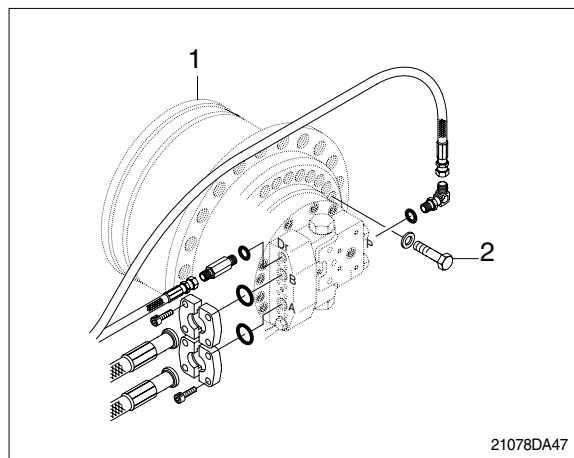


## GROUP 6 TRAVEL DEVICE

### 1. REMOVAL AND INSTALL

#### 1) REMOVAL

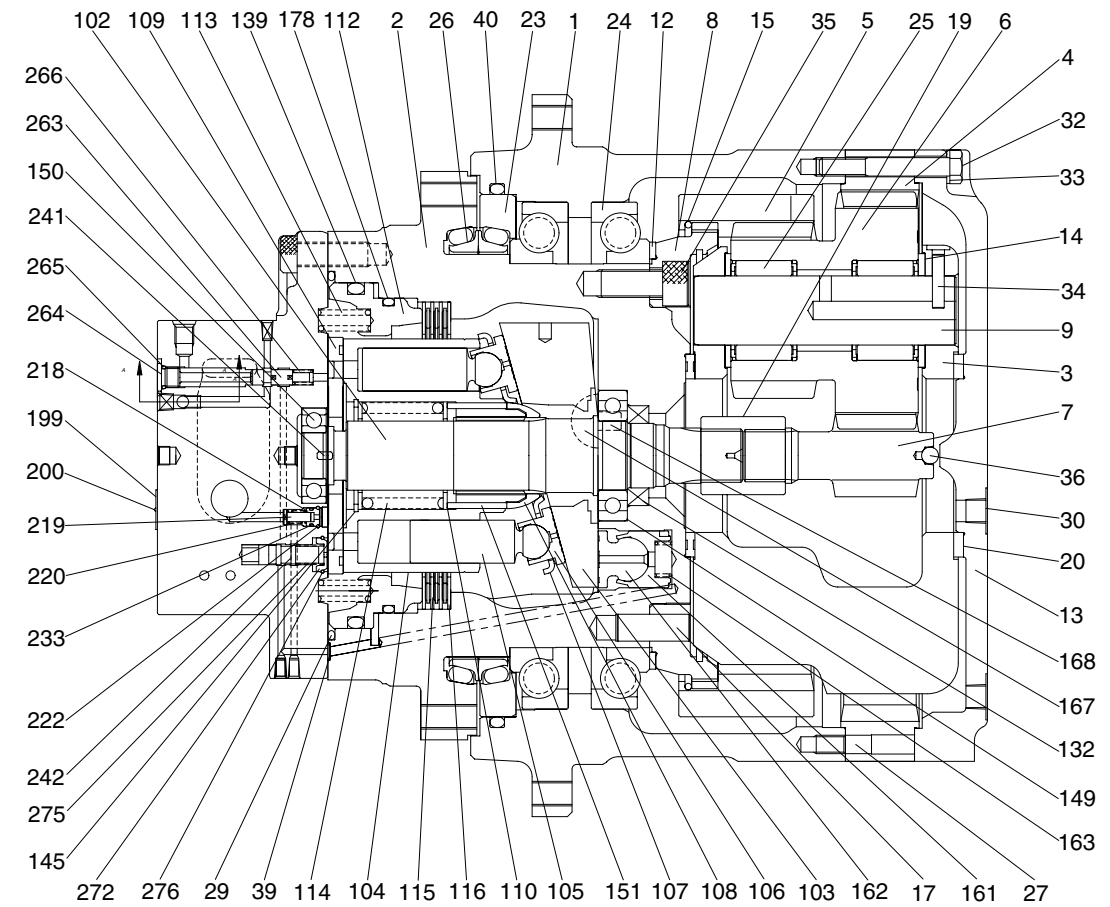
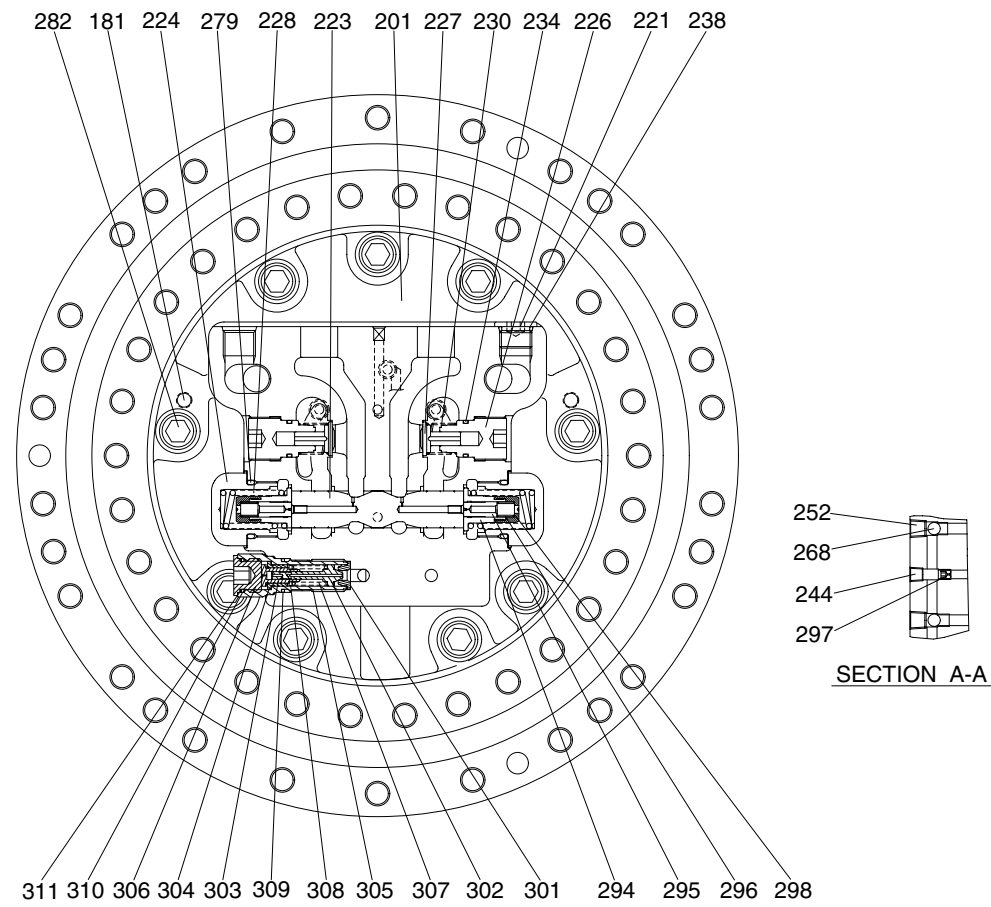
- (1) Swing the work equipment 90° and lower it completely to the ground.
- (2) Operate the control levers and pedals several times to release the remaining pressure in the hydraulic piping.
- (3) Loosen the breather slowly to release the pressure inside the hydraulic tank.
- ▲ Escaping fluid under pressure 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 : 310kg(680lb)



#### 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) STRUCTURE

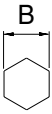


2507ATM03

1	Hub	25	Needle roller bearing	108	Thrust ball	168	Parallel pin	234	O-ring	295	Spool
2	Spindle	26	Floating seal	109	Timing plate	178	O-ring	238	O-ring	296	Spring
3	Carrier	27	Parallel pin	110	Washer	181	Pin	241	Parallel pin	297	Orifice
4	Ring gear A	29	O-ring	112	Piston	199	Name plate	242	Reducing Valve	298	Stopper B
5	Ring gear B	30	Plug	113	Spring	200	Rivet screw	244	Plug	301	Seat
6	Cluster gear	31	Hexagon bolt	114	Spring	201	Rear flange	252	Plug	302	Plunger
7	Sun gear	33	Spring washer	115	Friction plate	218	Seat valve	253	Plug	303	Rod
8	Coupling gear	34	Parallel pin	116	Mating plate	219	Valve	263	Spool	304	Piston
9	Cluster shaft	35	Hexagon socket bolt	132	Oil seal	220	Spring	265	O-ring	305	Body
12	Distance piece	36	Steel ball	139	O-ring	221	Plug	266	Spring	306	Plug
13	Cover	39	O-ring	145	Snap ring	222	Ring	267	Set screw	307	Spring
14	Thrust collar	40	O-ring	149	Ball bearing	223	Main spool	268	Steel ball	308	Shim
15	O-ring	102	Shaft	150	Ball bearing	224	Plug	272	Valve seat	309	O-ring
17	Pin	103	Swash plate	151	Needle roller	226	Plug	275	Spring	310	O-ring
19	Coupling	104	Cylinder block	161	Piston	227	Valve	276	Ring	311	Back up ring
20	Thrust plate	105	Piston	162	Shoe	228	Spring	279	O-ring		
23	Seal ring	106	Shoe	163	Spring	230	Spring	282	Socket bolt		
24	Ball bearing	107	Retainer plate	167	Pivot	233	O-ring	294	Stopper A		

