REPAIR MANUAL

4 HP - 22

Type Peugeot

ZF GETRIEBE GMBH SAARBRÜCKEN

INDEX

PRE-INFORMATION

This manual contains the exact work procedure to repair transmission 4 HP 22.

Disassembly and assembly of the transmission is explained in chronological order.

The photographs have been kept general in nature and therefore relate to a number of different versions of the transmission.

The transmission version is specified by the Parts List and can be obtained by refering to the Spare Parts List.

We shall advise of any major modifications which require to be taken into account, in Technical Circulars.

Depending on the failure, the repair of the transmission can be done as necessary.

Therefore, we recommend the following points:

- Kick-down cable, gaskets, o-rings, sealrings, and sealing bushings should always be replaced.
- If transmission has high mileage (over 31,250 miles 50,000 km), replace all clutch and steel plates.
- After clutch breakdown in a transmission, it is absolutely necessary to clean torque converter, oil cooler, and oil cooler hoses with appropriate cleaning material.
- All adjustments, which are necessary during transmission assembly should be done as explained in point 1.4.

There are the following requirements:

- Special tools to repair transmission listed under 1.8 is the complete set of special tools.
- Suitable test stand.
  The necessary technical data is available in the ZF „Circular Letter".

Note:

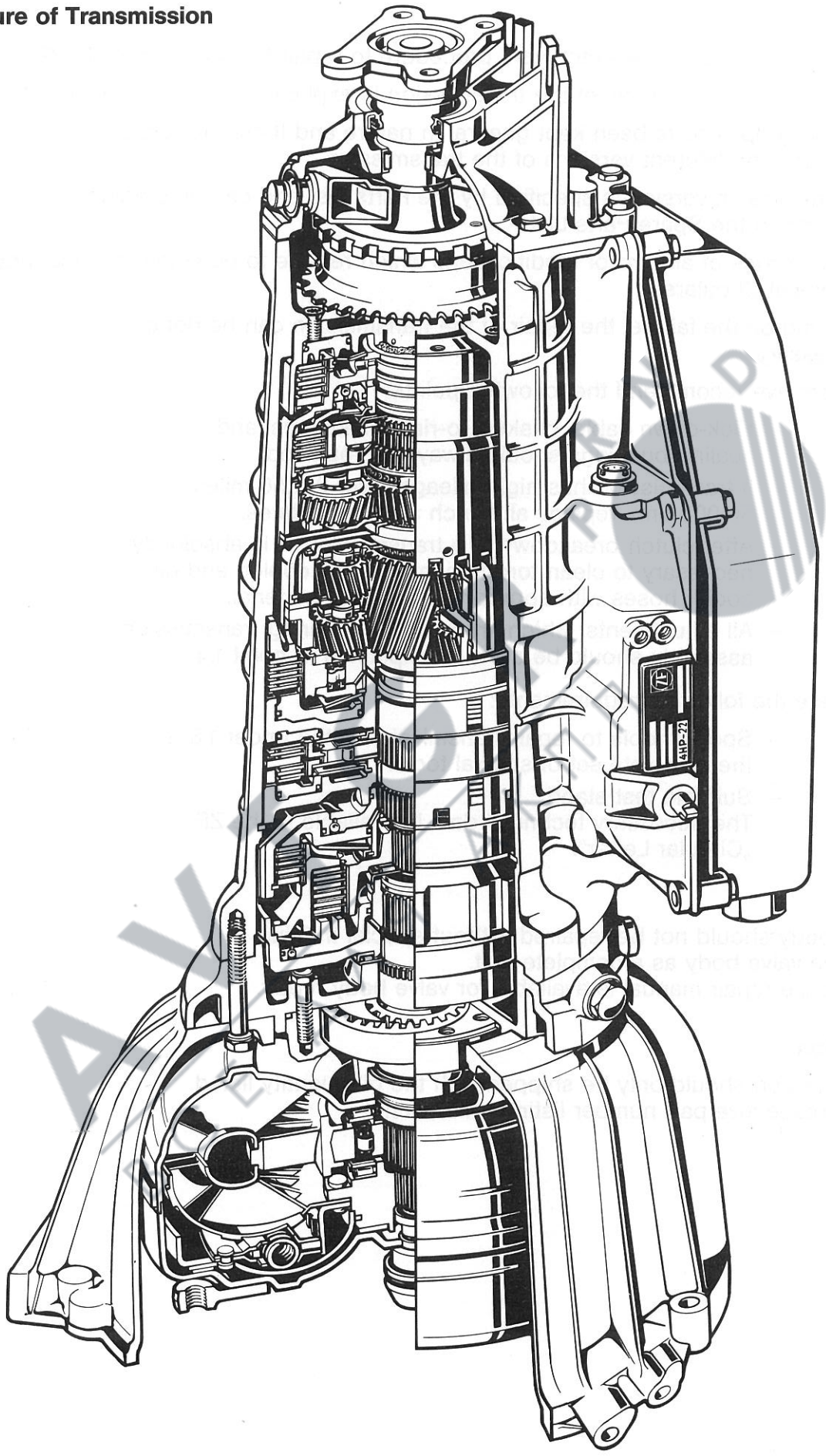
Valve body should not be repaired without special training.
Replace valve body as a complete unit.
A separate repair manual is available for valve body repair.

Attention:

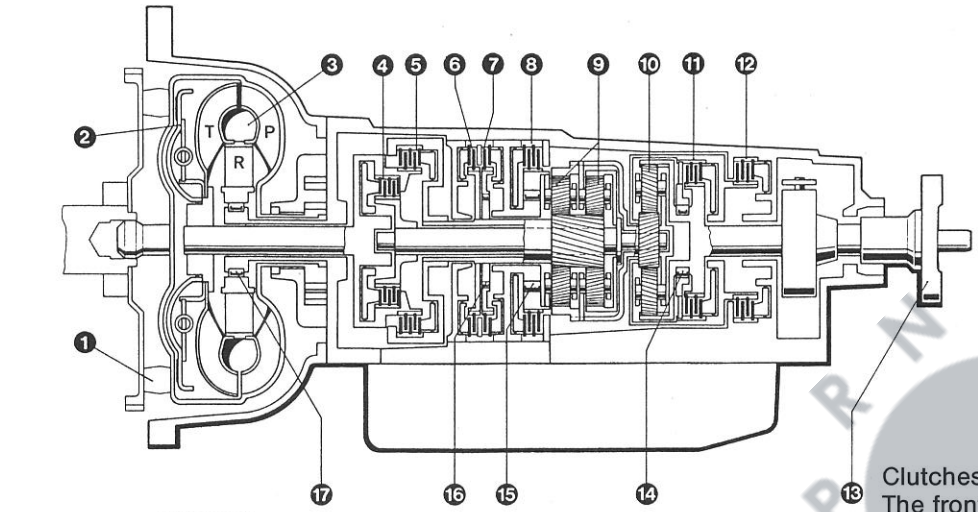
Transmission should only be shipped with the oil quantity listed in the respective part number listing (microfiche).

1. General notes

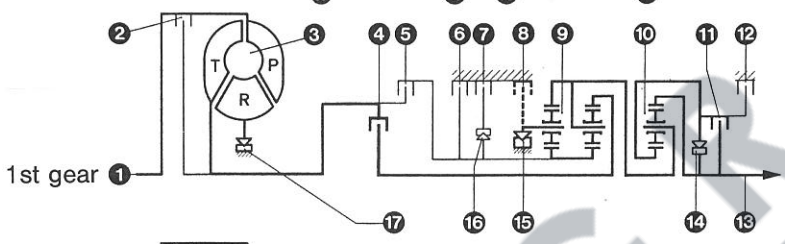
1.1 Picture of Transmission

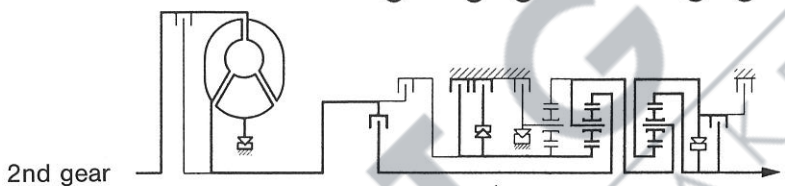


1.2 Power Flow Diagram

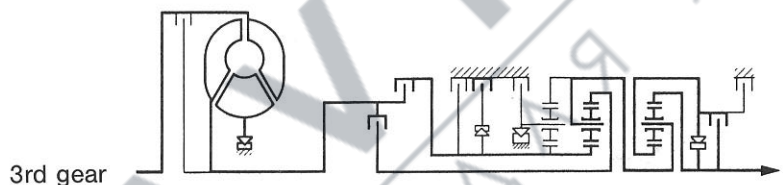


Clutches 4 and 11 are engaged. The front planet gear carrier of gear set 9 is locked against the housing through freewheel 15 when the engine is pulling, but is overrun when the engine is coasting. Planetary gear set 10 rotates as a solid block, with the front planet gear carrier. In addition, in selector lever position 1 and in speed range 1, clutch 8 is engaged to permit engine braking.

