

GROUP 4 DISASSEMBLY AND ASSEMBLY

1. CONTROL VALVE

1) DISASSEMBLY

(1) Loosen the cap screws and take off the gear shift housing.

※ Special tool
Socket spanner TX-27 5873 042 002

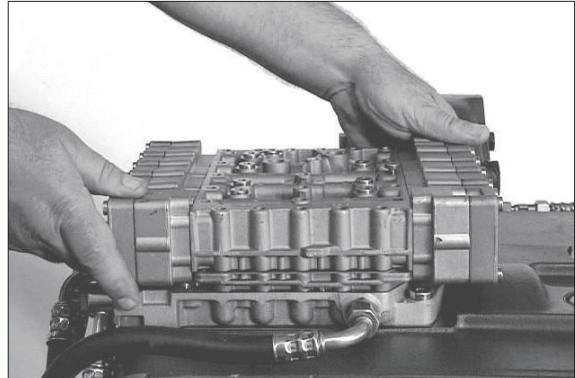


Figure 1001

(2) Separate the hose lines from the duct plate. Loosen the cap screws as well as the gasket from the transmission housing.

※ Special tool
Socket spanner TX-40 5873 042 004

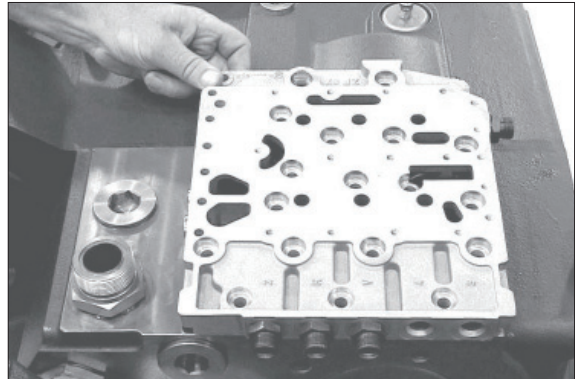


Figure 1002

(3) Mark the installation position of the wiring harness to the valve block.

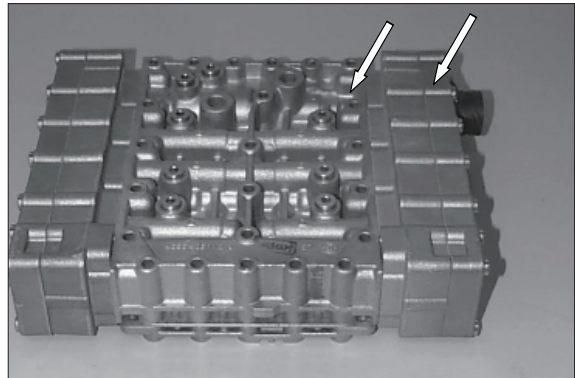


Figure 1003

(4) Loosen the cap screws.
Separate duct plate and intermediate plate from the valve block.

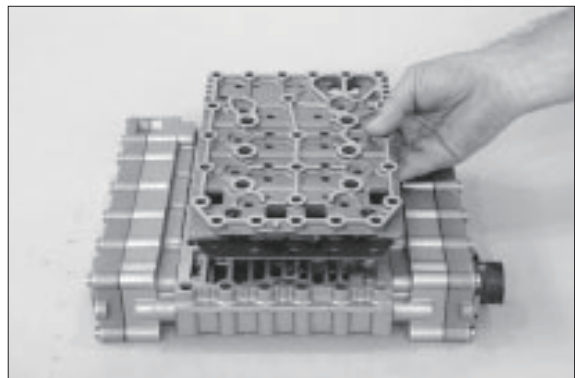


Figure 1004

(5) Remove the retaining clamp

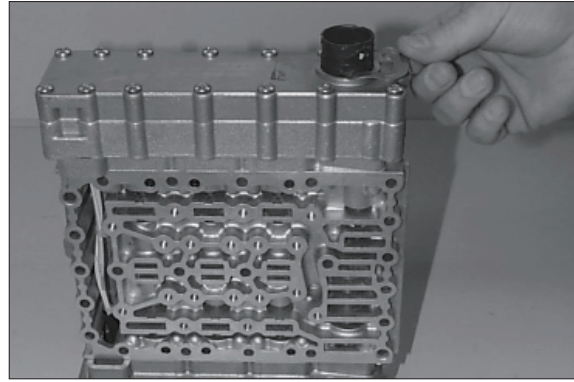


Figure 1005

(6) Loosen the cap screws and take off the cover.
Remove the opposite cover.

※ Special tool

Socket spanner TX-27 5873 042 002

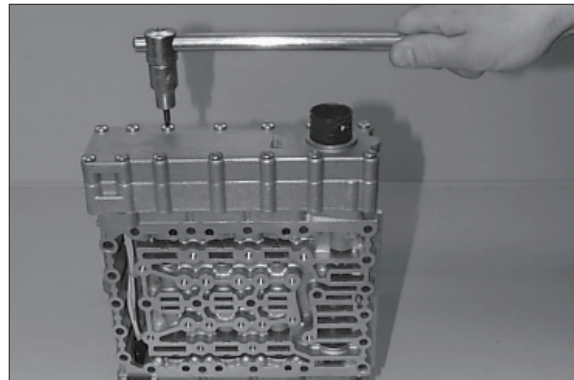


Figure 1006

(7) Remove the wiring harness.

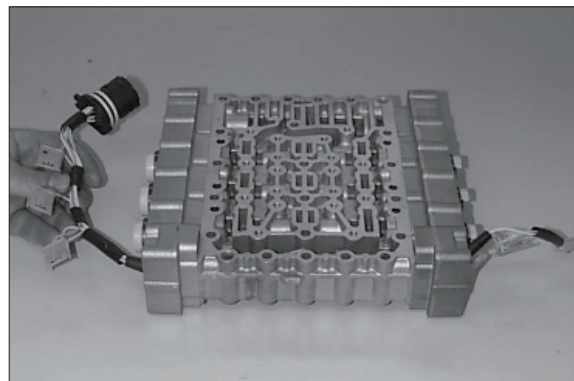


Figure 1007

(8) Loosen the cap screws, remove the fixing plates and the pressure controllers.

※ Special tool

Socket spanner TX-27 5873 042 002

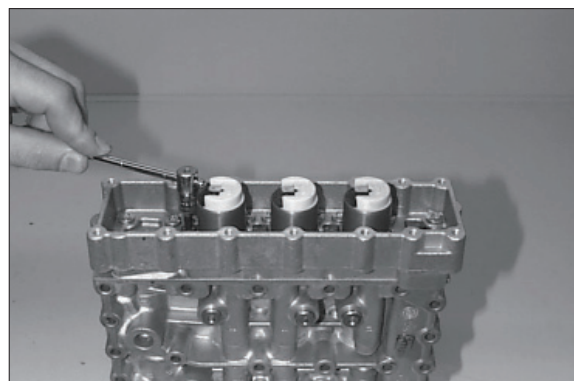


Figure 1008

(9) Loosen two cap screws and fasten the housing preliminarily by means of adjusting screws (housing is preloaded). Then loosen the remaining cap screws.

- ※ Special tool
- Adjusting screws 5870 204 036

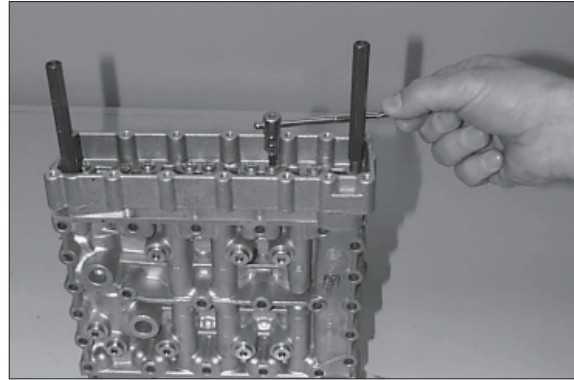


Figure 1009

(10) Separate the housing from the valve housing by equally loosening the adjusting screws.

- ※ Special tool
- Adjusting screws 5870 204 036

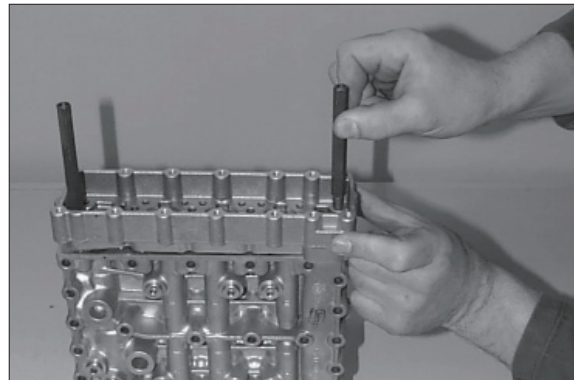


Figure 1010

(11) Remove the single components.

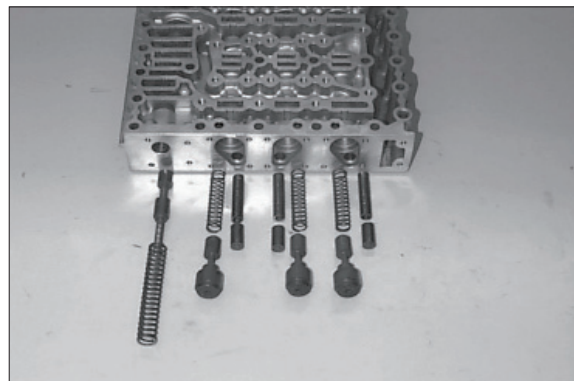


Figure 1011

(12) Remove the opposite pressure controllers, the housing as well as single components analogously.

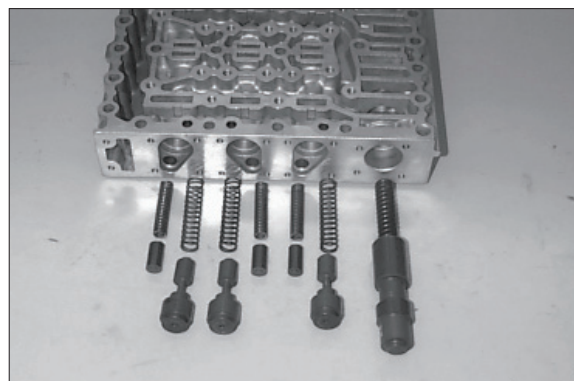


Figure 1012

2) ASSEMBLY

- ※ All single components are to be checked for damage and replaced, if required.
Prior to installation check the mobile parts in the housing for functionality.
Pistons can be replaced individually.
Oil the single components prior to installation.
Place the orifices, with the concave side showing upwards, until contact.

- ※ Installation position, see arrows.

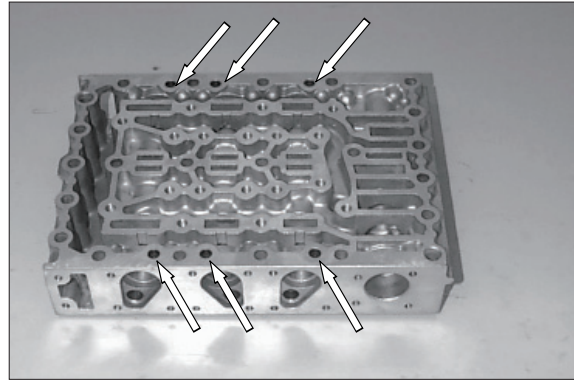


Figure 1013

- (1) Opposite figure shows the following single components.

- 1 Vibration damper
(3EA, piston & comp spring)
- 2 Follow-on slide
(3EA, piston & comp spring)
- 3 Pressure reducing valve
(1EA, piston & comp spring)

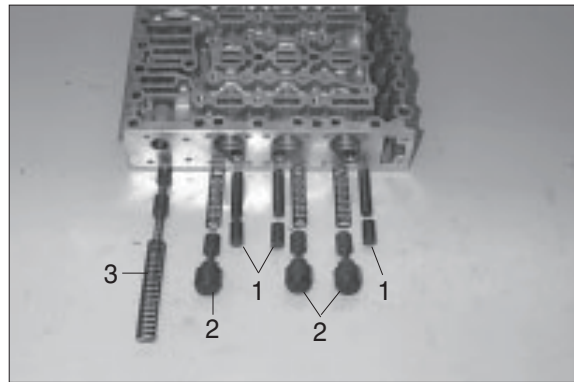


Figure 1014

- (2) Install the single components according to figure 1014.

- ※ Preload the compression springs of the follow-on slides and fasten the pistons preliminarily by means of cylindrical pins \varnothing 5.0 mm (assembly aid), see arrows/ figure 1015.

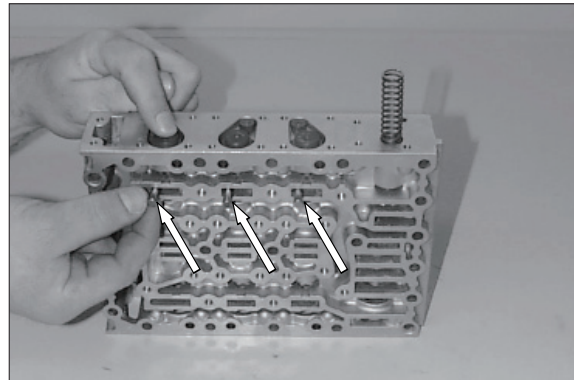


Figure 1015

- (3) Install two adjusting screws.

Assemble gasket (arrow) and housing cover (figure 1016).

Then place the housing cover by means of adjusting screws equally until contact (figure 1017).

- ※ Special tool
Adjusting screws 5870 204 036

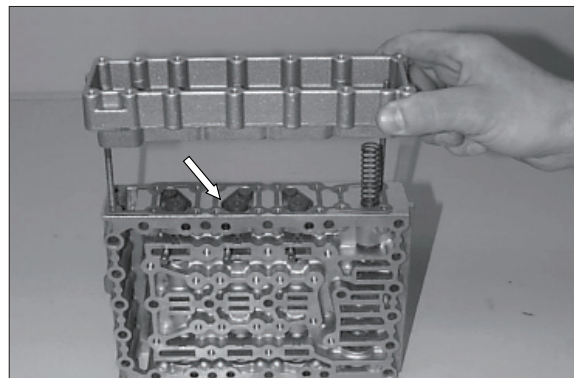


Figure 1016

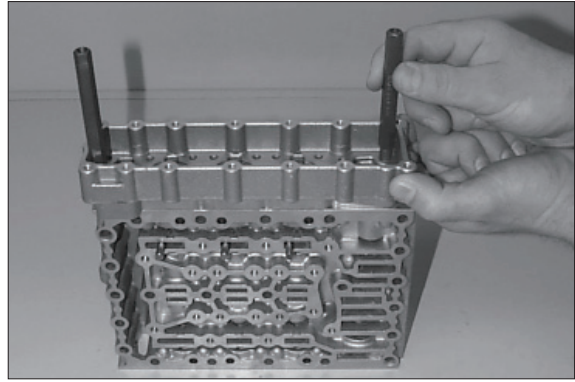


Figure 1017

- (4) Preload the pistons and remove the adjusting screws (assembly aid) again.

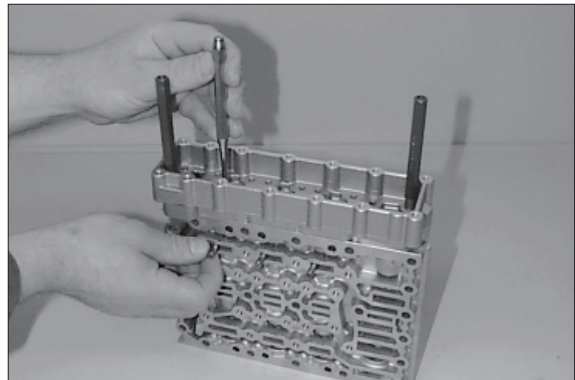


Figure 1018

- (5) Fasten the housing cover with cap screws.
 · Torque limit : 0.76 kgf · m (5.53 lbf · ft)

- ※ Special tool
 Socket spanner TX-27 5873 042 002

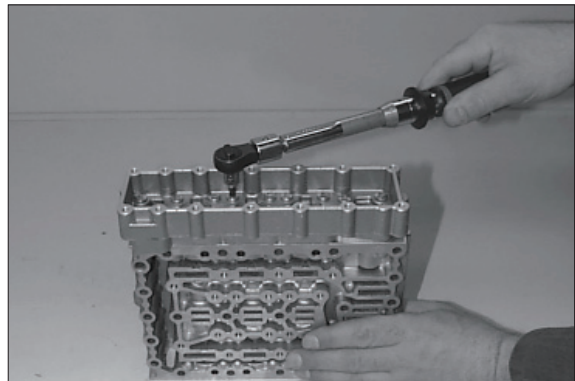


Figure 1019

- (6) Assemble the pressure controllers and fasten them by means of fixing plates and cap screws.

- ※ Install the fixing plate with the neck showing downwards.
 Observe radial installation position of the pressure controllers, see Figure.
 · Torque limit : 0.56 kgf · m (4.06 lbf · ft)

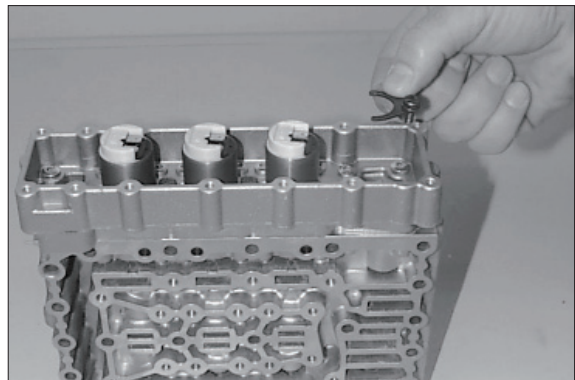


Figure 1020

Preassemble the opposite side :

(7) The opposite figure shows the following single components :

- 1 Main pressure valve
(1EA, piston & comp spring)
- 2 Follow-on slide
(3EA, piston & comp spring)
- 3 Vibration damper
(3EA, piston & comp spring)

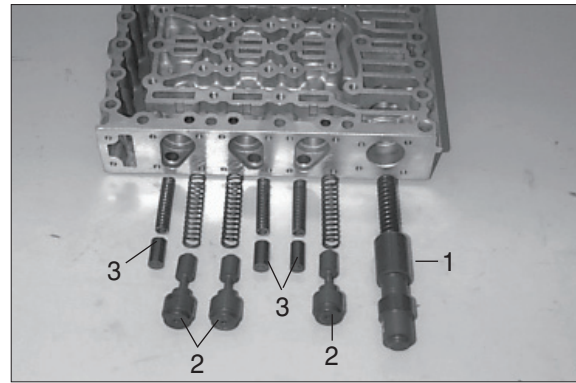


Figure1021

(8) Install the single components according to figure 1021.

Preload the compression springs of the follow-on slides and fasten the piston preliminarily by means of cylindrical pins \varnothing 5 mm (assembly aid), see arrows.

Install two adjusting screws.

Assemble the gasket (arrow 1) and the housing cover and place them equally until contact by means of adjusting screws.

Then fasten the housing cover with cap screws.

- Torque limit : 0.76 kgf · m (5.53 lbf · ft)

Remove the cylindrical pins (assembly aid) again.

※ Special tool

Adjusting screws 5870 204 036

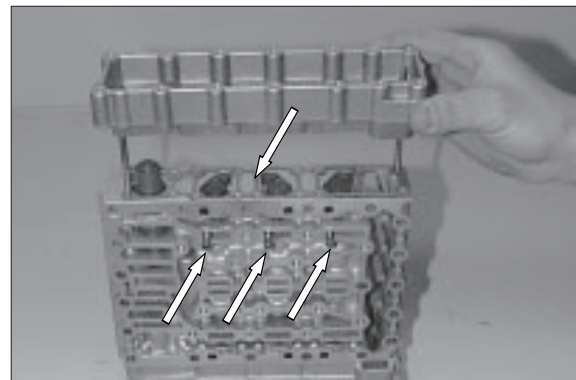


Figure1022

(9) Assemble the pressure controllers and fasten them by means of fixing plates and cap screws.

※ Install the fixing plates with the neck showing downwards.

Observe radial installation position of the pressure controllers, see Figure.

- Torque limit : 0.56 kgf · m (4.06 lbf · ft)

※ Special tool

Socket spanner TX-27 5873 042 002

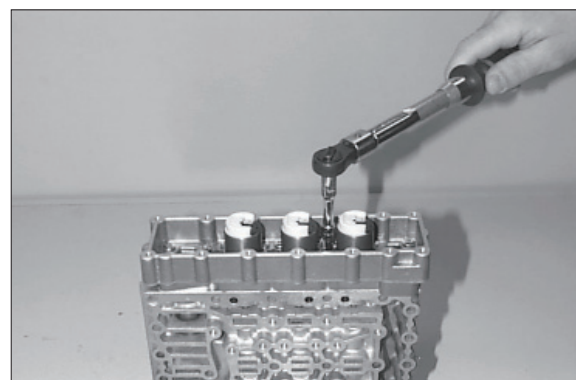


Figure1023

(10) Assemble the wiring harness and connect the pressure controllers (6EA).

※ Pay attention to the installation position of the wiring harness, also see markings (figure 1003).

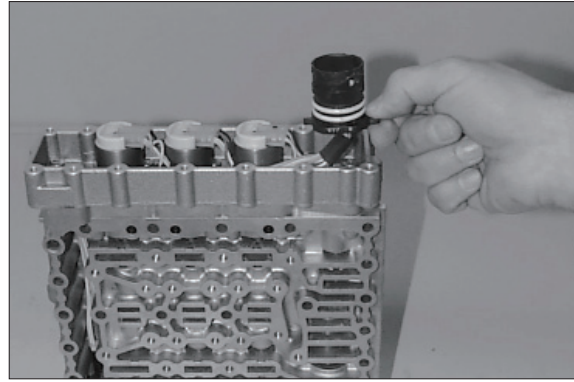


Figure1024

(11) Put on the flat gasket (arrow).

Assemble the plug socket with the slot showing to the lug of the cover until contact.

Fasten the cover by means of cap screws.

· Torque limit : 0.76 kgf · m (5.53 lbf · ft)

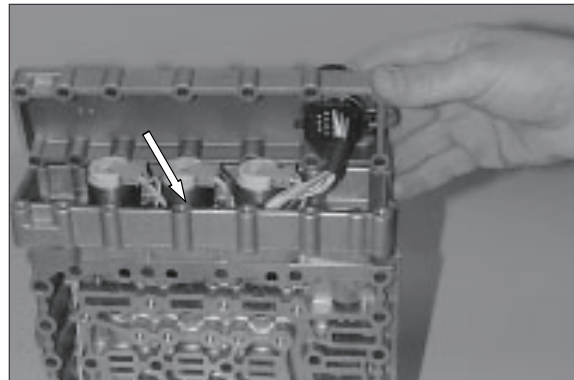


Figure1025

(12) Fasten the plug socket a retaining clamp.

Install the opposite cover.

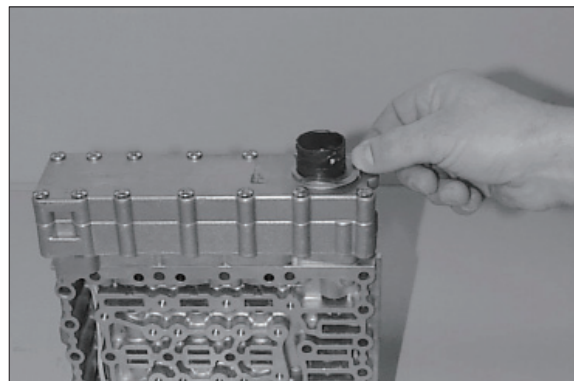


Figure 1026

(13) Screens (6EA) are to be flush mounted into the bores of the intermediate sheet, see arrows.

※ Observe the installation position-the screens are showing upwards (to the duct plate)

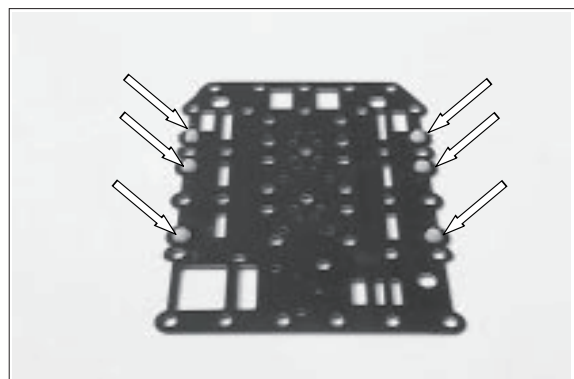


Figure1027

- (14) Install two adjusting screws.
Place the intermediate sheet with the screens showing upwards.

※ Special tool
Adjusting screws 5870 204 063

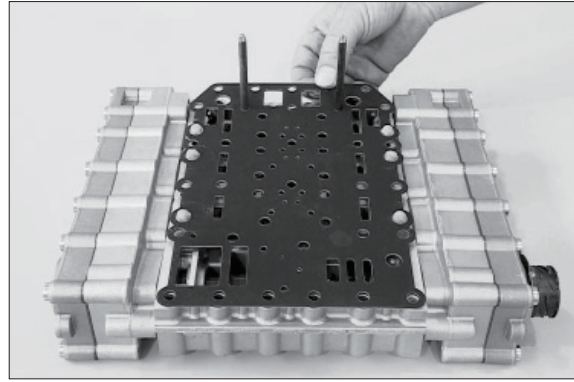


Figure1028

- (15) Put on the duct plate and fasten it equally by means of cap screws.
· Torque limit : 0.97 kgf · m (7.01 lbf · ft)

※ Special tool
Socket spanner TX-27 5873 042 002

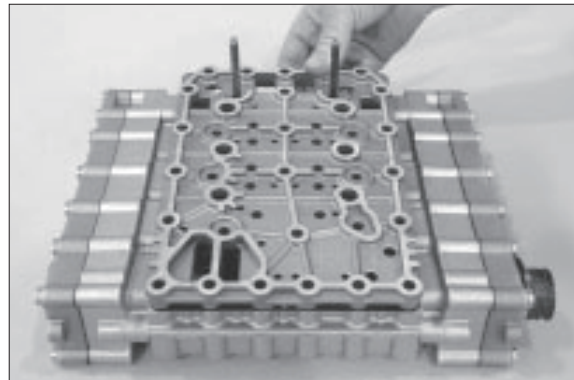


Figure1029

- (16) Provide the screw plugs (8EA) with new O-rings and install them.
· Torque limit : 0.61 kgf · m (4.43 lbf · ft)

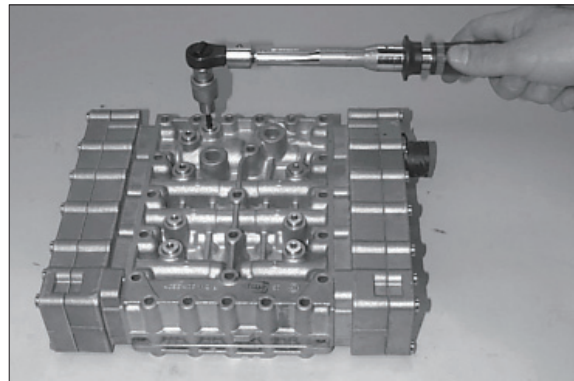


Figure1030

Preassemble the duct plate (figure 1031)

- (17) Install connection pipes 1~4.
Install screw plugs 5 and 6.
· Torque limit
Plug (M10×1) : 0.61 kgf · m (4.43 lbf · ft)
Plug (M14×1.5) : 4.08 kgf · m (29.5 lbf · ft)

※ Always install new O-rings.

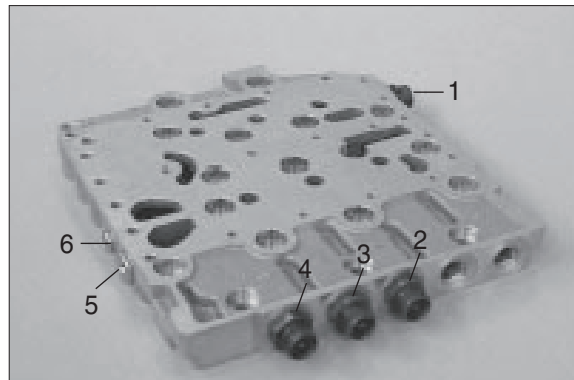


Figure1031

Installation of the Hydraulic Control Unit (HCU-94)(figure1032~1036) :

(18) Provide the screw plug with a new O-ring and install it.

· Torque limit

M26 × 1.5 : 8.16 kgf · m (59.0 lbf · ft)

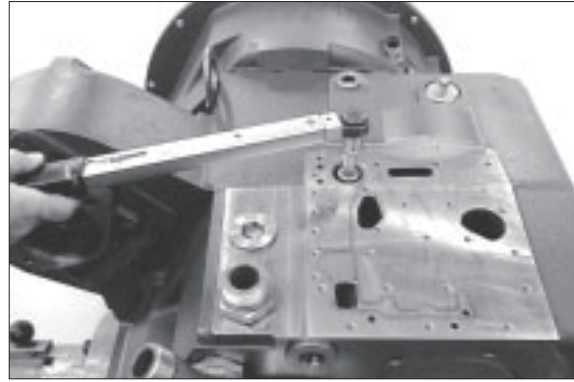


Figure 1032

(19) Install two adjusting screws.

Put on the gasket (arrow).

※ Special tool

Adjusting screws M8 5870 204 011

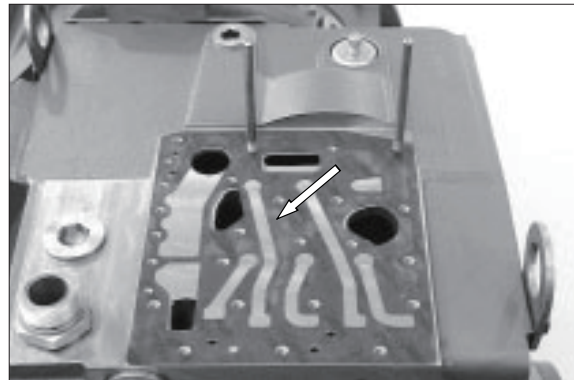


Figure 1033

(20) Put on the duct plate and fasten it equally by means of cap screws.

· Torque limit

M8/10.9 : 2.35 kgf · m (16.7 lbf · ft)

※ Special tool

Socket spanner TX-40 5873 042 004

Torque spanner Slipper 5870 203 043

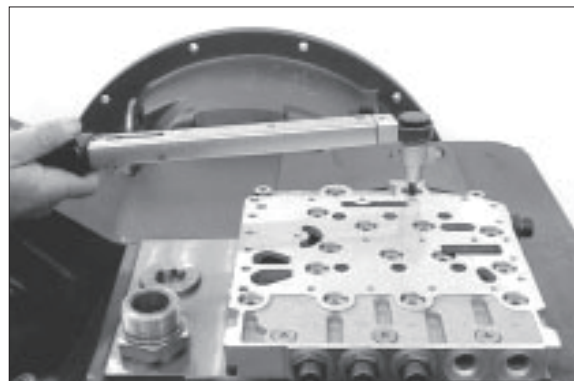


Figure 1034

(21) Install 2 adjusting screws (M6).

Put on the gasket (arrow).

※ Special tool

Adjusting screws M6 5870 204 063

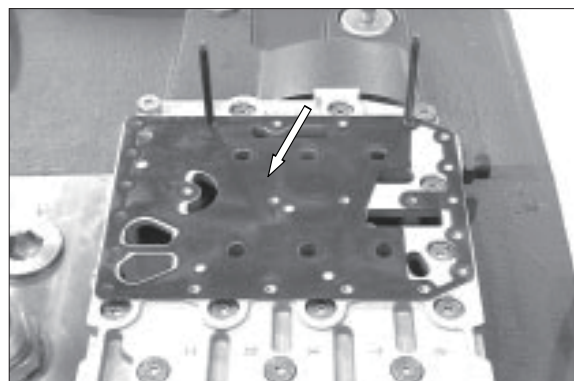


Figure 1035

(22) Fasten the complete valve block equally by means of cap screws (6pcs. M6 × 100 & 17pcs. M6 × 76 mm).

▲ Observe position of the cap screws (M6 × 100), see arrow.

· Torque limit : 1.22 kgf · m (8.85 lbf · ft)

※ Special tool

Socket spanner TX-27 5873 042 002

Torque spanner slipper 5870 203 043

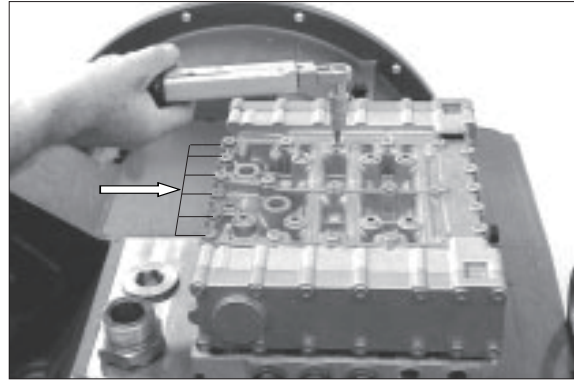


Figure 1036

Following to this all pressure lines are to be installed.

※ Installation of the lines differs depending on the version.

Observe the parts list of parts manual.

2. TRANSMISSION

1) DISASSEMBLY

(1) Fasten the complete transmission to the assembly truck.

※ Special tool

Assembly truck 5870 350 000

Holding fixture 5870 350 071

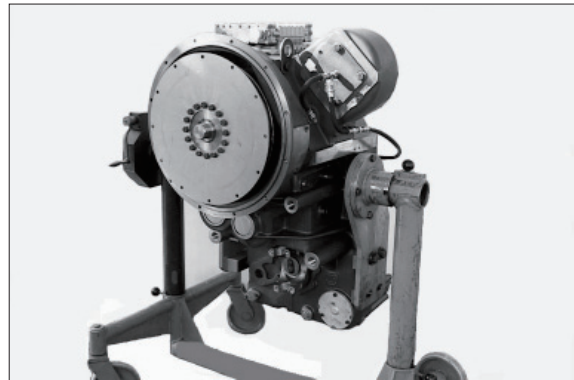


Figure 1

(2) Remove the plug (arrow) and drain the oil. Then remove the oil cylinder.

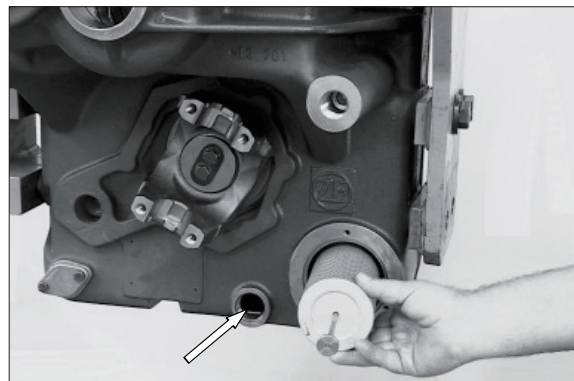


Figure 2

(3) Remove all oil pipes, the complete gear shift system and the duct plate.

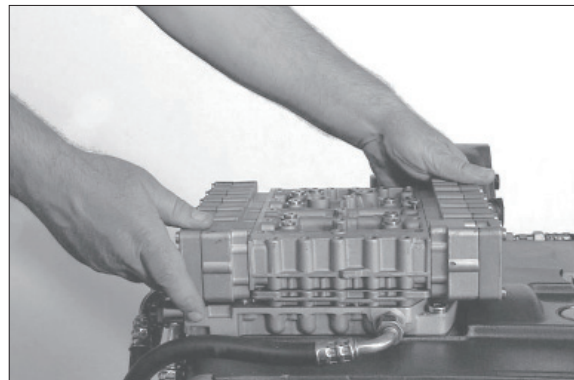


Figure 3

Converter drive

(1) By means of the lifting tackle separate the torque converter from the transmission.

※ Special tool

Eybolts assortment 5870 204 002

Lifting chain 5870 281 047



Figure 4

(2) Loosen the bolt connection and by means of the forcing screws (3EA) separate the cover from the converter bell.

※ Special tool
Forcing screws 5870 204 005

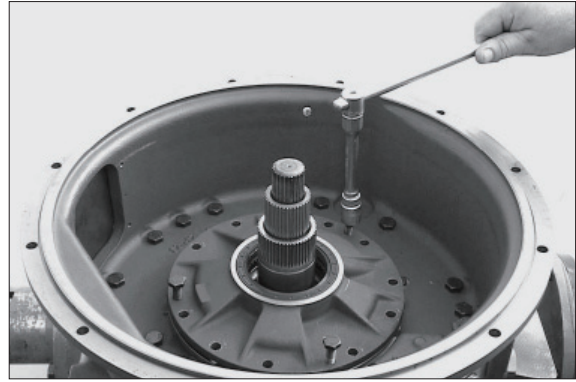


Figure 5

(3) By means of the extractor pull the oil supply flange out of the converter bell.

※ Special tool
Extractor 5870 000 089



Figure 6

(4) Remove the converter safety valve (arrow 1), if required.

※ Converter safety valve is fixed by means of slotted pin (arrow 2).



Figure 7

(5) Loosen the bolt connection (M8 and M12) and by means of lifting tackle and pry bar set separate the converter bell from the transmission housing.

※ Special tool
Eyebolts assortment 5870 204 002
Pry bar set 5870 345 036
Lifting chain 5870 281 047



Figure 8

(6) Remove the rectangular ring (arrow).



Figure 9

(7) Press the input shaft out of the spur gear bearing. Remove the released bearing inner ring and the spur gear.

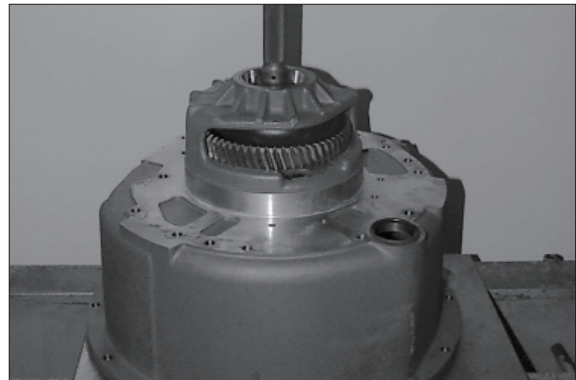


Figure10

(8) Press off the bearing inner ring from the spur gear.

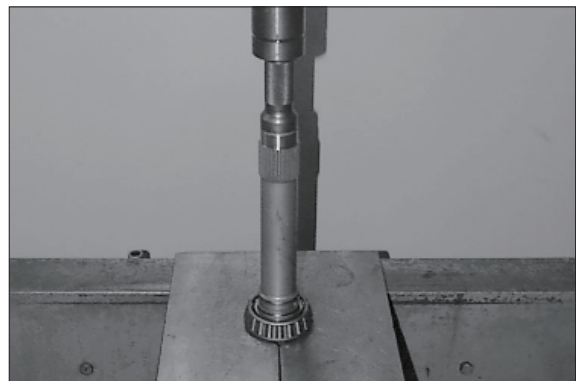


Figure11

(9) Remove the converter pressure back-up valve.

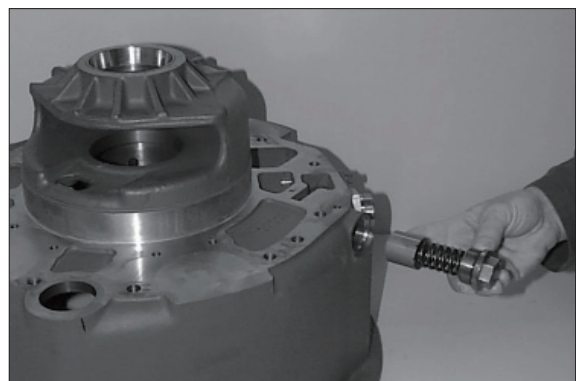


Figure 12

- (10) Remove the inductive transmitter.
9 = n - Engine

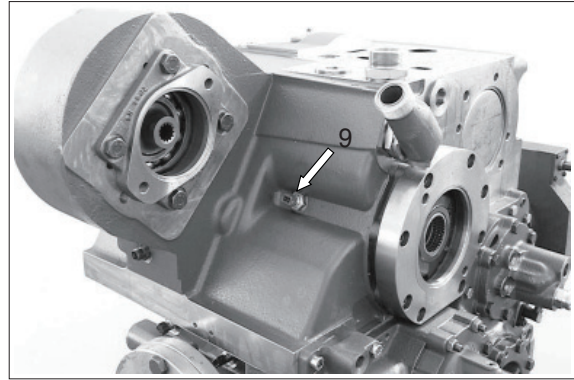


Figure 13

Input shaft-pump/power take-off (the 1st power take-off)

- (1) Loosen the cap screw.

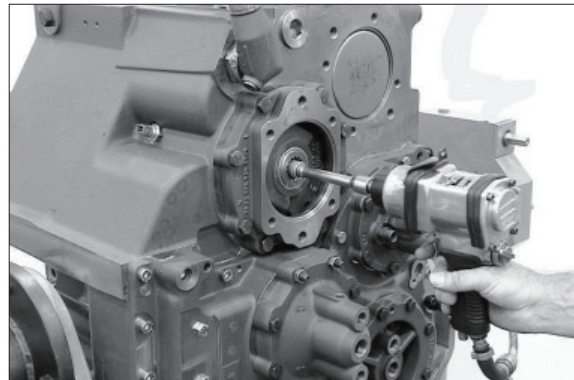


Figure 21

- (2) Remove the cap screw and clamping plate.

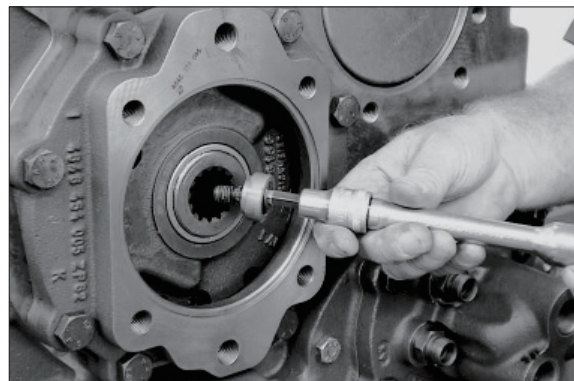


Figure 22

- (3) Press the input shaft out of the bearing.

※ Pay attention to released input shaft as well as shims.

※ Special tool
Extractor

5870 000 065

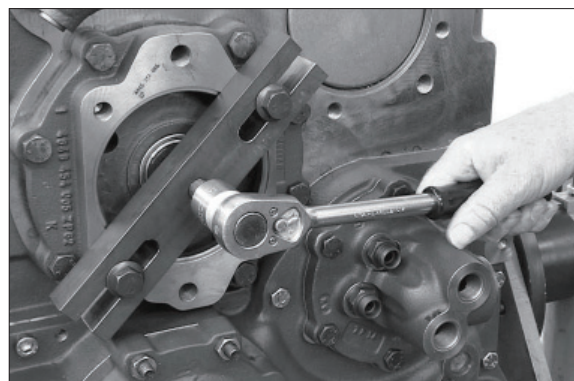


Figure 23

- (4) Snap out the rectangular ring (arrow 1) and remove both shims (arrow 2).

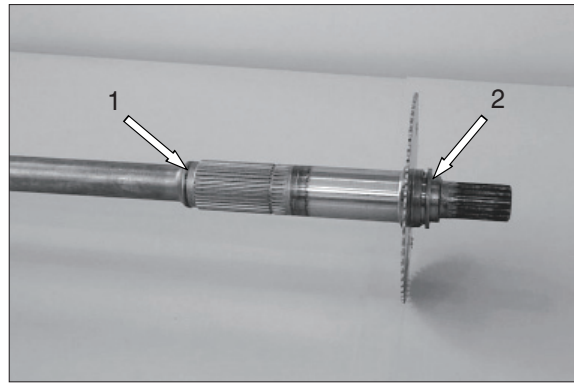


Figure 24

Transmission pump

- (1) Loosen the cap and hexagon screws (depending on the version) respectively and separate the pump flange from the housing.

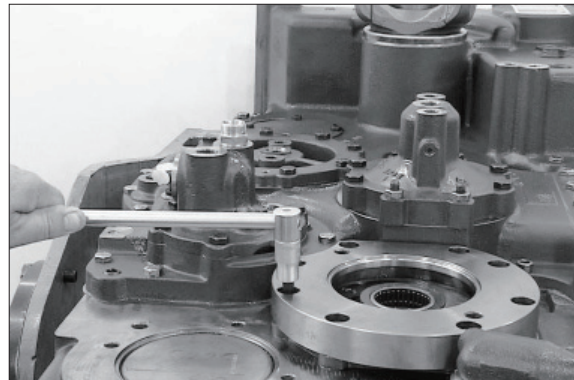


Figure 25

- (2) Loosen the cap screws (4EA / M8).
Position the extractor on the transmission pump and fasten it by means of screws (M8 × 65) to the transmission pump. Then pull out the pump from the housing bore.

※ Extracting is supported by slightly tapping onto the transmission housing.

※ Special tool

Extractor 5870 000 089

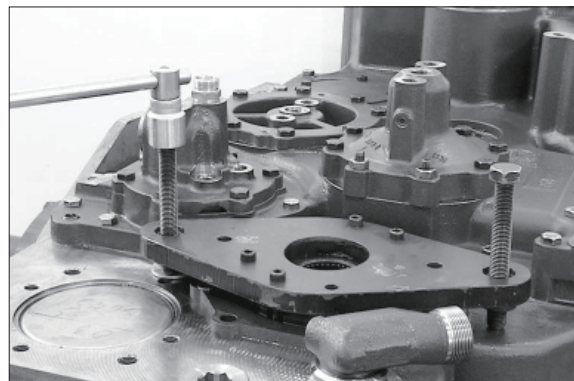


Figure 26

Remove the bearing outer ring (2nd/3rd and 4th power take-off)

- (3) Pull out the bearing outer ring from the bore.

※ Special tool

Internal extractor 5870 300 017

Counter-support 5870 300 009



Figure 27

Remove the ball bearing and the driver
(1st power take-off, figure 28~29)

(4) Snap out the retaining ring.



Figure 28

(5) Press out the driver with ball bearing from the bearing bore.
Then separate the ball bearing from the driver.

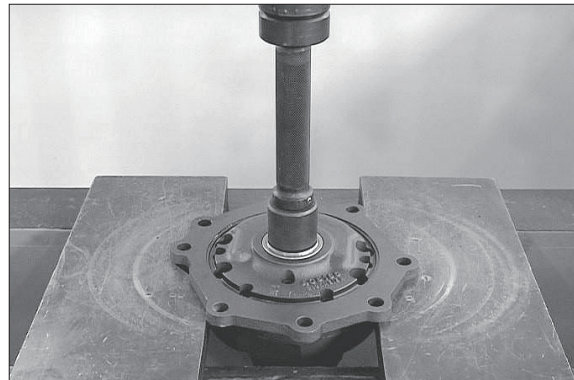


Figure 29

(6) Loosen the cap screws, take off the pump cover and remove the rotor set.

▲ If marks due to running-in are found on the pump housing or housing cover, the complete pump is to be replaced.

Then assemble the rotor set with the chamfer on the tooth tip showing downwards and install the housing cover again.

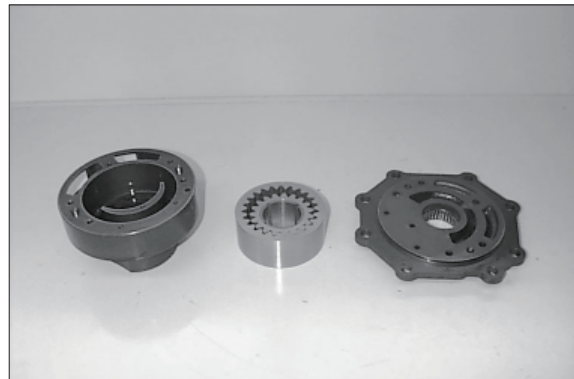


Figure 30

· Torque limit (M8/8.8) :

2.35 kgf · m (17.0 lbf · ft)

· Torque limit (M6/8.8) :

0.97 kgf · m (7.01 lbf · ft)

3rd/and 4th power take-off

(7) Remove the screw-in sleeve (arrow).

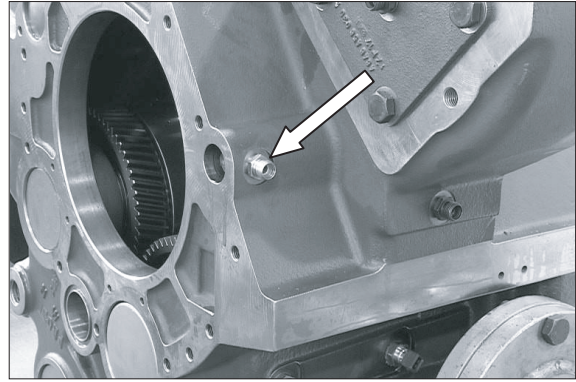


Figure 31

(8) Sealing cap is to be drilled centrally and thread M8 to be cut.
By means of the striker expel the sealing cap from the housing bore.

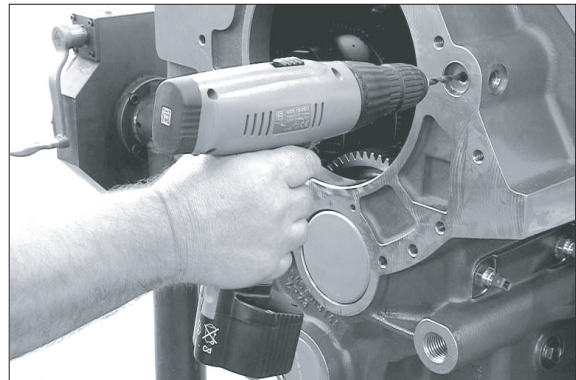


Figure 32

(9) By means of the striker expel the pin from the housing bore (figure 33) and remove the complete spur gear (figure 34).

Striker 5870 650 001

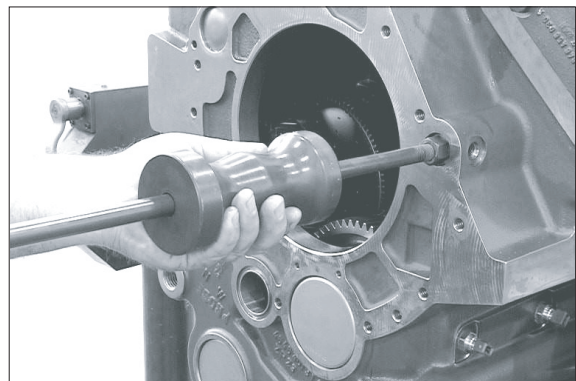


Figure 33

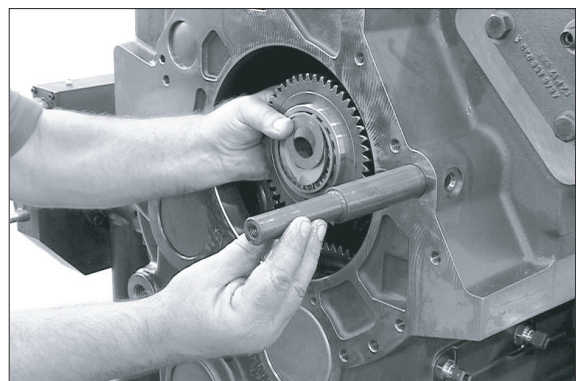


Figure 34

(10) Loosen the hexagon screws and remove the cover.

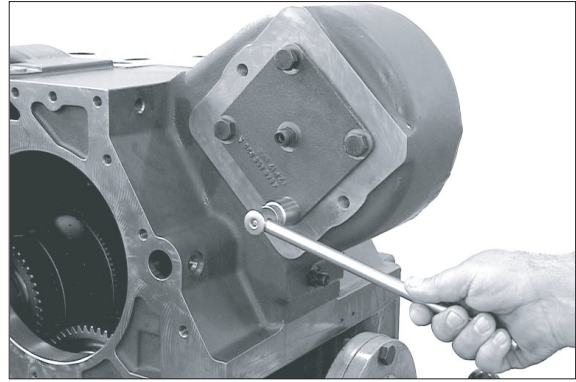


Figure 35

(11) Remove the pump flange on the rear side and snap out the retaining ring.

Clamping pliers 5870 900 021

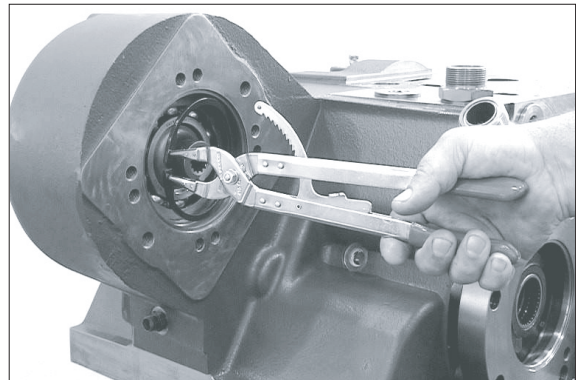


Figure 36

(12) Expel the driver from the bearing bore and remove the released single components.

Plastic hammer 5870 280 004

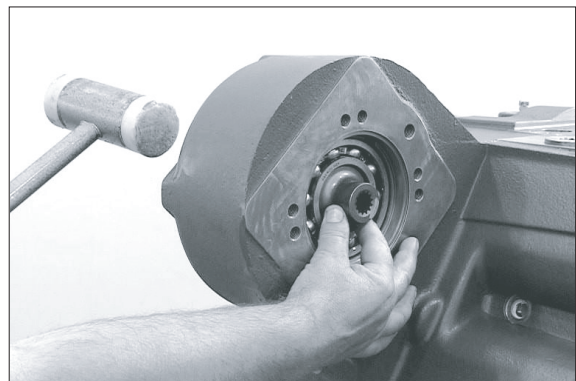


Figure 37

Layshaft

- (1) Remove the sealing cover and loosen the hexagon screw.

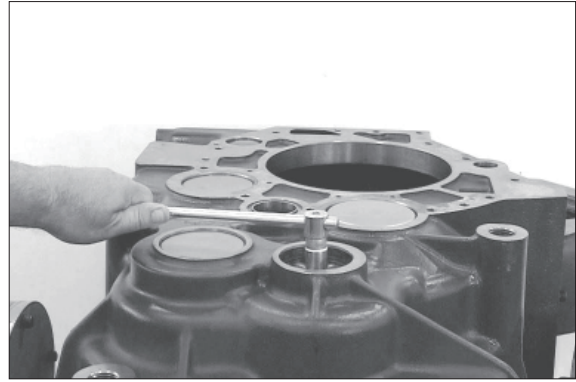


Figure 38

- (2) Expel the idler shaft by means of the striker from the housing bore and layshaft bearing respectively.

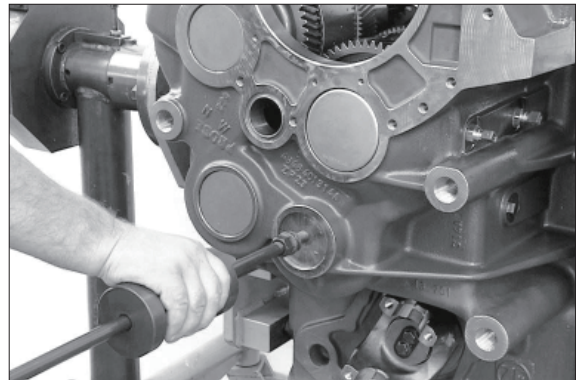


Figure 39

Removal of inductive and speed transmitter (figure 40~41)

- 14 = n - Turbine
- 5 = n - Internal speed input
- 13 = n - Output (speed transmitter)

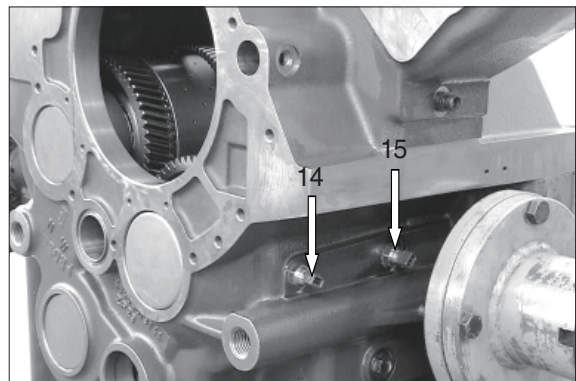


Figure 40

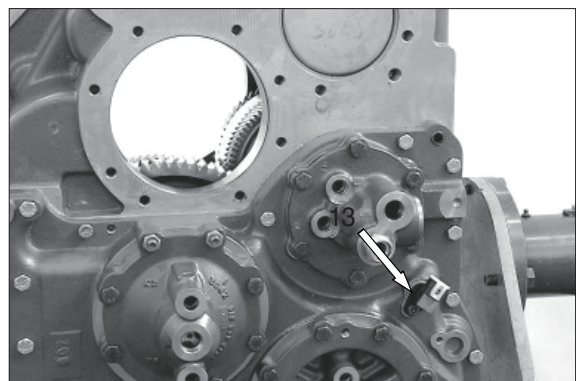


Figure 41

Output

Converter side :

Remove the lock plate. Loosen hexagon screws and take off the output flange. Rotate the housing by 180° and remove the output flange on the housing rear side.

