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 in 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)

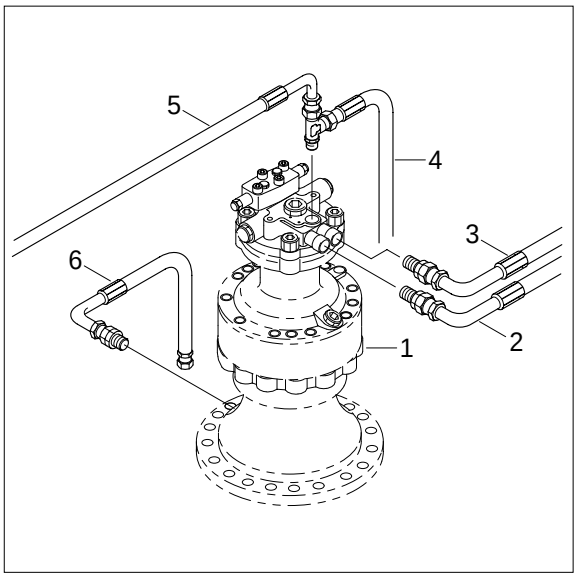
(4) Disconnect pilot line hoses(4, 5, 6, 7, 8)

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

- Motor device weight : 218kg(481lb)
- Tightening torque : 57.9kgf · m (418.8lbf · ft)

(6) Remove the swing motor assembly.

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



2) INSTALL

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

(2) Bleed the air from the swing motor.

① Remove the air vent plug.

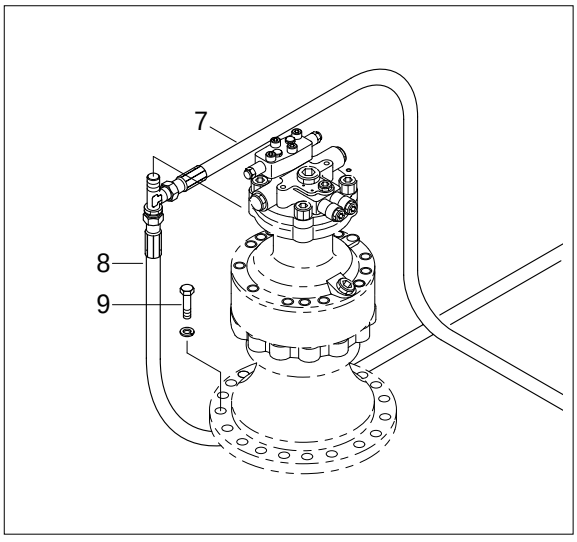
② Pour in hydraulic oil until it over flows from the port.

③ Tighten plug lightly.

④ Start the engine, run at low idling, and check oil come out from plug.

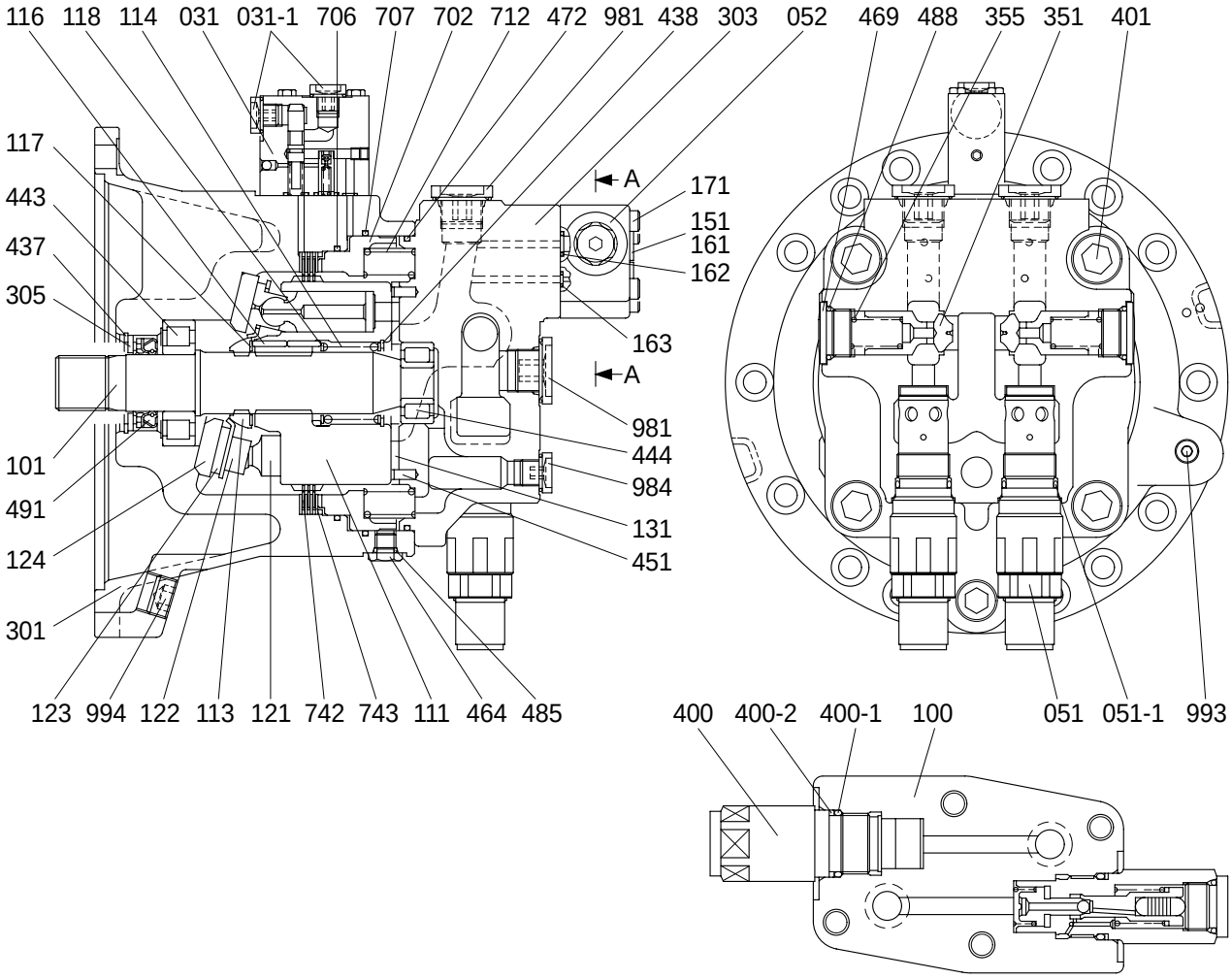
⑤ Tighten plug fully.

