

GROUP 5 SWING DEVICE

1. REMOVAL AND INSTALL OF MOTOR

1) REMOVAL

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

(2) 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.

(3) Disconnect pipe assy(2, 3).

(4) Disconnect pilot line hoses(4, 5, 6, 7, 8).

(5) Sling the swing motor assembly(1) and remove the swing motor mounting bolts(9).

- Motor device weight : 51kg(112lb)
- Tightening torque : 97.8~107.8kgf · m
(707~779lbf · 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.

Remove the air vent plug.

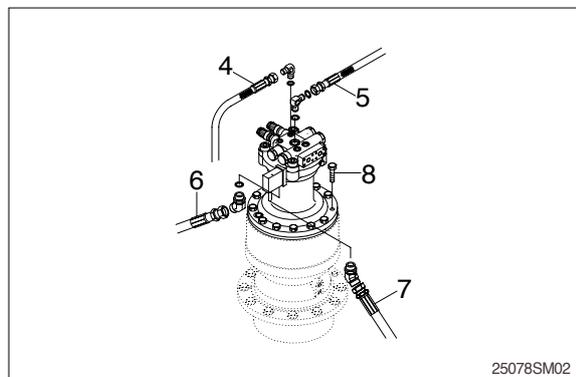
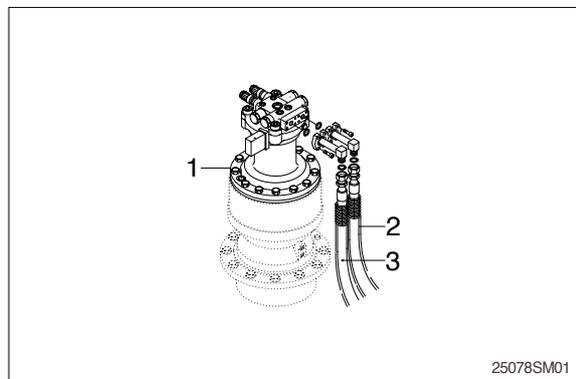
Pour in hydraulic oil until it over flows from the port.

Tighten plug lightly.

Start the engine, run at low idling, and check oil come out from plug.

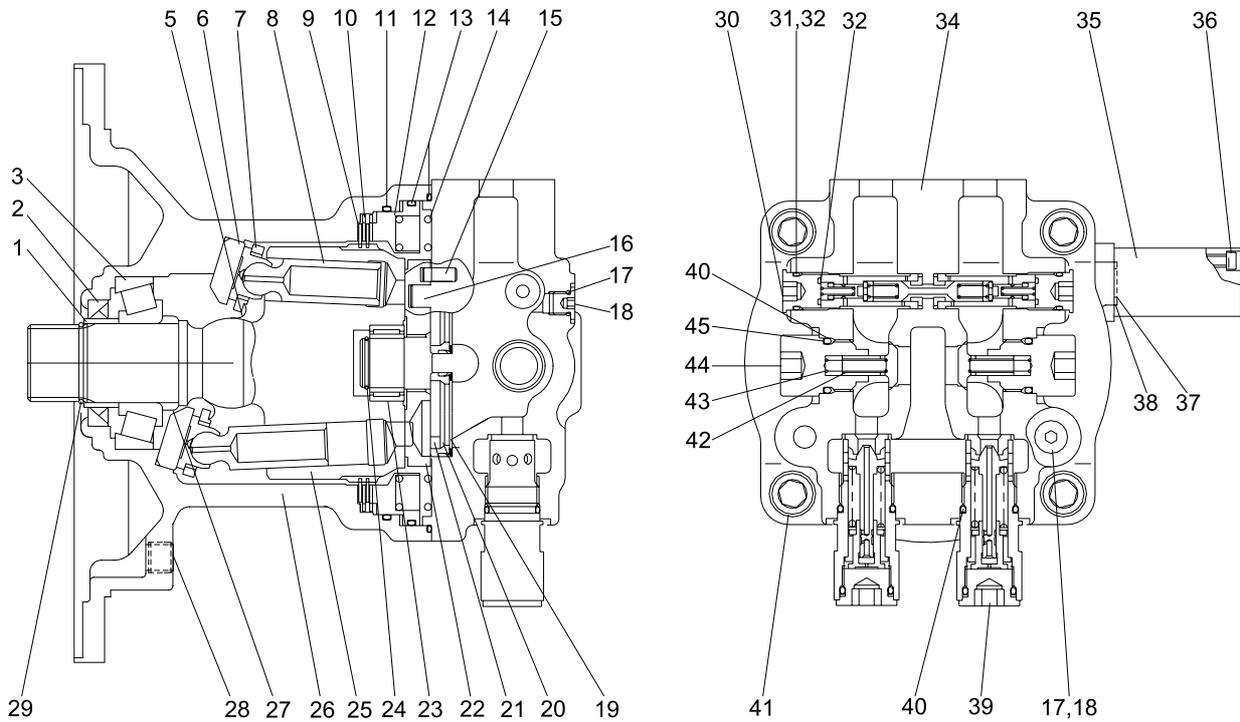
Tighten plug fully.

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



2. SWING MOTOR

1) STRUCTURE



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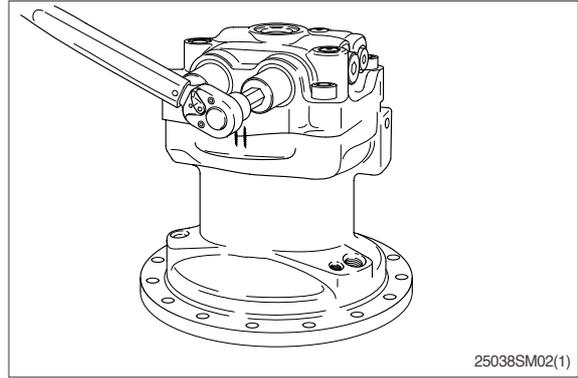
- | | | | | | |
|----|----------------------|----|-----------------------|----|---------------------|
| 1 | Iner ring | 17 | O-ring | 32 | O-ring |
| 2 | Oil seal | 18 | Cap | 33 | O-ring |
| 3 | Taper roller bearing | 19 | Scrowave | 34 | Cover |
| 5 | Backing spring | 20 | Teflon ring | 35 | Time delay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

2) DISASSEMBLY

(1) Removal of relief valve assembly

Remove cap of relief valve assembly(39) with 14mm hexagonal wrench.

Assemble removed relief valve assembly (39) to original state when reassembling.

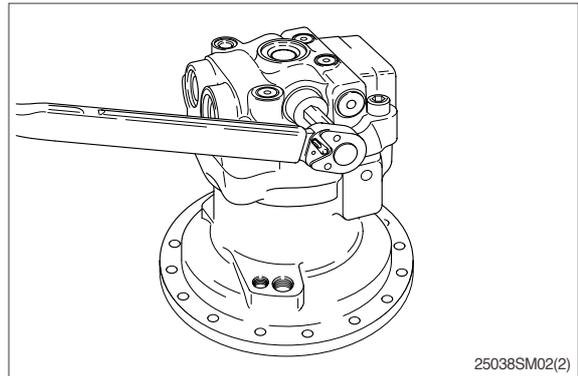


(2) Removal of make up valve and bypass valve assembly

Loosen cap(44) with 14mm hexagonal wrench, and remove check valve(42) and spring(43).

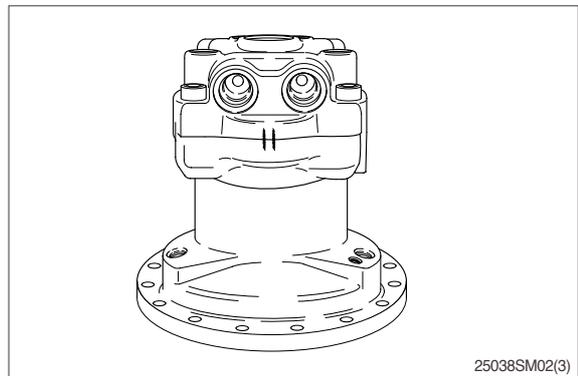
Remove bypass valve assembly(30) with 10mm hexagonal wrench.

