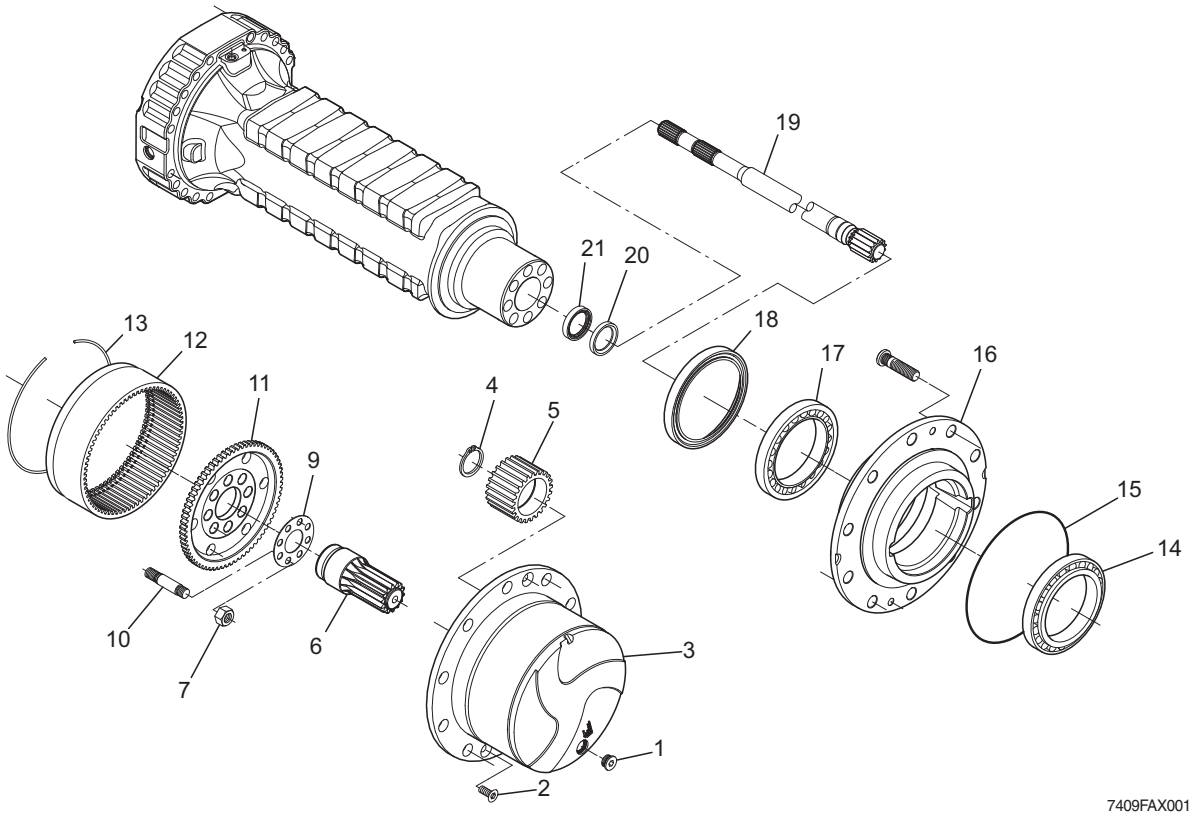
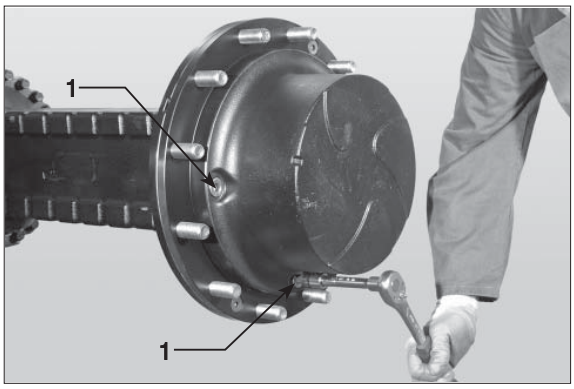
3. FRONT AXLE (DANA, machine serial No.: -#0079)

1) HOW TO DISASSEMBLY THE PLANETARY REDUCTION AND AXLE SHAFT



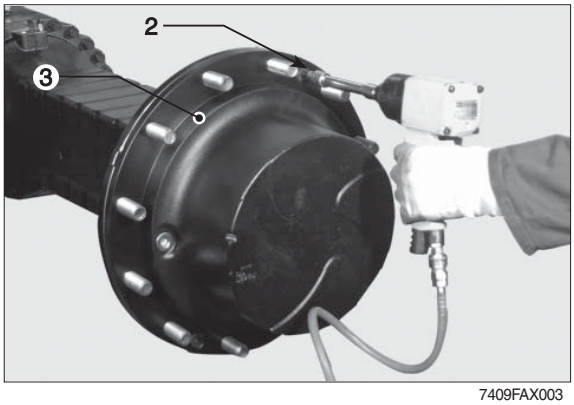
7409FAX001

(1) Remove oil-level plug (1) and drain oil.



7409FAX002

(2) Remove the locking screws (2) of planetary cover (3).

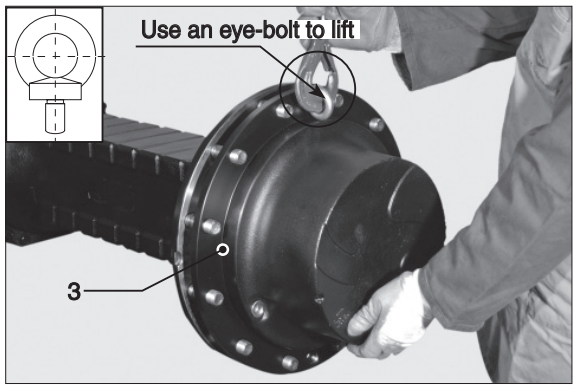


7409FAX003

(3) Using two screwdrivers or two levers inserted in the slots provided, disjoin the planetary cover (3) away from the wheel hub (16).

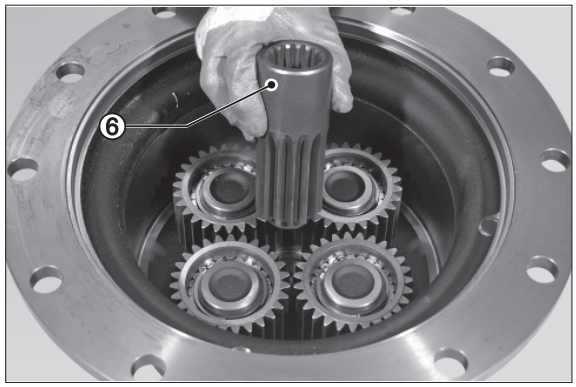
7409FAX004

(4) Remove the cover (3).



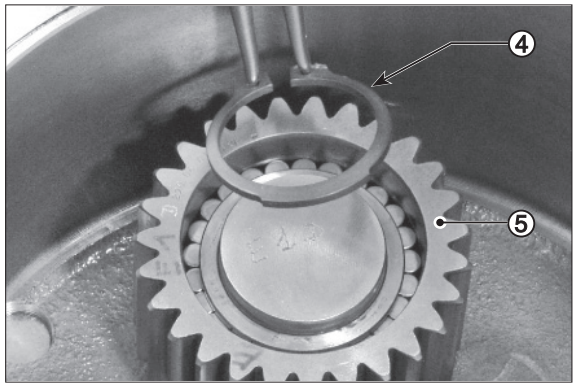
7409FAX005

(5) Remove the sun gear (6).



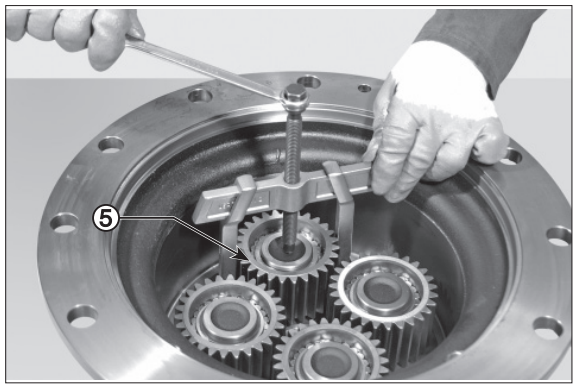
7409FAX006

(6) Remove the safety spring rings (4) of the planetary gears (5).



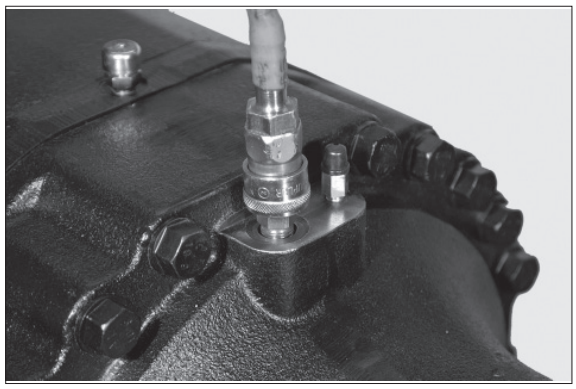
7409FAX007

(7) Remove the planetary gears (5).



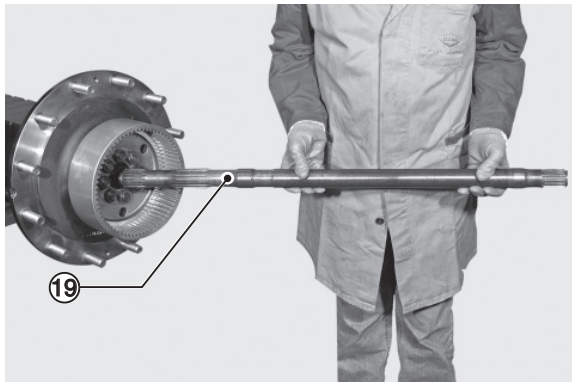
7409FAX008

(8) Insert air pressure to maintain in correct position the brake discs.



7409FAX009

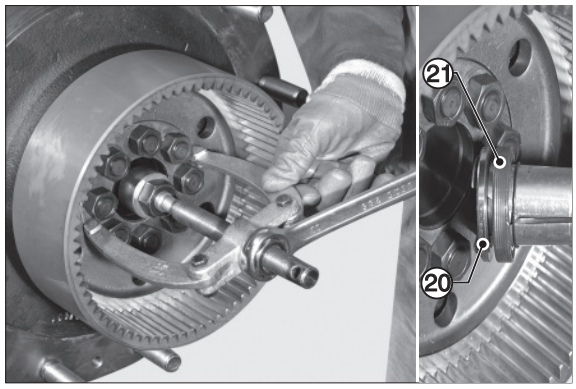
(9) Remove the axle shaft (19).



7409FAX010

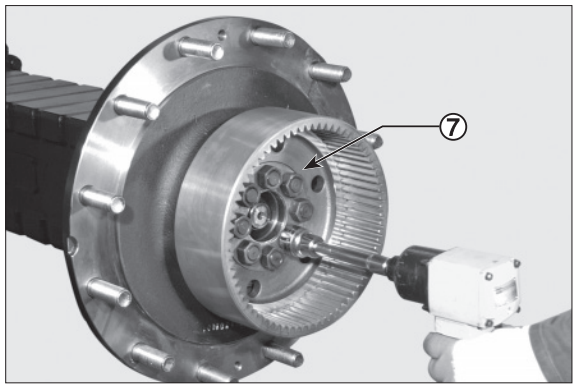
(10) Using an extractor, remove seal ring (21) and guide ring (20).

※ Note down the direction of assembly of snap ring.



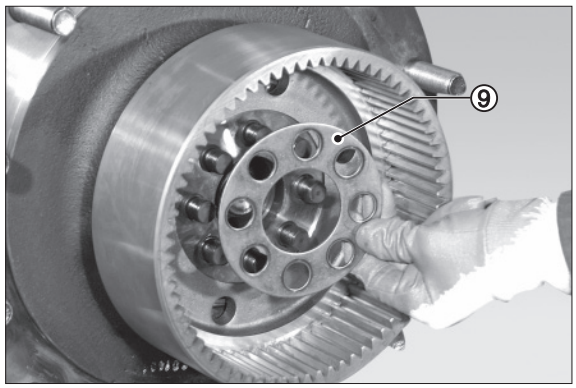
7409FAX011

(11) Loosen the nuts (7) and remove them.



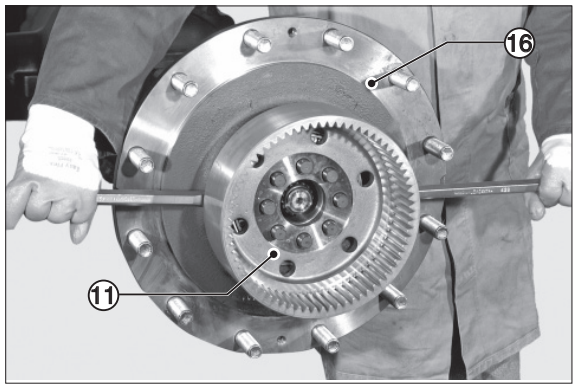
7409FAX012

(12) Remove the safety flange (9).



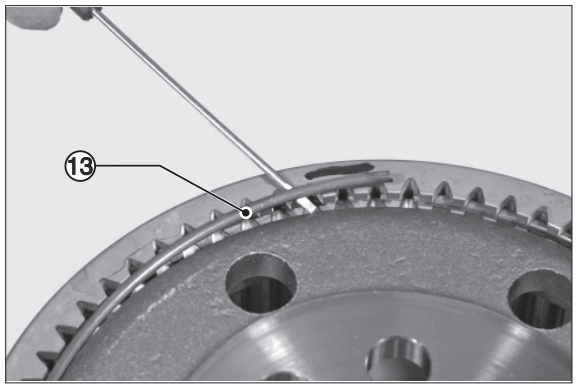
7409FAX013

(13) Using two screwdrivers or two levers inserted in the slots provided, disengage the crown wheel (11) from the hub (16). Remove the crown (11).



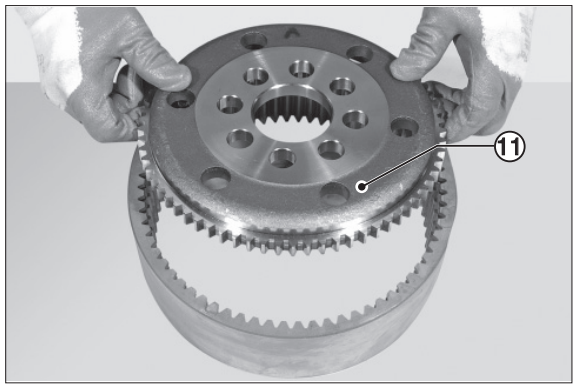
7409FAX014

(14) Remove the snap ring (13) from the crown (12).



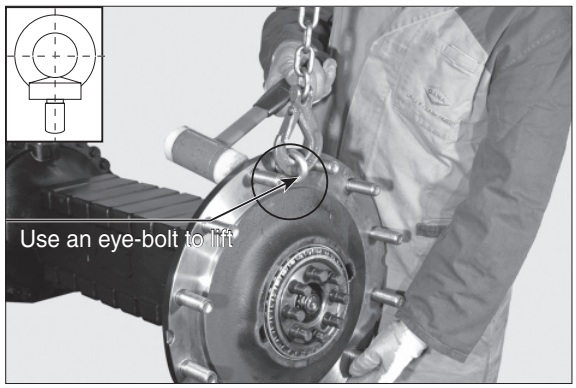
7409FAX015

(15) Remove the crown flange (11).



7409FAX016

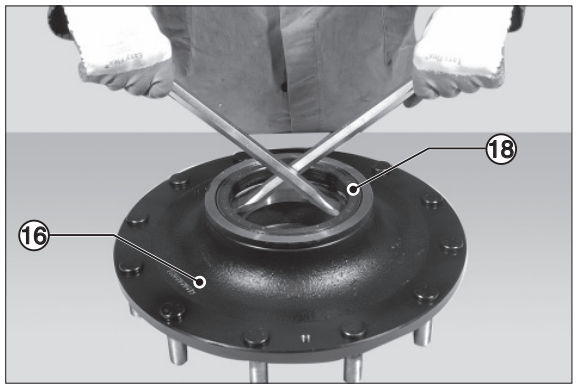
(16) With the help of a hammer, shift the hub (16) and the external bearing (13).



7409FAX017

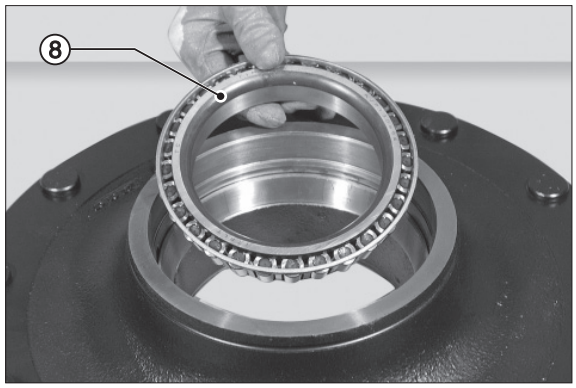
(17) Remove the seal ring (18) from the hub (16).

※ Note down direction of assembly.
※ The seal ring may not be reused.



7409FAX018

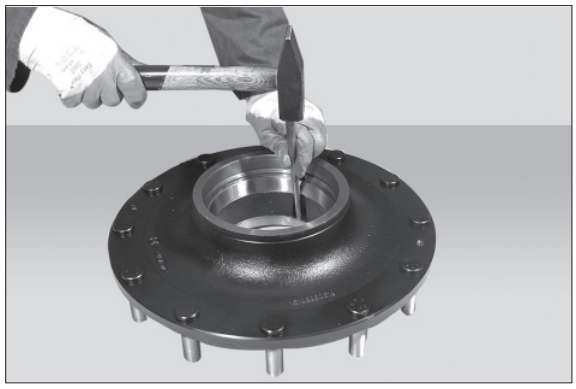
(18) Remove the internal bearing (8).



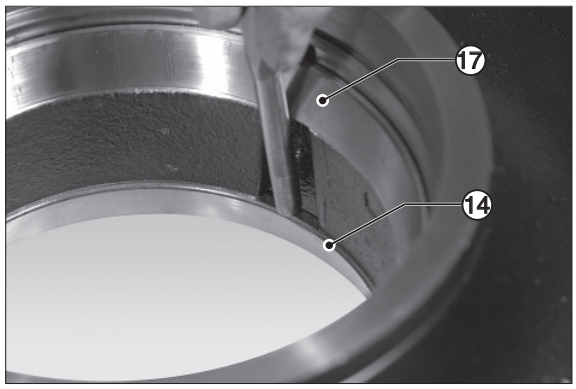
7409FAX019

(19) Remove the external thrust blocks of bearings (14) and (17), using a pin driver.

※ Hammer in an alternate sequence to prevent crawling and deformation of the thrust blocks.

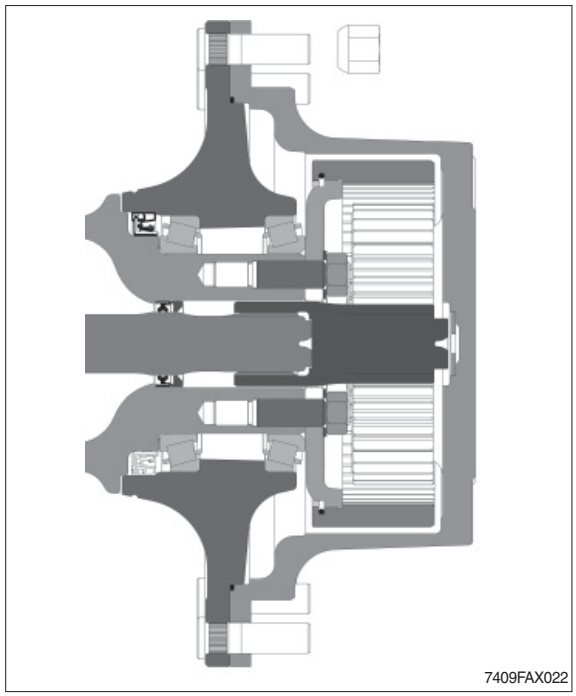


7409FAX020

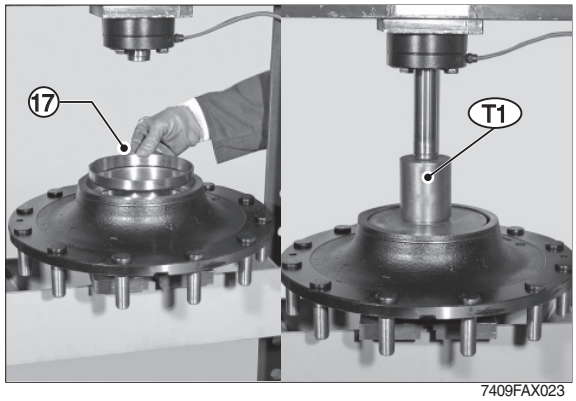


7409FAX021

2) ASSEMBLING THE PLANETARY REDUCTION AND AXLE SHAFT

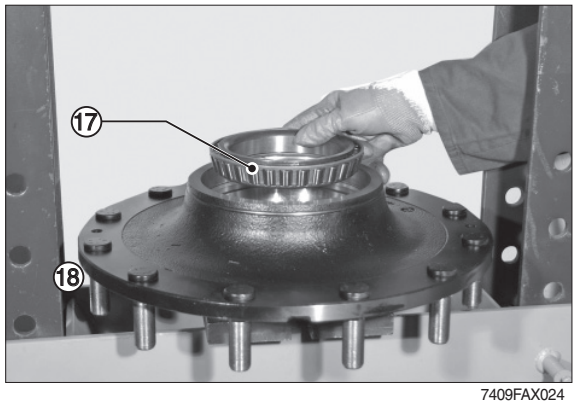

7409FAX022

(1) Position the wheel hub (16) under a press; lubricate the seat of the bearing cones (14)(17) and, using tool T1, install the bearing cup of the bearing cone (14)(17).



7409FAX023

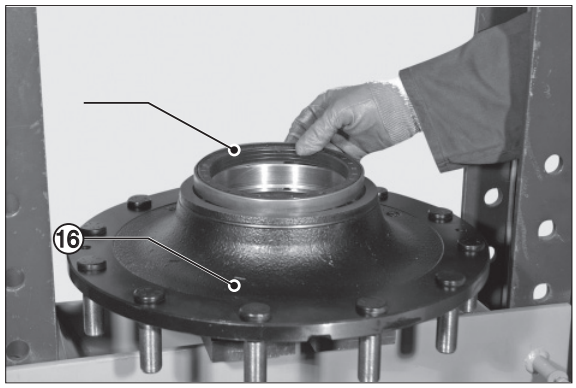
(2) Fit the bearing (17) and seal ring (18) into the internal thrust block.



7409FAX024

(3) Using special tool apply a jointing compound for seals to the outer surface of the sealing ring (18).
Position the sealing ring (18) in the hub (16).

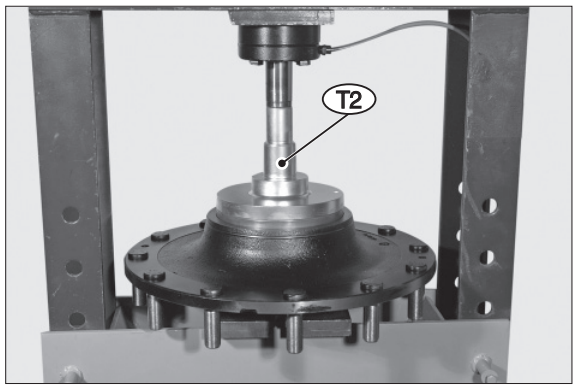
※ Check that the ring (18) is correctly oriented.



7409FAX025

(4) Position tool T2 and press the sealing ring (19) into its seat.

※ Install the seal ring, taking care to maintain the predefined distance of 7.00 mm ± 0.5.
Check the flatness of seal ring.

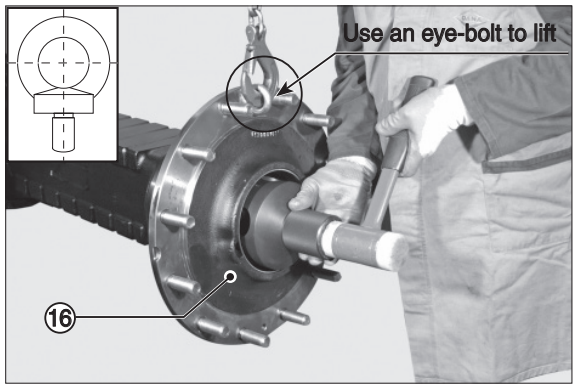


7409FAX026

(5) Install the wheel hub (16).

※ Move the bearing cone to the limit stop by hammering lightly all around the edge.

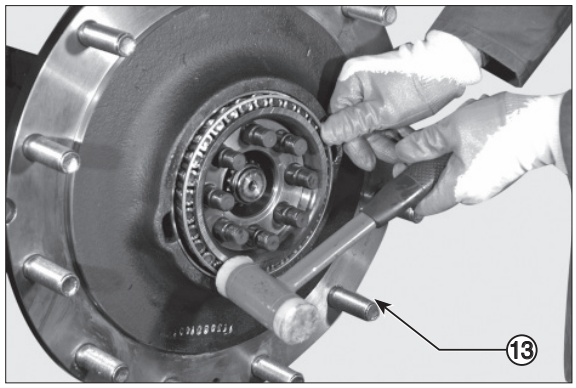
If insertion is difficult, use a punch with a suitable diameter to drive it seat.



7409FAX027

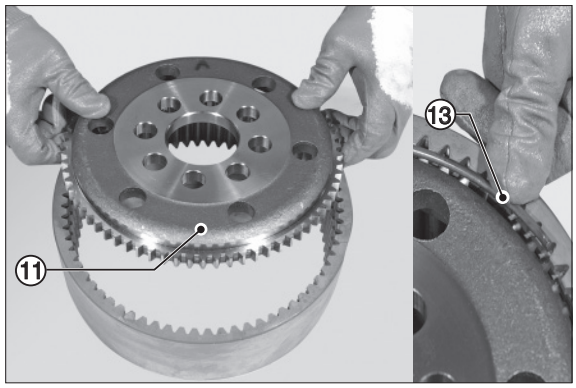
(6) Install the external bearing cone (14).

※ Using a plastic hammer, drive the bearing cone to the limit stop by lightly hammering around the edge.



7409FAX028

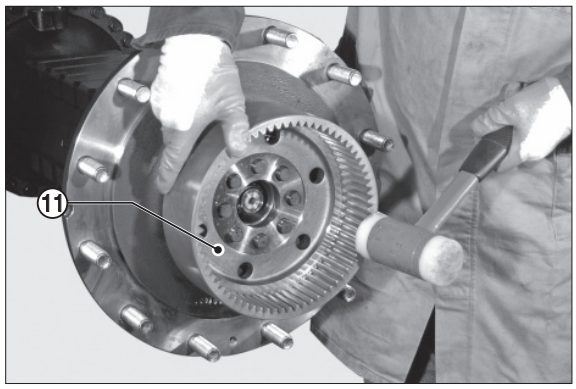
(7) Install the crown wheel flange (11).
Insert the snap ring (13) in order to fix the flange (11) in the crown (13).



7409FAX029

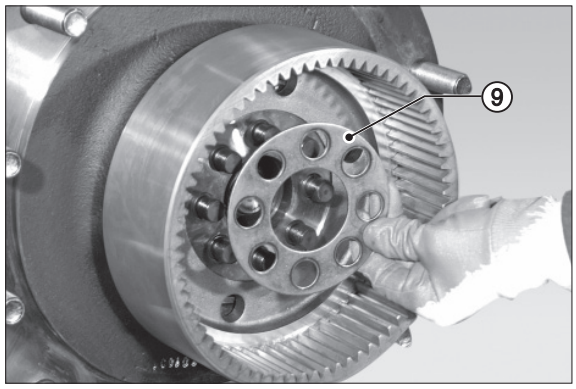
(8) Fit the complete crown flange (11).

※ In order to fasten the flange (11), use a plastic hammer and alternately hammer on several equidistant points.



7409FAX030

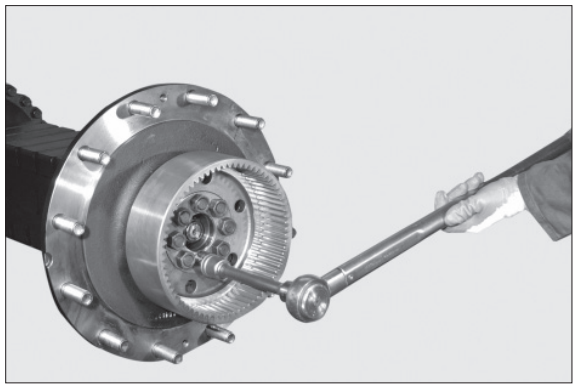
(9) Install the security flange (9).



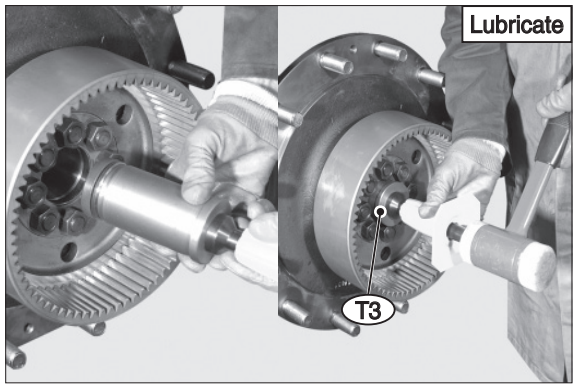
7409FAX031

(10) Coat the nuts (7) with loctite 242 and screw them.
Tighten nuts (7) in two stages, using the criss-cross method.

· Initial torque wrench setting :
33.7 kgf · m (243 lbf · ft)
· Final torque wrench setting :
39.3 kgf · m (284 lbf · ft)


7409FAX032

(11) Lubricate and fit the seal ring (21) and guide ring (20) onto tool T3 ; install the rings into the arm.

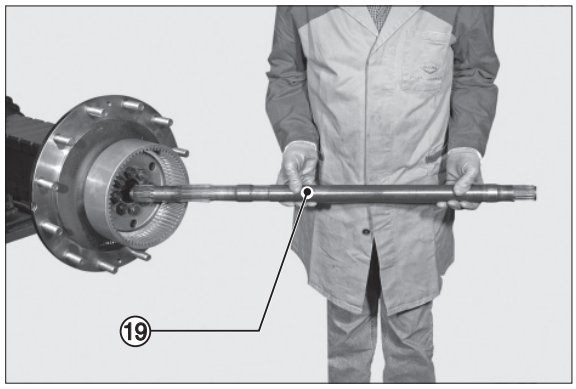


7409FAX033

※ Pay particular attention to the direction of assembly of the rings.

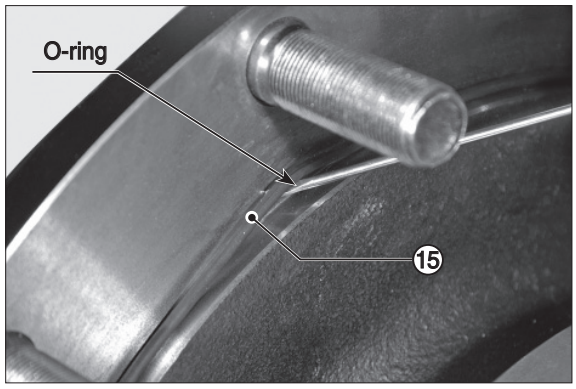
(12) Grease sealing face of axle shaft (19). Install the axle shaft (19) making sure it is properly engaged in the braking disks and in the differential unit.

※ Be very careful not to damage the seal ring (21).



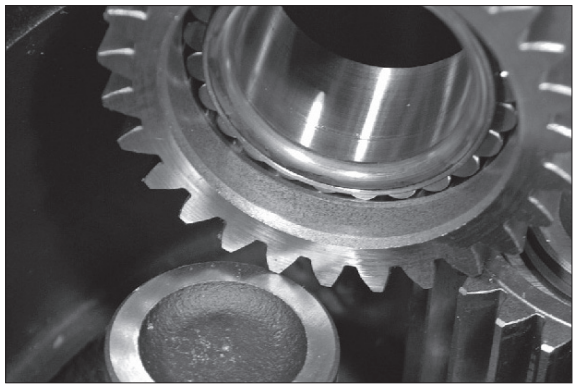
7409FAX034

(13) Substitute the O-ring (15). Lubricate the O-ring before fitting.



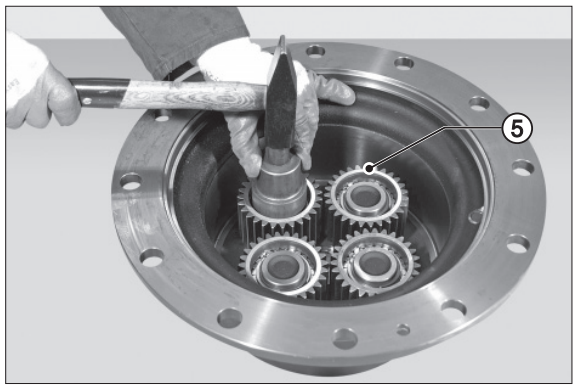
7409FAX035

(14) Accurately check the orientation.



7409FAX036

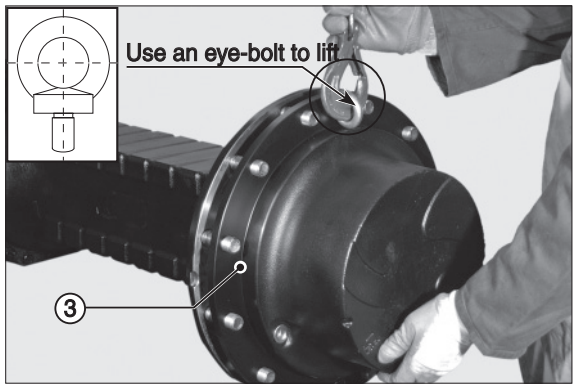
(15) Insert the planet wheel gears (5) into the cover (3).
Lock gears (5) into position by installing the snap rings.



7409FAX037

(16) Fit the planetary carrier cover (3) onto the hub (16).

※ Check that the O-ring is in good condition and in position.



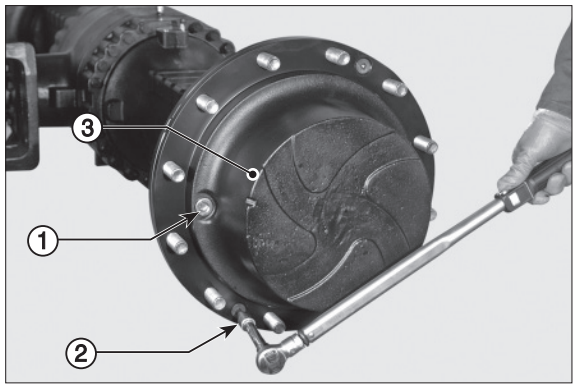
7409FAX038

(17) Lock the planetary carrier cover (3) by tightening the screws (2).

· Torque wrench setting for screws :
18.6~20.6 kgf · m (135~149 lbf · ft)

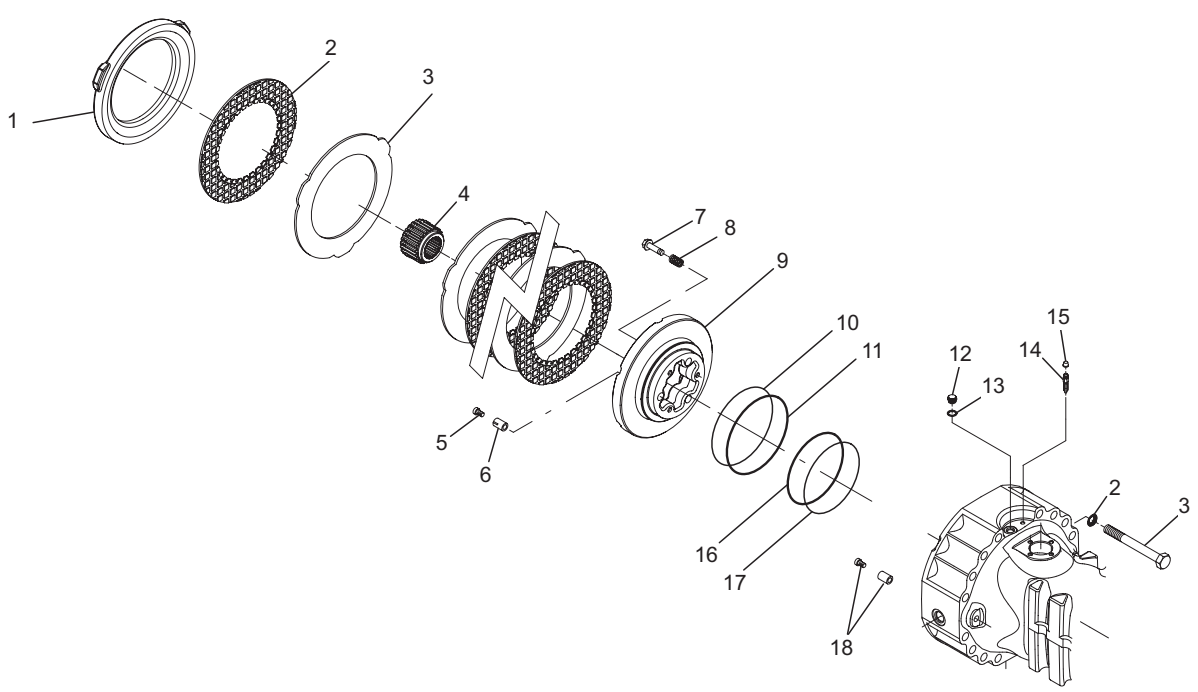
Install the oil-level plug (1).

· Torque wrench setting for screws :
9.18 kgf · m (66.4 lbf · ft)



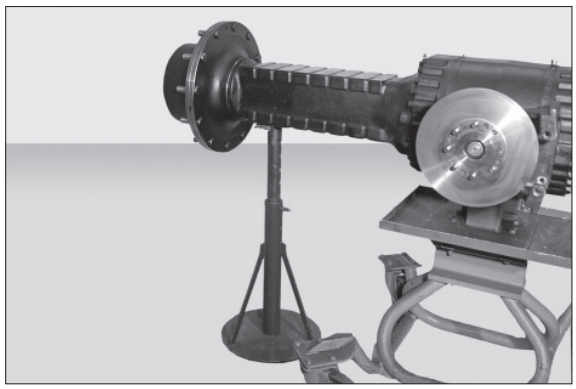
7409FAX039

3) DISASSEMBLY SERVICE BRAKE



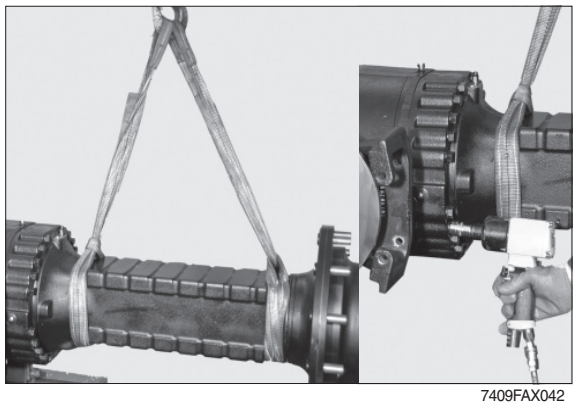
7409FAX040

(1) If axle is positioned on an overhaul bench, place a safety anti-tilting stand “B” under the arm that remains connected and block wheels, if any.



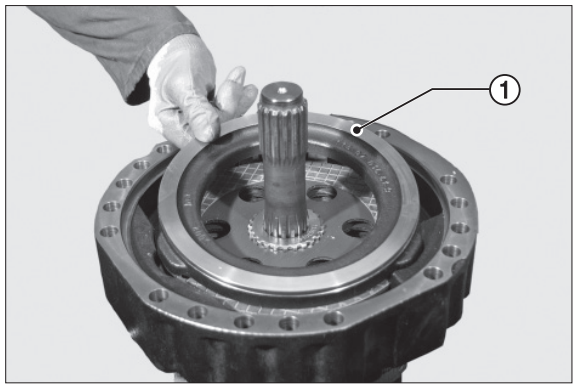
7409FAX041

(2) Sling the arm to be removed and connect it to a hoist.
Remove the retainer screws (3) and relative washers (2).



7409FAX042

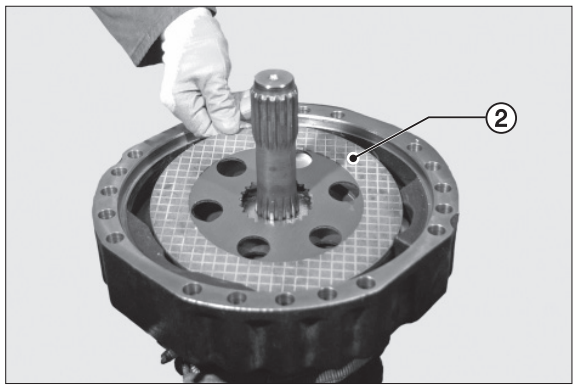
(3) Note down their order of assembly and remove the counterwasher (1).



7409FAX043

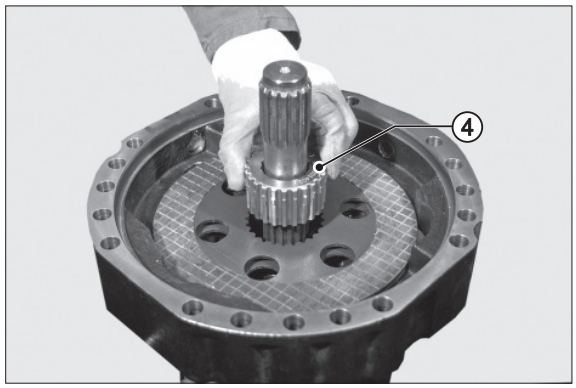
(4) Remove braking discs (2)(3), noting down direction of assembly.

※ If disks are not to be replaced, avoid changing their position.



7409FAX044

(5) Remove the flange (4) complete with the discs.
Noting down direction of assembly.



7409FAX045

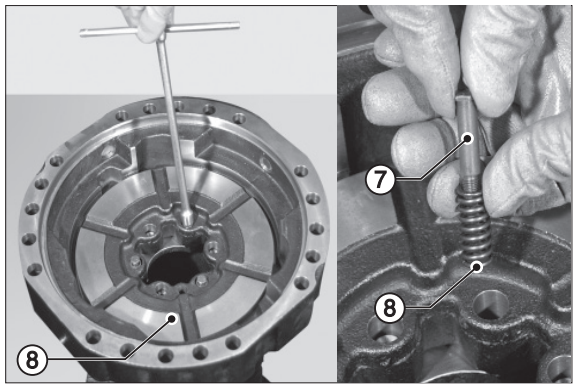
(6) Remove the axle shaft.

※ Be very careful not to damage the seal ring.


7409FAX046

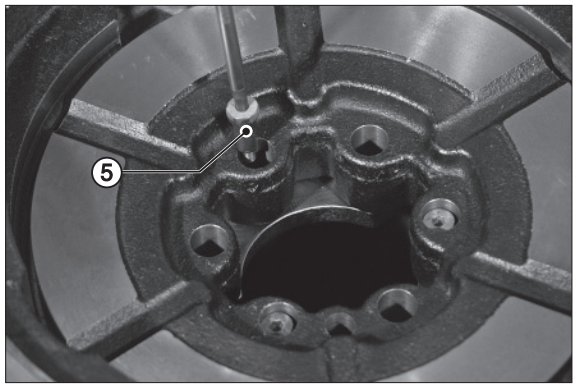
(7) Remove the reversal springs (8) and screws (7).

※ If the springs (8) are weak or deformed they must be replaced.



7409FAX047

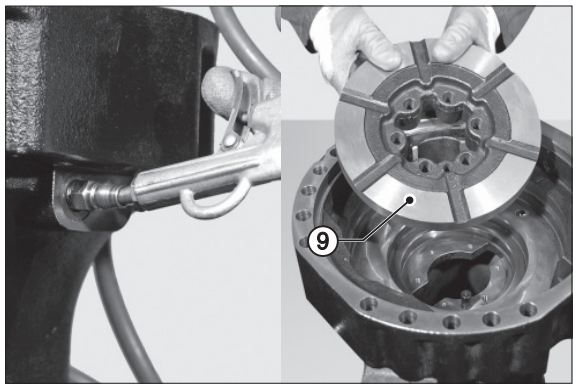
(8) Remove the adjusting screws (5).



7409FAX048

(9) Slowly introduce low-pressure compressed air through the connection member for the service brake (P1), in order to extract the piston (9).

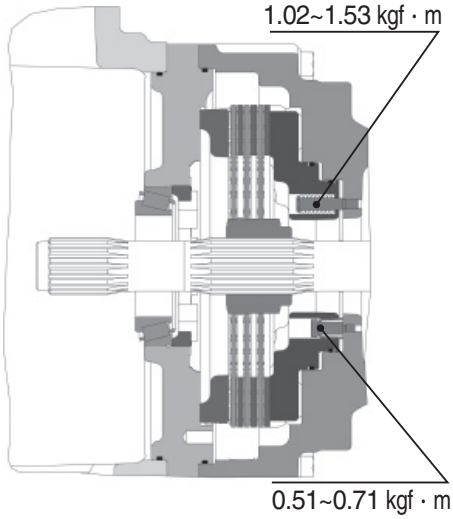
※ Hold the piston (9) back, as it may be suddenly ejected and damaged.



7409FAX049

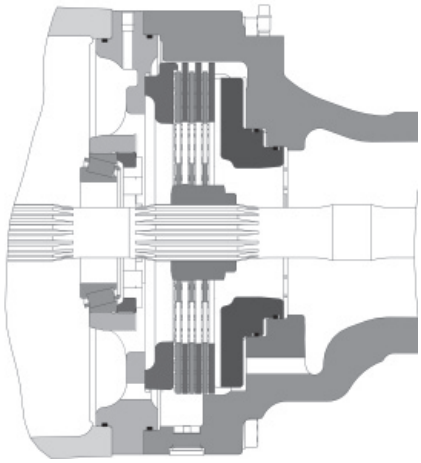
4) ASSEMBLY SERVICE BRAKE

UPPER VIEW



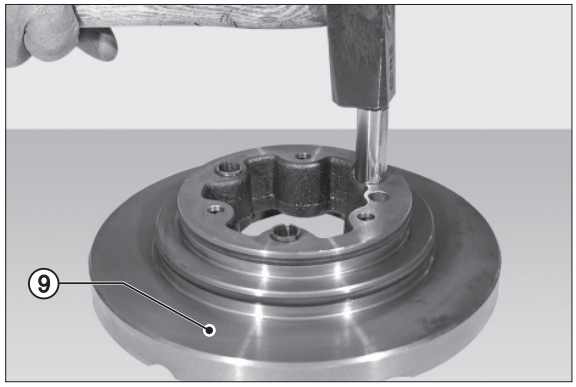
7409FAX050

SIDE VIEW



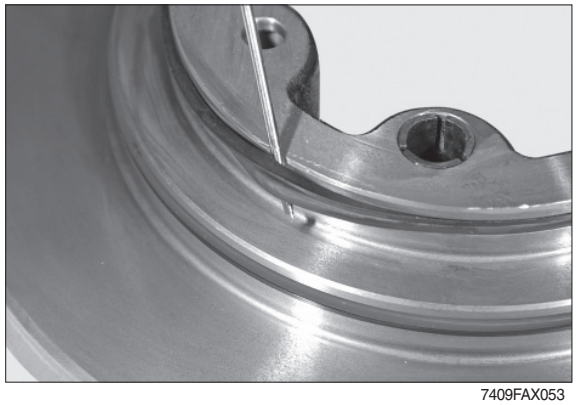
7409FAX051

(1) Insert the stroke automatic regulation springs (6); place them in line with the piston (9).

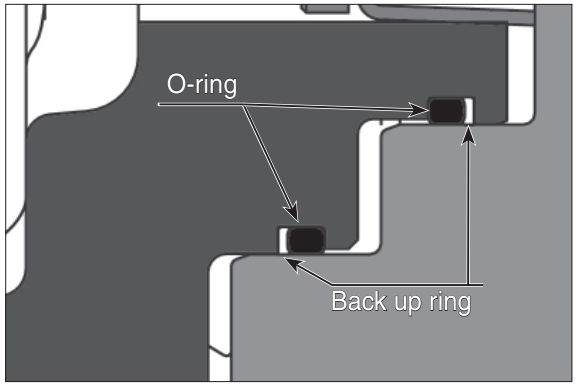


7409FAX052

(2) Fit O-ring (11)(16) and back-up ring (10) (17) onto the piston (11).
Lubricate the piston and the O-rings and install the unit into the arm.



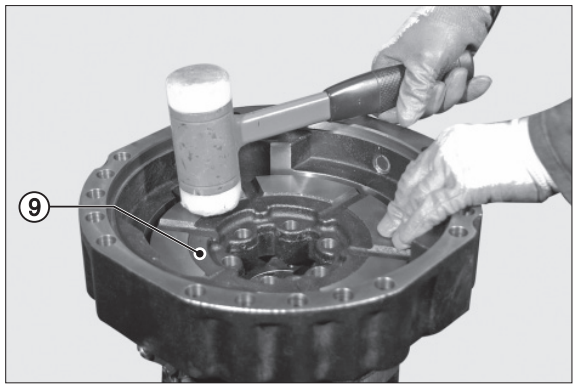
7409FAX053



7409FAX054

(3) Using a plastic hammer, ram the piston (9) into the arm.

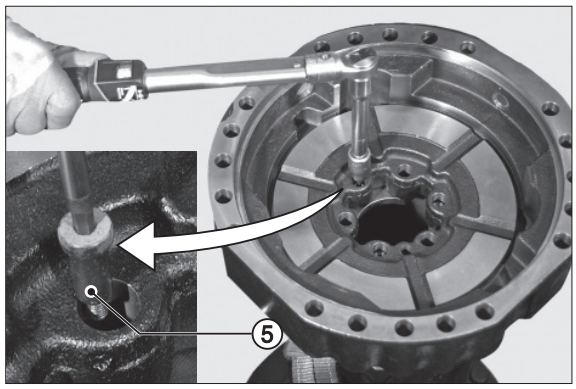
※ Lightly hammer all around the edge in an alternate sequence.



7409FAX055

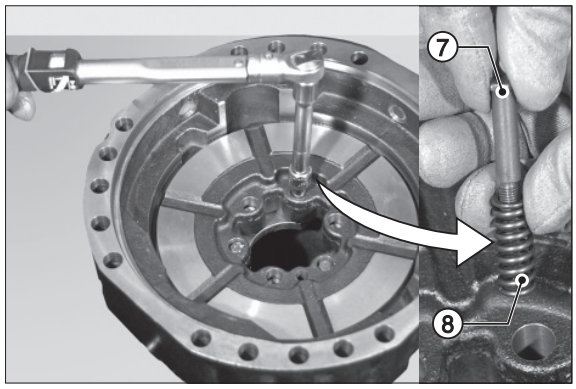
(4) Fit the adjusting screws (5).
Apply loctite 270 to the thread.

· Torque wrench setting :
0.51 kgf · m (3.69 kgf · m)



7409FAX056

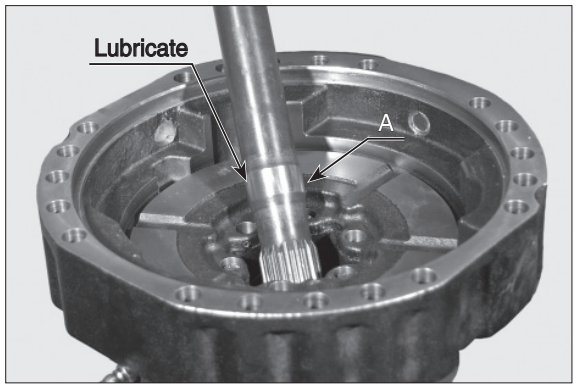
(5) Fit the reversal springs (8) on the piston (9).
Apply loctite 242 to the thread of the screw.
Tighten with torque wrench setting of 0.51 kgf · m (3.69 lbf · ft).



7409FAX057

(6) Grease sealing face “A” of axle shaft .

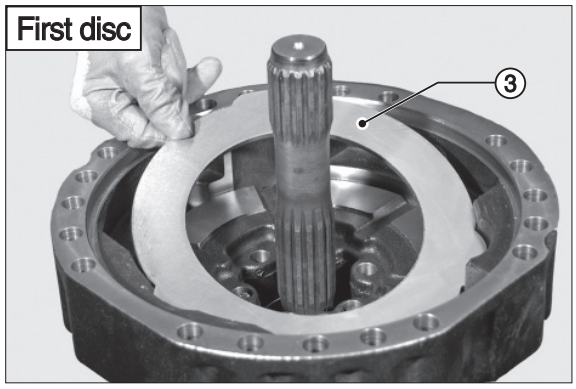
※ Be very careful not to damage the snap ring .



7409FAX058

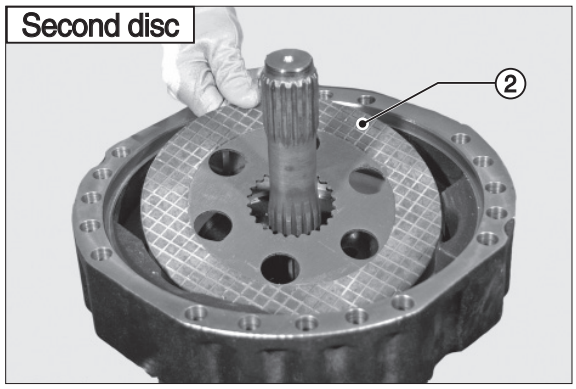
(7) Insert the brake discs in the right sequence.

※ The first brake disc (3) to be inserted must be of steel material.



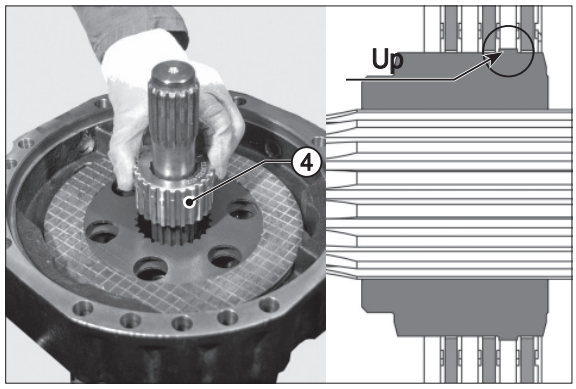
7409FAX059

※ The second brake disc (2) to be inserted must be of friction material.



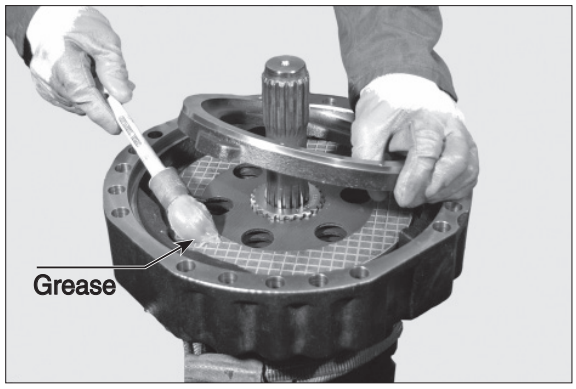
7409FAX060

(8) Install the flange (4) on the arm.



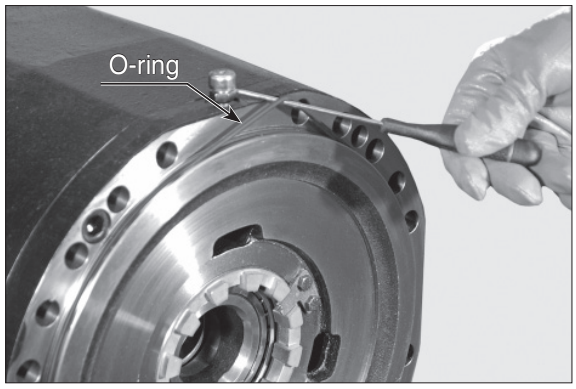
7409FAX061

(9) Insert the intermediate disk (1). Before installing the last brake disc and the intermediate disc, spread grease over the contact surfaces to hold them in position while mounting on the central housing.



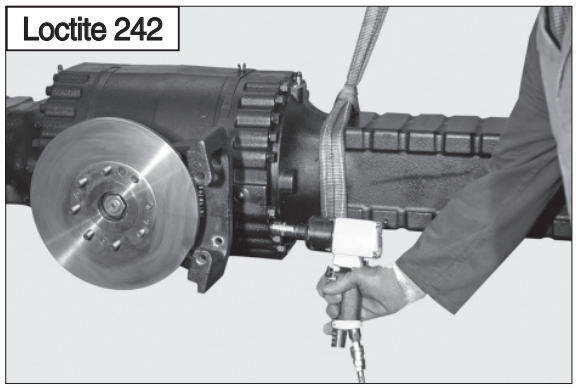
7409FAX062

(10) Check integrity and position of the cylinder's O-ring.



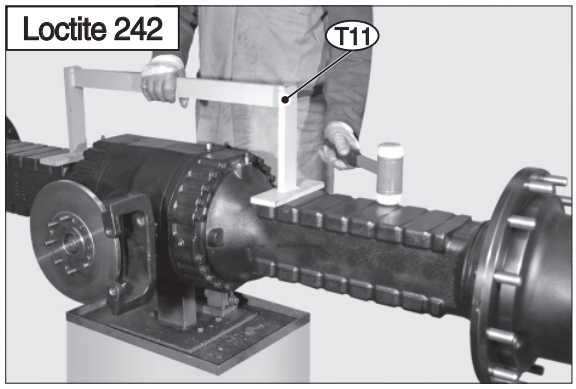
7409FAX063

(11) Temporarily lock the arm with nuts previously coated with loctite 242; tighten lightly to make the unit touch the main body.



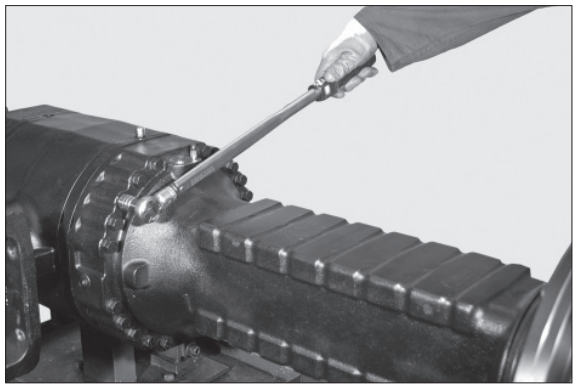
7409FAX064

(12) Check the flatness of the arms, using tool T11; then lock the arms into their final position, using screws adequately coated with loctite 242.



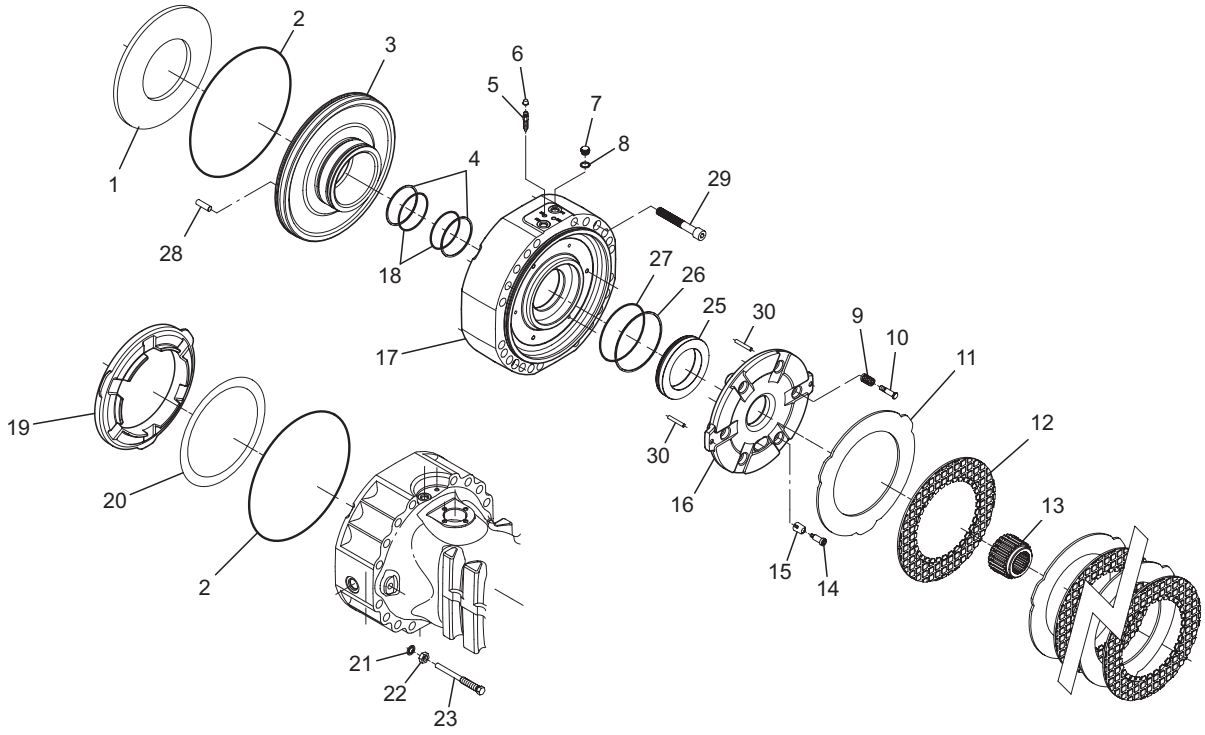
7409FAX065

(13) Secure in position with the screws (3) and relative washers (2), tightening to a torque of 30.4 kgf · m (220 lbf · ft).



7409FAX066

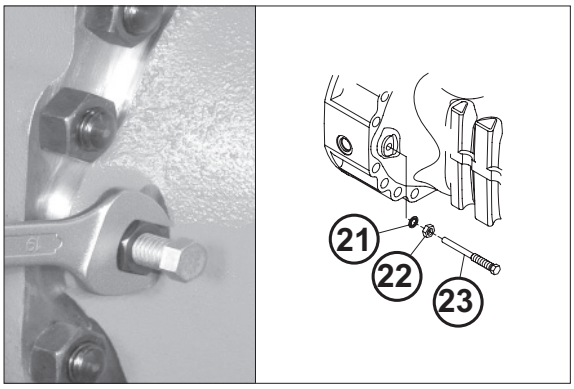
5) DISASSEMBLY SERVICE BRAKE AND NEGATIVE PARKING BRAKE



7409FAX067

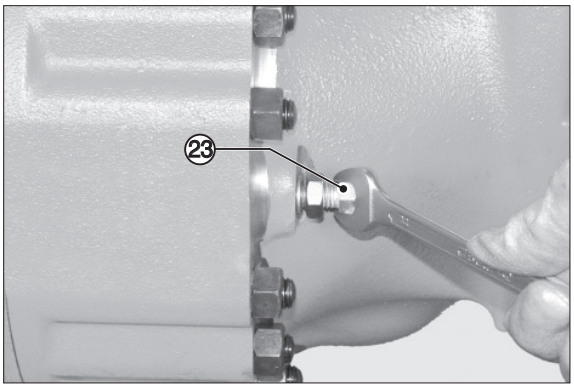
Manual emergency release

(1) Loosen nuts (30) of screws (31) provided for the mechanical and manual release of the braking units, then move the nuts backwards by approx. 8 mm.



7409FAX068

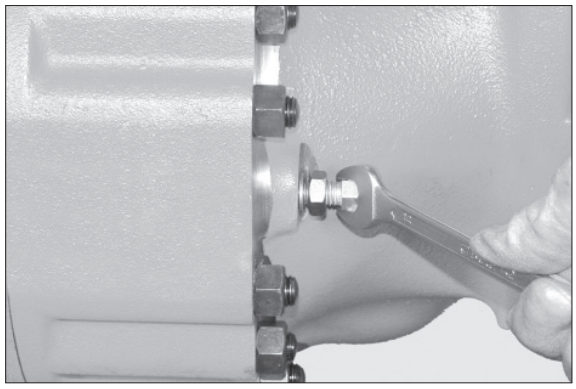
(2) Tighten screws (23) so as to fasten them onto the pressure plate (16).



7409FAX069

(3) Using a wrench, tighten the screws (23) in an alternate sequence by 1/4 turn at a time so as to compress the belleville washers (1) and disengage the braking disks.

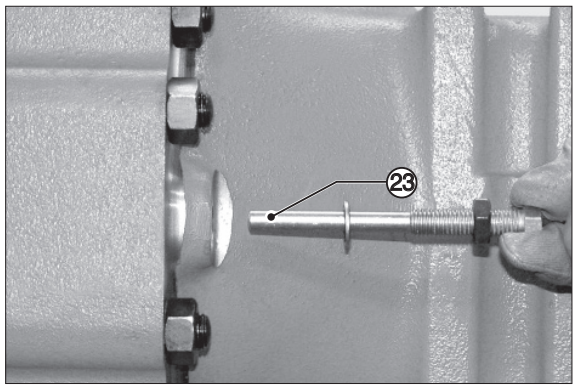
※ Tighten max. by one turn.



7409FAX070

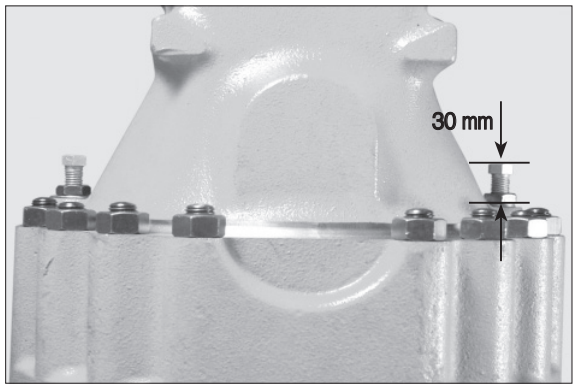
Adjustment after manual release

(4) Remove screws complete with nuts and seals. Replace seals, apply silicone-based grease to the screws and install all parts into the arm.



7409FAX071

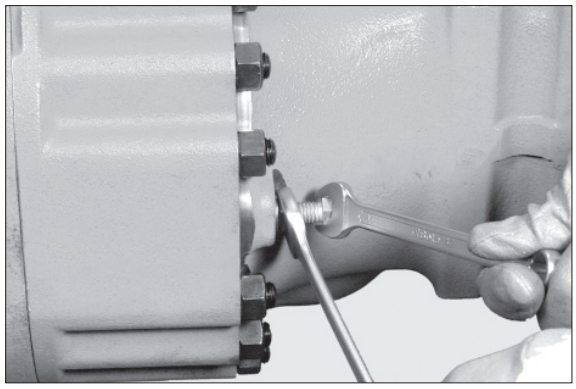
(5) Adjust screws (23) to obtain a jut of 35 mm in relation to the arm.



7409FAX072

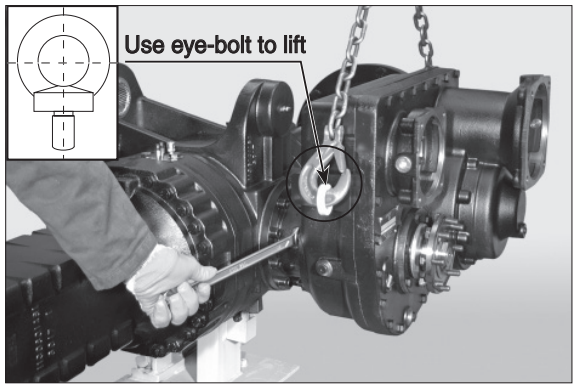
(6) Lock into position with nuts (22).

※ Hold screws (23) into position while locking the nuts (22); after locking, check the jut of screws (23) once more.



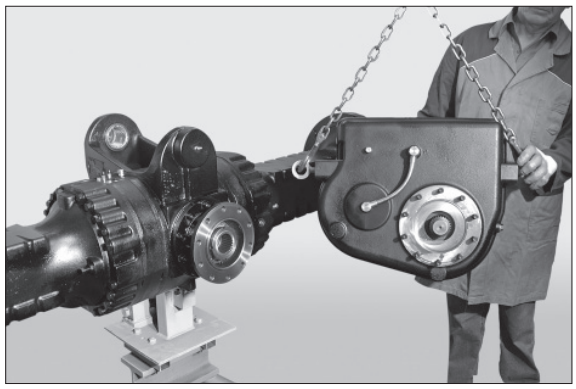
7409FAX073

(7) Remove fastening screws from the reduction unit.

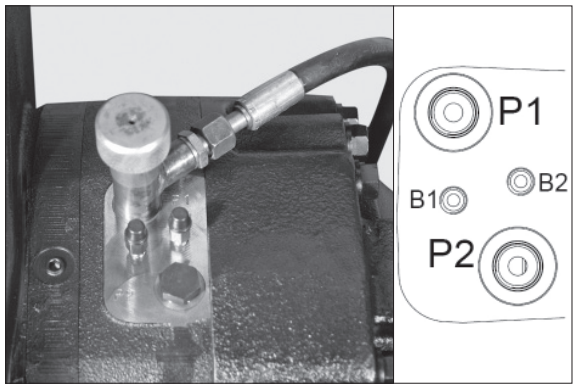


7409FAX074

(8) Disjoin the entire reduction unit from the axle and place it on a bench.