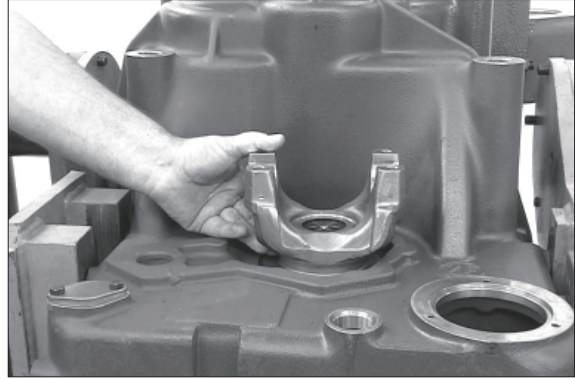


Figure 42

Transmission rear side

▲ For working on the brake system observe the instructions and specifications of the brake manufacturer.

(1) Unscrew the screw cap.

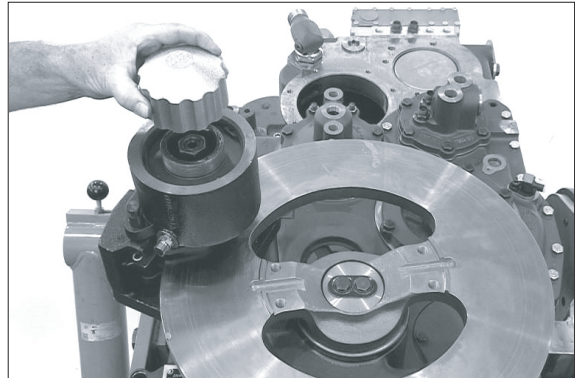


Figure 43

(2) Loosen the counternut and unscrew the adjusting screw in counterclockwise direction until the brake disc is released.

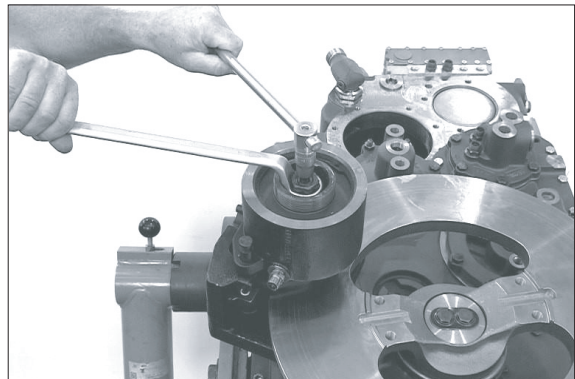


Figure 44

(3) Loosen the cap screws and separate the complete brake from the transmission housing.
Remove the lock plate. Loosen the hexagon screws and separate the output flange/brake disc from the output shaft.

※ (S) Socket spanner 5870 656 047

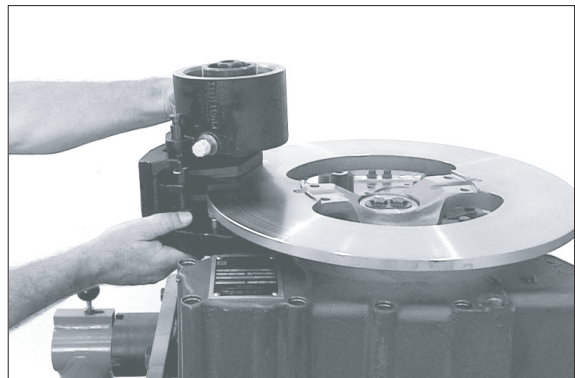


Figure 45

Removal of the clutches and layshaft

- (1) Loosen the hexagon screws and expel the bearing cover KV/K1 by means of the striker from the housing bore.
Remove the bearing cover KR/K2 (arrow) analogously.

※ Mark the installation location of the bearing cover.

※ Special tool

Threaded insert 5870 204 069

Striker 5870 650 014

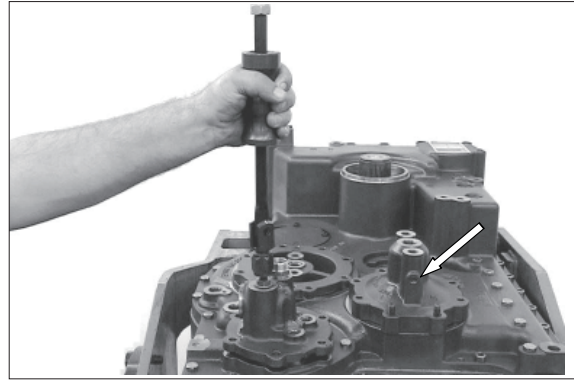


Figure 46

- (2) Pull out the bearing cover K4/K3 by means of the forcing screws from the housing bore.

※ Special tool

Forcing screws 5870 204 005

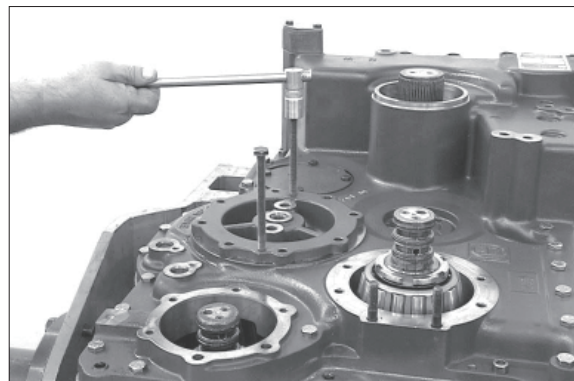


Figure 47

- (3) Separate the bearing inner ring from bearing cover K4/K3.

※ Special tool

Three-armed puller 5870 971 003

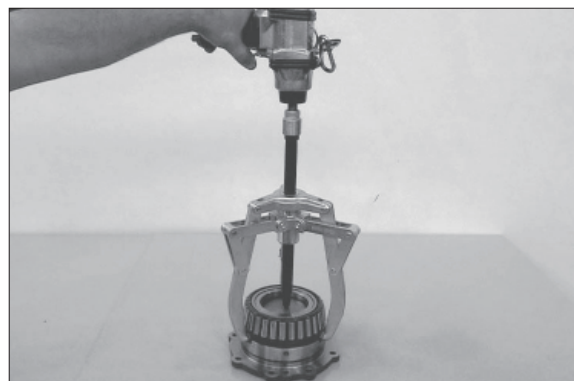


Figure 48

- (4) Loosen the bolt connection.
Separate the housing cover from the housing by equally tightening both forcing screws (arrow 1 and 2) as well as the threaded spindle (arrow 3).

※ Special tool

Internal hex spanner, size 8 5870 290 003

Forcing screws 5870 204 005

Lifting tackle 5870 281 061

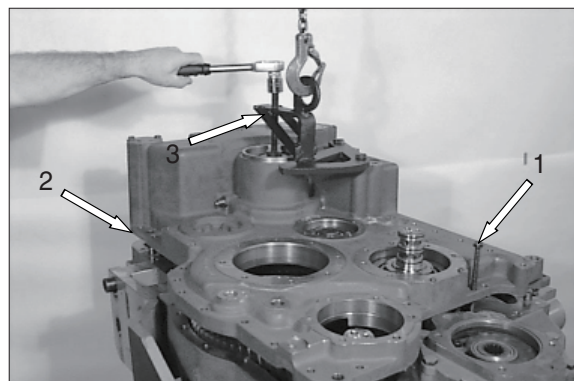


Figure 49

- (5) Expel the output shaft from the output gear.

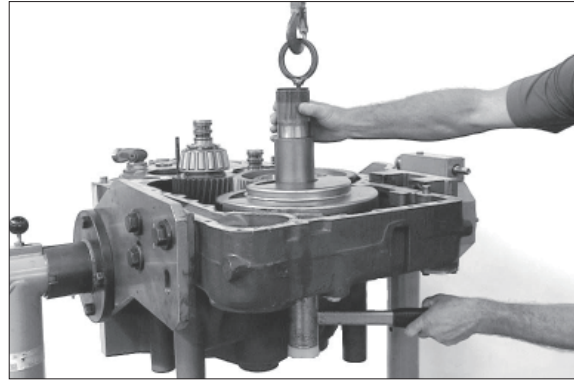


Figure 50

- (6) Loosen the hexagon screws and remove the oil baffle.
Lift the output gear out of the transmission housing (figure).

- ※ Special tool
Stop washer 5870 100 054
Eyebolts assortment 5870 204 002

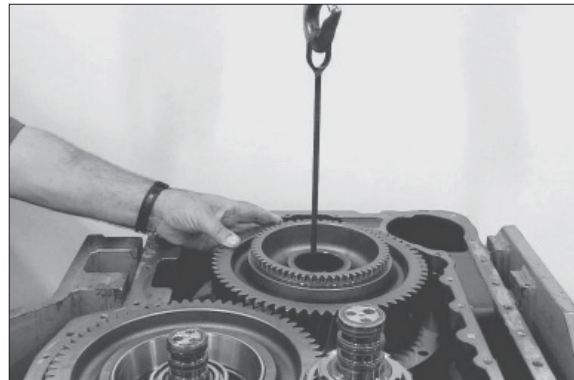


Figure 51

- (7) Remove the bearing inner ring from the output gear.

- ※ Special tool
Three-armed puller 5870 971 003

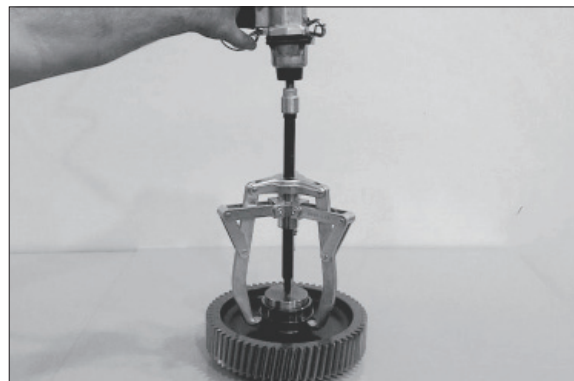


Figure 52

- (8) Take the roller bearing out of the housing bore and remove the oil baffle (arrow).

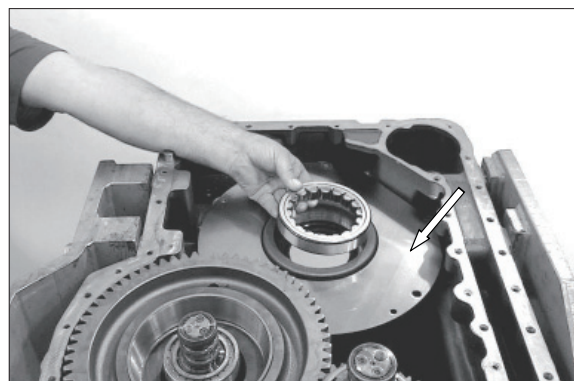


Figure 53

Remove the multi-disc clutches

※ For removal of the single clutches observe the following sequence :

K4/K3 → KR/K2 → KV/K1.

For removal of clutch K4/K3, lift the clutch KR/K2 slightly and move it in direction of the arrow, see figure.

※ Special tool

Eyebolts assortment 5870 204 002

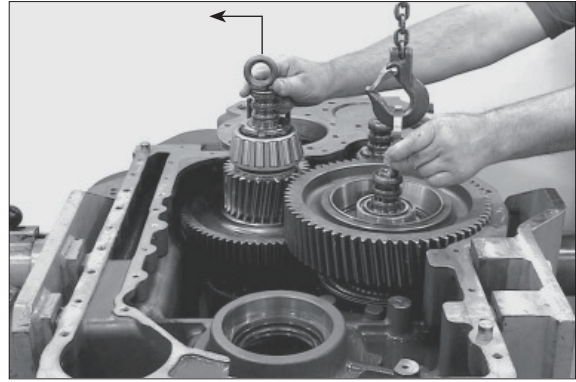


Figure 54

(9) Opposite figure shows the clutches when removed.



Figure 55

(10) Remove the layshaft gear.



Figure 56

Dismantling of the Multi-Disc Clutch K3/K4

(1) By means of clamping ring (S) fasten the clutch to the assembly truck.

※ Special tool
Clamping ring 5870 654 033

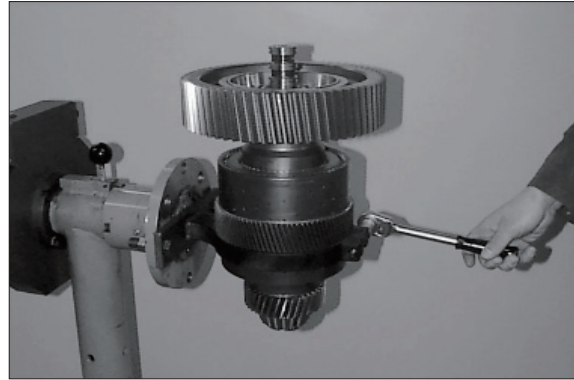


Figure 62

(2) Pull off the roller bearing from the disc carrier.

※ Special tool
Three-armed puller 5870 971 002



Figure 63

(3) Separate spur gear K3 from the disc carrier.

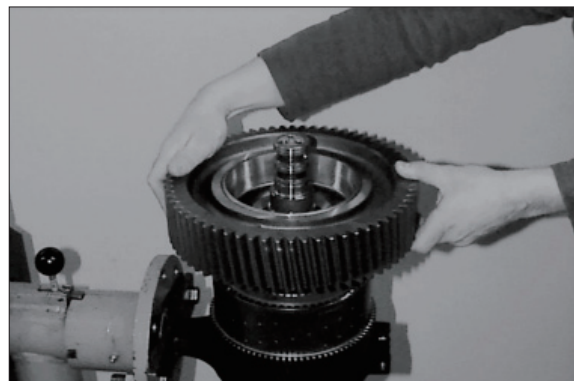


Figure 64

(4) Pull off the bearing inner ring from the disc carrier.

※ Special tool
Rapid grip 5873 012 012
Basic tool 5873 002 001



Figure 65

- (5) Squeeze out the snap ring.
Remove the end shim and disc set K3.

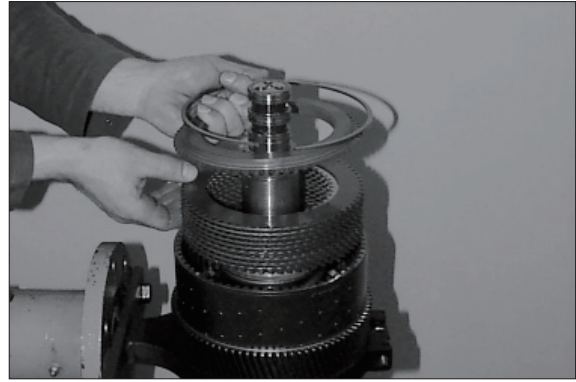


Figure 66

- (6) Rotate disc carrier by 90°.
Loosen the slotted nut.

- ※ Special tool
Slotted nut wrench 5870 401 118
Slotted nut wrench 5870 401 115

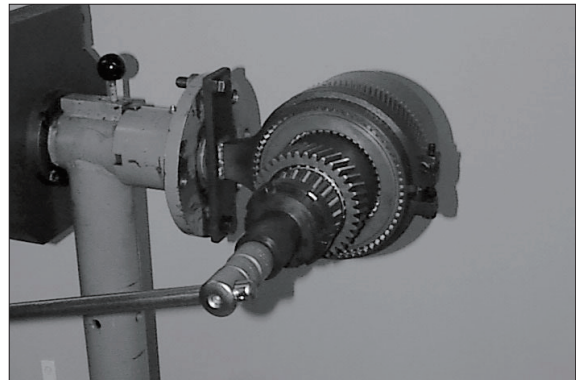


Figure 67

- (7) Rotate disc carrier by 90°.
Pull off the taper roller bearing.

- ※ Special tool
Gripping insert 5873 011 012
Basic tool 5873 001 000



Figure 68

- (8) Pull off the spur gear K4 from the disc carrier.

- ※ Special tool
Three-armed puller 5870 971 003

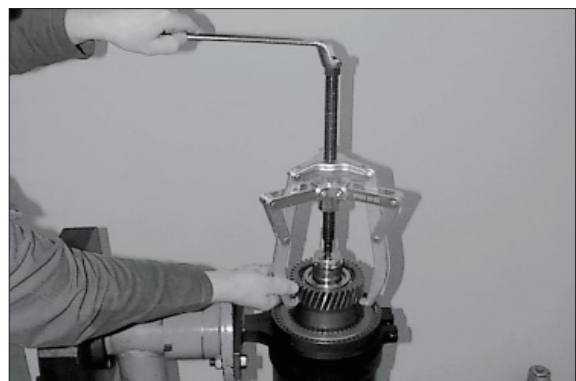


Figure 69

(9) Remove the ring.

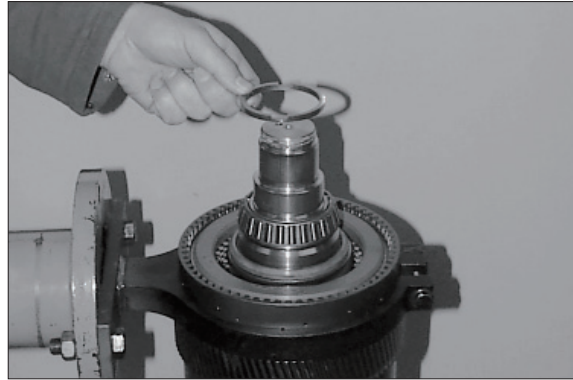


Figure 70

(10) Pull off the taper roller bearing.

※ Special tool
Three-armed puller 5870 971 002

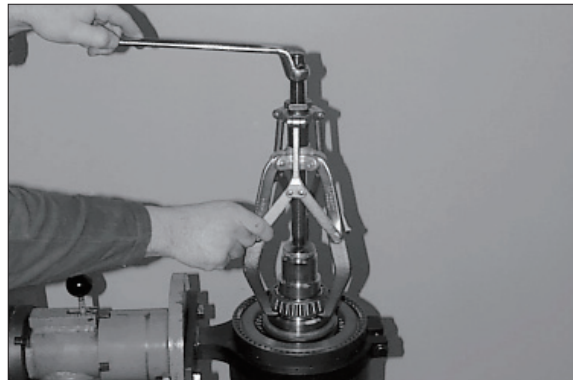


Figure 71

(11) Squeeze out the snap ring.
Remove the end shim and the disc set K4.

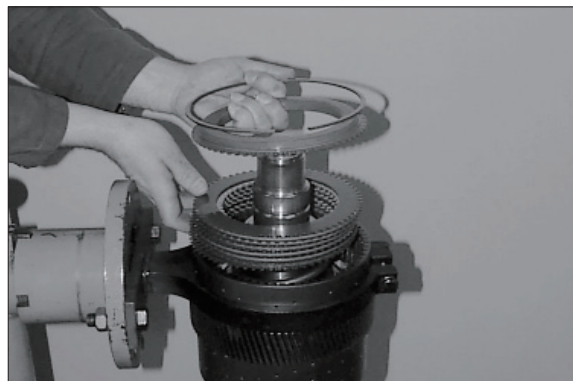


Figure 72

(12) Preload the compression spring by means of fixture (S).
Squeeze out the snap ring and the released single components.
Remove the opposite single components (K3 side) analogously.

※ Special tool
Pressure piece 5870 345 072

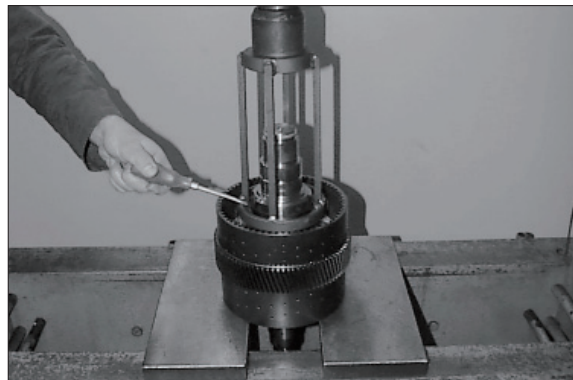


Figure 73

- (13) Separate both pistons by means of compressed air from the disc carrier.

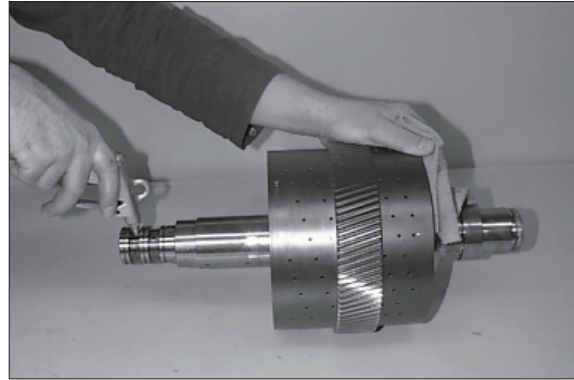


Figure 74

Dismantling of the multi-disc clutch KR/K2

- (1) Fasten the clutch by means of clamping ring (arrow) on the assembly truck.

※ Special tool
Clamping ring 5870 654 033

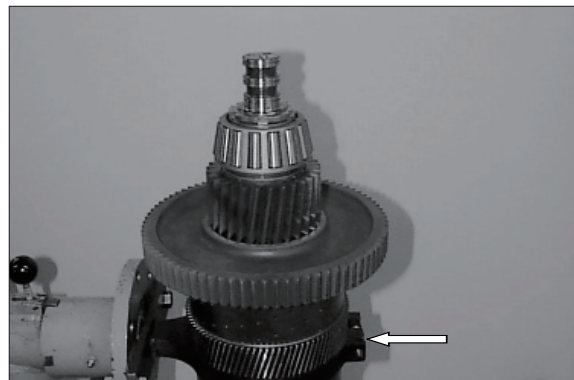


Figure 75

- (2) Rotate disc carrier by 90°. Loosen the slotted nut.

※ Special tool
Slotted nut wrench 5870 401 099

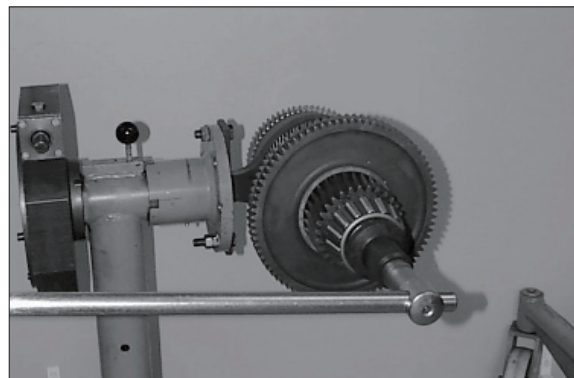


Figure 76

- (3) Pull off the taper roller bearing from the disc carrier.

※ Special tool
Gripping insert 5873 012 018
Basic tool 5873 002 001



Figure 77

- (4) Press off the spur gear K2 from the disc carrier.

▲ Pay attention to released disc carrier.

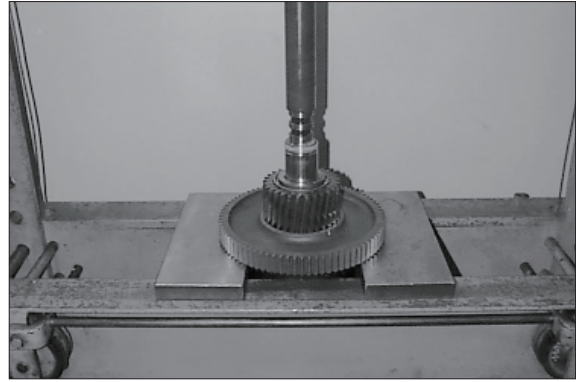


Figure 78

- (5) Fasten the disc carrier by means of clamping ring (S).
Pull off the taper roller bearing from the disc carrier.

※ Special tool
Clamping ring 5870 654 033
Gripping insert 5873 012 019
Basic tool 5873 002 001

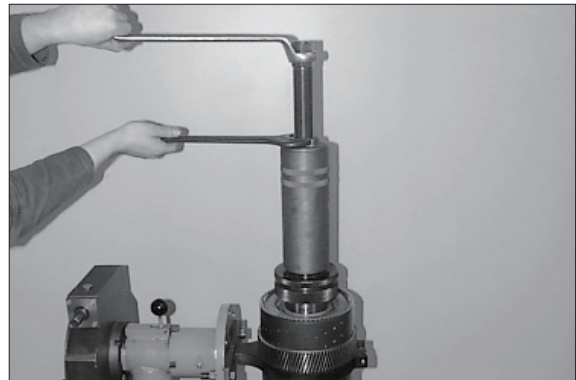


Figure 79

- (6) Squeeze out the snap ring.
Remove the end shim and disc set K2.

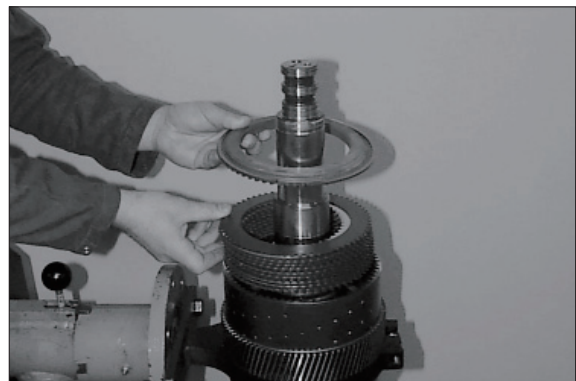


Figure 80

- (7) Rotate disc carrier by 90°.
Loosen the slotted nut.

※ Special tool
Slotted nut wrench 5870 401 099

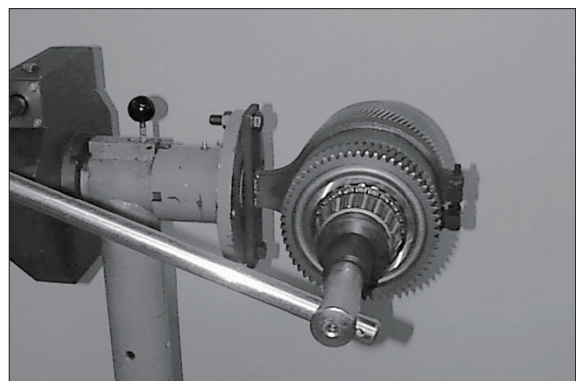


Figure 81

(8) Pull off the taper roller bearing from the disc carrier.

※ Special tool

Gripping insert 5873 002 044

Basic tool 5873 002 001

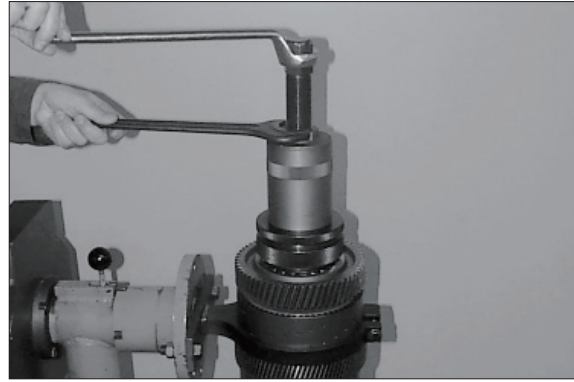


Figure 82

(9) Fasten spur gear KR by means of clamping ring (arrow) and pull it from the disc carrier.

※ Collar of the clamping ring must show upwards (to the spur gear).

※ Special tool

Three-armed puller 5870 971 003

Clamping ring 5870 654 045

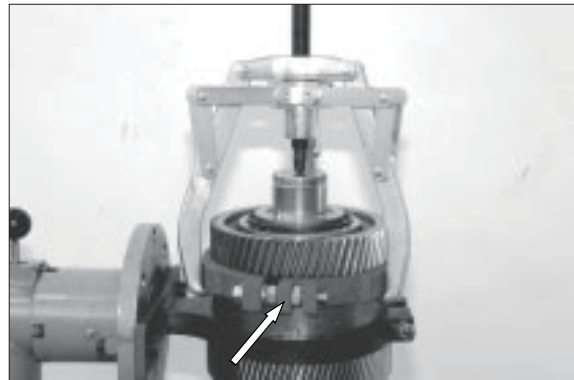


Figure 83

(10) Remove the ring.

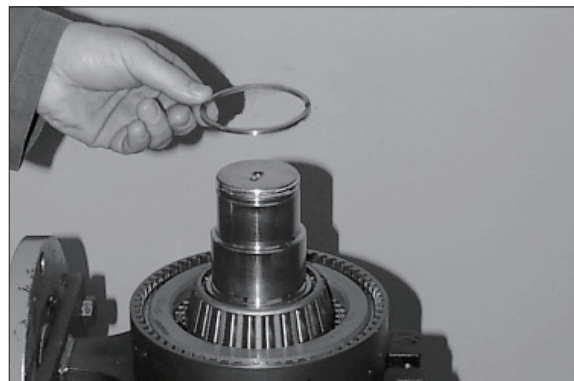


Figure 84

(11) Squeeze out the snap ring.
Remove end shim and disc set KR.



Figure 85

(12) Pull off the taper roller bearing from the disc carrier.

※ Special tool

Gripping insert 5873 012 013

Basic tool 5873 002 001

Remove both piston (like described in figure 73 and 74)

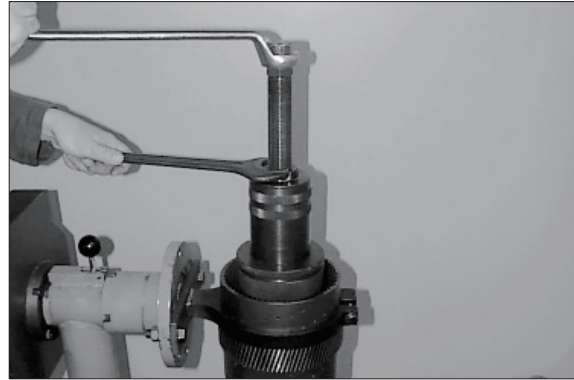


Figure 86

Dismantling of the multi-disc clutch KV/K1

(1) Fasten clutch by means of clamping ring to the assembly truck.

Loosen the slotted nut (figure 87).

※ Special tool

Clamping ring 5870 654 033

Slotted nut wrench 5870 401 118

Slotted nut wrench 5870 401 099

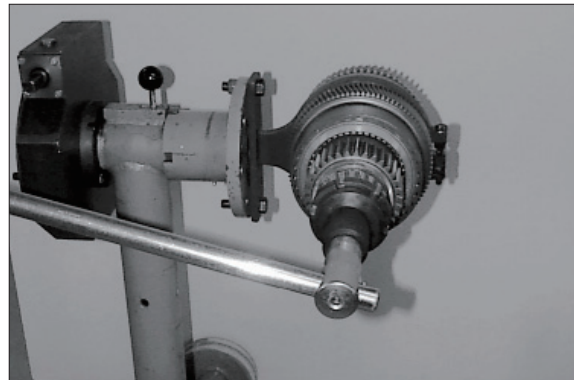


Figure 87

(2) Pull off the taper roller bearing from the disc carrier.

※ Special tool

Gripping insert 5873 001 023

Basic tool 5873 001 000

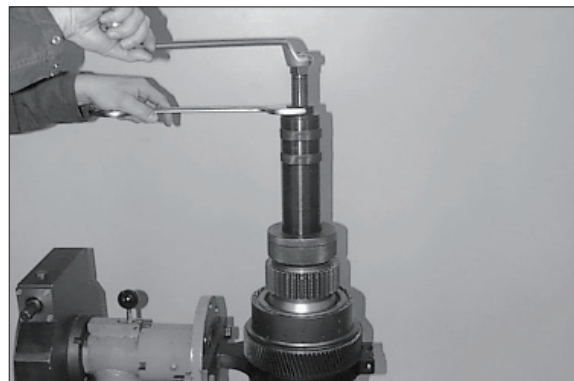


Figure 88

(3) Remove the shim.

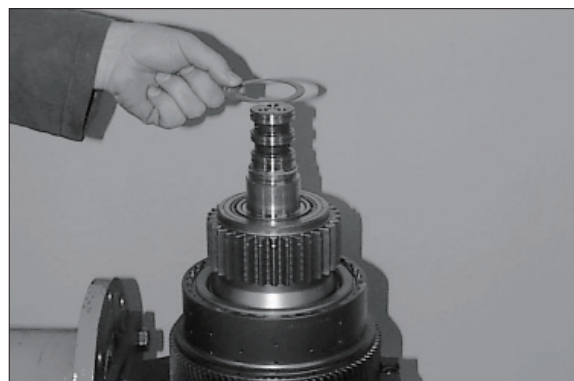


Figure 89

(4) Pull off spur gear K1 from the disc carrier.

※ Special tool

Three-armed puller 5870 971 003



Figure 90

(5) Opposite figure shows the spur gear bearing K1.

Bearing (1) can only be obtained as complete part.

▲ If it is necessary to remove the clutch-pack-sided ball bearing (arrow or Figure 93 and 94), the complete bearing (1) has to be removed.

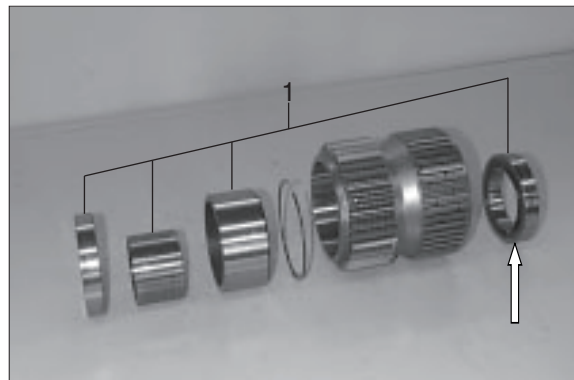


Figure 91

(6) Take off the bush.

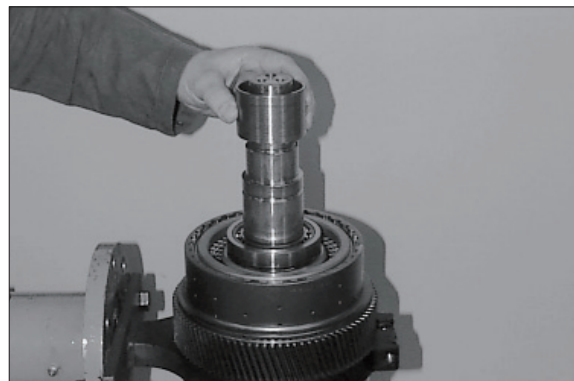


Figure 92

(7) Pull off the ball bearing from the disc carrier (figure 93 and 94).

※ Pay attention to released balls.



Figure 93

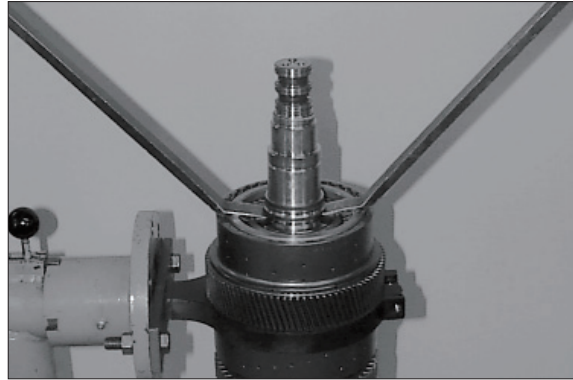


Figure 94

- (8) Squeeze out the snap ring.
Remove end shim and disc set K1.

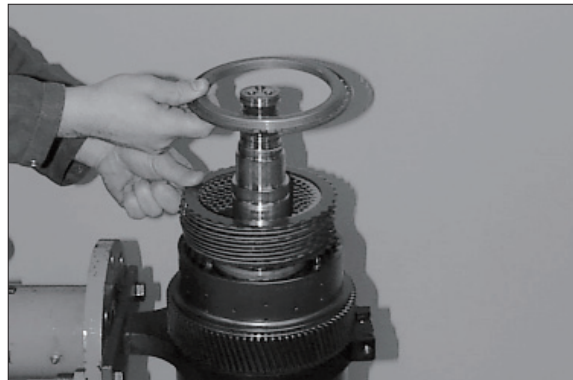


Figure 95

- (9) Rotate disc carrier by 90°.
Loosen the slotted nut.

- ※ Special tool
- Slotted nut wrench 5870 401 118
- Slotted nut wrench 5870 401 115

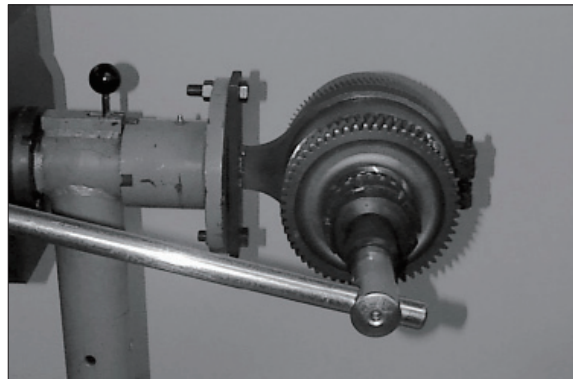


Figure 96

- (10) Pull off the taper roller bearing from the disc carrier.

- ※ Special tool
- Gripping insert 5873 001 034
- Basic tool 5873 001 000

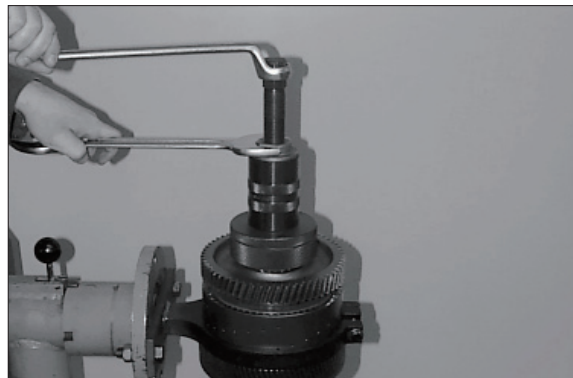


Figure 97

(11) Pull off spur gear KV from the disc carrier.

- ※ Special tool
Three-armed puller 5870 971 003

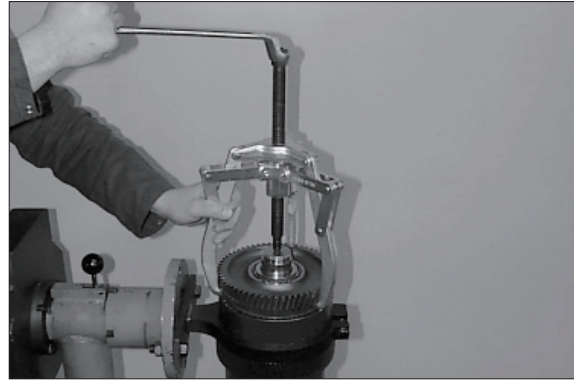


Figure 98

(12) Remove the ring.

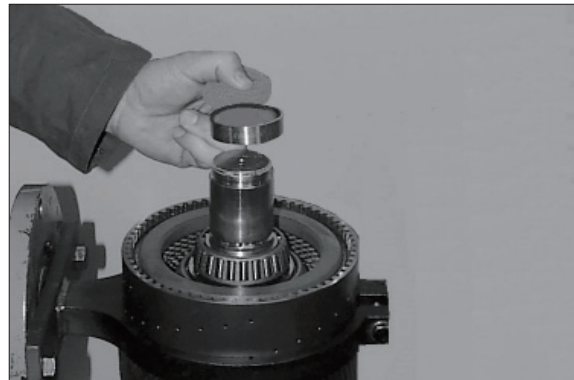


Figure 99

(13) Pull off the taper roller bearing from the disc carrier (figure 100).
Squeeze out the snap ring.
Remove end shim and disc set KV.
Remove both pistons (like described in Figure 73 and 74).

- ※ Special tool
Gripping insert 5873 001 034
Basic tool 5873 001 000

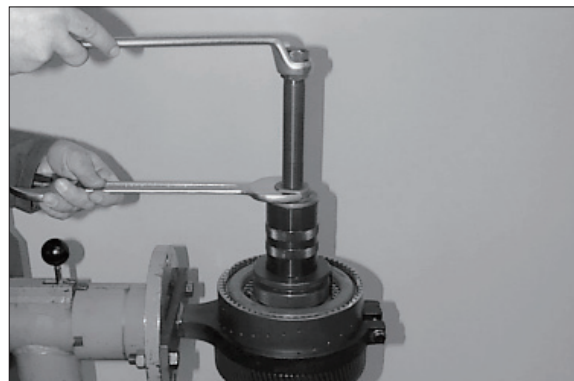


Figure 100

2) ASSEMBLY

3rd/4th power take-off

- 1 = Ball bearing
- 2 = Spur gear
- 3 = Driver
- 4 = Ball bearing
- 5 = Pump flange
- 6 = Cover
- 7 = Intermediate gear
- 8 = Shim
- 9 = Pin
- 10 = Sealing cover
- 11 = Orifice

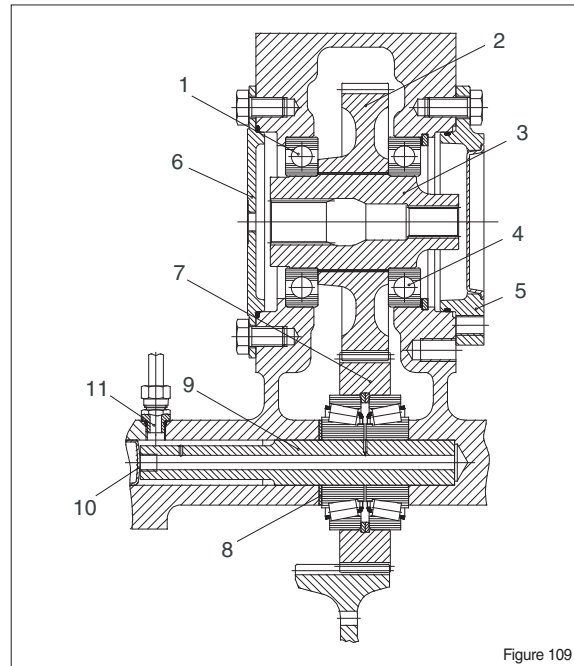


Figure 109

- (1) Insert the ball bearing (1) into the housing bore until contact.

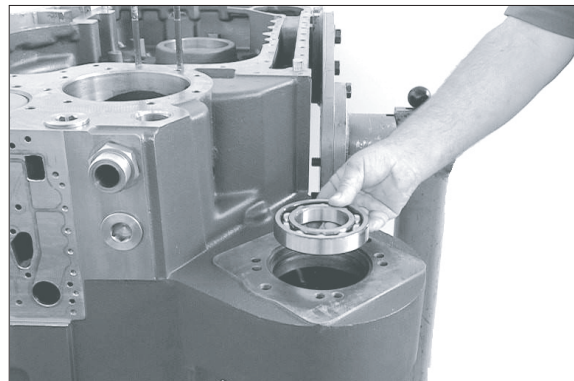


Figure 110

- (2) Position spur gear (2).
- ※ Pay attention to the installation position, see sketch (figure 109).

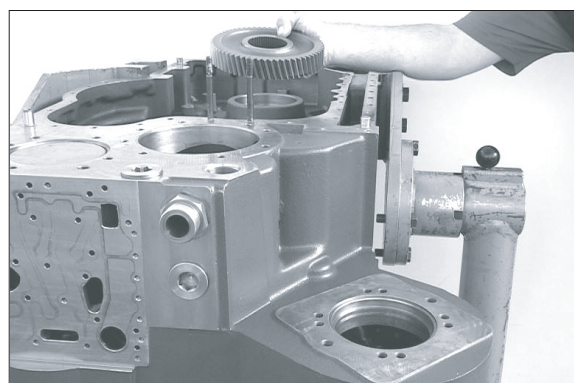


Figure 111

(3) Heat the ball bearing (inner ring) and bore of the gear respectively.

- ※ (S) Hot-air blower 230V 5870 221 500(S)
- Hot-air blower 115V 5870 221 501

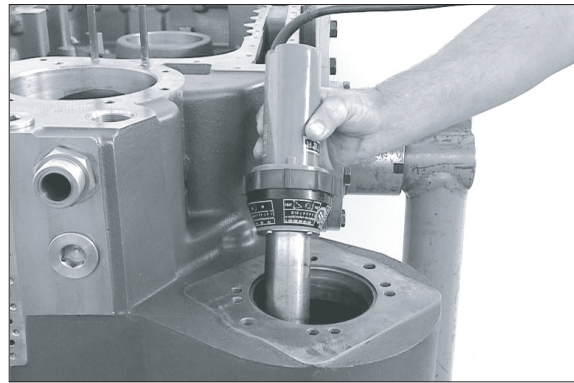


Figure 112

(4) Align the spur gear centrally and insert the driver (3) until contact.

- ※ Pay attention to the installation position, also see sketch (figure 109).

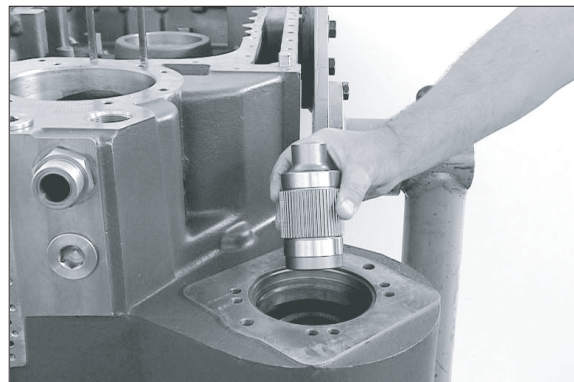


Figure 113

(5) Install the ball bearing (4) by means of fixture until contact.

- ※ Pay attention to perfect contact of the ball bearing.

Fixture 5870 000 083

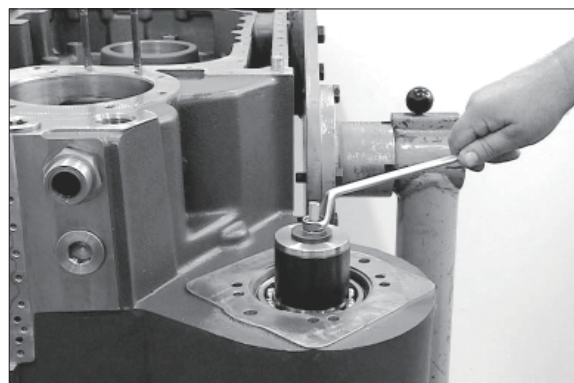


Figure 114

Adjust the axial play of power take-off bearing = 0.2~0.3 mm (figure 115~116)

(6) Fasten ball bearing by means of shim $s = 1.80$ mm (empirical value) and retaining ring.

Clamping pliers 5870 900 021

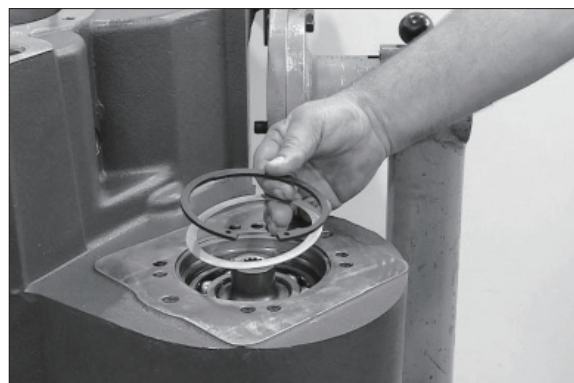


Figure 115

(7) Check the axial play by means of feeler gauge.

※ If different from the required axial play = 0.2~0.3 mm this is to be corrected with the corresponding shim.

Feeler gauge 5870 200 112

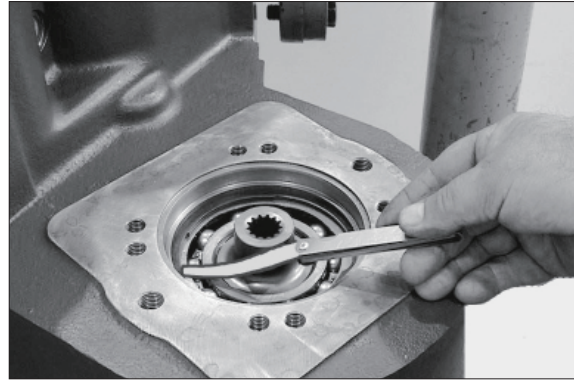


Figure 116

(8) Place the O-Ring (arrow) in the annular groove of the pumpflange (5) and grease it.

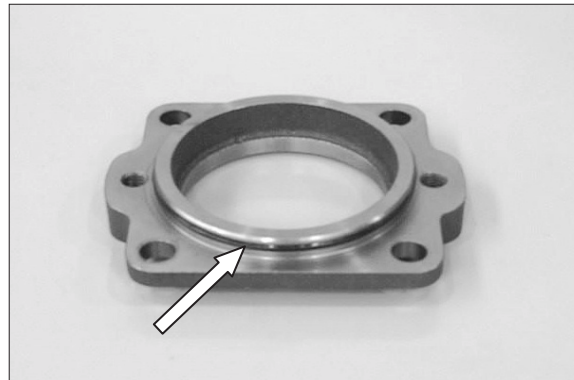


Figure 117

(9) Fasten the pump flange (5) by means of hexagon screws.

Tightening torque (M14/8.8) : 12.7 kgf · m
(92.2 lbf · ft)



Figure 118

Converter side

(10) Place the O-Ring (arrow) with assembly grease in the recess of the housing bore.

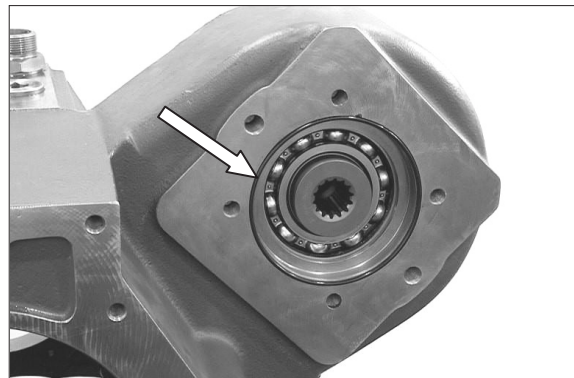


Figure 119

- (11) Fasten the cover (6) with hexagon screws.
 Tightening torque (M14/8.8) : 12.7 kgf · m
 (92.2 lbf · ft)

Provide the orifice (arrow) with a new sealing ring (CU) and install it.

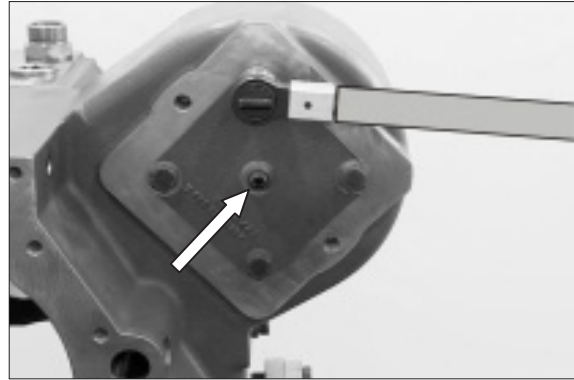


Figure 120

- (12) Preassemble the intermediate gear (7) according to figure 121.
 ※ Exact locating of the single components to be ensured by pressing

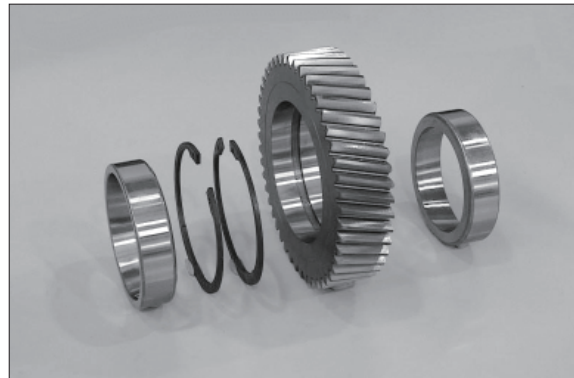


Figure 121

- (13) Put in the bearing inner rings and position the intermediate gear (7), see arrow.

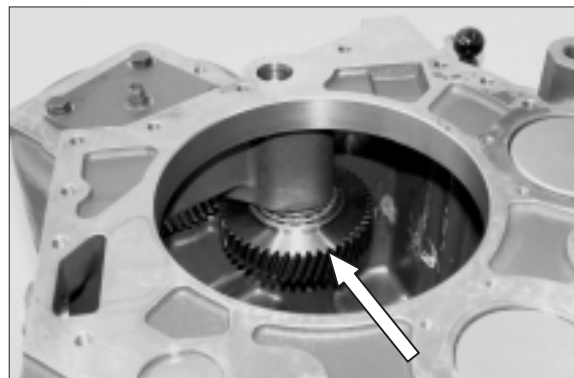


Figure 122

- (14) Adjust the axial play-intermediate gear bearing max. 0.1 mm (figure 123~124)

Determine the gap size by means of feeler gauge (arrow).

Dim I e.g. 1.25 mm

Example

Dim I (gap size) 1.25 mm

Axial play (0~0.1 mm) e.g. - 0.05 mm

resulting shim e.g. s = 1.20 mm

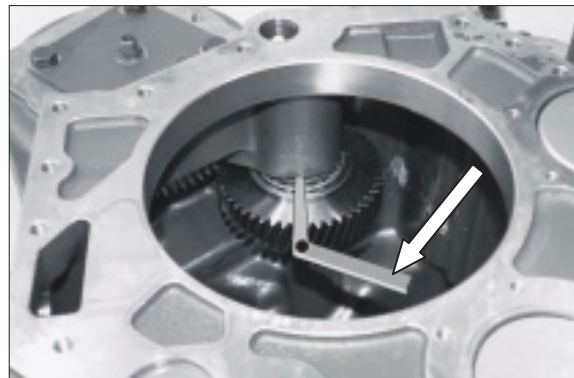


Figure 123

Feeler gauge 5870 200 112

(15) Install the corresponding shim (8) e.g. $s = 1.20$ mm (arrow).

※ Install shim on the converter side

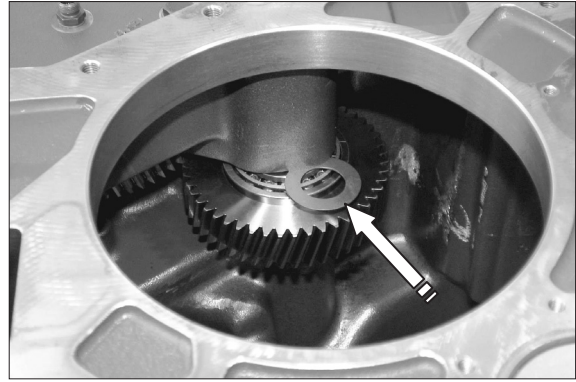


Figure 124

(16) Align the single components centrally. Undercool the pin (9) and install it until contact.

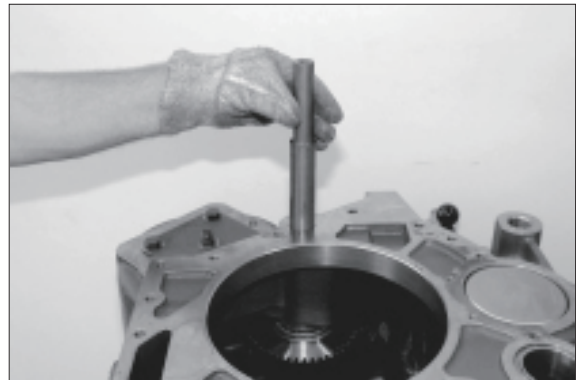


Figure 125

(17) Flush-mount the sealing cover (10) with the concave side showing upwards (arrow 1).

※ Wet contact face of the sealing cover with loctite (Type No.262).

※ Provide orifice (11) with a new O-Ring and install it (arrow 2).

