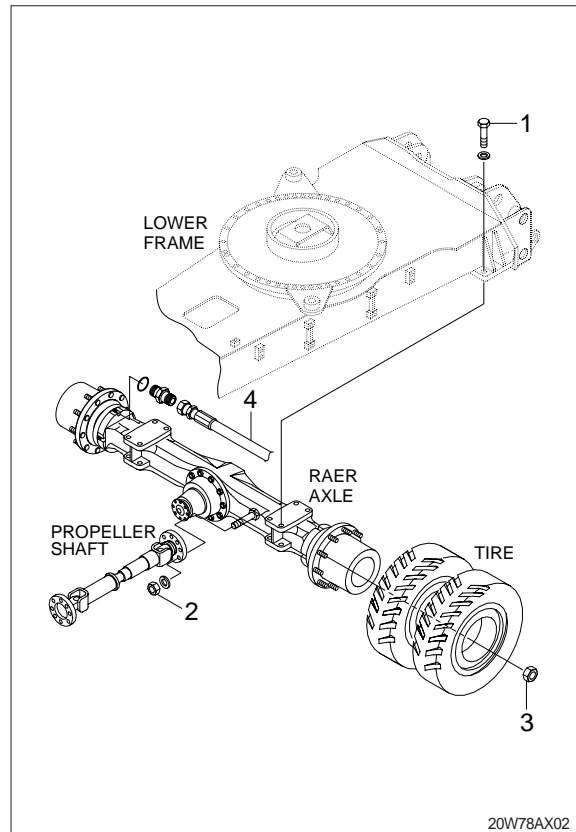


## GROUP 10 REAR AXLE

### 1. REMOVAL REAR AXLE

- 1) Rear axle mounting bolt(1, M24)  
; Tightening torque : 107 ; 10.7(kgf ; m)  
(723 ; 72.3lb ; ft)
- 2) Propeller shaft mounting bolt(2, M10)  
; Tightening torque : 5.9 ; 0.6kgf ; m  
(42.7 ; 4.3lb ; ft)
- 3) Wheel nut(3, M22)  
; Tightening torque :  $60^{+0}_{-5}$  kgf ; m  
(434<sup>0</sup><sub>-36</sub> lb ; ft)
- 4) Hose assy(4)
- 5) Rear axle weight : 480kg(1060lb)



## 2. GENERAL INSTRUCTIONS

### 1) GENERAL WORKING INSTRUCTIONS

- (1) This manual has been developed for the skilled serviceman, trained by axle manufacturer.
- (2) During all operations, pay attention to cleanliness and skilled working.  
Therefore, axle removed from the machine, must be cleaned prior to open them.
- (3) We assume that the special tools, specified by manufacturer, will be used.  
The special tools are available from manufacturer.
- (4) After the disassembly, all components must be cleansed, especially corners, cavities and recesses of housing and covers.
- (5) The old sealing compound must be carefully removed.
- (6) Check lubricating holes, grooves and pipes for free passage. They must be free of residues, foreign material or protective compounds.
- (7) The latter refers especially to new parts.
- (8) Parts which have been inevitably damaged in a disassembly operation, must be generally replaced by new ones, e.g. rotary seal rings, O-rings, U-section rings, cap boots, protective caps etc..
- (9) Components such as roller bearings, thrust washers, synchronizing parts etc. which are subject to normal wear in automotive operation, must be checked by the skilled Serviceman.  
He will decide if the parts can be reused.
- (10) For the heating of bearings etc., hot plates, rod heaters or heating furnaces must be used.
- (11) Never heat parts directly with the flame. An auxiliary solution would be to immerse the bearing in a vessel filled with oil, which is then heated with the flame.  
In this way, damage to the bearings could be avoided.
- (12) Ball bearings, covers, flanges and parts like that must be heated to about 90 to 100 °C.
- (13) Hot-mounted parts must be reset after cooling in order to assure a proper contact.
- (14) Before pressing shafts, bearings etc. in position, both parts must be lubricated.
- (15) During to reassembly, all specified adjustment values, testing specifications and tightening torque must be respected.
- (16) After the repair, units are filled up with oil.
- (17) After the oil filling, the oil level plugs and oil drain plugs must be tightened to the specified tightening torque.

## **2) IMPORTANT INSTRUCTIONS CONCERNING THE LABOUR SAFETY**

- (1) In principle, repairers are themselves responsible for the labour safety.
- (2) The observance of all valid safety regulations and legal rules is a precondition to prevent damage to individuals and products during the maintenance and repair operations.
- (3) Before starting the work, the repairers have to make themselves familiar with these regulations.
- (4) The proper repair of these products requires especially trained personnel.
- (5) The repairer himself is obliged to provide for the training.

## **3) LUBRICANT SPECIFICATIONS**

- (1) Gear oils with limited - slip additives.
- (2) API GL-5
- (3) MIL-L-2105D(SAE 85W-90, 85W-140 with LS-Additive)

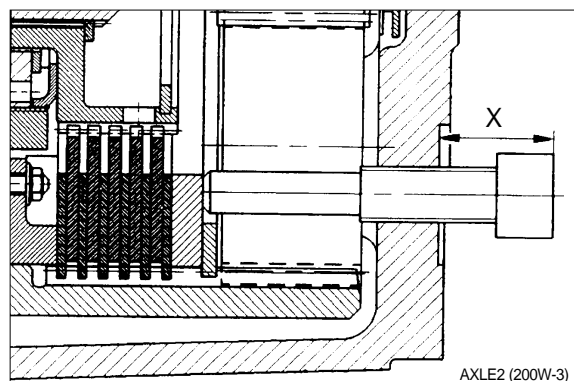
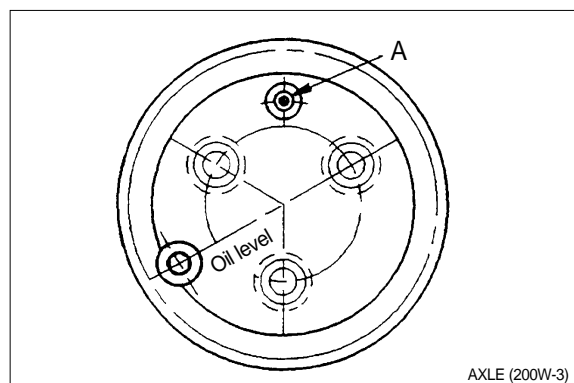
## 4) BRAKE LINING WEARING TEST

### (1) General

- The brake lining wearing test gives a limited information about the overall condition of the brake plate pack - without disassembly of the planetary carrier, resp. of the plates.
- The wearing test has to be carried out in case of the following criteria :
  - In the course of the oil change intervals
  - Braking noises
  - Reduced braking power
  - Change of deceleration of the brake fluid level as well as of the brake pressure
  - In case of a general change of the brake performance.
- Carry out the wearing test on both final drive sides.
  - Permitted piston stroke max. : 6.25mm
  - Piston stroke in new condition of the plate pack : 2.4~2.8mm

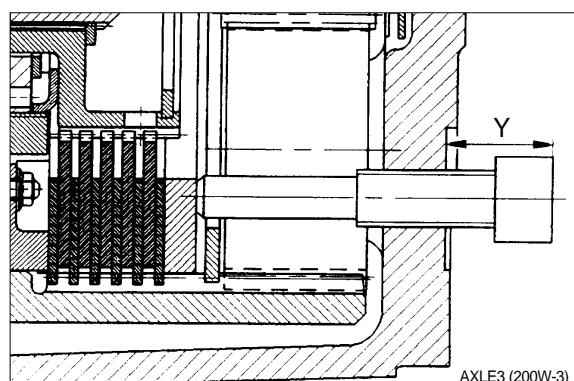
### (2) Carry out the wearing test

- Turn the planetary carrier until screw plug A (M16 ;  $\varnothing$ 1.5) is in the upper position (12 o'clock position).  
Now, remove the screw plug.
- Apply the brake (Required brake pressure min. 40bar).
- Screw measuring screw (M16 ;  $\varnothing$ 1.5) in until contact is obtained and tighten it with a torque of 1kg ; m.
- Determine dimension X according to the figure on the right.
- Release the brake and equalize the plate clearance by resetting the measuring screw.  
Torque limit 1kg ; m.
- Determine dimension Y according to the figure on the right.
- The difference of the two dimensions (X-Y) corresponds to the piston stroke (Actual state).



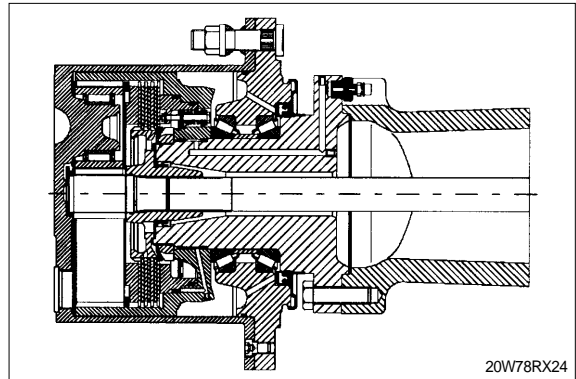
### (3) Result

If the max. permitted piston stroke (5.0mm) is exceeded, the lining plates must be renewed on both final drive sides.

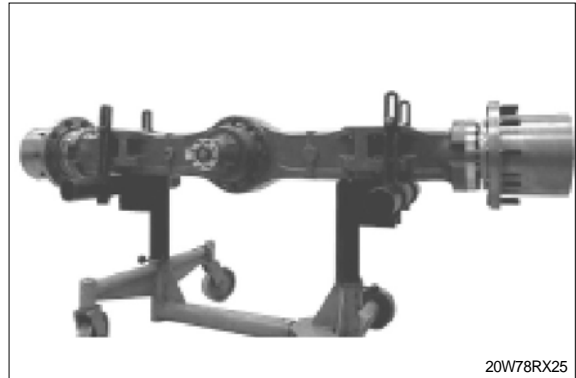


### 3. DISASSEMBLY OF THE OUTPUT

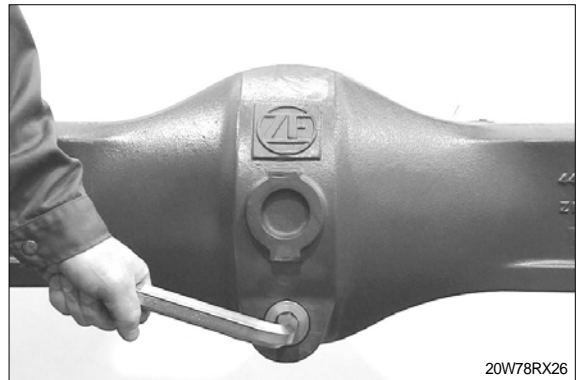
#### 1) DISASSEMBLY OF THE OUTPUT WITH MULTI DISK BRAKE.



- Fasten the axle on the assembly truck.  
Assembly truck 5870 350 000  
Holding fixtures 5870 350 077  
Clamping braces 5870 350 075



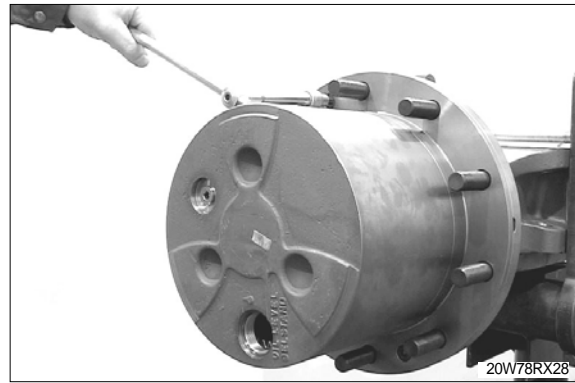
- Loosen the screw plug and drain oil from the axle casing.



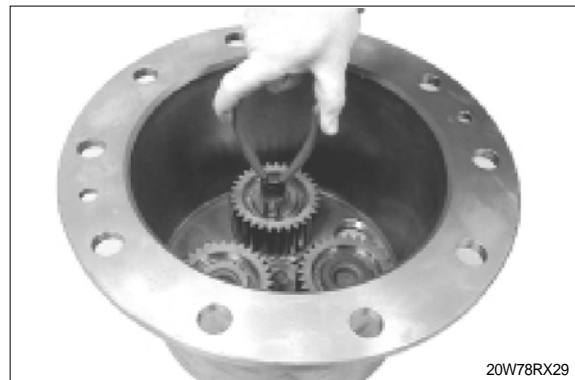
- Loosen the screw plug and drain oil from the planet carrier.
  - ⌋ To prevent any injury by a possible pressure build-up in the oil sump of the planet carrier, bring the filler and level plug to the top position (12 o'clock) and unscrew it cautiously. Then bring the drain hole to the bottom position (6 o'clock) and drain the oil.



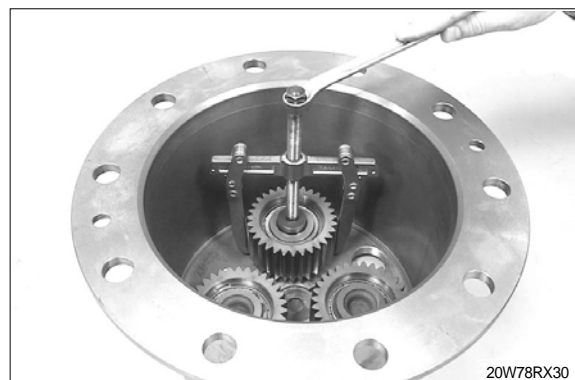
- Loosen the cap screws and pull off the planet carrier from the hub.  
Crowbar set 5870 345 071



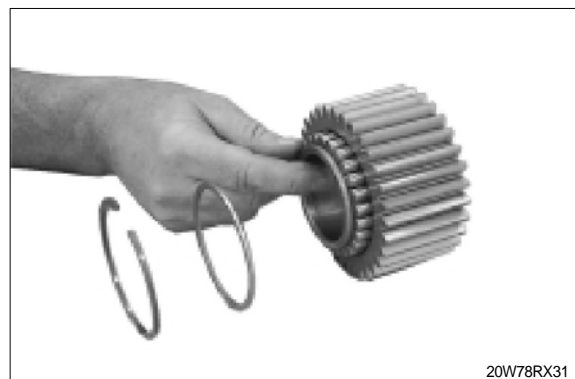
- Unsnap the retaining ring.  
Set of external pliers 5870 900 015



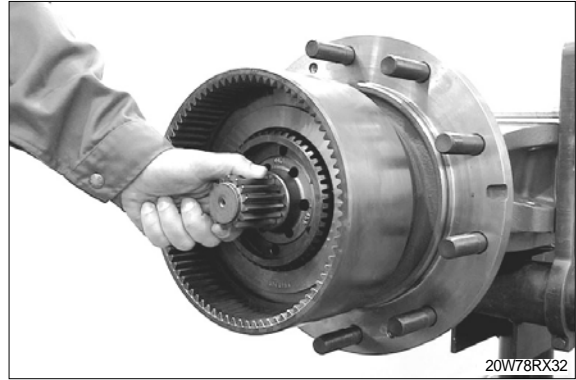
- Pull off the planet gear by means of two-armed puller.  
Two armed puller 5870 970 002



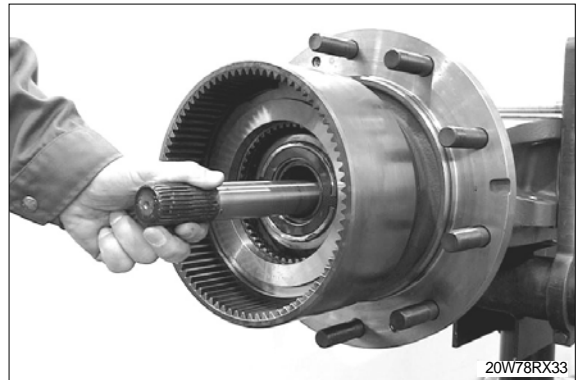
- Unsnap the retaining rings and remove the shims behind it.  
Then pull the roller bearing out of the planet gear.



