

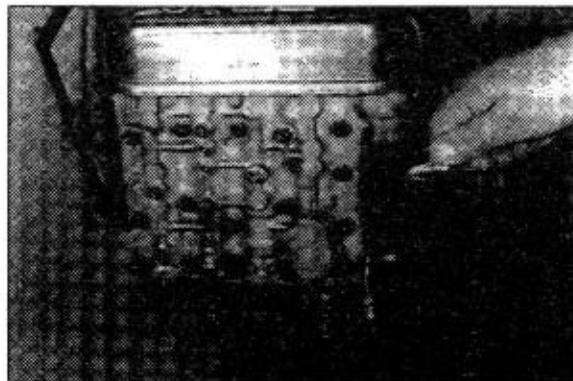
## GROUP 4 DISASSEMBLY AND ASSEMBLY

### 1. ELECTRO-HYDRAULIC SHIFT UNIT

#### 1) CONTROL VALVE ASSEMBLY

##### (1) Disassembly

① Remove line.

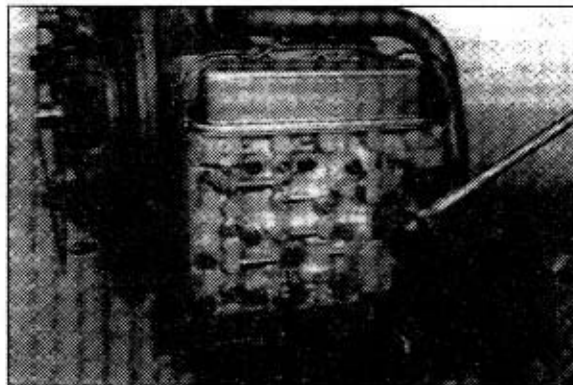


② Loosen socket head screws and remove control valve assembly.

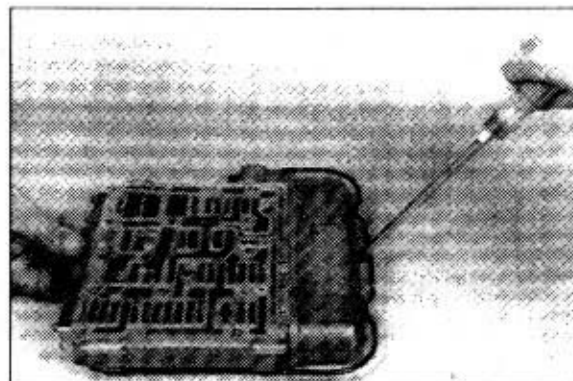
※ Use two adjusting screws.

※ Special tool

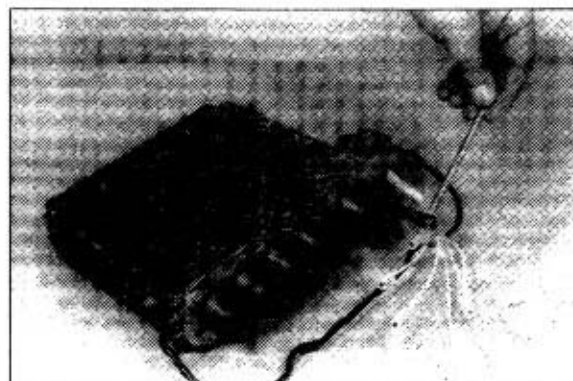
Adjusting screws(M8)      5870 204 011



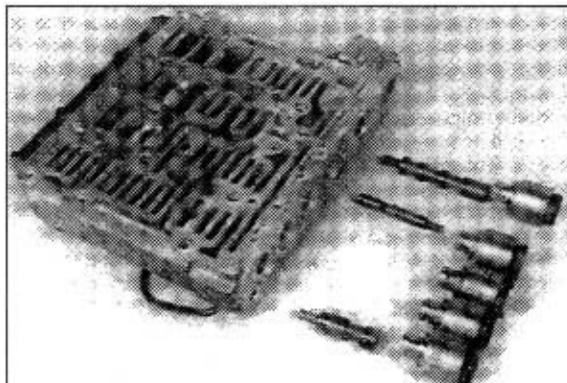
③ Relax spring clip and remove cover.



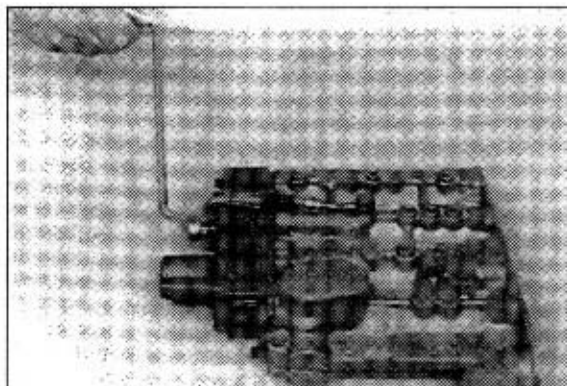
④ Pull off cable shoes, remove solenoid valves and cable harness.



⑤ Remove spool.



⑥ Remove line.

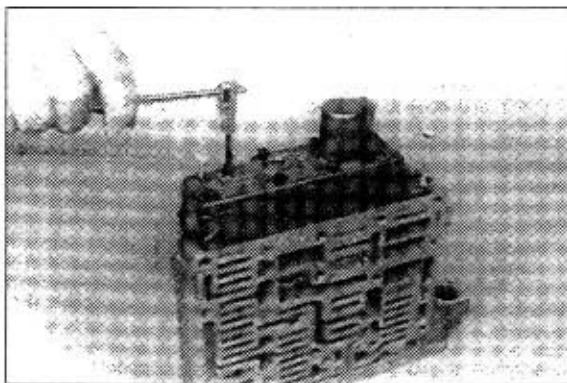


⑦ Remove adapter plate and cover.

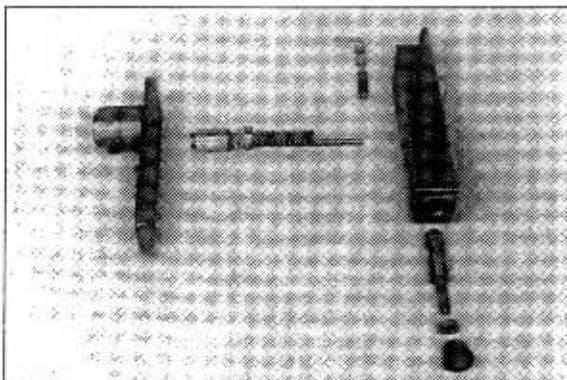
※ Adapter plate is spring-loaded.

※ Special tool

Adjusting screws(M5) 5870 204 036



⑧ Disassemble cover and adapter plate.

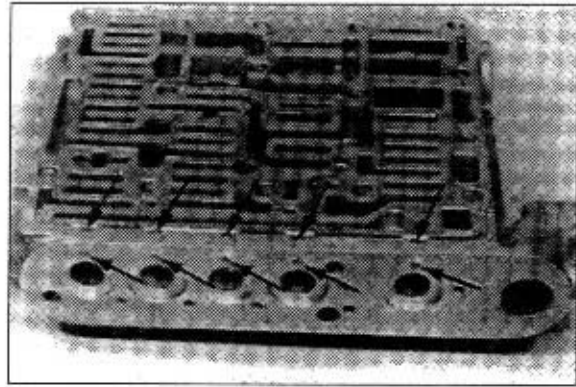


## (2) Assembly

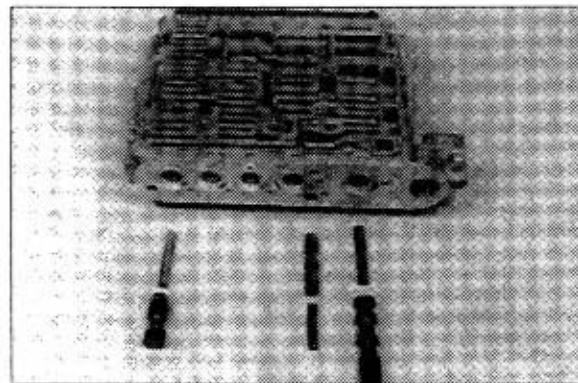
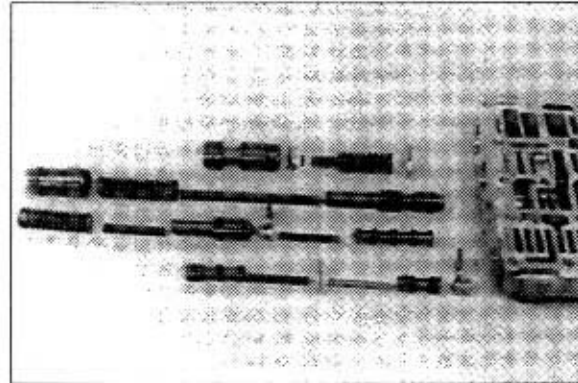
- ※ Check all components for damage and renew if necessary.

Before starting the installation, check the free movement of the moving parts in the housing.

The spools can be exchanged individually.  
Close the bores with balls(10pieces/  $\varnothing$  4.5mm) .



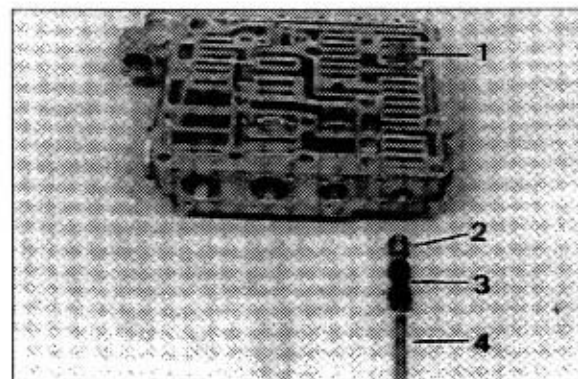
- ① Figure on the right show the components of the control valve assembly.



- ② Install components.

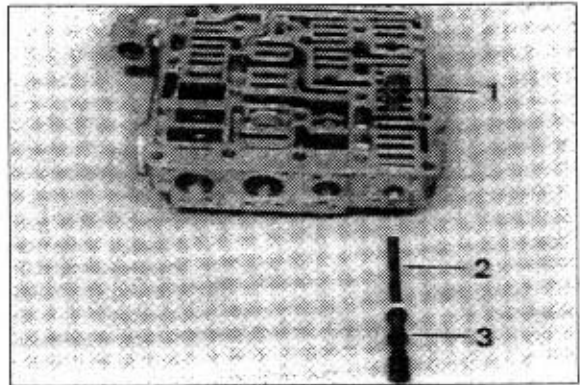
- 1 Stop plate
- 2 Detent block
- 3 Spool(Total length 39.0mm)
- 4 Spring(Lo = 51.3mm)

- ※ Fix detent block(2) with stop plate(1).



- ③ Install stop plate(1).  
Insert spring(2) and spool(3) into the bore.

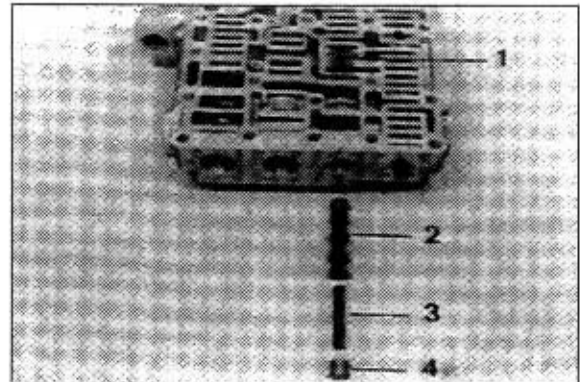
- 1 Stop plate
- 2 Spring(Lo = 53.4mm)
- 3 Spool



- ④ Install components.

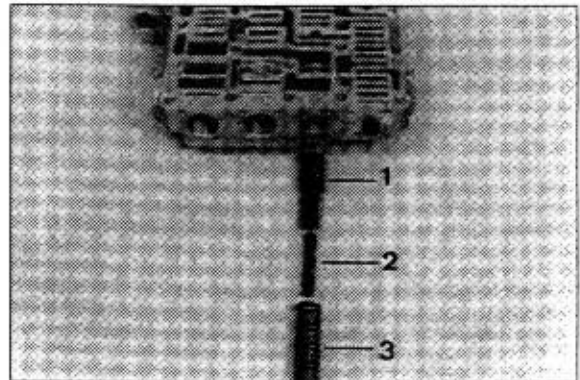
- 1 Stop plate
- 2 Spool
- 3 Spring(Lo = 53.4mm)
- 4 Detent block

※ Fix detent block(4) by means of stop plate(1).



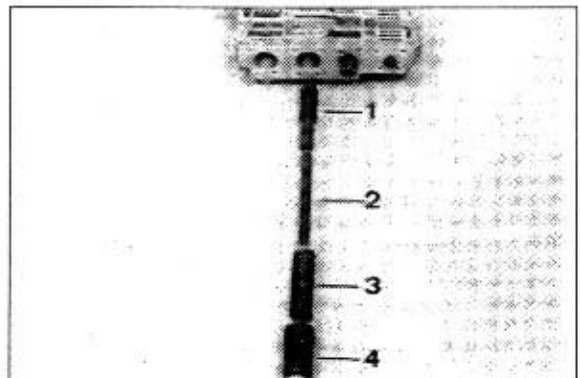
- ⑤ Install components.

- 1 Spool
- 2 Spring(Lo = 58.0mm)
- 3 Spring(Lo = 65.4mm)



- ⑥ Install components.

- 1 Spool
- 2 Spring(Lo = 132.4mm)
- 3 Spring(Lo = 76.7mm)
- 4 Spool



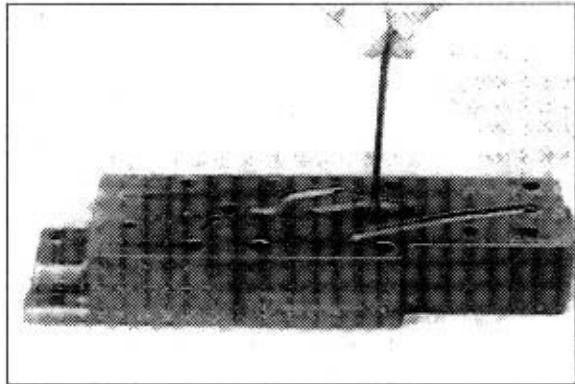
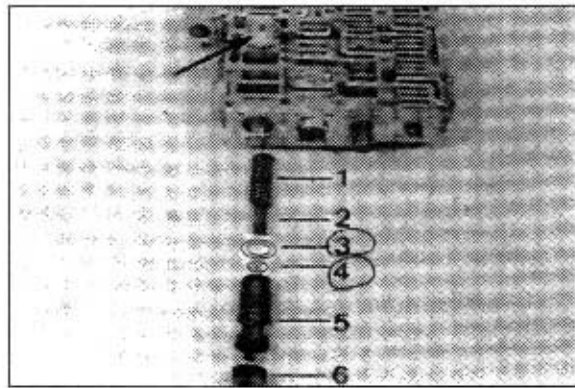


- ⑦ Insert stop plate(Arrow) and install components.

- 1 Spring( $L_0 = 53.8\text{mm}$ )
- 2 Spring( $L_0 = 78.6\text{mm}$ )
- 3 Disk(s)( $s = 2.4\text{mm}$  empirical value)
- 4 Disk(s)( $s = 1.0\text{mm}$  empirical value)
- 5 Spool
- 6 Sleeve

※ The control pressure  $16 \pm 2$  bar is determined by the disks  $s = 2.4\text{mm}$  (Outer diameter  $22\text{mm}$ ) and  $s = 1.0\text{mm}$  (Outer diameter  $13\text{mm}$ ). In case of deviations from the prescribed control pressure, correct with corresponding disks.

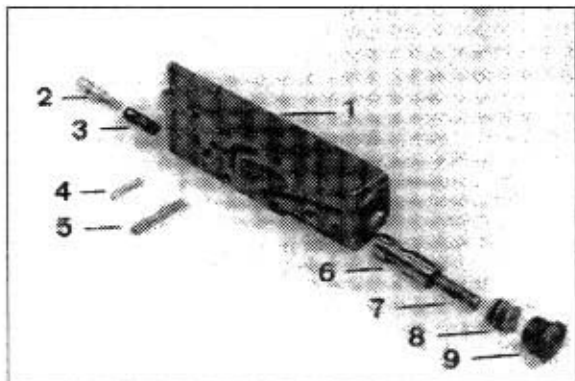
- ⑧ Install control diaphragm  $D = 0.70\text{mm}$ .



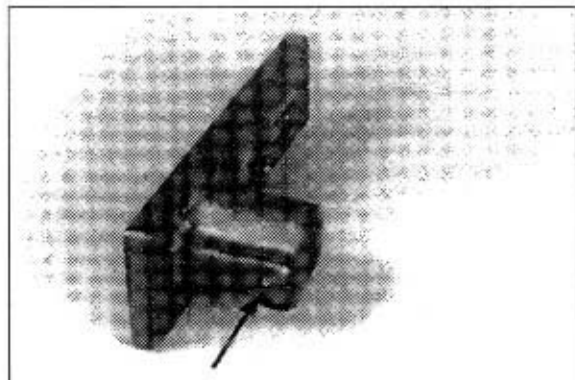
- ⑨ Install components of the adapter plate.

- 1 Adapter plate
- 2 Valve
- 3 Compression spring( $L_0 = 29.9\text{mm}$ )
- 4 Straight pin( $4 \text{ H}8 \times 25\text{mm}$ )
- 5 Roller
- 6 Spool
- 7 Spring( $L_0 = 70.9\text{mm}$ )
- 8 Disks(Total thickness  $s = 4.5\text{mm}$ )
- 9 Screw plug

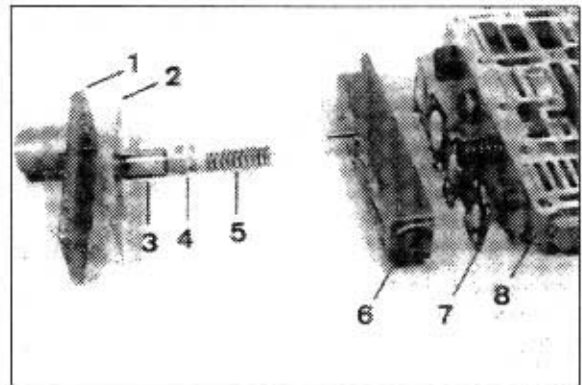
※ Employ new O-ring for the screw plugs.



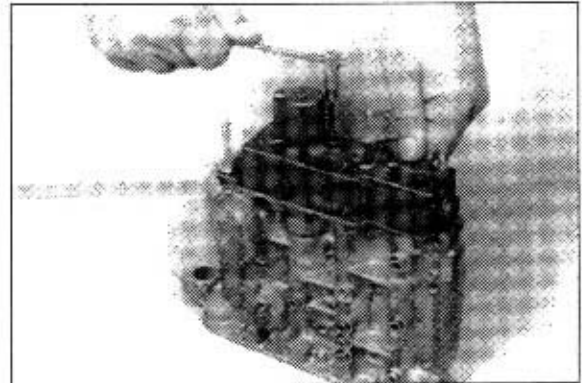
- ⑩ Close the bore with ball, see arrow.



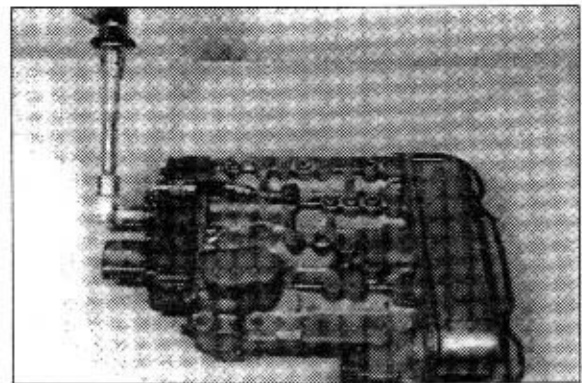
- ⑪ Pre-assemble cover and fasten 2-stage pressure control valve on the valve body.  
Torque limit(M5/8.8) 0.56kgf · m(4.05lbf · ft)
- 1 Cover
  - 2 Gasket
  - 3 Spool
  - 4 Ring(Total thickness  $s = 9.0\text{mm}$ )
  - 5 Spring( $L_0 = 48.0\text{mm}$ )
  - 6 Adapter plate(Pre-assembled)
  - 7 Gasket
  - 8 Valve body(Pre-assembled)



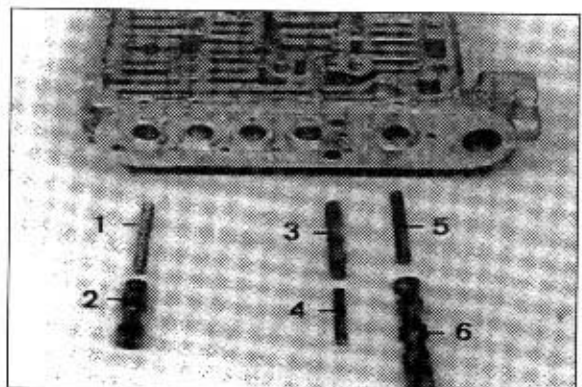
- ※ Special tool  
Adjusting screws(M5) 5870 024 036



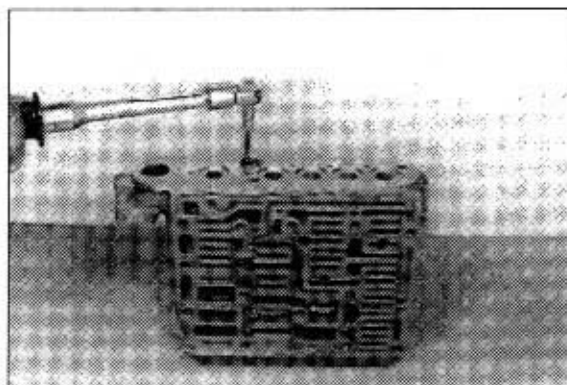
- ⑫ Assembly of the components on the opposite side, see figure ⑬~⑮.  
Fasten line and install screw plugs.  
※ Install new Cu-rings as well as O-rings.



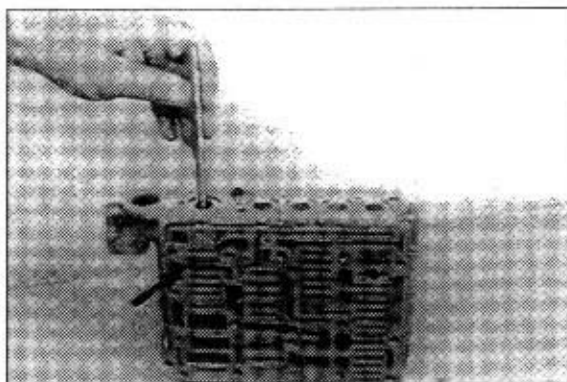
- ⑬ Install spools and springs on the opposite side, see figure.
- 1 = Spring( $L_0 = 51.3\text{mm}$ )
  - 2 = Spool(Total length =  $41.0\text{mm}$ )
  - 3 = Spool
  - 4 = Spring( $L_0 = 37.1\text{mm}$ )
  - 5 = Spring( $L_0 = 53.4\text{mm}$ )
  - 6 = Spool



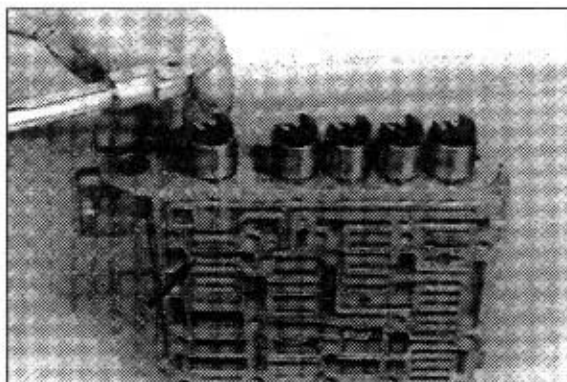
- ⑭ Fix reducing valve by means of retaining plate and socket head screws.  
Torque limit(M5/8.8) 0.56kgf · m(4.05lbf · ft)



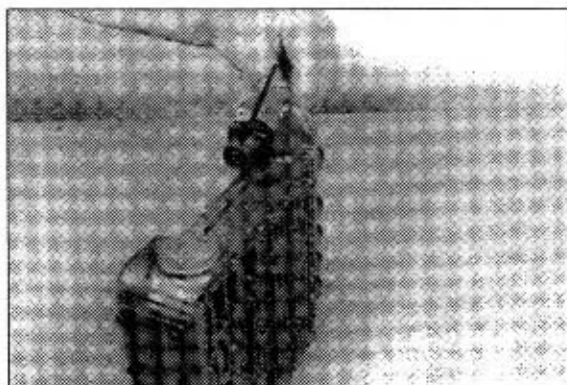
- ⑮ Preload spool and fix it provisionally by means of fixing plate(Arrow).



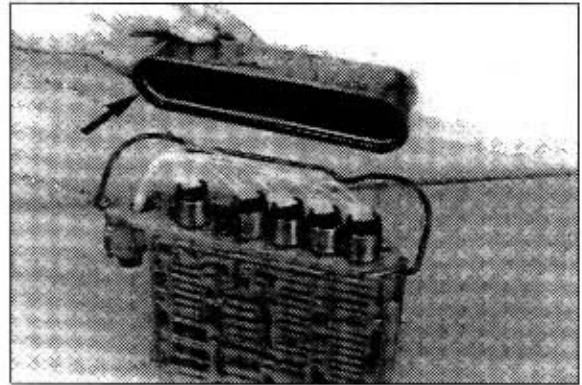
- ⑯ Insert solenoid valves and fix them by means of retaining plates and socket head screws.  
Torque limit(M5/8.8) 0.56kgf · m(4.05lbf · ft)  
※ Pay attention to the radial installation position, see figure.  
Now, remove fixing plate(Arrow).



- ⑰ Install complete cable harness.  
※ Use new gaskets.  
Pay attention to the location of the lug, see Arrow.

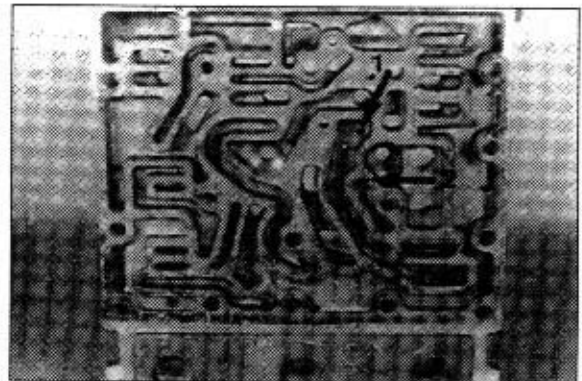


- ⑱ Connect solenoid valves according to the illustration on the right.  
Insert new O-ring(Arrow) and fix the cover by means of tightening clip.

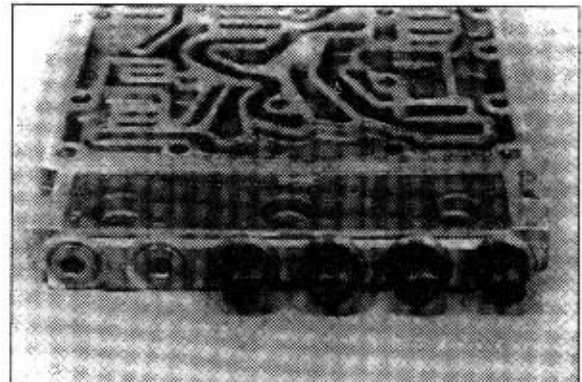


## 2) PRE-ASSEMBLE CHANNEL PLATE

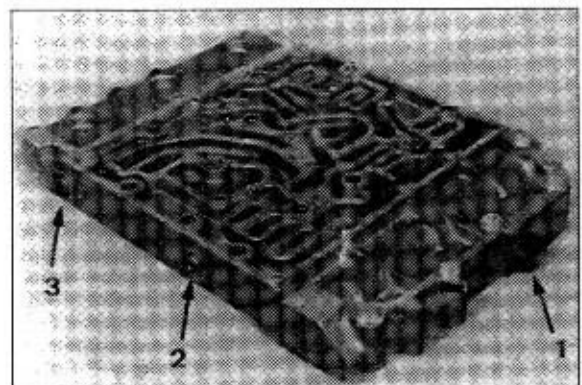
- (1) Install diaphragm for energy backfeed D = 1.0mm(Arrow 1) and set screw M5 × 6mm (Arrow 2) and secure by caulking.



- (2) Install connecting pieces(4EA) and screw plugs(2EA).  
※ Use new O-rings.



- (3) Install connection for the temperature control sender unit(Arrow 1) and the two screw plugs(Arrow 2 and 3).



## 2. CONVERTER COMPARTMENT

### 1) DISASSEMBLY

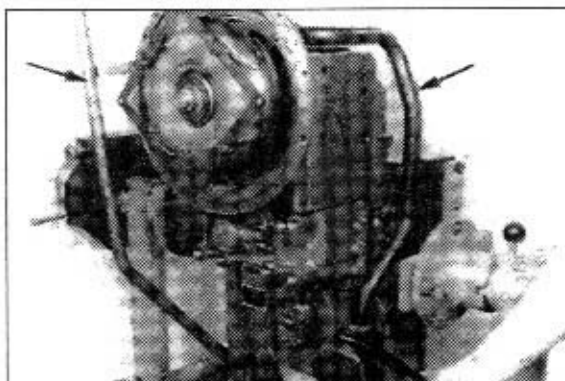
(1) Remove suction and filler pipe(Arrows).

※ Special tool

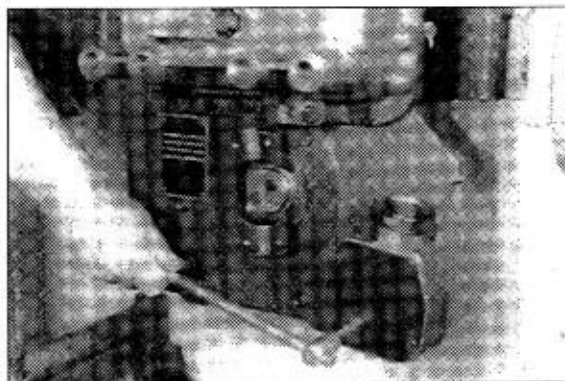
Assembling car 5870 350 000

Mounting bracket 5870 350 014

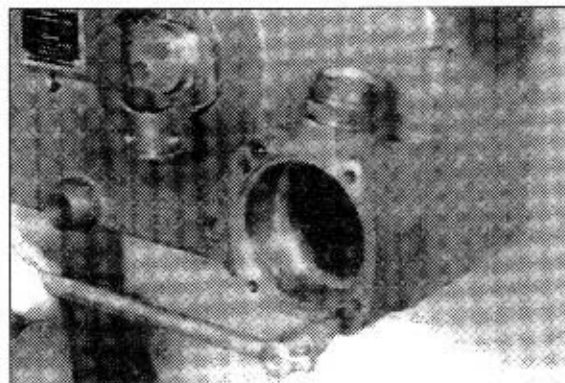
Mounting bracket 5870 350 036



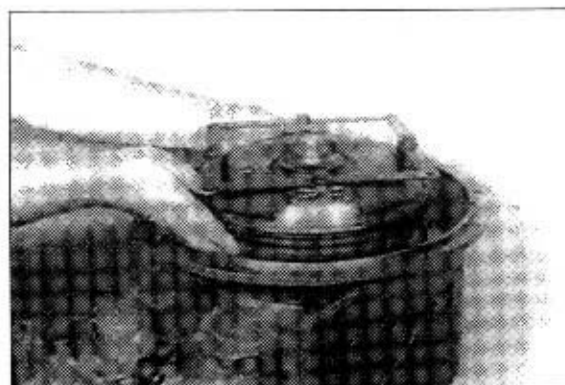
(2) Loosen hexagon head screws, take off cover and remove filter.



(3) Loosen both socket head screws and separate support from the gearbox.

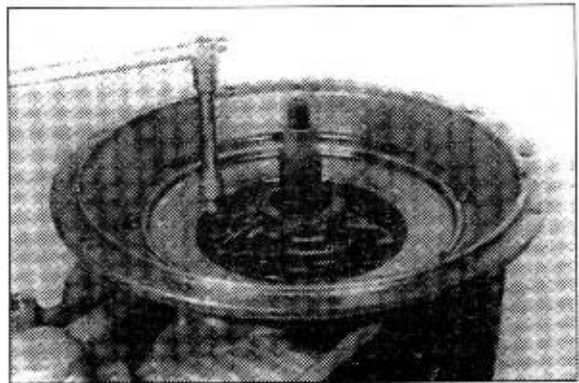


(4) Tilt housing for 90°.  
Remove converter.





(5) Loosen socket head screws.

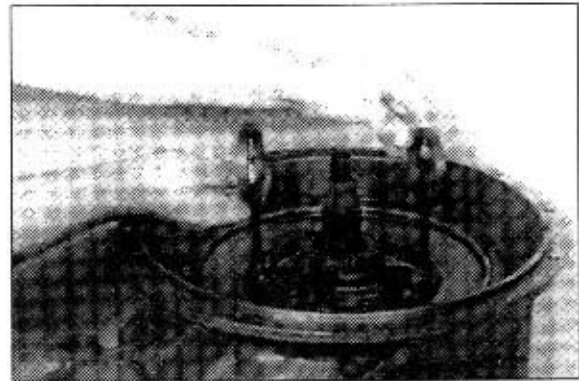


(6) Remove converter filling and control pressure pump.

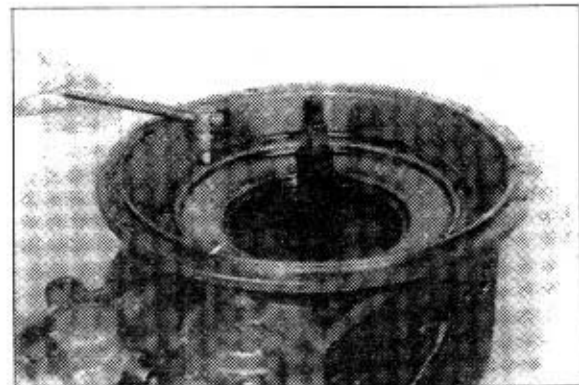
※ Special tool

Set of eye bolts

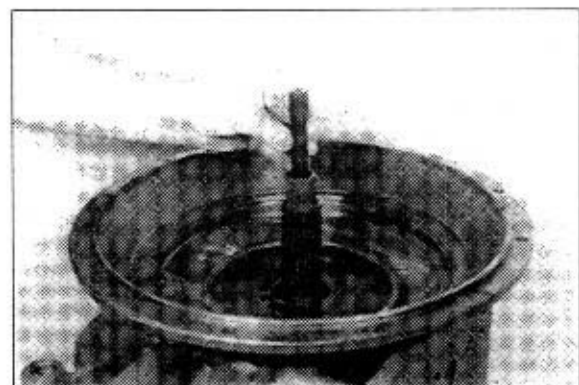
5870 204 002



(7) Loosen hexagon head screws and remove end plate.



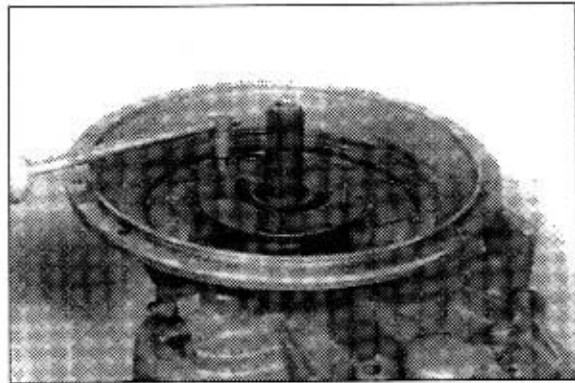
(8) Remove drive shaft(Power take-off).



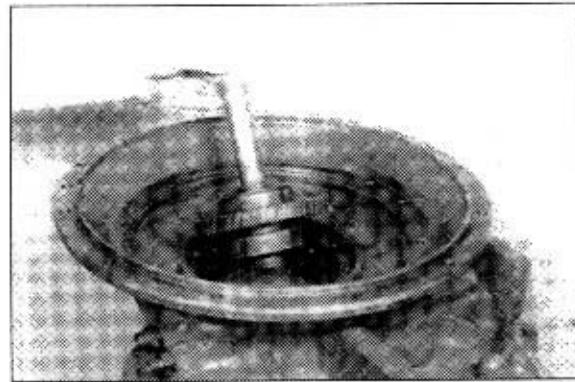
(9) Pull oil supply flange out of the housing bore, using hexagon head screws(M8 x 110mm).

※ Special tool

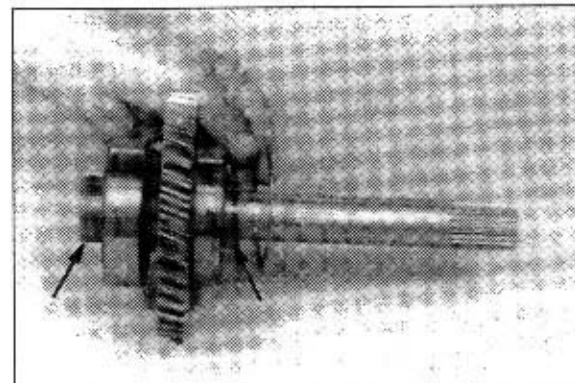
Back off screws(M8) 5870 204 008



(10) Remove output gear(Complete).



(11) Remove shim and both rectangular rings(Arrows).

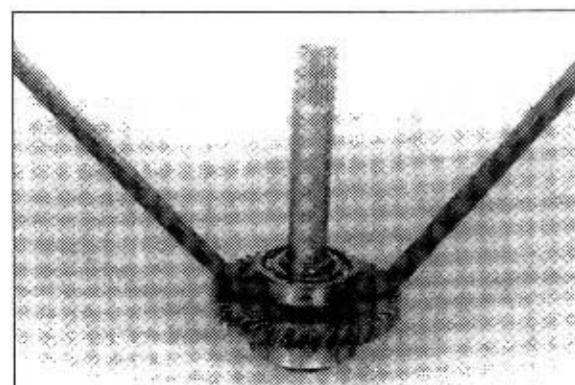


(12) Pry off both ball bearings from the drive gear.

※ Drive shaft and drive gear cannot be disassembled.

※ Special tool

Pry bar 5870 345 065

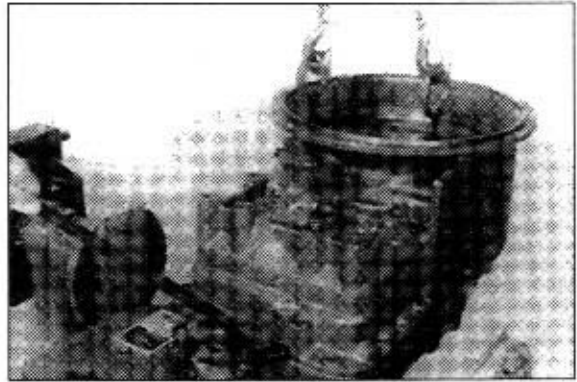


(13) Loosen screwed joint and separate converter compartment from the gearbox.

※ Special tool

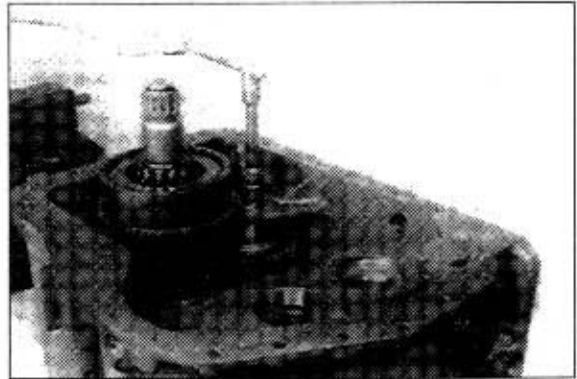
Pry bar 5870 345 065

Set of eye bolts 5870 204 002



(14) Remove countershaft.

Loosen hexagon head screw.

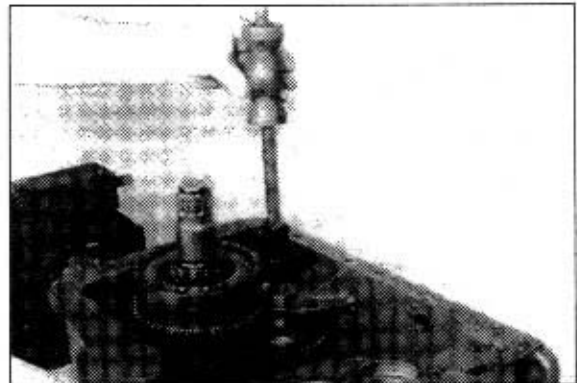


(15) Drive axle out of the housing bore, using striker.

Remove released components.

※ Special tool

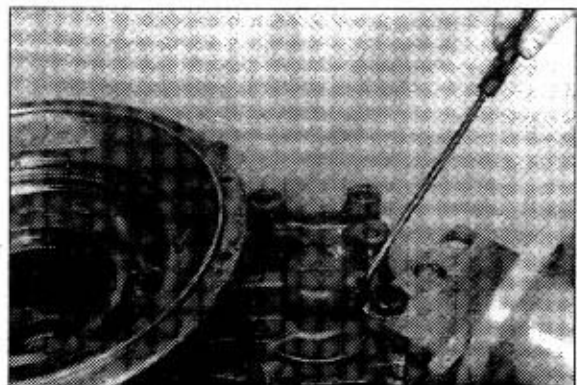
Striker 5870 650 001



(16) Tilt housing for 180°.

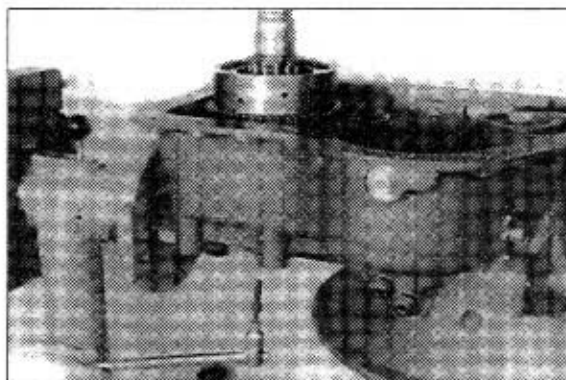
Open the beads on both cover lids and pry them out of the housing bore.

※ In the bores there are the two socket head screws, see next figure.



(17) Tilt housing for 180°.

Loosen both socket head screws.

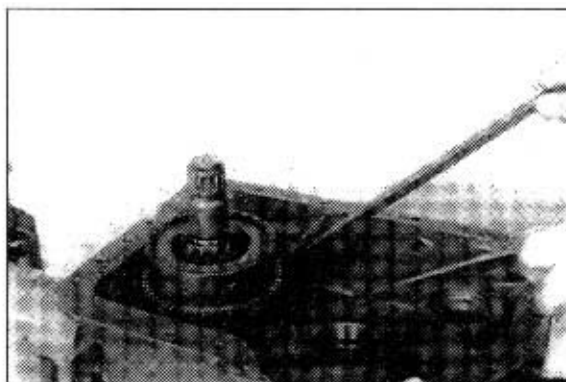


(18) Pry clutch K3/K4 out of the housing bore, using pry bar.

※ Special tool

Pry bar

5870 345 065



### 3. GEAR BOX

#### 1) DISASSEMBLY

##### (1) Remove clutch KR/K2 and KV/K1

① Pull bearing outer race of the clutch KR/K2 out of the housing bore.

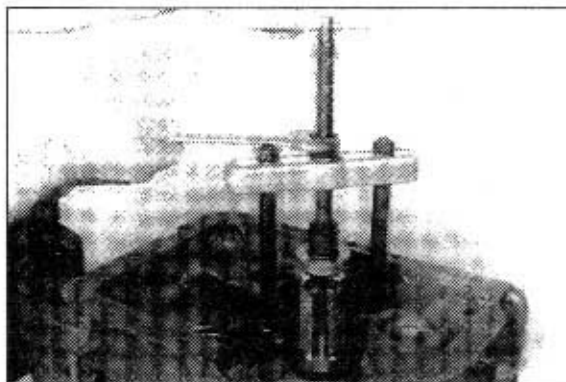
※ Special tool

Internal puller

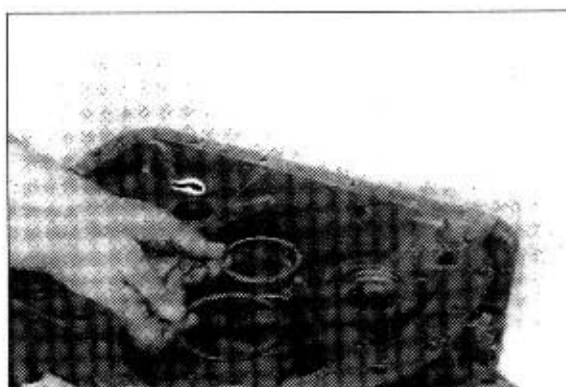
5870 300 019

Back up tool

5870 300 020



② Remove shims from KR/K2 and KV/K1.

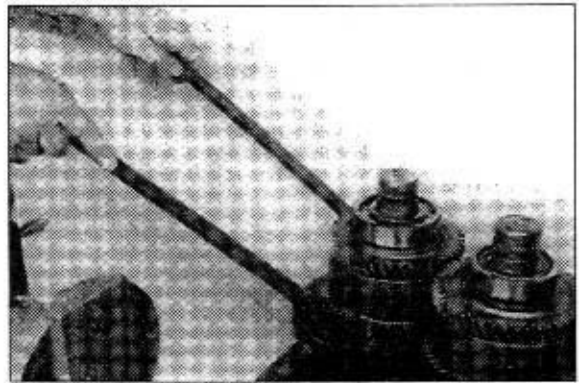


③ Pry clutch KV/K1 out of the housing bore.

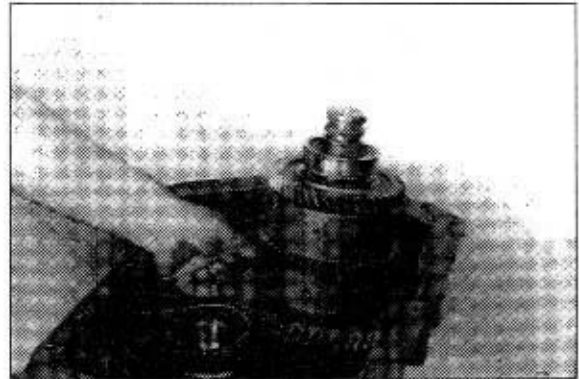
※ Special tool

Pry bar

5870 345 065

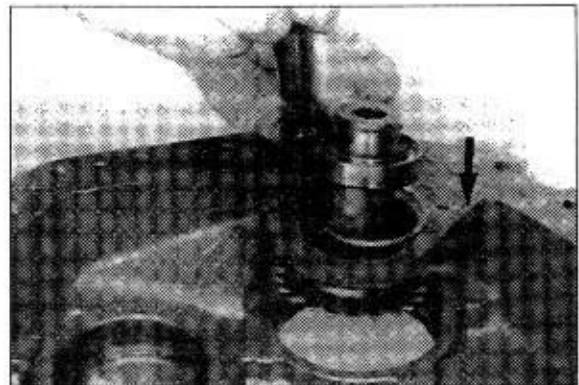


④ Lift clutch KR/K2 out of the housing.