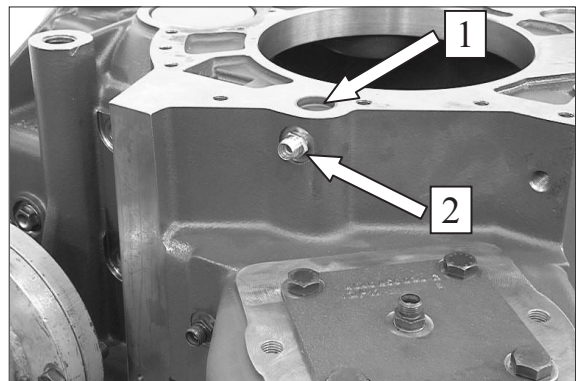


Figure 126

Assembly of the multi-disc clutch K4/K3

The following sketch shows the clutch sectioning

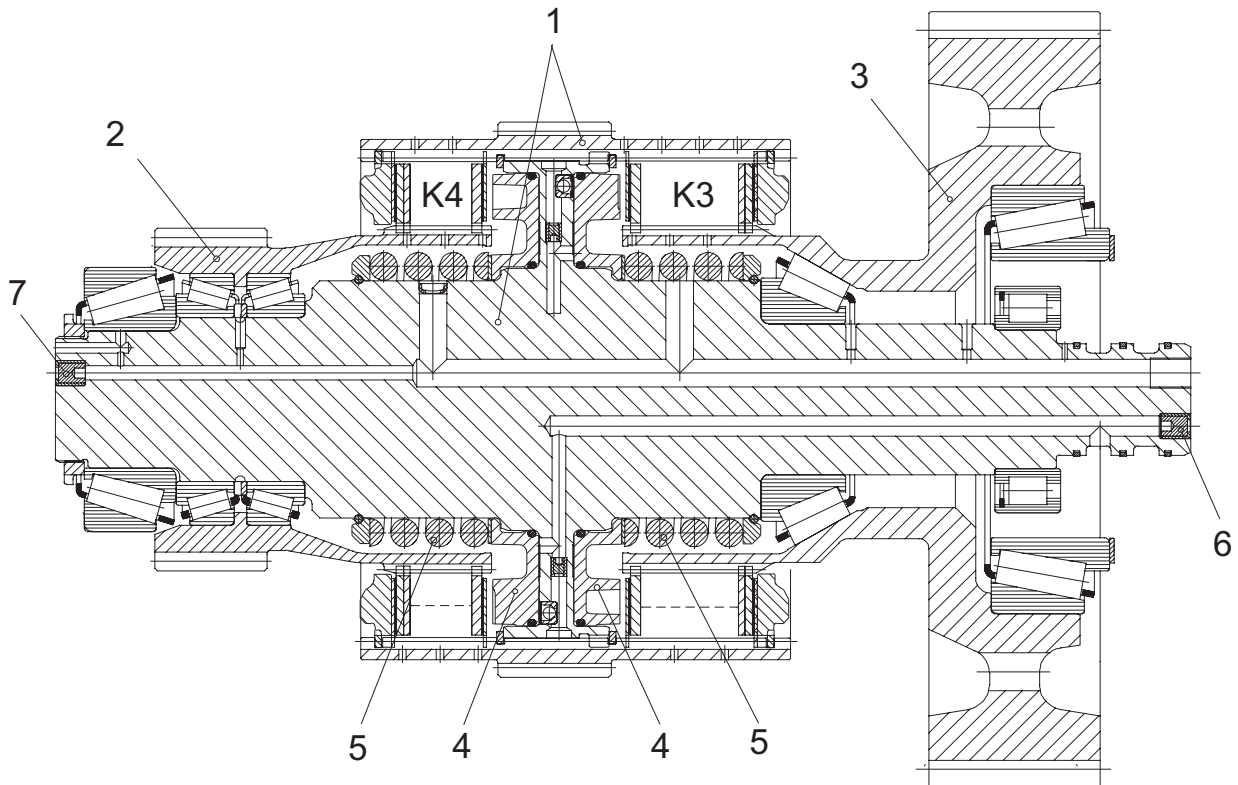


Figure 127

- | | | | | | |
|---|--------------------|----|----------------------|---|--------------------|
| 1 | Disc carrier(assy) | K4 | Multi-disc clutch K4 | 5 | Compression spring |
| 2 | Spur gear K4 | K3 | Multi-disc clutch K3 | 6 | Plug 2EA |
| 3 | Spur gear K3 | 4 | Piston | 7 | Plug 1EA |

※ Observe the installation position of the single components for the following assembly.

- (1) Lift the disc carrier with the K4-side showing downwards into the clamping ring (S) and fasten it.
Rotate disc carrier by 180°.

※ Special tool
Clamping ring 5870 654 033

▲ To install new disc carriers the finished bores have to be sealed with plugs.
Installation position, see arrow, figure 128 and 129.

※ Special tool
Hand inserting tool 5870 320 014
Ratchet spanner 5870 320 018

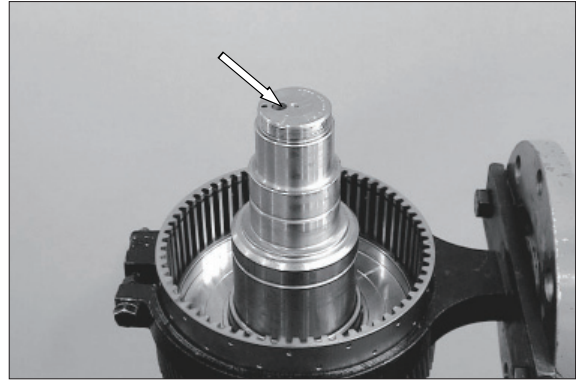


Figure 128

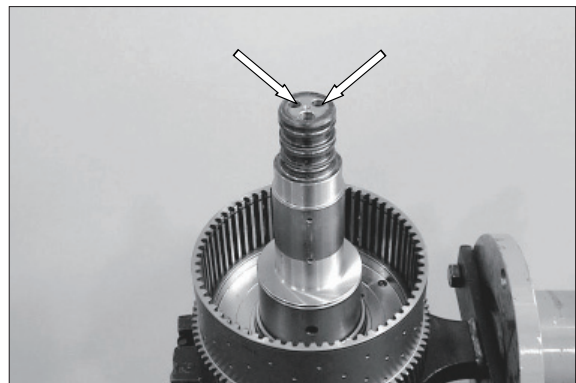


Figure 129

- (2) Flush-mount the drain valve (arrow) with the chamfer showing downwards.

※ Special tool
Inserting tool 5870 320 019

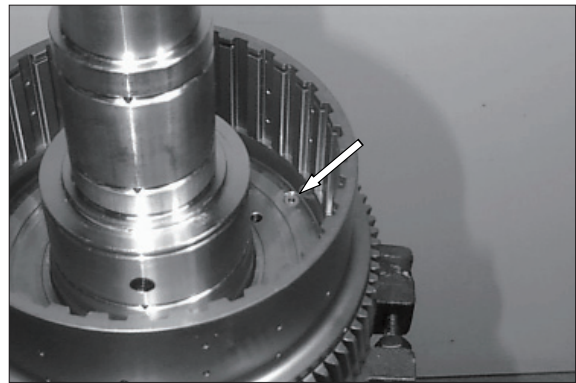


Figure 130

- (3) Put both O-rings scroll-free into the annular grooves of the piston, see arrows.

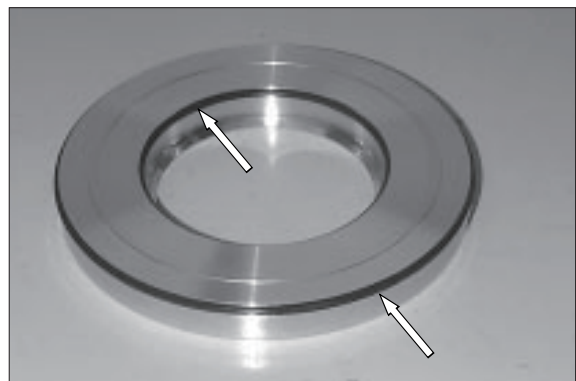


Figure 131

- (4) Oil the O-rings and the piston contact surface.
Install K3 piston equally until contact.
- ※ Observe the installation position of the piston, see figure.

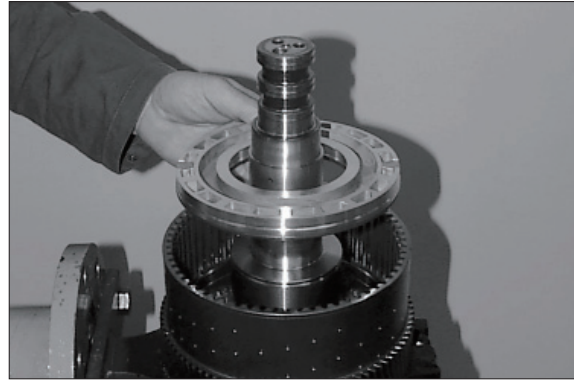


Figure 132

- (5) Install spacer and compression spring.

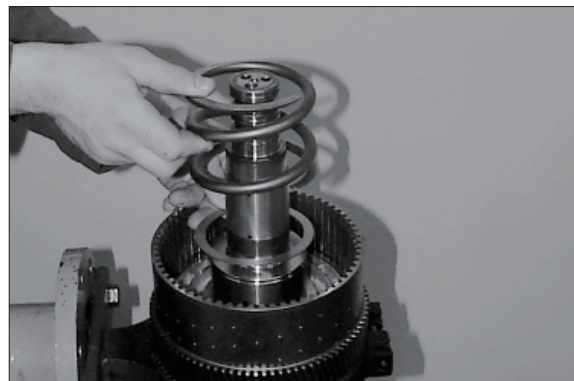


Figure 133

- (6) Place guide ring, with the chamfer (arrow) showing upwards, over the compression spring and install the snap ring.

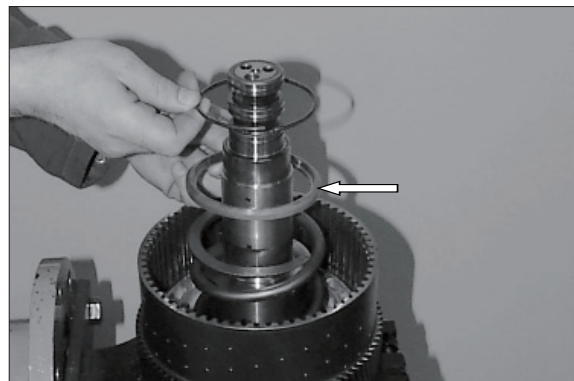


Figure 134

- (7) Lift the disc carrier out of the clamping ring. Preload the compression spring by means of fixture (S) and engage the snap ring into the annular groove of the disc carrier (arrow), see figure 135.

※ Special tool

Fixture	5870 345 072
Clamping fixture	5870 654 036

Install the drain valve, piston and compression spring on the opposite side (clutch K4) analogously (figure 130~135).

Then lift the disc carrier with the K4-side showing downwards into the clamping ring and fasten it. Rotate disc carrier by 180°.

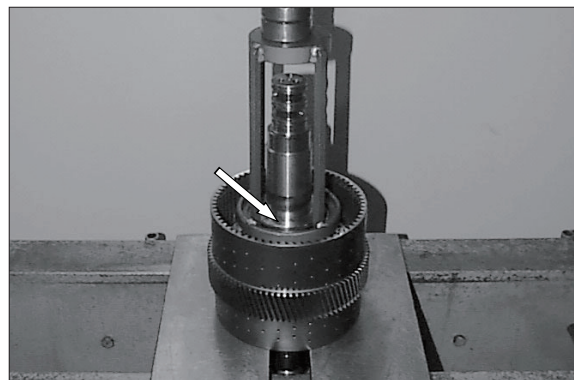


Figure 135

Disc Components K4

※ Below sketch or table shows the standard version as to the installation position of the single components. Obligatory is the respective spare parts list.

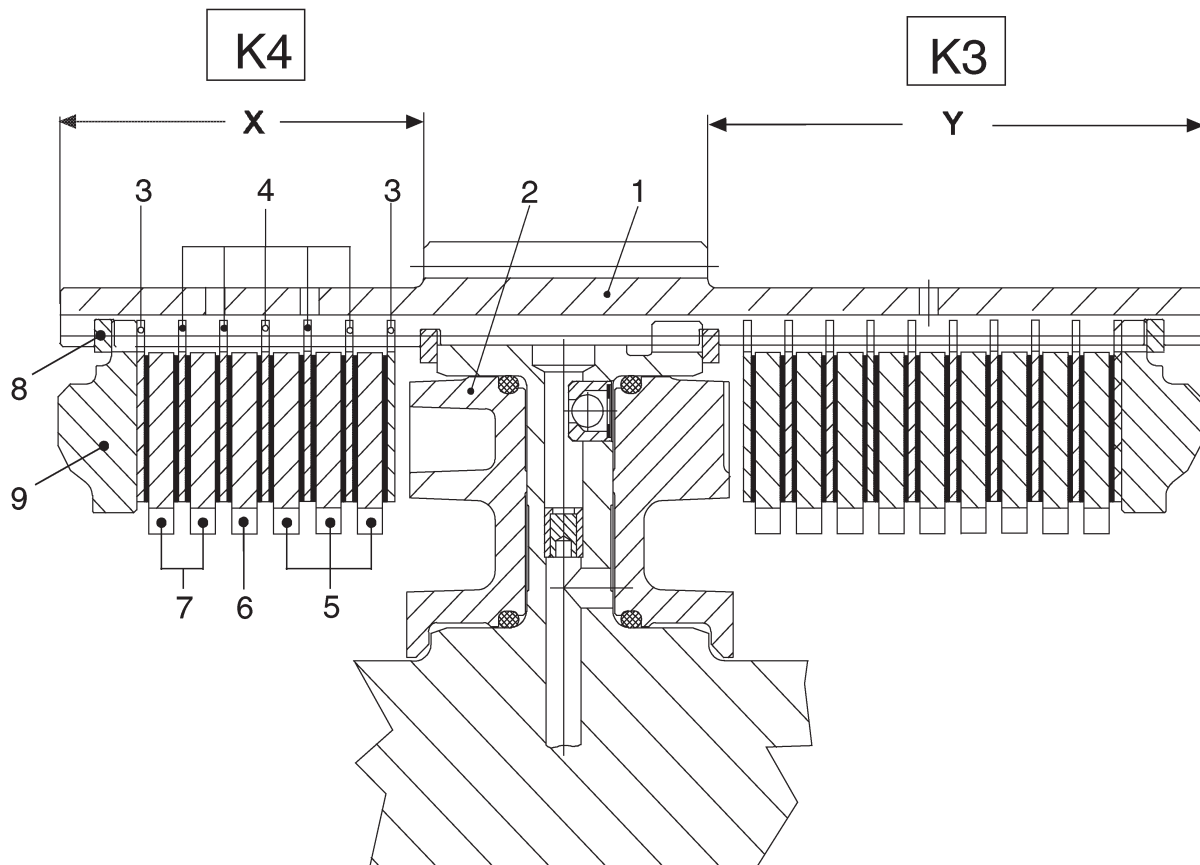


Figure 136

Position	Description	Quantity	s (mm)	Remarks
1	Disc carrier	1		
2	Piston	1		
3	Outer clutch disc	2	1.85	Coated on one side
4	Outer clutch disc	5	2.5	Coated on both sides
5	Inner clutch disc	3	3.5	
6	Inner clutch disc	1	4.0	
7	Inner clutch disc	2	2.5~4.0	Optional
8	Snap ring	1	2.10~3.10	Optional
9	End shim	1		
Number of friction surfaces : 12				
Disc clearance : 2.2 ~ 2.4 mm				

※ Install the outer clutch discs position 3 with uncoated side showing to the piston and end shim respectively. The respective clutch side can be seen on the length of the disc carrier, see sketch.

K4 Dimension X (short disc carrier side)

K3 Dimension Y (long disc carrier side)

Check disc clearance $K4=2.2\sim 2.4$ mm
(figure 137~139)

※ In order to ensure a perfect measuring result, the disc set is first of all to be installed without oil.

(1) Install disc set according to sketch or table.

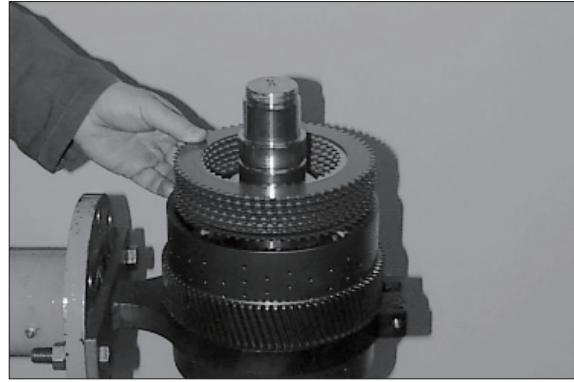


Figure137

(2) Install the end shim and fasten it by means of the snap ring.

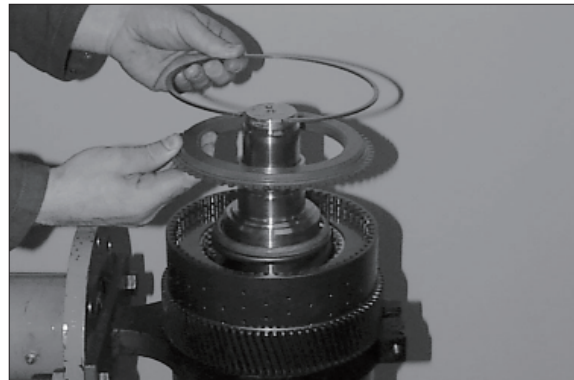


Figure138

(3) Press on end shim with approximately 100N (10 kg) and set dial indicator to "Zero".

Then press end shim against snap ring (upwards) and read disc clearance on the dial indicator.

※ If the required disc clearance differs, it has to be corrected with the adequate inner clutch disc or/and snap ring, see table/ position 7 and position 8.

Upon setting of disc clearance, remove the disc set, oil the clutch discs and reinstall them.

※ Special tool

Magnetic stand 5870 200 055

Dial indicator 5870 200 057

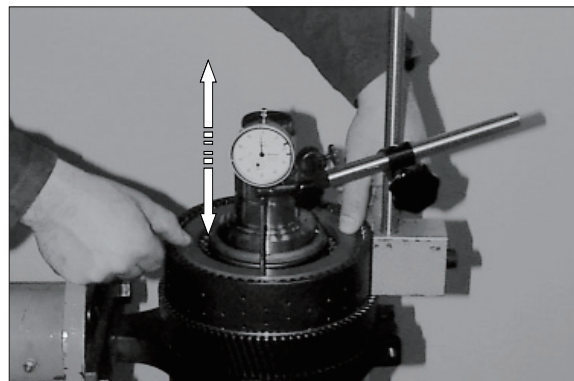


Figure139

**Preassemble and install spur gear K4
(figure 140~144) :**

(1) Opposite figure shows the single components of spur gear K4.

- 1 Bearing inner ring
- 2 Bearing outer ring
- 3 Ring
- 4 Spur gear

Locate both bearing outer rings (2) until contact.

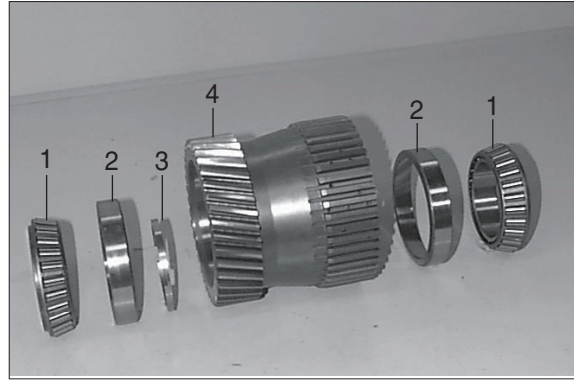


Figure140

(2) Heat the bearing inner ring and install it until contact.



Figure141

(3) Install the ring (3).

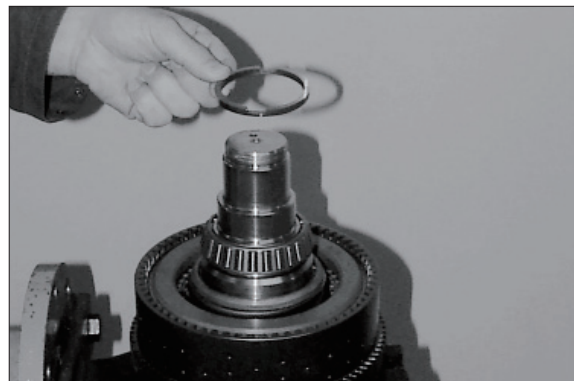


Figure142

(4) Assemble the spur gear until all inner clutch discs are located.

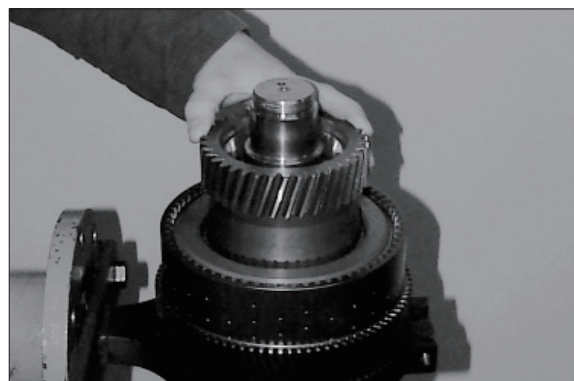


Figure143

(5) Heat the bearing inner ring (spur gear bearing) and locate it until contact.

▲ Use safety gloves.

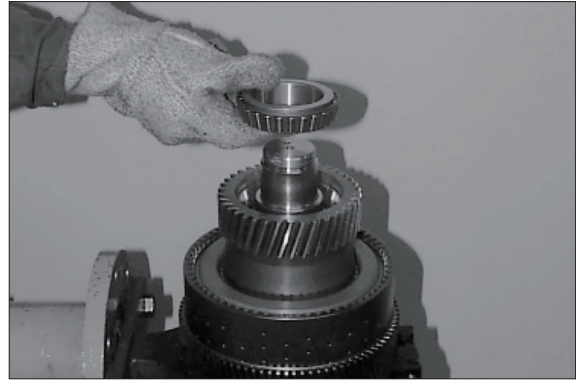


Figure144

(6) Heat the bearing inner ring (clutch bearing) and install it until contact.

▲ Use safety gloves.

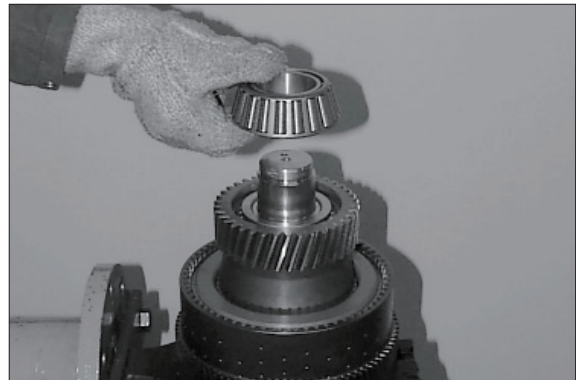


Figure145

Clutch Components K3

※ Below sketch or table shows the standard version as to the installation position of the single components. Obligatory is the respective spare parts list.

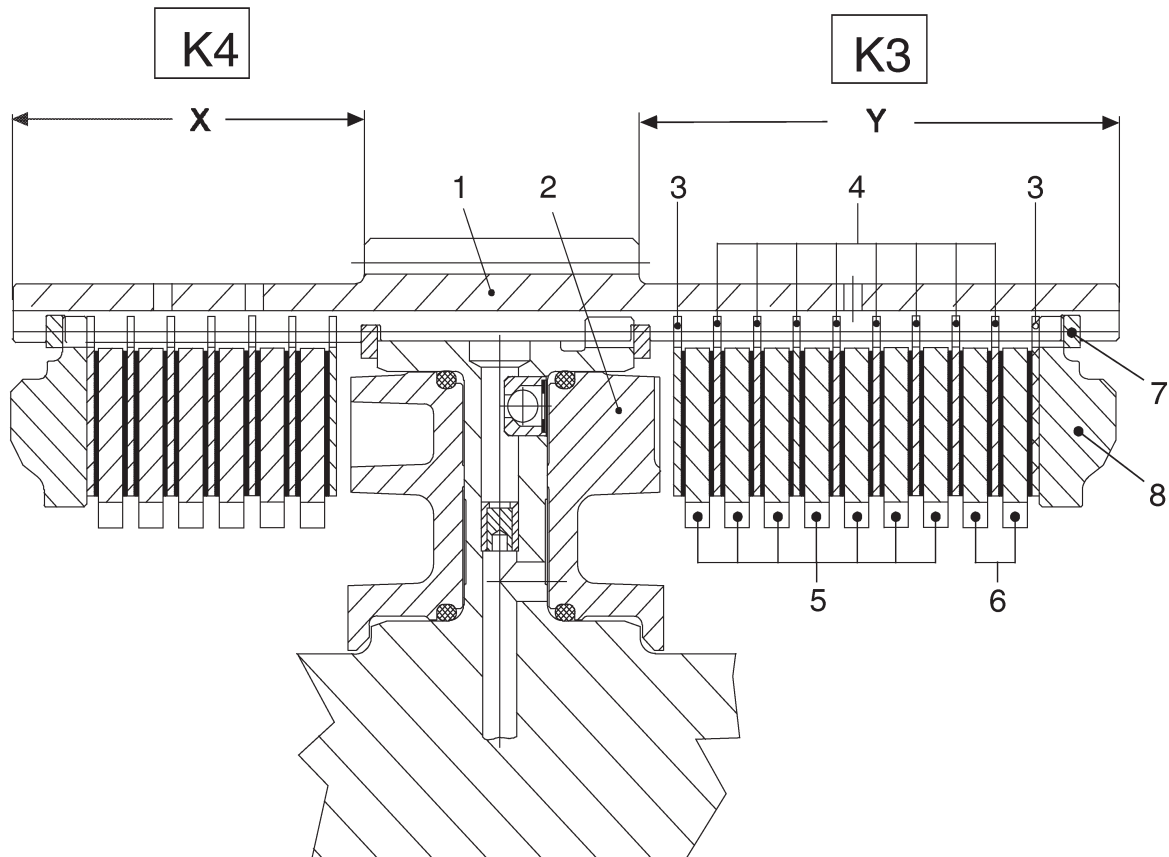


Figure146

Position	Description	Quantity	s(mm)	Remarks
1	Disc carrier	1		
2	Piston	1		
3	Outer clutch disc	2	1.85	Coated on one side
4	Outer clutch disc	8	2.5	Coated on both sides
5	Inner clutch disc	7	3.0	
6	Inner clutch disc	2	2.5~4.0	Optional
7	Snap ring	1	2.10~3.10	Optional
8	End shim	1		
Number of friction surfaces : 18				
Disc clearance : 2.6 ~ 2.8 mm				

※ Install the outer clutch discs position 3 with uncoated side showing to the piston and end shim respectively. The respective clutch side can be seen on the length of the disc carrier, see sketch.

K3 Dimension Y (long disc carrier side)

K4 Dimension X (short disc carrier side)

Check disc clearance $K3=2.6\sim 2.8$ mm
(figure 147~149)

※ In order to ensure a perfect measuring result, the disc set is first of all to be installed without oil.

(1) Install disc set according to sketch or table.

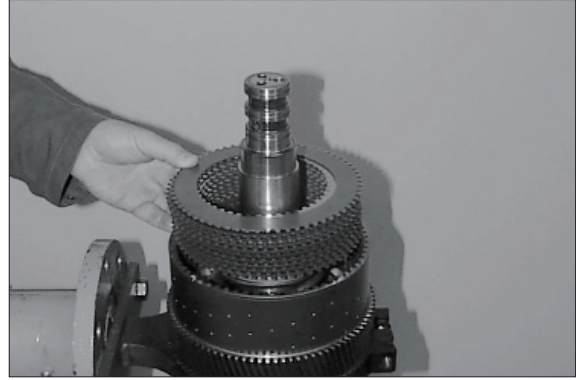


Figure 147

(2) Install the end shim and fasten it by means of the snap ring.

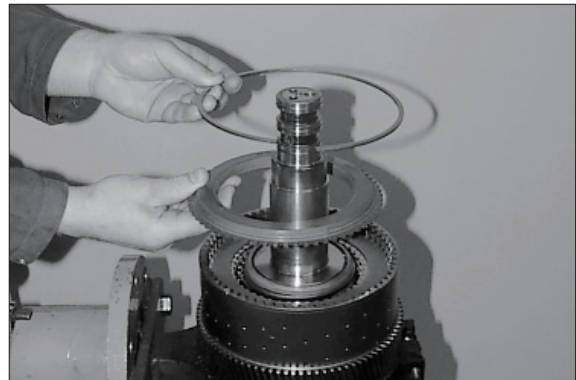


Figure 148

(3) Press on end shim with approximately 100N (10 kg) and set dial indicator to "Zero".

Then press end shim against snap ring (upwards) and read disc clearance on the dial indicator.

※ If the required disc clearance differs, it has to be corrected with the adequate inner clutch disc or/and snap ring, see table/ position 6 and position 7.

Upon setting of disc clearance, remove the disc set, oil the clutch discs and reinstall them.

※ Special tool

※ Magnetic stand 5870 200 055

Dial indicator 5870 200 057

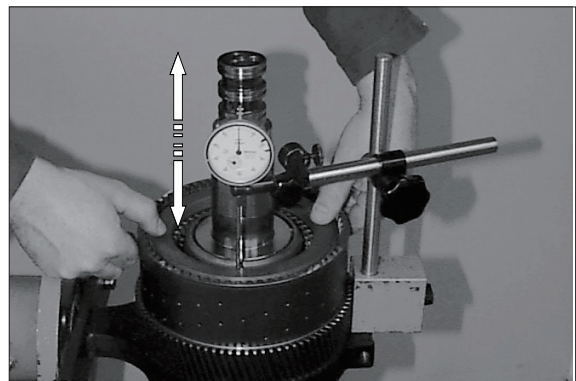


Figure 149

- (4) Heat the bearing inner ring and install it until contact.

▲ Use safety gloves.

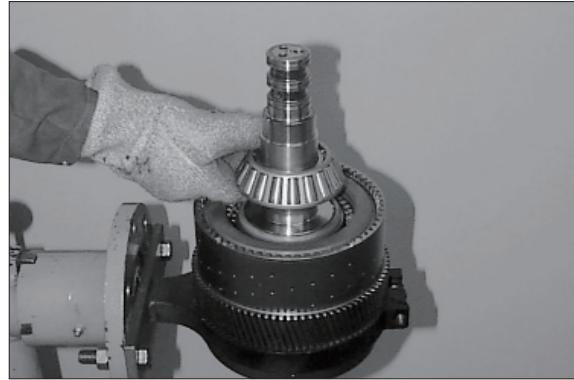


Figure 150

- (5) Lift the disc carrier out of the clamping ring (S).

To ensure the exact locating of the single components, preload the bearing with 100KN (10 t) (figure 151)

▲ Support on the lower as well as upper bearing inner ring.
Use pressure pieces (S).

※ Special tool

Pressure piece 5870 506 096

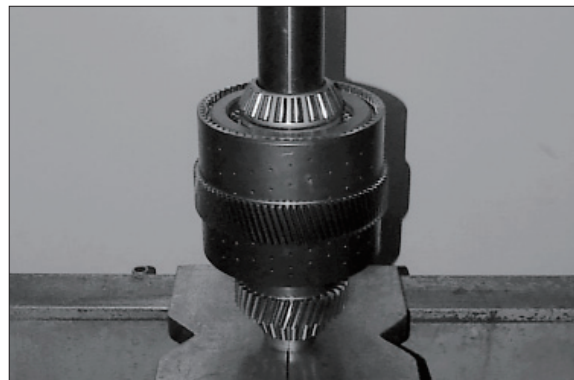


Figure 151

- (6) Lift the disc carrier with the K4-side showing downwards into the clamping ring (S) and fasten it.

Rotate disc carrier by 90°.

Install the slotted nut.

※ Observe installation position of the slotted nut. Collar (∅ 60 mm) must show to the bearing inner ring, also see sketch (Figure 127). Oil the thread.

· Tightening torque : 56.1 kgf · m (406 lbf · ft)

※ Special tool

Clamping ring 5870 654 033

Slotted nut wrench 5870 401 118

Slotted nut wrench 5870 401 115

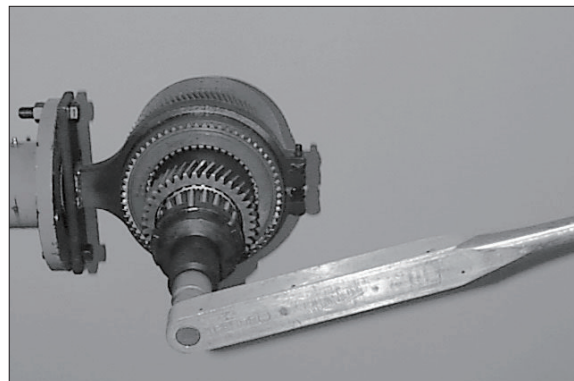


Figure 152

- (7) Install the bearing outer ring into spur gear K3 until contact.

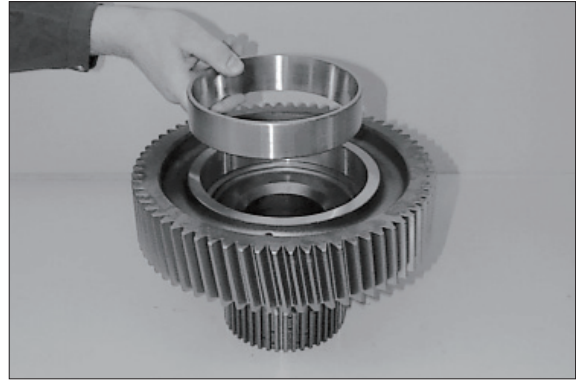


Figure 153

- (8) Assemble the spur gear until all inner clutch discs are located.

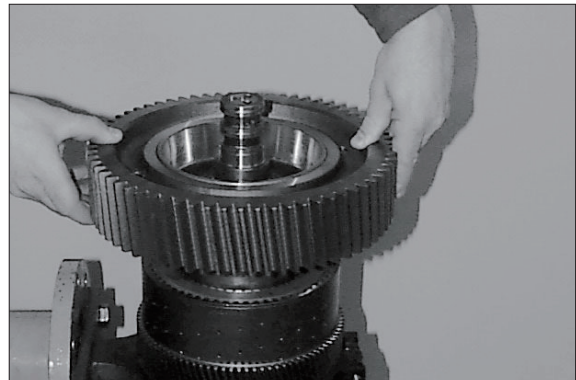


Figure 154

- (9) Heat the roller bearing and locate it until contact.

▲ Use safety gloves.

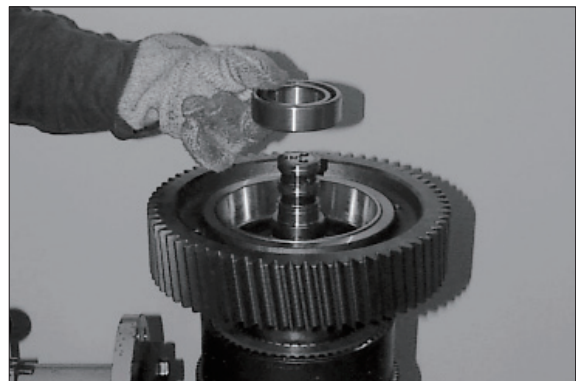


Figure 155

- (10) Install the bearing inner ring.

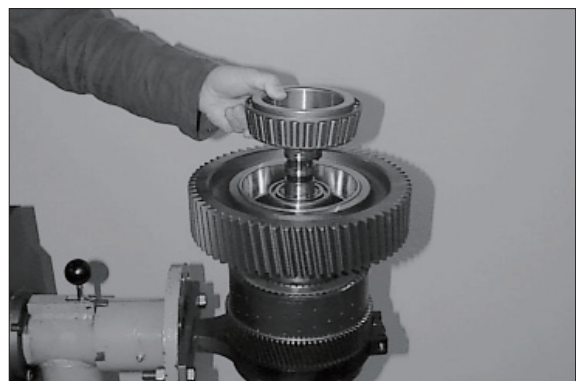


Figure 156

(11) Check function of the clutches K3 and K4 by means of compressed air.

※ Closing or opening of the clutches is clearly audible when the single parts have been installed adequately.

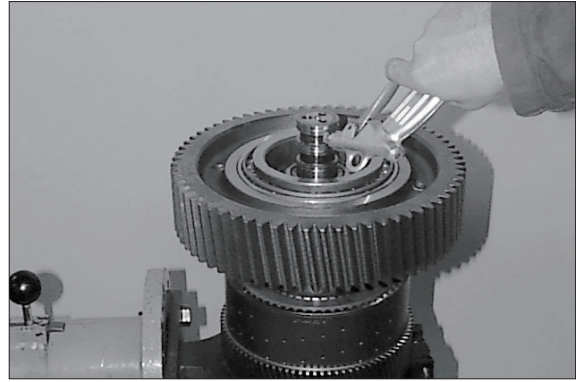


Figure 157

(12) Snap-in and lock the rectangular rings (3EA, see arrows).

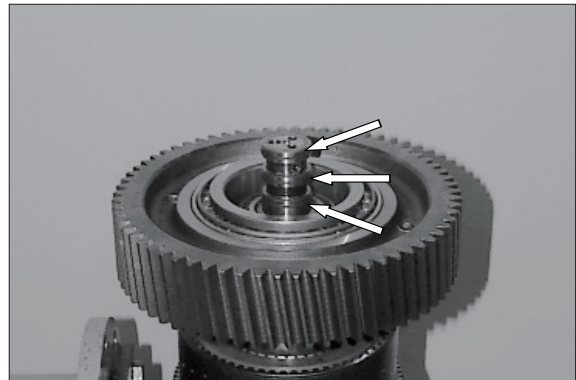


Figure 158

Assembly of the multi-disc clutch KR/K2

The following sketch shows the clutch sectioning.

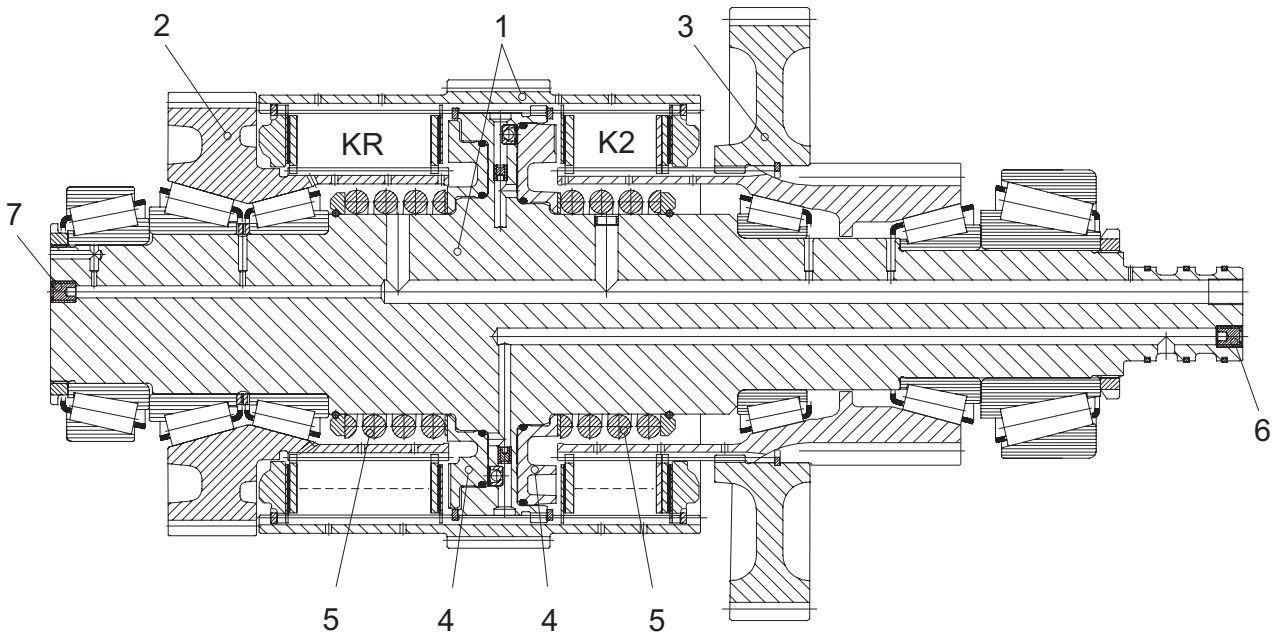


Figure159

- | | | | | | |
|---|--------------|----|----------------------|---|--------------------|
| 1 | Disc carrier | K4 | Multi-disc clutch KR | 5 | Compression spring |
| 2 | Spur gear KR | K2 | Multi-disc clutch K2 | 6 | Plug 2EA |
| 3 | Spur gear K2 | 4 | Piston | 7 | Plug 1EA |

※ Observe the installation position of the single components for the following assembly.

- (1) Lift the disc carrier with the KR-side showing downwards into the clamping ring and fasten it.
Then rotate disc carrier by 180°.

**▲ To install new disc carriers the finished bores have to be sealed with plugs.
Installation position, see arrow, figure 160~161.**

※ Special tool	
Clamping ring	5870 654 033
Hand mounting tool	5870 320 014
Ratchet	5870 320 018

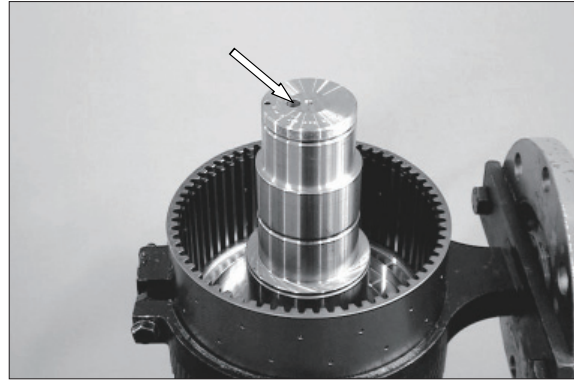


Figure 160

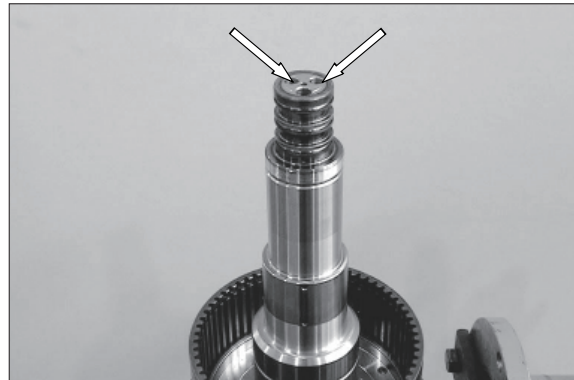


Figure 161

- (2) Flush-mount the drain valve (arrow) with the chamfer showing downwards.

※ Special tool	
Inserting tool	5870 320 019

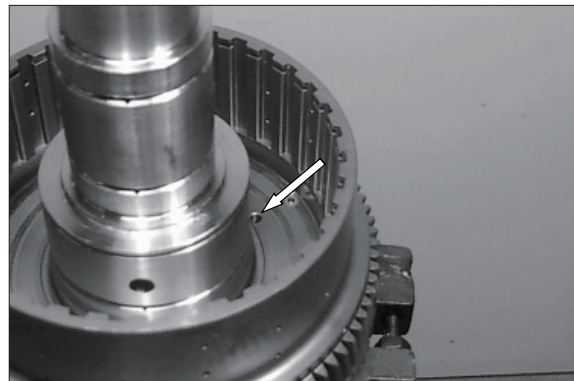


Figure 162

- (3) Put both O-rings scroll-free into the annular grooves of the piston, see arrows.

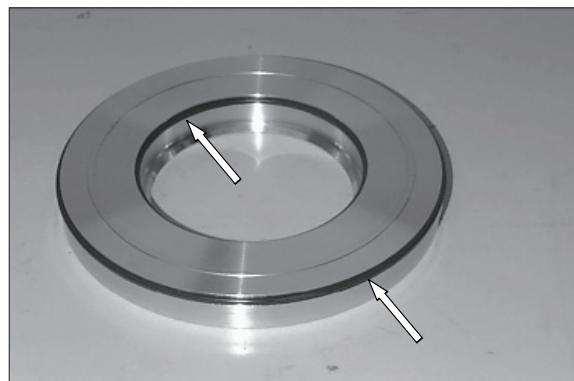


Figure 163

- (4) Oil the O-rings and the piston contact surface.
Install K2 piston equally until contact.
- ※ Observe the installation position of the piston, see figure.

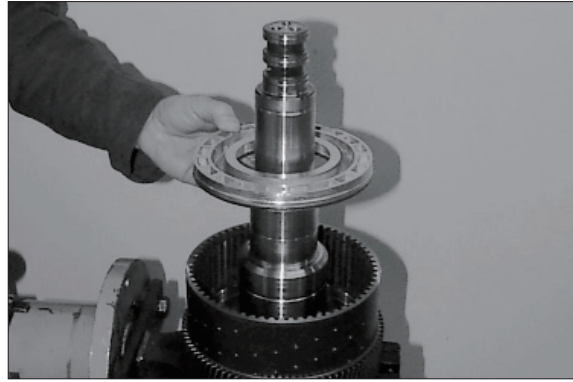


Figure 164

- (5) Install spacer and compression spring.

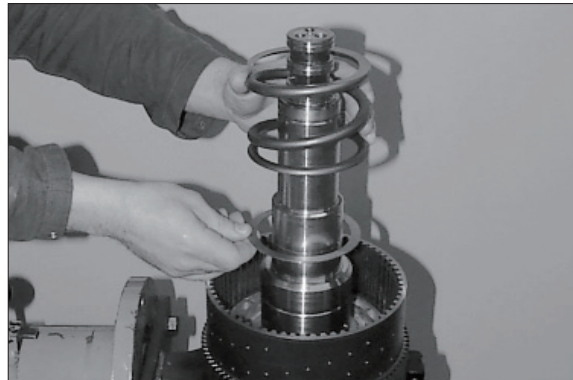


Figure 165

- (6) Place guide ring, with the chamfer (arrow) showing upwards, over the compression spring and install the snap ring.

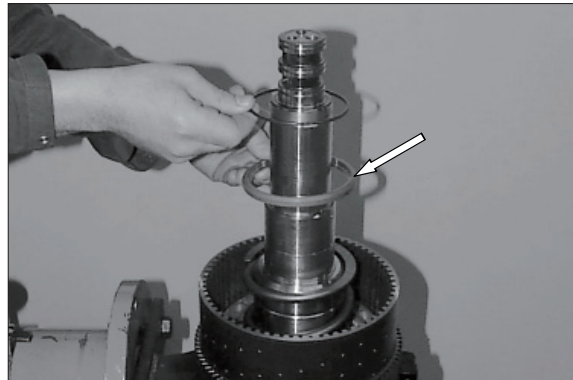


Figure 166

- (7) Lift the disc carrier out of the clamping ring. Preload the compression spring by means of fixture and engage the snap ring into the annular groove of the disc carrier (arrow), see figure 167.
Install the drain valve, piston and compression spring on the opposite side (clutch K4) analogously (like figure 162~167).
Then lift the disc carrier with the KR-side showing downwards into the clamping ring and fasten it. Rotate disc carrier by 180°.



Figure 167

- ※ Special tool
- | | |
|------------------|--------------|
| Pressure piece | 5870 345 072 |
| Clamping fixture | 5870 654 036 |

Disc Components KR

※ Below sketch or table shows the standard version as to the installation position of the single components. Obligatory is the respective spare parts list.

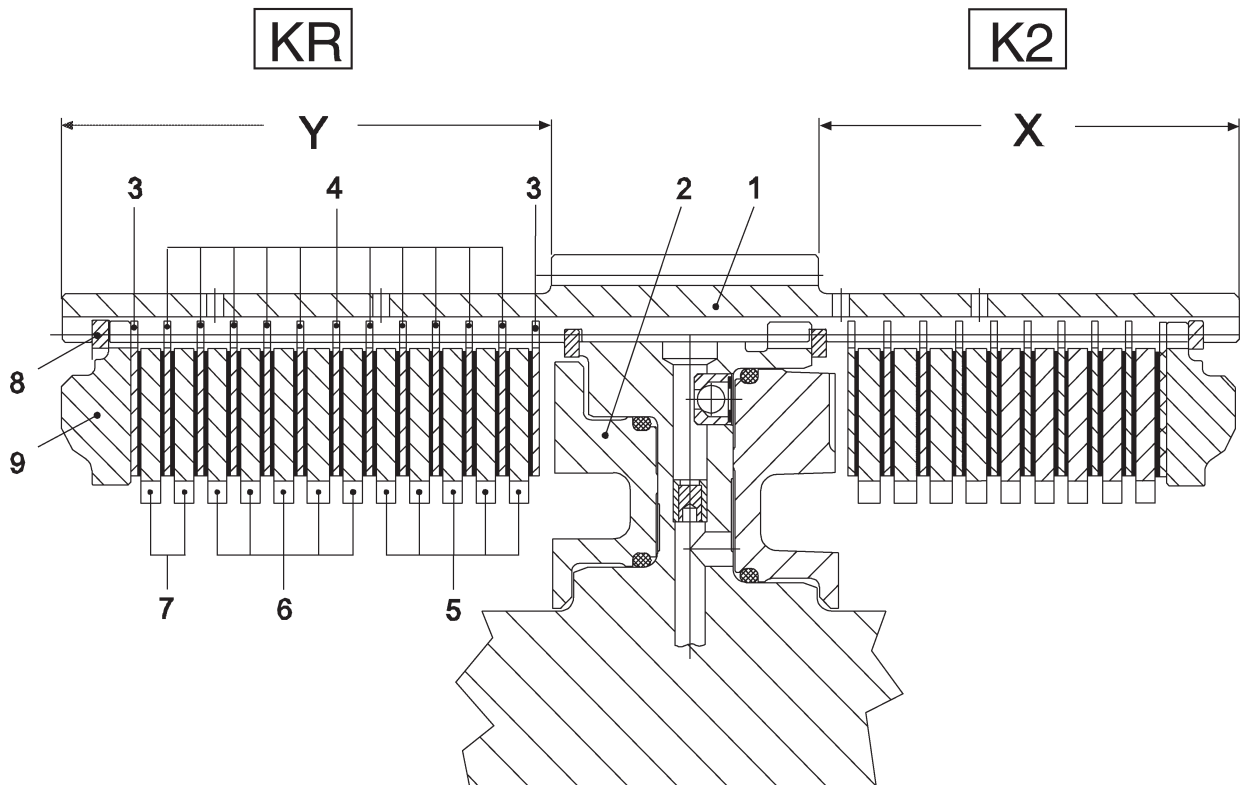


Figure 168

Position	Description	Quantity	s (mm)	Remarks
1	Disc carrier	1		
2	Piston	1		
3	Outer clutch disc	2	1.85	Coated on one side
4	Outer clutch disc	11	3.35	Coated on both sides
5	Inner clutch disc	5	2.5	
6	Inner clutch disc	5	3.0	
7	Inner clutch disc	2	2.5~4.0	Optional
8	Snap ring	1	2.10~3.10	Optional
9	End shim	1		
Number of friction surfaces : 24				
Disc clearance : 2.8 ~ 3.0 mm				

※ Install the outer clutch discs position 3 with uncoated side showing to the piston and end shim respectively. The respective clutch side can be seen on the length of the disc carrier, see sketch.

KR Dimension X (long disc carrier side)

K2 Dimension Y (short disc carrier side)

Check disc clearance KR=2.8~3.0 mm
(figure 169~171)

※ In order to ensure a perfect measuring result, the disc set is first of all to be installed without oil.

(1) Install disc set according to sketch or table.

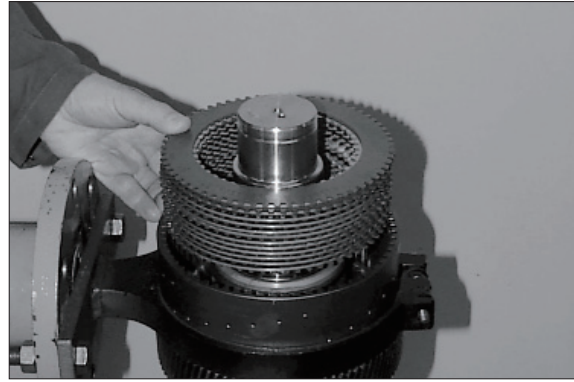


Figure 169

(2) Install the end shim and fasten it by means of the snap ring.

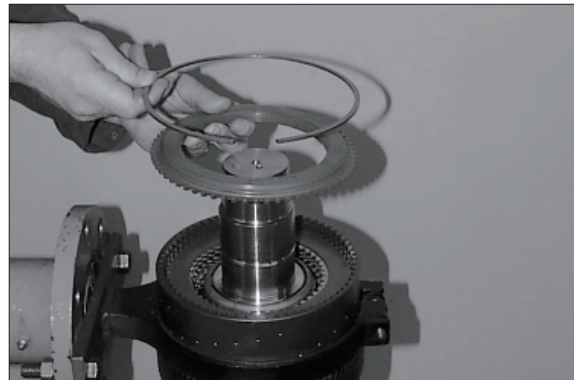


Figure 170

(3) Press on end shim with approximately 100N (10 kg) and set dial indicator to "Zero".

Then press end shim against snap ring (upwards) and read disc clearance on the dial indicator.

※ If the required disc clearance differs, it has to be corrected with the adequate inner clutch disc or/and snap ring, see table/ position 7 and Position 8.

Upon setting of disc clearance, remove the disc set, oil the clutch discs and reinstall them.

※ Special tool

Magnetic stand 5870 200 055

Dial indicator 5870 200 057

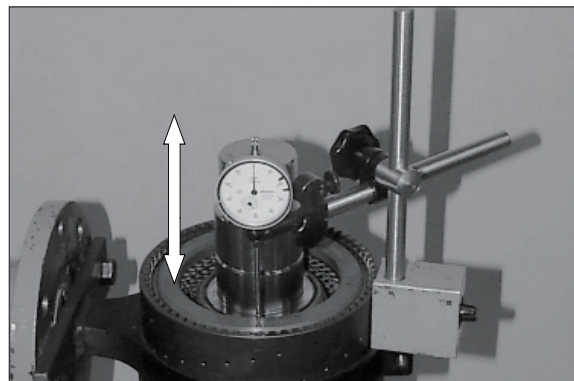


Figure 171

Preassemble and install spur gear KR (figure 172~176) :

(1) Opposite figure shows the single components of spur gear KR.

- 1 Bearing inner ring (75×37 mm)
- 2 Ring
- 3 Spur gear
- 4 Bearing inner ring (75×41 mm)

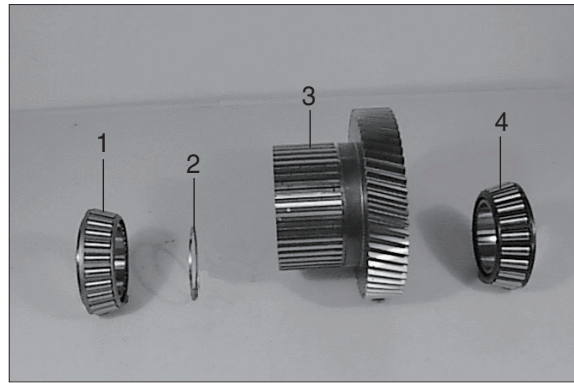


Figure 172

(2) Heat the bearing inner ring (75×37 mm) and install it until contact.

▲ Use safety gloves.

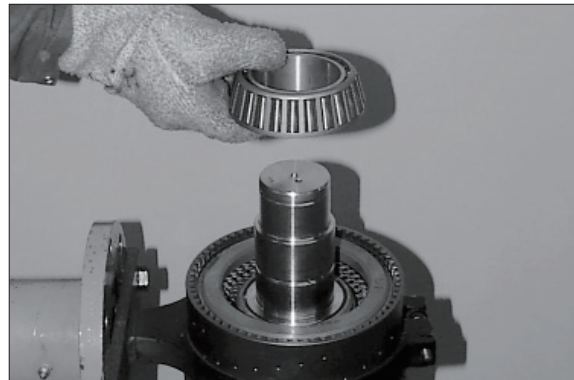


Figure 173

(3) Assemble the spur gear until all inner clutch discs are located.

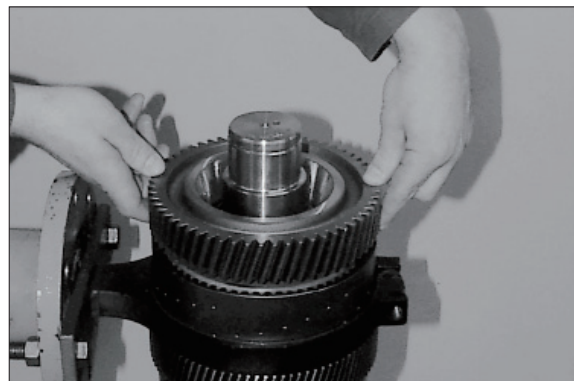


Figure 174

(4) Install the ring.

