■TRAVEL MOTOR (TYPE 1)

1. REMOVAL AND INSTALL

1) REMOVAL


13031GE18

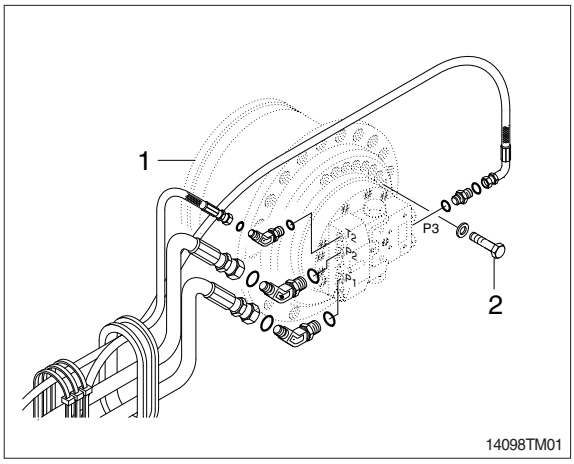
(1) Swing the work equipment 90˚and lower it completely to the ground.

(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) Remove the track shoe assembly.
For details, see **removal of track shoe assembly.**

(5) Remove the cover.

(6) Remove the hose.

※ Fit blind plugs to the disconnected hoses.

(7) Remove the bolts and the sprocket.

(8) Sling travel device assembly (1).

(9) Remove the mounting bolts (2), then remove the travel device assembly.
- Weight : 240 ㎏ (530 ㏪)

2) INSTALL

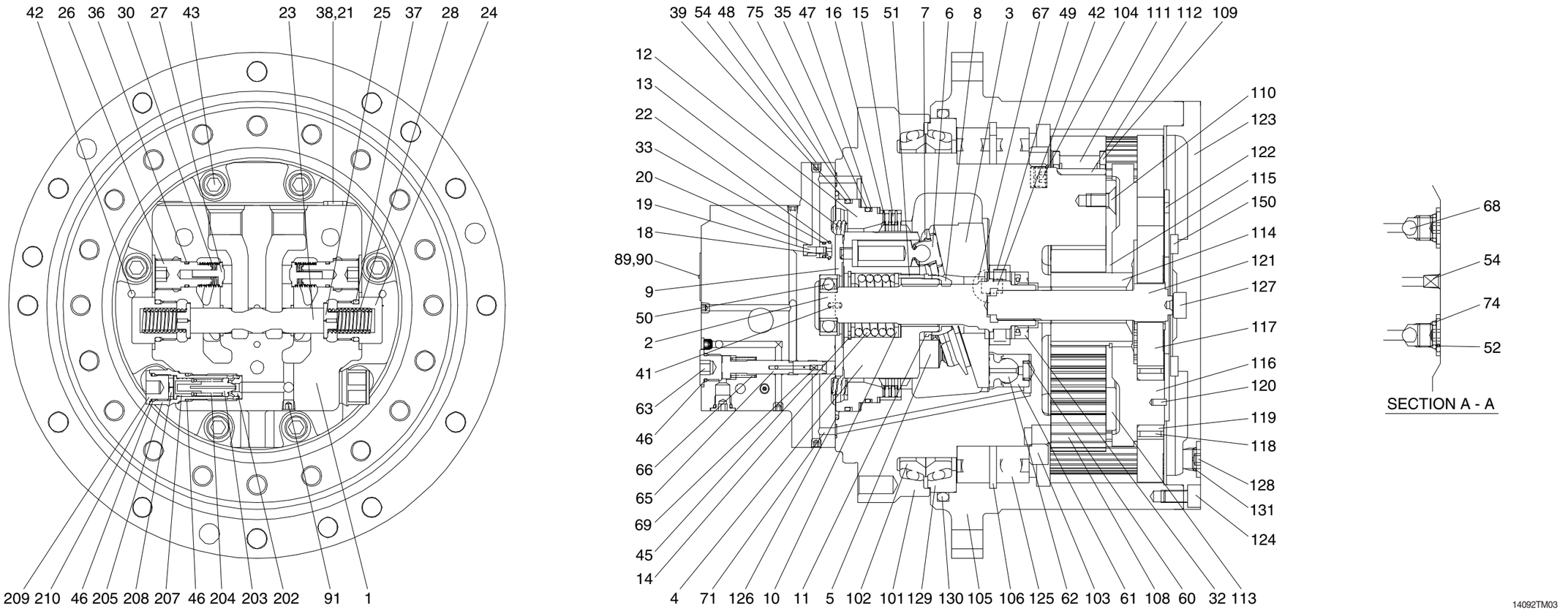
(1) Carry out installation in the reverse order to removal.

(2) Bleed the air from the travel 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. TRAVEL MOTOR

1) STRUCTURE



1	Rear flange	19	Valve	39	O-ring	65	2 Speed spool
2	Shaft	20	Spring	41	Parallel pin	66	2 Speed spring
3	Swash plate	21	Plug	42	Parallel pin	67	Pivot
4	Cylinder block	22	Ring	43	Socket bolt	68	Steel ball
5	Piston	23	Main spool	45	Snap ring	69	Set screw
6	Shoe	24	Main plug	46	O-ring	71	Orifice
7	Retainer plate	25	Retainer spring	47	Back up-ring	74	O-ring
8	Thrust ball	26	Check plug	48	Back up-ring	75	O-ring
9	Timing plate	27	Check valve	49	Roller bearing	89	Name plate
10	Washer	28	Main spring	50	Ball bearing	90	Set screw
11	Washer-collar	30	Check spring	51	Roller	91	Plug
12	Piston-parking	32	Oil seal	52	Plug	101	Spindle
13	Spring	33	O-ring	54	Plug	102	Floating seal
14	Spring	35	O-ring	60	Spring	103	Nut ring
15	Friction plate	36	O-ring	61	Piston	104	Plug
16	Mating plate	37	O-ring	62	Shoe	105	Hub
18	Seat valve	38	O-ring	63	Plug	106	Snap ring

108	Planetary gear	125	Angular bearing	205	Body
109	Thrust washer	126	O-ring	206	Shim
110	Screw	127	Thrust washer	207	Piston
111	Needle bearing	128	Plug	208	Rod
112	Collar	129	Seal ring	209	Plug
113	Thrust plate	130	O-ring	210	Back up-ring
114	Sun gear	131	O-ring		
115	Snap ring	150	Thrust plate		
116	Holder				
117	Planetary gear				
118	Needle bearing				
119	Inner race				
120	Spring pin				
121	Drive gear				
122	Thrust plate				
123	Cover				
124	Socket bolt				

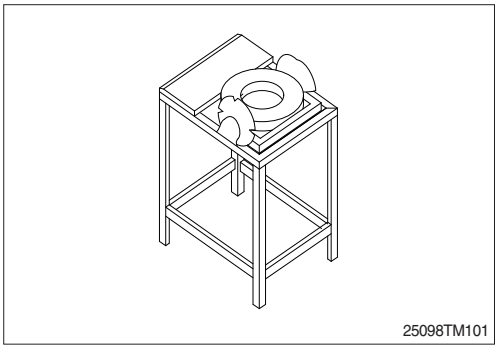
2) TOOLS

(1) Standard tools

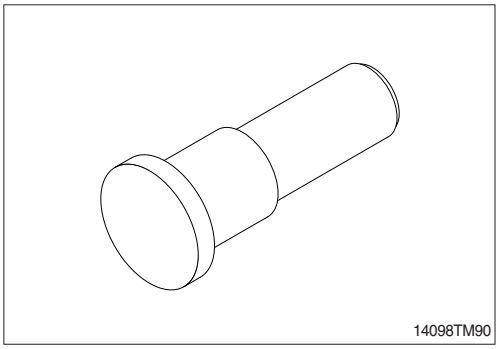
No.	Name	Description/Size	Qty
1	Hexagon wrench (JIS B 4650)	6 (M8) (PT1/4), 8 (M10)	each 1
		10 (M12) (PF1/2)	each 1
		4 (M6)	1
2	Socket wrench	-	1
3	Torque wrench	Nominal 30 kgf · m dial type	1
		Nominal 90 kgf · m dial type	1
4	Adapter for torque wrench	Socket 26, 27, 36	each 1
		Bar 4, 5, 6, 8, 10	each 1
5	Extension bar (JIS B 4637)	150 mm	1
6	Hammer (JIS B 4613)	12	1
7	Plastic hammer	L=300	1
8	(-) driver	150 mm	1
9	Snap ring plier	For shaft, For hole	1
10	Hanger	Weight : over 300 kgf	1
		Eye bolt (M16)	2
		Eye bolt (M10)	2
		Eye bolt (PF 1/2)	2
		Wire	1
11	Press	Press capacity above 200 kgf	1
12	Compressed air	3~5 kgf/cm^2, nozzle	1
13	Vessel	General vessel : W450 × D300 × H120	2
14	Heating vessel	Heating capacity : over 100˚C	1
		Volume : 500 × 500 × 500	
15	Depth micro-meter	Measuring range : 0.04 ~ 0.3 mm	1
16	Air hammer	BRH-8 (compressed air 5~6 kgf/cm^2)	1
17	Sealant	Silicone rubber (780-RTV)	1

(2) Special tools

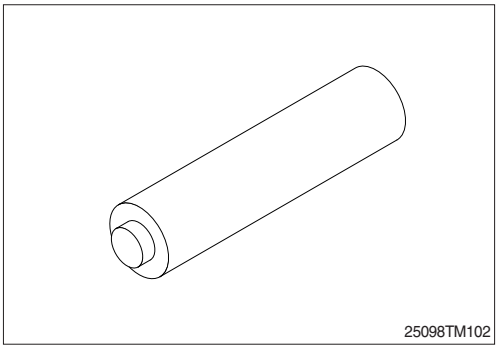
① Inversion working bench



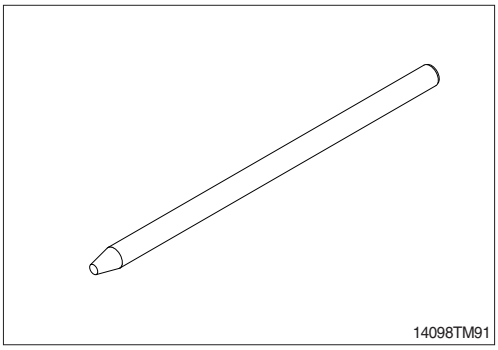
② Pressurize jig (Ⅰ)



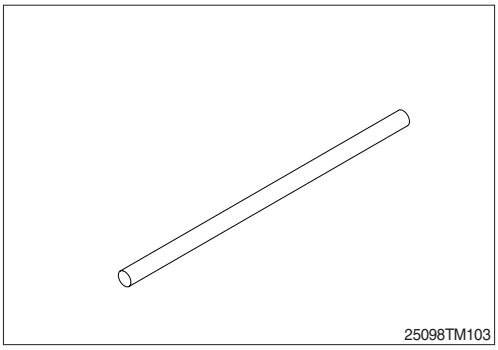
③ Pressurize jig (Ⅱ)



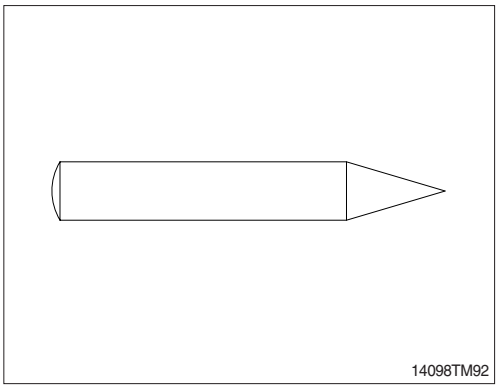
④ Aluminum bar



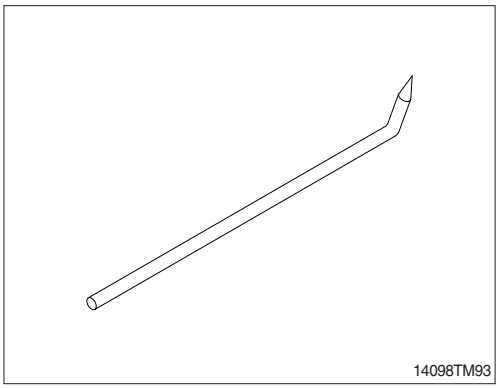
⑤ Steel bar



⑥ Sharp punch



⑦ Draw bar



3) TIGHTENING TORQUE

Item No.	Parts name	Size	Qty	Tightening torque	
				kgf · m	lbf · ft
21	Plug	PF 3/8	1	10 ± 2	72.3 ±14.5
24	Plug	M30×1.5	2	36 ± 7.2	260 ±52.1
26	Plug	M24×1.5	2	17 ± 3.4	123 ±24.6
43	Socket bolt	M10×1.5	8	5.9 ± 1.2	42.7 ±8.7
52	RO plug	PF 1/4	4	3.0 ± 0.5	21.7 ±3.6
54	Plug	NPTF 1/16	7	1.0 ± 0.25	7.2 ±1.8
63, 209	Plug	PF 1/2	1	3.0 ± 0.5	21.7 ±3.6
91	Plug	PT 1/8	4	1.25 ± 0.2	9 ±1.4
104	Plug	PT 3/8	3	6.0 ± 0.9	43 ±6.5
110	Screw	M6	4	0.83 ± 0.12	6 ±0.9
128	Plug	PF 3/8	3	6.0 ± 0.9	43 ±6.5
124	Socket bolt	M8	12	1.25 ± 0.2	9 ±1.4
205	Body	M20	1	12 ± 1.5	86.8 ±10.8
301	Plug	PF 1 1/2	1	26 ± 5.2	188 ±37.6

3. DISASSEMBLY

3.1 GENERAL PRECAUTIONS

1) Spread rubber or vinyl cover on the work bench.
2) When disassembling the travel motor, provide a match mark on the mating face or each part.
3) Arrange the detached parts to prevent them from being damaged or lost.
4) The disassembled seals must be replaced with new ones as a rule even if they are free from damage. For disassembly, therefore, prepare new seals in advance.

3.2 DISASSEMBLY PROCEDURE

1) When inspecting or repairing the travel motors, use the disassembling procedures described below.
2) Numerals in brackets ( ) following the part name denote the item numbers used in the structure drawing at page 8-68.
3) Prior to disassembly, install the travel motor on a inversion working bench.

3.3 DISASSEMBLING ORDER

1) DISASSEMBLING THE REDUCTION GEAR PART

(1) Remove plugs (128, 3EA) and drain the reduction gear oil.