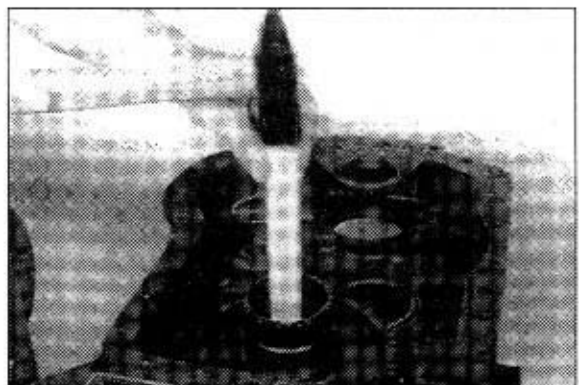
## (2) Remove power take-off

① Squeeze out circlip and remove power take-off in direction of the arrow.



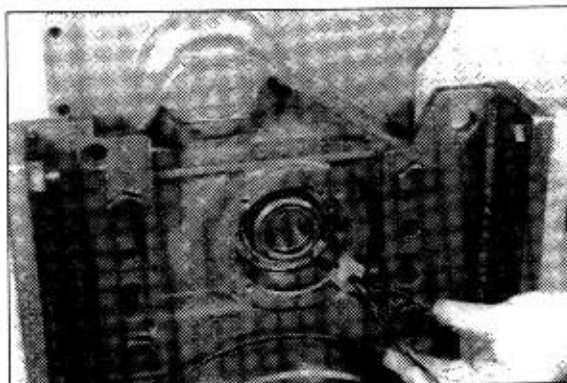
## (3) Remove spur gear K3

① Drive cover lid out of the housing bore.

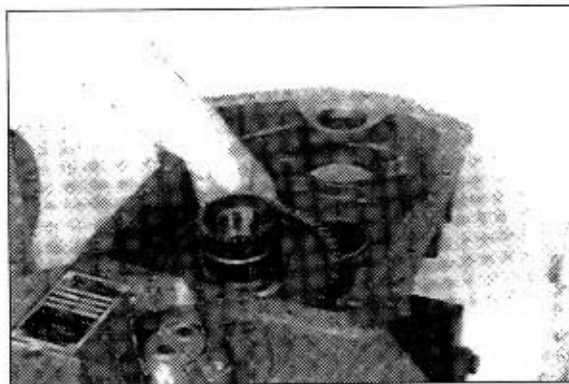




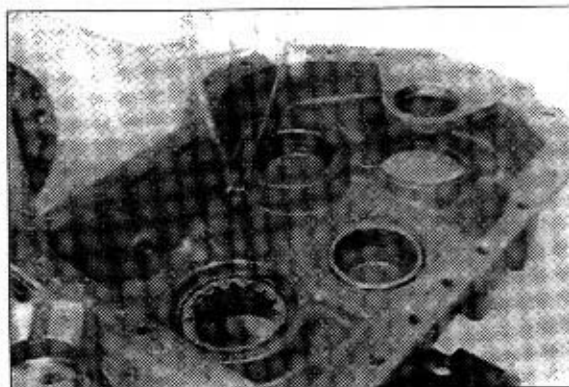
- ② Tilt housing for 90°.  
Squeeze out circlip and remove released shim.



- ③ Tilt housing for 90°.  
Remove spur gear K3.



- ④ Squeeze out circlip and remove released shim.



- ⑤ Pull roller bearing and bearing outer race(Arrow) out of the housing bores.

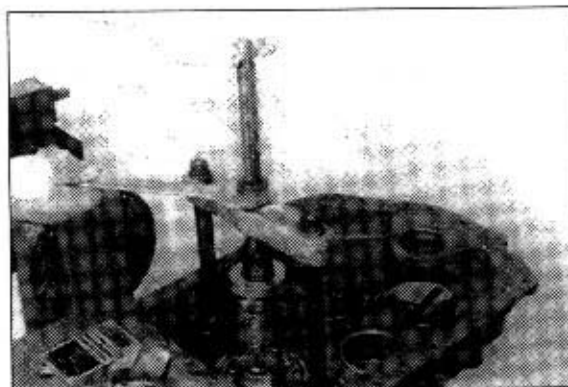
\* Special tool

Internal puller

5870 300 019

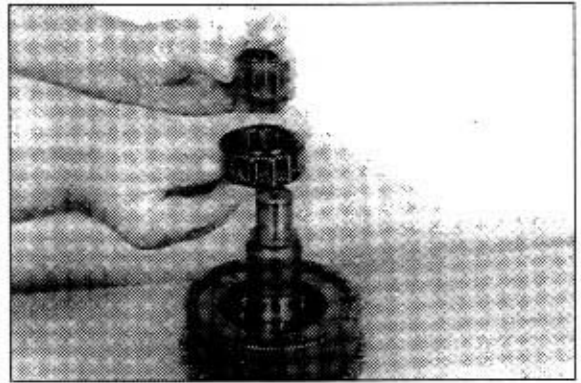
Back up tool

5870 300 020

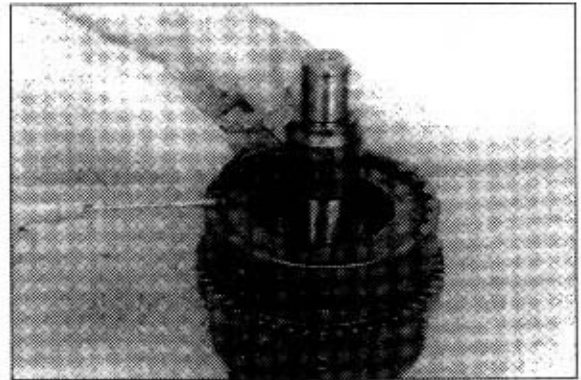


**(4) Disassemble clutch K3/K4**

- ① Squeeze out circlip and remove both roller bearings.



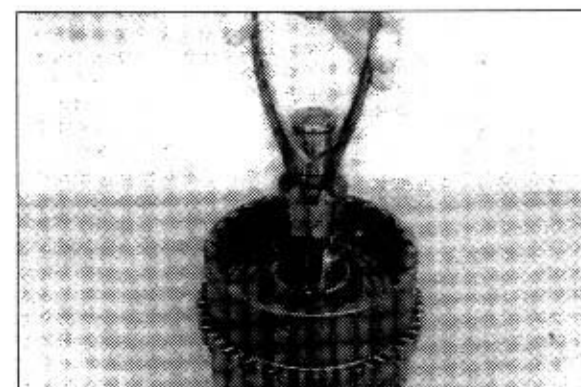
- ② Squeeze out snap ring.



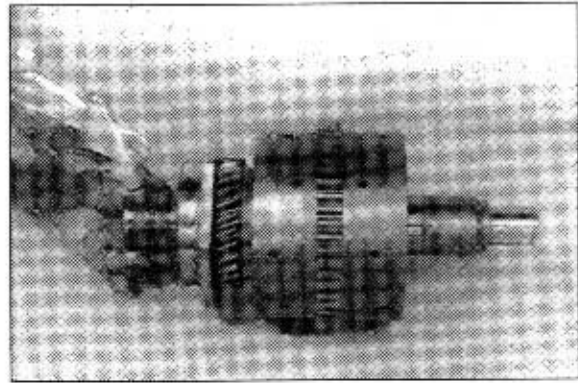
- ③ Remove plate pack.



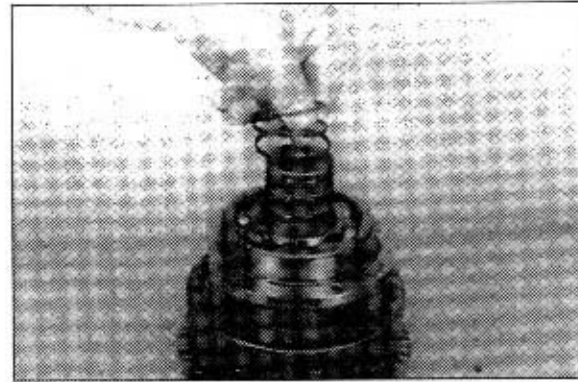
- ④ Squeeze out circlip, remove released shim and cup spring pack.



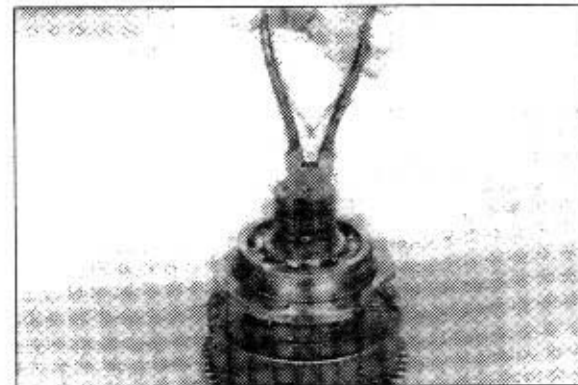
- ⑤ Remove piston by means of compressed air.



- ⑥ Squeeze out rectangular rings.



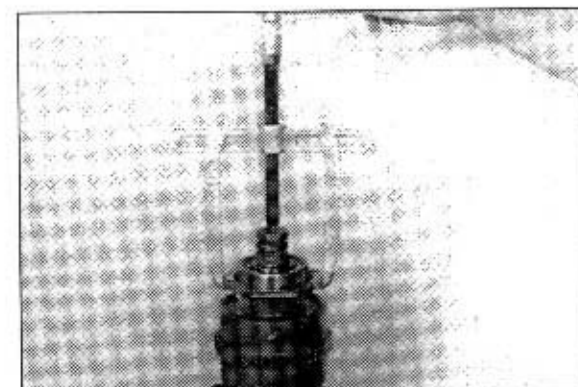
- ⑦ Squeeze out circlip.



- ⑧ Pull off ball bearing.

※ Special tool  
Two leg puller

5870 900 004

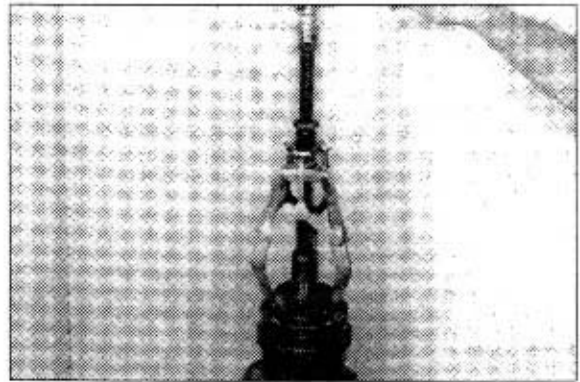


⑨ Pull off spur gear K4.

※ Special tool

Three leg puller

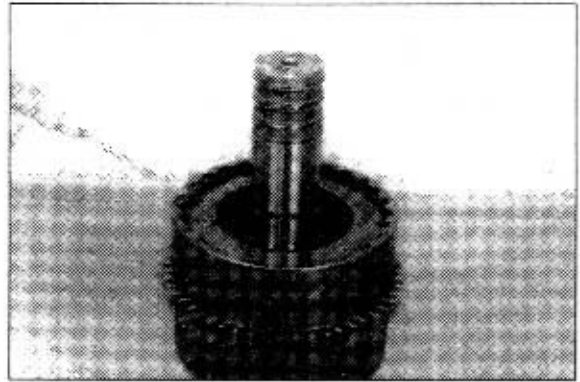
5870 971 003



⑩ Squeeze out snap ring, remove plate pack and cup springs.

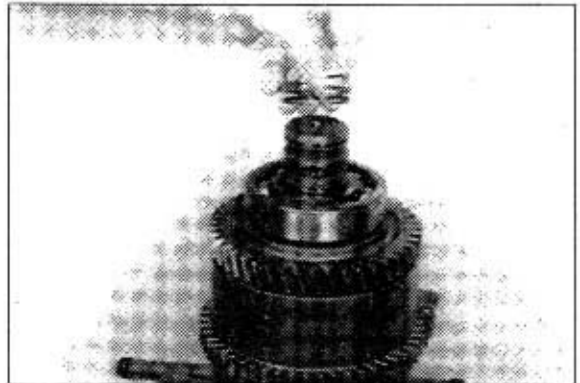
Now, remove the piston by means of compressed air.

※ The clutch cannot be further disassembled.



#### (5) Disassemble clutch KV/K1

① Squeeze out rectangular rings.

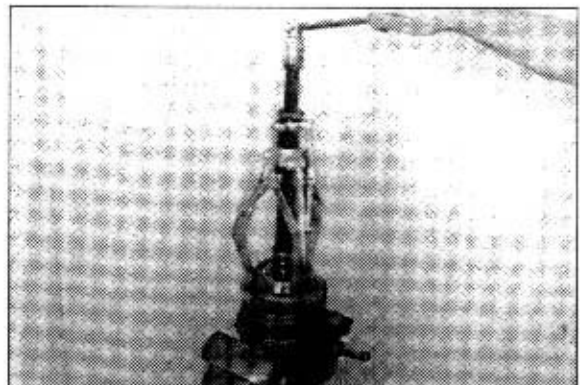


② Pull off ball bearing.

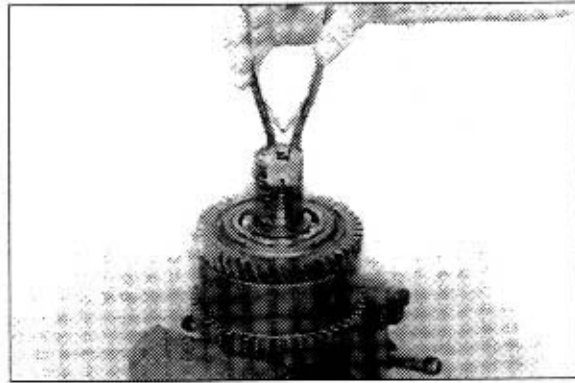
※ Special tool

Three leg puller

5870 971 003



③ Squeeze out circlip.

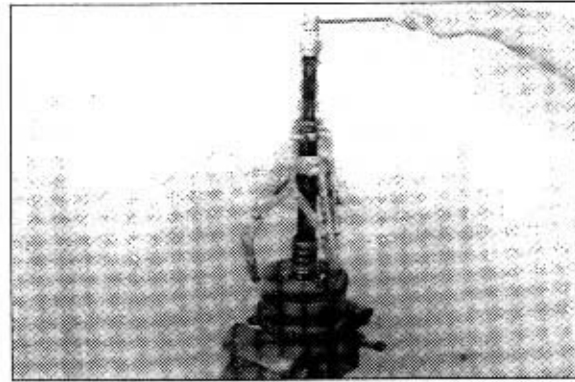


④ Pull off spur gear KV and remove components.

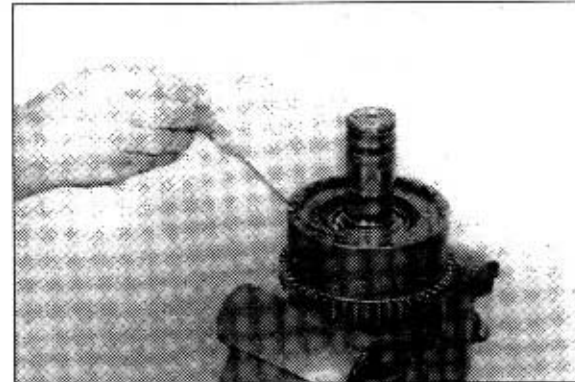
※ Special tool

Three leg puller

5870 971 003



⑤ Squeeze out snap ring and remove plate pack.

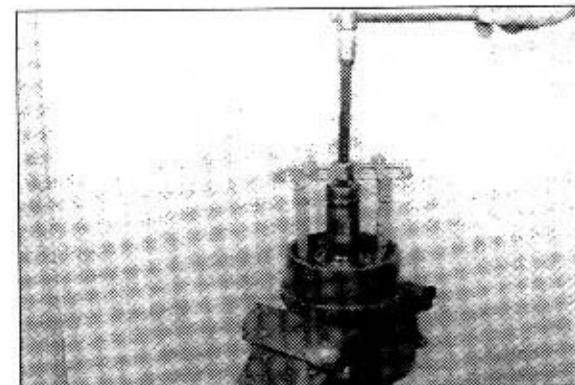


⑥ Pull off ball bearing and remove piston by means of compressed air.

※ Special tool

Two leg puller

5870 970 002



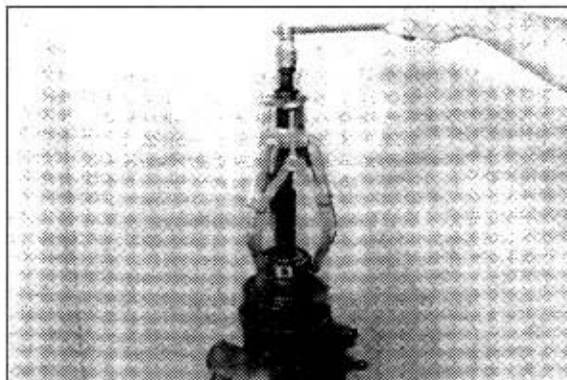


⑦ Pull off ball bearing.

※ Special tool

Three leg puller

5870 971 003



⑧ Squeeze out circlip and remove bushing.

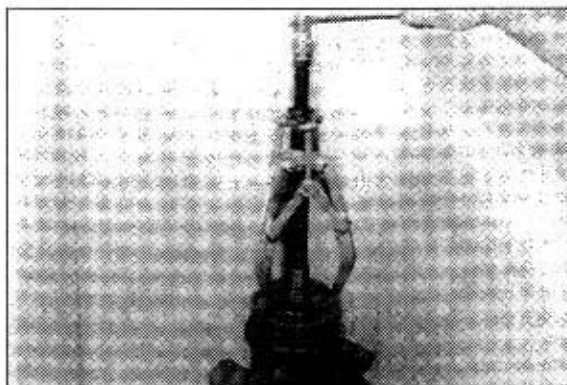


⑨ Pull off spur gear K1.

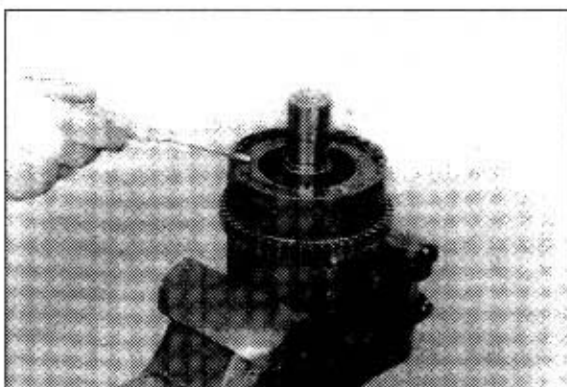
※ Special tool

Three leg puller

5870 971 003



⑩ Squeeze out snap ring, remove plate pack, cup springs and piston.



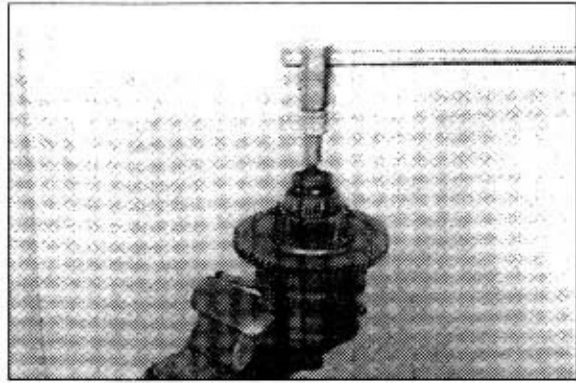
#### (6) Disassemble clutch KR/K2

① Unlock and loosen slotted nut.

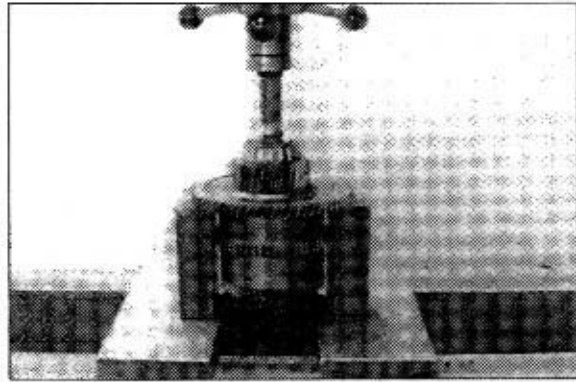
※ Special tool

Hook spanner

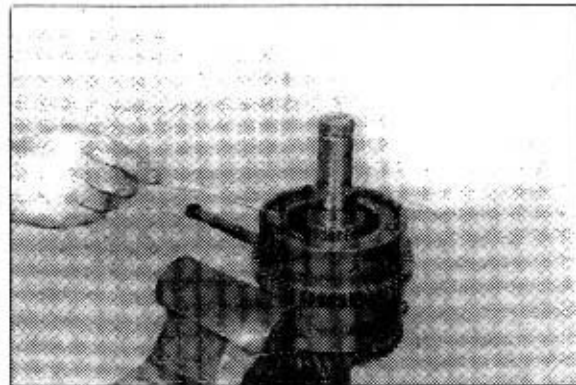
5870 401 026



② Press spur gear K2 from the shaft and remove released components.



③ Squeeze out snap ring and remove plate pack.



④ Pull off roller bearing and remove piston.

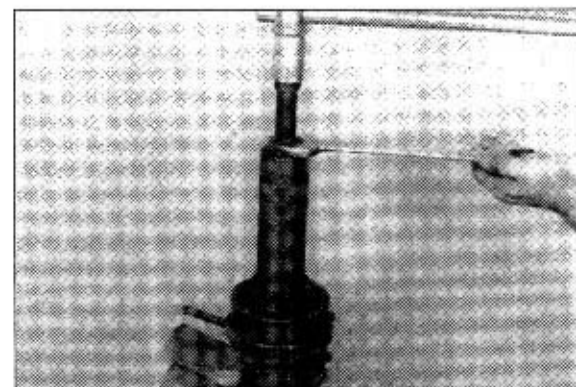
※ Special tool

Grab sleeve super

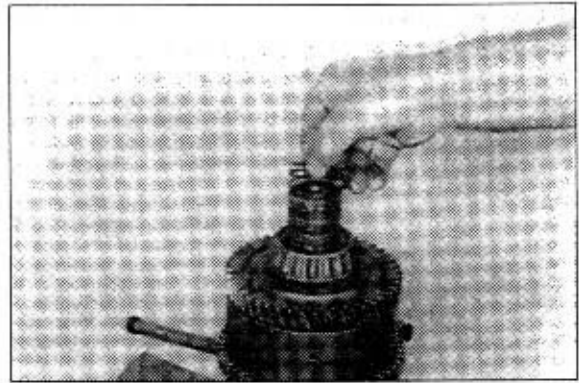
5870 026 020

Basic set

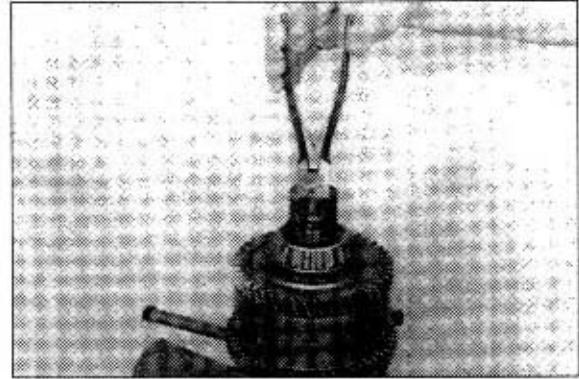
5870 026 000



- ⑤ Squeeze out rectangular rings.



- ⑥ Squeeze out circlip.

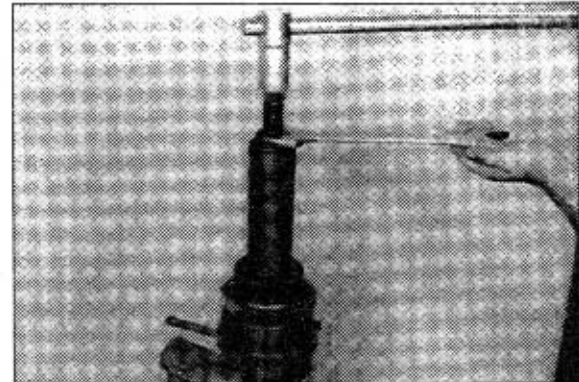


- ⑦ Pull off tapered roller bearing.

※ Special tool

Grab sleeve super 5870 026 022

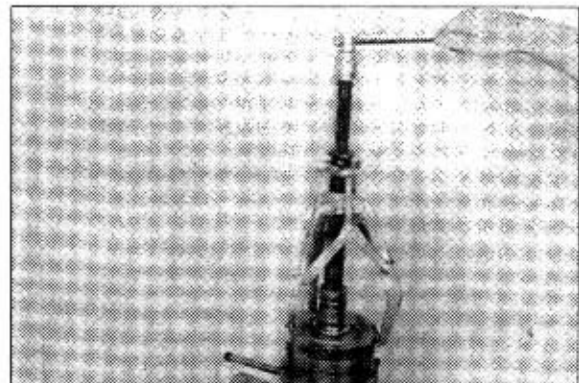
Basic set 5870 026 000



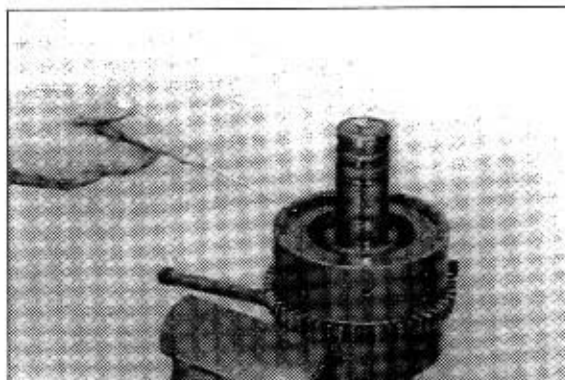
- ⑧ Pull off spur gear KR and remove components.

※ Special tool

Three leg puller 5870 971 003



- ⑨ Squeeze out snap ring and remove plate pack.

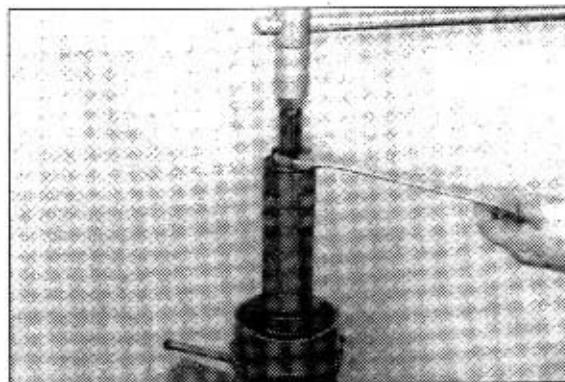


- ⑩ Pull off tapered roller bearing, remove cup springs and piston.

※ Special tool

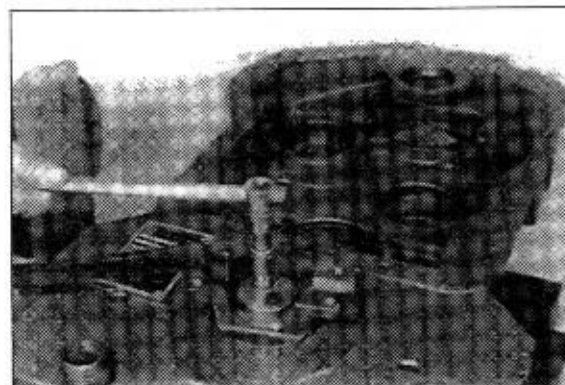
Grab sleeve super 5870 026 020

Basic set 5870 026 000

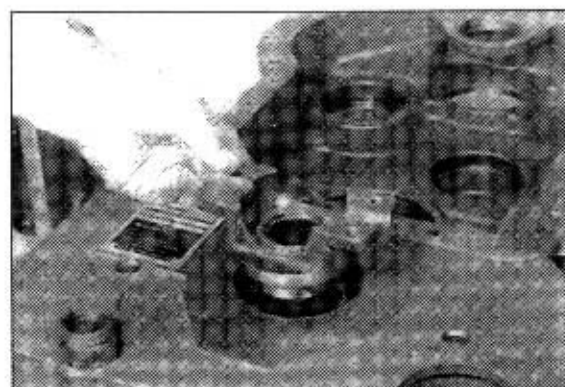


#### (7) Disassemble final drive-drum brake

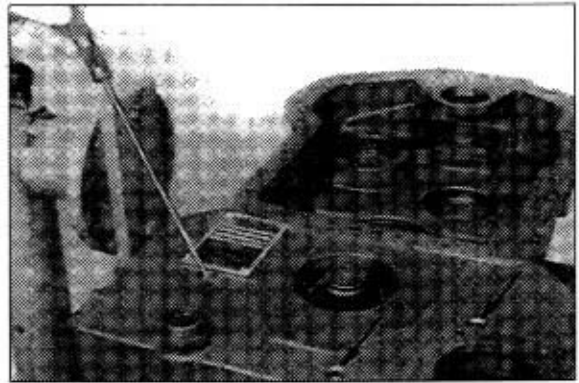
- ① Remove lock plate, loosen hexagon head screws and remove disk.



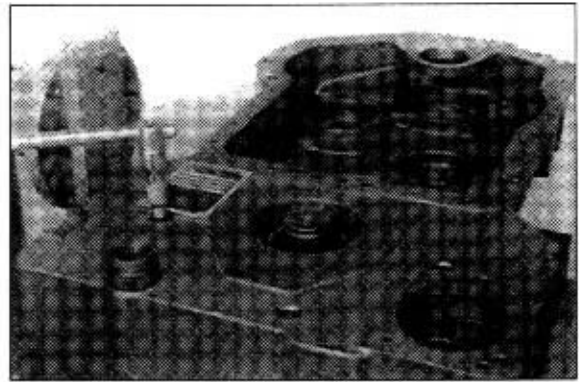
- ② Pull off output flange from the shaft.



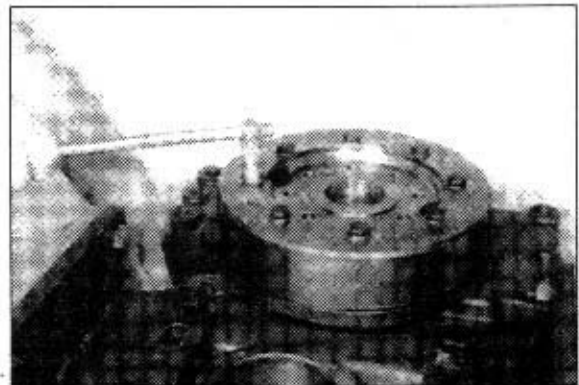
- ③ Remove cover lids(3EA).



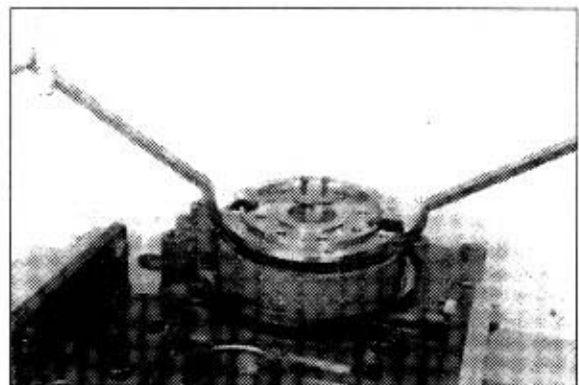
- ④ Loosen socket head screws(3EA).



- ⑤ Loosen hexagon head screws and remove brake drum.

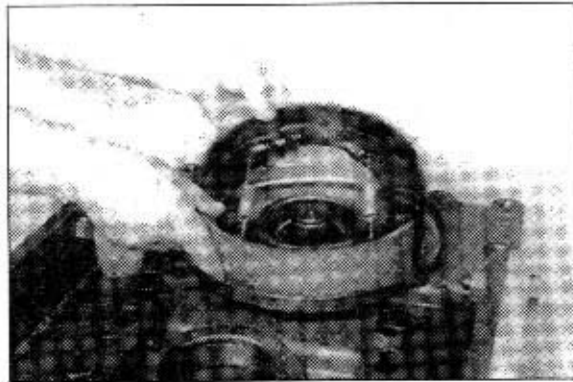


- ⑥ Remove lock plate, loosen hexagon head screws and pry off output flange from the shaft.

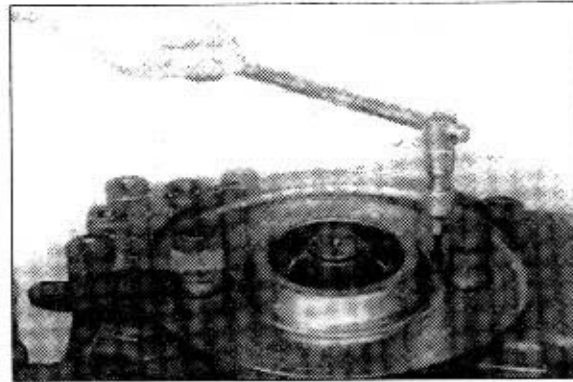




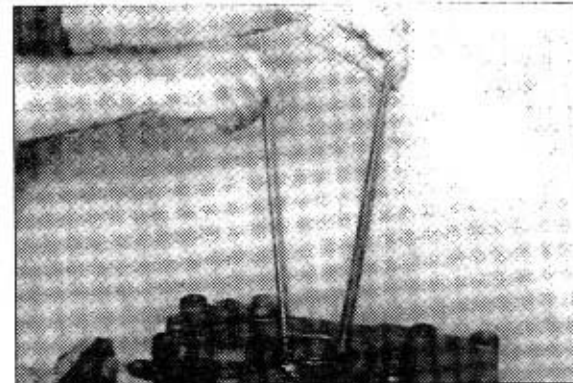
⑦ Remove brake shoes.



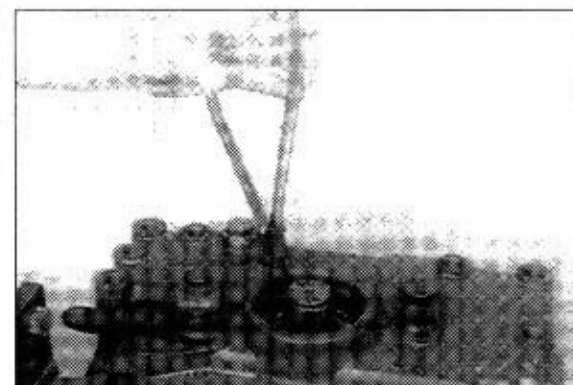
⑧ Loosen both socket head screws and remove cover plate.



⑨ Pry out shaft seal.



⑩ Squeeze out circlip.

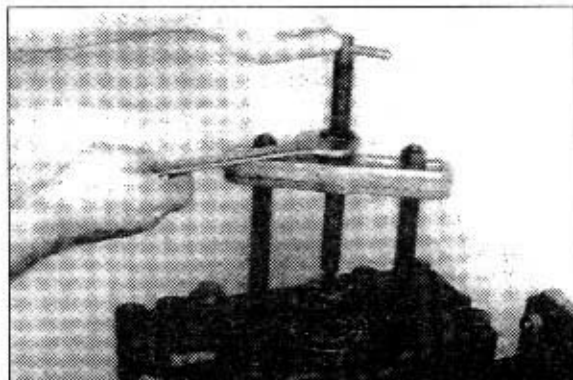


- ⑪ Pull output shaft out of the housing bore, respectively out of the output gear, using special device.

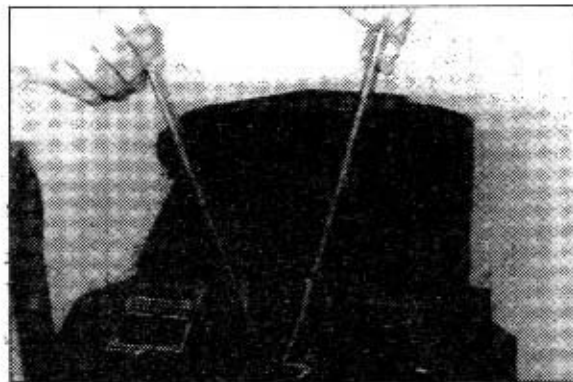
※ Special tool

Back up tool 5870 300 020

Threaded disk 5870 000 082



- ⑫ Tilt housing for 180°.  
Pry out shaft seal.



- ⑬ Pull ball bearing out of the housing bore.

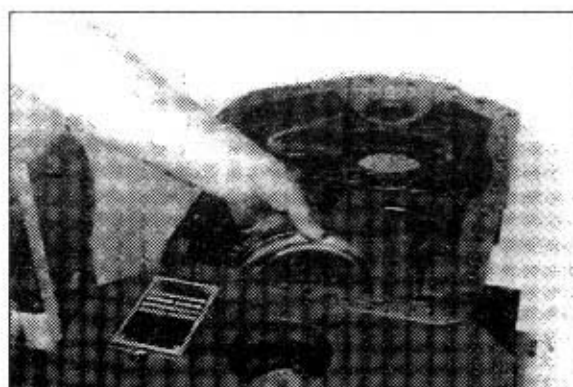
※ Special tool

Internal puller 5870 300 007

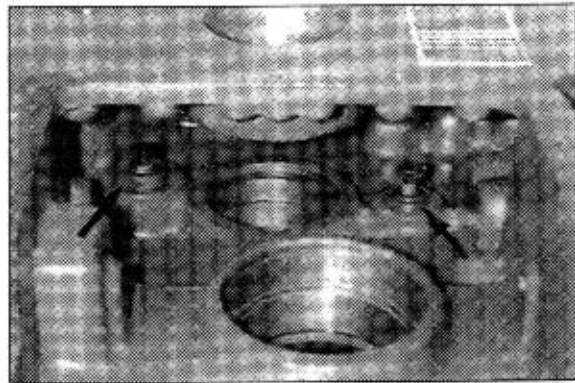
Back up tool 5870 300 003



- ⑭ Remove output gear and both plates.



- ⑮ Loosen hexagon head screws(Brake cam and anchor pin).

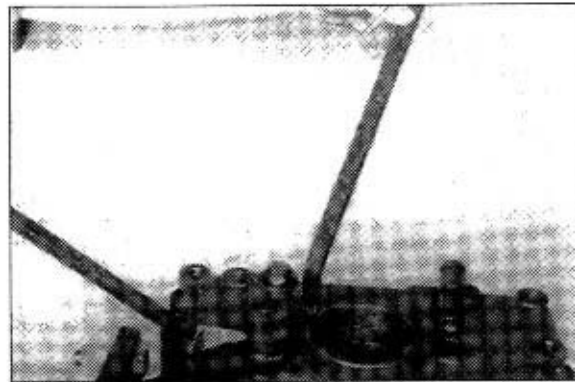


- ⑯ Pry brake cam and anchor pin(Arrow) out of the housing bores.

※ Special

Pry bar

5870 345 065



## 2) ASSEMBLY

### (1) Install final drive-drum brake

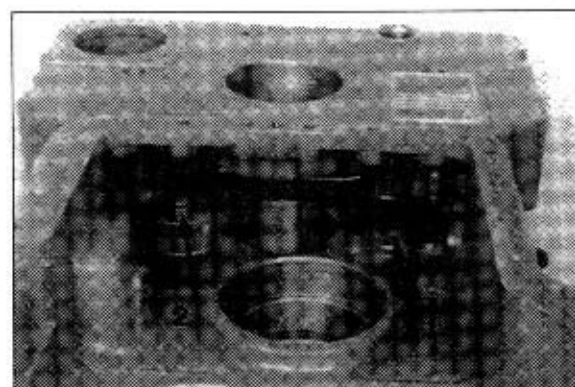
- ① Pre-assemble brake cam and insert it into the bore until contact is obtained.  
Mount anchor pin.

※ Insert new O-rings into the ring grooves, see arrows.

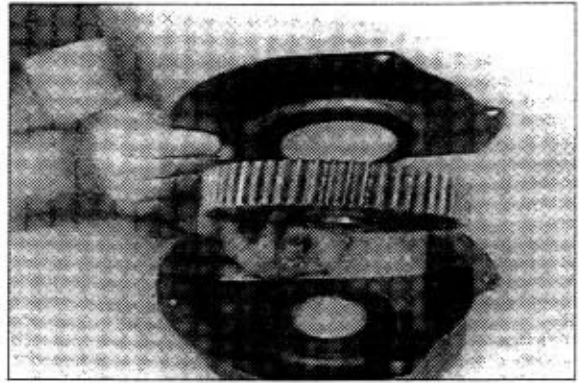


- ② Fasten brake cam with disk(s = 3.0mm), flat washer and hexagon head screw, see arrow 1. Fasten anchor pin with disk(s = 6.0mm), flat washer and hexagon head screw, see arrow 2.

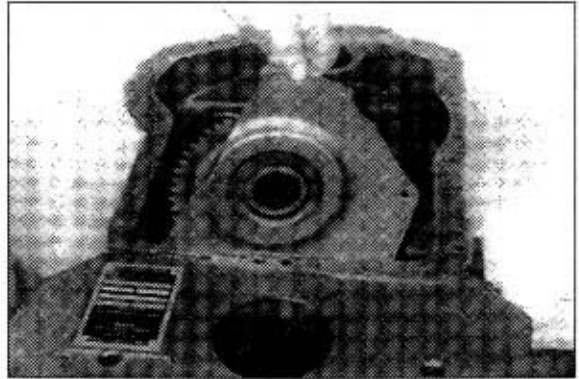
※ The free movement of the brake cam must be absolutely assured. Secure hexagon head screws with Loctite.(Type No.270)



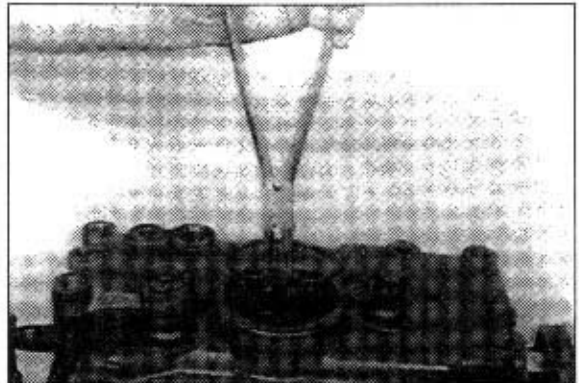
- ③ Insert output gear into the shield plate and mount 2nd shield plate.



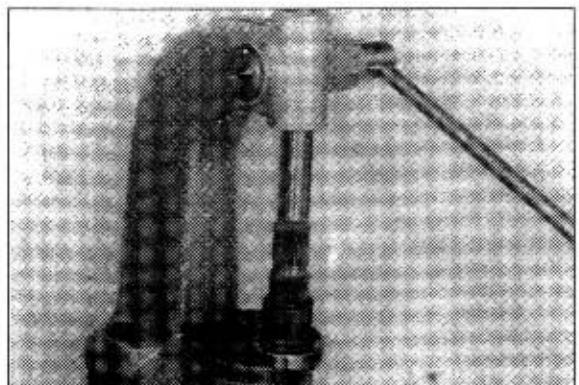
- ④ Insert output gear into the housing and bring it into position.  
Tilt housing for 180°.



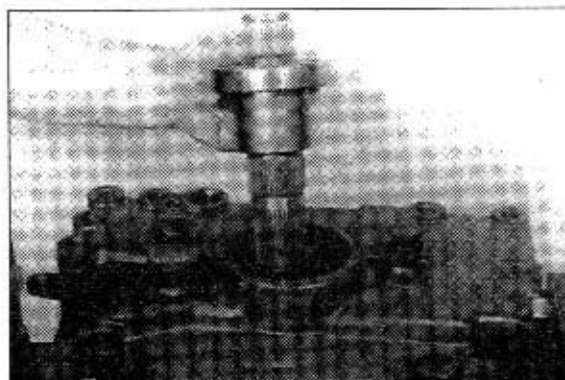
- ⑤ Squeeze in lower circlip.



- ⑥ Press ball bearing upon the output shaft until contact is obtained.



- ⑦ Heat housing bore and press output shaft against circlip until contact is obtained.



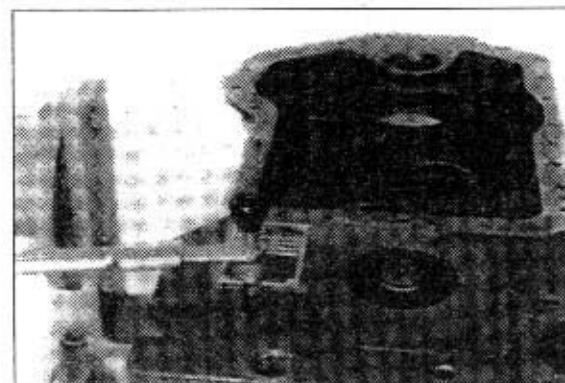
- ⑧ Adjust ball bearing free of play, using shim and circlip.



- ⑨ Fasten the shield plate by means of socket head screws(3EA).

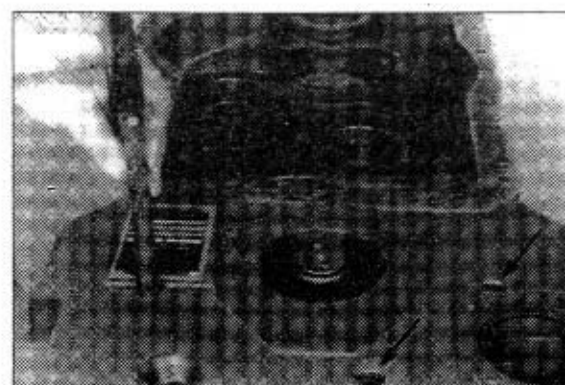
※ Secure socket head screws with Loctite.  
(Type No.270)

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



- ⑩ Install cover lids.

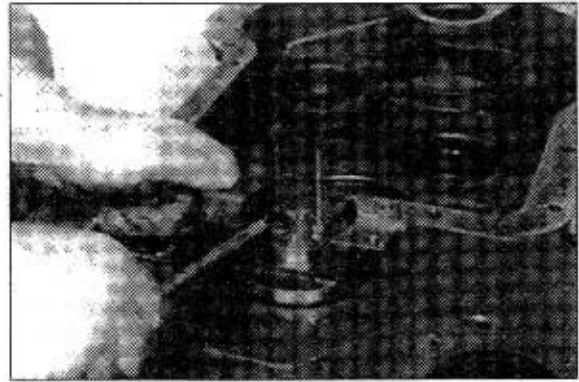
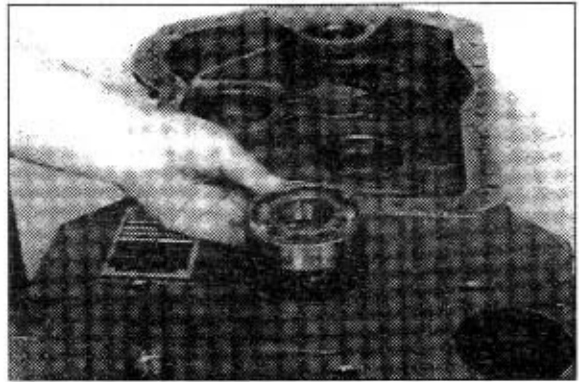
※ Use Loctite.(Type No.270)



- ⑬ Assemble ball bearing and pull it against shoulder (Next figure), using output flange, disk, hexagon head screws and hexagon nuts.

Now, remove output flange again.