Assemble removed bypass valve assembly(30) to original state when reassembling.



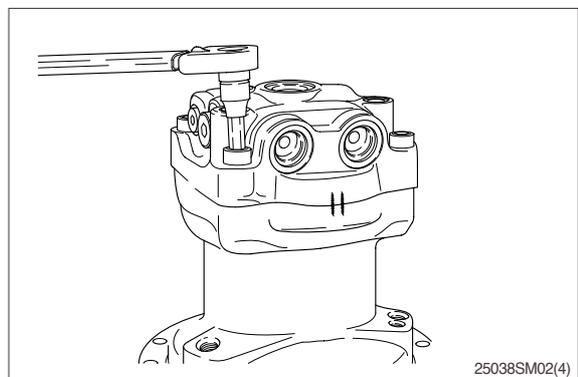
(3) Marking at swing motor

Before disassembling motor, make a matching mark between cover(34) and housing(26) for easy reassembling.



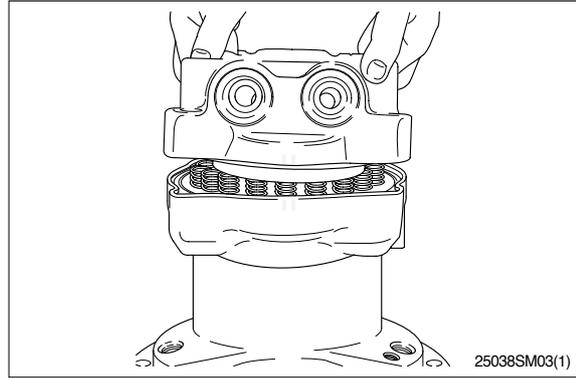
(4) Remove mounting bolts of cover

Loosen hexagon socket bolt(36) with 14mm hexagonal wrench.

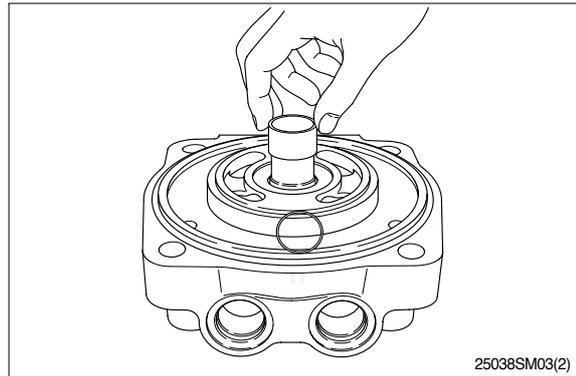


(5) Removal of cover assembly

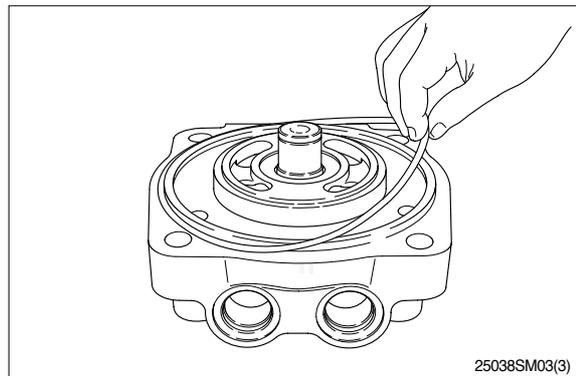
Place shaft of motor assembly to downward and take cover(34) out.



(6) Remove snap ring(24) with steel pointer and remove inner race of needle-bearing(23) by bearing puller.



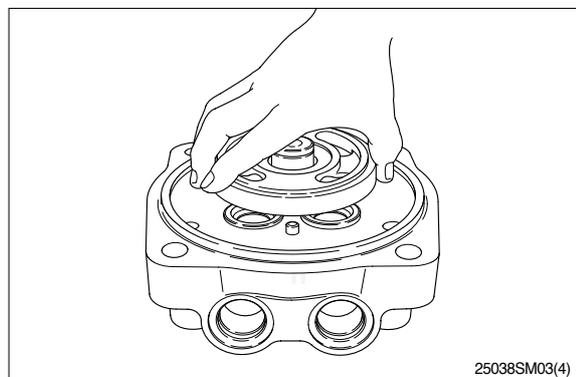
(7) Remove O-ring(13) from cover.



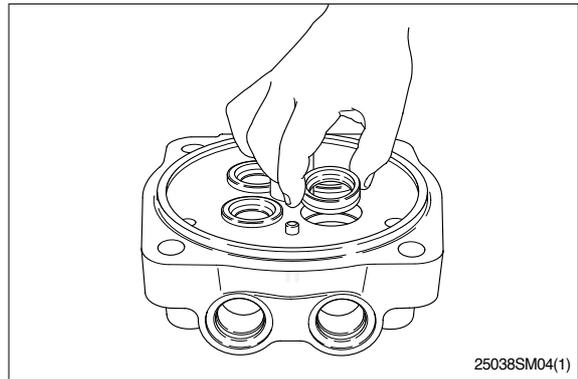
(8) Remove balance plate

Balance plate(22) is adhered on end surface of cylinder(25) by oil viscosity. Take off balance plate(22) with hands. Assembling method of balance plate(22) depends on cover(34).

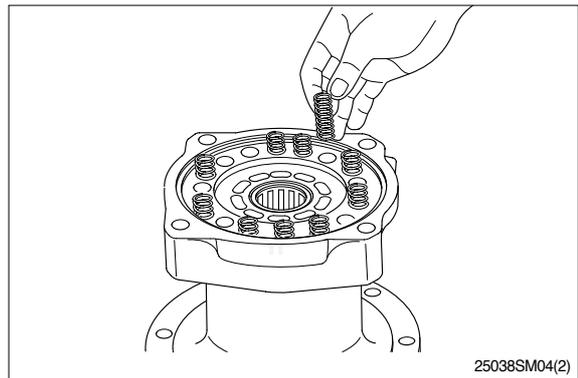
(Band groove and round groove of high · low pressure transmission area)
Before removing, check and record location of balance plate(22) to prevent misassembling.



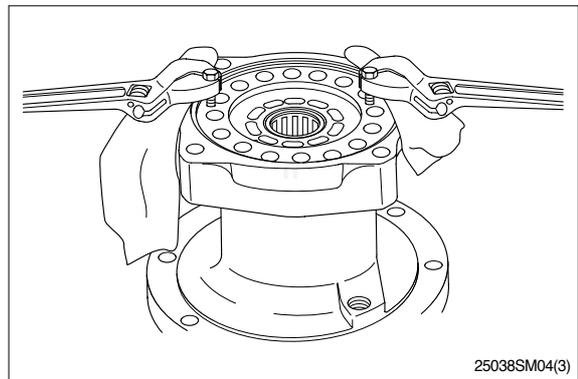
- (9) Remove bushing(21) and scrowave (19) from teflon ring(20).



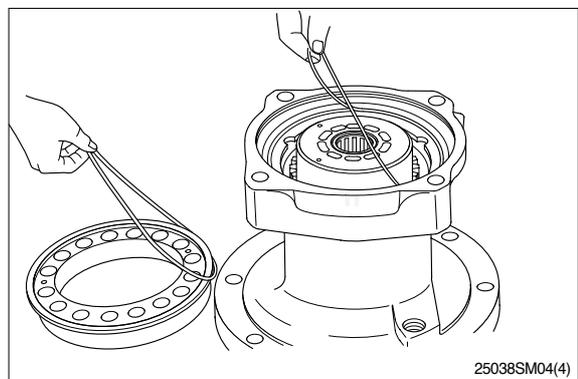
- (10) Removal of spring(14, brake area)**
Remove spring(14) from piston(12).
Check and record original position of each spring(13) for correct assembling.