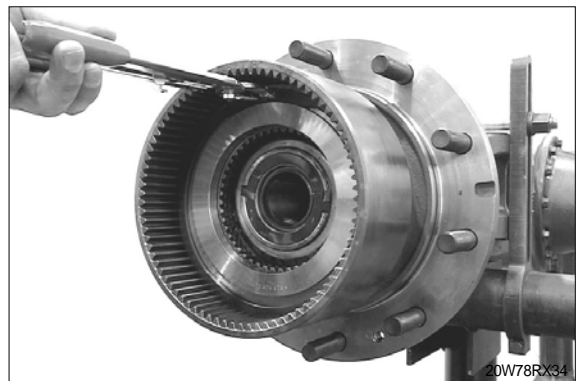
- Pull off the sun gear and the disc carrier from the stub shaft and out of the disc set respectively.



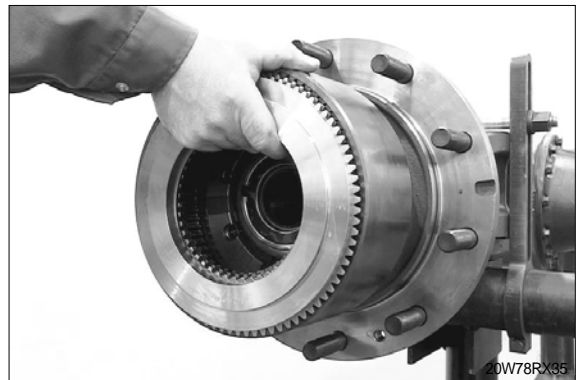
- Pull the stub shaft out of the axle casing.



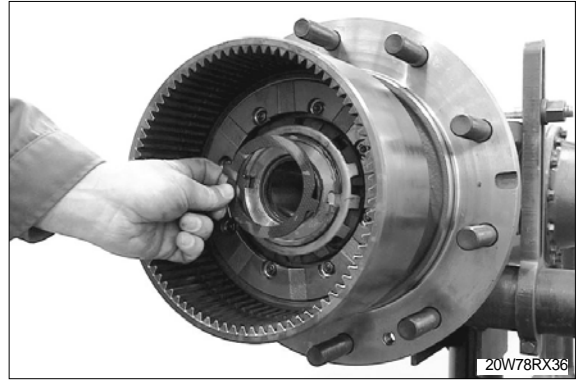
- Unsnap the retaining ring.  
Clamping pliers 5870 900 021



- Remove the end shim and the disc set from the ring gear.

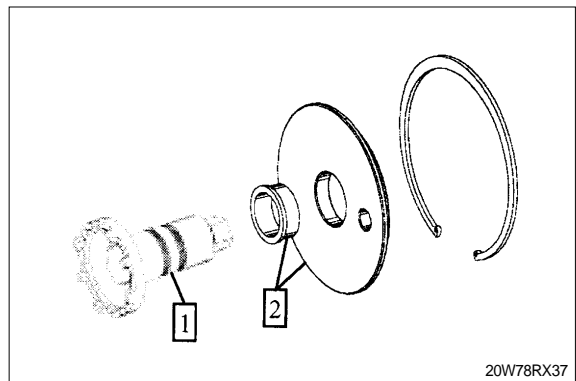


- Remove the thrust washer and the lock plate behind it.

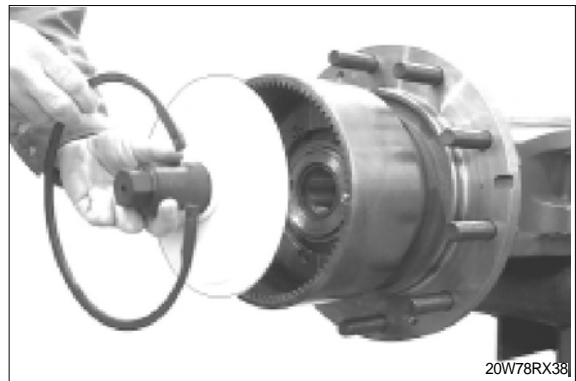


- Loosen the slotted nut (Figure □ ... □<sub>1</sub>)  
The opposite sketch shows the single parts of the special tool to loosen the slotted nut.

Slotted nut wrench            5870 401 105  
Centering disc cpl.            5870 912 011



- Position the slotted nut wrench and the support shim and fasten it by means of retaining ring.  
Clamping pliers                5870 900 021



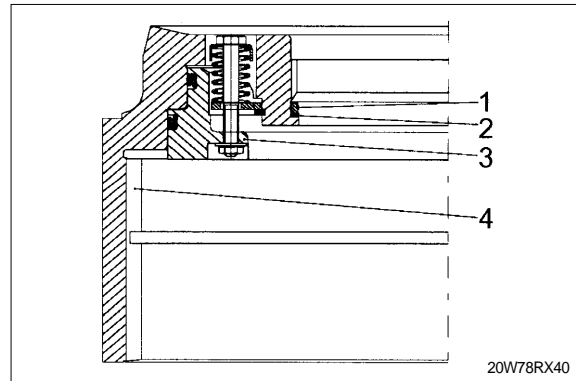
- <sub>1</sub> Loosen the slotted nut.
  - ¡ Pay attention to the released ring gear. By supporting the slotted nut wrench on the retaining ring, the ring gear is pulled from the hub carrier when the slotted nut is unscrewed.
  - ¡ The high tightening torque of the slotted nut makes it absolutely necessary to support the axle and the assembly truck respectively.



Then unsnap the retaining ring and remove the slotted nut wrench with slotted nut from the ring gear.

§ Remove the O-ring(1) and the support ring(2) from the annular groove of the ring gear.

- 1 O-ring
- 2 Support ring
- 3 Piston
- 4 Ring gear



§ Loosen all locking nuts.



§ Loosen all hexagon screws and remove the released single parts.



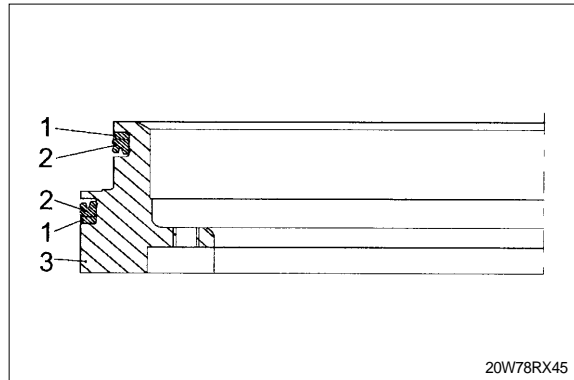
§ Unsnap the circlip.  
Set of external pliers 5870 900 015



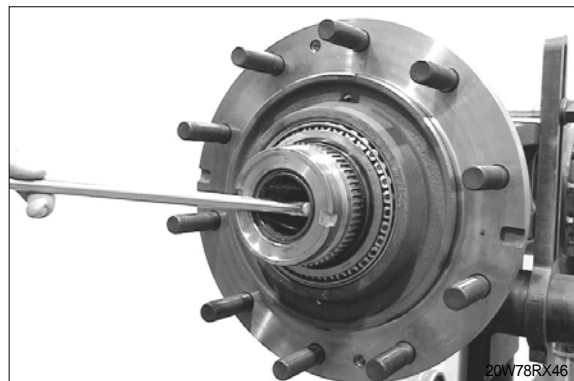
- § Press the piston out of the ring gear and remove the support shim behind it.  
Crowbar set 5870 345 071



- §<sub>1</sub> Remove the support and U-rings from the annular grooves of the piston.
  - 1 Support ring
  - 2 U-ring
  - 3 Piston

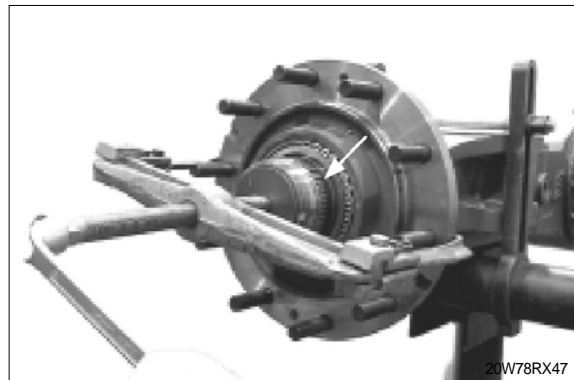


- § Press out the shaft seal from the hub carrier bore.  
Crowbar set 5870 345 071



- § Remove the O-ring and support ring(see arrow) from the annular groove of the hub carrier.  
Then pull off the hub by means of the two armed puller from the hub carrier.  
Two armed puller 5870 970 028

- ¡ Pay attention to the released bearing inner ring.

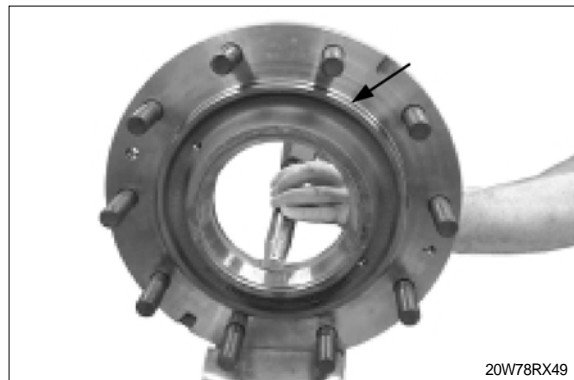


§1 Press the cassette type seal out of the hub.

Crowbar set                    5870 345 071

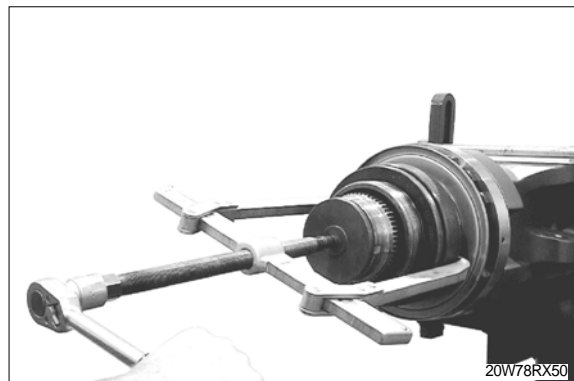


§2 Expel both bearing outer rings from the hub and remove the O-ring (see arrow).



§3 Remove the bush and pull the bearing inner ring from the hub carrier.

Rapid grip                    5873 014 012  
Two armed puller            5870 970 028  
Pressure ring                5870 285 026

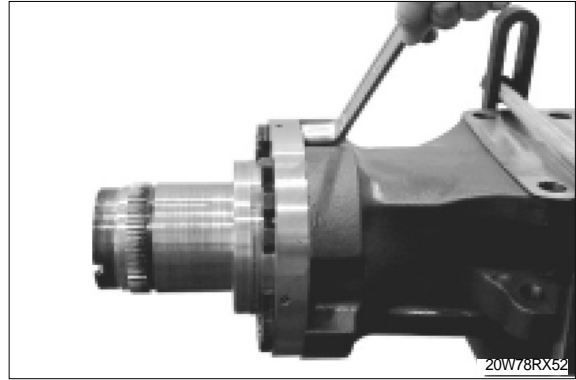


§4 By means of three armed puller pull off the support plate from the hub carrier.

Three armed puller            5870 971 003



§ Loosen the union (with breather valve).

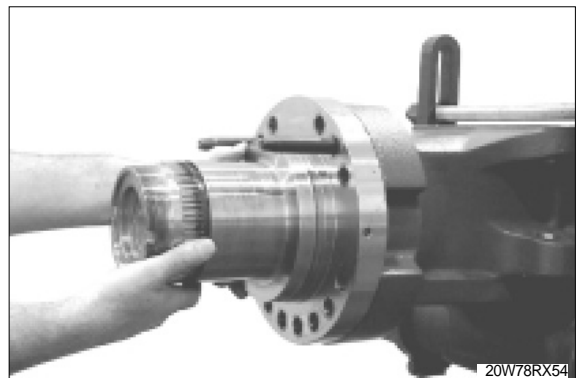


§ Loosen two hexagon screws and replace them by two adjusting screws.  
Then loosen the remaining hexagon screws.

Adjusting screws            5870 204 026

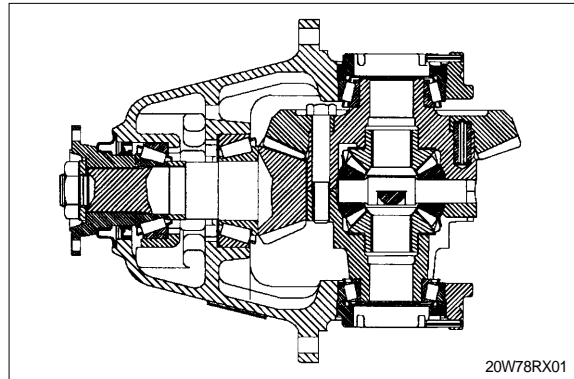


§ Separate the hub carrier from the axle casing.



#### 4. DISASSEMBLY OF THE AXLE INSERT

##### 1) DISASSEMBLY OF AXLE INSERT TYPE : BK / AE 650

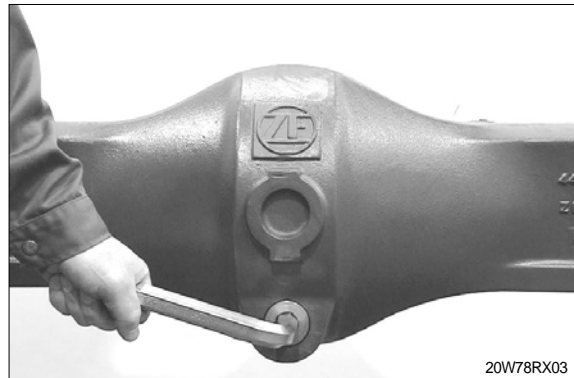


- Fasten the axle on the assembly truck.

|                  |              |
|------------------|--------------|
| Assembly truck   | 5870 350 000 |
| Holding fixtures | 5870 350 077 |
| Clamping braces  | 5870 350 075 |



- Loosen the screw plug and drain oil from the axle casing.