- ※ Back off screws (M8) 5870 204 008



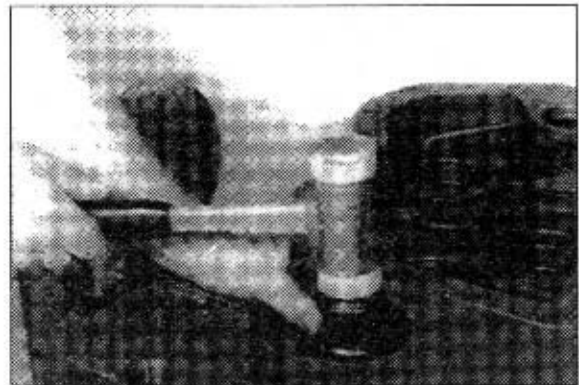
- ⑭ Install shaft seal.

- ※ The installation dimension is secured by the application of the prescribed special tool.

Cover outer diameter of the shaft seal with a spirit-water mixture (1:1).

- ※ Special tool

Driver 5870 048 135



- ⑮ Assemble output flange and fasten by means of disk and hexagon head screws.

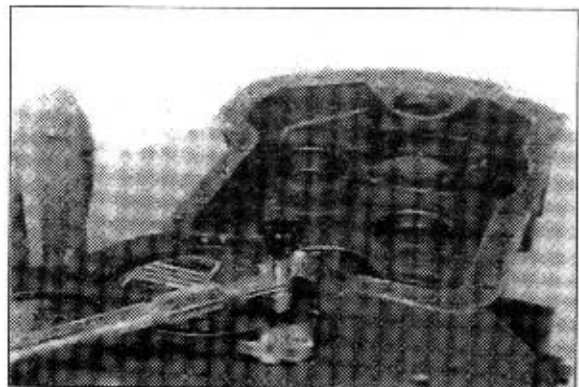
- ※ Cover disk with sealing compound. (Cunil T)

Torque limit (M8/10.9)

3.47kgf · m (25.1 lbf · ft)

- ※ Special tool

Clamping yoke 5870 240 025



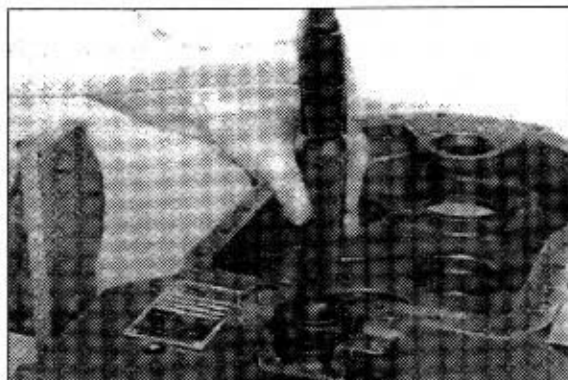


- ⑩ Fix hexagon head screw by means of lock plate.

※ Special tool

Driver 5870 057 011

Handle 5870 260 002



- ⑪ Tilt housing for 180°.

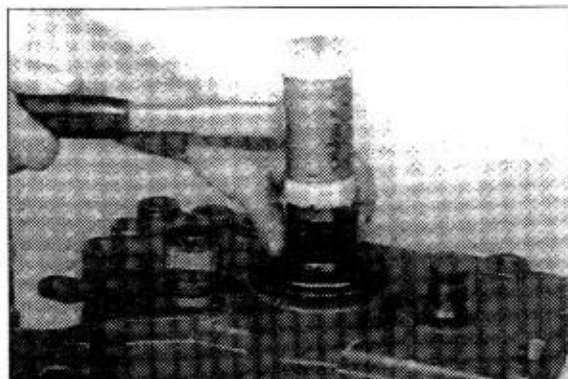
Install shaft seal.

※ The installation dimension(14mm) is given by the application of the special tool.

Cover outer diameter with a spirit-water mixture(1:1).

※ Special tool

Driver 5870 048 135



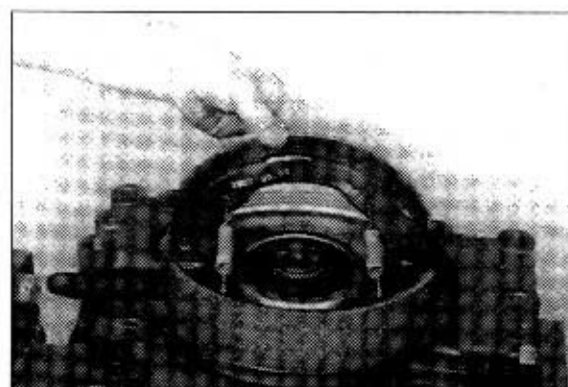
- ⑫ Fasten cover plate by means of socket head screws.

※ Secure socket head screw with Loctite.  
(Type No.270)

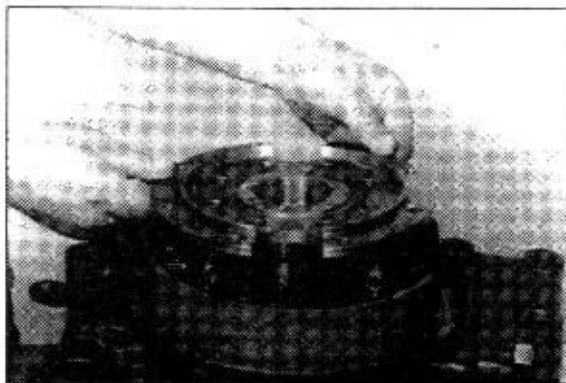
Torque limit(M6/8.8) 0.97kgf · m(7.02lbf · ft)



- ⑬ Install brake shoes.



- ⑳ Heat bore and assemble output flange against shoulder.



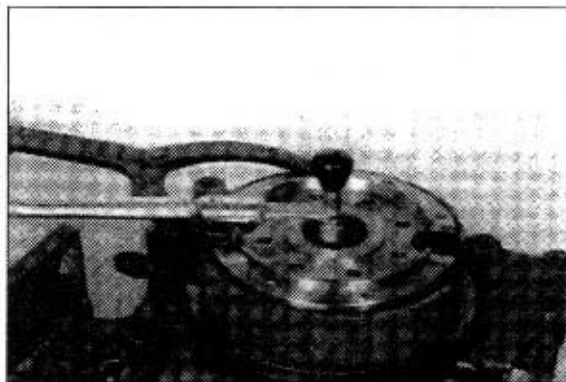
- ㉑ Cover disk with sealing compound(Curil T), install it and fasten by means of hexagon head screws.

Torque limit(M8/10.9)

3.47kgf · m(25.1lbf · ft)

- ※ Special tool

Clamping yoke 5870 240 025

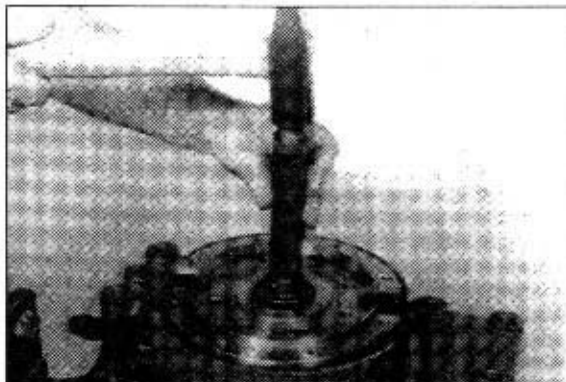


- ㉒ Fix hexagon head screw by means of lock plate.

- ※ Special tool

Driver 5870 057 011

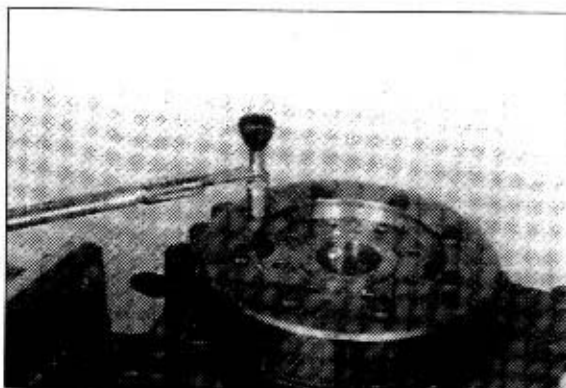
Handle 5870 260 002



- ㉓ Assemble brake drum and fasten by means of hexagon head screws(Use flat washers).

Torque limit(M10/10.9)

6.93kgf · m(50.1lbf · ft)

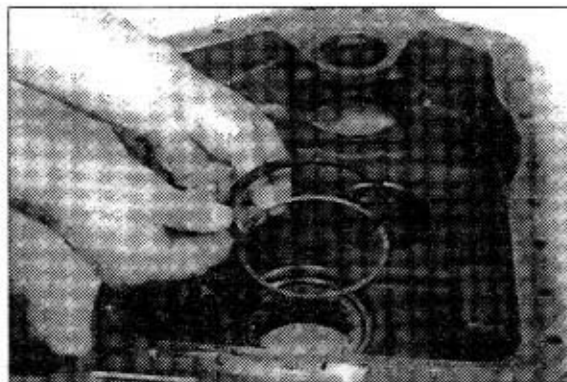


**(2) Install spur gear K3**

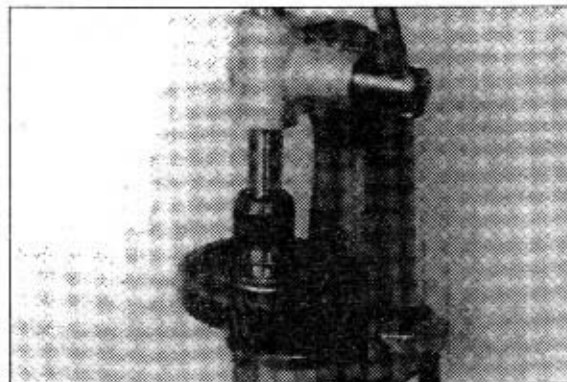
- ① Insert bearing outer race into the bore.



- ② Adjust roller bearing free of play, using shim and circlip.



- ③ Press bearing inner race firmly against shoulder.



- ④ Insert bearing outer race until contact is obtained.

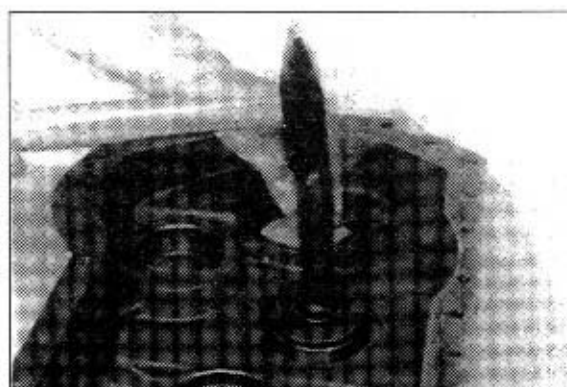
※ Special tool

Driver

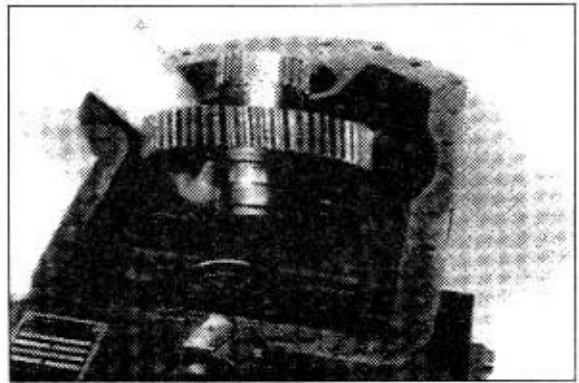
5870 058 022

Handle

5870 260 002

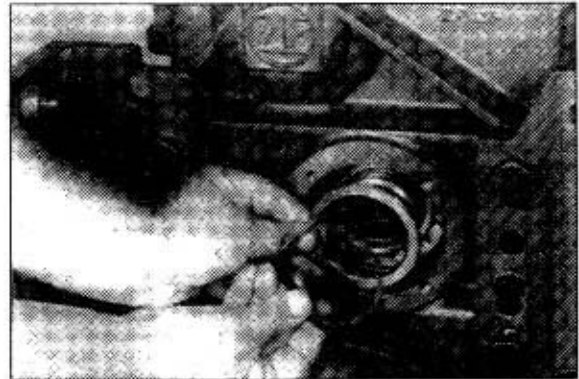


⑤ Assemble spur gear.



⑥ Tilt gearbox for 90°.

Assemble collar shim and fix spur gear free of play, using disk and circlip.



⑦ Tilt gearbox for 90°.

Install cover.

※ Use Loctite.(Type No.270)

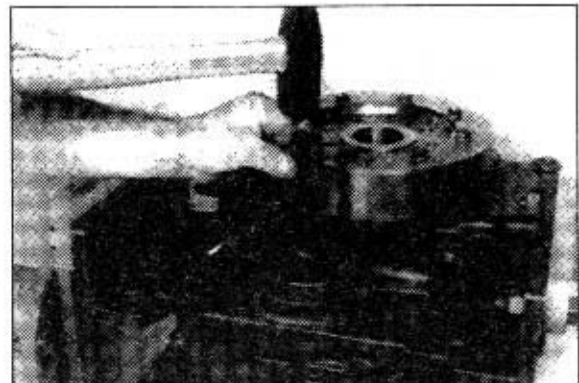
※ Special tool

Driver

5870 057 023

Handle

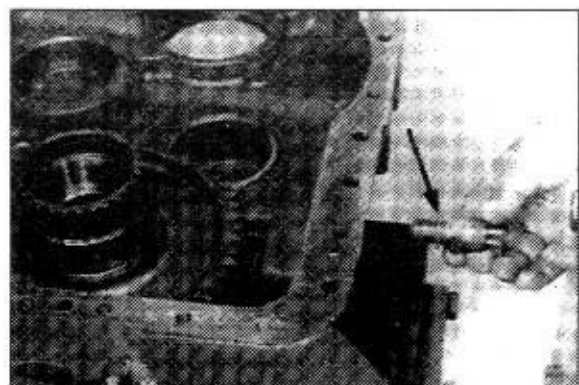
5870 260 002



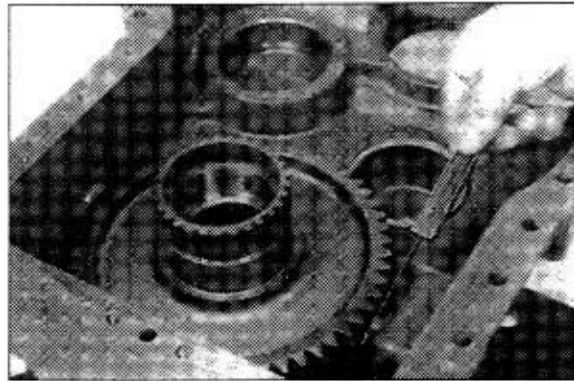
⑧ Tilt housing for 180°.

Install inductive transmitter.

※ The required clearance = 0.6~0.8mm between contact face/inductive transmitter and spur gear will be adjusted(Next page figure) by the installation of a corresponding shim (Arrow).



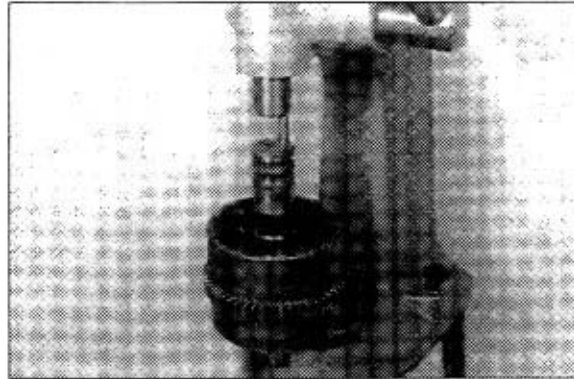
- ⑨ If the gearbox has not been completely disassembled and reassembled, the installation of the inductive transmitter has to be carried out according to Figure 1)/page 3-125.



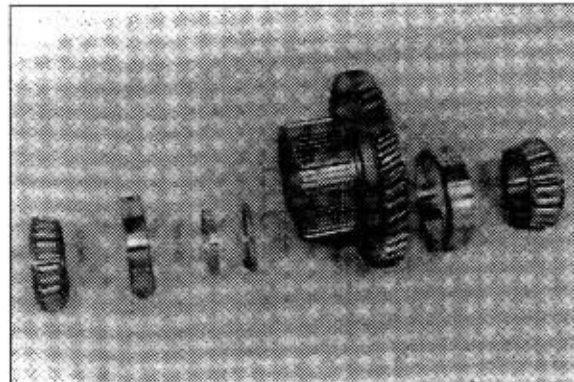
### (3) Complete multi-disk clutches

#### • Assemble clutch KR/K2

- ① Close the two bores with balls (ø 8mm).



- ② The illustration on the right shows the components of the spur gear KR.



- ③ Press bearing outer race firmly against shoulder.

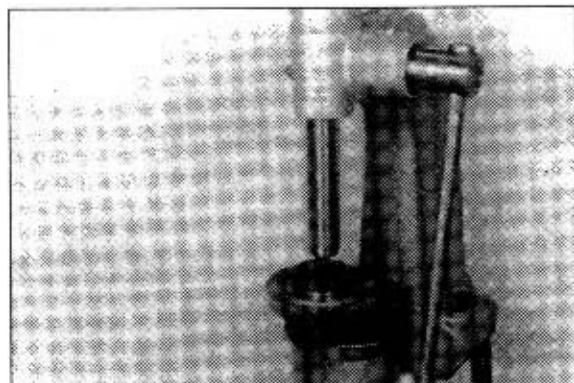
※ Special tool

Driver

5870 058 084

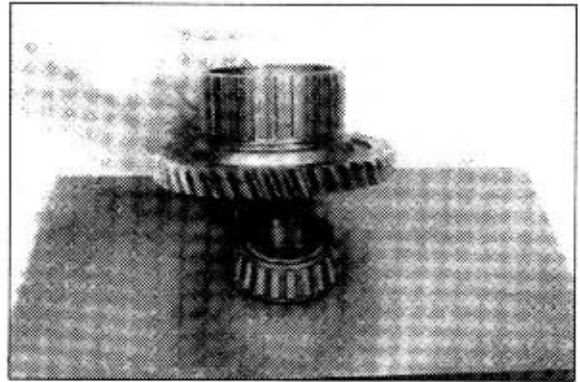
Handle

5870 260 002

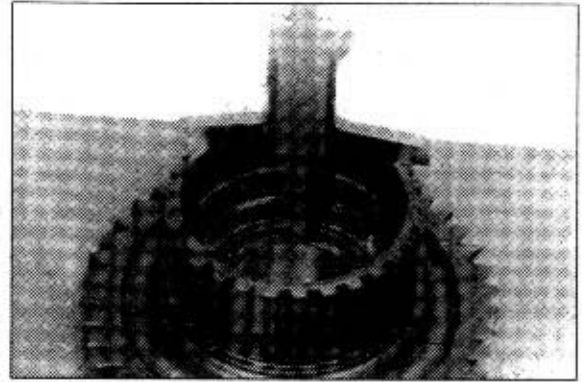




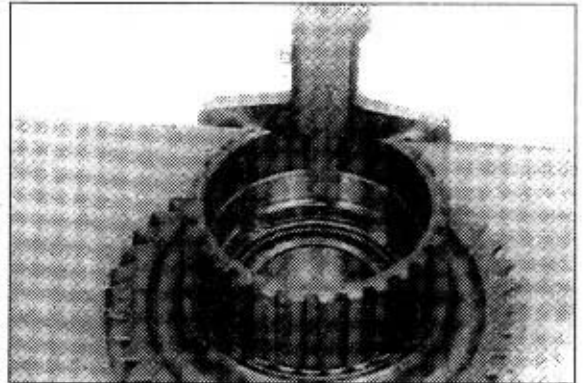
- ④ Adjust end play of the spur gear bearing-KR "maximum 0.05mm"(Example A)  
Lay spur gear upon tapered roller bearing.



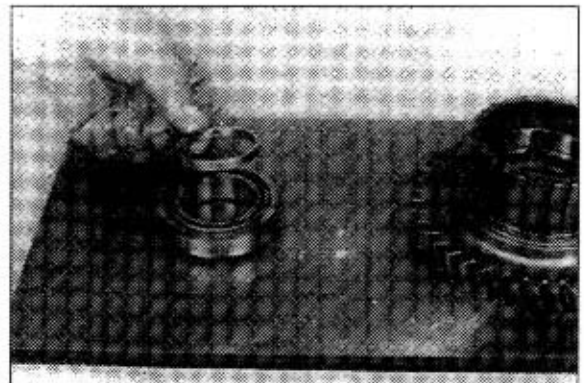
- ⑤ Determine Dimension I from the end face to the bearing inner race.  
Dimension I e.g. 45.60mm



- ⑥ Measure Dimension II from the end face to the contact face of the bearing outer race.  
Dimension II e.g. 37.10mm

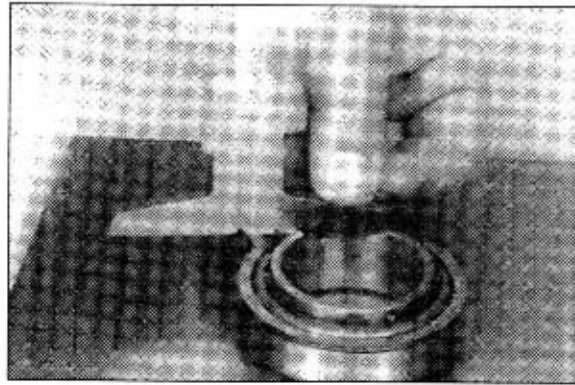


- ⑦ Lay bushing upon the tapered roller bearing.





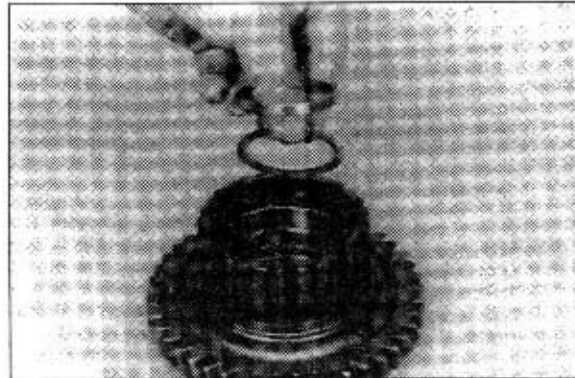
- ⑧ Determine Dimension III from the end face/bushing to the bearing outer race.  
Dimension III e.g. 6.35mm



**Example A**

Dimension I	45.60mm
Dimension II	- 37.10mm
Difference	8.50mm
Dimension III	- 6.35mm
Difference = Shim e.g.	s = 2.15mm

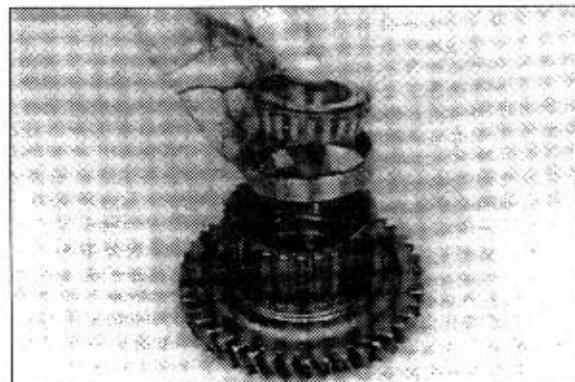
- ⑨ Insert shim(e.g. s=2.15mm) and bushing.



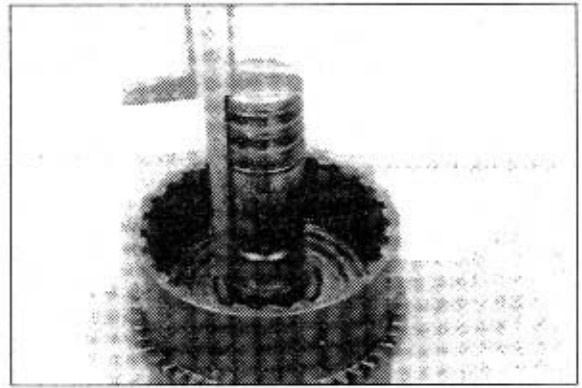
- ⑩ Install complete tapered roller bearing.

\* Special tool

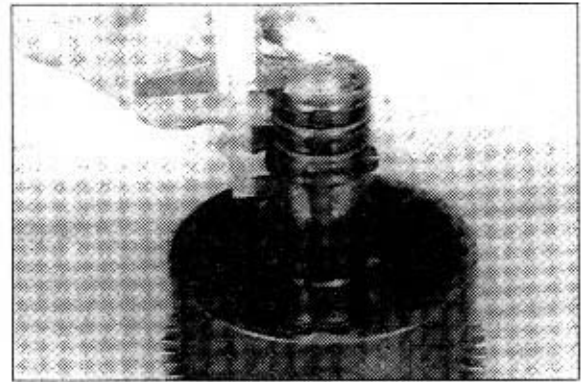
Driver	5870 058 084
Handle	5870 260 002



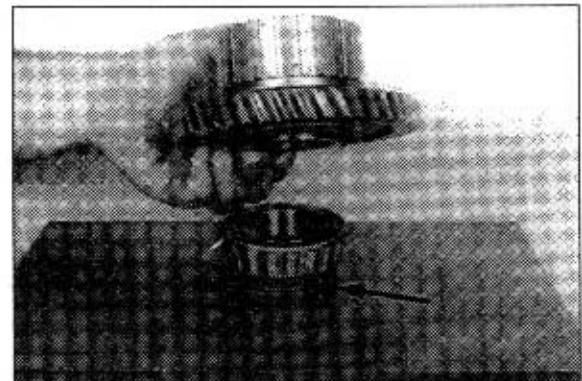
- ⑪ Adjust complete bearing of spur gear-KR free of play(Example C)  
Measure Dimension I from the end face to the contact face/tapered roller bearing on the clutch shaft.  
Dimension I e.g. 124.95mm



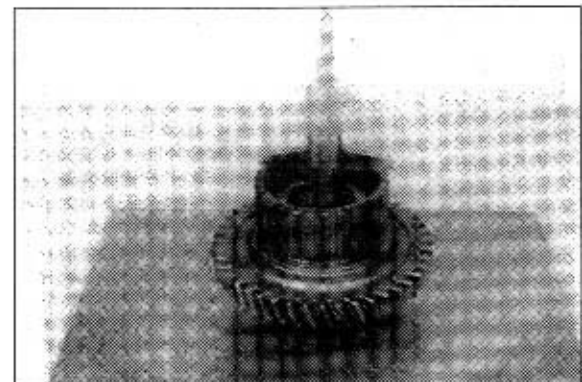
- ⑫ Squeeze in circlip and determine Dimension II from the end face to the circlip.  
Dimension II e.g. 45.40mm



- ⑬ Lay tapered roller bearing upon the measuring disk(Arrow) and install spur gear(With inserted tapered roller bearing).



- ⑭ Measure Dimension III from the end face to the measuring disk(Tapered roller bearing).  
Dimension III e.g. 94.60mm

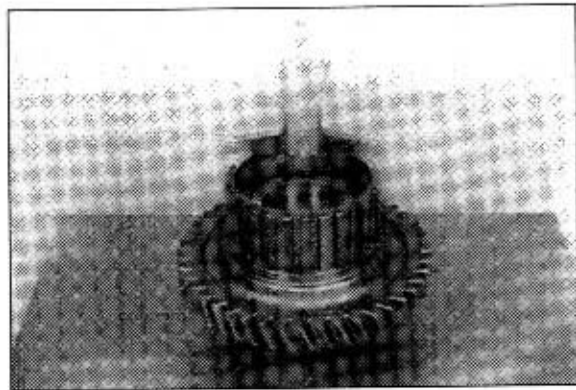


- ⑮ Determine Dimension IV from the end face to the tapered roller bearing inner race.

Dimension IV e.g. 16.90mm

**Example B**

Dimension I	124.95mm
Dimension II	- 45.40mm
Difference = Dimension X	79.55mm



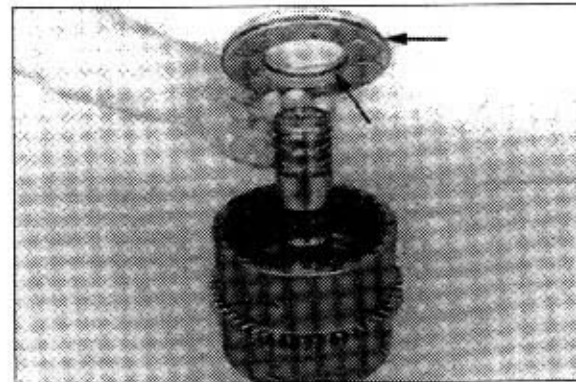
**Example C**

Dimension III	94.60mm
Dimension IV	- 16.90mm
Difference = Dimension Y	77.70mm

**Example II**

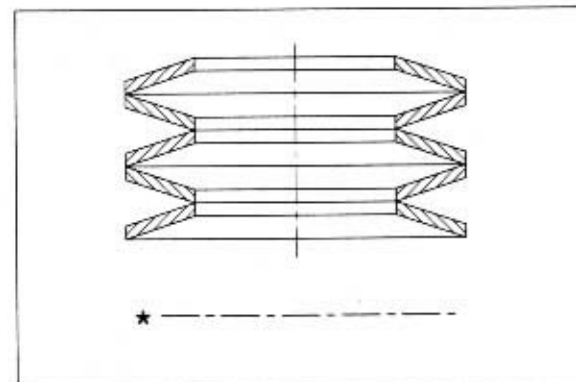
Dimension X	79.55mm
Dimension Y	- 77.40mm
Difference = Shim	s = 2.15mm

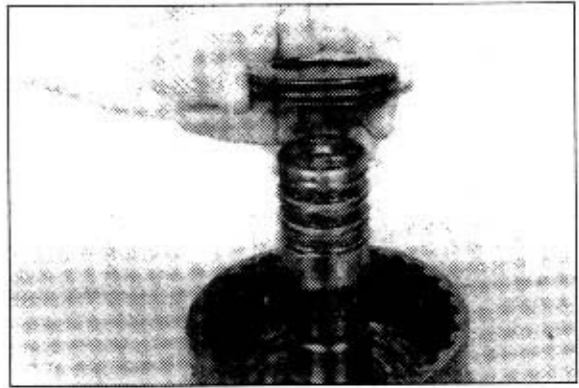
- ⑯ Install new O-rings(Arrows) and piston firmly against shoulder.



- ⑰ Assemble cup spring pack according to the Draft on the right, respectively on the right.

\* --- Piston side, respectively. Pressure side





⑱ Assemble the shim(e.g.  $s = 2.15\text{mm}$ ) determined from figure⑪/page3-81 to example.

- \* Cover upper cup spring as well as shim with grease and align then centrally.



⑲ Assemble alternating plate pack - starting with one outer plate.

- \* Plate pack KR is composed of :

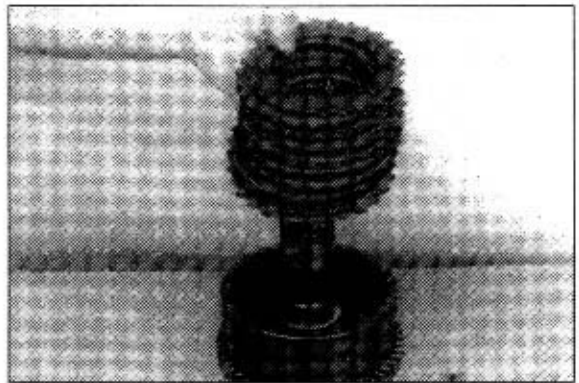
9 Outer plates  $s = 2.00\text{mm}$

5 Inner plates  $s = 2.00\text{mm}$

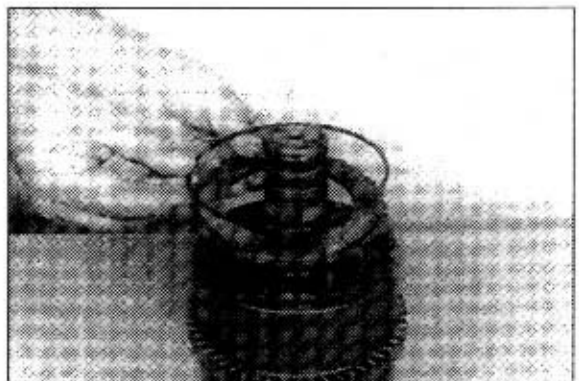
3 Inner plates  $s = 1.50\text{mm}$

The thinner inner plates have always to be installed on the backing plate side.

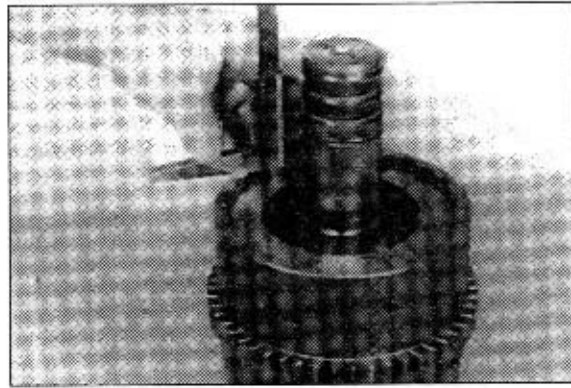
Lubricate plates prior to the installation.



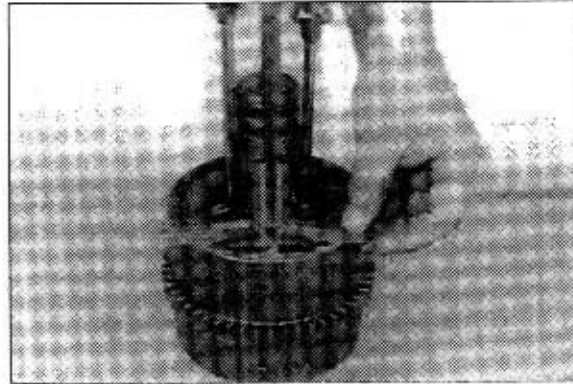
⑳ Place on backing plate and squeeze in snap ring.



- ②① Determine plate clearance(Piston travel)  
 "2.0~2.8mm"(Example D)  
 Measure Dimension I from the end  
 face/plate carrier to the backing plate.  
 Dimension I e.g. 5.80mm



- ②② Place backing plate against snap ring and  
 determine Dimension II from the end  
 face/plate carrier to the backing plate.  
 Dimension II e.g. 3.60mm

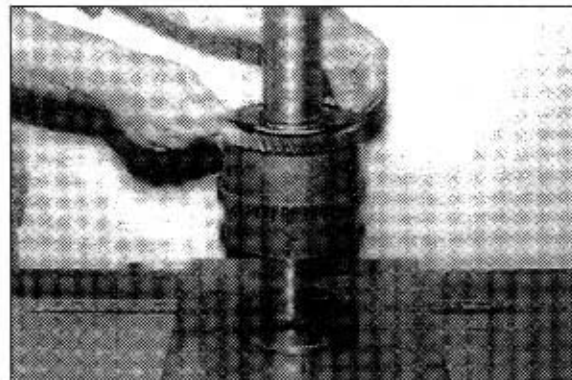


#### Example D

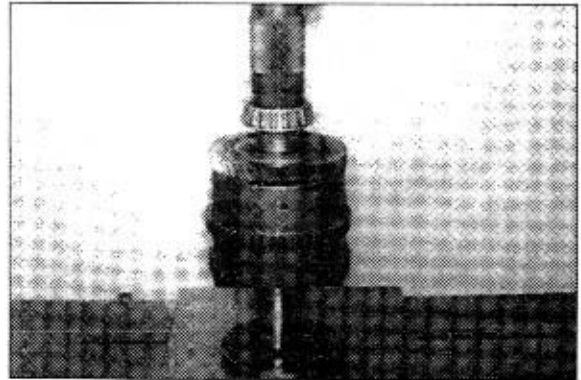
Dimension I e.g.	5.80mm
Dimension II e.g.	- 3.60mm
Difference = Plate clearance	2.20mm

- ※ In case of deviations from the prescribed  
 plate clearance - 2.0 to 2.8mm - correct by  
 means of corresponding inner plate(s) =  
 1.5, 2.0, or 2.5mm)

- ②③ Check centric location of the first cup  
 spring as well as of the shim again.  
 Now, align inner plates radially and press  
 the pre-assembled spur gear-KR firmly  
 against shoulder.  
 ※ By slight rotations(To and fro) during the  
 pressing step, the assembling of the  
 plates will be facilitated.



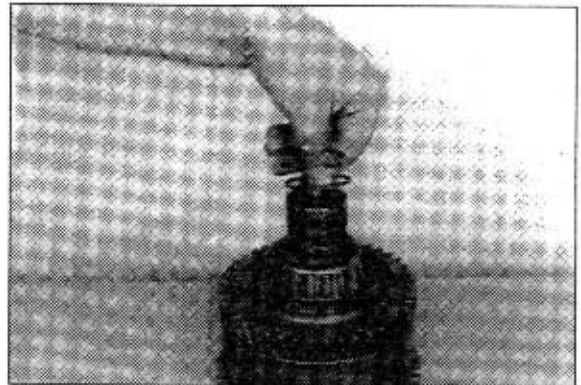
- ②④ Press tapered roller bearing firmly against shoulder.



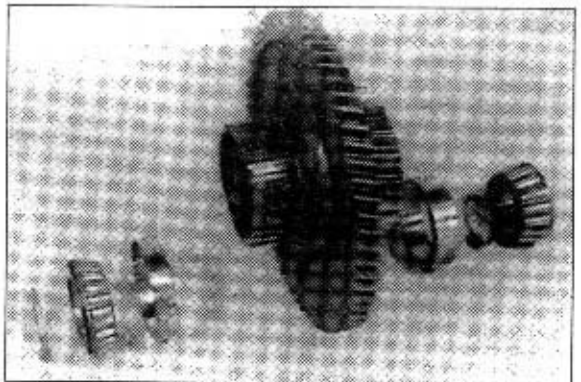
- ②⑤ Squeeze in circlip.



- ②⑥ Squeeze in and engage rectangular rings(3EA) in the ring grooves of the clutch shaft.



- ②⑦ The illustration on the right shows the spur gear bearing K2.



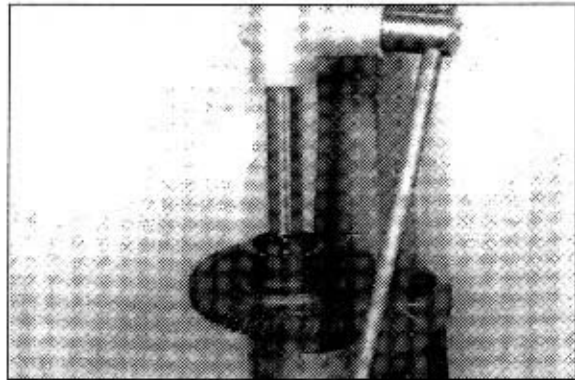


⑳ Press bearing outer race firmly against shoulder(Clutch side).

\* Special tool

Driver 5870 058 057

Handle 5870 260 002

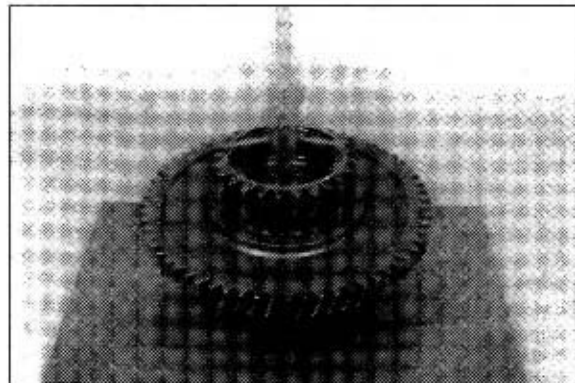


㉑ Adjust end play of the spur gear bearing-  
K2 "maximum 0.05mm" (Example E)  
Place tapered roller bearing upon  
measuring disk(Arrow), respectively spur  
gear upon tapered roller bearing.



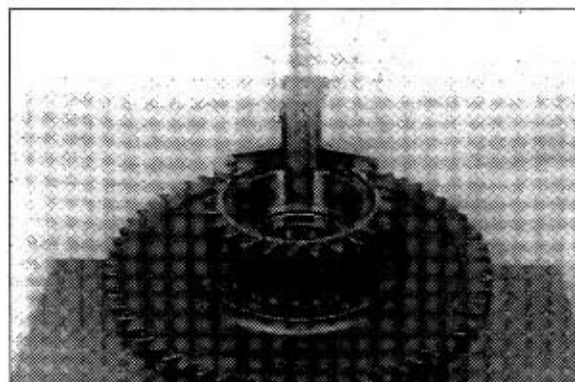
㉒ Determine Dimension I from the end  
face to the measuring disk.

Dimension I e.g. 86.00mm



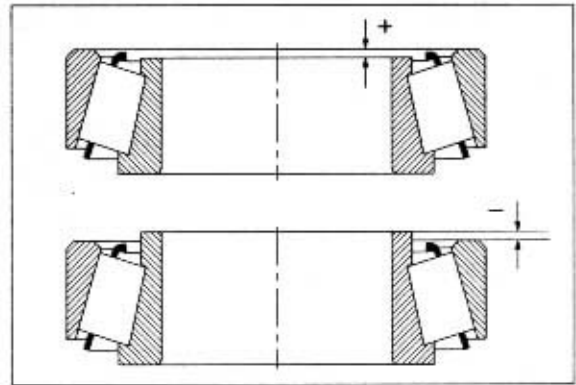
㉓ Measure Dimension I from the end face  
to the contact face of the bearing outer  
race.

Dimension I e.g. 30.55mm

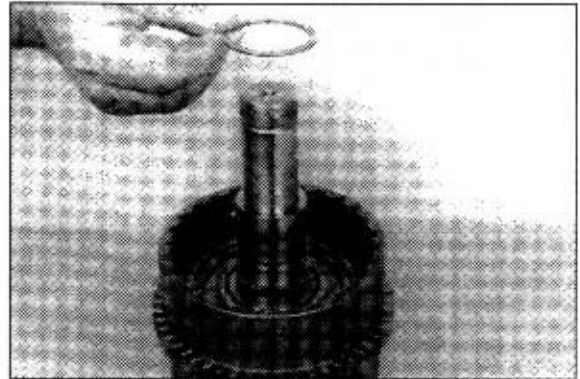


※ The draft on the right shows the tapered roller bearing No.33 207 with two different measuring results.

In the present case, Dimension III has been measured with +0.05mm.



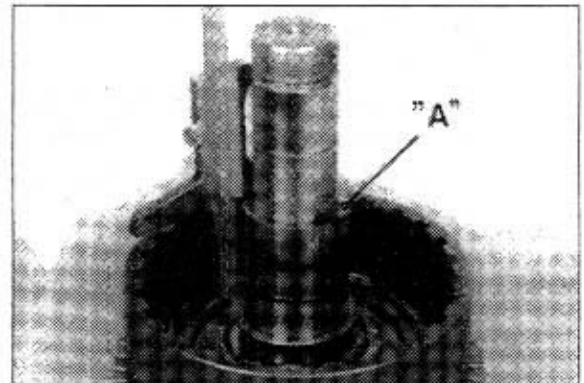
③② Assemble shim  $s = 2.00\text{mm}$ .



③③ Measure Dimension IV from the end face A to the shim.

Dimension IV e.g. 54.30mm

Remove shim again.



### Example E

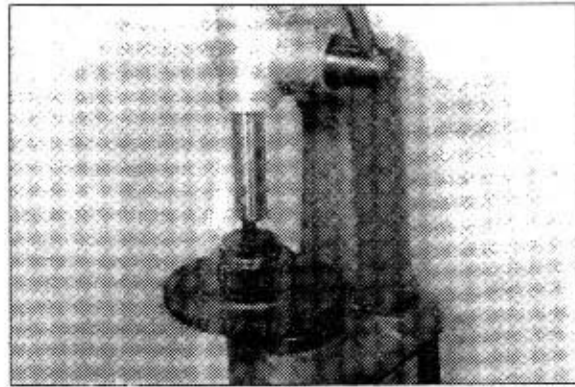
Dimension I	86.00mm
Dimension II	- 30.55mm
Difference	55.45mm
Dimension III	+ 0.05mm
gives Dimension X	55.50mm
Dimension IV	- 54.30mm
Difference = Shim	$s = 1.20\text{mm}$

- ③④ Press bearing outer race firmly against shoulder.

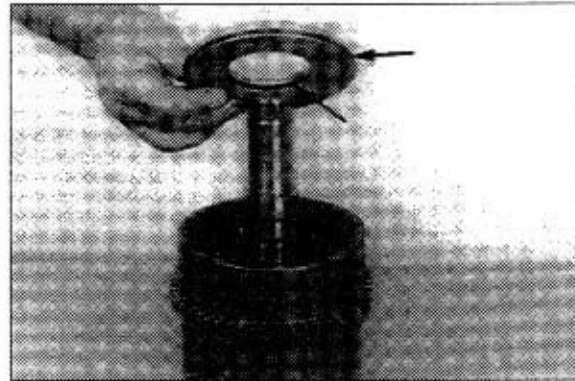
\* Special tool

Driver 5870 058 062

Handle 5870 260 002



- ③⑤ Install new O-rings (Arrows) and insert piston firmly against shoulder.



- ③⑥ Assemble cup spring pack and disk  $s = 2.00\text{mm}$ .

\* Cover upper cup spring as well as shim with grease and align them centrally.  
Arrangement of the cup springs, see Draft 17/page 3-82.

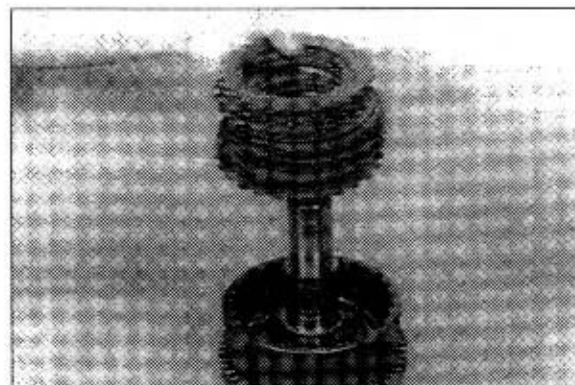


- ③⑦ Assemble alternating plate pack-starting with one outer plate.

\* Plate pack K2 is composed of :  
7 Outer plates  $s = 2.00\text{mm}$   
3 Inner plates  $s = 2.00\text{mm}$   
3 Inner plates  $s = 1.50\text{mm}$

Install the thinner inner plates always on the backing plate side.

Lubricate plates prior to the installation.

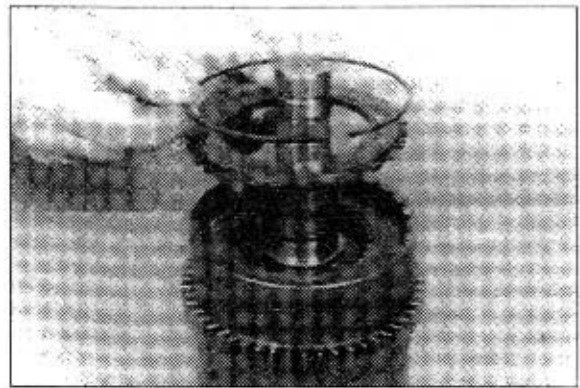


- ③⑧ Lay on backing plate and squeeze in snap ring.

※ Now, check the plate clearance(Piston travel).

