

# PROPELLER SHAFT AND AXLE

## REAR AXLE

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## REAR AXLE

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# REAR AXLE

## SPECIFICATION E995A950

### MODEL (F320)

Description		Specification	
Vehicle		HD72	
Model		F320	
Engine corresponded		D4DA, D4DB, D4DD	D4AL, D4DC
Gear ratio		5.428	6.666
Oil spec	Temperate or frigid zone	GL-5 SAE 85W/140	
	Torrid zone	GL-5 SAE 80W/90	
	Quantity(L)	5.3~5.7	
Grease		NLGI No.2	
Brake size(mm)		320 x 85	
Shock absorber center distance(mm)		536	
Distance of axle housing brake flange(mm)		1188	
Cross section of axle housing(mm)		110 x 108	

### MODEL (F302)

Description		Specification	
Vehicle		HD65	
Model		F302	
Engine corresponded		D4AL, D4DC, D4BD	
Gear ratio		6.166	
Oil spec	Quantity(L)	4.3~4.7	
	Temperate or frigid zone	GL-5 SAE 85W/140	
	Torrid zone	GL-5 SAE 80W/90	

**TIGHTENING TORQUE**

Description	Specification (F320)			Specification (F302)
	Nm	Kgf.m	lb-ft	Nm
Propeller shaft & Rear axle assembly	98~118	10~12	72~87	←
Wheel bolt	539~588	55~60	397~434	←
Pretightening load of pinion bearing	1.5~3	0.2~0.4	1.1~2.2	←
Pretightening load of differential bearing	2~4	0.2~0.4	1.5~3	←
Torque of flange nut of pinion	380~420	38.7~42.8	280.3~309.8	330~390
Torque of binding bolt for ring gear and differential case	240~280	24.5~28.6	177~206.5	←
Differential case binding bolt	130~170	13~17	96~125	50~80
Torque of differential bearing cap bolt	240~280	24.5~28.6	177~206.5	←
Torque of binding bolt of adjusting ring locking piece	16~30	1.6~3.1	11.8~22.1	←
Torque of bolt fastening the carrier and axle housing	140~180	14.3~18.3	103~133	←
Bolt connecting the brake backplate to axle housing flange	98~137	10~14	72.3~101	←
Axle shaft bolt	110~150	11.2~15.3	81~111	←
Torque of binding bolt of rear axle bearing cage	140~180	14.3~18.4	103.3~132.8	←
Torque of oil charging and drain plugs	100~140	10.2~14.3	73.8~103.3	←
Binding bolt of brake tube	6~10	0.6~1	4.4~7.4	←
Binding bolt of 3 way connector	16~30	1.6~3.1	11.8~22.1	←
Torque of hard tube joint bolt	13~16	1.3~1.6	9.6~11.8	←
Torque of wheel hub lock nut	180~220	18.4~22.4	132.8~162.3	←
Torque of lock washer bolt of wheel hub	2~4	0.2~0.4	1.5~3	←

**SERVICE STANDARD**

Item	Specification
Backlash of pinion and ring gear	0.15~0.3 mm
Variation of backlashes for the same pair of gears	Not greater than 0.08 mm
Oil capacity of rear axle hypoid gear	F320 : 5.5L, F302 : 4.5L

**ADJUSTMENT** E510DBDA**EXCHANGE THE LUBRICATING OIL**

1. Recommended lubricating oil  
The rear axle gear must be applied with hypoid gear oil SAE 80W-90 or SAE 85W-140 GL-5 Quantity: 5.5 Lit.  
In tropical zone: SAE 85W-140 GL-5 for 5.5 Lit  
In temperate or cold zone: SAE 80W-90 GL-5 for 5.5 Lit
2. Time of Change of Lubricating Oil  
For every 8000 Km travel, inspect the rear axle oil level and fill as specified.  
Oil change period for rear axle:
  - 1) On completion of running at beginning of vehicle (2500 Km of travel)
  - 2) Every 24000 Km of travel
3. Specific operation for change of lubricating oil  
The rear axle oil filler plug is on the axle housing rear cover.  
The oil should be filled so that the oil level is flush with the access hole.

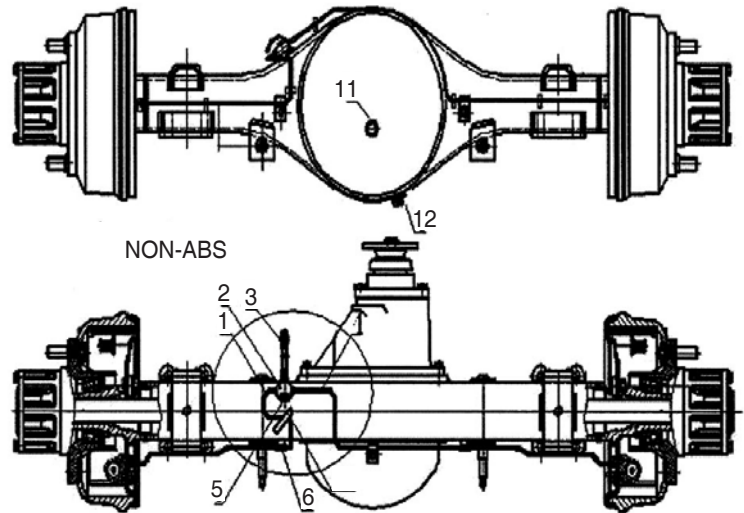
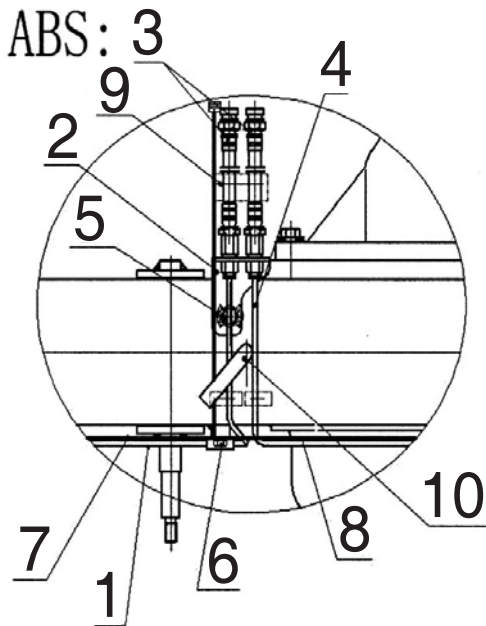
**NOTE**

- *Change of Lubricating oil should be carried out in warm condition.*
- *Be careful not to be hurt by hot oil.*
- *Clear the foreign matter from the oil drain plug.*
- *Clean the health plug.*

**CONNECTION OF BRAKE LINE AND ABS**

1. Connection of brake line
  - 1) Position the brake tube onto the axle housing transition boss. Connect one end of it to the tee fitting and the other end to brake hose.
  - 2) Before assembling, the line should be tested by compressed air for any leakage and the cavity should be cleaned.
2. Connection of ABS (If installed)
  - 1) Range of electric resistance of sensor: 1550-1700 ohm.
  - 2) When the wheel speed is greater 30 rpm, the output induced voltage of sensor is  $\geq 0.2V$  (AC) and the ratio of its max induced voltage to its min induced voltage should be  $\leq 2.0$ .

< If installed >

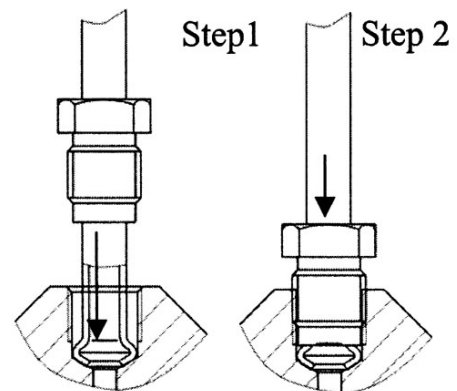


- 1. HARD PIPE ASSY-LH
- 2. 3-WAY VALVE (for TRANSITION BRACKET ASSEMBLY (for ABS)
- 3. HOSE (2 for ABS)
- 4. HARD PIPE ASSY-RH
- 5. BOLT  
BOLT (transition bracket assembly, for ABS)
- 6. BOLT  
CLIP
- 7. WIRE HARNESS ASSEMBLY (left)
- 8. WIRE HARNESS ASSEMBLY(right)
- 9. STRAP
- 10. BREATHER PLUG
- 11. Oil filler plug
- 12. Oil drain plug

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**NOTE**

The brake tubes 1 and 4 should be mounted as per the steps as given in Fig. which facilitates assembling and sealing.



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*On completion of assembling of the complete axle, oil should be applied as specified.*

### TEST SPECIFICATION FOR REAR AXLE ASSEMBLY

For users having necessary conditions, a rear axle test bed may be used to test the reassembled rear axle. For users without those conditions, the rear axle may be mounted onto the vehicle and observed during slow running.

#### **⊗ WARNING**

**Observing of the operation state of the rear axle mounted onto the vehicle should be done in a area far away from the crowd. Pay attention to the safety of human body and properties of other people and your own.**

1. Test scope  
During the test, check the assembling of the rear axle assembly for complete correctness and check all threaded connections for correct tightening and locking. Check the leakage condition of the bond area and the oil seal. Check the noise of the carrier assembly and braking effect of the wheel brake. The test duration is not less than 3 min.
2. The rear axle assembly under test should conform to the following:
  - 1) The gears must be free from any abnormal noise. When one of the brake drum is applied, knocking or drastic noise is not allowed from the differential.
  - 2) No rotating part may come into contact with any stationary part.
  - 3) After the vehicle is stopped, when touching by hand any bearing and oil seal seat, it should be cool or slightly warm. The brake drum should not be subject to overheat.
  - 4) No oil seal, bond area or castings blow hole, etc may be subject to oil leakage.
3. A defect found in the test may be reconditioned. However, reacceptance is required after the reconditioning.