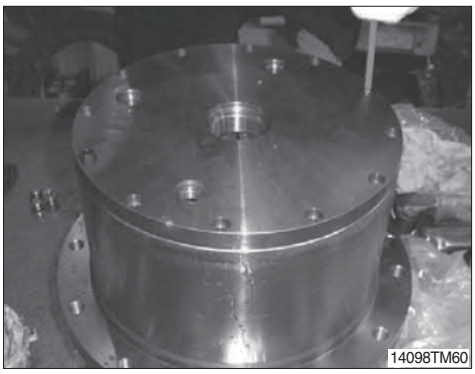
(2) Loosen socket bolts (124, 16EA) and remove the cover (123).

※ Remove the cover (123), after hook it, fit the eye bolt in a screw hole for use of the plug (128). If it's impossible, please remove the cover using the rod.

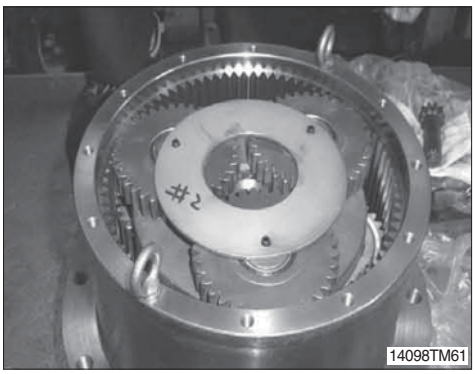
※ You can have difficulty removing it because loctite is spread in the socket bolt (124).

※ Tools

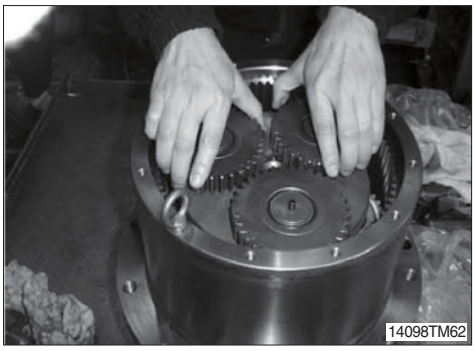
· Hexagon wrench 6, 8



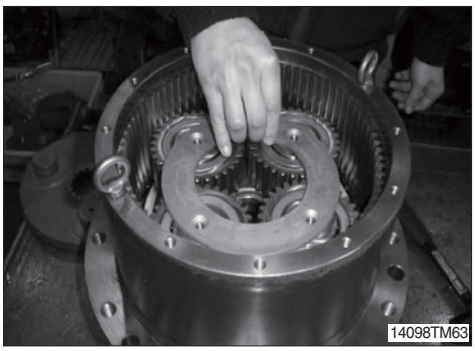
(3) Remove thrust plate R (122) and drive gear (121).



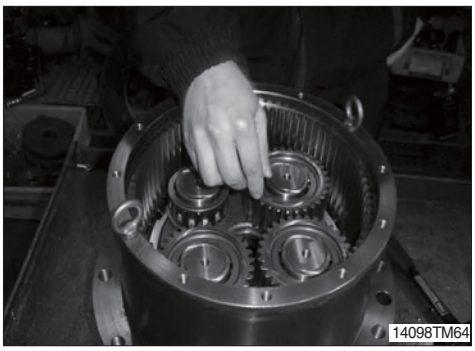
(4) Remove planetary gear R (117), needle bearing, inner race (119) and holder (116) from hub (105).



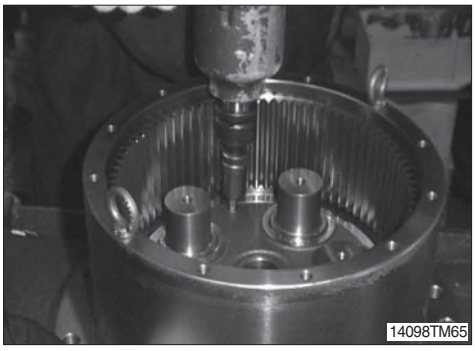
(5) Remove sun gear (114), screw (110) and thrust plate F (113).



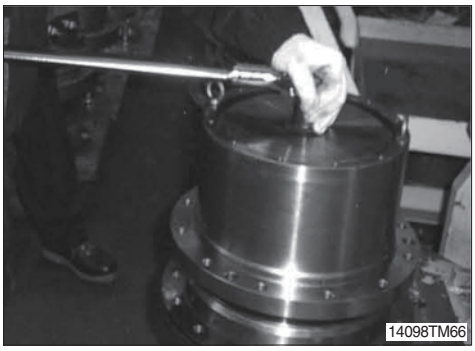
(6) Remove the thrust washer (109), planetary gears F (108), needle bearings (111) and collar (112) from hub (105).



(7) Remove the plugs (104, 3EA).

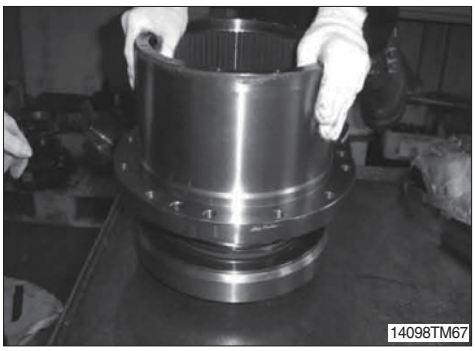


(8) Remove the nut ring (103) from hub (105).

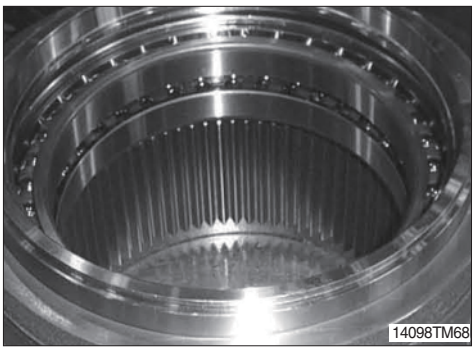


(9) Remove the spindle (101) from the hub (105).

※ Remove it using a crane after eye bolt is assembled at the hub (105).

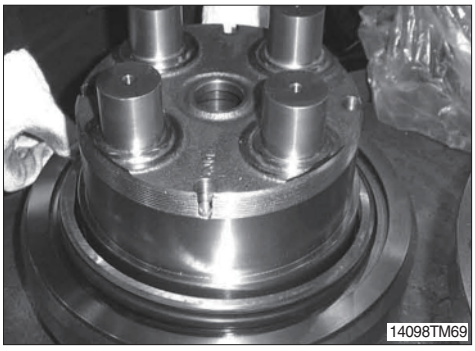


(10) Remove the floating seal (102), seal ring (129), angular bearings (125, 2EA), snap ring (106) and O-ring (130) from the hub (105).

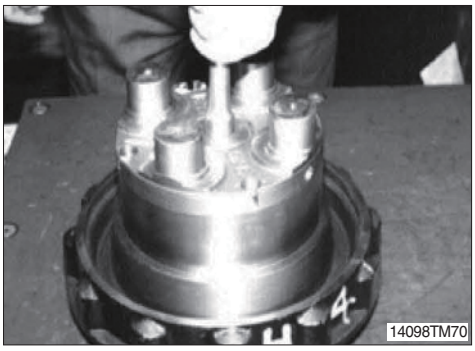


(11) Remove the floating seal (102) from the spindle (101).

※ User can remove easily if using (-) drivers.



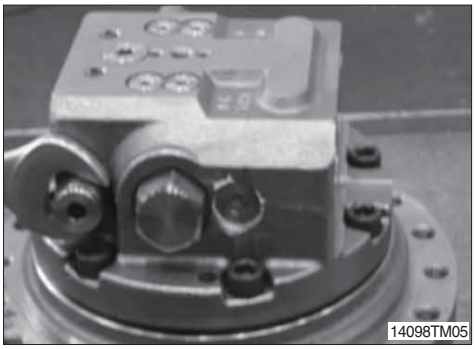
(12) Remove the oil seal (32) from spindle (101).



2) DISASSEMBLING THE HYDRAULIC MOTOR PART

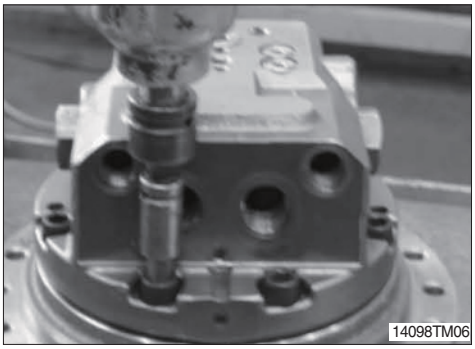
(1) Remove the relief valve (70, 2EA) from rear flange (1).

※ Tools
- · Hexagon socket
- · Torque wrench



(2) Remove hexagon socket head bolts (43, 8EA) from the rear flange (1).

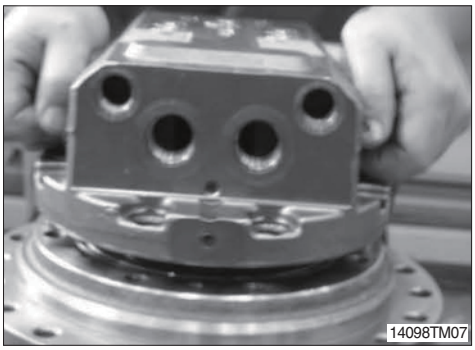
※ Tools
- · Hexagon wrench 8



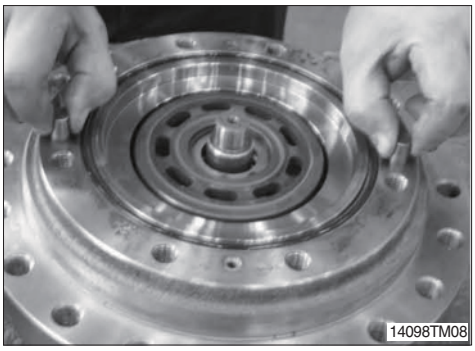
(3) Remove the rear flange (1) from the spindle (101).

(4) Remove the springs (13, 10EA) form the rear flange [1].

※ Remove the rear flange (1) carefully after taken using hands. Be careful not to detach the timing plate (9) and the spring (13) if twisted or beated by constraint.

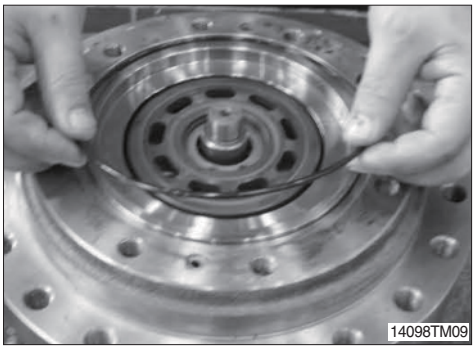


(5) Remove the parallel pin (42) from the spindle (101).



(6) Remove the O-ring (126) from the spindle (101).

※ Do not reuse the O-ring (126).



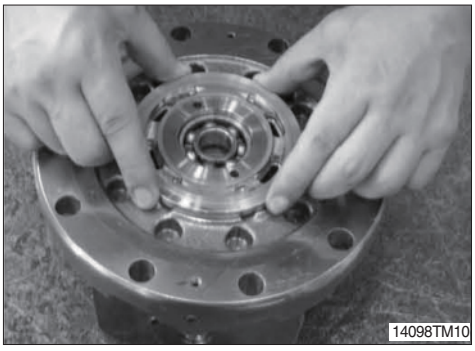
(7) Disassembling the rear flange (1) part

① Place the rear flange with the contact surface of the spindle upward.

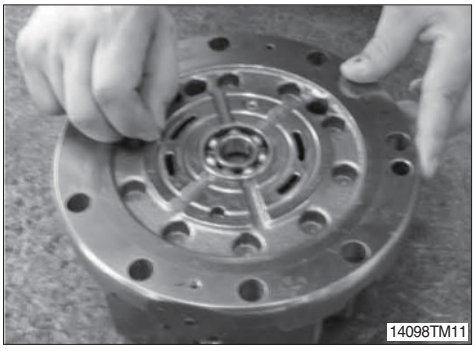
② Remove the timing plate (9) from the rear flange (1).

※ When removing the timing plate, user can have difficulty of the removal due to the close adhesion of rear flange (1) and oil. Remove it after fitting a rod through the hole which is used when a casting is detached.

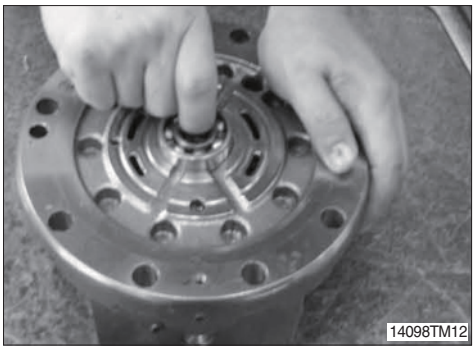
※ Be careful of the leakage due to both surface scratch if using a sharp tool.



③ Remove the paralell pin (41) from the rear flange (1).



④ Remove the ball bearing (50) from the rear flange (1).



(8) Disassembling the brake valve part

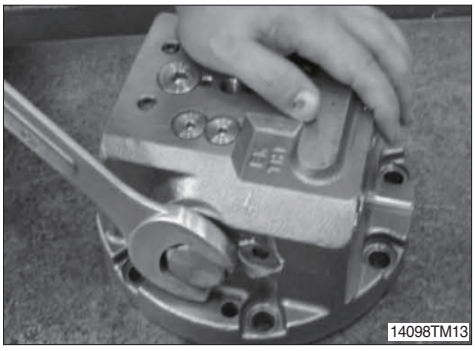
① Remove two plugs (24) from the rear flange (1).

※ User can work easily if sub-disassembly was done on the reversal table.

※ Tools

· Hexagon wrench 36

· Torque wrench

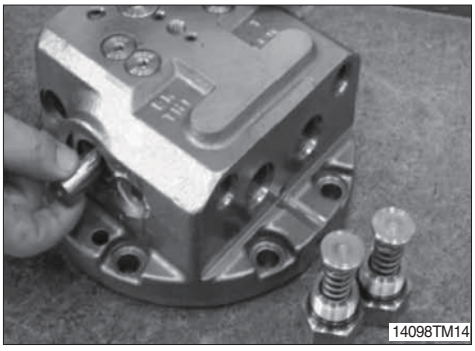


② Take out two spring retainers (25), two springs (28) from the rear flange (1).

③ Remove the spool (23) from the rear flange (1).

※ Be careful not to damage the outer surface of the spool (23) and the sliding surface of the rear flange (1).

※ Since the rear flange (1) and the spool (23) are of the selective fitting type, replace them together as a kit even if only one of the two parts is damaged.