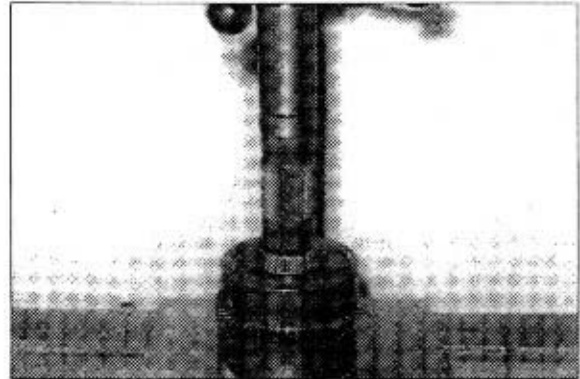
Plate clearance K2 should be 1.50~2.50mm.

In case of deviations from the prescribed plate clearance, correct with corresponding inner plate(s = 1.50, 2.00 or 2.50mm).

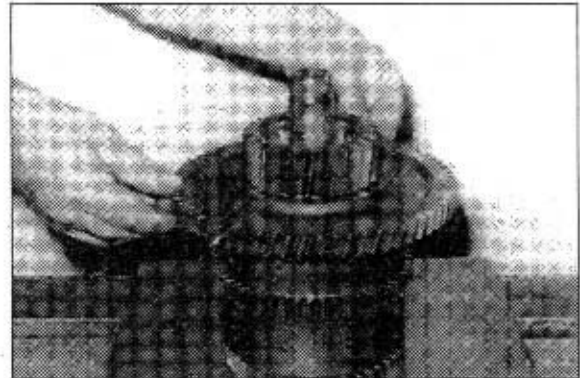


- ③⑨ Check centric location of the first cup spring again.

Now, press tapered roller bearing firmly against shoulder.



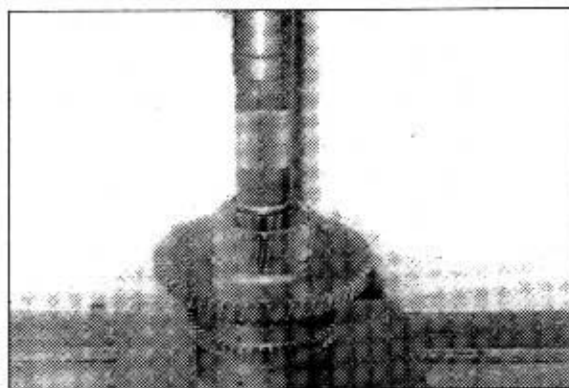
- ④⑩ Align inner plates radially and assemble pre-assembled spur gear K2 until all inner plates have been received.



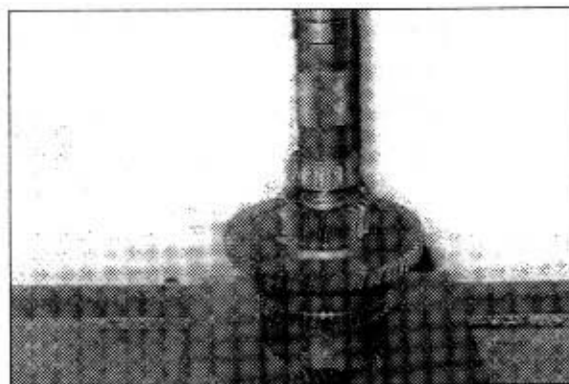
- ④⑪ Assemble the shim(e.g. s=1.20mm) determined from figure ② to example E.



- ④② Press tapered roller bearing firmly against shoulder.



- ④③ Press the housing side tapered roller bearing firmly against shoulder.



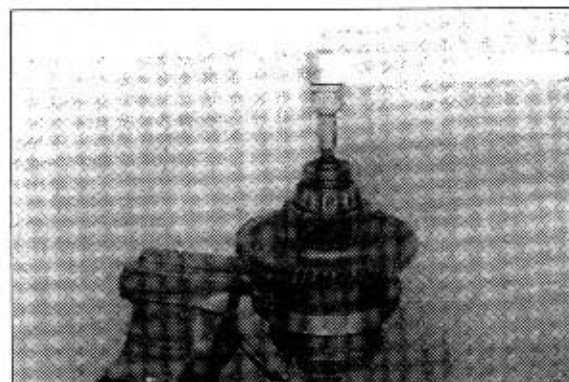
- ④④ Fix components by means of slotted nut.

Torque limit 60.0kgf · m(369lbf · ft)

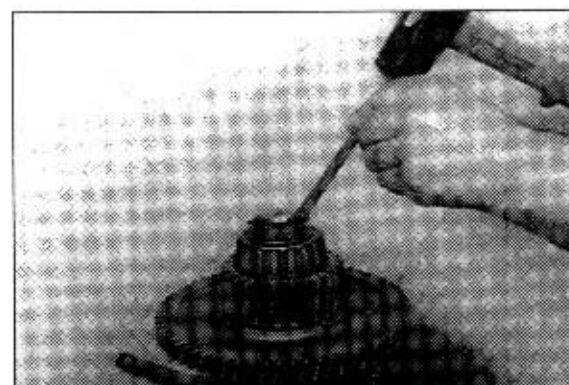
- ※ Special tool

Hook spanner 5870 401 026

Back up tool 5870 240 031

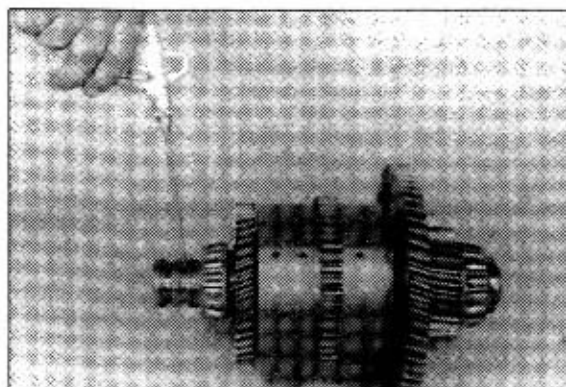


- ④⑤ Secure slotted nut.



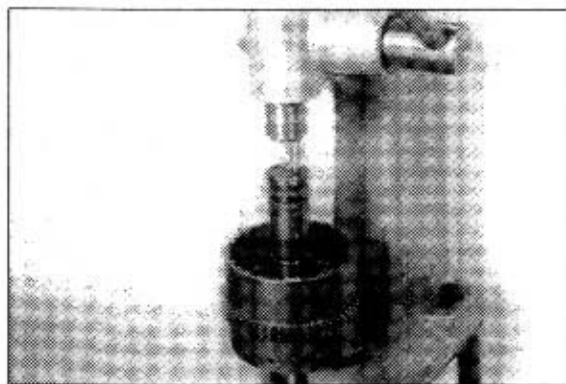
- ④⑥ Check performance of clutch KR and K2 by means of compressed air.

\* If all parts are correctly installed, the closing, respectively opening of the clutches is clearly audible.



• Assemble clutch KV/K1

- ① Close the two bores with balls(  $\varnothing$  8mm).



- ② The illustration on the right shows the components of the spur gear-KV.

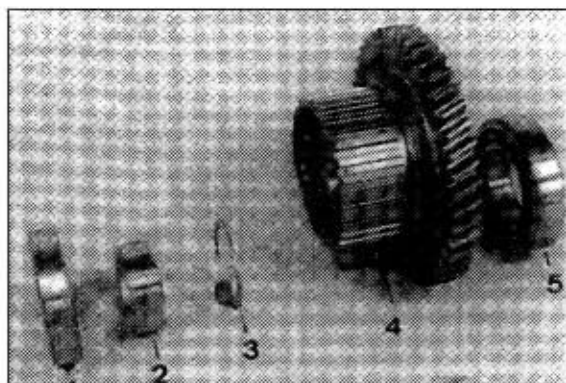
1 = Ball bearing(Denomination 6009 C3/J)

2 = Bushing

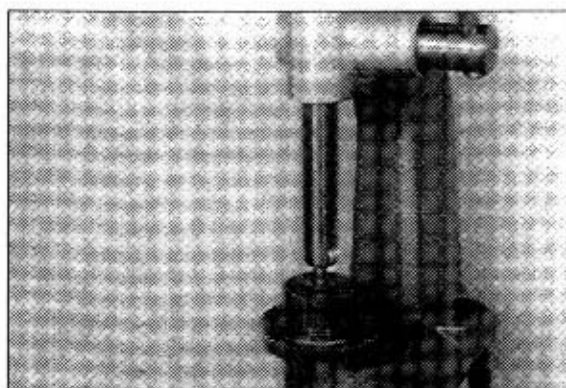
3 = Shim

4 = Spur gear-KV

5 = Ball bearing(Denomination 6209 C3/J)

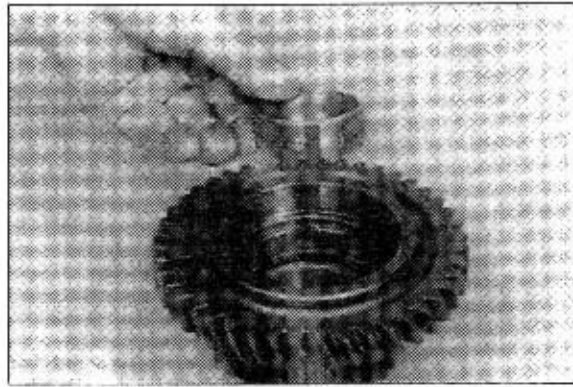


- ③ Press ball bearing(6009 C3/J) firmly against shoulder.





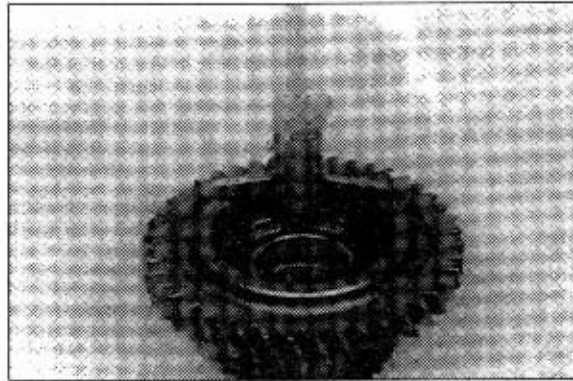
④ Insert bushing.



⑤ Adjust the spur gear bearing free of play and without exerting pressure(Example F):

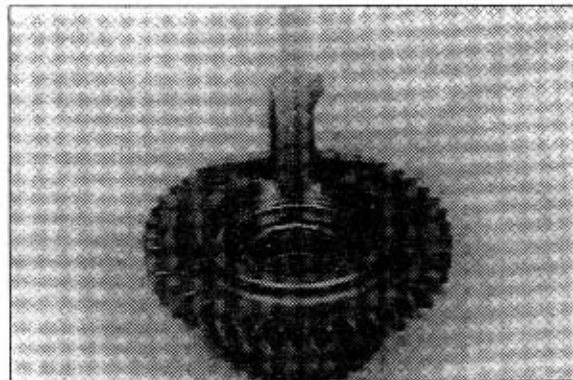
Determine Dimension I from the plane surface/spur gear to the end face/bushing.

Dimension I e.g. 19.70mm



⑥ Measure Dimension II from the plane surface/spur gear to the contact face of the ball bearing.

Dimension II e.g. 17.70mm



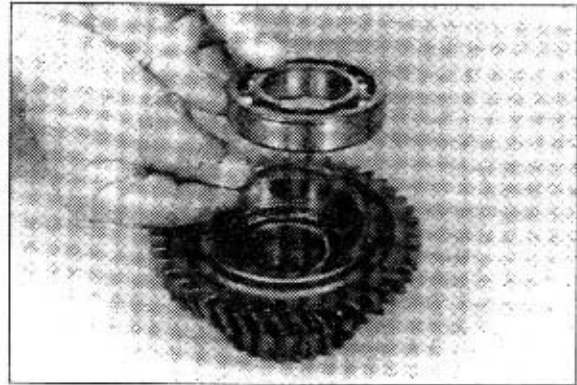
#### Example F

Dimension I 19.70mm

Dimension II - 17.70mm

Difference = Shim  $s = 2.00\text{mm}$

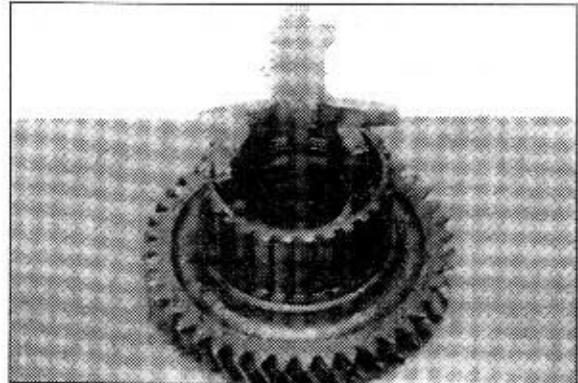
- ⑦ Insert shim(e.g.  $s = 2.00\text{mm}$ ) and install subsequently ball bearing firmly against shoulder.



- ⑧ Adjust end play of the spur gear bearing (Complete) "maximum  $0.05\text{mm}$ "(Example **G**):

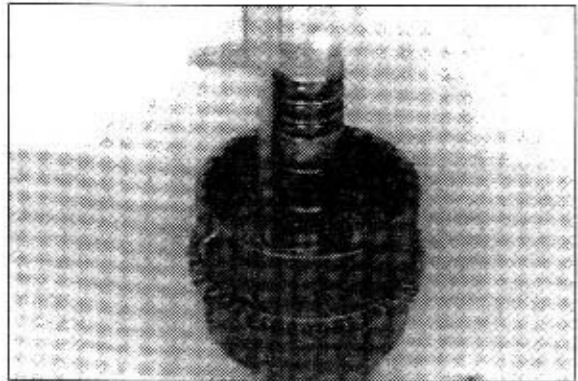
Measure Dimension I from the end face/bearing inner race of the lower ball bearing to the end face/bearing inner race of the upper ball bearing.

Dimension I e.g.  $54.10\text{mm}$



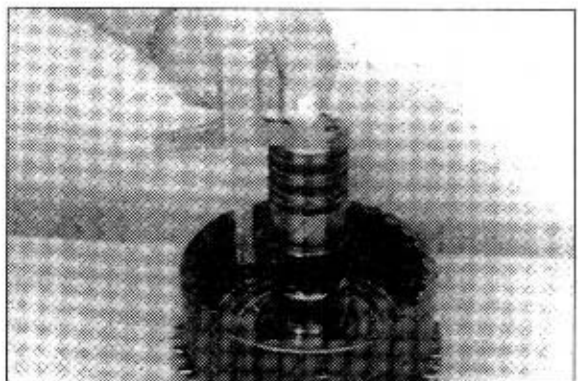
- ⑨ Determine Dimension II from the end face to the contact face/ball bearing.

Dimension II e.g.  $124.9\text{mm}$



- ⑩ Squeeze in circlip and measure Dimension III from the end face to the circlip.

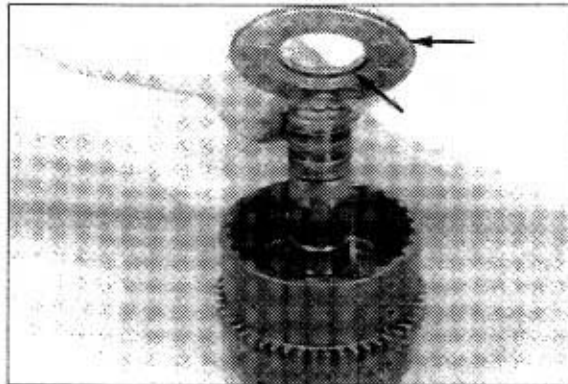
Dimension III e.g.  $68.40\text{mm}$



### Example G

Dimension I	124.90mm
Dimension II	- 68.40mm
Difference	56.50mm
Dimension I	- 54.10mm
Difference = Shim	s = 2.40mm

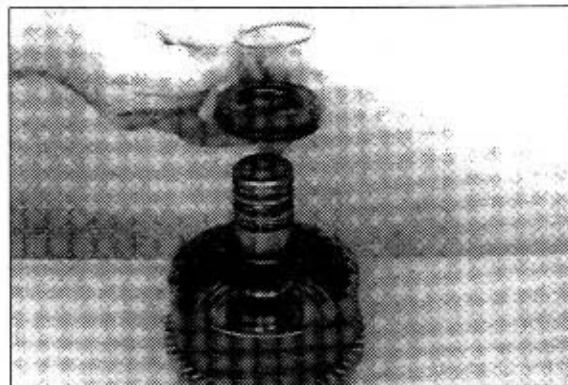
- ⑪ Install new O-rings(Arrows) and insert piston firmly against shoulder.



- ⑫ Assemble cup spring pack and shim(According to the example  $s = 2.40\text{mm}$ ).

\* Cover upper cup spring as well as shim with grease and align them centrally.

Arrangement of the cup spring, see draft  
⑰/page 3-82.



- ⑬ Assemble alternating plate pack-starting with one outer plate.

\* Plate pack KV is composed of :

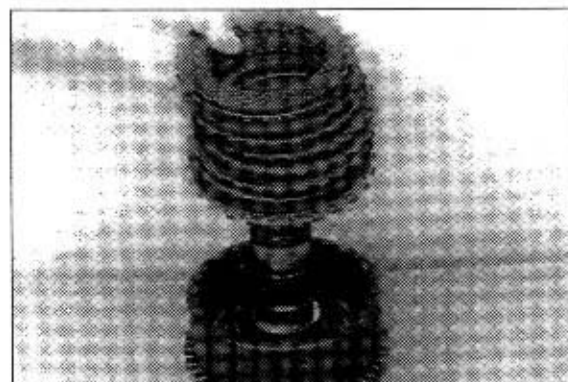
9 Outer plates  $s = 2.00\text{mm}$

5 Inner plates  $s = 2.00\text{mm}$

3 Inner plates  $s = 1.50\text{mm}$

The thinner inner plates have always to be installed on the backing plate side.

Lubricate plates prior to the installation.



- ⑭ Now, lay on backing plate and squeeze in snap ring.

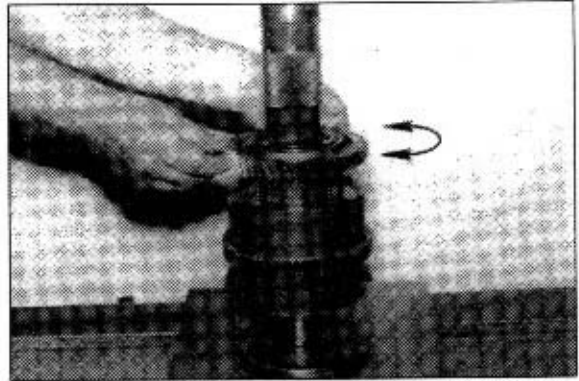
Check plate clearance KV.

Plate clearance KV should be 2.00~2.80 mm.

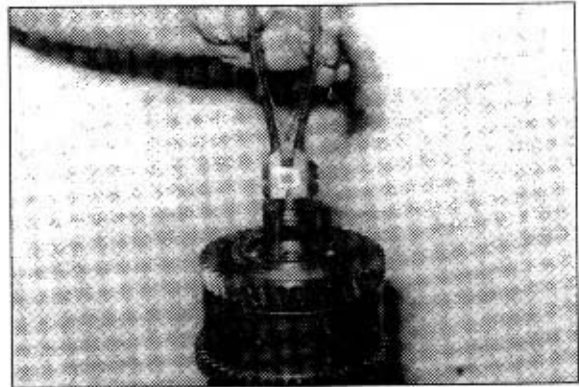
In case of deviations from the prescribed plate clearance, correct with corresponding inner plate(s = 1.50, 2.00 or 2.50mm).

- ⑮ Check centric location of the first cup spring and that of the shim again.  
Now, align inner plates radially and press pre-assembled spur gear KV firmly against shoulder.

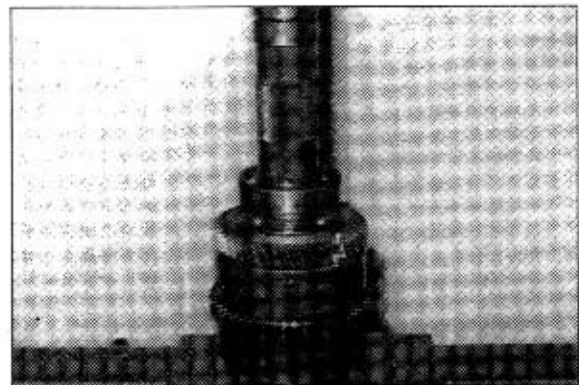
※ By slight rotations(To and fro) during the pressing step, the assembling of the plates will be facilitated.



- ⑯ Squeeze in circlip.



- ⑰ Press ball bearing(Denomination 6309 C3) firmly against shoulder.

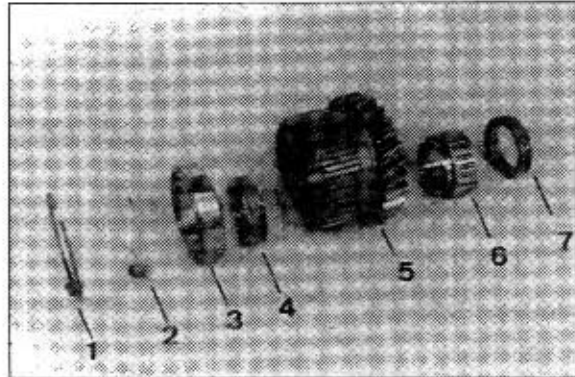


- ⑮ Squeeze in and engage rectangular rings(3EA).

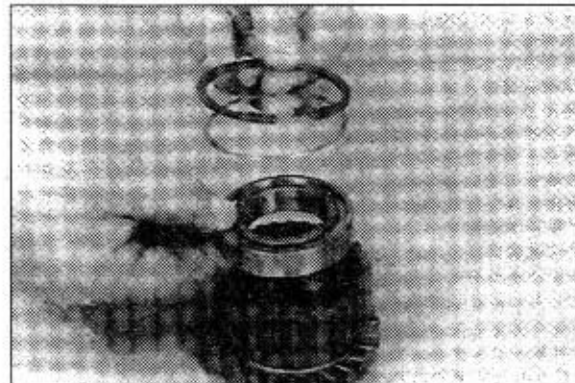


- ⑯ The illustration on the right shows the components of the spur gear K1.

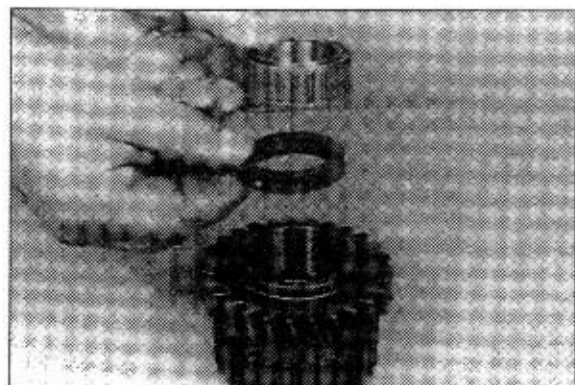
- 1 = Circlip
- 2 = Shim
- 3 = Ball bearing(Denomination 6009 MAC3)
- 4 = Bushing
- 5 = Spur gear K1
- 6 = Roller bearing
- 7 = Bushing



- ⑰ Press ball bearing firmly against shoulder and adjust free of play by means of shim and circlip.



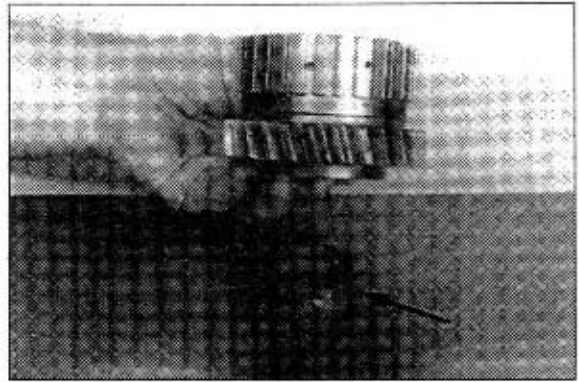
- ⑱ Install bushing and roller bearing.





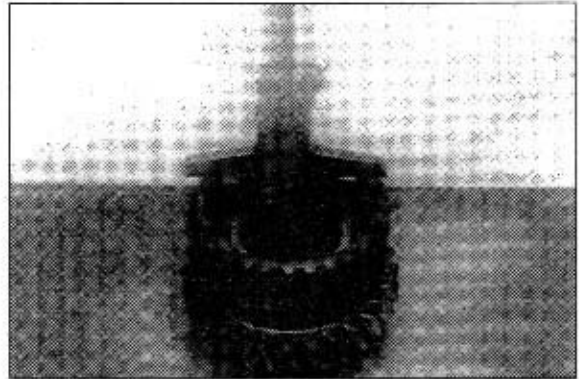
- ② Adjust end play of the spur gear bearing(Complete) "maximum 0.05mm"  
(Example H) :

Lay pre-assembled spur gear upon the  
bushing(Arrow).



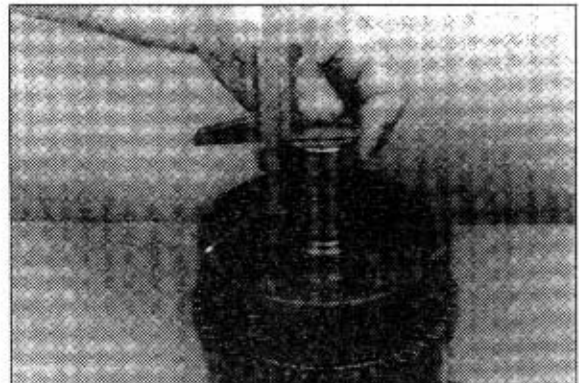
- ③ Determine Dimension I from the bearing  
inner race of the ball bearing to the end  
face/bushing(Measuring plate).

Dimension I e.g. 56.60mm



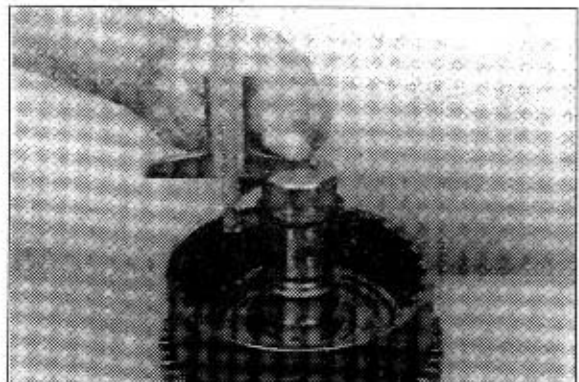
- ④ Measure Dimension II from the end face  
to the contact face of the ball bearing.

Dimension II e.g. 85.60mm



- ⑤ Squeeze in circlip and determine  
Dimension III.

Dimension III e.g. 24.60mm

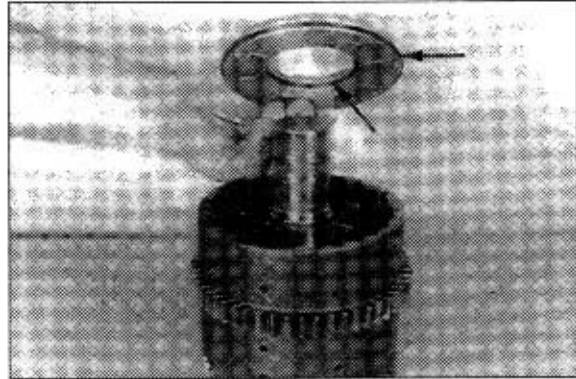




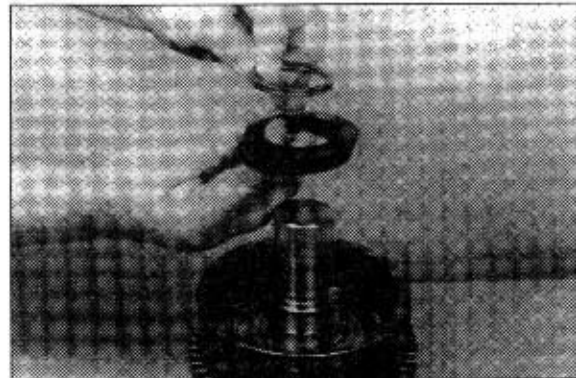
### Example H

Dimension I	85.60mm
Dimension II	- 24.60mm
Difference	61.00mm
Dimension I	- 56.60mm
Difference = Shim	s = 4.40mm

- ②⑥ Install new O-rings(Arrows) and insert piston firmly against shoulder.

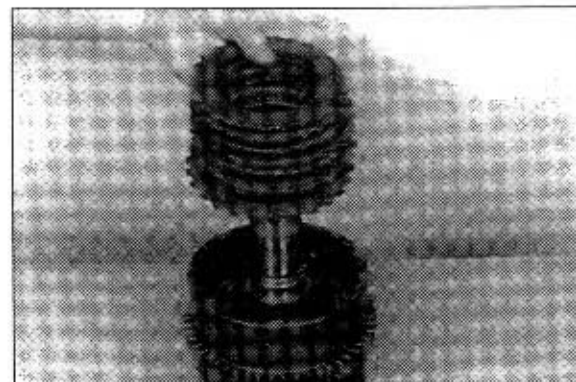


- ②⑦ Assemble cup spring pack and shim(s)(e.g.  $s = 4.40\text{mm}$ ).  
\* Cover upper cup spring as well as shim with grease and align them centrally.  
Arrangement of the cup springs, see draft ①⑦/page 3-82.



- ②⑧ Assemble alternating plate pack-starting with one outer plate.  
\* Plate pack K1 is composed of :  
7 Outer plates  $s = 2.00\text{mm}$   
3 Inner plates  $s = 2.00\text{mm}$   
3 Inner plates  $s = 1.50\text{mm}$

The thinner inner plates have always to be installed on the backing plate side.  
Lubricate plates prior to the installation.

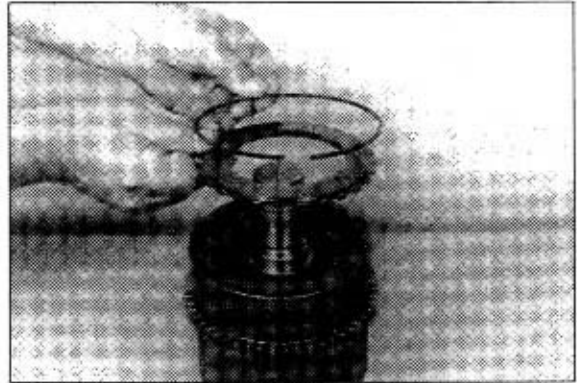


- ② Lay on backing plate and squeeze in snap ring, see figure.

Now, check the plate clearance(Piston travel).

Plate clearance-K2 should be 1.50~2.50 mm.

In case of deviations from the prescribed plate clearance, correct with corresponding inner plate(s = 1.50, 2.00 or 2.50mm).

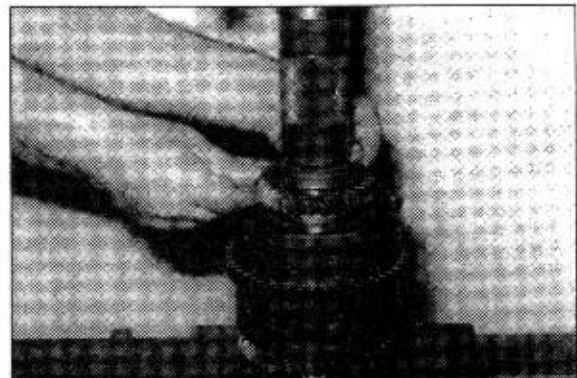
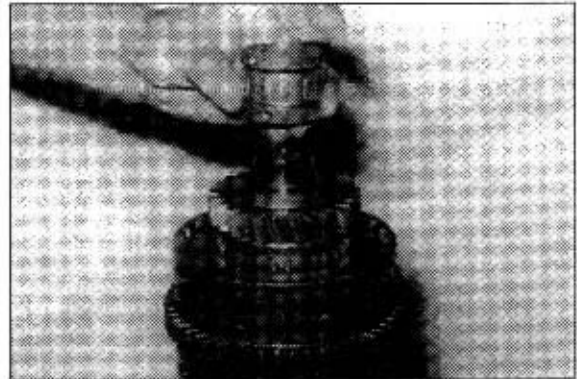


- ③ Check centric location of the first cup spring again.

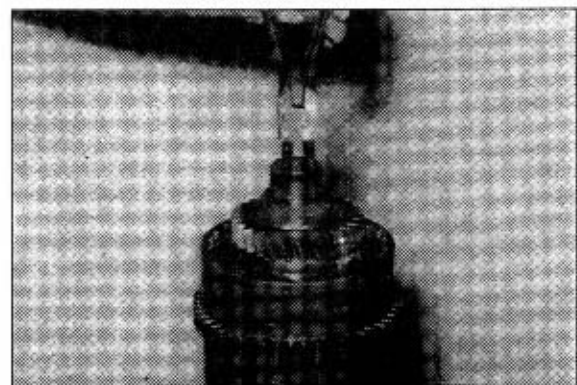
Align inner plates radially and assemble spur gear.

Assemble bushing, roller bearing (Composed of needle cage and bearing inner race) as well as 2nd bushing and press firmly against shoulder(Next figure).

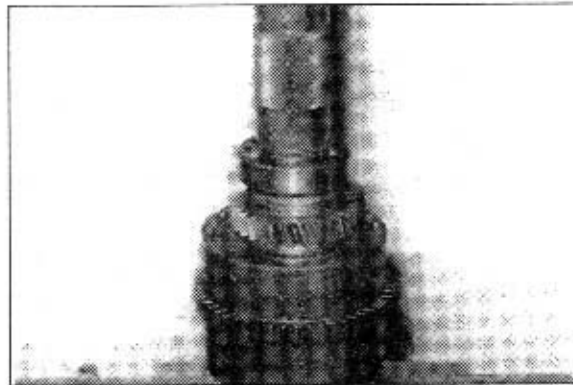
- ※ By slight rotations of the spur gear(To and fro) during the pressing step, the assembling of the plates will be facilitated.



- ④ Squeeze in circlip.

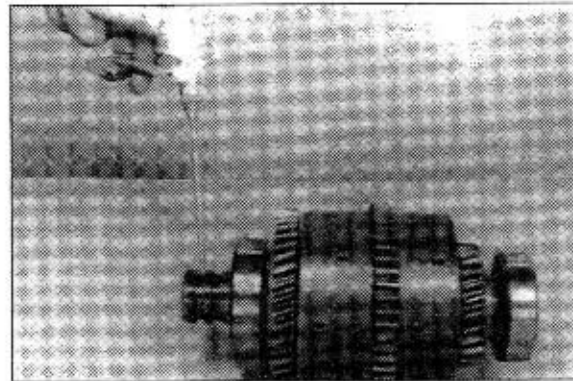


- ③② Press ball bearing(Denomination 6308 C3) firmly against shoulder.



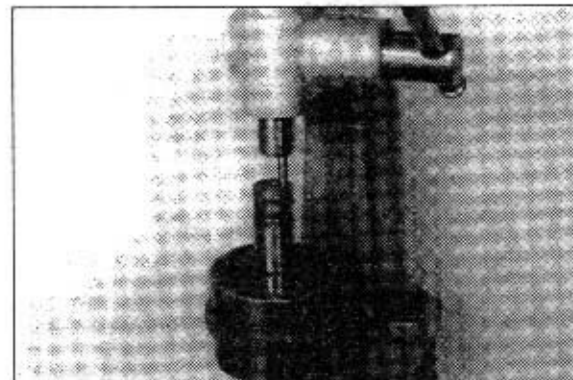
- ③③ Check performance of clutch KV and K1 by means of compressed air.

※ If all parts are correctly installed, the closing and opening of the clutches is clearly audible.



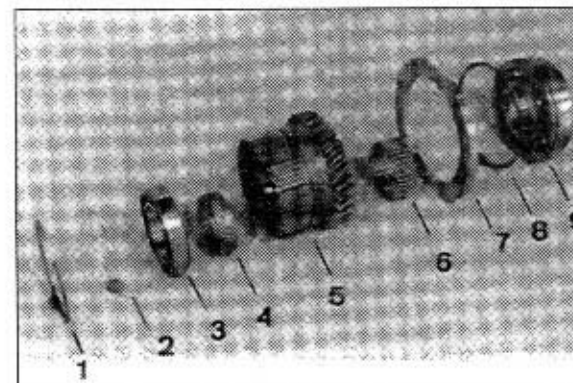
• Assemble clutch K3/K4

- ① Close the two bores with balls(  $\varnothing 8\text{mm}$ ).

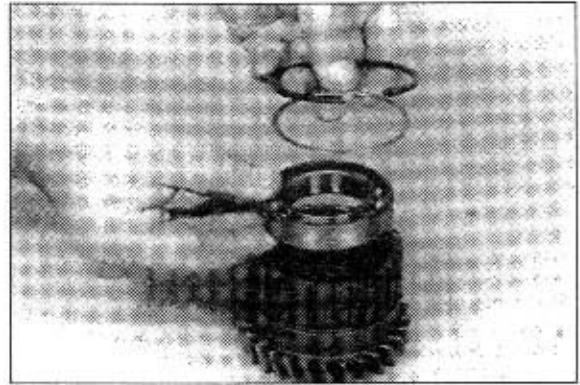


- ② The illustration on the right shows the components of the spur gear K4.

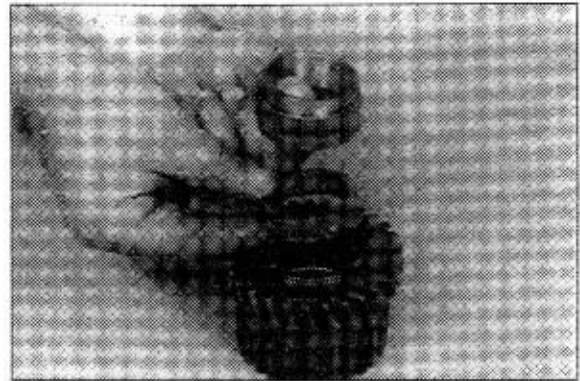
- 1 = Circlip
- 2 = Shim
- 3 = Ball bearing(Denomination 6009 C3/J)
- 4 = Bushing
- 5 = Spur gear
- 6 = Roller bearing
- 7 = Shim
- 8 = Shim
- 9 = Roller bearing(Denomination 6309 N.C3)



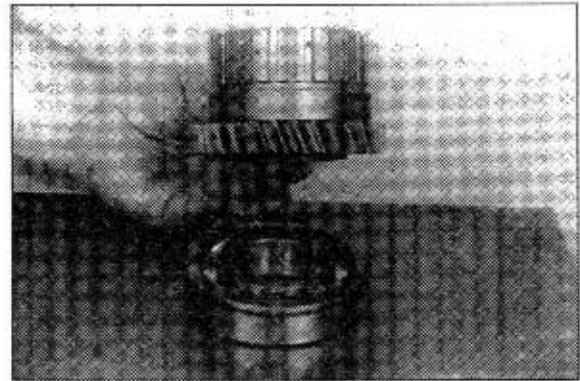
- ③ Insert ball bearing firmly against shoulder and adjust free of play by means of shim and circlip.



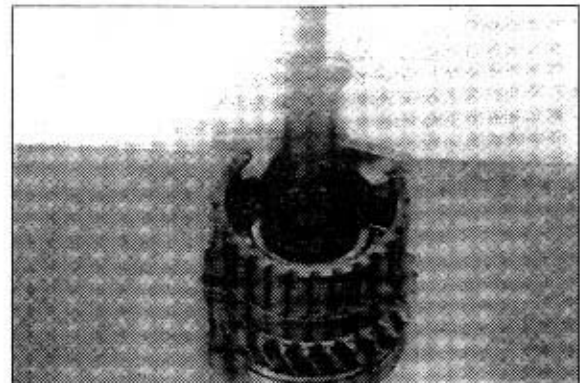
- ④ Install bushing and bearing(Composed of needle cage and bearing inner race).



- ⑤ Adjust spur gear bearing free of play and without exerting pressure(Example J) :  
Lay pre-assembled spur gear upon the ball bearing.

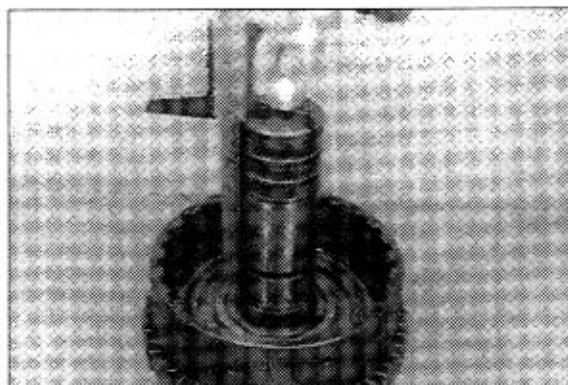


- ⑥ Determine Dimension I from the bearing inner race of the upper ball bearing to the end face of the lower ball bearing (Measuring plate).  
Dimension I e.g. 75.80mm



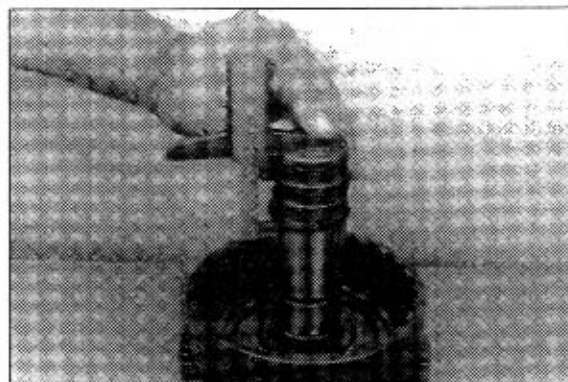
- ⑦ Measure Dimension I from the end face to the contact face of the ball bearing.

Dimension I e.g. 124.80mm



- ⑧ Squeeze in circlip and determine Dimension III.

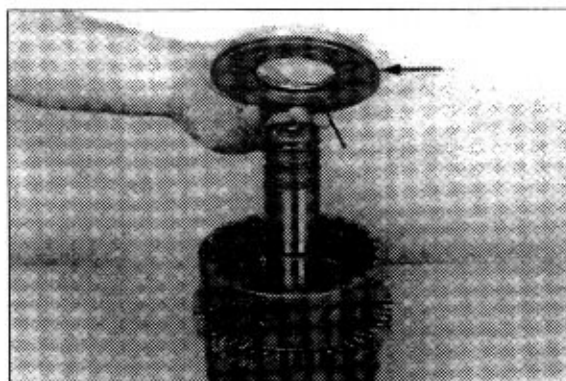
Dimension III e.g. 44.70mm



**Example J**

Dimension I e.g.	124.80mm
Dimension III e.g.	- 44.70mm
Difference	80.10mm
Dimension I	- 75.80mm
Difference = Shim	s = 4.30mm

- ⑨ Install new O-rings and insert piston firmly against shoulder.





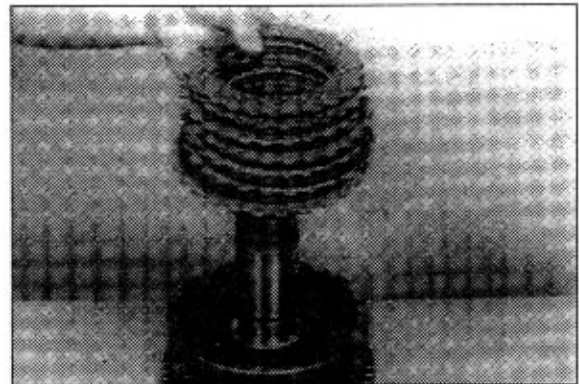
- ⑩ Assemble cup spring pack and shim(e.g.  $s = 4.30\text{mm}$ ).
- ※ Cover upper cup spring with grease and align it centrally.
- Arrangement of the cup springs, see draft ⑰/page 3-82.



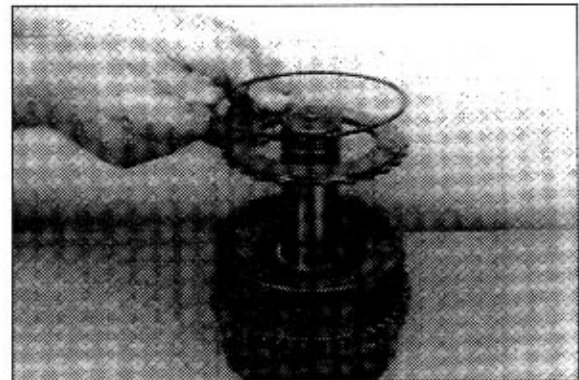
- ⑪ Assemble alternating plate pack-starting with one outer plate.
- ※ Plate pack K4 is composed of :
    - 7 Outer plates  $s = 2.00\text{mm}$
    - 3 Inner plates  $s = 2.00\text{mm}$
    - 3 Inner plates  $s = 1.50\text{mm}$

The thinner inner plates have always to be installed on the backing plate side.

Lubricate plates prior to the installation.



- ⑫ Lay on backing plate and squeeze in snap ring, see figure.
- Now, check plate clearance(Piston travel).
- Plate clearance K4 should be  $1.50\text{--}2.50\text{ mm}$ .
- In case of deviations from the prescribed plate clearance, correct with corresponding inner plate( $s = 1.50, 2.00$  or  $2.50\text{mm}$ ).



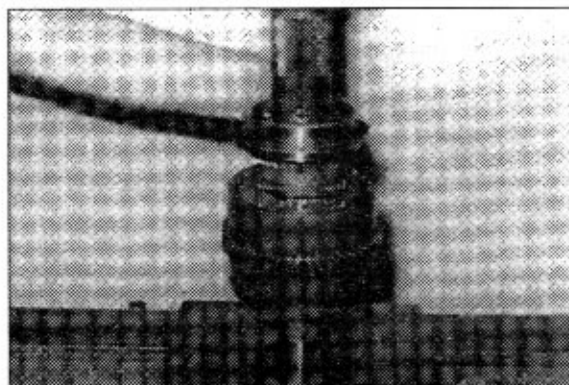
- ⑬ Squeeze snap ring into the ring groove of the ball bearing, see arrow.
- Assemble spur gear K4, shim and ball bearing.
- ※ Offset plane surface of shim is showing towards above.



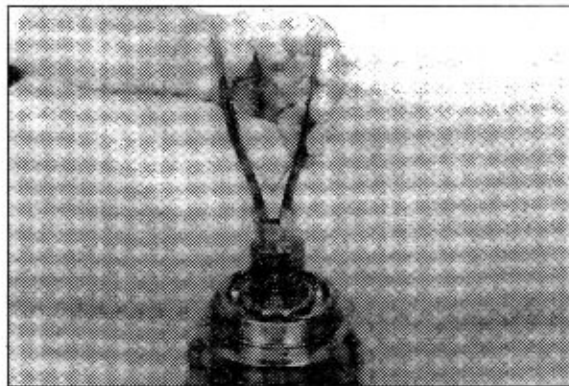


- ⑭ Align inner plates radially and press components firmly against shoulder.

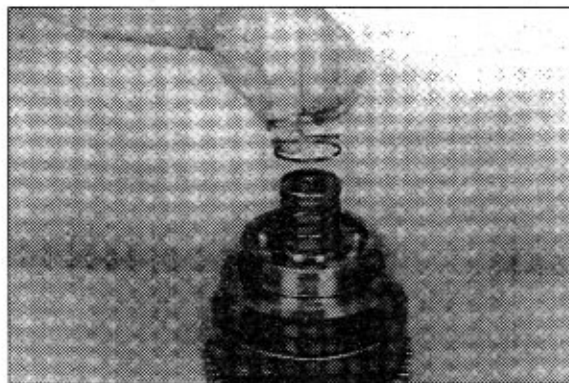
※ By slight rotations of the spur gear (To and fro) during the pressing step, the assembling of the plates will be facilitated.