## 2. TOOLS AND TIGHTENING TORQUE

### 1) TOOLS

Tool name	Remark	
Allen wrench	6, 10, 14	
Socket for socket wrench, spanner	19, 41	
Torque wrench	Nominal 2800, 5600 dial type	
Impact wrench	-	
(-) Driver	150mm	
Hand hammer	#1	
Plastic hammer	-	
Ratchet handle	-	
Extension bar	Nominal 150	
Leather glove	-	
Hexagon key	14	
Snap ring plier	For hole	
Punch	10mm	
Crane	Eye bolt M12, M16, PT 1/2	
Press	0.5 ton	
Compressed air	3~5 kgf/cm <sup>2</sup>	
Receptacle	-	
Jug	-	
Sealing tape	-	
Heating vessel	Heating capacity : over 100° C	
	Volume : 500 × 500 × 500	
Depth micro meter	Measuring range 0~25mm	
	Graduation 0.01mm	

### 2) TIGHTENING TORQUE

Part name	Item	Size	Torque	
			kgf · m	lbf · ft
Hexagon socket plug	30	PF 1/2	10.0 ± 2.0	72.3 ± 14.5
Hexagon bolt	32	M12	10.4 ± 1.6	75.2 ± 11.6
Hexagon socket bolt	35	M18	35.5 ± 5.5	257 ± 39.8
Plug	221	PF 1/2	10.0 ± 2.0	72.3 ± 14.5
Plug	224	M45 × 1.5	51.0 ± 7.5	326 ± 65.1
Plug	226	M36 × 1.5	26.0 ± 4.0	188 ± 28.9
Plug	253	PF 1/4	3.0 ± 0.5	21.7 ± 3.6
Hexagon socket bolt	282	M16 × 2.0	25.7 ± 4.0	186 ± 28.9
Plug	154, 169	NPTF 1/16	1.0 ± 0.25	7.2 ± 1.8

### **3. DISASSEMBLY**

#### **1) GENERAL PRECAUTIONS**

- (1) Before disassembling the motor, check the items to be inspected and, for remedy against trouble, closely examine the nature of the trouble, so that the motor can be disassembled effectively.
- (2) To disassemble the motor, use the disassembling procedures described in section 2) and select a clean place.
- (3) Place a rubber or vinyl sheet or other such protective materials on your working bench to protect the surface of the motor to be serviced.
- (4) During disassembly, give a match mark to the mating surfaces of each part.
- (5) Arrange removed parts in order so that they will not become damaged or missing during disassembly.
- (6) Once seals have been disassembled, they should be replaced even if damage is not observed. Have replacement seals ready on hand before starting your disassembling job.

## 2) DISASSEMBLING THE HYDRAULIC MOTOR SECTION

### (1) Disassembling

- ※ When inspecting or repairing the motor, use the disassembling procedures described below.
- ※ Numbers in parentheses ( ) following the part name denote the item numbers shown in the attached assembly drawings.
- ※ Prior to disassembly, install the motor on an inversion working bench.

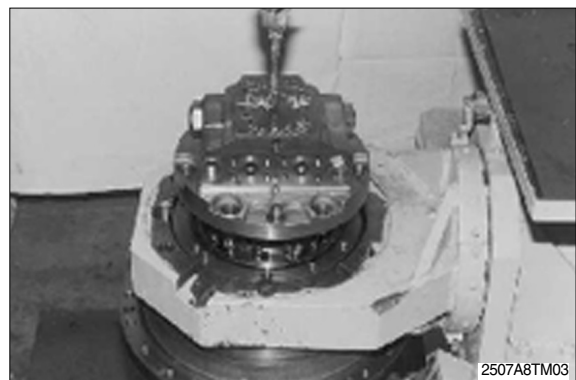
- ① Remove the relief valve from the rear flange(201).



- ② Remove the nine hexagon socket head bolts(282).



- ③ Remove the rear flange(201) from the spindle(2).



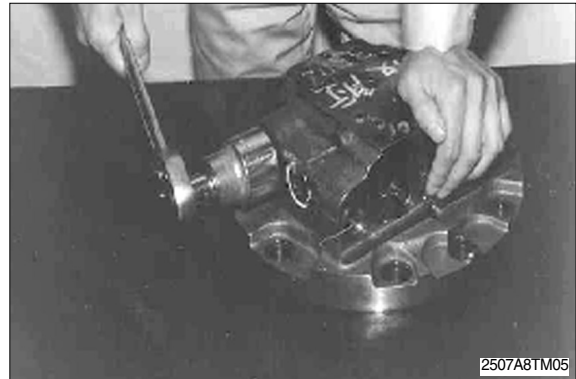
- ☐☒ Remove the timing plate(109), the two pins(168), the nine springs(113), the ball bearing(150) from the rear flange(201) and hydraulic motor.
- ☐° Remove the two O-rings(29)[2ea](39) from the spindle(2).
- ※ Do not reuse the O-rings(29, 39) after removal.



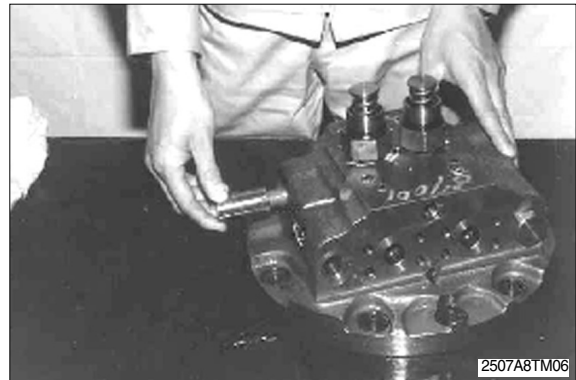
### 3) DISASSEMBLY OF BRAKE VALVE

#### (1) Disassembly of the spool

- ① Remove the two plugs(224) from the rear flange(201).  
Remove the O-ring(279) from the plug(224).
  - ※ Removal of the two plugs(224) from the rear flange(201) can better be done by loosening the former beforehand with the latter remaining connected to the spindle(2).
  - ※ Do not reuse the O-ring(279) after removal.

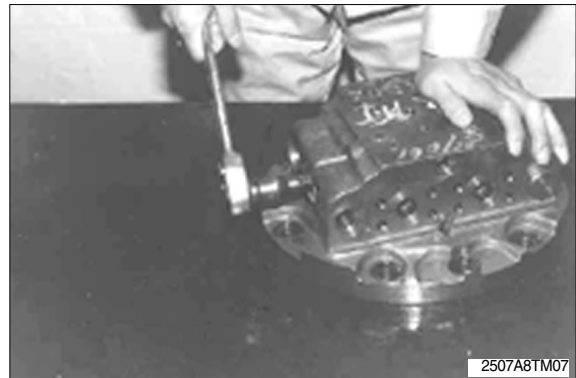


- ② Remove the two springs(228), the two stoppers, and the spool(223) from the rear flange(201).
  - ※ Be careful not to damage the outer surface of the spool(223) and the sliding surface of the rear flange(201).
  - ※ Since the rear flange(201) and the spool(223) are of the selective-fitting type, replace them together as a kit even if only one of the two parts is damaged.

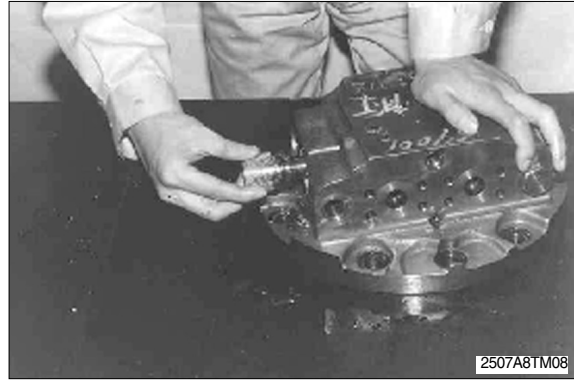


#### (2) Disassembly of the check valves

- ① Remove the two plugs(226) from the rear flange(201).
  - ※ Removal of the plugs(226) from the rear flange(201) can better be done by loosening the former beforehand with the latter remaining connected to the spindle (2).

