1. REMOVAL FRONT AXLE

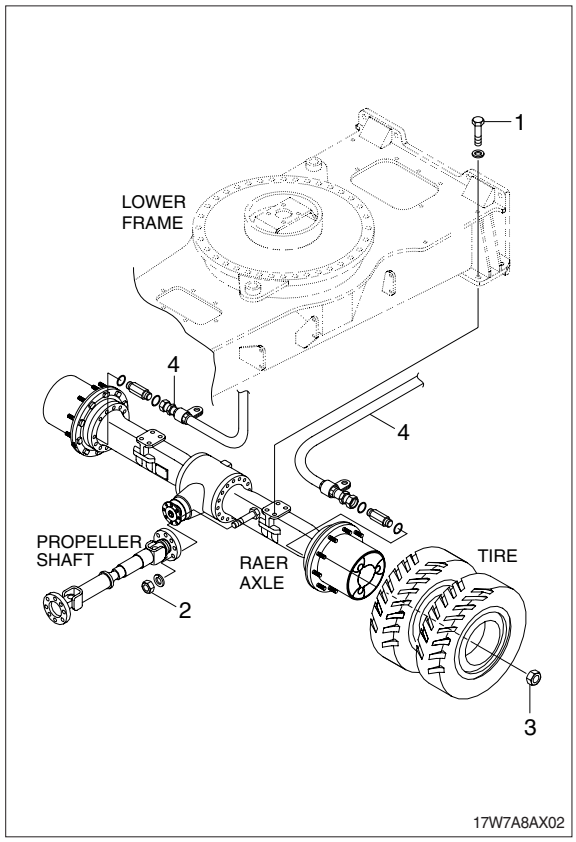
1) Rear axle mounting nut (1, M20)
   · Tightening torque : 58±6.3 kgf · m
   (419±45.5 lbf · ft)

2) Propeller shaft mounting bolt (2, M10)
   · Tightening torque : 5.9±0.6 kgf · m
   (42.7±4.3 lbf · ft)

3) Wheel nut (3, M22)
   · Tightening torque : 60 $^{0}_{-5}$ kgf · m
   (434 $^{0}_{-36}$ lbf · ft)

4) Hose assy (4)

5) Axle weight : 540 kg (1190 lb)



2. GENERAL INSTRUCTIONS

1) GENERAL WORKING INSTRUCTIONS

(1) This manual has been developed for the skilled serviceman, trained by the ZF-Passau.

(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 ZF, will be used.
The special tools are available from ZF-Passau.

(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.

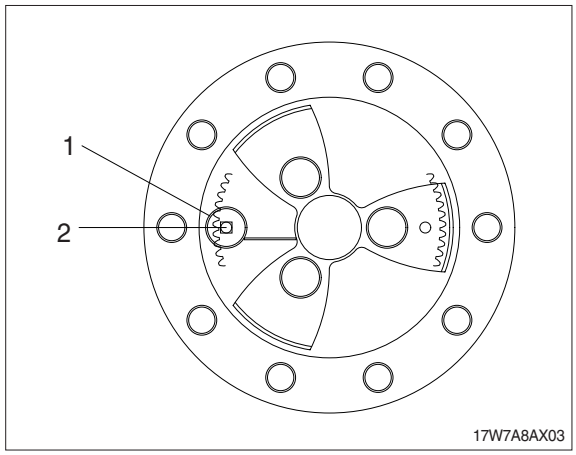
(2) API GL-5

(3) MIL-L-2105D (SAE 85W-90, 85W-140 with LS-Additive)

4) BRAKE LINING WEARING TEST

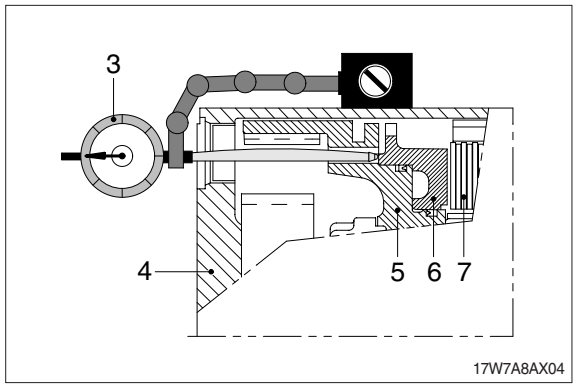
(1) The measurement of wear on the multi-disc brake only gives limited information on the total state of the plate pack without disassembling the output.
Make measurement of lining wear at least once per year, in particular, however, in case of a different braking behaviour, like :
- Braking noises
- Reduced braking power
- Different deceleration
- Different brake oil level
- Different braking pressure

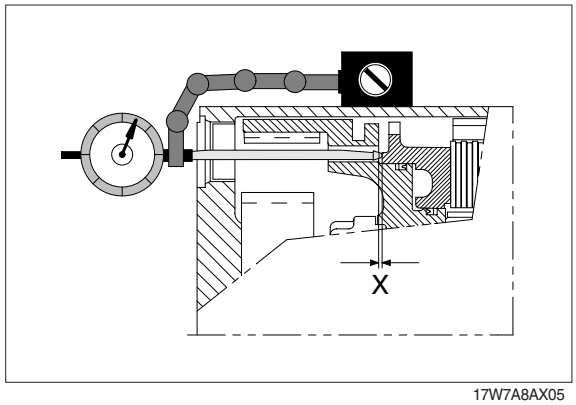
※ To avoid injury when opening the oil drain/ oil filler plug (1), due to a possible pressure build-up in the planetary carrier bring drain hole to topmost position (12 o'clock) and carefully unscrew oil drain and filler plug (1).



(2) Then turn output until oil filler / oil drain hole (2) is on 9 o'clock position.

1 = Oil filler-/oil drain hole
2 = Gauge hole (ø =10 mm) in ring gear
9 o'clock position
3 = Dial indicator with solenoid support
4 = Planetary carrier
5 = Ring gear
6 = Piston
7 = Plate pack
X = Piston stroke



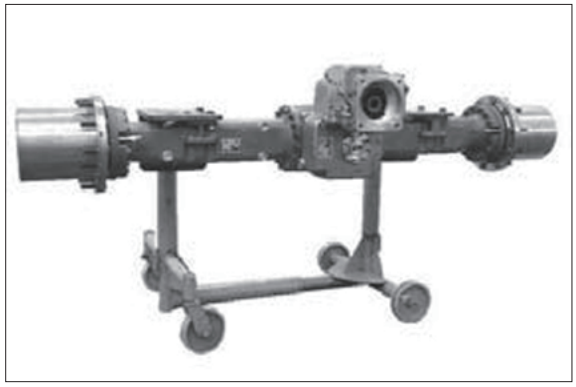


3. DISASSEMBLY

1) OUTPUT

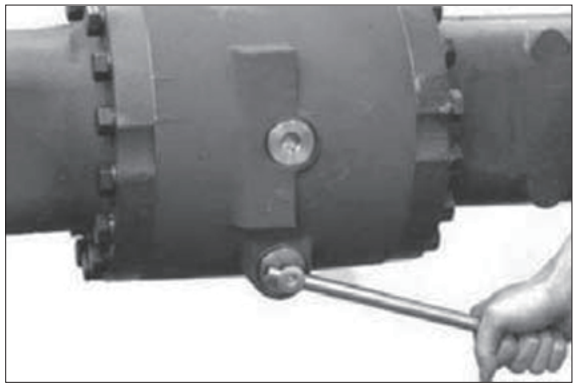
(1) Attach axle to the assembly truck.

(S) Assembly truck 5870 350 000
(S) Supporting bracket 5870 350 106



17W98RA001

(2) Loosen screw plug and drain oil from the axle.

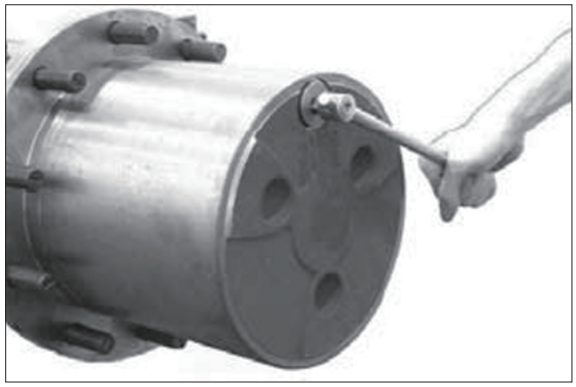


17W98RA002

(3) Loosen screw plug and drain oil from the planetary carrier.

※ To avoid any risk of injury due to a possible pressure buildup in the oil system of the planetary carrier, bring oil filler / level check plug to the uppermost position (12 o'clock) and turn it out carefully.
Then bring drain hole to 6 o'clock position and drain oil.

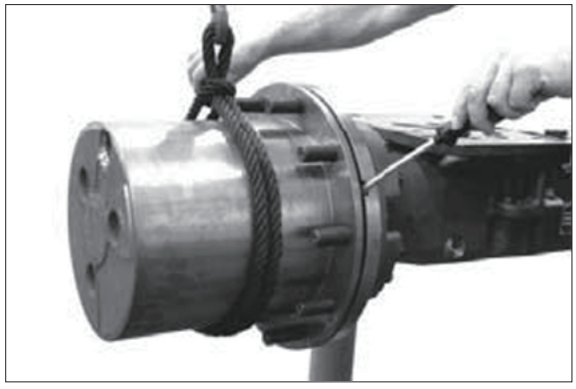
※ Use suitable oil reservoir environmental protection.



17W98RA003

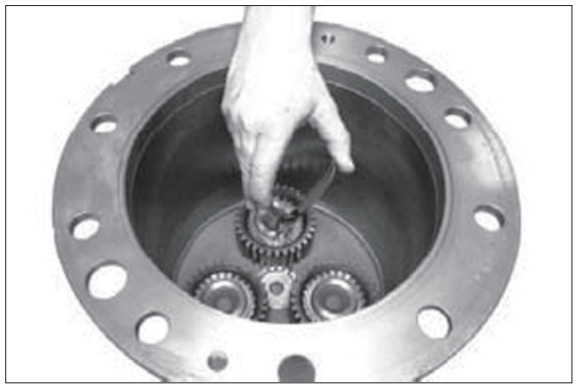
(4) Planetary carrier

Loosen both hexagon screws and separate planetary carrier from the hub.



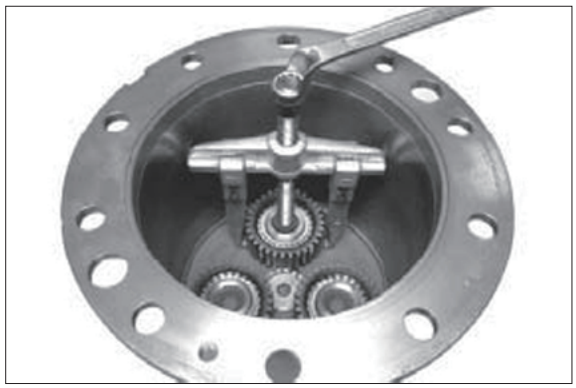
17W98RA004

(5) Snap out retaining ring.



17W98RA005

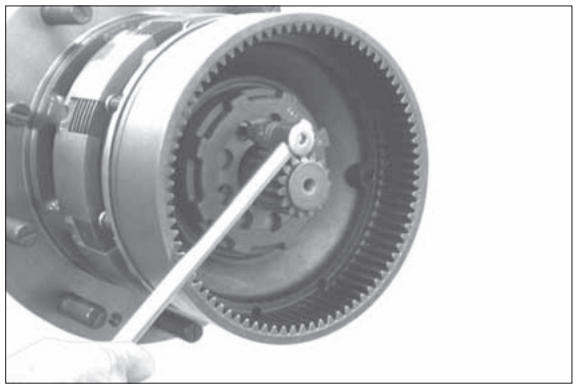
(6) Pull off planetary gear together with cylindrical roller bearing.



17W98RA006

(7) Brake

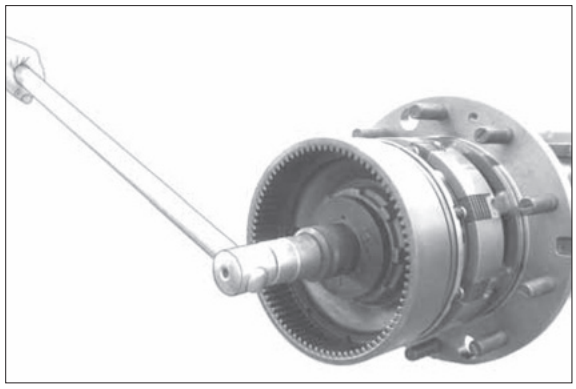
Loosen cylindrical screw (slotted nut fixing).



17W98RA007

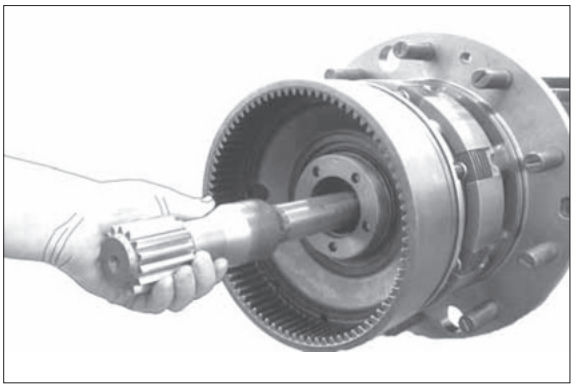
(8) Loosen slotted nut.

(S) Socket wrench 5870 656 097



17W98RA008

(9) Pull sun gear together with stub shaft out of the axle housing.