### INSPECTION EAEAE73

1. Cleaning  
The parts may possibly contaminated by dirty oil or sludge. Cleaning of parts is essential. Usual methods include steam cleaning, gasoline cleaning, acid or alkaline solution cleaning, neutral solvent cleaning, trichloroethylene cleaning and magnetic force cleaning. Some parts may possibly be damaged during cleaning. Therefore, careful inspection must be done during cleaning.
  - 1) Metal part
    - a. Gasoline  
Unlike any other method, gasoline is not able to penetrate or dissolve sludge. Unless the surface of part has been precision machined, a metal brush or other tool to remove sludge and brushing should be done twice.
    - b. Alkaline treatment  
Excellent result can be obtained by using alkaline treatment to clean steel parts and castings. Alkaline treatment is not appropriate for alloy parts.
  - 2) Rubber parts  
Mineral oil cannot be used. Alcohol can be used for cleaning or just a piece of clean cloth can be used to wipe off any dirt.
  - 3) Corrosion prevention  
After cleaning all waste oil and grease off the part surface, a layer of clean oil should be applied on the surface for corrosion prevention.
2. Inspection
  - 1) Before cleaning, the part should be inspected by using any already prepared measuring apparatus or tool. Decide according to the specified maintenance criteria if the part is suitable for reuse. Any damaged part should be repaired or replaced as required. If one of paired parts is seriously worn and the assembling clearance exceeds the specified degree, this part or the paired parts can be replaced as required. In principle, any paired parts should be replaced in a paired manner.
  - 2) For the view point of preventive maintenance, some parts within repair or wear limit should be replaced before they exceed the limit.

- 3) All parts should, as necessary, be carefully inspected by visual inspection or by means of NDT such as infrared ray, ultrasonic wave or X ray. The part can be repaired or replaced as necessary if any abnormality is found during visual inspection, such as irregular wear, iron rust, bending, deformation, scratch, crack, partial wear, discoloration, loose fitting, excessive wear of friction lining and etc, deterioration of friction lining and etc, failure of return spring or attenuation of return force or abnormal noise of bearing or gear, etc.
  - 4) Any rubber part such as O ring, oil seal or gasket, after disassembled, should be replaced according to the situation. All hub oil seals and pinion gear oil seal after disassembled must be replaced.
  - 5) For cleaning of carrier and differential assembly, replace them according to the assembling order.
  - 6) Check the dismantled bearing, gear and any other parts for any ablation, flaking off, pockmark or excessive wear. Replacement is necessary of any such defect.
3. Reconditioning and Replacement

 **NOTE**

*In order to achieve effectively the value of the rear axle product, it is an effective means to replace any low-value wear-prone part.*

*For instance, replacement of any worn gasket, bush or oil seal can prevent damage of gear or bearing, etc. Replacement of such parts will not increase the cost for replacement of important parts.*

- 1) **Steel parts**  
For paired parts that may not be reconditioned, such as gear, differential and bearing, when any used or damaged part is rejected, replacement by suited part is required as well. That is to say, any paired parts should be replaced in a paired manner but not in a single manner.
- 2) **Rubber parts**  
For rubber parts such as oil seal, replacement is a must once the seal is damaged. In this case, reuse may not be considered.

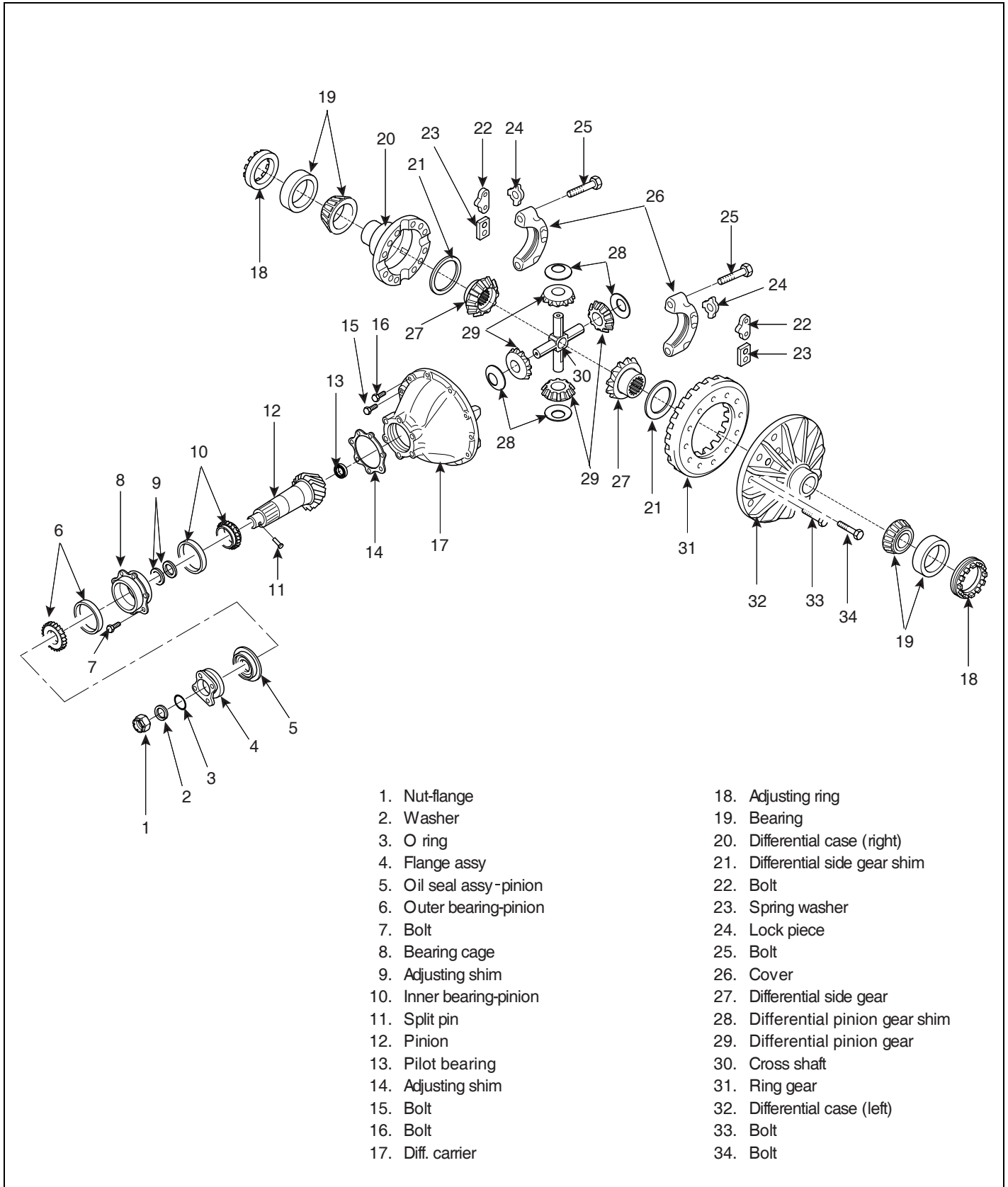
- 3) **Axle housing**  
Any cracked or bent axle housing should be replaced at once.

 **CAUTION**

***Never try to repair any axle housing by means of welding or straightening; otherwise, the axle housing may become defective during use of vehicle, possibly causing serious result.***

# DIFFERENTIAL CARRIER ASSEMBLY

## COMPONENTS EF6A02B6



- |                          |                                   |
|--------------------------|-----------------------------------|
| 1. Nut-flange            | 18. Adjusting ring                |
| 2. Washer                | 19. Bearing                       |
| 3. O ring                | 20. Differential case (right)     |
| 4. Flange assy           | 21. Differential side gear shim   |
| 5. Oil seal assy -pinion | 22. Bolt                          |
| 6. Outer bearing-pinion  | 23. Spring washer                 |
| 7. Bolt                  | 24. Lock piece                    |
| 8. Bearing cage          | 25. Bolt                          |
| 9. Adjusting shim        | 26. Cover                         |
| 10. Inner bearing-pinion | 27. Differential side gear        |
| 11. Split pin            | 28. Differential pinion gear shim |
| 12. Pinion               | 29. Differential pinion gear      |
| 13. Pilot bearing        | 30. Cross shaft                   |
| 14. Adjusting shim       | 31. Ring gear                     |
| 15. Bolt                 | 32. Differential case (left)      |
| 16. Bolt                 | 33. Bolt                          |
| 17. Diff. carrier        | 34. Bolt                          |



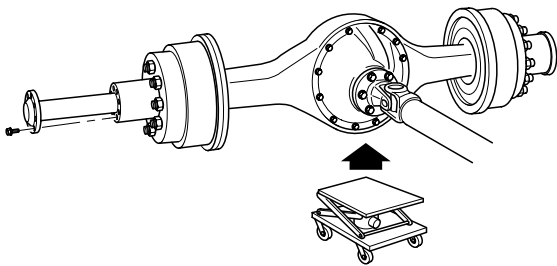
**REMOVAL** E49F5D36

**⚠ CAUTION**

*When axle shaft is dismantled, please distinguish left from right axle shaft, thus mistake will not be made in re-installation.*

The carrier is dismantled according to the following steps

1. Release and draw out left/right axle shaft.



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2. Support the carrier with cart, dismantle 12 bolts linking carrier and rear axle, dismantle the carrier assembly from axle housing.

**⊗ WARNING**

1. Don't use hammer to knock on the edge of axle shaft flange, don't prize axle shaft or screw by such tools as flat spade!
2. Don't lie under carrier while dismantling or installing tightening bolts of carrier. Cart shall be used to transport carrier.