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



2. SWING MOTOR

1) STRUCTURE



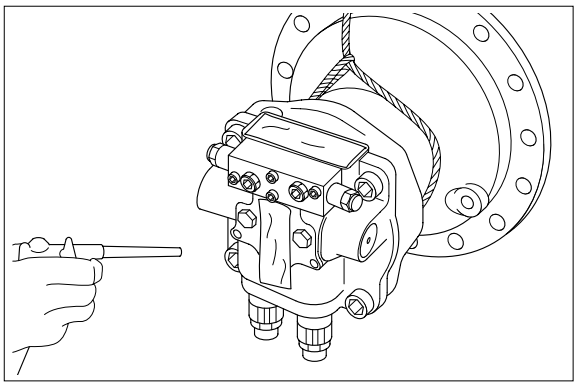
SECTION A-A

031	Time delay valve	161	O-ring	464	Plug
031-1	Plug	162	O-ring	469	Plug
051	Relief valve assembly	163	O-ring	472	O-ring
051-1	O-ring	171	Hexagon socket bolt	485	O-ring
100	Casing	301	Casing	488	O-ring
101	Drive shaft	303	Valve casing	491	Seal
111	Cylinder	305	Seal cover	702	Brake piston
113	Retainer ring	351	Plunger	706	O-ring
114	Spring	355	Spring	707	O-ring
116	Push rod	400	Reactionless valve	712	Brake spring
117	Spacer	400-1	O-ring	742	Friction plate
118	Spacer	400-2	Back up ring	743	Separate plate
121	Piston	401	Hexagon socket bolt	981	Plug
122	Shoe	437	Snap ring	984	Plug
123	Plate	438	Snap ring	993	Plug
124	Shoe plate	443	Roller bearing	994	Plug
131	Valve plate	444	Roller bearing		
151	Plug	451	Pin		

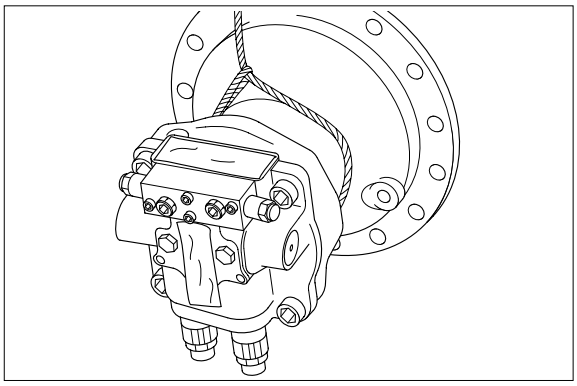
2) DISASSEMBLY

(1) Lift the motor out. Clean the motor in kerosene and dry with compressed air.

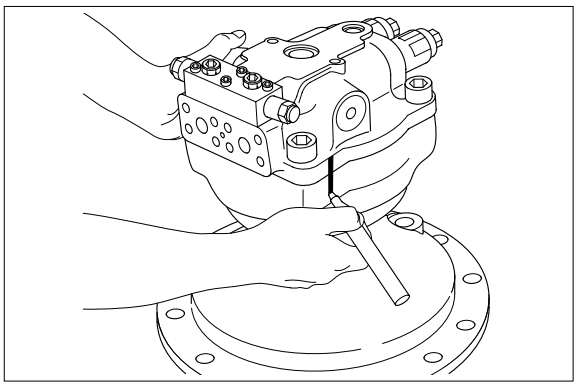
※ To avoid dust inside the motor, mask all the ports of the motor with tapes.



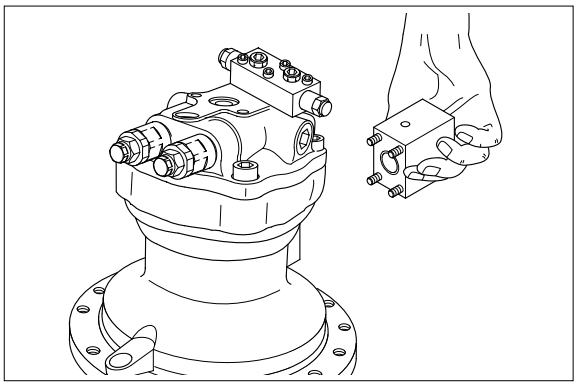
(2) Loosen the drain plug to discharge oil in the casing(301).



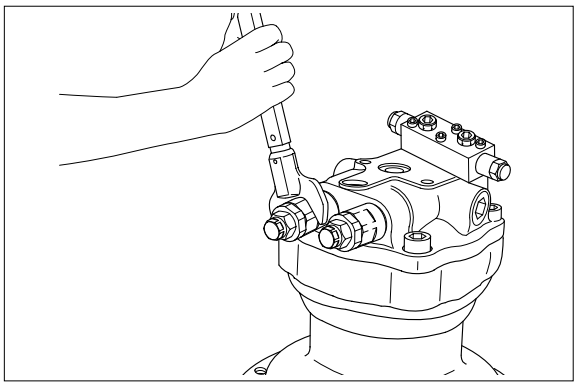
(3) Fix the output drive shaft(101) on the workbench with the end of output shaft down. Put matching marks on casing(301) and valve casing(303) for easy reassembly.



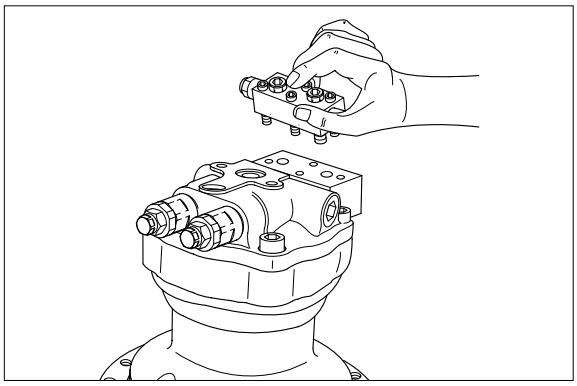
(4) Remove the time delay valve(031).



(5) Remove the relief valve(051) from valve casing(303).

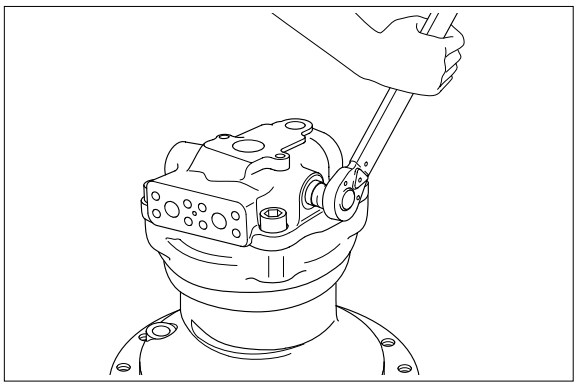


(6) Remove the anti rotation valve(052) from valve casing(303).