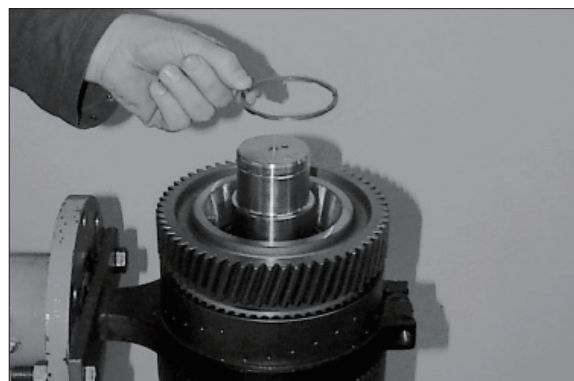


Figure 175

(5) Heat the bearing inner ring (75×41 mm) and locate it until contact.

▲ Use safety gloves.

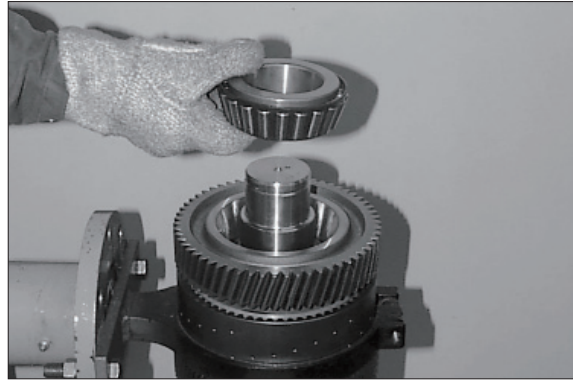


Figure 176

(6) Heat the bearing inner ring (clutch bearing) and locate it until contact.

▲ Use safety gloves.



Figure 177

Disc Components K2

※ Below sketch or table shows the standard version as to the installation position of the single components. Obligatory is the respective spare parts list.

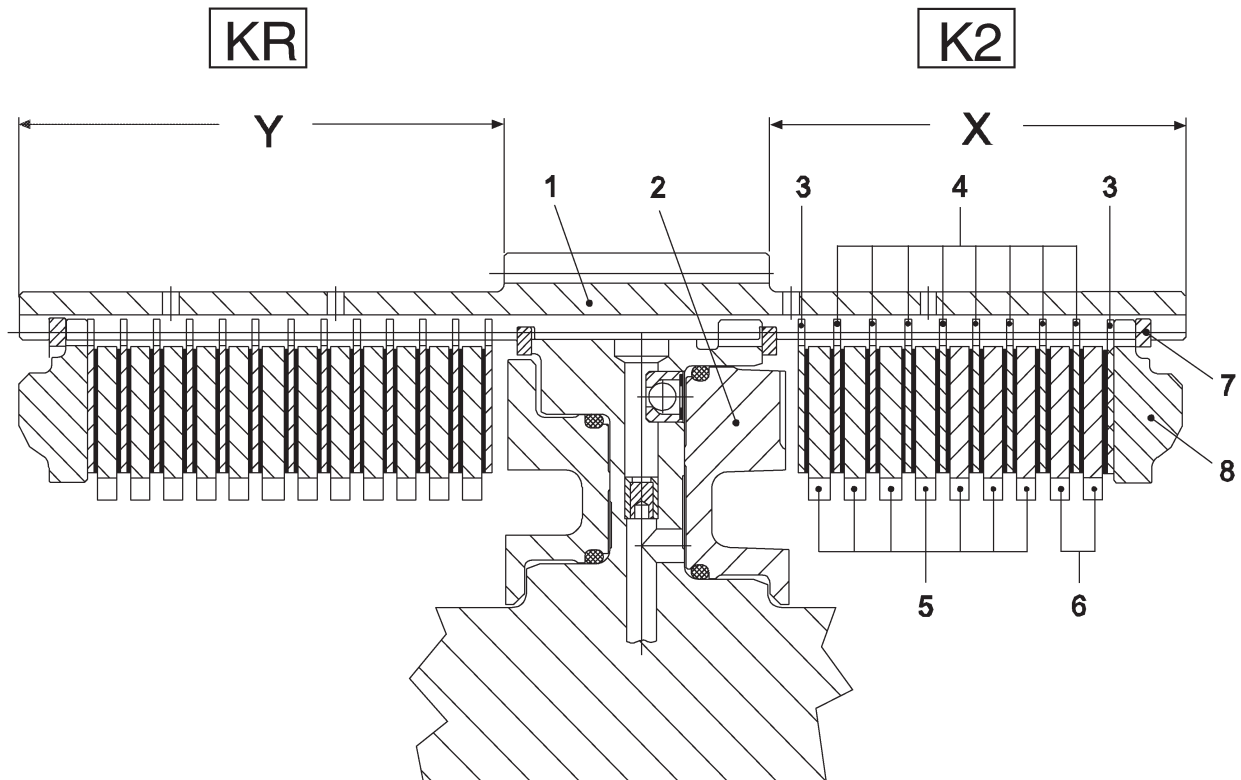


Figure 178

Position	Description	Quantity	s (mm)	Remarks
1	Disc carrier	1		
2	Piston	1		
3	Outer clutch disc	2	1.85	Coated on one side
4	Outer clutch disc	8	2.5	Coated on both sides
5	Inner clutch disc	7	3.0	
6	Inner clutch disc	2	2.5~4.0	Optional
7	Snap ring	1	2.10~3.10	Optional
8	End shim	1		
Number of friction surfaces : 18				
Disc clearance : 2.6 ~ 2.8 mm				

※ Install the outer clutch discs position 3 with uncoated side showing to the piston and end shim respectively. The respective clutch side can be seen on the length of the disc carrier, see sketch.

K2 Dimension X (short disc carrier side)

KR Dimension Y (long disc carrier side)

Check disc clearance $K2=2.6\sim 2.8$ mm
(figure 179~181)

※ In order to ensure a perfect measuring result, the disc set is first of all to be installed without oil.

(1) Install disc set according to sketch or table.

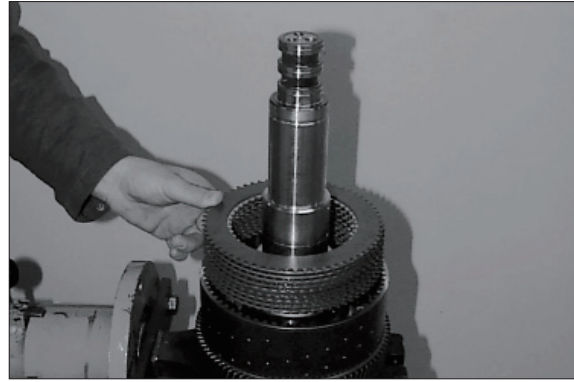


Figure 179

(2) Install the end shim and fasten it by means of the snap ring.

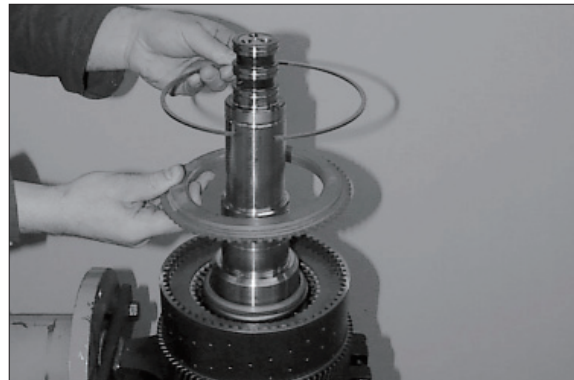


Figure 180

(3) Press on end shim with approximately 100N (10 kg) and set dial indicator to "Zero".

Then press end shim against snap ring (upwards) and read disc clearance on the dial indicator.

※ If the required disc clearance differs, it has to be corrected with the adequate inner clutch disc or/and snap ring, see table/ position 6 and position 7.

Upon setting of disc clearance, remove the disc set, oil the clutch discs and reinstall them.

※ Special tool

Magnetic stand 5870 200 055

Dial indicator 5870 200 057

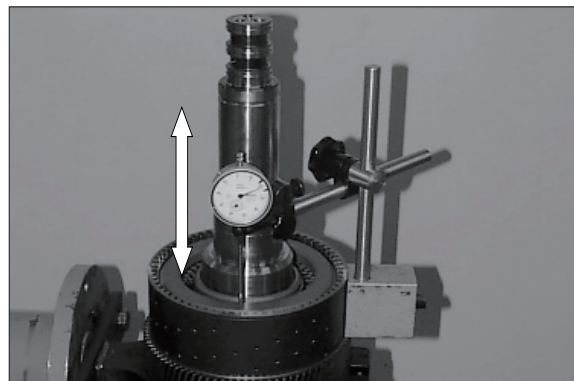


Figure 181

Preassemble and install spur gear K2 (figure182~186) :

- (1) Undercool gear 1 (approx -80°C) and heat gear 2 (approx 120°C). Engage the snap ring (arrow), preload it and join both components by means of hydraulic press until the snap ring engages into the annular groove of gear 2.

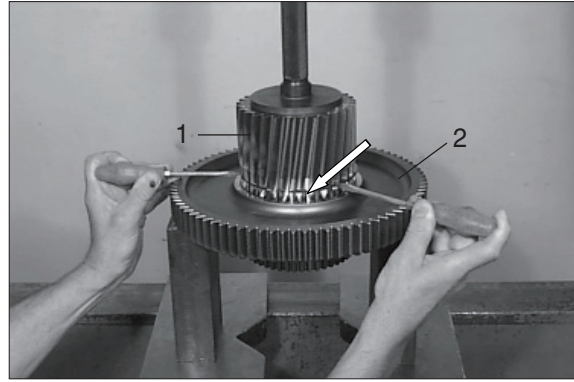


Figure 182

- (2) Opposite figure shows the single components of the spur gear bearing.

- 1 Bearing inner ring
- 2 Spur gear assy
- 3 Bearing inner ring

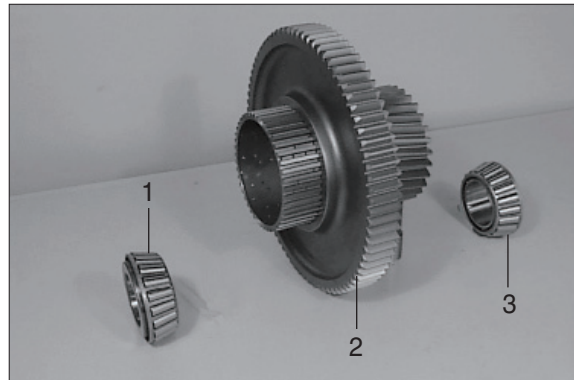


Figure 183

- (3) Heat the bearing inner ring and install it until contact.

▲ Use safety gloves.

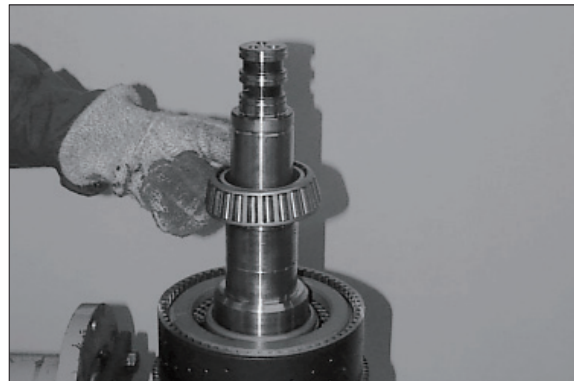


Figure 184

- (4) Assemble the spur gear until all inner clutch discs are located.

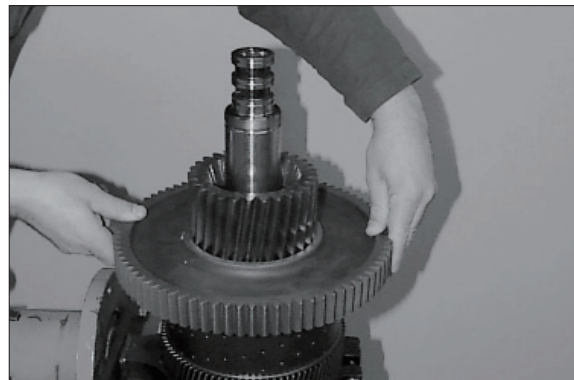


Figure 185

(5) Heat the bearing inner ring (spur gear bearing) and install it until contact.

▲ Use safety gloves.

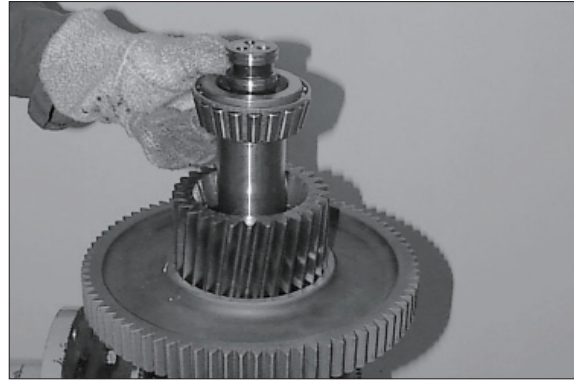


Figure 186

(6) Heat the bearing inner ring (clutch bearing) and locate it until contact.

▲ Use safety gloves.

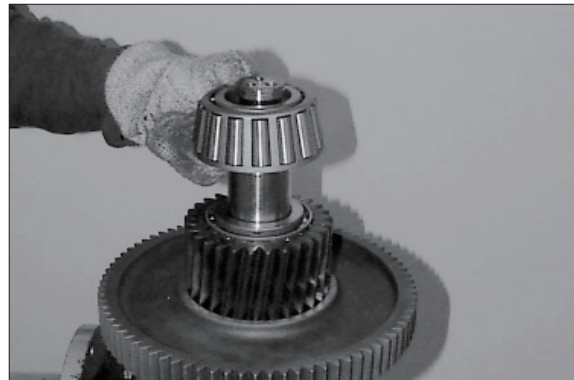


Figure 187

(7) Lift the disc carrier out of the clamping ring.

To ensure the exact locating of the single components, preload the bearing with 100 KN (10t) (figure 188)

**▲ Support on the lower as well as upper bearing inner ring.
Use pressure pieces (S).**

※ Special tool

Pressure piece

5870 506 096

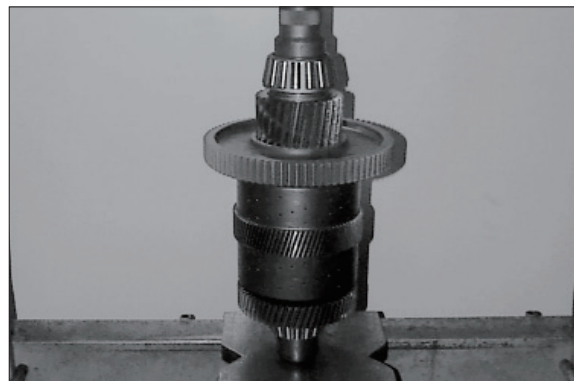


Figure 188

- (8) Lift the disc carrier into the clamping ring and fasten it.

Rotate disc carrier by 90°.

K2-side :

Install the slotted nut.

- ※ Observe installation position of the slotted nut. Chamfer must show to the bearing inner ring, also see sketch (Figure 159).

Oil the thread.

· Torque limit : 56.1 kgf · m (406 lbf · ft)

- ※ Special tool

Clamping ring 5870 654 033

Slotted nut wrench 5870 401 099

KR-side :

Install the slotted nut.

- ※ Observe installation position of the slotted nut. Collar (∅ 76 mm) must show to the bearing inner ring, also see sketch/page 3-113. Oil the thread.

· Torque limit : 56.1 kgf · m (406 lbf · ft)

- ※ Special tool

Slotted nut wrench 5870 401 099

- (9) Check function of the clutches K3 and K4 by means of compressed air (figure 191).

- ※ Closing or opening of the clutches is clearly audible when the single parts have been installed adequately.

Snap-in and lock the rectangular rings (3EA, see arrows).

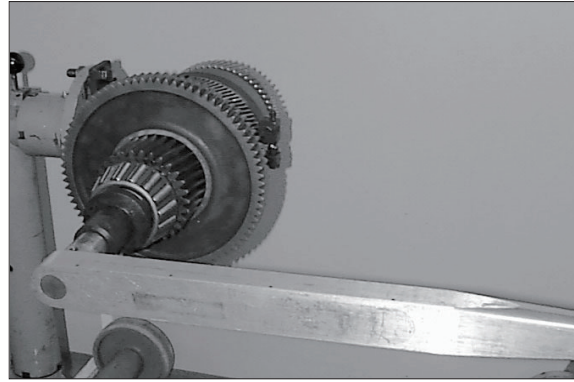


Figure 189



Figure 190

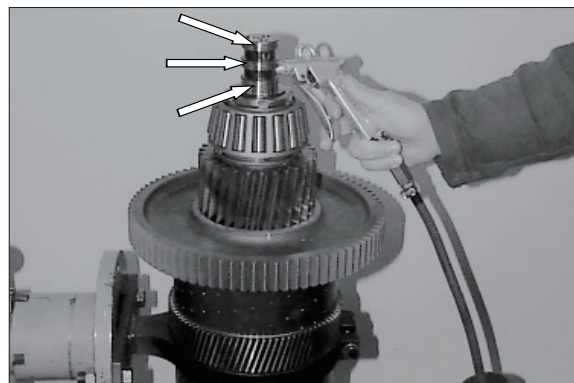


Figure 191

Assembly of the multi-disc clutch KV/K2

The following sketch shows the clutch sectioning

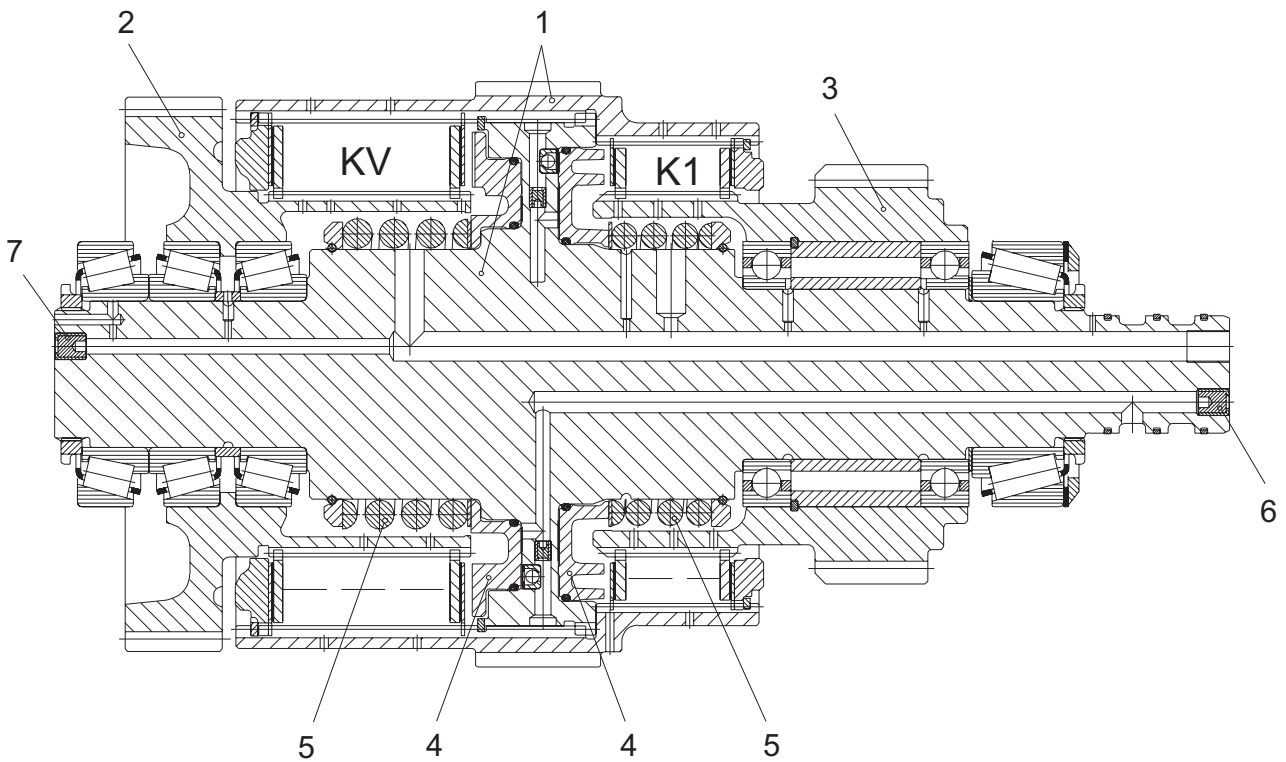


Figure 192

1	Disc carrier	KV	Multi-disc clutch KV	5	Compression spring
2	Spur gear KV	K1	Multi-disc clutch K1	6	Plug 2EA
3	Spur gear K1	4	Piston	7	Plug 1EA

※ Observe the installation position of the single components for the following assembly.

- (1) Lift the disc carrier with the KV-side showing downwards into the clamping ring(S) and fasten it.
Then rotate disc carrier by 180°.

▲ To install new disc carriers the finished bores have to be sealed with plugs. Installation position, see arrow, figure193~194.

- ※ Special tool
Hand mounting tool 5870 320 014
Ratchet spanner 5870 320 018

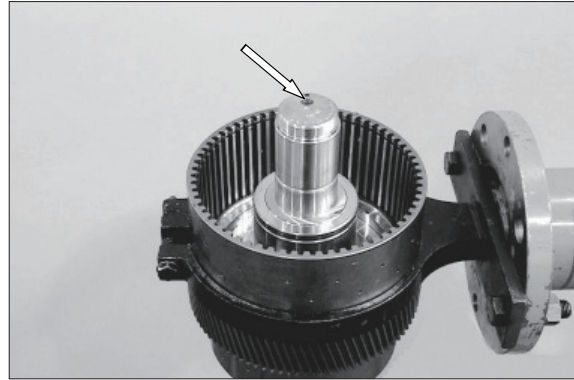


Figure 193



Figure 194

- (2) Flush-mount the drain valve (arrow) with the chamfer showing downwards.

- ※ Special tool
Inserting tool 5870 320 019

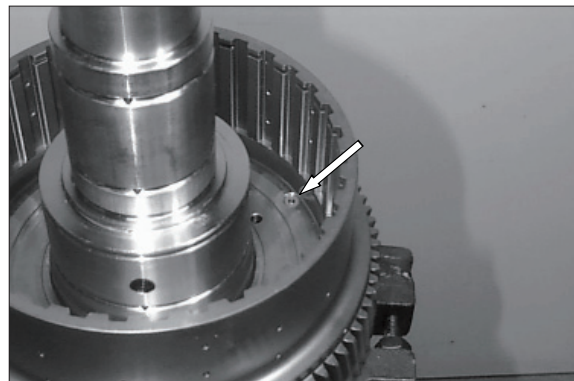


Figure 195

- (3) Put both O-rings scroll-free into the annular grooves of the piston, see arrows.

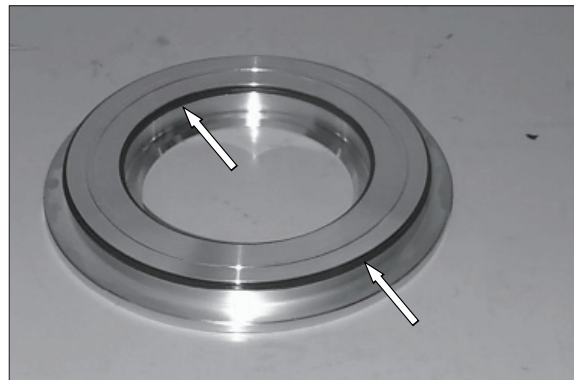


Figure 196

(4) Oil the O-rings and the piston contact surface.

Install K1 piston equally until contact.

※ Observe the installation position of the piston, see figure.

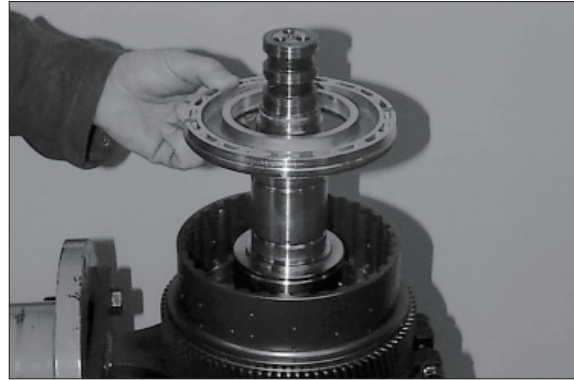


Figure 197

(5) Install spacer and compression spring.

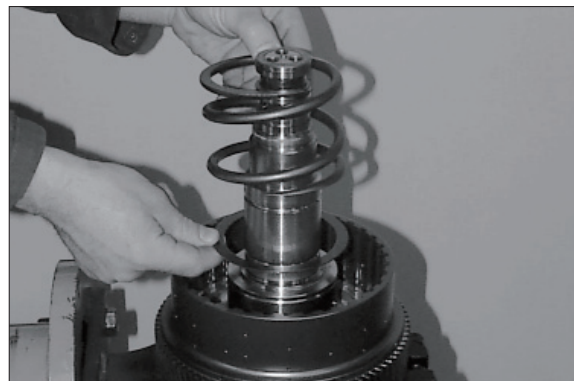


Figure 198

(6) Place guide ring, with the chamfer (arrow) showing upwards, over the compression spring and install the snap ring.

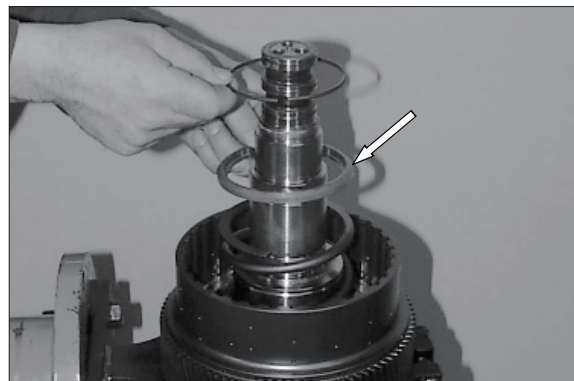


Figure 199

(7) Lift the disc carrier out of the clamping ring. Preload the compression spring by means of fixture and engage the snap ring into the annular groove of the disc carrier (arrow), see figure 200.

Install the drain valve, piston and compression spring on the opposite side (clutch KV) analogously.

Then lift the disc carrier with the KV-side showing downwards into the clamping ring and fasten it.

Rotate disc carrier by 180°.



Figure 200

※ Special tool

Pressure piece 5870 345 072

Clamping fixture 5870 654 036

Disc Components KV

※ Below sketch or table shows the standard version as to the installation position of the single components. Obligatory is the respective spare parts list.

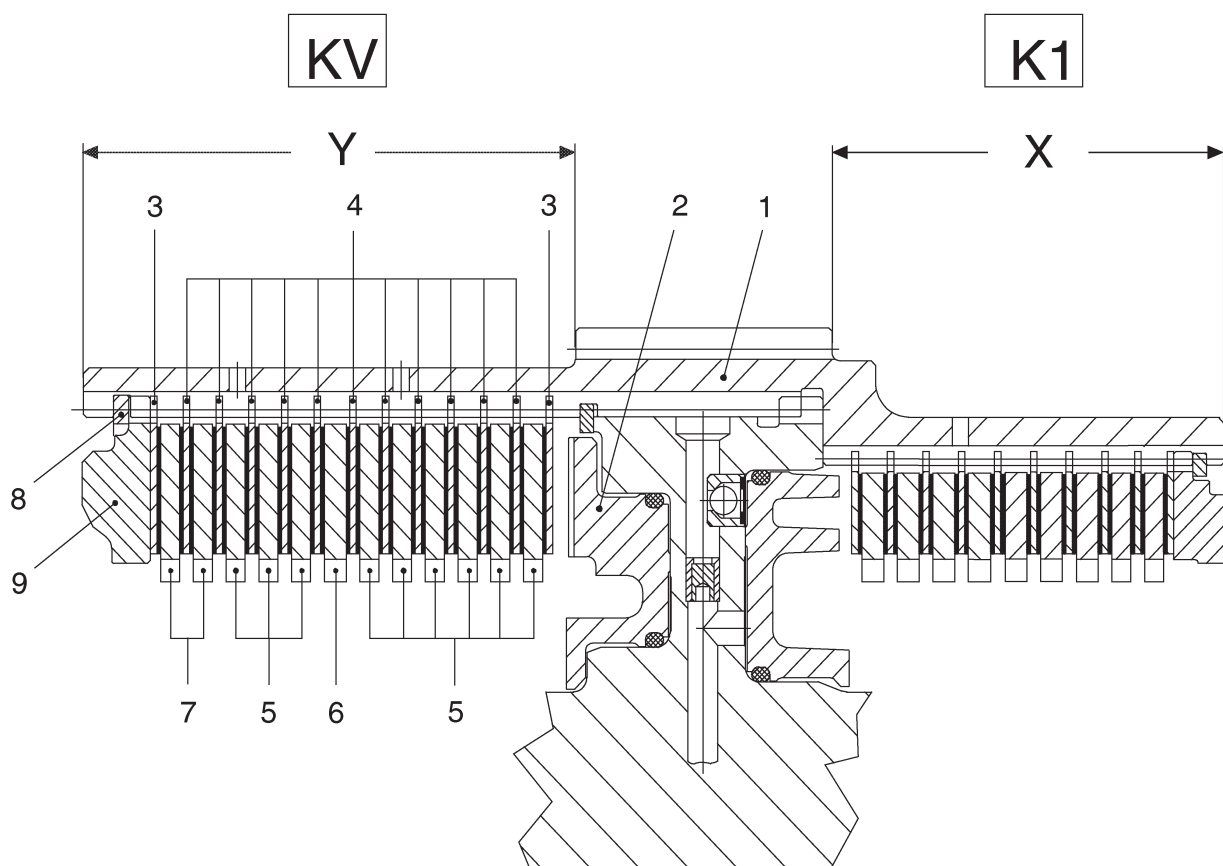


Figure 201

Position	Description	Quantity	s (mm)	Remarks
1	Disc carrier	1		
2	Piston	1		
3	Outer clutch disc	2	1.85	Coated on one side
4	Outer clutch disc	11	2.5	Coated on both sides
5	Inner clutch disc	9	3.5	
6	Inner clutch disc	1	4.0	
7	Inner clutch disc	2	2.5~4.0	Optional
8	Snap ring	1	2.10~3.10	Optional
9	End shim	1		
Number of friction surfaces : 24				
Disc clearance : 2.8 ~ 3.0 mm				

※ Install the outer clutch discs position 3 with uncoated side showing to the piston and end shim respectively. The respective clutch side can be seen on the length and \varnothing of the disc carrier respectively, see sketch.

KV Dimension Y (long disc carrier side and large \varnothing respectively)

K1 Dimension X (short disc carrier side and small \varnothing respectively)

Check disc clearance KV=2.8~3.0 mm
(figure 202~204)

※ In order to ensure a perfect measuring result, the disc set is first of all to be installed without oil.

(1) Install disc set according to sketch or table.

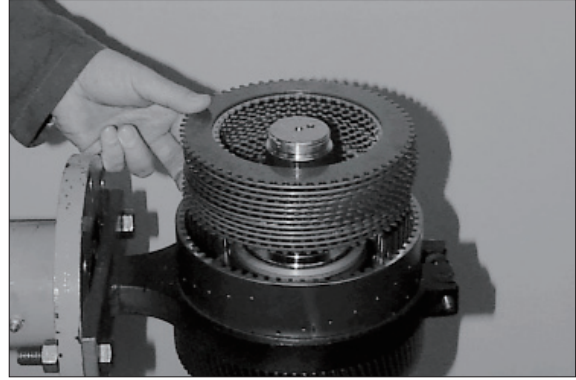


Figure 202

(2) Install the end shim and fasten it by means of the snap ring.

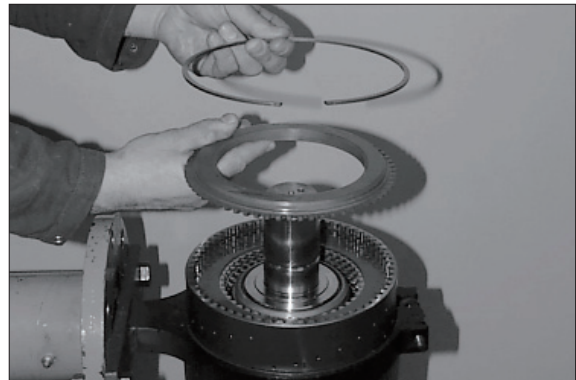


Figure 203

(3) Press on end shim with approximately 100N (10 kg) and set dial indicator to "Zero".

Then press end shim against snap ring (upwards) and read disc clearance on the dial indicator.

※ If the required disc clearance differs, it has to be corrected with the adequate inner clutch disc or/and snap ring, see table/ position 7 and position 8.

Upon setting of disc clearance, remove the disc set, oil the clutch discs and reinstall them.

※ Special tool

Magnetic stand 5870 200 055

Dial indicator 5870 200 057

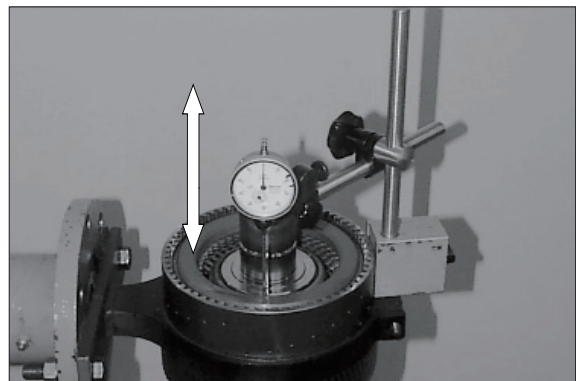


Figure 204

**Preassemble and install spur gear KV
(figure 205~209) :**

(1) Opposite figure shows the single components of spur gear KV.

- 1 Bearing inner ring
- 2 Bearing outer ring
- 3 Ring
- 4 Spur gear

Install both bearing outer rings (2) until contact.

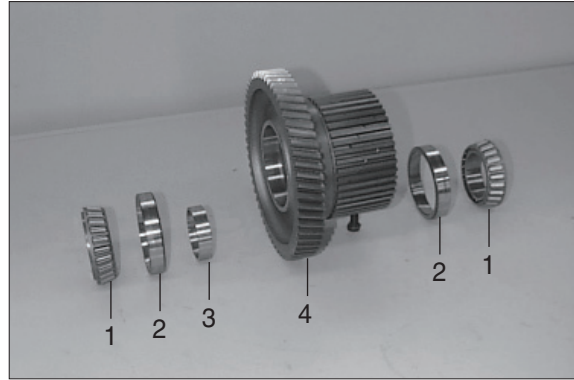


Figure 205

(2) Heat the bearing inner ring and install it until contact.

▲ Use safety gloves.

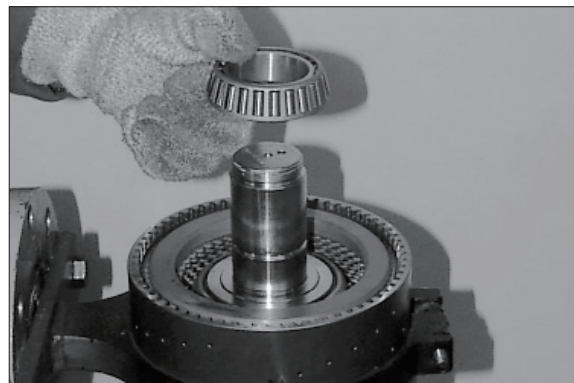


Figure 206

(3) Install the ring.

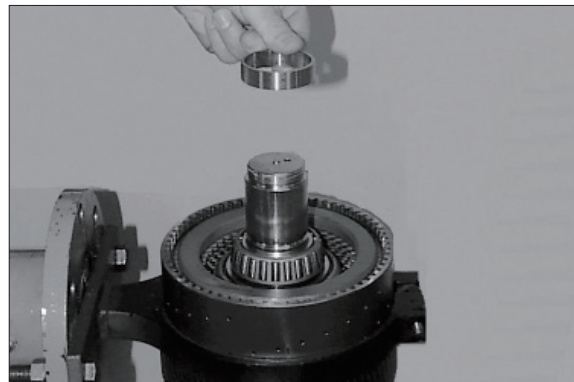


Figure 207

(4) Assemble the spur gear until all inner clutch discs are located.

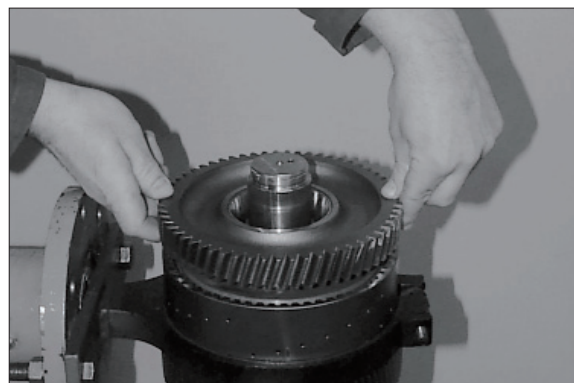


Figure 208

(5) Heat the bearing inner ring (spur gear bearing) and locate it until contact.

▲ Use safety gloves.

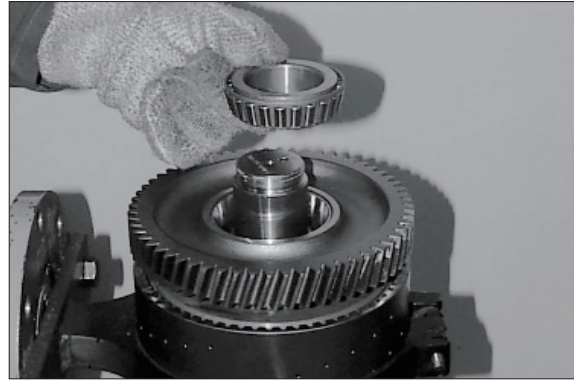


Figure 209

(6) Heat the bearing inner ring (clutch bearing) and locate it until contact.

▲ Use safety gloves.

Rotate disc carrier by 180°.

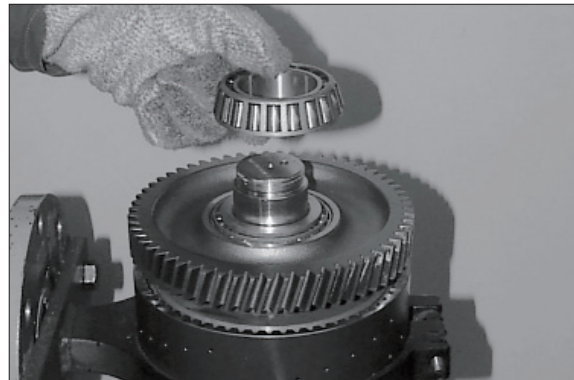


Figure 210

Disc Components K1

※ Below sketch or table shows the standard version as to the installation position of the single components. Obligatory is the respective spare parts list.

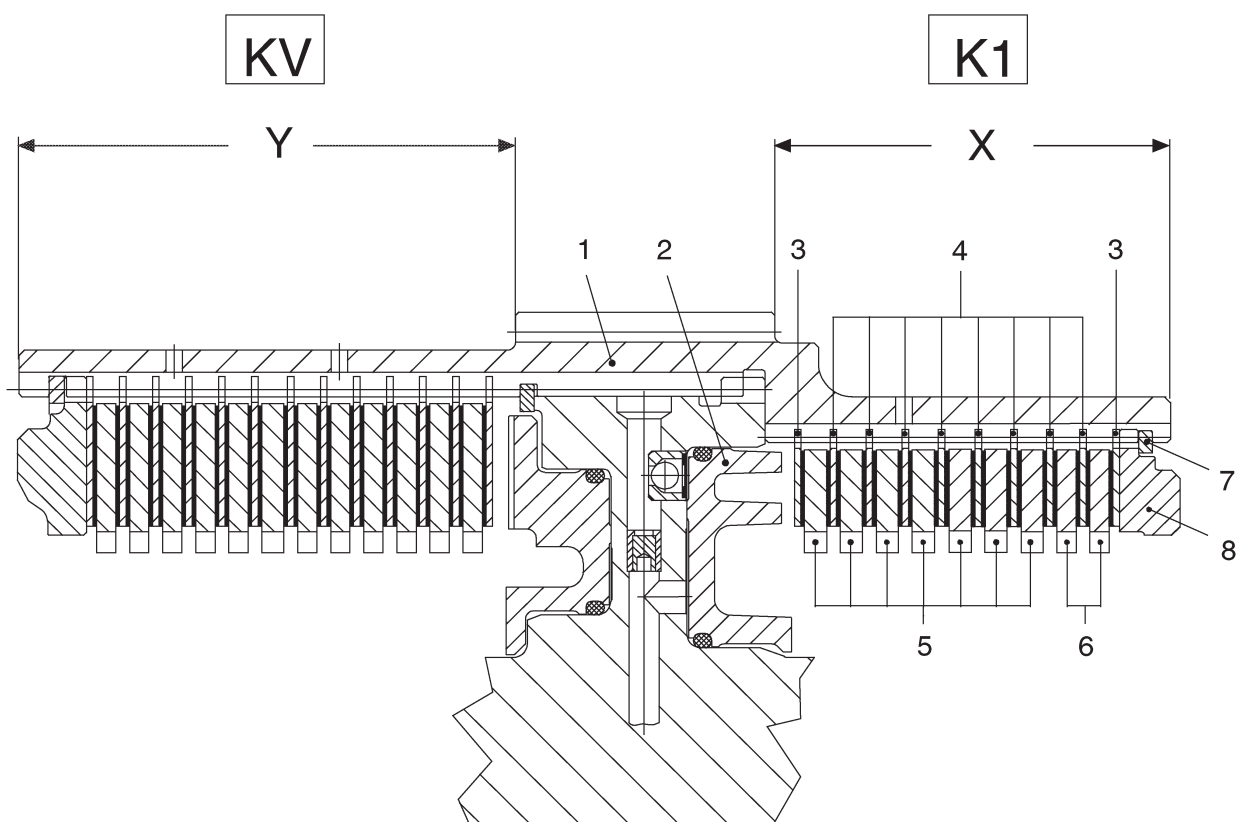


Figure 211

Position	Description	Quantity	s (mm)	Remarks
1	Disc carrier	1		
2	Piston	1		
3	Outer clutch disc	2	1.85	Coated on one side
4	Outer clutch disc	8	2.5	Coated on both sides
5	Inner clutch disc	7	2.5	
6	Inner clutch disc	2	2.5~4.0	Optional
7	Snap ring	1	2.1~2.5	Optional
8	End shim	1		
Number of friction surfaces : 18				
Disc clearance : 2.6 ~ 2.8 mm				

※ Install the outer clutch discs position 3 with uncoated side showing to the piston and end shim respectively. The respective clutch side can be seen on the length and \varnothing of the disc carrier respectively, see sketch.

K1 Dimension X (short disc carrier side and small \varnothing respectively)

KV Dimension Y (long disc carrier side and large \varnothing respectively)

Check disc clearance KV=2.6~2.8 mm
(figure 212~214)

※ In order to ensure a perfect measuring result, the disc set is first of all to be installed without oil.

(1) Install disc set according to sketch or table.

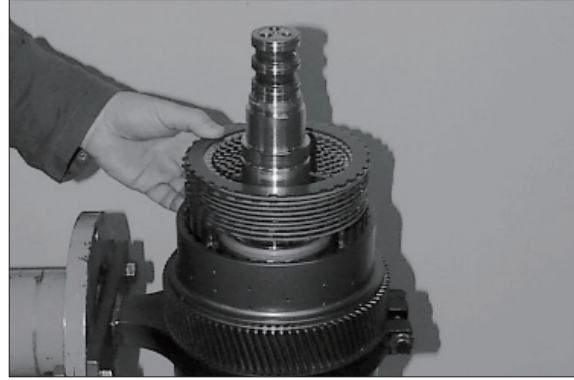


Figure 212

(2) Install the end shim and fasten it by means of the snap ring.

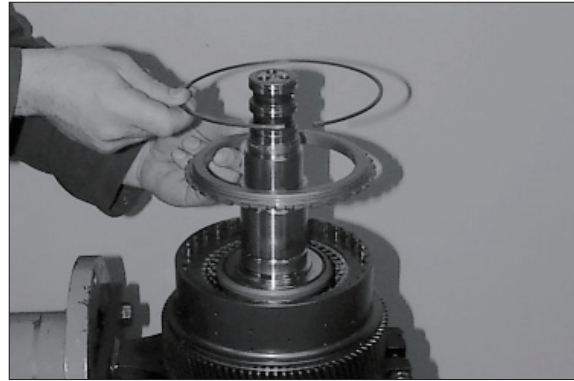


Figure 213

(3) Press on end shim with approximately 100N (10 kg) and set dial indicator to "Zero".

Then press end shim against snap ring (upwards) and read disc clearance on the dial indicator.

※ If the required disc clearance differs, it has to be corrected with the adequate inner clutch disc or/and snap ring, see table/ position 6 and position 7.

Upon setting of disc clearance, remove the disc set, oil the clutch discs and reinstall them.

※ Special tool

Magnetic stand 5870 200 055

Dial indicator 5870 200 057

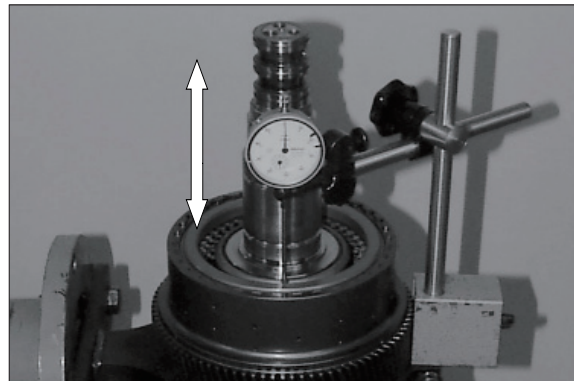


Figure 214

Preassemble and install spur gear K1 (figure 215~222) :

(1) Opposite figure shows the single components of spur gear K1.

- 1 Ball bearing (assy)
- 2 Snap ring
- 3 Spur gear

※ Prior to installation of the single components, align the disc set by means of the spur gear radially and center it, see figure 216.

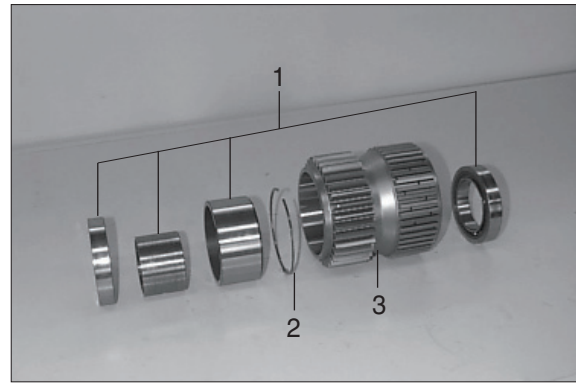


Figure 215



Figure 216

(2) Install the ring.

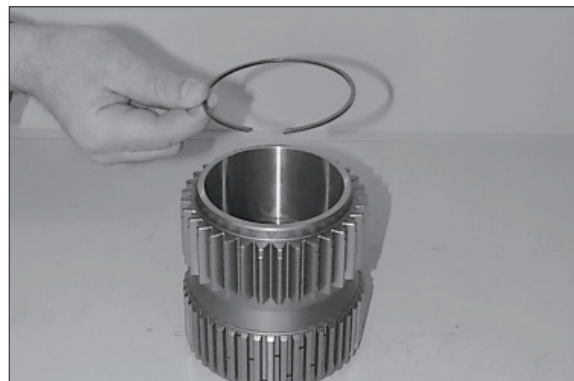


Figure 217

(3) Install the bush with collar (arrow) on face end showing to the snap ring.

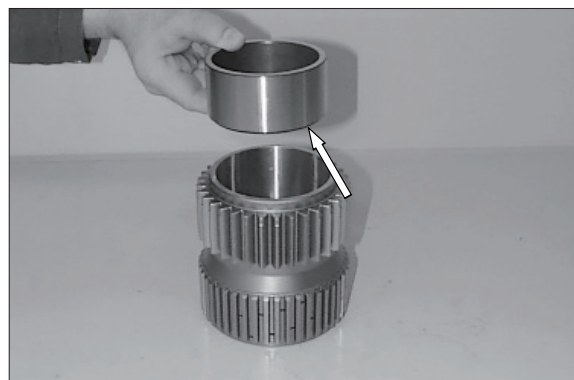


Figure 218

(4) Press in the ball bearing until contact.

- ※ Install the ball bearing with the lubricating groove (arrow) showing downwards. Put the press-in tool only to the bearing outer ring.

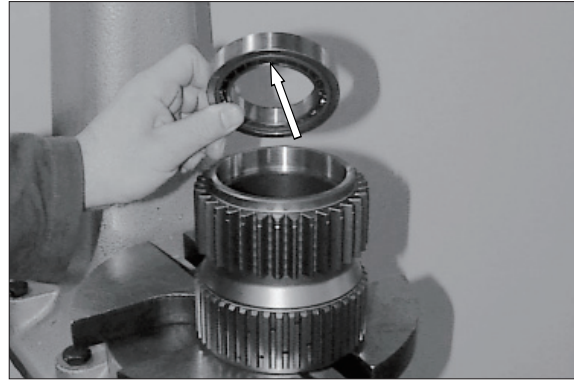


Figure 219

(5) Heat the second ball bearing and install it until contact.

- ※ Lubricating groove (arrow), must show upwards.

▲ Use safety gloves.



Figure 220

(6) Assemble the bush.

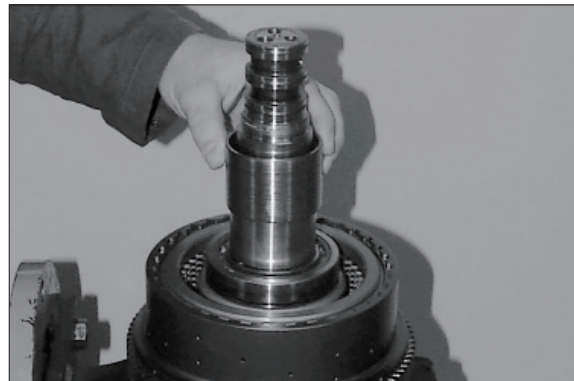


Figure 221

(7) Heat the spur gear to approximately 120°C and assemble it until all inner clutch discs are located.

▲ Use safety gloves.

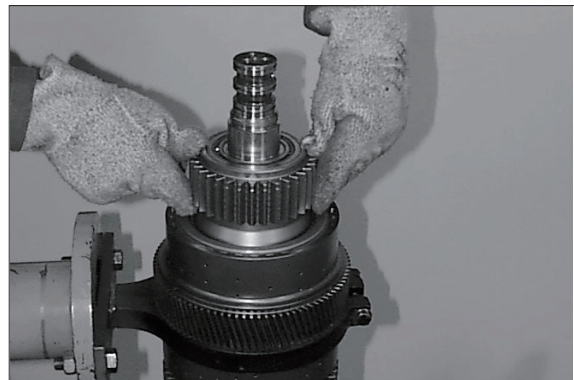


Figure 222

(8) Install shim $s = 1.20 \text{ mm}$

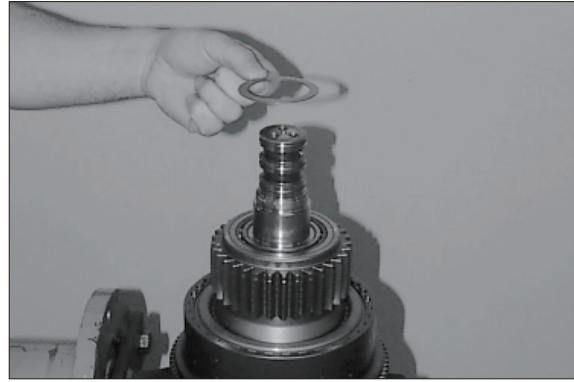


Figure 223

(9) Heat the bearing inner ring and install it until contact.

▲ Use safety gloves.



Figure 224

(10) Lift the disc carrier out of the clamping ring (S). To ensure the exact locating of the single components, preload the bearing with 100KN (10 t) (figure 225).

**▲ Support on the lower as well as upper bearing inner ring.
Use pressure pieces (S).**

※ Special tool

Pressure pieces

5870 506 096

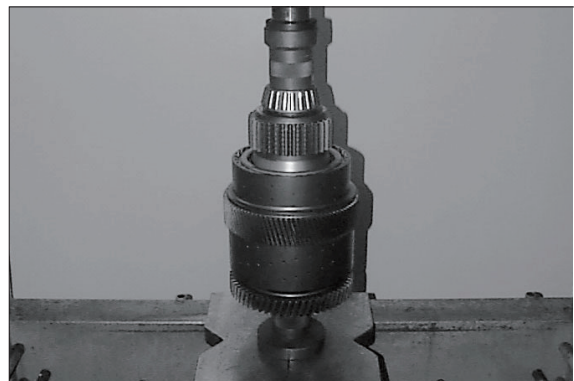


Figure 225

(11) Lift the disc carrier into the clamping ring (S). Rotate disc carrier by 90°. Install the slotted nut.

※ Observe installation position of the slotted nut. Collar (\varnothing 60 mm) must show to the taper roller bearing also see sketch (Figure 192). Oil the thread.

· Torque limit : 56.1 kgf · m (406 lbf · ft)

※ Special tool

Slotted nut wrench 5870 401 118

Slotted nut wrench 5870 401 099

Install the opposite slotted nut (KV-side) analogously.

※ Special tool

Slotted nut wrench 5870 401 118

Slotted nut wrench 5870 401 115

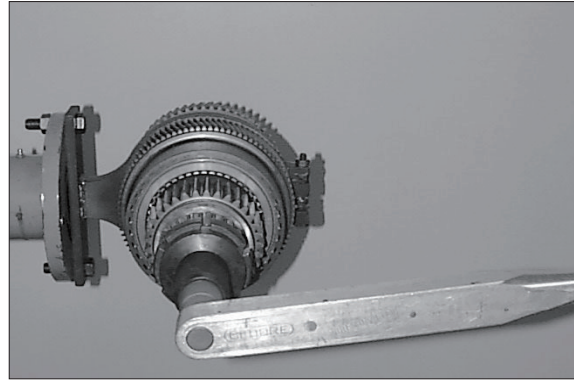


Figure 226

(12) Check function of the clutches KV and K1 by means of compressed air.

※ Closing or opening of the clutches is clearly audible when the single parts have been installed adequately.



Figure 227

(13) Snap-in and lock the rectangular rings (3EA, see arrows).



Figure 228

Installation of layshaft gear, multi-disc clutches and output gear

(1) Opposite figure shows the single components of the layshaft gear bearing.

- 1 Bearing inner ring (2EA)
- 2 Ring
- 3 Layshaft gear

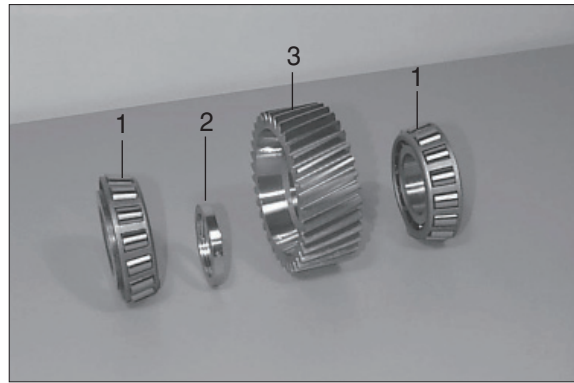


Figure 229

(2) Position layshaft gear (assy) in the housing.

※ Only when the clutches are installed, the idler shaft can be mounted.

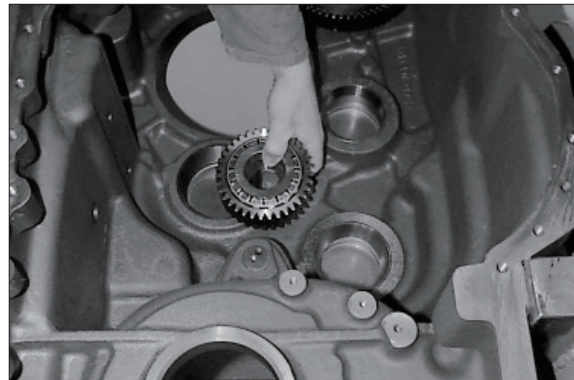


Figure 230

(3) Insert the bearing outer rings KV/K1, KR/K2 and K3/K4 into the housing bores until contact, see arrows.

