

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) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.

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

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

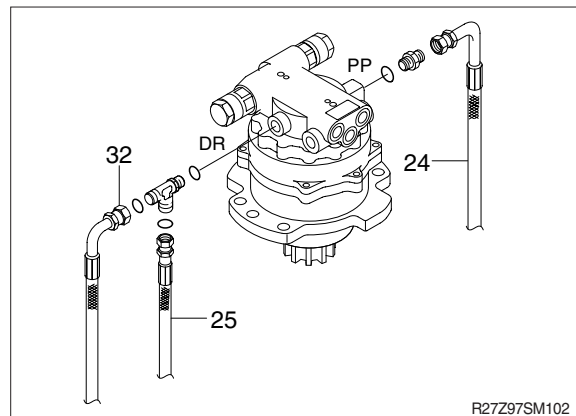
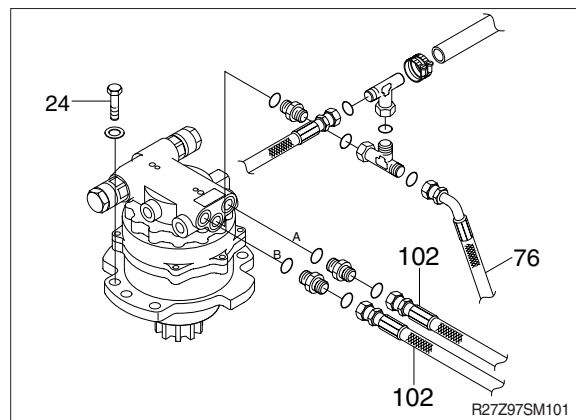
- (4) Disconnect hose assembly (76, 102).
- (5) Disconnect pilot line hoses (27, 29, 32).
- (6) Sling the swing motor assembly (1) and remove the swing motor mounting bolts (24).

※ Motor device weight : 34 kg (75 lb)

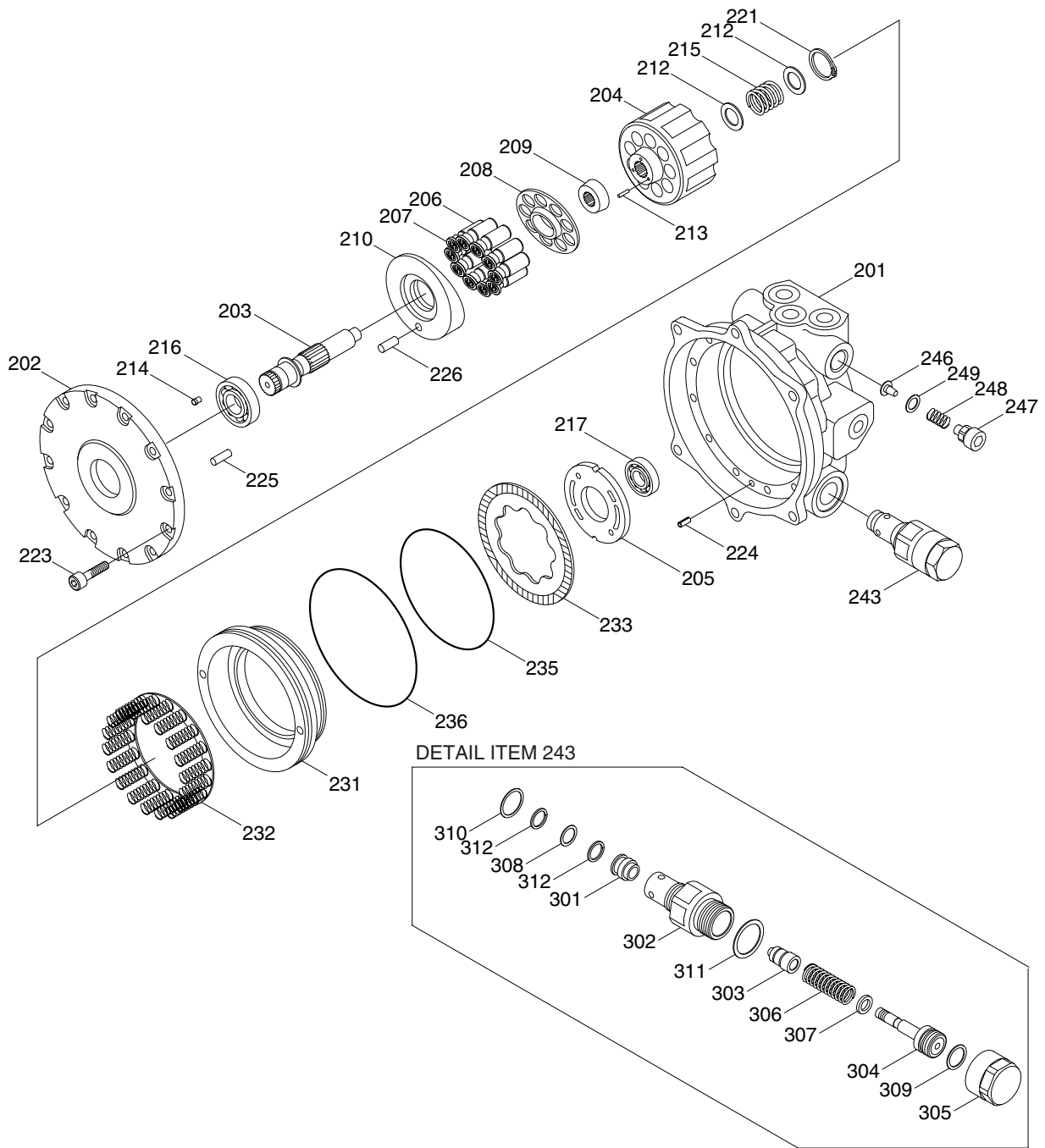
- (7) Remove the swing motor assembly.
※ When removing the swing motor assembly, check that all the piping have been disconnected.

