SECTION 8 DISASSEMBLY AND ASSEMBLY

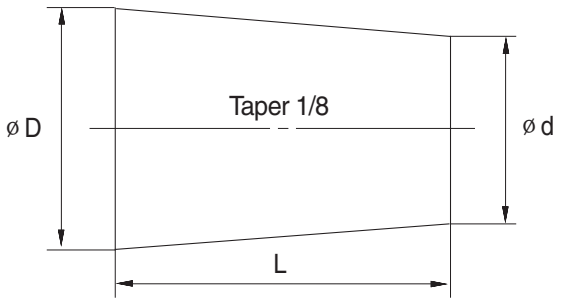
SECTION 8 DISASSEMBLY AND ASSEMBLY

GROUP 1 PRECAUTIONS

1. REMOVAL WORK

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

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



2. INSTALL WORK

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

※ If the hydraulic cylinder has been replaced, carry out this procedure before assembling the rod to the work equipment.

※ Carry out the same operation on machines that have been in storage for a long time after completion of repairs.

3. COMPLETING WORK

1) If the coolant has been drained, tighten the drain valve, and add water to the specified level. Run the engine to circulate the water through the system. Then check the water level again.

2) If the hydraulic equipment has been removed and installed again, add engine oil to the specified level. Run the engine to circulate the oil through the system. Then check the oil level again.

3) If the piping or hydraulic equipment, such as hydraulic cylinders, pumps, or motors, have been removed for repair, always bleed the air from the system after reassembling the parts.

4) Add the specified amount of grease (molybdenum disulphied grease) to the work equipment related parts.

GROUP 2 TIGHTENING TORQUE

1. MAJOR COMPONENTS

No.	Descriptions		Bolt size	Torque	
				kgf · m	lbf · ft
1	Engine	Engine mounting bolt (engine-bracket)	M12 × 1.75	10 ± 1.0	72.3 ± 7.2
3		Engine mounting bolt (bracket-frame)	M24 × 3.0	90 ± 9.0	651 ± 65
4		Radiator, oil cooler mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
5		Coupling mounting socket bolt	M20 × 2.5	46.5 ±2.5	336 ±18.1
6		Fuel tank mounting bolt	M20 × 2.5	46 ± 5.1	333 ± 36.9
7	Hydraulic system	Main pump housing mounting bolt	M10 × 1.5	4.8 ± 0.3	34.7 ± 2.2
8		Main pump mounting socket bolt	M20 × 2.5	46.5 ± 2.5	336 ± 18.1
9		Main control valve mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
10		Hydraulic oil tank mounting bolt	M20 × 2.5	57.9 ± 5.8	419 ± 42
11		Turning joint mounting bolt, nut	M12 × 1.75	12.3 ± 1.2	89.0 ± 8.7
12	Power train system	Swing motor mounting bolt	M24 × 3.0	97.8 ± 15	707 ± 108
13		Swing bearing upper part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
14		Swing bearing lower part mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
15		Travel motor mounting bolt	M20 × 2.5	57.9 ± 8.7	419 ± 62.9
16		Sprocket mounting bolt	M20 × 2.5	57.9 ± 6.0	419 ± 43.4
17	Under carriage	Carrier roller mounting bolt, nut	M16 × 2.0	29.7 ± 3.0	215 ± 21.7
18		Track roller mounting bolt	M24 × 3.0	100 ± 10	723 ± 72.3
19		Track tension cylinder mounting bolt	M16 × 2.0	29.7 ± 4.5	215 ± 32.5
20		Track shoe mounting bolt, nut	M24 × 1.5	140 ± 5.0	1010 ± 36.2
21		Track guard mounting bolt	M24 × 3.0	77.4 ± 11	560 ± 80
22	Others	Counterweight mounting bolt	M36 × 3.0	337 ± 33	2440 ± 239
23		Cab mounting bolt	M12 × 1.75	12.8 ± 3.0	92.6 ± 21.7
24		Operator's seat mounting bolt	M 8 × 1.25	4.05 ± 0.8	29.3 ± 5.8

※ For tightening torque of engine and hydraulic components, see each component disassembly and assembly.

2. TORQUE CHART

Use following table for unspecified torque.

1) BOLT AND NUT

(1) Coarse thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 6×1.0	0.8 ~ 1.2	5.8 ~ 8.6	1.2 ~ 1.8	8.7 ~ 13.0	1.5 ~ 2.1	10.9 ~ 15.1
M 8×1.25	2.0 ~ 3.0	14.5 ~ 21.6	2.8 ~ 4.2	20.3 ~ 30.4	3.4 ~ 5.0	24.6 ~ 36.1
M10×1.5	4.0 ~ 6.0	29.0 ~ 43.3	5.6 ~ 8.4	40.5 ~ 60.8	6.8 ~ 10.0	49.2 ~ 72.3
M12×1.75	6.8 ~ 10.2	50.0 ~ 73.7	9.6 ~ 14.4	69.5 ~ 104	12.3 ~ 16.5	89.0 ~ 119
M14×2.0	10.9 ~ 16.3	78.9 ~ 117	16.3 ~ 21.9	118 ~ 158	19.5 ~ 26.3	141 ~ 190
M16×2.0	17.9 ~ 24.1	130 ~ 174	25.1 ~ 33.9	182 ~ 245	30.2 ~ 40.8	141 ~ 295
M18×2.5	24.8 ~ 33.4	180 ~ 241	34.8 ~ 47.0	252 ~ 340	41.8 ~ 56.4	302 ~ 407
M20×2.5	34.9 ~ 47.1	253 ~ 340	49.1 ~ 66.3	355 ~ 479	58.9 ~ 79.5	426 ~ 575
M22×2.5	46.8 ~ 63.2	339 ~ 457	65.8 ~ 88.8	476 ~ 642	78.9 ~ 106	570 ~ 766
M24×3.0	60.2 ~ 81.4	436 ~ 588	84.6 ~ 114	612 ~ 824	102 ~ 137	738 ~ 991
M30×3.5	120 ~161	868 ~ 1164	168 ~ 227	1216 ~ 1641	202 ~ 272	1461 ~ 1967

(2) Fine thread

Bolt size	8.8T		10.9T		12.9T	
	kgf · m	lbf · ft	kgf · m	lbf · ft	kgf · m	lbf · ft
M 8×1.0	2.1 ~ 3.1	15.2 ~ 22.4	3.0 ~ 4.4	21.7 ~ 31.8	3.6 ~ 5.4	26.1 ~ 39.0
M10×1.25	4.2 ~ 6.2	30.4 ~ 44.9	5.9 ~ 8.7	42.7 ~ 62.9	7.0 ~ 10.4	50.1 ~ 75.2
M12×1.25	7.3 ~ 10.9	52.8 ~ 78.8	10.3 ~ 15.3	74.5 ~ 110	13.1 ~ 17.7	94.8 ~ 128
M14×1.5	12.4 ~ 16.6	89.7 ~ 120	17.4 ~ 23.4	126 ~ 169	20.8 ~ 28.0	151 ~ 202
M16×1.5	18.7 ~ 25.3	136 ~ 182	26.3 ~ 35.5	191 ~ 256	31.6 ~ 42.6	229 ~ 308
M18×1.5	27.1 ~ 36.5	196 ~ 264	38.0 ~ 51.4	275 ~ 371	45.7 ~ 61.7	331 ~ 446
M20×1.5	37.7 ~ 50.9	273 ~ 368	53.1 ~ 71.7	384 ~ 518	63.6 ~ 86.0	460 ~ 622
M22×1.5	51.2 ~ 69.2	370 ~ 500	72.0 ~ 97.2	521 ~ 703	86.4 ~ 116	625 ~ 839
M24×2.0	64.1 ~ 86.5	464 ~ 625	90.1 ~ 121	652 ~ 875	108 ~ 146	782 ~ 1056
M30×2.0	129 ~ 174	933 ~ 1258	181 ~ 245	1310 ~ 1772	217 ~ 294	1570 ~ 2126

2) PIPE AND HOSE (FLARE TYPE)

Thread size (PF)	Width across flat (mm)	kgf·m	lbf·ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

3) PIPE AND HOSE (ORFS TYPE)

Thread size (UNF)	Width across flat (mm)	kgf·m	lbf·ft
9/16-18	19	4	28.9
11/16-16	22	5	36.2
13/16-16	27	9.5	68.7
1-3/16-12	36	18	130.2
1-7/16-12	41	21	151.9
1-11/16-12	50	35	253.2

4) FITTING

Thread size	Width across flat(mm)	kgf·m	lbf·ft
1/4"	19	4	28.9
3/8"	22	5	36.2
1/2"	27	9.5	68.7
3/4"	36	18	130.2
1"	41	21	151.9
1-1/4"	50	35	253.2

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 : 230 ℓ

(5) Remove socket bolts (5) and disconnect pipes (1, 2).

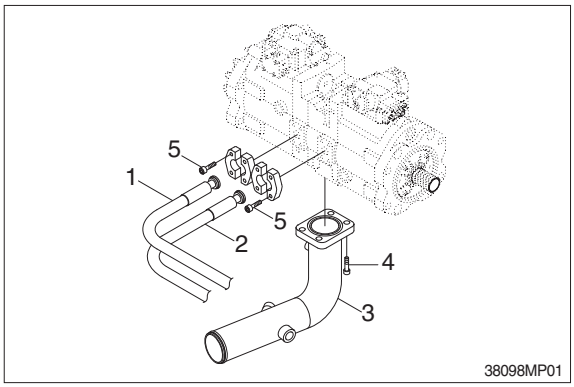
(6) Disconnect pilot line hoses (6, 7, 8, 9, 10, 11, 12, 13).

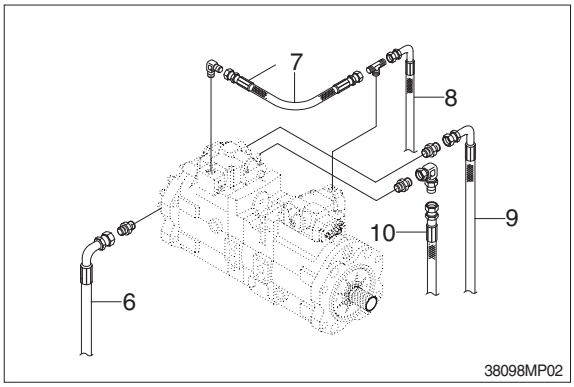
(7) Remove socket bolts (4) and disconnect pump suction tube (3).

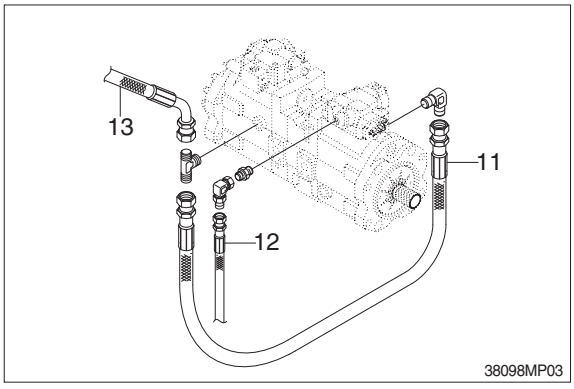
※ When pump suction tube is disconnected, the oil inside the piping will flow out, so catch it in oil pan.

(8) Sling the pump assembly and remove the pump mounting bolts.
· Weight : 190 kg (420 lb)

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







2) INSTALL

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

(2) Remove the suction strainer and clean it.

(3) Replace return filter with new one.

(4) Remove breather and clean it.

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

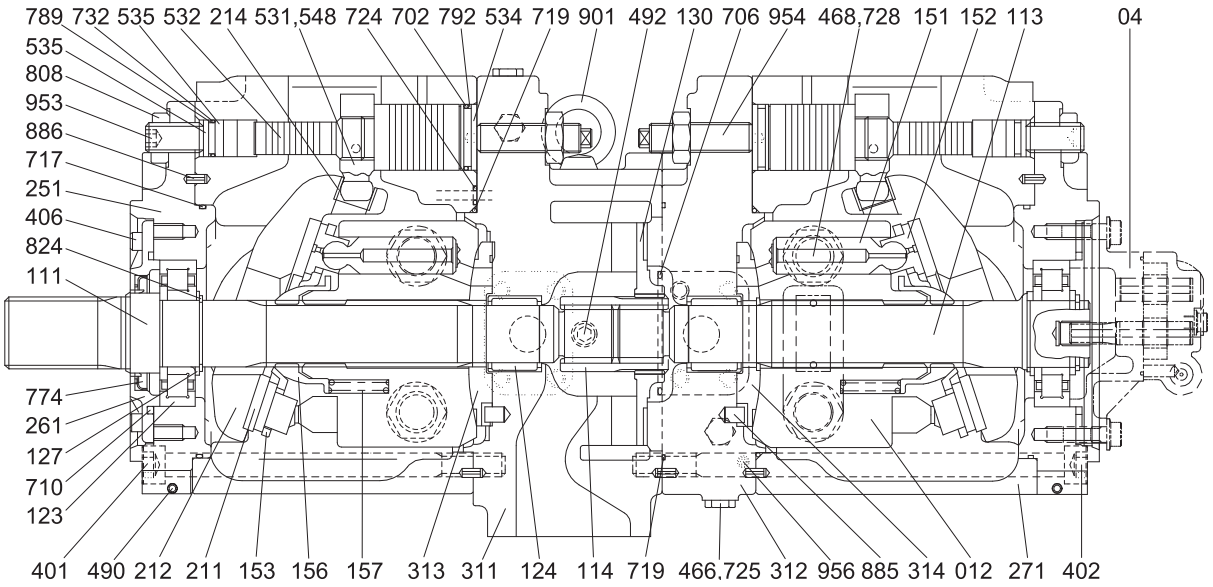
(6) Bleed the air from the hydraulic pump.
① Remove the air vent plug (2EA).
② Tighten plug lightly.
③ Start the engine, run at low idling, and check oil come out from plug.
④ Tighten plug.

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

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

2. MAIN PUMP (1/2)

1) STRUCTURE



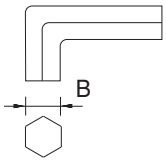
380F2MP02

04	Gear pump	271	Pump casing	710	O-ring
111	Drive shaft (F)	311	Valve cove r(F)	717	O-ring
113	Drive shaft (R)	312	Valve cover (R)	719	O-ring
114	Spline coupling	313	Valve plate (R)	724	Square ring
123	Roller bearing	314	Valve plate (L)	725	O-ring
124	Needle bearing	401	Hexagon socket bolt	728	O-ring
127	Bearing spacer	402	Hexagon socket bolt	732	O-ring
130	Booster	406	Hexagon socket bolt	774	Oil seal
012	Cylinder block	466	VP Plug	789	Back up ring
151	Piston	468	VP Plug	792	Back up ring
152	Shoe	490	Plug	808	Hexagon head nut
153	Set plate	492	Plug	824	Snap ring
156	Bushing	531	Tilting pin	885	Pin
157	Cylinder spring	532	Servo piston	886	Spring pin
211	Shoe plate	534	Stopper (L)	901	Eye bolt
212	Swash plate	535	Stopper (S)	953	Set screw
214	Bushing	548	Feedback pin	954	Adjust screw
251	Support plate	702	O-ring	956	Set screw
261	Seal cover (F)	706	O-ring		

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

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

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

(2) Tightening torque

Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt (material : SCM435)	M 5	0.7	5.1	0.16	4
	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M10	5.8	42.0	0.31	8
	M12	10.0	72.3	0.39	10
	M14	16.0	116	0.47	12
	M16	24.0	174	0.55	14
	M18	34.0	246	0.55	14
	M20	44.0	318	0.67	17
PT plug (material : S45C) ※ Wind a seal tape 1 1/2 to 2 turns round the plug	PT1/16	0.7	5.1	0.16	4
	PT 1/8	1.05	7.59	0.20	5
	PT 1/4	1.75	12.7	0.24	6
	PT 3/8	3.5	25.3	0.31	8
	PT 1/2	5.0	36.2	0.39	10
PF plug (material : S45C)	PF 1/4	3.0	21.7	0.24	6
	PF 1/2	10.0	72.3	0.39	10
	PF 3/4	15.0	109	0.55	14
	PF 1	19.0	137	0.67	17
	PF 1 1/4	27.0	195	0.67	17
	PF 1 1/2	28.0	203	0.67	17

3) DISASSEMBLY

(1) Select place suitable to disassembling.

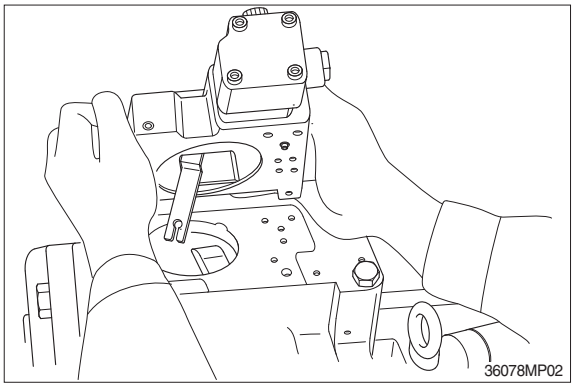
※ Select clean place.

※ Spread rubber sheet, cloth or so on on overhaul workbench top to prevent parts from being damaged.

(2) Remove dust, rust, etc, from pump surfaces with cleaning oil or so on.

(3) Remove drain port plug (468) and let oil out of pump casing (front and rear pump).

(4) Remove hexagon socket head bolts (412, 413) and remove regulator.



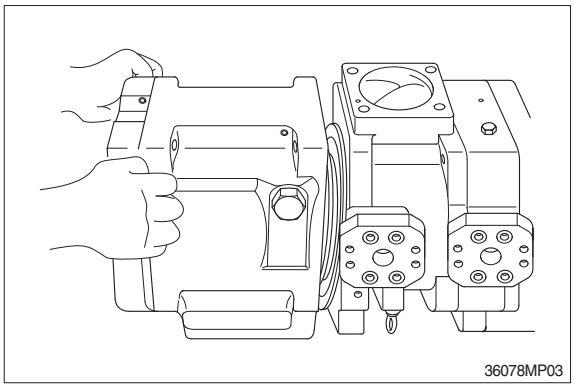
(5) Loosen hexagon socket head bolts (401) which tighten swash plate support (251), pump casing (271) and valve cover (F, 311).

※ If gear pump and so on are fitted to rear face of pump, remove them before starting this work.

(6) Loosen hexagon socket head bolts (402) which tighten swash plate support (251), pump casing (271) and valve cover (R, 312).

(7) Place pump horizontally on workbench with its regulator-fitting surface down, and separate pump casing (271) from valve cover (F, 311).

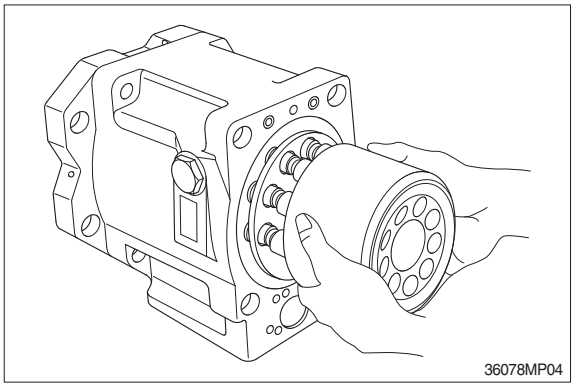
※ Before bringing this surface down, spread rubber sheet on workbench without fail to prevent this surface from being damaged.



(8) Separate valve cover (F, 311) from valve cover (R, 312) and pull out booster (130), spline coupling (114).

(9) Separate valve cover (R, 312) from pump casing and then pull out the cylinder block (012) of pump casing (271) straightly over drive shaft(R, 113). Pull out also pistons (151), set plate (153), spherical bush (156) and cylinder springs (157) simultaneously.

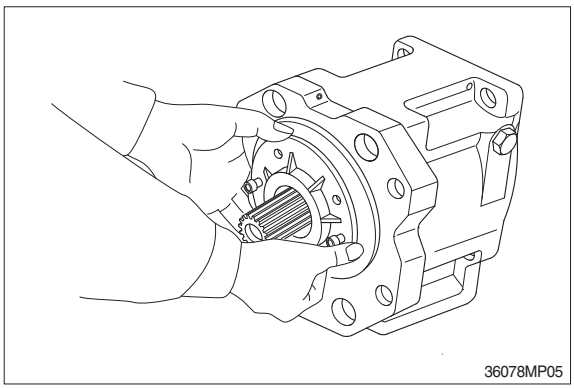
※ Take care not to damage sliding surfaces of cylinder, spherical bushing, shoes, swash plate, etc.



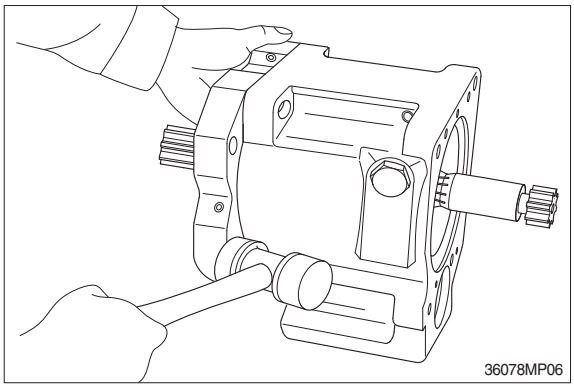
(10) Remove hexagon socket head bolts (406) and then seal cover (F, 261).

※ Fit bolt into pulling-out tapped hole of seal cover (F), and cover can be removed easily.

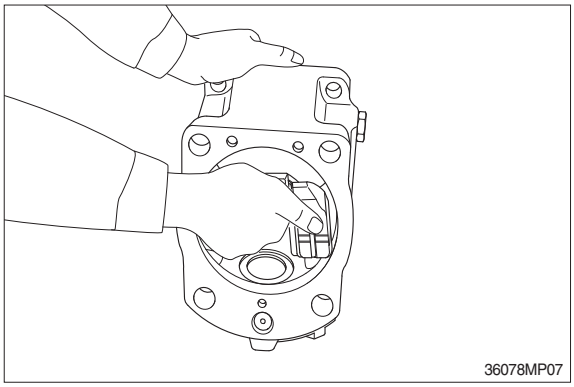
※ Since oil seal is fitted on seal cover (F), take care not to damage it when removing cover.



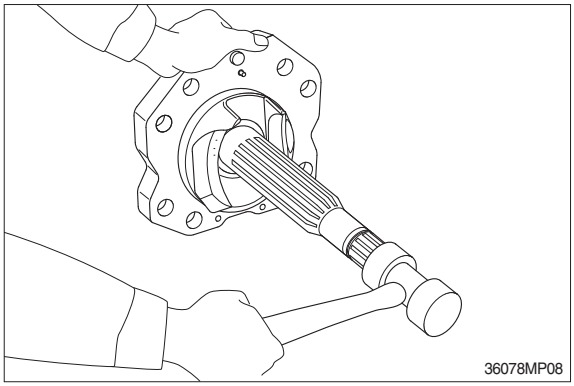
(11) Tapping lightly fitting flange section of swash plate support (251) on its pump casing side, separate swash plate support from pump casing.



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

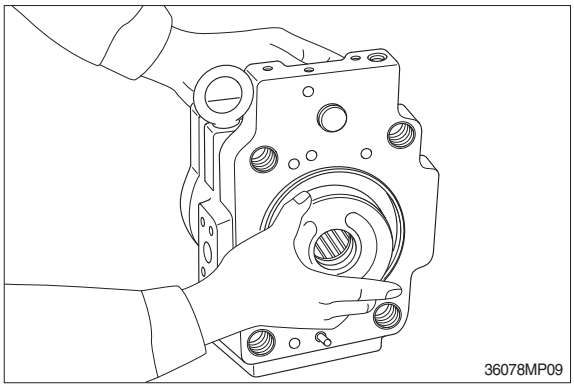


(13) Tapping lightly shaft ends of drive shafts (111, 113) with plastic hammer, take out drive shafts from swash plate supports.



(14) Remove valve plates (313, 314) from valve cover (311, 312).

※ These may be removed in work 7, 9.



(15) If necessary, remove stopper (L, 534), stopper (S, 535), servo piston (532) and tilting pin (531) from pump casing (271), and needle bearing (124) from valve cover (311, 312).

※ In removing tilting pin, use a protector to prevent pin head from being damaged.

※ Since loctite is applied to fitting areas of tilting pin and servo piston, take care not to damage servo piston.

※ Do not remove needle bearing as far as possible, except when it is considered to be out of its life span.

※ Do not loosen hexagon nuts of valve cover and swash plate support.
If loosened, flow setting will be changed.

(16) This is the end of disassembling procedures.

4) ASSEMBLY

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

① Do not fail to repair the parts damaged during disassembling, and prepare replacement parts in advance.

② Clean each part fully with cleaning oil and dry it with compressed air.

③ Do not fail to apply clean working oil to sliding sections, bearings, etc. before assembling them.

④ In principle, replace seal parts, such as O-rings, oil seals, etc.

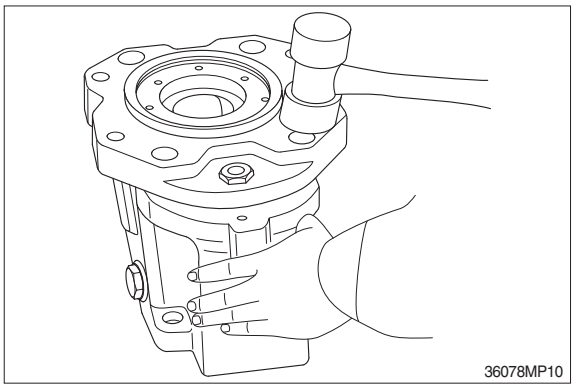
⑤ For fitting bolts, plug, etc., prepare a torque wrench or so on, and tighten them with torques shown in page 8-10, 11.

⑥ For the double-pump, take care not to mix up parts of the front pump with those of the rear pump.

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

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

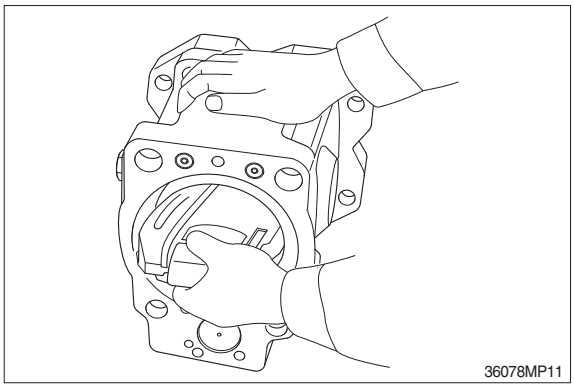
※ In tightening servo piston and tilting pin, use a protector to prevent tilting pin head and feedback pin from being damaged. In addition, apply loctite (medium strength) to their threaded sections.



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

※ Confirm with fingers of both hands that swash plate can be removed smoothly.

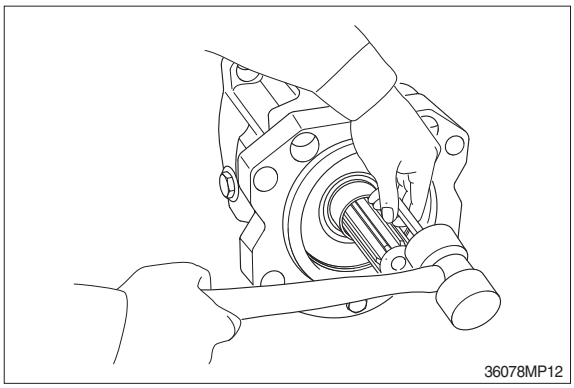
※ Apply grease to sliding sections of swash plate and swash plate support, and drive shaft can be fitted easily.



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

※ Do not tap drive shaft with hammer or so on.

※ Assemble them into support, tapping outer race of bearing lightly with plastic hammer.
Fit them fully, using steel bar or so on.

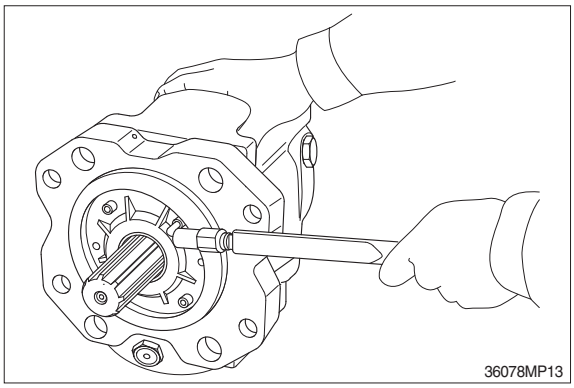


(5) Assemble seal cover(F, 261) to pump casing(271) and fix it with hexagon socket head bolts(406).

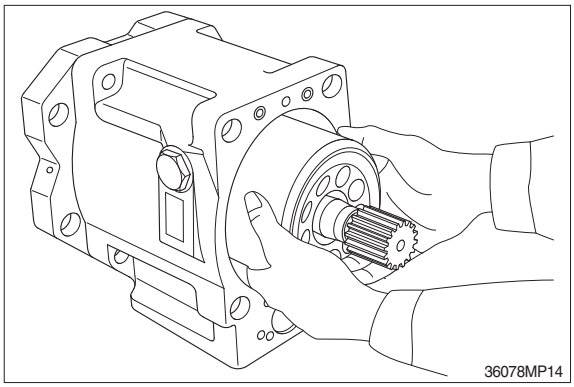
※ Apply grease lightly to oil seal in seal cover(F).

※ Assemble oil seal, taking full care not to damage it.

※ For tandem type pump, fit rear cover(263) and seal cover(262) similarly.

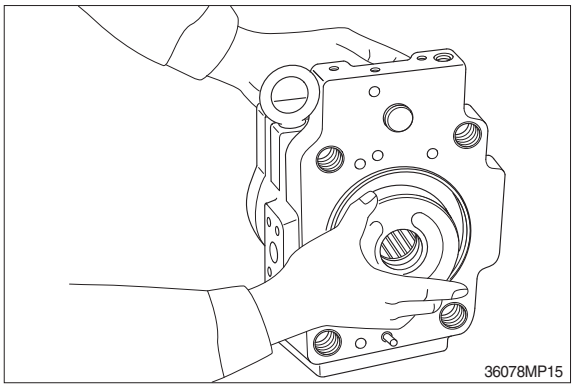


(6) Assemble piston cylinder subassembly [cylinder block (012), piston subassembly (151, 152), set plate (153), spherical bushing (156) and cylinder spring (157)].
Fit spline phases of retainer and cylinder.
Then, insert piston cylinder subassembly into pump casing (271).



(7) Fit valve plate (313) to valve cover (F, 311), and fit valve plate (314) to valve cover (R, 312), entering pin into pin hole.

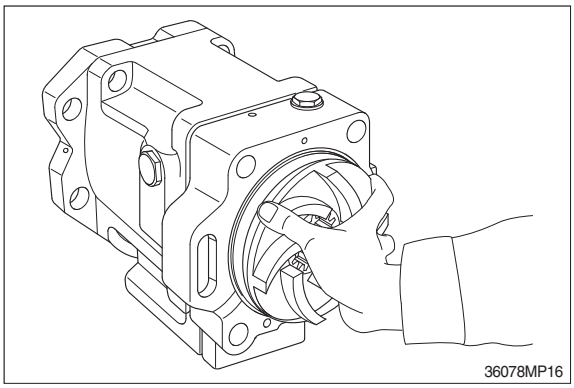
※ Take care not to mistake suction / delivery directions of valve plate.



(8) Fit valve block (R, 312) to pump casing (271) and fit spline coupling (114) and booster(130) to shaft (R, 113).

※ Take care not to mistake direction of valve cover.

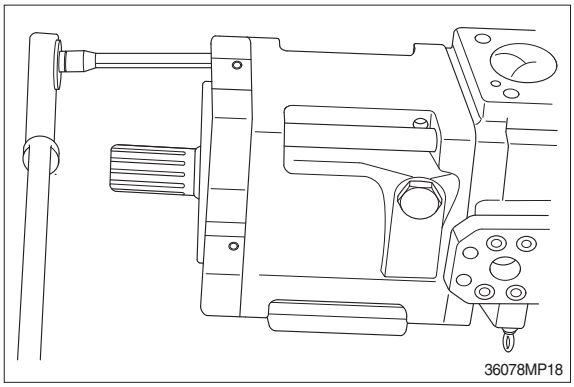
※ Fit valve cover with regulator up and with delivery flange left, viewed from front side. Take care not to mistake direction of booster (130).
(Refer to the sectional drawing)



(9) Fit valve cover (F, 311) to valve cover (R) and tighten hexagon socket head bolts (402).

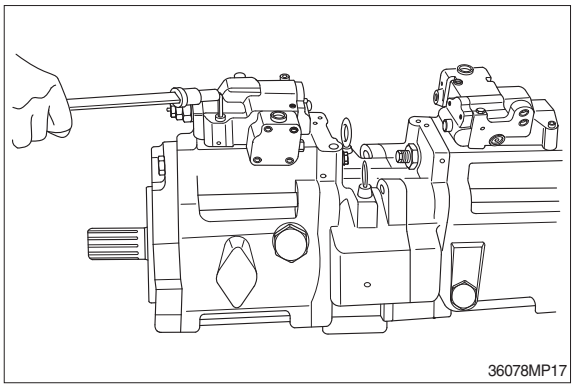
(10) Fit pump casing (271) with shaft (F, 111) to valve cover (F, 311) and tighten hexagon socket head bolts (401).

※ Mate spline phases of shaft (F) and spline coupling, with shaft (F) been rotating.



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

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

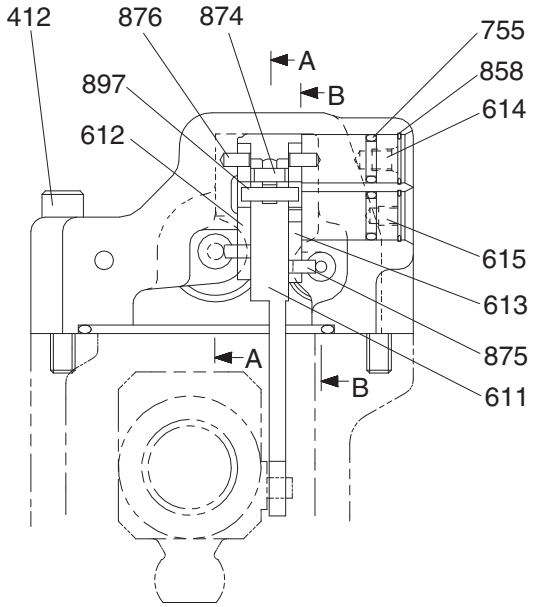


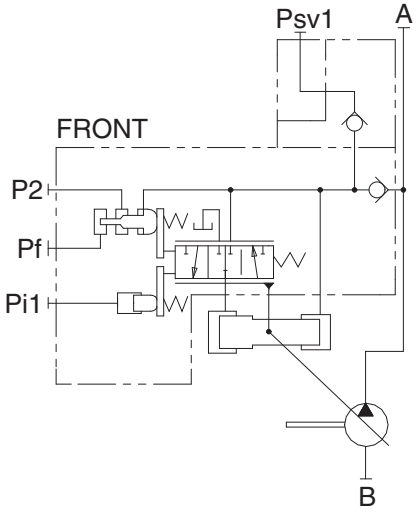
(12) Fit drain port plug (468).

This is the end of reassembling procedures.

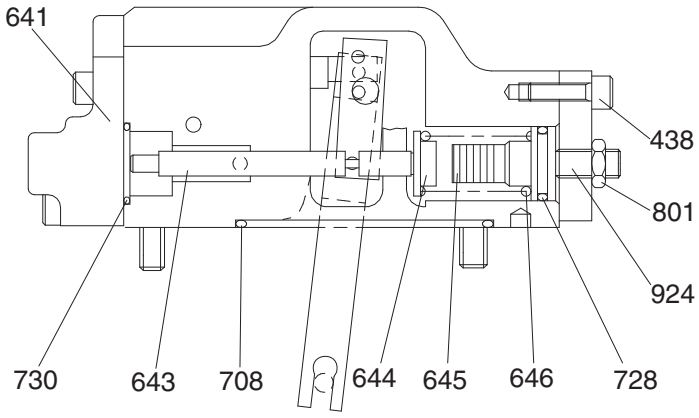
3. REGULATOR

1) STRUCTURE(1/2)

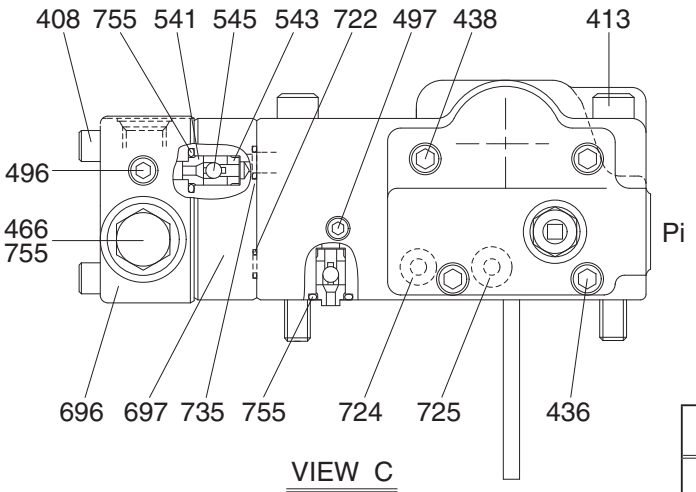




Hydraulic circuit



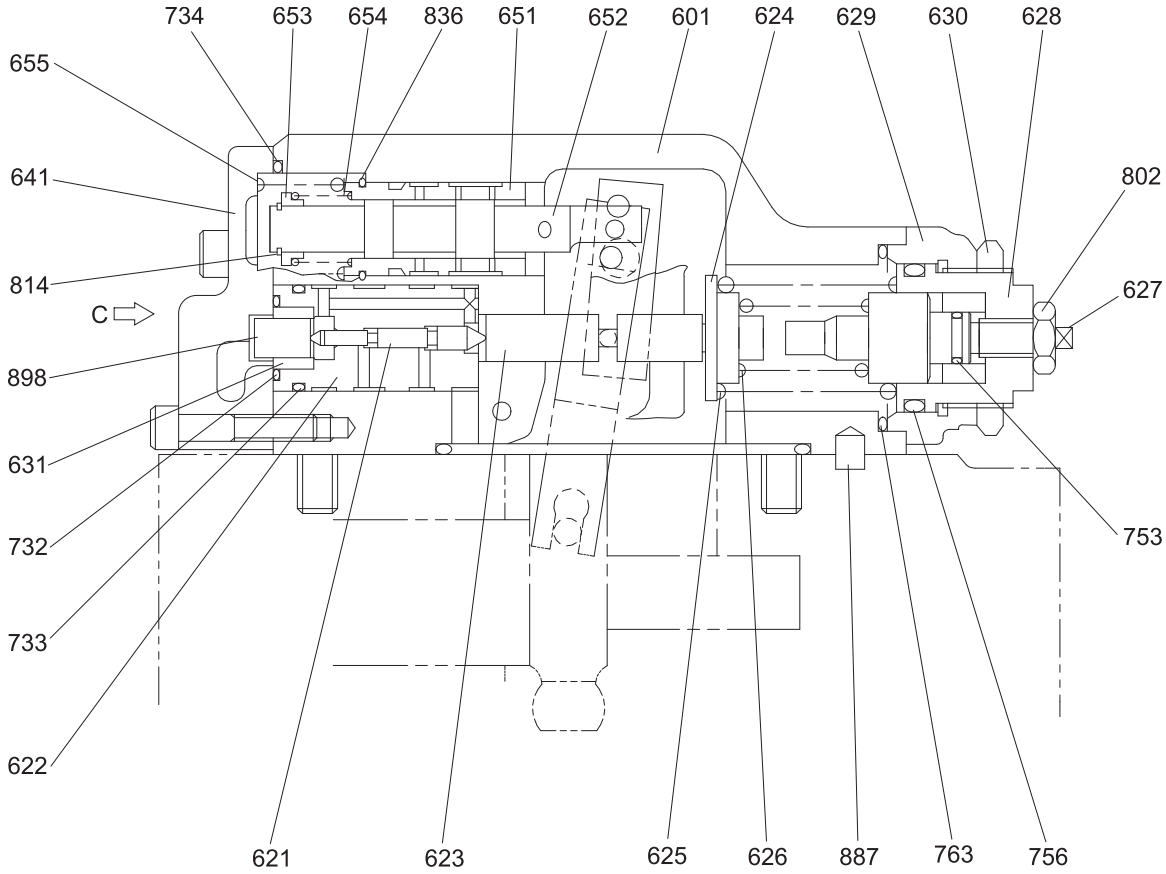
SECTION B-B



VIEW C

Port	Port name	Port size
Pi1,Pi2	Pilot port	PF 1/4-15
Psv1,Psv2	Servo assist port	PF 1/4-15

2) STRUCTURE (2/2)



SECTION A-A

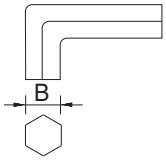
38092RG03

407	Hexagon socket bolt	625	Outer spring	725	O-ring
408	Hexagon socket bolt	626	Inner spring	728	O-ring
412	Hexagon socket bolt	627	Adjust stem (C)	730	O-ring
413	Hexagon socket bolt	628	Adjust screw (C)	732	O-ring
436	Hexagon socket bolt	629	Cover (C)	733	O-ring
438	Hexagon socket bolt	630	Lock nut	734	O-ring
466	Plug	631	Sleeve, pf	735	O-ring
482	Plug	641	Pilot cover	753	O-ring
496	Plug	643	Pilot piston	755	O-ring
497	Plug	644	Spring seat (Q)	756	O-ring
541	Seat	645	Adjust stem (Q)	763	O-ring
543	Stopper	646	Pilot spring	801	Hexagon nut
545	Steel ball	651	Sleeve	802	Nut
601	Casing	652	Spool	814	Snap ring
611	Feedback lever	653	Spring seat	836	Stop ring
612	Lever(1)	654	Return spring	858	Snap ring
613	Lever(2)	655	Set spring	874	Pin
614	Center plug	696	Port cover	875	Pin
615	Adjust plug	697	Check valve plate	876	Pin
621	Compensator piston	699	Valve casing	887	Pin
622	Piston case	708	O-ring	897	Pin
623	Compensator rod	722	O-ring	898	Pin
624	Spring seat (C)	724	Square ring	924	Set screw

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

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

<table>
<tr><td rowspan="4">Allen wrench
 
</td><td>B</td><td>Hexagon socket head bolt</td><td>PT plug (PT thread)</td><td>PO plug (PF thread)</td><td>Hexagon socket head setscrew</td></tr>
<tr><td>4</td><td>M 5</td><td>BP-1/16</td><td>-</td><td>M 8</td></tr>
<tr><td>5</td><td>M 6</td><td>BP1/ 8</td><td>-</td><td>M10</td></tr>
<tr><td>6</td><td>M 8</td><td>BP-1/ 4</td><td>PO-1/4</td><td>M12, M14</td></tr>
<tr><td rowspan="2">Double ring spanner, socket wrench, double (single) open end spanner
 
</td><td>-</td><td colspan="2">Hexagon head bolt</td><td>Hexagon head nut</td><td>VP plug (PF thread)</td></tr>
<tr><td>6</td><td colspan="2">M8</td><td>M8</td><td>-</td></tr>
<tr><td colspan="2">Adjustable angle wrench</td><td colspan="4">Small size, Max 36 mm</td></tr>
<tr><td colspan="2">Screw driver</td><td colspan="4">Minus type screw driver, Medium size, 2 sets</td></tr>
<tr><td colspan="2">Hammer</td><td colspan="4">Plastic hammer, 1 set</td></tr>
<tr><td colspan="2">Pliers</td><td colspan="4">For snap ring, TSR-160</td></tr>
<tr><td colspan="2">Steel bar</td><td colspan="4">4×100 mm</td></tr>
<tr><td colspan="2">Torque wrench</td><td colspan="4">Capable of tightening with the specified torques</td></tr>
<tr><td colspan="2">Pincers</td><td colspan="4">-</td></tr>
<tr><td colspan="2">Bolt</td><td colspan="4">M4, Length : 50mm</td></tr>
</table>

(2) Tightening torque

Part name	Bolt size	Torque		Wrench size	
		kgf · m	lbf · ft	in	mm
Hexagon socket head bolt (material : SCM435)	M 5	0.7	5.1	0.16	4
	M 6	1.2	8.7	0.20	5
	M 8	3.0	21.7	0.24	6
	M10	5.8	42.0	0.31	8
	M12	10.0	72.3	0.39	10
	M14	16.0	116	0.47	12
	M16	24.0	174	0.55	14
	M18	34.0	246	0.55	14
	M20	44.0	318	0.67	17
PT plug (material : S45C) ※ Wind a seal tape 1 1/2 to 2 turns round the plug	PT1/16	0.7	5.1	0.16	4
	PT 1/8	1.05	7.59	0.20	5
	PT 1/4	1.75	12.7	0.24	6
	PT 3/8	3.5	25.3	0.31	8
	PT 1/2	5.0	36.2	0.39	10
PF plug (material : S35C)	PF 1/4	3.0	21.7	0.24	6
	PF 1/2	10.0	72.3	0.39	10
	PF 3/4	15.0	109	0.55	14
	PF 1	19.0	137	0.67	17
	PF 1 1/4	27.0	195	0.67	17
	PF 1 1/2	28.0	203	0.67	17

3) DISASSEMBLY

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

For this reason, replacement of a regulator assembly is recommended, unless there is a special reason, but in case disassembly is necessary for an unavoidable reason, read through this manual to the end before starting disassembly.