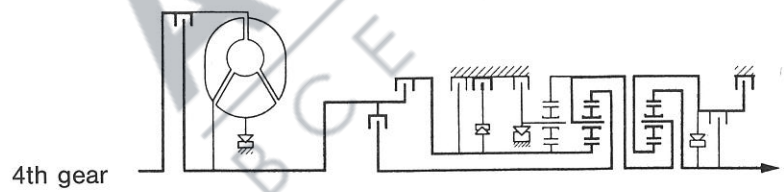




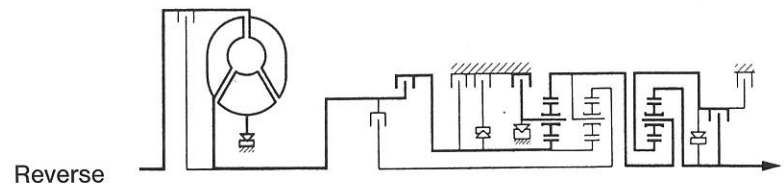
Clutches 4, 6, 7 and 11 are engaged. Freewheel 15 overruns. The hollow shaft with the sun wheel of planetary gear set 9 is locked. Planetary gear set 10 also rotates, as a solid block.



Clutches 4, 5, 7 and 11 are engaged. Freewheels 15 and 16 are overrun. Planetary gear sets 9 and 10 rotate as a solid block at a ratio of 1:1.



Clutches 4, 5, 7 and 12 are engaged. Freewheels 14, 15 und 16 are overrun. Planetary gear set 9 rotates as a solid block. The hollow shaft with the sun wheel of planetary gear set 10 is locked. Above a predetermined road speed, clutch 2 locks torque converter 3 solid to prevent slip.



Clutches 5, 8 and 11 are engaged. Since the front planet gear carrier of planetary gear set 9 is locked, the direction of output-shaft rotation is reversed. Planetary gear set 10 also rotates, as a solid block.

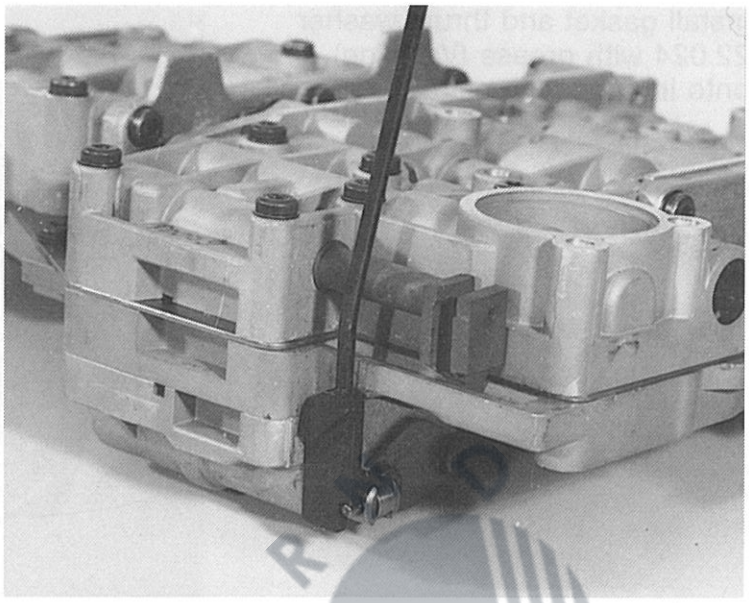
1.4 Adjustment Data

1.4.1 Positioning of Valve Body, Adjustment of Kick-down Cable (full throttle)

82 185

Screw the 13 valve body connecting bolts loosely by hand.

Carefully insert special adjustment tool 5 P 89 001 673 between pin of throttle pressure piston and machined face of throttle pressure housing as shown in picture.

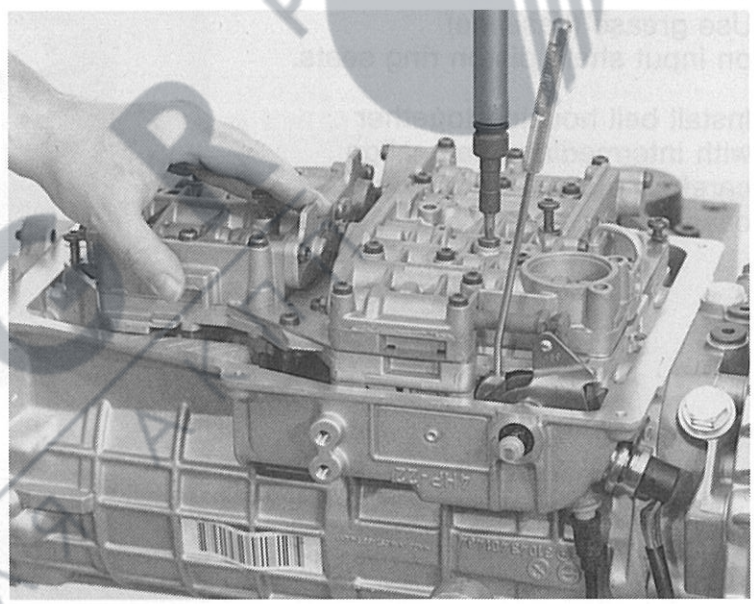


86 087

Lightly press valve body unit against special tool.

In that position tighten all connecting bolts of valve body. Tightening of bolts should be done from inside to outside.

(To be torqued - 8 Nm)

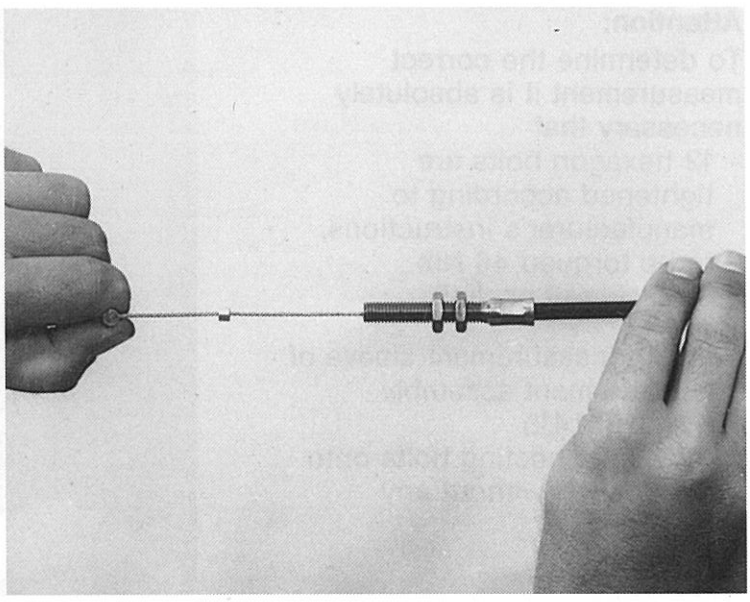


82 187

Straighten out kick-down cable. Pull cable through position full throttle.
Do not pull kick-down.

Set seal X mm from end of sleeve.

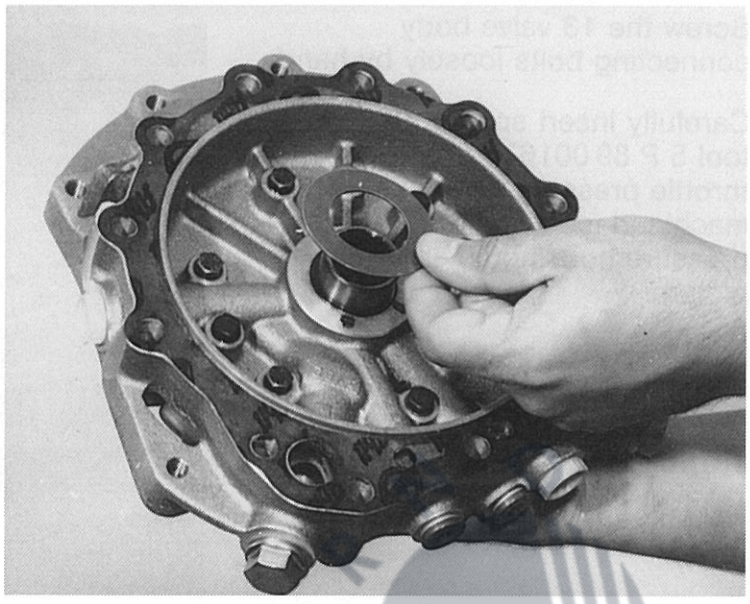
Refer to Technical Circular of Spare Parts Lists (microfiches) for adjustment C.



1.4.2 Determination of Axle Clearance

82 156

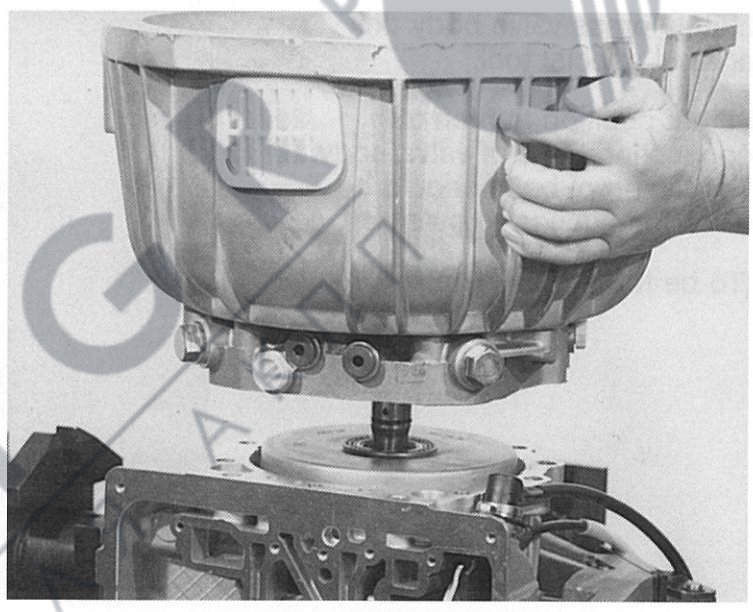
Install gasket and thrust washer 22.024 with grease (Vaseline) onto intermediate plate.



