

PARTS & SERVICE NEWS

REF NO.	AT03266
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(C)	Page 1 of 9

SUBJECT: REPAIR PROCEDURE FOR LOOSE DIFFERENTIAL BEVEL GEAR MOUNTING BOLT

PURPOSE: To introduce a modification procedure for repairing loose differential bevel gear mounting bolts

APPLICATION: HD465-7 Dump Trucks, Serial Nos. 7001 thru 7151
HD605-7 Dump Trucks, Serial Nos. 7001 thru 7056

FAILURE CODE: 2B37MS

DESCRIPTION:

1. Introduction

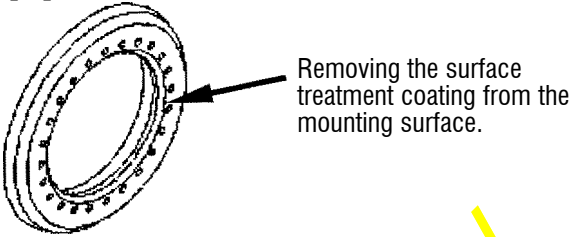
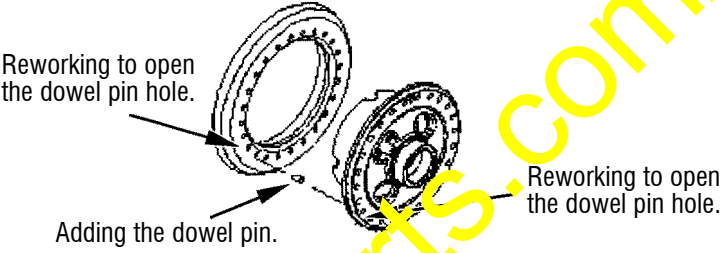
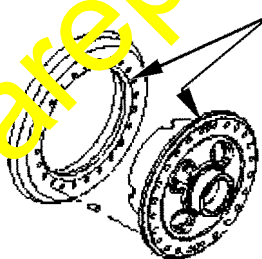
When the differential bevel gear mounting bolts on the HD465-7 and HD605-7 dump trucks become loose and fall out, follow the modification procedure outlined in this Service News to repair the failure.

<https://hespareparts.com/>

2. List of parts

Part No.	Part Name	Purpose of part	Q'ty	Remarks
569-22-71002 (569-22-71001)	Diff A. (Diff A.)	Rework	1 (1)	
569-22-71202 (569-22-71201)	Pinion A. (Pinion A.)	} Rework or Replacement	1 (1)	
569-22-71502 (569-22-71501)	Case A. (Case A.)		1 (1)	
01010-62065 (01010-62065)	Bolt (Bolt)		Replacement	24 (24)
04020-01842	Pin	Addition	4	
428-22-11850 (428-22-11850)	Bearing (Bearing)	}	2 (2)	} Replacing parts
569-22-71811 (569-22-71811)	Bearing (Bearing)		1 (1)	
07012-50150	Seal		1	
07000-15310 (07000-15310)	O-ring (O-ring)	} Replacement	1 (1)	} Consumable parts
07000-15290 (07000-15290)	O-ring (O-ring)		1 (1)	
568-33-11440 (568-33-11440)	O-ring (O-ring)		1 (1)	
07000-15415 (07000-15415)	O-ring (O-ring)	2 (2)		
428-22-11260 (428-22-11260)	O-ring (O-ring)	1 (1)		
287-01-12830	Adhesive	Addition	1	


3. Details of the modification

No.	Parts	Details of the modification
1	Spiral bevel gear	Removing the surface treatment coating from the mounting surface using sandpaper. 
2	Spiral bevel gear Differential case	Reworking to add the locking dowel pins. 
3	Spiral bevel gear Differential case	Assembling the bevel gear and the differential case after applying adhesive (Loctite 648) to the contact surface of the bevel gear and the contact surface of the differential case. 


4. Modification procedure

(For details, refer to the Section "Differential" in the Shop Manual.)

1. Removal of the differential ass'y

 Turn on the parking brake and apply the chock to each tire.

1) Drain oil from the differential case and from the final drive case.

 Differential case: 95 ℓ Final drive case: 21 ℓ/one side

2) Pull out to remove the final drive shaft.

3) Remove the propeller shaft.

