3. AXLE (machine serial No. : ~#0178)

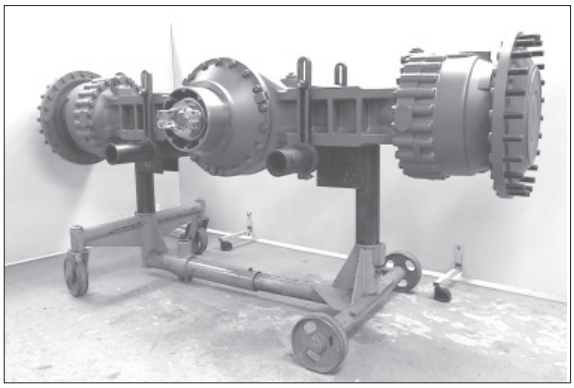
· FRONT AXLE

1) DISASSEMBLY OF OUTPUT AND BRAKE

(1) Fasten axle on assembly truck.

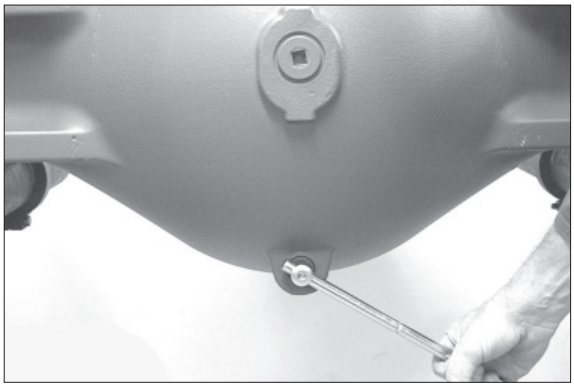
※ Special tool

Assembly truck	5870 350 000
Holding fixtures	5870 350 077
Clamps	5870 350 075

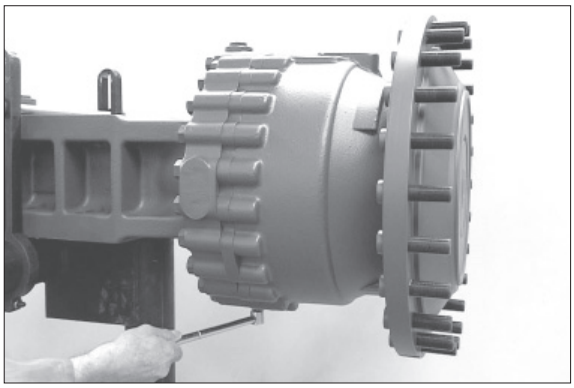


7577AAXF001

(2) Loosen screw plugs (3EA, see Figure 7577AAXF002 and 003) and drain oil from axle casing.



7577AAXF002

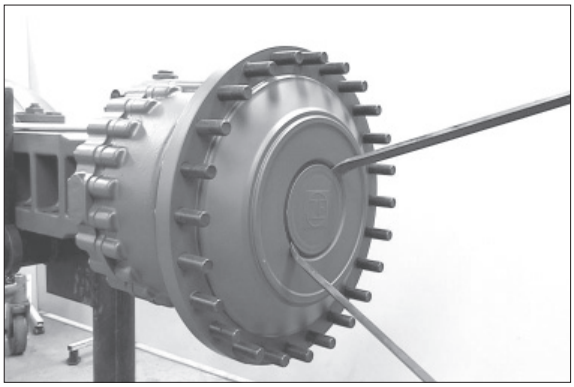


7577AAXF003

(3) Press off cover from the output shaft.

※ Special tool

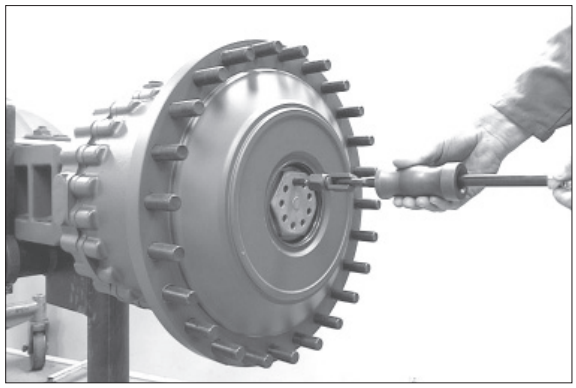
Pry bar set	5870 345 065



7577AAXF004

(4) Pull slotted pin by means of the striker out of the bore in the slotted nut.

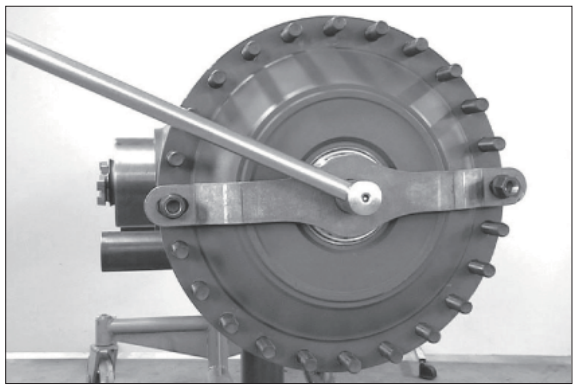
※ Special tool
Striker 5870 650 001



7577AAXF005

(5) Loosen slotted nut.

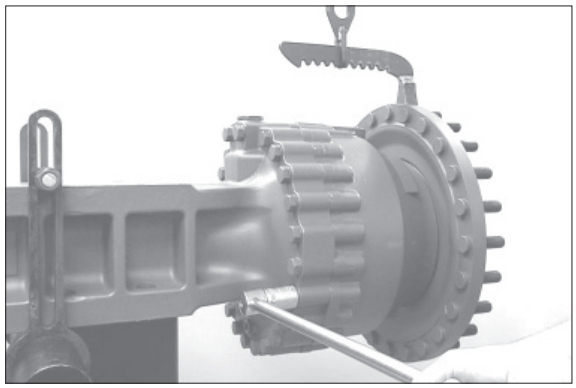
※ Special tool
Socket spanner 5870 656 078
Centering bracket 5870 912 028



7577AAXF006

(6) Secure output by means of lifting tackle and loosen hexagon screws.

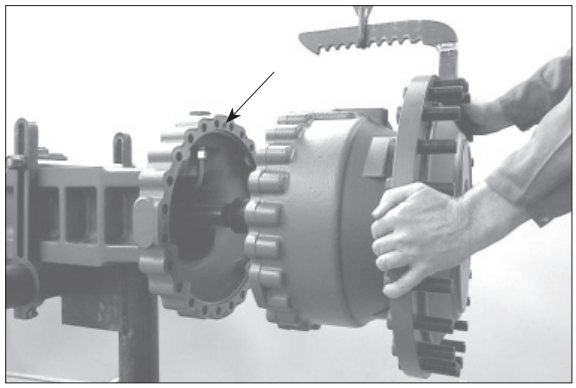
※ Special tool
Lifting bracket 5870 281 043



7577AAXF007

(7) Separate complete output from the axle casing.

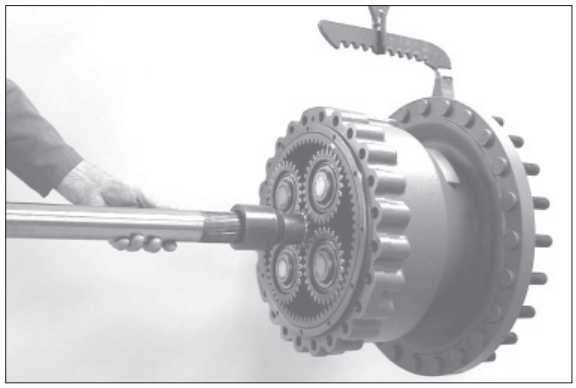
※ Pay attention to released O-ring (see arrow).



7577AAXF008

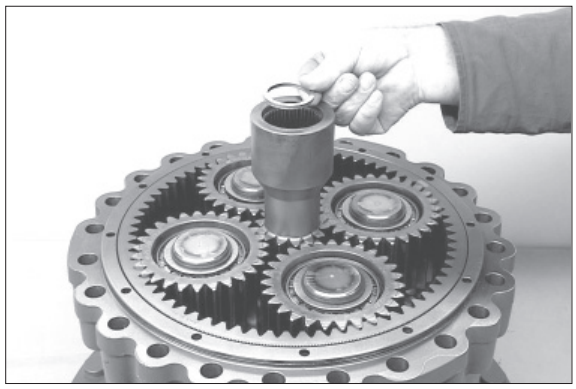
(8) Pull stub shaft out of the sun gear shaft.

※ Pay attention to possibly released shim (s).



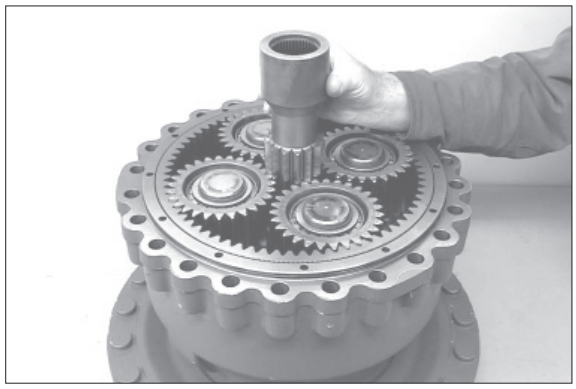
7577AAXF009

(9) Remove shim(s) from the sun gear shaft.



7577AAXF010

(10) Pull sun gear shaft out of the planet gears.



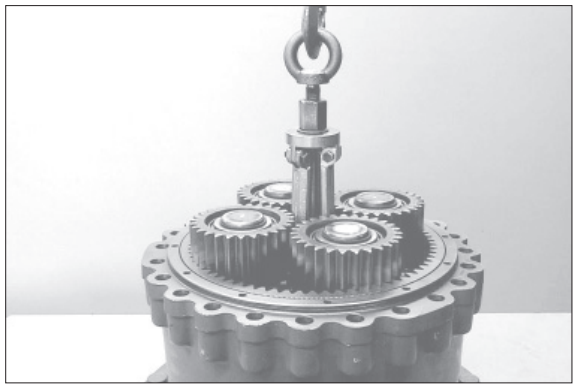
7577AAXF011

(11) Lift planet carrier out of the brake housing.

※

Special tool

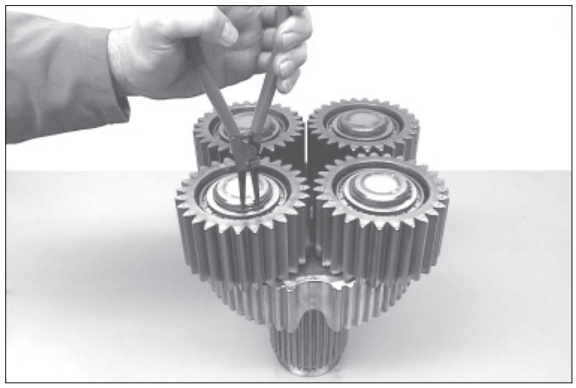
Internal extractor 5870 300 019



7577AAXF012

(12) Squeeze out the retaining ring.

※ Special tool
Set of external pliers 5870 900 015



7577AAXF013

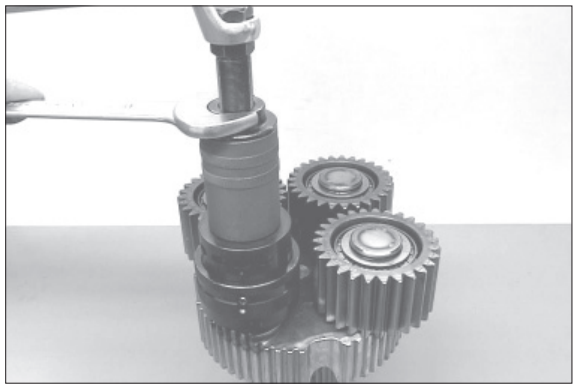
(13) Pull off the planet gear and remove the released bearing inner ring.

※ Special tool
Three-armed puller 5873 971 002

7577AAXF014

(14) Pull off the bearing inner ring.

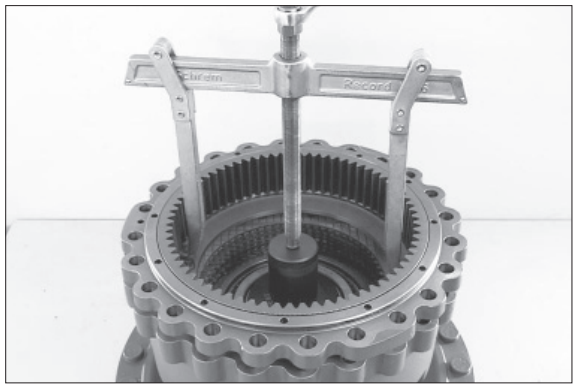
※ Special tool
Gripping insert 5873 001 058
Basic set 5873 001 000



7577AAXF015

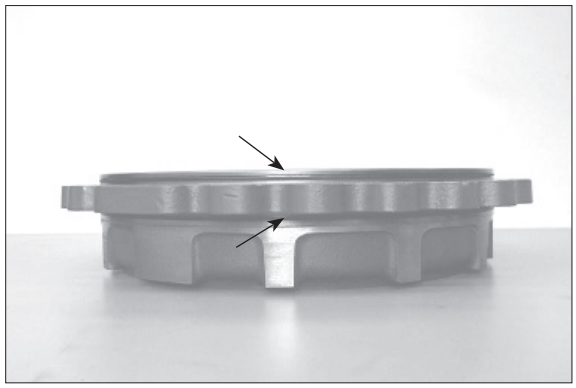
(15) Separate ring gear from the brake housing by means of two-armed puller.

※ Special tool
Two-armed puller 5870 970 007



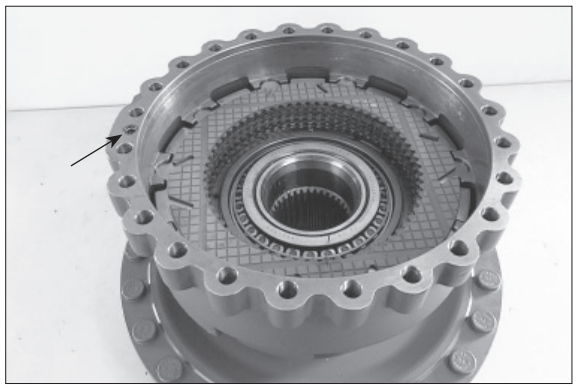
7577AAXF016

(16) Remove O-rings (see arrows) from the annular grooves of the ring gear.



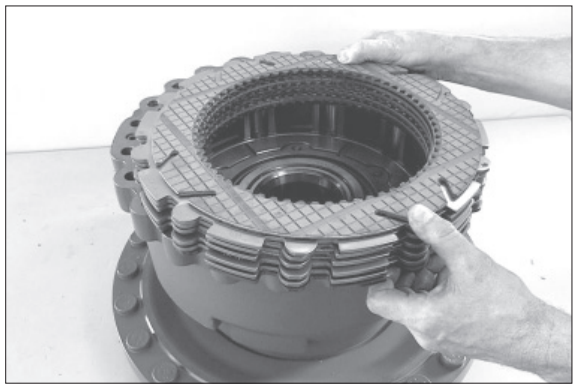
7577AAXF017

(17) Remove O-ring (see arrow) from the recess of the brake housing.



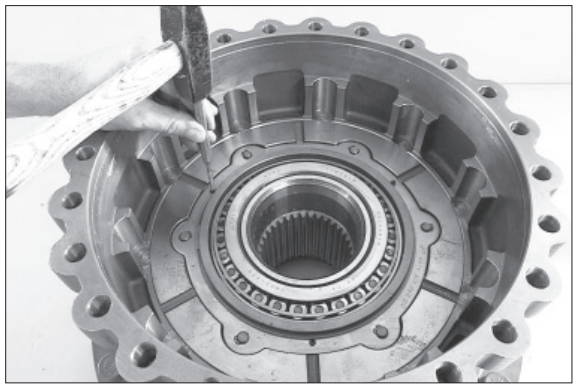
7577AAXF018

(18) Take the disc pack out of the brake housing.



7577AAXF019

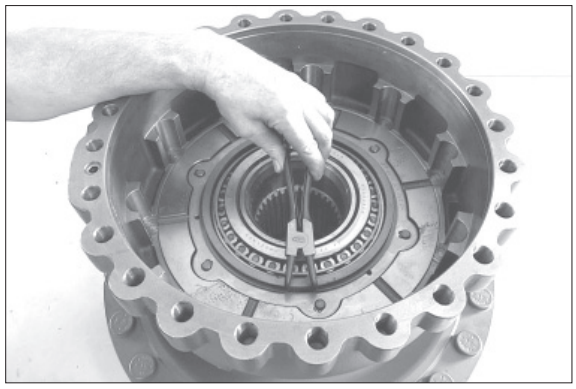
(19) Install slotted pins (6EA) in the support shim until they are flush-mounted.



7577AAXF020

(20) Squeeze out the circlip.

※ Special tool
Set of external pliers 5870 900 016

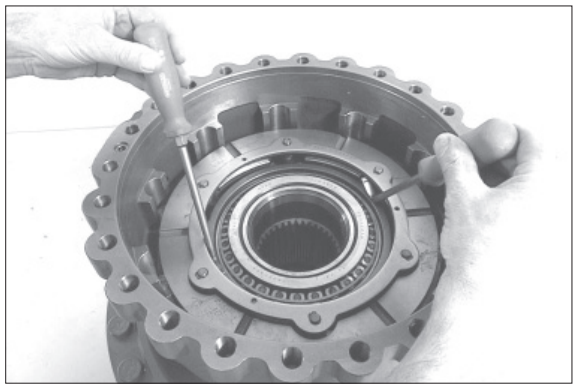


7577AAXF021

(21) Press piston out of the brake housing by means of compressed air.

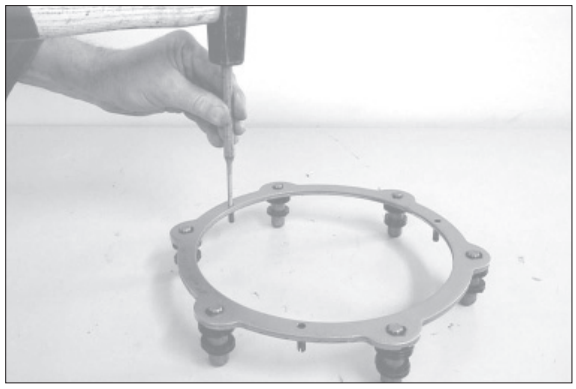
7577AAXF022

(22) Press support shim out of the piston by means of the automatic piston adjusting.



7577AAXF023

(23) Drive slotted pins (6EA) out of the support shim.

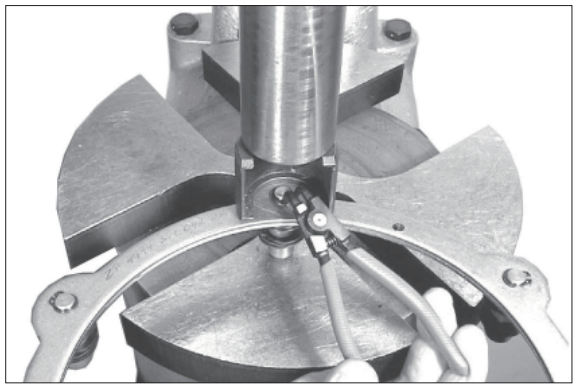


7577AAXF024

(24) Preload the cup springs by means of the press and unsnap the circlip.

※ Special tool

Assembly pliers	5870 900 051
Assembly fixture	5870 345 096

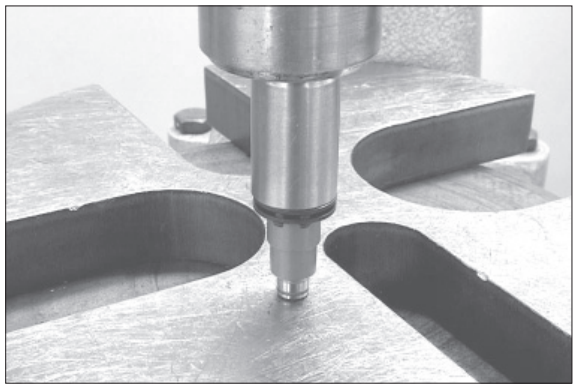


7577AAXF025

(25) Pull pin out of the support shim and remove released cup springs.

7577AAXF026

(26) Press gripping rings from the pin.

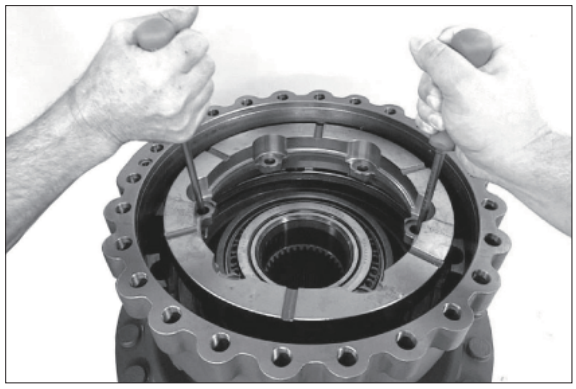


7577AAXF027

(27) Lift piston out of the brake housing.

※ Special tool

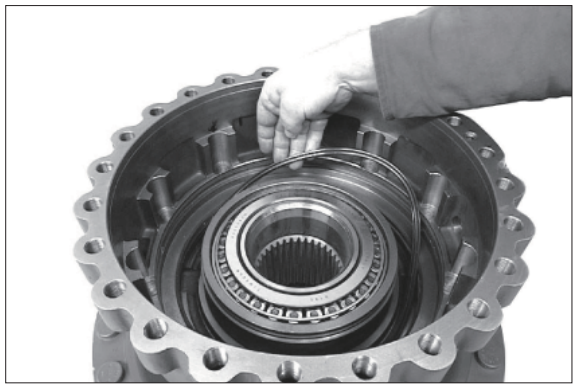
Adjusting device	5870 400 001



7577AAXF028

(28) Remove guide ring, support rings and U-rings from the annular grooves of the brake housing.

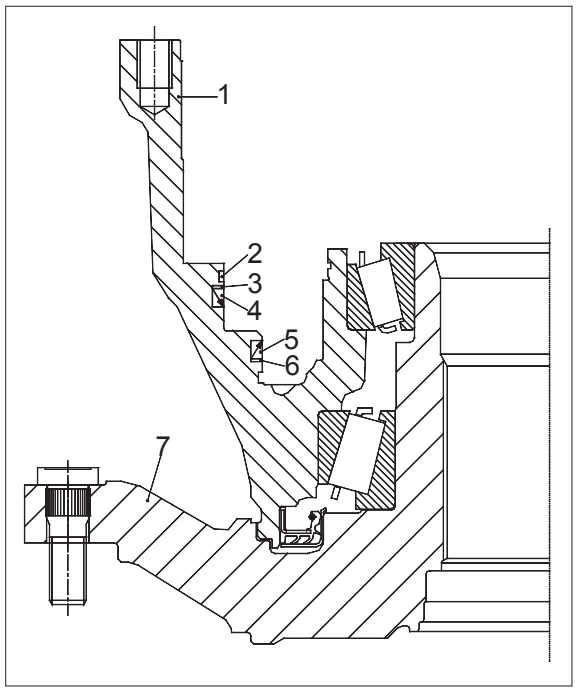
※ See below sketch for installation position of the single parts.



7577AAXF029

To the sketch :

1 Brake housing
2 Guide ring
3 Support ring
4 U-ring
5 U-ring
6 Support ring
7 Output shaft

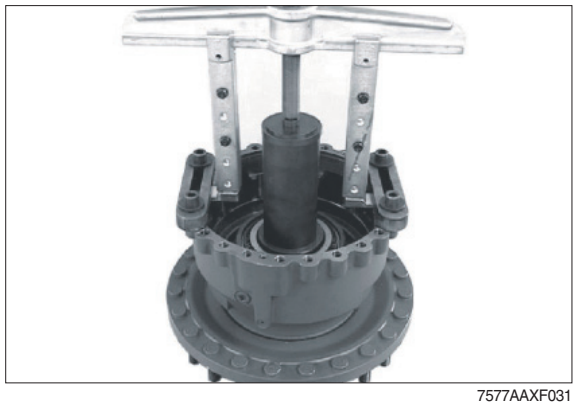


7577AAXF030

(29) Pull brake housing by means of two-armed puller from the output shaft and remove the released bearing inner ring.

※ Special tool

Two-armed puller	5870 970 007
Clamping bracket	5870 654 034
Press bush	5870 506 140

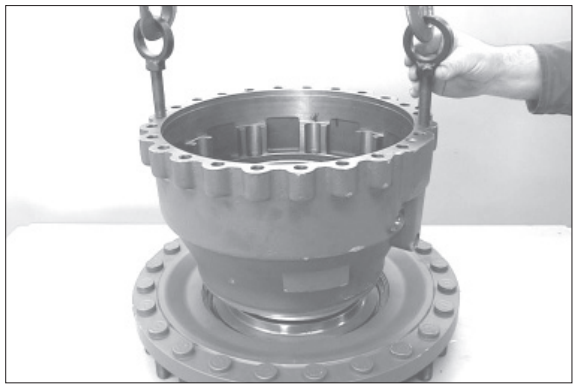


7577AAXF031

(30) Lift brake housing with lifting tackle from the output shaft.

※ Special tool

Lifting chain	5870 281 047
Eye bolts	5870 204 071



7577AAXF032

(31) If necessary drive both bearing outer rings out of the bearing bores in the brake housing.

7577AAXF033

(32) Press shaft seal out of the brake housing.

※ Special tool

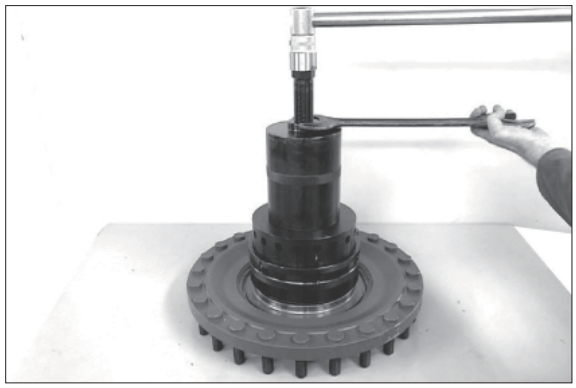
Pry bar set	5870 345 065

7577AAXF034

(33) Pull bearing inner ring from the output shaft.

※ Special tool

Rapid grip	5873 014 011
Basic set	5873 004 001

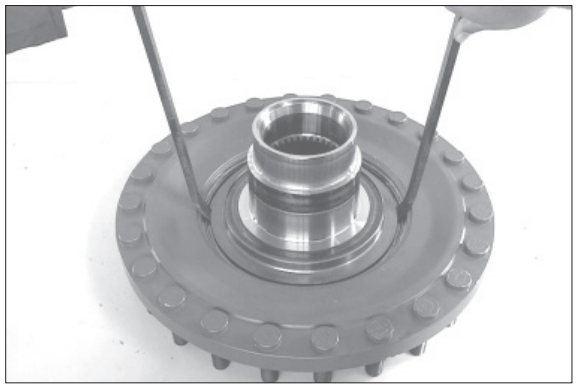


7577AAXF035

(34) Press off bearing sheet from the output shaft.

※ Special tool

Pry bar set	5870 345 065



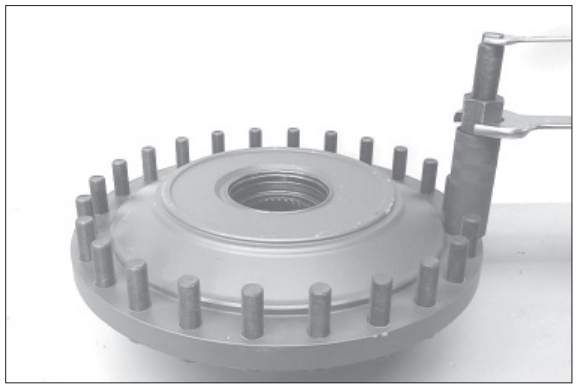
7577AAXF036

2) REASSEMBLY OF OUTPUT AND BRAKE

(1) Insert wheel bolt into the output shaft until contact.

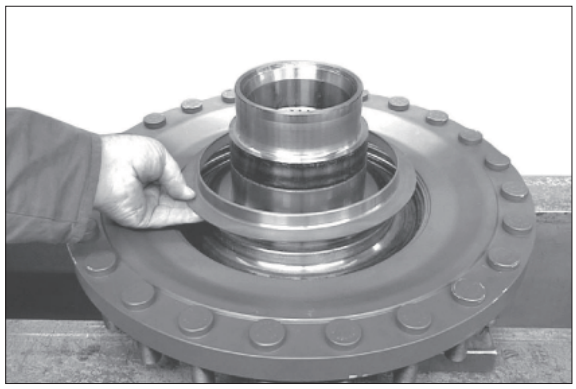
※ Special tool

Wheel bolt puller-basic set	5870 610 010
Insert (7/8"-14 UNF)	5870 610 011



7577AAXF037

(2) Assemble bearing sheet (shaft seal).



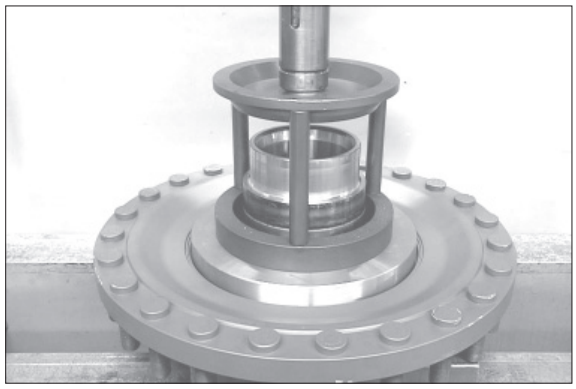
7577AAXF038

(3) Press bearing sheet over the collar of the output shaft.

※ Special tool

Pressure ring	5870 506 141

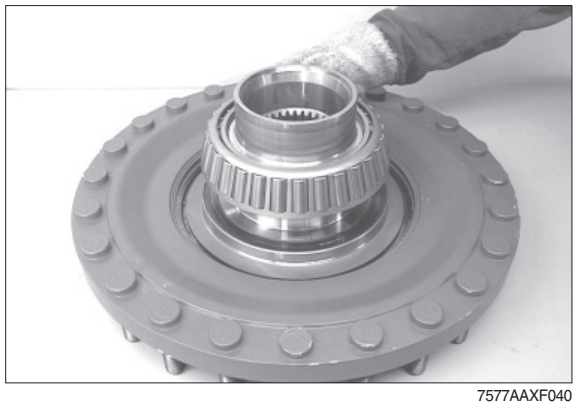
※ The exact installation position of the bearing sheet will be obtained by using the specified pressure ring.



7577AAXF039

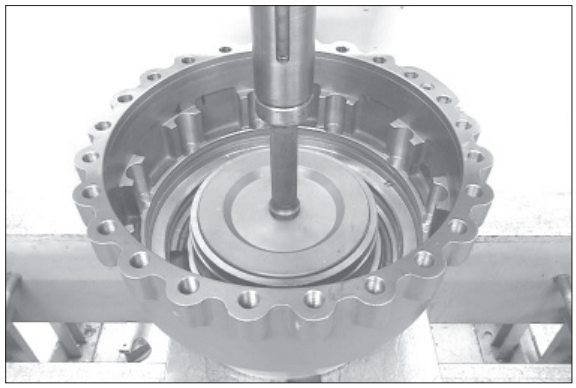
(4) Heat the roller bearing and install it until contact.

※ After cooling-down the bearing has to be installed subsequently.



7577AAXF040

(5) Press both bearing outer rings into the brake housing until contact.



7577AAXF041

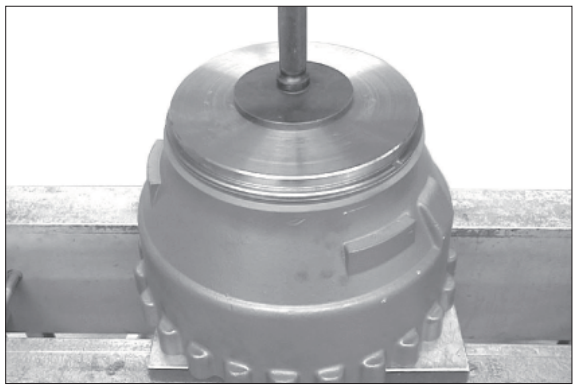
(6) Install shaft seal with the sealing lip showing to the oil chamber (see below sketch).

※ Special tool

Driver	5870 051 052

※ The exact installation position of the shaft seal will be obtained by using the specified driver.

⚠ **Just before the installation wet the outer diameter of the shaft seal with spirit.**

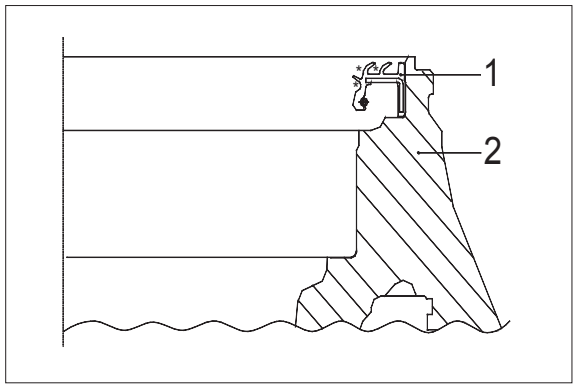


7577AAXF042

To the sketch :

1 Brake housing
2 Shaft seal
* Grease filling

※ Fill the space between sealing and dust lips with grease.

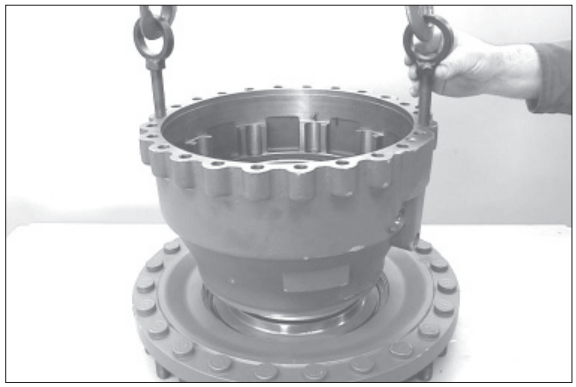


7577AAXF043

(7) Install the preassembled brake housing by means of the lifting tackle over the output shaft until contact.

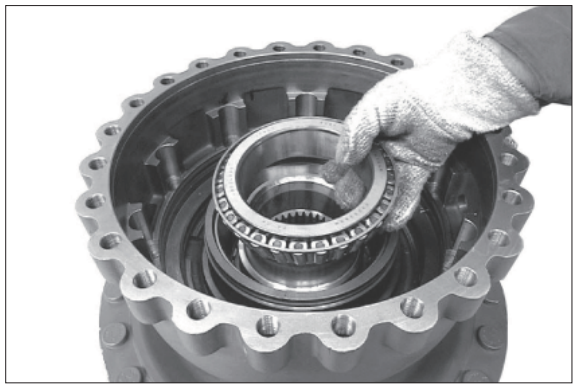
※ Special tool

Lifting chain	5870 281 047
Eye bolts	5870 204 071



7577AAXF044

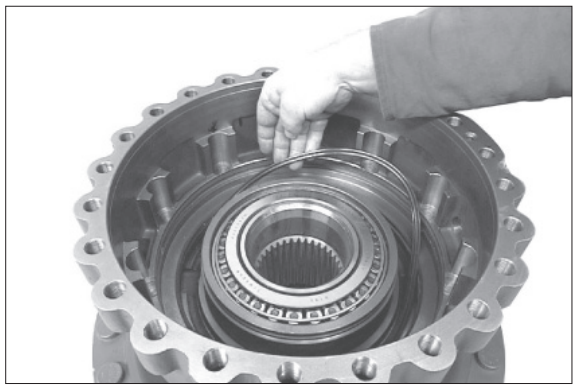
(8) Heat the roller bearing and install it until contact.



7577AAXF045

(9) Insert support and U-rings into the annular grooves of the brake housing.

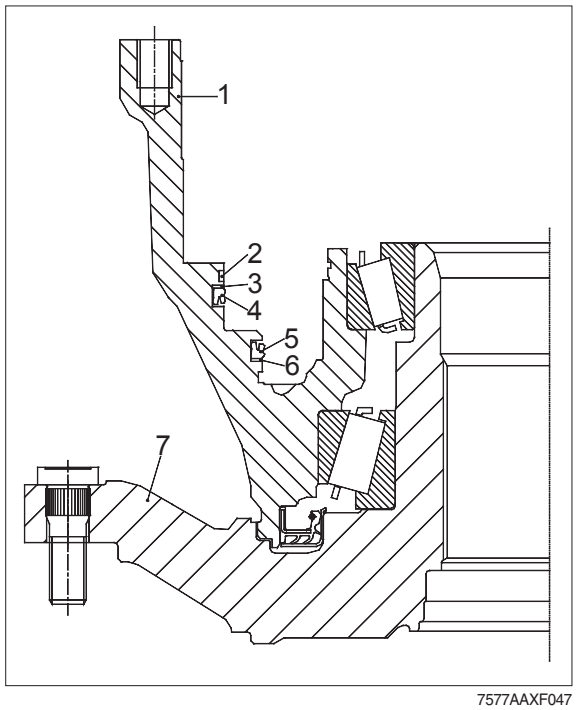
※ Pay attention to the installation position, see below sketch.