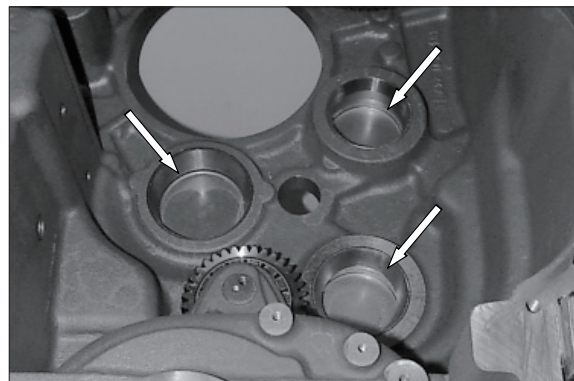


Figure 231

(4) Position clutch KV/K1 by means of lifting tackle.

※ Special tool
Eyebolts assortment 5870 204 002

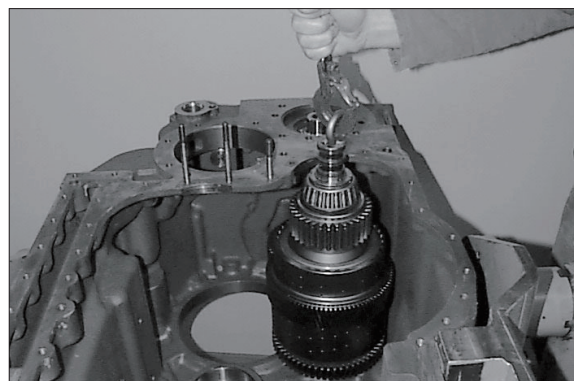


Figure 232

(5) Position clutch KR/K2.

- ※ Special tool
Eyebolts assortment 5870 204 002

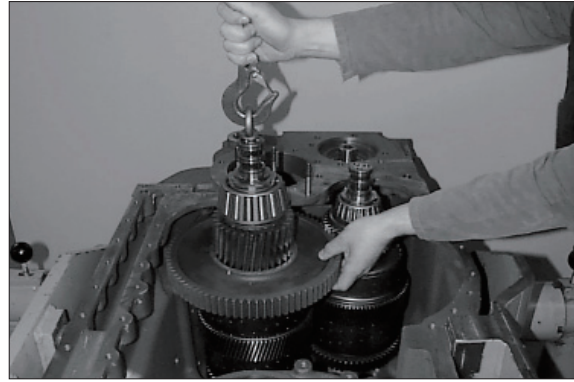


Figure 233

(6) Check the installation position of the layshaft gear (arrow) once again and correct it, if required.

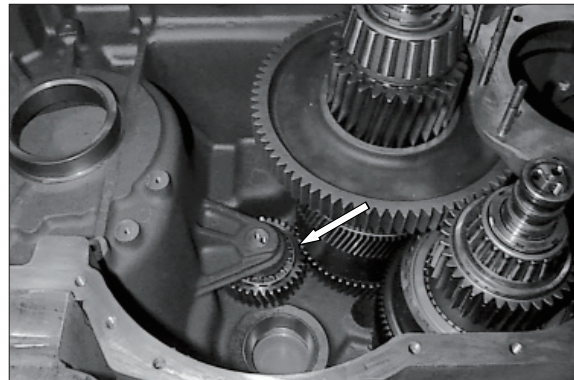


Figure 234

(7) Fasten the spur gear K3 by means of fixture and eyebolt (arrow) axially.

- ※ Spur gear fixing prevents the clutch discs from dislocating when the clutch is lifted in.
- ※ Special tool
Assembly fixture 5870 345 033
Eyebolt 5870 204 066



Figure 235

(8) Lift the clutch KR/K2 slightly, move it in direction of the arrow and position clutch K3/K4.

Then remove the fixture (figure 235) again.

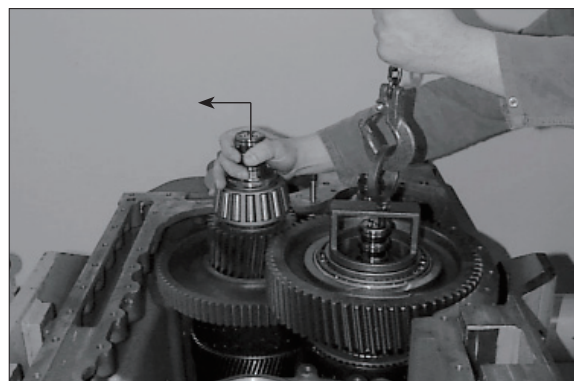


Figure 236

(9) Insert the bearing outer ring into the housing bore until contact.

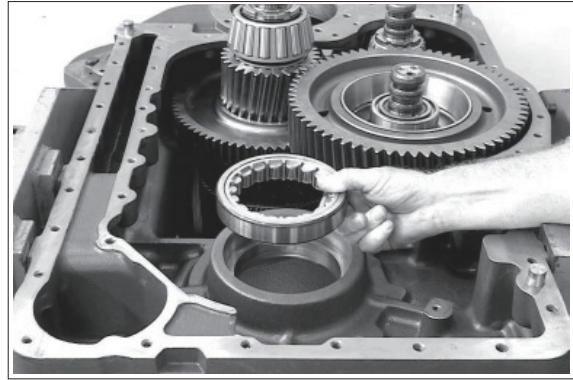


Figure 237

(10) Heat the bearing inner ring and install it until contact.

▲ Use safety gloves.

※ Observe installation position-collar (arrow) shows to the spur gear. Install the bearing inner ring after cooling down subsequently (press).



Figure 238

(11) Position the oil baffle.

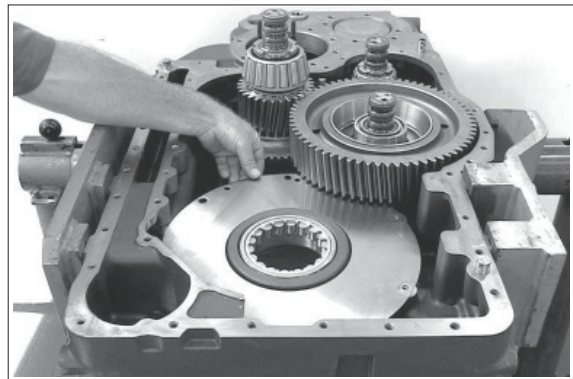


Figure 239

(12) Install the output gear by means of lifting tackle.

※ Special tool
Stop washer 5870 100 054
Eyebolts assortment 5870 204 002

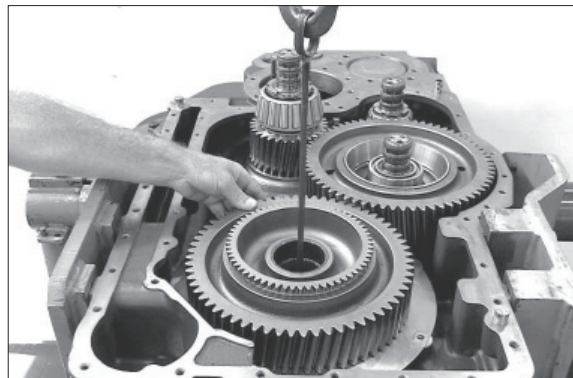


Figure 240

(13) Position upper oil baffle and fasten both plates by means of hexagon screws (4EA).

※ Install washers.

Secure hexagon screws with loctite (type No.243).

· Torque limit : 2.35 kgf · m (16.7 lbf · ft)

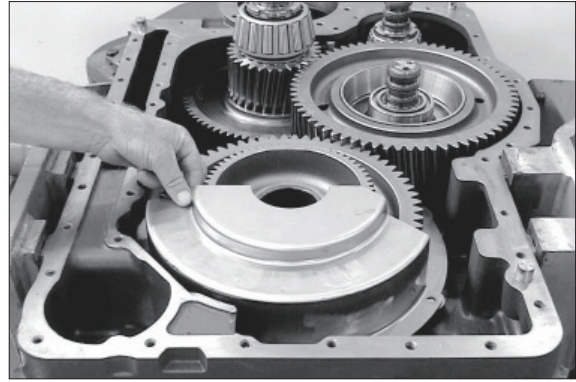


Figure 241

Preassembly and mounting of the housing cover

Note to figure 242 and 243 :

Depending on the transmission version, differences as regards the single components and their installation position are possible.

Obligatory is the respective parts list.

(1) Install the sealing cover (arrow).

※ Wet the sealing surface with Loctite (type No.262).

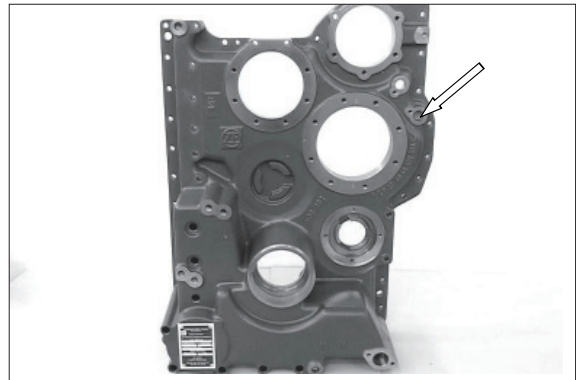


Figure 242

(2) Insert the O-ring into the annular groove of the cover and fasten the cover by means of hexagon screws.

※ Wet the thread of the hexagon screws with loctite (type No.574). Observe the installation position of the cover, see figure.

· Torque limit : 2.35 kgf · m (16.7 lbf · ft)

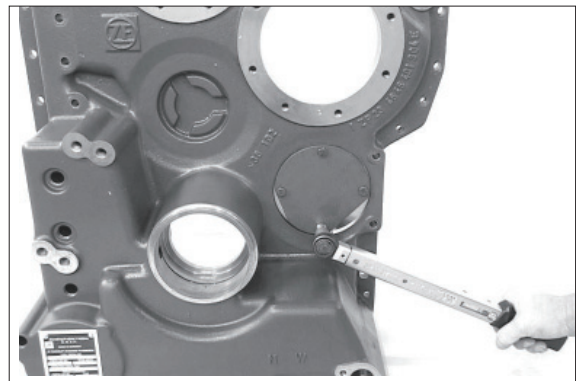


Figure 243

(3) Wet the mounting face with sealing compound (loctite, type No.574).

By means of the lifting tackle place the housing cover on the transmission housing until contact.

※ Special tool

Lifting tackle

5870 281 055

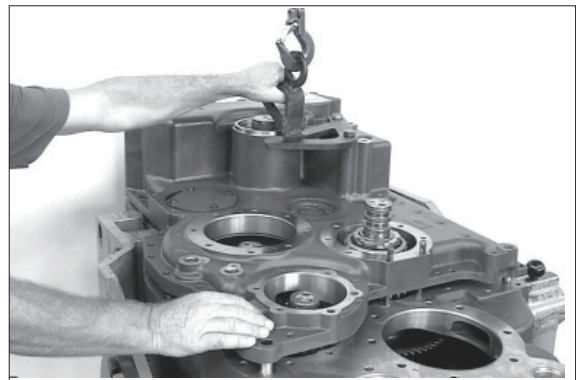


Figure 244

- (4) Install both cylindrical pins (arrow 1 and 2) and the slotted pin (arrow 3).

Then fasten the housing cover by means of hexagon and cap screws.

- Torque limit M10/8.8 :

4.69 kgf · m (33.9 lbf · ft)

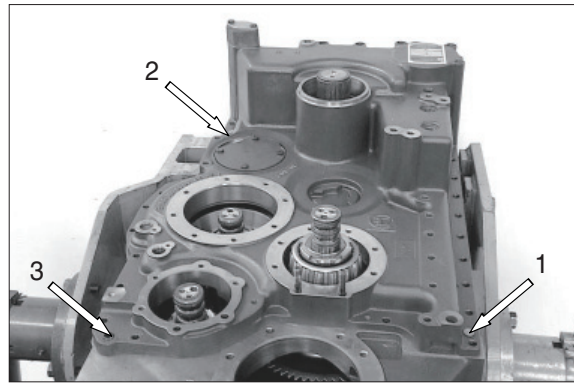


Figure 245

Adjust the bearing preload of clutch K4/K3 = 0.0~0.05 mm (figure 248~250)

- ※ For installation of a new bearing cover, both finished bores have to be sealed by means of a plug. Finished bores are located opposite (180°) to each other, also see arrow/figure 246 and 247.

- 1 Bearing cover-K4/K3
- 2 Plug (konig)
- (S) Special tool

- ※ Special tool
- Hand mounting tool 5870 320 014
- Ratchet spanner 5870 320 018

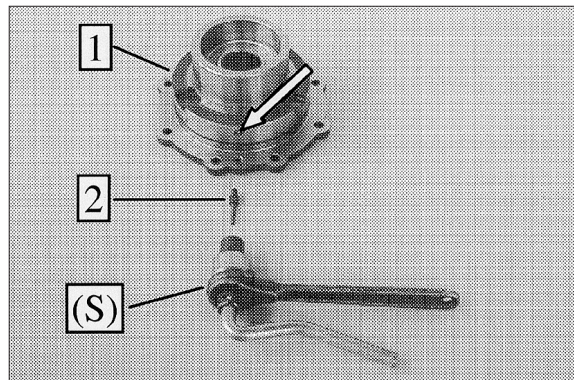


Figure 246

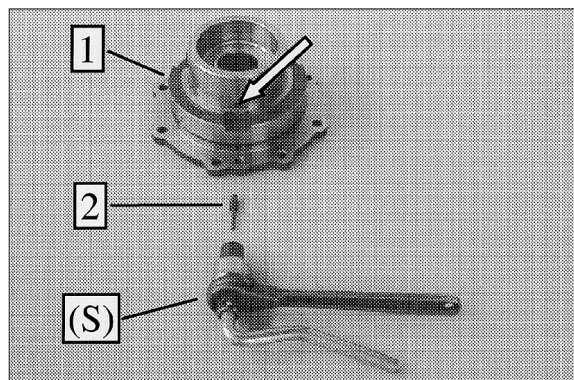


Figure 247

Housing dimension :

- (1) Press on equally the bearing inner ring and determine Dimension I, from the mounting face to the bearing inner ring.

Dimension I e.g 43.65 mm

- ※ Take several measuring points and determine the mean value.

Then remove the bearing inner ring again.

- ※ Special tool

Measuring shaft 5870 200 022

Digital depth gauge 5870 200 072

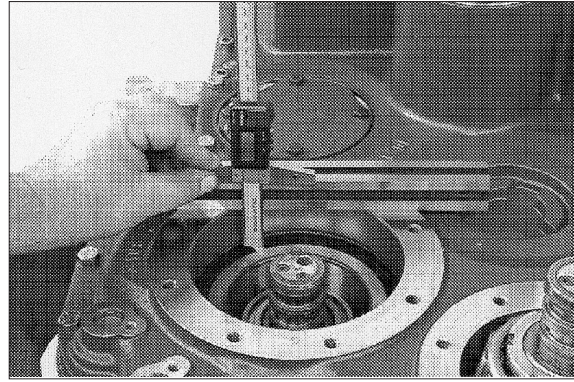


Figure 248

Cover dimension :

- (2) Determine Dimension II, from the mounting face until contact/bearing inner ring.

Dimension II e.g 42.12 mm

- ※ Special tool

Straightedge 5870 200 022

Gauge blocks 5870 200 067

Digital depth gauge 5870 200 072

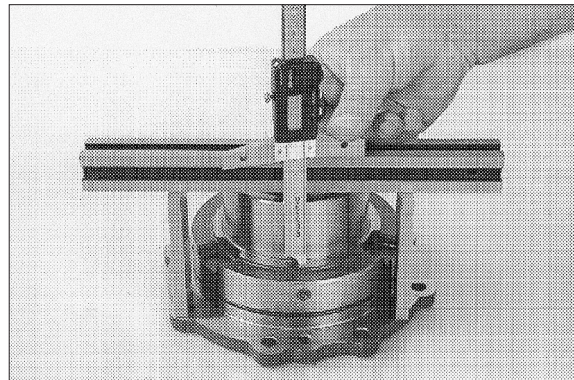


Figure 249

Example :

Dimension I 43.65 mm

Dimension II - 42.12 mm

Difference = 1.53 mm

Bearing preload e.g. + 0.02 mm

Resulting shim(s) s = 1.55 mm

- (3) Put on the shim.

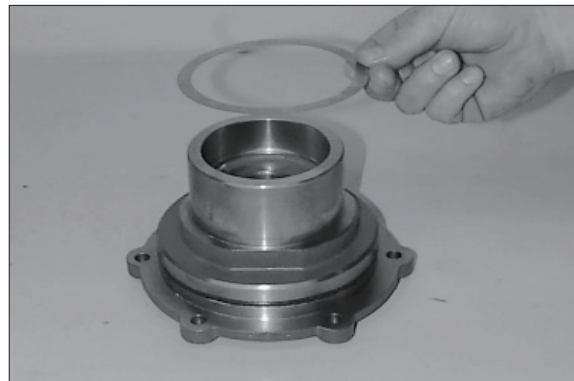


Figure 250

- (4) Heat the bearing inner ring and place it until contact.

- ▲ Use safety gloves.

- ※ Install the bearing inner ring after cooling down subsequently (press).



Figure 251

- (5) Grease the rectangular rings (3EA, arrows) and centrally align them.

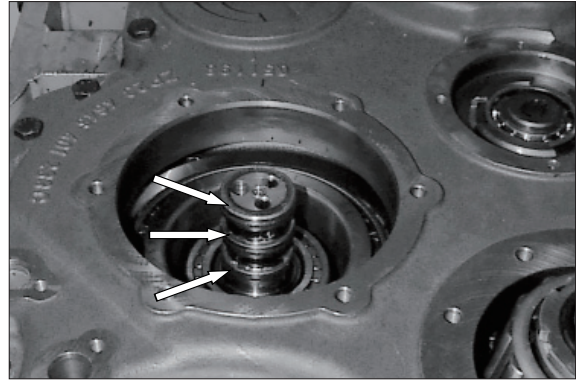


Figure 252

- (6) Install the O-ring (arrow) and grease it.
Heat the inner diameter of the bearing cover (bearing seat).

- ※ Special tool
Hot-air blower 230V 5870 221 500
Hot-air blower 115V 5870 221 501



Figure 253

- (7) Install two adjusting screws.
Assemble the bearing cover and tighten it equally until contact by means of hexagon screws.

- Torque limit (M10/8.8) :
 4.69 kgf · m (33.9 lbf · ft)

- ※ Observe the radial installation position.
※ Special tool
Adjusting screws 5870 204 007

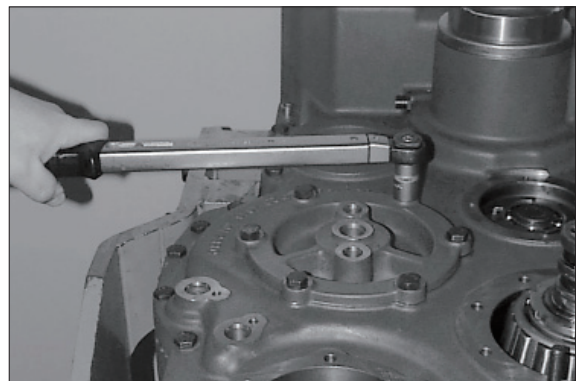


Figure 254

- (8) Check the function of both clutches by means of compressed air.

- ※ In case of a decisive pressure loss, the possible cause might be the breakage of one or several rectangular rings (see arrow , figure 252).
Replace the rectangular rings, if required.

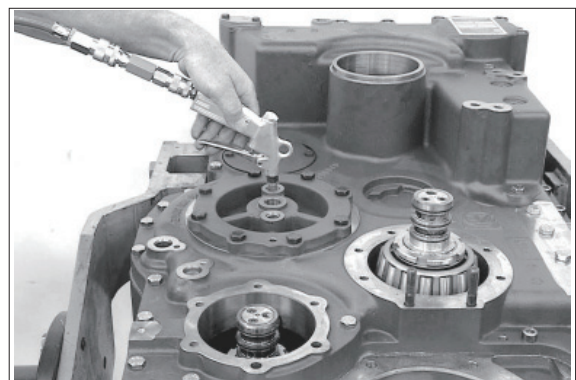


Figure 255

**Adjust the bearing preload of clutch KR/K2
= 0.0~0.05 mm (figure 258~262)**

※ For installation of a new bearing cover, both finished bores have to be sealed by means of a plug.

Finished bores are located opposite (18°) to each other, also see arrow/Figure 256 and 257.

- 1 Bearing cover-KR/K2
- 2 Plug
- (S) Special tool

※ Special tool

- Hand mounting tool 5870 320 014
- Ratchet spanner 5870 320 018

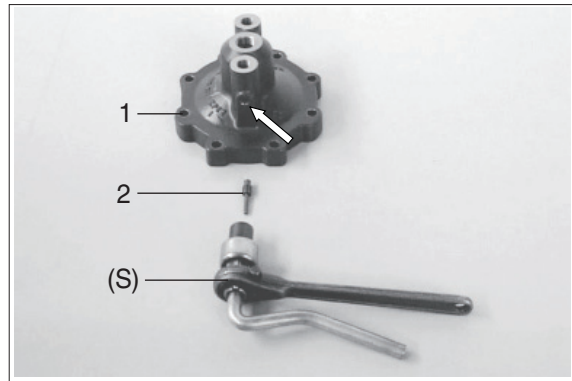


Figure 256

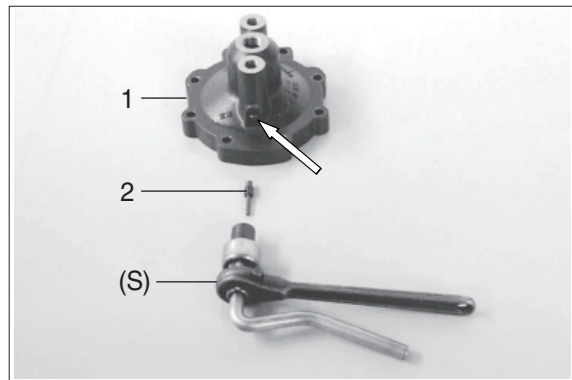


Figure 257

(1) Install both studs (arrows).

※ Wet the thread with loctite (type No. 243).

- Torque limit (M10) :
1.33 kgf · m (9.59 lbf · ft)

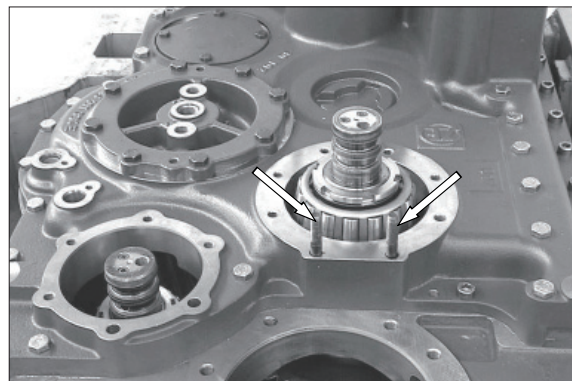


Figure 258

(2) Install the bearing outer ring until contact.

※ Pay attention to exact contact.

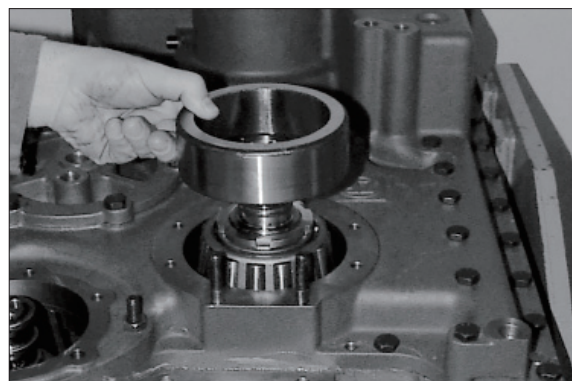


Figure 259

Housing dimension :

- (3) Determine Dimension I, from the bearing outer ring to the mounting face.

Dimension I e.g 16.13 mm

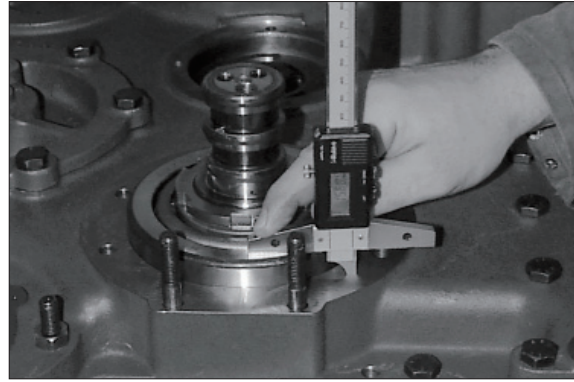


Figure 260

Cover dimension :

- (4) Determine Dimension II, from the contact/bearing outer ring to the mounting face.

Dimension II e.g 17.75 mm

※ Special tool

Digital depth gauge 5870 200 072

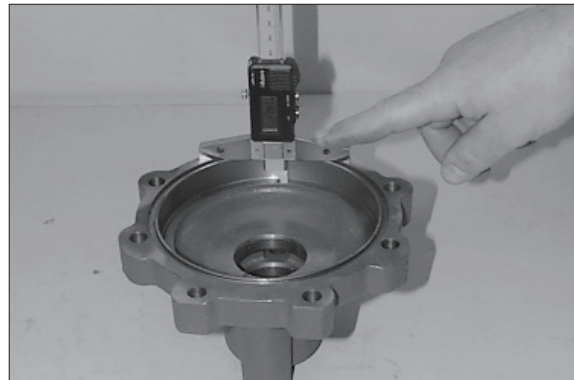


Figure 261

Example :

Dimension II 17.75 mm

Dimension I - 16.13 mm

Difference = 1.62 mm

Bearing preload e.g. + 0.03 mm

Resulting shim (s) s = 1.65 mm

- (5) Fix the shim with assembly grease into the cover. Install the O-ring (arrow).

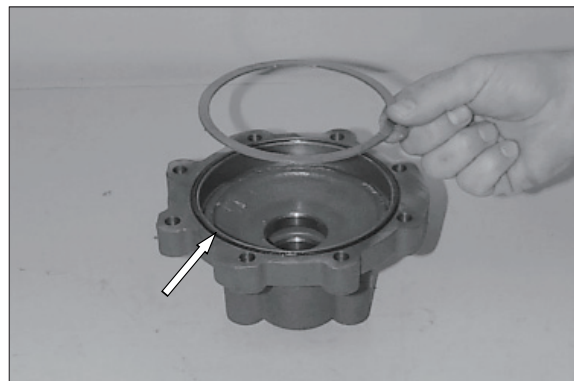


Figure 262

- (6) Grease the rectangular rings (arrows) and centrally align them.

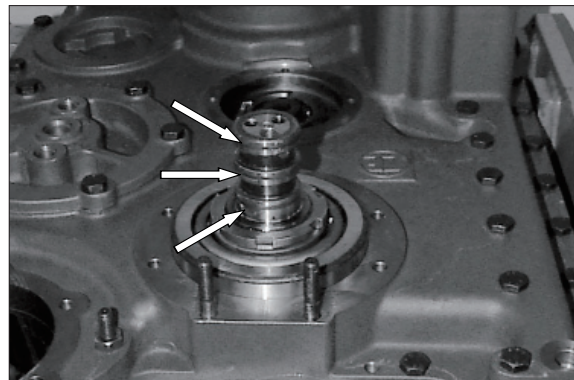


Figure 263

(7) Pull the bearing cover equally until contact.

· Torque limit (M10/8.8) :

4.69 kgf · m (33.9 lbf · ft)

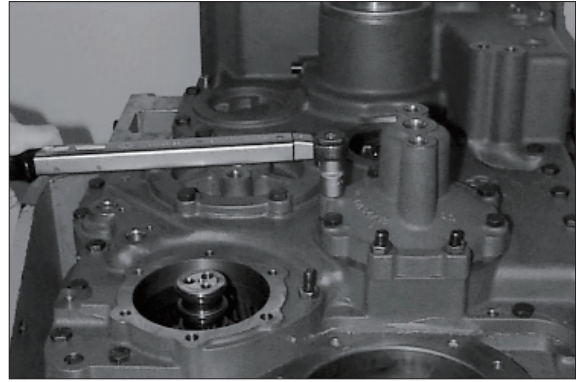


Figure 264

(8) Check the function of both clutches by means of compressed air.

※ In case of a decisive pressure loss, the possible cause might be the breakage of one or several rectangular rings (see figure 263).

Replace the rectangular rings, if required.

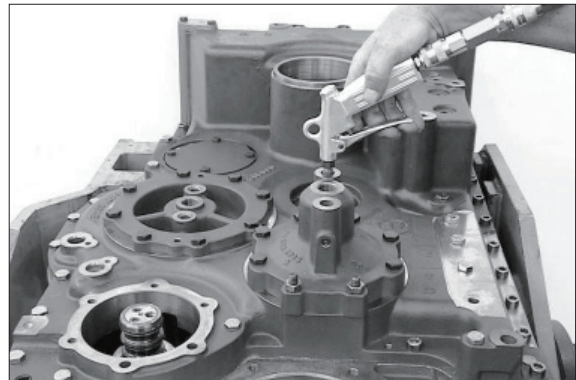


Figure 265

Adjust the bearing preload of clutch KV/K1 = 0.0~0.05 mm (figure 267~270)

※ For installation of a new bearing cover, both finished bores have to be sealed by means of a plug.
Installation position, see arrows/Figure 266.

- 1 Bearing cover-KV/K1
- 2 Plug
- (S) Special tool

※ Special tool
Hand mounting tool 5870 320 014
Ratchet spanner 5870 320 018

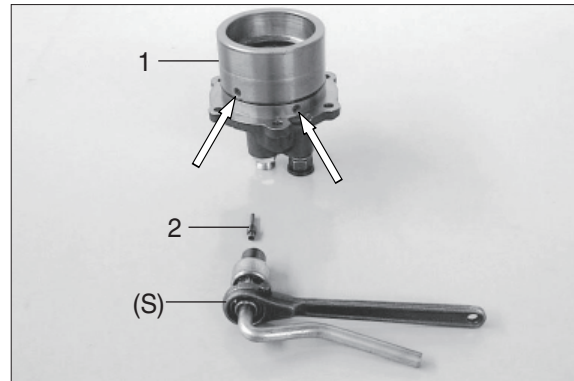


Figure 266

(1) Put the bearing outer ring over the bearing inner ring.

Housing dimension :
Press on equally the bearing outer ring and determine Dimension I, from the mounting face to the bearing outer ring.

Dimension I e.g 52.67 mm

※ Take several measuring points and determine the mean value.

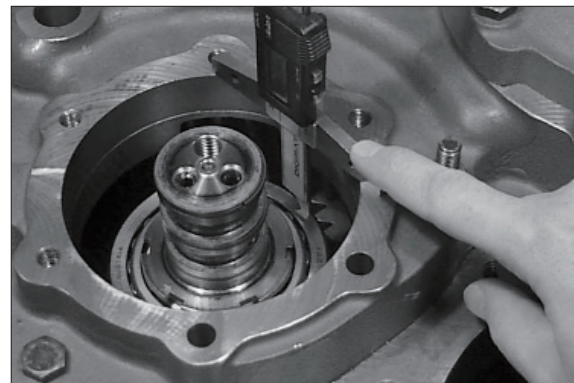


Figure 267

(2) Put the ring with the chamfer showing downwards into the bearing cover.

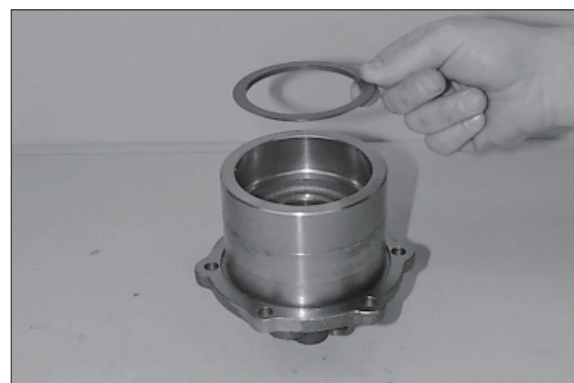


Figure 268

Cover dimension :

- (3) Determine Dimension II, from the mounting face to the ring.

Dimension II e.g 50.75 mm

※ Special tool

Digital depth gauge 5870 200 072

Gauge blocks 5870 200 067

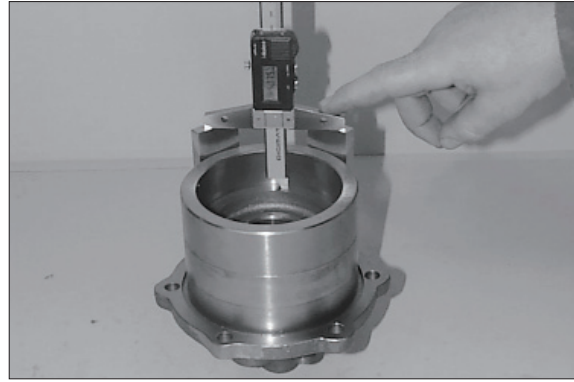


Figure 269

Example :

Dimension I 52.67 mm

Dimension II - 50.75 mm

Difference e.g. 1.92 mm

Bearing preload + 0.03 mm

Resulting shim (s) s = 1.95 mm

- (4) Put in the shim.



Figure 270

- (5) Install the bearing outer ring until contact.
Assemble the O-ring (arrow).



Figure 271

- (6) Grease the rectangular rings (arrows) and centrally align them.

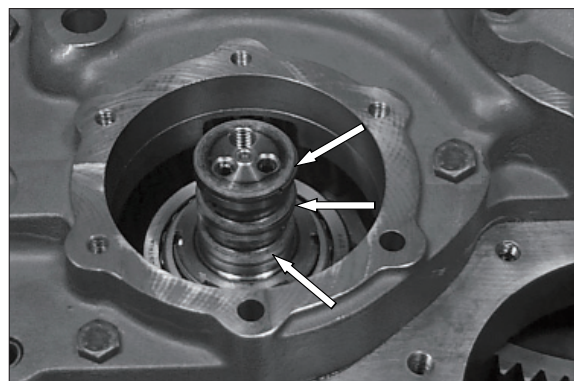


Figure 272

(7) Heat the bearing bore.

※ Special tool

Hot-air blower 230V 5870 221 500

Hot-air blower 115V 5870 221 501

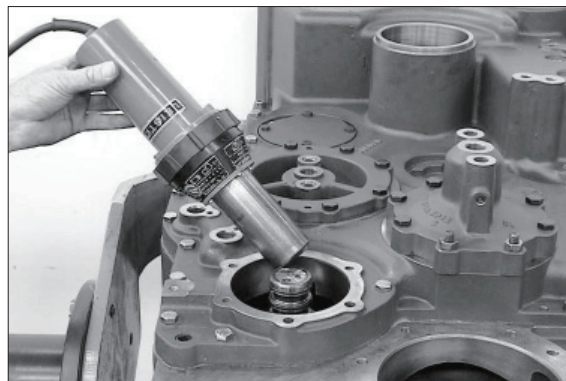


Figure 273

(8) Install two adjusting screws.

Place the bearing cover until contact and fasten it by means of hexagon screws.

※ Observe the radial installation position, see figure.

※ Special tool

Adjusting screws 5870 204 007

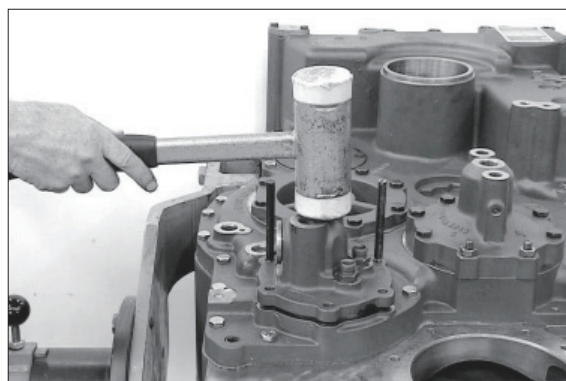


Figure 274

(9) Check the function of both clutches by means of compressed air.

※ In case of a decisive pressure loss, the possible cause might be the breakage of one or several rectangular rings (see arrow, figure 272).

Replace the rectangular ring (s), if required.

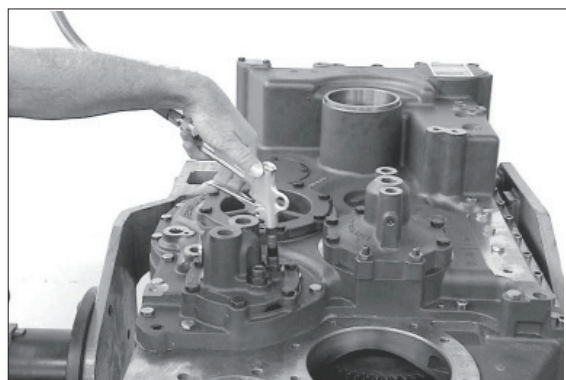


Figure 275

Output

Installation of the output shaft

(1) Heat the inner diameter of the output gear.

※ Special tool

Hot-air blower 230V 5870 221 500

Hot-air blower 115V 5870 221 501

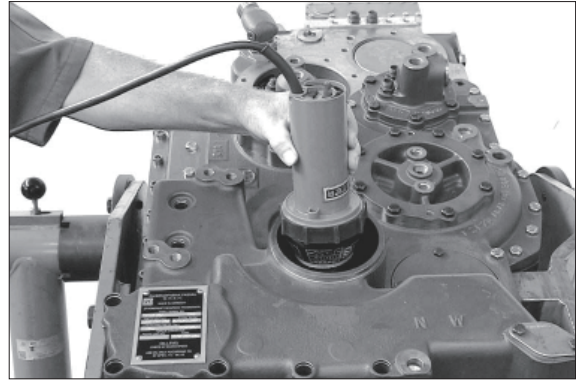


Figure 276

(2) Assemble the output shaft with the long gearing showing downwards until contact.

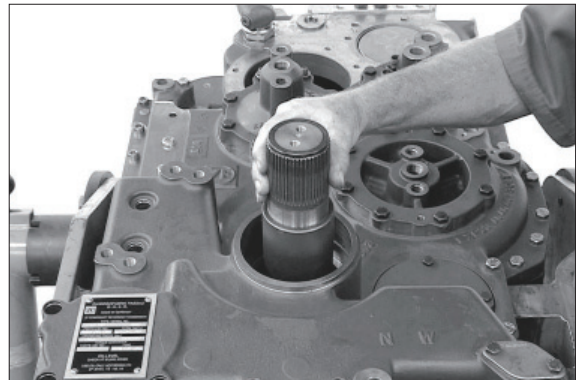


Figure 277

(3) Rotate the transmission housing into the vertical position (90°).

By means of the mounting tool the output shaft has preliminarily to be fixed axially (figure 278 and 279) at the converter side.

※ Special tool

Mounting tool 5870 048 265

Then rotate the transmission housing back again (90°).



Figure 278

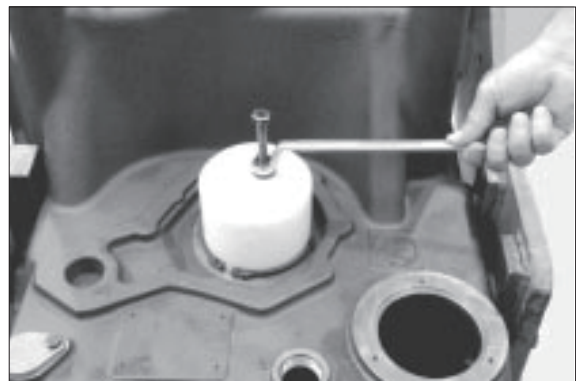


Figure 279

Adjust the axial play of the output bearing = 0.3~0.5 mm (figure 280~282)

- (4) Determine Dimension I, from plane face/housing to end face/output shaft.

Dimension I e.g 66.90 mm

※ Special tool

Digital depth gauge 5870 200 072

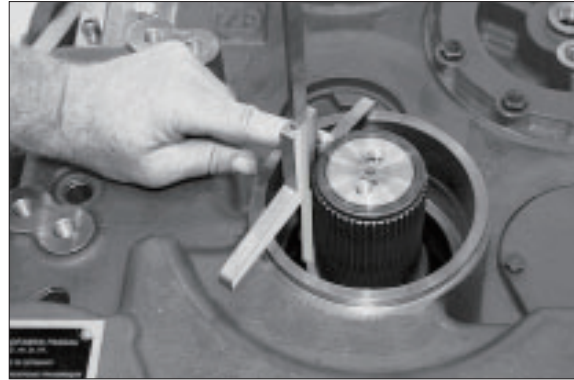


Figure 280

- (5) Measure Dimension II, from plane face/housing to contact face/ball bearing.

Dimension II e.g 64.20 mm

Example :

Dimension I 66.90 mm

Dimension II - 64.20 mm

Difference = 2.70mm

Required axial play e.g. - 0.40 mm

(0.3~0.5 mm)

Resulting shim s = 2.30 mm

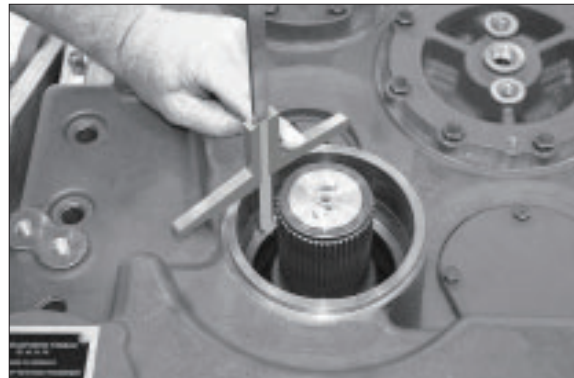


Figure 281

- (6) Install the shim.

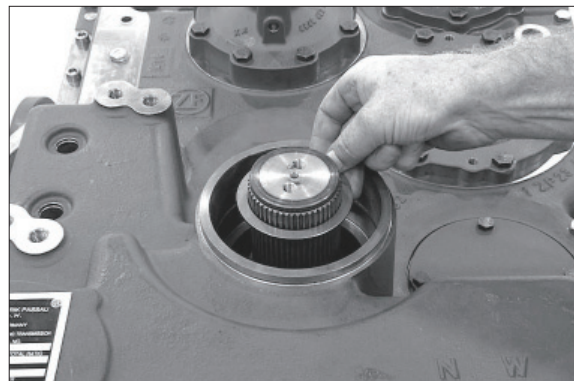


Figure 282

- (7) Install the ball bearing (figure 283) and pull it until contact by means of the output flange (figure 284).

Then remove the output flange again.

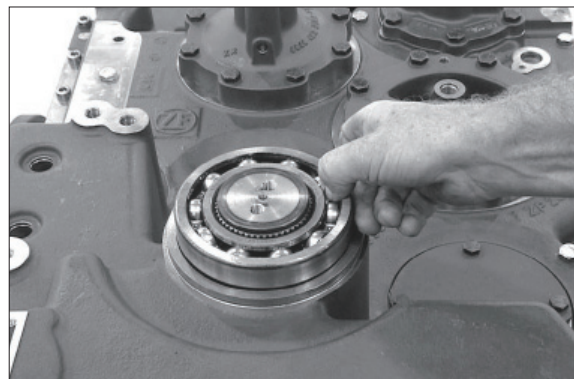


Figure 283

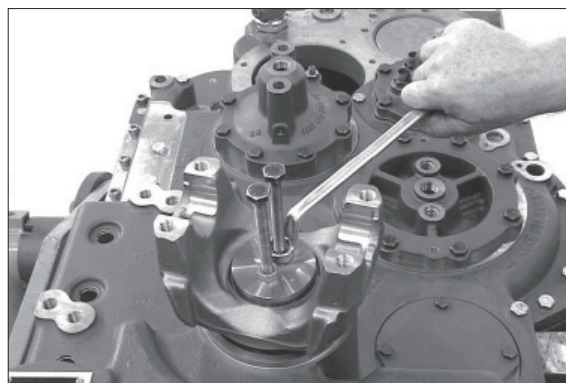


Figure 284

(8) Fasten the ball bearing by means of retaining ring.

※ Clamping pliers 5870 900 021

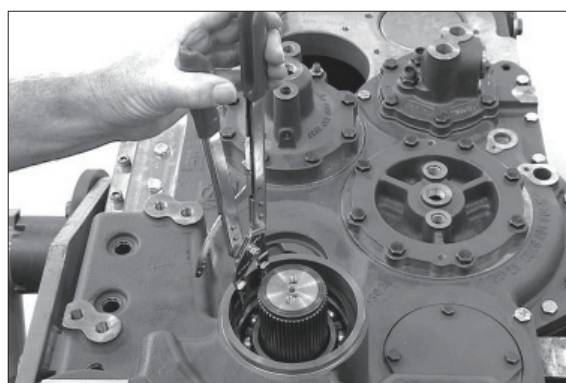


Figure 285

(9) Remove the converter-side mounting tool again.

Install the shaft seal, (arrow) with the sealing lip showing to the oil sump.

※ Using of the specified mounting tool (S), results in the exact installation position (without retaining ring = 20 mm). Grease the sealing lip.

※ Special tool
Mounting tool 5870 048 265

※ Depending on the version different shaft seals can be used :
Outer diameter rubber-coated-wet it with spirit. Outer diameter metallic-wet it with sealing compound (loctite, type No. 574).

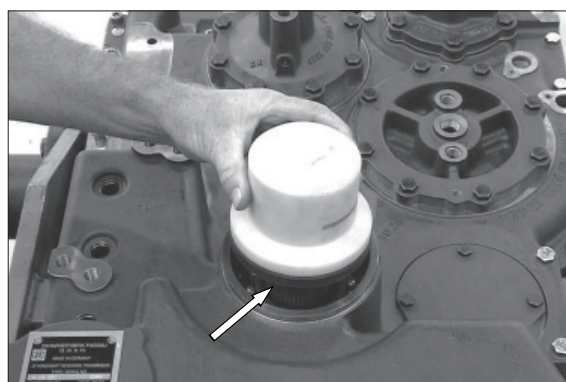


Figure 286

Adjust gap size $X = 0.3\sim 0.8$ mm
 (figure 289~292) :

- X Gap size
- 1 Shim
- 2 O-ring.

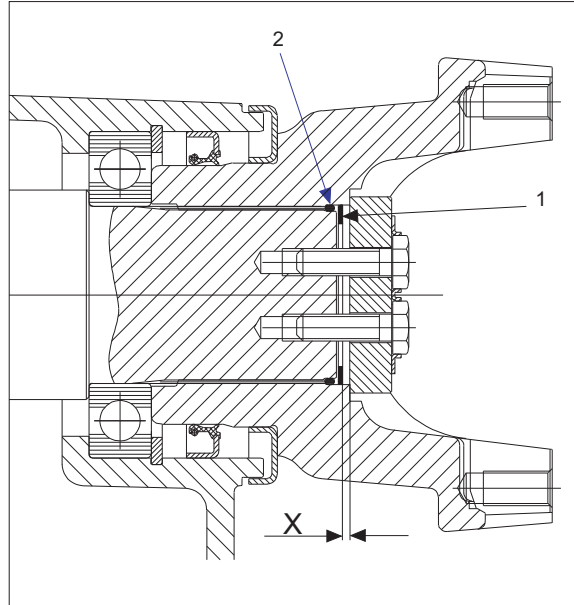


Figure 289

(1) Install the output flange until contact.

Measure Dimension I, from the plane face of the output flange to the end face of the output shaft.

Dimension I e.g.37.00 mm

※ Special tool

Digital depth gauge 5870 200 072

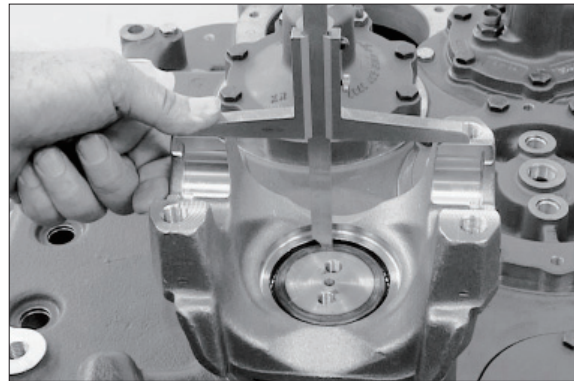


Figure 290

(2) Measure Dimension II, from the plane face to the collar of the output flange.

Dimension II e.g. 36.00 mm

Example :

Dimension I 37.00 mm

Dimension II - 36.00 mm

Difference = 1.00 mm

Gap size X e.g. - 0.50 mm

(0.3~0.8 mm)

Resulting shim s = 0.50 mm

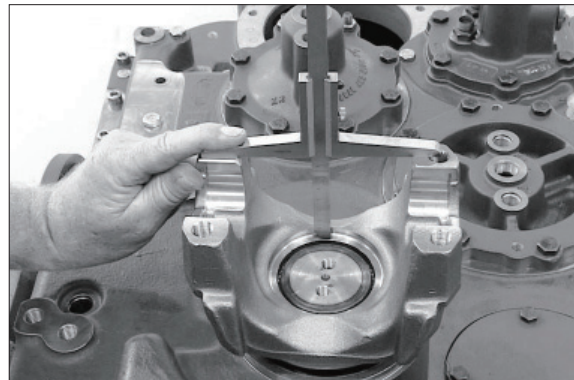


Figure 291

- (3) Place the O-ring (arrow) into the space between output flange and shaft (see also figure 289) and put on the shim.

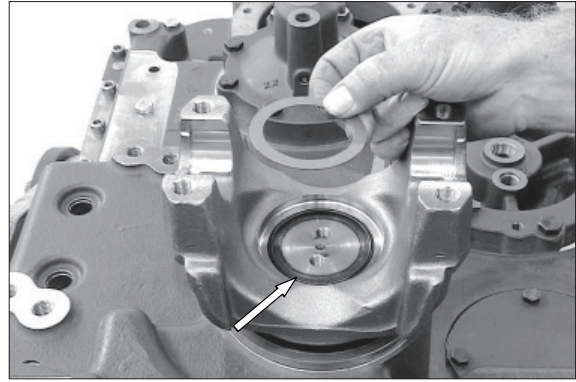


Figure 292

- (4) Put on the washer and fasten the output flange by means of hexagon screws.
- Torque limit (M10/8.8) :
4.69 kgf · m (33.9 lbf · ft)

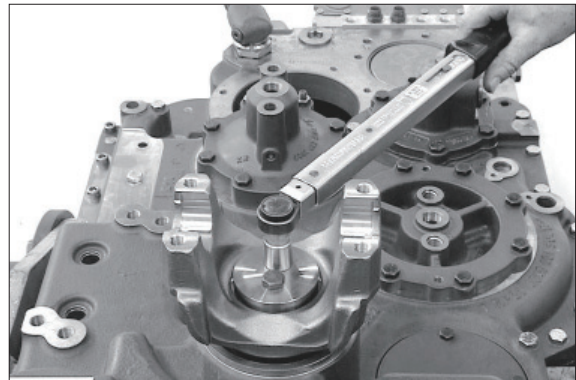


Figure 293

- (5) Fasten the hexagon screws by means of the lock plate.

- ※ Specail tool
- | | |
|---------------|--------------|
| Mounting tool | 5870 057 009 |
| Handle | 5870 260 002 |

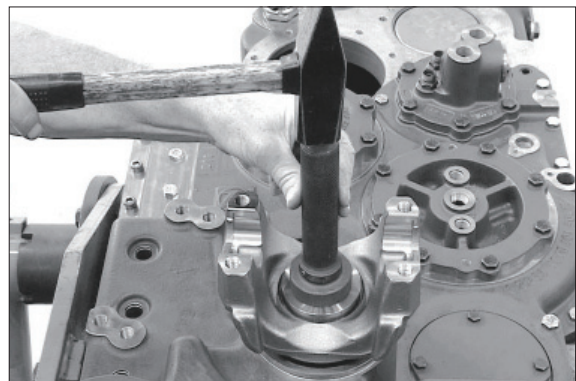


Figure 294

Output flange - parking brake

(1) Press on the screen sheet (arrow) until contact.

※ The installation position of the screen sheet is identical with the output flange.

Pressing bush 5870 506 138

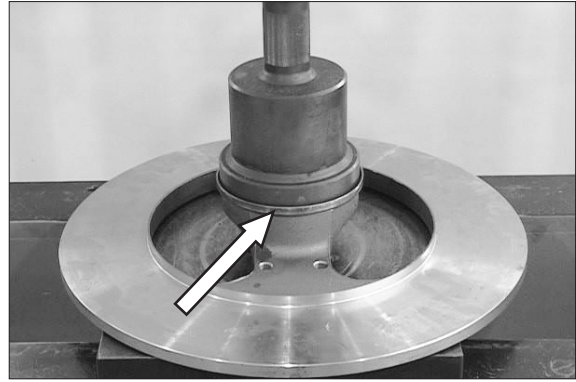


Figure 295

(2) Install the output flange-brake disk until contact.

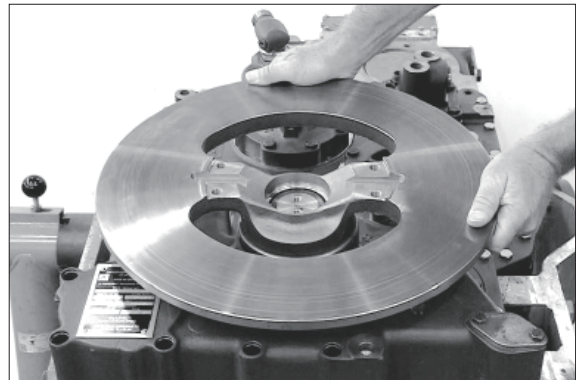


Figure 296

Mount the brake (figure 297~301)

▲ For working on the brake system, the instructions and specifications of the brake manufacturer are mandatory.

(3) Remove the screw cap and loosen the locking nut (wrench size 30).

Unscrew the adjusting screw in counterclockwise direction until a dimension > 13.0 mm (brake disc shim) results (figure 297).

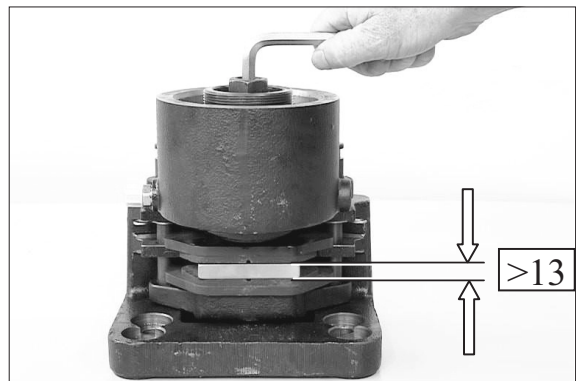


Figure 297

(4) Position the brake and fasten it with cap screws.

Tightening torque M14/8.8) : 12.7 kgf · m
(92.2 lbf · ft)

Socket spanner 5870 656 047

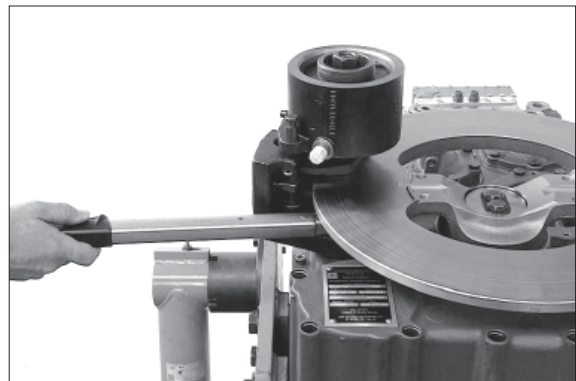


Figure 298

Adjust the nominal clearance = 2.0 mm (figure 299~301)

- (5) Make the pressure connection and apply the required release pressure = 150 bar to the brake (cup spring set preloaded). Fasten the adjusting screw in clockwise direction until both brake lining carriers contact the brake disc (turning of the adjusting screw is then not possible or admissible any more without a higher application of force).

Then turn back the adjusting screw by 4/5 turns in counterclockwise direction. 4/5 turns is equal to a nominal clearance of 2.0 mm.

- (6) Keep the adjusting screw positioned and fix it by means of a lock nut.

HP-Pump	5870 287 007
Mini-measuring hub	5870 950 102

- (7) Put new O-Ring into the screw cap and grease it.
Install the screw cap.