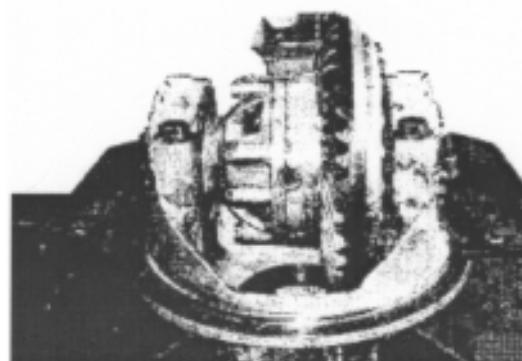
4) Remove the brake piping and slack adjuster.


5) Remove the differential ass'y.

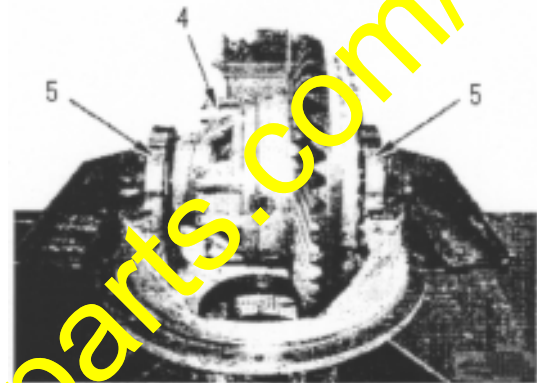
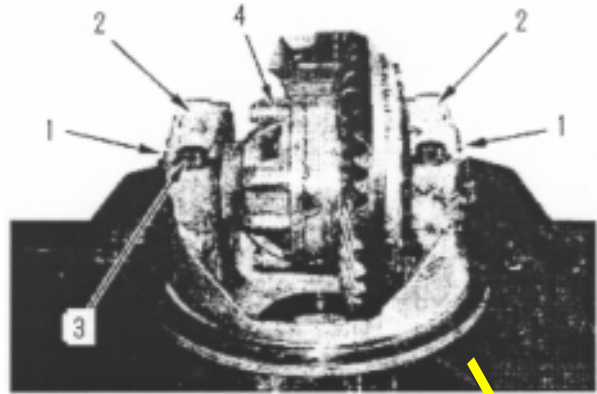
 Differential ass'y: 850 kg

2. Removal of the differential gear ass'y

1) Set the differential ass'y on the unit repair stand (790-501-500).

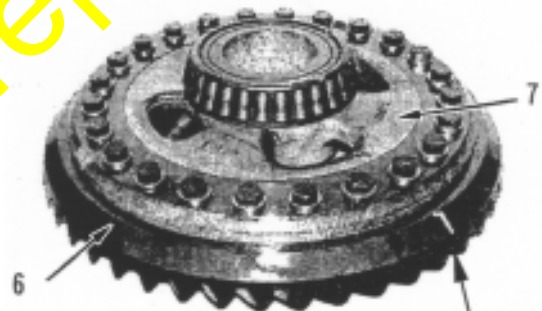


- 2) Loosen the adjustment nut (1).
 - 3) Temporarily hoist the differential gear ass'y (4).
 - 4) Remove the bearing cap bolt (3); then remove the bearing cap (2) and the adjustment nut (1).
 - 5) Remove the side bearing outer races (5) on the LH and the RH sides, and hoist and remove the differential gear ass'y (4).
-  Differential gear ass'y: 230 kg



3. Removal of the spiral bevel gear and removal of the surface treatment coating

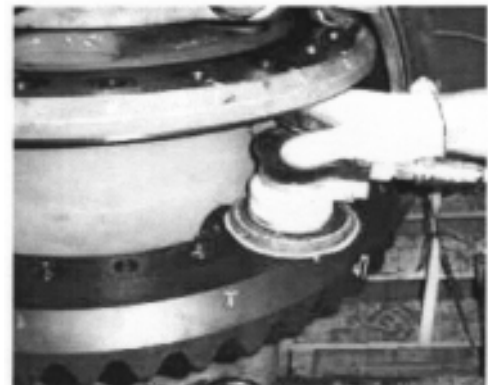
- 1) Remove the spiral bevel gear (6) from the case (7).
- ★ Before removing the spiral bevel gear, put counter marks on the bevel gear and the case.