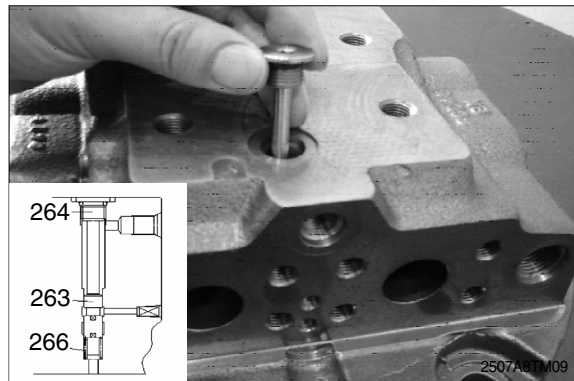


- ② Remove the two springs(230) and the two valves(227) from the rear flange(201).
- ※ Be careful not to damage the seat sections of the valves(227) or rear flange (201).
- ③ Remove the O-ring(234) from the plug (226).
- ※ Do not reuse the O-ring(234) after removal.



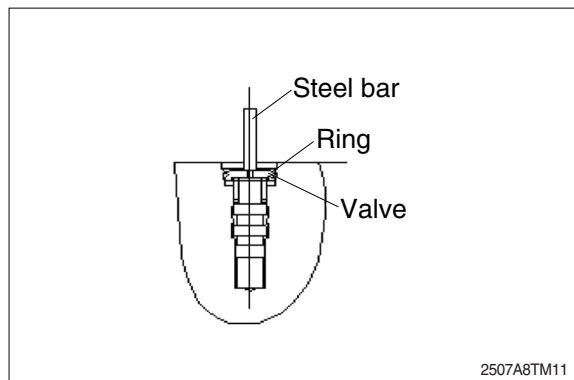
### (3) Disassembly of the two valves

- ① Remove the plug(264) and the two valves(263) and the spring(266) from the rear flange(201).

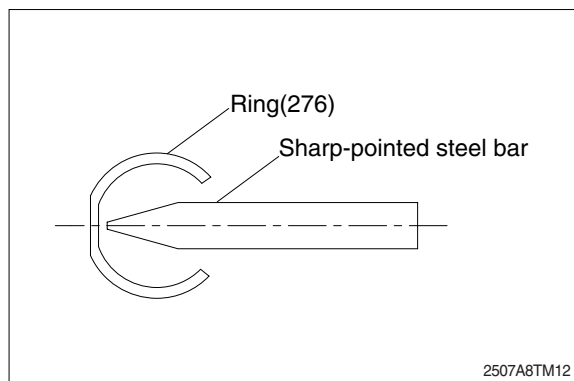


### (4) Disassembly of the reducing valve

- ① Press and hold down the valve seat(272) using a steel bar, and in that state, as shown in the diagram at right, press the notch in the ring(276) using a sharp-pointed steel bar. This deforms the ring(276), disengaging it from the ring groove in the rear flange(201). The ring(276) can now be removed from the rear flange(201).



- ※ After disassembly, do not reuse the ring(272).
- ※ Removing the ring(272) damages the hole section.
- ※ Repair the hole section after disassembly.





#### 4) DISASSEMBLY OF HYDRAULIC MOTOR

##### (1) Disassembly of the parking brake parts

- ① Remove the piston(112) by injecting compressed air from the parking brake access hole in the spindle(2).
- ※ Take care that abrupt injection of compressed air may cause the piston(112) to pop out.  
To ensure your safety, apply a protective cover to the piston.



- ② Remove the two O-rings(139, 178) from the piston(112).
- ※ Do not reuse O-rings(139, 178) after removal.

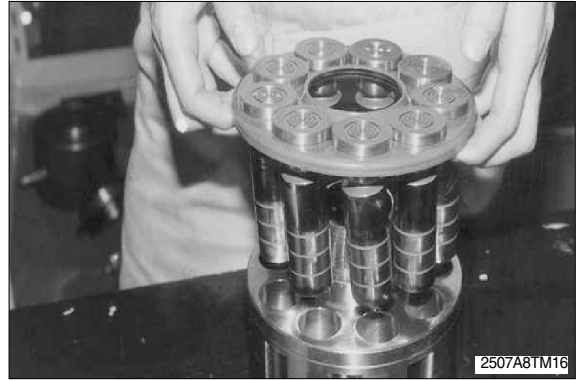


##### (2) Disassembly of the internal parts of the motor

- ① Lay the motor body on the side.
  - ② Drain out the oil from the motor.
  - ③ Hold the cylinder block(104) with both hands, and remove it from the spindle(2).
  - ※ Place an oil receptacle under the motor to receive the oil flowing out as the motor is being laid on the side.
  - ※ Before removal, hold the cylinder block(104) with both hands and turn it two to three times in a clockwise and a counterclockwise direction alternately to detach the shoe(106) from the swash plate(103).
- Be careful that if an attempt is made to remove the cylinder block(104) without detaching the shoe(106) from the swash plate(103), then the piston, shoe, and other parts that are connected to the cylinder block may come loose and fall into the spindle.



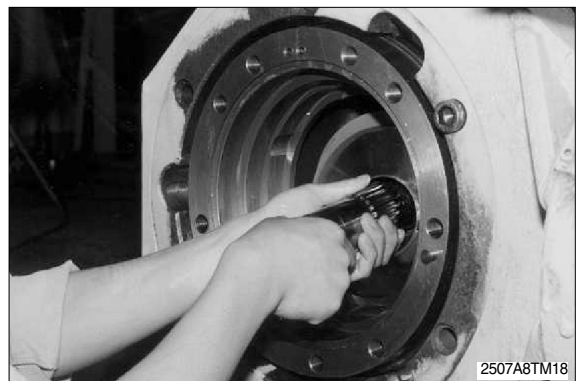
- ④ Remove the four mating plates(116) and three friction plates(115) that are mounted on the outer surface of the removed cylinder block(104).
- ⑤ Remove the piston assembly(105, 106), retainer plate(107), thrust ball(108), and six rollers(151) from the removed cylinder block(104).



- ⑥ Remove the swash plate(103) from the spindle (2).



- ⑦ Remove the shaft(102) from the spindle(2).
- ※ The Oil seal(132), however, cannot be removed.
- ⑧ Remove the pivot(167) and the parallel pins (168) from the spindle(2).



- ⑨ Remove the speed selector piston assembly(161, 162) from the spindle(2) by feeding compressed air from the access hole in the spindle(2).
- ※ Since the piston and shoe together from a single unit, replace the entire piston assembly even if only one of those two parts needs replacing.



### (3) Disassembly of the cylinder block

- ① Place the cylinder block(104) on a press working bench, and then whole pressing and holding down a retainer(1) against the washer(110), remove the snap ring(145) using snap ring pliers.
- ※ Press load : 200kgf (440lbf) or more
- ※ Protect the sliding surface of the cylinder block with a vinyl sheet.



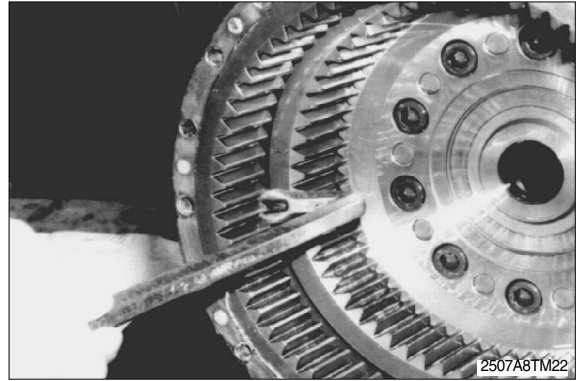
- ② Remove the snap ring(145) the washer(110), the spring(114), and the washer(110), in that order, from the cylinder block(104).
- ※ Remove the spring(114) only if it is to be replaced.



## 5) DISASSEMBLY OF REDUCTION GEAR

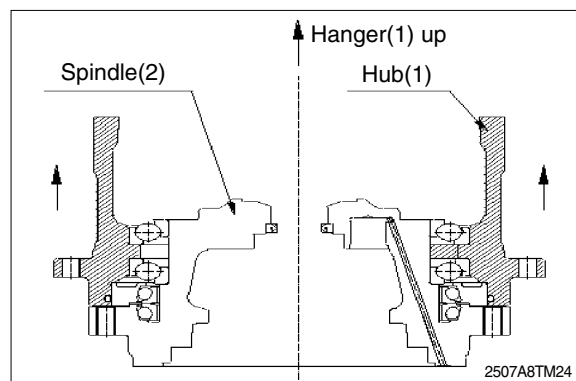
### (1) Disassembly of ring gear(A)

- ① To remove ring gear(A), give an alignment match mark to both the ring gear and hub(1).
- ※ After ring gear(A,4) has been removed, remove any adhesive residue from the mating surfaces of the ring gear and the hub.
- ② Remove the ring gear(A,4) using a crowbar or any other suitable tool.
- ∅ Remove the ten dowel pins(27) from the hub(1).



