209) and the pin (213).



- (10) Take out the snap ring (221), the retainer (212) and the spring C (215).

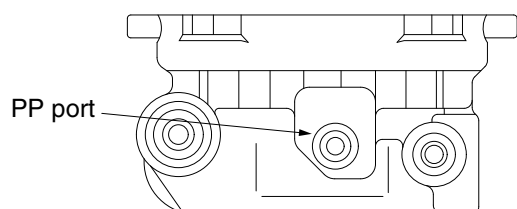
· Tools required :

Snap ring plier : $\varnothing 28$ for hole



- (11) Take out the brake piston (231) and the O-ring (235, 236).

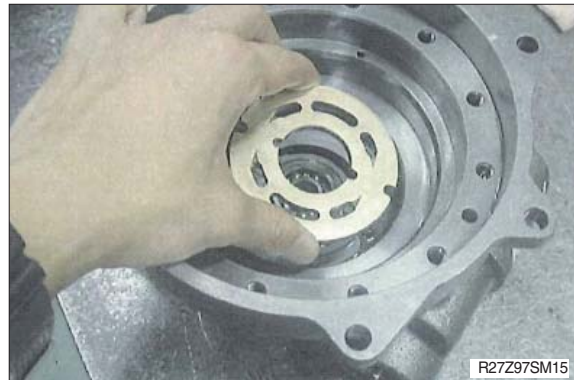
※ The brake piston is drawn out by the air blowing gradually from the PP port.
Pay attention not to draw out the brake piston rapidly by the air blowing gradually.



(12) Take out the disk plate (233).



(13) Take out the valve plate (205).



(14) Loose the plug (247), and take out the check valve (246) and the spring (248). (2 locations)

- Tools required :
Hexagon bar wrench : 8 mm



2) REDUCTION GEAR

(1) Take out the O-ring (114).



(2) Take out the S2 gear (109).

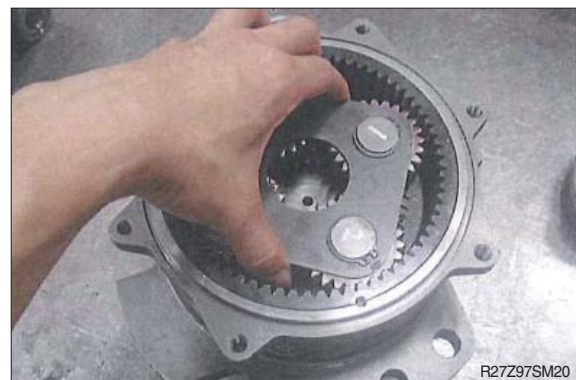


(3) Take out the carrier 2 kit.

※ Pay attention not to scattered each parts as lifting S1 gear up.



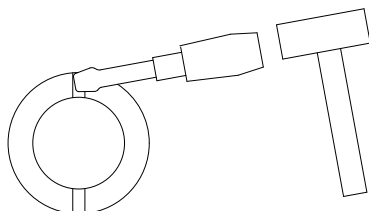
(4) Take out the carrier 1 kit.



(5) Take out the ring (128) and the pre-load collar (119).

※ To attach the minus driver to the gap of 2 pcs pre-load collar, and take out by hitting with the hammer.

As pre-adjusted the gap with the bearing, do not disassemble unless it is necessary.



R27Z97SM21



R27Z97SM22

(6) Take out the pinion kit.

※ To secure the drawing space of the pinion shaft, attach the approximate 130 mm pad to the flange part, and push out the pinion shaft (104) by the press.

As pre-adjusted the gap with the bearing, do not disassemble unless it is necessary.



R27Z97SM23

(7) Take out the thrust plate 2 (116) from the carrier 2 kit.



R27Z97SM24

(8) Take out the b2 gears (107) and the needles 2 (112) from the carrier 2 kit.



R27Z97SM25

- (9) Take out the rings 2 (130) and thrust washers 2 (118) from the carrier 2 kit.



- (10) Take out the thrust plate 1 (115) from the carrier 1 kit.
- Tools required :
Snap ring plier : $\varnothing 22$ for shaft



- (11) Take out the b1 gears (116) and needles 1 (111) from the carrier 1 kit.



- (12) Take out the rings 1 (129) and the thrust washers 1 (117) from the carrier 1 kit.



5. ASSEMBLY

1) HYDRAULIC MOTOR SECTION

- (1) Press-fit the bearing (217) and spring pin (224) into the body H (201).



- (2) Insert the 2 check valves (246) (1 pc/side), 2 springs (248) (1pc/side) and 2 plugs (247) (1pc/side) with O-ring (249) in that order into the body H (201).

· Tools required :

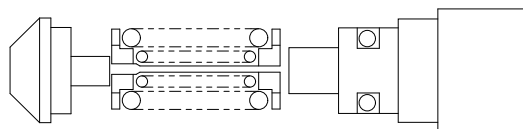
Hexagon bar wrench : 8 mm

Torque wrench

- ※ Apply grease slightly to the O-ring and assemble to pay attention not biting the seals.

· Plug tightening torque :

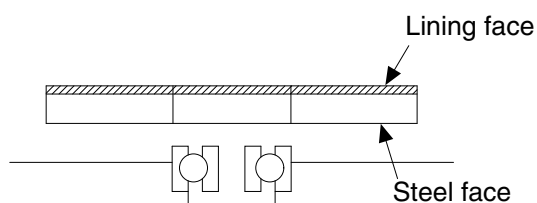
$6 \pm 0.3 \text{ kgf} \cdot \text{m}$ ($43.4 \pm 2.17 \text{ lbf} \cdot \text{ft}$)



R27Z97SM31

- (3) Place the valve plate (205) onto the body H (201).

- ※ The steel face of the valve plate should be downside and assemble.



R27Z97SM33



(4) Assemble the disk plate (233).



(5) Make the brake piston assembly which placed O-rings (235, 236) on brake piston (231), and place it onto the body H (201).

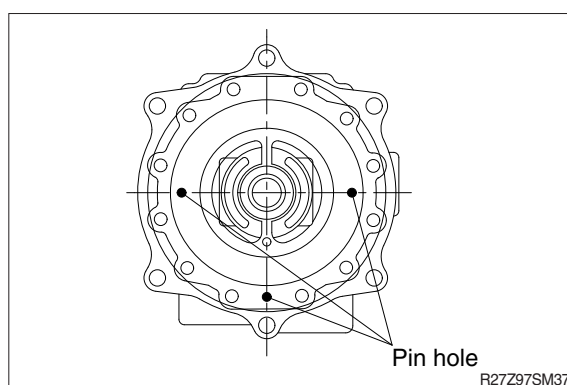
Place the brake piston assembly onto plate S placed 3 pins, then place it onto the body H as matched pin hole position. After that, press-fit it by tightening hexagon bolts little by little.

Check no pushed out, scratches and dust on O-ring at this time.

For prevention of brake piston assembly, apply grease on plate S.

Take out the plate S after placed brake piston assembly.

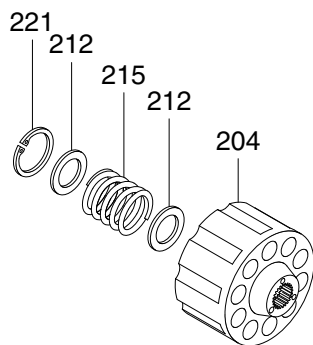
※ Pay attention to jam seal parts, install them applying grease on O-rings.



- (6) Place the retainer (212), spring C (215) and retainer (212) in that order into the cylinder barrel (204), and then secure them with the snap ring (221).

· Tools required :

Snap ring plier : $\varnothing 28$ for hole



R27Z97SM38



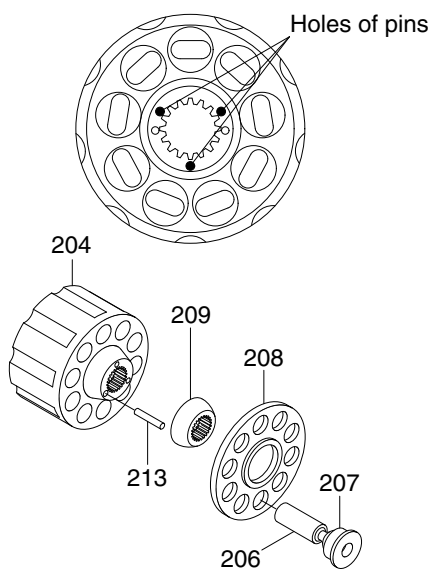
R27Z97SM39

- (7) Make the shoe holder assembly which has the 9 piston-shoe (206, 207) assemblies placed on the shoe holder (208).



R27Z97SM40

- (8) Place the 3 pins (213), barrel holder (209) and the shoe holder assembly onto the cylinder barrel (204) to make up a cylinder barrel assembly.



R27Z97SM41



R27Z97SM42

- (9) Insert cylinder barrel assembly along ditch of disk plate into body H (201).

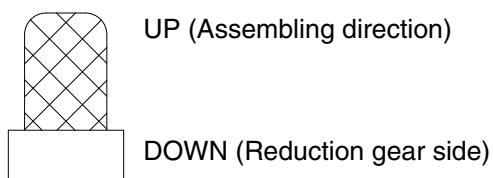


- (10) Insert the spring assembly (232) into the body H (201).



- (11) Place the filter (214) and the parallel pins (225) into the plate S (202).

- ※ Filter (214) : 1 pc
- Parallel pin (225) : 3 pcs



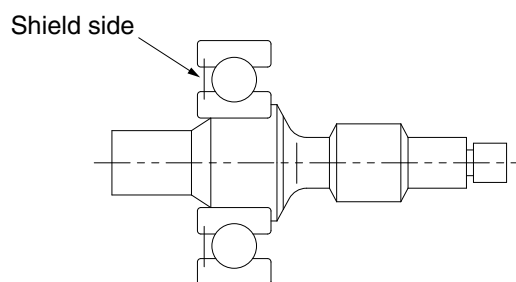
R27Z97SM45

Use a plastic hammer when it is tight.

- ※ Pay attention height of pins are 8 mm from surface after installation.



- (12) Press-fit bearing (216) with shaft (203).



R27Z97SM47



(13) Place the shaft kit into the plate S (202).



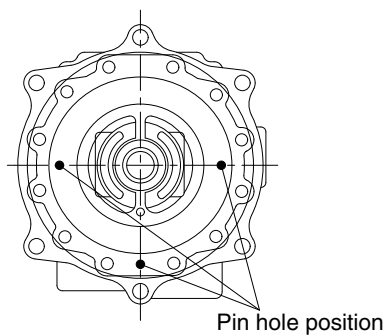
(14) Place the swash plate (210) onto the plate S (202).

- ※ In case the swash plate drops out, apply grease to the plate S side of it.



(15) Join the body H (201) and the plate S (202).

- ※ Align the serration of the shaft which is assembled to the plate S to the serration of the cylinder barrel assembly which is assembled to the body H.



R27Z97SM51

(16) Bolt the plate S (202) together with the 12 hexagon socket head cap bolts (223).

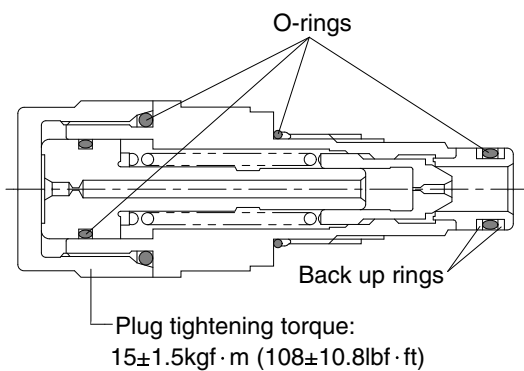
- Tools required :
Hexagon bar wrench : 6 mm
Torque wrench
- Plug tightening torque :
 $3 \pm 0.3 \text{ kgf} \cdot \text{m}$ ($21.7 \pm 2.17 \text{ lbf} \cdot \text{ft}$)



(17) Screw up the relief valve assembly.
(both side)

- Tools required :
Spanner : 36 mm
Torque wrench
- Plug tightening torque :
 $15 \pm 1.5 \text{ kgf} \cdot \text{m}$ ($108 \pm 10.8 \text{ lbf} \cdot \text{ft}$)

※ Once the relief valve is disassembled, replace the O-ring and the back up ring in the below, and screw the cap with the following torque.



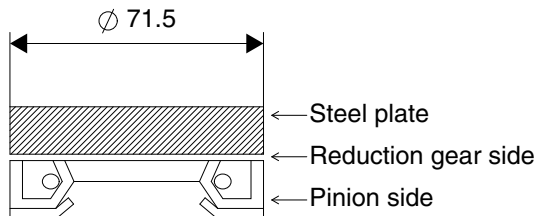
R27Z97SM54

2) REDUCTION GEAR SECTION

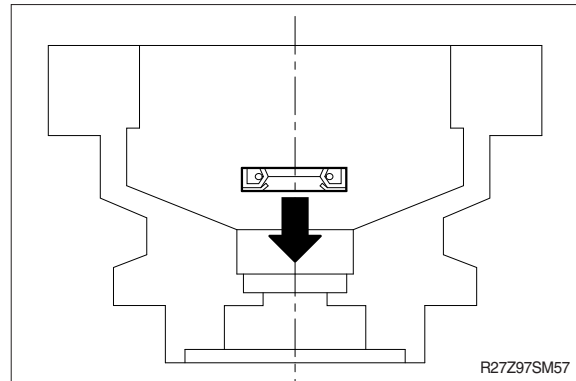
(1) Press-fit the oil seal (123) into the body (101).

※ Pay attention to the direction of the oil seal, use round steel plate for pressing to prevent misalignment.

Steel plate outer diameter : $\varnothing 71.5$



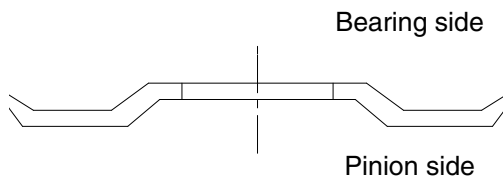
R27Z97SM56



R27Z97SM57

(2) Place the ring seal (113) onto the pinion shaft (104).

※ Pay attention to direction of the ring seal.



R27Z97SM58



R27Z97SM59

(3) Press-fit the inner ring of the bearing (121) to the pinion shaft (104).

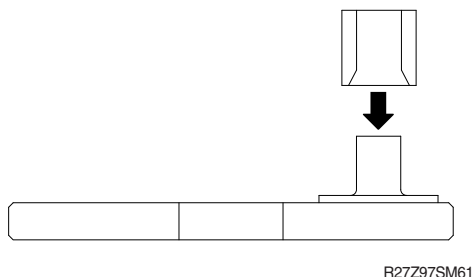
※ After press fitting, apply grease onto the surface of the rollers, and turn them manually so that the grease can spread to the whole roller surface.



R27Z97SM60

- (4) Place the 4 rings (129) (1 pc/pin) and the 4 thrust washers 1 (117) (1 pc/pin) in that order onto the 4 pins of the carrier 1 (102).

※ Pay attention to direction of the ring.
Beveling part of the ring should be down side.



- (5) Place the 4 b1 gears (106) (1 pc/pin) and the 92 needles 1 (111) (23 pcs/pin) in that order onto the 4 pins of the carrier 1 (102).



- (6) Place the thrust plate 1 (115) and the 4 snap rings (120) (1 pc/pin) to make up a carrier 1 kit.

· Tools required :

Snap ring plier : $\varnothing 22$ for shaft



- (7) Place the 3 thrust washers 2 (118) (1 pc/pin) and the 3 rings 2 (130) (1 pc/pin) in that order onto the 3 pins of the carrier 2 (103).



- (8) Place the 3 b2 gears (107) (1 pc/pin) and the 72 needles 2 (112) (24 pcs/pin) in that order onto the 3 pins of the carrier 2 (103).



- (9) Place the thrust plate 2 (116) and the S1 gear (108) to make up a carrier 2 kit.



- (10) Press-fit the outer ring of the bearing (122) into the body (101).



- (11) Press-fit the outer ring of the bearing (121) into the body (101).



(12) Fill grease in the bearing (121) section of the body (101).

※ Grease amount : approx. 80% of the space inside the outer ring.



(13) Insert the pinion shaft (104) into the body (101).

※ Pay attention not to damage the lip of the oil seal.

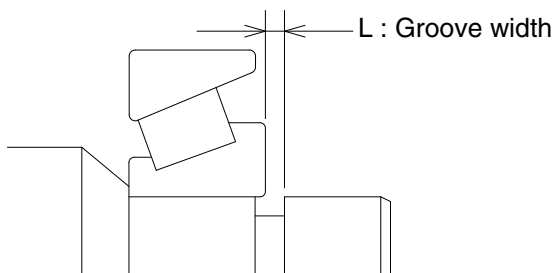


(14) Turn over the body (101), then press-fit inner ring of the bearing (122).



(15) Fix the pinion shaft (104) with the 2 pre-load collars (119).

※ Thickness of the pre-load collar must be adjusted for the below L dimension.
Standard's +0 to +0.05 mm



- (16) Place the ring (128) over the pre-load collars.



- (17) Place the carrier 1 assembly into the body (101) align spline of carrier to the pinion shaft (104).



- (18) Place the carrier 2 assembly into the body (101) align spline of S1 gear to the b1 gear.



- (19) Place the S2 gear (109) into the carrier 2 assembly.



(20) Place the O-ring (114) onto the body (101).



(21) Fill body (101) with hydraulic oil.

- ※ Oil : ISO VG 46 or equivalent
Oil amount : 2 to 3 mm below top of the thrust plate 2
Wipe oil off flange surface if it is spilled.



(22) Join the hydraulic motor and the body, and then bolt them together with the 4 hexagon socket head cap bolts (124).

- Tools required :
Hexagon bar wrench : 6 mm
Torque wrench
- ※ Align the shaft of the motor to the S2 gear.
Apply anti-loose adhesive to the screws.
- Plug tightening torque :
 $3 \pm 0.3 \text{ kgf} \cdot \text{m}$ ($21.7 \pm 2.17 \text{ lbf} \cdot \text{ft}$)



GROUP 6 TRAVEL DEVICE

1. REMOVAL AND INSTALL

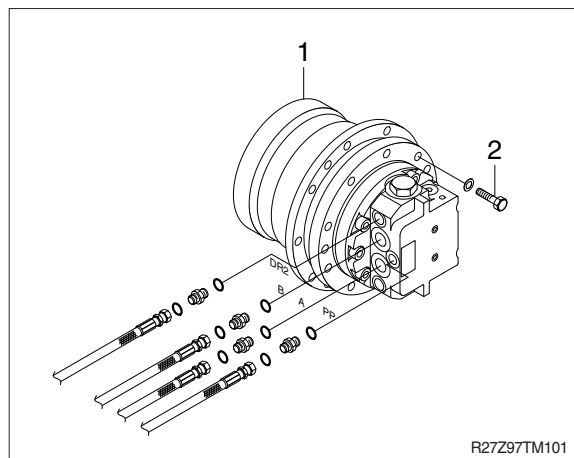
1) REMOVAL

- (1) Swing the work equipment 90° and lower it completely to the ground.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

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

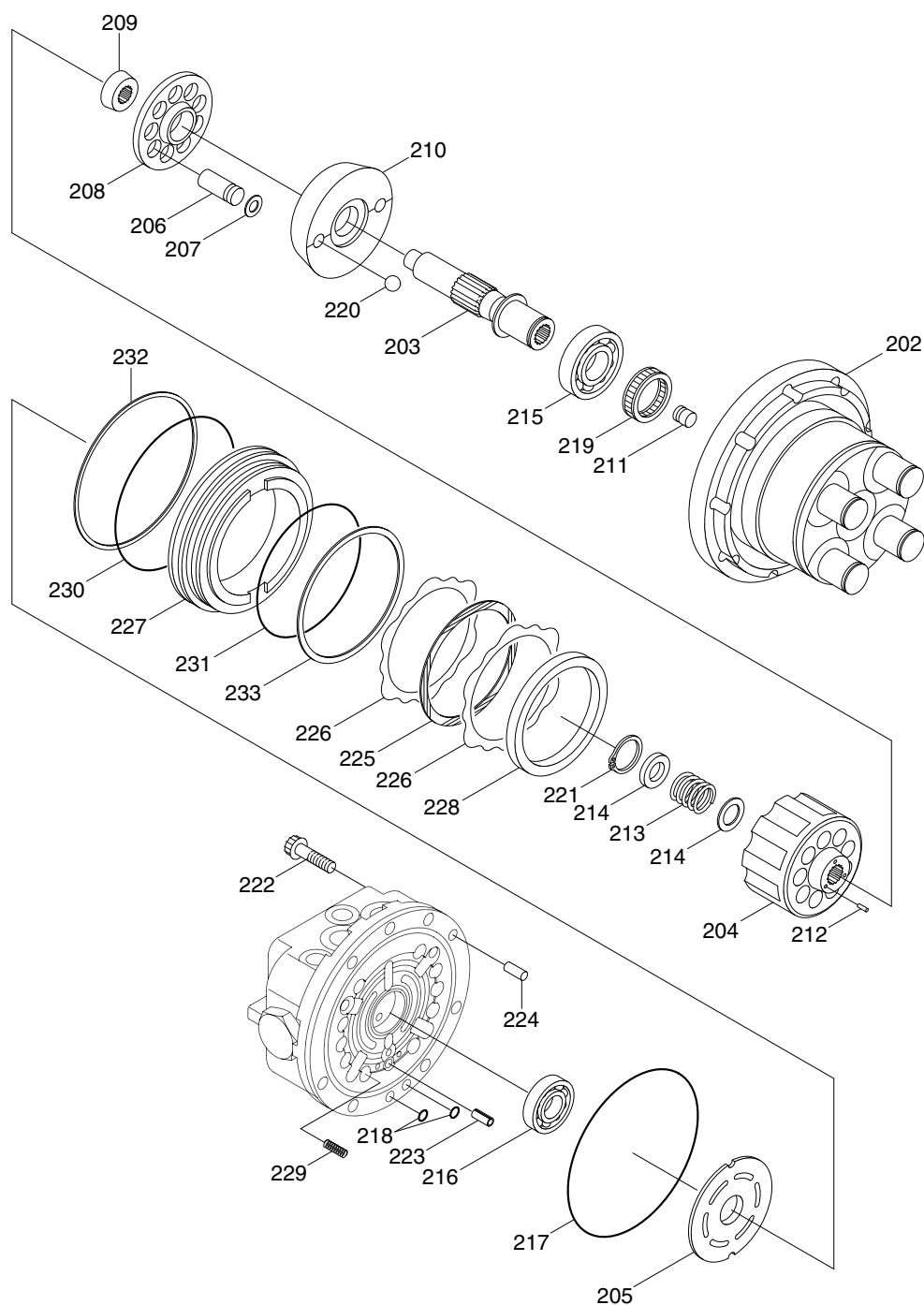
- (4) Remove the track shoe assembly.
For details, see removal of track shoe assembly.
- (5) Remove the cover.
- (6) Remove the hose.
※ Fit blind plugs to the disconnected hoses.
- (7) Remove the bolts and the sprocket.
- (8) Sling travel device assembly (1).
- (9) Remove the mounting bolts (2), then remove the travel device assembly.
 - Weight : 36 kg (80 lb)
 - Tightening torque : 12.8 ± 3.0 kgf·m
(92.3 ± 21.7 lbf·ft)



2) INSTALL

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

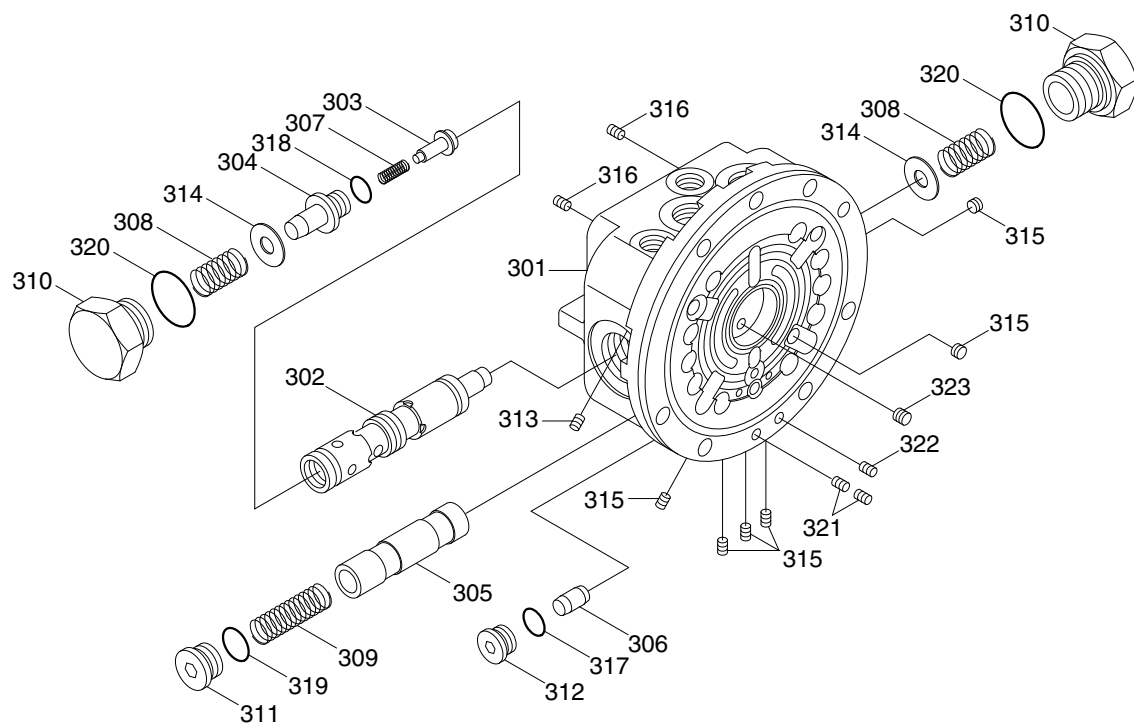
2. STRUCTURE (1/3)