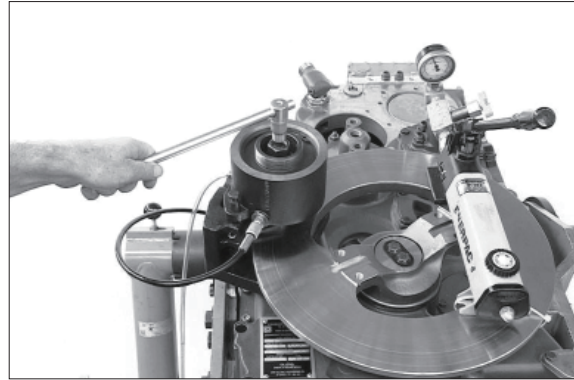


Figure 299

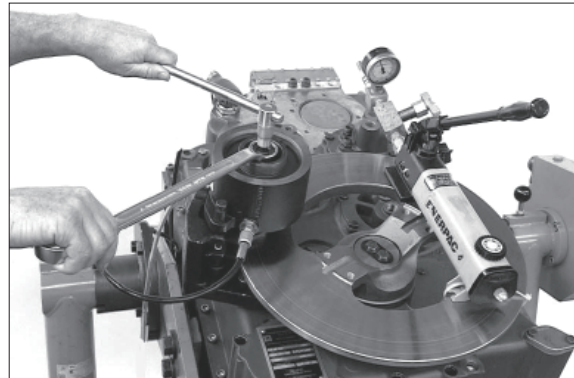


Figure 300

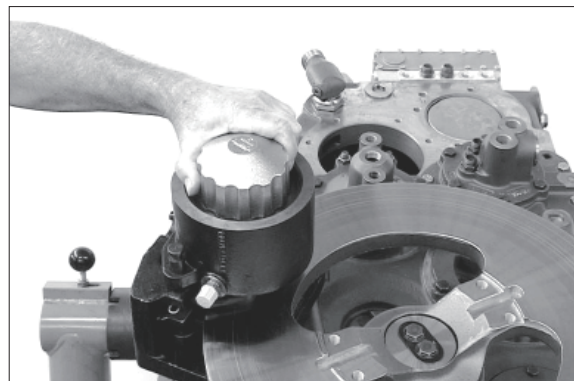


Figure 301

Output Flange (converter side)

(1) Install the shaft seal (arrow) with the sealing lip showing to the oil sump.

- ※ Using of the specified mounting tool, results in the exact installation position (with retaining ring = 7.0 mm). Grease the sealing lip.

※ Special tool
Mounting tool 5870 048 265

- ※ Depending on the version different shaft seals can be used :
Outer diameter rubber-coated-wet it with spirit. Outer diameter metallic-wet it with sealing compound (loctite, Type No. 574).

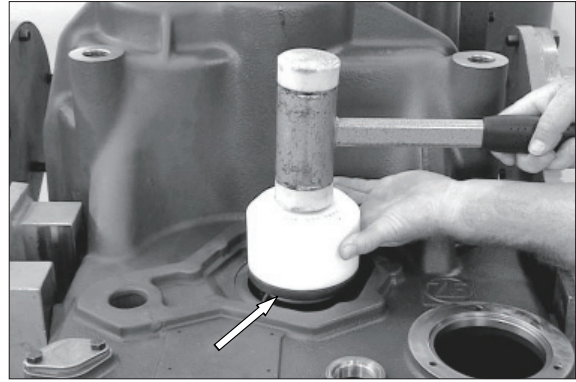


Figure 302

(1) Press the screen sheet (arrow) over the collar of the output flange until contact.

- ※ Observe the installation position, see figure 304.

※ Special tool
Pressing bush 5870 506 138

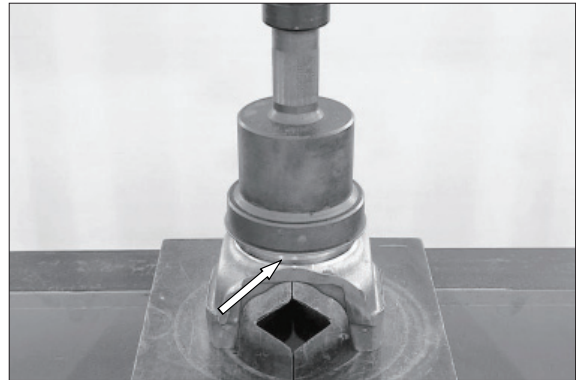


Figure 303

- 1 Screen sheet
- 2 Output flange

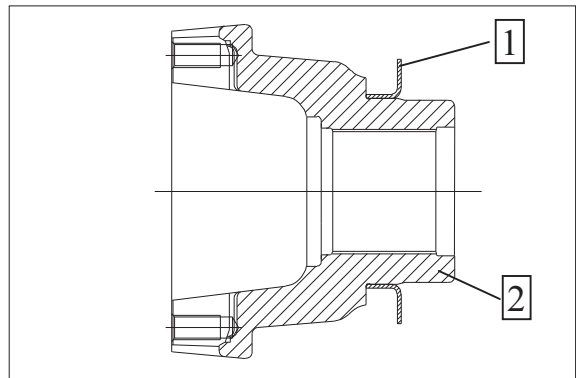


Figure 304

(2) Install the output flange until contact.

- ※ Setting of the gap size as well as fixing of the output flange is identical with the installation of the output flange at the transmission rearside.



Figure 305

Installation of the idler shaft

(1) Align the layshaft gear and the single components centrally.
Heat the layshaft gearing (figure 306).

- ※ Special tool
Hot-air blower 230V 5870 221 500
Hot-air blower 115V 5870 221 501

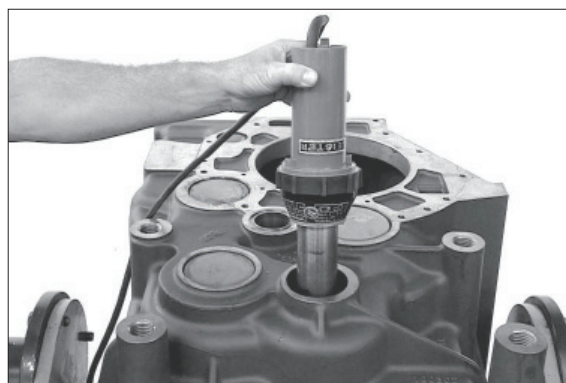


Figure 306

(2) Install the adjusting screw.

- ※ Special tool
Adjusting screws 5870 204 007

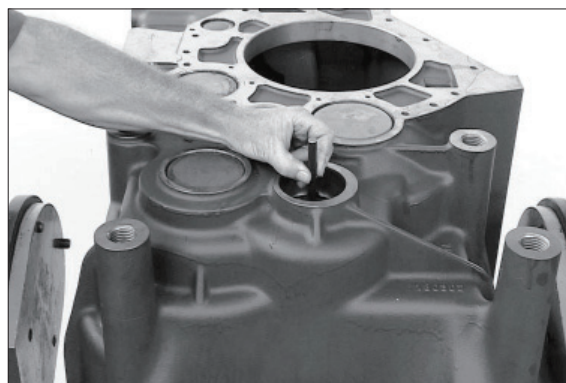


Figure 307

(3) Install the idler shaft until contact.

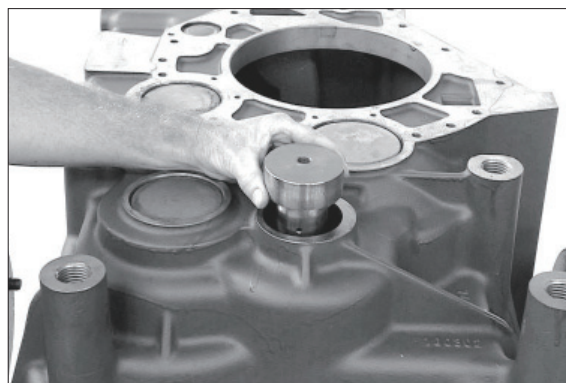


Figure 308

(4) Remove the adjusting screw and fasten the axle by means of hexagon screw.

※ Wet the thread of the hexagon screw with Loctite (type No. 243).

· Torque limit (M10/8.8) :
4.69 kgf · m (33.9 lbf · ft)

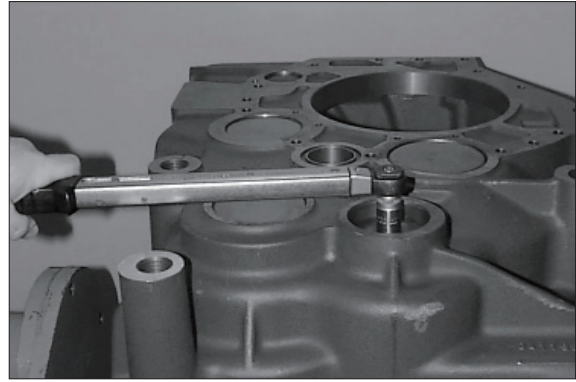


Figure 309

(5) Insert the sealing covers (arrow), with the concave side showing downwards, flush to the housing surface.

※ Wet contact face with Loctite (type No. 262).

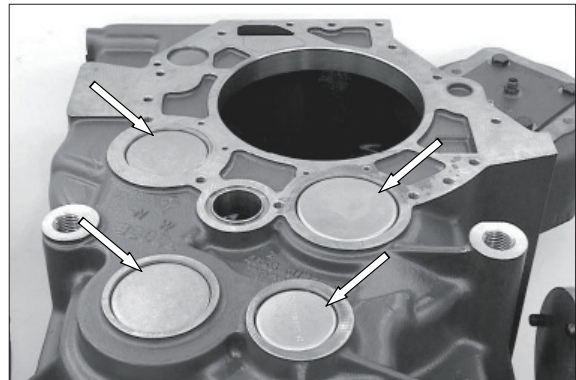


Figure 310

Transmission pump

(with 2nd/3rd or 4th power take-off)

(1) Press the needle sleeve (arrow), with the reinforced coating towards the press-in tool until contact.

Mounting tool 5870 058 041
Handle 5870 260 002

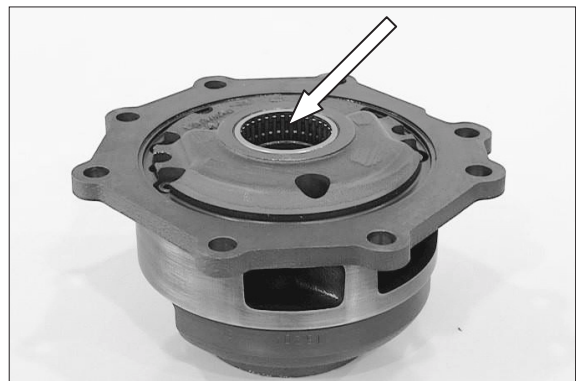


Figure 311

(2) Locate the bearing outer ring until contact.

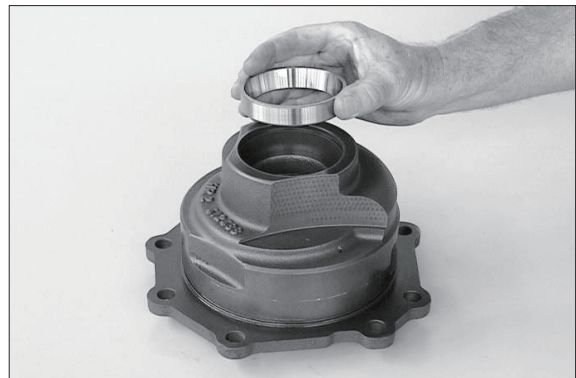


Figure 312

(3) Install the O-Ring (arrow) and grease it.

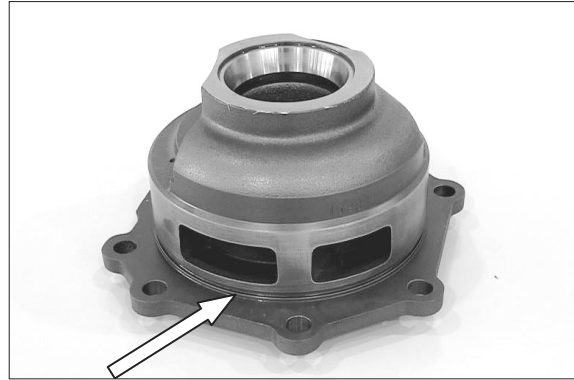


Figure 313

(4) Heat the housing bore.

Preheating bush	5870 801 006
Hot-air blower 230 V	5870 221 500
Hot-air blower 115 V	5870 221 501

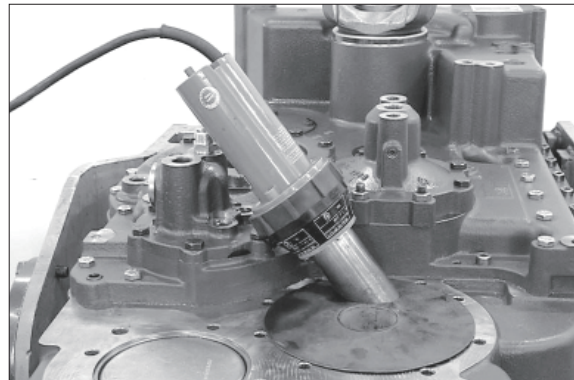


Figure 314

(5) Install two adjusting screws and assemble the pump until contact.

※ Observe the radial installation position.

Adjusting screws	5870 204 021
------------------	--------------

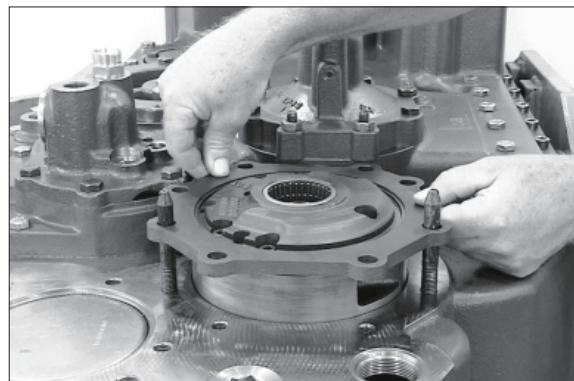


Figure 315

(6) Put the O-Ring (arrow) into the annular groove of the pump flange.

※ Depending on the transmission version, differences as regards the version and fastening of the pump flange are possible. Obligatory is the respective parts list.

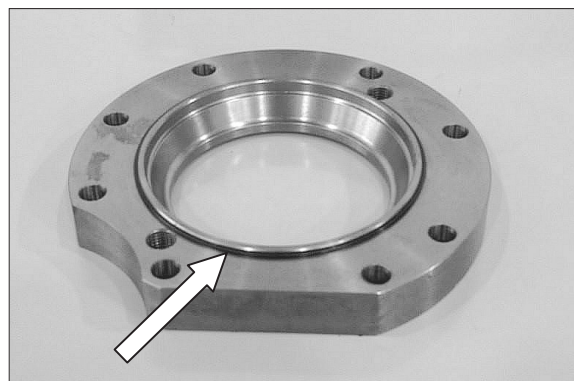


Figure 316

(7) Fasten the pump flange and pump respectively by means of cap screws.

※ Wet thread of both cap screws (position, see arrows) with loctite, Type No. 574 (through holes).

※ Tightening torque (M12/8.8) : 8.06 kgf · m
(58.3 lbf · ft)

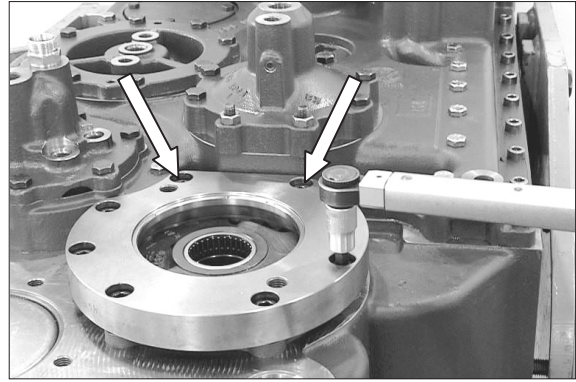


Figure 317

(8) Rotate the transmission housing by 180°.

Snap the V-rings (3X) into the recess of the driver (internal gearing).

Install the key (arrow).



Figure 318

(9) Install shim $s = 2.0$ mm and locate the bearing inner ring until contact.



Figure 319

(10) Install shim $s = 2.0$ mm.



Figure 320

(11) Install the driver by means of clamping plate until contact and fasten it by means of cap screw.

※ Tightening torque M10/8.8, DIN 6912) :
3.26 kgf · m (23.6 lbf · ft)

※ Wet thread of the cap screw with loctite (Type No. 243).

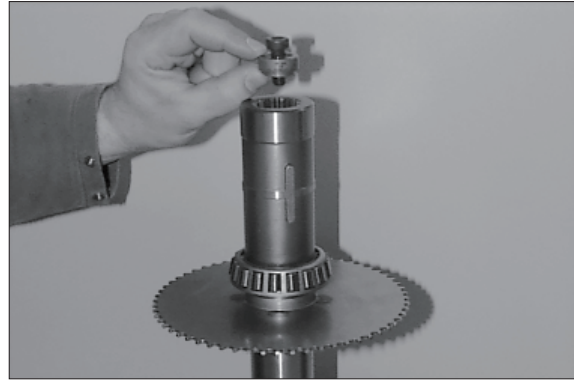


Figure 321

(12) Press the bearing inner ring until contact.

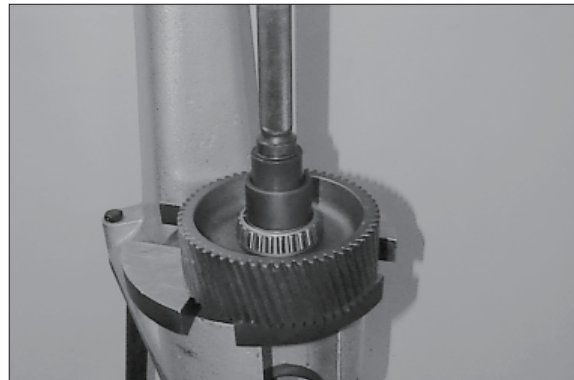


Figure 322

(13) Snap in the retaining ring (arrow) and install the input gear.

Set of external pliers 5870 900 015

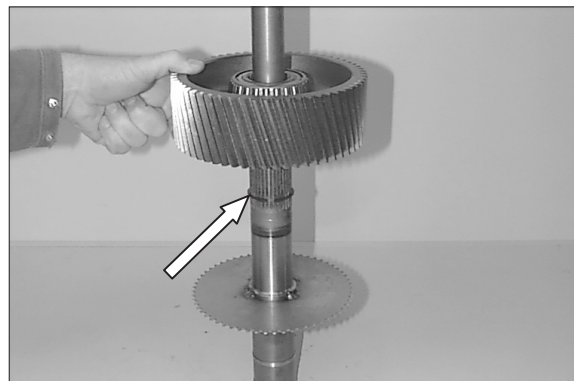


Figure 323

(14) Snap-in and lock the rectangular ring (arrow).

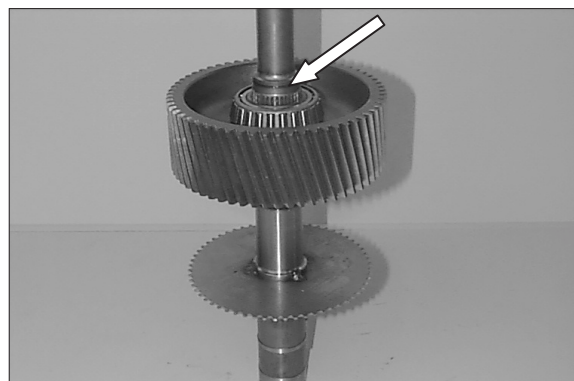


Figure 324

(15) Install the preassembled input shaft until contact.

※ Pay attention to align the key to the keyway.

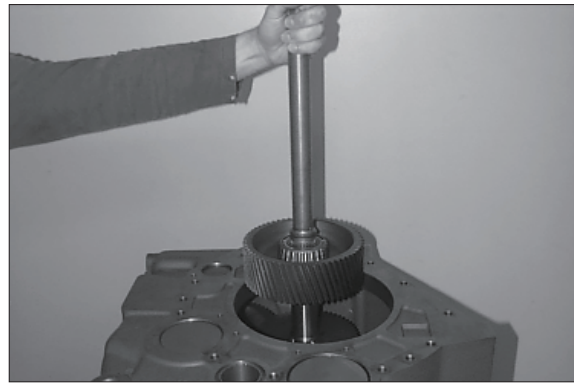


Figure 325

Adjust the axial play of the input shaft bearing = 0.0~0.05 mm (figure 326~328) :

(16) Put on the gasket.

Put on the bearing outer ring, press it on equally and determine Dim. I, from the mounting face (gasket) to the bearing outer ring.

Dim I e.g. 128.50 mm

※ Take several measuring points and determine the mean value.

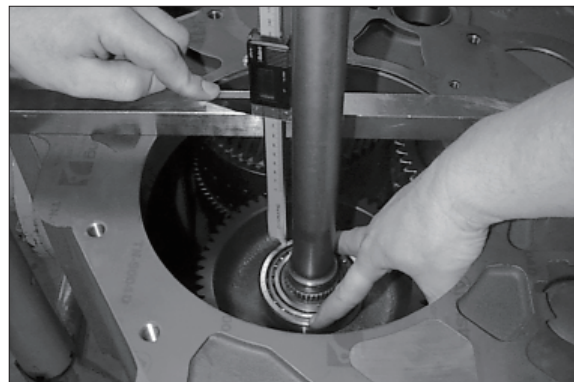


Figure 326

(17) Measure Dim II, from the mounting face/ converter bell to the mounting face/ bearing outer ring.

Dim II e.g. 127.46 mm

Straightedge 5870 200 022

Gauge blocks 5870 200 080

Digital depth gauge 5870 200 072

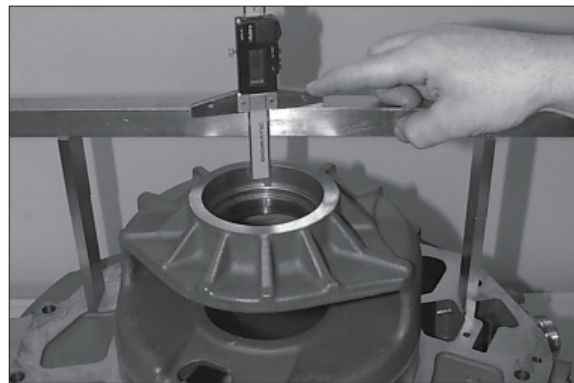


Figure 327

Example :

Dim I 128.50 mm

Dim II - 127.46 mm

Difference = 1.04 mm

Axial play - 0.04 mm

resulting shim(s) s = 1.00 mm

Put in the shim and locate the bearing inner ring until contact.



Figure 328

Transmission pump

(with 1st power take-off)

- (1) Press the needle sleeve (arrow), with the reinforced coating towards the press-in tool until contact.

※ Special tool

Mounting tool

5870 058 041

Handle

5870 260 002

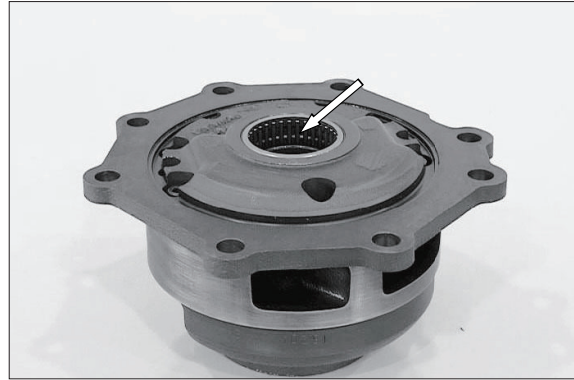


Figure 329

- (2) Snap the V-Rings (3EA) into the recess of the driver (internal gearing). Install the key (arrow).



Figure 330

- (3) Press the ball bearing over the collar of the driver until contact.



Figure 331

- (4) Install the ball bearing and driver respectively and press it until contact.

※ Pay attention to align the key to the keyway.



Figure 332

(5) Fasten the ball bearing by means of retaining ring.

- ※ Special tool
Set of internal pliers 5870 900 013



Figure 333

(6) Install the O-ring (arrow) and grease it.



Figure 334

(7) Heat the housing bore.

- ※ Special tool
Preheating bush 5870 801 006
Hot-air blower 230V 5870 221 500
Hot-air blower 115V 5870 221 501

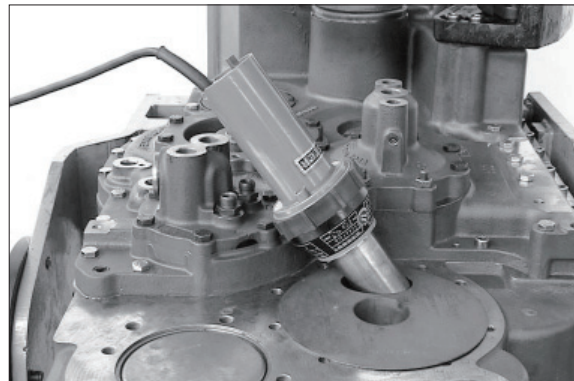


Figure 335

(8) Install two adjusting screws and assemble the pump until contact.

- ※ Observe the radial installation position.
- ※ Special tool
Adjusting screws 5870 204 021

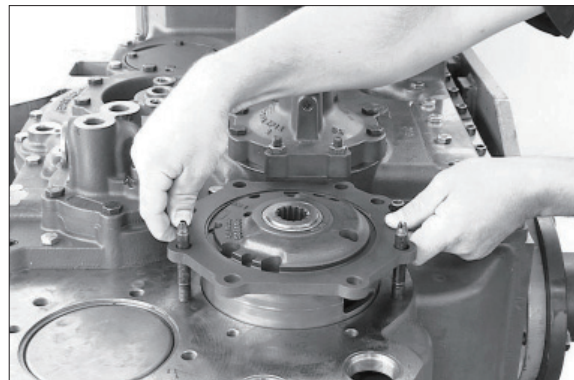


Figure 336

(9) Put the O-ring (arrow) into the annular groove of the pump flange.

- ※ Depending on the transmission version, differences as regards the version and fastening of the pump flange are possible. Obligatory is the respective parts list.

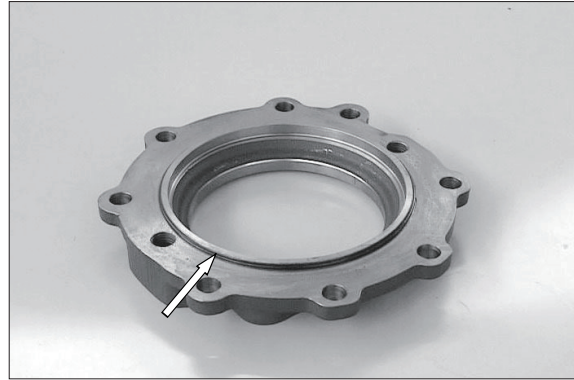


Figure 337

(10) Fasten the pump flange and the pump respectively by means of hexagon screws.

- ※ Wet thread of both hexagon screws (position, see arrows) with Loctite, Type No. 574 (through holes).

· Torque limit (M12/8.8) :

8.06 kgf · m (58.3 lbf · ft)

Then rotate the transmission housing by 90°.

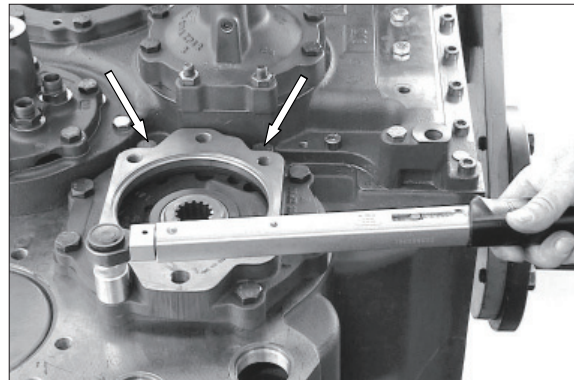


Figure 338

(11) Snap-in and lock the rectangular ring (arrow).

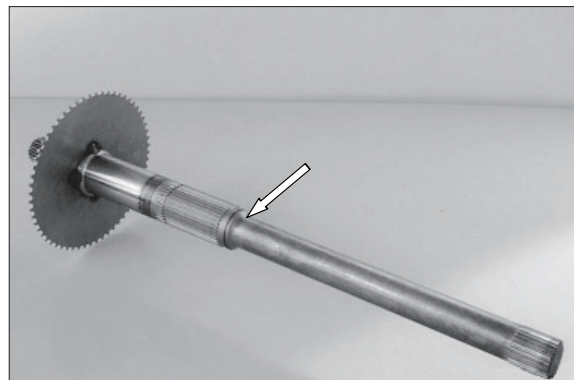


Figure 339

(12) Install both shims (each 2.0 mm thick)

- ※ Use assembly grease.

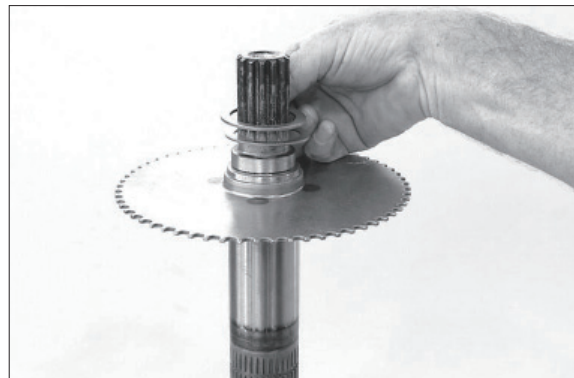


Figure 340

(13) Heat the bevel bearing inner ring.

※ Special tool

Hot-air blower 230V 5870 221 500

Hot-air blower 115V 5870 221 501

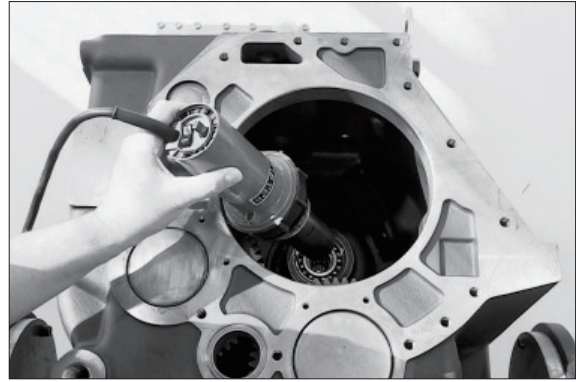


Figure 341

(14) Install the input shaft until contact.

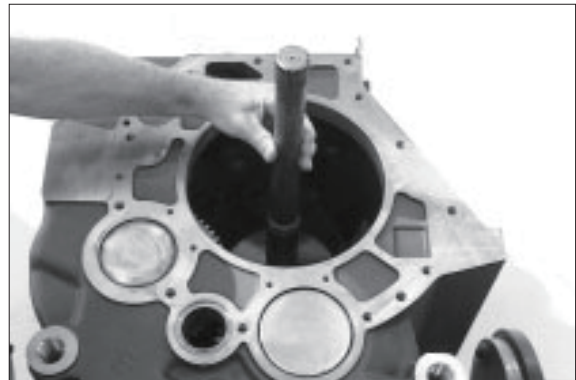


Figure 342

(15) Fasten the input shaft by means of clamping plate and cap screw (arrow).

· Torque limit (M10/8.8) :

3.26 kgf · m (23.6 lbf · ft)

※ Wet thread of the cap screw with Loctite (type No. 243).

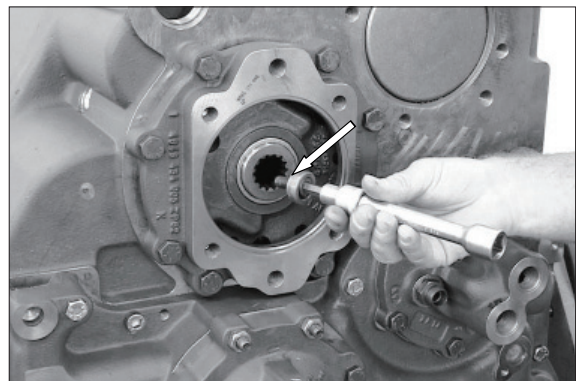


Figure 343

Input-Converter Bell

※ To install a new converter bell the finished bores (3EA) have to be sealed with plugs. Installation position, see arrow, figure 344.

※ Special tool

Lever riveting tongs 5870 320 016

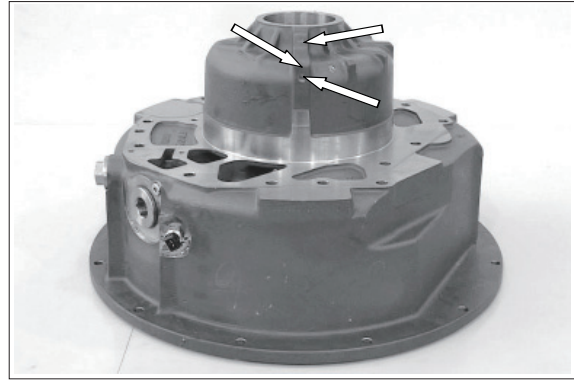


Figure 344

(1) Locate the bearing outer ring into the housing bore until contact and install the bearing inner ring, see arrow.

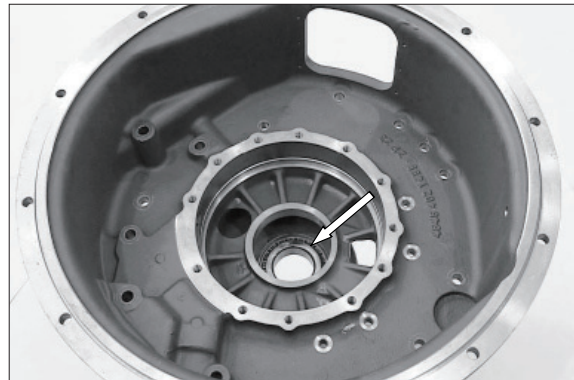


Figure 345

(2) Install the spur gear (arrow) with the long collar showing upwards and position it.



Figure 346

(3) Heat the spur gear bore (arrow).

※ Special tool

Hot-air blower 230V 5870 221 500

Hot-air blower 115V 5870 221 501



Figure 347

(4) Install the input shaft until contact.

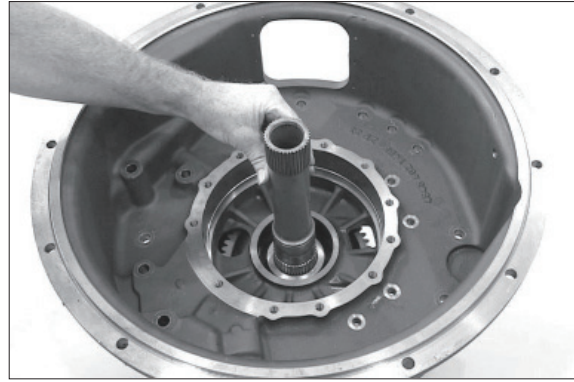


Figure 348

(5) Heat the bearing inner ring and install it until contact.

▲ Use safety gloves.

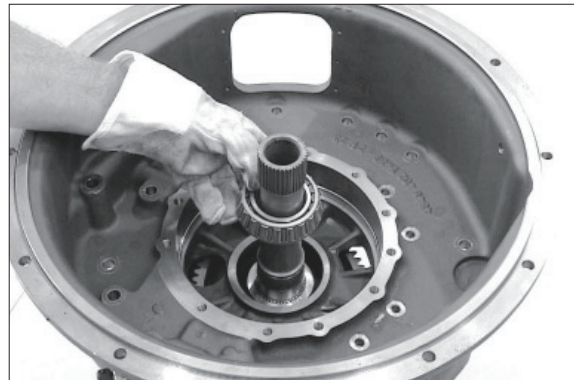


Figure 349

(6) Install the bearing outer ring until contact.

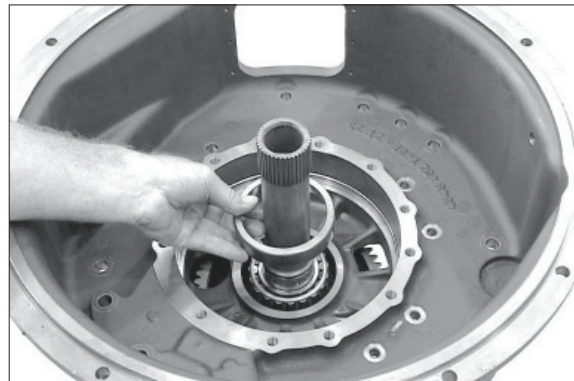


Figure 350

(7) Snap in the rectangular ring (arrow) into the annular groove of the input shaft and lock it.

Then grease the rectangular ring and centrally align it.

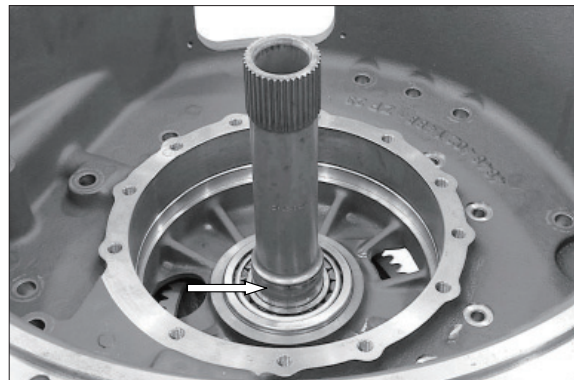


Figure 351

(8) Install the converter safety valve (arrow 1) and fasten it by means of slotted pin (arrow 2).

※ Flush-mount slotted pin to recess.

Put the O-ring (arrow 3) into the annular groove.

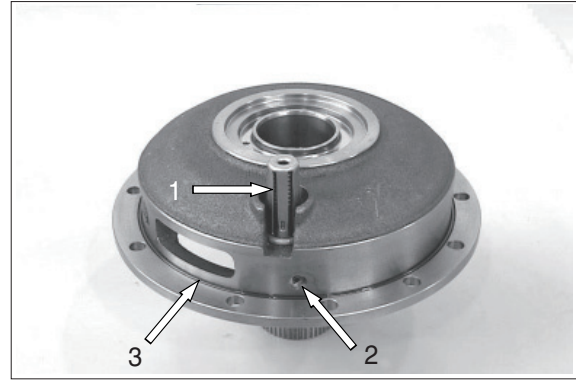


Figure 352

(9) Press the needle bearing (arrow), with the reinforced coating towards the press-in tool into the bore of the bearing cover until contact.

※ Special tool

Mounting tool 5870 058 051

Handle 5870 260 002

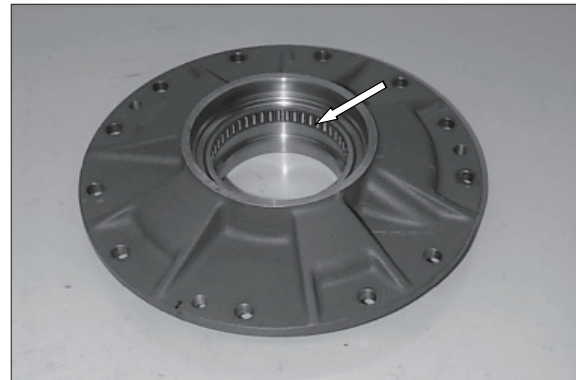


Figure 353

(10) Flush-mount the shaft seal (arrow) with the sealing lip showing (downwards) to the oil sump.

※ Wet the outer diameter with spirit.
Grease the sealing lip.

※ Special tool

Mounting tool 5870 048 030

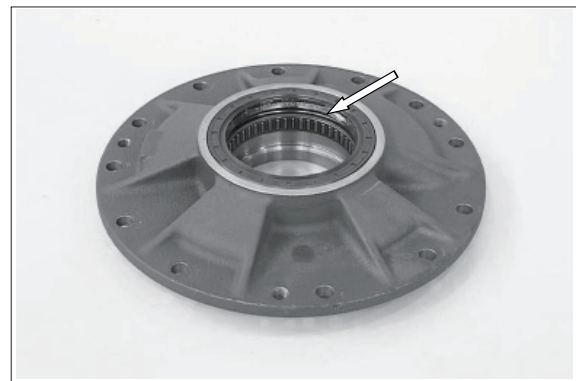


Figure 354

※ Make the following steps (figure 355~358) in direct time sequence to secure the precise contact of the oil supply flange.

(11) Heat the housing bore.

※ Special tool

Preheating bush 5870 801 006

Hot-air blower 5870 221 500

Hot-air blower 5870 221 501



Figure 355

(12) Install two adjusting screws and put in the oil supply flange until contact.

※ Observe the radial installation position.

※ Special tool

Adjusting screws 5870 204 007

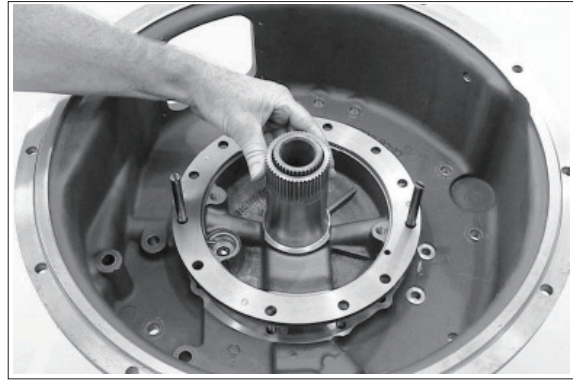


Figure 356

(13) Place the O-ring (arrow) with assembly grease into the annular groove of the bearing cover.

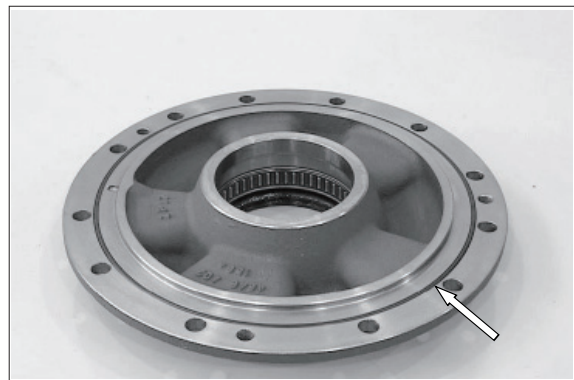


Figure 357

(14) Put on the bearing cover and fasten it by means of hexagon screws.

· Torque limit (M10/8.8) :

4.69 kgf · m (33.9 lbf · ft)

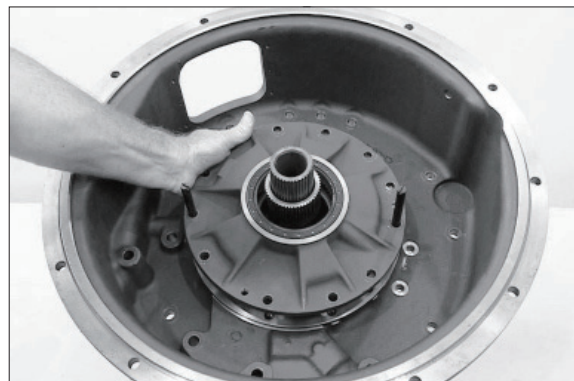


Figure 358

(15) Install the single components according to the opposite figure.

1 Screw plug : 15.3 kgf · m (110 lbf · ft)

2 Screw plug : 2.55 kgf · m (18.4 lbf · ft)

3 Temperature sensor :

2.55 kgf · m (18.4 lbf · ft)

and screw plug respectively (depending on the version) : 3.57 kgf · m (25.8 lbf · ft)

※ Always install new O-ring.

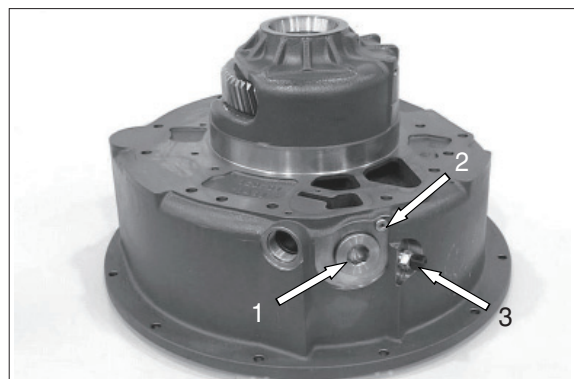


Figure 359

Converter pressure back-up valve
(figure 360~361)

- (1) Install the slotted pin (6×50 mm) until contact.

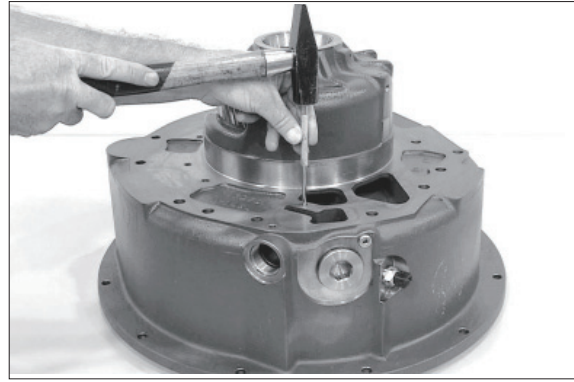


Figure 360

- (2) Assemble piston and compression spring. Provide screw plug with a new O-ring and install it.

- Torque limit (M36×1.5) :
13.3 kgf · m (95.9 lbf · ft)

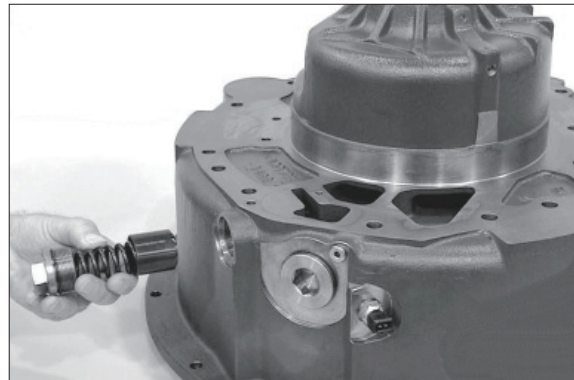


Figure 361

- (3) Fasten the gasket and cover plate by means of hexagon screws (install the washers).

- Torque limit (M6/8.8) :
0.97 kgf · m (7.0 lbf · ft)



Figure 362

- (4) Install two adjusting screws and put on the gasket (arrow 1). Put the O-ring (arrow 2) into the annular groove.

- ※ Special tool
Adjusting screws 5870 204 021

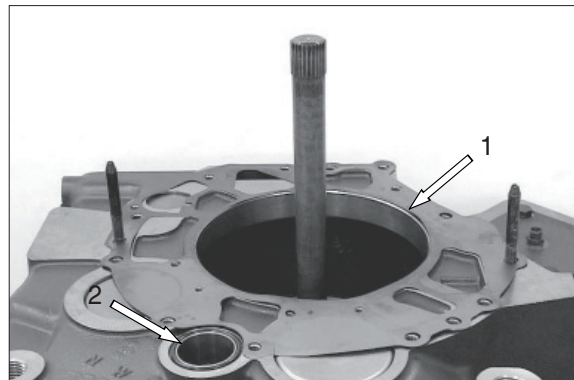


Figure 363

(5) Install the converter bell by means of lifting tackle until contact.

※ Slight rotary motions of the input shaft facilitate the installation (protect teeth from damage). Observe the radial installation position.

※ Special tool

Lifting tackle 5870 281 047

Eyebolts assortment 5870 204 002



Figure 364

(6) Fasten the converter bell by means of hexagon screws.

· Torque limit (M8/10.9) :

3.47 kgf · m (25.1 lbf · ft)

· Torque limit (M12/10.9) :

11.7 kgf · m (84.8 lbf · ft)

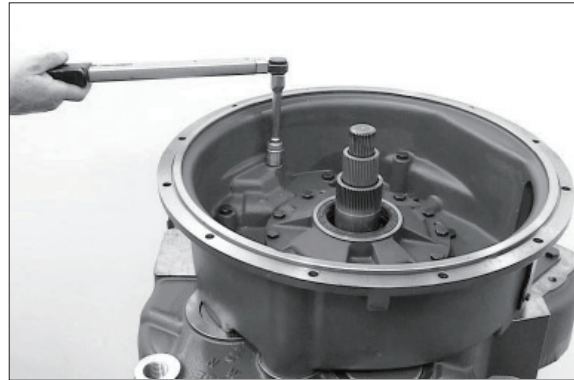


Figure 365

(7) Fasten flexible plate (3EA) by means of hexagon screws (install the washers).

※ Wet thread of the hexagon screws with Loctite (type No. 243).

· Torque limit (M10/8.8) :

4.69 kgf · m (33.9 lbf · ft)

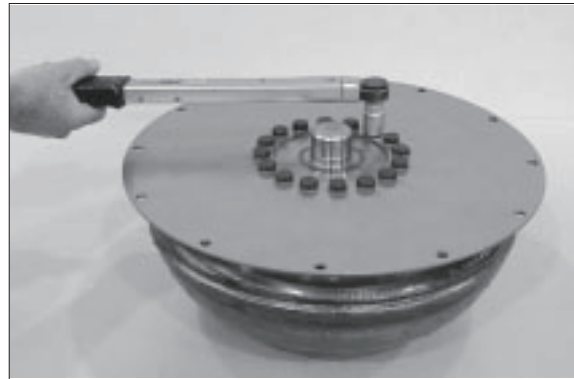


Figure 366

(8) Install the rectangular ring (arrow) into the annular groove and lock it.

Then grease the rectangular ring and centrally align it.

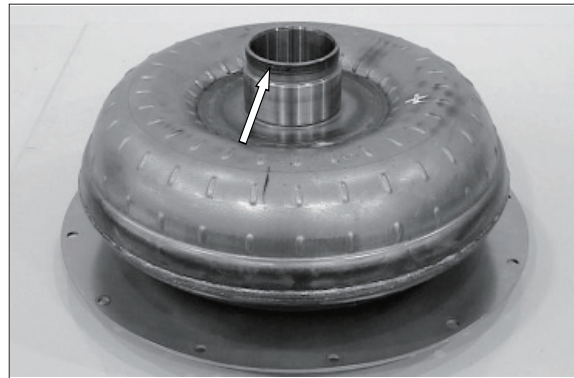


Figure 367

(9) Assemble converter by means of lifting tackle until contact (figure 368).

※ At a control dimension < 43 mm, the exact installation position of the converter is ensured, see Figure 369.

※ Special tool

Eyebolts assortment 5870 204 002

Lifting chain 5870 281 047

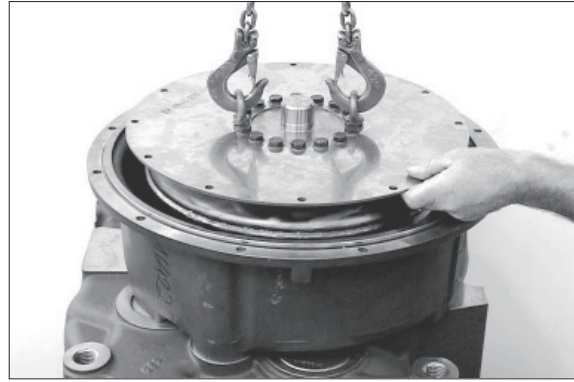


Figure 368

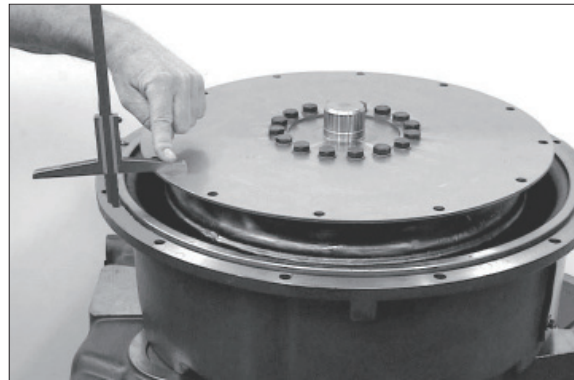


Figure 369

⚠ Until installation of the transmission, fix the converter axially, see figure 370.

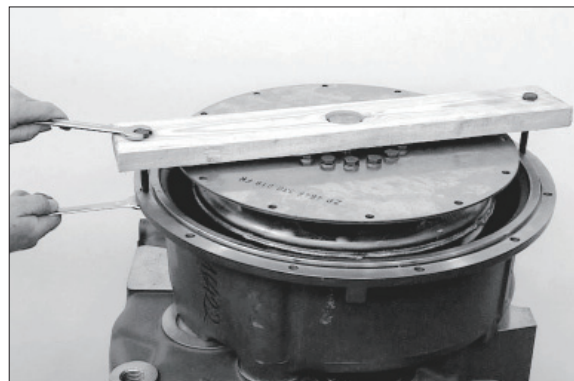


Figure 370

Coarse Filter

(1) Install filter (assy) into the housing bore.

※ Oil the sealing (arrow).

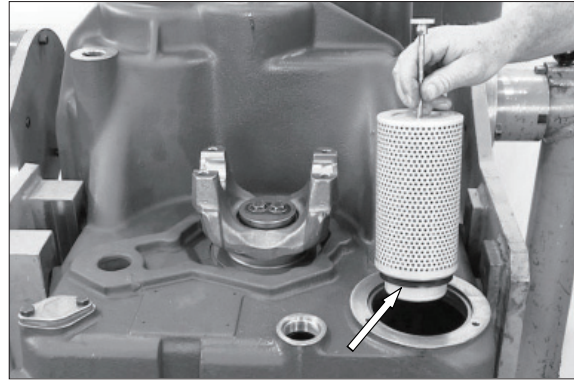


Figure 371

(2) Fasten the cover by means of hexagon screws (install the washers).

※ Install the new O-ring (arrow).

· Torque limit (M8/8.8) :

2.35 kgf · m (17.0 lbf · ft)

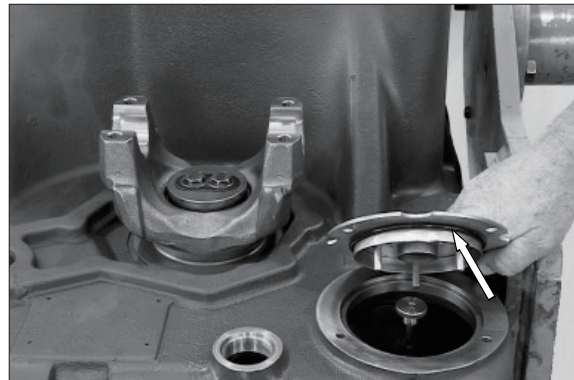


Figure 372

Inductive and speed transmitters

(1) Following sketches show the installation position of the single inductive and speed transmitters.

14	Inductive transmitter	n-Turbine
9	Inductive transmitter	n-Engine
5	Inductive transmitter	n-Internal speed input
13	Speed transmitter	n-Output

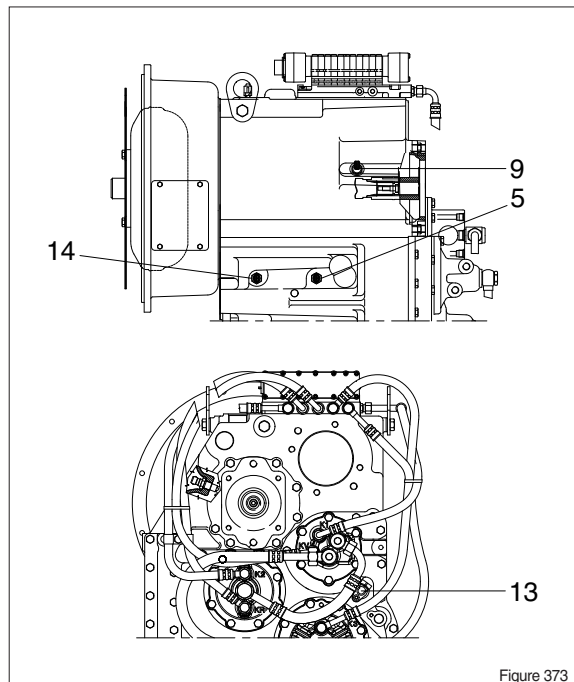


Figure 373

※ The following figures describe the installation and setting respectively of the inductive transmitter n-Engine (9).

Installation of the inductive transmitter n-Turbine (14) and n-internal speed input (5) is to be made analogously.

Observe the different setting dimensions "X" :

▲ Inductive transmitter n-Engine (9)

X = 0.5^{+0.3} mm

Inductive transmitter n-Turbine (14)

X = 0.5^{+0.3} mm

Induct. transmitter n-int. speed input (5)

X = 0.3^{±0.1} mm

Adjust Dimension "X" by means of shim ring (s) (figure 376~381)

(1) Measure Dimension I on the inductive transmitter, from contact face to screw-in face.