2) INSTALL

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



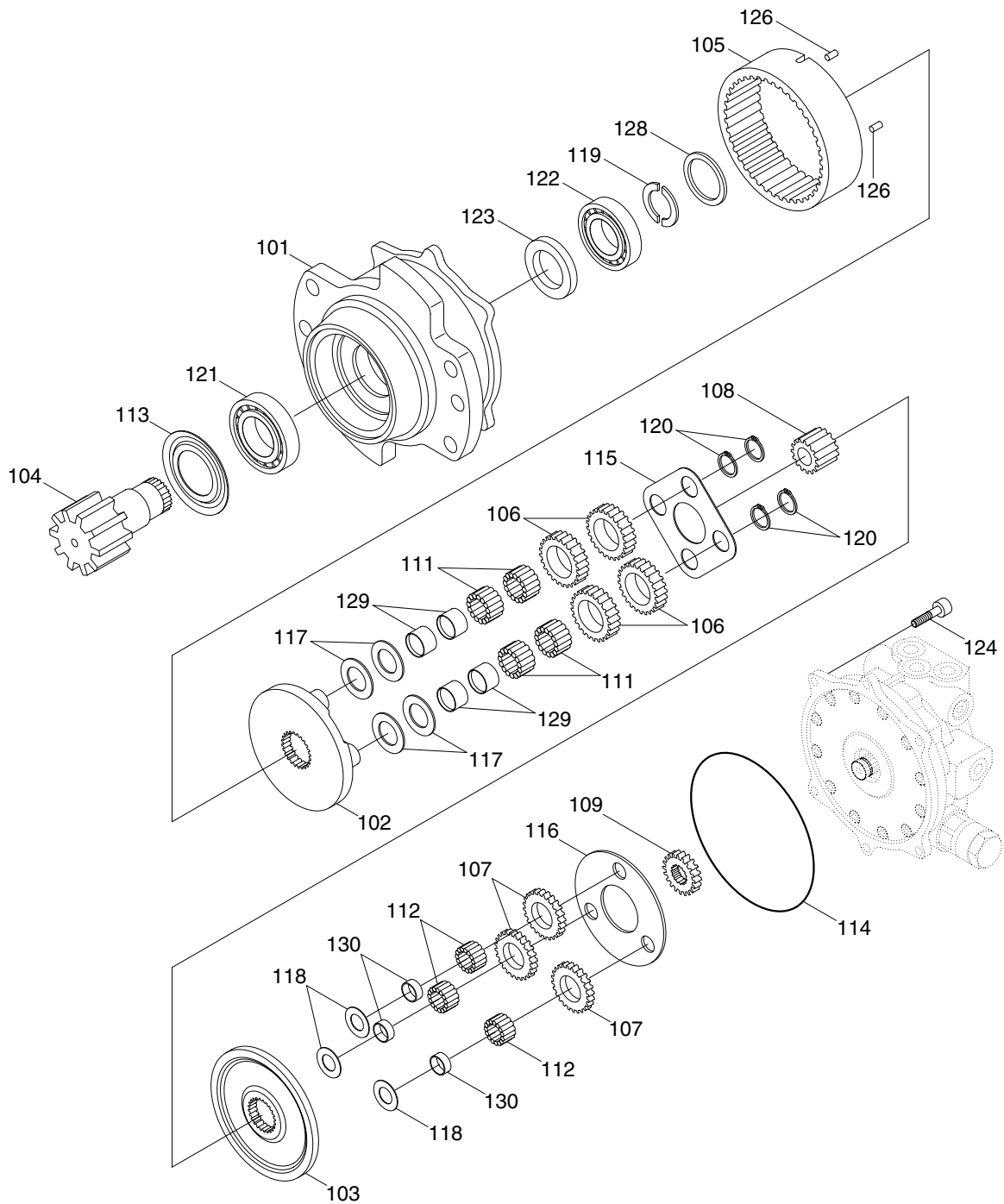
2) COMPONENTS (1/2)



R27Z92SM15

201	Body	213	Pin	232	Spring assy	303	Poppet
202	Plate	214	Filter	233	Disk plate	304	Piston
203	Shaft	215	Spring C	235	O-ring	305	Cap
204	Cylinder barrel	216	Bearing	236	O-ring	306	Spring
205	Valve plate	217	Bearing	243	Relief valve	307	Spacer
206	Piston	221	Snap ring	246	Check valve	308	O-ring
207	Shoe	223	Screw	247	Plug	309	O-ring
208	Shoe holder	224	Spring pin	248	Spring	310	O-ring
209	Barrel holder	225	Pin	249	O-ring	311	O-ring
210	Swash plate	226	Pin	301	Seat	312	Back up-ring
212	Retainer	231	Brake piston	302	Retainer		

COMPONENTS (2/2)



R27Z92SM16

101	Body	111	Needle	120	Snap ring
102	Carrier 1	112	Needle	121	Bearing
103	Carrier 2	113	Seal ring	122	Bearing
104	Pinion shaft	114	O-ring	123	Oil seal
105	Internal gear	115	Thrust plate 1	124	Screw
106	Gear B1	116	Thrust plate 2	126	Pin
107	Gear B2	117	Thrust washer 1	128	Ring
108	Gear S1	118	Thrust washer 2	129	Ring 1
109	Gear S2	119	Preload collar	130	Ring 2

2) GENERAL ATTENTION

Please pay attention following points.

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

3) DISASSEMBLY AND ASSEMBLY PROCEDURE

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

And please refer to the page 7-36~37.

4) TOOLS FOR DISASSEMBLY AND ASSEMBLY

No.	Tool	
1	Preset type hand torque wrench	45 N (JIS B4650)
2		90 N (JIS B4650)
3	Hexagon bar bit for above wrench	Two-plane width 6
4		Two-plane width 8
5		
6	Single purpose type hand torque	$T = 15 \pm 1.5 \text{ kgf} \cdot \text{m}$ ($108 \pm 10.8 \text{ lbf} \cdot \text{ft}$) Two-plane 36
7	Hexagon bar wrench	Two-plane width 6
8		Two-plane width 8
9		
10	Spanner	Two-plane width 36
11	Minus driver	Width 6~10
12	Snap ring pliers	∅ 28 For hole
13		∅ 22 For shaft
14	Hammer	-
15	Plastic hammer	-
16	Other	Grease
17		(Oil designated hydraulic oil)
18		Wire brush
19		Sand paper
20		Anti-loose adhesive (three bond #1305)

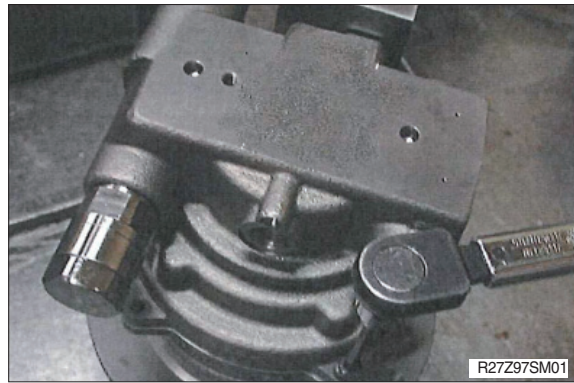
3. DISASSEMBLY

1) HYDRAULIC MOTOR

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

- Tools required :
Hexagon bar wrench : 6 mm

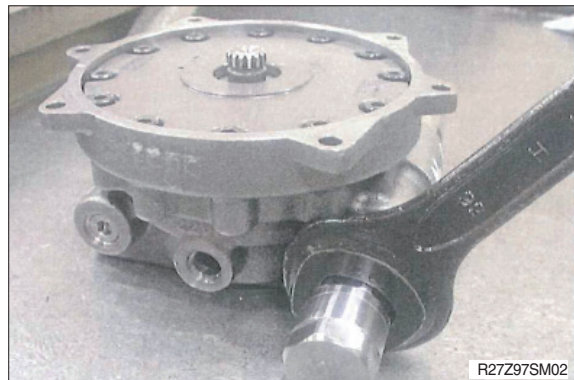
※ When taking out the hydraulic motor assembly from the reduction gear body, the drain port should be open.
When it is difficult to take out, insert the minus driver into the binding face to the body and take out the burr completely.