R27Z92TM23

202	Body 2	213	Spring C	224	Pin
203	Shaft	214	Retainer	225	Disk plate
204	Cylinder barrel	215	Bearing	226	Steel plate
205	Valve plate	216	Bearing	227	Brake piston
206	Piston	217	O-ring	228	Brake spacer
207	Shoe	218	O-ring	229	Spring B
208	Shoe holder	219	Oil seal	230	O-ring
209	Barrel holder	220	Ball	231	O-ring
210	Swash plate	221	Snap ring	232	Back up-ring
211	Control piston	222	Screw	233	Back up-ring
212	Pin	223	Spring pin		

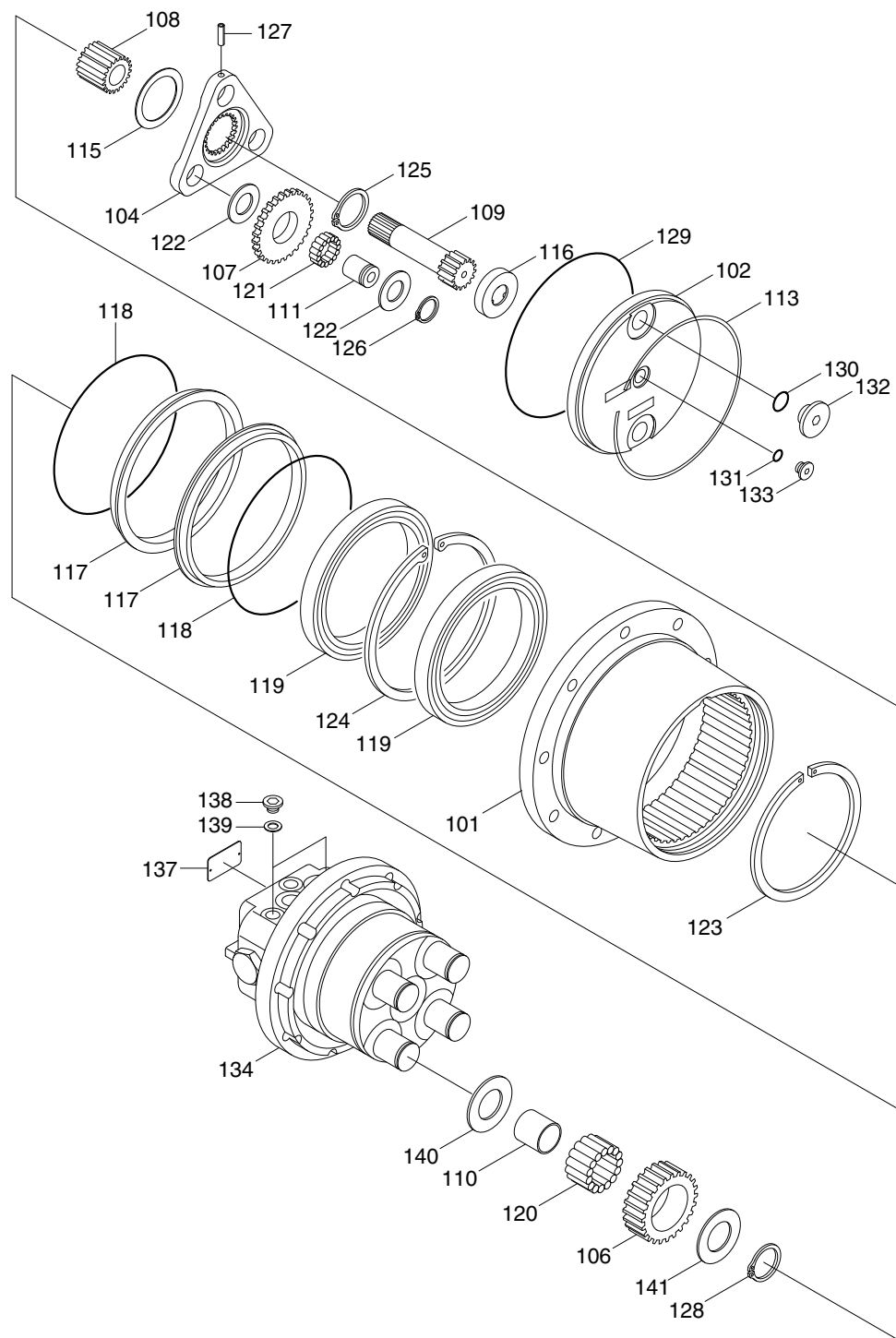
STRUCTURE (2/3)



R27Z92TM24

301	Body 1	309	Spring V3	317	O-ring
302	Spool	310	Plug	318	O-ring
303	Check valve	311	Plug	319	O-ring
304	Spring guide	312	Plug	320	O-ring
305	Spool	313	Choke	321	Choke
306	spool	314	Ring	322	Choke
307	Spring V1	315	Plug	323	Plug
308	Spring V2	316	Plug		

STRUCTURE (3/3)



R27Z92TM25

101 Body	113 Snap ring	122 Thrust washer	131 O-ring
102 Cover	115 Thrust collar	123 Snap ring	132 Plug
104 Carrier 2	116 Slide ring	124 Snap ring	133 Plug
106 Gear B1	117 Floating seal (Incl 118)	125 Snap ring	134 Hydraulic motor
107 Gear B2	118 O-ring	126 Snap ring	137 Name plate
108 Gear S1	119 Bearing	127 Spring pin	138 Plug
109 Gear S2	120 Needle	128 Snap ring	139 O-ring
110 Ring	121 Needle	129 O-ring	140 Thrust washer
111 Pin B2		130 O-ring	141 Thrust washer

3. DISASSEMBLY

1) TOOLS FOR DISASSEMBLY AND ASSEMBLY

No.	Necessary tool	
1 2 3	Torque wrenches	45N (JIS B4650) 90N (JIS B4650) 280N (JIS B4650)
4 5	Hexagon socket	Hexagon size : 5 mm Hexagon size : 8 mm
6	Socket wrenches	Hexagon size : 36 mm
7 8	Hexagon socket wrenches	Hexagon size : 5 mm Hexagon size : 8 mm
9	Screwdrivers	Width : 6~10 mm
10 11 12 13 14	Snap ring pliers	Ø28 mm for hole Ø25 mm for shaft Ø28 mm for shaft Ø30 mm for shaft Ø130 mm for shaft
15	Plastic hammer	-
16 17 18 19	Other	Grease Oil Sand paper C-clamps

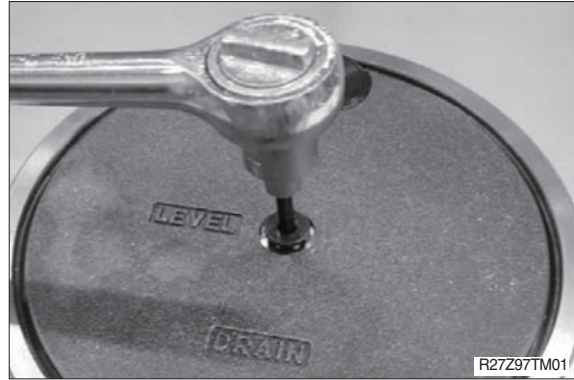
2) GENERAL PRECAUTIONS

- (1) Before disassembling the TM motors, check the items to be inspected and, for remedy against trouble, closely examine the nature of the trouble, so that the motor can be disassembled effectively.
- (2) To disassemble the motor, use the disassembling procedures described in section 2-2, and select a clean place.
- (3) Place a rubber or vinyl sheet or other such protective materials on your working bench to protect the surface of the motor to be serviced.
- (4) During disassembly, give a match mark to the mating surfaces of each part.
- (5) Arrange removed parts in order so that they will not become damaged or missing during disassembly.
- (6) Once seals have been disassembled, they should be replaced even if damage is not observed. Have replacement seals ready on hand before starting your disassembling job.

3) REDUCTION GEAR SECTION

(1) Remove the three plugs (PF3/8 and PF1/8).

- Tools required :
Hexagon size : 8 mm
Hexagon size : 5 mm



(2) Remove the snap-ring.

- ※ Put the screwdriver into the notch of the body, and then pull the snap-ring.



(3) Remove the cover.



(4) Remove the slide ring from the cover.



(5) Remove the O-ring from the body.



(6) Remove the s2 gear, the carrier 2 kit and thrust collar from the body.

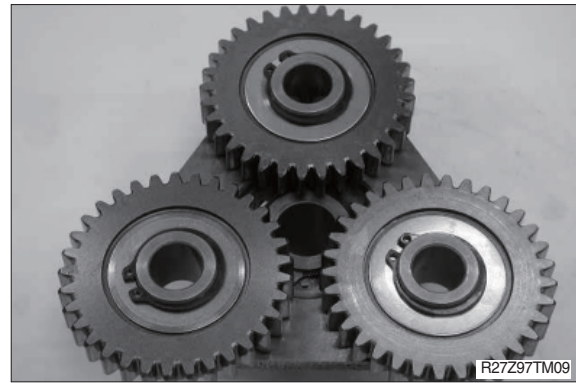
※ There is possibility the thrust collar sticks to the carrier 2 kit.



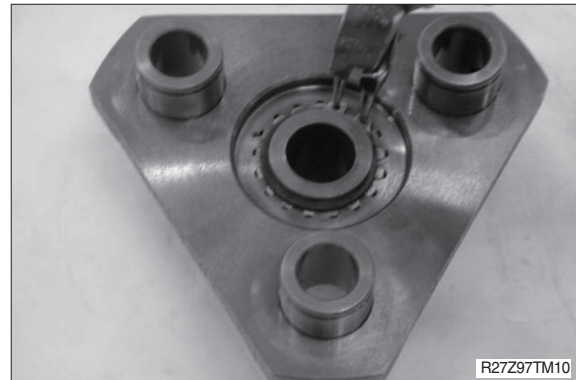
(7) Remove the three snap rings, three thrust washers, three b2 gears, forty-eight needles and three thrust washers.

※ The thrust washers on both sides of the b2 gears are the same.

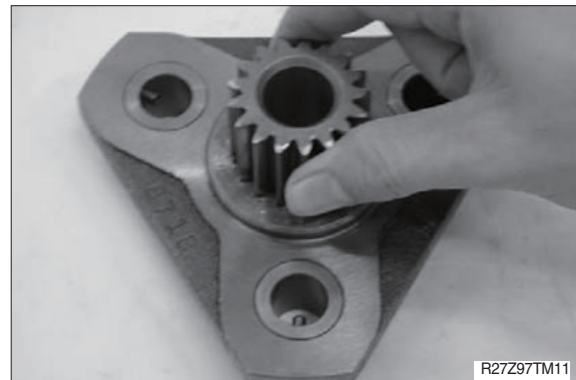
※ The b2 pins and spring pins are not able to disassemble, because they are press-fitted.



(8) Remove the snap ring from the carrier 2.



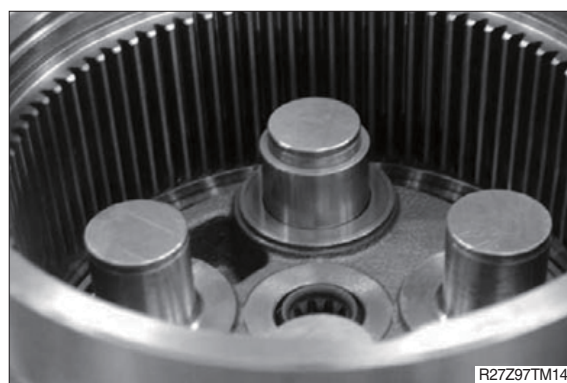
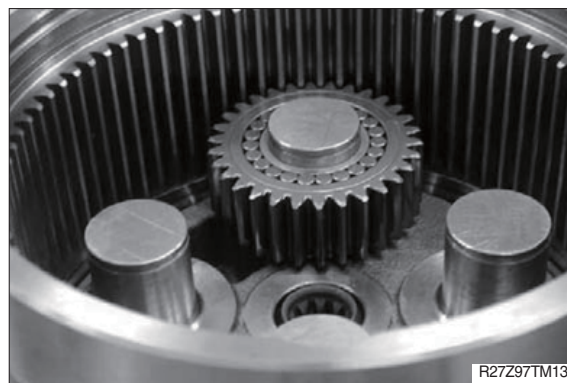
(9) Remove the s1 gear from the carrier 2.



(10) Remove the four snap rings and the four thrust washers.

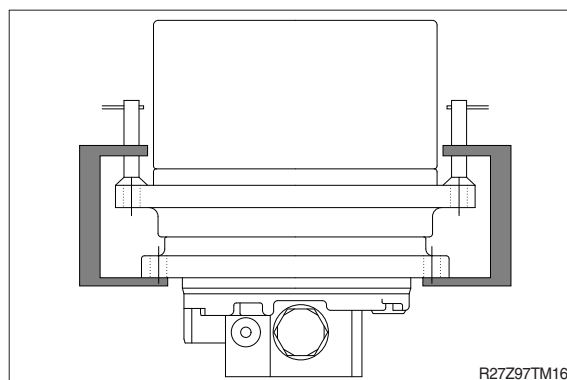
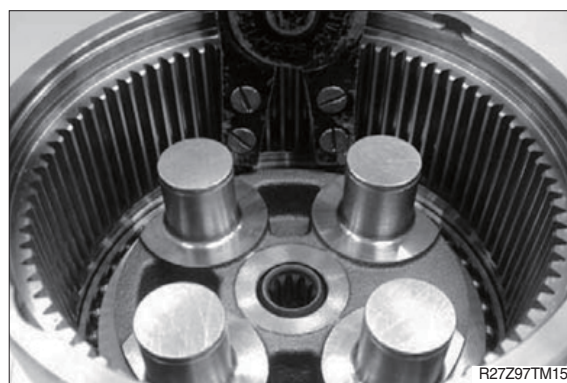


- (11) Remove the four b1 gears, ninety-two needles, four thrust washers and four rings.



- (12) Remove the snap ring and remove the body from the hydraulic motor.

- ※ Tighten the speed reducer flange and the motor flange with C-clamps or a hydraulic press (see the illustration) to make it easy.



(13) Remove the floating seal with O-ring from the body.



(14) Remove the floating seal with O-ring from the hydraulic motor.



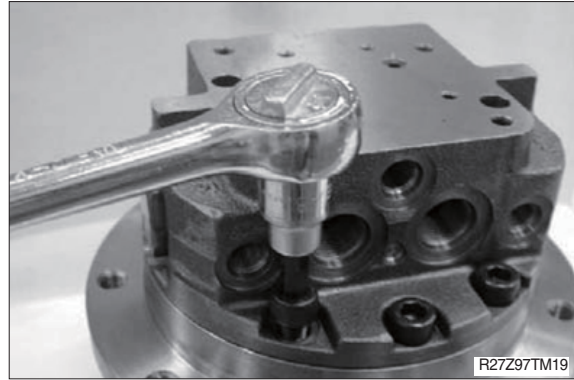
4) HYDRAULIC MOTOR SECTION

- (1) Remove the seven hexagon socket head cap bolts.

· Tools required :

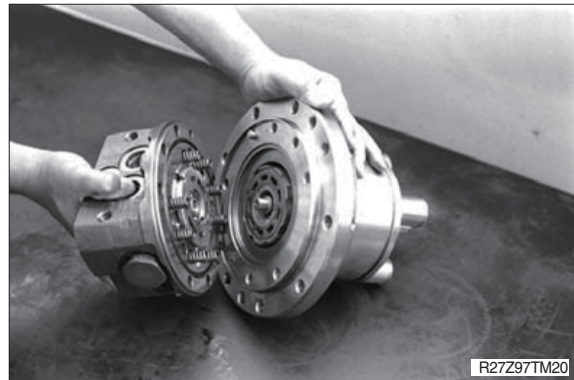
Hexagon size : 8 mm

- ※ If you fix the motor with a vice, protect it with aluminum plates or equivalent.



- (2) Remove the body 1 from the body 2.

- ※ Pay attention not to come off and damage the valve plate.



- (3) Remove the valve plate and the ten spring B.



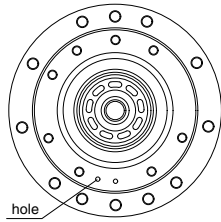
- (4) Remove the three O-rings from the body 1.

- ※ The bearing and spring pins are not able to disassemble, because they are press-fitted.

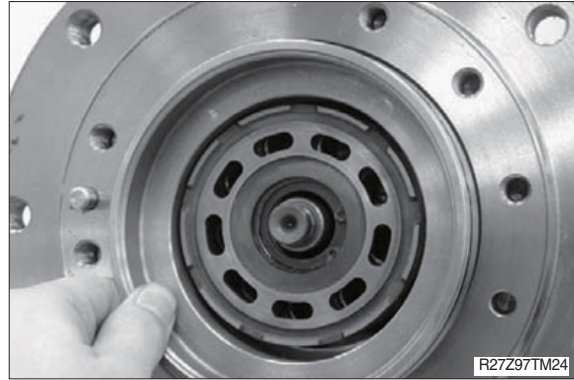


- (5) Remove the brake piston assembly from the body 2.

※ The brake piston removes when the air comes into the inside from the hole. Do not blow it suddenly, the brake piston assembly fly out.

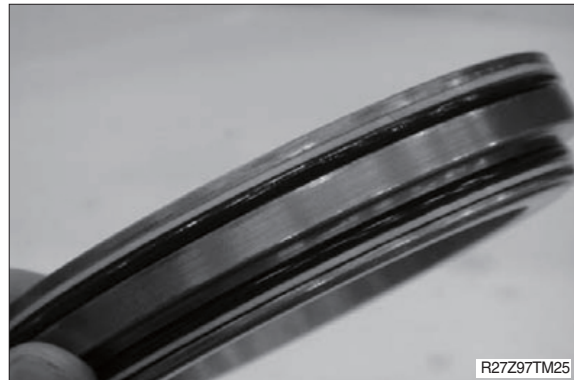


R27Z97TM23



R27Z97TM24

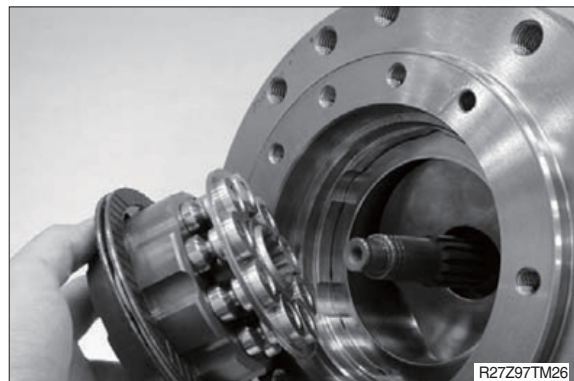
- (6) Remove the two O-rings and two back up rings from the brake piston.



R27Z97TM25

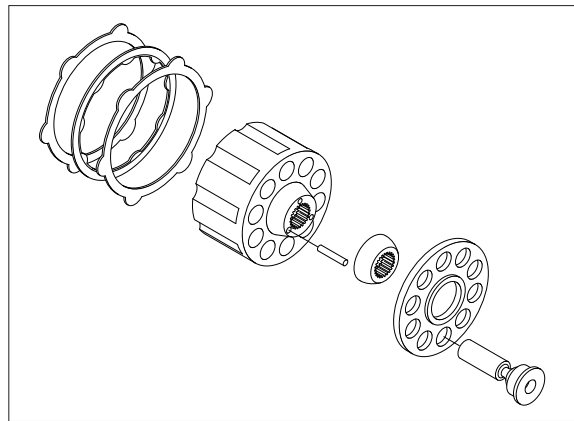
- (7) Remove the cylinder barrel assembly and brake spacer from the body 2.

※ Pay attention not to lose the each part.



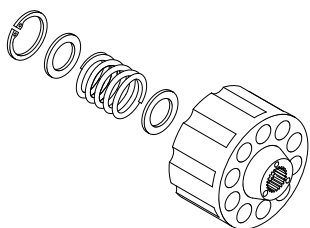
R27Z97TM26

- (8) Remove the nine piston-shoe assemblies, shoe holder, barrel holder, three pins, two steel plates and disk plate.



R27Z97TM27

- (9) Remove the snap ring, retainer, spring-C and retainer.

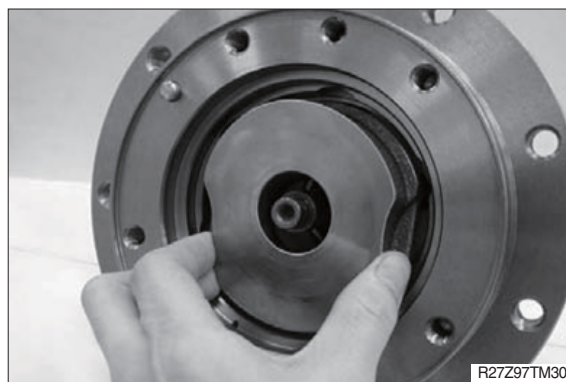


R27Z97TM28



R27Z97TM29

- (10) Remove the swash plate and two balls from the body 2.



R27Z97TM30

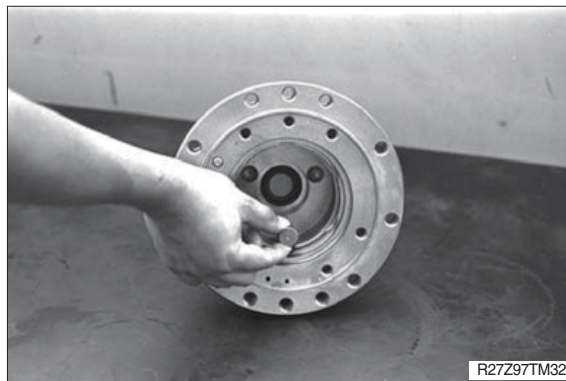
- (11) Remove the shaft from the body 2.

※ The bearing is not able to disassemble, because they are press-fitted.



R27Z97TM31

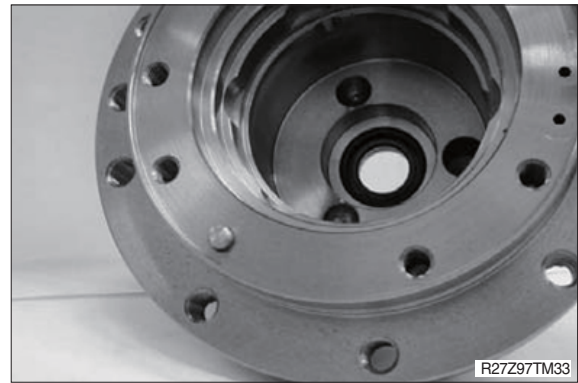
- (12) Remove the control piston from the body 2.



R27Z97TM32

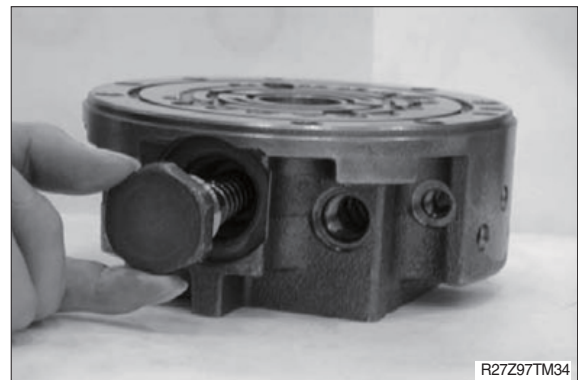
(13) Remove the oil seal from the body 2.

(14) Remove the pin from the body 2.



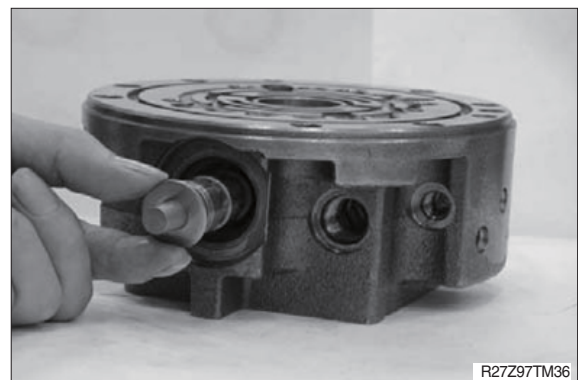
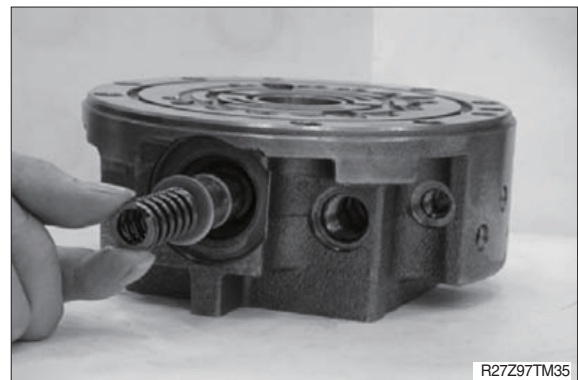
(15) Remove the two plugs with O-rings from the body 1.