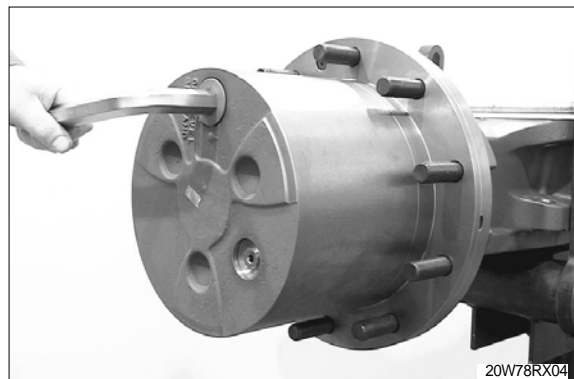


- Loosen the screw plug and drain oil from the planet carrier.

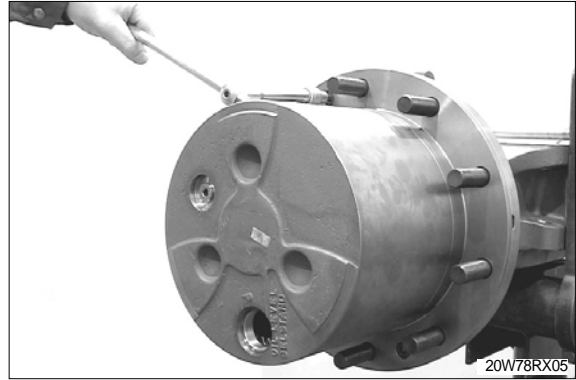
- ⌋ Step (Figure □□□) is to be carried out on both output sides.

- ⌋ To prevent any injury by a possible pressure build up in the oil sump of the planet carrier, bring the filler and level plug to the top position (12 o'clock) and unscrew it cautiously.

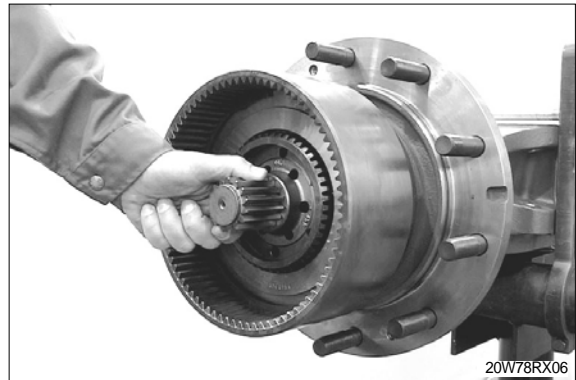
Then bring the drain hole to the bottom position (6 o'clock) and drain the oil.



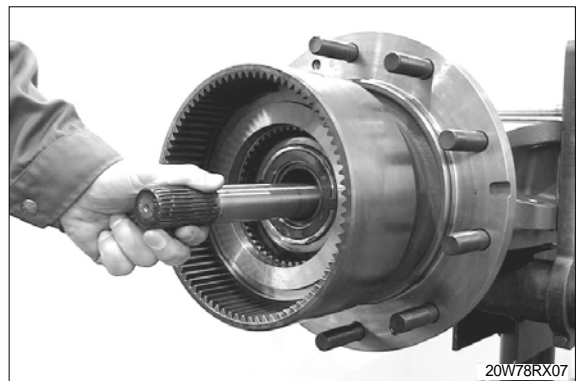
- ☒ ☒ Loosen the cap screws and pull off the planet carrier from the hub.  
Crowbar set                    5870 345 071



- ☒ ° Pull off the sun gear and the disc carrier from the stub shaft and out of the disc set respectively.

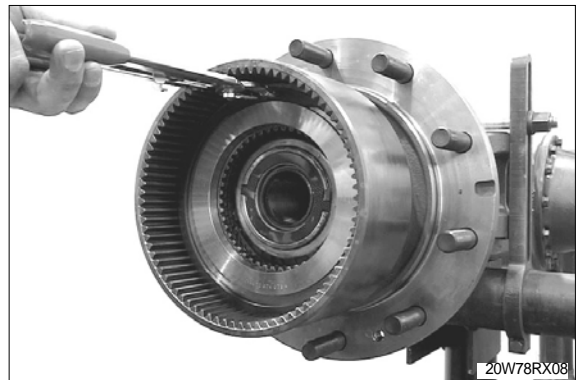


- ☒ Pull the stub shaft out of the axle casing.



- ☒ Unsnap the retaining ring and remove the end shim with disc set from the ring gear.  
Clamping pliers                    5870 900 021

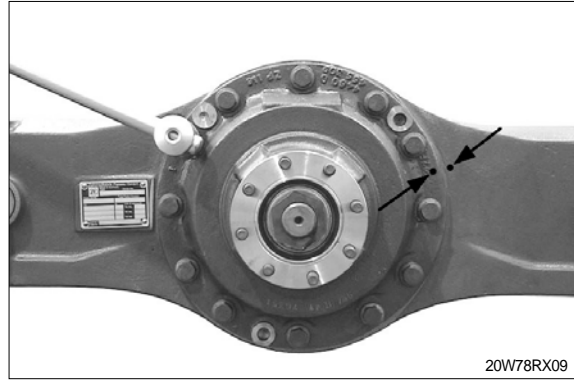
- ⌋ **This step is necessary to allow the later installation of the disc carrier.**



- Loosen two locking screws and replace them by two adjusting screws.  
Then loosen the remaining locking screws.

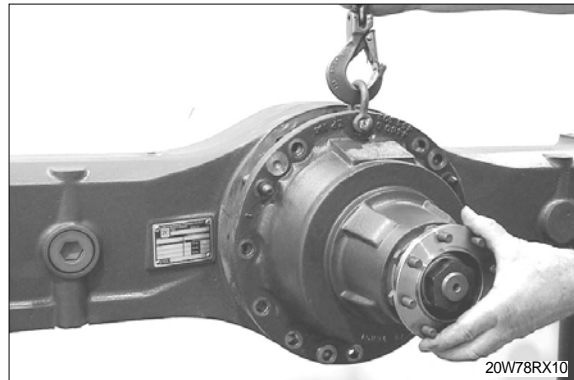
Adjusting screws            5870 204 022

- Mark the installation position of the axle insert to the axle casing (see arrow).



- By means of lifting tackle pull the axle insert out of the axle casing.

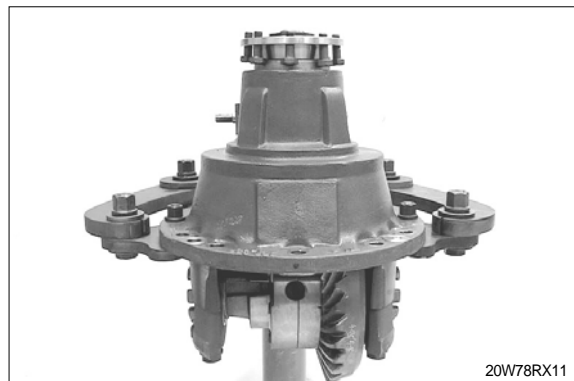
Lifting chain                5870 281 047



- Fasten the axle insert on the assembly truck.

Assembly truck            5870 350 000

Holding fixture            5870 350 112



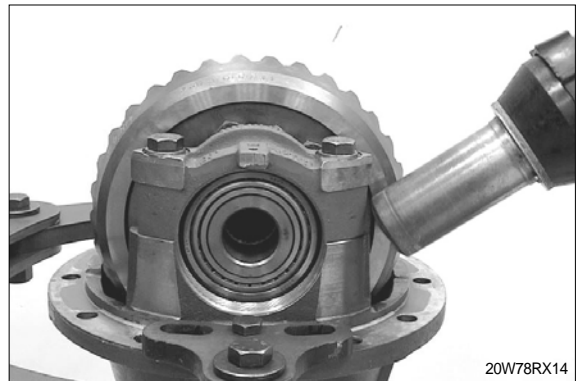
- Expel both slotted pins.



- Loosen the adjusting nuts.  
Pry bar set 5870 345 036

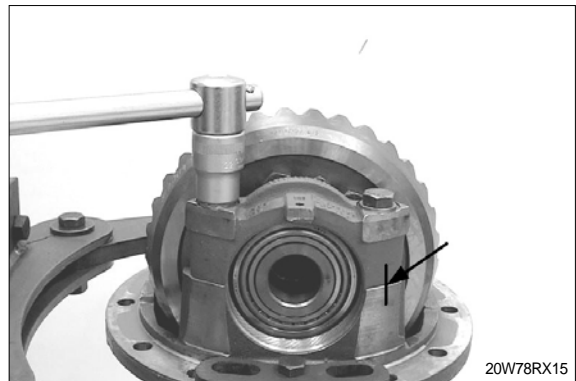


- Heat the axle drive housing by means of hot air blower.  
Hot air blower 230V 5870 221 500  
Hot air blower 115V 5870 221 501



- ı Hexagon screws are installed with loctite No.262.

- Loosen the hexagon screws and take off both bearing brackets.
- ı Mark the installation position of both bearing brackets to the axle drive housing (see arrow).  
Loosen hexagon screws only by hand.



- <sub>1</sub> Lift the differential out of the axle drive housing.
- ı For disassembly of the various differentials, see from page 8-247.
- ı Mark the installation position of the differential to the axle drive housing.



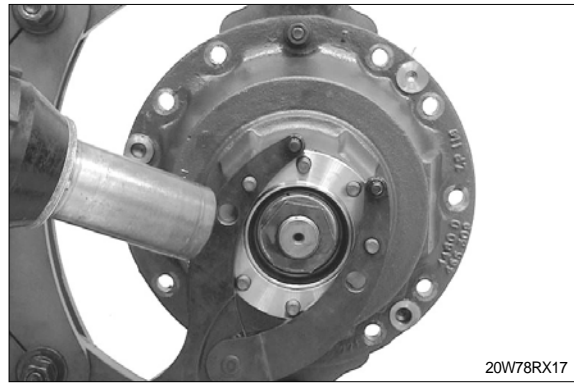
## 2) DISASSEMBLY OF THE INPUT PINION

- Heat the hexagon nut by means of hot air blower.

Hot air blower 230V      5870 221 500

Hot air blower 115V      5870 221 501

- ⌋ Hexagon nut is locked with loctite No.262.

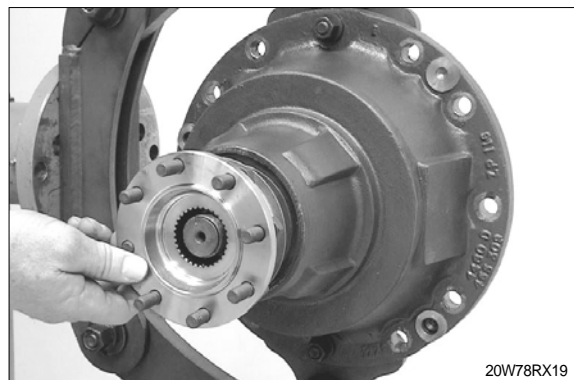


- Loosen the hexagon nut and remove the washer behind it.

Fixture                      5870 240 025

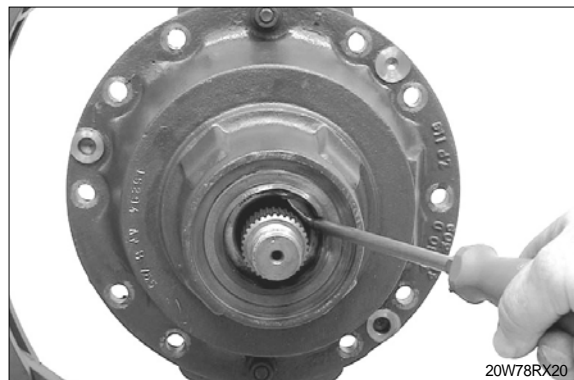


- Pull the input flange from the input pinion.



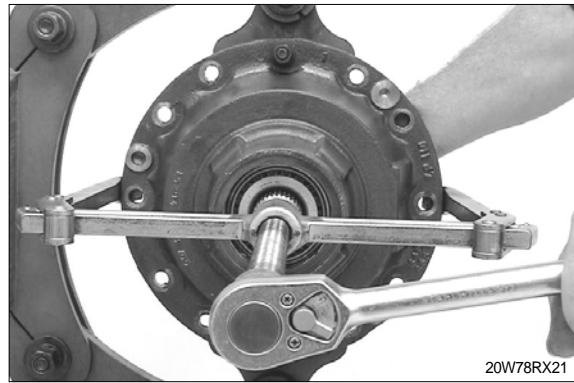
- Press the shaft seal out of the axle drive housing.

Crowbar set              5870 345 071



- ° By means of the two armed puller press the input pinion out of the axle drive housing and remove the released bearing inner ring.

Two armed puller                    5870 970 028



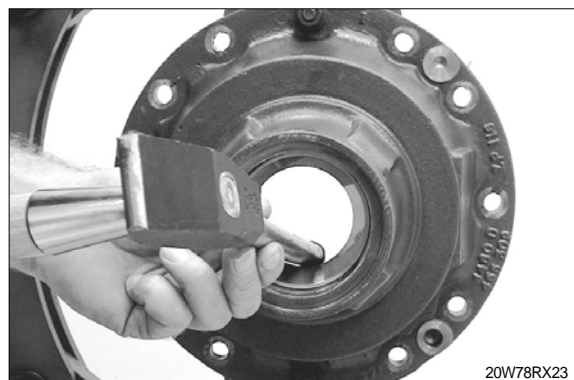
- Take off the spacer ring and pull the bearing inner ring from the input pinion.

Gripping insert                    5873 001 037

Basic set                            5873 001 000

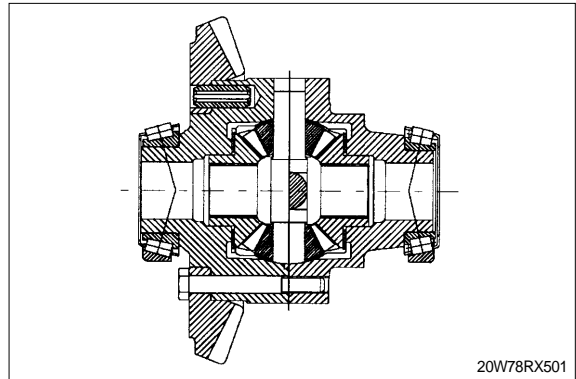


- If necessary, expel both bearing outer rings from the axle drive housing.



## 5. DISASSEMBLY OF DIFFERENTIALS

### 1) DISASSEMBLY OF DIFFERENTIAL TYPE : D-700



- Pull off the roller bearing from the differential cage.