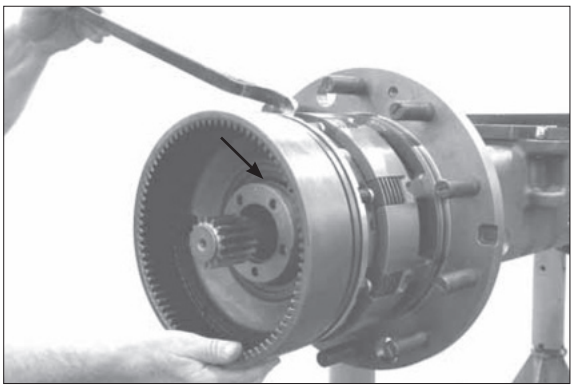


17W98RA009

(10) Press ring gear together with piston off the hub carrier.

(S) Assembly lever 5870 345 036

※ Pay attention so that the O-ring (arrow) does not drop.



17W98RA010

(11) Loosen hexagon screws and remove releasing spring sleeves and compression springs.

17W98RA011

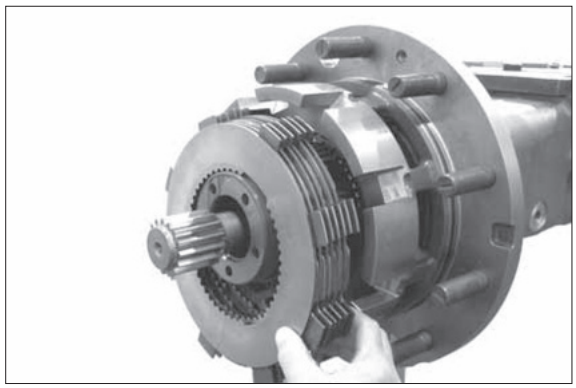
(12) Press piston off the ring gear.

17W98RA012

(13) Remove sealing elements from the annular grooves (see arrows) of the ring gear.

17W98RA013

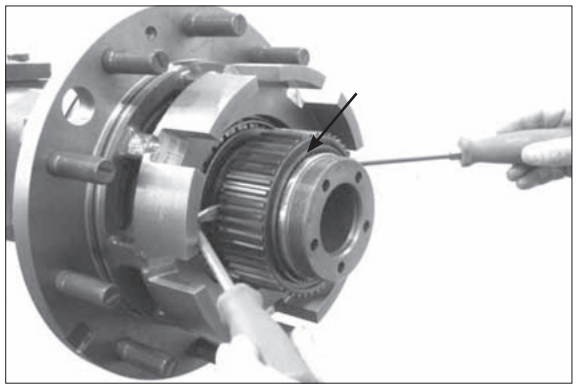
(14) Remove disk package.



17W98RA014

(15) Remove O-ring (seee arrow) and use a lever to remove disk carrier from hub carrier.

(S) Resetting device 5870 400 001



17W98RA015

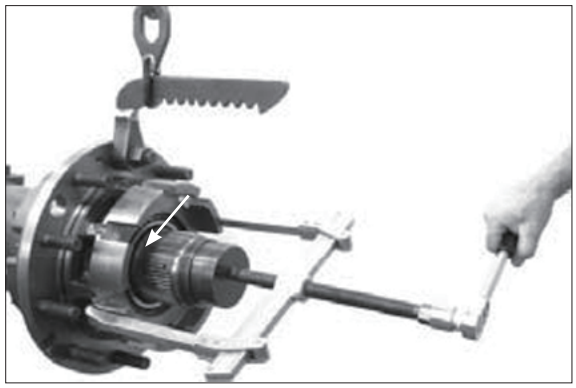
(15) Hub

Remove O-ring (see arrow).

Secure hub with lifting bracket (S) and pull it off the hub carrier by means of a two armed puller.

(S) Lifting bracket 5870 281 043
(S) Pressure piece 5870 100 063

※ Pay attention that the releasing bearing inner ring does not drop.

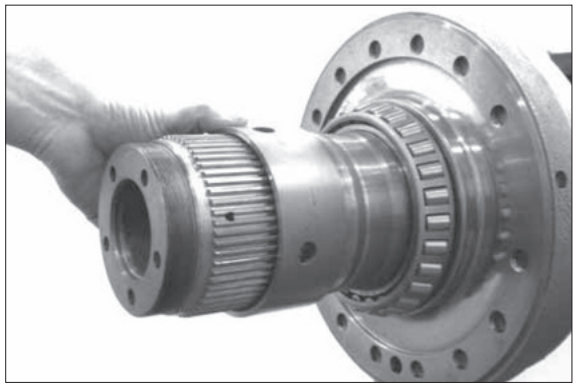


17W98RA016

(17) Use a lever to remove the shaft seal ring (see arrow) from the hub hole and force both bearing outer rings out of the hub.

17W98RA017

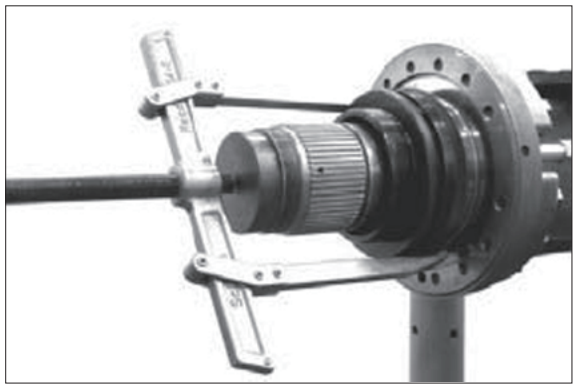
(18) Remove spacer bush.



17W98RA018

(19) Pull tapered roller bearing off the hub.

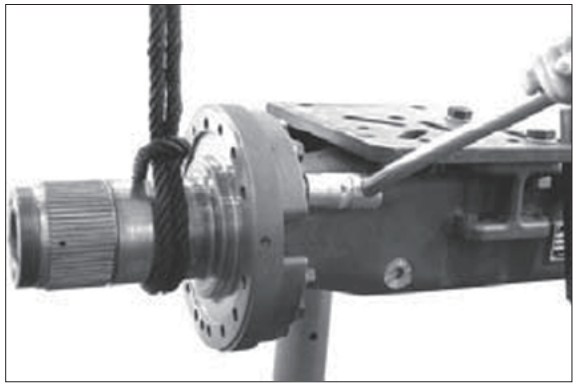
(S) Grab sleeve	5873 004 026
(S) Pressure piece	5870 100 063



17W98RA019

(20) Secure hub carrier with lifting tackle, loosen threaded joint and separate hub carrier from the axle housing.

Then remove single parts such as screw neck, breather valve and O-ring from the hub carrier.



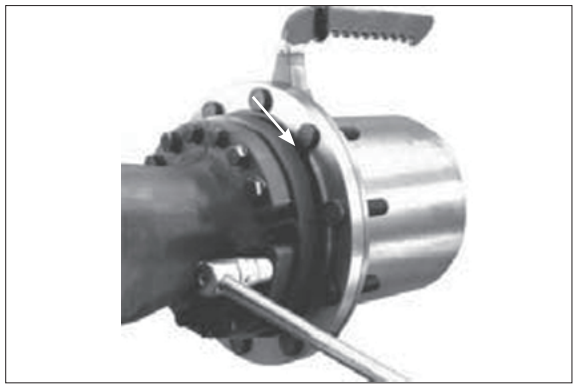
17W98RA020

(21) Output assy

※ If work is to be done on the differential or pinion, you may remove the output as a complete unit (operations figure RA021 and RA022).

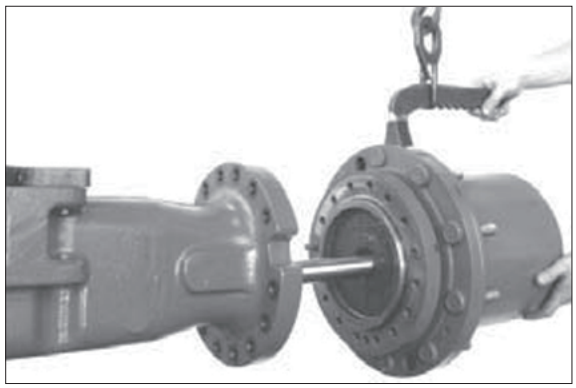
Secure output by means of lifting tackle (S) and loosen threaded joint.

(S) Lifting bracket 5870 281 043



17W98RA021

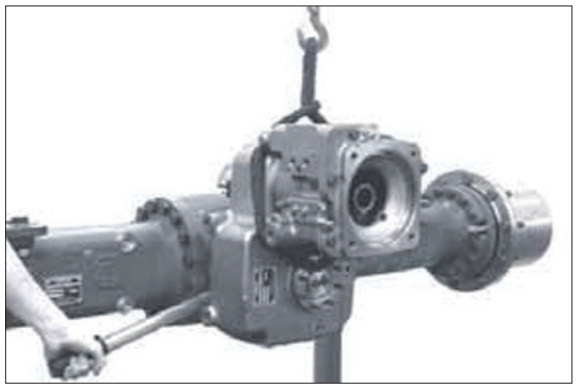
(22) Separate output assy from the axle housing and pull out stub shaft.



17W98RA022

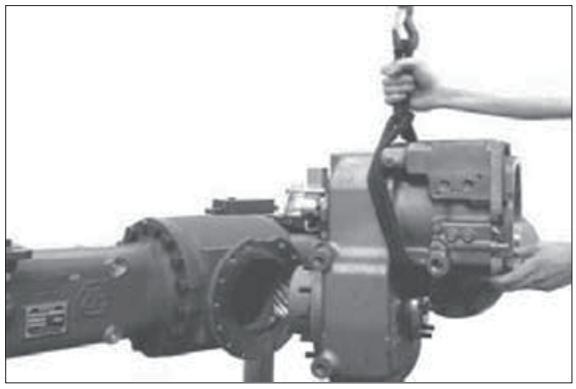
2) INTPUT

(1) Secure transmission with lifting tackle and loosen threaded joint (transmission/axle drive housing).



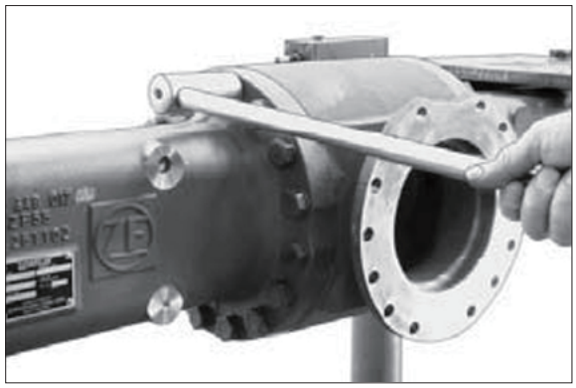
17W98RA023

(2) Separate transmission from the axle.



17W98RA024

(3) Secure axle housing (on crown wheel side) by means of lifting tackle and loosen threaded joint.

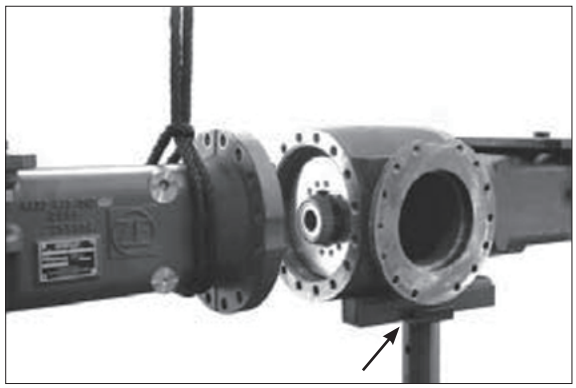


17W98RA025

(4) Support axle at the axle drive housing (see arrow).

Then separate axle housing from the axle drive housing.

※ Pay attention that the differential does not drop.

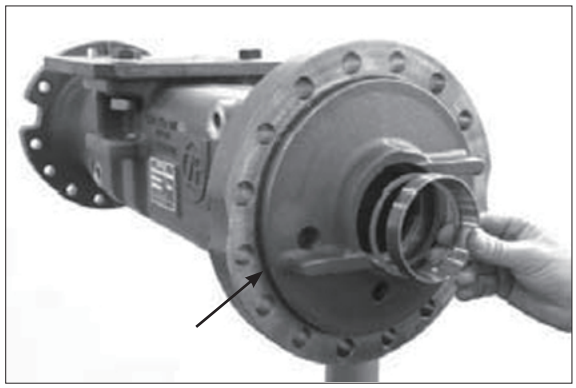


17W98RA026

(5) Pull bearing outer ring out of the bearing hole and remove the releasing shim.

Then remove O-ring (see arrow).

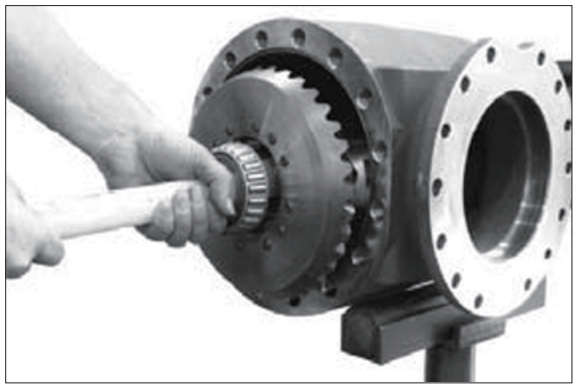
(S) Striker 5870 650 004



17W98RA027

(6) Lift differential out of the axle drive housing.