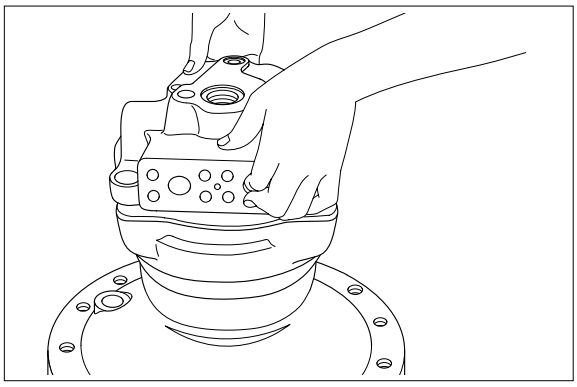


(7) Remove RO plug(469) from valve casing(303) and take off spring(355) and plunger(351).

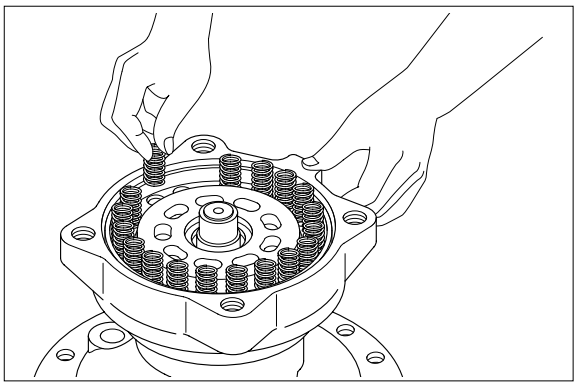
※ Be careful not to damage the plunger seat assembly.



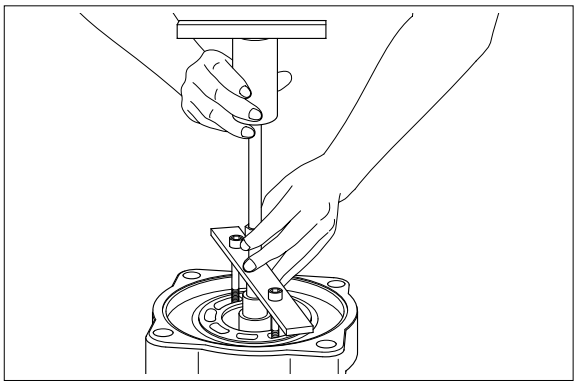
(8) Loosen the socket bolt(401) and remove valve casing(303) from casing(301). Then, remove the valve plate(131) from valve casing(303) with care.



(9) Remove the brake spring(712) from brake piston(702).

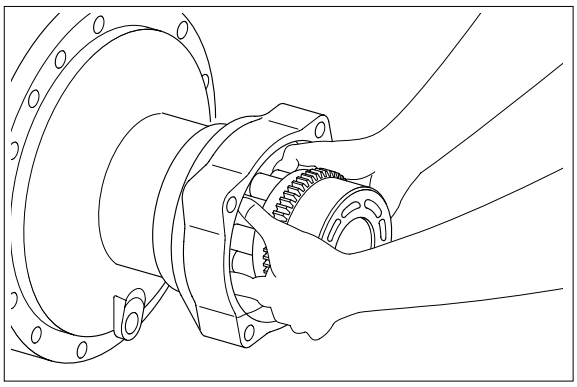


(10) Remove brake piston(702) from casing(301).



(11) Remove the cylinder(111) from the drive shaft (101) with the motor positioned horizontally. Remove piston(121), pushing plate(123), spherical bush(113) and spacer(117).

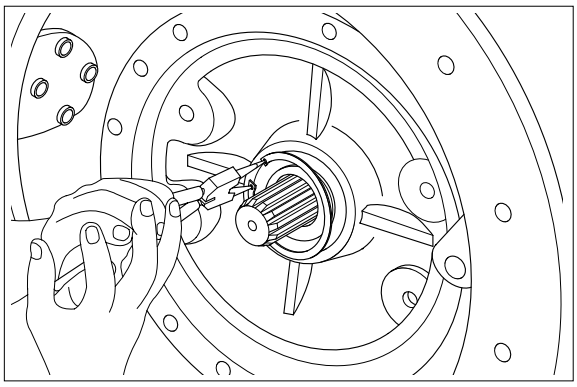
※ If shoe plate would not removed easily, try again after procedure(15).



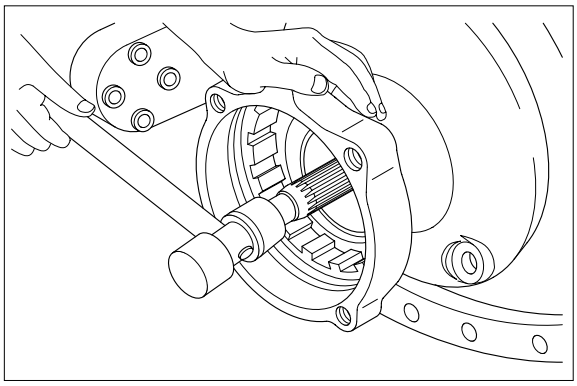
(12) Remove friction plate(742) and separate plate(743) from casing(301).

(13) Remove snap ring(437) with plier and remove the seal cover(305) from casing(301).

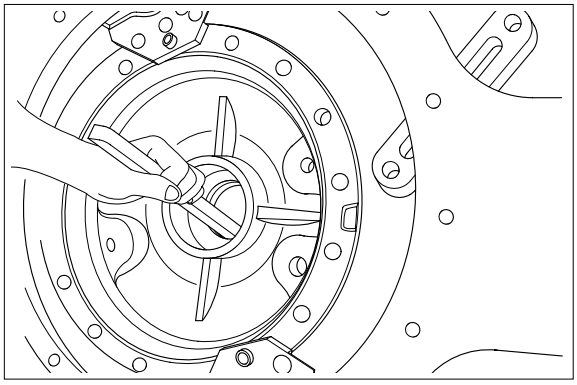
※ Seal cover could be removed with sliding shaft if necessary.



(14) Remove drive shaft(101) from casing(301).



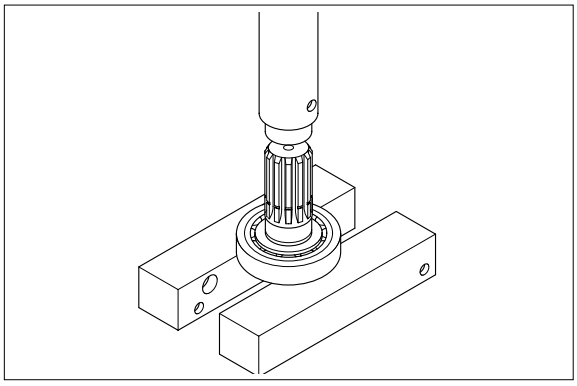
(15) Remove the shoe plate(124) from casing(301).