(1) Choose a place for disassembly.

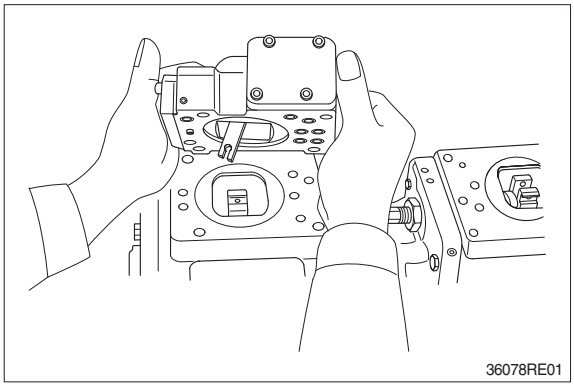
※ Choose a clean place.

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

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

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

※ Take care not to lose O-ring.

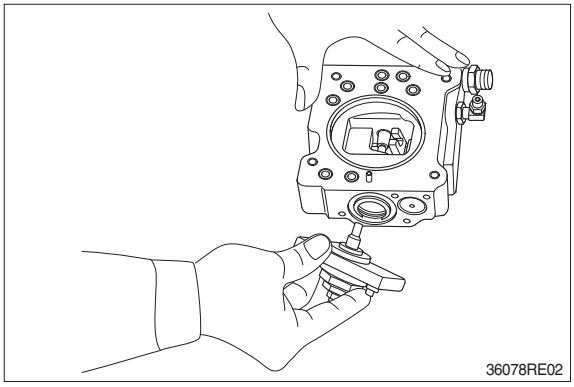


(4) Remove hexagon socket head screw (438) and remove cover (C,629)

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

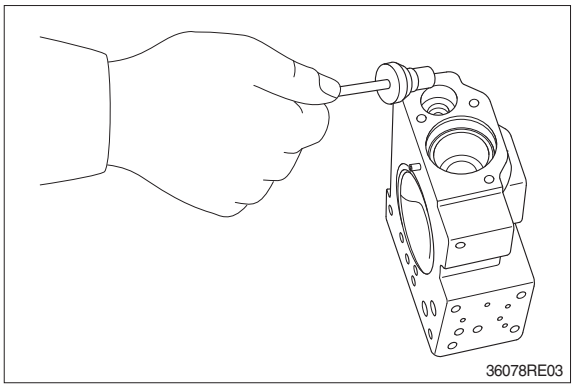
Do not loosen these screws and nuts.

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

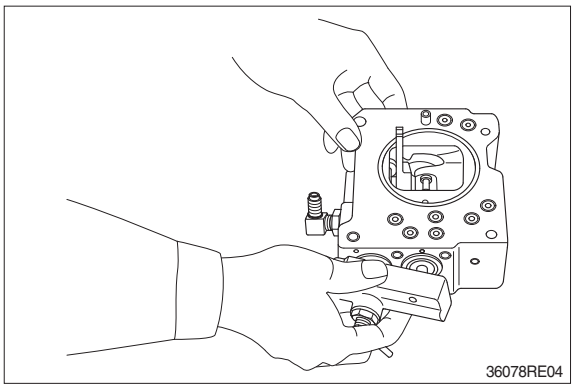


(5) After removing cover (C, 629) subassembly, take out outer spring (625), inner spring (626) and spring seat (C, 624) from compensating section.
Then draw out adjusting stem (Q, 645), pilot spring (646) and spring seat (644) from pilot section.

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



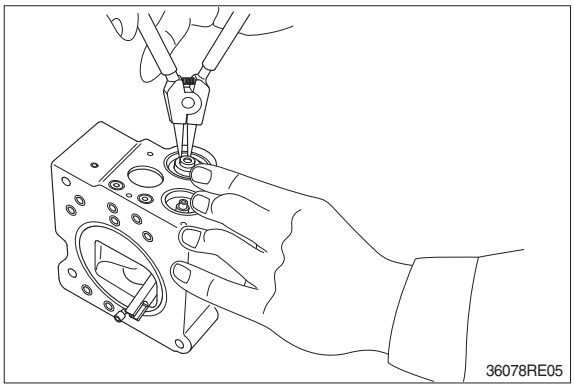
(6) Remove hexagon socket head screws (436, 438) and remove pilot cover (641).
After removing pilot cover, take out set spring (655) from pilot section.



(7) Remove snap ring (814) and take out spring seat (653), return spring (654) and sleeve (651).
Sleeve (651) is fitted with snap ring (836).

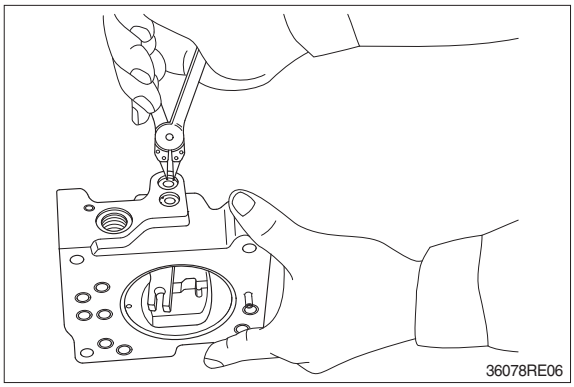
※ When removing snap ring (814), return spring (654) may pop out.

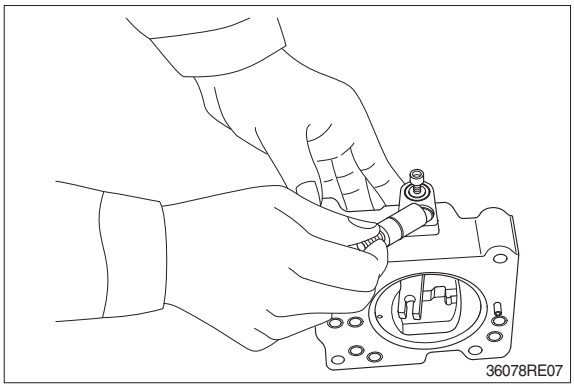
※ Take care not to lose it.



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

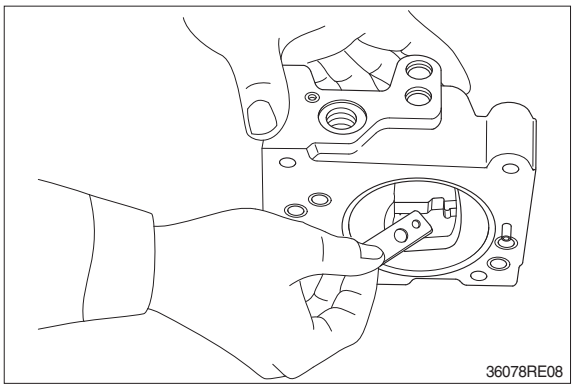
※ Fulcrum plug (614) and adjusting plug (615) can easily be taken out with M6 bolt.





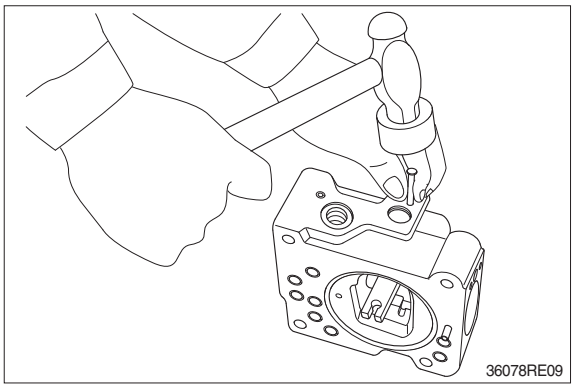
(9) Remove lever2 (613). Do not draw out pin (875).

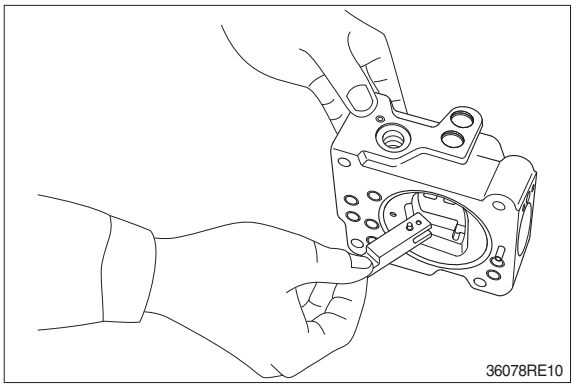
※ Work will be promoted by using pincers or so on.



(10) Draw out pin (874) and remove feedback lever (611).

※ Push out pin (874, 4 mm in dia.) from above with slender steel bar so that it may not interfere with lever1 (612).





(11) Remove lever1 (612). Do not draw out pin (875).

(12) Draw out pilot piston (643) and spool (652).

(13) Draw out piston case (622), compensating piston (621) and compensating rod (623).

※ Piston case (622) can be taken out by pushing compensating rod (623) at opposite side of piston case.

This completes disassembly.

4) ASSEMBLY

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

① Always repair parts that were scored at disassembly.

② Get replacement parts ready beforehand.
Mixing of foreign matter will cause malfunction.

③ Therefore, wash parts well with cleaning oil, let them dry with jet air and handle them in clean place.

④ Always tighten bolts, plugs, etc. to their specified torques.

⑤ Do not fail to coat sliding surfaces with clean hydraulic oil before assembly.
Replace seals such as O-ring with new ones as a rule.

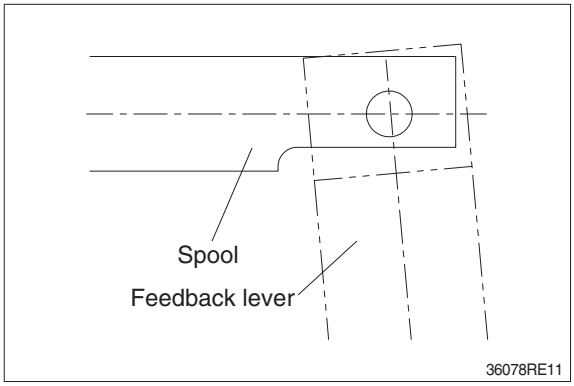
(2) Put compensating rod (623) into compensating hole of casing(601).

(3) Put pin force-fitted in lever1 (612) into groove of compensating rod and fit lever 1 to pin force-fitted in casing.

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

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

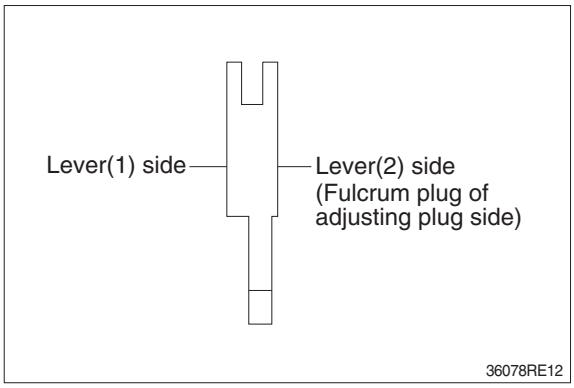
※ Pay attention to orientation of spool.



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

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

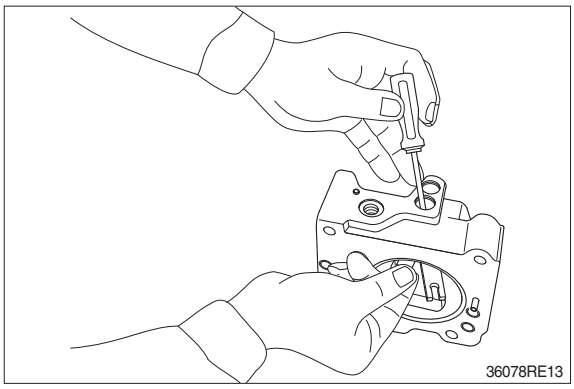
※ Take care not to mistake direction of feedback lever.



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

※ Confirm that pilot piston slides smoothly without binding.

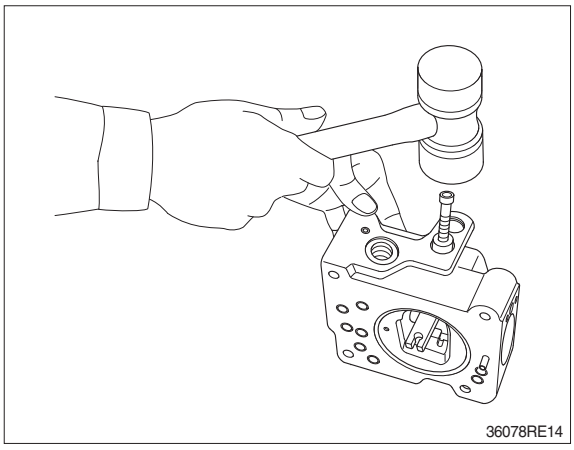
(7) Put pin force-fitted in lever2 (613) into groove of pilot piston.
Then fix lever (2).



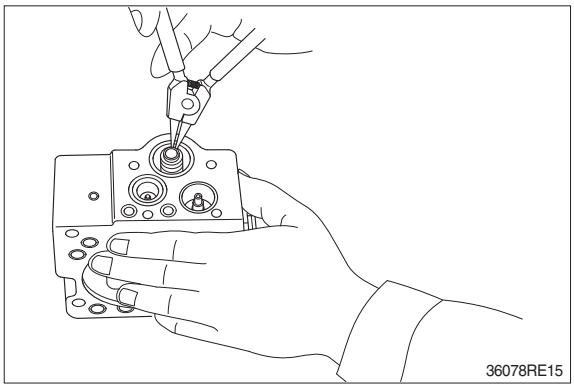
(8) Fit fulcrum plug (614) so that pin force-fitted in fulcrum plug (614) can be put into pin hole of lever (2).
Then fix locking ring (858).

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

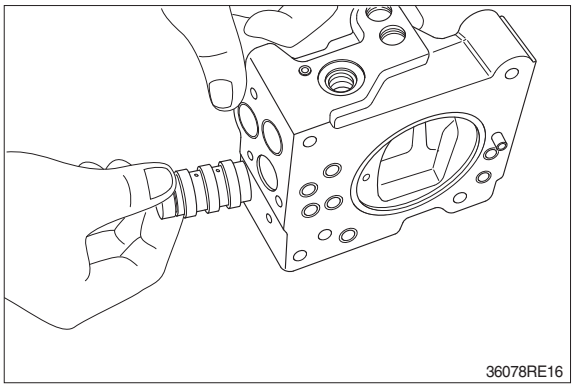
※ Take care not to mistake inserting holes for fulcrum plug and adjusting plug.
At this point in time move feedback lever to confirm that it has no large play and is free from binding.



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

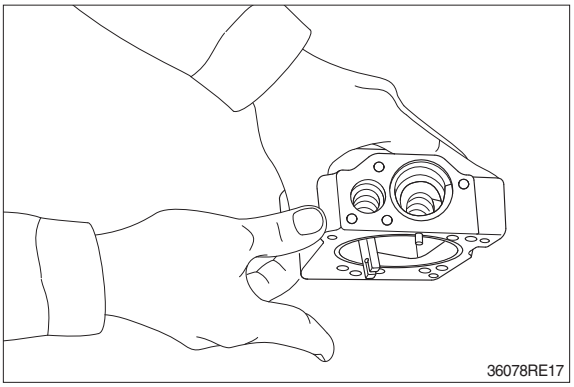


(11) Fit set spring (655) to spool hole and put compensating piston (621) and piston case (622) into compensating hole.
Fit pilot cover (641) and tighten it with hexagonal socket head screws (436, 438).



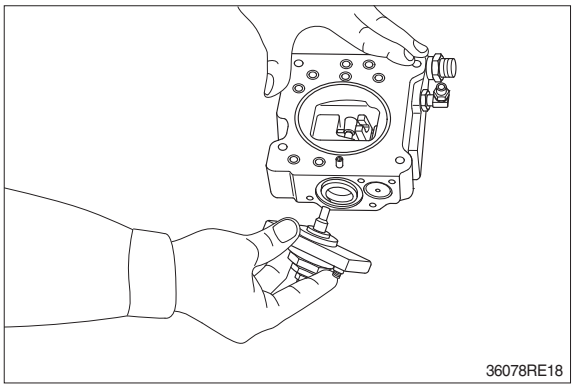
(12) Put spring seat (644), pilot spring (646) and adjusting stem (Q, 645) into pilot hole. Then fix spring seat (624), inner spring (626) and outer spring (625) into compensating hole.

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



(13) Install cover (C, 629) fitted with adjusting screws (628), adjusting stem (C, 627), lock nut (630), hexagon nut (802) and set screw (924).
Then tighten them with hexagonal socket head screws (438).

This completes assembly.



GROUP 4 MAIN CONTROL VALVE

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) Remove bolts and disconnect pipes.

(5) Disconnect pilot line hoses.

(6) Disconnect pilot pipes.

(7) Sling the control valve assembly and remove the control valve mounting bolts.
· Weight : 340 kg (750 lb)

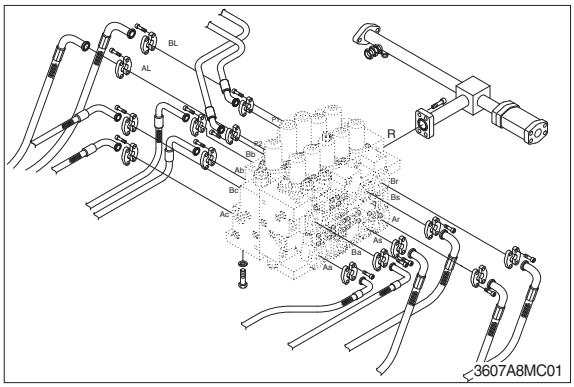
(8) Remove the control valve assembly.
When removing the control valve assembly, check that all the piping have been disconnected.

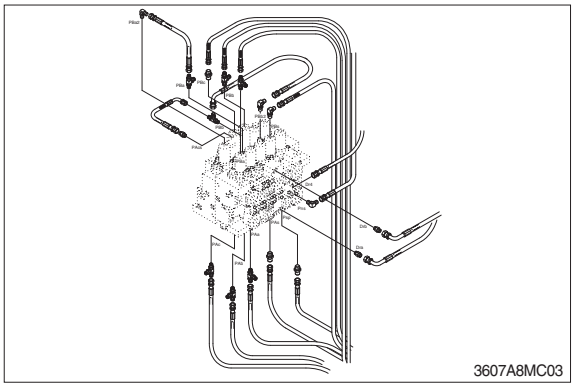
2) INSTALL

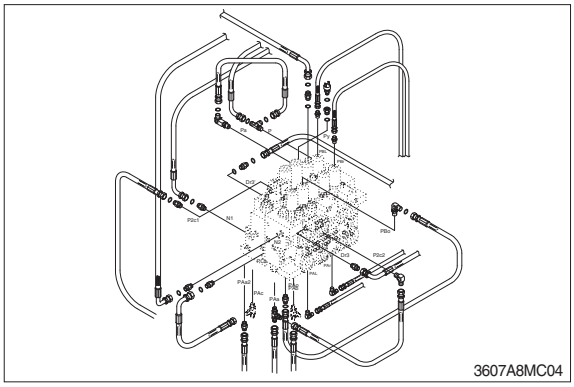
(1) Carry out installation in the reverse order to removal.

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

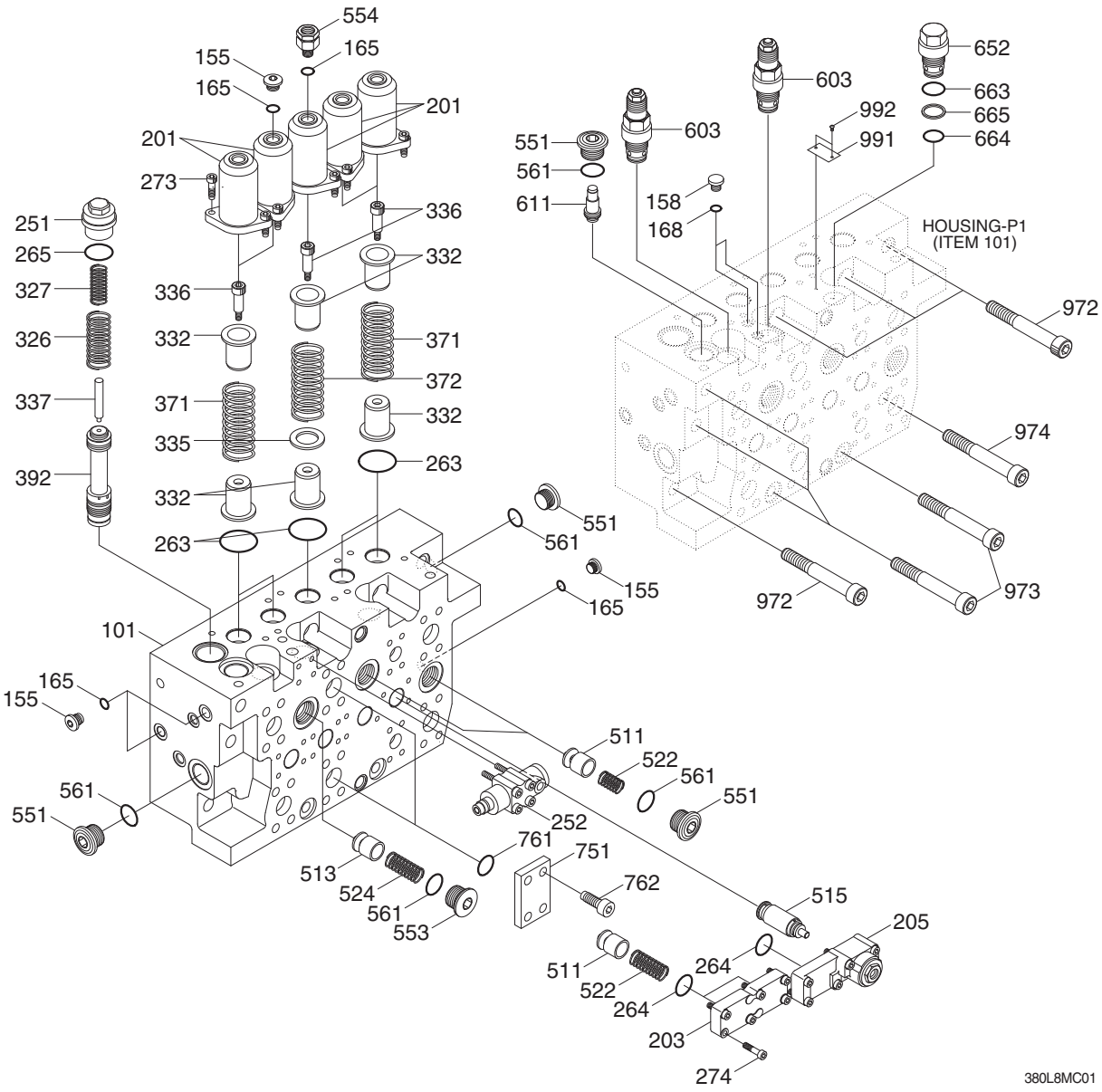
(3) Confirm the hydraulic oil level and recheck the hydraulic oil leak or not.





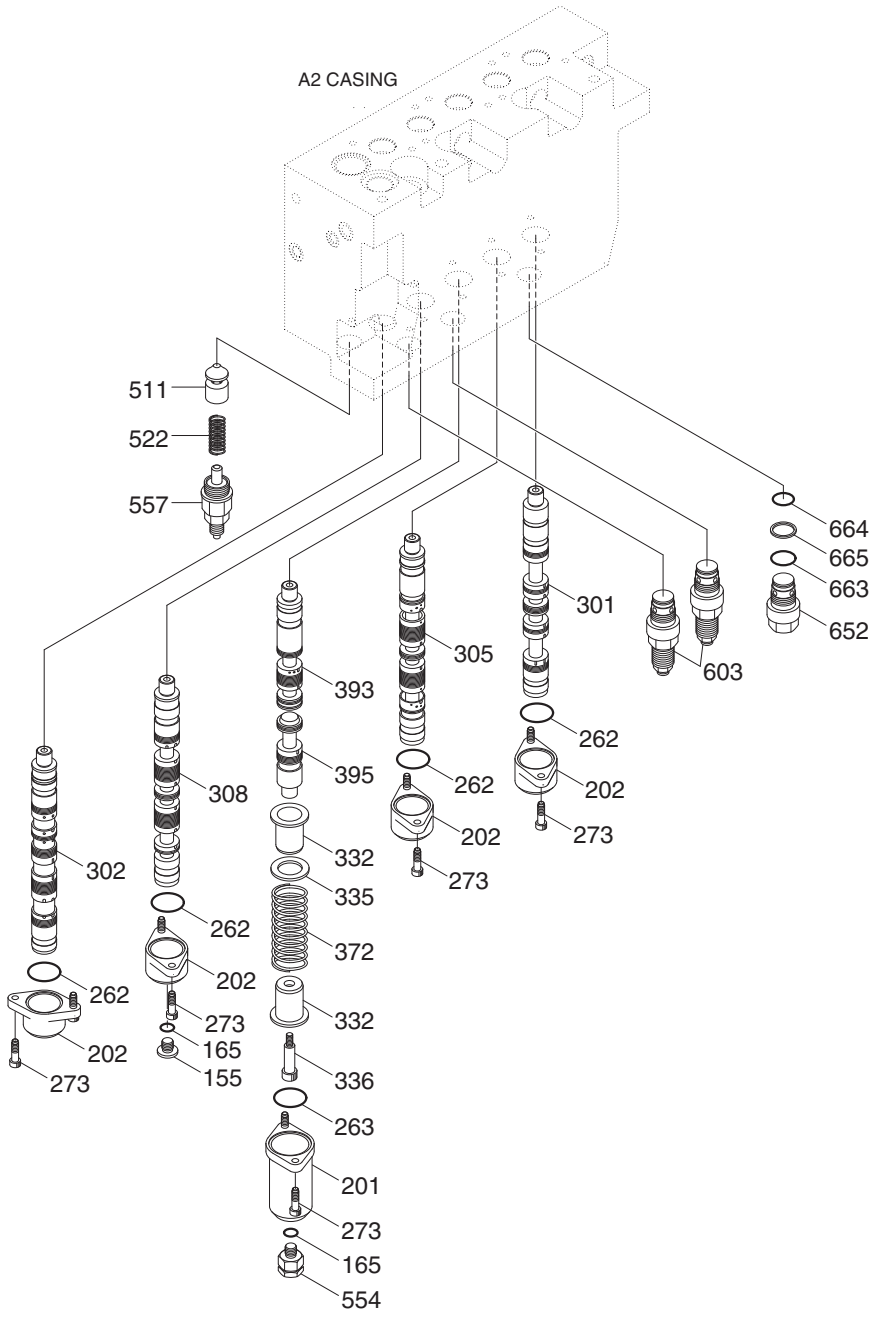


2. STRUCTURE (1/4)



101	Casing A	327	Spring	561	O-ring
155	Plug	332	Spring seat	603	Port relief assy
158	Plug	335	Shim	611	Negative relief valve assy
165	O-ring	336	Spacer bolt	652	Plug
168	O-ring	337	Rod	663	O-ring
201	Spring cover	371	Spring	664	O-ring
203	Spring cover	372	Spring	665	Back-up ring
205	Cover sub-Bm/Priority	392	By pass cut spool	751	Flange
251	Plug	511	Poppet	761	O-ring
252	Lock valve assy	513	Poppet	762	Screw
263	O-ring	515	Boom priority valve assy	972	Screw
264	O-ring	522	Spring	973	Screw
265	O-ring	524	Spring	974	Screw
273	Screw	551	Plug	991	Name plate
274	Socket bolt	553	Plug	992	Pin
326	Spring	554	Stopper plug		

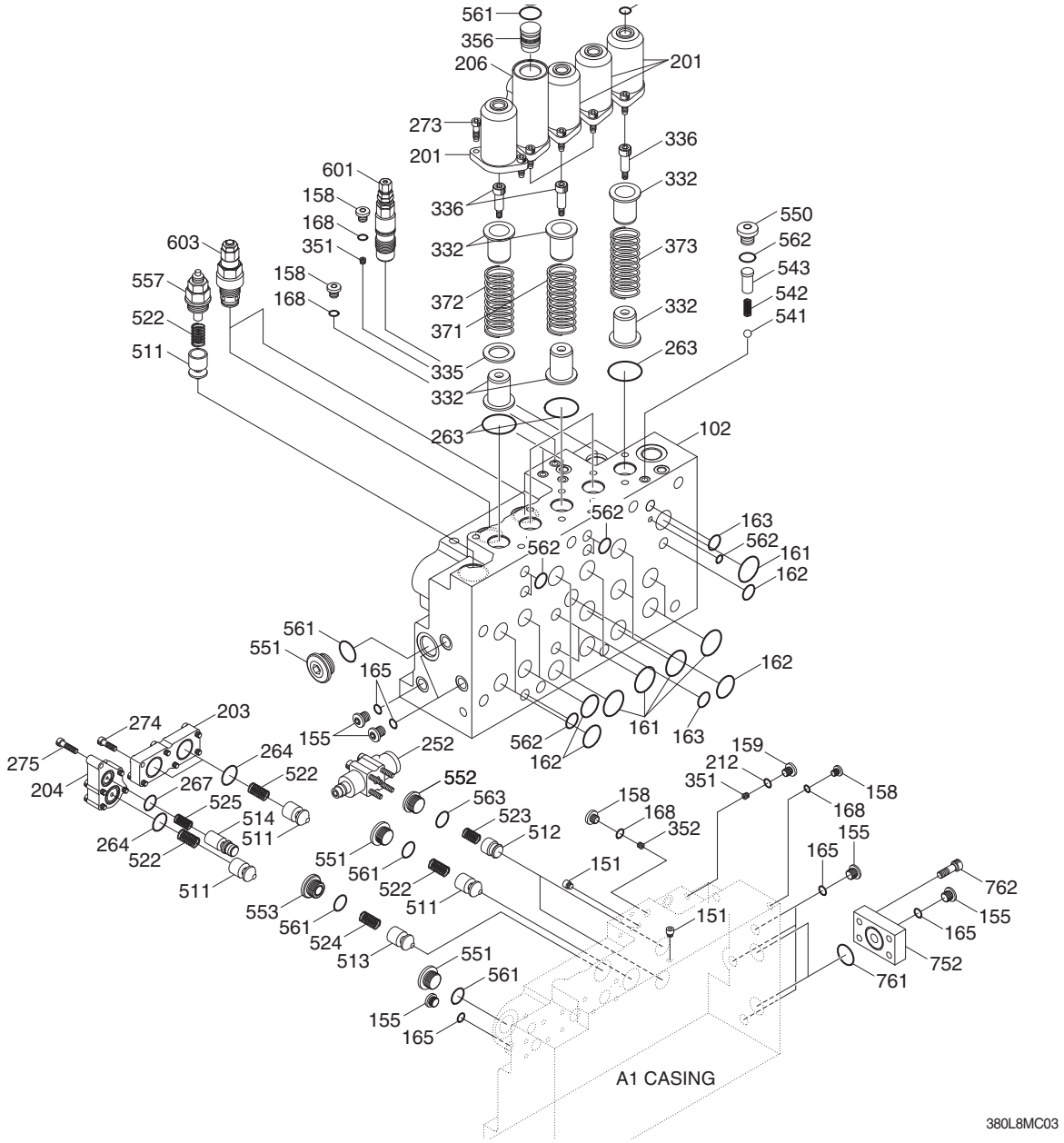
STRUCTURE (2/4)



380L8MC02

155	Plug	305	Swing spool kit	522	Spring
165	O-ring	308	Option spool kit	554	Stopper plug
201	Spring cover	332	Spring seat	557	Plug
202	Spring cover	335	Shim	603	Port relief assy
262	O-ring	336	Spacer bolt	652	Plug
263	O-ring	372	Spring	663	O-ring
273	Hex screw	393	Boom spool kit	664	O-ring
301	Travel spool kit	395	Swing priority spool kit	665	Back-up ring
302	Arm spool kit	511	Poppet		

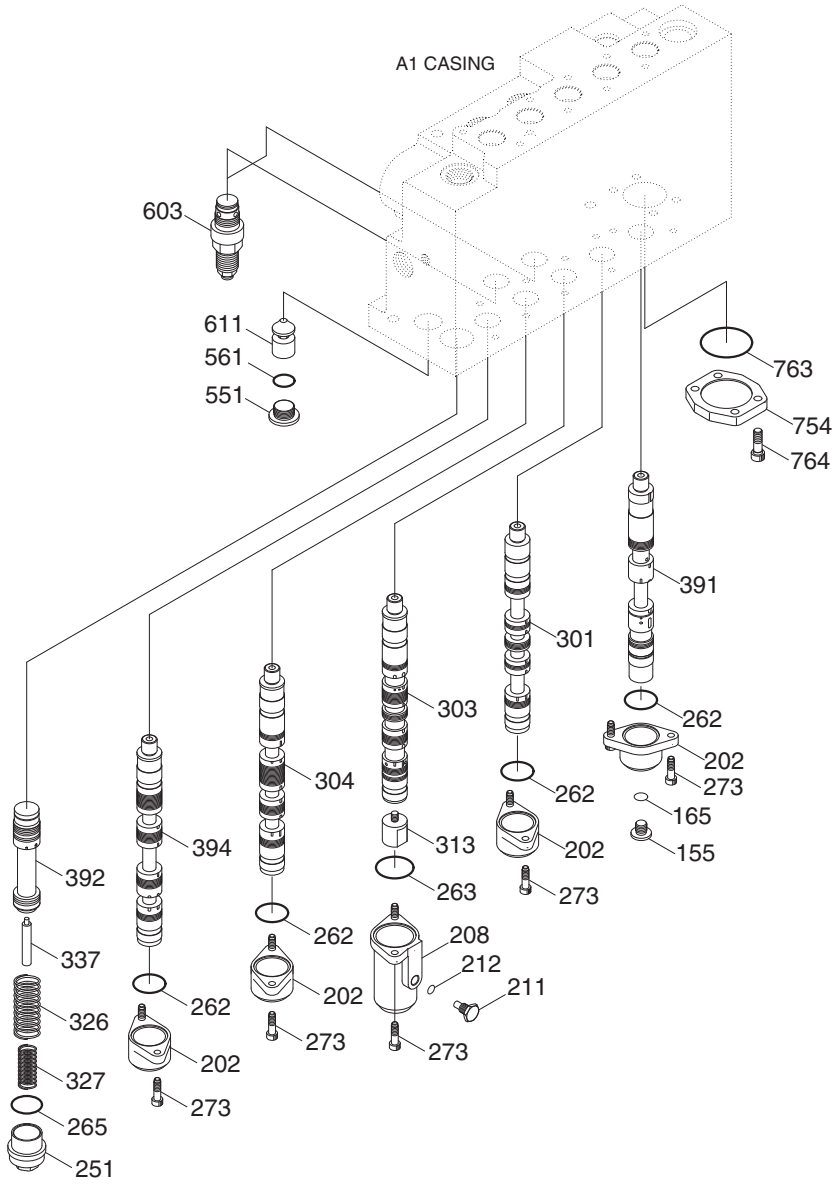
STRUCTURE (3/4)



380L8MC03

102	Casing-B	212	O-ring	371	Spring	551	Plug
151	Plug	252	Lock valve	372	Spring	552	Plug
155	Plug	263	O-ring	373	Spring	553	Plug
158	Plug	264	O-ring	511	Poppet	557	Plug
159	Plug	267	O-ring	512	Poppet	558	Plug
161	O-ring	273	Screw	514	Poppet	561	O-ring
162	O-ring	274	Socket bolt	522	Spring	562	O-ring
163	O-ring	275	Screw	523	Spring	563	O-ring
165	O-ring	332	Spring seat	524	Spring	601	Main relief assy
168	O-ring	335	Shim	525	Spring	603	Port relief assy
201	Spring cover	336	Spacer bolt	541	Steel ball	752	Blank flange
203	Spring cover	351	Orifice	542	Spring seat	761	O-ring
204	Cover	352	Orifice	543	Spring	762	Screw
206	Spring cover	356	Piston	550	Plug		

STRUCTURE (4/4)



155	Plug	273	Hex screw	394	Am/Confluence spool kit
165	O-ring	301	Travel spool kit	551	Plug
202	Spring cover	303	Boom spool kit	561	O-ring
208	Spool cover	304	Bucket spool kit	603	Port relief assy
211	Plug	313	Plug	611	Negative relief valve assy
212	O-ring	326	Spring	754	Flange
251	Plug	327	Spring	763	O-ring
262	O-ring	337	Rod	764	Socket screw
263	O-ring	391	Travel straight spool kit		
265	O-ring	392	By pass cut spool		

3. DISASSEMBLY AND ASSEMBLY

1) GENERAL PRECAUTIONS

(1) All hydraulic components must be worked with precision working. Then, 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, re-check that these caps and masking seals are fitted completely, and then clean the outside of the assembly. Use a proper bench for working, spread a paper or rubber mat on the bench, and disassemble the valve on it.

(4) Support the body section carefully in carrying, transferring and so on of the control valve. Do not support the lever, exposed spool, end cover section or so on without fail.

(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 the hydraulic test equipment is necessary to these tests.
Therefore, even when its disassembling can be carried out technically, do not disassemble such component that cannot be tested, adjusted, and so on.
Besides, 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 (㎜)
Vise bench	1 unit	-
Box wrench	Each 1 piece	22, 27, 32 & 36
Hexagon key wrench	Each 1 piece	5, 8, 12 & 17
Loctite #262	1 pc	-
Spanner	1 pc	10, 22, 24, 32 (Main relief valve), 36

3) DISASSEMBLING

(1) Place control valve on working bench.

※ Disassemble it in clean place and pay attention not to damage flange face.

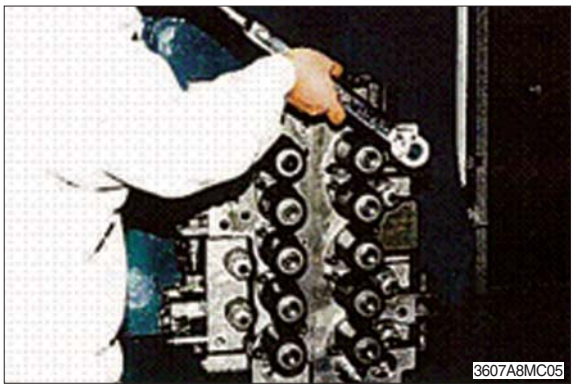
(2) Disassembling of main spool (travel, bucket, swing, option, arm 2, boom 2, swing priority):

① Loosen hexagon socket head bolts (273) and remove spring cover (201), (206).

· Hexagon key wrench : 8 mm

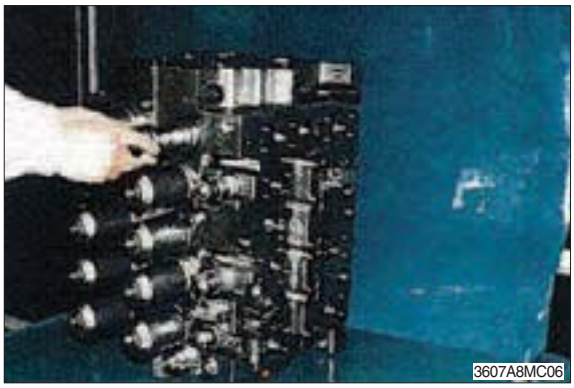
In removing bucket spring cover (206), at first remove plug (558) and piston (356).

· Hexagon key wrench : 17 mm



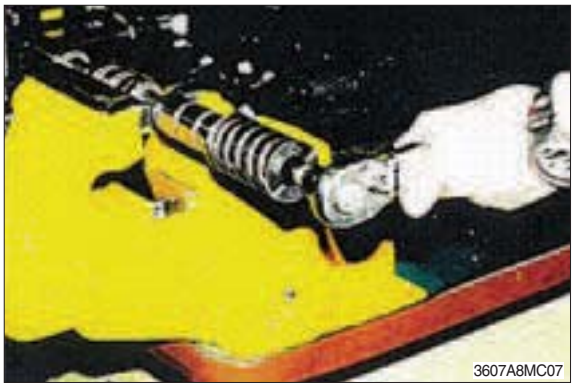
② Remove spool, spring, spring seats (shim) and spacer bolt in spool assembly condition from casing.