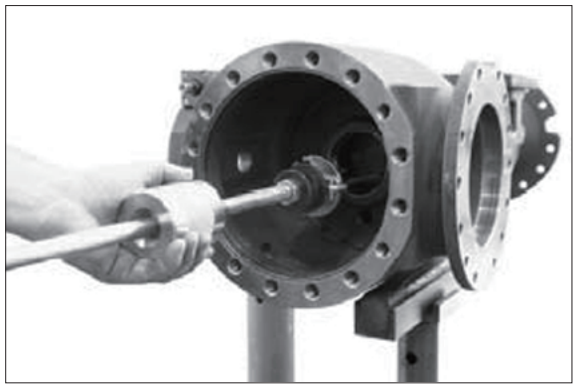
※ Disassembly of the differential see description on page 8-241 and following.



17W98RA028

(7) Use striker (S) to pull bearing outer ring out of the bearing hole (axle housing) and remove the releasing shim.

(S) Striker 5870 650 004

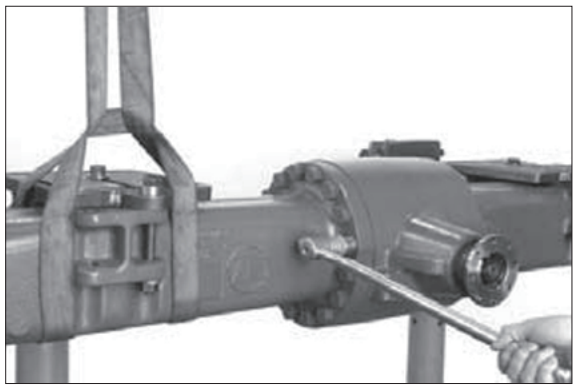


17W98RA029

(8) Secure axle housing (on crown wheel side, part II) by means of lifting tackle and loosen threaded joint.

Then separate axle housing (part II) from the axle drive housing.

※ Pay attention that the differential does not drop.

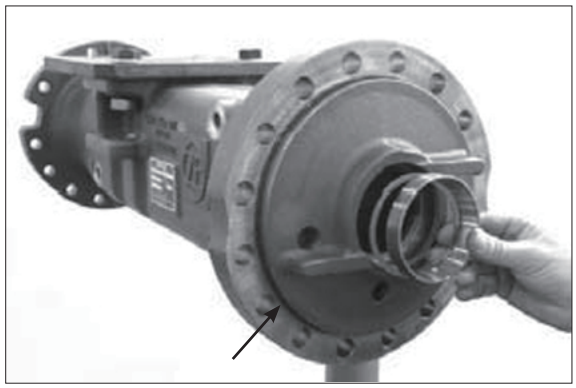


17W98RA030

(9) Pull bearing outer ring out of the bearing hole and remove the releasing shim.

Then remove O-ring (see arrow).

(S) Striker 5870 650 004

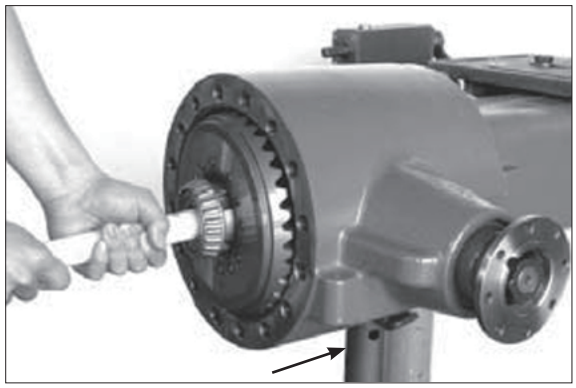


17W98RA031

(10) Support axle at the axle drive housing (see arrow).

Then lift differential out of the axle drive housing.

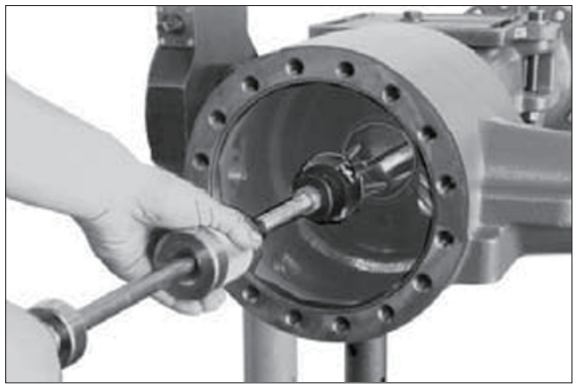
※ Disassembly of the differential see description on page 8-241 and following.



17W98RA032

(11) Use striker (S) to pull bearing outer ring out of the bearing hole (axle housing) and remove the releasing shim.

(S) Striker 5870 650 004



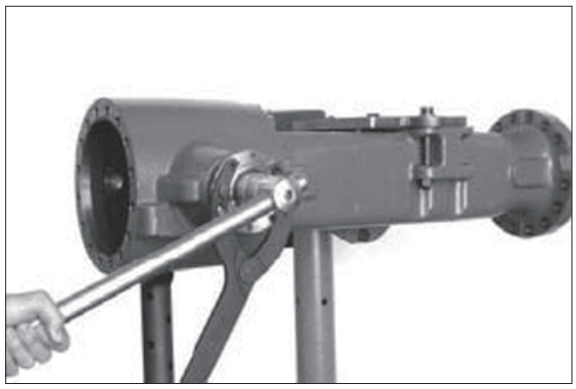
17W98RA033

(12) Heat up hexagon nut with hot-air blower.

Then loosen hexagon nut and remove the releasing washer.

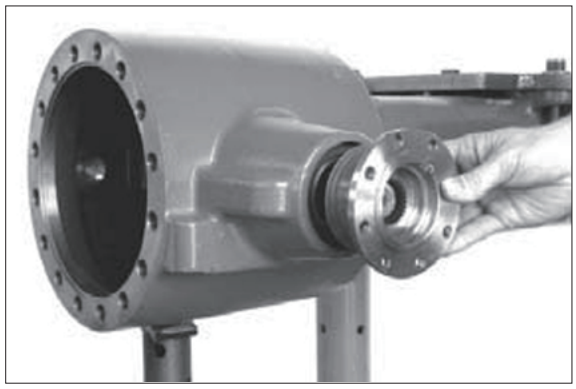
(S) Clamping fork 5870 240 025

※ Hexagon nut is secured with Loctite no. 262.



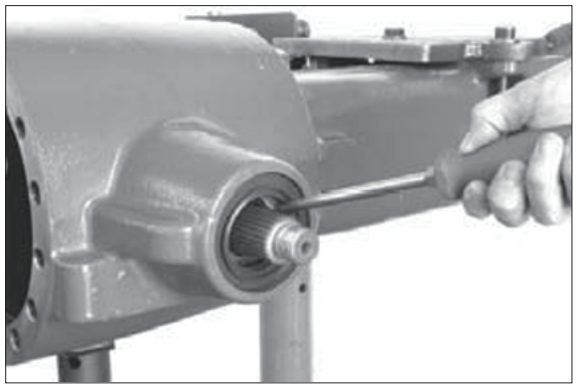
17W98RA034

(13) Pull input flange off the pinion.
If required, remove screen sheet from the flange.



17W98RA035

(14) Use a lever to remove the shaft seal ring out of the housing hole.

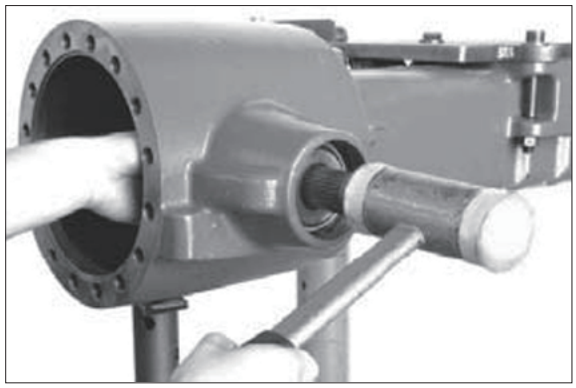


17W98RA036

(15) Force out input pinon and remove the releasing roller bearing.

※ Use a plastic hammer.

※ If the tapered roller bearings are not replaced, pay attention that all the rollers of the outer bearing inner ring are always in contact with the bearing outer ring when forcing out the input pinion.



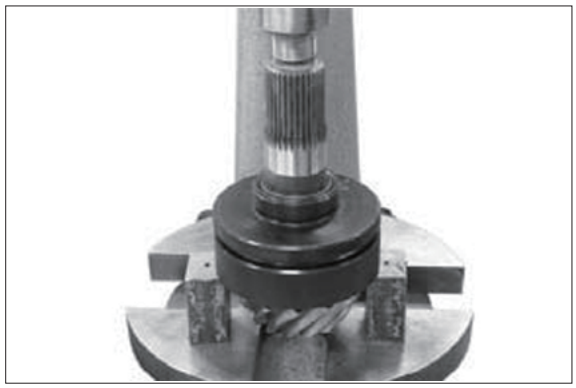
17W98RA037

(16) Remove spacer ring.

17W98RA038

(17) Press roller bearing off the input pinion.

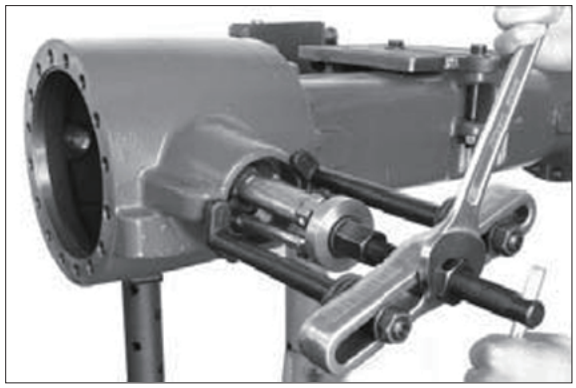
(S) Grab sleeve 5873 001 037



17W98RA039

(18) Pull external bearing outer ring out of the bearing hole.

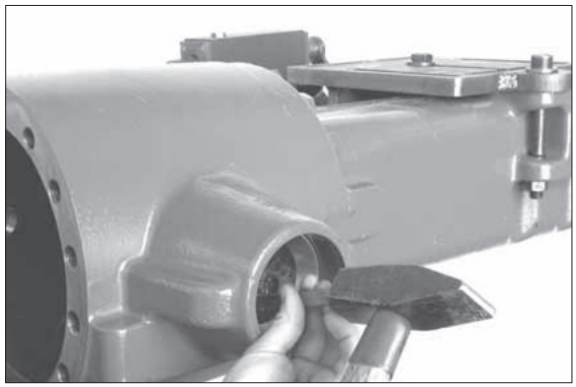
(S) Internal extractor 5870 300 019
(S) Counter support 5870 300 020



17W98RA040

(19) Force bearing outer ring off the inner bearing hole pay attention to the shim behind.

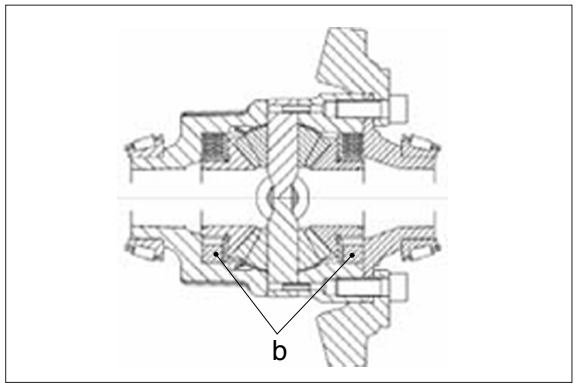
※ Mark shim regarding position/bearing allocation reassembly aid.



17W98RA041

3) DIFFERENTIAL

(1) b = Constant spacers



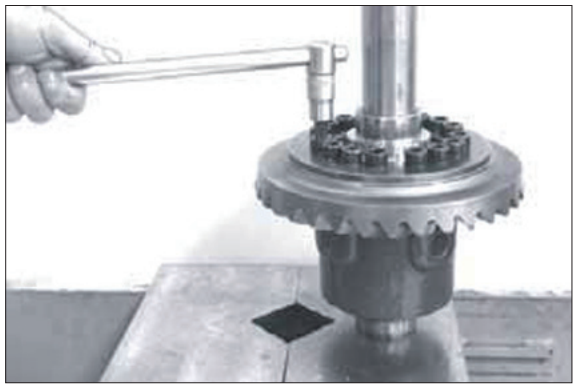
17W98RA042

(2) Pull both tapered roller bearings from differential carrier.

(S) Grab sleeve	5873 011 019
(S) Basic tool	5873 001 000
(S) Pressure piece	5870 100 009

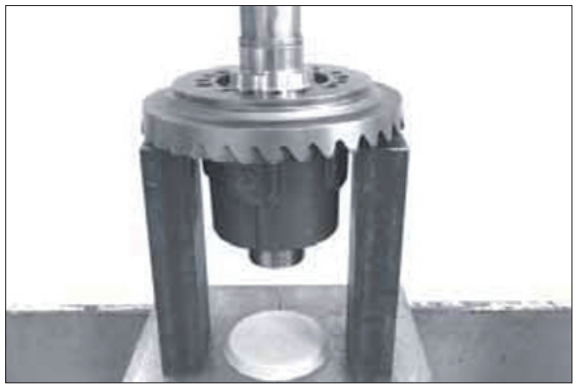
17W98RA043

(3) Use press to fix differential and loosen threaded joint crown wheel / differential carrier.



17W98RA044

(4) Press crown wheel from differential.



17W98RA045

(5) Remove single parts.

Remove axle bevel gear together with thrust washer and constant spacer from the differential carrier.

