

## GROUP 5 SWING DEVICE(up to #0062)

### 1. REMOVAL AND INSTALL OF MOTOR

#### 1) REMOVAL

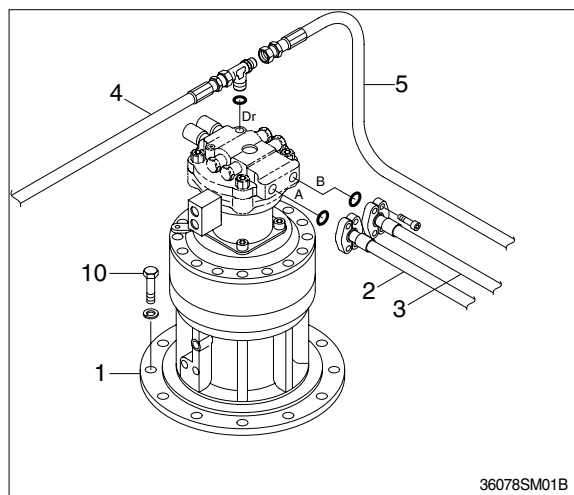
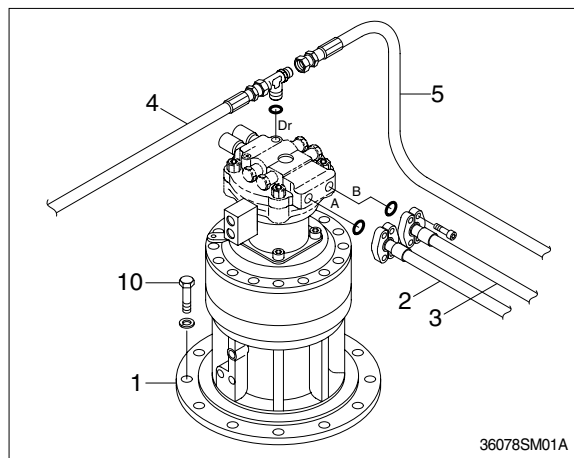
- (1) Lower the work equipment to the ground and stop the engine.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
- ▲ Escaping fluid under pressure can penetrate the skin causing serious injury.
- ※ When pipes and hoses are disconnected, the oil inside the piping will flow out, so catch it in oil pan.
- (4) Disconnect hoses (2, 3, 4, 5, 6, 7, 8, 9).
- (5) Sling the swing motor assembly(1) and remove the swing motor mounting bolts (10).

- Motor device weight : 360kg(794lb)
- Tightening torque :  $100 \pm 15 \text{kgf} \cdot \text{m}$   
( $723 \pm 108 \text{lb} \cdot \text{ft}$ )

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

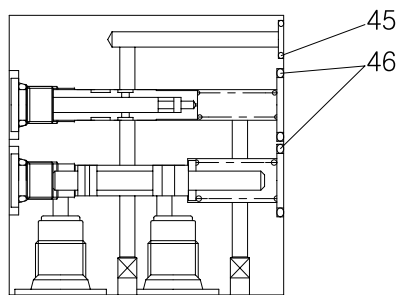
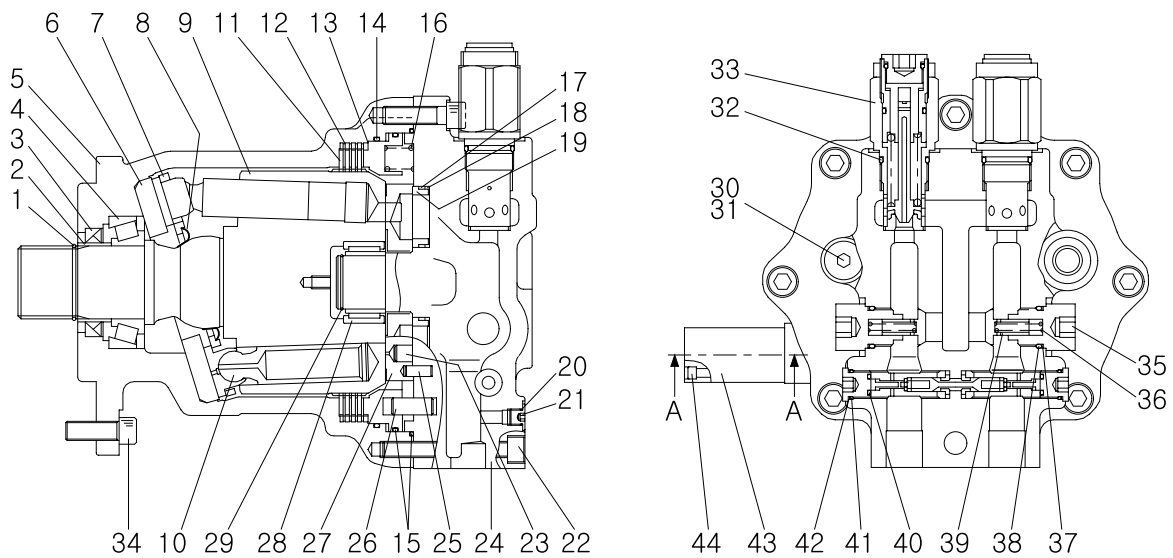
#### 2) INSTALL

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



## 2. DISASSEMBLY AND ASSEMBLY OF SWING MOTOR

### 1) STRUCTURE



SECTION A-A

36072SM02

1	Snap ring	17	Teflon ring	32	O-ring
2	Inner ring	18	Disk spring	33	Relief assembly
3	Oil seal	19	Bushing	34	Socket bolt
4	Taper roller bearing	20	Plug	35	Cap
5	Housing	21	O-ring	36	Spring
6	Cam plate	22	Socket bolt	37	Back up ring
7	Return plate	23	Piston	38	O-ring
8	Backing spring	24	Cover	39	Check
9	Cylinder assembly	25	Parallel pin	40	O-ring
10	Piston assembly	26	Parallel pin	41	Backup ring
11	Lining plate	27	Balance plate	42	Bypass valve assembly
12	Free plate	28	Needle bearing	43	Time delay valve
13	Piston	29	Snap ring	44	Socket bolt
14	O-ring	30	Cap	45	O-ring
15	O-ring	31	O-ring	46	O-ring
16	Spring				

## 2) DISASSEMBLY

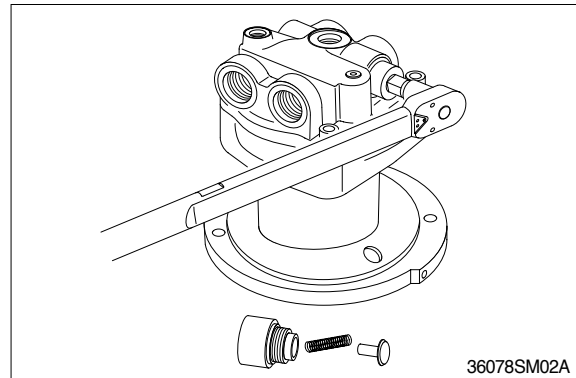
### (1) Removal of relief valve assembly

Remove cap of relief valve assembly(33) with 46mm hexagonal wrench.

Assemble removed relief valve assembly (31) to original state when reassembling.

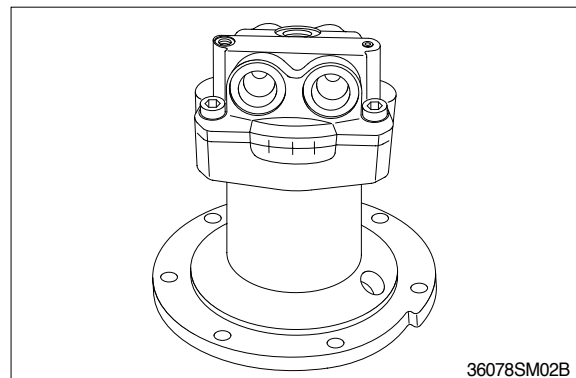
### (2) Removal of make up valve

Loosen cap(35) with 14mm hexagonal wrench, and remove check valve(39) and spring(36).



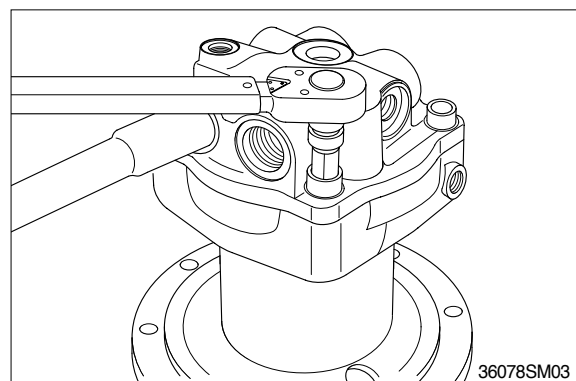
### (3) Marking at swing motor

Before disassembling motor, make a matching mark between cover(24) and housing(5) for easy reassembling.



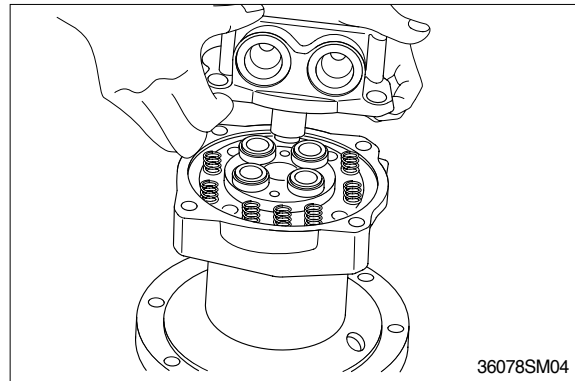
### (4) Remove mounting bolts of cover

Loosen cover(24) and housing(5) with 14mm hexagonal wrench, and remove them.

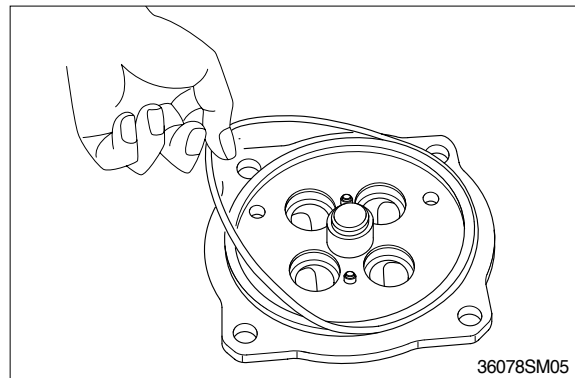


**(5) Removal of cover assembly**

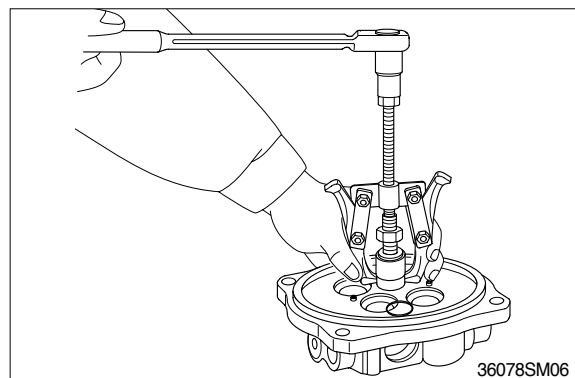
Place shaft of motor assembly to downward and take cover(24) out.



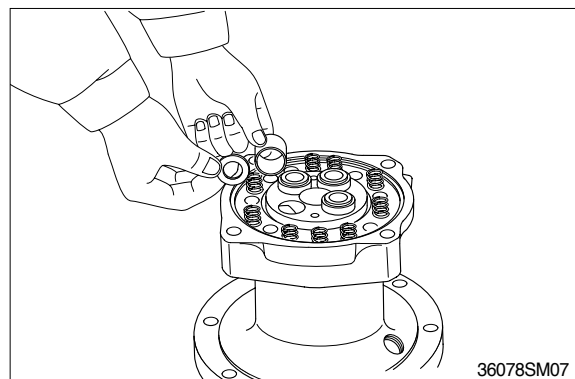
**(6) Remove O-ring(15) from cover.**



**(7) Remove snap ring(29) with steel pointer and remove inner race of needle-bearing(28) by bearing puller.**

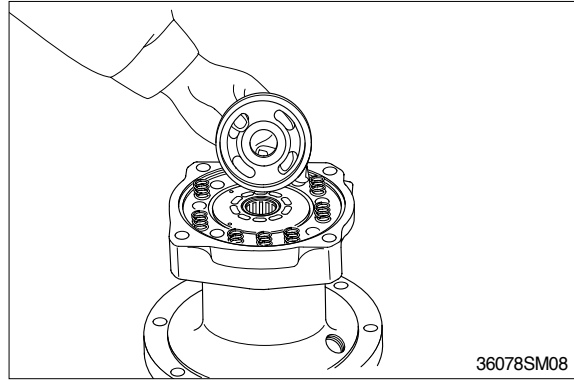


**(8) Remove bushing(19) and disk spring(18) from teflon ring(17).**



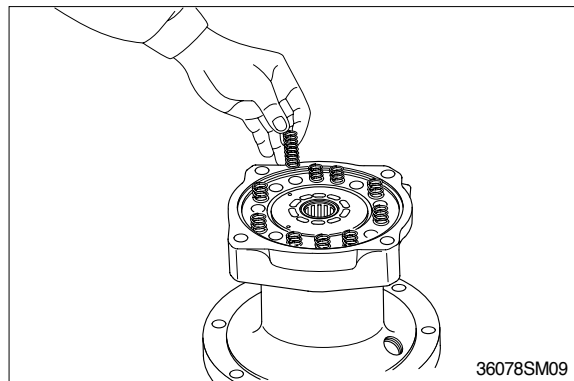
**(9) Remove balance plate**

Balance plate(27) is adhered on end surface of cylinder assembly(9) by oil viscosity. Take off balance plate(27) with hands. Assembly method of balance plate(27) depends on cap(35).  
(Band groove and round groove of high - low pressure transmission area)  
Before removing, check and record location of balance plate(27) for correct assembly.



