

## SECTION 7 DISASSEMBLY AND ASSEMBLY

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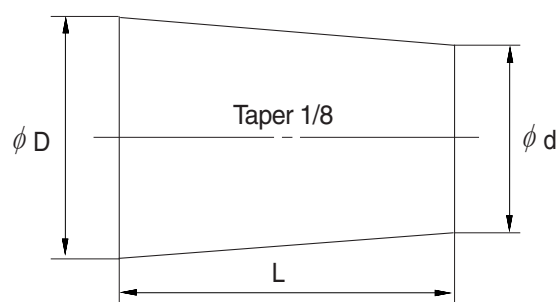
# SECTION 7 DISASSEMBLY AND ASSEMBLY

## GROUP 1 PRECAUTIONS

### 1. REMOVAL WORK

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

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



## 2. INSTALL WORK

- 1) Tighten all bolts and nuts(Sleeve nuts) to the specified torque.
- 2) Install the hoses without twisting or interference.
- 3) Replace all gaskets, O-rings, cotter pins, and lock plates with new parts.
- 4) Bend the cotter pin or lock plate securely.
- 5) When coating with adhesive, clean the part and remove all oil and grease, then coat the threaded portion with 2-3 drops of adhesive.
- 6) When coating with gasket sealant, clean the surface and remove all oil and grease, check that there is no dirt or damage, then coat uniformly with gasket sealant.
- 7) Clean all parts, and correct any damage, dents, burrs, or rust.
- 8) Coat rotating parts and sliding parts with engine oil.
- 9) When press fitting parts, coat the surface with antifriction compound(LM-P).
- 10) After installing snap rings, check that the snap ring is fitted securely in the ring groove(Check that the snap ring moves in the direction of rotation).
- 11) When connecting wiring connectors, clean the connector to remove all oil, dirt, or water, then connect securely.
- 12) When using eyebolts, check that there is no deformation or deterioration, and screw them in fully.
- 13) When tightening split flanges, tighten uniformly in turn to prevent excessive tightening on one side.
- 14) When operating the hydraulic cylinders for the first time after repairing and reassembling the hydraulic cylinders, pumps, or other hydraulic equipment or piping, always bleed the air from the hydraulic cylinders as follows:
  - (1) Start the engine and run at low idling.
  - (2) Operate the control lever and actuate the hydraulic cylinder 4-5 times, stopping 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)	M10 × 1.5	7±1.5	50.6±10.9
2		Engine mounting bolt (bracket-frame)	M16 × 2.0	30±4.5	217±32.5
3		Radiator mounting bolt, nut	M14 × 2.0	14±1.0	101±7.2
4		Coupling mounting socket bolt	M14 × 2.0	14±1.0	101±7.2
		Coupling mounting clamp bolt	M16 × 2.0	11±1.0	79.6±7.2
5	Hydraulic system	Main pump mounting bolt	M12 × 1.75	12±1.0	86.8±7.2
6		Main control valve mounting bolt	M 8 × 1.25	3.4±0.7	24.6±5.0
			M10 × 1.5	7±1.5	50.6±10.9
7		Fuel tank mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
8		Hydraulic oil tank mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
9		Turning joint mounting bolt, nut	M12 × 1.75	12.3±1.3	89±9.4
10	Power train system	Swing motor mounting bolt	M16 × 2.0	29.7±4.5	215±32.5
11		Swing bearing upper mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
12		Swing bearing lower mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
13		Travel motor mounting bolt	M16 × 2.0	23±2.5	166±18.1
14	Under carriage	Sprocket mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
15		Carrier roller mounting bolt, nut	M16 × 2.0	29.7±3.0	215±21.7
16		Track roller mounting bolt	M14 × 2.0	19.6±2.0	142±14.5
17		Track tension cylinder mounting bolt	M16 × 2.0	29.7±3.0	215±21.7
18		Track shoe mounting bolt, nut	M14 × 1.5	25.5±2.5	184±18.1
19	Others	Counter weight mounting bolt	M27 × 3.0	140±15	1013±108
20		Cab mounting bolt, nut	M12 × 1.75	12.2±1.3	88.2±9.4
21		Operator's seat mounting bolt	M 8 × 1.25	1.17±0.5	8.5±3.6

## 2. TORQUE CHART

Use following table for unspecified torque.

### 1) BOLT AND NUT

#### (1) Coarse thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 6 × 1.0	0.85 ~ 1.25	6.15 ~ 9.04	1.14 ~ 1.74	8.2 ~ 12.6
M 8 × 1.25	2.0 ~ 3.0	14.5 ~ 21.7	2.7 ~ 4.1	19.5 ~ 29.7
M10 × 1.5	4.0 ~ 6.0	28.9 ~ 43.4	5.5 ~ 8.3	39.8 ~ 60
M12 × 1.75	7.4 ~ 11.2	53.5 ~ 81.0	9.8 ~ 15.8	70.9 ~ 114
M14 × 2.0	12.2 ~ 16.6	88.2 ~ 120	16.7 ~ 22.5	121 ~ 163
M16 × 2.0	18.6 ~ 25.2	135 ~ 182	25.2 ~ 34.2	182 ~ 247
M18 × 2.5	25.8 ~ 35.0	187 ~ 253	35.1 ~ 47.5	254 ~ 344
M20 × 2.5	36.2 ~ 49.0	262 ~ 354	49.2 ~ 66.6	356 ~ 482
M22 × 2.5	48.3 ~ 63.3	349 ~ 458	65.8 ~ 98.0	476 ~ 709
M24 × 3.0	62.5 ~ 84.5	452 ~ 611	85.0 ~ 115	615 ~ 832
M30 × 3.0	124 ~ 168	898 ~ 1214	169 ~ 229	1223 ~ 1656
M36 × 4.0	174 ~ 236	1261 ~ 1704	250 ~ 310	1808 ~ 2242

#### (2) Fine thread

Bolt size	8T		10T	
	kg · m	lb · ft	kg · m	lb · ft
M 8 × 1.0	2.2 ~ 3.4	15.9 ~ 24.6	3.0 ~ 4.4	21.7 ~ 31.8
M10 × 1.2	4.5 ~ 6.7	32.5 ~ 48.5	5.9 ~ 8.9	42.7 ~ 64.4
M12 × 1.25	7.8 ~ 11.6	56.4 ~ 83.9	10.6 ~ 16.0	76.7 ~ 116
M14 × 1.5	13.3 ~ 18.1	96.2 ~ 131	17.9 ~ 24.1	130 ~ 174
M16 × 1.5	19.9 ~ 26.9	144 ~ 195	26.6 ~ 36.0	192 ~ 260
M18 × 1.5	28.6 ~ 43.6	207 ~ 315	38.4 ~ 52.0	278 ~ 376
M20 × 1.5	40.0 ~ 54.0	289 ~ 391	53.4 ~ 72.2	386 ~ 522
M22 × 1.5	52.7 ~ 71.3	381 ~ 516	70.7 ~ 95.7	511 ~ 692
M24 × 2.0	67.9 ~ 91.9	491 ~ 665	90.9 ~ 123	658 ~ 890
M30 × 2.0	137 ~ 185	990 ~ 1339	182 ~ 248	1314 ~ 1796
M36 × 3.0	192 ~ 260	1390 ~ 1880	262 ~ 354	1894 ~ 2562

**2) PIPE AND HOSE (FLARE type)**

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

**3) PIPE AND HOSE (ORFS type)**

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

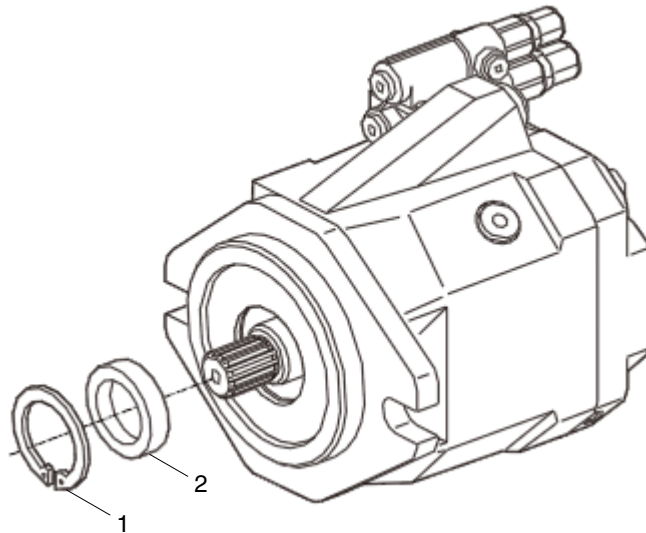
**4) FITTING**

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

## GROUP 3 PUMP DEVICE

### 1. DISASSEMBLY

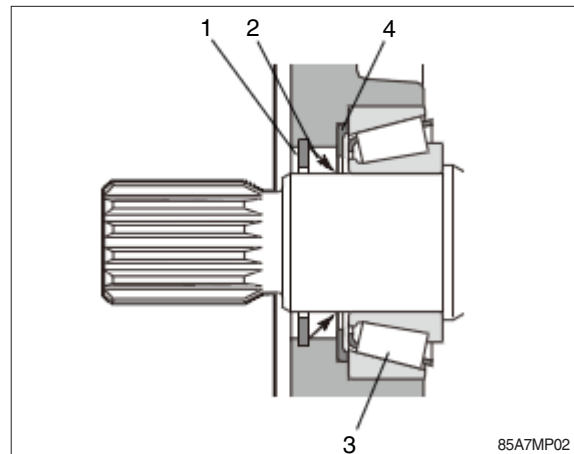
#### 1) SEALING OF THE DRIVE SHAFT



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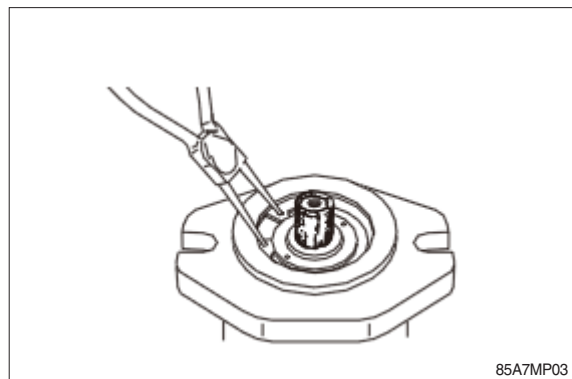
#### (1) Components

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



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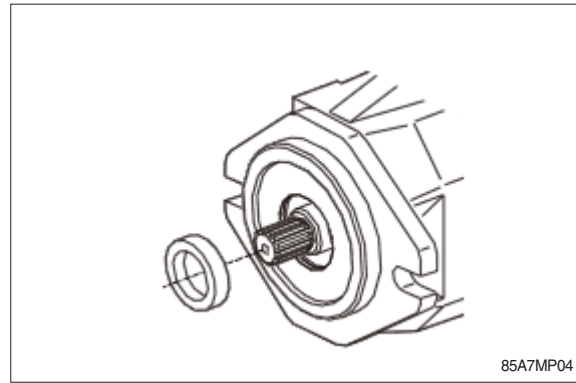
- (2) Protect the drive shaft.
- (3) Remove the circlip.
- (4) Remove shaft seal to front.



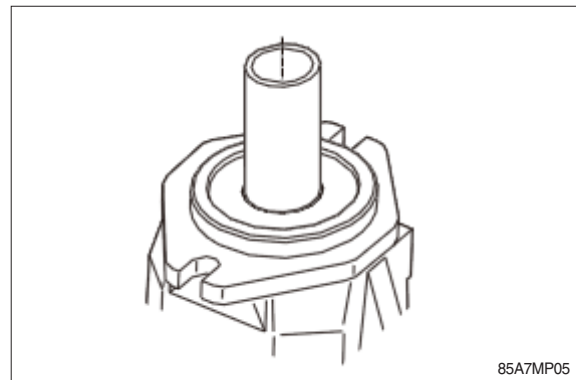
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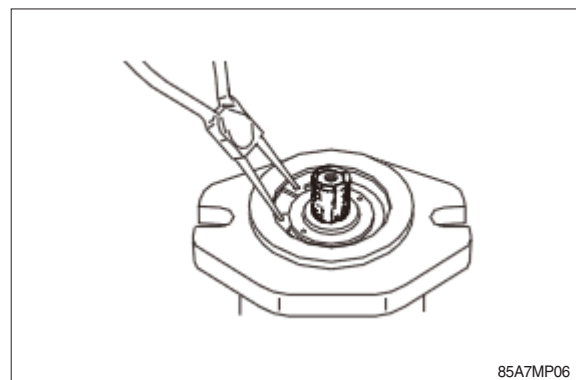
- ※ Change the shaft seal and check its sliding surface (drive shaft) and housing and grease the sealing ring.
- ※ Visual check shaft seal and housing.



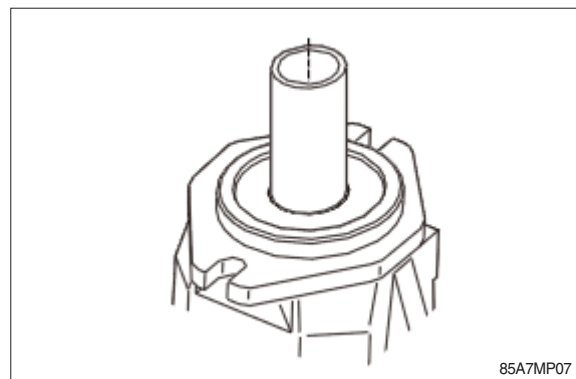
- (5) Assembling of the sealing ring carefully down to the distance ring.



- (6) Assemble the snap ring.

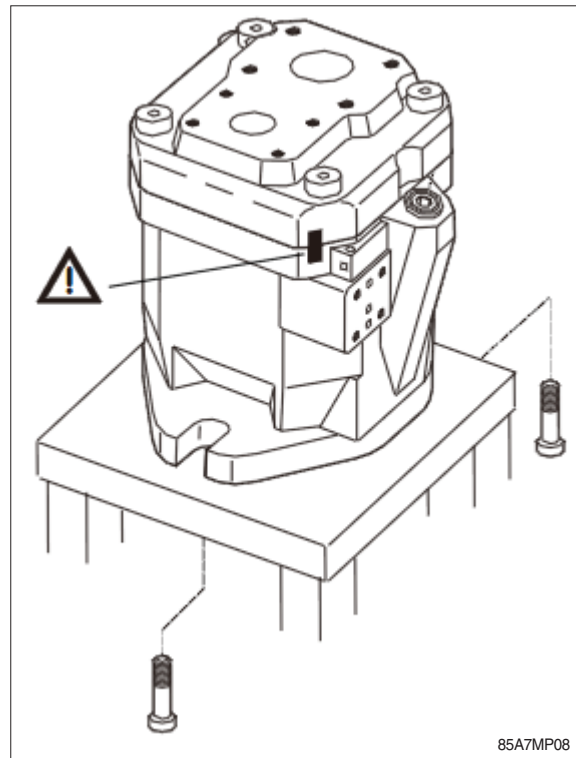


- ※ Visual check to ensure that the circlip is correctly located in the groove.

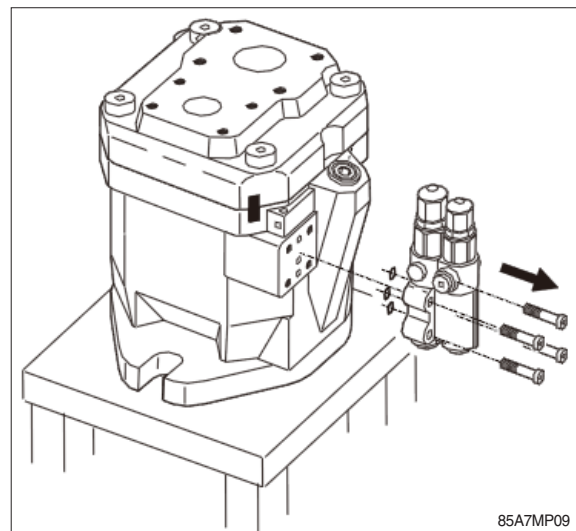


## 2) DISSAMBLE THE PUMP

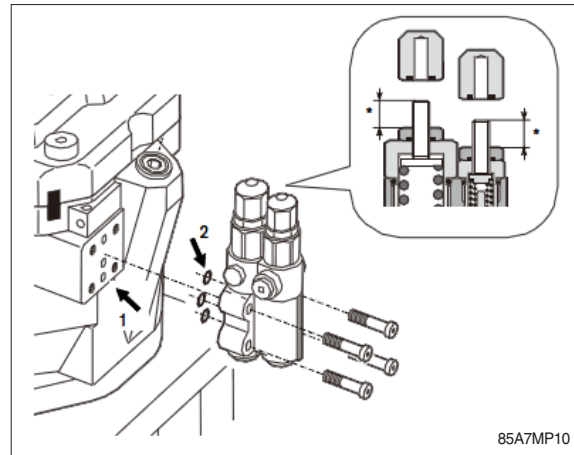
- ※ Disassembly position  
Mark the location of the connection plate  
on the housing of pump.



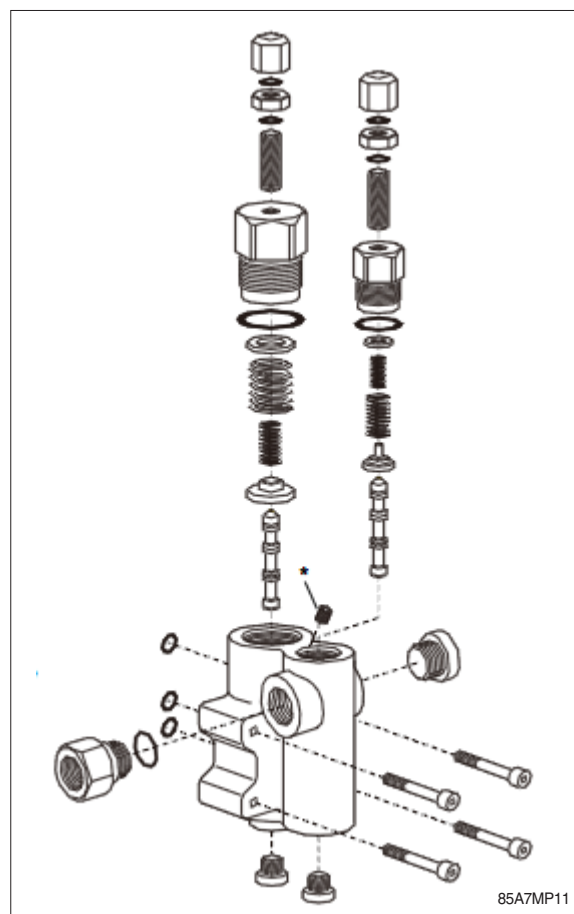
- (1) Remove the control valve.



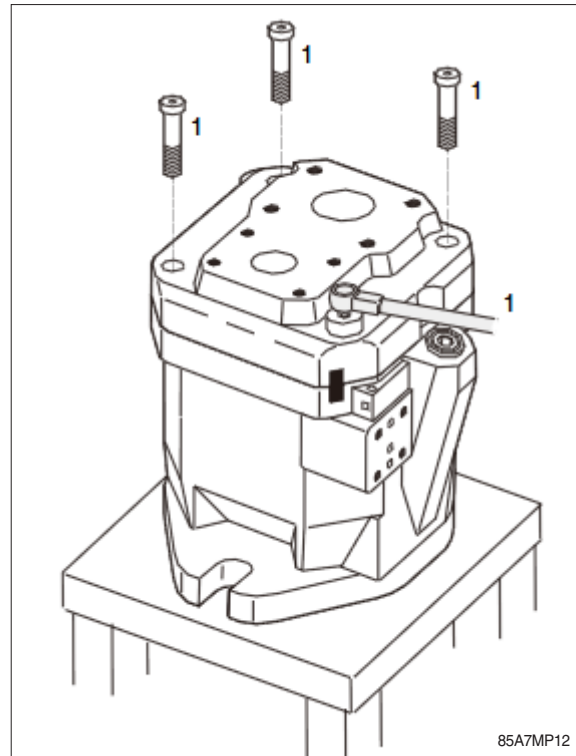
- (2) Remove the control valve
- ※ Measure dimension \* and note down.
  - ※ Check sealing surface (1) and O-rings (2).



- ※ Only DFR with orifice

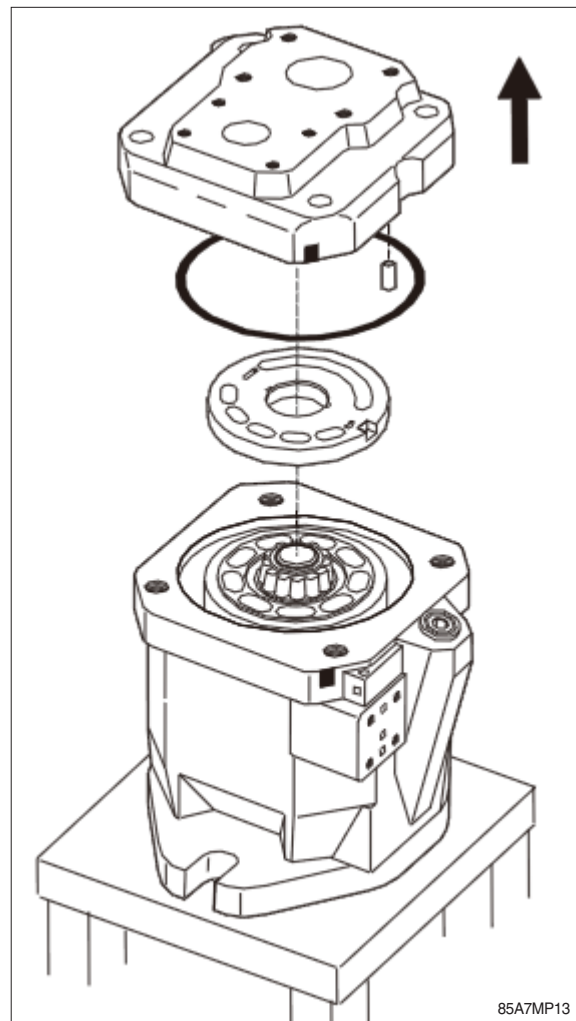


(2) Remove the socket screws (1).

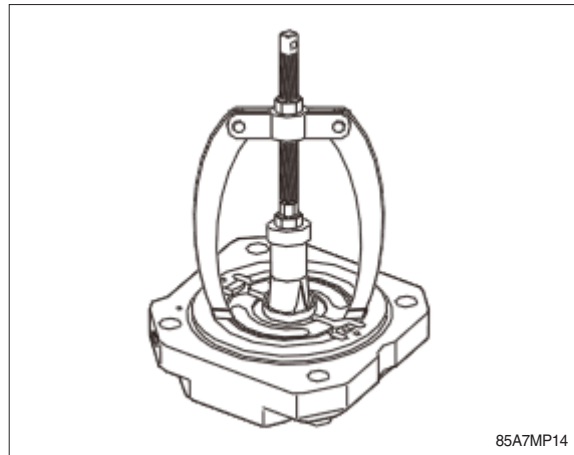


(4) Remove connection plate.

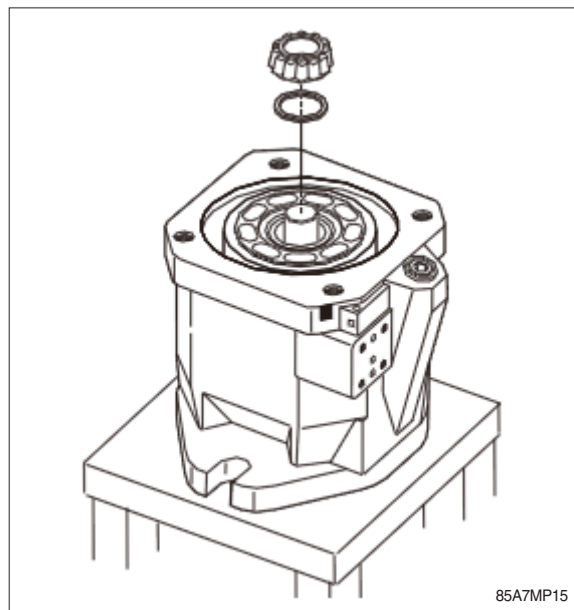
※ Control plate can drop down - keep tight while removing connection plate.



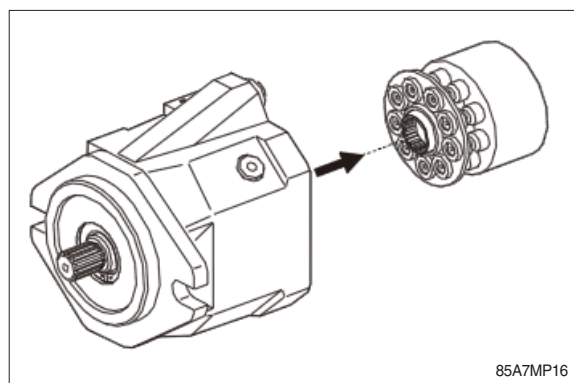
- (5) Pull bearing of the connection plate out using a bearing puller.  
※ Do not damage the sealing surface.



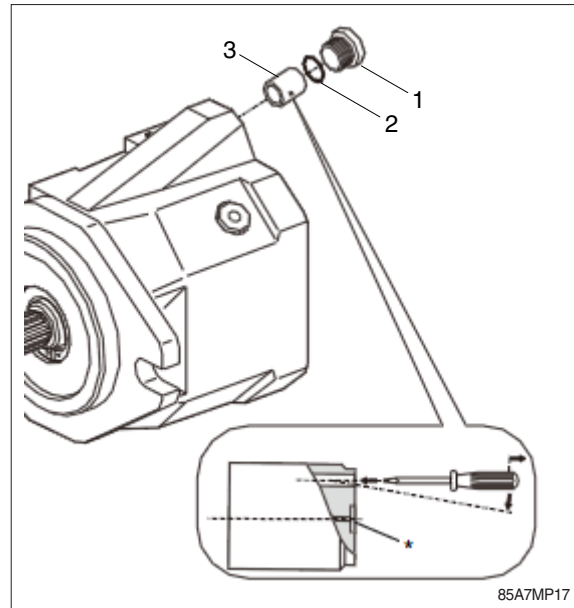
- (6) Remove bearing and shim.  
※ Do not damage the sealing surface.



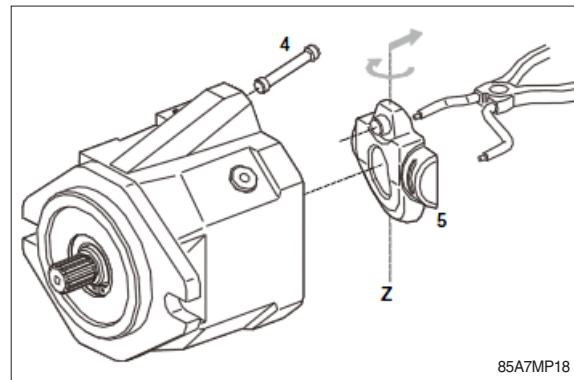
- (7) Remove the rotary group in a horizontal position.



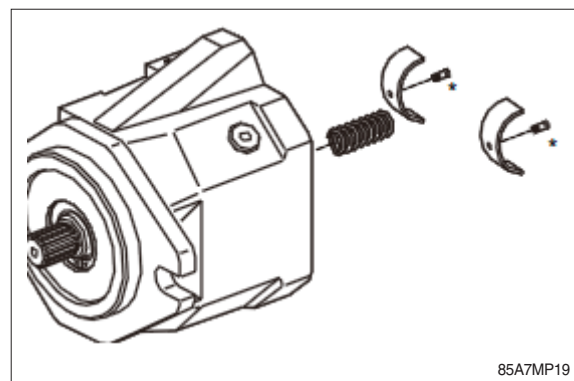
- (8) Remove plug (1) with seal (2).
- (9) Pull out control piston (3) (- flat surface \*-) with tool.



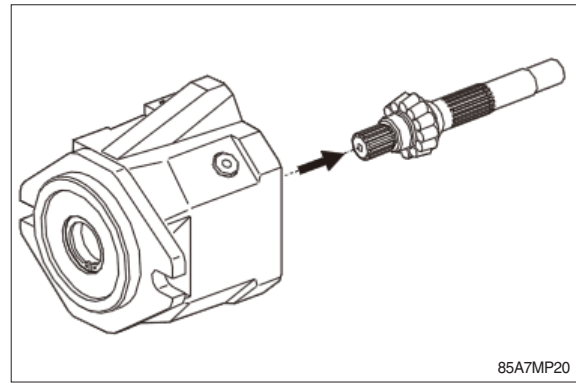
- (10) Remove piston rod and swash plate.  
Turn swash plate (5) inside of the housing slightly along Z-axis with tool. Remove piston rod (4). Remove swash plate (5). Do not damage the piston rod and swash plate.



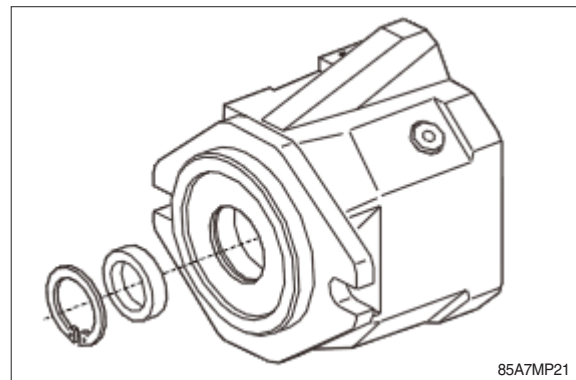
- (11) Remove bearing shells and bearing.  
※ Attention for position.  
Only size 60~85



(12) Remove drive shaft with bearing.



(13) Remove circlip and shaft seal.

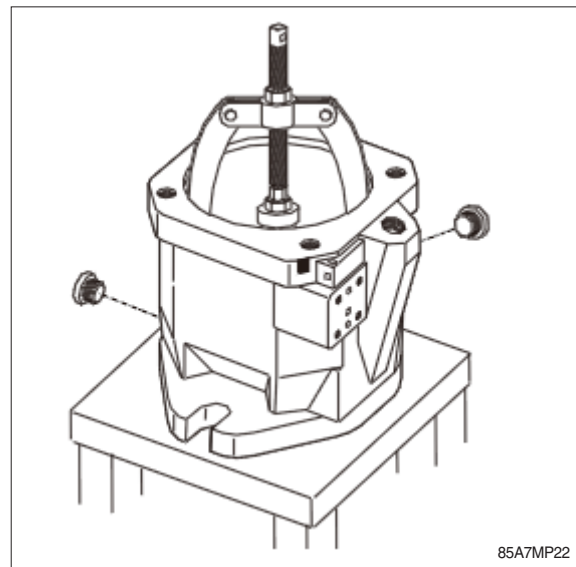


(14) Pull out outer race of tapered bearing out of housing press seat.

※ Use bearing puller.

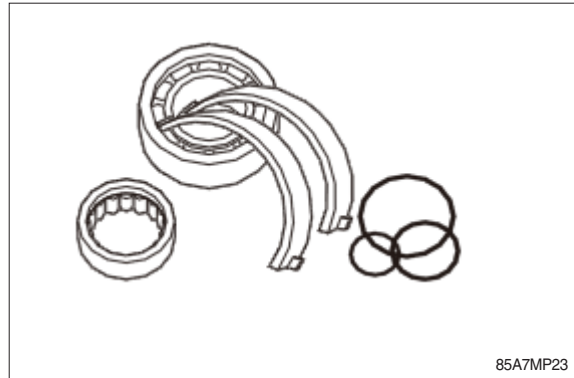
(15) Remove all plugs.

(16) Remove stop ring.



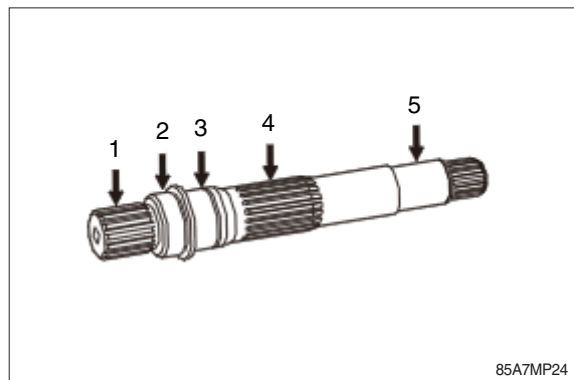
### 3) INSPECTION

(1) Renew all bearings and seals.



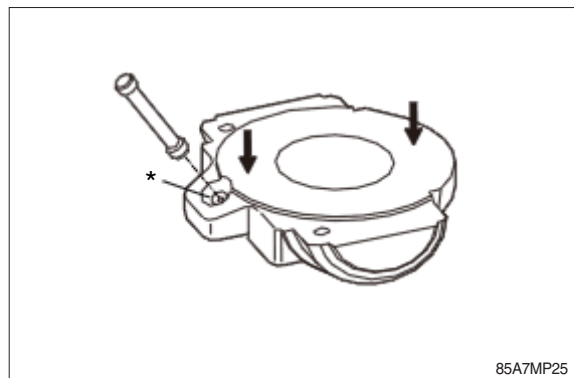
(2) Check below items

- ① Wear on splines, fretting
- ② Drive shaft seal wear grooves
- ③ Bearing seat
- ④ Splines for cylinder drive
- ⑤ Bearing seat

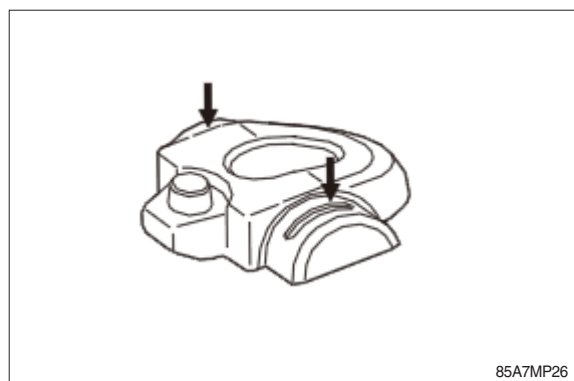


(3) Sliding surface free of grooves.

- \* Check for freedom of piston rod movement.

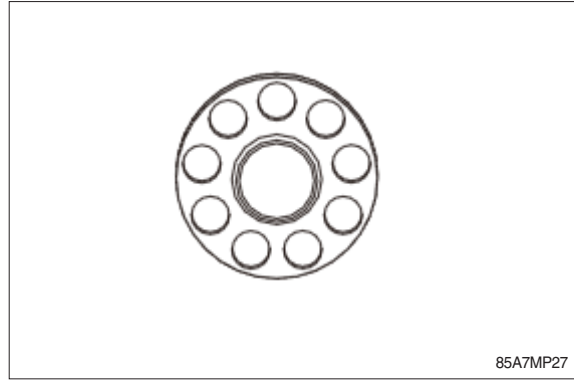


(4) Bearing surfaces

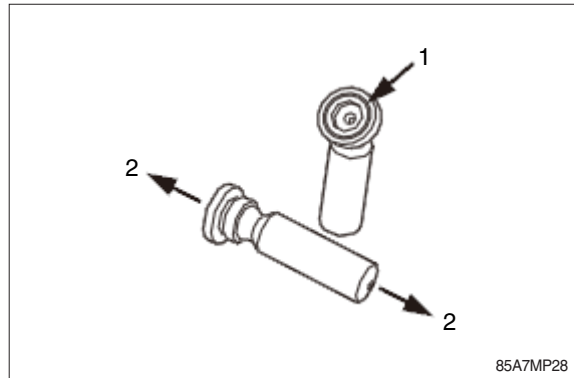




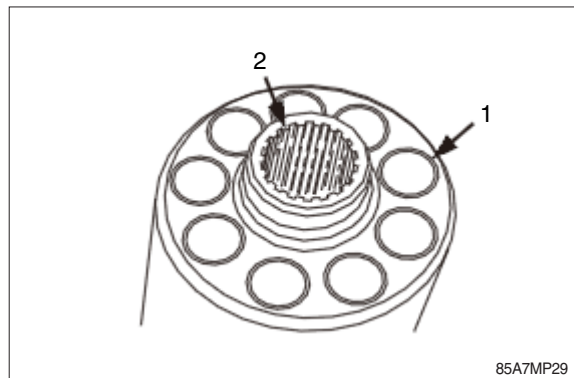
- (5) That the retaining plate is free of grooves and that there is no wear in the slipper pad area.



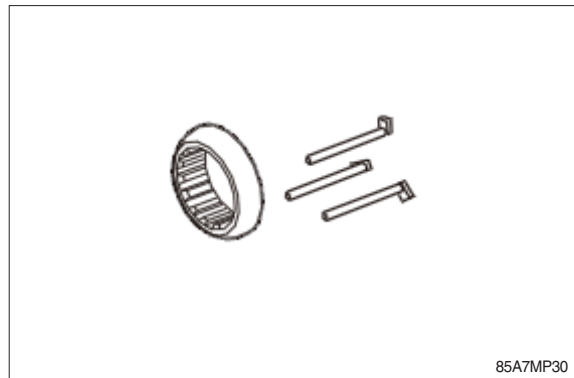
- (6) Check to see that there are no scratches or metal deposits on the sliding surface (1), and that there is no axial play (2), (pistons must only be replaced as a set).



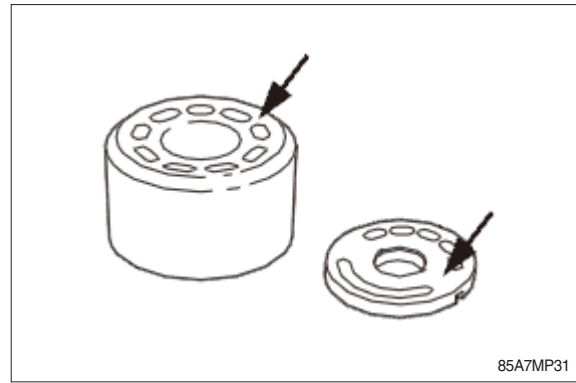
- (7) Cylinder bores (1), splines (2).



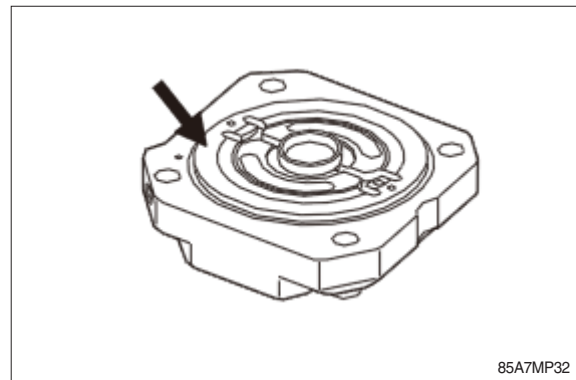
- (8) Free of grooves, no signs of wear.



- (9) Cylinder sliding surface free of grooves, no wear, no embedded foreign particles. That there are no scratches on the control plate. (Only replace them as a set).

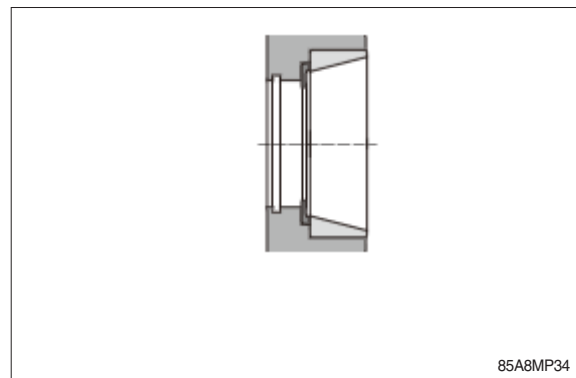
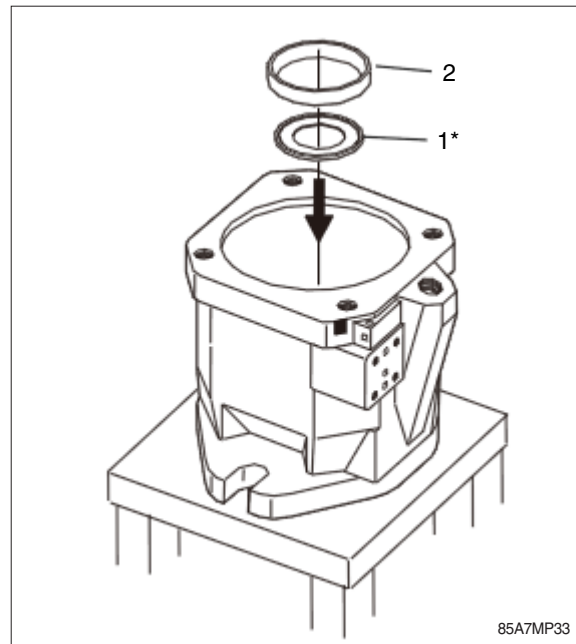


- (10) Mounting surface - control plate undamaged

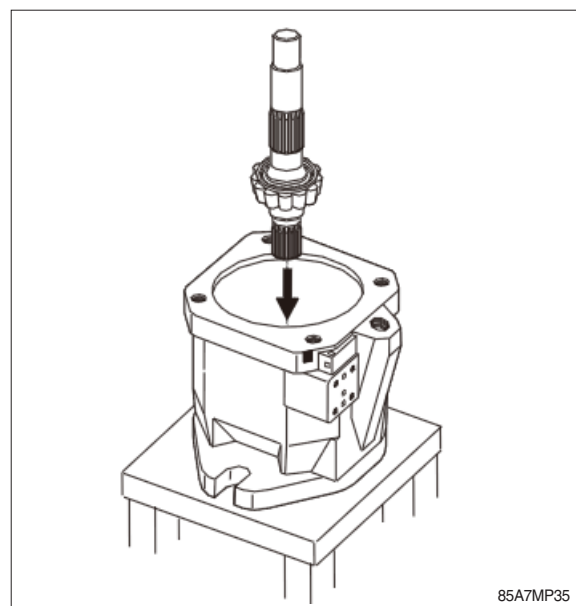


#### 4) ASSEMBLY

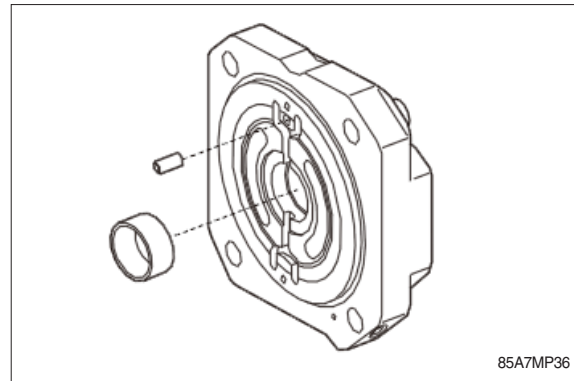
- (1) Assemble stop ring (1, \* see also below spare part list).
- (2) Press-in distance ring (2) with tool.