86 093

Use grease (Vaseline) on input shaft, piston ring seats.

Install bell housing together with intermediate plate, align carefully against transmission case.



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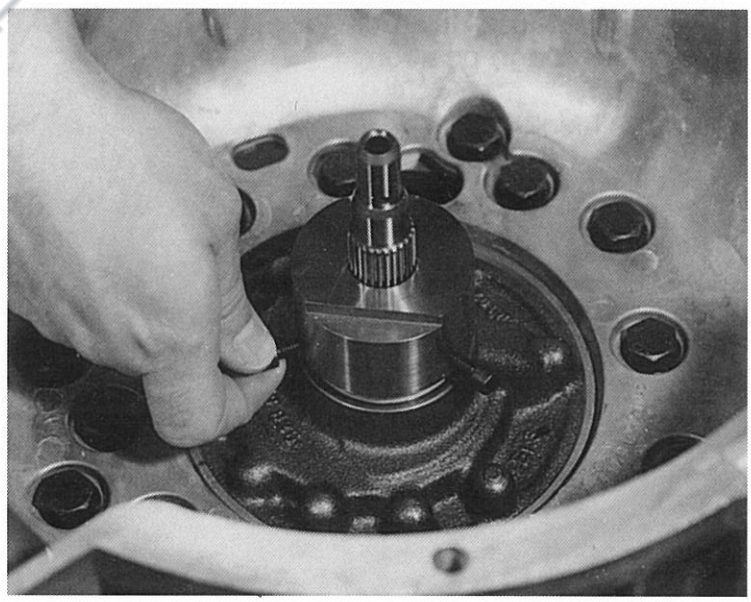
Attention:
To determine the correct measurement it is absolutely necessary that

- 12 hexagon bolts are tightened according to manufacturer's instructions, to be torqued 46 Nm (pressing of gasket).
- attach measurement sleeve of measurement assembly 5 P 01001415 with 3 connecting bolts onto stator shaft without any clearance.



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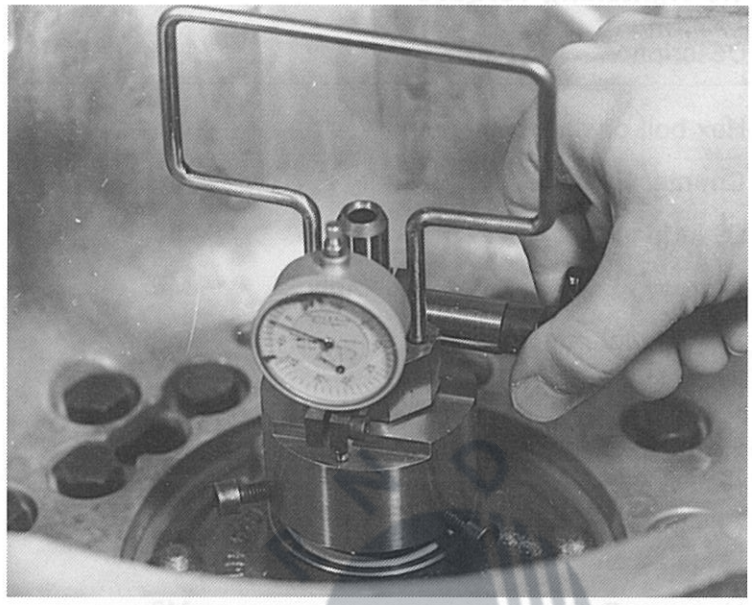
Also attach measurement gauge 5 P 01001415 onto teeth of input shaft and secure gauge with locking nut.



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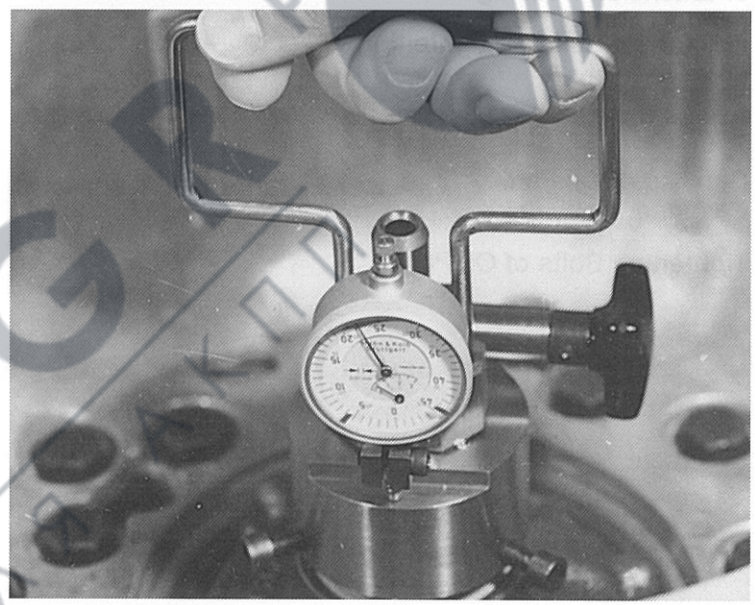
When pulling up handle, axial clearance will be shown on gauge (repeat measurement).

Axial clearance should be 0,2 – 0,4 mm.

If axial clearance is not correct, unscrew complete bell housing assembly and use either thinner or thicker thrust washer 22.024. Afterwards check axial clearance again.



1.5 Tightening Torques

Description		Page	To be torqued
Hex bolt of starter interlock	– M6	45	10 Nm
Counter Sunk Bolts of Cylinder F	– M6	56	10 Nm
Cylindrical Bolts of Park Assembly	– M6	57	10 Nm
Hexagon Bolts of Pump Assembly	– M6	79	10 Nm
Plugs of Intermediate Plate	– M20	79	50 Nm
Plugs of Intermediate Plate	– M14	79	40 Nm
Hexagon Bolts of Bell housing Assembly	– M10	81	46 Nm
Cylindrical Bolts of Governor Housing and Hub	– M6	84	10 Nm
Hexagon Bolts of Extension housing	– M8	87	23 Nm
Cylindrical Bolts for tightening of Valve Body	– M6	90	8 Nm
Drain Plug for Oil Pan	– M10	91	15 Nm
Cap Nut of Oil Pan Ölwanne	– M24	91	20 Nm when fitted 100 Nm in vehicle
Tightening Bolts of Oil Pan	– M6	91	8 Nm

1.6 FAULT FINDING TABLE AUTOMATIC GEARBOX - TYPE 4 HP 22

The following table is intended as a guide to diagnosis of faults which occur in the 4 HP 22.

The problems have been written down, as customers would describe them. Descriptions will, of course, vary, but it is up to the technical people to interpret and diagnose the fault.

If the customer complains of leakage, then check for the leak point, before carrying out any further work. De-greasing products such as 'Jizer' should be thoroughly used to clean the unit, then after a short road test, it should be possible to locate the leak point.

INITIAL CHECKS

- correct oil level
- correct setting of throttle cable:

Idling	Seal	0,5 mm from end of cover
Full Throttle	Seal	39,0 mm from end of cover
Kick-down	Seal	43,5 mm from end of cover

- correct setting of selector lever
- clean oil cooler and pipes, whenever gearbox is changed

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
1. Position P		
1.1 Parking does not engage	– wrong setting of gear change rods between control lever and gearbox	– correct setting
	– too much friction in parking lock mechanism	– replace parts (pawl and connection rod, possibly cam)
1.2 Parking position does not hold	– wrong setting of gear change rods between control lever and gearbox	– correct setting
1.3 Engine cannot be started	– starter inhibitor switch faulty	– replace switch
	– wrong setting of selector lever	– correct setting
	– faulty selector lever	– replace lever
2. Position R		
2.1 No reserve gear	– wrong setting of gear change rods between control lever and gearbox	– correct setting
	– dirty oil filter	– see 11.2
	– clutch B worn out, in this case also no 3rd gear	– replaçe transmission
	– clutch D worn out, no engine braking in Position 1, 1st gear	– replace transmission
	– clutch E worn out, no engine braking in 2nd + 3rd gear, also in Pos 1, 1st gear	– replace transmission
	– reverse gear safety valve faulty	– replace control unit
2.2 Slipping or shaking at start in reverse gear	– clutch B or E brake D defective	– replace gearbox
2.3 Strong jerk when putting in positions P-R or N-R, or distinct double jerk at P-R or N-R (below 1500 RPM engine speed)	– damper B defective (same problem when changing from 2nd to 3rd gear)	– replace control unit
2.4 Reverse light does not illuminate (bulbs, fuses and cables ok)	– see 1.3	– see 1.3