7409FAX075

(9) Connect an external pump to the union piece “P1” of the negative brake and introduce a pressure of 21.4~35.7 kgf/cm^2 (304~508 psi) bar to eliminate the pressure of the belleville washers (1).



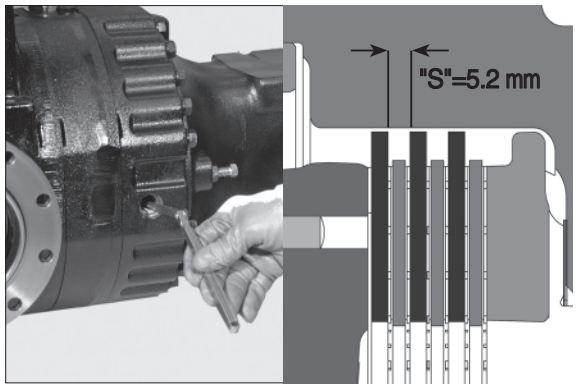
7409FAX076

Checking wear

※ The same operations must be carried out on both arms.

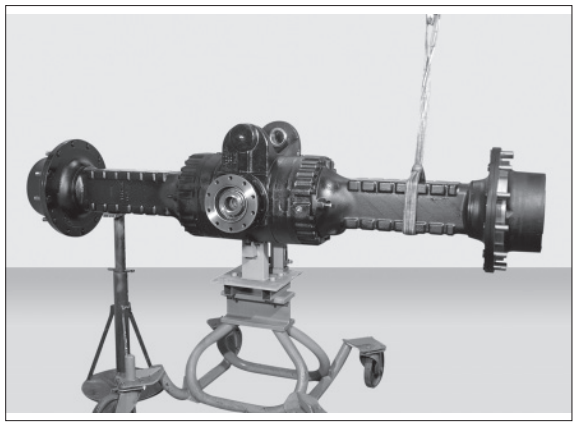
(10) Remove the oil level plug.
Apply the brakes once and, while keeping the pressure up, check thickness “S” between the intermediate brake discs.
Minimum “S” value : 5.2 mm.

※ If necessary, replace brake discs and intermediate discs on both sides.



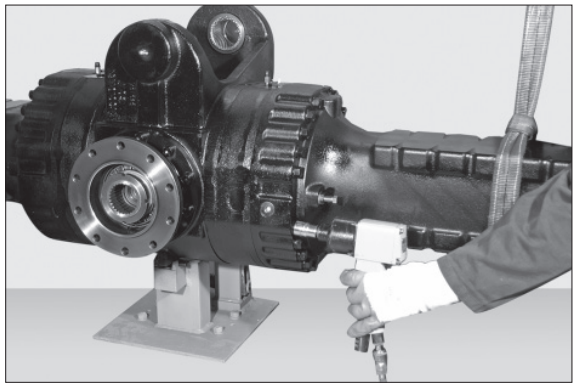
7409FAX077

※ If axle is positioned on an overhaul bench, place a safety antitilting stand “B” under the arm that remains connected and block wheels, if any.



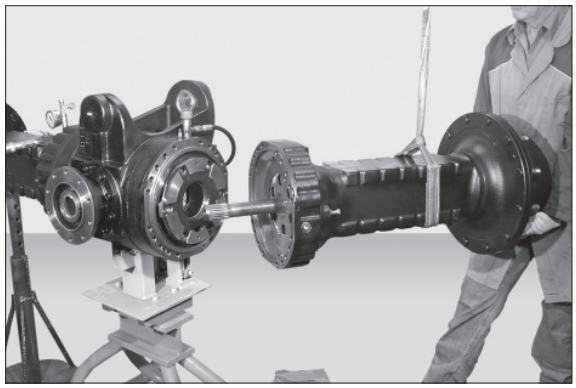
7409FAX078

(11) Sling the arm to be removed and connect it to a hoist.
Remove the retainer screws and relative washers.



7409FAX079

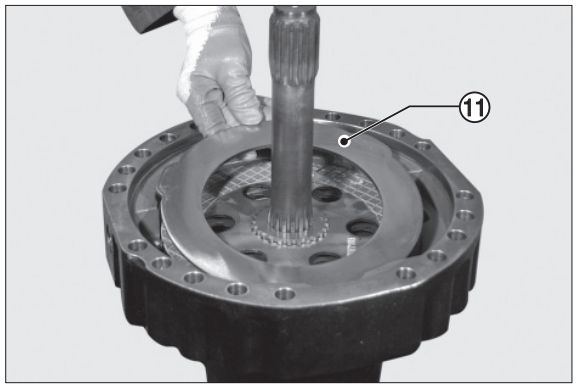
(12) Remove arm together with brakes and axle shafts; lay down the arm vertically.
Release pressure.



7409FAX080

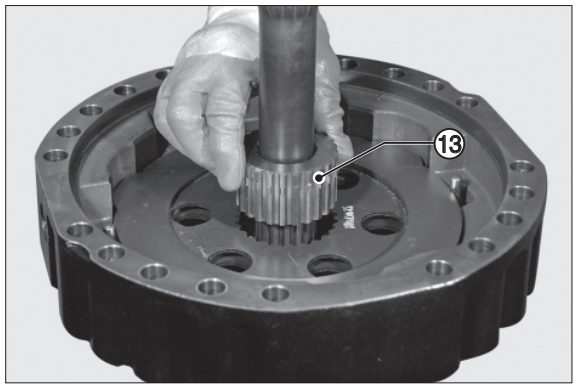
(13) Remove braking discs (11)(12), noting down direction of assembly.

※ If disks are not to be replaced, avoid changing their position.



7409FAX081

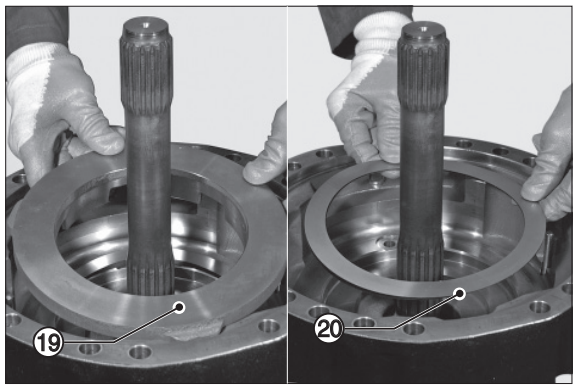
(14) Remove the flange (13) complete with the discs.
Noting down direction of assembly.



7409FAX082

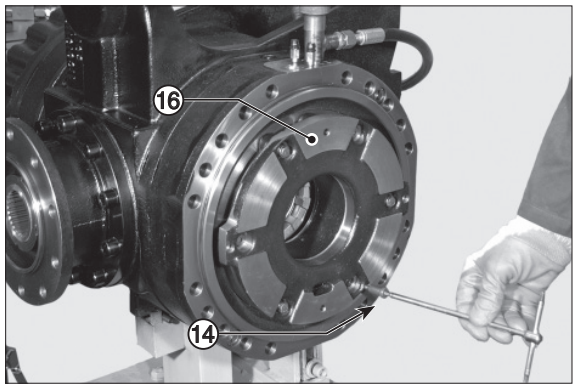
(15) Remove distance piece-braking discs (19) and shims (20), noting down direction of assembly.

※ Build a stack of washers and check the measure.



7409FAX083

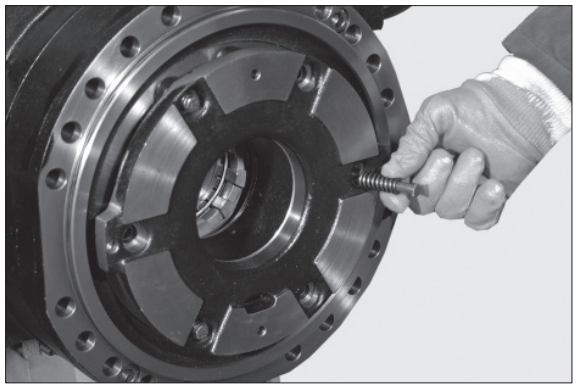
(16) Remove the adjusting screws (14) from the counterwasher (16).



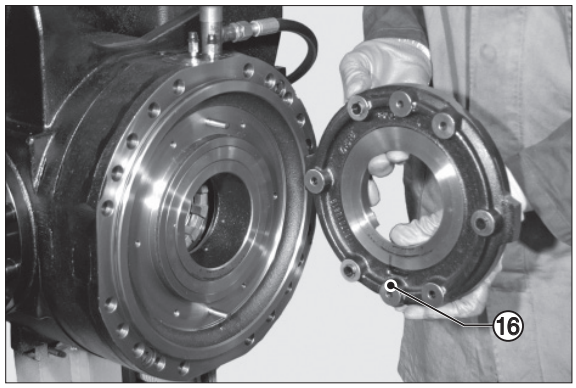
7409FAX084

(17) Remove the reversal springs (9) and screws (10).

※ If the springs (9) are weak or deformed they must be replaced.

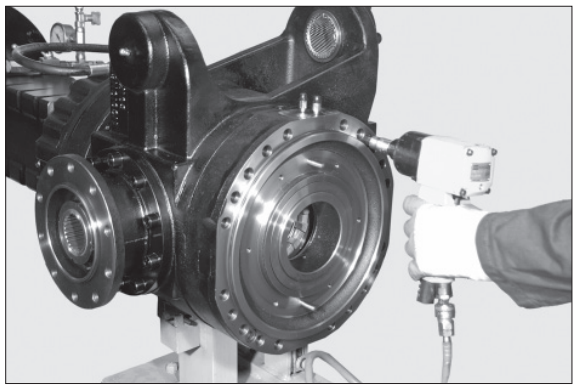

7409FAX085

(18) Note down their order of assembly and remove the counterwasher (16).

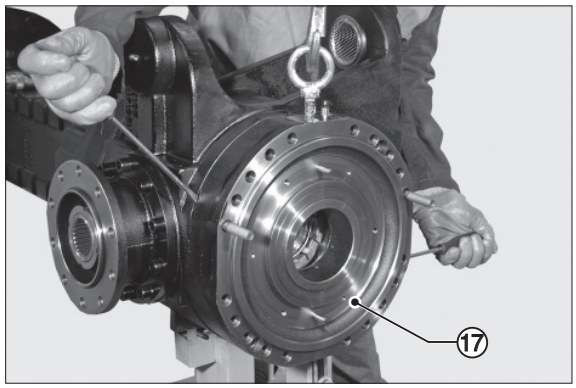


7409FAX086

(19) Loosen the fixing screws (29) in an alternate manner and remove them.

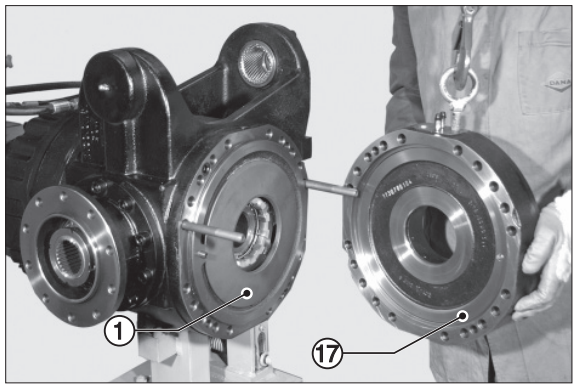

7409FAX087

(20) Remove the brake cylinder (17).



7409FAX088

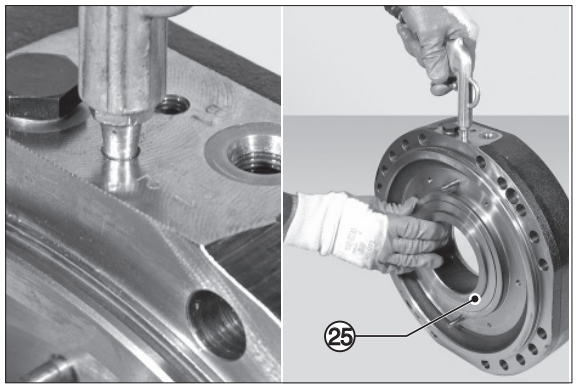
(21) Move the cylinder (17) outwards while supporting the belleville washers (1). Remove the belleville washers (1) and note down direction of assembly.



7409FAX089

(22) Slowly introduce low-pressure compressed air through the connection member for the service brake (P2), in order to extract the piston (25).

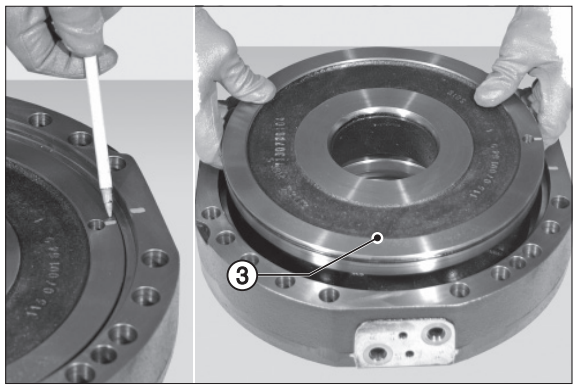
※ Hold the piston (25) back, as it may be suddenly ejected and damaged.



7409FAX090

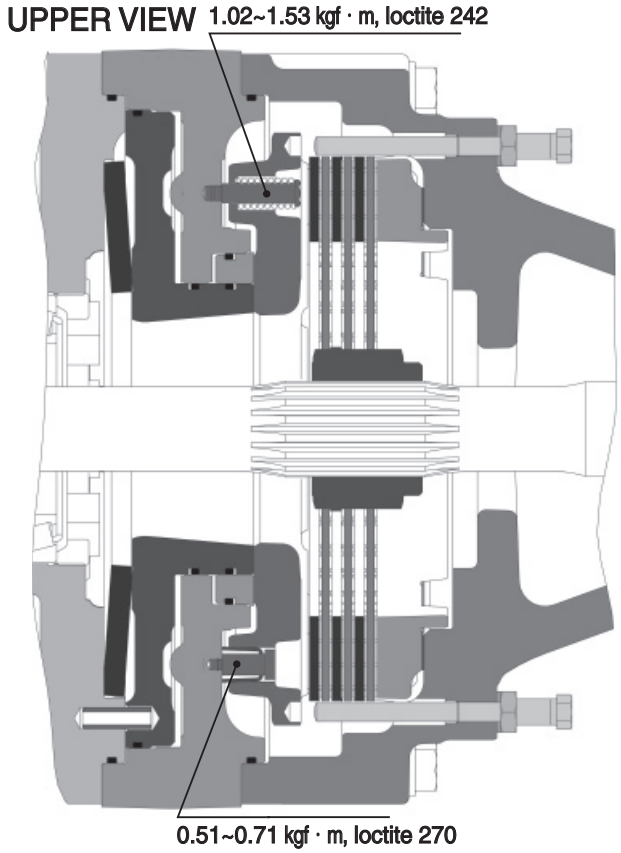
(23) Slowly introduce low-pressure compressed air through the connection member for the negative brake (P1), in order to extract the piston (3).

※ Hold the piston (3) back, as it may be suddenly ejected and damaged. Note down their order of assembly.

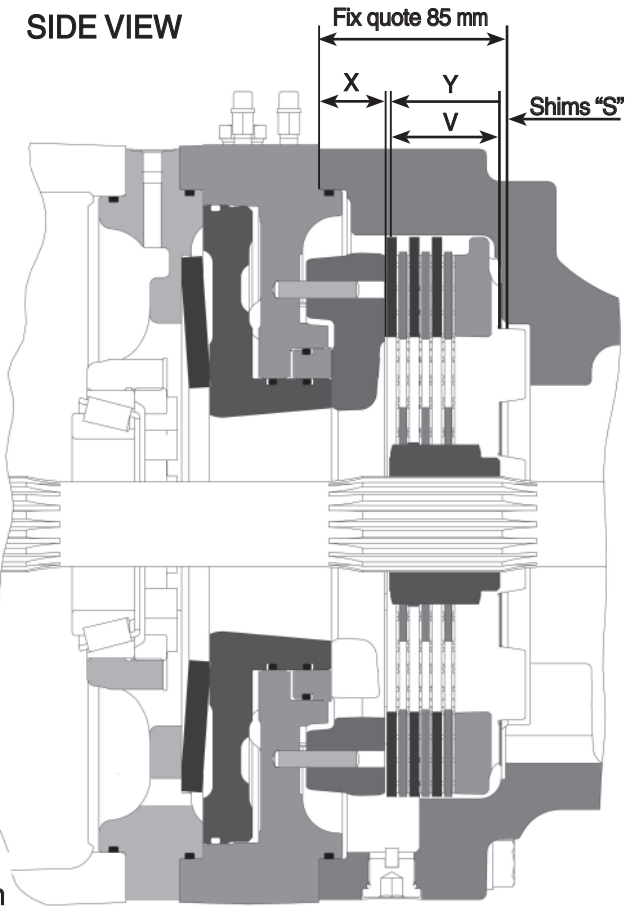


7409FAX091

6) ASSEMBLY SERVICE BRAKE AND NEGATIVE PARKING BRAKE



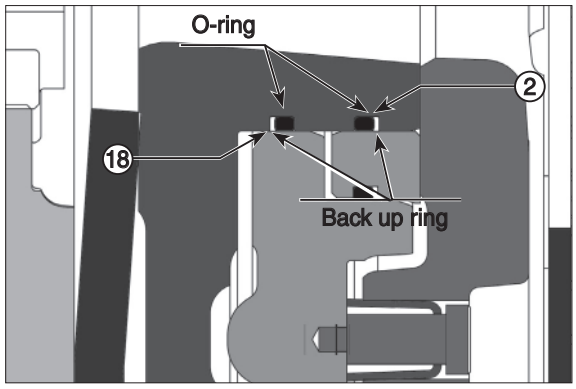
7409FAX092



7409FAX093

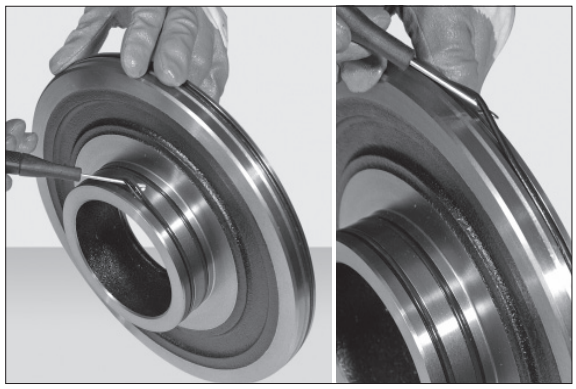
85 mm = arm fix quote
Y = 1 mm brake gap

Example :
X = 30.6 mm
V = 52.9 mm
S = 85 mm - (x + y + v)
S = 85 - (30.6 + 1 + 52.9) = 0.5 mm

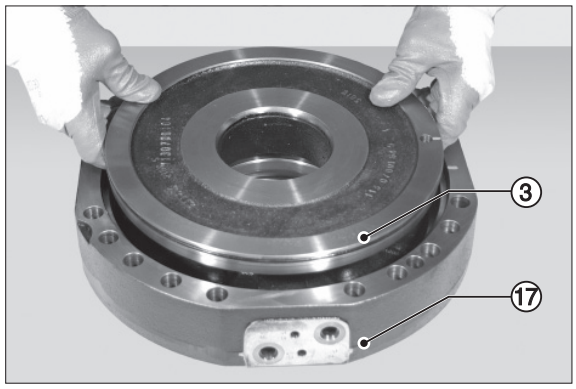


7409FAX094

(1) Fit O-ring (2) and (4) and anti-extrusion ring (18) onto the piston (3).


7409FAX095

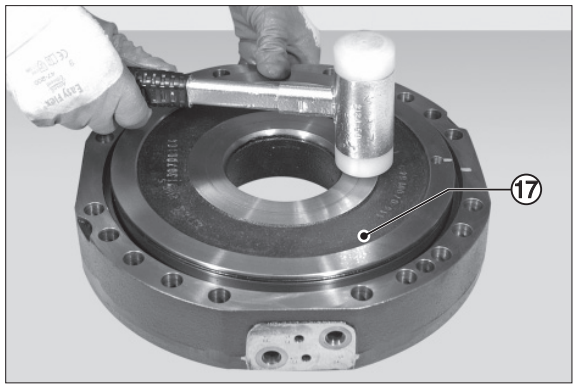
(2) Check the position of the anti-extrusion (18) and O-rings (2) and (4).
Lubricate the piston and the O-rings and install the unit (3) into the cylinder (17) .



7409FAX096

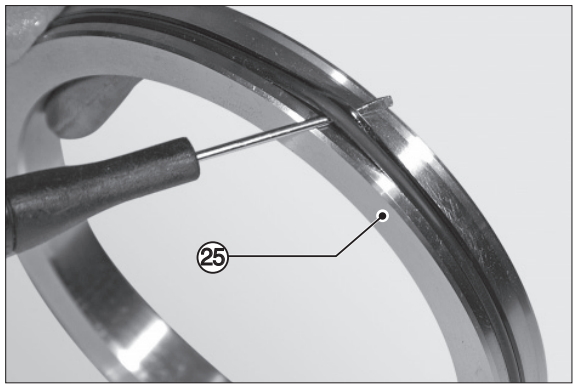
(3) Using a plastic hammer, ram the piston (3) into the cylinder (17).

※ Lightly hammer all around the edge in an alternate sequence.



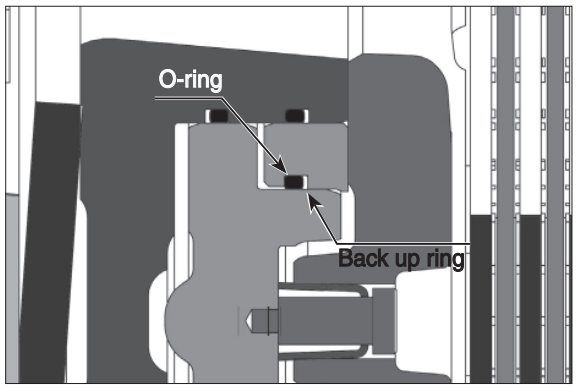
7409FAX097

(4) Fit O-ring (27) and anti-extrusion ring (26) onto the piston (25).



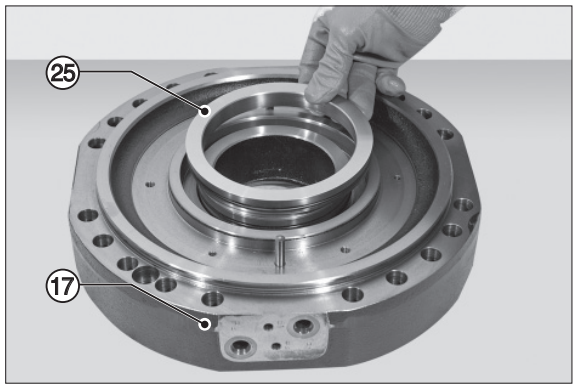
7409FAX098

※ The O-rings always have to be assembled from the pressure facing side.



7409FAX099

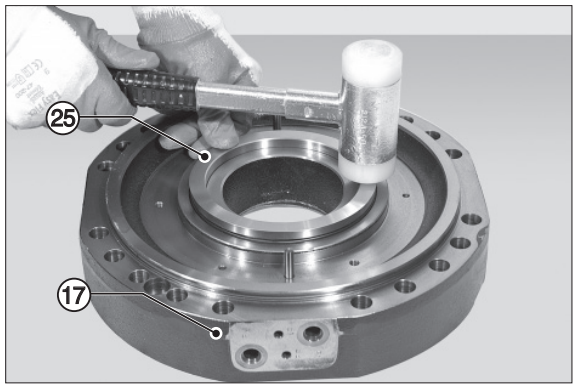
(5) Lubricate the piston and the O-rings and install the unit (25) into the cylinder (17) .



7409FAX100

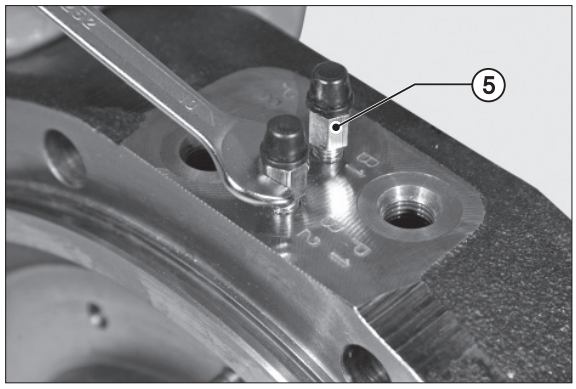
(6) Using a plastic hammer, ram the piston (25) into the cylinder (17).

※ Lightly hammer all around the edge in an alternate sequence.



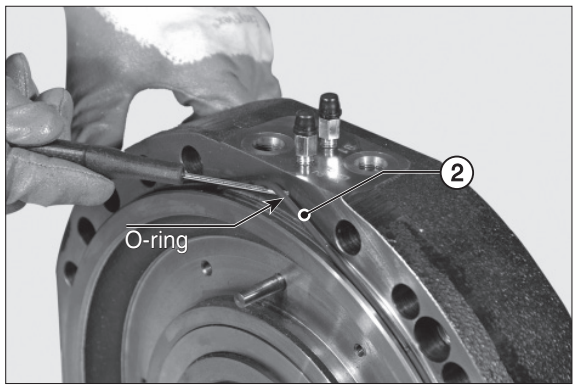
7409FAX101

(7) Assembly the breather (5).



7409FAX102

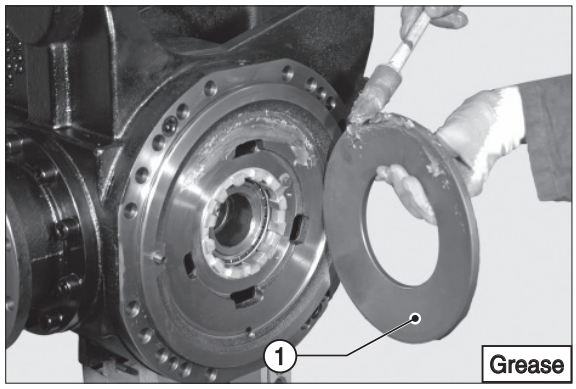
(8) Check integrity and position of the cylinder's O-ring (2).



7409FAX103

(9) Position the belleville washers (1) and engage the cylinder, spread grease over the contact surfaces to hold them in position while mounting on the central housing.

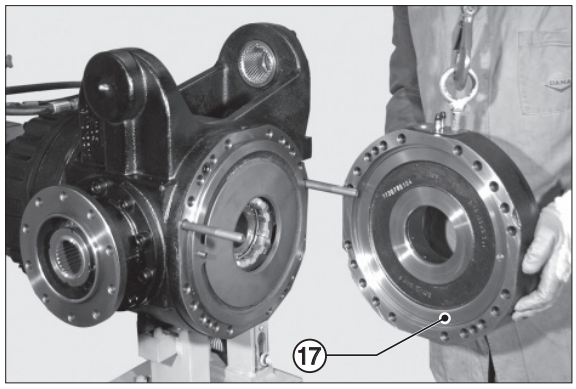
※ Check the sense of direction of belleville washers (1) and relative centring.



7409FAX104

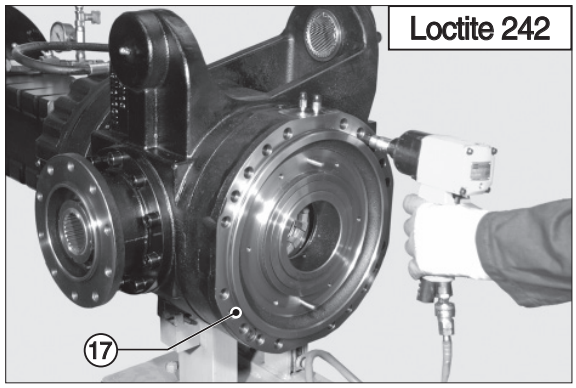
(10) Engage the cylinder (17).

※ Check the sense of direction of washers (1) and relative centring.



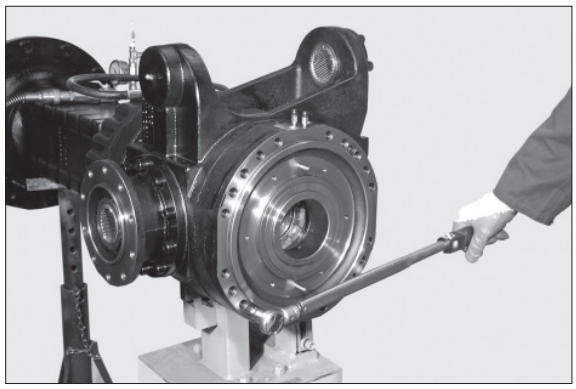
7409FAX105

(11) Insert the screws (29) and tighten them alternately.
Lock the cylinder (17).

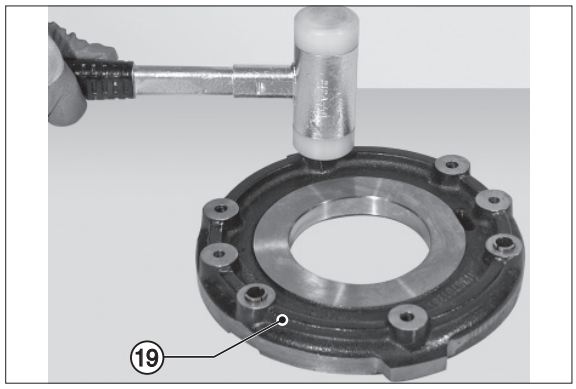


7409FAX106

(12) Tightening the screws (29) with a dynamometric wrench set to a torque of 3.1~3.57 kgf · m (22.4~25.8 lbf · ft).

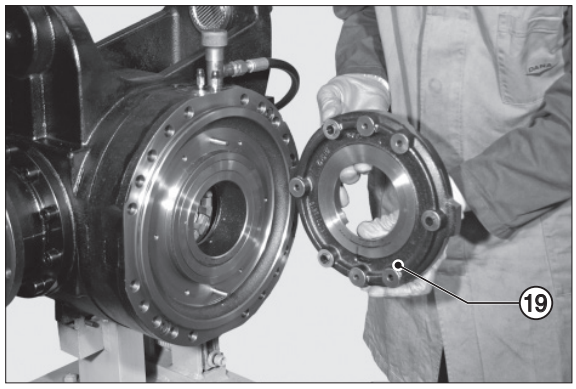

7409FAX107

(13) Insert the stroke automatic regulation springs (15); place them in line with the intermediate disc (19).



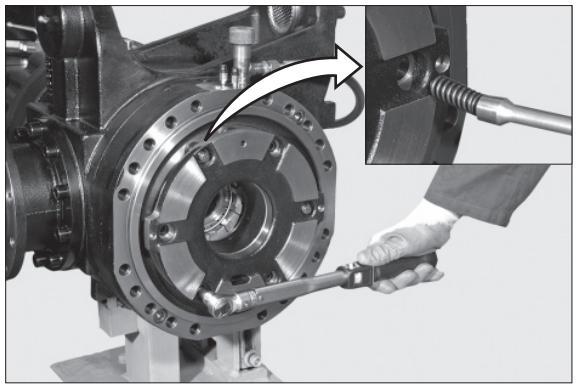
7409FAX108

(14) Insert the intermediate disc (19).
Connect an external pump to the negative brake and introduce pressure to 20.4~35.7 kgf/cm^2 (290~507 psi)



7409FAX109

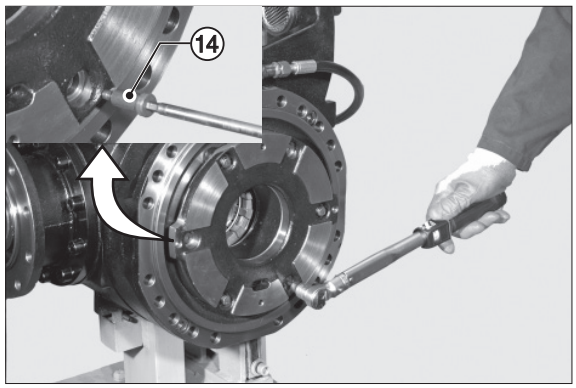
(15) Fit the reversal springs (9) and screws (10) on the intermediate disk (16).
Apply loctite 242 to the thread of the fixing screw.
Tighten with torque wrench setting of 1.02~1.53 kgf · m (7.38~11.1 lbf · ft)



7409FAX110

(16) Fit the adjusting screws (14).
Apply loctite 270 to the thread.

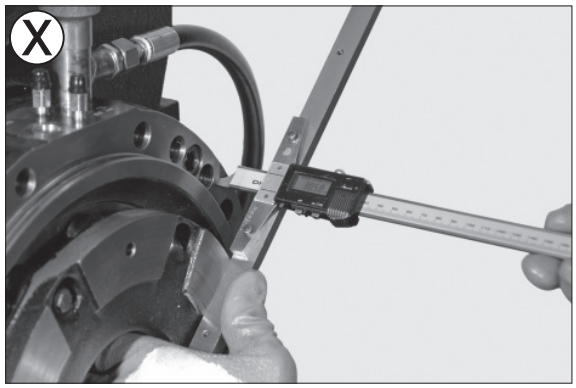
· Torque wrench setting :
0.51~0.71 kgf · m (3.69~5.14 lbf · ft)



7409FAX111

(17) Take the measure from the surface of the intermediate disk to the cover sealing surface with 20.4~35.7 kgf/m² (290~507 psi) of pressure introduced.

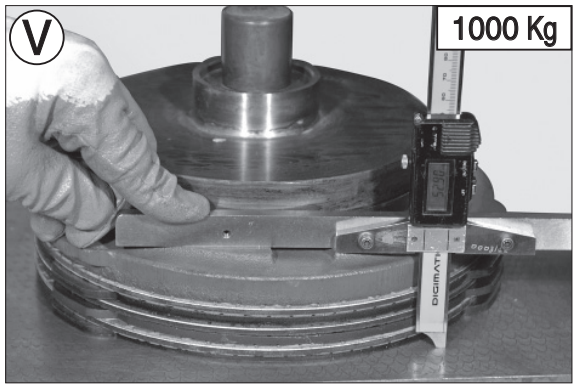
Example : X = 30.6 mm



7409FAX112

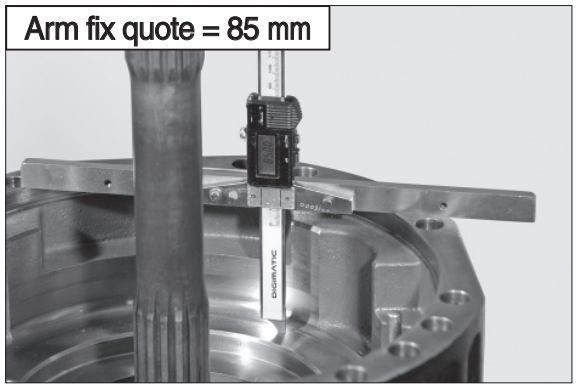
(18) Put the brake disc pack including the shim under a press, load with 1000 kg and take the measure "V".

Example : V = 52.9 mm



7409FAX113

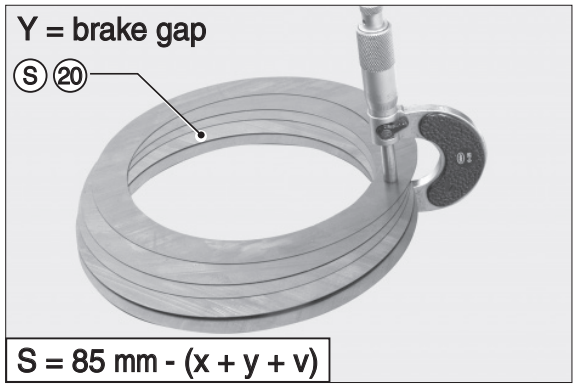
(19) Arm fix quote = 85 mm



7409FAX114

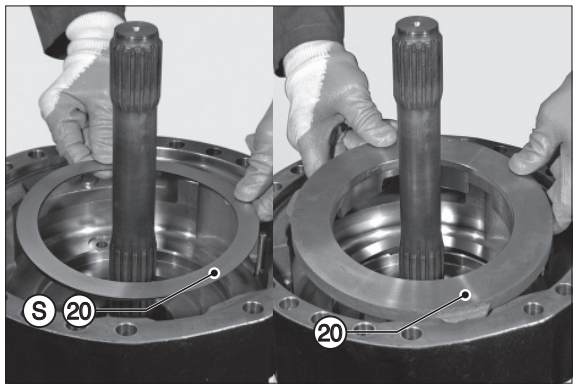
(20) **S = 85 mm - (x + y + v)** = Thickness of shims to insert under the shim washer.

Example :
85 mm - (30.6 + 52.9 + 1) = S = 0.5 mm



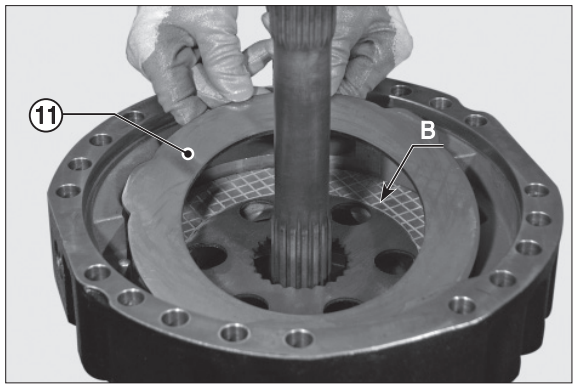
7409FAX115

(21) Insert under the shim washer a thickness of shims (20).



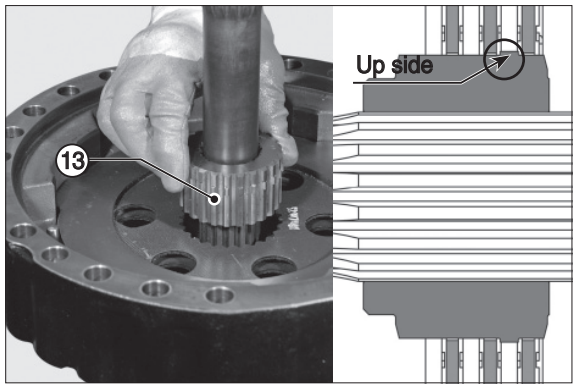
7409FAX116

(22) Slightly lubricate the braking disks (11) and (12) and fit them in the arm following the correct sequence; orient them so that the oil circulation holes and the marks "**B**" are perfectly lined up.



7409FAX117

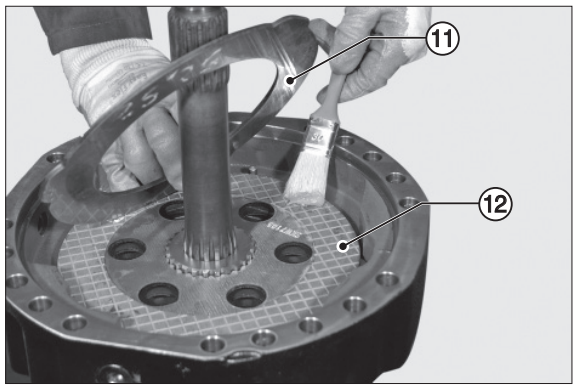
(23) Install the flange (13) on the arm.



7409FAX118

(24) Insert the brake discs (11) and (12) in the right sequence.

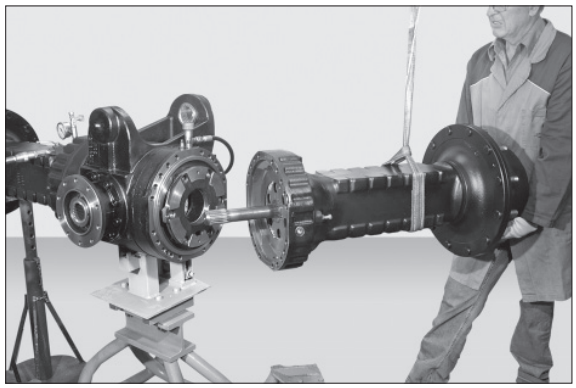
※ The last brake disc to be inserted must be in metal.



7409FAX119

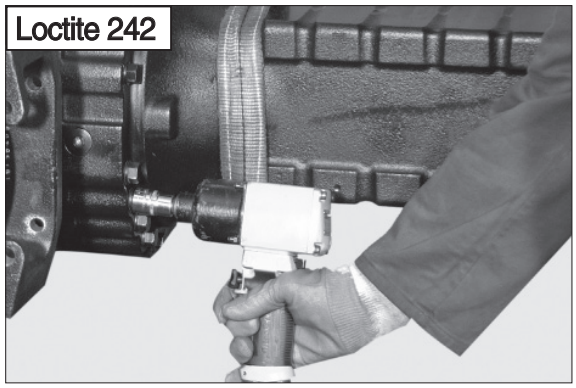
(25) Check integrity and position of the arm's O-ring; install the complete arm.

※ To assist axle shaft centring, slightly move the wheel hub.



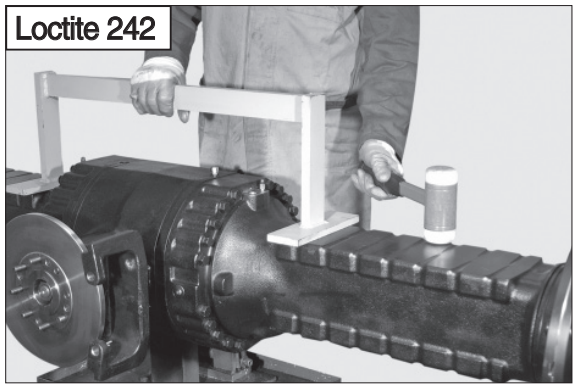
7409FAX120

(26) Temporarily lock the arm with nuts previously coated with loctite 242; tighten lightly to make the unit touch the main body.



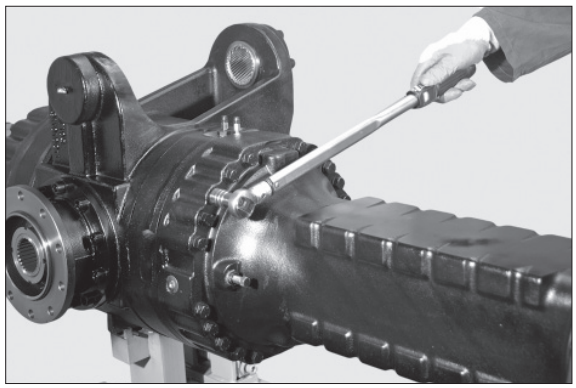
7409FAX121

(27) Check the flatness of the arms, using tool T11; then lock the arms into their final position, using screws adequately coated with loctite 242.

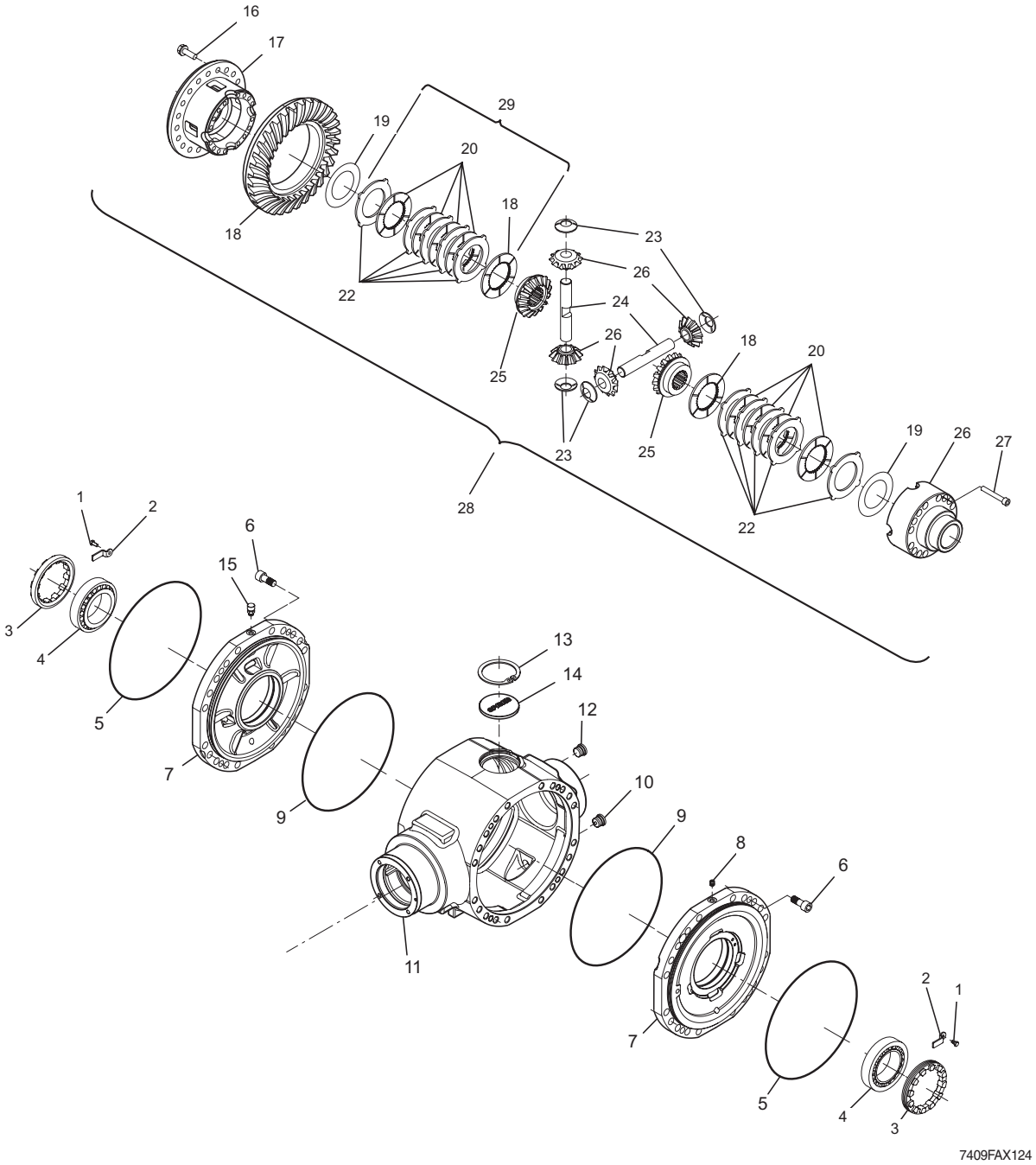


7409FAX122

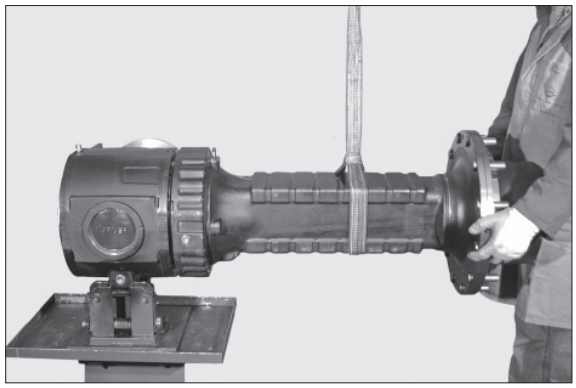
(28) Secure in position with the screws and relative washers, tightening to a torque of 30.4 kgf · m (220 lbf · ft).


7409FAX123

7) DISASSEMBLY LIMITED SLIP 45% DIFFERENTIAL UNIT

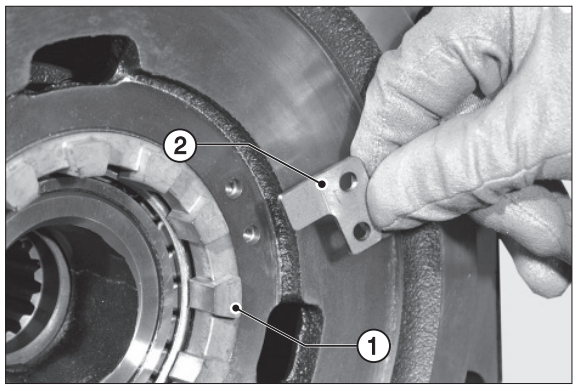


(1) Sling the arm to be removed and connect it to a hoist.
Remove the retainer screws and relative washers.



7409FAX125

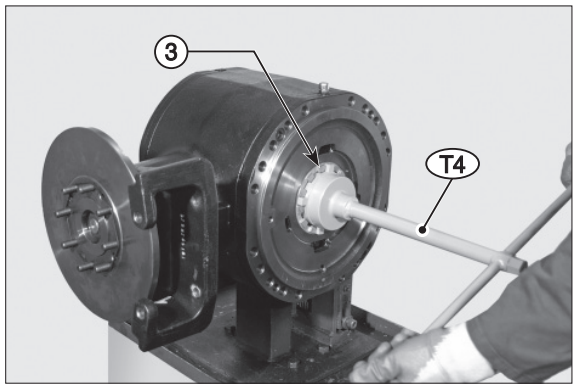
(2) Only if need removing or adjusting.
Mark the position of the ring nuts (3).
Remove screws (1) and ring nut checks (2).



7409FAX126

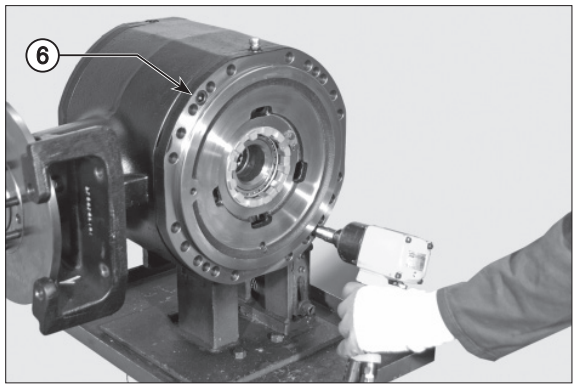
(3) Only if need removing or adjusting. Using tool T4, loosen and remove the ring nuts (3).

※ Accurately remove any trace of sealant from the threads of ring nuts and intermediate covers.



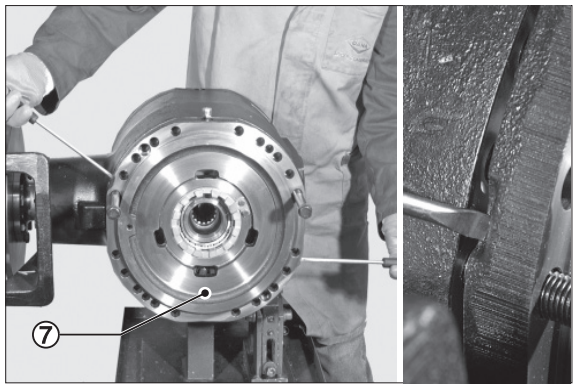
7409FAX127

(4) Tighten two safety M16 studs in the main body.
Loosen and remove the check screws (6) of intermediate cover (7) on gear ring side.



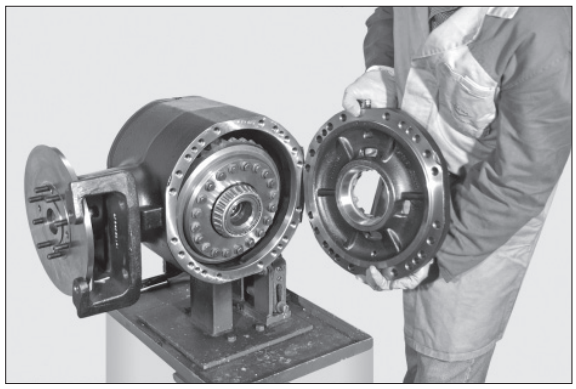
7409FAX128

(5) Disjoin the cover (7) crown side.



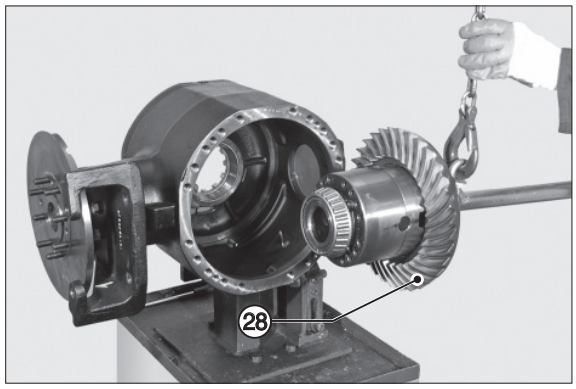
7409FAX129

(6) Remove the cover and studs.



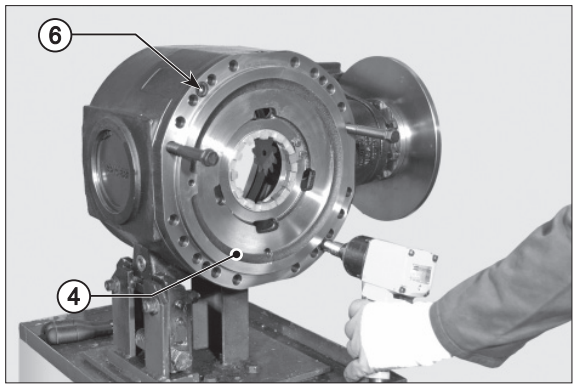
7409FAX130

(7) Extract the whole differential unit (28).



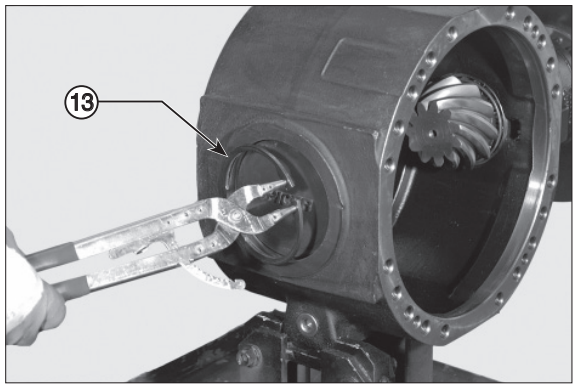
7409FAX131

(8) Tighten two safety M16 studs in the main body.
Loosen and remove the check screws (6) of intermediate cover (4) on gear ring side.



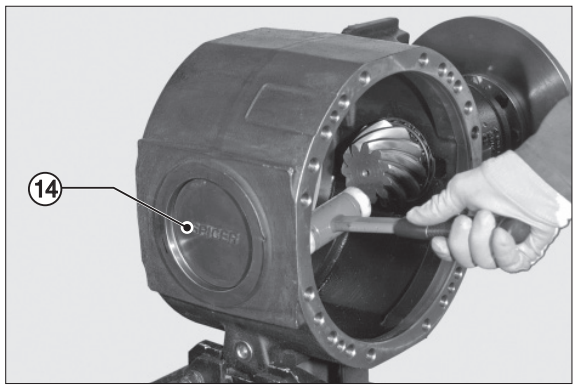
7409FAX132

(9) Remove the snap ring (13).



7409FAX133

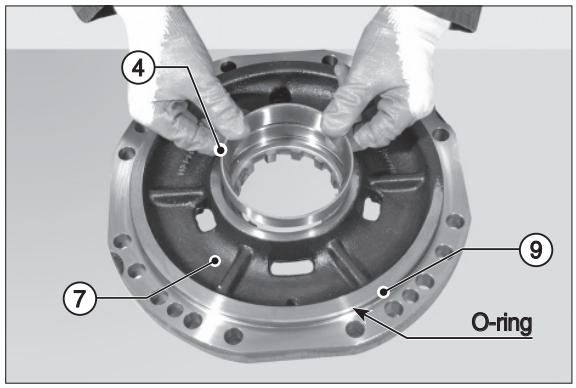
(10) Remove the cap (14).



7409FAX134

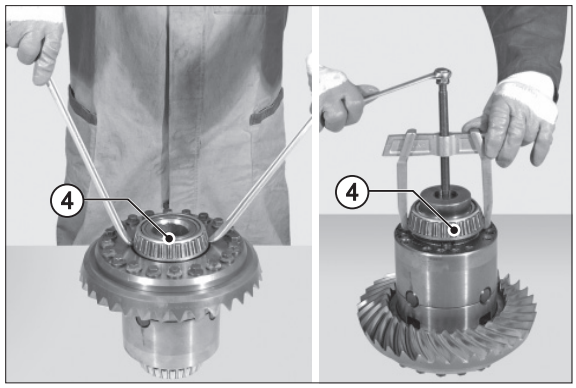
(11) If the bearings need replacing, extract the external thrust blocks of the bearings (4) from middle cover (7).

※ Accurately check the O-ring (9).



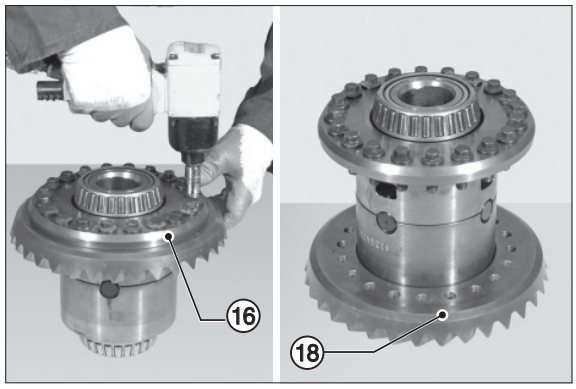
7409FAX135

(12) If the bearing need replacing, extract the bearings (4) from the differential carrier (28).



7409FAX136

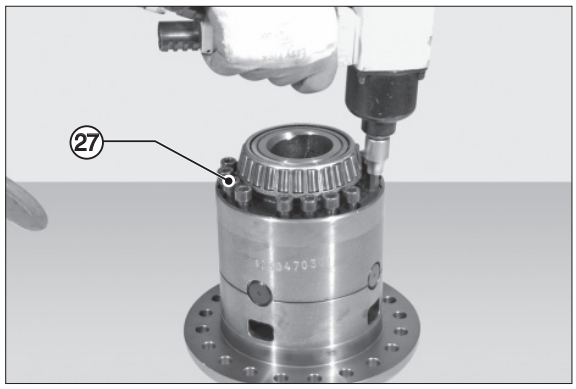
(13) Remove the fitting screws (16) of the crown (18).



7409FAX137

(14) Remove the screws (27) jointing the differential unit half box.

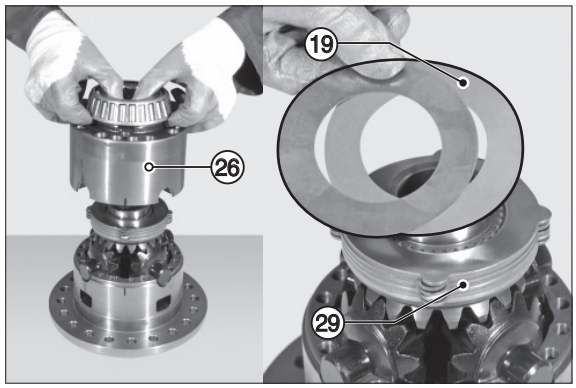
※ Note down the coupling marks.



7409FAX138

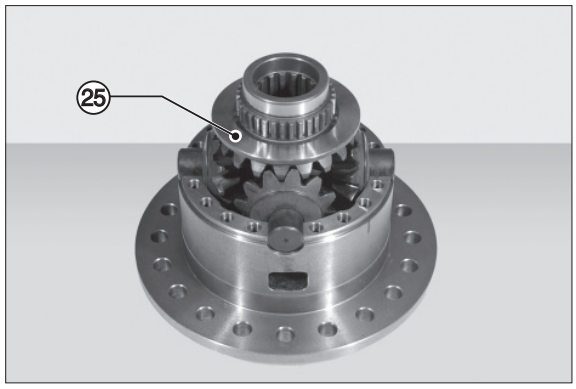
(15) Remove the upper half box (26) and pull out shims (19) and clutch pack (29).

※ If the clutch pack does not need replacing, avoid swapping discs position.



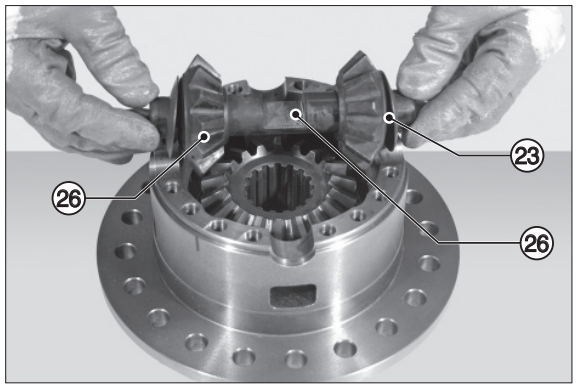
7409FAX139

(16) Remove the planet gear (25).



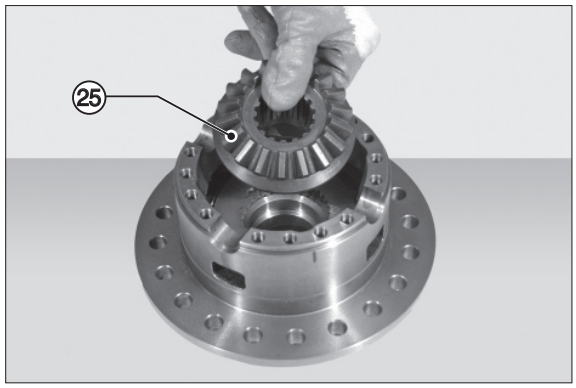
7409FAX140

(17) Remove shafts (24), complete with planet wheels (26) and spherical shoulder washers (23).



7409FAX141

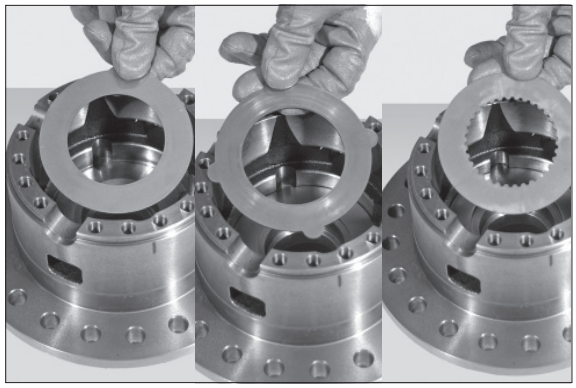
(18) Extract from the differential unit (17) the two final planet gears (26), the 2nd planet gear (25).



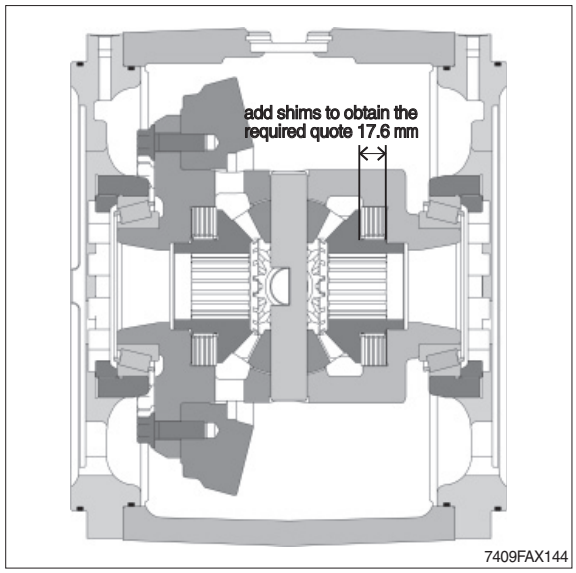
7409FAX142

(19) Remove the 2nd clutch pack (29) and shim set (19).

※ If the clutch pack does not need replacing, avoid swapping discs position.


7409FAX143

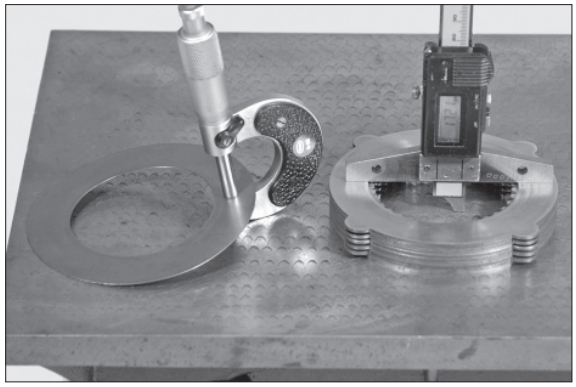
8) ASSEMBLY LIMITED SLIP DIFFERENTIAL UNIT 45%



7409FAX144

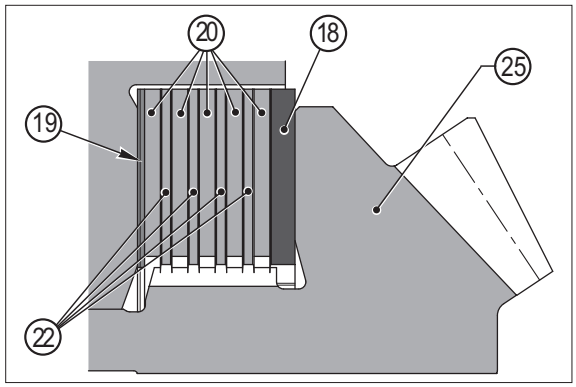
(1) Only in case of clutch pack replacement: make up the packs with increased shims (18), clutch discs (20), intermediate discs (22) and shims (19).

※ Add shims (19) until a total size of 17.6 mm is obtained.


7409FAX145

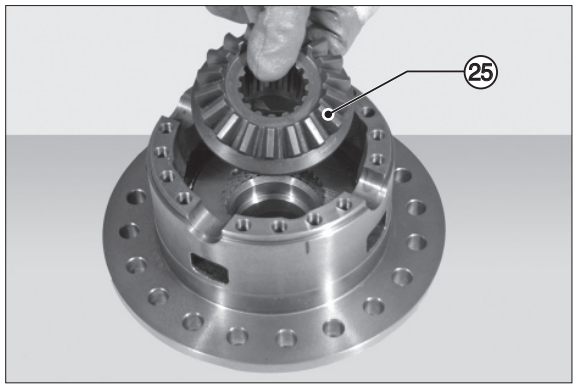
(2) Fit shims (19) and clutch pack (29) sequentially.

※ When installing the increased disc, place shim so that it leans against the crown wheel (25).



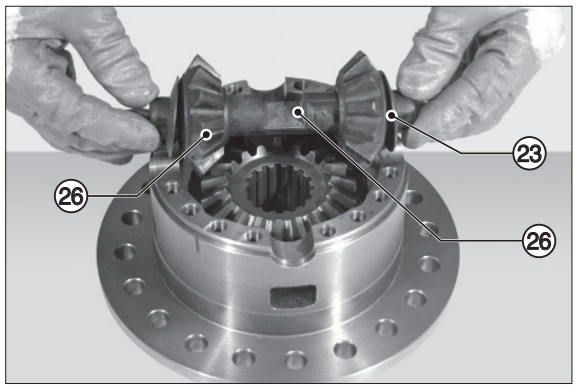
7409FAX146

(3) Install crown wheel (25).



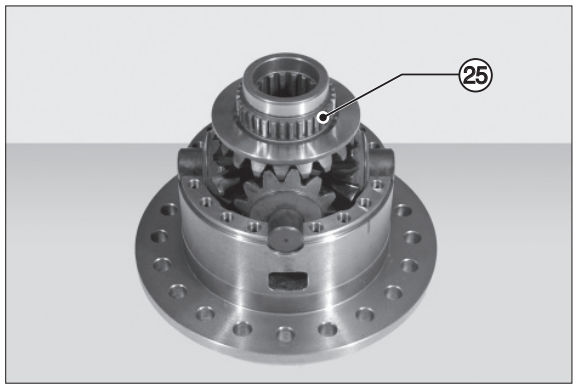
7409FAX147

(4) Install the planetary gears (26) and spherical shoulder washers (25) onto the bolts (24).
Install the planetary set.



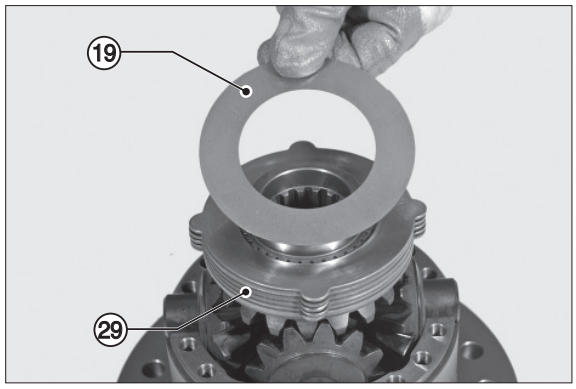
7409FAX148

(5) Install crown wheel (25).



7409FAX149

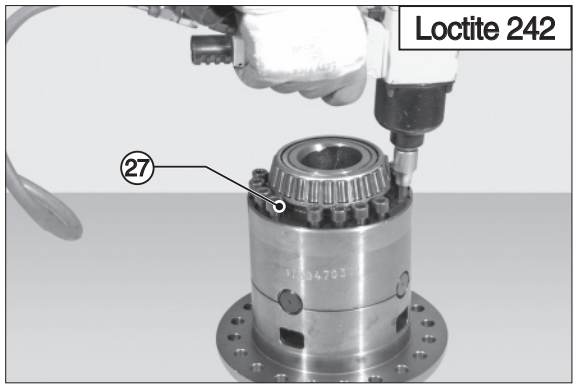
(6) Fit increased disc (18), clutch pack (29) and shims (6) onto the crown wheel (25). Fit the upper half box (26) and make sure that the match marks line up.



7409FAX150

(7) Lock the half box with screws (27) coated with loctite 242.