Match mark

- 2) Completely remove the surface treatment coating from the back face (mounting surface) of the spiral bevel gear using sandpaper.
(The thickness of the coating will be 5 to 15 μ .)
- ★ Do not use a tool like a sander, which may grind deep into the metallic part.

[The photograph on the RH side shows that a surface preparation paper sanding is being made.]



- 3) Re-tap the thread sections of the spiral bevel gear.
(to remove the thread tightener that adheres to the inside surface)
Thread size 20 \times 2.5
- 4) Wash the mounting surface of the threaded holes to remove any foreign substance.
- 5) Remove any foreign substance from the mounting surface of the case using sandpaper.

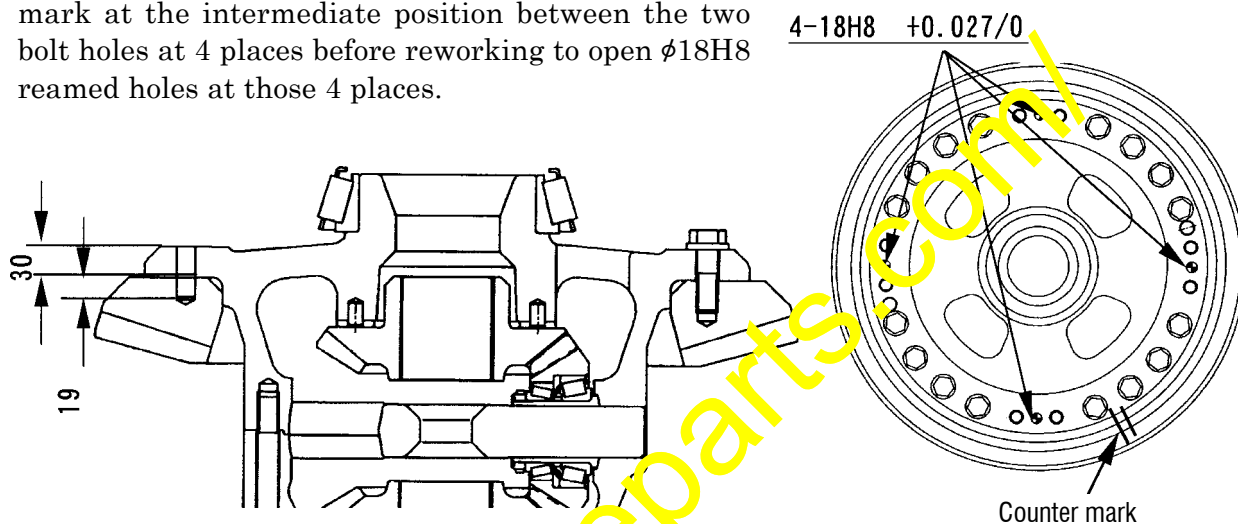
4. Reworking to open the dowel pin holes in the spiral bevel gear (6) and the case (7)
- ★ When replacing the spiral bevel gear and the case with new parts with dowel pin holes, refer to the part numbers of the spiral bevel gear and the case indicated on page 2.
 - ★ When reworking current parts, refer to the attached reworking drawing.

- 1) Install the spiral bevel gear (6) to the case (7).

Tighten the 16 mounting bolts.

- ★ When installing the spiral bevel gear to the case, dislocate the positions of counter marks that were put when the spiral bevel gear and the case were disassembled.

- 2) With the spiral bevel gear and the case tightened, mark at the intermediate position between the two bolt holes at 4 places before reworking to open $\phi 18H8$ reamed holes at those 4 places.



- 3) After the above reworking, put new counter marks on the spiral bevel gear and the case. (to match the positions of the reamed holes after removing the bevel gear)
- 4) Remove the spiral bevel gear and check the depth of the reamed holes. Remove chips inside these reamed holes.

5. Assembly of the differential gear assembly

- 1) Completely degrease the mounting surfaces of the bevel gear and case, and the screw holes in the bevel gear.

- 2) Apply liquid adhesive (LT-2) to the threaded holes in the bevel gear.

- ★ Wipe to clean the thread tightener coming out from the threaded holes.

- 3) Apply the adhesive Loctite 648 to the mounting surface of the bevel gear.