(2) Take out the relief valve assembly.

- Tools required :
Spanner : 36 mm

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



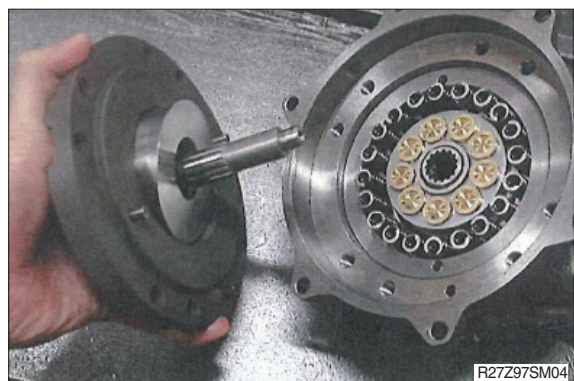
(3) Loose the hexagon socket head cap bolts (223), and take out it.

- Tools required :
Hexagon bar wrench : 6 mm



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

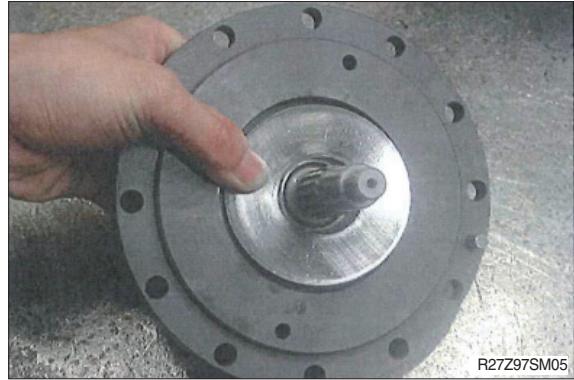
※ Pay attention not to drop off swash plate.



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

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

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

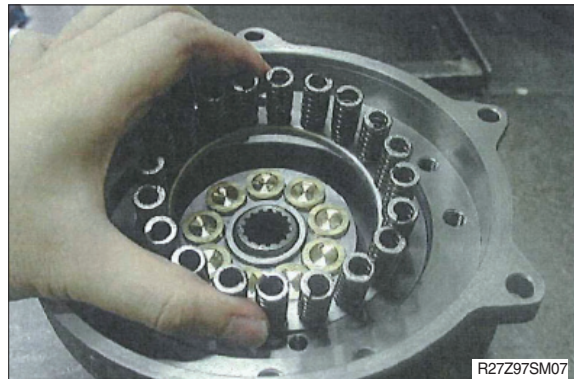


(6) Take out the filter (214) and the parallel pin (225) from the plate S (202).

- Filter (214) : 1 pcs
- Parallel pin (225) : 3 pcs



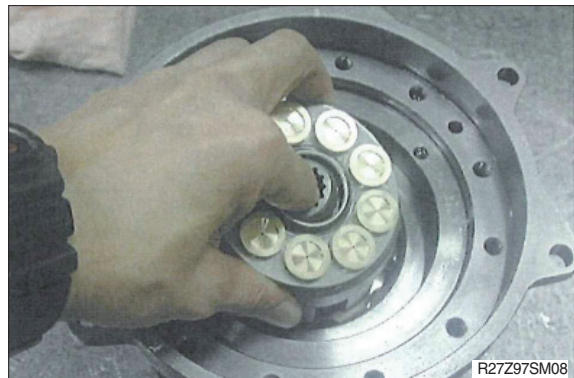
(7) Take out the spring assembly (232) from the body H (201).



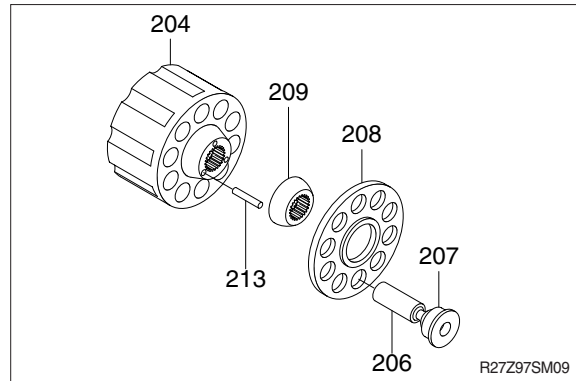
(8) Take out the cylinder barrel kit.

※ The small parts are easily dispersed, pay attention not to miss.

The valve plate (205) is sometime attached, pay attention not to drop out.



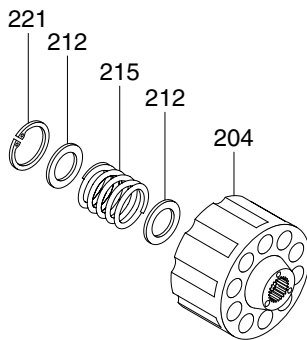
- (9) Take out the piston (206) and the shoe (207) assembly, the shoe holder (208), the barrel holder (209) and the pin (213).



- (10) Take out the snap ring (221), the retainer (212) and the spring C (215).

· Tools required :

Snap ring plier : $\varnothing 28$ for hole



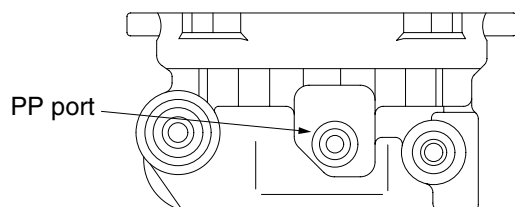
R27Z97SM10



R27Z97SM11

- (11) Take out the brake piston (231) and the O-ring (235, 236).

※ The brake piston is drawn out by the air blowing gradually from the PP port. Pay attention not to draw out the brake piston rapidly by the air blowing gradually.