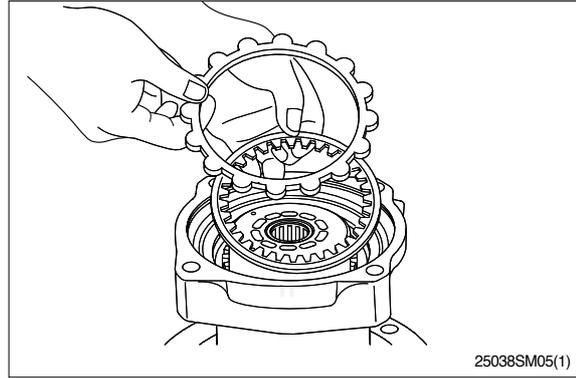
- (11) Removal of brake piston**
When removing piston(12) from housing (26), there is a sliding resistance against tightening of O-rings(11,13). Use tap hole(M6) on piston(12) as shown in the picture.



- (12) Remove O-rings(11,13) from piston(12) and housing(26).



- (13) Remove friction plate(10) and lining plate (9) from housing(26).



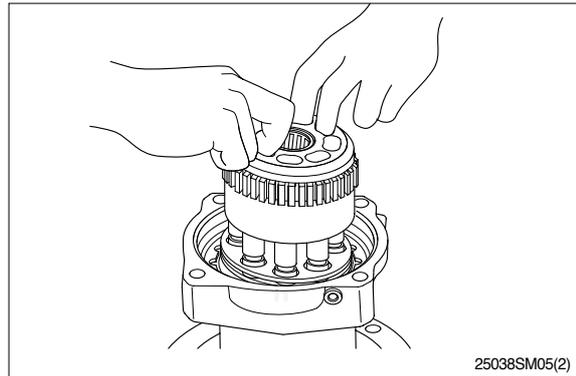
(14) Removal of cylinder assembly

Holding end of cylinder assembly(25) with hand, draw out cylinder assembly from housing.

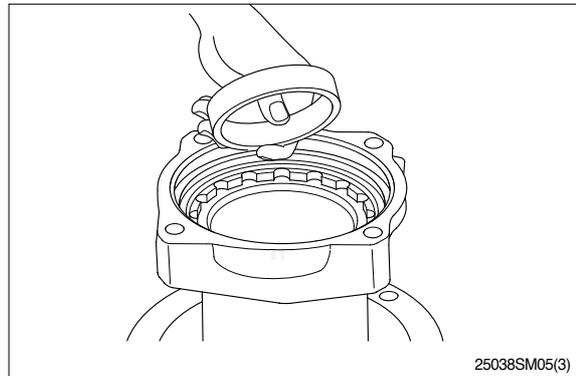
Oil seal(2) and outer race of taper roller bearing(3) are left inside of housing.

End surface of cylinder(25) is sliding face . So, protect the surface with a scrap of cloth against damage.

Make a matching mark on piston hole of cylinder(25) and piston assembly(8) to fit piston into the same hole when reassembling.



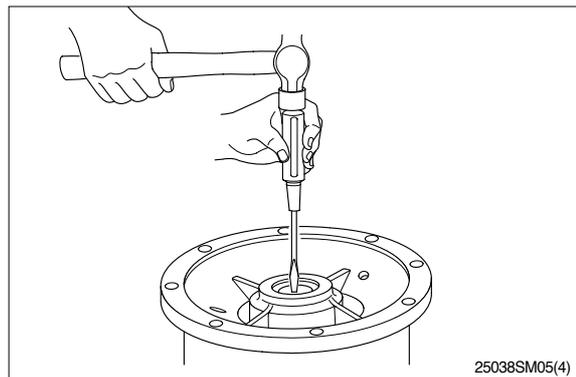
- (15) Separate outer race of taper roller bearing(3) from housing.



(16) Removal of oil seal

Remove oil seal(2) from housing(26) with driver and hammer.

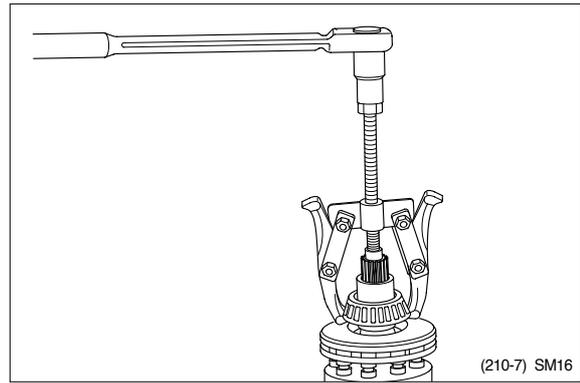
Do not reuse oil seal after removal.



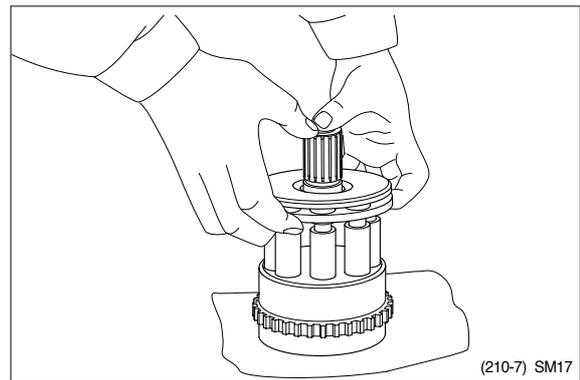
(17) Disassembly of cylinder assembly

Removal of inner race of taper roller bearing(3).

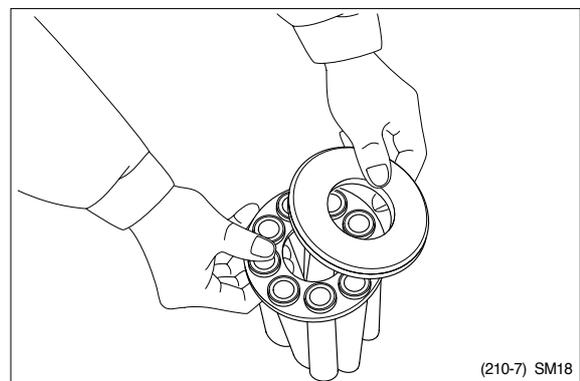
After removing snap ring(29), lift out cylinder(25) with 2 inner race of roller bearing(3) by applying gear puller at the end of spline in the cylinder.



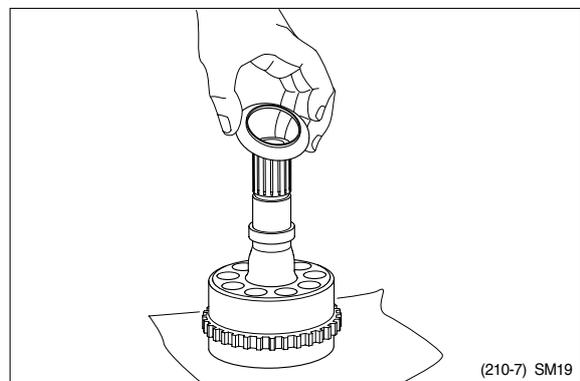
Separate cam plate(6), piston assembly (8), return plate(7) from cylinder(25).



Get cam plate(6) slide on sliding face of piston assembly(8) and remove it. Be cautious not to damage on sliding face of cam plate.



Remove backing spring(5) from cylinder (25).



This completes disassembly.