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
3. Position N		
3.1 Engine cannot be started	– see 1.3	– see 1.3
3.2 Vehicle moves in Position N	– wrong setting of gear change rods between control lever and gearbox – clutch A defective (seized up)	– correct setting – replace transmission
4. Position D		
4.1 No drive	– dirty oil filter – clutch A defective – one way clutch 1st gear slips – wrong setting of gear change rods between control lever and gearbox	– see 11.2 – replace transmission – replace transmission – correct setting
4.2 Slipping or shaking at starting forward	– clutch A damaged	– replace gearbox
4.3 Strong jerk N-D (below 1500 RPM engine speed)	– clutch A faulty – clutch A damper faulty	– replace transmission – replace control unit
4.4 Gear change functions (in cold or warm state) faulty		
– Change 1-2/2-1	– governor dirty – shift valve 1-2 sticking	– replace governor – replace control unit
– Change 1-2	– brake C' and/or C faulty	– replace gearbox
– Change 2-3/3-2	– governor dirty – shift valve 2-3 sticking	– replace governor – replace control unit
– Change 2-3	– clutch B faulty	– replace gearbox
– Change 3-4/4-3	– governor dirty – shift valve 3-4 sticking	– replace governor – replace control unit
– Change 3-4	– brake F defective	– replace gearbox
4.5 Vehicle starts in 2nd gear	– governor sleeve sticking – shift valve 1-2 sticking	– replace governor – replace control unit
Vehicle starts in 3rd gear	– governor sleeve sticking – shift valve 1-2 and 2-3 sticking	– replace governor – replace control unit
Gearbox changes 1-3	– shift valve 2-3 sticking	– replace control unit

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
4.6 Shift speeds		
– no changes at light throttle setting	– dirty governor – shift valves sticking	– replace governor – replace control unit
– change points incorrect at full throttle setting	– throttle cable setting incorrect	– correct setting
– no changes at kick-down 1-2/2-1	– throttle cable setting incorrect	– correct setting
– no changes at kick-down 2-3/3-2	– throttle cable setting incorrect	– correct setting
– no changes at kick-down 4-3	– 4-3 kick-down valve sticking	– replace control unit
4.7 Gear change quality		
– harsh changes at low throttle	– defective damper – modulation pressure too high – clutch plates damaged	– replace control unit – replace control unit – replace gearbox
– soft changes at full throttle and kick-down	– defective damper – modulation pressure too low – clutch plates damaged	– replace control unit – replace control unit – replace gearbox
– harsh changes at full throttle and kick-down	– incorrect modulation pressure – defective damper	– replace control unit – replace control unit
5. Position 3, 3rd gear		
5.1 No engine braking	– clutch E damaged	– replace gearbox
6. Position 2		
6.1 Manual change 3-2 faulty	– locking valve 2 sticking – governor sticking	– replace control unit – replace governor
6.2 No engine braking	– brake C' or clutch E damaged	– replace gearbox
7. Position 1		
7.1 Manual change 2-1 faulty	– locking valve 1 sticking – governor sticking	– replace control unit – replace governor
7.2 No engine braking	– brake D or clutch E damaged	– replace gearbox

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
8. Lock-Up Clutch = WK		
8.1 Change points incorrect	– WK safety valve sticking – no 4th gear – governor pressure incorrect	– replace control unit – replace control unit – replace governor
8.2 Gear change too harsh	– WK-damper faulty – torque converter faulty	– replace control – replace torque converter
8.3 No lock-up	– control unit faulty – WK faulty – no 4th gear	– replace control unit – replace torque converter – replace control unit
9. General		
9.1 Throttle cable sticking	– nipple in throttle cam is worn – too much friction in sleeve of throttle cable – throttle pressure piston sticking	– replace cable – replace cable – replace control unit
9.2 Noisy and no drive after long journey	– oil filter on control unit dirty	– if there is no burnt lining on oil sump, then only replace filter, otherwise replace gearbox
9.3 Very noisy and no drive	– flexi plate is worn – pump drive worn	– replace flexi-plate or torque converter – replace gearbox
10. Oil Leak		
10.1 Oil dripping from bell housing	– seal ring in pump housing damaged – pump housing porous – converter leaking from welded seam	– replace seal – replace pump housing – replace converter
10.2 Leakage between gearbox and oil sump	– incorrect torque of bolts – sump gasket damaged	– tighten bolts – replace gasket

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
10.3 Leakage between intermediate plate and main housing (esp. at pump pressure point)	– bell housing bolts have worked loose	– tighten bolts
10.4 Oil loss at tacho connection	– damaged o-ring on tacho – oil seal in tacho faulty	– replace o-ring – replace tacho sleeve
10.5 Oil leak from throttle connection cable	– o-ring connection damaged	– replace o-ring or complete cable
10.6 Oil leak at output	– output oil seal damaged	– replace seal
10.7 Loss of oil through breather	– oil level too high – incorrect oil (foaming) – no breather cap – o-ring breather damaged – securing clip faulty	– check level – remove gearbox and ensure that it is completly drained (including torque converter oil cooler and pipes) – fit cap or change breather – remove tail housing and replace o-ring – replace clip
10.8 Leakage in cooler pipes	– loose connections – pipes damaged – cooler leaks	– re-tighten – replace pipes – replace cooler
10.9 Oil leak at intermediate plate	– blanking plugs loose	– tighten plugs – replace washers
10.10 Leakage between main housing and tail housing	– loose bolts – gasket damaged	– re-tighten – replace gasket

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
11. Noises		
11.1 High pitched noise in all positions, esp. if oil is cold	– low oil level – leak in control unit	– top up as required – replace control unit
11.2 High-pitched squeaking noise, dependent on engine RPM, in all gears, when oil is warm, accompanied by intermittent drive after a long journey	– dirty filter	– if no debris in sump, just replace filter, otherwise replace gearbox
11.3 Strong noise when in lock-up	– torsion damper faulty	– replace torque converter
11.4 Torsional vibrations from engine when in lock-up	– engine RPM is too low, WK shift point incorrect	– replace control unit

1.7 Checking of Transmission (in Vehicle)

The following points have to be checked:

Correct Oil Level

Oil level check by running engine only (idle speed) in Position P.
The correct oil level can only be checked if oil is warmed up at 80° C.
Oil level must be marked between Min- and Max-mark, on dipstick.

Oil Level Too Low

Engine will spin, therefore no power flow in transmission (turbine cannot transmit power).
Transmission noisy when driving on curvy roads.

Oil Level Too High

Risk of severe losses due to oil slap, frothing, severe increase in temperature at high speeds. Loss of oil through breather.

Correct Adjustment of Engine

Correct idle rpm, refer to car manufacturer's data.

Power Flow Forward and Reverse

Correct linkage adjustment, refer to car manufacturer's data.

Stall Speed

Explained under Group 21 Technical Data, Tables, Pressures, Circular Letter Folder 401.

Shift Points

Explained under Group 21 Technical Data, Tables, Pressures, Circular Letter Folder 401.

Shift Quality

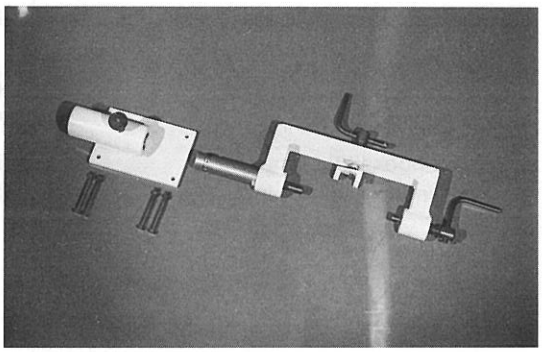
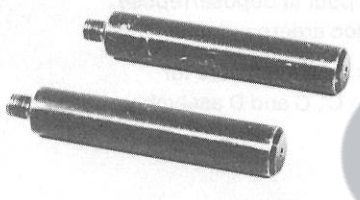
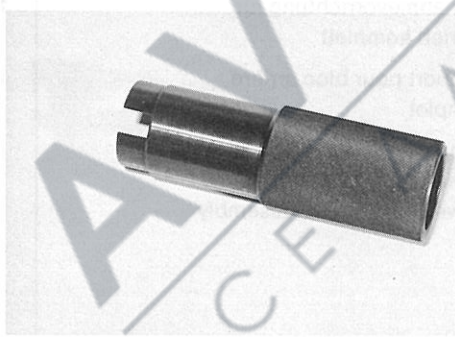
Correct kick-down cable adjustment information available under point 16 Function Description.
Correct adjustment, refer to car manufacturer's data.

Noise

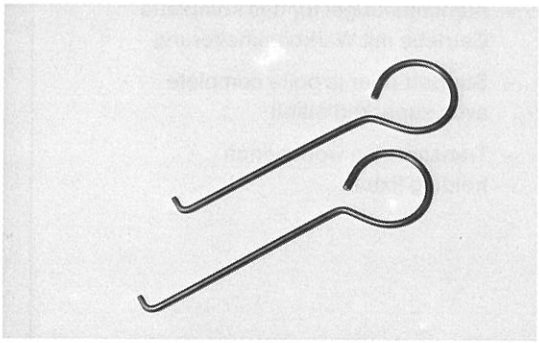
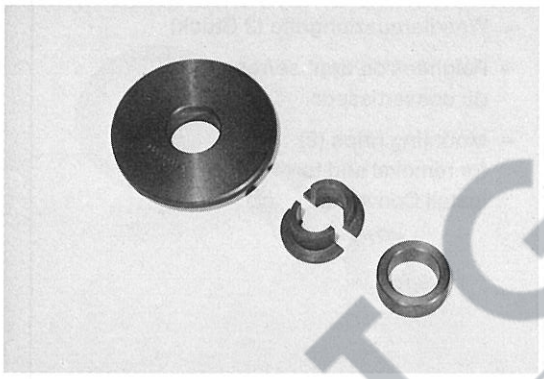
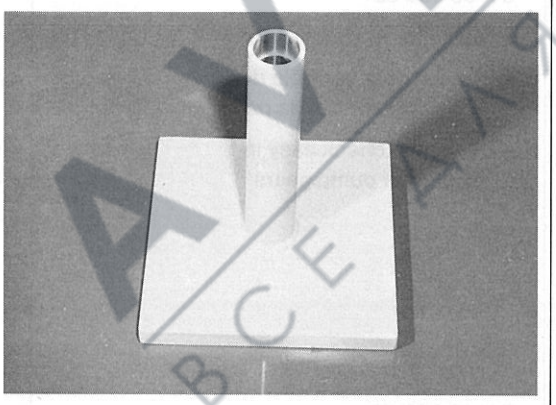
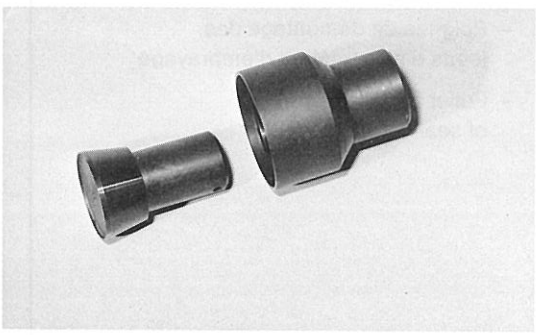
Checking Function of Torque Converter Lockup Clutch