※ When pulling out spool assembly from casing, pay attention not to damage casing.



③ Hold spool in mouthpiece-attached vise. Remove spacer bolt (336) and disassemble spring (, shim) and spring seats.

· Hexagon key wrench : 12 mm



(3) Disassembling of arm 1 spool :

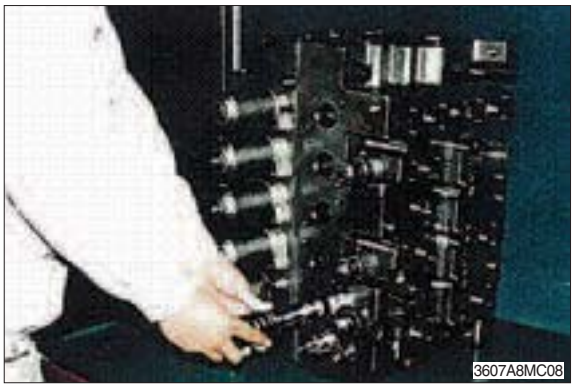
① Loosen hexagon socket head bolts (273) and remove spring cover (201).
- Hexagon key wrench : 8 mm

② Remove arm 1 spool (302), spring (371), spring seat (332) and spacer bolt (336) in spool assembly condition from casing.

※ When pulling out spool assembly from casing, pay attention not to damage casing.

③ Hold arm 1 spool (302) in mouthpiece-attached vise. Remove spacer bolt (336) and disassemble spring (371) and spring seats (332).
- Hexagon key wrench : 12 mm

④ Do not disassemble arm 1 spool (302) more than these conditions.


3607A8MC08


3607A8MC09

(4) Disassembling of travel straight spool :

① Loosen hexagon socket head bolts (273), remove spring cover, and pull out travel straight spool (391), spring (373), spring seat (332) and spacer bolt (336) in spool assembly condition from casing.
- Hexagon key wrench : 8 mm

※ When pulling out spool assembly from casing, pay attention not to damage casing.

② Hold travel straight spool (391) in mouthpiece-attached vise, remove spacer bolt (336) and disassemble spring (373) and spring seats (332).
- Hexagon key wrench : 12 mm

③ Do not disassemble travel straight spool (391) more than these conditions.

(5) Disassembling of boom 1 spool :

① Loosen hexagon socket head bolts (273), remove spring cover (201) and pull out boom 1 spool (303), plug (313), spring (371), spring seats (332) and spacer bolt(336) in spool assembly condition from casing.

· Hexagon key wrench : 8 mm

※ When pulling out spool assembly from casing, pay attention not to damage casing.

② Hold boom 1 spool (303) in mouthpiece-attached vise, remove spacer bolt (336), and disassemble spring (371) and spring seats (332).

· Hexagon key wrench : 12 mm

Remove plug (313).

· Spanner : 27 mm

③ Do not disassemble boom1 spool (303) more than these conditions.

(6) Disassembly of covers :

① Remove hexagon socket head bolts (273), and remove spool cover (202) and (208).

· Hexagon key wrench : 8 mm

In removing boom1 spool cover (208), at first remove plug (211).

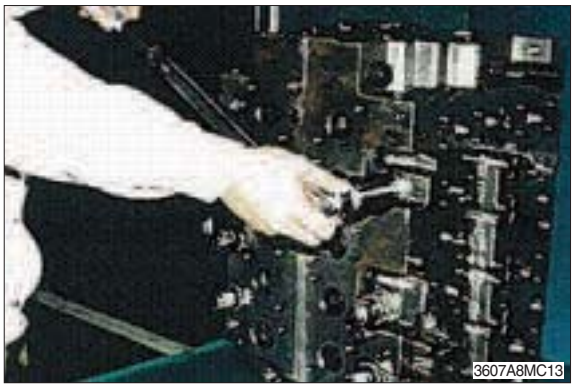
· Box wrench : 22 mm

(7) Removal of main relief valve and port relief valves :

① Remove main relief valve (601) and port relief valve (603), (604), (605) from casing.

· Main relief valve : Spanner 32 mm

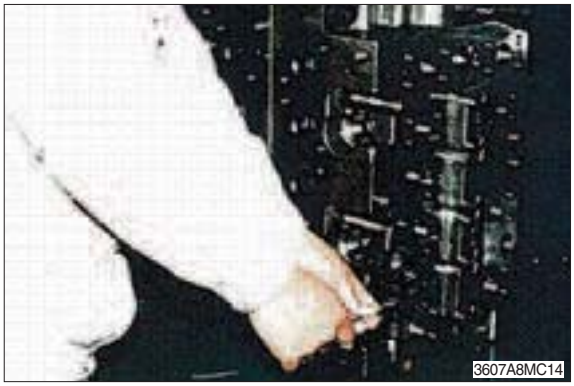
· Port relief valve : Box wrench 36 mm, Spanner 36mm



(8) Removal of lock valve assembly :

① Loosen hexagon socket head bolts and remove lock valve assembly (252).

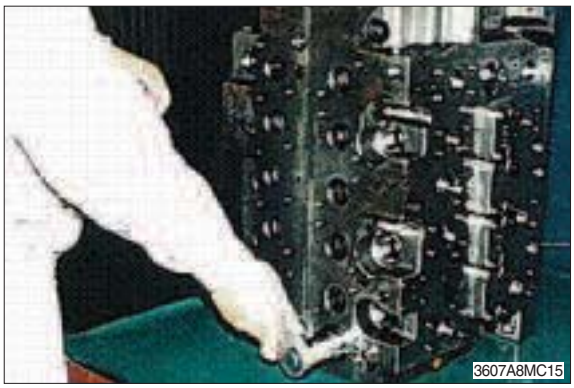
· Hexagon key wrench : 5 mm

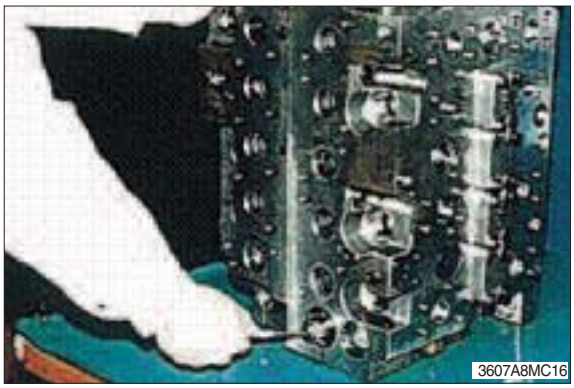


(9) Removal of bypass cut spool :

① Remove plug (251), spring (326 & 327), rod (337), and bypass cut spool (392).

· Box wrench : 27 mm

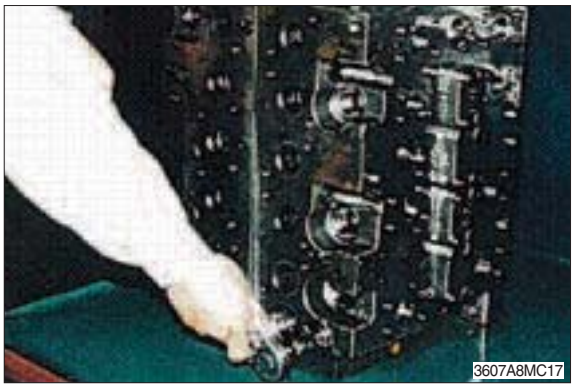




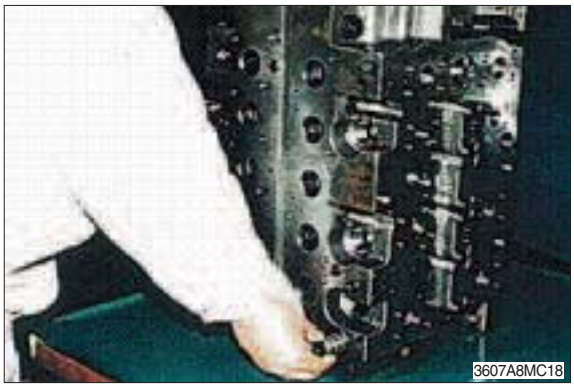
(10) Disassembly of negative control relief valve :

① Remove plug (551).

· Hexagon key wrench : 17 ㎜



② Remove poppet (611), spring (621) and damping rod(631).



(11) Disassembly of check valve :

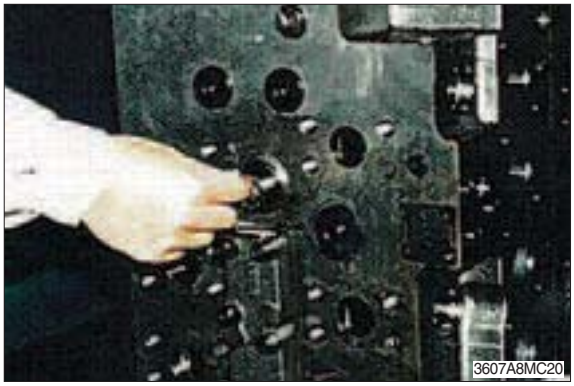
① Remove plug (551) and take out poppet (511) and spring (522).
- Hexagon key wrench : 17 mm

② Loosen hexagon socket head bolts (274) and remove load check cover (203) and take out poppet (551) and spring (522).
- Hexagon key wrench : 8 mm

③ Remove plug (553) and take out poppet (513) and spring (522).
- Hexagon key wrench : 17 mm

④ Remove plug (552) and take out poppet (512) and spring (523).
- Hexagon key wrench : 12 mm

⑤ Remove plug sub (557) and take out poppet (511) and spring (522).
- Box wrench : 32 mm



(12) Disassembly of boom priority valve :

① Loosen hexagon socket head bolts (276, 277) and remove cover sub (205) and poppet sub (515) of boom priority valve.
- Hexagon key wrench : 8 mm

② Hold cover sub (205) in mouthpiece-attached vise, remove poppet sub (515).

③ Cover sub (205) :
Hold cover in mouthpiece-attached vise, Loosen plug (559), and remove piston (356).
- Box wrench : 24 mm

④ Poppet sub (515) :
Remove assy of poppet (101, 102), plug (103) and spring (104) from bush (106).

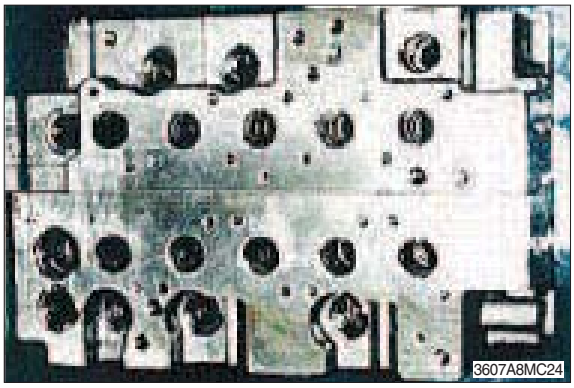
⑤ Remove spring (105) and spool (107).

⑥ Do not disassemble ass'y in above ④more than these conditions.

(13) Disassembly of casing :

① Except when required specially, do not disassemble tie bolts of casing A.

② Since plugs not described in above disassembling procedures are blind plugs for sacrifice holes and blind plugs for casing sanitation, do not disassemble them as far as not required specially.



(14) Inspection after disassembling :

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 casing and block are smooth and free of dust, dent, rust etc.

c. Correct dents and damages on check seat faces of casing, if any, by lapping.

※ Pay attention not to leave lapping agent in casing.

d. Confirm that all sliding and fitting parts can be moved manually and that all grooves and paths are free from foreign matter.

e. If any spring is broken or deformed, replace it with new one.

f. When relief valve do not function properly, repair it, following its disassembling assembling procedures.

g. Replace all seats 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 are uniform 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 breaking, 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 relief valve assembly.

4) ASSEMBLING

(1) In this assembling section, explanation only is shown. Refer to figures and photographs shown in disassembling section.

(2) Figure in ( ) shown after part name in explanation sentence shows number in construction figure.

(3) Cautions in assembling seals

① Pay attention to keep seals free from defects in its forming and damages in its handling.

② Apply grease, hydraulic oil or so on to seals and seal-fitting sections for full lubrication.

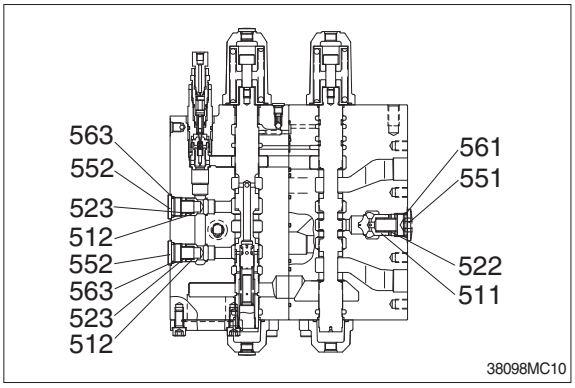
③ Do not stretch seals so much to deform them permanently.

④ In fitting O-ring, pay attention not to roll it into its position. In addition, twisted O-ring cannot remove its twisting naturally with ease after being fitted, and causes oil leakage.

⑤ Tighten fitting bolts at all sections with torque wrench to their respective tightening torques shown in "Maintenance Standards".

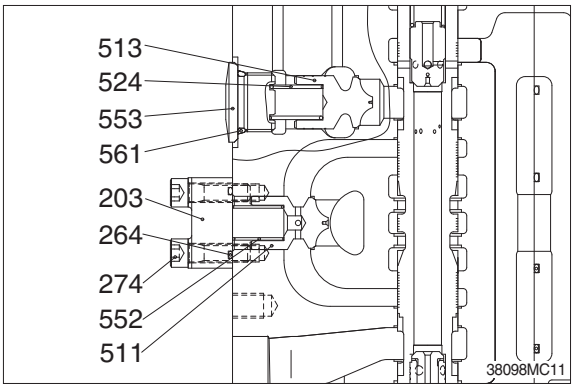
(4) Assembly of check valve :

① Assemble poppets (511,513 & 512) and springs (522 & 523).
Put O-rings (561) onto plugs (551 & 553).
Put O-rings (563) onto plugs (552).
Put O-rings (264) on cover (203).
Tighten the latters with their specified torques.



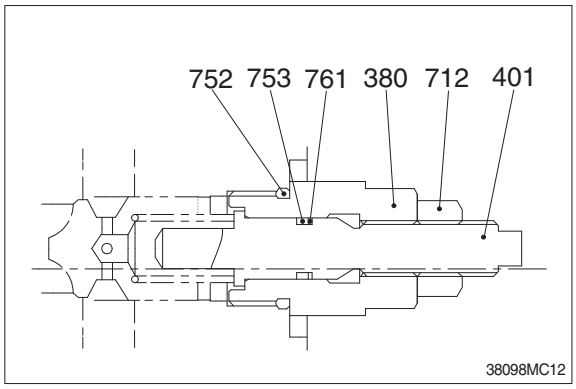
※ Use poppets, springs and plugs in following groups.

Poppet	Spring	Plug or cover	Remember that
511	522	203, 204, 551, 557	511 in 10 positions
512	523	552	512 in 2 positions
513	522	553	513 in 2 positions
514	525	204	514 in 1 positions



No.	Hexagon key wrench	Tightening torque	
		kgf · m	lbf · ft
(551)	17 mm	37.7~41.8	273~302
(274)	8 mm	5.3~6.3	38.3~45.6
(553)	17 mm	37.7~41.8	273~302
(552)	12 mm	23.5~27.5	170~197
(557)	(box wrench) 32 mm	20.4~25.5	148~184

② Bucket, option confluence plug sub :
If you want bucket confluence or option confluence effective, loosen rod (401) and tighten lock nut (712).
If you want to cancel bucket confluence or option confluence, tighten rod (401) and lock nut (712).
· Spanner : 10 mm for (401)
· Tightening torque : 3.0~4.0 kgf · m (21.7~28.9 lbf · ft)
· Spanner : 24 mm for (712)
· Tightening torque : 4.0~5.0 kgf · m (28.9~36.2 lbf · ft)



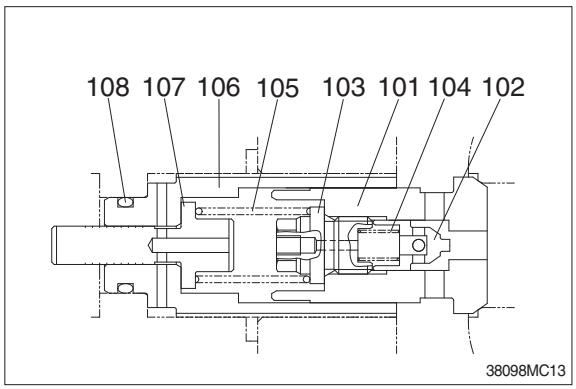
(5) Assemble boom priority valve :

① Put O-ring (108) onto bushing (106), and assemble spool (107) and spring (105).

Assemble assy of poppet (101, 102), plug (103) and spring (104) into bushing (106).

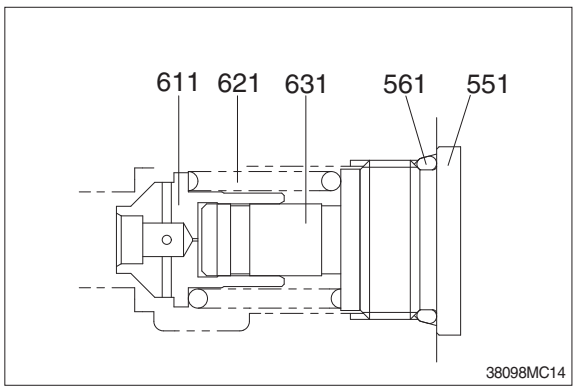
Assemble bushing sub in above ② into cover (205) and assemble them into casing, and tighten hexagon socket head bolts (276, 277)
· Hexagon key wrench : 8 mm
· Tightening torque : 5.3~6.3 kgf · m (38.3~45.6 lbf · ft)

Assemble piston (356) in cover (205), and tighten plug (559)
· Box wrench : 24 mm
· Tightening torque : 20.4~25.5 kgf · m (147.5~184.4 lbf · ft)



(6) Assembling of negative control relief valve

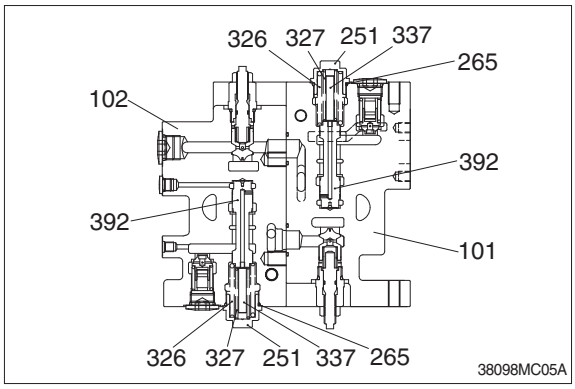
① Assemble poppet (611), spring (621),and damping rod (631) to casing A (101) & casing B(102). Put O-ring (561) onto plug (551) and tighten the latter with its specified torque.
· Hexagon key wrench : 17 mm
· Tightening torque : 37.7~41.8 kgf · m (272.7~302.3 lbf · ft)



(7) Assembly of bypass cut valve

① Assemble bypass cut spool (392), spring (326 & 327) and rod (337) into casing A (101) & casing B(102).
Put O-ring (265) onto plug (251) and tighten the latter with its specified torque.

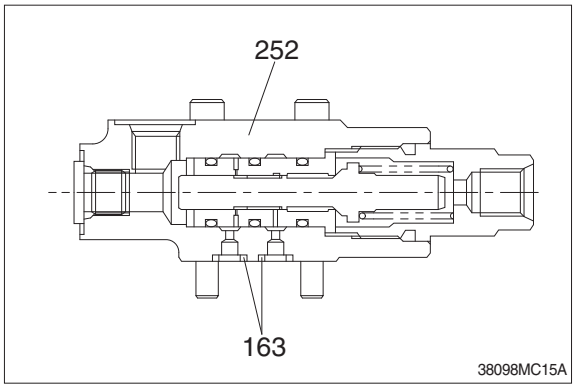
- Box wrench : 27 mm
- Tightening torque : 7.95~10.0 kgf · m (57.5~72.3 lbf · ft)



(8) Assembling of lock valve assembly

① Fit O-ring (163) to lock valve assembly (252) and tighten hexagon socket head bolts with specified torque.

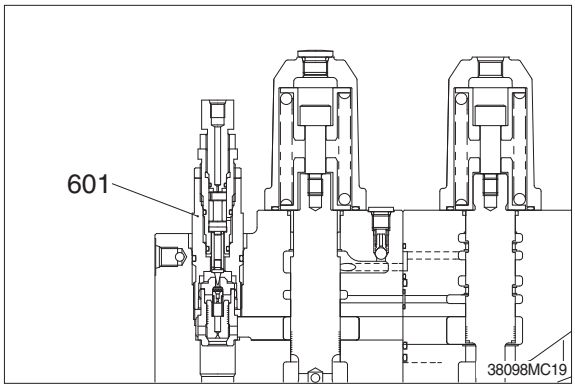
- Hexagon key wrench : 5 mm
- Tightening torque : 1.0~1.42 kgf · m (7.2~10.2 lbf · ft)

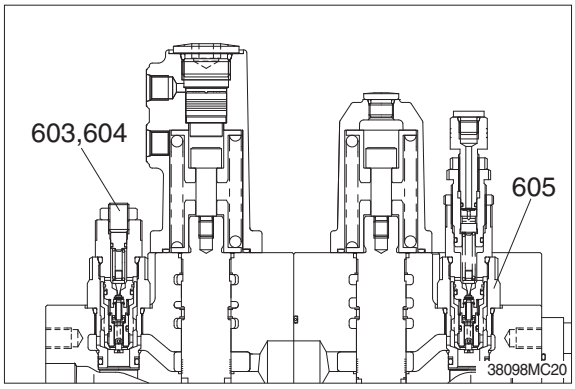


(9) Assembling of main relief valve and port relief valve :

① Assemble main relief valve (601) and port relief valves (603, 604, & 605) to casing and tighten it with specified torque.

Item	Size	Tightening torque	
		kgf · m	lbf · ft
Main relief valve	Spanner 32 mm	12.2~14.3	88.2~103
Port relief valve	Spanner 36 mm Box wrench 36 mm		





(10) Assembling of travel straight spool :

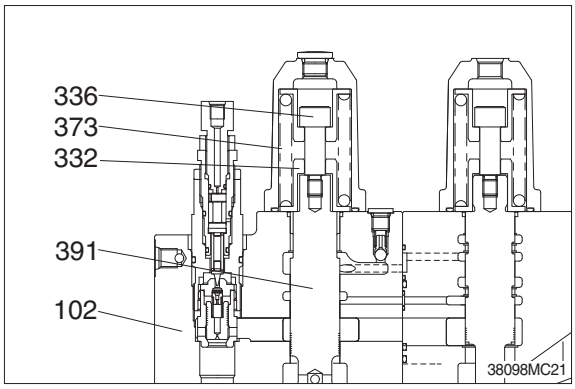
① Hold end of travel straight spool (391) in mouthpiece-attached vise, set spring seat (332) and spring (373) and tighten spacer bolt (336) with specified torque.

※ Before tightening spacer bolt (336), apply Loctite #262 to it.

- Hexagon key wrench : 12 mm
- Tightening torque : 3.77~4.18 kgf · m (27.2~30.2 lbf · ft)

② Fit spool assemblies of items ① above into casing B (102).

※ Fit spool assemblies into casing B (102) carefully and slowly. Do not push them forcibly without fail.



(11) Assembling of boom 1 spool :

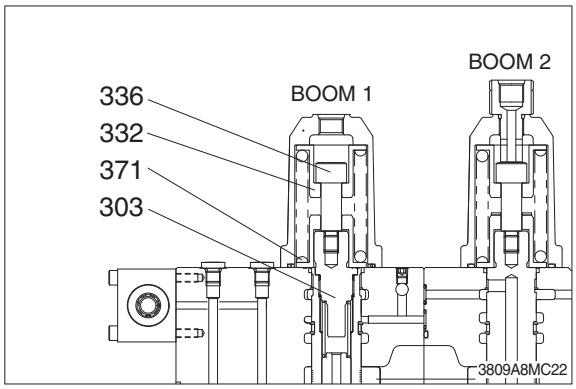
① Hold the middle of boom 1 spool (303) in mouthpiece-attached vise, set spring seat (332) and spring (371) and tighten spacer bolt (336) with specified torque, and tighten plug(313) with specified torque.

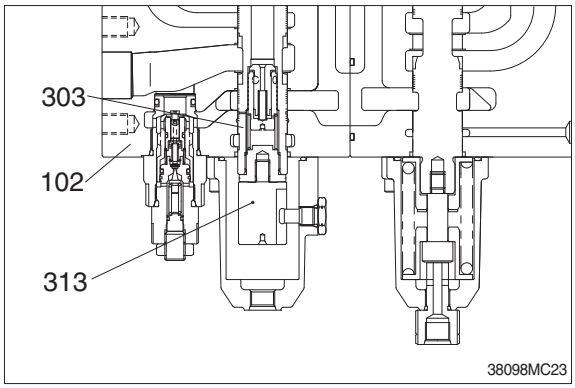
※ Before tightening spacer bolt (336) and plug (313), apply Loctite #262 to them.

- Spacer bolt (336) : Hexagon key wrench 12 mm
- Tightening Torque : 3.77~4.18 kgf · m (27.2~30.2 lbf · ft)
- Plug (313) : Spanner 27 mm
- Tightening Torque : 3.77~4.18 kgf · m (27.2~30.2 lbf · ft)

② Fit spool assemblies of Items ① above into casing B (102).

※ Fit spool assemblies into casing B (102) carefully and slowly. Do not push them forcibly without fail.





(12) Assembling of arm 1 spool :

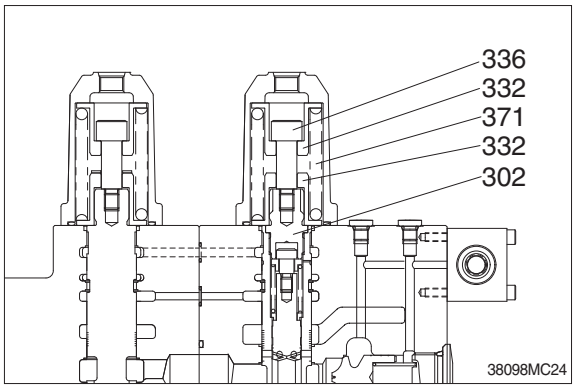
① Hold end of arm 1 spool (302) in mouthpiece-attached vise, set spring seats (332) and spring (371) and tighten spacer bolt (336) with specified torque.

※ Before tightening spacer bolt (336), apply Loctite #262 to it.

- Hexagon key wrench : 12 mm
- Tightening Torque : 3.77~4.18 kgf · m (27.2~30.2 lbf · ft)

② Fit spool assemblies of Items ① above into casing A (101).

※ Fit spool assemblies into casing A (101) carefully and slowly.
Do not push them forcibly without fail.



(13) Assembling of main spool (travel (301), bucket (304), swing (305), option (308), arm 2 (394), boom 2 (393), swing priority (395)

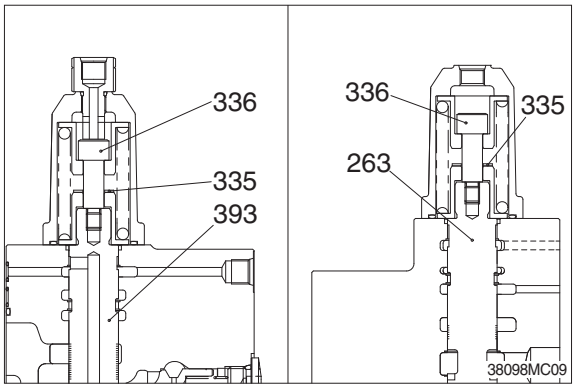
① Hold end of each spool in mouthpiece-attached vise, set spring seats, springs (shim (335) for arm 2, boom 2 and swing priority spool) and tighten spacer bolt (336) with specified torque.

※ Before tightening spacer bolt (336), apply Loctite #262 to it.

- Hexagon key wrench : 12 mm
- Tightening Torque : 3.77~4.18 kgf · m (27.2~30.2 lbf · ft)

② Insert spool assemblies of Items ① above into casing.

※ Fit spool assemblies into casing A (101) and casing B (102) carefully and slowly.
Do not push them forcibly without fail.

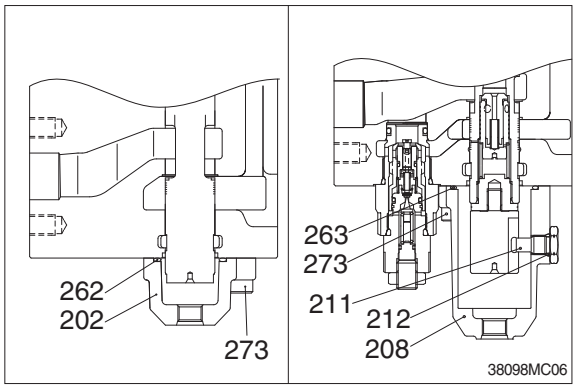


(14) Assembling of cover :

① Fit spool covers (202) and (208) to sides reverse to spring sides spools, and tighten hexagon socket head bolts (273) with specified torque.

※ Confirm that O-rings (262) have been fitted to spool cover (202), O-ring (263) to boom 1 spool cover (208).

- Hexagon key wrench : 8 mm
- Tightening torque : 5.3~6.3 kgf · m (38.3~45.6 lbf · ft)



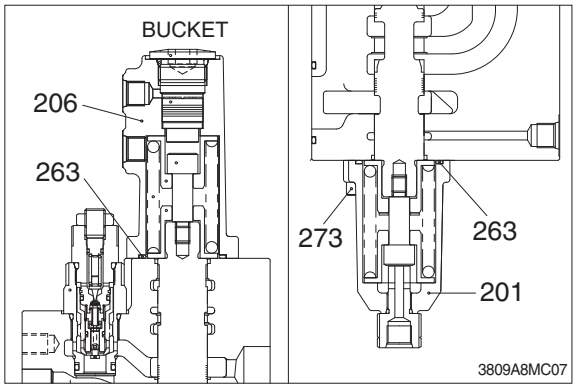
② Boom 1 spool cover :
Put O-ring (212) onto plug (211) and tighten the latter onto boom 1 spool cover (208) with its specified torque.

- Box wrench : 22 mm
- Tightening torque : 3.5~4.0 kgf · m (25.3~29 lbf · ft)

③ Fit spring covers (201), (206) to spring sides of spools, and tighten hexagon socket head bolts (273) with specified torque.

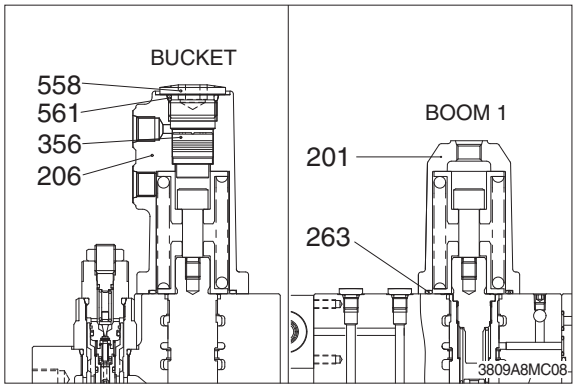
※ Confirm that O-rings (263) have been fitted.

- Hexagon key wrench : 8 mm
- Tightening torque : 5.3~6.3 kgf · m (38.3~45.5 lbf · ft)



④ Bucket spring cover :
Assemble piston (356) to bucket spring cover (206). Put O-ring (561) onto plug (558) and tighten the latter with specified torque.

- Hexagon key wrench : 17 mm
- Tightening torque : 20.1~25.1 kgf · m (144.6~180.8 lbf · ft)



⑤ Boom 1 spring cover :
Fit spring cover (201) to spring sides and tighten hexagon socket head bolts (273) with specified torque.

※ Confirm that O-rings (263) have been fitted.

- Hexagon key wrench : 8 mm
- Tightening torque : 5.3~6.3 kgf · m (38.3~45.5 lbf · ft)

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 hoses (2, 3, 4, 5, 6, 7, 8, 9).

(5) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (10).
- Motor device weight : 75 kg (165 lb)
- Tightening torque : 97.8 ± 15 kgf·m (707 ± 108 lbf·ft)

(6) Remove the swing motor assembly.

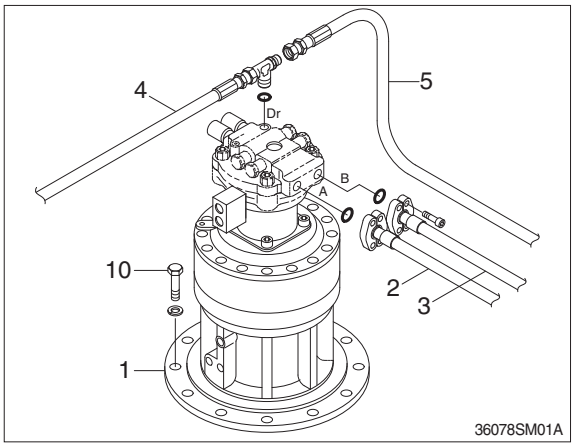
※ When removing the swing motor assembly, check that all the piping have been disconnected.

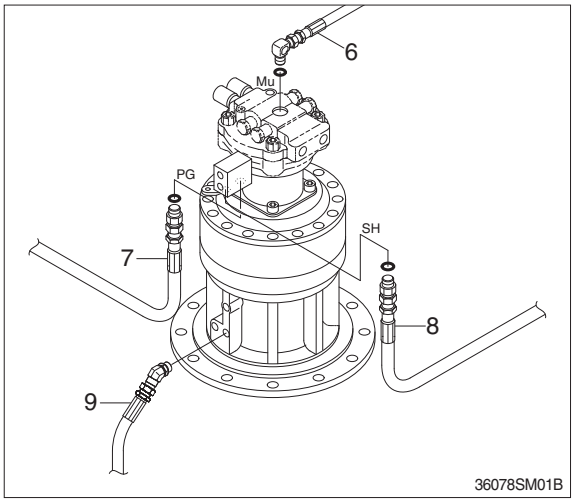
2) INSTALL

(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 over flows 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.

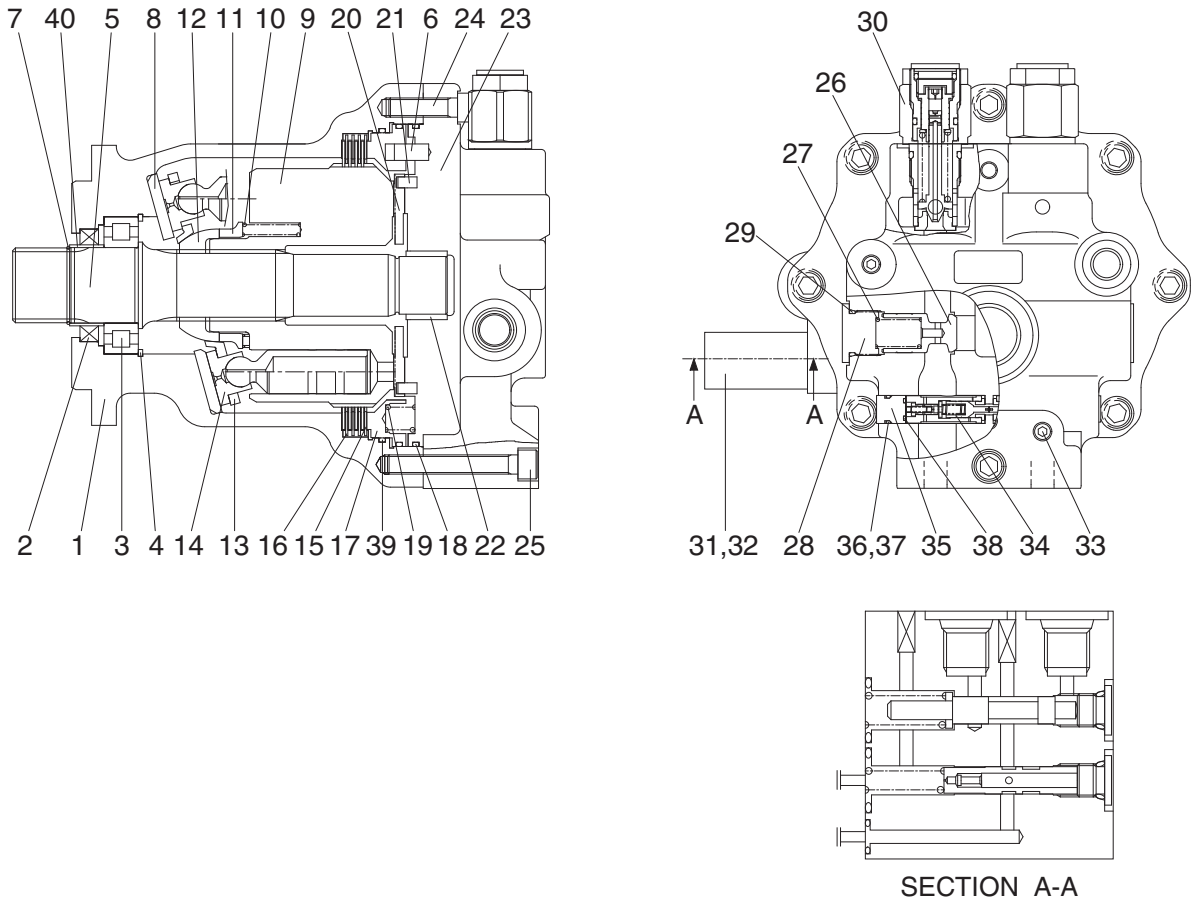
(3) Confirmed the hydraulic oil level and check the hydraulic oil leak or not.





2. SWING MOTOR

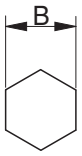
1) STRUCTURE



1	Body	15	Friction plate	29	O-ring
2	Oil seal	16	Plate	30	Relief valve assy
3	Roller bearing	17	Brake piston	31	Time delay valve
4	Snap ring	18	O-ring	32	Wrench bolt
5	Shaft	19	Spring	33	Plug
6	Pin	20	Valve plate	34	Swing reactionless valve assy
7	Stop ring	21	Pin	35	Plug
8	Shoe plate	22	Needle bearing	36	O-ring
9	Cylinder block	23	Rear cover	37	Back up ring
10	Spring	24	Wrench bolt	38	O-ring
11	Ball guide seat	25	Wrench bolt	39	O-ring
12	Ball guide	26	Poppet	40	Bushing
13	Set plate	27	Spring		
14	Piston assy	28	Plug		

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	Remark	
Allen wrench	5	
	6	
	12	
	17	
Socket for socket wrench, spanner	36	
Torque wrench	Capable of tightening with the specified torques	
Snap ring plier(for holes, axis)	Snap ring(4)	
Solder hammer	Needle bearing(22), pin(6, 21)	
Oil seal inserting jig	Oil seal(2)	
Induction heating apparatus for bearing	Roller bearing(3)	

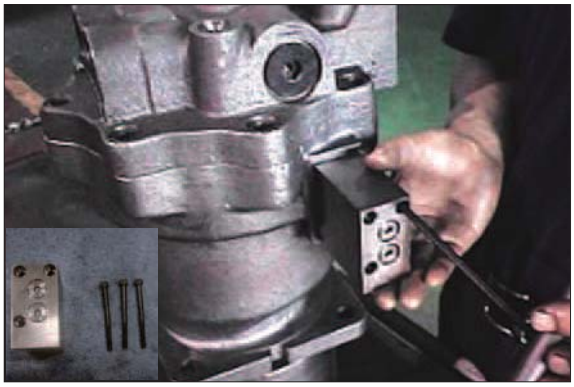
(2) Tightening torque

Part name	Item	Size	Torque		Wrench size	
			kgf · m	lbf · ft	in	mm
Wrench bolt	24	M14	20.9	151.2	0.47	12
Wrench bolt	25	M14	20.9	151.2	0.47	12
Relief valve	30	M33	18.0	130.2	1.42	36
Wrench bolt	32	PF 1/4	6.9	49.9	0.20	5
Plug	33	PF 1/4	20.9	151.2	0.24	6

2) DISASSEMBLING

(1) Disassemble the sub of a TURNING AXIS

① Unloosing wrench bolt (32) and disassemble time delay valve assy (31) from rear cover (23)

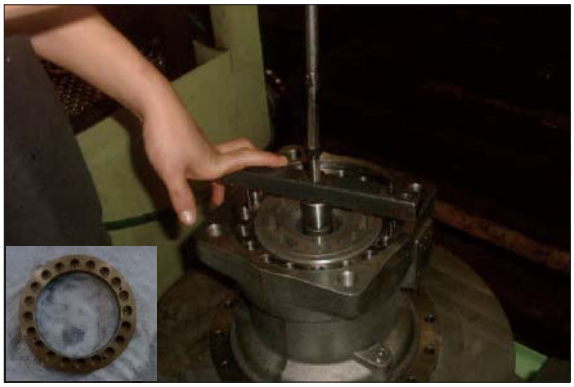


3607A8SM01/01A

② Hang rear cover (23) on hoist, unloose wrench bolt (24, 25) and disassemble from body (1).

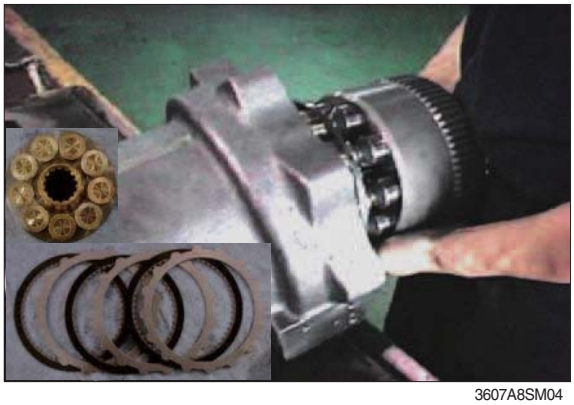
3607A8SM02

③ Using a jig, disassemble break piston (17) from body (1).



3607A8SM03

④ Disassemble respectively cylinder block assy, fricktion plate (15), plate (16) from body (1).



3607A8SM04

⑤ Disassemble shoe plate (8) from body (1).

3607A8SM05

⑥ Using a plier jig, disassemble snap ring (4) and shaft assy (5).