※ Dimension I e.g 30.00 mm

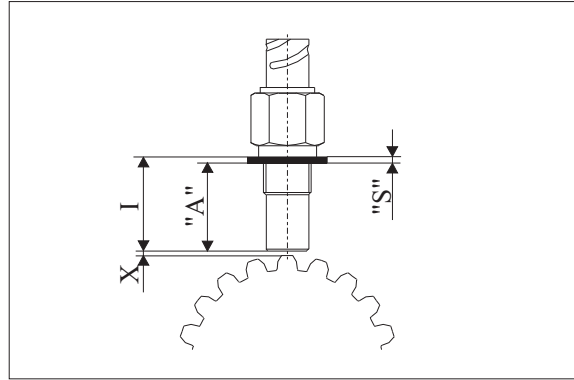


Figure 375



Figure 376

(2) Turn in the counting disc radially until one tooth tip is centrally to the inductive transmitter bore.

Turn the plug gauge until contact.

Locate anvil at the tooth tip and lock it by means of threaded pin (figure 377 and 378).

※ Special tool
Plug gauge 5870 200 104

※ Special tool
Plug gauge 5870 200 104

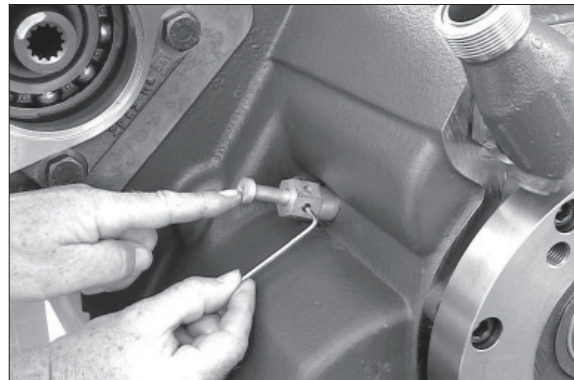


Figure 377

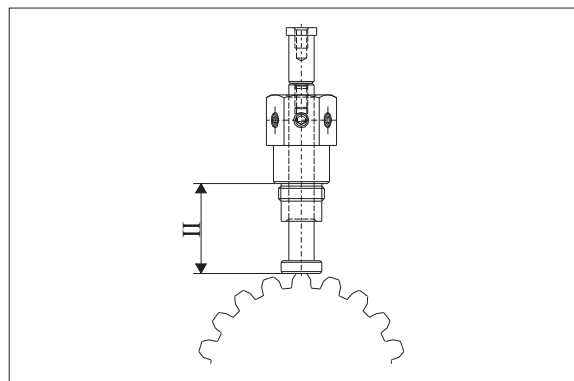


Figure 378

- (3) Turn out the plug gauge and determine Dimension II (also see figure 378).

Dimension II e.g 30.10 mm

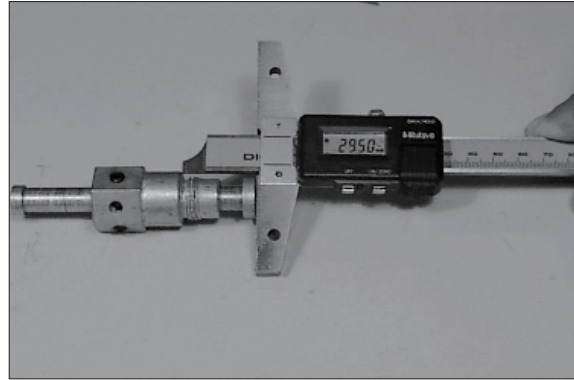


Figure 379

Example "A₁" :

$$\begin{array}{r}
 \text{Dimension II} \quad \quad \quad \underline{30.10 \text{ mm}} \\
 \text{Dimension X (0.5}^{+0.3} \text{ mm)} \quad - \underline{0.60 \text{ mm}} \\
 \text{Results in installation dimension A} \\
 \quad \quad \quad \quad \quad \quad \quad = \underline{29.50 \text{ mm}}
 \end{array}$$

Example "A₂" :

$$\begin{array}{r}
 \text{Dimension I} \quad \quad \quad \underline{30.00 \text{ mm}} \\
 \text{Installation dimension A} \quad - \underline{29.50 \text{ mm}} \\
 \text{Results in shim ring (s)} \quad s = \underline{0.50 \text{ mm}}
 \end{array}$$

- (4) Install the adequate shim ring (s) and wet the thread (arrow) with Loctite (type No. 574).

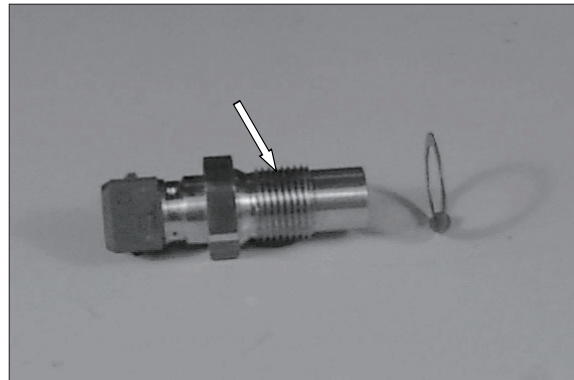


Figure 380

- (5) Install the inductive transmitter n-Engine (9), see arrow.

· Torque limit : 3.06 kgf · m (22.1 lbf · ft)

Set and install the inductive transmitter n-Turbine (14) and n-internal speed input (5) analogously.

- ※ Observe the different setting dimensions. Installation position of the single inductive transmitters.

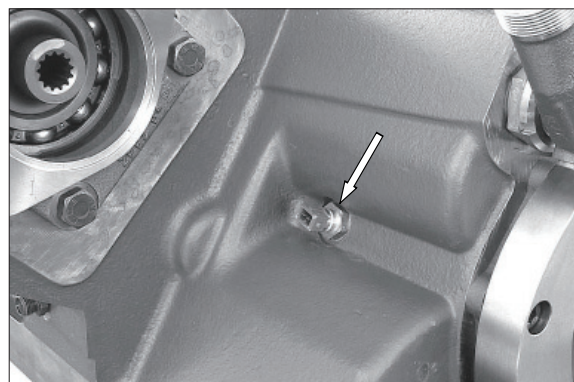


Figure 381

Install speed transmitter n-Output/Speedo (13) (figure 382~387)

- 1 Housing
- 2 Spur gear K3
- 3 Disc carrier
- 13 Speed transmitter (hall sensor)
- X** Setting dimension "X" =1.0+0.5 mm

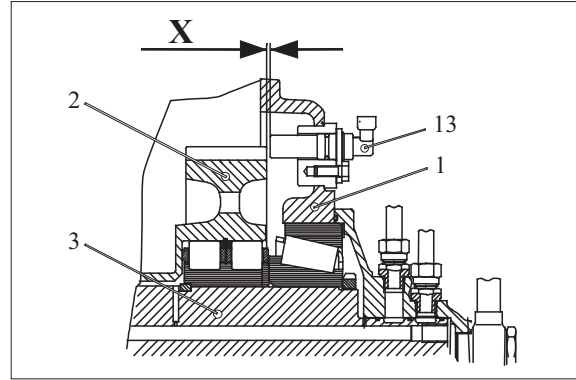


Figure 382

(1) Opposite figure shows the speed transmitter (hall sensor).



Figure 383

(2) Determine Dimension I, from the housing face to spur gear K3.

Dimension I e.g 39.70 mm

- ※ Special tool
- Digital depth gauge 5870 200 072

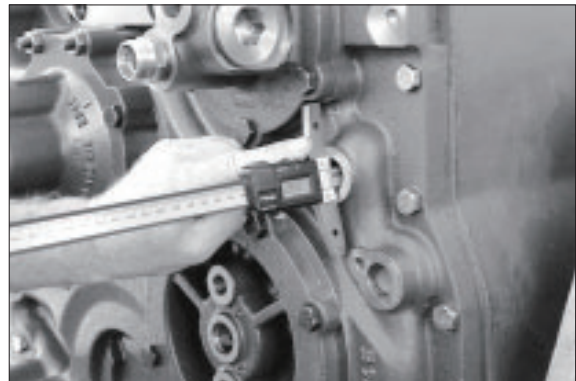


Figure 384

(3) Measure Dimension II, from the contact face to the mounting face.

Dimension II e.g 40.00 mm

- ※ Special tool
- Digital depth gauge 5870 200 072

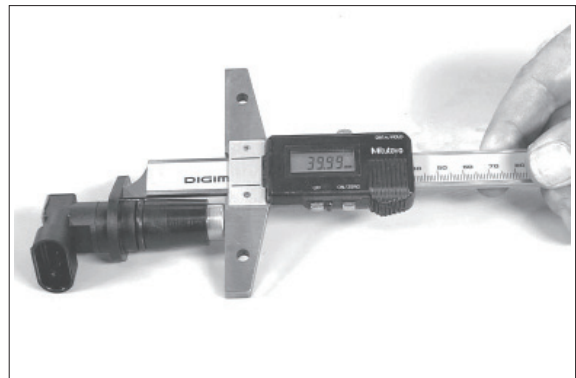


Figure 385

Example "B₁" :

$$\begin{array}{r} \text{Dimension I} \qquad \qquad \qquad \underline{39.70 \text{ mm}} \\ \text{Dimension X}(1.0+0.5\text{mm}) \quad - \underline{1.20 \text{ mm}} \\ \text{Results in installation dimension} \\ \hline \qquad \qquad \qquad \qquad \qquad \qquad = \underline{38.50 \text{ mm}} \end{array}$$

Example "B₂" :

$$\begin{array}{r} \text{Dimension II} \qquad \qquad \qquad \underline{40.00 \text{ mm}} \\ \text{Installation dimension A} \quad - \underline{38.50 \text{ mm}} \\ \text{Results in shim(s)} \qquad \qquad \quad s = \underline{1.50 \text{ mm}} \end{array}$$

(4) Install shims (3EA, s = 0.50 mm) and grease the O-ring (arrow).

(5) Fasten the speed transmitter by means of cap screw.

- Torque limit (M8/8.8) :
2.35 kgf · m (17.0 lbf · ft)

※ Installation position of the speed transmitter, also see figure 373.

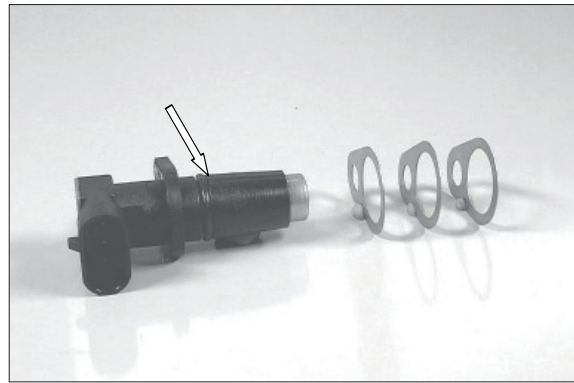


Figure 386

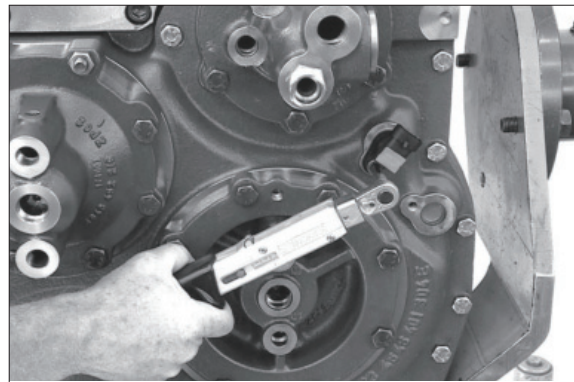


Figure 387

3. AXLE

1) DISASSEMBLY

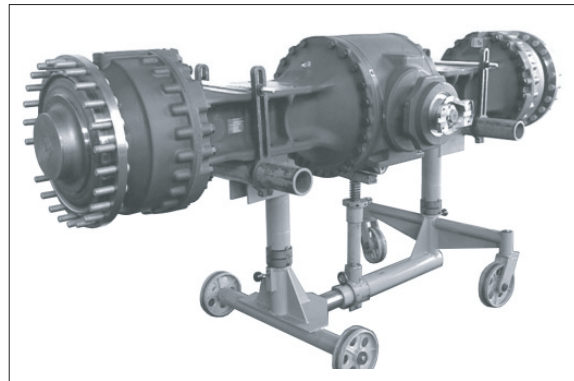
(1) Disassembly output and brake

① Fix axle to assembly truck.

Assembly truck	5870 350 000
Fixtures	5870 350 077
Clamping brackets	5870 350 075
Support	5870 350 125

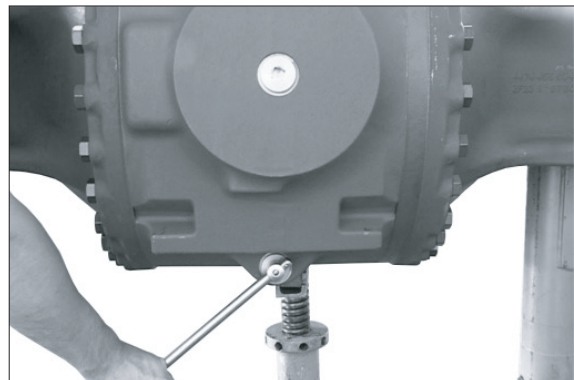
※ Before clamping the axle fully turn in the support.

Position axle first onto the two fixtures, secure with clamping brackets and then unbolt the support until contact with the axle is obtained.

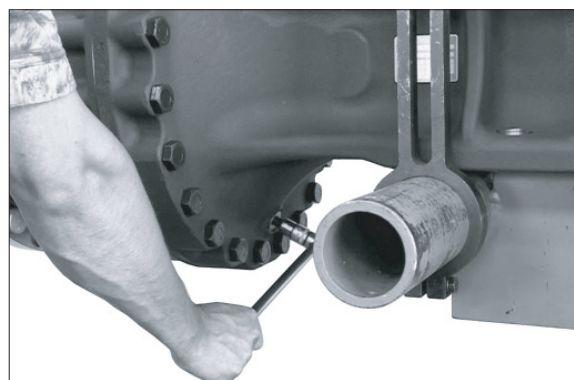


7809AX01

② Loosen screw plugs (3EA, see figure AX02 and AX03) and drain oil from the axle.



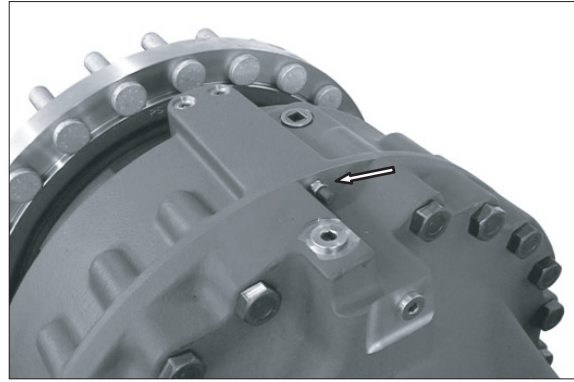
7809AX02



7809AX03

③ Remove the breather valve (see arrow).

※ To avoid any damage, the breather valve must be removed when separating the output.

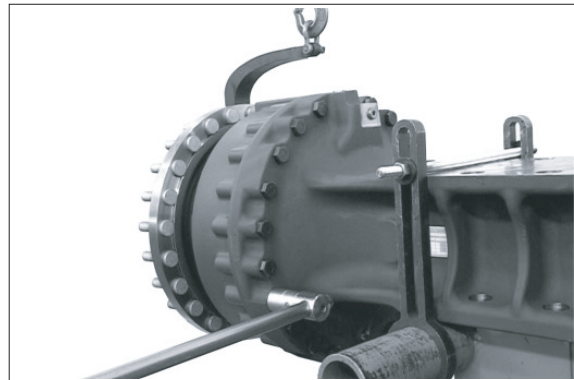


7809AX04

④ Secure the output with the lifting device and loosen hexagon screws. Then separate the output assy from the axle housing.

Load carrying device AA00 685 875

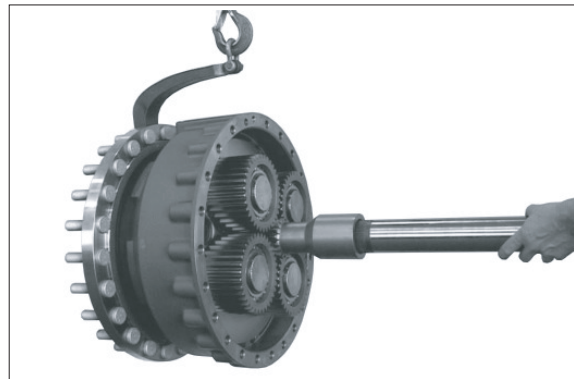
※ Fix the load carrying device with wheel nuts.



7809AX05

⑤ Pull stub shaft and sun gear shaft.

※ Pay attention to potentially releasing shim(s).

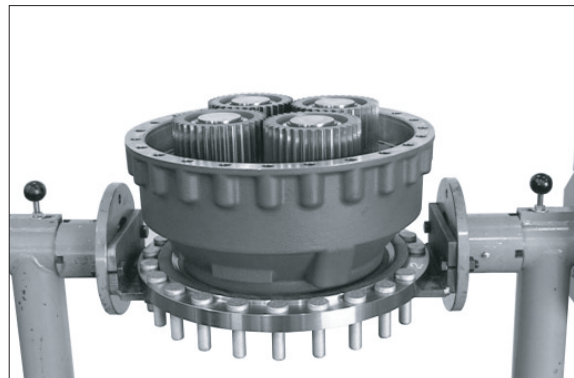


7809AX06

⑥ Fix output to assembly truck.

Assembly truck 5870 350 000

Fixtures (2EA) 5870 350 113



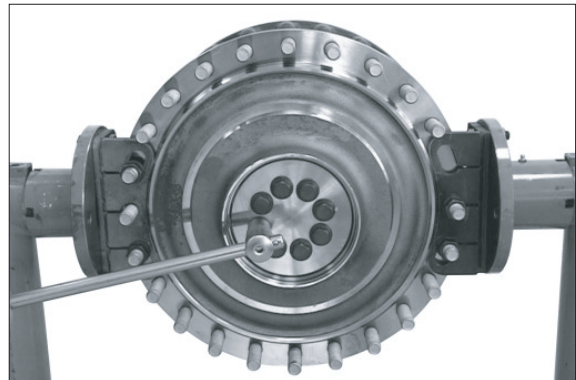
7809AX07

- ⑦ Use a lever to remove the cover from the output shaft.



7809AX08

- ⑧ Loosen locking screws and remove the releasing cover.



7809AX09

- ⑨ Lift the planetary carrier out of the brake housing by means of the lifting device.

- Rear axle (planetary carrier with 3 planetary gears)

Internal extractor	5870 300 019
Eye bolt	5870 204 073
- Front axle (planetary carrier with 4 planetary gears)

Internal extractor	5870 300 008
Eye nut	AA00 680 376



7809AX10

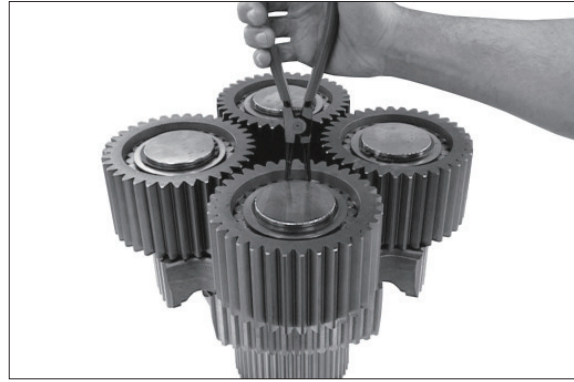
- ⑩ Pull the tapered roller bearing from the planetary carrier.

- | | |
|-------------------|--------------|
| Rapid grip | AA00 693 459 |
| Basic tool | 5873 004 001 |
| Clamping cylinder | 5873 003 016 |
| Pump | 5870 287 010 |



7809AX70

⑪ Disengage retaining ring.



7809AX71

⑫ Pull off planetary gear.

Extractor	AA00 696 012
Clamping cylinder	5873 003 016
Pump	5870 287 010



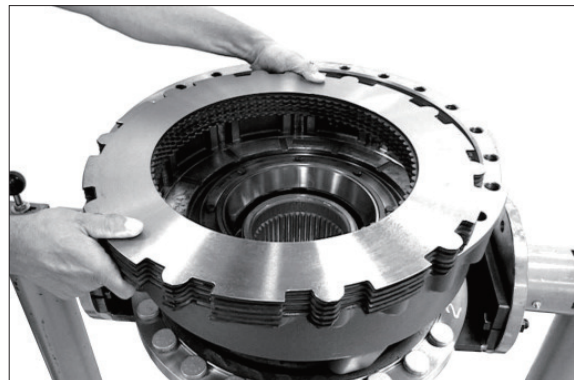
7809AX72

⑬ Lift the end plate out of the brake housing.



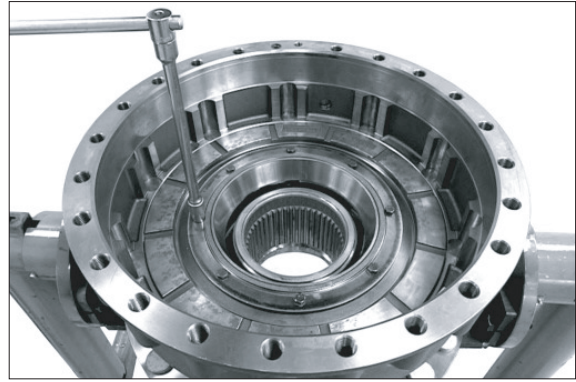
7809AX73

⑭ Lift the disk package out of the brake housing.



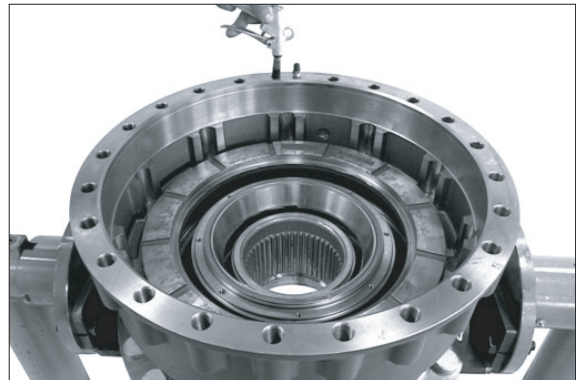
7809AX12

- ⑮ Loosen hexagon screws, remove releasing disk and cup spring.



7809AX13

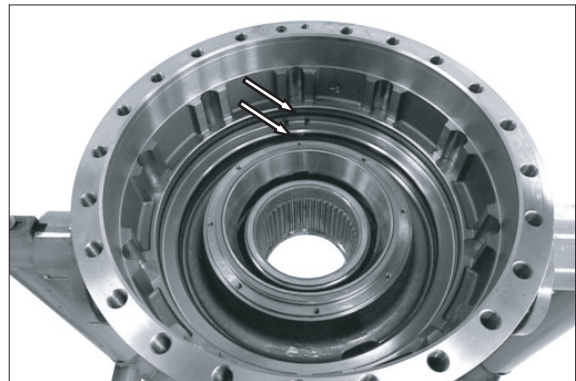
- ⑯ Mount breather valve and press piston out of the brake housing by means of compressed air.



7809AX14

- ⑰ If necessary, remove guide ring, back-up rings and grooved rings out of the annular grooves of the brake housing (see arrows).

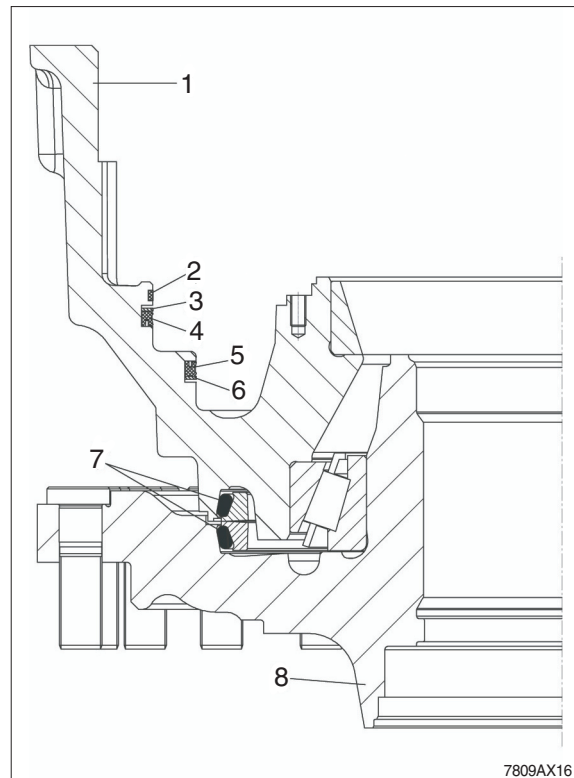
- ※ For the installation position of the single parts please also refer to the following sketch.



7809AX15

Legend to sketch :

- 1 = Brake housing
- 2 = Guide ring
- 3 = Back-up ring
- 4 = Grooved ring
- 5 = Grooved ring
- 6 = Back-up ring
- 7 = Slide ring seal
- 8 = Output shaft



7809AX16

- ⑱ Lift the brake housing from the output shaft by means of the lifting device.



7809AX17

- ⑲ Use a lever to remove the slide ring seal from the brake housing.

If necessary, force out both bearing outer rings.

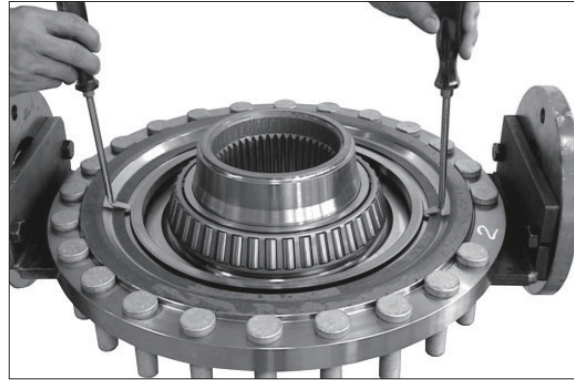
Resetting device 5870 400 001



7809AX18

- ⑩ Use a lever to remove the slide ring seal from the output shaft.

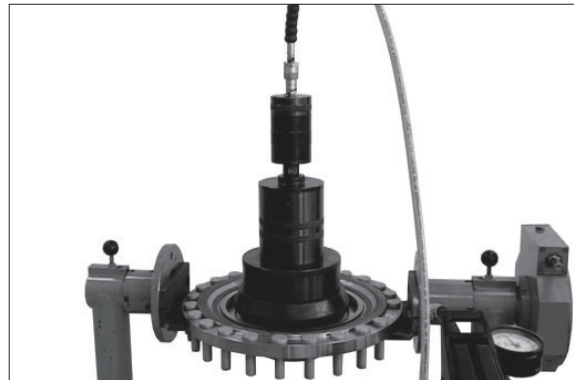
Resetting device 5870 400 001



7809AX74

- ⑪ Pull the tapered roller bearing from the output shaft.

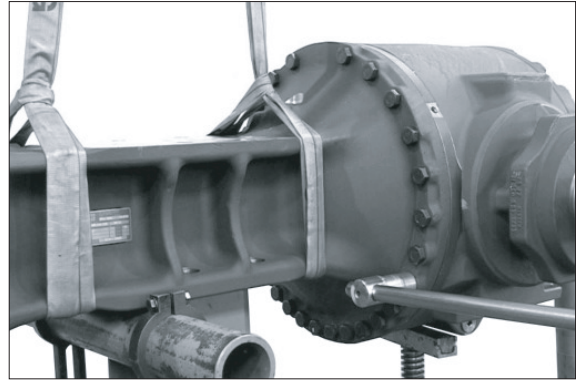
Gripping device AA00 633 495
Adapter ring AA00 633 500
Basic tool 5873 004 001
Pressure piece AA00 696 181
Clamping cylinder 5873 003 016
Pump 5870 287 010



7809AX75

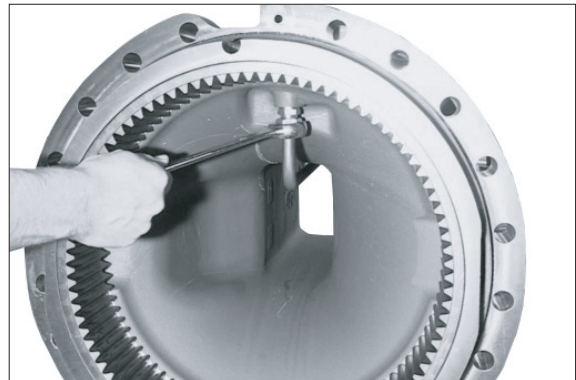
(2) Disassembly axle housing

- ① Secure axle housing with the lifting device and loosen the hexagon screws. Then separate the axle housing from the axle drive housing.



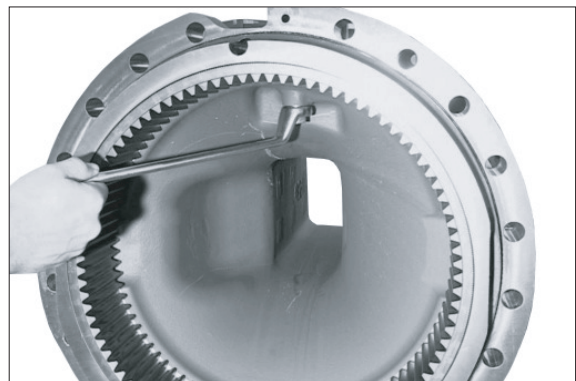
7809AX19

- ② Loosen the threaded connections and remove the releasing brake tube.



7809AX20

- ③ Loosen both screw necks.



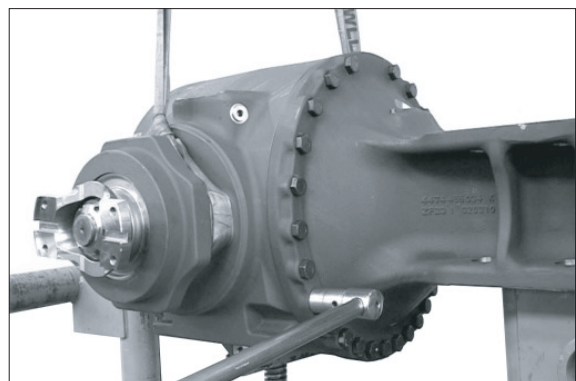
7809AX21

(3) Disassembly axle drive housing

- ① Secure axle drive housing with the lifting device and loosen the hexagon screws. Then separate the axle drive housing from the axle housing.

Eyebolt (M20)
Thread insert

5870 204 086
AA00 677 715



7809AX22

- ② Fix axle drive housing to the assembly truck.

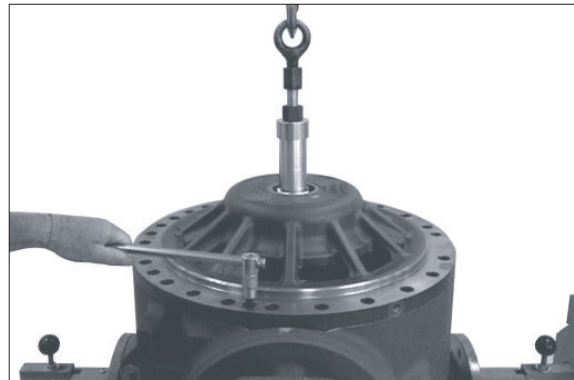
Assembly truck	5870 350 000
Fixtures (2EA)	5870 350 113



7809AX76

- ③ Loosen cylindrical screws and lift the releasing bearing housing with the lifting device.

Inner extractor	5870 300 008
Eye bolt	AA00 680 376



7809AX77

- ④ Pull the bearing outer ring (see arrow) out of the bearing hole and remove the shim behind.



7809AX78

- ⑤ Press the piston out of the bearing housing by means of compressed air.



7809AX79

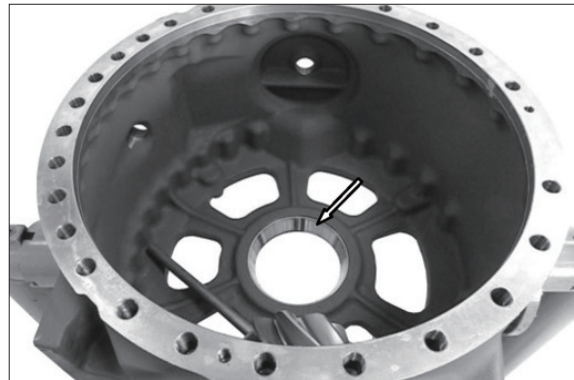
- ⑥ Lift differential out of the axle drive housing with the lifting device.

Inner extractor 5870 300 008
Eye nut AA00 680 376



7809AX80

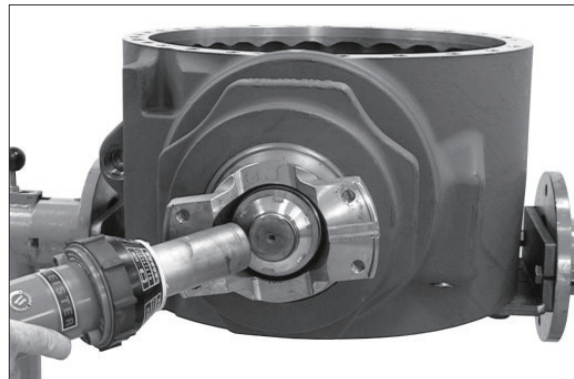
- ⑦ Pull the bearing outer ring (see arrow) out of the bearing hole and remove the shim behind.



7809AX81

- ⑧ Heat slotted nut by means of hot-air blower.

※ Slotted nut is secured with Loctite # 262.



7809AX82

- ⑨ Loosen the slotted nut and remove the shim behind.

Wrench 5870 401 093
Fixing device AA00 695 905
Clamping device 5870 240 002



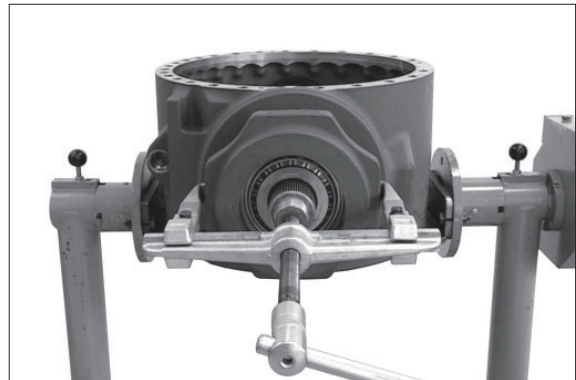
7809AX83

- ⑩ Pull input flange from the input pinion and use a lever to lift the shaft seal ring behind out of the axle drive housing.



7809AX84

- ⑪ Use a two-armed puller to press the input pinion out of the axle drive housing and remove the releasing tapered roller bearing.



7809AX85

- ⑫ Remove the spacer and pull the tapered roller bearing from the input pinion.

Gripping device	AA00 253 881
Basic tool	5873 003 000
Clamping cylinder	5873 003 016
Pump	5870 287 010



7809AX86

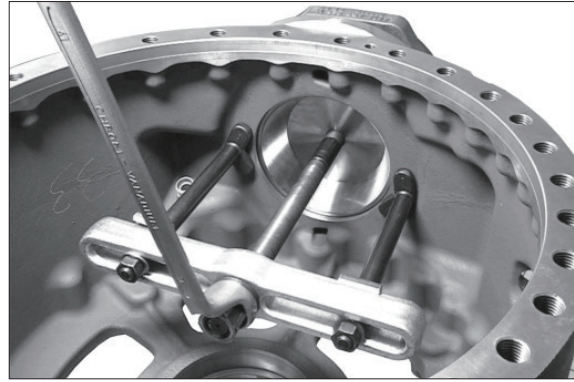
- ⑬ Loosen the threaded connection and remove the releasing oil tube.



7809AX87

- ⑭ If necessary pull the internal bearing outer ring out of the axle drive housing and remove the shim behind.

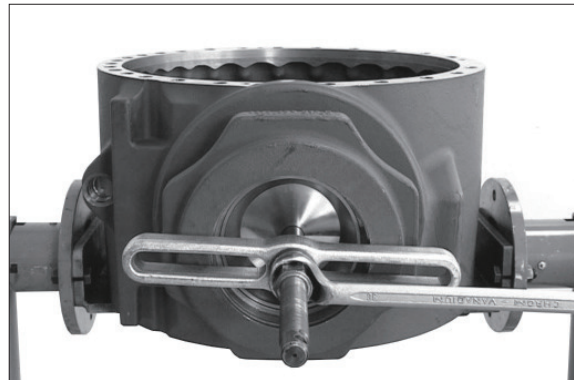
Assembly device AA00 696 770
Counter support 5870 300 020



7809AX88

- ⑮ If necessary pull the external bearing ring out of the axle drive housing.

Assembly device AA00 696 770
Counter support 5870 300 020

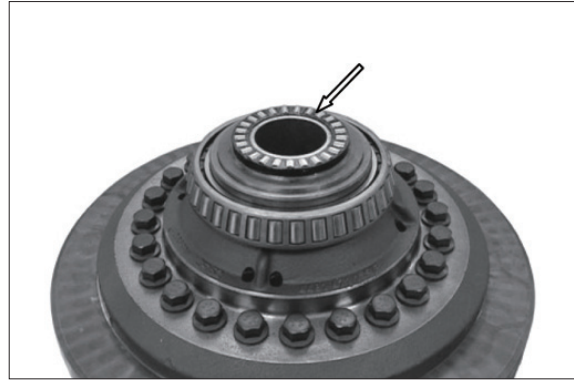


7809AX89

(4) Disassembly differentials

Disassembly multi-disk differential lock

- ① Remove axial roller cage (arrow).



7809AX90

- ② Pull both tapered roller bearings from the differential.

Crown wheel side

Rapid grip AA00 303 274

Basic tool 5873 004 001

Pressure piece AA00 694 360

Opposite side

Grab sleeve 5873 004 026

Basic tool 5873 004 001

Clamping cylinder 5873 003 016

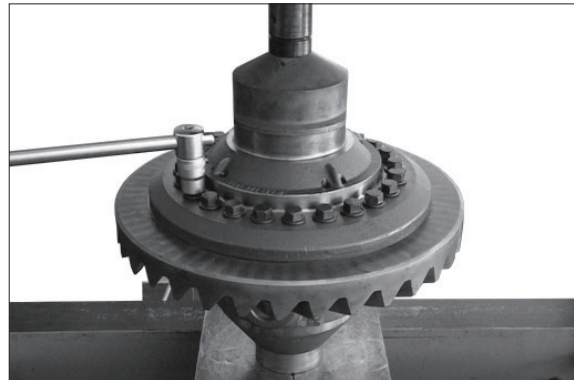
Pump 5870 287 010



7809AX91

- ③ Preload the differential by means of the press and loosen the locking screws.

Pressure piece AA00 694 360



7809AX92

- ④ Lift the differential cover from the differential housing by means of the lifting device.

Inner extractor 5870 300 008

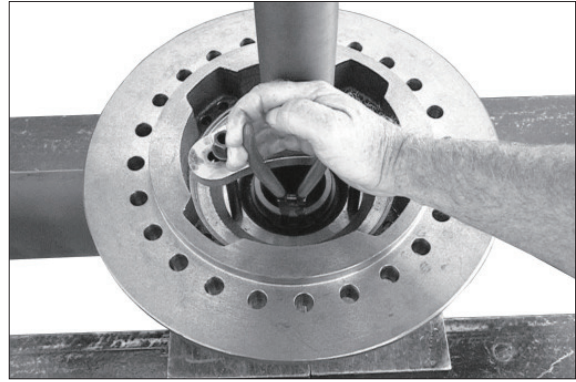
Eye nut AA00 680 376



7809AX93

- ⑤ Preload the compression spring by means of the press and disengage the retaining ring.

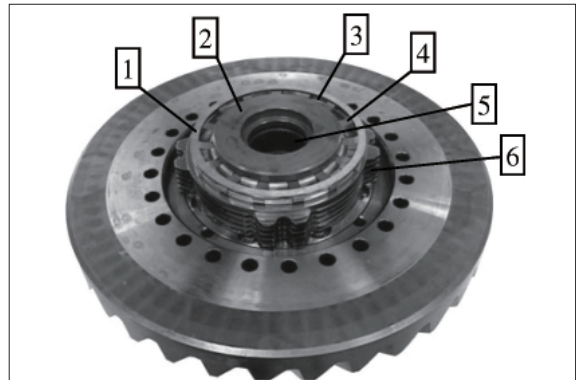
Then pull the sliding sleeve out of the differential cover and remove the releasing compression springs.



7809AX94

- ⑥ Remove single parts.

- 1 = Disk
- 2 = Pressure piece
- 3 = Cage
- 4 = Lever (15EA)
- 5 = Disk carrier
- 6 = Disk package



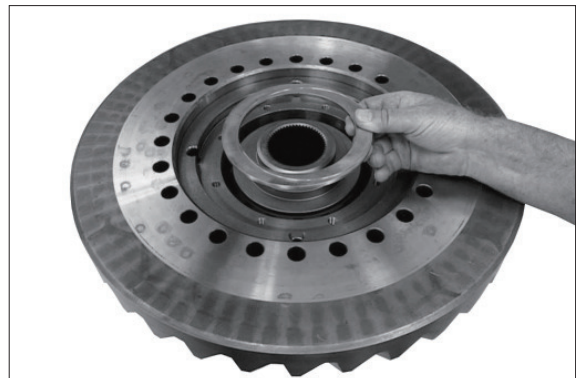
7809AX95

- ⑦ Loosen hexagon screws and remove the releasing disk.



7809AX96

- ⑧ Remove thrust washer and axle bevel gear from the differential housing.



7809AX97

⑨ Force out slotted pins (4EA).



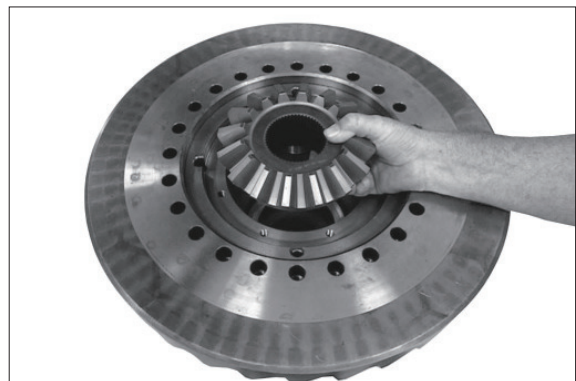
7809AX98

⑩ Pull spider shafts (4EA) and remove the releasing spider gears with the thrust washers from the differential housing.



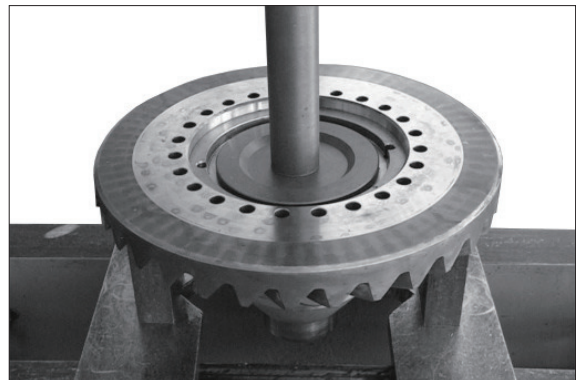
7809AX99

⑪ Remove the axle bevel gears and the shims behind.



7809AX100

⑫ Support the crown wheel and force out the differential housing.



7809AX101

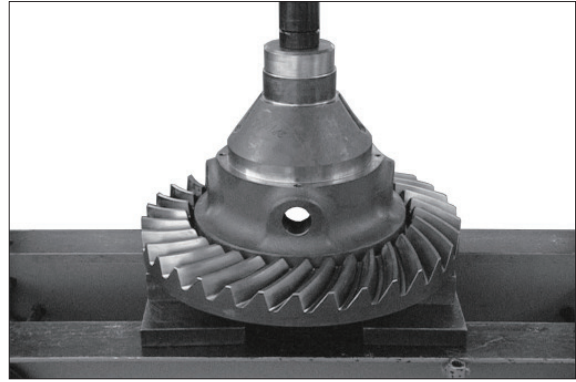
2) ASSEMBLY

(1) Assembly differentials

Assembly multi-disk differential lock

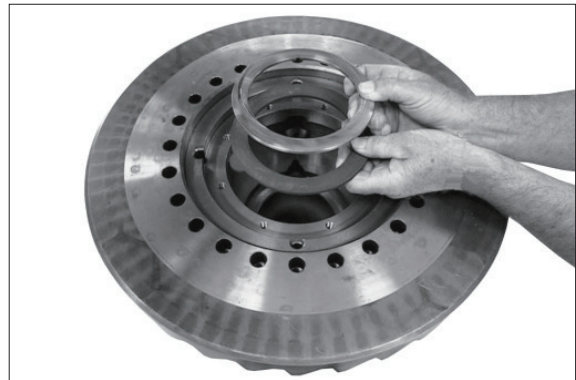
- ① Mount two adjusting screws and press the heated crown wheel onto the differential housing until contact is obtained.

Adjusting screws 5871 204 040



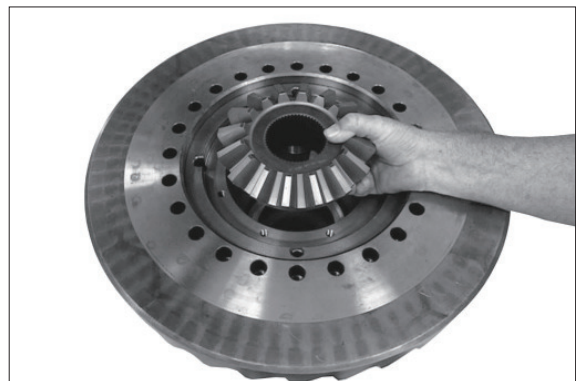
7809AX102

- ② Insert disk and thrust washer into the differential housing



7809AX103

- ③ Insert axle bevel gear.

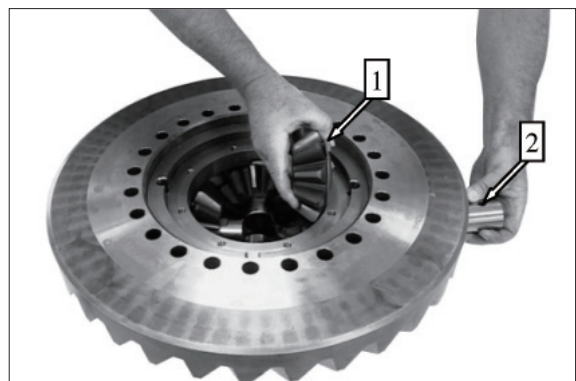


7809AX104

- ④ Insert spider gears with thrust washers into the differential housing and fix them with the spider shaft.

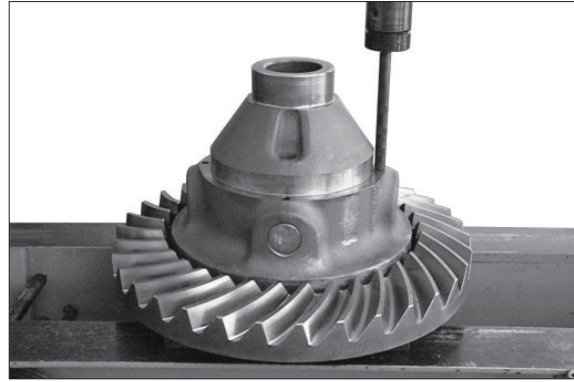
※ Thrust washers must be positioned with the tabs (see arrow 1) in the recesses of the differential housing.

Pay attention to radial installation position of the spider shafts (fixing holes, arrow 2).



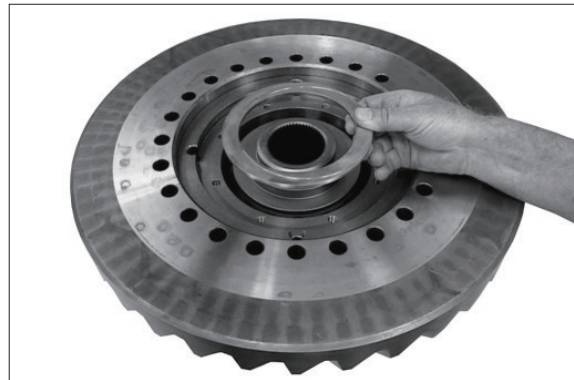
7809AX105

- ⑤ Fix spider shafts with slotted pins (2 pieces / hole).
※ Press the slotted pins with 180° offset openings into flush position.



7809AX106

- ⑥ Mount second axle bevel gear and thrust washer.



7809AX107

- ⑦ Mount disk and fix it with hexagon screws.
· Tightening torque (M10/10.9) :
5.1 kgf · m (36.9 lbf · ft)

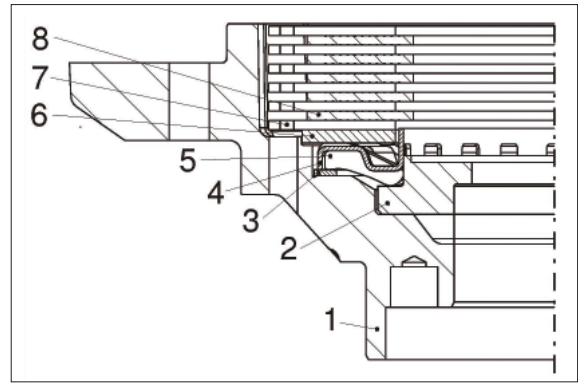


7809AX108

Setting of disk package

- ⑧ Premount single parts according to the adjacent sketch.

- 1 = Differential cover
- 2 = Pressure piece
- 3 = Disk
- 4 = Cage
- 5 = Lever (15EA)
- 6 = End plate
- 7 = Outer disks (optional)
- 8 = Inner disks

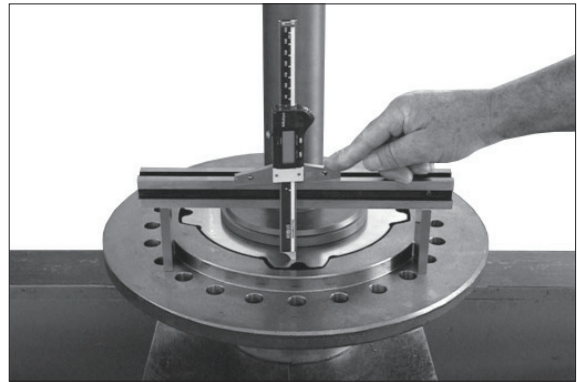


7809AX109

- ⑨ Preload disk package with an axial force of $F = 7$ ton.

Then check the **setting dimension A** = $15.5_{-0.2}$ mm from the mounting face of the differential cover to the plane face of the outer disk (see also below sketch).

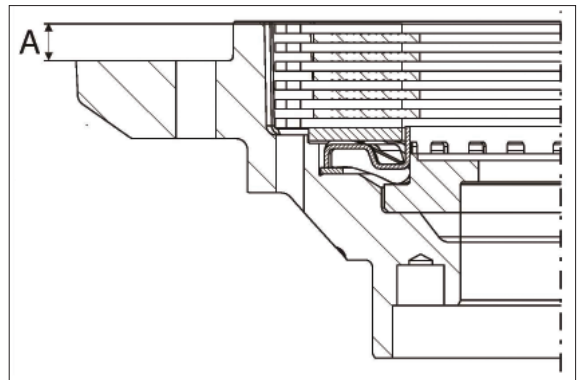
- ※ Any deviation from the specified setting dimension must be corrected with a corresponding outer disk.



7809AX110

Legend to sketch:

A = Setting dimension = $15.5_{-0.2}$ mm



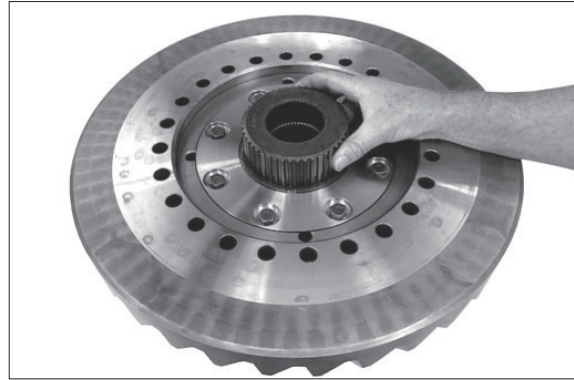
7809AX111

- ⑩ Engage the snap ring (see arrow) into the annular groove of the disk carrier.



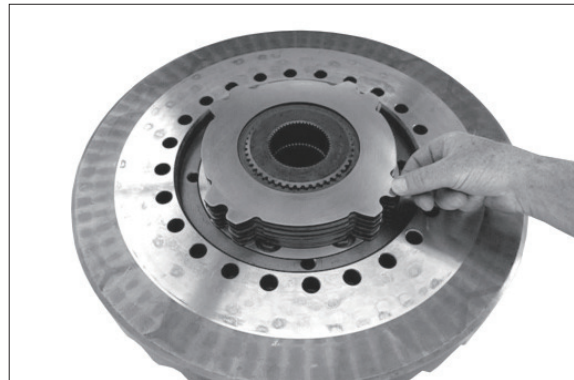
7809AX112

- ⑪ Insert the premounted disk carrier onto the axle bevel gear.



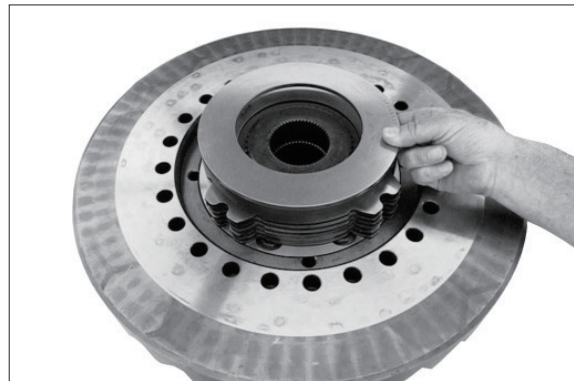
7809AX113

- ⑫ Mount outer and inner disks.
- ※ For the number of disks and disk arrangement please refer to the parts manual.
 - ※ Pay attention to the radial installation position of the disk package, as shown on the adjacent figure.



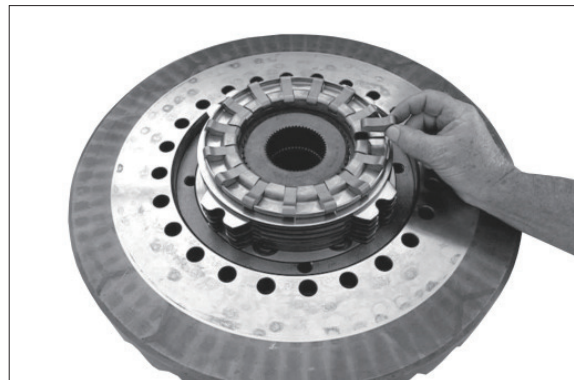
7809AX114

- ⑬ Insert end plate.



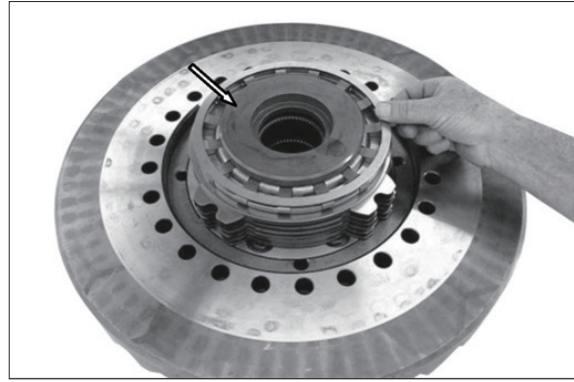
7809AX115

- ⑭ Mount cage and lever (15EA).



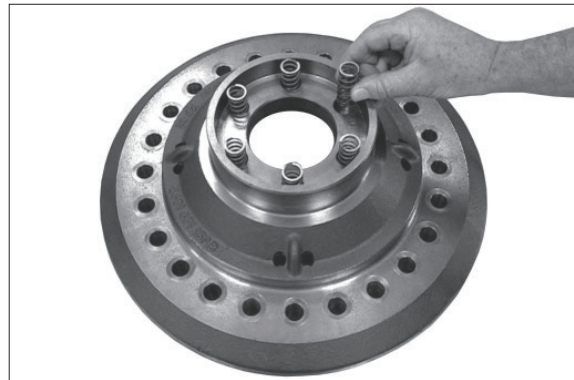
7809AX116

- ⑮ Insert pressure piece (see arrow) and install disk.



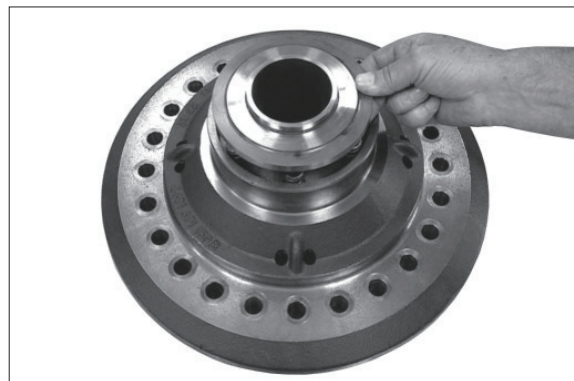
7809AX117

- ⑯ Insert compression springs (6EA) into the differential cover.