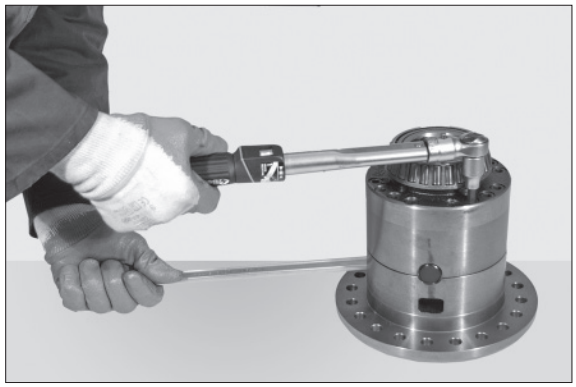
※ 1. The match marks on the two half-boxes must correspond.
2. Use only new screws.



7409FAX151

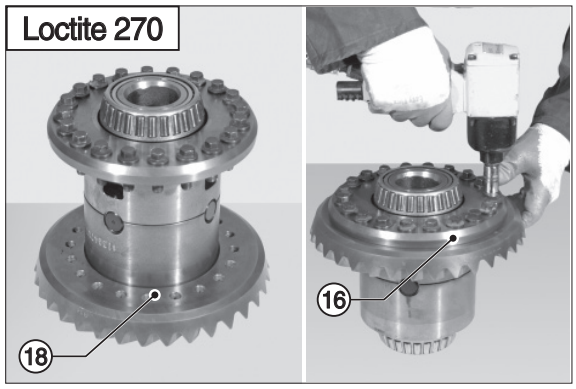
(8) Fit the complete differential unit in a vice and tighten the screws (27) holding the two half boxes together to a torque of 7.29~8.0 kgf · m (52.7~57.9 lbf · ft).

※ Tighten screws using the alternate and criss-cross method.


7409FAX152

(9) Mount the gear ring (18) and fasten it to the differential box with screws (16).

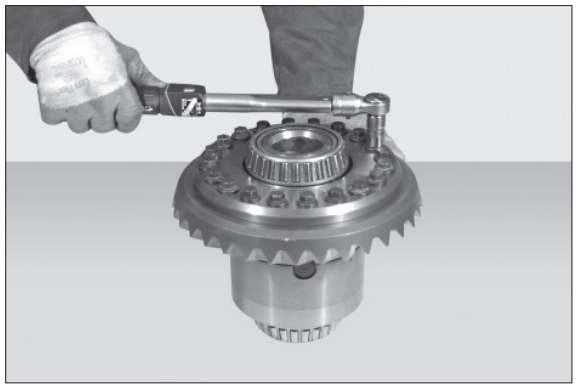
※ Use only new screws.



7409FAX153

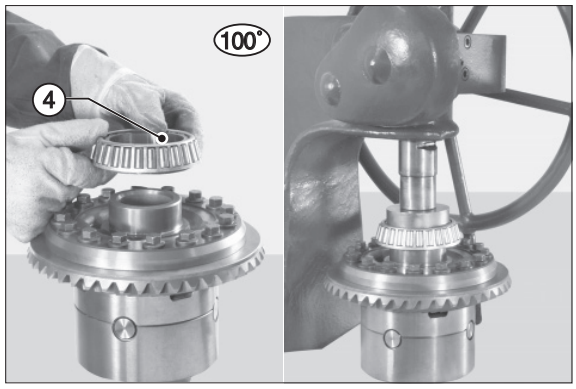
(10) Lock the gear ring (6) by tightening the screws (4) to a torque of 14.2~15.7 kgf · m (103~114 lbf · ft)

※ Use the alternate and criss-cross tightening method.


7409FAX154

Installation of the differential unit

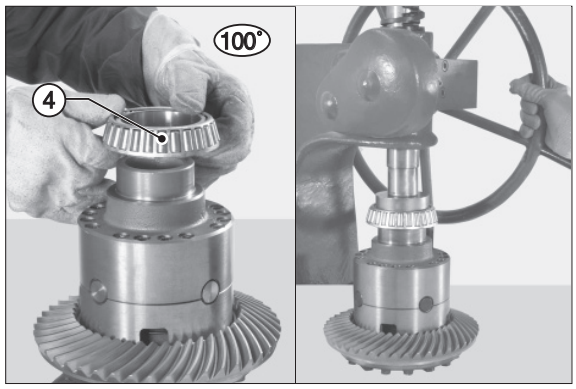
(11) Position the differential unit under a press and, using a driver with an adequate diameter, install the first bearing (4).



7409FAX155

(12) Turn the unit upside down and install the second bearing (4).

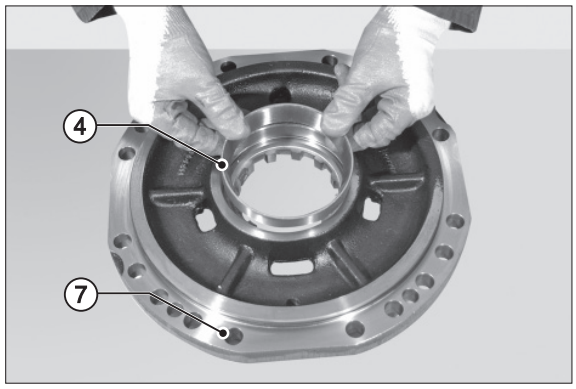
※ Pay particular attention; position a shim with adequate diameter in order to engage the internal ring of bearing without engaging the cage.



7409FAX156

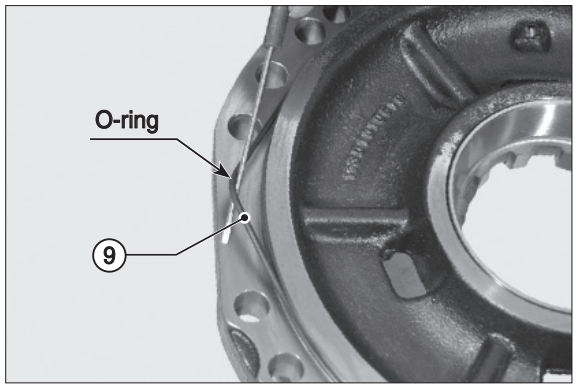
(13) Only if bearings are replaced

Insert the thrust blocks of the bearings (4) into the intermediate covers (7).



7409FAX157

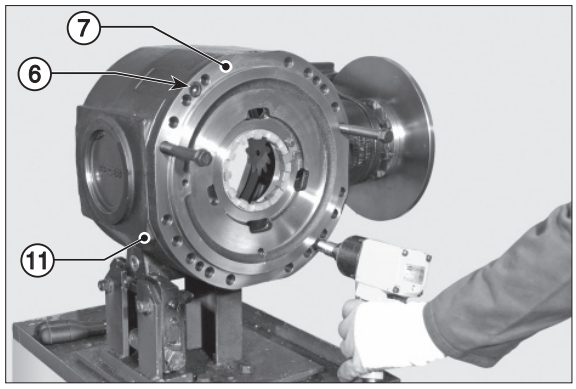
※ Thoroughly check the state of the O-ring (9).



7409FAX158

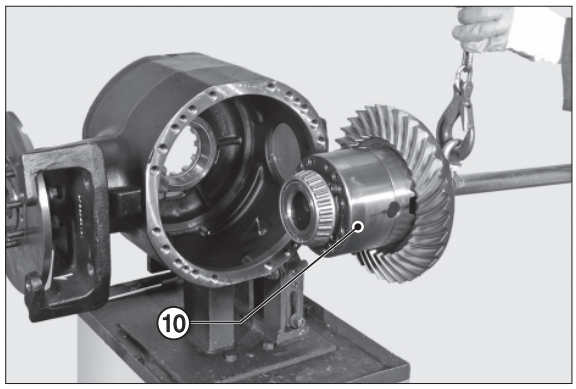
(14) Fit the intermediate cover (7) on opposite side of ring gears : lock cover with screws (6) coated with loctite 242.

Tighten screws to a torque of 13.2~14.6 kgf · m (95.5~106 lbf · ft).



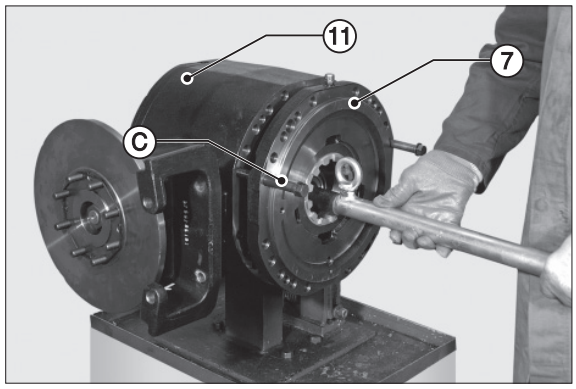
7409FAX159

(15) Position the differential unit (10) in the central body with the help of a bar and fit the middle cover.



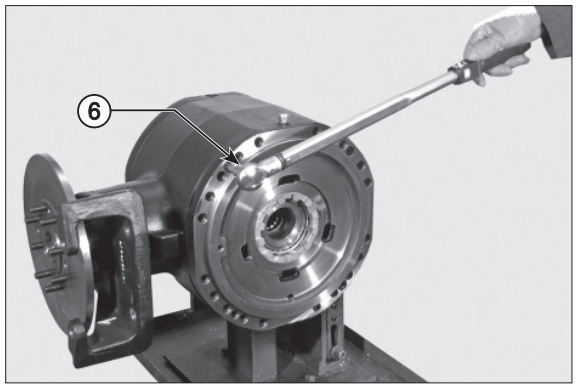
7409FAX160

(16) Tighten the two safety screws “C” into the main body (11) and install the intermediate cover (7).



7409FAX161

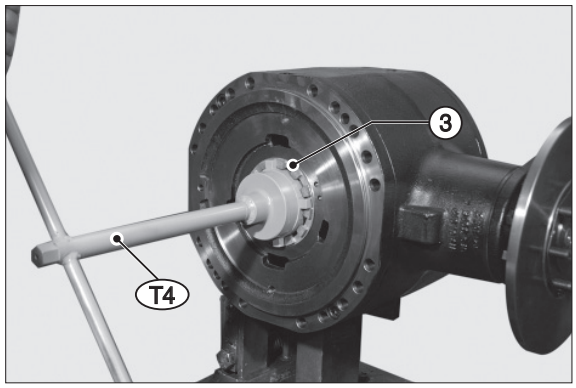
(17) Tighten screws (6) to a torque of 13.2~14.6 kgf · m (95.5~106 lbf · ft).



7409FAX162

(18) Only if ring nuts have been removed

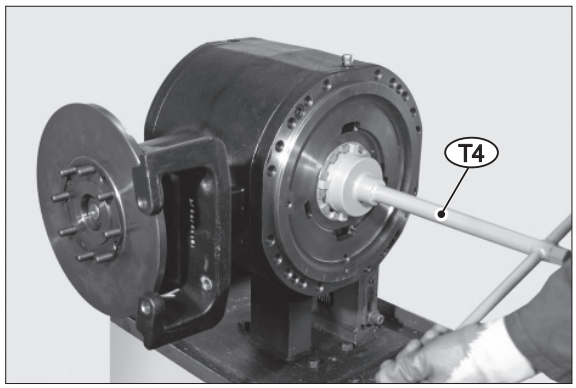
Tighten the ring nut (3) on gear ring side until clearances between pinion and gear ring are zeroed. Then, loosen by about 1/4 turn.



7409FAX163

(19) Only if ring nuts have been removed. Preload bearings with ring nut (26) on non-gear ring side in order to increase the torque of the pinion.

※ In the case of used bearings, check thrust torque; in the case of new bearings, check continuous torque.



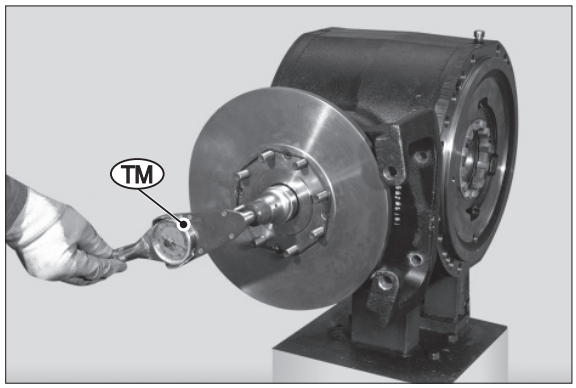
7409FAX164

(20) Apply torque meter TM to pinion nut and check that torque will increase by 20-40 Ncm as a result of differential bearing preload.

Example :

· Pinion torque : 12.2~18.4 kgf · cm

· Pinion + differential torque : 14.3~19.4 kgf · cm

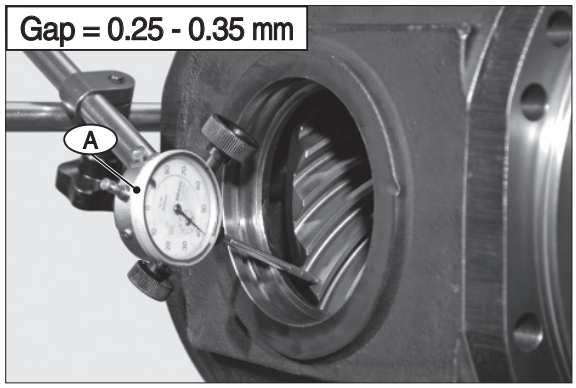


7409FAX165

(21) Introduce a comparator "**A**" with long tracer through the hole provided for the cap. Position the tracer on the side of a tooth of the gear ring, approximately 5 mm from the outer rim; preload by about 1 mm and zero the comparator.

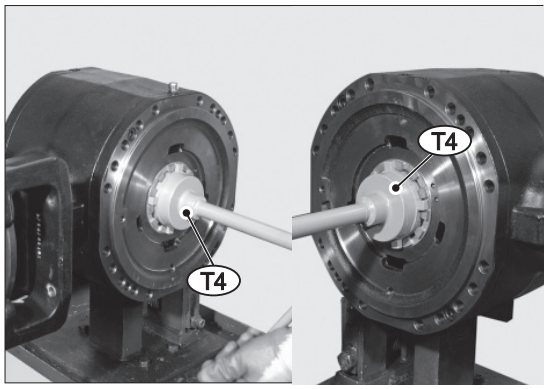
As you hold the pinion in position, move the gear ring manually in both directions to check clearance between pinion and gear ring.

Standard clearance : 0.25 - 0.35 mm



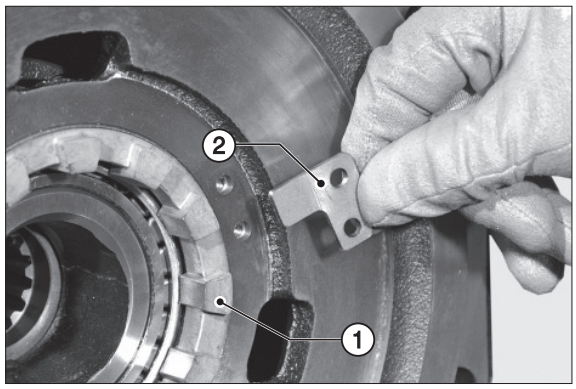
7409FAX166

(22) Adjusting clearance between pinion and gear ring.
To INCREASE : loosen the ring nut on gear ring side and tighten the ring nut on non-gear ring side by the same measure.
To DECREASE : perform the same operations inversely.
To rotate ring nuts, use special wrench T4.



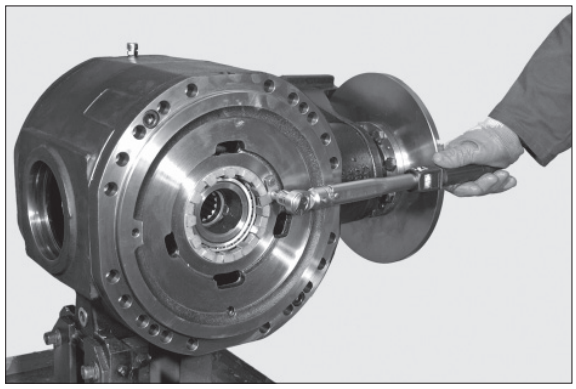
7409FAX167

(23) Install in correct position the safety plate (2).

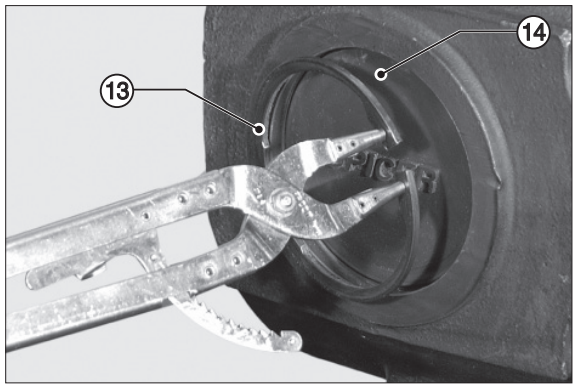


7409FAX168

(24) Engage screw (1) in the slot next to the holes provided for the check screws.
Coat screws with loctite 270 and tighten to a torque of 1.12 kgf · m (8.11 lbf · ft).

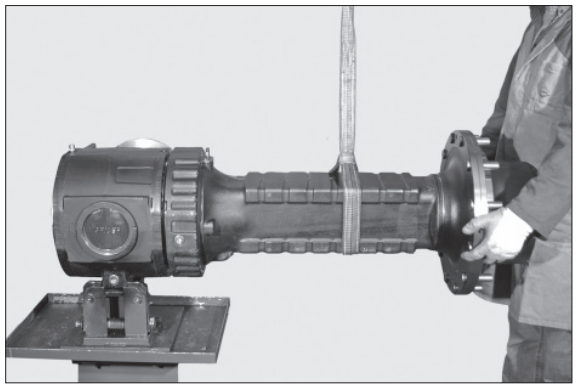

7409FAX169

(25) Using a driver, fit the cap (14) and position it in its seat with the snap ring (13).



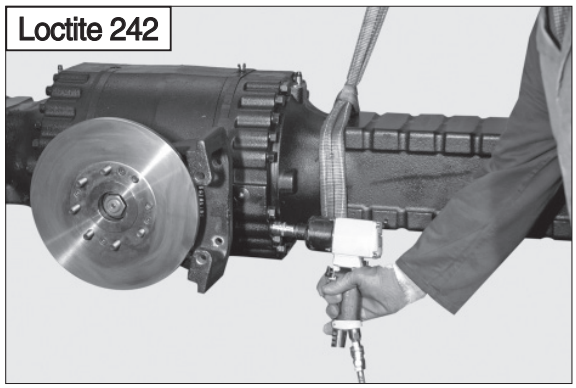
7409FAX170

(26) Check that the positioning of the sealing ring on the arm is intact; install the complete arm. Lock it into position using two facing screws and washers.



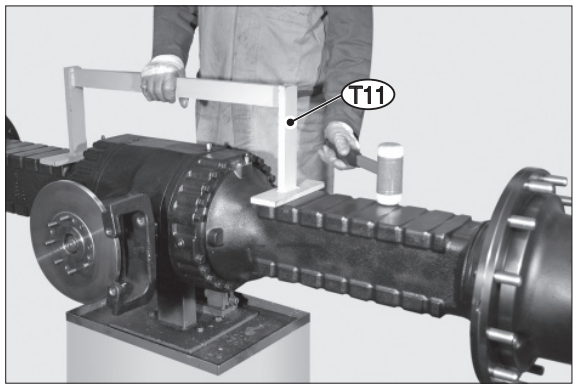
7409FAX171

(27) Temporarily lock the arm with screws previously coated with loctite 242; tighten lightly to make the unit touch the main body.



7409FAX172

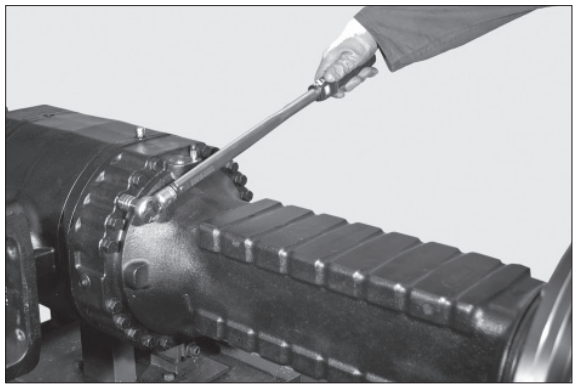
(28) Check the flatness of the arms, using tool T11; then lock the arms into their final position, using screws adequately coated with loctite 242.



7409FAX173

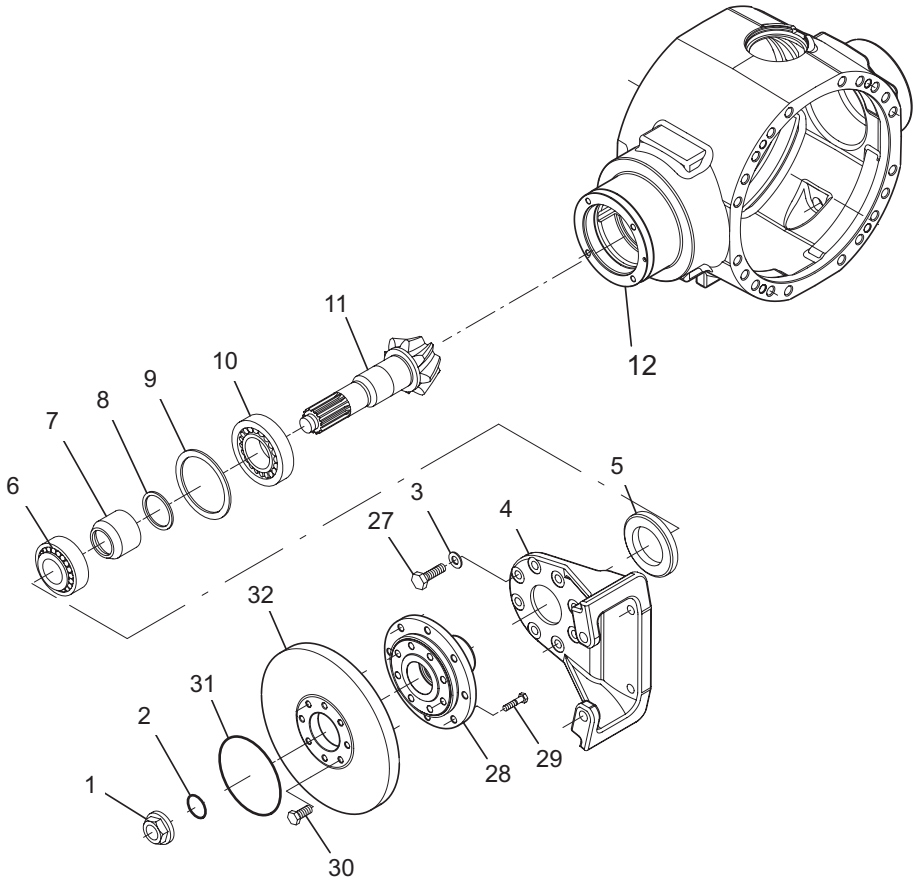
(29) Cross tighten the nuts in two stages.

· Torque wrench setting :
30.4 kgf · m (219 lbf · ft)



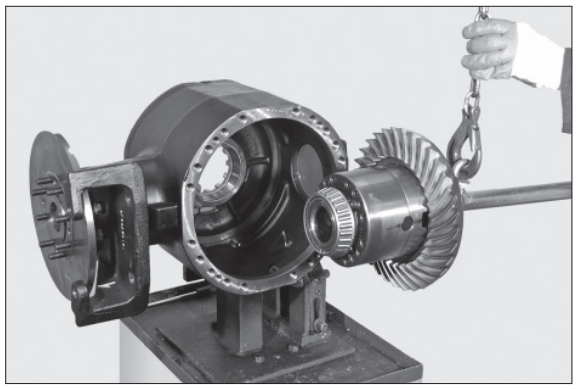
7409FAX174

9) HOW TO REMOVE THE BEVEL PINION WITH SUPPORT BRAKING DISK



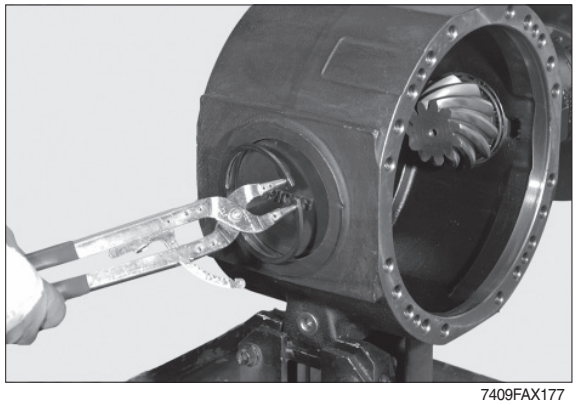
7409FAX175

(1) Remove the intermediate cover and the whole differential unit.
For details, see HOW TO REMOVE THE DIFFERENTIAL UNIT.



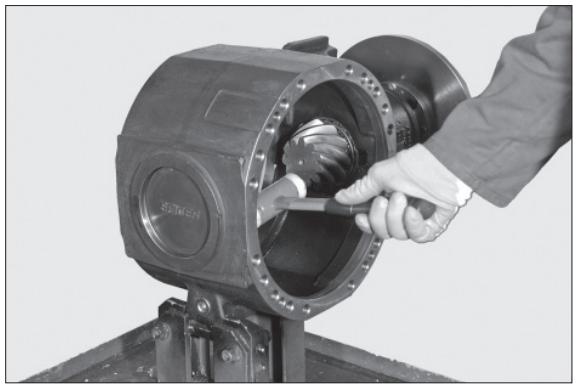
7409FAX176

(2) Remove the snap ring.



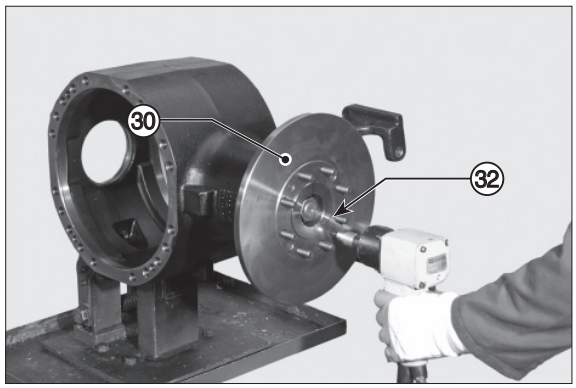
7409FAX177

(3) Remove the cap.



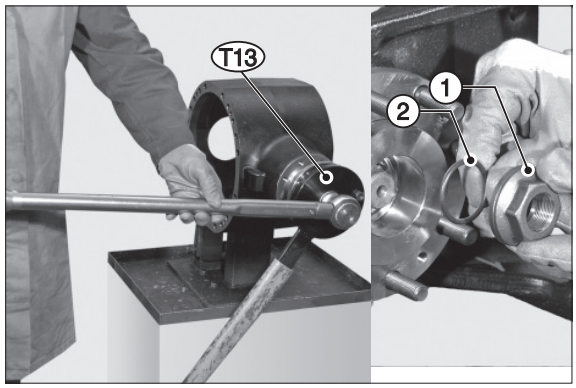
7409FAX178

(4) Draw out the screws (30) and remove the disk (32).



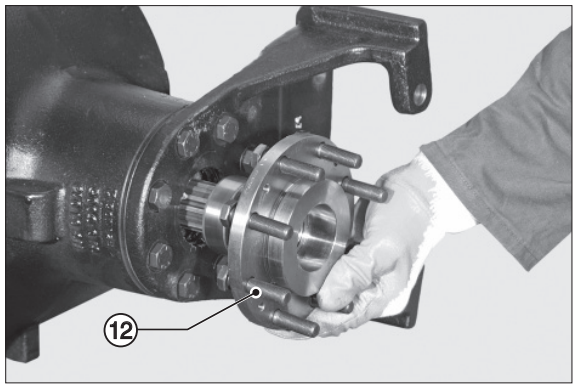
7409FAX179

(5) Position tool T13, so as to avoid pinion rotation.
Unloose and remove the nut (1); also remove the O-ring (2).



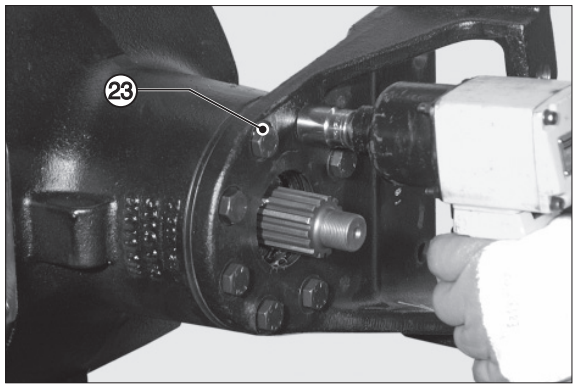
7409FAX180

(6) Remove the flange (28).



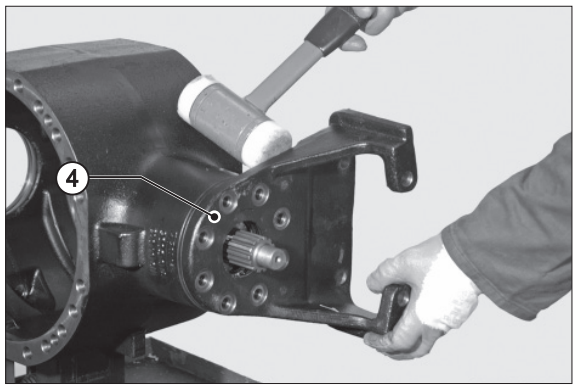
7409FAX181

(7) Remove the retainer screws (23) and relative washers (3).



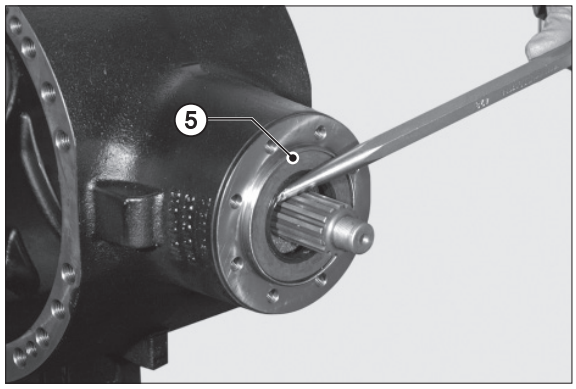
7409FAX182

(8) Remove the brake support (4).



7409FAX183

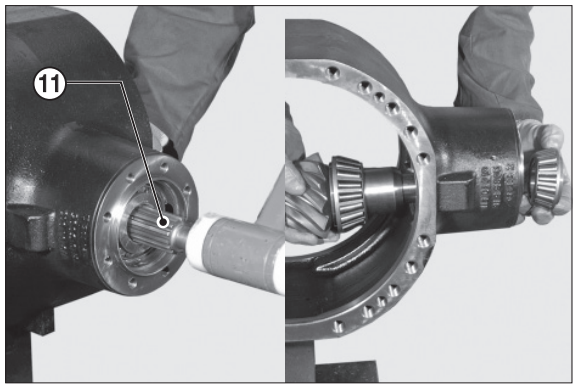
(9) Remove the sealing ring (5).



7409FAX184

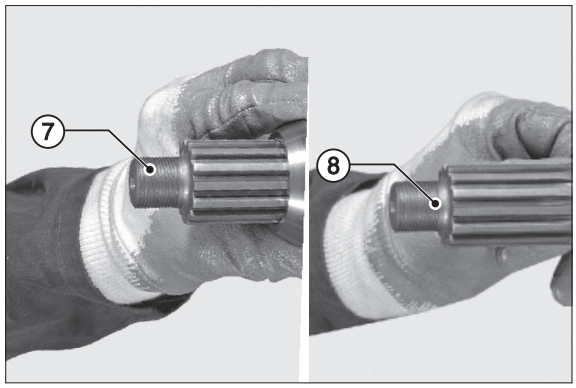
(10) Extract the pinion (11) complete with the internal bearing cone (10), the distance piece (7) and shims (8).

※ The bearing cups of the bearing cones remain in the central body.



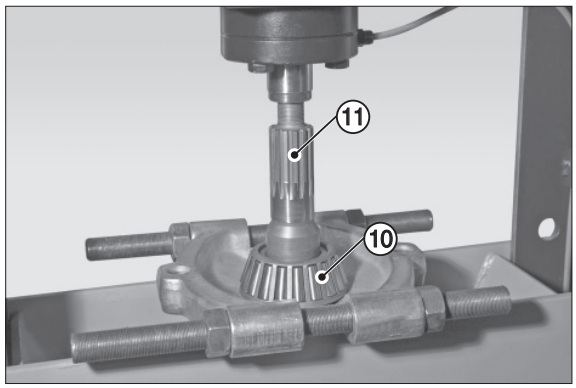
7409FAX185

(11) Refer and keep to the positions marked during disassembly.



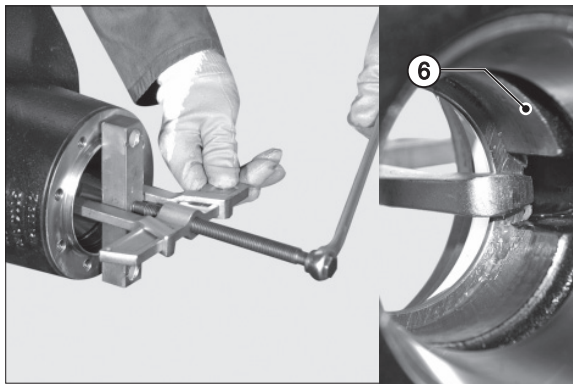
7409FAX186

(12) Using a puller and a press, remove the inner bearing cone (10) from the pinion (11).



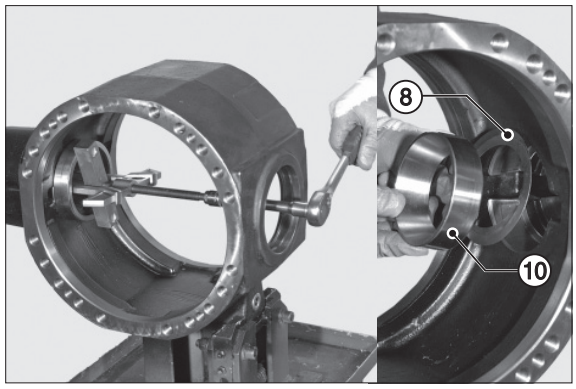
7409FAX187

(13) Remove the bearing cup of the tail bearing cone (6).



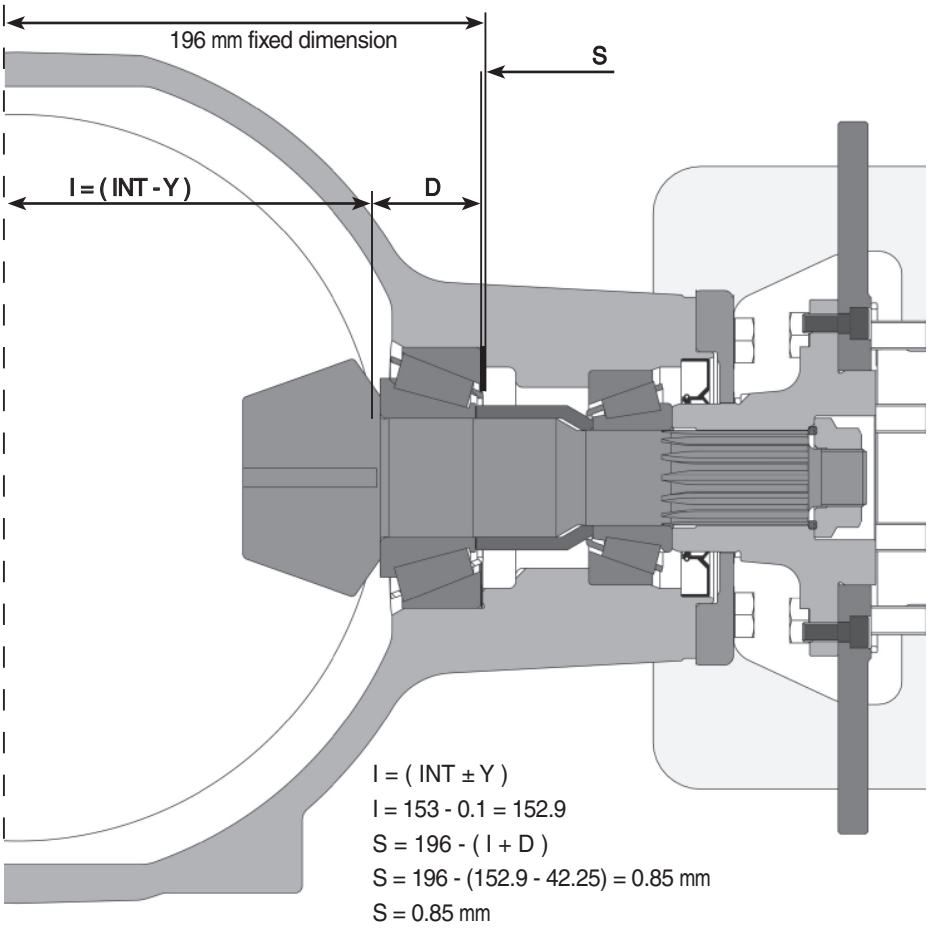
7409FAX188

(14) Remove the bearing cup of the internal bearing cone (10) as well as the shim washers (8).



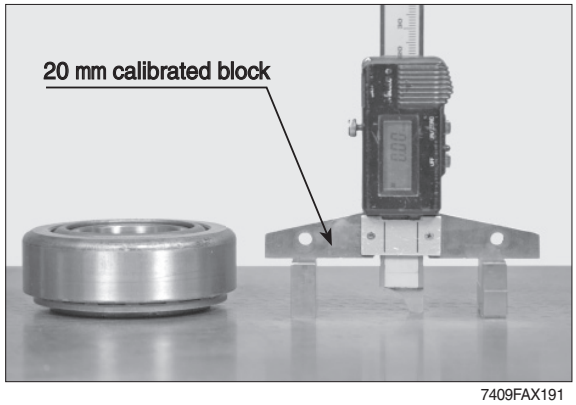
7409FAX189

10) HOW TO INSTALL AND ADJUST THE BEVEL PINION WITH SUPPORT BRAKING DISK



7409FAX190

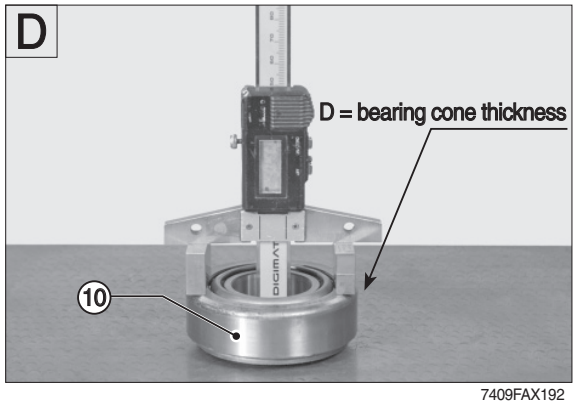
(1) Reset a centesimal digital depth gauge on a calibrated block (whose known thickness is 20 mm).



7409FAX191

(2) With a calibrated block on a faceplate, allow the bearing cone to set by rotating them in both directions and by applying a vertical thrust position the calibrated block on the external bearing cups.
Check overall thickness of bearing.

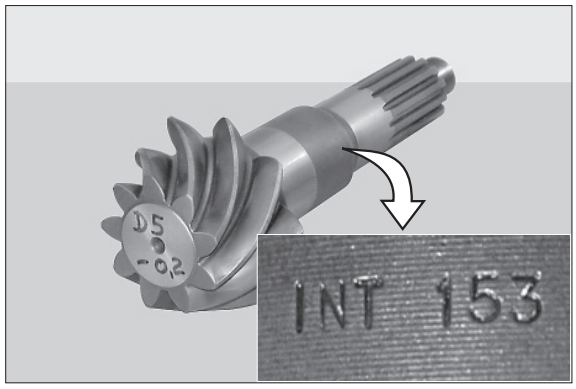
D = 42.25 mm



7409FAX192

(3) Check nominal dimension "**INT**" as marked on the pinion.
Add up to or subtract from "**INT**" the variation indicated as "**Y**" to obtain the actual center distance "**I**".

Example :
I = (INT - Y) = 153 - 0.1 = 152.9 mm

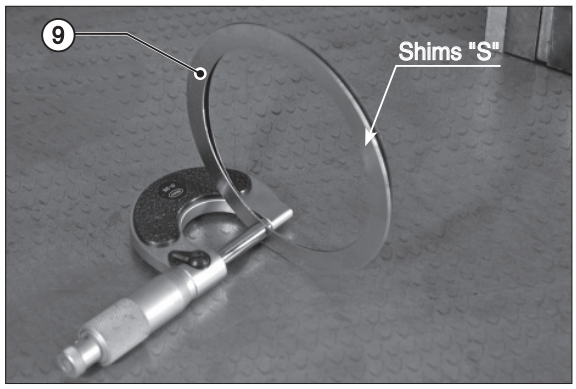


7409FAX193

(4) Calculate shims "**S**" for insertion under the bearing cup of the inner bearing cone using the following formula :

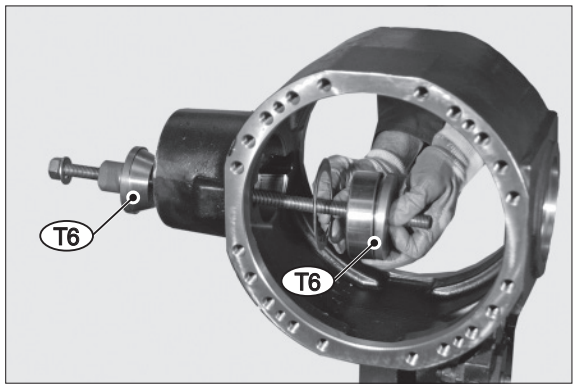
S = 196 - (I + D)
where: 196 = fixed dimension
I = actual pinion center distance
D = Total bearing thickness;

Example :
S = 196 - (152.9 + 42.25) = 0.85 mm



7409FAX194

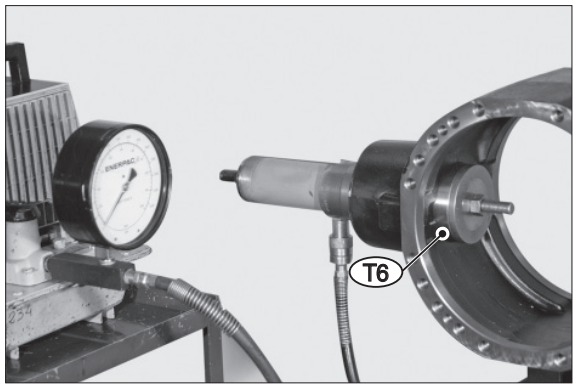
(5) Using special tool T6.
Partially insert the bearing cup of the bearing cones (6) and (10) and shims (9).



7409FAX195

(6) Connect the tension rod to the press and move the bearing cup of bearing cones (6) and (10) into the seats.
Disconnect the press and remove the tension rod.

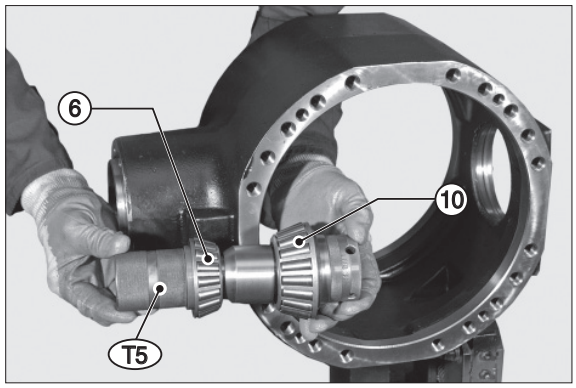
※ Before starting the next stage, make sure that the bearing cup has been completely inserted into its seat.



7409FAX196

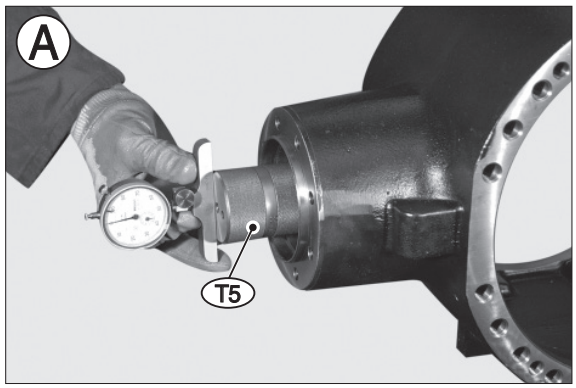
Calculation pinion bearings rolling torque

(7) Introduce tool T5 complete with bearings (6) and (10) into the central housing; tighten by hand until to eliminate the axial gap.



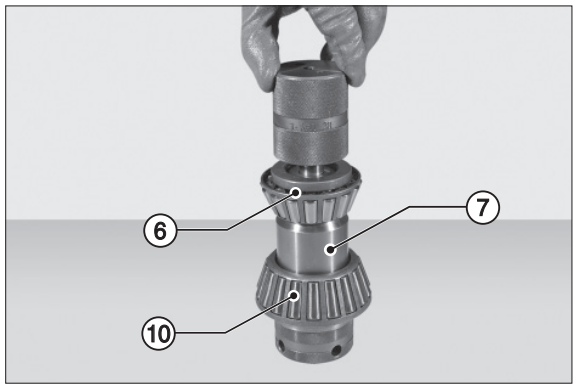
7409FAX197

(8) Introduce the tracer of a dept comparator 'DDG' into either side hole of tool T5.
Reset the comparator with a preload of about 3 mm.



7409FAX198

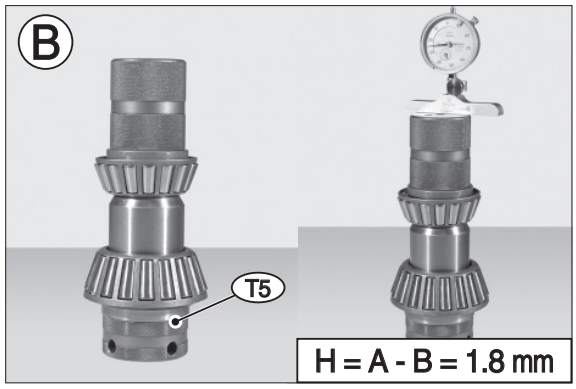
(9) Remove the comparator and take out tool and bearing cone kits from the main body.
Reinstall every part, also introducing a distance piece (7) between bearing cones (10) and (6). Tighten the entire pack by hand.



7409FAX199

(10) Introduce depth comparator "DDG" in tool T5 and measure deviation "H" from the previous reset.

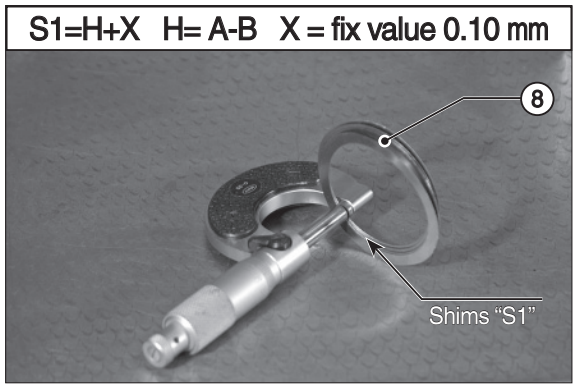
Example :
H = A - B = 1.8 mm



7409FAX200

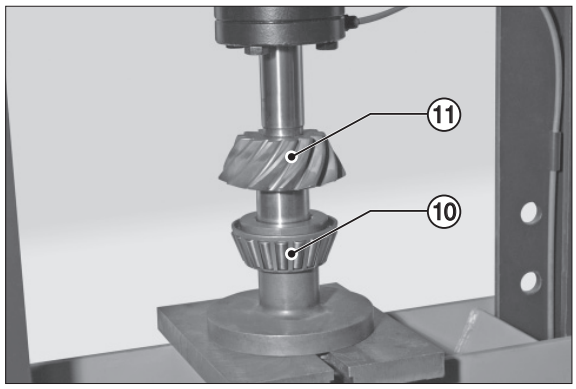
(11) Deviation "**H**" must be added to a set value of **0.10 mm** to make up the pack of shims "**S1**" (8) for insertion between pinion (6) and distance piece (7).
Dimension "**S1**" must be rounded off to the higher 5/100.

Example :
S1 = H + X = 1.8 + 0.1 =1.9 mm



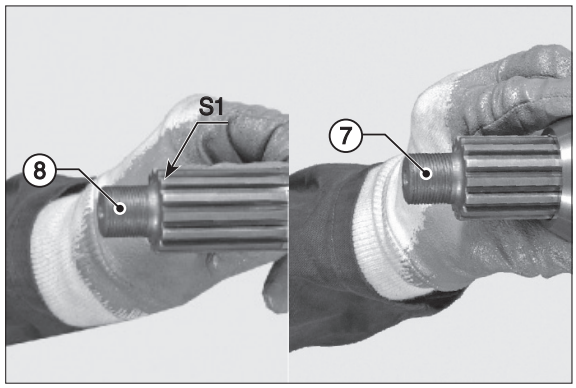
7409FAX201

(12) Position the internal bearing (10) and the pinion (11) under a press; force the bearing onto the pinion.



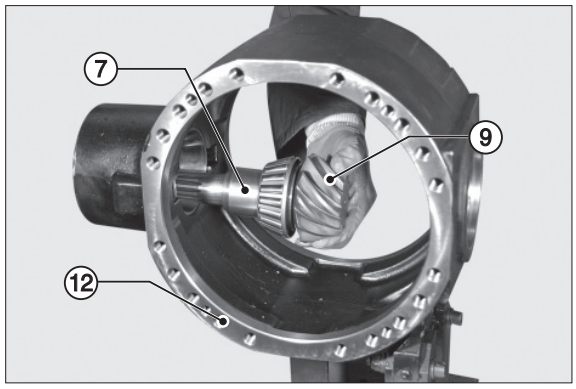
7409FAX202

(13) Insert the external bearing (6) in the central body in order to complete the pack arranged as in the figure.



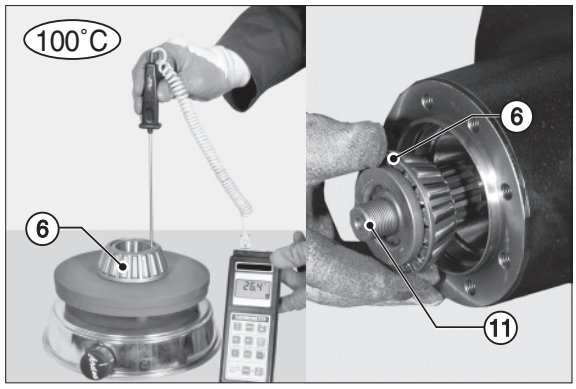
7409FAX203

(14) Fit the pinion (11), shim "**S1**" (9) and distance piece (7) in the main body (12).



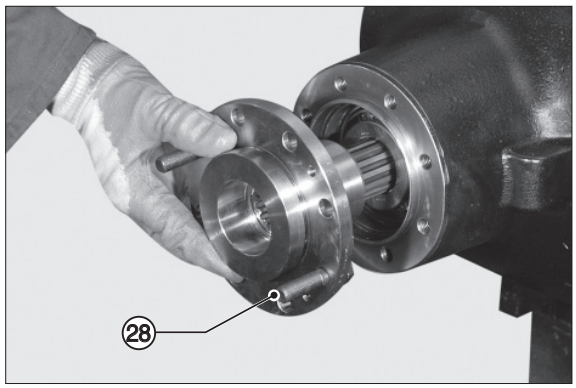
7409FAX204

(15) Heat the external bearing cone (6) to a temperature of about 100˚C and fit it on to the pinion (11) so as to complete the pack as shown in the figure.



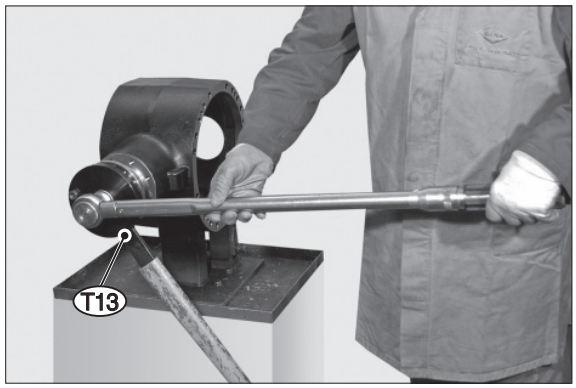
7409FAX205

(16) Install the flange (28) onto the pinion (11) without sealing ring.



7409FAX206

(17) Apply wrench to the ring nut (1) and special tool T5 to the pinion (11).
Lock the wrench T5 and rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 89.7~112 kgf · m (649~810 lbf · ft).

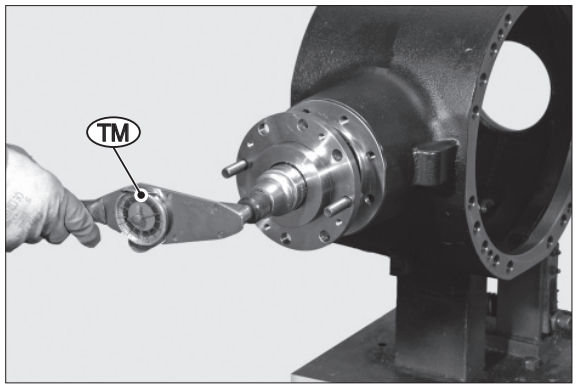


7409FAX207

(18) Apply onto the pinion (11) the bar-hold and with the help of a torque meter, check the torque of the pinion (11).

· Torque : 12.2~18.4 kgf · cm

※ If torque exceeds the maximum value, then the size of shim “S1” (9) between the bearing cone (10) and the distance piece (7) needs to be increased.



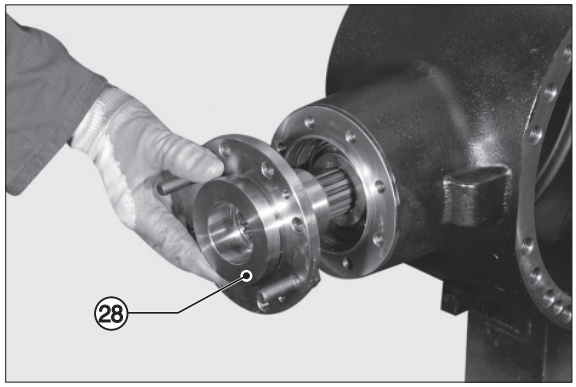
7409FAX208

(19) If torque does not reach the set value, increase the torque setting of the ring nut (3) in different stages to obtain a maximum value of 89.7~112 kgf · m (649~810 lbf · ft).

※ If torque does not reach the minimum value, then the size of shim “S1” (9) needs to be reduced.

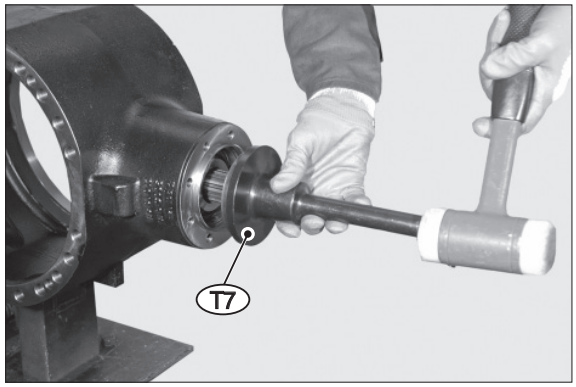
※ When calculating the increase or decrease in size of shim “S1”, bear in mind that a variation of shim (9) of 0.01 mm corresponds to a variation of 6.12 kgf · cm in the torque of the pinion (11).

(20) Remove nut (1) and flange (28)



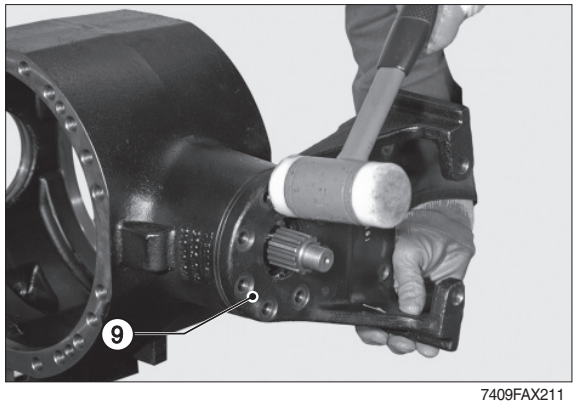
7409FAX209

(21) Apply Arexons rubber cement to the outer surface of the new seal ring (5) and fit ring in the main body using driver T7.



7409FAX210

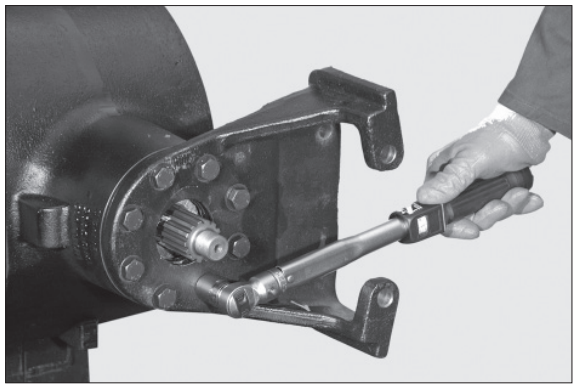
(22) Lubricate the coupling surfaces and position the brake support (4).



7409FAX211

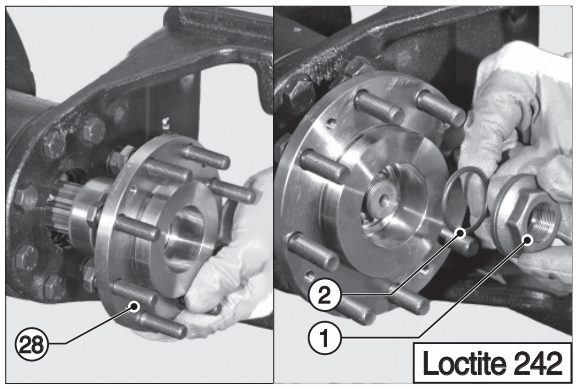
(23) Apply loctite 242 to the screws (13) and tighten using the crisscross method.

· Torque wrench setting :
11.8±13.1 kgf · m (85.3±94.4 lbf · ft)



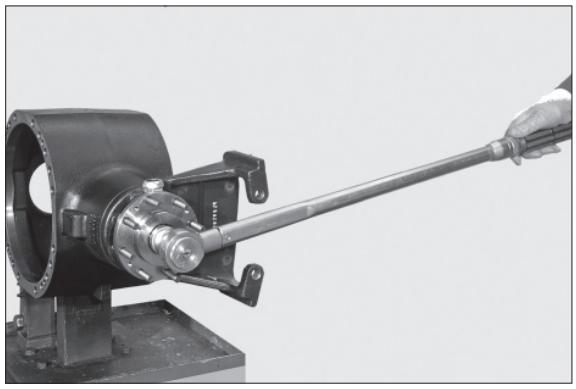
7409FAX212

(24) Oil seal ring lips and install flange (28). Mount O-ring (2) and apply loctite 242 to pinion tang; tighten nut (1).



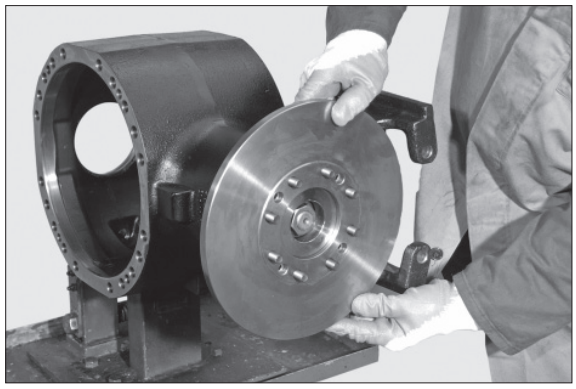
7409FAX213

(25) Apply wrench to the ring nut (1) and special tool T5 to the pinion (11). Lock the wrench T5 and rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 89.7~112 kgf · m (649~810 lbf · ft).



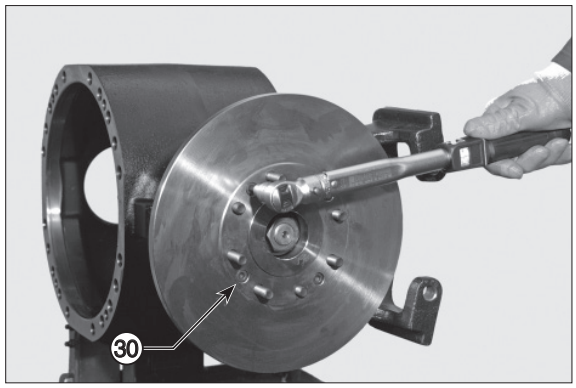
7409FAX214

(26) Install disk (3) and keep it into position with screws (19) and nuts (4).



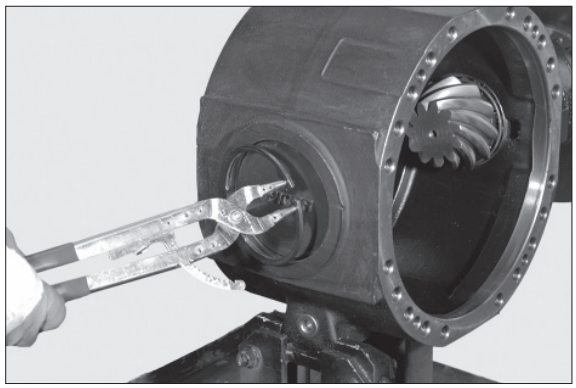
7409FAX215

(27) Tighten using a dynamometric wrench to a tightening torque of 13.1±14.5 kgf · m (94.8±105 lbf · ft).



7409FAX216

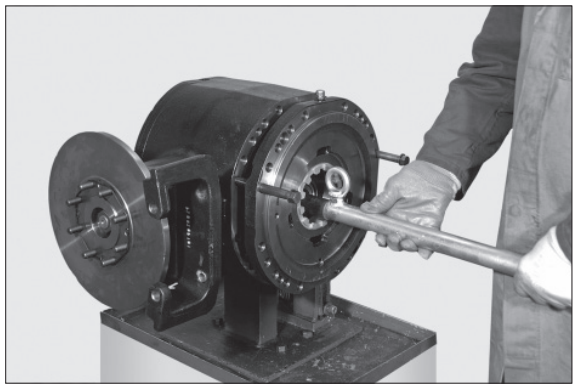
(28) Using a driver, fit the cap and position it in its seat with the snap ring.


7409FAX217

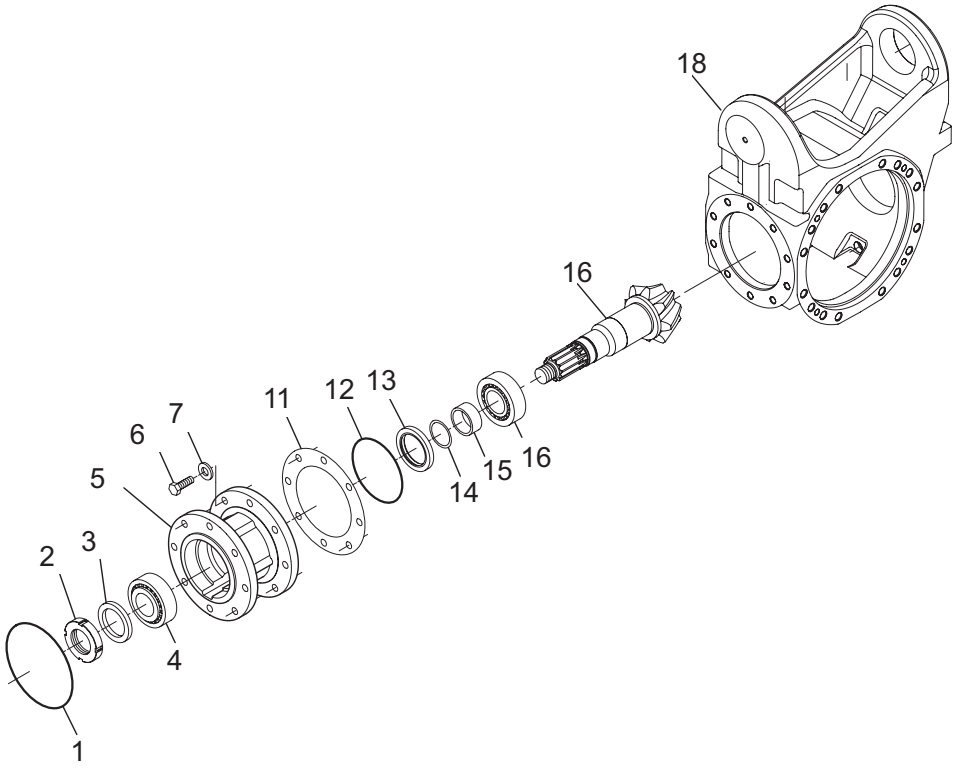
(29) Reinstall the differential unit and the intermediate cover.

※ If the crown and pinion has been replaced, reinstate clearances.

For details, see HOW TO ASSEMBLE AND ADJUST THE DIFFERENTIAL UNIT.

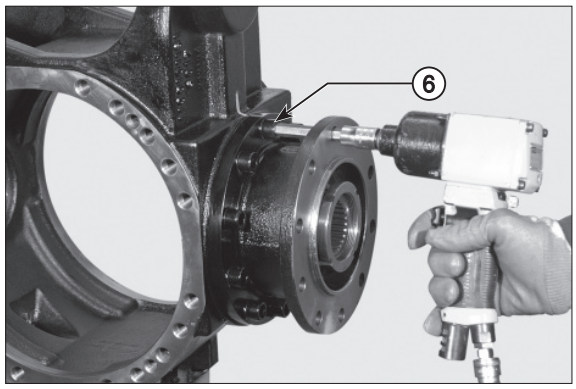

7409FAX218

11) HOW TO REMOVE THE FLANGED BEVEL PINION



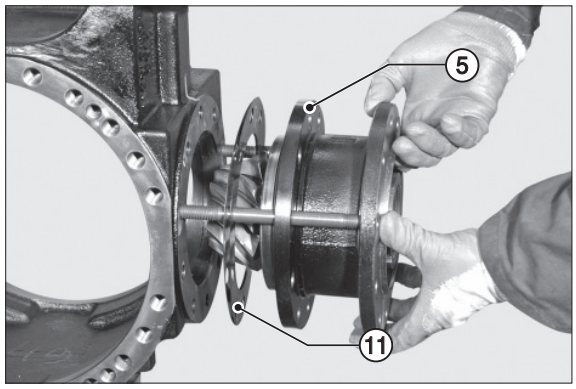
7409FAX219

(1) Remove the retainer screws (6) and relative washers (7).



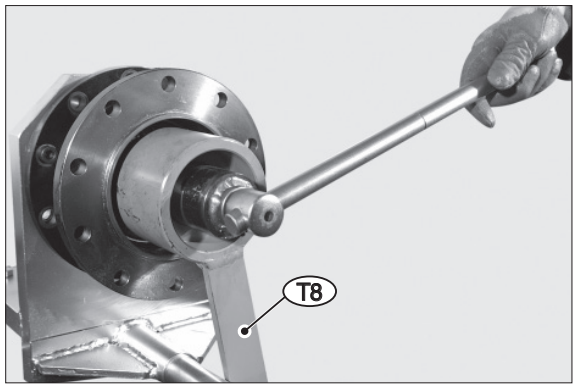
7409FAX220

(2) Remove shims (11) and pinion support (5).
Refer and keep to the positions marked during disassembly.



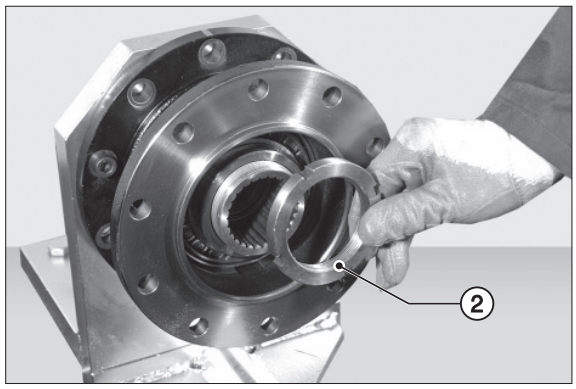
7409FAX221

(3) Stop wrench and rotate the pinion so as to release and remove the ring nut (2).



7409FAX222

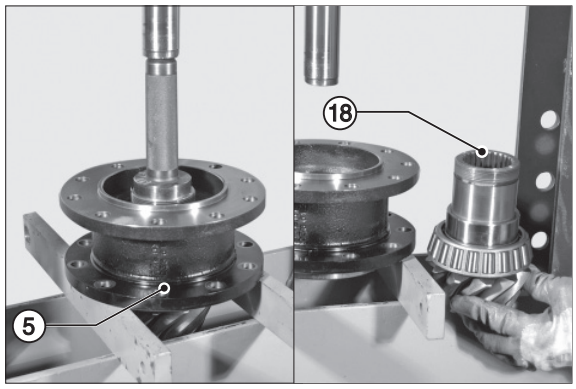
(4) Remove pinion ring nut (2).