### (2) Disassembly of the hub(1), ring gear(B, 5) and the coupling gear(8)

- ① Remove the ten hexagon socket head bolts(35).
- ② Before removing the coupling gear(8) from the spindle(2), mark the mating surfaces of the coupling gear(8) and the spindle(2) using a paint marker.
- ※ Since the hex socket head bolts(35) have their threaded sections coated with an adhesive, a loosening torque larger than the tightening one is needed to remove the bolts.
- ※ Tightening torque :  $35.5 \pm 5.5 \text{ kgf} \cdot \text{m}$   
( $257 \pm 39.8 \text{ lbf} \cdot \text{ft}$ )
- ※ Be extra careful during removal not to let the threaded sections of the hex socket head bolts(35) seize.
- ∅ Mount ring bolts in the M12 tapped holes of the hub(1), and then lift the hub(1) using hanger(1) and separate the hub(1) and the spindle(2).  
This also disconnects the two ball bearings(24), the seal ring(23), the O-ring(40), the coupling gear(8), ring gear(B,5), the ring(15), and the distance piece(12).
- ※ Lay a rubber mat under the working bench to prevent damage to hub(1) and other parts due to possible fall from the working bench.

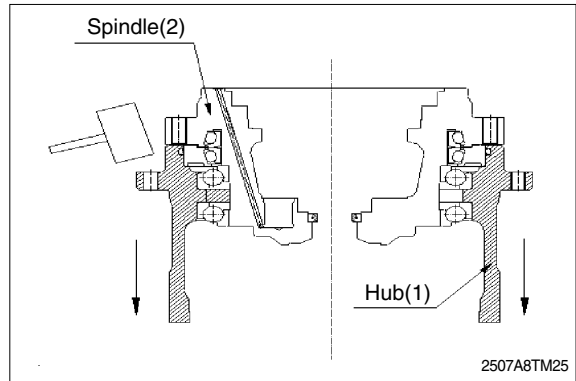


④ Proceed as follows if disassembly is not possible with the method mentioned above.

Ⓐ Rotate the motor through 180 degrees to let the spindle side of the motor face upward.

Ⓑ As shown in the photo below, lightly tap the edge of the hub(1) equally with an aluminum rod and a hammer until the hub(1) has become disconnected from the spindle(2). This will also disconnect the following parts.

- ⌋ Two ball bearing(24),
- ⌋ Seal ring(23), O-ring(40),
- ⌋ Coupling gear(8),
- ⌋ Ring gear(B,5), Ring(15)
- ⌋ Distance piece(12)



### (3) Disassembly of spindle(2)

① Remove the O-ring(29) from the spindle(2).

Ⓐ Rotate the spindle(2) through 180 degrees.

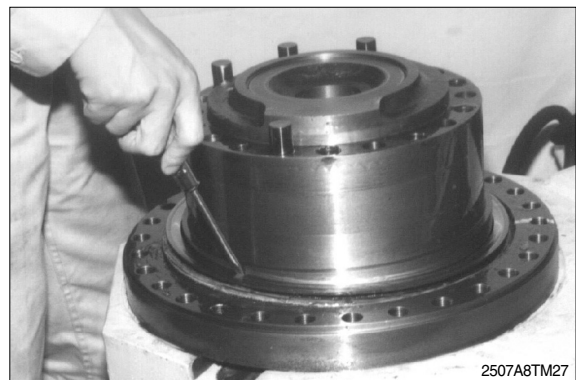
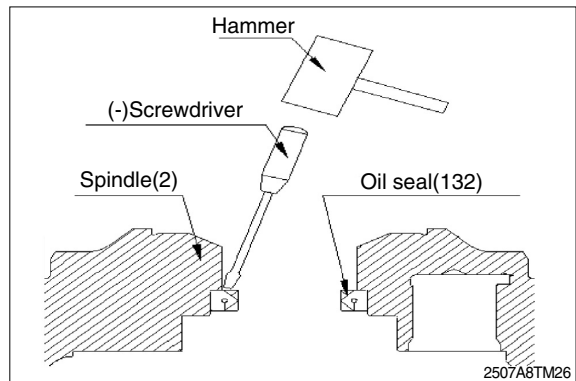
Ⓑ Remove the oil seal(132) from the spindle(2). (To remove the oil seal, set a (-) screwdriver at the cylindrical edge of the oil seal and lightly tap with a hammer.)

※ Do not reuse the O-ring(29) after removal.

※ Remove the oil seal(132) only if it is to be replaced.

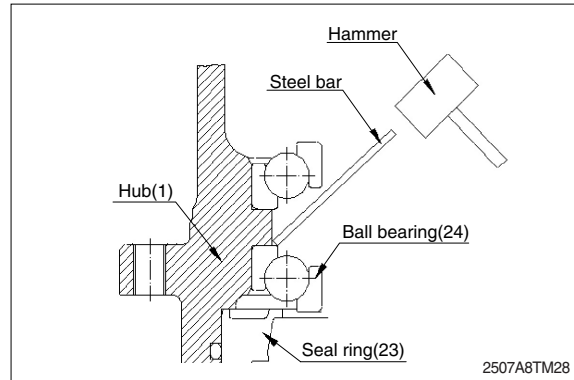
※ Do not reuse the oil seal(132) once it has been removed.

Ⓒ Remove the floating seal(26) from the spindle(2).

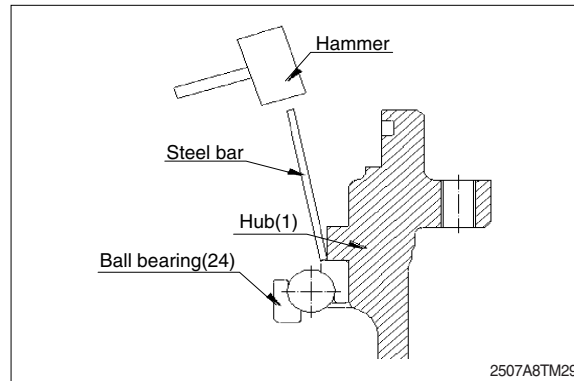


#### (4) Disassembly of hub(1)

- ① Remove the floating seal(26) from the hub(1).
  - ② Remove one of the two ball bearing(24) from the hub(1) as shown in the diagram. This also lets the seal ring(23) come loose.
- ※ In principle, the ball bearings(24) should not be removed from the hub(1) since the former is shrinkage fitted into the latter.
  - ※ Do not reuse the ball bearings(24) after removal.
- ☐ Place the hub(1) on the working bench so that the hub facing the spindle points upward.

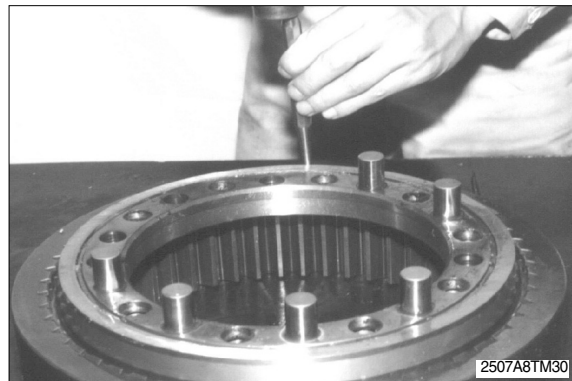


- ☐ Remove the other ball bearing(24) from the hub(1) as shown in the diagram.
- ☐ Remove the O-ring(40) from the hub(1).
- ※ Do not reuse the O-ring(40) after removal.



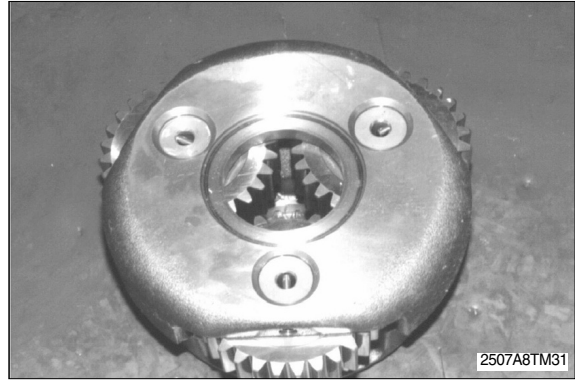
#### (5) Disassembly the coupling gear(8)

- ① Removing the ring(15) from ring gear(B,5).
- ※ Do not reuse the ring(15) after removal.
  - ※ Sharp-pointed steel bar.
- ② Remove the coupling gear(8) from ring gear(B,5).
- ※ Except for their replacement, do not disassemble the coupling gear(8) or ring gear(B,5)



**(6) Disassembly the carrier assembly**

- ① Do not disassemble the carrier assembly any further.  
If a component of the carrier assembly is irrecoverably damaged, replace the entire carrier assembly with a new one.



**4. ASSEMBLY**

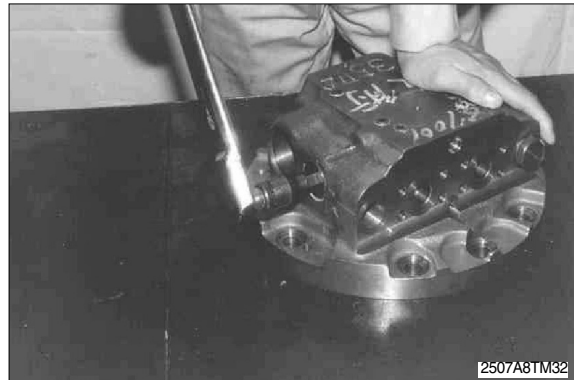
**1) GENERAL PRECAUTIONS**

- (1) Reassemble in work area that is clean and free from dust and dirt.
- (2) Handle parts with bare hands to keep them free of liny contaminates.
- (3) Repair or replace the damaged parts.  
Each parts must be free of burrs its corners.
- (4) Do not reuse O-rings, 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 components of 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.