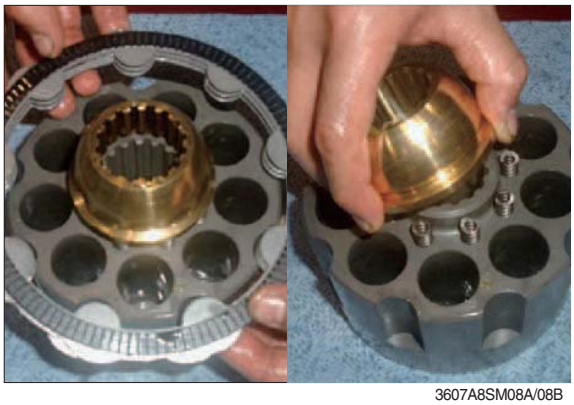
3607A8SM06/06A

(2) Disassemble cylinder block assy sub

① Disassemble pistion assy (14), set plate (13) from cylinder block assy.

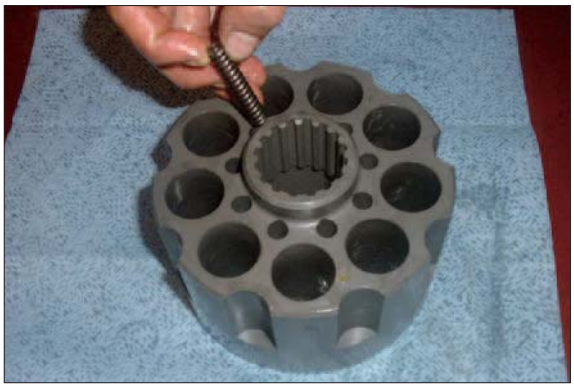
3607A8SM07

② Disassemble ball guide (12), friction plate (15), plate (16) and ball guide seat (11) from cylinder block (9).



3607A8SM08A/08B

③ Disassemble spring (10) from cylinder block (9).



3607A8SM09

(3) Disassemble rear cover assy sub

① Disassemble pin (6, 21) and valve plate (20) from rear cover (23).

3607A8SM10/10A

② Using a torque wrench, disassemble relief valve assy (30) 2 set from rear cover (23).

3607A8SM11/11A

③ Disassemble make up check valve assy with a torque wrench from rear cover (23).

3607A8SM12/12A

4) ASSEMBLING

(1) Assemble the sub of a turning axls

① Put roller bearing (3) on preheater and provide heat to inner wheel (compress ing temp : 290˚C for 2 minutes)

· Roller bearing ×1EA

3607A8SM21

② After assembling and compressing pre-heated roller bearing (3), stop ring (7) into shaft (5).

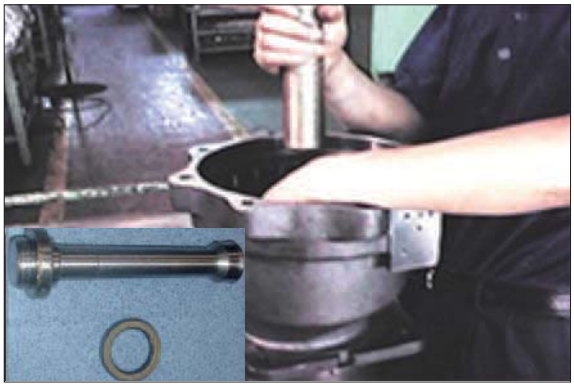
· Stop ring ×1EA

· Shaft× 1EA

3607A8SM22/22A

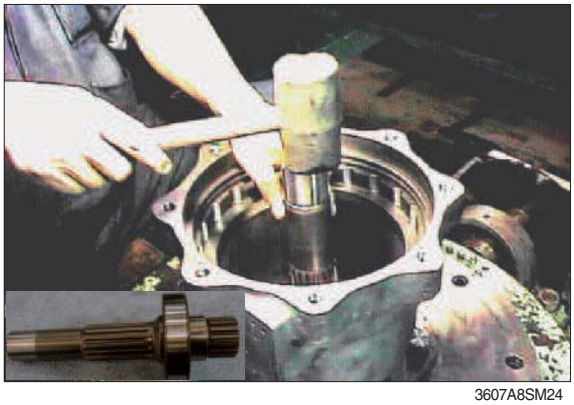
③ Using a compressing tool and steel stick, assemble oil seal (2) into body (1).

· Oil seal ×1EA



3607A8SM23/23A

④ Insert above shaft sub into body (1) and assemble it with a hammer.



3607A8SM24

⑤ Fix snap ring (4) to shaft with a plier jig.
- Snap ring ×1EA

3607A8SM06

⑥ Spread grease on shoe plate (8) and assemble on the body.
- Shoe plate ×1EA

3607A8SM05

(2) Assemble the sub of cylinder block assy

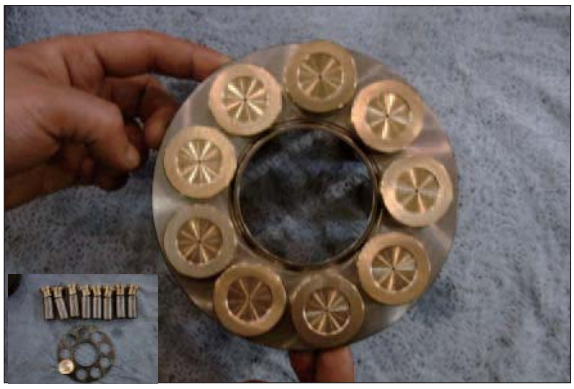
① Assemble spring (10) 9 set into cylinder block (9).
- Spring ×9EA

3607A8SM25

② Assemble ball guide (12) and ball guide seat (11) into cylinder block (9).
- Ball guide ×1EA

3607A8SM26

③ Assemble piston assy (14) 9 set into set plate (13).
- Piston assy ×9EA
- Set plate ×1EA



3607A8SM27

④ Assemble above item ② and ③.

3607A8SM28

⑤ Assemble cylinder block assy into body (1).

3607A8SM04

⑥ Assemble 4 set of lining plate (16), friction plate (15) respectively into body.
- Lining plate ×4EA
- Friction plate ×4EA

3607A8SM29

⑦ Assemble O-ring (18) into break piston (17).
- O-ring ×2EA

3607A8SM30

⑧ Insert break piston assy into body (1) and assemble spring (19) into break piston (17).
- Spring×19EA

3607A8SM31/31A

(3) Assemble the sub of rear cover assy sub

① After assembling needle bearing (22) into rear cover (23), with a hammer assemble pin (6, 21).

3607A8SM32/32A

② Assemble respectively make up check valve assy spring (27), poppet (26), plug (28) into rear cover (23) after then screw it torque wrench.
- Make up check sub ×2set
- Spring ×2EA
- Check ×3EA

3607A8SM33/12A

③ Assemble relief valve assy (30) 2set into rear cover (23) with a torque wrench.

3607A8SM34/11A

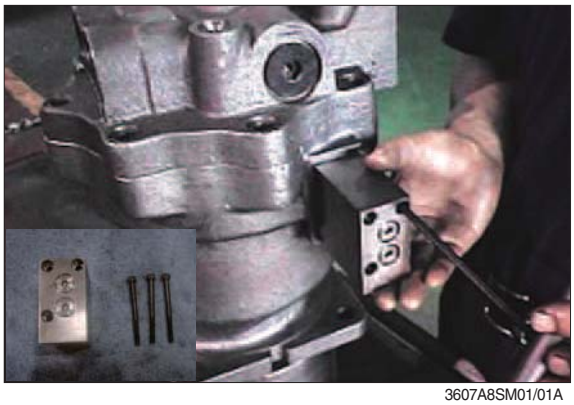
④ Spreading grease on valve plate (20), assemble into rear cover (23).
・Valve plate × 1EA

3607A8SM10/10A

⑤ Lift up rear cover assy on body (1) by a crane and assemble it with a wrench bolt (24, 25).

3607A8SM02

⑥ Assemble time delay valve assy (31) into rear cover (23) with a wrench bolt (32).



3607A8SM01/01A

(4) Air pressing test

Be sure of leakage, after press air into assembled motor.

14078SM232

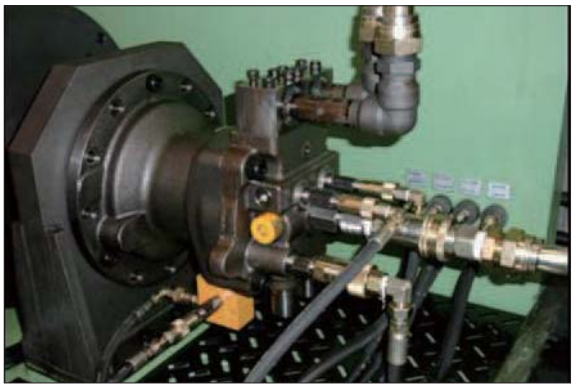
(5) Leakage check

After cleaning motor by color check No.1, paint No.3 and be sure of leakage.

14078SM233/233A

(6) Mount test bench

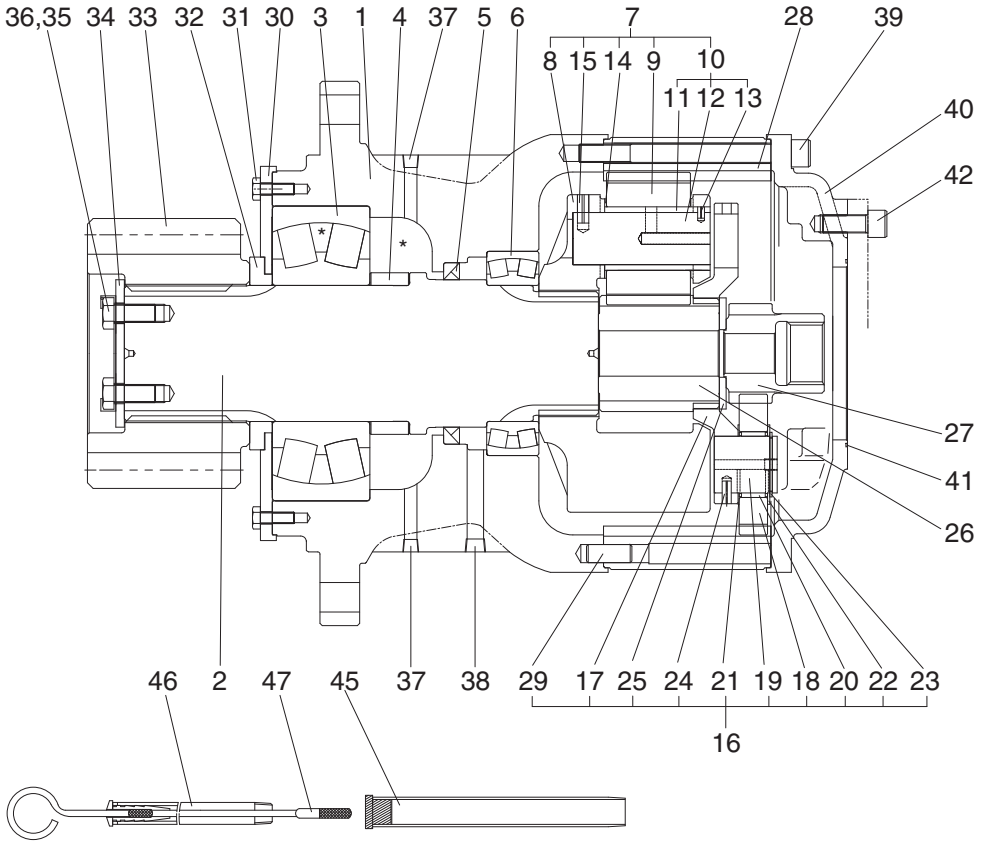
Mounting motor test bench, test the availability of each part.



220078SM14

3. REDUCTION GEAR

1) STRUCTURE



38092SM03

1	Casing	17	Carrier 1	33	Pinion gear
2	Drive shaft	18	Planetary gear 1	34	Lock plate
3	Roller bearing	19	Pin 1	35	Hexagon bolt
4	Spacer ring	20	Needle cage	36	Lock washer
5	Oil seal	21	Side plate 1	37	Plug
6	Roller bearing	22	Side plate 2	38	Plug
7	Carrier 2	23	Stop ring	39	Socket bolt
8	Carrier 2	24	Spring pin	40	Cover
9	Planetary gear 2	25	Thrust ring	41	O-ring
10	Pin 2	26	Sun gear 2	42	Hexagon socket bolt
11	Pin 2	27	Sun gear 1	43	Plug
12	Bushing 2	28	Ring gear	45	Air breather assy
13	Spring pin	29	Knock pin	46	Gauge pipe
14	Thrust washer	30	Cover plate	47	Gauge bar
15	Spring pin	31	Hexagon bolt		
16	Carrier 1	32	Spacer		

2) DISASSEMBLY

(1) Removal of cover

※ Loosen the socket bolt (24) with 16mm hexagonal socket and remove the cover (37).

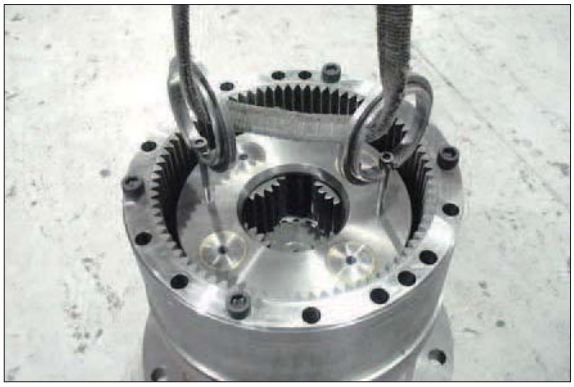
(2) Removal of sun gear 1 and thrust ring assembly

Remove carrier 1(16), install eye bolt to tap hole (M10) and remove carrier 1 assembly itself.

3607A8SR03

(3) Removal of sun gear 2

Remove sun gear 2 (26), install eye bolt to tap (M10) of carrier 2 (8) and remove carrier 2 assembly itself.



3607A8SR04

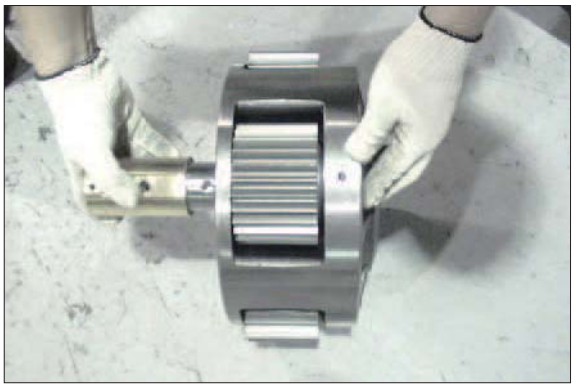
(4) Disassembly of 2nd carrier assembly

① Insert spring pin (15) into pin assy 2(11) by hammering.

※ Do not reuse spring pin after removal.

3607A8SR05

② Remove pin assy 2 (11) from carrier 2 (7), planetary gear 2 (9) and thrust washer (14) with hands.



3607A8SR06

(5) Removal of ring gear

Remove ring gear (28) from casing (1).

※ Fluid packing is applied on contacting face of ring gear and gear casing. Therefore, remove ring gear from casing by minus screw driver.

3607A8SR07

(6) Removal of drive shaft (2) assembly

① Spread off the corners of spacer (32), cover plate (30) and hex bolt (31) with a tool.

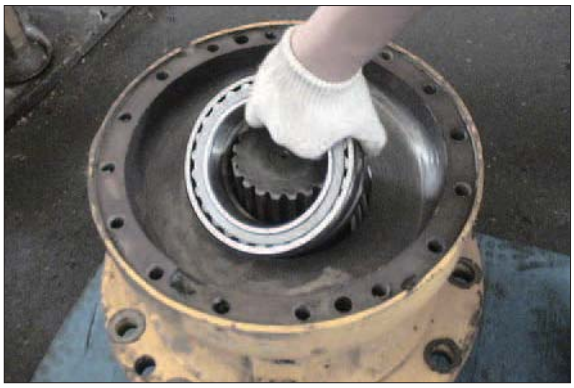
3607A8SR08

② Install hydraulic press at the end face of shaft, and remove drive shaft(2), spacer ring (4), and roller bearing (3) as assembly.

※ Do not reuse oil seal after removal.

3607A8SR09

③ Remove roller bearing (6) from gear casing (1).



3607A8SR10

④ Remove oil seal (5) from gear casing (1).

3607A8SR11

(7) Disassembly of shaft assembly

Insert motor side of shaft (2) into steel tube (inner dia : ø145 mm) and push the end of output shaft side with hydraulic press and then remove roller bearing (3), and spacer ring (4) as assembly from drive shaft (2).

3607A8SR12

3) ASSEMBLY

(1) Assembly of drive shaft assembly

① After assembly drive shaft (2), heat roller bearing (3) up to 50˚C plus surrounding temperature and assemble it to shaft with hydraulic press and then assemble spacer ring (4) in this order.

※ Pay attention to the assembling direction of cover plate (30).

3607A8SR13

(2) Installation of oil seal

Remove oil from assembled face of oil seal of gear casing (1) and oil seal (5).
Apply fluid packing (three bond of white color) on outer face of oil seal and assemble at pressing jig of gear casing.
After inserting with press, lubricate oil seal with grease.

3607A8SR14

(3) Assembly of drive shaft assembly

① Be careful lest oil seal lip damage by spline of drive shaft (2).
Assemble drive shaft assembly by using seal guide.

② Put drive shaft of gear casing (1) upward.
Assemble drive shaft assembly to gear casing by tightening eye bolt into tap hole (M16) of output side of drive shaft (2).

※ Place support (approx 150 mm) below of gear case (1) for seal protector contact with work table.

3607A8SR15

(4) Install of roller bearing

Put gear casing under output shaft and heat roller bearing (6) up to 50˚C plus surrounding temperature and then assemble it to the shaft.

3607A8SR16

(5) Assembly of ring gear

① Remove oil from mating faces between gear casing (1) and ring gear (28), and knock pin (29). Assemble collar of gear casing and apply fluid packing (three bond of grey color).

3607A8SR17

② Assemble ring gear (28).

36078SR18

(6) Assembly of carrier 2 assembly

① Assemble planetary gear 2 (9) to carrier 2 (8) with thrust washer (14) and insert pin assy 2 (11).

※ Lubricate gear oil to inside of gear and outside of shaft.

3607A8SR19

② Insert spring pin (15) by hammering.

※ Insert as the clearance between spring pins toward planetary gear 2 (9).

3607A8SR20

(7) **Assembly of carrier 2 assembly and sun gear 2**

① Mount eye bolt into tap hole (M10) of carrier 2 (8) and lift carrier assembly and then insert carrier assembly being engaged with internal teeth of ring gear (28). Rotate carrier assembly lightly so that splines of drive shaft (2) are engaged.

3607A8SR21

② Insert sun gear 2 (26) to planetary gear 2 (9).

3607A8SR22

(8) Assembly of sun gear 1, carrier 1 assembly

① Mount eye bolt into tap hole (M10) of lift carrier assembly and then insert carrier assembly being engaged with internal teeth of ring gear (28).

Rotate holder assembly lightly so that sun gear 2 (26) is engaged with teeth of carrier 1 (17).

3607A8SR23

② Insert sun gear 1 (27) to planetary gear 1 (18).

3607A8SR24

(9) Check rotation of sun gear by turning plunge part of gear casing with hands.

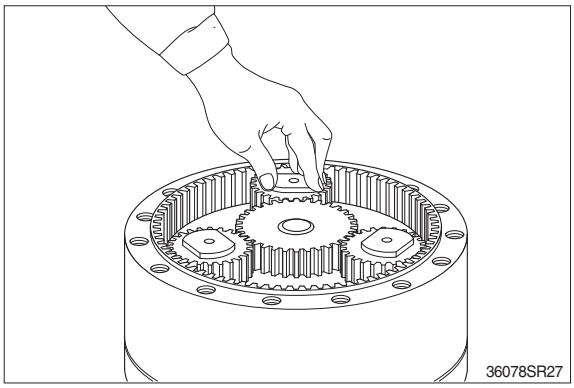
(10) Assembly of cover

Remove oil from mating faces between ring gear (28) and cover (40) and apply fluid packing.

Assemble cover (40) and tighten socket bolt (39) with 16mm hexagonal socket.

Tightening torque : 28.5±3.0 kgf · m
(206±21.7lbf · ft)

This completes assembly



36078SR27

1. REMOVAL AND INSTALL

1) REMOVAL


13031GE18

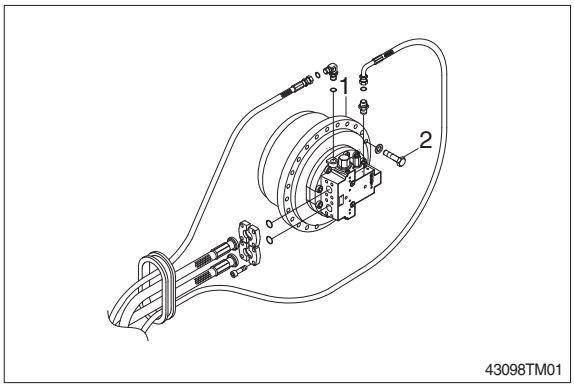
(1) Swing the work equipment 90° and lower it completely to the ground.

(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.



43098TM01

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

(5) Remove the cover.

(6) Remove the hoses.
※ 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 : 620 kg (1370 lb)

2) INSTALL

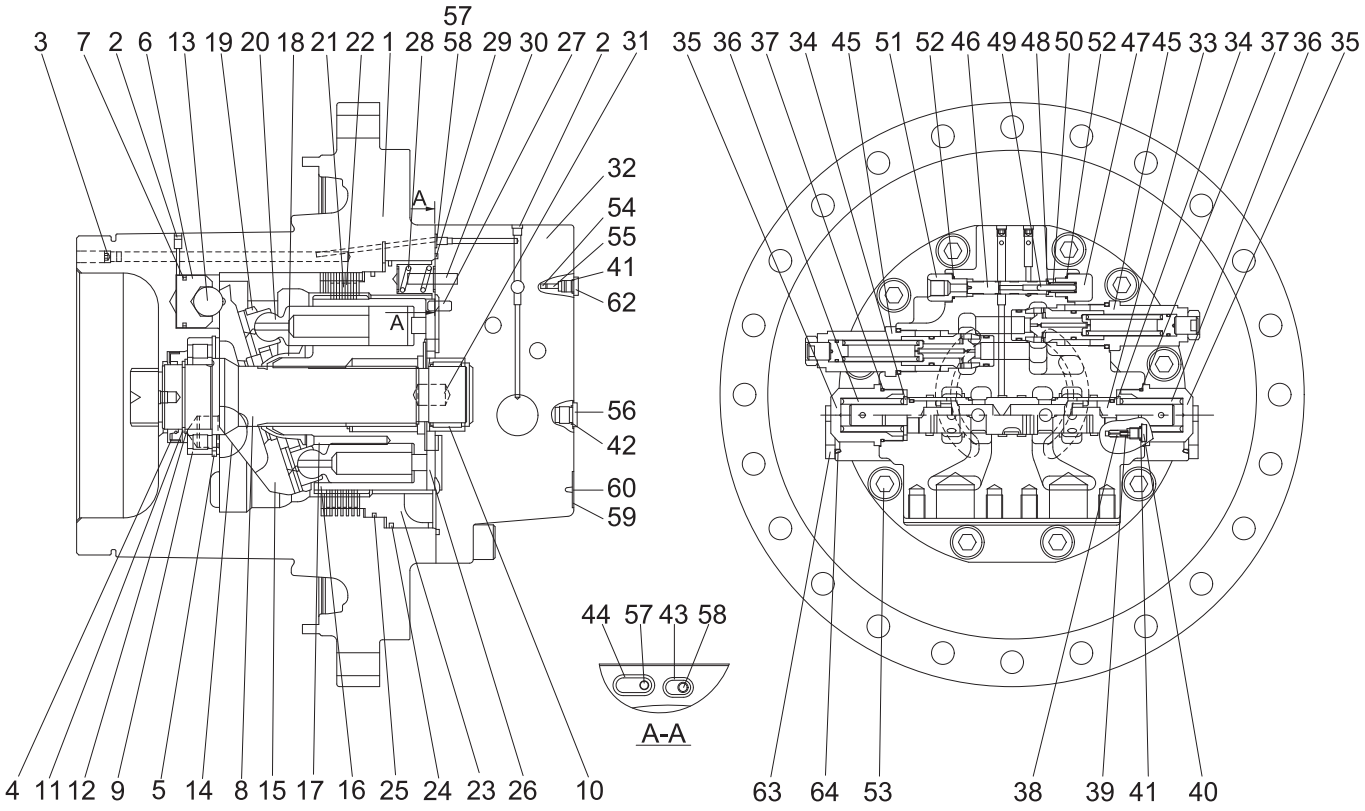
(1) Carry out installation in the reverse order to removal.

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

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

2. SPECIFICATION

1) TRAVEL MOTOR



43092TM02

1	Casing	22	Separated plate	43	O-ring
2	Plug	23	Parking piston	44	O-ring
3	Plug	24	D-ring	45	Relief valve assy
4	Oil seal	25	D-ring	46	Spool
5	Snap ring	26	Valve plate	47	Plug
6	Piston	27	Parallel pin	48	Spring seat
7	Piston seal	28	Spring	49	Parallel pin
8	Shaft	29	O-ring	50	Spring
9	Cylinder roller bearing	30	Spring pin	51	Connector
10	Needle bearing	31	Parallel pin	52	O-ring
11	Snap ring	32	Rear cover	53	Hexagon socket head bolt
12	Thrust plate	33	Main spool assy	54	Check valve
13	Steel ball	34	Spring seat	55	Spring
14	Pivot	35	Plug	56	Plug
15	Swash plate	36	Spring	57	Restrictor
16	Cylinder block	37	O-ring	58	Restrictor
17	Spring	38	Restrictor	59	Name plate
18	Ball guide	39	Spring	60	Rivet
19	Retainer plate	40	O-ring	62	Plug
20	Piston assy	41	O-ring	63	Plug
21	Friction plate	42	O-ring	64	O-ring

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Tool name	B-size	Name of part applied
Hexagonal L-wrench	4	Plug (2)
	5	Plug (3), Plug (40)
	6	Plug (56)
	14	Hex (53)
Socket wrench/Spanner	21	Plug (47), Connector (51)
	30	Relief valve (45)
	41	Plug (53)
Snap ring plier (for holes, axis)		Snap ring (5), Snap ring (11)
Solder hammer		Needle bearing (10), Pin (27), Spring pin(30)
Torque wrench		Size : 500, 700, 5000
Jig for assembling oil seal		Oil seal (4)

(2) Tightening torque

Part name	Item	Size	Torque	
			kgf·m	lbf·ft
Plug	2	NPTF 1/16	1.1±0.1	8.0±0.72
Plug	3	PT 1/8	1.3±1.0	9.4±7.2
Plug	35	M45×1.5	45±4.5	325±32.5
Plug	40	PF 1/8	3.0±0.3	21.7±2.17
Relief valve assy	45	-	26±2.6	188±18.8
Plug	47	PF 3/8	5.5±0.5	39.8±3.6
Connector	51	-	5.5±0.5	39.8±3.6
Hex socket head bolt	53	M18×55	33±3.3	239±23.9
Plug	56	PF 1/4	4.5±0.5	32.5±3.6

3. DISASSEMBLING & ASSEMBLING OF TRAVEL MOTOR

1) GENERAL INSTRUCTIONS

⚠ Combustibles such as white kerosene are used for washing parts.
These combustibles are easily ignited, and could result in fire or injury.
Be very careful when using.

⚠ Internal parts are coated with hydraulic fluid during disassembling and are slippery.
If a part slips out of your hand and fails, it could result in bodily injury or could damage the park.
Be very careful when handling.

(1) Generally, hydraulic equipment is precisely manufactured and clearances between each parts are very narrow. Therefore, disassembling and assembling works should be performed on the clean place where dusts hardly gather. Tools and kerosene to wash parts should also be clean and handled with great care.

(2) When motor is removed from the host machine, wash around the ports sufficiently and put the plugs so that no dust and/or water may invade. Take off these plugs just before the piping works when re-attach it to the host machine.

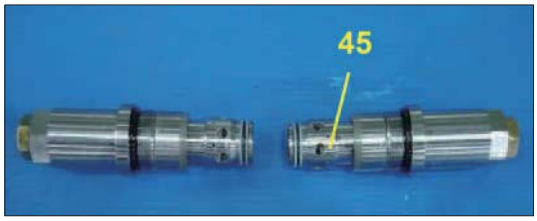
(3) Bofore disassembling, review the sectional drawing and prepare the required parts, depending on the purpose and the range of disassembling.
Seals, O-rings, etc., if once disassembled, are not reusable.
There are some parts that should be replaced as a subassembly.
Consult with the parts manual in advance.

(4) The piston can be inserted to whichever cylinder block for the initial assembling.
However, their combination should not be changed if they are once used. To reuse them, put the matching mark on both pistons and cylinder block before disassembling.

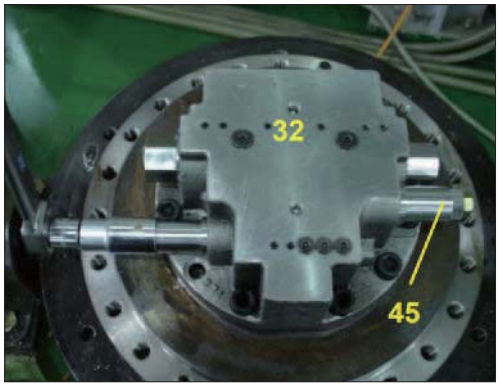
⚠ Take great care not to pinch your hand between parts while disassembling nor let fall parts on your foot while lifting them.

2) DISASSEMBLING TRAVEL MOTOR

(1) Disassemble relief valve assy (45) from rear cover (32) using spanner or torque wrench.

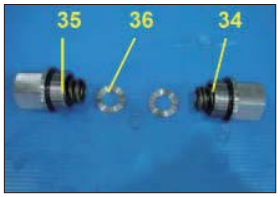


43098TM02

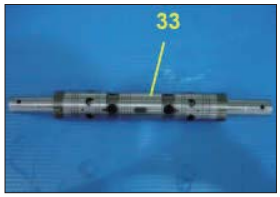


43098TM03

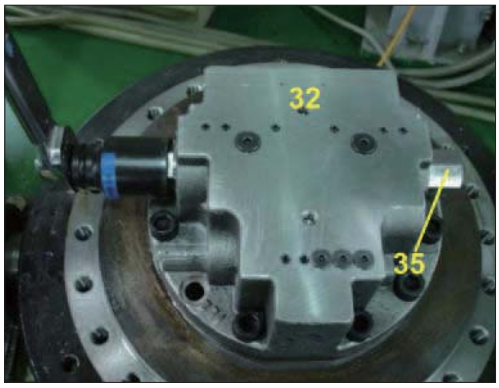
(2) Disassemble main spool cover (35) from rear cover (32) and then disassemble spring (36), spring seat (34), main spool assy (35) in regular sequence.



43098TM04

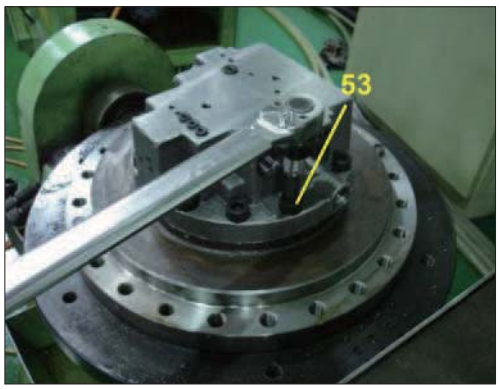


43098TM05



43098TM06

(3) Disassemble wrench bolt (53, 10EA) using torque wrench.



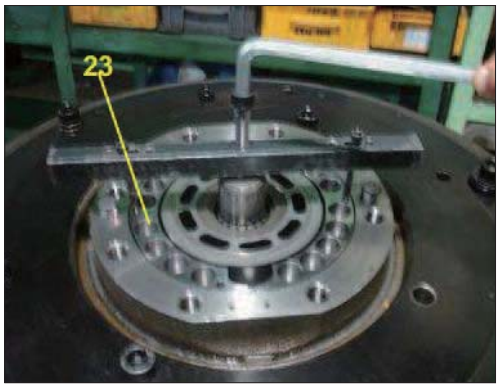
43098TM07

(4) Take out rear cover (34) from casing (1).

43098TM08

(5) Disassemble parking piston (23) using jig.

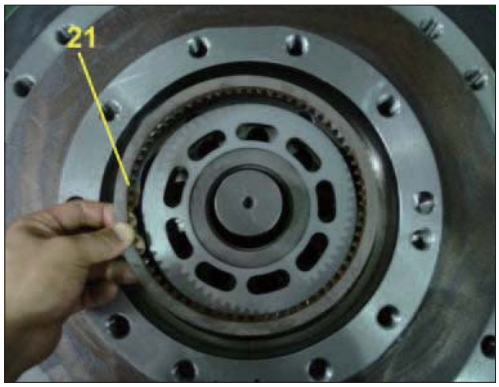
43098TM09



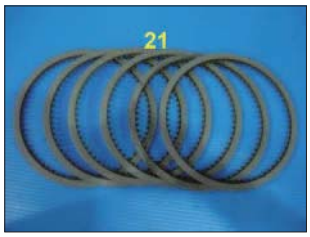
43098TM10

(6) Disassemble separated plate (22, 7EA) and friction plate (21, 6EA).

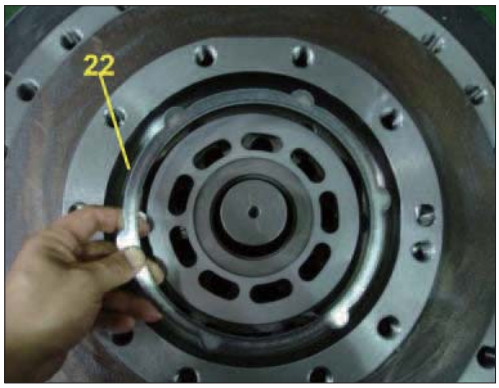
43098TM11



43098TM12

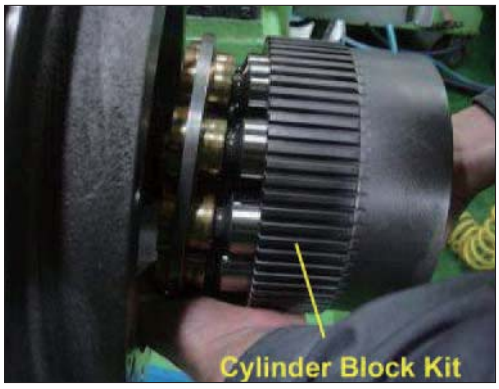


43098TM13



43098TM14

(7) Remove cylinder block kit.
It is easier to work by placing the casing (1) horizontal.

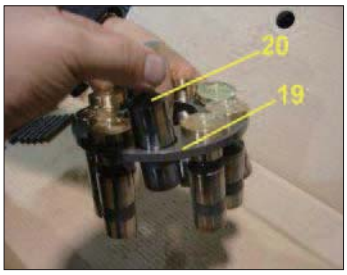


43098TM15

(8) Disassemble cylinder block (16), retainer plate (19), piston assy (20), ball guide (18) and spring (17) from cylinder block kit.

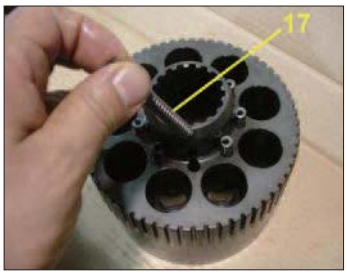

43098TM16


43098TM17



43098TM18

43098TM19



43098TM20

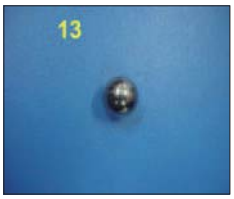
(9) Disassemble swash plate (15) from shaft casing (1).

43098TM21

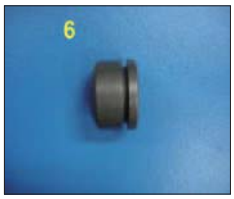

43098TM22

(10) Disassemble steel ball (13) and swash piston (6).

※ Hole in the casing (1) of two speed line is decomposed by injecting oil.



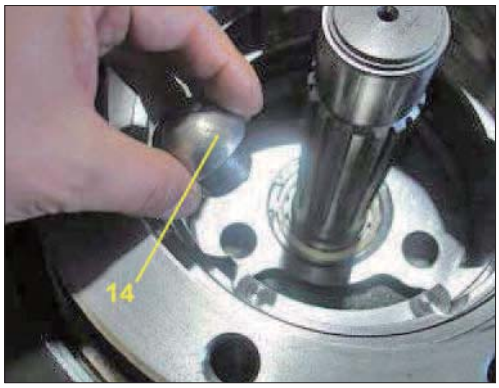
43098TM23



43098TM24

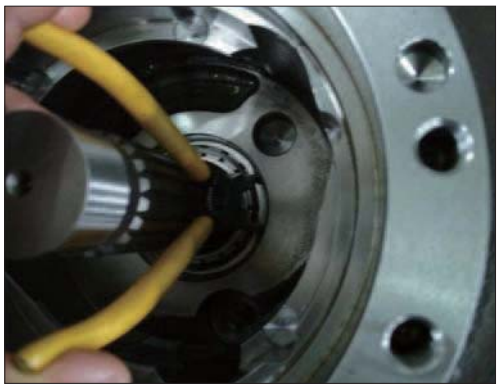

43098TM25

(11) Disassemble pivot (14, 2EA) from casing (1).



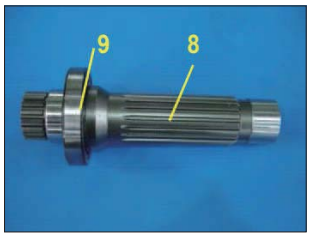
43098TM26

(12) Disassemble snap ring (5) using pliers.

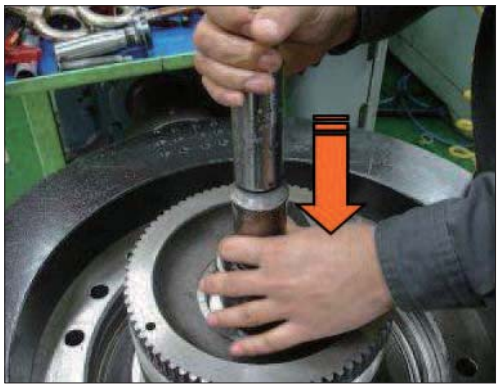


43098TM27

(13) In the casing (1), the arrow part of the shaft (8) using a rubber mallet taps and then disassemble the shaft (8) and bearing-roller (9) to the other side.



43098TM28

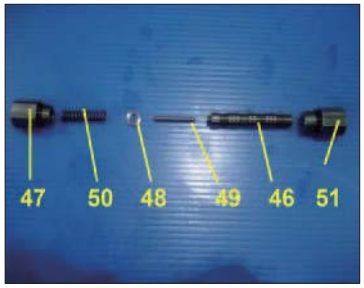


43098TM29

(14) Disassemble valve plate (28) from rear cover (32).

43098TM30

(15) Disassemble plug (47), connector (51) from rear cover (32) and then disassemble spring (50), spring-seat (50), pin – parallel (49), spool (47) in regular sequence.

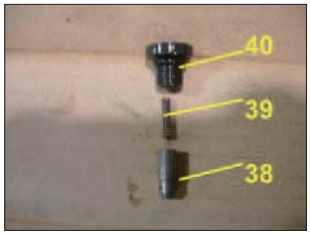


43098TM31

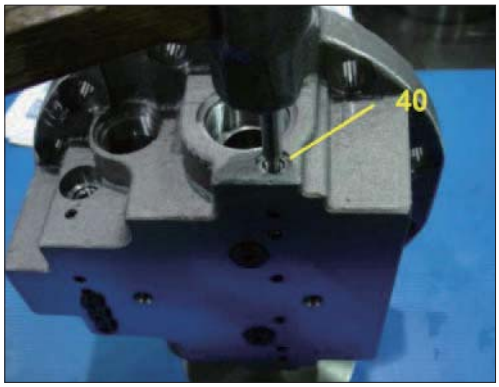

43098TM32


43098TM33

(16) Disassemble plug (40) from rear cover (32) and then disassemble spring (39), restictor (38) from rear cover (34) in regular sequence.

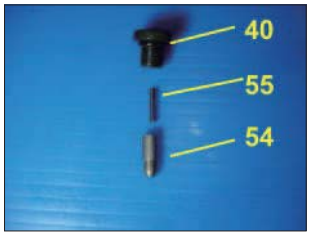


43098TM34

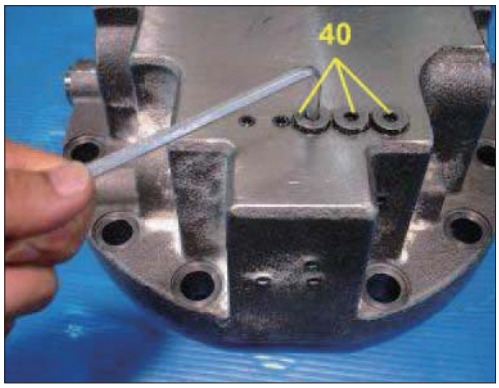


43098TM35

(17) Disassemble plug (40) from rear cover (34) and then disassemble spring(55), check valve (54) from rear cover (32) in regular sequence.

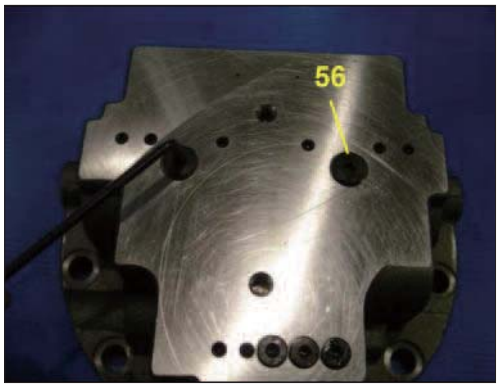


43098TM36



43098TM37

(18) Disassemble plug (56) from rear cover (32).

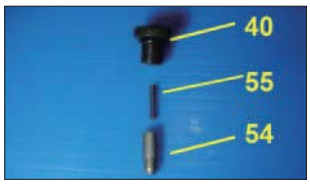


43098TM38

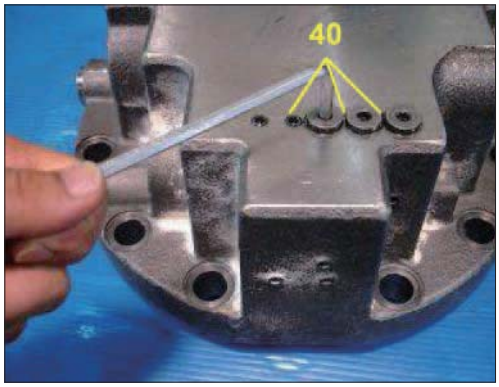
3) ASSEMBLING TRAVEL MOTOR
- REAR COVER ASSY

(1) Insert check valve (55), spring (56) into rear cover (32) and then assemble plug (40) using torque-wrench.