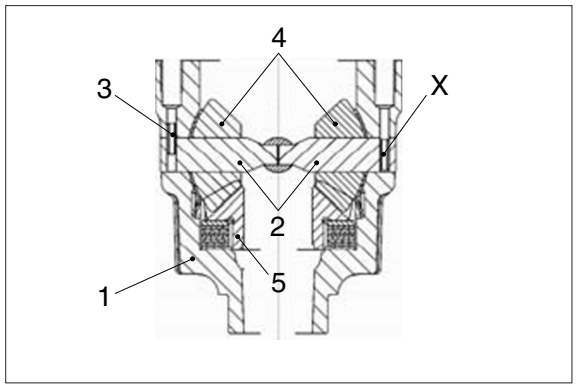
17W98RA046

(6) Force slotted pins (considering position "X", see subsequent sketch) into the spider shafts.

17W98RA047

(7) Comment on sketch:

1 = Differential carrier
2 = Spider shafts (short)
3 = Slotted pins
4 = Differential bevel gears
5 = Axle bevel gear
X = Position of the slotted pin to force out the spider shafts



17W98RA048

(8) Force out both spider shafts (short).

17W98RA049

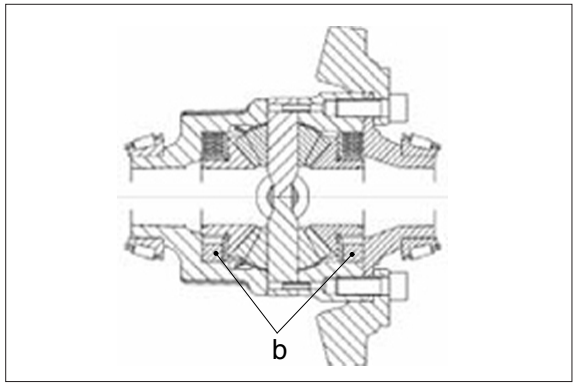
(9) Remove all single parts.

17W98RA050

4. REASSEMBLY

1) DIFFERENTIAL

(1) b = Constant spacers

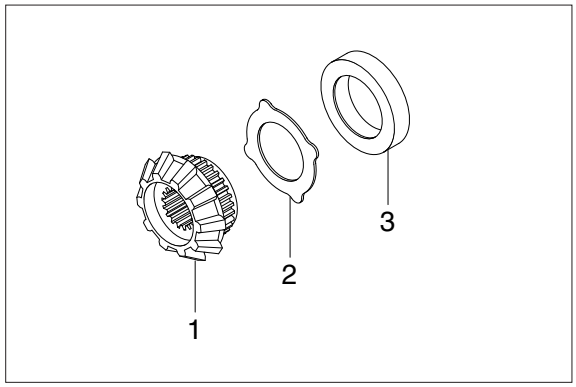


17W98RA042

(2) All outer and inner disks are replaced by a constant spacer (see figure FA054).

1 = Axle bevel gear
2 = Pressure disk
3 = Constant ring

※ No measuring / setting of the axial play of the two axle bevel gears is required, therefore single parts can be immediately oiled.



17W98RA053

(3) Insert premounted axle bevel gear into the differential carrier.

17W98RA054

(4) Insert differential bevel gears (1) with thrust washers (2) and fix with spider shafts (3 and 4).

※ Pay attention to radial installation position of the thrust washers.

17W98RA055

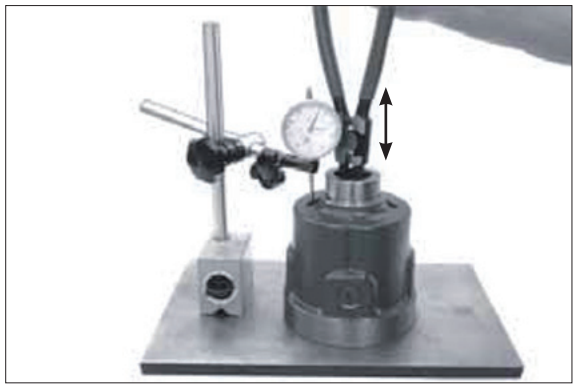
(5) Check axial play of the axle bevel gear 0.0 … 0.15 mm.

※ If the axial play is not within the specified tolerance, correct with the corresponding outer disks.

After the setting procedure separate the single parts again.

Then oil and reassemble all single parts again.

※ Make sure that thickness and arrangement of the second disk package are identical (Figure RA059).



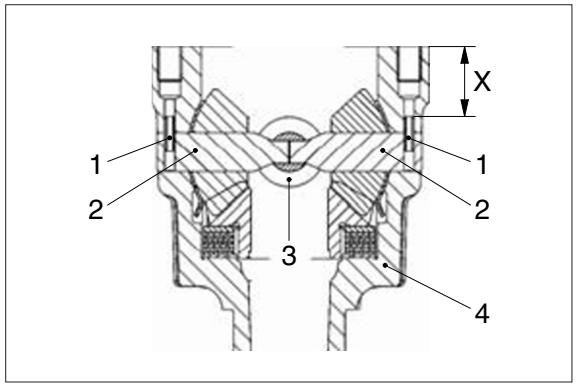
17W98RA056

(6) Fix both spider shafts (short) by means of slotted pins (considering installation dimension, see sketch RA058).

17W98RA057

(7) Comment on sketch:

1 = Slotted pin
2 = Spider shaft (short)
3 = Spider shaft
4 = Differential carrier
X = Installation dimension 34 ± 0.5 mm



17W98RA058

(8) Mount second axle bevel gear with thrust washer and constant spacer (see also figure RA053).

※ Mount the pressure disk with the coated surface showing to the outer disk.

※ Thickness and arrangement of the disk package must be identical on both sides of the differential gear.

17W98RA059

(9) Check axial play of the second axle bevel gear 0.0 … 0.15 mm.

※ If the axial play is not within the specified tolerance, correct with the corresponding outer disks.

After the resetting procedure remove the second axle bevel gear together with the disk package from the differential carrier.

Then oil and reassemble all single parts.

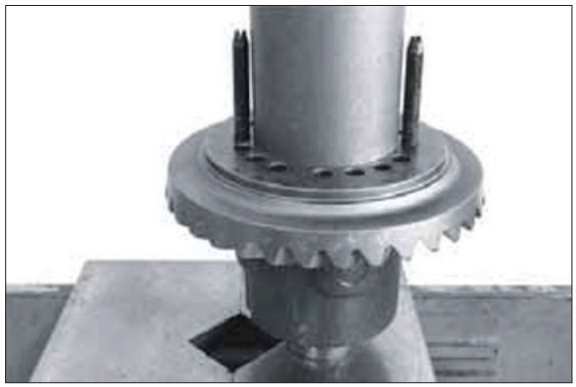
17W98RA060

(10) Mount two adjusting screws (S) and insert cover.

(S) Adjusting screws (M12 × 1.5)
5870 204 027

17W98RA061

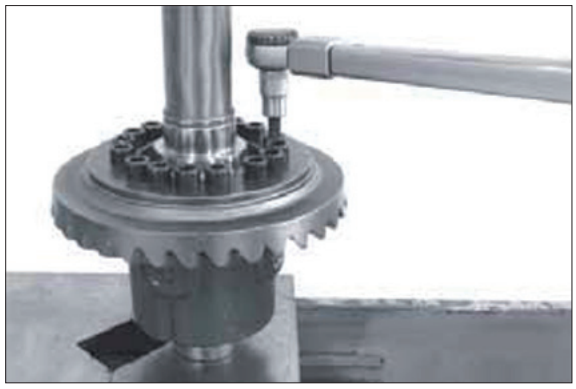
(11) Press crown wheel onto the cover / differential carrier until contact position is obtained.



17W98RA062

(12) Fix differential with press and tighten crown wheel with cylindrical screws.

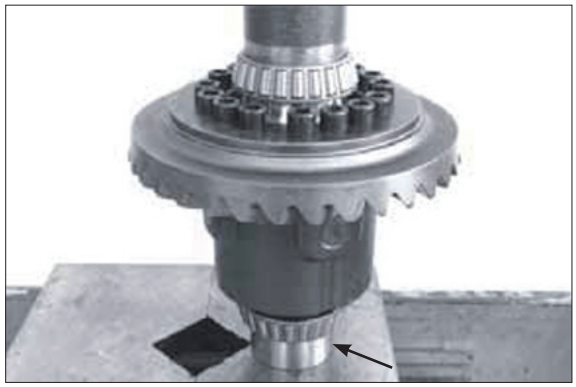
Tightening torque (M12 × 1.5/12.9) . . . . . MA = 145 Nm



17W98RA063

(13) Press on both bearing inner rings until contact is obtained.

※ Use an appropriate support (arrow) differential may not be supported on the bearing cage.

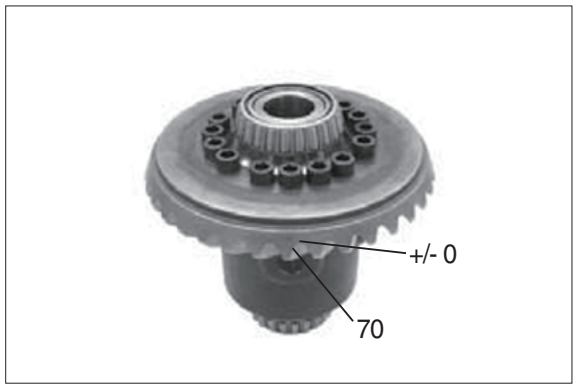


17W98RA064

2) INPUT

(1) Determination of shims for setting the bearing rolling torque (differential bearing) and the backlash (bevel gear set).

※ Determine the required shims on basis of the read value (test dimension/ crown wheel) and the corresponding specifications of the table next page : (KRS – SET – RIGHT) (KRS = bevel gear set)

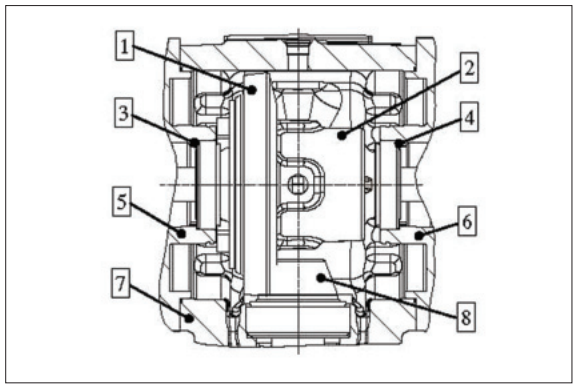


17W98RA065

(2) Test dimension see crown wheel rear side.

※ The test dimension "70" is stamped into the crown wheel rear side. If no + or deviation is indicated, this value corresponds with the test dimension/ actual value "70" in the table below. According to this value, the required shims are allocated in the table below.

Any + or - deviation of the test dimension caused by production is also marked on the crown wheel rear side (e.g. 20 or – 10 / 10 or 20) . In accordance with this deviation, the required shims are allocated in the table below.



17W98RA066

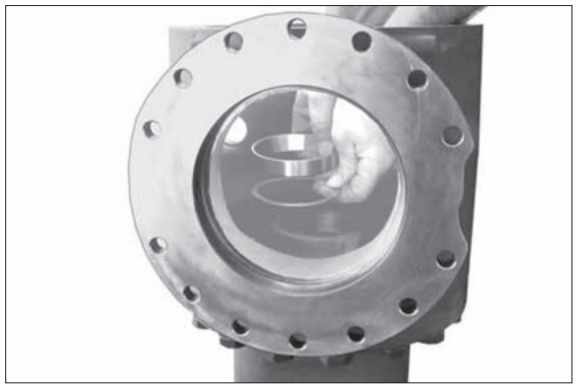
· Legend to sketch:

1 = Crown wheel
2 = Differential carrier
3 = Shim (crown wheel side)
4 = Shim (diff. carrier side)
5 = Axle housing
6 = Axle housing
7 = Axle drive housing
8 = Input pinion

Setting disks for differential					
Test dimension/crown wheel marking 70 and deviation	-20	-10	0	10	20
results in→test dim. / actual value	69.80	69.90	70.0	70.10	70.20
Shim/ diff. carrier side Required shim thickness	0.95	1.05	1.15	1.25	1.35
Shim No.	0730 006 518	0730 006 519	0730 006 521	0730 006 522	0730 006 524
Shim/crown wheel side Required shim thickness	1.35	1.25	1.15	1.05	0.95
Shim No.	0730 006 524	0730 006 522	0730 006 521	0730 006 519	0730 006 518

(3) Place determined shim (e.g. thickness = 1.15 mm) and bearing outer ring into the hole of the axle housing on differential carrier side.

※ Rotate axle housing by 90˚.



17W98RA067

(4) Place determined shim (e.g. thickness = 1.15 mm) and bearing outer ring into the hole of the axle housing on crown wheel side.

17W98RA068

(5) Contact pattern check of bevel gear set

Cover some drive and coast flanks of the crown wheel with marking ink.

17W98RA069

(6) Place preassembled differential into the axle drive housing.

(S) Internal extractor 5870 300 005

17W98RA070

(7) Use lifting tackle to mount the axle housing (crown wheel side) and preliminarily fix it with hexagon screws.

Tightening torque (M18/10.9) . . . . . MA = 390 Nm

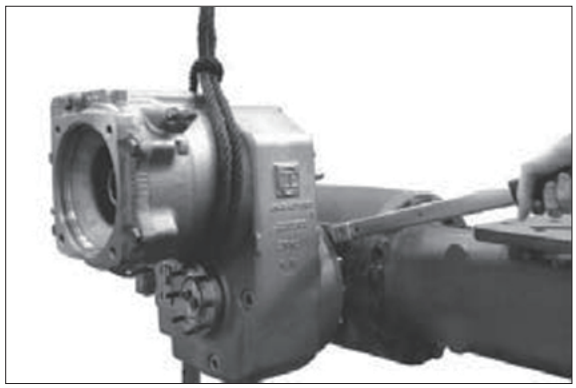
※ Preliminarily fix axle housing without O-ring.