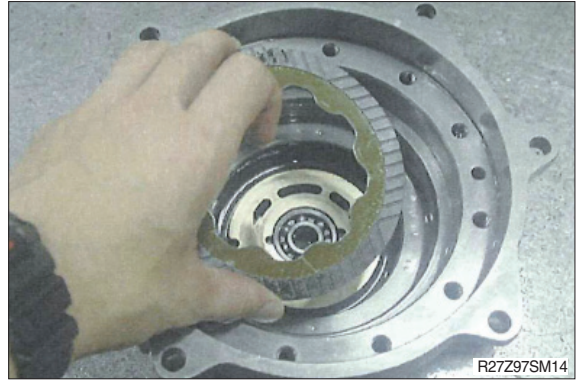


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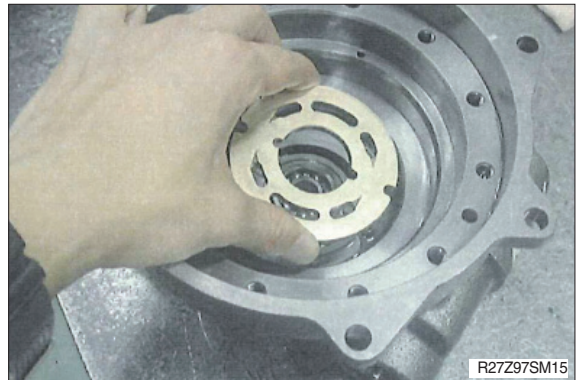


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(12) Take out the disk plate (233).



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



(14) Loose the plug (247), and take out the check valve (246) and the spring (248). (2 locations)

- Tools required :
Hexagon bar wrench : 8 mm



2) REDUCTION GEAR

(1) Take out the O-ring (114).

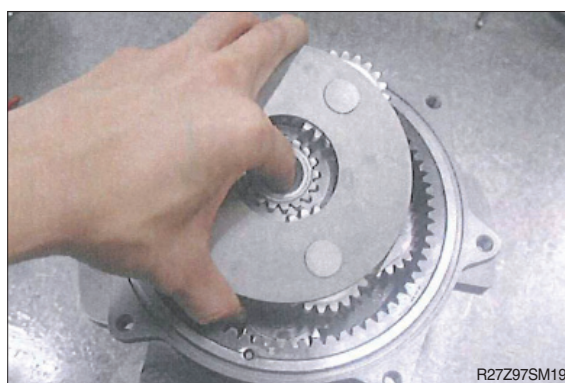


(2) Take out the S2 gear (109).

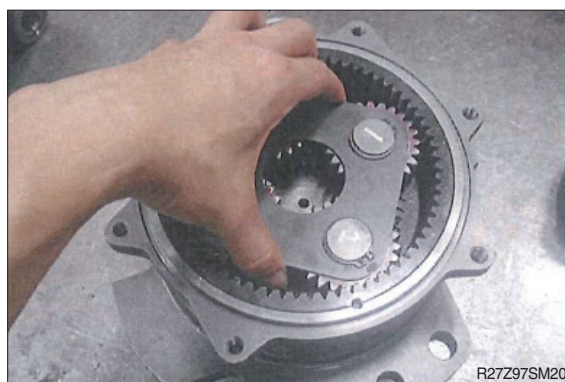


(3) Take out the carrier 2 kit.

※ Pay attention not to scattered each parts as lifting S1 gear up.



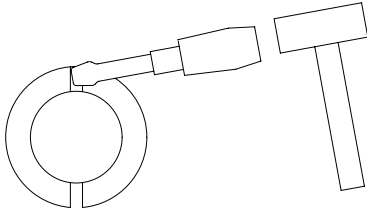
(4) Take out the carrier 1 kit.



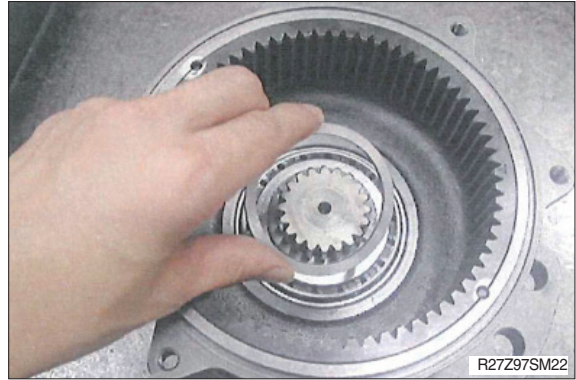
(5) Take out the ring (128) and the pre-load collar (119).

※ To attach the minus driver to the gap of 2 pcs pre-load collar, and take out by hitting with the hammer.

As pre-adjusted the gap with the bearing, do not disassemble unless it is necessary.



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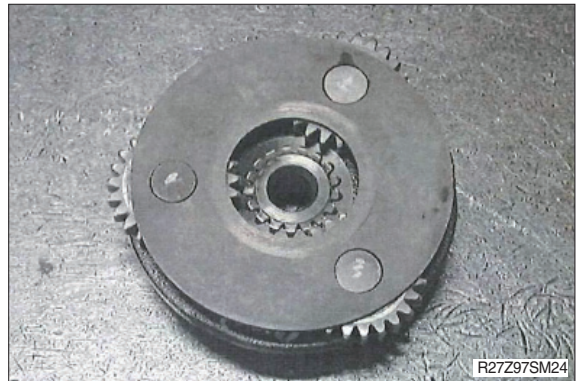
(6) Take out the pinion kit.

※ To secure the drawing space of the pinion shaft, attach the approximate 130 mm pad to the flange part, and push out the pinion shaft (104) by the press.

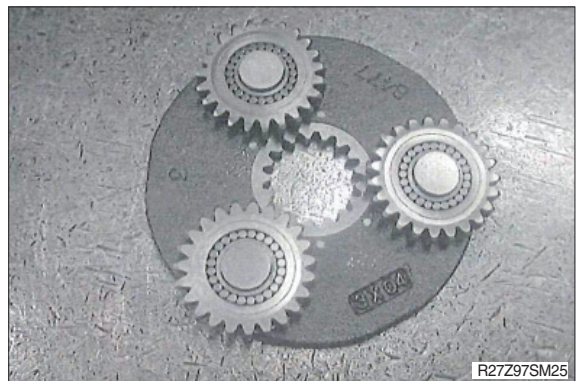
As pre-adjusted the gap with the bearing, do not disassemble unless it is necessary.



(7) Take out the thrust plate 2 (116) from the carrier 2 kit.



(8) Take out the b2 gears (107) and the needles 2 (112) from the carrier 2 kit.

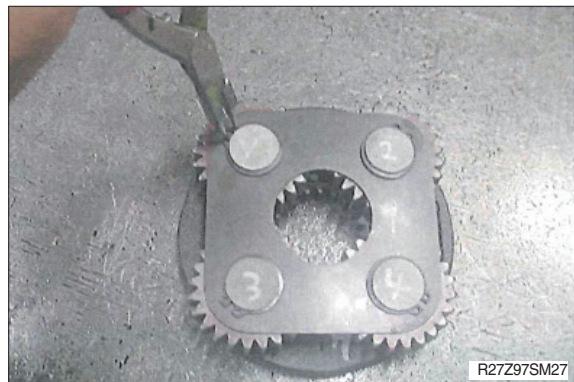


- (9) Take out the rings 2 (130) and thrust washers 2 (118) from the carrier 2 kit.