Upshifts 1-2, 2-3, 3-4 by pushing down on gas pedal to 1/4 position.
The clutch in torque converter should be locked at 85–90 km/h when traveling, or at engine speed of 2000 rpm. After lockup, engine speed will drop to approximately 400 rpm.

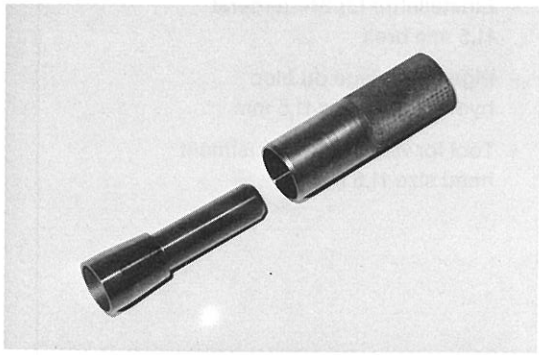
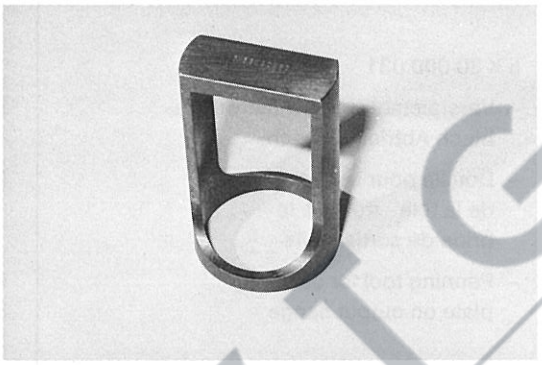
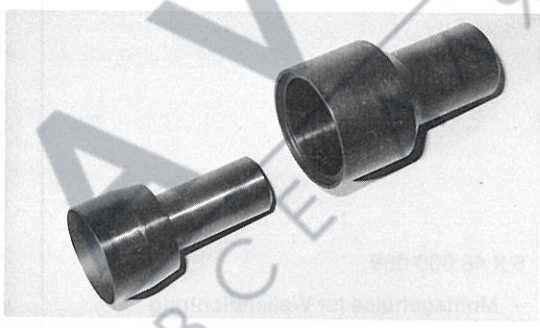
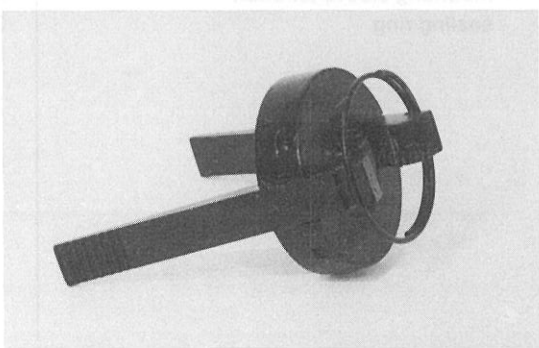
1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
1	76 051 	5 X 56 000 096 – Aufnahmebügel für das komplette Getriebe mit Werkbankhalterung – Support pour la boîte complète avec support d'établi – Transmission work bench holding fixture	identisch identique identical to 3 HP 22
2	81 021 	5 X 46 000 110 – Wandlerausziehgriffe (2 Stück) – Poignées de dépose/repose du convertisseur – Mounting grips (2) for removal and to install Convertor	identisch identique identical to 3 HP 22
3	76 047 	5 X 56 000 021 – Hülse für Pumpenprüfung – Douille pour contrôle de la libre rotation de la pompe – Sleeve to check easy in rotation of pump gears	identisch identique identical to 3 HP 22
4	82 176 	5 X 46 000 170 – Ausziehgriff für Dichthülsen – Poignée de démontage des joints d'alimentation d'embrayage – Puller for removal of sealing bushings	

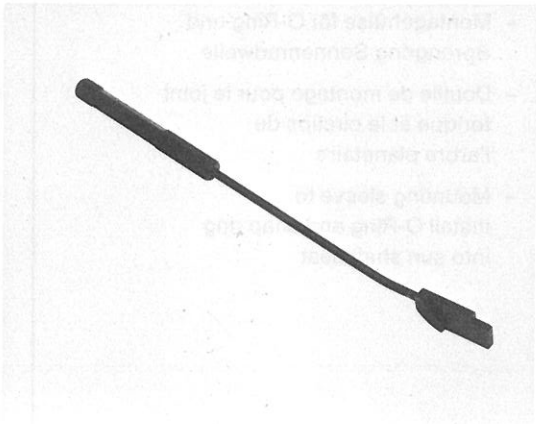
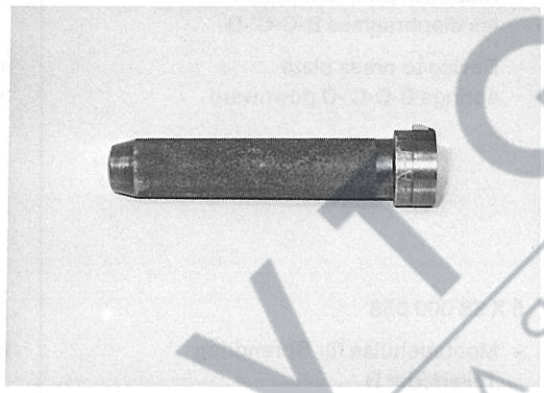
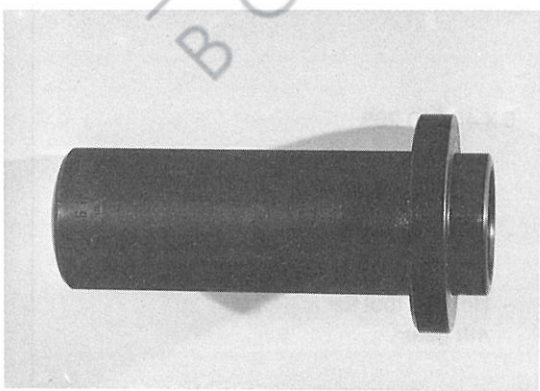
1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
5	76 045 	5 X 56 000 095 – Ausziehhaken (2 Stück) für Zylinder B komplett – Poignées de dépose (2) du cylindre B complet – Puller hooks (2) for pulling of cylinder B assembly	identisch identique identical to 3 HP 22
6	76 037 	5 X 56 000 094 – Haltevorrichtung für Abtrieb komplett – Outil pour la dépose/repose du bloc arrière complet – Work locating fixture for brake C', C and D assembly	identisch identique identical to 3 HP 22
7	76 050 	5 X 56 000 072 – Aufnahmevorrichtung für Abtrieb komplett – Support pour bloc arrière complet – Supporting device for brake C', C and D assembly, as well as 4th gear assembly	identisch identique identical to 3 HP 22
8	76 041 	5 X 56 000 092 – Montagehülse für Sprengring Tellerfeder Kupplung B – Douille de montage pour le circlips du diaphragme embrayage – Mounting sleeve to insert snap ring onto plate spring	identisch identique identical to 3 HP 22