3) ASSEMBLY

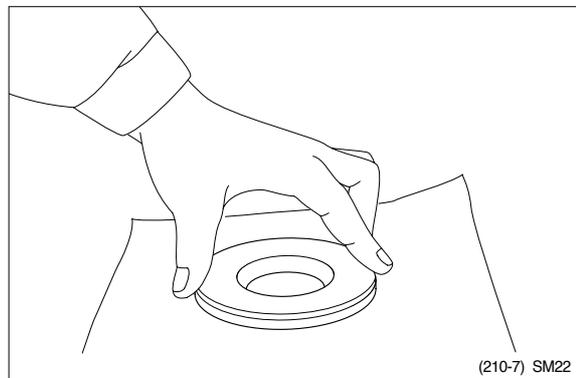
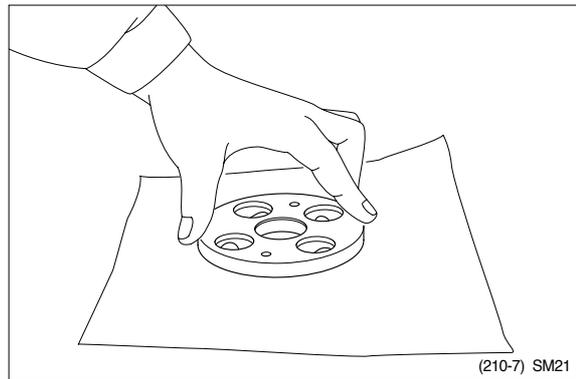
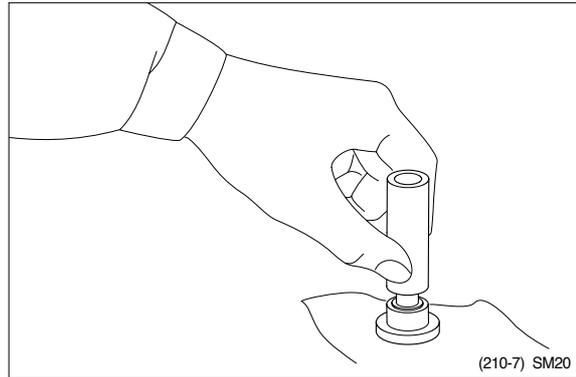
(1) Preparation

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(8), balance plate(22) and cam plate(6) with sandpaper #2000.

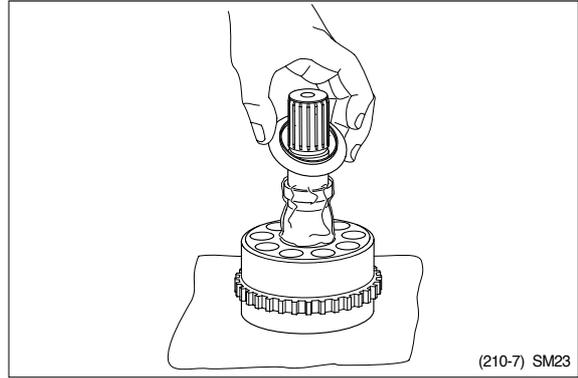


When assembling, lubricate with specified clean hydraulic oil.

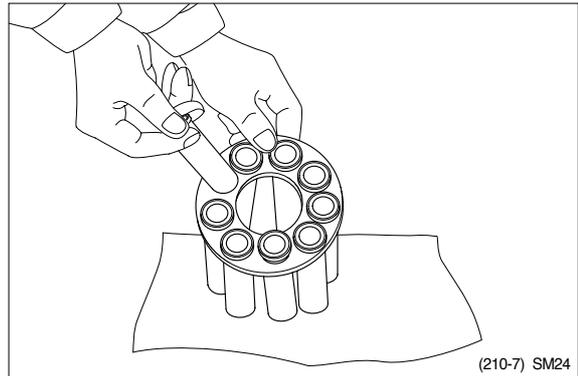
When assembling piston assembly(8) to piston hole of cylinder(25), check matching mark between them.

(2) Cylinder assembly

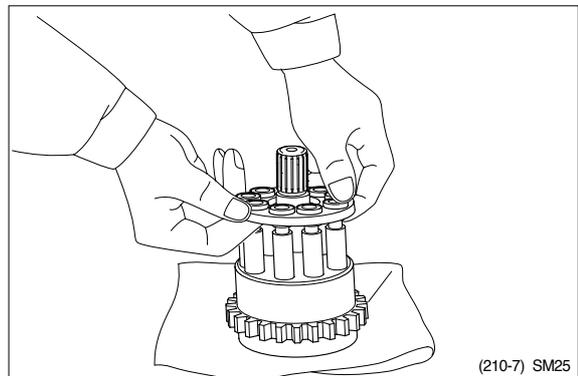
Lubricate grease on round area (Contacting area with spring(5) of cylinder(25) and assemble spring(5).



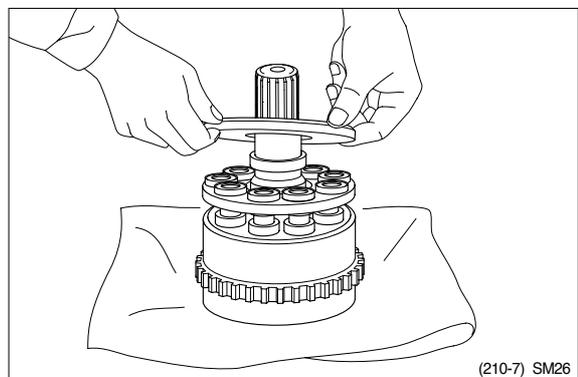
Insert piston assembly(8) in hole of return plate(7).



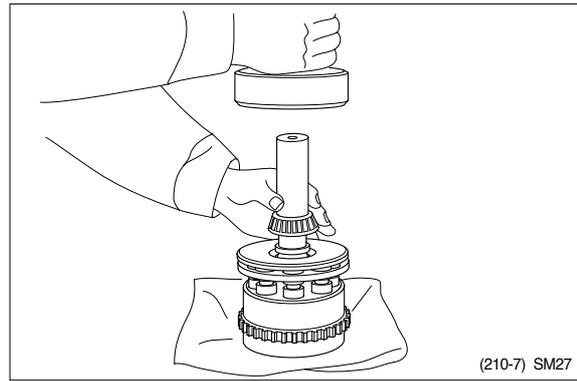
Assemble piston assembly(8) and return plate(7) to cylinder(25). When assembling, check matching mark between them. Before assembling, lubricate specified hydraulic oil in piston hole of cylinder(25).



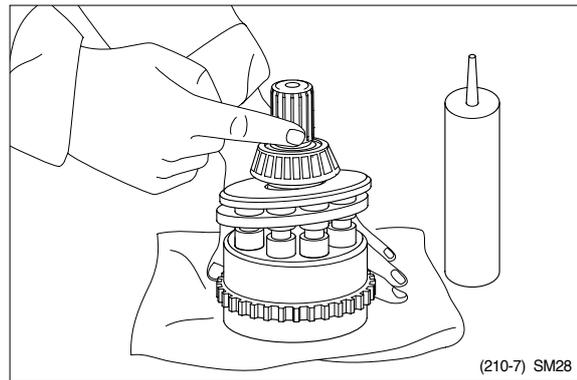
Lubricate specified hydraulic oil on shoe sliding face of piston assembly(8) and assemble cam plate(6).



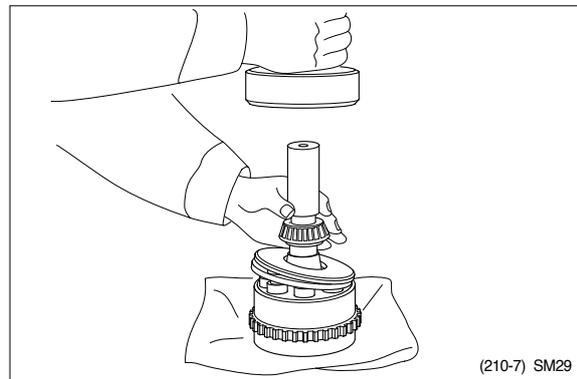
Assemble inner race of taper roller bearing(3) to cylinder(25).



Apply loctite to bearing mounting area of inner race of cylinder(25) lightly.