- ⑮ Squeeze in circlip.

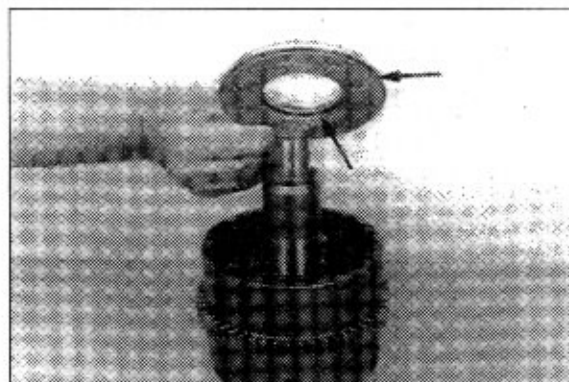


- ⑯ Squeeze in and engage rectangular rings (3EA).

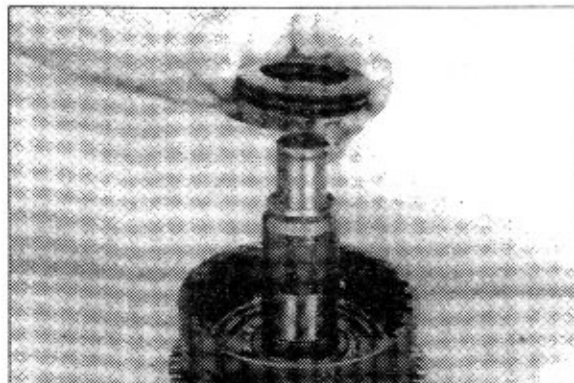


- ⑰ **Assemble clutch K3** (Figure 17~24)

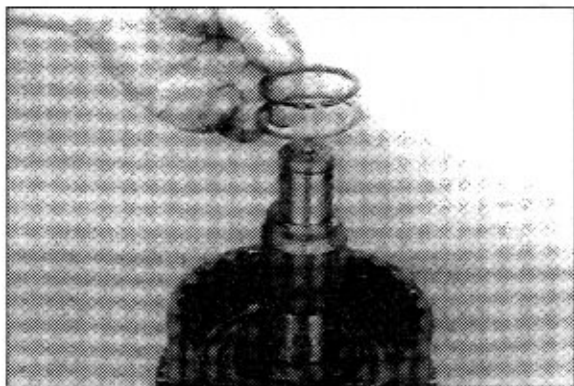
Install new O-rings and insert piston firmly against shoulder.



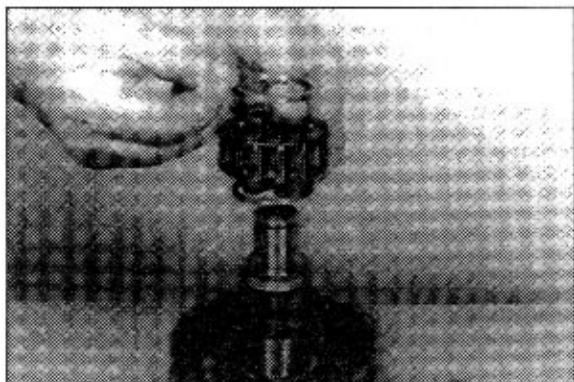
- ⑱ Assemble cup spring pack.  
※ Arrangement of the cup springs, see draft  
⑰/page 3-82.



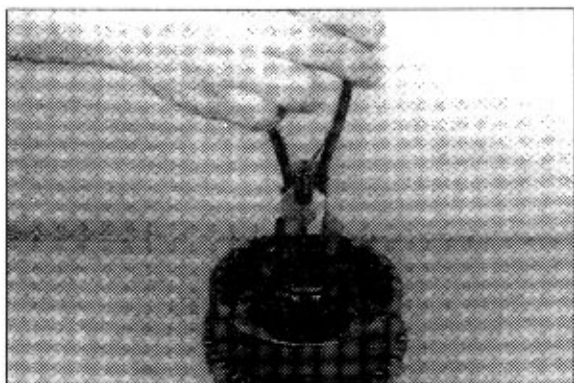
- ⑲ Lay on shim  $s = 1.60\text{mm}$  and squeeze in circlip.  
※ Cup spring pack is slightly preloaded.



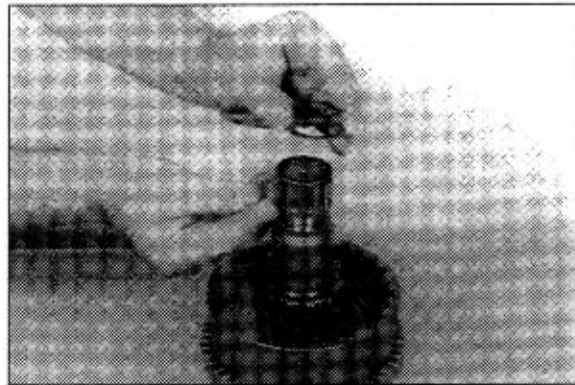
- ⑳ Assemble both thrust washers and roller ring.



- ㉑ Fix roller bearing by means of circlip.



- ② Install needle cage, thrust washer and circlip.



- ③ Assemble alternating plate pack-starting with one outer plate.

※ Plate pack K3 is composed of :

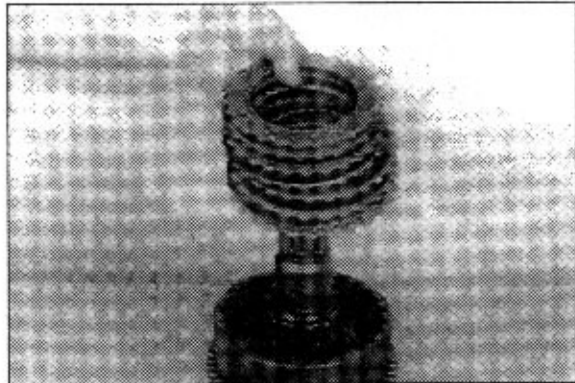
7 Outer plates  $s = 2.00\text{mm}$

3 Inner plates  $s = 2.00\text{mm}$

3 Inner plates  $s = 1.50\text{mm}$

The thinner inner plates have always to be installed on the backing plate side.

Lubricate plates prior to the installation.

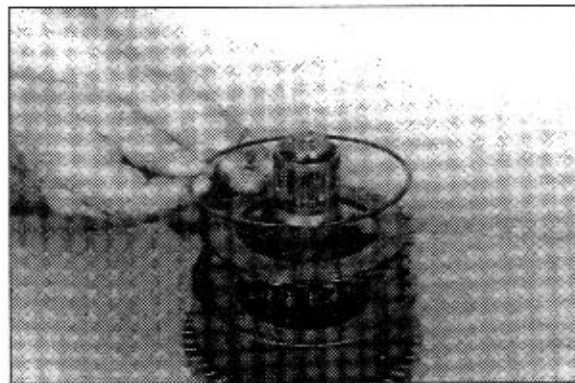


- ④ Lay on backing plate and squeeze in snap ring, see figure.

Now, check the plate clearance(Piston travel).

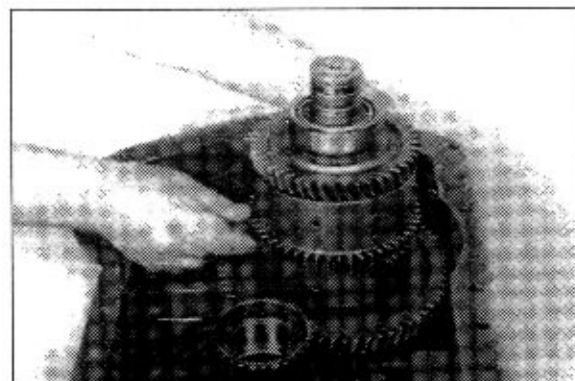
Plate clearance K3 should be  $1.50\sim 2.50\text{mm}$ .

In case of deviations from the prescribed plate clearance, correct with corresponding inner plate( $s = 1.50, 2.00$  or  $2.50\text{mm}$ ).



#### (4) Install clutch KR/K2 and KV/K1

- ① Insert clutch KR/K2.



② Heat housing bore.

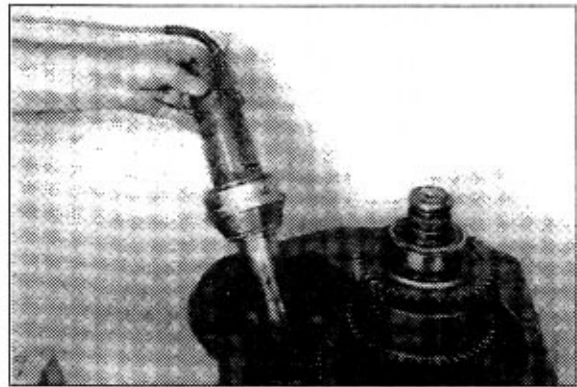
※ Special tool

Hot air blower 220V

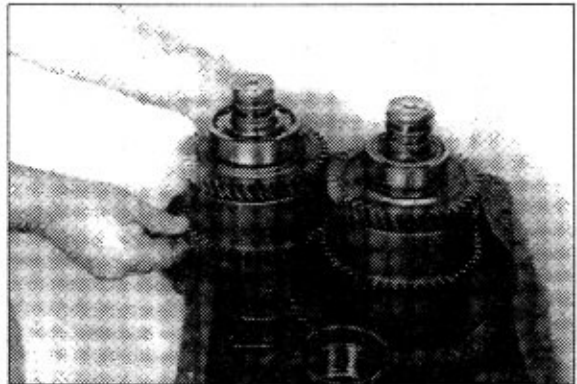
5870 221 500

Hot air blower 110V

5870 221 501



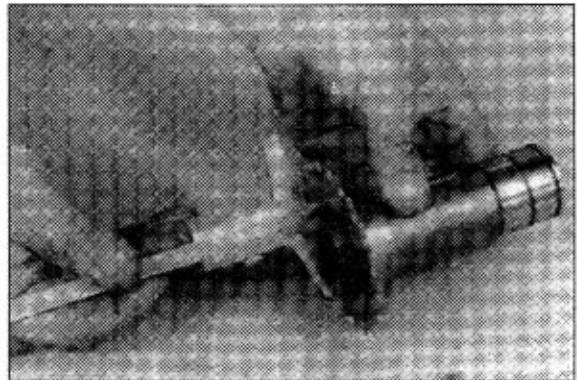
③ Insert clutch KV/K1.



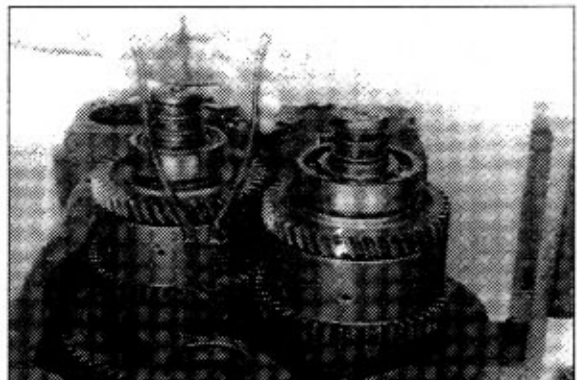
**(5) Install power take-off (Version with inductive transmitter)**

① Press impulse disk upon the stem of the bushing.

※ Pay attention to the installation dimension = 5.50mm, see figure on the right.



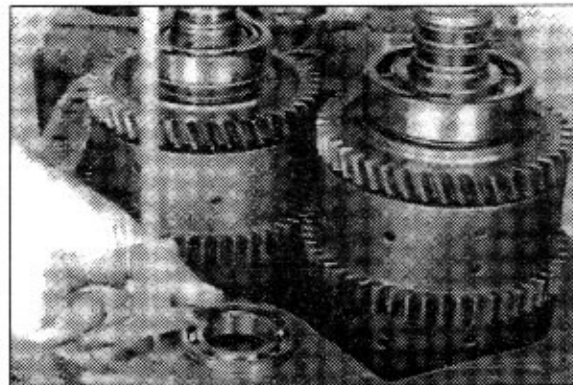
② Adjust bearing - Power take off free of play (Example K) :  
Squeeze in circlip.



- ③ Insert ball bearing until contact on the circlip is obtained.

Determine Dimension I from the end face/ball bearing to the flange-mounted surface.

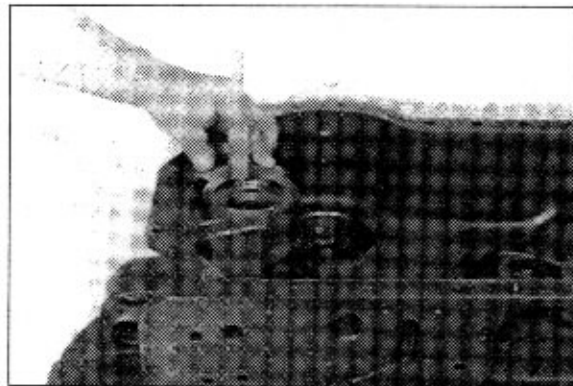
Dimension I e.g. 5.90mm



- ④ Compartment :

Measure Dimension II from the flange-mounted surface to the contact face of the ball bearing.

Dimension II e.g. 7.20mm



#### Example K

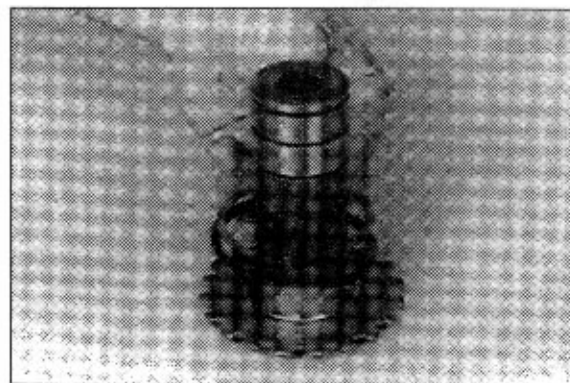
Dimension II e.g. 7.20mm

Dimension I e.g. - 5.90mm

Difference = Shim  $s = 1.30\text{mm}$

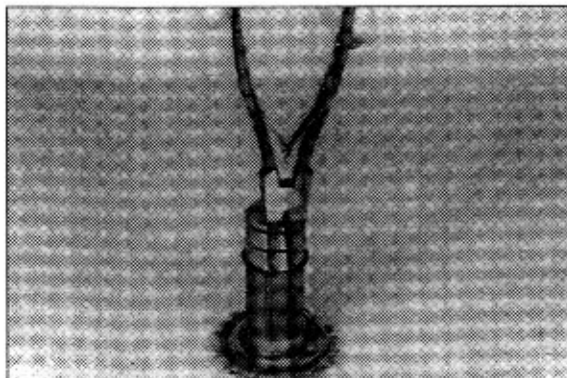
Remove ball bearing and circlip again.

- ⑤ Place on circlip and shim(According to the example  $s = 1.30\text{mm}$ ).

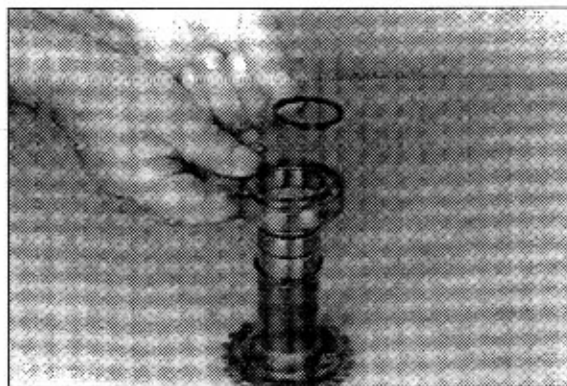




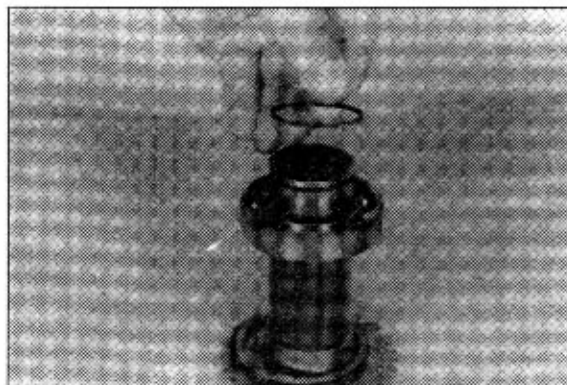
⑥ Squeeze in circlip.



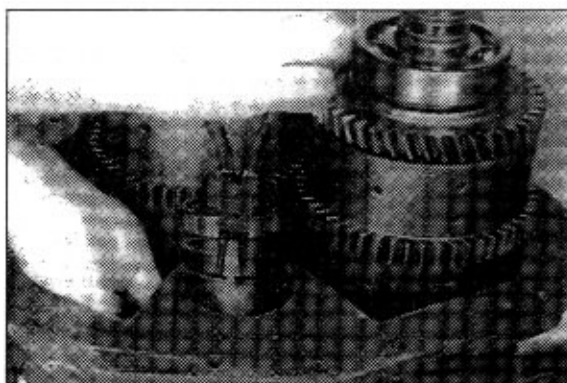
⑦ Press bearing firmly against shoulder and fix by means of circlip.



⑧ Squeeze in and engage rectangular ring.



⑨ Guide pre-assembled power take-off through the housing bore, squeeze in circlip and insert ball bearing until contact on the circlip is obtained.





#### 4. CONVERTER COMPARTMENT

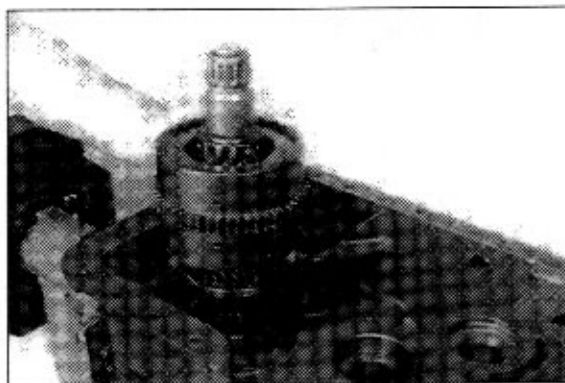
##### 1) ASSEMBLY

###### (1) Install clutch K3/K4

① Use two adjusting screws.

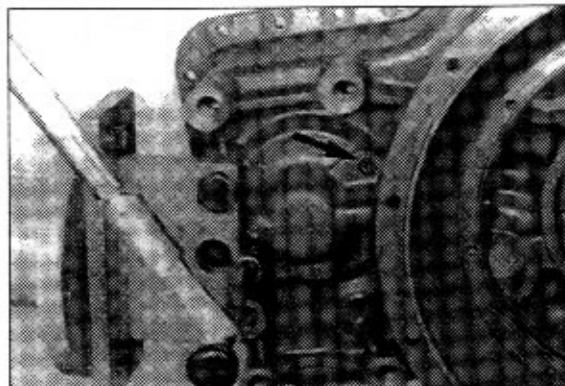
※ Special tool

Adjusting screws(M8) 5870 204 011



② Fix clutch K3/K4 by means of two socket head screws.

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



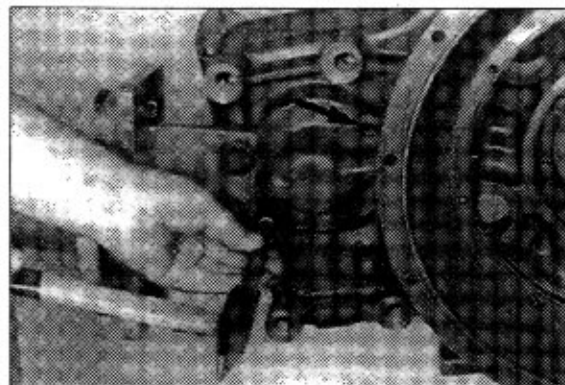
③ Insert cover lids(2EA) firmly against shoulder.

※ Use Loctite.(Type No.270)

※ Special tool

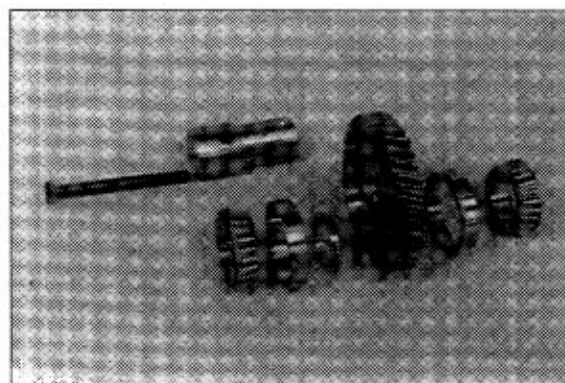
Driver

5870 048 037

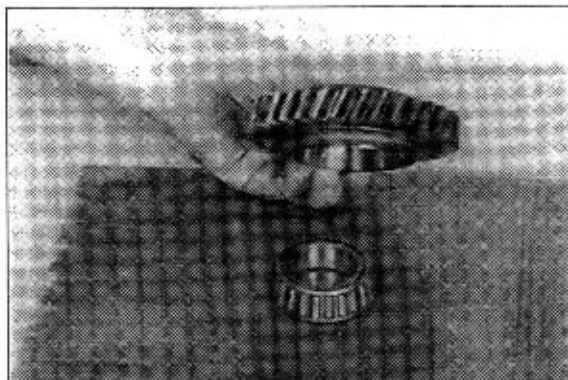


###### (2) Install countershaft gear

① The illustration on the right shows the components of the countershaft gear.

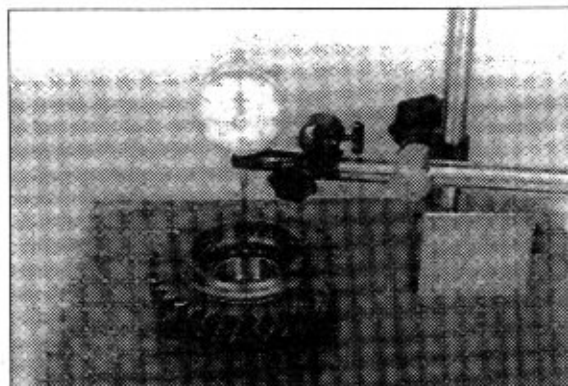


- ② Insert 1st bearing outer race firmly against shoulder and lay spur gear upon the bearing inner race.

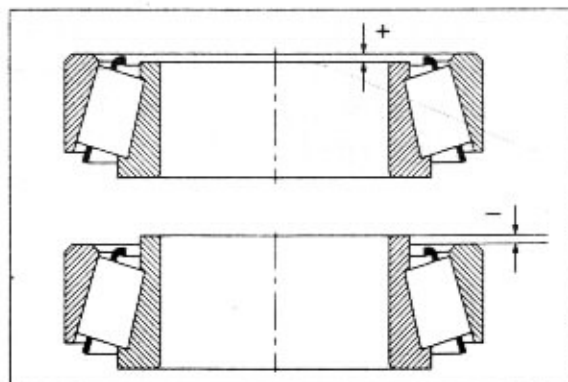


- ③ Determine Difference Dimension I from the bearing inner race to the contact face/bearing outer race.

Difference Dimension I e.g. 7.20mm



- ※ The Draft on the right shows the tapered roller bearing(No.32008 X/J) with two different measuring results.  
In the present case, Dimension I has been measured with +0.15mm.



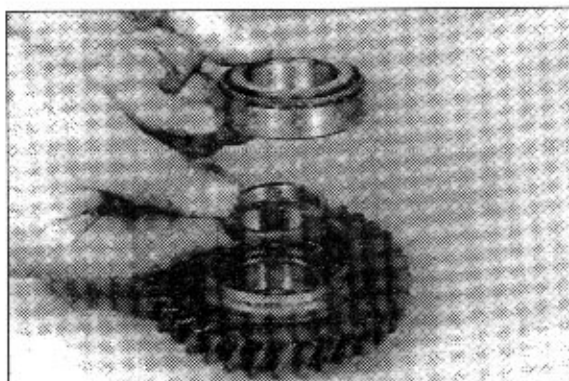
### Example L

Difference Dimension I 7.20mm

Dimension I + 0.15mm

Difference = Bushing width  $s = 7.35\text{mm}$

Insert bushing(e.g.  $s = 7.35\text{mm}$ ) and install tapered roller bearing.

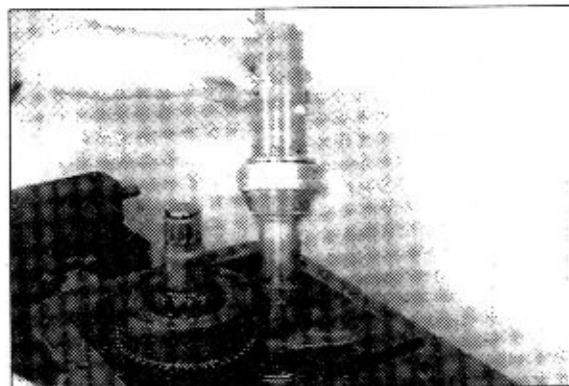


- ④ Insert pre-assembled countershaft gear(arrow) and heat housing bore as well as bearing inner races.

※ Special tool

Hot air blower 220V 5870 221 500

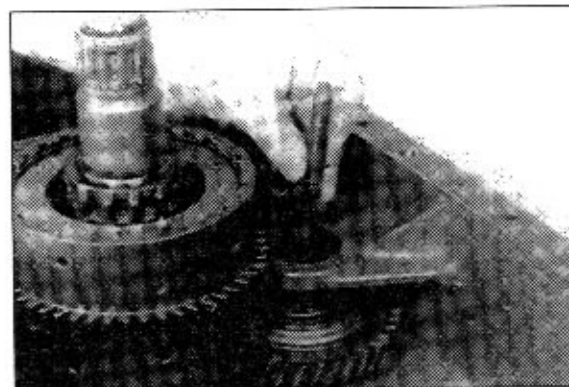
Hot air blower 110V 5870 221 501



- ⑤ Install adjusting screw.

※ Special tool

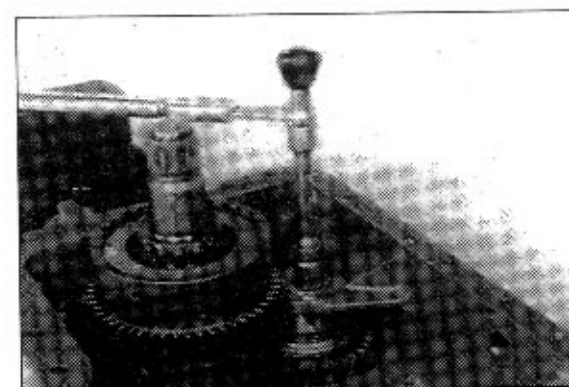
Adjusting screws(M12) 5870 204 021



- ⑥ Insert shaft firmly against shoulder, remove back-off screw and fasten shaft by means of hexagon head screw.

Torque limit(M12/8.8)

8.06kgf · m(58.3lbf · ft)



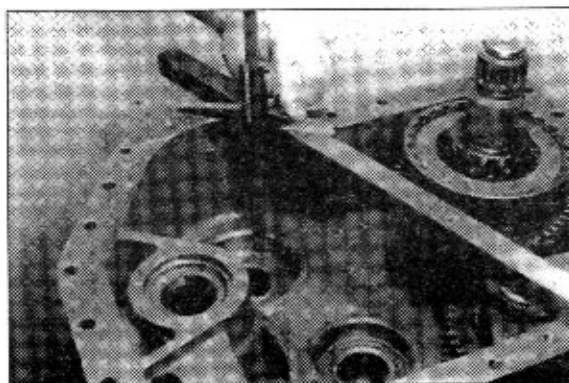
### (3) Mount converter compartment

- ① Adjust end play of the clutches KV/K1(Example M) :

Admissible end play KV/K1 = 0.10~0.15 mm

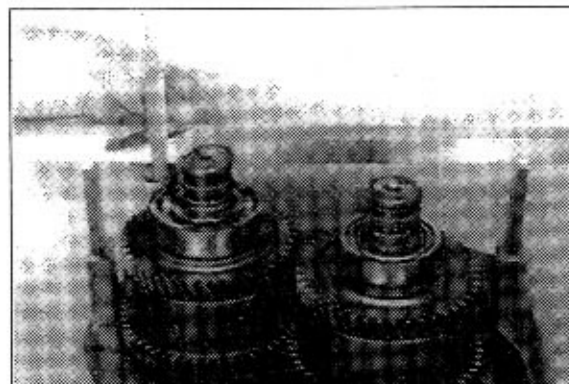
Determine Dimension I from the flange-mounted surface of the converter compartment to the contact face/ball bearing.

Dimension I e.g. 140.70mm



- ② Measure Dimension II from the flange-mounted surface of the gearbox to the end face of the ball bearing.

Dimension II e.g. 138.50mm



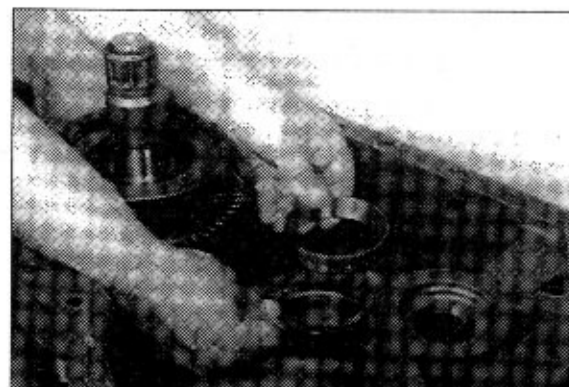
#### Example M

Dimension I	140.70mm
Dimension II	- 138.50mm
Difference	2.20mm
Admissible end play e.g.	- 0.15mm
Difference = Shim	s = 2.05mm

- ③ Determine end play of clutch KR/K2 in a similar manner.

The admissible end play of the clutch-KR/K2 should be 0.05~0.10mm.

Install shim KR/K2(e.g. s = 1.60mm) and bearing outer race.

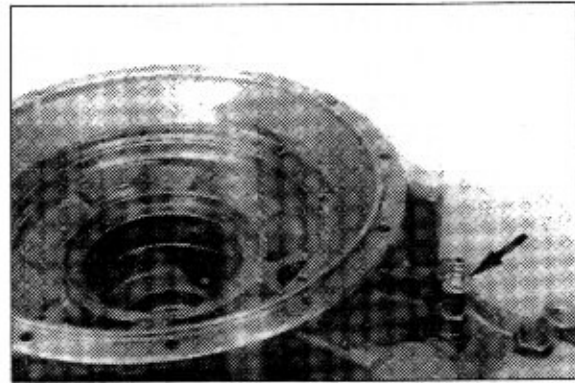


- ④ Install air pressure connection(Special tool), see arrow.

※ Special tool

Test adapter

5870 509 008



- ⑤ Align plate pack K3 and fix it subsequently by means of compressed air(Arrow).

※ For the alignment of the plate pack K3, the spur gear K4(New or old part/ZP-No.4651 353 002) can be used.

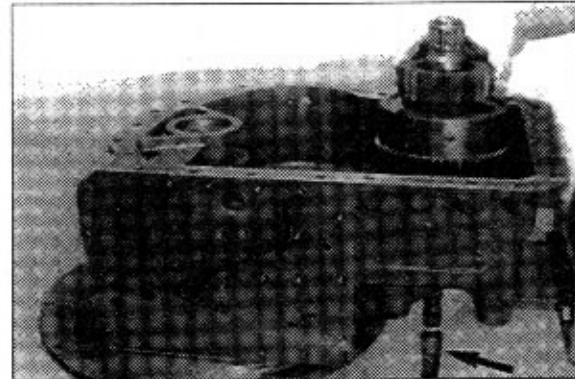
※ Special tool

Set of eye bolts

5870 204 002

Test adapter

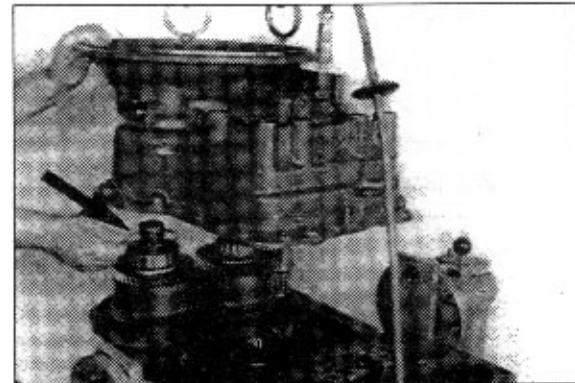
5870 509 008



- ⑥ Cover flange-mounted surface with sealing compound.

Make shim KV/K1(According to example  $s = 2.05\text{mm}$ ) adhere with grease, see arrow.

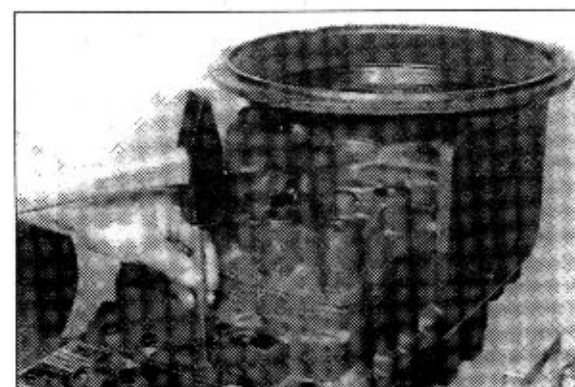
Now, heat housing bore of the KV bearing and place converter compartment firmly against shoulder.



- ⑦ Drive in straight pin until it is flush and fasten converter compartment by means of hexagon head screws.

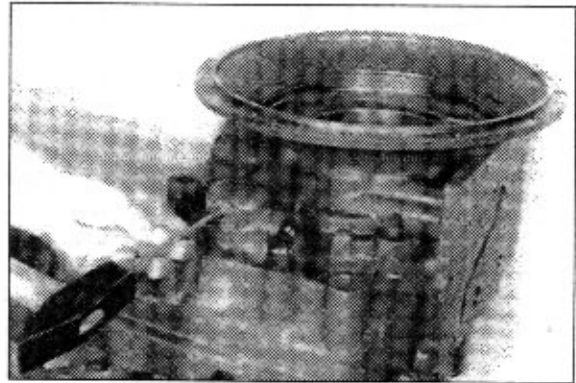
Torque limit(M10/8.8)

4.69kgf · m(33.9lbf · ft)



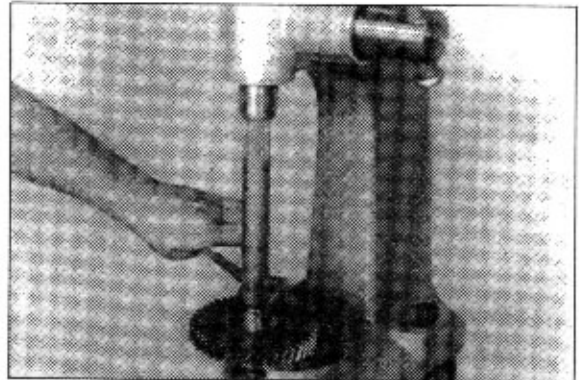


- ⑧ Drive in ball until it is flush.



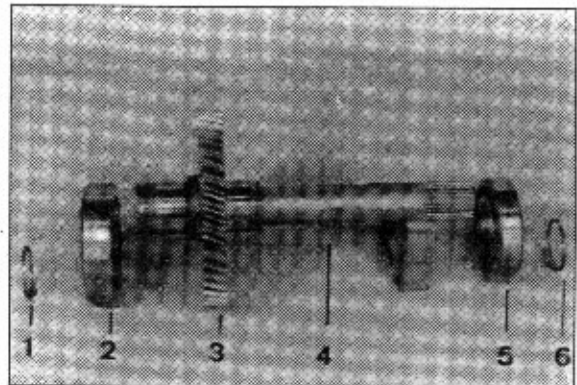
**(4) Pre-assemble and install converter filling pump and control pressure pump**

- ① Squeeze snap ring into the ring groove, prestress and press turbine shaft in until the snap ring has engaged.
- ※ Pay attention to the installation position of the turbine shaft, see below figure ②.



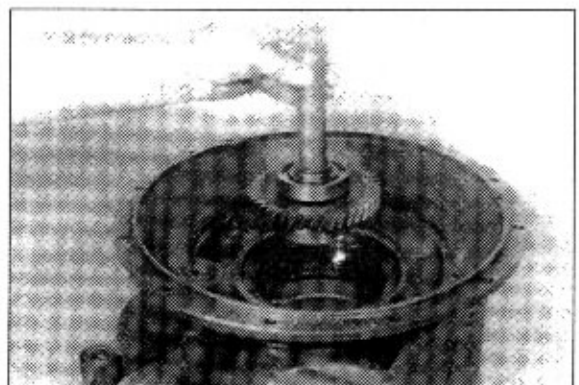
- ② The illustration on the right shows the components of the pump drive.

- 1 = Rectangular ring  
2 = Ball bearing(No.6308 C3)  
3 = Drive gear  
4 = Turbine shaft  
5 = Ball bearing(No. 6208 C3/J)  
6 = Rectangular ring



- ③ Press both ball bearings firmly against shoulder, squeeze in and engage rectangular rings.

- ※ Grease rectangular rings after the engagement.
- Insert pump drive against shoulder until contact is obtained.



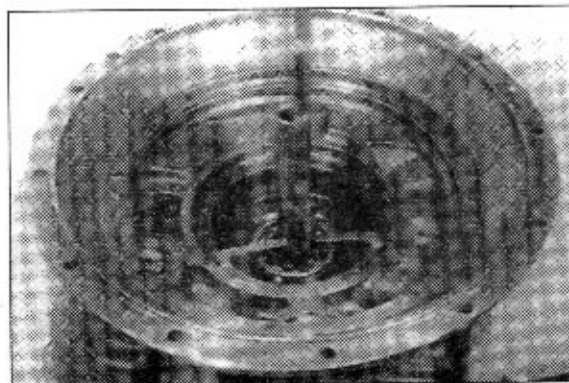


- ④ Adjust end play of the pump drive  
(Example N) :

Required end play 0.20~0.40mm

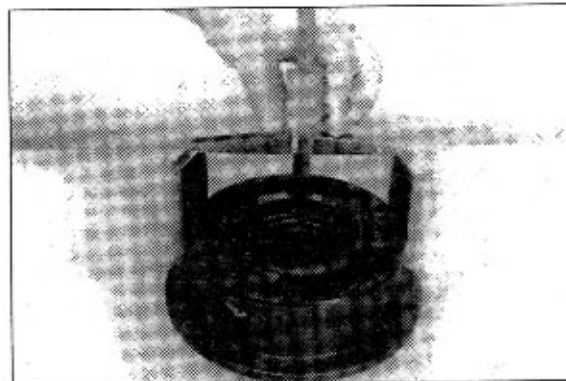
Determine Dimension I from the flange-mounted surface of the oil supply flange to the bearing outer race of the ball bearing.

Dimension I e.g. 33.75mm



- ⑤ Measure Dimension II from the flange-mounted surface to the contact face of the ball bearing.

Dimension II e.g. 32.40mm



**Example N**

Dimension I 33.75mm

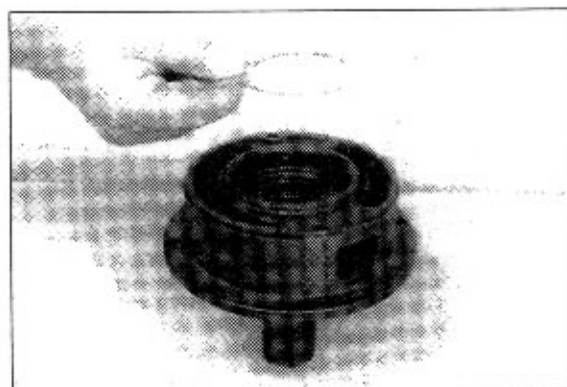
Dimension II - 32.40mm

Difference 1.35mm

required end play e.g. - 0.30mm

Difference = Shim  $s = 1.05\text{mm}$

- ⑥ Make shim(e.g.  $s = 1.05\text{mm}$ ) adhere with grease in the housing bore.



- ⑦ Insert O-ring into the ring groove, see arrow.

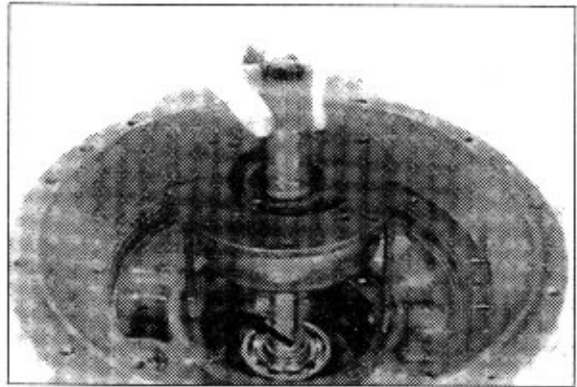
Heat housing bore and install oil supply flange.

- ※ Pay attention to the radial installation position. Use two adjusting screws.

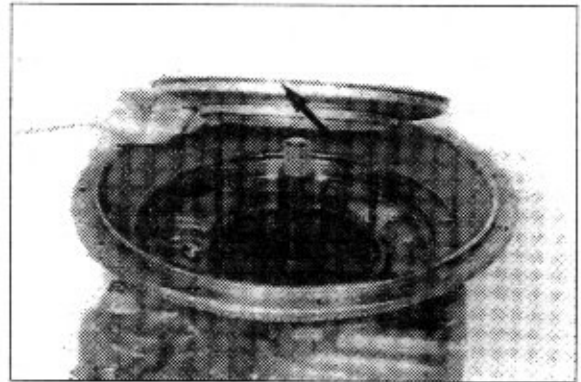
The undercooling of the oil supply flange would facilitate the installation.

- ※ Special tool

Adjusting screws(M8) 5870 204 011



- ⑧ Assemble O-ring(Arrow) and install cover.



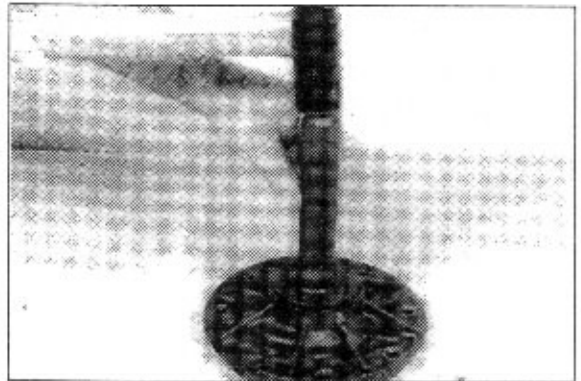
- ⑨ Insert shaft seal firmly against shoulder.

- ※ Cover outer diameter with sealing compound(Curil T).

- ※ Special tool

Driver

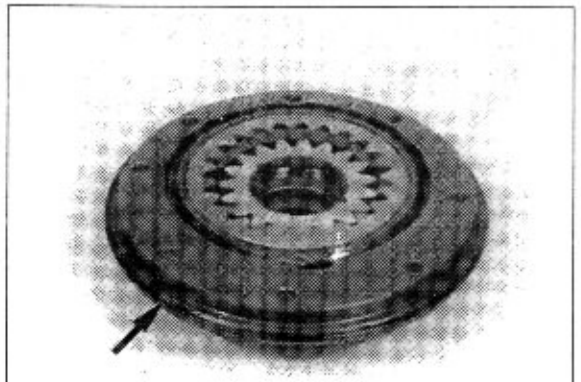
5870 048 136



- ⑩ Insert O-ring(Arrow) into the ring groove and grease.

Lubricate running faces of the internal and external gear.

- ※ Pay attention to the installation position of the internal gear, see figure.



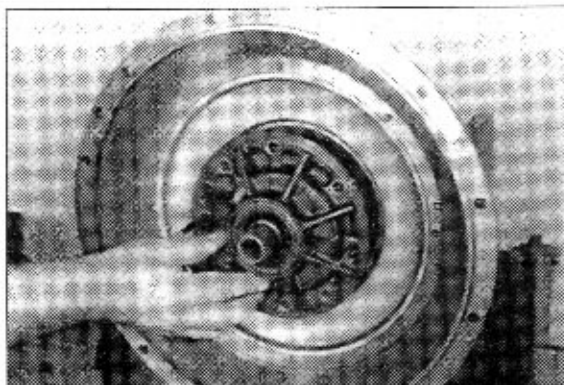
⑪ Tilt housing for 90°.

Install two adjusting screws and place pump against shoulder.

※ Pay attention to the radial installation position.

※ Special tool

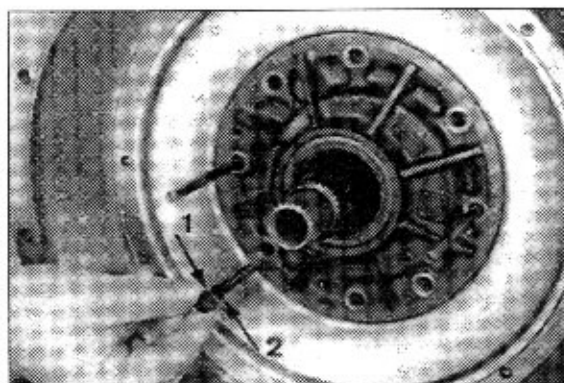
Adjusting screws(M8) 5870 204 011



⑫ Fasten pump by means of socket head screws.

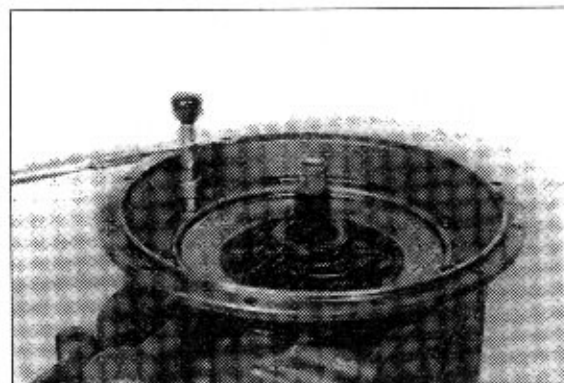
Torque limit(M8/8.8) 2.35kgf · m(17.0lbf · ft)

※ Assemble flat washers(Arrow 1) and O-rings(Arrow 2), see figure.



⑬ Fasten end plate by means of hexagon head screws(Use flat washers).

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



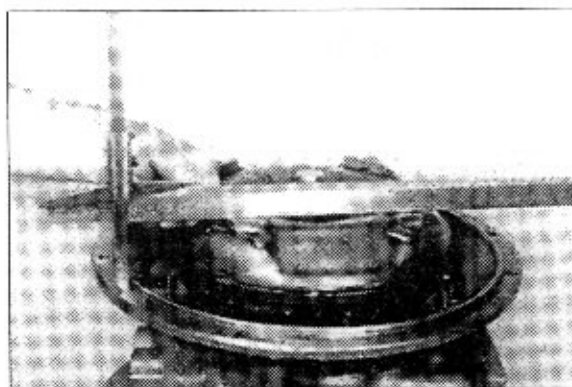
(5) Install drive shaft(Power take-off) and converter

① Assemble drive shaft(Power take-off).



- ② Assemble converter firmly against shoulder.

※ Only if a control dimension of 70mm-measured from the flange-mounted surface/converter housing cover to the flange-mounted surface/brackets - is obtained, it is assured that the converter is assembled against shoulder.