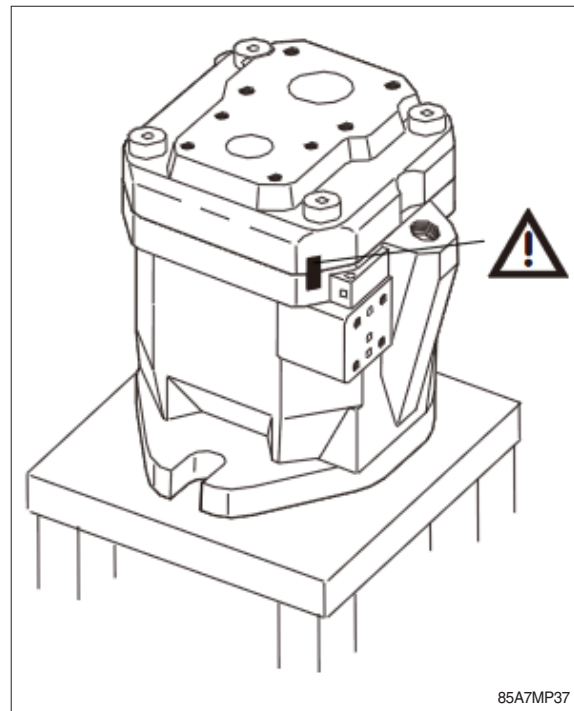
- (3) Assemble shaft in correct position.  
※ Do not cut shaft seal.



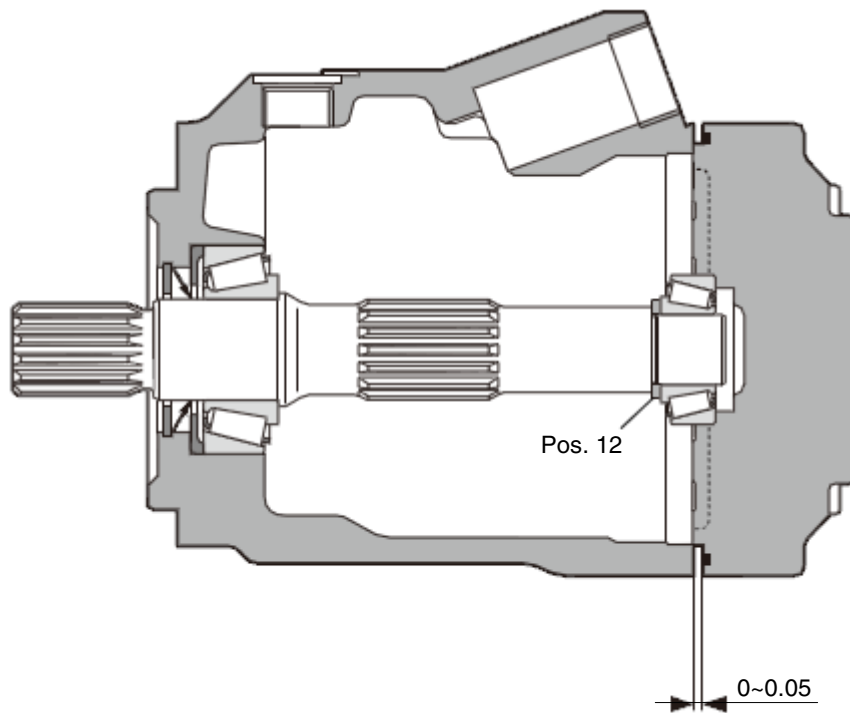
- (4) Press-in outer racer of rear bearing into connection plate.



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



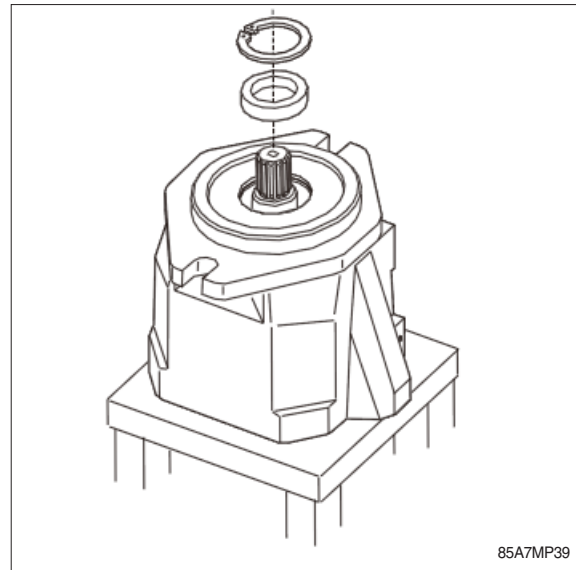
② Taper roller bearing initial tension



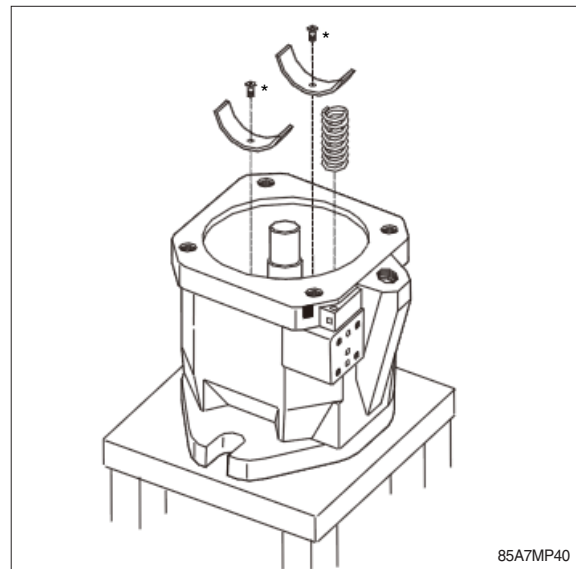
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- ※ Adjustment of taper roller bearing set  
Cast iron housing must have initial tension of the bearings :  
0~0,05 mm, grind position 12 if necessary.

(8) Assembly instruction shaft seal see page 6.



(9) Fit in bearing shells and spring.  
※ Fix with grease.  
\* Only size 60~85

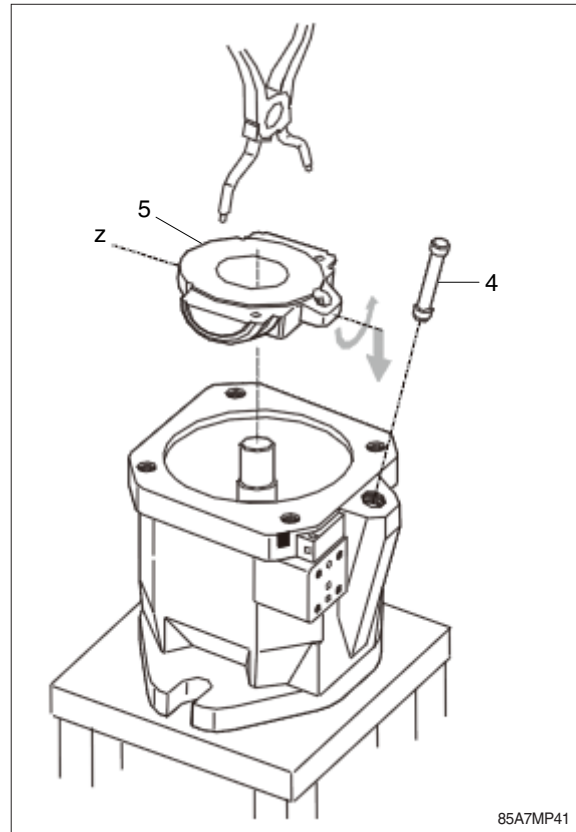


(10) Assemble swash plate (5) and piston rod (4) into pump.

※ Spring guide pin in correct position.

※ Check correct position of the spring.

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



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

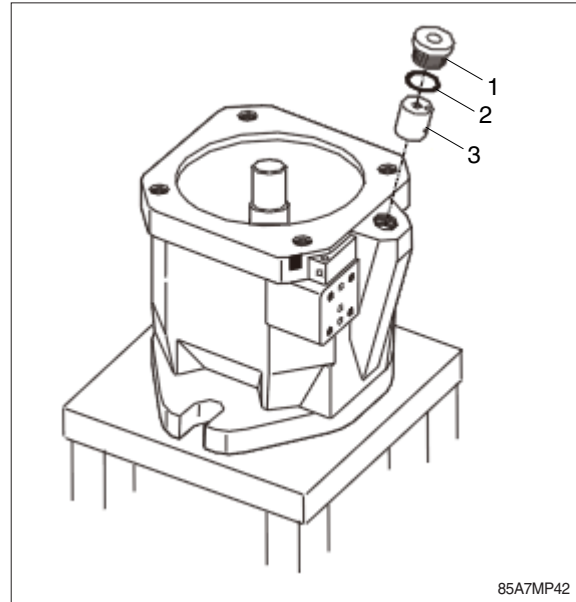
※ Plug tighten torque.

- Size 28, 45, 60

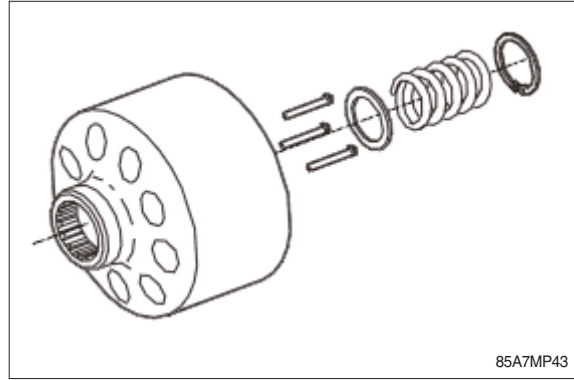
$19.4 \pm 2.0 \text{ kgf} \cdot \text{m}$  ( $140 + 14.5 \text{ lbf} \cdot \text{ft}$ )

- Size 85

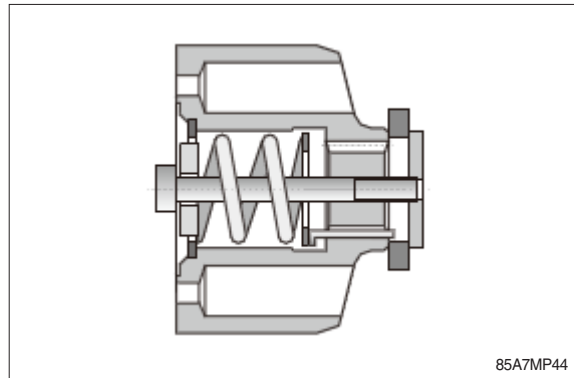
$32.6 \pm 2.0 \text{ kgf} \cdot \text{m}$  ( $236 + 14.5 \text{ lbf} \cdot \text{ft}$ )



(13) Fit pressure pins using an assembly aid.

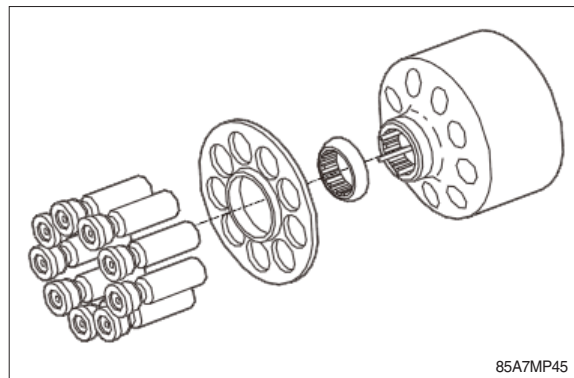


(14) Pre-tension the spring using a suitable device.



(15) Assemble piston with retaining plate.

※ Oil piston and slipper pad.



(16) Assemble piston with retaining plate.

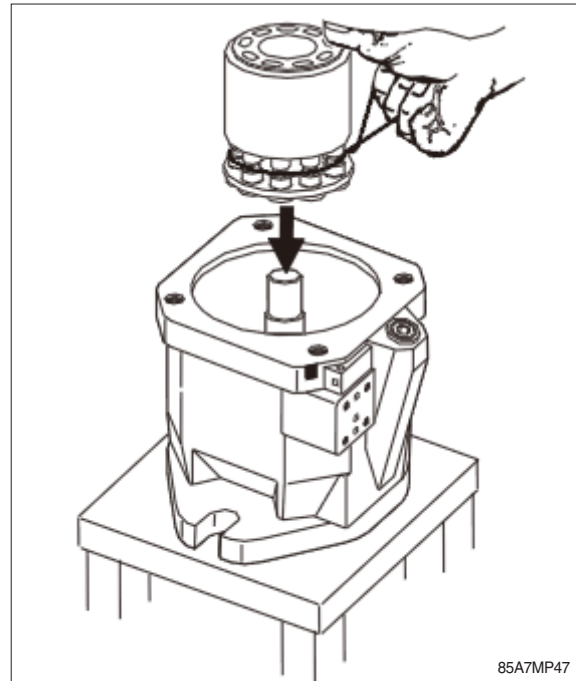




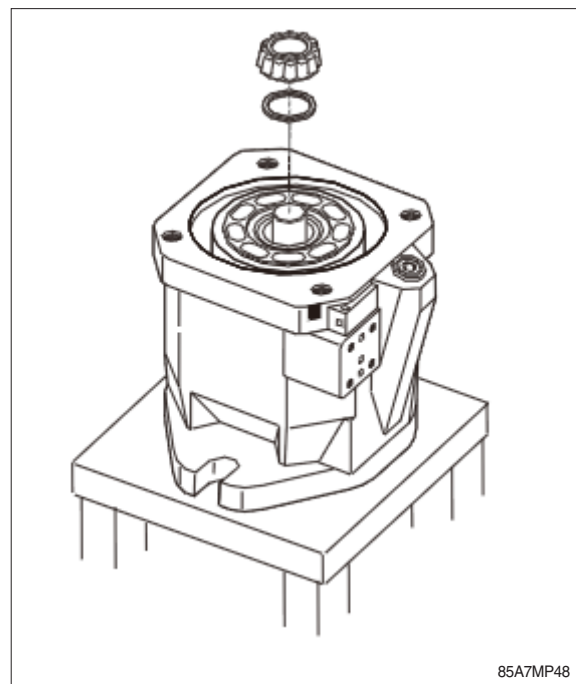
(17) Fit rotary group

※ Assembly aid

Hold the pistons by using an O-ring.



(18) Assemble bearing and adjustment shim to shaft.



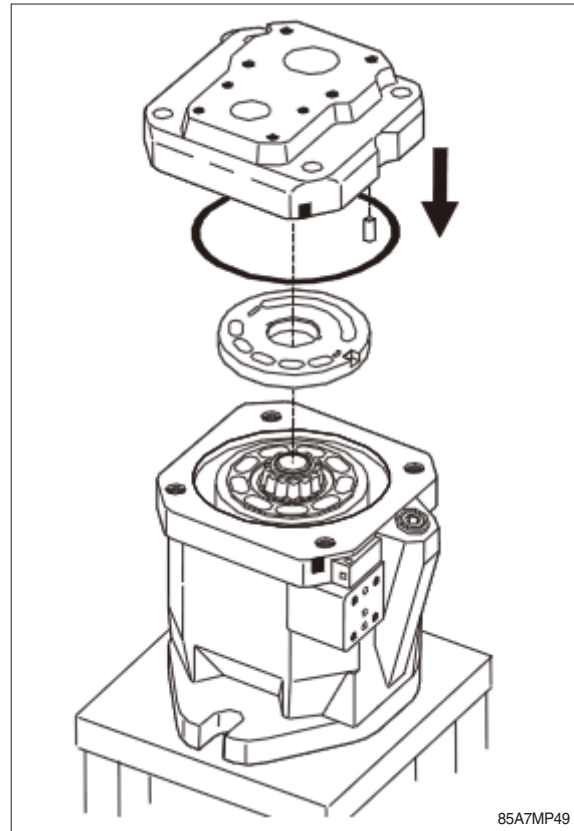
(19) Fit O-ring.

※ Fix with grease.

(20) Fit control plate.

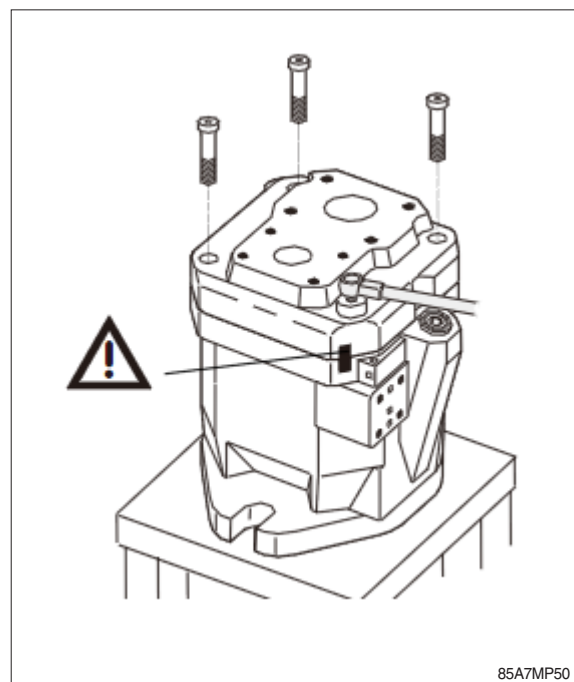
※ Fix with grease.

※ Check correct position to pin.

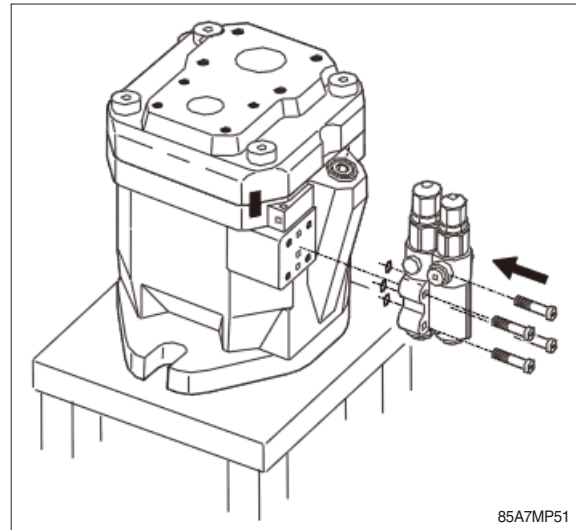


(21) Assemble connection plate.

※ Check the correct position to housing.

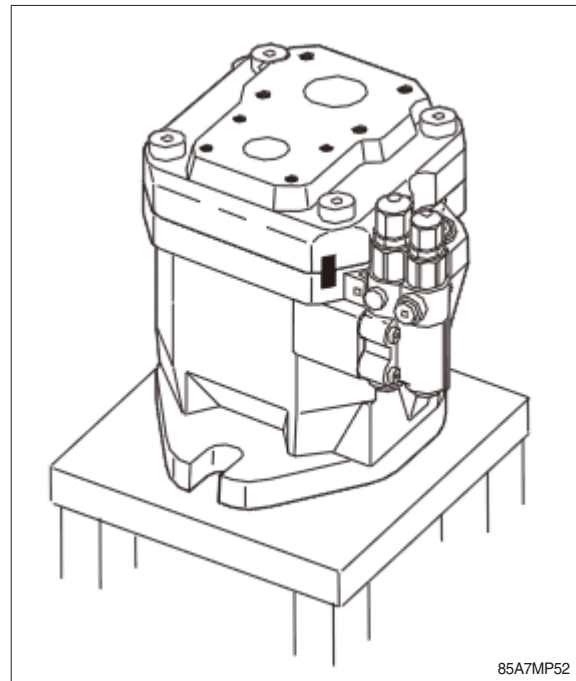


(22) Assemble control valve.



(23) Final pump assembly

※ Double check of the housing signs.



## GROUP 4 MAIN CONTROL VALVE

### 1) STARTING, MAXIMAL PRESSURE SET UP

- (1) Break the locking cover with a pair of pliers.

Decalibrate the LS pressure relief valve (19 mm open end spanner on counter nut ; 5 mm socket wrench) before starting the machine.

Maintain one of the control block spool valve in action before the linked hydraulic receiver is at the end of stroke.



H940AC6SE01

- ※ On the spool valve, the value of the secondary valve pressure must be greater than that of the LS pressure relief valve to adjust.

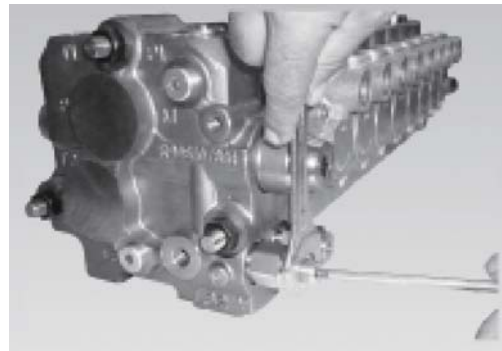
- (2) Adjust the maximum pressure measured in M using the LS pressure relief valve (19 mm open end spanner on counter nut ; 5 mm socket wrench).

Tighten the counter nut of the adjusting screw to the torque :

-  $2.55 \pm 0.25 \text{ kgf} \cdot \text{m}$  ( $18.4 \pm 1.8 \text{ lbf} \cdot \text{ft}$ )

Protect the setting by putting a new locking cover.

Fit together two half covers.



H940AC6SE02

## 2) LS PRESSURE RELIEF VALVE REPLACEMENT

The control block does not need to be removed from the machine to perform this operation.

- ▲ Place all of the machine's actuators connected to the control block in neutral position. Release stored pressure by operating all the spools.

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

- ※ Reassembly

Install the LS pressure relief valve on the inlet element.

- Torque :

$$4.59 \pm 0.46 \text{ kgf} \cdot \text{m} \text{ (} 33.2 \pm 3.3 \text{ lbf} \cdot \text{ft)}$$

Set the LS pressure relief valve to the specified value

Fit a new appropriate locking cover



H940AC6SE03

## 3) REGULATING UNIT REPLACEMENT

- (1) Unscrew the plug (12 mm socket wrench).

- (2) Remove using a magnet to extract it from its bore : shims, spring, piston.

- ※ Clean parts to remove any attracted metal particle.

Do not use magnet for reassembly.

- ※ Reassembly

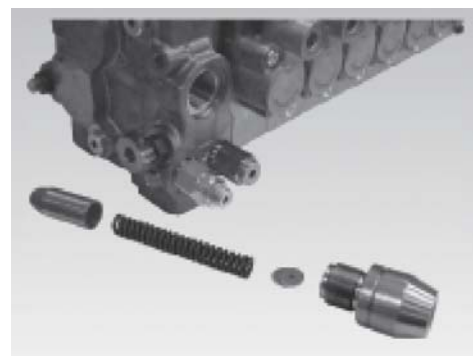
Reassemble parts in reverse order.

- Torque :

$$10.2 \pm 1.02 \text{ kgf} \cdot \text{m} \text{ (} 73.8 \pm 7.38 \text{ lbf} \cdot \text{ft)}$$



H940AC6SE04



H940AC6SE05

#### 4) FLOW REGULATOR REPLACEMENT

(1) Unscrew the flow regulator (22 mm open end spanner).

- ※ Reassembly  
reassemble parts in reverse order.  
- Torque :  
 $2.04 \pm 0.20 \text{ kgf} \cdot \text{m}$  ( $14.8 \pm 1.48 \text{ lbf}\cdot\text{ft}$ )



H940AC6SE06



H940AC6SE07

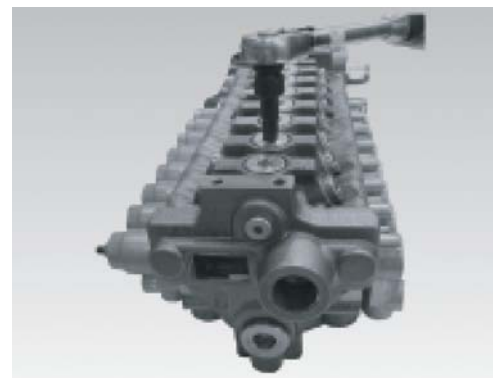
#### 5) PRESSURE COMPENSATOR REPLACEMENT

(1) Unscrew the compensator plug (12 mm socket wrench).

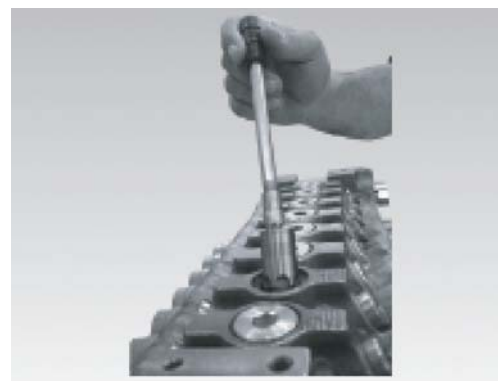
(2) Remove the compensator piston using a magnet to extract it from its bore.

- ※ Clean parts to remove any attracted metal particle.  
Do not use magnet for reassembly.

- ※ Reassembly  
reassemble parts in reverse order.  
- Torque :  
 $12.2 \pm 1.22 \text{ kgf} \cdot \text{m}$  ( $88.5 \pm 8.85 \text{ lbf}\cdot\text{ft}$ )



H940AC6SE10



H940AC6SE11



H940AC6SE12

## 6) CHECK VALVE REPLACEMENT

(1) Unscrew one of the check valves (6 mm socket wrench).

※ Reassembly

Install the check valve on the distribution element.

- Torque :

$7.14 \pm 0.71 \text{ kgf} \cdot \text{m}$  ( $51.6 \pm 5.16 \text{ lbf}\cdot\text{ft}$ )



H940AC6SE13



H940AC6SE14

## 7) REMOVAL OF THE HYDRAULIC COVER

(1) Remove the 2 mounting screws.

(2) Remove the cover and O-ring.

※ Reassembly

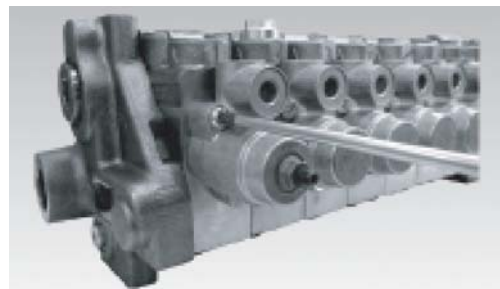
Replace the cover O-ring.

Reassemble parts in reverse order.

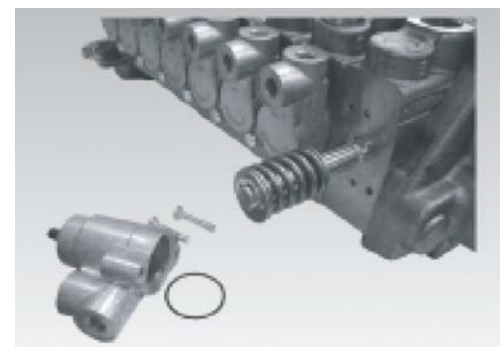
Torque for the 2 mounting screws.

- Torque :

$0.61 \pm 0.06 \text{ kgf} \cdot \text{m}$  ( $4.43 \pm 0.44 \text{ lbf}\cdot\text{ft}$ )



H940AC6SE15

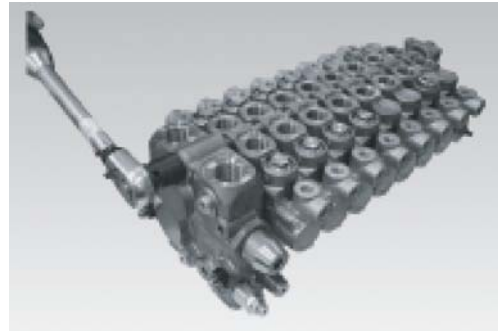


H940AC6SE16

## 8) COMPLET CONTROL BLOCK DISASSEMBLY/ASSEMBLY

- (1) Remove the control block from the machine.

Remove the 3 nuts (19 mm ring wrench).



H940AC6SE18

- (2) Remove the final element.  
Separate the distribution elements.



H940AC6SE19

- (3) Reassembly

- Replace the O-rings between distribution elements, initial element and final element.
- Check the cleanliness of the element faces.
- In case of tie rods reassembly, check their orientation : the shortest thread goes into the final element.
- Torque for the 3 tie rods :

$6.12 \pm 0.25 \text{ kgf} \cdot \text{m}$  ( $44.3 \pm 4.43 \text{ lbf} \cdot \text{ft}$ )

- Reassemble elements in reverse order

Place the control block horizontally on an even support area to tight the nuts.

Torque for the 3 nuts :

$6.12 \pm 0.25 \text{ kgf} \cdot \text{m}$  ( $44.3 \pm 4.43 \text{ lbf} \cdot \text{ft}$ )



H940AC6SE20



## GROUP 5 SWING DEVICE

### 1. REMOVAL AND INSTALL

#### 1) REMOVAL

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

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

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

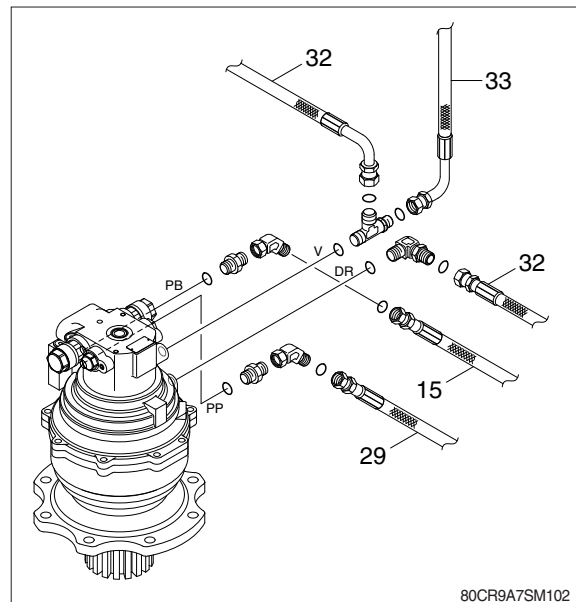
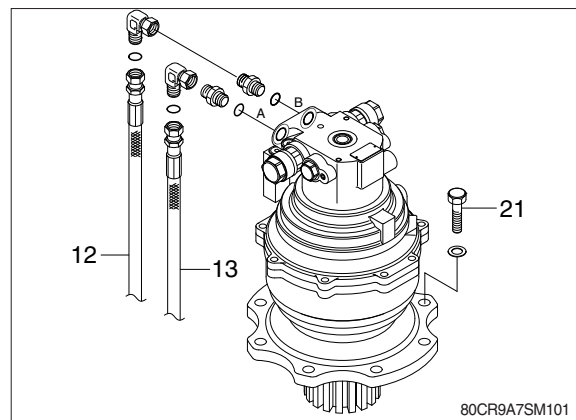
- (4) Disconnect hose assembly (12, 13).
- (5) Disconnect pilot line hoses (15, 29, 32, 33).
- (6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (21).

※ Motor device weight : 80 kg (176 lb)

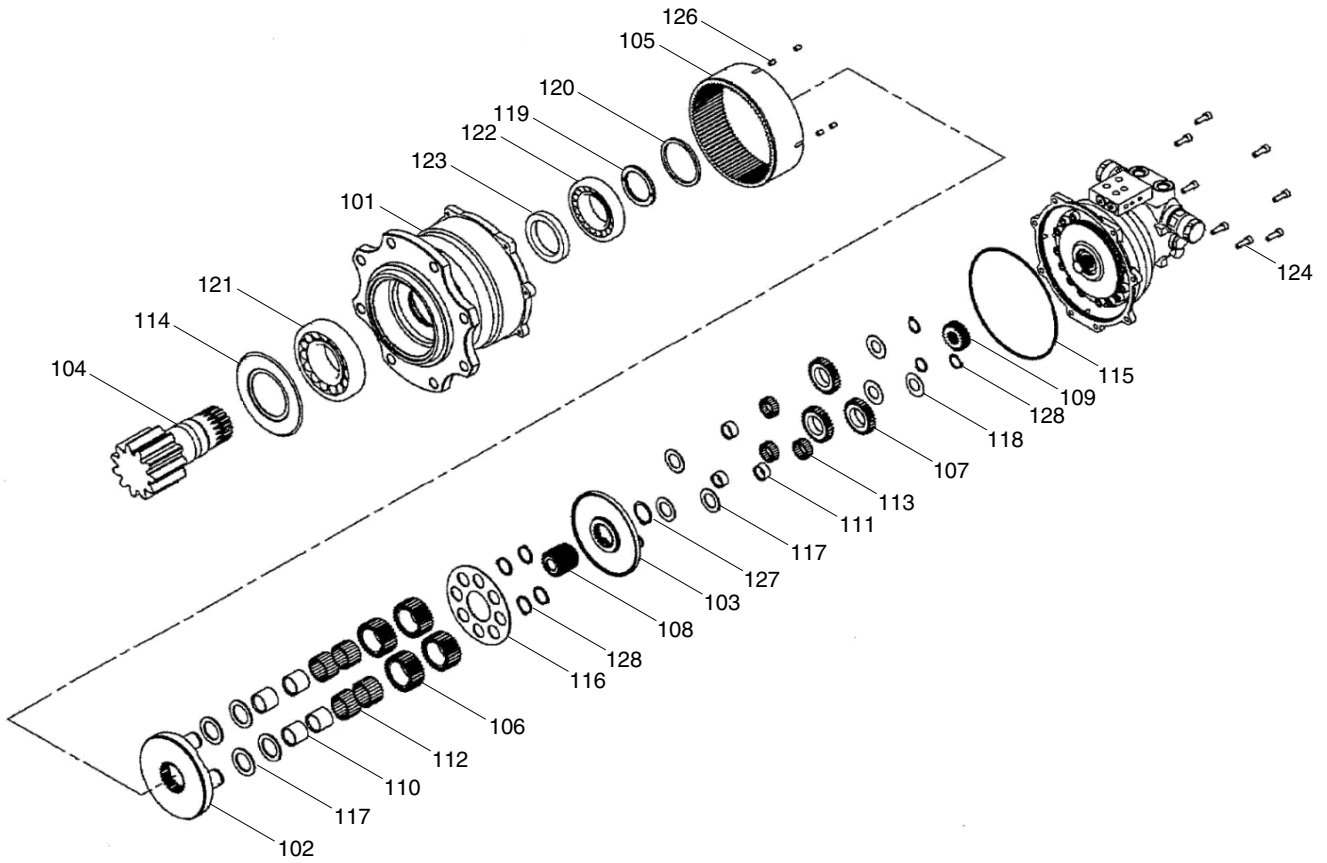
- (7) Remove the swing motor assembly.  
※ When removing the swing motor assembly, check that all the piping have been disconnected.

#### 2) INSTALL

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



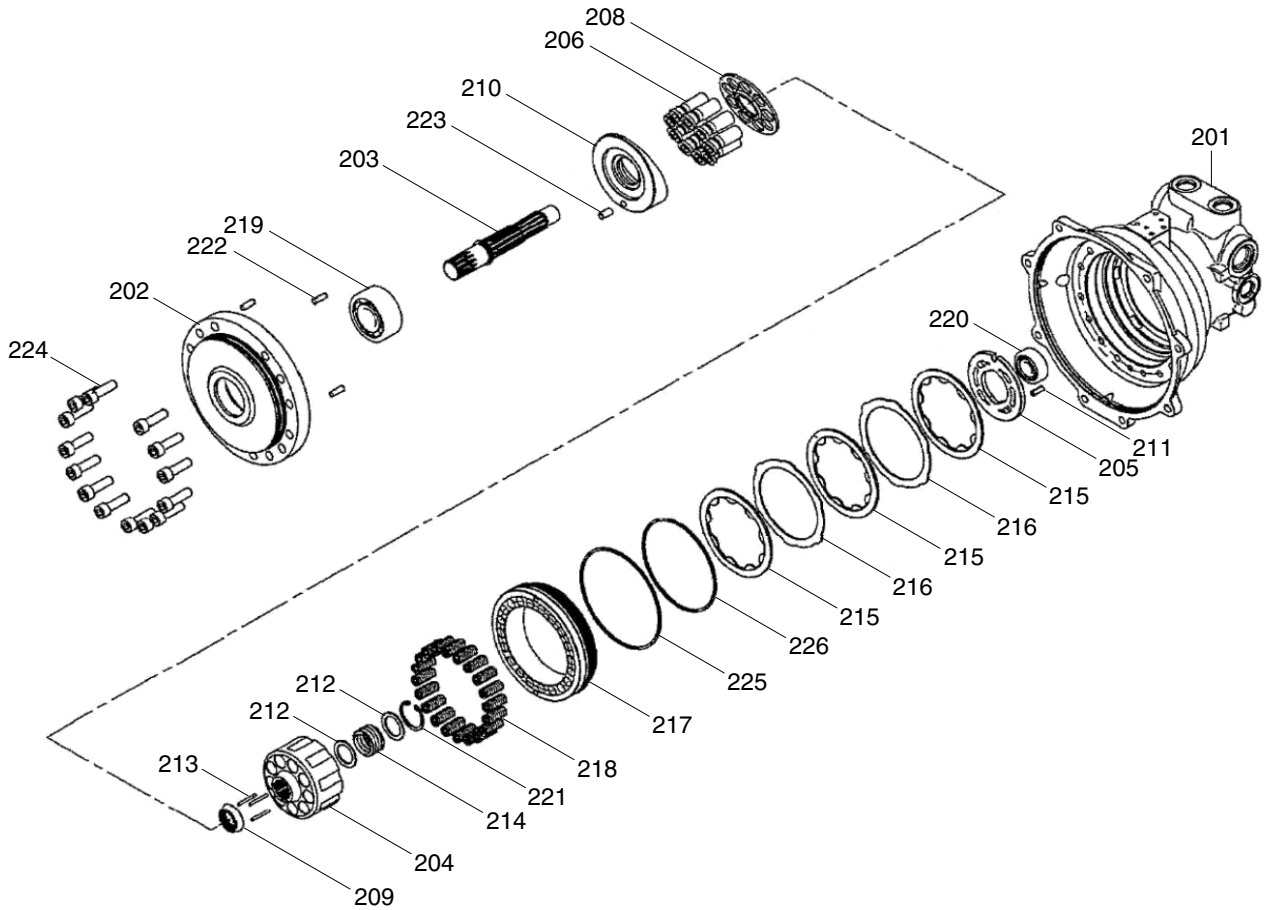
## 2) COMPONENTS (1/3)



80CR9A2SM15

101	Body	110	Ring 1	119	Preload collar
102	Carrier 1	111	Ring 2	120	Ring
103	Carrier 2	112	Needle	121	Bearing
104	Pinion shaft	113	Needle	122	Bearing
105	Internal gear	114	Ring seal	123	Oil seal
106	Gear B1	115	O-ring	124	Screw
107	Gear B2	116	Thrust plate	126	Bushing pin
108	Gear S1	117	Thrust washer 1	127	Snap ring
109	Gear S2	118	Thrust washer 2	128	Snap ring

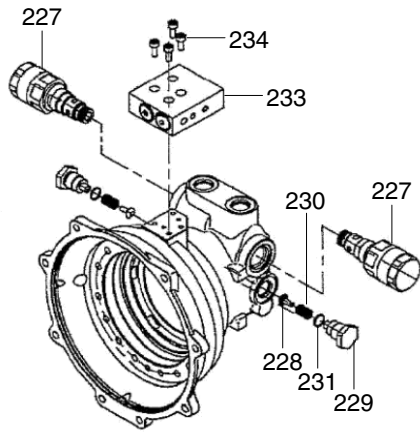
## COMPONENTS (2/3)



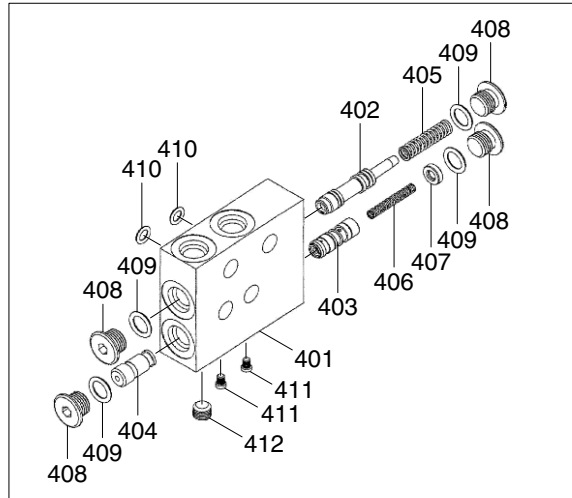
80CR9A2SM16

201	Body H	211	Spring pin	220	Bearing
202	Plate S	212	Retainer	221	Snap ring
203	Shaft	213	Pin	222	Pin
204	Cylinder barrel	214	Spring C	223	Pin
205	Valve plate	215	Disk plate	224	Screw
206	Piston assy	216	Steel plate	225	O-ring
208	Shoe holder	217	Brake piston	226	O-ring
209	Barrel holder	218	Spring B		
210	Swash plate	219	Bearing		

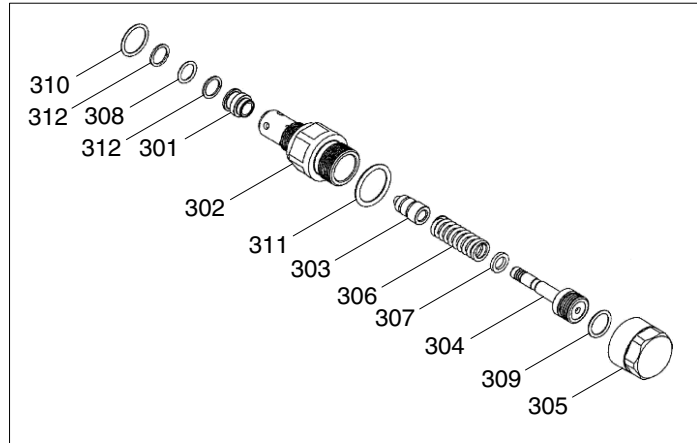
## COMPONENTS (3/3)



DETAIL ITEM 233



DETAIL ITEM 227



80CR9A2SM16-1

227	Relief valve	305	Cap	404	Stopper
228	Check valve	306	Spring	405	Spring
229	Plug	307	Spacer	406	Spring
230	Spring	308	O-ring	407	Spring holder
231	O-ring	309	O-ring	408	Plug
233	P/brake timer valve	310	O-ring	409	O-ring
234	Screw	311	O-ring	410	O-ring
301	Seat	312	Back-up ring	411	Metal plug
302	Retainer	401	Body	412	Plug
303	Poppet	402	Spool		
304	Piston	403	Piston		

## 2) GENERAL ATTENTION

Please pay attention following points.