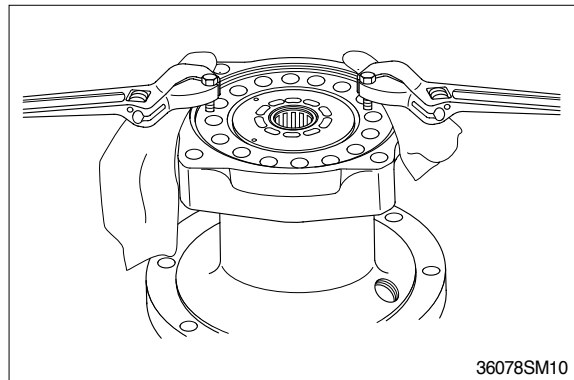
**(10) Removal of spring(16, brake area)**

Remove spring(16) from piston(13).  
Check and record original position of each spring(16) for correct assembly.

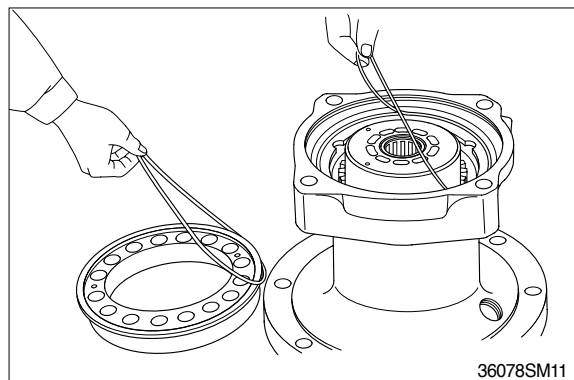


**(11) Removal of brake piston**

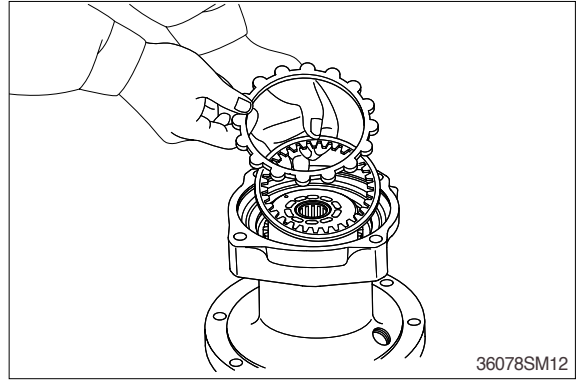
When removing piston(3) from housing (5), there is a sliding resistance against tightening of O-rings(14,15). Use tap hole(M6) on piston(13) as figure.



**(12) Remove O-rings(14,15) from piston(13) and housing(5).**

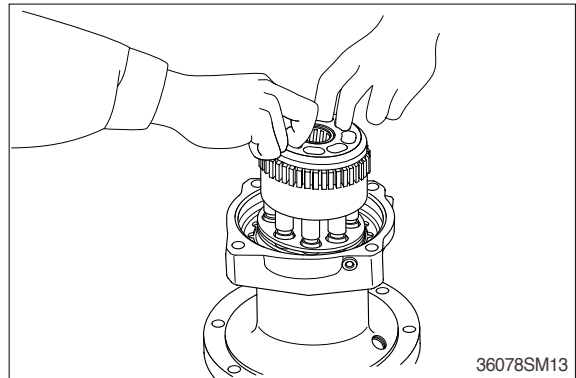


- (13) Remove lining plate(11) and mating plate(12).

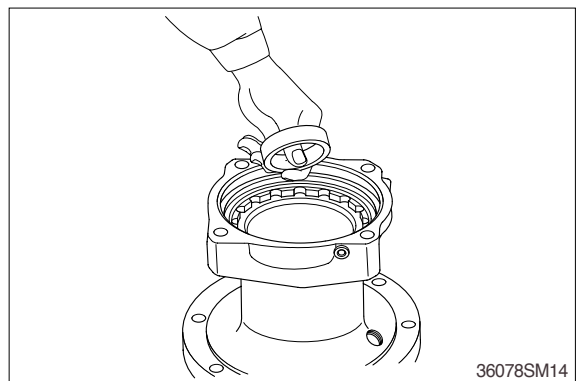


**(14) Removal of cylinder assembly**

Holding end of cylinder(9) with hand, draw out cylinder assembly from housing. Oil seal(3) and outer race of taper roller bearing(4) are left inside of housing. End surface of cylinder(9) is sliding face. So, protect the surface with a scrap of cloth against damage. Make a matching mark on piston hole of cylinder(9) and piston assembly(10) to fit piston into the same hole when assembling

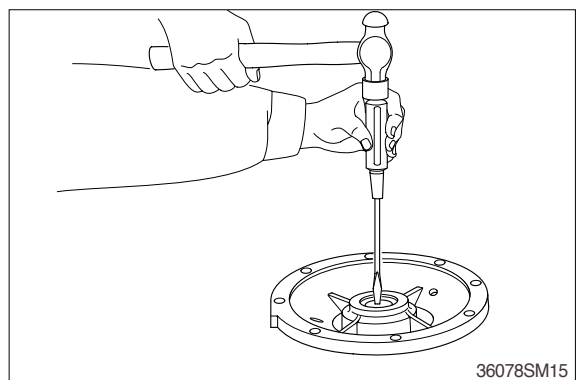


- (15) Separate outer race of taper roller bearing(4) from housing.



**(16) Removal of oil seal**

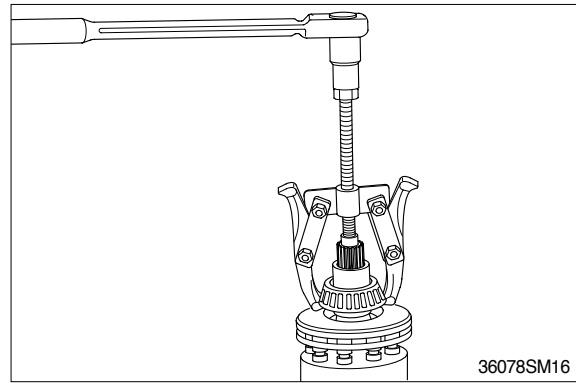
Remove oil seal(3) from housing(5) with driver and hammer. Do not reuse oil seal after removal.



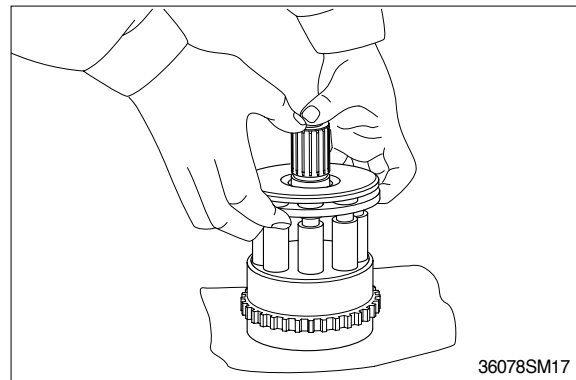
**(17) Disassembly of cylinder assembly**

Remove inner race of taper roller bearing (4) by bearing puller.

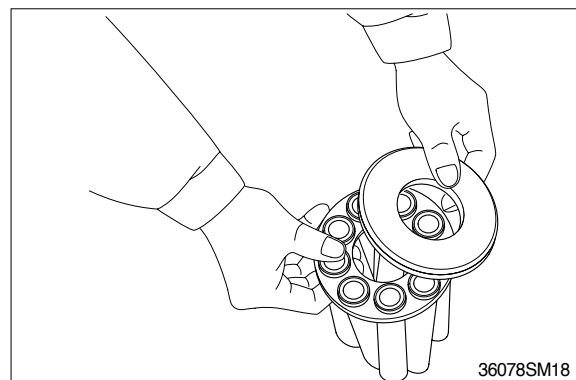
After removing snap ring(1), lift out cylinder(9) with 2 inner race of roller bearing(4) by applying gear puller at the end of spline in the cylinder.



Separate cam plate(6), piston assembly (10) and return plate(7) from cylinder(9).

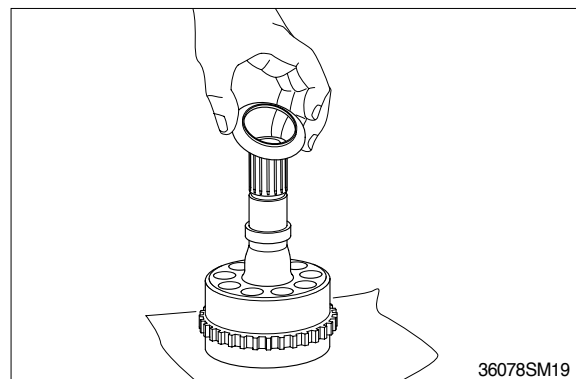


Get cam plate(6) slide on sliding face of piston assembly(10) and remove it. Be cautious not to damage on sliding face of cam plate.



Remove backing spring(8) from cylinder(9).

This completes disassembly.



### 3) ASSEMBLY

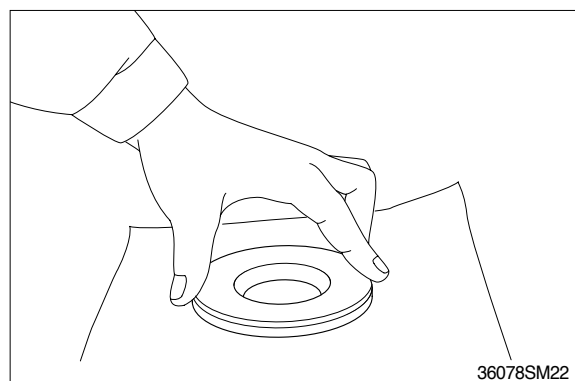
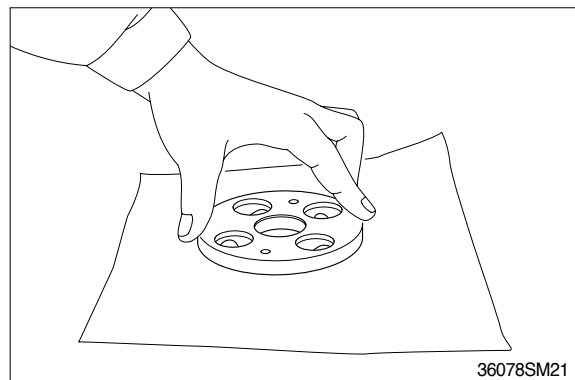
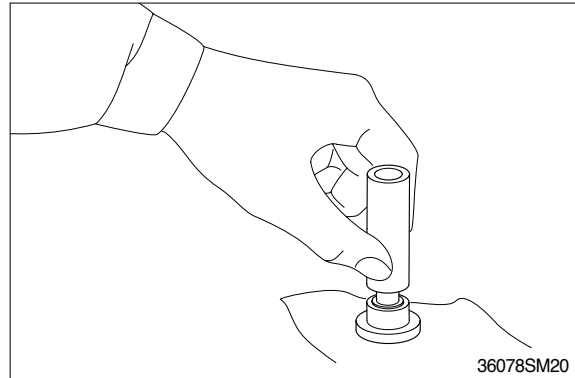
#### (1) Preparation

Before reassembling, perform below procedure.

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

Replace seal with new one.

Grind sliding face of piston assembly (10), balance plate(27) and cam plate (6) with sandpaper #2000.

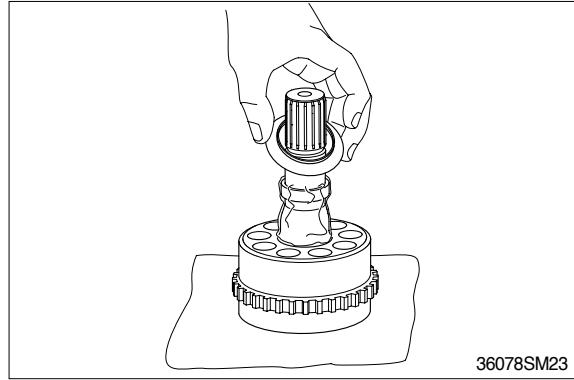


When assembling, lubricate with specified clean hydraulic oil.