17W98RA071

(8) Rotate axle by 90˚ and support it.

Use lifting tackle to bring HL transmission into contact position with the axle housing and fix it.

Tightening torque . . . . . MA = 79 Nm



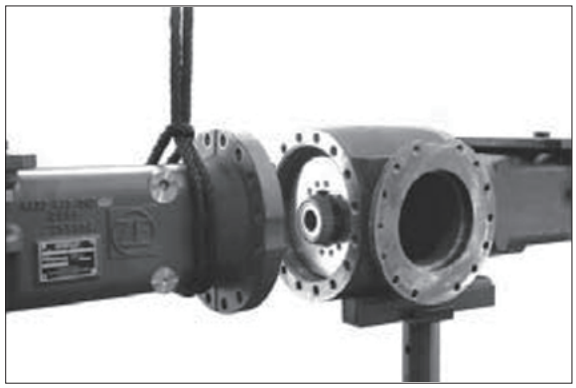
17W98RA072

(9) By rotating the input flange, roll crown wheel over the input pinion in both directions several times.

Then remove transmission and axle housing and lift differential out of the axle drive housing.

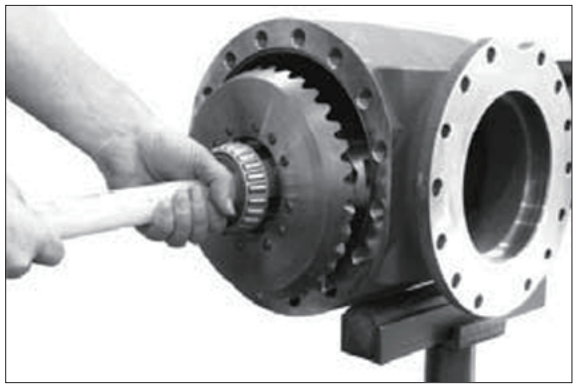
Compare the obtained contact pattern.

※ In case of a contact pattern deviation, check the pinion shimming of the transmission.



17W98RA073

(10) After contact pattern check, place differential into the axle drive housing.



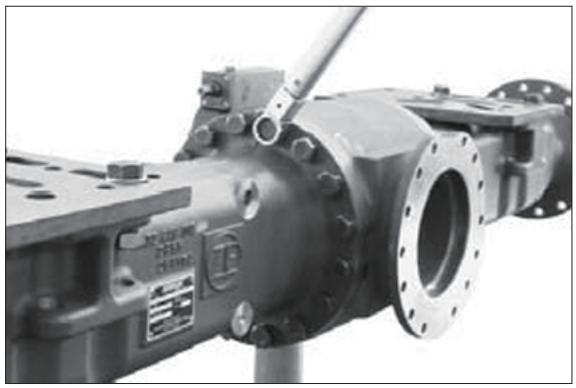
17W98RA074

(11) Grease O-ring (see arrow) and mount it to axle housing.

17W98RA075

(12) Use lifting tackle to mount the axle housing and finally tighten it with hexagon screws.

Tightening torque (M18/10.9) . . . . . MA = 390 Nm



17W98RA076

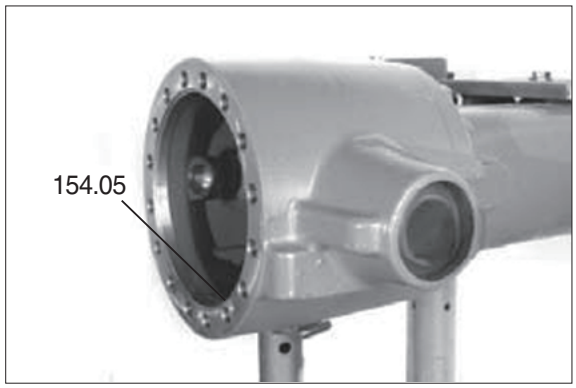
3) INPUT PINION

The following measuring operations must be carried out with utmost accuracy.
Inaccurate measurements lead to an incorrect contact pattern and require an additional disassembly and reassembly of the input pinion.

(1) Determination of shim thickness to obtain a correct contact pattern

Read dimension I from the axle drive housing.

Dim. I e.g. . . . . 154.05 mm



17W98RA077

(2) Read dimension II (pinion dimension).

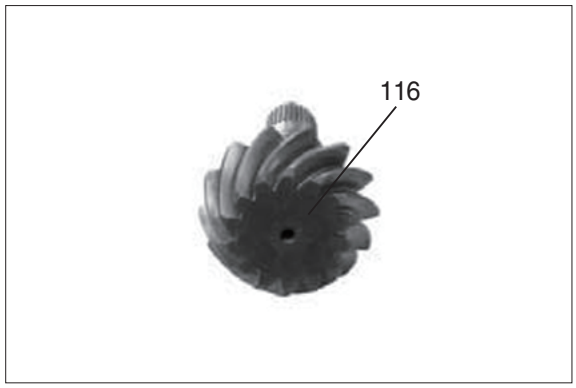
Dim. II e.g. . . . . 116.00 mm

In case of a + or - deviation of the pinion dimension for production reasons, the respective value is marked by hand on the pinion.

Pinion dim. (without + or – deviation) = 116.0 mm

Pinion dim. with + 0.1 deviation value = 116.1 mm

Pinion dim. with - 0.1 deviation value = 115.9 mm



17W98RA078

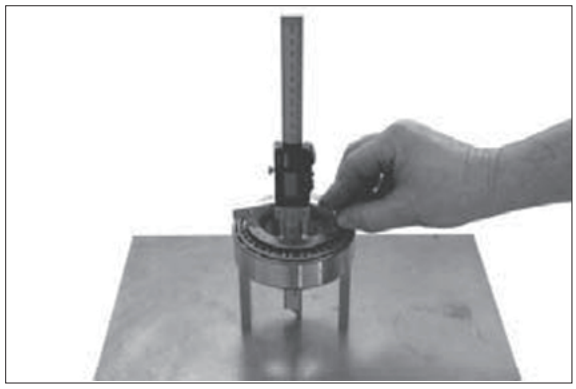
(3) Determine dimension III (bearing width).

※ Make sure that the rollers are located without any play (rotate bearing inner ring several times in both directions roller setting).

Since the installed roller bearing is subject to a preload in installation position, deduct an experience value of 0.1 mm.

Dimension III, e.g. 36.60 mm - 0.1 mm = 36.50 mm

(S) Gage blocks 5870 200 066

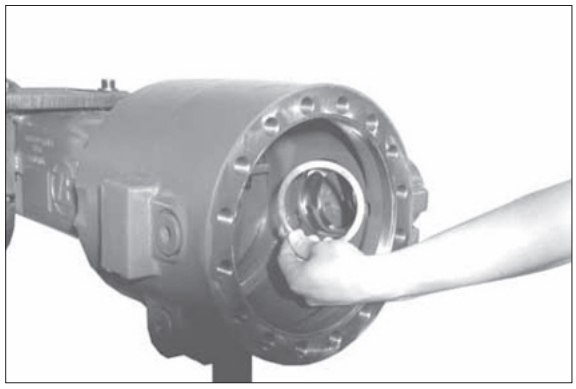


17W98RA079

(4) Calculation example :

Dimension I . . . . . 154.05 mm
Dimension X . . . . . - 152.50 mm
Difference = shim s = 1.55 mm

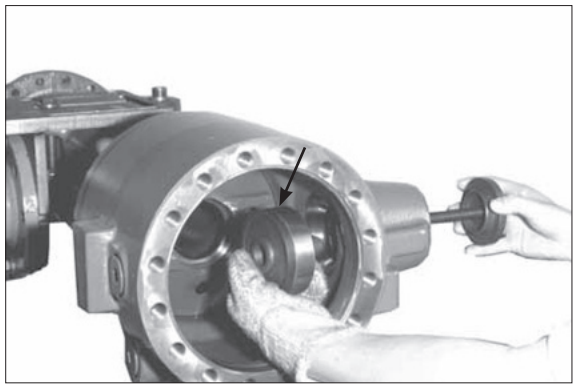
Place the determined shim (e.g. thickness = 1.55 mm) into the inner bearing hole.



17W98RA080

(5) Undercool bearing outer ring (see arrow) and bring it into contact position in the bearing hole by using the assembly fixture (S).

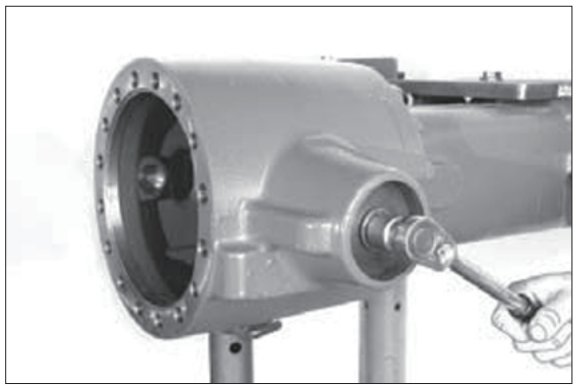
(S) Assembly fixture 5870 345 049
(S) Pressure ring 5870 345 056



17W98RA081

(6) Undercool external bearing outer ring and insert it into the bearing hole until contact is obtained.

(S) Assembly fixture 5870 345 049
(S) Pressure ring 5870 345 056

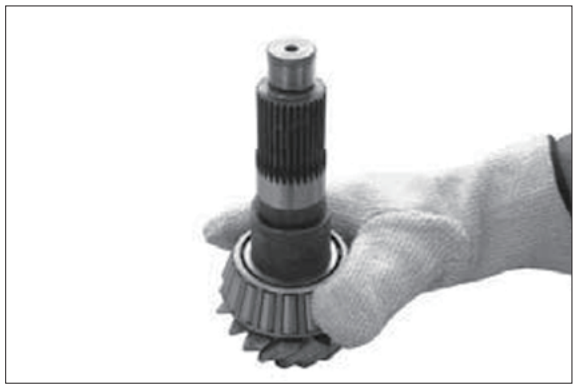


17W98RA082

(7) Adjustment of the rolling torque of input pinion bearing 1.0 ... 3.0 Nm (without shaft seal ring)

Heat up roller bearing and install it until contact is obtained.

※ Adjust bearing after cooling-down.



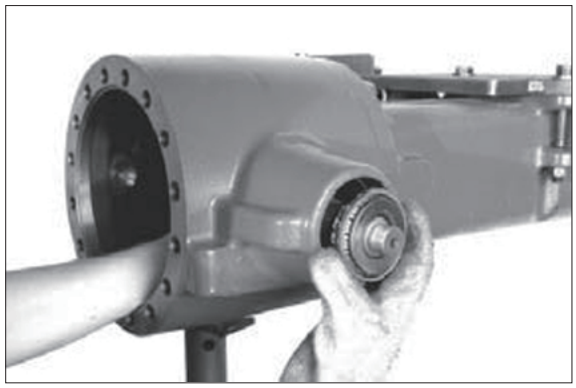
17W98RA083

(8) Mount spacer ring (e.g. thickness = 16.96 mm).

※ According to our experience, the necessary rolling torque is obtained when reusing the spacer ring which has been removed during disassembly (e.g. thickness = 16.96 mm).
A later check of the rolling torque, however, is absolutely necessary.

17W98RA084

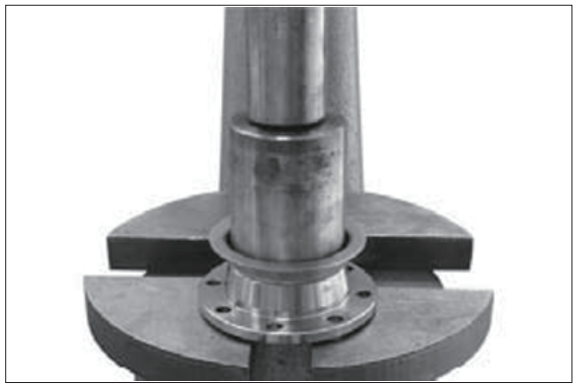
(9) Place the preassembled input pinion into the axle housing and mount the heated roller baring until contact is obtained.



17W98RA085

(10) Press screen sheet (see arrow) onto the input flange until contact is obtained.

※ Do not fit the shaft seal ring until the contact pattern has been checked.



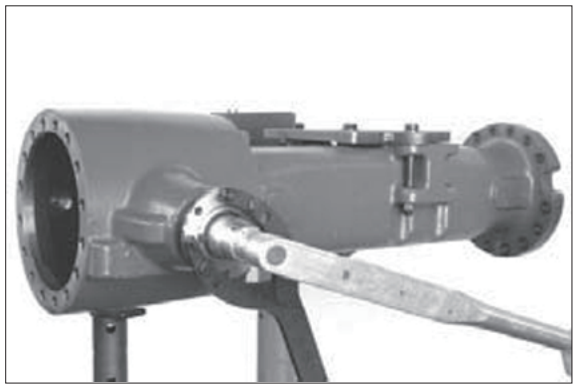
17W98RA086

(11) Mount input flange and fix it with washer and hexagon nut.

Tightening torque (M30x1.5) . . . . . MA = 600 Nm

(S) Clamping fork 5870 240 025

※ While tightening, rotate the input pinion in both directions several times.