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

## 3) DISASSEMBLY AND ASSEMBLY PROCEDURE

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

And please refer to the page 7-67~69.

## 4) TOOLS FOR DISASSEMBLY AND ASSEMBLY

No.	Tool	
1	Preset type hand torque wrench	45 N (JIS B4650)
2		90 N (JIS B4650)
3	Hexagon bar bit for above wrench	Two-plane width 5
4		Two-plane width 6
5		Two-plane width 8
6	Single purpose type hand torque	T = $12 \pm 0.6$ kgf · m (86.8 ± 4.4 lbf · ft) Two-plane 27 T = $22.5 \pm 2.5$ kgf · m (163 ± 18.1 lbf · ft) Two-plane 41
7	Hexagon bar wrench	Two-plane width 5
8		Two-plane width 6
9		Two-plane width 8
10	Spanner	Two-plane width 27 Two-plane width 41
11	Minus driver	Width 6~10
12	Snap ring pliers	Ø35 for hole
13		Ø30 for shaft
14		Ø48 for shaft
15	Hammer	-
16	Plastic hammer	-
17	Other	Grease
18		(oil designated hydraulic oil)
19		Wire brush
20		Sand paper
21		Anti-loose adhesive (three bond #1305)

### 3. DISASSEMBLY

#### 1) HYDRAULIC MOTOR

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

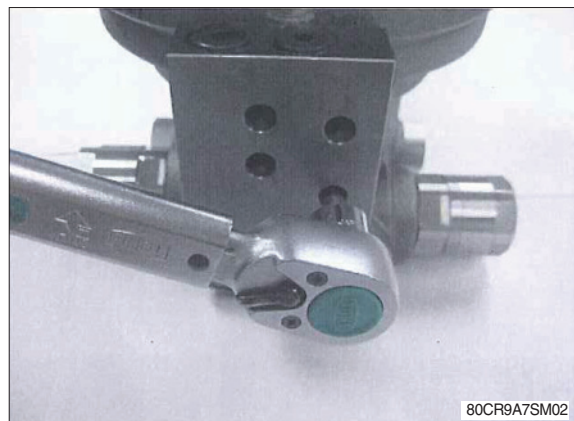
- Tools required :  
Hexagon bar wrench : 6 mm

※ When taking out the hydraulic motor assembly from the reduction gear body, the drain port should be open.  
When it is difficult to take out, insert the minus driver into the binding face to the body. If a part of the binding the surface becomes convex by the driver, take out the burr completely.



(2) Loose the hexagon socket head cap bolts (234), and take out the timer valve (233) from the hydraulic motor assembly.

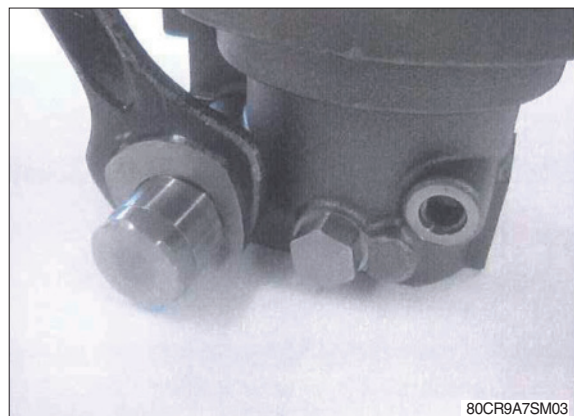
- Tools required :  
Hexagon bar wrench : 5 mm



(3) Take out the relief valve assembly (227).

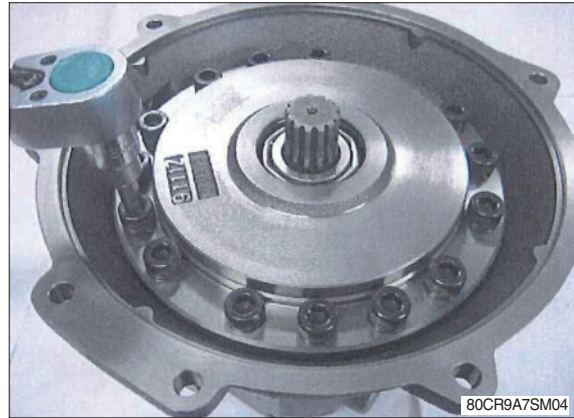
- Tools required :  
Spanner : 41 mm

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



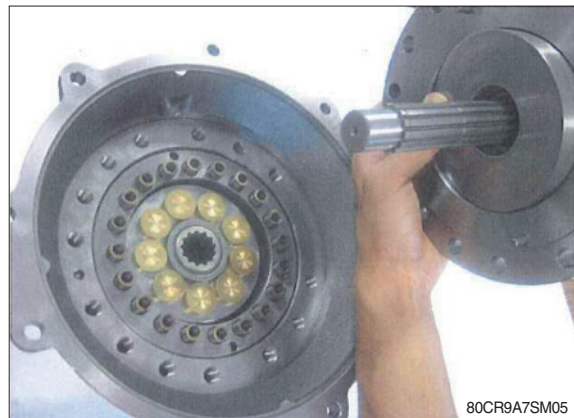
(4) Loose the hexagon socket head cap bolts (224), and take out it.

- Tools required :  
Hexagon bar wrench : 8 mm



(5) Take out the plate S (202).

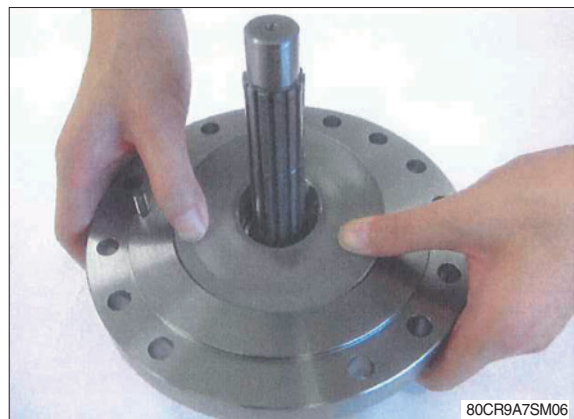
- ※ Pay attention not to drop off swash plate (210).



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

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

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



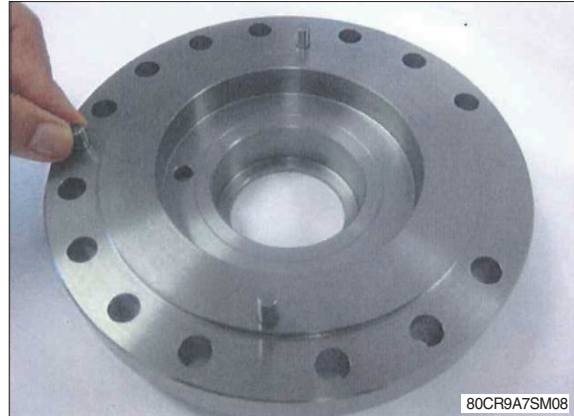
(7) Take out the spring B (218) from the brake piston (217).

- Spring B (218) : 20 pcs



(8) Take out the parallel pin (222) from the plate S (202).

- Parallel pin (222) : 3 pcs



80CR9A7SM08

(9) Take out the cylinder barrel kit.

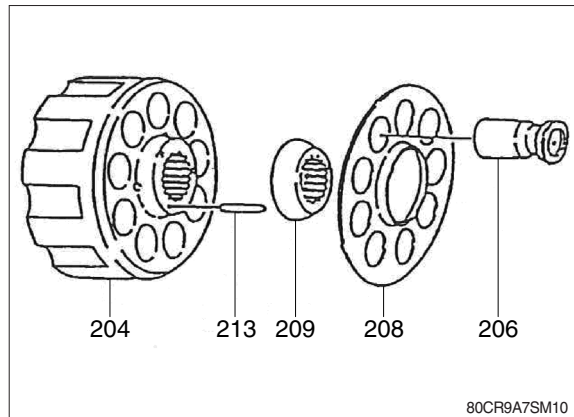
※ Pay attention not to lose parts, which are scattered easily.

There is a possibility to stay valve plate (205) on bottom face of cylinder barrel. Pay attention not to drop off it.



80CR9A7SM09

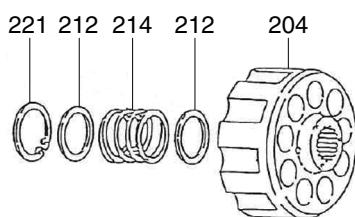
(10) Take out the piston assemblies (206), the shoe (208), the barrel holder (209) and the pin (213).



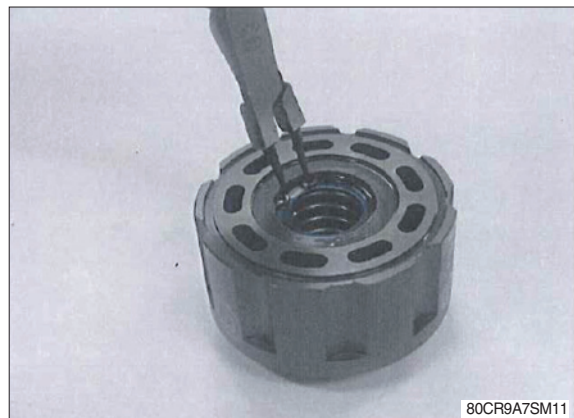
80CR9A7SM10

(11) Take out the snap ring (221), the retainer (212) and the spring C (214).

- Tools required :  
Snap ring plier :  $\varnothing 35$  for hole



80CR9A7SM11-1

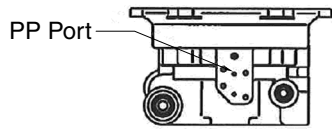


80CR9A7SM11

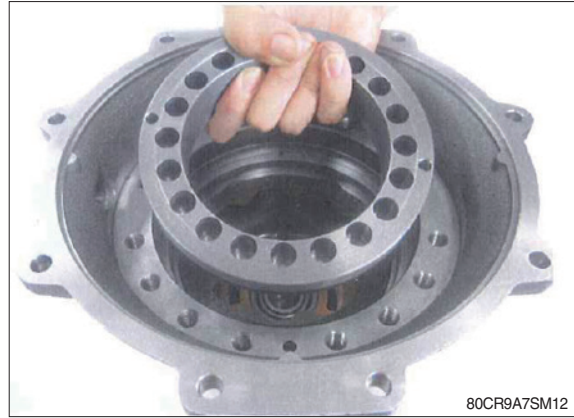


(12) Take out the brake piston (217) and the O-ring (225, 226) from body H (201).

- ※ Blow in air from PP port little by little to remove brake piston.  
Pay attention not to come off it suddenly.



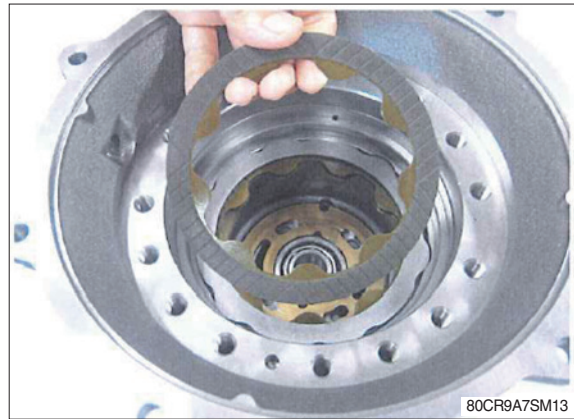
80CR9A7SM12-1



80CR9A7SM12

(13) Take out the disk plate (215), and the steel plate (216).

- Disk plate (215) : 3 pcs
- Steel plate (216) : 2 pcs



80CR9A7SM13



80CR9A7SM14

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



80CR9A7SM15

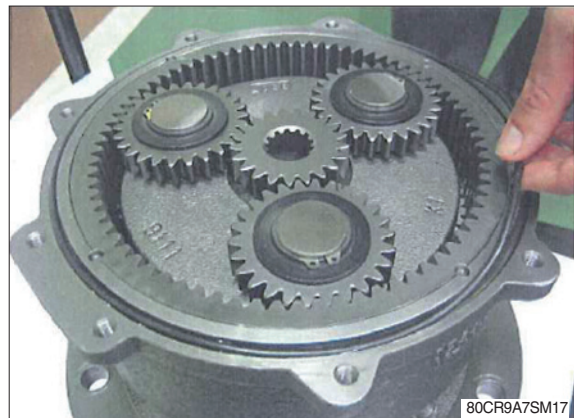
(15) Loose the plug (229), and take out the check valve (228) and the spring (230).  
(2 locations)

- Tools required :  
Spanner : 27 mm

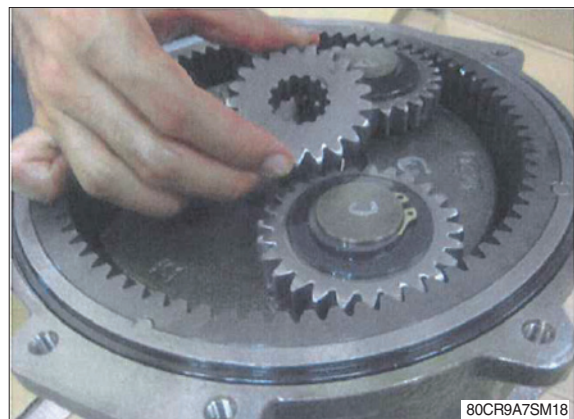


## 2) REDUCTION GEAR

(1) Take out the O-ring (115).



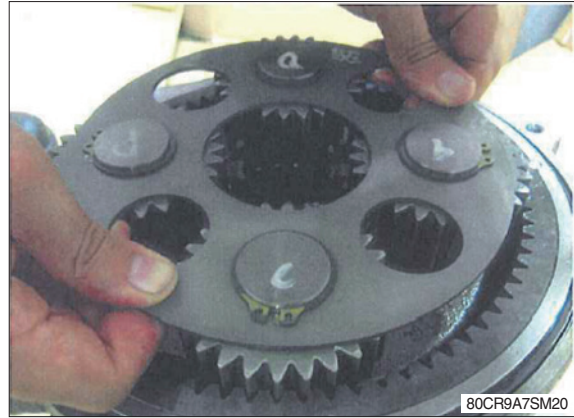
(2) Take out the S2 gear (109).



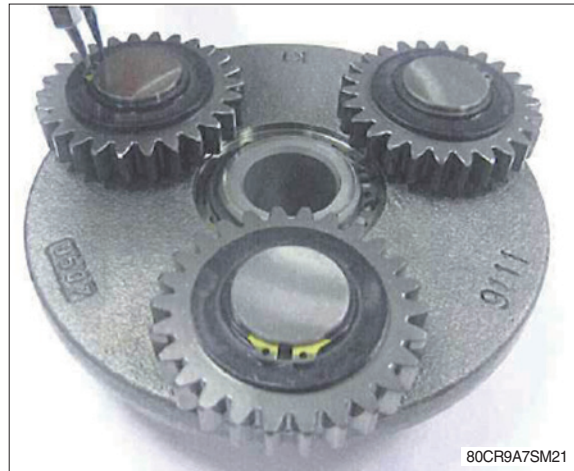
(3) Take out the carrier 2 kit.



(4) Take out the carrier 1 kit.



(5) Take out the snap ring (128), the thrust washer (118), the b2 gears (107) and the needles 2 (113) from the carrier 2 kit.



(6) Take out the snap ring (128), and the S1 gear (108) from the carrier 2 kit.



- (7) Take out the ring 2 (111) and thrust washers (117) from the carrier 2 kit.



- (8) Take out the snap ring (128) and the thrust plate 1 (116) from the carrier 1 kit.



- (9) Take out the b1 gears (106) and needles (112) from the carrier 1 kit.



- (10) Take out the rings 1 (110) and the thrust washers (117) from the carrier 1 kit.



## 4. ASSEMBLY

### 1) HYDRAULIC MOTOR SECTION

- (1) Press-fit the bearing (220) and spring pin (211) into the body H (201).

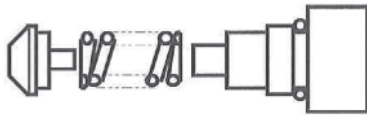
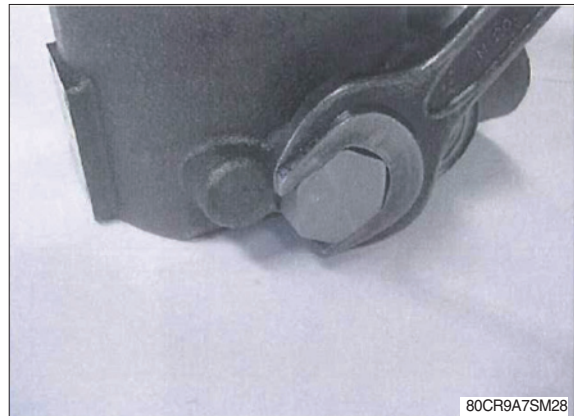


- (2) Insert the 2 check valves (228) (1 pc/side), springs (230) (1pc/side) and plug (229) (1pc/side) with O-ring (231) in that order into the body H (201). (2 locations)

- Tools required :  
Spanner : 27 mm  
Torque wrench

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

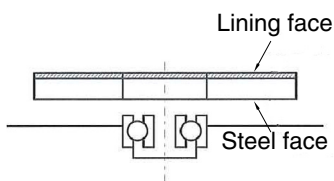
- Plug tightening torque :  
 $12 \pm 0.6 \text{ kgf} \cdot \text{m}$  ( $86.8 \pm 4.34 \text{ lbf} \cdot \text{ft}$ )



80CR9A7SM28-1

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

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

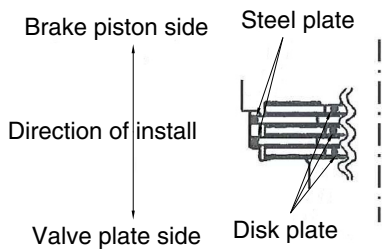
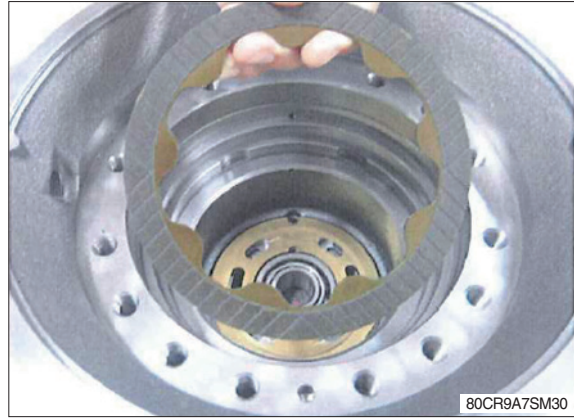


80CR9A7SM29-1



(4) Assemble the disk plate (215) and steel plate (216).

- ※ Number of parts count on installing
  - Disc plate : three
  - Steel plate : two
- ※ Please assemble exact number of parts and exact order. (refer the below drawing)
- ※ Please install disc plate ditch with accuracy in order to install cylinder barrel assy into it on (9), see the page 7-81.



80CR9A7SM31-1



(5) Make the brake piston assembly which placed O-rings (225, 226) on brake piston (217), and place it onto the body H (201).

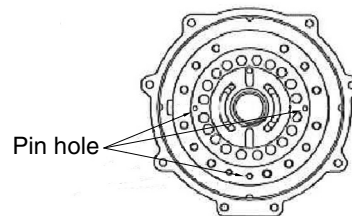
Place the brake piston assembly onto plate S placed 3 pins, then place it onto the body H as matched pin hole position. After that, press-fit it by tightening hexagon bolts little by little.

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

To preven the brake piston assembly falling off, apply grease on plate S.

Take out the plate S after placed brake piston assembly.

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

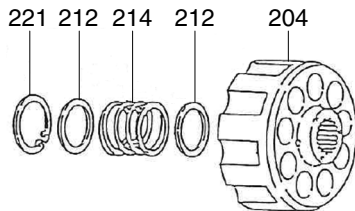


80CR9A7SM32-1

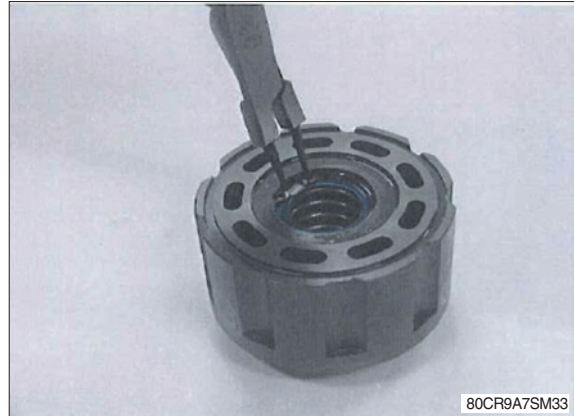
(6) Place the retainer (212), spring C (214) and retainer (212) in that order into the cylinder barrel (204), and then secure them with the snap ring (221).

· Tools required :

Snap ring plier :  $\varnothing 28$  for hole



80CR9A7SM11-1



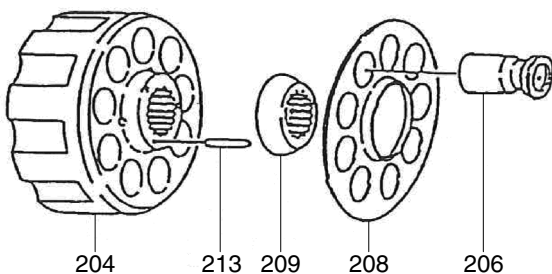
80CR9A7SM33

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



80CR9A7SM34

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



80CR9A7SM10



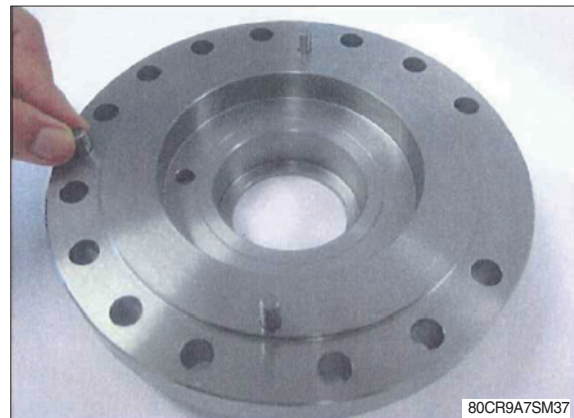
80CR9A7SM35

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



(10) Place the parallel pins (222) into the plate S (202).

· Parallel pin (222) : 3 pcs



(11) Insert the spring B (218) into the brake piston (217).

· Spring B (218) : 20 pcs

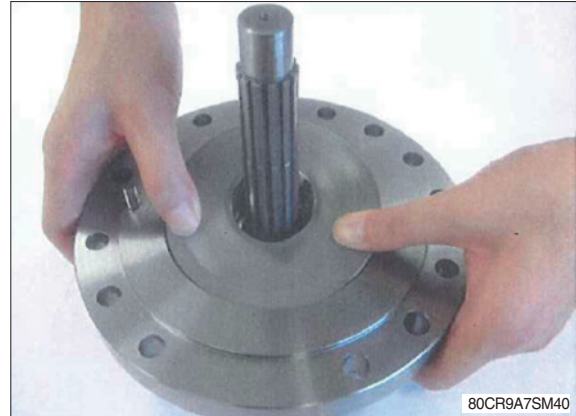


(12) Press-fit bearing (219) with shaft (203).

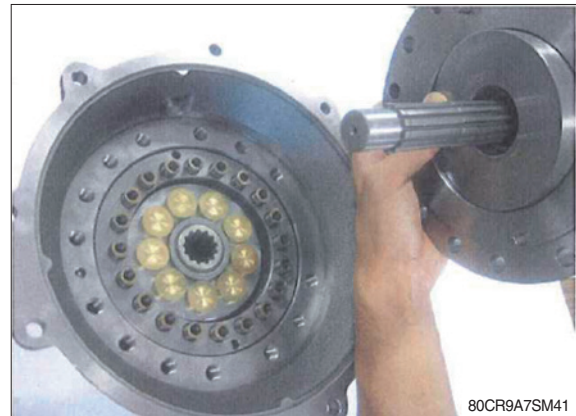




(13) Place the shaft kit and the swash plate (210) into the plate S (202).



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



(15) Bolt the plate S (202) together with the 14 hexagon socket head cap bolts (224).

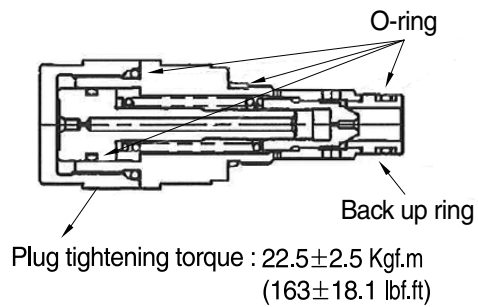
- Tools required :  
Hexagon bar wrench : 8 mm  
Torque wrench
- Bolt tightening torque :  
 $6 \pm 0.3 \text{ kgf} \cdot \text{m}$  ( $43.4 \pm 2.17 \text{ lbf} \cdot \text{ft}$ )



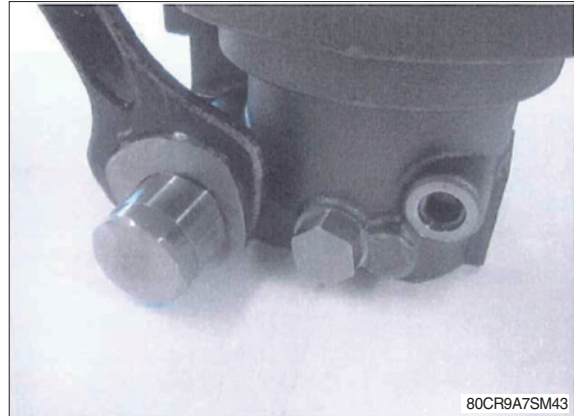
(16) Screw up the relief valve assembly.  
(both side)

- Tools required :  
Spanner : 41 mm  
Torque wrench
- Plug tightening torque :  
 $22.5 \pm 2.5 \text{ kgf} \cdot \text{m}$  ( $163 \pm 18.1 \text{ lbf} \cdot \text{ft}$ )

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

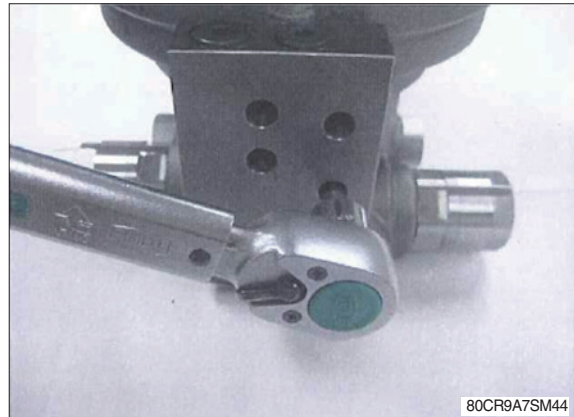


80CR9A7SM43-1



(17) Screw up the timer valve.

- Tools required :  
Hexagon bar wrench : 5 mm  
Torque wrench
- Plug tightening torque :  
 $1.2 \pm 0.1 \text{ kgf} \cdot \text{m}$  ( $8.7 \pm 0.72 \text{ lbf} \cdot \text{ft}$ )



## 2) REDUCTION GEAR SECTION

- (1) Place the ring (110) (1 pc/pin) and the thrust washer (117) (1 pc/pin) in that order onto the pins of the carrier 1 (102). (4 locations)



- (2) Place the b1 gear (106) (1 pc/pin) and the 92 needles 1 (112) (24 pcs/pin) in that order onto the 4 pins of the carrier 1 (102). (4 locations)



- (3) Place the thrust plate (116) and the 4 snap rings (128) (1 pc/pin) to make up a carrier 1 kit.

· Tools required :

Snap ring plier :  $\varnothing 30$  for shaft

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

The snap ring which was opened too much should lose tension and be replaced.



- (4) Place the thrust washer (117) (1 pc/pin) and the ring 2 (111) (1 pc/pin) in that order onto the pin of the carrier 2 (103). (3 locations)



- (5) Place the S1 gear (108) onto the carrier 2 (103) to make up a carrier 2 kit.

· Tools required :

Snap ring plier :  $\varnothing 48$  for shaft

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

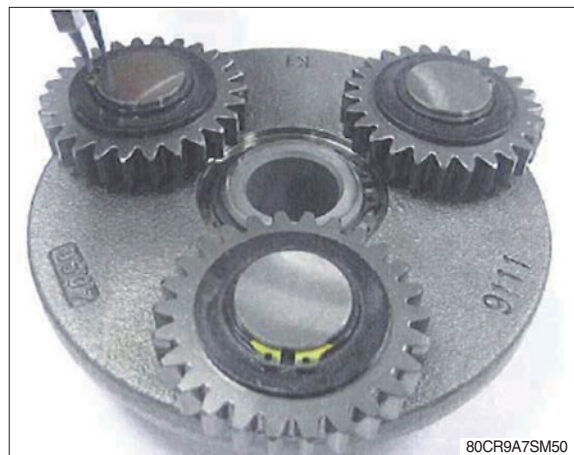


- (6) Place the b2 gears (107) (1 pc/pin), the 72 needle (113) (24 pcs/pin), and the snap ring (128) in that order onto the pin of the carrier 2 (103). (3 locations)

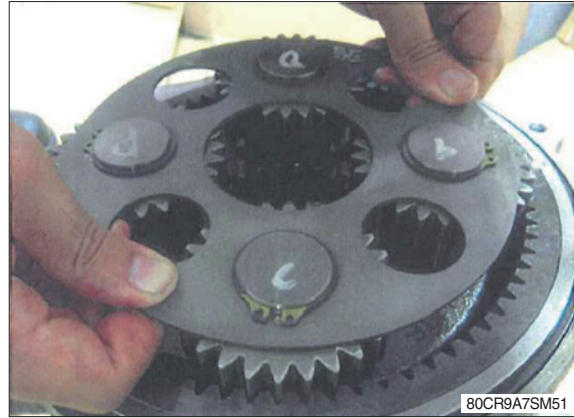
· Tools required :

Snap ring plier :  $\varnothing 30$  for shaft

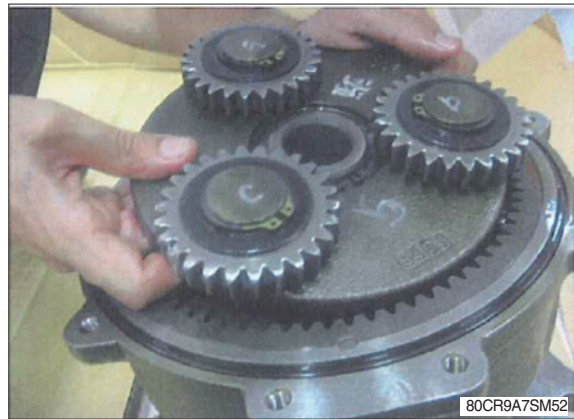
- ※ Pay attention to the direction of the snap ring. The edge side should be uppermost. Pay attention not to open the snap ring too much.  
The snap ring which was opened too much should lose tension and be replaced.



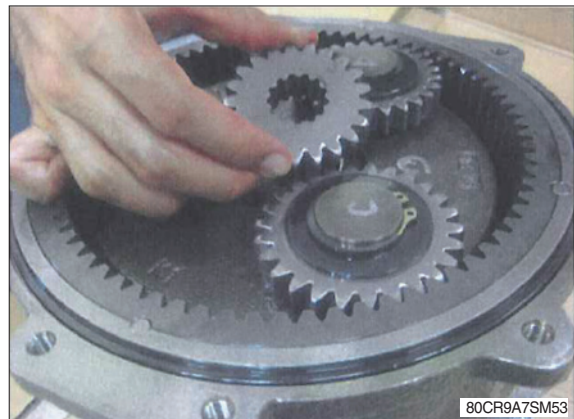
- (7) Place the carrier 1 assembly into the body (101) align spline of carrier to the pinion shaft (104).



- (8) Place the carrier 2 assembly into the body (101) align spline of S1 gear (108) to the b1 gear (106).



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

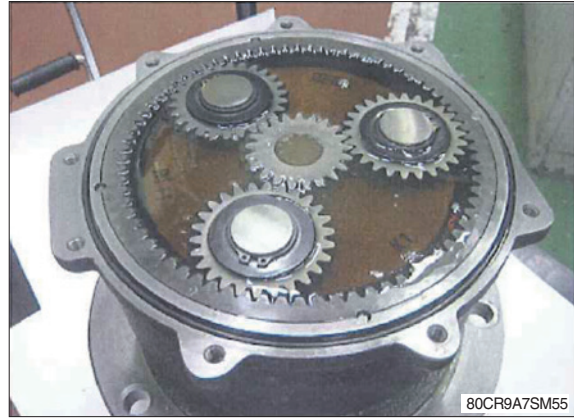


- (10) Place the O-ring (115) onto the body (101).



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

- ※ Oil : ISO VG 46 or equivalent  
Oil amount : 2 to 3 mm below top of the B2 gear.  
Wipe oil off flange surface if it is spilled.

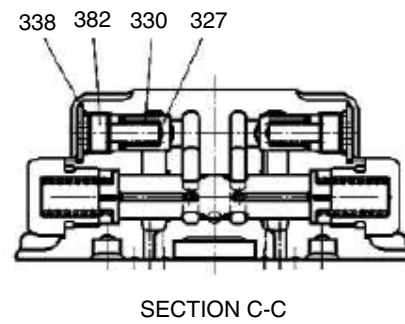
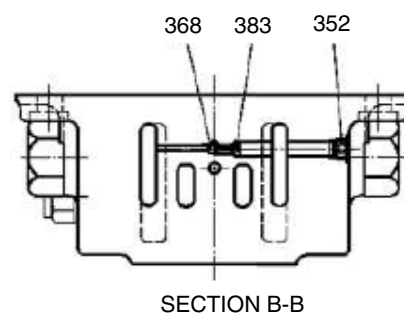
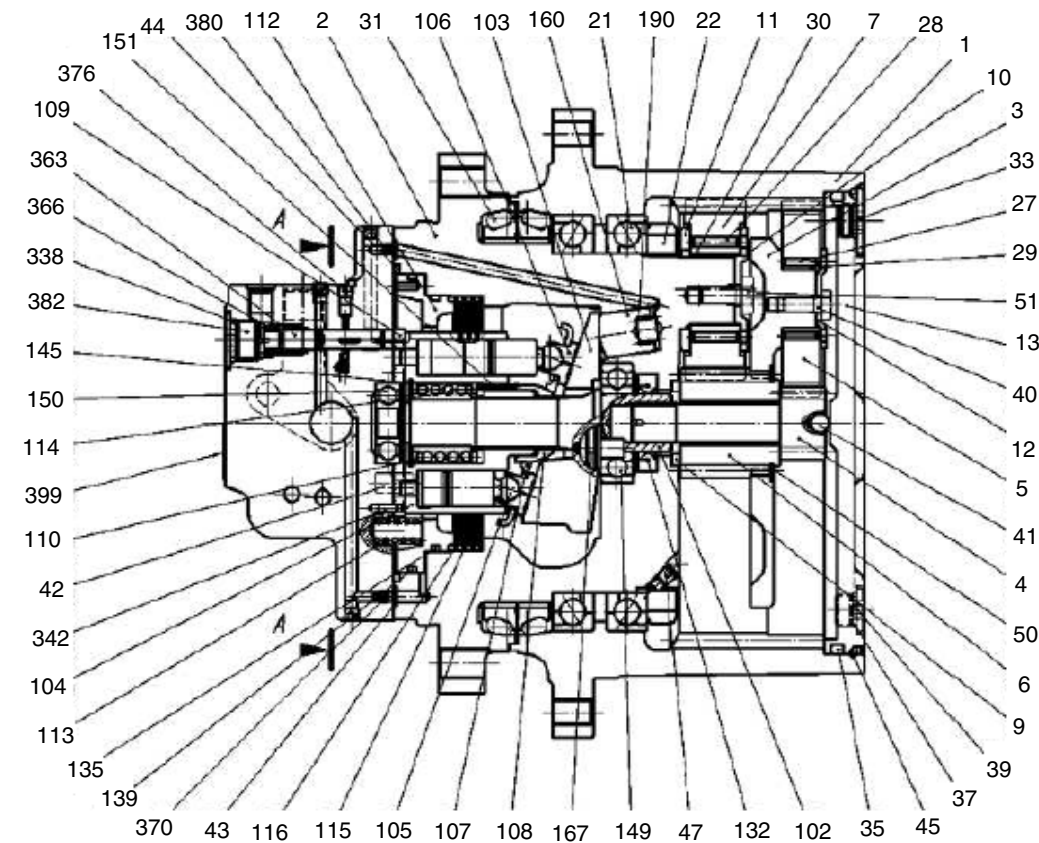
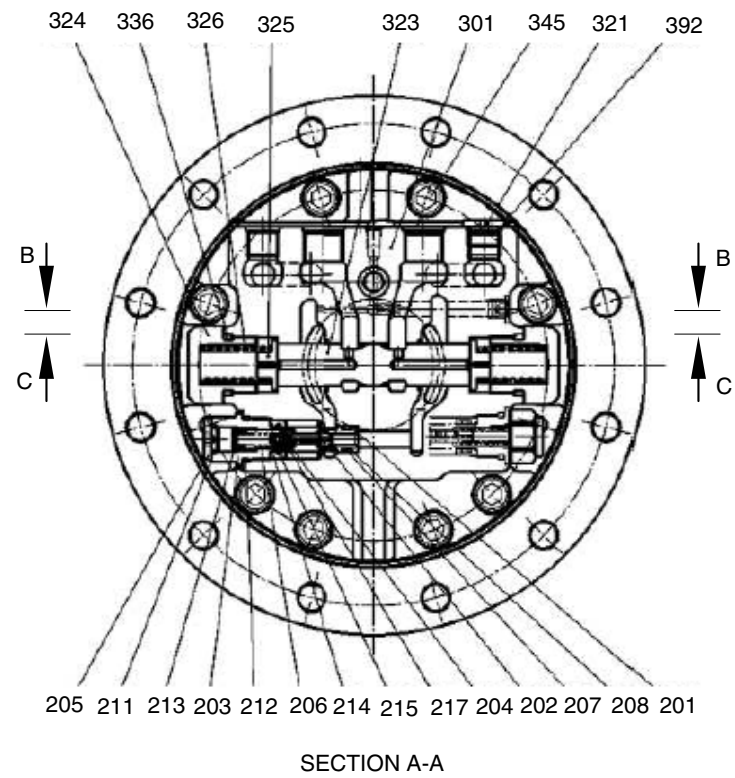


(12) Join the hydraulic motor and the body, and then bolt them together with the hexagon socket head cap bolts (124).

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



1. STRUCTURE



85A2TM02

1 Hub	29 Inner ring	104 Cylinder block	139 O-ring	211 O-ring	324 Plug
2 Spindle	30 Inner ring	102 Shaft	145 Snap ring for hole	212 O-ring	325 Spring retainer
3 Carrier	31 Floating seal	103 Swash plate	149 Ball bearing	213 Shim	327 Valve
4 Sun gear 1	33 Plug	105 Piston	150 Ball bearing	214 Piston	328 Spring
5 Planetary gear 1	35 O-ring	106 Shoe	151 Roller	215 O-ring	330 Spring
6 Sun gear 2	37 O-ring	107 Retainer plate	160 Piston	217 Orifice	336 O-ring
7 Planetary gear 2	39 Plug	108 Thrust ball	167 Pivot	301 Rear flange	338 O-ring
9 Thrust collar 1	40 Hex head bolt	109 Timing plate	170 Spring	323 Spool	342 Parallel pin
10 Thrust washer 1	41 Steel ball	110 Washer	201 Valve seat	352 Hex socket plug	345 Hex socket bolt
11 Thrust washer 2	42 Parallel pin	112 Piston	202 Valve	368 Steel ball	363 Spool
12 Thrust washer 3	43 O-ring	113 Spring	203 Sleeve	375 Hex socket plug	366 Spring
13 Cover	44 O-ring	114 Spring	204 Collar	379 Filter	382 Plug
21 Bell bearing	45 Ring	115 Friction plate	205 Plug	380 Orifice	392 O-ring
22 Ring nut	47 Hex socket set screw	116 Mating plate	206 Spring	383 Plug	
27 Needle roller bearing	50 Retaining ring for shaft	132 Oil seal	207 O-ring	390 Name plate	
28 Needle roller bearing	51 Hex head bolt	135 O-ring	208 Back-up ring	321 Plug	

## 2. DISASSEMBLY

### 1) PREPARATION

Prepare for the following items before disassembling.