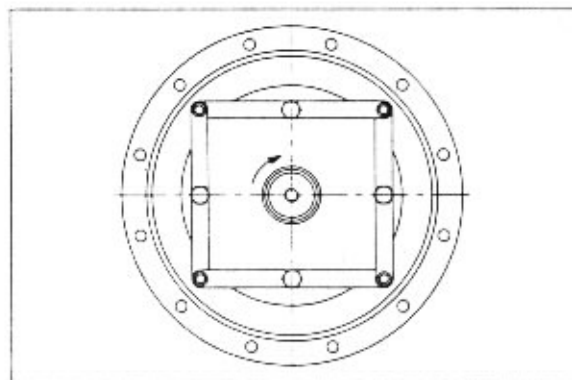
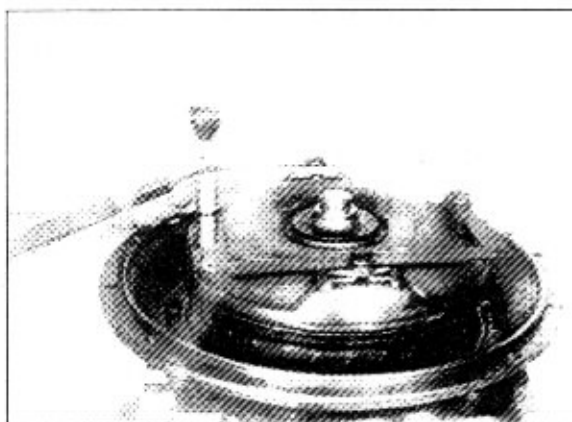


- ③ Fasten brackets by means of hexagon head screws.

Installation position(Arrangement) of the brackets, see draft.

Torque limit(M10/8.8)

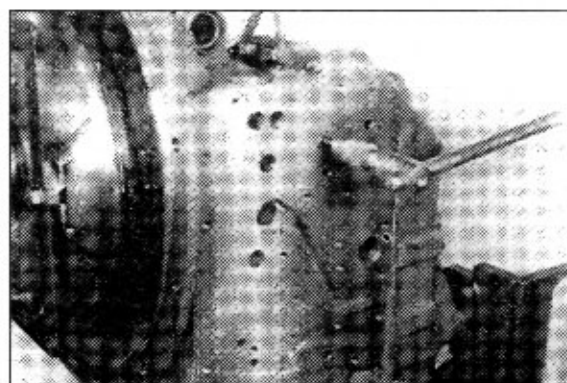
4.69kgf · m(33.9lbf · ft)



## 5. INSTALL CHANNEL PLATE AND SHIFT UNIT

- 1) Install threaded plug(M10×8).

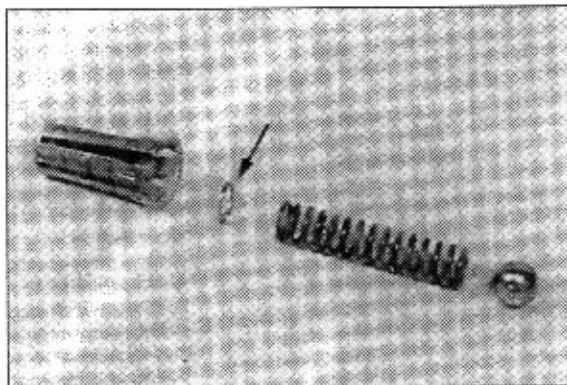
※ Insert threaded plug with Loctite(Type-N0.241).



2) The illustration on the left shows the components of the converter relief valve.

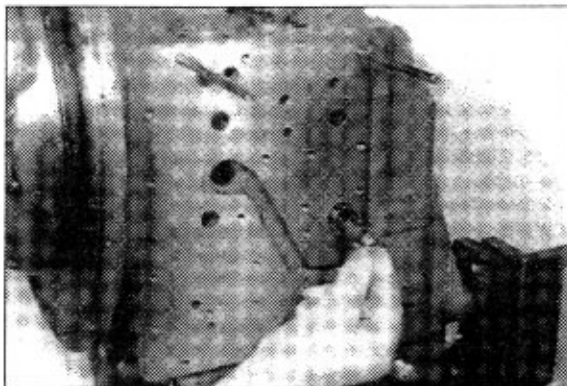
Shim  $s = 1.50\text{mm}$ , see arrow.

- \* In case of deviations from the prescribed opening pressure  $9 \pm 1\text{bar}$  (To be determined during the bench testing), correct by means of a corresponding shim.

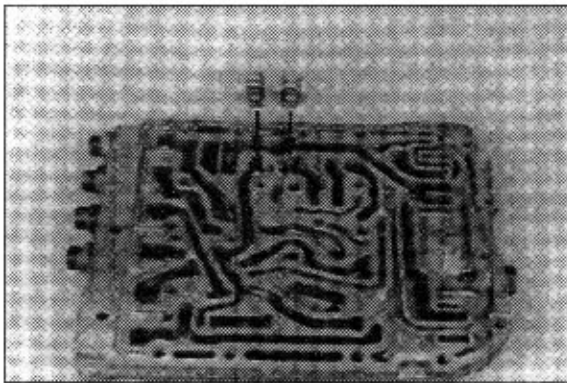


3) Install converter relief valve.

- \* If required, install ball during the reassembly of the channel plate, see figure 5).



4) Insert both check valves (Composed of balls and springs) with grease into the bores.

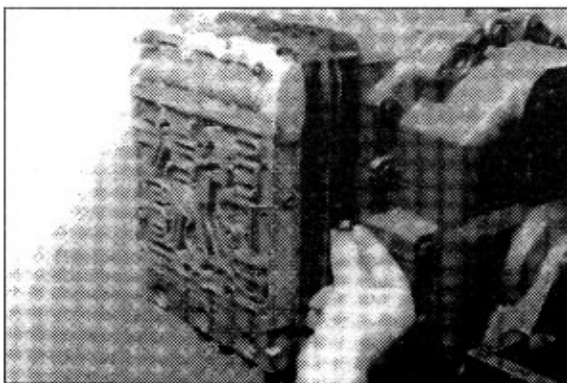


5) Mount the two adjusting screws.

Place 1st gasket, adapter plate, 2nd gasket and pre-assembled channel plate against the housing until contact is obtained.

- \* Position ball of the converter relief valve.
- \* Special tool

Adjusting screws (M8) 5870 204 011





- 6) Fasten channel plate by means of socket head screws.

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

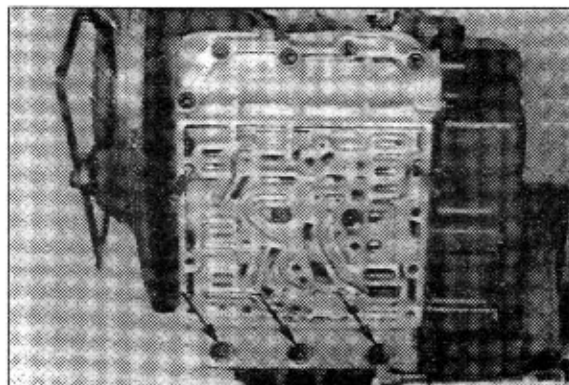
Torque limit(M8/8.8) 1.63kgf · m(11.8lbf · ft)

- ※ Install socket head screws M8 × 40(Flat head) below, see arrows.

Remaining socket head screws(7 pieces)

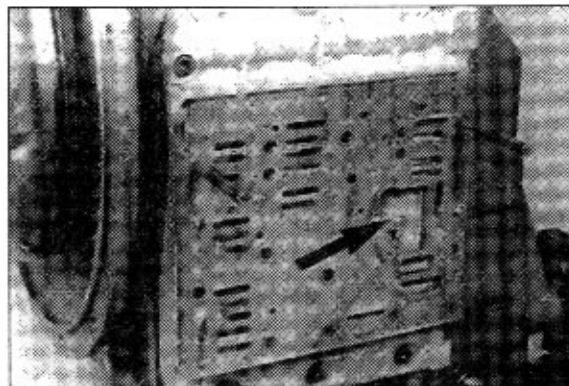
M8 × 30.

Install flat washers.

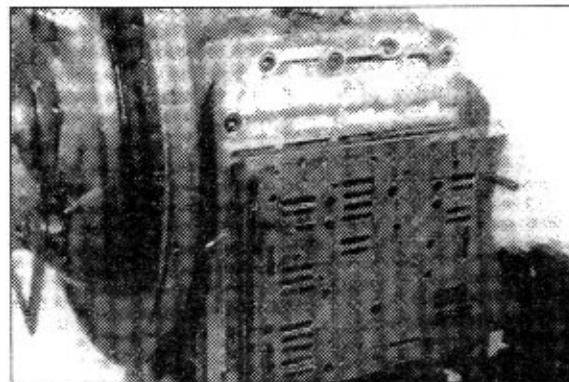


- 7) Assemble 1st gasket.

- ※ Pay attention to the different gaskets, see right figure(Arrow) and next figure.

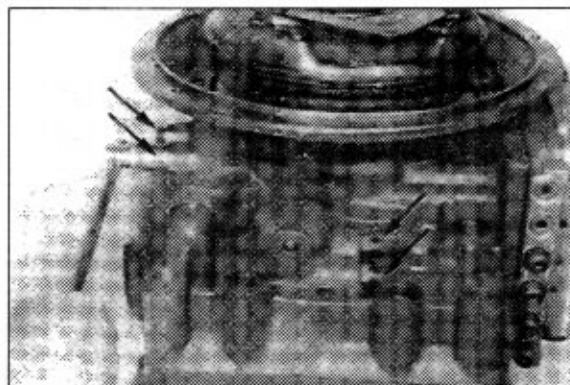


- 8) Assemble adapter plate and 2nd gasket.

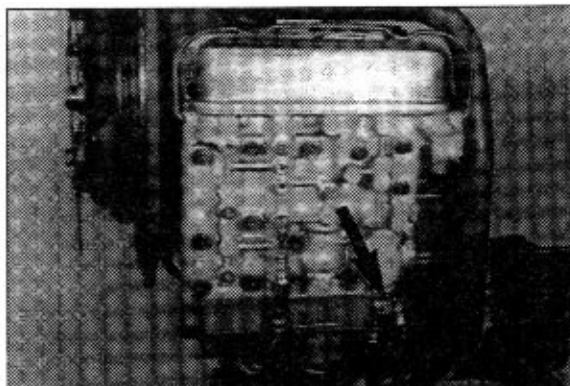


**6. INSTALL DELIVERY AND SUCTION LINES  
AS WELL AS FILTER**

- 1) Install connecting sleeve, see arrows.
- ※ Use new O-rings.



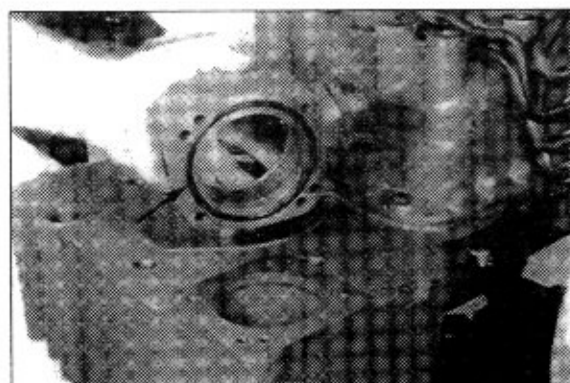
- 2) Install delivery line, see arrow.



- 3) Install delivery lines.

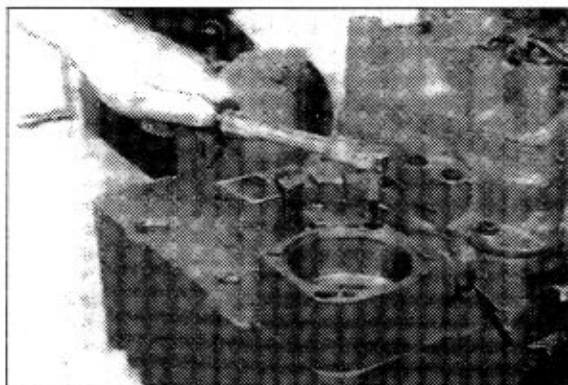


- 4) Insert O-ring into the ring groove (Arrow) and place filter adapter case firmly against shoulder.
- ※ Pay attention to the installation position, see next figure.



- 5) Fasten adapter case by means of two socket head screws and install screw neck, see arrow.

Torque limit                      2.35kgf · m(17.0lbf · ft)  
socket head screws M8/8.8

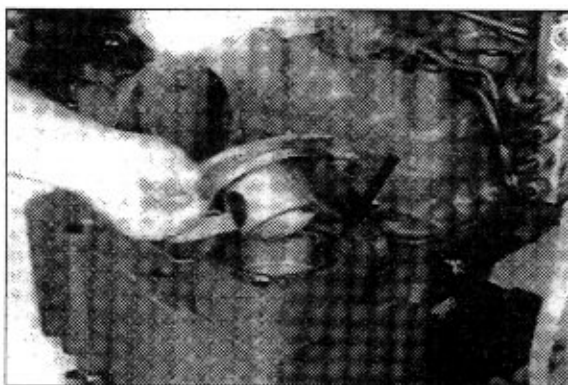


- 6) Insert O-ring into the ring groove(Arrow) and insert filter.

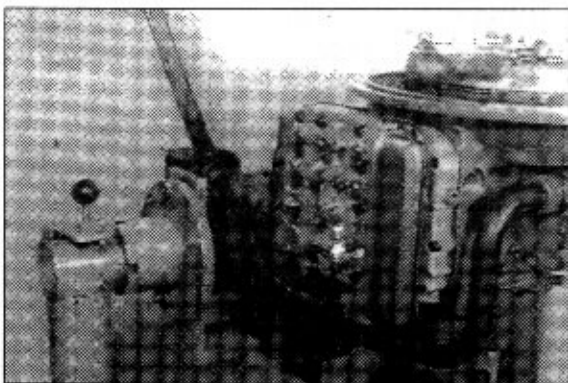


- 7) Install O-ring(Arrow) and fasten cover by means of hexagon head screw.

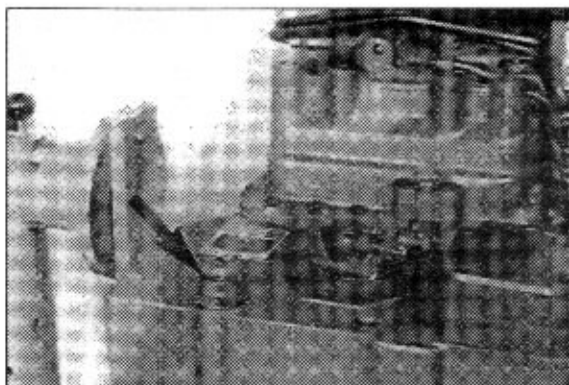
Torque limit(M8/8.8)    2.35kgf · m(17.0lbf · ft)



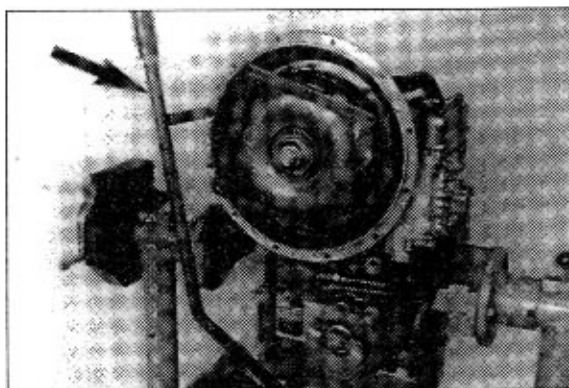
- 8) Install suction pipe.



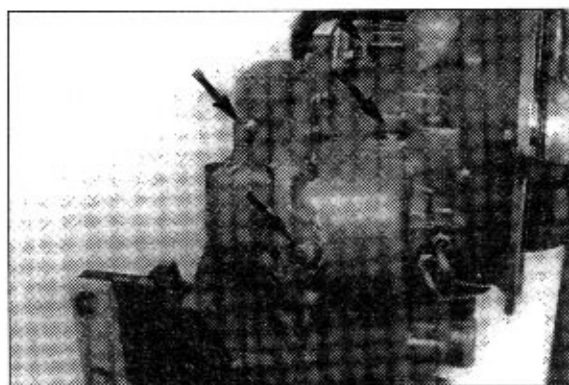
9) Install connecting sleeve, see arrow.



10) Install filler pipe, see arrow.

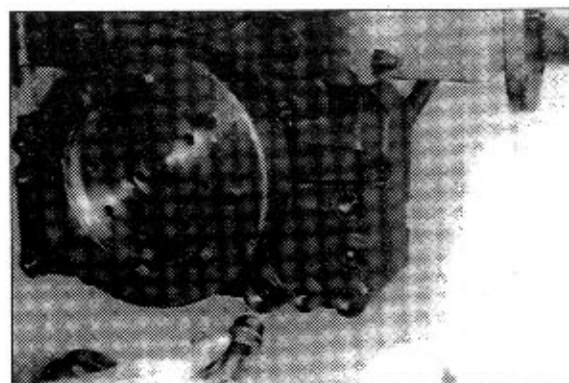


11) Install screw plugs and breather, see arrows.



12) Install oil drain plug.

※ Install new O-ring.



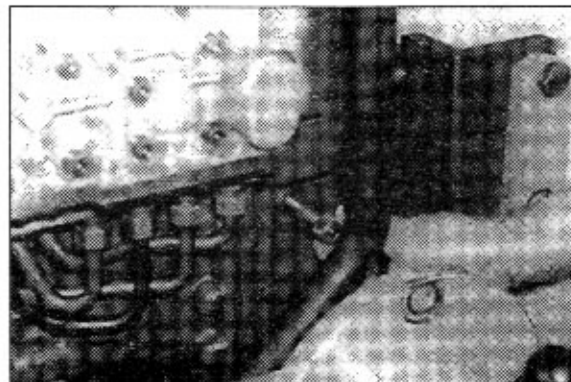
## 7. INSTALL INDUCTIVE TRANSMITTER

- 1) Adjust the required clearance = 0.60 to 0.80mm between contact face-inductive transmitter and spur gear K3(Tip of tooth), (Example O) :

Insert measuring pin until the end face has contact with the tip of tooth, respectively the circlip has contact with the screwed face.

※ Special tool

Measuring pin 5870 200 040

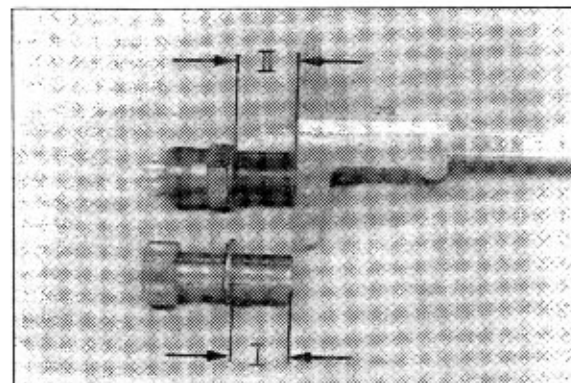


- 2) Remove measuring pin and measure Dimension I from the end face/measuring pin to the circlip.

Dimension I e.g. 26.20mm

Determine Dimension II, see figure.

Dimension II e.g. 26.50mm



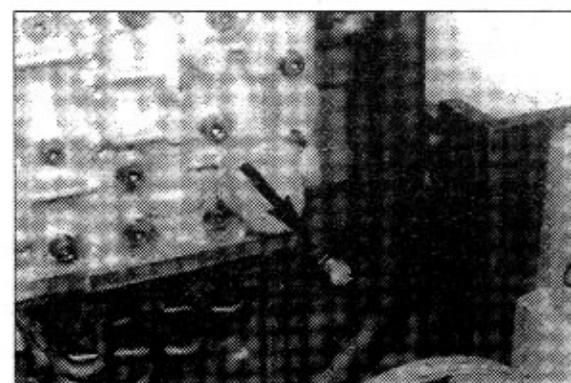
### Example O

Dimension I	26.20mm
required clearance e.g.	- 0.70mm
Difference = Adjustment Dim	25.50mm

Dimension II	26.50mm
Adjustment Dimension	- 25.50mm
Difference = Shim	s = 1.00mm

- 3) Assemble shim(e.g. 1.00mm), insert new O-ring into the ring groove and screw in inductive transmitter(Arrow).

※ Before the vehicle is put into service, it is absolutely necessary to pay attention to the informations given in the manual for the operation and maintenance.





### 3. AXLE

#### 1) SCREW-LOCKING, SEALING AND LUBRICATING MATERIALS

- (1) Locking, sealing and lubricating materials referred to in this manual are the same used in the shop-floor.
- (2) The table below gives an account of the typical applications of each single material, in order to facilitate replacement with similar products marketed by different brand names with different trade marks.

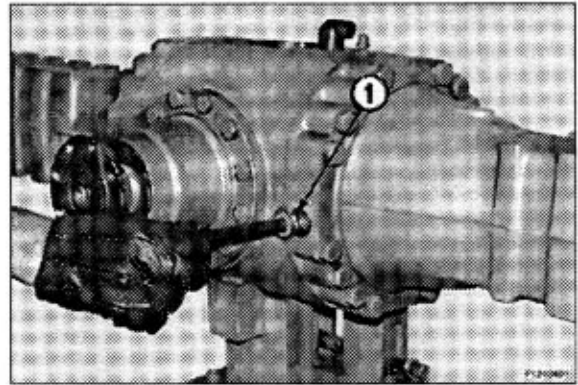
Denomination	Application
Loctite 242	• Anaerobic product apt to prevent the loosening of screws, nuts and plugs. Used for medium-strength locking. Before using it, completely remove any lubricant by using the specific activator.
Loctite 243	• The oleocompatible alternative to 242. Does not require the activation of lubricated surfaces.
Loctite 270	• Anaerobic product for very-high strength locking of screws and nuts. Before using it, completely remove any lubricant by using the specific activator. To remove parts, it may be necessary to heat them at 80° C approx.
Loctite 275	• Anaerobic product suitable for high-strength locking and sealing of large threaded parts, bolts and stud bolts, for pipe sealing and for protecting parts against tampering ; Suitable for sealing coupling surfaces with a max. diametrical clearance of 0.25mm.
Loctite 510	• Anaerobic product for the hermetic sealing of flanged units and screw holes communicating with fluids. Can seal clearances between flanges up to 0.2mm.
Loctite 577	• Quick anaerobic sealant for sealing threaded portions of conical or cylindrical unions up to M80. Before using it, remove any lubricant with the specific activator. After polymerization, disassembly may result rather difficult, so heating may be necessary for larger diameters.
Loctite 638	• Anaerobic adhesive for fast and high-strength gluing of cylindrical metal joints(Hub on shaft). Can glue together parts with clearance ranging between 0.1 and 0.25mm.
Loctite 648	• Anaerobic adhesive for fast and medium-strength gluing of cylindrical metal joints(Hub on shaft). Can glue together parts with radial clearance below 0.1mm.
(AREXONS) Repositionable jointing compound for seals	• Solvent-based sealing compound for elastic seals, drying through evaporation. Used for sealing the outer diameter of sealing rings for rotating shafts with outer metal reinforcement.
Silicone	• Semi-fluid adhesive material used for sealing and filling and to protect components from environmental and physical elements. Polymerizes with non-corrosive dampness.
(TECNO LUPE/101) Silicone-based grease	• Highly adhesive synthetic grease, with silicone compounds added.
Molikote	• Lubricating compound containing molybdenum disulphide, used to lubricate articulation pins and to prevent sticking and oxidation of parts that are not lubricated on a regular basis.
(Lithium-based) Grease	• Applied to bearings, sliding parts and used to lubricate seals or parts during assembly.

## 2) CHECKING WEAR AND REPLACING THE BRAKING DISKS

### (1) DISASSEMBLY THE BRAKING UNITS

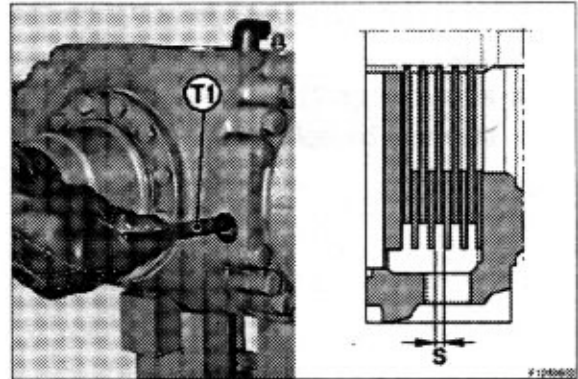
※ Perform all operations on both arms.

① Remove the oil-level plug(1).

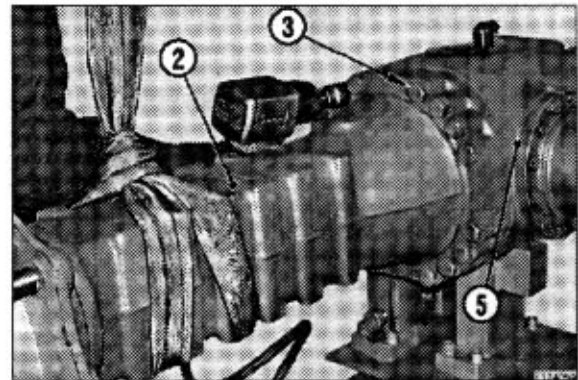


② Apply the brakes and, keeping them under pressure, check the linings **S** between the disks using tool **T1**.  
Minimum **S** : 4.5mm.

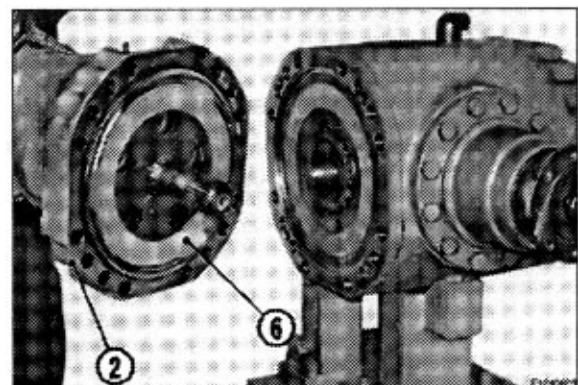
※ Replace the braking disks and the intermediate disks on both sides if necessary.



③ Unloose and remove the screws(3) and the washers(4) that fix the arm(2) to the central body(5).

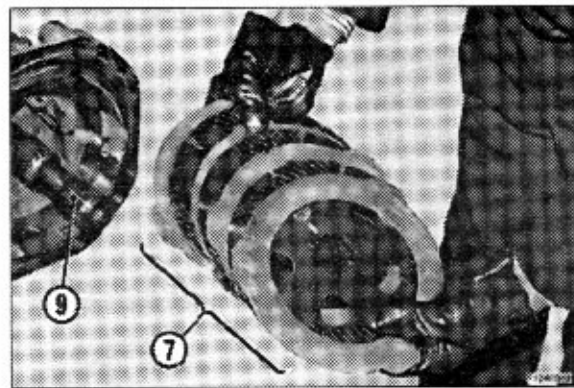


④ Remove the arm(2) together with the pack of the braking disks(6).  
Place the arm on a bench.



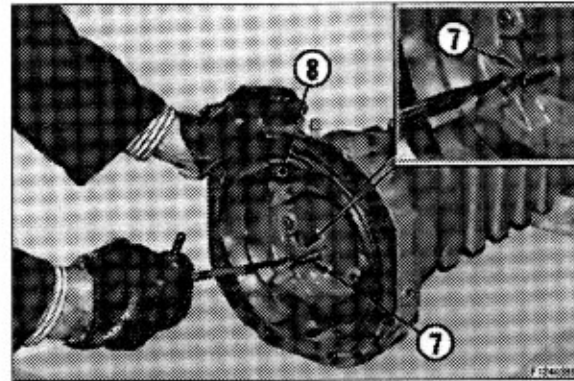
- ⑤ Remove the braking disks(6) and note down their order of assembly.

- ※ 1. If the disks do not need replacing, avoid switching their position.
- 2. Extract the axle shaft(9).



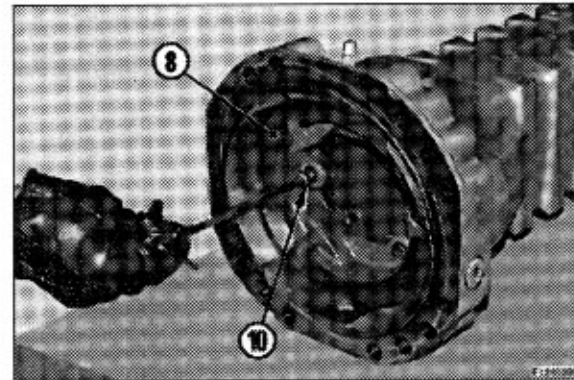
- ⑥ Remove the reversal springs(7) from the piston(8).

- ※ If the springs(7) are weak or deformed they must be replaced.



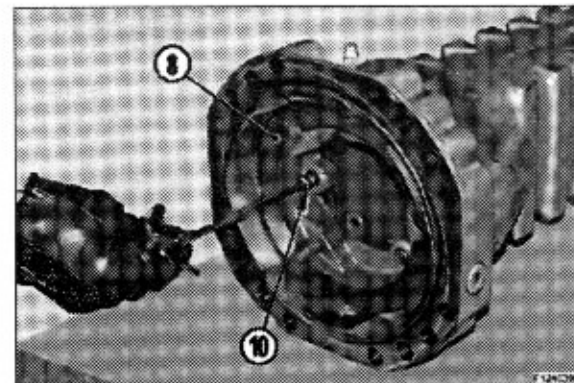
- ⑦ Remove the pin screws(10) guiding the piston(8).

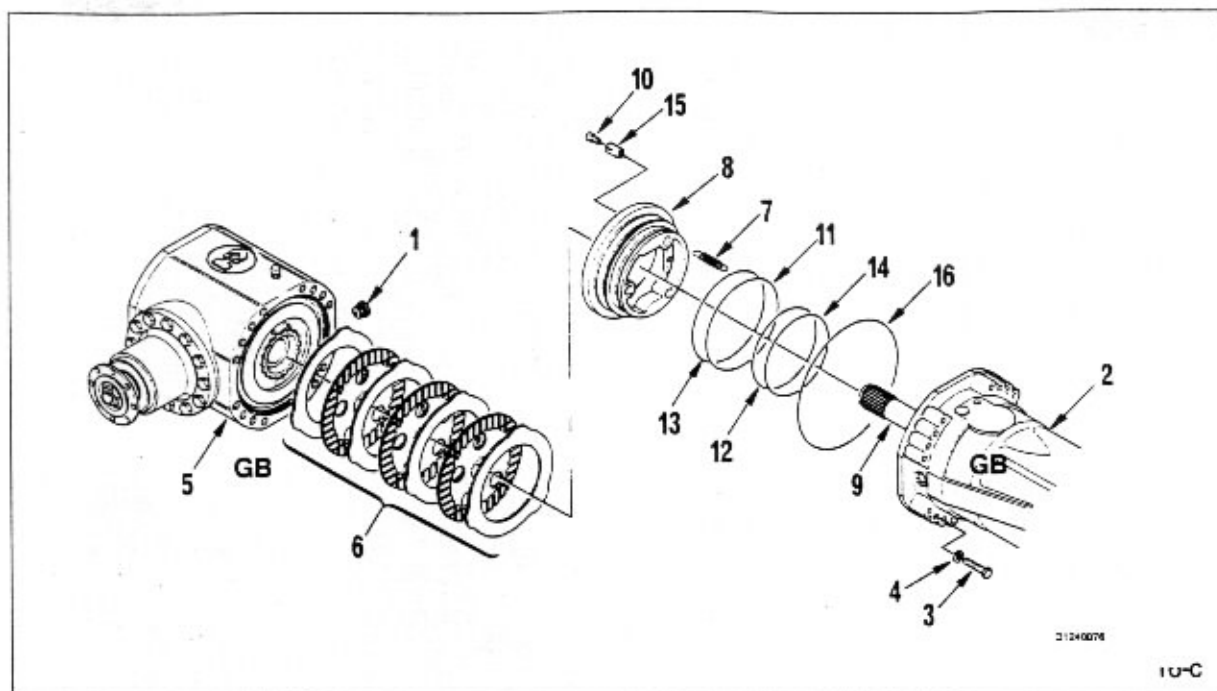
- ※ If the screws are to be replaced, note down the different colors for the different brake gaps.(See **ASSEMBLY THE BRAKING UNITS**)



- ⑧ Slowly introduce compressed air through the connection of the braking circuit in order to extract the entire piston.

- ※ Hold on to the piston as it may be suddenly ejected and damaged.

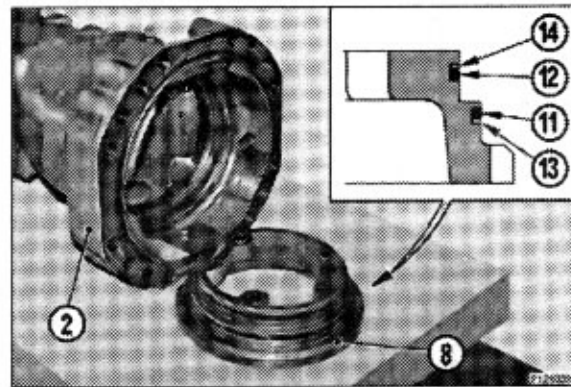




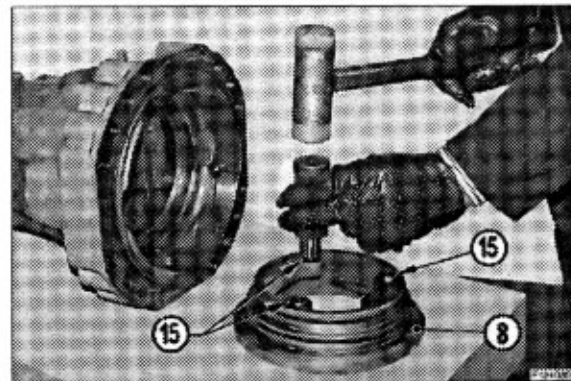
## (2) ASSEMBLY THE BRAKING UNITS

- ① Accurately clean the piston(8) and the seats of slide and seal. Replace the O-rings(11) and (12) and the anti-extrusion rings(13) and (14) ; Make sure that the assembly side is correct.

※ Accurately check the positioning of the anti-extrusion rings(13) and (14).

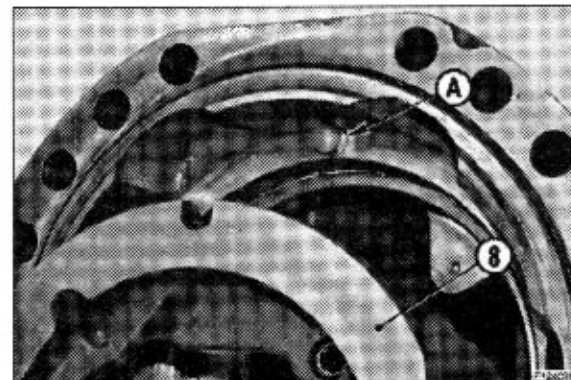


- ② Insert the stroke automatic regulation springs(15) ; Place them in line with the piston(8).

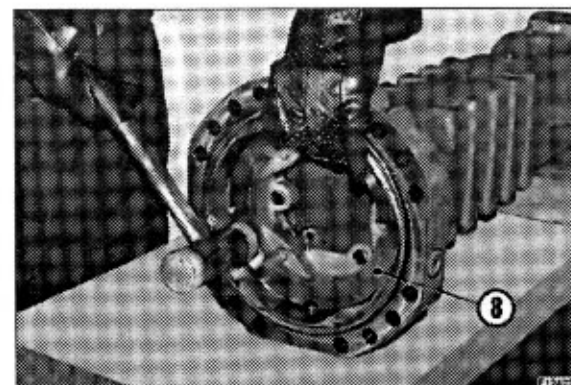


- ③ Lubricate the seals(11) and (12) and fit the piston(8) into the arm(2).

※ Make sure that the piston seat fits into the stop pin A inside the arm..

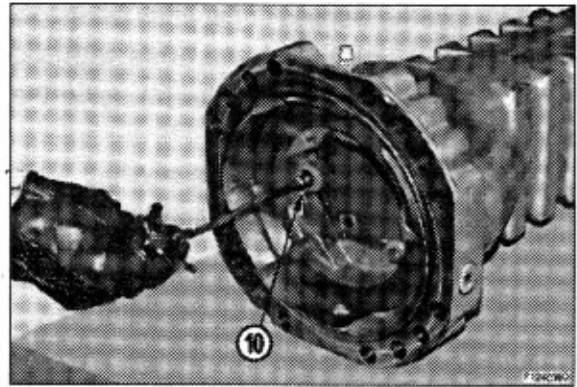


- ④ Assist the insertion of the piston(8) by lightly hammering around the edge with a plastic hammer.

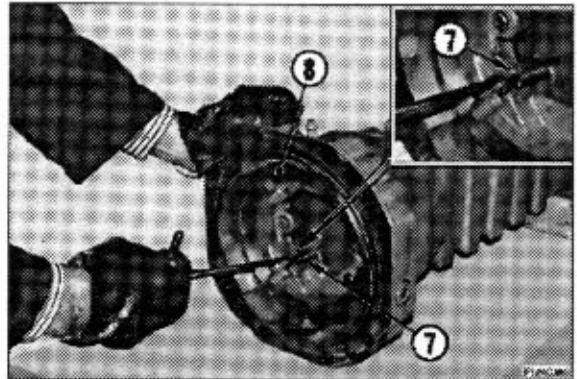




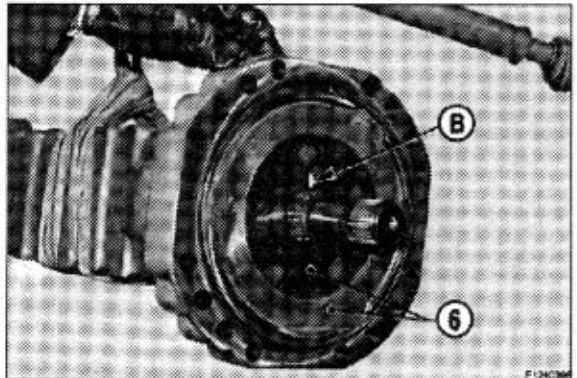
- ⑤ Fit the pin screws(10) making sure that they are all of the same color.  
 White : 1mm gap  
 Yellow : 0.75mm gap  
 Blue : 0.5mm gap  
 Apply Loctite 270 to the thread.
- Torque wrench setting : 0.5~0.7kgf · m  
 (3.6~5.1lbf · ft)



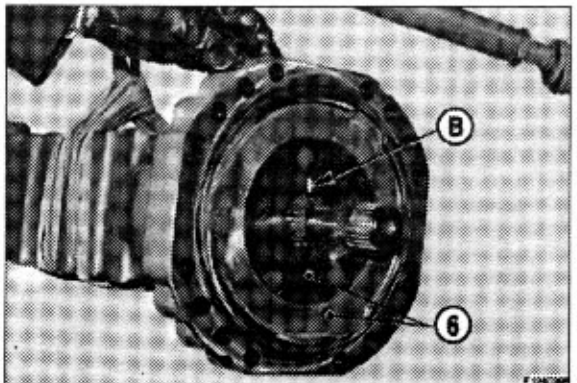
- ⑥ Fit the reversal springs(7) on the piston(8).
- ※ Pay due attention not to deform the connections of the springs.



- ⑦ Slightly lubricate the braking disks(6) and fit them in the arm following the correct sequence ; Orient them so that the oil circulation holes and the marks **B** are perfectly lined up.

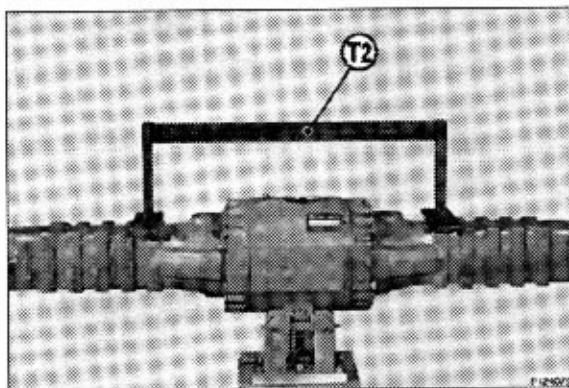


- ⑧ Check that the positioning of the sealing ring(16) on the arm is intact ; Install the complete arm(2). Lock it into position using two facing screws(3) and washers(4).



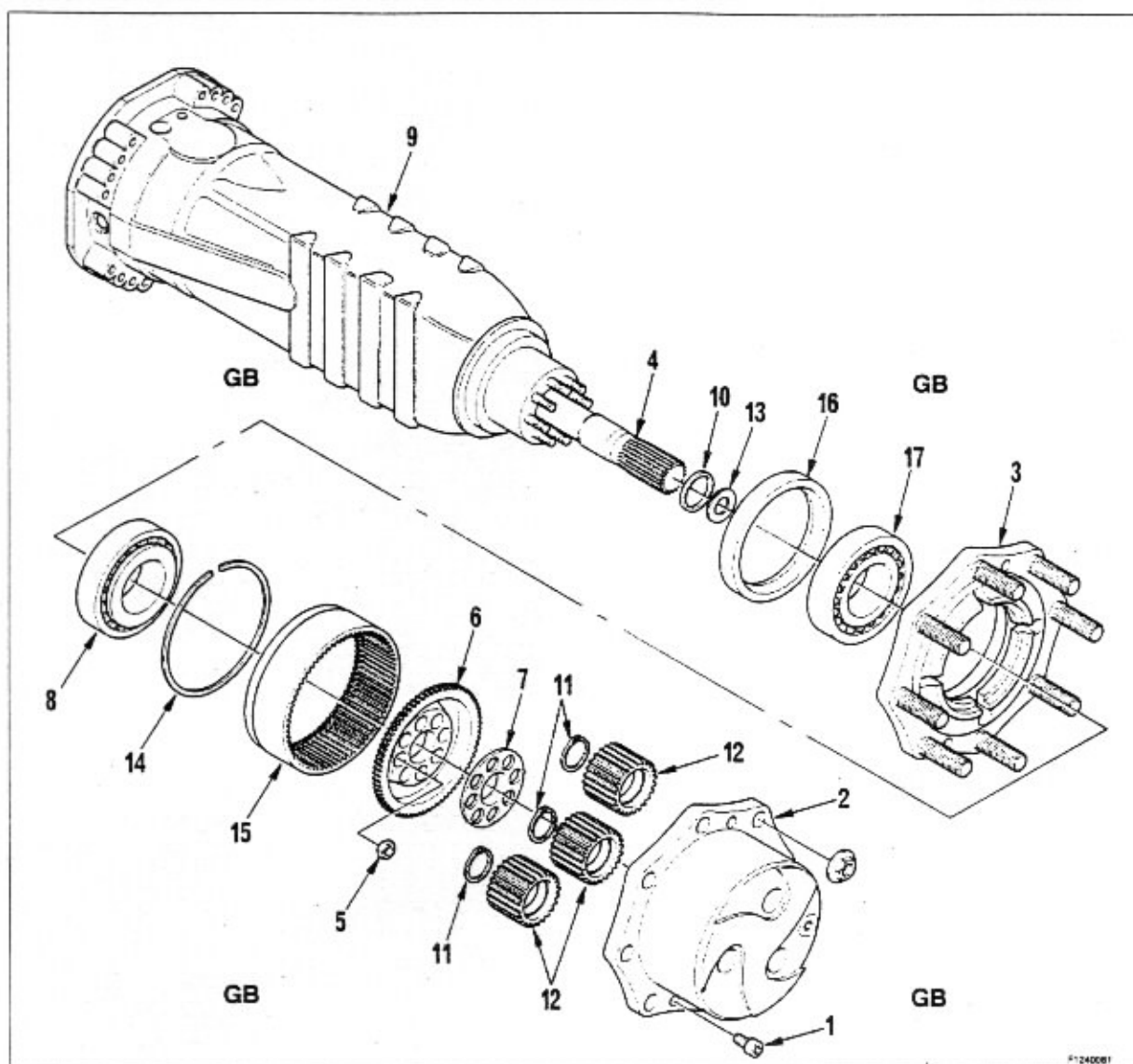
- ⑨ Check the flatness of the arms using tool **T2** and finally lock the arms with the screws(3) and the washer(4) using the crosstightening method.

- Torque wrench setting : 30.4kgf · m  
(220lbf · ft)

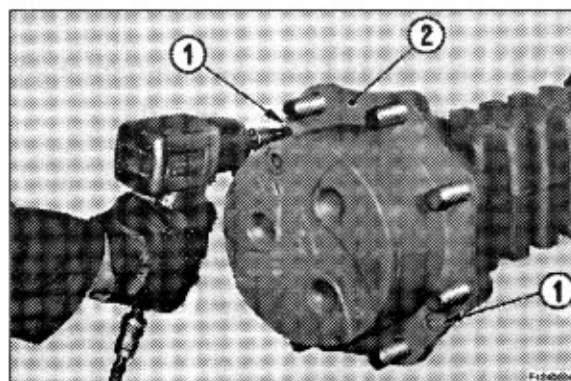


### 3) PLANETARY REDUCTION AND AXLE SHAFT

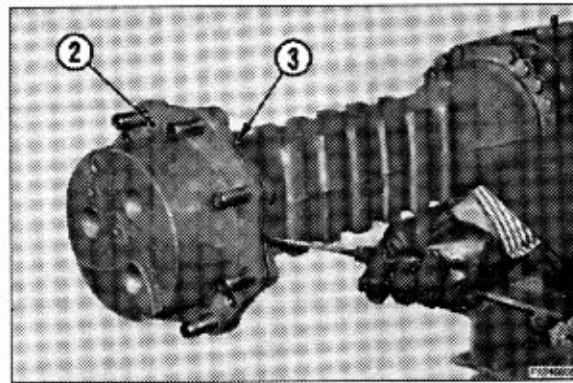
#### (1) DISASSEMBLY



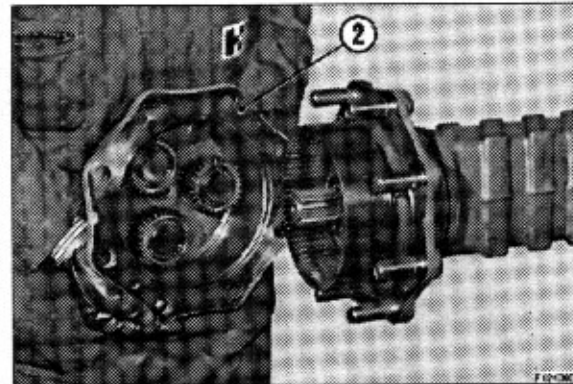
- ① Remove the securing screws(1) from the spider cover(2).



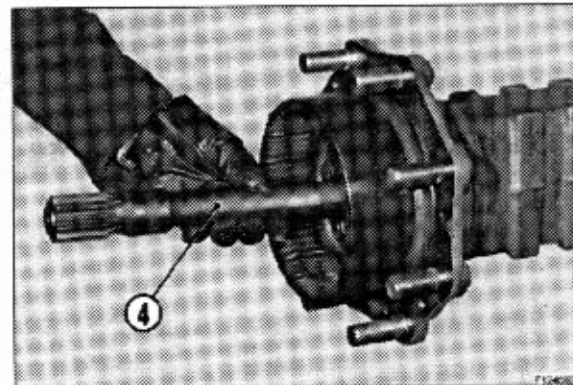
- ② Disjoin the spider cover(2) from the hub(3) by alternatively forcing a screwdriver into the appropriate slots.