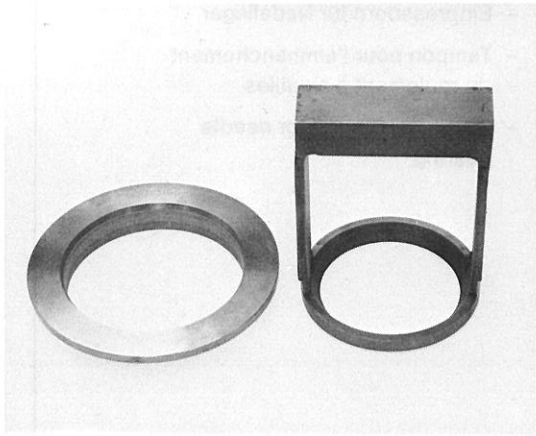
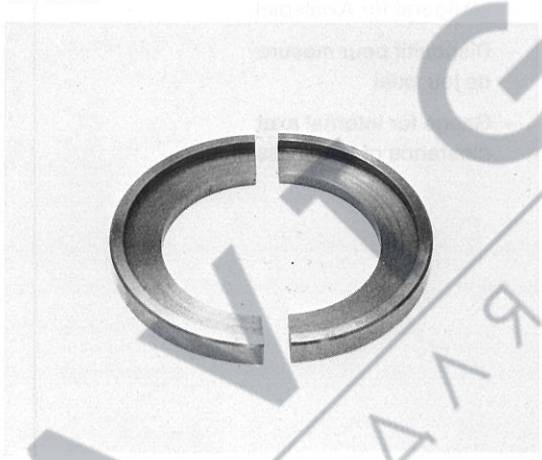
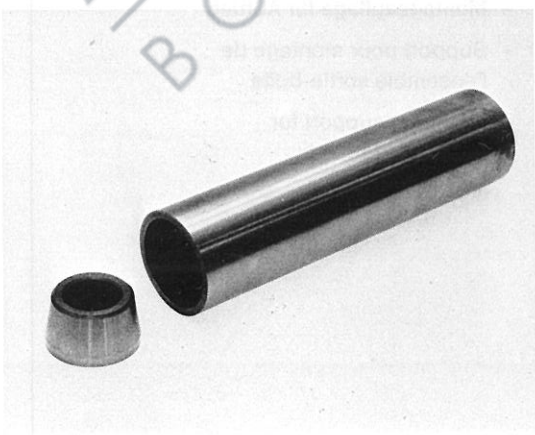
1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
9	76048 	5 X 56 000 075 – Montagehülse für O-Ring und Sprengring Sonnenradwelle – Douille de montage pour le joint torique et le circlips de l'arbre planétaire – Mounting sleeve to install O-Ring and snap ring into sun shaft seat	identisch identique identical to 3 HP 22
10	76043 	5 X 56 000 093 – Vorrichtung zum Drücken der Tellerfeder B-C-C'-D – Dispositif pour comprimer les diaphragmes B-C-C'-D – Device to press plate springs B-C-C'-D downward	identisch identique identical to 3 HP 22
11	76049 	5 X 56 000 058 – Montagehülse für Sprengring Tellerfeder D – Douille pour le montage du circlips du diaphragme D – Mounting sleeve for snap ring plate spring D	identisch identique identical to 3 HP 22
12	86094 	5 X 46 000 209 – Klammer für Turm 4. Gang – Pince de montage pour pièces 4ème vitesse – Holding tool for 4th gear	

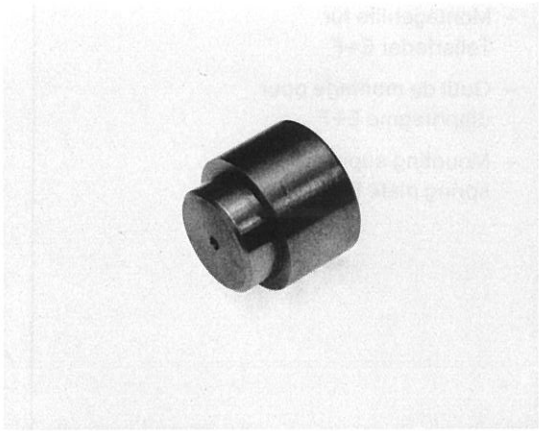
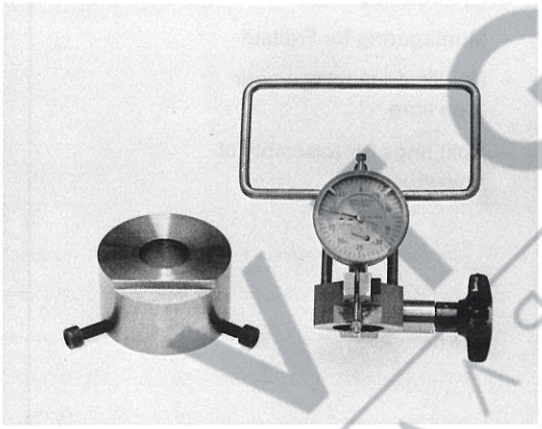
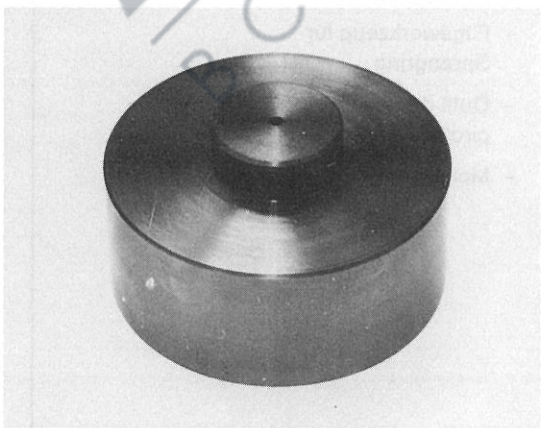
1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
13	82 184 	5 P 89 001 673 – Einstellehre für Steuergerät 11,5 mm breit – Pige de réglage du bloc hydraulique cote 11,5 mm – Tool for valve body adjustment head size 11,5 mm	
14	77 034 	5 X 30 000 031 – Verstemmhülse für Sicherungsblech Abtriebsflansch – Douille pour le sertissage de la tôle - frein de la bride de sortie-boîte – Penning tool for securing plate on output flange	identisch identique identical to 3 HP 22
15	78 085 	5 X 46 000 069 – Montagehülse für Wellendichtring – Douille de montage pour le joint à lèvre – Mounting sleeve for shaft sealing ring	identisch identique identical to 3 HP 22

1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
16	82 179 	5 X 46 000 167 – Montagehilfe für Tellerfeder E+F – Outil de montage pour diaphragme E+F – Mounting support tools for spring plate E+F	
17	82 180 	5 X 46 000 169 – Montagering für Freilauf – Douille de montage pour roue libre – Split rings for assembly of freewheel cage	
18	82 181 	5 X 46 000 139 – Fügewerkzeug für Sprengring – Outil de montage pour circlips – Mounting tool for snap ring	

1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
19	82 182 	5 X 46 000 413 – Einpressdorn für Nadellager – Tampon pour l'emmanchement du roulement à aiguilles – Insertion mandrel for needle bearing	
20	82 183 	5 P 01 001 415 – Meßgerät für Axialspiel – Dispositif pour mesure de jeu axial – Gauge for internal axal clearence of transmission	
21	82 178 	5 X 46 000 168 – Montageauflage für Abtrieb – Support pour montage de l'ensemble sortie-boîte – Mounting support for 4th gear assembly	

1.8 Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks

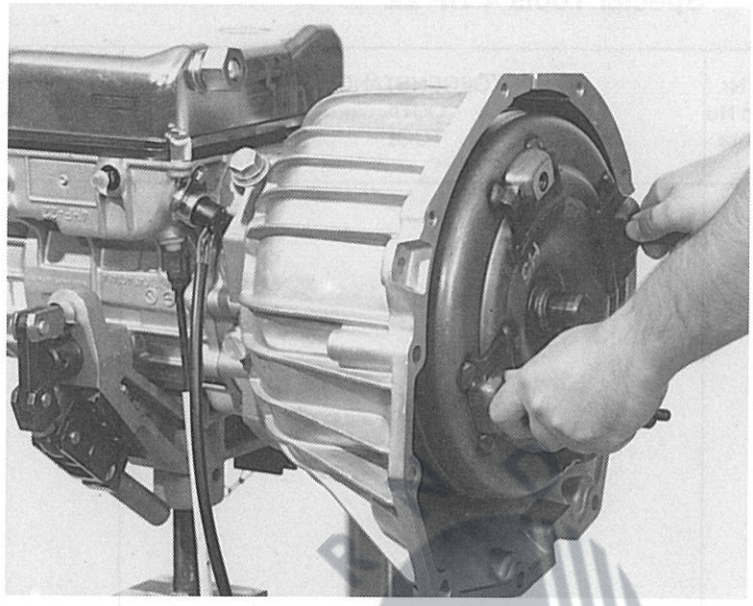
2. Disassembling

2.1 Disassembling according to assemblies

86 001

Fit complete transmission into clamping device 5 X 56 000 096. Remove converter strap and use the two screwed-in assembly grips 5 X 46 000 110 to take out the converter.

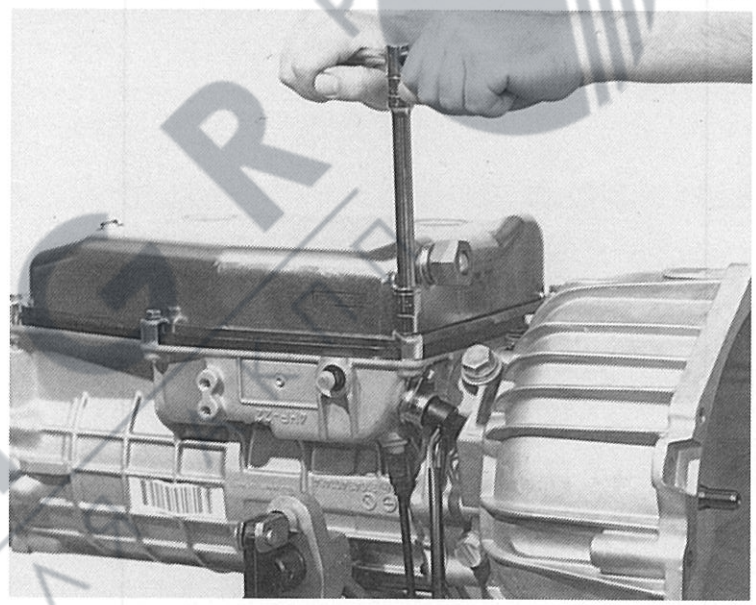
Attention: Oil running out. Handle carefully, do not damage pump bush and lip of seal ring.