7409FAX223

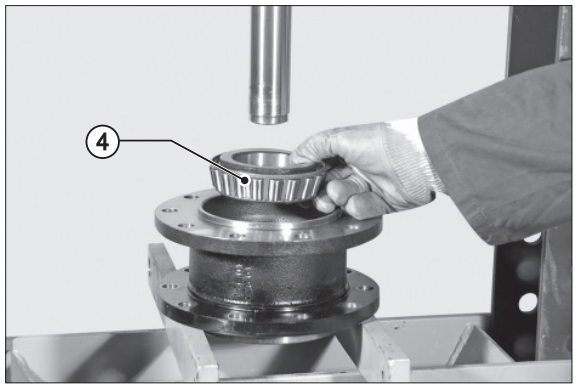
(5) Position the cover under a press, extract the pinion (18) complete with the internal bearing (16), the distance piece (15) and shims (14).

※ The thrust blocks of the bearings remain in the central body (5).



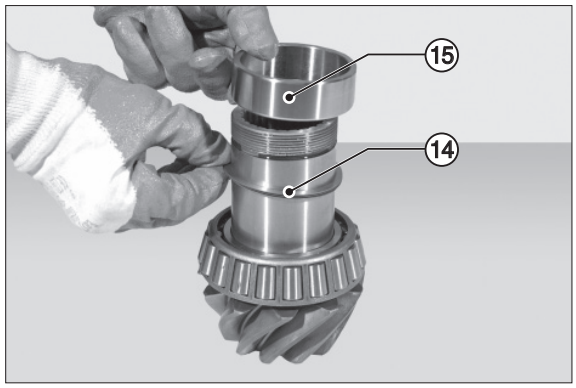
7409FAX224

(6) Remove sealing ring (13) and bearing (4).



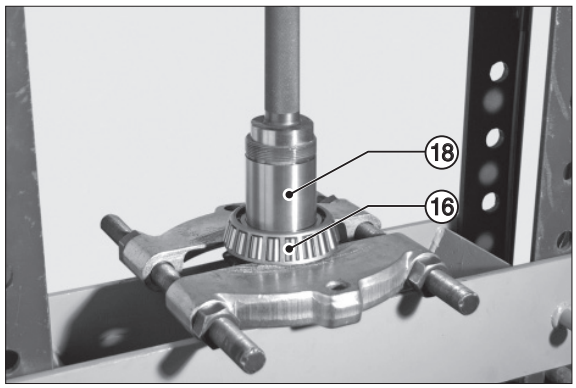
7409FAX225

(7) Remove spacer (15) and shims (14).



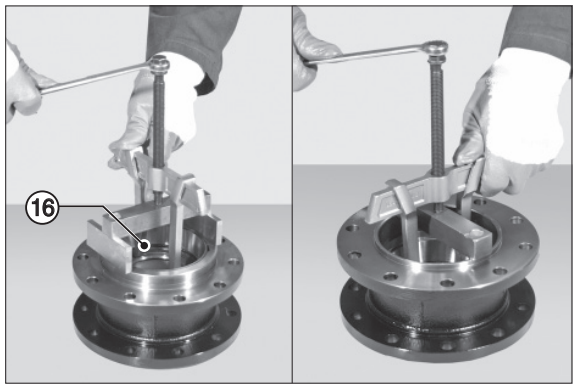
7409FAX226

(8) Position the pinion (18) under a press, remove the bearing (16).



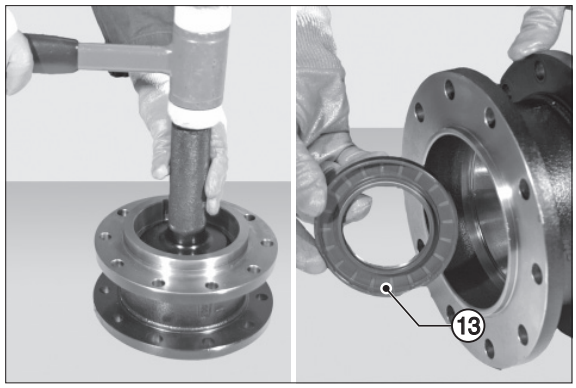
7409FAX227

(9) With the help of an extractor, remove the thrust blocks (4)(16).



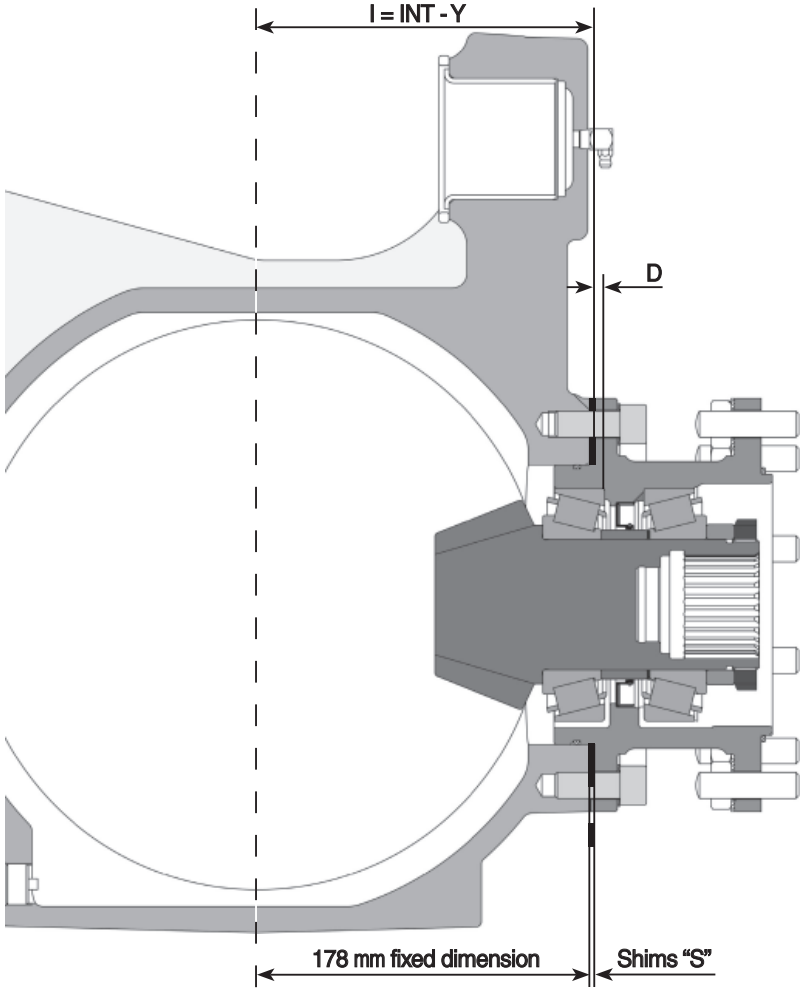
7409FAX228

(10) Remove sealing ring (13).



7409FAX229

12) HOW TO INSTALL AND ADJUST THE FLANGED BEVEL PINION

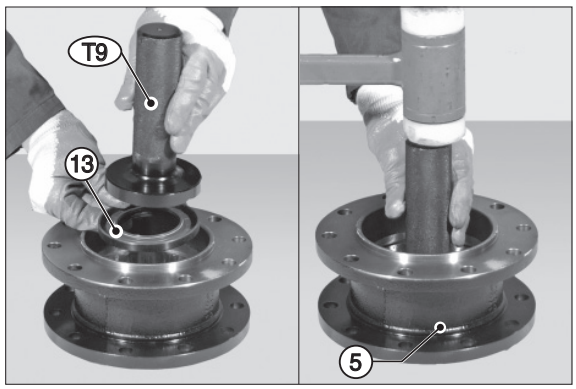


I = (INT ± Y)
I = 153 - 0.1 = 152.9

S = 178 - (I + D)
S = 178 - (152.9 - 25.8) = 0.7mm
S = 0.7mm

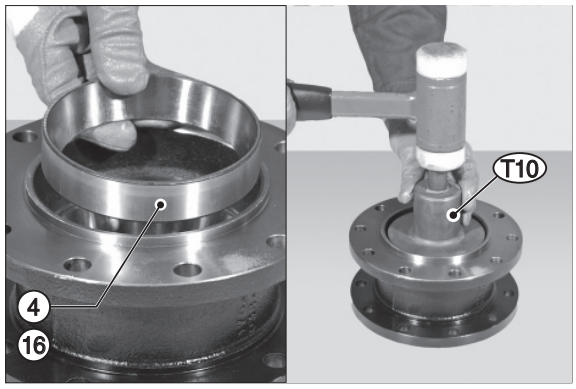
7409FAX230

(1) Lubricate the outer surface of the new sealing ring (13) and fit it onto the cover (5) using tool T9.



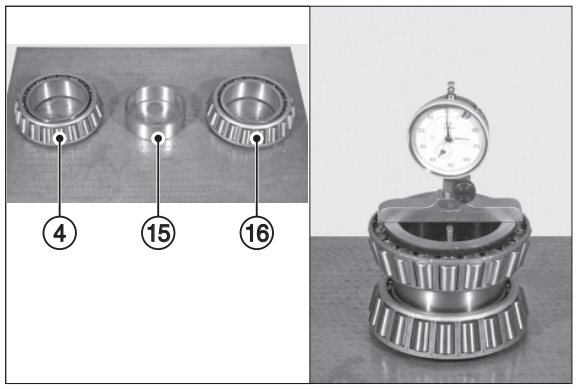
7409FAX231

(2) Using tool T10, insert the thrust blocks of bearing (4)(16).



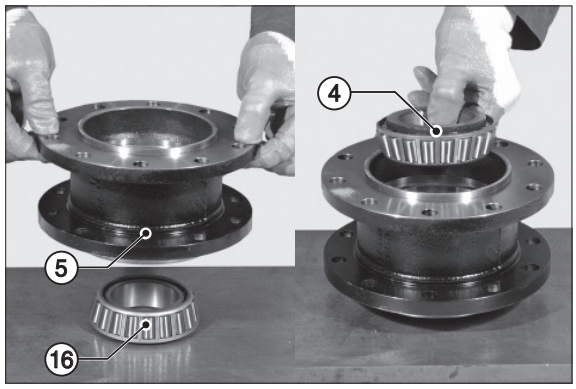
7409FAX232

(3) Reset the digital dept gauge on pinion bearings (4)(16) and pinion spacer arranged (15) as in the figure.



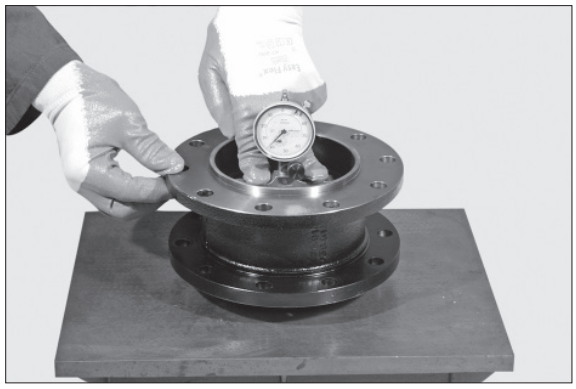
7409FAX233

(4) Using a surface plate, position the pinion support (5) on the outer bearing (16) and then insert the outer bearing (4) in the pinion support (5).



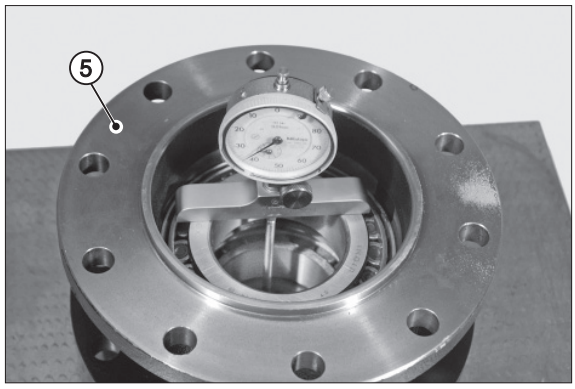
7409FAX234

(5) Arrange accurately the pinion bearings.


7409FAX235

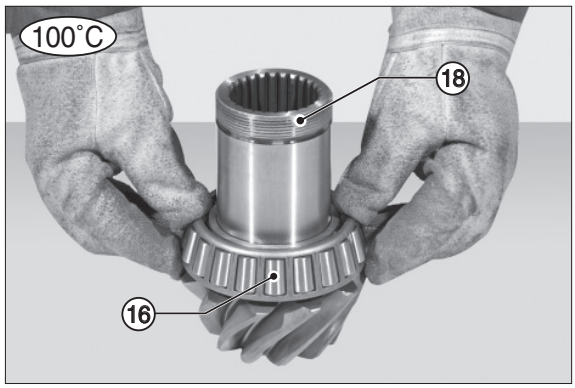
(6) Insert depth comparator “DDG” into pinion support (5) and measure variation “H” in relation to the zero setting performed back at point C.

H = 1.7 mm



7409FAX236

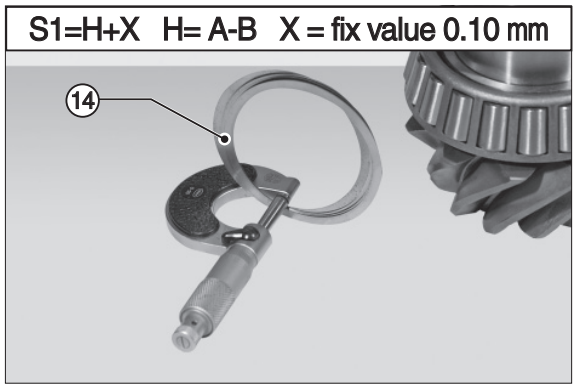
(7) Heat the inner bearing (16) to about 100 ˚C and fit it to the pinion (18).



7409FAX237

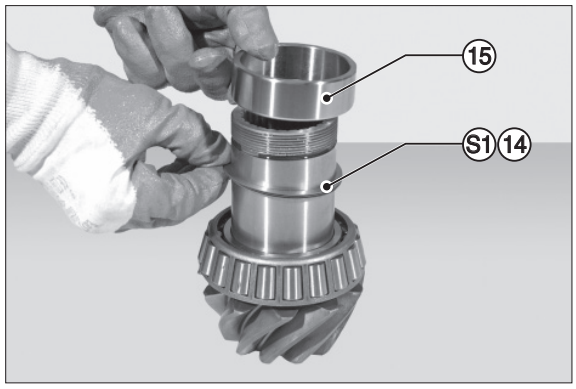
(8) Deviation “**H**” must be added to a set value of **0.10 mm** to make up the pack of shims “**S1**” (14) for insertion between inner bearing cone (4) and distance piece (15).
Dimension “**S1**” must be rounded off to the higher 5/100.

Example :
S1 = H + X = 1.7 + 0.1 =1.8 mm



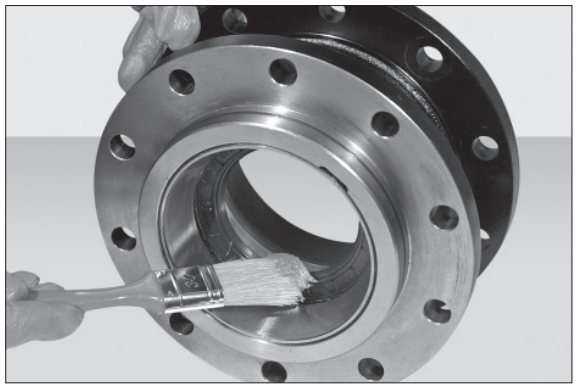
7409FAX238

(9) Insert distance piece (27) and shims “S1” (26).



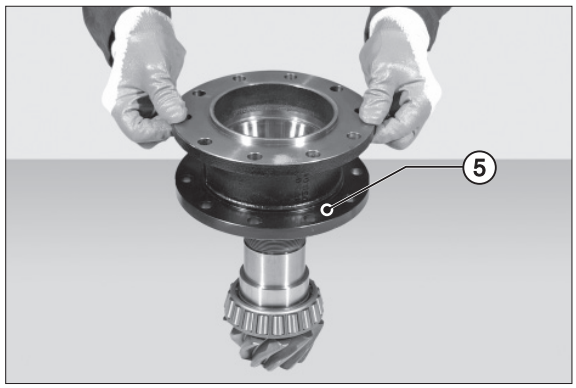
7409FAX239

(10) Oil seal ring lips.



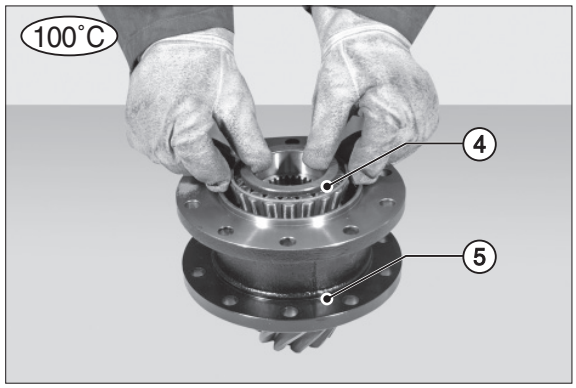
7409FAX240

(11) Insert the cover (5).



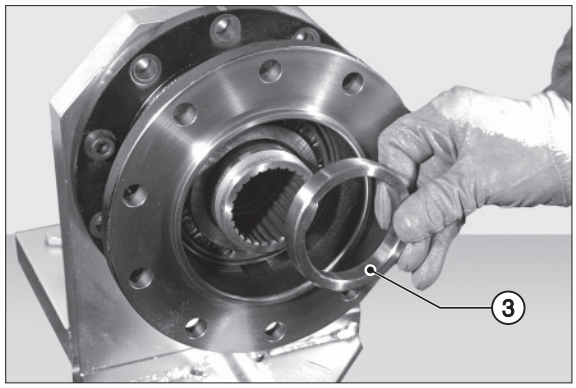
7409FAX241

(12) Heat the outer bearing (2) to about 100 ˚C and fit it to the pinion (1).



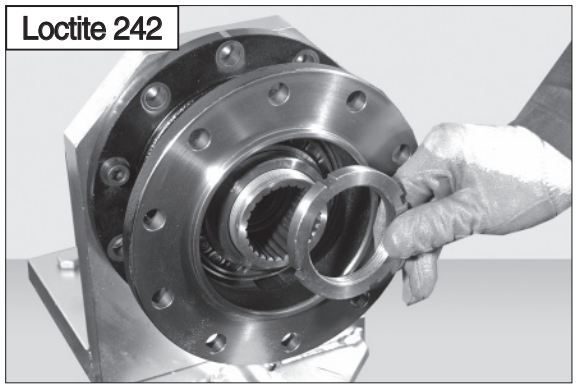
7409FAX242

(13) Insert distance piece (3)



7409FAX243

(14) Apply loctite 242 to the thread of the pinion ring nut (10) and screw the nut onto the pinion.



7409FAX244

(15) Lock the wrench T8, rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 61.2~81.6 kgf · m (443~590 lbf · ft).


7409FAX245

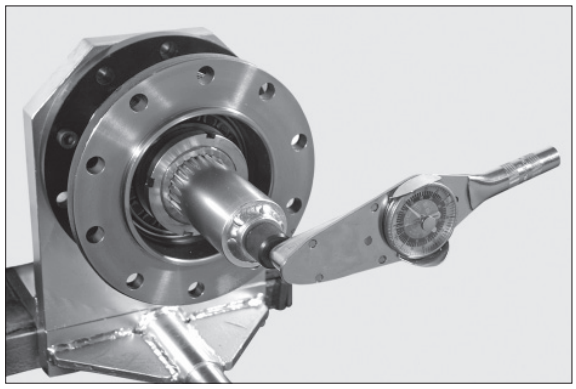
(16) Apply onto the pinion (18) the special tool T8 and with the help of a torque meter, check the torque of the pinion (18).

· Torque : 14.3~19.4 kgf · cm

※ If torque exceeds the maximum value, then the size of shim “S1” (14) between the bearing (4) and the distance piece (15) needs to be increased.
If torque does not reach the set value, increase the torque setting of the ring nut (10) in different stages to obtain a maximum value of 61.2~81.6 kgf · m (443 ~590 lbf · ft)

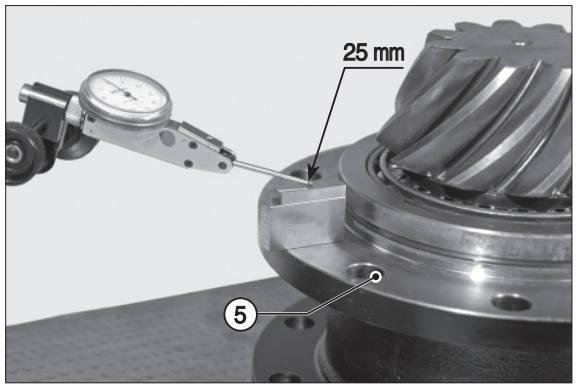
※ If torque does not reach the minimum value, then the size of shim “S1” (14) needs to be reduced.

※ When calculating the increase or decrease in size of shim “S1”, bear in mind that a variation of shim of 0.01 mm corresponds to a variation of 6.12 kgf · cm in the torque of the pinion (18).


7409FAX246

Calculating pinion center distance

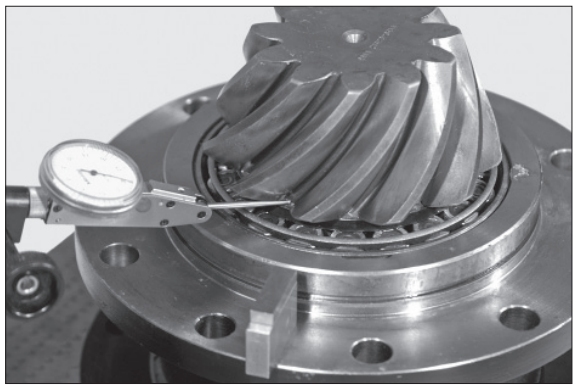
(17) Using a faceplate, reset a centesimal comparator “DG” on a calibrated block (whose known thickness is 25 mm).



7409FAX247

(18) Bring internal bearing (2) under comparator “DG”, test the difference for calculating of D

D= 25+H = 25+0.5 = 25.8 mm

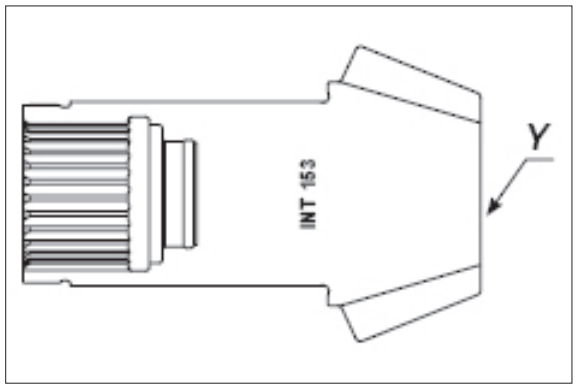


7409FAX248

(19) Check nominal dimension “I” as marked on the pinion. Add up to or subtract from “I” the variation indicated as “Y” to obtain the actual center distance “I”.

Example :

I = INT ± Y = 153 - 0.1= 152.9 mm



7409FAX249

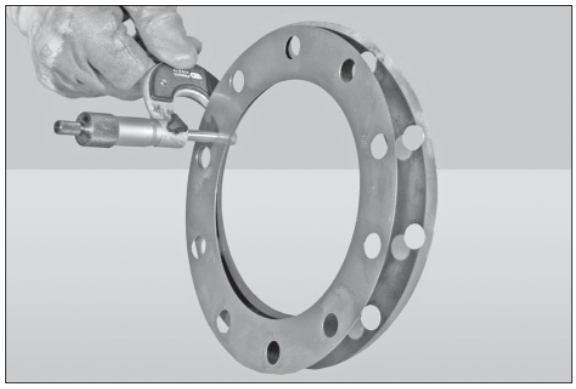
(20) Shims “S” for insertion :

S=(I+D)-X=(152.9+25.5)-178=0.7 mm

I = Actual pinion center distance

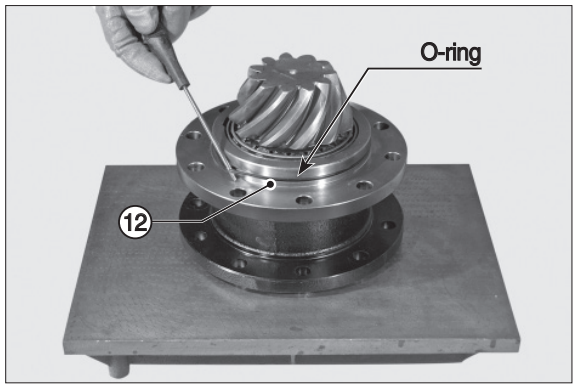
D = Bearing distance

X = 178 mm = Fix dimension



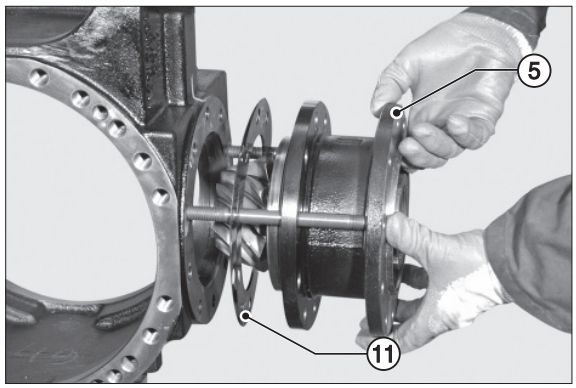
7409FAX250

(21) Install a new seal ring (12).
Lubricate the seal ring before fitting.



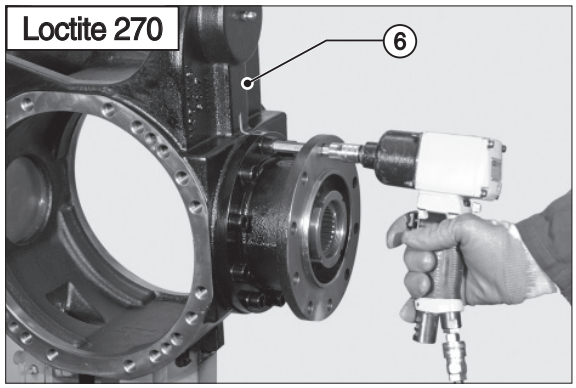
7409FAX251

(22) Install shims (11) and cover (5).



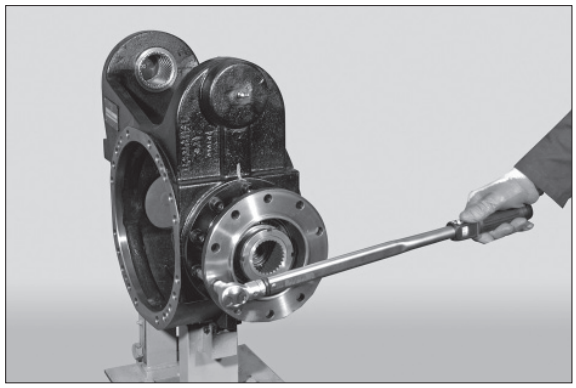
7409FAX252

(23) Secure in position with the screws (6) and relative washers (7), coated with loctite 270.

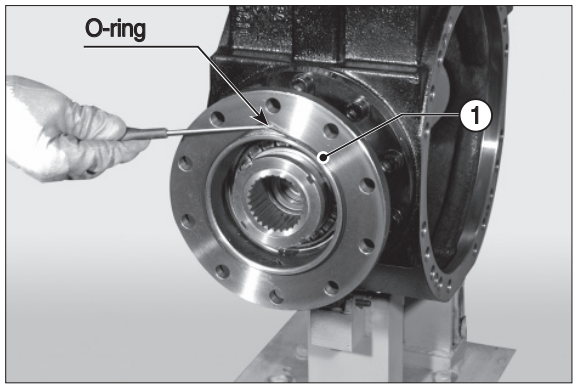


7409FAX253

(24) Using the criss-cross method and a tightening torque of 13.2~14.6 kgf · m (95.5~106 lbf · ft)

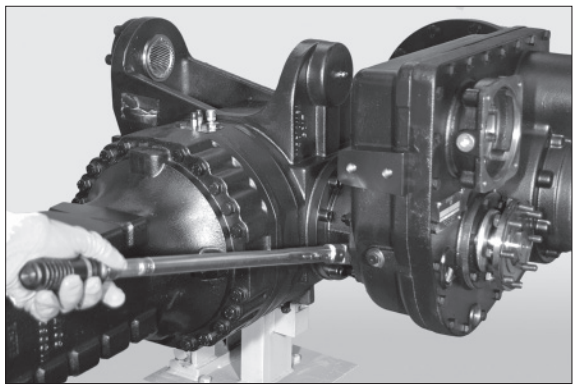

7409FAX254

(25) Install a new seal ring (1).
Lubricate the seal ring before fitting.



7409FAX255

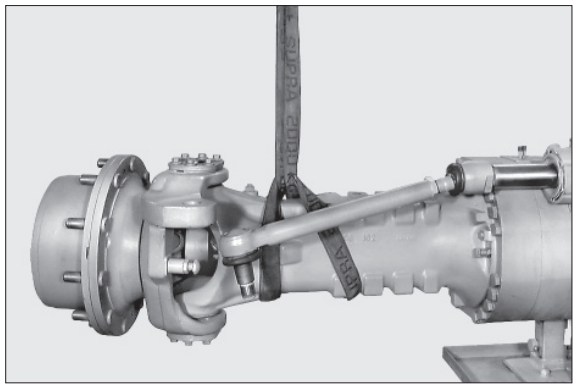
(26) Refit the reduction unit onto the axle.
Fasten the support planes (turn flange to assist assembly).
Insert nuts by applying loctite 242.
Tighten nuts using a torque wrench setting of 13.2~14.6 kgf · m (95.5~106 lbf · ft).


7409FAX256

13) REMOVING AND DISASSEMBLING THE HYDRAULIC DIFFERENTIAL UNIT

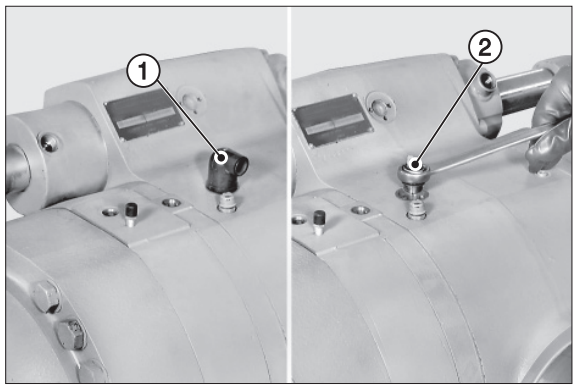
Removal

(1) Pull out the arms.
For details, see CHECKING WEAR AND REPLACING THE BRAKE DISCS.



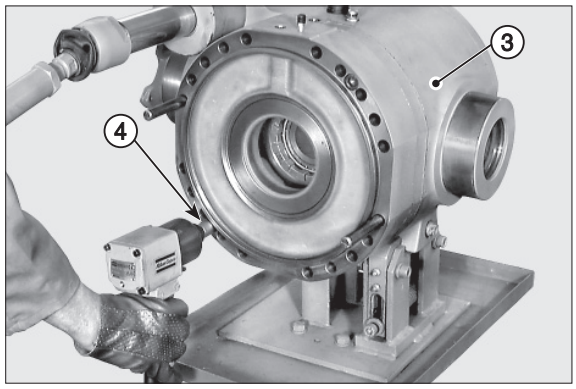
7409FAX257

(2) Remove both guard (1) and differential-lock-enabled microswitch indicator(2).



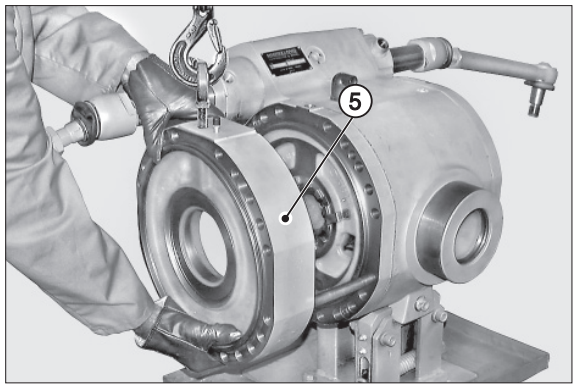
7409FAX258

(3) Tighten two safety studs "A" (M16) in two opposing holes in the main body (3).
Loosen and remove the screws (4).



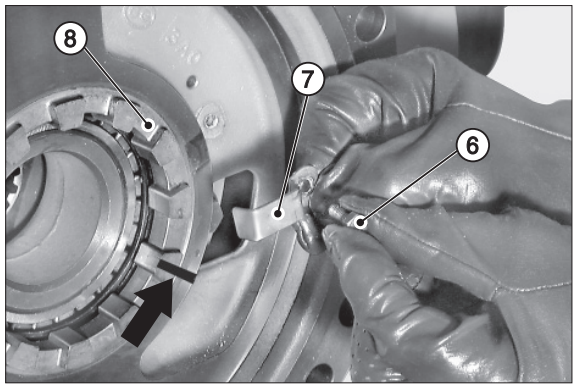
7409FAX259

(4) Connect to a hoist and remove the whole brake cylinders (5).



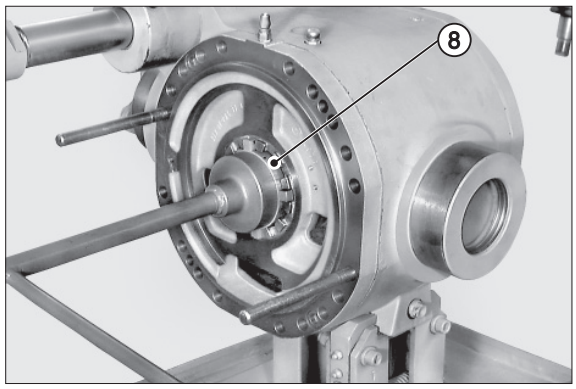
7409FAX260

(5) Remove screws (6) and safety stops (7) from adjustment ring nuts (8).



7409FAX261

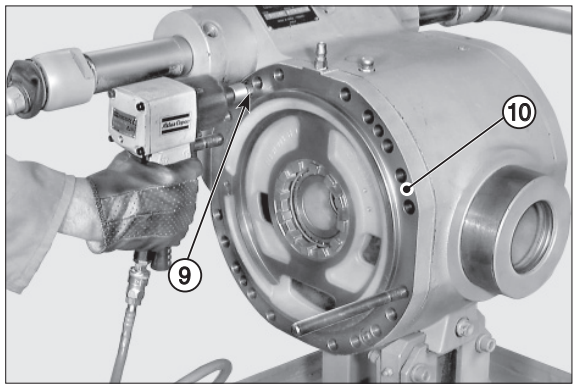
(6) Only if locking piston seal is replaced :
make positional match marks across the adjustment ring nut on non-gear ring side. Loosen the ring nut (8) by about 6 mm (4 turns).



7409FAX262

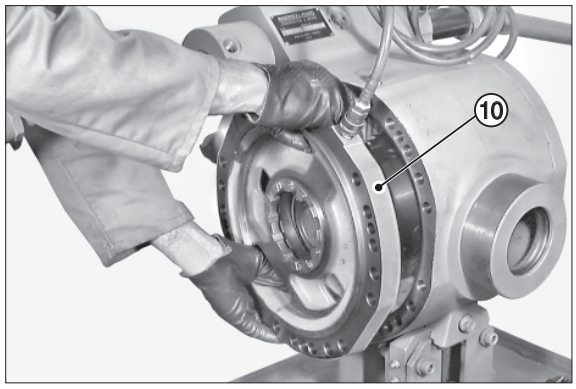
(7) Loosen and remove check screws (9) from intermediate cover (10) and apply a compressed air connection "B" to the lock's pressure intake hole.

Thread : M14 X 1.5



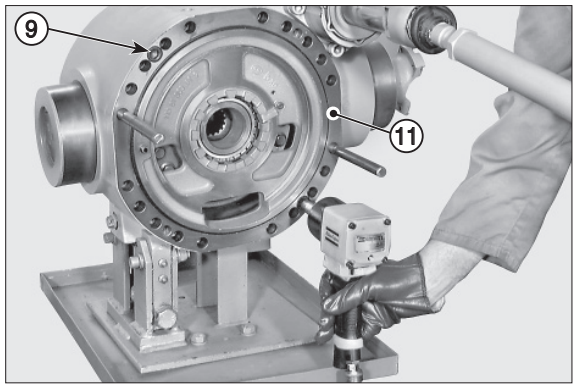
7409FAX263

(8) Introduce low-pressure compressed air through connection "**B**" and make sure that the lock control piston comes out at end of stroke.
Remove safety studs, rotate cover (10) to an angle of about 45˚ and remove cover.



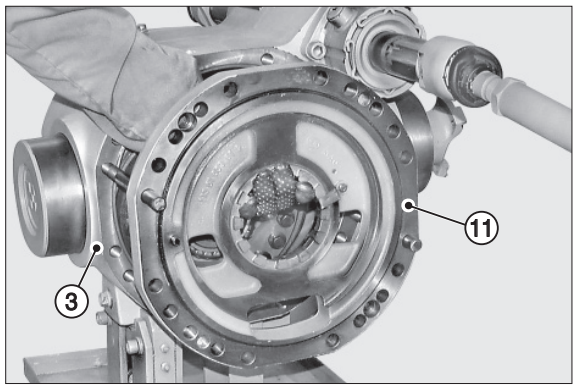
7409FAX264

(9) Tighten two safety studs **"A"** (M16) in the main body.
Loosen and pull out check screws (9) from intermediate cover (11) on gear ring side.



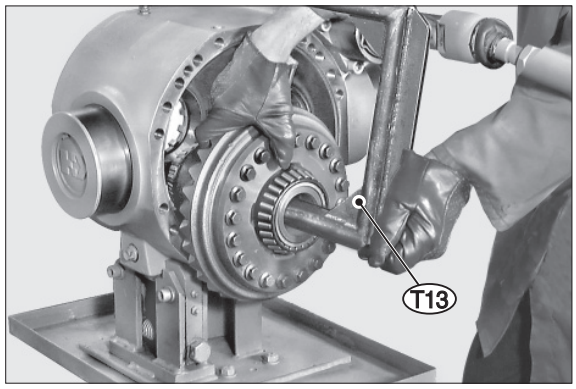
7409FAX265

(10) Support the differential unit and disconnect intermediate cover (11) from main body (3).
Pull out cover (11).



7409FAX266

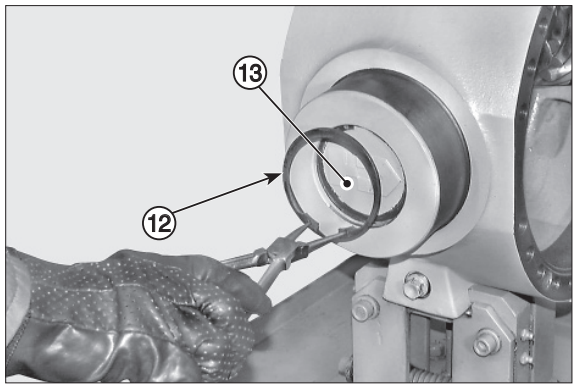
(11) Remove the differential unit by using tool T13; position the unit on a workbench.



7409FAX267

(12) Remove the snap ring (12) and locking cap (13).

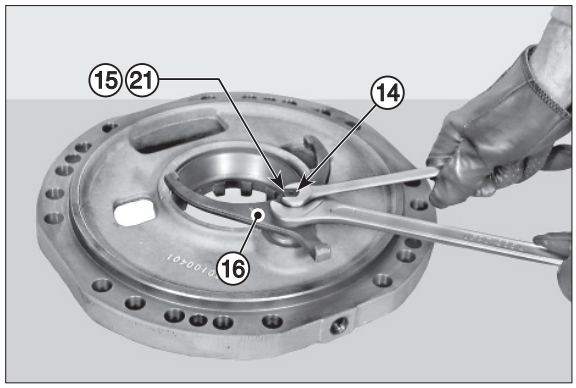
※ Replace the cap at each disassembly.



7409FAX268

Control disassembly

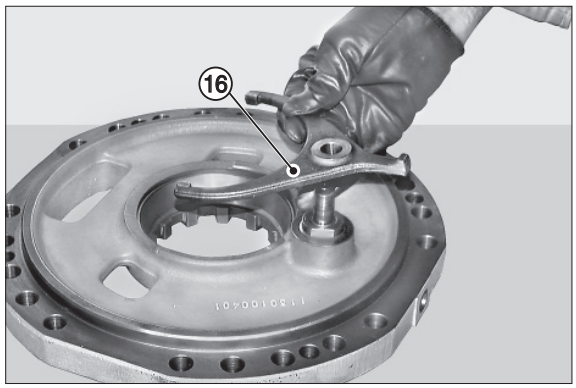
(13) As you hold piston (14) in position, loosen check nut (15) of fork (16).
Remove nut (15) and spring washer (21).



7409FAX269

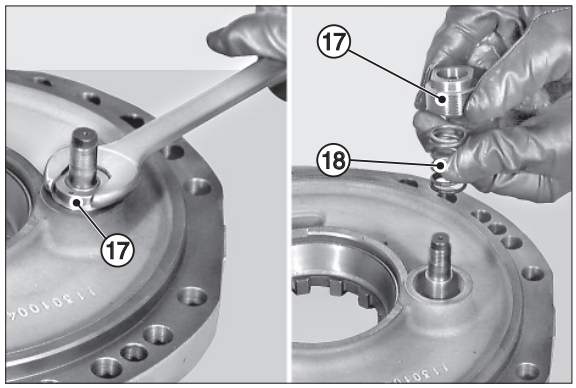
(14) Remove fork (16).

※ Note down direction of installation and thoroughly inspect pad for wear.



7409FAX270

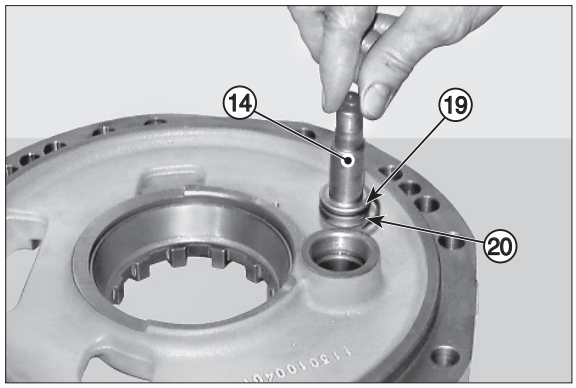
(15) Loosen piston stop ring nut (17); remove ring nut and spring (18).



7409FAX271

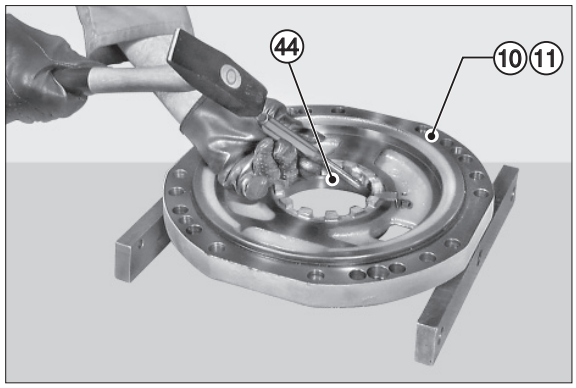
(16) Remove piston (14) complete with O-ring (19) and guide pad (21).

※ Replace pad and O-ring at each disassembly.



7409FAX272

(17) If bearings need replacing, remove the outer thrust blocks of bearings (44) from intermediate covers (10) and (11).

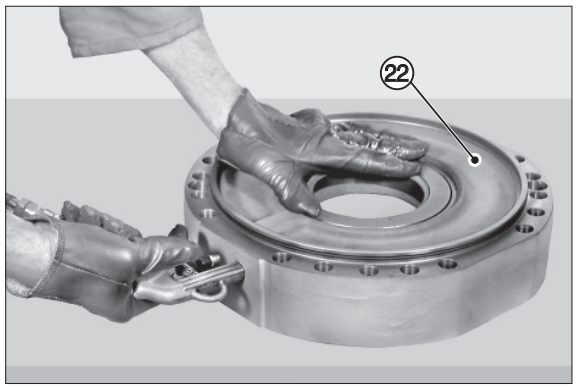


7409FAX273

Disassembling the brake piston

(18) Gently introduce low-pressure compressed air through the connection of the working brake line and eject the whole piston (22).

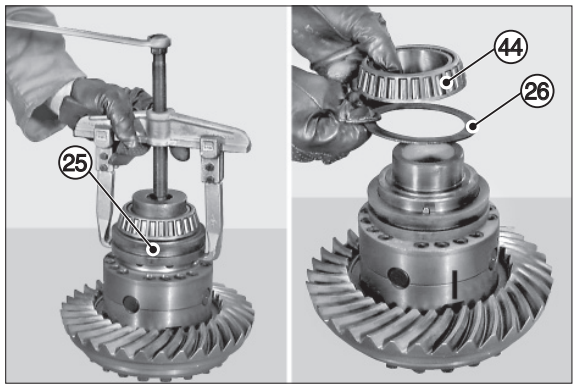
※ Replace seals (23) and (24) and anti-extrusion rings at each disassembly.



7409FAX274

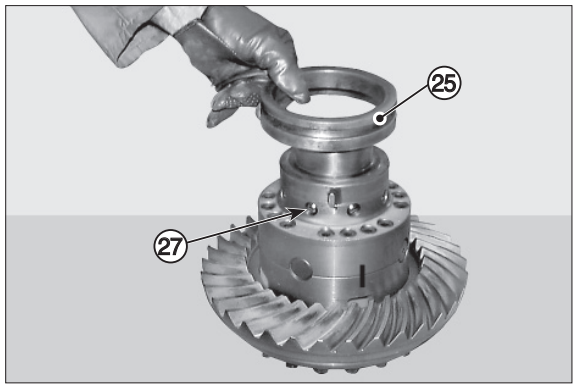
Disassembling the differential gear

(19) With a puller applied under coupling (25), pull out bearing (44) and shoulder (26) for coupling (25).



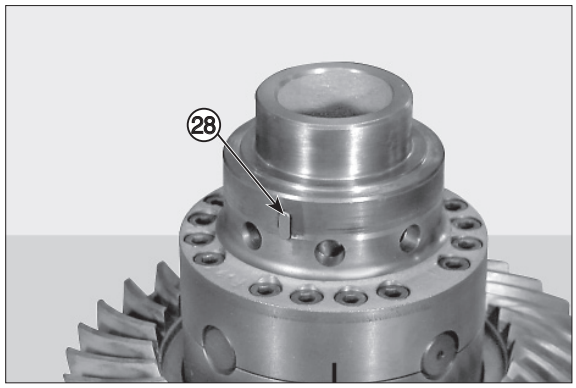
7409FAX275

(20) Remove coupling (25) and collect the drive balls (27).



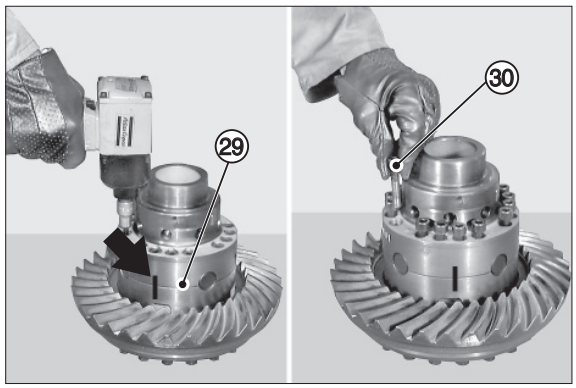
7409FAX276

(21) **Only if necessary** : remove guide key (28) from coupling (25).



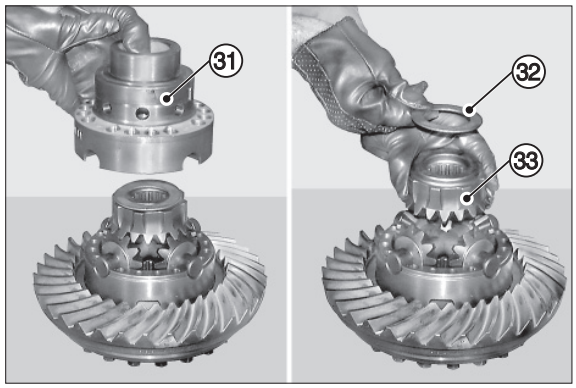
7409FAX277

(22) Make positional marks on the half-boxes of differential (29); loosen and remove joining screws (30).



7409FAX278

(23) Remove upper half box (31), and then pull out shoulder ring (32) and crown wheel (33).

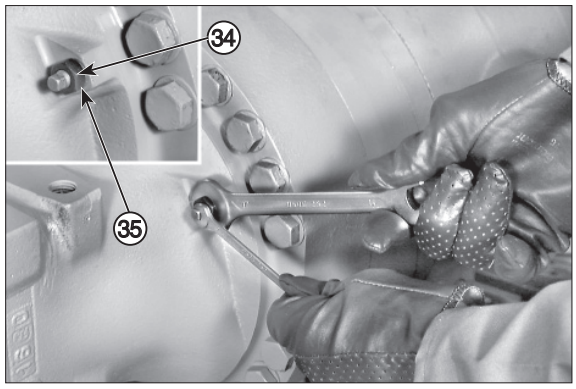


7409FAX279

(24) Complete differential disassembly procedure by following the instructions given in REMOVING AND DISASSEMBLING THE DIFFERENTIAL UNIT.

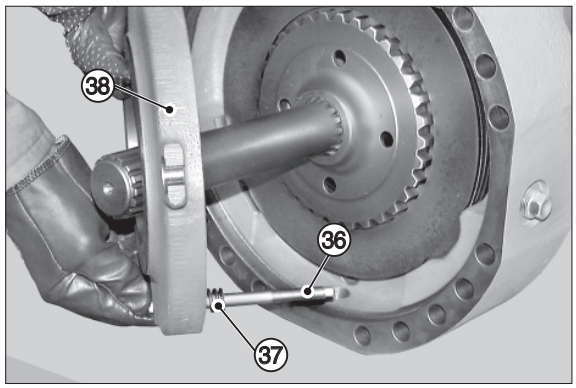
Replacing the brake discs

(25) Loosen and then remove lock nuts (34) (3EA) ; also remove seal washers (35).



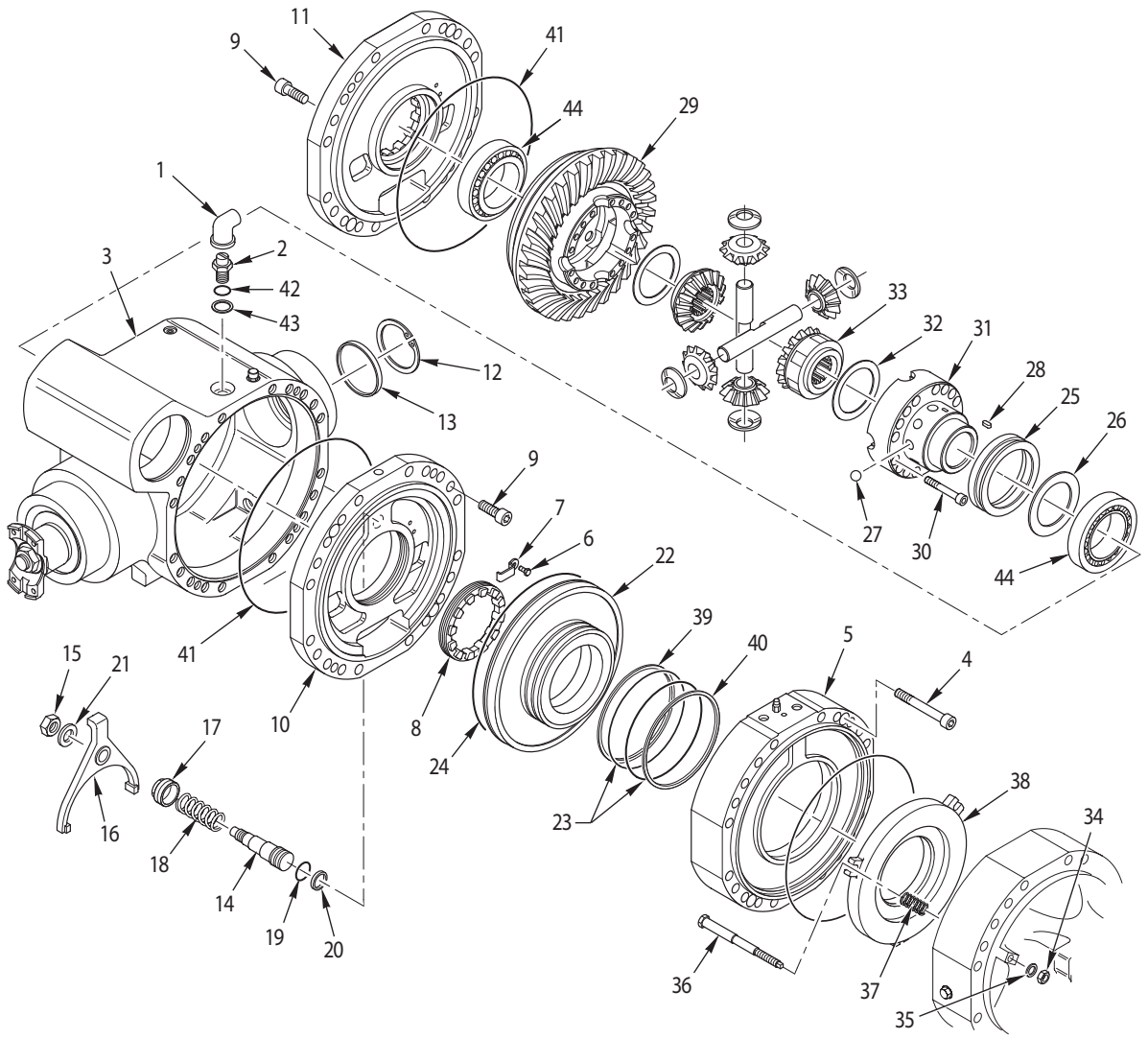
7409FAX280

(26) Remove screws (36), springs (37) and pressure plate (38).
Proceed by removing the brake discs.
(for details, see REPLACING DISCS AND BRAKE SEALS).



7409FAX344

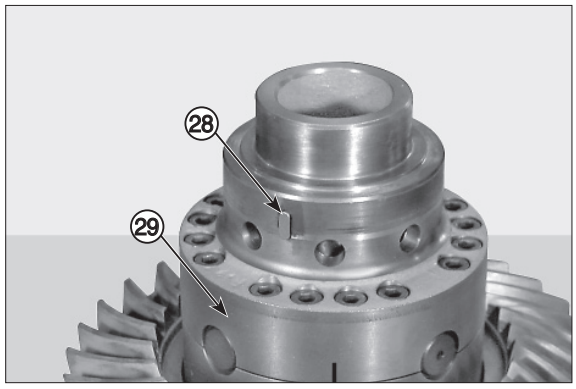
14) ASSEMNBLING AND INSTALLING THE HYDRAULIC DIFFERENTIAL UNIT



7409FAX281

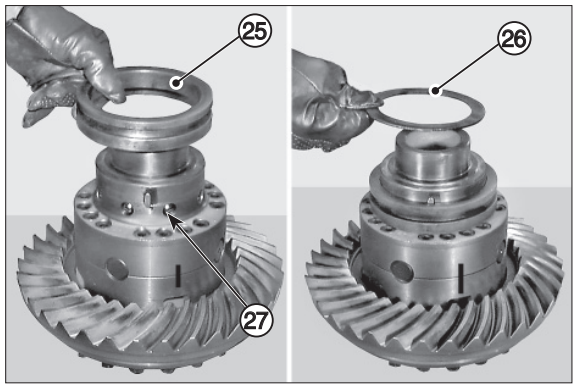
Only if differential has been disassembled

(1) Assemble the differential unit (29).
For details, see ASSEMBLING THE DIFFERENTIAL UNIT.
Put the guide key (28) of coupling (25) in place.



7409FAX282

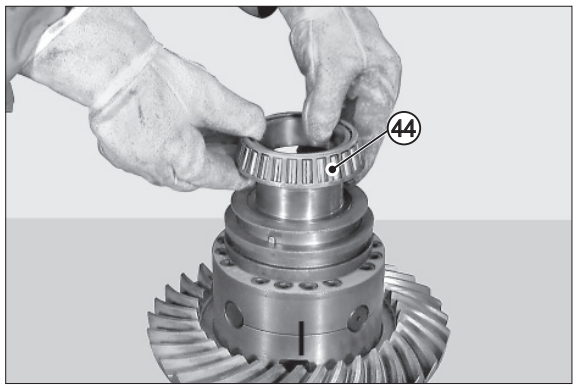
(2) Grease the ball slots and fit in the balls (27), coupling (25) and shoulder (26).



7409FAX283

(3) Heat bearing (44) to approx. 90˚C and install on the differential.

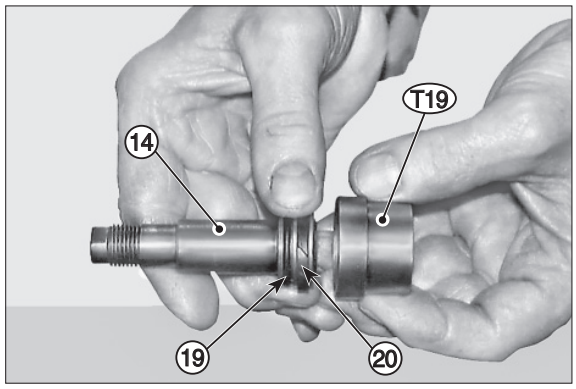
※ Make sure that the bearing is securely engaged.



7409FAX284

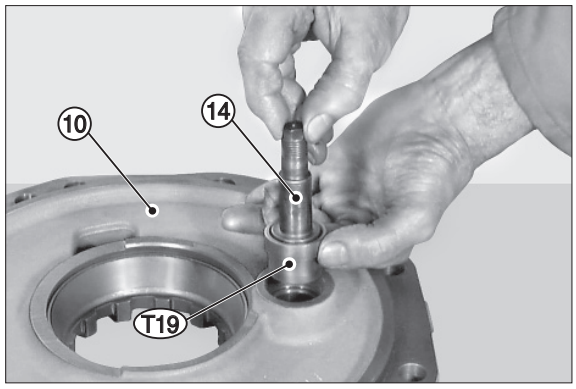
Assembling lock control

(4) Fit O-ring (19) and guide ring (20) onto piston (14).
Lubricate the seals and introduce the unit in tool T19.



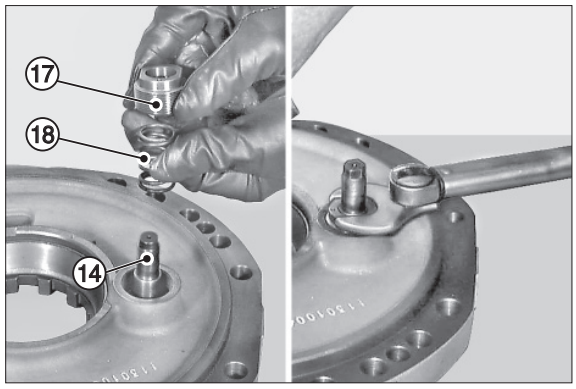
7409FAX285

(5) Place tool T19 on the intermediate cover (10) and push piston (14) into its seat.



7409FAX286

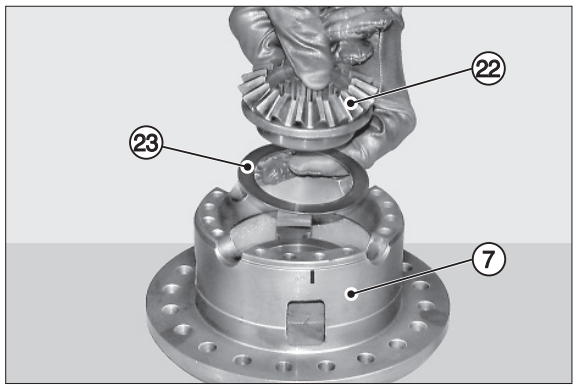
(6) Fit spring (18) and ring nut (17) on piston (14). Tighten the ring nut by a few turns, apply a coat of loctite 242 to the ring nut and tighten to a torque of MAX 5.1 kgf · m (36.9 lbf · ft) using a dynamometric wrench.



7409FAX287

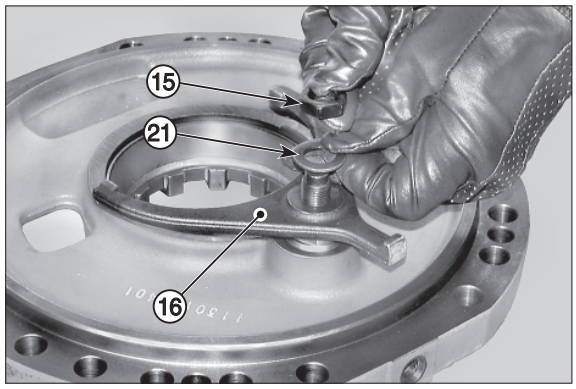
(7) Fit fork (16) on piston (14) and make sure fork orientation is correct.

※ Microswitch activation cam "A" must face upwards.



7409FAX288

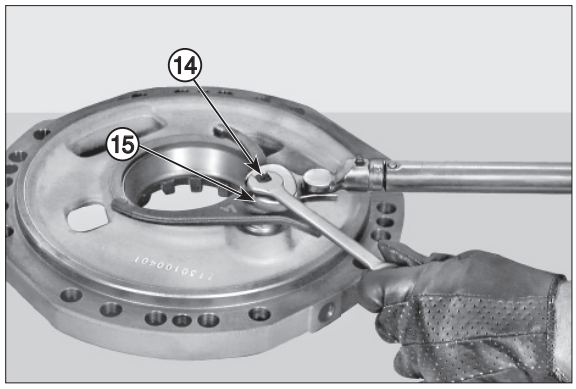
(8) Secure fork (16) with snap washer (21) and nut (15).



7409FAX289

(9) As you hold piston (14) in position, lock the nut (15) with a dynamometric wrench.

· Tightening torque : 22.9~23.5 kgf · m
(166~170 lbf · ft)

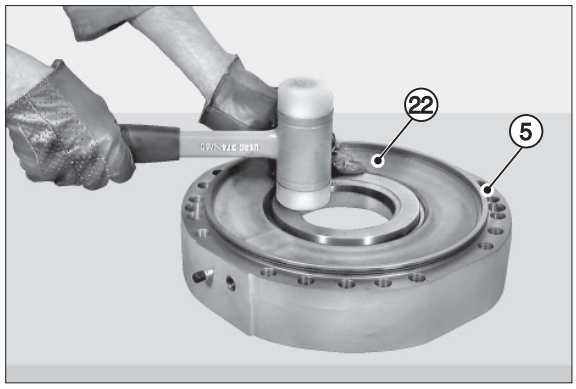


7409FAX290

Assembling the brake piston

(10) Fit O-rings (23), (24) and anti-extrusion rings (39) and (40) on piston (22).

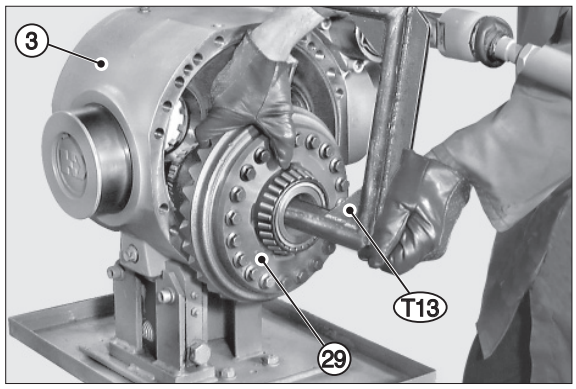
※ Throughly check the positioning of anti-extrusion rings (39) and (40).
Lubricate the seals and introduce piston (22) into cylinder (5).



7409FAX291

Installation

(11) Using tool T13, introduce the whole differential (3) into the main body (29).

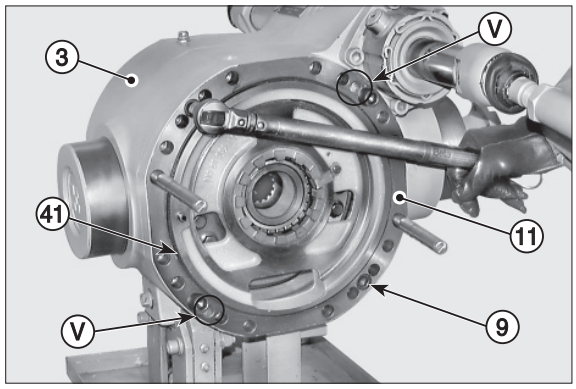


7409FAX292

(12) Tighten two safety studs in the main body (3) and install the intermediate cover (11). Lock in position with screws "**V**" tightened to a matching torque.

· Tightening torque : 13.3~14.6 kgf · m
(96.2~106 lbf · ft)

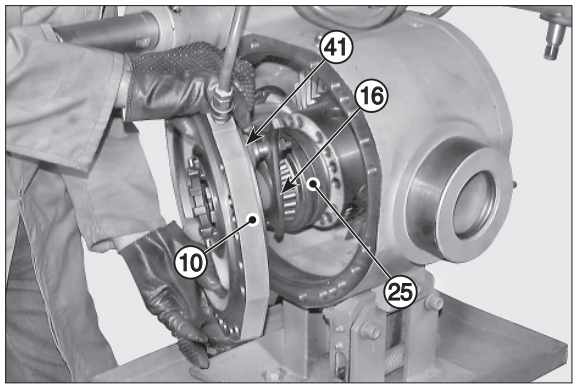
※ Check the state of the O-ring (41).



7409FAX293

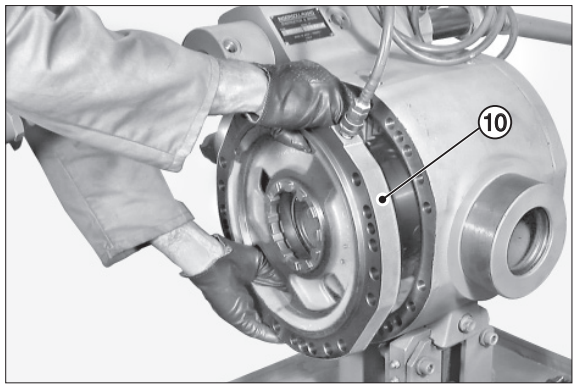
(13) Introduce low-pressure compressed air through connection "**B**" and make sure that the lock control piston comes out at the end of stroke.
Rotate the intermediate cover (10) to an angle of about 45˚; engage the fork (16) in the lock control coupling (25).

※ Check the condition of the O-ring (41).



7409FAX294

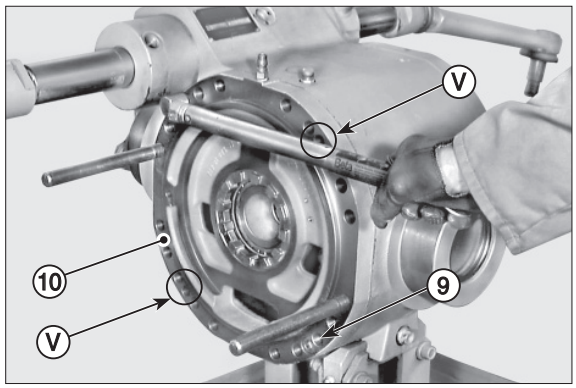
(14) As you hold the fork in position (16), rotate the intermediate cover into its final position (10).
To lock into position, tighten two safety studs "**A**" in two opposing holes.



7409FAX295

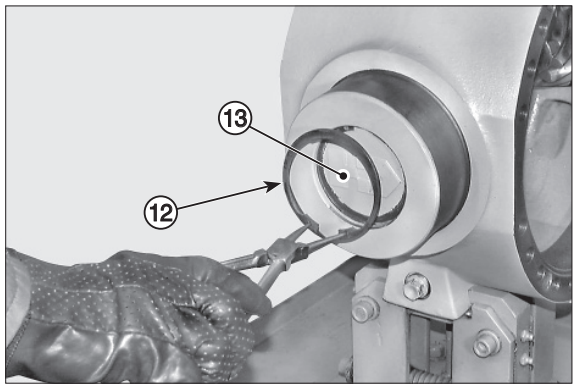
(15) Clear any compressed air and finally move the intermediate cover (10) into its seat. Lock into position with nuts "**V**" tightened to matching torque.

· Tightening torque : 13.3~14.6 kgf · m
(96.2~106 lbf · ft)



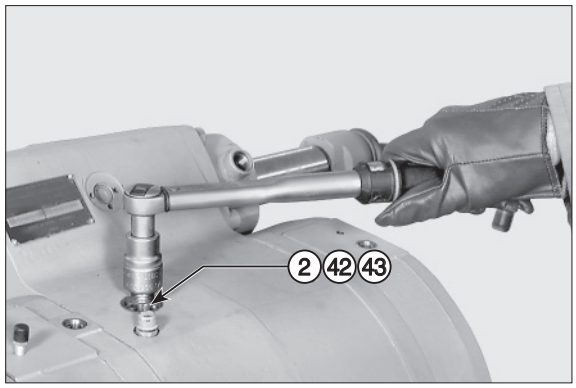
7409FAX296

(16) If necessary, adjust differential clearances (see ASSEMBLING THE DIFFERENTIAL UNIT).
Fit the cap (13) and snap ring (12).