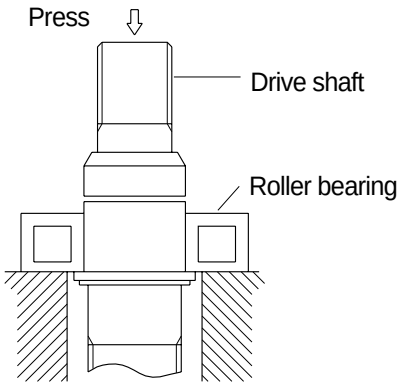


(16) Proceed with following job only when necessary.

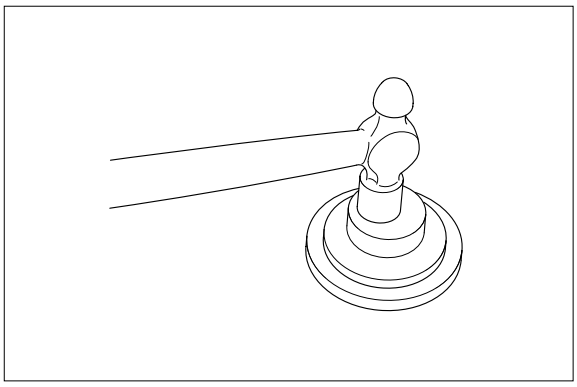
① Remove the cone of roller bearing(443) from output drive shaft(101) by press.

※ Do not reuse bearings.

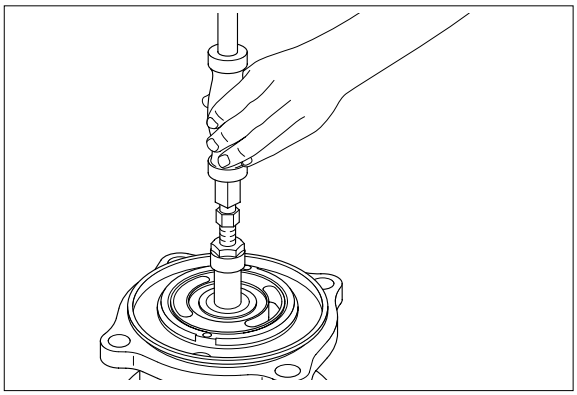




② Remove oil seal(491) from seal cover(305).

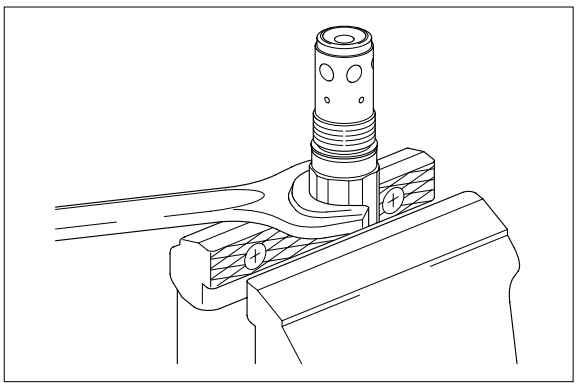


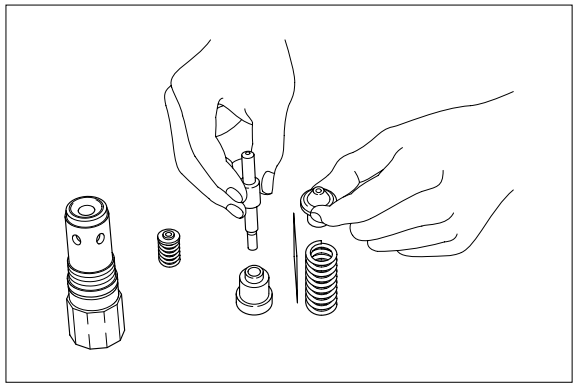
③ Remove the roller bearing(444) from the valve casing(303) by using slide hammer bearing puller.



④ When disassembling the relief valve, release the plug(201) and remove the bush(343), spring(322), and spring seat(333) from the rod(303) of the body(101). Remove the piston(302), rod(303), spring(321), spring seat(331) and plunger(301) with the body(101) downward.

※ Do not release the adjust bolt(471) and lock nut(472).



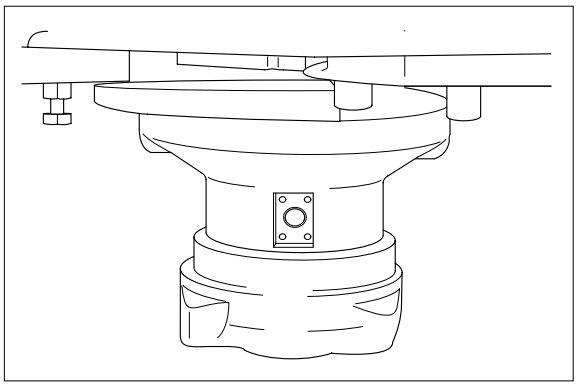


This completes disassembly.

3) ASSEMBLY

Do the reassembly in the reverse procedure of the disassembly.

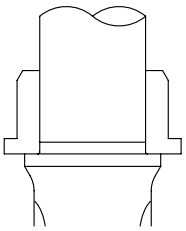
(1) Place the casing(301) on the workbench with the valve casing(303) downward.

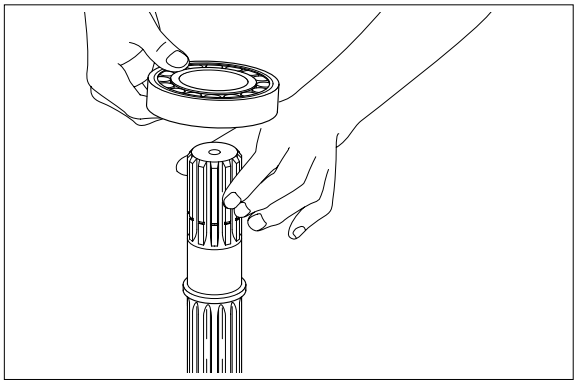


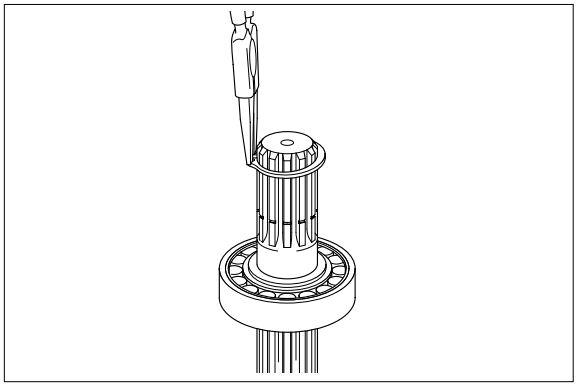
(2) Install the cone of roller bearing(443) to the output drive shaft(101).