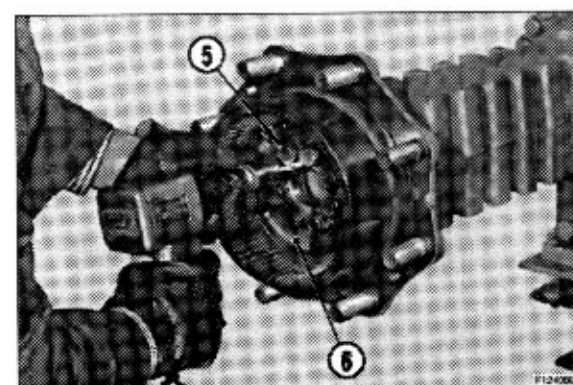
- ③ Remove the complete planetary carrier cover(2).



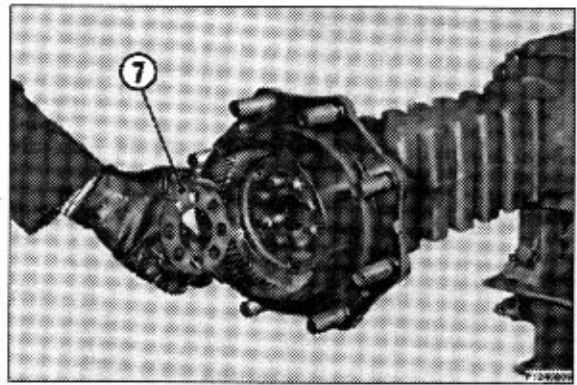
- ④ Remove the complete axle-shaft(4).



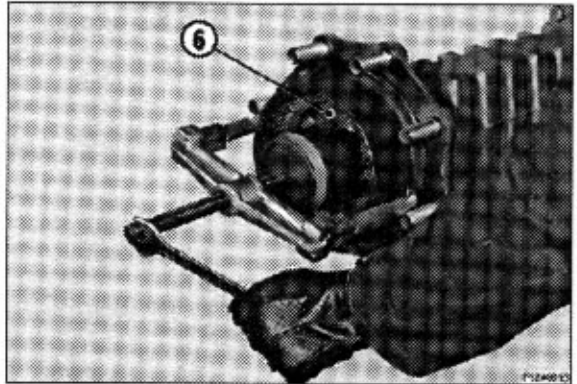
- ⑤ Unloose and remove the tightening nuts(5) from the crown flange(6).



⑥ Remove the safety flange(7).

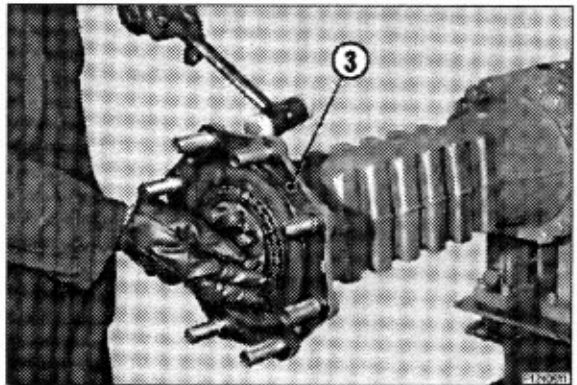


⑦ Using a puller, remove the complete crown flange(6) by acting on the stud bolts.

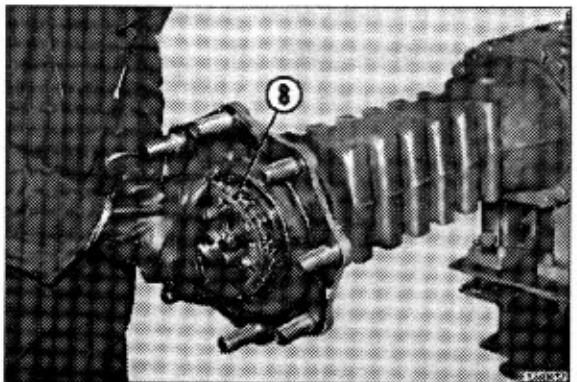


⑧ Partially extract the hub(3) using a plastic hammer.

※ Alternately hammer on several equidistant points.

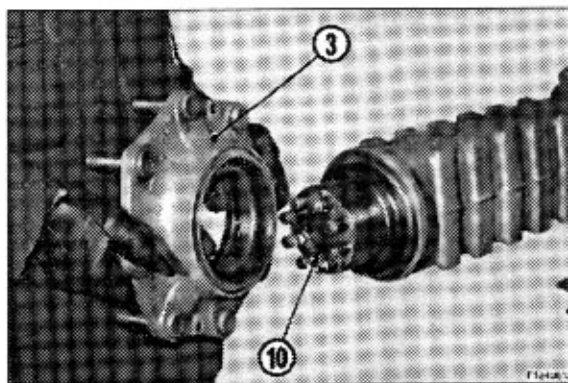


⑨ Remove the external bearing(8).

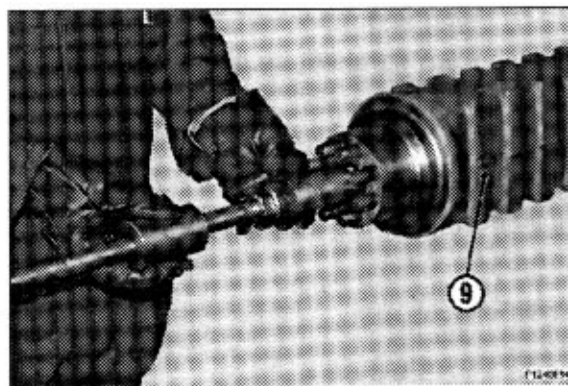




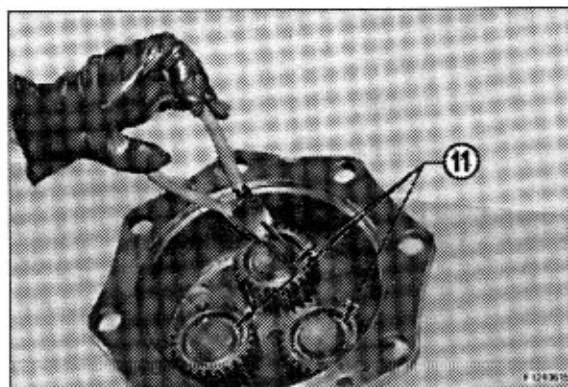
⑩ Extract the hub(3).



⑪ Remove snap ring(10) from the arm(9).

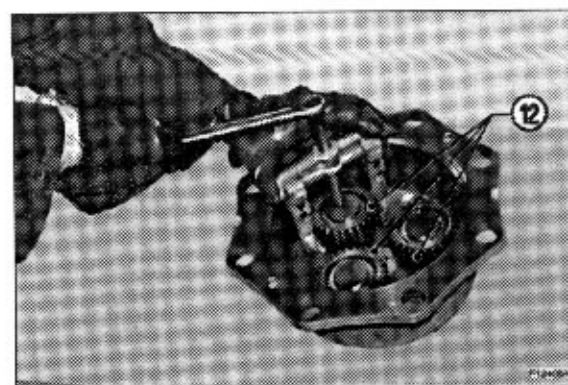


⑫ Remove the snap rings(11).

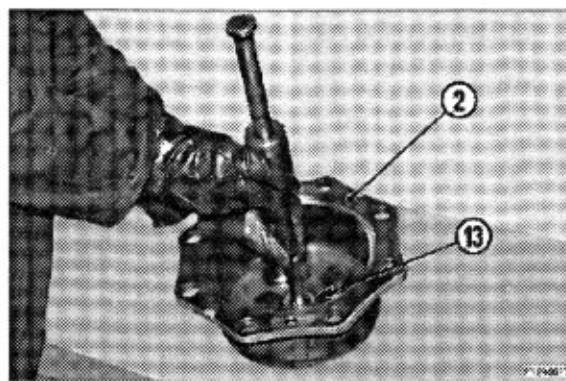


⑬ With the help of an puller, remove the planet wheel gears(12).

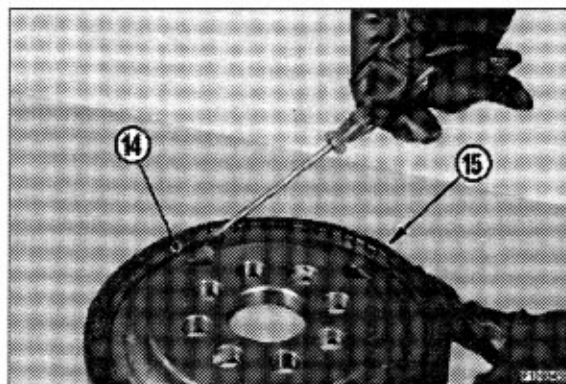
※ Note down the assembly side of planet wheels.



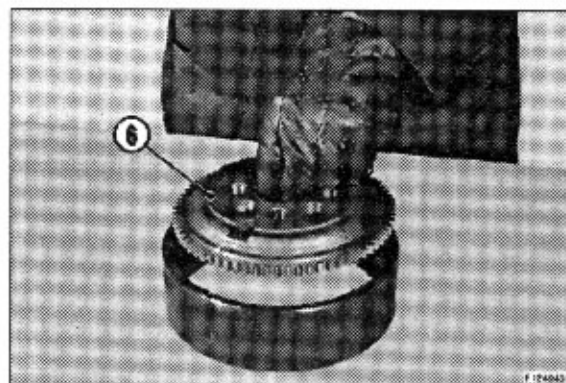
- ⑭ Using a puller for inner parts, remove shim washer(13) from planetary cover(2).



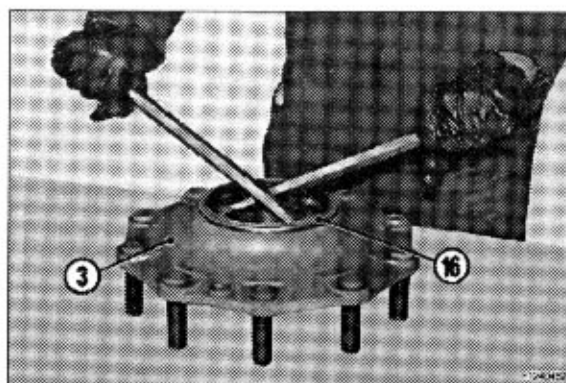
- ⑮ Remove the snap ring(14) from the crown(15).



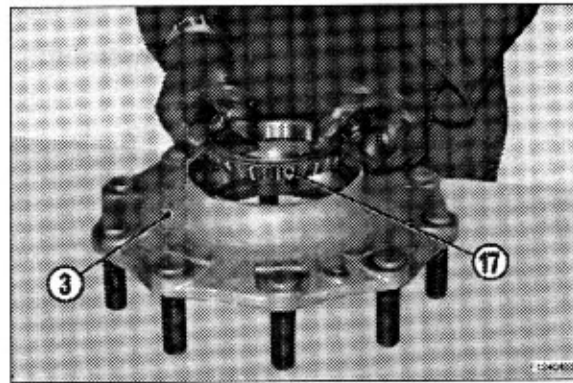
- ⑯ Remove the crown flange(6).



- ⑰ Remove the sealing ring(16) from the hub(3).

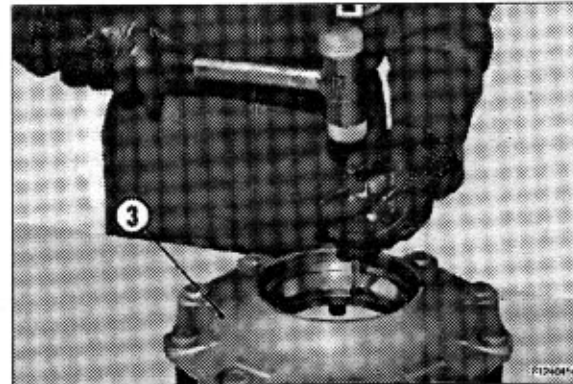


- ⑮ Remove the internal bearing(15).



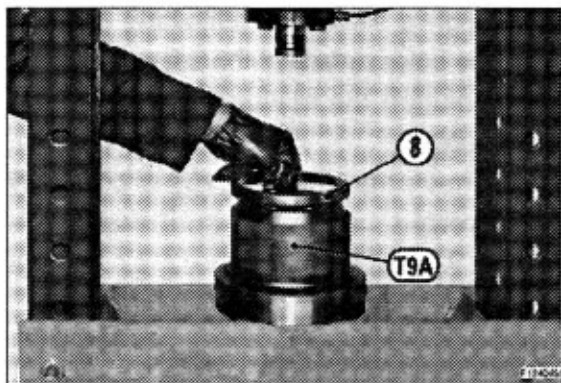
- ⑯ Remove the external thrust blocks from the bearing(8) and (17) forcing a pin-driver into the appropriate slots on the hub(3).

\* Hammer in an alternate way so as to avoid crawling or deformation of the thrust blocks.



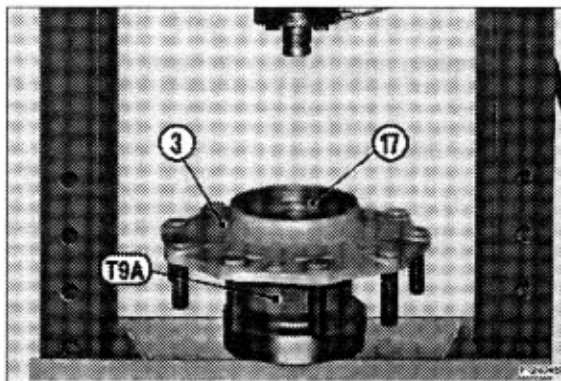
## (2) ASSEMBLY

- ① Position the lower part of tool **T9A** and the thrust block of the external bearing(8) under the press.

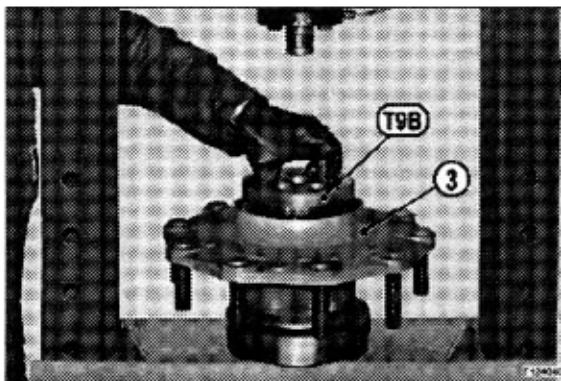


- ② Lubricate the seats of the bearings and position the hub(3) on tool **T9A** ; Position the thrust block of the internal bearing(17).

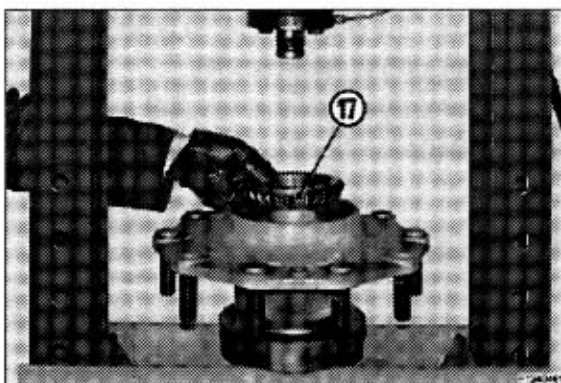
\* Check that the thrust block is correctly oriented.



- ③ Position the upper part of tool **T9B** and press the thrust blocks into the hub(3) all the way down.

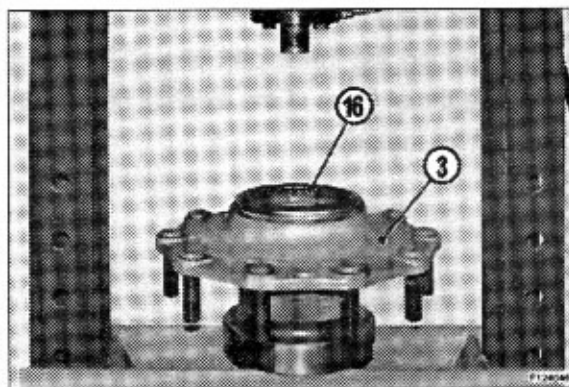


- ④ Fit the bearing(15) into the internal thrust block.

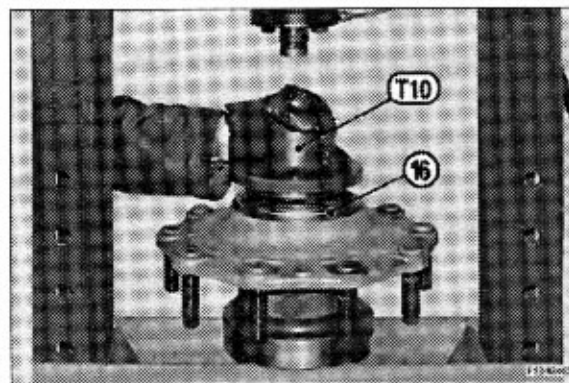


- ⑤ Apply a sealant for removable seals to the outer surface of the sealing ring(16). Position the sealing ring(16) in the hub(3).

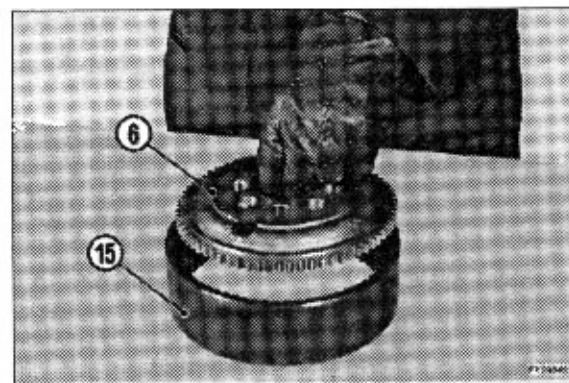
※ Check that the ring(16) is correctly oriented.



- ⑥ Position tool T10 and press the sealing ring(16) into its seat.

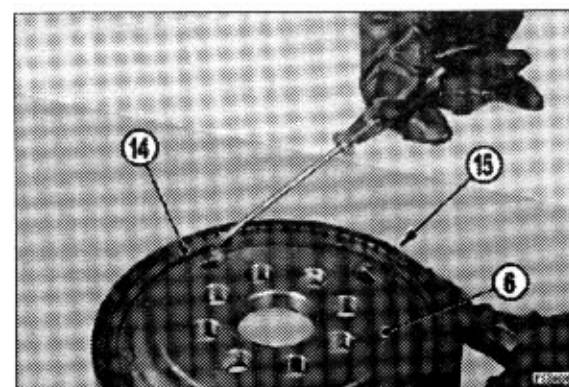


- ⑦ Insert the flange(6) in the crown(15).



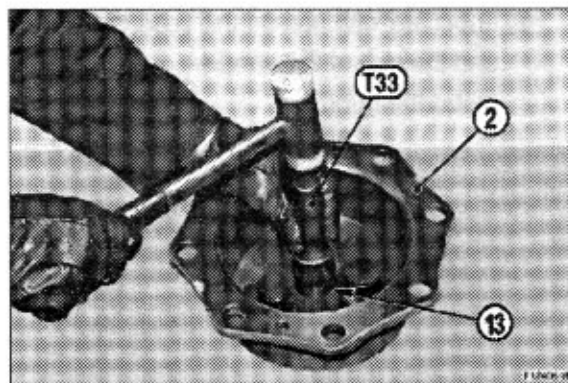
- ⑧ Insert the snap ring(14) in order to fix the flange(6) in the crown(15).

※ Carefully check that ring(14) is properly inserted in the slot of the crown(15).

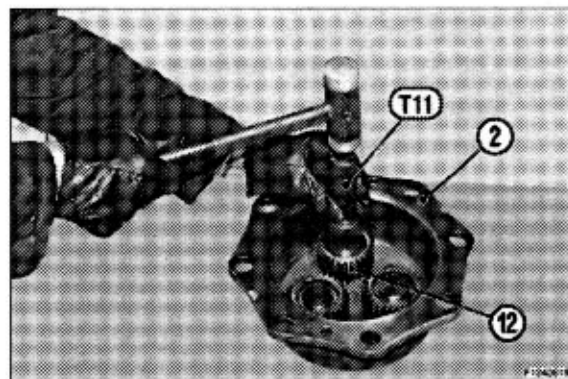




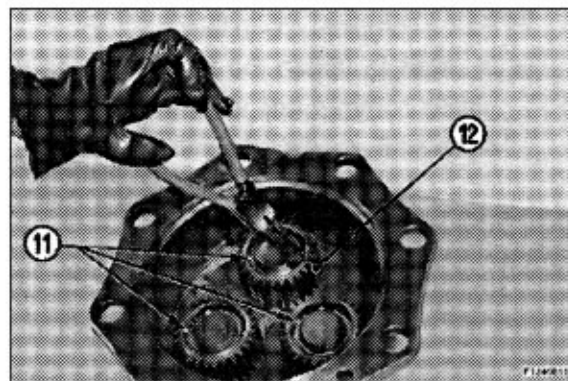
- ⑨ Using tool **T33**, fit shim washer(13) into planetary cover(2).



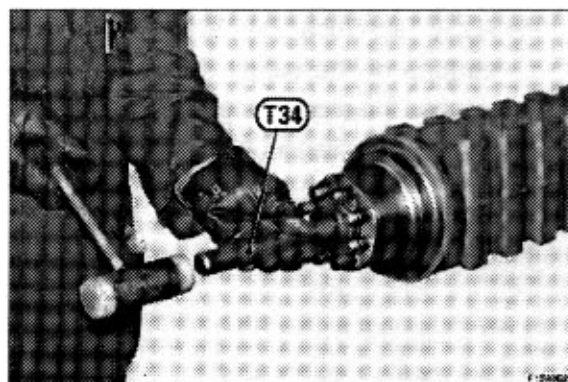
- ⑩ With the help of tool **T11**, insert the planet wheel gears(12) into the cover(2).  
Accurately check the orientation.



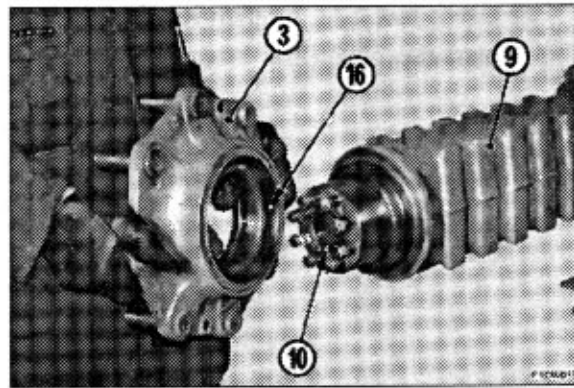
- ⑪ Lock the gears(12) into position by fitting the snap rings(11).



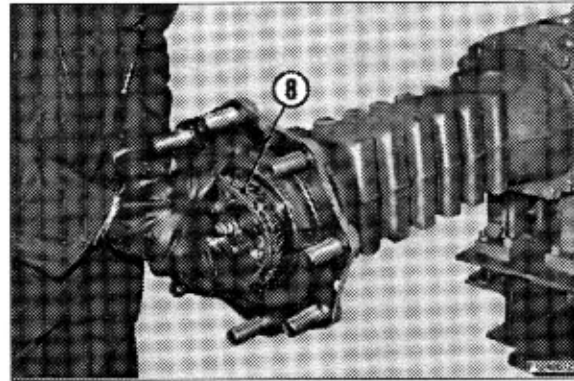
- ⑫ Lubricate the outer face of the sealing ring(10) and, with the help of tool **T34**, fit it in the arm.  
※ Accurately check direction of assembly.



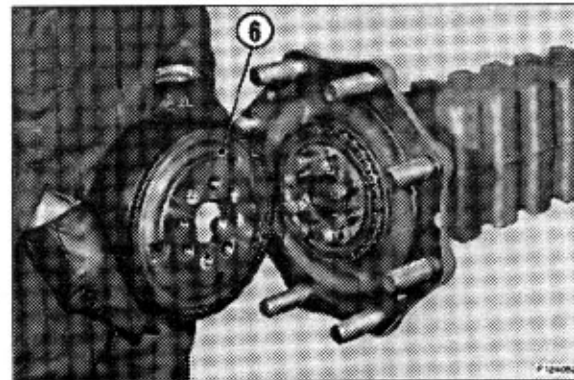
- ⑬ Lubricate with grease the sealing ring(16) and the hub of the arm(9).  
Install the hub(3).



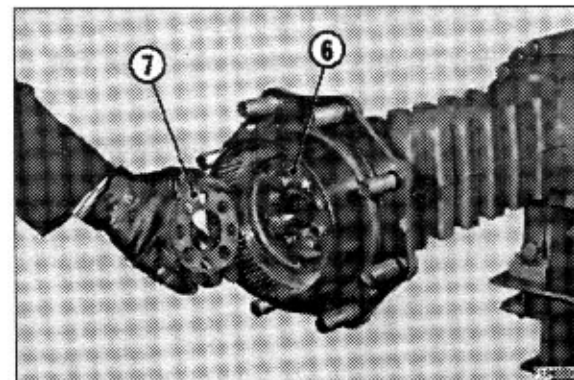
- ⑭ Install the external bearing(8).  
※ Using a plastic hammer, drive the bearing to the limit stop by lightly hammering around the edge.



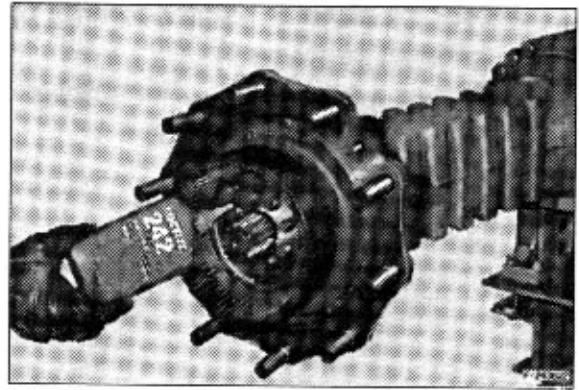
- ⑮ Fit the complete crown flange(6).  
※ In order to fasten the flange(6), use a plastic hammer and alternately hammer on several equidistant points.



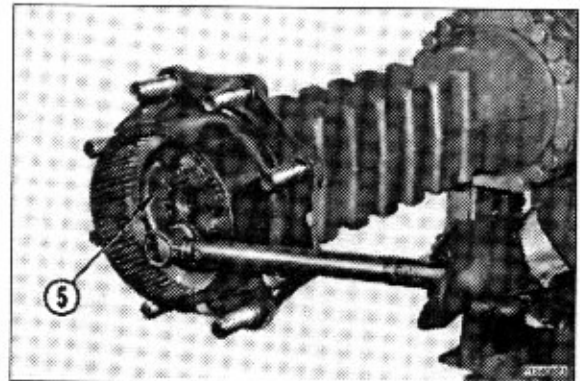
- ⑯ Apply TecnoLube Seal 101 grease to the surface of the safety flange(7) which touches the crown flange(6).  
Fit the safety flange(7).



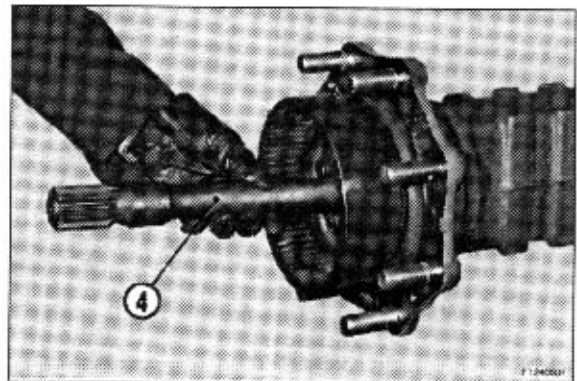
- ⑰ Apply Loctite 242 to the studs and fit in the nuts(5).



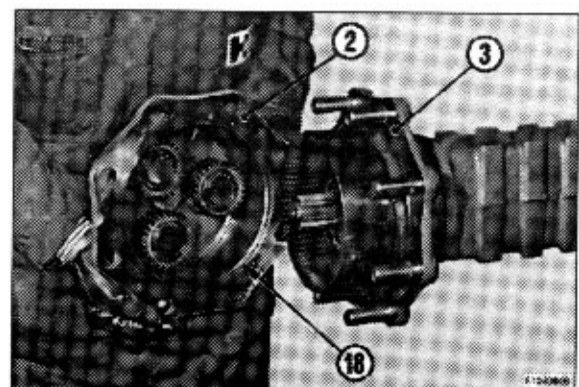
- ⑱ Cross tighten the nuts(5) in two stages.
- Initial torque wrench setting : 13.3kgf · m(96.2lbf · ft)
  - Final torque wrench setting : 26.0~29.1kgf · m(188~210lbf · ft)



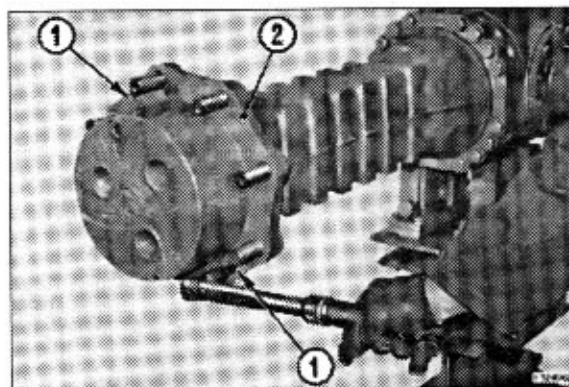
- ⑲ Grease snap ring(10) and sealing face of axle-shaft(4).  
Install the axle shaft(4) making sure it is properly engaged in the braking disks and in the differential unit.
- ※ Be very careful not to damage the snap ring(10).



- ⑳ Fit the planetary carrier cover(2) onto the hub(3).
- ※ Check that the O-ring(18) is in good condition and in position.



- ② Lock the planetary carrier cover(2) by tightening the screws(1).
- Torque wrench setting for screws :  
4.1~5.1kgf · m(29.7~36.9lbf · ft)



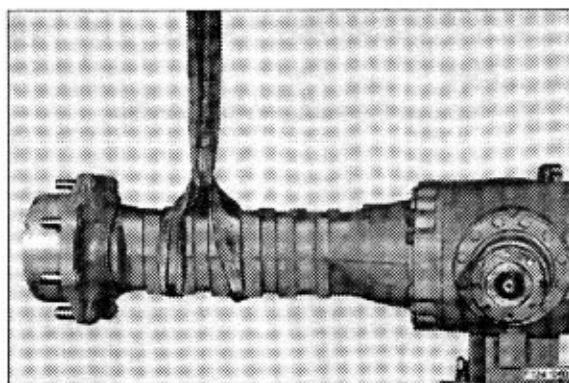
#### 4) BEVEL PINION

##### (1) REMOVAL

※ Though the photos in this manual refer to a steering and oscillating axle, the operations described apply anyway.

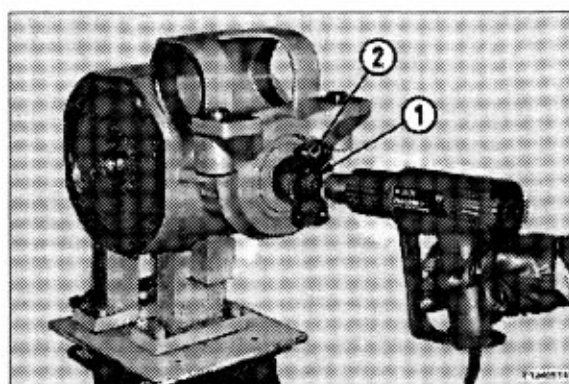
① Remove the complete arms and the differential unit.

※ For details, see **CHECKING WEAR AND REPLACING THE BRAKING DISKS** and **REMOVING THE DIFFERENTIAL UNIT**.



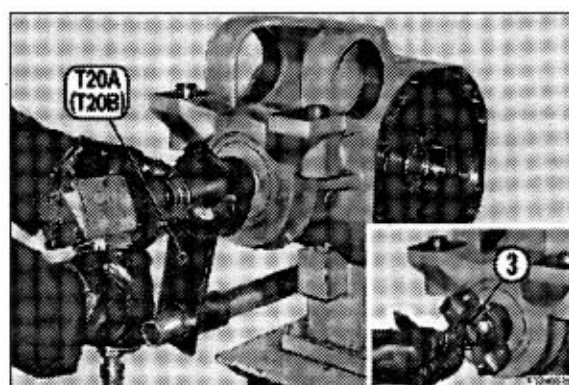
② If disassembly is awkward, heat the check nut(1) of the flange(2) at 80°C.

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

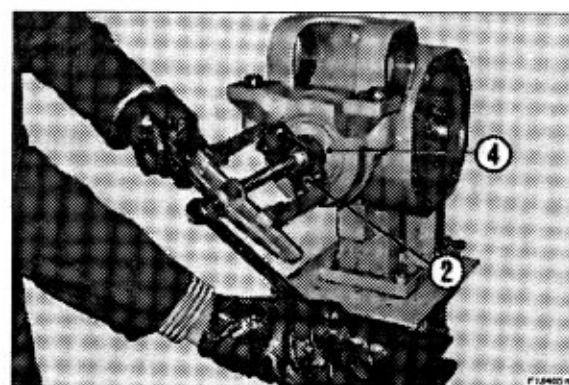


③ Position tool T20A(or T20B), so as to avoid pinion rotation.

Unloose and remove the nut(1) ; Also remove the O-ring(3).



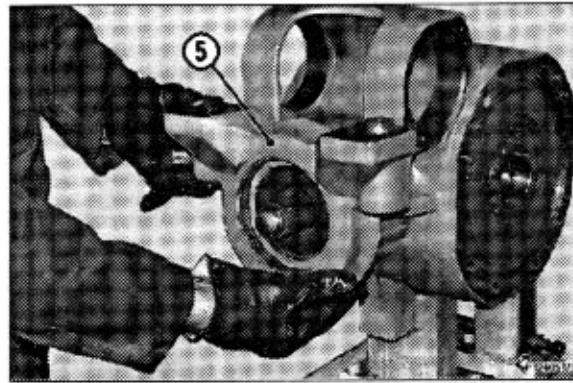
④ Remove the flange(2) complete with guard(4) by means of a puller.



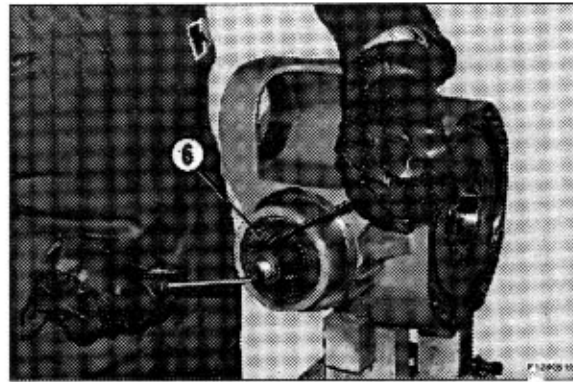


※ This operation does not apply to the fixed axle.

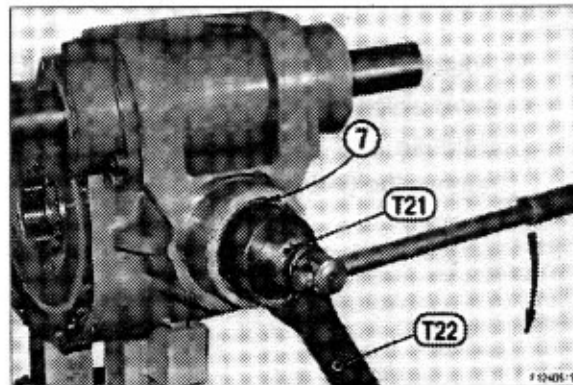
⑤ Remove the swinging support(5).



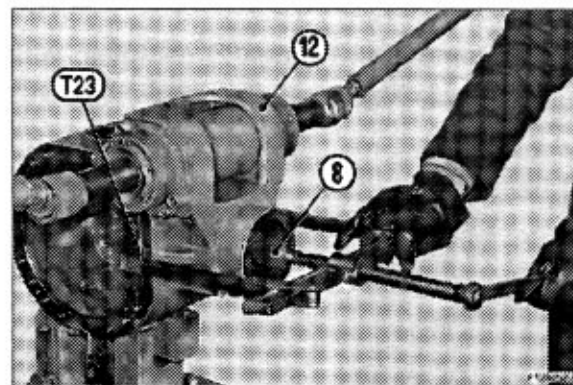
⑥ Remove the sealing ring(6).



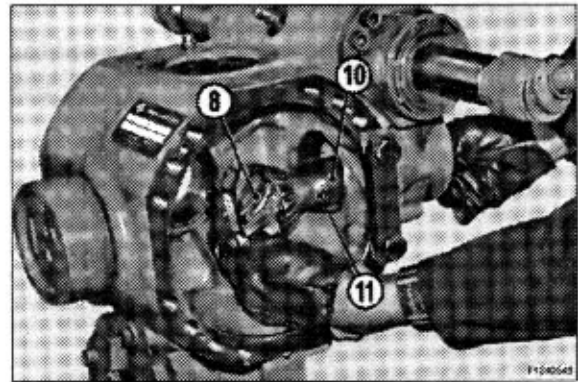
⑦ Position wrench **T22** onto the ring nut(7) and apply bar hold **T21** to the pinion(8). Stop wrench **T22** and rotate the pinion so as to release and remove the ring nut(7).  
※ If disassembly proves awkward, weld the ring nut at approximately 80°C.



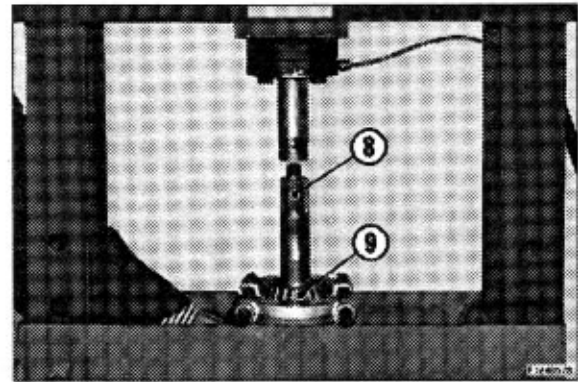
⑧ Apply blocks **T23** and, with the help of a puller, extract the pinion(8) complete with the internal bearing(9), the distance piece(10) and shims(11).  
※ The thrust blocks of the bearings remain in the central body(12).



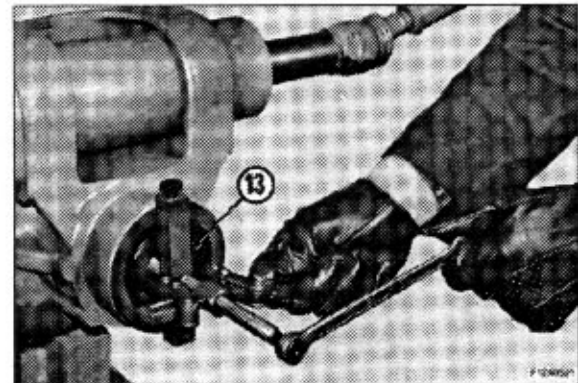
- ⑨ Remove the pinion(8), shims(11) and distance piece(10).



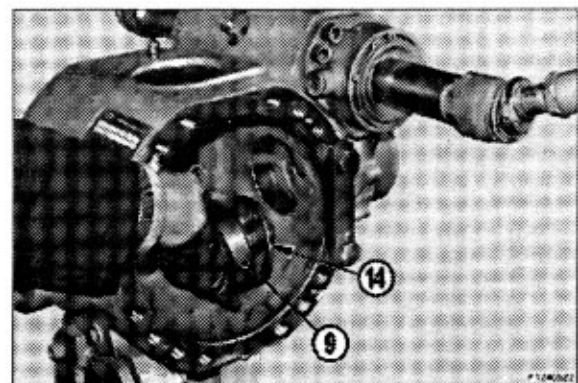
- ⑩ Using a puller and a press, remove the inner bearing(9) from the pinion(8).



- ⑪ Remove the thrust block of the external bearing(13).

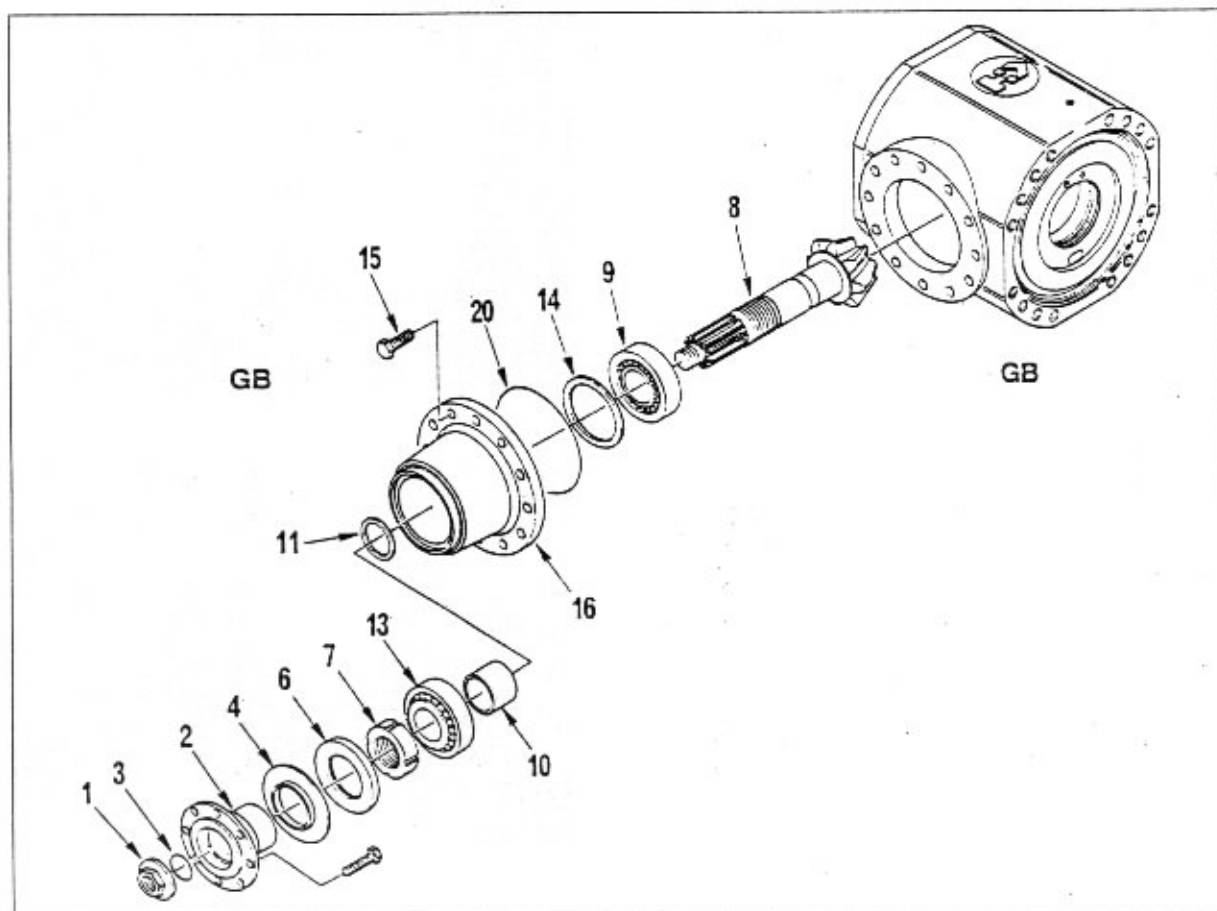
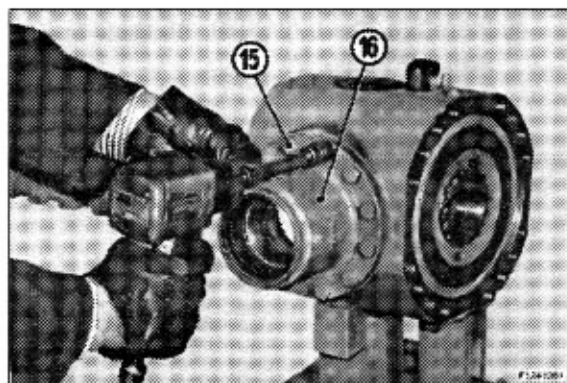


- ⑫ Insert a drift in the appropriate holes and remove the thrust block of the internal bearing(9) as well as the shim washers(14).



**⑬ Only if necessary**

Unloose and remove the screws(15)  
locking the support(16) ; Remove the  
whole support.

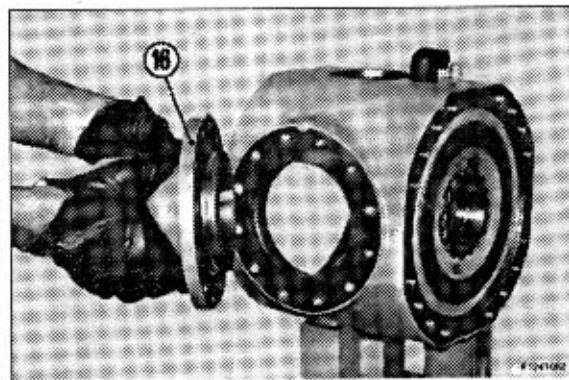


## (2) ADJUSTING AND INSTALLATION

Only if has been removed

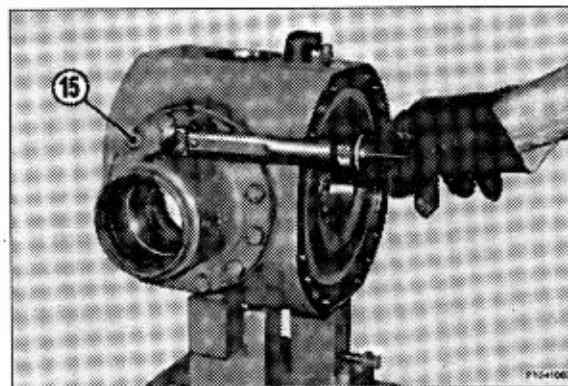
- ① Fit support(16), including O-ring(20), onto the intermediate body.

- ※ 1. The cavity located on the outer diameter must face upwards.
- 2. Check and lubricate the O-ring(20).



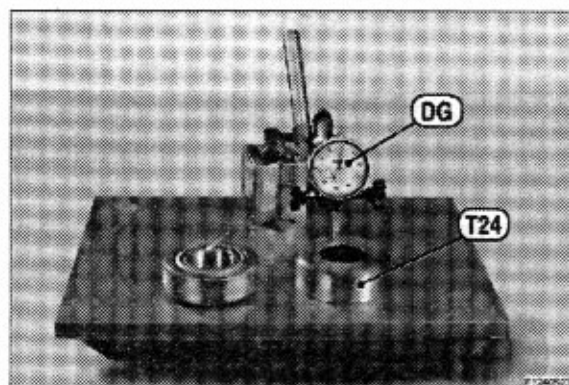
- ② Fasten support with screws(15) previously coated with Loctite 270.

Tighten using the criss-cross method to a tightening torque of 9.2~10.2kgf · m (66.5~73.8lbf · ft).



- ③ Using a surface plate, reset a centesimal comparator **DG** and place it on the measurement ring **T24**(With a thickness of 30.2mm).