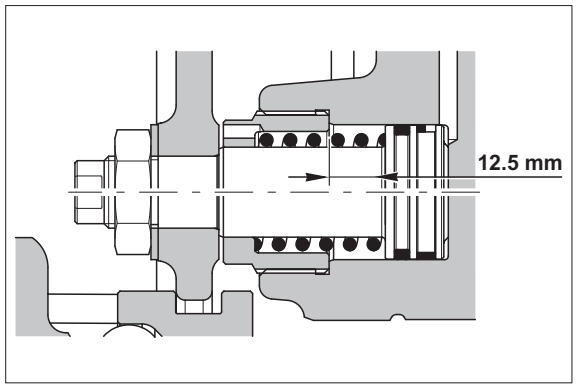


7409FAX297

(17) Fit the microswitch (2) complete with the O-ring (42) and the relative retainer ring (43).
Install the arms (see CHECKING WEAR AND REPLACING THE BRAKING DISCS).



7409FAX298

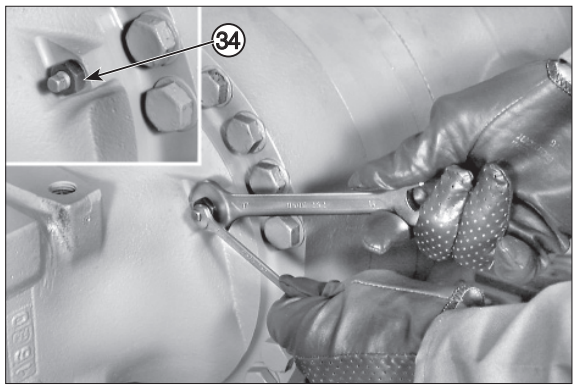


7409FAX299

15) ADJUSTING THE SERVICE BRAKE

※ Perform brake adjustment on both sides of the axle.

(1) Loosen the lock nuts (34) and unscrew by a few turns.

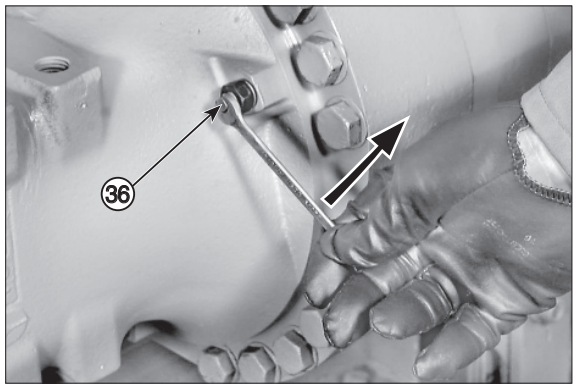


7409FAX300

(2) Introduce pressure at 20.4~30.6 kgf/cm^2 (290~435 psi) bar into the service brake. Turn the adjusting screws (36) anti-clockwise until they lean against the pressure plate.

Clearance between discs = 0 mm

※ Turn the screws gradually and by the same measure until a max. torque of 1.02 kgf · m (7.38 lbf · ft) is obtained.

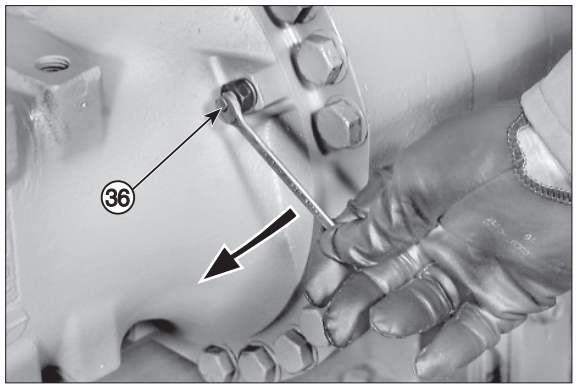


7409FAX301

(2) Once the jut of the three screws (36) has been checked and found to be equivalent, turn the screws clockwise to restore disc clearance :

1 turn =1 mm

3/4 of a turn = 0.75 mm

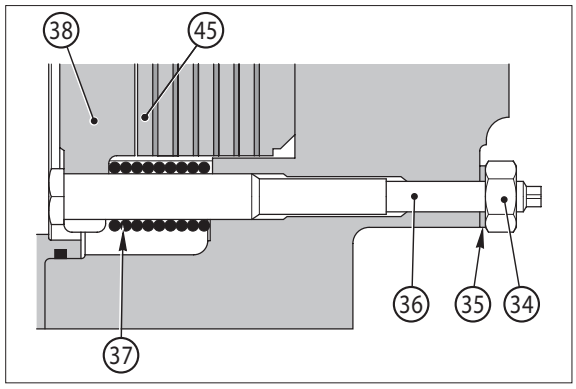


7409FAX302

(3) As you hold the screws (36) in position, lock the nuts (34).

· Nut tightening torque : max 1.53 kgf · m (11.1 lbf · ft)

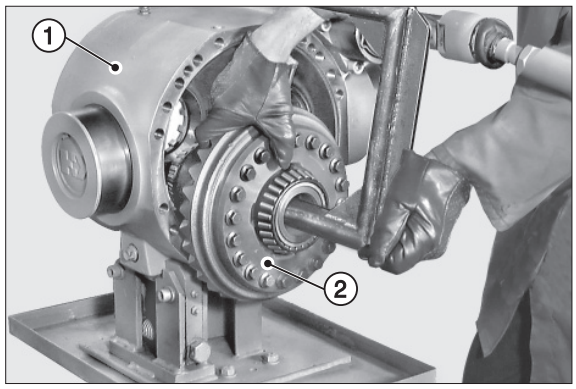
Release pressure from service brake.



7409FAX303

16) REMOVING AND DISASSEMBLING THE LIMITED SLIP (45%) DIFFERENTIAL

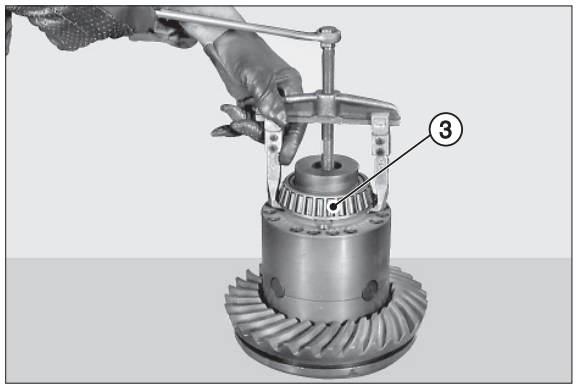
(1) Remove the whole differential unit (2) from the main body (1).
(for details, see REMOVING THE DIFFERENTIAL UNIT).



7409FAX304

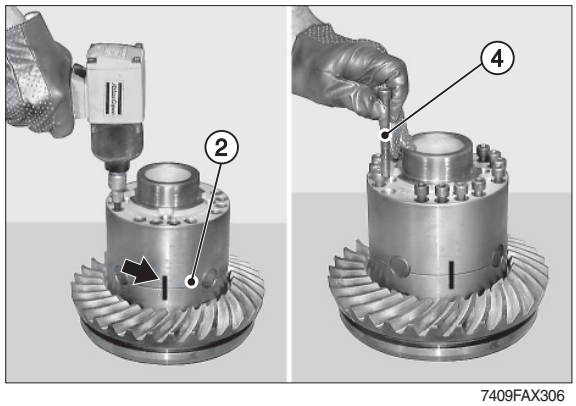
※ The following section includes clutch replacement procedures only; for gear ring replacement, see DISASSEMBLING THE DIFFERENTIAL UNIT.

(2) Using a puller, remove bearing (3).



7409FAX305

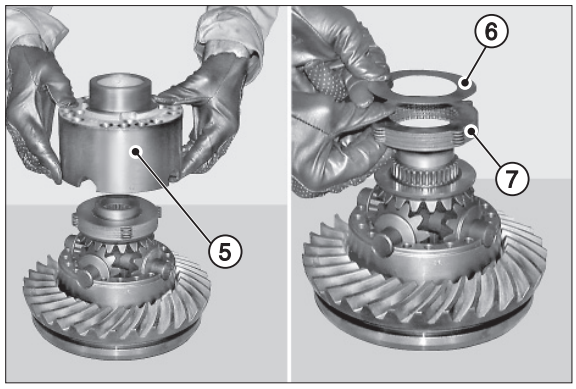
(3) Make positional match marks on the half boxes of the differential gear (2); loosen and pull out joining screws (4).



7409FAX306

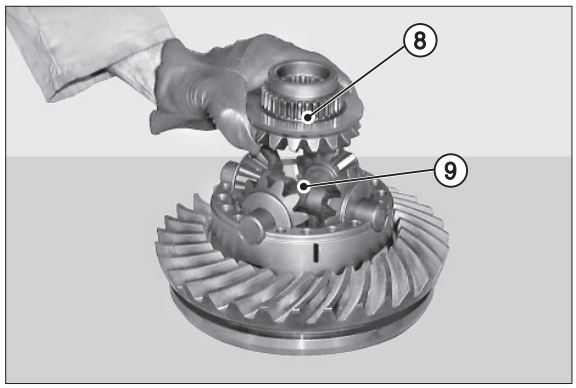
(4) Remove the upper half box (5) and pull out shims (6) and clutch pack (7).

※ If the clutch pack does not need replacing, avoid swapping discs position.



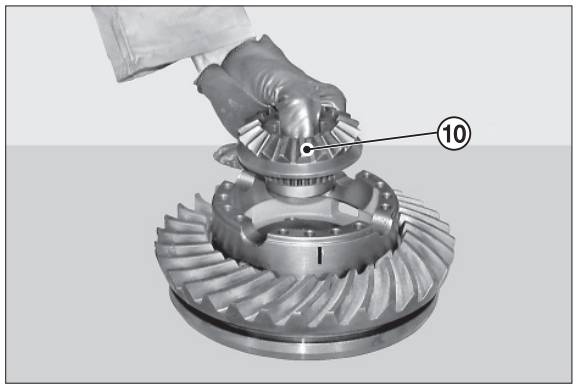
7409FAX307

(5) Remove the crown wheel (8) and planet wheels set (9).



7409FAX308

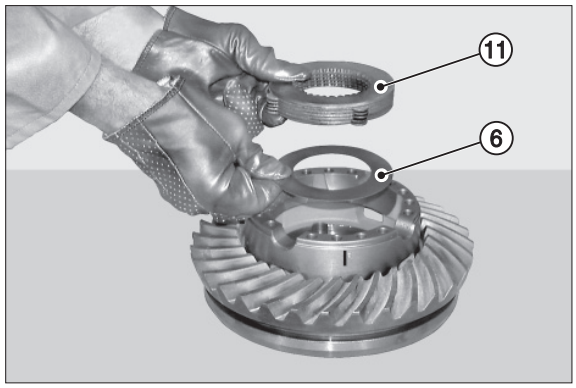
(6) Remove the 2nd crown wheel (10).



7409FAX309

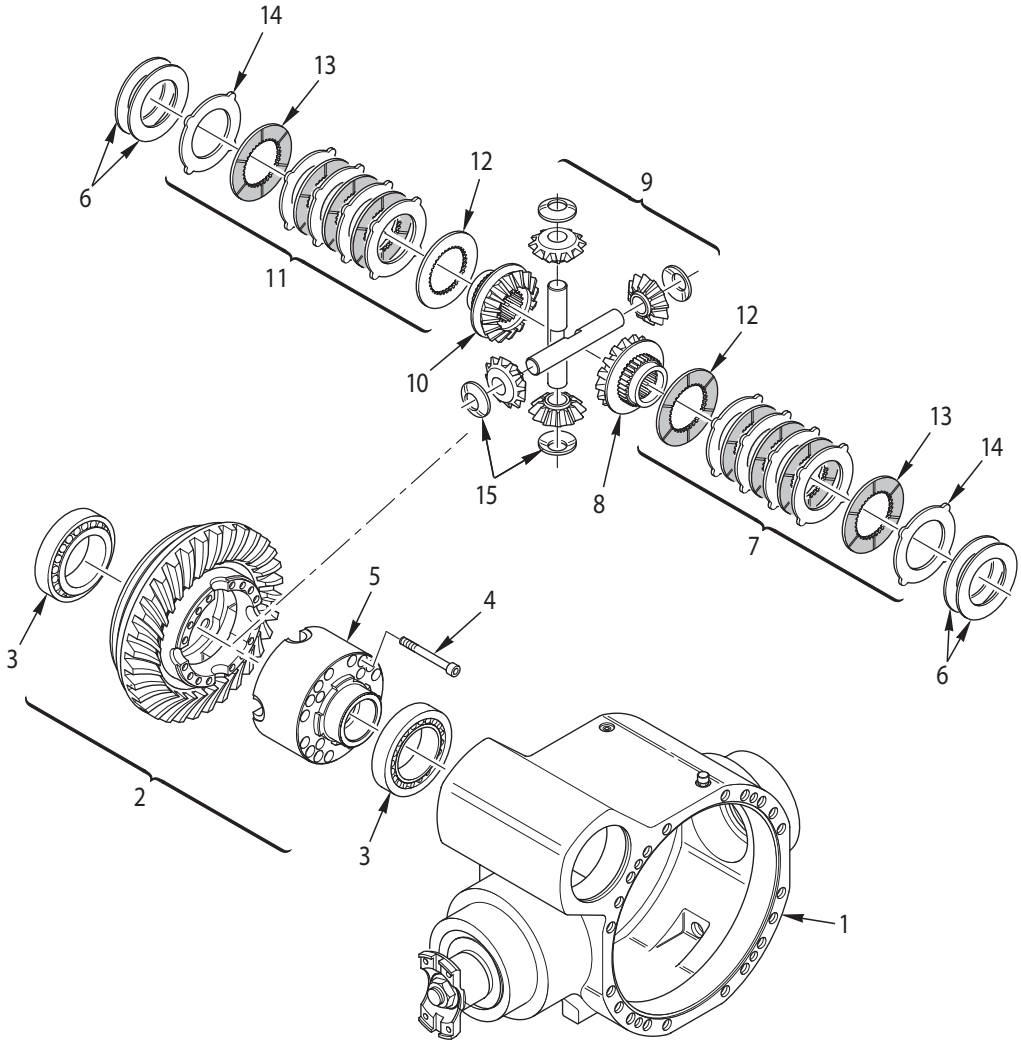
(7) Remove the 2nd clutch pack (11) and shim set (6).

※ If the clutch pack does not need replacing, avoid swapping discs position.



7409FAX310

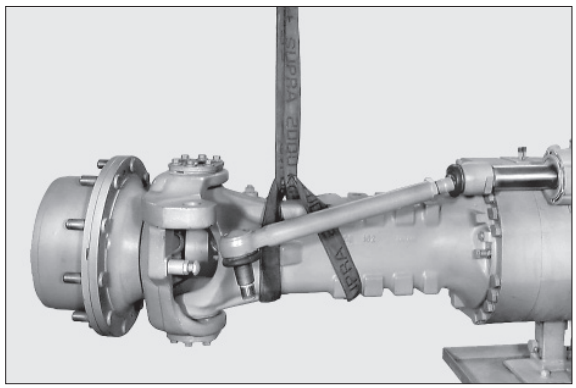
17) REMOVING AND DISASSEMBLING THE DIFFERENTIAL UNIT



7409FAX311

Removal

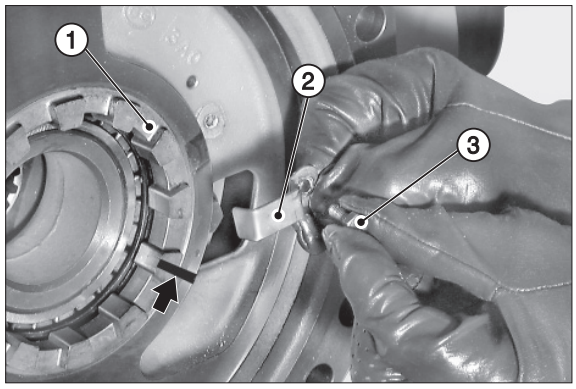
(1) Remove the entire arms and negative brake cylinders.
For details, see CHECKING WEAR-REPLACING DISCS AND BRAKE SEALS.



7409FAX312

Only if need removing or adjusting

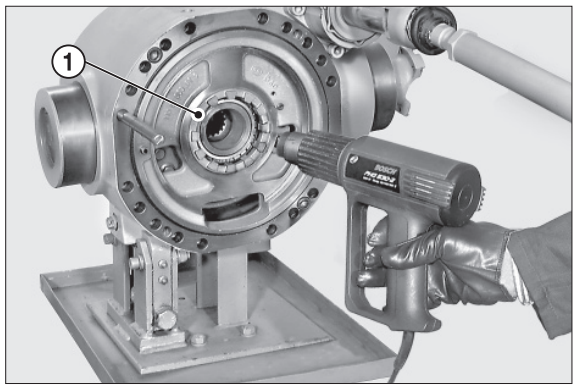
(2) Mark the position of the ring nuts (1). Remove screws (3) and ring nut checks (2).



7409FAX313

Only if need removing or adjusting

(3) Heat the ring nuts (1) uniformly to a temperature of about 80˚C.

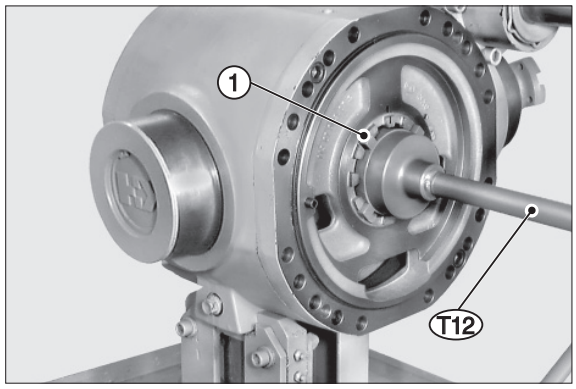


7409FAX314

Only if need removing or adjusting

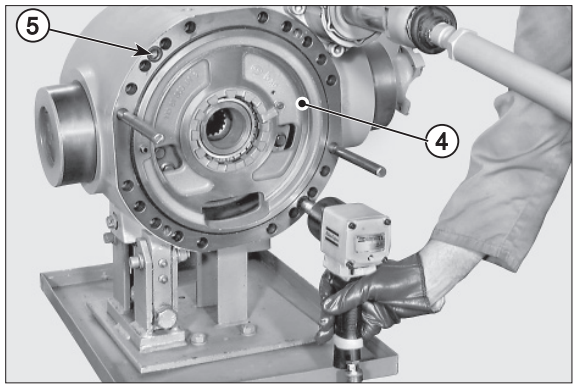
(4) Using tool T12, loosen and remove the ring nuts (1).

※ Accurately remove any trace of sealant from the threads of ring nuts and intermediate covers.



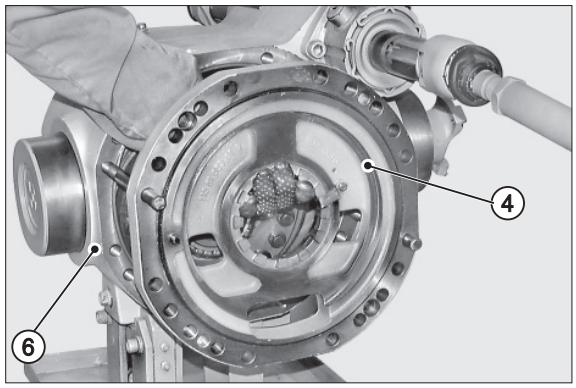
7409FAX315

(5) Tighten two safety M16 studs in the main body.
Loosen and remove the check screws (5) of intermediate cover (4) on gear ring side.



7409FAX316

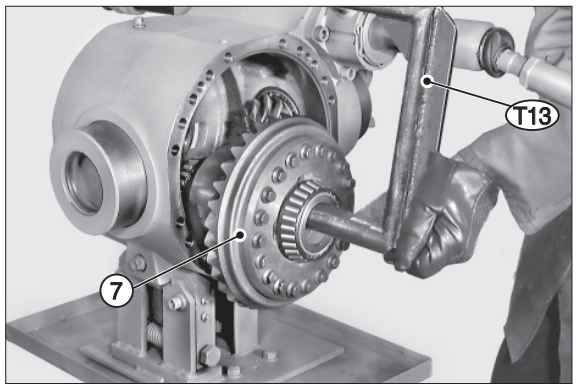
(6) Support the differential unit and separate the intermediate cover (4) from the main body (6).
Remove cover (4).



7409FAX317

(7) Remove the differential unit (7) and place it on a work bench.

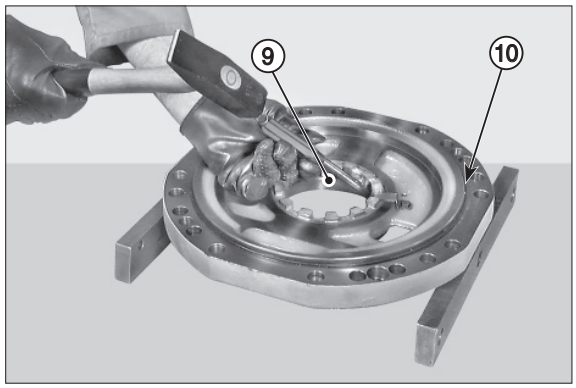
※ Use the tool T13 to ease removal.



7409FAX318

(8) If bearings need replacing, remove the outer thrust blocks of bearings (9) from intermediate covers (4) and (8).

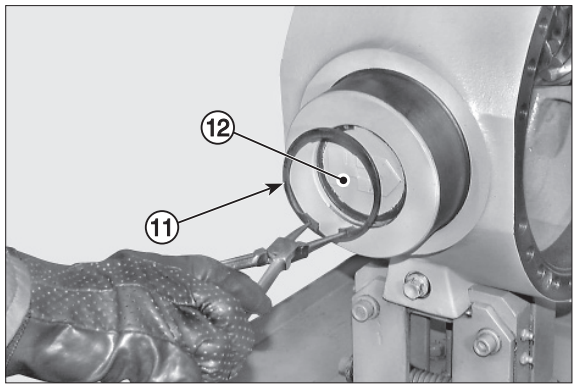
※ Carefully check the O-rings (10).



7409FAX319

(9) Remove snap ring (11) and cap (12).

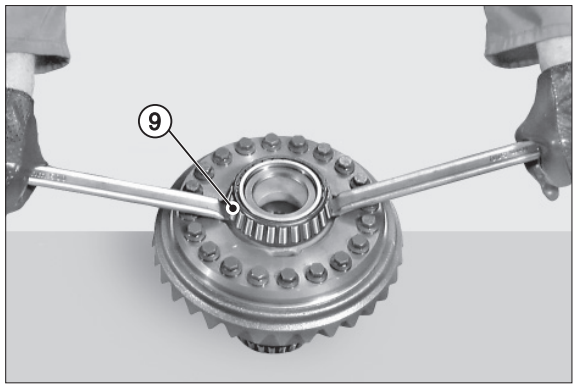
※ Replace cap at each disassembly.



7409FAX320

Disassembly

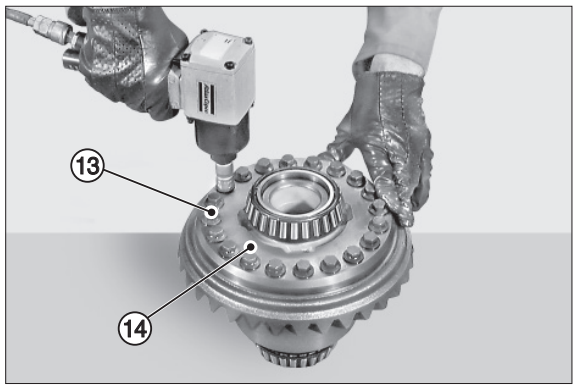
(10) Using two levers, lift bearing (9) on gear ring side by about 8 mm.



7409FAX321

(11) Loosen and remove the check screws (13) of gear ring (14).

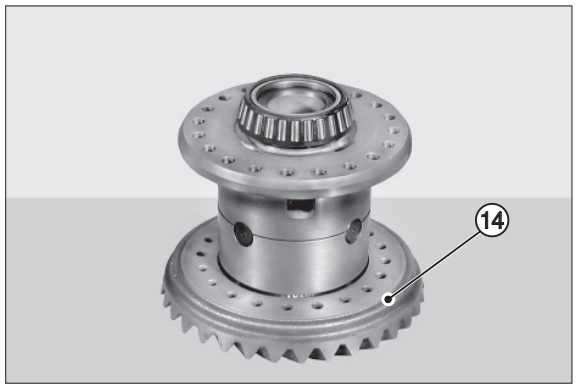
※ The screws must be replaced at each disassembly.



7409FAX322

(12) Remove the gear ring (14).

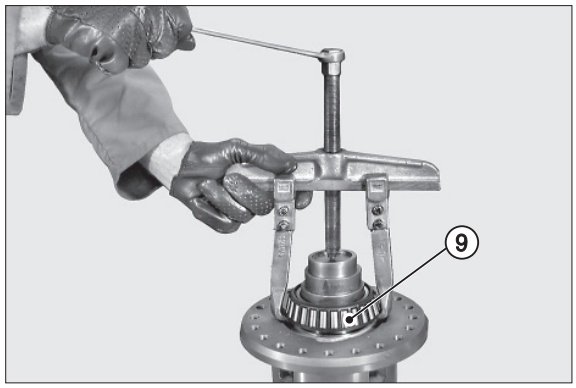
※ If necessary, use a plastic hammer.



7409FAX323

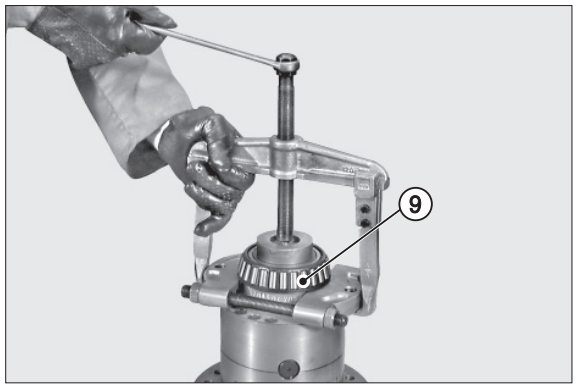
(13) Using a puller, remove bearings from gear ring (9) side.

※ Fit puller in connection with the slots provided.



7409FAX324

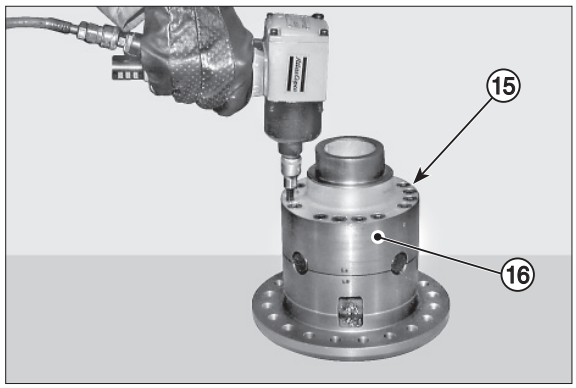
(14) Using a separator and a puller, remove bearing from non gear ring side.



7409FAX325

(15) Loosen and remove check screws (15) from differential box (16).

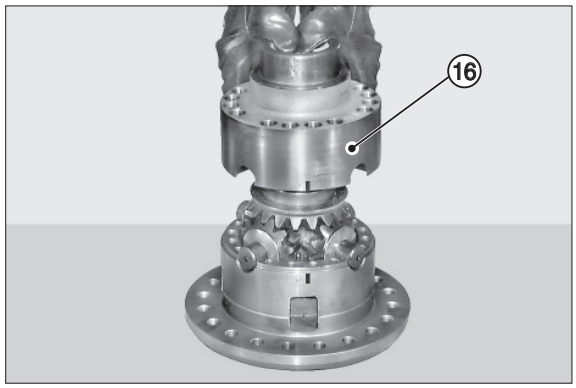
※ The screws must be replaced at each disassembly.



7409FAX326

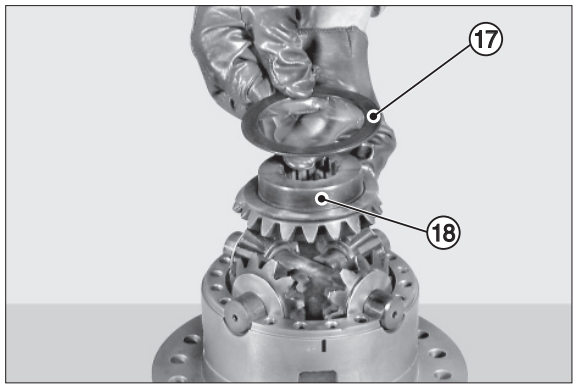
(16) Remove half-box (16).

※ Note down reference marks for joining the two halves.



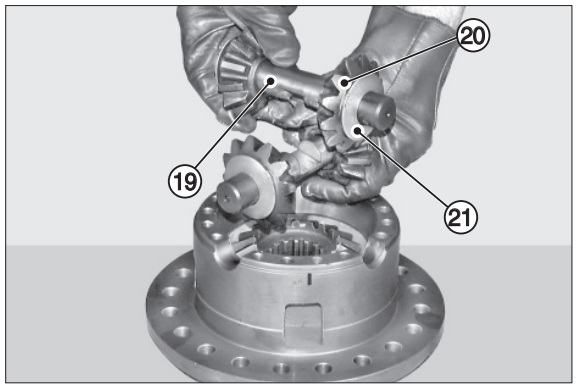
7409FAX327

(17) Remove shoulder (17) and first planetary gear (18).



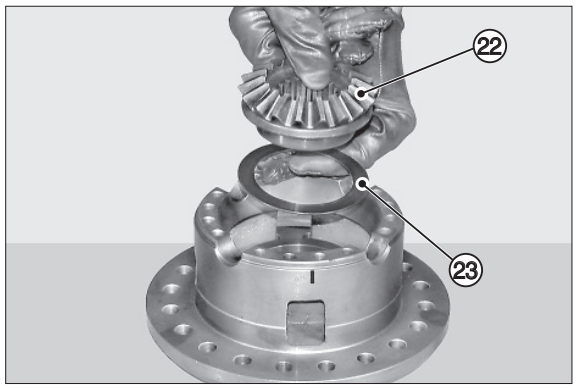
7409FAX328

(18) Remove shafts (19), complete with planet wheels (20) and spherical shoulder washers (21).



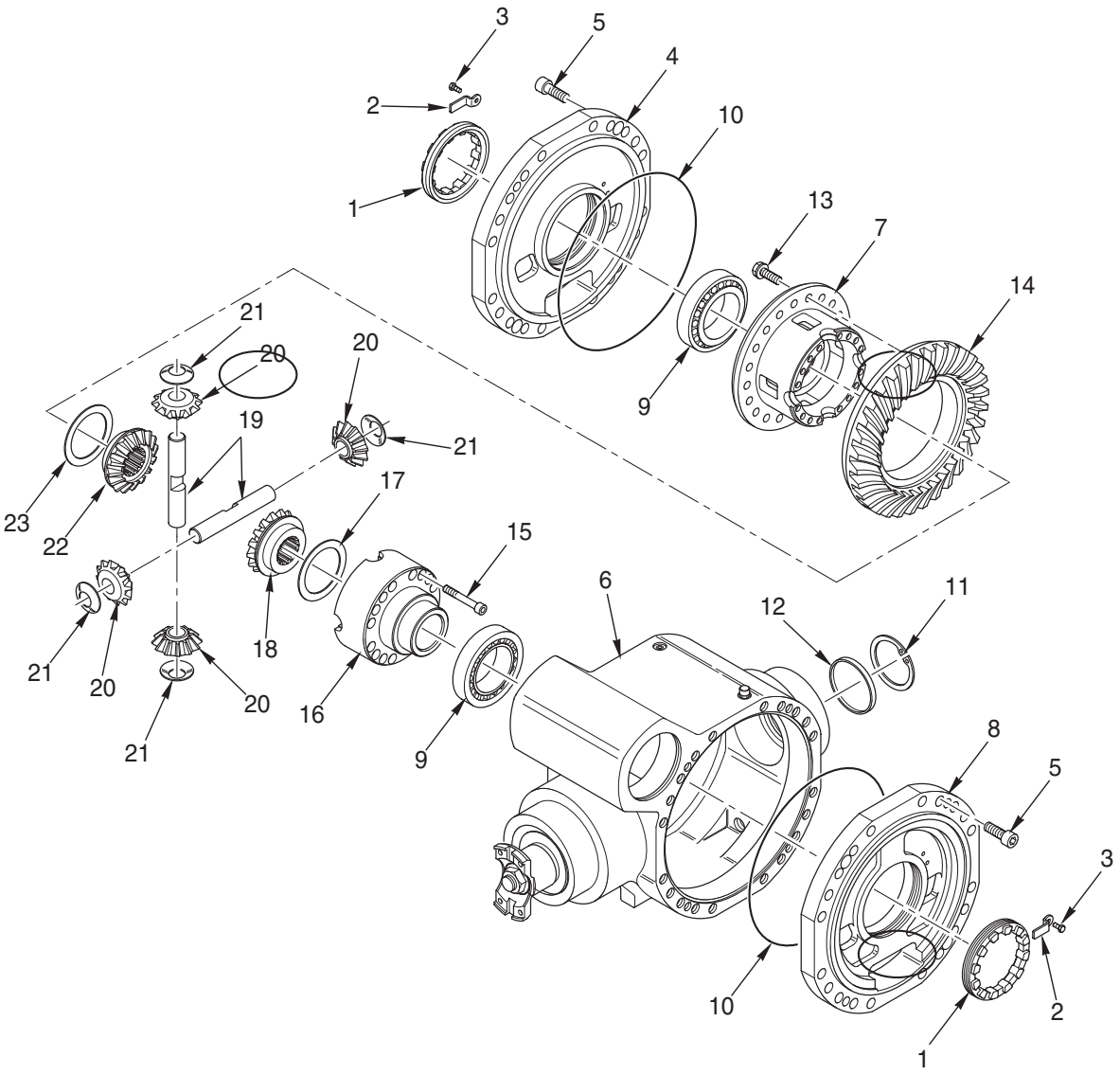
7409FAX329

(19) Remove the 2nd planetary gear (22) and shoulder ring (23).



7409FAX330

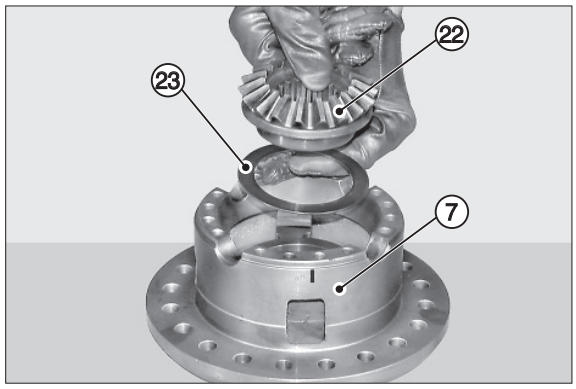
18) ASSEMBLING AND INSTALLATION THE DIFFERENTIAL UNIT



7409FAX331

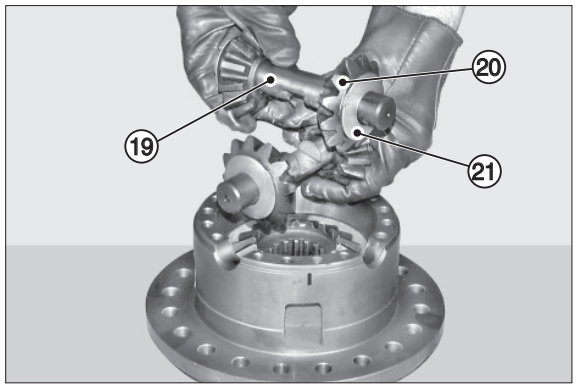
Assembly

(1) Install the shoulder ring (23) and planetary gear (22) into the half-box (7).



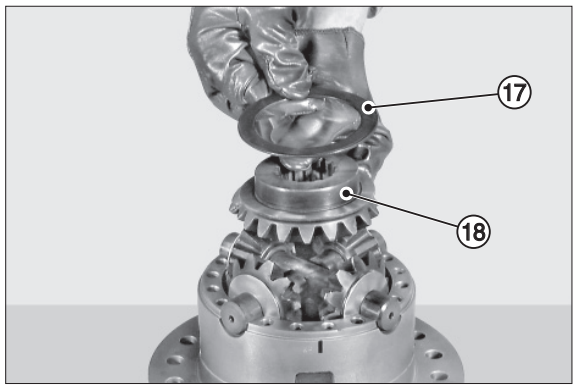
7409FAX332

(2) Install the planetary gears (20) and spherical shoulder washers (21) onto the shafts (19).
Install the assemblies in the half-box (7).



7409FAX333

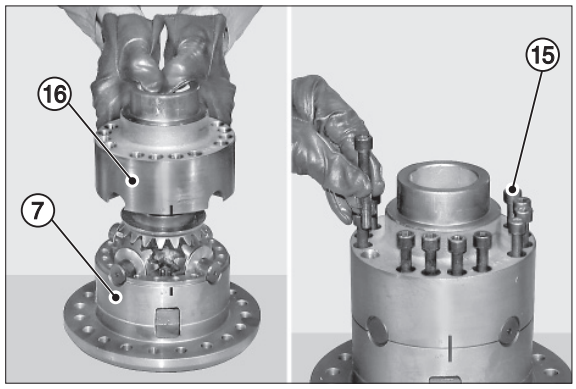
(3) Install the planetary gear (18) and shoulder ring (17).



7409FAX334

(4) Mount the locking half-box (16) onto the half-box (7) and lock it with screws (15) coated with loctite 270. Tighten provisionally by hand.

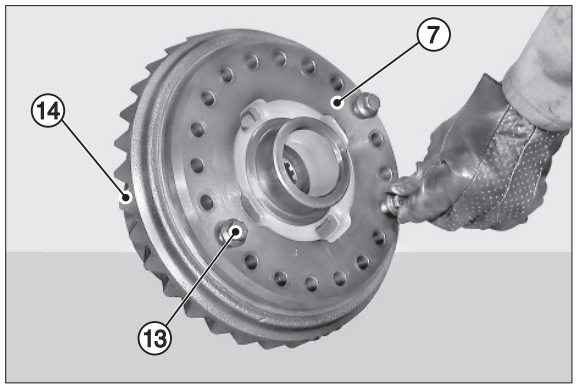
※ 1. The match marks on the two half-boxes must correspond.
2. Use only new screws.



7409FAX335

(5) Mount the gear ring (14) and fasten it to the differential box (7) with screws (13) tightened provisionally by hand.

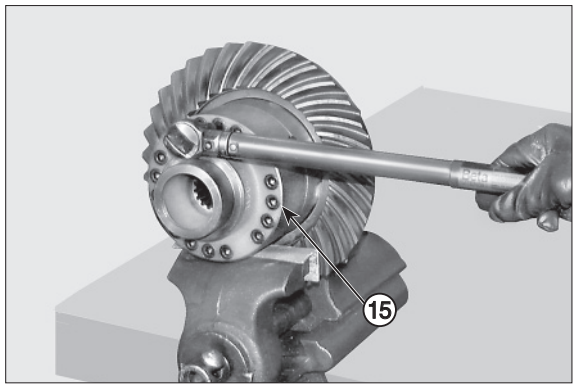
※ Use only new screws.



7409FAX336

(6) Fit the complete differential unit in a vice and tighten the screws (15) holding the two half boxes together to a torque of 14.3~15.7 kgf · m (103~114 lbf · ft).

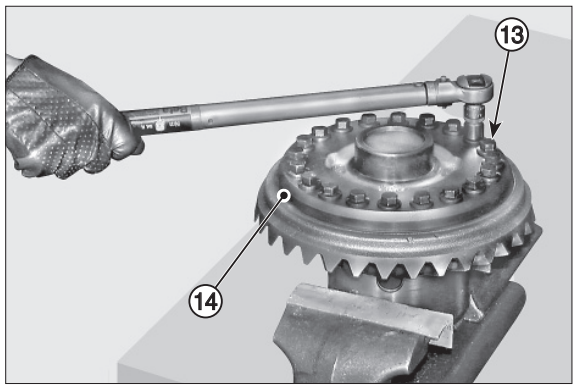
※ Tighten screws using the alternate and criss-cross method.



7409FAX337

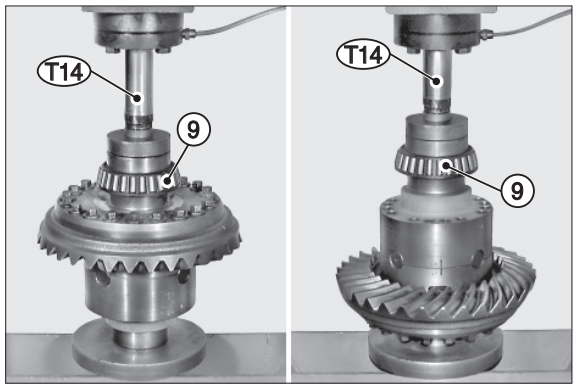
(7) Lock the gear ring (14) by tightening the screws (13) to a torque of 11.7~14.5 kgf · m (84.6~105 lbf · ft).

※ Use the alternate and criss-cross tightening method.



7409FAX338

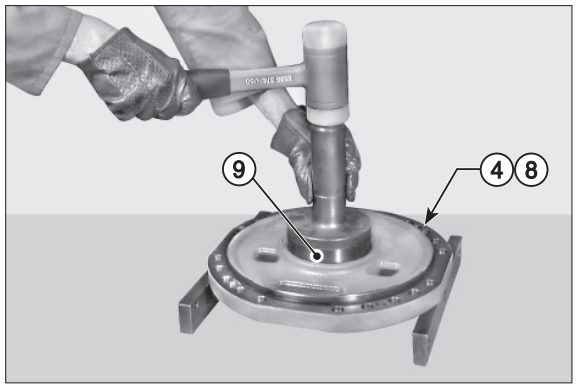
(8) Position the differential unit under a press and fit it with bearings (9) using tool T14.



7409FAX339

Installation

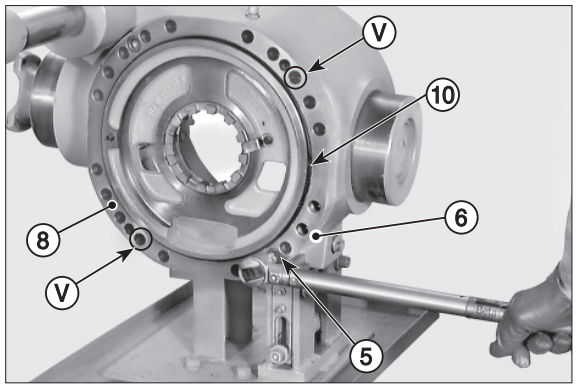
※ If bearings (9) are replaced, introduce the thrust blocks into intermediate covers (4) and (8).



7409FAX340

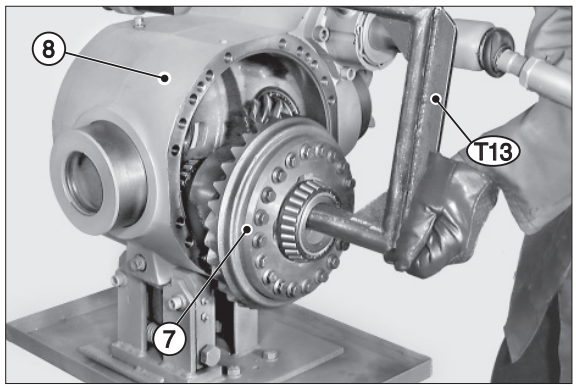
(9) Fit the non-gear ring side of main body (6) complete of pinion with intermediate cover (8); lock cover with screws (5) coated with loctite 242 and with two service screws "**V**" (M16X50) tightened to the same torque.
Tighten screws to a torque of 13.3~14.6 kgf · m (96.2~106 lbf · ft).

※ Check the state of the O-ring (10).



7409FAX341

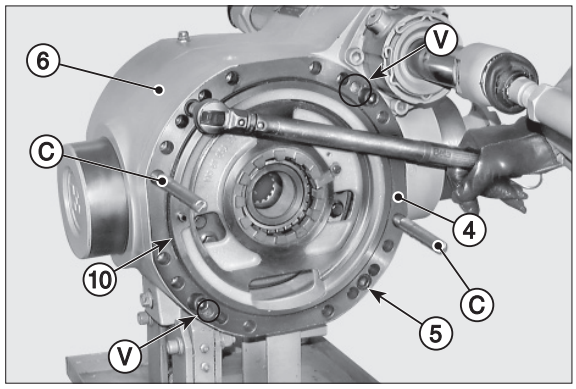
(10) Using tool T13, position the differential unit (7) into the main body (6).



7409FAX342

(11) Tighten the two safety studs "**C**" into the main body (6) and install the intermediate cover (4).
Lock into position with screws (5) treated with loctite 242 and two service screws "**V**" (M16X50) locked to the same torque.
Tighten screws to a torque of 13.3~14.6 kgf · m (96.2~106 lbf · ft).

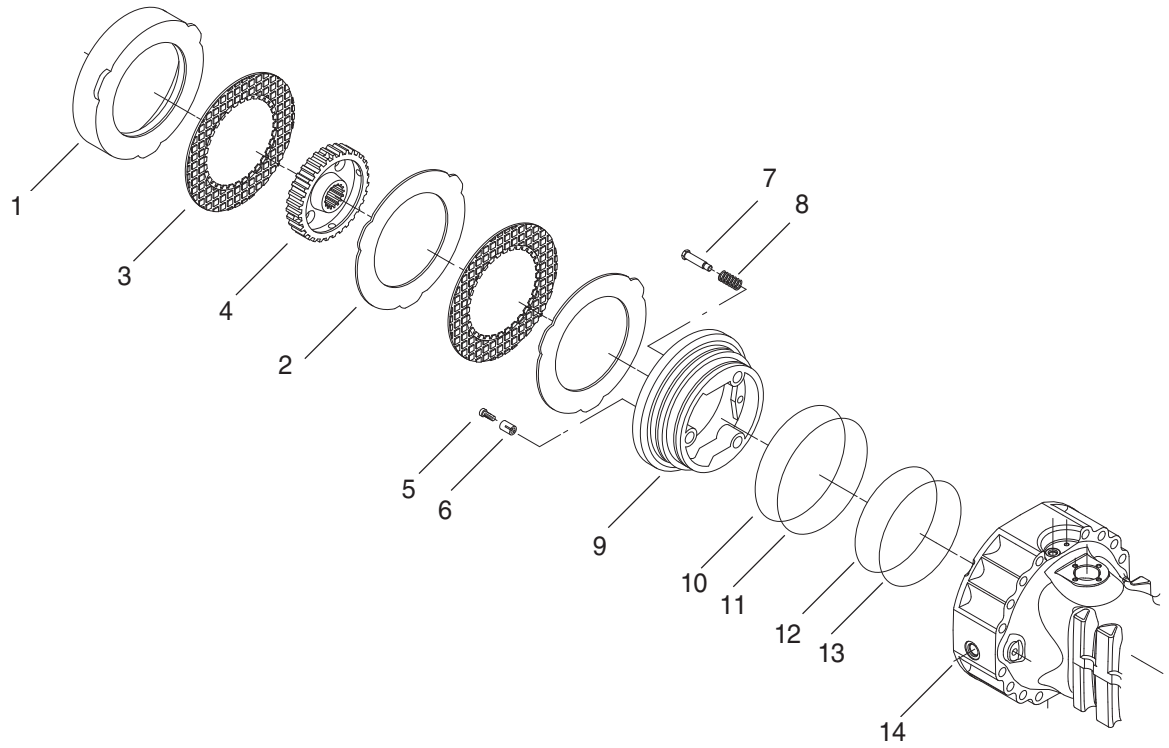
※ Check the state of O-ring (10).



7409FAX343

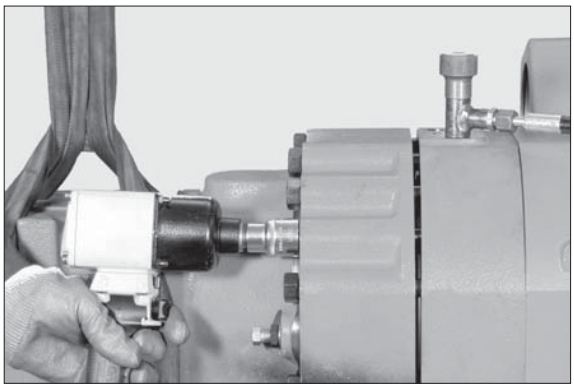
4. REAR AXLE (DANA, machine serial No.: -#0079)

1) SERVICE BRAKE DISASSEMBLY



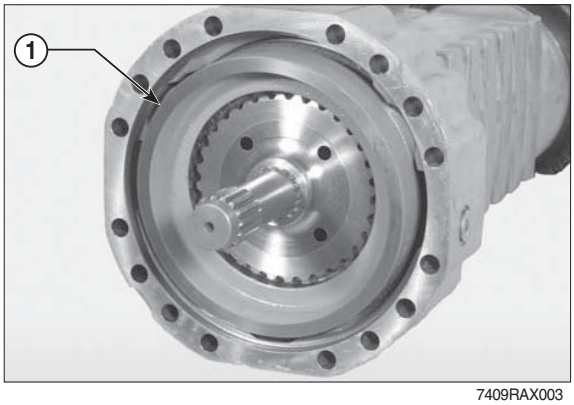
7409RAX001

(1) Sling the arm to be removed and connect it to a hoist.
Loosen and remove screws.

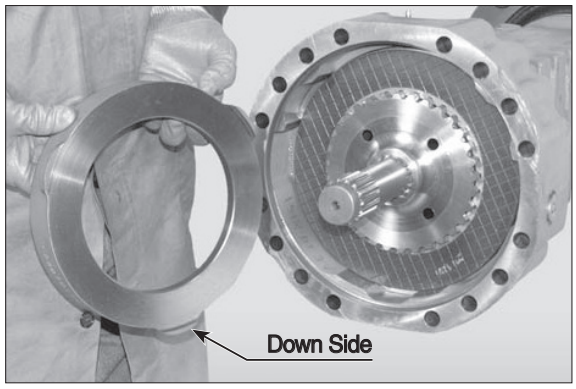


7409RAX002

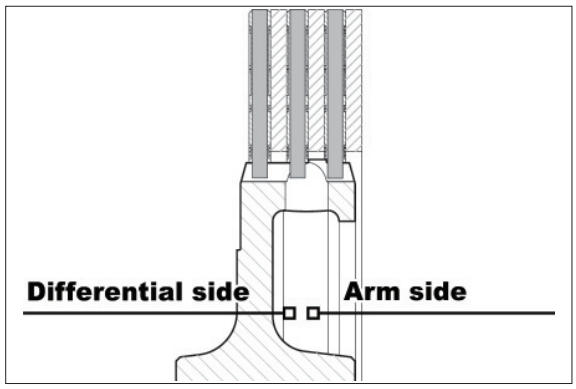
(2) Note down their order of assembly and remove the counterwasher (1).



7409RAX003



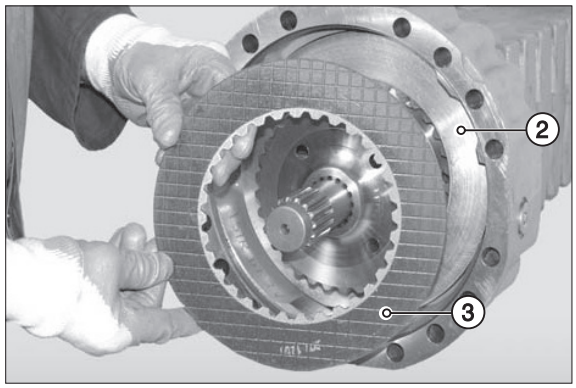
7409RAX004



7409RAX005

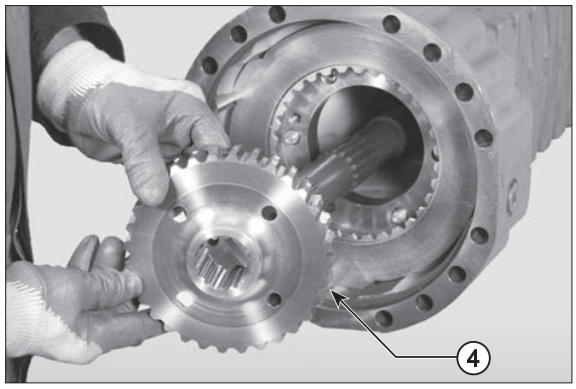
(3) Remove braking discs (2)(3), noting down direction of assembly.

※ If disks are not to be replaced, avoid changing their position.



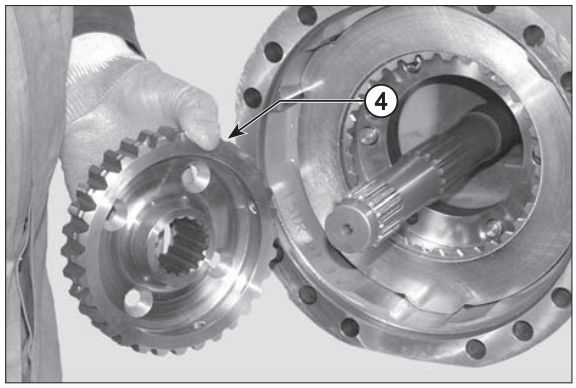
7409RAX006

(4) Remove the flange (4) complete with the discs.



7409RAX007

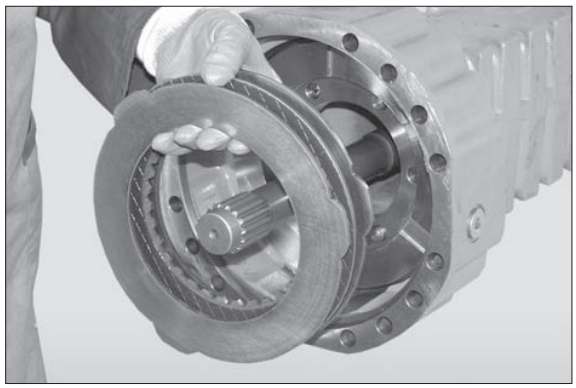
(5) Noting down direction of assembly.



7409RAX008

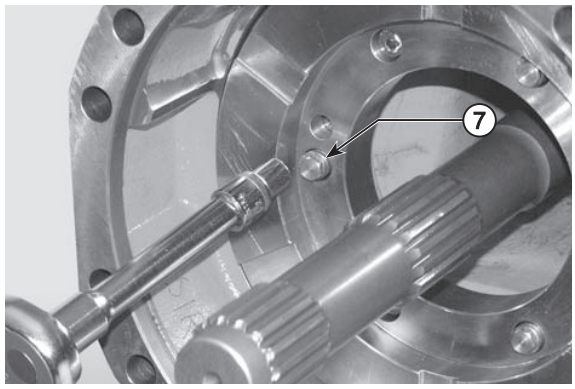
(6) Remove braking discs, noting down direction of assembly.

※ If disks are not to be replaced, avoid changing their position.

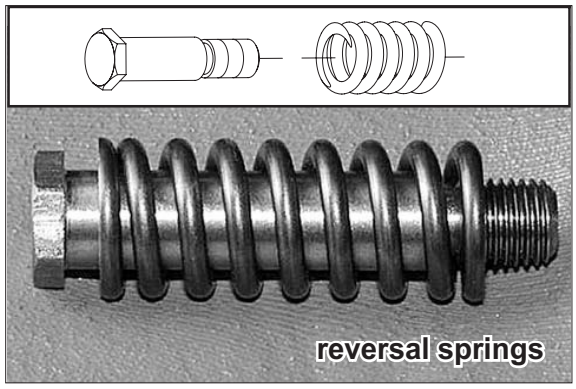


7409RAX009

(7) Remove the reversal springs (7)

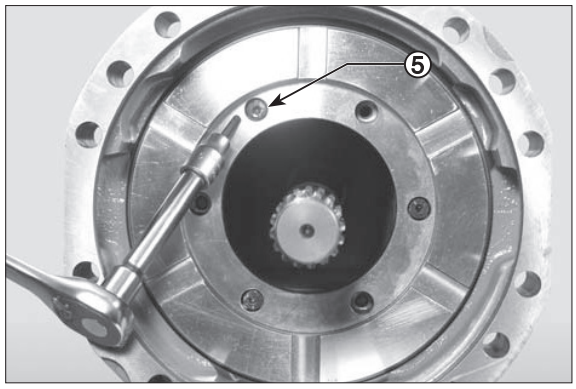


7409RAX010

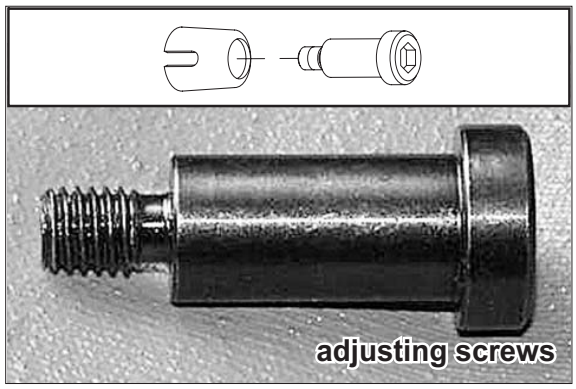


7409RAX011

(8) Remove the adjusting screws (5)



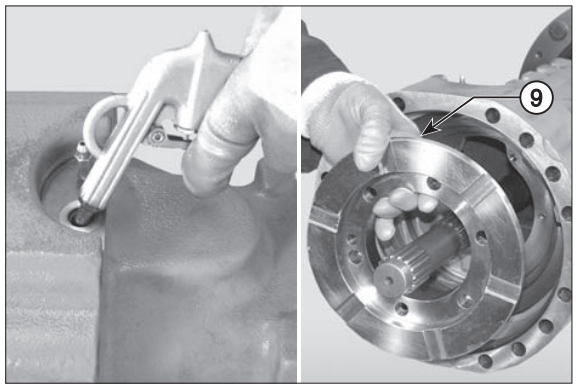
7409RAX012



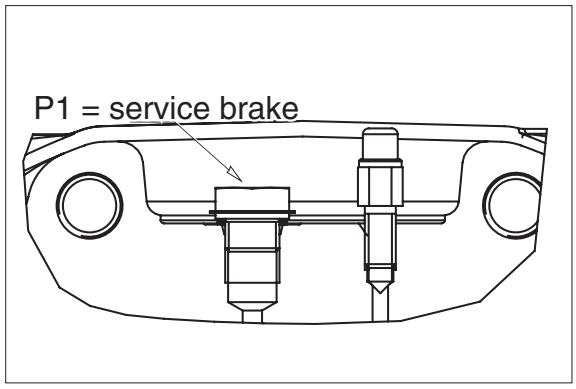
7409RAX013

(9) Slowly introduce low-pressure compressed air through the connection member for the service brake (P1), in order to extract the piston (9).

※ Hold the piston (9) back, as it may be suddenly ejected and damaged.

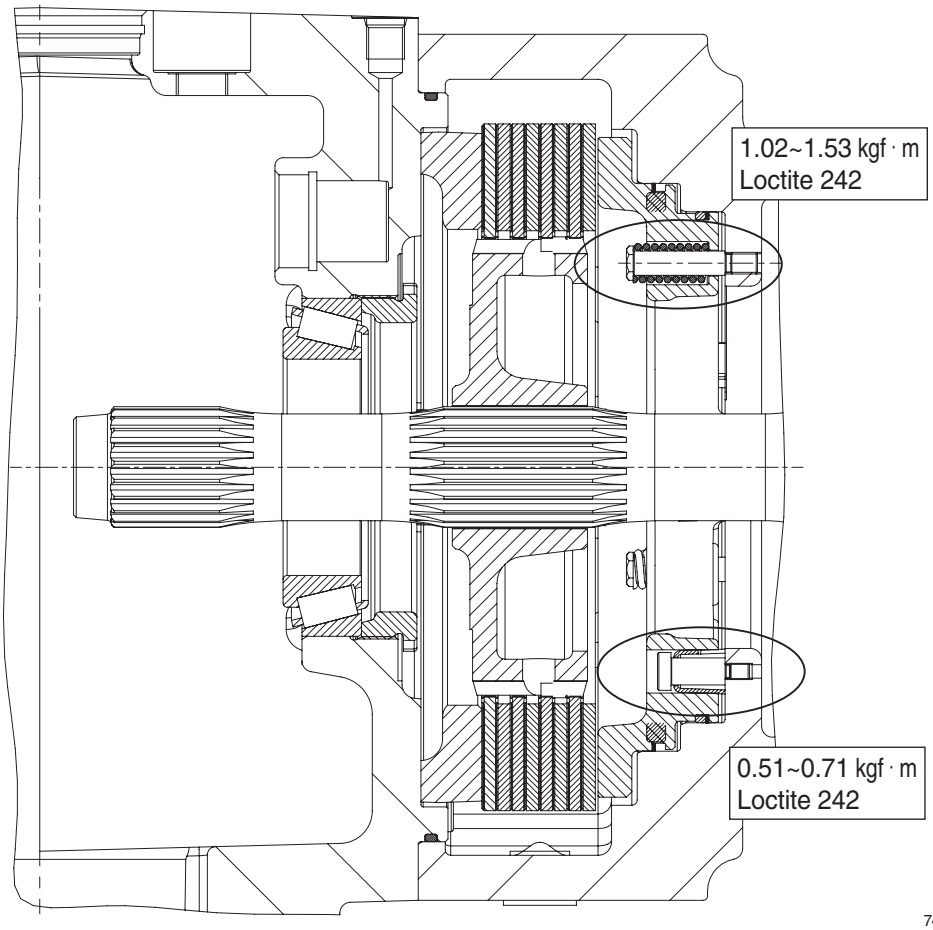


7409RAX014



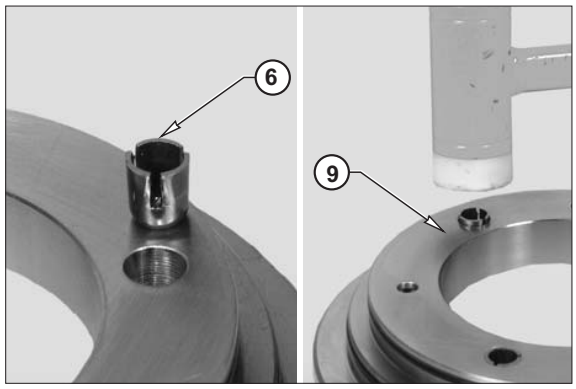
7409RAX015

2) SERVICE BRAKE ASSEMBLING



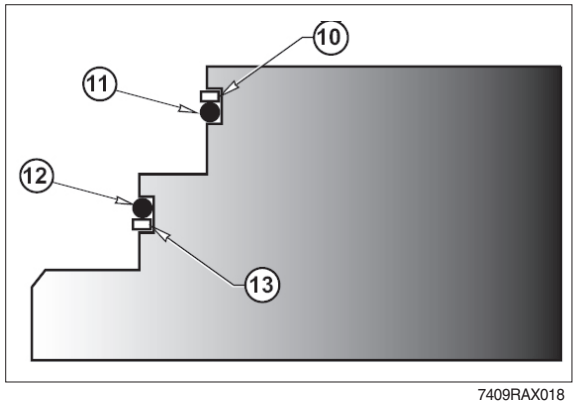
7409RAX016

(1) Insert the stroke automatic regulation springs (6); place them in line with the piston (9).



7409RAX017

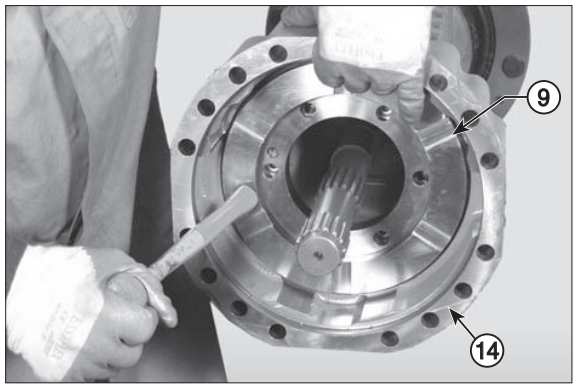
(2) Fit O-ring (11)(12) and back-up ring (10) (13) onto the piston (11).
Lubricate the piston and the O-rings and install the unit into the arm (14).



7409RAX018

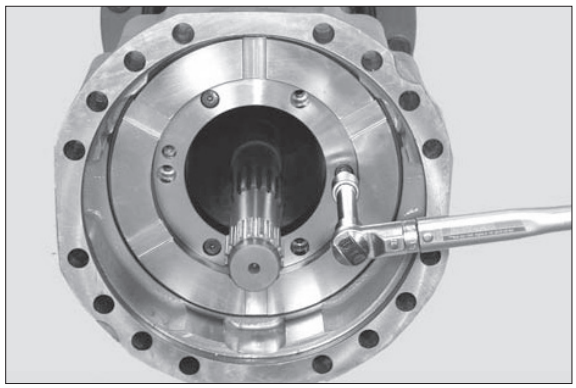
(3) Using a plastic hammer, ram the piston (9) into the arm (14).

※ Lightly hammer all around the edge in an alternate sequence.



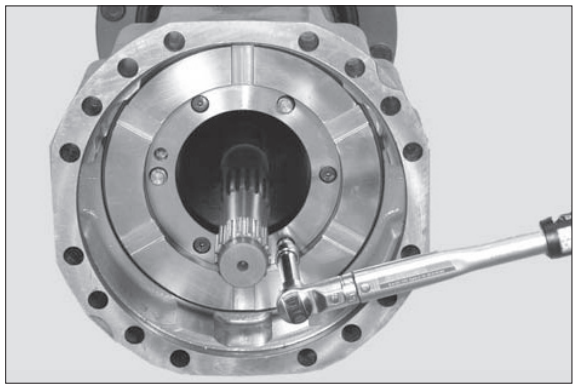
7409RAX019

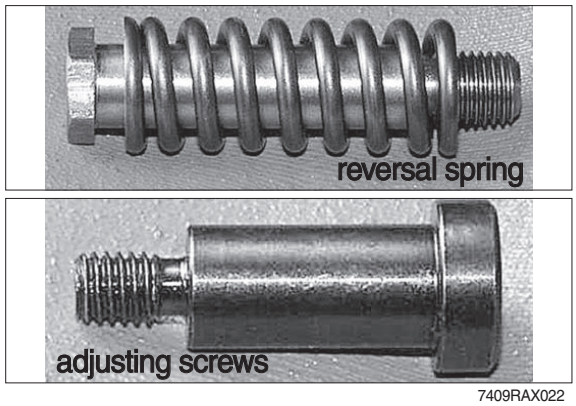
(4) Fit the reversal springs (7) on the piston (9).
Apply loctite 242 to the thread of the adjustment screw.
Tighten with torque wrench setting of 0.51~0.71 kgf · m (3.69~5.14 lbf · ft).


7409RAX020

(5) Fit the adjusting screws (5).
Apply loctite 270 to the thread.

· Torque wrench setting :
0.51~0.71 kgf · m (3.69~5.14 lbf · ft)

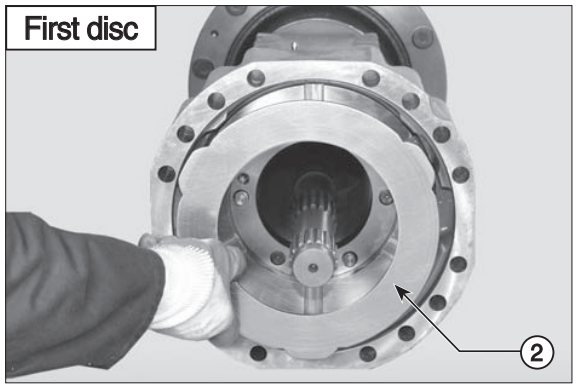

7409RAX021



7409RAX022

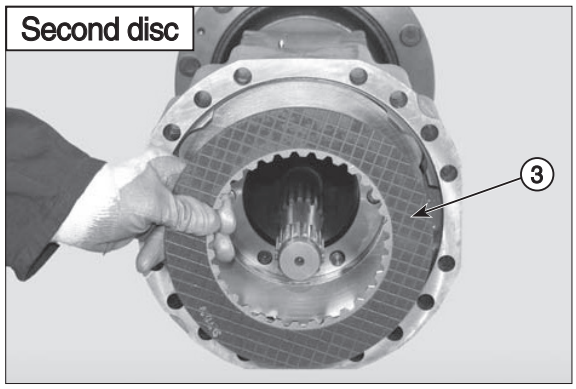
(6) Insert the brake discs in the right sequence.

※ The first brake disc (2) to be inserted must be of metal material.