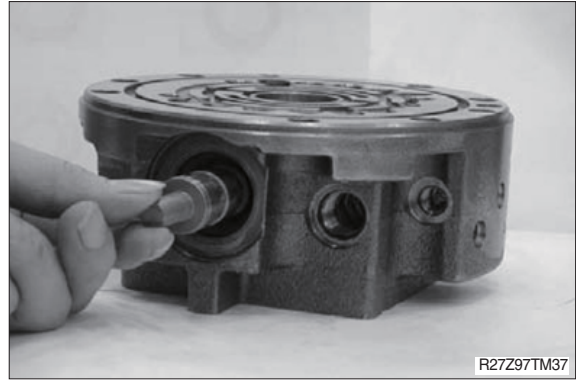
- Tools required :
Hexagon size : 36 mm



(16) Remove the two spring V2, two rings and spool assembly.

- ※ The spool assembly is not able to disassemble.





(17) Remove the two plugs with O-rings from the body 1.

- Tools required :
Hexagon size : 8 mm

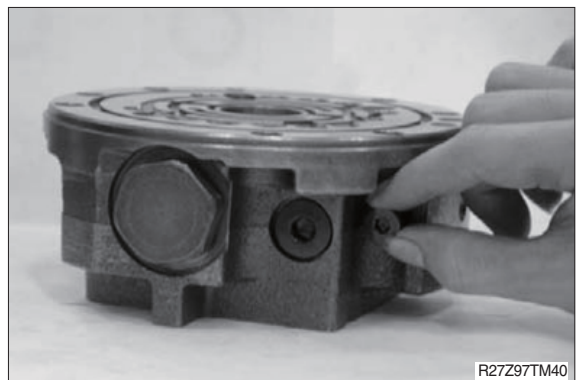


(18) Remove the spring V3 and two speed spool.

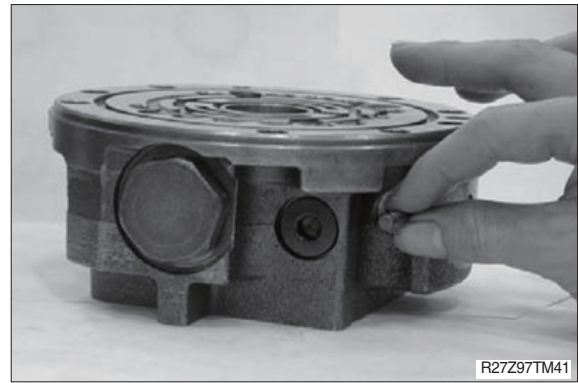


(19) Remove the plugs with O-rings from the body 1.

- Tools required :
Hexagon size : 5 mm



(20) Remove the shuttle spool.



4. ASSEMBLY

1) HYDRAULIC MOTOR SECTION

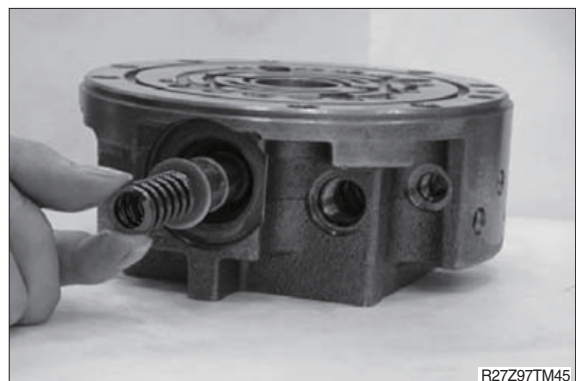
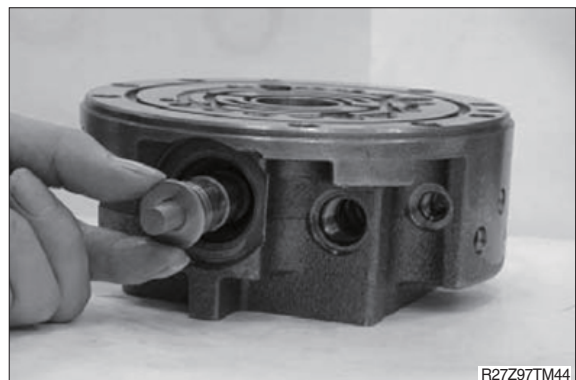
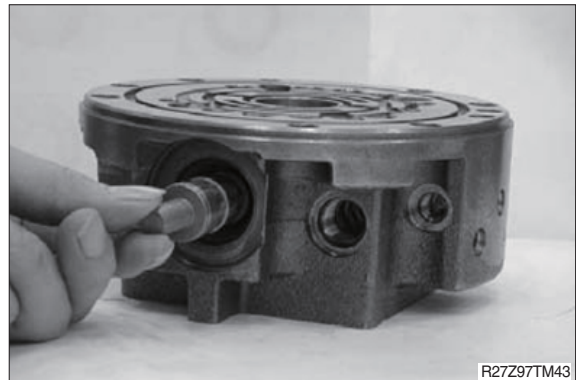
- (1) Press-fit the bearing and the spring pin into the body 1.

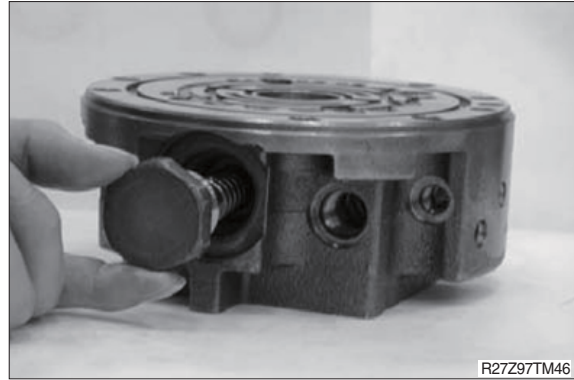


- (2) Insert the spool assembly, two rings (1pc/side) and two springs (1pc/side) in that order into the body 1, and then screw the two plugs (1pc/side) with two O-rings (1pc/side).

※ The spool assembly is not able to disassemble.

- Plugs tightening torque :
20~25 kgf · m (145~180 lbf · ft)
- Hexagon size : 36 mm





(3) Insert the spring V3 and two speed spool into the body 1, and screw the two plugs (1pc/side) with two O-rings (1pc/side).

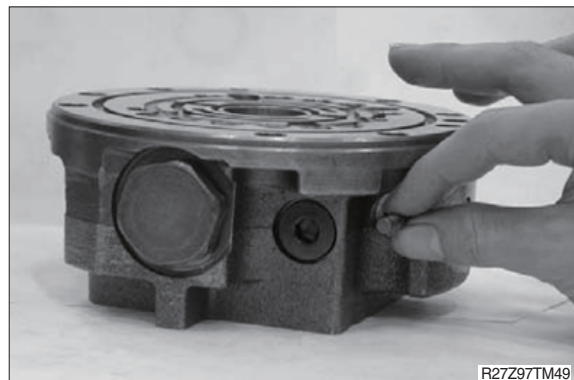
- Plugs tightening torque :
4.69~5.2 kgf · m (33.9~37.6 lbf · ft)
- Hexagon size : 8 mm

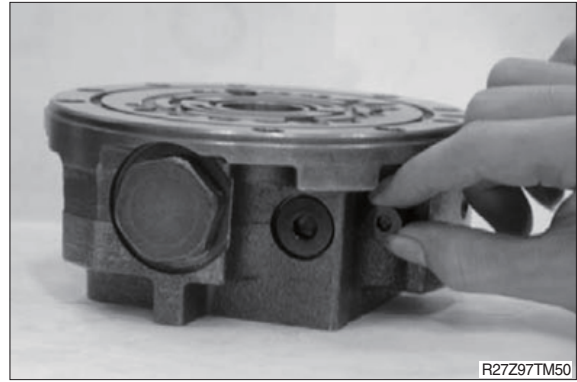
※ Pay attention to the direction of the spool.
(See cross sectional drawing for the direction, page 7-59~61).



(4) Insert the shuttle spool into the body 1, and then screw the two plugs (1pc/side), with two O-rings (1pc/side).

- Plugs tightening torque :
1.22~1.84 kgf · m (8.82~13.3 lbf · ft)
- Hexagon size : 5 mm



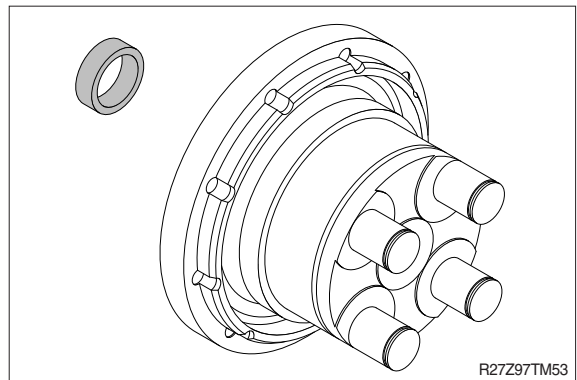
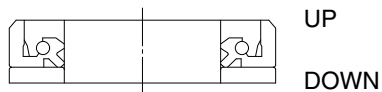


(5) Place three O-rings onto the body 1.



(6) Press-fit the oil seal into the body 2.

- ※ Apply grease to the periphery of the oil seal.
- ※ Pay attention to the direction of the oil seal, and do not slant it.

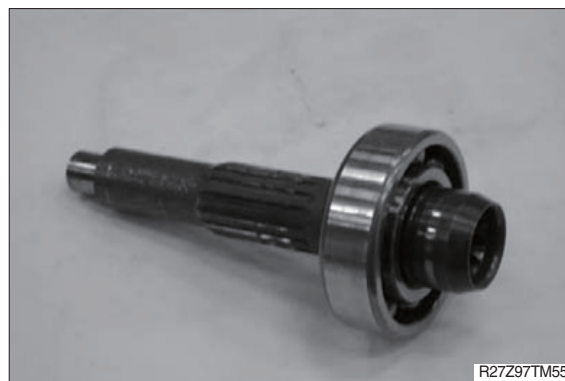


R27Z97TM52

(7) Place the pin into the body 2.

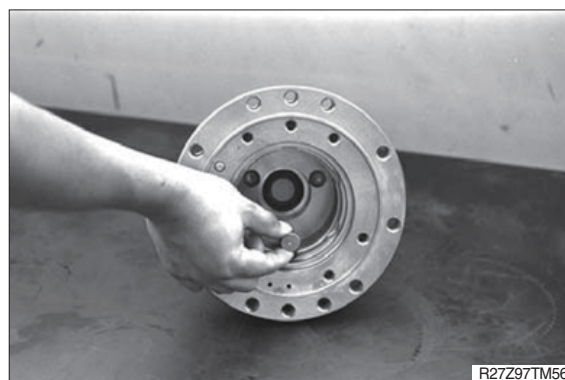


(8) Press-fit the bearing with the shaft.



(9) Insert the control piston into the body 2.

- ※ Pay attention to the direction of the control piston. (See cross sectional drawing for the direction, page 7-59~61).



(10) Place the shaft into the body 2.

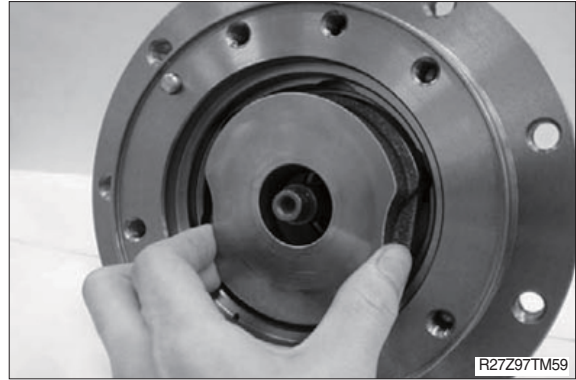
- ※ Pay attention not to damage the oil seal with the shaft.
- A oil which damaged should be replaced.



(11) Place the two balls and the swash plate onto the body 2.

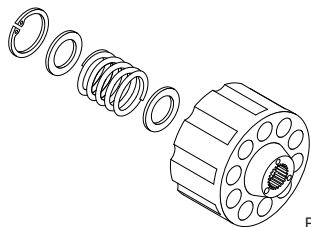
- ※ Apply oil to the working face of the swash plate.
- ※ In case the swash plate drops out, apply grease to the back of it.





R27Z97TM59

- (12) Place the retainer, spring and retainer in that order into the cylinder barrel, and then secure them with the snap ring.



R27Z97TM60



R27Z97TM61

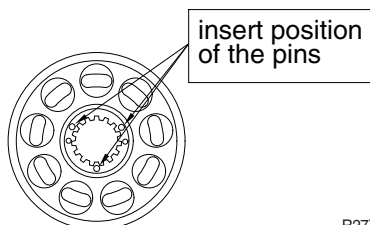
- (13) Place the piston-shoe assemblies into the shoe holder.



R27Z97TM62

- (14) Place the three pins, barrel holder and piston-shoe assemblies in that order into the cylinder barrel.

- ※ Apply oil to the inside of the cylinders, then lower the pistons into the cylinder barrel.
- ※ Pay attention to the order of pins, barrel holder and piston-shoe assemblies.

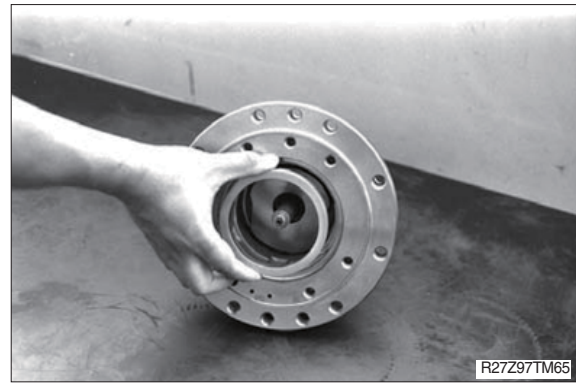


R27Z97TM63

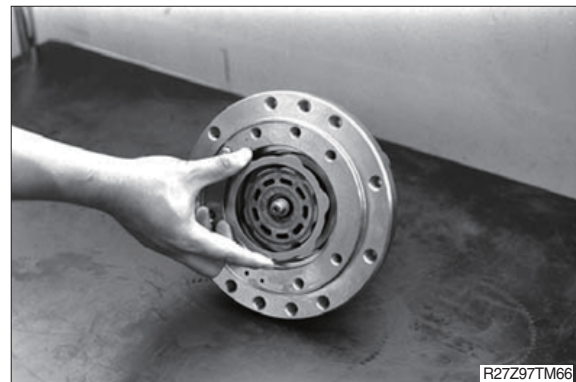


R27Z97TM64

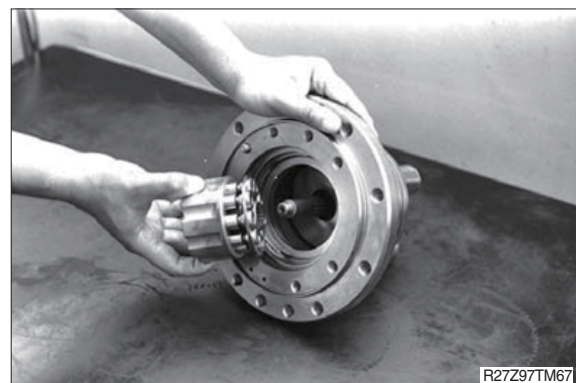
- (15) Place the brake spacer plate into the body 2.



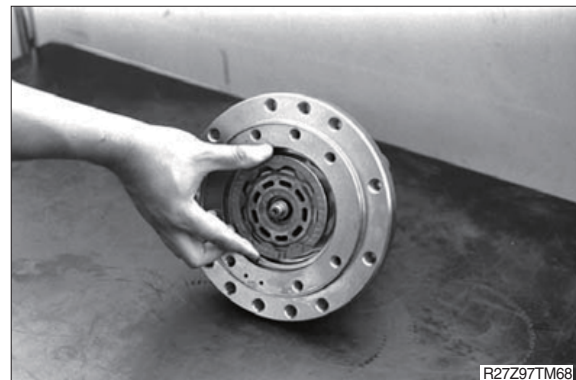
- (16) Place the steel plate into the body 2 along the groove.



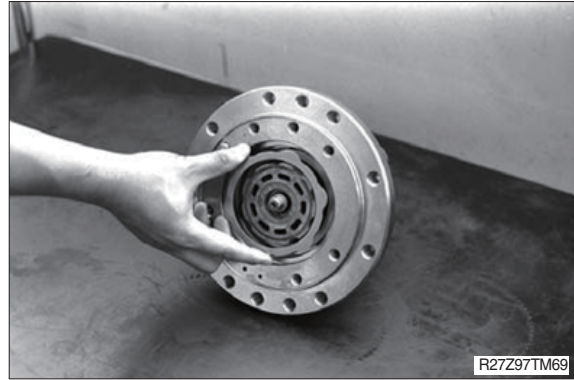
- (17) Insert the cylinder barrel assembly into the body 2 so that the shoes contact the swash plate.



- (18) Place the disk plate into the body 2 along the groove.

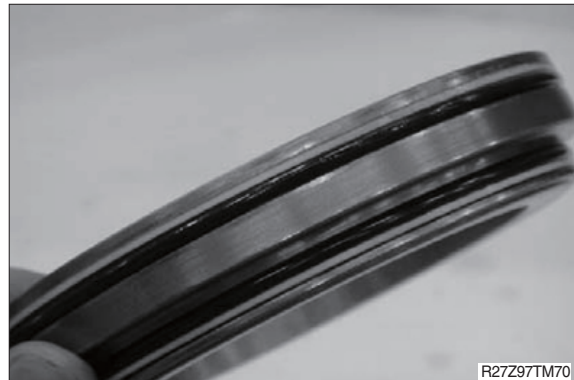


- (19) Place the steel plate into the body 2 along the groove.



- (20) Place the two O-rings and two back up rings onto the brake piston.

- ※ Pay attention to the direction of O-rings and back up rings.
(See cross sectional drawing for the direction.)



- (21) Inset the brake piston assembly into the body 2.

- ※ Apply grease to the O-ring to make it easy.



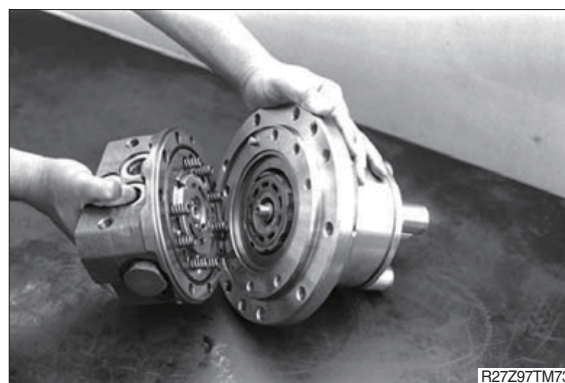
- (22) Fill the body 2 with 0.1ℓ hydraulic oil for lubrication.

(23) Place the valve plate and ten springs onto the body 1.

- ※ The copper face of the valve plate should be uppermost.
- ※ Apply oil to the copper face of the valve plate.
- ※ In case the valve plate drops out, apply grease to the steel face of it.
- ※ In case the springs drop out, apply grease to the bottom of it.
- ※ Please refer to the parts list for the number and the position with the spring B.



(24) Join the body 1 to the body 2.



(25) Bolt them with seven hexagon socket head cap bolts.

- Bolt tightening torque :
5.2~6.6 kgf · m (37.6~47.7 lbf · ft)
- Hexagon size : 8 mm

- ※ If you fix the motor with a vice, protect it with aluminum plates or equivalent.



2) REDUCTION GEAR SECTION

- (1) Place the floating seal with O-ring into the hydraulic motor.



- (2) Join the bearing and snap ring to the body.

※ Pay attention to the direction of the bearings.

(See cross sectional drawing for the direction, page 7-59~61).

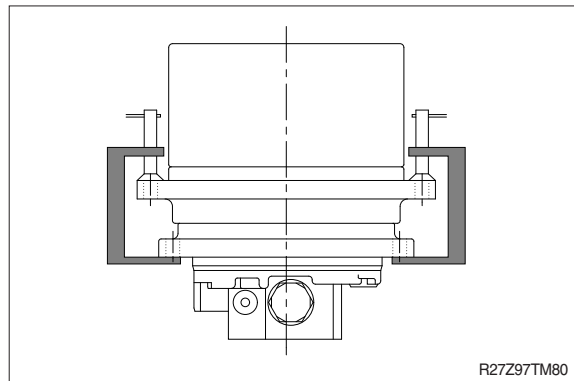


- (3) Put the floating seal with O-ring onto the body.



- (4) Join the body to the motor, and secure it with snap ring.

- ※ Degrease the surface of floating seal.
- ※ Hit around the body by the resinous hammer equally to make it easy.
- ※ Tighten the speed reducer flange and the motor flange with C-clamps or a hydraulic press when the snap ring is fastened.
- ※ The pre-load for the bearings is adjusted by thickness of the snap ring.

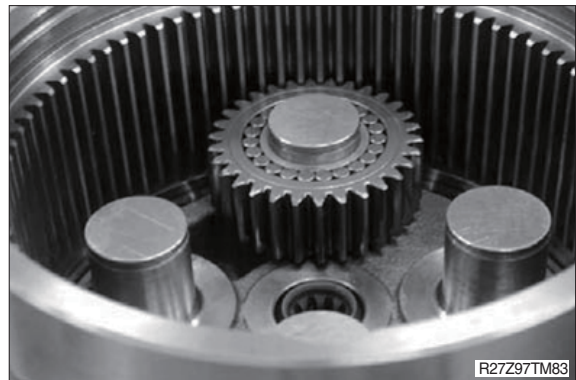
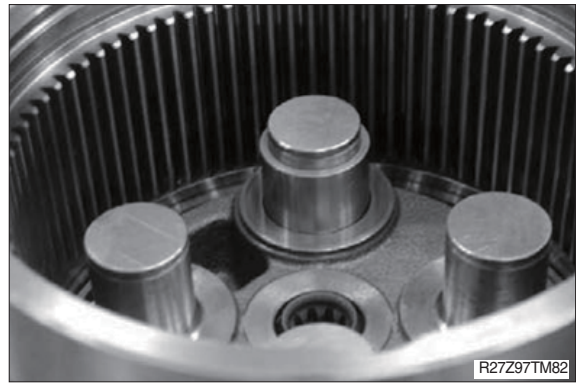


(5) Place the four rings (1pc/1pin), four thrust washers (1pc/1pin), four b1 gears (1pc/1pin) and ninety-two needles (23pcs/1pin), and four thrust washers in that order onto the body 2, and secure it with four snap rings.

※ Pay attention to the direction of the b1 gears (see cross sectional drawing for the direction, page 7-59~61).

※ Pay attention to the direction of the snap ring. The edge side should be uppermost.

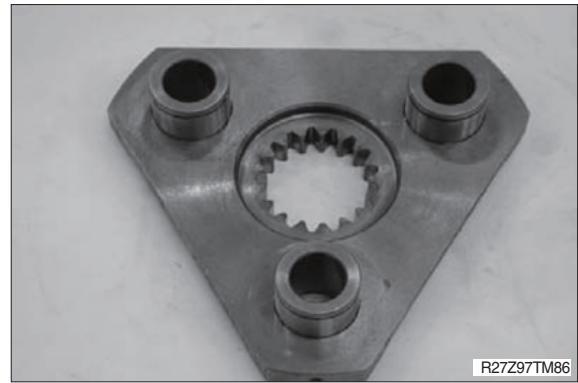
※ Pay attention not to open the snap ring too much. A snap ring which loses tension should be replaced.



(6) Place thrust collar onto the gears.

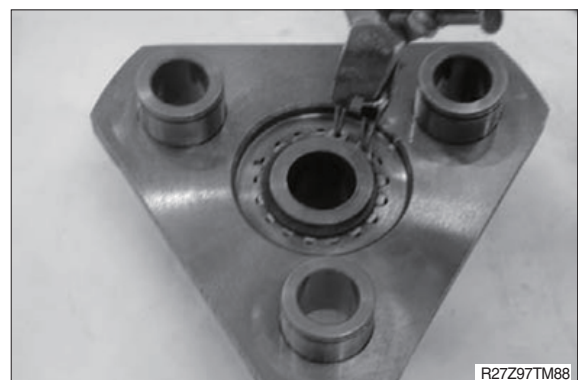
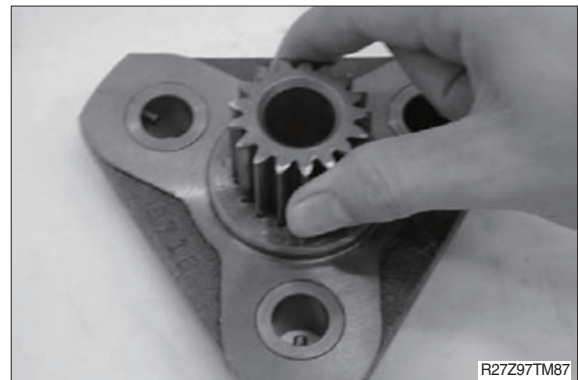


- (7) Press-fit the three b2 pins and three spring pins (1pc/pin) into the carrier 2.