Gripping insert                    5873 001 059

Pressure piece                    5870 506 058

Back-off insert                    5870 026 100



- Pull off the crown wheel-sided roller bearing.

Gripping insert                    5873 001 034

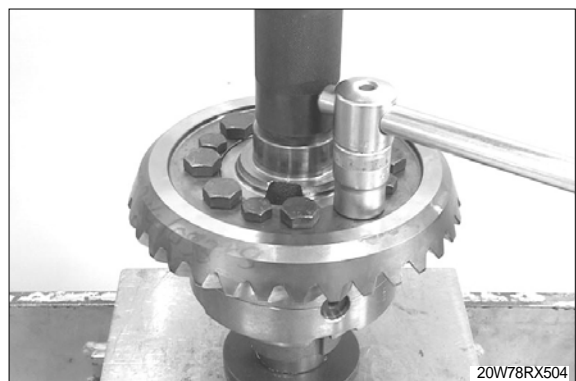
Pressure piece                    5870 506 058

Back-off insert                    5870 026 100

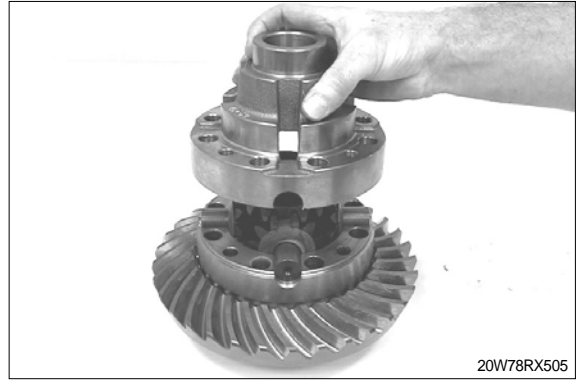


- Fasten the differential by means of press and loosen all hexagon screws.

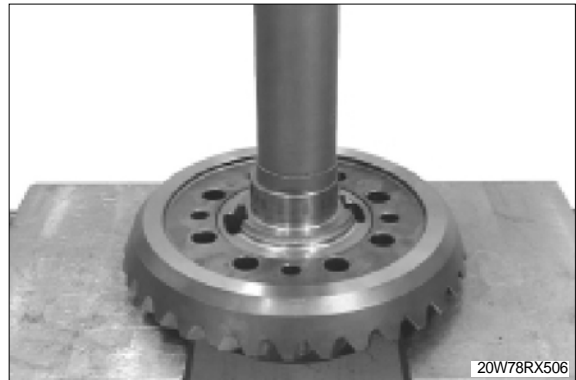
- ⋮ Hexagon screws are installed with loctite No.262.



☒ Take off the differential cage half and remove the released single parts.



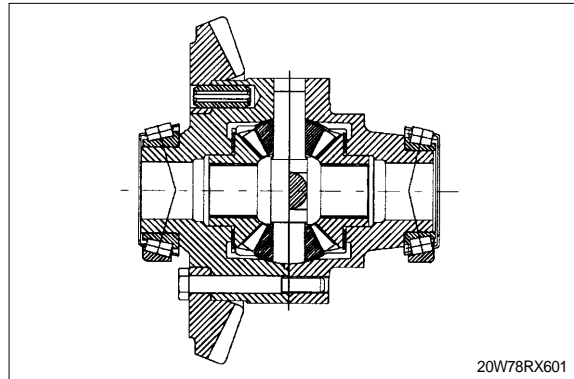
☒ Press off the crown wheel from the differential cage.



## 6. REASSEMBLY OF THE DIFFERENTIALS

### 1) REASSEMBLY OF DIFFERENTIAL TYPE : D-700

¡ Prior to installation oil all single parts of the differentials to list of lubricants TE-ML 05.



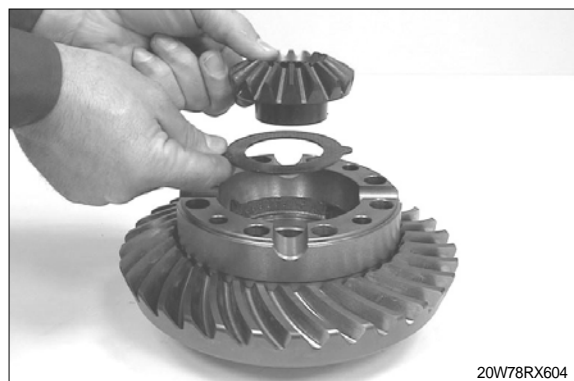
- Install slotted pins (2 pcs. / bore) aligned into the blind holes (4x) of the differential cage half I.
- ¡ Install openings of the slotted pins always in circumferential direction and 180° offset to each other.



- Heat crown wheel and press it upon the slotted pins until contact.

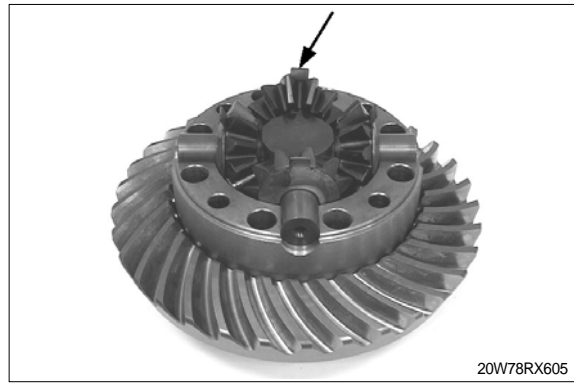


- Place the thrust washer and the axle bevel gear into the differential cage half.

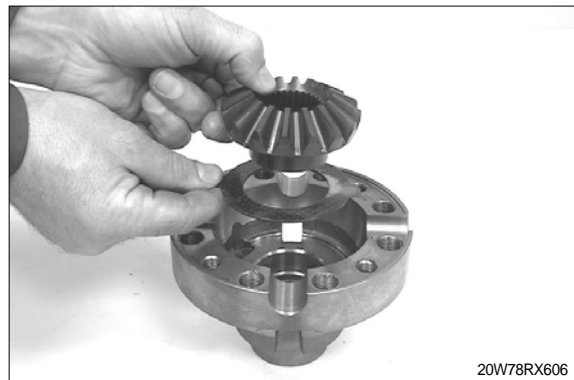


☒ Install the complete compensating set.

- ⌋ Pay attention to radial location of thrust washers. Pins show vertically upwards (see arrow).



☒ Place the thrust washer and the axle bevel gear into the differential cage half II.



☒ Put on the differential cage half II.

- ⌋ Observe radial location, see description.



☒ Fix the differential by means of press and fasten the differential cage halves by means of hexagon screws.

Tightening torque ⌋ / ⌋ / 12.2kgf · m

Tightening torque ⌋ / ⌋ / 30.6kgf · m

- ⌋ Wet thread of the hexagon screws with loctite No. 262.



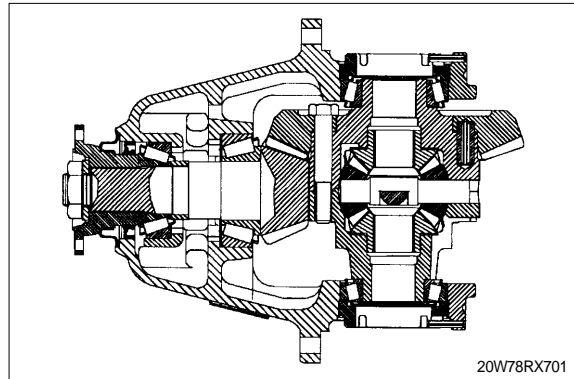
- Heat both roller bearings and assemble them until contact.  
Pressure piece 5870 506 058



## 7. REASSEMBLY OF THE AXLE INSERT

### 1) REASSEMBLY OF AXLE INSERT TYPE : BK / AE650

- i If crown wheel or input pinion are damaged, both parts have to be replaced together.  
For new installation of a complete bevel gear set pay attention to the same pair number of input pinion and crown wheel.



#### (1) Determine shim thickness for a perfect tooth contact pattern

- ※ Make the following measuring steps at maximum accuracy.  
Inexact measurements result in a faulty tooth contact pattern and require a repeated dis-and reassembly of the input drive pinion as well as of the differential.

- Install adapter pieces(1) and preliminarily fasten the bearing bracket by means of hexagon screws.

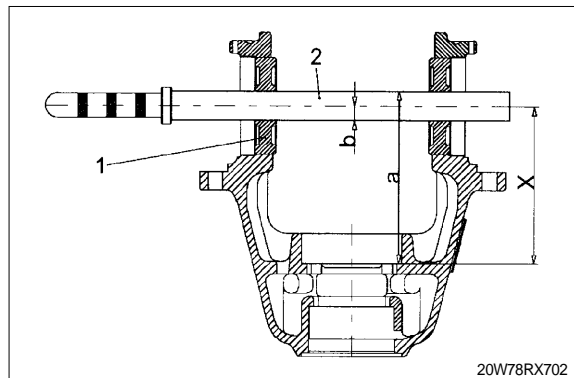
Then assemble the measuring shaft(2).

Adapter pieces 5870 500 035

Measuring shaft 5870 200 001

If available, additionally

Measuring pin 5870 500 002



- Measure Dim. a, from the upper edge of the measuring shaft to the mounting face of the bearing outer ring and shim resp.

Dim. a e.g ..... 178.05mm

Digital depth gauge 5870 200 072

#### **EXAMPLE A :**

Dim. a e.g ..... 178.05mm

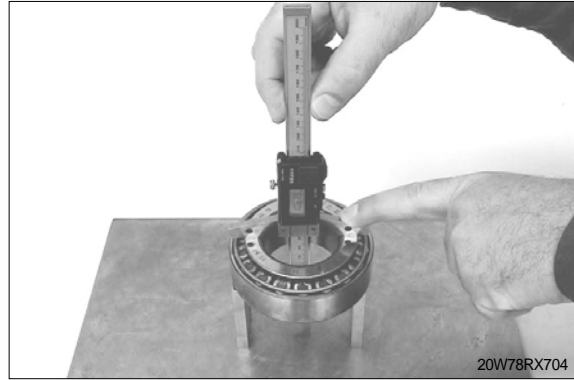
Dim. b e.g ..... - 15.00mm

**Results in Dim. X =163.05mm**



☐ Measure Dim. I (bearing width).

Dim. I e.g ..... 36.8mm  
 Digital depth gauge 5870 200 072  
 Gauge blocks 5870 200 066

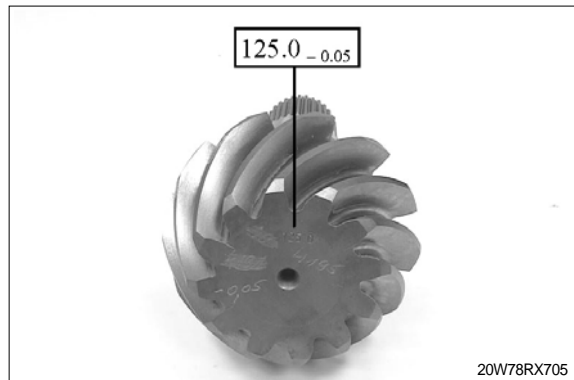


☐ Read Dim. II (pinion dimension).

Dim. II e.g ..... 124.95mm

**EXAMPLE B :**

Dim. I e.g ..... 36.80mm  
 Dim. II e.g ..... +124.95mm  
Results in Dim. Y = 161.75mm

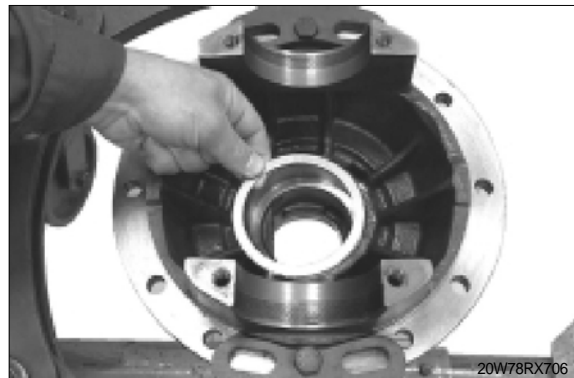


**EXAMPLE C :**

Dim. X e.g ..... 163.05mm  
 Dim. Y e.g ..... -161.75mm  
Difference = shim e.g s = 1.3mm

**(2) Install the input pinion**

☐ Place the determined shim e.g. s = 1.3mm into the bearing bore.



⊠ Undercool bearing outer ring and insert it into the bearing bore until contact.

Driver 5870 058 078

Handle 5870 260 002



20W78RX707

⊠ Undercool the bearing outer ring on the input flange side and install it until contact.

Driver 5870 058 061

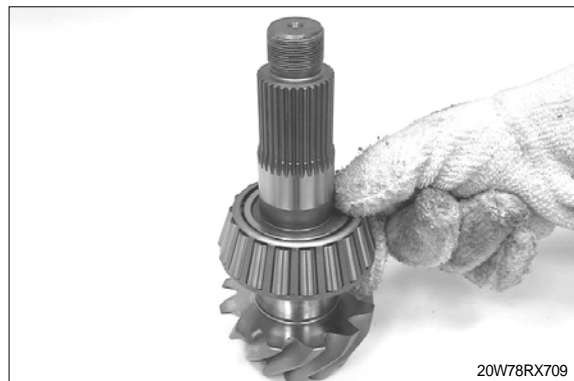
Handle 5870 260 002



20W78RX708

⊠ Heat the bearing inner ring and assemble it until contact.

⊠ After cooling-down install the bearing inner ring subsequently.



20W78RX709

⊠ Adjust rolling moment of input pinion bearing 0.1...0.2kgf · m (without shaft seal) (figure ⊠...⊠ )

Assemble the spacer ring (e.g.  $s = 16.96\text{mm}$ ).

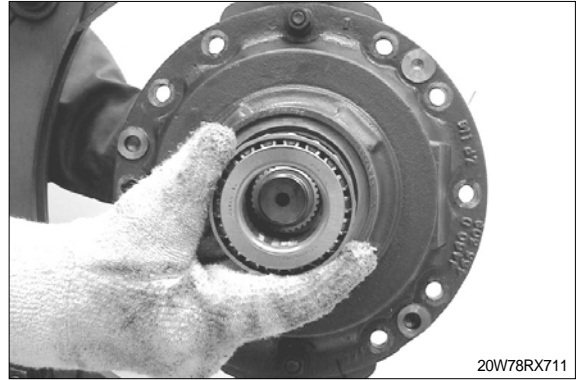
⊠ As per experience the required rolling moment is obtained by use of the spacer ring (e.g.  $s = 16.96\text{mm}$ ) available at disassembly.

However, a later checking of the rolling moment is imperative.



