

2. Assembling the Spindle Part

- A. Apply grease on the O-ring of the Floating Seal[29]. Insert the Floating Seal (29) into the floating seal groove on the Spindle (2).

NOTE: To assemble the Floating Seal (29), place the F/S assembling tool (I), Floating Seal (29), and F/S assembling tool (II), in the listed order, and press until the F/S assembling tool (II) touches the F/S assembling tool (I). Remove the F/S assembling tools and confirm that the end surface of the Hub is within 1 mm difference with the floating seal surface.

- B. Join two eye bolts on the Spindle (2) at symmetric position.
- C. Place the Spindle (2) on the work bench with the hex-groove bolts are on symmetric position.



CAUTION!

Tighten the hex-groove bolt sufficiently. Otherwise, the Travel Motor may fall down when turned over.

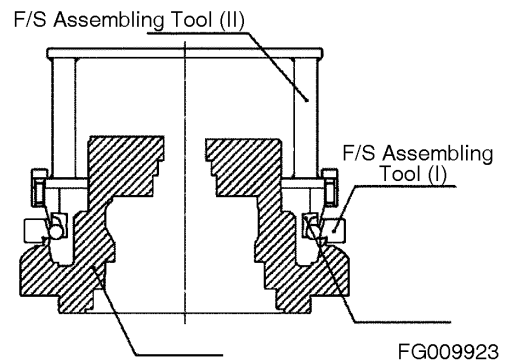


Figure 78



Figure 79

3. Adjusting the Pre-pressure of the Angular Ball Bearing

NOTE: When the Hub (1), Angular Ball Bearing (24) or Spindle (2) is replaced, carry out pre=pressure adjustment. If the pre-pressure is not appropriate, the Angular Ball Bearing may be fractured soon.

A. Insert the Lock Washer (22) in the Spindle (2), and measure size C.

B. Measure the width D of the Angular Ball Bearing.

NOTE: Turn Hub (1) and Angular Ball Bearing (24) by a few rounds to remove loose, before measuring the size.

C. Deduct size C with D. Select the Seam (23) for which the skimmer is +0.13 mm ~ +0.17 mm in the Table below.

Symbol	T mm
A	0.9
B	1.0
C	1.1
D	1.2
E	1.3
F	1.4
G	1.5
H	1.6
I	1.7
J	1.8
K	1.9
L	2.0

D. Mount the Seam (23) on the Spindle (2).

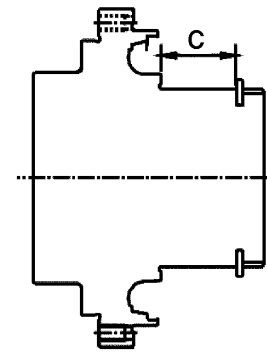


Figure 80

FG009872

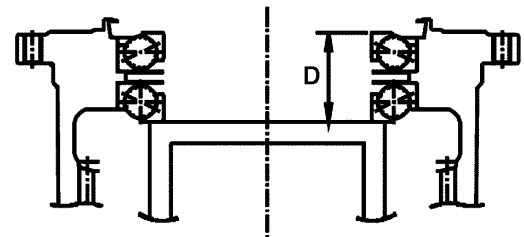


Figure 81

FG009873



Figure 82

FG009874

4. Assembling the Hub

- A. Align the central axes of the hung Hub[1] and Spindle (2) straight, lower the Spindle (2) slowly and insert into the Angular Ball Bearing (24).

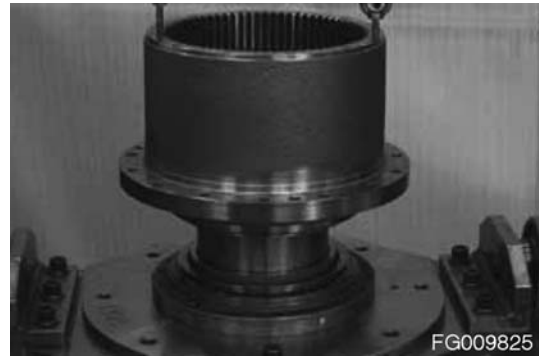


Figure 83

- B. Tighten a lock hex-groove bolt in the $\text{Ø}14$ hole of the Hub to fix with the work bench.
- C. Place a metal rod on the inner ring of the Angular Ball Bearing (24) on the reduction gear side, knock it lightly with a hammer to remove looseness of the inner ring.



Figure 84

- D. Place the Lock Washer (22) on the groove on the Spindle (2).



Figure 85

- E. Insert the Lock Washer (22) into the Spindle groove with a tool.

NOTE: *When assembling the Carrier (2, 7), insert the Lock Washer (22) fully into the groove to avoid interference with the Lock Washer (22).*

- F. Remove the Lock Hex-Groove Bolt which has been connecting the Hub (1) with the workbench.
- G. Turn the Hub (1) by 2-3 turns.