7577AAXF046

To the sketch :

1 Brake housing
2 Guide ring
3 Support ring
4 U-ring
5 U-ring
6 Support ring
7 Output shaft



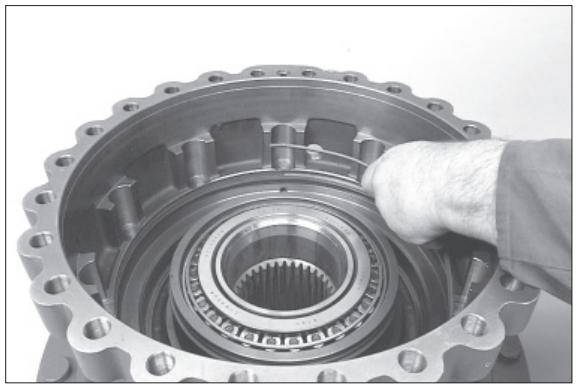
7577AAXF047

(10) Clean annular groove of the brake housing with spirit.

Then insert the guide ring into the annular groove (also see sketch page 3-188) and fix it with Loctite (type No. 415) at its extremities.

※ Guide ring must have contact on the whole circumference.

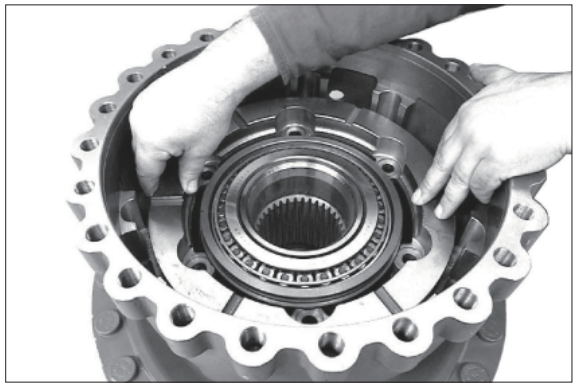
⚠ **Upon installation the orifice of the guide ring must show upwards (12 o'clock).**



7577AAXF048

(11) Insert piston into the brake housing and install it cautiously until contact.

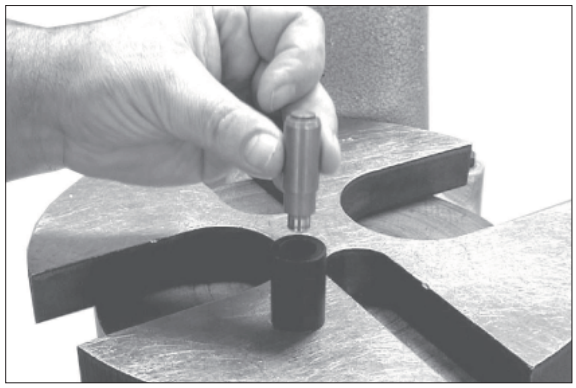
※ Apply sufficiently oil on the sliding surface of the piston or support rings, U-rings and guide ring (use W-10 oils).



7577AAXF049

(12) Insert pins into the assembly fixture until contact.

※ Special tool
Assembly fixture 5870 345 096

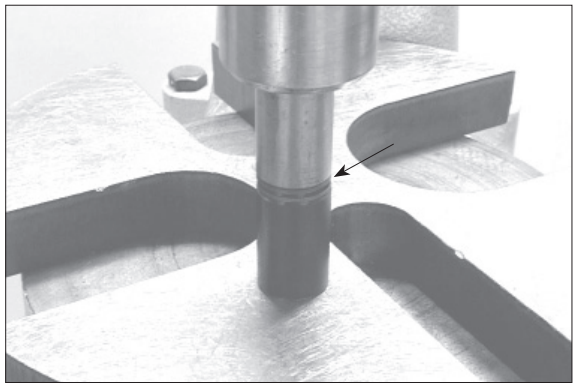


7577AAXF050

(13) Press gripping rings (4EA, see arrows) onto the pins until contact on the assembly fixture.

※ The exact installation dimension (see sketch page 3-190) of the gripping rings is obtained when using the specified assembly fixture.

⚠ **Observe the installation position, install gripping rings with the orifices offset by 180˚ to each other.**



7577AAXF051

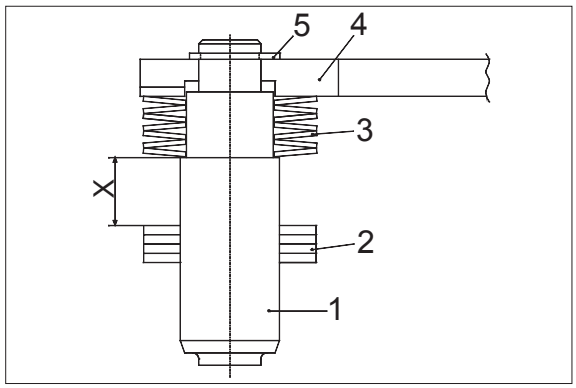
(14) Install cup springs (7 pieces each/pin).

※ Pay attention to the installation position of the cup springs, see below sketch.

7577AAXF052

To the sketch :

1 Pin
2 Gripping rings
3 Cup springs
4 Support shim
5 Circlip
X Installation dimension gripping rings
10.5 $^{+0,3}$ mm

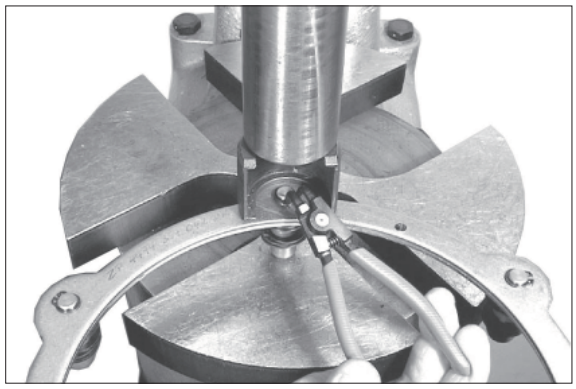


7577AAXF053

(15) Insert preassembled pins into the support shim and fix it by means of the circlip.

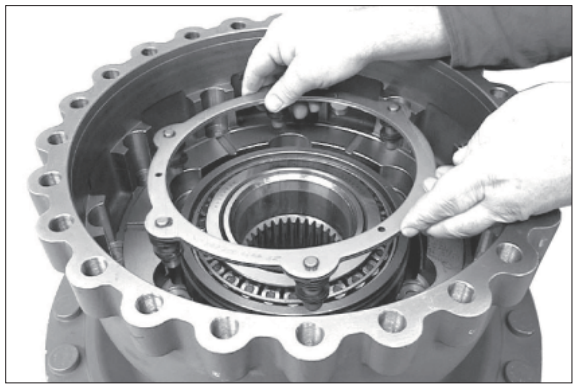
※ Special tool
Assembly pliers 5870 900 051

※ Pay attention to clearance of the cup springs.



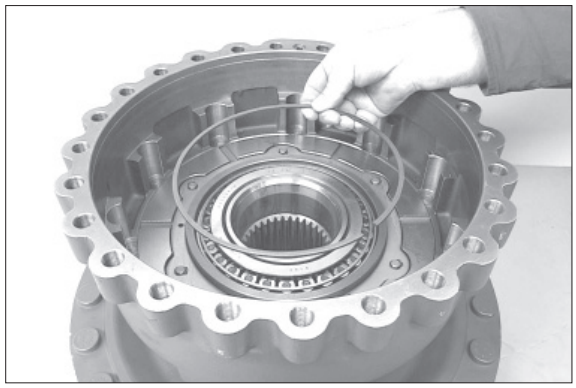
7577AAXF054

(16) Insert preassembled support shim into the piston.



7577AAXF055

(17) Fix support shim by means of the circlip.

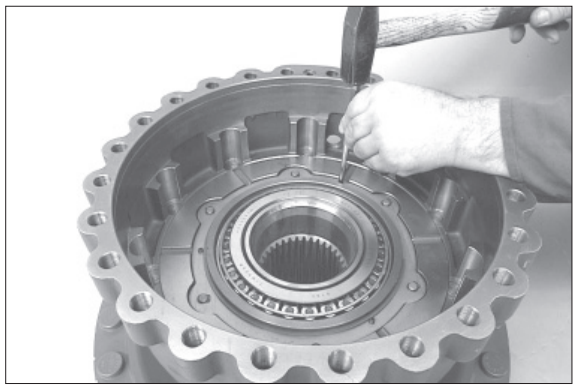


7577AAXF056

(18) Drive slotted pins (6EA) into the bores of the support shim to lock the circlip.

※ Special tool
Drive mandrel 5870 705 011

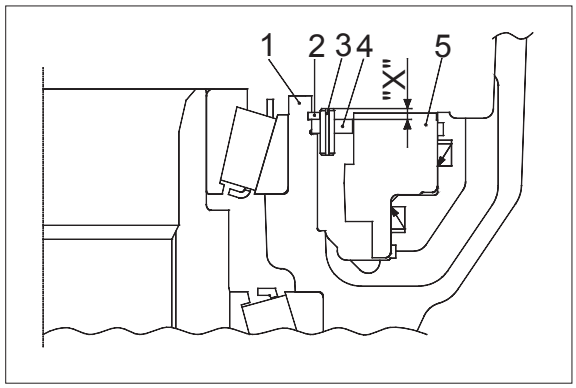
※ Pay attention to the installation position, see below sketch.



7577AAXF057

To the sketch :

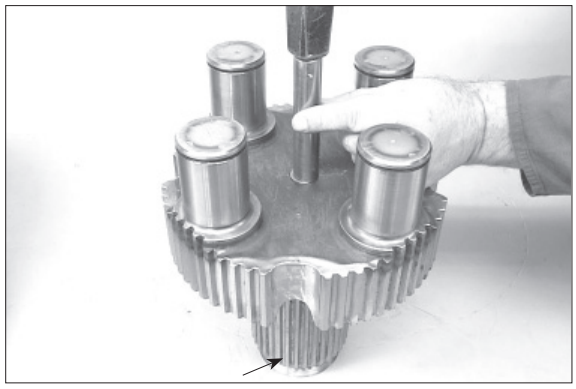
1 Brake housing
2 Circlip
3 Slotted pin
4 Support shim
5 Piston
X Installation dimension 4.0 $_{-0,5}$ mm



7577AAXF058

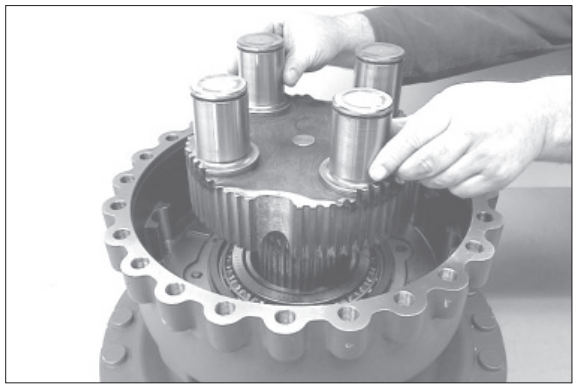
(19) Drive stop bolt into the planet carrier until contact.

Then wet spline (see arrow).



7577AAXF059

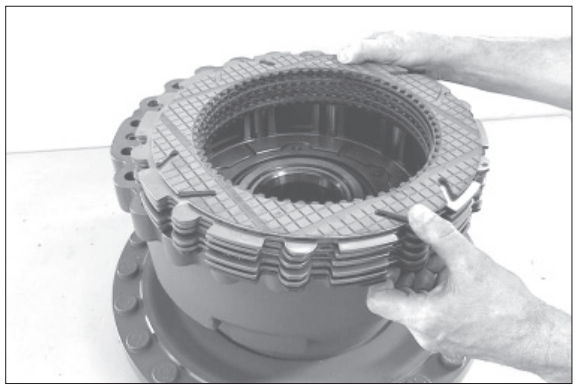
(20) Insert planet carrier into the spline of the output shaft until contact.



7577AAXF060

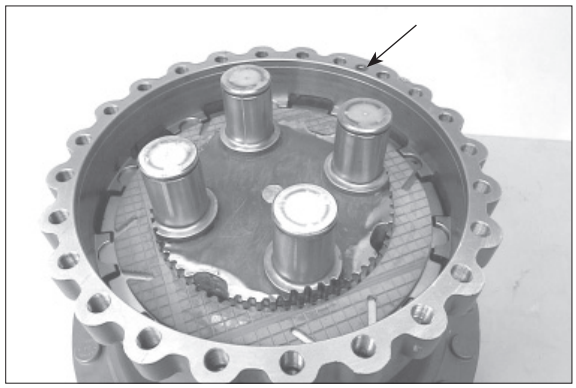
(21) Mount outer and inner disks (lining disks with paper or sinter lining).

※ Quantity and arrangement of the disks please take from the related parts list.



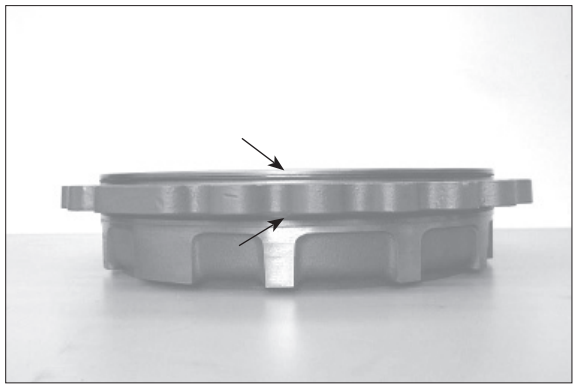
7577AAXF061

(22) Insert O-ring (see arrow) into the recess of the brake housing.



7577AAXF062

(23) Grease both O-rings (see arrows) and insert them into the annular grooves of the ring gear.

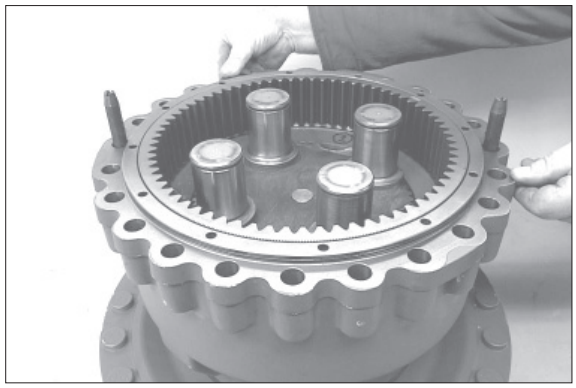


7577AAXF017

(24) Install two adjusting screws and insert ring gear into the brake housing until contact.

※ Special tool
Adjusting screws 5870 204 029

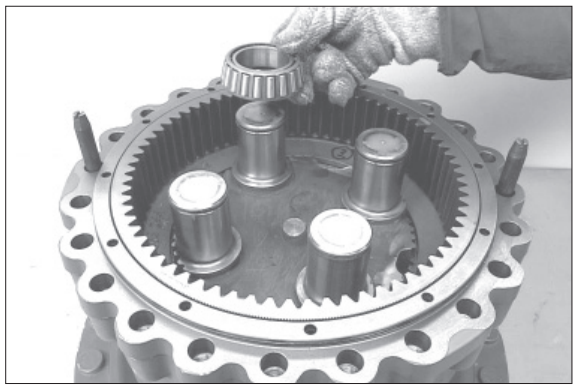
※ Pay attention to radial location.



7577AAXF063

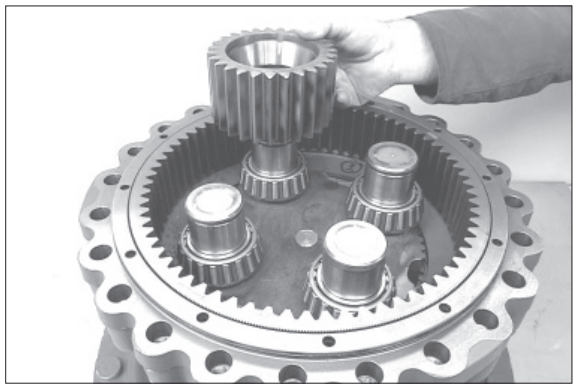
(25) Heat bearing inner rings and install them until contact with the big radius showing to the planet carrier (downwards).

※ Subsequently install bearing inner rings after cooling down.



7577AAXF064

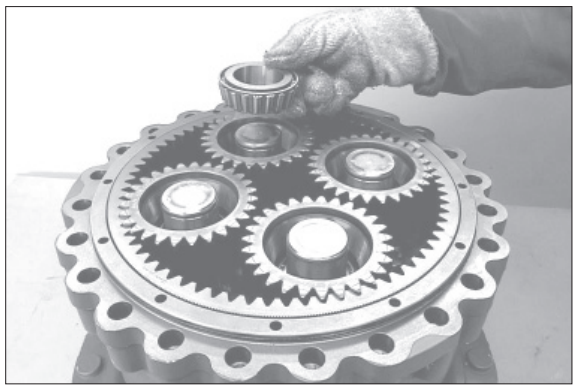
(26) Put planet gears onto the bearing inner rings.



7577AAXF065

(27) Heat bearing inner rings and install them on the planet gears until contact.

※ Subsequently install bearing inner rings after cooling down.

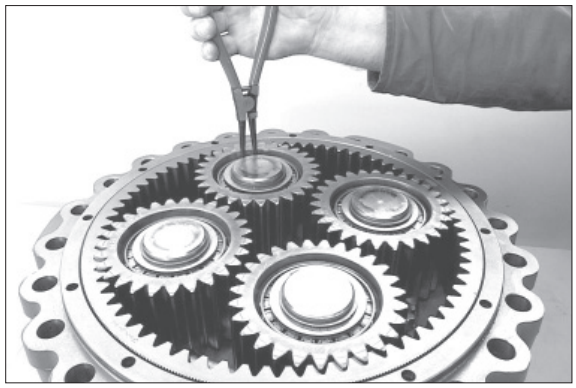


7577AAXF066

(28) Fasten plant gears by means of retaining rings.

※ Special tool

Set of external pliers	5870 900 015



7577AAXF067

Adjust end play of sun gear shaft 0.5 ~ 2.0 mm

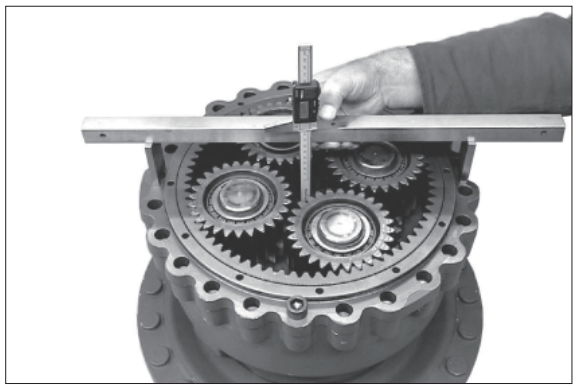
(29) Fasten ring gear by means of cap screws until contact.

Then determine dimension I, from the mounting face of the ring gear up to the face of the stop bolt.

Dimension I e.g . . . . . 67.90 mm

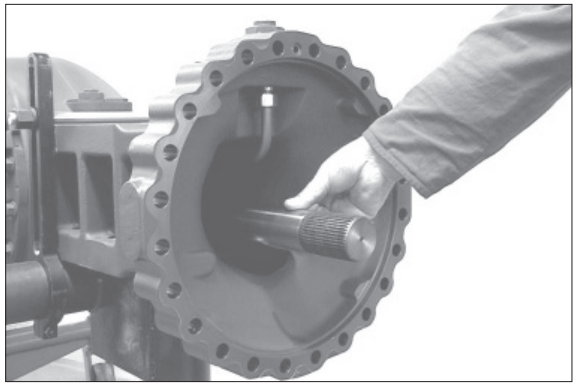
※ Special tool

Digital depth gauge	5870 200 072
Gauge blocks	5870 200 066
Straightedge	5870 200 022



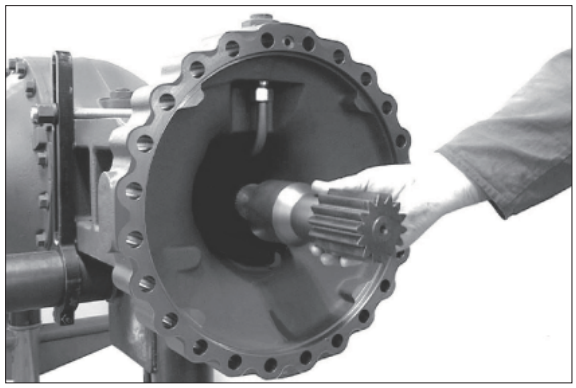
7577AAXF068

(30) Insert stub shaft into spline of the axle bevel gear until contact.



7577AAXF069

(31) Assemble sun gear shaft until contact.



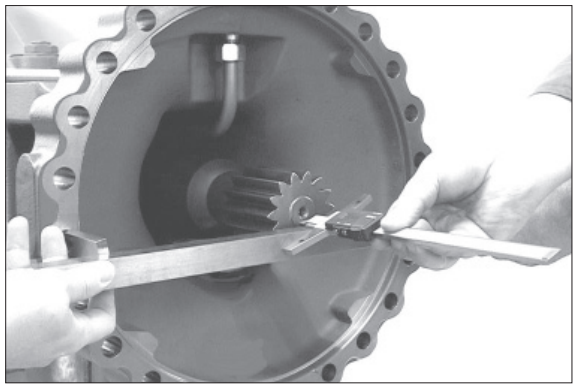
7577AAXF070

(32) Determine Dimension II from the face of the sun gear shaft up to the mounting face of the axle casing.

Dimension II e.g . . . . . 63.00 mm

※ Special tool

Digital depth gauge	5870 200 072
Gauge blocks	5870 200 066
Straightedge	5870 200 022

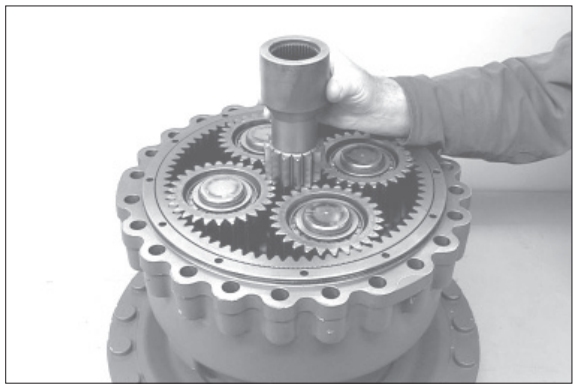


7577AAXF071

EXAMPLE A :

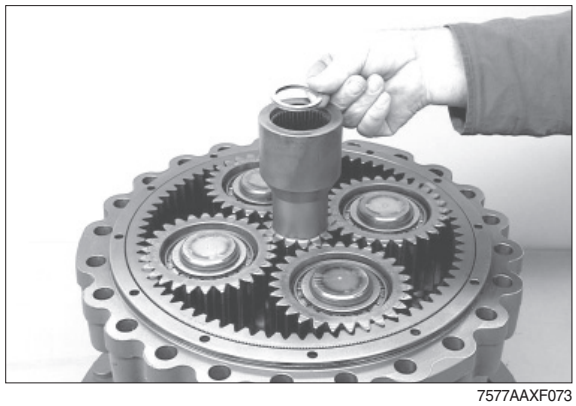
Dimension I . . . . . 67.90 mm
Dimension II . . . . . - 63.00 mm
Difference . . . . . 4.90 mm
required end play e.g. . . . . - 1.10 mm
Difference = shim e.g. s = 3.80 mm

(33) Insert sun gear shaft into the planet carrier.



7577AAXF072

(34) Fix determined shim (s), e.g. s = 3.80 mm, into the sun gear shaft by means of grease.

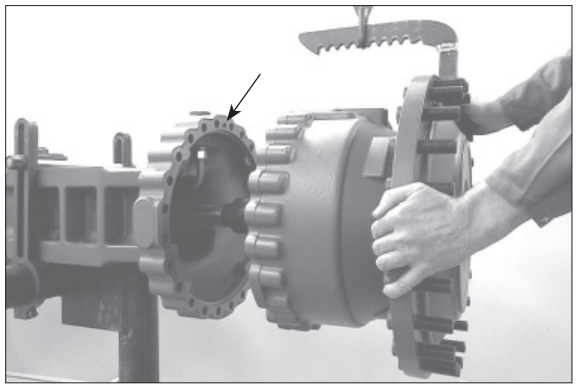


7577AAXF073

(35) Fix O-ring (see arrow) into the recess of the axle casing by means of grease and install the preassembled output to the axle casing until contact by means of lifting tackle.

※ Special tool

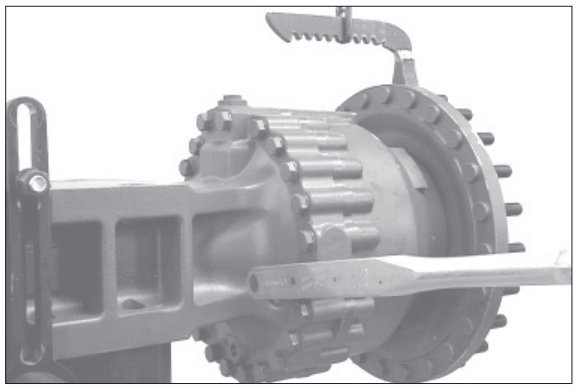
Lifting bracket	5870 281 043



7577AAXF074

(36) Fasten output by means of hexagon screws and washers.

· Tightening torque (M18/10.9) :
39.8 kgf · m (288 lbf · ft)



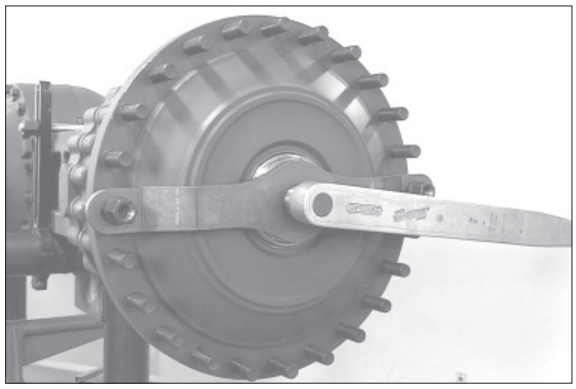
7577AAXF075

(37) Unscrew slotted nut by hand and then fasten it.

· Tightening torque : $153^{+20.4}$ kgf · m
(1107^{+148} lbf · ft)

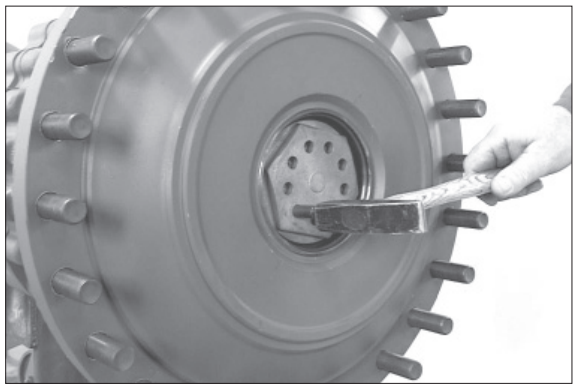
※ Special tool

Socket spanner	5870 656 078
Centering bracket	5870 912 028



7577AAXF076

(38) Secure slotted nut by means of slotted pin.



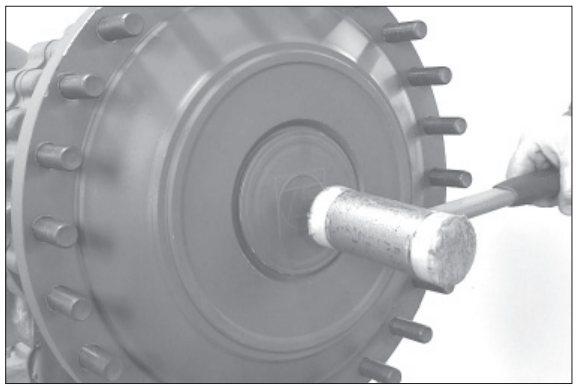
7577AAXF077

(39) Assemble O-ring (see arrow) to the cover.

7577AAXF078

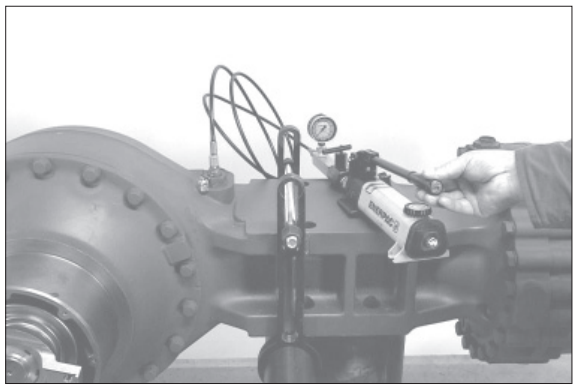
(40) Insert cover into the output shaft until contact.

※ Special tool
Hammer (plastic ø 60) 5870 280 004



7577AAXF079

Leakage test of the brake hydraulics



※ Prior to start the test, ventilate the brake hydraulics completely.

1) Open the bleeder.
2) Slowly actuate the HP-pump until oil flows out of the bleeder.
3) Close the bleeder again.
4) Slowly pressurize the HP-pump with p > 10 bar and hold the pressure for some seconds.

※ The brake piston extends and the cylinder chamber fills up with oil. The air accumulates in the upper section of the cylinder chamber.

5) Loosen the shut-off valve on the HP-pump.

※ The reversing piston presses the air from the upper section of the cylinder into the brake line.

6) Open the bleeder again.
7) Slowly actuate the HP-pump until oil flows out of the bleeder.

※ Repeat procedure - Item 3)~7) until at 7) from the beginning of the actuation no more air exits from bleeder.

※ Then pressurize the brake temporarily (5EA) with p = 100 bar max.

High-pressure test :

Increase test pressure up to p = 100_{-10} bar and close connection to HP-pump by means of shut-off valve.
During a 5 min. testing time a pressure drop of max. 2% (2 bar) is allowed.

⚠ **If the maximum pressure of 100 bar is exceeded, there will be an excessive piston adjustment and a repeated disassembly of the brake or the adjusting is required to reset the gripping rings to the adjusting dimension.**

Low-pressure test :
Reduce test pressure to p = 5 bar and close the shut-off valve again.
During a 5 min. testing time a pressure drop is not allowed.

※ Special tool

HP-Pump	5870 287 007
Mini-measuring hub (9/16"- 18UNF)	5870 950 115

※ Prior to putting the axle into operation, fill in the oil acc. to the lubrication and maintenance instructions.

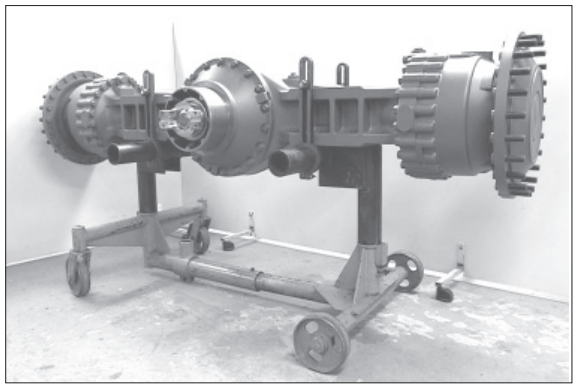
3) DISASSEMBLY OF DIFFERENTIAL CARRIER AND OIL PIPES

(1) Disassembly of differential carrier

① Fasten axle on assembly truck.

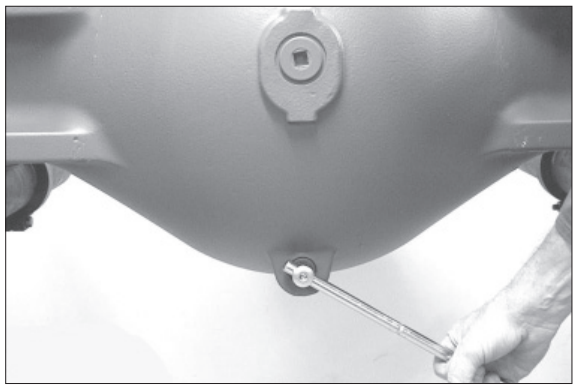
※ Special tool

Assembly truck	5870 350 000
Holding fixtures	5870 350 077
Clamps	5870 350 075

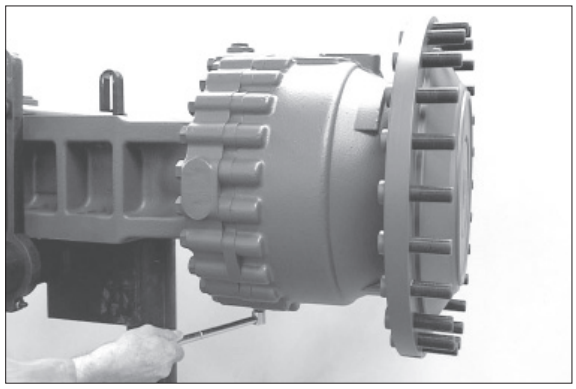


7577AAXF001

② Loosen screw plugs (3EA, see Figure 7577AAXF002 and 003) and drain oil from axle casing.



7577AAXF002



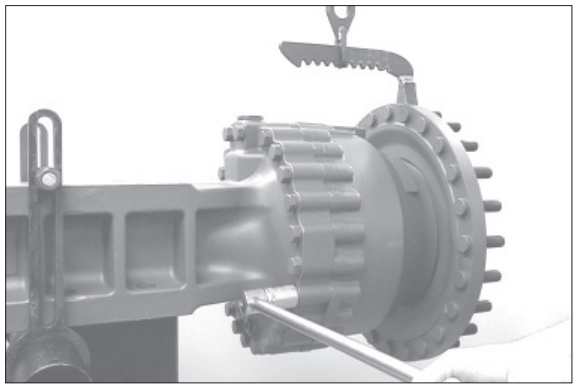
7577AAXF003

③ Secure output by means of lifting tackle and loosen hexagon screws.

※ Special tool

Lifting bracket	5870 281 043

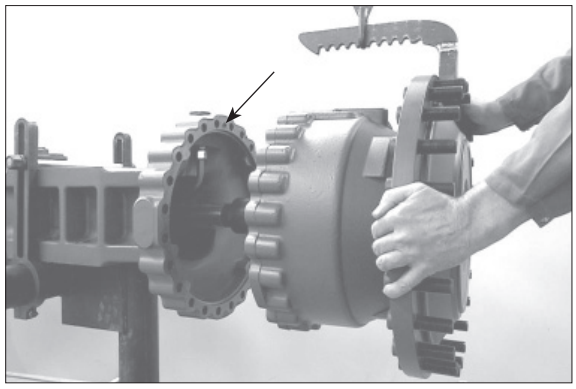
※ Make step (Fig. 7577AAXF007~9) on both output sides.



7577AAXF007

④ Separate complete output from the axle casing.

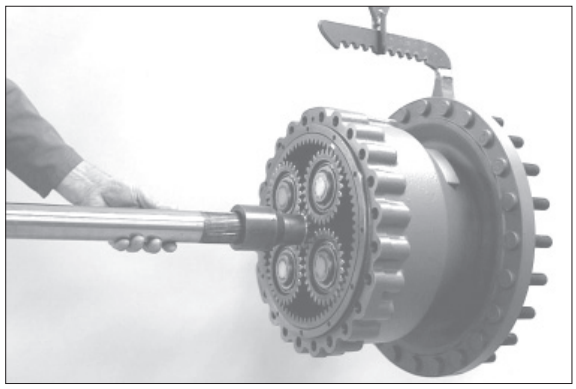
※ Pay attention to released O-ring (see arrow).



7577AAXF008

⑤ Pull stub shaft out of the sun gear shaft.

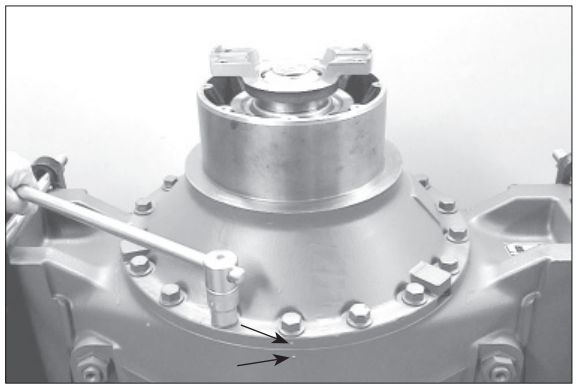
※ Pay attention to released shim (s).



7577AAXF009

⑥ Loosen hexagon screws.

※ Mark location of differential carrier to the axle casing (see arrows).

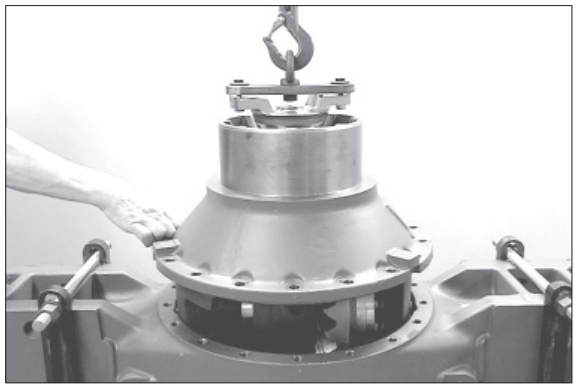


7577AAXF081

⑦ Lift differential carrier by means of lifting tackle out of the axle casing.

※ Special tool

Lifting tackle	5870 281 044

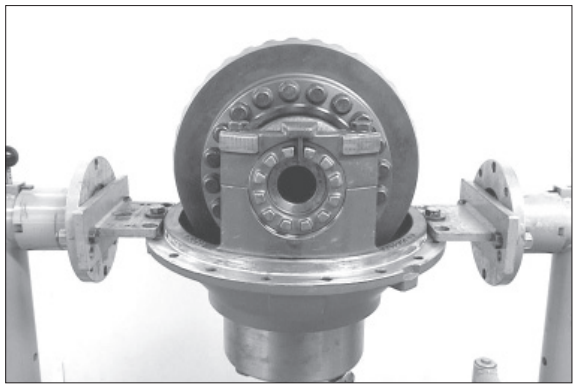


7577AAXF082

⑧ Fasten differential carrier to assembly truck.