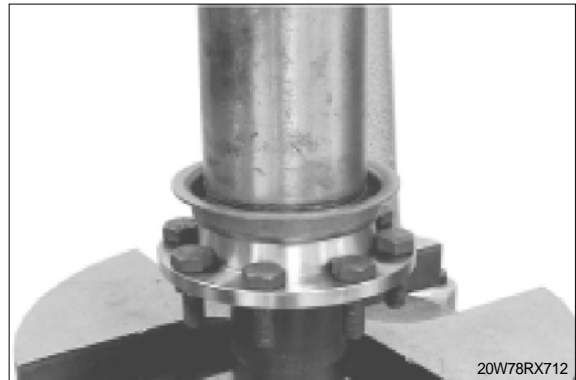
20W78RX710

- Place the preassembled input pinion into the axle drive housing and assemble the heated bearing inner ring until contact.

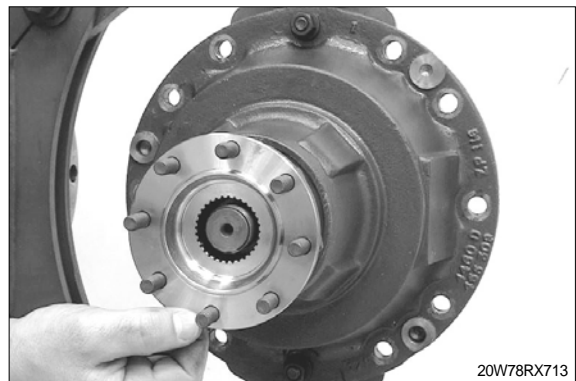


- Insert the hexagon screws into the bores of the input flange and press on the protecting plate until contact.

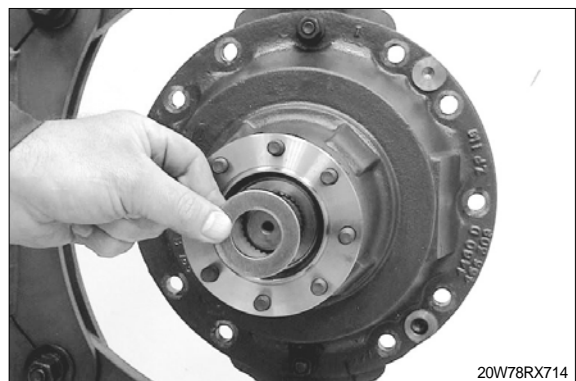
Driver                      5870 056 004  
Handle                      5870 260 002



- Assemble the preassembled input flange.



- Assemble the washer.

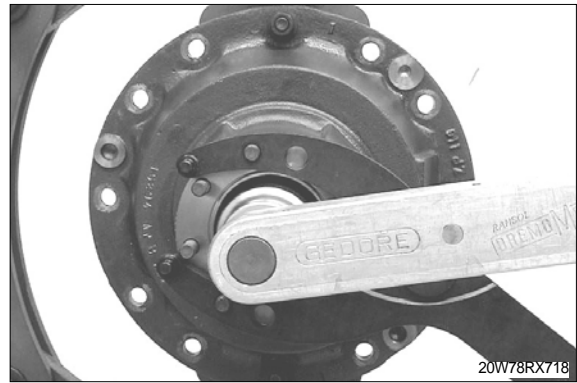




- Assemble the input flange by means of shim and finally fasten it with hexagon nut.

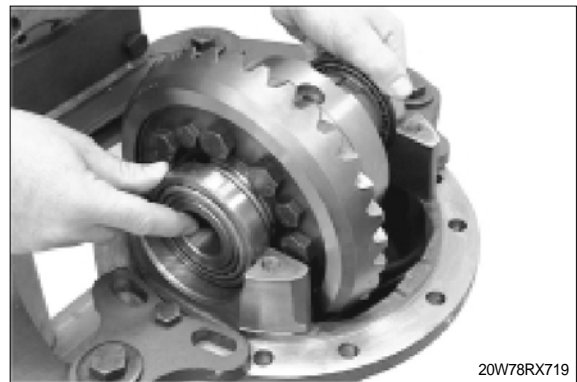
Tightening torque ..... 61.2kgf ;/m  
 Fixture                                 5870 240 002

- Wet thread of the hexagon nut with loctite No. 262.



**(3) Adjust backlash and bearing rolling moment of the differential bearing 0.1...0.4kgf ;/m**

- Put on both bearing outer rings and place the preassembled differential into the axle drive housing.
- For assembly of various differentials, see from page 8-247
- Observe installation position of the crown wheel, see marking. When the axle insert is installed the crown wheel is - looking to the input flange - on the “right”.



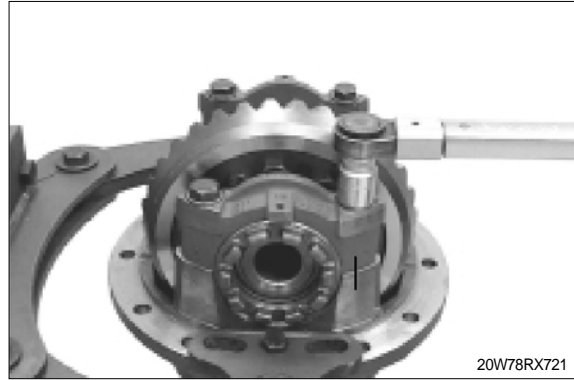
- Screw both adjusting nuts into the lower halves of the threaded hole.



- ∅ Put on both bearing brackets and fasten them by means of hexagon screws and washers.

Tightening torque ..... 18.9kgf / m

- ; Observe the installation position of the bearing brackets and clearance of the adjusting nuts.
  - ; Wet thread of the hexagon screws with loctite No. 262.



20W78RX721

- ∅ Place dial indicator right-angled at the outer diameter of the tooth flank (crown wheel).

Then install both adjusting nuts only to such an extent that the required backlash - see value etched on the outer diameter of the crown wheel is reached.

- Magnetic stand ..... 5870 200 055
- Dial indicator ..... 5870 200 057
- Pry bar set ..... 5870 345 036
- Plastic hammer ..... 5870 280 004

- ; During the setting procedure rotate the differential several times and relieve the bearing by means of slight blows on both bearing by means of slight blows on both bearing brackets (use a plastic hammer).



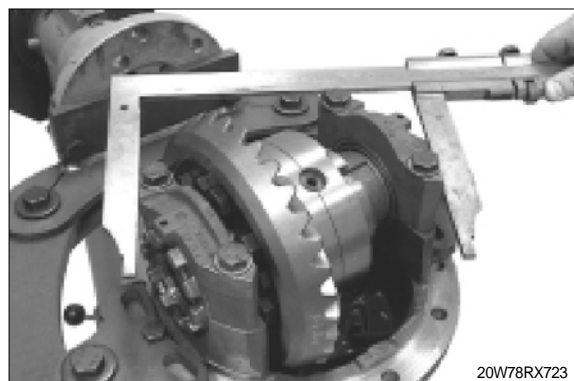
20W78RX722

- ∅ Determine the bracket width and correct it on both adjusting nuts, if required.

- Bracket width ..... 258.0<sup>-0.1</sup>mm
- Caliper gauge ..... 5870 200 058

Then check the backlash once again.

- ; Adjusting of the bracket width results in the required bearing rolling moment of the differential bearing.



20W78RX723

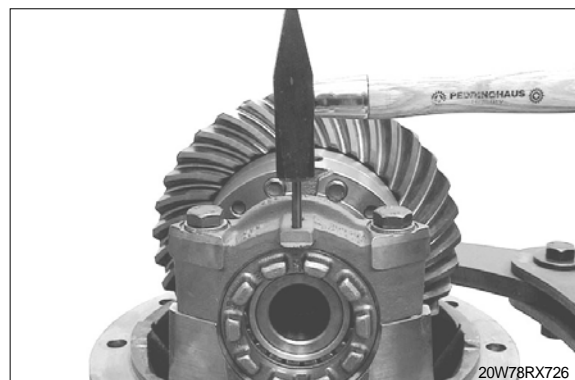
- **Check the contact pattern (Figure □ ...□ )**  
Cover some concave and convex flanks of the crown wheel with marking ink.



- Roll the crown wheel in both directions over the input pinion.  
Compare the obtained tooth contact pattern with the examples on page 8-219.
- ¡ If the tooth contact pattern differs, there has been a measuring error at determination of the shim (Figure □ , Page 8-253)

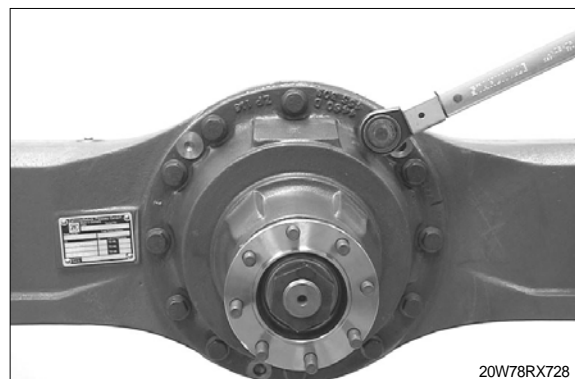


- Lock both adjusting nuts by means of slotted pins.



#### **(4) Install the preassembled axle insert**

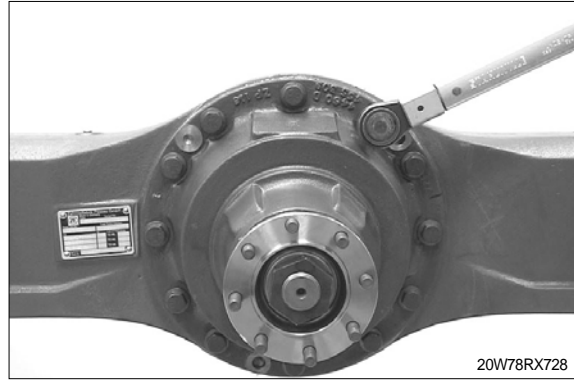
- Install two adjusting screws and place the axle casing by means of lifting tackle into the axle casing.  
Adjusting screws            5870 204 021  
Lifting tackle                5870 281 047
- ¡ Observe radial location.
- ¡ Wet the mounting face with sealing compound loctite No. 574.



☒ Place the axle insert until contact and fasten it by means of new locking screws.

Tightening torque ..... 23.5kgf<sub>i</sub>/m

☒ Only the use of new locking screws is allowed.



☒ Grease the O-ring and insert into the annular groove of the disc carrier.

☒ Step (Figure ☒..☒ ) is to be made on both output sides.

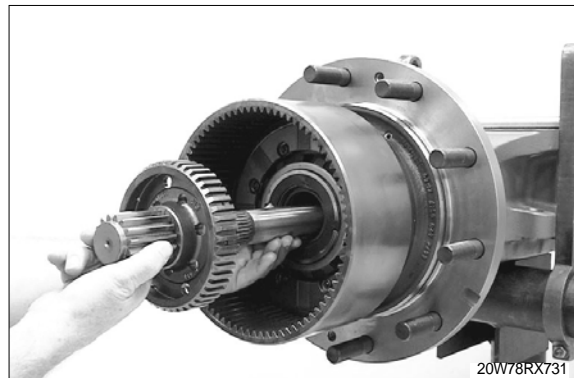


☒ Assemble the sun gear into the disc carrier until contact.

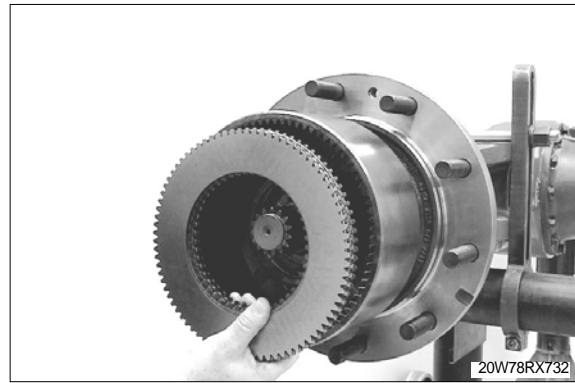
Then pass the disc carrier over the teeth of the stub shaft until contact.



☒ Assemble the stub shaft with disc carrier and sun gear until contact into the axle casing and into the teeth of the axle bevel gear respectively.



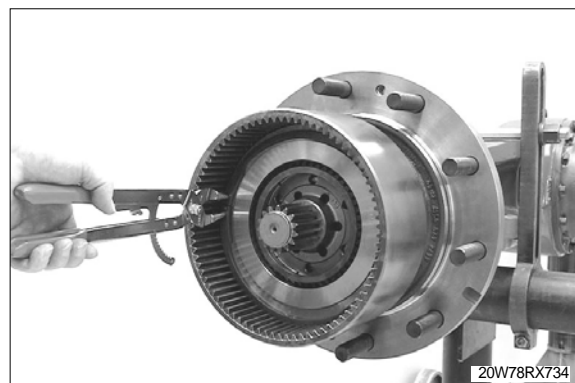
- Install the outer and inner discs alternately, starting with an outer disc.
- ┆ Oil the discs to ZF List of Lubricants TE-ML 05.
- ┆ When installing outer discs of different strength, the thinner outer discs have always to be installed at the piston and end shim side.



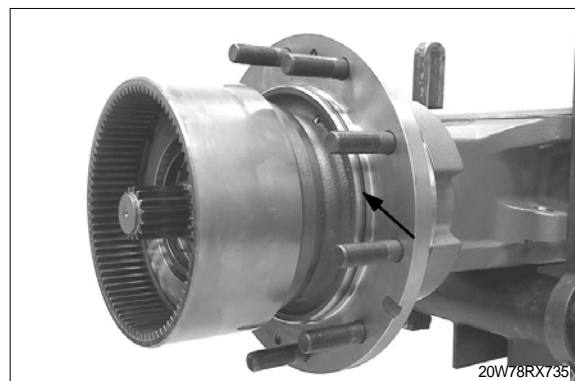
- Place the end shim into the ring gear.
- ┆ Observe the installation position, see picture.



- Fasten the disc set and end shim by means of retaining ring.  
Clamping pliers 5870 900 021



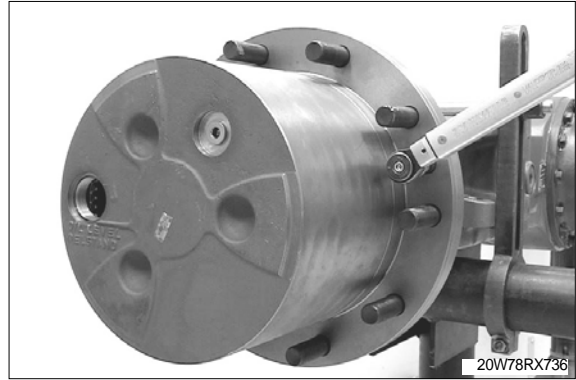
- Place O-ring (see arrow) into the annular groove and grease it.



- Assemble the planet carrier until contact and fasten it by means of cap screws.