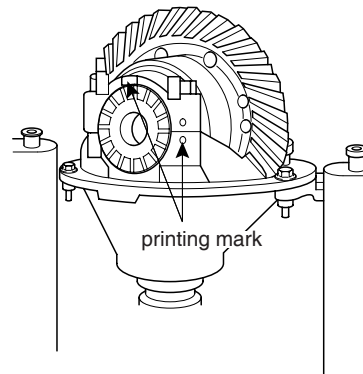
**DISASSEMBLY** EF82CD9B

**⚠ CAUTION**

*If pinion and ring gear need to be used repetitively, before Diff. Carrier assembly is decomposed, the contact dent of gear and gear gap shall be checked. Of course, the best result is to acquire good gear contact dent and gear gap by adjustment. If gear is decided to replace at the beginning, the step can be given up.*

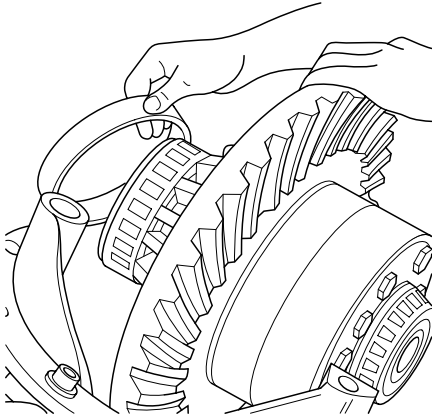
**THE STEPS FOR REPLACING PINION AND RING GEAR**

1. Install Diff. Carrier shell assembly inside repair gantry, loosen but not dismantle collar nut. Before Diff. Carrier assembly is decomposed, mark shall be made on the left and right bearing cover, so to prevent left and right bearing cover from being wrongly assembled in reassembling; ditto, the adjusting ring shall also be marked.



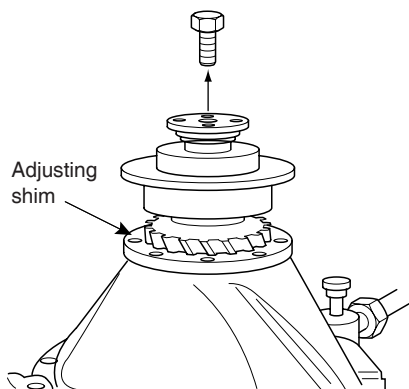
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2. Dismantle the retainer bolt on the bearing cover , take down lock piece, loosen the bolt fixing bearing cover, dismantle nut on bearing cover by wrench; dismantle bearing cover and bolt, take out differential assembly from Diff. Carrier by chain and hoister.



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3. Turn over carrier assy, make ring gear assembly upwardly, dismantle connection bolt between the bearing cage of and carrier, take down pinion assembly by chain and hoister.

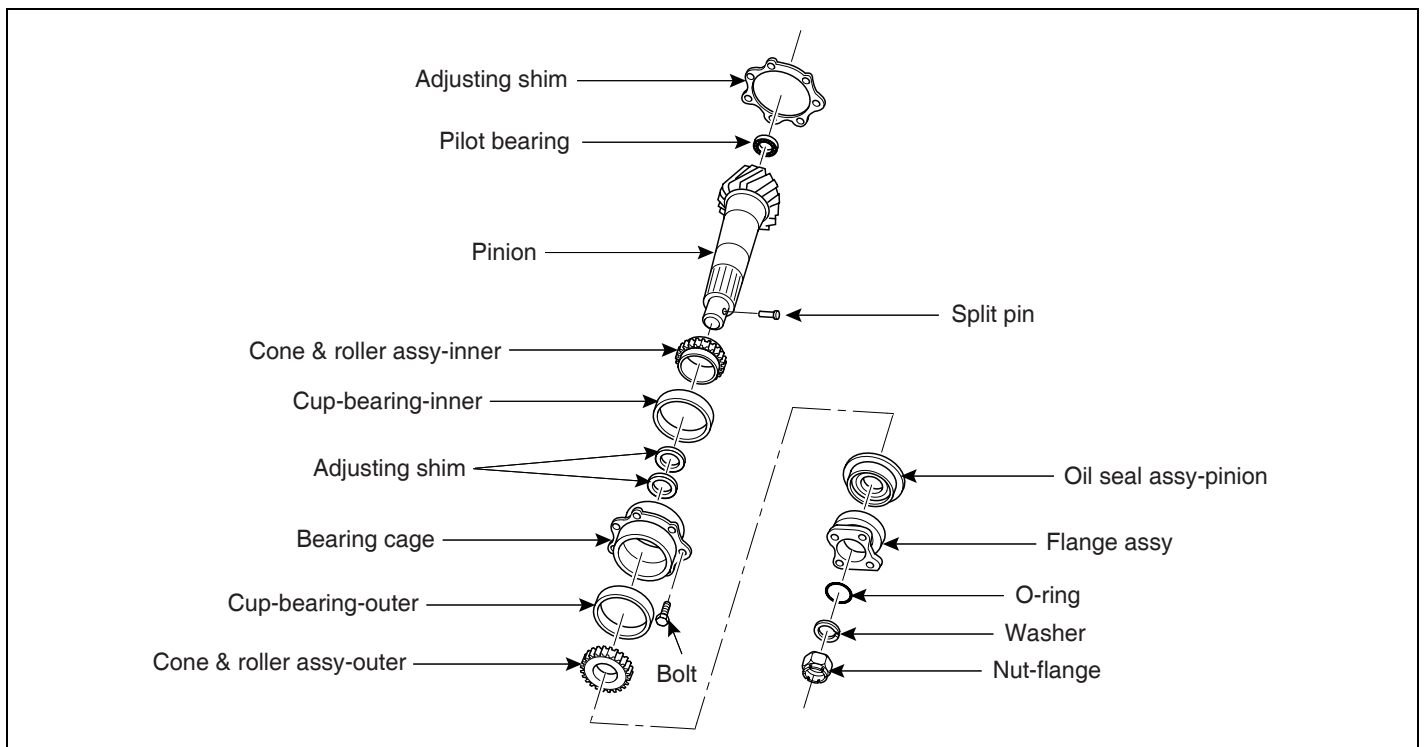


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**CAUTION**

**Be sure not to damage or lose the adjustment shim on the bearing cage . If shim cannot surely be used again, the group number and thickness of shim shall be made clear, shim shall be reorganized and reassembly.**

DISMANTLE PINION ASSEMBLY



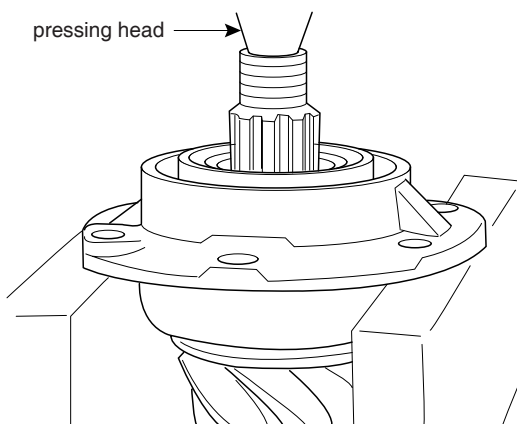
SUDPA7007L

**CAUTION**

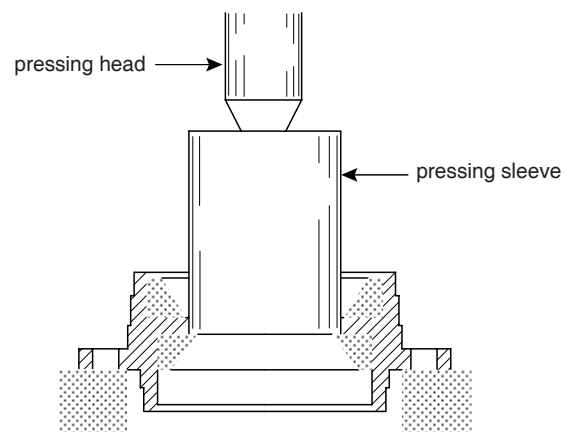
**When dismantling flange assembly, don't lay pinion on hard surface.**

1. Take out flange nut loosened in step 1 of "The steps for replacing pinion and ring gear" by special tool, take down flange assembly; then press out pinion and cone & roller assy by special tool. If bearing has not be damaged, it is not necessary to dismantle its cup-bearing and cone; if a part will be replaced, corresponding parts shall be replaced. (see Figure 8), the dismantling steps are shown in 2 and 3.

2. Take down the cup-bearing-inner.

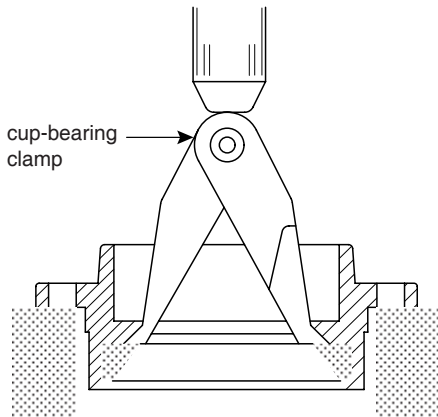


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SUDPA7009L

- 3. Take down the cone & roller assy-outer.