17W98RA087

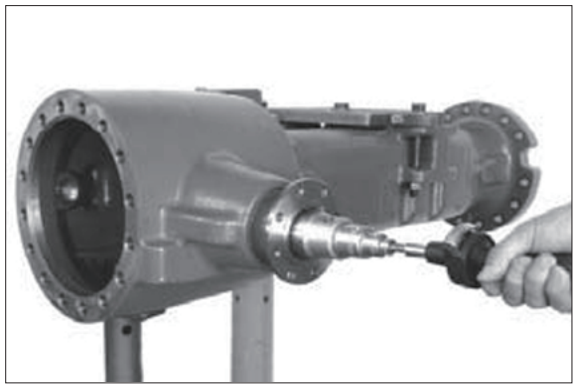
(12) Check rolling torque (1.0 ... 3.0 Nm without shaft seal ring).

※ When installing new bearings, try to achieve the upper value of the rolling torque.

※ Any deviation from the required rolling torque must be corrected with an appropriate spacer ring (Figure RA110) as specified below.

Insufficient rolling torque - install thinner spacer ring.

Excessive rolling torque - install thicker spacer ring.



17W98RA088

(13) Determination of shims for setting the bearing rolling torque (differential bearing) and the backlash (bevel gear set)

※ Determine the required shims on basis of the read value (test dimension/crown wheel) and the corresponding specifications of the table below:
(KRS – SET – RIGHT) (KRS = bevel gear set) : Test dimension see crown wheel rear side.

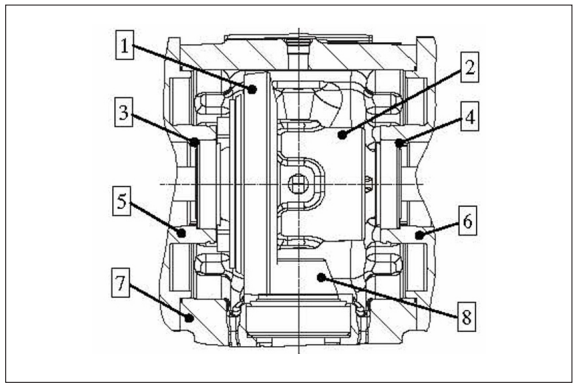
※ The test dimension "70" is stamped into the crown wheel rear side. If no + or deviation is indicated, this value corresponds with the test dimension/ actual value "70" in the table below. According to this value, the required shims are allocated in the table below.

※ Any + or – deviation of the test dimension caused by production is also marked on the crown wheel rear side (e.g. – 20 or – 10 / 10 or 20) . In accordance with this deviation, the required shims are allocated in the table below.

17W98RA089

(14) Legend to sketch:

1 = Crown wheel
2 = Differential carrier
3 = Shim (crown wheel side)
4 = Shim (diff. carrier side)
5 = Axle housing
6 = Axle housing
7 = Axle drive housing
8 = Input pinion

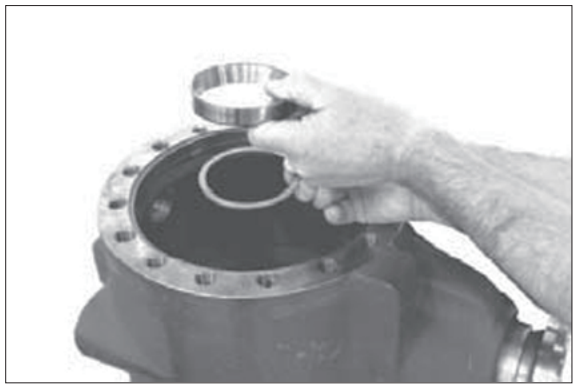


17W98RA090

Shims for differential					
Test dimension/crown wheel marking 70 and deviation	-20	-10	0	10	20
results in → test dim. / actual value	69.80	69.90	70.0	70.10	70.20
Shim/ diff. carrier side Required shim thickness	0.95	1.05	1.15	1.25	1.35
Shim No.	0730 006 518	0730 006 519	0730 006 521	0730 006 522	0730 006 524
Shim/crown wheel side Required shim thickness	1.35	1.25	1.15	1.05	0.95
Shim No.	0730 006 524	0730 006 522	0730 006 521	0730 006 519	0730 006 518

(15) Place determined shim (e.g. thickness = 1.15 ㎜) and bearing outer ring into the hole of the axle housing on differential carrier side (part I).

※ Rotate axle housing by 90˚.



17W98RA091

(16) Place determined shim (e.g. thickness = 1.15 ㎜) and bearing outer ring into the hole of the axle housing on crown wheel side (part II).

17W98RA092

(17) Contact pattern check of bevel gear set

Cover some drive and coast flanks of the crown wheel with marking ink.

17W98RA093

(18) Place preassembled differential into the axle drive housing.

17W98RA094

(19) Use lifting tackle to mount the axle housing (crown wheel side, part II) and preliminarily fix it with hexagon screws.

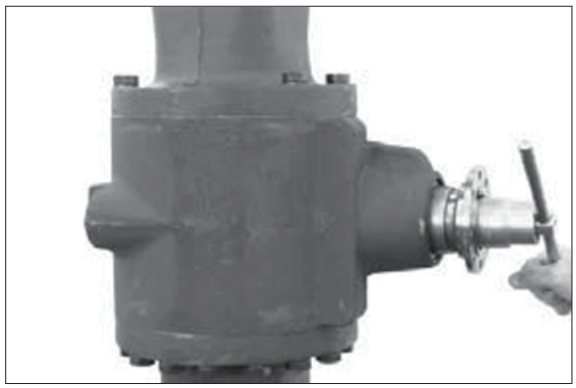
Tightening torque (M18/10.9) . . . . . MA = 390 Nm

※ Preliminarily fix axle housing without O-ring.

17W98RA095

(20) By rotating the input flange, roll crown wheel over the input pinion in both directions several times.
Then remove axle housing and lift differential out of the axle drive housing.
Compare the obtained contact pattern with contact pattern.

※ In case of a contact pattern deviation it is imperative to correct the measuring error which was made when determining the shim (figure RA080).



17W98RA096

(21) After contact pattern check, place differential into the axle drive housing.

Grease O-ring (see arrow) and mount it to the axle housing.

17W98RA097

(22) Use lifting tackle to mount the axle housing and finally fix it with hexagon screws.

Tightening torque (M18/10.9) . . . . . MA = 390 Nm

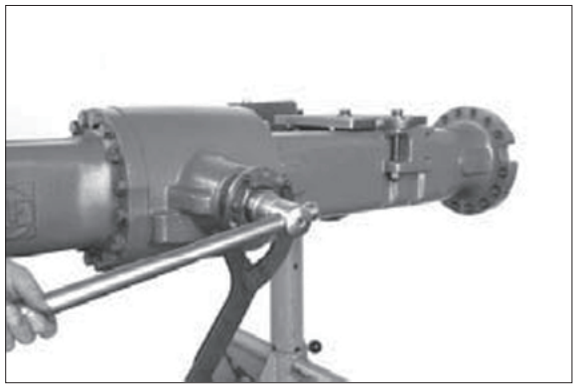
Then bring axle into horizontal position and reassemble the second supporting bracket (S) (see also figure RA001).

17W98RA098

(23) Fitting of shaft seal ring (input flange)

Loosen hexagon nut and pull input flange off the input pinion.

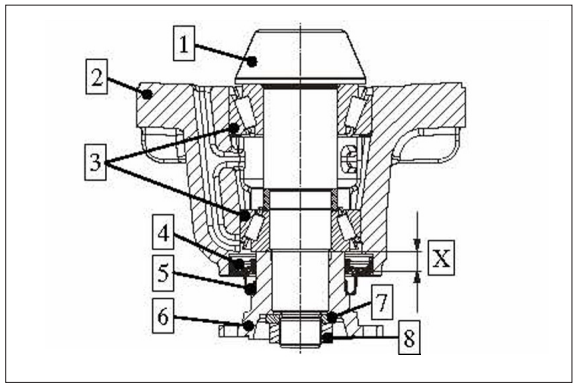
(S) Clamping fork 5870 240 025



17W98RA099

(24) Legend to sketch:

1 = Input pinion
2 = Axle drive housing
3 = Tapered roller bearing
4 = Shaft seal ring
5 = Screen sheet
6 = Input flange
7 = Washer
8 = Hexagon nut
X = Installation dimension → 13.5 +0. 2 mm



17W98RA100

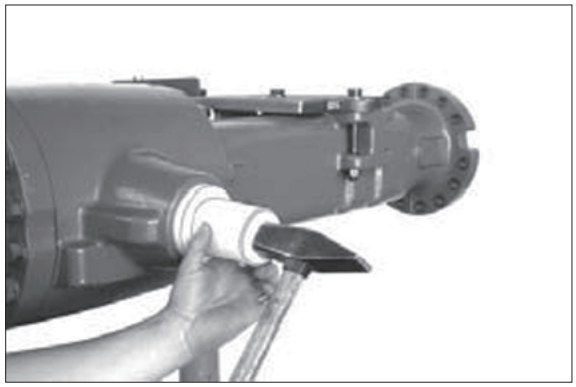
(25) Mount shaft seal ring with the sealing lip facing the oil chamber.

(S) Driver tool 5870 048 286

※ Use of the specified driver tool (S) ensures the exact installation position of the shaft seal ring.

※ Just before fitting, apply lubricant to the contact face of shaft seal ring/axle drive housing.

Apply grease to seal and dust lip of the shaft seal ring.



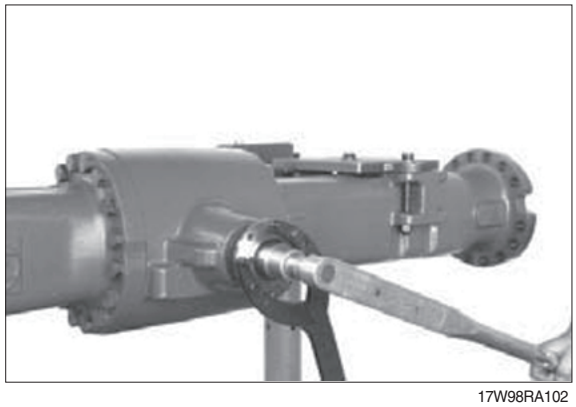
17W98RA101

(26) Mount input flange and finally fix it with washer and hexagon nut.

Tightening torque (M30x1.5) . . . . . MA = 600 Nm

(S) Clamping fork 5870 240 025

※ Wet thread of hexagon nut with Loctite no. 262.



17W98RA102

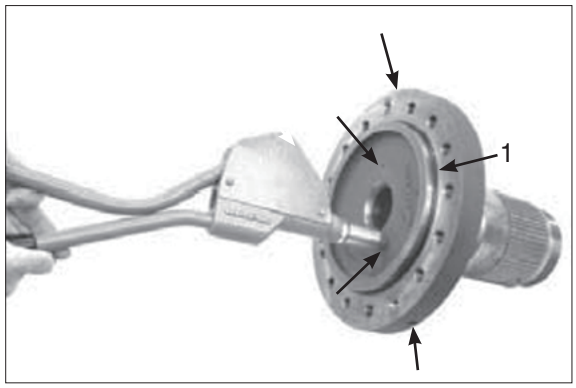
4) OUTTPUT

(1) Hub carrier

Grease O-ring (1) and mount it to hub carrier.

The following operation is only required when fitting a new hub carrier :
Seal machining openings (arrows) of oil supply holes with plugs.

(S) Lever riveting tongs 5870 320 016

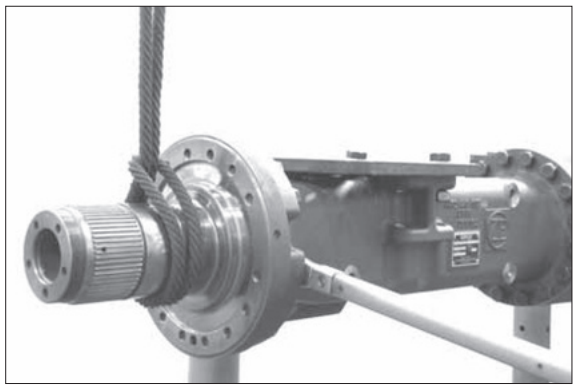


17W98RA103

(2) Mount preassembled hub carrier to the axle housing, considering the installation position, and fix it with hexagon screws.

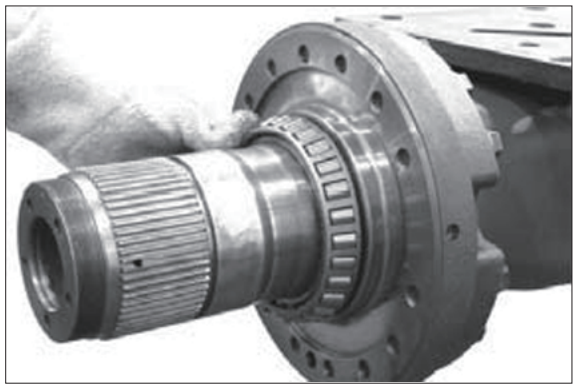
Tightening torque (M 16/10.9) . . . . . MA = 280 Nm

※ Ensure radial installation position. Stamped circle (see arrow) must be in uppermost (12 o'clock) position.

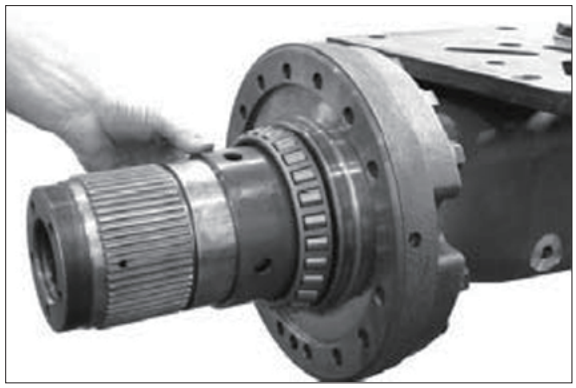

17W98RA104

(3) Hub (Hub bearing SET-RIGHT)

Heat up tapered roller bearing and mount it to hub carrier until contact is obtained.