- (8) Put the S1 gear to the carrier 2, and then secure them with the snap ring.

- ※ Pay attention to the direction of the snap ring. The edge side should be uppermost.
- ※ Pay attention not to open the snap ring too much. A snap ring which loses tension should be replaced.

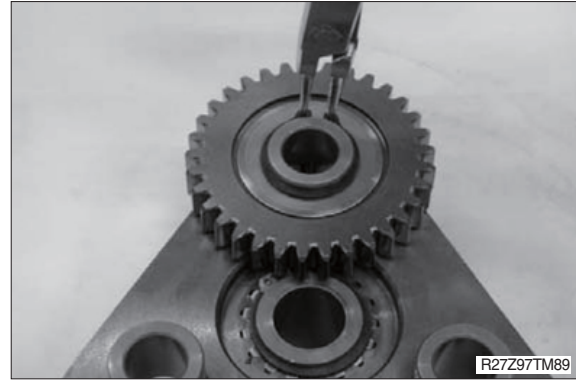


(9) Place the three thrust washers (1pc/1pin), three b2 gears (1pc/1pin), forty-eight needles (16pcs/1pin) and the three thrust washers (1pc/1pin), and secure it with three snap rings.

※ Pay attention to the direction of the b2 gears (see cross sectional drawing for the direction).

※ Pay attention to the direction of the snap ring. The edge side should be uppermost.

※ Pay attention not to open the snap ring too much. A snap ring which loses tension should be replaced.



(10) Place the carrier 2 assembly into the body.



(11) Join the S2 gear to the body.



(12) Place the O-ring to the body.

- ※ Apply grease to the O-ring.
- ※ Pay attention not the rubbish in the O-ring groove.



(13) Fill 0.6 ℓ (0.16 U.S. gal) gear oil in the body.

(14) Insert the slide ring in the cover.

- ※ Pay attention to the direction of the slide ring (see cross sectional drawing for the direction, page 7-59~61).
- ※ Apply grease to the slide ring to prevent it dropping out.



(15) Insert cover in the body.

- ※ Pay attention not to damage the O-ring.
- ※ The vertical tapped hole should be aligned with notches of the body.



(16) Put the snap ring into the groove of the body to secure the cover.

※ Put the flat blade-flared tip screwdriver to the end of the snap ring, and tap it in the direction of the circumference.



(17) Screw the two plugs (size : PF3/8) with O-rings to the cover.

- Plug tightening torque :
4.69~5.2 kgf · m (33.9~37.6 lbf · ft)
- Hexagon size : 8 mm



(18) Screw the three plugs (size : PF3/8, PF1/8) with O-rings (1pc/plug) to the cover.

- Plug tightening torque (PF3/8) :
4.69~5.2 kgf · m (33.9~37.6 lbf · ft)
- Hexagon size : 8 mm (PF3/8)
- Plug tightening torque (PF1/8) :
1.22~1.84 kgf · m (8.82~13.3 lbf · ft)
- Hexagon size : 5 mm (PF1/8)



GROUP 7 RCV LEVER

1. REMOVAL AND INSTALL

1) REMOVAL

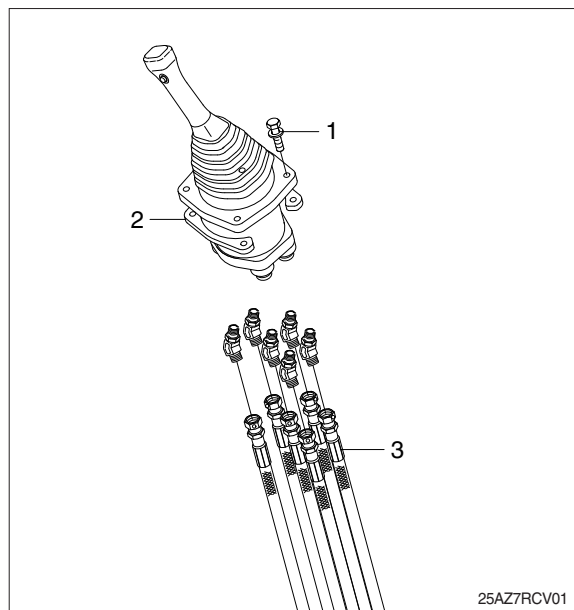
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

▲ 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.

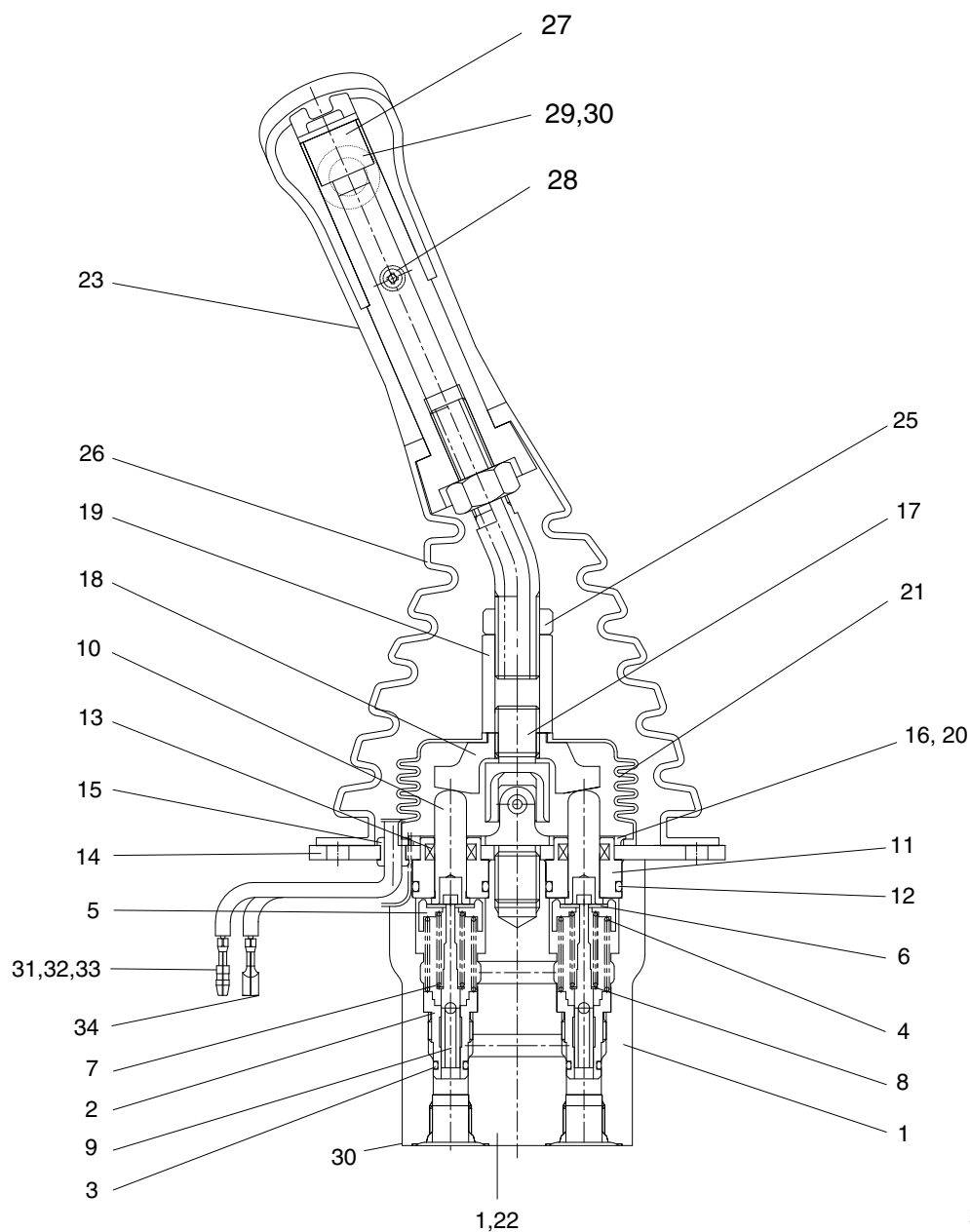
2) INSTALL

- (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

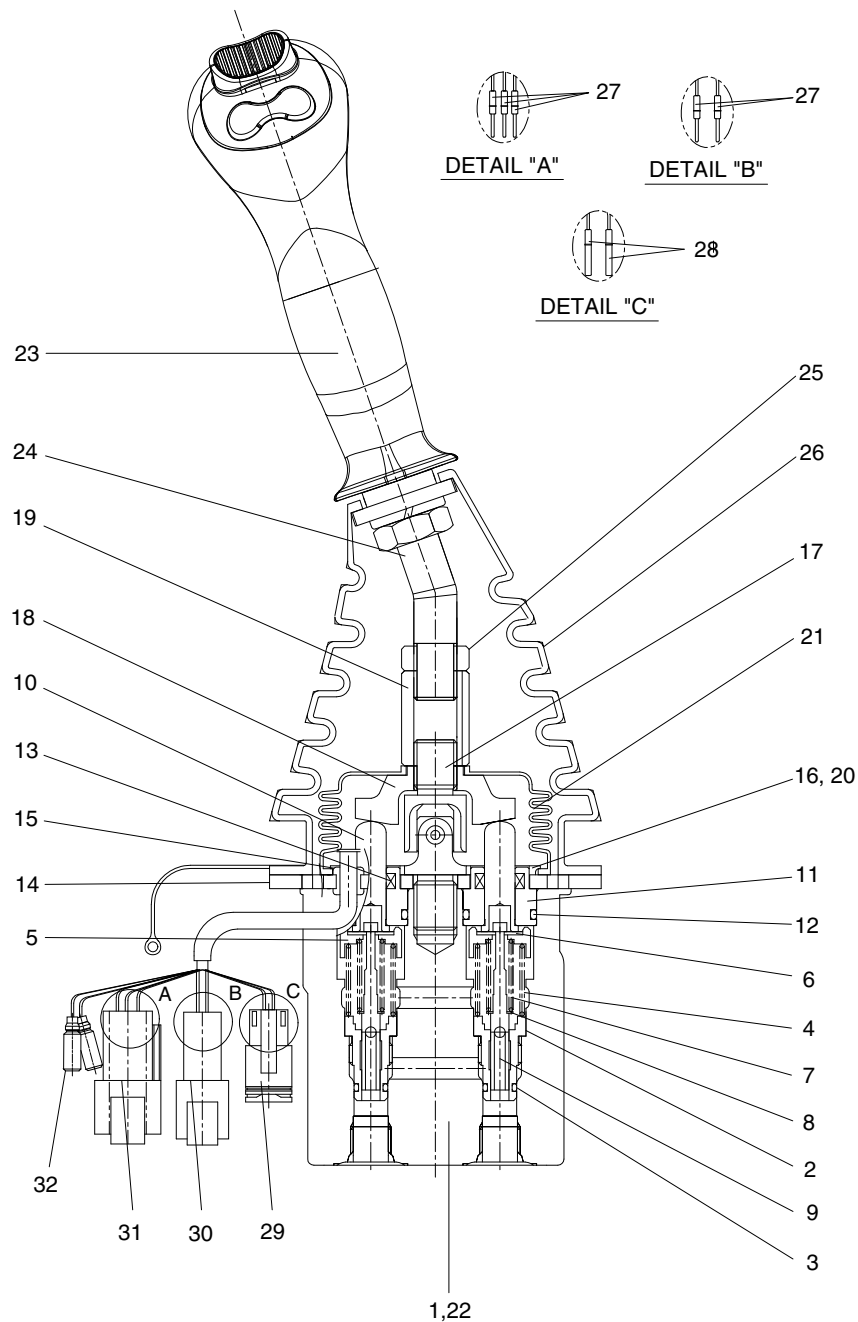
1) STRUCTURE (STD)



31MS-24010P

1	Body	12	O-ring	23	Handle assy (LH, RH)
2	Plug	13	Rod seal	24	Handle bar
3	O-ring	14	Plate (A)	25	Nut
4	Spring	15	Bushing	26	Boots
5	Spring seat	16	Machine screw	27	Switch 1
6	Stopper	17	Joint assy	28	Screw
7	Spring	18	Swash plate	29	Switch 2
8	Shim	19	Hex nut	30	Switch cover
9	Spool	20	Plate (B)	31	Connector assy
10	Push rod	21	Inner boots	32	Terminal
11	Plug	22	Plug	33	Guide
				34	Connector

STRUCTURE (PROPORTIONAL, OPT)



31MS-24120P

- | | | |
|---------------|------------------|-------------------------|
| 1 Body | 12 O-ring | 23 Handle assy (LH, RH) |
| 2 Plug | 13 Rod seal | 24 Handle bar |
| 3 O-ring | 14 Plate (A) | 25 Nut |
| 4 Spring | 15 Bushing | 26 Boots |
| 5 Spring seat | 16 Machine screw | 27 Connector pin male |
| 6 Stopper | 17 Joint assy | 28 Connector pin female |
| 7 Spring | 18 Swash plate | 29 Connector assy |
| 8 Shim | 19 Hex nut | 30 Connector assy |
| 9 Spool | 20 Plate (B) | 31 Connector assy |
| 10 Push rod | 21 Inner boots | 32 Connector |
| 11 Plug | 22 Plug | 33 Cap |

2) TOOLS

Tool name	Information
Torque wrench	22 mm
Spanner	22 & 27 mm
Long nose plier	-
Screwdriver	-
Plastic hammer	-
L-wrench	M10

3) ASSEMBLY

(1) Prepare the body.

- ※ Secure the product on a flat table.



(2) Insert greased plugs into the respective ports.

- ※ Insert the spring while making sure that it is as close to the center as possible.



(3) Assemble plug.

- ※ 10 mm torque wrench, direction of assembly: clockwise
- Tightening torque : 3kgf·m (21.7 lbf·ft)



(4) Insert the op spring into the respective ports.



(5) Assemble the spool kit.

- ※ Assemble the spool, spring, spring seat, shim and stopper as shown in the photo.



(6) Assemble the spool kit to the respective ports.



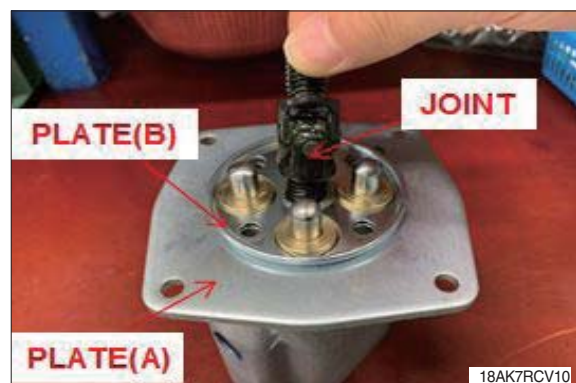
(7) Place the plug kit over the spool kit.

- ※ Align the spool head part with the push rod hole.



(8) Place plate (B) over plate (A) and assemble the joint with the wire hole facing toward port P.

- ※ Assemble the joint clockwise while pressing the plate.



(9) Assemble the joint assy.

-Tightening torque : 3 kgf·m (21.7 lbf·ft)

※ Direction of assembly: clockwise

※ Lightly tap with a hammer in all four compass directions while making sure not to scratch the product, so that the plug can be inserted at the same time.



(10) Insert screws into the four holes.



(11) Fasten the screws with an electric driver.
(Direction of assembly): clockwise



(12) Apply grease to the joint assy and push rod.

※ Grease spec: combi ep no.1 or equivalent

※ Apply grease to the rotating part of the joint and the upper surface of push rod.



(13) Assemble the swash plate.

- ※ Assemble the swash plate and push rod along the contact surface, and make sure that the push rod is not pressed.
- ※ Direction of assembly: clockwise.



(14) Assemble the hex nut.

- ※ Direction of assembly: clockwise.



(15) Assemble the hex nut with the torque wrench.

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

- ※ Direction of assembly of upper torque wrench: clockwise.



(16) Assemble the inner boots.

- ※ Insert the boots between the plate and body.



(17) Assemble the handle kit and fasten with a torque wrench.

-Tightening torque : 6kgf·m (43.4 lbf·ft)

※ When assembling, fasten according to the direction of the handle.

※ Assembly direction of the upper torque wrench: clockwise.



STD



PROPORTIONAL, OPT

(18) Insert wire into the bushing hole.

※ After inserting the wire, secure it with a cable tie.



(19) Insert the terminal into the respective wire.



STD

Insert the terminal into the respective wire.

SWITCH NUMBER	CONNECTOR SPECIFICATION	WIRE COLOR
1	DT06-2S-EP05	GRAY
2	DT04-2P-E005	BLACK
3	JIS D 5403 CB104	BLUE
(PUSH BUTTON SWITCH)		
SWITCH NUMBER	CONNECTOR SPECIFICATION	WIRE COLOR
4	DT04-3P-E004-1	RED
4	DT04-3P-E004-2	PURPLE
4	DT04-3P-E004-3	WHITE
(PROPORTIONAL SWITCH)		



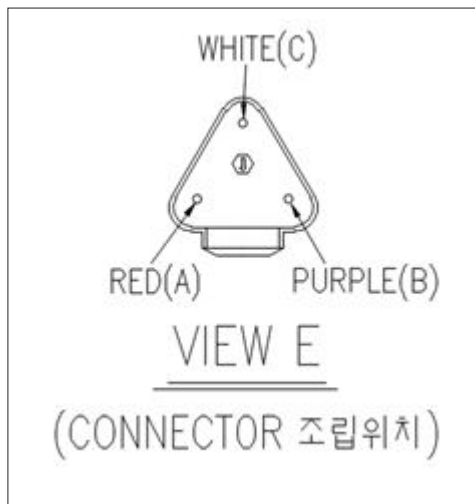
PROPORTIONAL, OPT

(20) Insert the female and male terminals.



STD

Insert the wire into the connector.



PROPORTIONAL, OPT

(21) Check the final status.

- ※ Check the exterior parts for irregularities as well as the connector specifications.



STD



PROPORTIONAL, OPT

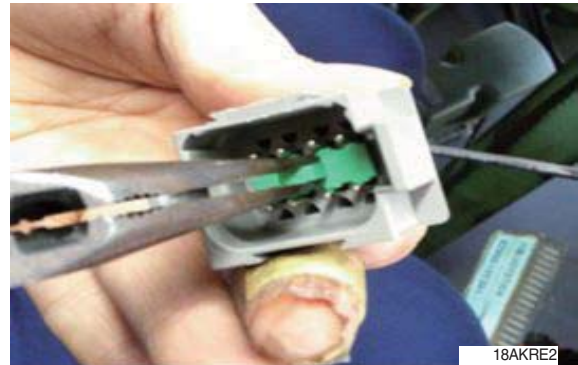
4) DISASSEMBLY

(1) 1. Prepare the joystick product.

※ Fix the product on a flat table.



(2) Disassemble the guide from the connector.



(3) Disassemble the wire from the connector.

※ Force the terminal holder to the opposite side and fix it.



(4) Pull out the terminal wire by moving the holder to the opposite side.



(5) Pull out the wire from the bushing hole.



(6) Disassemble the handle kit from the hex nut.

※ Disassembly direction: counterclockwise.



(7) Disassemble the inner boots.



(8) Disassemble the hex nut.

※ Disassembly direction: counterclockwise



- (9) Disassemble the swash plate.
※ Disassembly direction: counterclockwise.



- (10) Disassemble the joint assy.
※ Disassembly direction: counterclockwise.



- (11) Disassemble the plate and spacer.



- (12) Disassemble the plug kit from each port.
※ Fix the plug side using pliers and then force in the upper direction. take care not to damage the plug side.



(13) Disassemble the bushing.

※ Extract the bushing using a screwdriver.



(14) Extract the spool kit from the body.



(15) Extract the op spting from the body.



(16) Check the final parts.



GROUP 8 TURNING JOINT

1. REMOVAL AND INSTALL

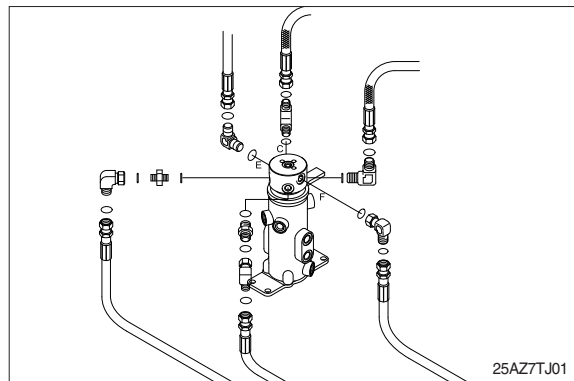
1) REMOVAL

- (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.**

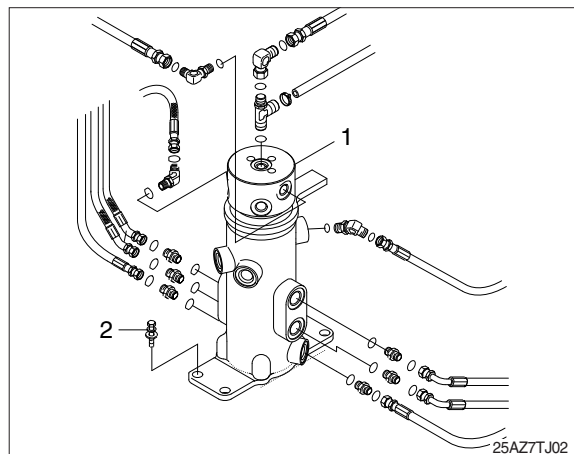
※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

- (4) Disconnect all hoses.
 - (5) Sling the turning joint assembly (1) and remove the mounting bolt (2).
 - Weight : 11 kg (24 lb)
 - Tightening torque : $6.9 \pm 1.4 \text{ kgf} \cdot \text{m}$
($49.9 \pm 10.1 \text{ lbf} \cdot \text{ft}$)
 - (6) Remove the turning joint assembly.
- ※ When removing the turning joint, check that all the hoses have been disconnected.



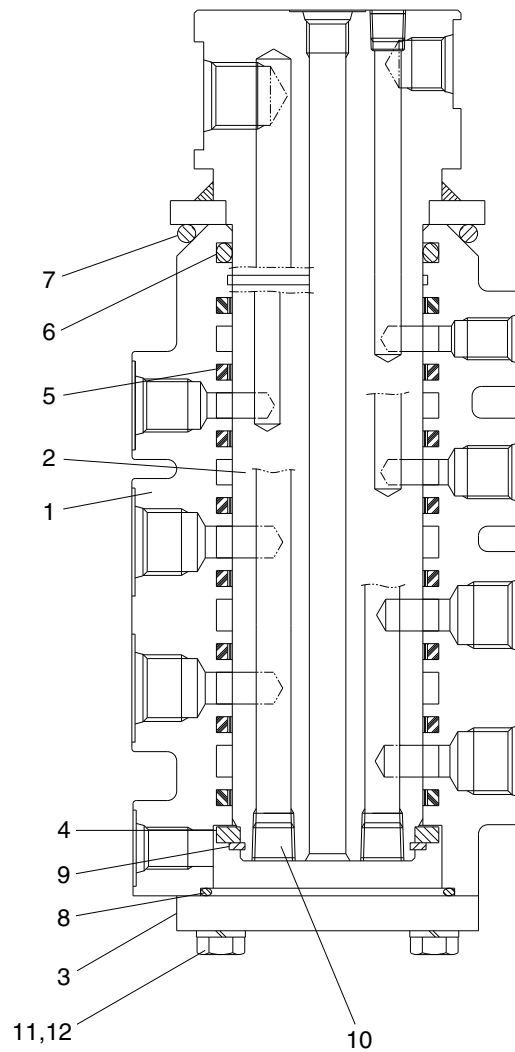
2) INSTALL

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



2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE



25AZ7TJ03

- 1 Hub
- 2 Shaft
- 3 Cover
- 4 Spacer

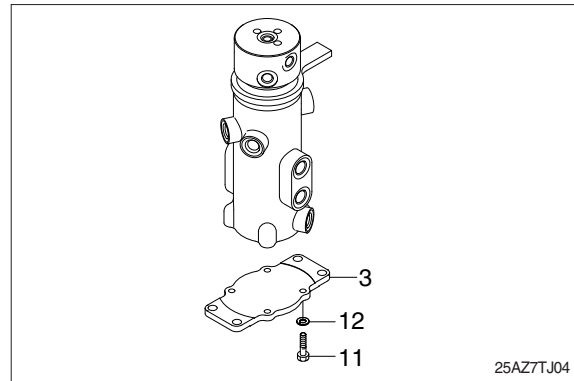
- 5 Slipper seal
- 6 O-ring
- 7 O-ring
- 8 O-ring

- 9 Retainer ring
- 10 Plug
- 11 Hexagon bolt
- 12 Spring washer

2) DISASSEMBLY

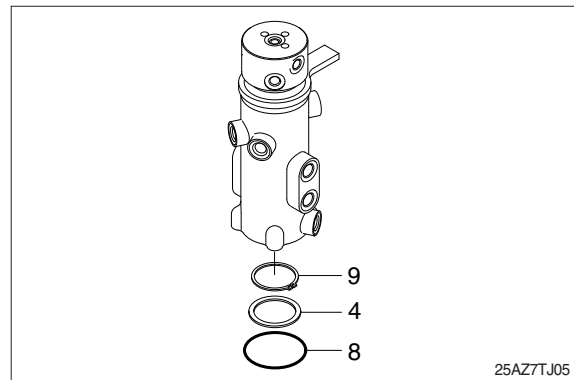
※ Before the disassembly, clean the turning joint.