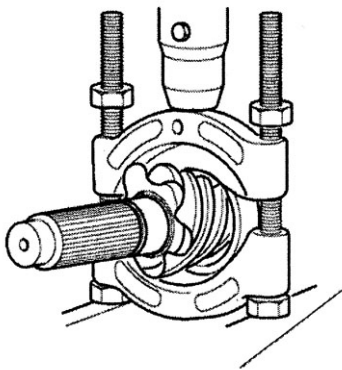


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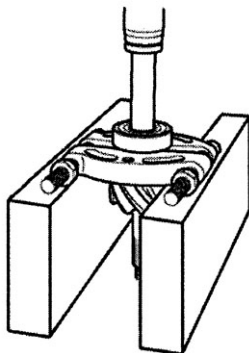
 **NOTE**

*Dismantling tools indicated in figure is only as schematic use. Under the premise of not damaging component, a user himself can select tools with similar functions for dismantling.*

- 4. Dismantle guide bearing of pinion



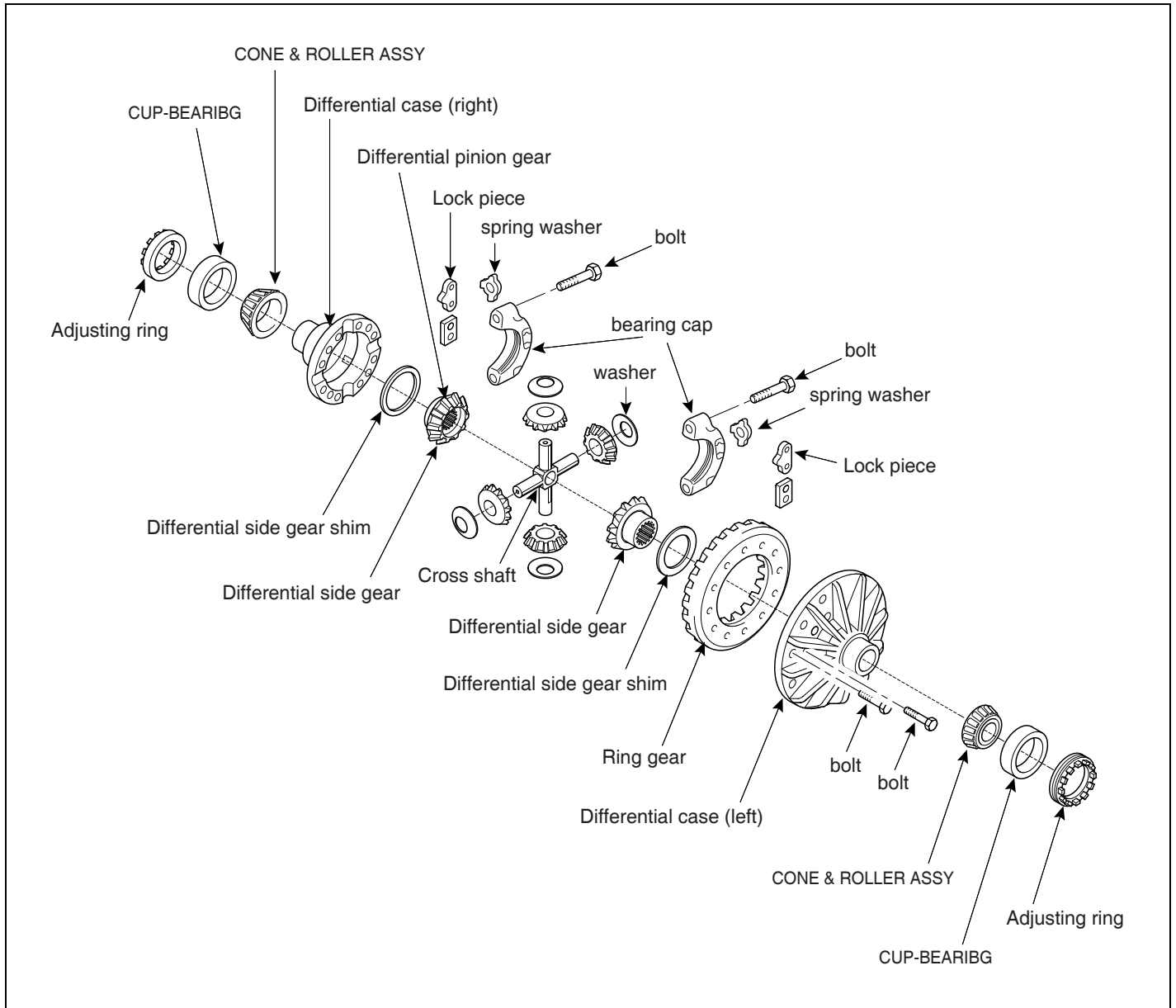
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**INSPECTION** ED66DC5F

**DETECTION AND MAINTENANCE ON DIFFERENTIAL ASSEMBLY**

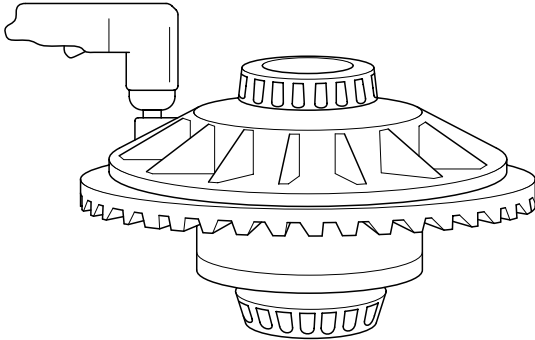


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**NOTE**

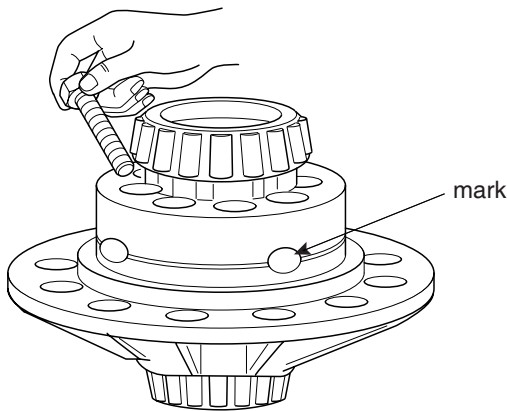
- *In the process of dismantling differential assembly, differential assembly shall be laid on soft surface, so to prevent wheel tooth of ring gear from being damaged.*

1. Dismantle the linking bolt tightening ring gear and differential case, if ring gear doesn't slide down from differential case, copper bar or soft hammer can be used to slightly knock on the external edge of ring gear, then dismantle ring gear.



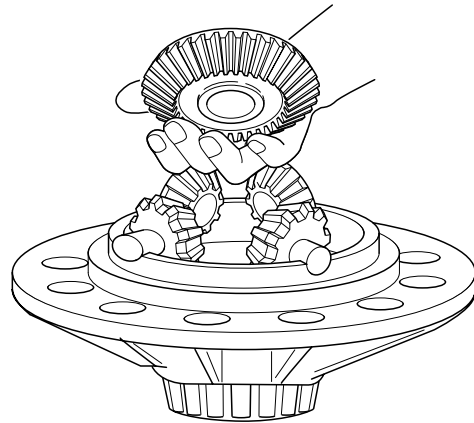
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2. Make assembly mark on the engagement face between left and right differential case, dismantle bolt tightening and differential case(left and right), take down the differential case(right).



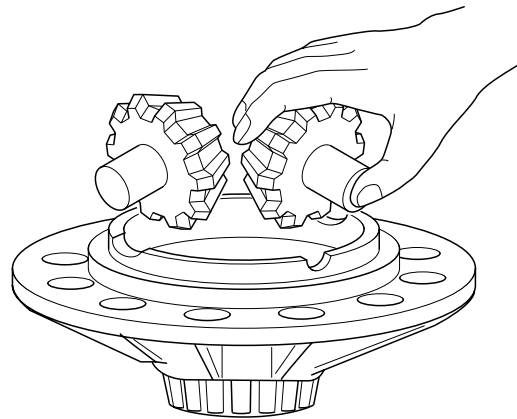
SUDPA7014L2

3. Take down side gear shim and side gear.



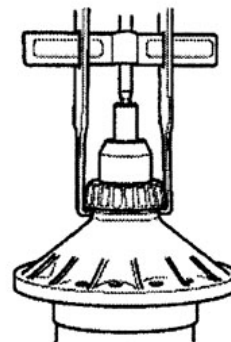
SUDPA7014L3

4. Dismantle differential pinion gear and cross shaft assembly, then dismantle shim and differential pinion gear from cross shaft.



SUDPA7014L4

5. Take down side gear shim and side gear.
6. Check if bearings on both ends of differential gear have been damaged or not. If not, it is not necessary to dismantle bearing; if damaged, the cone & roller assy and cup-bearing shall all be replaced.



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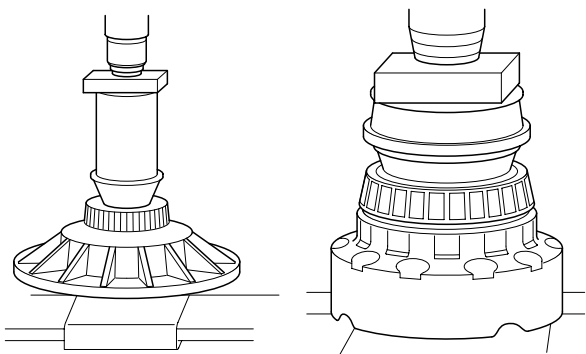
**REASSEMBLY** E339F5FB

**ASSEMBLY ON DIFFERENTIAL ASSEMBLY**

**! CAUTION**

*Before assembling, hyperbolic gear oil shall be applied on the rotation engagement surface of differential case, side gear, differential pinion gear, support shim and bearing of side gear. (in tropical zone, applying SAE 85W-140 GL-5; in temperate zone or Frigid zone, applying SAE 80W-90 GL-5 )*

1. Assemble the cone & roller assy.

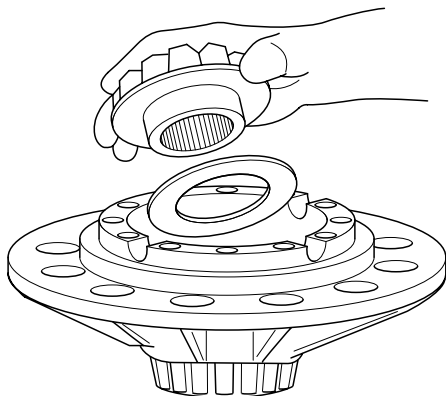


SUDPA7016L1

**NOTE**

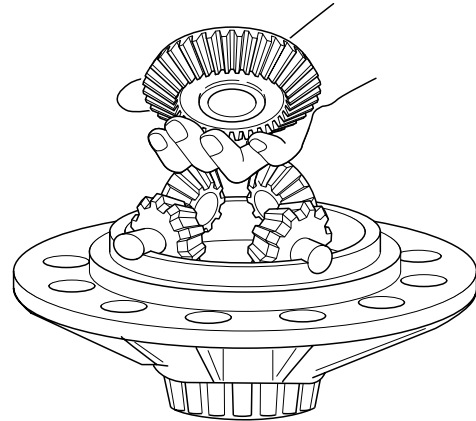
*In order to prevent bearing from being damaged, suitable pressing sleeve shall be applied. Used cup-bearing is a good option. If the inner diameter of inner ring is less than the outer diameter of bearing engagement part of differential case, a notch can be made from bearing shaft upwardly, so to solve the matter.*