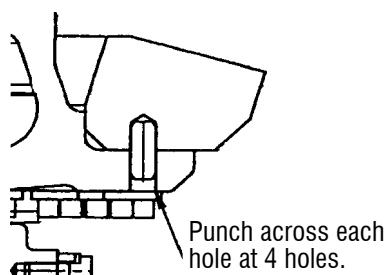
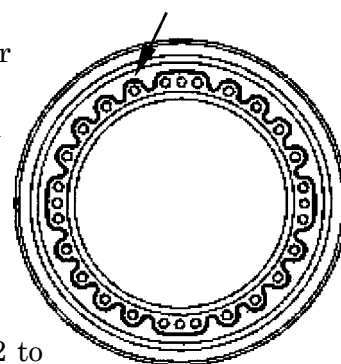
Apply Loctite 648 around the threaded holes with a width of 2 to 3 mm as shown above.

- 4) Insert the bevel gear into the case aligning the match marks which were according to section 4-(3) above.


Hammer 4 dowel pins (04020-01842) into the bevel gear.

Punch across each hole at the 4 holes to prevent the dowel pins from falling.

Apply Loctite 648 with a width of 2 to 3 mm.



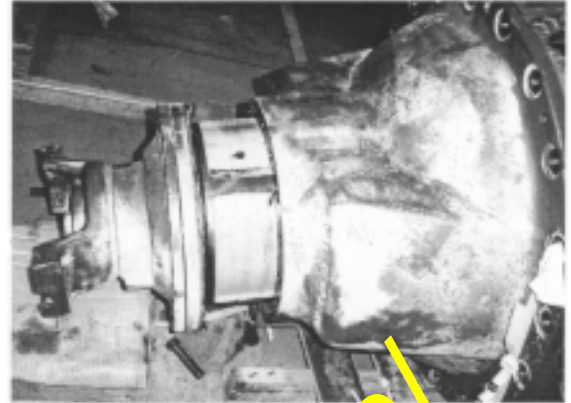
- 5) Using new bolts, install the bevel gear to the case.

 : Apply liquid adhesive LT-2.

 : 490 – 605 Nm {50 – 62 kgm}

6. Pulling out the bevel pinion and the cage ass'y
(Pull out the bevel pinion and the cage ass'y to make a pre-pressure adjustment for the side bearing (5).)

- 1) Remove the cage mounting bolts.
- 2) Using the coupling screw, pull out the bevel pinion and the cage ass'y by about 100 mm.
(to prevent occurrence of engagement between the bevel gear and the bevel pinion)




7. Installation of the differential gear ass'y


- 1) Hoisting the differential gear ass'y (4), install the side bearing outer races (5) on the LH side and on the RH side.

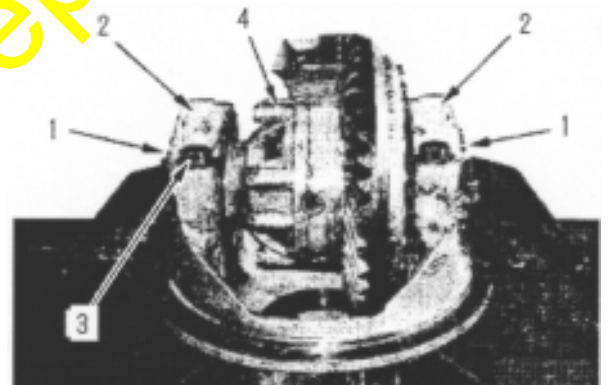
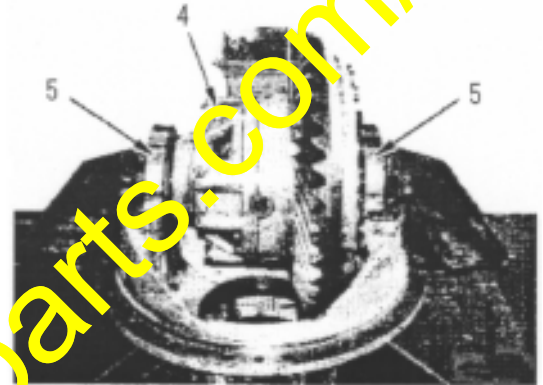
★ Apply engine oil (E030-CD) to the bearing.

- 2) Installing the adjustment nut (1) and the bearing cap (2), tighten the bearing cap bolt (3).

★ When tightening the above bearing cap bolt, turn the bevel gear 20 to 30 times to fit the bearing into position.

 : Apply liquid adhesive (LT-2).