- (1) Remove bolts (11), washer (12) and cover (3).



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

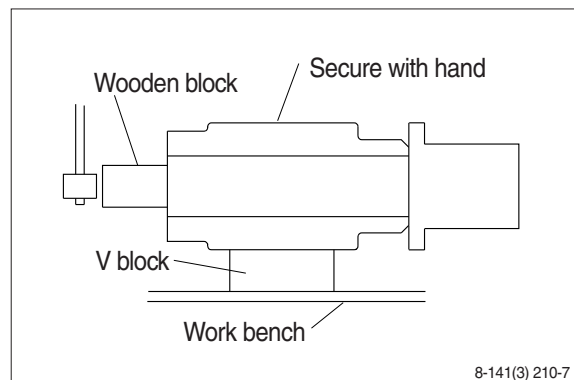
- (3) Remove retainer ring (9) and spacer (4).



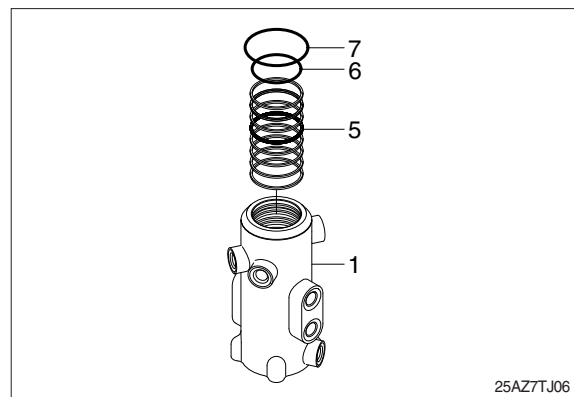
- (4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

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

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



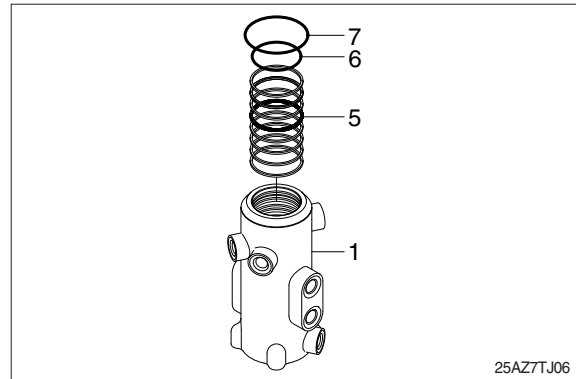
- (5) Remove eight slipper seals (5) and O-ring (6, 7) from hub (1).



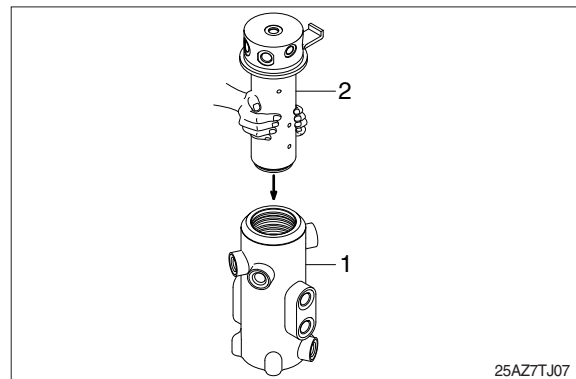
3) ASSEMBLY

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

- (1) Fix eight slipper seal (5) and O-ring (6, 7) to hub (1).

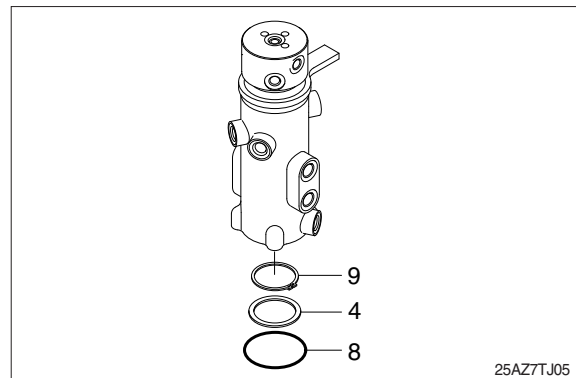


- (2) Set hub (1) on block, install shaft (2) into hub (1) by hand.

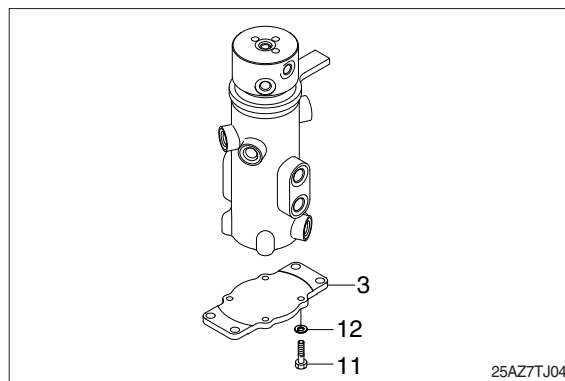


- (3) Fit spacer (4) and retainer ring (9) to shaft (2).

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



- (5) Install cover (3) to hub and tighten bolts (11).
- Tightening torque : 2.5~3.0 kgf·m
(18.1~21.7 lbf·ft)



GROUP 9 BOOM, ARM AND BUCKET CYLINDERS

1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

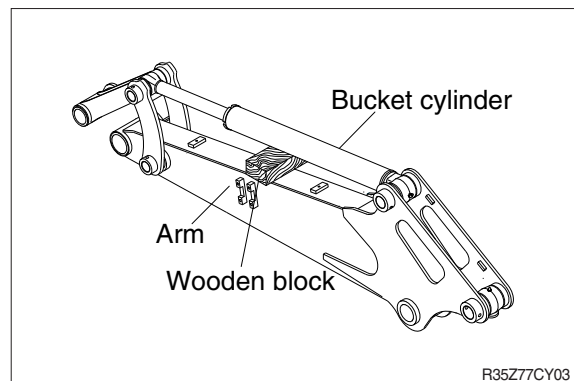
(1) Removal

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

▲ Loosen the breather slowly to release the pressure inside the hydraulic tank. Escaping fluid under pressure can penetrate the skin causing serious injury.

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

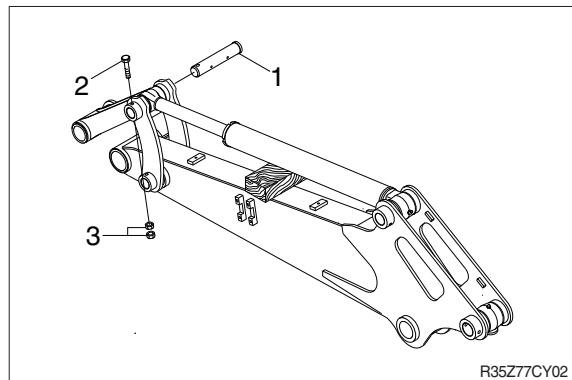
① Set block between bucket cylinder and arm.



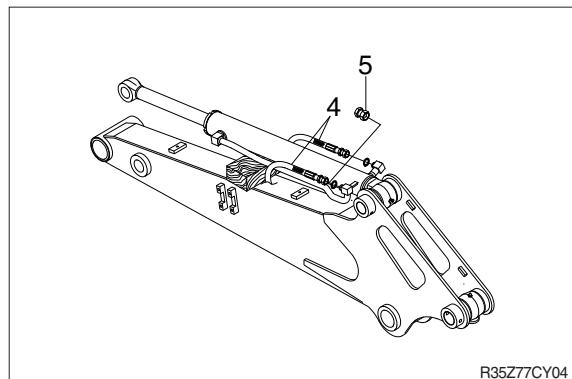
② Remove bolt (2), nut (3) and pull out pin (1).

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

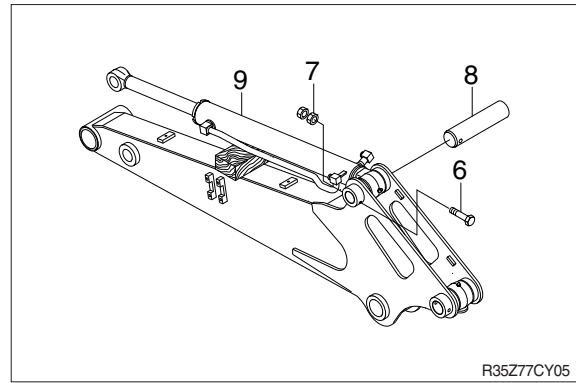
· Tightening torque : 6.9 ± 1.4 kgf·m
(49.9 ± 10.1 lbf·ft)



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



- ④ Sling bucket cylinder assembly (9) and remove bolt (6) and nut (7) then pull out pin (8).
- ⑤ Remove bucket cylinder assembly (9).
 - Weight : 15 kg (32 lb)
 - Tightening torque : 6.9 ± 1.4 kgf·m
(49.9 ± 10.1 lbf·ft)



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(2) Install

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

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

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

2) ARM CYLINDER

(1) Removal

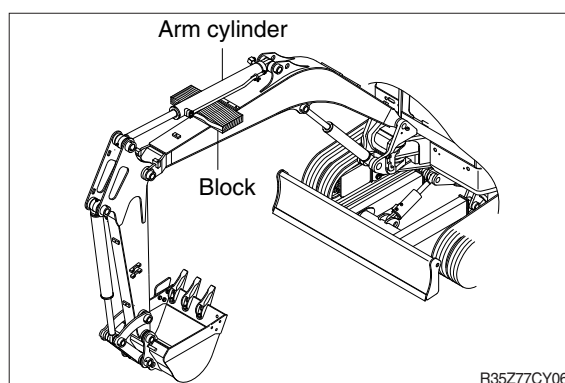
- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

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

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

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

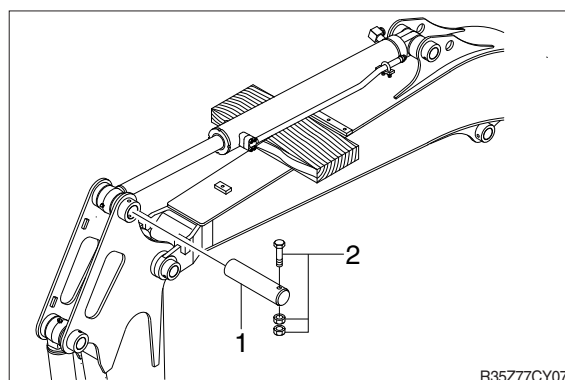
- ① Set block between arm cylinder and boom.



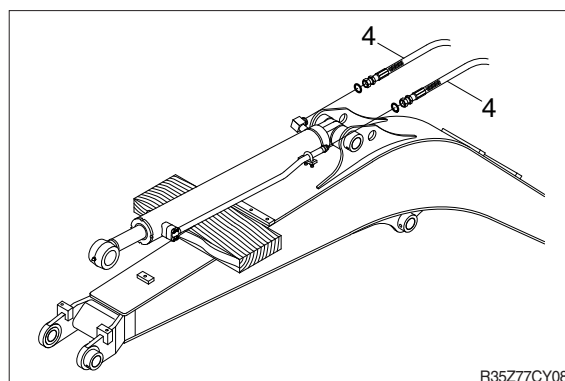
- ② Remove bolt and nut (2) and pull out pin (1).

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

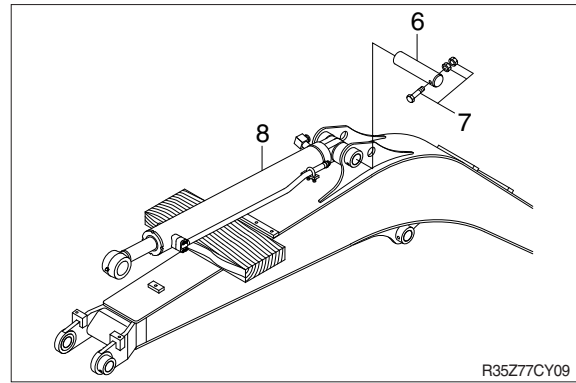
- ※ Tie the rod with wire to prevent it from coming out.



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



- ④ Sling arm assembly (8) and remove bolt and nut (7) then pull out pin (6).
- ⑤ Remove arm cylinder assembly (8).
 - Weight : 26 kg (57 lb)
 - Tightening torque : 6.9 ± 1.4 kgf·m
(49.9 ± 10.1 lbf·ft)



(2) Install

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

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

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

3) BOOM CYLINDER

(1) Removal

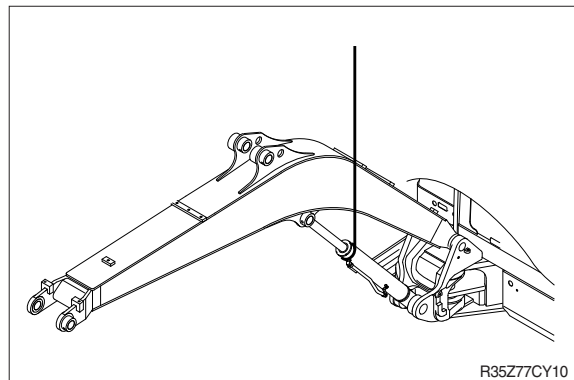
- ※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.
- ※ Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.

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

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

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

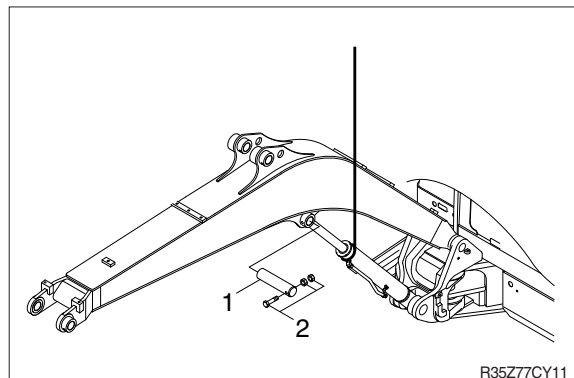
① Sling boom cylinder assembly.



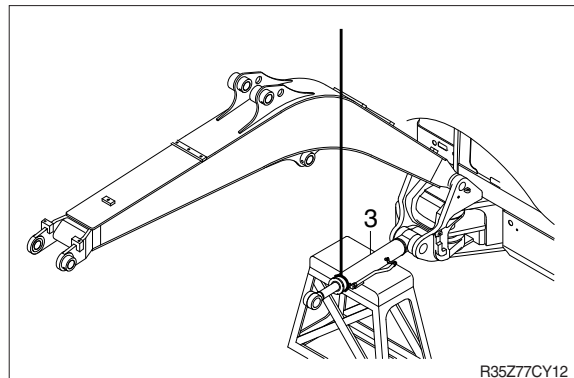
② Remove bolt and nut (2) and pull out pin (1).

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

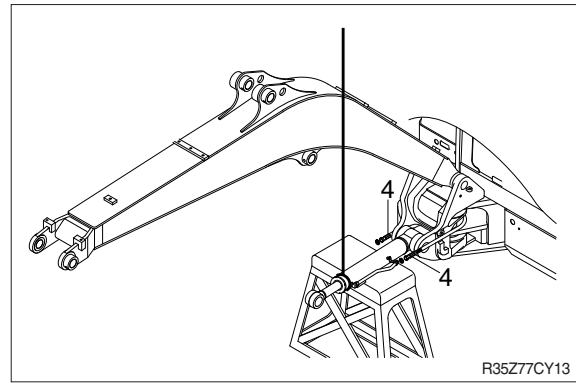
· Tightening torque : 6.9 ± 1.4 kgf·m
(49.9 ± 10.1 lbf·ft)



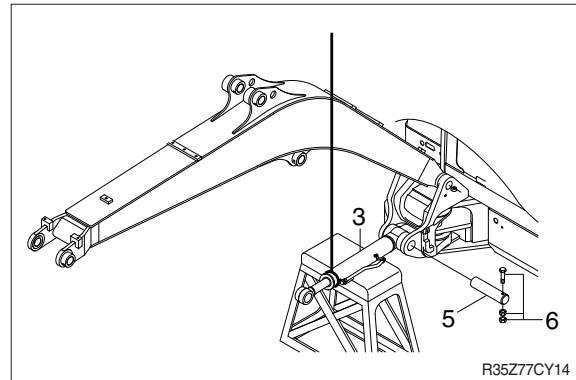
③ Lower the boom cylinder assembly (3) on a stand.



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



- ⑤ Remove bolt (6) and pull out pin (5).
⑥ Remove boom cylinder assembly (3).
· Weight : 29 kg (63 lb)
· Tightening torque : 12.8 ± 3.0 kgf·m
(92.6 ± 21.7 lbf·ft)



(2) Install

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

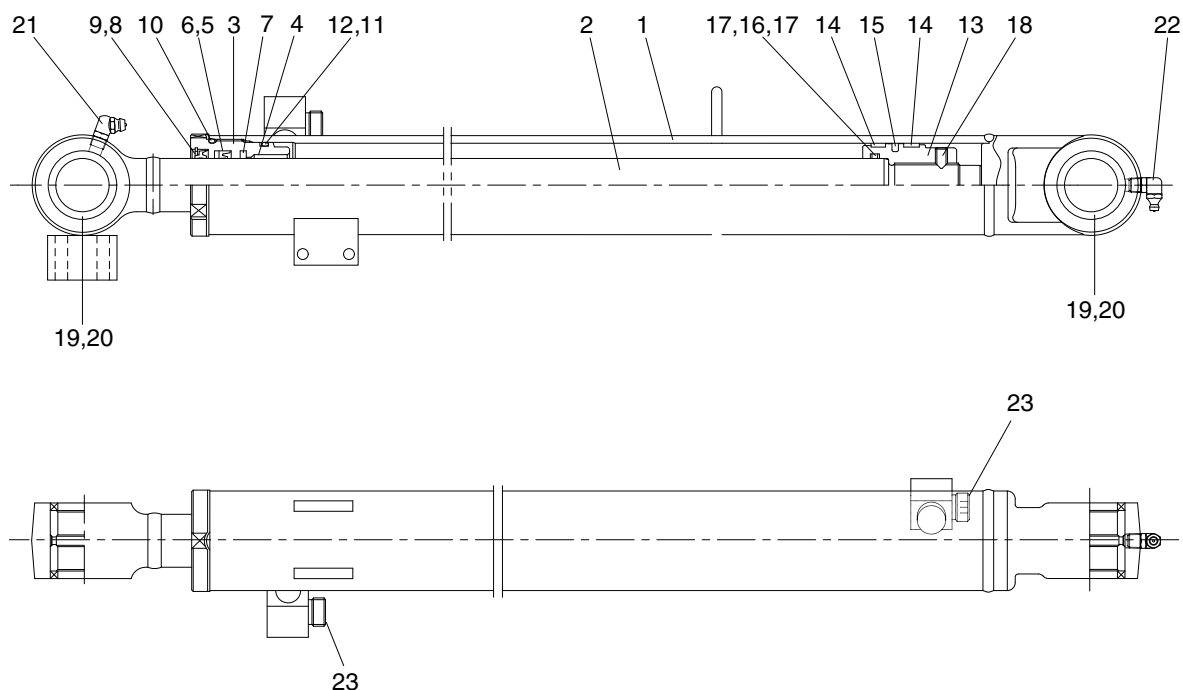
▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.

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

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

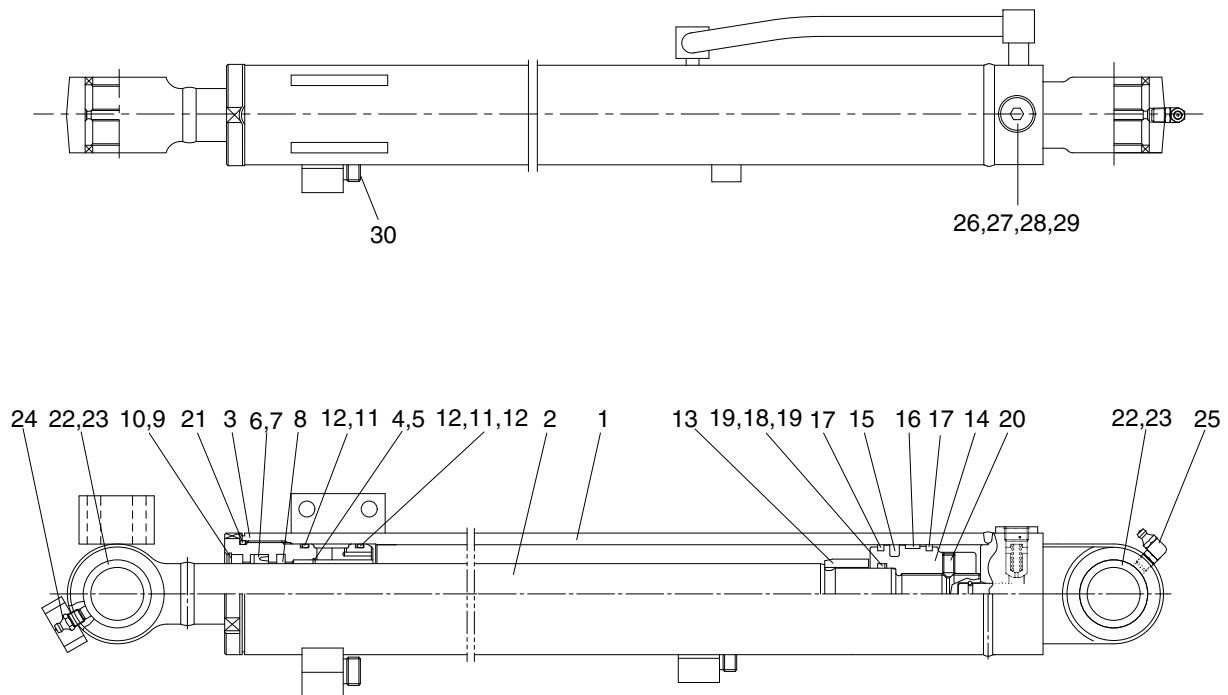
(1) Bucket cylinder



HCMR-51032

- | | | | | | |
|---|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 9 | Snap ring | 17 | Back up ring |
| 2 | Rod assembly | 10 | O-ring | 18 | Set screw |
| 3 | Gland | 11 | O-ring | 19 | Pin bushing |
| 4 | DU bushing | 12 | Back up ring | 20 | Dust seal |
| 5 | Rod seal | 13 | Piston | 21 | Grease nipple |
| 6 | Back up ring | 14 | Wear ring | 22 | Grease nipple |
| 7 | Buffer ring | 15 | Piston seal | 23 | O-ring |
| 8 | Dust wiper | 16 | O-ring | | |

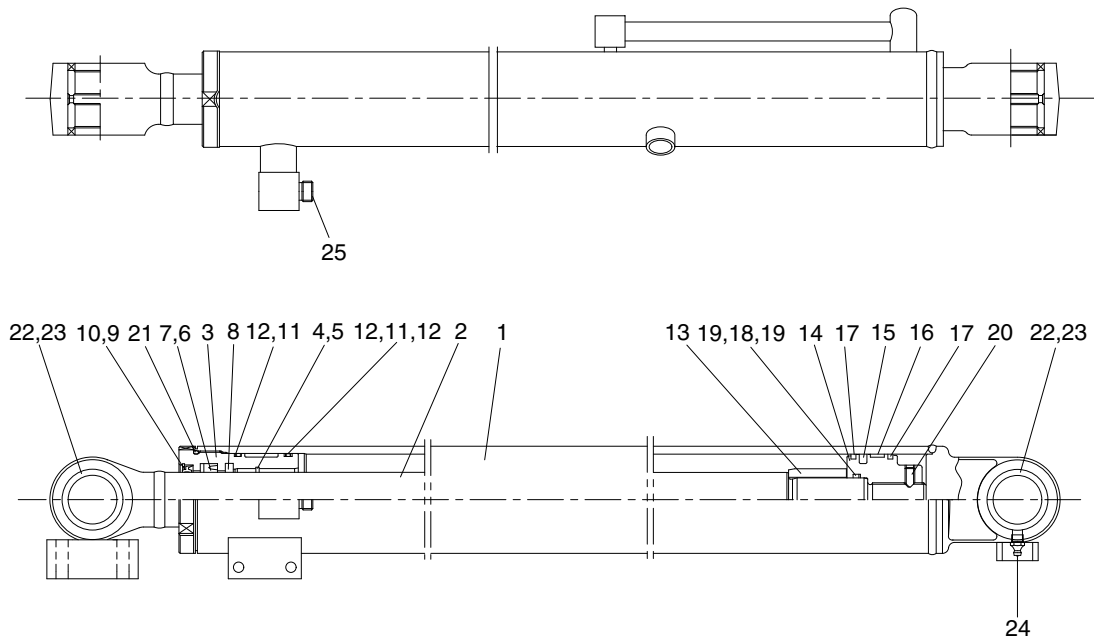
(2) Arm cylinder



HCMR-51022

1	Tube assembly	11	O-ring	21	O-ring
2	Rod assembly	12	Back up ring	22	Dimple bushing
3	Gland	13	Cushion ring	23	Dust seal
4	DU bushing	14	Piston	24	Grease nipple
5	Snap ring	15	Piston seal	25	Grease nipple
6	Rod seal	16	Wear ring	26	Check valve
7	Back up ring	17	Dust ring	27	Coil spring
8	Buffer ring	18	O-ring	28	O-ring
9	Dust wiper	19	Back up ring	29	Socket plug
10	Snap ring	20	Set screw	30	O-ring