2. Assemble side gear shim and side gear into differential case(left).



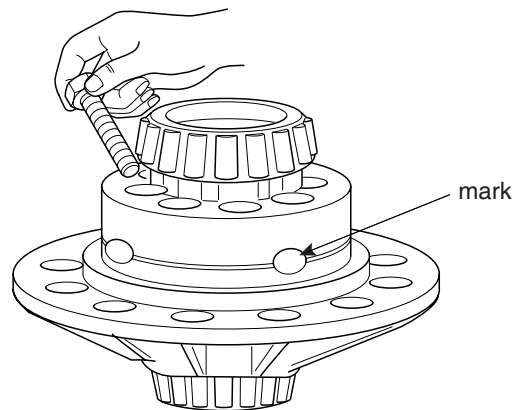
SUDPA7016L-2

3. Assemble planetary gear and shim on cross shaft, then assemble them together into differential case(left) . Rotate gear, check if gear system may be blocked or not.



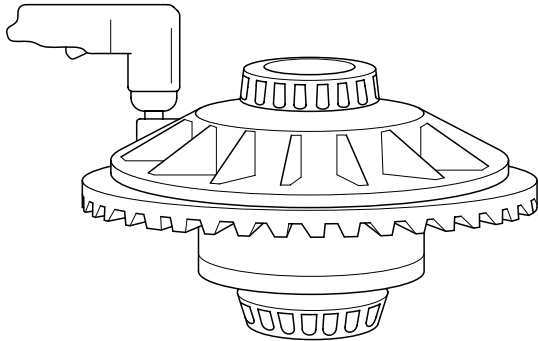
SUDPA7016L3

4. Assemble side gear and side gear shim.
5. Assemble differential case(right) according to mark on the differential case. Assemble linking bolt of differential case and tighten to correct torque. Rotate side gear to see if gear system may be blocked or not.



SUDPA7016L5

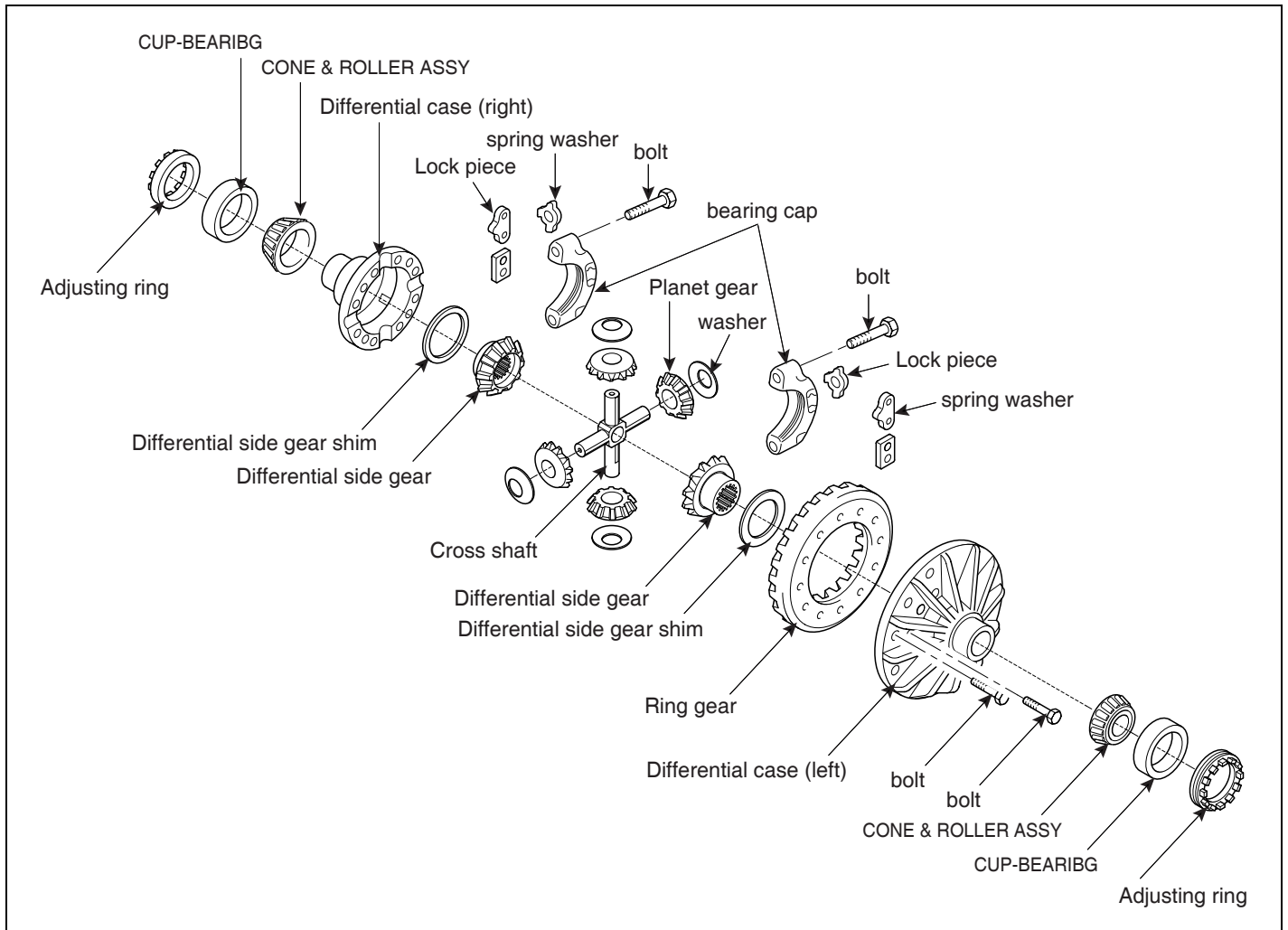
6. Assemble ring gear, assemble bolt linking ring gear and differential case, tighten bolt to correct torque.



SUDPA7016L6



ASSEMBLE AND ADJUST PINION ASSEMBLY



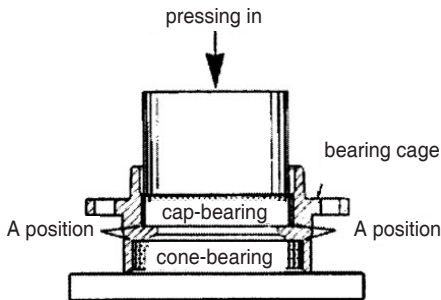
SUDPA7017L

**CAUTION**

**Before pressing bearing in, a little lubricating oil shall be applied on the out diameter of pinion. (in tropical zone, applying SAE 85W-140 GL-5; in temperate zone or Frigid zone, applying SAE 80W-90 GL-5 ). Before cone & roller assy of bearing and guide bearing are assembled, suitable pressing sleeve shall be used. (size is basically equivalent to size of inner ring of bearing, in addition, the inner ring of pressing sleeve shall be larger than the diameter of gear axle).**

1. Assembling components of pinion assembly

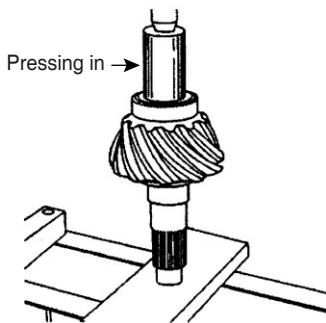
- 1) Before assembling the cup-bearing, check if burr exists on the surface of cup-bearing, if existing, clear away it.  
Press cup-bearing into bearing cage



A position cap-bearing must be assembled to position here.  
Detecting the position with 0.03 feeler  
Attention : Every time an cap-bearing is assembled and the assembling is completed in one time.

SUDPA7018L

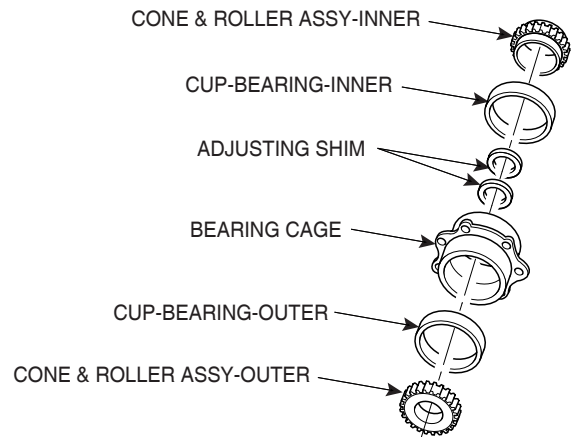
2) Pressing pilot bearing into pinion.



SUDPA7019L

2. Adjustment on the pre-tightened force of bearing inside pinion.

- 1) Assemble bearing cage, inside, outside bearing and pre-tightened shim(not including pinion and oil seal), lay pre-tightened shim between two cone of bearing and along the direction of axis of bearing.