(1) Workbench preparation However, disassembly procedure is not affected even if the disassembled product are different from this manual.

- ① Prepare a sturdy workbench with which the internal parts of a traveling unit can be disassembled or assembled, is wide enough to place parts so they do not move or fall off from the bench while working.
- ② Spread a rubber or vinyl sheet on the workbench.

(2) Preparation of tools and facilities

### 2) GENERAL PRECAUTIONS

**▲ Internal parts are covered with hydraulic fluid and gear oil during disassembly and are slippery. If a part slips out from your hand and falls, it could result in bodily injury or could damage the part. Be very careful for handling.**

**▲ If combustibles such as white kerosene are used for washing parts, be careful for handling. These combustibles are easily ignited, and could result in fire or injury.**

- (1) Before disassembling, perform inspections and confirm clearly the indication of no abnormality, which may be occurring, and work according to the disassembly procedure.
- (2) All parts are manufactured precisely. Be careful for handling. Avoid rough contact or drop of parts.
- (3) Do not bang or remove parts forcefully. Such act could cause burs or damages on the parts, which leads to failure of assembling or inferior performance.
- (4) If you leave disassembled parts or with partially disassembling, rust could develop on the parts due to moisture or dirt. If you have to interrupt the work before completion, take measures to protect against rust or dust.
- (5) Put a counter mark on mating faces of parts when disassembling.
- (6) Tidy removed parts when disassembling so as not to damage or lose the parts while working.
- (7) As a rule, once any type of seal are disassembled, they should be replaced with new ones even if they show no signs of damage. New parts shall be provided prior to disassembling
- (8) The photographs and drawings contained in this manual are of representative models. However, disassembly procedure is not affected even if the disassembled product are different from this manual.



### 3) DISASSEMBLY PROCEDURE

#### (1) Washing the traveling unit

- ① Fasten eye bolts into the spindle (2).
  - ※ Tighten the two eyebolts symmetrically into the screw holes for mounting the spindle.
- ② Hook the wire in the eyebolts, hoist the traveling unit with a crane and carry to the washing tank.



85A7TM01

- ③ Wash each part of the traveling unit with a brush.
  - ※ The clearance between the hub (1) and the spindle (2) (floating seal mounting section) is clogged up with soil and mud. Be sure to clean these portions with particular care.



85A7TM02

#### (2) Traveling unit installation

- ① Hoist the traveling unit and put it to the reversing device workbench like the left picture.
  - ※ Match the screw holes of the spindle (2) to the screw holes of the reversing device and carefully insert the traveling unit to the installation area on the reversing device.



85A7TM03

- ② Mount the traveling unit into the reversing device so that the two hexagon socket bolts are positioned symmetrically.
  - ▲ Tighten the hexagon socket bolts completely. If not completely tightened, the traveling unit could fall off the reversing device, causing injury when the reversing device plate is turned.



85A7TM04

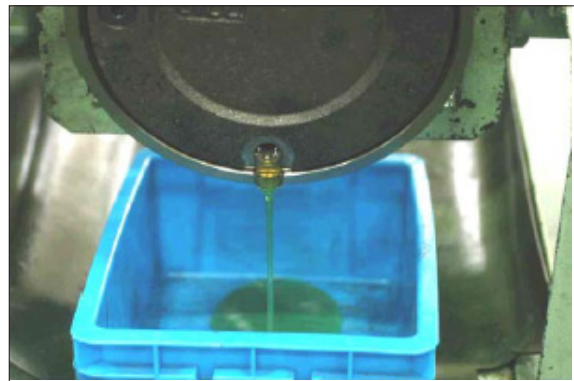
### (3) Lubricating oil extraction

- ※ If disassembling the rear flange only, proceed to the item (8) of page 19.
- ① Turn the reversing device plate so that the reduction gear oil drain port is at upward.
- ② Loosen and remove the plugs (39), (33).
- ③ Turn the reversing device plate to remove the gear oil. (The drain port shall be at downward.)



85A7TM05

- ※ Prepare a container that can fully collect the gear oil discharged. (The oil volume inside the reduction gear portion is about 1.1 liters.)
- ④ Remove the O-rings (37) from the plugs (33), (39).



85A7TM06

- ※ Do not reuse the O-rings (37).

### (4) Cover removal

- ① Turn the reversing device plate so that the reduction gear oil drain port is upward.
- ② Remove the ring (45) using the steel rod (I).
- ③ Tighten two inside bolts of the cover removal jig into screw holes for the plug (33) and (39).
- ④ Put blocks under two outside bolts of the cover removal jig and tighten slowly equally them to remove it.



85A7TM07

- ※ When it is hard to remove the cover (13) because of resistance of the O-ring (35), lift it up while lightly and equally tapping the outer rim of the cover by a plastic hammer.
- ⑤ Remove the O-ring (35) from the cover (13).
- ※ Do not reuse the O-ring (35).



85A7TM08

### (5) Sun gear 1 removal

- ① Remove the sun gear 1 (4).
- ② Remove the steel ball (41) from the sun gear 1 (4).



85A7TM09

### (6) Carrier assy removal

- ① Remove the carrier assy from the hub (1).
  - ※ The thrust collar 1 (9) may be pulled out together when pulling the carrier assy.
  - ※ Grasp the planetary gears 1 (5) and remove slowly and vertically them against the axis of the pillars of carrier assy, otherwise the planetary gears 1 (5) might damage inner tooth of the hub (1) by the edge of them.
  - ※ Be careful not to drop the carrier assy because it slips easily with lubricating oil.



85A7TM10

### ② Carrier assy disassembly

- Loosen the three hexagon head bolts (40) and remove them from the carrier (3).
- Remove the thrust washers 3 (12) (3 pcs), planetary gears 1 (5) (3 pcs), needle roller bearings (27) (3 pcs), and inner rings (29) (3 pcs) from the carrier (3).



85A7TM11

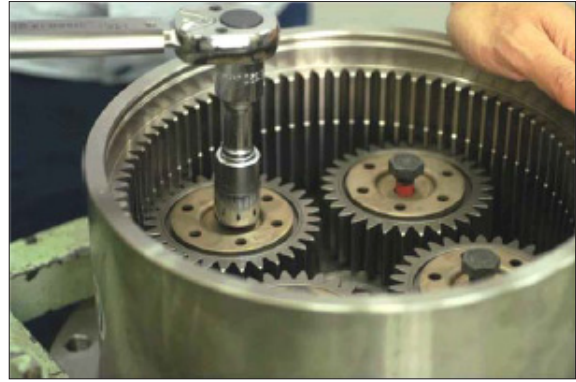
- ③ Remove the retaining ring (50) from the sun gear 2 (6).
- ④ Remove the sun gear 2 (6) from the carrier (3).



85A7TM12

### (7) Planetary gear 2 removal

- ① Loosen the hexagon head bolts (51) (4 pcs) and remove them from the spindle (2).
- ② Remove the planetary gears 2 (7) (4 pcs), the needle roller bearings (28) (4 pcs) and the inner rings (30) (4 pcs).
- ③ Remove the thrust washers 2 (11) (4 pcs) from the spindle (2).
- ④ Remove the thrust collar 1 (9) from the spindle (2).



85A7TM13

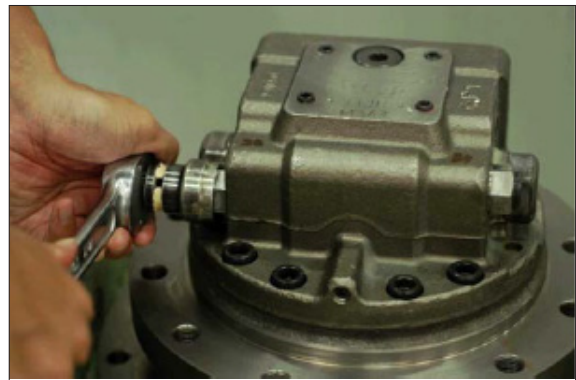
- ※ Remove slowly and vertically the planetary gears 2 (7) (4 pcs) against the axis of them, otherwise planetary gears 2 (7) (4 pcs) might damage inner tooth of the hub (1) by the edge of them.
- ※ Be careful not to drop the planetary gears 2 (7) (4 pcs) because they slip easily with lubricating oil.



85A7TM14

### (8) Rear flange removal

- ※ Turn the reversing device plate so that the rear flange (301) is upward. These works are to make it easier to remove the plugs at the next work.
- ※ Do not loosen the bolts if the rear flange inside will not be disassembled.



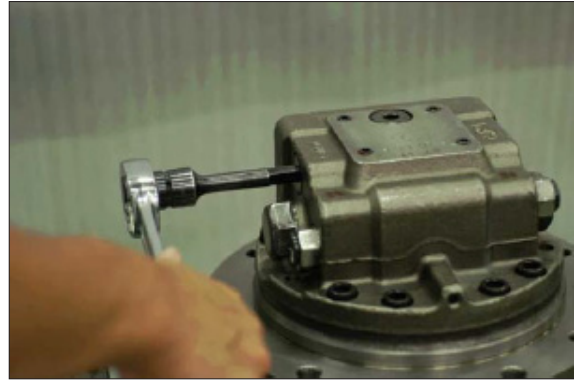
85A7TM15

- ② Temporarily loosen the sleeves (203) (2 pcs).
- ③ Temporarily loosen the plugs (324) (2 pcs).



85A7TM16

- ④ Temporarily loosen the plugs (382) (2 pcs).



85A7TM17

- ⑤ Temporarily loosen the plug (382).



85A7TM18

- ⑥ Loosen and remove hexagon socket bolts (345) (8 pcs) from the rear flange (301).

- ※ When loosening the hexagon socket bolts (345) (8 pcs), the rear flange (301) gradually begins to part from the contact face with the spindle (2) due to the springs (113) force assembled inside. Loosen them equally not to make the rear flange (301) to lean.



85A7TM19

- ⑦ Remove the rear flange (301) from the spindle (2).

- ※ Hold the rear flange (301) by both hands and remove it gently. Perform the work with care not to forcibly pry or strike the rear flange (301).

- ※ Otherwise the timing plate (109) may drop from the rear flange (301) and be damaged.



85A7TM20

- ⑧ Remove the parallel pins (42) (2 pcs) from the spindle (2).



85A7TM21

- ⑨ Remove the O-rings (43) (2 pcs), (44) from the spindle (2).  
※ Do not reuse the O-rings (43), (44).

(9) Disassembly of parts assembled into rear flange

- ① Put the removed rear flange (301) on the workbench. (Face up the mating face with the spindle (2).)



85A7TM22

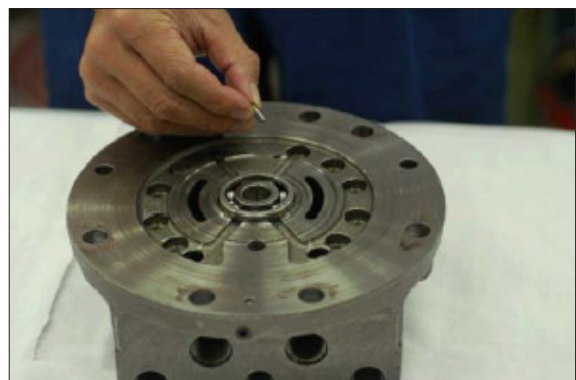
- ② Remove the springs (113) (10 pcs) from the rear flange (301).  
③ Remove the timing plate (109) from the rear flange (301).



85A7TM23

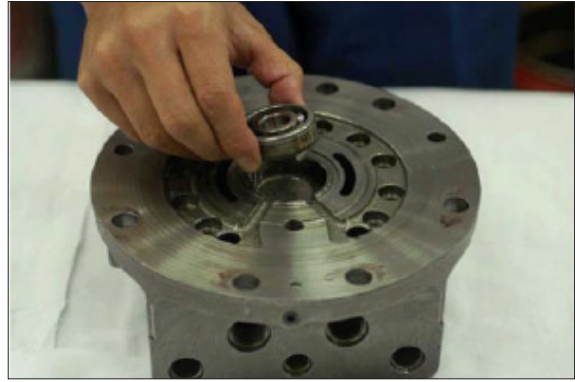
- ※ The timing plate (109) might stick on the contact face with the rear flange (301). To separate it, insert the spatula into a casting groove of the rear flange (301) and raise it slowly. Never try to insert a sharp or a pointed tool to pry the timing plate (109) off, otherwise the contact faces will suffer damage and may occur oil leakage from it.

- ④ Remove the parallel pin (342) from the rear flange (301).



7078TM29/29A

- ⑤ Remove the ball bearing (150) from the rear flange (301).



85A7TM25

**(10) SRV disassembly**

- ① Remove the sleeves (203) (2 pcs) from the rear flange (301) .



85A7TM26

- ② Remove the O-ring (207) and the backup rings (208) (2pcs) from the valve seat (201) one by one.

※ Do not reuse the O-ring (207) and the backup rings (208).



85A7TM27

- ③ Remove the O-ring (212) from the sleeve (203).

※ Do not reuse the O-ring (212).



85A7TM28

(11) Brake valve parts disassembly

- ① Remove the plugs (324) (2 pcs) from the rear flange (301).

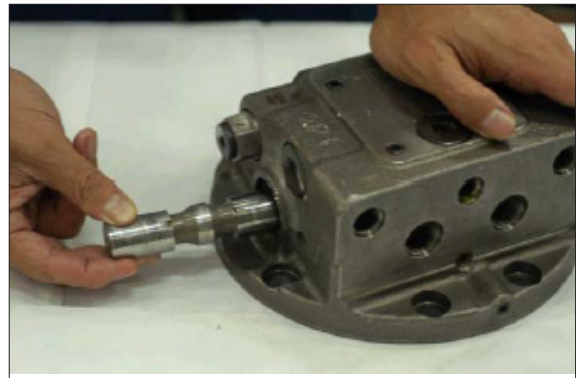


85A7TM29

- ② Remove the spring retainers (325) (2 pcs) and the springs (328) (2 pcs) from the rear flange (301).

- ③ Remove the spool (323) from the rear flange (301).

※ When removing the spool (323), do not tilt the plug port on the rear flange (301) downward so that the spool (323) does not fall off the rear flange (301). Grasp the spool (323) by hand and remove it.



85A7TM30

- ④ Remove the O-rings (336) (2 pcs) from the plugs (324) (2 pcs).

※ Do not reuse O-ring (336).



85A7TM31

- ⑤ Remove the plugs (382) (2pcs) from the rear flange (301).



85A7TM32



- ⑥ Remove the springs (330) (2 pcs) and the valves (327) (2 pcs) from the rear flange (301).



85A7TM33

- ⑦ Remove the O-rings (338) (2 pcs) from the plugs (382).  
※ Do not reuse O-rings (338).



85A7TM34

(12) Pilot valve removal.

- ① Remove the plug (382) from the rear flange (301).  
② Remove the O-ring (338) from the plug (382).  
※ Do not reuse O-ring (338).



85A7TM35

- ③ Remove the spool (363) and the spring (366) from the rear flange (301).



85A7TM36

### (13) Parking brake removal

▲ The abrupt injection of compressed air could cause the piston (112) to pop out. To ensure your safety, arrange protective cover over the piston (112).

① Remove the piston (112) from the spindle (2) by injecting compressed air into the access hole for parking brake arranged on the spindle (2).



85A7TM37

② Remove the O-rings (135), (139) from the piston (112).

※ Do not reuse O-rings (135), (139).



85A7TM38

### (14) Hydraulic motor disassembly

※ When turning the traveling unit, place an oil container just below the traveling unit to catch the oil.

① Turn the traveling unit 90 degrees.

② Drain hydraulic oil from the traveling unit.

③ Remove the mating plates (116) (4pcs) and the friction plates (115) (3pcs).



85A7TM39

④ Hold the cylinder block (104) by hand, turn alternately 2 or 3 times, and cut off shoes (106) adhered on the swash plate (103).

※ When removing the cylinder block (104) from the spindle (2) without turning 2 or 3 times, the shoes (106) remain adhered on the swash plate (103), and parts (piston, shoe and etc.) mounted into the cylinder block (104) will come off fall into the spindle (2).



85A7TM40

- ⑤ Draw out the cylinder block (104) from the shaft (102).
- ⑥ Remove the piston assys (pistons (105), shoes (106)) and the retainer plate (107) from the cylinder block (104).
- ※ When removing the piston assys, grip the retainer plate (107) with both hands and remove together with it. A piston assy is a minimum unit. If replacement is necessary, replace a piston assy as one unit.



85A7TM41

- ⑦ Remove the piston assys (9 pcs) (pistons (105), shoes (106)) from the retainer plate (107).



85A7TM42

- ⑧ Remove the thrust ball (108) from the cylinder block (104).



85A7TM43

- ⑨ Remove the rollers (151) (3 pcs) from the cylinder block (104).



85A7TM44

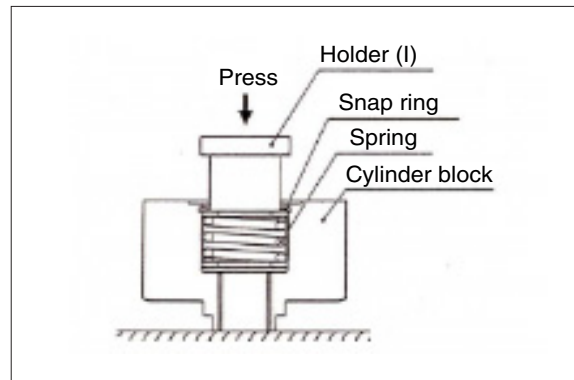
**(15) Hydraulic motor disassembly**

- ① Place the cylinder block (104) on the press bench.
  - ※ The spring (114) should be removed only when replacing.
  - ※ The spring (114) is removed by lining up the shaft centers of the holder, and the washer (110) in order to prevent damage to the cylinder block (104) through contact.
  - ※ Cover the cylinder block (104) with a vinyl sheet to prevent the sliding surfaces of the cylinder block (104) from being damaged.



85A7TM45

- ② Place the holder (I) on the washer (110), and press it while pressing, remove the snap ring (145) with a snap ring pliers.
  - ▲ Release the press slowly. If release suddenly, the spring (114) will pop out and incurring danger of injury.



85A7TM46

- ③ Remove the snap ring (145), washer (110), spring (114) and washer (110) from the cylinder block (104).



85A7TM47

**(16) Swash plate removal**

- ① Remove the swash plate (103) from the shaft (102).



85A7TM48

- ② Remove the shaft (102) from the spindle (2) and then, the ball bearing (149) is removed together.

- ※ When striking the tip of shaft (102) from the reduction gear side to remove it to make easy the work, be careful not to strike hard, because the shaft (102) may pop out.



85A7TM49

- ③ Remove the pivots (167) (2 pcs) from the spindle (2).

- ④ Inject compressed air into the access passage for 1st/2nd speed piston (160) arranged into the spindle (2) to remove the 1st/2nd speed piston (160) from the spindle (2).



85A7TM50

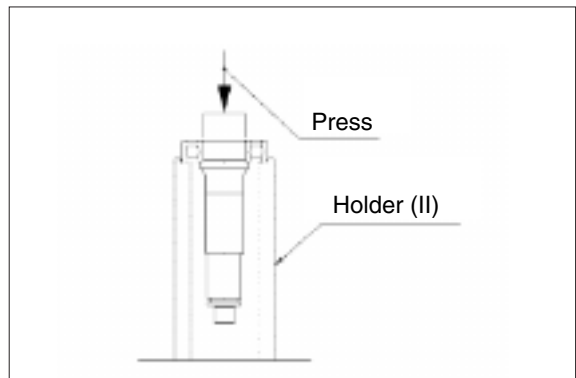
#### (17) Ball bearing removal

- ※ The ball bearing (149) should be removed only when replacing.

- ① Place the holder (II) on the press bench and put the shaft (102) into the holder.

- ② Remove the ball bearing (149) from the shaft (102) by pressing on the shaft end with press.

- ※ Do not reuse the ball bearing (149).



85A7TM51

(15) Ring nut removal

- ① Fix the hub (1) and the spindle (2) with the fixture by tightening the hexagon socket bolts. The bolts should be tightened equally in symmetrical positions with each other.
- ② Invert the traveling unit. (The side of the reduction gear is turned up.)



85A7TM52

- ③ Remove the hexagon socket set screws (47) (2 pcs).

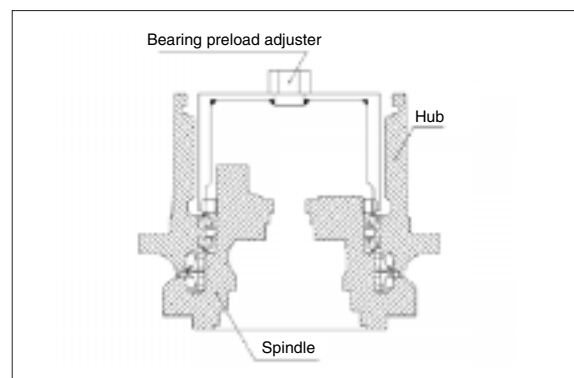


85A7TM53

- ④ Loosen the ring nut (22) with the bearing preload adjuster.
- ※ Do not reuse the ring nut (22).



85A7TM54



85A7TM55

- ⑤ Remove the ring nut (22) from the spindle (2).

⚠ When removing it, be careful not to injure your hands by touching the screw part.



85A7TM56

#### (19) Spindle removal

- ① Invert the traveling unit. (Turn up the side of motor.)
- ② Remove the fixture from the hub (1) and the spindle (2).
- ③ Tighten the eye bolts (2 bolts, for M16) in the mounting holes of spindle (2) so they are symmetrically positioned.
- ④ Hook the eye bolts, gently and slowly hoist with a crane and remove the spindle (2) from the hub (1). At this time, the floating seal (31) and the oil seal (132) come off together.

⚠ A diagonally lifting exerts great force on the hoisting tools and the eyebolts, and the wire may be cut off. Since the wire that is cut off might hit worker and cause injuries, for safety, use a crowbar etc. to remove if the hub (1) cannot be lifted up smoothly.



85A7TM57

#### (20) Ball bearing removal

- ① Remove the floating seal (31) from the hub (1).
- ※ Do not reuse the floating seal (31) .
- ⚠ When removing it, be careful not to injure your hands by touching the edge.



85A7TM58

- ② Tapping equally and gradually 3 or 4 points of the end face of the ball bearing (21) with an aluminum rod (pin punch) and a hammer to remove the ball bearing (21) from the hub (1).
- ※ The ball bearings (21) cannot be reused once their inner races are struck and damaged by a pin punch. Only remove the angular ball bearings (21) when replacement is necessary.
- ※ The ball bearings (21) get damaged when mating part of its outer race is dislocated from the hub (1) and fall from the reversing device. Put a rubber mat (for buffering the bearing's falling shock) under the hub (1).
- ③ Turn over the traveling unit.
- ④ Tapping equally and gradually 3 or 4 points of the end face of the ball bearing (21) with an aluminum rod (pin punch) and a hammer, remove the ball bearing from the hub (1).



85A7TM59

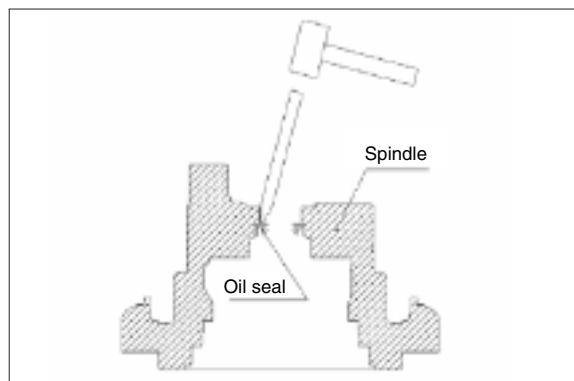
**(21) Disassembly of parts assembled into spindle.**

- ① Remove the floating seal (31) from into spindle (2).
- ▲ When removing it, pay attention not to injure your hands by touching the edge.



85A7TM60

- ② Remove the oil seal (132) from the spindle (2).
- ※ Do not reuse the floating seal (31) and the oil seal (132).



85A7TM61



## (22) Washing

- ① Separate the hub (1), spindle (2), cover (13) and rear flange (301) from other parts. (hereafter called the built-in parts)
  - ② Wash the built-in parts in a wash tank.
- ※ Carefully wash to remove any darts from the external surfaces.



85A7TM62

### ▲ As white kerosene is combustible, pay attention to fire, burns and injury.

- ※ From the beginning, washing each dirty part by white kerosene will be easy to get damaged. At first, immerse them in white kerosene until dust and fat will be detached sufficiently.
- ③ Wash the built-in parts in roughly washing container that is filled with white kerosene.



85A7TM63

## (23) Finish washing

- ① Put each part in the washing tank for finishing that equips white kerosene, and wash the whole including the inside sufficiently with white kerosene.
  - ② Wipe white kerosene attached to each part with clean waste cloth.
- ※ Dry the inside of the hub (1) and spindle (2) by spraying compressed air in place without dust and humidity. After drying, apply hydraulic oil on each part.



85A7TM64

### 3. MAINTENANCE STANDARDS

Follow these standards when disassembling and inspecting the traveling unit.  
Be especially careful not to damage moving and sliding parts.

#### 1) Seals

Once disassembled, all seals (O-rings, oil seals, floating seals) should be replaced with new ones even if no damage is observed.

#### 2) Bolts

Do not reuse bolts coated with adhesive.

#### 3) Maintenance standards for wearing parts

- (1) Replace all parts whose appearance damaged significantly.
- (2) Replace parts when the following abnormal phenomenon occurs.

Item No.	Part name	Phenomenon	Service limit
1	Hub	<ul style="list-style-type: none"> <li>· Serious damage in appearance</li> <li>· Pitting on tooth flank of ring gear</li> <li>· Abnormal wear such as scuffing</li> </ul>	-
2	Spindle	<ul style="list-style-type: none"> <li>· Serious damage in appearance</li> <li>· Abnormal wear such as scuffing</li> </ul>	-
3 and others	Carrier assy	<ul style="list-style-type: none"> <li>· Abnormal wear such as scuffing</li> </ul>	-
4	Sun gear 1	<ul style="list-style-type: none"> <li>· Pitting on tooth flank</li> <li>· Flaking on rolling contact surface with bearing</li> </ul>	-
5	Sun gear 2		
6	Planetary gear1		
7	Planetary gear2		
10	Thrust washer 1	<ul style="list-style-type: none"> <li>· Tarnish on sliding surface</li> <li>· Abnormally wear on sliding surface</li> </ul>	-
11	Thrust washer 2		
12	Thrust washer 3		
21	Ball bearing	<ul style="list-style-type: none"> <li>· Indentation on contact surface</li> <li>· Flaking on contact surface</li> <li>· Unequal wear on contact surface</li> </ul>	-
27	Needle roller bearing	<ul style="list-style-type: none"> <li>· Pitting on roller</li> <li>· Abnormally wear of cage and face</li> </ul>	-
28			
29	Inner ring	<ul style="list-style-type: none"> <li>· Flaking on rolling contact surface of bearing.</li> </ul>	-
30			
102	Shaft	<ul style="list-style-type: none"> <li>· Abnormal wear on contact surface with oil seal (132).</li> <li>· Wear on spline.</li> </ul>	-
103	Swash plate	<ul style="list-style-type: none"> <li>· Seizure on sliding surface.</li> </ul>	-
104	Cylinder block	<ul style="list-style-type: none"> <li>· Wear on spline.</li> <li>· Excessive wear on inner surface of bores.</li> <li>· Flaw and wear on sliding surface with timing plate (109).</li> </ul>	-

Item No.	Part name	Phenomenon	Service limit
105 106	Piston assy Piston Shoe	<ul style="list-style-type: none"> <li>· Clearance is found in the axial direction between piston (105) and shoe (106).</li> <li>· Abnormal and unequal wear on shoe.</li> </ul>	Clearance 0.15mm below
107	Retainer plate	<ul style="list-style-type: none"> <li>· Sliding part with shoe (106) is worn unequally.</li> <li>· Flaw and unequal wear on sliding surface with thrust ball (108).</li> </ul>	-
108	Thrust ball	<ul style="list-style-type: none"> <li>· Ball surface sliding part with retainer plate (107) is worn unequally.</li> </ul>	-
109	Timing plate	<ul style="list-style-type: none"> <li>· Seizure and unequal wear on sliding surface</li> </ul>	
115 116	Friction plate Mating plate	<ul style="list-style-type: none"> <li>· Unequal wear on both end faces</li> <li>· Less torque than specified one</li> <li>· Seizure on sliding surface</li> </ul>	Braking torque 18.5 kgf · m (134 lbf · ft) or more
112	Piston	<ul style="list-style-type: none"> <li>· Flaw on outer circumference</li> </ul>	-
149 150	Ball bearing	<ul style="list-style-type: none"> <li>· Indentation on contact surface</li> <li>· Flaking on contact surface</li> <li>· Wear on contact surface</li> </ul>	-
160	Piston	<ul style="list-style-type: none"> <li>· Abnormal wear on contact surface</li> </ul>	-
301	Rear flange	<ul style="list-style-type: none"> <li>· Flaw on sliding surface with spools (323) (363)</li> </ul>	-
323 363	Spool	<ul style="list-style-type: none"> <li>· Unequal wear on outer circumference</li> <li>· Flaw on outer circumference.</li> </ul>	-

## 4. ASSEMBLING

Basically, assembly is carried out by performing the procedure for disassembly in reverse.

### 1) Preparations

Prepare the same workbench, tools and equipment as those listed in section 2 (disassembly).

### 2) General precautions

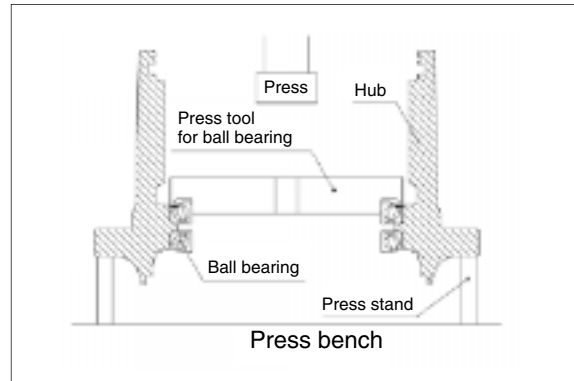
- (1) Pay the same attention as for general precautions for disassembly in section 2.
- (2) When assembling, remove all foreign objects or metal fragments from parts, and make sure there are no burrs or dents, etc. on parts. If there are burrs or dents, remove with an oilstone.
- (3) Replace O-rings, oil seals and floating seals with new ones.
- (4) Remove remaining glue of the pillars of the spindle (2) by using the tap (M10x1.5), and wash with solvent. After that, remove solvent of the holes by spraying with compressed air. Replace hexagon head bolts (51) with new ones.
- (5) Remove remaining glue of the pillars of the carrier (3) by using the tap (M8x1.25), and wash with solvent. After that, remove solvent of the holes by spraying with compressed air. Replace hexagon head bolts (40) with new ones.
- (6) Be careful not to damage O-rings, oil seals and floating seals when mounting. (Apply small amount of grease to make them slippery.)
- (7) Be sure to coat the moving and sliding parts of the hydraulic motor section and the valve section with clean hydraulic fluid (NAS standards class 9 or superior) and assemble.
- (8) Do not use cloth gloves for assembly. (To prevent fiber pieces from causing faulty operation.)
- (9) Bolts and plugs should be tightened by the torque value.
- (10) When assembly is complete, plug all ports to prevent dirt from entering.
- (11) The photographs and drawings contained in this manual are of representative models. Disassembly procedure is not affected even if the product you are using differs in part.

### 3) Assembly procedure

- ※ If reassembling after replacing parts, preload adjustment of the main bearing (21) is necessary. Before assembling, make sure the following parts have been replaced
- ※ Renewal parts required for preload adjustment of the main bearing: Hub (1), spindle (2), ball bearing (21).
- ※ If reassembling after replacing the parts listed above, be sure to reassemble using parts that have been adjusted. If you reassembly with parts that have not been adjusted, it will cause malfunction of traveling unit or early failure.

(1) Hub section assembly

- ① Place the hub (1) on the press bench.
  - ② Place the ball bearing (21) on the hub (1) with checking the direction, and place the bearing press fitting jig on the outer race, then press fit by the press machine. Insert the ball bearing (21) into the hub (1).
  - ③ Turn the hub (1) upside down.
  - ④ Repeat the above procedure to insert the ball bearing (21) into the hub (1).
- ※ Make sure that the installing direction of the ball bearing (21) is correct.

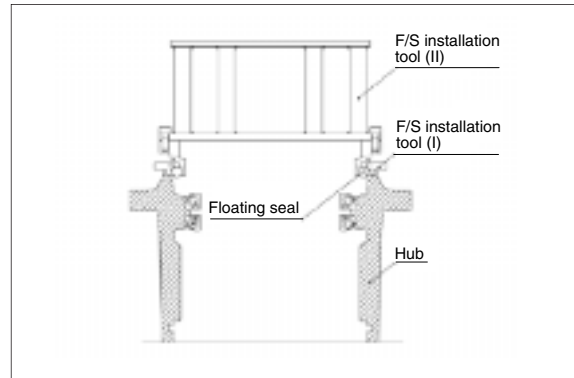


85A7TM70

- ⑤ Apply thinly lithium grease on the outside circumference of the O-ring of the floating seal (31), and fit the floating seal (31) in the floating seal groove of the hub (1).

※ When applying grease to the O-ring of the floating seal (31), remove the O-ring from the floating seal (31) and apply lightly grease to the entire surface of it.

※ To mount the floating seal (31), place the F/S installation tool ( I ) , floating seal (31) and F/S installation tool ( II ) in that order, and press in until the F/S installation tool ( I ) reaches the F/S installation tool ( II ). After removing the installation tools, make certain that the end face of the hub and the surface of the floating seal (31) are parallel with each other within a tolerance of 1 mm.



85A7TM71

- ⑥ Fasten two eye bolts in the screw holes of the hub (1) so they are symmetrically positioned.
- ⑦ Hook the hook on the eye bolts, hoist the hub (1) with a crane, and set the hub (1) on the workbench.



85A7TM69

- ※ While matching the screw holes of the hub (1) and mounting holes of the workbench, place the hub (1) gently in the mounting holes of the workbench.
- ⑧ Fix the hub (1) into the workbench by tightening the hexagon socket bolts which are symmetrically positioned.
- ▲ Tighten the hexagon socket bolts securely. Failure to do so could result in injury if the traveling unit is inverted and then, falls.



85A7TM72

## (2) Spindle assembly

- ① Apply thinly lithium grease on the outside circumference of the O-ring of the floating seal (31) and mount the floating seal (31) in the floating seal groove of the spindle (2).
- ※ To mount the floating seal (31), place the F/S installation tool (Ⅲ) , floating seal (31) and F/S installation tool (Ⅱ) in that order, and press in until the F/S installation tool (Ⅱ) reaches the F/S installation tool (Ⅲ). After removing the installation tools, make certain that the end face of the spindle (2) and the surface of the floating seal (31) are parallel with each other within a tolerance of 1 mm.



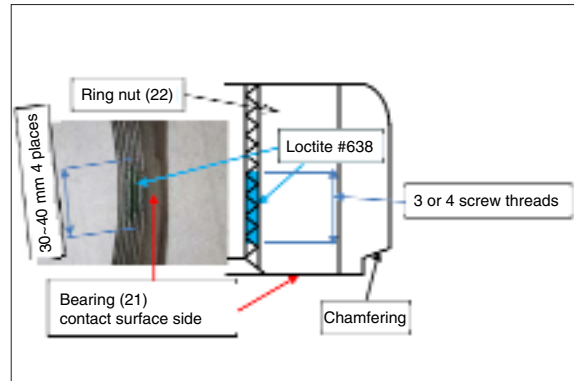
85A7TM52

- ② Tighten two eyebolts symmetrically into the spindle (2).
- ③ Hook the hook on the eyebolts, lift the spindle (2) by the crane, and then insert the spindle (2) into the hub (1) slowly.
- ④ Fix the hub (1) and spindle (2) with the fixture and then, tighten the bolts equally.



85A7TM73

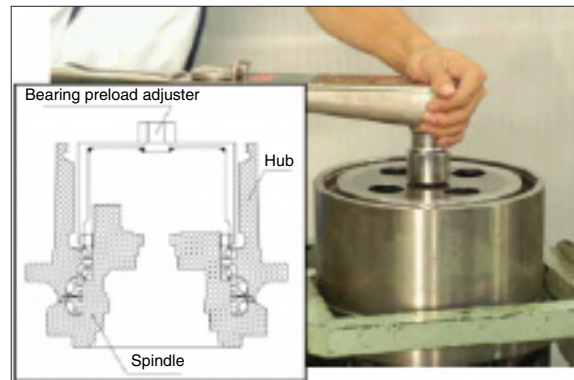
- ⑤ Invert the traveling unit. (Turn up the side of reduction gear)
- ⑥ Apply Loctite #638 like in the left drawing.



85A7TM74

- ⑦ Tighten the ring nut (22) into the spindle (2) with the bearing preload adjuster. Please note that the contact surface of the ring nut (22) with the ball bearing (21) should be chamfering side.

· Tightening torque:  $60 \pm 6.0 \text{ kgf} \cdot \text{m}$   
 $(434 \pm 43.4 \text{ lbf} \cdot \text{ft})$



85A7TM75

- ⑧ Tighten the hexagon socket set screws (47) (2 pcs) with the specified torque.

· Tightening torque:  $1.0 \pm 0.2 \text{ kgf} \cdot \text{m}$   
 $(7.2 \pm 1.4 \text{ lbf} \cdot \text{ft})$

- ⑨ After tightening up the screws, caulk the entrance of the threaded holes to avoid loosening the screws.



85A7TM53

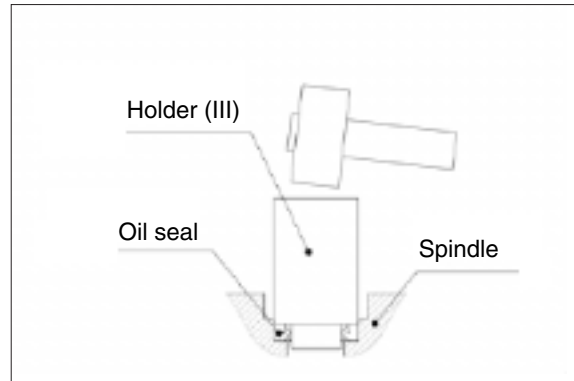
- ⑩ Invert the traveling unit. (Turn up the side of motor.)
- ⑪ Remove the fixture.



85A7TM52

### (3) Assembly of inner parts of spindle

- ① Press fit the oil seal (132) into the spindle (2) with the holder (III) and a hammer.
- ※ Apply lithium grease to the lip section of the oil seal (132) when mounting it.
- ※ Pay attention for the oil seal (132) direction when assembling.



85A7TM76

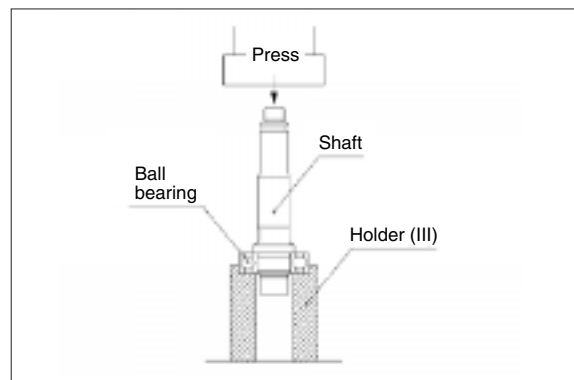
- ② Apply lithium grease to the hemispherical surface of the pivots (167) (2 pcs), and install them into the pin hole of the spindle (2).
- ③ Apply lithium grease to the spring (190), and install it into the piston (160).
- ④ Apply hydraulic fluid to the sliding surface of the piston (160), install it into the piston hole of the spindle (2).



85A7TM50

### (4) Shaft assembly

- ① Put the ball bearing (149) in a heating tank to heat it at  $100 \pm 10^{\circ}\text{C}$  for ten minutes and then insert it into the shaft (102).
- ▲ Wear leather gloves in handling the heated ball bearing (149) due to the possibility of burns.
- ② Install the shaft (102) slowly into the spindle (2).



85A7TM77

- ※ When installing the shaft (102), be careful not to damage the lip portion of the oil seal (132). Damage of the lip portion will cause oil leakage and bring premature failure to the traveling unit.
- ③ Turn the traveling unit 90 degrees. (Axial direction of the traveling unit : level)



85A7TM78



- ④ Install the swash plate (103) into the spindle (2).
- ※ Apply lithium grease on the swash plate (103) where mating surface of the spindle (2). Make sure that the pivots (167) mounted on the spindle (2) enter to the pivot holes of the swash plate (103).



85A7TM48

### (3) Assembly of cylinder block interior parts

- ※ Insert the THS snap rings (145) so that the snap edge side faces to the entrance of the spring hole. Insert the washer (110) so that the sharp edge side faces to the THS snap ring (145).
- ① Insert the washer (110), spring (114), washer (110) and snap ring (145) in that order into the cylinder block (104).
- ② Place the cylinder block (104) on the press bench.