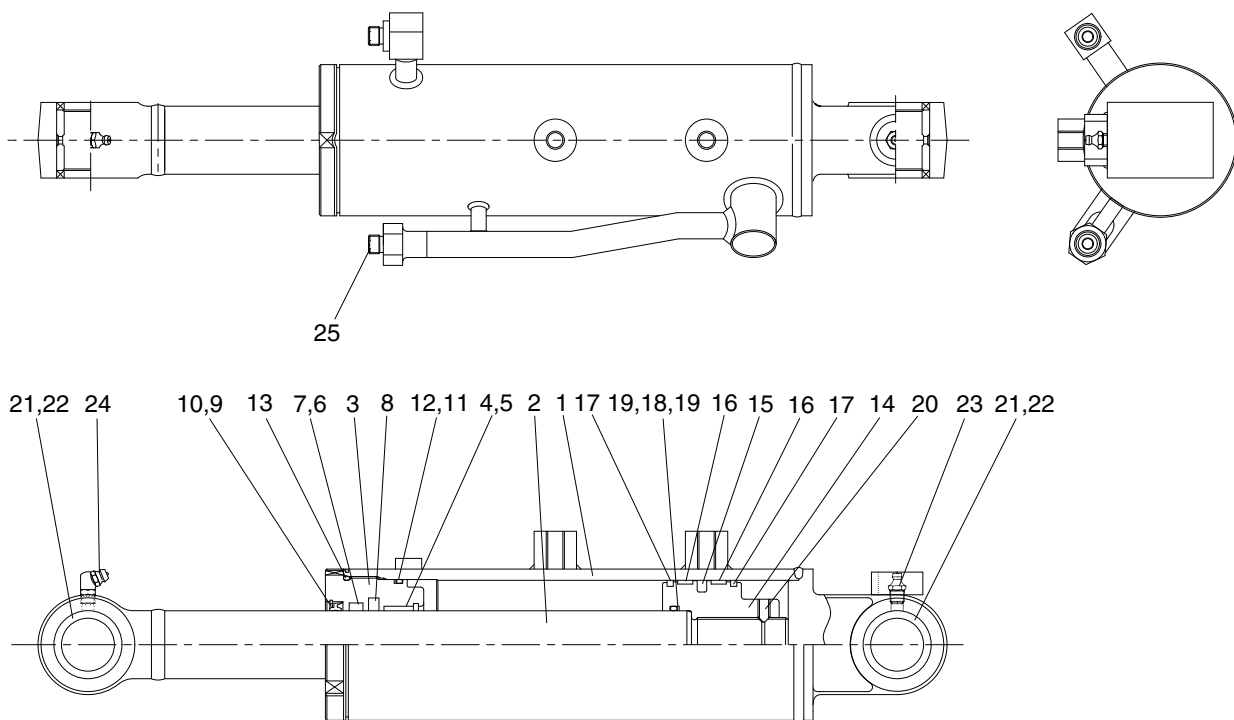
(3) Boom cylinder



HCMR-51012

- | | | | | | |
|---|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 10 | Snap ring | 19 | Back up ring |
| 2 | Rod assembly | 11 | O-ring | 20 | Set screw |
| 3 | Gland | 12 | Back up ring | 21 | O-ring |
| 4 | DU bushing | 13 | Cushion ring | 22 | Pin bushing |
| 5 | Snap ring | 14 | Piston | 23 | Dust seal |
| 6 | Rod seal | 15 | Piston seal | 24 | Grease nipple |
| 7 | Back up ring | 16 | Wear ring | 25 | O-ring |
| 8 | Buffer ring | 17 | Dust ring | | |
| 9 | Dust wiper | 18 | O-ring | | |

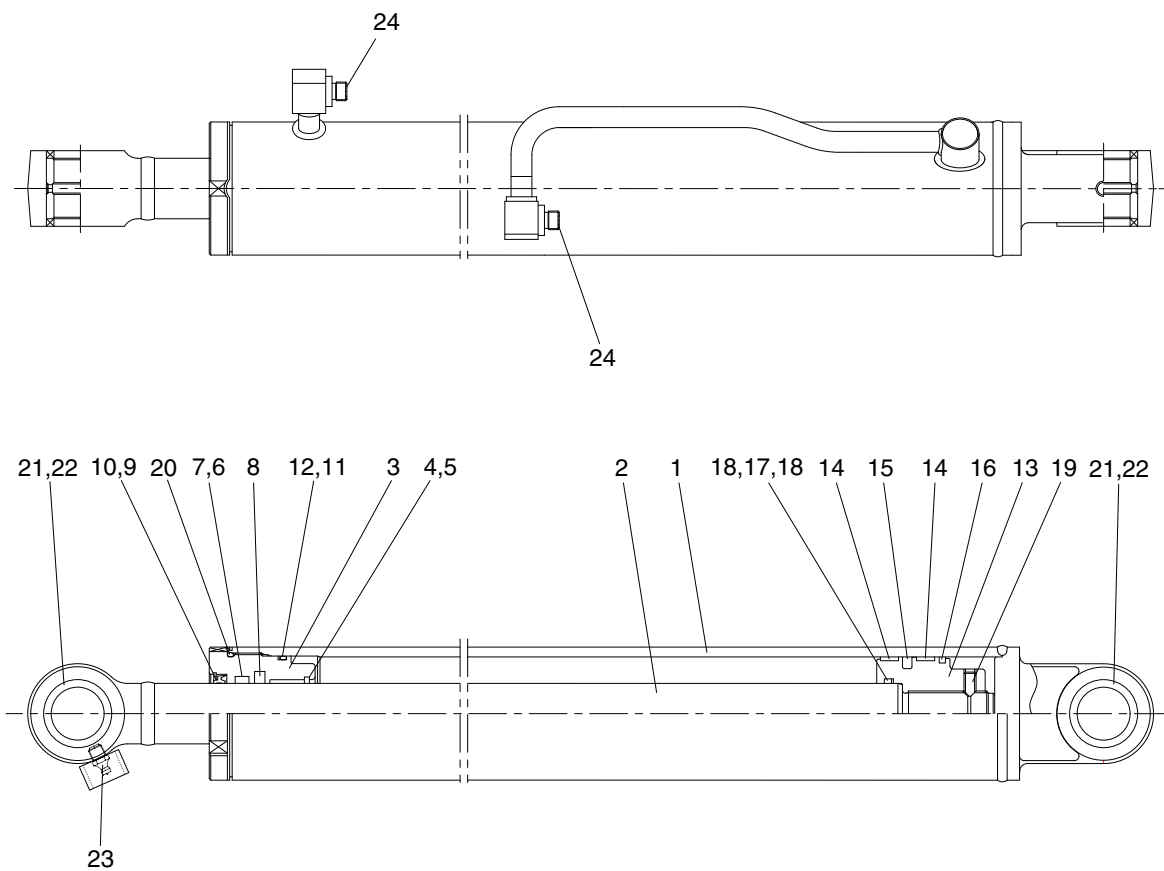
(4) Dozer cylinder



HCMR-40040

- | | | | | | |
|---|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 10 | Snap ring | 19 | Back up ring |
| 2 | Rod assembly | 11 | O-ring | 20 | Set screw |
| 3 | Gland | 12 | Back up ring | 21 | Pin bushing |
| 4 | DU bushing | 13 | O-ring | 22 | Dust seal |
| 5 | Snap ring | 14 | Piston | 23 | Grease nipple |
| 6 | Rod seal | 15 | Piston seal | 24 | Grease nipple |
| 7 | Back up ring | 16 | Wear ring | 25 | O-ring |
| 8 | Buffer ring | 17 | Dust ring | | |
| 9 | Dust wiper | 18 | O-ring | | |

(5) Boom swing cylinder

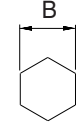


HCMR-10120

- | | | | | | |
|---|---------------|----|--------------|----|---------------|
| 1 | Tube assembly | 10 | Snap ring | 18 | Back up ring |
| 2 | Rod assembly | 11 | O-ring | 19 | Set screw |
| 3 | Gland | 12 | Back up ring | 20 | O-ring |
| 4 | DU bushing | 13 | Piston | 21 | Pin bushing |
| 5 | Snap ring | 14 | Wear ring | 22 | Dust seal |
| 6 | Rod seal | 15 | Piston seal | 23 | Grease nipple |
| 7 | Back up ring | 16 | Wear ring | 24 | O-ring |
| 8 | Buffer ring | 17 | O-ring | | |
| 9 | Dust wiper | | | | |

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark	
Allen wrench	8	
	3	
Spanner	22	
Hook spanner	Suitable size (80~120 mm)	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

(2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Gland	Boom cylinder	3	-	70 ± 7.0	506 ± 50.6
	Arm cylinder	3	-	70 ± 7.0	506 ± 50.6
	Bucket cylinder	3	-	70 ± 7.0	506 ± 50.6
	Dozer cylinder	3	-	70 ± 7.0	506 ± 50.6
	Boom swing cylinder	3	-	70 ± 7.0	506 ± 50.6
Piston	Boom cylinder	14	-	75 ± 7.5	542 ± 54.2
	Arm cylinder	14	-	50 ± 5.0	362 ± 36.2
	Bucket cylinder	13	-	50 ± 5.0	362 ± 36.2
	Dozer cylinder	14	-	75 ± 7.5	542 ± 54.2
	Boom swing cylinder	13	-	75 ± 7.5	542 ± 54.2
Set screw	Boom cylinder	20	M8	1.5 ± 0.1	10.8 ± 0.7
	Arm cylinder	20	M8	1.5 ± 0.1	10.8 ± 0.7
	Bucket cylinder	18	M8	1.5 ± 0.1	10.8 ± 0.7
	Dozer cylinder	20	-	1.5 ± 0.1	10.8 ± 0.7
	Boom swing cylinder	19	-	1.5 ± 0.1	10.8 ± 0.7

3) DISASSEMBLY

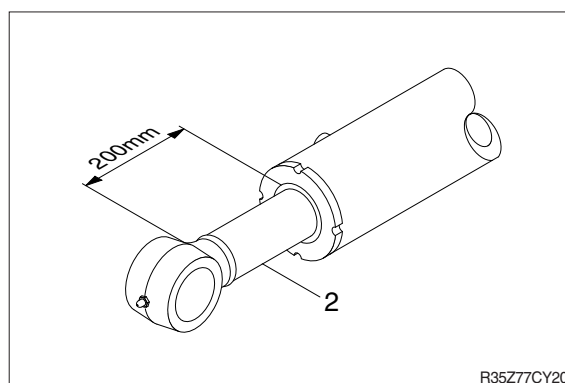
※ Procedures are based on the boom cylinder.

(1) Remove cylinder head and piston rod

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

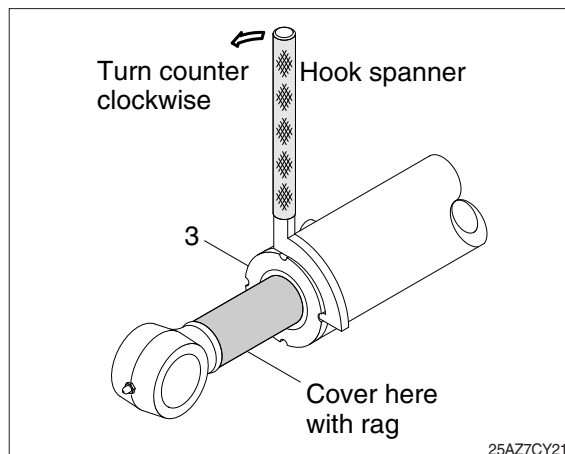
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

② Pull out rod assembly (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.



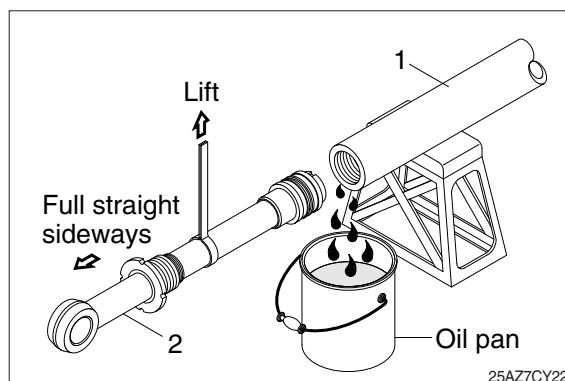
③ Loosen and remove the gland (3) by hook spanner.

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



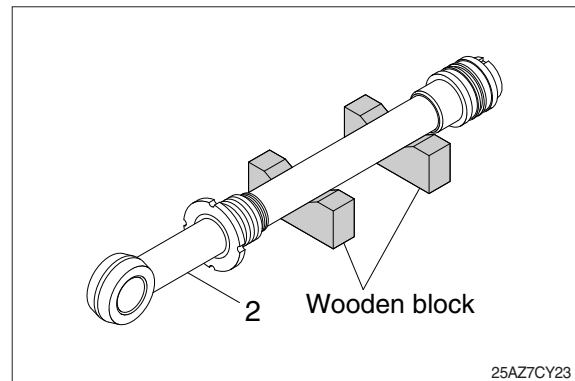
④ Draw out cylinder head and rod assembly together from tube assembly (1).

※ 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.



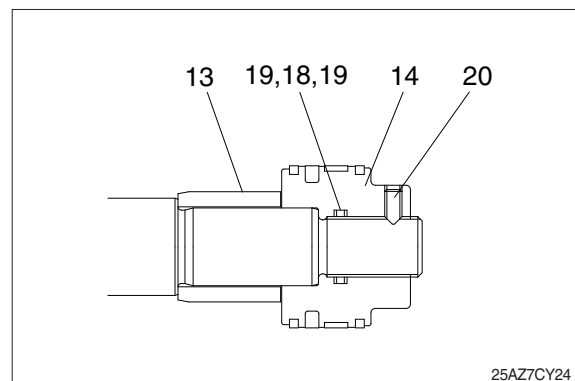
- ※ Note that the plated surface of rod assembly (2) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

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

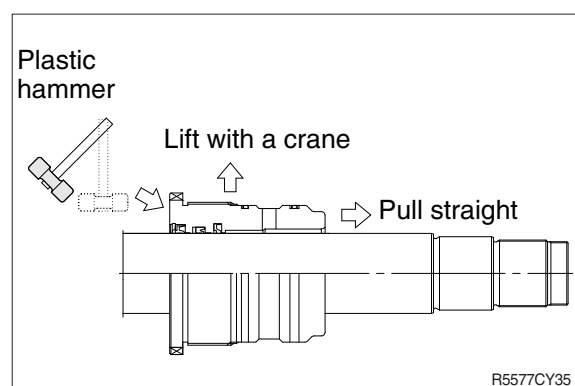


(2) Remove piston and gland

- ① Remove set screw (20).
- ② Remove piston assembly (14), back up ring (19), O-ring (18) and cushion ring (13).

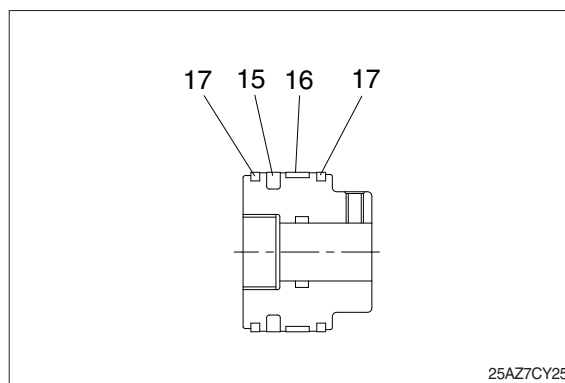


- ③ Remove the gland assembly from rod assembly (2).
 - ※ If it is too heavy to move, move it by striking the flanged part of gland with a plastic hammer.
 - ※ Pull it straight with gland assembly lifted with a crane.
- Exercise care so as not to damage the lip of DU bushing (6) and packing (5, 6, 7,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



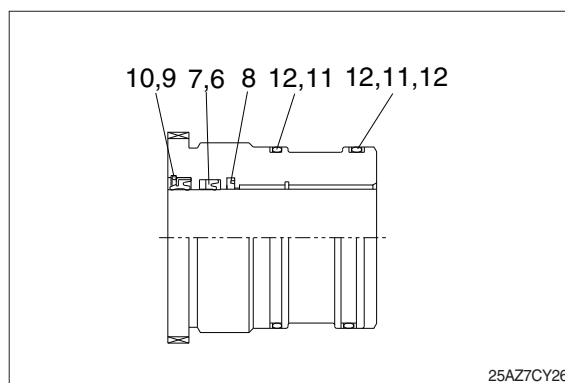
(3) Disassemble the piston assembly

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



(4) Disassemble gland assembly

- ① Remove back up rings (12) and O-ring (11).
 - ② Remove snap ring (10), dust wiper (9).
 - ③ Remove buffer ring (8).
 - ④ Remove the back up ring (7) and rod seal (6).
- ※ Exercise care in this operation not to damage the grooves.
- ※ Do not remove seal and ring, if does not damaged.

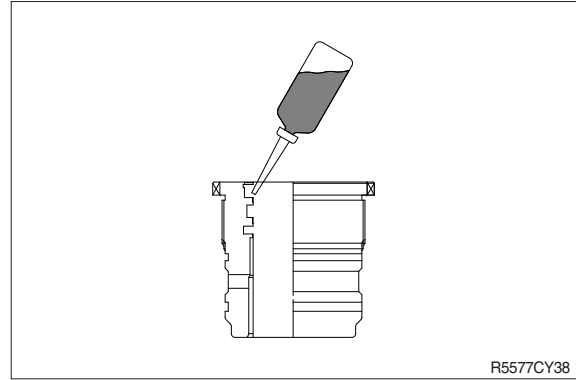


4) ASSEMBLY

(1) Assemble cylinder head assembly

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

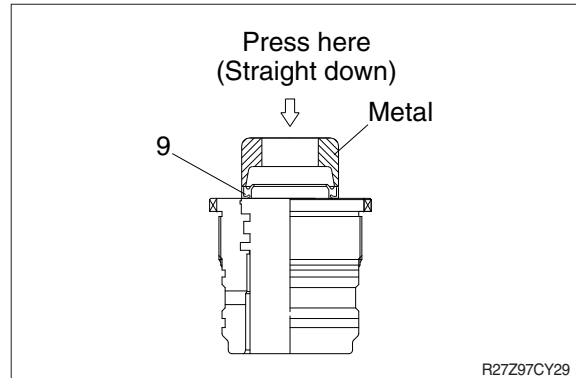
- ① Coat the inner face of gland (3) with hydraulic oil.



- 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.

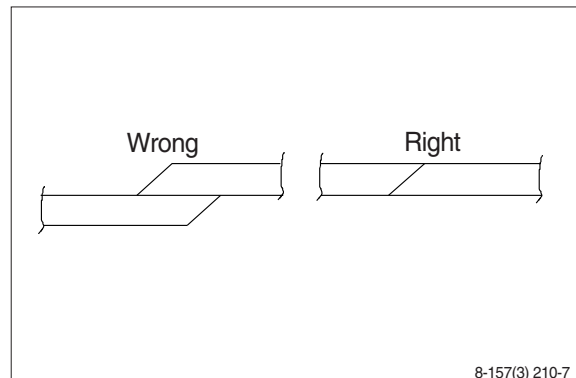
- ③ Fit back up ring (10) to the stop face.



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

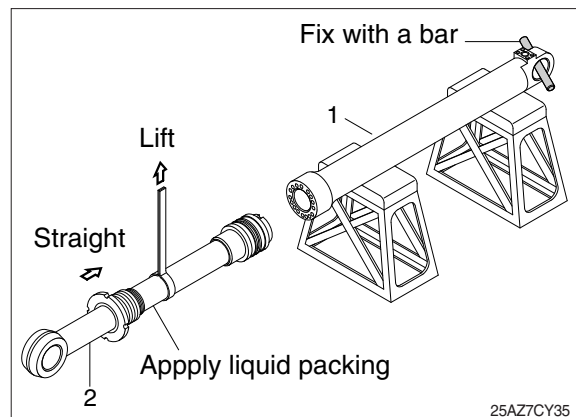
※ Coat each packing with hydraulic oil before fitting it.

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

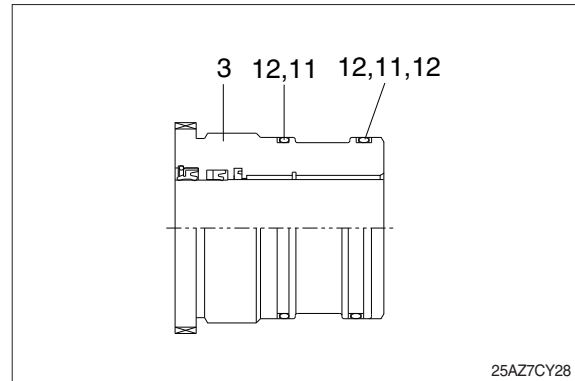


※ Buffer ring (8) has its own fitting direction. Therefore, confirm it before fitting them.

※ Fitting buffer ring (8) upside down may damage its lip. Therefore check the correct direction that is shown in fig.

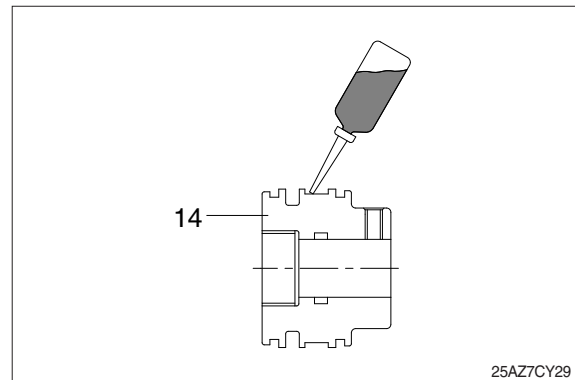


- ⑤ Fit back up ring (12) to gland (3).
- ※ Put the back up ring in the warm water of 30~50°C .
- ⑥ Fit O-ring (11) and back up ring (12) to gland (3).

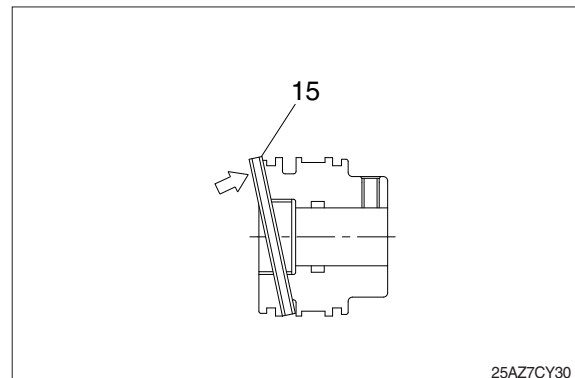


(2) Assemble piston assembly

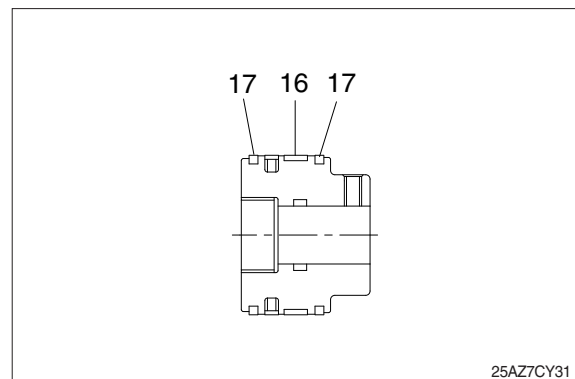
- ※ Check for scratches or rough surfaces.
If found smooth with an oil stone.
- ① Coat the outer face of piston (14) with hydraulic oil.



- 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.

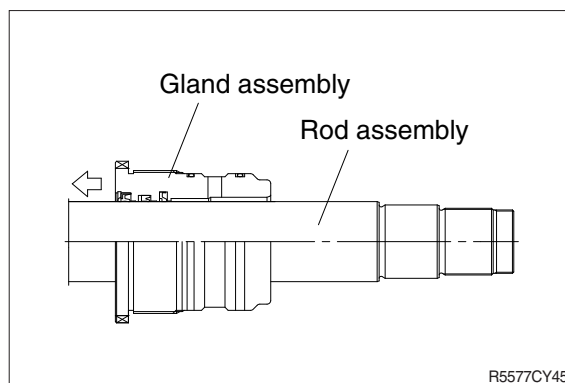


- ③ Fit wear ring (16) and dust rings (17) to piston (14).

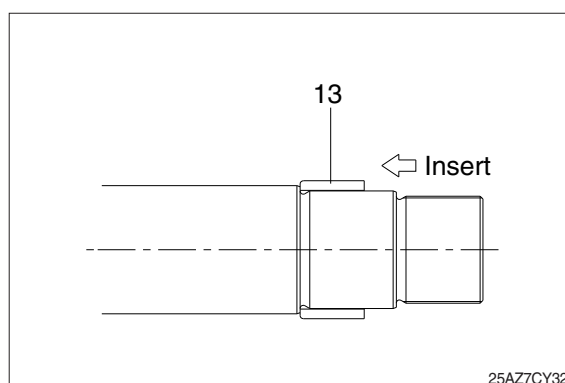


(3) Install piston and cylinder head

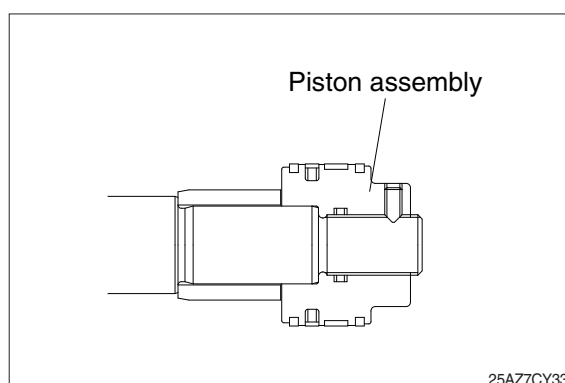
- ① Fix the rod assembly to the work bench.
- ② Apply hydraulic oil to the outer surface of rod assembly (2), the inner surface of piston and gland.
- ③ Insert gland assembly to rod assembly.