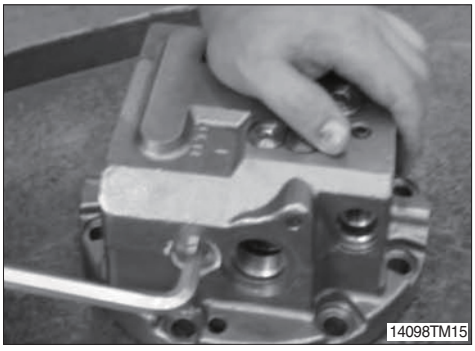


④ Remove two plugs (26) from the rear flange (1).

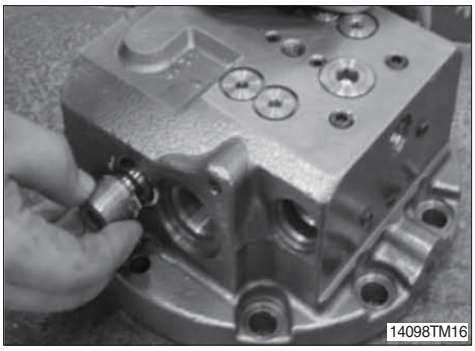
※ User can work easily if sub-disassembly was done on the reversal table.

※ Tools

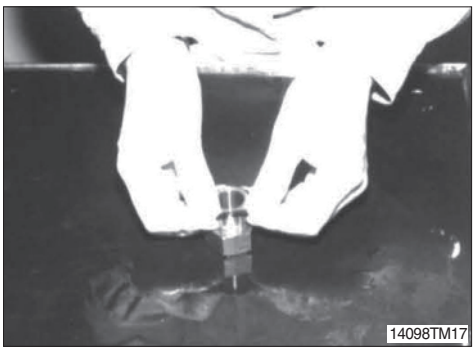
· Hexagon wrench 10



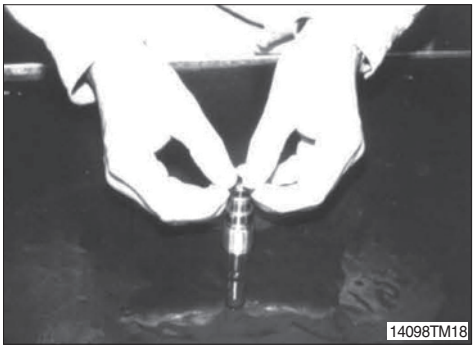
⑤ Remove the springs (30, 2EA), valves (27, 2EA) from rear flange (1).



⑥ Remove the O-ring (37) from plug (24).
※ Do not reuse the O-ring (37).



⑦ Remove the O-ring (36) from plug (26).
※ Do not reuse the O-ring (36).

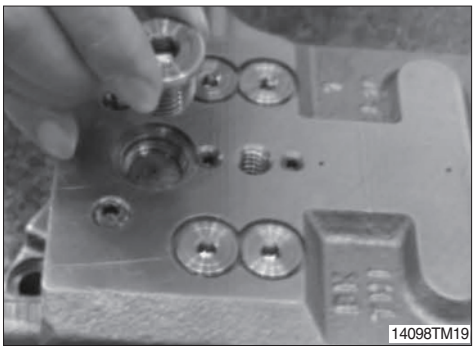


(9) Disassembling the two speed change valve

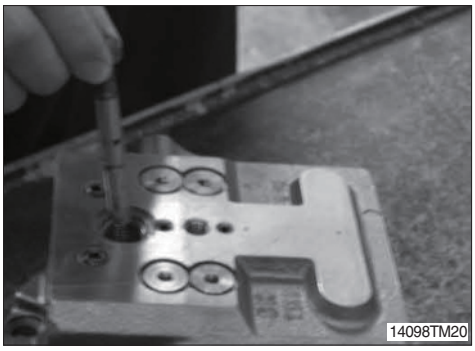
① Remove the plug (63) from the rear flange (1).

※ User can work easily if sub-disassembly was done on the reversal table.

※ Tools
· Hexagon wrench 10



② Remove the spool (65) and spring (66) from rear flange (1).



(10) Disassembling the plug (52).

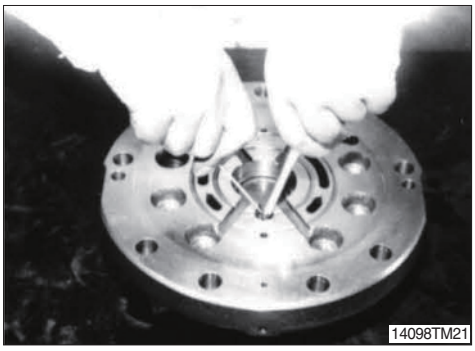
① Do not remove plug (52) if it not to be necessary. Disassembling the plug (52) if it was malfunction because of get mixed with dust.
Clean the plug (52) after disassembled.

※ Be careful not to drop the steel ball (68).

(11) Disassembling the parking brake valve (19)

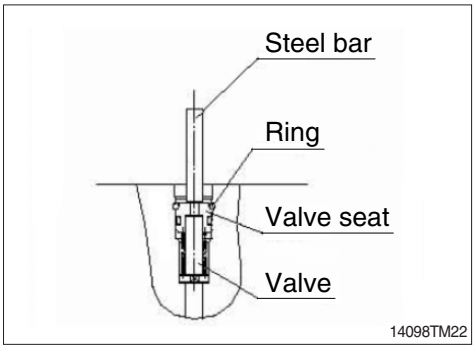
① Mount the rear flange (1) on a working bench that the mounting side of the spindle (101) faces upward.

② Pushing valve seat (18) by a steel bar, disassemble ring (22) from rear flange (1).

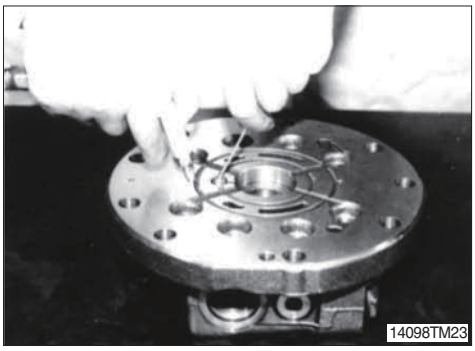


※ Do not remove ring (22) if it not to be replace.

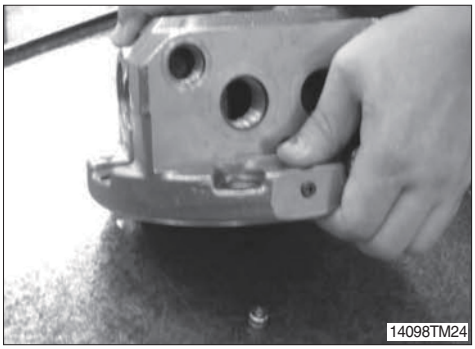
※ Do not reuse the ring (22), valve seat (18) and O-ring (33).



③ Remove the valve seat (18) by injecting compressed air from the access hole in the spindle (101) after caulking the hole of valve seat (18).

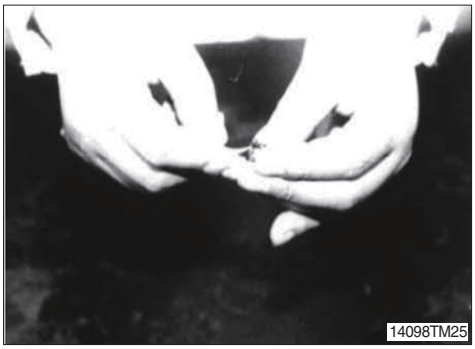


④ Remove the valve (19) and spring (20) from rear flange (1) downside hole with shaking lightly.



⑤ Remove the O-ring (33) and valve seat (18).

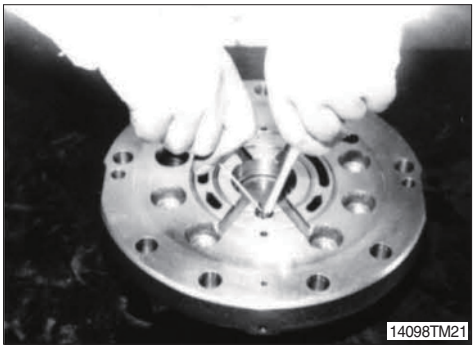
※ Do not reuse the O-ring (33).



(12) Disassembling the parking brake

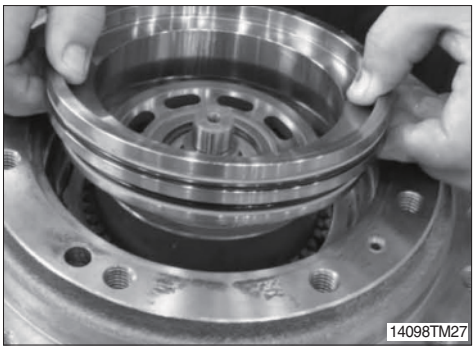
① Remove the piston (12) by injecting compressed air from the parking brake access hole in the spindle (101).

※ Use the protection cover on the upper part of spindle (101) when users put the pressed air into suddenly. Otherwise part damage and accident might go on because the piston (12) is rushed out of the spindle (101).



② Remove the O-rings (35, 39) and backup rings (47 , 48) from the piston (12).

※ Do not reuse O-rings (35, 39) and backup rings (47, 48) after removal.

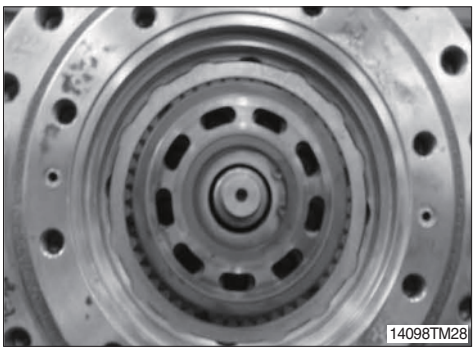


(13) Disassembling the hydraulic motor part

① Lay the travel motor body on the side.

② Drain out the oil from the travel motor.

※ Place an oil receptacle under the travel motor to receive the oil flowing out as the motor is being laid on the side.

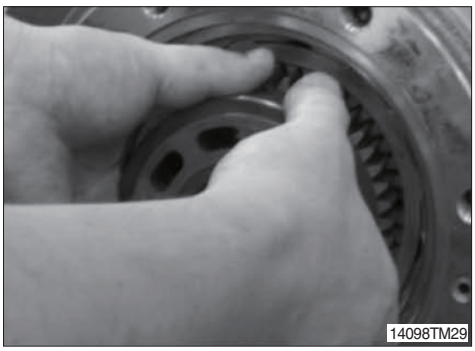


③ Hold the cylinder block (4) with both hands, and remove it from the shaft (2).

④ Remove the mating plates (16) and friction plates (15) from the cylinder block (4).

※ Before removal, hold the cylinder block (4) with both hands and turn it two to three times in a clockwise and a counterclockwise direction alternately to detach the shoe (6) from the swash plate (3).

※ Be careful that if an attempt is made to remove the cylinder block (4) without detaching the shoe (6) from the swash plate (3), then the piston, shoe and other parts that are connected to the cylinder block may come the cylinder loose and fall into the spindle (101).

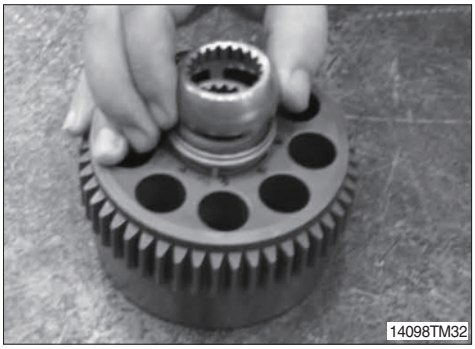


(14) Disassembling the cylinder block kit

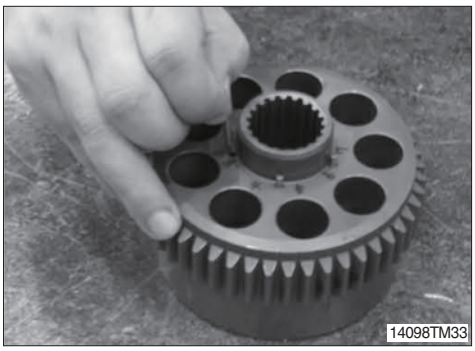
① Piston assembly [piston (5), shoe (6)] from the removed cylinder block (4).

② Piston (5) and shoe (6) from the removed retainer plate (7).

③ Thrust ball (8) from the removed cylinder block (4).



④ Roller (51, 5EA) from the removed cylinder block (204).



(15) Disassembling the spring of the cylinder block

① Put the cylinder block (4) on the pressurize jig.
② Press the washer (10) with pressurize jig, and remove the spring (14) after snap ring (45) removed.
※ Put a vinyl cover on the sliding surface of cylinder block (4) for protection.
※ Do not remove spring (14) if it not to be replace.

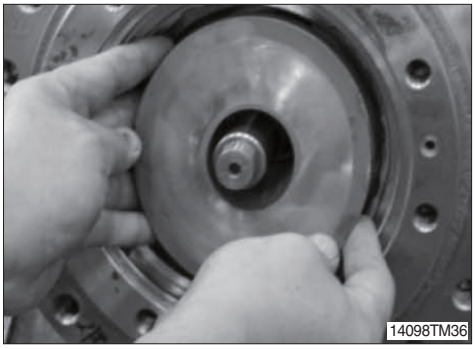

14098TM34

③ Remove the snap ring (45), washer (10), spring (14) and washer (10) from cylinder block (4).

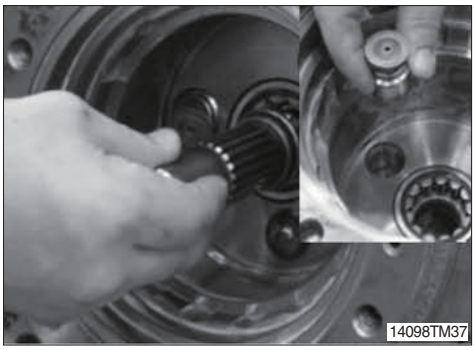

14098TM35

(16) Disassembling the shaft

① Remove swash plate (3) from the shaft (2).
② Remove shaft (2) from the spindle (101).
※ When separating the swash plate, separate and turn it by using hands to free from intervention of the stopper.