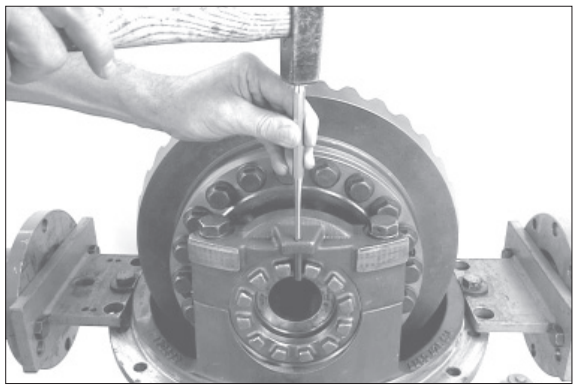
※ Special tool

Assembly truck	5870 350 000
Holding fixture	5870 350 034



7577AAXF083

⑨ Drive out slotted pins.

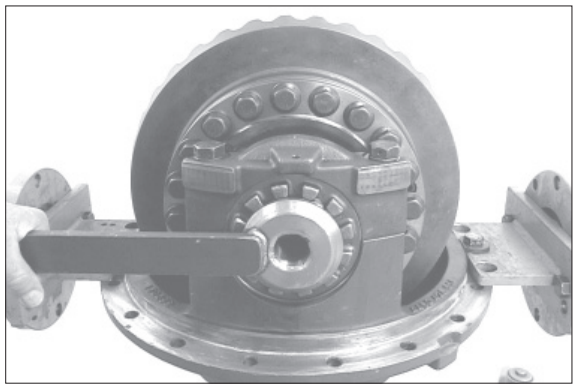


7577AAXF084

⑩ Loosen and remove both adjusting nuts.

※ Special tool

Socket spanner	5870 656 079



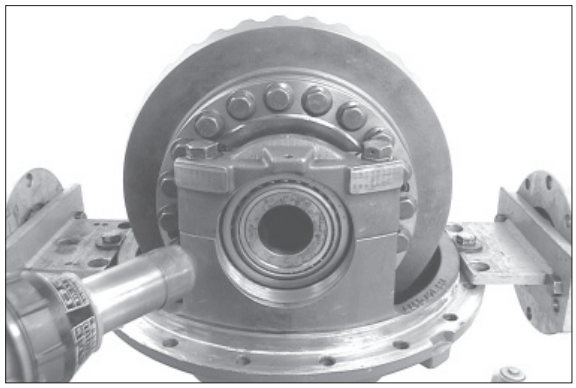
7577AAXF085

⑪ Heat axle drive housing by means of hot-air blower.

※ Special tool

Hot-air blower 230 V	5870 221 500
Hot-air blower 115 V	5870 221 501

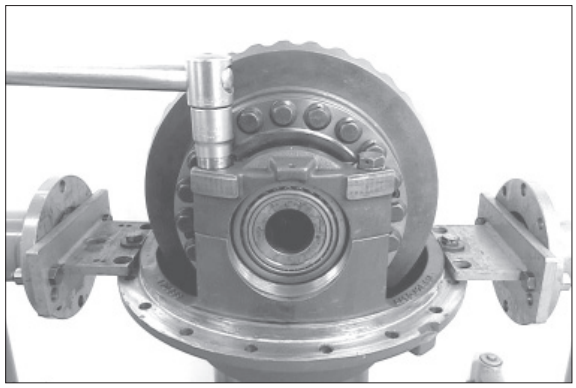
※ Hexagon screws are installed with Loctite (type No. 262).



7577AAXF086

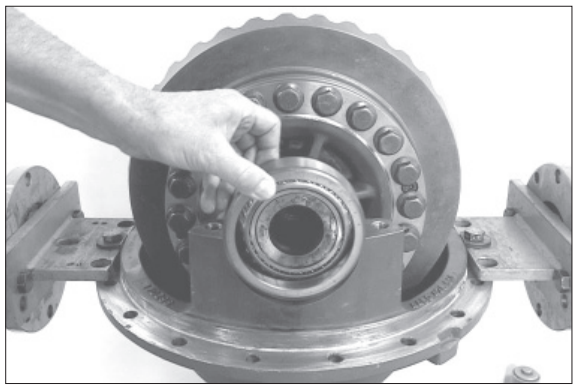
⑫ Loosen hexagon screws and take off bearing bracket.

⚠ **Loosen hexagon screws by hand only.**



7577AAXF087

⑬ Remove both bearing outer rings.

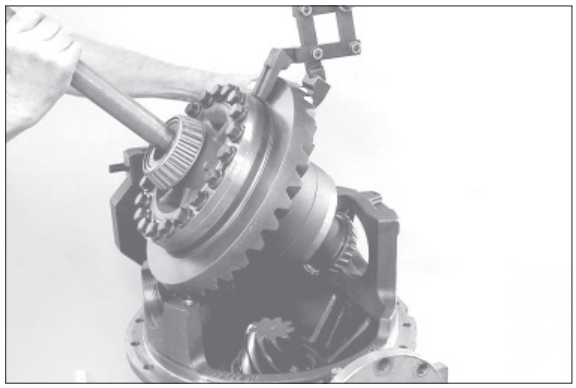


7577AAXF088

⑭ Lift differential out of the housing by means of lifting tackle.

※ Special tool

Lifting tackle	5870 281 013



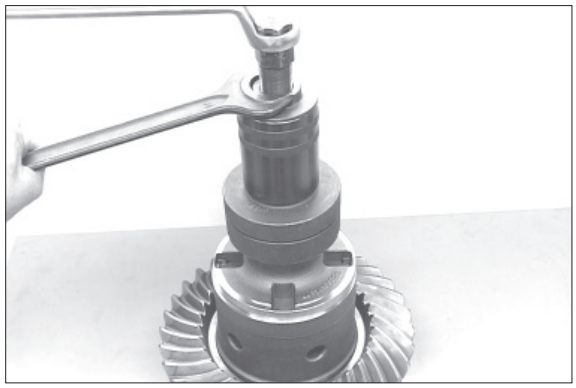
7577AAXF089

Disassembly of limited slip differential

⑮ Pull bearing inner ring from the differential housing.

※ Special tool

Gripping insert	5873 002 027
Basic set	5873 002 001

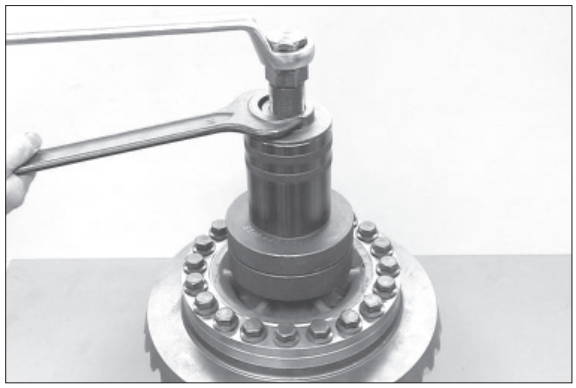


7577AAXF090

⑯ Pull bearing inner ring from the housing cover.

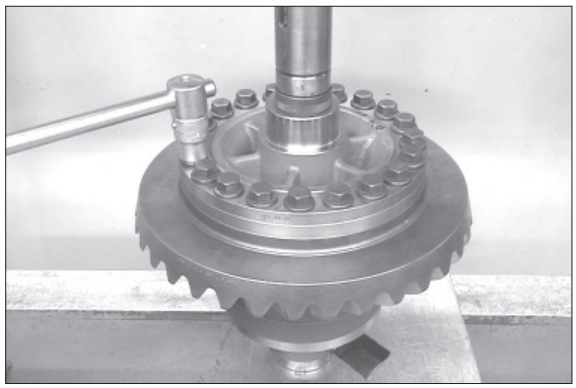
※ Special tool

Rapid grip	5873 012 017
Basic set	5873 002 001



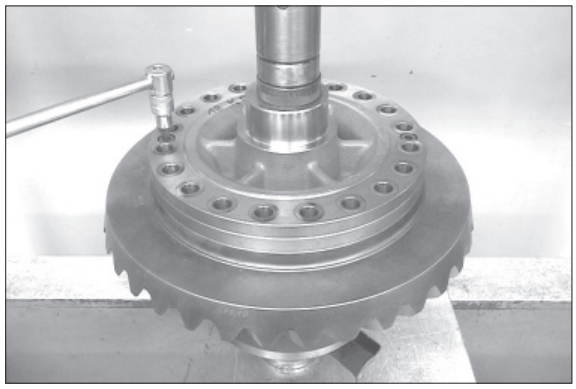
7577AAXF091

⑰ Fasten differential by means of press and loosen locking screws.



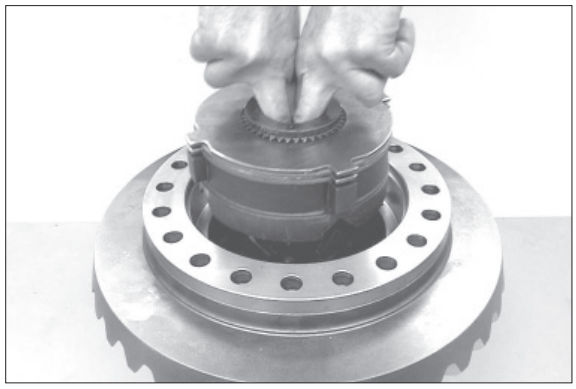
7577AAXF092

⑱ Loosen cap screws and remove released housing cover.



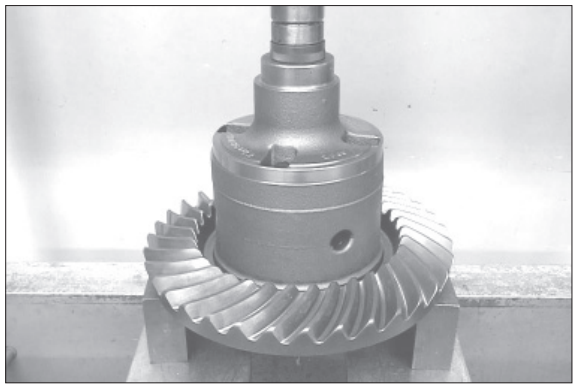
7707AAXR001

⑲ Remove all single parts from the differential housing.



7577AAXF093

⑳ Press off crown wheel from the differential housing.



7577AAXF094

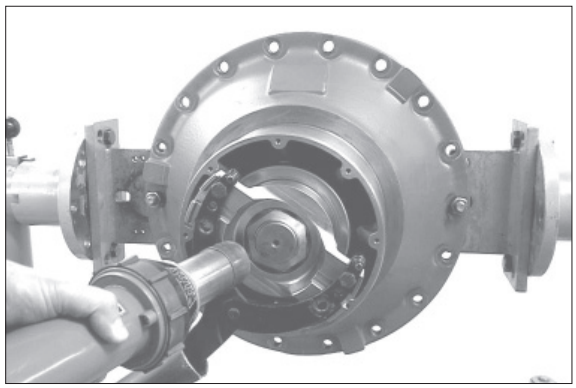
Disassembly of drive pinion

㉑ Heat slotted nut by means of hot-air blower.

※ Special tool

Hot-air blower 230 V	5870 221 500
Hot-air blower 115 V	5870 221 501

※ Slotted nut is locked with Loctite (type No. 262).

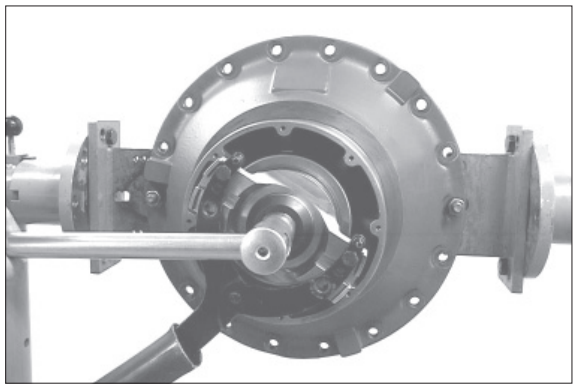


7577AAXF095

㉒ Loosen slotted nut and remove the washer behind it.

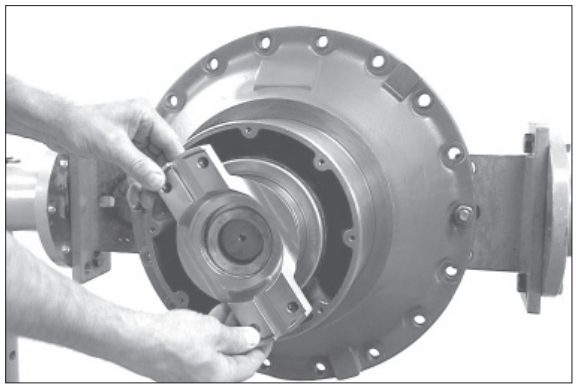
※ Special tool

Slotted nut wrench	5870 401 139
Fixture	5870 240 002



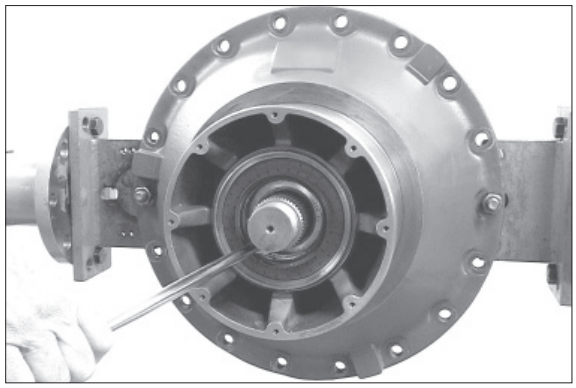
7577AAXF096

㉓ Pull input flange from the drive pinion.



7577AAXF097

㉔ Press shaft seal out of the axle drive housing.

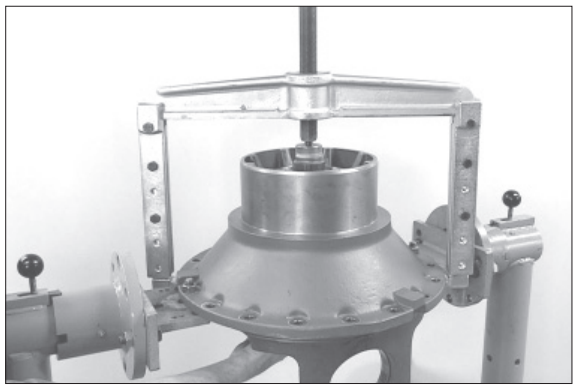


7577AAXF098

㉕ Press drive pinion out of the axle drive housing by means of two-armed puller and remove the released bearing inner ring.

※ Special tool

Two-armed puller	5870 970 007

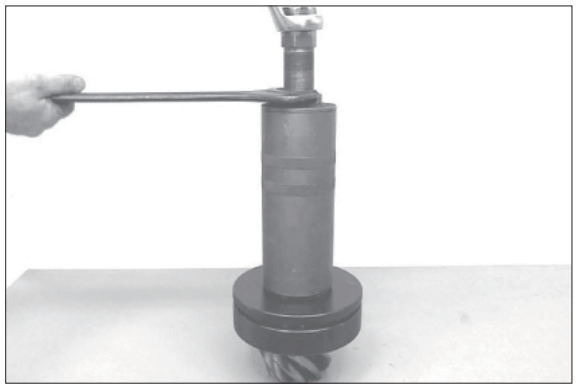


7577AAXF099

㉖ Take off spacer ring and pull bearing inner ring from the drive pinion.

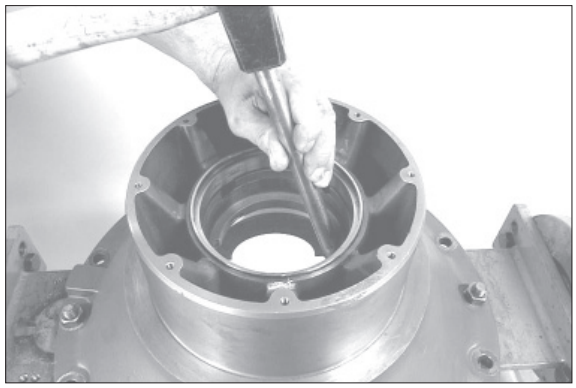
※ Special tool

Gripping insert	5873 002 030
Basic set	5873 002 001



7577AAXF100

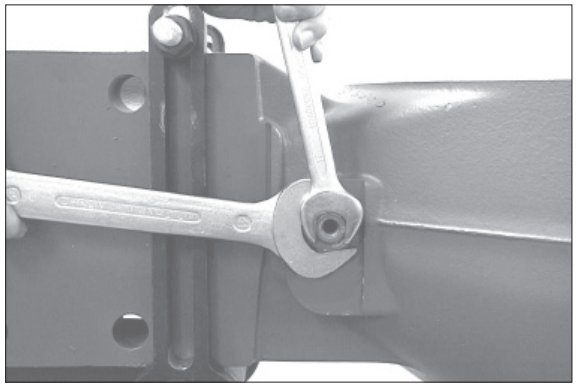
㉗ If necessary drive out both bearing outer rings from the axle drive housing.



7577AAXF101

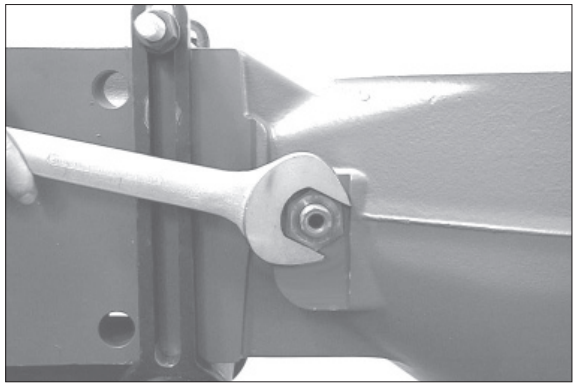
(2) Disassembly of brake tubes

① Loosen hexagon nut.



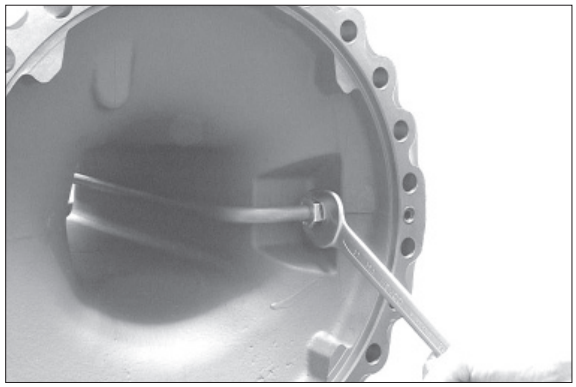
7577AAXF103

② Loosen union screw.



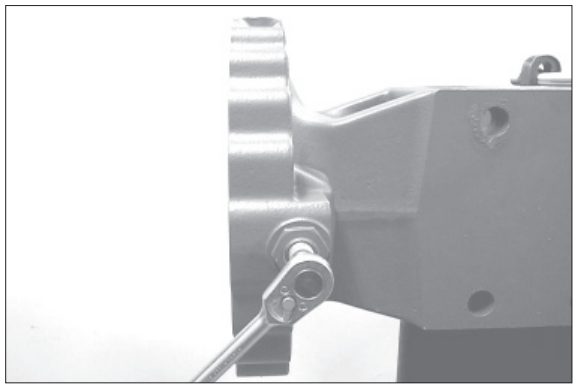
7577AAXF104

③ Loosen pipe union and remove released brake tube from the axle casing.



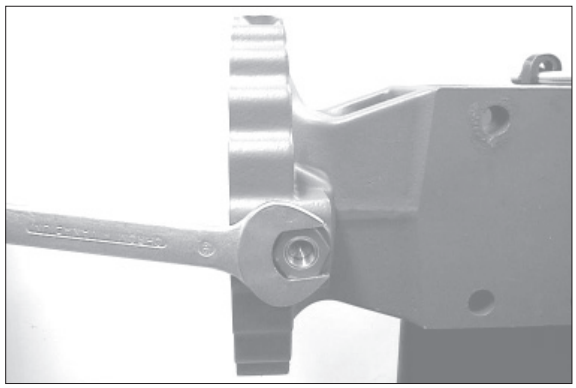
7577AAXF105

④ Remove vent valve from the connection part.



7577AAXF106

⑤ Loosen connection part and remove it from the axle casing.



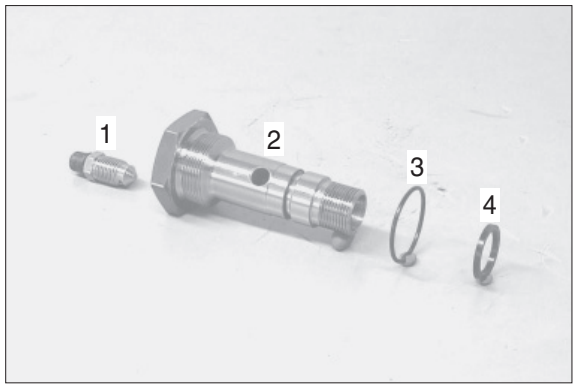
7577AAXF107

4) REASSEMBLY OF BRAKE TUBES AND DIFFERENTIAL CARRIER

(1) Reassembly of brake tubes

① Preassemble connection part as shown in opposite figure.

1 Vent valve
2 Connection part
3 O-Ring
4 Rectangular ring

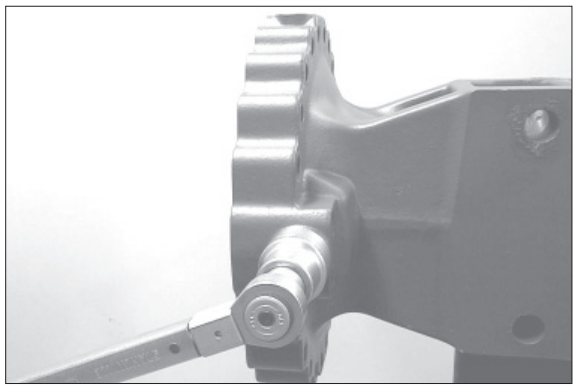


7577AAXF108

※ Step (figure 7577AAXF108 ~ 114) is to be made on both output sides.

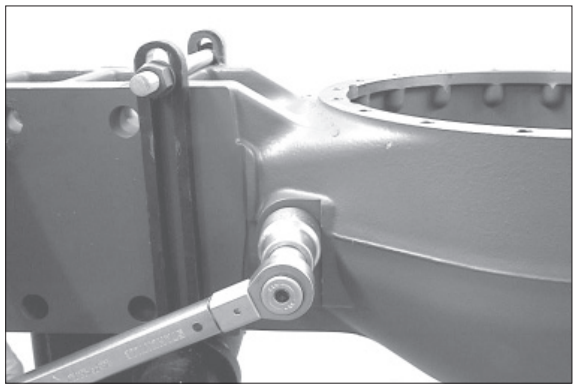
② Install connection part.

· Tightening torque : 13.3 kgf · m (95.9 lbf · ft)

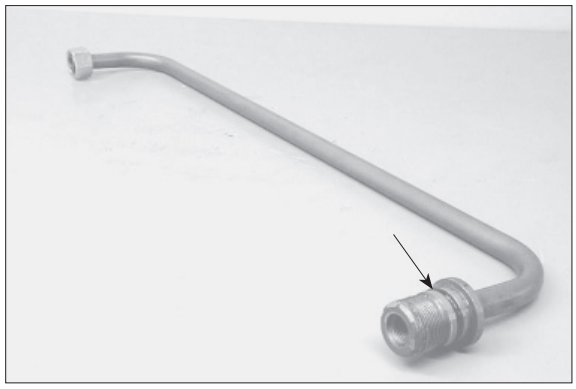

7577AAXF109

③ Provide union screw with new O-ring and install it.

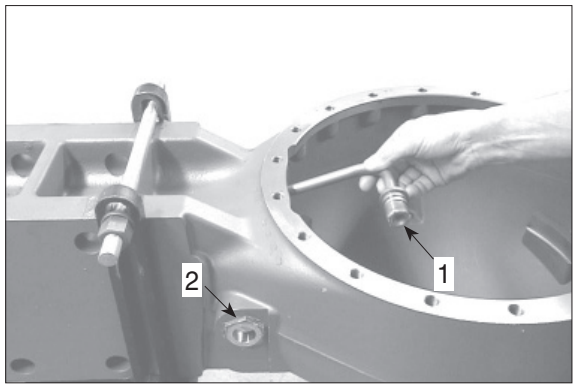
· Tightening torque : 15.3 kgf · m (111 lbf · ft)


7577AAXF110

④ Insert O-ring (see arrow) into the annular groove of the brake tube.


7577AAXF111

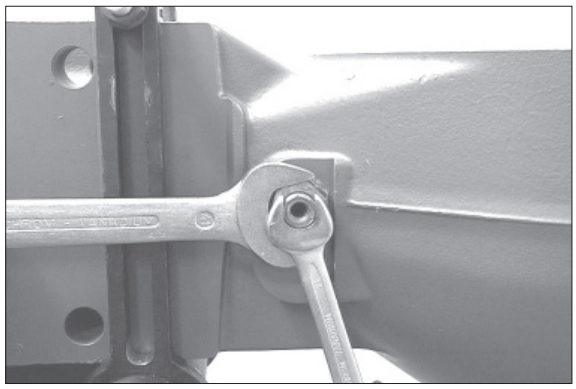
⑤ Insert brake tube into the axle casing, assembling the connection part (see arrow 1) through the union screw (see arrow 2).



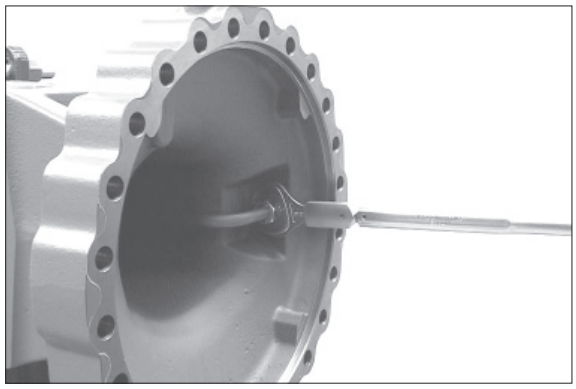
7577AAXF112

⑥ Fasten brake tube by means of hexagon nut and union nut (see below figure).

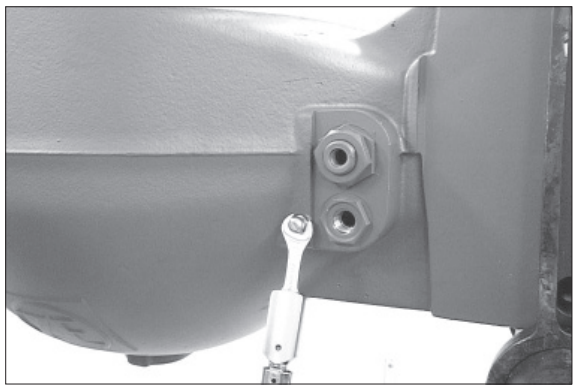
· Tightening torque : 10.2 kgf · m (73.8 lbf · ft)


7577AAXF113

· Tightening torque : 8.2 kgf · m (59 lbf · ft)


7577AAXF114

⑦ Install vent valve.


7707AAXF014

(2) Reassembly of differential carrier

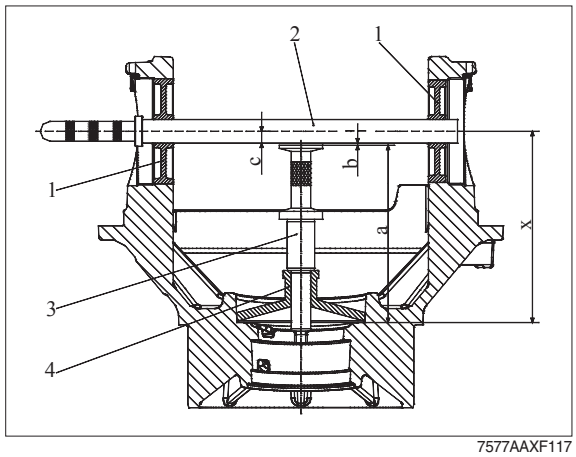
※ If crown wheel or drive pinion are damaged, both parts have to be replaced together.
For new installation of a complete bevel gear set pay attention to the same pair number of drive pinion and crown wheel.

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 disassembly and reassembly of the drive pinion as well as of the differential.

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

Then install stop washer (4) and measuring pin (3) and assemble measuring shaft (2) (see sketch).



7577AAXF117

※ Special tool

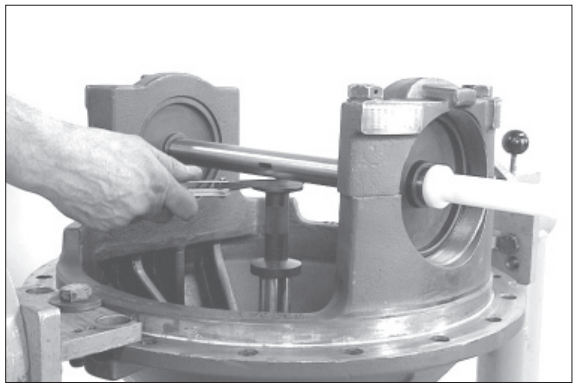
Adapter pieces	5870 500 046
Adapter pieces	5870 500 030
Measuring shaft	5870 500 001
Measuring pin	5870 351 016
Stop washer	5870 351 019

② Determine gap (dimension b) between measuring shaft and measuring pin by means of feeler gauge.

Dimension b e.g . . . . . 5.60 mm

EXAMPLE A :

Dimension a (= Measuring pin + stop washer) . . . . . 225.00 mm
Dimension b . . . . . + 5.60 mm
Dimension c . . . . . + 15.00 mm
results in dimension X = 245.60 mm

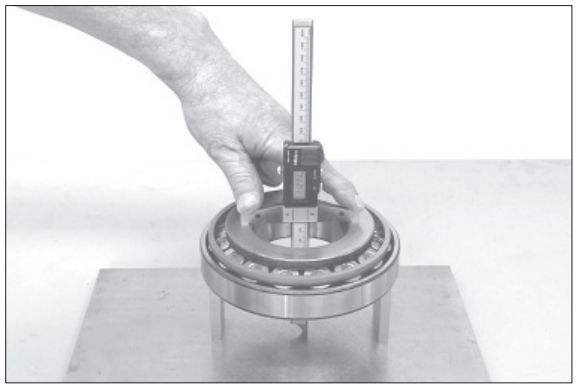

7577AAXF118

③ Determine dimension I (bearing width).

Dimension I e.g . . . . . 42.65 mm

※ Special tool

Digital depth gauge	5870 200 072
Gauge blocks	5870 200 066



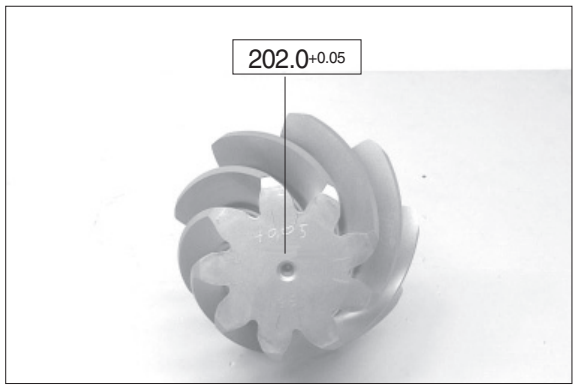
7577AAXF119

④ Read dimension II (dimension for pinion).

Dimension II e.g. . . . . 202.05 mm

EXAMPLE B :

Dimension I . . . . . 42.65 mm
Dimension II . . . . . + 202.05 mm
results in dimension Y = 244.70 mm



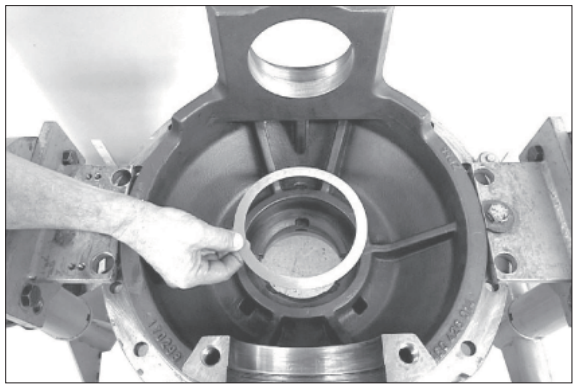
7577AAXF120

EXAMPLE C :

Dimension X . . . . . 245.60 mm
Dimension Y . . . . . - 244.70 mm
Difference = shim e.g. s = 0.90 mm

Install the drive pinion

⑤ Place determined shim e.g. s = 0.90 mm into the bearing bore.

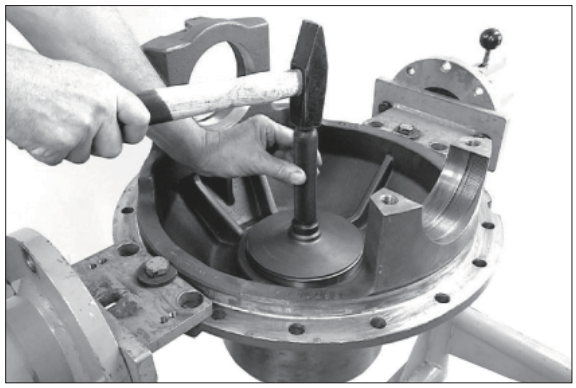


7577AAXF121

⑥ Undercool bearing outer ring and insert it into the bearing bore until contact.

※ Special tool

Driver	5870 050 009
Handle	5870 260 004



7577AAXF122

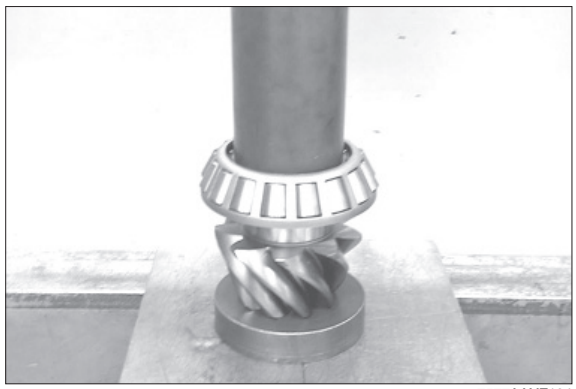
⑦ Undercool bearing outer ring on the input flange side and insert it until contact.

※ Special tool

Driver	5870 058 077
Handle	5870 260 002

7577AAXF123

⑧ Press bearing inner ring on the drive pinion until contact.

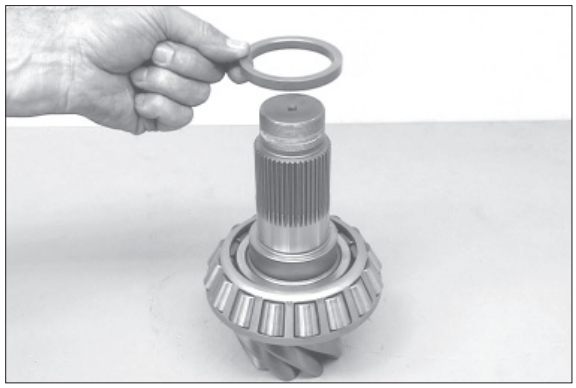


7577AAXF124

Adjust rolling moment of drive pinion bearing 0.36 ~ 0.46 kgf · m (Figure 7577AAXF125~131) :

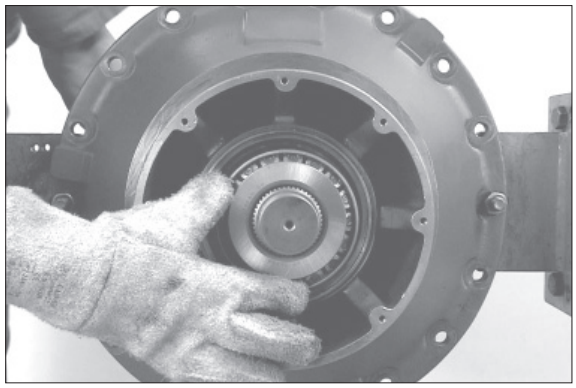
⑨ Assemble spacer ring (e.g. s = 8.10 mm).

※ As per experience the required rolling moment is obtained by use of the spacer ring (e.g. s = 8.10mm) available at disassembly.
However, a later checking of the rolling moment is imperative.



7577AAXF125

⑩ Insert preassembled drive pinion into the axle drive housing and assemble the heated bearing inner ring until contact.

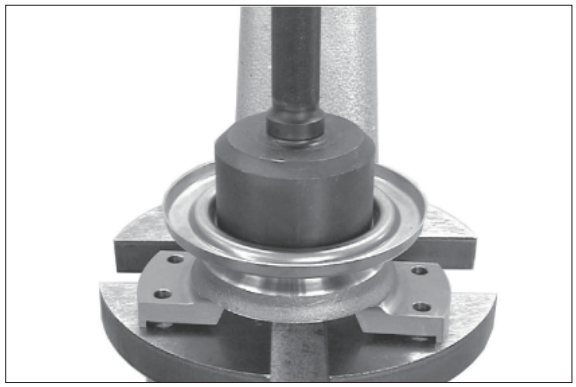


7577AAXF126

⑪ Press dust protection on the input flange until contact.

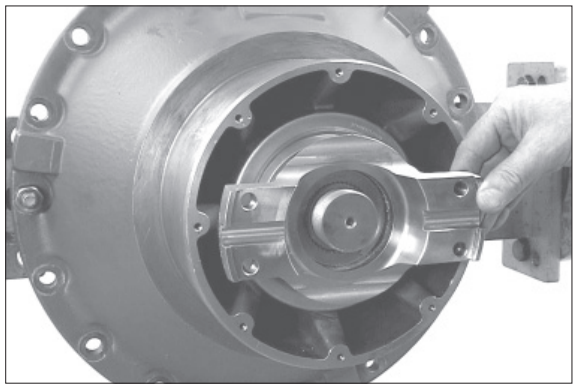
※ Special tool

Driver	5870 056 003



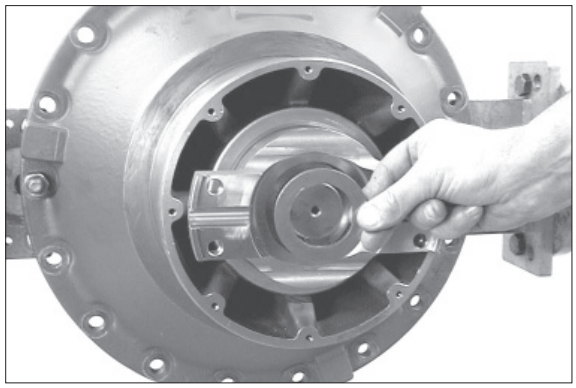
7577AAXF127

⑫ Assemble input flange.