※ Pay attention to roller bearing(443) direction.

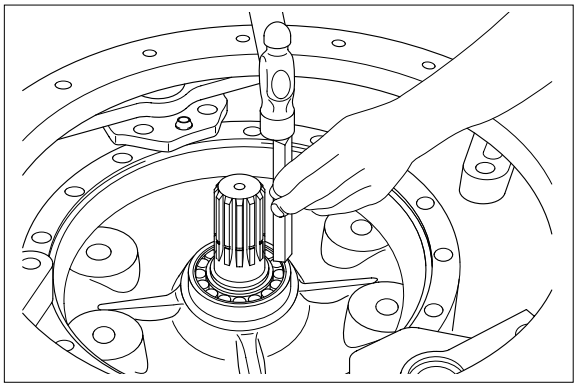
Output side



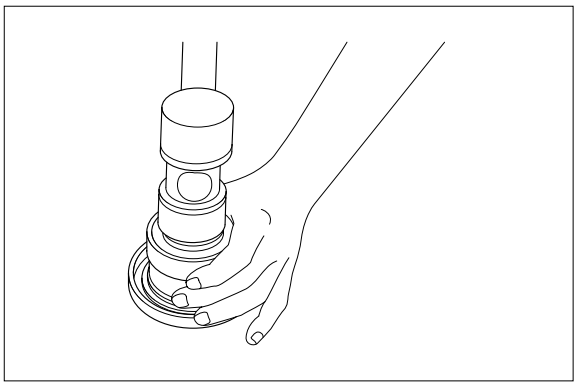




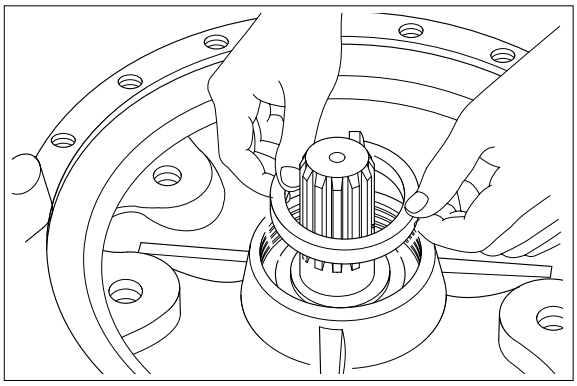
(3) Insert the drive shaft(101) into the casing(301) with the end of output shaft upward and tap the outer race of roller bearing the hammer.



(4) Insert the output drive shaft(101) in the casing.

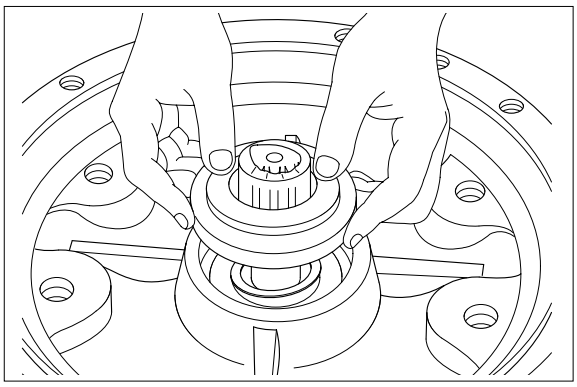


(5) Tack oil seal(491) to the casing(301).

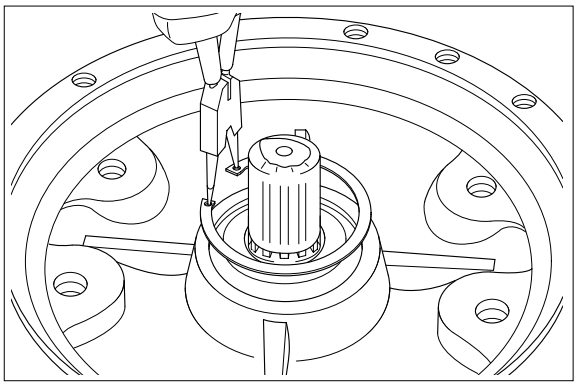


(6) Reassemble the seal cover(305) to the casing(301).

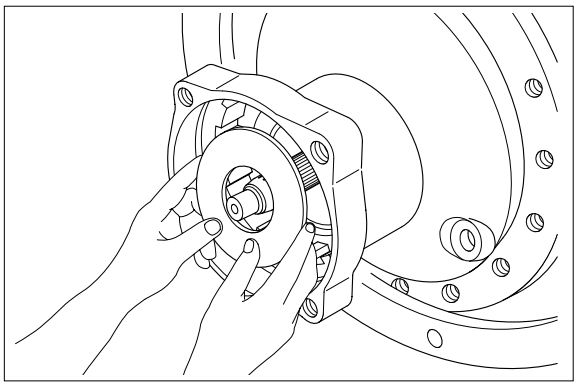
※ Apply grease to the rib of oil seal to avoid damage to the rib.



(7) Install the snap ring(437) to the casing(301).

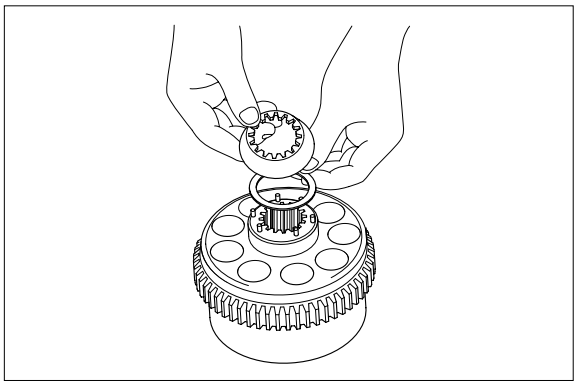


(8) Insert the shoe plate(124) with the casing(301) position horizontally.

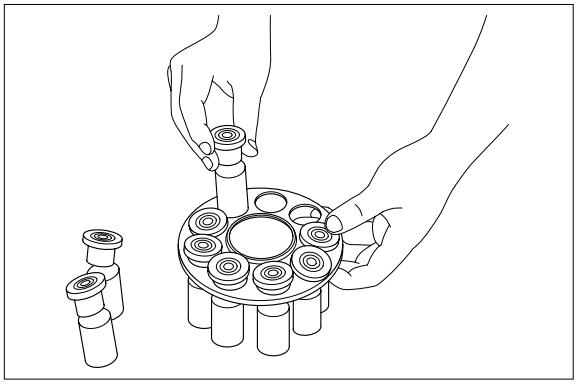


(9) Insert the push rod(116) into the cylinder(111). Place the spherical bush(113) assembled with spacer(117) onto the cylinder.