14098TM36

③ Remove speed selector piston assembly [piston (61) and shoe (62)] form the spindle [101] by feeding compressed air into the access hole in spindle (101).
④ Remove parallel pins (42, 2EA) and pivots (67, 2EA) from the spindle (101).
⑤ Remove roller bearing (49) from the spindle (101).
※ Piston assembly ; Piston (61), Shoe (62)
※ Compressed air ; 3~5 kgf/cm^2 (43~71 psi)
※ When piston (61) or shoe (62) is damaged, if exchange is necessary, they have to be exchanged together because the separation is impossible. Use the protection cover on the upper part spindle when users put the compressed air into suddenly. Otherwise part damage and accident might go on because the piston is rushed out of the spindle.


14098TM37

4. REASSEMBLY

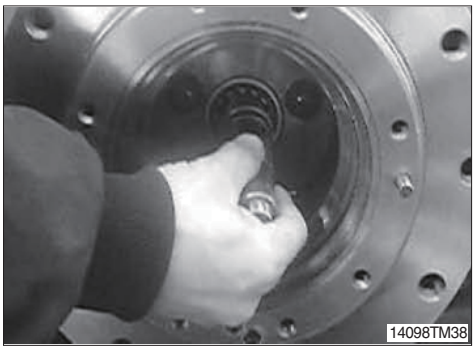
4.1 GENERAL PRECAUTIONS

1) Reassemble in a work area that is clean and free from dust and dirt.
2) Handle parts with bare hands to keep them free of linty contaminants.
3) Repair or replace the damaged parts.
   Each parts must be free of burrs its corners.
4) Do not reuse O-ring, oil seal and floating seal that were removed in disassembly. Provide the new parts.
5) Wash all parts thoroughly in a suitable solvent. Dry thoroughly with compressed air.
   Do not use the cloths.
6) When reassembling oil motor components of travel motor, be sure to coat the sliding parts of the motor and valve with fresh hydraulic oil. (NAS class 9 or above)
7) Use a torque wrench to tighten bolts and plugs, to the torque specified as follows.

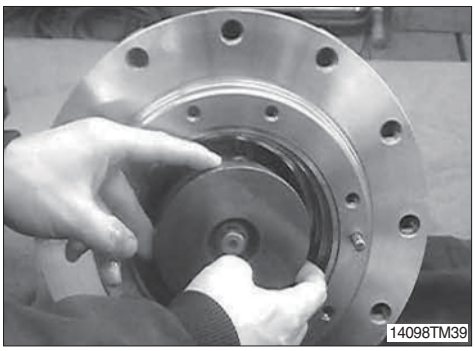
4.2 REASSEMBLY PROCEDURE

1) REASSEMBLE THE HYDRAULIC MOTOR PART

(1) Install roller bearing (49) into the spindle (101).
(2) Install pivots (67, 2EA), parallel pin (42, 2EA) and two speed piston assembly (61, 62) into the spindle (101).
(3) Install shaft (2) into the roller bearing (49) assembled spindle (101).
※ Be careful not to damage the seal (3) of assembling part.



(4) Lay the travel motor body on the side.
(5) Apply lithium grease to the shaft (2)'s spline part.
(6) Install swash plate (3) to the spindle (101).



(7) Reassembe the cylinder block kit

① Install washer (10), spring (14, 9EA), washer (10) and snap ring (45) in that order, into the cylinder block (4) inner part.

② Put the cylinder block (4) on the pressurize jig.

③ While pressing washer (10) by pressurize jig, install snap ring (45).

※ Put a vinyl cover on the sliding surface of the cylinder block (4) and timing plate (9) for protection.

(8) Reassembe the hydraulic motor

① Install roller (51, 5EA) to the pin hole of cylinder block (4).

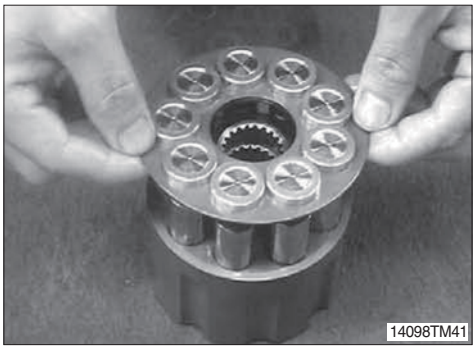
② Install thrust ball (8) to the cylinder block (4).

③ Insert piston assembly [piston (61) and shoe (62), 9 set] into retainer plate (7).

※ After mounting, immerse the entire them in a working fluid.

④ Mount the piston assembly (9 set) into the cylinder block (4).

※ The retainer plate (7) must be in contact with the round part of thrust ball (8).



⑤ Install cylinder block (4) assembly to the shaft (2).

※ After fitting splines of both cylinder block (4) and shaft (2), assemble them.

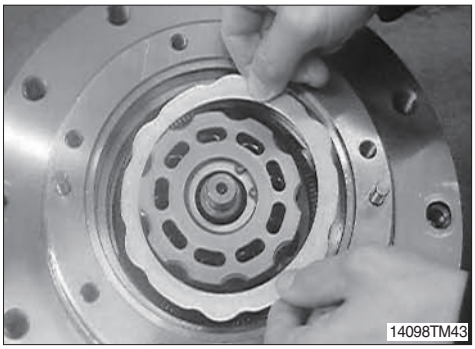
※ After installing the cylinder (4), confirm whether it revolves or not by turning using both hands.

※ Motor is malfunction when it isn't revolve.

(9) Reassembe the parking brake

① Install mating plate (16) first and then a friction plate (15), one by one, into the grooves of the outer surface of the cylinder block (4).

※ Immerse the friction plates (15) in a working fluid before fitting them into the grooves.



② Install two O-rings (35, 39) and two back up ring (47, 48) into O-ring grooves.

③ Mount a piston (12) in the spindle (101).

※ Apply a thin coat of grease to the O-rings (35, 39).

※ If the piston (12) does not fit into the spindle (101) because of the resistance of the O-ring, tap the edge of the piston (12) lightly and equally with a plastic hammer.

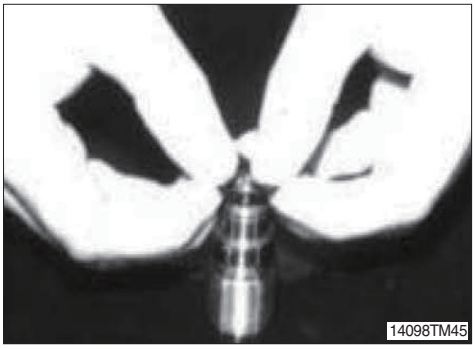
※ Be careful not to damage the O-ring and back up ring at this time.

2) REASSEMBLE THE REAR FLANGE (1) PART

(1) Reassemble the check valve

① Install O-ring (36, 2EA) on the plug (26, 2EA).

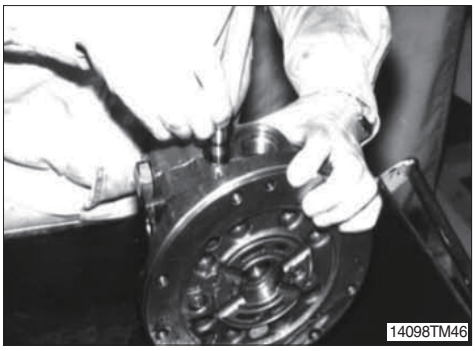
※ Apply grease to the O-ring (36).



② Install spring (30) and valve (27) into the plug (26).

③ Install plug (26) into the rear flange (1).

※ Install spring (30) and valve (27) into the plug (26), and then grease the spring (30) and the valve (27) and hand-lock the former.



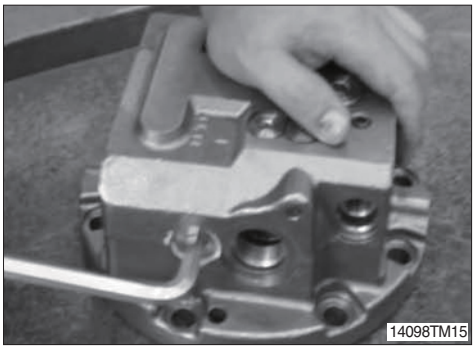
④ Install plug (26) in conjunction with the spring (30) and the valve (27) into the rear flange (1), and tighten the plug to the required torque.

※ Tightening torque : 17±2.6 kgf · m (123±18.8 lbf · ft)

※ Tools

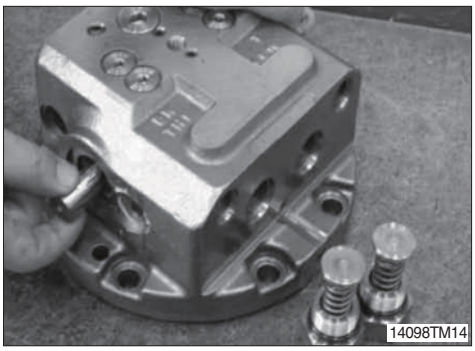
· Adapter for hexagon wrench 10

· Torque wrench

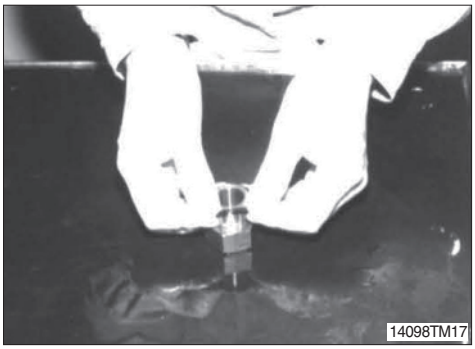


⑤ Install spool (23) into the rear flange (1).

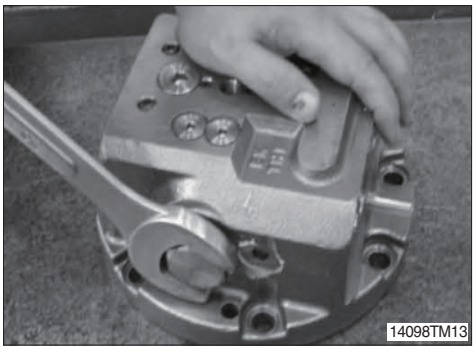
※ Before installing the spool (23), apply hydraulic oil to the spool. Be careful not to damage the spool's surface and the inner of rear flange (1).



⑥ Install O-ring (37) on the plug (24).
Apply grease to the O-ring (37).

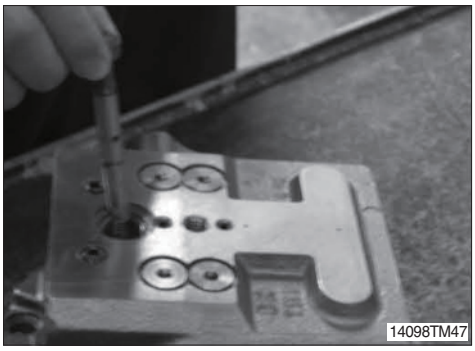


⑦ Install spring retainer (25) and spring (28) into the plug (24).
⑧ Install plug (24) into the rear flange (1).
⑨ Tighten the plug (24) to the required torque.
※ Tightening torque : 36±5.4 kgf · m (260±39 lbf · ft)
※ Socket (#36) / Torque for hexagon wrench.
※ Tools
· Hexagon socket 36
· Torque wrench

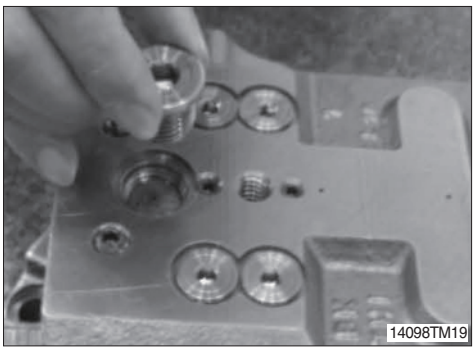


(2) Reassembe the two speed change valve

① Install spring (66) into the valve (65).
② Insert the valve (65) into the rear flange (1).



③ Insert a plug (63) into the rear flange (1).
※ Tightening torque : 13±2.6 kgf · m (94±18.8 lbf · ft)
※ Tools
· Adapter for hexagon wrench 10
· Torque wrench

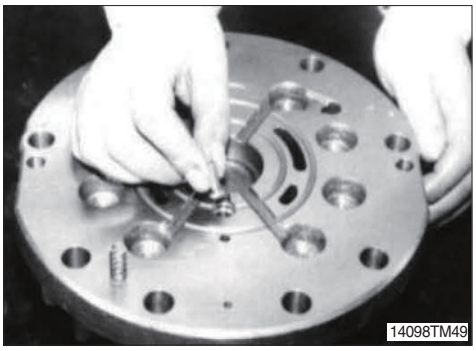


(3) Reassembe the parking brake valve

① Install O-ring (33) on the valve seat (18).
※ Do not reuse the O-ring (33).

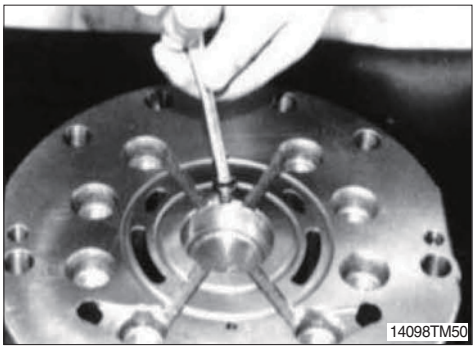
② Mount the rear flange (1) on a working bench that the mounting side of the spindle (101) faces upward.

③ Install valve (19), spring (20) and valve seat (18) in that order.



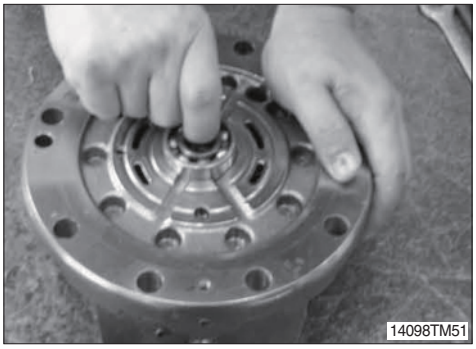
④ After new ring (22) bend somewhat and put the valve seat (18), then into the rear flange (1) ring's groove.

※ Do not reuse the ring (22).

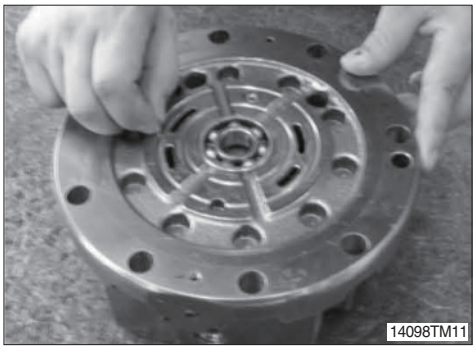


⑤ Install ball bearing (50) into the rear flange (1).

※ Apply hydraulic oil to the ball bearing (50).