 : 2,450 – 3,040 Nm
{250 – 310 kgm}



8. Pre-pressure adjustment for the side bearing

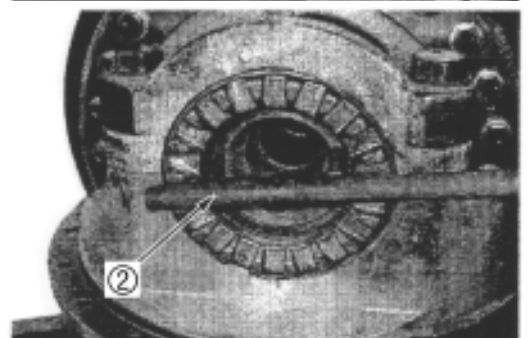
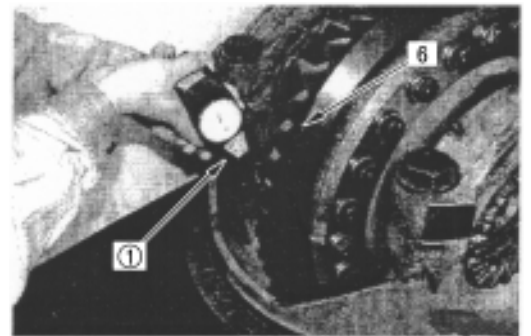
Pushing the push-pull scale ① onto the outer circumference of the spiral bevel gear (6), measure the starting tangential force in a tangential direction.

Starting tangential force: 39 – 63 N
{4.0 – 6.4 kgf}

Target: 51 N {5.2 kgf}

★ If the starting tangential force is less than the datum value, tighten the adjustment nuts located on both sides using the tool ②, and if the starting tangential force is more than the datum value, loosen the adjustment nuts located on both sides.

★ While carrying out the above adjustment, turn the bevel gear so that it makes sufficient contact with the bearing.
(20 to 30 turns)



9. Insertion of the bevel pinion and the cage ass'y

Insert the bevel pinion and the cage ass'y; after that, tighten the cage mounting bolts.

- ★ Be careful not to cut or bite the O-ring positioned on the cage's outer circumference.

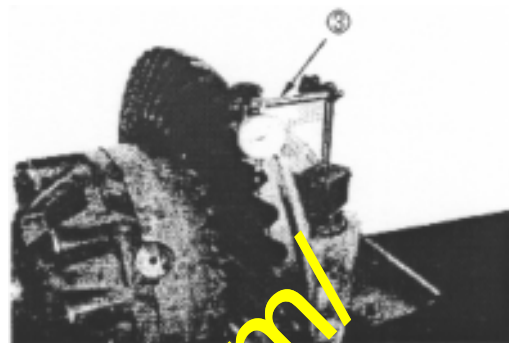
 : 490 – 605 Nm {50 – 62 kgm}

10. Backlash adjustment for the bevel gear

1) Apply the dial gauge ③ probe at a right angle to the addendum at the bevel gear tip end.

2) With the bevel pinion fixed, turn the bevel gear forward and backward to read the scale of dial gauge swings.

- ★ Carry out the above measurement at 3 to 4 places, and check that the difference between each backlash is within 0.1 mm.



Datum value of the backlash: 0.41 – 0.56 mm

3) If the backlash is out of the datum value, move the bevel gear with the adjustment nut (1) to adjust the backlash within the datum value.

- ★ So that the pre-pressure load of the side bearing may not be changed, when the adjustment nut on one side is tightened, loosen the adjustment nut on the opposite side the same amount.

11. Inspection of tooth contact

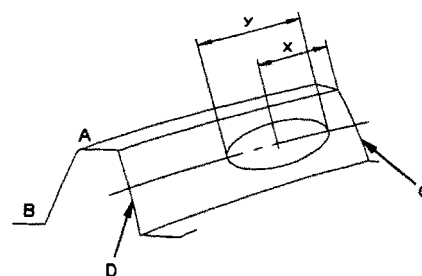
Applying the red lead primer lightly onto the tooth surface of 7 to 8 teeth of the bevel gear, turn the bevel gear forward and backward to inspect the contact patterns made on the tooth surfaces.

- ★ The center of tooth contact should be as follows:

- The center section of the tooth height
- The distance "X" from the smaller side edge C :
"X = 46 ± 6 mm"

- ★ Tooth contact width "y" should be 41 – 82 mm.