- (10) Take out the thrust plate 1 (115) from the carrier 1 kit.

- Tools required :
Snap ring plier : $\varnothing 22$ for shaft



- (11) Take out the b1 gears (116) and needles 1 (111) from the carrier 1 kit.



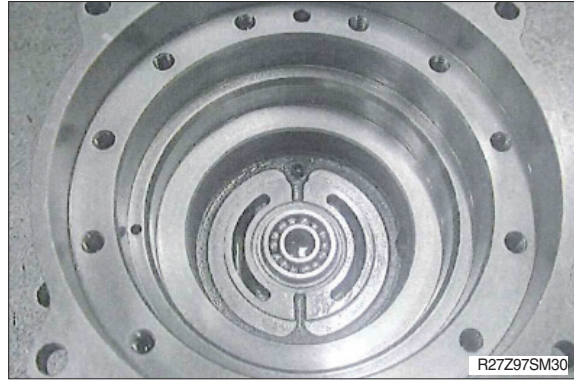
- (12) Take out the rings 1 (129) and the thrust washers 1 (117) from the carrier 1 kit.



4. ASSEMBLY

1) HYDRAULIC MOTOR SECTION

- (1) Press-fit the bearing (217) and spring pin (224) into the body H (201).

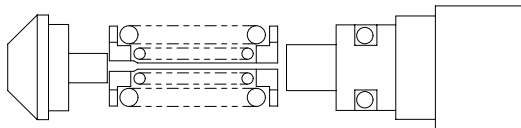


- (2) Insert the 2 check valves (246) (1 pc/ side), 2 springs (248) (1pc/side) and 2 plugs (247) (1pc/side) with O-ring (249) in that order into the body H (201).

- Tools required :
Hexagon bar wrench : 8 mm
Torque wrench

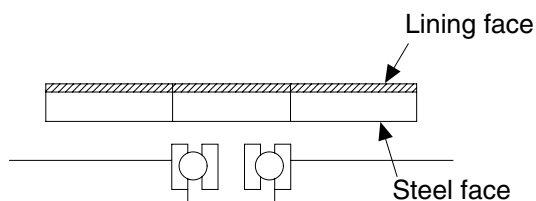
- ※ Apply grease slightly to the O-ring and assemble to pay attention not biting the seals.

- Plug tightening torque :
 $6 \pm 0.3 \text{ kgf} \cdot \text{m}$ ($43.4 \pm 2.17 \text{ lbf} \cdot \text{ft}$)

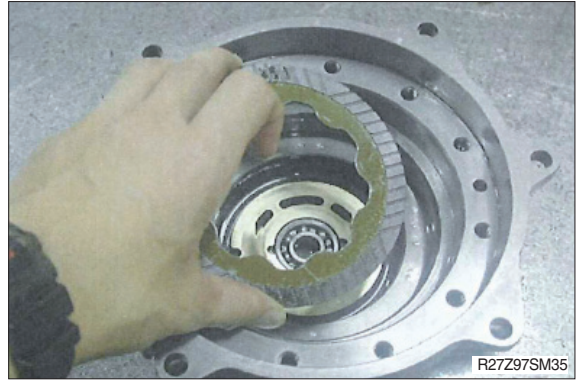


- (3) Place the valve plate (205) onto the body H (201).

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



(4) Assemble the disk plate (233).



(5) Make the brake piston assembly which placed O-rings (235, 236) on brake piston (231), and place it onto the body H (201).

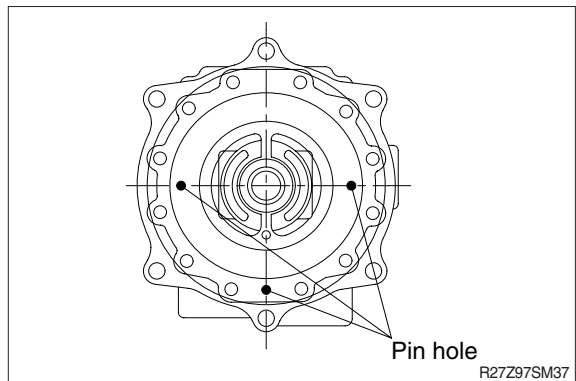
Place the brake piston assembly onto plate S placed 3 pins, then place it onto the body H as matched pin hole position. After that, press-fit it by tightening hexagon bolts little by little.

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

For prevention of brake piston assembly, apply grease on plate S.

Take out the plate S after placed brake piston assembly.

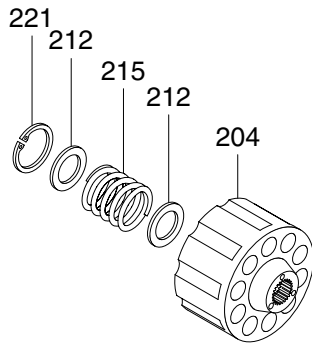
※ Pay attention to jam seal parts, install them applying grease on O-rings.



(6) Place the retainer (212), spring C (215) and retainer (212) in that order into the cylinder barrel (204), and then secure them with the snap ring (221).

· Tools required :

Snap ring plier : \varnothing 28 for hole



R27Z97SM38



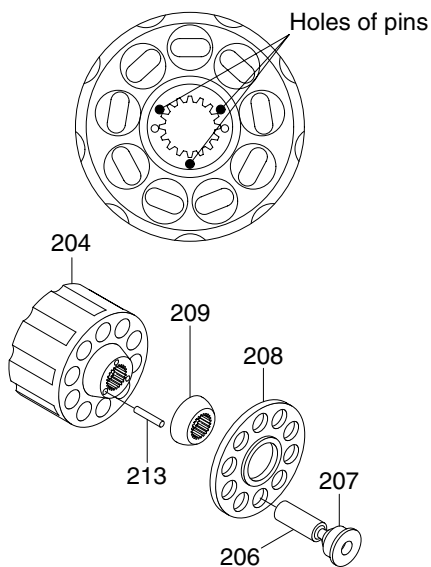
R27Z97SM39

(7) Make the shoe holder assembly which has the 9 piston-shoe (206, 207) assemblies placed on the shoe holder (208).