7577AAXF128

⑬ Assemble washer.



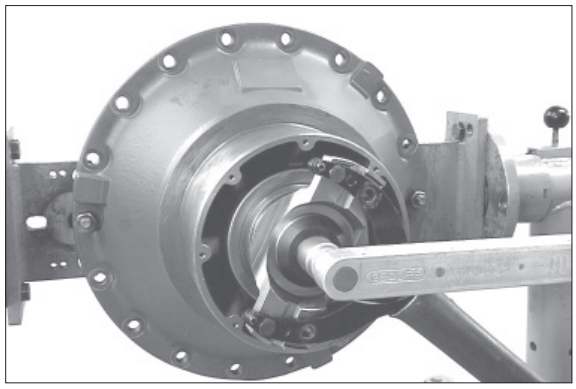
7577AAXF129

⑭ Unscrew slotted nut by hand and tighten it.
· Tightening torque : 122 kgf · m
(885 lbf · ft)

※ Special tool

Slotted nut wrench	5870 401 139
Fixture	5870 240 002

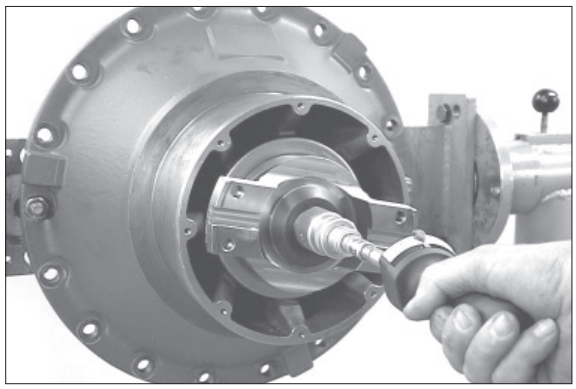
※ When tightening rotate drive pinion in both directions several times.


7577AAXF130

⑮ Check rolling moment (0.36~0.46 kgf · m).

※ For new bearings it should be tried to achieve the max. value of the rolling moment.

⚠ If the required rolling moment is not obtained, correct it with an adequate spacer ring (figure 7577AAXF125), according to the following indications :
Rolling moment too low - install a thinner spacer ring
Rolling moment too high - install a thicker spacer ring.


7577AAXF131

⑯ Then loosen the slotted nut again and pull input flange from the drive pinion.

Install shaft seal with the sealing lip showing to the oil chamber (downwards).

※ Special tool

Driver	5870 048 233

※ The exact installation position of the shaft seal will be obtained by using the exact driver.

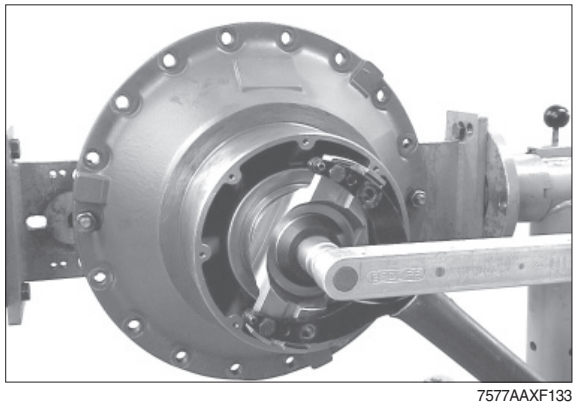

7577AAXF132

⚠ Just before the installation wet the outer diameter of the shaft seal with spirit and fill the space between sealing and dust lip with grease.

⑰ Assemble input flange and finally fasten it by means of washer and slotted nut.

· Tightening torque : 122 kgf · m (885 lbf · ft)

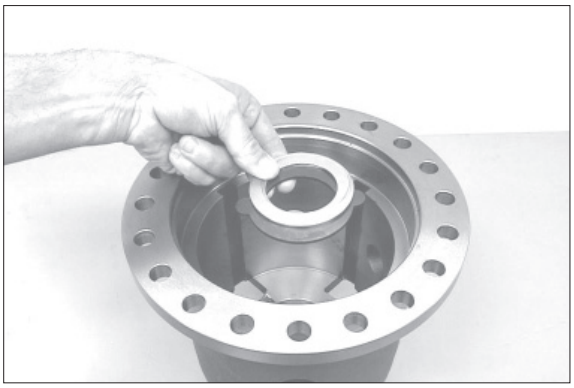
⚠ Apply Loctite (type No. 262) onto the thread of the slotted nut.


7577AAXF133

Reassembly of limited slip differential

⑱ Place both thrust washers into the differential housing.

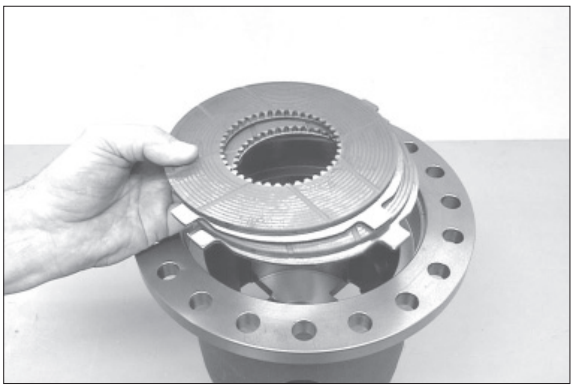
※ Prior to installation all single parts of the differential must be oiled.



7577AAXF134

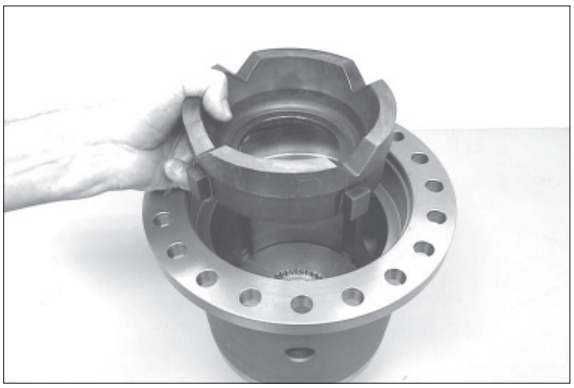
⑲ Starting with an outer clutch disc install alternately the outer and inner clutch discs.

⚠ **Thickness of the disc pack must be identical on both sides.**



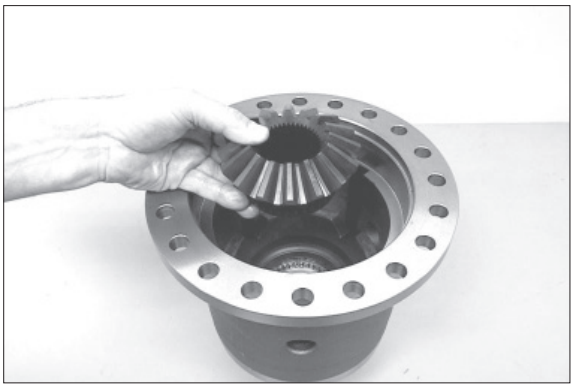
7577AAXF135

⑳ Put on the pressure ring.



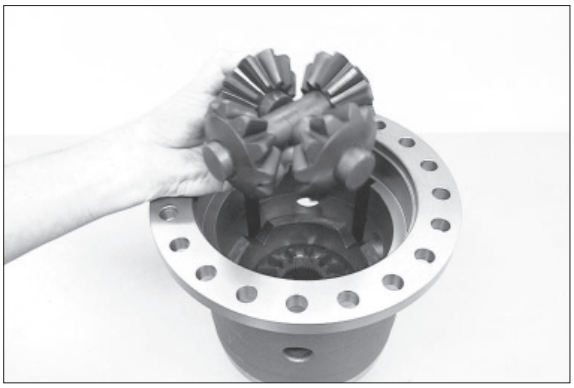
7577AAXF136

㉑ Insert axle bevel gear until contact and at the same time assemble all inner clutch discs with the spline.



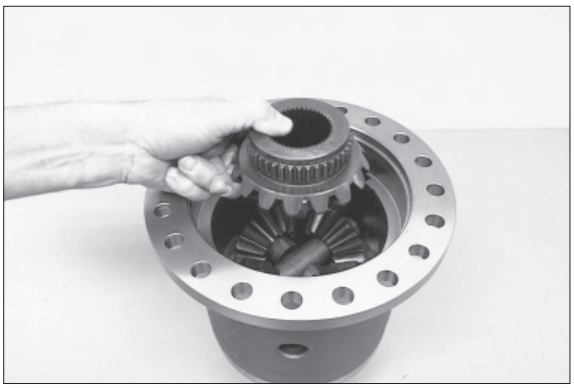
7577AAXF137

㉒ Preassemble differential spider and insert it into the differential housing.



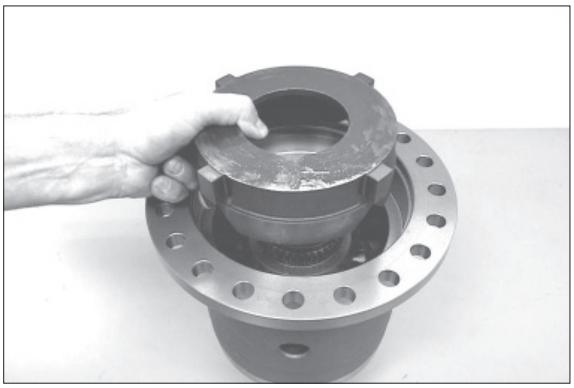
7577AAXF138

㉓ Put on the second axle bevel gear.



7577AAXF139

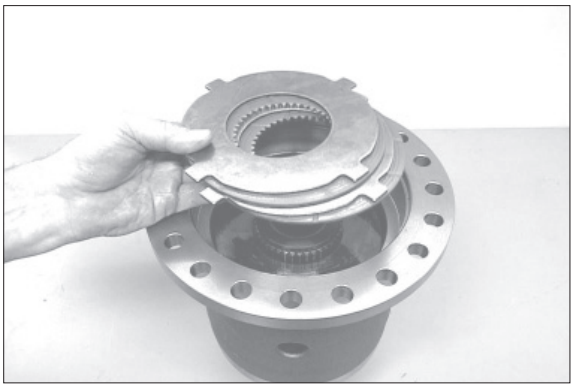
㉔ Insert the second pressure ring into the differential housing.



7577AAXF140

㉕ Starting with an inner clutch disc install alternately the inner and outer clutch discs.

⚠ Thickness of the clutch disc pack must be identical on both sides.



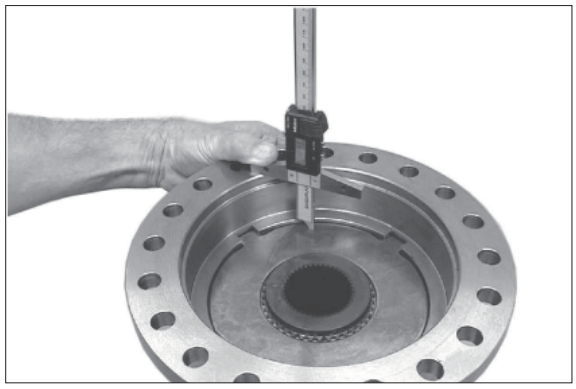
7577AAXF141

Determine disc clearance 0.2~0.8 mm

㉖ Determine dimension I, from mounting face of the differential housing to plane face of the outer clutch disc.

Dimension I e.g . . . . . 49.30 mm

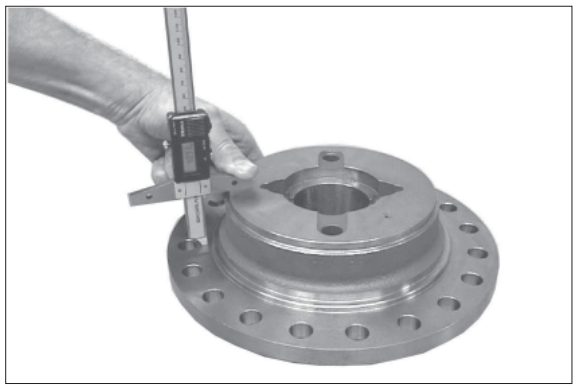
※ Special tool
Digital depth gauge 5870 200 072



㉗ Determine dimension II, from contact surface of the outer clutch disc to the mounting face of the housing cover.

Dimension II e.g . . . . . 48.95 mm

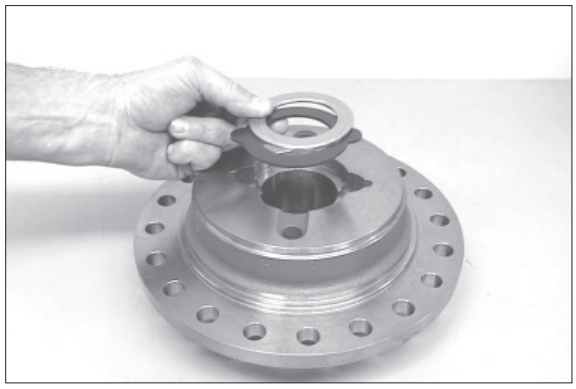
EXAMPLE D :
Dimension I . . . . . 49.30 mm
Dimension II . . . . . - 48.95 mm
Difference = Disc clearance = 0.35 mm



7577AAXF143

※ If the required disc clearance is not obtained, correct it with the adequate outer clutch discs (s = 2.7, s = 2.9, s = 3.0, s = 3.1 or s = 3.3 mm), taking care that the difference in thickness between the left and the right disc pack must only be 0.01 at a maximum.

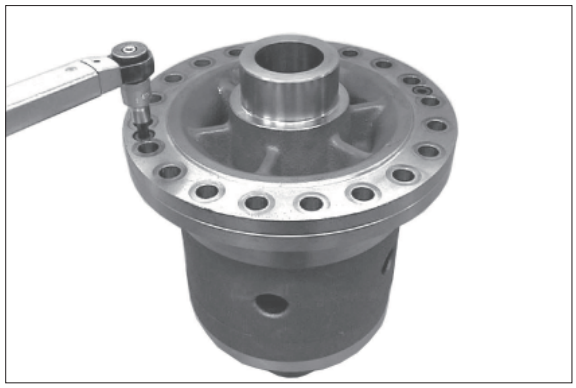
㉘ Fix both thrust washers with grease into the recess of the housing cover.



7577AAXF144

㉙ Put on the housing cover and fasten it by means of cap screws (2EA).

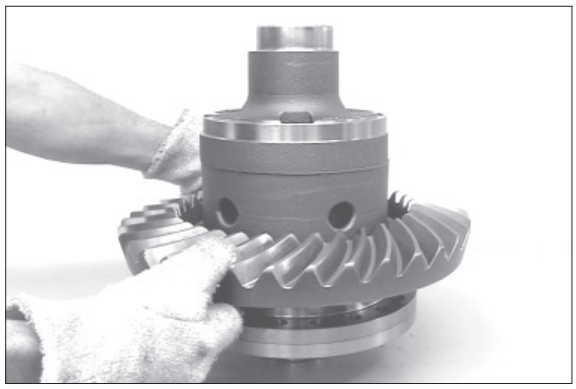
· Tightening torque (M10/8.8) :
4.7 kgf · m (33.9 lbf · ft)



7707AAXF015

㉚ Heat crown wheel and install it until contact.

※ Special tool
Adjusting screws 5870 204 040

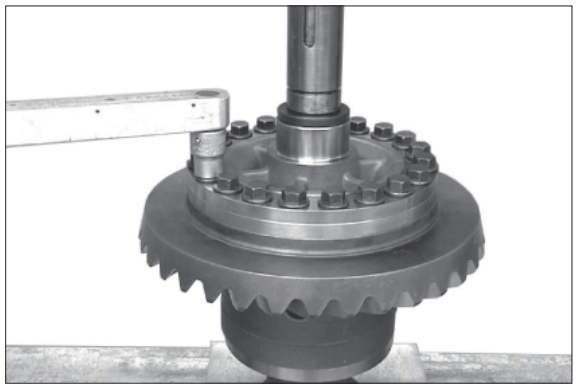


7577AAXF145

㉛ Fix differential by means of press and fasten crown wheel by means of new locking screws.

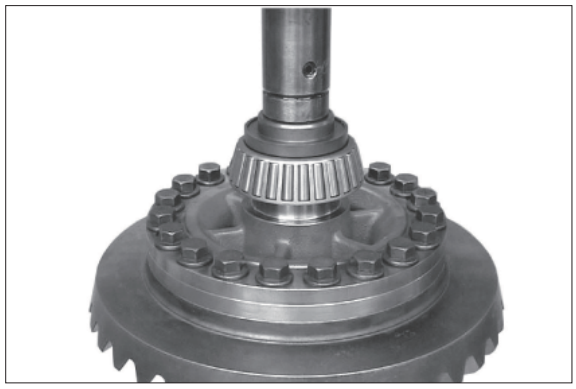
· Tightening torque : 39.8 kgf · m
(288 lbf · ft)

⚠ Only use of new locking screws is permissible.



7577AAXF146

㉜ Press on both bearing outer rings until contact.

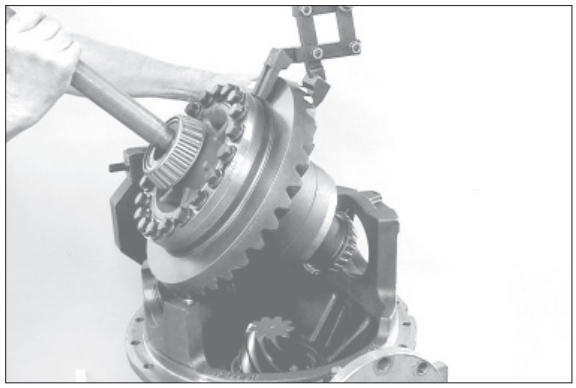


7577AAXF147

㉝ Insert differential into the axle drive housing by means of lifting tackle.

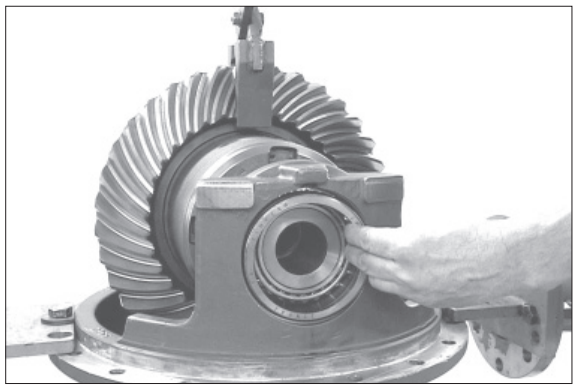
※ Special tool

Lifting tackle	5870 281 013



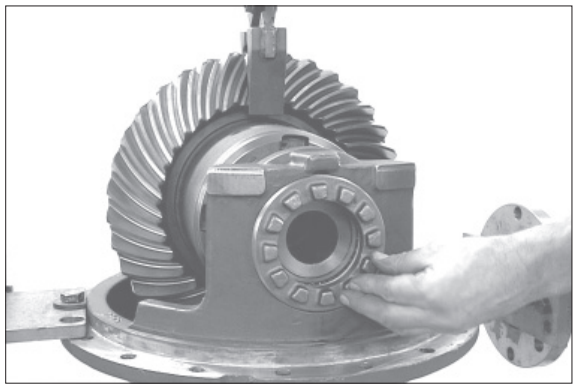
7577AAXF148

㉞ Place bearing outer ring into the axle drive housing.



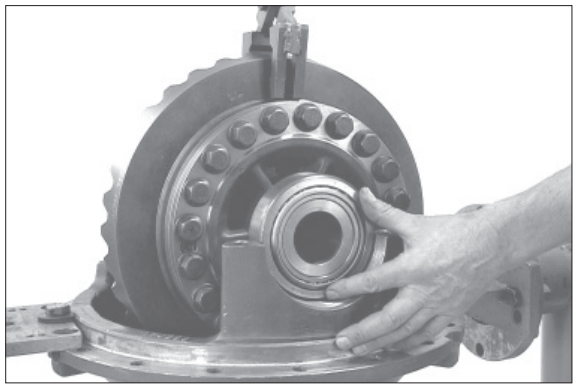
7577AAXF149

㉟ Preliminarily fix the bearing outer ring by means of adjusting nut.



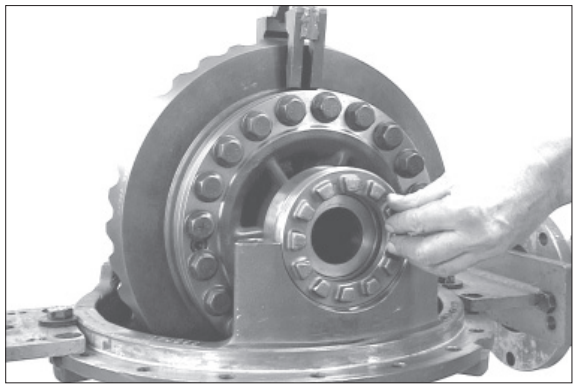
7577AAXF150

㊱ Install crown wheel-sided bearing outer ring.



7577AAXF151

㊲ Preliminarily fix the crown wheel-sided bearing outer ring by means of the second adjusting nut.



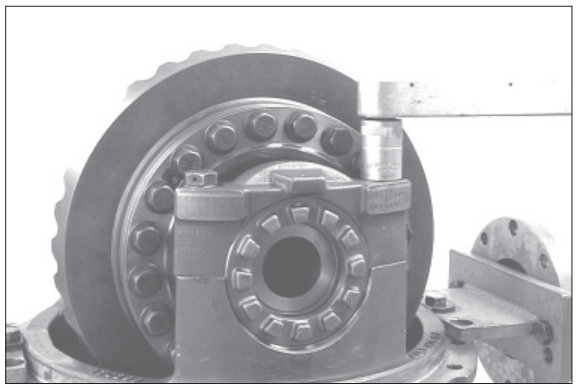
7577AAXF152

㊳ Put on bearing bracket and fasten it by means of hexagon screws and washers.

· Tightening torque (M18/10.9) :
39.8 kgf · m (288 lbf · ft)

※ Pay attention to clearance of the adjusting nut.

⚠ **Apply Loctite (type No. 262) onto threads of the hexagon screws.**



7577AAXF153

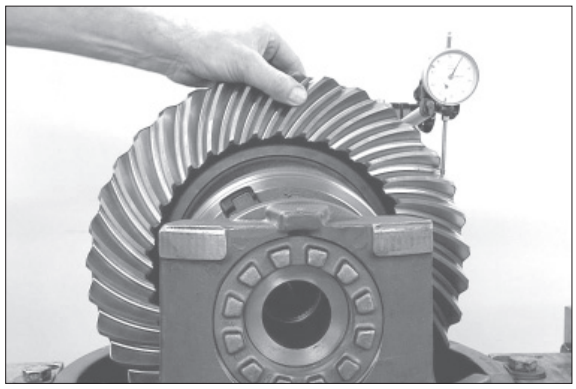
Adjustment of backlash and bearing preload

㊴ 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 the value etched on the outer diameter of the crown wheel - is reached.

※ Special tool

Magnetic stand	5870 200 055
Dial indicator	5870 200 057

※ At this step rotate the differential several times.



7577AAXF154

㊵ Determine bracket width and correct it on both adjusting nuts, if required.

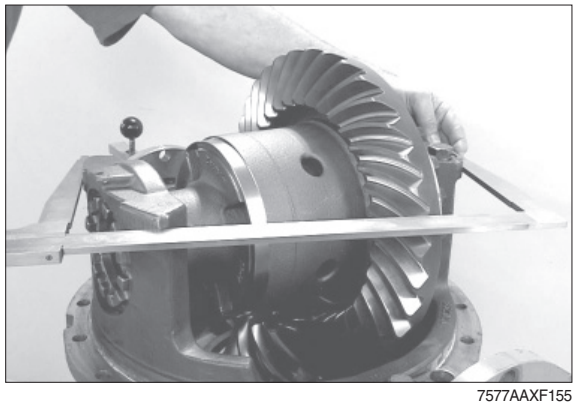
Bracket width . . . . . .448 $^{-0,05}$ mm

※ Special tool

Caliper gauge	5870 200 058

Then check backlash once again.

※ Adjusting of the bracket width results in the required bearing preload.

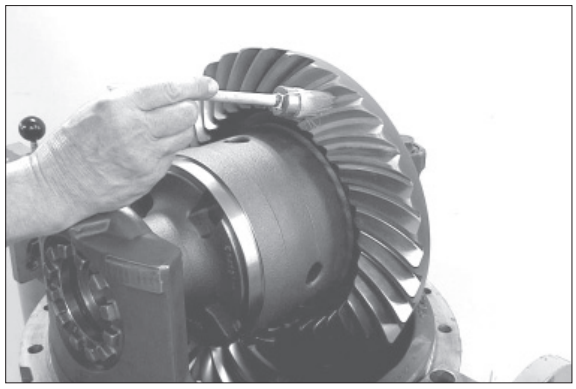


7577AAXF155

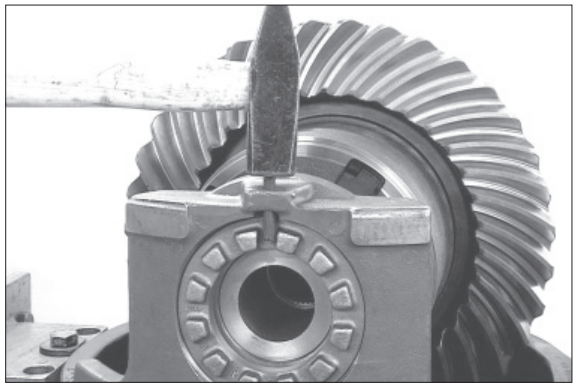
㊶ Cover some tooth flanks of the crown wheel with marking ink and roll crown wheel in both directions over the drive pinion.

Compare the obtained tooth contact pattern with the examples on page 3-267

⚠ **If the tooth contact pattern differs, there has been a measuring error at determination of the shim (figure 7577AAXF121/page 3-211), what is imperative to be corrected.**


7577AAXF156

㊷ Secure both adjusting nuts by means of slotted pins.


7577AAXF157

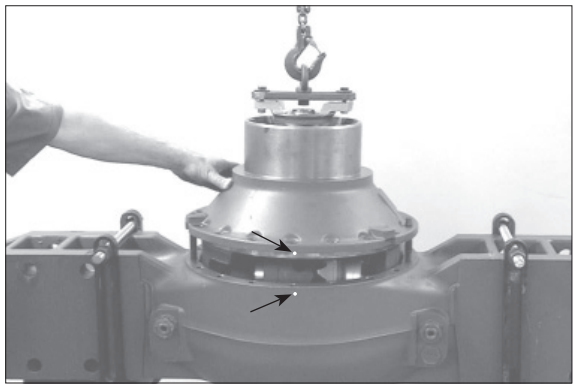
㊸ Install two adjusting screws and insert differential carrier into the axle casing until contact by means of lifting tackle.

※ Special tool

Adjusting screws	5870 204 023
Lifting tackle	5870 281 044

※ Observe radial location (see marking Page 3-199 / Figure 7577AAXF081).

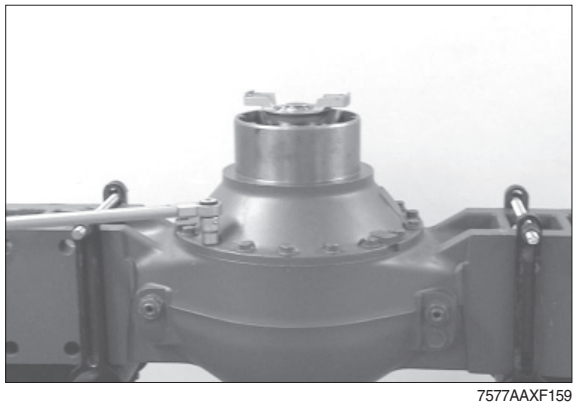
⚠ **Apply sealing compound (three Bond Type 1215) on mounting face.**


7577AAXF158

㊹ Fasten differential carrier by means of new locking screws.

・Tightening torque : 25.5 kgf・m (184 lbf・ft)

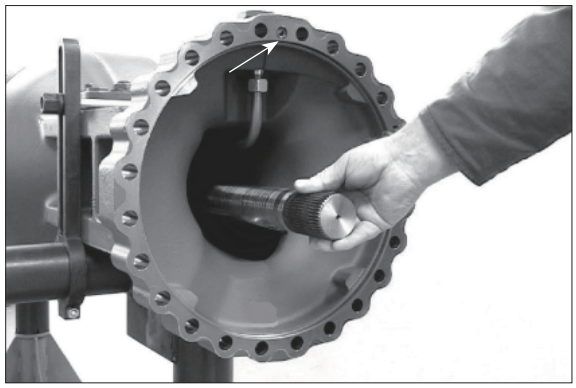
⚠ **Only use of the new locking screws is permissible.**


7577AAXF159

㊺ Insert stub shaft into spline of the axle bevel gear until contact.

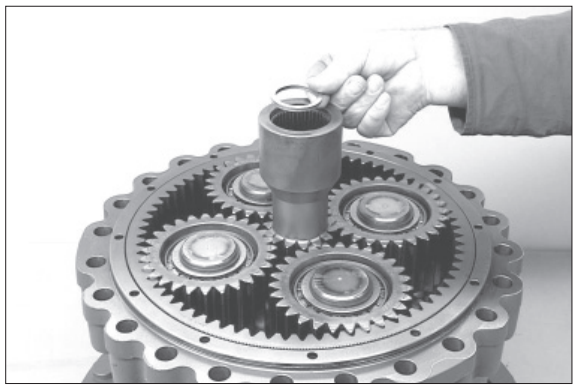
Then fix O-ring (see arrow) by means of grease into the recess of the axle casing.

※ Step (Figure 7577AAXF160 ~ 163) is to be made on both output sides.



7577AAXF160

㊻ Thrust washer (s) removed at disassembly have to be fixed in the sun gear shaft by means of grease.

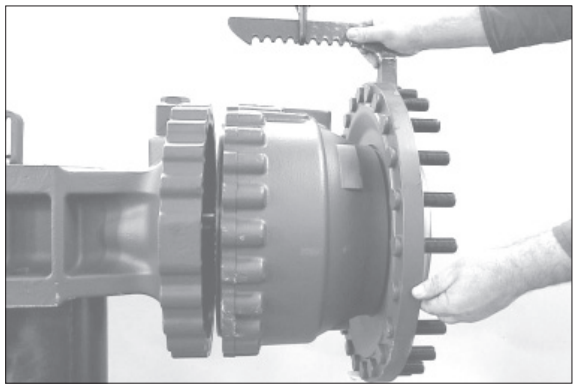


7577AAXF161

㊼ Place complete output by means of lifting tackle to the axle casing until contact.

※ Special tool

Lifting bracket	5870 281 043

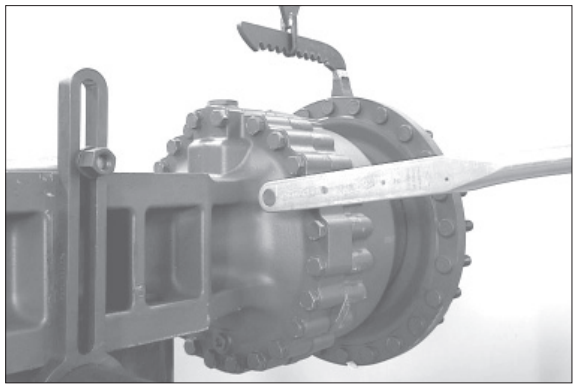


7577AAXF162

㊽ Fasten output by means of hexagon screws and washers.

· Tightening torque (M18/10.9) :
39.8 kgf · m (288 lbf · ft)

※ Prior to putting into operation of the axle, fill oil in accordance with lubrication instructions.

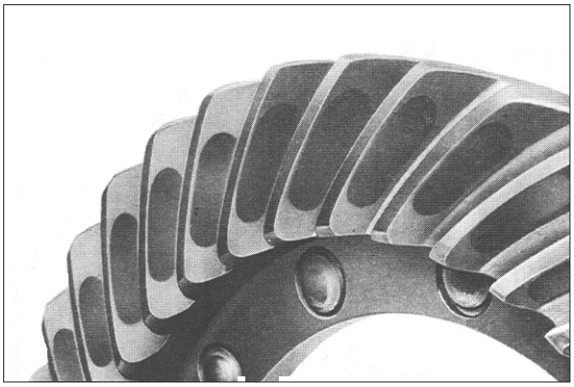


7577AAXF163

※ BACKLASH CHECK

- Applied the paint (or red lead) on the surface of several bevel gear teeth.
- Turn the pinioin gear and check the contact pattern.

Correct pattern



WTHAX16

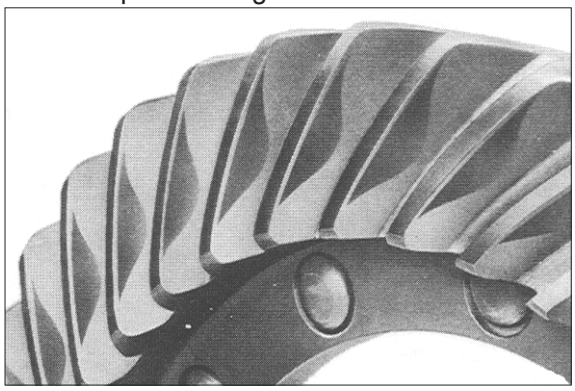
Concave side

WTHAX17

Convex side

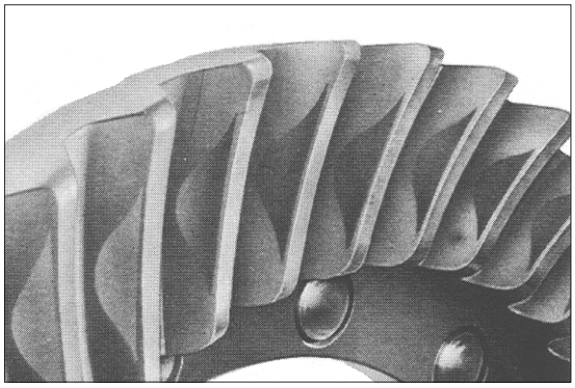
※ ADJUSTMENT

Incorrect pattern : high contact



WTHAX18

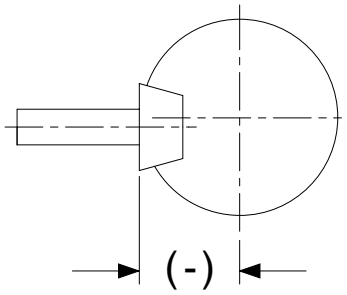
Concave side



WTHAX19

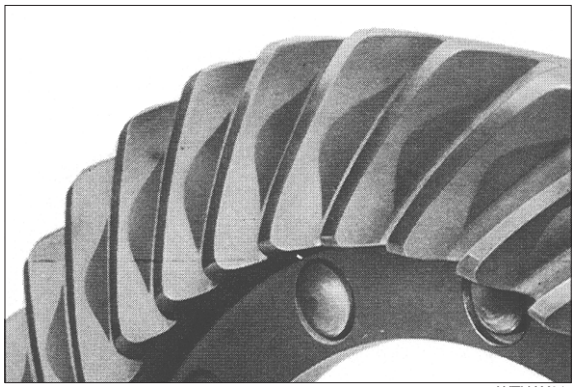
Convex side

- Reduce the distance (-)



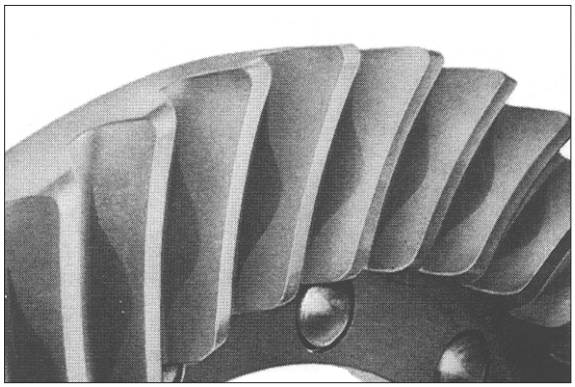
WTHAX20

Incorrect pattern, low contact



WTHAX21

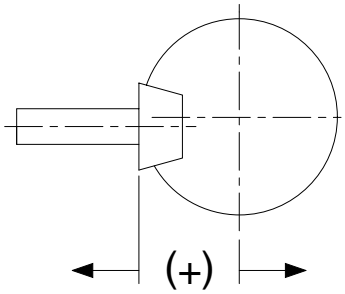
Concave side



WTHAX22

Convex side

- Add the distance (+)



WTHAX23

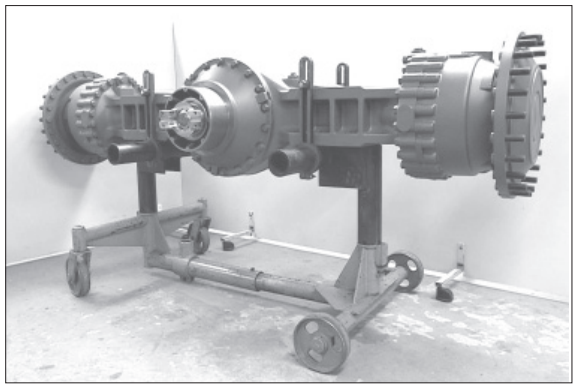
· REAR AXLE

1) DISASSEMBLY OF OUTPUT AND BRAKE

(1) Fasten axle on assembly truck.