· Tightening torque : 3.0±0.3 kgf · m
(21.7±2.17 lbf · ft)



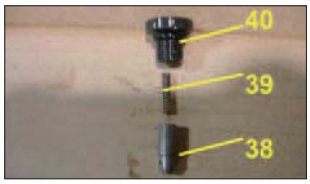
43098TM39



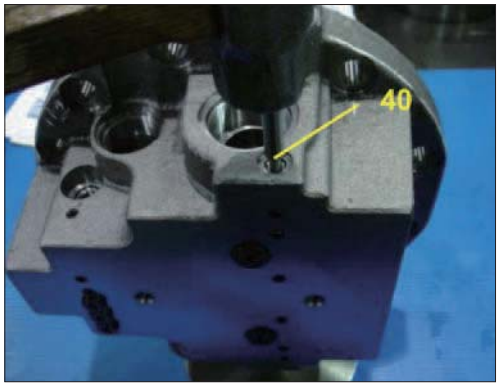
43098TM40

(2) Insert restrictor (38), spring (39) into rear cover (32) and then assemble plug (40) using torque-wrench.

· Tightening torque : 3.0±0.3 kgf · m
(21.7±2.17 lbf · ft)



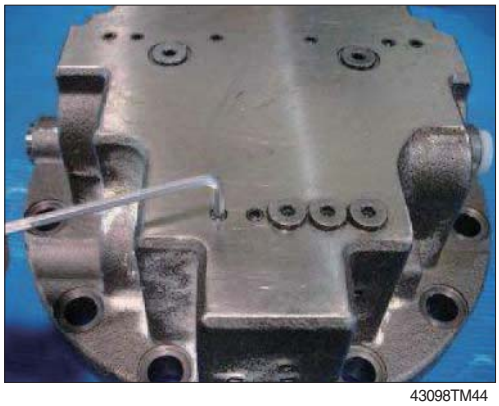
43098TM41



43098TM42

(3) Apply loctitle #242 on the 14 plug (2) and then assemble them into rear cover (32).

43098TM43


43098TM44

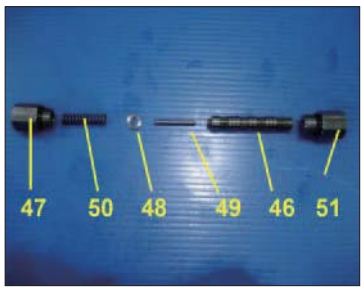
(4) Assemble 2 plug (42, 56) using torque-wrench.

· Tightening torque : 4.5±0.5 kgf · m
(32.5±3.62 lbf · ft)


43098TM45

(5) Insert spool (46), parallel pin (49), spring seat (48) and spring (50) in regular sequence and then assemble plug (47), connector (51) using torque-wrench.

· Tightening torque : 5.5±0.5 kgf · m (39.8±3.62 lbf · ft)



43098TM46


43098TM47


43098TM48

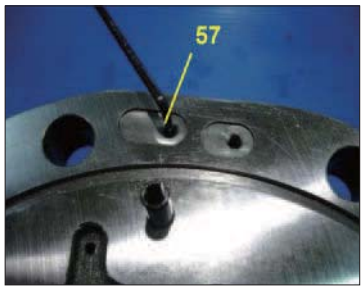
(6) Press needle bearing (10) into rear cover (32) using jig.


43098TM49

(7) Assemble spring pin (30), parallel pin (27) using small hammer.

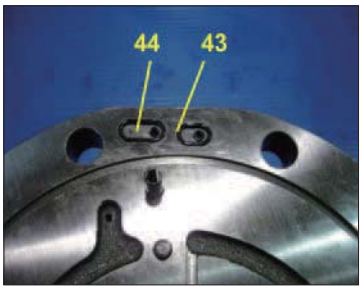

43098TM50

(8) Apply loctitle #242 on the restrictor (57, 58) and then assemble restrictor (57, 58), O-ring (43, 44) into rear cover (34).



43098TM51

43098TM52



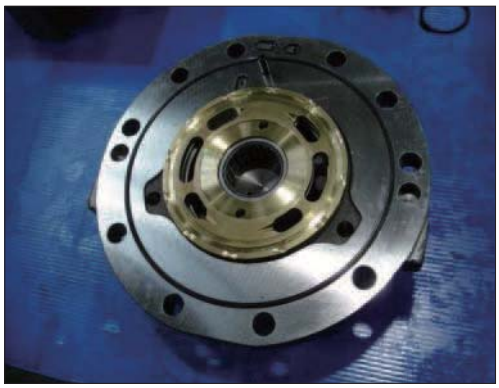
43098TM53

(9) Assemble valve plate (26) into rear cover (32).

※ **Apply grease to the valve plate contact and then assemble it into rear cover (32).**

43098TM54

(10) Apply grease to the O-ring (29), and then assemble **it** into rear cover (34).



43098TM55

(11) Assemble the heated roller bearing (9) onto the shaft (8) and then assemble snap ring (6) into shaft (8).

① The temperature of the roller bearing : 100˚C.

※ **Using tool : Heater.**

※ **Be careful not to damage the sliding surface for the oil seal on the shaft.**

43098TM56

43098TM57

43098TM58

43098TM59

(12) Install casing (1) into assembling jig.

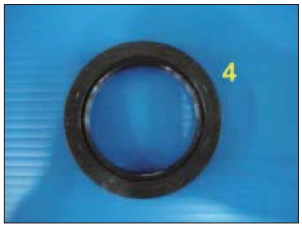
43098TM60

(13) Assemble plug (2), (3) into casing (1).

43098TM61

43098TM62

(14) Assemble oil seal (3) into casing (1) with assembling jig.



43098TM63

43098TM64

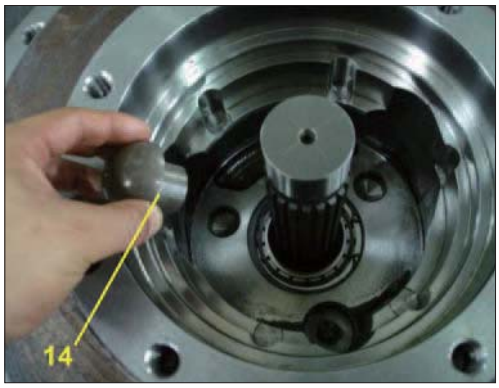
(15) Insert assembled shaft assy in the direction of the arrow into casing(1) using a rubber mallet.


43098TM65


43098TM66

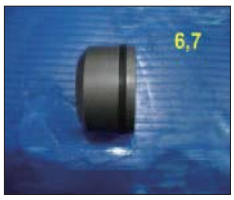
43098TM67

(16) Apply the grease to pivot (14, 2EA) and then assemble pivot (14) into casing(1).

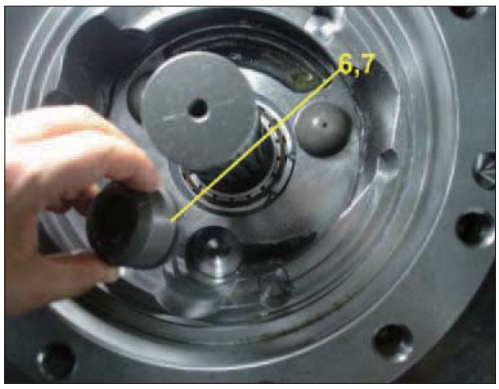


43098TM68

(17) Warm piston seal (7) and assemble it on swash piston (6) and then bind the piston seal (7) with a bend for a minute.
Remove the bend and assemble it into casing (1).



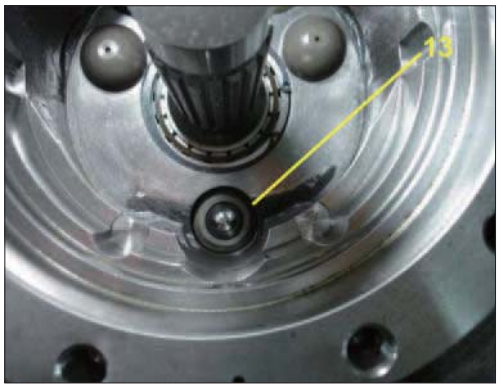
43098TM69



43098TM70

(18) Apply the grease to steel ball (15) and then assemble steel ball (15) into casing (1).

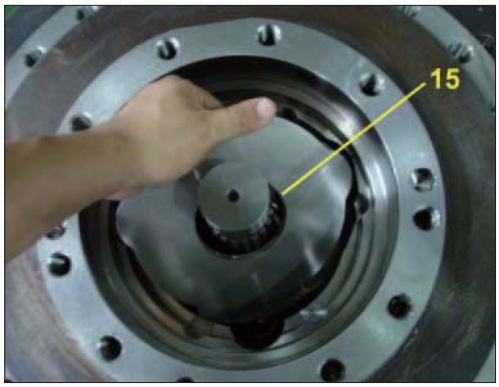
43098TM71



43098TM72

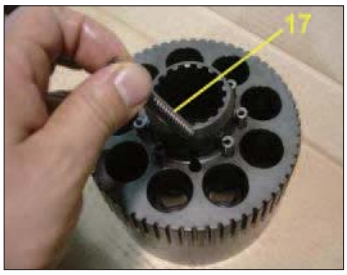
(19) Apply the grease to swash plate (15) and then assemble swash plate (15) into casing (1).

43098TM73



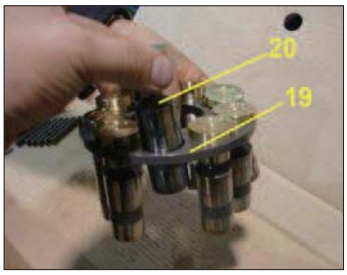
43098TM74

(20) Assemble spring (17), ball guide (18), retainer plate (19), piston assy (20) into cylinder block (16) in regular sequence.

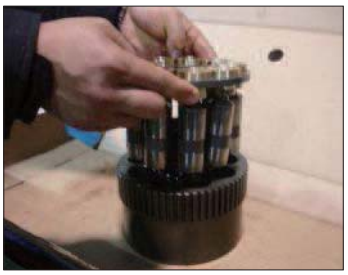


43098TM75

43098TM76



43098TM77

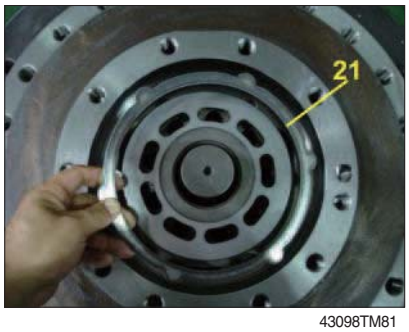

43098TM78


43098TM79

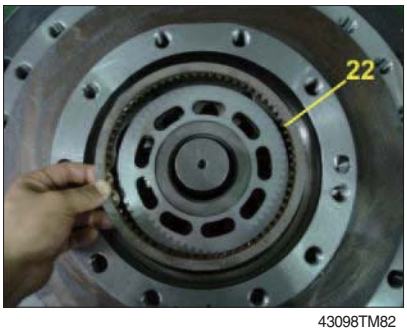
(21) Assemble cylinder block kit into casing (1).


43098TM80

(22) Assemble separated plate (21), friction plate (22) into cylinder block in regular sequence.
Friction plate : 6EA
Separated plate : 7EA



43098TM81

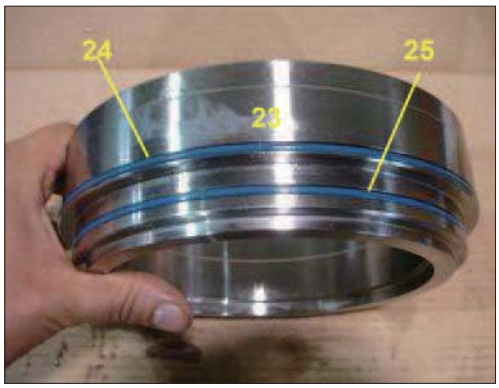


43098TM82

(23) Assemble parallel pin (31) into casing(1).

43098TM83

(24) Apply the grease to D-ring (24, 25) and then assemble them into parking piston (23).



43098TM84

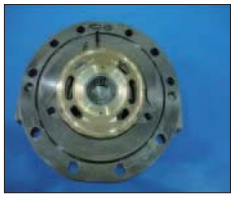
(25) Assemble parking piston into casing using jig.

43098TM85

(26) Assemble parking spring (28, 14EA).

43098TM86

(27) Put on the rear cover (32) on the casing (1).



43098TM87

43098TM88

(28) Assemble rear cover (32) into casing (1) and then tighten the wrench bolt (53) using torque wrench.

· Tightening torque : 33±3.3 kgf · m
(239±23.9 lbf · ft)

43098TM89

(27) Assemble main spool assy (33) into rear cover (32) after checking the direction to be correct.

43098TM90

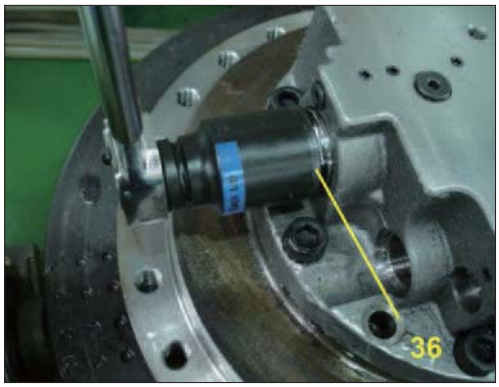
43098TM91

(30) Assemble spring (37), plug (36) into rear cover (34) in regular sequence and then plug (36) into rear cover (34) using torque wrench.

· Tightening torque : 45±4.5 kgf · m
(325±32.5 lbf · ft)

43098TM92

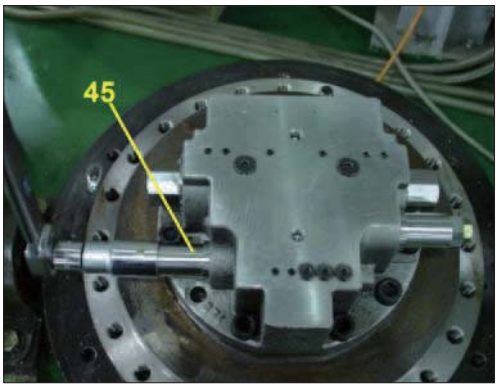
43098TM93



43098TM94

(31) Assemble relief valve assy (45) using torque-wrench.

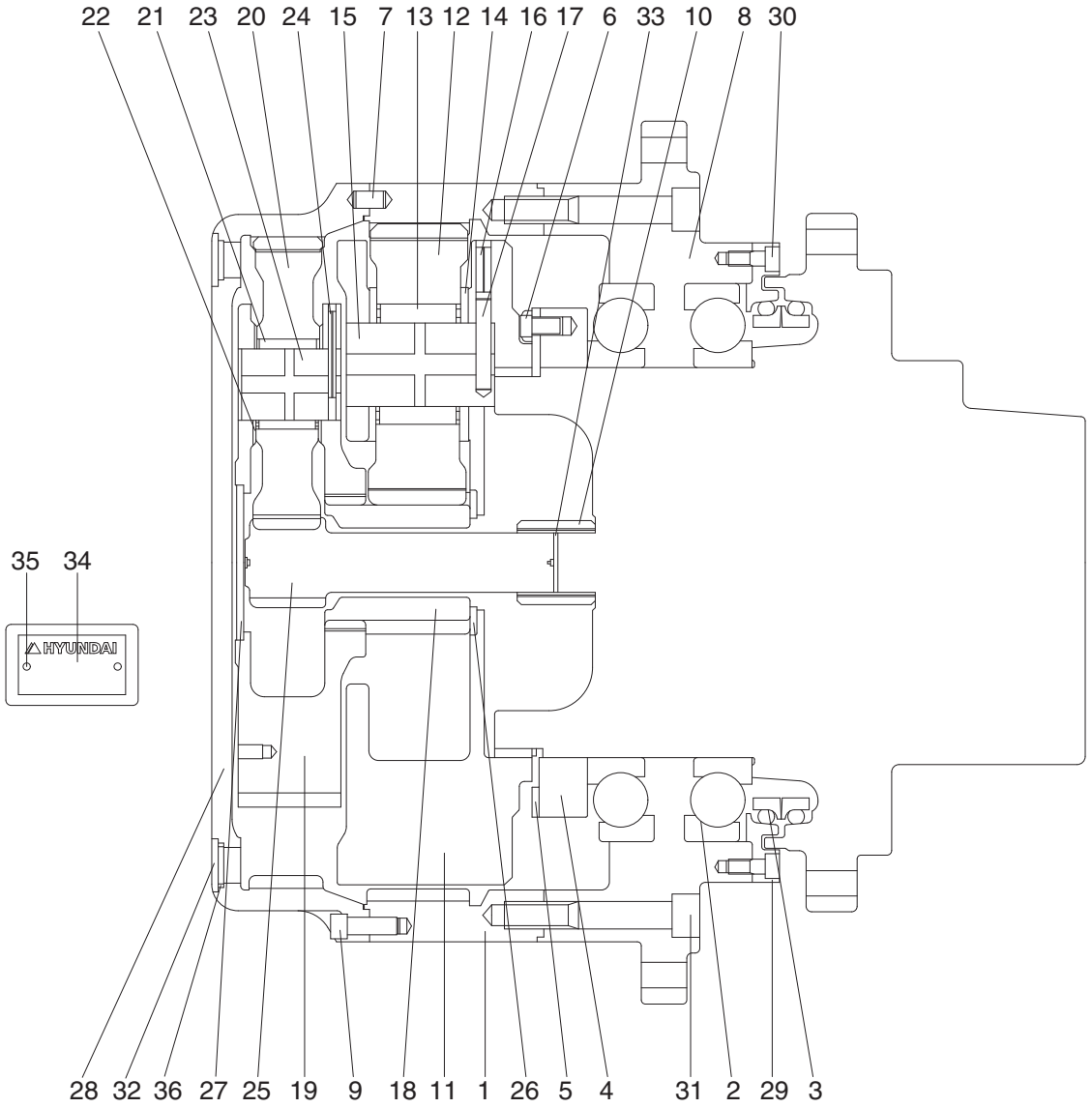
· Tightening torque : 26±2.6 kgf · m
(188±18.8 lbf · ft)



43098TM95

4. TRAVEL REDUCTION GEAR

1) STRUCTURE



43092TM03

1	Ring gear	13	Needle bearing 2	25	Sun gear 1
2	Ball bearing	14	Thrust washer 2	26	Thrust plate
3	Floating seal assy	15	Carrier pin 2	27	Thrust plate
4	Ring nut	16	Spring pin 2	28	Cover
5	Lock plate	17	Solid pin 2	29	Cover seal
6	Hexagon socket head bolt	18	Sun gear 2	30	Hexagon socket head bolt
7	Parallel pin	19	Carrier 1	31	Hexagon socket head bolt
8	Housing	20	Planetary gear 1	32	Plug
9	Hexagon socket head bolt	21	Needle bearing 1	33	Snap ring
10	Coupling	22	Thrust washer 1	34	Name plate
11	Carrier 2	23	Carrier pin 1	35	Rivet
12	Planetary gear 2	24	Spring pin 1	36	O-ring

2) TOOL AND TIGHTENING TORQUE

(1) Tools

Tool name	B-size	Name of part applied
Hexagonal L-wrench	10	Hex socket head bolt (30)
	12	Hex socket head bolt (9)
	14	Plug (32)
	20	Hex socket head bolt (31)
Socket wrench/Spanner	12	Hex socket head bolt (6)
Hammer		Needle bearing (13, 21), Pin (15, 16, 17, 23, 24)
Torque wrench		Capable of tightening with the specified torques
Jig for assembling floating seal		Floating seal (3)
Bearing assembly jig		Arg-ball bearing (2)

(2) Tightening torque

Item	Name	Size	Torque	
			kgf·m	lbf·ft
4	Ring nut	M280	66±6.0	477±43.4
6	Hexagon head bolt	M12	8.8±0.9	63.7±6.5
9	Hexagon socket head bolt	M12	14.3±1.4	103±10.1
30	Hexagon socket head bolt	M10	6.3±0.6	45.5±4.3
31	Hexagon socket head bolt	M20	53±5.0	383±36.2
32	Plug	PF 3/4	10±1.0	72.3±7.2

5. DISASSEMBLING AND ASSEMBLING OF REDUCTION GEAR

1) GENERAL INSTRUCTIONS

⚠ **Combustibles such as white kerosene are used for washing parts.**
These combustibles are easily ignited, and could result in fire or injury.
Be very careful when using.

⚠ **Internal parts are coated with gear oil during disassembling and are slippery.**
If a part slips off from your hand and fails, it could result in bodily injury or could damage the park.
Be very careful when handling.

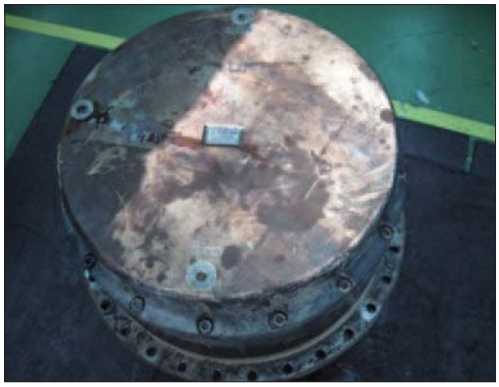
(1) Therefore, disassembling and assembling works should be performed on the clean place where dusts hardly gather.
Tools and kerosene to wash parts should also be clean and handled with great care.

(2) Bofore disassembling, review the sectional drawing and prepare the required parts, depending on the purpose and the range of disassembling.
Seals, O-rings, etc., if once disassembled, are not reusable.
There are some parts that should be replaced as a subassembly.
Consult with the parts manual in advance.

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

2) DISASSEMBLING TRAVEL REDUCTION GEAR

(1) Ready for disassembling



43098TR01

① Reduction gear removed from machine usually covered with dirt, so clean it with cleaning liquid and dry it.

② Put reduction gear on stable place with drain port down side and remove oil plug (PF3/4) to pull-out gear oil through drain port.

※ When the oil is hot, there are high chance to blow out hot oil because of the pressure difference between container and out side.

③ Set reduction gear on work table.

④ Mark surface of cover, ring gear and housing for proper re-assembly.

(2) Put reduction gear on work table to disassemble

43098TR02

① Set eye bolt (M20) into M20 tap hole on housing flange. Make reduction gear cover upper direction using hoist machine.

⚠ Be aware of safety. There are some chances of accidents when put down the reduction gear. Do not place the part fall on your foot.

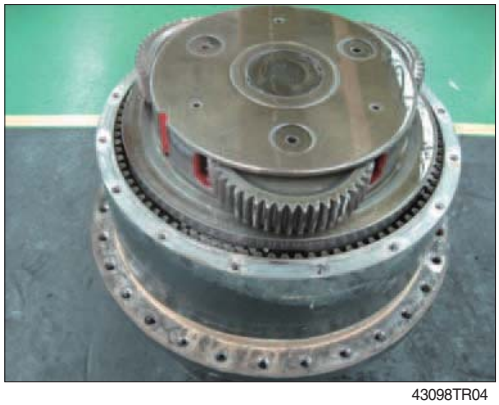
(3) Removing cover

43098TR03

① Remove 16 of hex socket head bolt (M12×35) connecting cover and ring gear using torque wrench.

② Using sharp tools to separate cover and ring gear. Put sharp tools into the gap between ring gear and cover and tap the tool tenderly.

(4) Remove thrust plate and No.1 carrier sub



43098TR04

① Remove thrust plate first, set eye bolt (M10) in No.1 carrier tap hole. After these, pull-up No.1 carrier assy slowly.

② Remove No.1 sun gear from reduction gear slowly.

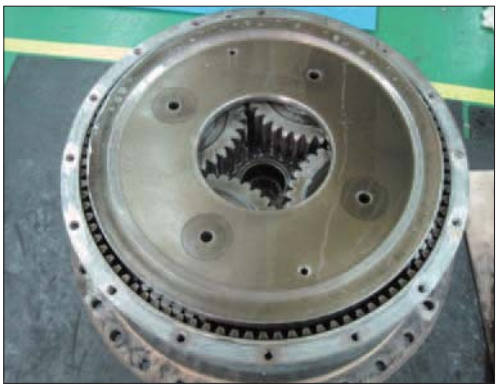
※ **When disassemble No.1 sun gear, be sure to keep vertical against ground with No.1 sun gear.**

43098TR05

(5) Removing carrier sub No.2

① Remove No.2 sun gear slowly.

※ **When disassemble No.2 sun gear, be sure to keep vertical against ground with No.2 sun gear.**



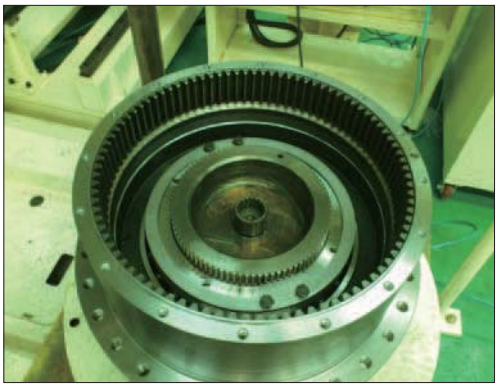
43098TR06

② Set eye bolt (M10) in No.2 carrier assy, pull-up slowly.

43098TR07

(6) Remove coupling

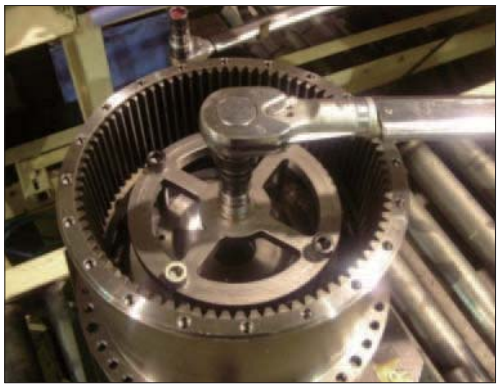
① Remove coupling on motor spline.



43098TR08

(7) Remove nut ring and lock plate

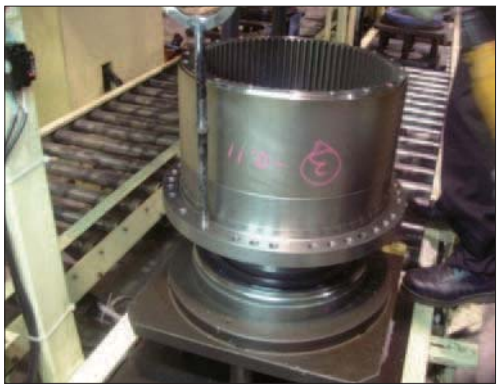
① Remove hex head bolt (M12×20) using torque wrench which is connecting ring and lock plate.
② Remove lock plate from motor casing spline.
③ Remove nut ring using designed tools.



43098TR09

(8) Disassemble ring gear and housing

① Set eye bolt (M20) in flange of housing, pulling ring gear and housing from motor.

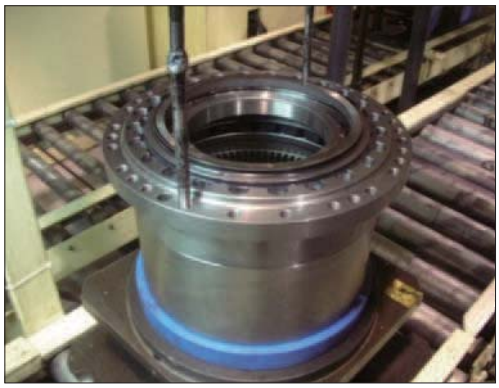


43098TR10

② Put disassembled ring gear and housing on work table. Be sure to set floating seal upper side, and remove floating seal.

※ **Do not re-use floating seal.**

③ Remove hex socket head bolt (M20×120) connecting housing and ring gear using torque wrench.
④ Put sharp tool into gap between ring gear and housing and tap it tenderly to separate gear and housing.



43098TR11

(9) Disassemble housing components

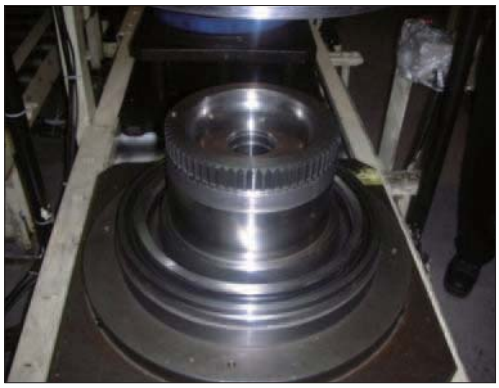
① Hex head bolt (M10×25) connecting housing and seal cover using torque wrench, and remove seal cover.

43098TR12

(10) Separate motor casing and floating seal

① Pull floating seal in motor casing slowly and remove floating seal from motor casing.

※ **Do not re-use floating seal.**



43098TR13

(11) Disassemble No. 1 carrier assy

① Put spring pin into No.1 spring pin hole using specially designed tool.

43098TR14

② Disassemble No.1 planetary gear, thrust washer, No.1 pin, needle bearing form No.1 carrier.

※ **Do not re-use No. 1 pin.**

43098TR15

(12) Disassemble No. 2 carrier assy

① Cut solid pin by pressing No. 2 pin using press machine.

⚠ **Be aware of scattering of components when operator use press machine.**

② Disassemble No. 2 planetary gear, thrust washer, No. 2 pin, needle bearing from No. 2 carrier.

※ **Do not re-use No. 2 pin.**

43098TR16

3) ASSEMBLYING TRAVEL REDUTION GEAR

(1) General precautions

① Clean all components with kerosene and dry them in shade. Remove all loctite with solvent. Check the components.
Apply loctite #262 on thread of hex socket head bolt.
Be aware of dropping of parts on foot and safety accident.
Check the quantity of all parts in advance.

② Check the abnormality of thrust washer like twist or wear.

③ Check the surface of every gear. Whether there is pitting or crack on them.

④ Rolling the bearing and check the rolling condition and the noise.

⑤ Check the surface of floating seal and crack of O-ring.

(2) Carrier No. 1 assembly

① Set No.1 carrier on stable and even place.

② Put No.1 needle bearing in No.1 planetary gear and place No.1 thrust washer 2 pcs on both side of gear. Assemble gear in carrier.

43098TR17

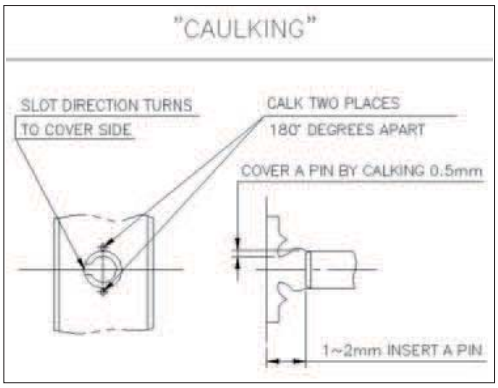
③ Align spring pin hole of No.1 pin with No. 1 carrier spring pin hole and assemble No.1 pin accordingly.

43098TR18

④ Put spring pin into No.1 carrier using jig with force.

43098TR19

⑤ Caulking both side of pressed spring pin 180˚ using caulking jig.



43098TR20

(3) Carrier No. 2 assembly


43098TR21

① Set No. 2 carrier on stable and even place.

② Put No.2 needle bearing in No.2 planetary gear and place No.2 thrust washer 2pcs on both side of gear. Assemble gear in carrier.

③ Align solid pin hole of No. 2 pin and No. 2 carrier spring pin hole. and assemble No. 2 pin accordingly.

④ After assembly solid pin, put spring pin with force.

⑤ Caulking both sides of pressed spring pin 180˚ using caulking jig.

(4) Assembling floating seal


43098TR22

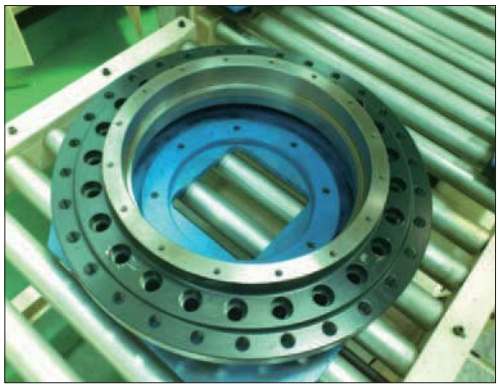
① Wipe O-ring side of floating seal and contact surface of floating seal of motor casing with oil applied lint free towel, and press fitting floating seal into motor casing with special jig.

※ Keep the floating seal vertical against ground.

(5) Housing & main bearing

① Heating and cleaning housing with 60~70˚C temperature.

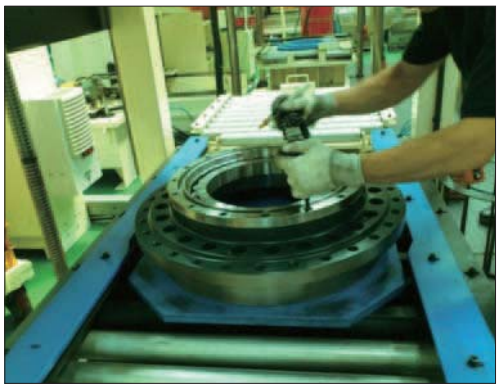
② Set the housing on working table safely, press fitting main bearing into both side of housing.



43098TR23

(6) Seal cover

① Apply three bond #1194 on contact surface of housing and seal cover, tighten hex socket head bolt (M10×25) with designed torque 6.3±0.6 kgf · m (45±4.3 lbf · ft) using torque wrench.

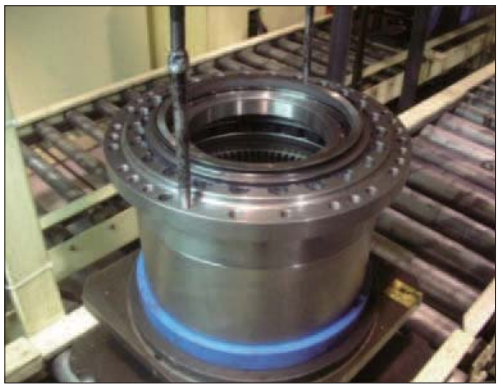


43098TR24

(7) Housing components and ring gear

① Apply three bond #1194 on the surface of ring gear and housing contact surface, tighten hex socket head bolt (M20×120) with designed torque 53±5.3 kgf · m (383±38.3 lbf · ft) using torque wrench.

② Wipe O-ring side of floting seal and contact surface of floating seal of seal cover with oil applied lint free towel, and press fitting floating seal into seal cover.



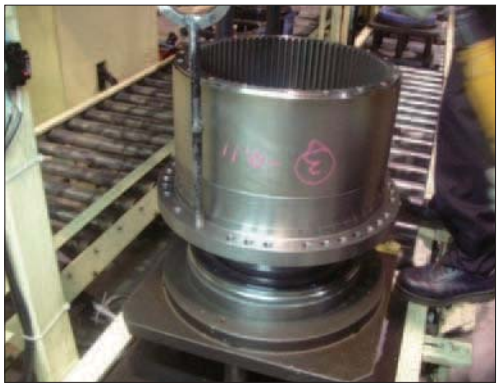
43098TR25

(8) Motor & assembled housing components assembly

① Set eye bolt (M20) in housing flange tap hole.

② Assemble assembled housing components on motor using hoist.

※ Be sure set eye bolt firmly to keep operator safe.



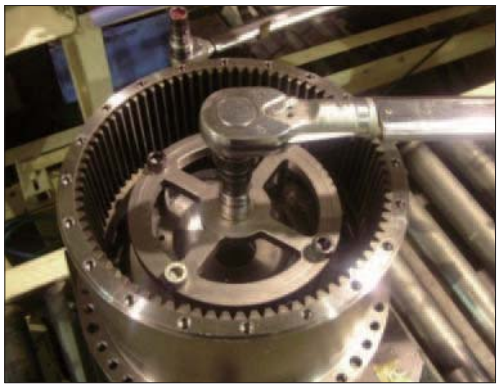
43098TR26

(9) Nut ring and lock plate

① Tighten nut ring with designed torque using torque wrench.

② Set lock plate along with bolt hole of nut ring and assemble them.

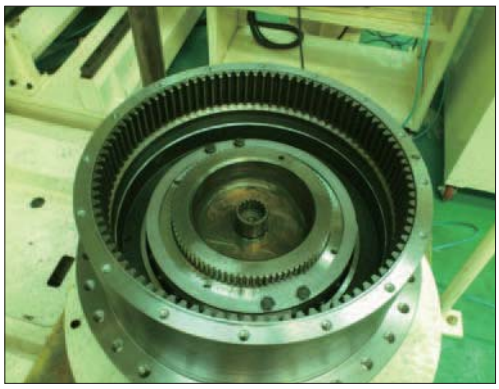
③ Tighten hex head bolt (M12×20) with designed torque 8.8±0.9 kgf·m (63.7±6.5 lbf·ft).



43098TR27

(10) Coupling

① Assembly coupling with motor's spline.



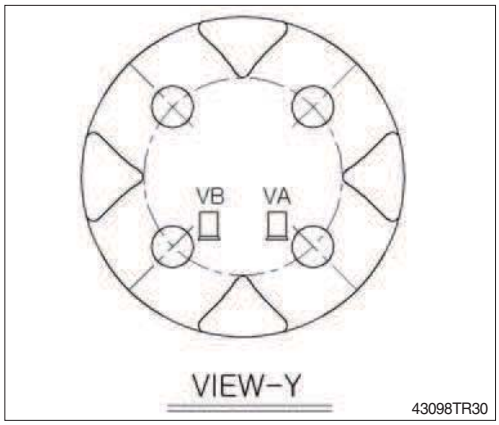
43098TR28

(11) No.2 carrier sub

① Set eye bolt (M10) in No.2 carrier assy, lift them using hoist and set down No.2 carrier assy into motor.

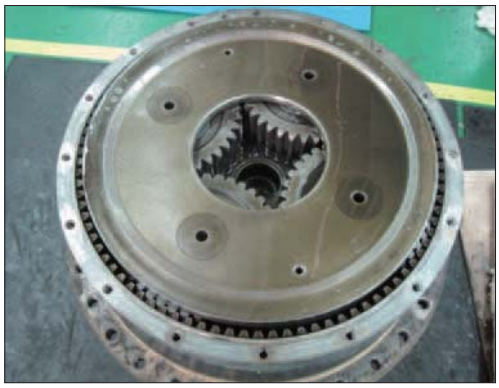
43098TR29

※ To set the align valve ports, refer to right drawing.



43098TR30

② Assemble No.2 sun gear into No.2 carrier assy.



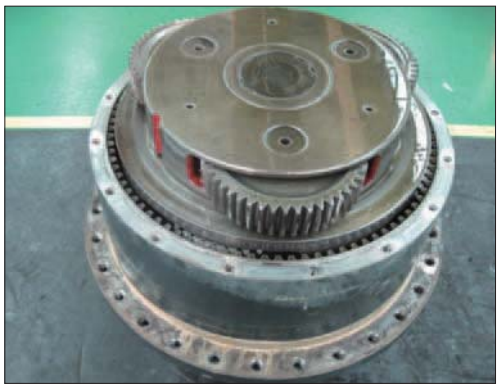
43098TR31

(12) No.1 carrier sub assembly

① Set eye bolt (M10) in No.1 carrier tap hole and set down No.1 carrier assy slowly.

② Assemble No.1 sun gear and No.1 carrier assy.

③ Assemble thrust plate and carrier.



43098TR32

(13) Cover assembly

① Put parallel pin (ø 13 × 20) into parallel pin hole of ring gear with rubber hammer.

② Apply three bond #1194 on cover contacting surface of ring gear and assemble cover.

③ Tighten 16 of hex socket head bolt (M12 × 35) with designed torque 14.3 ± 1.4 kgf · m (103 ± 10.1 lbf · ft) using torque wrench.

43098TR33

(14) Putting gear oil

(1) Put gear oil 12 ± 0.5 liter through fill port and check the oil level.

(2) Tighten oil plug with torque 10 ± 0.1 kgf · m (72.3 ± 0.72 lbf · ft).

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.

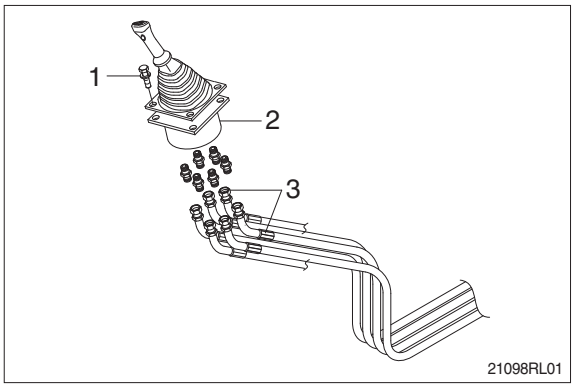
(4) Loosen the socket bolt (1).

(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.