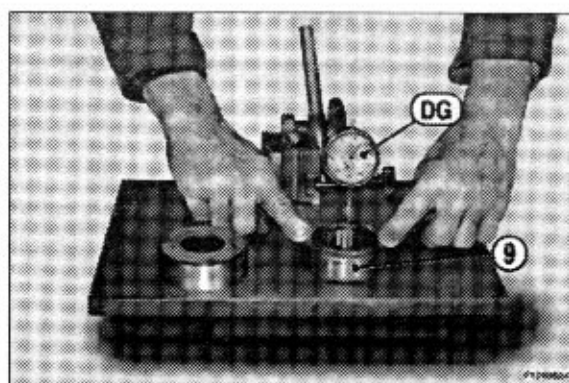
Preset the comparator to approximately 2mm.



- ④ Bring the internal bearing(9), complete with its thrust block, under the comparator **DG**.

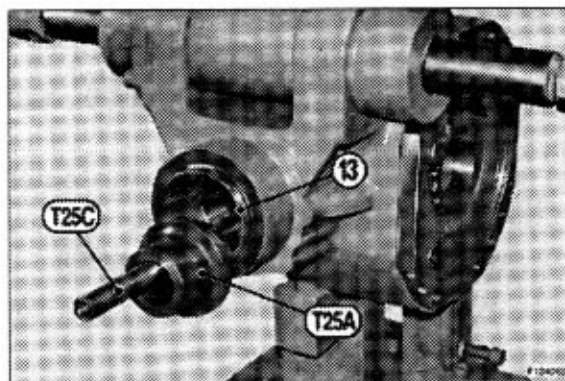
Determine overall thickness **D** of the bearing checking the discrepancy between this size and the size of the measurement ring.

- ※ Press the thrust block in the center and take several measurements while rotating the thrust block.

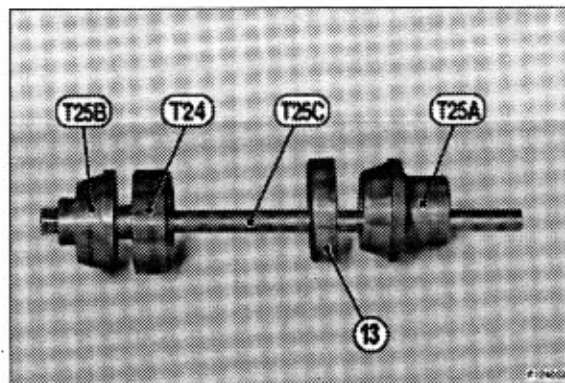




- ⑤ Partially insert the thrust block of the external bearing(13).

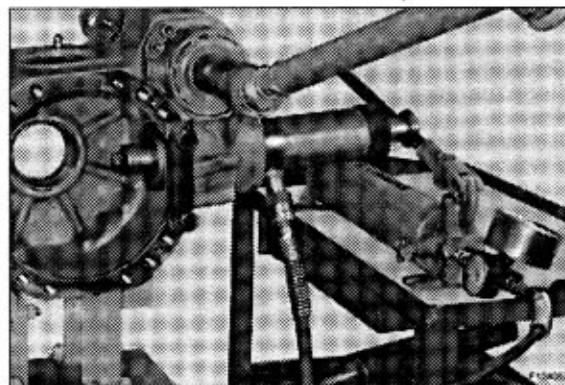


- ⑥ Install tension rod **T25C**, measurement ring **T24** and front guide tool **T25A** on the thrust block of the external bearing(13).

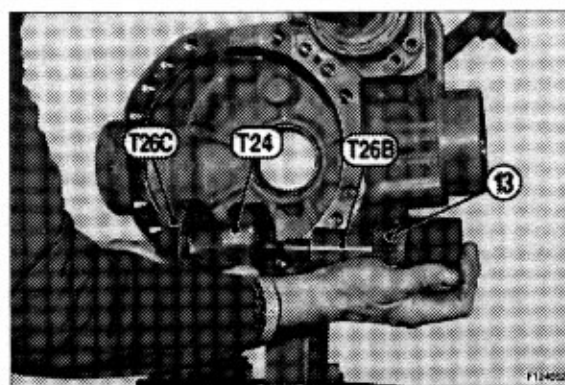


- ⑦ Connect the tension rod to the press and move the thrust block of the external bearing(13) into its seat.  
Disconnect the press and remove the tension rod.

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

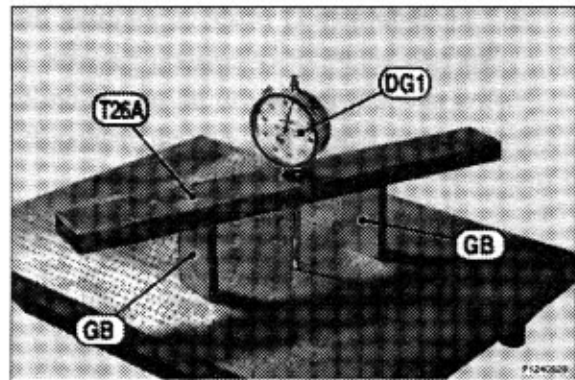


- ⑧ Insert tool **T26B** complete with external bearing(13), measurement ring **T24** and gauged ring nut **T26C**.  
Manually tighten.

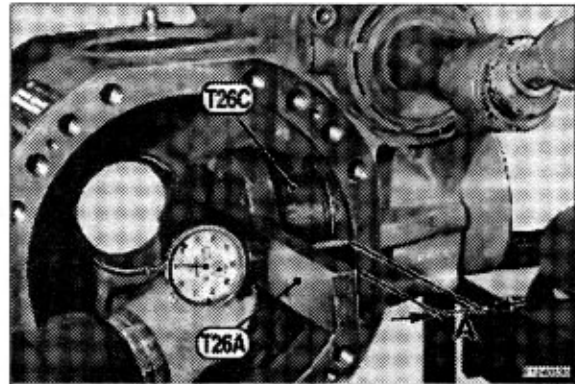




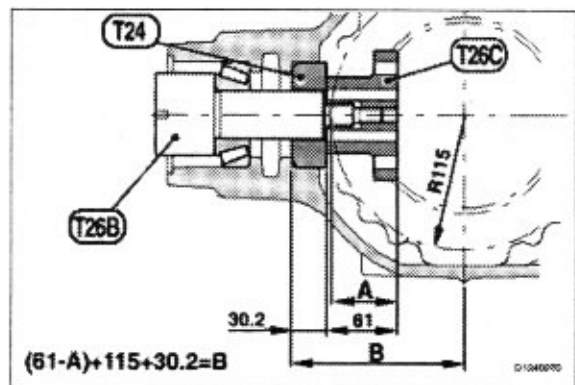
- ⑨ Fit a centesimal comparator **DG1** with long stem into bar **T26A** ; When the bar rests on two size-blocks **GB** of 57mm , reset the comparator.
- Preset the comparator to approximately 2mm and reset.



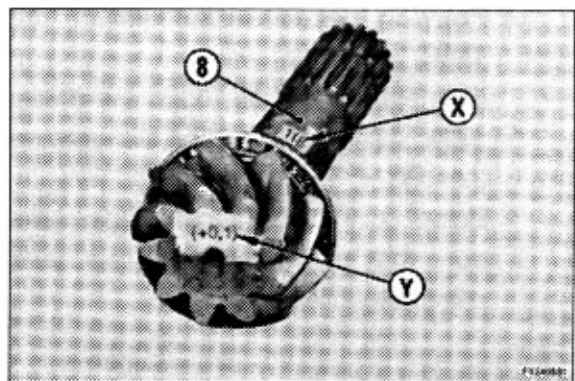
- ⑩ Lay bar **T26A** on gauged nut **T26C** and take the size **A** at about 57mm corresponding to the maximum diameter of arms centring.



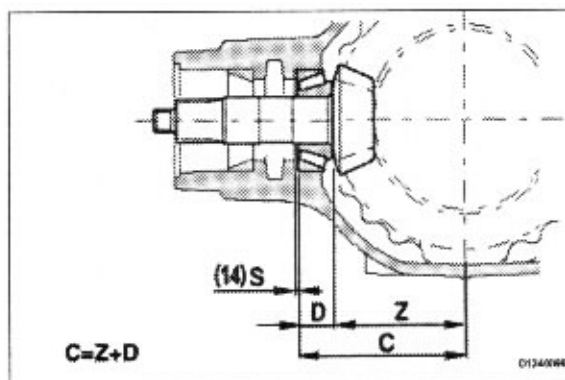
- ⑪ Calculate size **B** which will be the first useful value for calculating the size of the shims(14) that are to be inserted under the thrust block of the internal bearing(9).



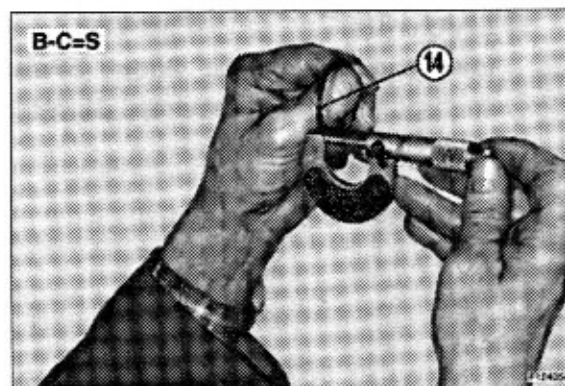
- ⑫ Check the nominal size(X) marked on the pinion and add or subtract the indicated variation(Y) so as to obtain size Z.
- e.g. :  $Z = 118 + 0.1 = 118.1$   
 $Z = 118 - 0.2 = 117.8$



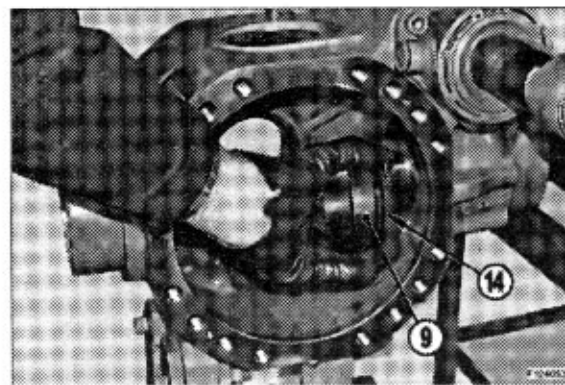
- ⑬ Calculate size **C** which represents the second value for calculating the size of the shims **S** that are to be placed under the thrust block of the internal bearing(9).



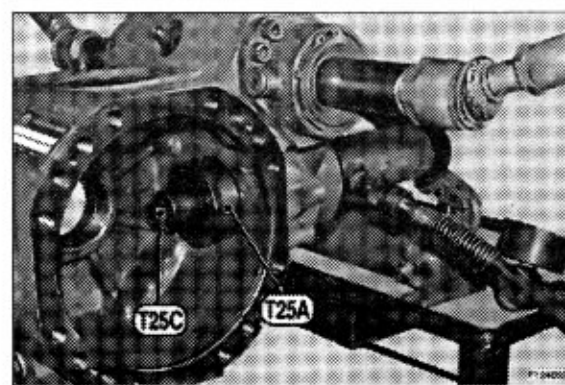
- ⑭ Calculate the difference between sizes **B** and **C** so as to obtain the size **S** of the shim(14) that will go under the thrust block of the internal bearing(9).



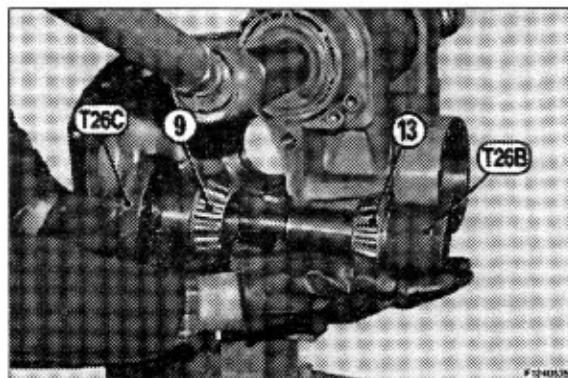
- ⑮ Insert shim **S**(14) and the thrust block of the internal bearing(9) in the central body.  
 \* To hold shim **S**(14) in position, apply grease.



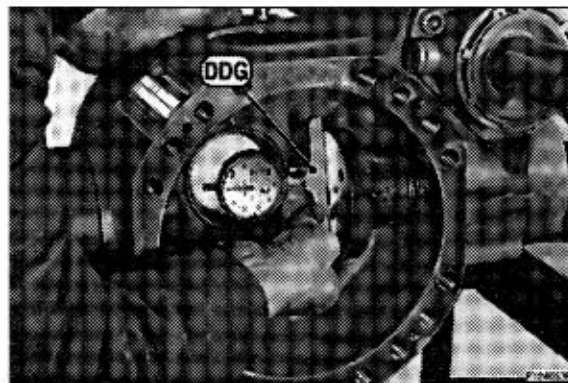
- ⑯ Position tool **T25A** and tension rod **T25C**.  
 Connect the tension rod to the press, fasten the thrust block and then remove the tools.  
 \* Before going on to the next stage, make sure that the thrust block has been completely inserted.



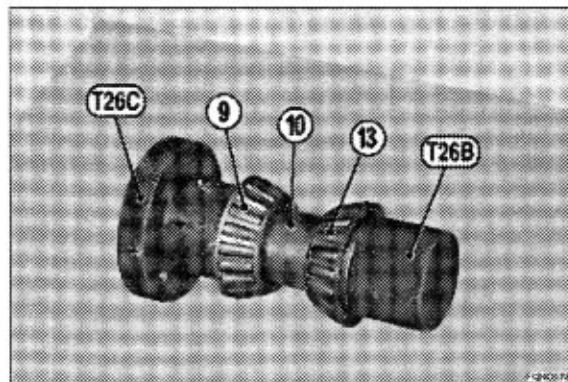
- ⑰ Position tools **T26C** and **T26B** complete with tapered bearing(9) and (13) ;  
Manually tighten until a rolling torque has been obtained.



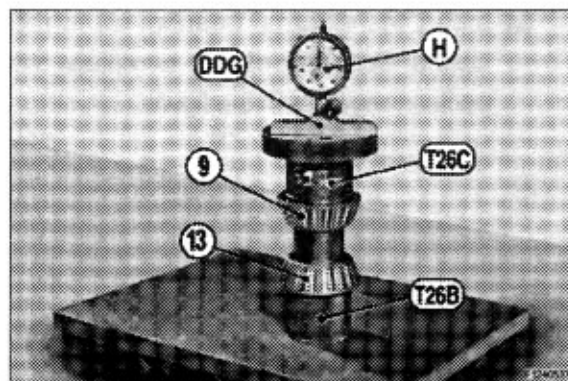
- ⑱ Insert the stem of a depth comparator **DDG** in either side hole of tool **T26C** ;  
Reset the comparator with a presetting of approximately 3mm.



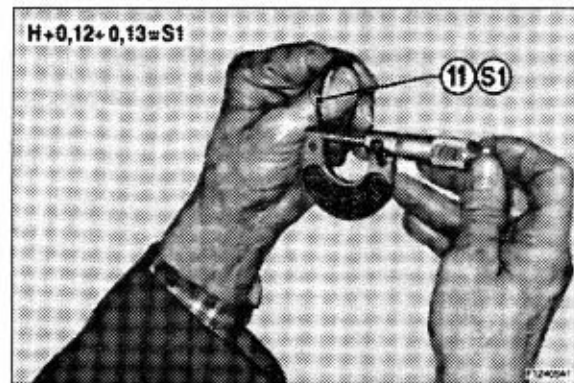
- ⑲ Remove the comparator and release tools and bearings from the central body.  
Reinstall all and insert the distance piece(10) between bearings(9) and (13) ;  
Manually tighten the whole pack.



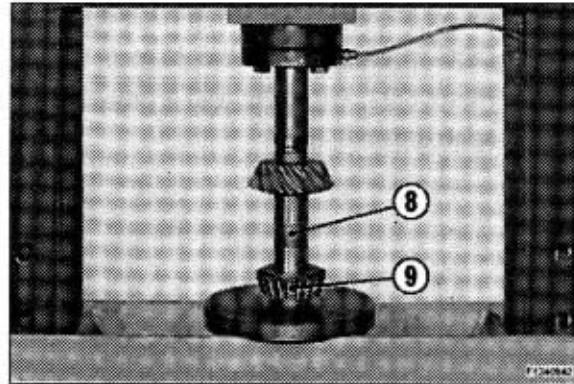
- ⑳ Insert depth comparator **DDG** into tool **T26B-T26C** and measure variation **H** in relation to the zero setting performed back at point d.



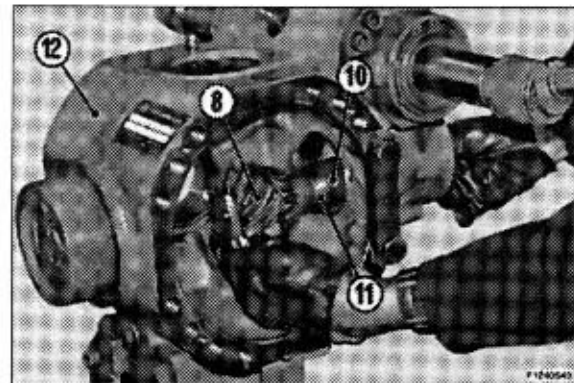
- ②① The variation is to be added to a set value of 0.12-0.13mm, so as to obtain the size of shim **S1**(11) which will be inserted between the external bearing(13) and the distance piece(10) and subsequently, to determine the preload for the bearings.



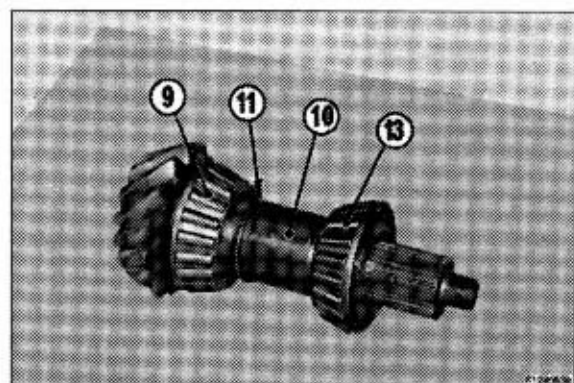
- ②② Position the internal bearing(9) and the pinion(8) under a press ; Force the bearing onto the pinion.



- ②③ Fit the pinion(8), shim **S1**(11) and distance piece(10) in the main body(12).  
\* The finer shims must be placed in-between the thicker ones.

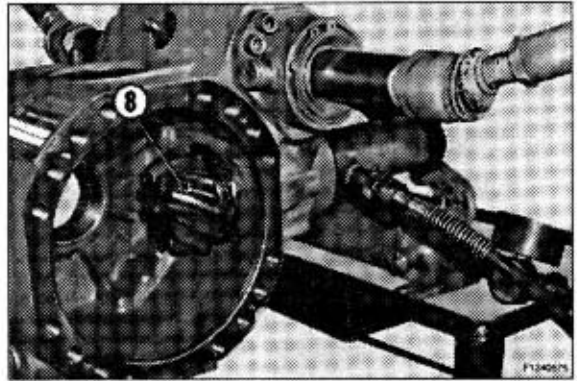


- ②④ Insert the external bearing(13) in the central body in order to complete the pack arranged as in the figure.

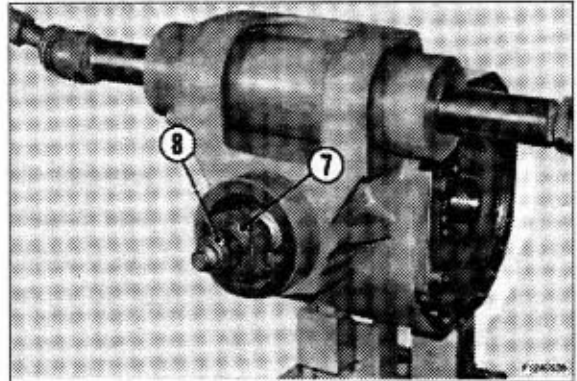




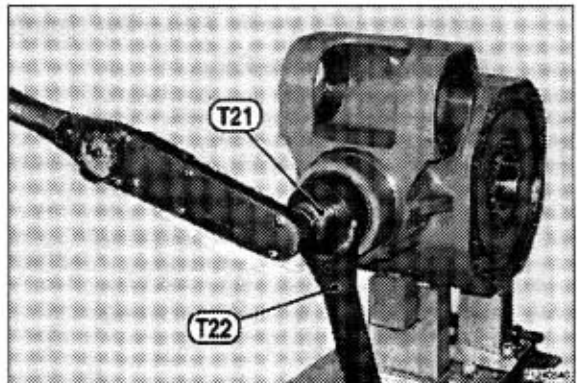
- ② Connect the pinion(8) to the tie rod **T28A** and **T28B** ; Connect the tie rod **T28C**(See special tools) to the press and block.



- ③ Apply Loctite 242 to the thread of the ring nut(7) and screw the nut onto the pinion(8).



- ④ Apply special wrench **T22** to the ring nut(7) and bar-hold **T21** to the pinion(8). Lock the wrench **T22** and rotate the pinion using a dynamometric wrench, up to a minimum required torque setting of 51kgf · m(369lbf · ft).



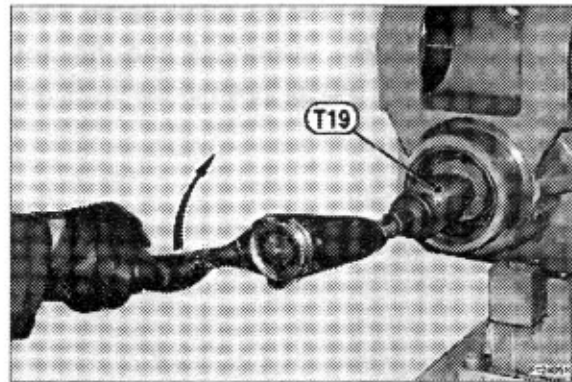


- ⑳ Apply onto the pinion(8) the bar-hold and with the help of a torque metre, check the torque of the pinion(8).

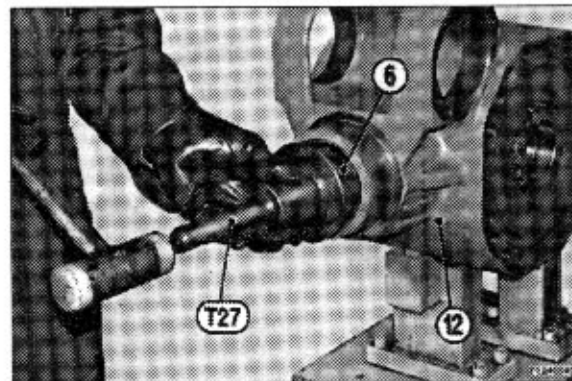
- Torque : 12.2~17.3kgf · m(88.2~125lbf · ft)
- \* If torque exceeds the maximum value, then the size of shim **S1**(11) between the bearing(13) and the distance piece(10) needs to be increased.

If torque does not reach the set value, increase the torque setting of the ring nut(7) in different stages to obtain a maximum value of 58.1kgf · m(420lbf · ft).

- \* If torque does not reach the minimum value, then the size of shim **S1**(11) needs to be reduced.
- \* When calculating the increase or decrease in size of shim **S1**, bear in mind that a variation of shim(11) of 0.01mm corresponds to a variation of 60 in the torque of the pinion(8).

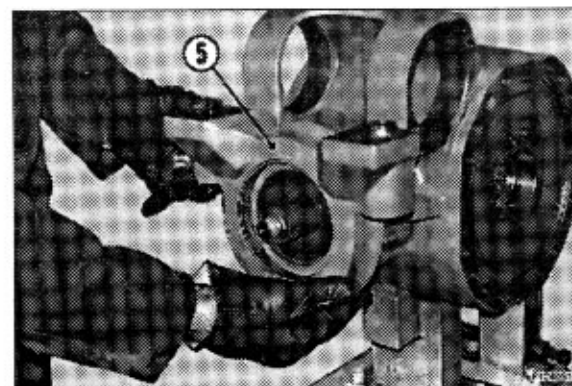


- ㉑ Lubricate the outer surface of the new sealing ring(6) and fit it onto the central body(12) using tool **T27**.



- ㉒ This operation does not apply to the fixed axle.

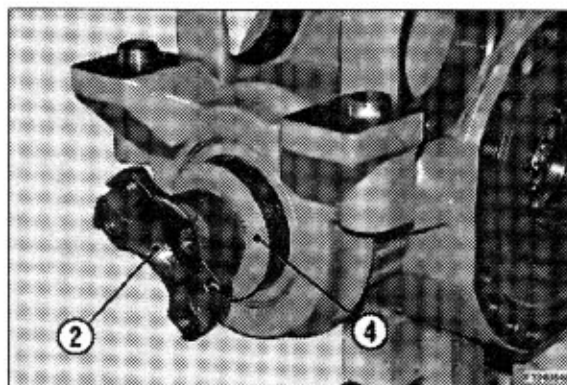
- \* Check that it is properly oriented.



- ③① Fit the flange(2) complete with the guard(4) and fasten it.

For keying the flange(2), use a plastic hammer if necessary.

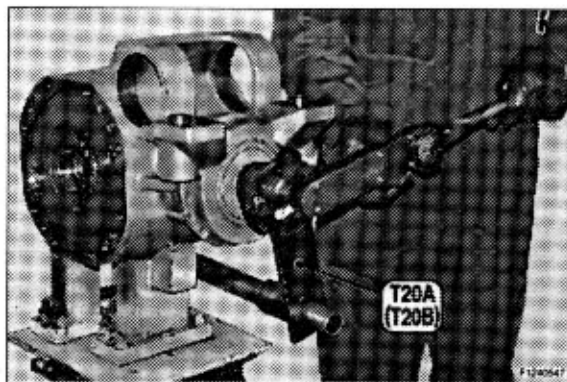
- \* Make sure that the guard(4) is securely fastened onto the flange and that it is not deformed.



- ③② Apply Loctite 242 to the threaded part of the pinion(8).

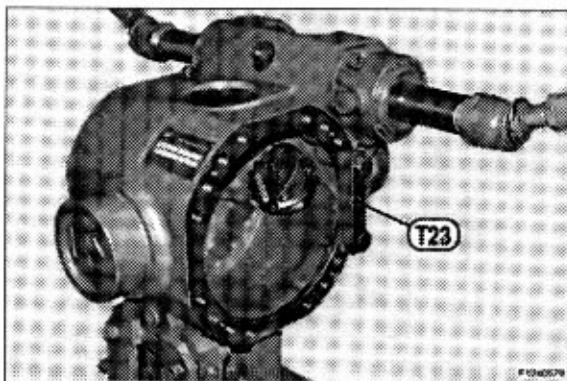
Position tool **T20A**(or **T20B**) and fasten it in order to avoid rotation. Insert O-ring(3) the nut(1) and tighten it using a dynamometric wrench.

- Torque wrench setting : 28.6~31.6kgf · m  
(207~229lbf · ft)

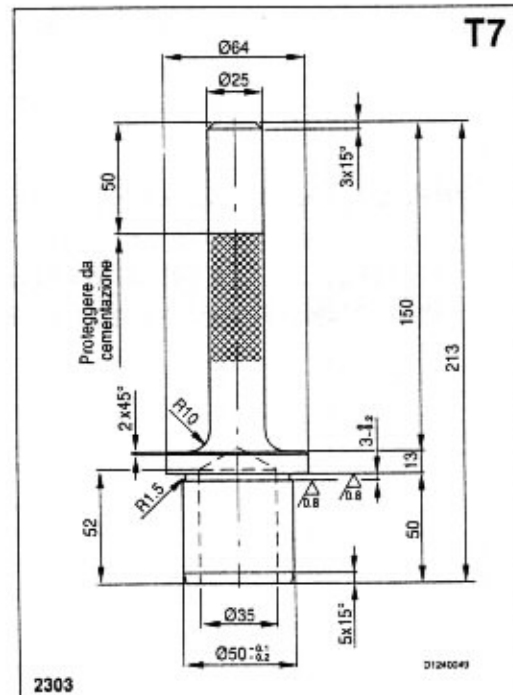
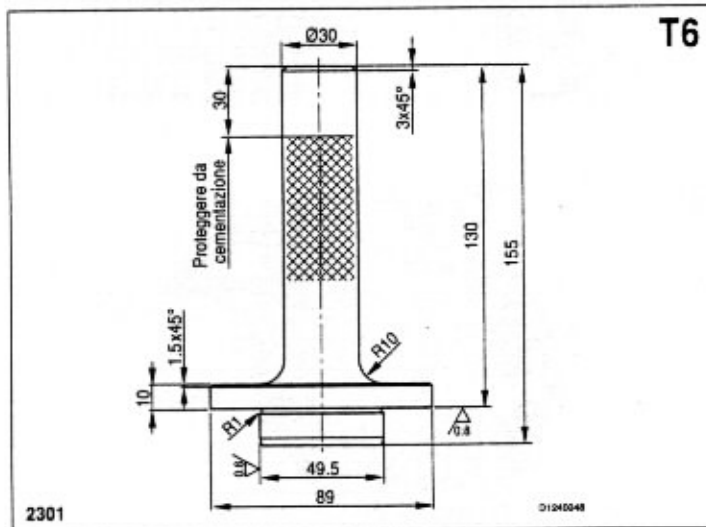
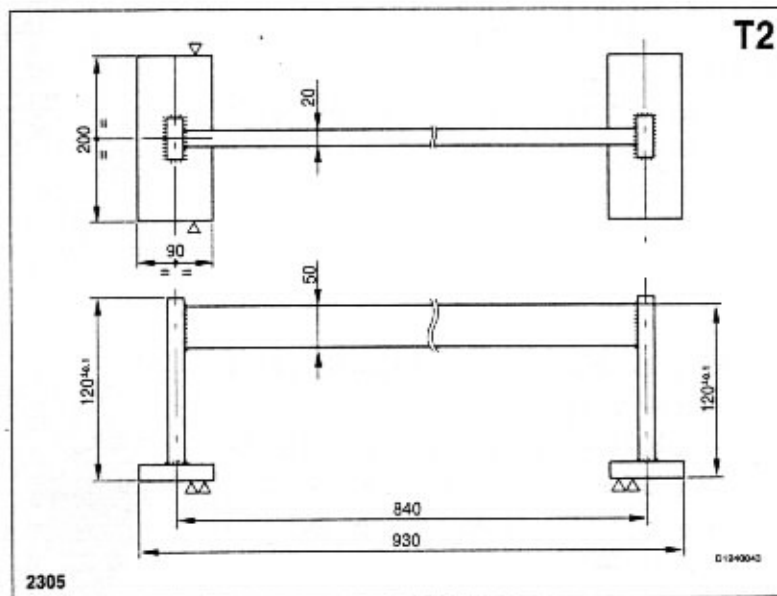
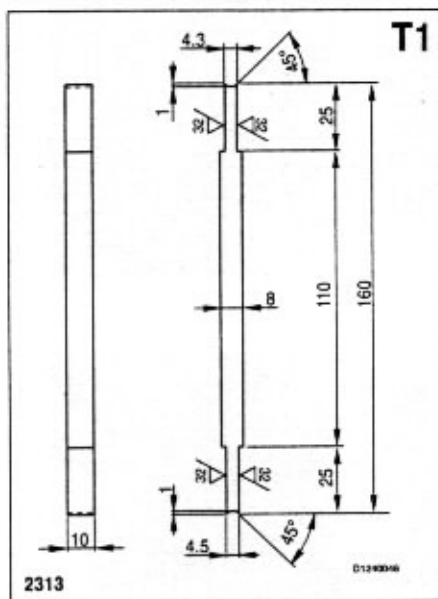


- ③③ Remove blocks **T23**(Used for extracting the pinion) and reinstall the arms.

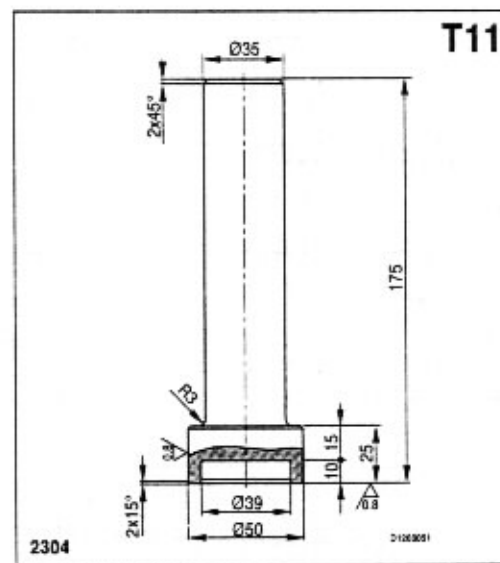
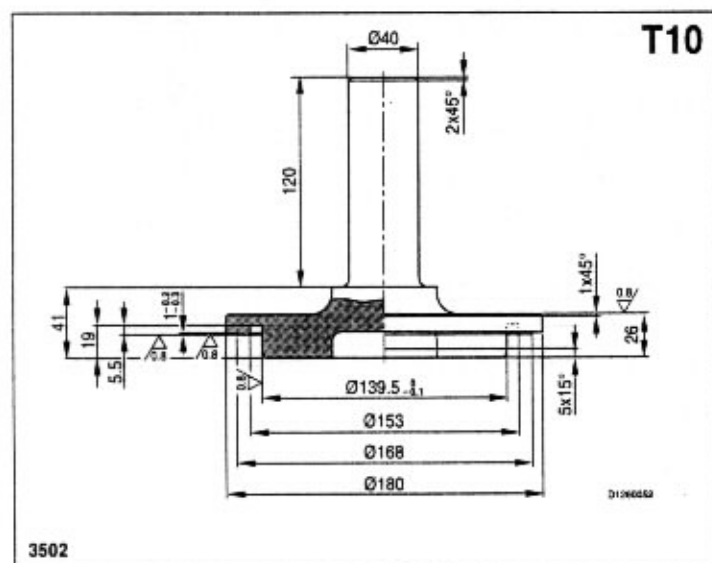
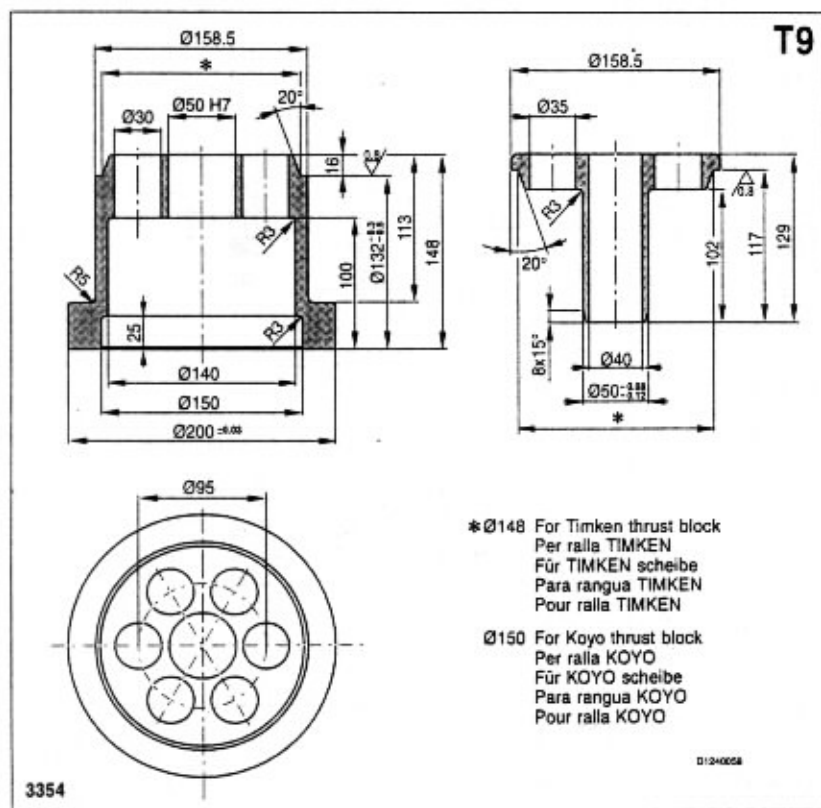
For details, see **CHECKING WEAR AND REPLACING THE BRAKING DISKS.**

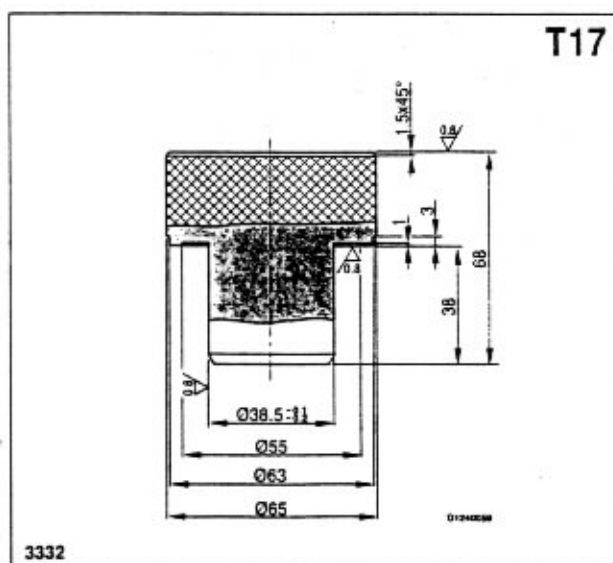
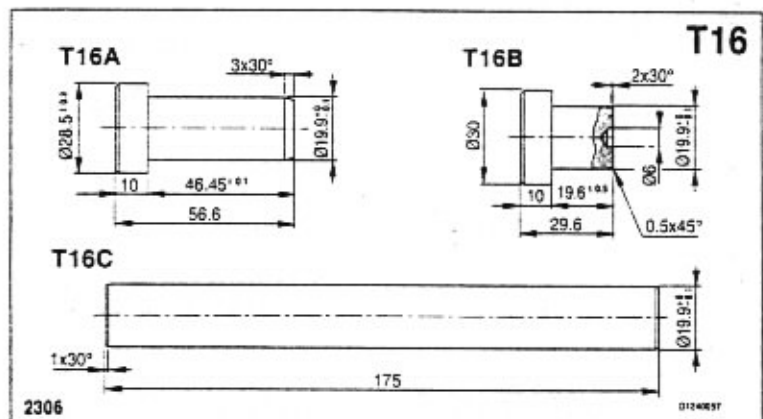
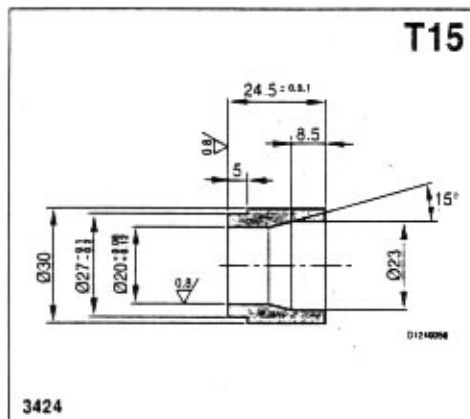
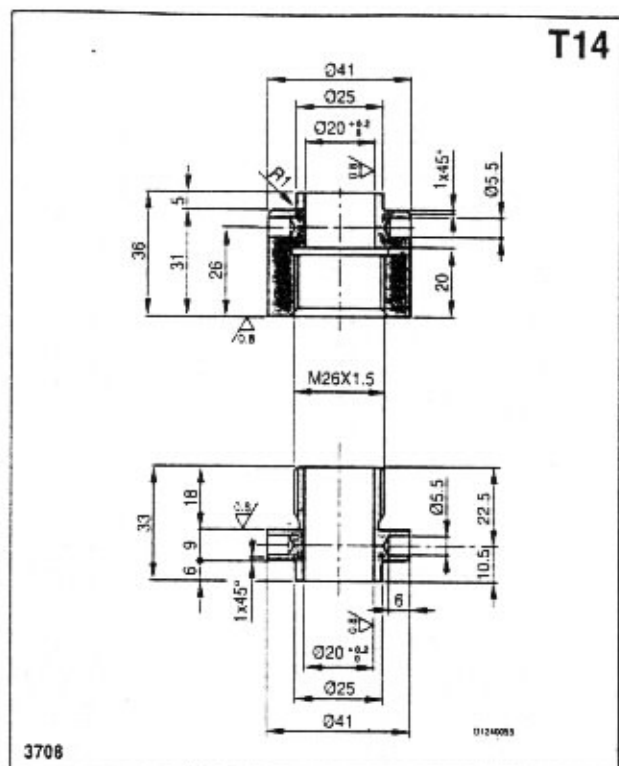
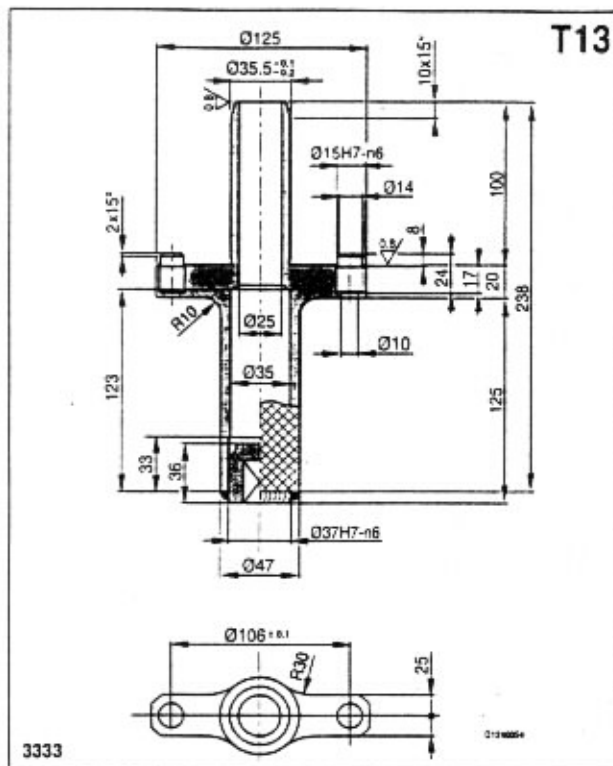


# 5) SPECIAL TOOLS(1/7)



# SPECIAL TOOLS(2/7)



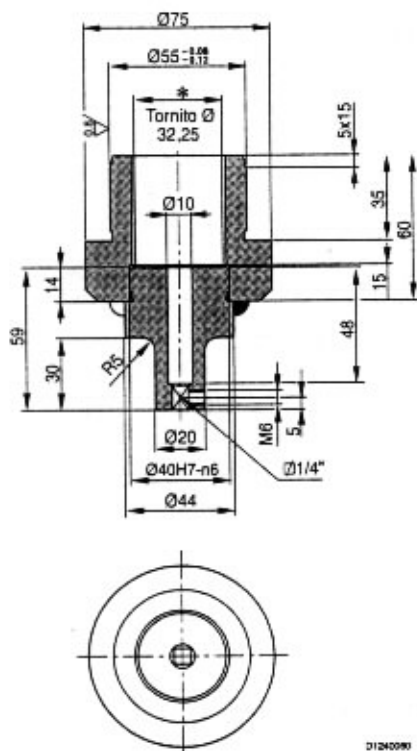




# SPECIAL TOOLS(4/7)

**T19**

\*38x1.25x29 DIN 5480

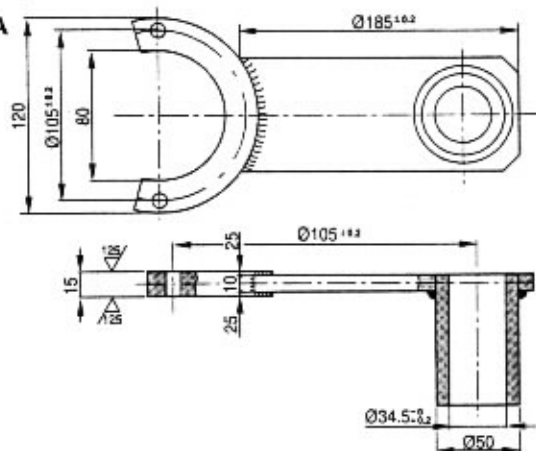


3317/4

01240090

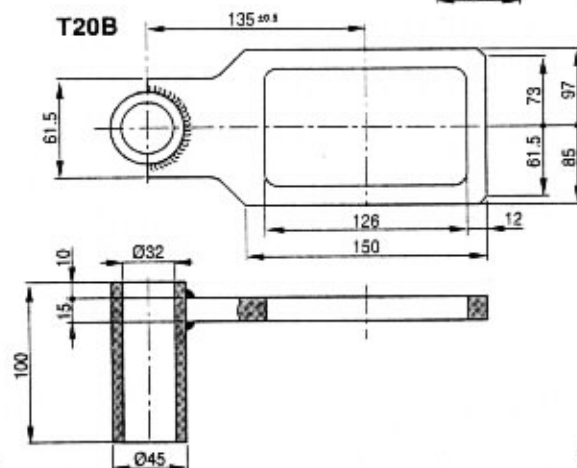
**T20**

**T20A**



2307

**T20B**

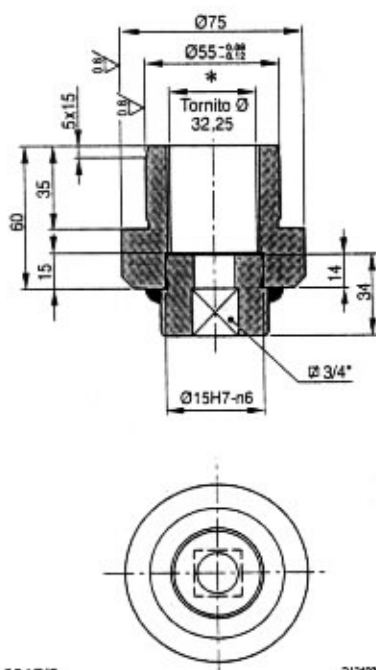


2308

01240081

**T21**

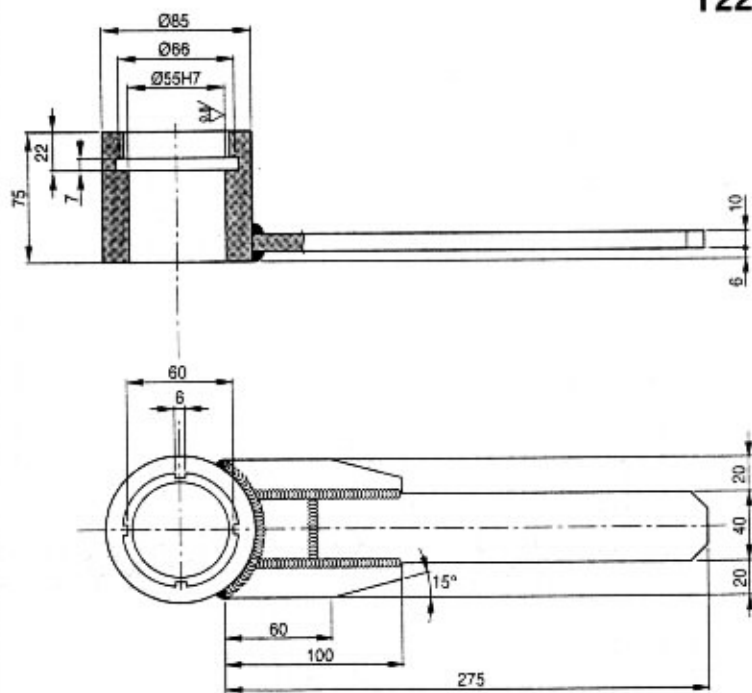
\*38x1.25x29 DIN 5480



3317/3

01240083

**T22**



3317/A

01240084

# SPECIAL TOOLS(5/7)