## 2) ASSEMBLY OF BRAKE VALVE

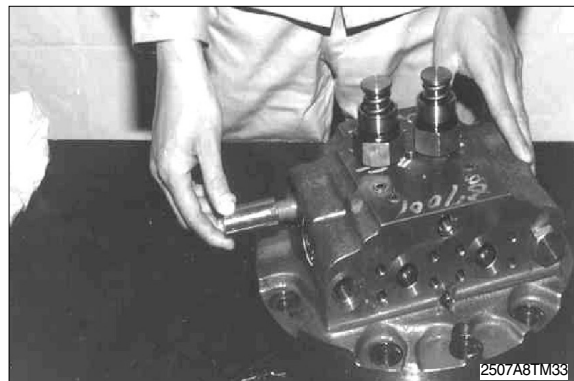
### (1) Assembly of the check valve

- ① Fit the O-ring(234) on the plug(226).
  - ② Insert the spring(230) and the valve(227) into the plug(226), and then grease the spring(230) and the valve(227) and hand-lock the former.
  - ③ Insert the plug(226) in conjunction with the spring(230) and the valve(227) into the rear flange(201), and tighten the plug to the required torque.
- ※ Apply grease to the O-ring(234).
  - ※ Tighten the plug(226) using a torque wrench.  
Tightening torque :  $26 \pm 4 \text{kgf} \cdot \text{m}$   
( $188 \pm 29 \text{lb} \cdot \text{ft}$ )



### (2) Assembly of the spool

- ① Insert the spool(223) into the rear flange (201).
- ※ Apply a working fluid to the spool(223) and insert it into the rear flange(201).
  - ※ The spool must be remounted with its axial center accurately in line with the hole center of the rear flange.  
This prevents the inner surface of the rear flange and the outer surface of the spool from damage due to their contact.
- ② Attach the O-ring(279) to the plug(224).
  - ※ Apply grease to O-ring(279).



- ③ Install stopper(225) and the spring(228) into both plugs(224) and tighten the plugs(224) into the rear flange(201) at the required torque.
- ※ Required torque :  $51 \pm 7.5 \text{kgf} \cdot \text{m}$   
( $369 \pm 54 \text{lb} \cdot \text{ft}$ )
  - ※ Even if either the rear flange(201) or the spool(223) is to be replaced, their entire assembly(kit) must be replaced.

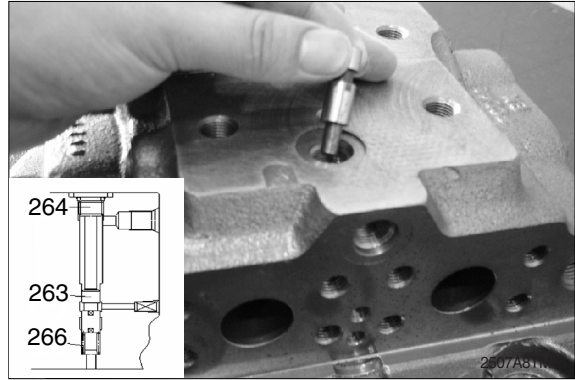




### (3) Assembly of the two valve

① Insert the plug(264) and the two valves(263) and the spring(266) from the rear flange(201).

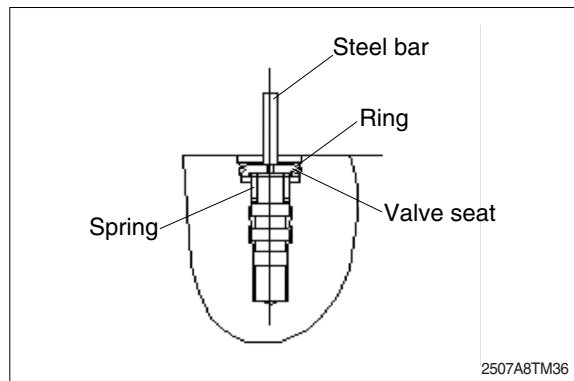
※ Tightening torque :  $3 \pm 0.5 \text{kgf} \cdot \text{m}$   
( $21.7 \pm 3.62 \text{lb} \cdot \text{ft}$ )



### (4) Assembly of the reducing valve

① Assemble the reducing valve assy, the valve seat(272), and the spring(275) into the rear flange(201).

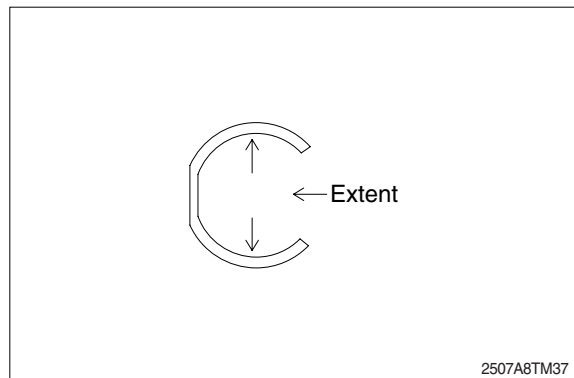
② Press and hold down the valve seat(272) using a steel bar, and in that state, mount the ring(276) in the ring groove of the rear flange(201).



※ The ring(276) will remain deformed while inside the rear flange(201).

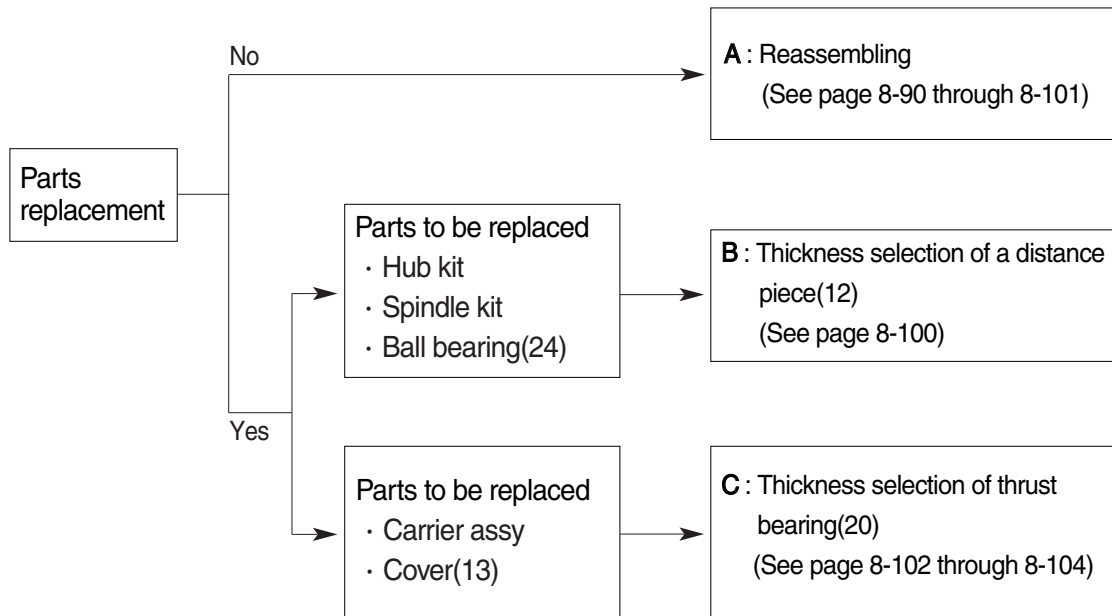
Before inserting the ring(276) into the ring groove of the rear flange(201), therefore, both ends of the ring must be extended using snap-ring pliers.

※ The ring(276) must be a new one.



### 3) ASSEMBLY OF REDUCTION GEAR AND HYDRAULIC MOTOR

- ※ Before reassembling the reduction gear and the hydraulic motor following completion of parts replacement, one of the following two operations must be carried out:
  - Selecting a distance piece(12) of the appropriate thickness.
  - Selecting a thrust bearing(20) of the appropriate thickness.
- ※ Reassembling must be down only after clearance adjustment of these parts.
- ※ Prior to the start of reassembling, check for parts that require replacement.

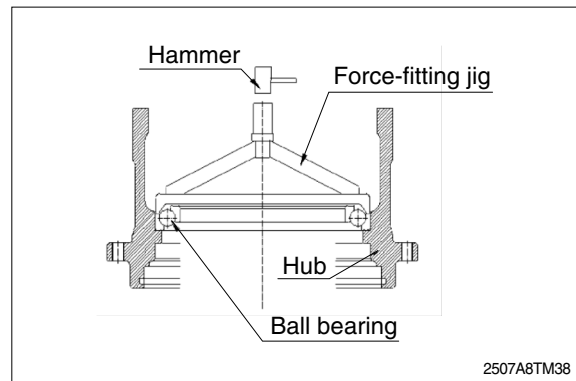


- ※ When the parts listed above are to be replaced, use correctly preadjusted parts as the replacement one.  
Reassembling with nonadjusted parts may cause travel motor malfunctions, resulting in early damage.