17W98RA105

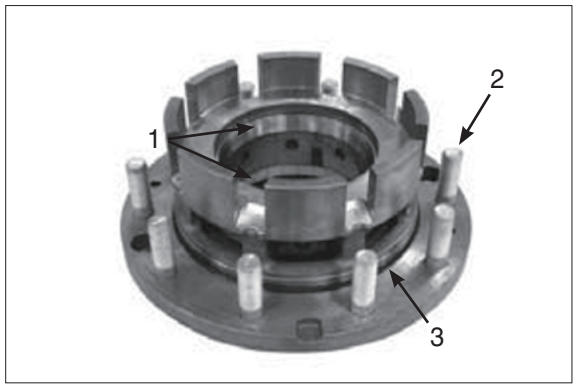
(4) Mount spacer bushing.


17W98RA106

(5) Insert both bearing outer rings (1) of the hub bearing until contact position is obtained.

Press wheel bolts (2) into the hub until contact position is obtained.

Grease O-ring (3) and place it into the annular groove of the hub.



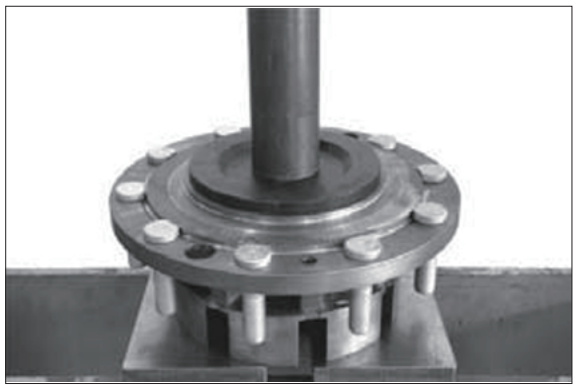
17W98RA107

(6) Press shaft seal ring into the hub, with the marking "OUT SIDE" showing outwards (facing up):

(S) Driver tool 5870 051 035

※ Use of the specified driver tool (S) ensures the exact installation position of the shaft seal ring.

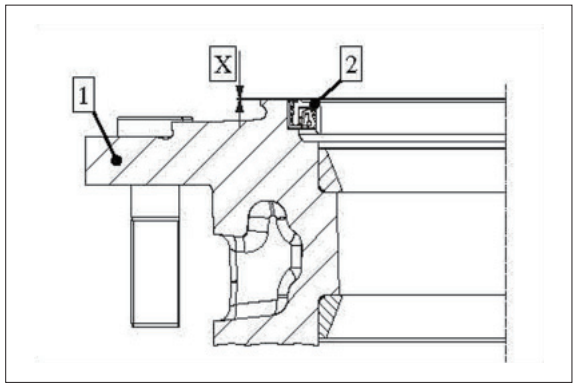
※ Wet outer diameter of the shaft seal ring with Loctite no. 574.



17W98RA108

(7) Legend to sketch:

1 = Hub
2 = Shaft seal ring
X = Installation dimension – shaft seal ring
..... 0.0~0.3 mm

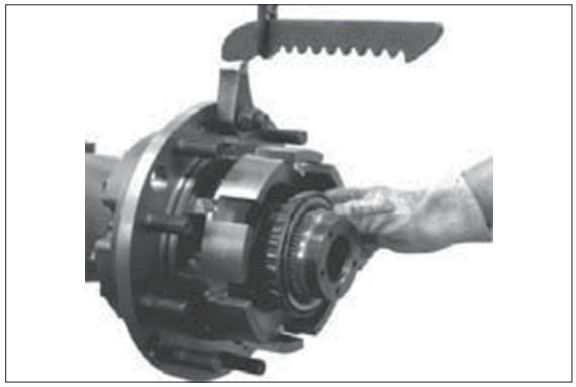


17W98RA109

(8) Mount preassembled hub until contact is obtained and fix it with heated tapered roller bearing.

(S) Lifting bracket 5870 281 043

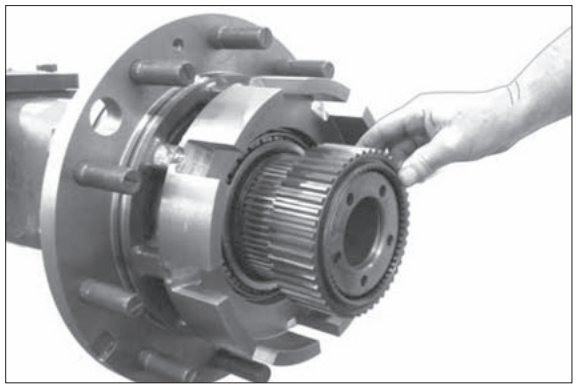
※ Just before fitting, wet sealing lips of shaft seal ring with lubricant.



17W98RA110

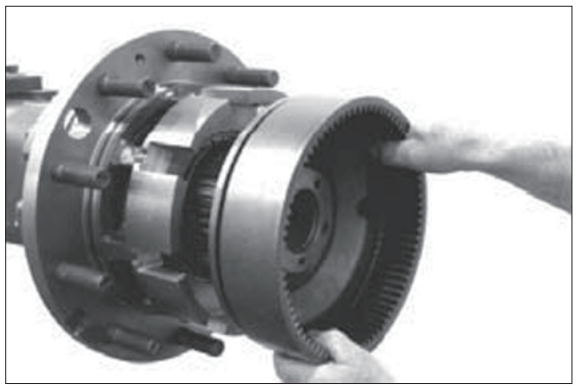
(9) Oil O-ring and insert it into the annular groove (see arrow) of the hub carrier.

Then mount disk carrier.



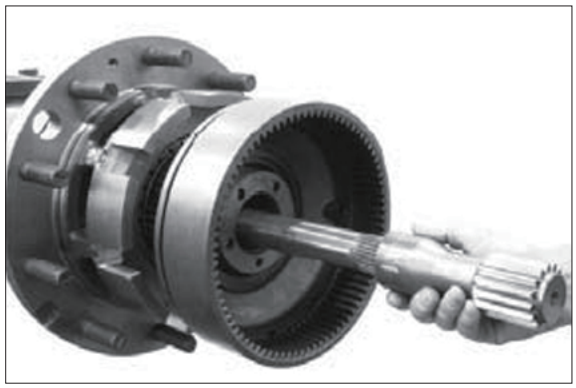
17W98RA111

(10) Bring disk carrier and hub bearing into contact position (figure No. RA112 ... RA115) :
Mount ring gear (without sealing elements).



17W98RA112

(11) Insert stub shaft and sun gear shaft for supporting the socket wrench (see following figure).



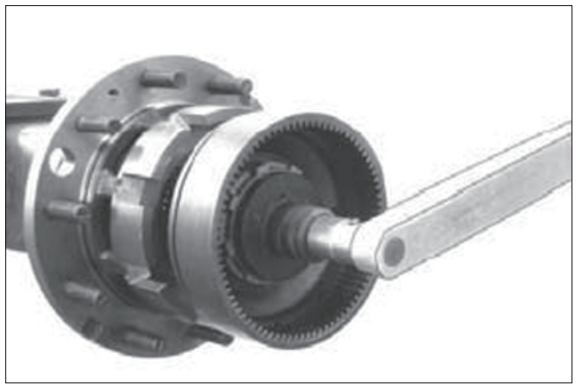
17W98RA113

(12) Bring hub bearing into contact position for this purpose tighten slotted nut with a tightening torque of 1400 Nm max.

(S) Socket wrench 5870 656 097

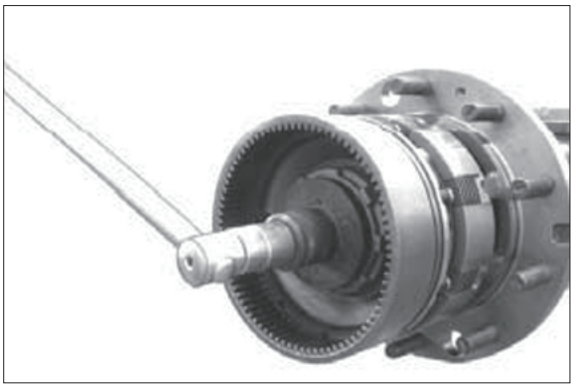
※ While tightening the slotted nut rotate hub in both directions several times roller setting.

※ Apply lubricant to thread of knuckle housing/slotted nut.



17W98RA114

(13) Loosen slotted nut and remove ring gear.

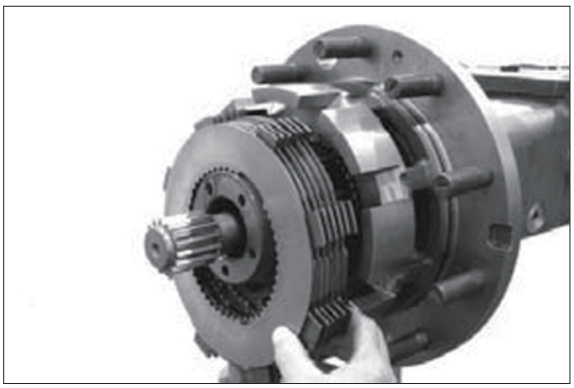


17W98RA115

(14) Multi-disk brake

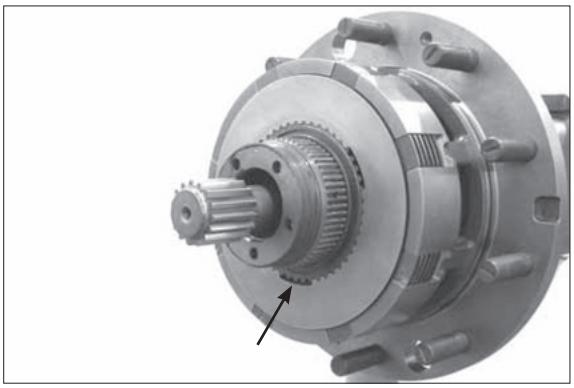
Mount outer and inner disks of the disk package alternately, starting with an outer disk.

※ For the actually required disk fitting/ arrangement please refer to the corresponding spare parts list.



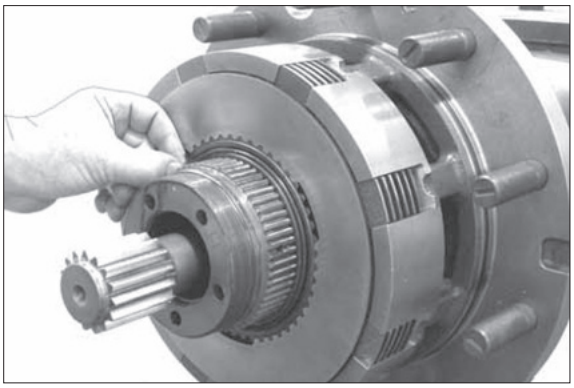
17W98RA116

(15) Bring inner clutch disks into a position where one of the tooth recesses is in 6 o'clock position after installation of the axle into the vehicle.



17W98RA117

(16) Oil O-ring and place it into the annular groove of the disk carrier.



17W98RA118

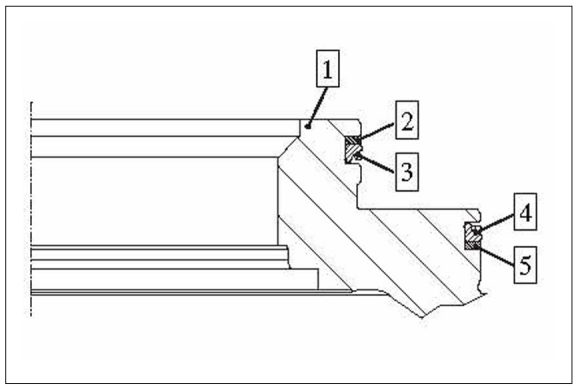
(17) Oil grooved and back-up rings and insert them into the annular grooves of the ring gear.

※ Observe installation position, see sketch below.

17W98RA119

(18) Legend to sketch:

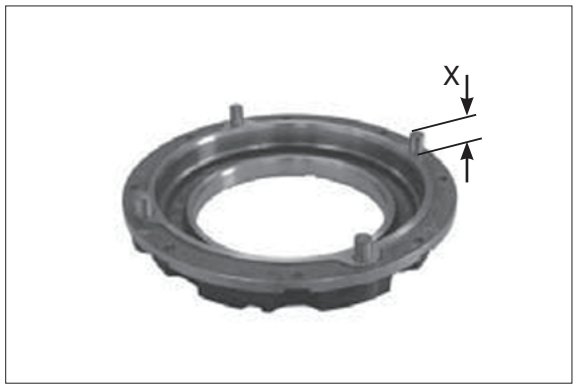
1 = Ring gear
2 = Back-up ring
3 = Grooved ring
4 = Grooved ring
5 = Back-up ring



17W98RA120

(19) Fit cylindrical pins into the piston, considering the installation dimension "X".

X = Installation dimension . . . . . .16.00 mm



17W98RA121

(20) Mount piston onto ring gear.

17W98RA122

(21) Fix piston with "new" hexagon screws (1), spring sleeves (2) and compression springs (3 and 4).

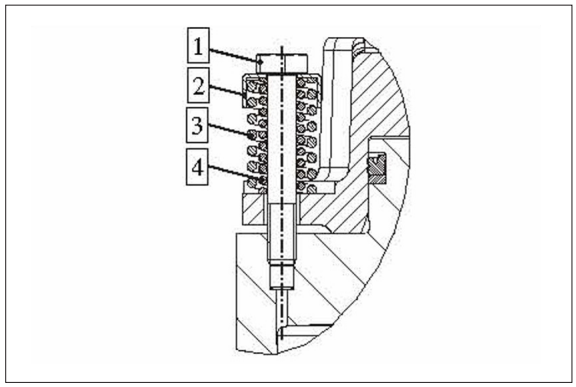
Tightening torque (M 6/8.8) . . . . . MA = 8 Nm

※ Use hexagon screws just once.