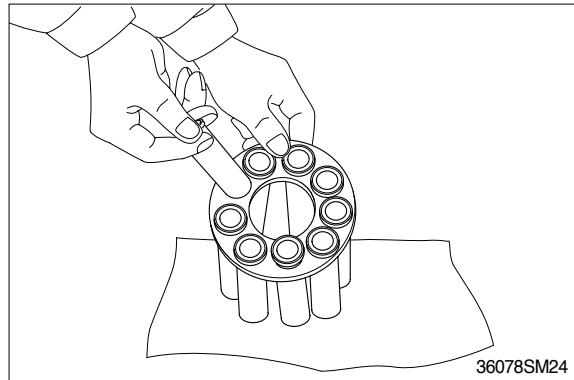
When assembling piston assembly(10) to piston hole of cylinder(9), check matching mark between them.

**(2) Assembly of cylinder assembly**

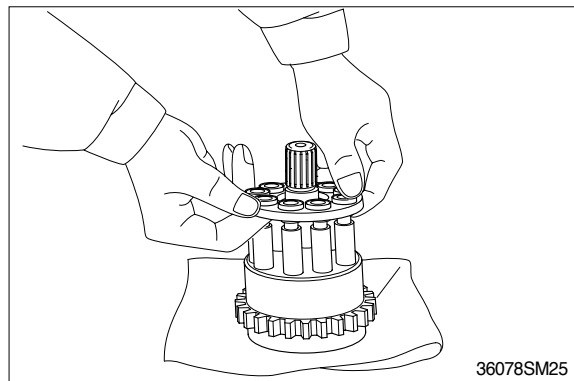
Lubricate grease on round area (contacting area with backing spring(8)) of cylinder(9) and assemble backing spring(8).



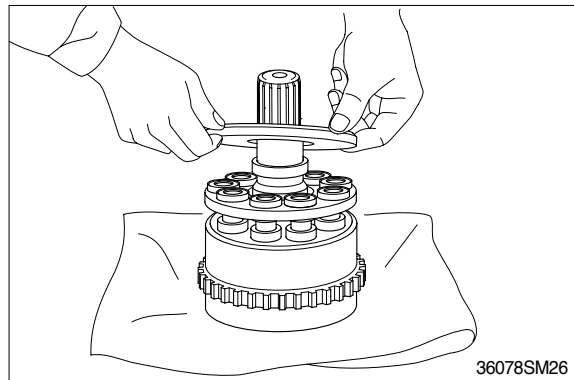
Insert piston assembly(10) in hole of return plate(7).



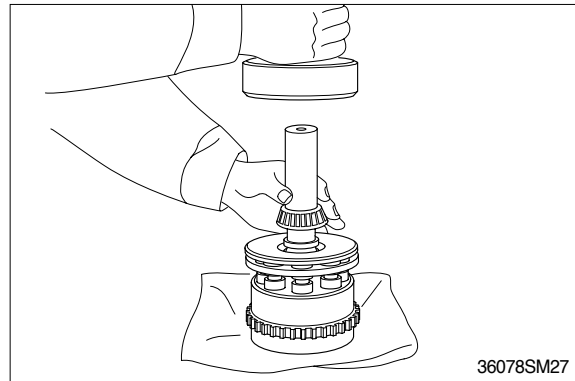
Assemble piston assembly(10) and return plate(7) to cylinder(9). When assembling, check matching mark between them. Before assembling, lubricate specified hydraulic oil in piston hole of cylinder(9).



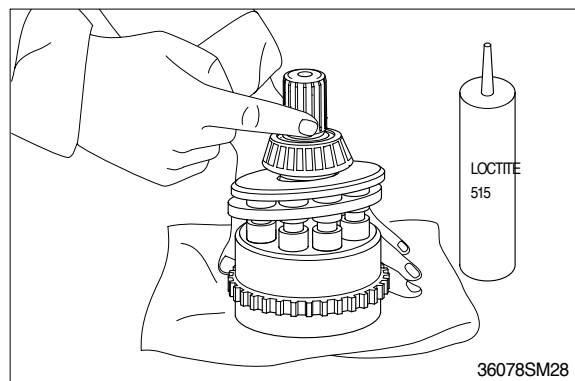
Lubricate specified hydraulic oil on shoe sliding face of piston assembly(10) and assemble cam plate(6).



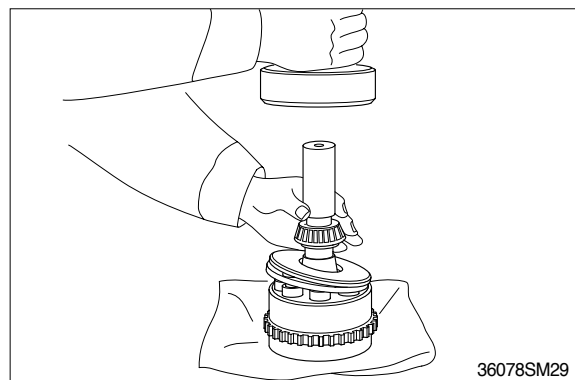
Assemble inner race of taper roller bearing(4) to cylinder(9).



Apply loctite to bearing mounting area of inner race of cylinder(9) lightly.

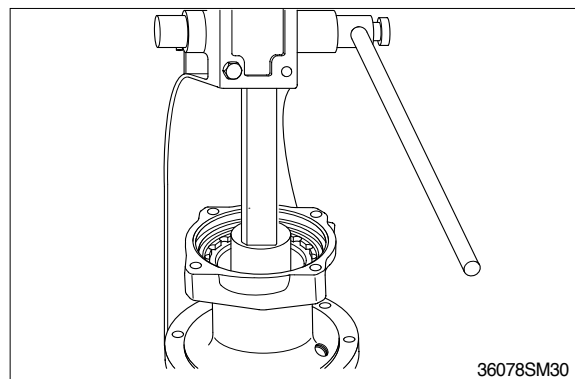


Assemble inner ring(2) to cylinder(9).  
Fit snap ring(1).

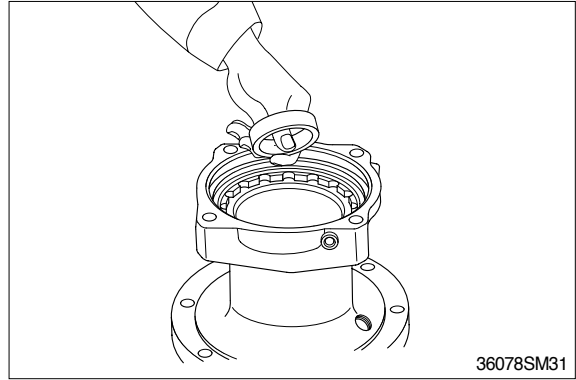


### (3) Assembly of oil seal

Apply three bond of white color on outer surface of oil seal(2) and insert it.  
Before assembling, lubricate lip of oil seal with grease.



- (4) Assemble outer race of taper roller bearing(4) to motor housing(5).

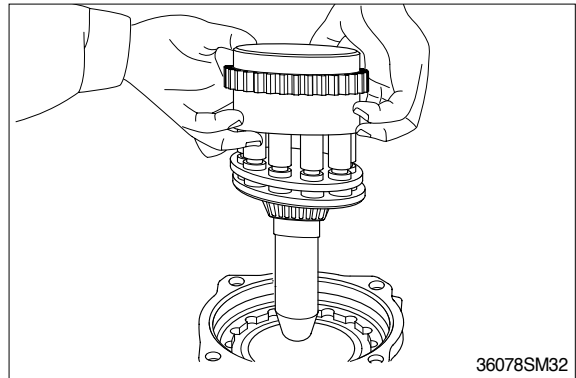


**(5) Assembly of cylinder assembly**

Hold end of cylinder(9) with hands and assemble cylinder assembly to housing (5). Be careful to prevent damage of seal by spline of shaft.

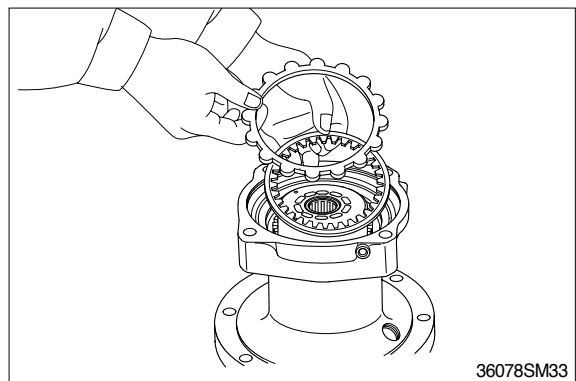
When assembling cylinder assembly, spline shaft of cylinder is protruded from end of housing, therefore put pads with length 60~80 mm under bottom of housing.

Make sure that backing spring(8) is placed on the groove of return plate(7).



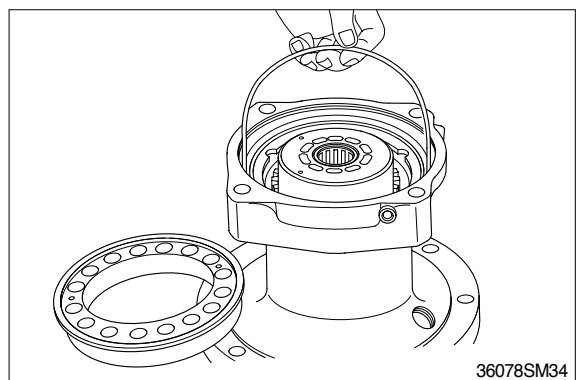
- (6) Assemble lining plate(11) and mating plate(12).

Lubricate specified hydraulic oil on each side.



- (7) Insert O-rings(14,15) into housing(5) and piston(13).

Lubricate O-ring with grease.

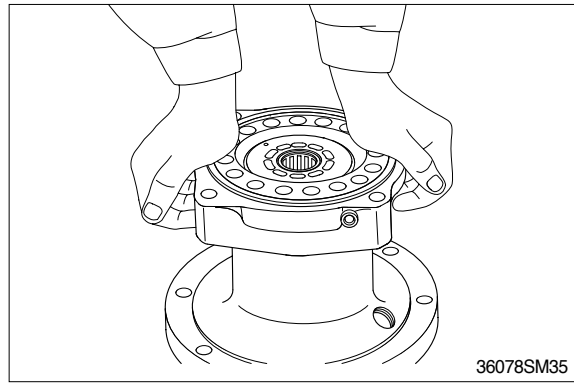


**(8) Assembly of brake piston**

Lubricate specified hydraulic oil on outer sliding face of piston(13) and assemble brake piston to housing(5).

It is too tight to assemble piston(13) because O-rings(14,15) are fitted, therefore it is recommended to push piston(13) horizontally by hands at once.

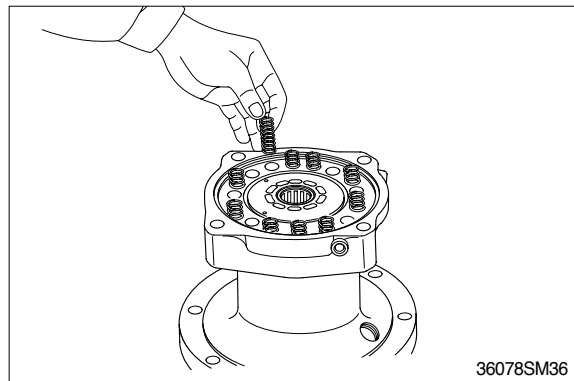
Pay attention to the fitting hole alignment with cover.



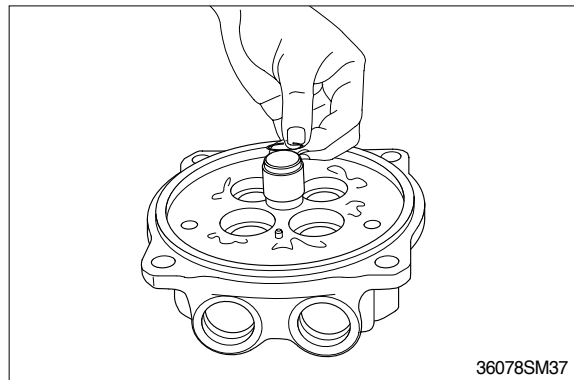
**(9) Assembly of spring(16, brake unit)**

Assemble spring(16) to piston(13) of brake unit.

Insert spring(16) into original position.