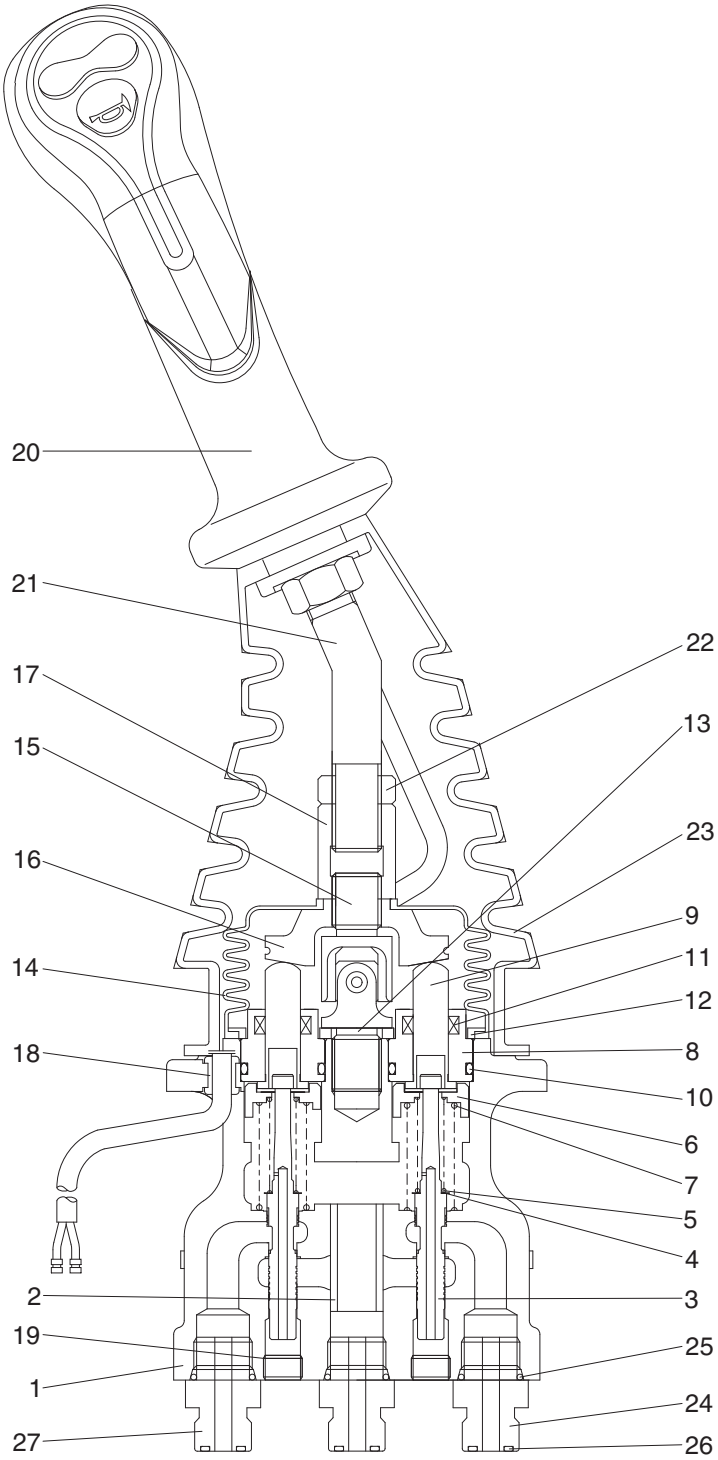
2) INSTALL

(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

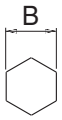


300L2RL06

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

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

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

(2) Tightening torque

Part name	Item	Size	Torque	
			kgf · m	lbf · ft
Joint	15	M14	3.5	25.3
Swash plate	16	M14	5.0±0.35	36.2±2.5
Adjusting nut	17	M14	5.0±0.35	36.2±2.5
Lock nut	22	M14	5.0±0.35	36.2±2.5

3) DISASSEMBLY

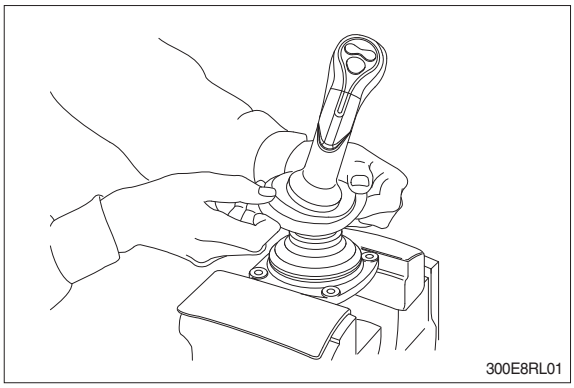
※ Procedures are based on the type L1.

(1) Clean pilot valve with kerosene.

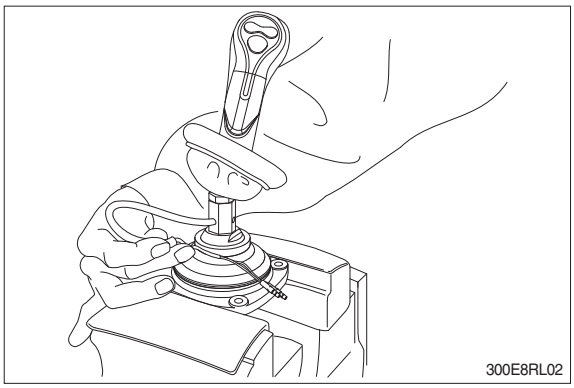
※ Put blind plugs into all ports

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

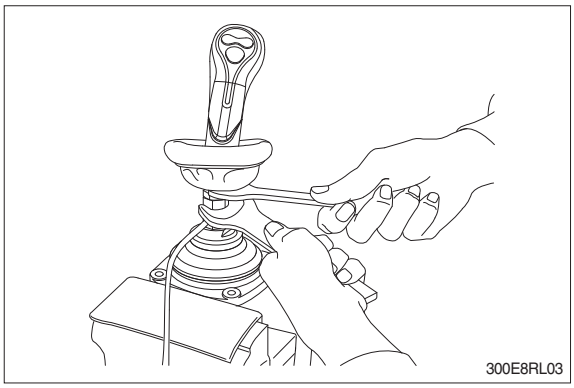
(3) Remove end of boot (23) from case (1) and take it out upwards.



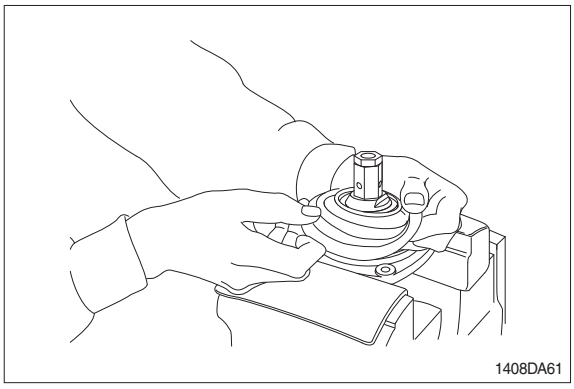
※ For valve with switch, remove cord also through hole of casing.



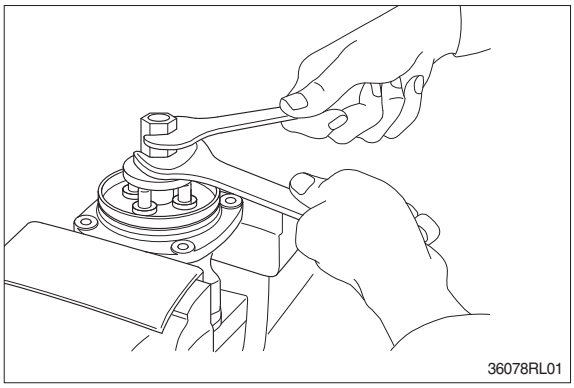
(4) Loosen lock nut (22) and adjusting nut (17) with spanners on them respectively, and take out handle section as one body.

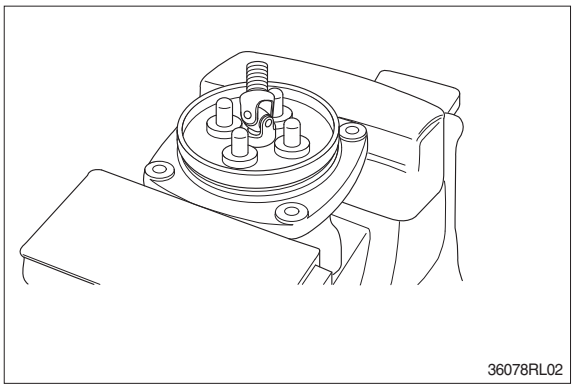


(5) Remove the boot (14).



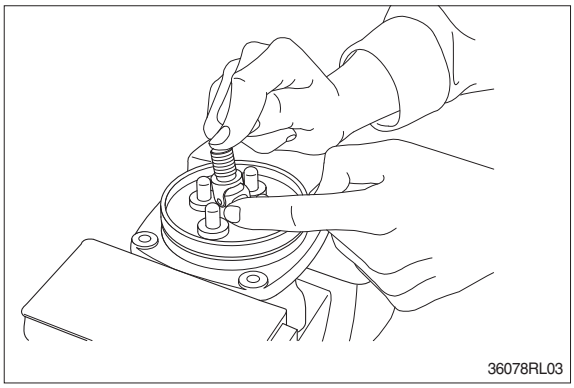
(6) Loosen adjusting nut (17) and swash plate (16) with spanners on them respectively, and remove them.

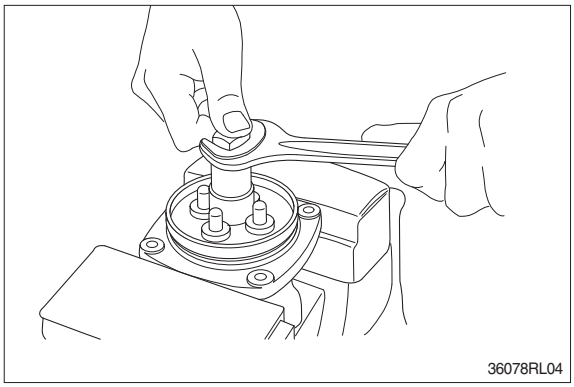




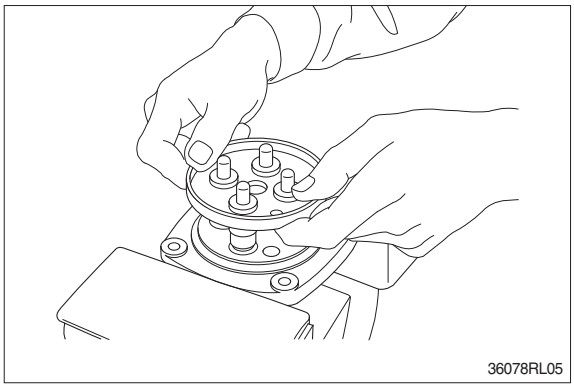
(7) Turn joint anticlockwise to loosen it, utilizing jig (Special tool).

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





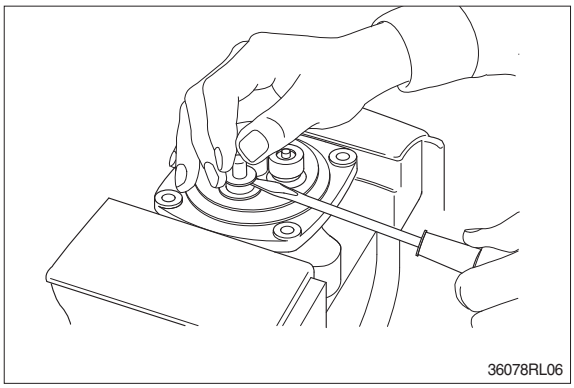
(8) Remove plate (12).



(9) When return spring (7) is weak in force, plug (8) stays in casing because of sliding resistance of O-ring.

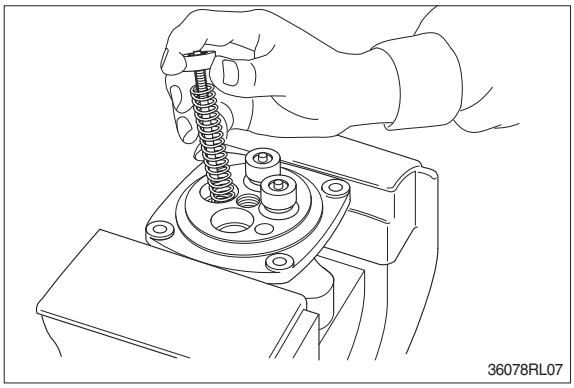
※ Take it out with minus screwdriver.
Take it out, utilizing external periphery groove of plug and paying attention not to damage it by partial loading.

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



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

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

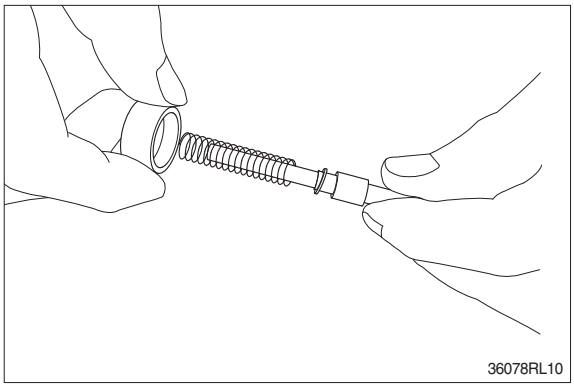


(11) Separate spool (3), spring seat (6), spring (5) and shim (4) individually.

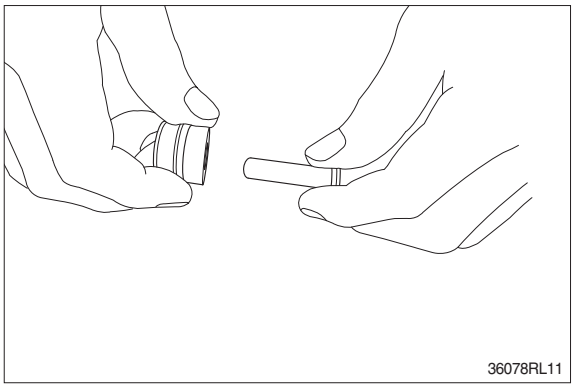
※ Pay attention not to damage spool surface.

※ Record original position of spring seat (6).

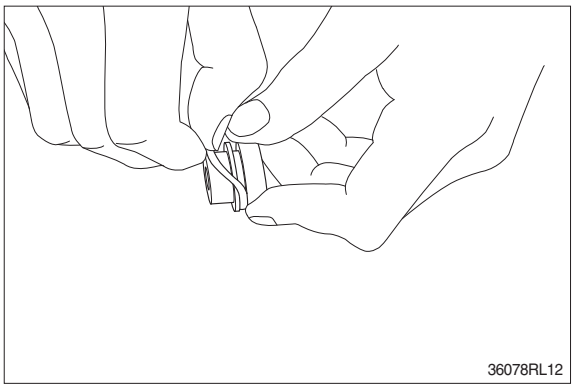
※ Until being assembled, they should be handled as one subassembly group.

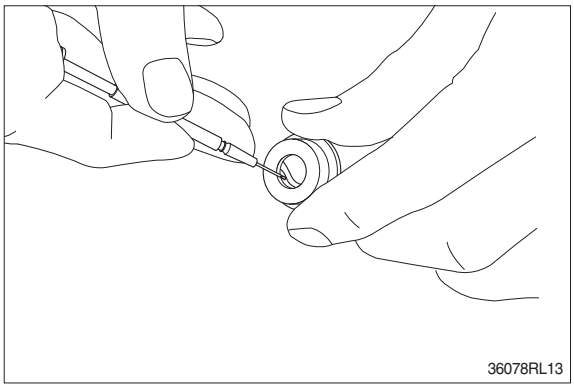


(12) Take push rod (9) out of plug (8).

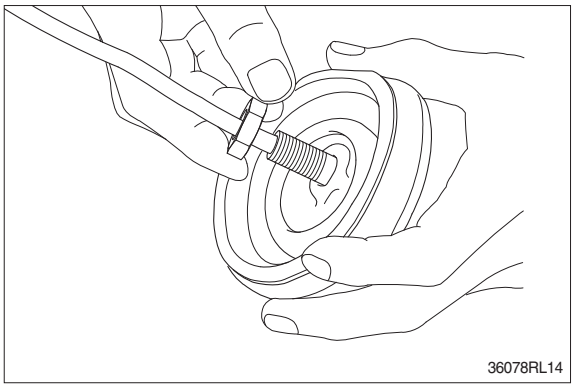


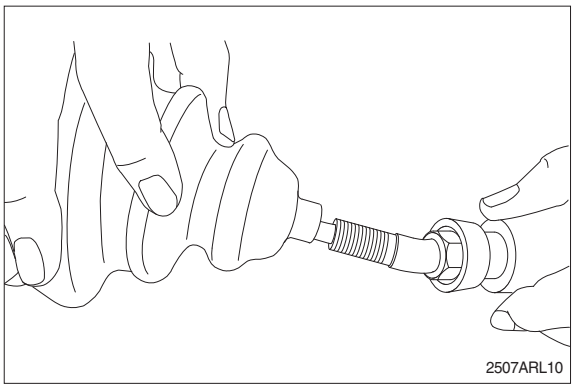
(13) Remove O-ring (10) and seal (11) from plug (8).
Use small minus screwdriver or so on to remove this seal.





(14) Remove lock nut (22) and then boot (23).





(15) Cleaning of parts

① Put all parts in rough cleaning vessel filled with kerosene and clean them (rough cleaning).

※ If dirty part is cleaned with kerosene just after putting it in vessel, it may be damaged. Leave it in kerosene for a while to loosen dust and dirty oil.

※ If this kerosene is polluted, parts will be damaged and functions of reassembled valve will be degraded.
Therefore, control cleanliness of kerosene fully.

② Put parts in final cleaning vessel filled with kerosene, turning it slowly to clean them even to their insides (finish cleaning).

※ Do not dry parts with compressed air, since they will be damaged and/or rusted by dust and moisture in air.

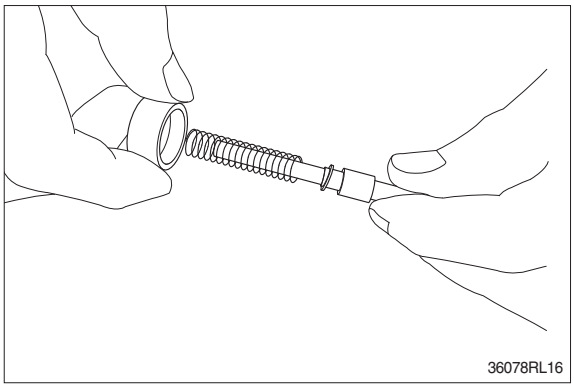
(16) Rust prevention of parts

Apply rust-preventives to all parts.

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

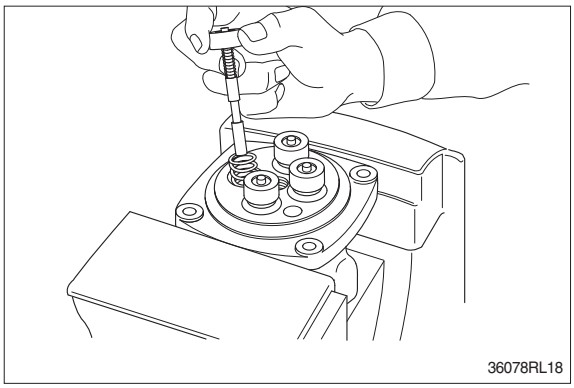
4) ASSEMBLY

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

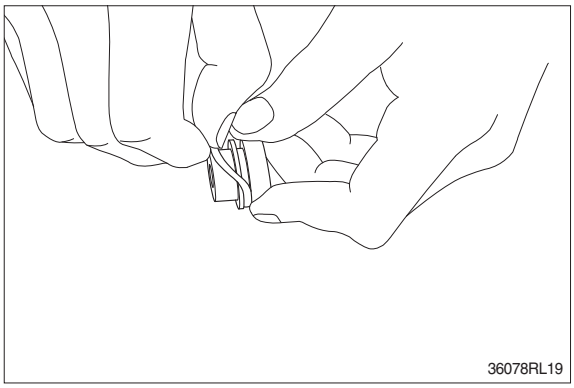


(2) Assemble spring (7) into casing (1). Assemble reducing valve subassembly into casing.

※ Assemble them to their original positions.

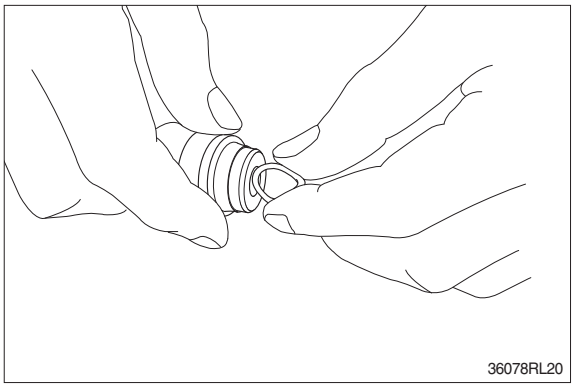


(3) Assemble O-ring (10) onto plug (8).



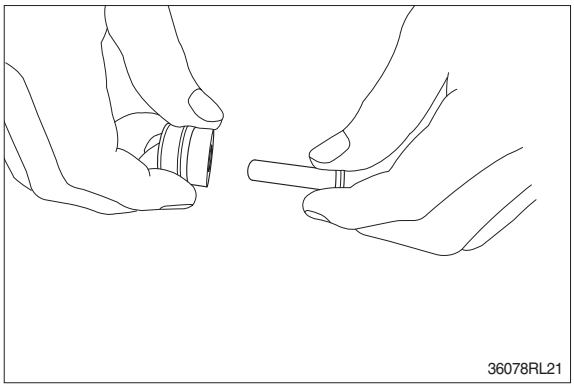
(4) Assemble seal (11) to plug (8).

※ Assemble seal in such lip direction as shown below.



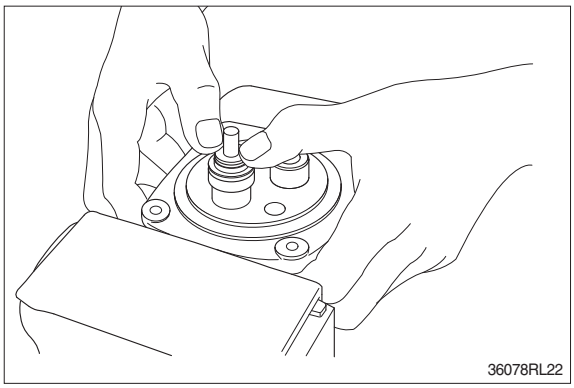
(5) Assemble push rod (9) to plug (8).

※ Apply working oil on push-rod surface.

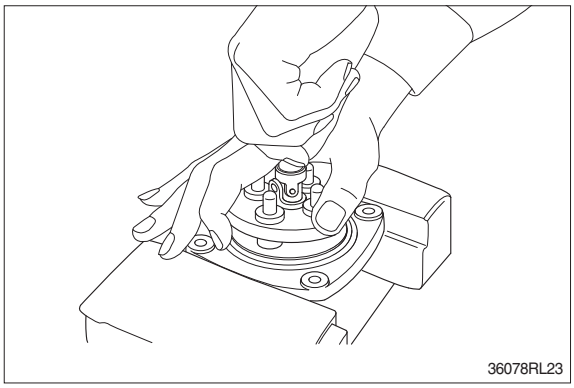


(6) Assemble plug subassembly to casing.

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

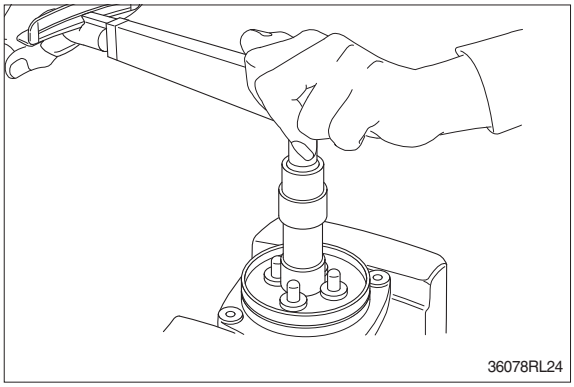


(7) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (12), and tighten joint (15) temporarily.



(8) Fit plate (12).

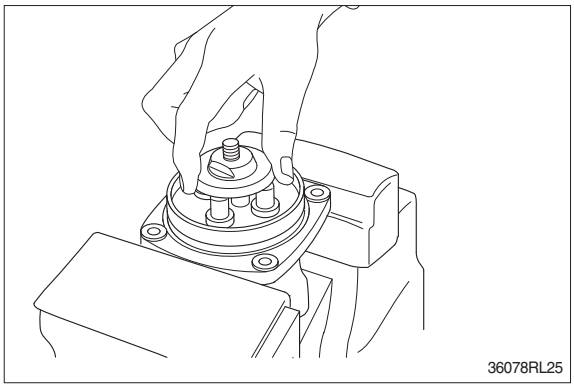
(9) Tighten joint (15) with the specified torque to casing, utilizing jig.



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

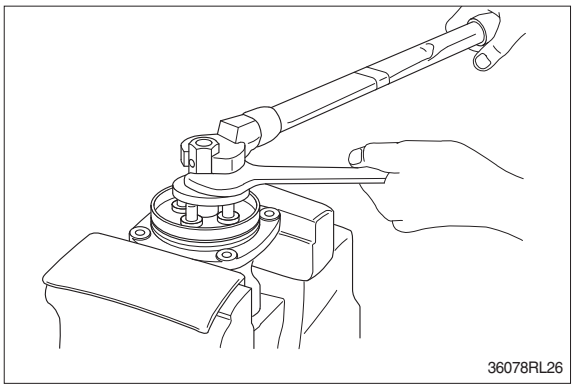
※ Screw it to position that it contacts with 4 push rods evenly.

※ Do not screw it over.

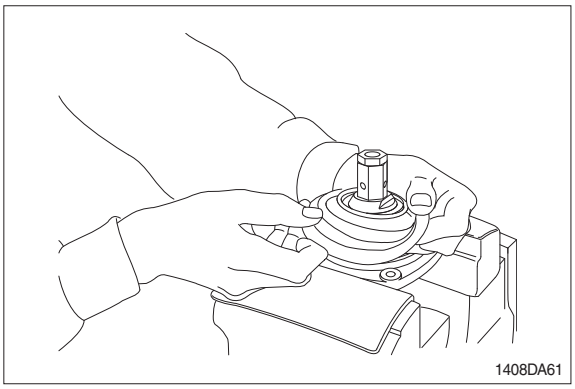


(11) Assemble adjusting nut (17), apply spanner to width across flat of plate (16) to fix it, and tighten adjusting nut to the specified torque.

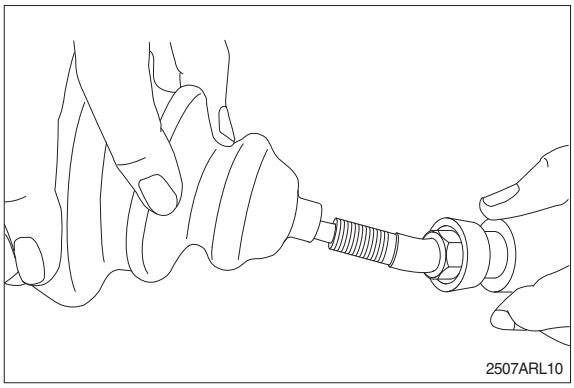
※ During tightening, do not change position of disk.

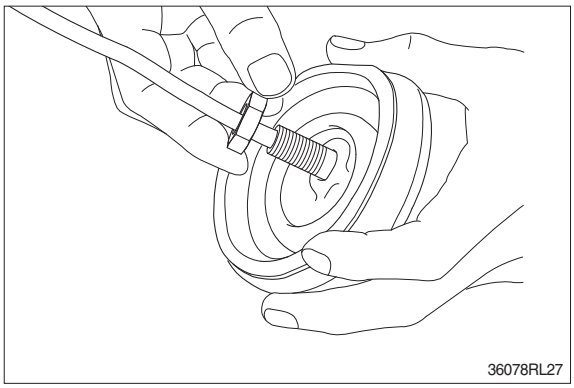


(12) Fit boot (14) to plate.

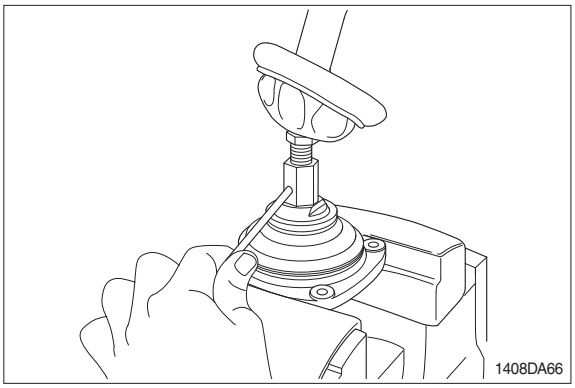


(13) Fit boot (23) and lock nut (22), and handle subassembly is assembled completely.



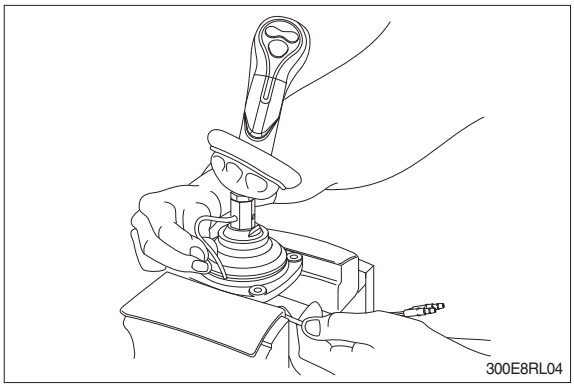


(14) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.

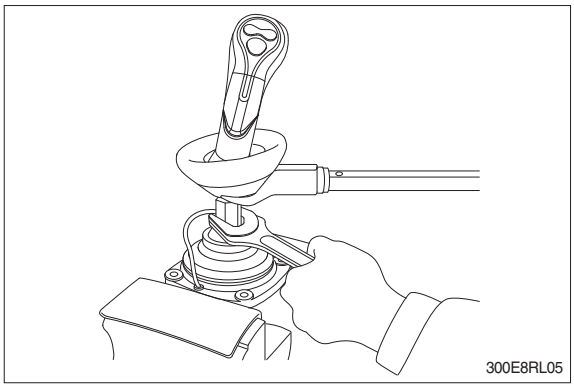


(15) Assemble bushing (18) to plate and pass cord and tube through it.

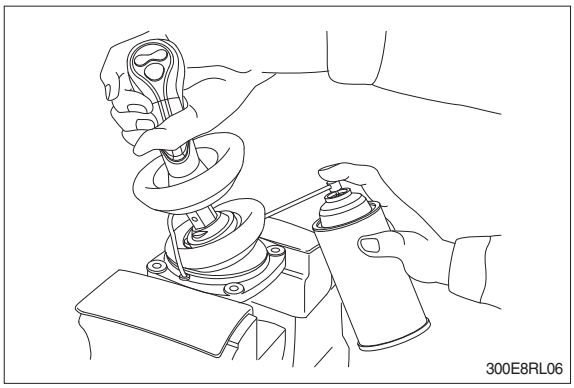
※ Provide margin necessary to operation.



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

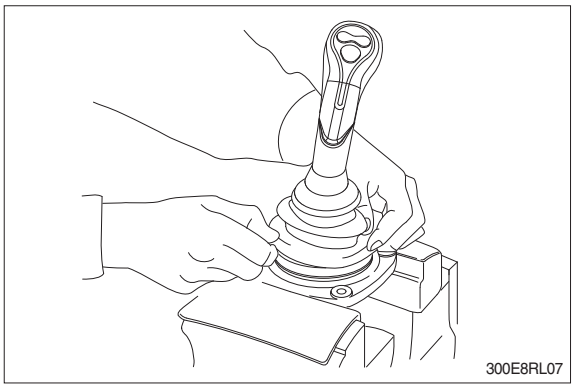


(17) Apply grease to rotating section of joint and contacting faces of disk and push rod.



(18) Assemble lower end of bellows to casing.

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



GROUP 8 TURNING JOINT

1. REMOVAL AND INSTALL

1) REMOVAL

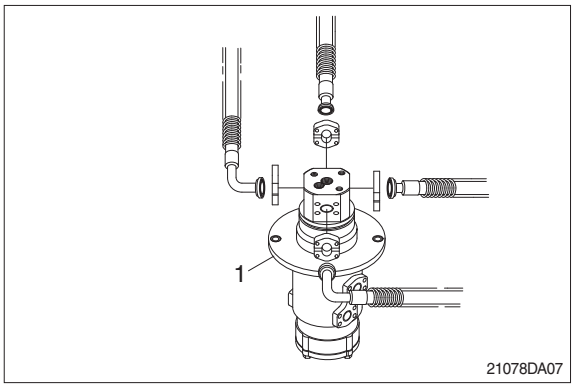
(1) Lower the work equipment to the ground and stop the engine.

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

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

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

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



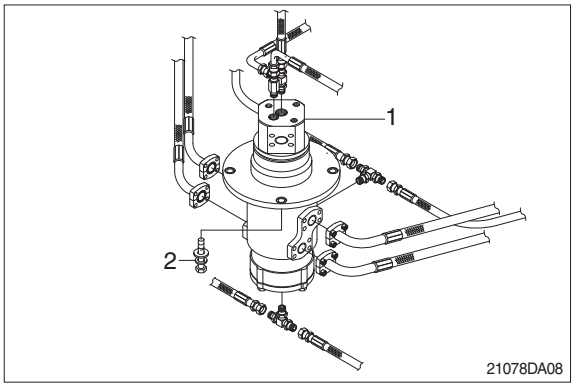
(4) Disconnect all hoses.

(5) Sling the turning joint assembly (1) and remove the mounting bolt (2).
Weight : 55 kg (120 lb)
Tightening torque : 12.3±1.3 kgf · m
(89±9.4 lbf · ft)

(6) Remove the turning joint assembly.

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

2) INSTALL



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

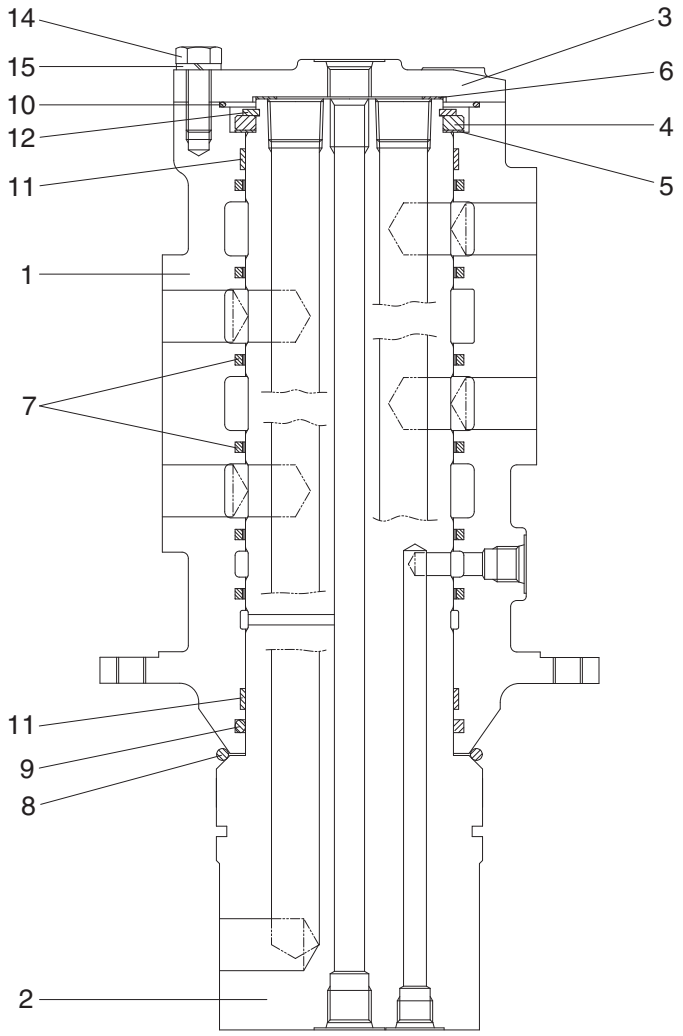
※ Take care of turning joint direction.

※ Assemble hoses to their original positions.

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

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE



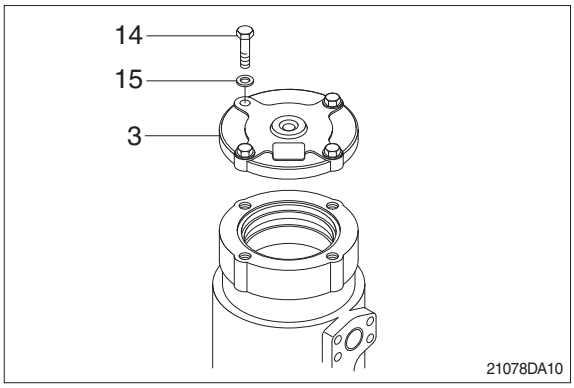
21098TJ01

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

2) DISASSEMBLY

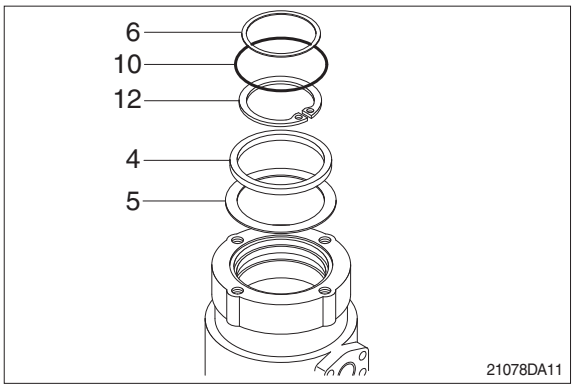
※ Before the disassembly, clean the turning joint.

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



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

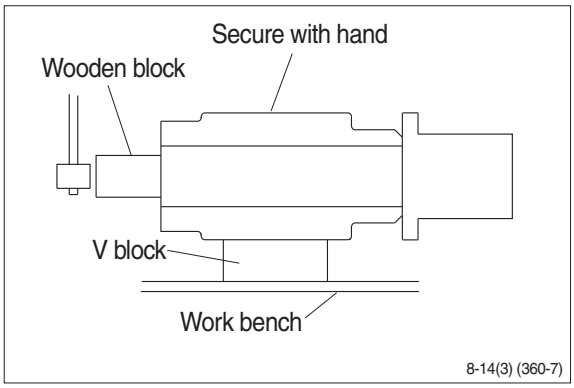
(3) Remove retainer ring (12), spacer (4) and shim (5).



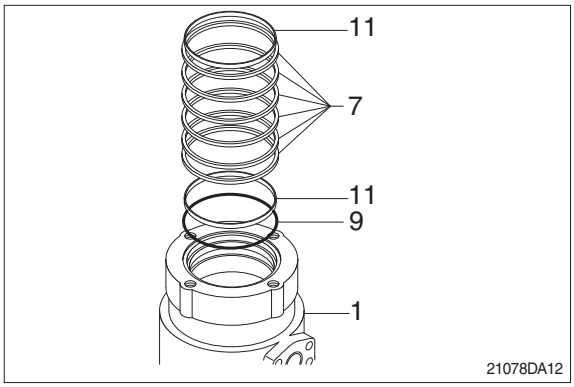
(4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

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

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



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

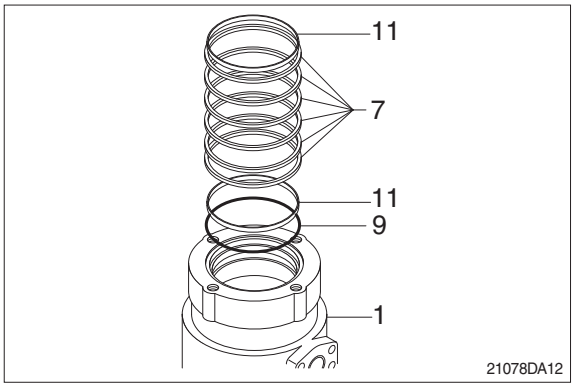


3) ASSEMBLY

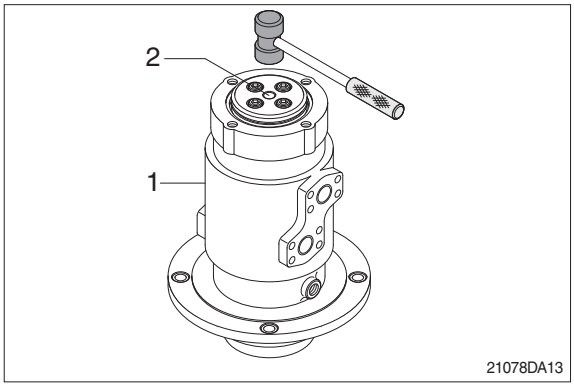
※ Clean all parts.
※ As a general rule, replace oil seals and O-ring.
※ Coat the sliding surfaces of all parts with engine oil or grease before installing.

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

(2) Fit O-ring (8) to shaft (2).



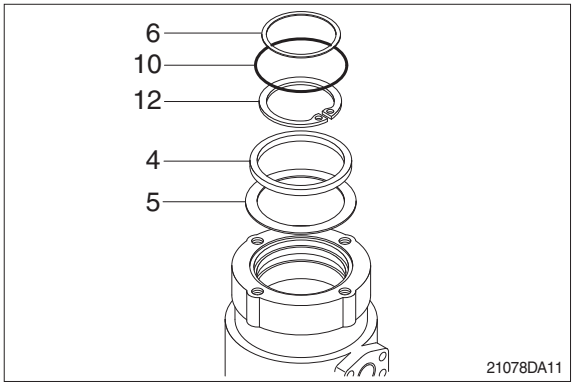
(3) Set shaft (2) on block, tap hub (1) with a plastic hammer to install.



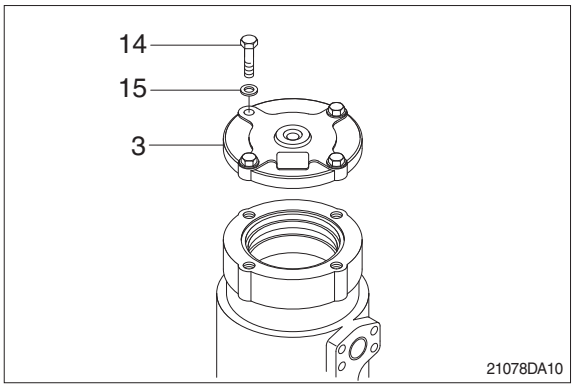
(4) Fit shim (5), spacer (4) and retainer ring (12) to shaft (2).

(5) Fit O-ring (10) to hub (1).

(6) Fit shim (6) to shaft (2).



(7) Install cover (3) to body (1) and tighten bolts (14).
Torque : 10~12.5 kgf · m
(72.3~90.4 lbf · ft)



1. REMOVAL AND INSTALL

1) BUCKET CYLINDER

(1) Removal

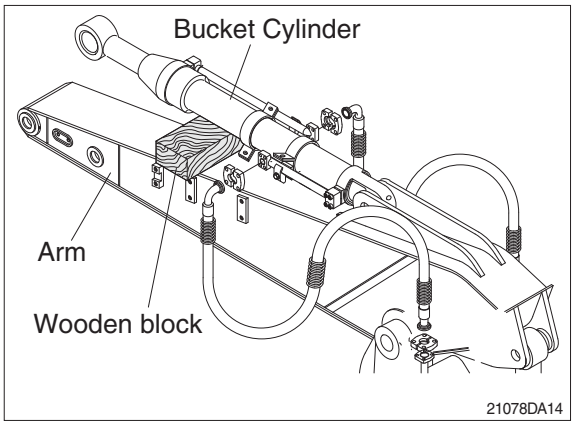
※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

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

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

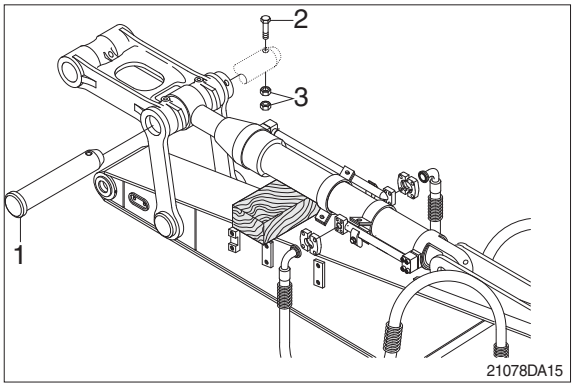
※ Escaping fluid under pressure can penetrate the skin causing serious injury.
Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between bucket cylinder and arm.