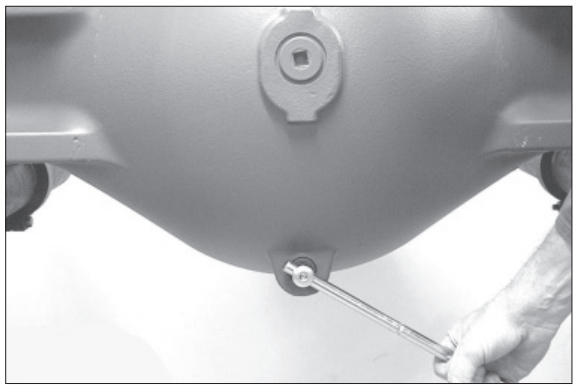
※ Special tool

Assembly truck	5870 350 000
Holding fixtures	5870 350 077
Clamps	5870 350 075

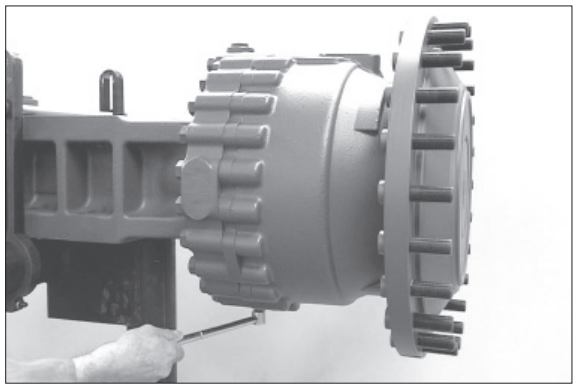


7577AAXF001

(2) Loosen screw plugs (3EA, see Figure 7577AAXF002 and 003) and drain oil from axle casing.



7577AAXF002

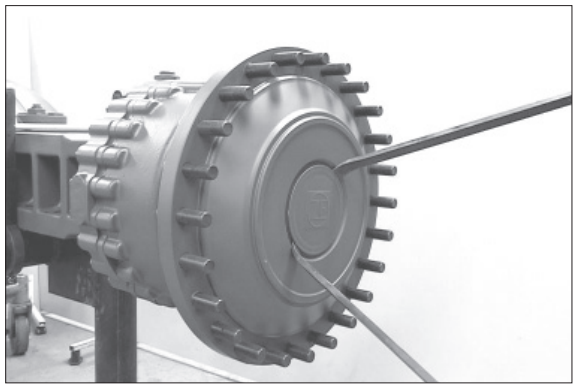


7577AAXF003

(3) Press off cover from the output shaft.

※ Special tool

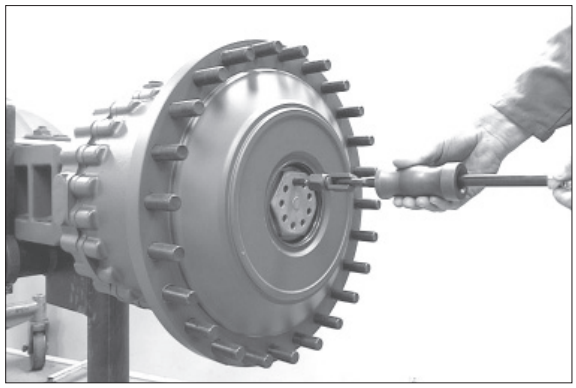
Pry bar set	5870 345 065



7577AAXF004

(4) Pull slotted pin by means of the striker out of the bore in the slotted nut.

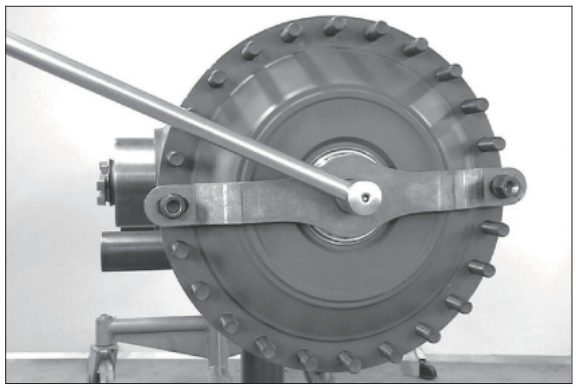
※ Special tool
Striker 5870 650 001



7577AAXF005

(5) Loosen slotted nut.

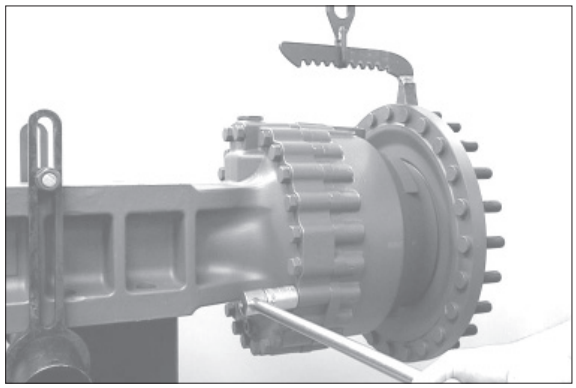
※ Special tool
Socket spanner 5870 656 078
Centering bracket 5870 912 028



7577AAXF006

(6) Secure output by means of lifting tackle and loosen hexagon screws.

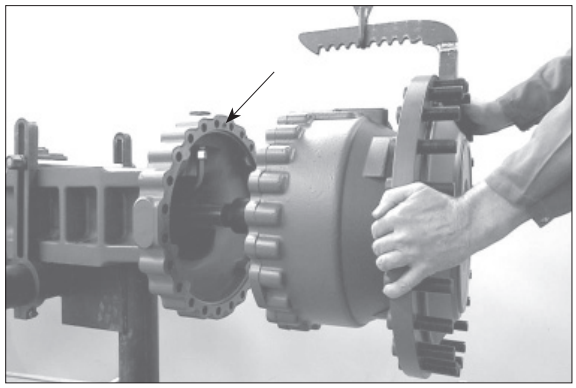
※ Special tool
Lifting bracket 5870 281 043



7577AAXF007

(7) Separate complete output from the axle casing.

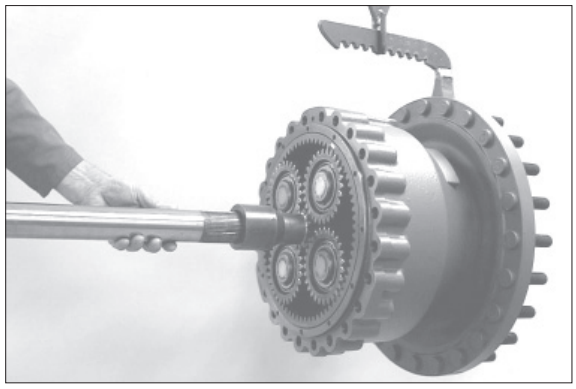
※ Pay attention to released O-ring (see arrow).



7577AAXF008

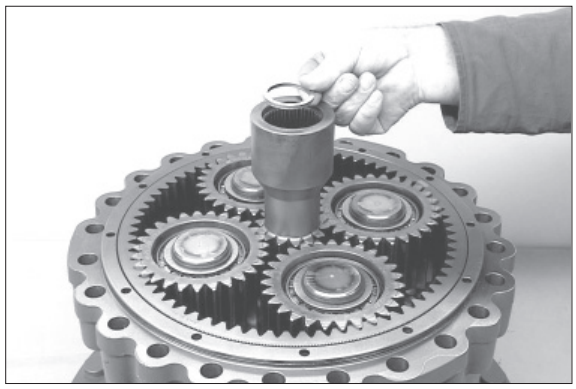
(8) Pull stub shaft out of the sun gear shaft.

※ Pay attention to possibly released shim (s).



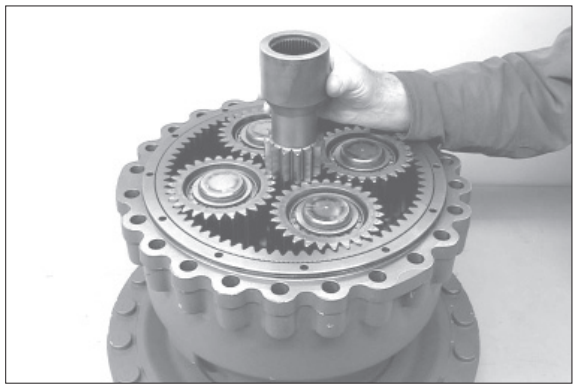
7577AAXF009

(9) Remove shim (s) from the sun gear shaft.



7577AAXF010

(10) Pull sun gear shaft out of the planet gears.

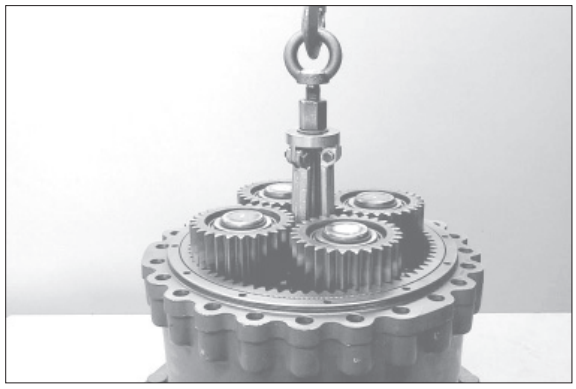


7577AAXF011

(11) Lift planet carrier out of the brake housing.

※ Special tool

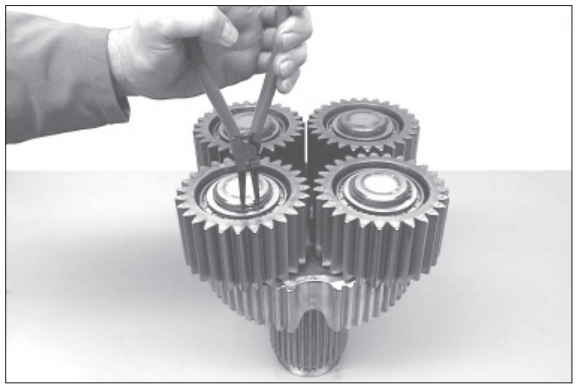
Internal extractor	5870 300 019



7577AAXF012

(12) Squeeze out the retaining ring.

※ Special tool
Set of external pliers 5870 900 015



7577AAXF013

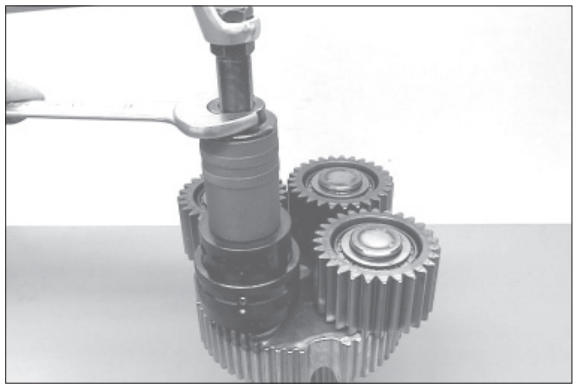
(13) Pull off the planet gear and remove the released bearing inner ring.

※ Special tool
Three-armed puller 5873 971 002

7577AAXF014

(14) Pull off the bearing inner ring.

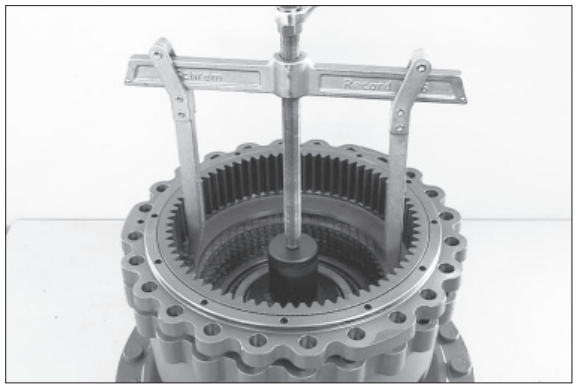
※ Special tool
Gripping insert 5873 001 020
Basic set 5873 001 000



7577AAXF015

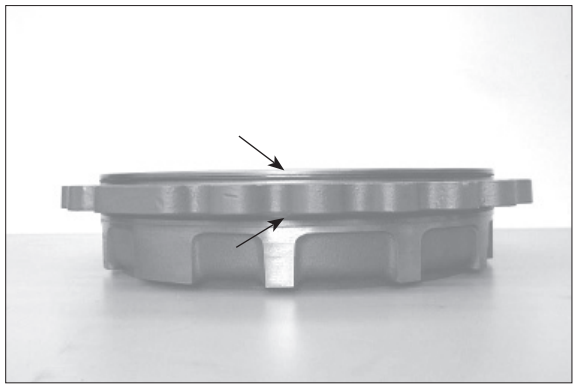
(15) Separate ring gear from the brake housing by means of two-armed puller.

※ Special tool
Two-armed puller 5870 970 007



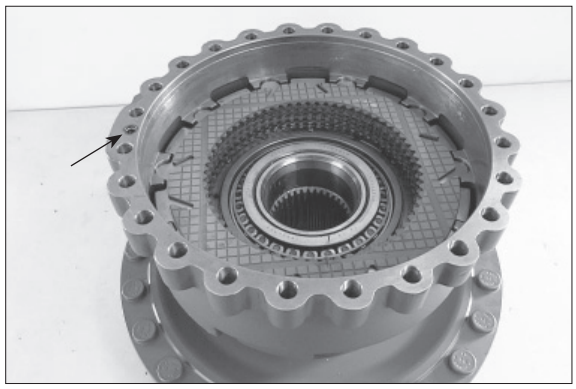
7577AAXF016

(16) Remove O-rings (see arrows) from the annular grooves of the ring gear.



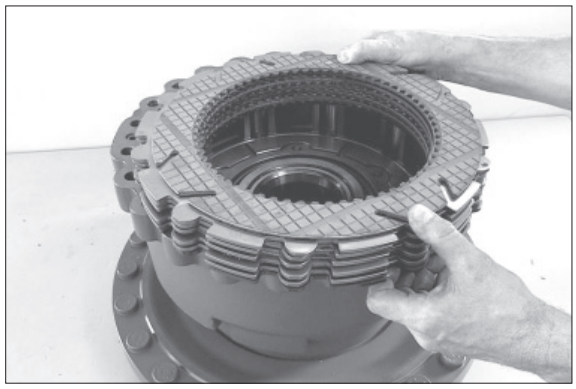
7577AAXF017

(17) Remove O-ring (see arrow) from the recess of the brake housing.



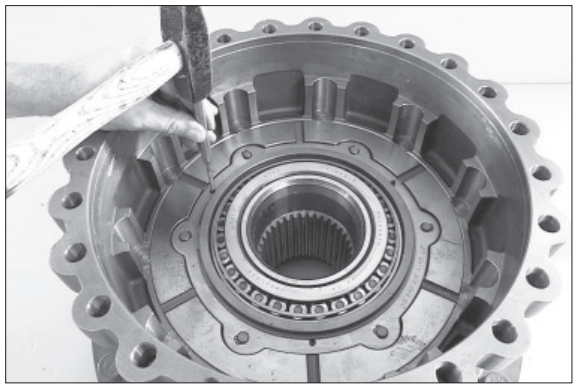
7577AAXF018

(18) Take the disc pack out of the brake housing.



7577AAXF019

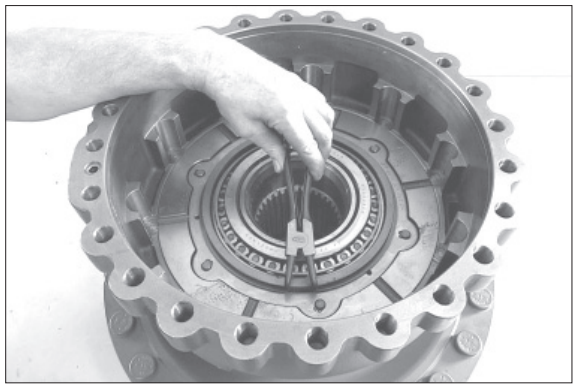
(19) Install slotted pins (6EA) in the support shim until they are flush-mounted.



7577AAXF020

(20) Squeeze out the circlip.

※ Special tool
Set of external pliers 5870 900 016

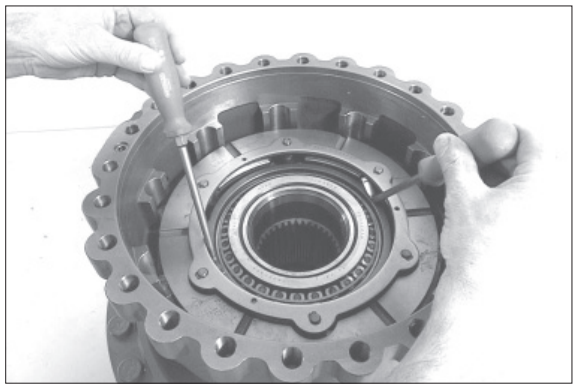


7577AAXF021

(21) Press piston out of the brake housing by means of compressed air.

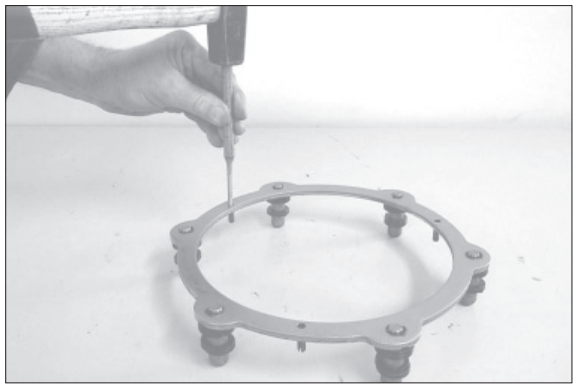
7577AAXF022

(22) Press support shim out of the piston by means of the automatic piston adjusting.



7577AAXF023

(23) Drive slotted pins (6EA) out of the support shim.

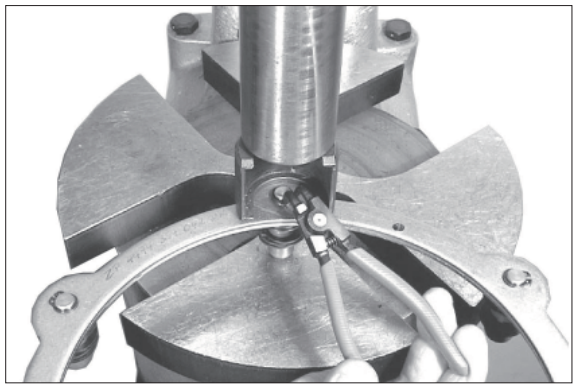


7577AAXF024

(24) Preload cup springs by means of a press and squeeze out the circlip.

※ Special tool

Assembly pliers	5870 900 051
Assembly fixture	5870 345 096

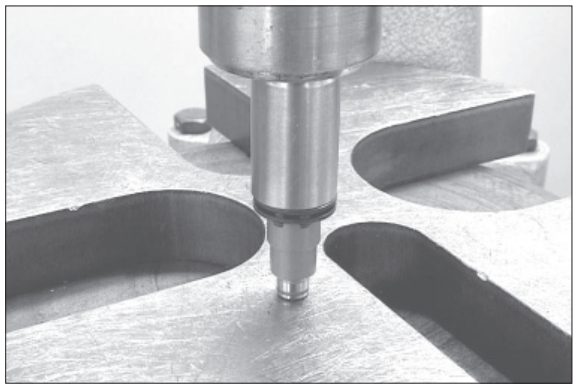


7577AAXF025

(25) Pull pin out of the support shim and remove released cup springs.

7577AAXF026

(26) Press gripping rings from the pin.

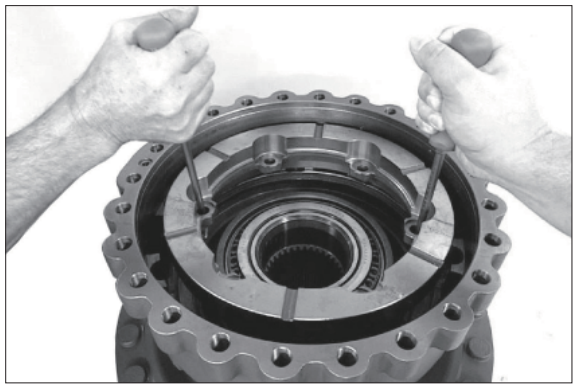


7577AAXF027

(27) Lift piston out of the brake housing.

※ Special tool

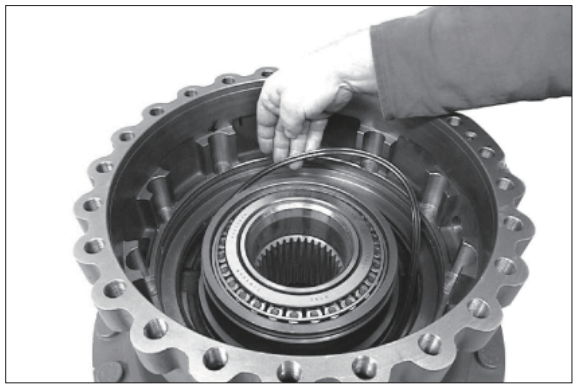
Adjusting device	5870 400 001



7577AAXF028

(28) Remove guide ring, support rings and U-rings from the annular grooves of the brake housing.

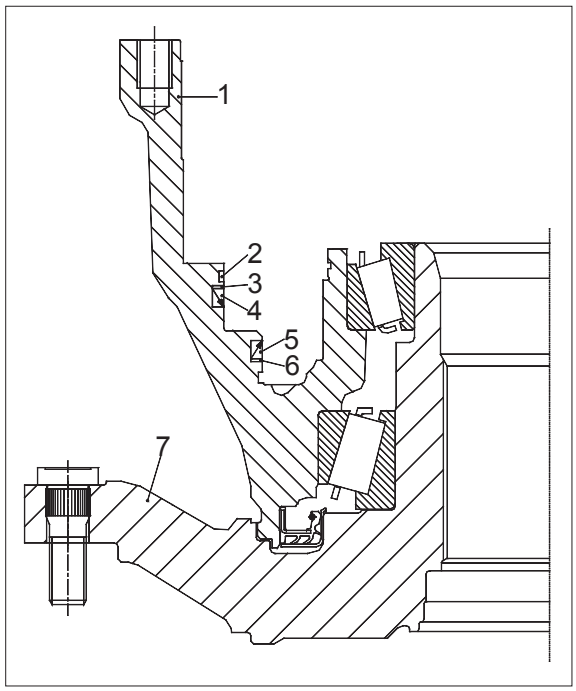
※ See below sketch for installation position of the single parts.



7577AAXF029

To the sketch :

1 Brake housing
2 Guide ring
3 Support ring
4 U-ring
5 U-ring
6 Support ring
7 Output shaft

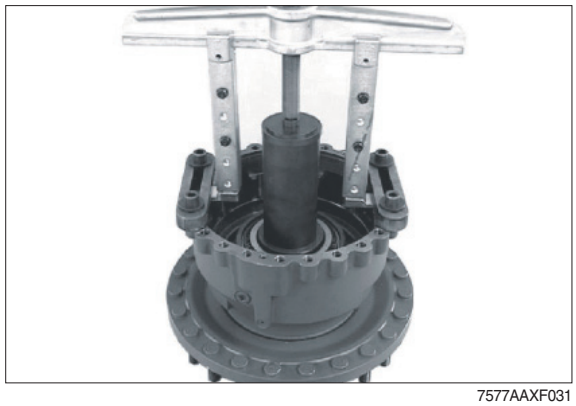


7577AAXF030

(29) Pull brake housing by means of two-armed puller from the output shaft and remove the released bearing inner ring.

※ Special tool

Two-armed puller	5870 970 007
Clamping bracket	5870 654 034
Press bush	5870 506 140

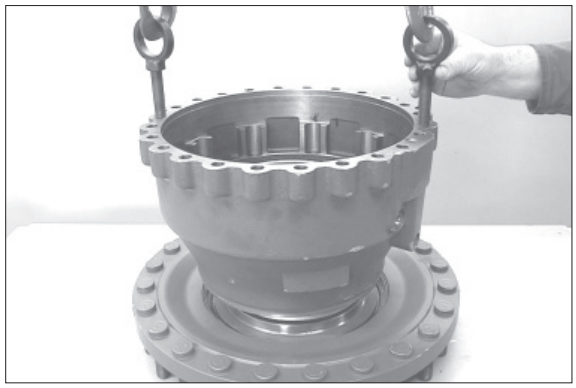


7577AAXF031

(30) Lift brake housing with lifting tackle from the output shaft.

※ Special tool

Lifting chain	5870 281 047
Eye bolts	5870 204 071



7577AAXF032

(31) If necessary drive both bearing outer rings out of the bearing bores in the brake housing.

7577AAXF033

(32) Press shaft seal out of the brake housing.

※ Special tool

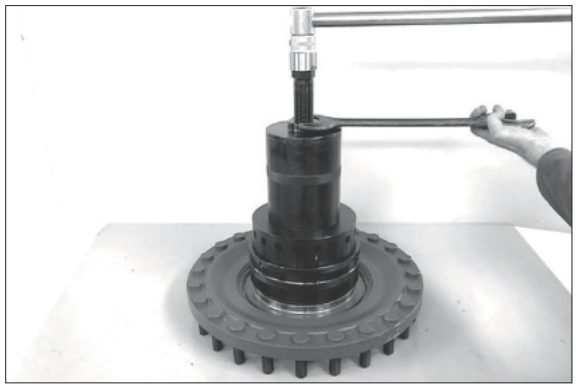
Pry bar set	5870 345 065

7577AAXF034

(33) Pull bearing inner ring from the output shaft.

※ Special tool

Rapid grip	5873 014 013
Basic set	5873 004 001

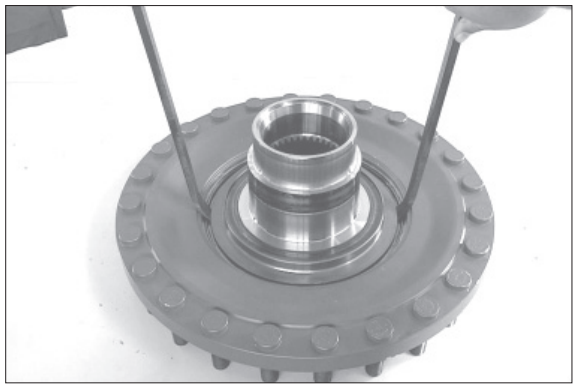


7577AAXF035

(34) Press off bearing sheet from the output shaft.

※ Special tool

Pry bar set	5870 345 065



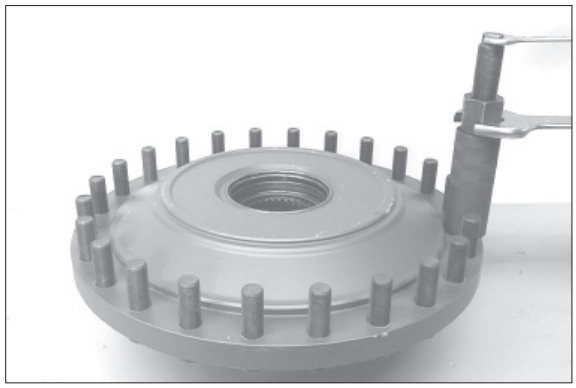
7577AAXF036

2) REASSEMBLY OF OUTPUT AND BRAKE

(1) Insert wheel bolt into the output shaft until contact.

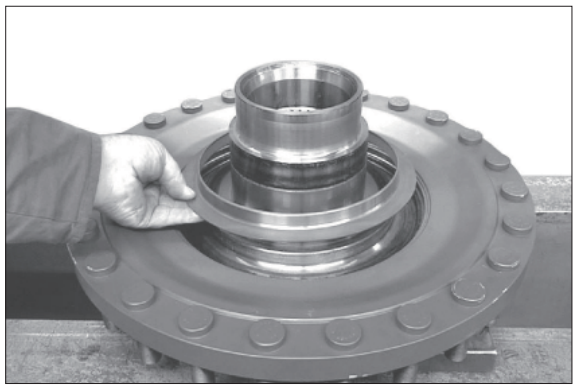
※ Special tool

Wheel bolt puller-basic set	5870 610 010
Insert (7/8"-14 UNF)	5870 610 011



7577AAXF037

(2) Assemble bearing sheet (shaft seal).



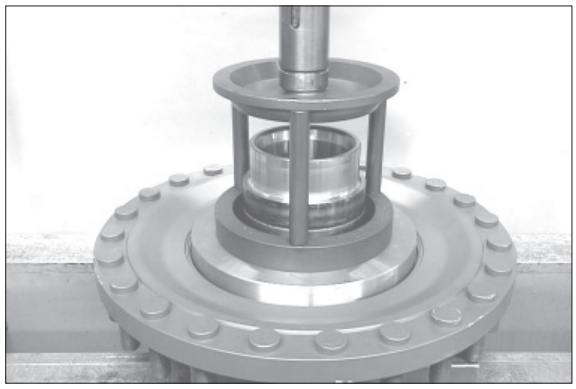
7577AAXF038

(3) Press bearing sheet over the collar of the output shaft.

※ Special tool

Pressure ring	5870 506 141

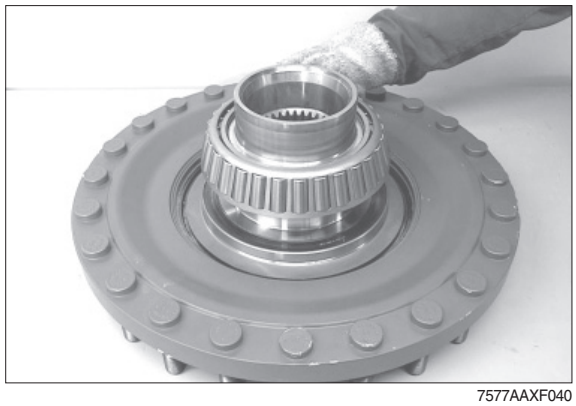
※ The exact installation position of the bearing sheet will be obtained by using the specified pressure ring.



7577AAXF039

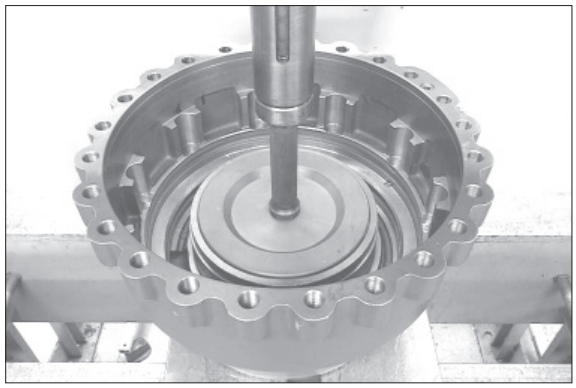
(4) Heat the roller bearing and install it until contact.

※ After cooling-down the bearing has to be installed subsequently.



7577AAXF040

(5) Press both bearing outer rings into the brake housing until contact.



7577AAXF041

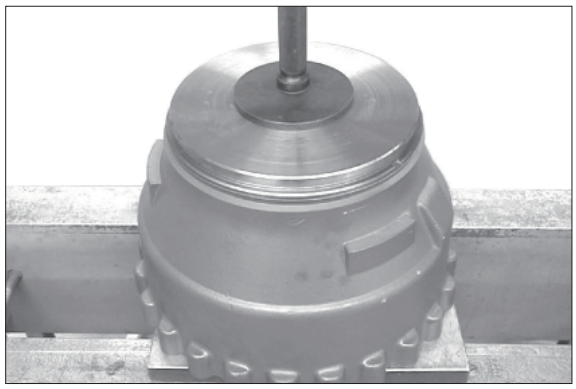
(6) Install shaft seal with the sealing lip showing to the oil chamber (see below sketch).

※ Special tool

Driver	5870 051 052

※ The exact installation position of the shaft seal will be obtained by using the specified driver.

⚠ **Just before the installation wet the outer diameter of the shaft seal with spirit.**

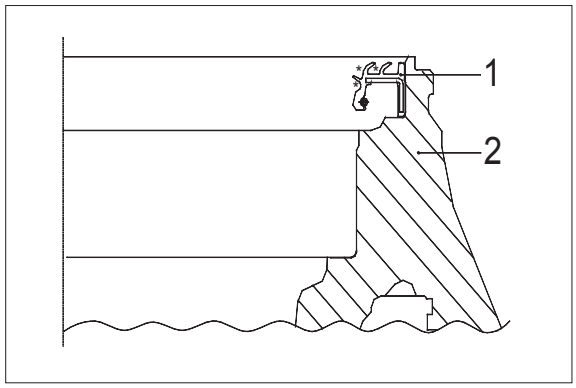


7577AAXF042

To the sketch :

1 Brake housing
2 Shaft seal
* Grease filling

※ Fill the space between sealing and dust lips with grease.

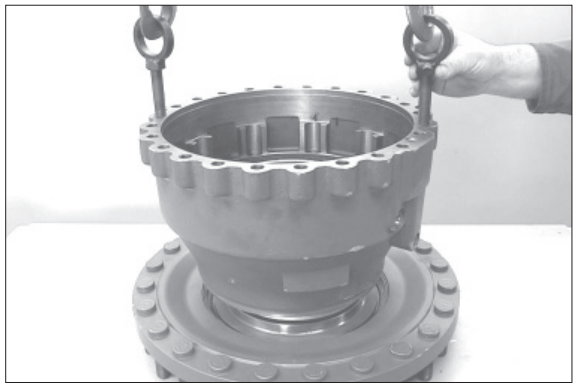


7577AAXF043

(7) Install the preassembled brake housing by means of the lifting tackle over the output shaft until contact.

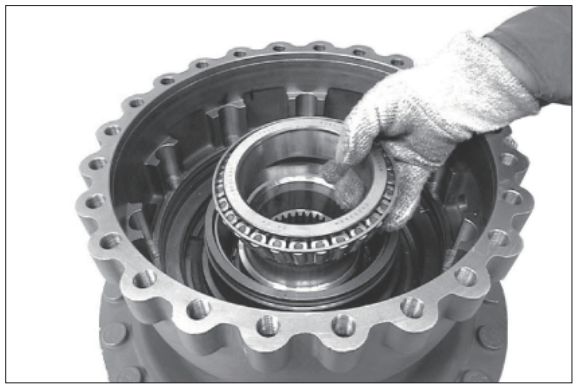
※ Special tool

Lifting chain	5870 281 047
Eye bolts	5870 204 071



7577AAXF044

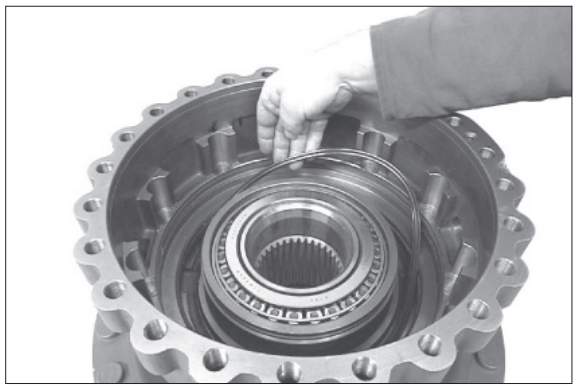
(8) Heat the roller bearing and install it until contact.



7577AAXF045

(9) Insert support and U-rings into the annular grooves of the brake housing.

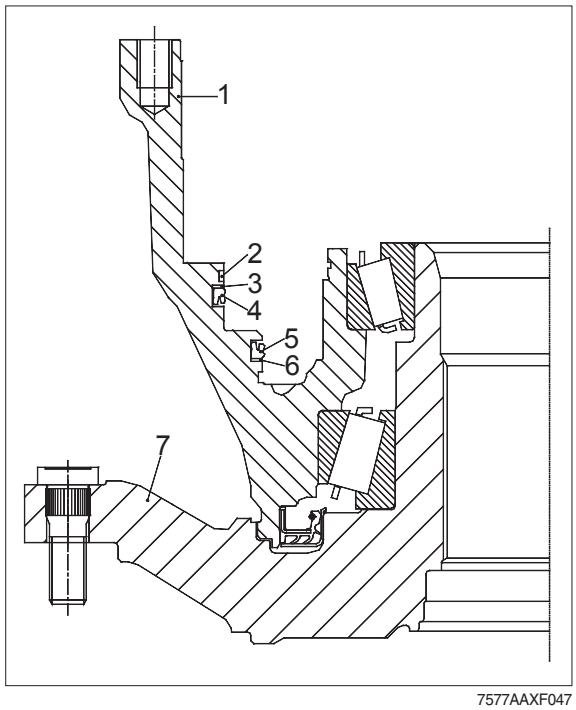
※ Pay attention to the installation position, see below sketch.



7577AAXF046

To the sketch :

1 Brake housing
2 Guide ring
3 Support ring
4 U-ring
5 U-ring
6 Support ring
7 Output shaft



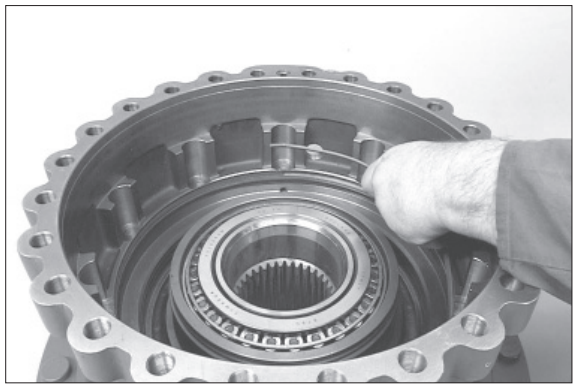
7577AAXF047

(10) Clean annular groove of the brake housing with spirit.

Then insert the guide ring into the annular groove (also see sketch page 3-237) and fix it with Loctite (type No. 415) at its extremities.

※ Guide ring must have contact on the whole circumference.