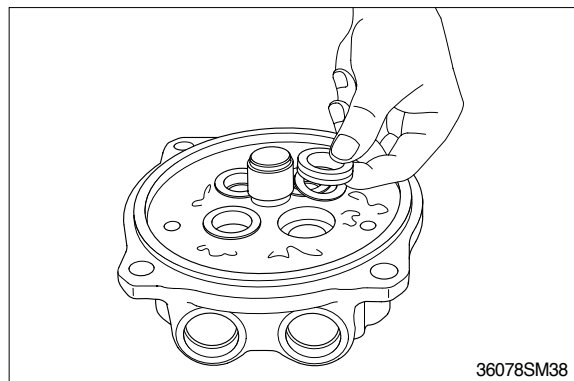


**(10) Assemble inner race of needle bearing (28) and snap ring(29) to cover(24).**

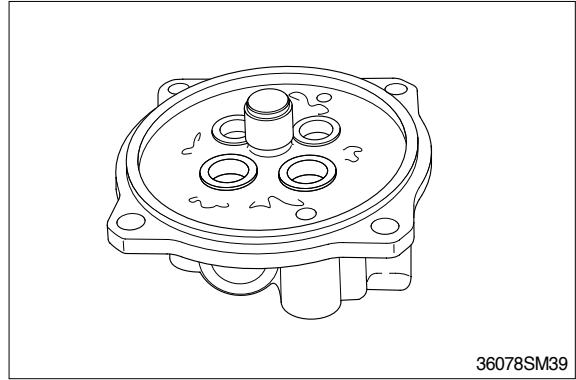


**(11) Assemble bushing(19) with teflon ring(17) and dish spring(18) to bushing hole of cover(24).**

Lubricate on both end surfaces of bushing(19) and outer face of teflon ring(17) with grease and assemble cover to housing, and parts are adhered on cover by grease viscosity which makes assembling easy.



- (12) Lubricate parallel pin [25, for anti rotation of balance plate(27)] of cover(24) with grease sufficiently and install parallel pin to housing.

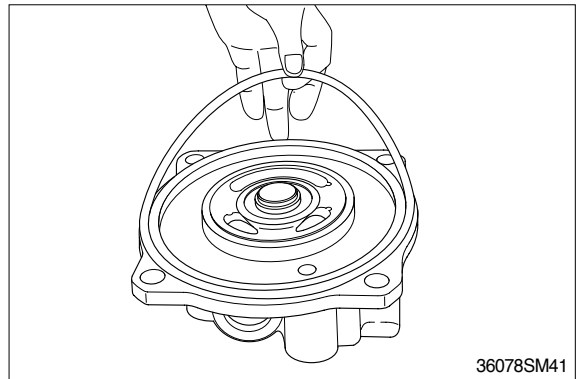


**(13) Assembly of balance plate**

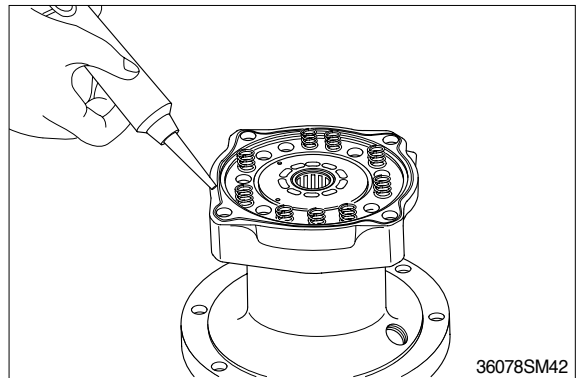
- Assemble balance plate(27) to cover(24).  
Be cautious of assembling direction.  
Make sure that piston(23) is inserted into balance plate.



- (14) Assemble O-ring(15) to cover(24).  
Lubricate O-ring with grease.



- (15) Apply three bond of white color to distinguish oil leakage from remaining oil in bolt hole(M14) of cover(24).

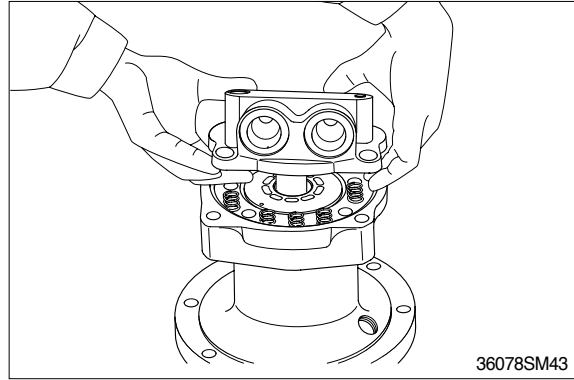


**(16) Assembly of cover**

Assemble cover(24) and balance plate (27) to housing(5) lightly, holding them up with hands.

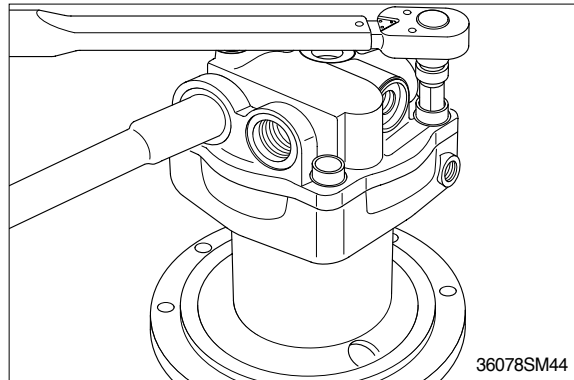
When assembling, be careful not to detach balance plate(27) and bushing (19) from cover(24).

Fit matching marks on housing(5) and cover(24) made before disassembling.



**(17) Tighten cover(24) and housing(5) with 14mm hexagonal socket bolt(22).**

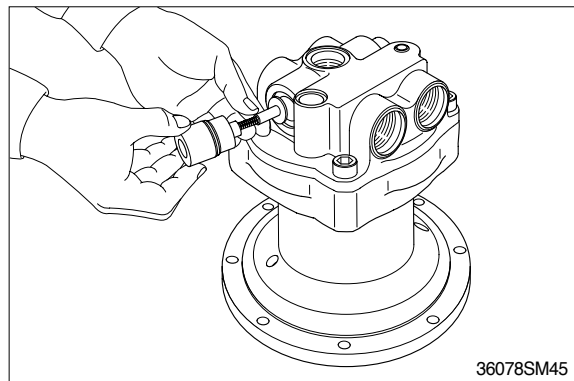
- Tightening torque : 14kgf · m  
(101 lbf · ft)



**(18) Assembly of make up valve**

Assemble check(39) and spring(36) to cover(24) and tighten cap(35) with 14mm hexagonal socket bolt.

- Tightening torque : 14kgf · m  
(101 lbf · ft)

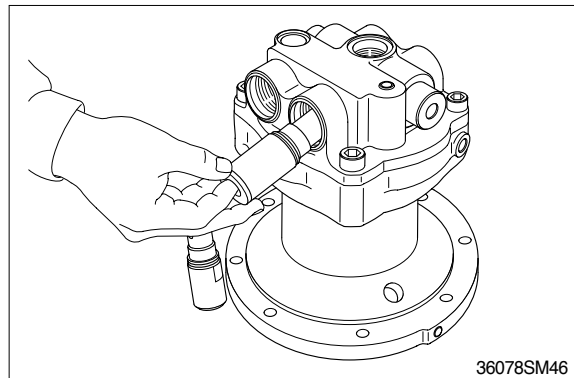


**(19) Assembly of relief assembly**

Assemble relief assembly(33) to cover(24) with 46mm hexagonal socket.

- Tightening torque : 14kgf · m  
(101 lbf · ft)

Be cautious of assembling method.



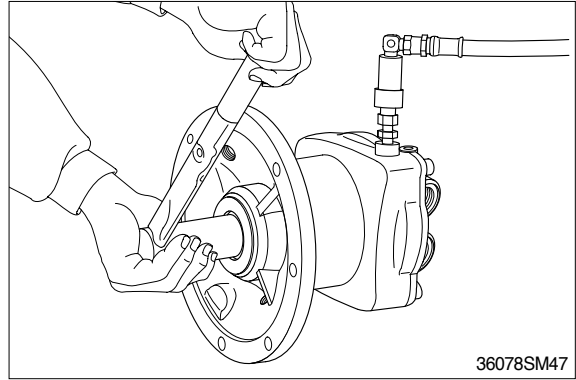
**(20) Check of assembly**

Load pilot pressure of 30kgf/cm<sup>2</sup> to brake release port after opening inlet and outlet port.

Check if output shaft is rotated smoothly around torque of 3~5kgf · m.

If not rotated, disassemble and check.

This completes assembly.



### 3. REMOVAL AND INSTALL OF REDUCTION GEAR

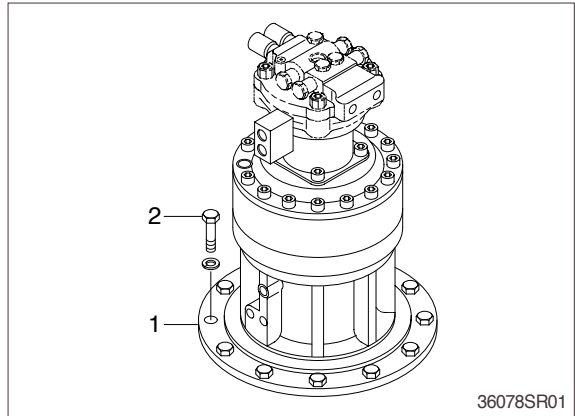
#### 1) REMOVAL

- (1) Remove the swing motor assembly.  
For details, see **removal of swing motor assembly**
- (2) Slide reduction gear assembly(1) and remove mounting bolts(2)
- (3) Remove the reduction gear assembly
  - Reduction gear : 285kg (628lb)



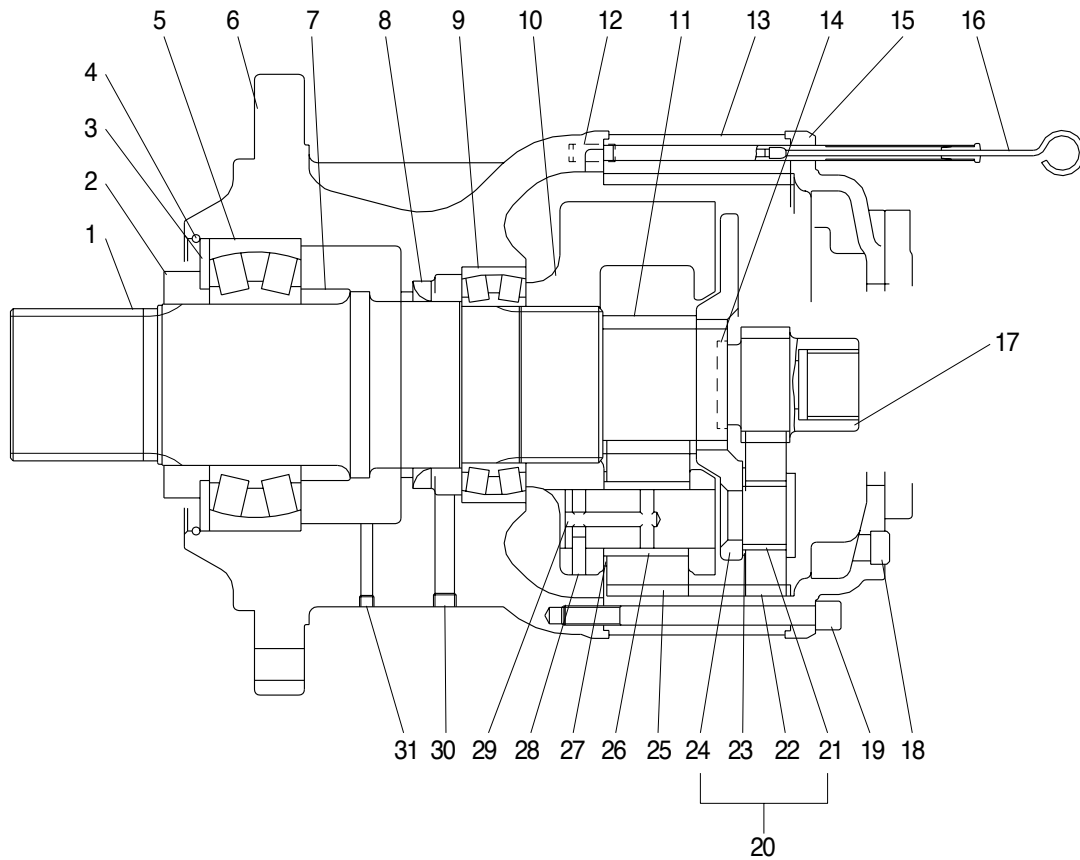
#### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
  - Mounting bolt :  $100 \pm 15 \text{ kgf} \cdot \text{m}$   
( $723 \pm 108 \text{ lb} \cdot \text{ft}$ )



## 4. REDUCTION GEAR

### 1) STRUCTURE



36078SR02

1	Shaft	12	Parallel pin	23	Thrust plate 1
2	Collar	13	Ring gear	24	Holder 1
3	Plate	14	Thrust plate	25	Gear 5
4	Snap ring	15	Cover	26	Bushing 2
5	Roller bearing	16	Level gauge	27	Thrust plate 2
6	Gear casing	17	Sun gear	28	Spring pin
7	Collar	18	Plug	29	Shaft 2
8	Oil seal	19	Socket bolt	30	Plug
9	Roller bearing	20	Holder 1 assembly	31	Plug
10	Holder 2	21	Shaft 1		
11	Gear 4	22	Gear 2		

## 2) DISASSEMBLY

### (1) Removal of cover

Loosen the socket bolt(19) with 14mm hexagonal socket and remove the cover(15).