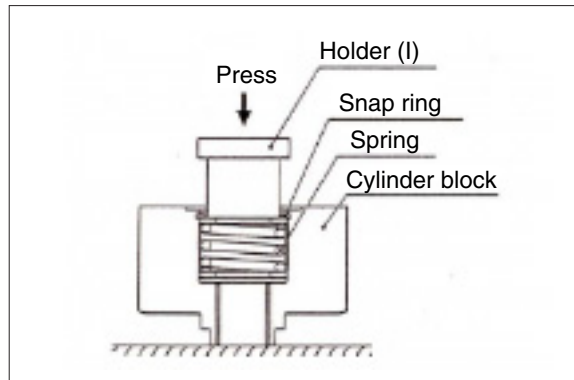
85A7TM47

- ▲ **Be careful when installing the snap ring (145), since it may pop out and cause injury.**



85A7TM45

- ※ Press force of the spring (114) is 120 kgf (265 lbf) or more. Protect by covering the cylinder block (104) with a vinyl sheet so the contact surface with the timing plate (109) does not get damaged.
- ③ Place holder ( I ) on the washer (110), and while clamping with press, install the snap ring (145) into the snap ring groove of the cylinder block (104) with a snap ring pliers.



85A7TM46

## (6) Hydraulic motor parts assembly

- ① Place the rollers (151) (3 pcs) into the cylinder block (104) and place the thrust ball (108) on the top.



85A7TM44

- ② Install the piston assys (9 pcs) into the retainer plate (107).
- ※ After assembling, dip the whole thing in hydraulic fluid. (NAS standards class 9 or superior)
- ③ Install the retainer plate (107) and the piston assys (9 pcs) into the cylinder block (104).



85A7TM79

- ※ Match the round surface sections of the retainer plate (107) and the thrust ball (108).
- ④ Install the cylinder block assy into the shaft (102).
  - ※ Install the cylinder block assy into the spline of the shaft (102) by aligning the spline hole with the spline of the shaft.



85A7TM80

- ⑤ After installing the cylinder block assy, rotate it by hand and make sure that it fits properly. If not, inspect it.
- ※ After installing the cylinder block assy, keep pushing the cylinder block assy to the swash plate side. If not, the thrust ball (108) will be separated from it and then, it will not rotate normally.



85A7TM81

### (7) Parking brake section assembly

- ① Invert the traveling unit. (Turn up the motor side) .
- ② Dip the friction plates (115) into hydraulic oil.
- ③ Install mating plates (116) (4 pcs) and friction plates (115) (3 pcs) into the spindle (2) in the order of the mating plate (116) and friction plate (115) alternately.



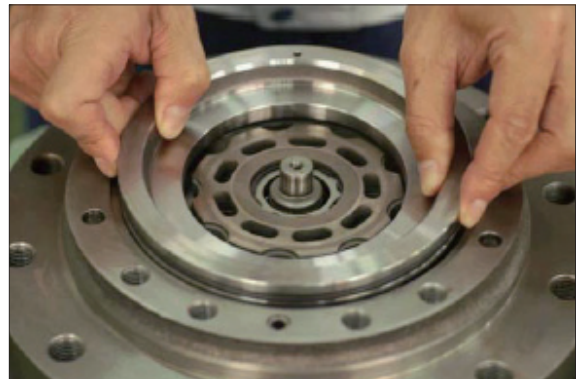
85A7TM82

- ※ Be careful not to mistake the order of mating plates (116) and friction plates (115).
- ④ At this time, apply thinly lithium grease to the O-rings (135), (139).
- ⑤ Install the O-rings (135), (139) into the O-ring grooves of the piston (112). Install the piston (112) into the spindle (2).



85A7TM83

- ※ After putting the piston (112) on the spindle (2), push it until the O-ring (139) reaches to the contact surface with the rear flange (301) and then, check whether you can rotate it by your hands. If unable, since it might not be appropriate posture, disassemble and reassemble it.
- ※ If the piston (112) doesn't enter easily into the spindle (2) because of the resistance of the O-rings, tap the edge of the piston (112) lightly and equally with a plastic hammer to install.
- ※ Be careful not to damage the O-rings when assembling the piston (112).



85A7TM38

**(8) Assembly of brake valve parts in rear flange**

- ① Install the O-rings (338) (2 pcs) into the plugs (382) (2 pcs).
- ※ Apply lithium grease to the O-rings (338) (2 pcs).
- ② Install the valves (327) (2 pcs), and springs (330) (2 pcs) into the rear flange (301). At this time, apply lithium grease in order to connect the valve (327) and the spring (330) by cohesion of the grease.



85A7TM34

- ※ For insertion of the plug (382), put the rear flange (301) on the workbench like in the left picture and align the center of tapped hole with the plug center. This is intended to prevent the O-rings (338) from being damaged and the springs (330) from coming out of the valves (327) due to contact between the bore of the rear flange (301) and the valves (327).
- ※ When the springs (330) are separated from the valve (327), the valves (327) do not touch the seat side of the rear flange (301) correctly, causing oil leakage.



85A7TM33

- ③ After inserting the plugs (382) (2 pcs), temporarily tighten into the rear flange (301) by a hexagon wrench.



85A7TM32

④ Insert the spool (323) into the rear flange (301).

※ Apply hydraulic fluid to the spool (323) and insert it into the rear flange (301). To install the spool (323), align the hole of the rear flange (301) with the axis of the spool (323) so as to prevent the inner surface of the rear flange (301) and the outer surface of the spool (323) from being damaged due to interference.

Otherwise internal leaks will occur after reassembly, resulting in performance deterioration of the traveling unit.



85A7TM30

⑤ Insert the O-rings (336) (2 pcs) into the plugs (324) (2 pcs).

※ Apply lithium grease to the O-rings (336).



85A7TM31

⑥ Install the spring retainers (325) (2 pcs) and the spring (328) (2 pcs) into the plugs (324) (2 pcs).

⑦ Tighten the plugs (324) (2 pcs) into the rear flange (301).

※ When tighten the plugs (324) into the rear flange (301), insert carefully so as not to come off the springs (328) (2 pcs) and spring retainer (325) (2 pcs).



85A7TM84

⑧ Temporarily tighten two plugs (324) into the rear flange (301).



85A7TM85

**(9) Assembly of SRV part into rear flange**

- ① Install the O-ring (207) and the backup rings (208) (2pcs) into the valve sheet (201).
  - ② Install the O-ring (212) into the sleeve (203).
- ※ Apply lithium grease to the O-rings (207), (212).



85A7TM86

- ③ Insert the sleeve (203) into the rear flange (301).
- ※ Internal parts of the sleeve kit shall be handled as a set. So do not use separately supplied parts.



85A7TM87

- ④ Temporarily tighten the sleeves (203) (2 pcs) into the rear flange (301).



85A7TM26

**(10) Assembly of rear flange mounted parts**

- ① Assembly of parts mounted into the rear flange (301).
  - a. Put the rear flange (301) so that the contact surface with the spindle (2) is down.
  - b. Insert the spring (366) and spool (363) into the rear flange (301).
  - c. Install the O-ring (338) into the plug ※ (382).
  - d. Apply lithium grease to the O-ring (338). Temporarily tighten the plug (382) into the rear flange (301).



85A7TM88

- ※ When tightening the plug (382) into the rear flange (301), insert the plug (382) carefully so that the spring (301) may not be deformed.
- ② Apply hydraulic fluid to the ball bearing (150), and install it into the rear flange (301).
- ③ Insert the parallel pins (342) (2 pcs) into the pin holes of the rear flange (301).
- ④ Apply lithium grease to the contact surface of the timing plate (109) in contact with the rear flange (301).



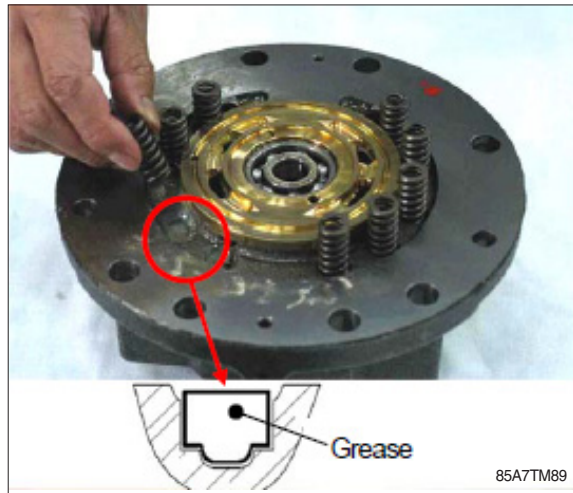
85A7TM25

- ⑤ Install the timing plate (109) on the rear flange (301) using the parallel pin (342) and the ball bearing (150) as a guide.
- ※ When installing the timing plate (109), make sure it is in close contact with the rear flange (301). The adhesion by the close contact prevents the timing plate (109) from falling from the rear flange (301) when mounting the rear flange (301) onto the spindle (2).



85A7TM23

- ⑥ Install the springs (113) (10 pcs) into the rear flange (301).
- ※ Applying plenty of lithium grease to the spring seat surfaces prevents the springs (113) (10 pcs) from falling from the rear flange (301).



85A7TM89

**(11) Connection of rear flange with spindle**

- ① Install the O-rings (43) (2 pcs), (44) into the O-ring grooves of the spindle (2).  
Install the O-rings (43) without applying lithium grease. If assembled with lithium grease applied, the grease may ooze from the mating face of the rear flange (301) and the spindle (2) when the traveling unit is running. This may be mistaken as an oil leak, so do not apply lithium grease.



85A7TM22

- ② Install the parallel pins (42) (2 pcs) into the spindle (2).
- ③ Add 1.2 liters of hydraulic fluid into the spindle (2).
- ④ Apply hydraulic fluid to the contact surface of the cylinder block (104) with the timing plate (109).



85A7TM21

- ⑤ Install the rear flange (301) onto the spindle (2) so that two parallel pins (42) on the spindle (2) enter the pinholes in the rear flange (301).

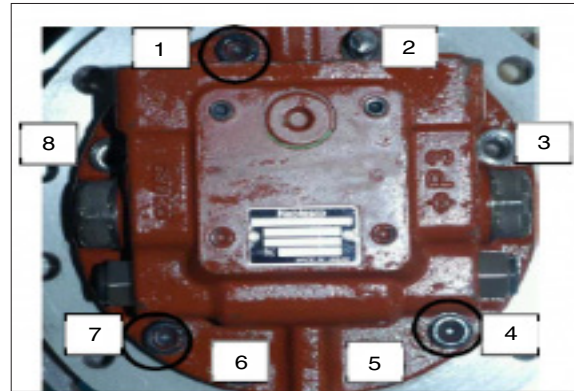


85A7TM20



- ⑥ Temporarily tighten the hexagon socket bolts (345) slowly and evenly (No.1,4,7 3 pcs) so as to keep the gap between the rear flange (301) and the spindle (2) even.

※ If you feel that something is wrong even a little while temporarily tightening, disassemble again and check if parts don't have any abnormal. After that, assemble again.



85A7TM90

- ⑦ Temporarily tighten the rest of the hexagon socket bolts (345) (5 pcs).

- ⑧ Tighten the hexagon socket bolts (345) (8 pcs) equally and evenly with the specified torque.

· Tightening torque:  $10.4 \pm 1.6 \text{ kgf} \cdot \text{m}$   
( $75.2 \pm 11.6 \text{ lbf} \cdot \text{ft}$ )

※ Tighten them on diagonally.



85A7TM19

- ⑨ Tighten the plugs (382) (2 pcs) with the specified torque.

· Tightening torque :  $10 \pm 2.0 \text{ kgf} \cdot \text{m}$   
( $72.3 \pm 14.5 \text{ lbf} \cdot \text{ft}$ )



85A7TM17

- ⑩ Tighten the sleeves (203) (2 pcs) with the specified torque.

· Tightening torque :  $14 \pm 1.5 \text{ kgf} \cdot \text{m}$   
( $101 \pm 10.8 \text{ lbf} \cdot \text{ft}$ )



85A7TM15

- ⑪ Tighten the plugs (324) (2 pcs) with the specified torque.
- Tightening torque :  $36 \pm 4.0$  kgf · m  
( $260 \pm 28.9$  lbf · ft)



85A7TM16

- ⑫ Tighten the plug (382) with the specified torque.
- Tightening torque :  $10.0 \pm 2.0$  kgf · m  
( $72.3 \pm 14.5$  lbf · ft)



85A7TM18

### (12) Carrier assy assembly

- ※ When assembling, use the new hexagon bolts (40) (3 pcs) and remove the remaining adhesive in the screw holes by tapping (M8x1.25). After that, wash and defat, and then remove washing liquid by air blow. If not removing completely, the hexagon bolts (40) (3 pcs) might loosen because of the lack of the axial force of the bolts.



85A7TM12

- ① Insert the sun gear 2 (6) into the carrier (3), and install the retaining ring (50) into the groove of the sun gear 2 (6).
- ② Insert the inner rings (29) (3 pcs), needle roller bearings (27) (3 pcs), planetary gears 1 (5) (3 pcs) and thrust washers 3 (12) (3 pcs) in that order into the pillars of the carrier (3).
- ③ Install the thrust washers 3 (12) (3 pcs) into the carrier (3) with the trust washer installation tool (carrier (3)).



85A7TM11

- ④ Tighten the hexagon bolts (40) (3 pcs) with the specified torque.
- Tightening torque :  $3.4 \pm 0.5 \text{ kgf} \cdot \text{m}$   
( $24.6 \pm 3.6 \text{ lbf} \cdot \text{ft}$ )

- ※ When not using the jig, be careful not to rotate the thrust washers 3 (12) (3 pcs) during tightening the hexagon bolts (40) (3 pcs). After tightening, make sure to check that the planetary gears 1 (12) (3 pcs) rotate smoothly.

**Completion of carrier assy**



85A7TM91

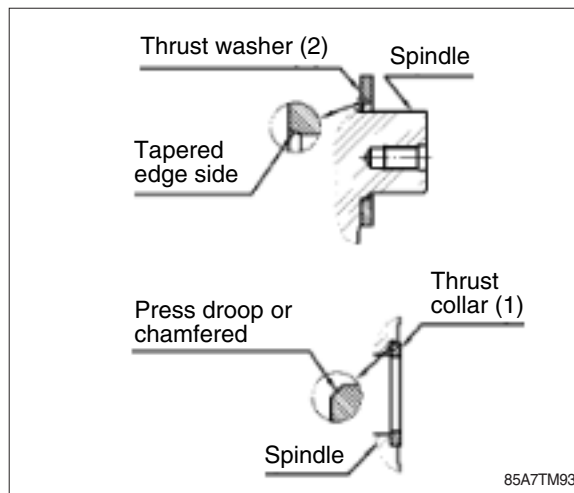
**(13) Planetary gear 2 assembly**

- ※ When assembling, use the new hexagon bolts (51) (4 pcs) and remove the remaining adhesive in the screw holes (4 pcs) by tapping (M10x1.50). After that, wash and defat, and then remove washing liquid by air blow. If not removing completely, the hexagon bolts (51) (4 pcs) might loosen because of the lack of the axial force of the bolts.



85A7TM92

- ① Invert the traveling unit. (Turn up the side of reduction gear).
- ② Install the thrust collar 1 (9) into the spindle (2).
- ③ Install the thrust washer 2 (11) (4 pcs) into the pillars of the spindle (2).



85A7TM93

※ Be careful about the inserting direction of the thrust collar 1 (9) and thrust washer 2 (11) (4 pcs) like in the left drawing.

④ Install the inner rings (30) (4 pcs) into the pillars of the spindle (2).

⑤ Install the needle roller bearings (28) (4 pcs) into the pillars of the spindle (2).

⑥ Install the planetary gears 2 (7) (4 pcs) into the pillars of the spindle (2), meshing with internal teeth of the hub (1).

⑦ Install the thrust washer 1 (10) (4 pcs) into the pillars of the spindle (2) with the thrust washer installation tool (spindle (2)).



85A7TM94

⑧ Tighten the hexagon head bolts (51) (4 pcs) with the specified torque.

· Tightening torque :  $5.9 \pm 1.0 \text{ kgf} \cdot \text{m}$   
( $42.7 \pm 7.2 \text{ lbf} \cdot \text{ft}$ )

※ When not using the jig, be careful not to rotate the thrust washers 1 (10) (4 pcs) during tightening the hexagon bolts (51) (4 pcs). After tightening, make sure to check that the planetary gears 2 (7) (4 pcs) rotate smoothly.



85A7TM95

#### (14) Carrier assy assembly

① Install the carrier assy, meshing with internal teeth of hub (1) and planetary gears 1 (5).



85A7TM10

### (15) Sun gear 1 (4) assembly

- ① Install the sun gear 1 (4) into the shaft (102) meshing with the planetary gears 1. At this time, install the steel ball (41) into the sun gear 1 (4).
- ※ When installing the steel ball (41), apply lithium grease to the steel ball (41) to prevent it from falling down from the sun gear 1 (4).



85A7TM96

### (16) Cover assembly

- ① Install the O-ring (35) into the O-ring groove of the cover (13).
- ※ Apply lithium grease to the O-ring (35).
- ② Install the cover (13) into the hub (1).



85A7TM97

- ※ When installing the cover (13) into the hub (1), tapping evenly the outer circumference of the cover (13) with a plastic hammer. Be careful not to install the cover (13) forcibly by striking strongly with the hammer. Otherwise the O-ring (35) is damaged resulting in oil leakage.
- ③ Install the ring (45) in the ring groove of hub (1).
- ※ Make sure that the ring (45) end gap is not at the notch of the hub (1).



85A7TM98

- ④ Add 1.1 liters of lubricating oil into the hub (1).



85A7TM99

- ⑤ Install the O-rings (37) into the plug (33) and plugs (39) (2 pcs).
- ※ Apply lithium grease to the O-rings (37).
- ⑥ Tighten the plug (33) and plugs (39) (2 pcs) with the specified torque into the cover (13).
  - Tightening torque :  $6.0 \pm 1$  kgf·m  
( $43.4 \pm 7.2$  lbf·ft)



85A7TM100

**(17) Removal of assembled traveling unit from the reversing device**

- ① Invert the traveling unit (Turn up the side of motor)
- ② Remove the bolts tightening the traveling unit to the reversing device.
- ③ Tighten two eyebolts into the spindle (2).



85A7TM03

- ※ Be sure that the two eyebolts are positioned symmetrically with each other.
- ④ Hook the hook on the eyebolts and remove the traveling unit from the reversing device with a crane.
- ▲ **A diagonally lifting exerts great force on the hoisting tools and the eyebolts, and the wire may be cut off. Since the wire that is cut off might hit worker and cause injuries, for safety, use a crowbar and so on to remove if the hub (1) cannot be lifted up smoothly.**

## GROUP 7 RCV LEVER

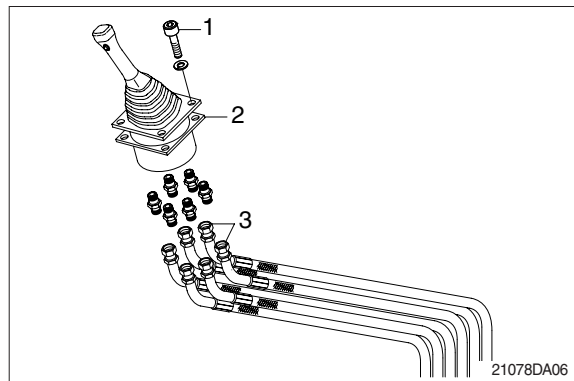
### 1. REMOVAL AND INSTALL

#### 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.

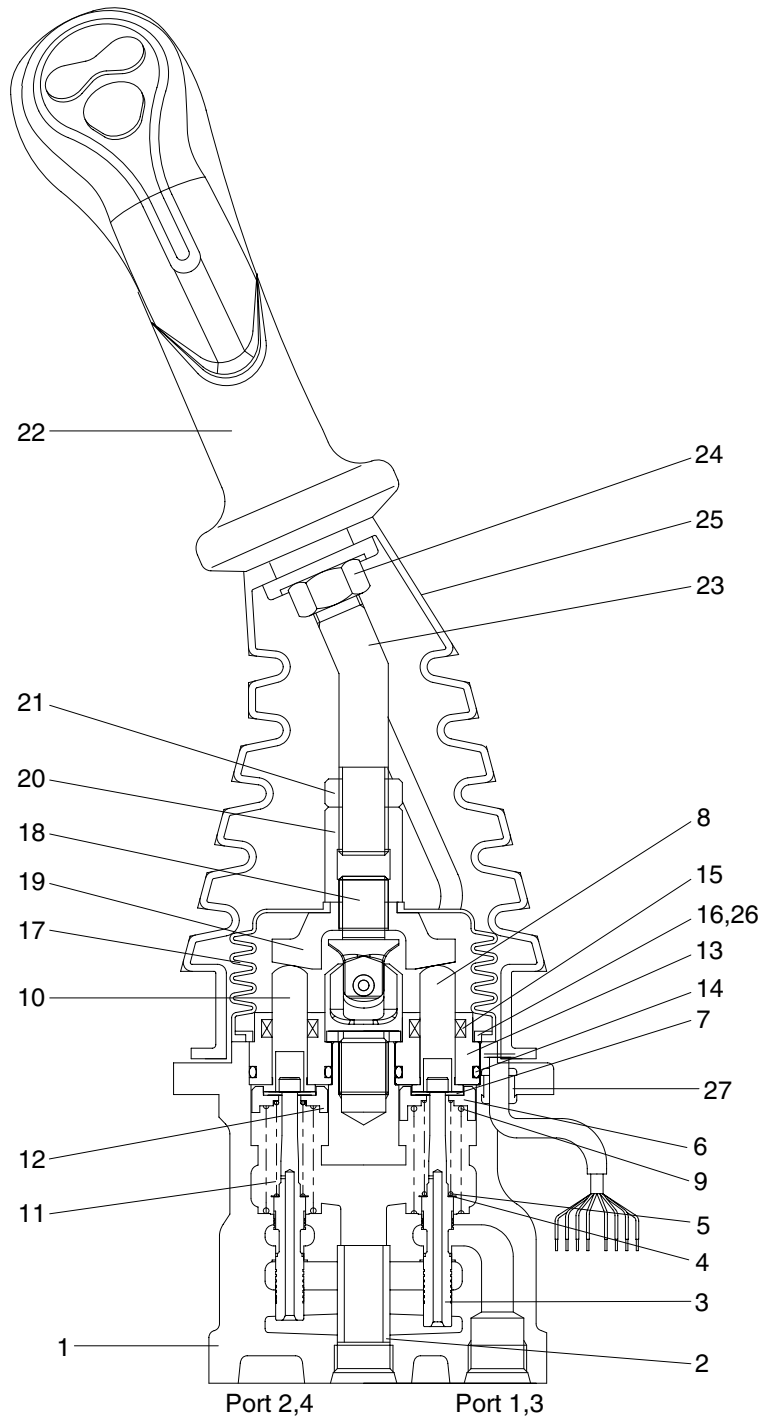


#### 2) INSTALL

- (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




60W9S2RL02

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



## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

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

### (2) Tightening torque

Part name	Item	Size	Torque	
			kgf · m	lbf · ft
Joint	18	M14	3±0.2	14.5±1.4
Adjusting nut	20	M14	6±0.6	43.4±4.3
Lock nut	21	M14	6±0.6	43.4±4.3

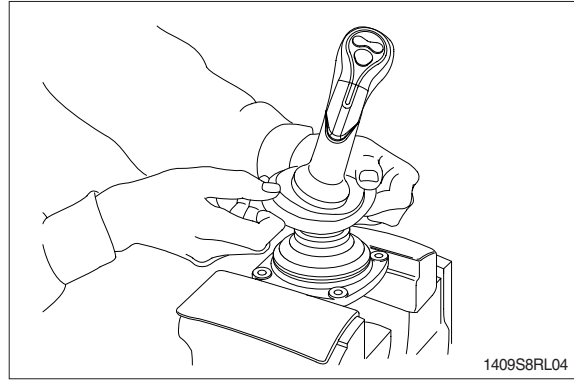
### 3) DISASSEMBLY

(1) Clean pilot valve with kerosene.

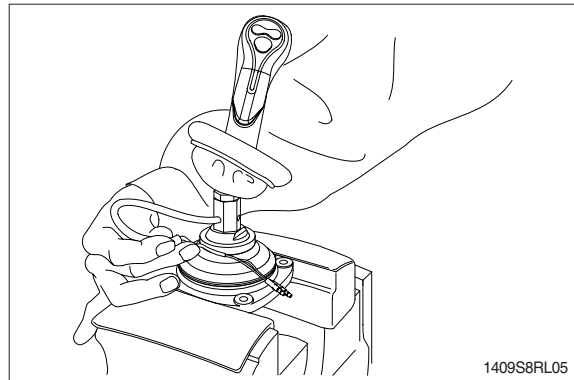
※ Put blind plugs into all ports

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

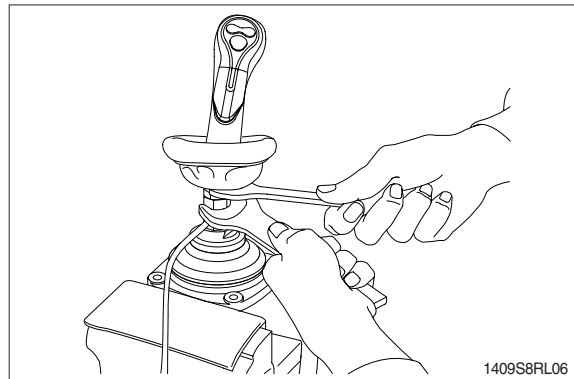
(3) Remove end of boot (25) from case (1) and take it out upwards.



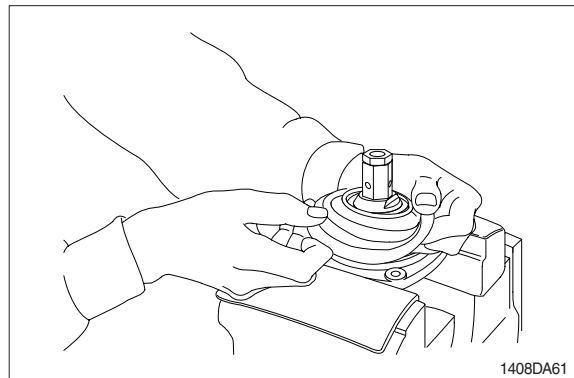
※ For valve with switch, remove cord also through hole of casing.



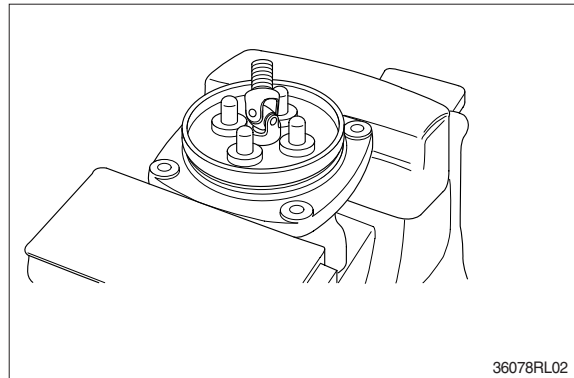
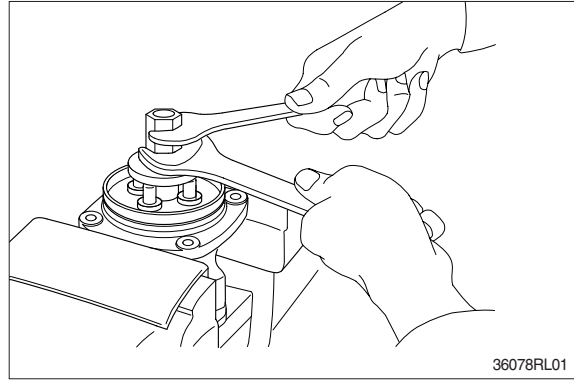
(4) Loosen lock nut (21) and adjusting nut (20) with spanners on them respectively, and take out handle section as one body.



(5) Remove the boot (17).

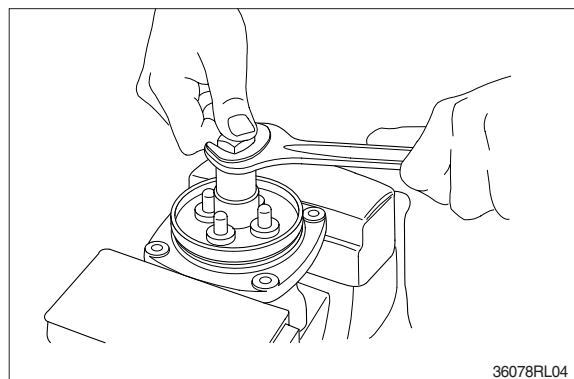
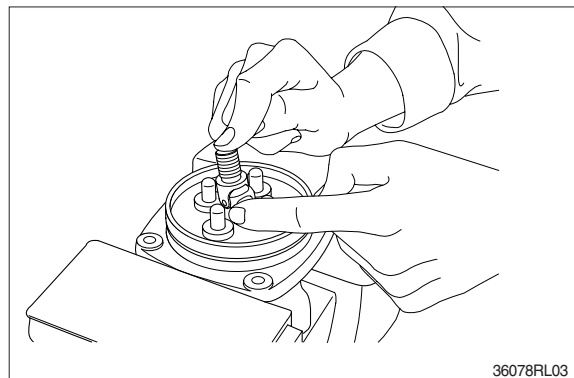


- (6) Loosen adjusting nut (20) and swash plate (19) with spanners on them respectively, and remove them.

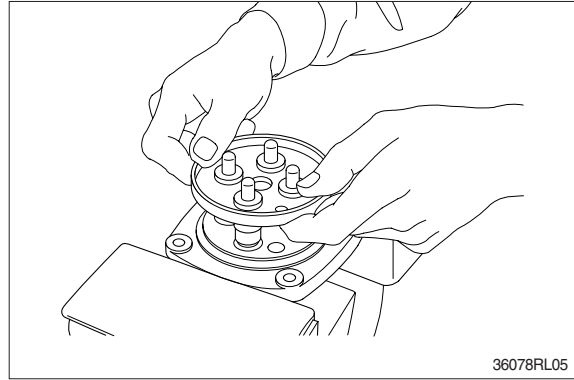


- (7) Turn joint anticlockwise to loosen it, utilizing jig (Special tool).

- ※ When return spring (9) is strong in force, plate (16), plug (13) and push rod (10) will come up on loosening joint. Pay attention to this.



(8) Remove plate (16).



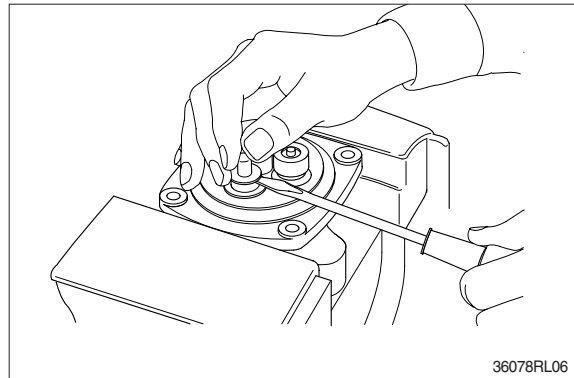
(9) When return spring (9) is weak in force, plug (13) stays in casing because of sliding resistance of O-ring.

※ 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.

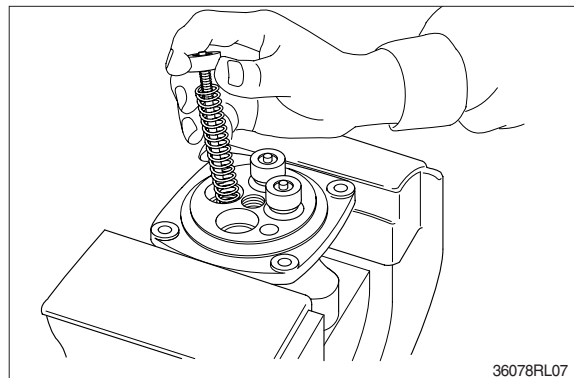
※ During taking out, plug may jump up due to return spring (9) force.

Pay attention to this.



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

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

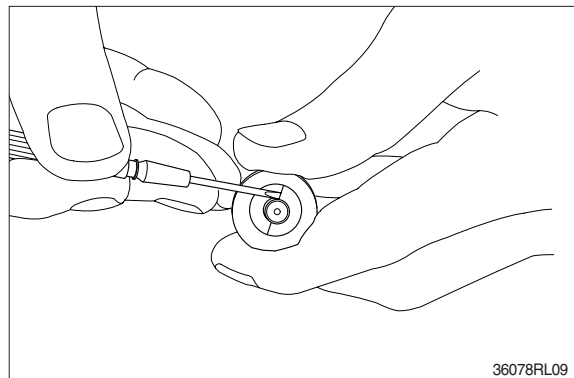


(11) For disassembling reducing valve section, stand it vertically with spool (3) bottom placed on flat workbench. Push down spring seat (6) and remove two pieces of semicircular stopper (7) with tip of small minus screwdriver.

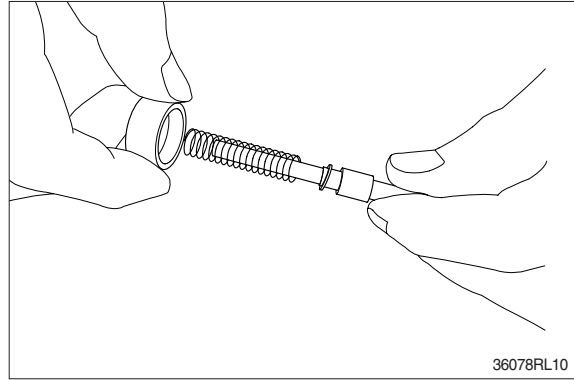
※ Pay attention not to damage spool surface.

※ Record original position of spring seat (6).

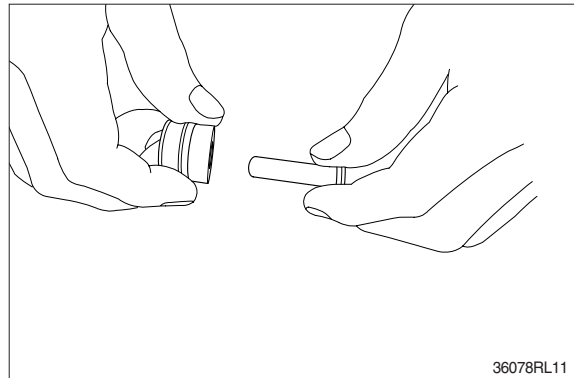
※ Do not push down spring seat more than 6 mm.



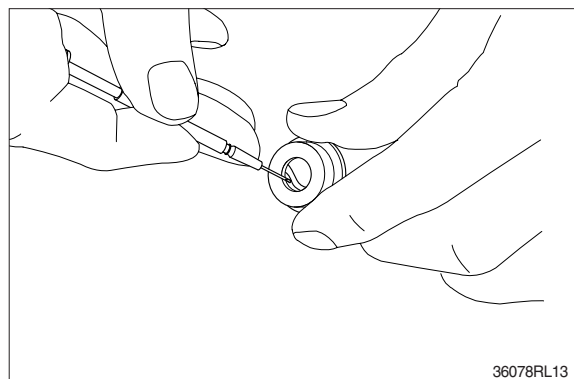
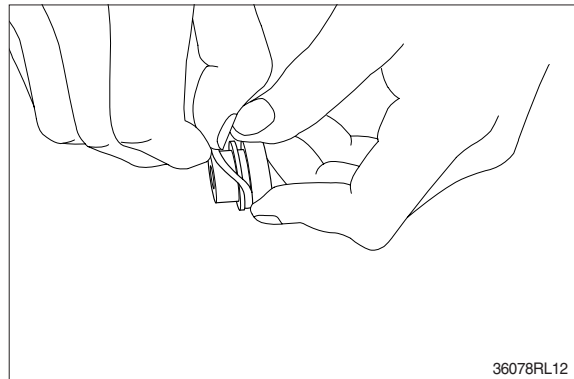
- (12) Separate spool (3), spring seat (6), spring (5) and shim (4) individually.  
※ Until being assembled, they should be handled as one subassembly group.



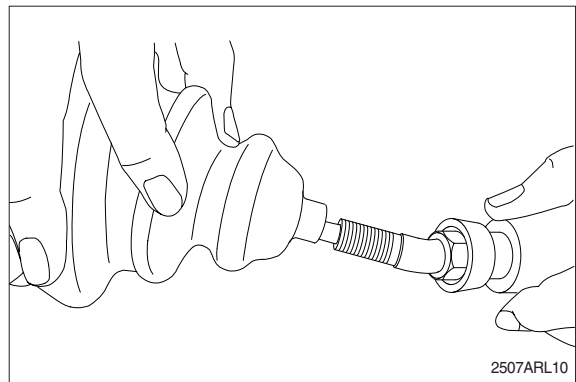
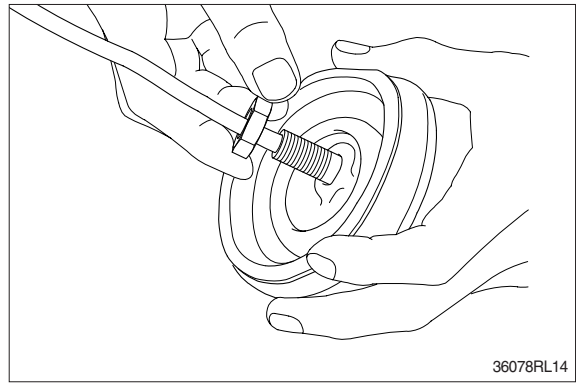
- (13) Take push rod (10) out of plug (13).



- (14) Remove O-ring (14) and seal (15) from plug (13).  
Use small minus screwdriver or so on to remove this seal.



(15) Remove lock nut (21) and then boot (25).



### **(17) Cleaning of parts**

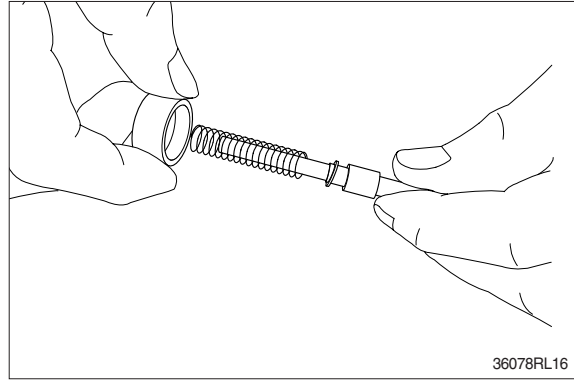
- ① Put all parts in rough cleaning vessel filled with kerosene and clean them (rough cleaning).
  - ※ If dirty part is cleaned with kerosene just after putting it in vessel, it may be damaged. Leave it in kerosene for a while to loosen dust and dirty oil.
  - ※ If this kerosene is polluted, parts will be damaged and functions of reassembled valve will be degraded.  
Therefore, control cleanliness of kerosene fully.
- ② Put parts in final cleaning vessel filled with kerosene, turning it slowly to clean them even to their insides (finish cleaning).
  - ※ Do not dry parts with compressed air, since they will be damaged and/or rusted by dust and moisture in air.

### **(18) Rust prevention of parts.**

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

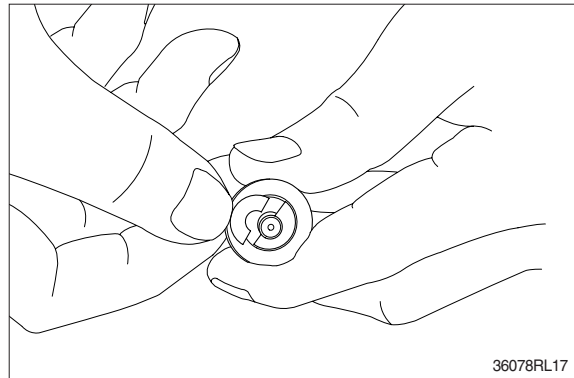
#### 4) ASSEMBLY

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



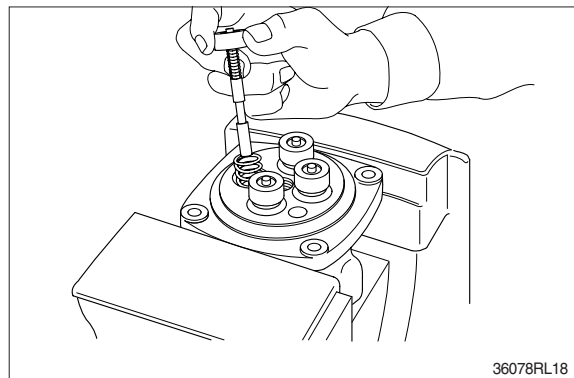
- (2) Stand spool vertically with its bottom placed on flat workbench, and with spring seat pushed down, put two pieces of semicircular stopper (7) on spring seat without piling them on.

- ※ Assemble stopper (7) so that its sharp edge side will be caught by head of spool. Do not push down spring seat more than 6 mm.

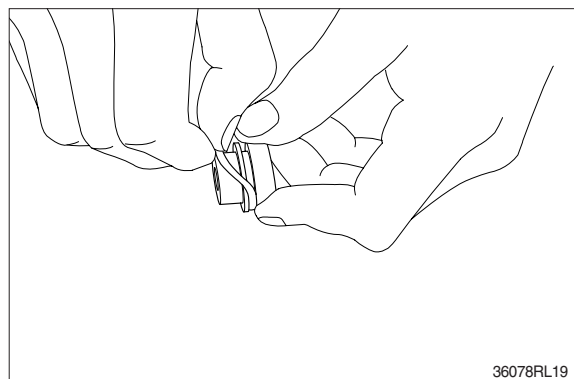


- (3) Assemble spring (9) into casing (1). Assemble reducing valve subassembly into casing.

- ※ Assemble them to their original positions.