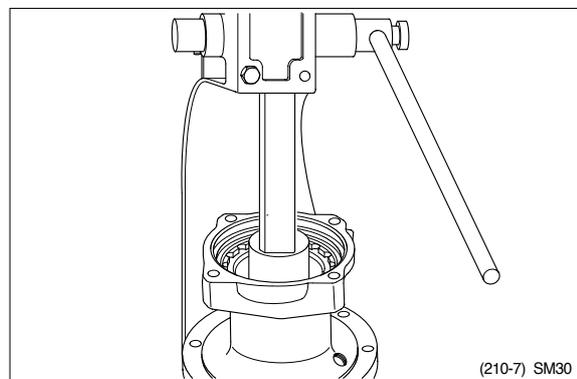
Assemble inner race(1) to cylinder(25).



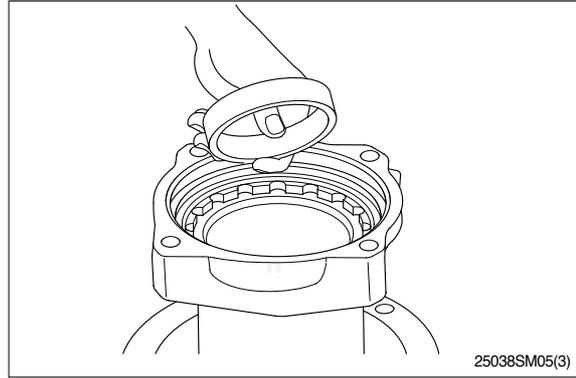
(3) Oil seal

Apply three bond of white color on outer surface of oil seal(2) and assemble and insert it.

Before assembling, lubricate lip of oil seal with grease.

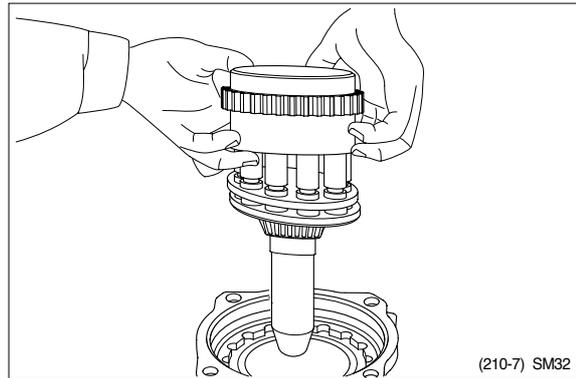


- (4) Assemble outer race of taper roller bearing(3) to motor housing(26).

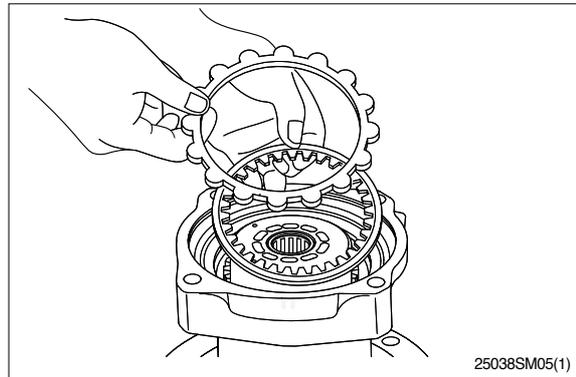


(5) Cylinder assembly

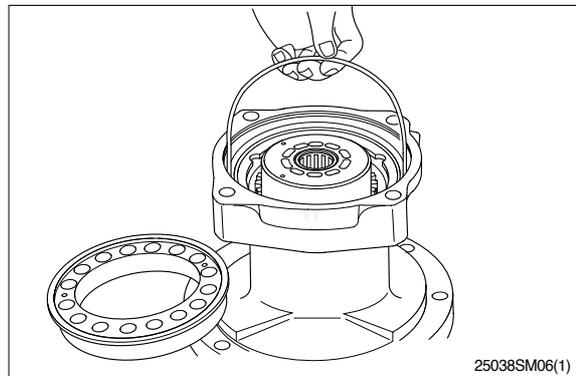
Hold end of cylinder assembly(25) with hands and assemble cylinder assembly to housing(26). Be careful to prevent damage of seal by spline of shaft. When assemble cylinder assembly, spline shaft of cylinder is protruded from end of housing, therefore put pads with length 30~50mm under bottom of housing.



- (6) Assemble plate(10) and lining plate(9).
Lubricate specified hydraulic oil on each side.



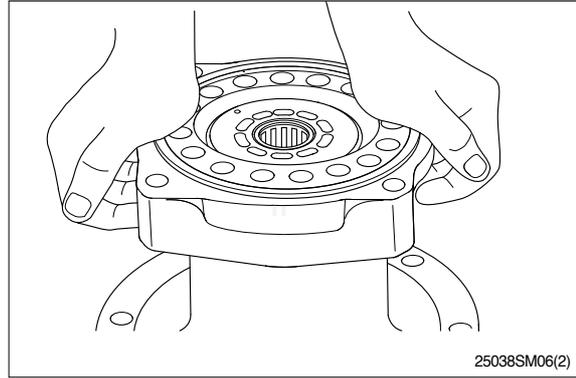
- (7) Insert O-rings(11,13) into housing(26) and piston(12).
Lubricate O-ring with grease.



(8) Brake piston

Lubricate specified hydraulic oil on outer sliding face of piston(12) and assemble brake piston to housing(26).

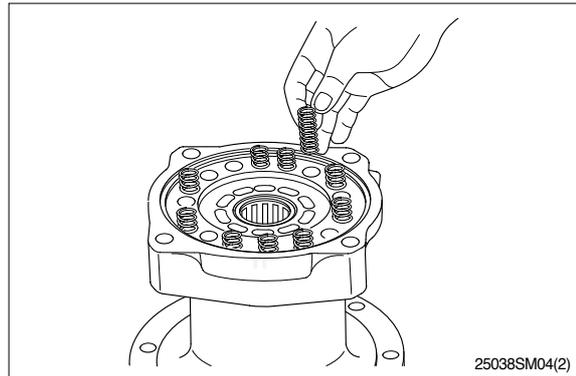
It is too tight to assemble piston(8) because O-rings(11,13) are fitted, therefore it is recommended to push piston(12) horizontally by hands at once.



(9) Spring(14, brake unit)

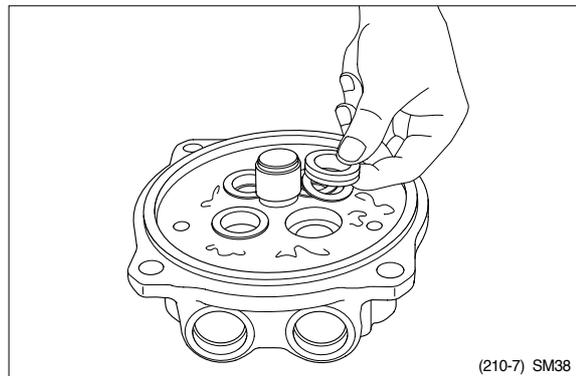
Assemble spring(14) to piston(12) of brake unit.

Insert spring(14) into original position.

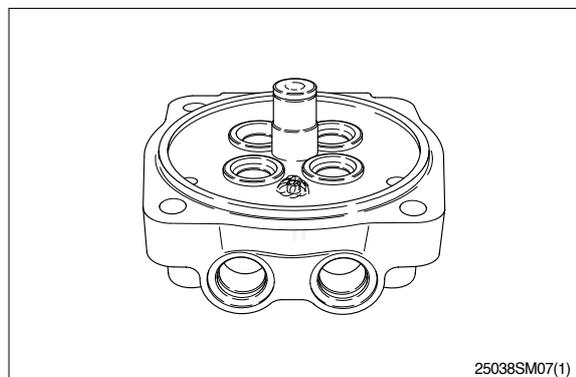


(10) Assemble bushing(21) with teflon ring(20) and scroware(19) to bushing hole of cover(34).