17W98RA123

(22) Legend to sketch:

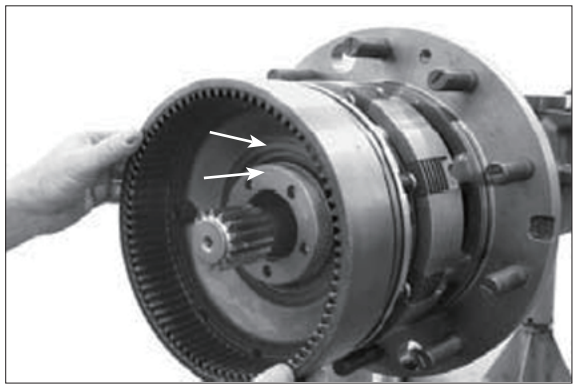
1 = Hexagon screw (special version)
2 = Spring sleeve
3 = Compression spring
4 = Compression spring



17W98RA124

(23) Mount preassembled ring gear, considering the installation position (markings O in 12 o'clock position – see arrows).

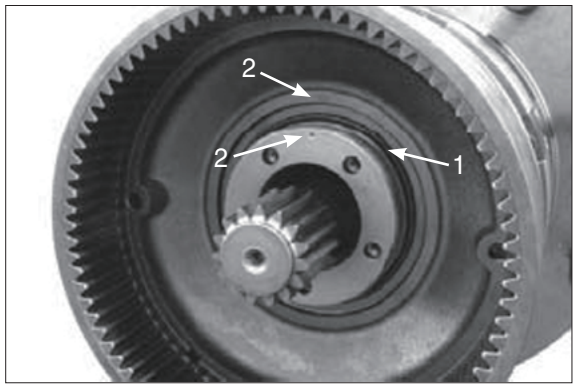
※ Ensure exact toothing position of oil supply holes – hub carrier/ring gear (pressure oil supply to brake piston).



17W98RA125

(24) Oil O-ring and insert it into the recess (see arrow 1).

※ Arrows (2) show once more the markings O and the installation position of hub carrier and ring gear.



17W98RA126

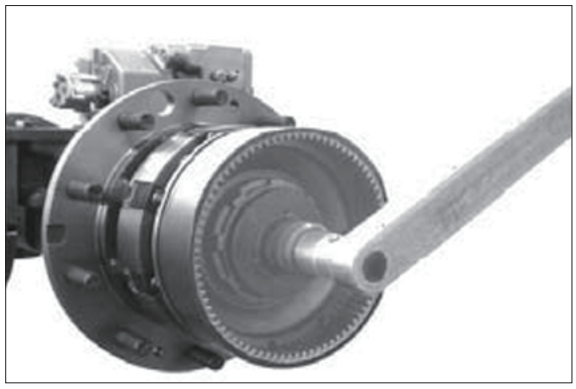
(25) Fix ring gear with slotted nut.

Tightening torque (M110 × 1.5) . . . . . MA = 1400 + 600 Nm

(S) Socket wrench 5870 656 097

※ Pretighten slotted nut with 1400 Nm, then continue tightening the slotted nut until a fixing hole overlaps a threaded hole in the knuckle housing.
While tightening the slotted nut rotate hub in both directions several times – roller setting.

※ Apply lubricant to thread of knuckle housing/slotted nut.



17W98RA127

(26) Leakage test of multi-disk brake

Fit breather (arrow) and threaded coupling (S), then connect HP pump.

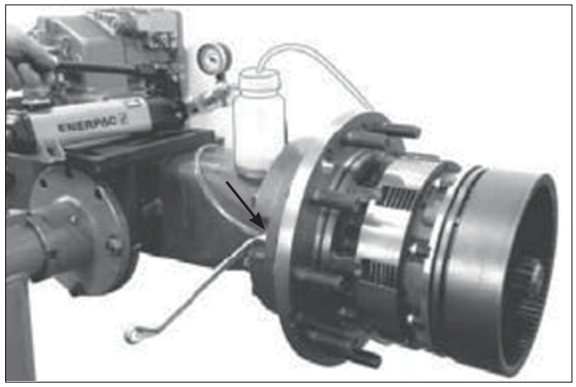
(S) HP pump 5870 287 007
(S) Threaded coupling (M14 × 1.5) 5870 950 102
(S) Breather bottle 5870 286 072

※ Breathe brake completely before starting the test.

Test media :
Motor oils SAE-10W

High-pressure test:
Build up test pressure p = 100 bar and close shut-off valve of HP pump.
A maximum pressure drop of 3 bar is permissible during a 5-minute test.

Low-pressure test:
Reduce test pressure to p = 5 bar and close shut-off valve.
No pressure drop is allowed during a 5-minute test.



17W98RA128

(27) Adjustment and check of piston stroke

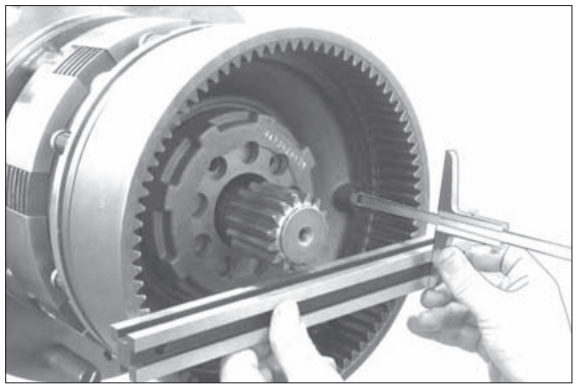
Piston stroke / disk clearance =
0.7 ... 1.3 mm

Build up brake pressure (100 bar) and close shut-off valve of HP pump.

Determine dimension "A", from face of the ring gear (1) through the measuring hole (see also sketch 43) to the face of the piston (3).

Dim. "A" e.g. . . . . 83.10 mm

※ Breathe brake completely before starting the measuring operation.

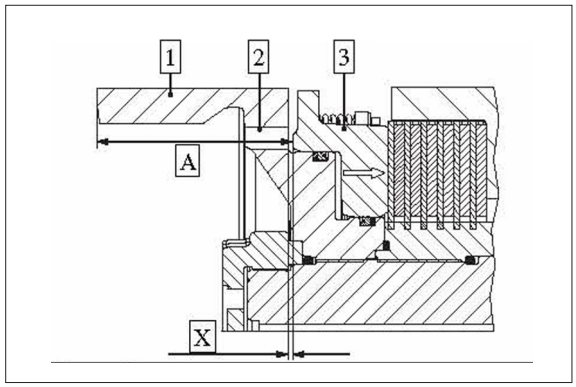


17W98RA129

(28) Then open shut-off valve of HP pump and release pressure from brake (piston return via compression springs).

Determine dimension "B", from the face of the ring gear (1) through the measuring hole (see also sketch RA131) to the face of the piston (3).

Dimension "B" e.g . . . . . 82.10 mm



17W98RA130

(29) Calculation example :

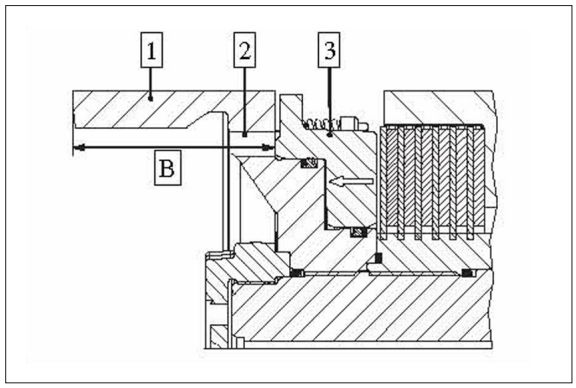
Dimension „A“ e.g. . . . . 83.10 mm
Dimension „B“ e.g. . . . . - 82.10 mm
Difference = piston stroke = 1.00 mm

※ If the required piston stroke (0.7 ... 1.3 mm) is not achieved, correct it with (a) corresponding inner clutch disk(s) – see respective spare parts list.

Then remove HP pump (S), breather bottle (S) and threaded coupling (S).

Legend to sketches RA130 and RA131:
1 = Ring gear
2 = Measuring hole
3 = Piston
X = Piston stroke/disk clearance

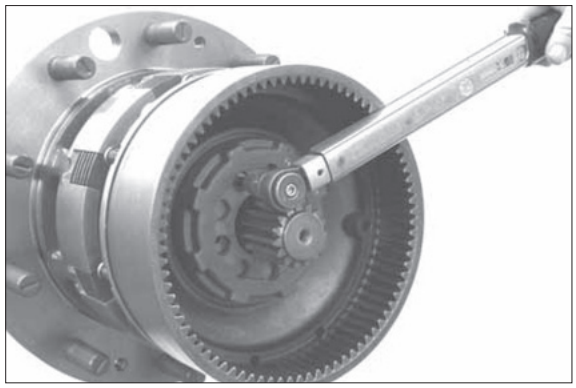
(S) Straightedge 5870 200 022



17W98RA131

(30) Secure slotted nut with cylindrical screw (see also figure RA127).

Tightening torque (M 10/8.8) . . . . . MA = 32 Nm



17W98RA132

(31) Planetary carrier

Press thrust washer into the planetary carrier until contact is obtained.

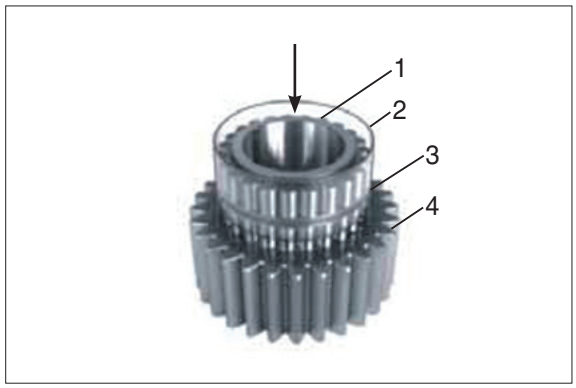
(S) Driver tool 5870 048 263

17W98RA133

(32) Insert the cylindrical roller bearing into the planetary gear – for this purpose press the cylindrical roller bearing through the packaging sleeve until the snap ring engages into the annular groove of the planetary gear.

※ Use packaging sleeve to facilitate assembly.

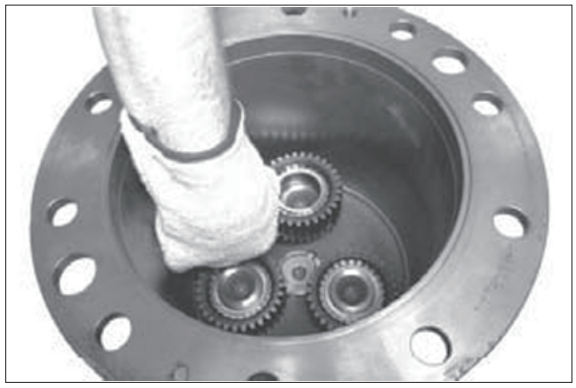
1 = Cylindrical roller bearing
2 = Packaging sleeve
3 = Snap ring
4 = Planetary gear



17W98RA134

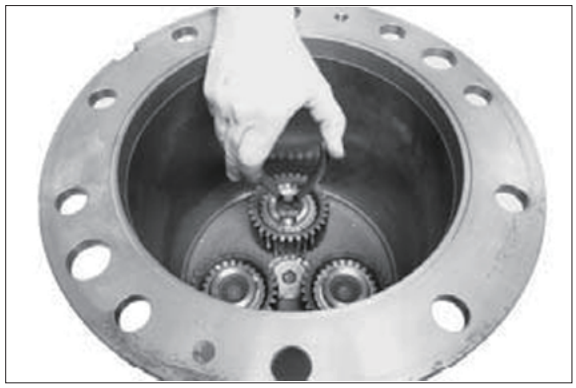
(33) Heat up bearing inner ring and mount preassembled planetary gear until contact is obtained.

※ Mount bearing inner ring with the large radius facing the planetary carrier (downwards).



17W98RA135

(34) Fix planetary gear by means of retaining ring.



17W98RA136

(35) Mount preassembled planetary carrier and fix it with hexagon screws.

Tightening torque (M12/8.8) . . . . . MA = 55 Nm

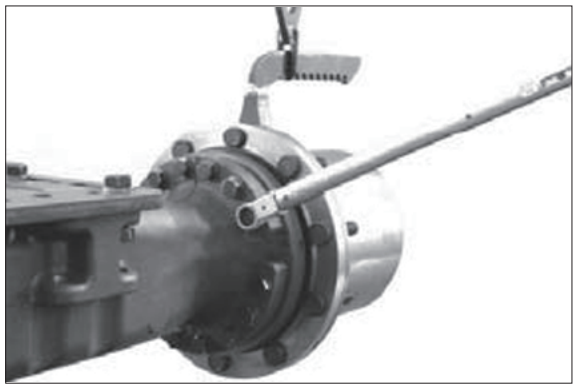
17W98RA137

(36) Output assy

Use lifting tackle (S) to locate the output assy at the axle, mount stub shaft into the teeth of the axle bevel gear and fix output assy with hexagon screws.

Tightening torque (M 16/10.9) . . . . . MA = 280 Nm

(S) Lifting bracket 5870 281 043



17W98RA138

※ Prior to putting the axle into operation, fill in oil.

Observe the vehicle manufacturer's instructions and specifications for the installation and commissioning of the unit.