## A : REASSEMBLING

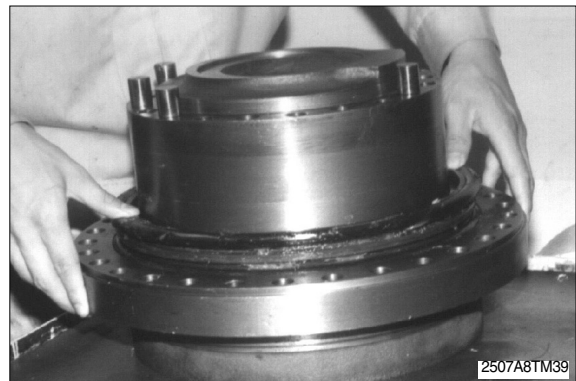
### (1) Assembly of the hub(1) section

- ① Mount the hub(1) on a working bench so that the mounting side of the cover(13) faces upward.
  - ※ Heat the hub(1) to a temperature of  $90 \pm 5$  °C.
- ② Insert the ball bearing(24) into the hub(1) using a force-fitting jig.
  - ※ Shrinkage-fit the ball bearing(24).
  - ※ If a force-fitting jig is not available, insert the ball bearing(24) into the hub(1) and then hammer the former.
- ③ Rotate the hub(1) through 180° C to make the mounting side of the spindle(2) face upward.
- ④ Insert the ball bearing(24) into the hub(1) using a force-fitting jig.
  - ※ Shrinkage-fit the ball bearing(24).
- ⑤ Assemble the O-ring(40) into the hub(1).
  - ※ Apply a thin coat of grease to the O-ring(40).
- ⑥ Assemble the seal ring(23) into the hub(1). The seal ring can better be assembled into the hub by tapping the edge of the seal lightly with a plastic hammer.
  - ※ When assembling the seal ring(23) into the hub(1).  
Be extra careful not to damage the O-ring.



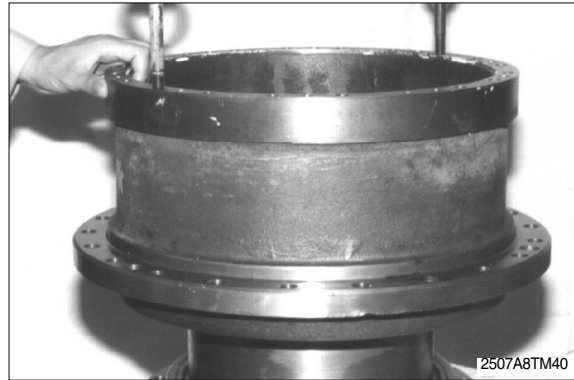
### (2) Assembly of the spindle(2)

- ① Mount the two floating seals(26) in the spindle(2).
  - ※ Apply a thin coat of grease to the O-ring in the floating seal(26).
  - ※ Be extra careful to ensure that dust does not stick to the seal surface.



### (3) Assembly of the hub(1) and spindle(2)

- ① Mount the spindle(2) on working bench so that the cover side of the spindle faces upward.
- ※ If the hub(1) or the spindle(2) does not snugly fit because of the presence of the ball bearing(24) evenly tap the top of the hub(1) with a plastic hammer during fitting.
- ② Fit eye-bolts to the hub(1), and then lift it with a crane and gently insert it into the spindle(2)

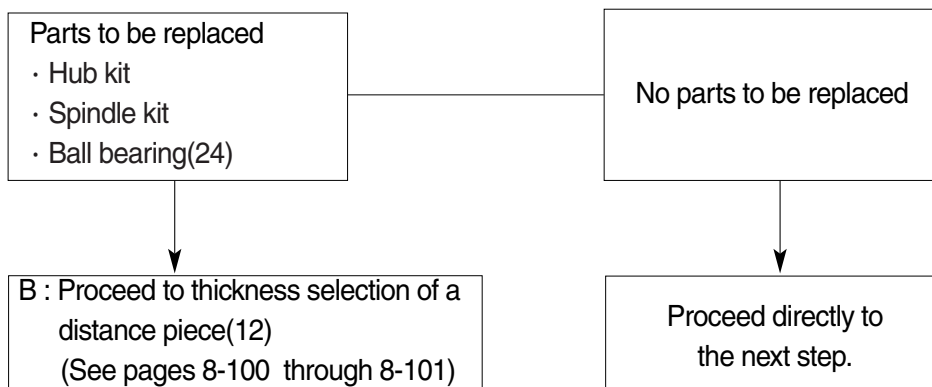


### (4) Assembly of the coupling gear(8) and ring gear(B,5)

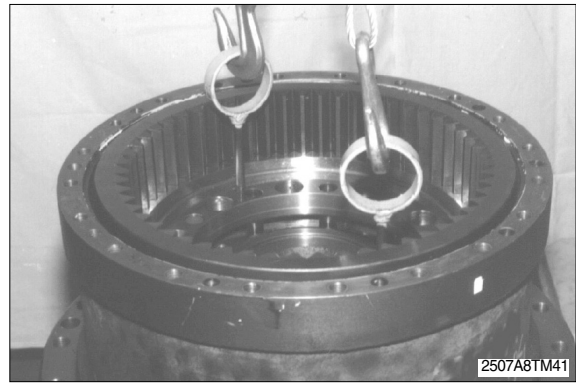
- ① Mount the coupling gear(8) in ring gear(B,5)
- ② Fit the ring(15) into the ring groove of ring gear(B,5)
- ※ Do not reuse the ring(15) after removal.
- ※ Use a new one during reassembling.

### (5) Assembly of the coupling gear(8)

- ① Attach a distance piece(12) to the coupling gear(8) using grease.
- ※ During attachment, apply a thin coat of grease to the mounting surface of the coupling gear(8) to prevent possible fall of the distance piece(12).



- ② Mount the coupling gear(8)(fitted with ring gear(B,5)) on a coupling gear hanger, and then lift it with the crane and mount it in the spindle.
- ③ Match the match marks on the coupling gear(8) and the spindle(2).
- ④ Insert the ten pins(17), and caulk the pin hole edges of the coupling gear(8).
  - ※ Do not reuse the pins(17) after removal.
  - ※ Use new ones during reassembling.



- ⑤ Tighten the ten hexagon socket bolts(35) to the required torque to the required torque using a torque wrench.
  - ※ Tightening torque :  $35.5 \pm 5.5 \text{kgf} \cdot \text{m}$   
( $256.8 \pm 39.8 \text{lb} \cdot \text{ft}$ ).
  - ※ Apply an adhesive to the threaded section of the spindle(2) and the pin holes after degreasing both.
  - ※ After completely degreasing the hexagon socket bolts(35), apply molycoat to the bottom of each such bolt neck.
  - Rotate the motor through  $180^\circ \text{C}$  to make the spindle side face upward.



#### **(6) Assembly of the oil seal(132)**

- ① Fit the oil seal(132) into the oil seal mounting hole of the spindle(2).
  - ※ Apply white petroleum or lithium grease to the lip section of the oil seal(132).
  - ※ Use a new oil seal during reassembling.

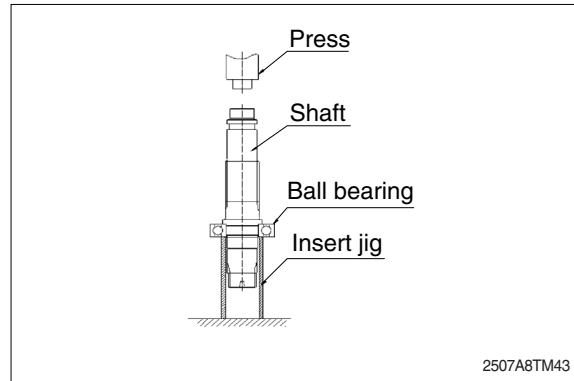
### (7) Assembly of the ball bearing(149)

① Shrinkage-fit the ball bearing(149) onto the shaft(102).

※ If the ball bearing(149) has been removed from the shaft(102) during disassembly, replace the former with a new one and then shrinkage-fit it onto the shaft(102).

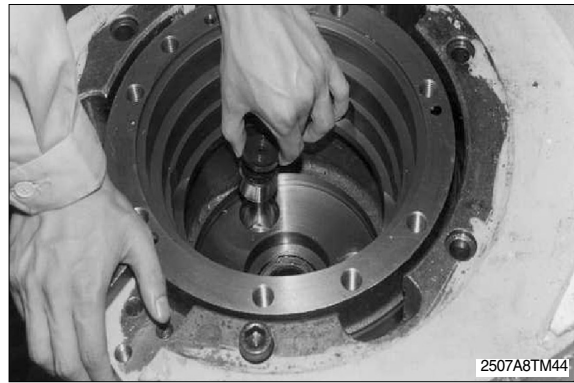
Shrinkage-fitting temperature :

$100 \pm 10^{\circ}\text{C}$ .



### (8) Assembly of the piston assembly(161, 162)

① Mount the piston assembly(161,162) in the piston hole of the spindle(2).