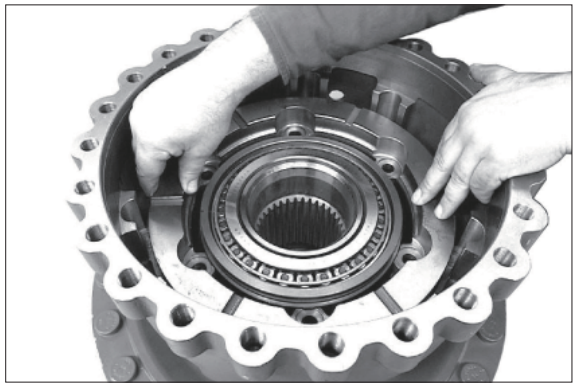
⚠ **Upon installation the orifice of the guide ring must show upwards (12 o'clock).**



7577AAXF048

(11) Insert piston into the brake housing and install it cautiously until contact.

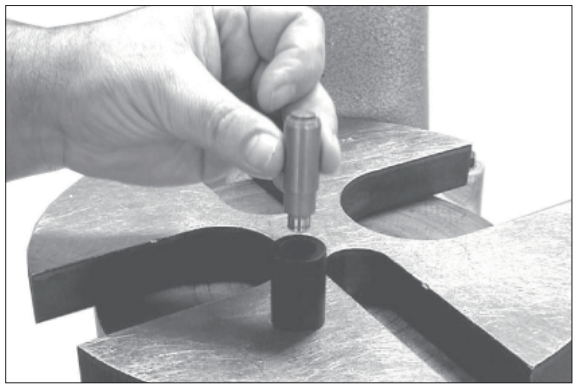
※ Apply sufficiently oil on the sliding surface of the piston or support rings, U-rings and guide ring (use W-10 oils).



7577AAXF049

(12) Insert pins into the assembly fixture until contact.

※ Special tool
Assembly fixture 5870 345 096

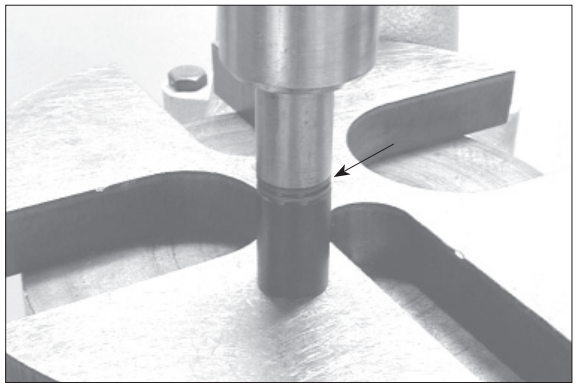


7577AAXF050

(13) Press gripping rings (4EA, see arrows) onto the pins until contact on the assembly fixture.

※ The exact installation dimension (see sketch page 3-239) of the gripping rings is obtained when using the specified assembly fixture.

⚠ **Observe the installation position, install gripping rings with the orifices offset by 180˚ to each other.**



7577AAXF051

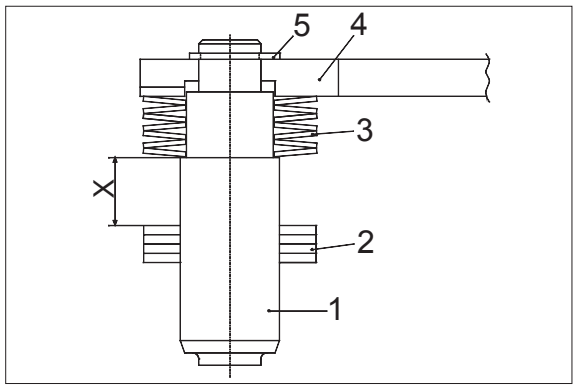
(14) Install cup springs (7 pieces each/pin).

※ Pay attention to the installation position of the cup springs, see below sketch.

7577AAXF052

To the sketch :

1 Pin
2 Gripping rings
3 Cup springs
4 Support shim
5 Circlip
X Installation dimension gripping rings
10.5 $^{+0,3}$ mm

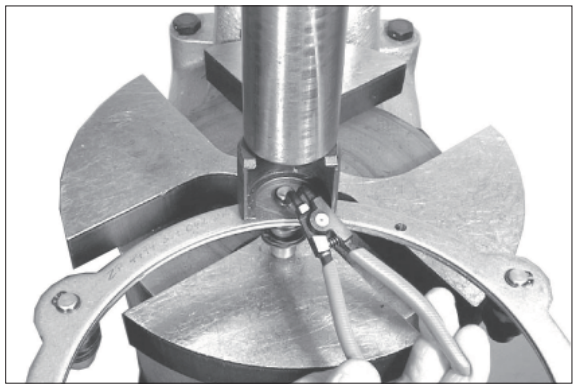


7577AAXF053

(15) Insert preassembled pins into the support shim and fix it by means of the circlip.

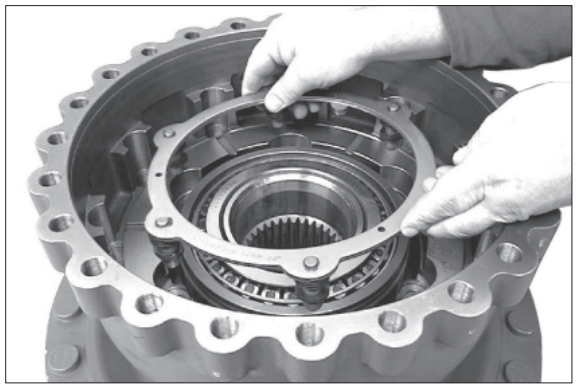
※ Special tool
Assembly pliers 5870 900 051

※ Pay attention to clearance of the cup springs.



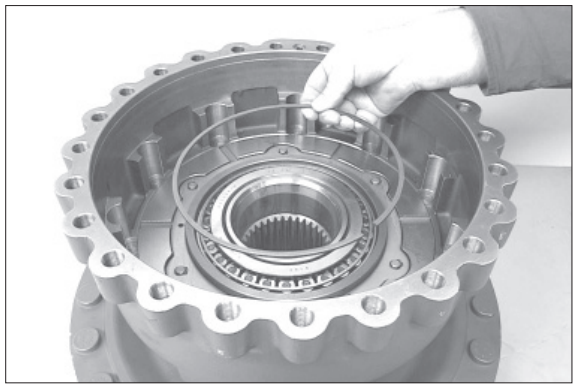
7577AAXF054

(16) Insert preassembled support shim into the piston.



7577AAXF055

(17) Fix support shim by means of the circlip.

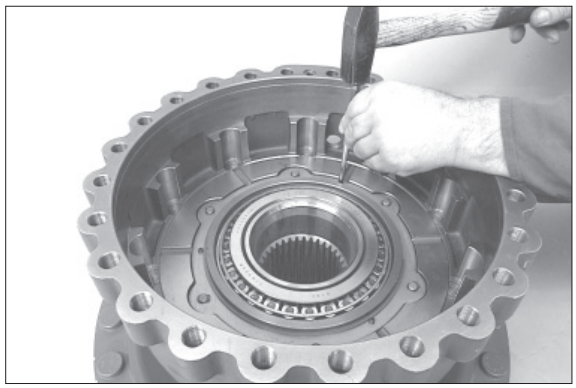


7577AAXF056

(18) Drive slotted pins (6EA) into the bores of the support shim to lock the circlip.

※ Special tool
Drive mandrel 5870 705 011

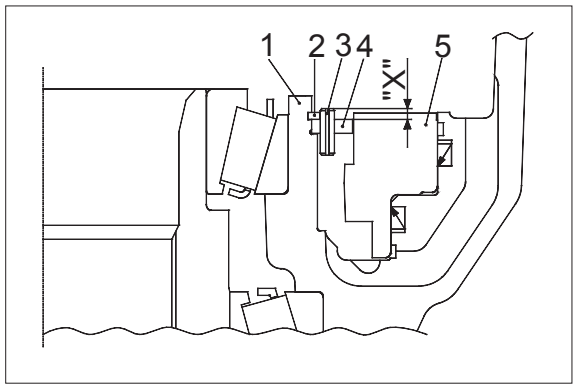
※ Pay attention to the installation position, see below sketch.



7577AAXF057

To the sketch :

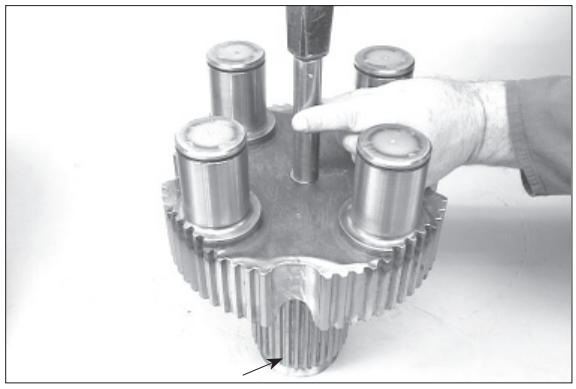
1 Brake housing
2 Circlip
3 Slotted pin
4 Support shim
5 Piston
X Installation dimension 4.0 $_{-0,5}$ mm



7577AAXF058

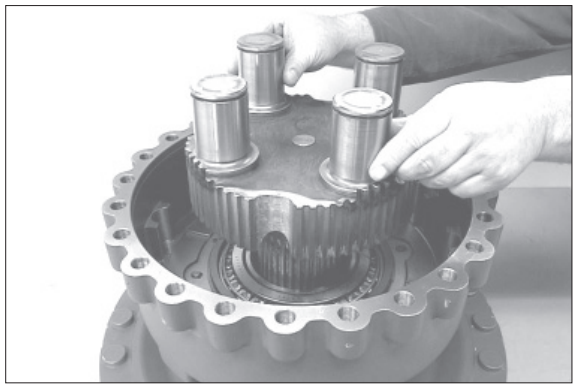
(19) Drive stop bolt into the planet carrier until contact.

Then wet spline (see arrow).



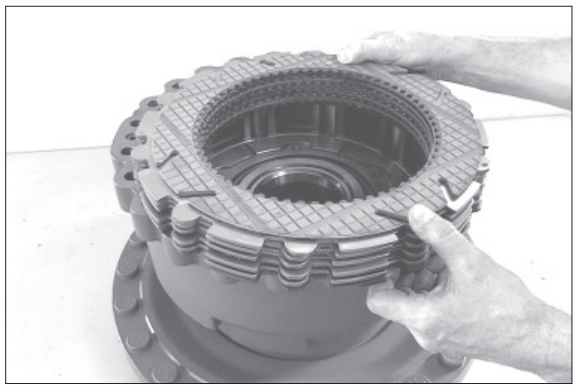
7577AAXF059

(20) Insert planet carrier into the spline of the output shaft until contact.



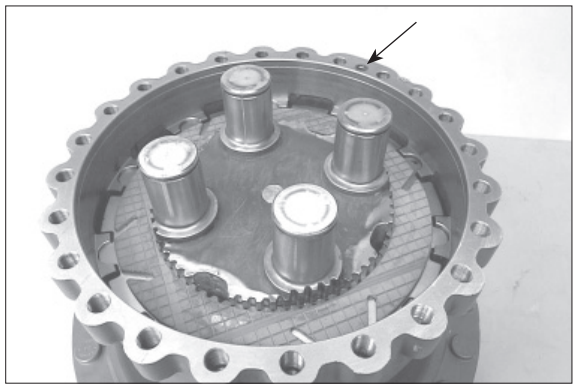
7577AAXF060

(21) Install outer-and inner clutch discs alternately starting with an outer clutch disc.



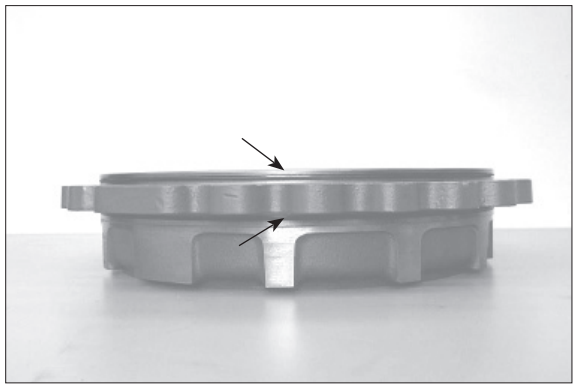
7577AAXF061

(22) Insert O-ring (see arrow) into the recess of the brake housing.



7577AAXF062

(23) Grease both O-rings (see arrows) and insert them into the annular grooves of the ring gear.

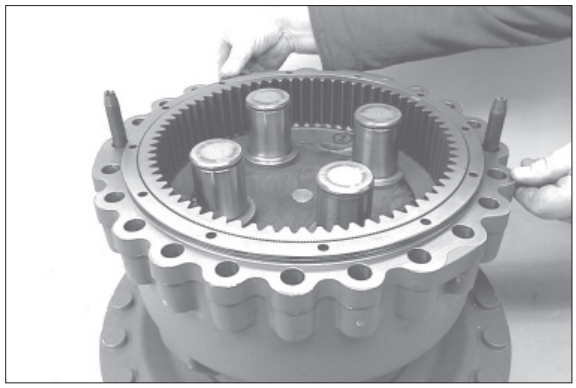


7577AAXF017

(24) Install two adjusting screws and insert ring gear into the brake housing until contact.

※ Special tool
Adjusting screws 5870 204 029

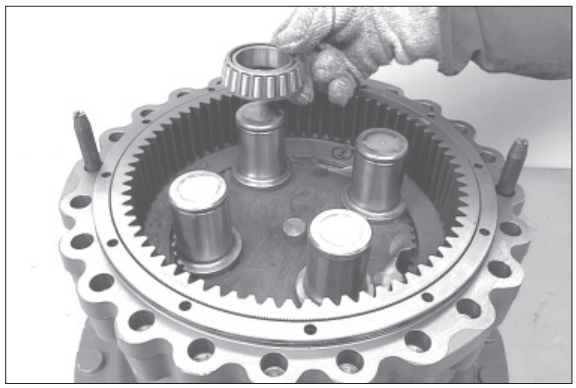
※ Pay attention to radial location.



7577AAXF063

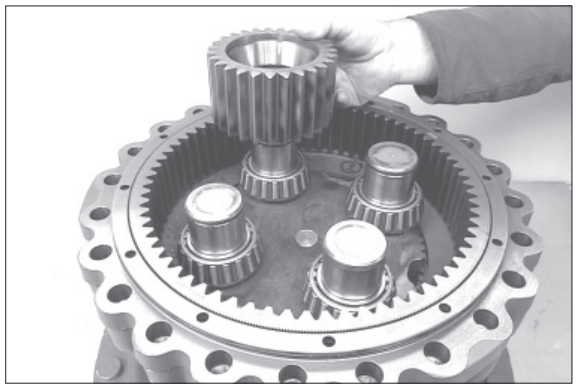
(25) Heat bearing inner rings and install them until contact with the big radius showing to the planet carrier (downwards).

※ Subsequently install bearing inner rings after cooling down.



7577AAXF064

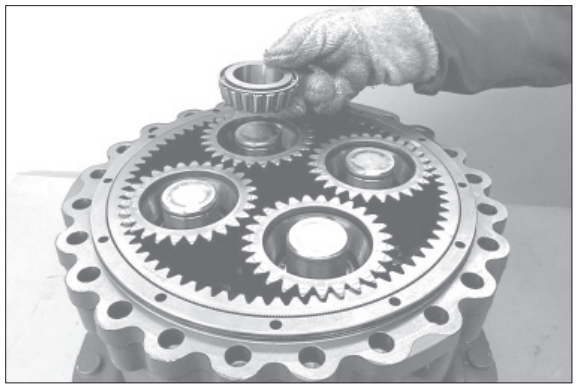
(26) Put planet gears onto the bearing inner rings.



7577AAXF065

(27) Heat bearing inner rings and install them on the planet gears until contact.

※ Subsequently install bearing inner rings after cooling down.

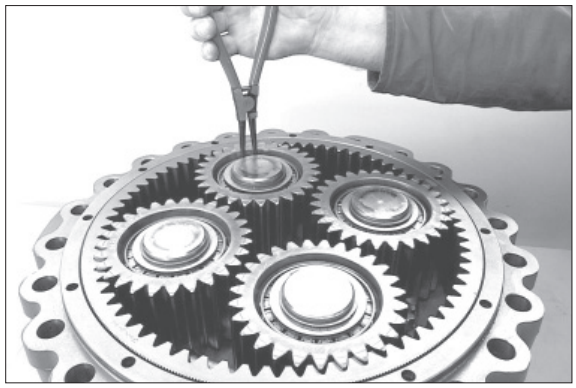


7577AAXF066

(28) Fasten plant gears by means of retaining rings.

※ Special tool

Set of external pliers	5870 900 015



7577AAXF067

Adjust end play of sun gear shaft 0.5 ~ 2.0 mm

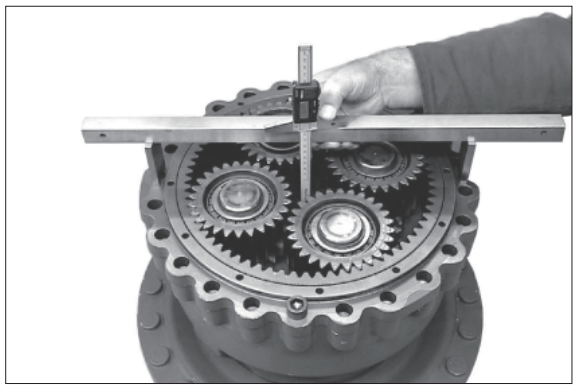
(29) Fasten ring gear by means of cap screws until contact.

Then determine dimension I, from the mounting face of the ring gear up to the face of the stop bolt.

Dimension I e.g . . . . . 46.20 mm

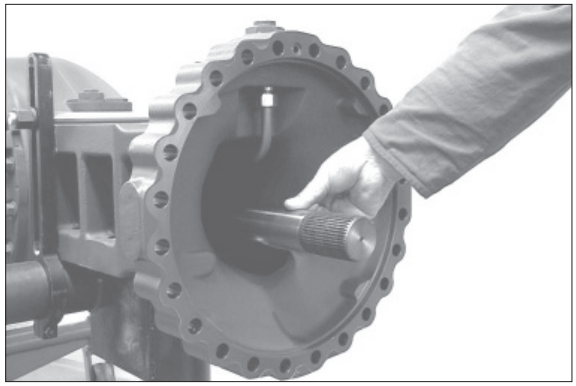
※ Special tool

Digital depth gauge	5870 200 072
Gauge blocks	5870 200 066
Straightedge	5870 200 022



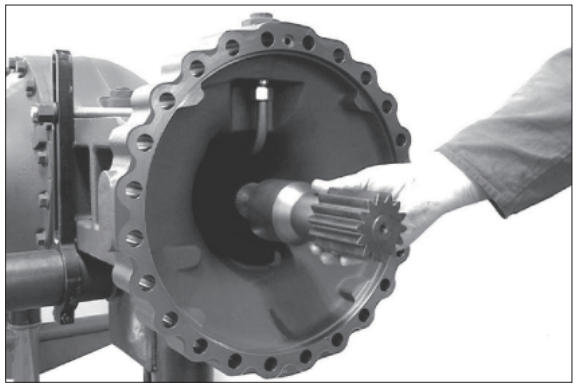
7577AAXF068

(30) Insert stub shaft into spline of the axle bevel gear until contact.



7577AAXF069

(31) Assemble sun gear shaft until contact.



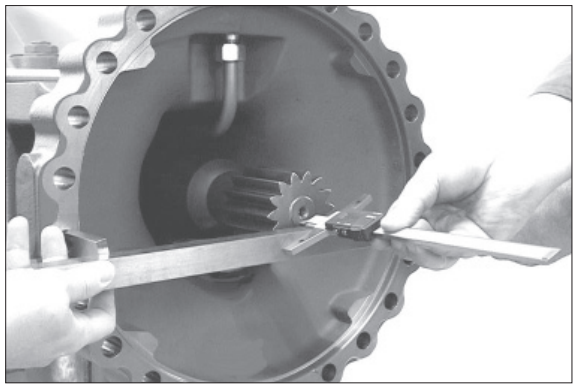
7577AAXF070

(32) Determine Dimension II from the face of the sun gear shaft up to the mounting face of the axle casing.

Dimension II e.g . . . . . .43.00 mm

※ Special tool

Digital depth gauge	5870 200 072
Gauge blocks	5870 200 066
Straightedge	5870 200 022

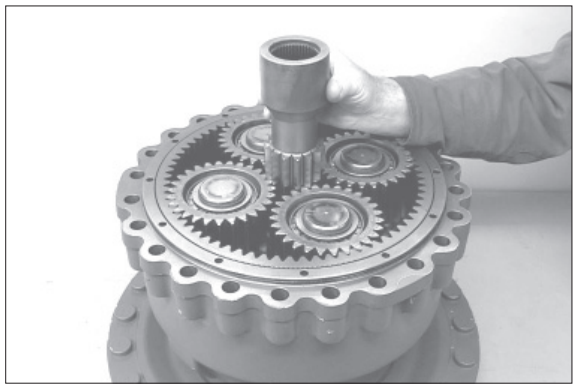


7577AAXF071

EXAMPLE A :

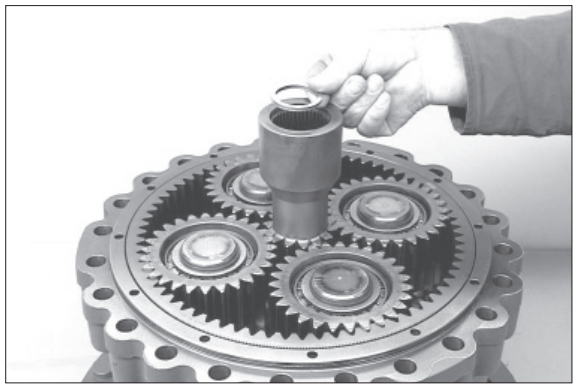
Dimension I		46.20 mm
Dimension II	-	43.00 mm
Difference		3.20 mm
required end play e.g.	-	1.00 mm
Difference = shim e.g.	s =	2.20 mm

(33) Insert sun gear shaft into the planet carrier.



7577AAXF072

(34) Fix determined shim (s), e.g. s = 2.20 mm, into the sun gear shaft by means of grease.

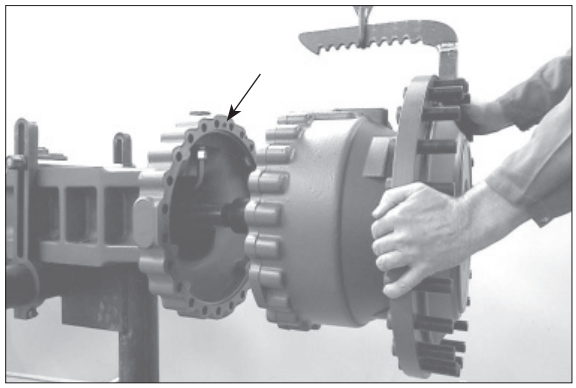


7577AAXF073

(35) Fix O-ring (see arrow) into the recess of the axle casing by means of grease and install the preassembled output to the axle casing until contact by means of lifting tackle.

※ Special tool

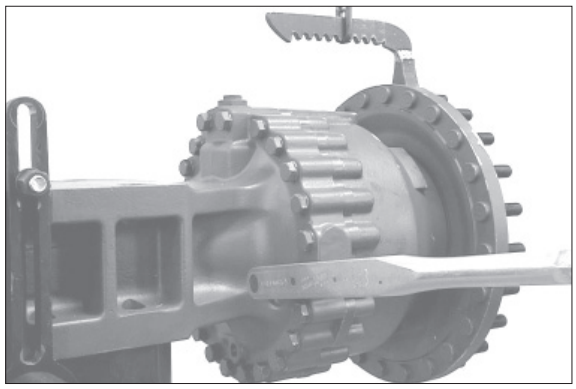
Lifting bracket	5870 281 043



7577AAXF074

(36) Fasten output by means of hexagon screws and washers.

· Tightening torque (M18/10.9) :
39.8 kgf · m (288 lbf · ft)



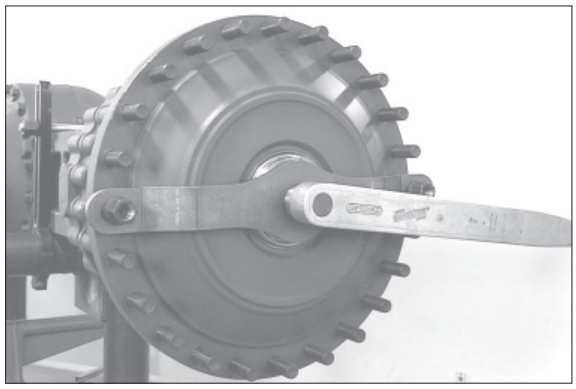
7577AAXF075

(37) Unscrew slotted nut by hand and then fasten it.

· Tightening torque : $153^{+20.4}$ kgf · m
(1107^{+148} lbf · ft)

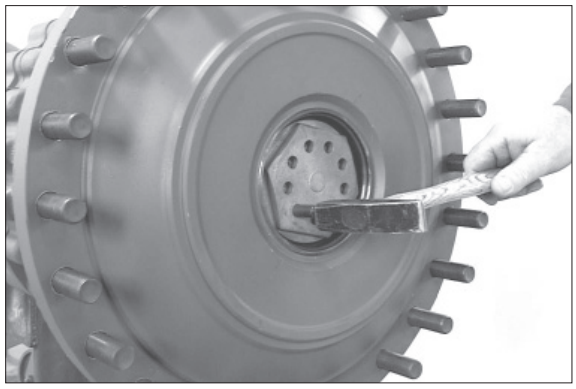
※ Special tool

Socket spanner	5870 656 078
Centering bracket	5870 912 028



7577AAXF076

(38) Secure slotted nut by means of slotted pin.

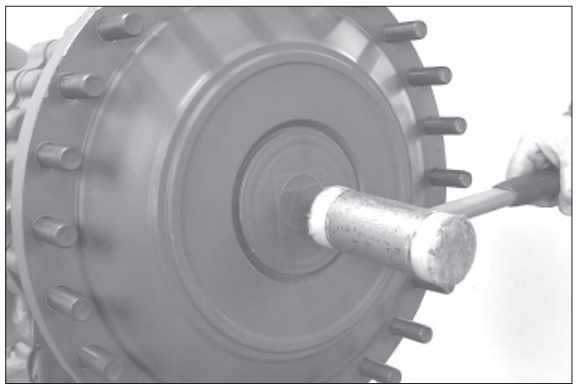


7577AAXF077

(39) Assemble O-ring (see arrow) to the cover.

(40) Insert cover into the output shaft until contact.

※ Special tool
Hammer (plastic ø 60) 5870 280 004

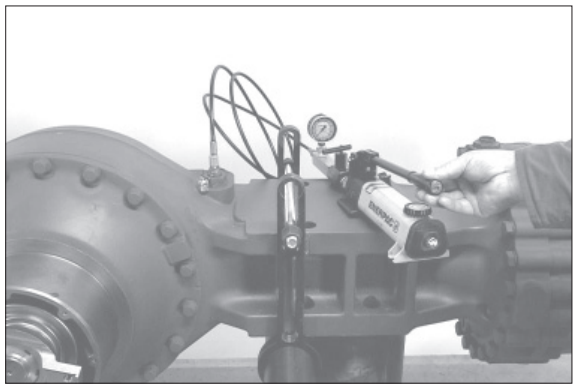


7577AAXF079

Leakage test of the brake hydraulics

※ Prior to start the test, ventilate the brake hydraulics completely.

1) Open the bleeder.
2) Slowly actuate the HP-pump until oil flows out of the bleeder.
3) Close the bleeder again.
4) Slowly pressurize the HP-pump with p > 10 bar and hold the pressure for some seconds.



※ The brake piston extends and the cylinder chamber fills up with oil. The air accumulates in the upper section of the cylinder chamber.

5) Loosen the shut-off valve on the HP-pump.

※ The reversing piston presses the air from the upper section of the cylinder into the brake line.

6) Open the bleeder again.
7) Slowly actuate the HP-pump until oil flows out of the bleeder.

※ Repeat procedure - Item 3)~7) until at 7) from the beginning of the actuation no more air exits from bleeder.

※ Then pressurize the brake temporarily (5EA) with p = 100 bar max..

High-pressure test :

Increase test pressure up to p = 100_{-10} bar and close connection to HP-pump by means of shut-off valve.
During a 5 min. testing time a pressure drop of max. 2% (2 bar) is allowed.

⚠ **If the maximum pressure of 100 bar is exceeded, there will be an excessive piston adjustment and a repeated disassembly of the brake or the adjusting is required to reset the gripping rings to the adjusting dimension.**

Low-pressure test :
Reduce test pressure to p = 5 bar and close the shut-off valve again.
During a 5 min. testing time a pressure drop is not allowed.

※ Special tool

HP-Pump	5870 287 007
Mini-measuring hub (9/16"- 18UNF)	5870 950 115

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

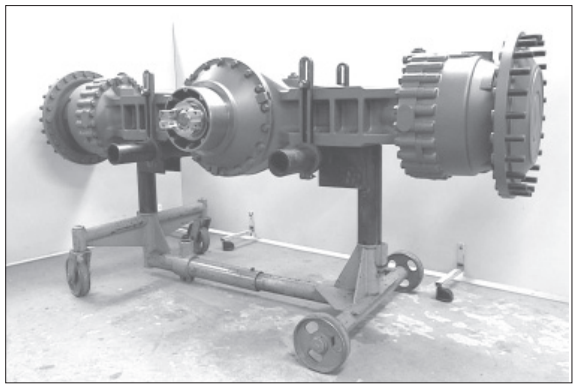
3) DISASSEMBLY OF DIFFERENTIAL CARRIER AND BRAKE TUBES

(1) Disassembly of differential carrier

① Fasten axle on assembly truck.

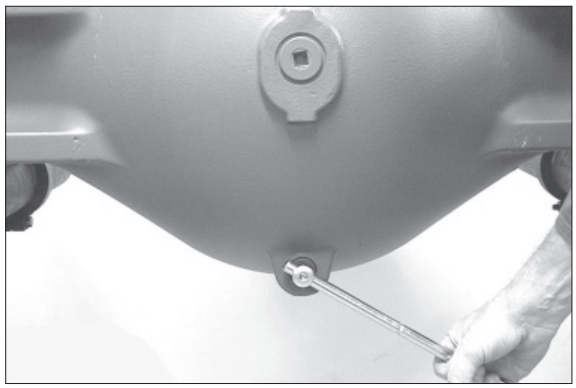
※ Special tool

Assembly truck	5870 350 000
Holding fixtures	5870 350 077
Clamps	5870 350 075

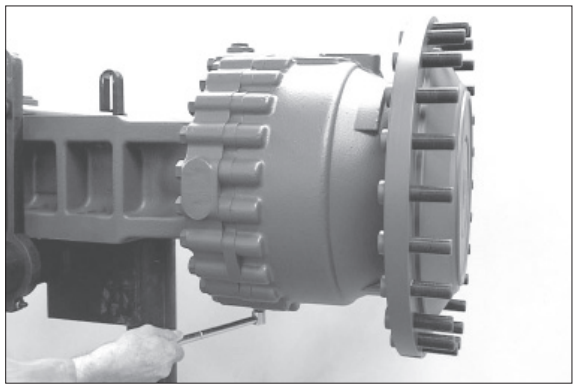


7577AAXF001

② Loosen screw plugs (3EA, see Figure 7577AAXF002 and 003) and drain oil from axle casing.



7577AAXF002



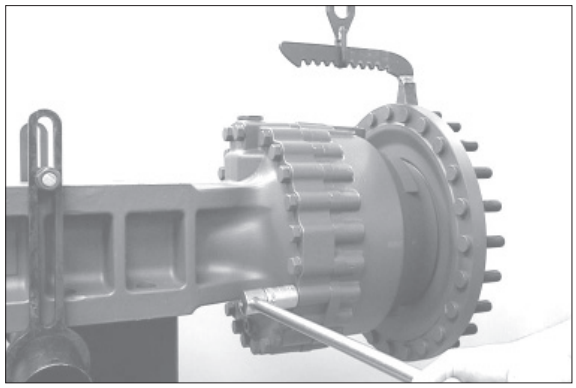
7577AAXF003

③ Secure output by means of lifting tackle and loosen hexagon screws.

※ Special tool

Lifting bracket	5870 281 043

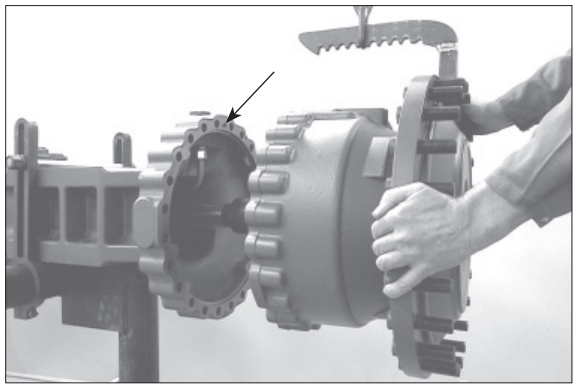
※ Make step (Fig. 7577AAXF007~9) on both output sides.



7577AAXF007

④ Separate complete output from the axle casing.

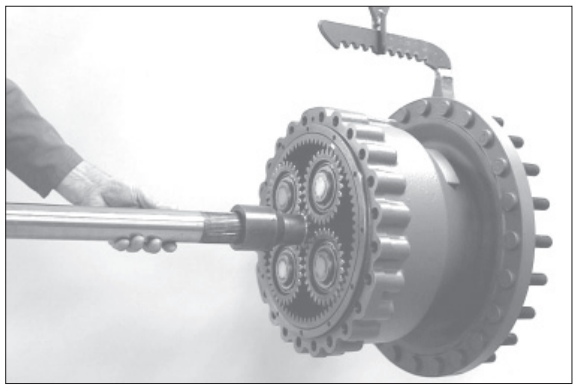
※ Pay attention to released O-ring (see arrow).



7577AAXF008

⑤ Pull stub shaft out of the sun gear shaft.

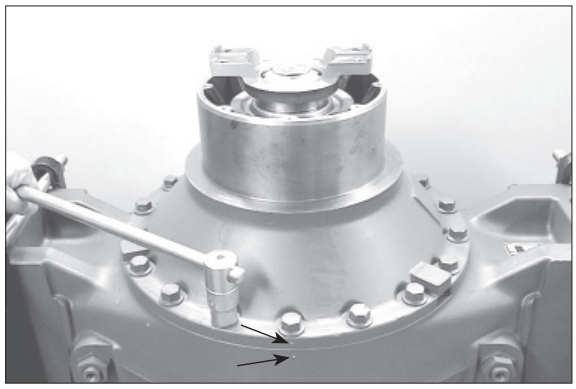
※ Pay attention to released shim (s).



7577AAXF009

⑥ Loosen hexagon screws.

※ Mark location of differential carrier to the axle casing (see arrows).

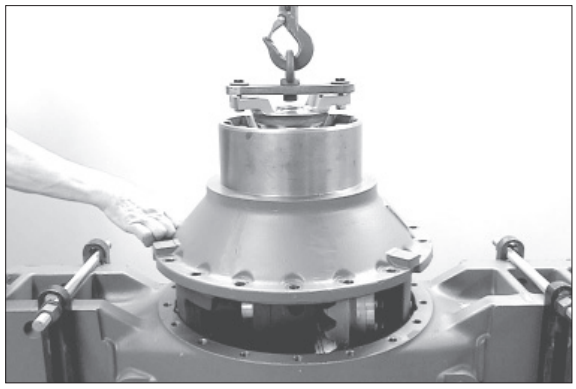


7577AAXF081

⑦ Lift differential carrier by means of lifting tackle out of the axle casing.

※ Special tool

Lifting tackle	5870 281 044

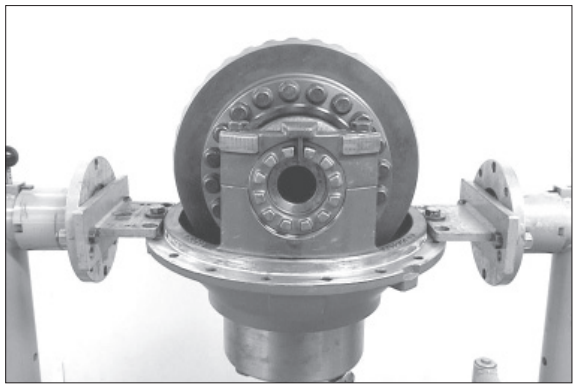


7577AAXF082

⑧ Fasten differential carrier to assembly truck.

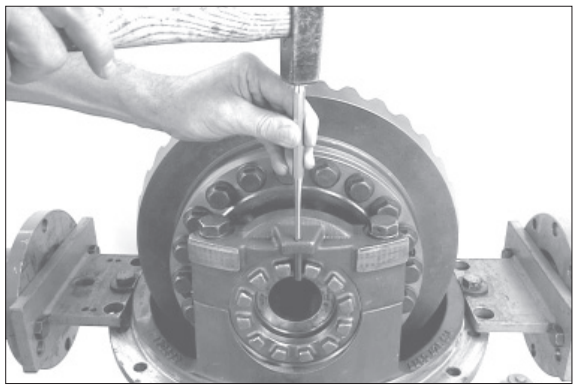
※ Special tool

Assembly truck	5870 350 000
Holding fixture	5870 350 034



7577AAXF083

⑨ Drive out slotted pins.