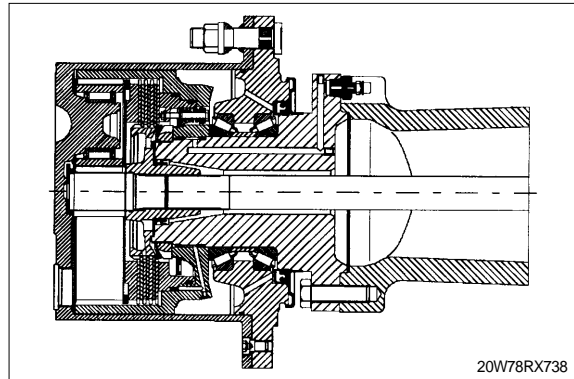
Tightening torque ..... 5.6kgf<sub>i</sub>/m

- Prior to putting into operation of the axle, fill up oil to lubrication and maintenance instructions.



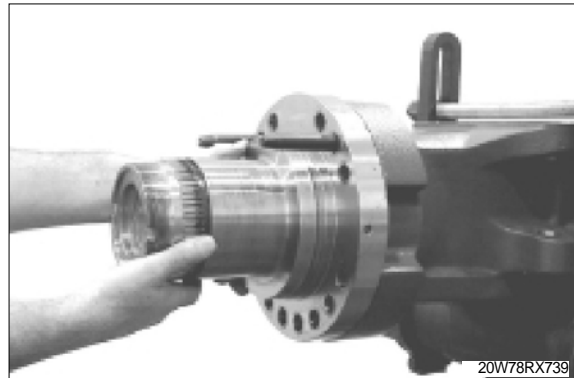
## 8. REASSEMBLY OF THE OUTPUTS

### 1) REASSEMBLY OF THE OUTPUT WITH MULTI-DISC BRAKE



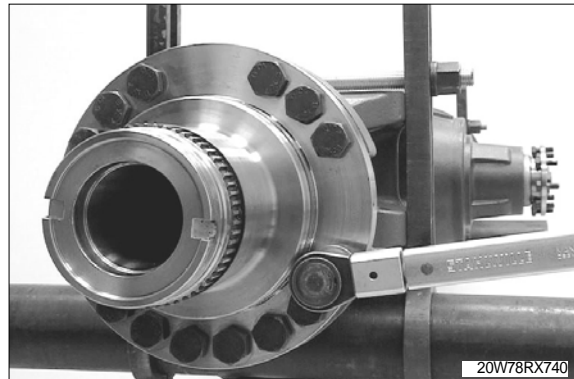
#### (1) Reassembly of the hub carrier

- Install two adjusting screws and assemble the hub carrier until contact.  
Adjusting screws 5870 204 026
- ¡ Observe the installation position, see picture.
- ¡ Wet the mounting face with loctite No. 574.



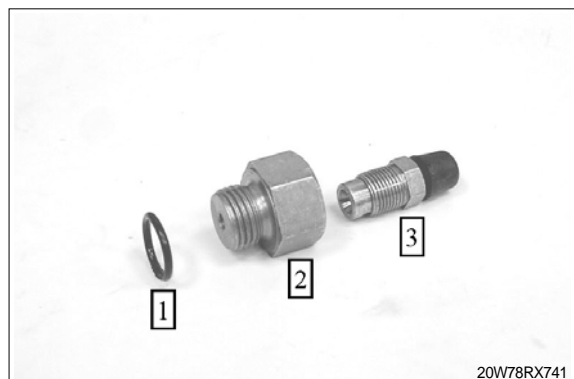
- Fasten the hub carrier to the axle casing by means of hexagon screws.

Tightening torque ..... 39.8kgf / m



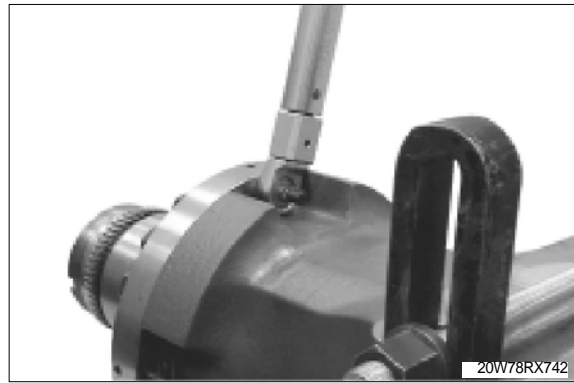
- Preassemble the union as shown in the opposite figure.

- 1 O-ring
- 2 Union
- 3 Breather valve



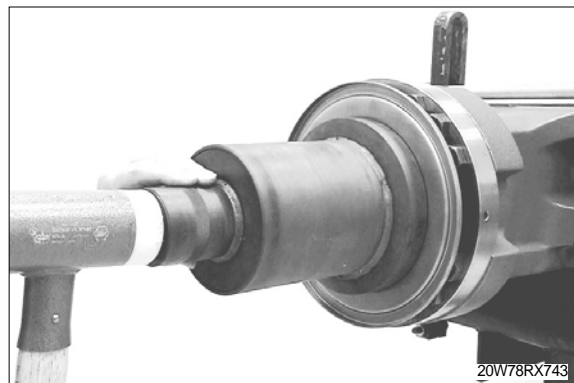
☞ Install the union.

Tightening torque ..... 4.6kgf<sub>i</sub>/m



☞ Heat the screen sheet and place it until contact to the hub carrier by means of driver.

Driver ..... 5870 048 129

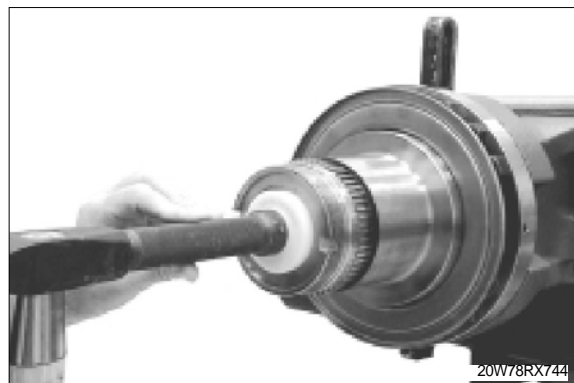


☞ Place the shaft seal into the bore of the hub carrier.

Driver ..... 5870 055 102

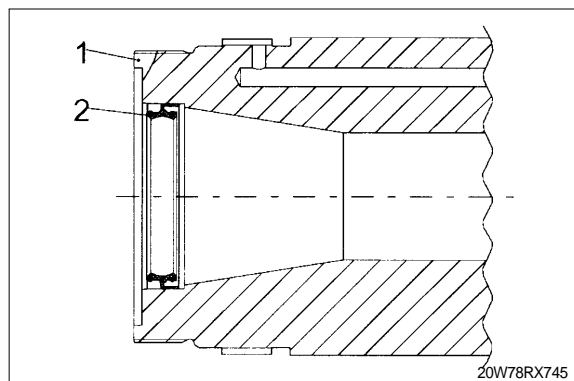
Handle ..... 5870 260 002

⌋ Observe the installation position, see below sketch.  
Exact installation position of the shaft seal will be obtained by use of the specified driver.



⌋ Wet outer diameter of the shaft seal with loctite No. 574.  
Fill the space between the sealing lips with grease.

- 1 Hub carrier
- 2 Shaft seal



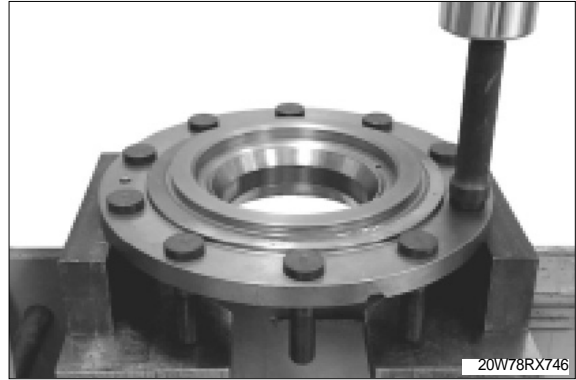
## (2) Reassembly of the hub

- Press the wheel bolts into the hub bores until contact.

Wheel bolt puller-basic set 5870 610 010

Insert M22;  $\varnothing$ 1.5 5870 610 002

- ∣ Special tool can only be used for repair solution when single wheel bolts are replaced with the hub mounted-on.



- ⊞ Press in both of the bearing outer rings until contact.

Driver 5870 051 031



- ∅ Adjust the rolling moment of the wheel bearing 1.0...1.5kgf · m (without cassette-type seal) (Figure □∅...□ )

Heat the roller bearing and assemble it until contact to the hub carrier.



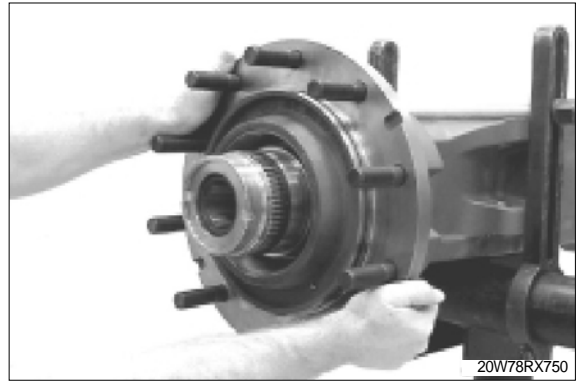
- ⊞ Assemble the bush(e.g.s = 26.29mm, empirical value) until contact.

- ∣ If the hub as well as both of the roller bearings were not replaced, we recommend to reinstall the spacer ring which had been available for disassembly. However, a later checking of the rolling moment is absolutely necessary.

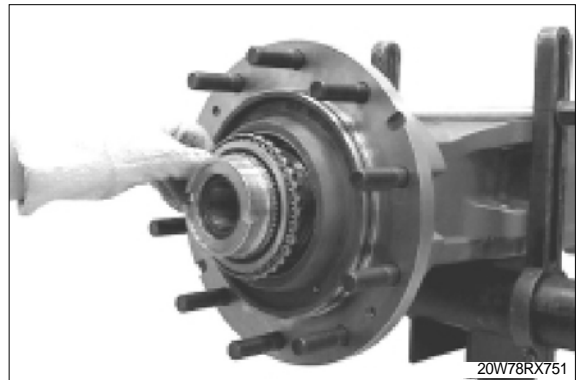


□ ° Assemble the hub (without cassette-type seal).

¡ The cassette-type seal will be installed after setting of the bearing rolling moment.



□ Heat the roller bearing and assemble it until contact.



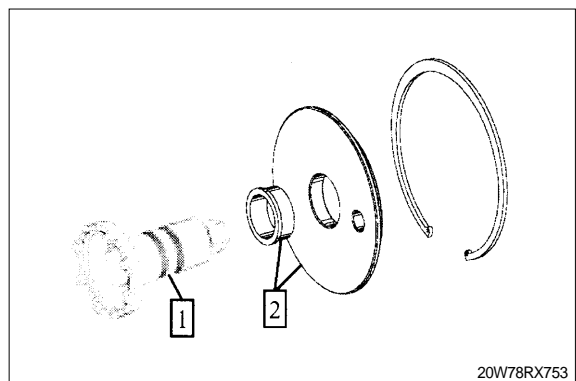
□ Assemble the ring gear and screw on the slotted nut by hand.

¡ Thread of the slotted nut is to be provided with lubricant (Molykote 1000).



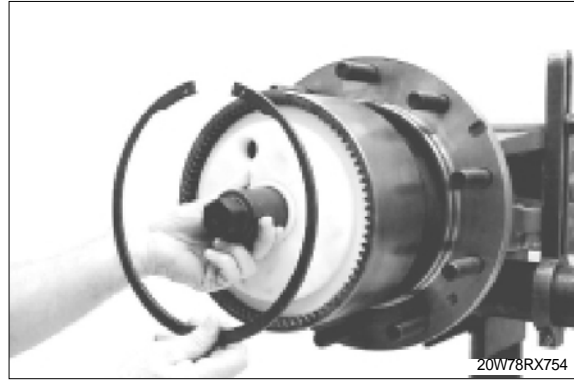
□ Tighten the slotted nut (Figure □ ... □ )  
The opposite sketch shows the single parts of the special tool for tightening of the slotted nut.

- 1 Slotted nut wrench 5870 401 105
- 2 Centering disc cpl. 5870 912 011



- Position the slotted nut wrench and the support shim and fasten it by means of retaining ring.

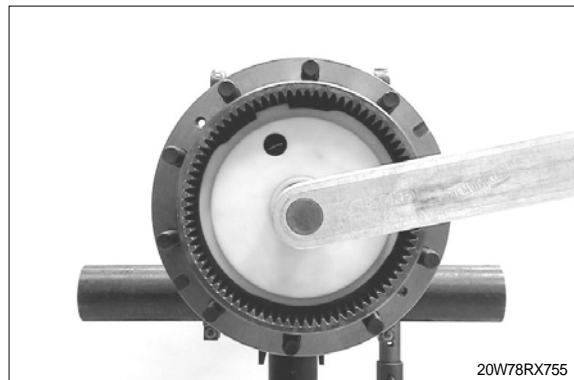
Clamping pliers                      5870 900 021



- Tighten the slotted nut.

Tightening                      torque  
 143+20.4kgf<sub>i</sub>/m

- ı During the tightening have the hub rotated in both directions for several times.
- ı The high tightening torque of the slotted nut makes it absolutely necessary to support the axle and the assembly truck



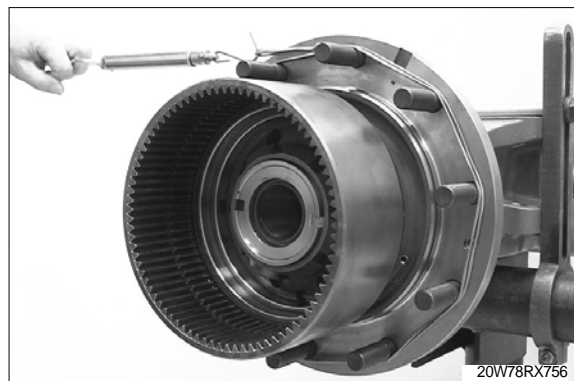
- Check the rolling moment of the wheel bearing and tractive force respectively by means of spring balance.

Spring balance                      5870 230 007

- ı  $T = 1.0 \sim 1.5 \text{kgf}_i/\text{m}$  corresponds to a tractive force from 5.7 to 8.6kgf, assuming 357mm on the hub diameter. For new bearings the max. value should be achieved.