### (2) Removal of sun gear and 1st holder assembly

Remove sun gear(17), install eye bolt to tap(M8) of shaft(21) and remove holder assembly itself.

Shaft 1(21) is pressed into holder(24) and tighten by press.

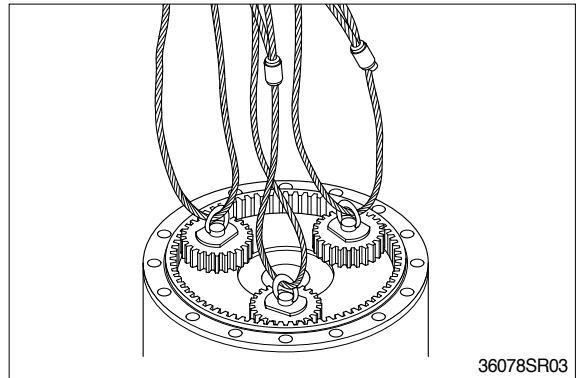
Therefore, it is impossible to disassemble any more.

24 : Holder 1

21 : Shaft 1

22 : Sun gear 2

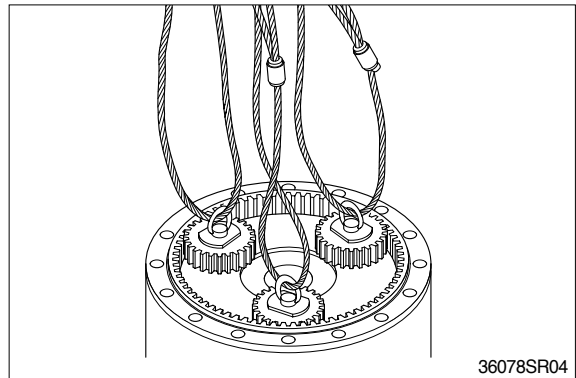
23 : Plate



36078SR03

### (3) Removal of sun gear 4 and 2nd holder

Remove sun gear(11), install eye bolt to tap(M8) of shaft(29) and remove holder assembly itself.

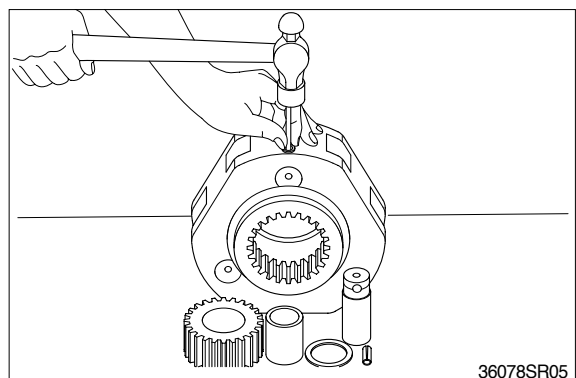


36078SR04

### (4) Disassembly of 2nd holder assembly

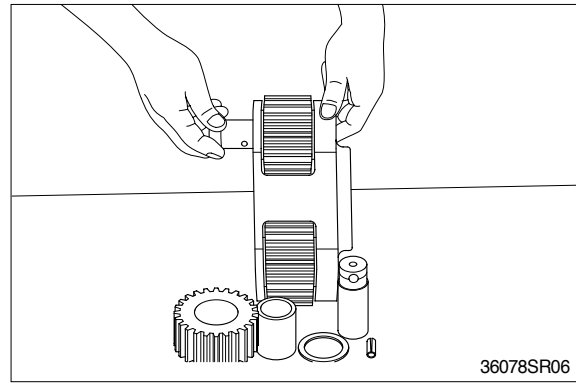
Insert spring pin(28) into shaft(29) by hammering.

Do not reuse spring pin after removal.



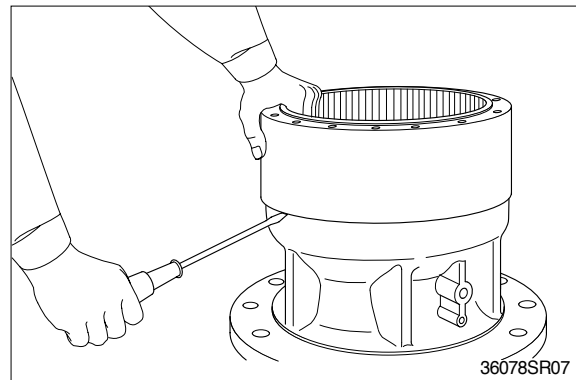
36078SR05

Remove shaft(29) from holder(10), holding gear(25) with hands.



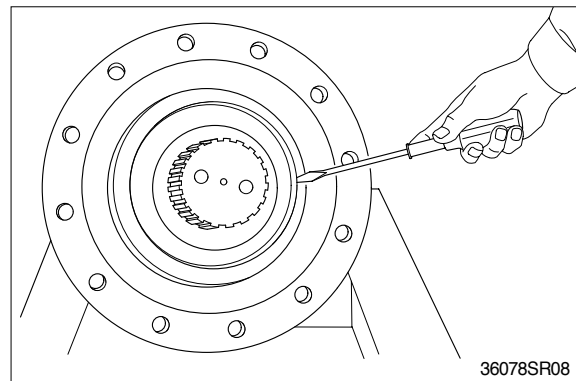
**(5) Removal of ring gear**

Remove ring gear(13) from casing(6). Fluid packing is applied on contacting face of ring gear and gear casing. Therefore, remove ring gear from casing by minus screw driver.



**(6) Removal of pinion shaft assembly**

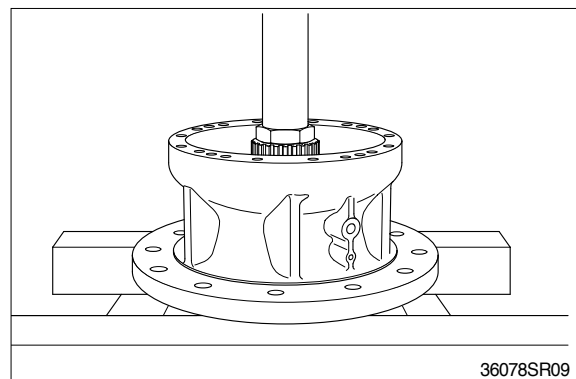
Remove snap ring(4) through hole of gear casing with (-)driver.



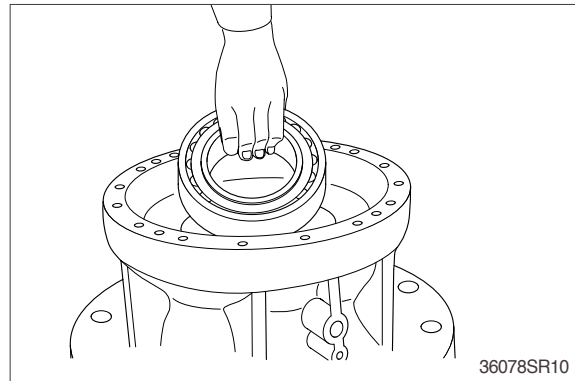
Install hydraulic press at the end face of shaft, and remove shaft(1), collar(2), plate(3) and roller bearing(5) as assembly.

Use support (approx 300mm), to gain space needed for removing shaft at flange part of gear casing.

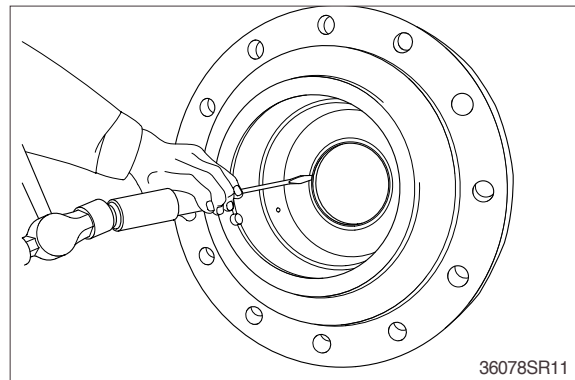
Do not reuse oil seal after removal.



Remove roller bearing(9) from gear casing(6).

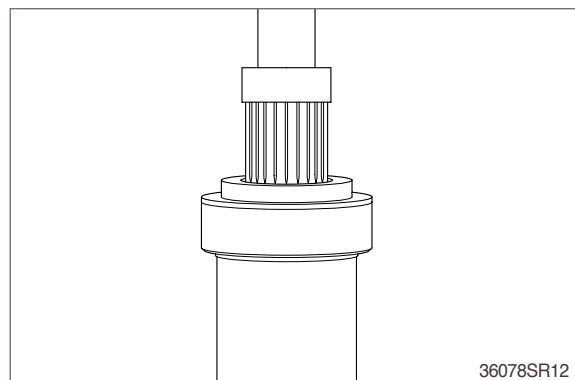


Remove oil seal(8) from gear casing(6).



**(7) Disassembly of shaft assembly**

Insert motor side of shaft(1) into steel tube (inner dia :  $\varnothing$ 145mm) and push the end of output shaft side with hydraulic press and then remove roller bearing(5), plate(3) and collar(2) as assembly from shaft(1).

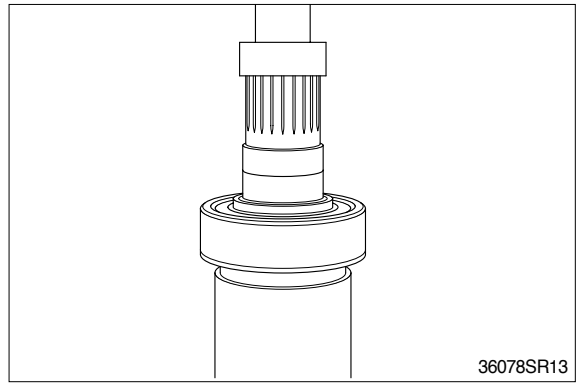


### 3) ASSEMBLY

#### (1) Assembly of shaft assembly

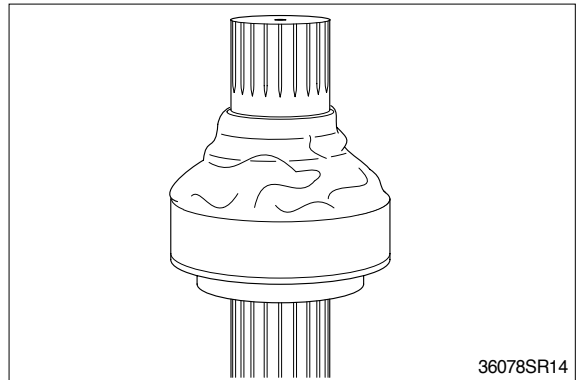
Heat roller bearing(5) up to 50 ℃ plus surrounding temperature and assemble it to shaft with hydraulic press and then assemble plate(3) and collar(2) in this order.

Pay attention to the assembling direction of plate(3).



Lubricate on outer face of roller bearing (5) with grease.

Capacity : 600 cc

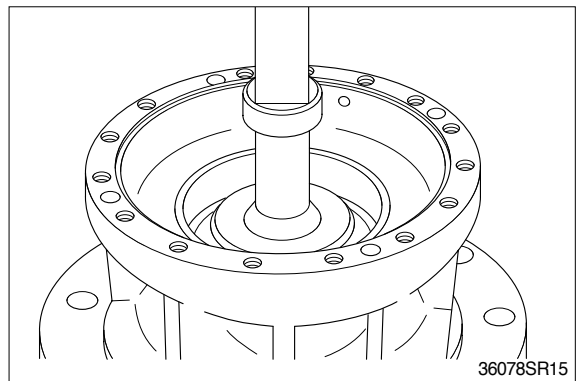


#### (2) Installation of oil seal

Remove oil from assembled face of oil seal of gear casing(6) and oil seal(8).

Apply fluid packing(three bond of white color) on outer face of oil seal and assemble at pressing jig of gear casing.

After inserting with press, lubricate oil seal with grease.



#### (3) Assembly of pinion shaft assembly

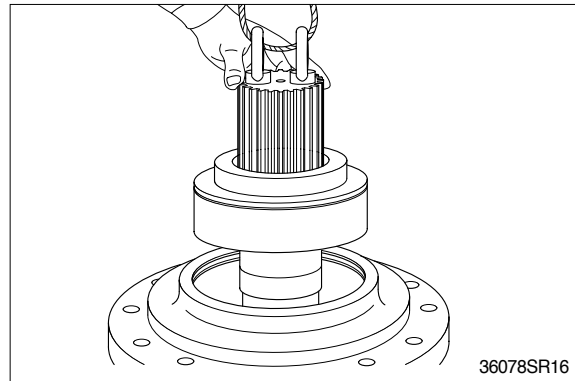
Be careful lest oil seal lip damage by spline of pinion shaft(1).