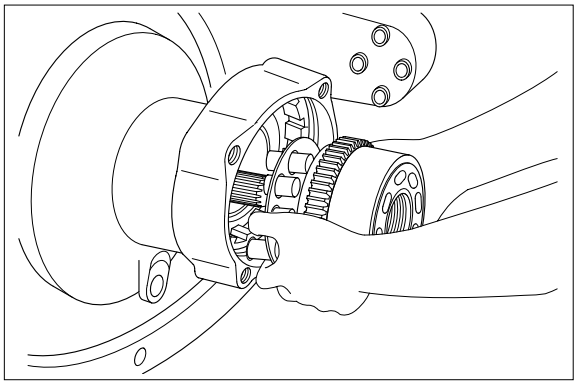
※ Insert two push rods in each hole.



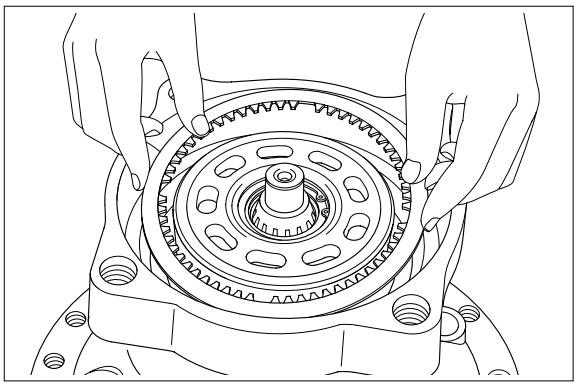
(10) Install the piston sub-assembly(121, 122) to the push plate(123).



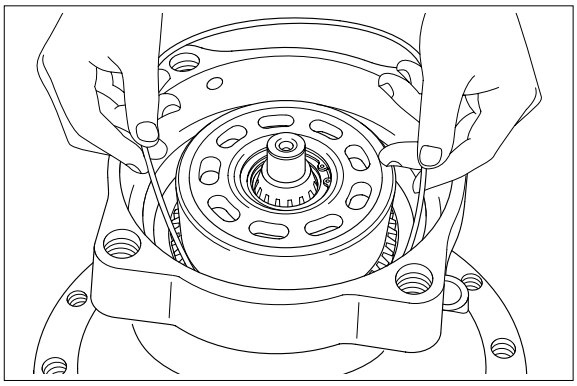
(11) Reassemble the piston assembly(121, 122) to the cylinder(111).
Then, insert the cylinder assembly into the casing(301).



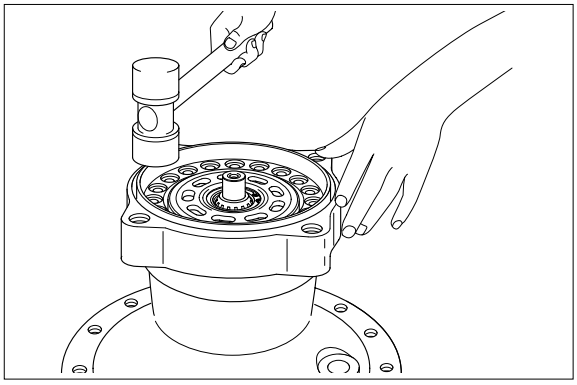
(12) Place the casing(301) under the seal cover(305) and reassemble 3 sheets of separate plate(743) and then 2 sheets of friction plate(742) to the casing(301).



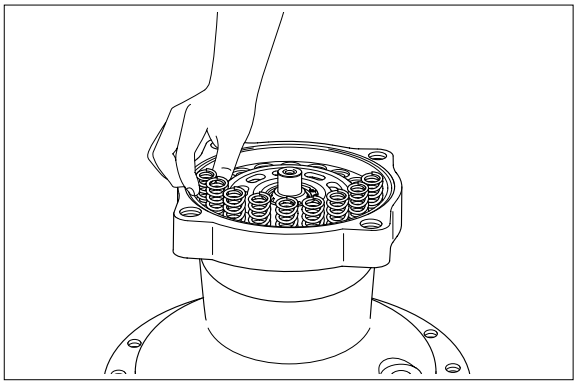
(13) Insert O-ring(706, 707) in the casing (301).



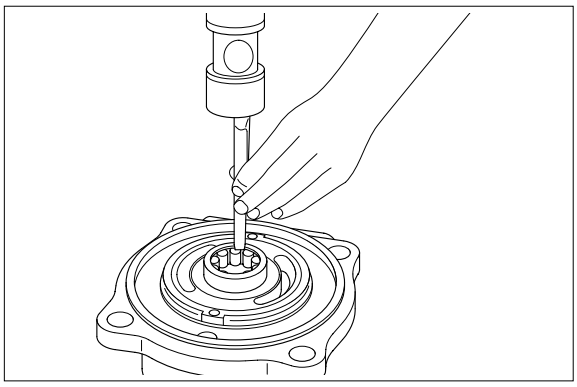
(14) Reassemble brake piston(702) to the casing (301).



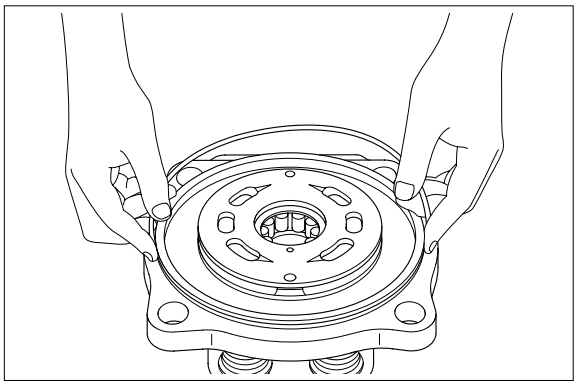
(15) Reassemble brake spring(712) to the brake piston(702).



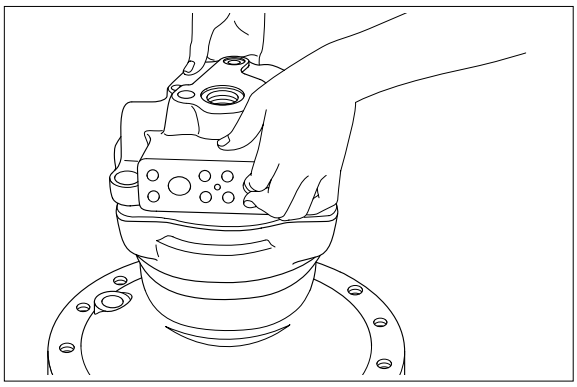
(16) When the roller bearing(444) is removed. Insert the roller bearing(444) into valve casing(303) with hammering.