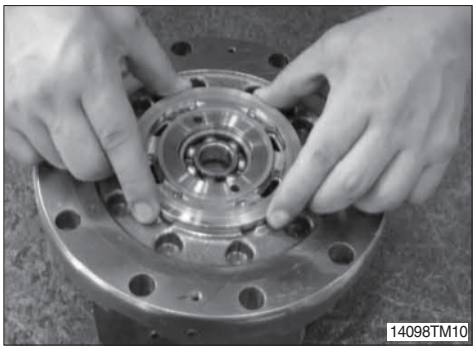


⑥ Install parallel pin (41) into the pin hole of rear flange (1).



⑦ Install timing plate (9) into the rear flange (1).

※ Apply hydraulic oil to the contact surface of rear flange.

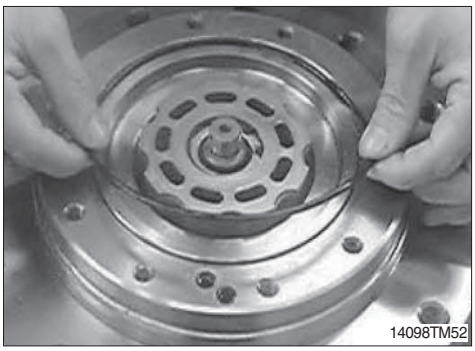


(4) Reassembe the rear flange (1) and spindle (101)

① Tilt the work bench 90˚ for travel motor reassembling.

② Insert the O-ring (75, 126) on the spindle (101).

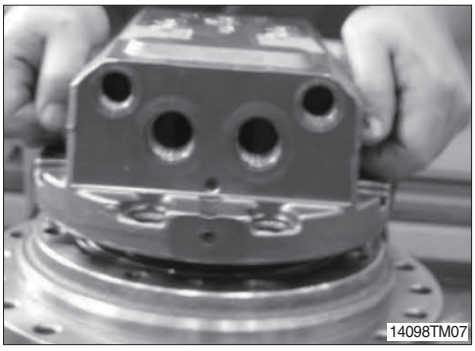
※ Apply grease to the O-rings (75, 126) thinly.



③ Install parallel pins (42, 2EA) into the spindle (101).

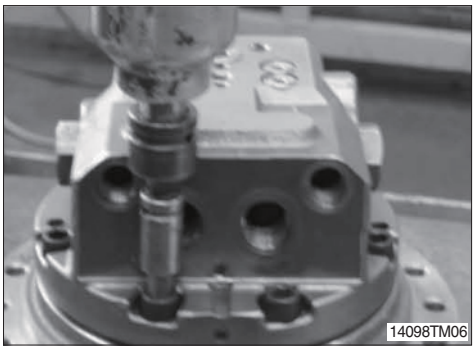
④ Mount the rear flange (1) on the spindle (101).

※ When the rear flange (1) is mounted on the spindle (101), fix the spring (13) applied grease to not drop.



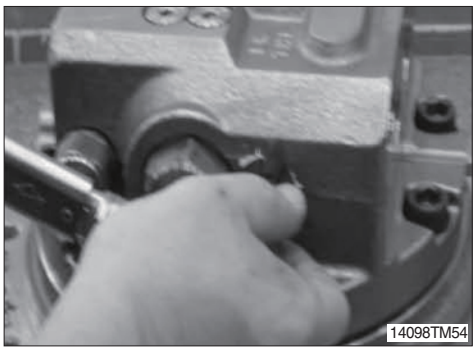
⑤ Tighten the socket bolt (43) into the spindle (101) to the required torque.

※ Tightening torque : 5.9±1.0 kgf · m (42.7±7.2 lbf · ft)
※ Tools
· Adapter for hexagon wrench 8
· Torque wrench



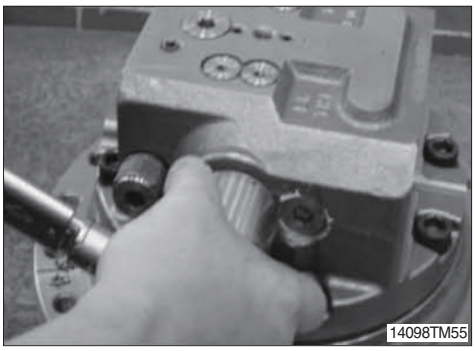
⑥ Tighten the plug (24) into the rear flange (1) to the required torque.

※ Tightening torque : 13±4.0 kgf · m (94±28.9 lbf · ft)
※ Tools
· Hexagon socket 36
· Torque wrench



⑦ Tighten the plug (26) into the rear flange (1) to the required torque.

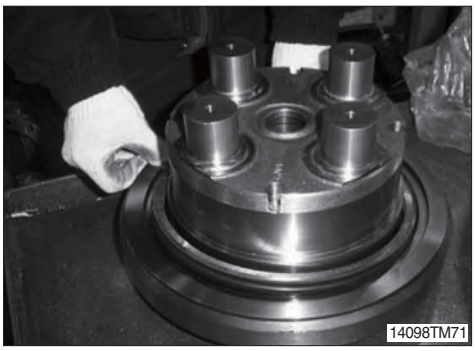
※ Tightening torque : 36±1.5 kgf · m
(260±10.8 lbf · ft)
※ Tools
· Hexagon socket 10
· Torque wrench



3) REASSEMBLE THE REDUCTION GEAR ASSEMBLY

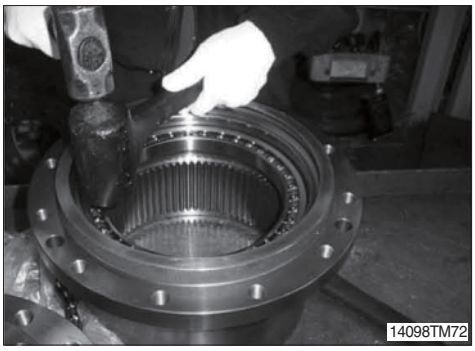
(1) Install floating seal (102) on the spindle (101).

※ Apply grease to the floating seal (102).



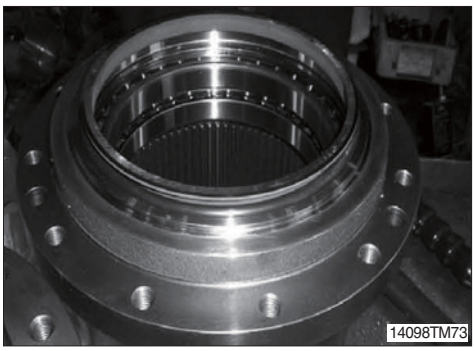
(2) Install angular bearing (125) and snap ring (106) into the hub (105).

※ Be careful for the insert direction.

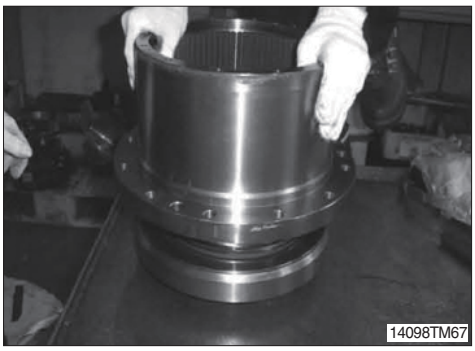


(3) Insert the O-ring (130), the sealing (129) and floating seal (102) in the hub (105).

※ Apply grease to the floating seal (102) thinly.



(4) Install the spindle (101) into the hub (105) assembly.



(5) Tighten the nut ring (103) and plug (104) into the hub (105) to the required torque.

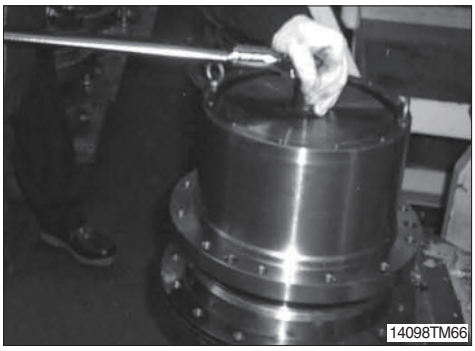
※ Do not wind the seal tape to the plug (104).

※ Punch two place for not to loosen the plug (104).

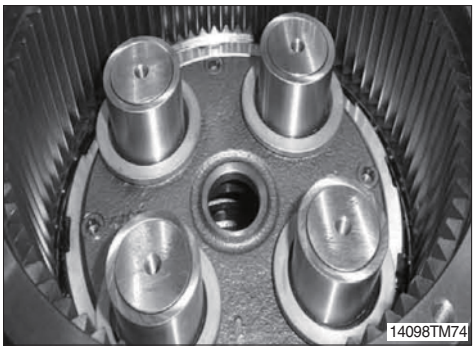
※ Tightening torque : 3.5±0.7 kgf · m (25.3±5.1 lbf · ft)

· Hexagon socket 8

· Torque wrench

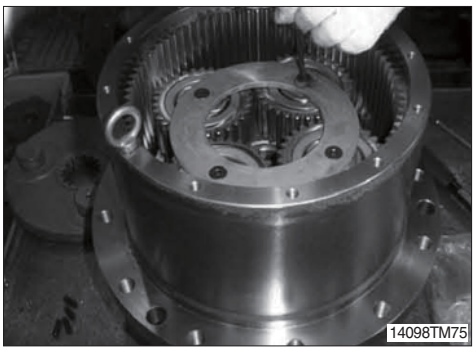


(6) Install thrust washer (109) and collar (112) into the hub (105).



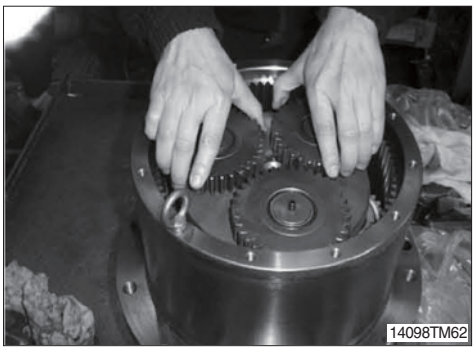
(7) Install needle bearing (111) planetary gear F (108), thrust washer (109), thrust plate F (113) and screw (110) into the hub (105).

※ Tightening torque : 0.83 kgf · m (6.0 lbf · ft)
- · Hexagon socket 5
- · Torque wrench

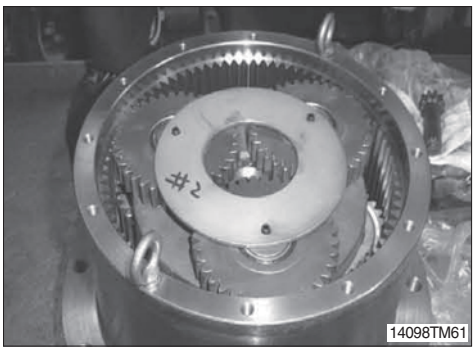


(8) Install sun gear (114) and holder assembly, then insert needle bearing (118) and planetary gear R (117) into the hub (105).

※ Holder assembly : holder (116) + spring pin (120) + inner race (119)

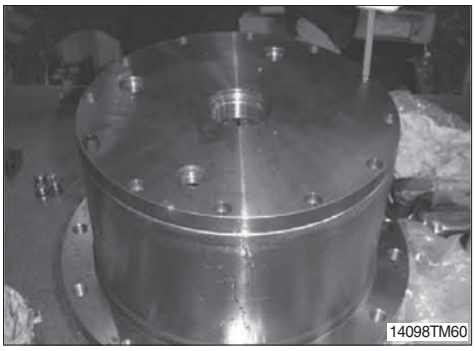


(9) Install drive gear (121) and thrust plate R (122) into the hub (105).



(10) Install cover (123), thrust plate (150), plug (301, 128) and socket bolt (124) into the hub (105).

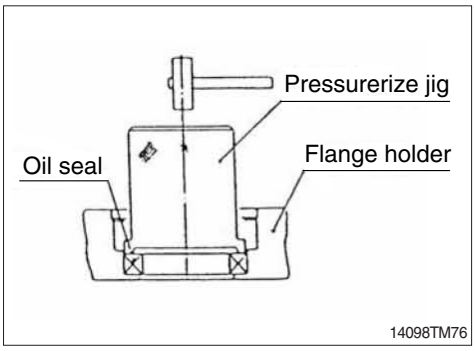
※ Apply grease to the cover (123) after installed O-ring (127).



(11) Pressing the oil seal

① Insert the oil seal (32) by hit the pressurize jig with plastic hammer.

※ Apply grease to the seat of oil seal (32).



3.4 CHECKING FACTS AFTER ASSEMBLY

1) AIR TEST OF REDUCTION GEAR

Disassemble plug (128) of reduction gear part. When compressed air (0.3 kgf/cm^2) is inserted that in water during the 2 minutes, it should be not happened air bubble.

Fill the gear oil.

· Oil amount : 3.0 liter (0.79 U.S.gallon)

2) AIR TEST OF HYDRAULIC MOTOR

One port should be opened, the others port should be closed. When compressed air (3 kgf/cm^2) is inserted opened port in water during the 2 minutes, it should be not happened air bubble.

Fill the hydraulic oil.

· Oil amount : 0.55 liter (0.15 U.S.gallon)

■ TRAVEL MOTOR (TYPE 2)

1. REMOVAL AND INSTALL

1) REMOVAL

(1) Swing the work equipment 90˚ and lower it completely to the ground.

(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) Remove the track shoe assembly.
For details, see **removal of track shoe assembly.**

(5) Remove the cover.

(6) Remove the hose.

※ Fit blind plugs to the disconnected hoses.

(7) Remove the bolts and the sprocket.

(8) Sling travel device assembly (1).