- ★ Strong contact should not be made to addendum "A," addendum "B," the smaller side edge "C," and the larger side edge "D."




12. Installation of the differential ass'y

1) Install the differential ass'y to the vehicle.

 : 490 – 605 Nm {50 – 62 kgm}

2) Install the propeller shaft.

- ★ Tighten the bolt after checking that the spider cap key is inserted completely into the keyway of the opposite yoke.


 : Apply liquid adhesive LT-2.


 : 157 – 196 Nm {16 – 20 kgm}

3) Install the brake piping and the slack adjuster.

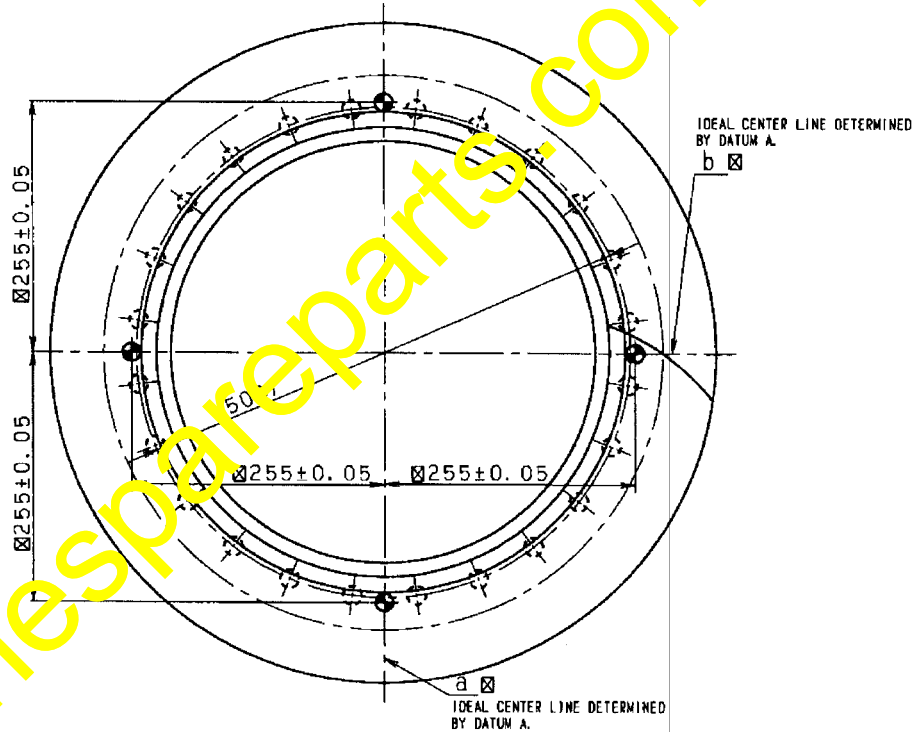
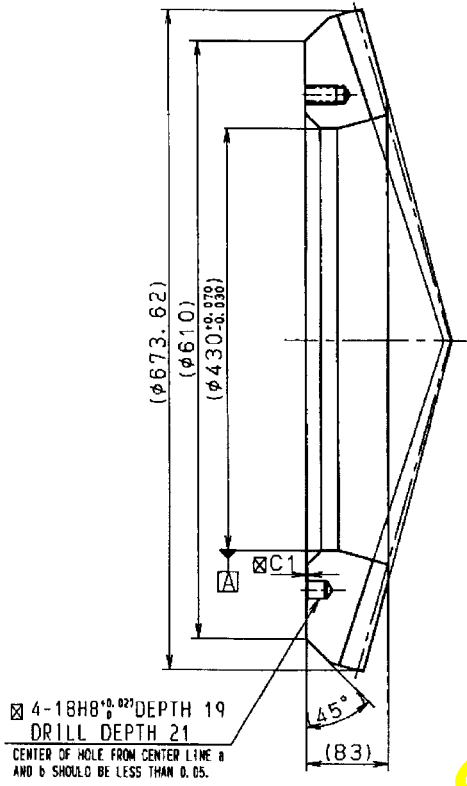
4) Install the final drive shaft; after that, install the cover.

5) Refill the final drive case and differential case with oil.