Lubricate on both end surfaces of bushing(21) and outer face of teflon ring(20) with grease and assemble cover to housing, and parts are adhered on cover by grease viscosity which makes assembling easy.

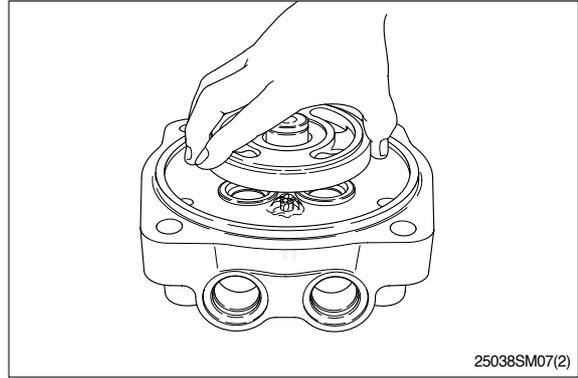


(11) Lubricate locating pin for antirotation of balance plate(22) of cover(34) with grease sufficiently and install locating pin to housing.

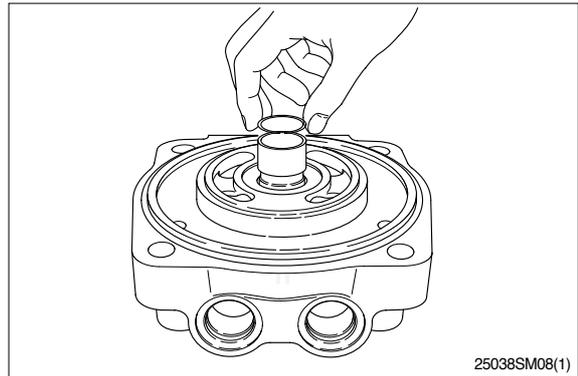


(12) Balance plate

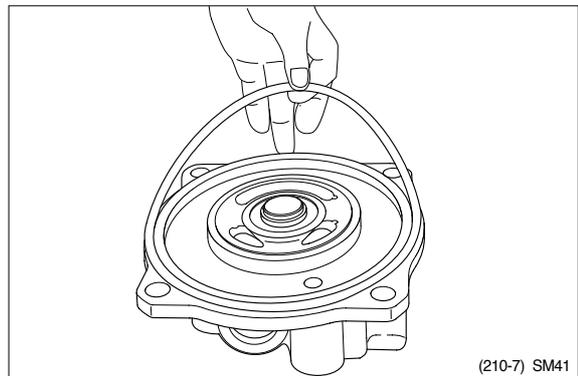
Assemble balance plate(22) to cover(34).
Be cautious of assembling direction.



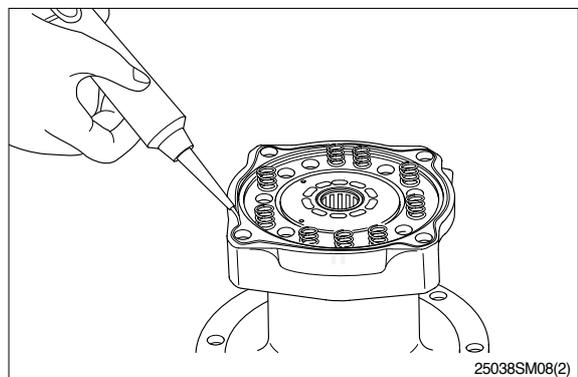
(13) Assemble inner race of needle bearing (23) and snap ring(24) to cover(34).



**(14) Assemble O-ring(13) to cover(34).
Lubricate O-ring with grease.**



(15) Apply three bond of white color to distinguish oil leakage from remaining oil in bolt hole(M16) of cover(34).

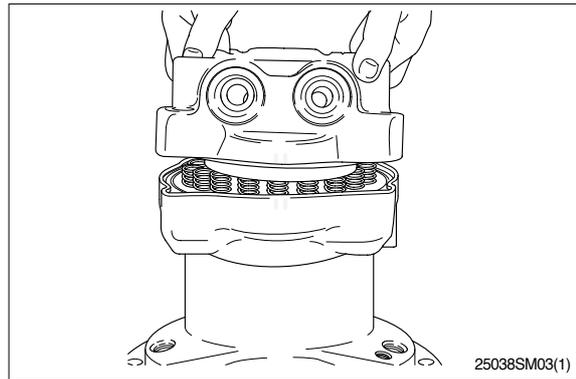


(16) Cover

Assemble cover(34) and balance plate (22) to housing(26) lightly, holding them up with hands.

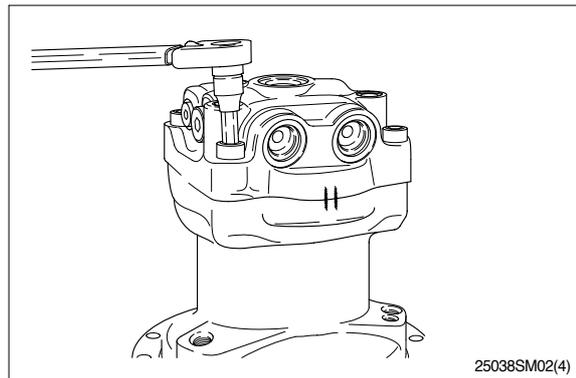
When assembling, be careful not to detach balance plate(22) and bushing (21) from cover(34).

Fit matching marks on housing(26) and cover(34) made before disassembling.



(17) Tighten cover(34) and housing(26) with 16mm hexagonal socket bolt(36).

- Tightening torque : 29kgf · m(210lbf · ft)



(18) Make up valve

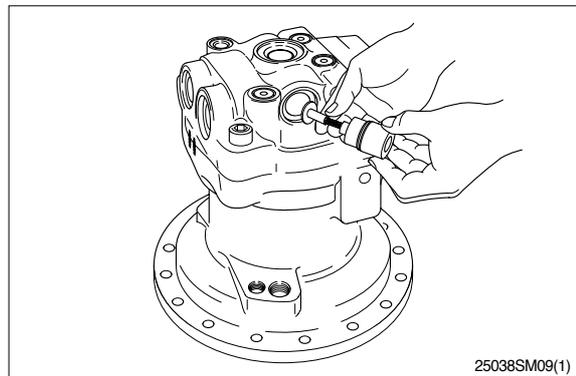
Assemble check(42) and spring(43) to cover(34) and tighten cap(44) with 14mm hexagonal socket bolt.

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

(19) Bypass valve assembly

Assemble bypass valve assembly(30) to cover(34) with 10mm hexagonal socket bolt.

- Tightening torque : 8kgf · m(58lbf · ft)

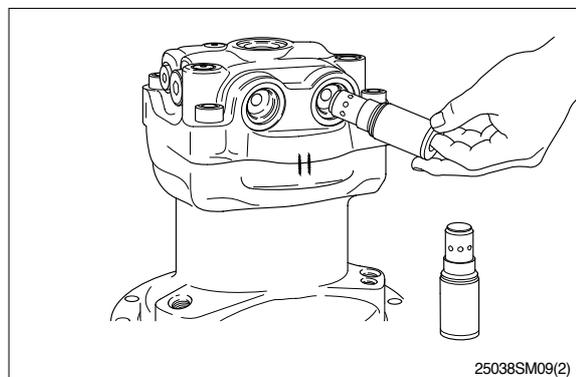


(20) Relief assembly

Assemble relief valve assembly(39) to cover(34) with 14mm hexagonal socket bolt.

- Tightening torque : 8kgf · m(58lbf · ft)

Be cautious of assembling method.