NOTE: *Turning the Hub (1) will settle the fitting surface of the Floating Seal (29) to prevent leak.*

- H. Turn the work bench so that the Motor faces upward.



Figure 86

5. Assembling the Motor Parts in the Spindle

- A. Insert the Oil Seal (132) into the Spindle[2] using oil seal press-fitting tool and hammer.

NOTE: When assembling the Oil Seal, apply lithium grease on the Oil Seal lip

Take care that the assembling direction of the Oil Seal (132) is correct.

- B. Assemble the two Parallel Pins (171) into the pin holes of the Spindle (2).
- C. Apply lithium grease on the semi-spherical surface of the two Pivots (167) and press-fit them into the Parallel Pins (171) which are inserted in the Spindle (2).
- D. Apply grease on the Spring (185) and assemble it with the Piston Assembly Piston (161), Shoe (162).
- E. Apply machine oil on the reciprocating surface of the Piston Assembly and mount it into the Piston hole on the Spindle (2).
- F. Insert the two Parallel Pins (34) into the pin groove on the fitting surface of the Rear Flange of the Spindle (2).

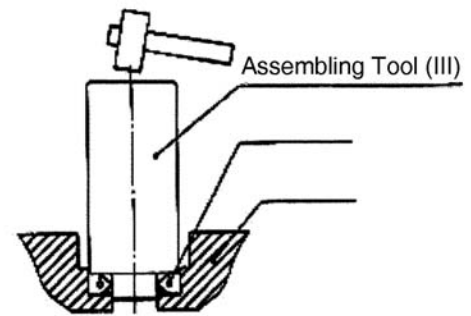


Figure 87

FG009925



Figure 88

FG009860

6. Assembling the Shaft



Wear leather gloves during the inserting work, to prevent burn.

- A. Put the Deep Grooved Ball Bearing (149) into the heating tank, heat it for 10 minutes at $100 \pm 10^{\circ}\text{C}$, and insert it onto the Shaft (102).

- B. Turn the Travel Motor by 90 degrees.
- C. Insert the Shaft (102) into the Spindle (2).

NOTE: Insert the Shaft[102] slowly into the Spindle (2) so that the lip of the Oil Seal (132) inserted into the Spindle is not damaged.

Damaged lip will cause oil leak, resulting in the earlier failure of the Travel Motor.

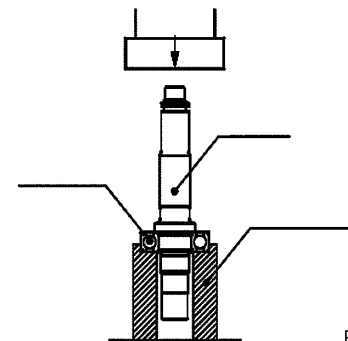


Figure 89

FG009878



Figure 90

FG009859

- D. Insert the Swash Plate (103) into the Spindle (2).

NOTE: Apply grease on the fitting surface of the Swash Plate (103) with the Spindle (2).

Insert the Swash Plate (103) into the Spindle (2) by matching the pivot mounting grooves on the Swash Plate (103) with the two Pivots (167) inserted onto the Spindle (2).



Figure 91

7. Assembling the Inner Parts of the Cylinder Block

NOTE: Insert the THS Snap Ring (145) with its sharp edge facing the inlet.

Insert the Washer (110) which contacts with the Fix Ring (145) with its sharp edge facing the Fix Ring (145).

- A. Insert the Washer (110), Spring (114), Washer (110), and THS Snap Ring, in the said order, into the Cylinder Block (104).
- B. Place the Cylinder Block (104) on the press work bench.

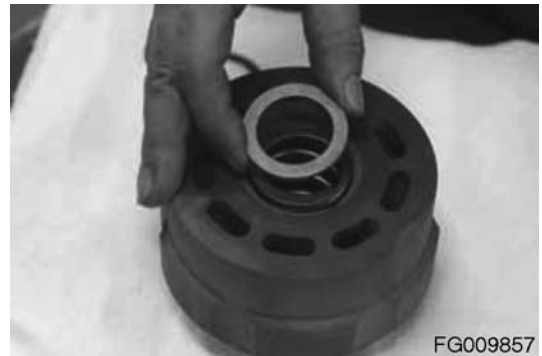


Figure 92

CAUTION!

Take care to prevent the ejection of the Fix Ring which may occur if the plier tip slips out of the groove of the Fix Ring, when assembling the THS Snap Ring (145).

NOTE: The pressure of the Spring (114) must be 112N (115kgf) or more.

Protect the Cylinder Block (104) with a vinyl cover sheet to prevent damage on the contact surface with the Timing Plate (109).