- ı If the required rolling moment is not obtained, correct it with an adequate spacer ring (Figure □□/ Page 8-265)-repeat setting procedure (Figure □□-□□)

- ı Rolling moment too low - install a thinner spacer ring
- ı Rolling moment too high - install a thicker spacer ring

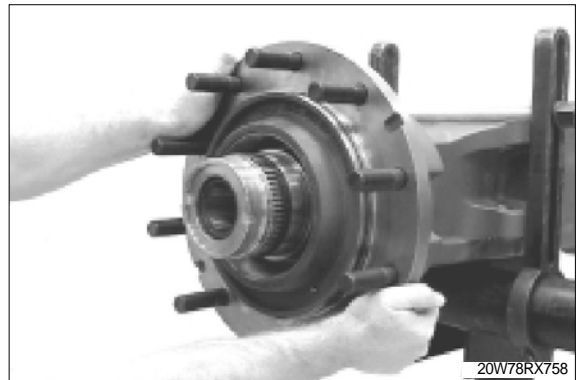


- Then loosen the slotted nut and remove the ring gear and the hub again.
- ┆ Inner roller bearing and spacer ring remain on the hub carrier.

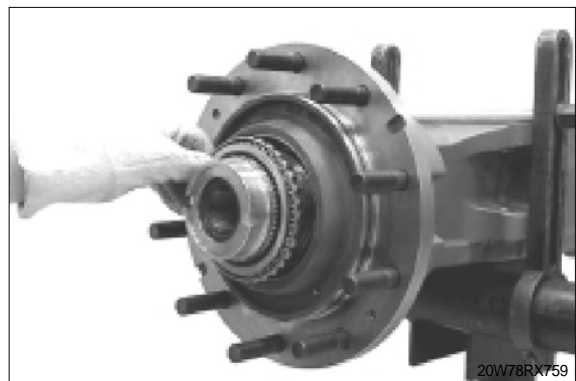
- Install the cassette-type seal.
  - Driver 5870 051 055
  - Handle 5870 260 004
- ┆ Exact installation position of the cassette-type seal will be obtained by use of the specified driver.
- ┆ Wet outer diameter of the cassette-type seal with loctite No. 574.  
Fill the space between the sealing lips with grease.



- Install the preassembled hub until contact.

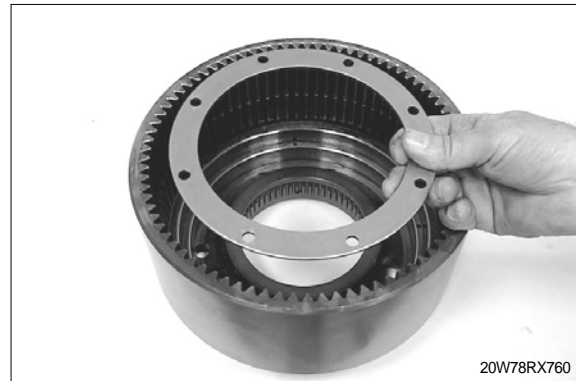


- <sub>1</sub> Heat the roller bearing and assemble it until contact.



### (3) Reassembly of the ring gear

- Place the support shim into the ring gear.
- ¡ Observe the radial location.

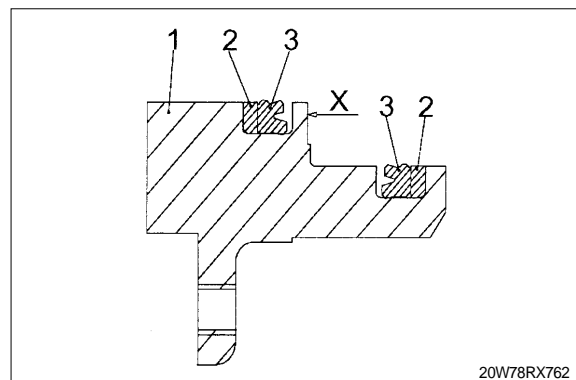


- Fasten the support shim by means of circlip.



- Heat both support rings in the oil bath and place it into the recesses of the piston. Then install the U-rings with the sealing lip showing to the pressure cavity.

- 1 Piston
- 2 Support ring
- 3 U-ring
- X Pressure cavity



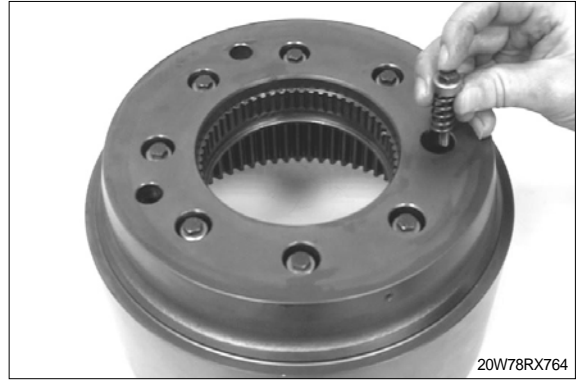
- ¡ After cooling down, oil the support and U-rings (use W-10 oils).

- Assemble the piston into the ring gear and press it until contact.

- ¡ Observe the radial location.
- ¡ To avoid any shearing or tipping over of the U-rings, install the pistons with extreme caution (by means of hand press).



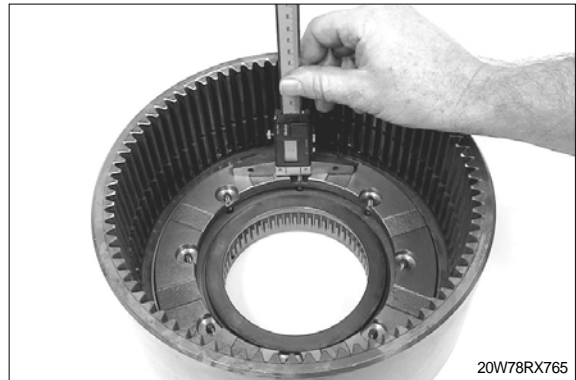
- Assemble the spring sleeves and compression springs as well as the piston with hexagon screws.



20W78RX764

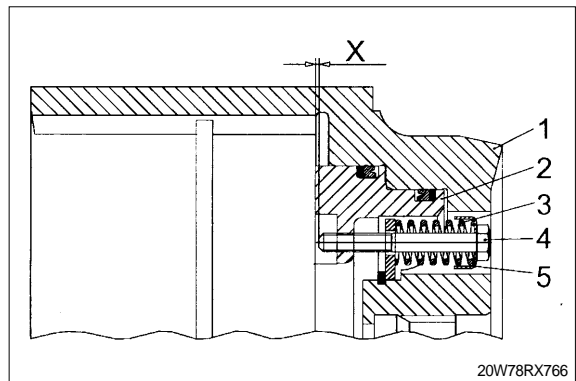
- Turn in the hexagon screws until dimension X = 0.5~1.0mm results - measured from the plane face of the piston up to the end of the screw - (also see below sketch).

Digital depth gauge 5870 200 022



20W78RX765

- 1 Ring gear
- 2 Piston
- 3 Compression spring
- 4 Hexagon screw
- 5 Spring sleeve
- X Setting dimension 0.5~1.0mm

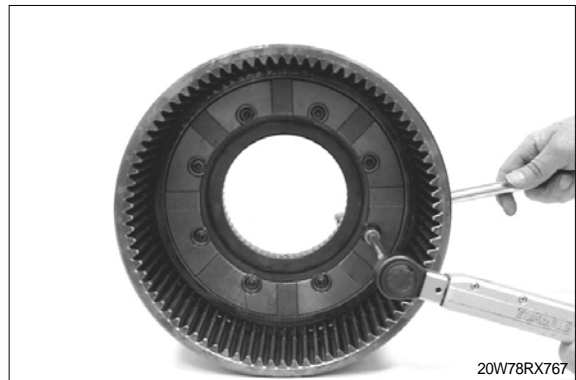


20W78RX766

- Hold hexagon screws in place and secure them by means of locking nuts.

Tightening torque ..... 1.1kgf<sub>i</sub>/m

- ⌋ It is only allowed to use new locking screws.

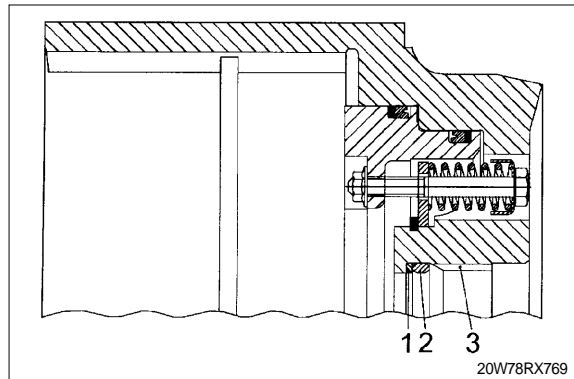


20W78RX767

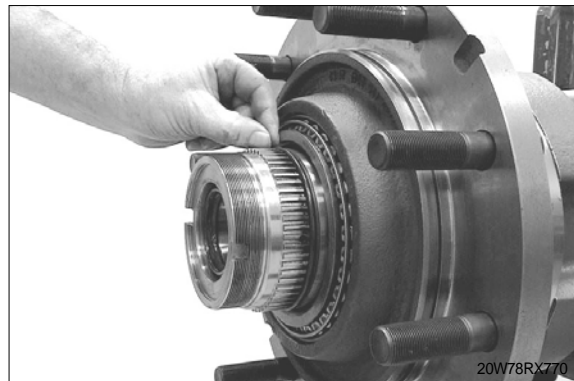
- Place the support and O-ring into the annular groove of the ring gear.
- ¡ Oil the support and O-ring (use W-10 oils).
- ¡ Observe the location, install the concave side of the support ring showing to the O-ring (also see below sketch).



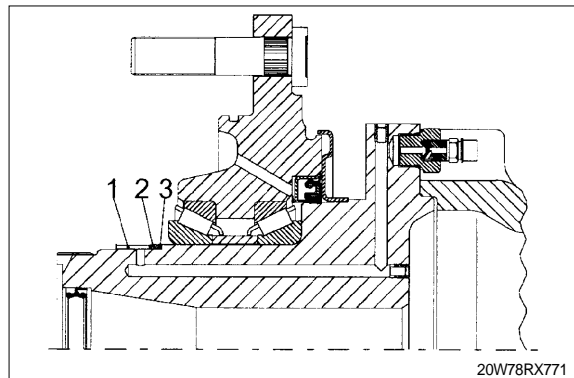
- 1 Support ring
- 2 O-ring
- 3 Ring gear



- Place the split support ring as well as the O-ring into the annular groove of the hub carrier.
- ¡ Oil the support and O-ring (use W-10 oils).
- ¡ Observe the location, install the concave side of the support ring showing to the O-ring (also see below sketch). Both ends of the support ring must contact (use assembly grease) allowing a perfect installation of the ring gear.



- 1 Hub carrier
- 2 O-ring
- 3 Support ring

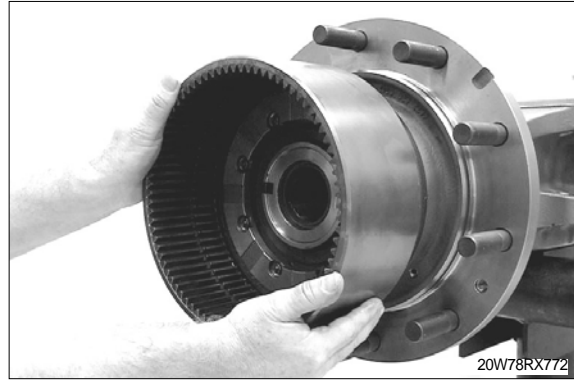


- Put the ring gear over the teeth of the hub carrier and screw on the slotted nut by hand.

- ı Thread of the slotted nut is to be provided with lubricant (Molykote 1000).

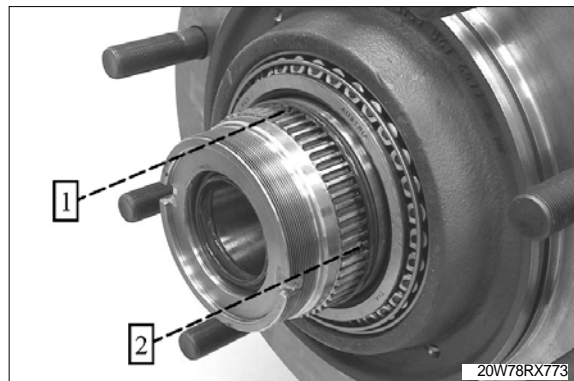
For assembling of the ring gear the exact

- ı contact of the oil bores(hub carrier / ring gear) must be observed (also see below figure).



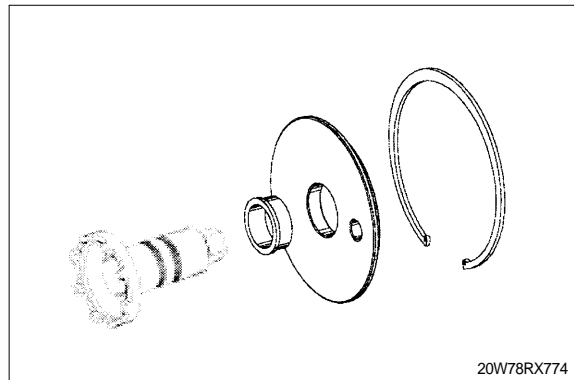
- æ Then pull the ring gear by means of the slotted nut - cautiously over the sealing elements - until contact.

Opposite figure shows the position of the two oil bores on the hub carrier.



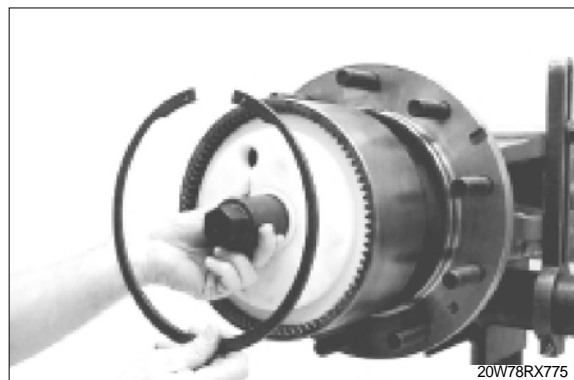
- Tighten the slotted nut (Figure □ ~□ )  
The opposite sketch shows the single parts of the special tool for tightening of the slotted nut.

- 1 Slotted nut wrench 5870 401 105
- 2 Centering disc cpl. 5870 912 011



- Position the slotted nut wrench and the support shim and fasten it by means of retaining ring.

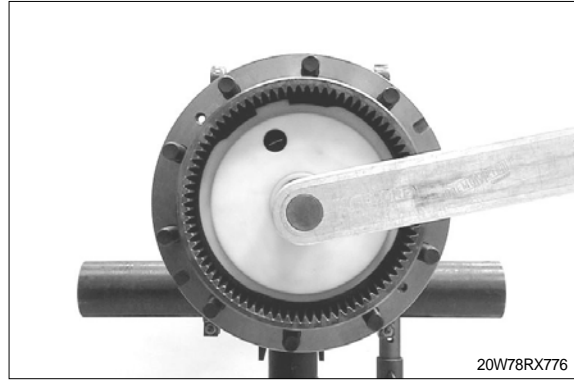
Clamping pliers 5870 900 021



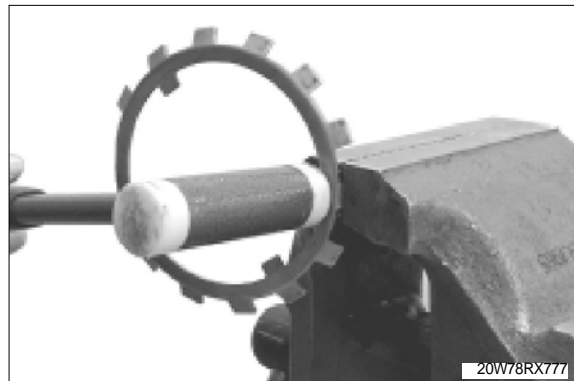
- Tighten the slotted nut.