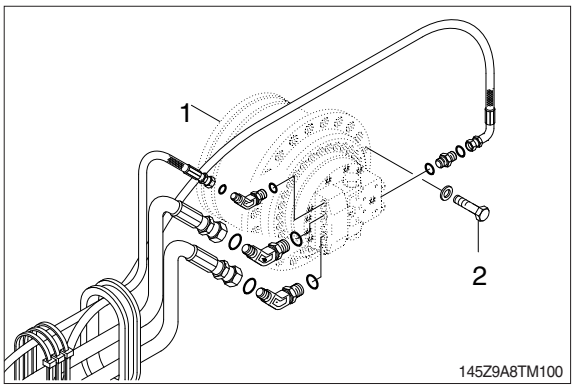
(9) Remove the mounting bolts (2), then remove the travel device assembly.
· Weight : 185 kg (410 lb)

2) INSTALL

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

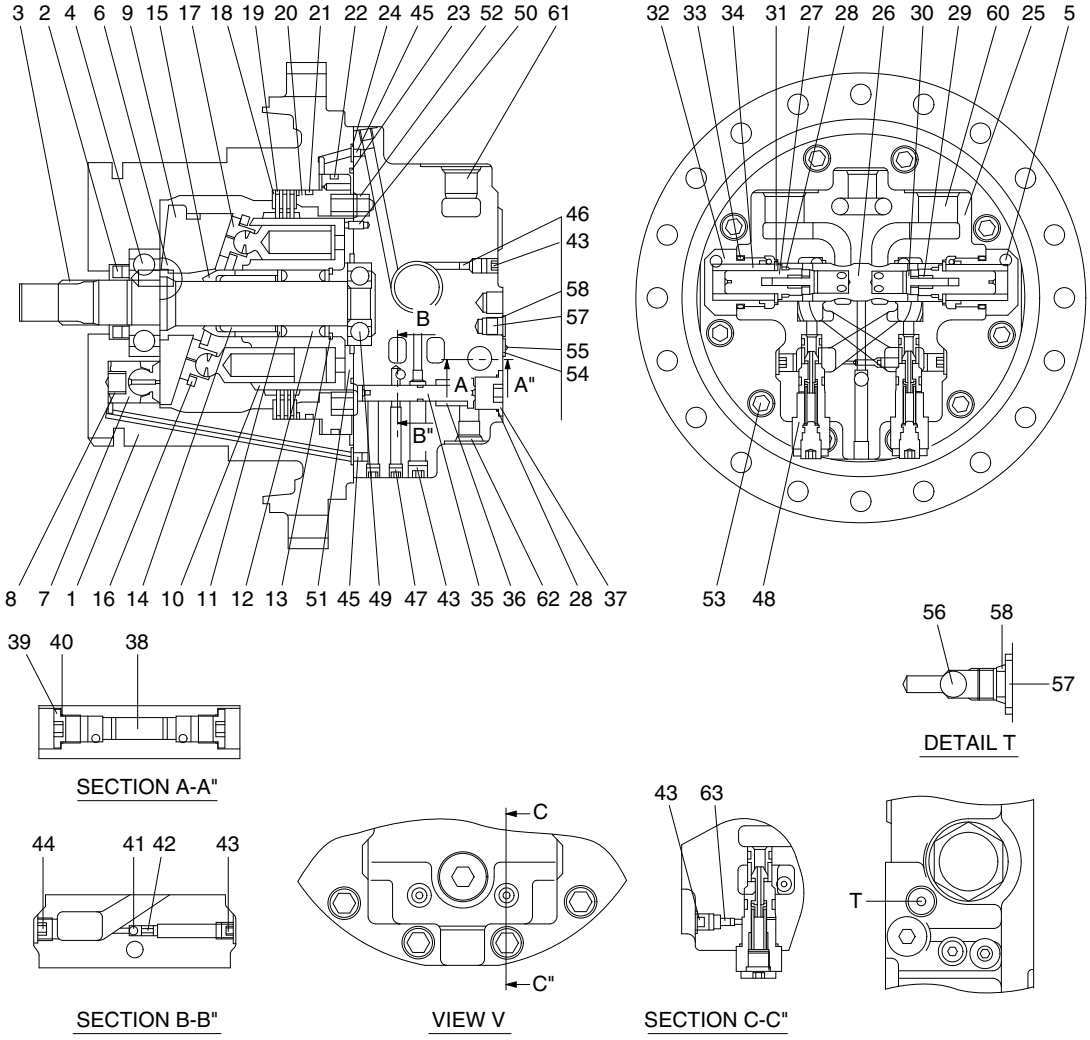
(2) Bleed the air from the travel motor.
① Remove the air vent plug.
② Pour in hydraulic oil until it overflows from the port.
③ Tighten plug lightly.
④ Start the engine, run at low idling, and check oil come out from plug.
⑤ Tighten plug fully.

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



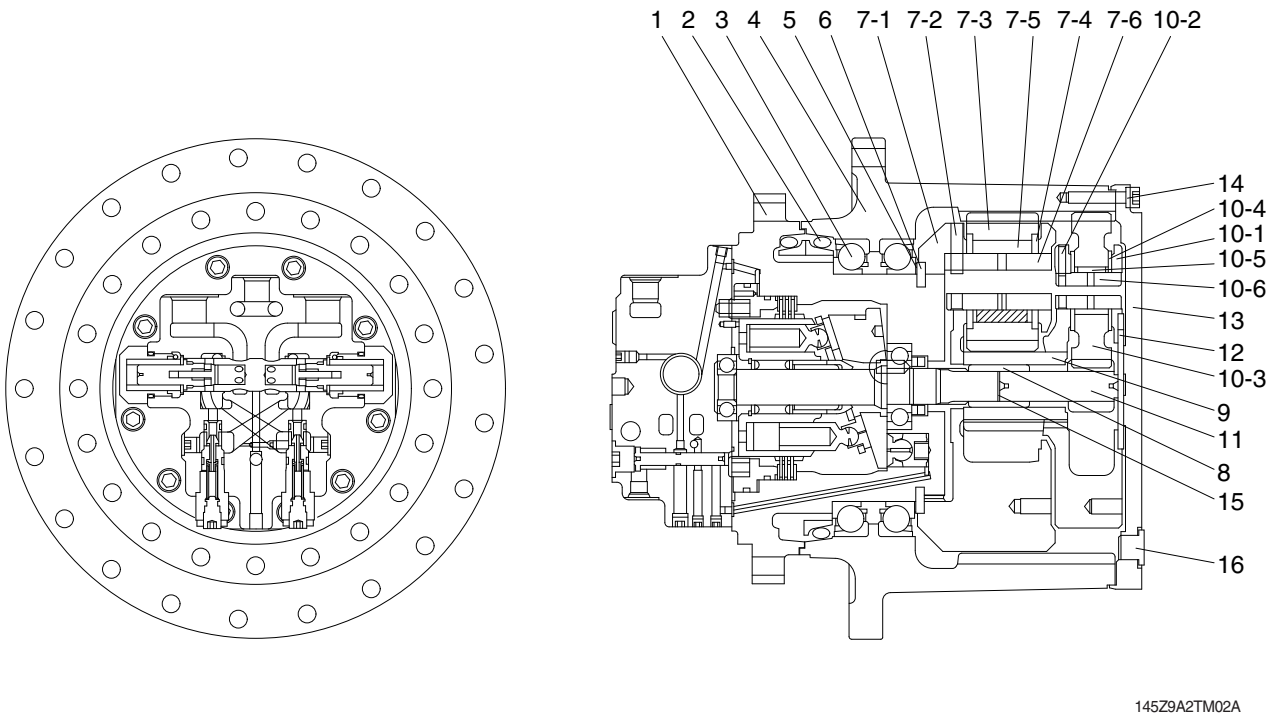
2. SPECIFICATION

1) STRUCTURE



145Z9A2TM02

1	Shaft casing	17	Piston assy	33	O-ring	49	Bearing
2	Oil seal	18	Steel plate	34	Spring	50	Pin
3	Shaft	19	Friction plate	35	Spool	51	Valve plate
4	Bearing	20	Brake piston	36	Spring	52	Spring
5	Pin	21	Ring	37	Plug	53	Wrench bolt
6	Swash ball	22	Ring	38	Piston	54	Name plate
7	Swash piston	23	O-ring	39	Plug	55	Rivet
8	Spring	24	O-ring	40	O-ring	56	Steel ball
9	Swash plate	25	Valve casing	41	Steel ball	57	Plug
10	Cylinder block	26	Main spool	42	Orifice	58	O-ring
11	Spring seat	27	Plug	43	Plug	60	Plastic plug
12	Spring	28	O-ring	44	Plug	61	Plastic plug
13	Snap ring	29	Spring	45	Orifice	62	Plastic plug
14	Pin	30	Check	46	Orifice	63	Orifice
15	Ball guide	31	Plate	47	Plug		
16	Set plate	32	Plug	48	Relief valve assy		

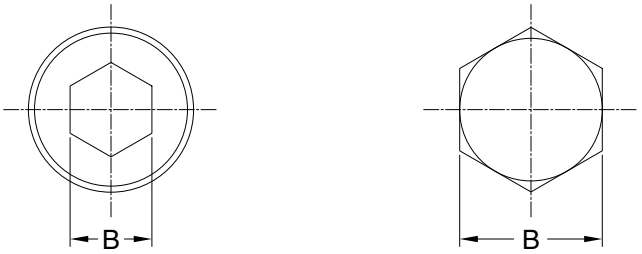


1	Spindle	7-4	Washer 2	10-5	Bearing 1
2	Floating sesal	7-5	Bearing 2	10-6	Pin 1
3	Ball bearing	7-6	Pin 2	11	Sun gear 1
4	Housing	8	Coupling	12	Plate 1
5	Shim	9	Sun gear 2	13	Cover
6	Shim	10	Carrier assy 1	14	Bolt
7	Carrier assy 2	10-1	Carrier 1	15	Snap ring
7-1	Carrier 2	10-2	Spring pin 1	16	Plug
7-2	Spring pin 2	10-3	Planetary gear 1		
7-3	Planetary gear 2	10-4	Washer 1		

2) TOOL AND TIGHTENING TORQUE

(1) Tools

Name of tools	B (mm)	Name of part applied
Hexagonal L-Wrench	4	Plug (42, 45, 46, 47)
	6	Plug (43, 44)
	8	Plug (39)
	10	Plug (37, 57), Wrench bolt (53)
Socket wrench/ spanner	24	Relief plug (48)
	41	Main spool plug (32)
Snap ring plier (for holes, axis)		ø 42 (13)
Hammer		Ball bearing (49), Pin (50)
Torque wrench		Size : 5 kgf · m, 100 kgf · m
Jig for oil seal assembling		Oil seal (2)
Heating tool for bearing		Parking spring (20)



Size B

145Z9A8TM99

(2) Tightening torque

Item no.	Part name	Size	B (mm)	Torque	
				kgf · m	lbf · ft
25	Wrench bolt	-	-	68	491.8
32	Main spool plug	M36	41	45	325.5
37	Plug	PF 3/8	10	6	43.4
39	Plug	PF 1/4	8	3	21.7
42, 45, 46, 47	Plug	PT 1/16	4	0.7~1.1	5.1~8.0
43	Plug	PT 1/8	6	1.25	9.0
48	Relief valve plug	PF 1/2	24	10	72.3
53	Wrench bolt	M12×30	10	10.4	75.2

2. DISASSEMBLING AND ASSEMBLING

1) GENERAL INSTRUCTIONS

(1) Generally, hydraulic equipment is precisely manufactured and clearances between each parts are very narrow. Therefore, disassembling and assembling works should be performed on the clean place where dusts hardly gather. Tools and kerosene to wash parts should also be clean and handled with great care.

(2) When motor is removed from the host machine, wash around the ports sufficiently and put the plugs so that no dust and/or water may invade. Take off these plugs just before the piping works when re-attach it to the host machine.

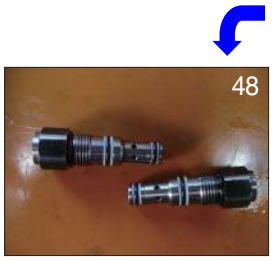
(3) Before disassembling, review the sectional drawing and prepare the required parts, depending on the purpose and the range of disassembling.
Seals, O-rings, etc., if once disassembled, are not reusable.
There are some parts that should be replaced as a subassembly.
Consult with the parts manual in advance.

(4) The piston can be inserted to whichever cylinder block for the initial assembling.
However, their combination should not be changed if they are once used. To reuse them, put the matching mark on both pistons and cylinder block before disassembling.

⚠ Take great care not to pinch your hand between parts while disassembling nor let fall parts on your foot while lifting them.

2) DISASSEMBLING MOTOR UNIT

(1) Disassemble relief valve (48) from valve casing (25) using a torque wrench.



145Z9A8TM01

145Z9A8TM02

(2) Disassemble wrench bolt (53) (M12 × 30) and take out valve casing sub assembly.

145Z9A8TM03

(3) Remove parking spring (52) - 12EA.

145Z9A8TM04

(4) Remove O-ring (23).

145Z9A8TM05

(5) Disassemble brake piston (20) using a jig.

145Z9A8TM06

145Z9A8TM07

(6) Disassemble friction plate (19)-3EA, steel plate (18)-4EA.

145Z9A8TM09

145Z9A8TM08

145Z9A8TM10

(7) Remove the cylinder block kit (II).

※ It is easier to work by placing the shaft casing (1) horizontal.

145Z9A8TM12

145Z9A8TM11

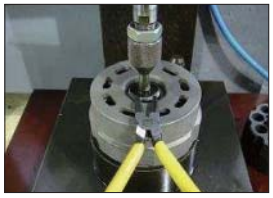
(8) Disassemble cylinder block (10), ball guide (15), set plate (16), piston assy (17), pin (14) from cylinder block kit (II).
Press spring (12) using a jig and take out snap ring (14) using a plier.
Disassemble snap ring (13), spring seat (11), spring (12) from cylinder block kit (II).

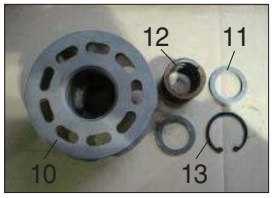

145Z9A8TM13

145Z9A8TM14

145Z9A8TM15

145Z9A8TM16


145Z9A8TM17



145Z9A8TM18

(9) Disassemble swash plate (9).

145Z9A8TM19

(10) Disassemble swash ball (6).

145Z9A8TM20

(11) Disassemble shaft (3) from shaft casing (1).

145Z9A8TM21

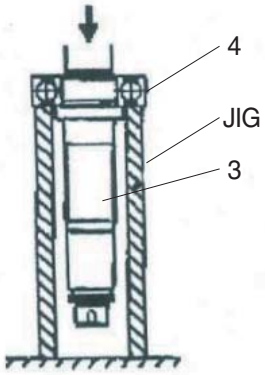
145Z9A8TM22

- After disassembled shaft (3) is placed on a jig, top of shaft is pressed down using a press. It can remove ball bearing (4) portion.

※ Remove ball bearing (4) in case it is replaced only.

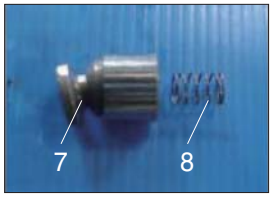
- Dismantled bearing can't be reused.

145Z9A8TM23



145Z9A8TM24

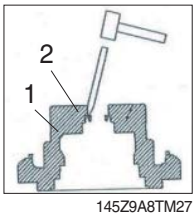
(12) Disassemble swash piston (7), spring (8) into shaft casing(1).