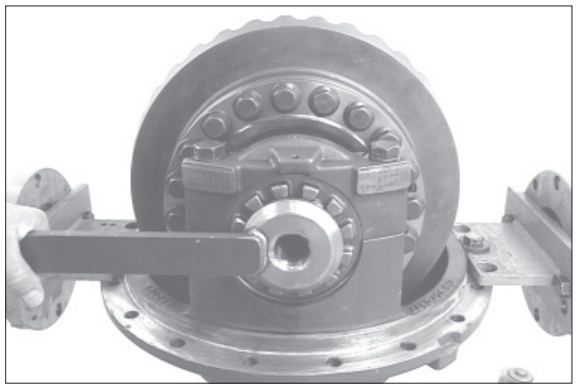


7577AAXF084

⑩ Loosen and remove both adjusting nuts.

※ Special tool

Socket spanner	5870 656 079



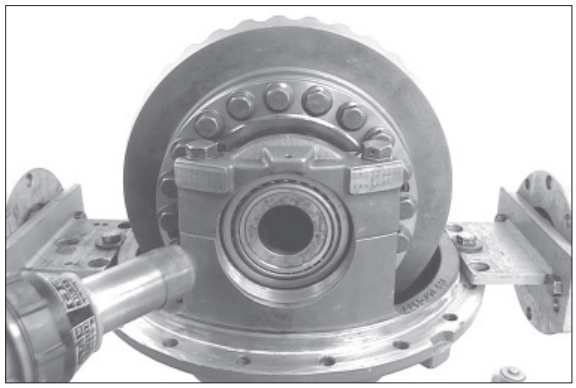
7577AAXF085

⑪ Heat axle drive housing by means of hot-air blower.

※ Special tool

Hot-air blower 230 V	5870 221 500
Hot-air blower 115 V	5870 221 501

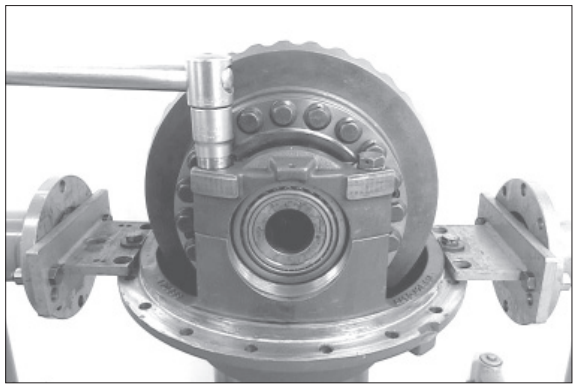
※ Hexagon screws are installed with Loctite (type No. 262).



7577AAXF086

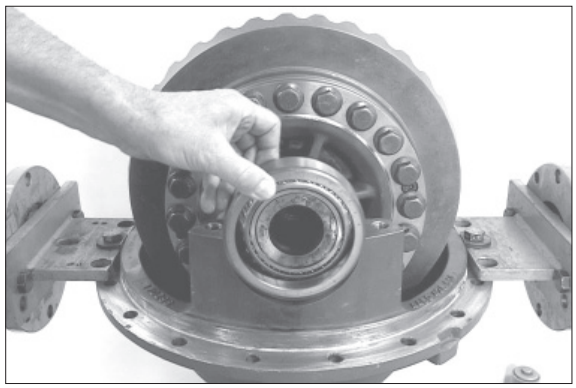
⑫ Loosen hexagon screws and take off bearing bracket.

⚠ **Loosen hexagon screws by hand only.**



7577AAXF087

⑬ Remove both bearing outer rings.

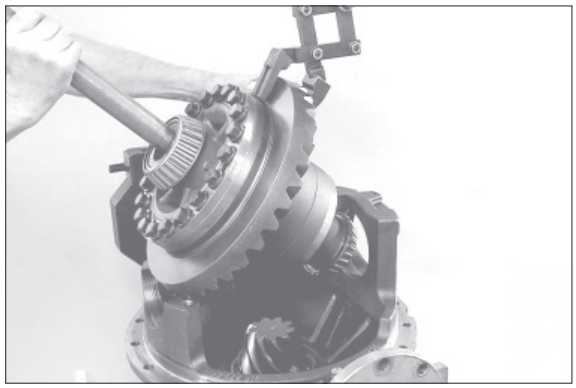


7577AAXF088

⑭ Lift differential out of the housing by means of lifting tackle.

※ Special tool

Lifting tackle	5870 281 013



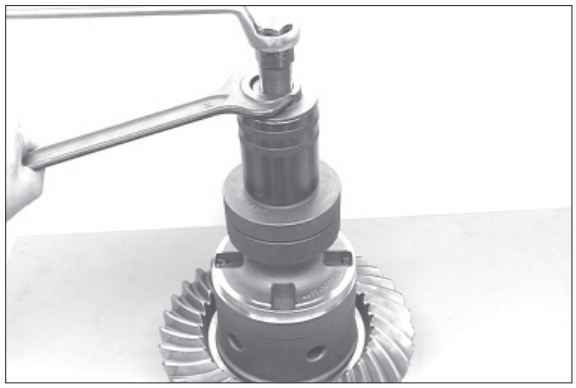
7577AAXF089

Disassembly of limited slip differential

⑮ Pull bearing inner ring from the differential housing.

※ Special tool

Gripping insert	5873 002 023
Basic set	5873 002 001

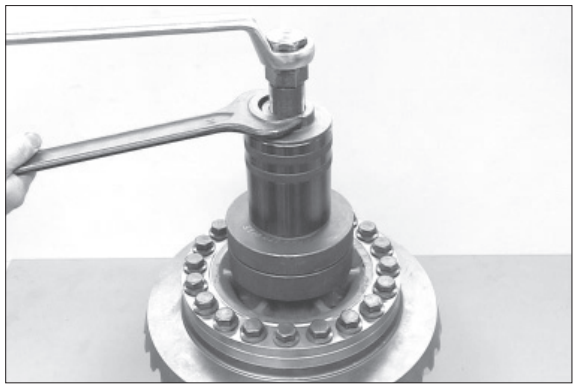


7577AAXF090

⑯ Pull bearing inner ring from the housing cover.

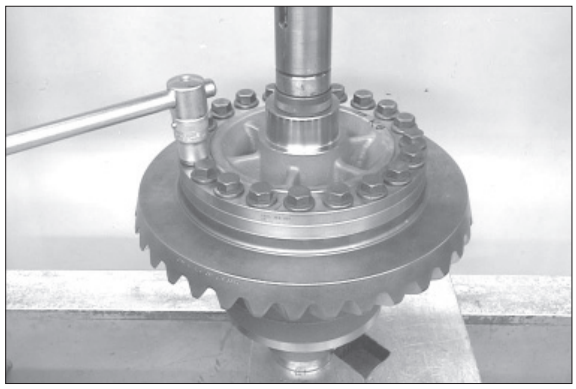
※ Special tool

Rapid grip	5873 012 018
Basic set	5873 002 001



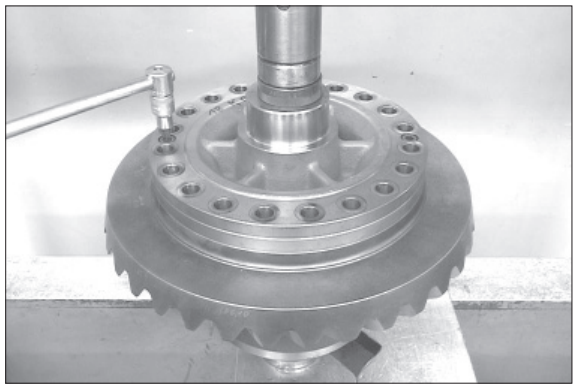
7577AAXF091

⑰ Fasten differential by means of press and loosen locking screws.



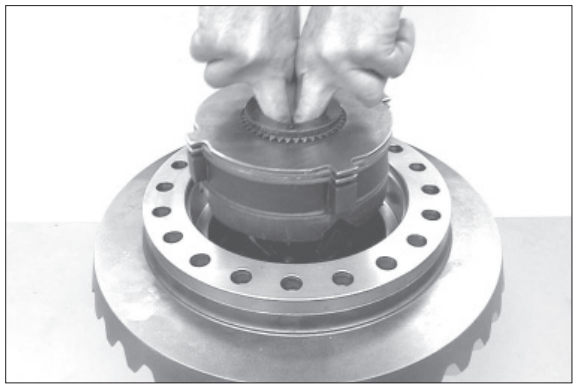
7577AAXF092

⑱ Loosen cap screws and remove released housing cover.



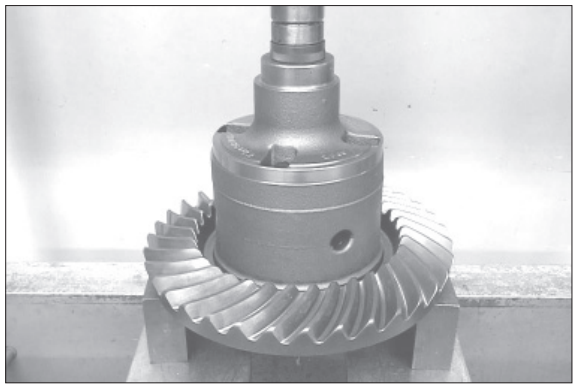
7707AAXR001

⑲ Remove all single parts from the differential housing.



7577AAXF093

⑳ Press off crown wheel from the differential housing.



7577AAXF094

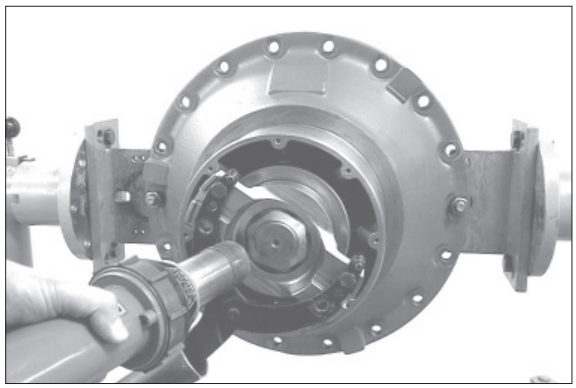
Disassembly of drive pinion

㉑ Heat slotted nut by means of hot-air blower.

※ Special tool

Hot-air blower 230 V	5870 221 500
Hot-air blower 115 V	5870 221 501

※ Slotted nut is locked with Loctite (type No. 262).

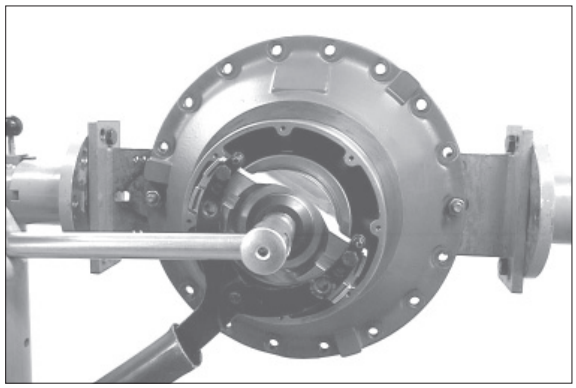


7577AAXF095

㉒ Loosen slotted nut and remove the washer behind it.

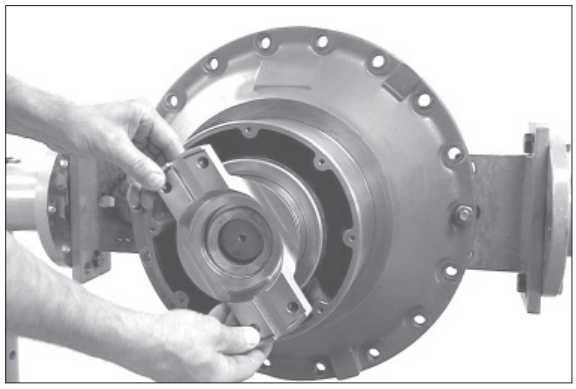
※ Special tool

Slotted nut wrench	5870 401 139
Fixture	5870 240 002



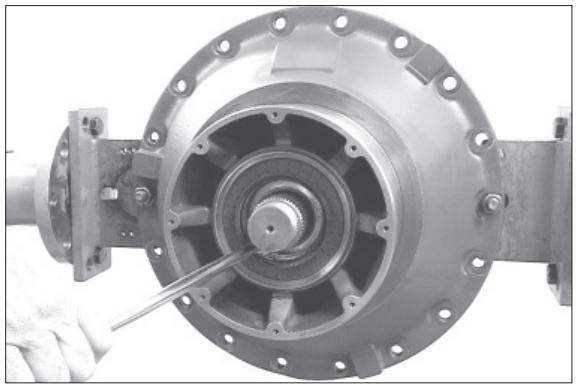
7577AAXF096

㉓ Pull input flange from the drive pinion.



7577AAXF097

㉔ Press shaft seal out of the axle drive housing.

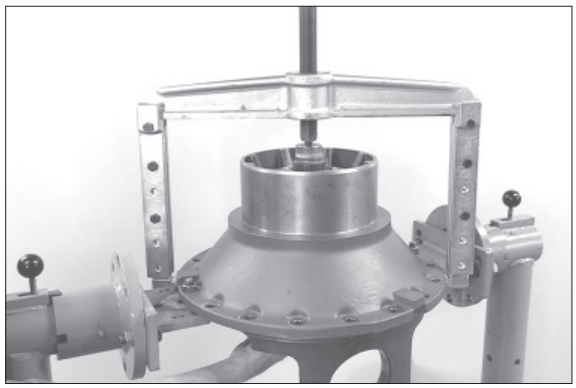


7577AAXF098

㉕ Press drive pinion out of the axle drive housing by means of two-armed puller and remove the released bearing inner ring.

※ Special tool

Two-armed puller	5870 970 007

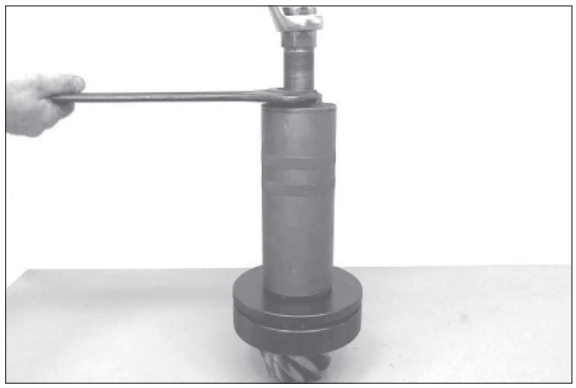


7577AAXF099

㉖ Take off spacer ring and pull bearing inner ring from the drive pinion.

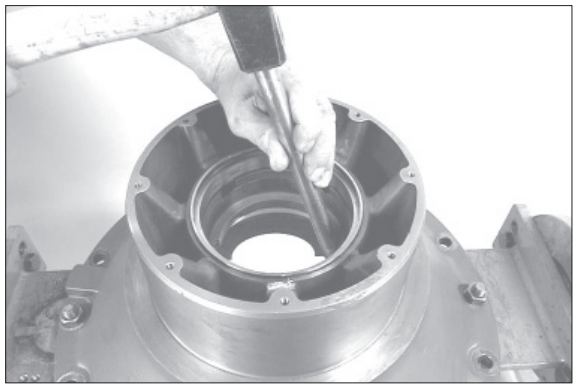
※ Special tool

Gripping insert	5873 002 032
Basic set	5873 002 001



7577AAXF100

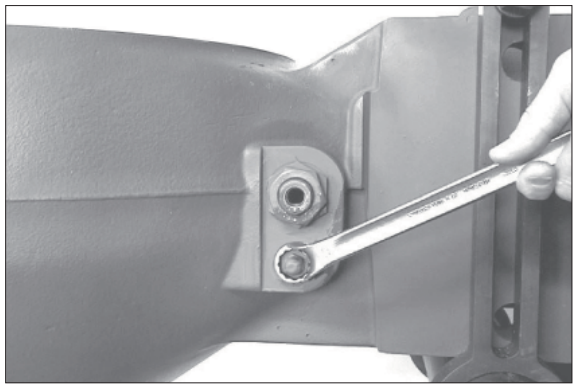
㉗ If necessary drive out both bearing outer rings from the axle drive housing.



7577AAXF101

(2) Disassembly of brake tubes

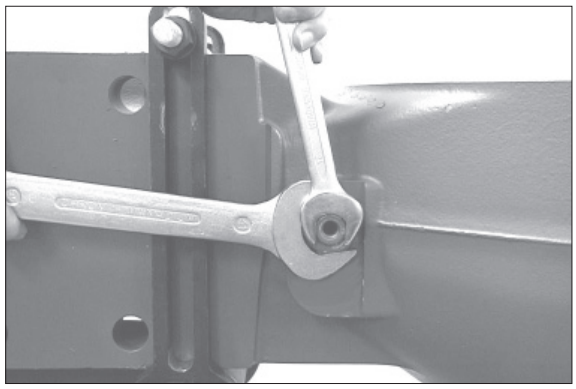
① Remove screw plug with vent valve from the axle casing.



7577AAXF102

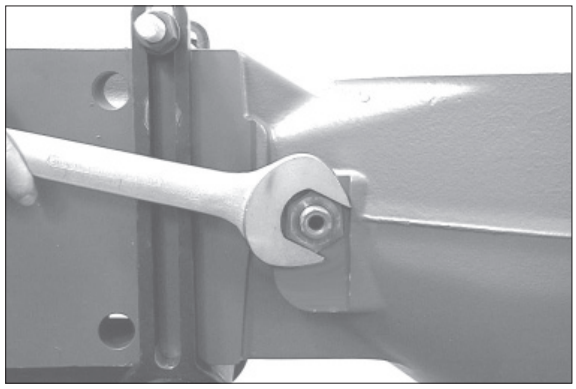
② Loosen hexagon nut.

※ Step (Figure 7577AAXF103~107) to be made on both sides.



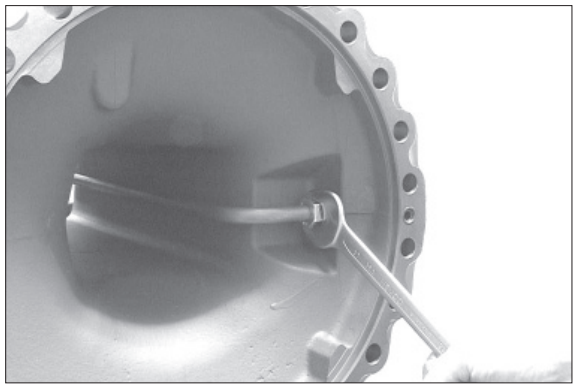
7577AAXF103

③ Loosen union screw.



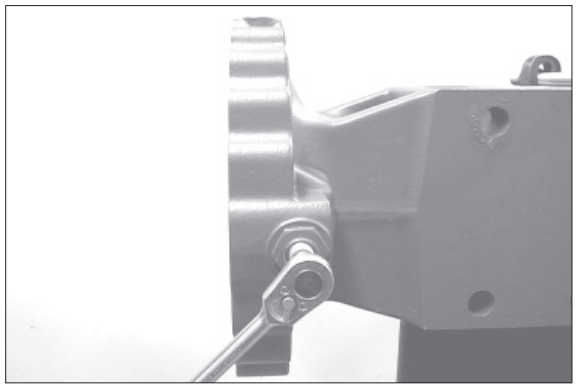
7577AAXF104

④ Loosen pipe union and remove released brake tube from the axle casing.



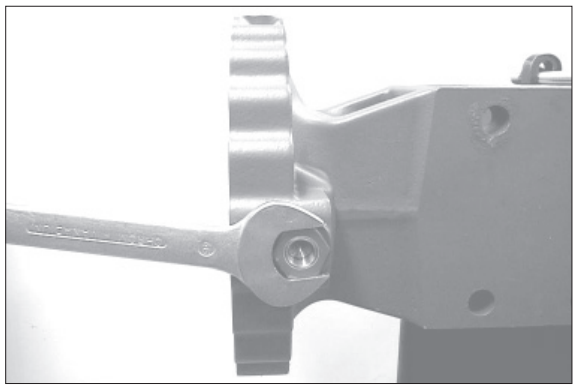
7577AAXF105

⑤ Remove vent valve from the connection part.



7577AAXF106

⑥ Loosen connection part and remove it from the axle casing.



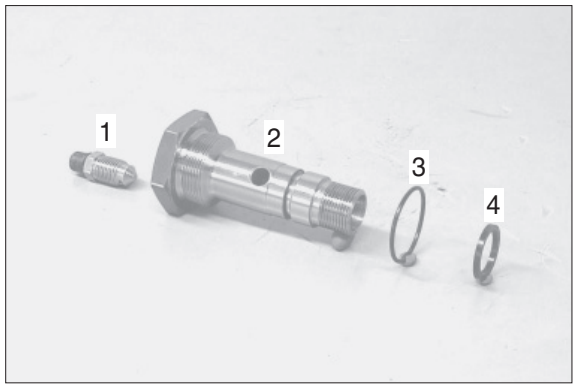
7577AAXF107

4) REASSEMBLY OF BRAKE TUBES AND DIFFERENTIAL CARRIER

(1) Reassembly of brake tubes

① Preassemble connection part as shown in opposite figure.

1 Vent valve
2 Connection part
3 O-Ring
4 Rectangular ring

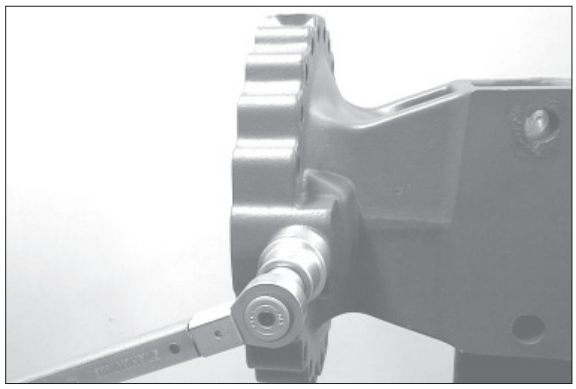


7577AAXF108

※ Step (Figure 7577AAXF108~114) is to be made on both output sides.

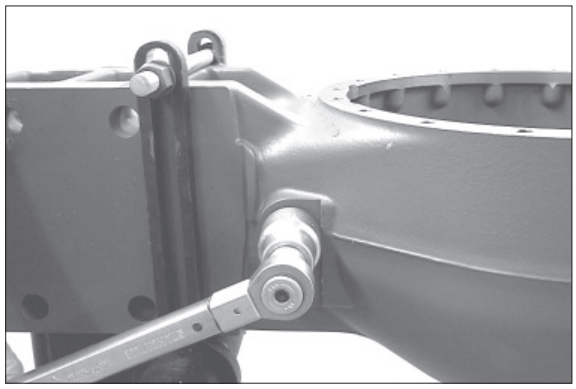
② Install connection part.

· Tightening torque : 13.3 kgf · m (95.9 lbf · ft)

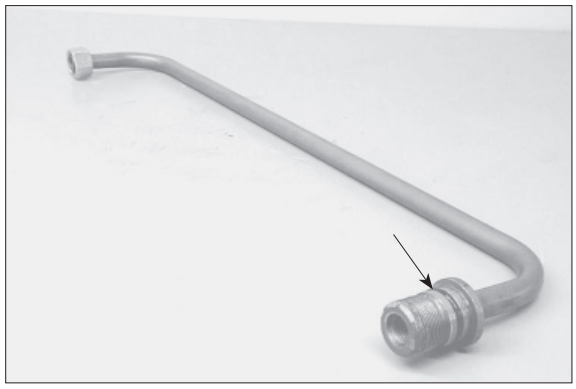

7577AAXF109

③ Provide union screw with new O-ring and install it.

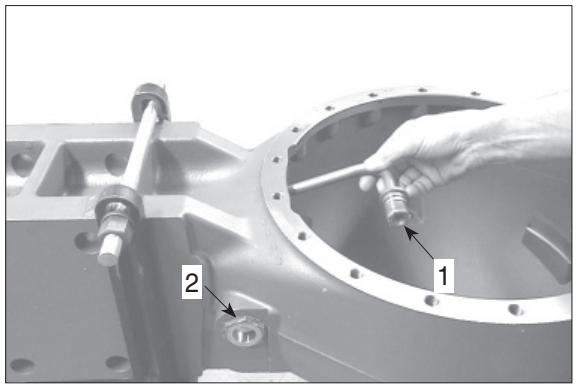
· Tightening torque : 15.3 kgf · m (111 lbf · ft)


7577AAXF110

④ Insert O-ring (see arrow) into the annular groove of the brake tube.


7577AAXF111

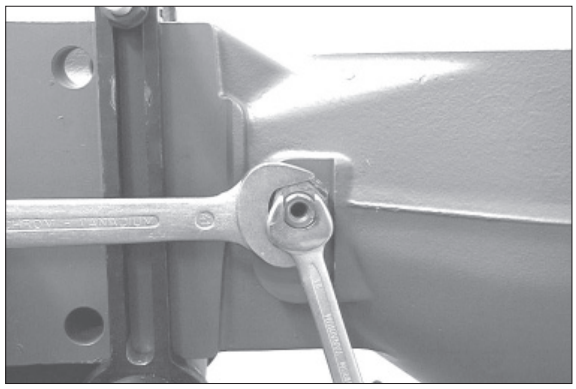
⑤ Insert brake tube into the axle casing, assembling the connection part (see arrow 1) through the union screw (see arrow 2).



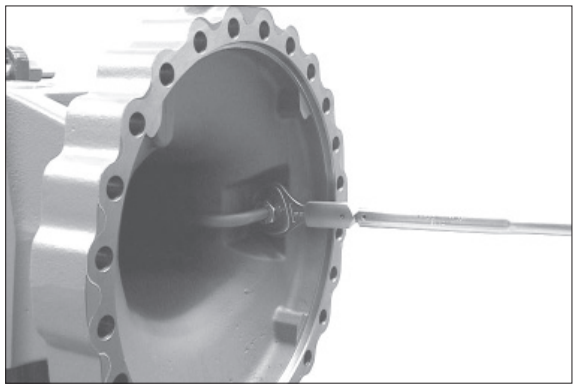
7577AAXF112

⑥ Fasten brake tube by means of hexagon nut and union nut (see below figure).

· Tightening torque : 10.2 kgf · m (73.8 lbf · ft)

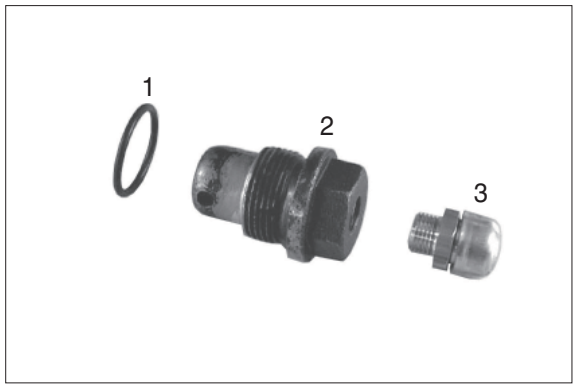

7577AAXF113

· Tightening torque : 8.2 kgf · m (59 lbf · ft)


7577AAXF114

⑦ Preassemble screw plug as shown in opposite figure.

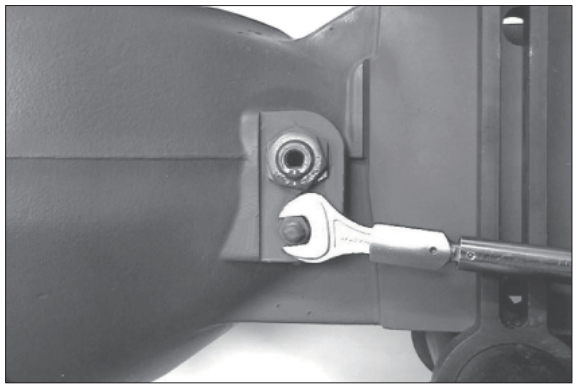
1 O-Ring
2 Screw plug
3 Vent valve



7577AAXF115

⑧ Install screw plug.

· Tightening torque : 7.1 kgf · m
(51.6 lbf · ft)



7577AAXF116

(2) Reassembly of differential carrier

※ If crown wheel or drive 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 drive pinion and crown wheel.

Determine shim thickness for a perfect tooth contact pattern

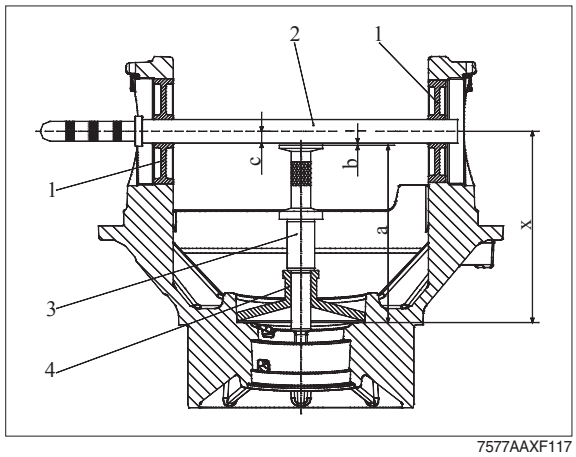
※ Make the following measuring steps at maximum accuracy.
Inexact measurements result in a faulty tooth contact pattern and require a repeated disassembly and reassembly of the drive pinion as well as of the differential.

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

Then install stop washer (4) and measuring pin (3) and assemble measuring shaft (2) (see sketch).

※ Special tool

Adapter pieces	5870 500 044
Measuring shaft	5870 500 001
Measuring pin	5870 351 016
Stop washer	5870 351 029



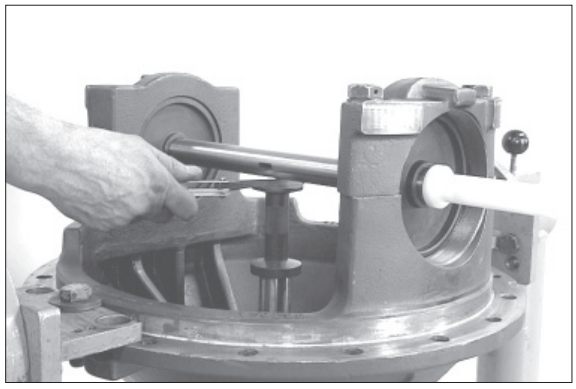
7577AAXF117

② Determine gap (dimension b) between measuring shaft and measuring pin by means of feeler gauge.

Dimension b e.g . . . . . 0.20 mm

EXAMPLE A :

Dimension a (= Measuring pin + stop washer) . . . . . 206.00 mm
Dimension b . . . . . + 0.20 mm
Dimension c . . . . . + 15.00 mm
results in dimension X = 221.20 mm

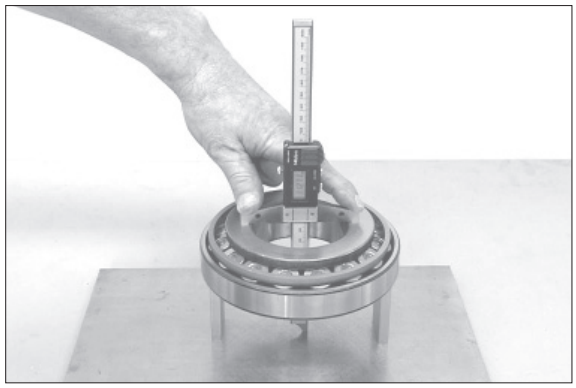

7577AAXF118

③ Determine dimension I (bearing width).

Dimension I e.g . . . . . 39.05 mm

※ Special tool

Digital depth gauge	5870 200 072
Gauge blocks	5870 200 066



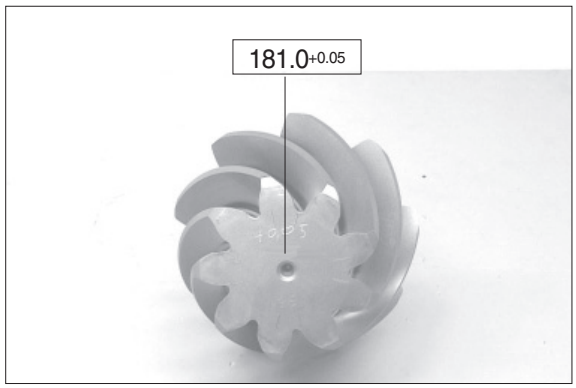
7577AAXF119

④ Read dimension II (dimension for pinion).

Dimension II e.g. . . . . 181.05 mm

EXAMPLE B :

Dimension I . . . . . 39.05 mm
Dimension II . . . . . + 181.05 mm
results in dimension Y = 220.10 mm



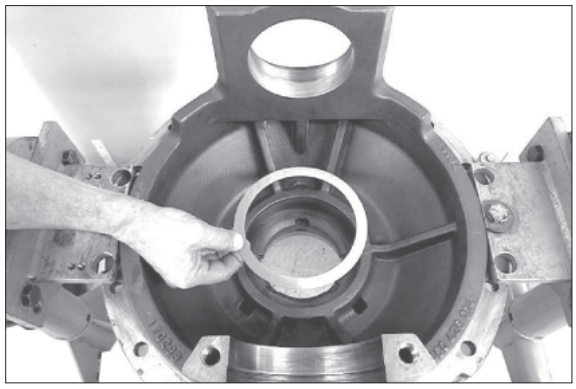
7577AAXF120

EXAMPLE C :

Dimension X . . . . . 221.20 mm
Dimension Y . . . . . - 220.10 mm
Difference = shim e.g. s = 1.10 mm

Install the drive pinion

⑤ Place determined shim e.g. s = 1.10 mm into the bearing bore.

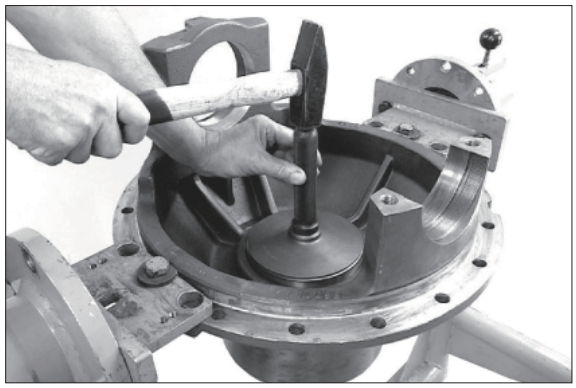


7577AAXF121

⑥ Undercool bearing outer ring and insert it into the bearing bore until contact.

※ Special tool

Driver	5870 058 060
Handle	5870 260 002



7577AAXF122

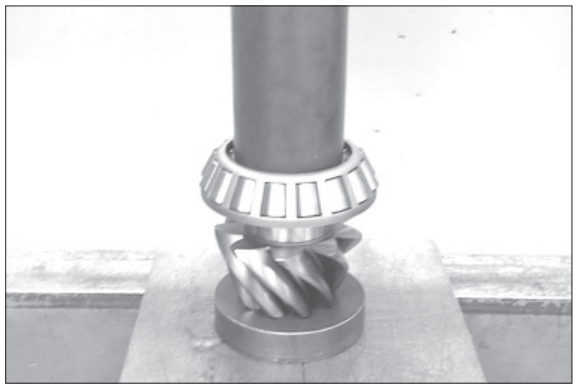
⑦ Undercool bearing outer ring on the input flange side and insert it until contact.

※ Special tool

Driver	5870 058 079
Handle	5870 260 002

7577AAXF123

⑧ Press bearing inner ring on the drive pinion until contact.

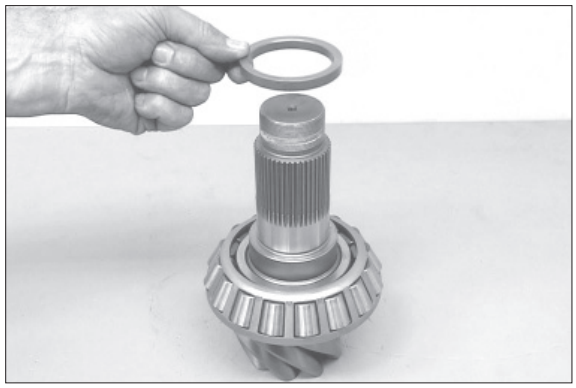


7577AAXF124

Adjust rolling moment of drive pinion bearing 0.15 ~ 0.31kgf · m (Figure 7577AAXF125~133) :

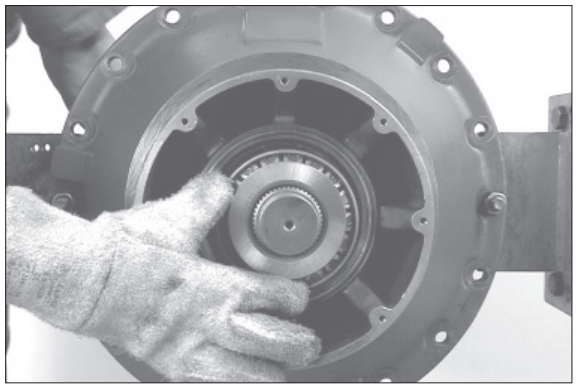
⑨ Assemble spacer ring (e.g. s = 8.10 mm).

※ As per experience the required rolling moment is obtained by use of the spacer ring (e.g. s = 8.10 mm) available at disassembly.
However, a later checking of the rolling moment is imperative.



7577AAXF125

⑩ Insert preassembled drive pinion into the axle drive housing and assemble the heated bearing inner ring until contact.

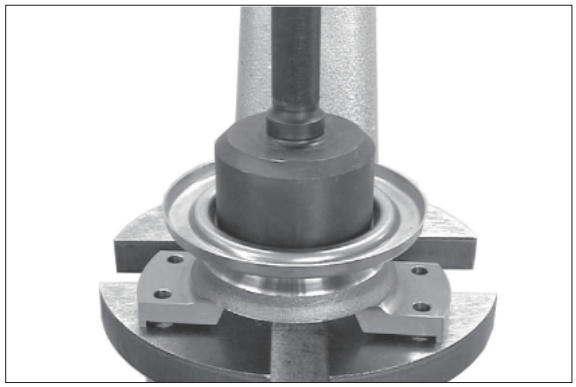


7577AAXF126

⑪ Press dust protection on the input flange until contact.