Tightening ..... torque  
143+20.4kgf ; /m

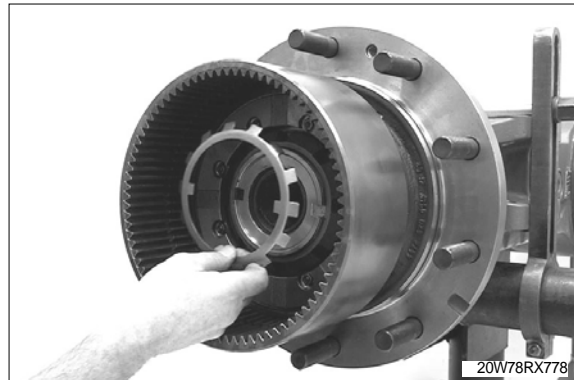
- ; During the tightening have the hub rotated in both directions for several times.
- ; The high tightening torque of the slotted nut makes it absolutely necessary to support the axle and the assembly truck



- <sub>1</sub> Lock the securing lugs(2x) which have to be beaded by locating of the lock plate to the slotted nut preliminarily.  
Then bead the securing lugs in the vice.



- § Fasten the slotted nut by means of lock plate.



#### (4) Reassembly of the multi-disc brake

- Adjust the clearance or piston stroke to the following table.

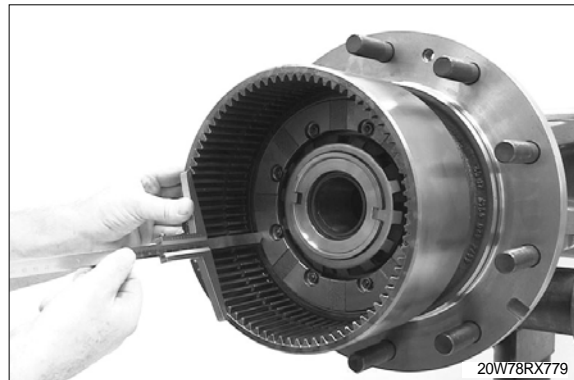
| Number of inner discs | Number of outer discs | Piston stroke or clearance |
|-----------------------|-----------------------|----------------------------|
| 2                     | 3                     | 1.6~2.0mm                  |
| 3                     | 4                     | 2.4~2.8mm                  |

- i The following measuring procedure (Figure □E~ Example B) describes the version with 3 inner discs and 4 outer discs.

- E Measure Dim. I, from the front of the ring gear to the plane face of the piston.

Dim. I, e.g ..... 91.00mm

Depth gauge ..... 5870 200 051

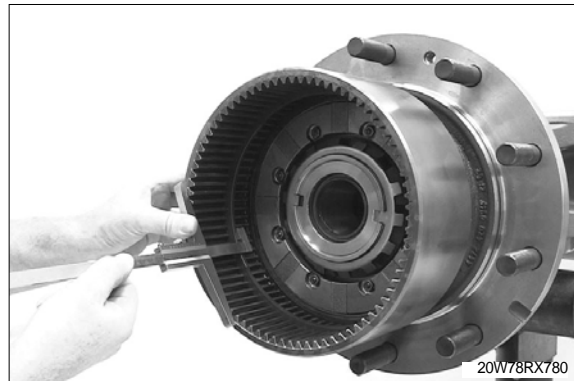


- F Snap in the retaining ring and place it until contact on the outer surface of the recess.

Measure Dim. II, from the front of the ring gear to the internal surface of the retaining ring.

Dim. II, e.g ..... 58.00mm

Then unsnap the retaining ring again.



- G Determine Dim. III, overall height of the disc set incl. end shim.

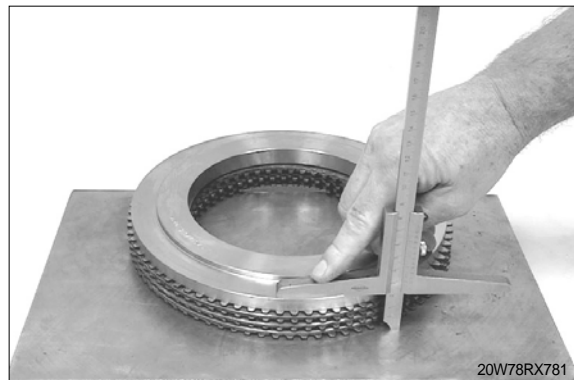
i 2 Outer discs  $s = 2.00\text{mm} = 4.00\text{mm}$

i 2 Outer discs  $s = 2.50\text{mm} = 5.00\text{mm}$

i 3 Inner discs  $s = 4.00\text{mm} = 12.00\text{mm}$

1 End shim  $s = 9.40\text{mm} = \underline{9.40\text{mm}}$

Results in overall height or Dim. III = 30.40mm



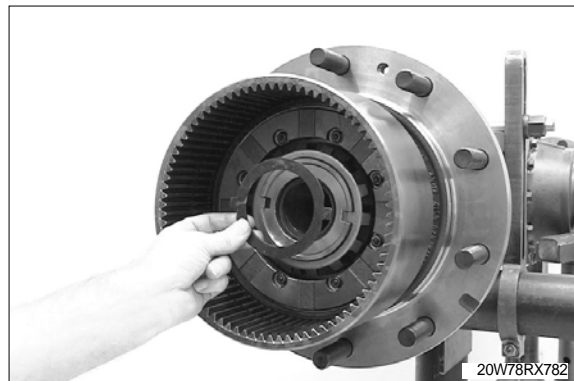
☐ **EXAMPLE B :**

|                               |                |
|-------------------------------|----------------|
| Dim. I e.g                    | 91.0mm         |
| Dim. II e.g                   | <u>-58.0mm</u> |
| Difference                    | 33.0mm         |
| Dim. III e.g                  | <u>-30.4mm</u> |
| <b>Result = Piston stroke</b> | <b>2.6mm</b>   |

- ☐ If the required piston stroke is not obtained (see table page 8-274), it has to be corrected with adequate outer discs (s=2.0mm, s=2.5mm or s=3.0mm).

- ☐ Place the thrust washer with grease into the recess of the hub carrier.

- ☐ If no perfect contact of the thrust washer is obtained, both lugs of the lock plate (inside) have to be installed subsequently.



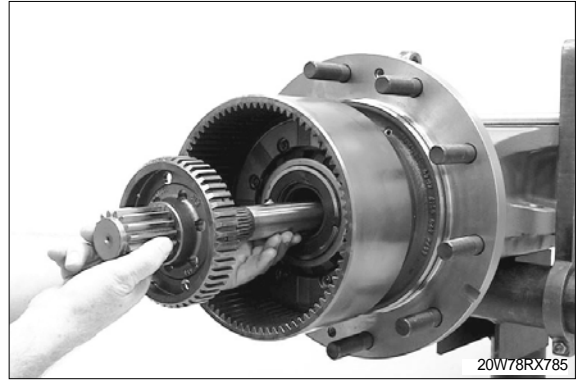
- ☐ Grease the O-ring and place it into the annular groove of the disc carrier.



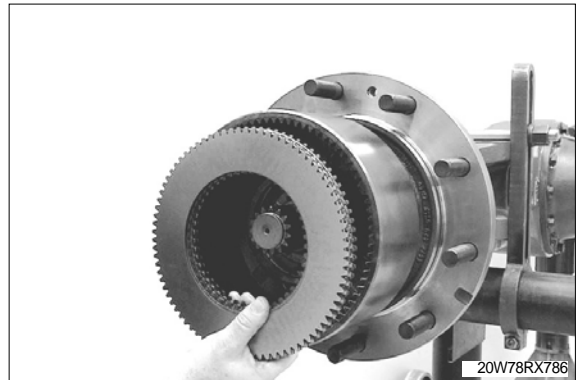
- ☐ Assemble the sun gear into the disc carrier until contact. Then place the disc carrier over the teeth of the stub shaft until contact.



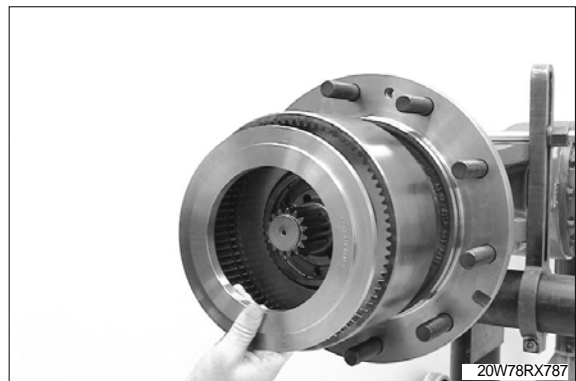
- Assemble the stub shaft with disc carrier and sun gear until contact into the axle casing and into the teeth of the axle bevel gear respectively.



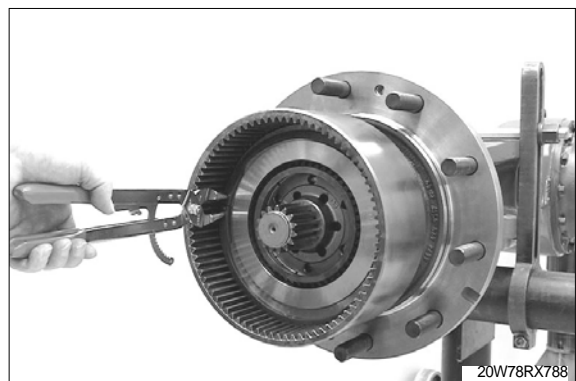
- Install the outer and inner discs alternately, starting with an outer disc.
- ┆ Oil the discs to list of lubricants TE-ML 05.
- ┆ When installing outer discs of different strength, the thinner outer discs have always to be installed at the piston and end shim side.



- Install the end shim into the ring gear.
- ┆ Observe the installation position, see picture.



- æ Fasten the disc set and the end shim by means of the retaining ring.  
Clamping pliers                      5870 900 021



### **Check brake hydraulics for leakage**

- Install the pressure connection.

HP-Pump 5870 287 007

Mini-measuring hub 5870 950 102

Venting bottle 5870 286 072

- ;
- i Prior to start the test, ventilate the brake and then actuate it several times (min. 10 times).

### **Test media :**

Motor oils SAE-10 W corresponding with,

MIL-L 2104 C, MIL-L 46152,

API-CC, CD, SC, SD, SE

ATF oils Type A, Suffic A

Dexron of II D

### **High-pressure test :**

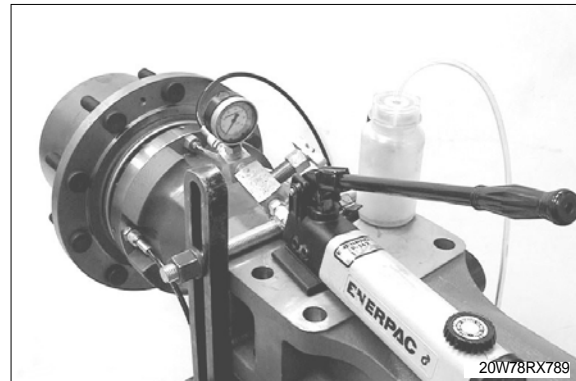
Build up a test pressure of  $p = 120\text{bar}$  and close shut-off valve of the HP-pump.

During a 5 minute testing time a pressure drop of max. 2% ( $p = 2\text{bar}$ ) is allowed.

### **Low-pressure test :**

Build up test pressure  $p = 5\text{bar}$  and close shut-off valve of the HP-pump.

During a 5 minute testing time no pressure drop is allowed.

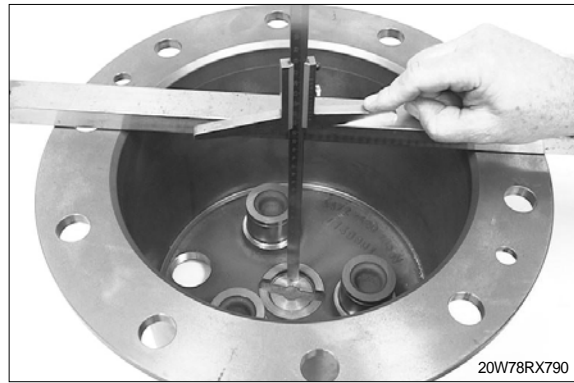


**(5) Reassembly of the planet carrier**

- Adjust the axial play of the sun gear shaft 0.4~0.6mm (Figure □ ~□□)

Measure Dim. I, from the mounting face of the planet carrier to the mounting face of the thrust washer.

|                     |              |
|---------------------|--------------|
| Dim. I, e.g         | 204.6mm      |
| Straightedge        | 5870 200 022 |
| Digital depth gauge | 5870 200 072 |

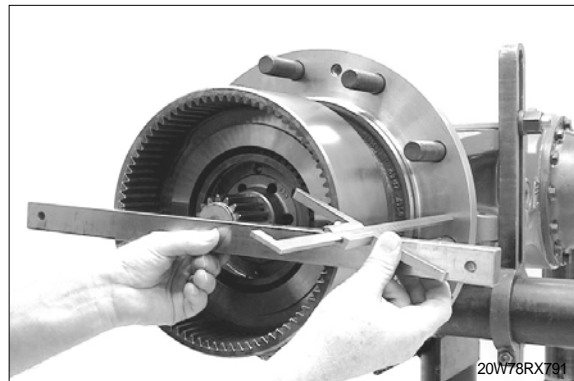


- Determine Dim. II, from the front of the sun gear to the mounting face of the hub.

|              |          |
|--------------|----------|
| Dim. II, e.g | 202.40mm |
|--------------|----------|

**EXAMPLE C :**

|  |          |
|--|----------|
| Dim. I e.g.                                  | 204.6mm  |
| Dim. II e.g.                                 | -202.4mm |
| Difference                                   | 2.2mm    |
| Required axial play e.g.                     | -0.5mm   |
| <b>Result = Thrust washer e.g. s = 1.7mm</b> |          |



- Place the thrust washer(e.g. s = 1.7mm) into the planet carrier and press it until contact.

|        |              |
|--------|--------------|
| Driver | 5870 048 263 |
|--------|--------------|



- Install the planet gear as shown in the opposite figure.

- 1 Planet gear
- 2 Roller bearing
- 3 Shim
- 4 Circlip