145Z9A8TM25

145Z9A8TM26

(13) Disassemble oil seal (2) from shaft casing (1) using a tool.



145Z9A8TM27

145Z9A8TM28


145Z9A8TM29

(14) Disassemble valve plate (51) and ball bearing (49) from valve casing (25).

145Z9A8TM30

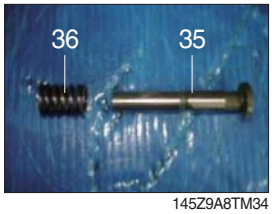
145Z9A8TM31

145Z9A8TM32

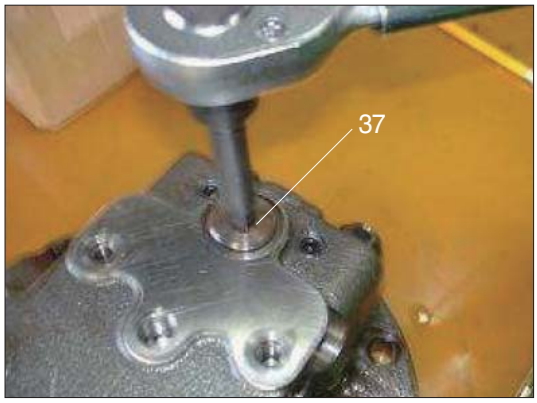
(15) Disassemble plug (47) from valve casing (25).

145Z9A8TM33

(16) Disassemble plug (37) from valve casing (25) using a torque wrench and disassemble two speed control spool (35), spring (36) in regular sequence.

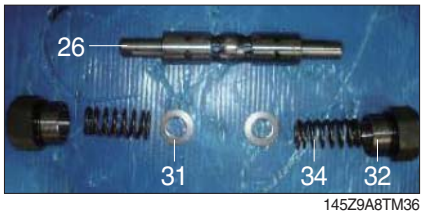


145Z9A8TM34

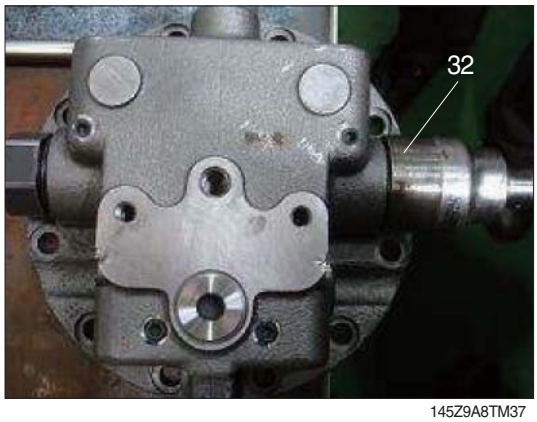


145Z9A8TM35

(17) Disassemble main spool plug (32) from valve casing (25) using a torque wrench and disassemble spring (34), plate (31), main spool (26) in regular sequence.



145Z9A8TM36



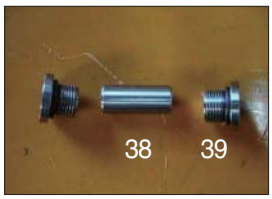
145Z9A8TM37

(18) Disassemble plug (43) from valve casing (25) and then disassemble orifice (42), steel ball (41) one by one.

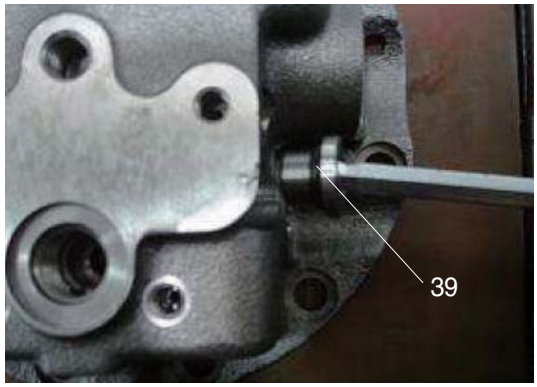
145Z9A8TM38

145Z9A8TM39

(19) Disassemble plug (39), relief valve damping piston (38) from valve casing (25).



145Z9A8TM40

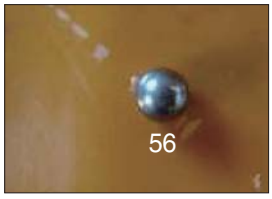


145Z9A8TM41

(20) Disassemble plug (43) from valve casing (25) and disassemble orifice (63).

145Z9A8TM42

(21) Disassemble plug (57), steel ball (56) from valve casing (25).



145Z9A8TM43

145Z9A8TM44

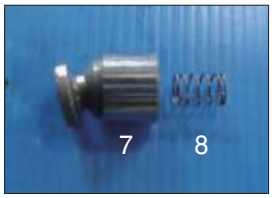
3) ASSEMBLING MOTOR UNIT

(1) Put oil seal into shaft casing (1) using a jig.
※ Caution direction of oil seal.

145Z9A8TM45

145Z9A8TM46

(2) Assemble swash spring (8) into shaft casing (1) and put swash piston (7) into shaft casing (1).



145Z9A8TM47

145Z9A8TM48

(3) Press the ball bearing (4) into shaft (3) after preheating of ball bearing (4).

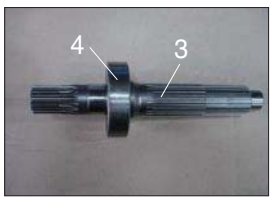
① Induction heating apparatus temperature : 100˚C
② Be careful not to damage the sliding surface for the seal on the shaft.


145Z9A8TM49

145Z9A8TM50


145Z9A8TM51

(4) Assemble shaft into shaft casing (1).



145Z9A8TM52


145Z9A8TM53

(5) Assemble swash ball (6)-2EA.

145Z9A8TM54

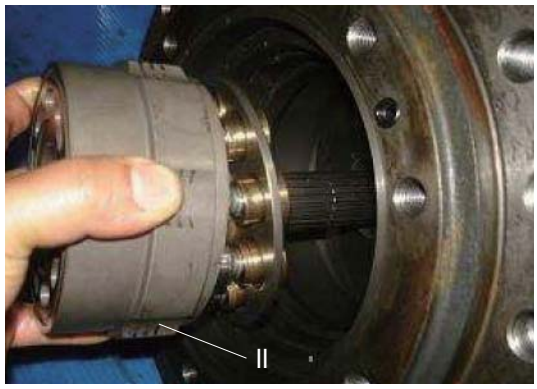
(6) Apply grease to swash plate (9) and assemble swash plate (9) into shaft casing (1).

145Z9A8TM55

145Z9A8TM56

(7) Slant the shaft casing (1) and then assemble cylinder block kit (II).

- Assemble spring seat (11), spring (12), spring seat (11) into cylinder block kit (II) in regular sequence.
  Push down spring(12) and then assemble snap ring (13) into gap of cylinder block(10) using a plier.
- Assemble pin (14), ball guide (15), set plate (16), piston assy (17) into cylinder block (10) in regular sequence.



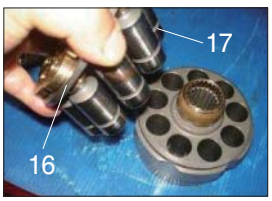
145Z9A8TM57

145Z9A8TM58


145Z9A8TM59

145Z9A8TM60

145Z9A8TM61



145Z9A8TM62

145Z9A8TM63

(8) Assemble friction plate (19), steel plate (18) into cylinder block in regular sequence.
Friction plate : 3 EA
Steel Plate : 4 EA

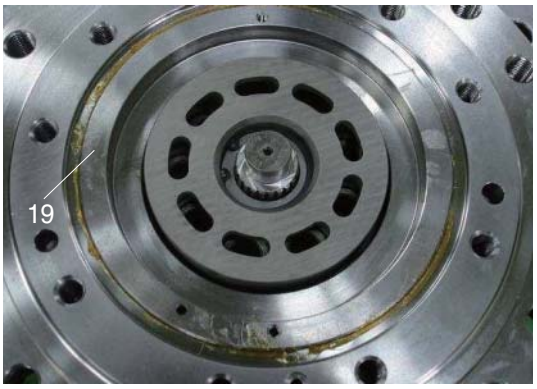
145Z9A8TM65

145Z9A8TM64

145Z9A8TM66

(9) Assemble parking piston (20) into shaft casing (1) using a jig.

145Z9A8TM68



145Z9A8TM67

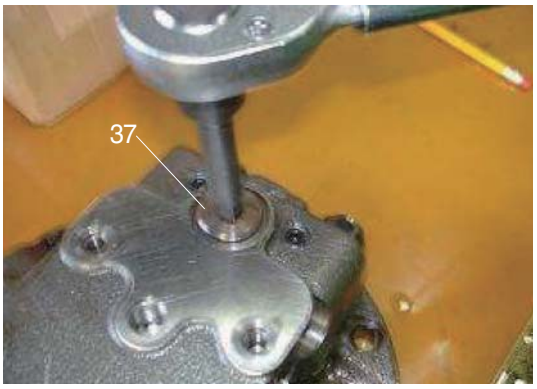
(10) Put O-ring (23) into shaft casing (1).
Apply the grease to O-ring.

145Z9A8TM69

(11) Put spring (36), two speed control spool (35) into valve casing (25) in regular sequence and assemble plug (37) into valve casing (25) using a torque wrench.

- Tighten torque : 10 kgf-m (72.3 lbf-ft)

145Z9A8TM70

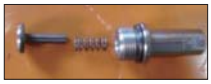


145Z9A8TM71

(12) Assemble check (30), spring (29), plug (27) into main spool (26) in regular sequence.

145Z9A8TM72

145Z9A8TM73

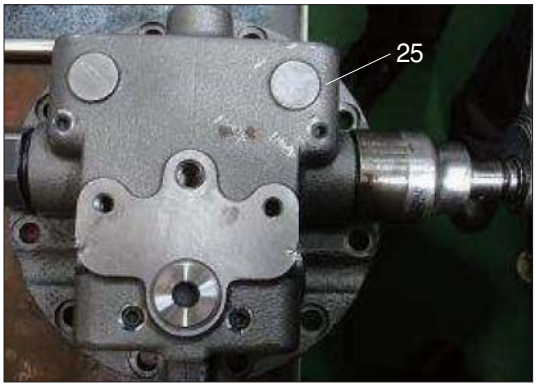

145Z9A8TM74


145Z9A8TM75

(13) Put the main spool (26) into valve casing (25) and assemble plate (31), spring (29) into it. Tighten main spool plug (32) using a torque wrench.

- Tighten torque : 45 kgf-m (325.5 lbf-ft)

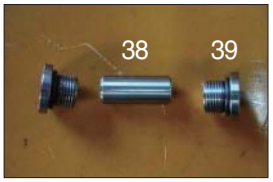
145Z9A8TM76



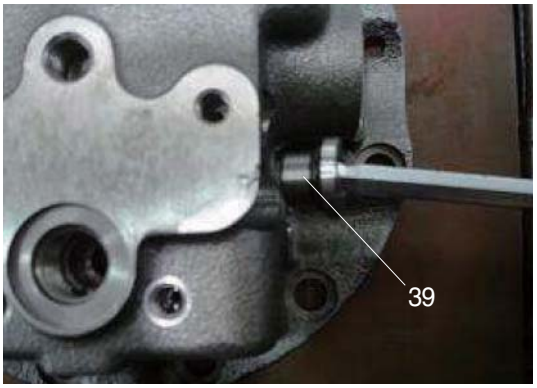
145Z9A8TM77

(14) Put relief valve damping piston (38) into valve casing (25) and assemble plug (39) into valve casing (25).

- Tighten torque : 6 kgf-m (43.4 lbf-ft)



145Z9A8TM78



145Z9A8TM79

(15) Put steel ball (41), orifice (42) into valve casing (25) and tighten the plug (43).
- Tighten torque : 1.25 kgf-m (9.0 lbf-ft)

145Z9A8TM80

145Z9A8TM81

(16) Put steel ball (56) into valve casing (25) and tighten the plug (57).
- Tighten torque : 1.25 kgf-m (9.0 lbf-ft)

145Z9A8TM82

145Z9A8TM83

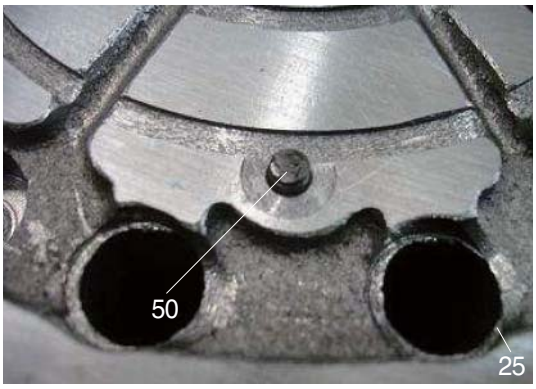
(17) Assemble orifice (63) into valve casing (25) and tighten the plug (43).
- Tighten torque : 1.25 kgf-m (9.0 lbf-ft)

145Z9A8TM84

(18) Assemble orifice (63) into valve casing (25) and tighten the plug (47).
- Tighten torque : 0.7~1.1 kgf-m (5.1~8.0 lbf-ft)

145Z9A8TM85

(19) Assemble pin (50) into valve casing (25).



145Z9A8TM86

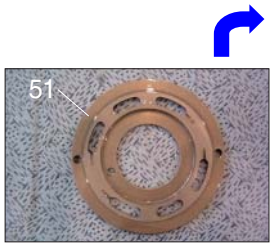
(20) Assemble pin (5) into valve casing (25).

145Z9A8TM87

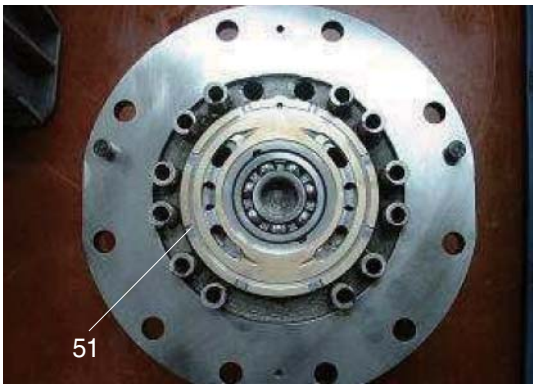
(21) Assemble ball bearing (49) into valve casing (25).

145Z9A8TM88

(22) Apply grease on the face of valve plate and assemble valve plate (51) into valve casing (25).