SUDPA7020L

**CAUTION**

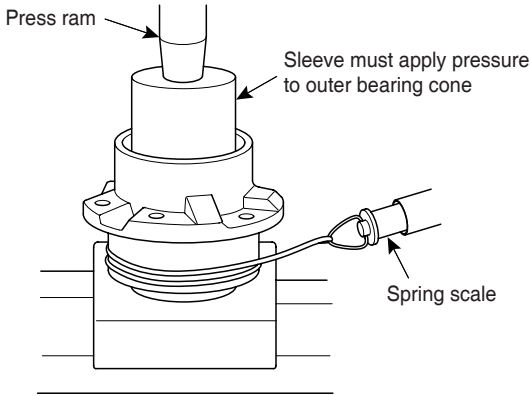
*If the reassembled bearing of pinion has been used, new pre-tightened shim shall be applied. If it is found that pre-tightened shim has been seriously worn during the period of decomposing assembly, the shim shall be abandoned during the period, however, the thickness of the shim shall be measured and recorded.*

- 2) Assembled system shall be properly oiled and lubricated; 64KN force shall be applied on assembly. Pressing sleeve must be pressed on the end face of the inner ring of bearing.
- 3) When 64KN force is applied on assembly, check rotation torque. Around bearing cage, wind soft metal wire, hang spring balance to pull. Rotation torque of bearing cage shall be within the scope of 1.5~3.0 N.m.

**CAUTION**

*After having confirmed value of torque, start to rotate bearing cage.*

- 4) If the pre-tightened force of bearing cannot reach the requirement, adjust the preload of pinion support by varying pre-tightened shim. Thicker pre-tightened shim will reduce pre-tightened load, thinner pre-tightened shim will increase pre-tightened load.



SUDPA7021L

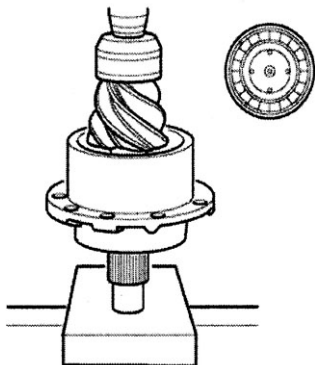
**NOTE**

Generally, for this kind of adjustment, suitable preload may not be acquired in one time of operation. Preload testing shall be applied in each assembly and each time of adjustment.

After pre-tightened force has reached requirement, when pinion assembly is assembled, a pre-tightened shim with size larger than test value by 0.02~0.03 shall be selected. When shim is assembled on assembly, the surplus 0.02~0.03 size can just meet the pre-tightened pressure of assembly. Test on pre-tightened force of bearing shall be completed through 3~4 times of tests.

3. Final test on pinion bearing for pretightening force

- 1) Assemble the pinion, the bearing and the bearing cage



SUDPA7022L

- 2) Fix the bearing cage assembly by means of the method as given in Fig.1 or 2. Jaw vice method: Use a jaw vice to clamp the bearing saddle assembly (See Fig.1. Use flange nut to fasten the flange. See the tightening torque table for the tightening torque of the flange nut.) Holding down method: By means of continuous force, use pressing sleeve to hold down the inner race of outer bearing.

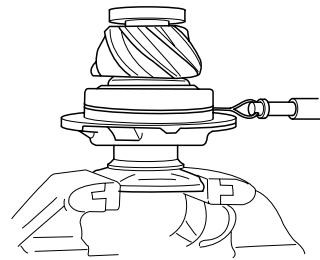


Fig 1.

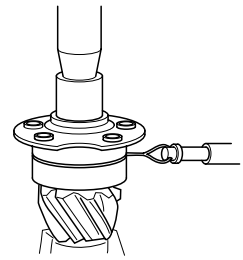


Fig 2.

SUDPA7023L

- 3) Test the pinion bearing for preload. Wind the soft annealed wire around the bearing cage. Hook up the spring balance to pull it. The rotating torque for bearing cages should be between 1.5 and 3.0 N.m.

**NOTE**

After confirming the torque value, start the operation of turning the bearing cage.

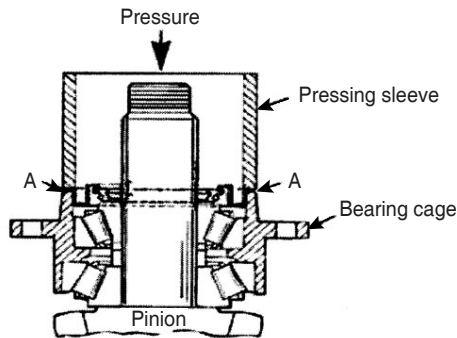
- 4) If the requirement of bearing pretightening force is not met, then the pinion assembly should be disassembled and assembly and commissioning should be done again as per the procedure as given in page 19 in this manual. Adjust the preload of pinion bearing by changing the pretightening washer. A thicker pretightening washer will reduce the pretightening load while a thinner one will increase it.

**WARNING**

A pretightening washer as supplied by the manufacturer should be used. Never try to use a shim or any washer as made by yourself. Such inappropriate part may cause failure of pretightening load and bearing or gear.

## 4. Mounting of oil seal and flange

- 1) After adjustment of the pinion bearing cage for pretightening load, an appropriate tool should be used to press the oil seal onto the pinion bearing cage.



The diameter of pressing sleeve must conform to that as shown at point A in the Figure.

SUDPA7024L

**NOTE**

At the point A in the size of the pressing sleeve should be ensured.

- 2) Before mounting the flange, make sure that the fitting surface between flange and oil seal is clean and dry. Mount the flange washer and flange nut and tighten the flange nut to the specified torque. Insert and lock the cotter pin. (See the torque table for the torque.)

**NOTE**

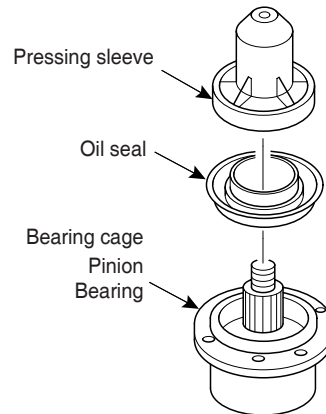
After tightening and locking the flange nut and check the torque of pinion bearing cage, the procedure to mount the bearing cage assembly into the carrier may begin.

## 5. Requirement and method for reassembly of flange

**WARNING**

Never use any flange whose fitting surface with the oil seal is subject to any damage (nick or scratch).

The surface fitting with the oil seal, on the flange, is an important interface to prevent foreign dirt from entering into the axle and to prevent internal lubricating oil from leaking outside. The condition of the fitting surface with the oil seal, on the flange, is a very important factor for the service life of oil seal. It is required that oil seal fitting surface on the flange should be inspected carefully to check for any sign of abrasion or damage. This flange should not be used in case of any visible score or abrasion or any rubbed surface exceeding the protecting diameter of oil seal lip.



SUDPA7025L

**NOTE**

Never use any abrasive paper or abrasive material to clean the oil seal fitting surface on the flange. Dirt should be got rid off by using chemical cleaning agent.

## 6. Replacement of oil seal

It is strongly recommended that mounting should be done by using an oil seal pressing sleeve. An appropriate pressing sleeve can allow the oil seal to be mounted vertically to a proper depth.

**NOTE**

The oil seal may be subject to damage before and during mounting. For mounting of a new oil seal, damage or pollution should be prevented. Before mounting the new oil seal, the oil seal should be placed inside the package.

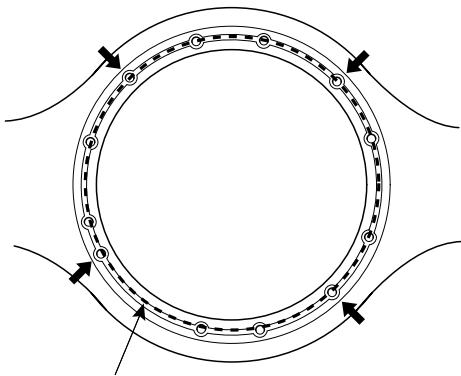
A new flange should also be placed in a proper protective device before mounting.

## INSTALLATION EB8FEDFB

## 1. ASSEMBLY OF DIFFERENTIAL CARRIER

**! CAUTION**

1. *Before carrier is installed, one shall assure the interior of axle housing has been checked and cleared utterly*
2. *On the engagement face between axle housing and carrier, heavy load sealing glue will be applied.*



Applying glue according to the shape indicated in figure.

SUDPA7003L

- 1) Install carrier assembly inside axle housing, after bolt has been tightened, it shall be retightened. In tightening, the torque shall reach the value required in torque table (Table on Bolt Torque is shown in "Tightening torque").
- 2) Install axle shaft, tighten linking bolt, retighten bolt to the scope required in torque table (Table on Bolt Torque is shown in "Tightening torque").
- 3) Fill wheel axle with correct lubricating oil.

**! CAUTION**

*If the pinion, ring gear, differential gear and wheel end parts were decomposed, checked or replaced, before traffic tool is operated, differential gear shall be assured to operate normally (in addition, wheel on one side can rotate independently and freely).*

2. Mounting of pinion assembly

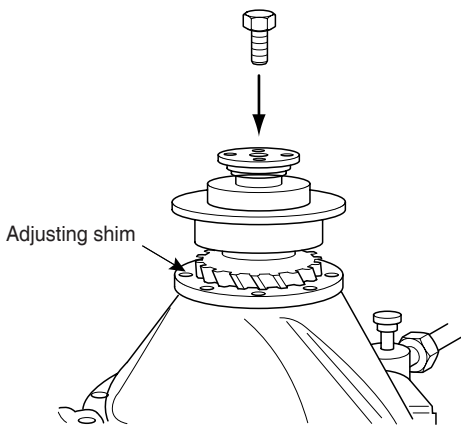
- 1) Place the adjusting shim onto the Diff carrier. The upper most and bottommost shims should be applied with sealant on the surface to contact the housing.