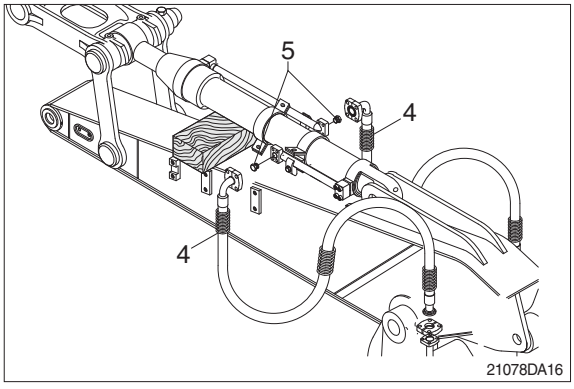


② Remove nuts (3), bolt (2) and pull out pin (1).

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



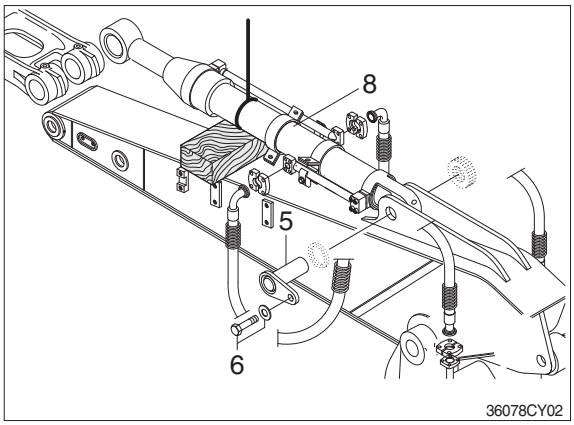
③ Disconnect bucket cylinder hoses (4) and put plugs (5) on cylinder pipe.



④ Sling bucket cylinder assembly, and remove bolt (6), plate (7) then pull out pin (5).

⑤ Remove bucket cylinder assembly (8).

· Weight : 320 kg (710 lb)



(2) Install

① Carry out installation in the reverse order to removal.

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

※ Bleed the air from the bucket cylinder.

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

2) ARM CYLINDER

(1) Removal

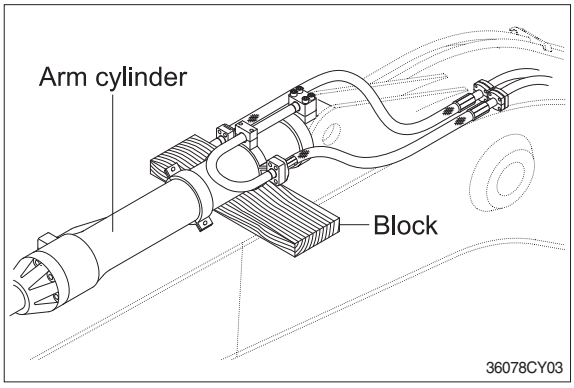
※ Expand the arm and bucket fully, lower the work equipment to the ground and stop the engine.

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

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

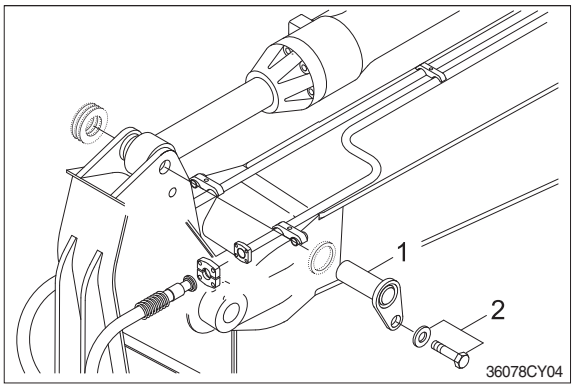
※ Escaping fluid under pressure can penetrate the skin causing serious injury.
Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between arm cylinder and boom.



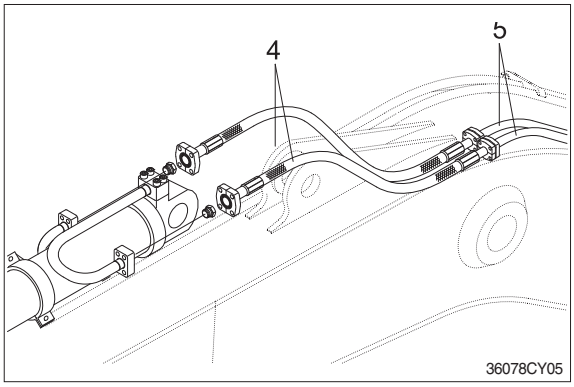
② Remove bolt (2) and pull out pin (1).

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

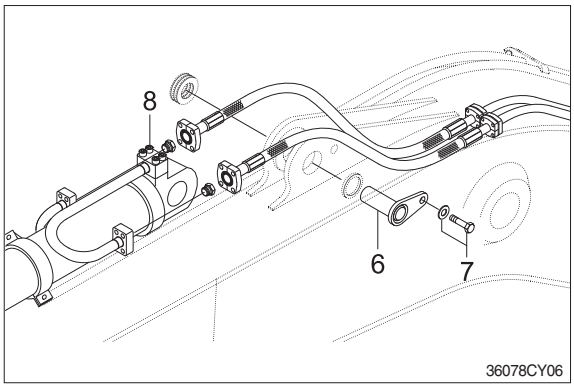


③ Disconnect arm cylinder hoses (4) and put plugs on cylinder pipe.

④ Disconnect greasing pipings (5).



⑤ Sling arm assembly (9), and remove bolt (7), plate (8) then pull out pin (6).
⑥ Remove arm cylinder assembly (9).
· Weight : 490 kg (1080 lb)



(2) Install

① Carry out installation in the reverse order to removal.

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

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

3) BOOM CYLINDER

(1) Removal

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

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

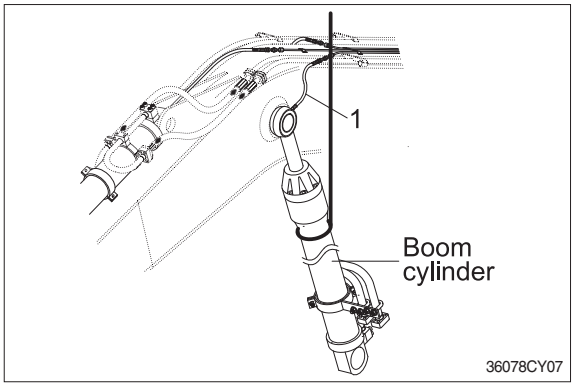
⚠ Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

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

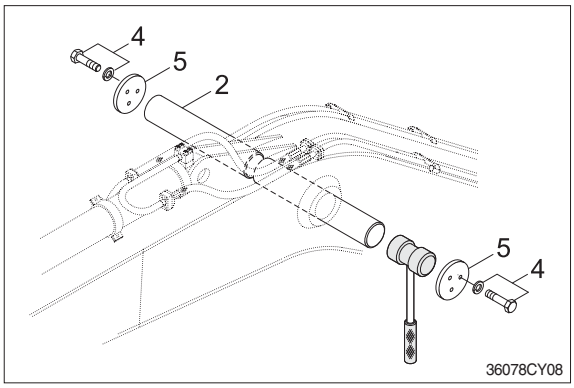
① Disconnect greasing hoses (1).

② Sling boom cylinder assembly.

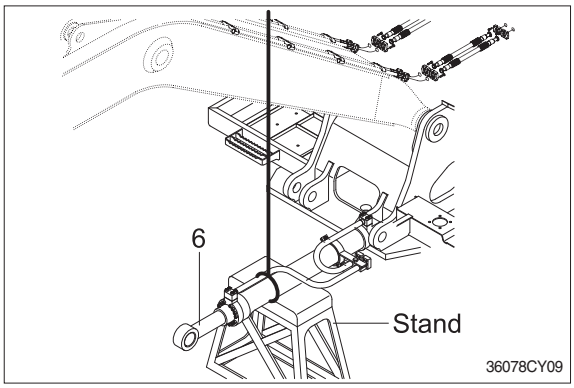


③ Remove bolt (4), stop plate (5) and pull out pin (2).

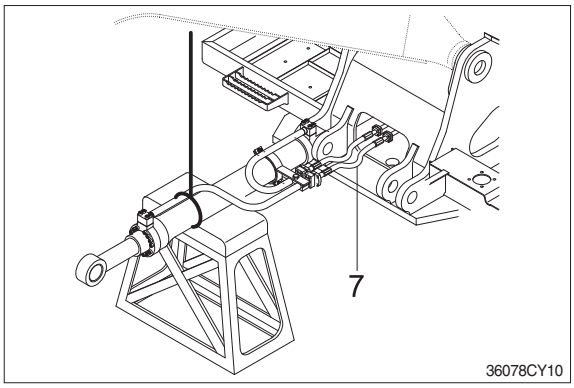
※ Tie the rod with wire to prevent it from coming out.



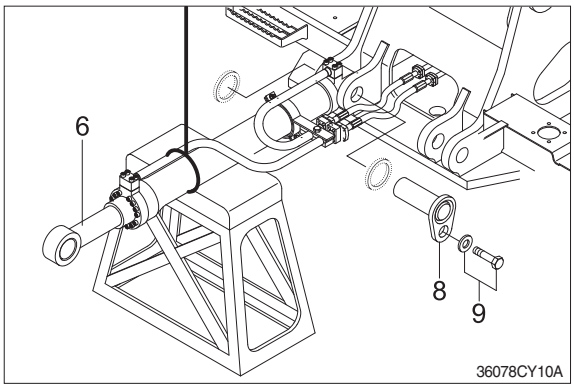
④ Lower the boom cylinder assembly (6) on a stand.



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



⑥ Remove bolt (9) and pull out pin (8).
⑦ Remove boom cylinder assembly (6).
· Weight : 370 kg (820 lb)



(2) Install

① Carry out installation in the reverse order to removal.

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

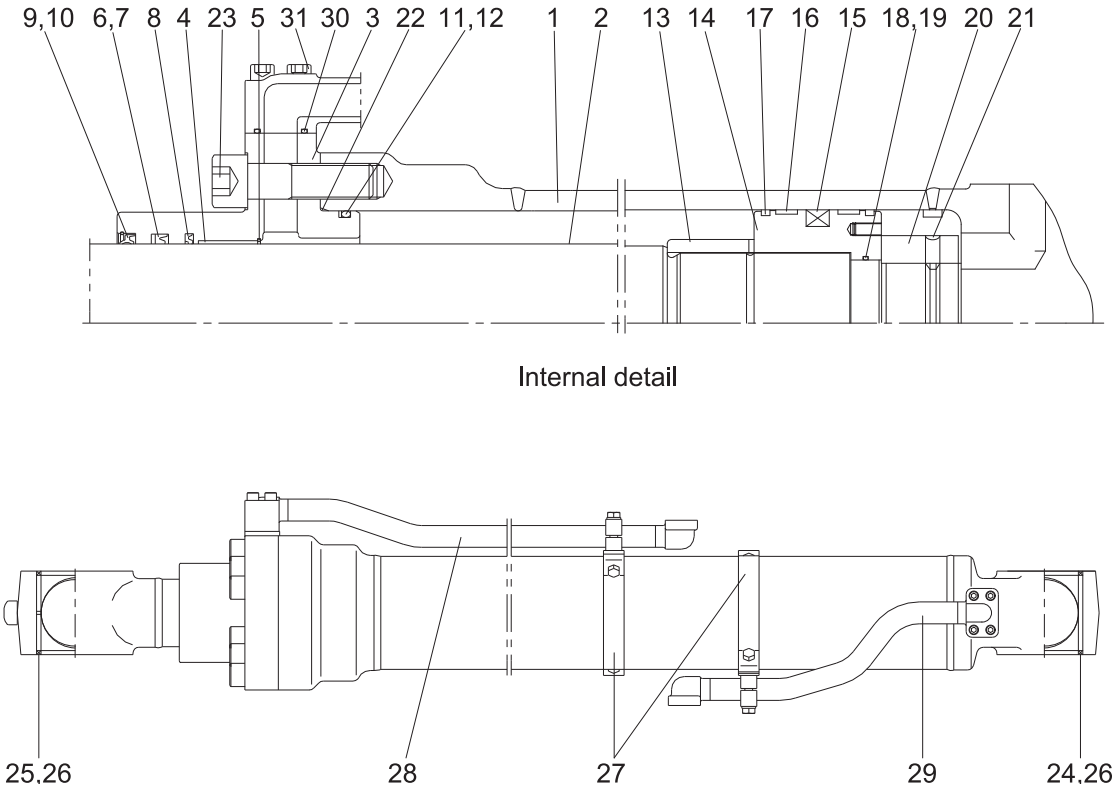
※ Bleed the air from the boom cylinder.

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

2. DISASSEMBLY AND ASSEMBLY

1) STRUCTURE

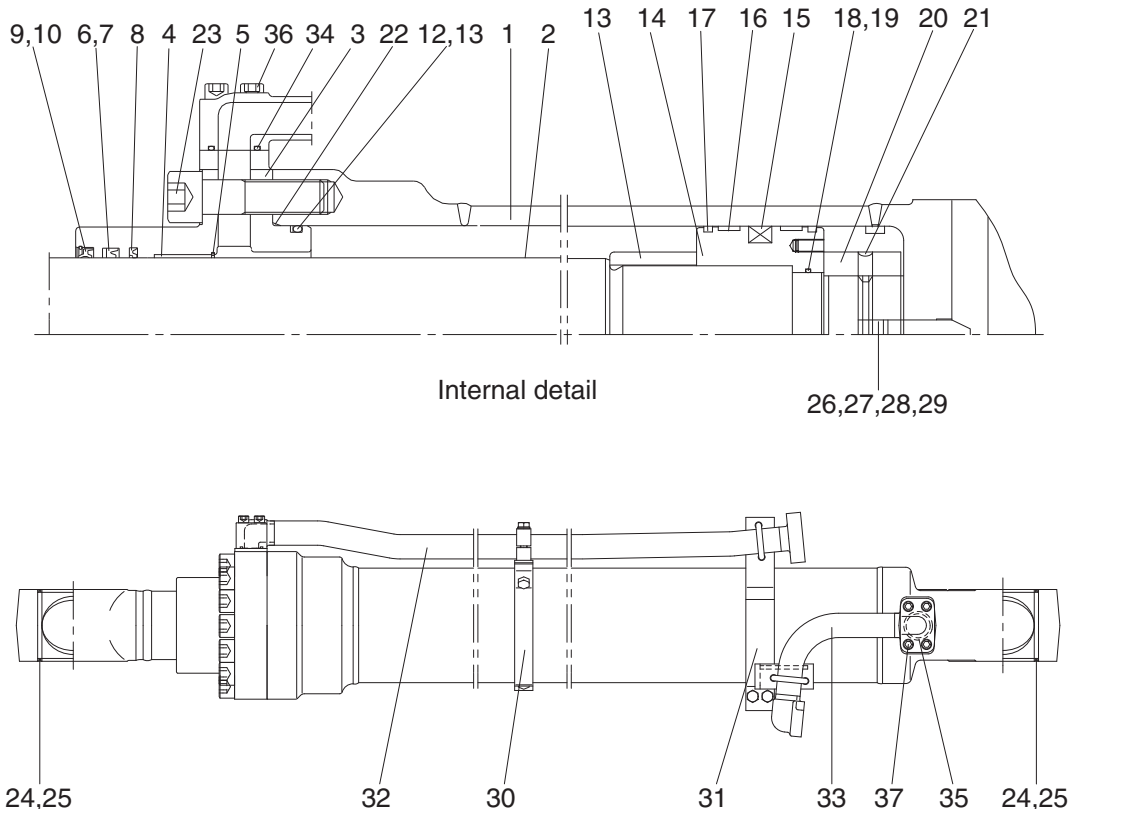
(1) Bucket cylinder



38098CY01A

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

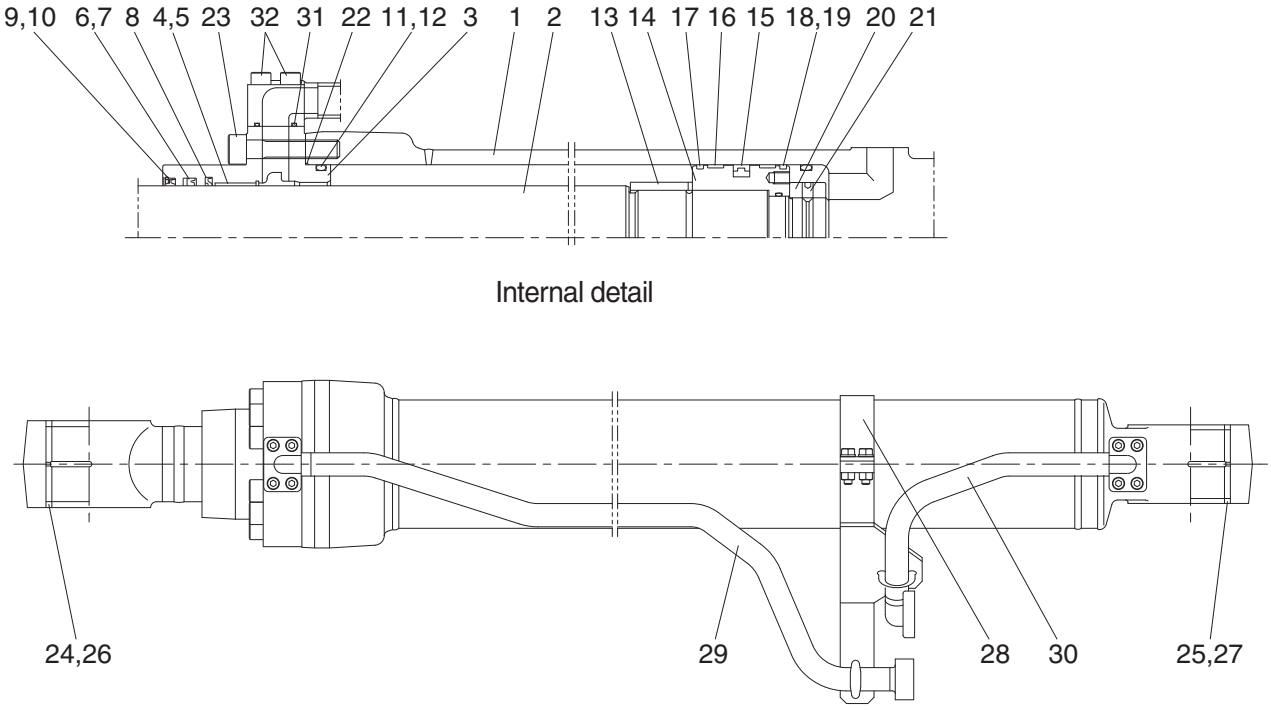
(2) Arm cylinder



38098CY02

1	Tube assembly	14	Piston	27	Coil spring
2	Rod assembly	15	Piston seal	28	O-ring
3	Gland	16	Wear ring	29	Plug
4	DD2 bushing	17	Dust ring	30	Band assembly (R)
5	Snap ring	18	O-ring	31	Band assembly (B)
6	Rod seal	19	Back up ring	32	Pipe assembly (R)
7	Back up ring	20	Lock nut	33	Pipe assembly (B)
8	Buffer ring	21	Set screw	34	O-ring
9	Dust wiper	22	O-ring	35	O-ring
10	Snap ring	23	Hexagon socket head bolt	36	Hexagon socket head bolt
11	O-ring	24	Pin bushing	37	Hexagon socket head bolt
12	Back up ring	25	Dust seal		
13	Cushion ring	26	Check valve		

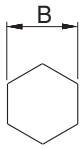
(3) Boom cylinder



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

2) TOOLS AND TIGHTENING TORQUE

(1) Tools

Allen wrench	10	
	19	
Spanner	19	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

(2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Socket head bolt	Bucket cylinder	23	M20	46±5	333±36.1
	Boom cylinder	23	M22	63±6	456±43.4
	Arm cylinder	23	M22	63±6	456±43.4
Socket head bolt	Bucket cylinder	31	M12	9.4±1	68.0±7.2
	Boom cylinder	32	M12	9.4±1	68.0±7.2
	Arm cylinder	36	M12	9.4±1	68.0±7.2
		37	M12	9.4±1	68.0±7.2
Lock nut	Bucket cylinder	20	M76	100±10	723±72.3
	Boom cylinder	20	M80	150±15	1085±108
	Arm cylinder	20	M90	150±15	1085±108
Piston	Bucket cylinder	14	-	150±15	1085±109
	Boom cylinder	14	-	200±20	1447±145
	Arm cylinder	14	-	200±20	1447±145

3) DISASSEMBLY

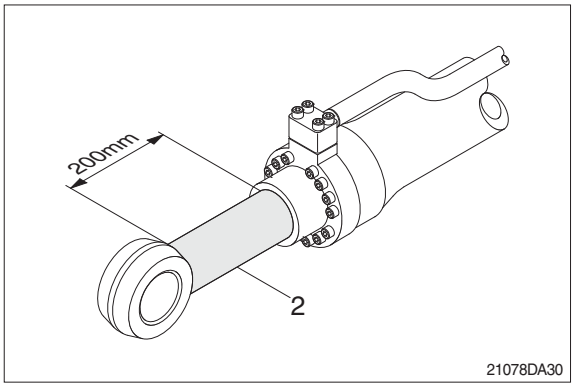
(1) Remove cylinder head and piston rod

※ Procedures are based on the bucket cylinder.

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

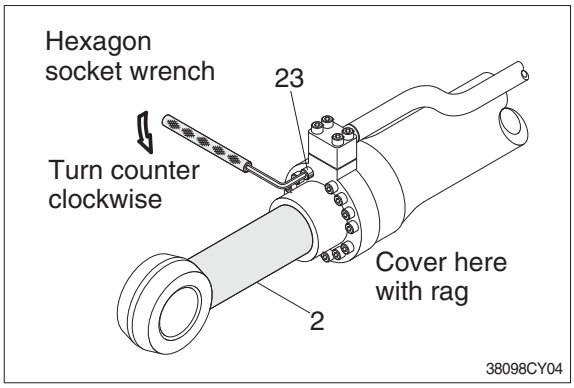
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

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



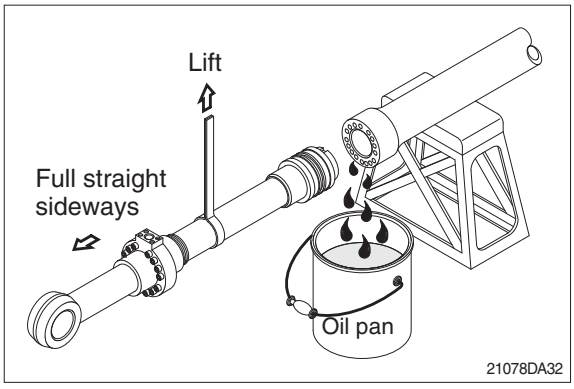
③ Loosen and remove socket bolts (23) of the gland in sequence.

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



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

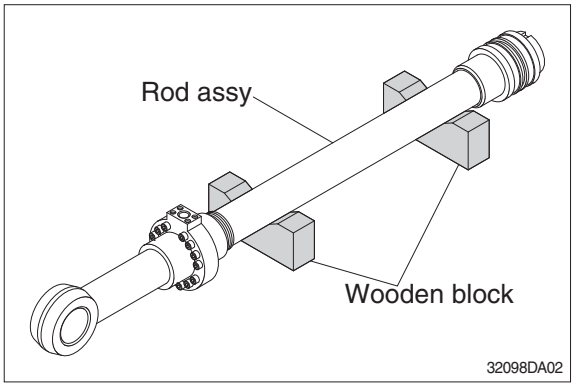
※ Since the rod assembly is heavy in this case, lift the tip of the rod assembly (2) with a crane or some means and draw it out. However, when rod assembly (2) has been drawn out to approximately two thirds of its length, lift it in its center to draw it completely.



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

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

※ Cover a V-block with soft rag.

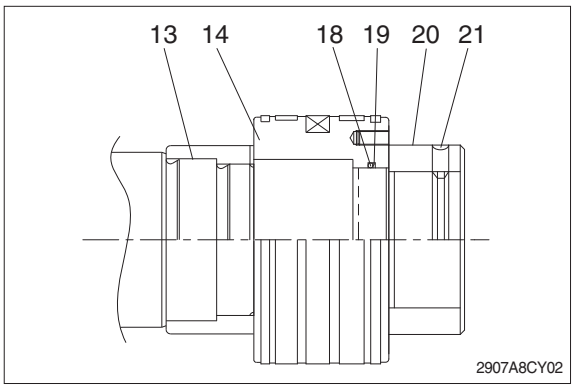


(2) Remove piston and cylinder head

① Loosen socket set screw (21) and remove set screw (21).

※ Since set screw (21) and lock nut (20) is tightened to a high torque, use a hydraulic and power wrench that utilizers a hydraulic cylinder, to remove the lock set screw (21) and lock nut (20).

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

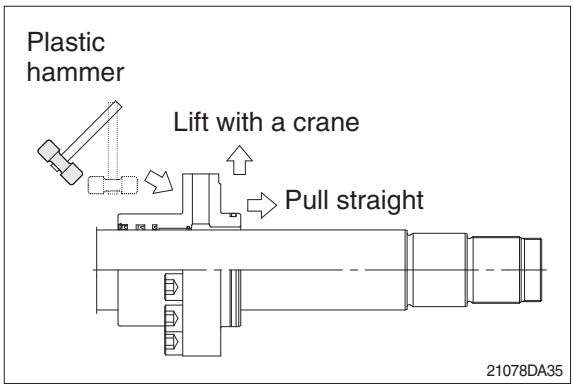


③ Remove the cylinder head assembly from rod assembly (2).

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

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

Exercise care so as not to damage the lip of rod bushing (4) and packing (5,6,7,8,9,10) by the threads of rod assembly (2).

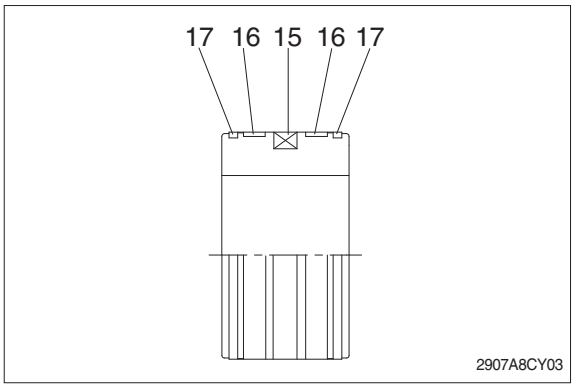


(3) Disassemble the piston assembly

① Remove wear ring (16).

② Remove dust ring (17) and piston seal (15).

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



(4) Disassemble cylinder head assembly

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

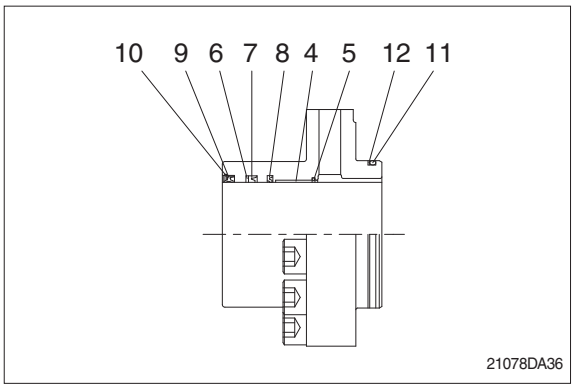
② Remove snap ring (10), dust wiper (9).

③ Remove back up ring (7), rod seal (6), buffer ring (8) and snap ring (5).

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

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

※ Do not remove bushing (4).

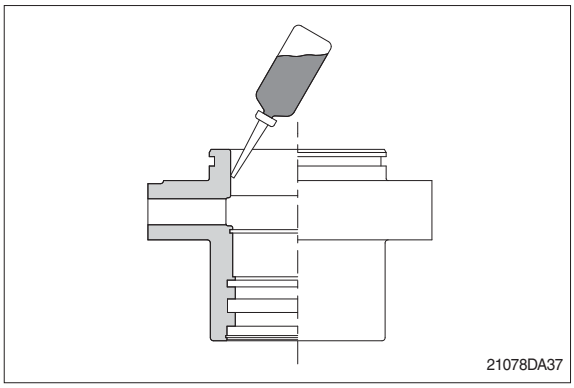


3) ASSEMBLY

(1) Assemble cylinder head assembly

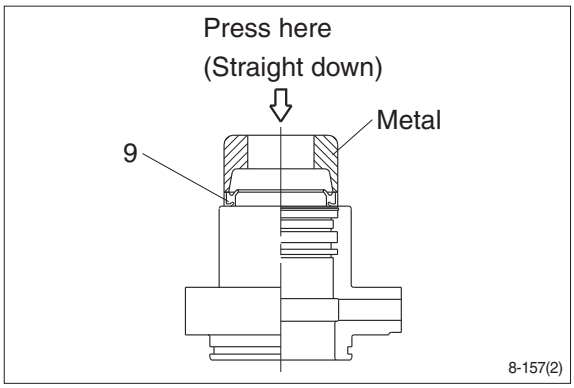
※ Check for scratches or rough surfaces if found smooth with an oil stone.

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



② Coat dust wiper (9) with grease and fit dust wiper (9) to the bottom of the hole of dust seal.
At this time, press a pad metal to the metal ring of dust seal.

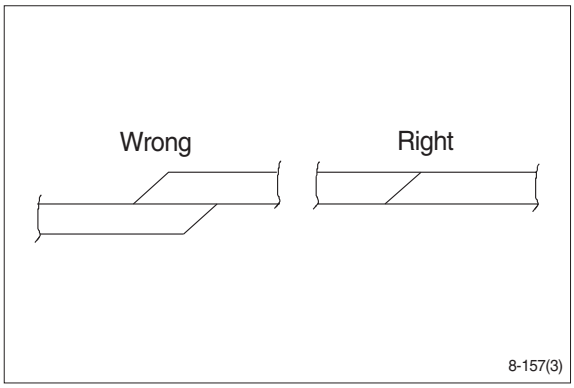
③ Fit snap ring (10) to the stop face.



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

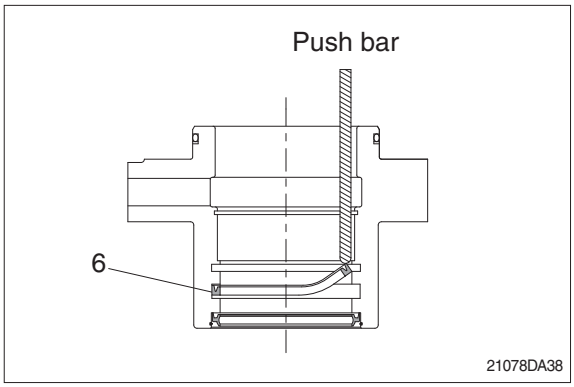
※ Coat each packing with hydraulic oil before fitting it.

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



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

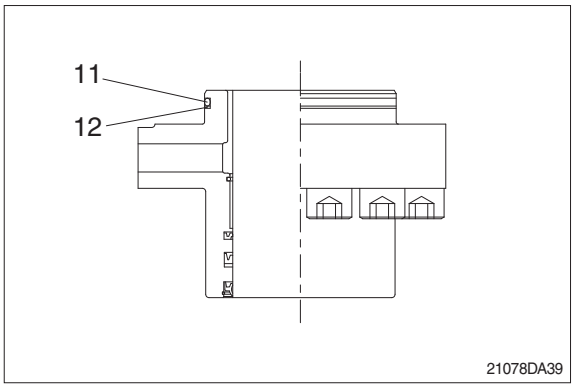
※ Fitting rod seal (6) upside down may damage its lip. Therefore check the correct direction that is shown in fig.



⑤ Fit back up ring (12) to gland (3).

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

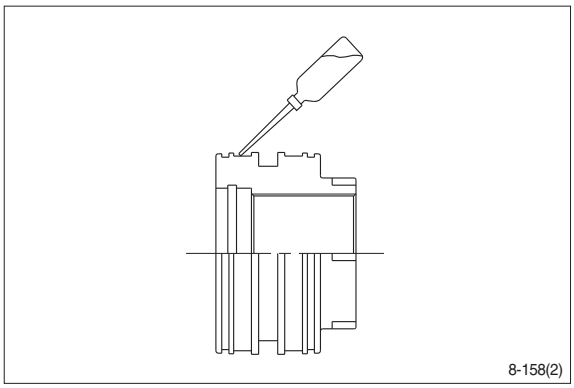
⑥ Fit O-ring (11) to gland (3).



(2) Assemble piston assembly

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

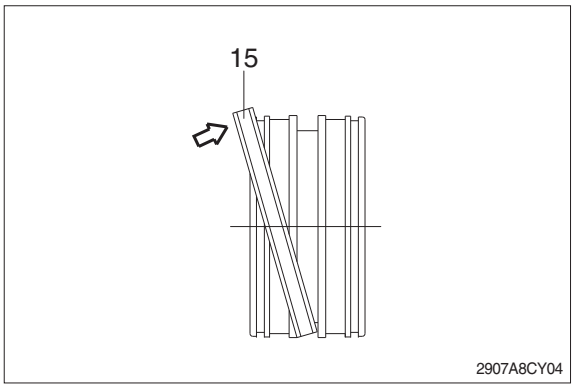
① Coat the outer face of piston (14) with hydraulic oil.



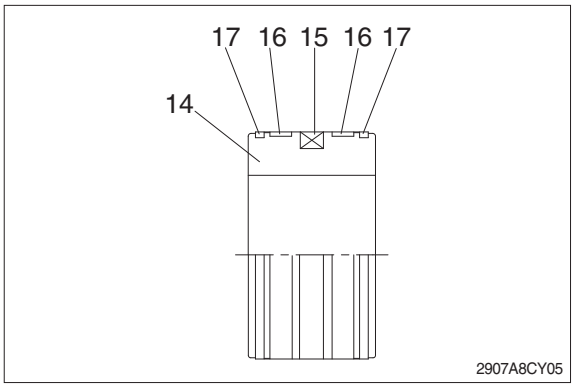
② Fit piston seal (15) to piston.

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

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



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

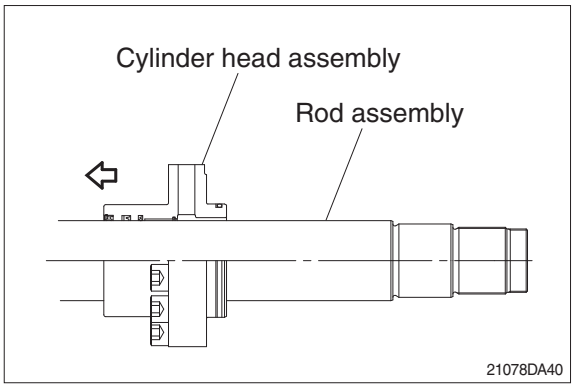


(3) Install piston and cylinder head

① Fix the rod assembly to the work bench.

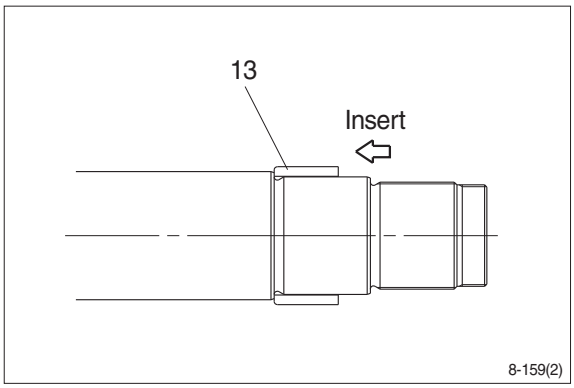
② Apply hydraulic oil to the outer surface of rod assembly (2), the inner surface of piston and cylinder head.

③ Insert cylinder head assembly to rod assembly.



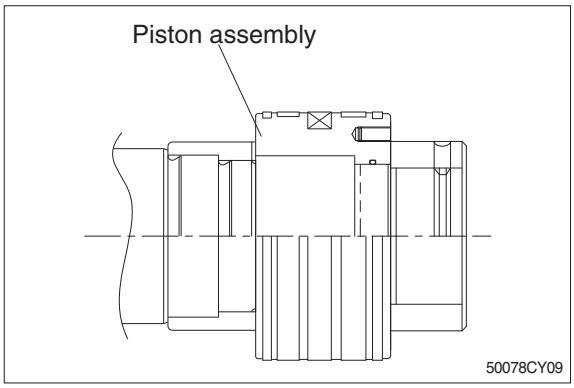
④ Insert cushion ring (13) to rod assembly.

※ Note that cushion ring (13) has a direction in which it should be fitted.



⑤ Fit piston assembly to rod assembly.

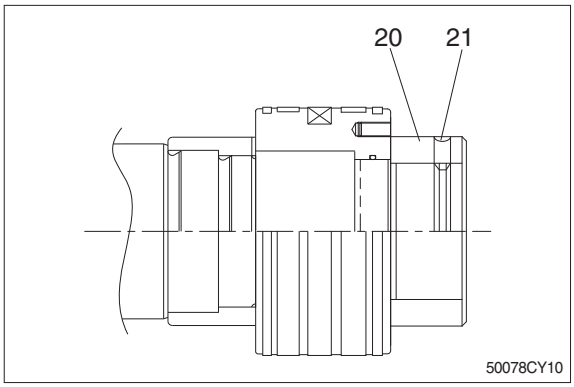
· Tightening torque : 150±15 kgf · m
(1085±108 lbf · ft)



⑥ Fit lock nut (20) and tighten the set screw (21).

· Tightening torque :

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



(3) Overall assemble

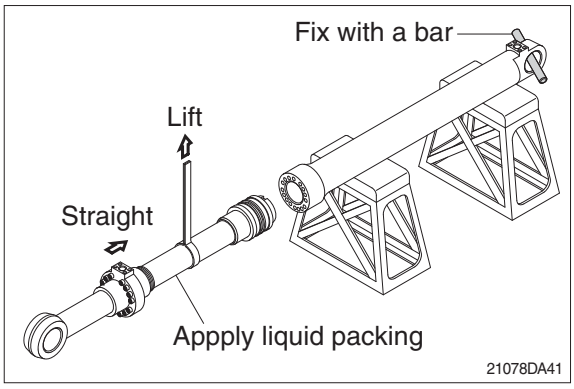
① Place a V-block on a rigid work bench. Mount the tube assembly (1) on it and fix the assembly by passing a bar through the clevis pin hole to lock the assembly.

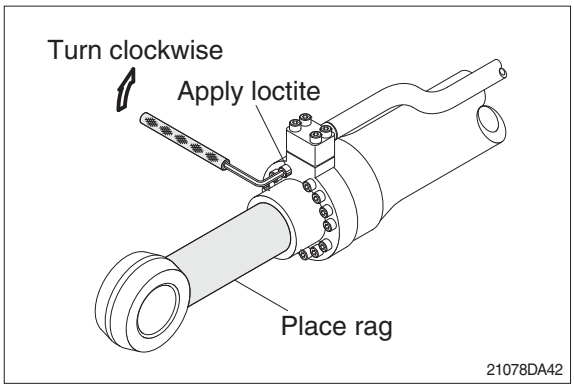
② Insert the rod assembly in to the tube assembly, while lifting and moving the rod assembly with a crane.

※ Be careful not to damage piston seal by thread of tube assembly.

③ Match the bolt holes in the cylinder head flange to the tapped holes in the tube assembly and tighten socket bolts to a specified torque.

※ Refer to the table of tightening torque.





1. TRACK LINK

1) REMOVAL

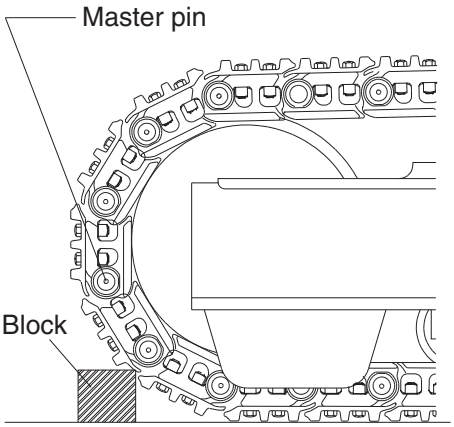
(1) Move track link until master pin is over front idler in the position put wooden block as shown.

(2) Loosen tension of the track link.

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

※ Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.
Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.

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



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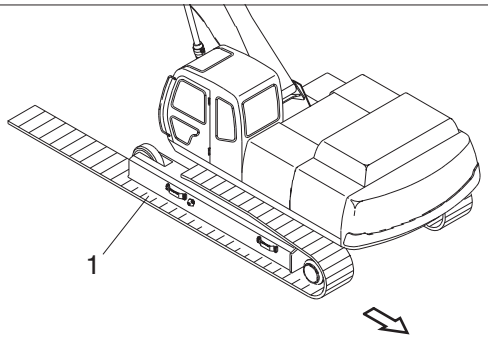
(4) Move the machine slowly in reverse, and lay out track link assembly (1).

※ 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.



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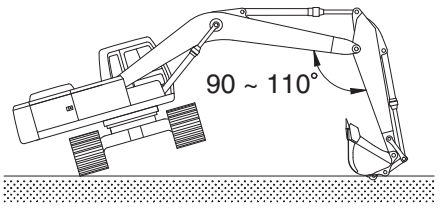
2) INSTALL

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

※ Adjust the tension of the track link.



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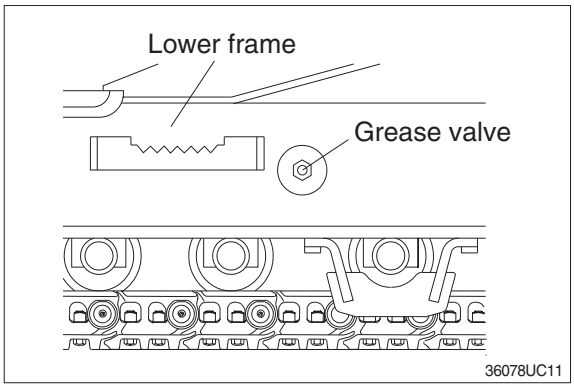
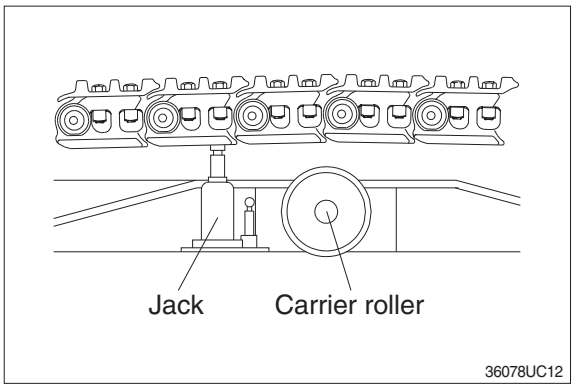
2. CARRIER ROLLER

1) REMOVAL

(1) Loosen tension of the track link.