R27Z97SM40

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

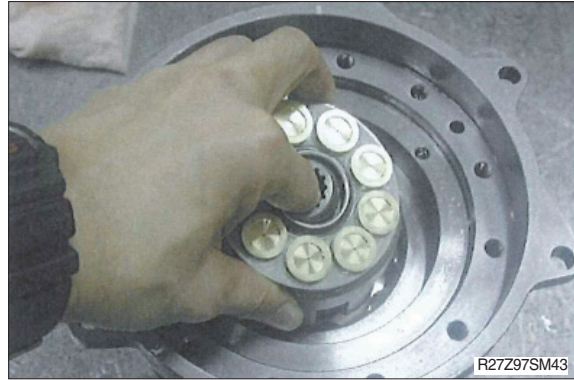


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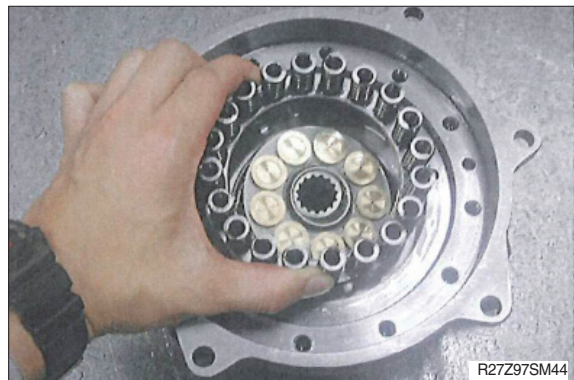


R27Z97SM42

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

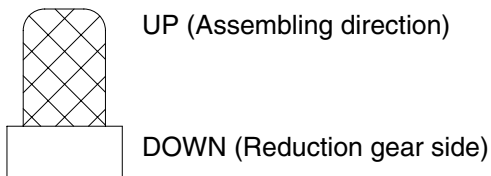


(10) Insert the spring assembly (232) into the body H (201).



(11) Place the filter (214) and the parallel pins (225) into the plate S (202).

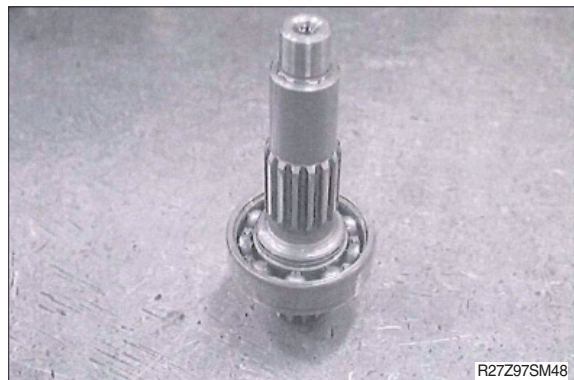
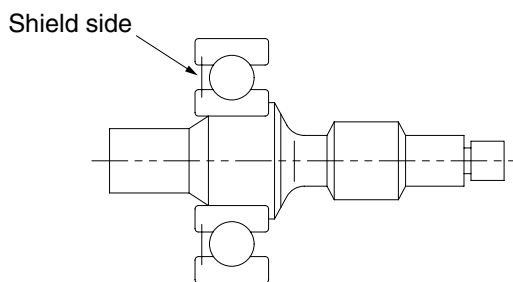
- ※ Filter (214) : 1 pc
- Parallel pin (225) : 3 pcs



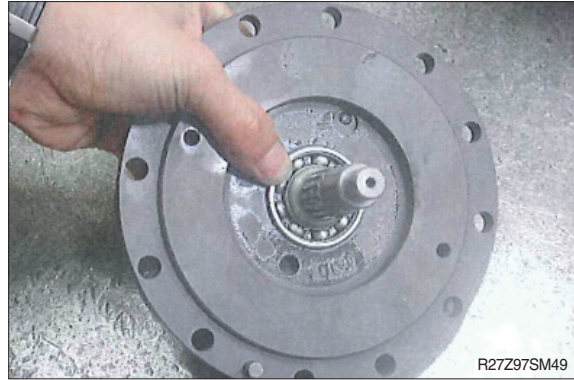
Use a plastic hammer when it is tight.

- ※ Pay attention height of pins are 8 mm from surface after installation.

(12) Press-fit bearing (216) with shaft (203).



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



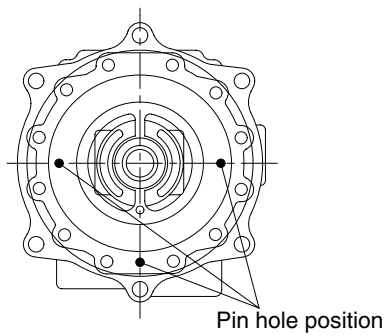
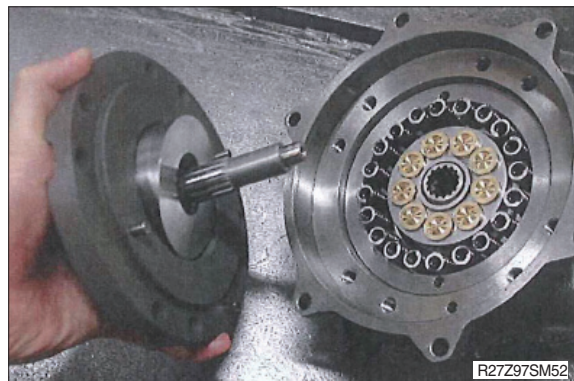
(14) Place the swash plate (210) onto the plate S (202).

- ※ In case the swash plate drops out, apply grease to the plate S side of it.



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

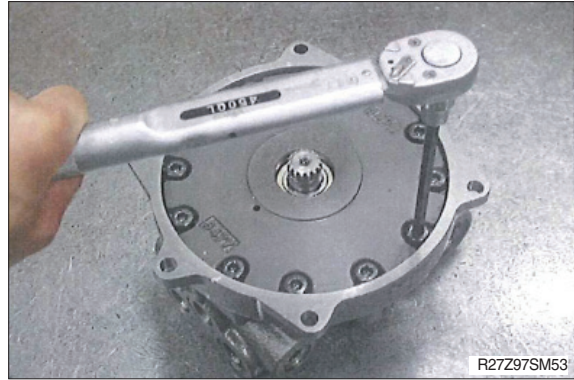
- ※ Align the serration of the shaft which is assembled to the plate S to the serration of the cylinder barrel assembly which is assembled to the body H.



R27Z97SM51

(16) Bolt the plate S (202) together with the 12 hexagon socket head cap bolts (223).