 Differential case 95 ℓ (EO30-CD)

 Final drive case: 21 ℓ/one side (EO30-CD)

6) Bleed air from the brake piping.

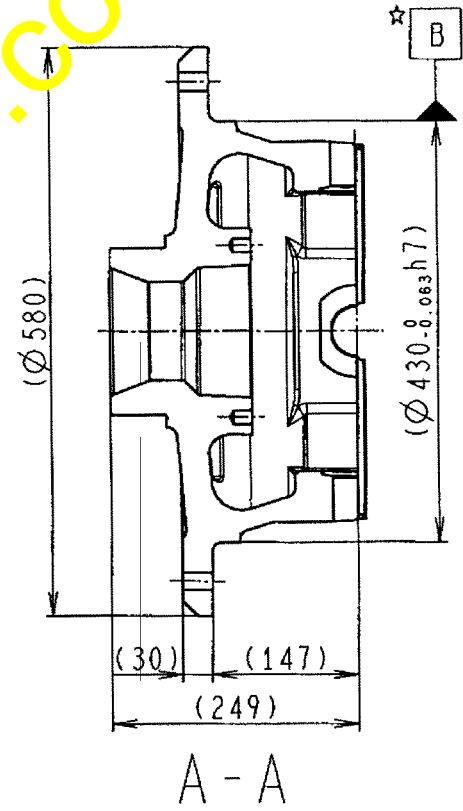
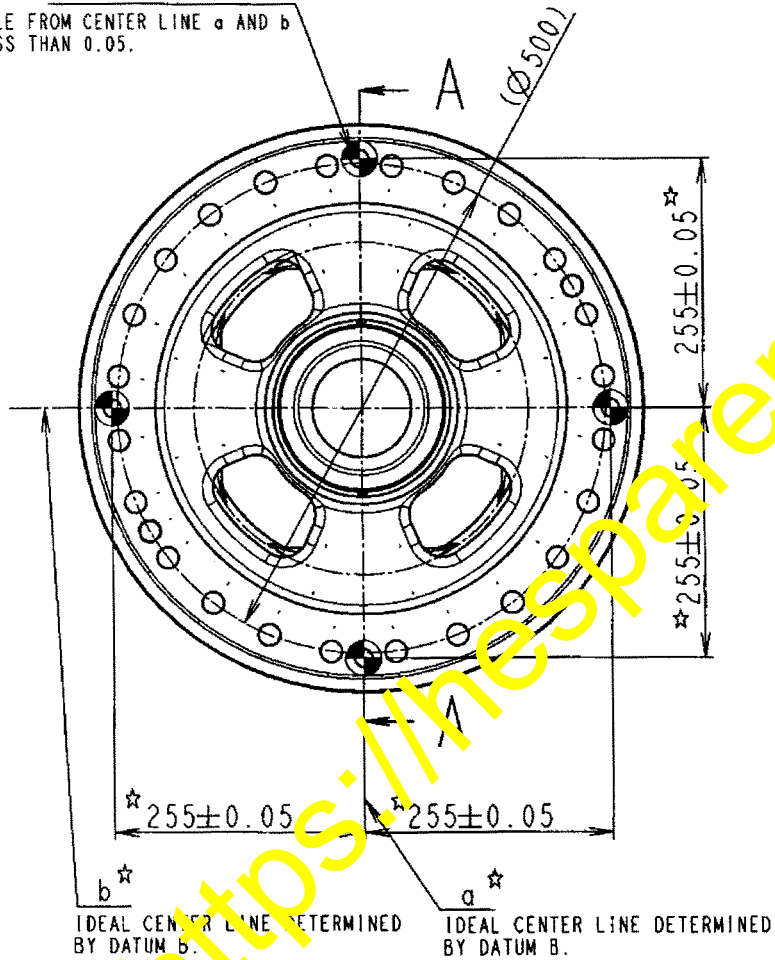


THIS DRAWING IS FOR GEAR, 569-22-71222, REWORK.
 REWORK \square MARKED DIMENSIONS (8 PLACES).

<https://thespareparts.com/>

☆ 4-18H8^{+0.027}₀

CENTER OF HOLE FROM CENTER LINE a AND b SHOULD BE LESS THAN 0.05.



THIS DRAWING IS FOR CASE, 569-22-71513, REWORK.
REWORK ☆ MARKED DIMENSIONS (8 PLACES).