86 002

Unscrew bolts in oil pan to remove oil pan.

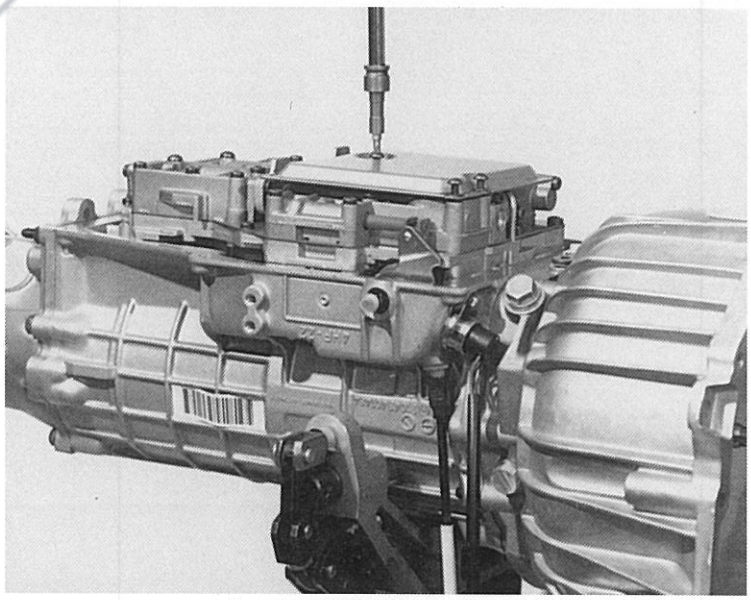
Screw head size 10 mm.



86 003

Unscrew three torx head bolts to remove oil screen.

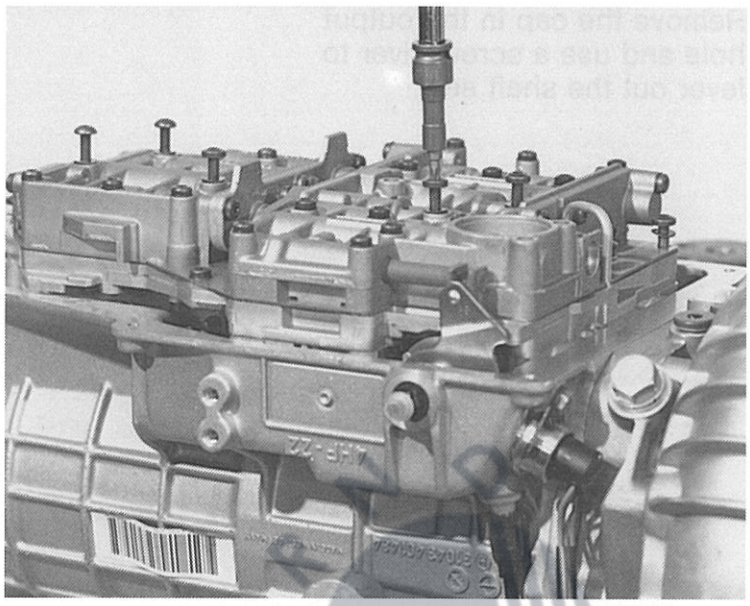
Use Torx bit 27.



86 004

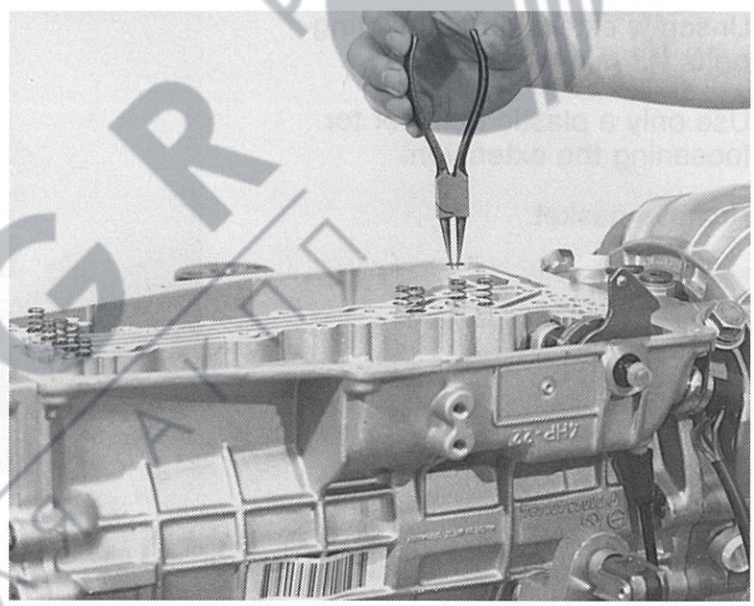
Unscrew valve body connecting bolts (large head only) to remove valve body assembly.

Use torx bit 27.



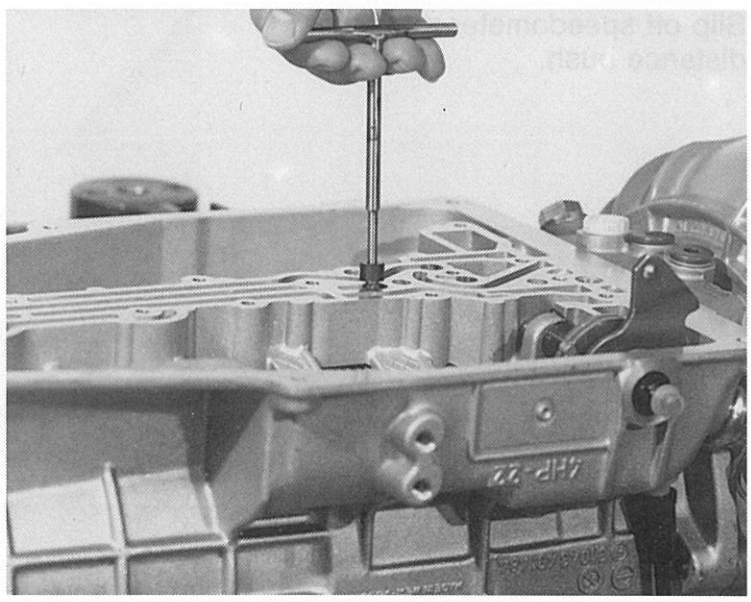
86 005

Remove 9 circlips and springs.



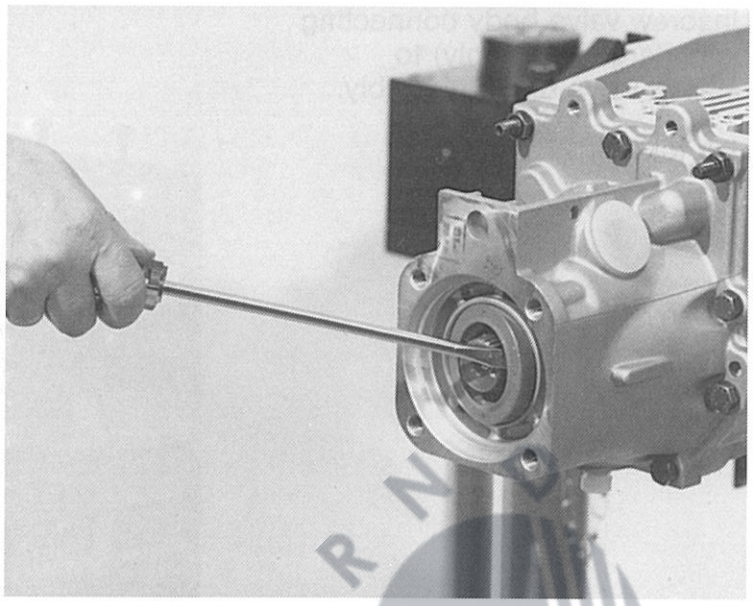
86 006

With puller 5 X 46 000 170 screw in and pull out 9 sealing rubbers.



86 007

Remove the cap in the output hole and use a screwdriver to lever out the shaft seal.

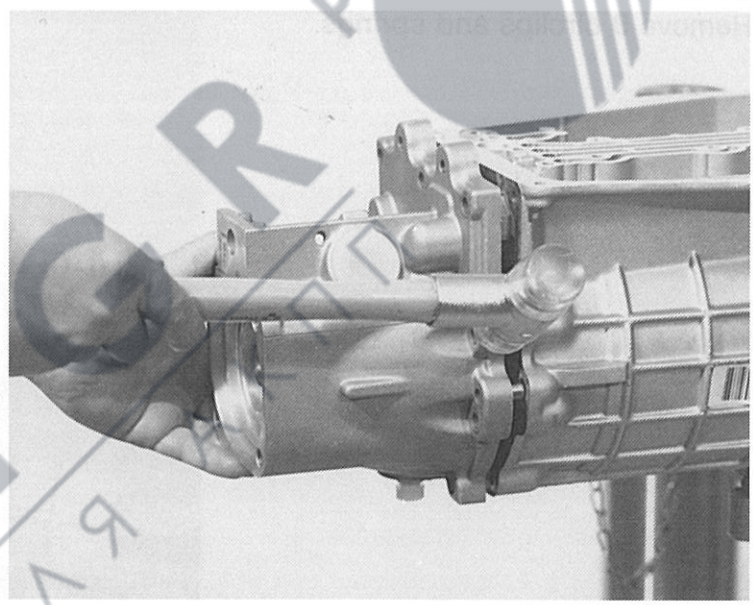


86 008

Unscrew extension connecting bolts (13 mm headsize).