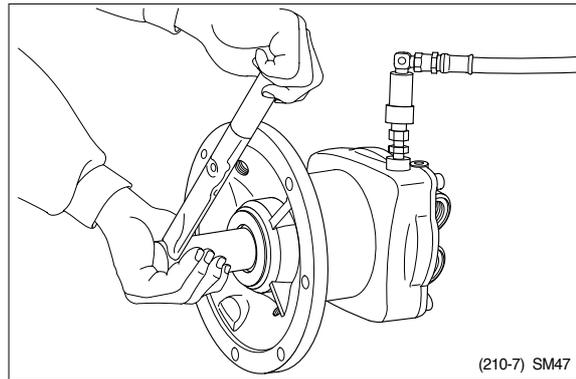
(21) Check of assembly

Load pilot pressure of 30kgf/cm² to brake release port after opening inlet and outlet port.

Check if output shaft is rotated smoothly around torque of 4kgf · m.

If not rotated, disassemble and check.

This completes assembly.



3. REMOVAL AND INSTALL OF REDUCTION GEAR

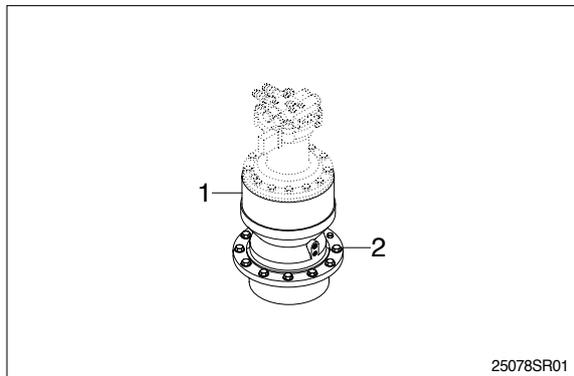
1) REMOVAL

- (1) Remove the swing motor assembly.
For details, see **removal of swing motor assembly**.
- (2) Sling reduction gear assembly(1) and remove mounting bolts(2).
- (3) Remove the reduction gear assembly.
 - Reduction gear device weight : 279kg
(615lb)



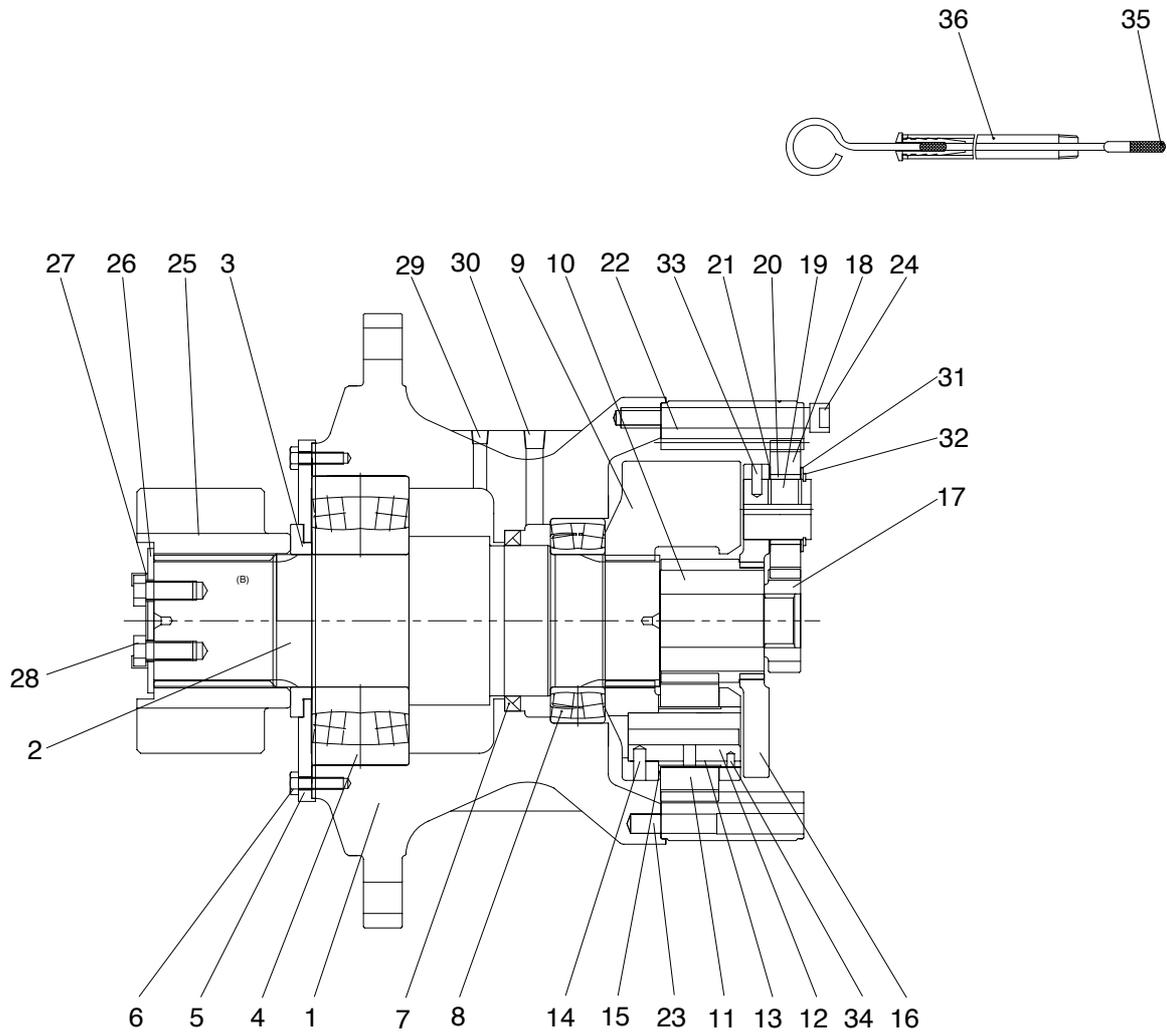
2) INSTALL

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



4. DISASSEMBLY AND ASSEMBLY OF REDUCTION GEAR

1) REDUCTION GEAR



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1	Casing	13	bushing 2	25	Pinion gear
2	Drive shaft	14	Spring pin	26	Lock plate
3	Spacer	15	Thrust washer	27	Lock washer
4	Roller bearing	16	Carrier 1	28	Hexagon bolt
5	Cover plate	17	Sun gear 1	29	Plug
6	Hexagon bolt	18	Planet gear 1	30	Plug
7	Oil seal	19	Pin 1	31	Side plate 2
8	Roller bearing	20	Needle cage	32	Stop ring
9	Carrier 2	21	Side plate 1	33	Spring pin
10	Sun gear 2	22	Ring gear	34	Spring pin
11	Planet gear 2	23	Knock pin	35	Gage bar
12	Pin 2	24	Socket bolt	36	Gage pipe

2) DISASSEMBLY

(1) SWING REDUCTION GEAR

Remove plug(29, 30) and drain out gear oil.



Loosen the socket bolts(24) to separate swing motor from reduction gear.



Move out No.1 sun gear(17) and No.1 carrier sub assy by using jig.



Full out No.2 sun gear(10).



Full out No.2 carrier sub assy by using jig and crane.

pay attention to ensure gear is not damaged during disassembling.



Moue out ring gear by the removal groove between ring gear(22) and casing(1) by using removal jig.

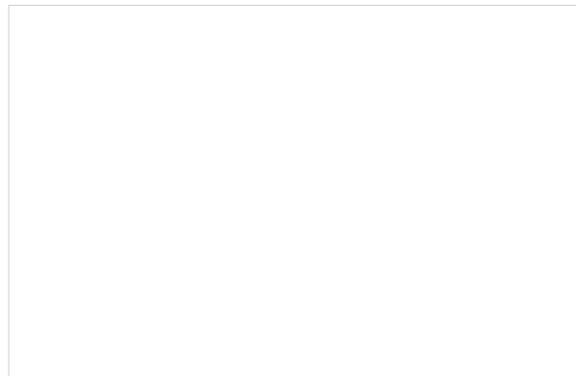


Full out knock pin(23).

Do not need to remove the knock pin if it is not worn or damaged.



Put it on the working table with drive shaft up.