### (9) Assembly of the pivot(167)

① Mount the two parallel pin(168) and two pivot(167) in the pivot hole of the spindle(2).



### (10) Assembly of the cylinder block section

① Insert washer(110), spring(114) washer(110) and snap ring(145) in that order, into the shaft bore of cylinder block(104).



- Set cylinder block in the press in order to compress the spring(114).

Place retainer(1) on the washer(110) and push down this tool with the press arbor until the snap ring groove becomes cleared.

Fit snap ring(145) into the groove.

- ※ When working on the cylinder block, protect its sliding face by covering it with a vinyl sheet.
- ※ A push of about 120 kgf will be needed to compress the spring.



### (11) Assembly of the piston motor sub assembly

- ① Fit six-rollers(151) into the pin holes of cylinder block(104), and then, put thrust ball(108) on it.

- ※ Immerse piston assembly in hydraulic oil.



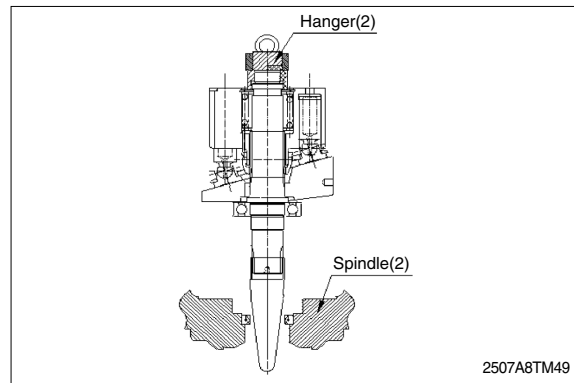
- Insert piston assembly into retainer plate(107).



- Mount the piston assembly in the cylinder block(104).

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

- ☐☒ As shown in the diagram, mount the swash plate(103), the thrust plate(153), the thrust ball(108), the retainer plate(107), the roller(150), the cylinder block(104), and the piston assembly(105,106) in the shaft(102). Then, mount a hanger(2) and make the shaft(102) upright.
- ※ The outer racing of the ball bearing(149) must be mounted in the spindle(2) beforehand.
- ※ Accurately align and assemble the retainer plate(107) and the spherical section of the thrust ball(108).
- ※ Mounting must be done so that the pivot hole in the swash plate(103) and the pivot(167) come into a fit. Mounting must also be done gently so that no parts come into contact with the spindle(2) or other sections. Contact may damage parts.
- ※ After the motor assembly has been mounted, turn the cylinder block by hand to check for backlash. Perform inspections if backlash is present.
- ☐° Lift the motor assembly using a hanger(2), and mount it in the spindle(2).



## (12) Assembly of the parking brake

- ① Fit the mating plate(116) first and then the friction plate(115), one by one, into the grooves of the outer surface of the cylinder block(104).
- ※ Immerse the friction plates(115) in a working fluid before fitting them into the grooves.

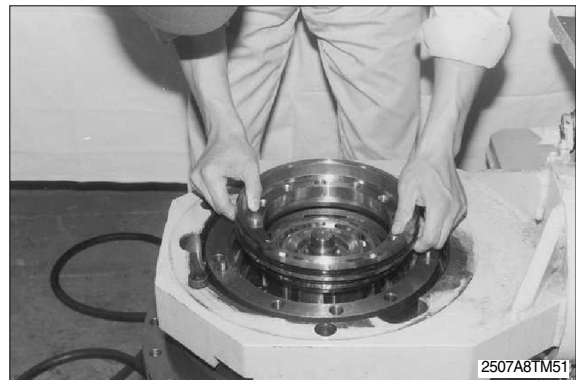




- <sub>L</sub> Fit the O-ring(139,178) in the O-ring grooves of the piston(112).
- ※ Apply a thin coat of grease to the O-ring(139,178).



- <sub>Ø</sub> Mount the piston(112) in the spindle(2).
  - ※ If the piston(112) does not fit into the spindle(2) because of the resistance of the O-ring, tap the edge of the piston(112) lightly and equally with a plastic hammer.
- Be careful not to damage the O-ring at this time.



- <sub>⊞</sub> Mount the ball bearing(150) and timing plate(109) and parallel pin(241) and spring(113) into the rear flange(201).



- <sup>o</sup> Fit the O-ring(39) and the O-ring(29) in the O-ring grooves of the piston(2).
- Fit the two dowel pins(181) into the spindle(2).

- Mount the rear flange(201) on the spindle(2). At this time, the two dowel pins that have been fitted into the spindle(2) must be aligned with the pin holes.



- Tighten the nine hexagon socket(282) head bolts into the spindle(2) at the required torque.
- ※ Tightening torque :  $25.7 \pm 4 \text{kgf} \cdot \text{m}$   
( $185.9 \pm 1 \text{lbf} \cdot \text{ft}$ )

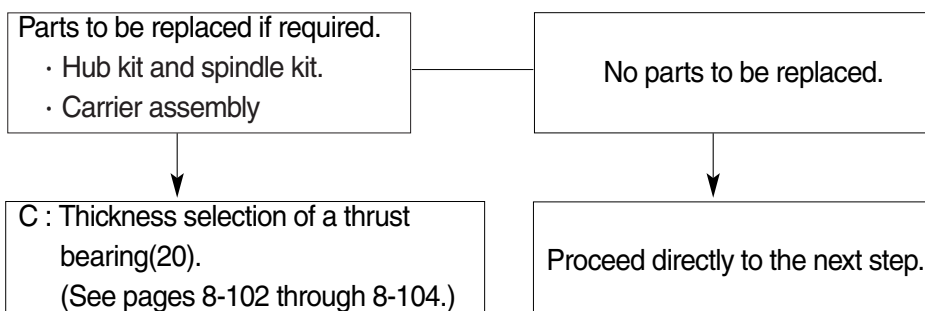


- Tighten the relief valve(300) into the rear flange(201) at the required torque.
- ※ Tightening torque :  $12 \pm 1 \text{kgf} \cdot \text{m}$   
( $86.8 \pm 7.2 \text{lbf} \cdot \text{ft}$ )



### (13) Assembly of the carrier assembly

- ① Attach one of the two thrust bearings(20) to the coupling gear(8) using grease.
- ※ Apply a thin coat of molybdenum disulfide grease to the thrust bearing(20).



- <sub>E</sub> Mount the coupling(19) on the shaft(102).
- ※ Apply a thin coat of molybdenum disulfide grease to the spline section of the coupling(19).



- <sub>0</sub> Place the steel ball(36) in the sun gear(7) and place the sun gear in the coupling(19).



- <sub>0</sub> Insert the carrier assembly into the hub(1), and correctly engage the teeth B of the cluster gear(6).
- ※ This must be done only after determining the timing point of carrier assembly reassembling by the below procedure.



※ **Determining the timing point carrier assembly reassembling**

To insert the carrier assembly into the hub(1) and correctly engage teeth B of the cluster gear(6) and the teeth of ring gear(B,5) carry out the operating procedure described after this diagram.

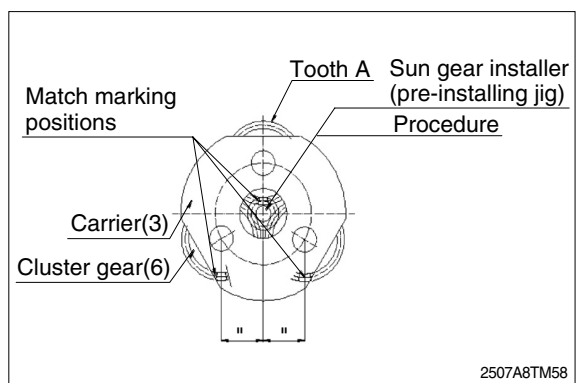
**Procedure**

Align the match marks of the three cluster gear(6) at the positions shown.

At those positions, engage the sun gear installer correctly with the cluster gear(6) and fix the sun gear installer.

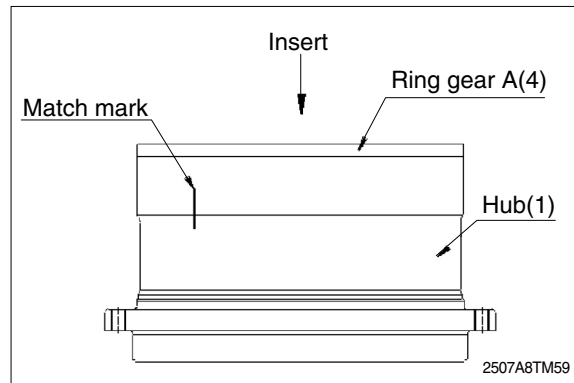
Insert the carrier assembly into the hub(1).

This dismounts the sun gear installer automatically.