Assemble pinion shaft assembly by using seal guide.

Put pinion shaft of gear casing(6) upward.

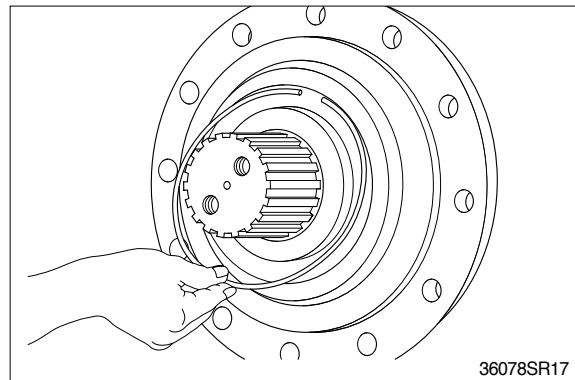
Assemble pinion shaft assembly to gear casing by tightening eye bolt into tap hole (M16) of output side of pinion shaft(1).

Place support (approx 150mm) below of gear case(6) for seal protector contact with work table.



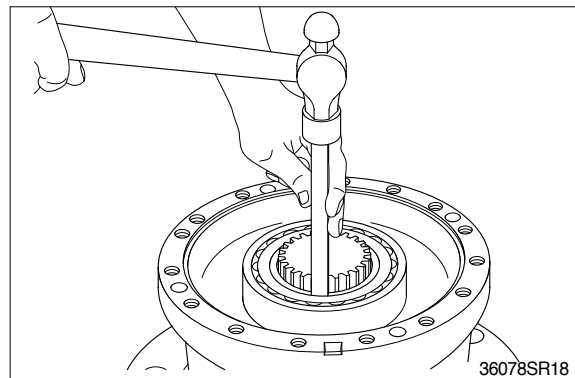
Assemble snap ring(4).

When assembling, loosen cutting place of snap ring about 30mm from connections of gear casing for easy disassembly.



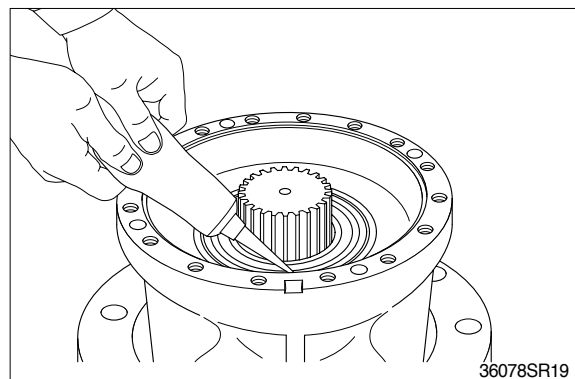
#### (4) Install of roller bearing

Put gear casing under output shaft and heat roller bearing(9) up to 50 °C plus surrounding temperature and then assemble it to the shaft.

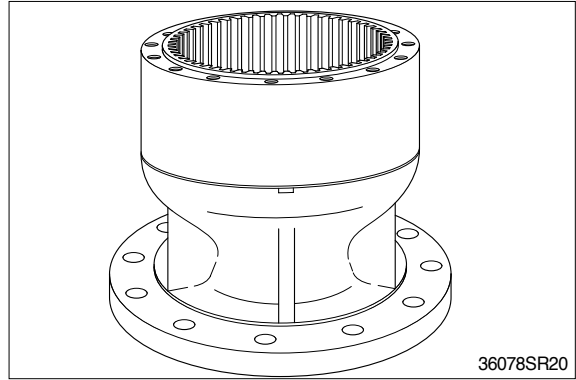


#### (5) Assembly of ring gear

Remove oil from mating faces between gear casing(6) and ring gear(13), and from pin(12). Assemble collar of gear casing and apply fluid packing(three bond of grey color).

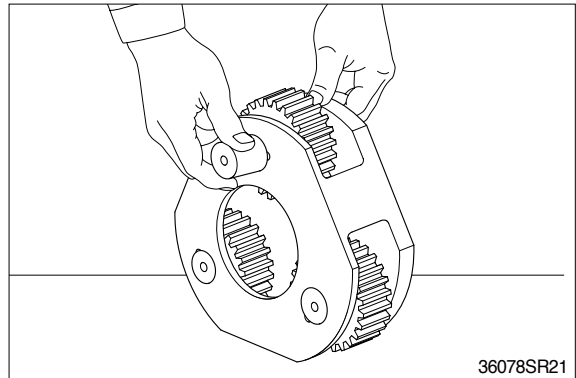


Assemble ring gear(13).

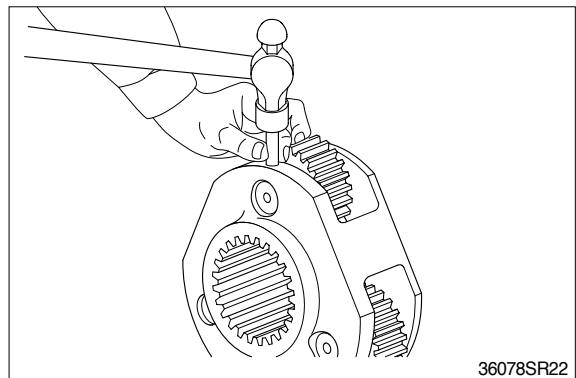


**(6) Assembly of holder assembly**

Assemble gear 5(25) to holder 2(10) with thrust plate(27) and insert shaft 2(29).  
Lubricate gear oil to inside of gear and outside of shaft.

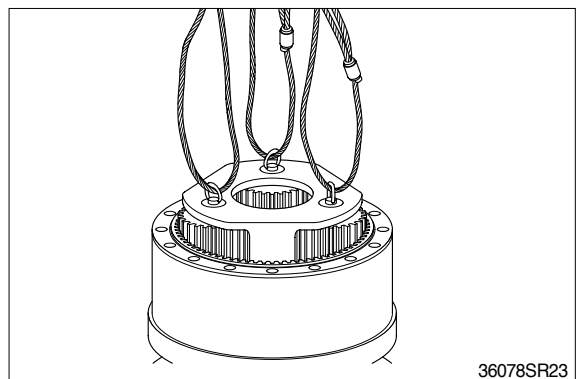


Insert spring pin(28) by hammering.  
Insert as the clearance between spring pins toward gear(25).

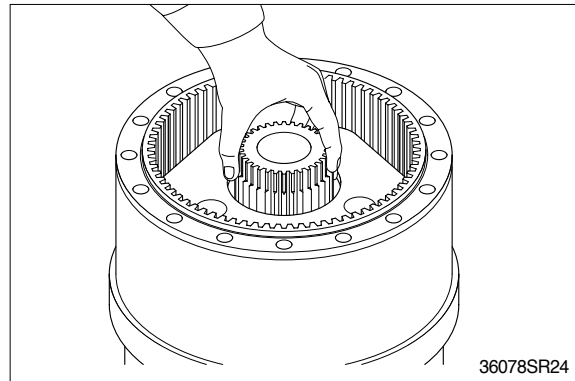


**(7) Assembly of holder assembly and sun gear 4**

Mount eye bolt into tap hole(M8) of shaft 2(29) and lift holder assembly and then insert holder assembly being engaged with internal teeth of ring gear(13).  
Rotate holder assembly lightly so that splines of pinion shaft(1) are engaged.



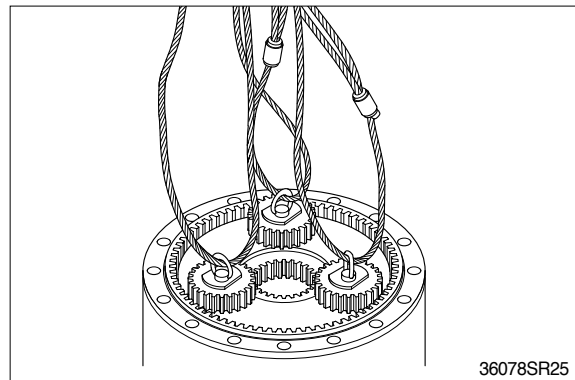
Insert gear 4(11) to gear 5(25).



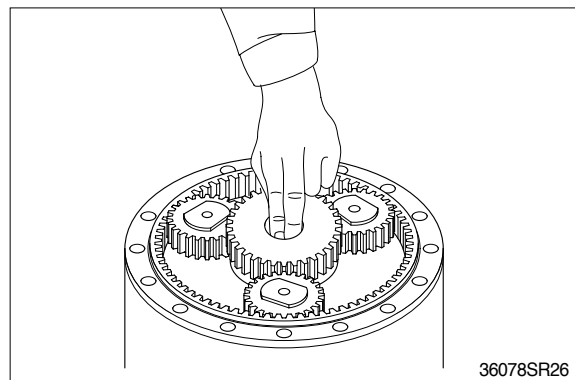
**(8) Assembly of sun gear 1st holder assembly**

Mount eye bolt into tap hole(M8) of shaft assembly 1(21) and lift holder assembly and then insert holder assembly being engaged with internal teeth of ring gear(13).

Rotate holder assembly lightly so that gear 4(11) is engaged with teeth of holder 1(24).



Insert sun gear(17) to gear 2(22).



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

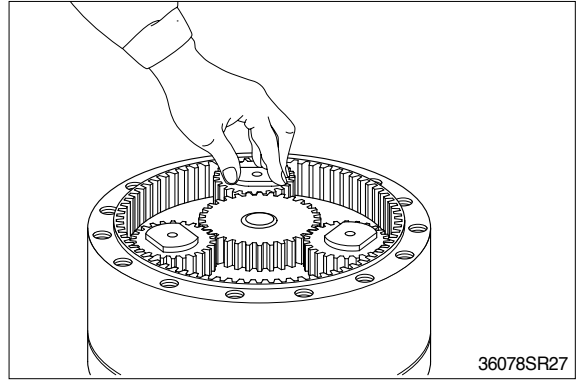
**(10) Assembly of cover**

Remove oil from mating faces between ring gear and cover(15) and apply fluid packing.

Assemble cover(15) and tighten socket bolt(19) with 14mm hexagonal socket.

Tightening torque : 29 kgf · m  
(412.5 lbf · ft)

This completes assembly



## GROUP 5 SWING DEVICE(#0063 and up)

### 1. REMOVAL AND INSTALL OF MOTOR

#### 1) REMOVAL

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

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

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

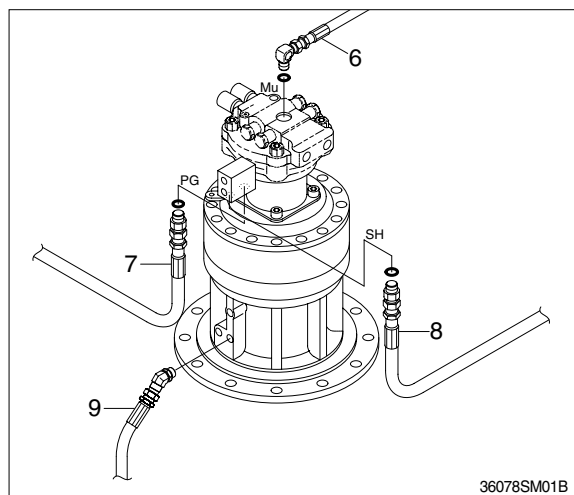
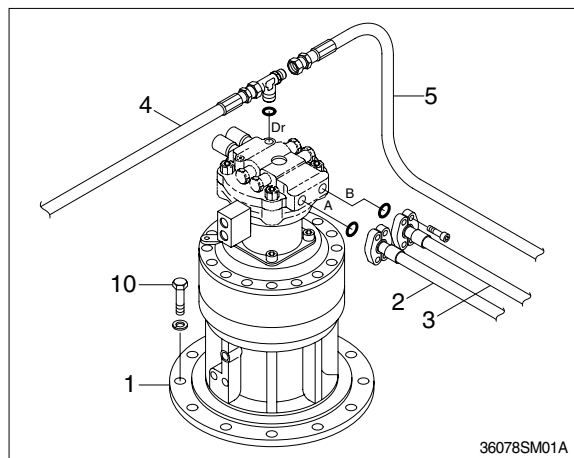
- (4) Disconnect hoses (2, 3, 4, 5, 6, 7, 8, 9).
- (5) Sling the swing motor assembly(1) and remove the swing motor mounting bolts (10).
  - Motor device weight : 360kg(794lb)
  - Tightening torque :  $100 \pm 15 \text{ kgf} \cdot \text{m}$   
( $723 \pm 108 \text{ lbf} \cdot \text{ft}$ )

- (6) Remove the swing motor assembly.