Remove lock washer(27) by removal jig and loosen hex bolt(28) with fixing pinion gear(25) and thereafter plate lock(26) & pinion gear(25).



Loosen hex bolt(6) and remove spacer (3) and cover plate by screwing a removal bolt into tap hole on the cover plate(5).



Dismantle drive shaft by using jig
Removed oil seal should not be reused.
Replace new oil seal when assembling.



(2) NO.1 CARRIER SUB ASSY

Remove stop ring(32) and dismantle No.2 side plate(31) and No.1 planet gear(18).



Dismantle needle cage(20) and No.1 side plate(21).

Do not need to dismantle No.1 pin, No.1 carrier and spring pin, when they have no problems.

Be sure to make a marking on the pin of each planet gear to ensure them to be placed in the same locations when assembling.

When need to dismantle pin. Hammer the section end of pin to pull out.



(3) NO.2 CARRIER SUB ASSY

Remove spring pin(14) by hammering in a key to the opposite side of the No.2 pin.



Full out No.2 pin assy

Do not reuse both the No.2 pin assy and spring pin.



(4) SHAFT ASSY

Press drive shaft(2) by using jig to remove roller bearing.

Do not need to disassemble if it has no special problems.



3) ASSEMBLY

(1) NO.1 CARRIER SUB ASSY

Place the No.1 carrier(16) horizontally on the work table. Fit the No.1 pin(19) into the hole of No.1 carrier(16) by hydraulic pressing machine.

Be careful to direct the pin(19) perpendicularly to the carrier(16) when pressing.



Install the No.1 side plate(21) and needle cage(20) thereafter.

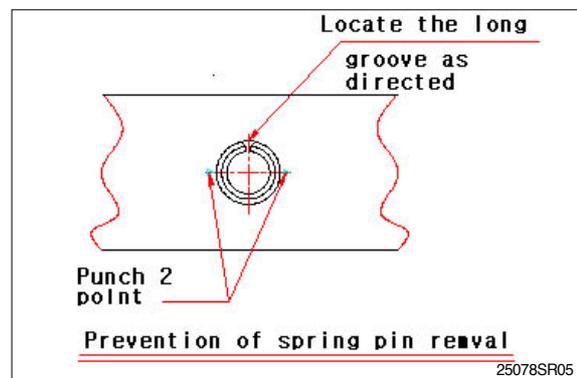


Put No.1 planet gear(18) and No.2 side plate(31) together and install a stop ring(32) by using assembling.



Insert spring pin(33) into the carrier sub-assembly by using jig and hammer.

Take care of planet gear(18) when assembling spring pin(33).



(2) ASSEMBLY-NO.2 CARRIER

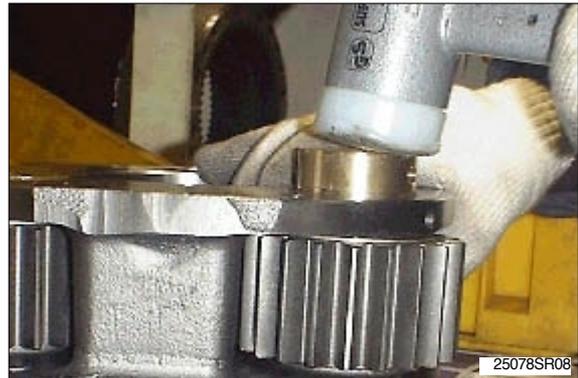
Place the thrust washer(15) on the No.2 carrier(9), meeting it with pin hole location. Be sure to check that the carrier(9) is not turned up side down when putting the washer(15).



Place No.2 planet gear(11) onto the right location of the carrier(9).

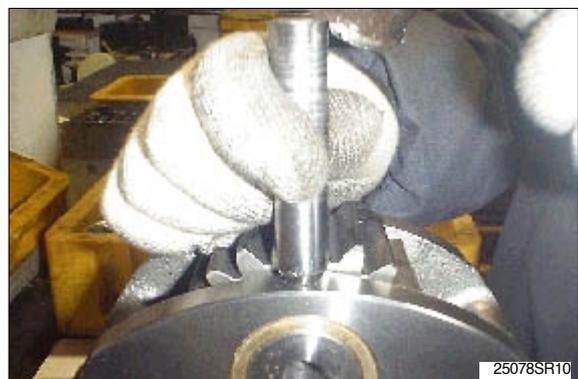


Assemble the planet gears(11) and carrier (9) by inserting the pin assembly(12) using rubber hammer. Pay special attention to locate the spring pin hole to meet with the hole of the carrier(9).



Insert spring pin(14) by using fixture and hammer.

Take care of planet gears(11) when hammering the pin(12).



After complete assembly, check if it revolves without problem when rotate the planet gears(11) by hand.

When problems found in revolution, disassemble it in reverse course and assemble again. Be sure to use new spring pin(14) when re-assembling.



(3) SHAFT ASSY

Heat roller bearing(4) with bearing heater up to about 80~100°C.

Be sure to keep the suggested heating temperature. Over heating may cause deformation.



Demagnetize roller bearing(4) using demagnetizing machine.

Use special care to handle the bearing as it is very hot.



Place drive shaft(2) with positioning 2 tap holes upside.

Put bearing into drive shaft(2).

Be sure to prevent any contamination on the assembling surface during the install. Be sure to check by eye the surface of roller bearing(4) is completely contacting to the mating surface of the drive



Turn the drive shaft(2) to have the 2 tap hole side down and inject grease oil into roller bearing(4).

Recommended amount of grease is 1.4kg (3.1pound).



(4) CASE SUB ASSY

Place the case(1) on the reversing machine, having the flange side of the case up.

Tighten lifting bolts into the 2 Tap holes (M16) of shaft(2) and install shaft assembly(2) into case using crane.

Be sure to clean the case before install, using washing machine with the temperature of 80.C(176.F).

Do not install shaft assembly by force.



Assemble cover plate(5) and thereafter spacer(3).

Use jig when assembling spacer to be seated completely on surface.

Spread grease on the inner part of spacer.



Assemble cover plate(5) with case(1) after spreading loctite 262 and tighten hex bolt(M10) (6).



Install pinion gear(25).
Be careful to check right direction of pinion gear when installing.



Put lock plate(26) and lock washer(27),
matching tap holes and tighten hex bolt
(28).

· Tightening torque : 24kgf · m(173lbf · ft)

When installing hex bolt(28), be sure to
spread loctite 262.



To lock the bolts(28), bend the lock
washer(27) to cover over the bolt head
using jig.



Reverse case(1) and press to insert oil
seal(7) by using jig after spreading
grease oil on the outside ring of the seal.
Coat grease oil slightly on the lip surface
of the oil seal to prevent any scratch
when installing.



Be sure to check by eye the oil seal(7) is seated completely after being installed.



Spread loctite 609 on the outside ring of roller bearing(8) and insert the bearing(8) by using a pressing jig.



Clean the assembling surface of case and spread packing liquid(TH1105).



Place ring gear(22) on the case by matching knock pin hole.

Insert 4 knock pins(23) by using jig.

Be sure to check the hole location of oil gage before inserting.



Assemble ring gear with case by screwing socket bolt(M16) (24).

Spread loctite 262 on socket bolt(24) when installing.



Install drain plug(29,30) after winding sealing tape.



LEAK TEST

The successful assembly should have no air leakage when applied by 2kgf/cm² of compressed air for about 3 minutes after being air sealed.



(5) SWING REDUCTION GEAR

Mount No.2 carrier assembly in the case sub assembly and install bolts into 2 tap holes(M8).

Turn the carrier slowly by hand to adjust the matching holes when assembling.



Install No.2 sun gear(10).

Be sure to check the direction of sun gear(10) when assembling.



Mount No.1 carrier assembly in the case sub assembly and install bolts into 2 tap holes(M8).

Turn the carrier slowly by hand to adjust the catching holes when assembling.



Assemble No.1 sun gear(17).