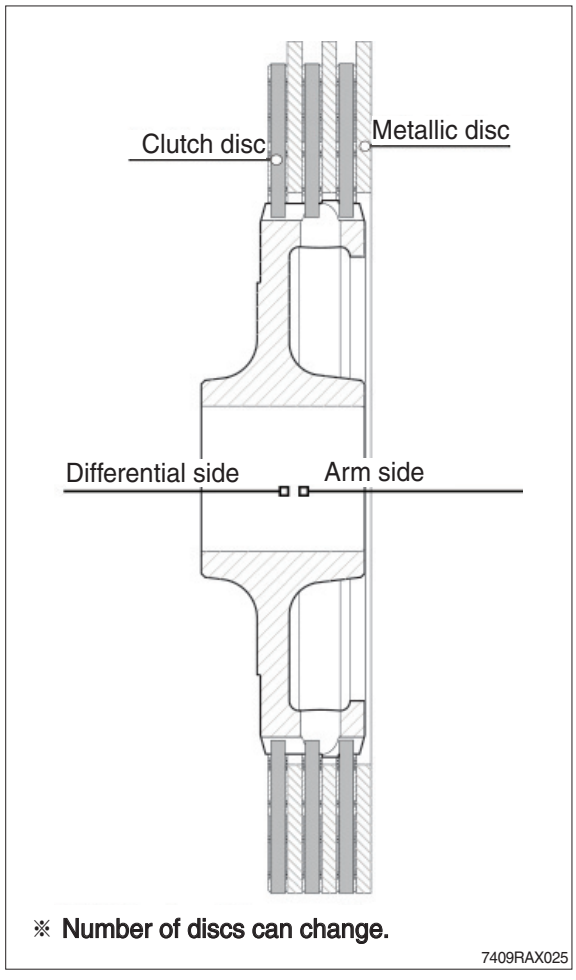


7409RAX023

※ The second brake disc (3) to be inserted must be of friction material.

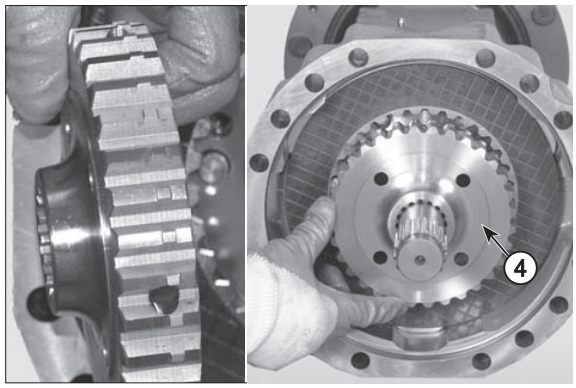


7409RAX024



7409RAX025

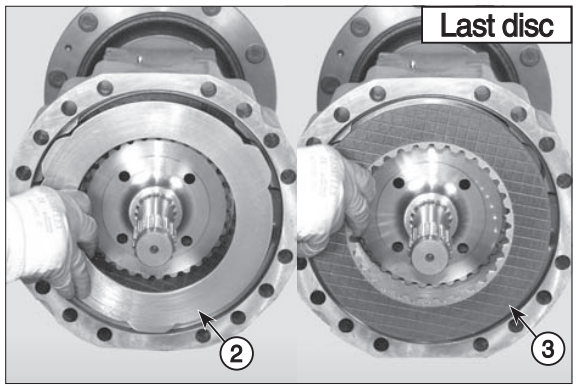
(7) Install the flange (4) on the arm.



7409RAX026

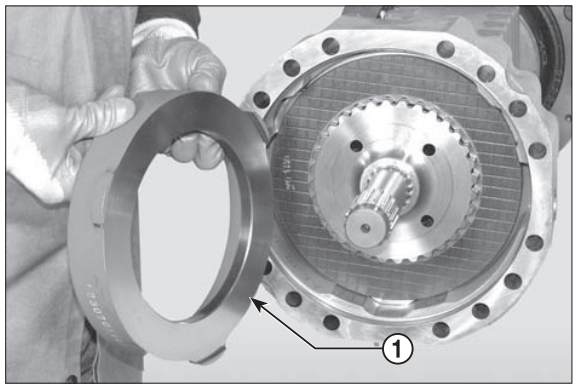
(8) Insert the brake discs (2)(3) in the right sequence.

※ The last brake disc to be inserted must be of friction material.

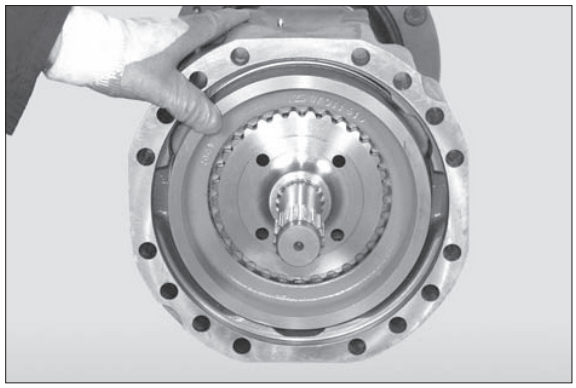


7409RAX027

(9) Insert the intermediate disk (1).

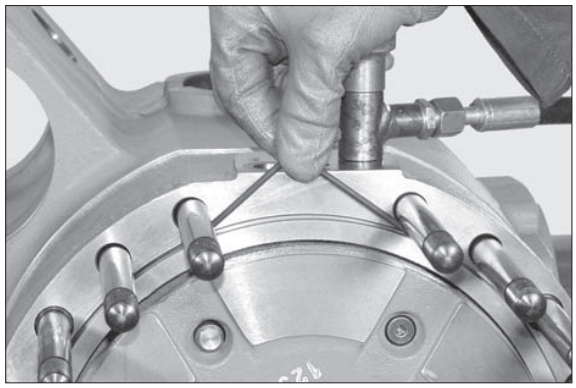


7409RAX028



7409RAX029

(10) Check integrity and position of the cylinder's O-ring.

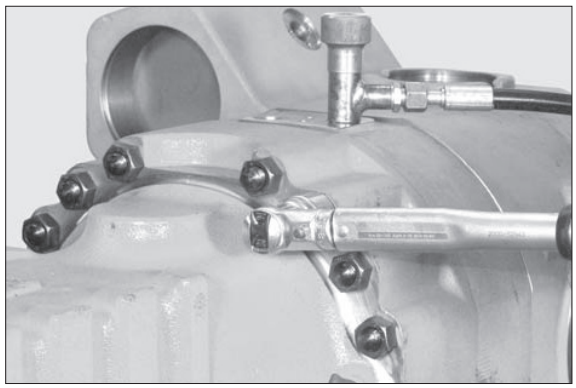


7409RAX030

(11) Cross tighten the nuts in two stages.

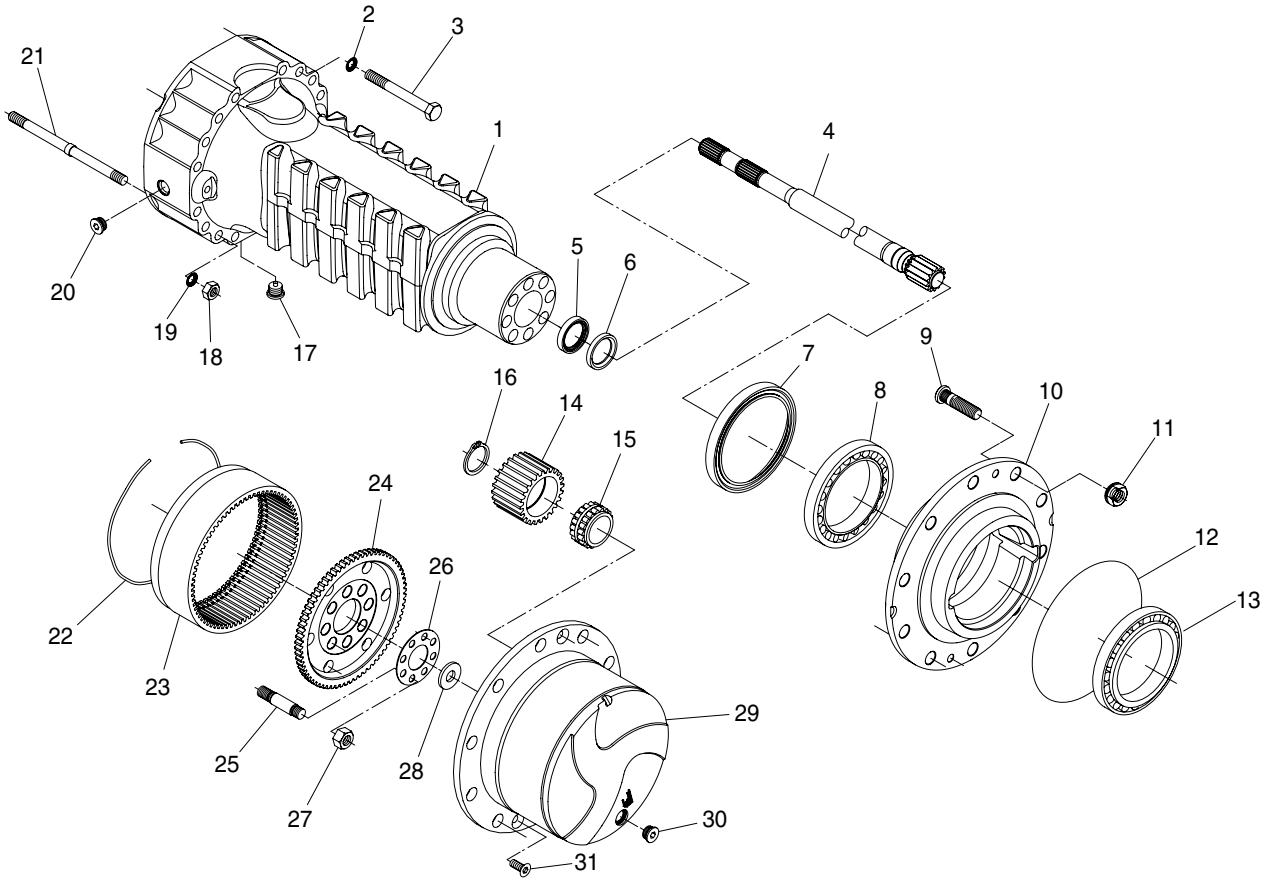
· Torque wrench setting :

20.4~22.5 kgf · m (148~163 lbf · ft)



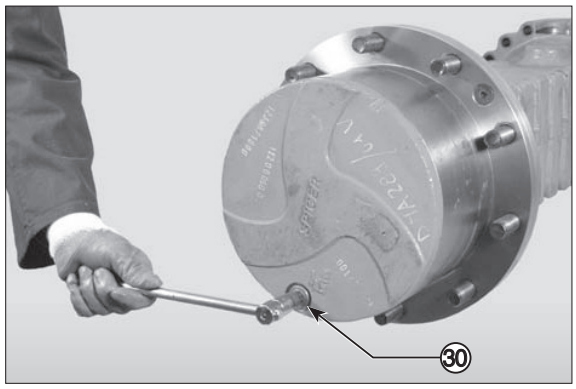
7409RAX031

3) HOW TO DISASSEMBLE THE PLANETARY REDUCTION



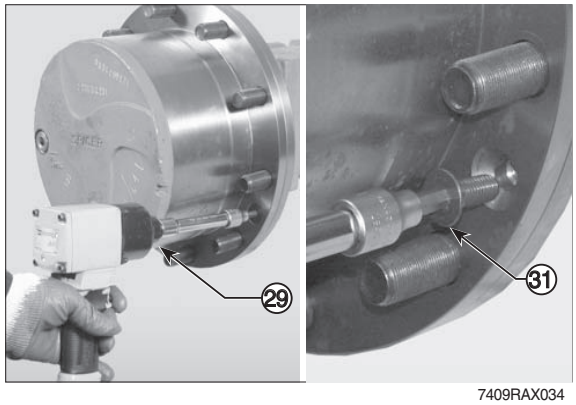
7409RAX032

(1) Remove oil-level plug (30) and the oil.



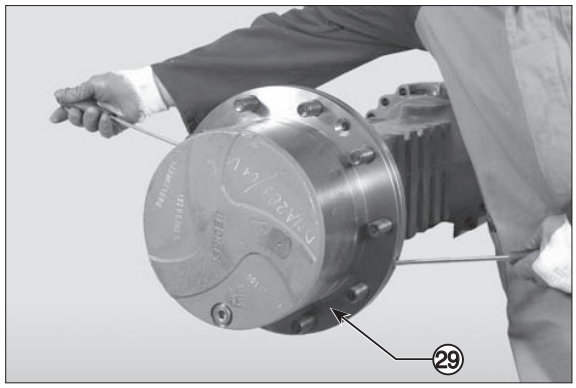
7409RAX033

(2) Remove the locking screws (31) of planetary cover (29).



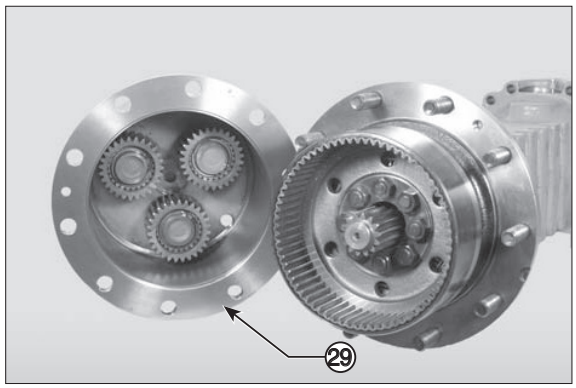
7409RAX034

(3) Using two screwdrivers or two levers inserted in the slots provided, pry the planetary cover (29) away from the wheel hub (10).



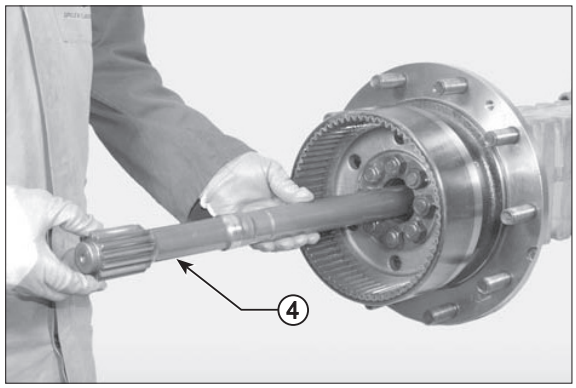
7409RAX035

(4) Remove the cover (29).



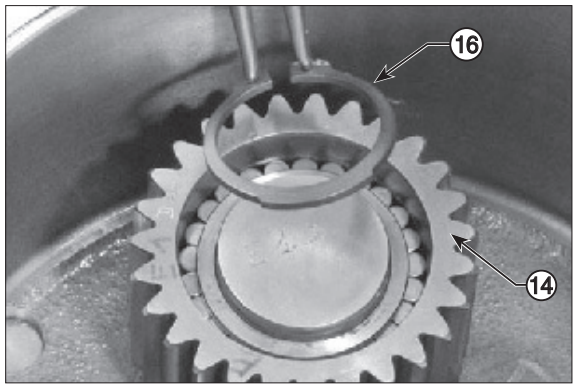
7409RAX036

(5) Remove the axle half shaft (4).



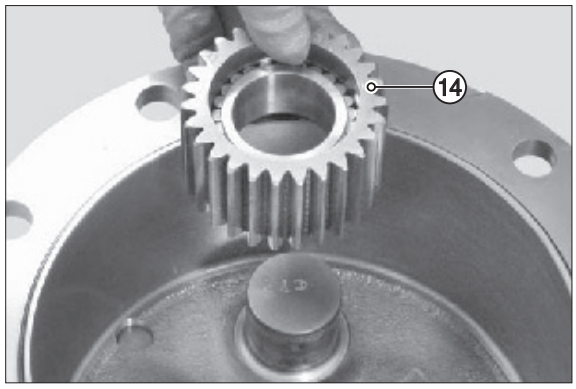
7409RAX037

(6) Remove the safety spring rings (16) of the planetary gears (14).



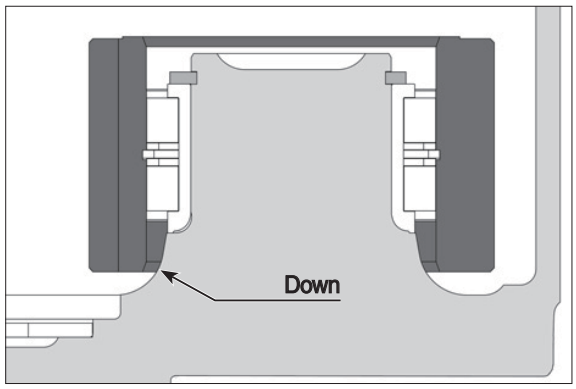
7409RAX038

(7) Remove the planetary gears (14).



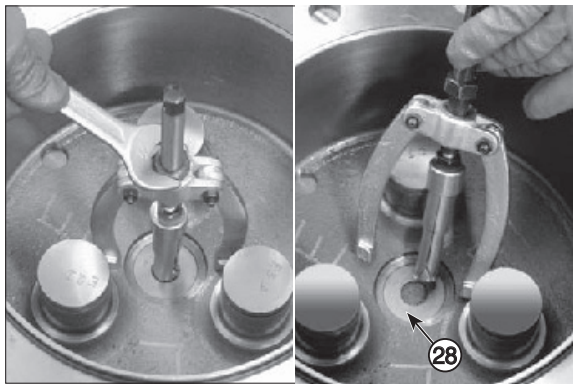
7409RAX039

※ Note down direction of assembly of planetary gears.



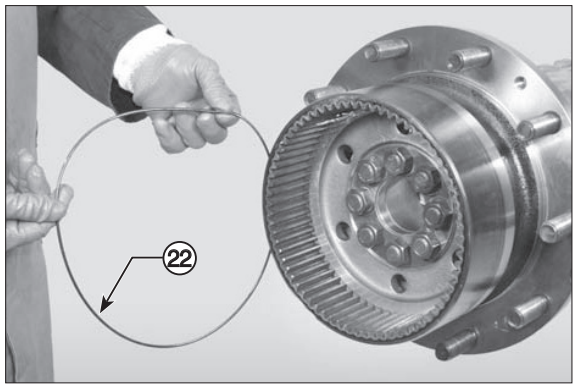
7409RAX040

(8) Check the wear of the shim washer (28) .



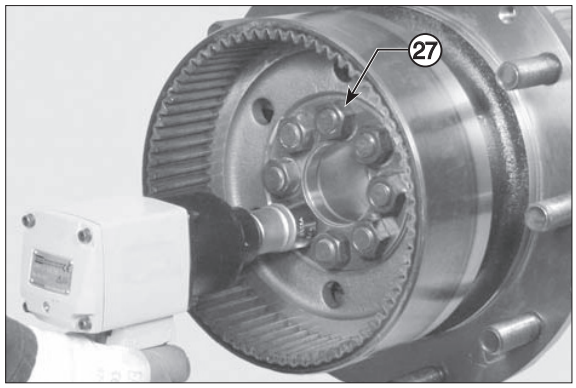
7409RAX041

(9) Accurately check the O-ring (22).



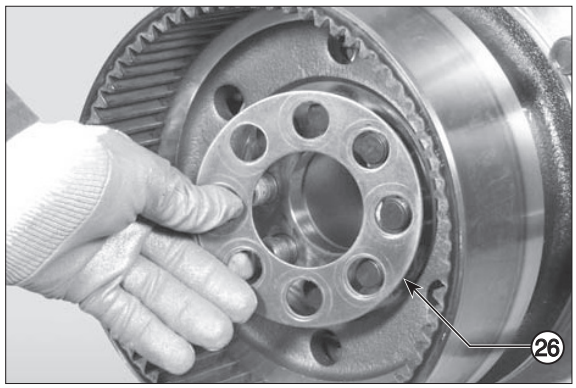
7409RAX042

(10) Loosen the nuts (27) and remove them.



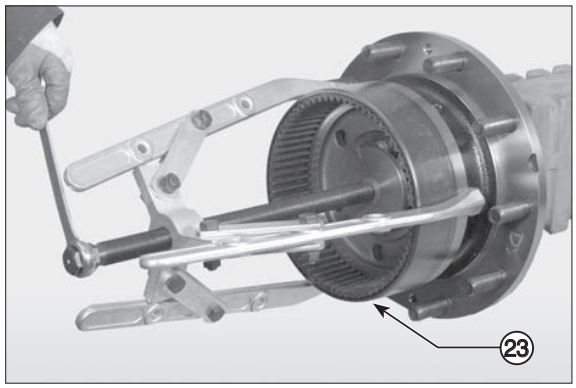
7409RAX043

(11) Remove the safety flange (26).



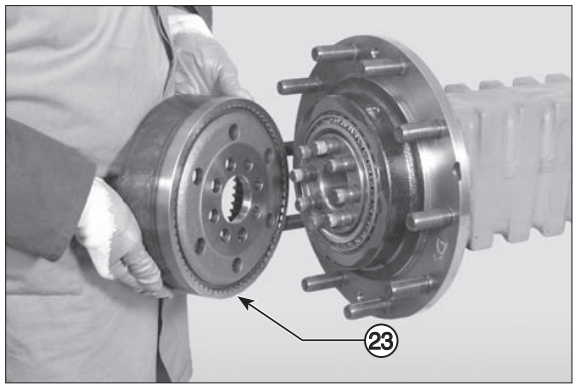
7409RAX044

(12) Using an extractor and applying a counter pressure to the screws (25), disengage the crown wheel (23) from the hub (10).



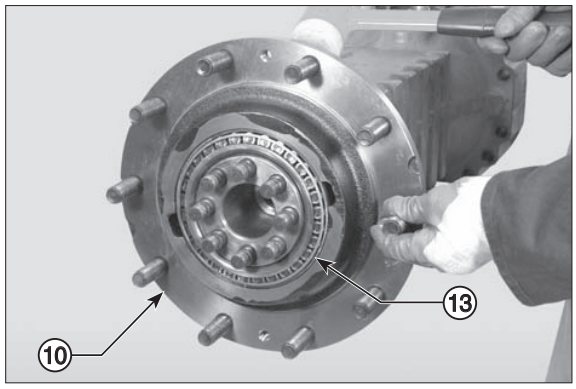
7409RAX045

(13) Remove the crown (23).



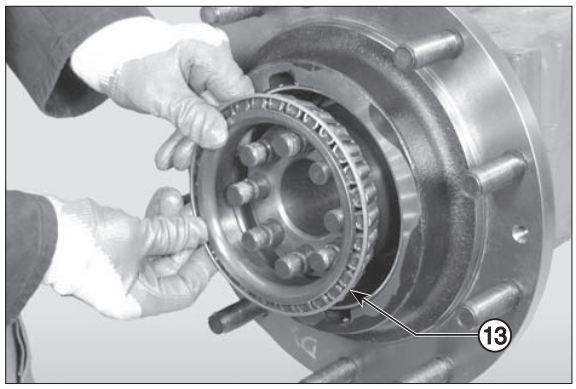
7409RAX046

(14) With the help of a hammer, shift the hub (10) and the external bearing (13).



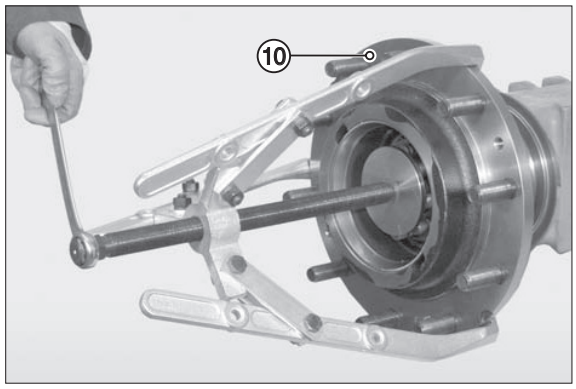
7409RAX047

(15) Extract the external bearing (13).



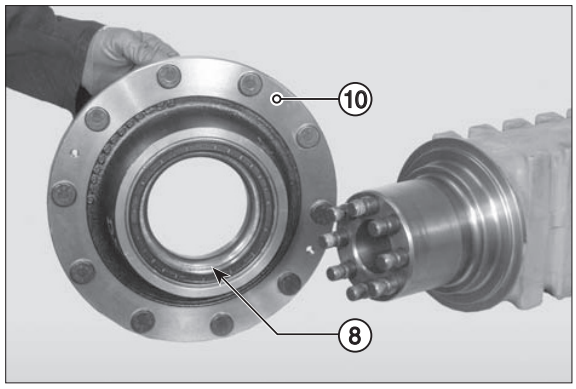
7409RAX048

(16) Using an extractor and applying a counter pressure to the screws disengage the hub (10).



7409RAX049

(17) Remove the internal bearing (8) and the hub (10).

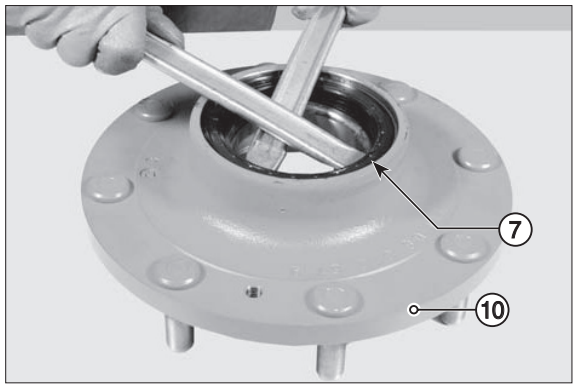


7409RAX050

(18) Remove the seal ring (7) from the hub (10).

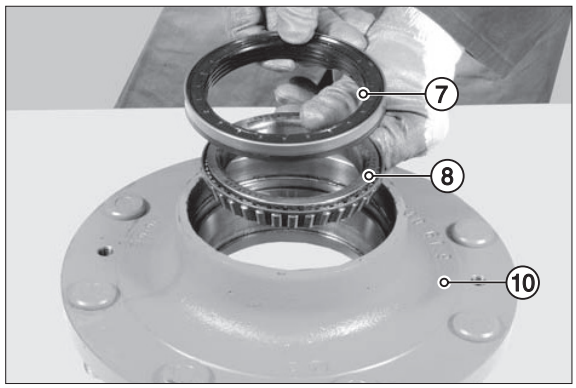
※ Note down direction of assembly.

※ The seal ring may not be reused.



7409RAX051

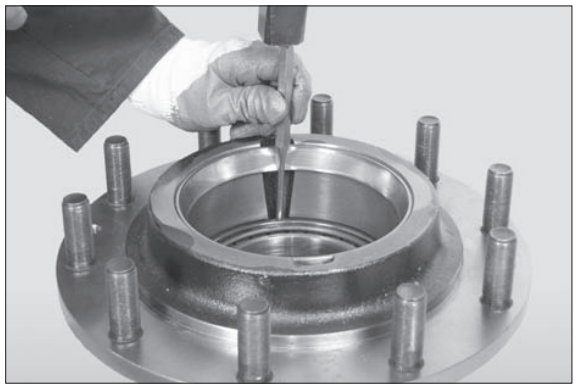
(19) Remove the internal bearing (8) and sealing ring (7).



7409RAX052

(20) Remove the external thrust blocks of bearings, using a pindriver.

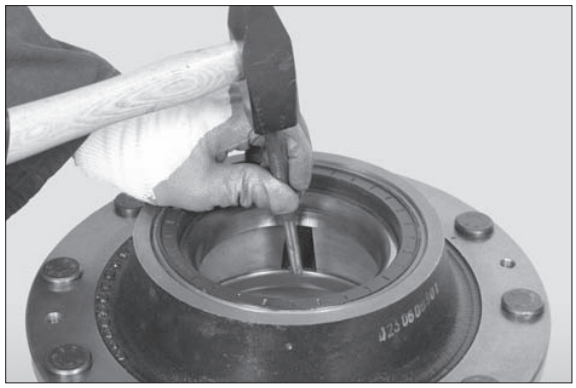
※ Hammer in an alternate sequence to prevent crawling and deformation of the thrust blocks.



7409RAX053

(21) Remove the external thrust blocks of bearings, using a pindriver.

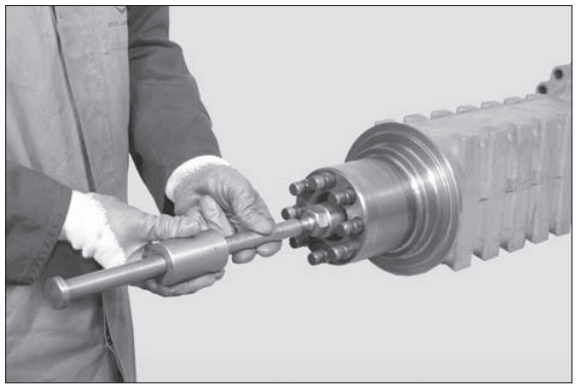
※ Hammer in an alternate sequence to prevent crawling and deformation of the thrust blocks.



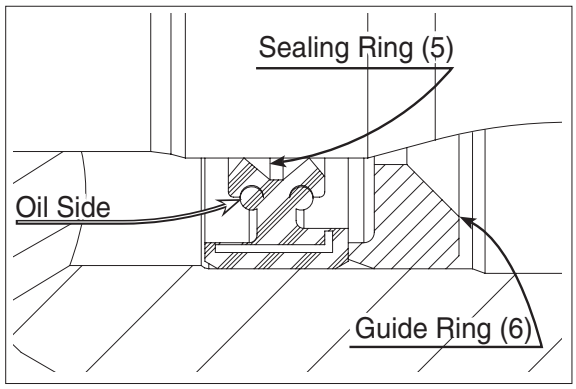
7409RAX054

(22) Using an extractor, remove seal ring (5) and guide ring(6).

※ Note down the direction of assembly of snap ring.

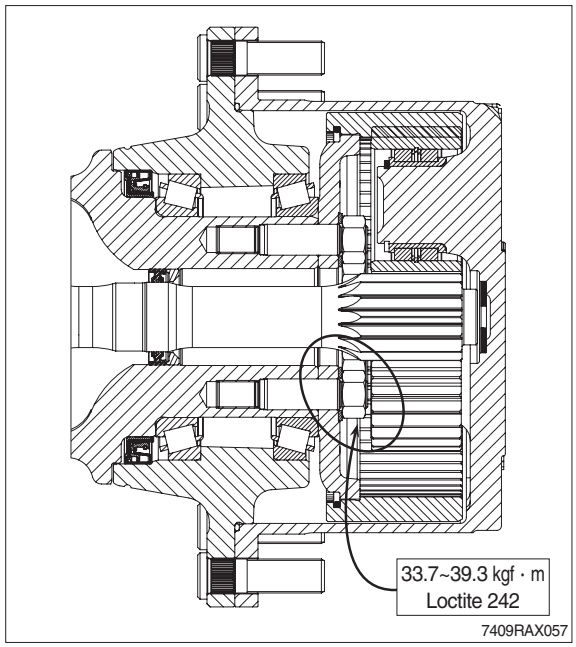


7409RAX055

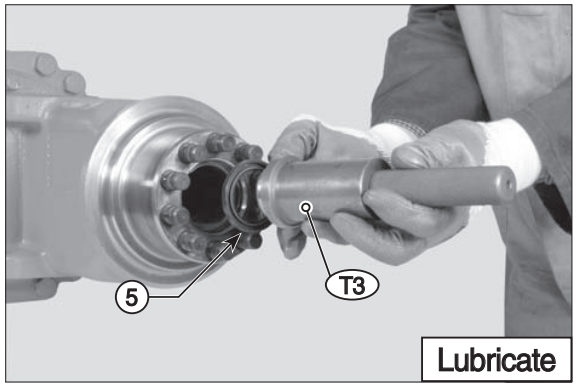


7409RAX056

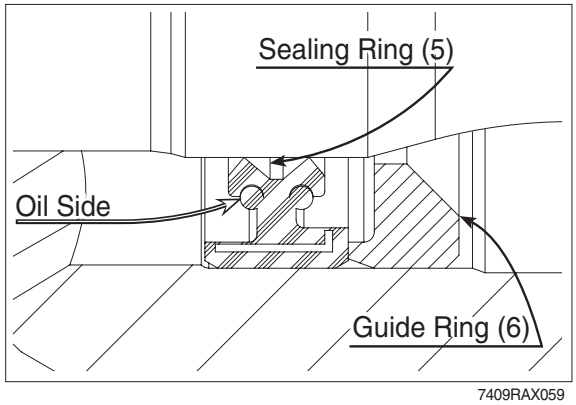
4) ASSEMBLING THE PLANETARY REDUCTION



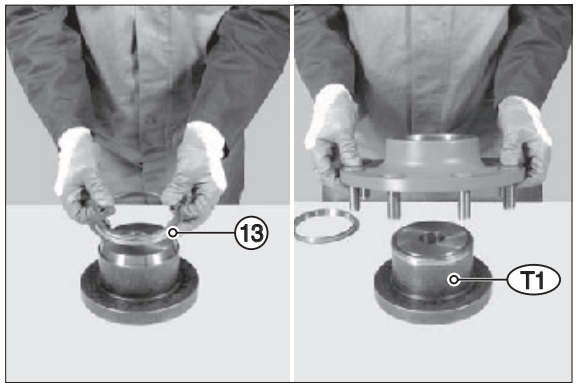
(1) Lubricate and fit the seal ring (5) and guide ring(6) onto tool T3; install the rings into the arm.



※ Pay particular attention to the direction of assembly of the rings.



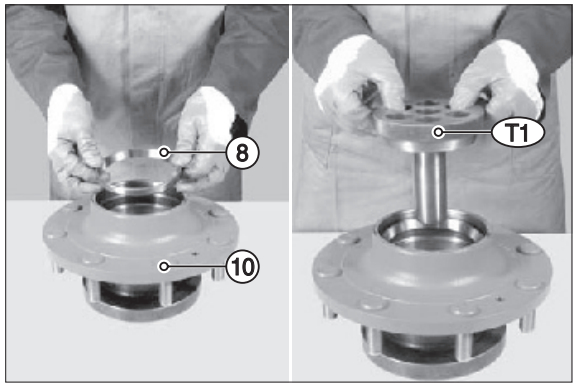
(2) Position the lower part of tool T1 and the thrust block of the external bearing (13).



7409RAX060

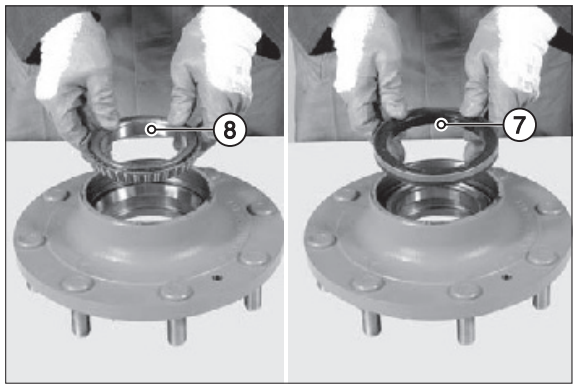
(3) Lubricate the seats of the bearings and position the hub (10) on tool T1; position the thrust block of the internal bearing (8).

※ Check that the thrust block is correctly oriented.



7409RAX061

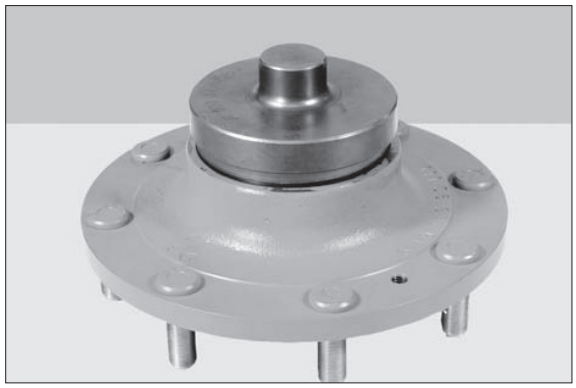
(4) Fit the bearing (8) and seal ring (7) into the internal thrust block.



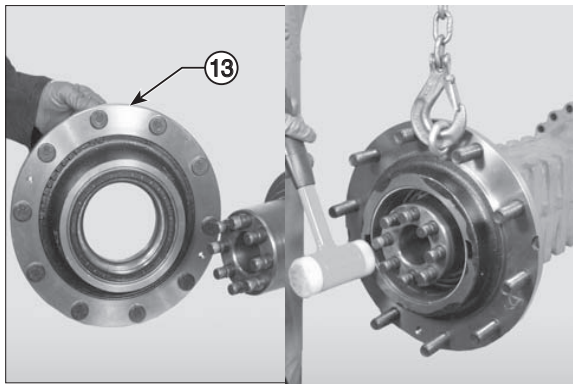
7409RAX062

(5) Using special tool apply a repositionable jointing compound for seals to the outer surface of the sealing ring (7). Position the sealing ring (7) in the hub (10).

※ Check that the ring (7) is correctly oriented.


7409RAX063

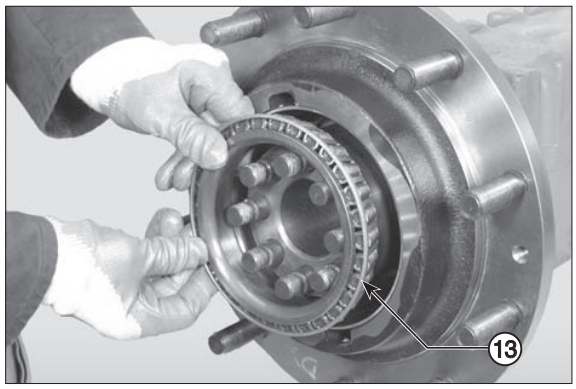
(6) Install the wheel hub.



7409RAX064

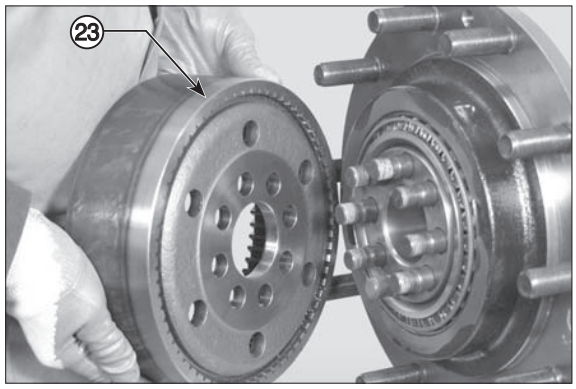
(7) Install the external bearing (13).

※ Move the bearing to the limit stop by hammering lightly all around the edge.



7409RAX065

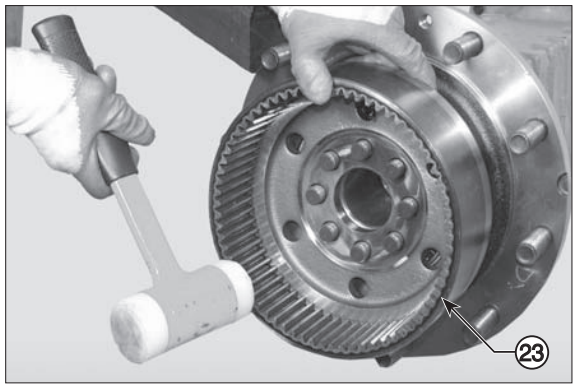
(8) Install the crown wheel (23).



7409RAX066

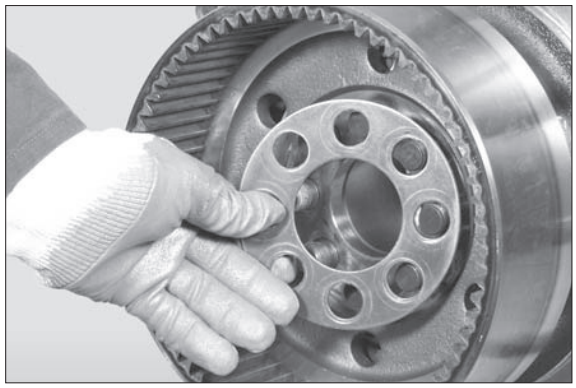
(9) Fit the complete crown flange (23).

※ In order to fasten the flange (23), use a plastic hammer and alternately hammer on several equidistant points.



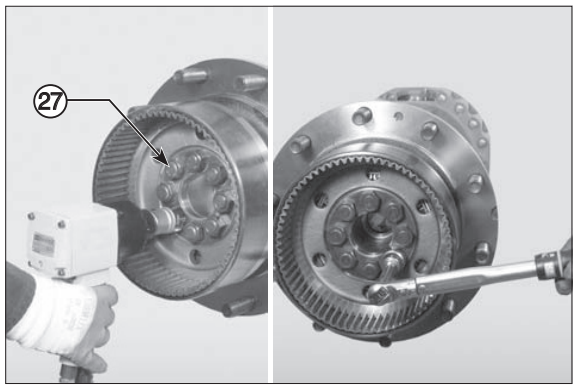
7409RAX067

(10) Install the security flange (26).
Using grease the surface of the safety flange (26) that touches the crown wheel.


7409RAX068

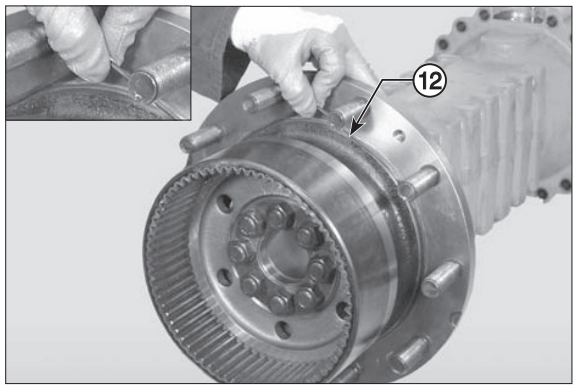
(11) Coat the nuts (27) with loctite 242 and screw them.
Tighten nuts (27) in two stages, using the criss-cross method.

· Initial torque wrench setting :
33.7 kgf · m (244 lbf · ft)
· Final torque wrench setting :
39.3 kgf · m (284 lbf · ft)



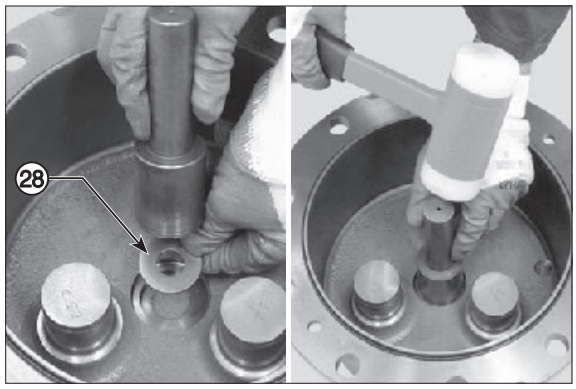
7409RAX069

※ Check the condition and position of the O-ring (12).



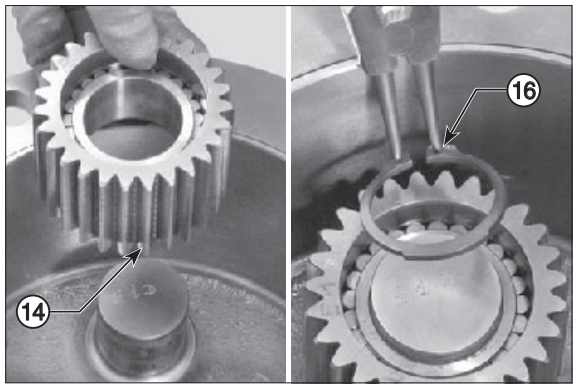
7409RAX070

(12) Fit shim washer (28) into spider cover (29).



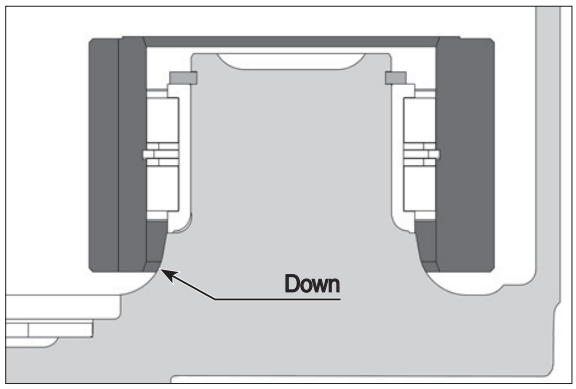
7409RAX071

(13) Insert the planet wheel gears (14) into the cover (29).
Lock gears (14) into position by installing the snap rings.



7409RAX072

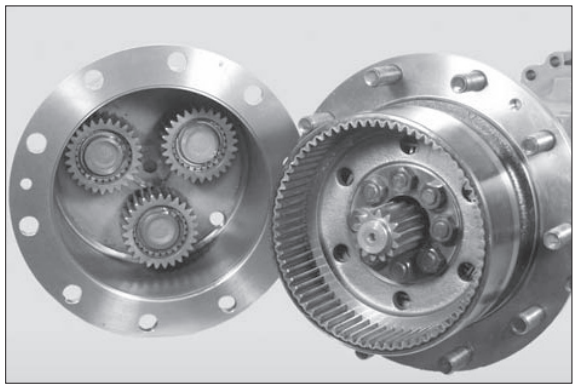
(14) Accurately check the orientation.



7409RAX073

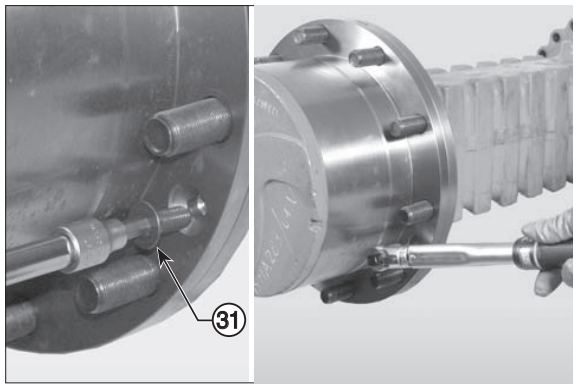
(15) Fit the planetary carrier cover onto the hub.

※ Check that the O-ring is in good condition and in position.


7409RAX074

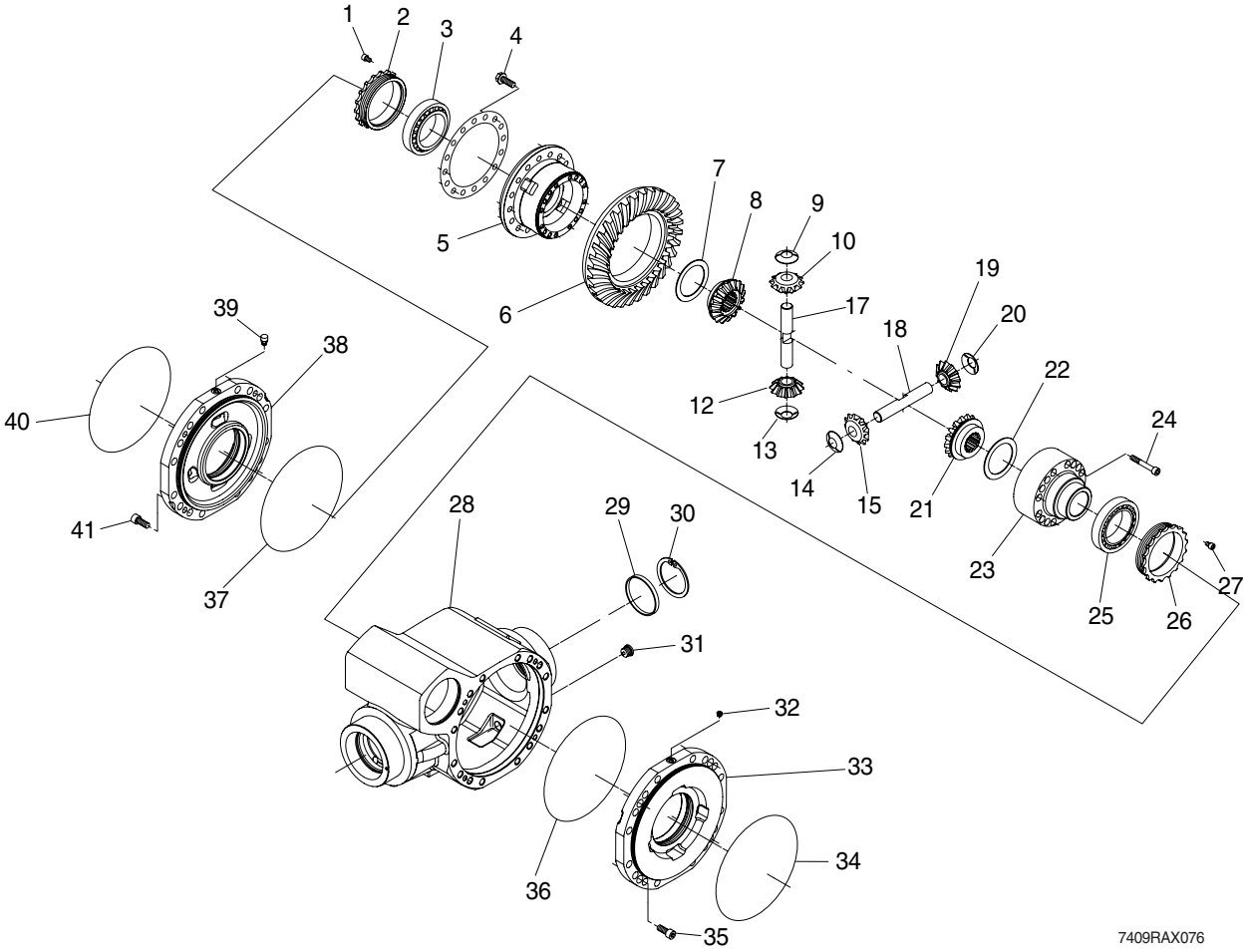
(16) Lock the planetary carrier cover by tightening the screws.

· Torque wrench setting for screws :
3.57~5.1 kgf · m (25.8~36.9 lbf · ft)



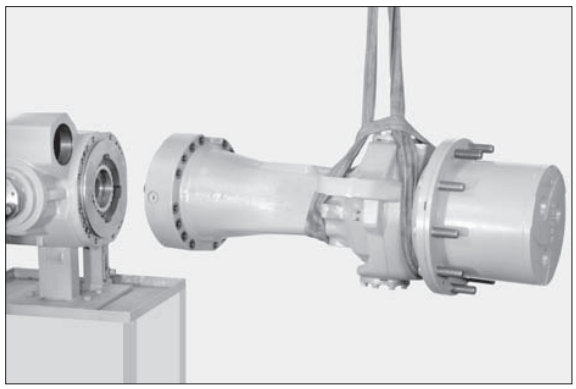
7409RAX075

5) HOW TO REMOVE AND DISASSEMBLE THE DIFFERENTIAL UNIT



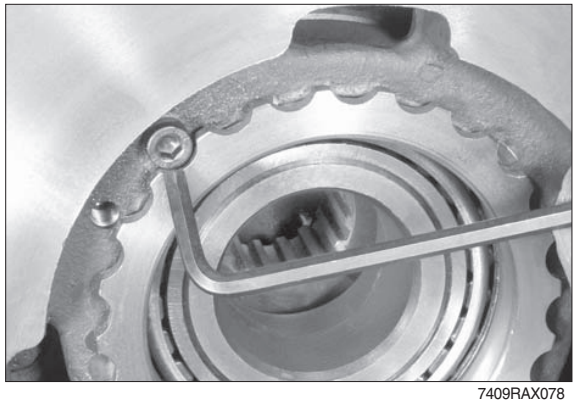
7409RAX076

(1) Sling the arm to be removed and connect it to a hoist.
Loosen and remove screws and nuts.



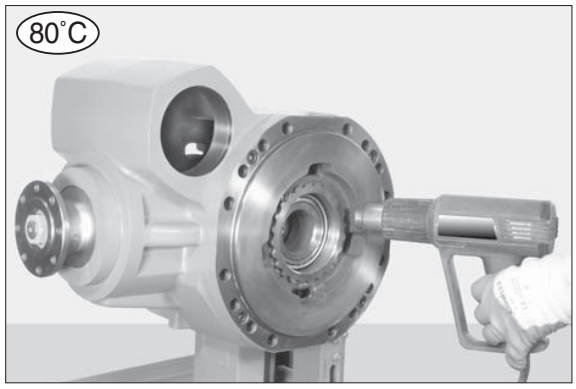
7409RAX077

(2) Only if need removing or adjusting.
Remove the screw (27).



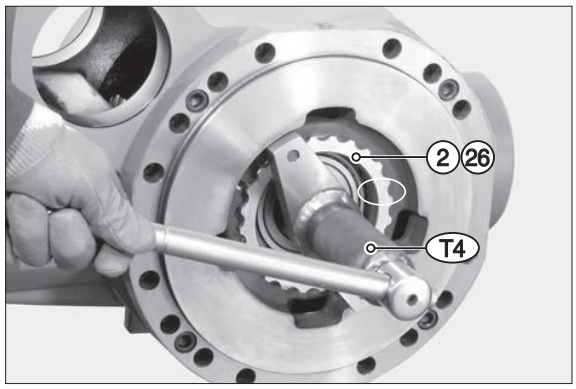
7409RAX078

(3) Only if need removing or adjusting.
Uniformly heat the ring nuts up to a temperature of 80˚C.



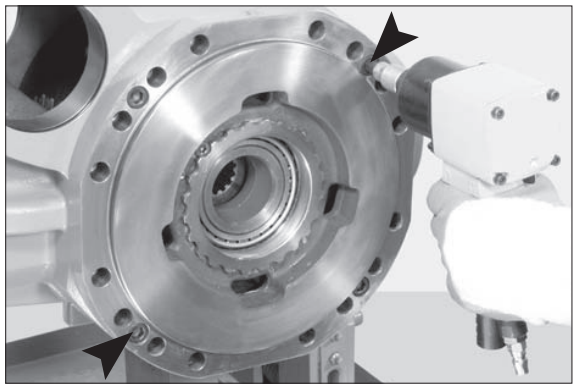
7409RAX079

(4) Only if need removing or adjusting.
Using special tool T4 mark the position of the ring nuts (2) (26).

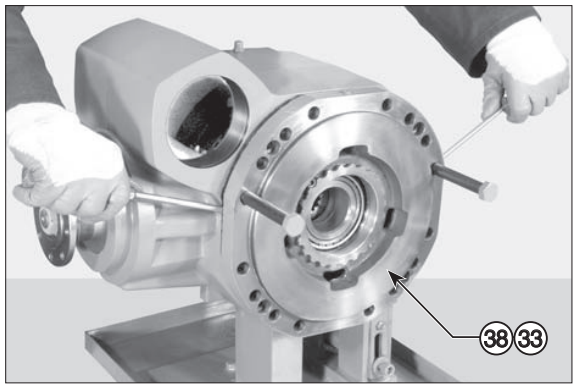


7409RAX080

(5) Loose he stud bolts (35)(41) and remove two of them.

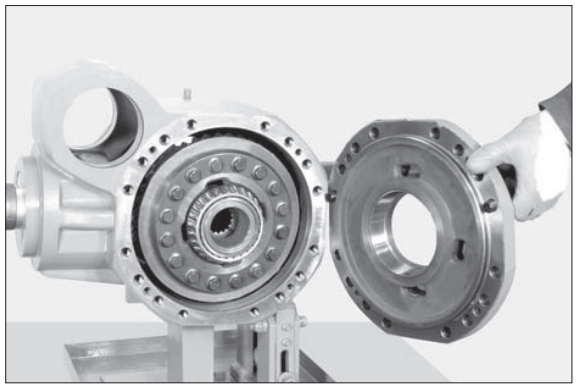

7409RAX081

(6) Disjoin the cover (38)(33) crown side.



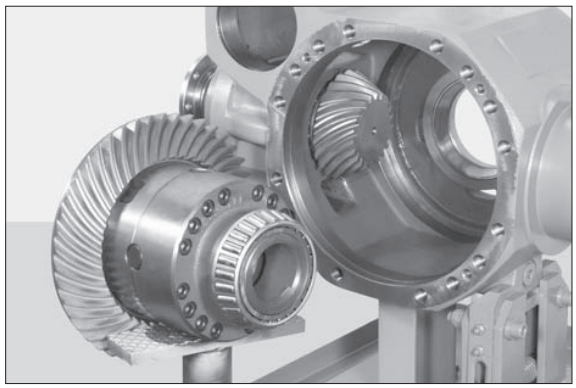
7409RAX082

(7) Remove the cover and studs.



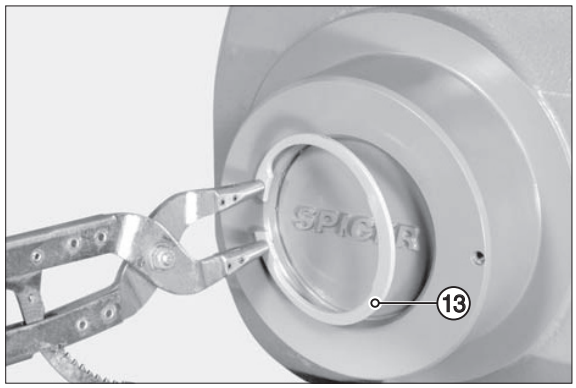
7409RAX083

(8) Extract the whole differential unit.



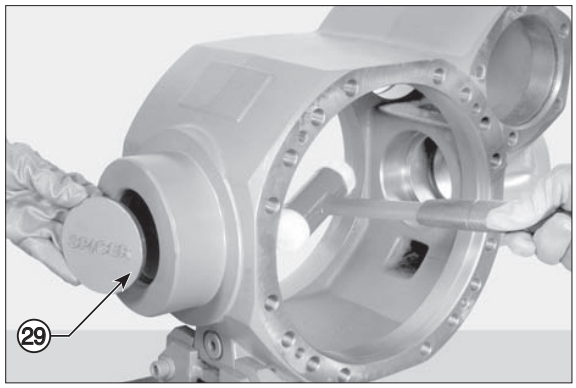
7409RAX084

(9) Remove the snap ring (30).



7409RAX085

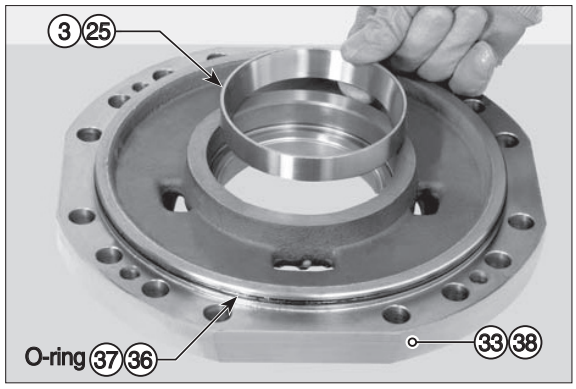
(10) Remove the cap (29).



7409RAX086

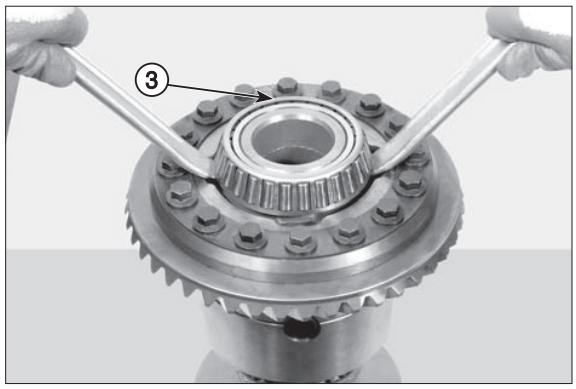
(11) If the bearings need replacing, extract the external thrust blocks of the bearings (3) and (25) from middle cover (33)(38).

※ Accurately check the O-ring (37)(36).



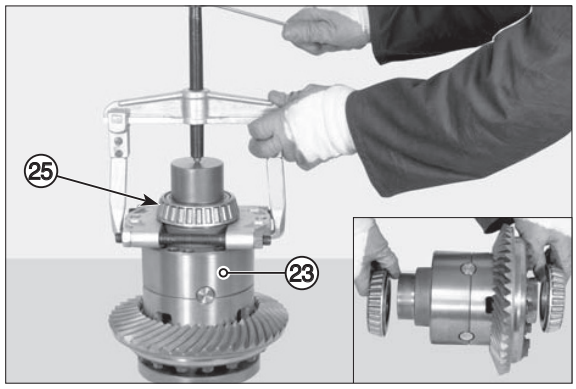
7409RAX087

(12) If the bearing need replacing, extract the bearing (3).



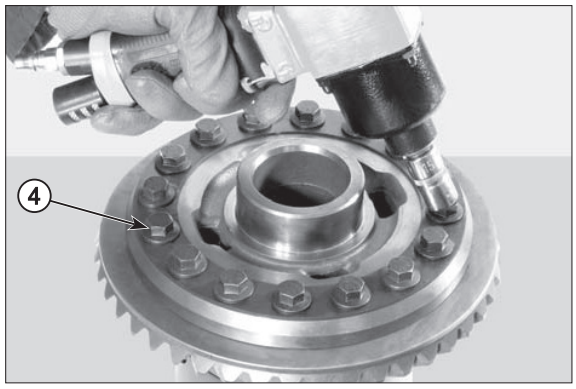
7409RAX088

(13) If the bearing need replacing, extract the bearing (25) from the differential carrier (23).



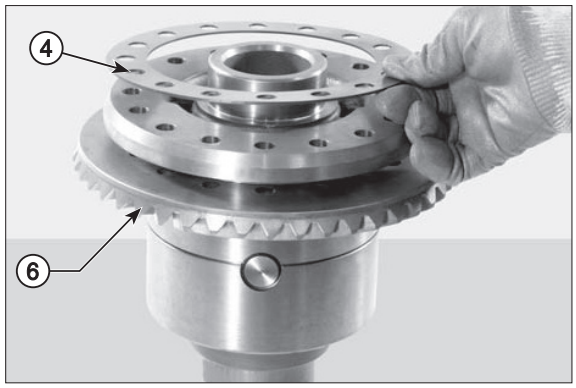
7409RAX089

(14) Remove the fitting screws (4) of the crown (6).



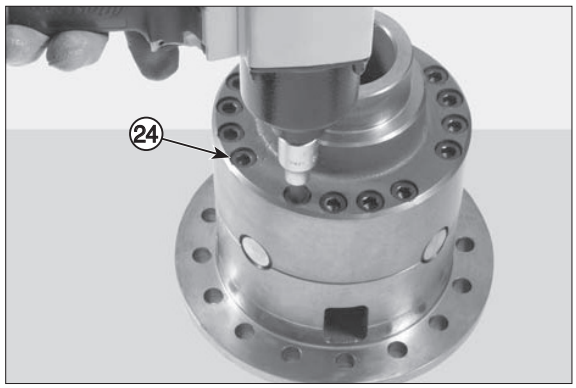
7409RAX090

(15) Remove the spacer (42) and the crown (6).



7409RAX091

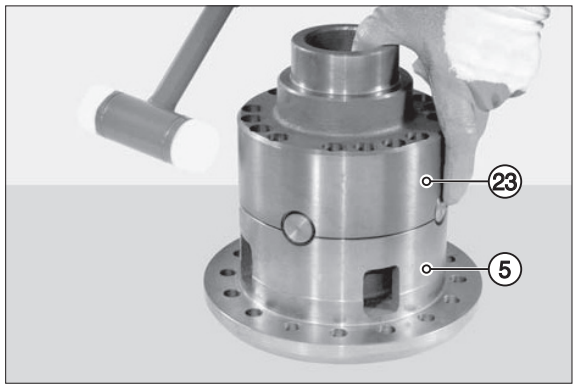
(16) Remove the screws (24) jointing the differential unit half box .



7409RAX092

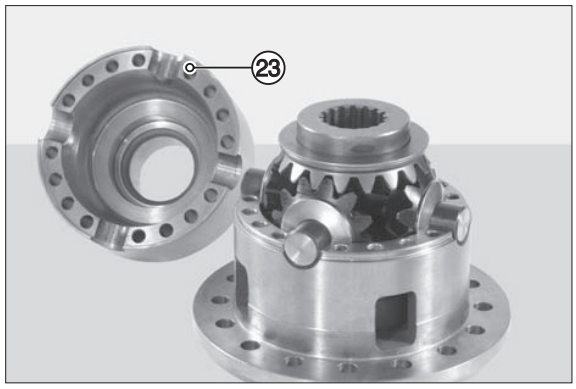
(17) Using a plastic hammer, take the half box (23)(5) to pieces.

※ Note down the coupling marks.



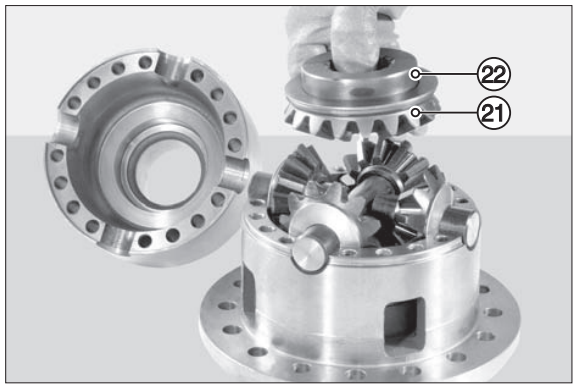
7409RAX093

(18) Remove the upper half box (23).



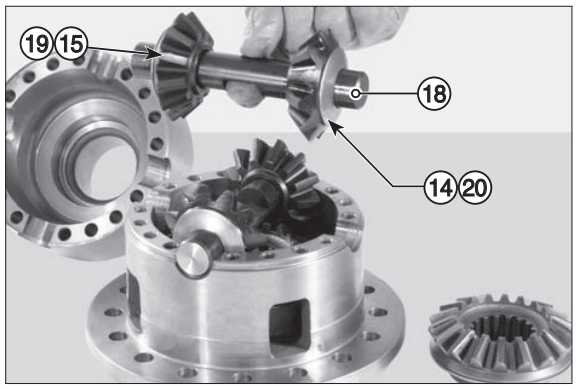
7409RAX094

(19) Remove shoulder (22) and first planetary gear (21).



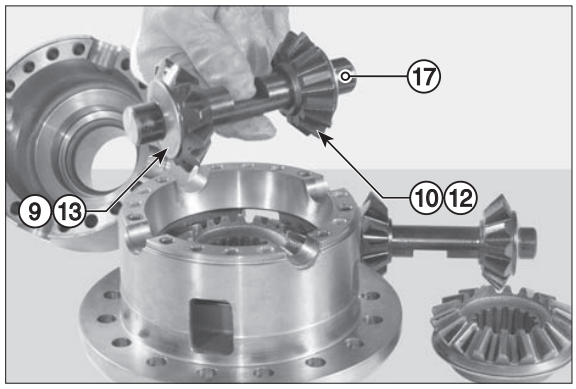
7409RAX095

(20) Remove shafts (18), complete with planet wheels (15)(19) and spherical shoulder washers (14)(20).



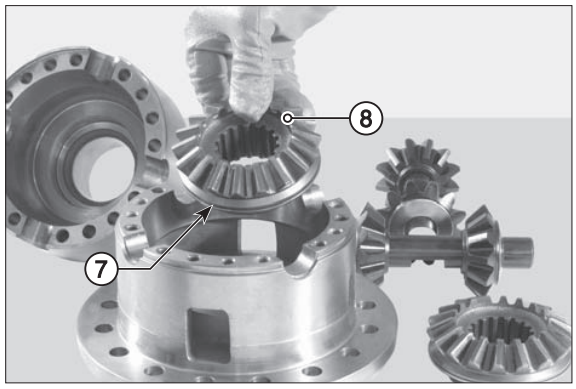
7409RAX096

(21) Remove shafts (17), complete with planet wheels (10)(12) and spherical shoulder washers (9)(13).



7409RAX097

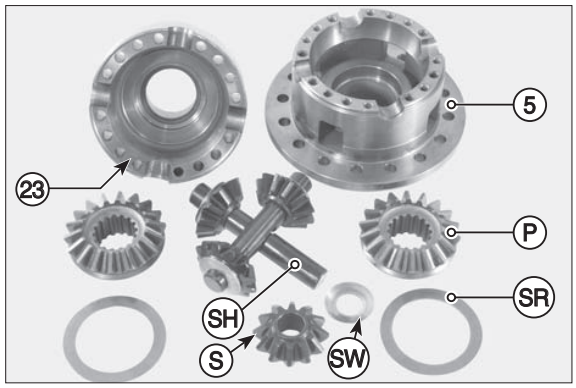
(22) Remove the 2nd planetary gear (8) and shoulder ring (7).



7409RAX098

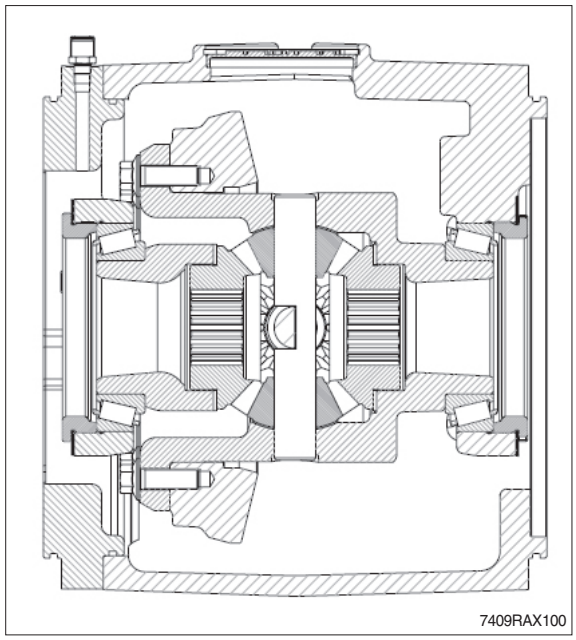
(23) The differential unit.