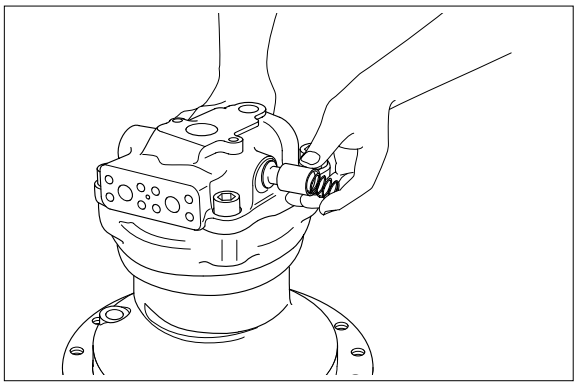
(17) Reassemble valve plate(131) to the valve casing(303) and reassemble O-ring(472).



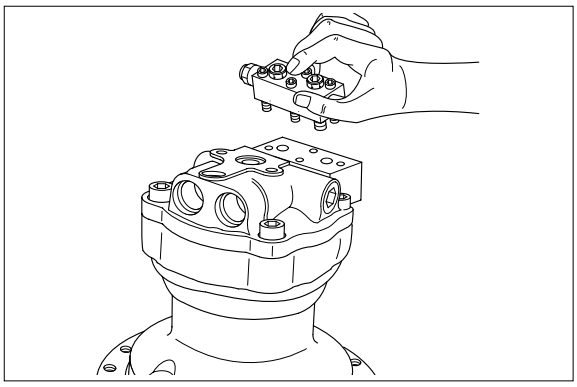
(18) Connect the valve casing(303) with the casing(301) and tighten the hex socket bolt(401).



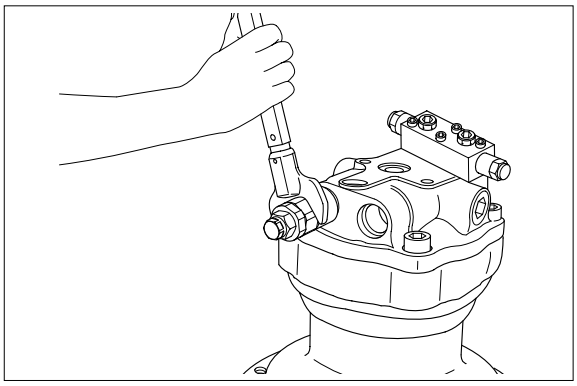
(19) Insert plunger(351) and spring(355) in the valve casing and install O-ring(488). Tighten RO plug(469) to the valve casing.



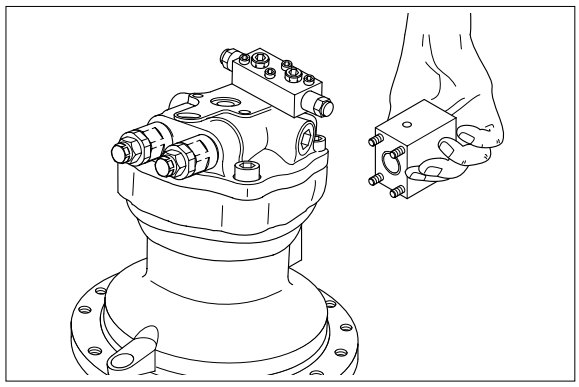
(20) Connect the anti-rotation valve(052) with the casing(303) and tighten the hex socket bolt(171).
- Tightening torque : 3kgf · m(21.7lbf · ft)



(21) Insert back-up ring(162) and O-ring(161) to the relief valve(051), and reassemble them to valve casing(303).
- Tightening torque : 18kgf · m(130.2lbf · ft)



(22) Connect the time delay valve(031) with the casing(301) and tighten the hex bolt.



(23) Connect the valve casing(303) with the casing(301).

This completes assembly.

3. REMOVAL AND INSTALL OF REDUCTION GEAR

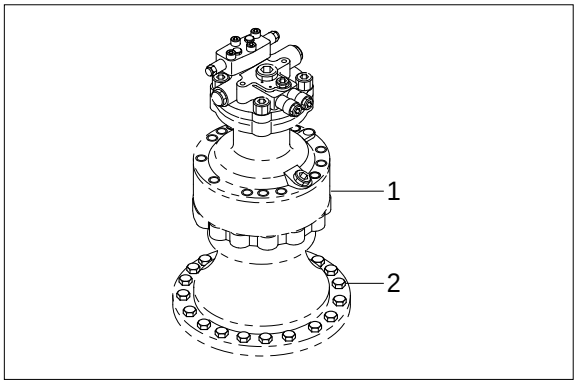
1) REMOVAL

(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 device weight : 150kg(330lb)