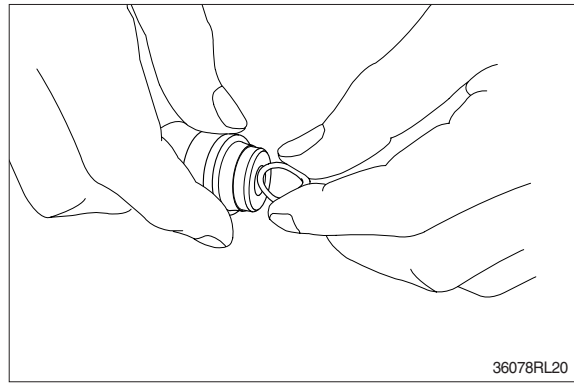
- (4) Assemble O-ring (14) onto plug (13).





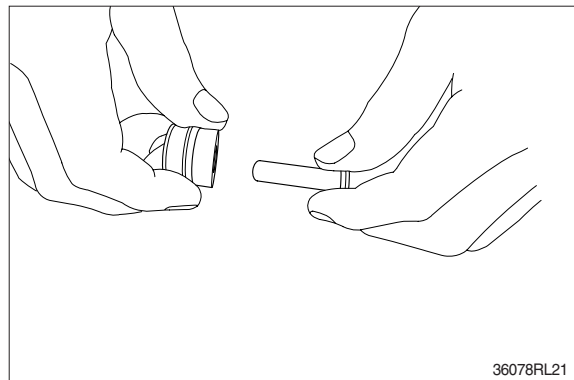
(5) Assemble seal (15) to plug (13).

- ※ Assemble seal in such lip direction as shown below.



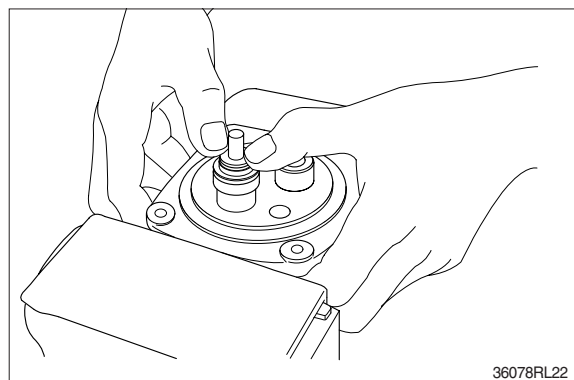
(6) Assemble push rod (10) to plug (13).

- ※ Apply working oil on push-rod surface.

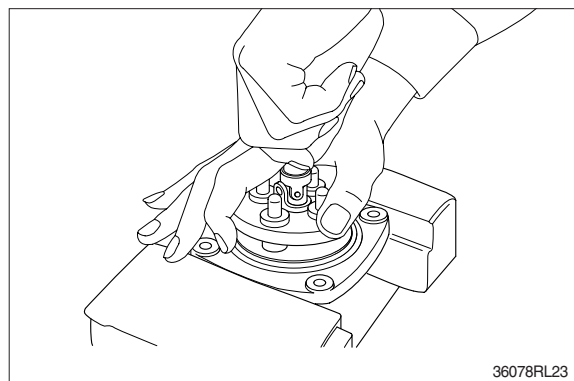


(7) Assemble plug subassembly to casing.

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

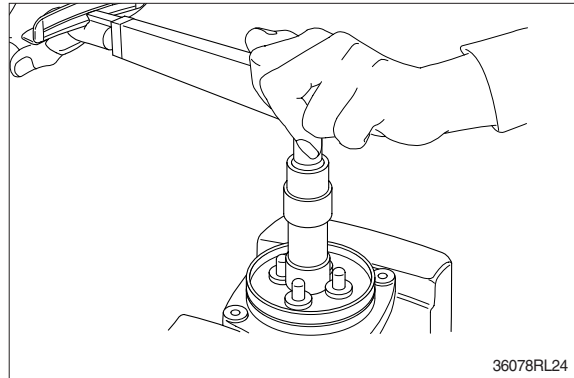


(8) When return spring is strong in force, assemble 4 sets at the same time, utilizing plate (16), and tighten joint (18) temporarily.



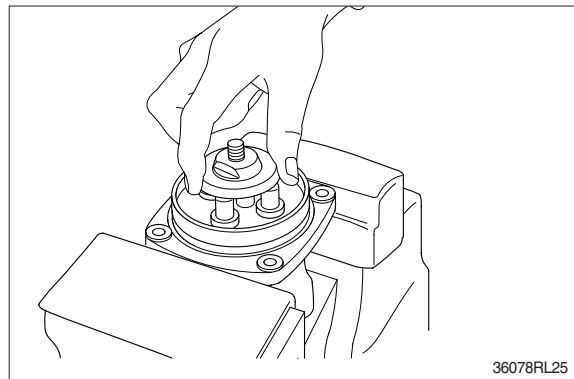
(9) Fit plate (16).

(10) Tighten joint (18) with the specified torque to casing, utilizing jig.



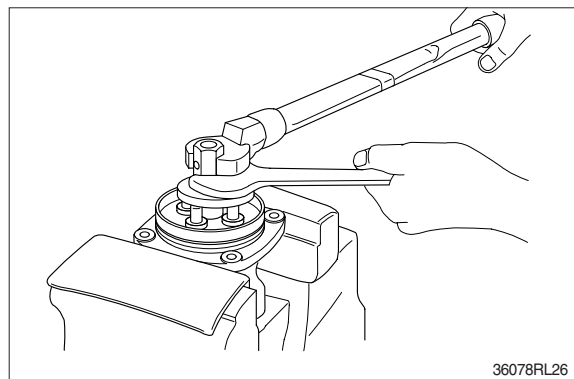
(11) Assemble swash plate (19) to joint (18).

- ※ Screw it to position that it contacts with 4 push rods evenly.
- ※ Do not screw it over.

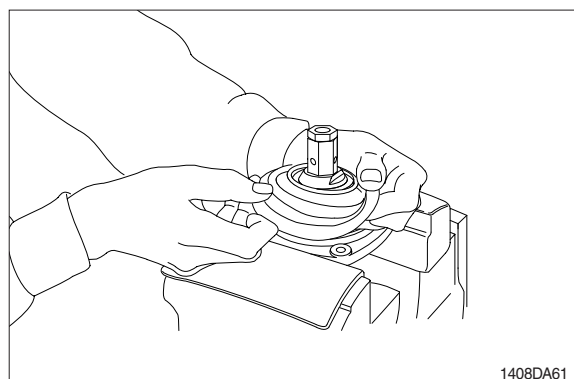


(12) Assemble adjusting nut (20), apply spanner to width across flat of plate (19) to fix it, and tighten adjusting nut to the specified torque.

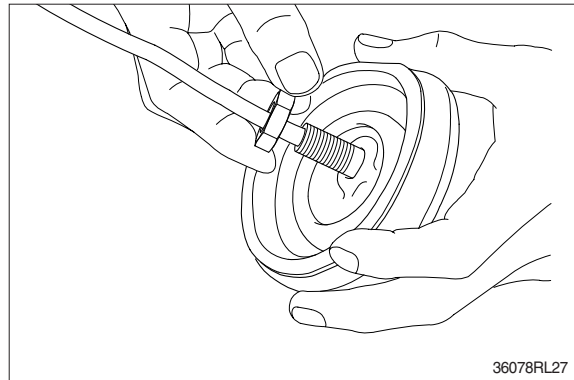
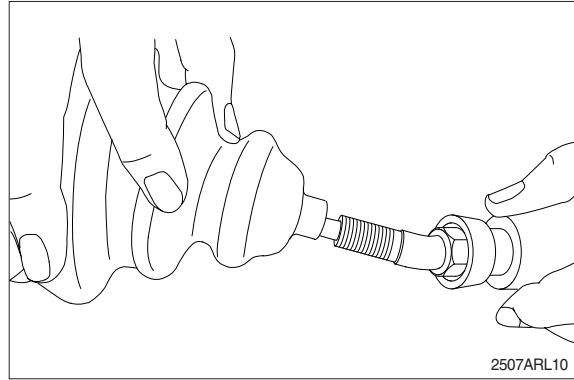
- ※ During tightening, do not change position of disk.



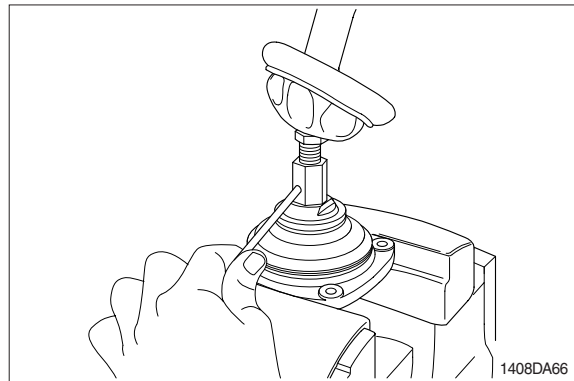
(13) Fit boot (17) to plate.



(14) Fit boot (25) and lock nut (21), and handle subassembly is assembled completely.

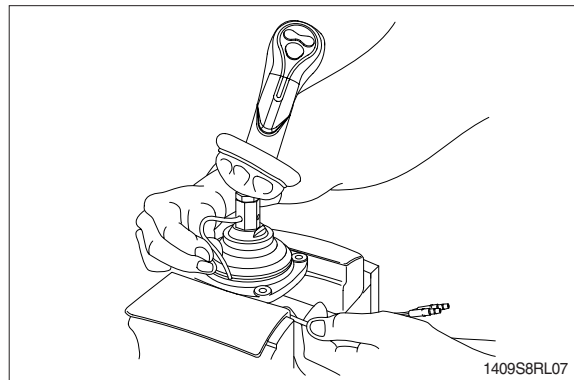


(15) Pull out cord and tube through adjusting nut hole provided in direction 60° to 120° from casing hole.

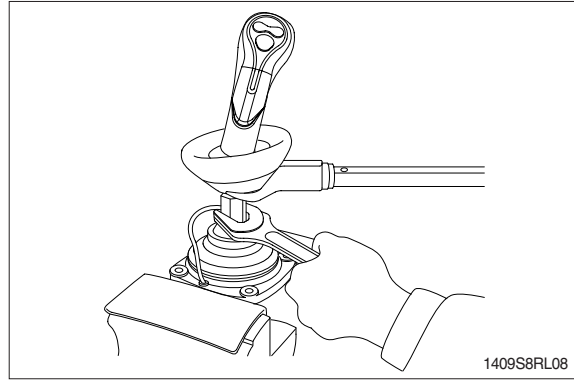


(16) Assemble bushing (27) to plate and pass cord and tube through it.

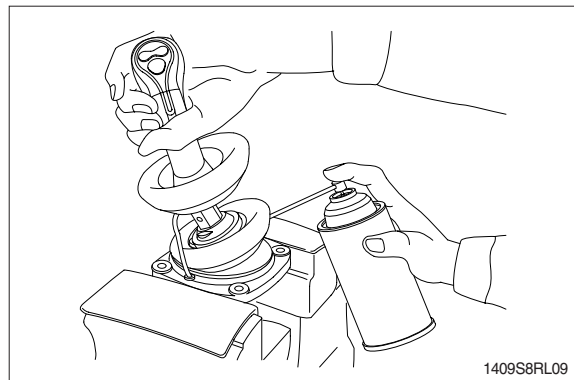
※ Provide margin necessary to operation.



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

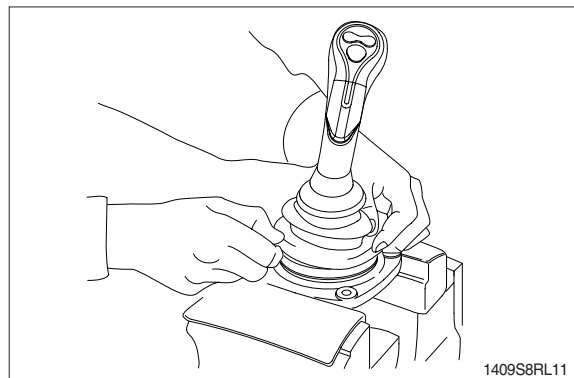


(18) Apply grease to rotating section of joint and contacting faces of disk and push rod.



(19) Assemble lower end of bellows to casing.

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



## 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.**

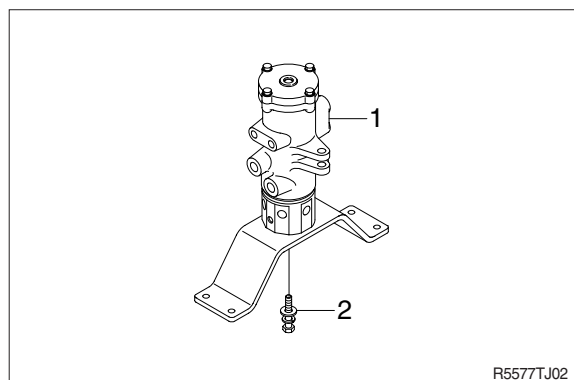
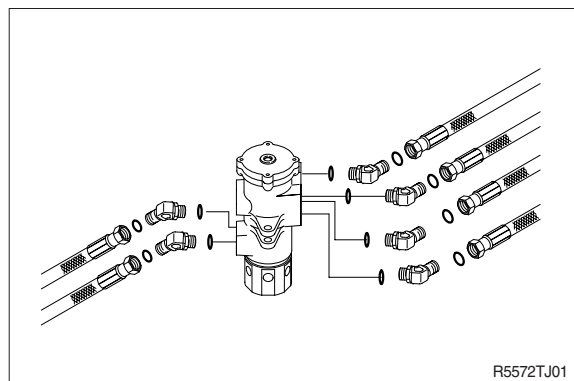
※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.

- (4) Disconnect all hoses.
- (5) Sling the turning joint assembly (1) and remove the mounting bolt (2).
  - Weight : 30 kg (70 lb)
  - Tightening torque :  $12.3 \pm 1.3$  kgf · m  
( $88.9 \pm 9.4$  lbf · ft)

- (6) Remove the turning joint assembly.
  - ※ When removing the turning joint, check that all the hoses have been disconnected.

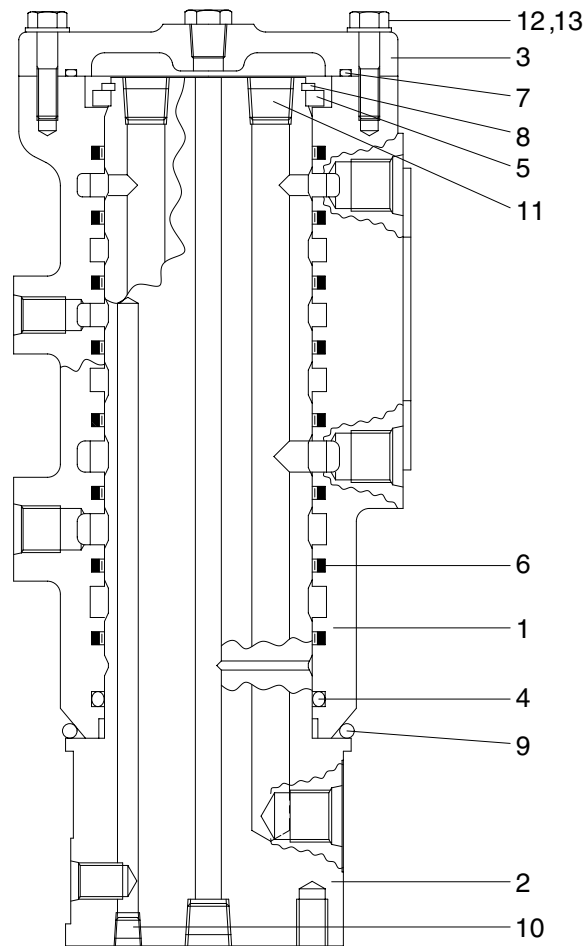
#### 2) INSTALL

- (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



- 1 Hub
- 2 Shaft
- 3 Cover
- 4 O-ring
- 5 Ring

- 6 Slipper seal
- 7 O-ring
- 8 Retainer ring
- 9 O-ring

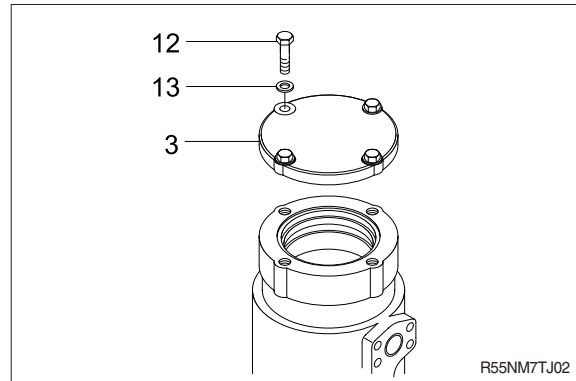
- 10 Plug
- 11 Plug
- 12 Hexagon bolt
- 13 Spring washer

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## 2) DISASSEMBLY

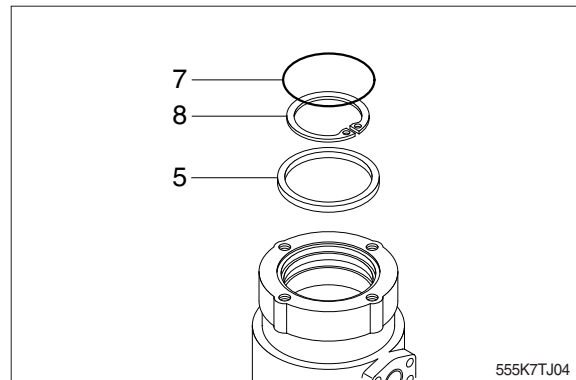
※ Before the disassembly, clean the turning joint.

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



- (2) Remove O-ring (7).

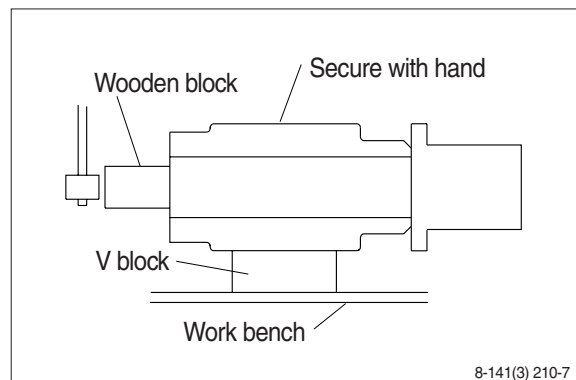
- (3) Remove retainer ring (8) and ring (5).



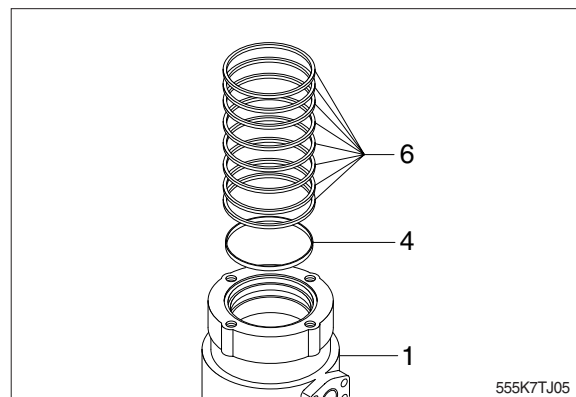
- (4) Place hub (1) on a V-block and by using a wood buffer at the shaft end, hit out shaft (2) to about 1/2 from the body with a hammer.

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

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



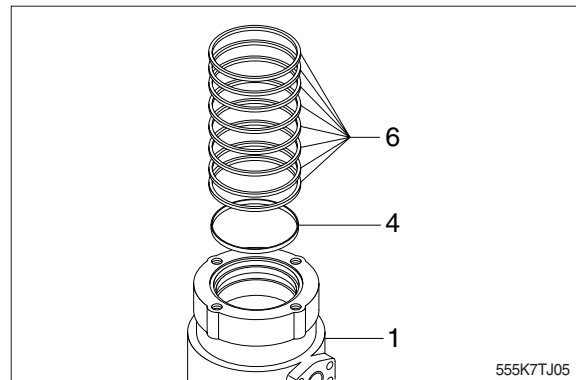
- (5) Remove eight slipper seals (6) and O-ring (4) from hub (1).



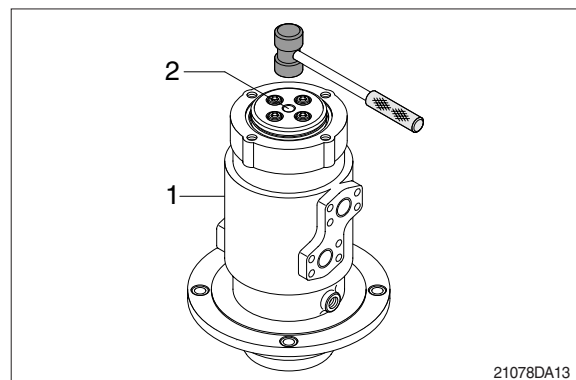
### 3) ASSEMBLY

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

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

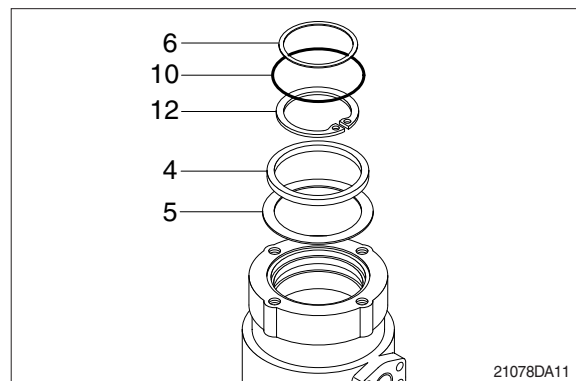


(2) Set shaft (2) on block, tap hub (1) with a plastic hammer to install.



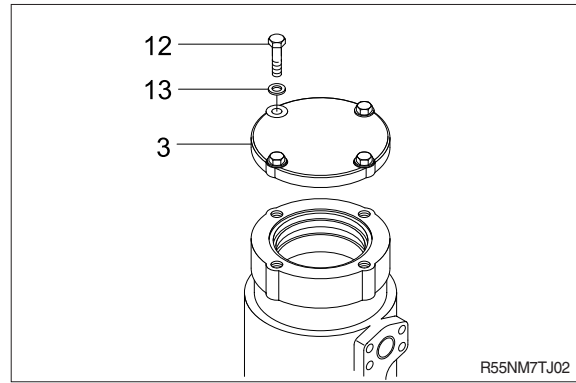
(3) Ring (5) and retainer ring (8) to shaft (2).

(4) Fit O-ring (7) to hub (1).





(5) Install cover (3) to body (1) and tighten bolts (12) with washer (13).



## GROUP 9 BOOM, ARM AND BUCKET CYLINDERS

### 1. REMOVAL AND INSTALL

#### 1) BUCKET CYLINDER

##### (1) Removal

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

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

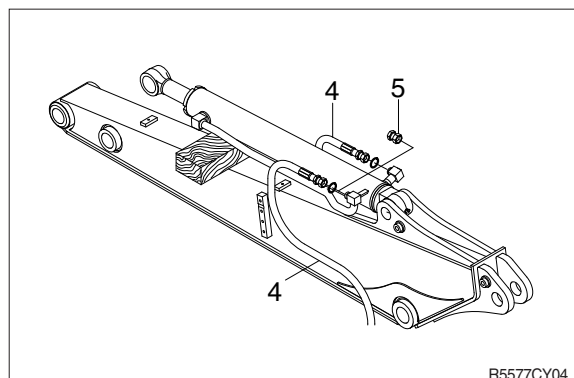
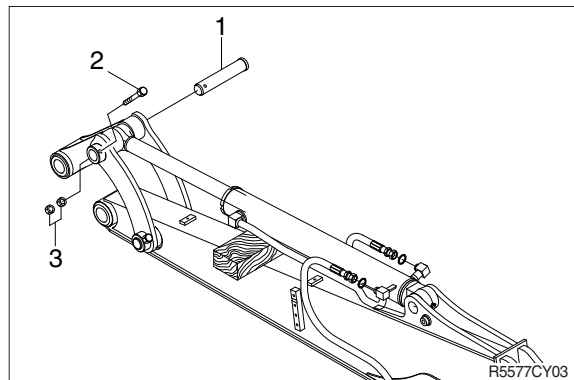
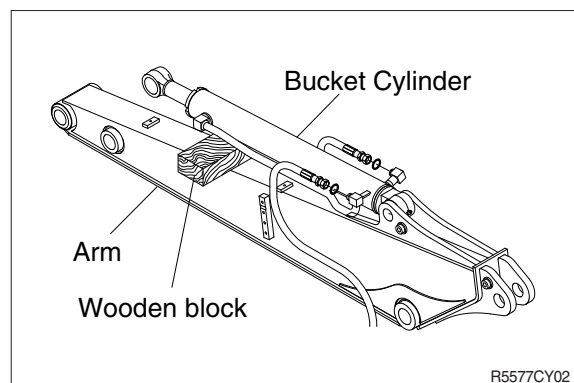
- ※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.

① Set block between bucket cylinder and arm.

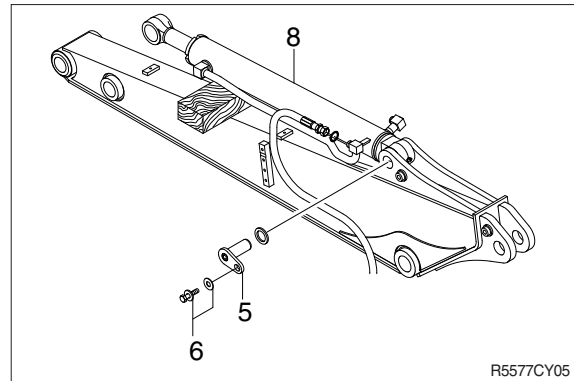
② Remove bolt (2), nut (3) and pull out pin (1).

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

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



- ④ Sling bucket cylinder assembly (8) and remove bolt (6) then pull out pin (5).
- ⑤ Remove bucket cylinder assembly (8).
  - Weight : 60 kg (130 lb)



## (2) Install

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

## 2) ARM CYLINDER

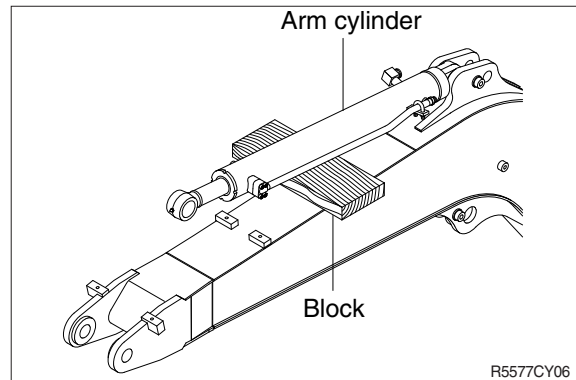
### (1) Removal

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

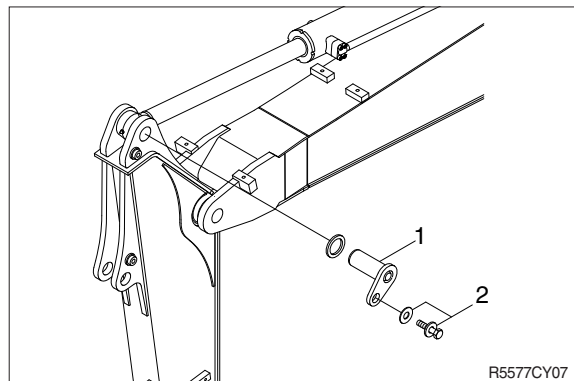
**▲ Loosen the breather slowly to release the pressure inside the hydraulic tank.**

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

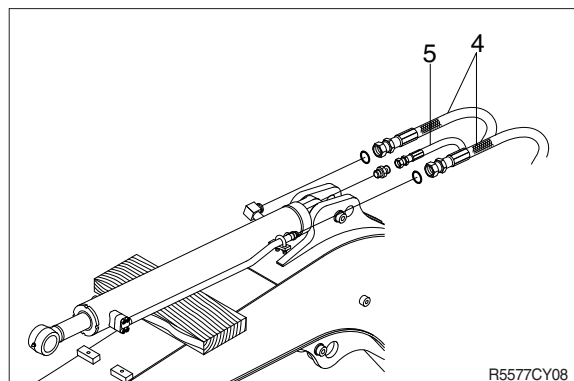
- ※ Fit blind plugs in the hoses after disconnecting them, to prevent dirt or dust from entering.
- ① Set block between arm cylinder and boom.



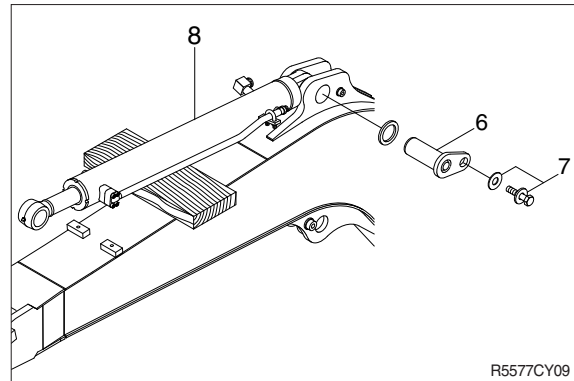
- ② Remove bolt (2) and pull out pin (1).
- ※ Tie the rod with wire to prevent it from coming out.



- ③ Disconnect arm cylinder hoses (4) and put plugs on cylinder pipe.
- ④ Disconnect greasing pipings (5).



- ⑤ Sling arm assembly (8) and remove bolt (7) then pull out pin (6).
- ⑥ Remove arm cylinder assembly (8).
  - Weight : 67 kg (148 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.**
- ② Bleed the air from the arm cylinder.
  - ③ Confirm the hydraulic oil level and check the hydraulic oil leak or not.

### 3) BOOM CYLINDER

#### (1) Removal

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

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

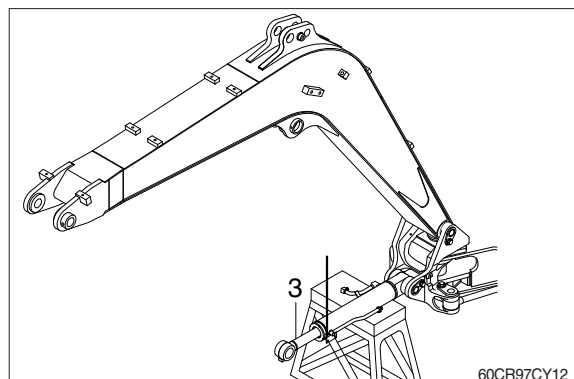
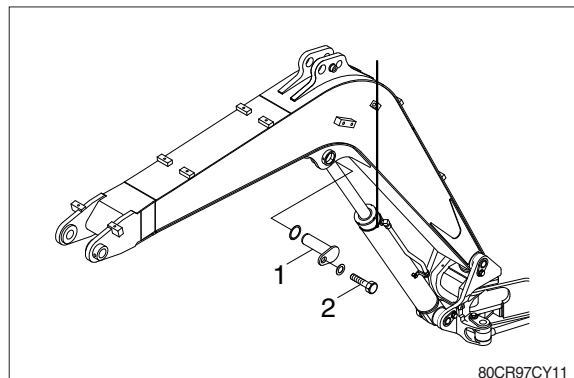
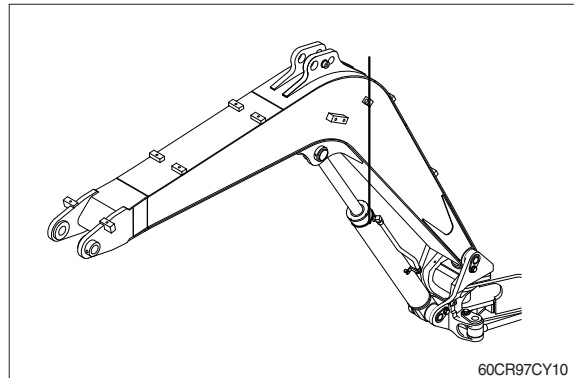
**▲ Escaping fluid under pressure can penetrate the skin causing serious injury.**

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

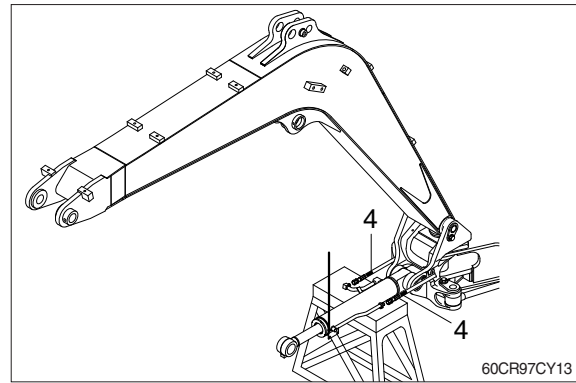
- ① Disconnect greasing hoses.
- ② Sling boom cylinder assembly.

- ③ Remove bolt (2) and pull out pin (1).
- ※ Tie the rod with wire to prevent it from coming out.

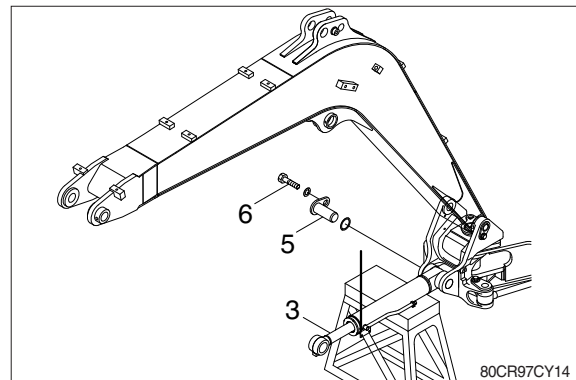
- ④ Lower the boom cylinder assembly (3) on a stand.



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



- ⑥ Remove bolt (6) and pull out pin (5).  
⑦ Remove boom cylinder assembly (3).  
· Weight : 113 kg (249 lb)



## (2) Install

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

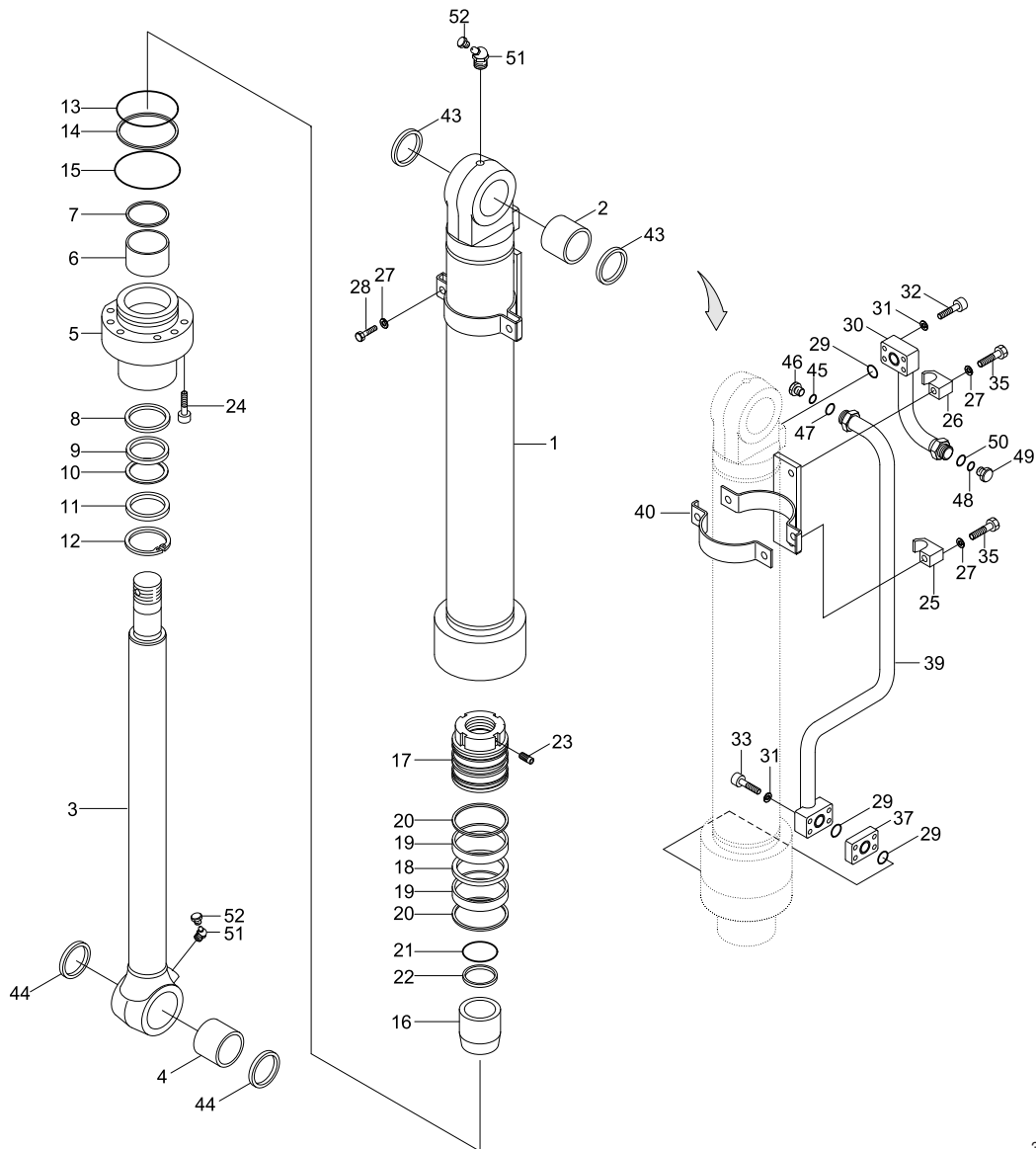
**▲ When aligning the mounting position of the pin, do not insert your fingers in the pin hole.**

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

## 2. DISASSEMBLY AND ASSEMBLY

### 1) STRUCTURE

#### (1) Bucket cylinder

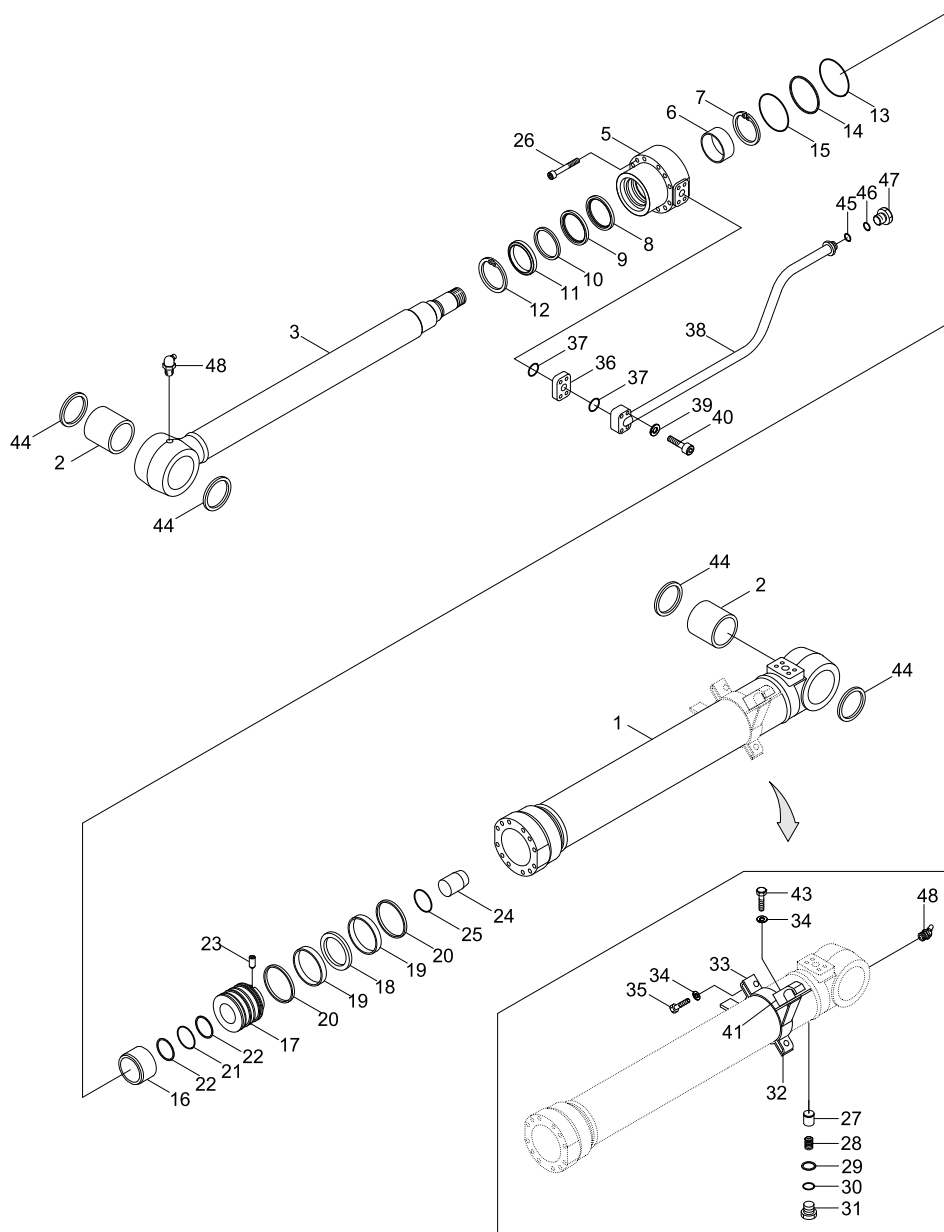


31MQ-50131

- |    |                |    |                     |    |                     |
|----|----------------|----|---------------------|----|---------------------|
| 1  | Tube assembly  | 17 | Piston              | 33 | Hexagon socket bolt |
| 2  | Dimple bushing | 18 | Piston seal         | 35 | Hexagon bolt        |
| 3  | Rod assembly   | 19 | Wear ring           | 37 | Spacer              |
| 4  | Dimple bushing | 20 | Dust ring           | 39 | Pipe assy           |
| 5  | Rod cover      | 21 | O-ring              | 40 | Clamp               |
| 6  | Pin bushing    | 22 | Back up ring        | 43 | Dust seal           |
| 7  | Retainer ring  | 23 | Set screw           | 44 | Pin wiper           |
| 8  | Buffer seal    | 24 | Hexagon socket bolt | 45 | O-ring              |
| 9  | U-packing      | 25 | Band clamp assy     | 46 | Dust cap            |
| 10 | Back up ring   | 26 | Band clamp assy     | 47 | O-ring              |
| 11 | Dust seal      | 27 | Spring washer       | 48 | O-ring              |
| 12 | Retainer ring  | 28 | Hexagon bolt        | 49 | Dust cap            |
| 13 | O-ring         | 29 | O-ring              | 50 | O-ring              |
| 14 | Back up ring   | 30 | Pipe assy           | 51 | Grease nipple       |
| 15 | O-ring         | 31 | Spring washer       | 52 | Cap                 |
| 16 | Cushion ring   | 32 | Hexagon socket bolt |    |                     |