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

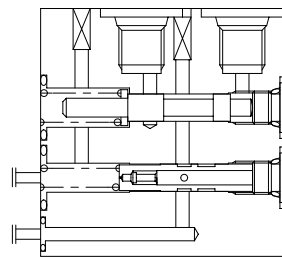
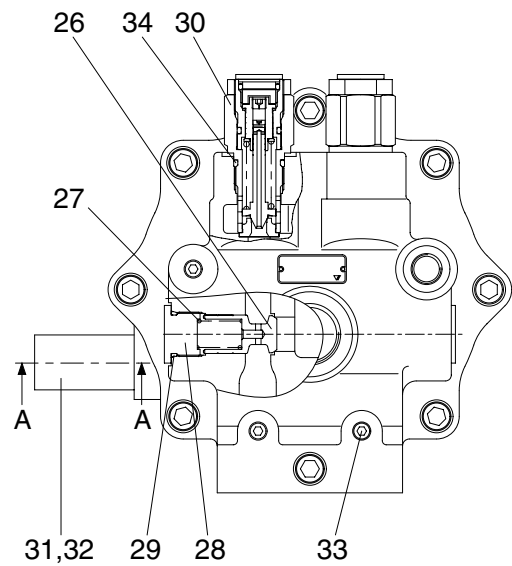
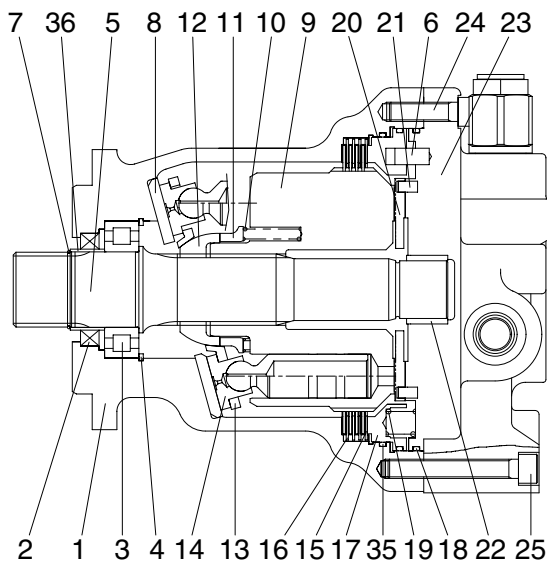
#### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
- (2) Bleed the air from the swing motor.
  - ① Remove the air vent plug.
  - ② Pour in hydraulic oil until it 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. SWING MOTOR

### 1) STRUCTURE



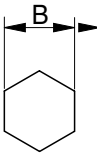
SECTION A-A

3607A2SM02

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

## 2) TOOLS AND TIGHTENING TORQUE

### (1) Tools

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

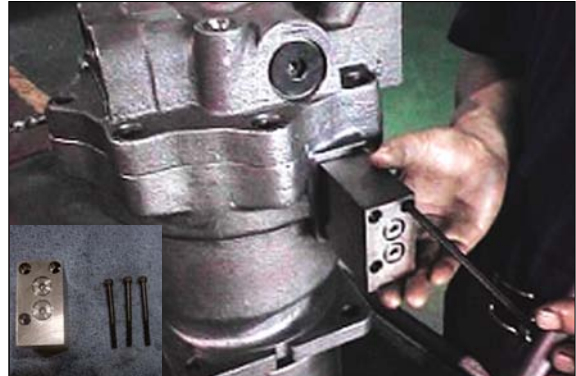
### (2) Tightening torque

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

## 2) DISASSEMBLING

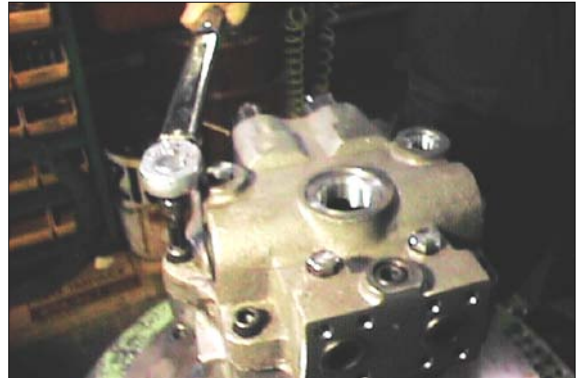
### (1) Disassemble the sub of a TURNING AXIS

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



3607A8SM01/01A

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



3607A8SM02

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



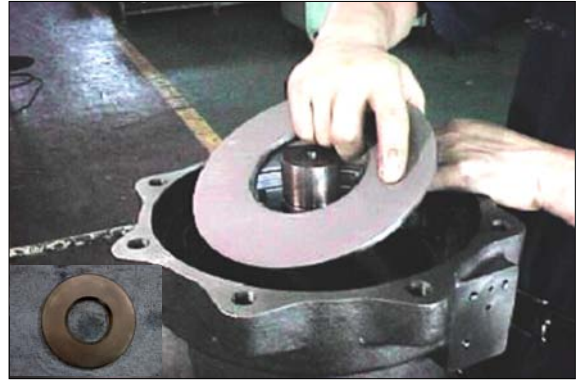
3607A8SM03

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



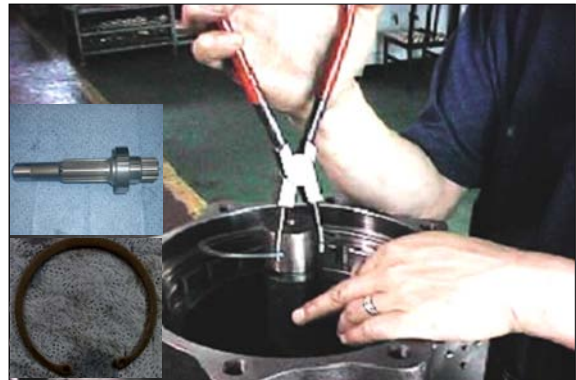
3607A8SM04

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



3607A8SM05

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



3607A8SM06/06A

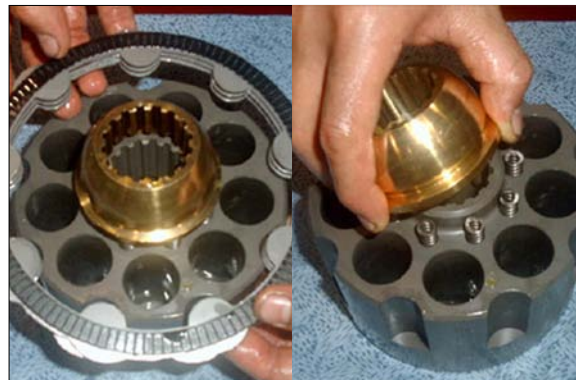
**(2) Disassemble cylinder block assy sub**

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



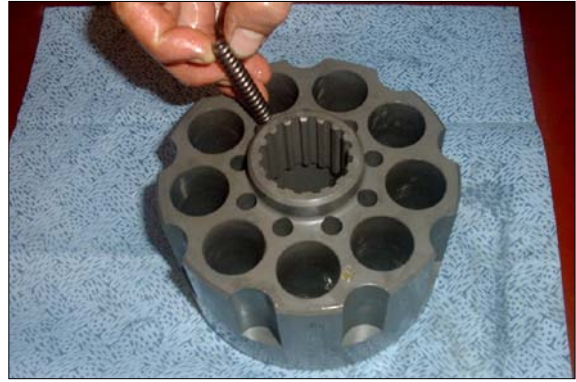
3607A8SM07

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



3607A8SM08A/08B

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



3607A8SM09

**(3) Disassemble rear cover assy sub**

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



3607A8SM10/10A

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



3607A8SM11/11A

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



3607A8SM12/12A

#### 4) ASSEMBLING

##### (1) Assemble the sub of a turning axls

- ① Put roller bearing(3) on preheater and provide heat to inner wheel(compressing temp : 290°C for 2 minutes)
  - Roller bearing × 1EA



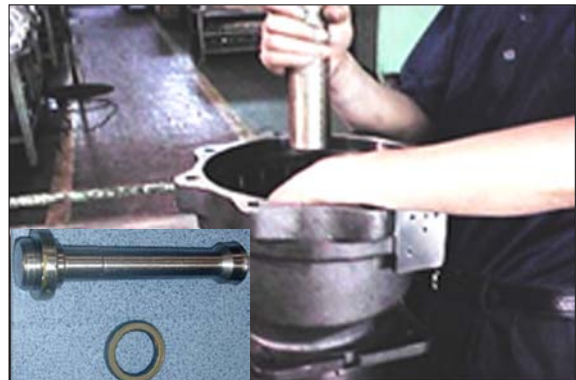
3607A8SM21

- ② After assembling and compressing preheated roller bearing(3), stop ring(7) into shaft(5).
  - Stop ring × 1EA
  - Shaft × 1EA



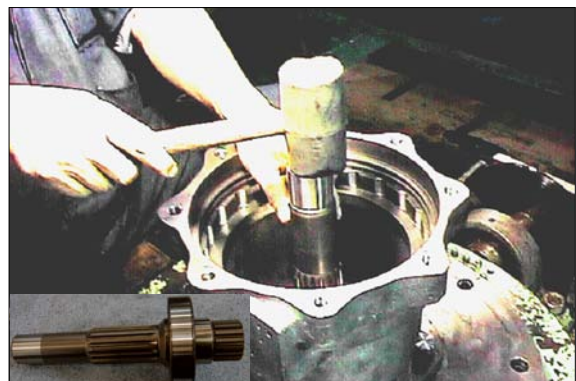
3607A8SM22/22A

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



3607A8SM23/23A

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



3607A8SM24

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



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



**(2) Assemble the sub of cylinder block assy**

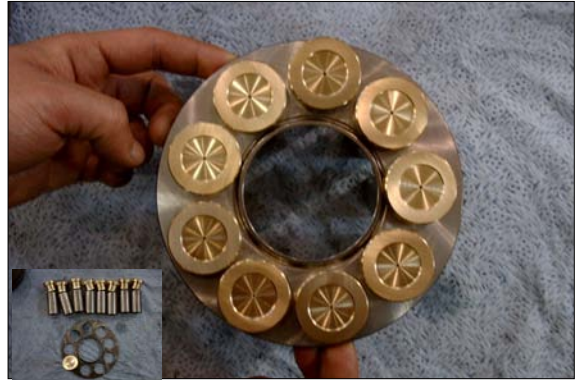
- ① Assemble spring(10) 9 set into cylinder block(9).  
· Spring × 9EA



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



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



- ④ Assemble above item ② and ③.



- ⑤ Assemble cylinder block assy into body (1).



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

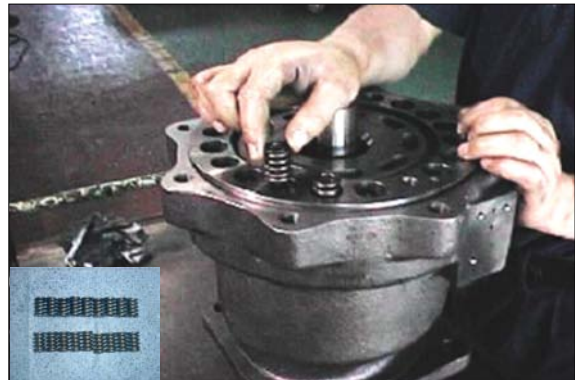


- ⑦ Assemble O-ring(18) into break piston (17).  
 · O-ring × 2EA



3607A8SM30

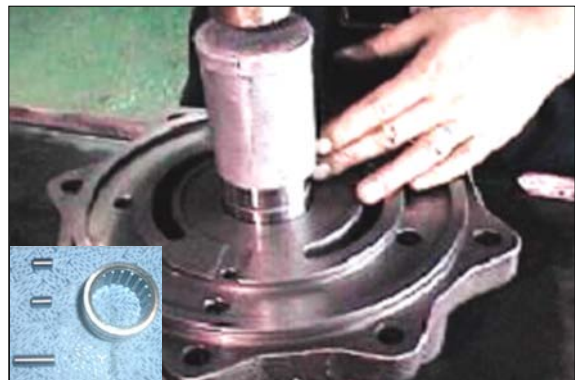
- ⑧ Insert break piston assy into body(1) and assemble spring(19) into break piston (17).  
 · Spring × 19EA



3607A8SM31/31A

**(3) Assemble the sub of rear cover assy sub**

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



3607A8SM32/32A

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



3607A8SM33/12A

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



3607A8SM34/11A

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



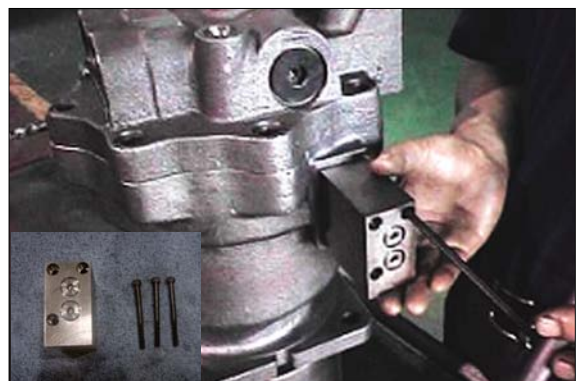
3607A8SM10/10A

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



3607A8SM02

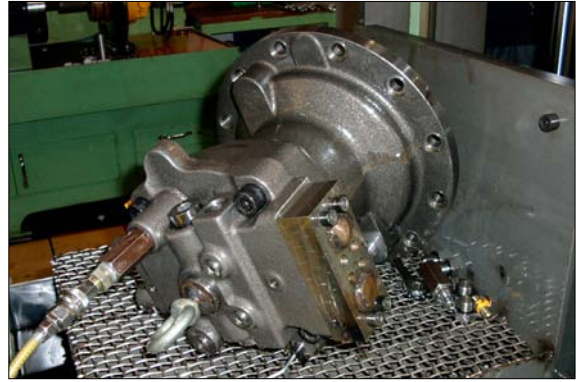
- ⑥ Assemble time delay valve assy(31) into rear cover(23) with a wrench bolt(32).