- C. Place a press tool (I) on the Washer (110), press the tool with press, and assemble the THS Snap Ring (145) into the fix Ring Groove on the Cylinder Block (104) using fix ring plier.



Figure 93

8. Assembling the Hydraulic Motor Parts

- A. Insert the three needle-type Collars (151) into the groove on the Cylinder Block (104), and place the Thrust Ball (108) on them.



Figure 94

- B. Insert the nine Piston Assemblies into the Retainer Plate (107).

NOTE: Soak the whole assembly in machine oil.

- C. Assemble the Retainer Plate (107) and the nine Piston Assemblies with the Cylinder Block (104).

NOTE: Align the Retainer Plate (107) and the spherical surface of the Thrust Ball (108).



Figure 95

- D. Insert the Cylinder Block (104) into the Shaft (102).

NOTE: Align the splines on the Cylinder Block (104) with those on the Shaft (102).



Figure 96

- E. After assembling the Cylinder Block (104), turn the Cylinder Block (104) with hands to check if there is any looseness or clicking.

If it clicks, check the assembly.

NOTE: The Cylinder Block[104] cannot be lifted up after assembling.

If lifted up, the Thrust Ball[108] will be dropped, unable to rotate normally.



Figure 97

9. Assembling the Packing Brake

NOTE: Soak the Friction Plate (115) in machine oil before assembling.

- A. Turn the work bench by 90 degrees.
- B. On the Cylinder Block (104), assemble the four Opposite Plates (116) and the three Friction Plates in turns.
- C. Apply grease thinly and insert the O-rings (135, 139) into the O-ring groove on the Piston (112).



Figure 98

- D. Assemble the Piston (112) in the Spindle (2).

NOTE: In the event that the Piston (112) would not be inserted into the Spindle (2) due to the friction of the O-rings (135, 139), knock the end of the Piston (112) lightly with a plastic hammer.

Take care to prevent scratch on the O-ring when assembling the Piston (112).

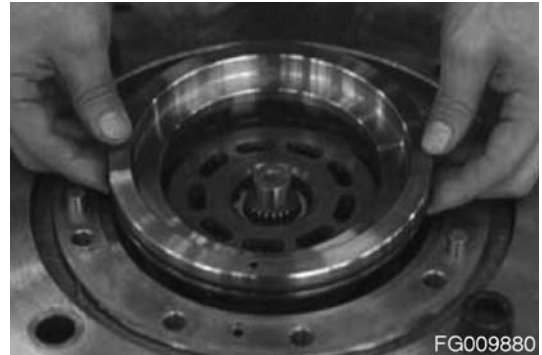


Figure 99

10. Assembling the 2-Speed Switching Spool in the Rear Flange

NOTE: Insert the Spring (366) and Spool (363) into the Rear Flange (301).

- A. Assemble the O-ring (359) on the Plug (357).

NOTE: Apply grease on the O-ring (359).



Figure 100

- B. Insert the Plug (357) into the Rear Flange (301).
- C. Tighten the Plug (357) with the Rear Flange (301) using a hex-wrench, temporarily.



Figure 101

11. Assembling the Check Ball Part

- A. Assemble the two O-rings (358) with the two Plugs (352).

NOTE: *Apply grease on the O-ring (358).*

- B. Insert the Steel Ball (353) into the Rear Flange (301).



Figure 102

- C. Tighten the Plug (352) with the Rear Flange (301) using a hex-wrench, temporarily.



Figure 103

12. Assembling the Piston

- A. Assemble the two O-rings (383) with the two Plugs (380).

NOTE: *Apply grease on the O-ring (383).*

- B. Insert the Piston (381) into the Rear Flange (301).



Figure 104

- C. Tighten the Plug (380) with the Rear Flange (301) using a hex-wrench, temporarily.



Figure 105

13. Reassembling the Brake Valve

- A. Insert the Spool (323) into the Rear Flange (301).

NOTE: Apply machine oil on the Spool (323) and insert the Spool (323) into the Rear Flange (301).

Align the center lines of the Spool (323) and the Rear Flange (301) to prevent the damage on the inner surface of the Rear Flange (301) and the outer surface of the Spool (323) by contact.

If the groove of the Rear Flange (301) or outer surface of the Spool (301) is damaged, internal leak may occur after the reassembling, resulting in the performance degradation of the Travel Motor.

- B. Assemble the O-ring (336) on the Plug (324).

NOTE: Apply grease on the O-ring (336).

- C. Insert Washer (325) and Spring (328) into the Plug (324).

- D. Insert the two Plugs (324) into the Rear Flange (301).

NOTE: Take care when inserting the Plug (324) into the Rear Flange (301) to prevent the deformation of the Spring (328).