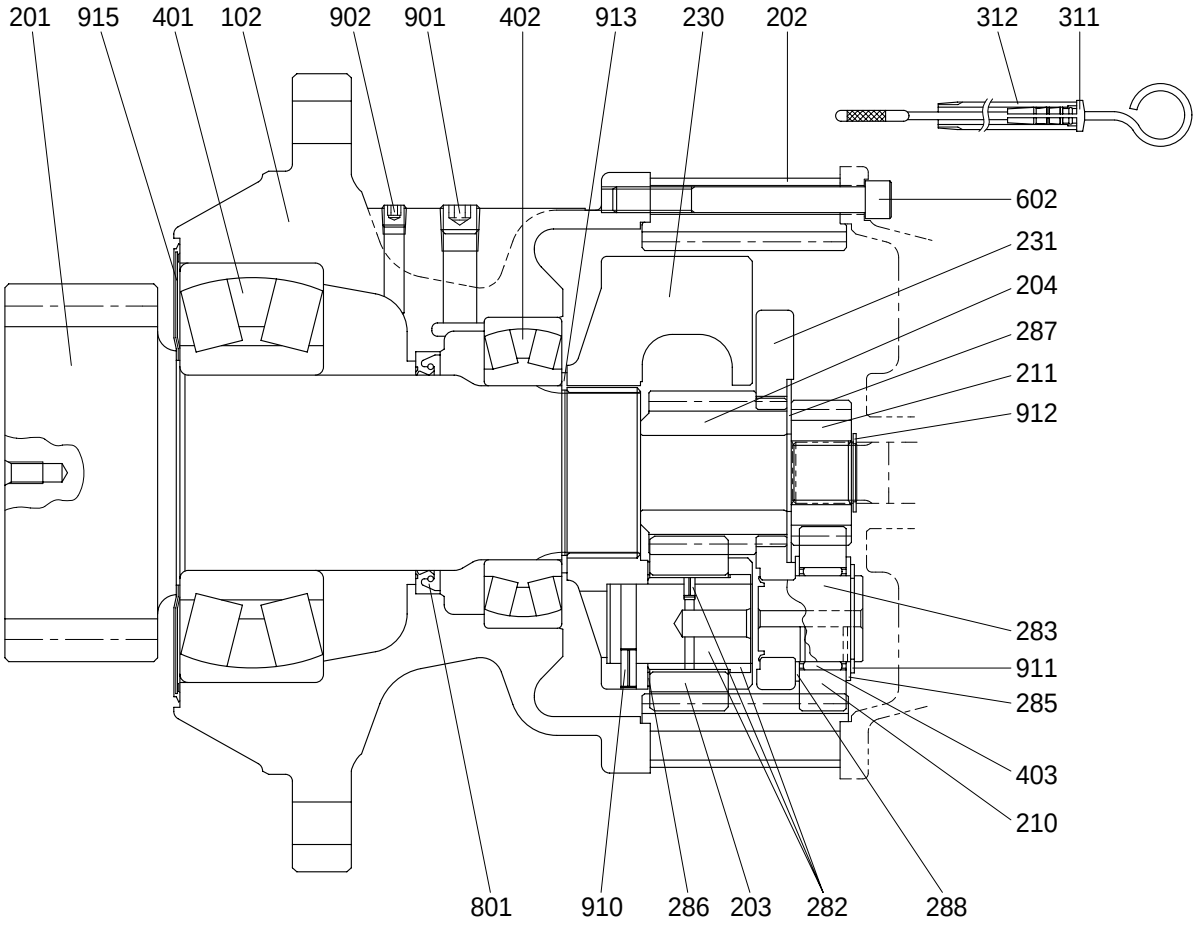
2) INSTALL



(1) Carry out installation in the reverse order to removal.
- Tightening torque : 57.9kgf · m (418.8lbf · ft)

4. REDUCTION GEAR

1) STRUCTURE



102	Casing	283	Pin	602	Hexagon socket bolt
201	Drive shaft	285	Side plate	801	Seal
202	Ring gear	286	Side plate	901	Plug
203	Planetary gear 2	287	Side plate	902	Plug
204	Sun gear 2	288	Side plate	910	Spring pin
210	Planetary gear 1	311	Level bar	911	Snap ring
211	Sun gear 1	312	Pipe	912	Snap ring
230	Carrier 2	401	Roller bearing	913	Snap ring
231	Carrier 1	402	Roller bearing	915	Bearing seal
282	Pin	403	Needle cage		

2) INSPECTIONS

(1) Precautions

This assembly is designed to balance the life time of each part. Therefore, when replacing the parts, some parts could require another part's replacement at the same time because of their structural or functional correlations.

(2) Inspections replacement

① When the pitting happens on a tooth of sun gear, planetary gear or ring gear, replace the gear.(When a pit size is bigger than ø1㎜(0.04") or the pits are more than 5 percent of the tooth.)

② Replace the lock pin when loosely installed in the pin groove because of the wearing.

③ Replace the oil seal when damaged or weared. Replace the oil seal when reassembling the reduction gear assembly.

④ Replace the No.1 carrier assembly when flaking happens on the sliding surfaces of the No.1 planetary gear.

⑤ Replace the No.2 planetary gear assembly when radial clearance of bearing is more than 0.6㎜(0.02").
Replace the No.2 planetary gear assembly when removing the output shaft.

⑥ Replace the thrust button when the sliding surface of the sun gear is badly damaged.

⑦ Replace the thrust washer only when it was damaged.

⑧ Replace the shaft support bearing when it was damaged. Do not reuse the disassemble shaft support bearing.

※ Inspect the No.2 planetary gear, thrust button, thrust washer, and shaft support bearing as in assembly.

3) DISASSEMBLY

(1) Remove the level bar(311) and pipe(312) installed in the swing motor.

(2) Loosen the drain plug in the swing gear box to discharge the gear oil.

※ Check the gear oil for contamination.

(3) Release the bolt(602) and remove the swing motor from reduction gear assembly.

(4) Release the No.1 sun gear(211).

(5) Release the No.1 carrier assembly(231) including No.1 planetary gear(210).

(6) Disassemble the No.1 carrier assembly, if necessary.

① Release the snap ring(911) and remove the side plate(285).

② Remove the No.1 planetary gear(210) and needle cage(403).

③ Remove the side plate(288).

④ Remove the side plate(287) in the center of No.1 carrier.

(7) Release the No.2 sun gear(204).

(8) Remove the No.2 carrier assembly(230) including No.2 planetary gear 2.

(9) Disassemble the No.2 carrier assembly, if necessary.

(10) Remove the ring gear(202).

(11) Remove the snap ring(913) from drive shaft(201) assembly.

(12) Remove the bearing seal(915) and roller bearing(401) from the casing(102), if necessary.

(13) Remove oil seal(801) from casing(102).

※ Remove that the above articles(6,9,12) are applied for only special inspections or maintenance.

4) ASSEMBLY

(1) Reassemble the drive shaft assembly.
① Insert the bearing seal(915) in the drive shaft(201).
② Install the roller bearing(401) in the drive shaft(201) after warming it up for about 10 minutes in the oil can at 80~100℃(176~ 212℉).

(2) Insert the oil seal(801) in the casing(102).

(3) Insert the roller bearing(402) with snap ring(913).

(4) Reassemble the drive shaft assembly in the casing(102).

(5) Reassemble the ring gear(202) after applying grease to the casing(102).

(6) Reassemble the No.2 carrier assembly(230).

(7) Reassemble No.2 sun gear(204) with the side plate(287).

(8) Reassemble the No.1 carrier assembly(231).
① Insert the No.1 pin(285)with the spring pin(910) in the No.1 carrier(231).
② Insert the spring pin(910) in the No.1 carrier.
③ Insert the side plate(287) in the center of No.1 carrier.
④ Insert the side plate(288).
⑤ Insert the side plate(285) with snap ring(911).
※ See the Table for the sizes of side plates.

Item no.	Inner dia.		Outer dia.		Thickness	
	mm	in	mm	in	mm	in
285	45	1.77	59	2.32	2	0.08
286	50	1.97	64	2.52	1	0.04
287	42	1.65	95	3.74	2	0.08
288	45	1.77	59	2.32	1	0.04

(9) Install the No.1 carrier assembly in the No.2 sun gear.

(10) Install the No.1 sun gear(211) with snap ring(912).

(11) Install the swing motor with bolts(602) in the ring gear(202) with grease.

(12) Insert the drain plug(901) of the gear.

(13) Reassemble the level bar(311) and pipe(312).

(14) Give gear oil.

This completes assembly.