145Z9A8TM89



145Z9A8TM90

(23) Apply grease to brake spring (52)-12EA and assemble brake spring (52)-12EA into valve casing (25).

145Z9A8TM91

(24) Assemble valve casing (25) into shaft casing (1) and tighten the wrench bolt (53) using a torque wrench.

- Tighten torque : 10.4 kgf-m (75.2 lbf-ft)

145Z9A8TM92

(25) Assemble relief valve (48) into valve casing (25) using a torque wrench.

- Tighten torque : 10 kgf-m (72.3 lbf-ft)

145Z9A8TM93

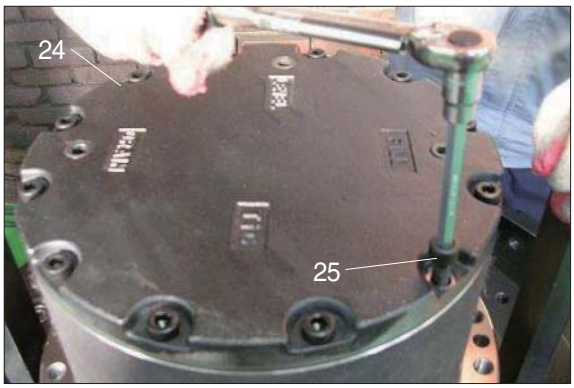
145Z9A8TM94

4) DISASSEMBLING REDUCTION GEAR

(1) Loose plug (26)-3EA and drain reduction oil.

145Z9A8TR02

(2) Loose wrench bolt (25) using a tool.



145Z9A8TR03

(3) Disassemble end cover (24).

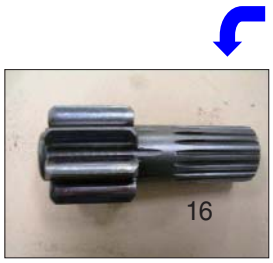
145Z9A8TR04

(4) Disassemble trust plate (23).

145Z9A8TR05

145Z9A8TR06

(5) Disassemble driver gear (16).



145Z9A8TR07

145Z9A8TR08

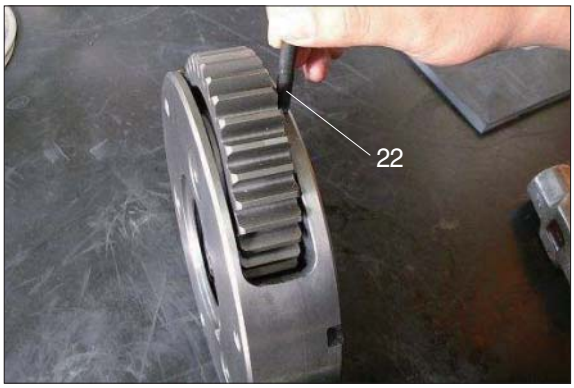
(6) Disassemble carrier No.1 (17) sub assy.

※ Assemble eyebolt into carrier No.1 tap hole and disassemble carrier No.1 (17) sub assy using a hoist.

145Z9A8TR09

(7) Disassemble carrier No.1 sub assy.

※ Remove spring pin No.1 (22) from carrier No.1 (17) and planetary gear No.1 (18), washer No.1 (19), needle bearing No.1 (20), carrier pin No.1 (21) in regular sequence.



145Z9A8TR10

145Z9A8TR11

145Z9A8TR12

145Z9A8TR13

145Z9A8TR14

(8) Disassemble carrier No.2 (7) sub assy.

※ Assemble eyebolt into carrier No.2 tap hole and disassemble carrier No.2 (7) sub assy using a hoist.

145Z9A8TR15

(9) Disassemble carrier No.2 (7) sub assy.

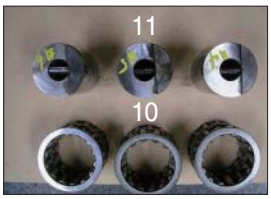
※ Remove spring pin No.2 (12) from carrier No.2 (7) and disassemble planetary gear No.2 (8), washer No.2 (9), needle bearing No.2 (10), carrier pin No.2 (11) in regular sequence.

145Z9A8TR16

145Z9A8TR17

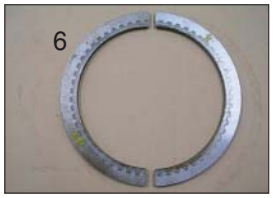
145Z9A8TR18

145Z9A8TR19



145Z9A8TR20

(10) Push down ring gear (4) using a jig and disassemble shim (6).



145Z9A8TR21

145Z9A8TR22

(11) Disassemble ring gear sub assy (4) into motor assy.

※ Assemble eye bolt into tap hole of ring gear sub assy (4) and disassemble ring gear sub assy (4) using a hoist.

145Z9A8TR23

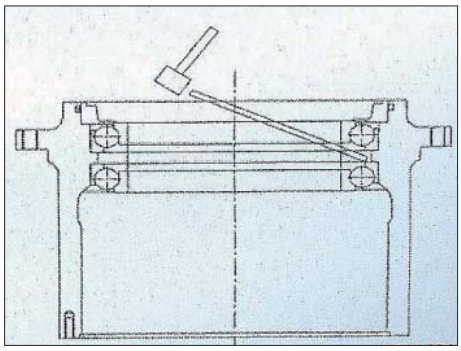
(12) Disassemble floating seal (2) from ring gear sub assy (4).

145Z9A8TR24

145Z9A8TR25

(13) Disassemble angular bearing (3) from ring gear sub assy (4).

※ Be careful not to damage the parts using a hammer.



145Z9A8TR26

4) ASSEMBLING REDUCTION GEAR

Before assembing please observe following item.

- Wash all parts cleanly using solvent and dry all parts perfectly using compressed air.
- Check metal dust in casing and cleansing solution.
- Before application packing, please remove oil certainly.
- Before insert needle bearing, apply grease to bearing inlet enough.
- Apply lubricant to rotation part and sliding part.
- Damaged part or discolored part exchanges by new parts.

(1) Assemble hub

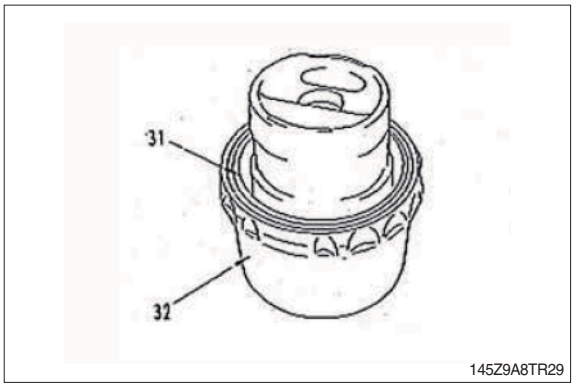
① Place the motor assy on the bench and assemble floating seal (2) into motor (1) using a jig.

145Z9A8TR27

145Z9A8TR28

② Remove completely the oil of surface that O-ring and O-ring contact.

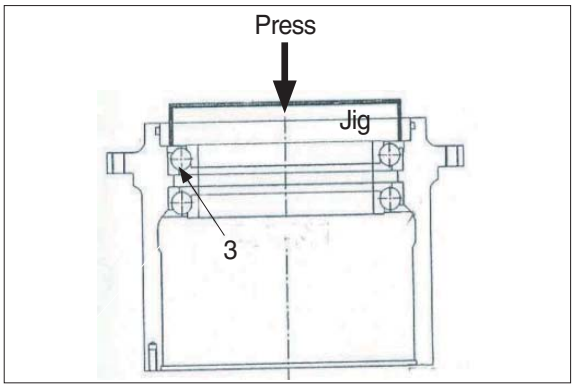
- Dry completely the floating seal.
- After assembling the floating seal, coat lubricant to the sliding surface of the floating seal.



145Z9A8TR29

(2) Press angular bearing (3) into ring gear (4) using a jig.

145Z9A8TR30



145Z9A8TR31

(3) Assemble floating seal(2) into ring gear(4) using a jig.

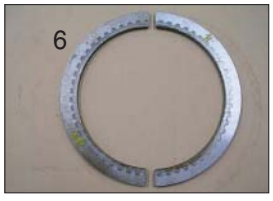
145Z9A8TR32

145Z9A8TR33

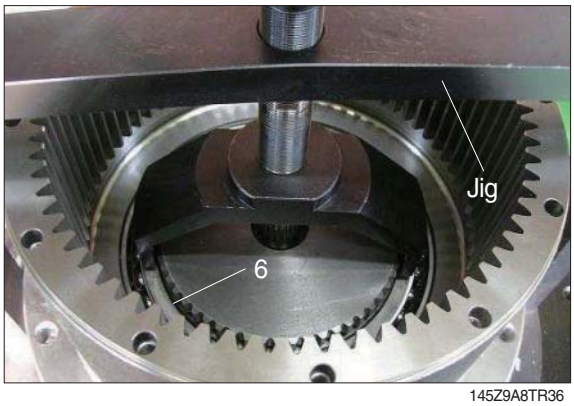
(4) Assemble ring gear sub assy (4) into motor assy using a assembly epuipment.

145Z9A8TR34

(5) Push down ring gear (4) using a jig and assemble shim (6).

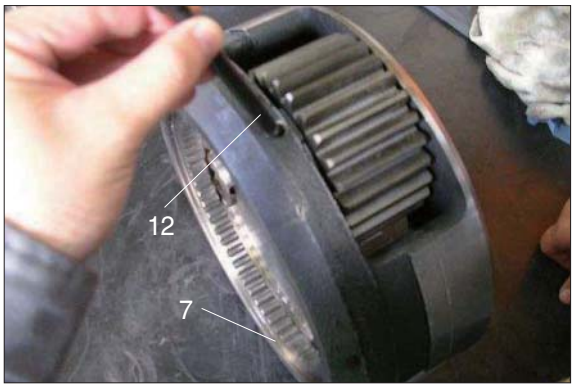


145Z9A8TR35



145Z9A8TR36

(6) Assemble carrier No.2 sub assy.
- Assemble planetary gear No.2 (8), washer No.2 (9), needle bearing No.2 (10) and carrier pin No.2 (11) into carrier No.2 (7) in regular sequence.
  Assemble spring pin No.2 (12).
- Assemble spring pin No.2 (12) and caulk spring pin into pin hole.

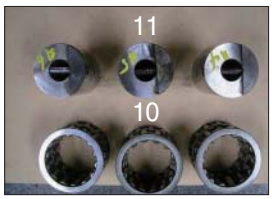


145Z9A8TR37

145Z9A8TR38

145Z9A8TR39

145Z9A8TR40

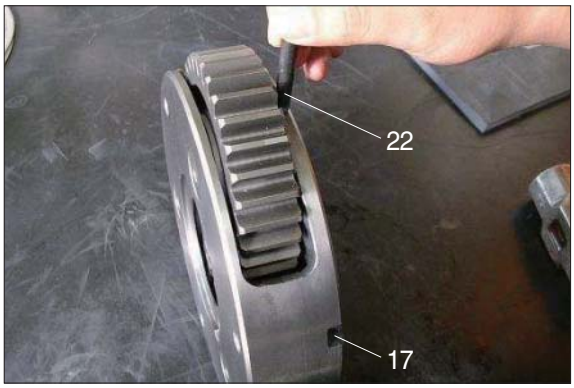


145Z9A8TR41

(7) Disassemble carrier No.2 (7) sub assy.
- Assemble eyebolt into carrier No.2 and assemble carrier No.2 (7) sub assy into ring gear using hoist.

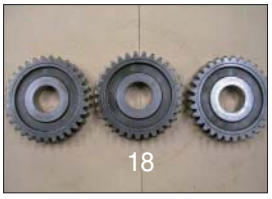
145Z9A8TR42

(8) Disassemble carrier No.2 (7) sub assy.
- Assemble planetary gear No.1 (18), washer No.1 (19), needle bearing No.1 (20) and carrier pin No.1 (21) into carrier No.1 (17) in regular sequence.
  Assemble spring pin No.1 (22)
- Assemble spring pin No.1 (22) and caulk spring pin into pin hole.



145Z9A8TR43

145Z9A8TR44



145Z9A8TR45

145Z9A8TR46

145Z9A8TR47

(9) Assemble carrier No.1 (17) sub assy.
- Assemble eyebolt into carrier No.1 and assemble carrier No.1 (17) sub assy into ring gear using hoist.

145Z9A8TR48

(10) Assemble driver gear(16).

145Z9A8TR49

145Z9A8TR50

(11) Assemble trust plate (23).

145Z9A8TR51

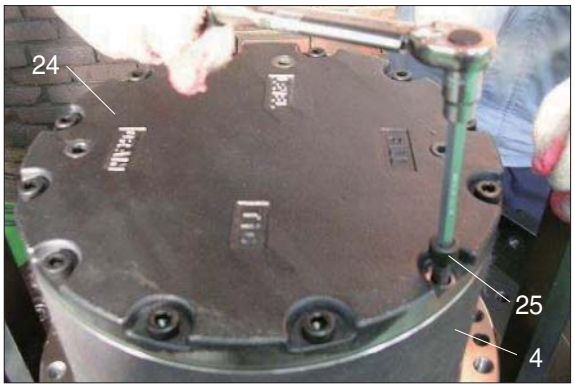
145Z9A8TR52

(12) Assemble end cover (24).

145Z9A8TR53

(13)Tighten wrench bolt (25) using a air impact.

· Tighten torque : 68 kgf-m (491.8 lbf-ft)

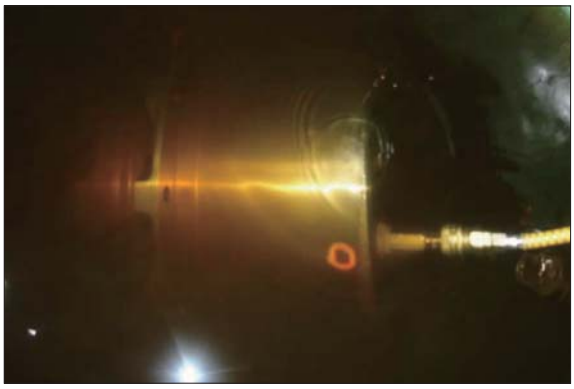


145Z9A8TR54

(14)Adjust control lever to be sunk the product under the test oil and then check the air leak.

*TEST : Air pressure 0.7 kgf/cm^2 × 30sec

145Z9A8TR55



145Z9A8TR56

(15)Inject gear oil and assemble plug (26)-3EA.

- Volume of gear oil : 2.2 ℓ

· Tightening torque : 10 kgf-m (72.3 lbf-ft)

145Z9A8TR57