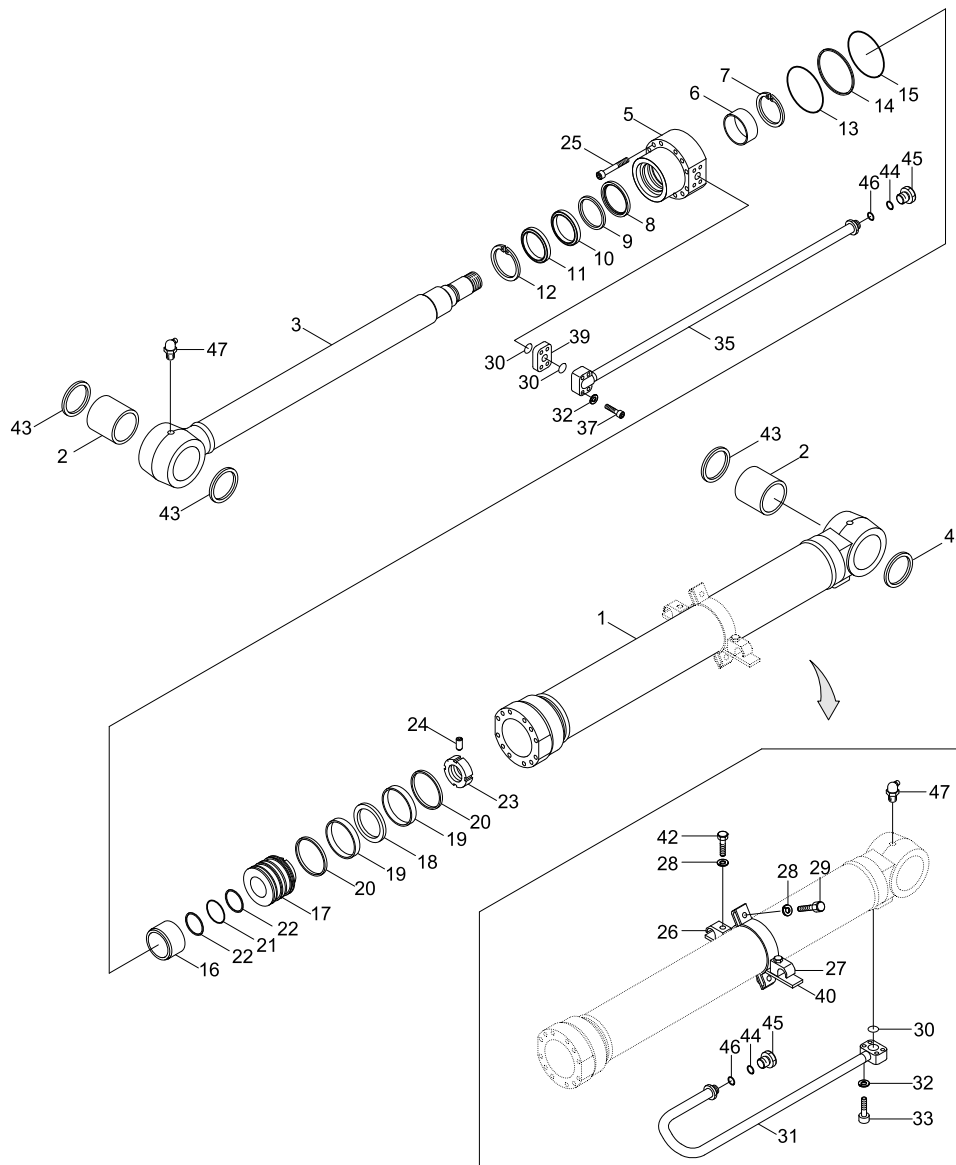
## (2) Arm cylinder



31MQ-50120

- |    |                |    |                     |    |                     |
|----|----------------|----|---------------------|----|---------------------|
| 1  | Tube assembly  | 18 | Piston seal         | 34 | Spring washer       |
| 2  | Dimple bushing | 19 | Wear ring           | 35 | Hexagon bolt        |
| 3  | Rod assembly   | 20 | Dust ring           | 36 | Spacer              |
| 5  | Rod cover      | 21 | O-ring              | 37 | O-ring              |
| 6  | Pin bushing    | 22 | Back up ring        | 38 | Pipe assy           |
| 7  | Retainer ring  | 23 | Set screw           | 39 | Hexagon socket bolt |
| 8  | Buffer seal    | 24 | Cushion plunger     | 40 | Spring washer       |
| 9  | U-packing      | 25 | Stop ring           | 41 | Clamp               |
| 10 | Back up ring   | 26 | Hexagon socket bolt | 43 | Hexagon bolt        |
| 11 | Wiper ring     | 27 | Check valve         | 44 | Dust seal           |
| 12 | Retainer ring  | 28 | Spring              | 45 | O-ring              |
| 13 | O-ring         | 29 | Spring support      | 46 | O-ring              |
| 14 | Back up ring   | 30 | O-ring              | 47 | Dust cap            |
| 15 | O-ring         | 31 | Plug                | 48 | Cap                 |
| 16 | Cushion ring   | 32 | Band clamp assy     |    |                     |
| 17 | Piston         | 33 | Band clamp          |    |                     |

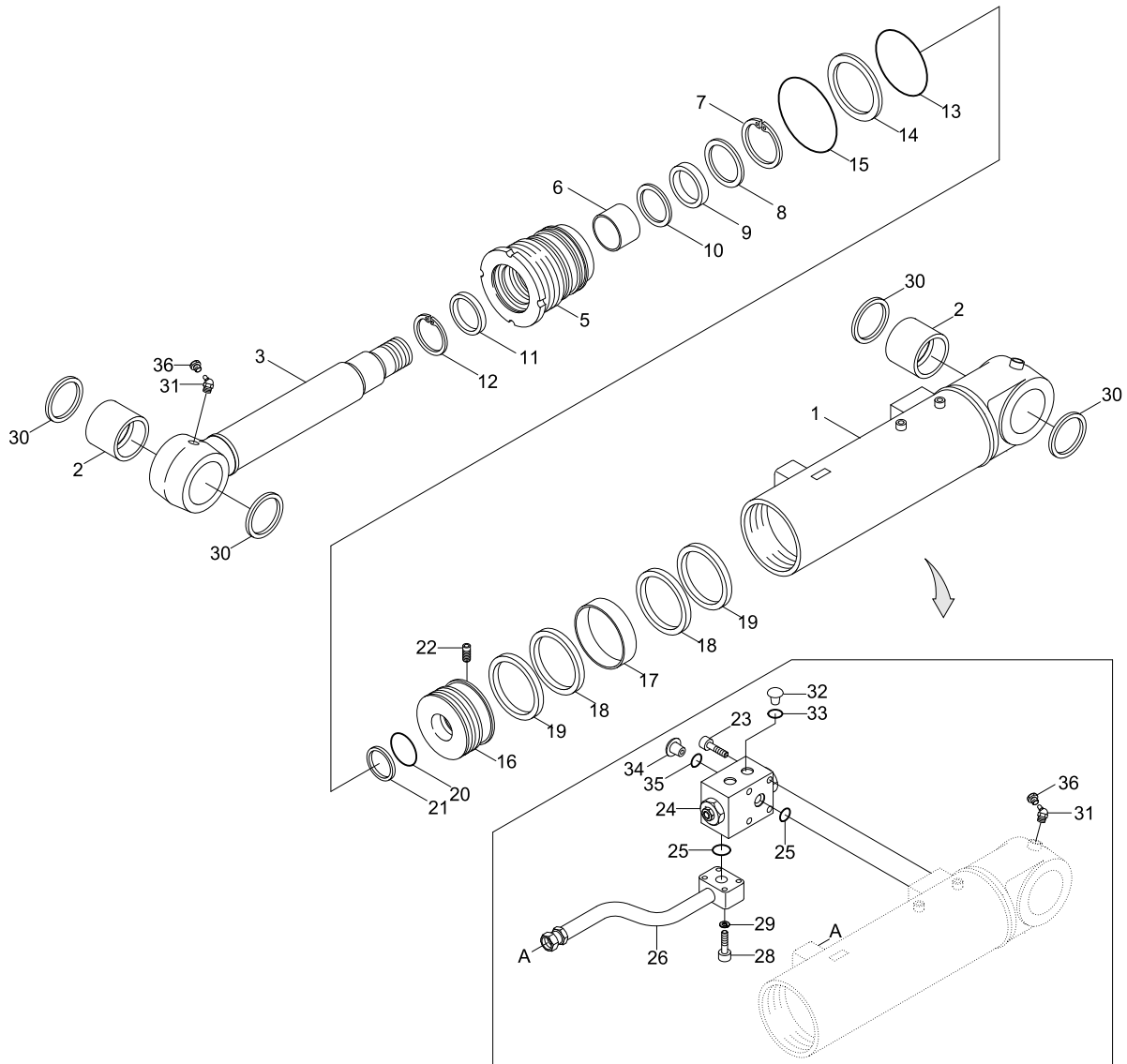
### (3) Boom cylinder



31MQ-50110

- |    |                |    |                     |    |                     |
|----|----------------|----|---------------------|----|---------------------|
| 1  | Tube assembly  | 16 | Cushion ring        | 30 | O-ring              |
| 2  | Dimple bushing | 17 | Piston              | 31 | Pipe assy           |
| 3  | Rod assembly   | 18 | Piston seal         | 32 | Spring washer       |
| 5  | Rod cover      | 19 | Wear ring           | 33 | Hexagon socket bolt |
| 6  | Rod bushing    | 20 | Dust ring           | 35 | Pipe assy           |
| 7  | Retainer ring  | 21 | O-ring              | 37 | Hexagon socket bolt |
| 8  | Buffer seal    | 22 | Back up ring        | 39 | Spacer              |
| 9  | U-packing      | 23 | Nut                 | 40 | Clamp               |
| 10 | Back up ring   | 24 | Set bolt            | 42 | Hexagon bolt        |
| 11 | Wiper ring     | 25 | Hexagon socket bolt | 43 | Dust wiper          |
| 12 | Retainer ring  | 26 | Band clamp assy     | 44 | O-ring              |
| 13 | O-ring         | 27 | Band clamp assy     | 45 | Dust cap            |
| 14 | Back up ring   | 28 | Spring washer       | 46 | O-ring              |
| 15 | O-ring         | 29 | Hexagon bolt        | 47 | Cap                 |

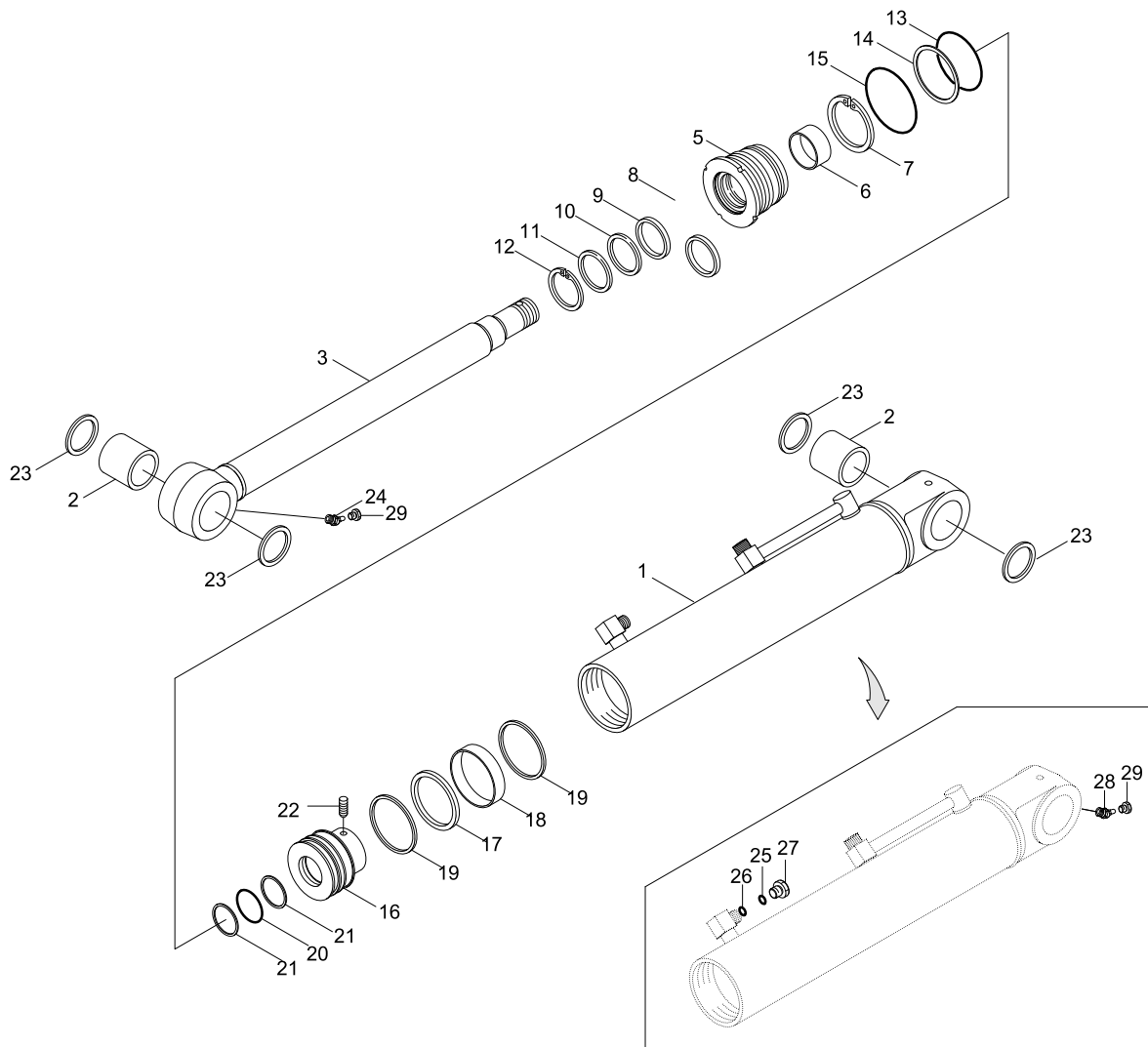
#### (4) Dozer cylinder



31MQ-40120

- |    |               |    |              |    |                     |
|----|---------------|----|--------------|----|---------------------|
| 1  | Tube assembly | 13 | O-ring       | 25 | O-ring              |
| 2  | Pin bushing   | 14 | Back up ring | 26 | Pipe assy           |
| 3  | Rod assembly  | 15 | O-ring       | 28 | Hexagon socket bolt |
| 5  | Rod cover     | 16 | Piston       | 29 | Spring washer       |
| 6  | Rod bushing   | 17 | Piston seal  | 30 | Dust wiper          |
| 7  | Retainer ring | 18 | Wear ring    | 31 | Grease nipple       |
| 8  | Buffer seal   | 19 | Dust ring    | 32 | Dust cap            |
| 9  | U-packing     | 20 | O-ring       | 33 | O-ring              |
| 10 | Back up ring  | 21 | Back up ring | 34 | Dust cap            |
| 11 | Wiper ring    | 23 | Set screw    | 35 | O-ring              |
| 12 | Retainer ring | 24 | Check valve  | 36 | Cap                 |

## (5) Boom swing cylinder

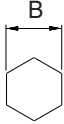


31MQ-11010

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

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

Name	Specification	
Allen wrench	8	
	10	
Spanner	M22	
Hook spanner	Suitable size	
(-) Driver	Small and large sizes	
Torque wrench	Capable of tightening with the specified torques	

### (2) Tightening torque

Part name		Item	Size	Torque	
				kgf · m	lbf · ft
Gland mounting bolt (socket head bolt)	Boom cylinder	25	M16 × 2.0	30 ± 2	217 ± 14.5
	Arm cylinder	26	M14 × 2.0	19 ± 1.0	137 ± 7.2
	Bucket cylinder	24	M14 × 2.0	19 ± 1.0	137 ± 7.2
Gland	Dozer cylinder	5	M135 × 2.0	90 ± 9	651 ± 65.1
	Boom swing cylinder	3	M115 × 2.0	92 ± 9.2	665 ± 66.5
Lock nut	Boom cylinder	23	M50 × 2.0	130 ± 13	940 ± 94
	Dozer cylinder	21	M55 × 2.0	130 ± 13	940 ± 94
Piston	Boom cylinder	17	M60 × 3.0	75 ± 7.5	542 ± 54
	Arm cylinder	17	M52 × 2.0	190 ± 19	1374 ± 137
	Bucket cylinder	17	M45 × 2.0	130 ± 13	940 ± 94.0
	Dozer cylinder	16	M65 × 3.0	75 ± 7.5	542 ± 54
	Boom swing	13	M50 × 2.0	125 ± 12.5	904 ± 90.4

### 3) DISASSEMBLY

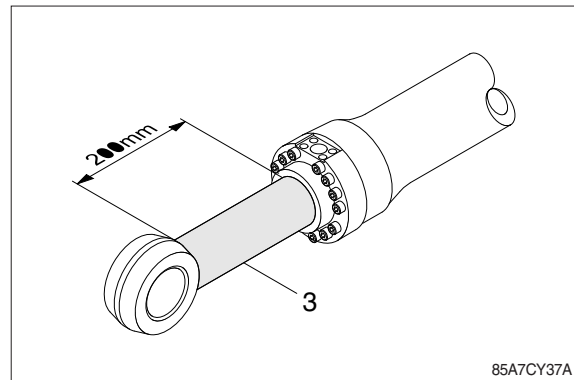
#### (1) Remove cylinder head and piston rod

※ Procedures are based on the bucket cylinder.

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

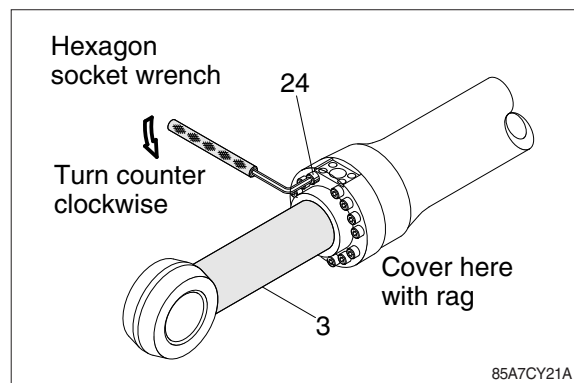
※ Use mouth pieces so as not to damage the machined surface of the cylinder tube. Do not make use of the outside piping as a locking means.

② Pull out rod assembly (3) about 200 mm (7.1 in). Because the rod assembly is rather heavy, finish extending it with air pressure after the oil draining operation.



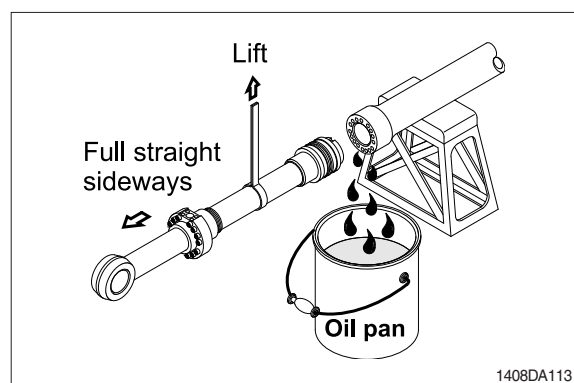
③ Loosen and remove socket bolts (24) of the gland in sequence.

※ Cover the extracted rod assembly (3) with rag to prevent it from being accidentally damaged during operation.



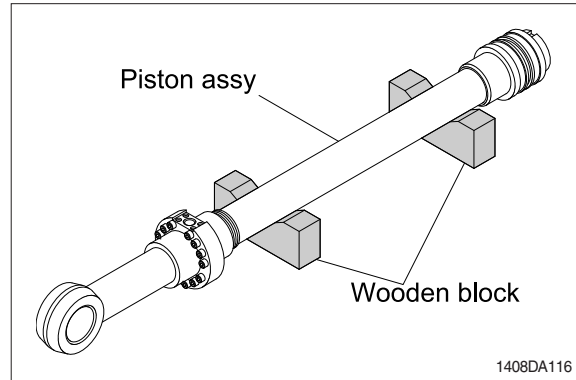
④ Draw out cylinder head and rod assembly together from tube assembly (1).

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



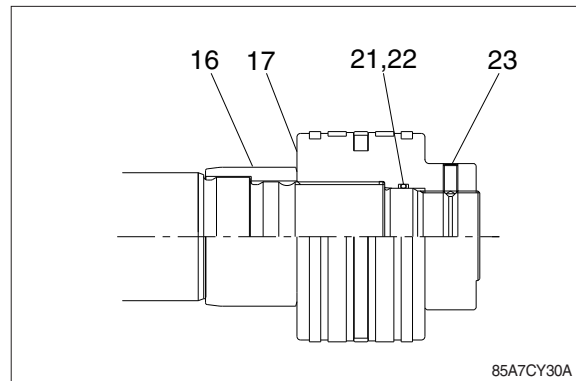
※ Note that the plated surface of rod assembly (3) is to be lifted. For this reason, do not use a wire sling and others that may damage it, but use a strong cloth belt or a rope.

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

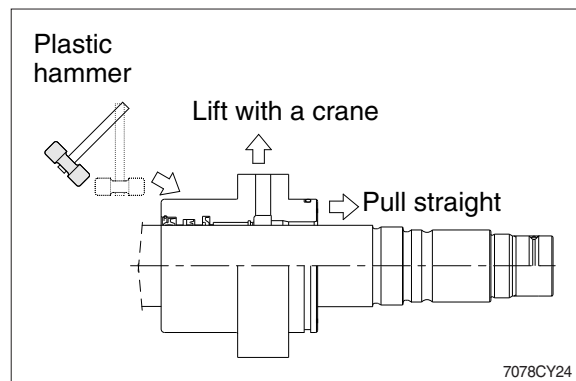


**(2) Remove piston and rod cover**

- ① Remove screw (23).
- ② Remove piston assembly (17), back up ring (22), and O-ring (21).

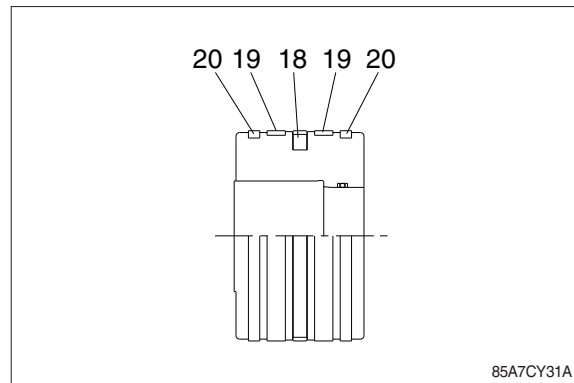


- ③ Remove the cylinder head assembly from rod assembly (3).
- ※ If it is too heavy to move, move it by striking the flanged part of cylinder head with a plastic hammer.
- ※ Pull it straight with cylinder head assembly lifted with a crane. Exercise care so as not to damage the lip of rod bushing (6) and packing (8, 9, 10, 11, 12) by the threads of rod assembly (3).



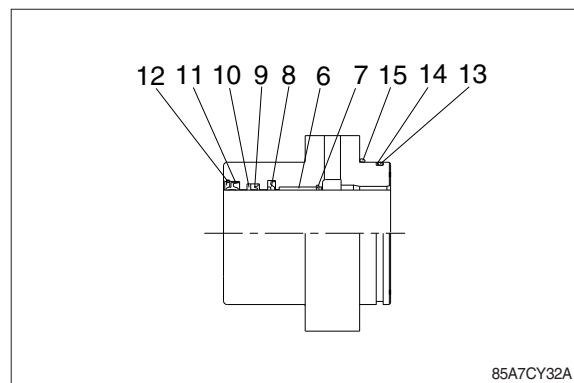
### (3) Disassemble the piston assembly

- ① Remove wear ring (19).
  - ② Remove dust ring (20) and piston seal (18).
- ※ Exercise care in this operation not to damage the grooves.



### (4) Disassemble rod cover assembly

- ① Remove back up ring (14) and O-ring (13, 15).
  - ② Remove retainer ring (12), dust wiper (11).
  - ③ Remove back up ring (10), U-packing (9) and buffer seal (8).
- ※ Exercise care in this operation not to damage the grooves.
- ※ Do not remove seal and ring, if does not damaged.
- ※ Do not remove bushing (6).

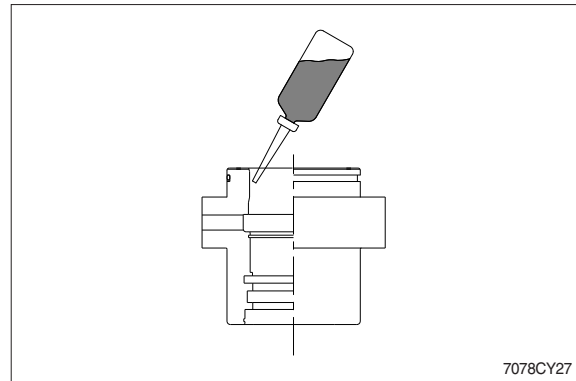




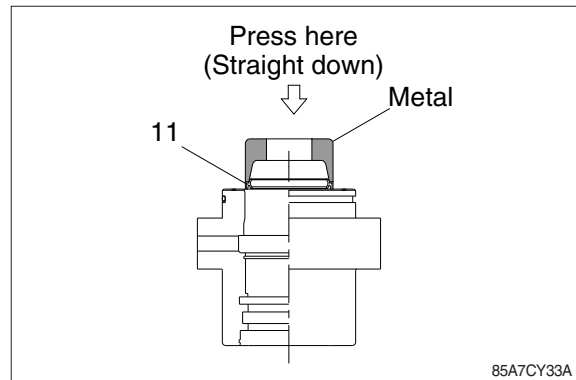
#### 4) ASSEMBLY

##### (1) Assemble rod cover assembly

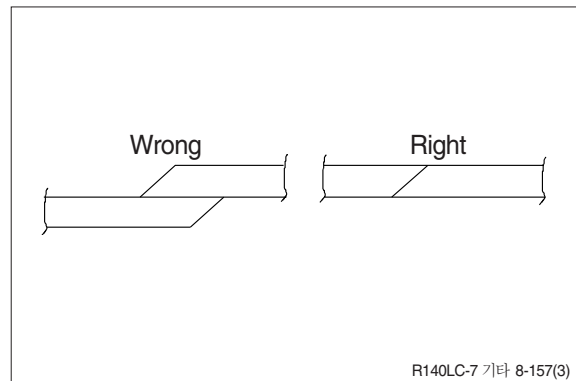
- ※ Check for scratches or rough surfaces if found smooth with an oil stone.
- ① Coat the inner face of rod cover (5) with hydraulic oil.



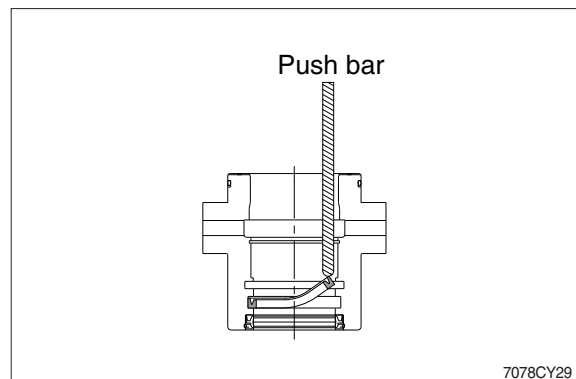
- ② Coat dust wiper (11) with grease and fit dust wiper (11) to the bottom of the hole of dust seal.
- ③ At this time, press a pad metal to the metal ring of dust seal.  
Fit retainer ring (12) to the stop face.



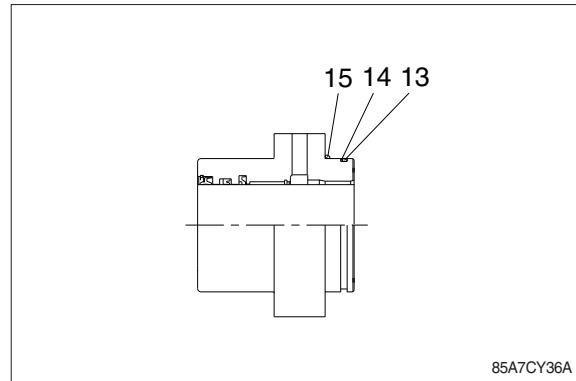
- ④ Fit back up ring (10), U-packing (9) and buffer seal (8) to corresponding grooves, in that order.
- ※ Coat each packing with hydraulic oil before fitting it.
- ※ Insert the backup ring until one side of it is inserted into groove.



- ※ U-packing (9) has its own fitting direction. Therefore, confirm it before fitting them.
- ※ Fitting U-packing (9) upside down may damage its lip. Therefore check the correct direction that is shown in fig.

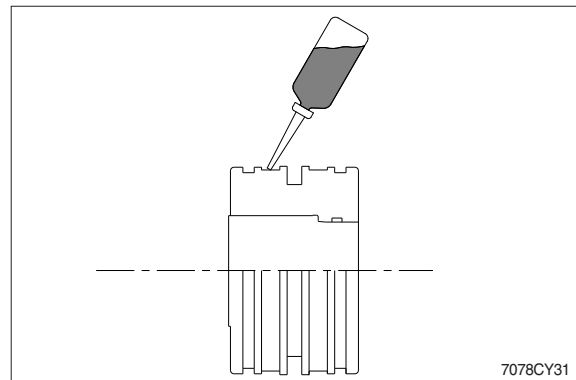


- ⑤ Fit back up ring (14) to rod cover (5).
- ※ Put the backup ring in the warm water of 30~50°C.
- ⑥ Fit O-ring (13, 15) to rod cover (5).

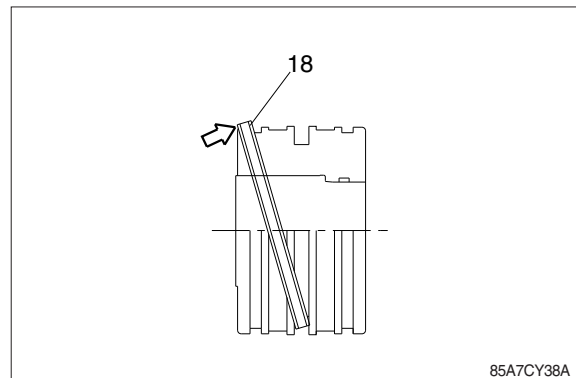


## (2) Assemble piston assembly

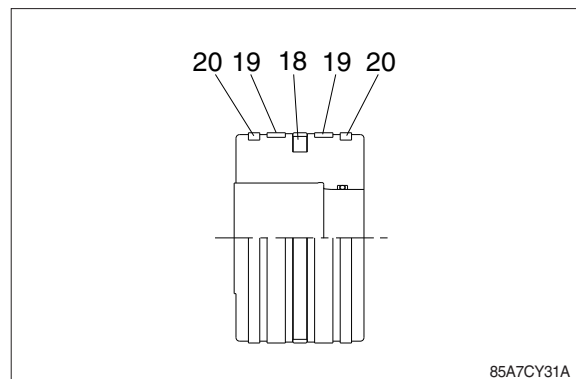
- ※ Check for scratches or rough surfaces. If found smooth with an oil stone.
- ① Coat the outer face of piston (17) with hydraulic oil.



- ② Fit piston seal (18) 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.

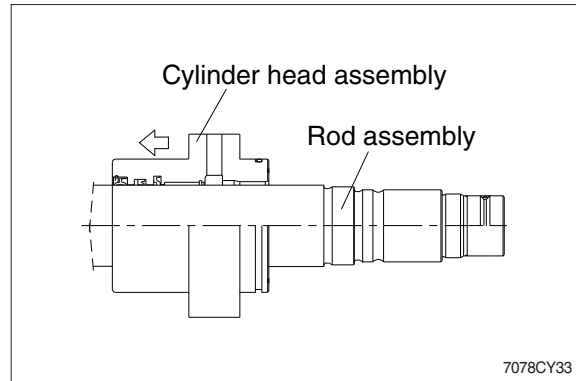


- ③ Fit wear ring (19) and dust ring (20) to piston (17).

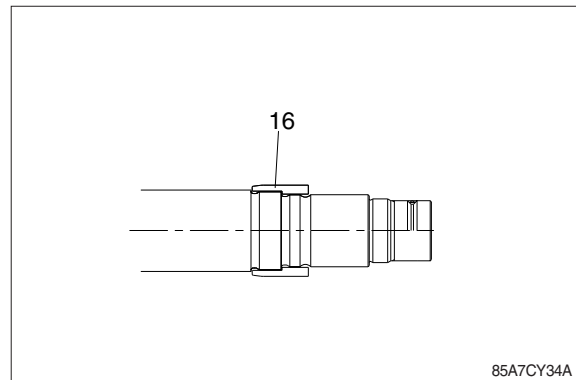


**(3) Install piston and cylinder head**

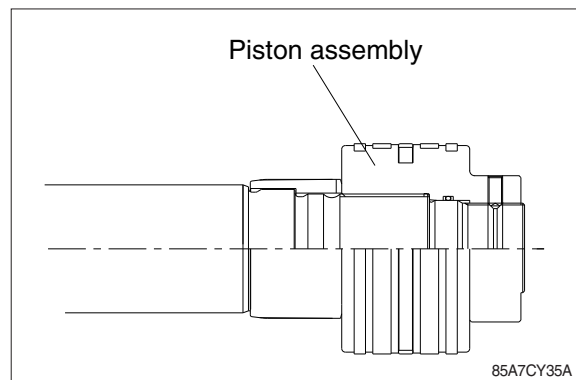
- ① Fix the rod assembly to the work bench.
- ② Apply hydraulic oil to the outer surface of rod assembly (3), the inner surface of piston and cylinder head.
- ③ Insert cylinder head assembly to rod assembly.



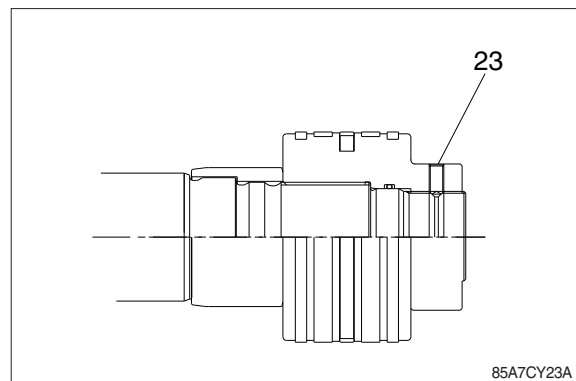
- ④ Insert cushion ring (16) to rod assembly.
- ※ Note that cushion ring (16) has a direction in which it should be fitted.



- ⑤ Fit piston assembly to rod assembly.
- Tightening torque :  $130 \pm 113$  kgf · m  
( $940 \pm 94$  lbf · ft)
- ※ Refer to page 7-124.

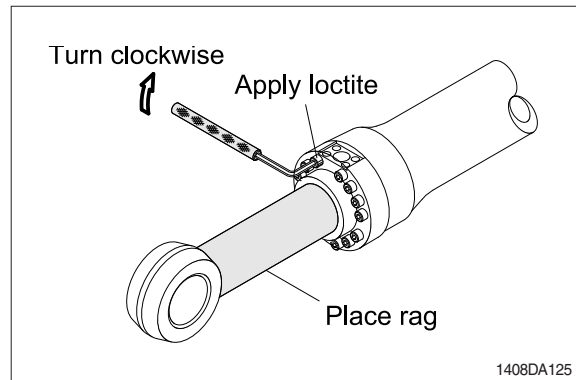
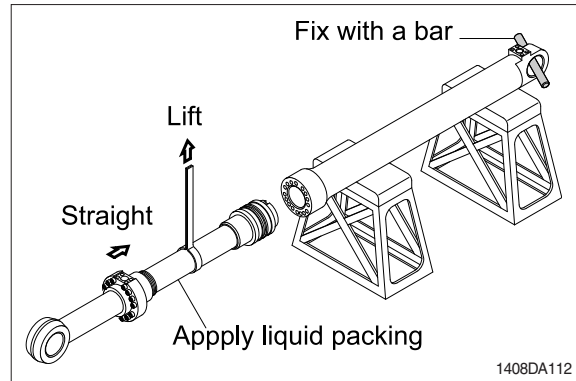


- ⑥ Fit screw (23).
- Tightening torque :  $1.5$  kgf · m  
( $10.8$  lbf · ft)
- ※ Refer to page 7-124.



### (3) Overall assemble

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

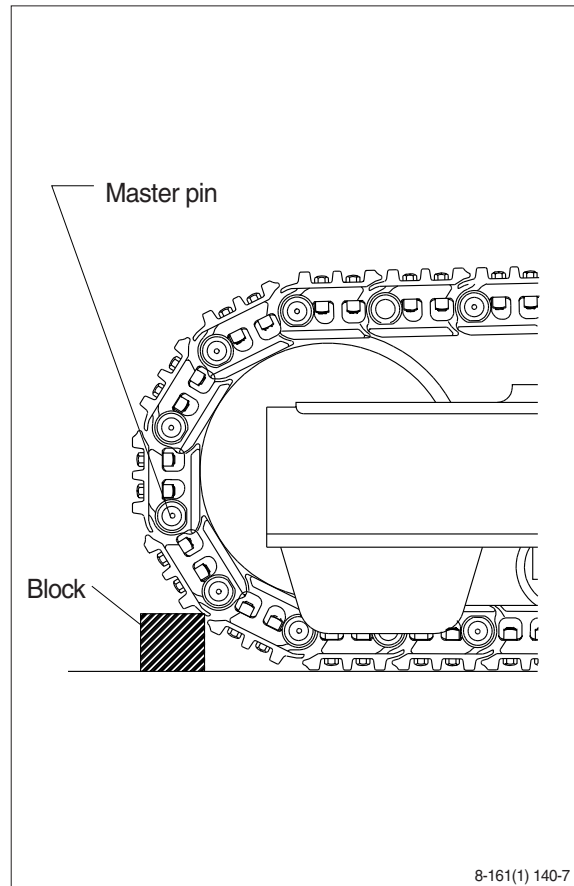


## GROUP 10 UNDERCARRIAGE

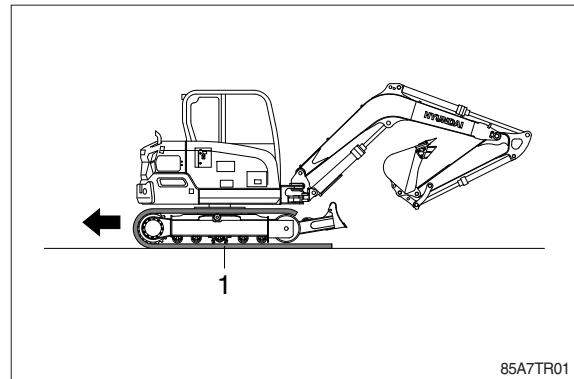
### 1. TRACK LINK

#### 1) REMOVAL

- (1) Move track link until master pin is over front idler in the position put wooden block as shown.
- (2) Loosen tension of the track link.
  - ※ If track tension is not relieved when the grease valve is loosened, move the machine backwards and forwards.
  - ※ Unscrew the grease nipple after release the tension by pushing the poppet only when necessarily required.  
Grease leaking hole is not existing. So, while unscrew the grease nipple, grease is not leaking until the grease nipple is completely coming out. If the tension is not released in advance, the grease nipple can be suddenly popped out by pressurized grease.
- (3) Push out master pin by using a suitable tool.

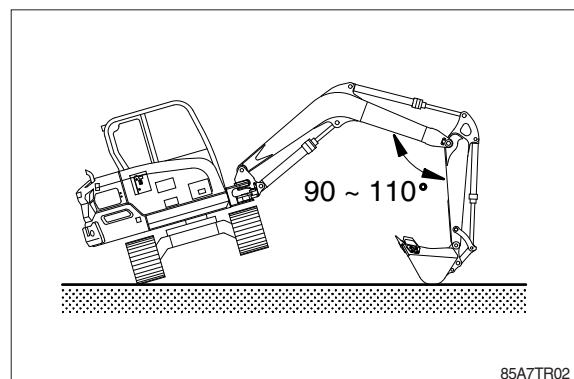


- (4) Move the machine slowly in reverse, and lay out track link assembly (1).
  - ※ Jack up the machine and put wooden block under the machine.
  - ※ Don't get close to the sprocket side as the track shoe plate may fall down on your feet.