3607A8SM01/01A

**(4) Air pressing test**

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



14078SM232

**(5) Leakage check**

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



14078SM233/233A

**(6) Mount test bench**

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



220078SM14

### 3. REMOVAL AND INSTALL OF REDUCTION GEAR

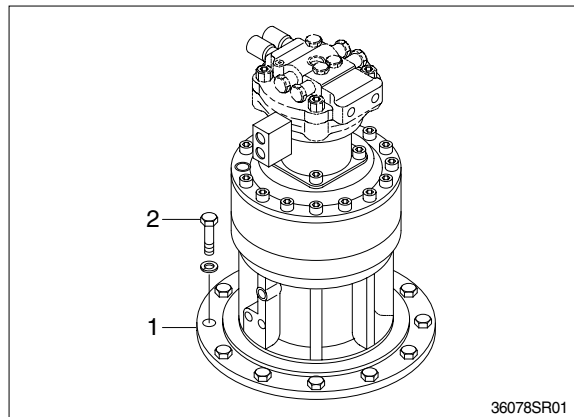
#### 1) REMOVAL

- (1) Remove the swing motor assembly.  
For details, see **removal of swing motor assembly**.
- (2) Slide reduction gear assembly(1) and remove mounting bolts(2)
- (3) Remove the reduction gear assembly
  - Reduction gear : 285kg(628lb)



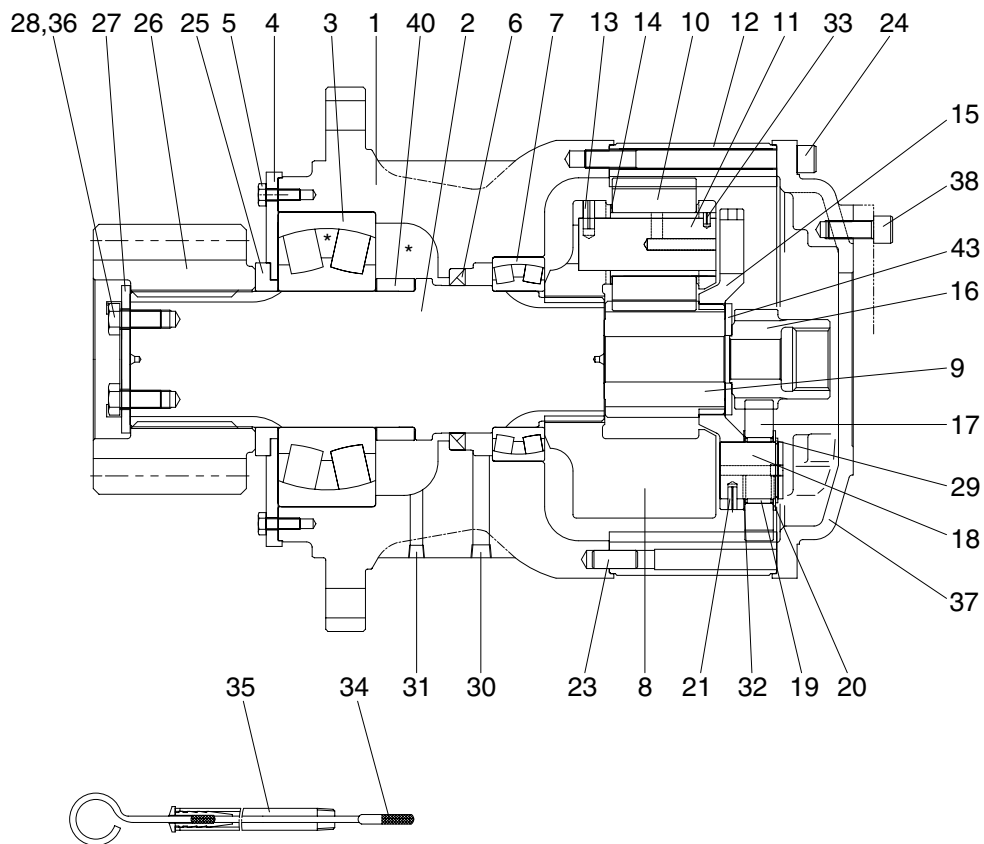
#### 2) INSTALL

- (1) Carry out installation in the reverse order to removal.
  - Mounting bolt :  $100 \pm 15 \text{ kgf} \cdot \text{m}$   
( $723 \pm 108 \text{ lb} \cdot \text{ft}$ )



## 4. REDUCTION GEAR

### 1) STRUCTURE



3607A2SM03

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

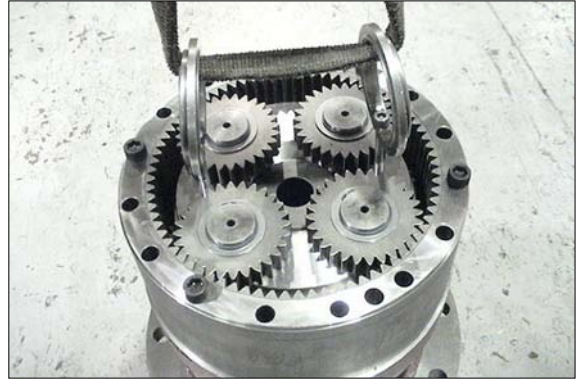
## 2) DISASSEMBLY

### (1) Removal of cover

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

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

Remove carrier 1(15), install eye bolt to tap hole(M10) and remove carrier 1 assembly itself.



3607A8SR03

### (3) Removal of sun gear 2

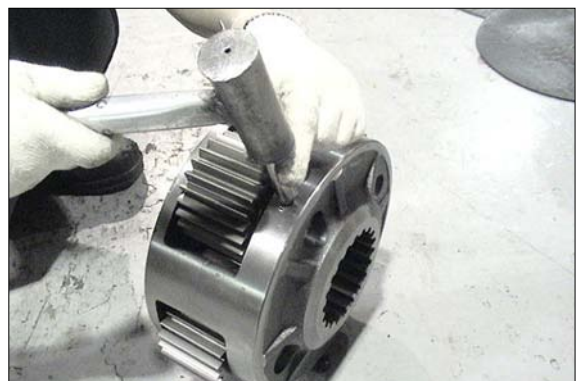
Remove sun gear 2(9), install eye bolt to tap(M10) of carrier 2(8) and remove carrier 2 assembly itself.



3607A8SR04

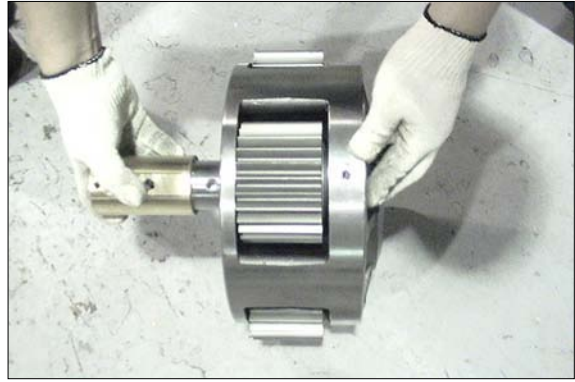
### (4) Disassembly of 2nd carrier assembly

- ① Insert spring pin(13) into pin assy 2(11) by hammering.
- ※ Do not reuse spring pin after removal.



3607A8SR05

- ② Remove pin assy 2(11) from carrier 2(8), planetary gear 2(10) and thrust washer (14) with hands.



3607A8SR06

#### (5) Removal of ring gear

Remove ring gear(22) from casing(1).

- ※ Fluid packing is applied on contacting face of ring gear and gear casing.

Therefore, remove ring gear from casing by minus screw driver.



3607A8SR07

#### (6) Removal of drive shaft(2) assembly

- ① Spread off the corners of spacer(25), cover plate(4) and hex bolt(5) with a tool.



3607A8SR08

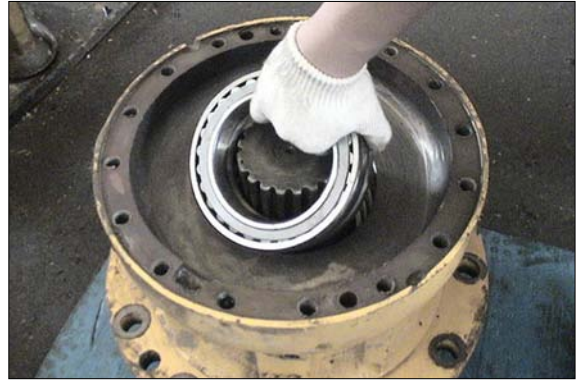
- ② Install hydraulic press at the end face of shaft, and remove drive shaft(2), spacer ring(40), and roller bearing(3) as assembly.

- ※ Do not reuse oil seal after removal.



3607A8SR09

- ③ Remove roller bearing(7) from gear casing(1).



3607A8SR10

- ④ Remove oil seal(6) from gear casing(1).



3607A8SR11

**(7) Disassembly of shaft assembly**

Insert motor side of shaft(2) into steel tube (inner dia :  $\varnothing$  145mm) and push the end of output shaft side with hydraulic press and then remove roller bearing(3), and spacer ring(40) as assembly from drive shaft(2).



3607A8SR12

### 3) ASSEMBLY

#### (1) Assembly of drive shaft assembly

- ① After assembly drive shaft (2), heat roller bearing(3) up to 50°C plus surrounding temperature and assemble it to shaft with hydraulic press and then assemble spacer ring(4) in this order.
- ※ Pay attention to the assembling direction of cover plate(4).



3607A8SR13

#### (2) Installation of oil seal

Remove oil from assembled face of oil seal of gear casing(1) and oil seal(6). Apply fluid packing(three bond of white color) on outer face of oil seal and assemble at pressing jig of gear casing. After inserting with press, lubricate oil seal with grease.



3607A8SR14

#### (3) Assembly of drive shaft assembly

- ① Be careful lest oil seal lip damage by spline of drive shaft(2). Assemble drive shaft assembly by using seal guide.
- ② Put drive shaft of gear casing(1) upward. Assemble drive shaft assembly to gear casing by tightening eye bolt into tap hole (M16) of output side of drive shaft(2).
- ※ Place support (approx 150mm) below of gear case(1) for seal protector contact with work table.



3607A8SR15

#### (4) Install of roller bearing

Put gear casing under output shaft and heat roller bearing(7) up to 50°C plus surrounding temperature and then assemble it to the shaft.



3607A8SR16

#### (5) Assembly of ring gear

- ① Remove oil from mating faces between gear casing(1) and ring gear(22), and knock pin(23). Assemble collar of gear casing and apply fluid packing(three bond of grey color).



3607A8SR17

- ② Assemble ring gear(22).



36078SR18

#### (6) Assembly of carrier 2 assembly

- ① Assemble planetary gear 2(10) to carrier 2(8) with thrust washer(14) and insert pin assy 2(11).
- ※ Lubricate gear oil to inside of gear and outside of shaft.



3607A8SR19

- ② Insert spring pin(13) by hammering.
- ※ Insert as the clearance between spring pins toward planetary gear 2(10).



3607A8SR20

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

- ① Mount eye bolt into tap hole(M10) of carrier 2(8) and lift carrier assembly and then insert carrier assembly being engaged with internal teeth of ring gear (22). Rotate carrier assembly lightly so that splines of drive shaft(2) are engaged.



3607A8SR21

- ② Insert sun gear 2(9) to planetary gear 2 (10).



3607A8SR22

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

- ① Mount eye bolt into tap hole(M10) of lift carrier assembly and then insert carrier assembly being engaged with internal teeth of ring gear(22). Rotate holder assembly lightly so that sun gear 2(9) is engaged with teeth of carrier 1(15).



3607A8SR23

- ② Insert sun gear 1(16) to planetary gear 1 (17).



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

**(10) Assembly of cover**

Remove oil from mating faces between ring gear(22) and cover(37) and apply fluid packing.

Assemble cover(37) and tighten socket bolt(24) with 16mm hexagonal socket.

Tightening torque : 27kgf · m  
(195.3lbf · ft)

This completes assembly