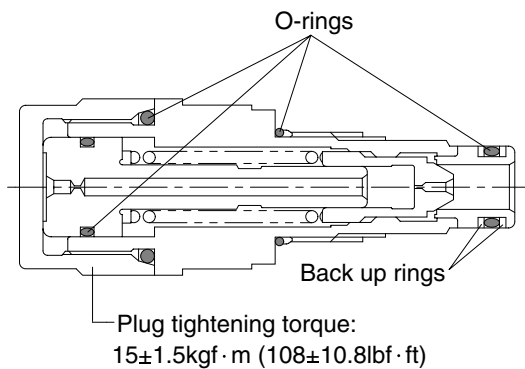
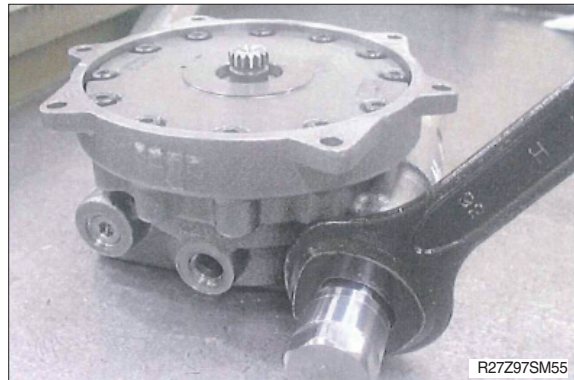
- Tools required :
Hexagon bar wrench : 6 mm
Torque wrench
- Plug tightening torque :
 $3 \pm 0.3 \text{ kgf} \cdot \text{m}$ ($21.7 \pm 2.17 \text{ lbf} \cdot \text{ft}$)



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

- Tools required :
Spanner : 36 mm
Torque wrench
- Plug tightening torque :
 $15 \pm 1.5 \text{ kgf} \cdot \text{m}$ ($108 \pm 10.8 \text{ lbf} \cdot \text{ft}$)

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



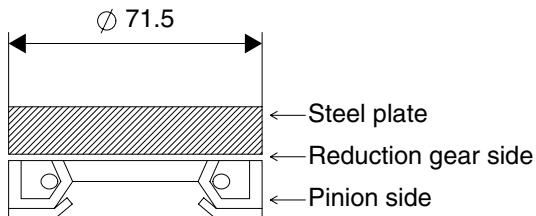
R27Z97SM54

2) REDUCTION GEAR SECTION

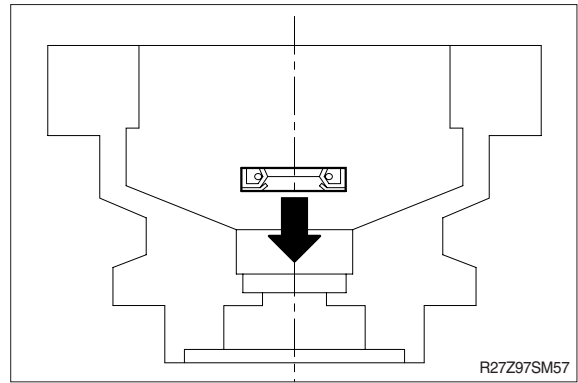
(1) Press-fit the oil seal (123) into the body (101).

※ Pay attention to the direction of the oil seal, use round steel plate for pressing to prevent misalignment.

Steel plate outer diameter : $\varnothing 71.5$



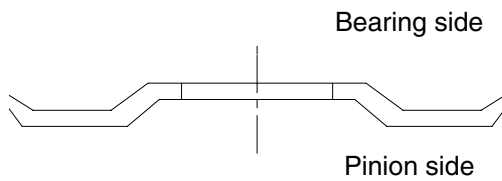
R27Z97SM56



R27Z97SM57

(2) Place the ring seal (113) onto the pinion shaft (104).

※ Pay attention to direction of the ring seal.



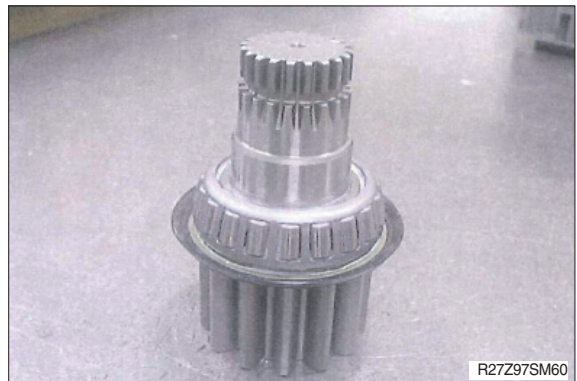
R27Z97SM58



R27Z97SM59

(3) Press-fit the inner ring of the bearing (121) to the pinion shaft (104).

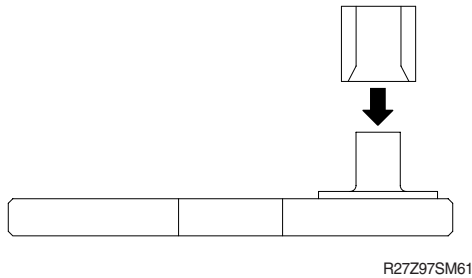
※ After press fitting, apply grease onto the surface of the rollers, and turn them manually so that the grease can spread to the whole roller surface.



R27Z97SM60

(4) Place the 4 rings (129) (1 pc/pin) and the 4 thrust washers 1 (117) (1 pc/pin) in that order onto the 4 pins of the carrier 1 (102).

※ Pay attention to direction of the ring.
Beveling part of the ring should be down side.

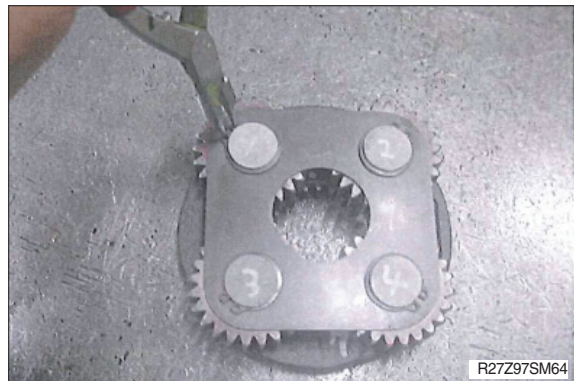


(5) Place the 4 b1 gears (106) (1 pc/pin) and the 92 needles 1 (111) (23 pcs/pin) in that order onto the 4 pins of the carrier 1 (102).



(6) Place the thrust plate 1 (115) and the 4 snap rings (120) (1 pc/pin) to make up a carrier 1 kit.

- Tools required :
Snap ring plier : $\varnothing 22$ for shaft



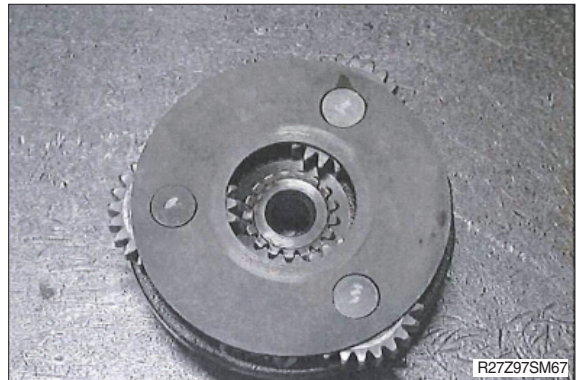
(7) Place the 3 thrust washers 2 (118) (1 pc/pin) and the 3 rings 2 (130) (1 pc/pin) in that order onto the 3 pins of the carrier 2 (103).



- (8) Place the 3 b2 gears (107) (1 pc/pin) and the 72 needles 2 (112) (24 pcs/pin) in that order onto the 3 pins of the carrier 2 (103).