#### 2) INSTALL

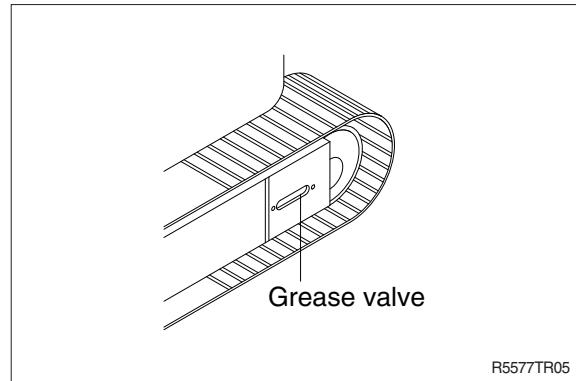
- (1) Carry out installation in the reverse order to removal.
  - ※ Adjust the tension of the track link.



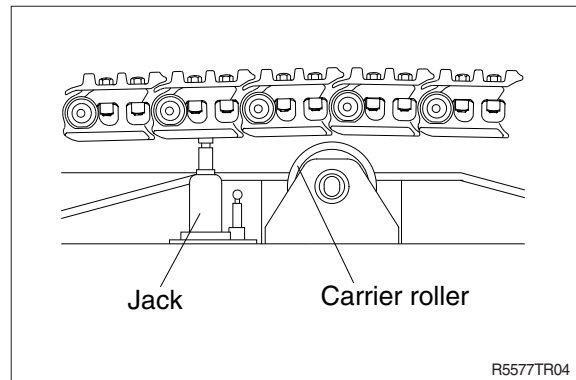
## 2. CARRIER ROLLER

### 1) REMOVAL

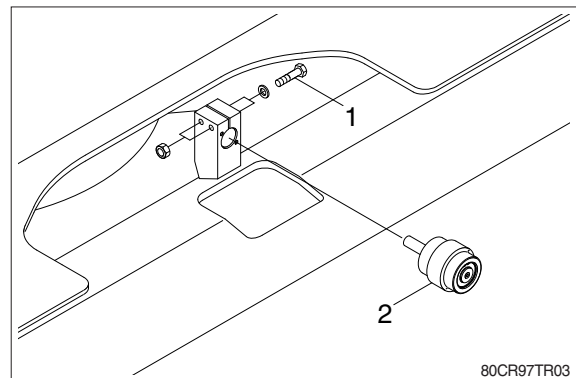
- (1) Loosen tension of the track link.



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



- (3) Remove bolt (1) at both side.
- (4) Remove carrier roller (2).
  - Weight : 7 kg (15.4 lb)



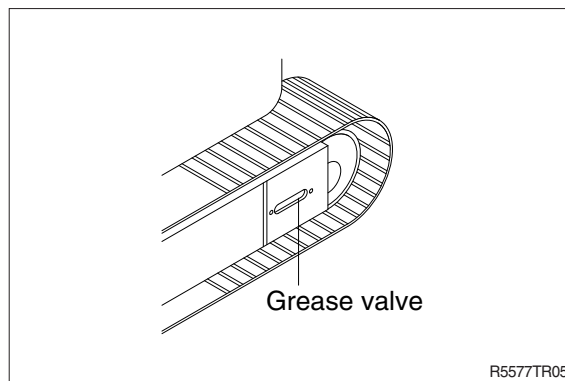
### 2) INSTALL

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

### 3. TRACK ROLLER

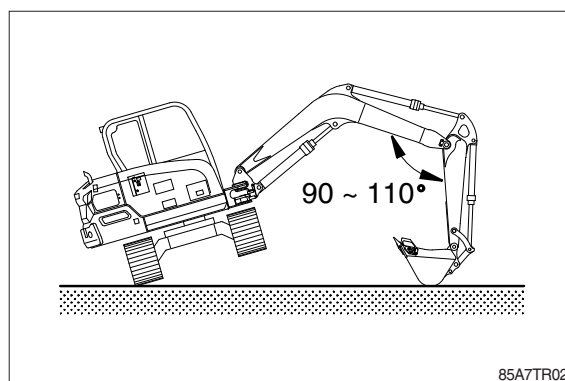
#### 1) REMOVAL

- (1) Loosen tension of the track link.



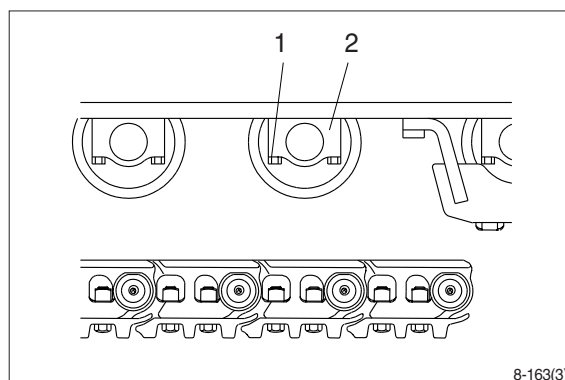
- (2) Using the work equipment, push up track frame on side which is to be removed.

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



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

· Weight : 16 kg (36 lb)



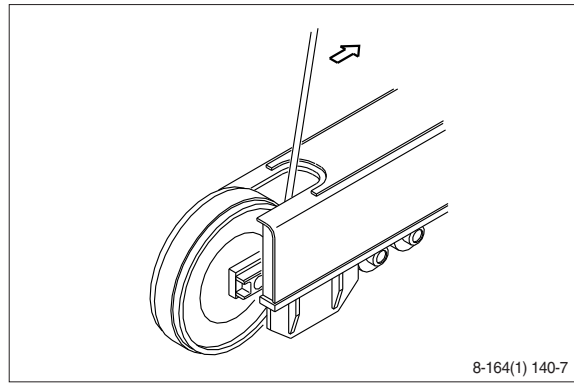
#### 2) INSTALL

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

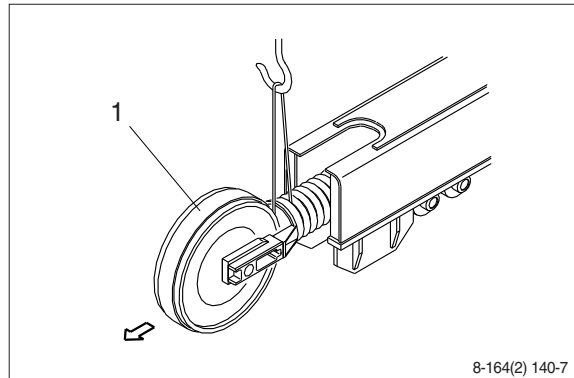
## 4. IDLER AND RECOIL SPRING

### 1) REMOVAL

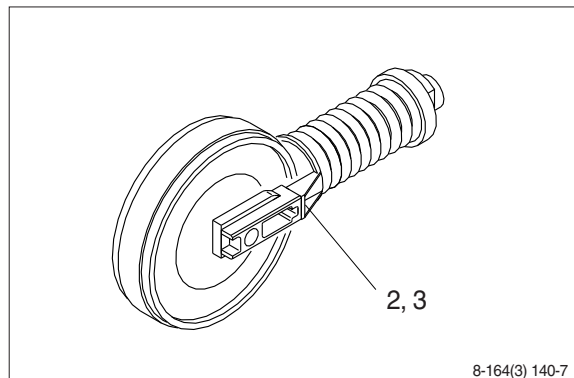
- (1) Remove the track link.  
For detail, see removal of track link.



- (2) Sling the recoil spring (1) and pull out idler and recoil spring assembly from track frame, using a pry.  
· Weight : 123 kg (271 lb)

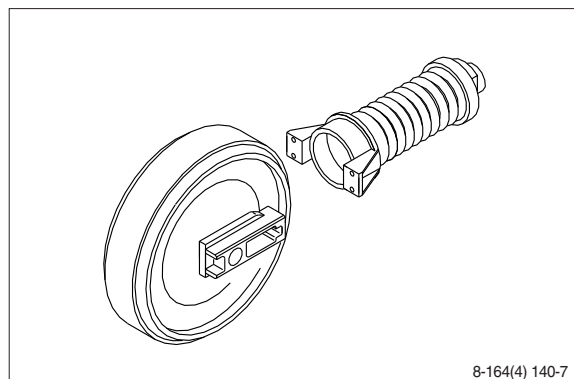


- (3) Remove the bolts (2), washers (3) and separate idler from recoil spring.



### 2) INSTALL

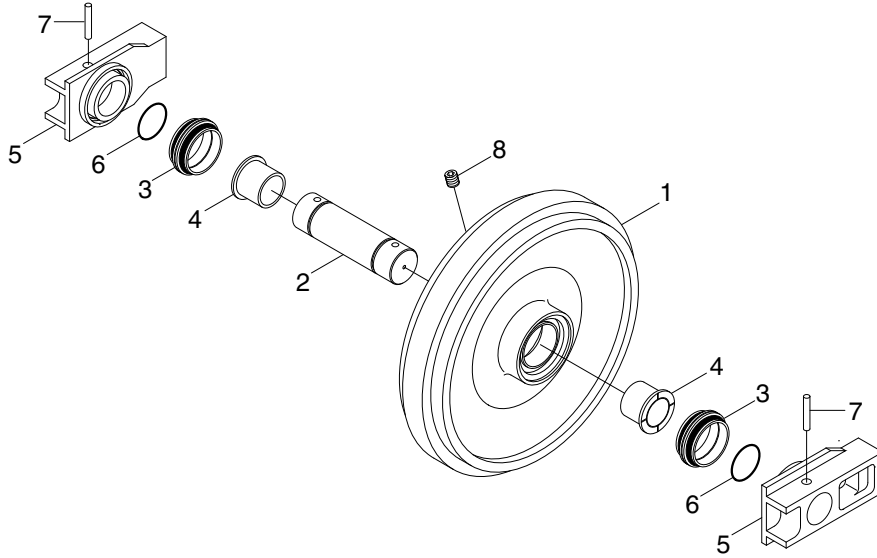
- (1) Carry out installation in the reverse order to removal.  
※ Make sure that the boss on the end face of the recoil cylinder rod is in the hole of the track frame.





### 3) DISASSEMBLY AND ASSEMBLY OF IDLER

#### (1) Structure

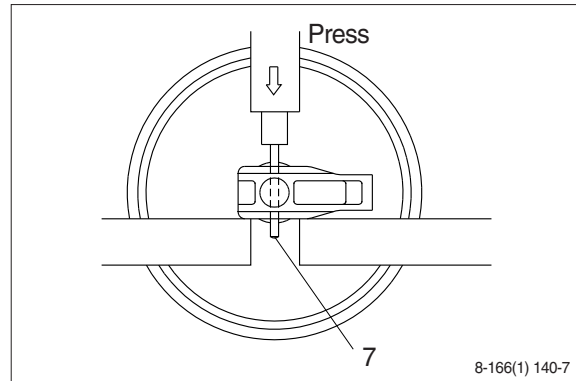


80CR97ID30

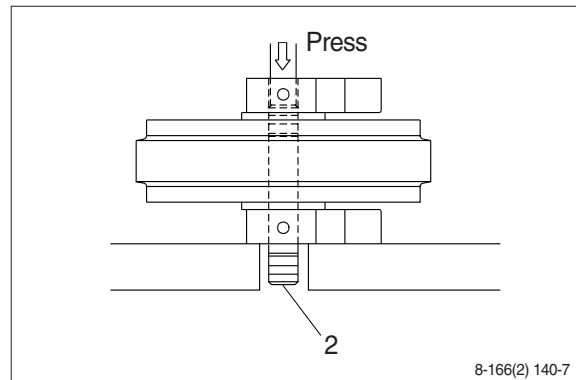
- |   |               |   |         |   |            |
|---|---------------|---|---------|---|------------|
| 1 | Shell         | 4 | Bushing | 7 | Spring pin |
| 2 | Shaft         | 5 | Bracket | 8 | Plug       |
| 3 | Seal assembly | 6 | O-ring  |   |            |

**(2) Disassembly**

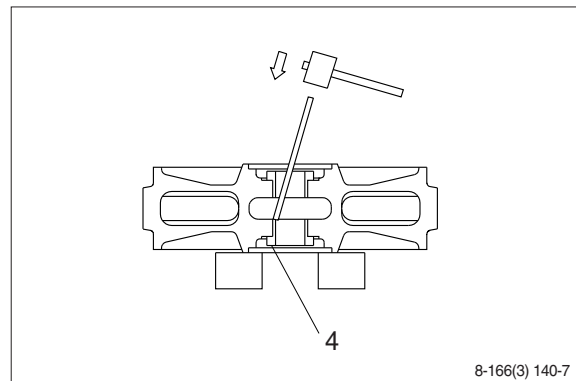
- ① Remove plug and drain oil.
- ② Draw out the spring pin (7), using a press.



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



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

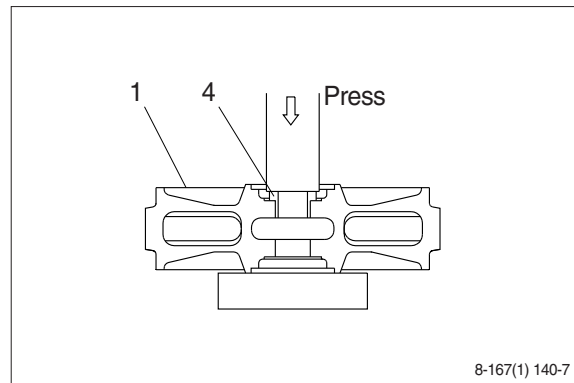


### (3) Assembly

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

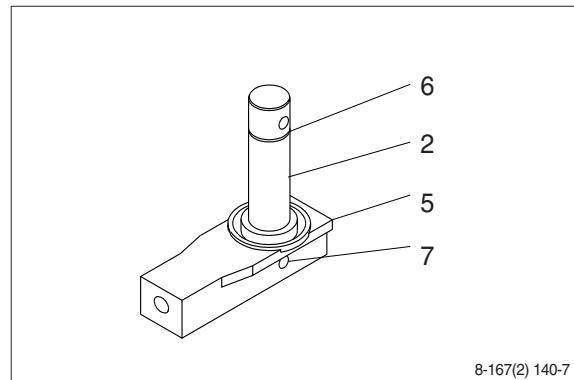
① Cool up bushing (4) fully by some dry ice and press it into shell (1).

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

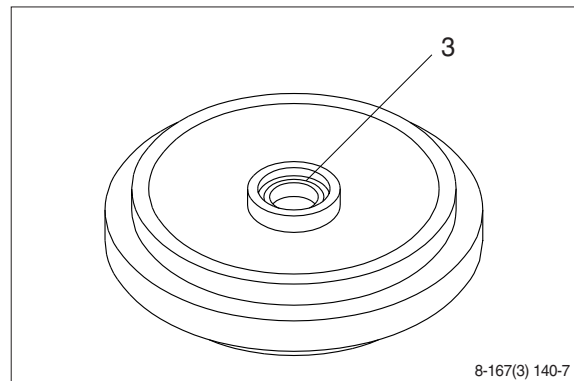


② Coat O-ring (6) with grease thinly, and install it to shaft (2).

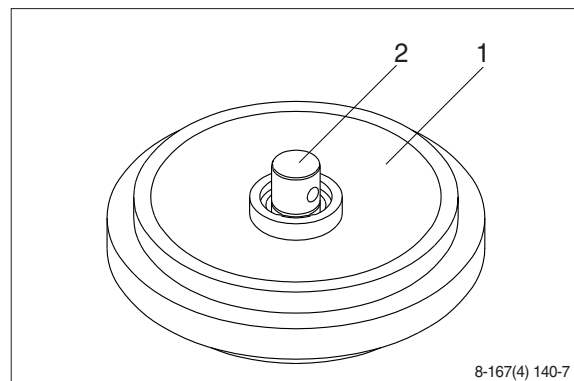
③ Insert shaft (2) into bracket (5) and drive in the spring pin (7).



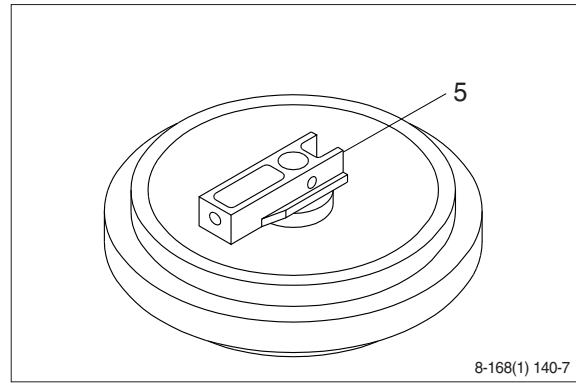
④ Install seal (3) to shell (1) and bracket (5).



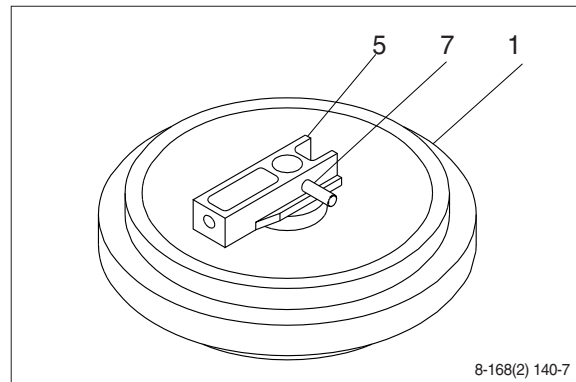
⑤ Install shaft (2) to shell (1).



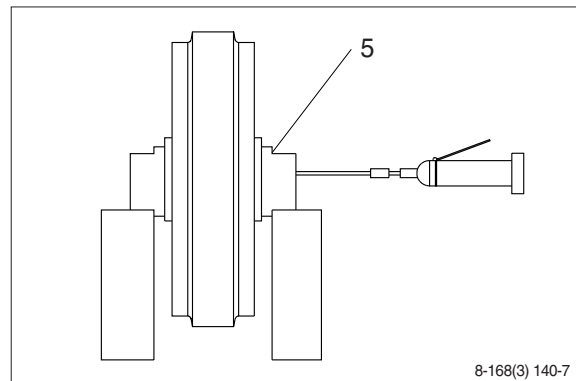
- ⑥ Install bracket (5) attached with seal (3).



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

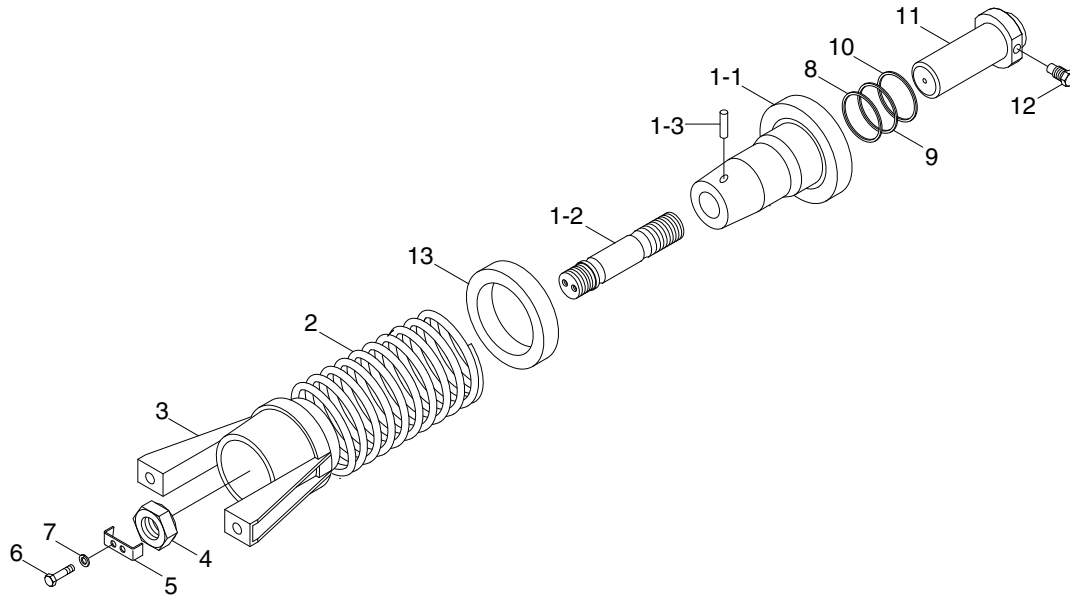


- ⑧ Lay bracket (5) on its side.  
Supply engine oil to the specified level,  
and tighten plug.



#### 4) DISASSEMBLY AND ASSEMBLY OF RECOIL SPRING

##### (1) Structure



80CR97ID31

1-1 Body  
1-2 Tie bar  
1-3 Spring pin  
2 Spring  
3 Bracket

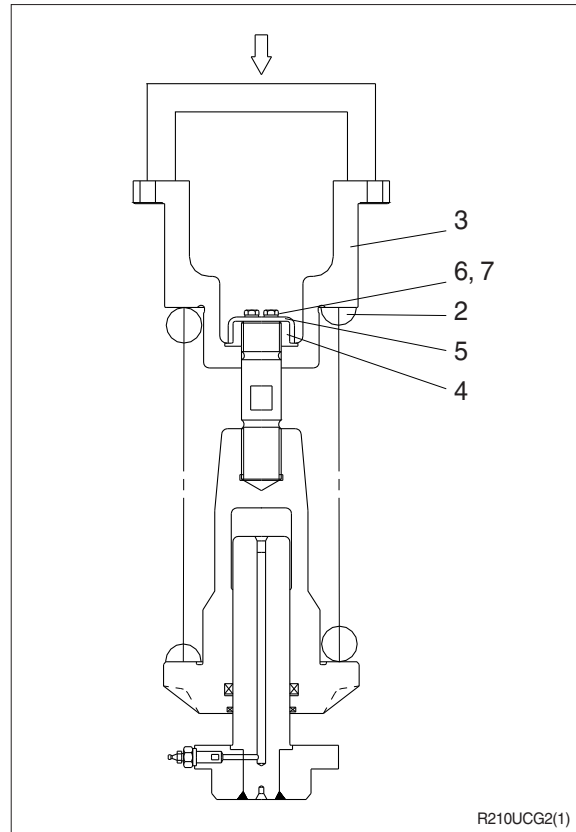
4 Lock nut  
5 Lock plate  
6 Bolt  
7 Spring washer  
8 Rod seal

9 Back up ring  
10 Dust seal  
11 Rod assembly  
12 Grease valve  
13 Spacer

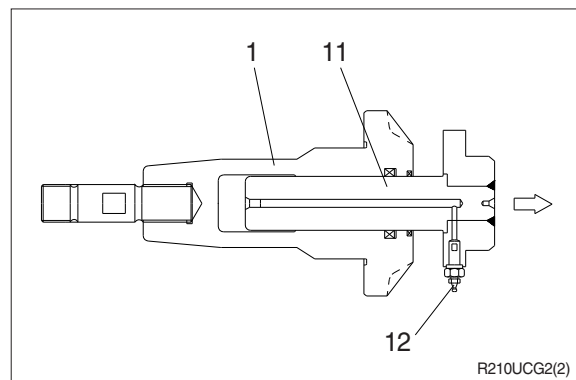
## (2) Disassembly

- ① Apply pressure on spring (2) with a press.
  - ※ The spring is under a large installed load. This is dangerous, so be sure to set properly.
    - Spring set load : 4816 kg (10617 lb)
- ② Remove bolt (6), spring washer (7) and lock plate (5).
- ③ Remove lock nut (4).

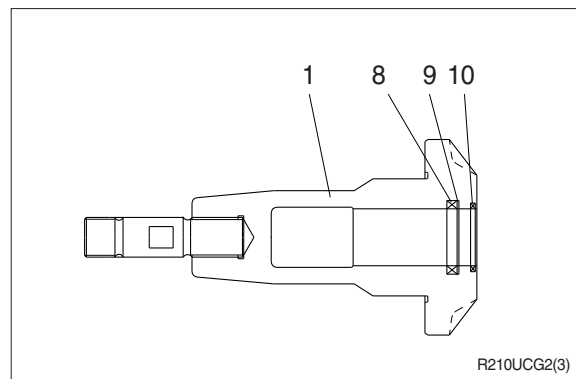
Take enough notice so that the press which pushes down the spring, should not be slipped out in its operation.
- ④ Lighten the press load slowly and remove bracket (3) and spring (2).



- ⑤ Remove rod (11) from body (1-1).
- ⑥ Remove grease valve (12) from rod (11).



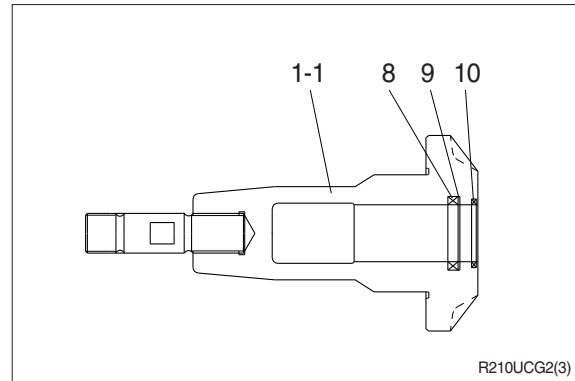
- ⑦ Remove rod seal (8), back up ring (9) and dust seal (10).



### (3) Assembly

① Install dust seal (10), back up ring (9) and rod seal (8) to body (1-1).

※ When installing dust seal (10) and rod seal (8), take full care so as not to damage the lip.



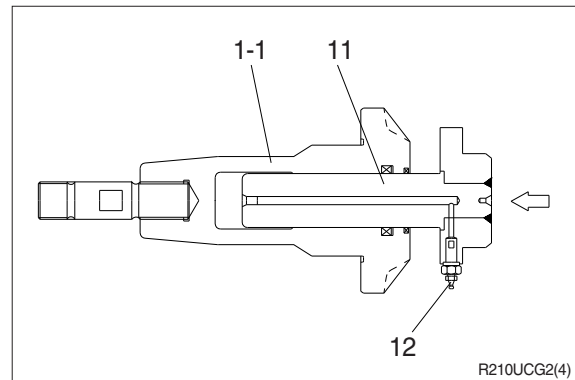
② Pour grease into body (1-1), then push in rod (11) by hand.

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 (11).

· Tightening torque :  $13 \pm 1.0 \text{ kgf} \cdot \text{m}$   
( $94 \pm 7.2 \text{ lbf} \cdot \text{ft}$ )

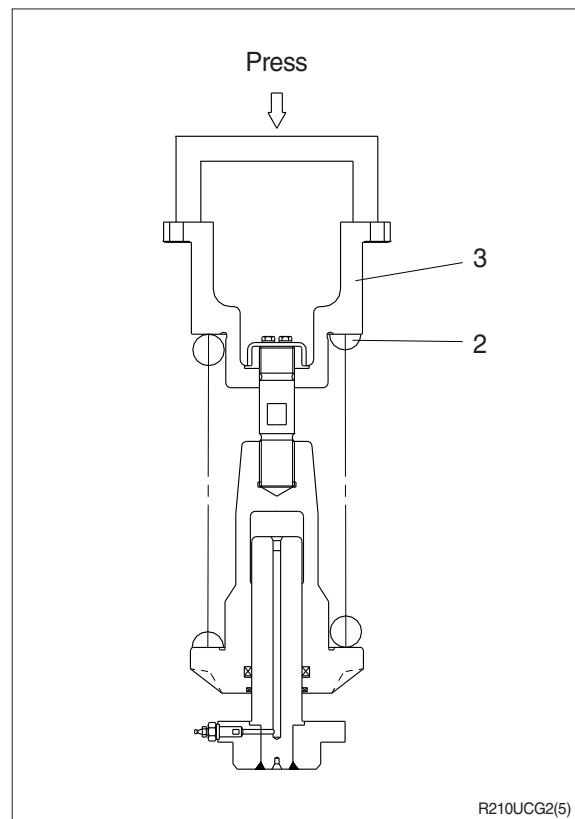


④ Install spring (2) and bracket (3) to body (1-1).

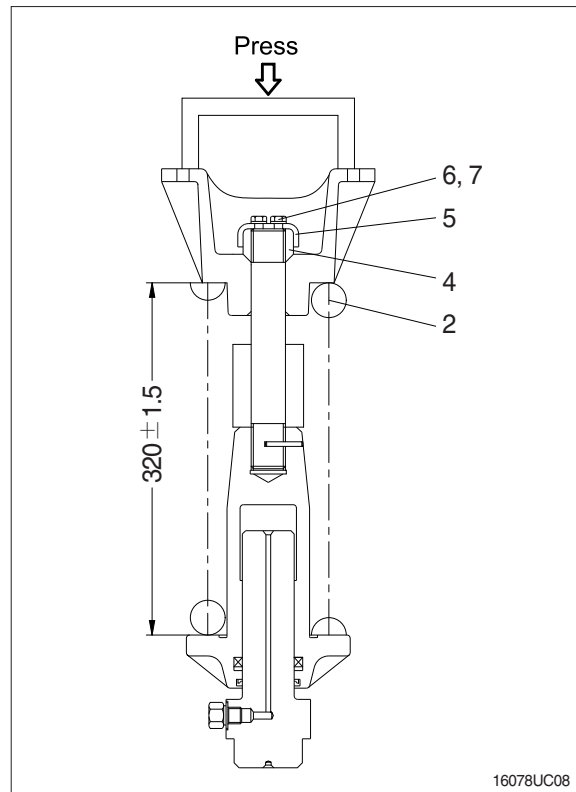
⑤ Apply pressure to spring (2) with a press and tighten lock nut (4).

※ 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 (2).
- ⑦ After the setting of spring (2), install lock plate (5), spring washer (7) and bolt (6).

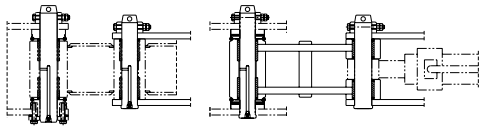
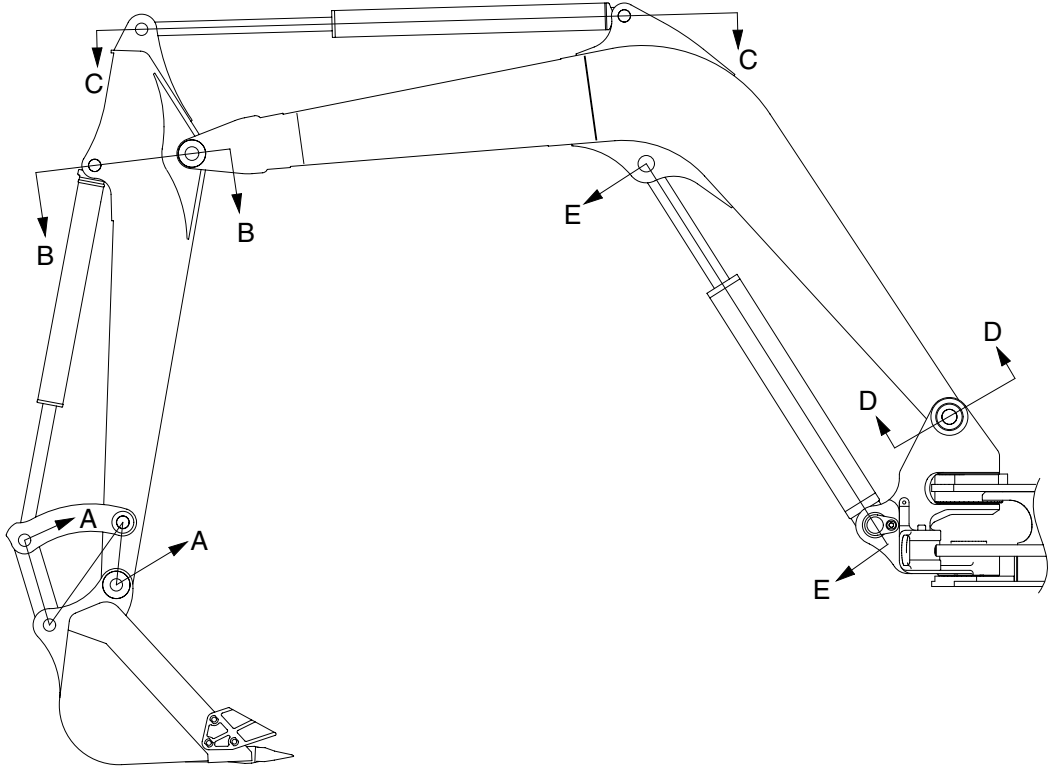


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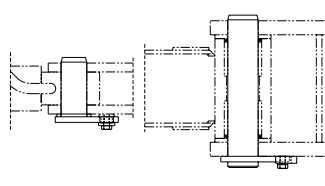


# GROUP 11 WORK EQUIPMENT

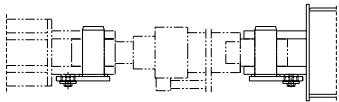
## 1. STRUCTURE



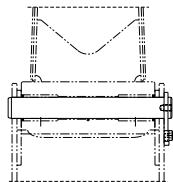
SECTION A-A



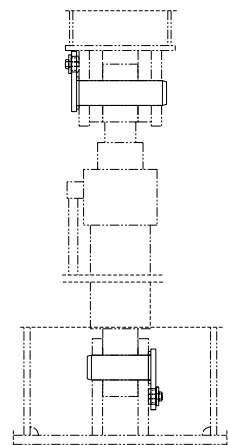
SECTION B-B



SECTION C-C



SECTION D-D



SECTION E-E

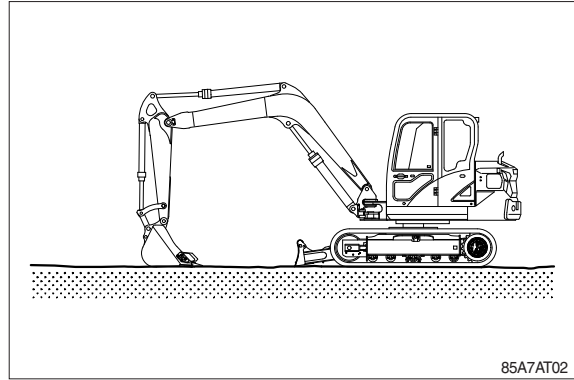
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## 2. REMOVAL AND INSTALL

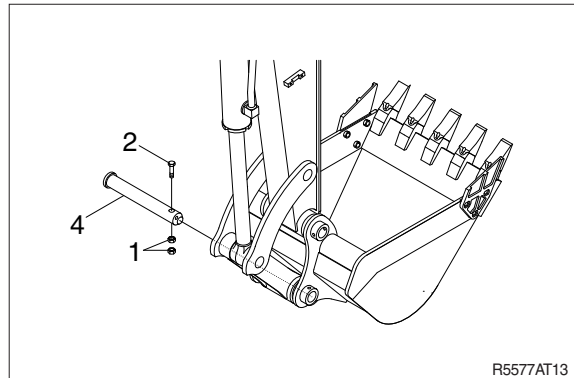
### 1) BUCKET ASSEMBLY

#### (1) Removal

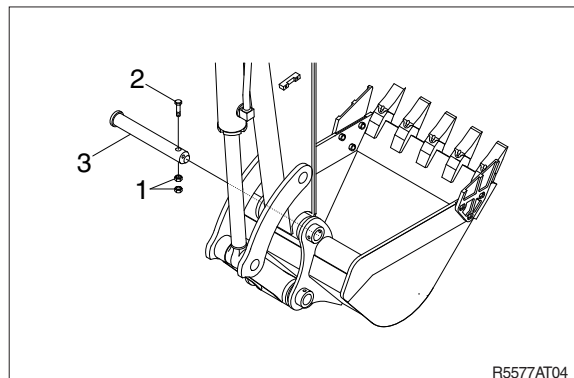
- ① Lower the work equipment completely to ground with back of bucket facing down.



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



- ③ Remove nut (1), bolt (2) and draw out the pin (3) then remove the bucket assembly.  
· Weight : 230 kg (510 lb)

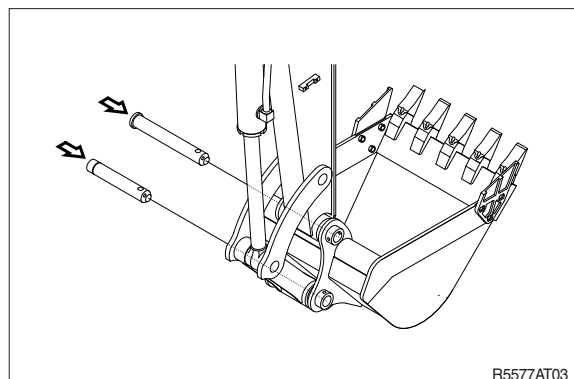


#### (2) Install

- 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.

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



## 2) ARM ASSEMBLY

### (1) Removal

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

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

① Remove bucket assembly.

For details, see removal of bucket assembly.

② Disconnect bucket cylinder hose (4).

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

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

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

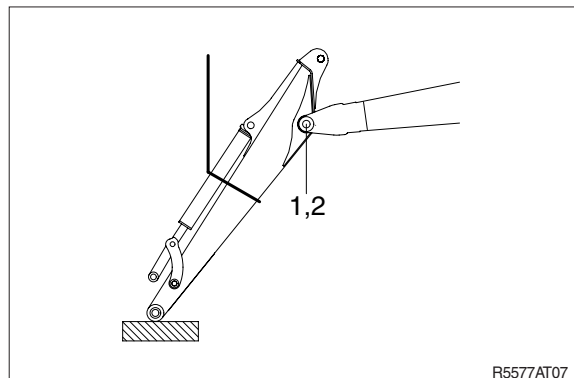
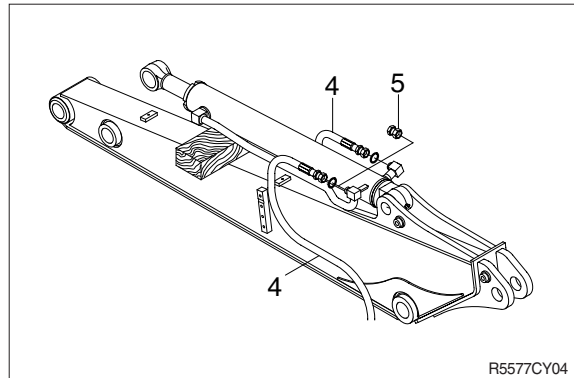
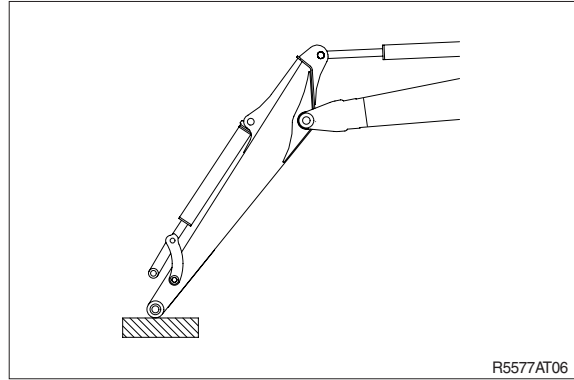
※ For details, see removal of arm cylinder assembly.

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

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

· Weight : 167 kg (368 lb)

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



### (2) Install

① Carry out installation in the reverse order to removal.

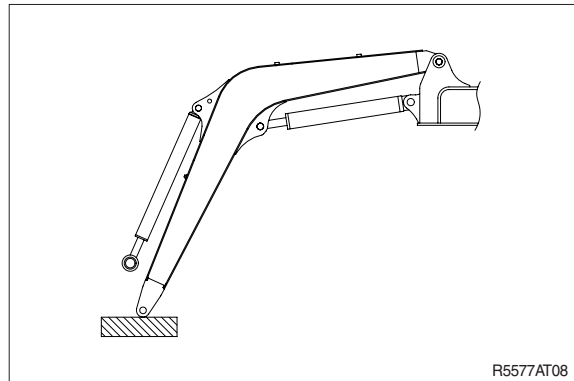
▲ When lifting the arm assembly, always lift the center of gravity.

※ Bleed the air from the cylinder.

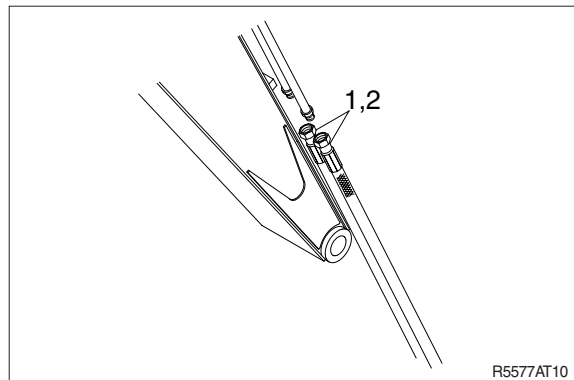
### 3) BOOM CYLINDER

#### (1) Removal

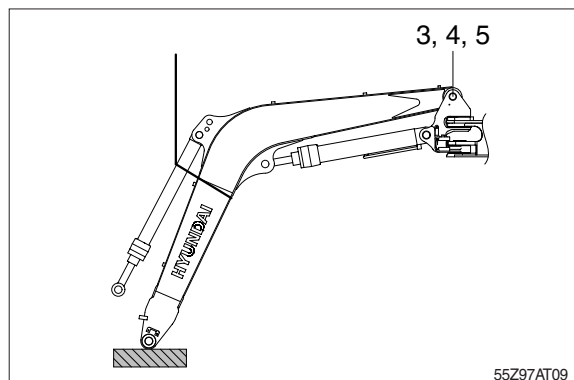
- ① Remove arm and bucket assembly.  
For details, see removal of arm and bucket assembly.
- ② Remove boom cylinder assembly from boom.  
For details, see removal of arm cylinder assembly.



- ③ Disconnect head lamp wiring.
- ④ Disconnect bucket cylinder hose (2) and arm cylinder hose (1).  
※ When the hose are disconnected, oil may spurt out.
- ⑤ Sling boom assembly (3).



- ⑥ Remove bolt (3), nut (4) and pull out the pin (5) then remove boom assembly.  
· Weight : 405 kg (893 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.