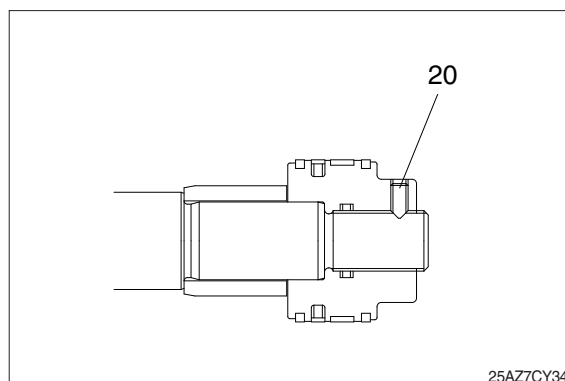
- ④ Insert cushion ring (13) to rod assembly.
- ※ Note that cushion ring (13) has a direction in which it should be fitted.



- ⑤ Fit piston assembly to rod assembly.
- Tightening torque : refer to page 7-122

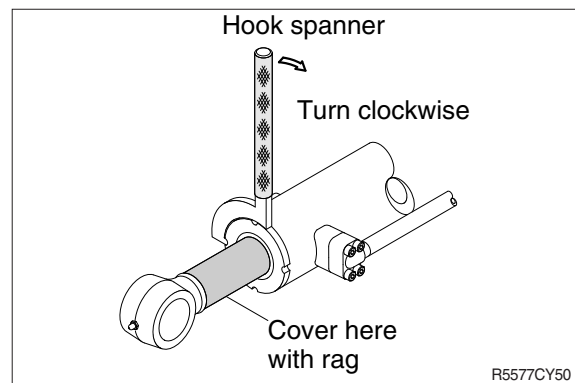
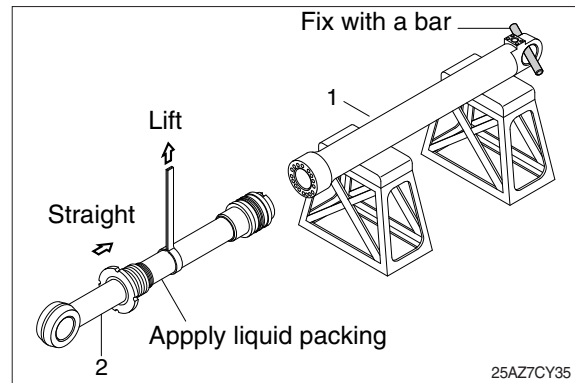


- ⑥ Fit set screw (20).
- Tightening torque : refer to page 7-122



(4) Overall assemble

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

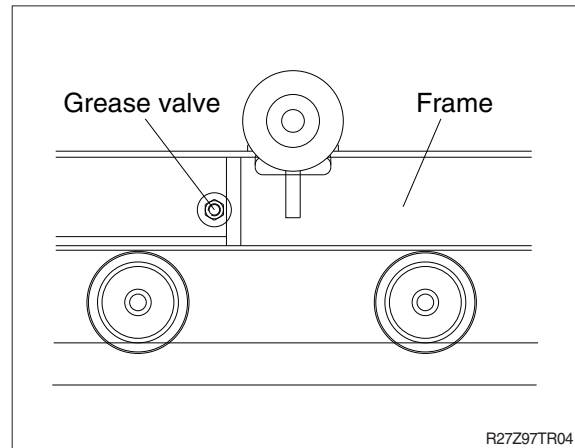


GROUP 10 UNDERCARRIAGE

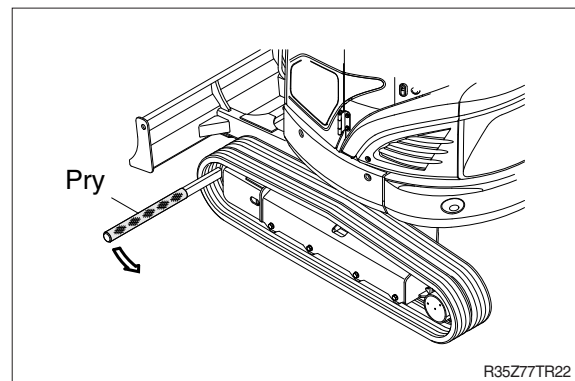
1. RUBBER TRACK

1) REMOVAL

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

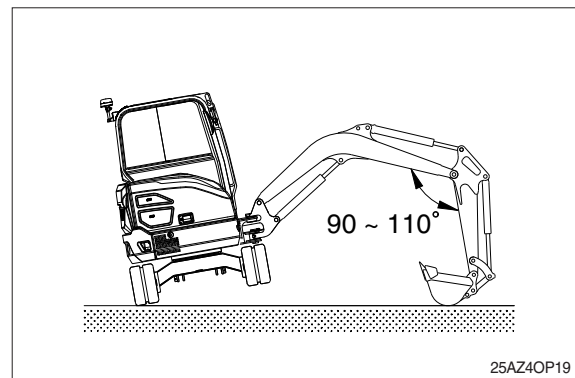


- (2) Remove the rubber track from lower frame using pry.



2) INSTALL

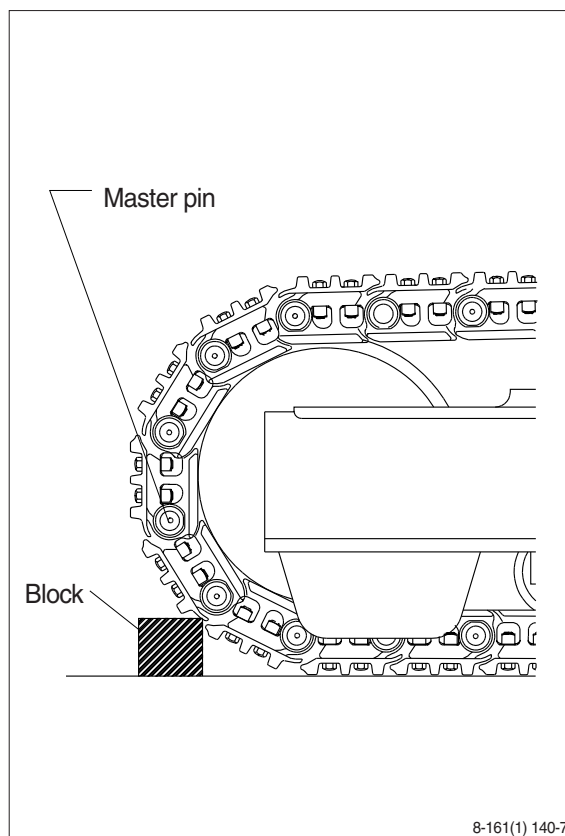
- (1) Carry out installation in the reverse order to removal.
 - ※ Adjust the tension of the rubber track.



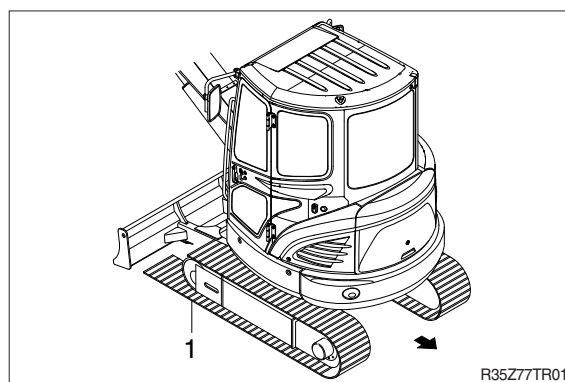
2. TRACK LINK

1) REMOVAL

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

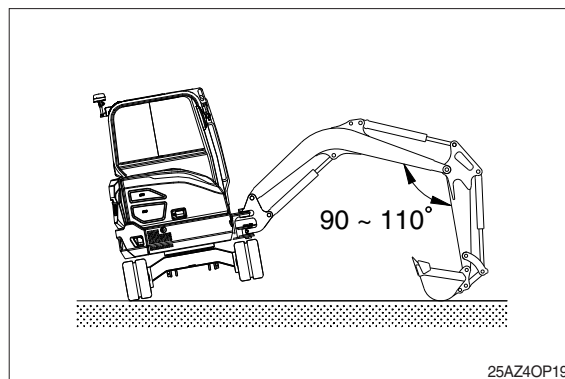


- (4) Move the machine slowly in reverse, and lay out track link assembly (1).
 - ※ Jack up the machine and put wooden block under the machine.
 - ※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



2) INSTALL

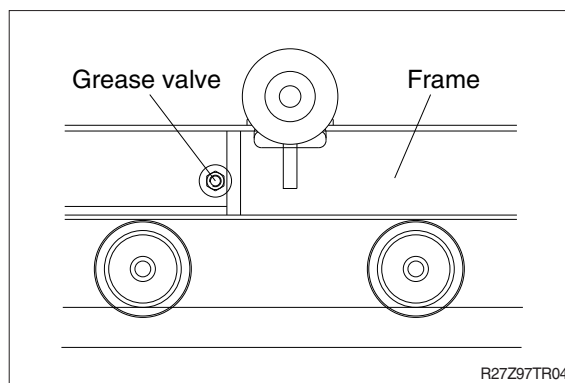
- (1) Carry out installation in the reverse order to removal.
 - ※ Adjust the tension of the track link.



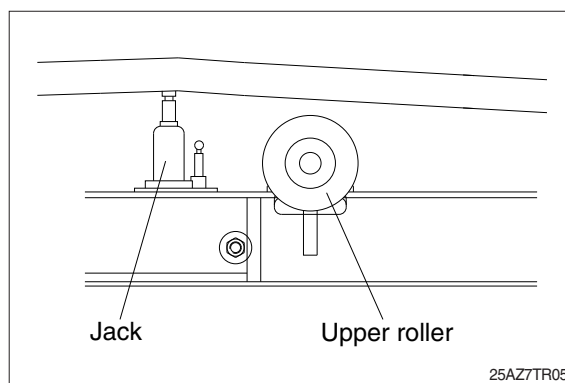
3. UPPER ROLLER

1) REMOVAL

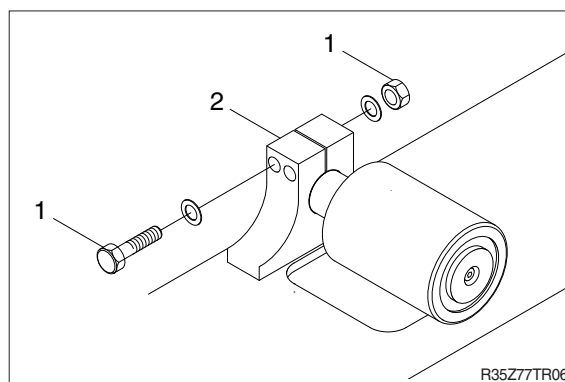
- (1) Loosen tension of the rubber track.



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



- (3) Loosen the bolt and nut (1).
- Tightening torque : $12.3 \pm 1.2 \text{ kgf} \cdot \text{m}$
($89 \pm 8.7 \text{ lbf} \cdot \text{ft}$)
- (4) Open bracket (2) with a screwdriver, push out from inside, and remove upper roller assembly.
- Weight : 2.5 kg (5.5 lb)



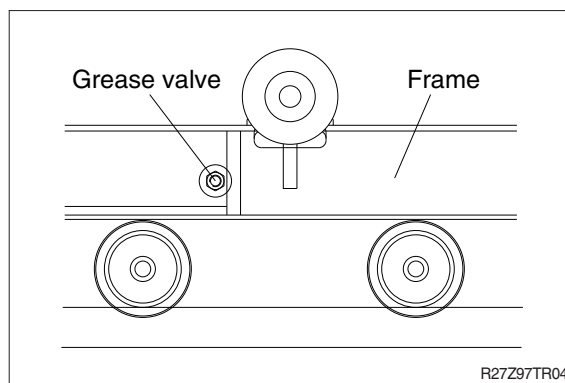
2) INSTALL

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

4. LOWER ROLLER

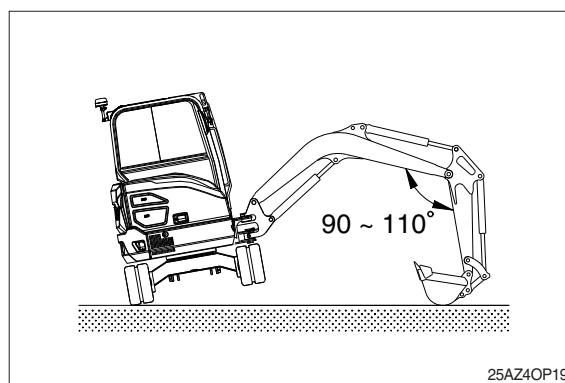
1) REMOVAL

- (1) Loosen tension of the rubber track.



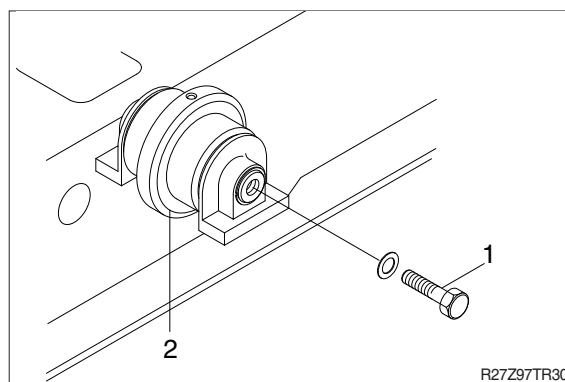
- (2) Using the work equipment, push up track frame on side which is to be removed.

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



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

- Weight : 6.8 kg (15.0 lb)
- Tightening torque : 31.3 ± 3.0 kgf · m
(226 ± 21.7 lbf · ft)



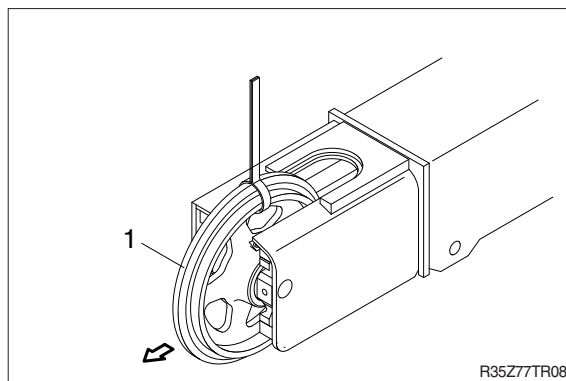
2) INSTALL

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

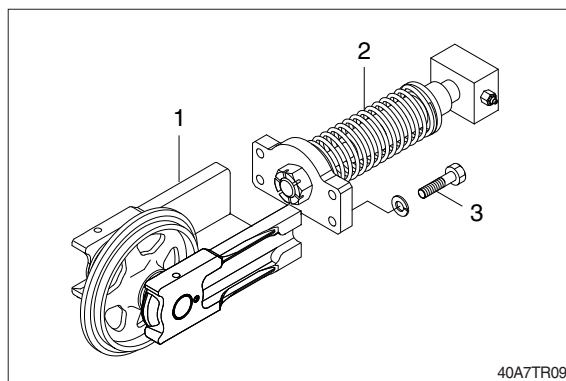
5. IDLER AND RECOIL SPRING

1) REMOVAL

- (1) Remove the track link.
For detail, see removal of track link.
- (2) Sling the idler (1) and pull out idler and recoil spring assembly from track frame, using a pry.
 - Weight : 33 kg (72.8 lb)

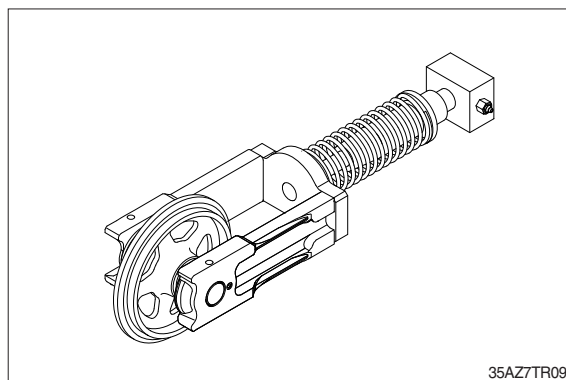


- (3) Loosen the hexagon bolt (3) and remove the idler (1) from the recoil spring assembly (3).
 - Tightening torque : 6.5 ± 0.7 kgf·m
(47.0 ± 5.1 lbf·ft)



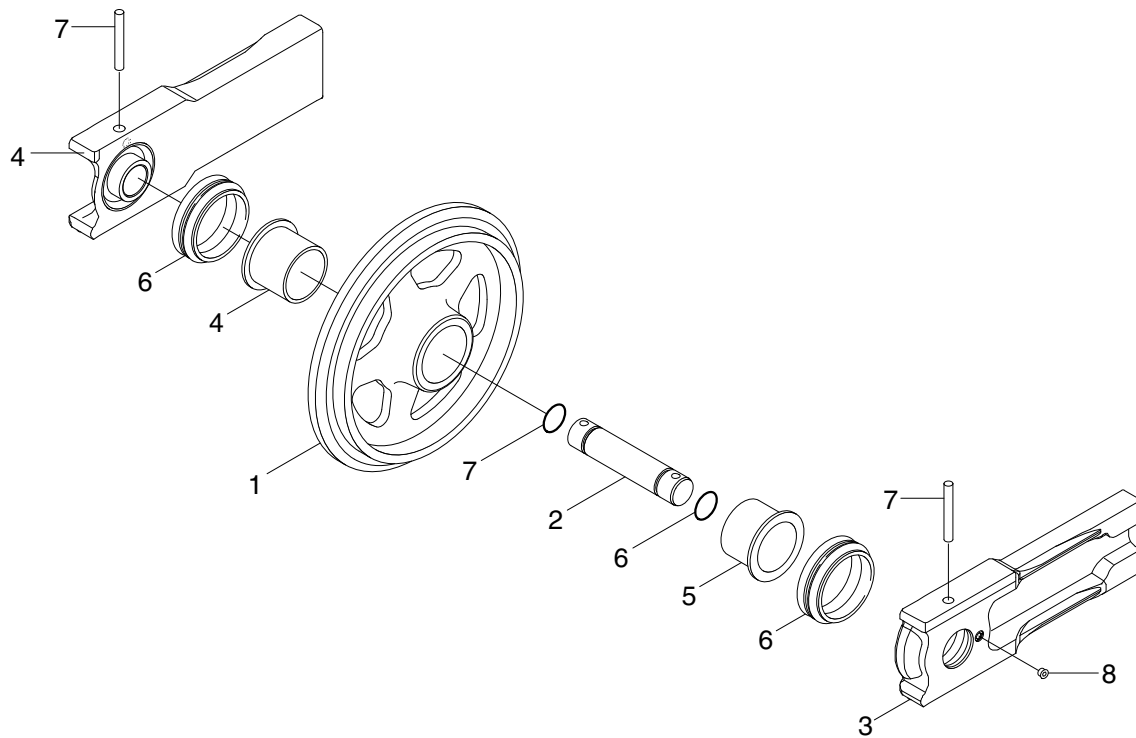
2) INSTALL

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



3) DISASSEMBLY AND ASSEMBLY OF IDLER

(1) Structure



81MR-13010

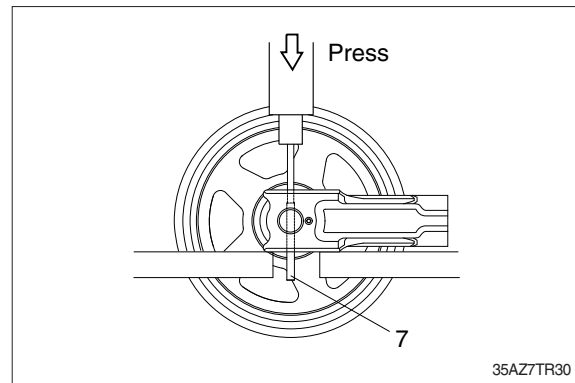
1 Shell
2 Shaft
3 Collar

4 Bushing
5 Seal assembly
6 O-ring

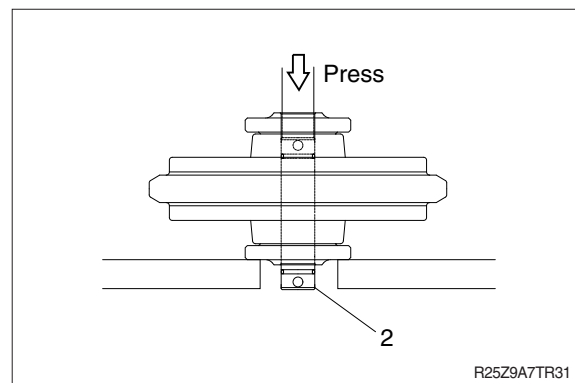
7 Spring pin
8 Plug

(2) Disassembly

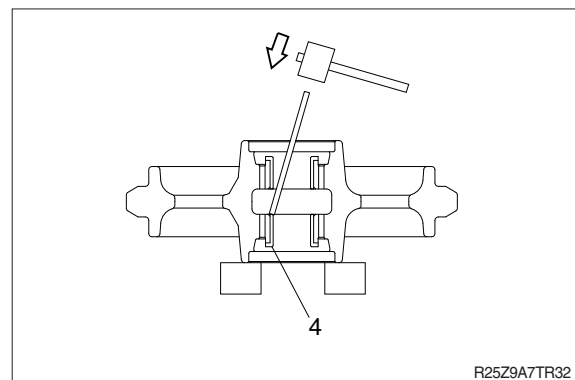
- ① Remove plug (8) and drain oil.
- ② Draw out the spring pin (7), using a press.



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



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

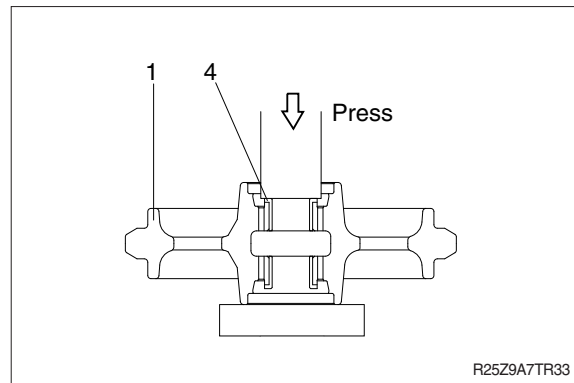


(3) Assembly

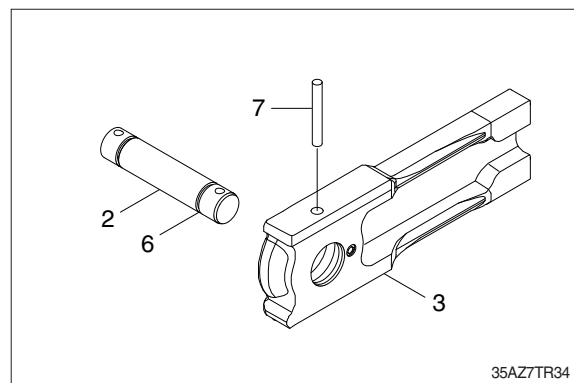
- ※ Before assembly, clean the parts.
- ※ Coat the sliding surfaces of all parts with oil.

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

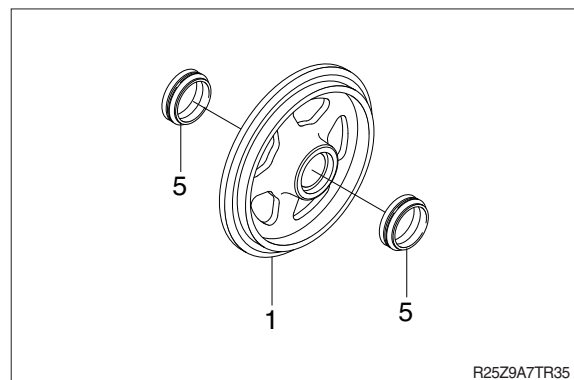
Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.



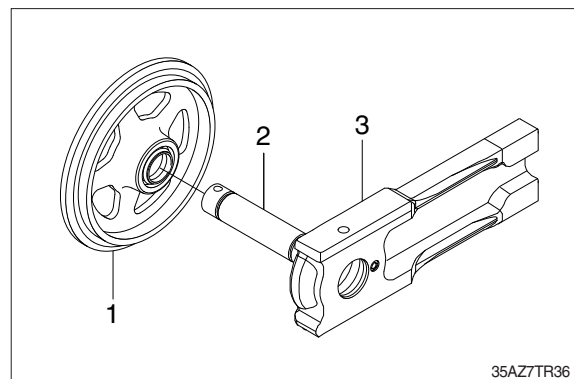
- ② Coat O-ring (6) with grease thinly, and install it to shaft (2).
- ③ Insert shaft (2) into collar (3) and drive in the spring pin (7).