 **NOTE**

*If the gear before disassembly is used, the adjusting shim kept after disassembly of the assembly should be used. If the shims are damaged, then shims with the same thickness and quantity should be prepared prior to the assembling. If a new gear is to be mounted, a set of adjusting shims with nominal thickness can be mounted first.*

*That not fewer than two shims of 0.1mm and 0.2mm should be used. (The nominal thickness of F320 series adjusting shim is 1.75mm.)*

- 2) Mount the pinion assembly onto the carrier. Screw on the attachment bolt to the specified torque. (For the tightening torque see the Torque Table.)



If there is an oil groove hole, it should be aligned with that on the carrier. The pinion assembly should be so too.

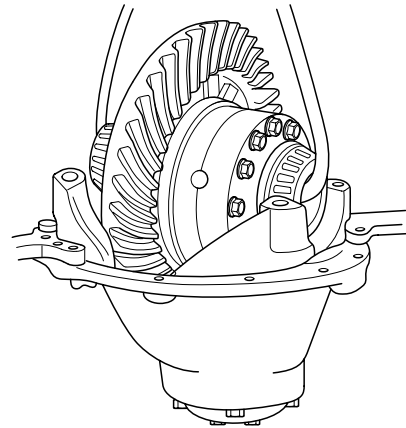
SUDPA7026L

3. Mounting of differential assembly

 **NOTE**

*Lubricate the differential bearing.*

- 1) Mount the differential assembly onto the carrier.



SUDPA7027L

- 2) Mount the bearing outer races on both sides of the differential. Mount the differential bearing cap and adjusting ring. Mount but not tighten the attachment bolts of the bearing cap.

- 3) Use hands to tighten the attachment bolts of the bearing cap. A wrench may be used if it is difficult to tighten the bolts by hands.

 **NOTE**

*It may be difficult to screw on the adjusting ring if the ring and the relevant threads are not lubricated.*

*Up to this point, the preliminary assembling of the carrier assembly has been finished. Next, the pretightening load of the differential bearing, the backlash and-contact pattern of gears should be adjusted.*

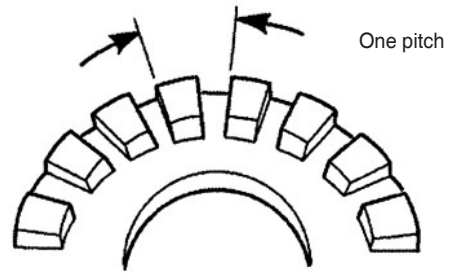
**ADJUSTMENT** EA2F42D0

1. Adjustment of pretightening load of differential bearing  
 Appropriate pretightening load of differential bearing can ensure proper operation the differential bearing and facilitate correct contact of the pinion and ring gear.

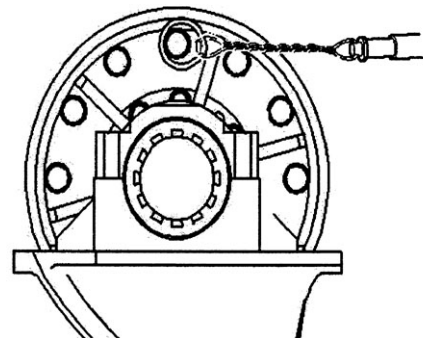
**NOTE**

Before the adjustment, check that the adjusting ring screw thread pair and the driven gear have been cleaned. For adjustment of the pretightening load, the only adjustment item is the differential adjusting ring and any other operation has been finished in the above-mentioned procedures.

Tighten the left and right adjusting rings in such a way that the axial positions of the adjusting rings on both sides are approximately the same. Adjust the pretightening load of the differential bearing by means of the adjusting rings. The tightening torque to rotate the differential assembly should be 2.0~4.0Nm.



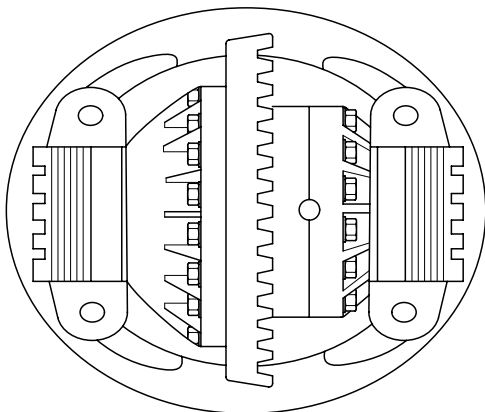
SUDPA7030L



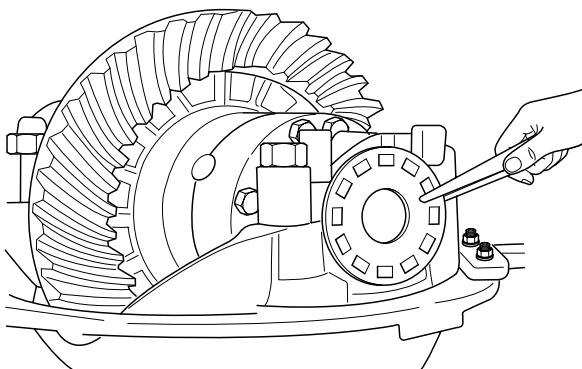
SUDPA7031L

**NOTE**

When checking the pretightening load of the bearing, the bearing must have been lubricated and checking must be done after the bearing has rotated for several turns.

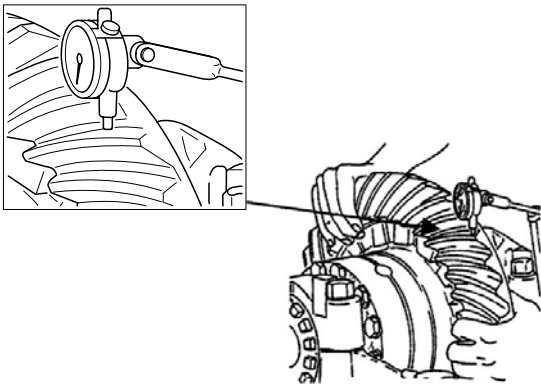


SUDPA7028L



SUDPA7029L

2. Adjustment of backlash of gears  
Rotate the left and right adjusting rings to change the axial position of the ring gear so as to adjust the pinion and ring gear. In order not to change the already adjusted pretightening load of the differential bearing, the advance and retreat amount of the left and right adjusting rings must be equal. Measure the backlash of the ring gear at the approximately trisection point. Backlash should be between 0.15 and 0.30 and the backlash variation should not be greater than 0.08.



SUDPA7032L

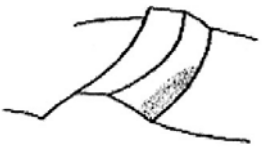
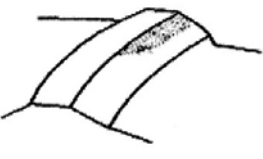
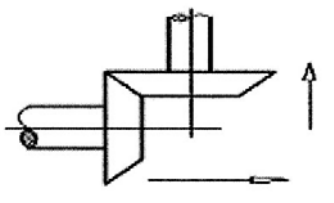


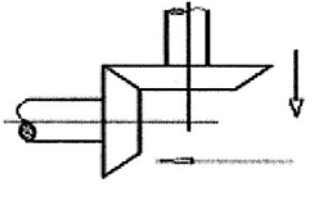


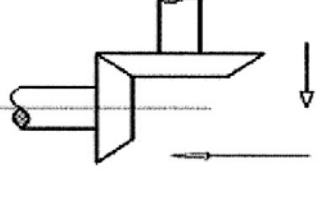


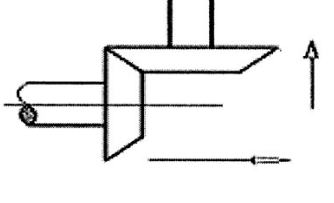
**NOTE**

*In order to reduce the backlash of the gear, the adjusting ring of the ring gear on the side with tooth should be loosened for several pitches. The adjusting ring on the other side should be tightened for the same pitches. Reverse operation can be carried in order to increase the backlash.*