#### (14) Assembly of the ring gear(A,4)

- ① Mount ring gear(A,4) on the hub(1).  
Check at this time that the teeth of ring gear(A) and teeth A of the cluster gear are in correct engagement.
- ※ After completely degreasing that surface of ring(A,4) that contacts the hub(1), apply a thin coat #SS60F hermetic sealant to that contact surface.
- ⌘ Rotate the hub(1) to fit the match marks on ring gear(A) and the hub.
- ∅ Fit the ten dowel pins(27) into the hub(1).
- ⊞ Fill the reducer section with a lubricating oil.
  - Quantity required : Approx. 3.3 l  
(0.87 U.S gal)

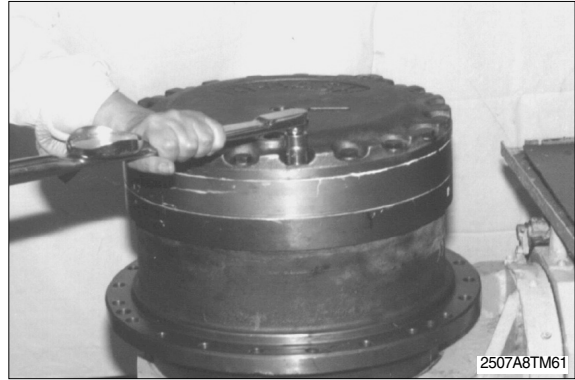


#### (15) Assembly of the cover(13)

- ① Attach the thrust bearing(20) to the carrier(3) using grease.
  - ※ Apply a thin coat of molybdenum disulfide grease to the surface of the thrust bearing(20).
- 
- ⌘ Install cover(8) to hub(1).
  - ※ Apply slightly three-band No-1211 to that matching face of cover which is to mate with the surface of hub(1).



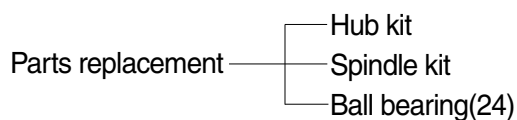
- Fasten cover(13) to hub(1) with 20-hex bolts(32) and 20 super lock washers(33) applying to the specified torque.
  - ※ Tightening torque :  $10.4 \pm 1.6 \text{ kgf} \cdot \text{m}$   
( $75.2 \pm 11.6 \text{ lbf} \cdot \text{ft}$ )
  - ※ Before tightening bolts, apply loctite 242 to the hexagon bolts(32).
- Tighten 3-plugs(30) to cover(13) to the specified torque.
  - ※ Tightening torque :  $10 \pm 2 \text{ kgf} \cdot \text{m}$   
( $72.3 \pm 14.5 \text{ lbf} \cdot \text{ft}$ )
  - ※ Before tightening plugs, wrap the threaded portion of each plug with two lags of the seal tape.
  - ※ Tighten each plug until the last thread becomes nearly flush with the cover surface within an extent equal to plus or minus one thread relative to the surface.



## B : Thickness selection of a distance piece(12)

- (1) If the parts listed below have been replaced, select a distance piece(12) of the appropriate thickness.

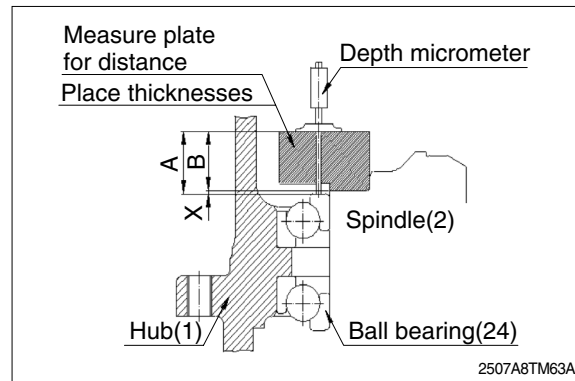
After selection, return to the original reassembling procedure (procedure 5 of subsection 4-2-2) and carry out the next step of that procedure.



- (2) Steps 1 through 4 of the original reassembling procedure must be carried out as directed.
- Mount a measure plate on the spindle(2) without inserting a distance piece(12).
  - Lightly tighten a few hexagon socket bolts(35).
  - As shown in the diagram at next page, measure dimension "A" using a depth micrometer.



※ Tighten the hexagon socket head bolts equally.



☐ Measure dimension **C** of the coupling gear(8) to be mounted.  
See the diagram at right.

☐ Using the clearance measurements, calculate the appropriate distance piece thickness as follows:

i / Measure the clearance between the edge of the spindle(2) and that of the ball bearing(24).  
Take this clearances as **X**

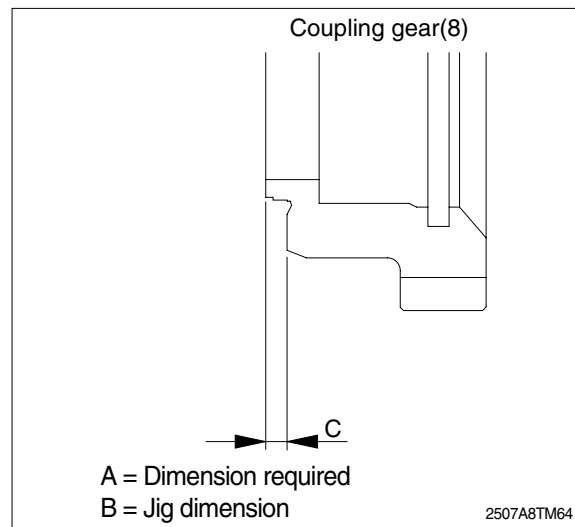
**X = A - B**

i / Next, determine the distance piece of the appropriate thickness.

Take this thickness as **T**.

$$T = (C + X) \pm 0.1$$

☐ Using the results the results of steps ☐ through ☐ above, select the appropriate thickness from 9 types.

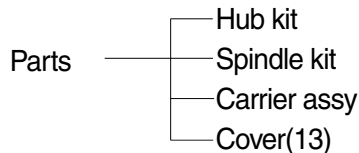


## C: Thickness selection of a thrust bearing(20)

(1) If the parts listed below have been replaced, select a thrust bearing(20) of the appropriate thickness.

After selection, return to the original reassembling procedure and carry out the next step of that procedure.

※ Refer to the page 8-100 for details.



(2) Steps □ through □ of the original reassembling procedure must be carried out as directed.

□ Attach one of the two thrust bearings(20) to the coupling gear(8).

At this time, use the thinnest distance piece.

※ Do not apply molybdenum disulfide grease to the thrust bearing(20).

□ Mount the coupling(19) on the shaft(102).

□ Insert the carrier assembly into the hub(1), and correctly engage the teeth of ring gear(B,5) and teeth B of the cluster gear(6).

※ This must be done only after determining the timing point of carrier assembly reassembling (see page 8-98 for further details).

□ Using the clearance measurements, calculate the appropriate thrust bearing thickness as follows.

a) Measure the clearance between the edge of the carrier(3) and that of ring gear(A,4)

Take this clearances as **X**.

$$X = B - A$$

**A** = Dimension required

**B** = Jig dimension

b) Next, determine the thrust bearing of the appropriate thickness.

Take this clearances as **T**.

$$T = (C - X) - (0.3 \text{ to } 0.6)$$

□ Using the results of steps □ through □ above, select the appropriate thickness from these types.

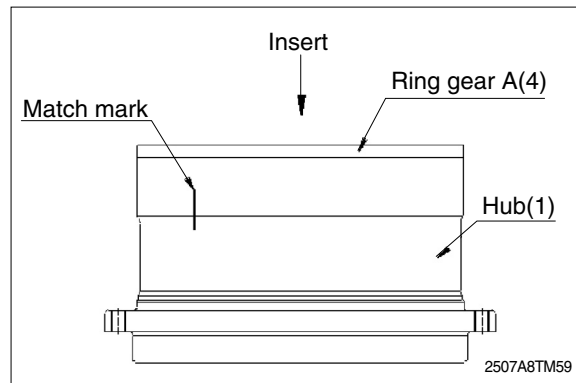
Then, proceed with the original reassembling operation.



- ° Fit the match marks on ring gear(A,4) and the hub(1), and mount the ring gear on the hub.

Check at this time that teeth A of the cluster gear(6) and the teeth of ring gear (A,4) are in correct engagement.

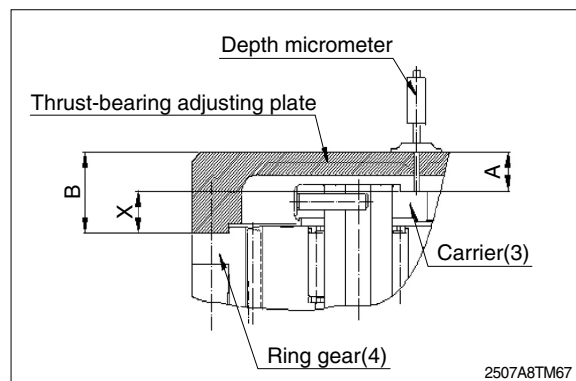
- ※ Do not mount the thrust bearing(20) at this time.



- Mount a thrust-bearing adjusting plate on the hub(1), and lightly tighten the former using two M12 hexagon socket bolts.



- As shown in the diagram at right, measure dimension A using a depth micrometer.



- Measure dimension C of the cover(13) to be mounted. See the diagram at right.