Sh = shafts (18)(17)
SW = spherical shoulder washers (9)(13) (14)(20)
P = planetary gears (8)(21)
SR = shoulder ring (22)(7)
23 = upper half box
5 = half box crown side
S = planet wheels (10)(12)(15)(19)

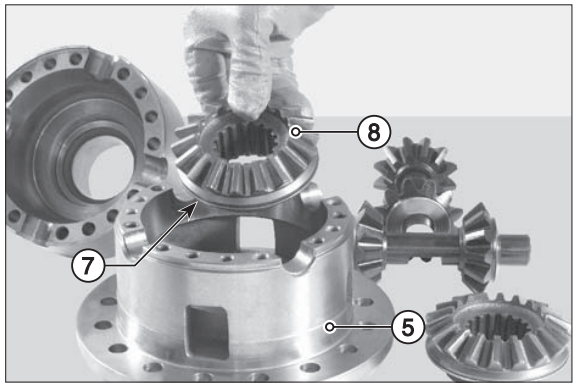


7409RAX099

6) HOW TO ASSEMBLE AND INSTALL THE DIFFERENTIAL UNIT

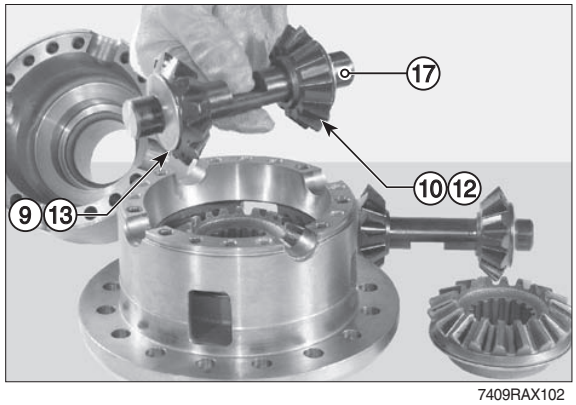

7409RAX100

(1) Install the shoulder ring (7) and planetary gear (8) into the halfbox (5).



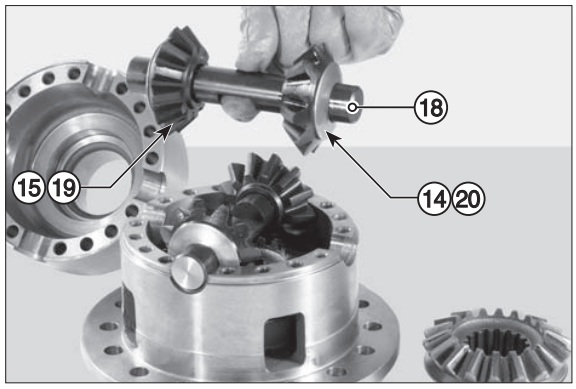
7409RAX101

(2) Install the planetary gears (10)(12) and spherical shoulder washers (9)(13) onto the shafts (17).
Install the planetary set.



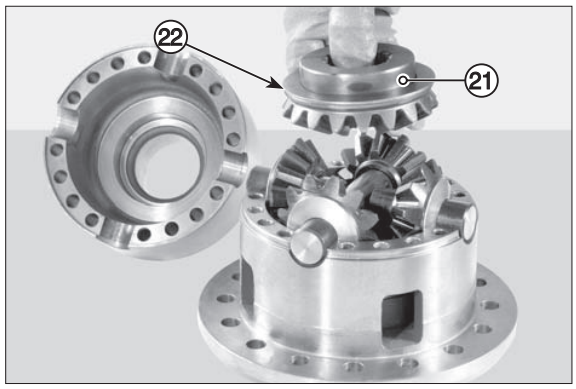
7409RAX102

(3) Install the planetary gears (15)(19) and spherical shoulder washers (14)(20) onto the shafts (18).
Install the planetary set.



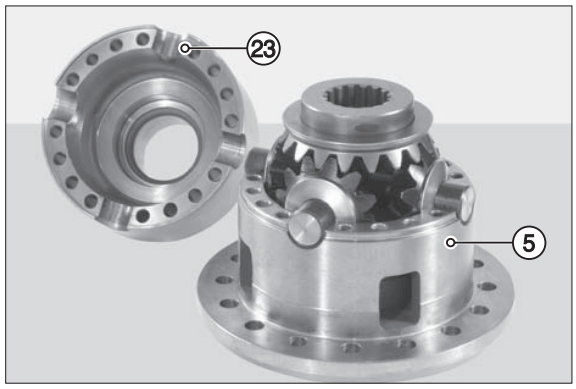
7409RAX103

(4) Install the planetary gear (21) and shoulder ring (22).



7409RAX104

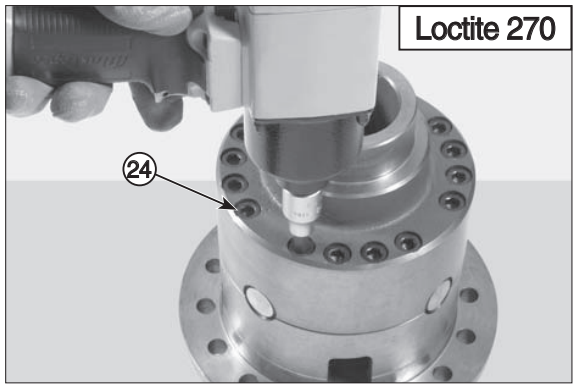
(5) Mount the locking half-box (5) onto the half-box (23)



7409RAX105

(6) Lock the half box with screws (24) coated with loctite 270.

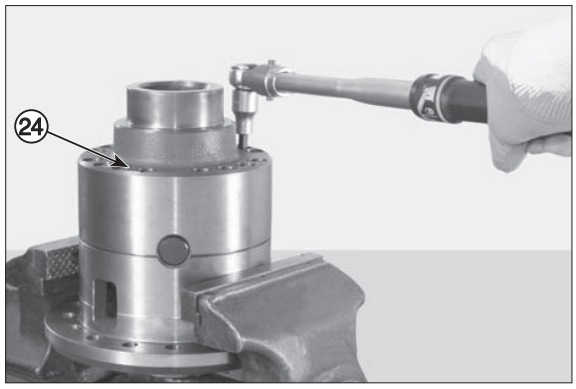
※ 1. The match marks on the two half-boxes must correspond.
2. Use only new screws.



7409RAX106

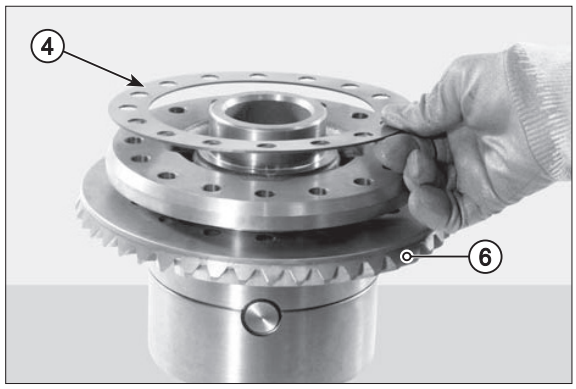
(7) Fit the complete differential unit in a vice and tighten the screws (24) holding the two half boxes together to a torque of 8.16 kgf · m (59 lbf · ft).

※ Tighten screws using the alternate and criss-cross method.



7409RAX107

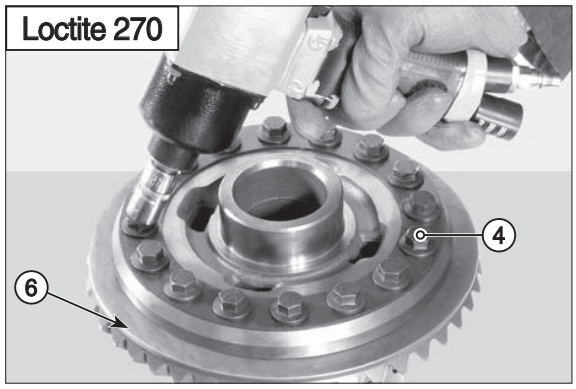
(8) Install the spacer (4) and the crown (6).



7409RAX108

(9) Mount the gear ring (6) and fasten it to the differential box with screws (4).

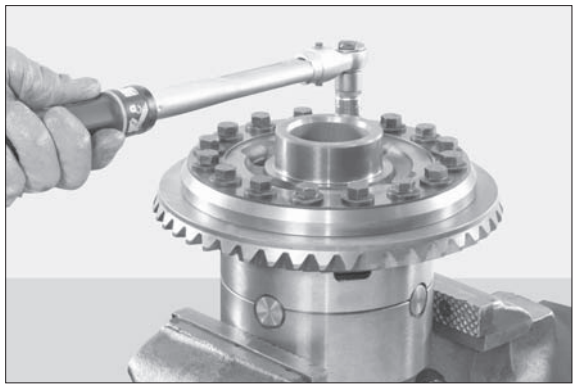
※ Use only new screws.



7409RAX109

(10) Lock the gear ring (6) by tightening the screws (4) to a torque of 15.3 kgf · m (111 lbf · ft).

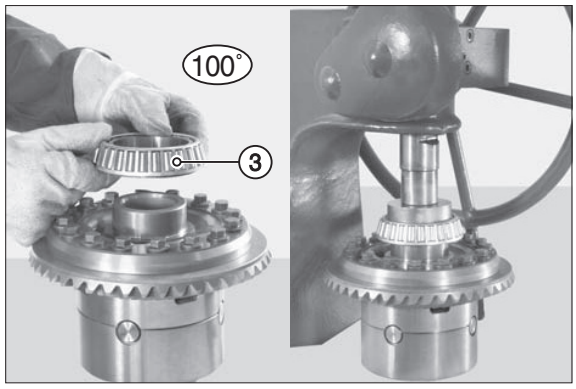
※ Use the alternate and criss-cross tightening method.



7409RAX110

Installation of the differential unit

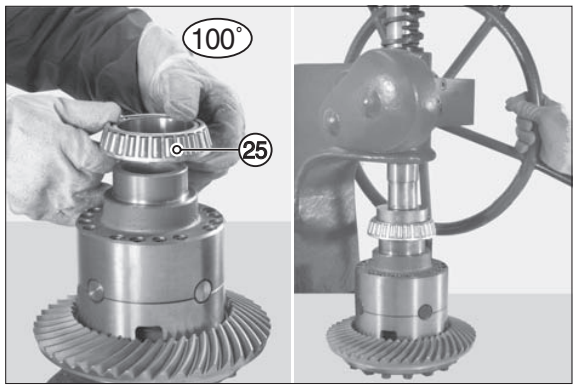
(11) Position the differential unit under a press and, using a driver with an adequate diameter, install the first bearing (3).



7409RAX111

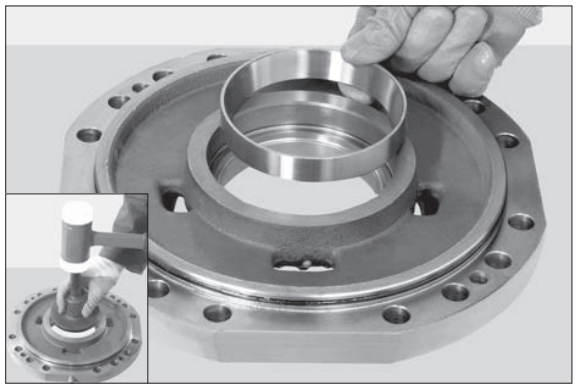
(12) Turn the unit upside down and install the second bearing (25).

※ Pay particular attention; position a shim with adequate diameter in order to engage the internal ring of bearing without engaging the cage.

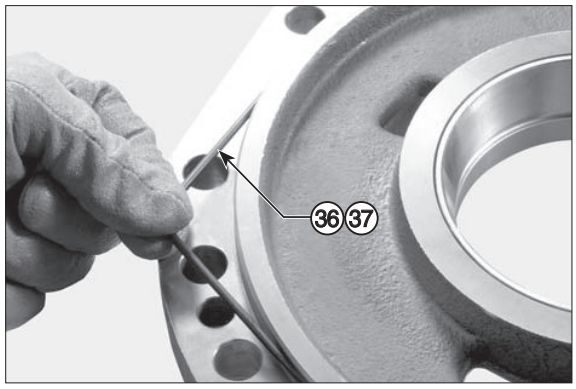


7409RAX112

(13) Only if bearings are replaced.
Insert the thrust blocks of the bearings into the intermediate covers.

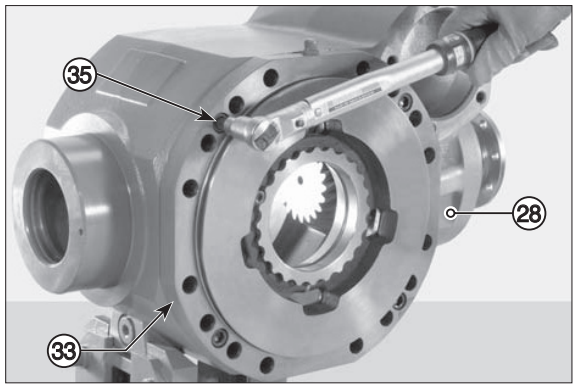

7409RAX113

※ Thoroughly check the state of the O-ring (36)(37).



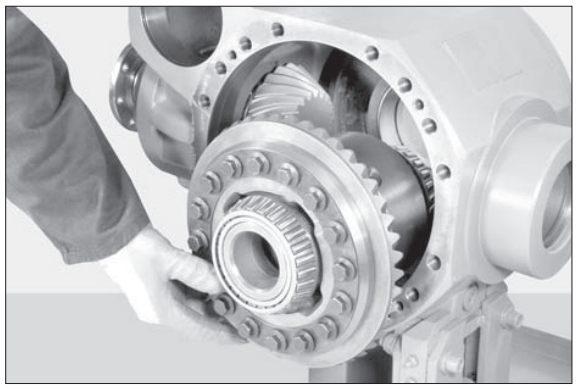
7409RAX114

(14) Fit the intermediate cover (33) on opposite side of ring gears :
lock cover with screws (35) coated with loctite 242.
Tighten screws to a torque of 14.3 kgf · m (103 lbf · ft).

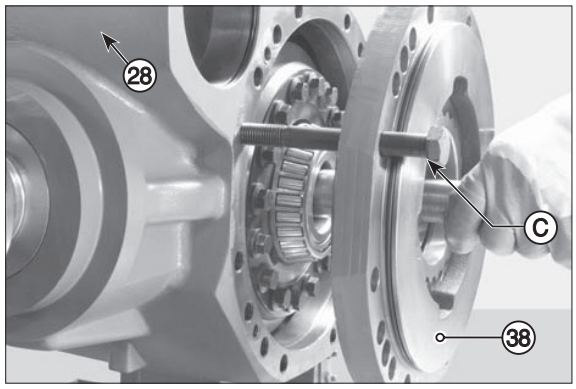


7409RAX115

(15) Position the differential unit in the central body with the help of a bar and fit the middle cover.

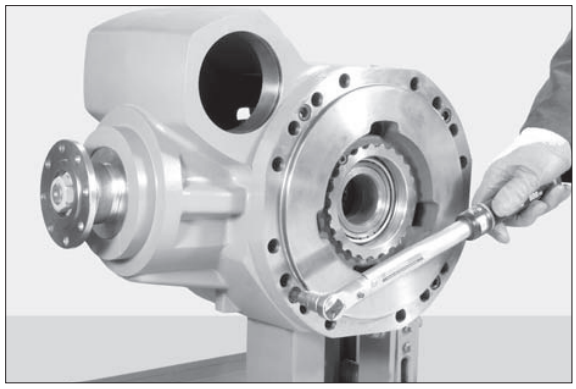

7409RAX116

(16) Tighten the two safety screws “C” into the main body (28) and install the intermediate cover (38).

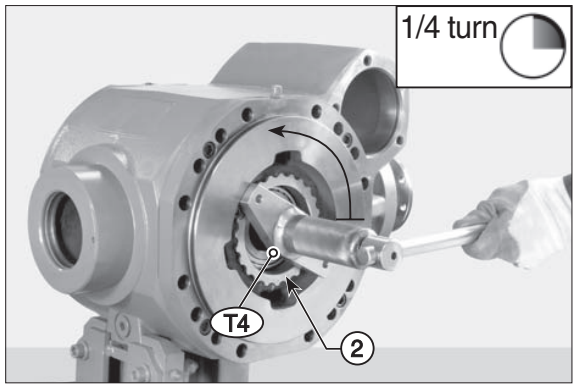


7409RAX117

(17) Tighten screws to a torque of 14.3 kgf · m (103 lbf · ft).


7409RAX118

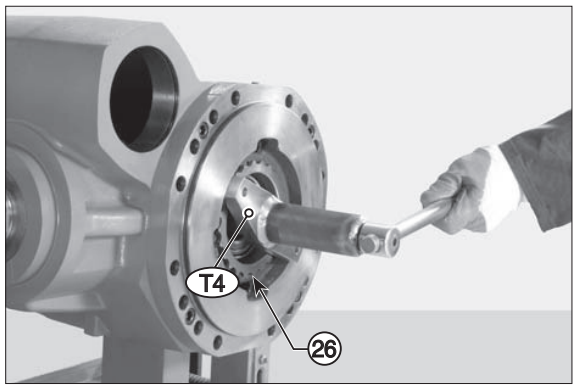
(18) Only if ring nuts have been removed. Tighten the ring nut (2) on gear ring side until clearances between pinion and gear ring are zeroed. Then, loosen by about 1/4 turn.



7409RAX119

(19) Only if ring nuts have been removed. Preload bearings with ring nut (26) on non-gear ring side in order to increase the torque of the pinion.

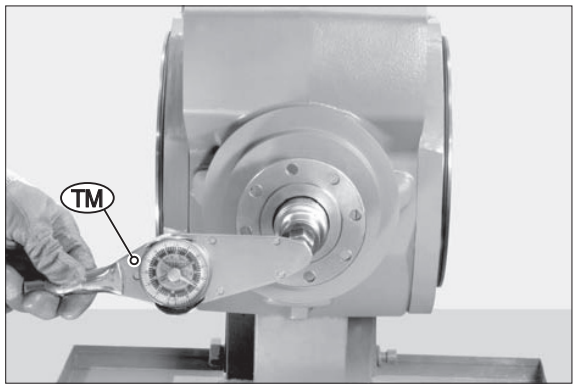
※ In the case of used bearings, check thrust torque ; in the case of new bearings, check continuous torque.



7409RAX120

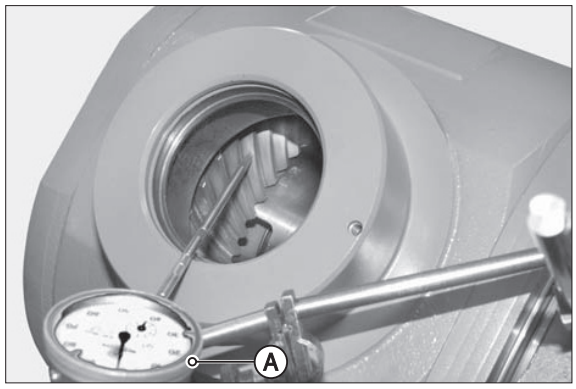
(20) Apply torque meter TM to pinion nut and check that torque will increase by 2.04~4.08 kgf · cm as a result of differential bearing preload.

- Example : pinion torque :
  12.2~13.3 kgf · cm
- Pinion + differential torque :
  14.3~17.3 kgf · cm



7409RAX121

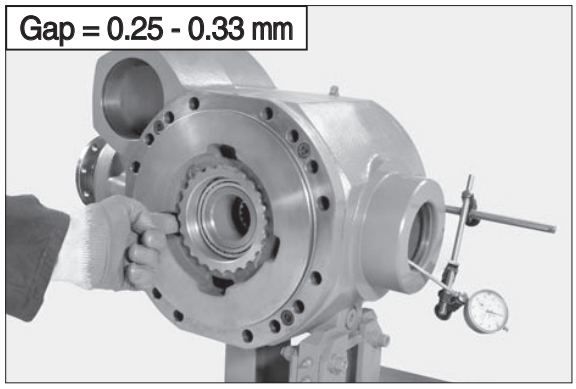
(21) Introduce a comparator “A” with long tracer through the hole provided for the cap.
Position the tracer on the side of a tooth of the gear ring, approximately 5 mm from the outer rim; preload by about 1 mm and zero the comparator.



7409RAX122

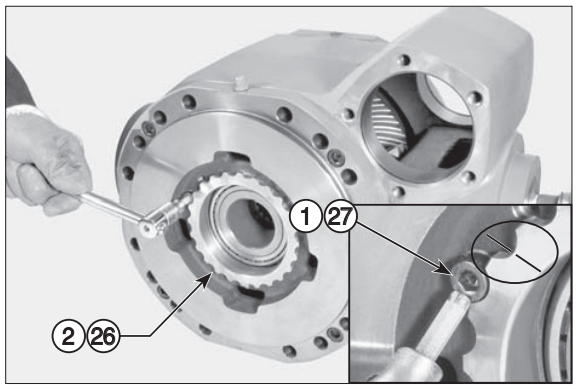
(22) As you hold the pinion in position, move the gear ring manually in both directions to check clearance between pinion and gear ring.

Standard clearance : 0.25 - 0.33 mm



7409RAX123

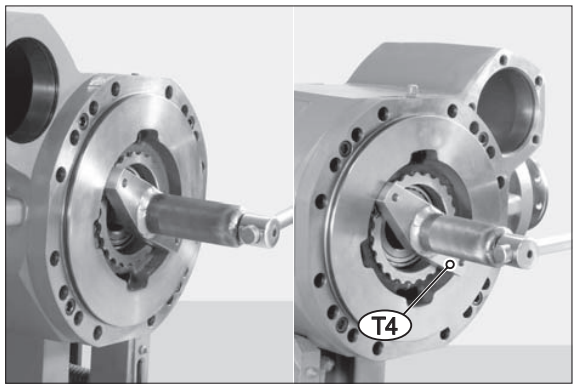
(23) If torque and/or pinion-gear ring clearance is not within tolerance values and the ring nuts have not been removed, mark the position of the ring nuts (2)(26) and remove the safety stops (1)(27).



7409RAX124

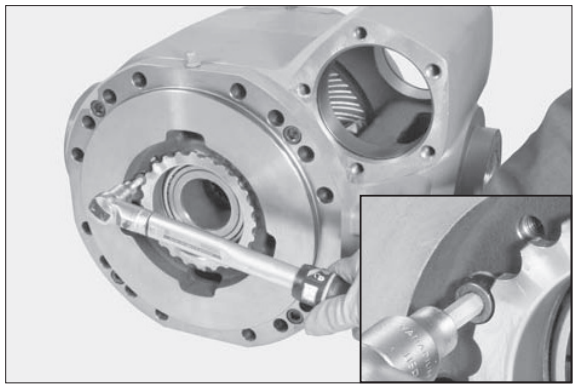
(24) Adjusting clearance between pinion and gear ring.

To INCREASE: loosen the ring nut on gear ring side and tighten the ring nut on non-gear ring side by the same measure.
To DECREASE: perform the same operations inversely.
To rotate ring nuts, use special wrench T4.



7409RAX125

(25) Engage screw (27) in the slot next to the holes provided for the check screws.
Coat screws (27) with loctite 242 and tighten to a torque of 2.45~2.65 kgf · m (17.7~19.2 lbf · ft).

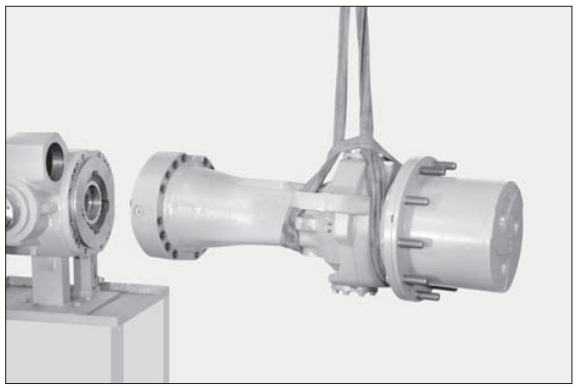


7409RAX126

(26) Fit the top plug after applying repositionable jointing compound for seals to the rims.
Install the snap ring.

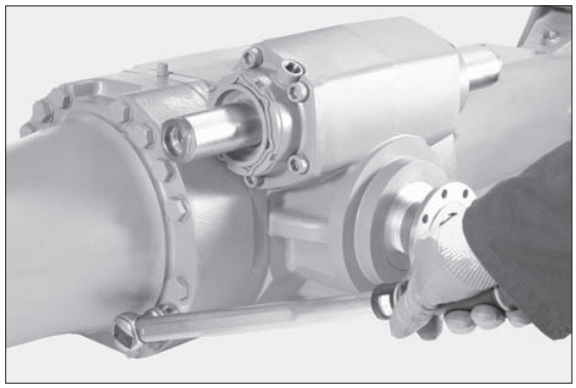
7409RAX127

(27) Install the complete arm.

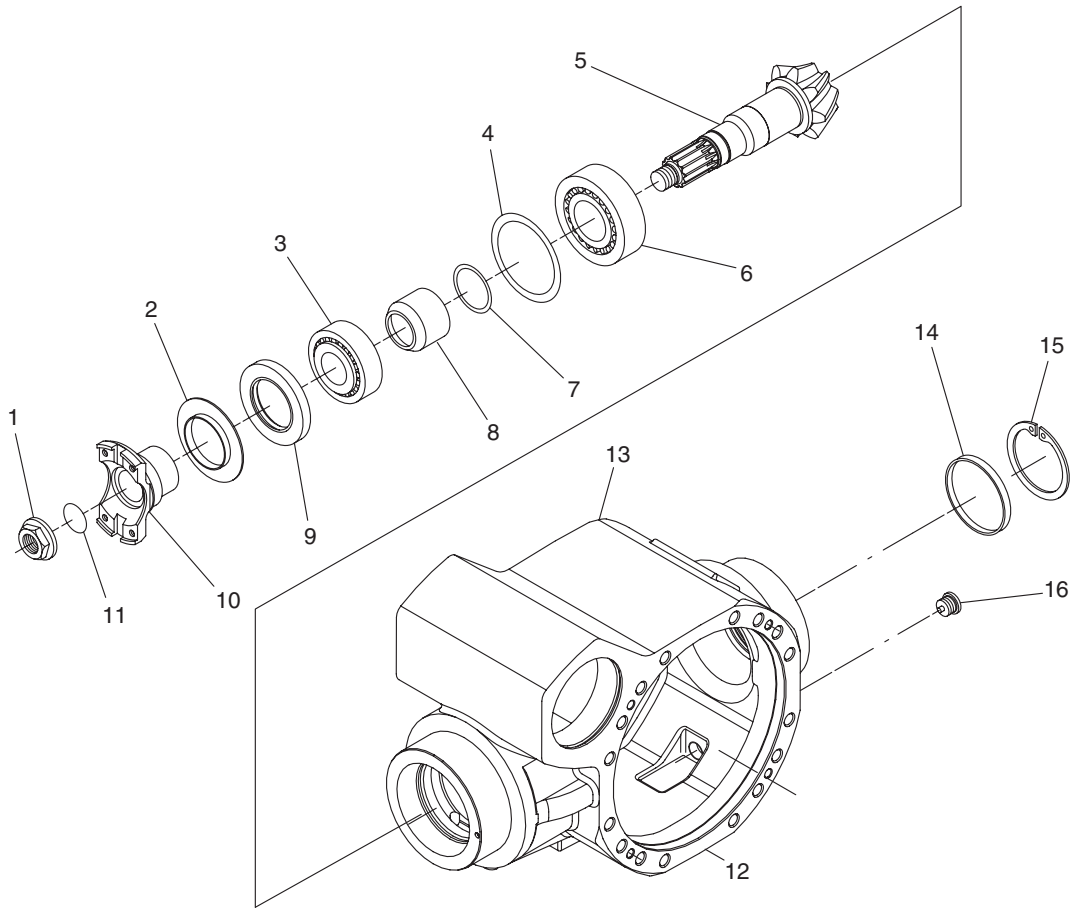

7409RAX128

(28) Torque wrench setting :
28.9~31.8 kgf · m (209~230 lbf · ft)

※ Tighten using the criss-cross method.

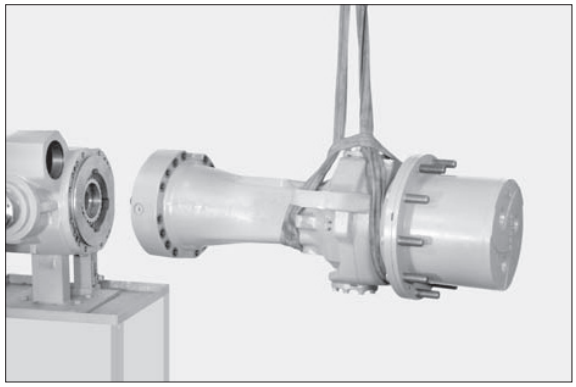

7409RAX129

7) DISASSEMBLY OF THE PINION



7409RAX130

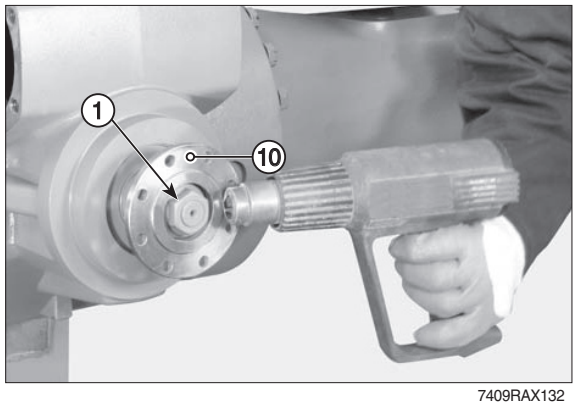
(1) Remove both axle arms.



7409RAX131

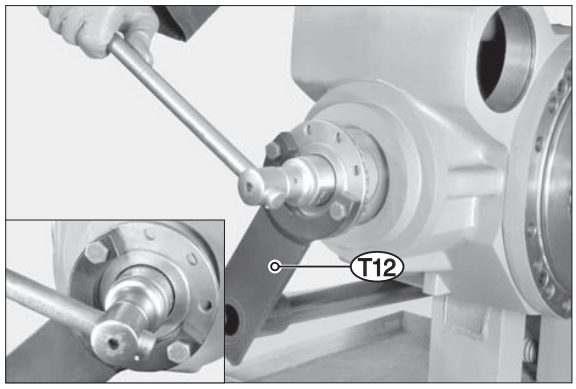
(2) If disassembly is awkward, heat the check nut (1) of the flange (10) at 80˚C.

※ Heating is meant to unloose the setting of loctite on the nut (1).

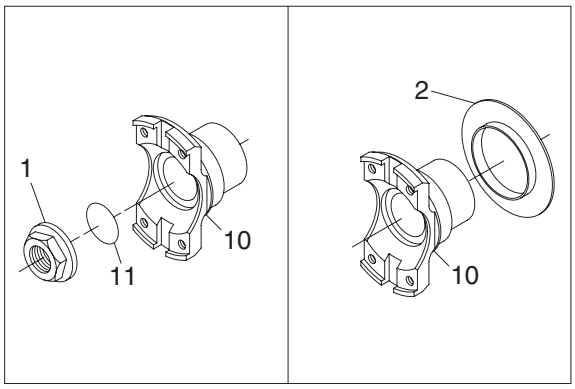


7409RAX132

(3) Position tool T12, so as to avoid pinion rotation.
Unloose and remove the nut (1); also remove the O-ring (11).

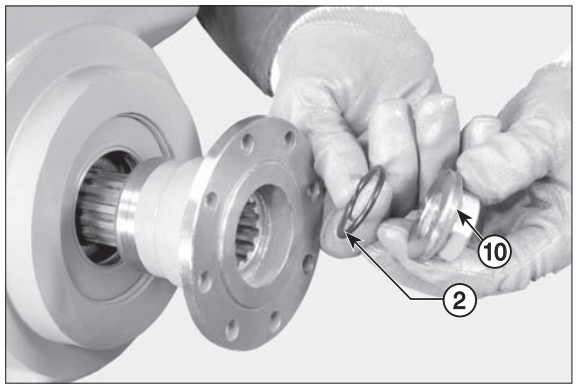


7409RAX133



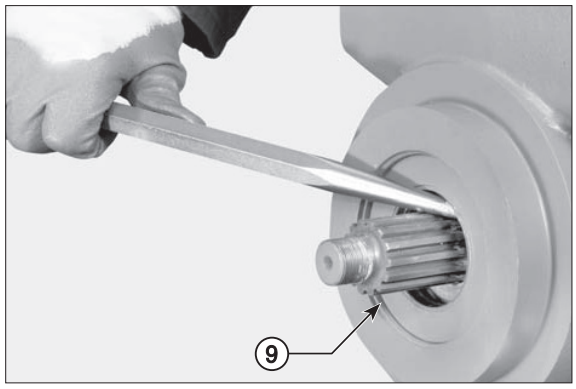
7409RAX134

(4) Remove the flange (10) complete with guard (2).



7409RAX135

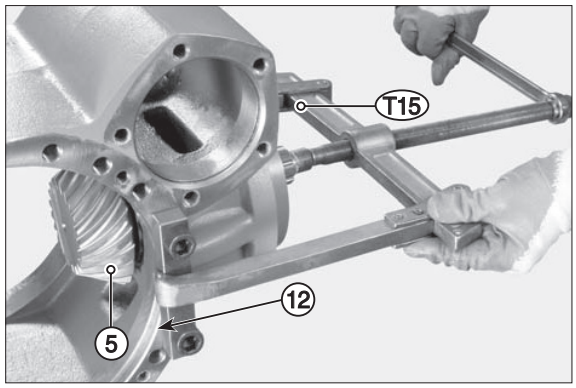
(5) Remove the sealing ring (9).



7409RAX136

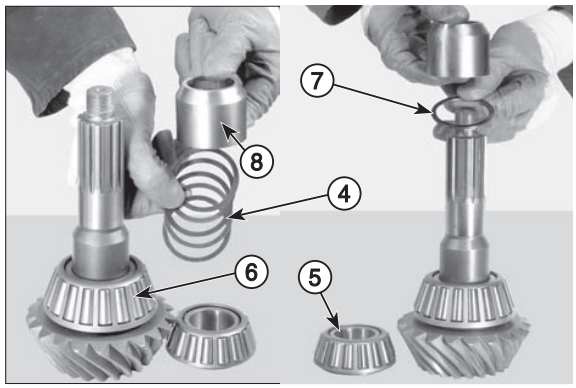
(6) Apply blocks T15 and, with the help of a puller, extract the pinion (5) complete with the internal bearing (6), the distance piece (8) and shims (4)(7).

※ The thrust blocks of the bearings remain in the central body (12).



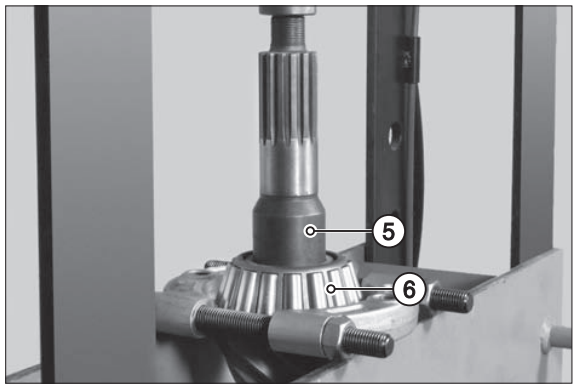
7409RAX137

(7) Refer and keep to the positions marked during disassembly.



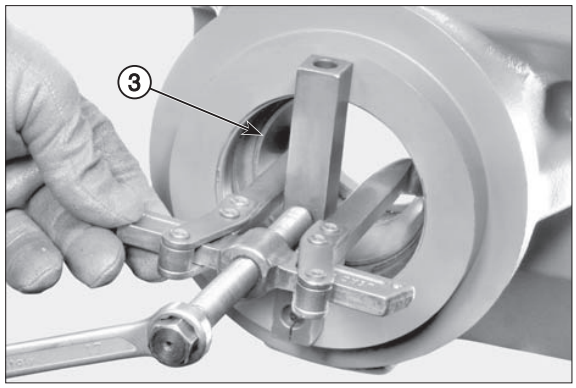
7409RAX138

(8) Using a puller and a press, remove the inner bearing (5) from the pinion (6).



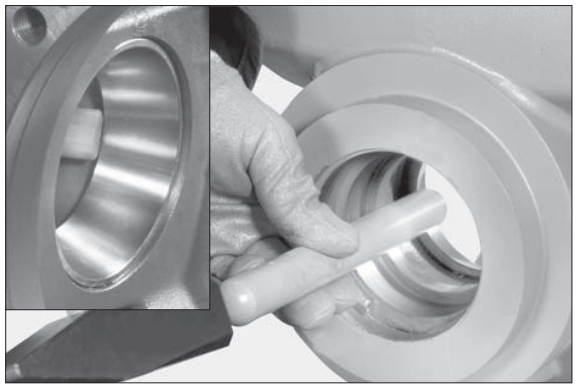
7409RAX139

(9) Remove the thrust block of the external bearing (3).



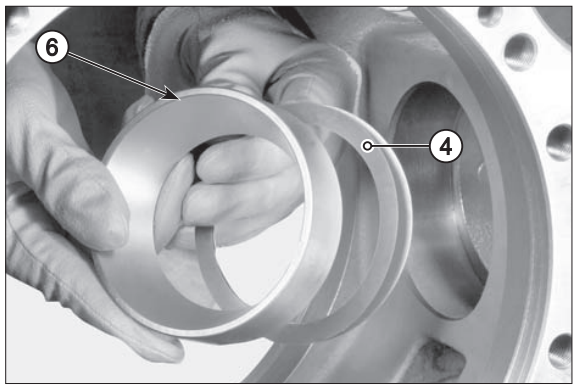
7409RAX140

(10) Insert a drift in the appropriate holes.



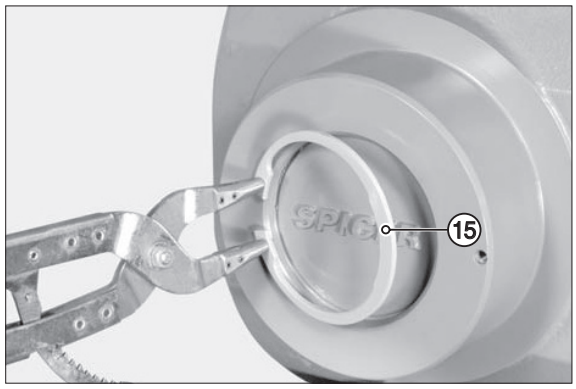
7409RAX141

(11) Remove the thrust block of the internal bearing (6) as well as the shim washers (4).



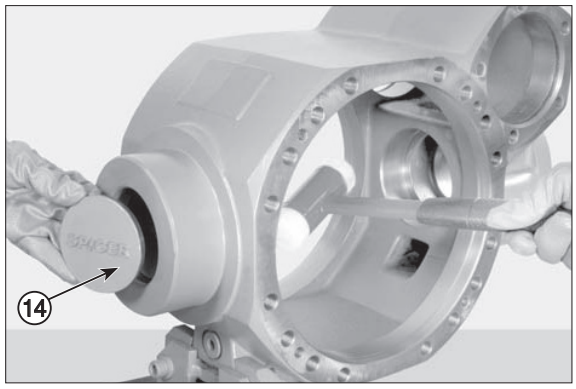
7409RAX142

(12) Remove the snap ring (15).



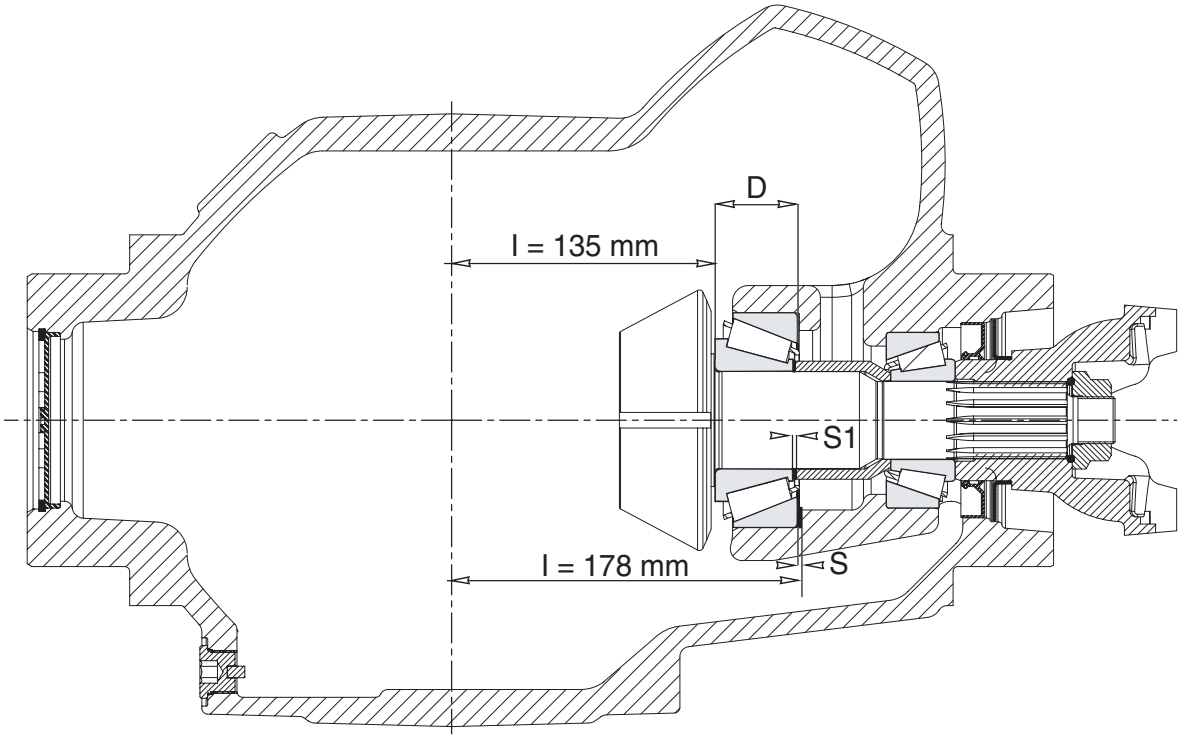
7409RAX143

(13) Remove the cap (14).



7409RAX144

8) ASSEMBLY OF THE PINION

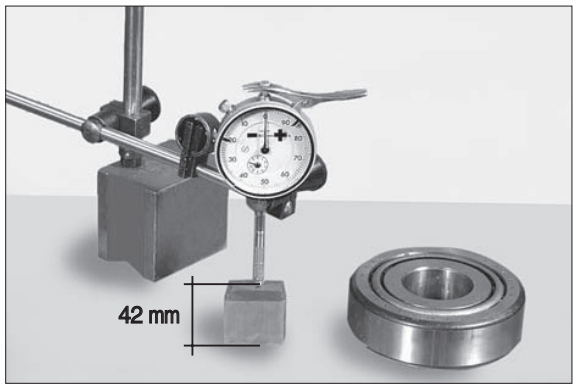


S = 178 - (I + D) S = shims Ø 110 mm
S1 = shims Ø 50 mm

7409RAX145

Calculating pinion center distance

(1) Using a faceplate, reset a centesimal comparator “DG” on a calibrated block (whose known thickness is 42 mm). Preload the comparator by about 3 mm.

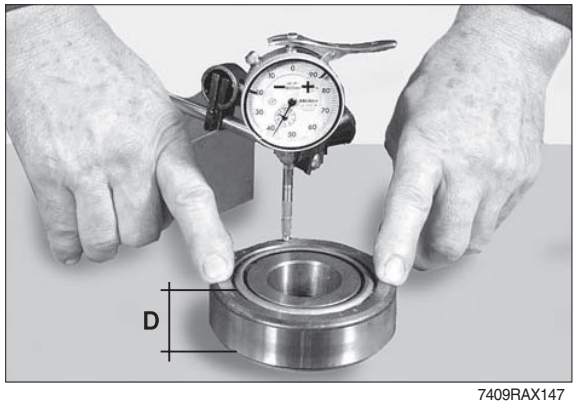


7409RAX146

(2) Bring inner bearing (6), complete with thrust block, under comparator "DG".

※ Press the thrust block centrally and carry out several measurements by rotating the thrust block.

Example : 42 + 0.5 = 42.5 = "D".

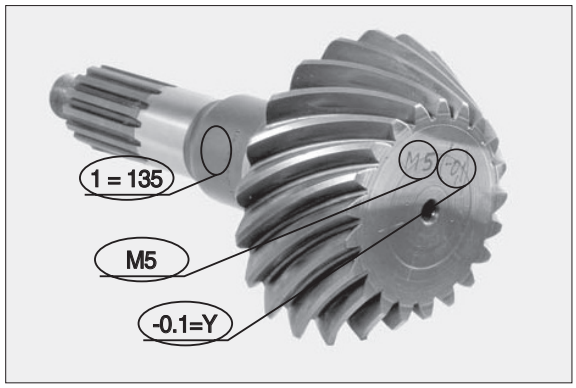


7409RAX147

(3) Check nominal dimension “I” as marked on the pinion. Add up to or subtract from “I” the variation indicated as “Y” to obtain the actual center distance “I”.

Example : I = 135 - 0.1 = 134.9

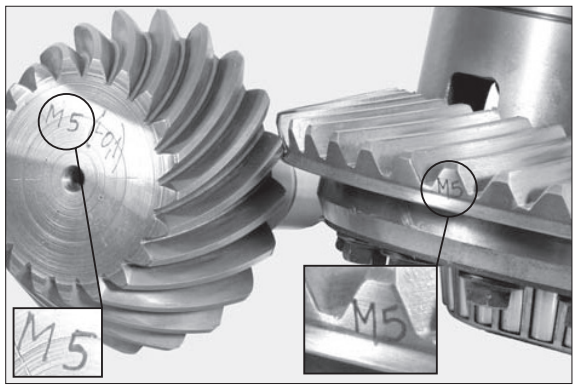
※ M5 = Match part number



7409RAX148

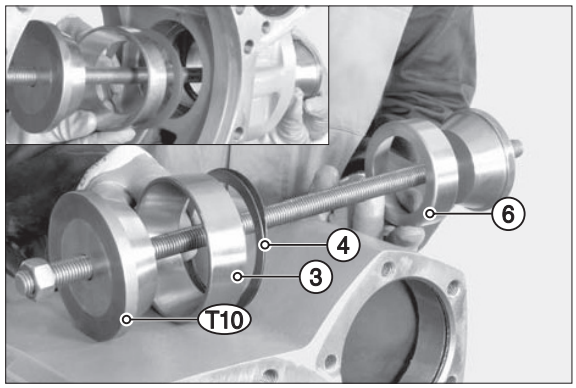
(4) Calculate shims “S” for insertion under the thrust block of the inner bearing using the following formula :

S = 178 - (I + D) where : 178 = fixed dimension
I = actual pinion center distance
D = total bearing thickness ;
Example :
S = 178 - (134.9 + 42.5) = 0.6 mm.



7409RAX149

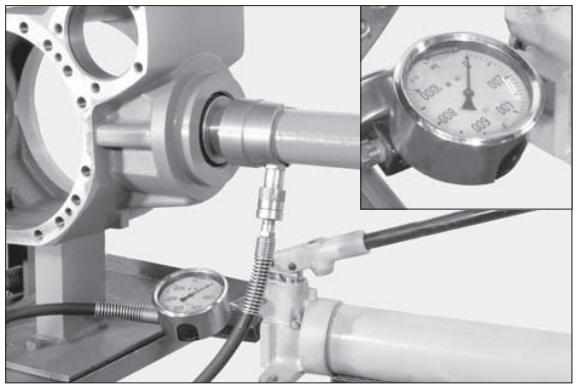
(5) Using special tool T10.
Partially insert the thrust block of the bearings (3) (6) and shims (4) .



7409RAX150

(6) Connect the tension rod to the press and move the thrust block of bearings (3) (6) into the seats.
Disconnect the press and remove the tension rod.

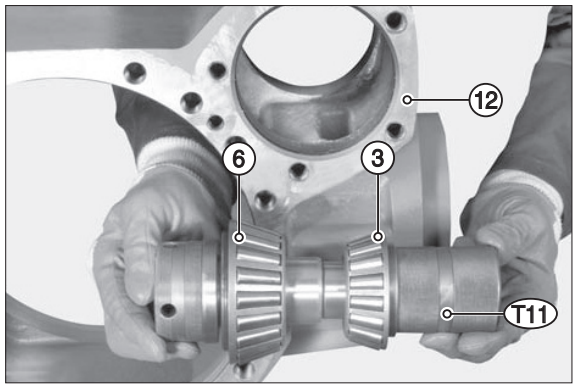
※ Before starting the next stage, make sure that the thrust block has been completely inserted into its seat.



7409RAX151

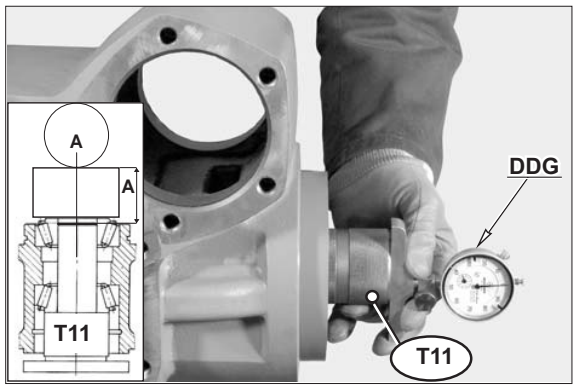
Calculating pinion bearings rolling torque

(7) Introduce tool T11 complete with bearings (3) and (6) into the main body (12); tighten by hand until a rolling torque is definitely obtained.



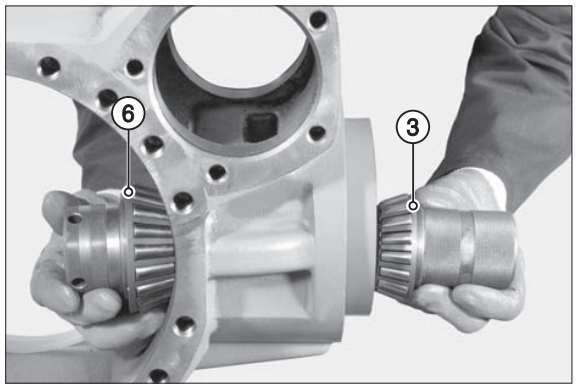
7409RAX152

(8) Introduce the tracer of a depth comparator "DDG" into either side hole of tool T11. Reset the comparator with a preload of about 3 mm.



7409RAX153

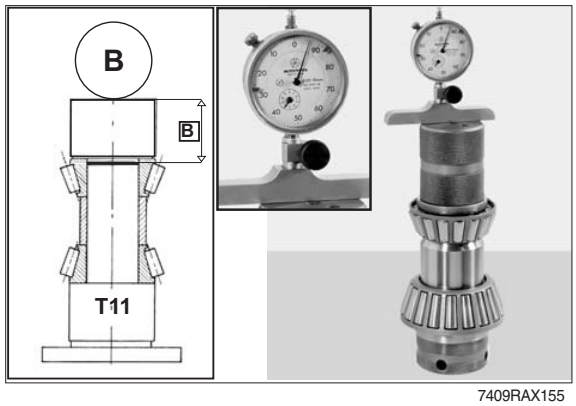
(9) Remove the comparator and take out tool and bearing kits from the main body. Reinstall every part, also introducing a distance piece between bearings (3) and (6). Tighten the entire pack by hand.



7409RAX154

(10) Introduce depth comparator "DDG" in tool T11 and measure deviation "H" from the previous reset.

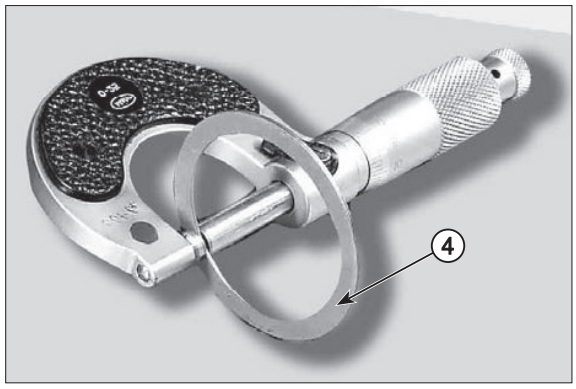
Example : H = A - B = 1.19 mm.



7409RAX155

(11) Deviation “H” must be added to a set value of 0.12~0.13 mm (X) to make up the pack of shims “S1” (4) for insertion between inner bearing (6) and distance piece (8).
Dimension “S1” must be rounded off to the higher 5/100.

Example : S1=H+X=1.19+(0.12~0.13)
=1.33~1.35 mm.



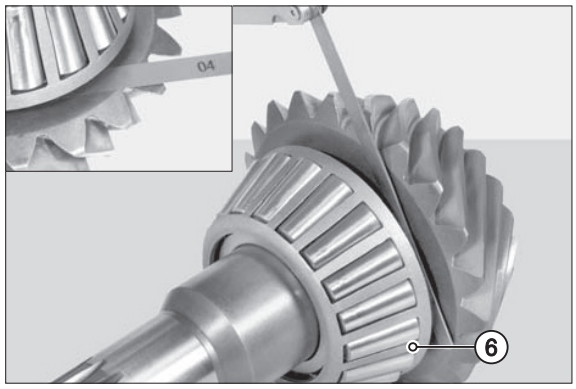
7409RAX156

(12) Heat the inner bearing (6) to about 100˚C and fit it to the pinion (5).

※ Once the bearing has cooled down, lightly lubricate bearing (6) with SAE 85W90 oil.

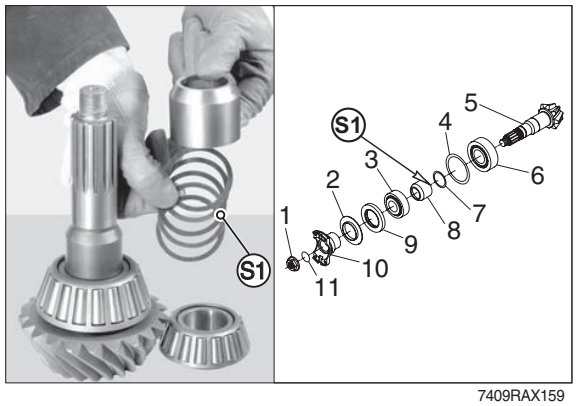
7409RAX157

(13) Make sure that the bearing (6) is well set.



7409RAX158

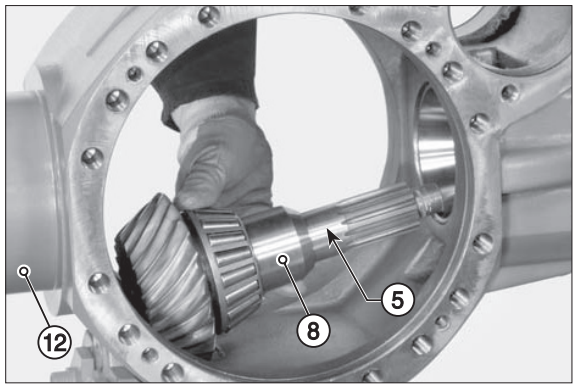
(14) Refer and keep to the positions marked during disassembly.



7409RAX159

(15) Fit the pinion (5), shim “S1” (7) and distance piece (8) in the main body (12).

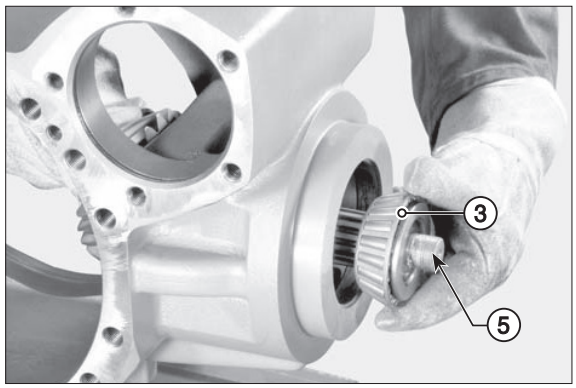
※ The finer shims must be placed in-between the thicker ones.



7409RAX160

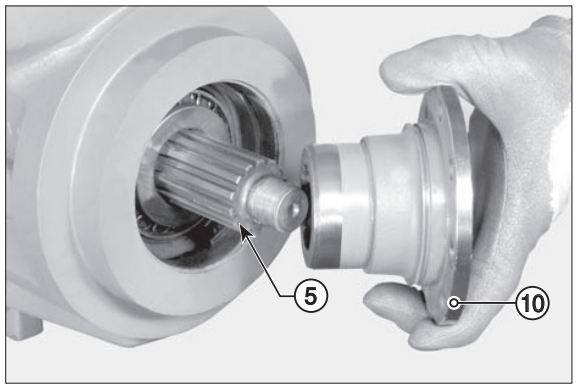
(16) Heat the external bearing (3) to a temperature of about 100˚C and fi t it on to the pinion (5) so as to complete the pack as shown in the figure.

※ Lightly lubricate bearing (3) with SAE 85W90 oil.



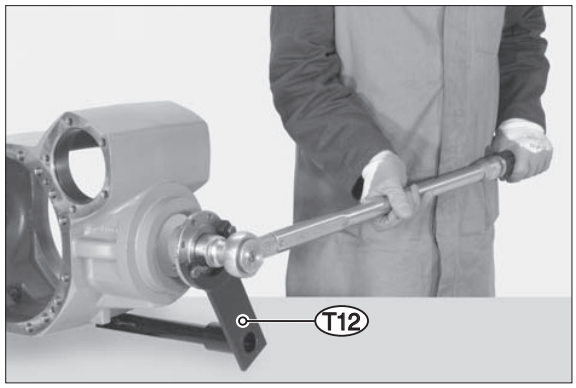
7409RAX161

(17) Install the flange (10) onto the pinion (5) without sealing ring.



7409RAX162

(18) Apply wrench to the ring nut (1) and bar-hold T12 to the pinion (5).
Lock the wrench T12 and rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 81.6~102 kgf · m (590~738 lbf · ft)



7409RAX163

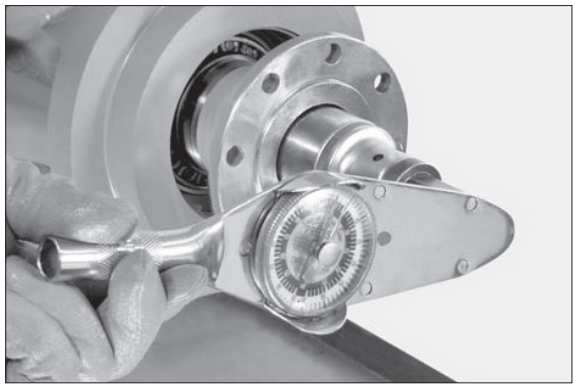
(19) Apply onto the pinion (5) the bar-hold and with the help of a torque meter, check the torque of the pinion (5).

· Torque : 12.2~18.4 kgf · cm

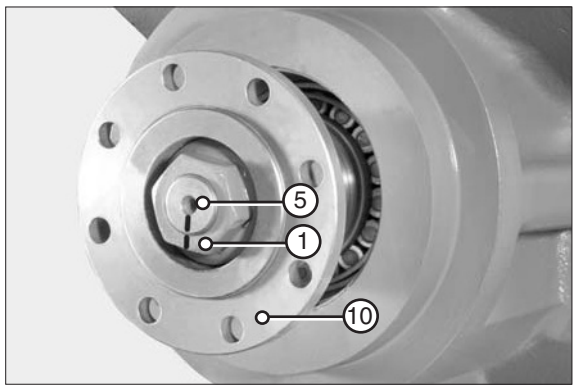
※ If torque exceeds the maximum value, then the size of shim “S1” (7) between the bearing (6) and the distance piece (8) needs to be increased.
If torque does not reach the set value, increase the torque setting of the ring nut (1) in different stages to obtain a maximum value of 81.6~102 kgf · m (590~738 lbf · ft).

※ If torque does not reach the minimum value, then the size of shim “S1” (7) needs to be reduced.

※ When calculating the increase or decrease in size of shim “S1”, bear in mind that a variation of shim (4) of 0.01 mm corresponds to a variation of 6.12 kgf · cm in the torque of the pinion (5).

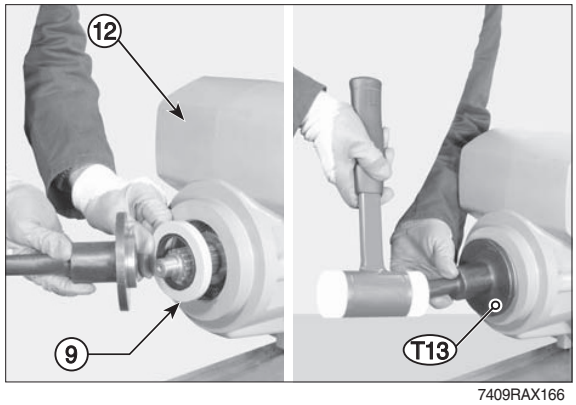

7409RAX164

(20) Make positional marks across nut (1) and pinion (5) tang ; then remove nut and flange (10)



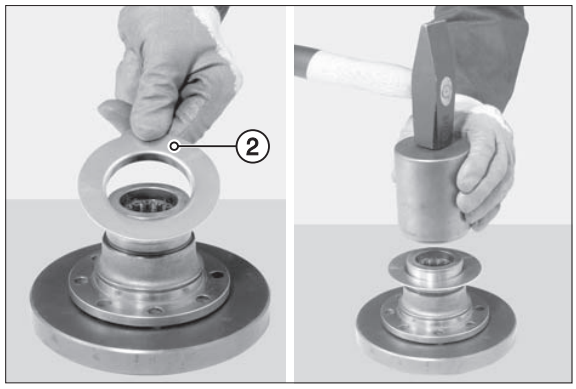
7409RAX165

(21) Apply Arexons rubber cement to the outer surface of the new seal ring (9) and fit ring in the main body (12) using driver T13.



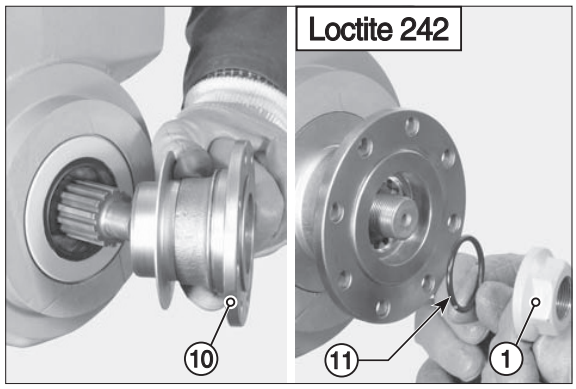
7409RAX166

(22) Fit the safety flange (2).



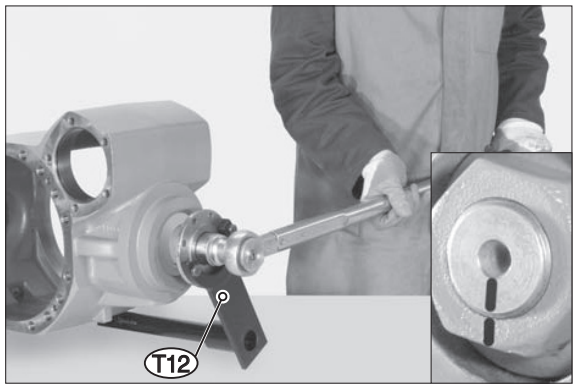
7409RAX167

(23) Oil seal ring lips and install flange (10). Mount O-ring (11) and apply loctite 242 to pinion tang; tighten nut (1).



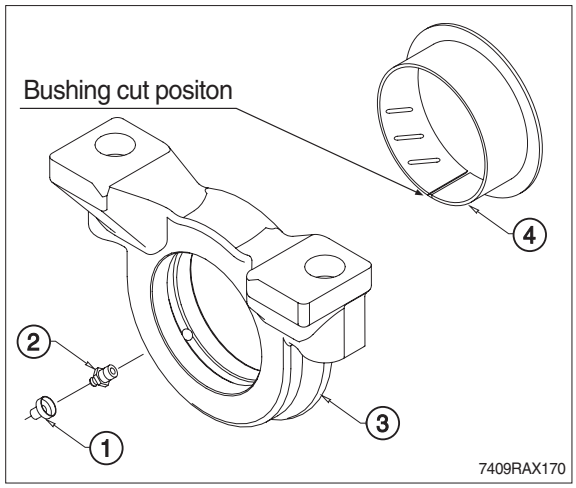
7409RAX168

(24) Tighten the nut until the match marks made at stage “a” line up.

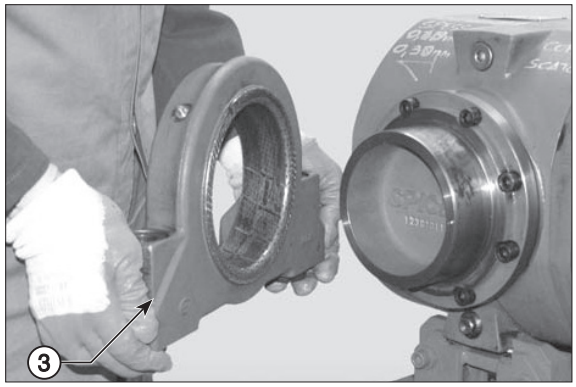


7409RAX169

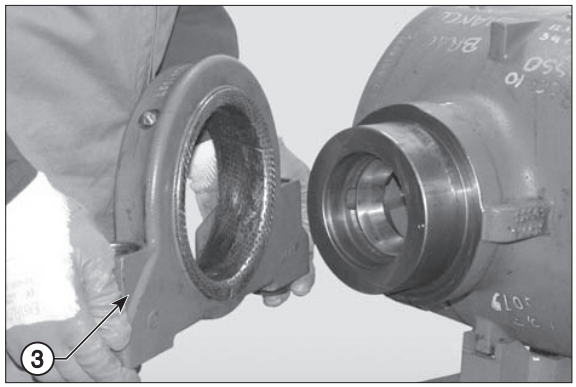
9) DISASSEMBLE THE SWINGING SUPPORT



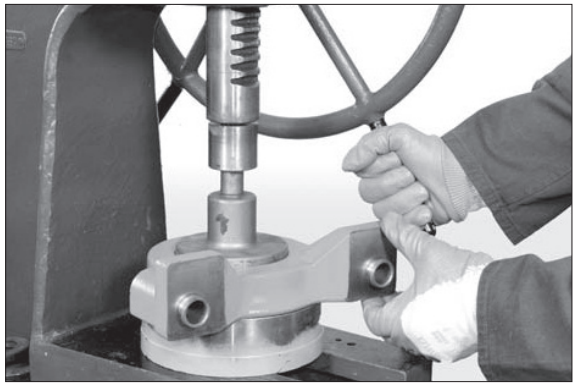
(1) Remove the swinging support (3).

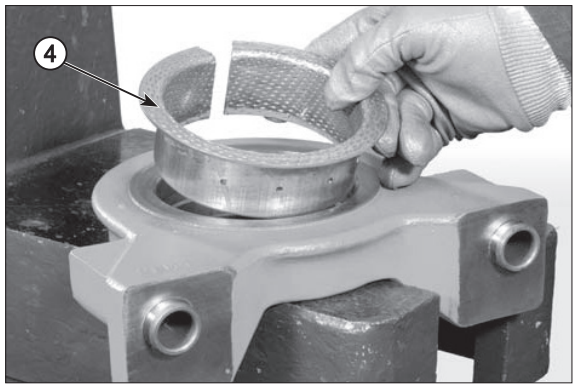


(2) Remove the swinging support (3) on the side opposite the drive.



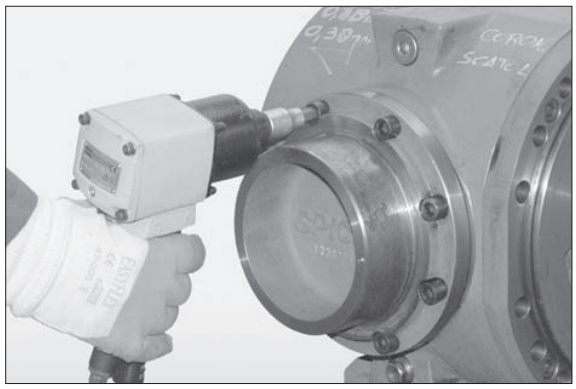
(3) Position the swinging support (3) under a press and remove the complete bushing (4).



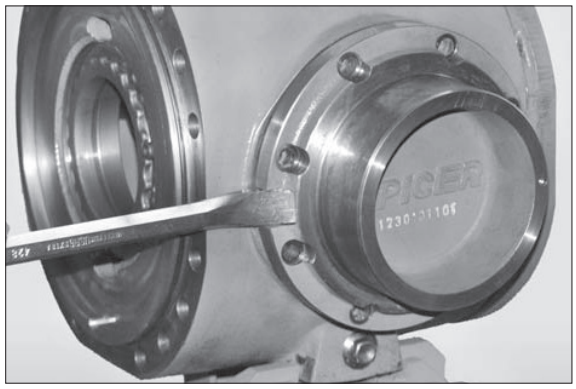


7409RAX174

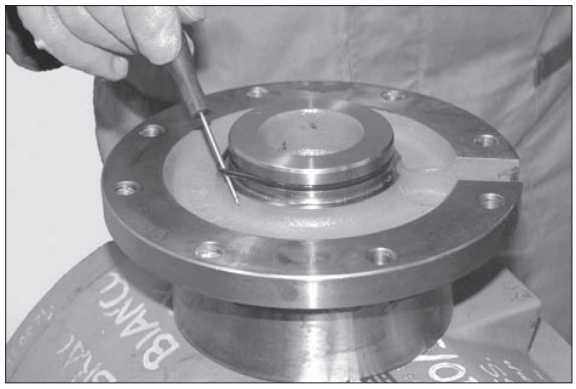
(4) Remove the screws.