3. Adjustment of contact pattern of pinion and ring gear

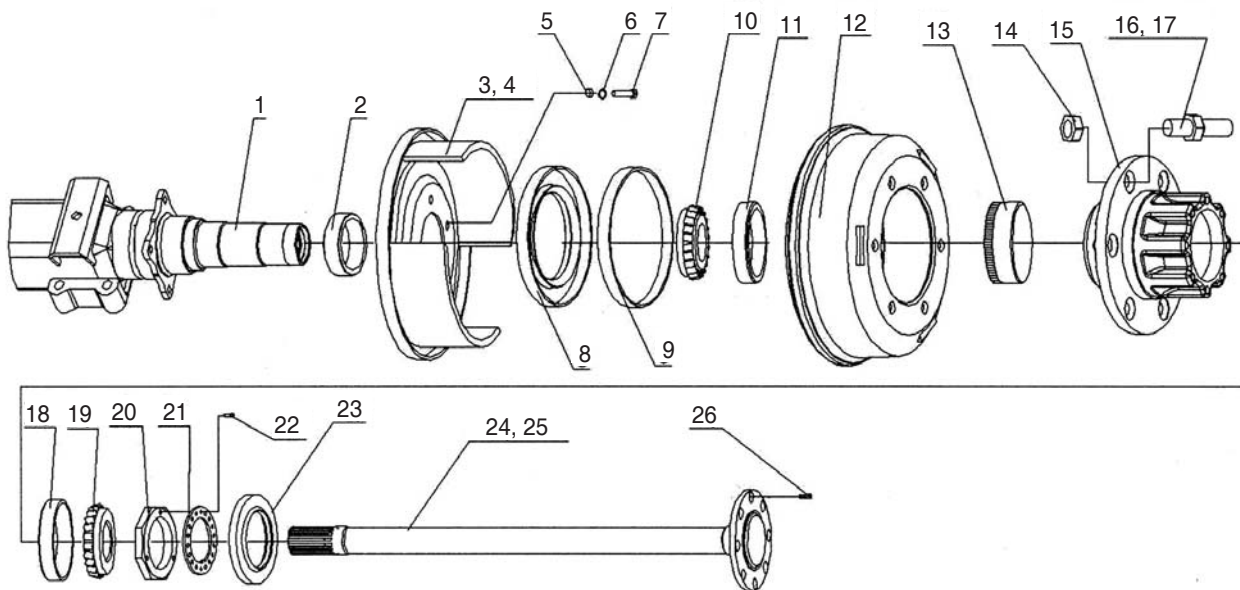
**ADJUSTMENT OF CONTACT PATTERN OF PINION AND RING GEAR**

Contact pattern of ring gear		Adjusting method	
Convex side	Concave side		
 <p>SUDPA7040L1</p>	 <p>SUDPA7040L2</p>	<p>Move the ring gear towards the pinion. If the backlash is too small at the moment, move the pinion away.</p>	 <p>SUDPA7041L</p>
 <p>SUDPA7040L3</p>	 <p>SUDPA7040L4</p>	<p>Move the ring gear away from the pinion. If the backlash is too large at the moment, move the pinion towards the ring gear.</p>	 <p>SUDPA7042L</p>
 <p>SUDPA7040L5</p>	 <p>SUDPA7040L6</p>	<p>Move the pinion towards the ring gear. If the backlash is too small at the moment, move the ring gear away.</p>	 <p>SUDPA7043L</p>
 <p>SUDPA7040L7</p>	 <p>SUDPA7040L8</p>	<p>Move the pinion away from the ring gear. If the backlash is too large at the moment, move the ring gear towards the pinion.</p>	 <p>SUDPA7044L</p>

# WHEEL HUB

## COMPONENTS E218D6FF

1. Part list and exploded view of wheel end part.



- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>1. REAR AXLE ASSY</li> <li>2. SPACING RING</li> <li>3. BRAKE ASSY-LH</li> <li>4. BRAKE ASSY-RH</li> <li>5. NUT</li> <li>6. SPRING WASHER</li> <li>7. BOLT</li> <li>8. INNER OIL SEAL ASSY-HUB</li> <li>9. SPACER</li> <li>10. CUP-BEARING</li> <li>11. CONE &amp; ROLLER ASSY</li> <li>12. DRUM</li> <li>13. GEAR RING-ABS</li> <li>14. NUT (12 for F320 series: 10 for F302 series)</li> <li>15. HUB-RR WHEEL</li> </ul> | <ul style="list-style-type: none"> <li>16. BOLT-HUB,LH (6 for F320 series: 5 for F302 series)</li> <li>17. BOLT-HUB,RH (6 for F320 series: 5 for F302 series)</li> <li>18. CUP-BEARING</li> <li>19. CONE &amp; ROLLER ASSY</li> <li>20. NUT</li> <li>21. LOCK WASHER</li> <li>22. CROSS GROOVE BOLT</li> <li>23. OUTER OIL SEAL ASSY-HUB</li> <li>24. AXLE SHAFT-RH</li> <li>25. AXLE SHAFT-LH</li> <li>26. BOLT</li> </ul> |
|--|---|

**[NOTE]** Never work under the vehicle when only one jack is used! During repair of the vehicle (inc. axles), make sure the wheels are blocked by using sole timber. Make sure the vehicle will not move even if the brake fails.

## REPLACEMENT EA54727E

## 1. Dismounting of wheel end part

## 1) Dismounting of axle shaft

**⊗ WARNING**

Before dismounting the axle shaft, the wheels should be blocked by using sole timber and the parking system should be released.

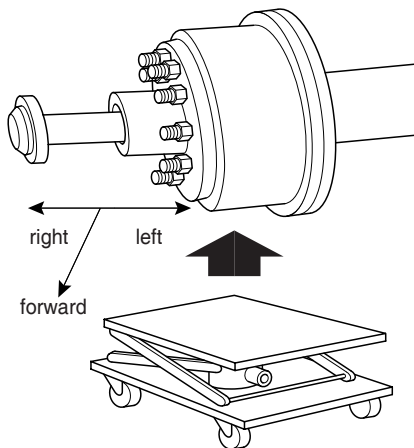
For dismounting, loosen and screw off all the axle shaft bolt. Use a copper hammer to slightly knock on the center of the tail of the axle shaft for 2 or 3 times so that the axle shaft flange face is disconnected from the wheel hub joint face. Then pull the axle shaft flange by hand and the axle shaft can be drawn out.

**📖 NOTE**

When the axle shaft spline part is to pass through the oil seal, the axle shaft lever part should be propped by hands and the axle shaft should be rotated slowly so that they are shift out in parallel and that hub oil seal will not be damaged and the axle shaft are prevented from falling onto the ground and hurting anyone.

## 2) Dismounting of wheel hub

Screw off the bolt 22 and remove the locking washer. Screw off the nut 20. Place the pallet under the wheel hub brake drum assembly. Use a copper bar or soft hammer to knock on the outer edge of the brake drum outwards. Remove the wheel hub brake drum assembly.



SUDPA7035L

## 2. Equipment and adjustment of wheel end part

- 1) Mount the brake assembly onto the flange of axle housing and tighten the brake backplate bolt to 98~137 N.m. Adjust the brake clearance to  $0.3 \pm 0.05$ mm (Measurement and adjustment can be done by using a clearance gauge or adjustment can be done on the brake pump stroke in such a manner that the wheel hub is blocked. Then adjust it in an inverse way for approximately 4 to 6 turns).

**📖 NOTE**

Make sure that the inside of the rear axle housing is clean and free from any iron dust, dirt, cutting edge, burr or any mechanical impurities.

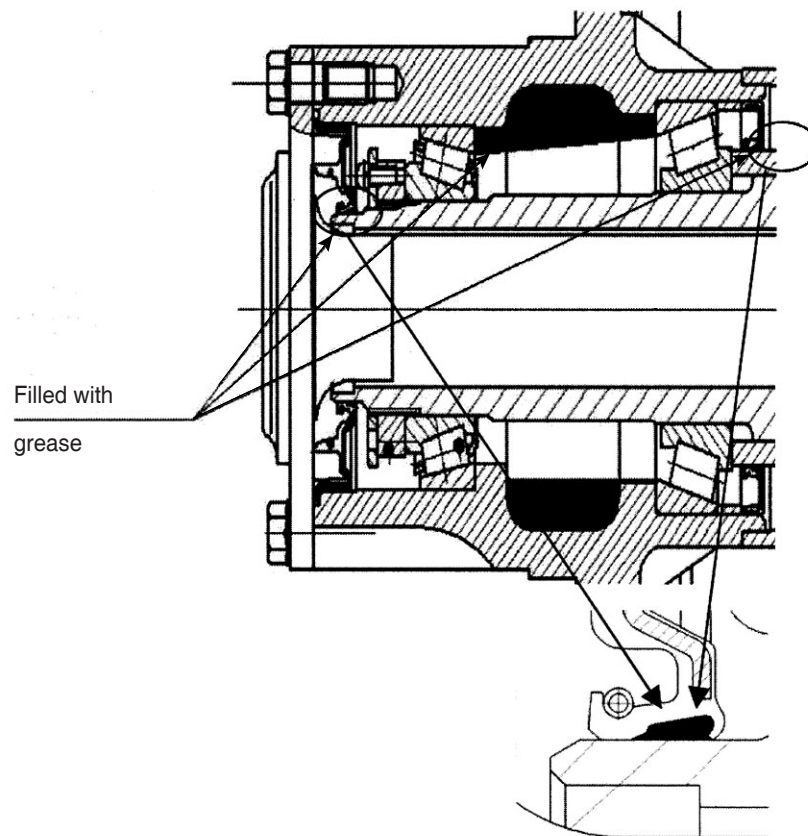
**⊗ WARNING**

Brakes of the same batch should be selected. New brakes, i.e. left and right brakes, must be in consistent color. The old brakes should be the product on the same axle.

**📖 NOTE**

During assembling, there are marks R (right) and L (left) on the brake backplate. Make sure that assembling is not done in an inverse way.

- 2) Assemble the spacing ring 2 onto the axle sleeve so that the inner end face of the spacing ring abuts on the sleeve step.
- 3) The wheel hub with brake drum assembly must be clean inside before mounting. The wheel hub must be filled with No. 2 lithium grease. Mount the spacer. Apply small amount of grease at the internal and external cutting edges of the inner oil seal and press in the wheel hub.



SUDPA7036L

- 4) Mount the wheel hub with oil seal assembly into the axle sleeve.

Fit over the spacing ring. Mount the outer bearing inner race. Screw on the wheel hub nut. At the same time, adjust the pretightening force of the wheel hub bearing, i.e. tighten the wheel hub nut so that when rotating the wheel hub, the tangential pulling force applied on the wheel hub bolt is 42-52 N. Fit over the lock washer onto the axle sleeve. Use three cross groove screws to lock the lock washer on the wheel hub nut and tighten it. Mount the wheel hub outer oil seal.

**NOTE**

Assembling may fail if the thread on the axle sleeve on the axle housing or the thread of the axle head nut is subject to any damage or corrosion.

- 5) Mount the axle shaft. Tighten the axle shaft bolt to  $180 \pm 20$  Nm.

**NOTE**

1. A proper pressing tool should be used for mounting of the oil seal. An inappropriate tool may cause damaged oil seal.
2. The oil seal may be prone to damage and should be placed in the package before assembling.

3. When the axle shaft spline part is to pass through the oil seal, the axle shaft lever part should be propped by hands and the axle shaft should be rotated slowly so that they pass through in parallel and that the axle shaft oil seal will not be damaged.

**CAUTION**

1. When assembling the axle assy, the lubricating oil and grease to lubricate various assemblies and parts should be of the same grade as for normal service.
2. Never apply any lubricating grease onto the bearing before assembling. (The bearing should be lubricated when assembling.) Dry grease may possibly prevent normal lubrication of the axle assy., even causing defective oil seal.