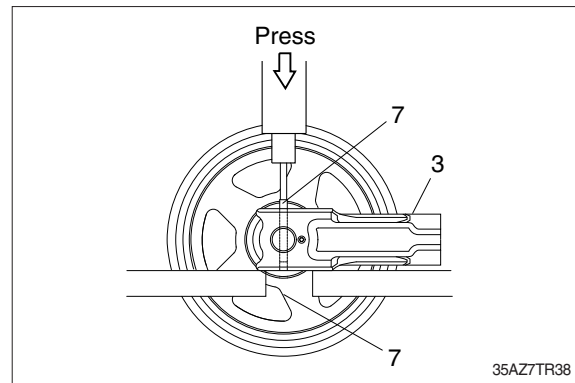
- ④ Install seal (5) to shell (1) and collar (3).



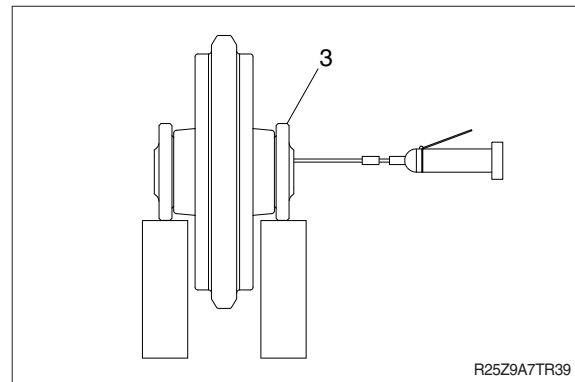
- ⑤ Install shaft (2) and collar (3) to shell (1).



- ⑥ Knock in the spring pin (7) with a hammer.

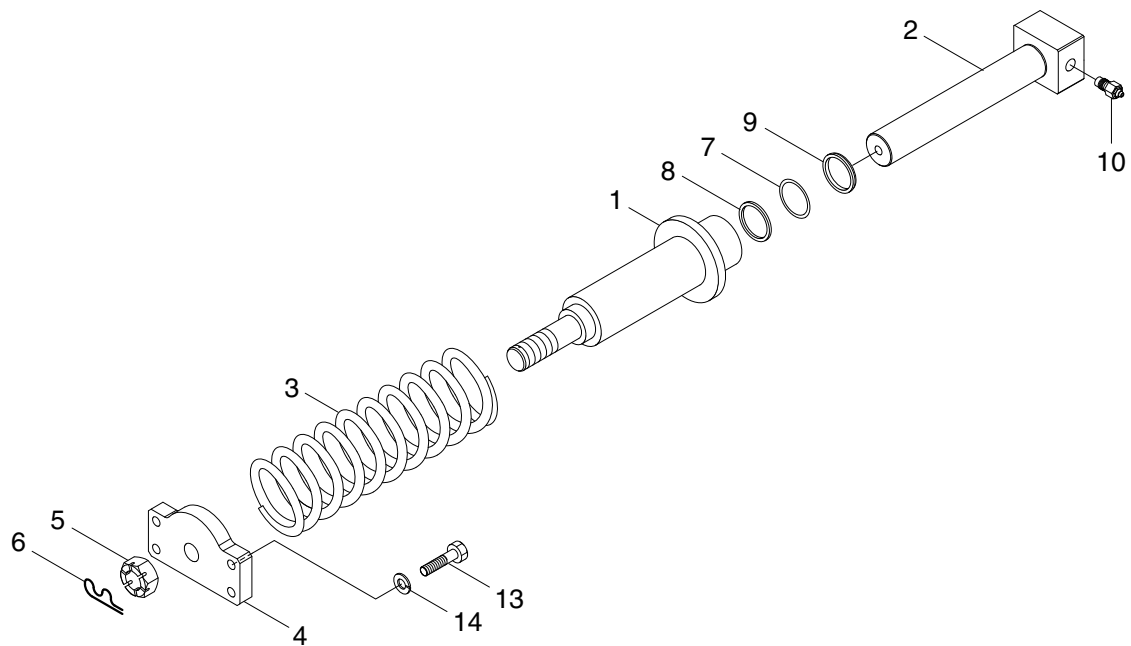


- ⑦ Lay collar (3) on its side.
Supply engine oil to the specified level,
and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure

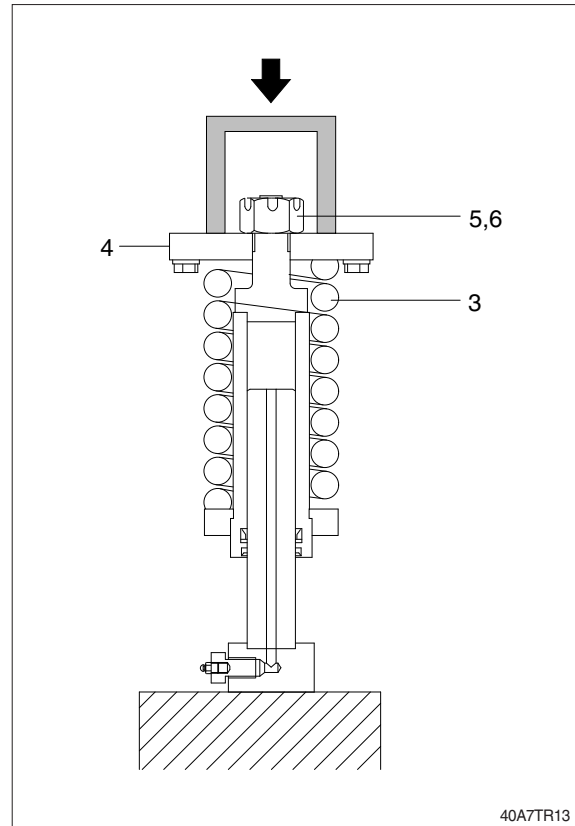


81MR-14011

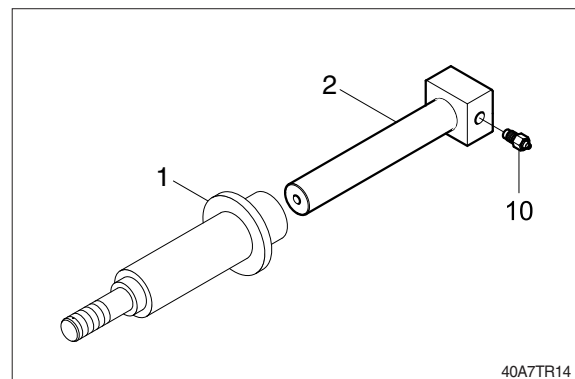
- | | | | | | |
|---|------------------|---|--------------|----|---------------|
| 1 | Tension cylinder | 5 | Castle nut | 9 | Dust seal |
| 2 | Piston | 6 | Split pin | 10 | Grease |
| 3 | Tension spring | 7 | Rod seal | 13 | Hexagon bolt |
| 4 | Yoke plate | 8 | Back up ring | 14 | Spring washer |

(2) Disassembly

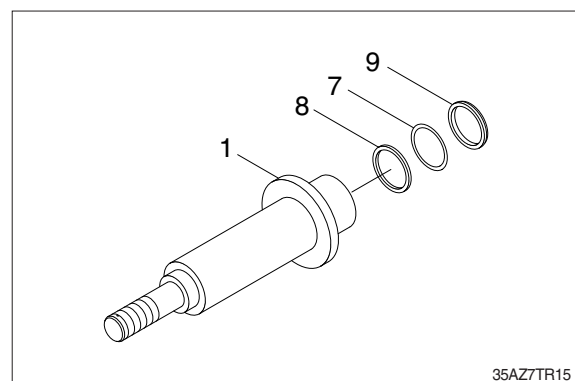
- ① Apply pressure on yoke plate (4) with a press.
 - ※ The spring is under a large installed load. This is dangerous, so be sure to set properly.
- ② Remove split pin (6) and castle nut (5).
Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.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



- ④ Remove piston (2) from tension cylinder (1).
- ⑤ Remove grease valve (10) from piston (2).

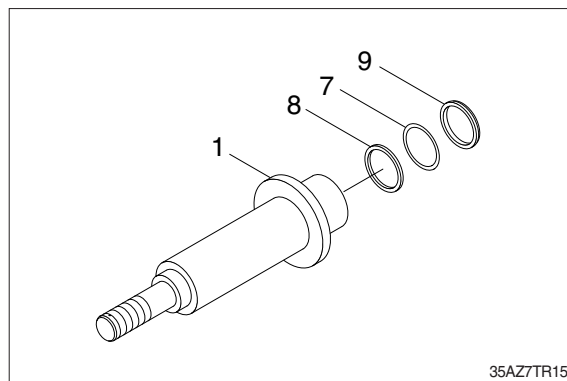


- ⑥ Remove dust seal (9), rod seal (8) and snap ring (7) from tension cylinder (1).



(3) Assembly

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

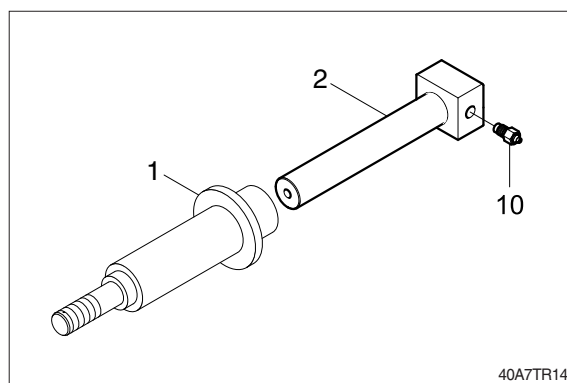


- ② Pour grease into tension cylinder (1), then push in piston (2) by hand.
After take grease out of grease valve mounting hole, let air out.

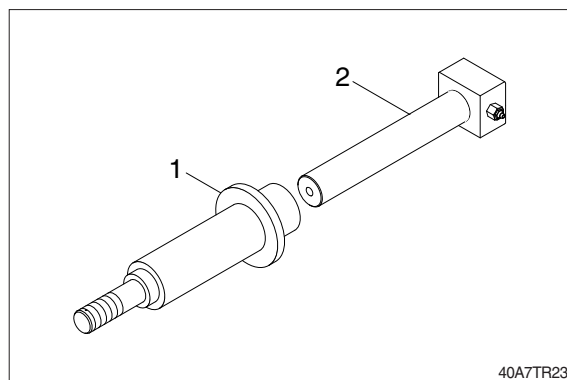
※ If air letting is not sufficient, it may be difficult to adjust the tension of crawler.

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

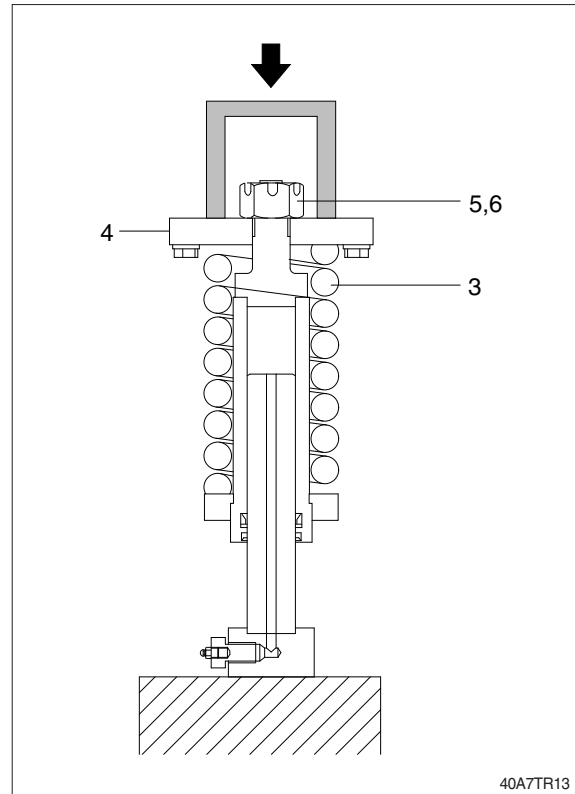
· Tightening torque : 8 kgf · m
(57.9 lbf · ft)



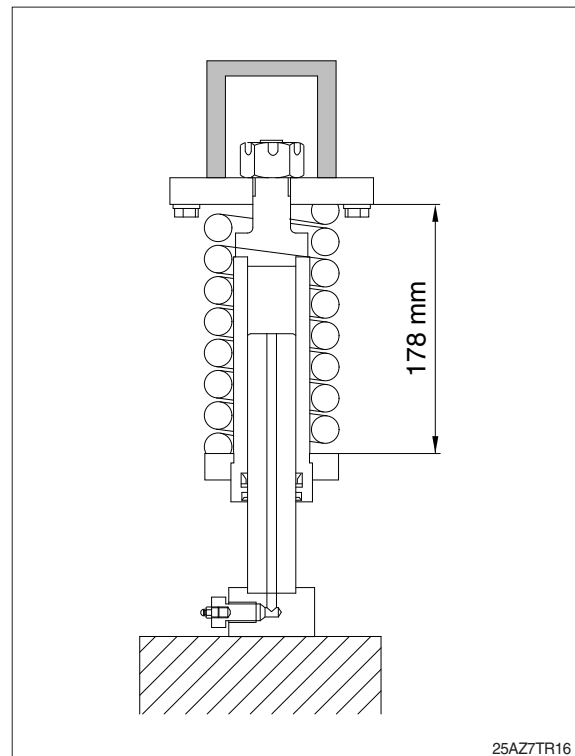
- ④ Install piston (2) to tension cylinder (1).



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

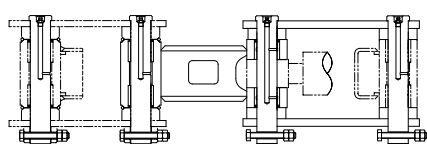
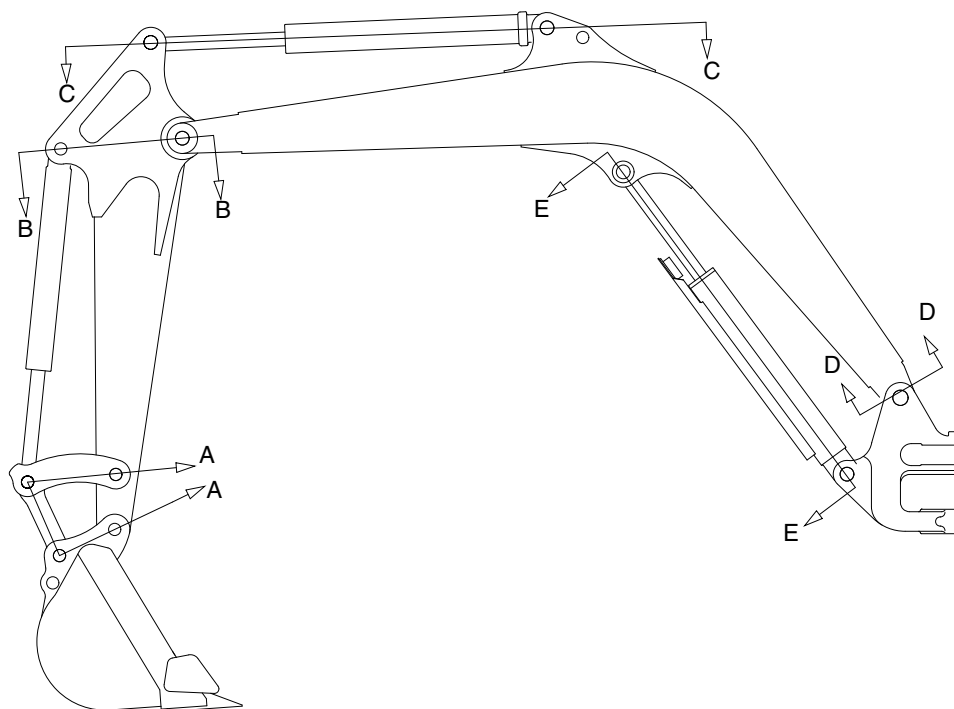


- ⑧ Lighten the press load and confirm the set length of tension spring (3).
- Spring length : 178 mm

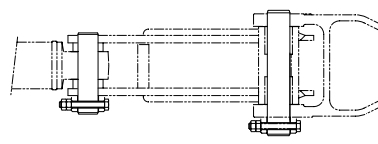


GROUP 11 WORK EQUIPMENT

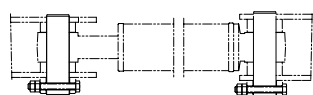
1. STRUCTURE



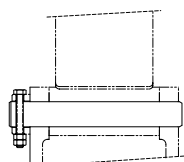
SECTION A-A



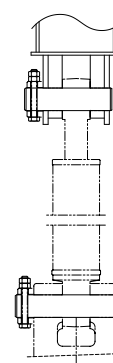
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

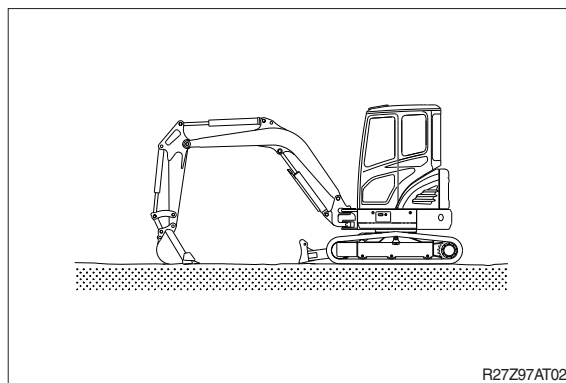
R27Z97AT01

2. REMOVAL AND INSTALL

1) BUCKET ASSEMBLY

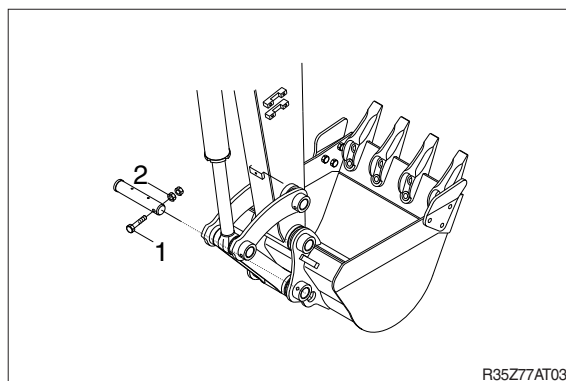
(1) Removal

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



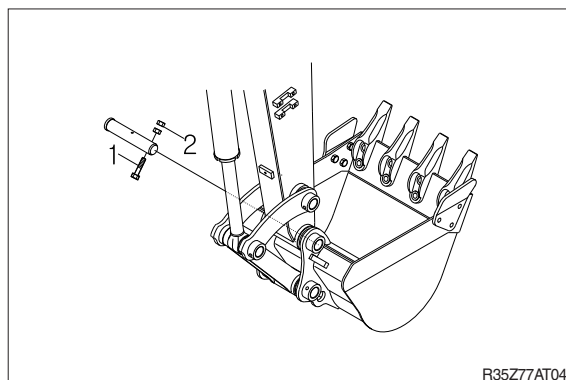
- ② Remove nut (1), bolt (2) and draw out the pin (4).

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



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

- Weight : 55 kg (120 lb)
- Tightening torque : 12.8 ± 3.0 kgf·m
(92.6 ± 21.7 lbf·ft)

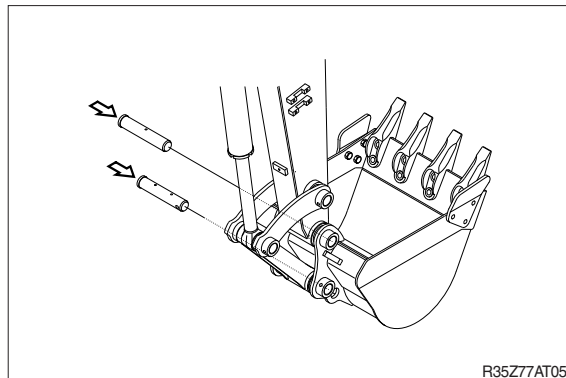


(2) Install

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

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

- ※ Adjust the bucket clearance.
For detail, see operator's manual.



2) ARM ASSEMBLY

(1) Removal

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

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

① Remove bucket assembly.

For details, see removal of bucket assembly.

② Disconnect bucket cylinder hose (4).

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

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

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

④ For details, see removal of arm cylinder assembly.

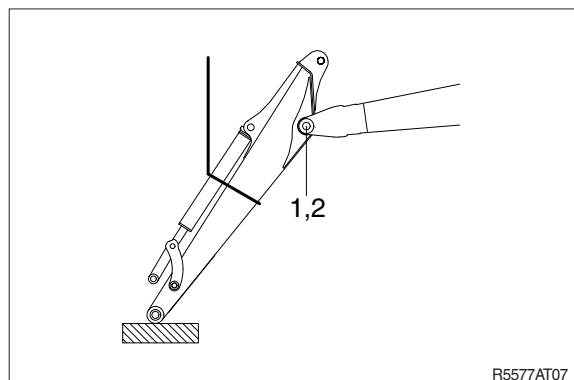
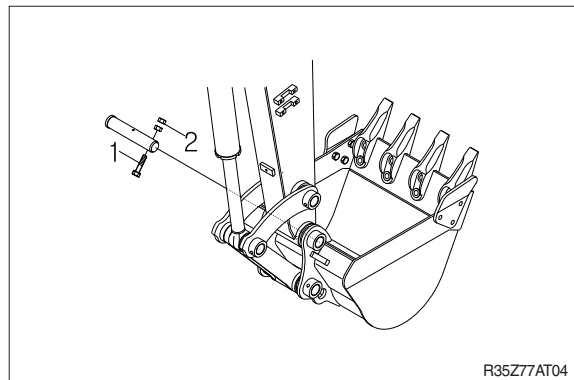
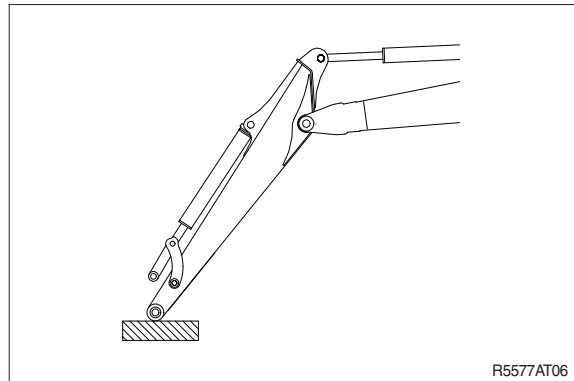
Place a wooden block under the cylinder and bring the cylinder down to it.

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

· Weight (1.12 m arm) : 46 kg (100 lb)

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

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



(2) Install

① Carry out installation in the reverse order to removal.

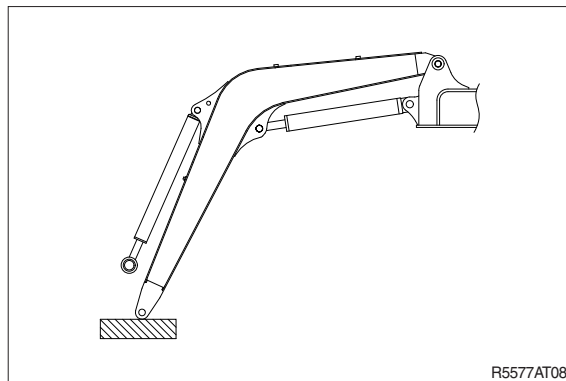
▲ When lifting the arm assembly, always lift the center of gravity.

※ Bleed the air from the cylinder.

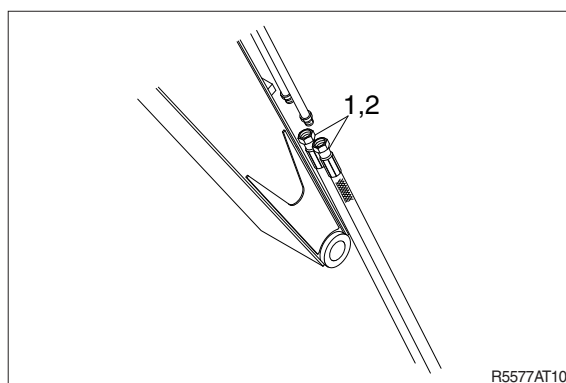
3) BOOM CYLINDER

(1) Removal

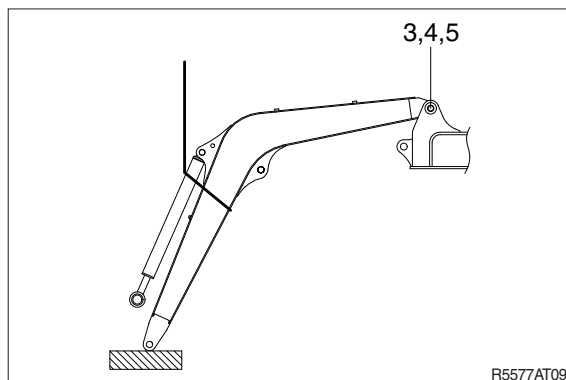
- ① Remove arm and bucket assembly.
For details, see removal of arm and bucket assembly.
- ② Remove boom cylinder assembly from boom.
For details, see removal of arm cylinder assembly.



- 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 (3), nut (4) and pull out the pin (5) then remove boom assembly.
 - Weight : 101 kg (220 lb)
 - Tightening torque : 12.8 ± 3.0 kgf·m
(92.6 ± 21.7 lbf·ft)
- ※ When lifting the boom assembly always lift the center of gravity.



(2) Install

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