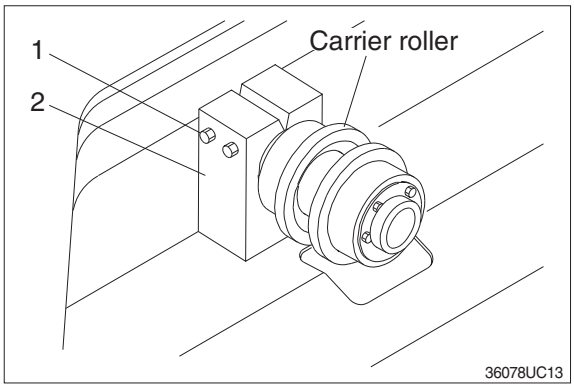


(2) Jack up the track link height enough to permit carrier roller removal.



(3) Loosen the lock nut (1).

(4) Open bracket (2) with a screwdriver, push out from inside, and remove carrier roller assembly.
- Weight : 80 ㎏ (180 ㏪)



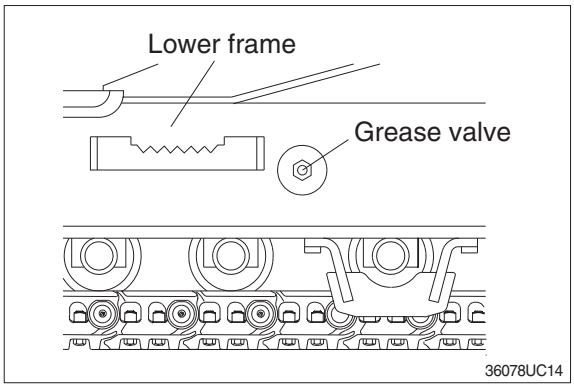
2) INSTALL

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

3. TRACK ROLLER

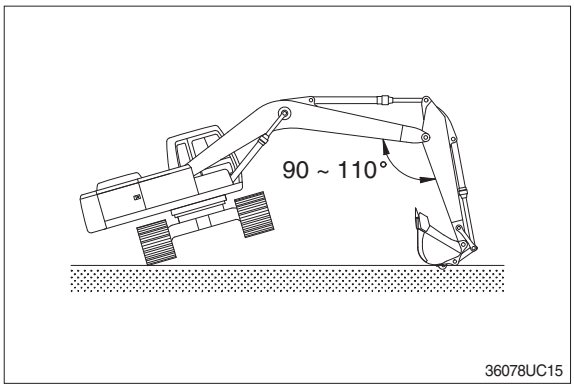
1) REMOVAL

(1) Loosen tension of the track link.

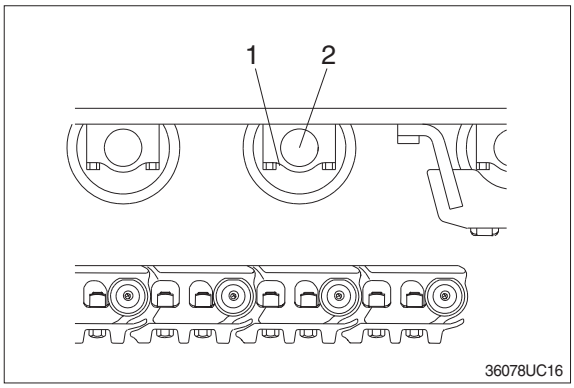


(2) Using the work equipment, push up track frame on side which is to be removed.

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



(3) Remove the mounting bolts (1) and draw out the track roller (2).
· Weight : 80 kg (176.4 lb)



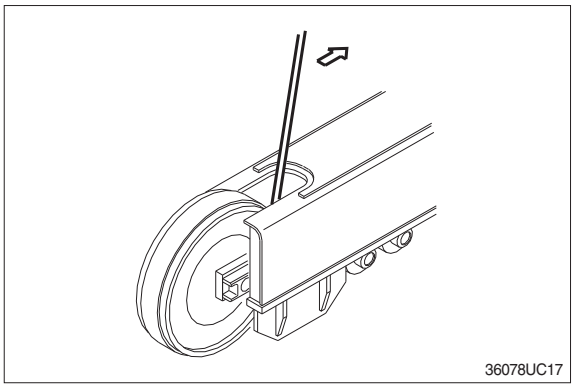
2) INSTALL

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

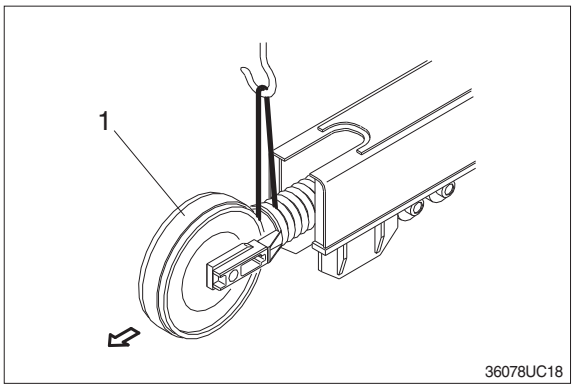
4. IDLER AND RECOIL SPRING

1) REMOVAL

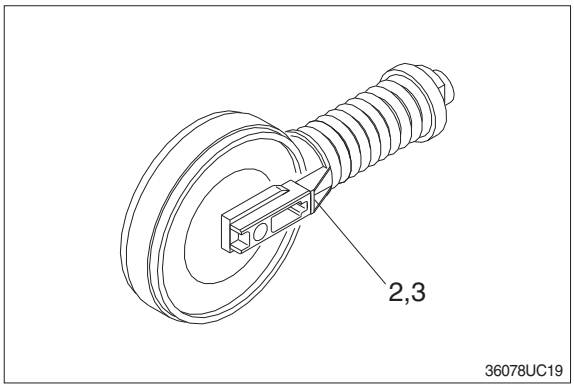
(1) Remove the track link.
For detail, see removal of track link.



(2) Sling the recoil spring (1) and pull out idler and recoil spring assembly from track frame, using a pry.
· Weight : 550 kg (1210 lb)



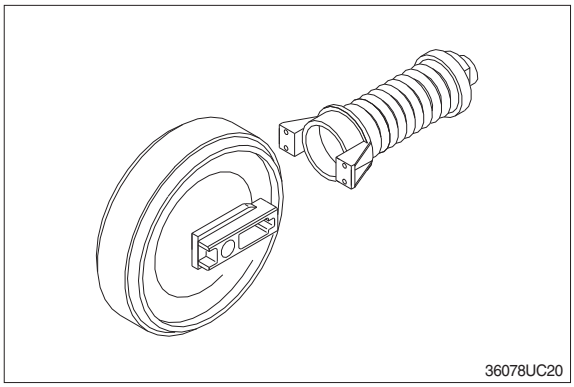
(3) Remove the bolts (2), washers (3) and separate ilder from recoil spring.



2) INSTALL

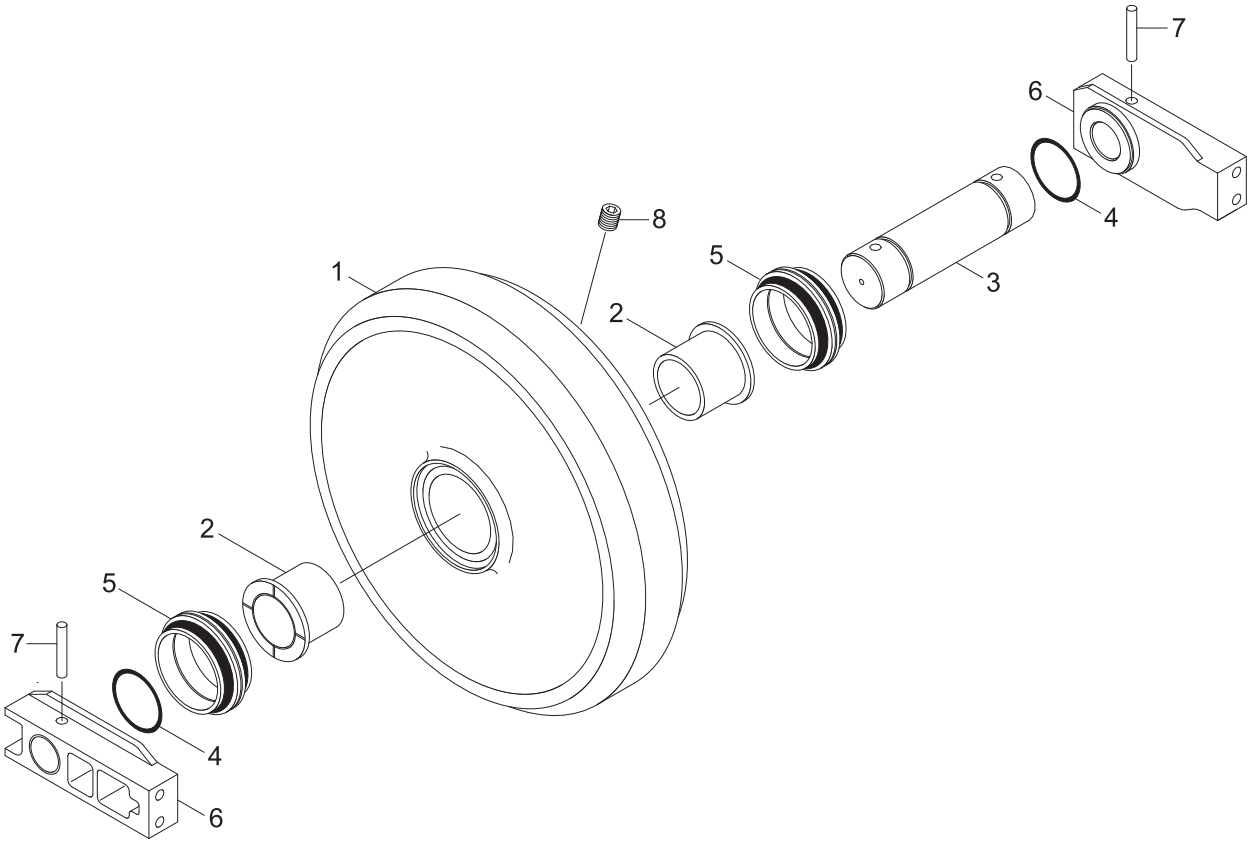
(1) Carry out installation in the reverse order to removal.

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



3) DISASSEMBLY AND ASSEMBLY OF IDLER

(1) Structure



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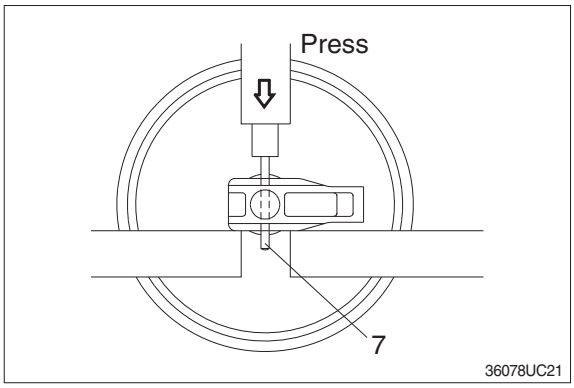
1	Shell	4	O-ring	7	Spring pin
2	Bushing	5	Seal assembly	8	Plug
3	Shaft	6	Bracket		

(2) Disassembly

① Remove plug and drain oil.

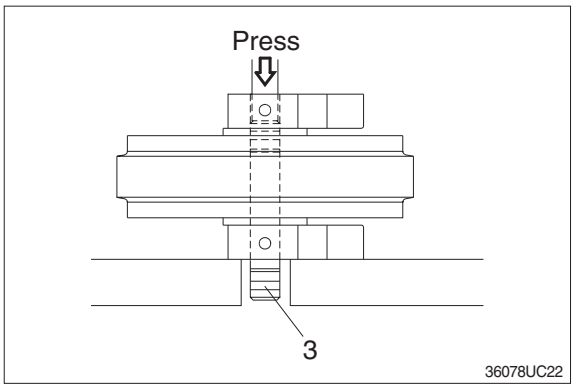
② Draw out the spring pin (7), using a press.



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

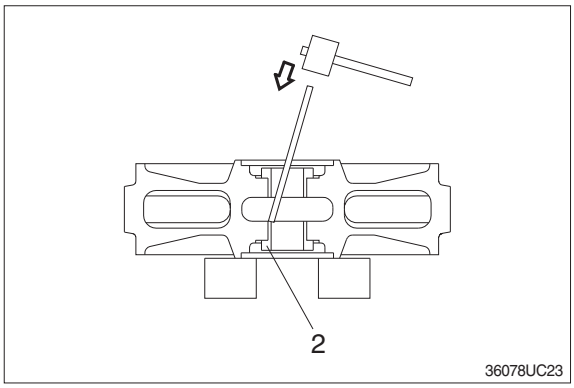
④ Remove seal (5) from shell (1) and bracket (6).

⑤ Remove O-ring (4) from shaft.



⑥ Remove the bushing (2) from shell, using a special tool.

※ Only remove bushing if replacement is necessity.

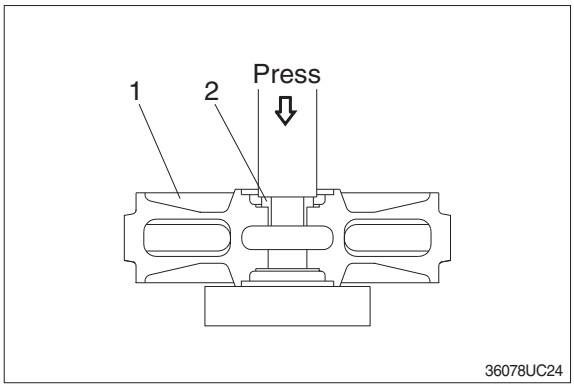


(3) Assembly

※ Before assembly, clean the parts.

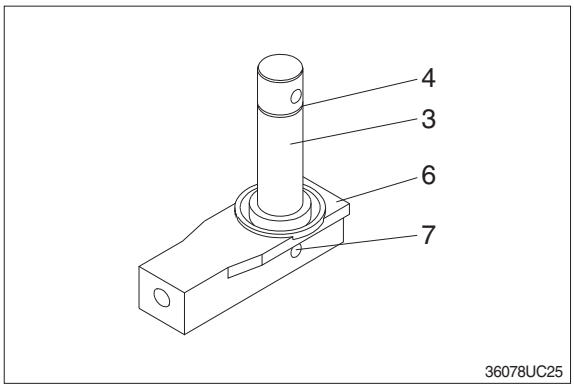
※ Coat the sliding surfaces of all parts with oil.

① Cool up bushing (2) fully by some dry ice and press it into shell (1).
Do not press it at the normal temperature, or not knock in with a hammer even after the cooling.

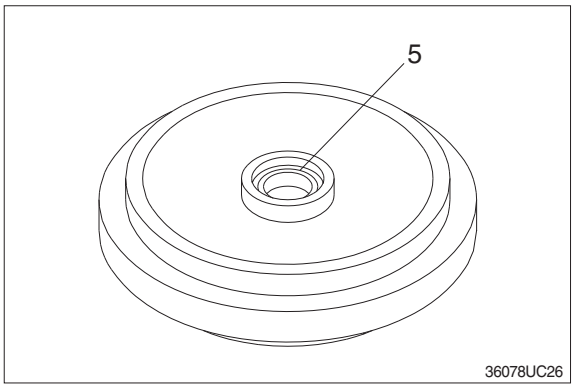


② Coat O-ring (4) with grease thinly, and install it to shaft (3).

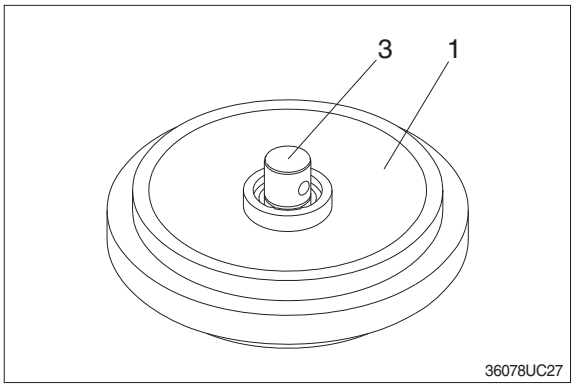
③ Insert shaft (3) into bracket (6) and drive in the spring pin (7).



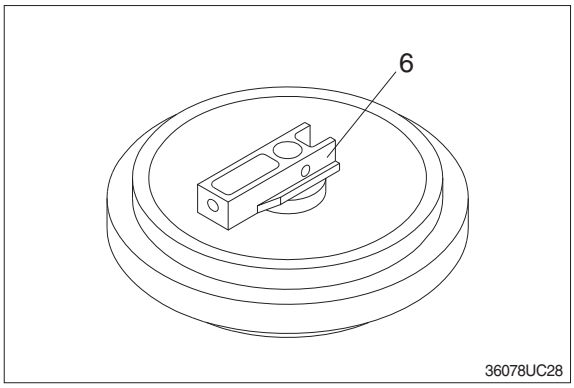
④ Install seal (5) to shell (1) and bracket (6).



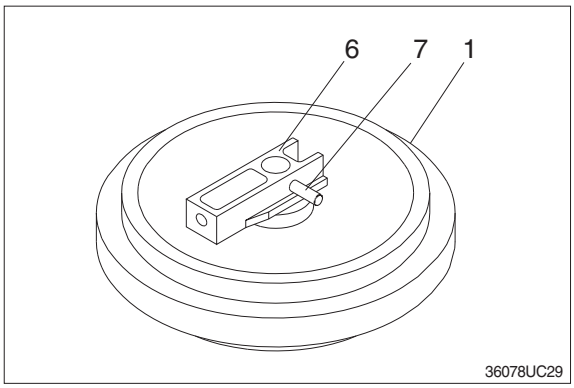
⑤ Install shaft (3) to shell (1).



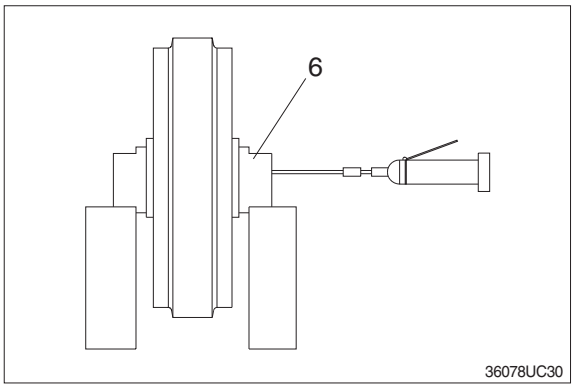
⑥ Install bracket (6) attached with seal (5).



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

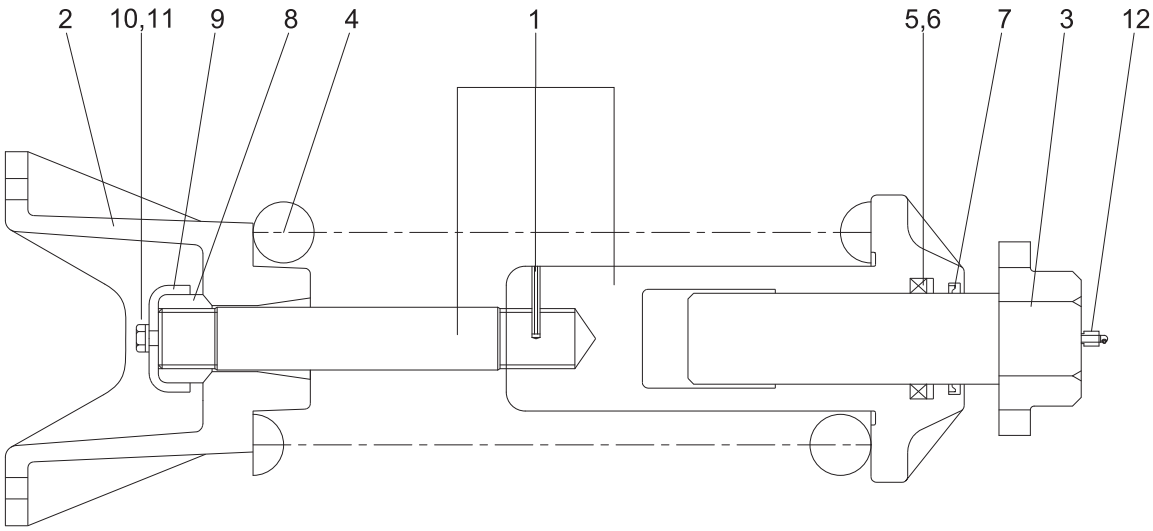


⑧ Lay bracket (6) on its side.
Supply engine oil to the specified level, and tighten plug.



4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

(1) Structure



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1	Body	5	Rod seal	9	Lock plate
2	Bracket	6	Back up ring	10	Hex bolt
3	Rod assembly	7	Dust seal	11	Spring washer
4	Spring	8	Lock nut	12	Grease valve

(2) Disassembly

① Apply pressure on spring (4) with a press.

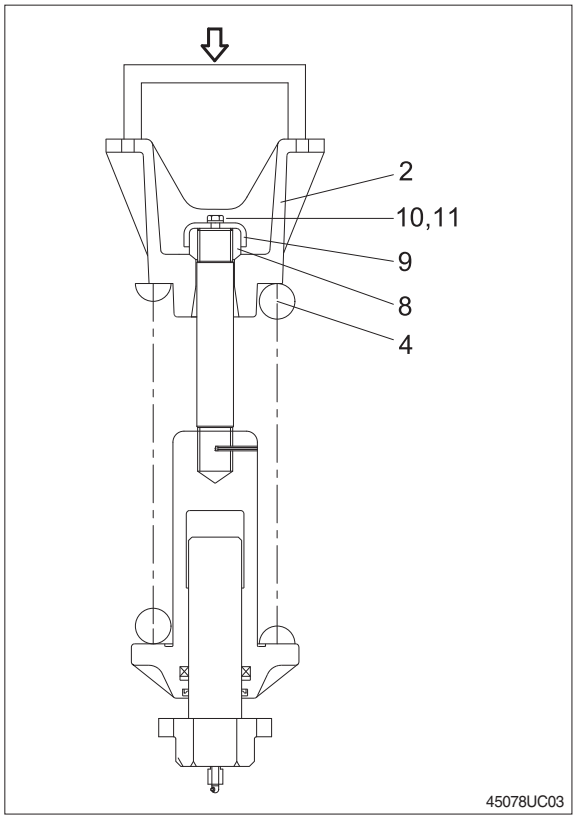
※ The spring is under a large installed load. This is dangerous, so be sure to set properly.

· Spring set load : 28840 kg (63580 lb)

② Remove bolt (10), spring washer (11) and lock plate (9).

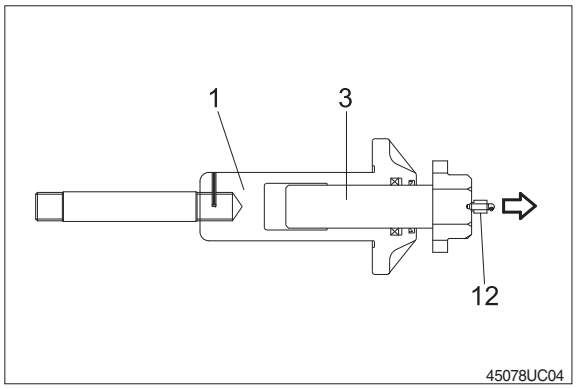
③ Remove lock nut (8).
Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.

④ Lighten the press load slowly and remove bracket (2) and spring (4).

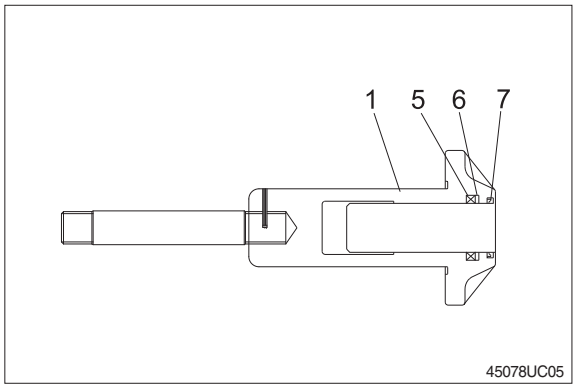


⑤ Remove rod (3) from body (1).

⑥ Remove grease valve (12) from rod (3).



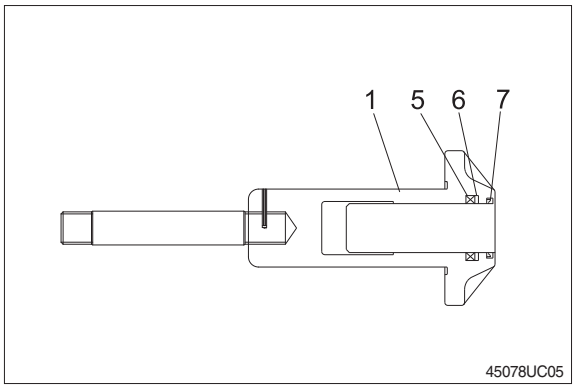
⑦ Remove rod seal (5), back up ring (6) and dust seal (11).



(3) Assembly

① Install dust seal (7), back up ring (6) and rod seal (5) to body (1).

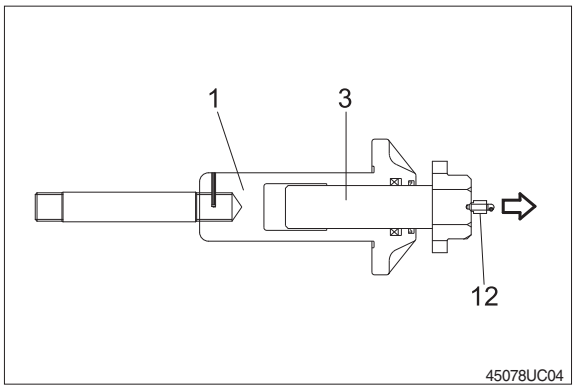
※ When installing dust seal (7) and rod seal (5), take full care so as not to damage the lip.



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

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

③ Fit grease valve (12) to rod (3).
· Tightening torque : 13.0±1.0 kgf · m
(94±7.2 lbf · ft)

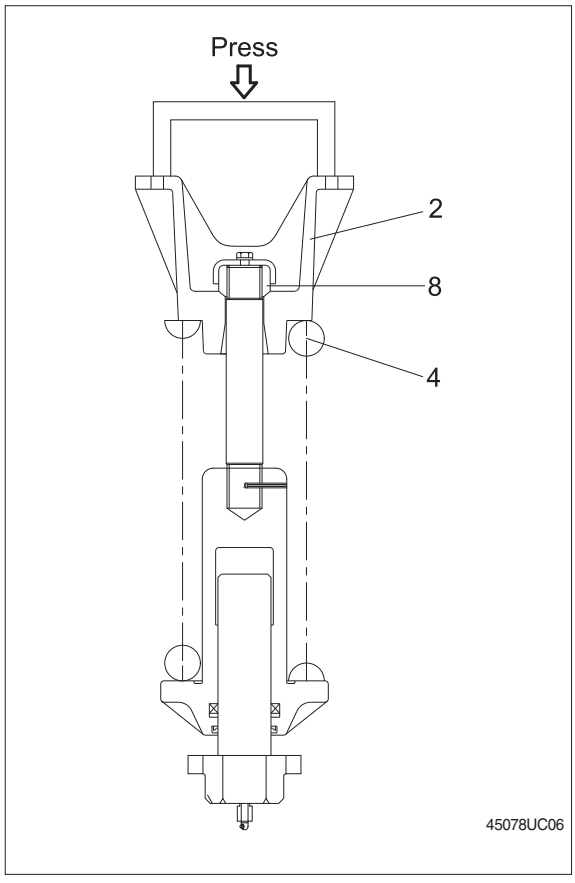


④ Install spring (4) and bracket (2) to body (1).

⑤ Apply pressure to spring (4) with a press and tighten lock nut (8).

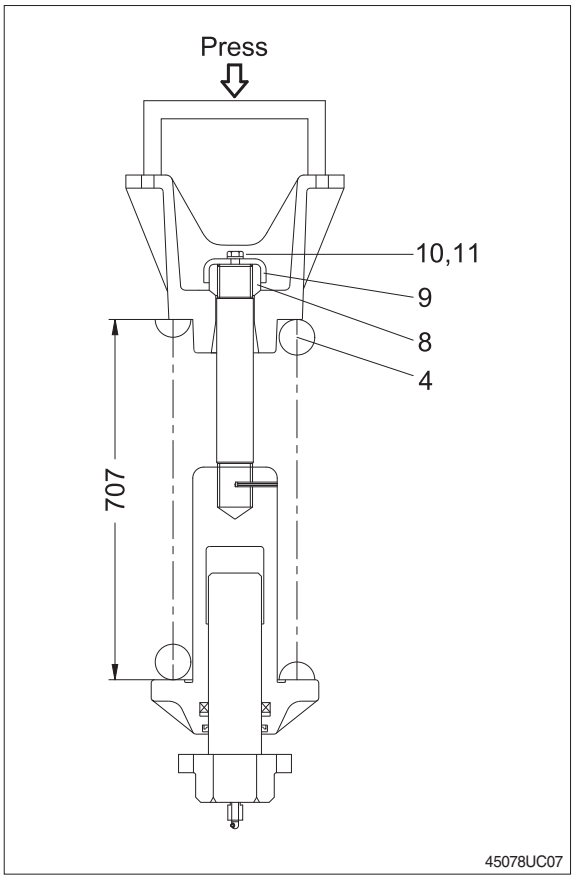
※ Apply sealant before assembling.

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

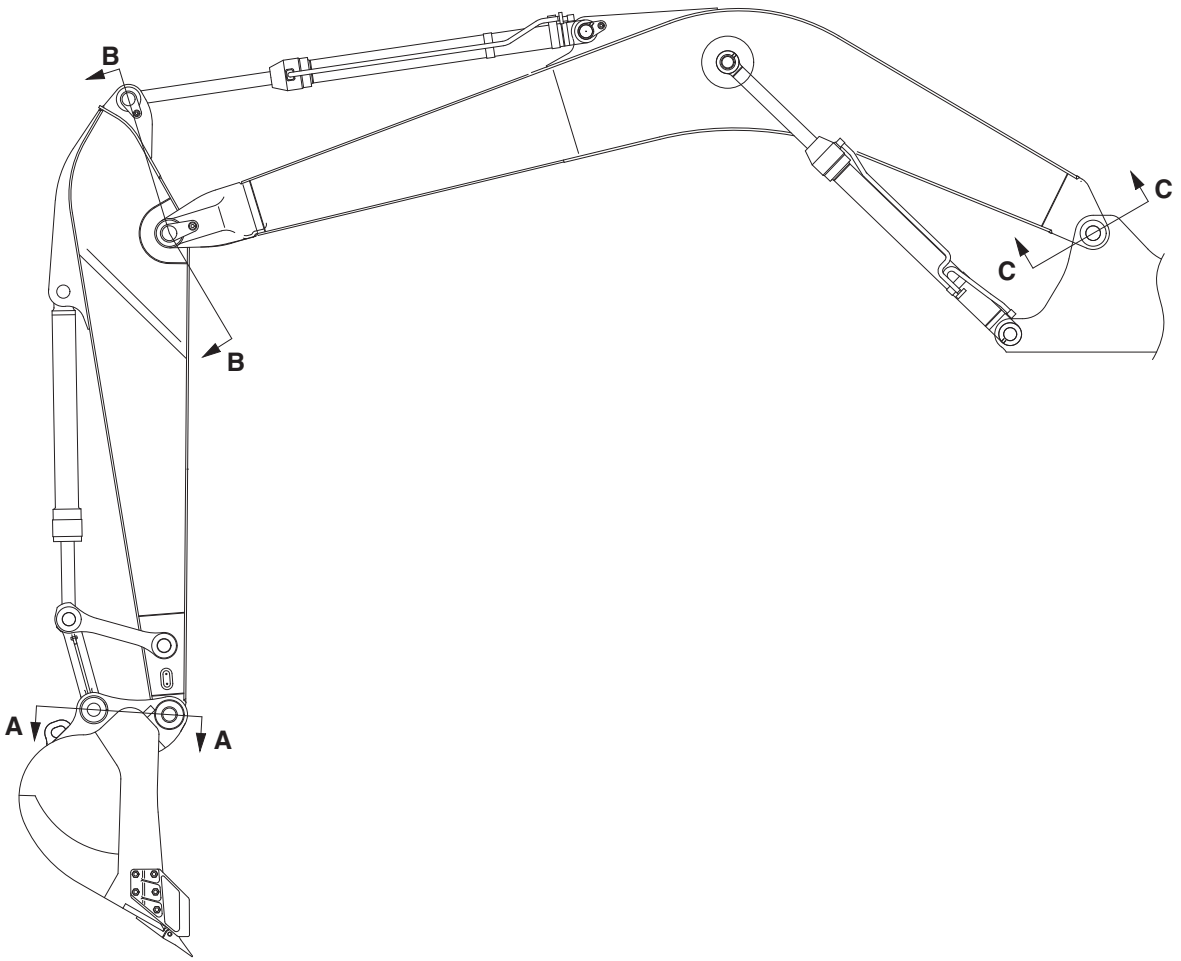


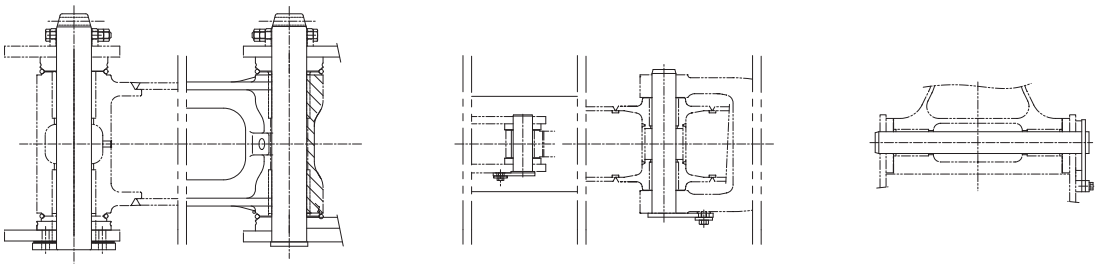
⑥ Lighten the press load and confirm the set length of spring (4).

⑦ After the setting of spring (4), install lock plate (9), spring washer (11) and bolt (10).



1. STRUCTURE





SECTION A SECTION B SECTION C

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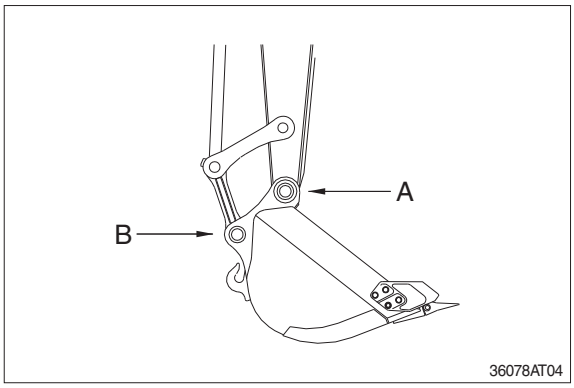
2. REMOVAL AND INSTALL

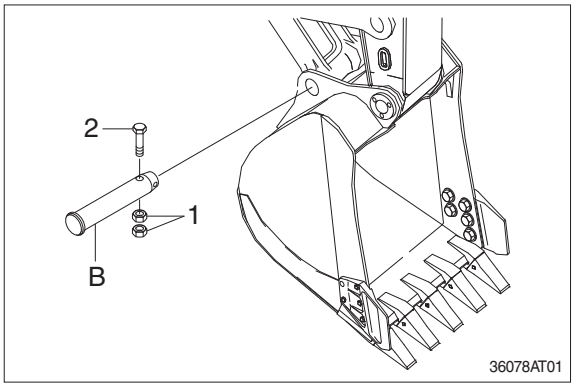
1) BUCKET ASSEMBLY

(1) Removal

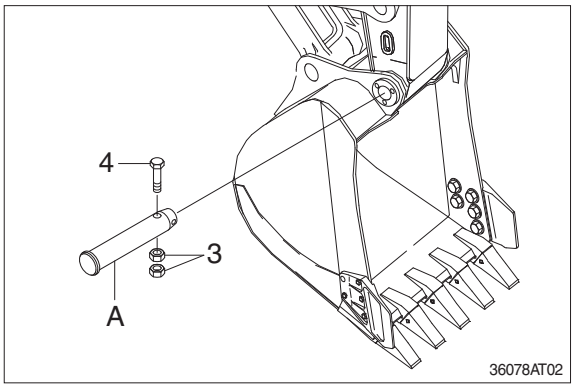
① Lower the work equipment completely to ground with back of bucket facing down.



② Remove nuts (1), bolt (2) and draw out the pin (B).



③ Remove nuts (3), bolt (4) and draw out the pin (A).

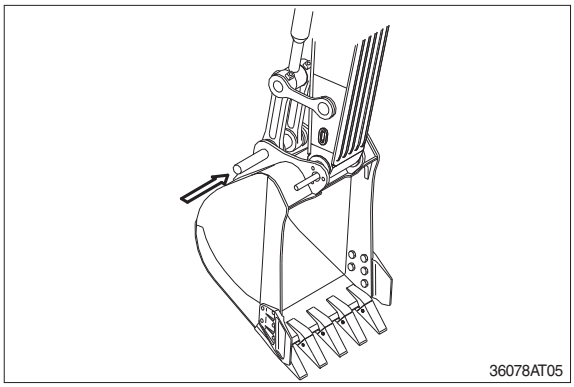


(2) Install

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 penetrated the skin causing serious injury.

① Remove bucket assembly.
For details, see removal of bucket assembly.

② Disconnect bucket cylinder hose(1).

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

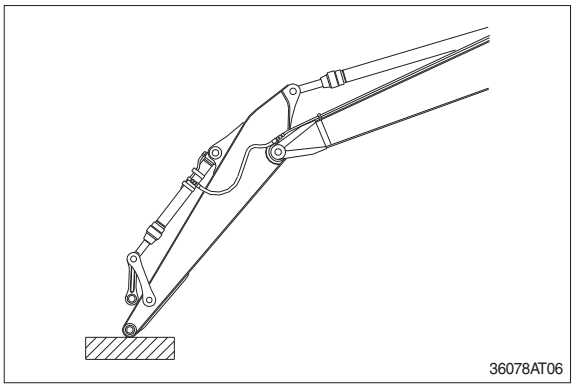
③ Sling arm cylinder assembly, remove spring, pin stopper and pull out pin.

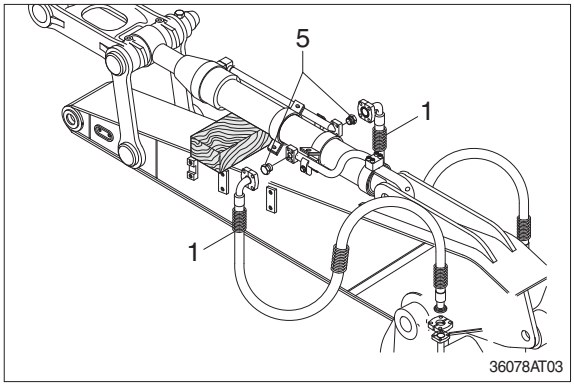
※ Tie the rod with wire to prevent it from coming out.
For details, see removal of arm cylinder assembly.

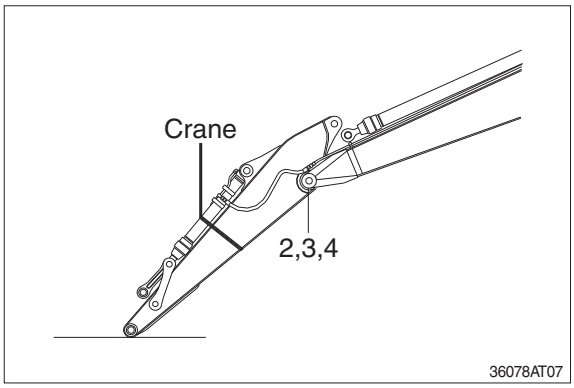
④ Place a wooden block under the cylinder and bring the cylinder down to it.

⑤ Remove bolt (2), plate (3) and pull out the pin (4) then remove the arm assembly.
· Weight : 1243 kg(2740 lb)

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







(2) Install

① Carry out installation in the reverse order to removal.

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

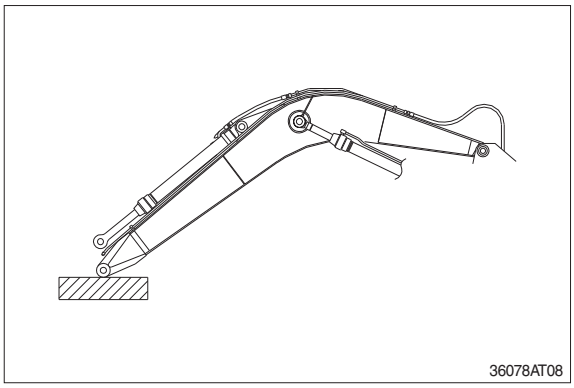
※ Bleed the air from the cylinder.

3) BOOM ASSEMBLY

(1) Removal

① Remove arm and bucket assembly.
For details, see removal of arm and bucket assembly.

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

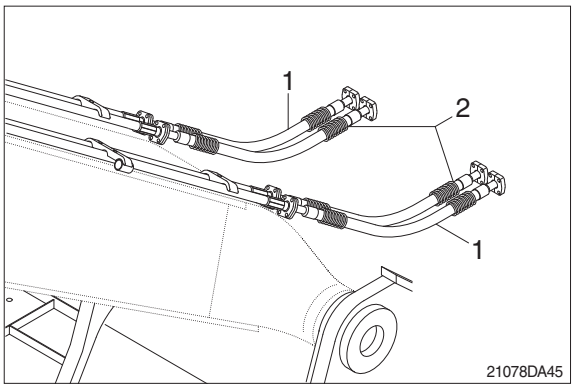


③ Disconnect head lamp wiring.

④ Disconnect bucket cylinder hoses (2) and arm cylinder hoses (1).

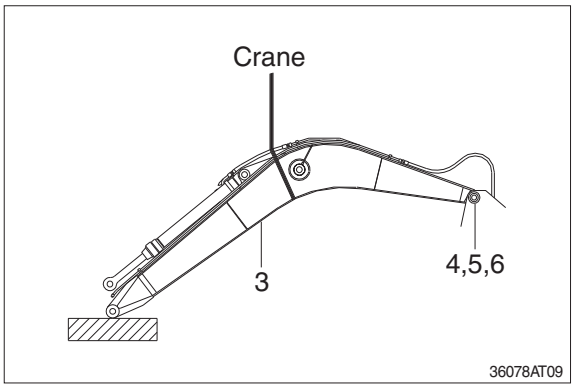
※ When the hoses are disconnected, oil may spurt out.

⑤ Sling boom assembly (3).



⑥ Remove bolt (4), plate (5) and pull out the pin (6) then remove boom assembly.
· Weight : 2600 kg (5730 lb)

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



(2) Install

① Carry out installation in the reverse order to removal.

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

※ Bleed the air from the cylinder.