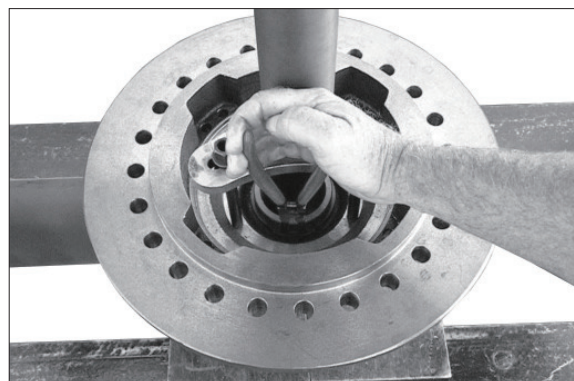
7809AX118

- ⑰ Insert sliding sleeve.



7809AX119

- ⑱ Preload the compression springs by means of the press and engage the retaining ring into the annular groove of the sliding sleeve.



7809AX120

- ① Mount two adjusting screws and insert the differential cover by means of the lifting device.

Adjusting screws	5870 204 040
Inner extractor	5870 300 008
Eye nut	AA00 680 376

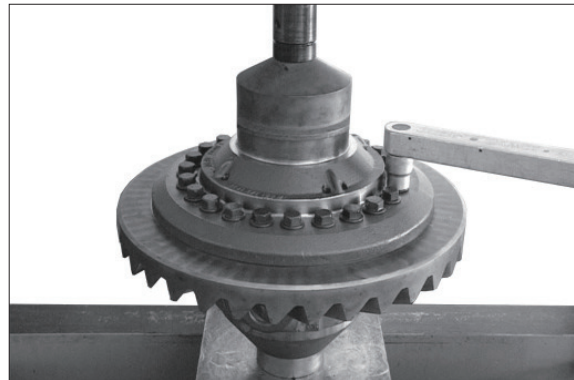


7809AX121

- ② Preload the differential by means of the press and bolt with **new** locking screws.

· Tightening torque (M16/12.9) :
40.7 kgf · m (295 lbf · ft)

Pressure piece AA00 694 360



7809AX122

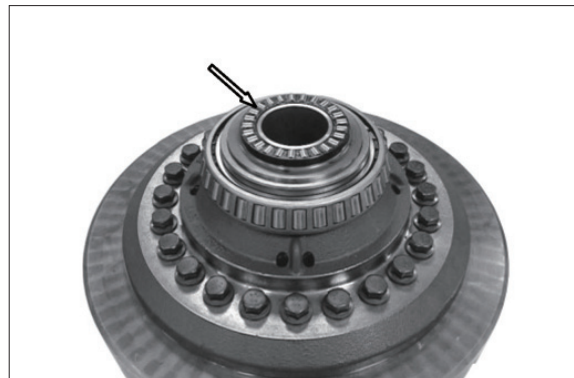
- ③ Heat both tapered roller bearings and insert until contact is obtained.

※ Adjust tapered roller bearing after cooling down.



7809AX123

- ④ Insert axial roller cage (see arrow).



7809AX124

(2) Assembly axle drive housing

※ If crown wheel or input pinion are damaged, both parts must be jointly replaced.

In case of a new installation of a complete bevel gear set pay attention to an identical mating number of input pinion and crown wheel.

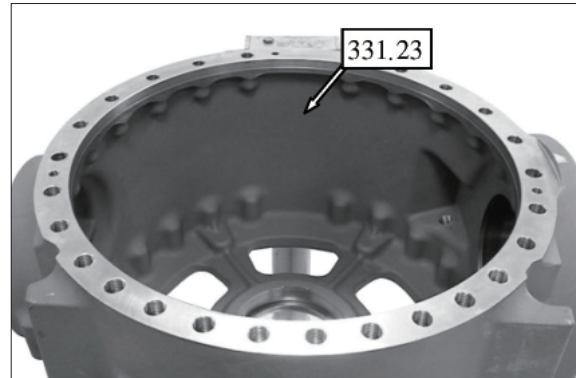
Determination of shim thickness to obtain a correct contact pattern

※ The following measuring procedures must be carried out with utmost accuracy.

Inaccurate measurements lead to an incorrect contact pattern requiring an additional disassembly and reassembly of input pinion and differential.

① Read dimension I from the axle drive housing.

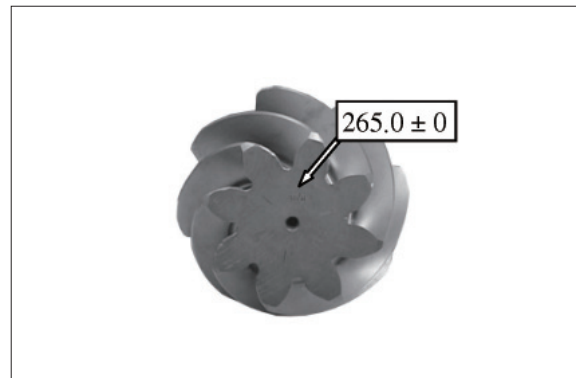
Dimension I e.g 331.25 mm



7809AX125

② Read dimension II (pinion dimension).

Dimension II e.g 265.00 mm



7809AX126

- ③ Determine dimension III (bearing width).

Dimension III e.g. 63.60 mm

Calculation example A :

Dimension I 331.25 mm

Dimension II - 265.00 mm

Dimension III - 63.60 mm

Difference = shim s = 2.60 mm



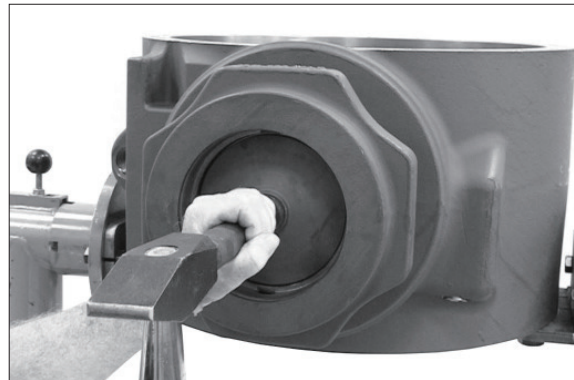
7809AX127

Reassembly of input pinion

- ① Undercool the external bearing outer ring and insert it into the axle drive housing until contact is obtained.

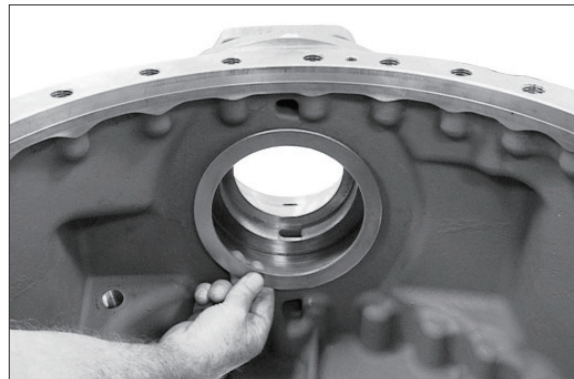
Driver tool 5870 050 007

Handle 5870 260 004



7809AX128

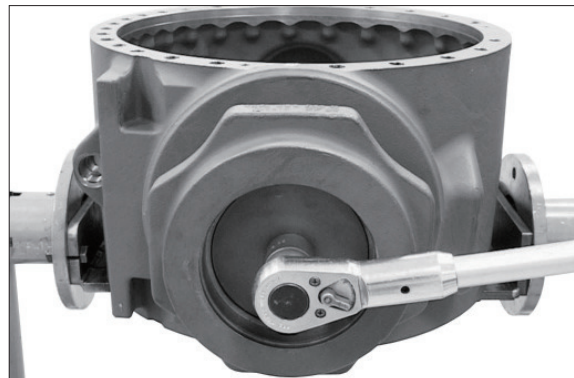
- ② Insert the determined shim e.g. $s = 2.60$ mm into the housing hole.



7809AX129

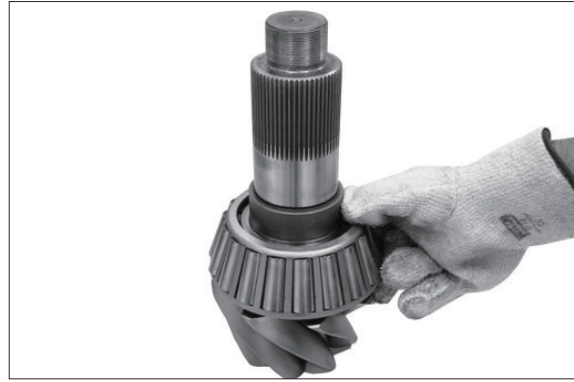
- ③ Undercool the internal bearing outer ring and bring it into contact position in the housing hole by using the assembly fixture.

Assembly fixture AA00 623 955



7809AX130

- ④ Heat the tapered roller bearing and insert it into the input pinion until contact is obtained.



7809AX131

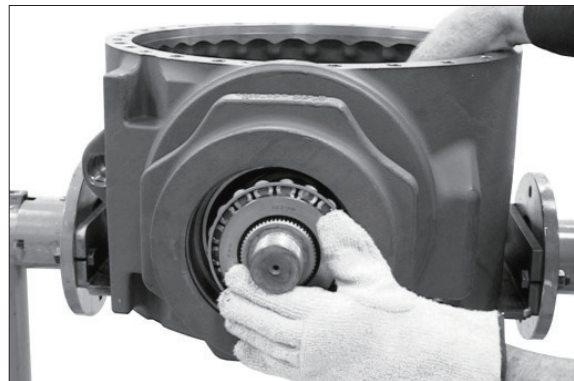
Setting of rolling torque of input pinion bearing 0.1~0.5 kgf·m (without shaft seal ring)

- ⑤ Insert spacer (e.g. $s = 7.13$ mm).
- ※ According to our experience the necessary rolling torque is obtained when reusing the spacer which has been removed during disassembly (e.g. $s = 7.13$ mm).
A later check of the rolling torque, however, is absolutely necessary.



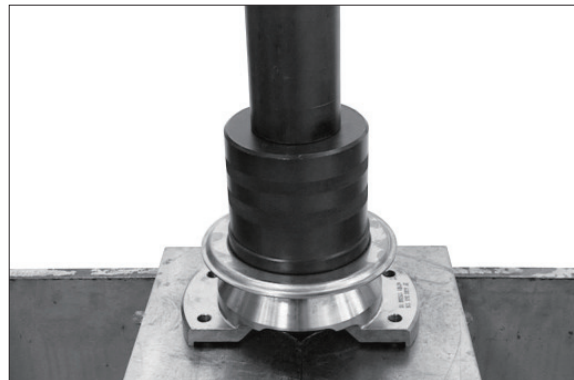
7809AX132

- ⑥ Insert the preassembled input pinion into the axle drive housing and insert the heated tapered roller bearing until contact is obtained.



7809AX133

- ⑦ Press the protection plate onto the input flange (see arrow) until contact is obtained.
- ※ Do not fit the shaft seal ring until the contact pattern has been checked.



7809AX134

- ⑧ Insert input flange and fix it by means of disk and slotted nut.

· Tightening torque :

122 kgf · m (885 lbf · ft)

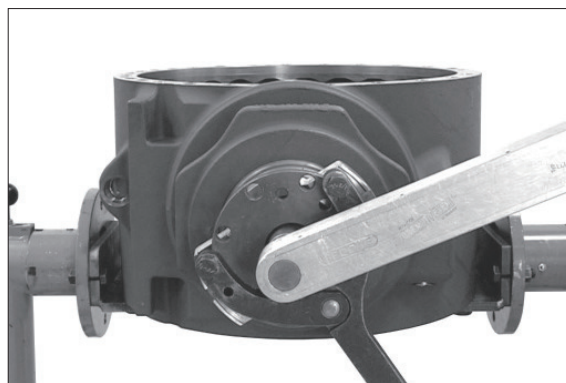
Wrench 5870 401 093

Fixing device AA00 695 905

Clamping device 870 240 002

- ※ Preliminarily mount slotted nut without Loctite.

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



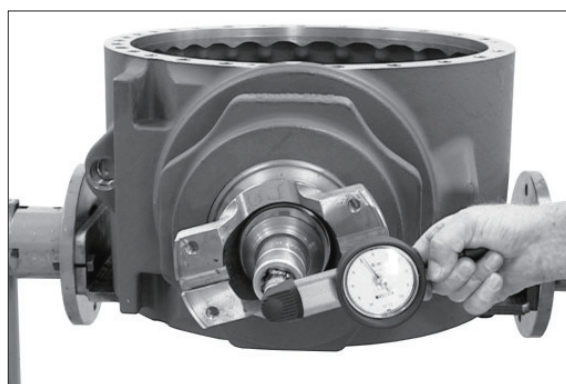
7809AX135

- ⑨ Check rolling torque (0.15~0.51 kgf·m without shaft seal ring).

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

- ※ In case of deviations from the necessary rolling torque correct with a corresponding spacer (figure AX132) as specified below.
Insufficient rolling torque - install thinner spacer ring.

Excessive rolling torque - install thicker spacer ring.

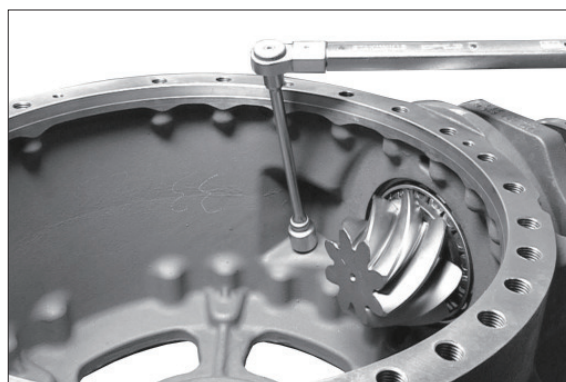


7809AX136

- ⑩ Mount threaded connection.

· Tightening torque :

10.2 kgf · m (73.8 lbf · ft)



7809AX137

⑪ Mount oil tube.

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



7809AX138

⑫ Grease O-rings (see arrows) and insert them into the annular grooves of the piston.



7809AX139

⑬ Insert piston (see arrow) into the bearing housing until contact is obtained.



7809AX140

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

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

① Deviation see crown wheel rear side.

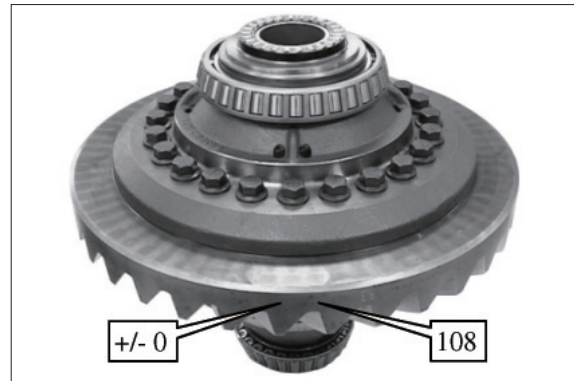
The test dimension 108 is stamped into the crown wheel rear side. If no + or – deviation is indicated, this value corresponds to the actual value 0 in the table below. According to this value, the required shims are allocated in the table below.

※ Any + or – deviation of the test dimension caused by production is also marked on the crown wheel rear side (e.g. - 20 or - 10 or 10 or 20) .

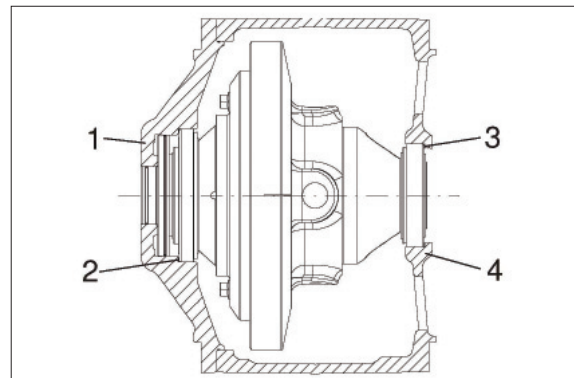
In accordance with this deviation, the required shims are allocated in the table below.

Legend to sketch:

- 1 = Bearing housing
- 2 = Shim (crown wheel side)
- 3 = Shim (differential carrier side)
- 4 = Axle drive housing



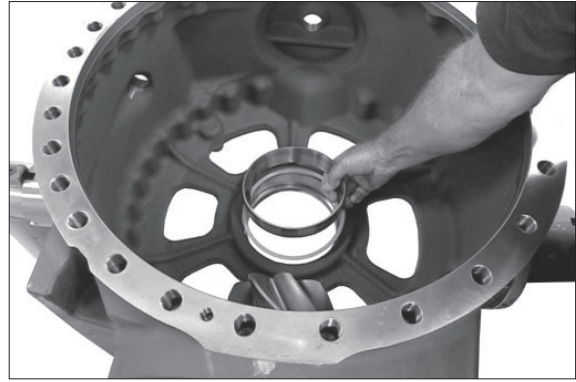
7809AX141



7809AX142

Shims for differential						
Crow wheel marking	- 30	- 20	- 10	0	10	20
Deviation	- 0.3	- 0.2	- 0.1	0	0.1	0.2
Shim diff cage side shim thickness	1.1	1.2	1.3	1.4	1.5	1.6
Shim P/No.	ZGAQ-03681	ZGAQ-03676	ZGAQ-03677	ZGAQ-03678	ZGAQ-03679	ZGAQ-03680
Shim crown wheel side shim thickness	1.7	1.6	1.5	1.4	1.3	1.2
Shim P/No.	ZGAQ-03687	ZGAQ-03686	ZGAQ-03685	ZGAQ-03684	ZGAQ-03683	ZGAQ-03682

- ② Insert the determined shim (e.g. $s = 1.4$ mm) into the hole of the axle drive housing and reset until contact with the bearing outer ring is obtained.



7809AX143

- ③ Cover some drive and coast flanks of the crown wheel with marking ink. Then insert the premounted differential into the axle drive housing.

Inner extractor	5870 300 008
Eye nut	AA00 680 376



7809AX144

- ④ Insert the determined shim (e.g. $s = 1.4$ mm) into the bearing housing and reset the bearing outer ring until contact is obtained.



7809AX145

- ⑤ Place the premounted bearing housing onto the axle drive housing by means of the lifting device.

Inner extractor	5870 300 008
Eye nut	AA00 680 376

- ※ Preliminarily mount the bearing housing without O-ring.



7809AX146

- ⑥ Fix the bearing housing by means of cylindrical screws (3EA).

· Tightening torque (M12/10.9) :
5.1 kgf · m (36.9 lbf · ft)

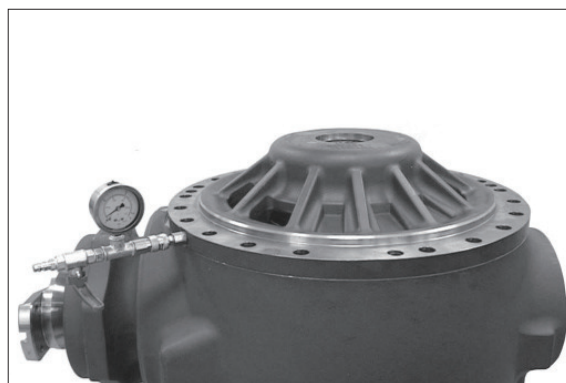


7809AX147

Leakage test of lock

- ⑦ Pressurize the lock ($p = 1$ bar), close shut-off valve and remove air line.

※ No noticeable pressure loss is allowed to occur within 10 sec.



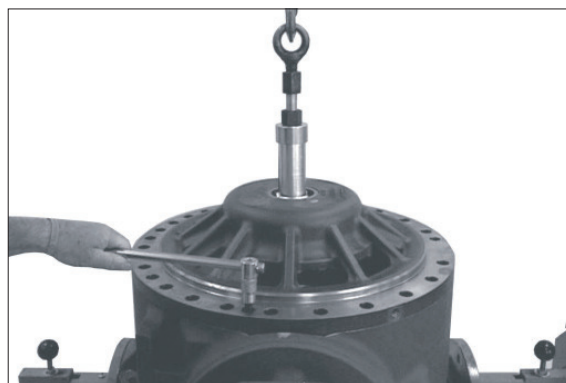
7809AX148

- ⑧ By rotating the input flange, roll crown wheel over the input pinion in both directions several times.

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

Compare the obtained contact pattern with contact pattern.

※ In case of any contact pattern deviation, a measuring error was made when determining the shim (Figure AX129), which must be corrected by all means.



7809AX149

- ⑨ After the contact pattern check insert the differential again into the axle drive housing.

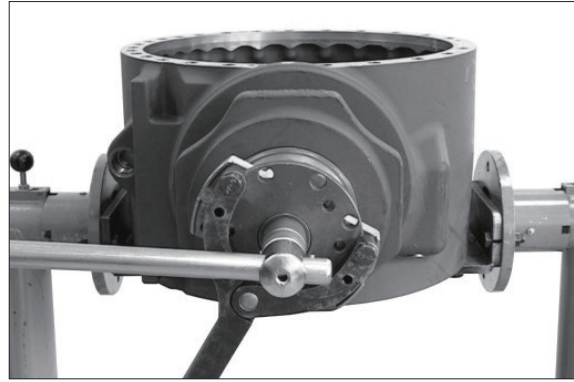


7809AX150

Reassembly of shaft seal ring (figure AX151~153)

- ⑩ Loosen slotted nut and pull the input flange from the input pinion.

Wrench	5870 401 093
Fixing device	AA00 695 905
Clamping device	5870 240 002

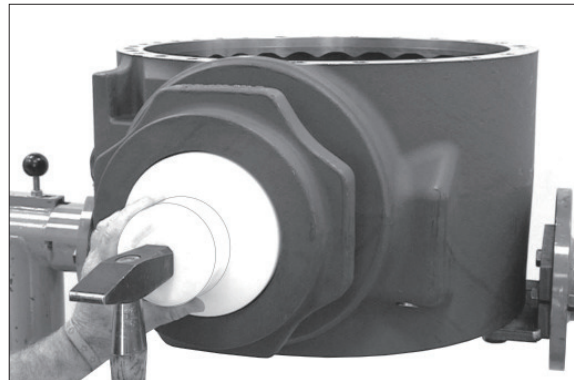


7809AX151

- ⑪ Mount the shaft seal ring with the seal lip showing to the oil chamber.

Driver tool	AA00 623 986
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- ※ The exact installation position of the shaft seal ring is obtained when using the specified driver tool.
- ※ Wet the outer diameter of the shaft seal ring with spirit directly before installation and fill the space between seal and dust lip with grease.



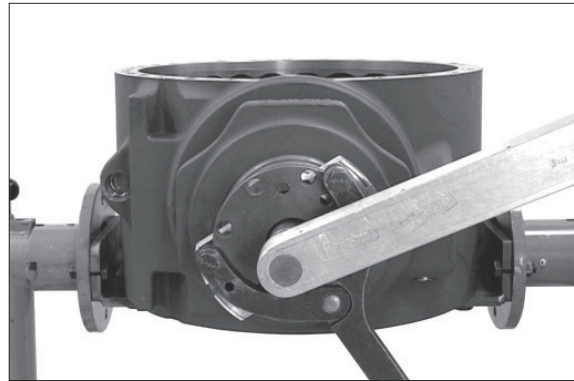
7809AX152

- ⑫ Insert input flange and finally tighten by means of disk and slotted nut.

· Tightening torque :
122 kgf · m (12.5 lbf · ft)

Wrench	5870 401 093
Fixing device	AA00 695 905
Clamping device	5870 240 002

- ※ Cover the thread of the slotted nut with loctite #262.



7809AX153

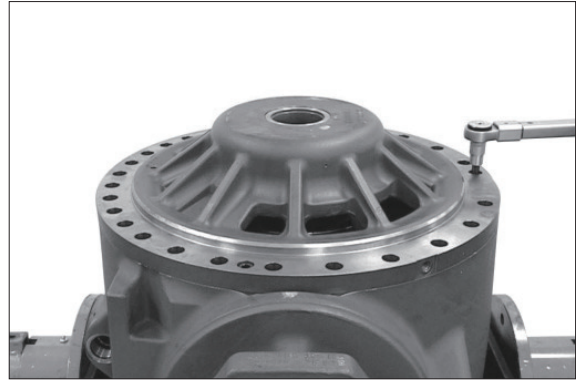
- ⑬ Grease O-ring (see arrow) and insert it into the annular groove of the bearing housing.



7809AX154

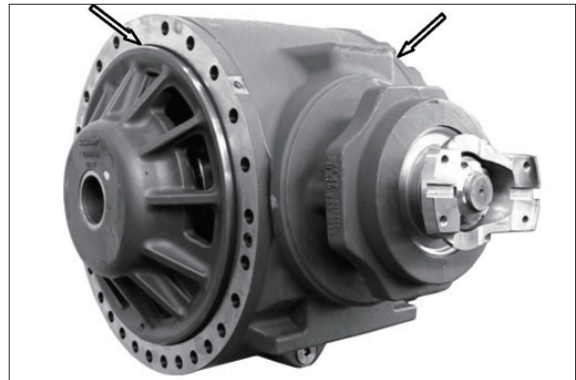
- ⑭ Insert the bearing housing by means of the lifting device and finally tighten it with cylindrical screws.

· Tightening torque (M12/10.9) :
5.1 kgf · m (36.9 lbf · ft)



7809AX155

- ⑮ Grease O-rings (see arrows) and insert them on both sides of the axle drive housing.



7809AX156

- ⑯ Mount two adjusting screws and bring axle drive housing in contact position with the axle housing by using the lifting device.

Then fix the axle drive housing with hexagon screws.

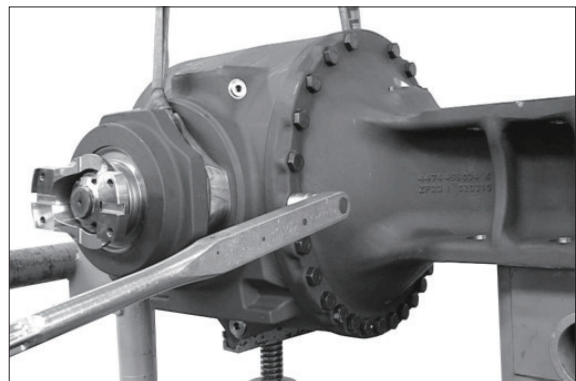
· Tightening torque (M20/10.9) :
57.1 kgf · m (413 lbf · ft)

Adjusting screws (M20) 5870 204 024

Eye bolt (M20) 5870 204 086

Thread insert AA00 677 715

- ※ After mounting the axle drive housing unbolt the support until contact is obtained.

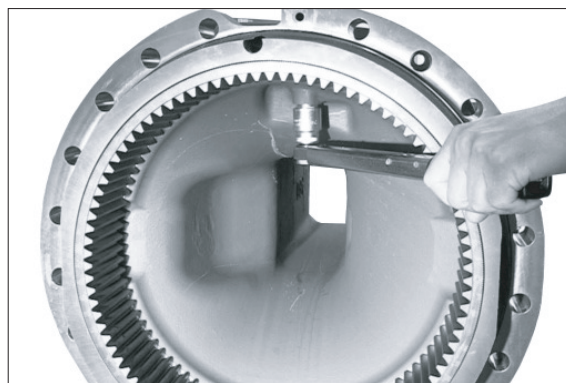


7809AX157

(3) Assembly axle housing

① Mount both fittings.

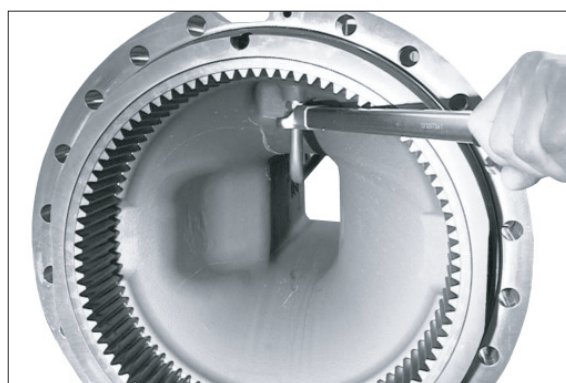
- Tightening torque : 3.67 kgf · m
(26.6 lbf · ft)



7809AX158

② Mount brake tube.

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



7809AX159

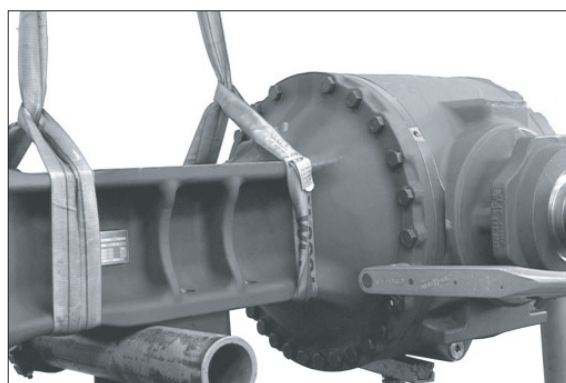
③ Mount two adjusting screws and bring the axle housing into contact position with the axle drive housing by using the lifting device.

Then fix the axle housing by means of hexagon screws.

- Tightening torque (M20/10.9) :
57.1 kgf · m (413 lbf · ft)

Adjusting screws (M20) 5870 204 024

- ※ After assembling the axle housing secure the axle with clamping brackets.



7809AX160

(4) Reassembly output and brake

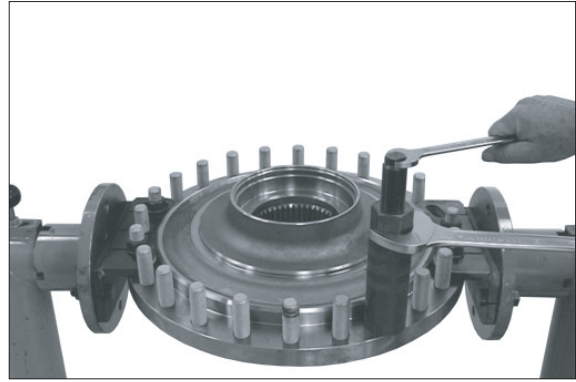
- ① Pull in wheel stud into the output shaft until contact is obtained.

Wheel stud puller - basic tool

5870 610 001

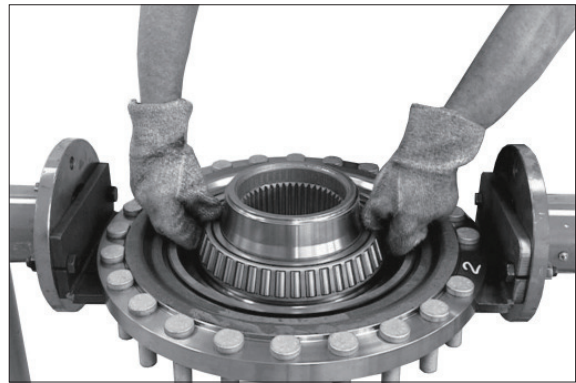
Insert (M22x1.5) 5870 610 002

- ※ Special tool may only be used for repair solution when exchanging individual wheel studs with mounted output shaft. When using a new output shaft, mount the wheel studs with the press.



7809AX28

- ② Heat tapered roller bearing and insert it into the output shaft until contact is obtained.



7809AX29

- ② Wet O-ring of the slide ring seal and locating hole with spirit.

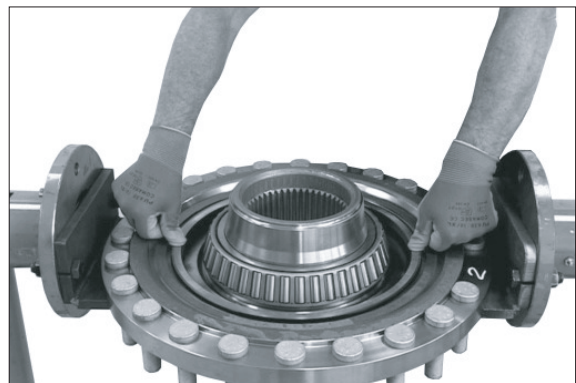
Snap **new** slide ring seal (1) into the output shaft.

Then mount **new** slide ring seal (part 2) accordingly into the brake housing.

- ※ For the installation position of the seal please also refer to sketch AX34.

The surface of the slide ring seal may not have any grooves, scratches or other types of damage. Take care that the sealing surface is parallel to the housing face.

- ※ The O-rings must be mounted evenly into the locating hole and must not bulge out of the hole. Risk of injury - Metal rings have extremely sharp edges. Wear protective gloves.



7809AX30



7809AX31

③ Insert the premounted brake housing by means of the lifting device over the output shaft until contact is obtained.

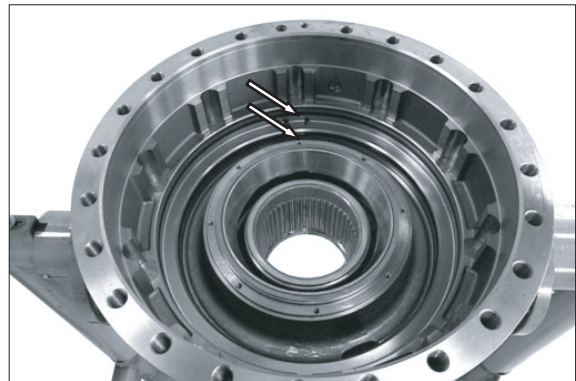
※ Before clamping the seal rings to installation dimension, clean the sliding surfaces and apply an oil film. We recommend to use a leather cloth soaked with oil.



7809AX31

④ Insert back-up rings and grooved rings into the annular grooves of the brake housing (see arrows).

※ Pay attention to the installation position; please also refer to sketch AX34, page 3-223.



7809AX32

⑤ Clean the annular groove of the brake housing with spirit.

Then insert the guide ring into the annular groove (see also the following sketch) and fix it with loctite #415 at its extremities (see arrows).

※ The full circumference of the guide ring must be in an exact contact position.

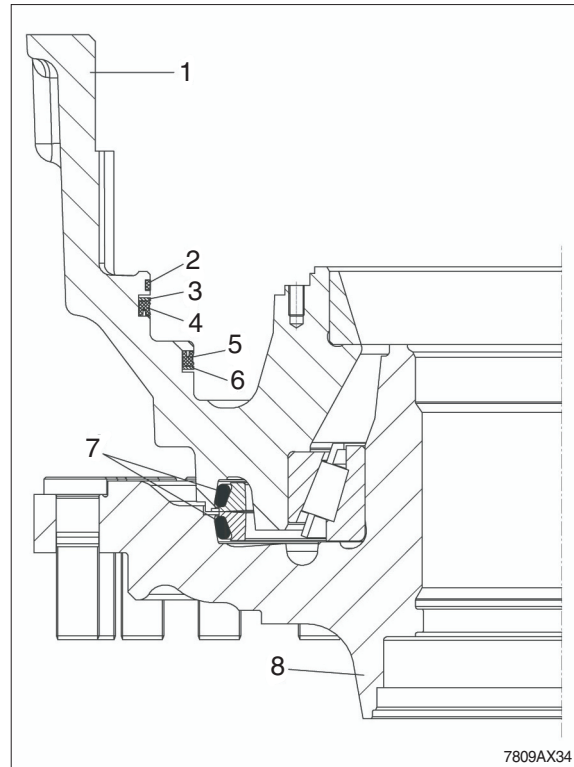
※ Upon installation the orifice of the guide ring must show upwards (12 o'clock).



7809AX33

Legend to sketch:

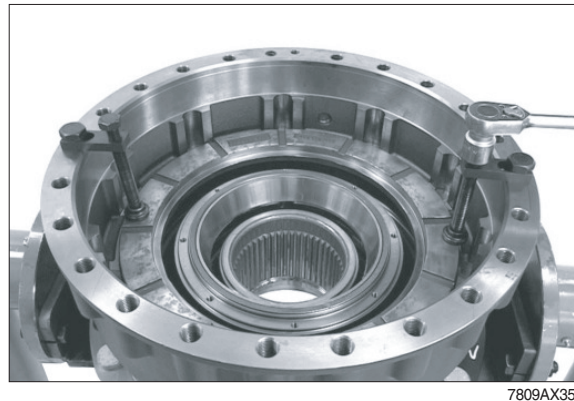
- 1 = Brake housing
- 2 = Guide ring
- 3 = Back-up ring
- 4 = Grooved ring
- 5 = Grooved ring
- 6 = Back-up ring
- 7 = Slide ring seal
- 8 = Output shaft



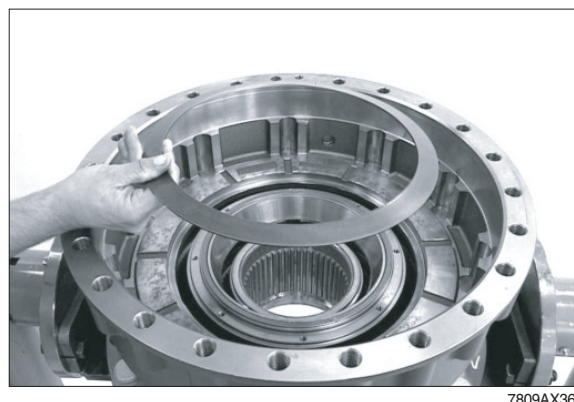
- ⑥ Insert the piston into the brake housing and carefully install with the fixing device until contact is obtained.

Fixing device AA00 680 530

- ※ Sufficiently oil seal surface of piston/back-up rings, grooved rings and guide ring (W-10 oils to be used).

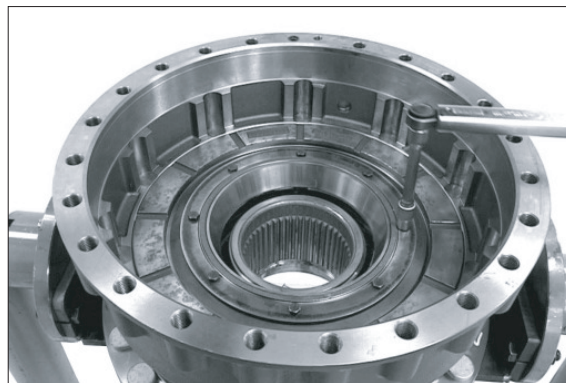


- ⑦ Insert cup spring into the piston with the convex side showing upwards.



- ⑧ Insert disk and fix it by means of hexagon screws.

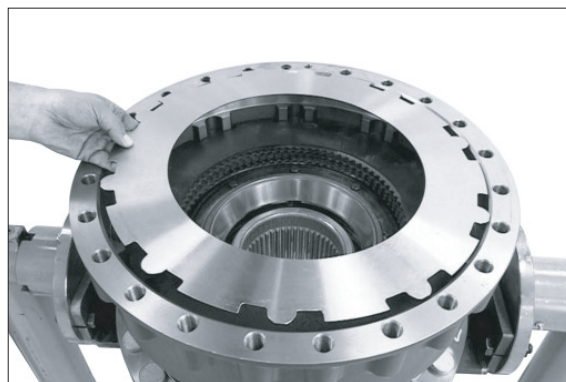
· Tightening torque (M8/10.9) :
3.47 kgf · m (25.1 lbf · ft)



7809AX37

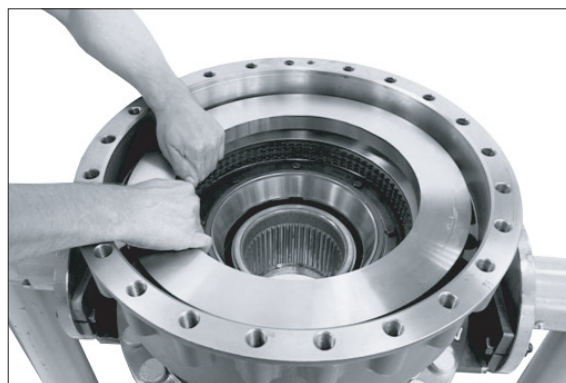
- ⑨ Mount outer and inner disks.

※ For the number of disks and the disk arrangement please refer to the relating spare parts list.



7809AX38

- ⑩ Insert end plate.



7809AX39

Setting of installation dimension 57.25~57.79 mm

- ⑪ Measure installation dimension from the mounting face of the brake housing to the front face of the end plate.

Installation dimension e.g 57.50 mm

※ Any deviation from the necessary installation dimension must be corrected with an appropriate outer disk (see spare parts manual).



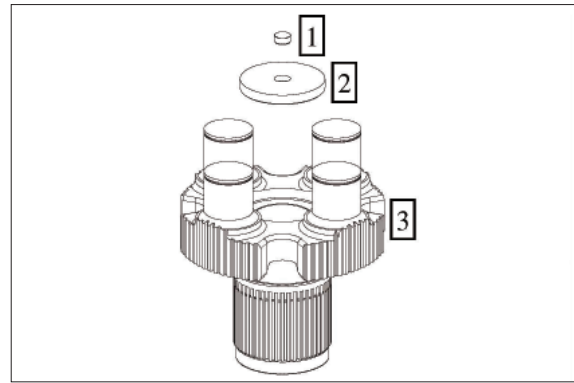
7809AX40

- ⑫ Press stop bolt into the cover until contact is obtained.

Then insert the premounted cover into the planetary carrier until contact is obtained.

Legend to sketch:

- 1 = Stop bolt
- 2 = Cover
- 3 = Planetary carrier

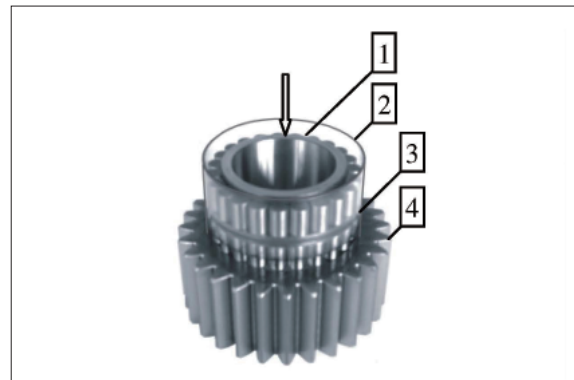


7809AX161

- ⑬ Insert the cylindrical roller bearing into the planetary gear – for this purpose press the cylindrical roller bearing through the packaging sleeve until the snap ring engages into the annular groove of the planetary gear.

※ Use packaging sleeve to facilitate assembly.

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



7809AX162

- ⑭ Heat bearing inner rings and insert the premounted planetary gears with large radius facing the planetary carrier (downwards) until contact is obtained.

※ Adjust bearing inner rings after cooling down.

Then fix planetary gears by means of retaining rings.



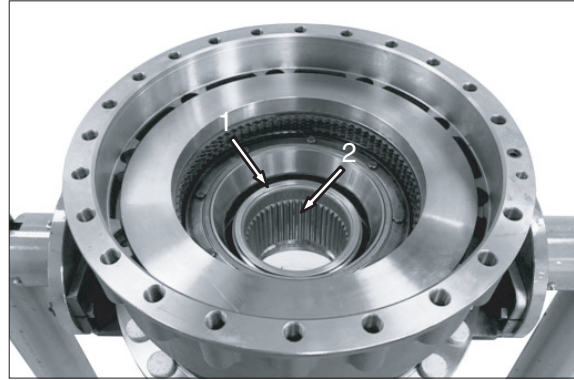
7809AX163

- ⑮ Heat tapered roller bearing and install it to the planetary carrier until contact is obtained.



7809AX164

- ⑩ Wet front face (contact face bearing inner ring, arrow 1) and profile (teeth, arrow 2) in the output shaft with anti-corrosive agent.



7809AX41

- ⑪ Align disk package centrally and radially. Then insert the planetary carrier by means of the lifting device into the teeth of the output shaft until contact is obtained.

- Rear axle (planetary carrier with 3 planetary gears)

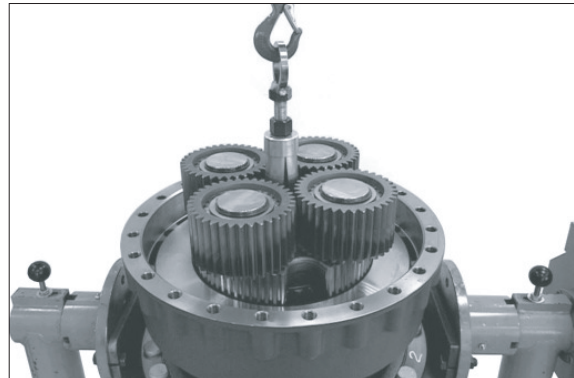
Inner extractor 5870 300 019

Eye bolt 5870 204 073

- Front axle (planetary carrier with 4 planetary gears)

Inner extractor 5870 300 008

Eye nut AA00 680 376

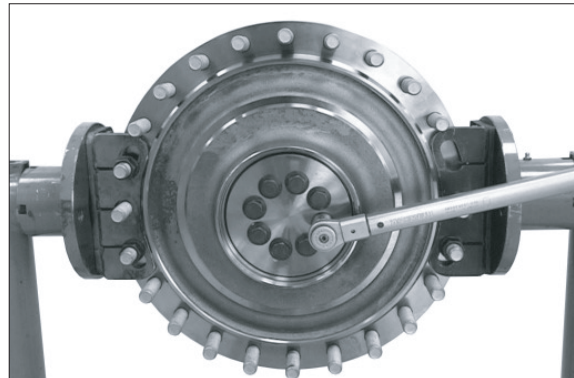


7809AX42

- ⑫ Pivot output 90°. Insert disk and fix planetary carrier with **new** locking screws.

- ※ Tighten locking screws successively with a tightening torque of 20.4 kgf · m (147.5 lbf · ft).

Then retighten the locking screws successively with a tightening torque of 51 kgf · m (369 lbf · ft).



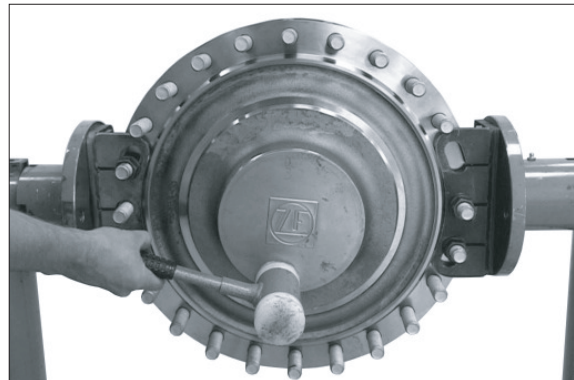
7809AX43

⑱ Install O-ring (see arrow) to the cover.



7809AX44

⑳ Insert the cover into the output shaft until contact is obtained.



7809AX45

**Set the axial play of the sun gear shaft
0.5~2.0 mm**

㉑ Determine dimension I, from the mounting face of the brake housing to the front face of the stop bolt.

Dimension I e.g. 58.60 mm

Gauge blocks 5870 200 066

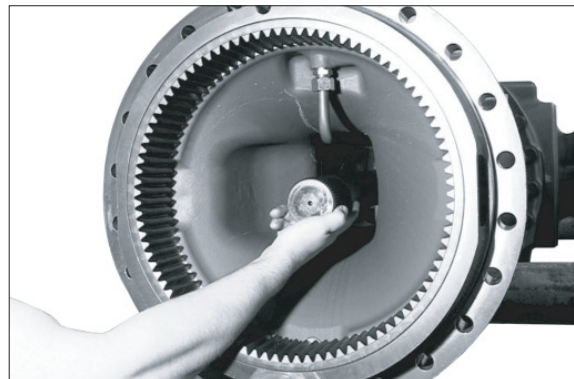
Straightedge 5870 200 022



7809AX46

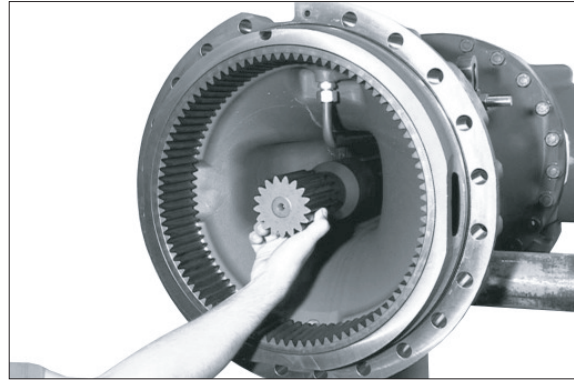
㉒ Insert stub shaft into the teeth of the axle bevel gear until contact is obtained.

※ Pay attention to the installation position;
mount the stub shaft with the long teeth
showing to the differential.



7809AX47

- ② Insert the sun gear shaft until contact is obtained.



7809AX48

- ③ Measure dimension II, from the front face of the sun gear shaft to the mounting surface of the axle housing.

Dimension II e.g. 56.60 mm

Straightedge 5870 200 022

Calculation example :

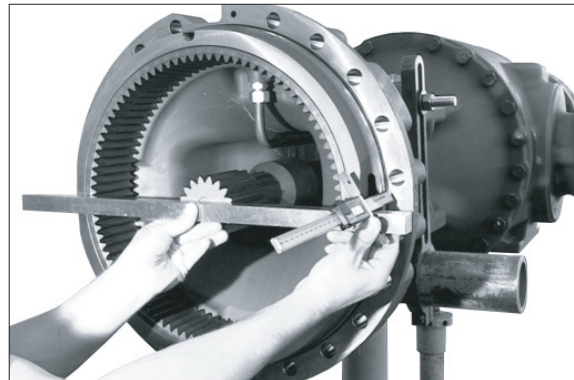
Dimension I 58.60 mm

Dimension II - 56.60 mm

Difference 2.00 mm

Required axial play e.g. - 1.00 mm

Difference = shim e.g. s = 1.00 mm



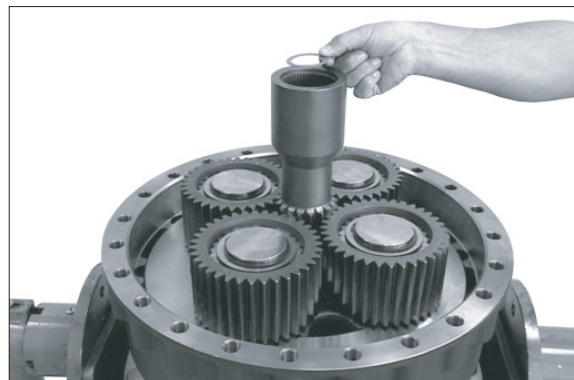
7809AX49

- ④ Insert sun gear shaft into the planetary carrier.



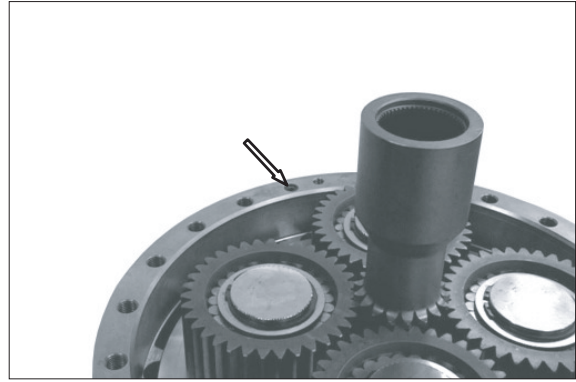
7809AX50

- ⑤ Fix determined shim e.g. $s = 1.00$ mm with grease into the sun gear shaft.



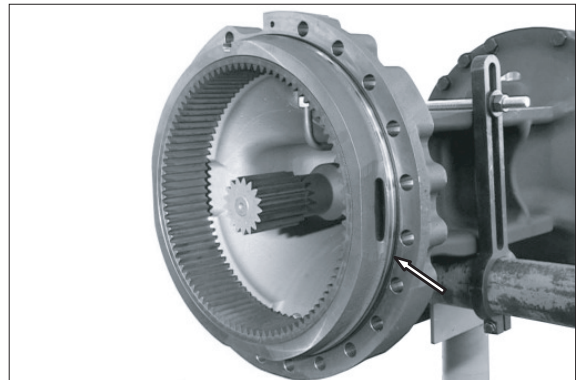
7809AX51

- ②⑥ Fix O-ring (see arrow) with grease into the countersink of the brake housing.



7809AX52

- ②⑦ Grease O-ring (see arrow) and install it to the axle housing.



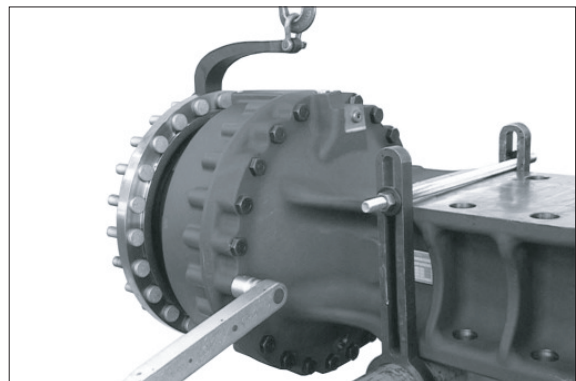
7809AX53

- ②⑧ Mount two adjusting screws and use the lifting device to bring the output into contact position with the axle housing. Then fix the output by means of hexagon screws.

- Tightening torque (M20/10.9) ;
57.1 kgf · m (413 lbf · ft)

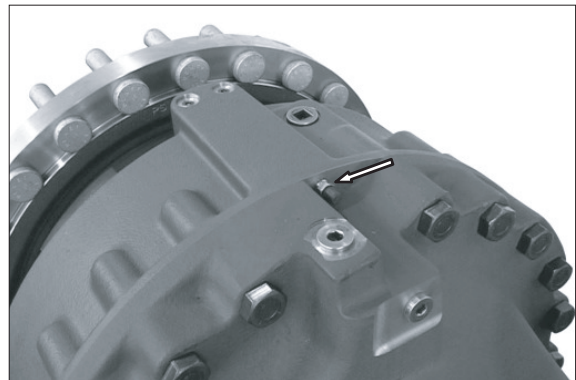
Adjusting screws (M20) 5870 204 024
Load-carrying device AA00 685 875

- ※ Fix load carrying device with wheel stud.



7809AX54

- ②⑨ Mount breather (see arrow).



7809AX55

⑩ Check brake hydraulics for leakages.

- ※ Before starting the test, completely breathe the brake hydraulics.
Then pressurize the brake temporarily (5EA) with $p = 100$ bar max.

High-pressure test :

Build up test pressure $p = 100_{-10}$ bar max. and close connection to HP pump via shut-off valve.

A pressure drop of max. 2 % (2 bar) is permissible during a 5 minute testing time.

Low-pressure test :

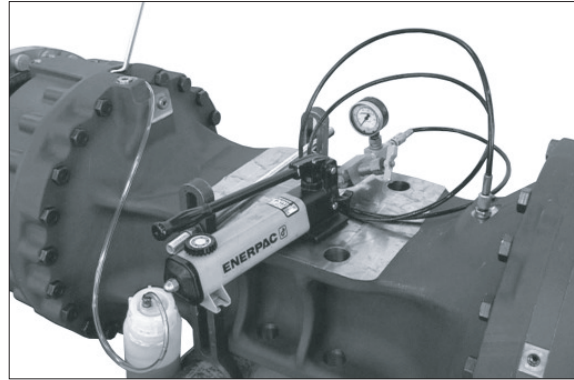
Reduce test pressure $p = 5$ bar and close shut-off valve.

No pressure drop is allowed during a 5 minute testing time.

Test media :

Engine oils SAE 10-W

HP pump	5870 287 007
Clutch	0501 207 939
Reduction (M18x1.5)	5870 950 161
Oil collector bottle	5870 286 072



7809AX56

⑪ Check operability of differential hydraulic lock

Build up pressure $p = 20$ bar max. and close connection to HP pump via shut-off valve.

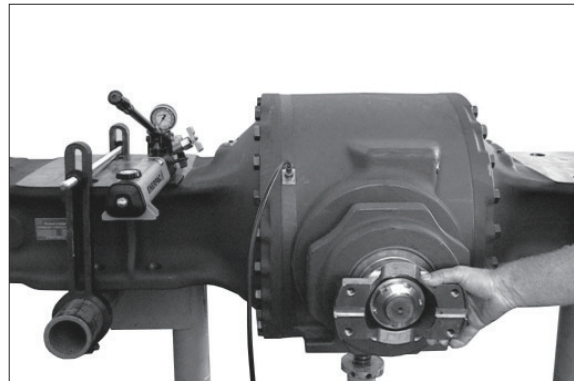
Lock on:

When rotating the input flange, both outputs must have the same direction of rotation.

Lock off:

When rotating the input flange one side holds or has the opposite direction of rotation.

- ※ Prior to putting the axle into operation, fill it with oil according to the related lubrication and maintenance instructions.



7809AX165