- (9) Place the thrust plate 2 (116) and the S1 gear (108) to make up a carrier 2 kit.



- (10) Press-fit the outer ring of the bearing (122) into the body (101).

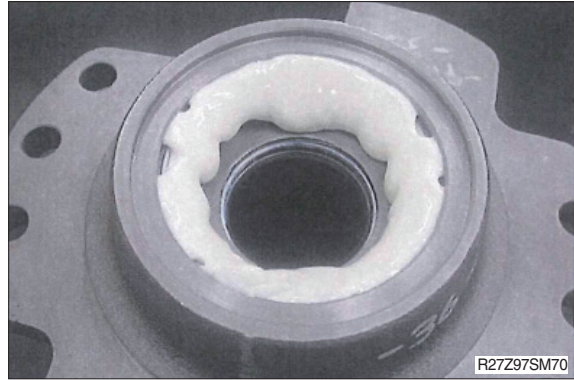


- (11) Press-fit the outer ring of the bearing (121) into the body (101).



(12) Fill grease in the bearing (121) section of the body (101).

※ Grease amount : approx. 80% of the space inside the outer ring.

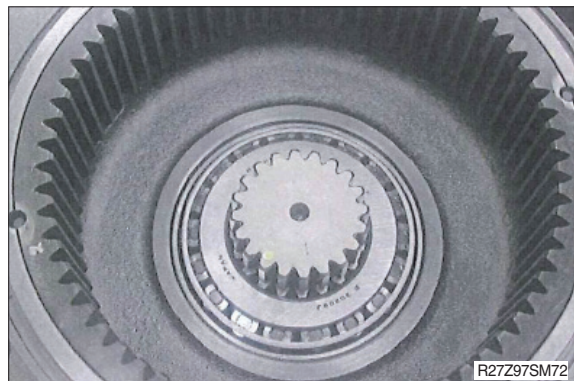


(13) Insert the pinion shaft (104) into the body (101).

※ Pay attention not to damage the lip of the oil seal.

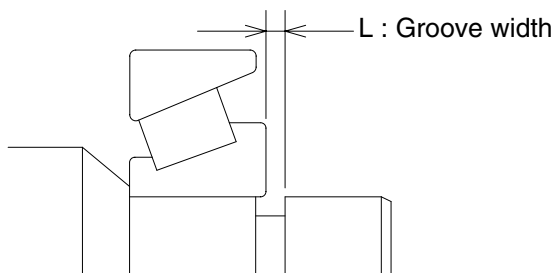


(14) Turn over the body (101), then press-fit inner ring of the bearing (122).

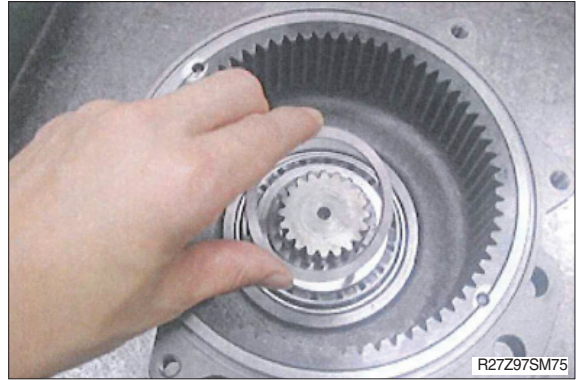


(15) Fix the pinion shaft (104) with the 2 pre-load collars (119).

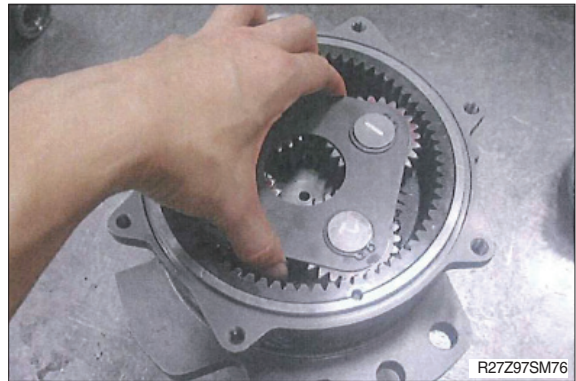
※ Thickness of the pre-load collar must be adjusted for the below L dimension.
Standard's +0 to +0.05 mm



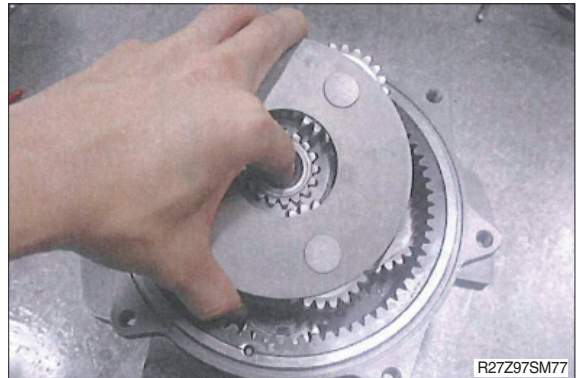
(16) Place the ring (128) over the pre-load collars.



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



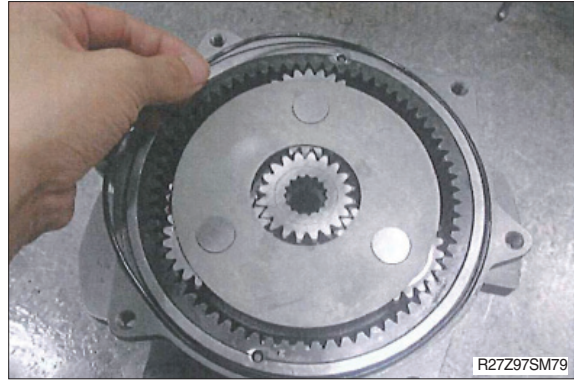
(18) Place the carrier 2 assembly into the body (101) align spline of S1 gear to the b1 gear.



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

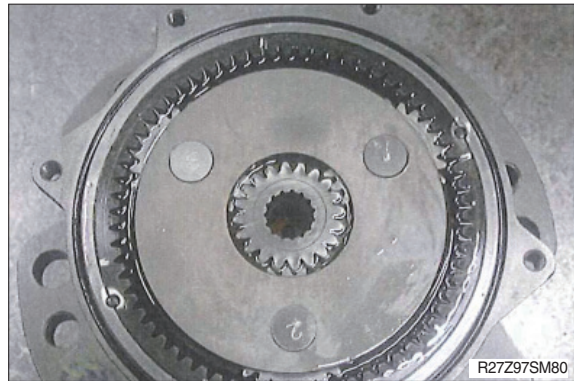


(20) Place the O-ring (114) onto the body (101).



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

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



(22) Join the hydraulic motor and the body, and then bolt them together with the 4 hexagon socket head cap bolts (124).

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