7409RAX175

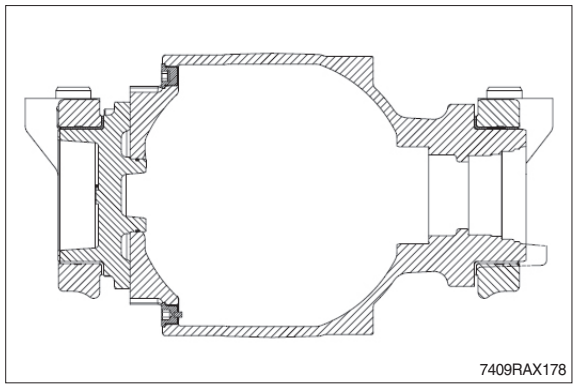
(5) Disjoin the cover from the differential box by alternatively forcing a screwdriver into the appropriate slots.


7409RAX176

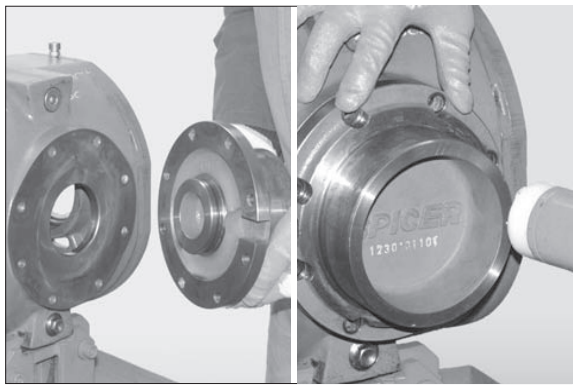
(6) Check integrity and position of the cylinder's O-ring.


7409RAX177

10) ASSEMBLY THE SWINGING SUPPORT

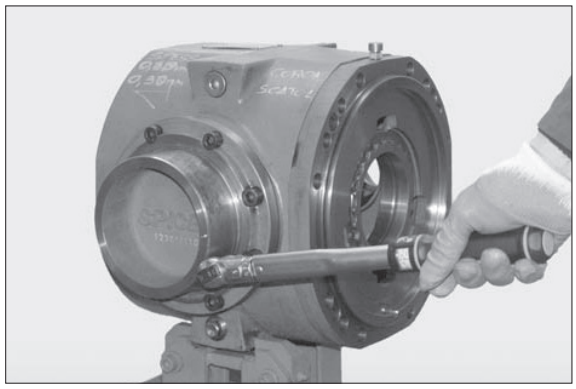

7409RAX178

(1) Install the cover.

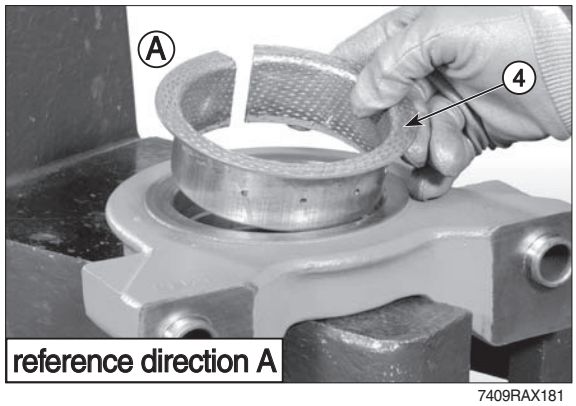

7409RAX179

(2) Lock the cover by tightening the screws.

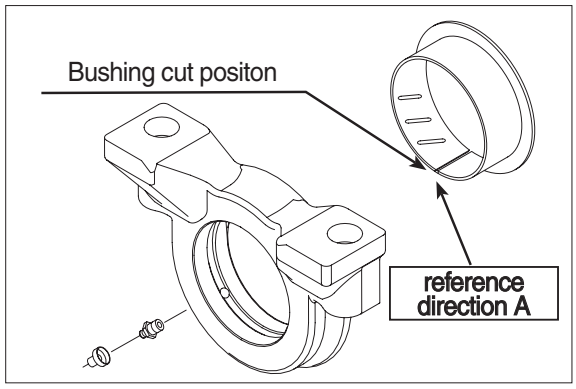
Torque wrench setting for screws :
4.08~5.1 kgf · m (29.5~36.9 lbf · ft)


7409RAX180

※ If the bushing (4) is worn and needs replacing, note down the assembly side of the connection notch "A".

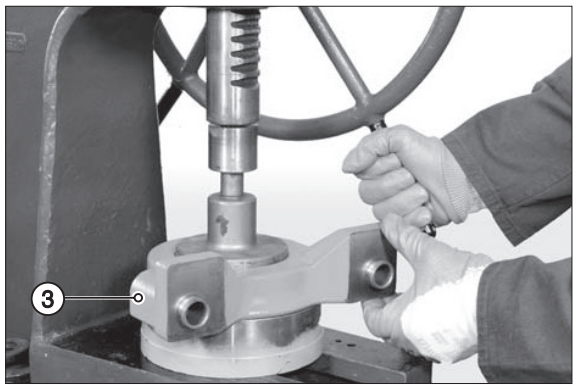


7409RAX181



7409RAX182

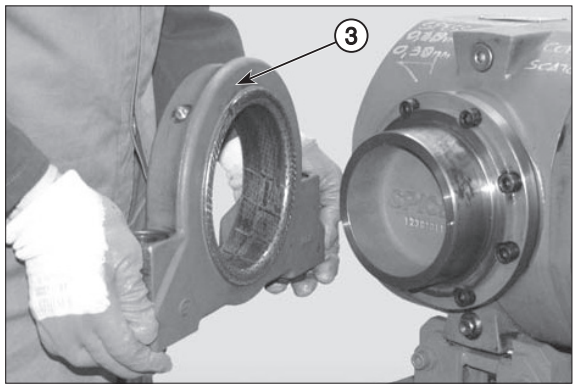
(3) Position the swinging support (3) under a press and insert the complete bushing (4).



7409RAX183

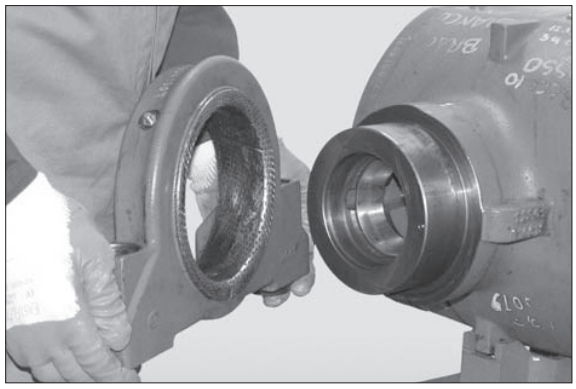
(4) Install the swinging support (3).

※ Check that it is properly oriented.



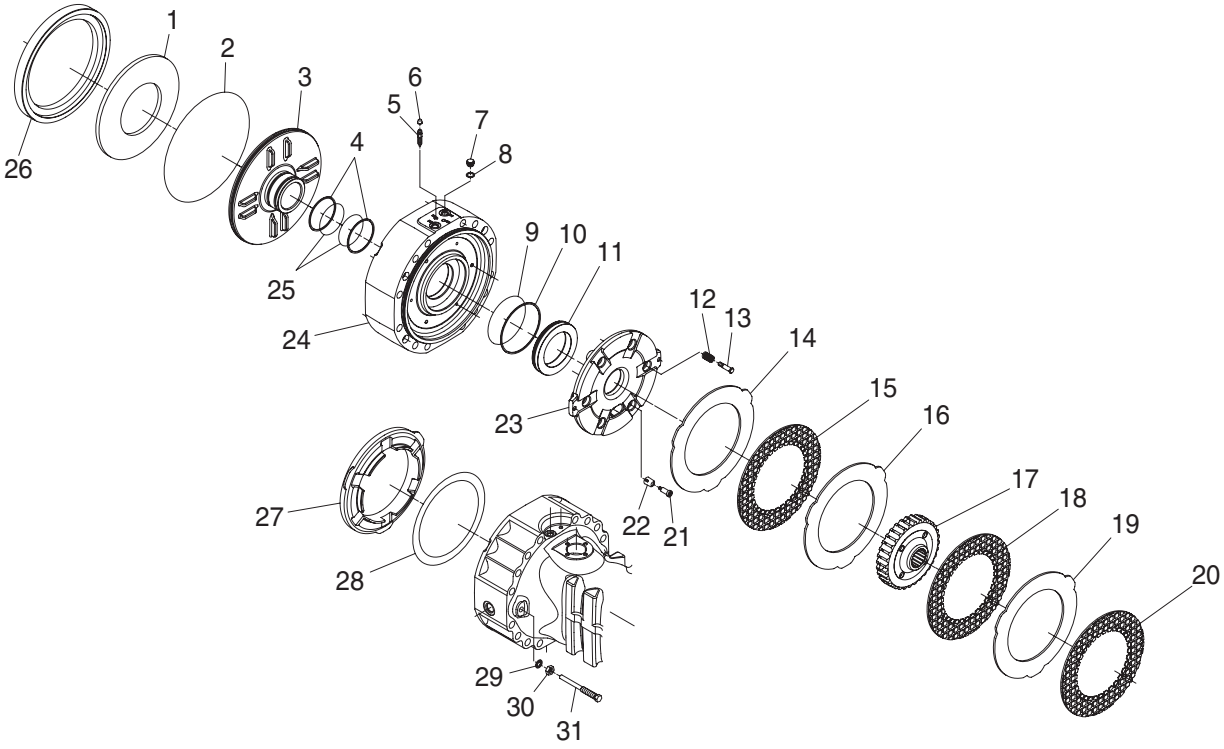
7409RAX184

(5) Install the swinging support (4) on the side opposite the drive.



7409RAX185

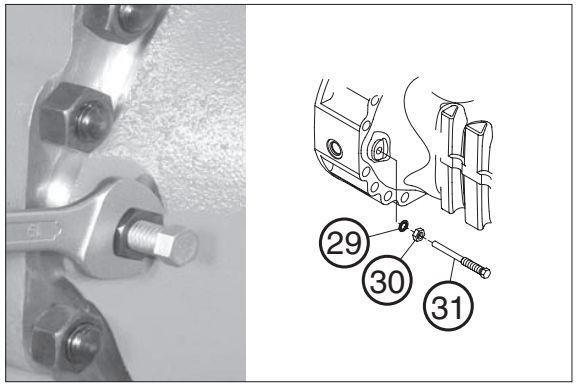
11) NEGATIVE BRAKE : ASSEMBLING NEGATIVE BRAKE DISKS



7409RAX186

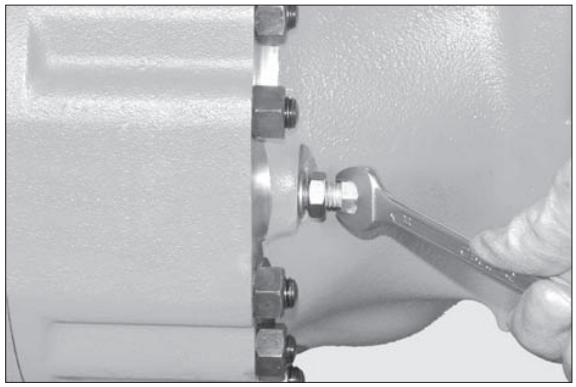
Manual emergency release

(1) Loosen nuts (30) of screws (31) provided for the mechanical and manual release of the braking units, then move the nuts backwards by approx. 8 mm.



7409RAX187

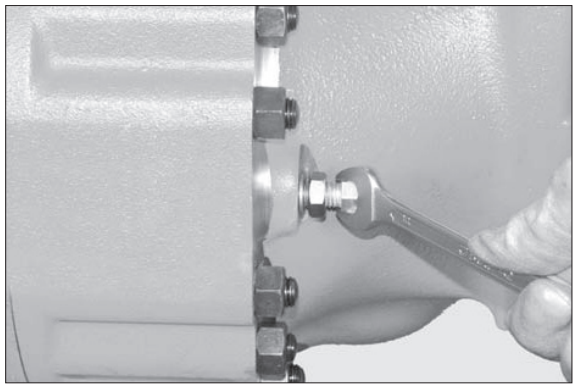
(2) Tighten screws (31) so as to fasten them onto the pressure plate (23).



7409RAX188

(3) Using a wrench, tighten the screws (31) in an alternate sequence by 1/4 turn at a time so as to compress the belleville washers (1) and disengage the braking disks.

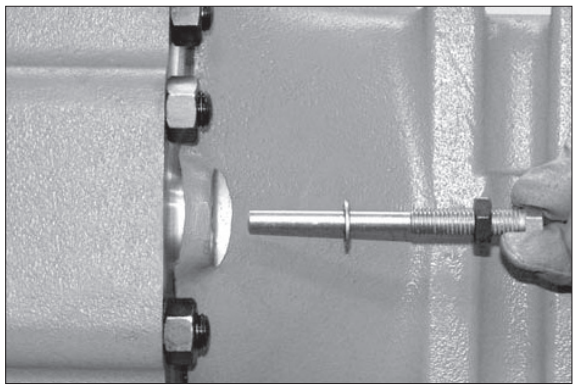
※ Tighten max. by one turn.



7409RAX189

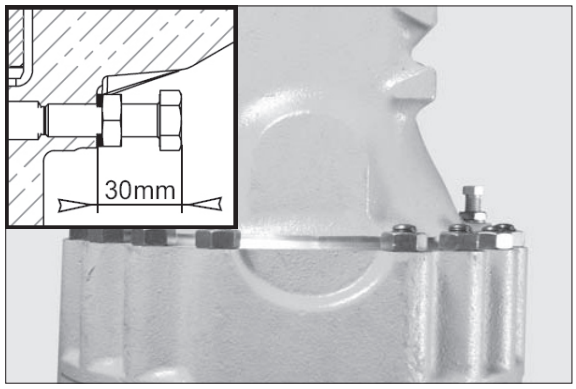
Adjustment after manual release

(4) Remove screws complete with nuts and seals.
Replace seals, apply grease to the screws and install all parts into the arm.



7409RAX190

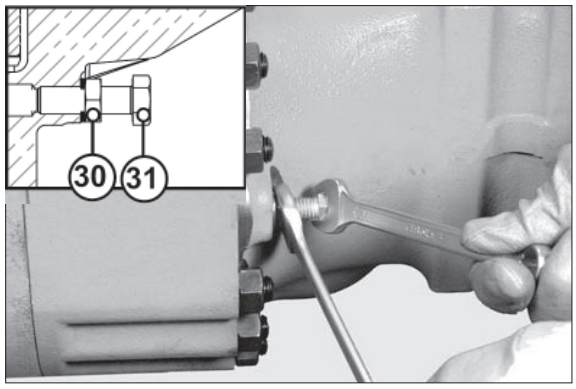
(5) Adjust screws (31) to obtain a jut of 30 ± 0.5 mm in relation to the arm.



7409RAX191

(6) Lock into position with nuts (30).

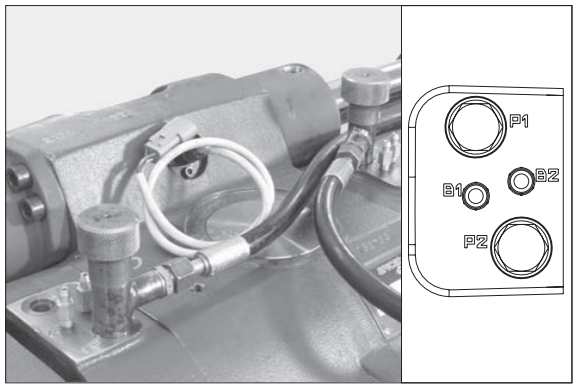
※ Hold screws (31) into position while locking the nuts (30); after locking, check the jut of screws (31) once more.



7409RAX192

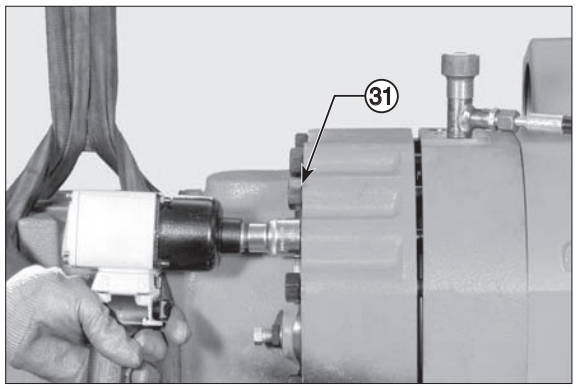
11) NEGATIVE BRAKE : DISASSEMBLING

(1) Connect an external pump to the union piece “P1” of the negative brake and introduce a pressure of 21.4~35.7 kgf/cm^2 (304~508 psi) to eliminate the pressure of the belleville washers (1).



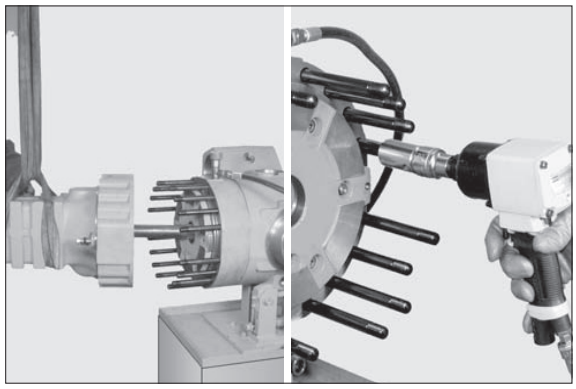
7409RAX193

(2) Sling the arm to be removed and connect it to a hoist.
Loosen and remove screws (31).

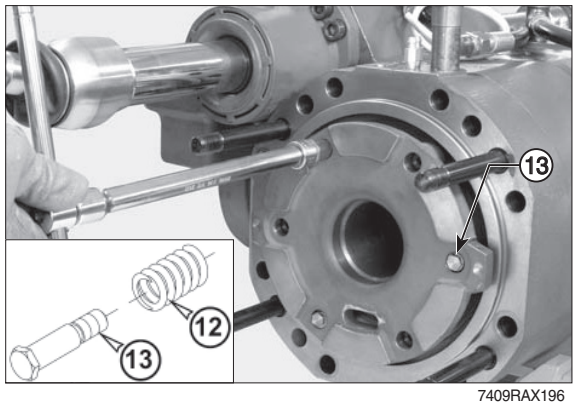


7409RAX194

(3) Remove arm together with brakes and axle shafts; lay down the arm vertically.
Release pressure.

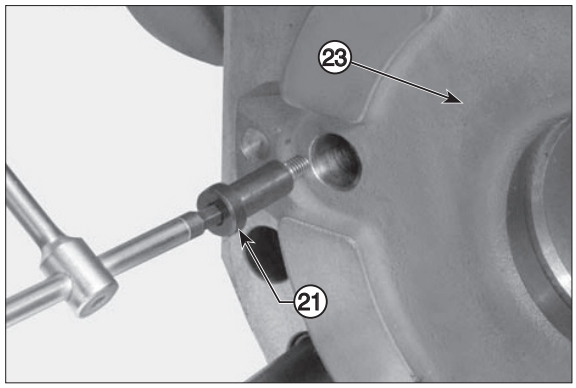

7409RAX195

(4) Remove the reversal springs (13)



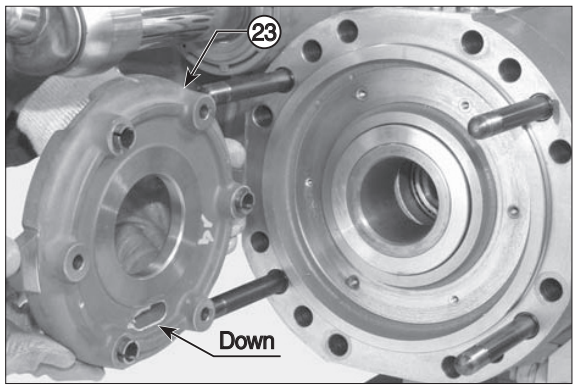
7409RAX196

(5) Remove the adjusting screws (21) from the counterwasher (23).



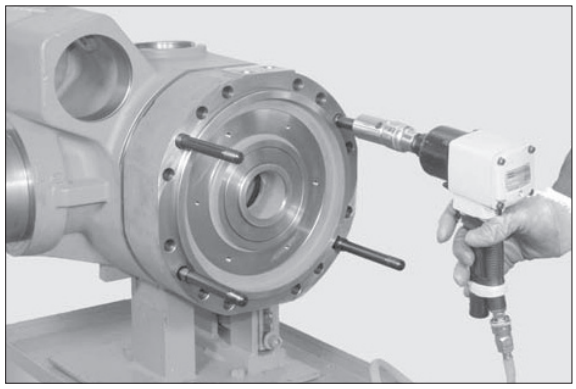
7409RAX197

(6) Note down their order of assembly and remove the counterwasher (23).

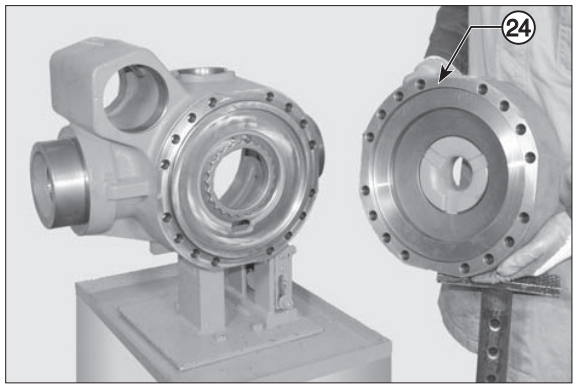


7409RAX198

(7) Loosen the studs in an alternate manner and remove them.

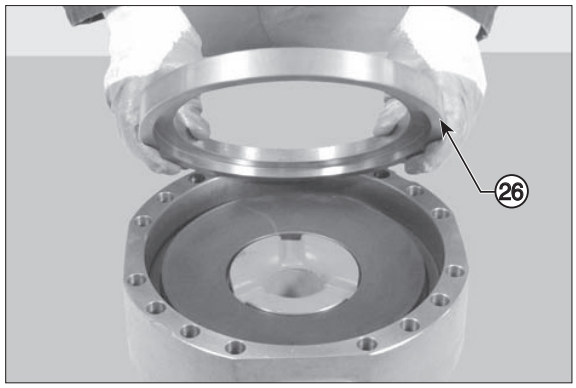

7409RAX199

(8) Remove the cylinder (24).



7409RAX200

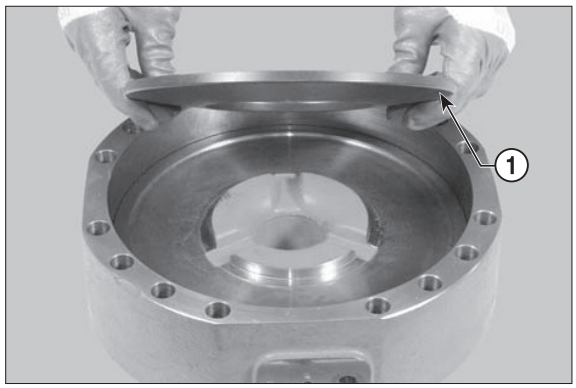
(9) Remove the centering device (26) in the cylinder.



7409RAX201

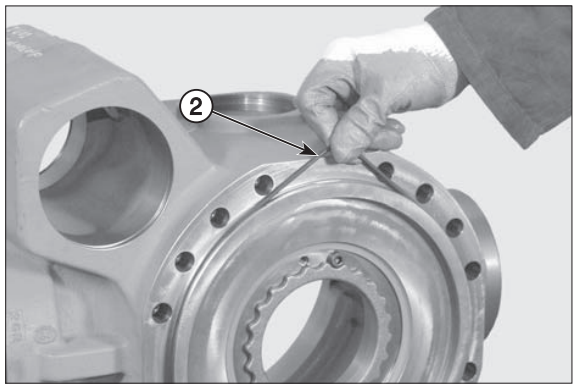
(10) Remove the belleville washers (1).

※ Check the sense of direction of washers (1).



7409RAX202

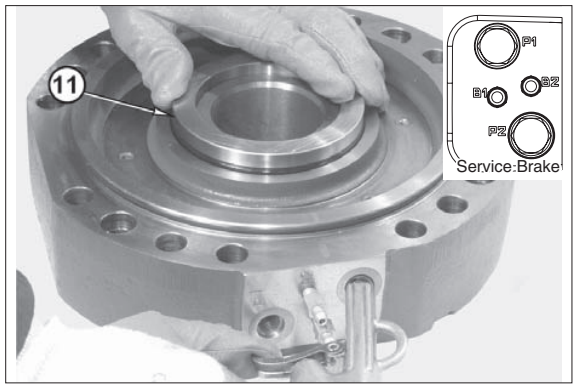
※ The O-rings (2) must be replaced each time the unit is disassembled.



7409RAX203

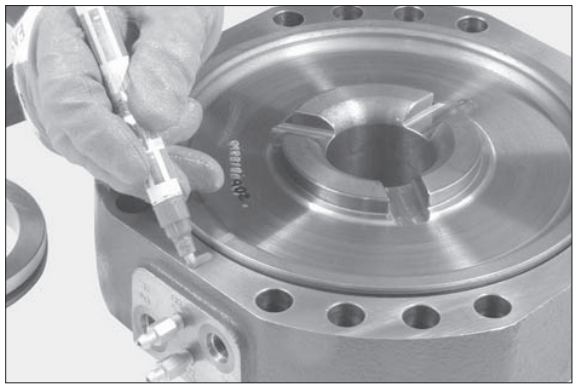
(11) Slowly introduce low-pressure compressed air through the connection member for the service brake (P2), in order to extract the piston (11).

※ Hold the piston (11) back, as it may be suddenly ejected and damaged.



7409RAX204

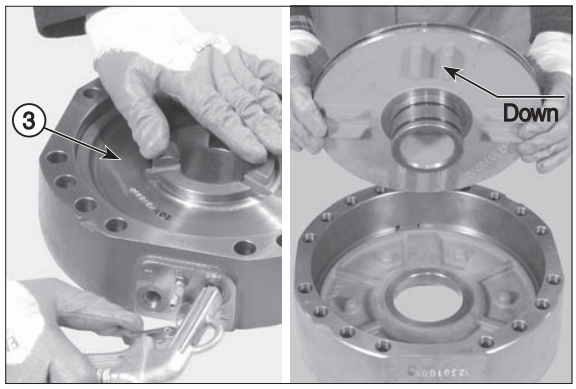
(12) Note down their order of assembly.



7409RAX205

(13) Slowly introduce low-pressure compressed air through the connection member for the service brake (P1), in order to extract the piston (3).

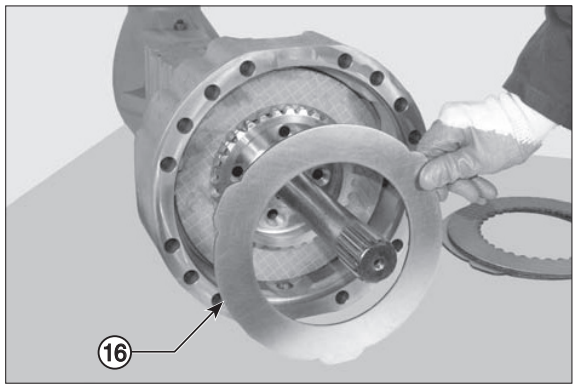
※ Hold the piston (3) back, as it may be suddenly ejected and damaged.



7409RAX206

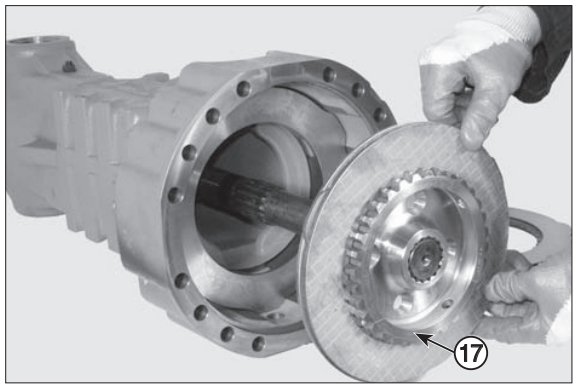
(14) Remove braking discs (14)(15)(16), noting down direction of assembly.

※ If disks are not to be replaced, avoid changing their position.

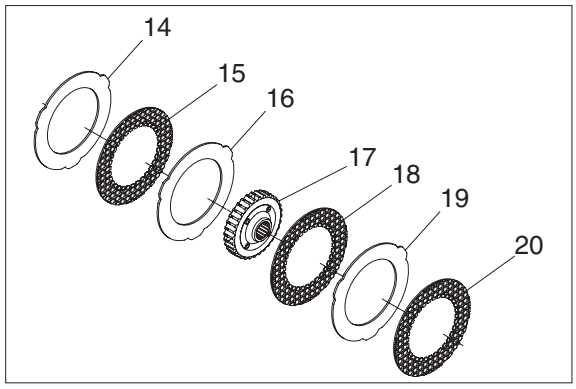


7409RAX207

(15) Remove the flange (17) complete with the discs (20)(19)(18).



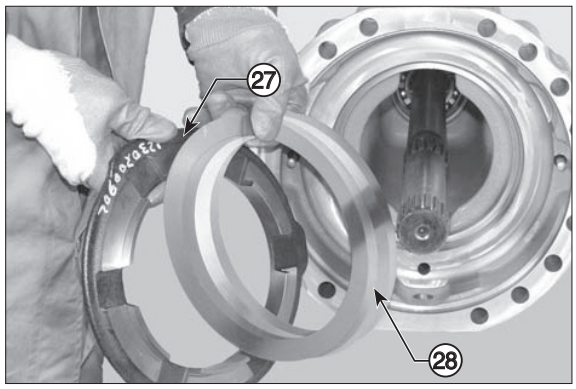
7409RAX208



7409RAX209

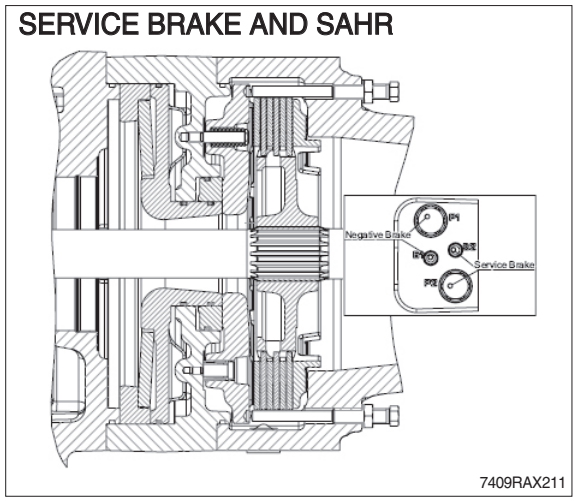
(16) Remove distance piece-braking discs (27) and shims (28), noting down direction of assembly.

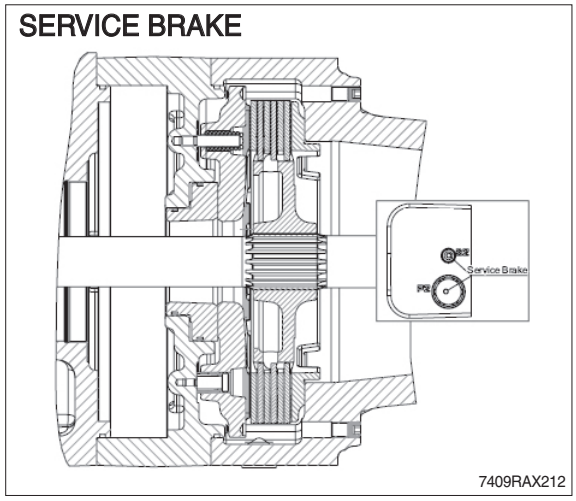
※ Build a stack of washers and check the measure.



7409RAX210

13) NEGATIVE BRAKE : ASSEMBLING

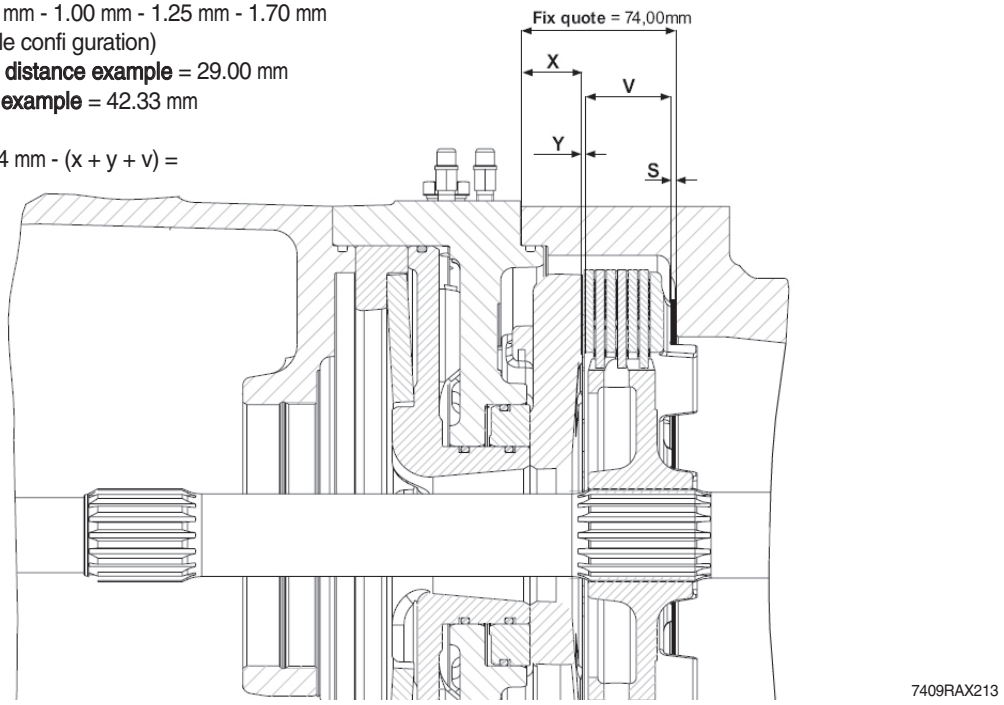




Fix quote = 74.00 mm
Y = brake gap = 0.75 mm - 1.00 mm - 1.25 mm - 1.70 mm
(depending on axle confi guration)
X = intermediate disc distance example = 29.00 mm
V = brake discs pack example = 42.33 mm

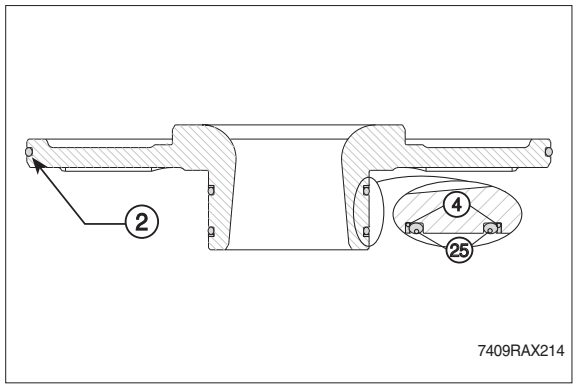
S = adjust. shims = 74 mm - (x + y + v) =

example =
74-(29+1.25+42.33)
= 74-72.58
= 1.42 mm = **S**



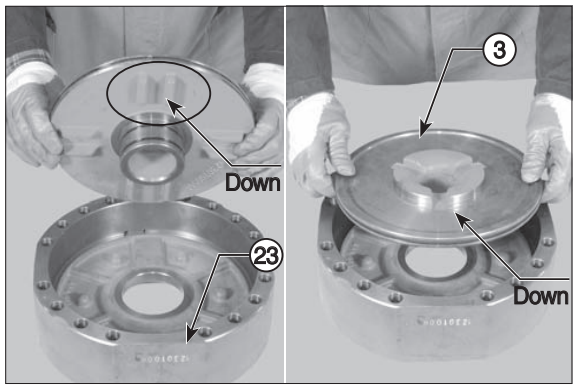
(1) Complete the O-rings and anti-extrusion rings on all pistons.

※ The O-rings always have to be assembled from the pressure facing side.



7409RAX214

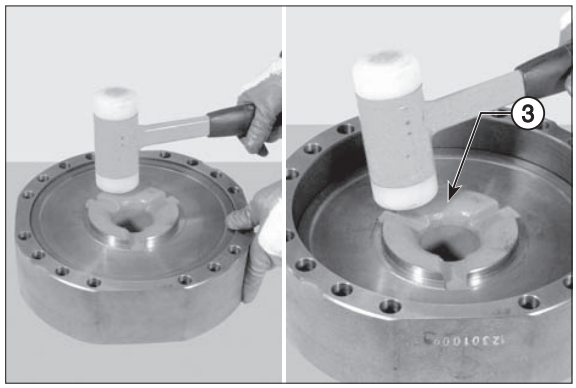
(2) Check the position of the anti-extrusion (4) and O-rings (2) (25).
Lubricate the piston and the O-rings and install the unit (3) into the cylinder (24) .



7409RAX215

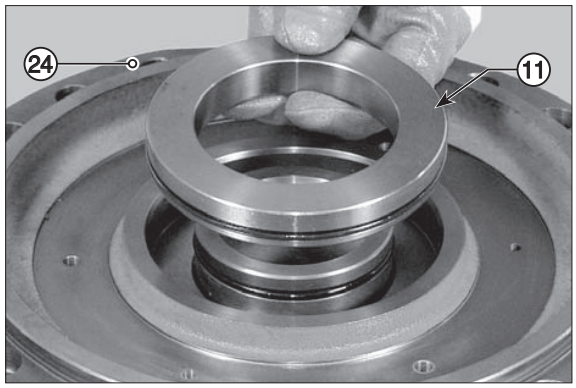
(3) Using a plastic hammer, ram the piston (3) into the cylinder (24).

※ Lightly hammer all around the edge in an alternate sequence.



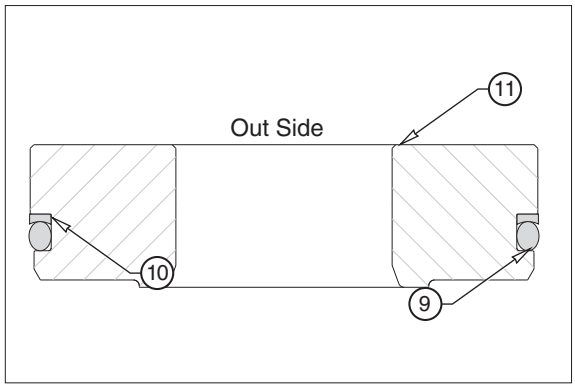
7409RAX216

(4) Fit O-ring (9) and anti-extrusion ring (10) onto the piston (11).
Lubricate the piston and the O-rings and install the unit into the cylinder (24).



7409RAX217

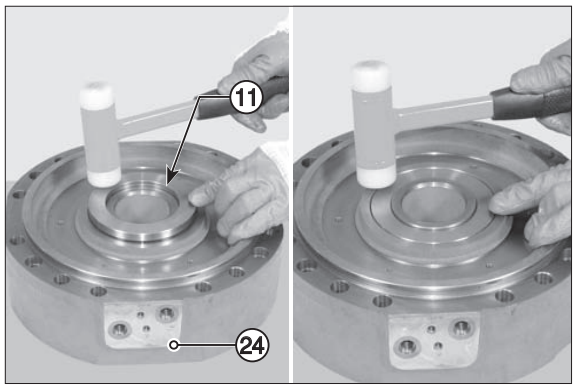
※ The O-rings always have to be assembled from the pressure facing side.



7409RAX218

(6) Using a plastic hammer, ram the piston (11) into the cylinder (24).

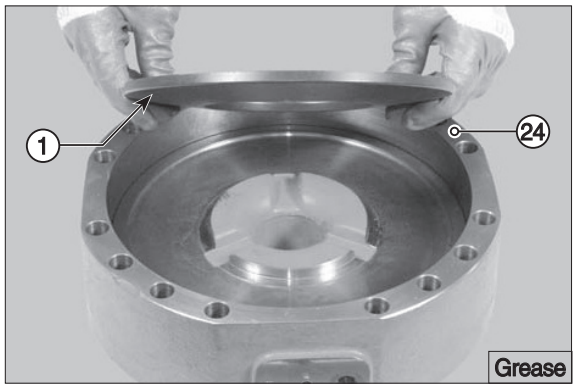
※ Lightly hammer all around the edge in an alternate sequence.



7409RAX219

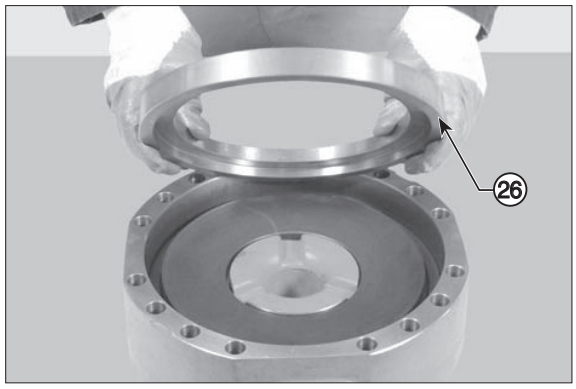
(7) Position the belleville washers (1) and engage the cylinder (24).

※ Check the sense of direction of belleville washers (1) and relative centering.

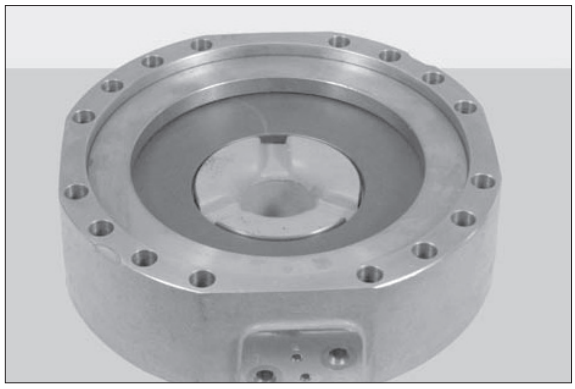


7409RAX220

(8) Install the centering device (26) in the cylinder.

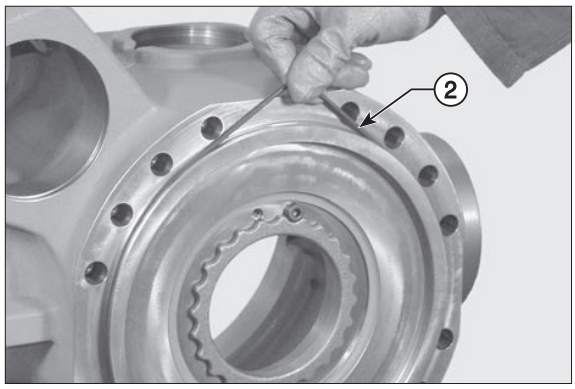


7409RAX221



7409RAX222

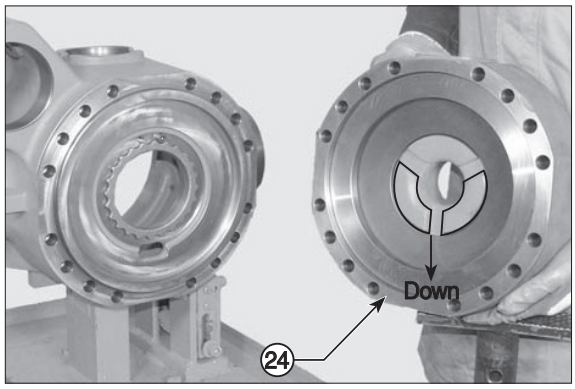
(9) Check integrity and position of the cylinder's O-ring (2).



7409RAX223

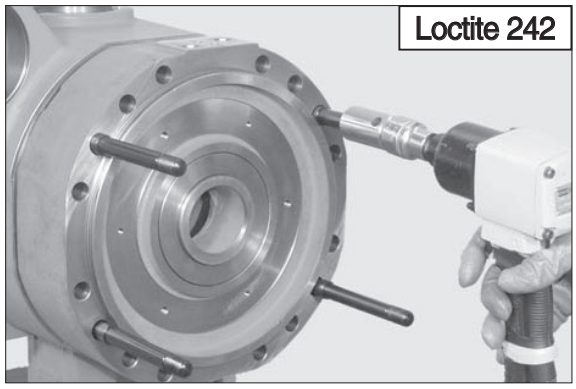
(10) Engage the cylinder (24).

※ Check the sense of direction of washers (1) and relative centering.



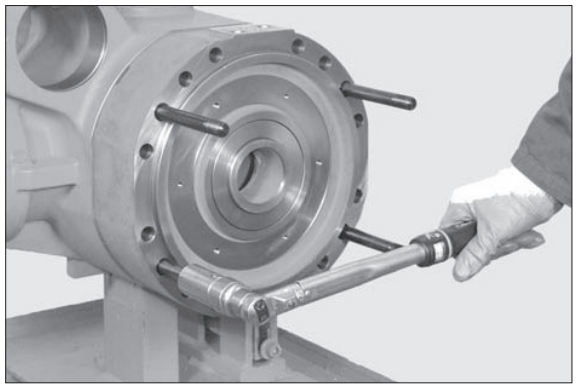
7409RAX224

(11) Insert the screws and tighten them alternately.
Lock the cylinder.

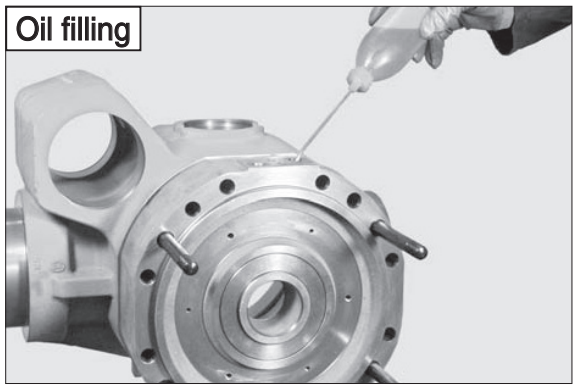


7409RAX225

(12) Tightening the studs with a dynamometric wrench set to a torque of 3.06~3.57 kgf · m (22.1~25.8 lbf · ft).

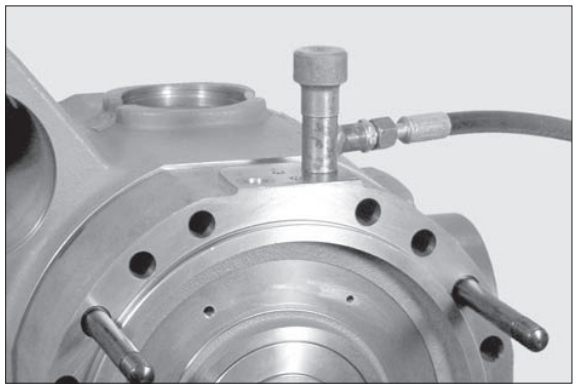


7409RAX226

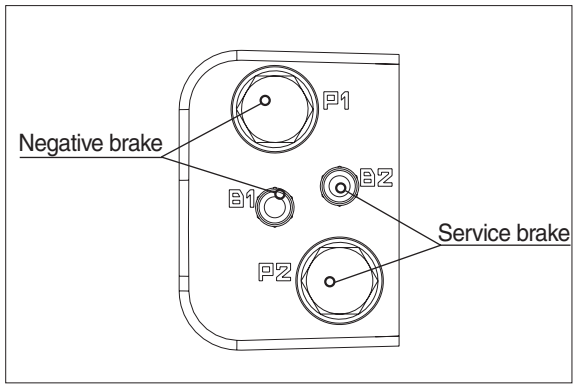


7409RAX227

(13) Connect an external pump to the negative brake and introduce pressure to 21.4~35.7 kgf/cm^2 (304~508 psi).

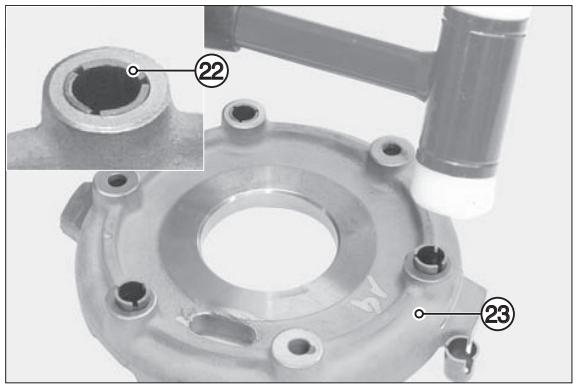


7409RAX228



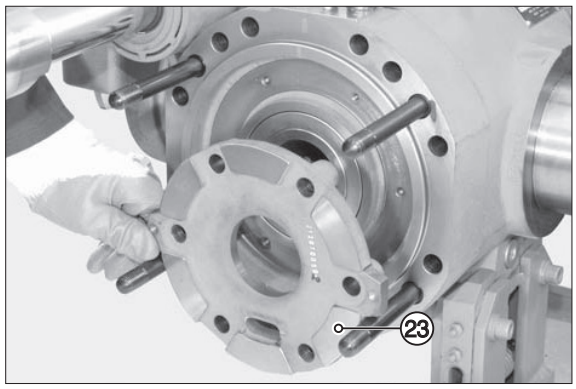
7409RAX229

(14) Insert the stroke automatic regulation springs (22); place them in line with the piston (23).



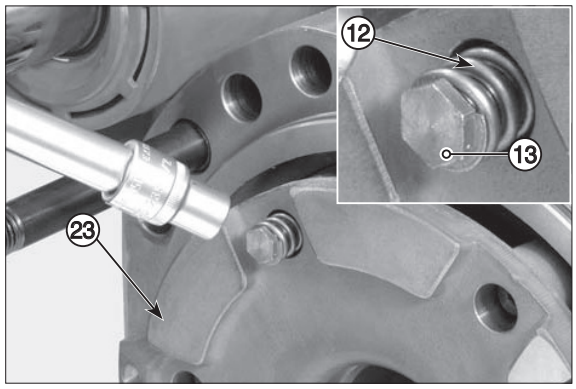
7409RAX230

(15) Insert the intermediate disk (23).



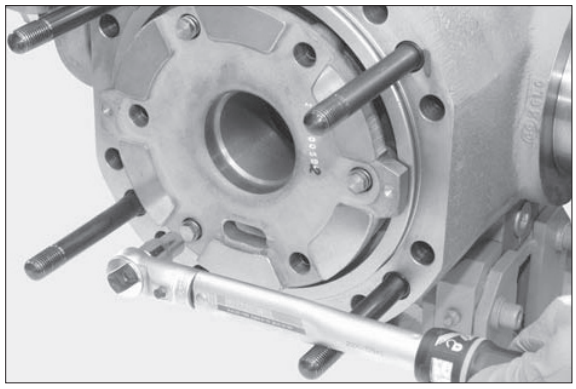
7409RAX231

(16) Fit the reversal springs (12)(13) on the intermediate disk (23).

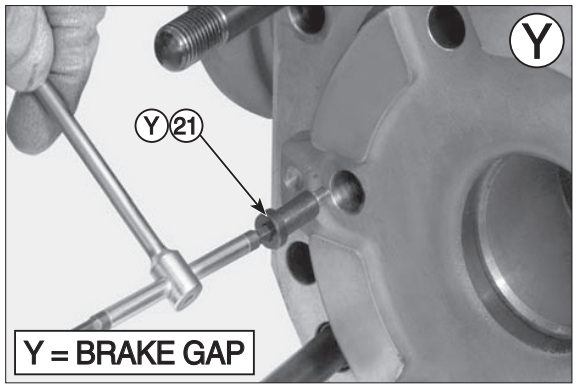


7409RAX232

(17) Apply loctite 242 to the thread of the adjustment screw.
Tighten with torque wrench setting of 1.02~1.53 kgf · m (7.38~11.1 lbf · ft).


7409RAX233

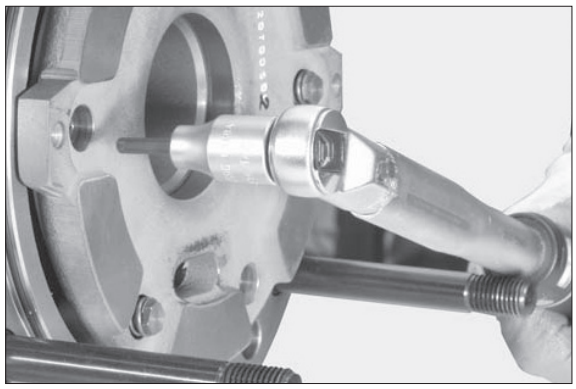
(18) Y=brake gap
(0.75 mm 1.00 mm 1.25 mm 1.50 mm)
depending on axle configuration.



7409RAX234

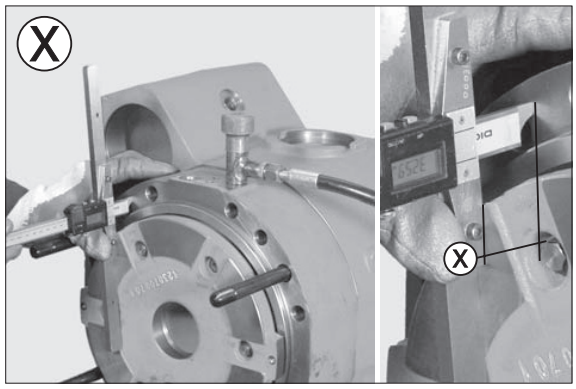
(19) Fit the pin screws.
Apply loctite 270 to the thread.

· Torque wrench setting :
0.51~0.71 kgf · m (3.69~5.16 lbf · ft)


7409RAX235

(20) Take the measure from the surface of the intermediate disk to the cover sealing surface with 30.6 kgf/cm^2 (435 psi) of pressure introduced.

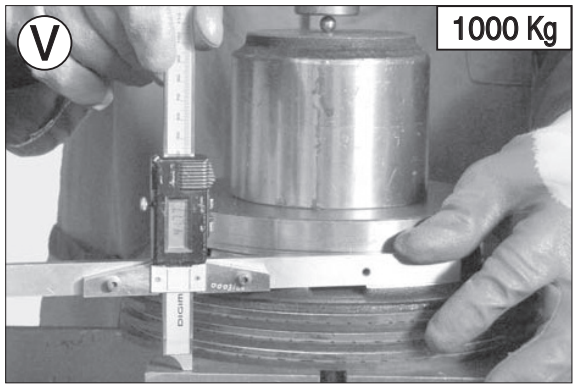
Example : 29 mm



7409RAX236

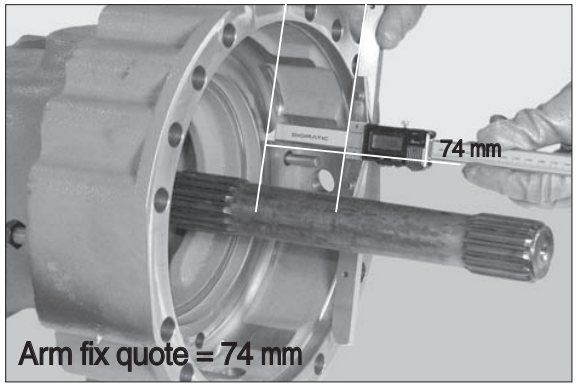
(21) Put the brake disc pack including the shim under a press, load with 1000 kg and take the measure "V".

Example : V = 42.33 mm



7409RAX237

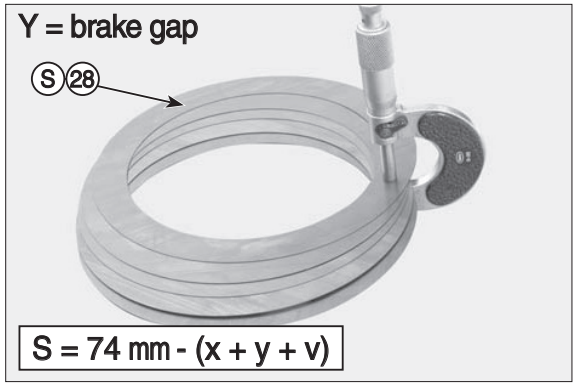
(22) Arm fix quote = 74 mm



7409RAX238

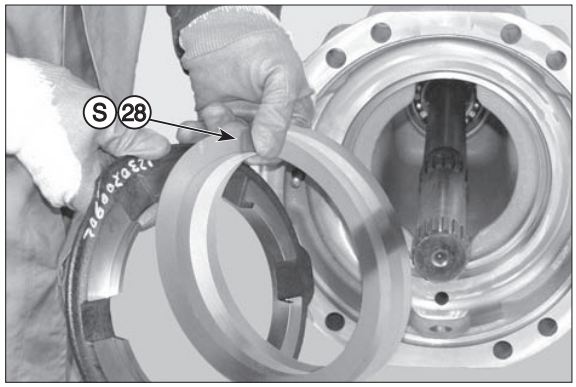
(23) **S = 74 mm - (x + y + v)** = Thickness of shims to insert under the shim washer.

Example :
74 mm - (29 + 42.33 + 1.25) = S = 1.42 mm

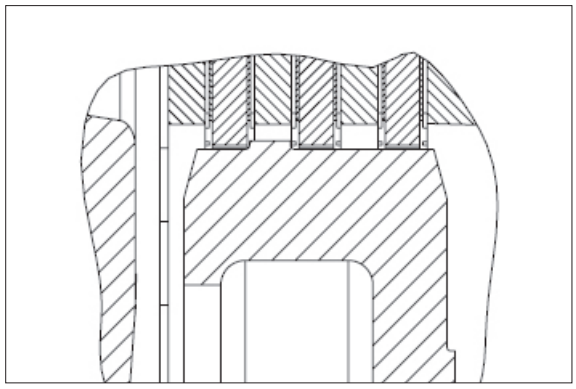


7409RAX239

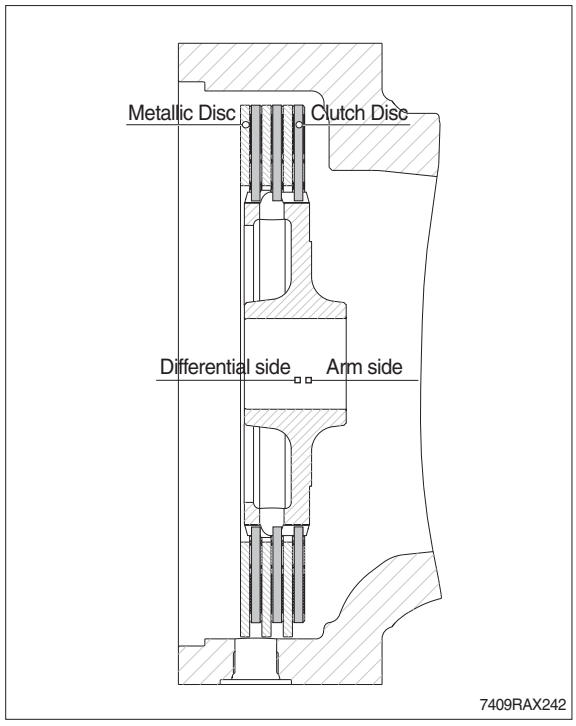
(24) Insert under the shim washer a thickness of shims (28).



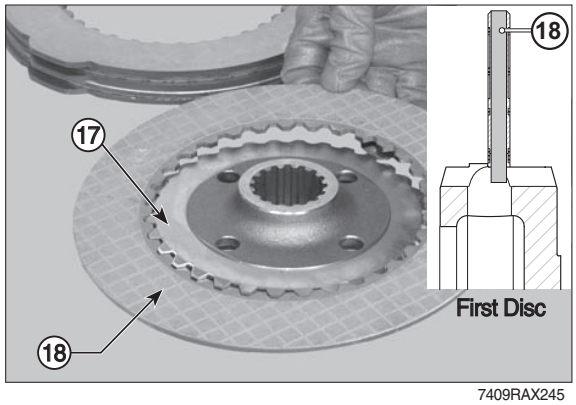
7409RAX240

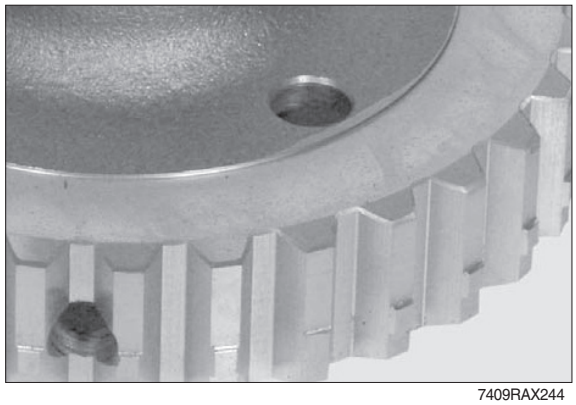


7409RAX241

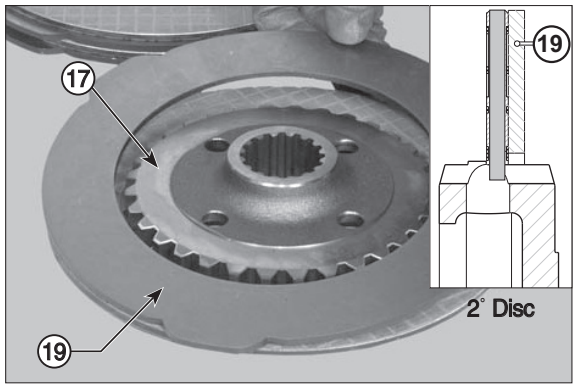


(25) Install the friction disc (18) on the flange (17) from arm side.



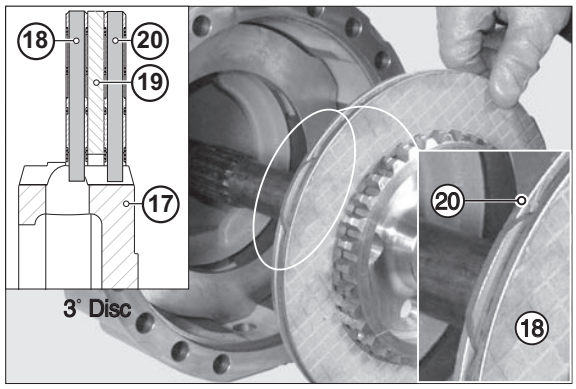


(26) Install the metal disc (19) on the flange (17) from arm side.



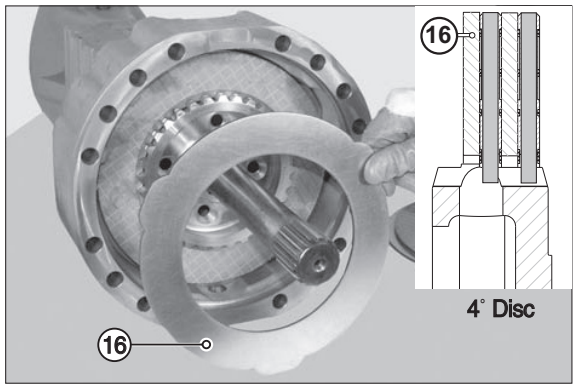
7409RAX243

(27) Install the friction disc (18) on the flange from arm side and insert the group on the u-joint.

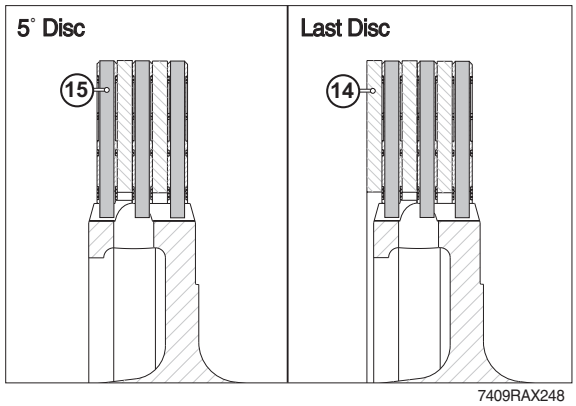


7409RAX246

(28) Insert on the fl ange the discs (16)(15) (14).

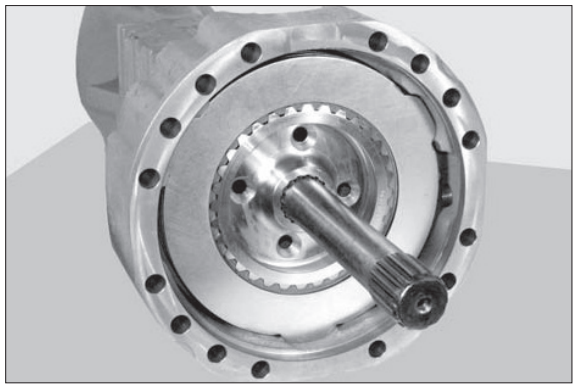


7409RAX247

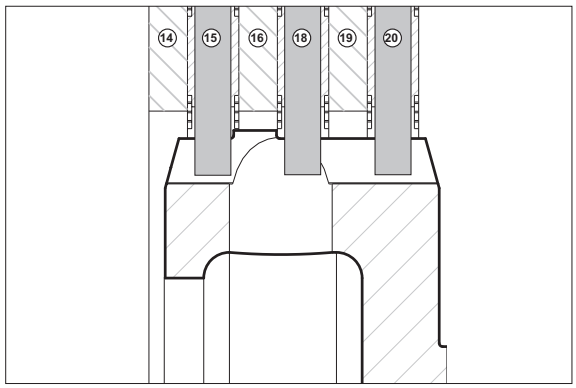


7409RAX248

(29) Check the alignment of last disc (14) and flange.



7409RAX249

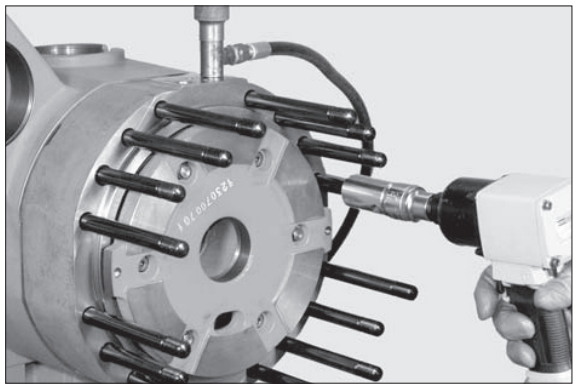


7409RAX250

(30) **Apply loctite 242 to the studs and tighten it using a dynamometric wrench.**

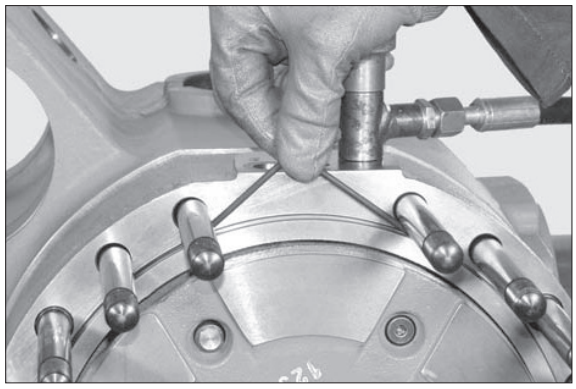
· Torque wrench setting :

3.06~3.57 kgf · m (22.1~25.8 lbf · ft)



7409RAX251

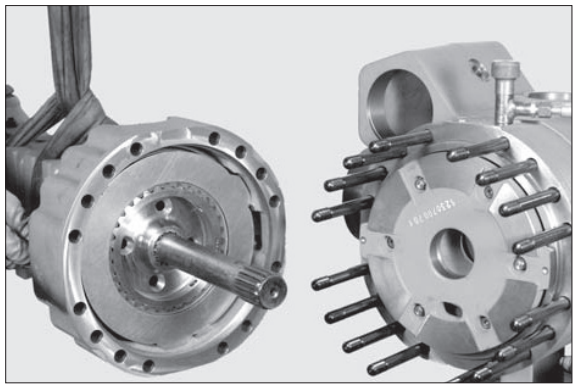
(31) Check integrity and position of the cylinder's O-ring.



7409RAX252

(32) Check integrity and position of the arm's O-ring; install the complete arm.

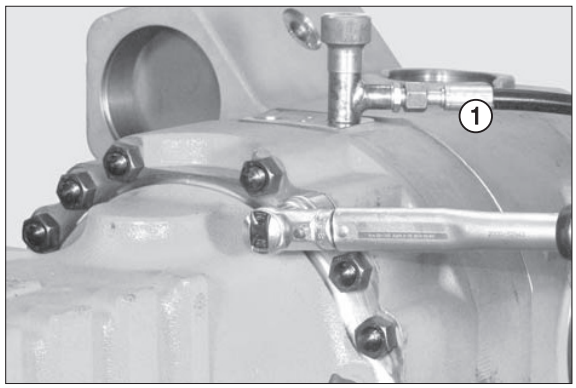
※ To assist axle shaft centering, slightly move the wheel hub.



7409RAX253

(33) Apply loctite 242 to the nuts and cross tighten it in two stages.

· Torque wrench setting :
20.4~22.5 kgf · m (148~163 lbf · ft)



7409RAX254