- E. Tighten the two Plugs (324) on the Rear Flange (301) temporarily.



Figure 106



Figure 107



Figure 108

14. Assembling the Rear Flange Components

- A. Apply machine oil on the Deep Grooved Ball Bearing (150) and insert the Ball Bearing (150) into the Rear Flange (301).
- B. Insert the Parallel Pin (341) into the pin groove of the Rear Flange (301).
- C. Apply grease on the fitting surface of the Timing Plate (109) with the Rear Flange (301).



Figure 109

- D. Assemble the Timing Plate (109) with the Rear Flange (301) using the Parallel Pin (341) as the guide.

NOTE: *Mount the Timing Plate (109) until it contacts with the Rear Flange (301). The contacting will prevent the Timing Plate (109) from being separated from the Rear Flange (301) when mounting the Rear Flange (301) on the Spindle (2).*



Figure 110

- E. Mount the ten Springs (113) on the Rear Flange (301).

NOTE: *Apply grease on the Springs (113) sufficiently to prevent being separated from the Rear Flange (301).*



Figure 111

15. Connecting between the Rear Flange and Spindle

- A. Insert the two O-rings (32, 33) into the O-ring grooves on the Spindle (2).

NOTE: *Do not apply grease on the O-rings (32, 33). If grease is applied, it may smear on the fitting surface between the Rear Flange (301) and Spindle (2) during Motor operation. The smearing may be mistaken as the oil leak.*

- B. Pour 1.0 liter of hydraulic oil in the Spindle (2).



Figure 112

- C. Insert the Rear Flange (301) into the Spindle[2], aligning the pin groove on the Rear Flange (301) and the two Parallel pins inserted in the Spindle (2).
- D. Tighten the ten hex-grooved Bolts (343) to the Spindle (2) temporarily, using hex-wrench.



Figure 113

16. Tighten all parts by the specified torques.

- A. Tighten the ten hex-grooved Bolts (343) to the Spindle (2) by specified torque.

Torque : $102 \pm 15.7 \text{ N}\cdot\text{m}$ ($10.4 \pm 1.6 \text{ kgf}\cdot\text{m}$)



Figure 114

- B. Tighten the Plug (324) by specified torque.

Torque : $441 \pm 39.2 \text{ N}\cdot\text{m}$ ($45.0 \pm 4.0 \text{ kgf}\cdot\text{m}$)

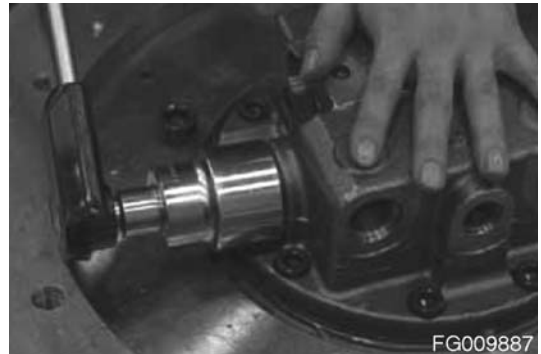


Figure 115

- C. Tighten the Plug (380) by specified torque.

Torque : $58.8 \pm 9.81 \text{ N}\cdot\text{m}$ ($6.0 \pm 1.0 \text{ kgf}\cdot\text{m}$)



Figure 116

- D. Tighten the Plug (352) by specified torque.
Torque : $12.3 \pm 2.45 \text{ N}\cdot\text{m}$ ($1.25 \pm 0.25 \text{ kgf}\cdot\text{m}$)



Figure 117

- E. Tighten the Plug (357) by specified torque.
Torque : $98.1 \pm 19.6 \text{ N}\cdot\text{m}$ ($10.0 \pm 2.0 \text{ kgf}\cdot\text{m}$)



Figure 118

17. Assembling the Relief Valve Assembly

- A. Mount the two Relief Valve Assemblies (including 203).

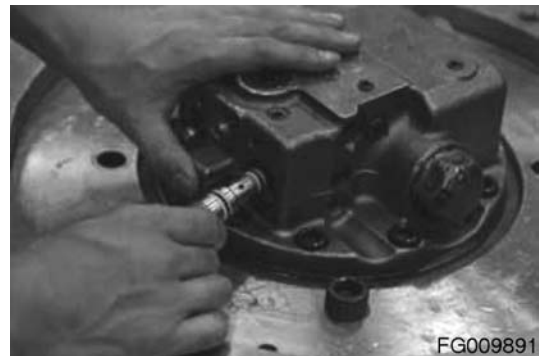


Figure 119

- B. Tighten the two Relief Valve Assemblies (including 203) by specified torque.

Torque : $98.1 \pm 19.6 \text{ N}\cdot\text{m}$ ($10.0 \pm 2.0 \text{ kgf}\cdot\text{m}$)



Figure 120