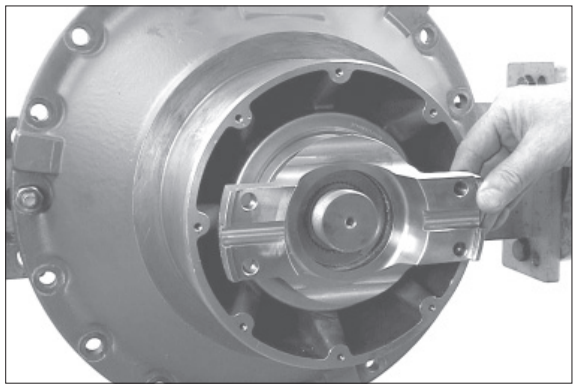
※ Special tool

Driver	5870 056 003



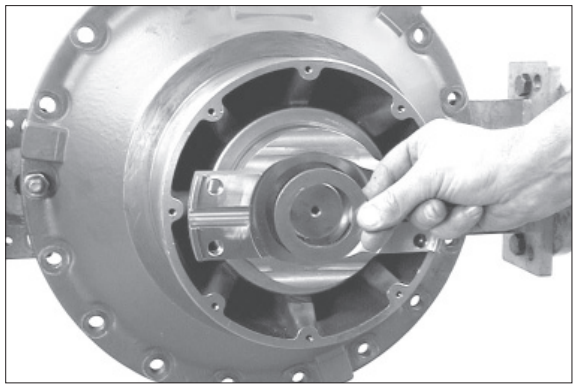
7577AAXF127

⑫ Assemble input flange.



7577AAXF128

⑬ Assemble washer.



7577AAXF129

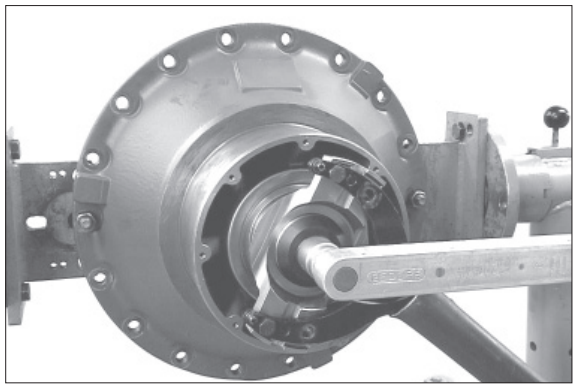
⑭ Unscrew hexagon nut by hand and tighten it.

· Tightening torque : 122 kgf · m (885 lbf · ft)

※ Special tool

Slotted nut wrench	5870 401 139
Fixture	5870 240 002

※ When tightening rotate drive pinion in both directions several times.



7577AAXF130

⑮ Check rolling moment (0.15~0.30 kgf · m).

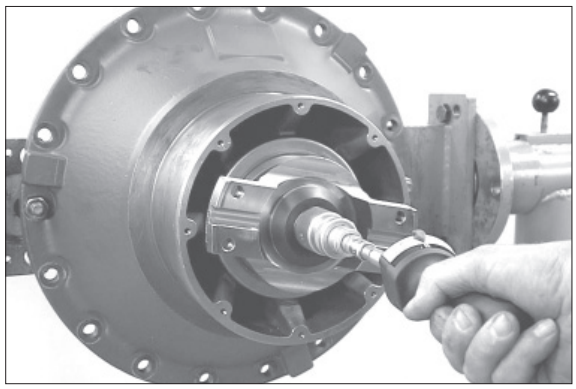
※ For new bearings it should be tried to achieve the max. value of the rolling moment.

⚠ If the required rolling moment is not obtained, correct it with an adequate spacer ring (Figure 7577AAXF125), according to the following indications :

Rolling moment too low - install a thinner spacer ring

Rolling moment too high - install a thicker spacer ring.

Then loosen the slotted nut again and pull input flange from the drive pinion.



7577AAXF131

⑯ Install shaft seal with the sealing lip showing to the oil chamber (downwards).

Special tool

※ Driver 5870 048 233

※ The exact installation position of the shaft seal will be obtained by using the exact driver.

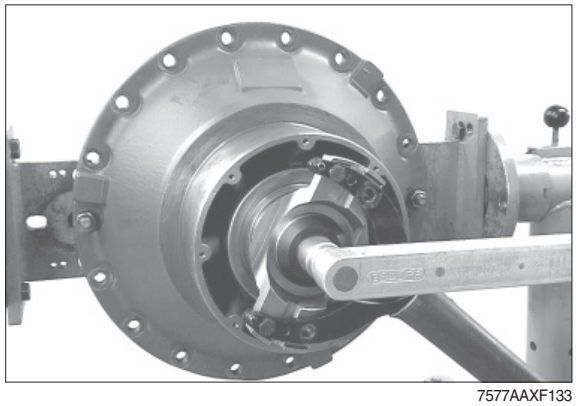
⚠ Just before the installation wet the outer diameter of the shaft seal with spirit and fill the space between sealing and dust lip with grease.

7577AAXF132

⑰ Assemble input flange and finally fasten it by means of washer and slotted nut.

· Tightening torque : 122kgf · m(885lbf · ft)

⚠ Apply Loctite (type No. 262) onto the thread of the slotted nut.

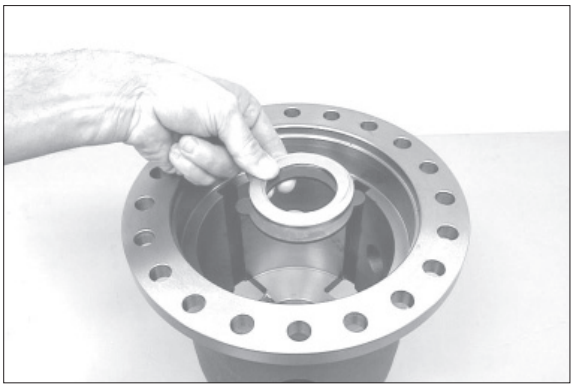


7577AAXF133

Reassembly of limited slip differential

⑱ Place both thrust washers into the differential housing.

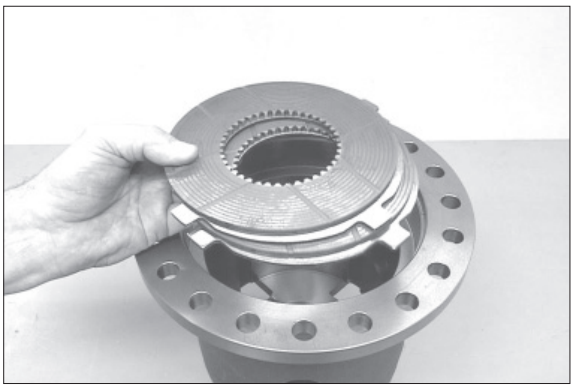
※ Prior to installation all single parts of the differential must be oiled.



7577AAXF134

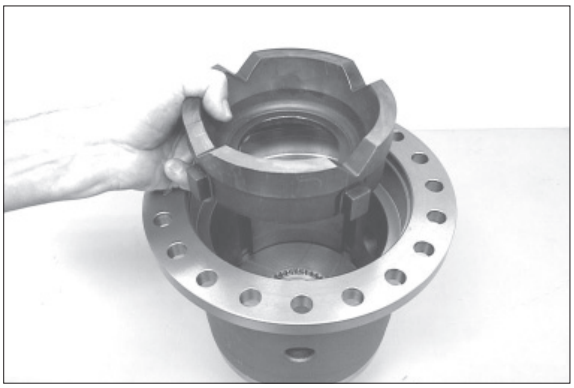
⑲ Starting with an outer clutch disc install alternately the outer and inner clutch discs.

⚠ **Thickness of the disc pack must be identical on both sides.**



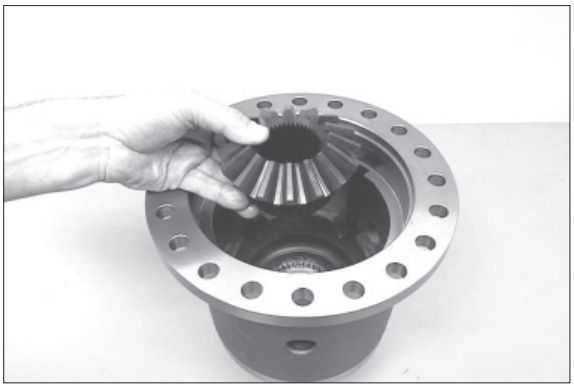
7577AAXF135

⑳ Put on the pressure ring.



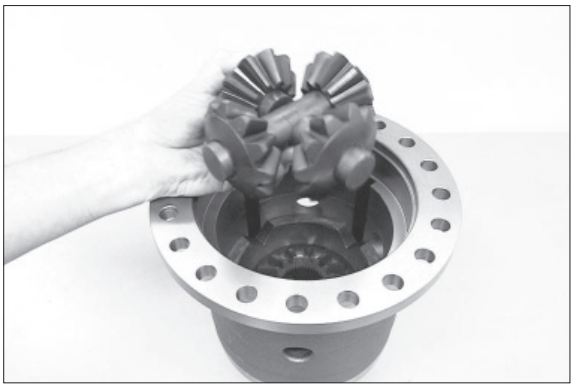
7577AAXF136

㉑ Insert axle bevel gear until contact and at the same time assemble all inner clutch discs with the spline.



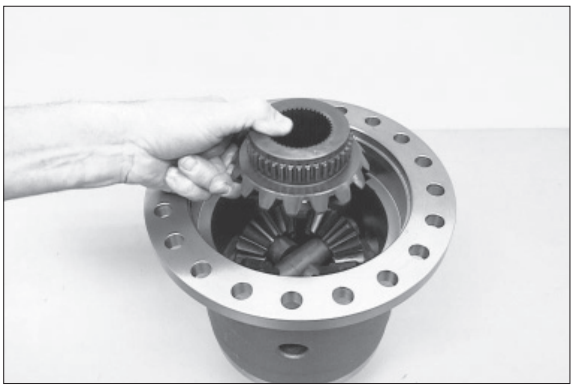
7577AAXF137

㉒ Preassemble differential spider and insert it into the differential housing.



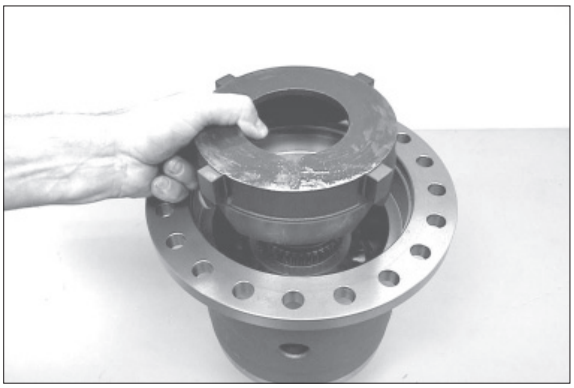
7577AAXF138

㉓ Put on the second axle bevel gear.



7577AAXF139

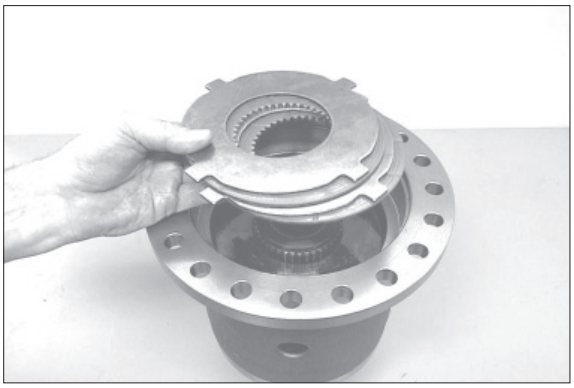
㉔ Insert the second pressure ring into the differential housing.



7577AAXF140

㉕ Starting with an inner clutch disc install alternately the inner and outer clutch discs.

⚠ **Thickness of the clutch disc pack must be identical on both sides.**



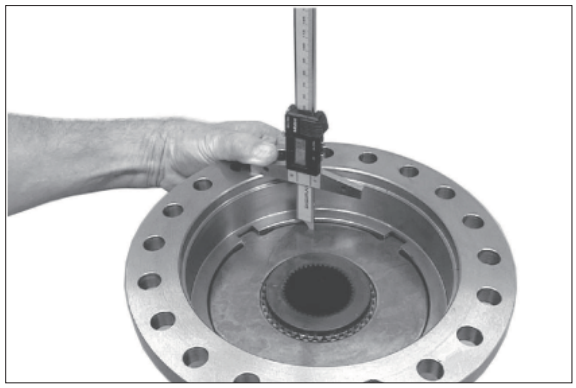
7577AAXF141

Determine disc clearance 0.2~0.8 mm

㉖ Determine dimension I, from mounting face of the differential housing to plane face of the outer clutch disc.

Dimension I e.g . . . . . 44.30 mm

※ Special tool
Digital depth gauge 5870 200 072

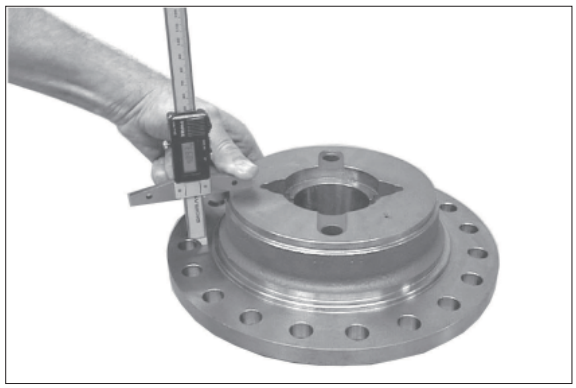


7577AAXF142

㉗ Determine dimension II, from contact surface of the outer clutch disc to the mounting face of the housing cover.

Dimension II e.g . . . . . 43.95 mm

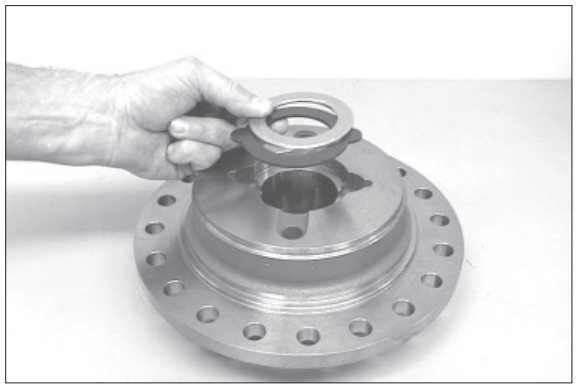
EXAMPLE D :
Dimension I . . . . . 44.30 mm
Dimension II . . . . . - 43.95 mm
Difference = Disc clearance = 0.35 mm



7577AAXF143

※ If the required disc clearance is not obtained, correct it with the adequate outer clutch discs (s = 2.7, s = 2.9, s = 3.0, s = 3.1 or s = 3.3 mm), taking care that the difference in thickness between the left and the right disc pack must only be 0.01 at a maximum.

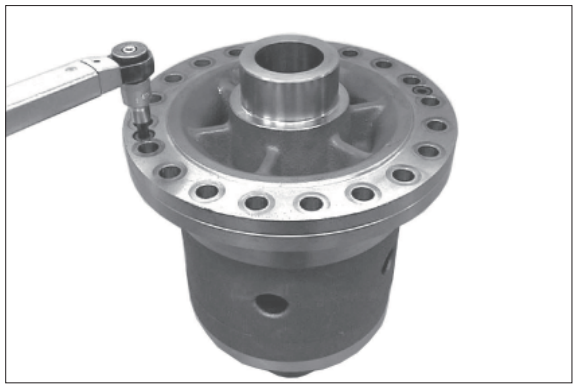
㉘ Fix both thrust washers with grease into the recess of the housing cover.



7577AAXF144

㉙ Put on the housing cover and fasten it by means of cap screws (2EA).

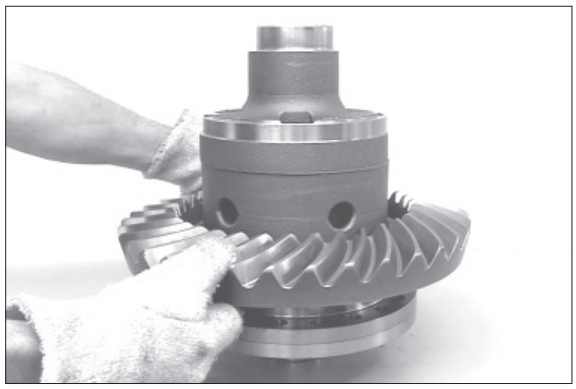
· Tightening torque (M10/8.8) :
4.7 kgf · m (33.9 lbf · ft)



7707AAXF015

㉚ Heat crown wheel and install it until contact.

※ Special tool
Adjusting screws 5870 204 040

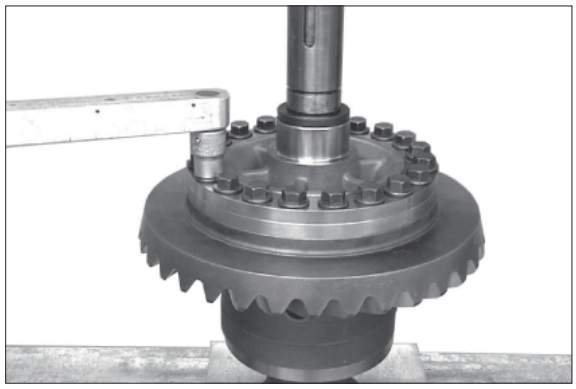


7577AAXF145

㉛ Fix differential by means of press and fasten crown wheel by means of new locking screws.

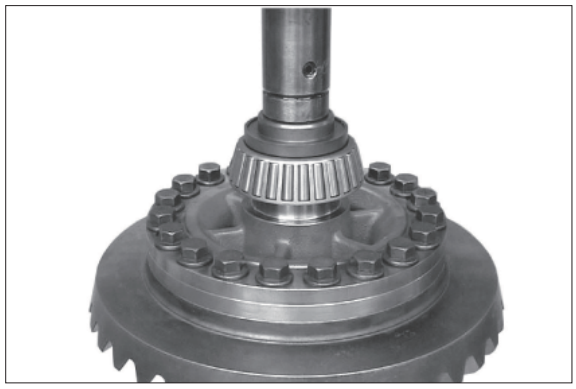
· Tightening torque : 41.8 kgf · m
(302 lbf · ft)

⚠ Only use of new locking screws is permissible.



7577AAXF146

㉜ Press on both bearing outer rings until contact.

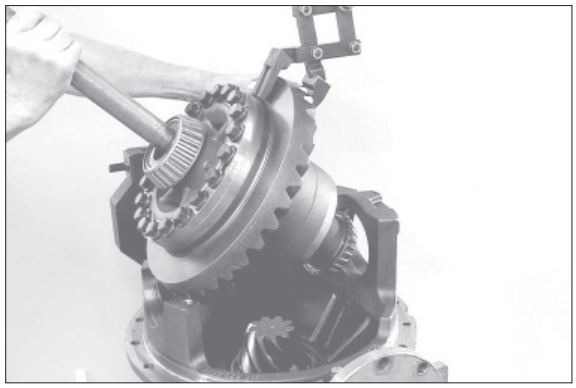


7577AAXF147

㉝ Insert differential into the axle drive housing by means of lifting tackle.

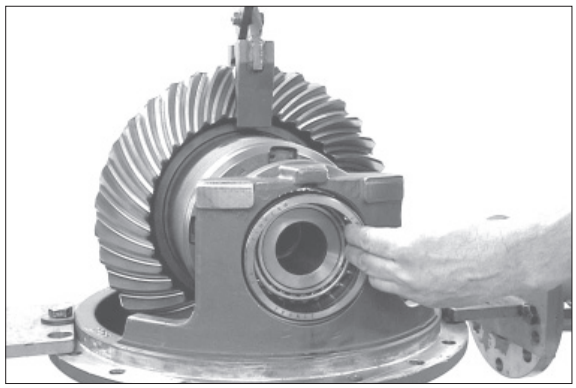
※ Special tool

Lifting tackle	5870 281 013



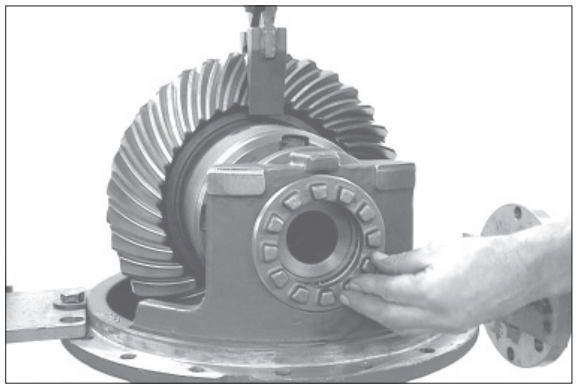
7577AAXF148

㉞ Place bearing outer ring into the axle drive housing.



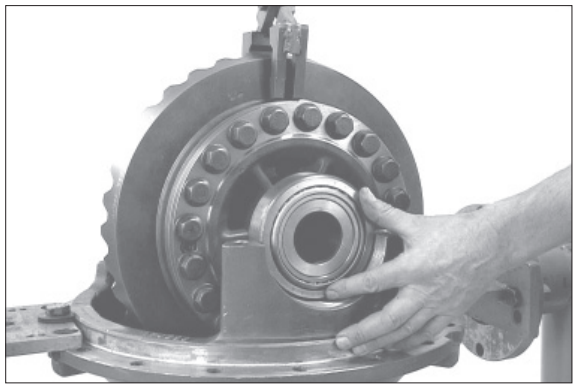
7577AAXF149

㉟ Preliminarily fix the bearing outer ring by means of adjusting nut.



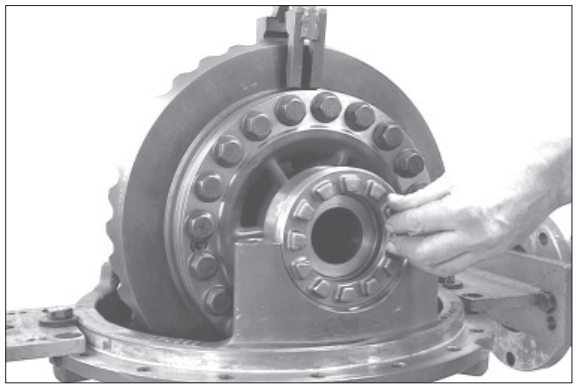
7577AAXF150

㊱ Install crown wheel-sided bearing outer ring.



7577AAXF151

㊲ Preliminarily fix the crown wheel-sided bearing outer ring by means of the second adjusting nut.



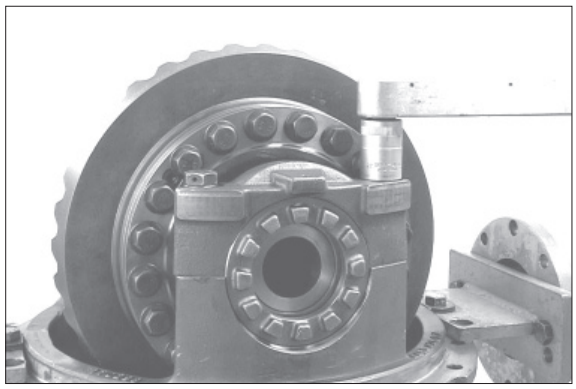
7577AAXF152

㊳ Put on bearing bracket and fasten it by means of hexagon screws and washers.

· Tightening torque (M16/10.9) :
28.6 kgf · m (207 lbf · ft)

※ Pay attention to clearance of the adjusting nut.

⚠ Apply Loctite (type No. 262) onto threads of the hexagon screws.



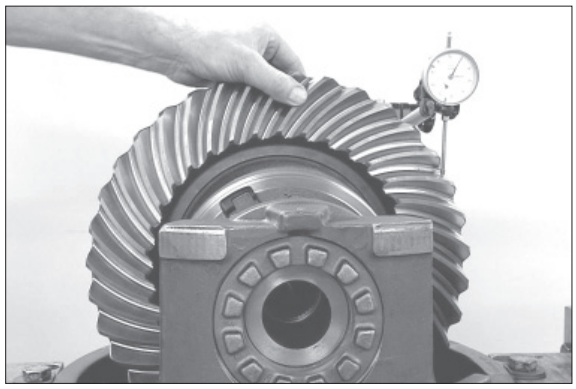
7577AAXF153

Adjustment of backlash and bearing preload

㊴ 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 the value etched on the outer diameter of the crown wheel - is reached.

※ Special tool

Magnetic stand	5870 200 055
Dial indicator	5870 200 057
Socket spanner	5870 656 079



7577AAXF154

※ At this step rotate the differential several times.

㊵ Determine bracket width and correct it on both adjusting nuts, if required.

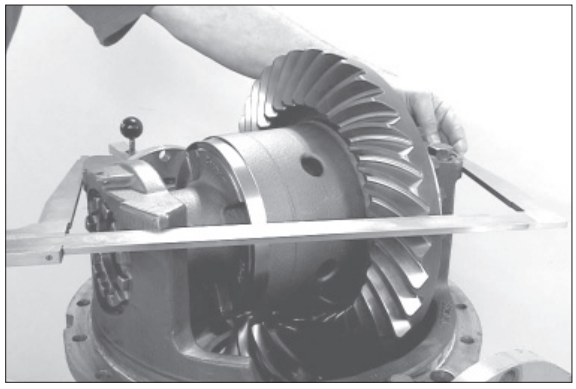
Bracket width . . . . . .418 $^{-0,05}$ mm

※ Special tool

Caliper gauge	5870 200 058

Then check backlash once again.

※ Adjusting of the bracket width results in the required bearing preload.

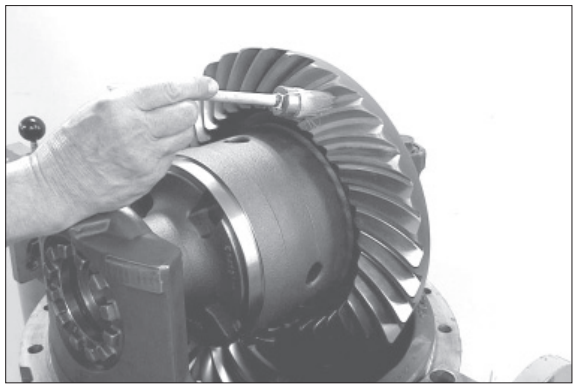


7577AAXF155

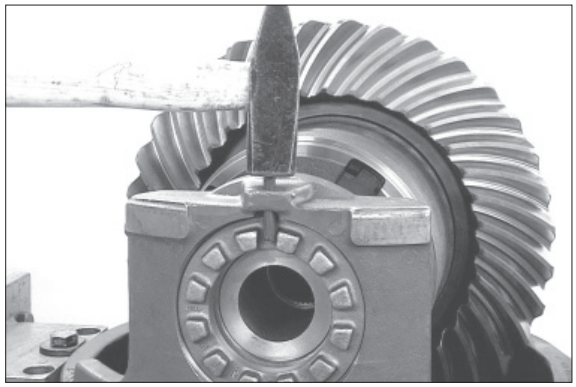
㊶ Cover some tooth flanks of the crown wheel with marking ink and roll crown wheel in both directions over the drive pinion.

Compare the obtained tooth contact pattern with the examples on page 3-269.

⚠ **If the tooth contact pattern differs, there has been a measuring error at determination of the shim (figure 7577AAXF121/page 3-273), what is imperative to be corrected.**


7577AAXF156

㊷ Secure both adjusting nuts by means of slotted pins.


7577AAXF157

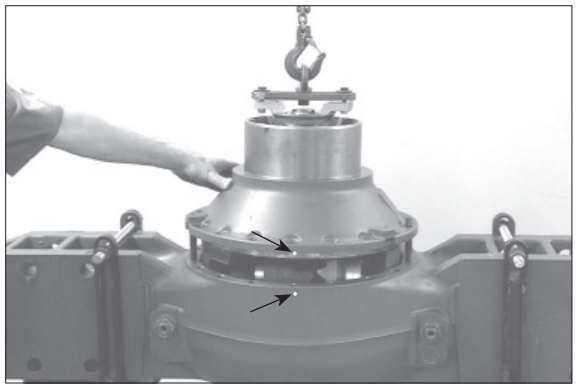
㊸ Install two adjusting screws and insert differential carrier into the axle casing until contact by means of lifting tackle.

※ Special tool

Adjusting screws	5870 204 023
Lifting tackle	5870 281 044

※ Observe radial location (see marking Page 3-249 / Figure 7577AAXF081).

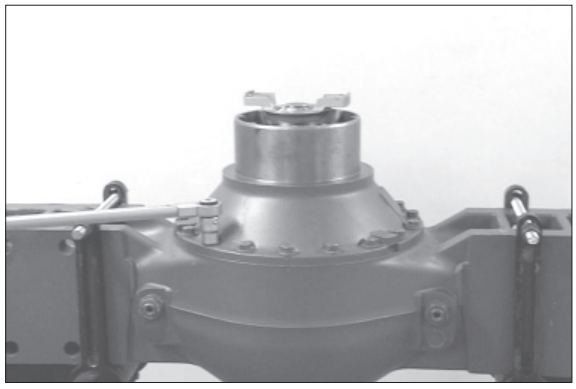
⚠ **Apply sealing compound (Three Bond Type 1215) on mounting face.**


7577AAXF158

㊹ Fasten differential carrier by means of new locking screws.

・Tightening torque : 25.5 kgf・m
(184 lbf・ft)

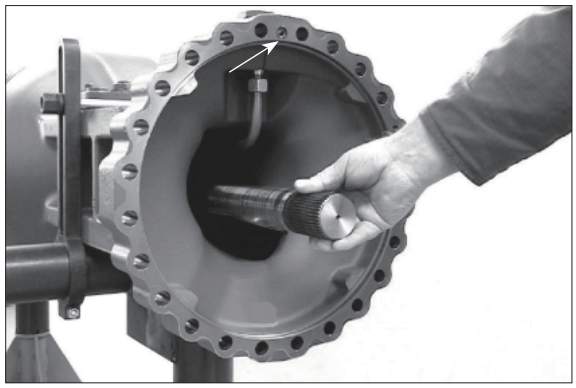
⚠ **Only use of the new locking screws is permissible.**


7577AAXF159

㊺ Insert stub shaft into spline of the axle bevel gear until contact.

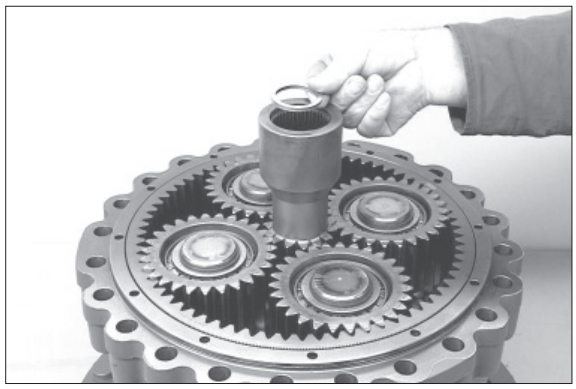
Then fix O-ring (see arrow) by means of grease into the recess of the axle casing.

※ Step (Figure 7577AAXF160 ~ 163) is to be made on both output sides.



7577AAXF160

㊻ Thrust washer (s) removed at disassembly have to be fixed in the sun gear shaft by means of grease.

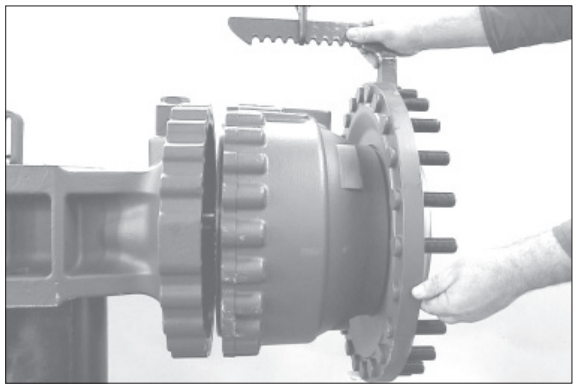


7577AAXF161

㊼ Place complete output by means of lifting tackle to the axle casing until contact.

※ Special tool

Lifting bracket	5870 281 043

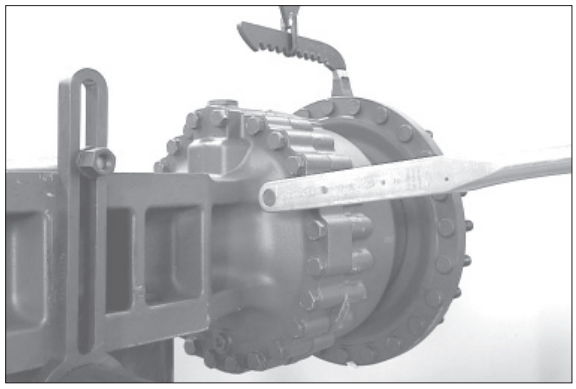


7577AAXF162

㊽ Fasten output by means of hexagon screws and washers.

· Tightening torque (M18/10.9) :
39.8 kgf · m (288 lbf · ft)

※ Prior to putting into operation of the axle, fill oil in accordance with lubrication instructions.

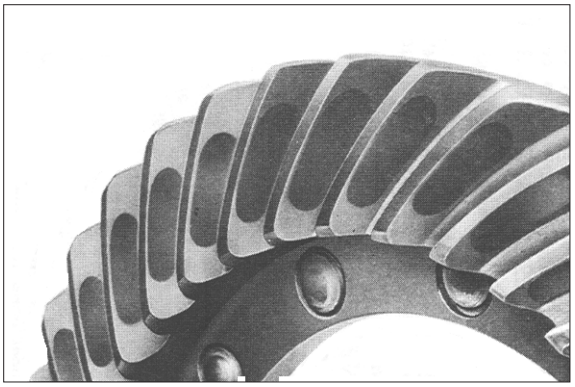


7577AAXF163

※ BACKLASH CHECK

- Applied the paint (or red lead) on the surface of several bevel gear teeth.
- Turn the pinioin gear and check the contact pattern.

Correct pattern



WTHAX16

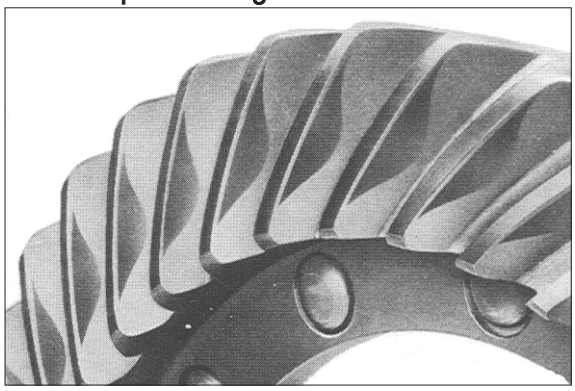
Concave side

WTHAX17

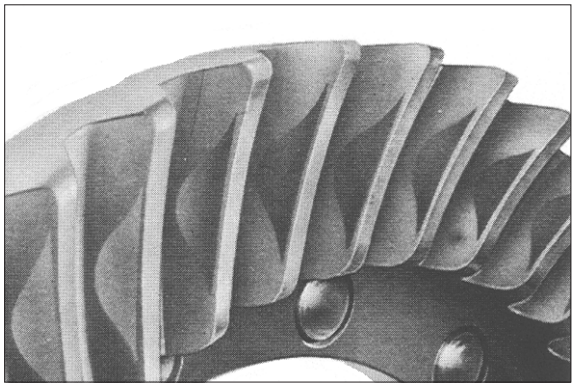
Convex side

※ ADJUSTMENT

Incorrect pattern : high contact

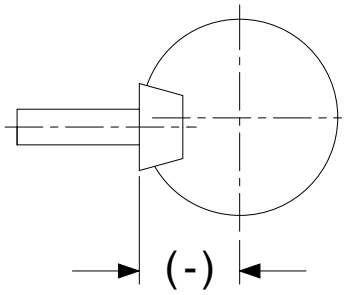


Concave side



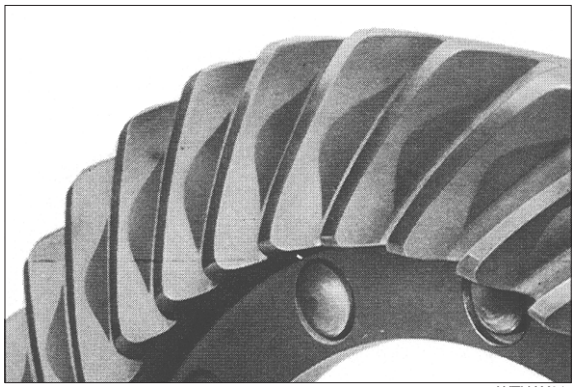
Convex side

- Reduce the distance (-)



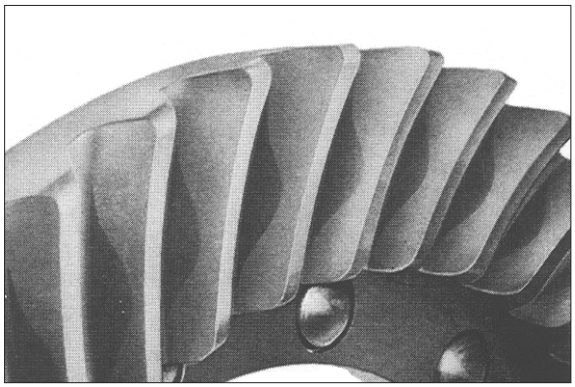
WTHAX20

Incorrect pattern, low contact



WTHAX21

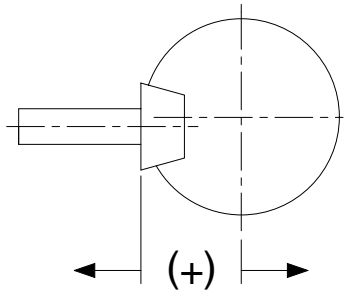
Concave side



WTHAX22

Convex side

- Add the distance (+)



WTHAX23