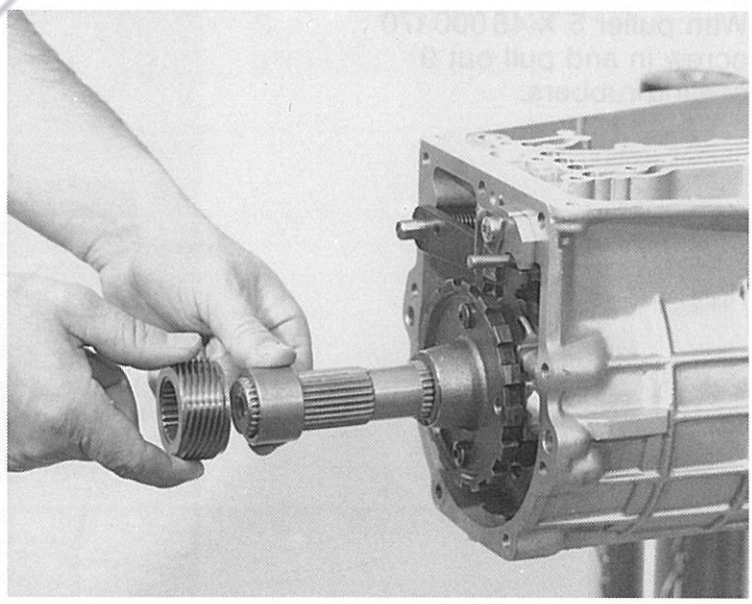
Use only a plastic hammer for loosening the extension.

Remove gasket.



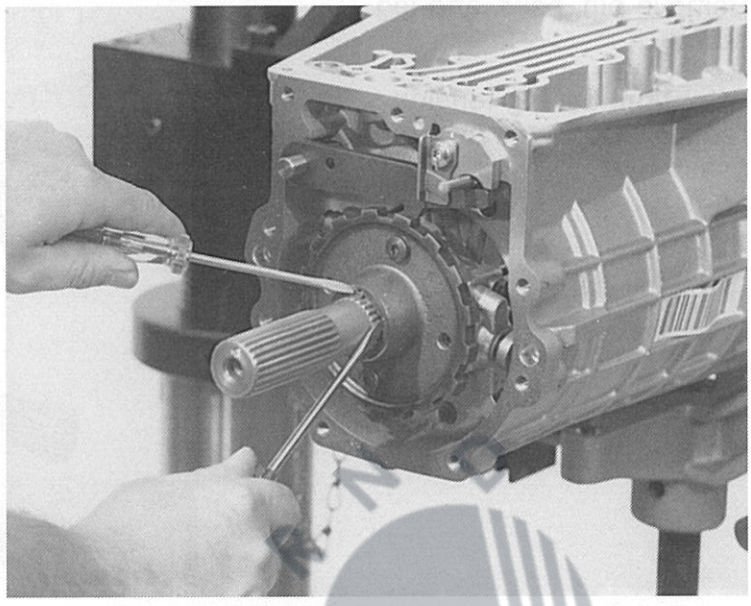
86 009

Slip off speedometer worm and distance bush.



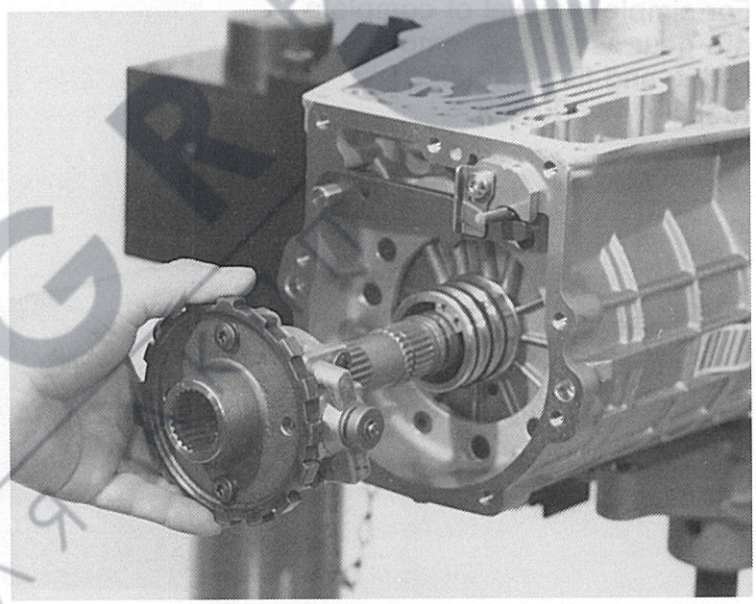
86 010

Use two screwdrivers to slacken the end ring on the output shaft.



86 011

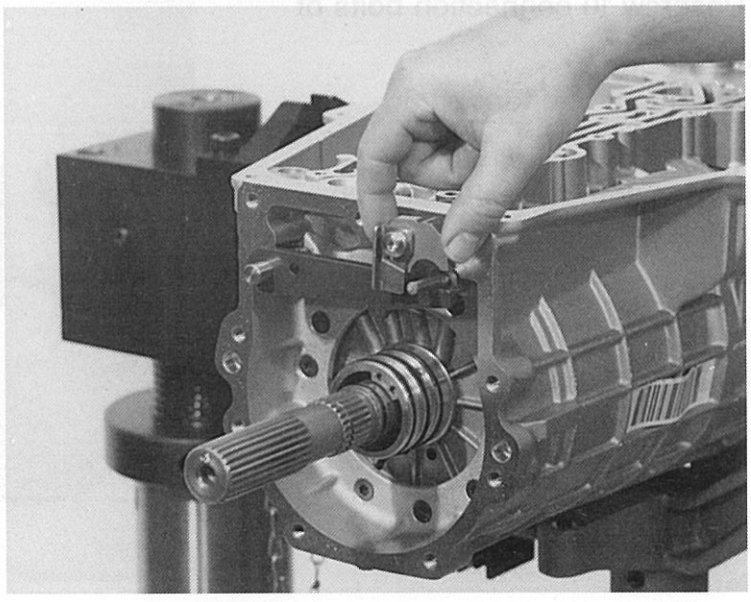
Disengage position park and pull out parking wheel together with governor hub.



86 012

Unscrew connection bolt on guide plate for removal.

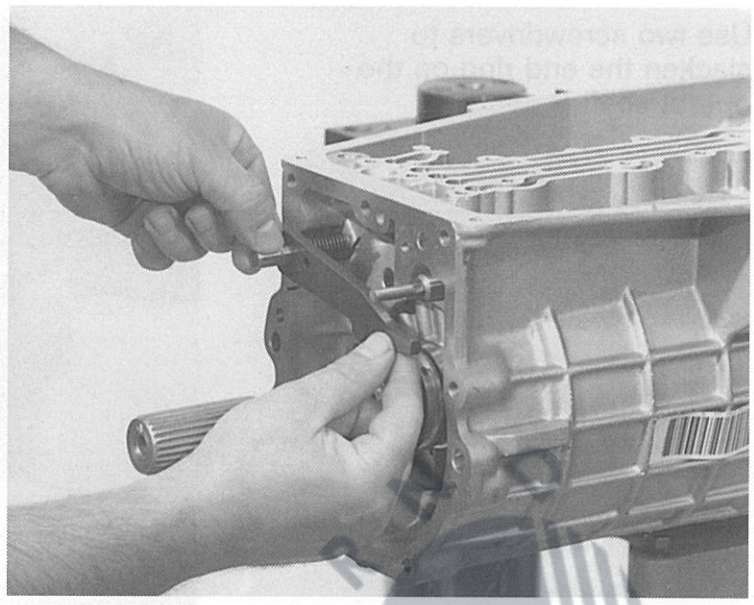
Use Torx bit 27.



86 013

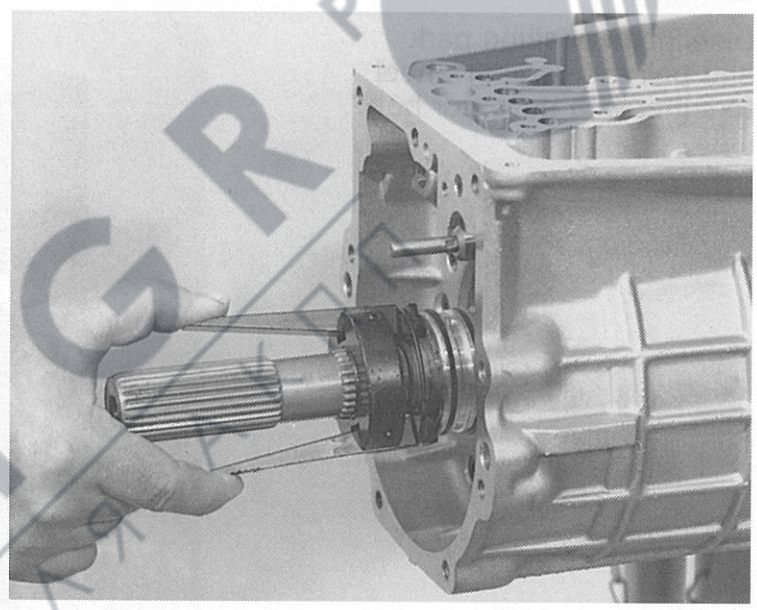
Remove pin, pawl, and leg spring.

Attention: Spring tension reduced upon removal of park assembly.



86 014

For simple removal of complete 4th gear assembly, remove o-ring and fit on holding tool 5 X 46 000 209.

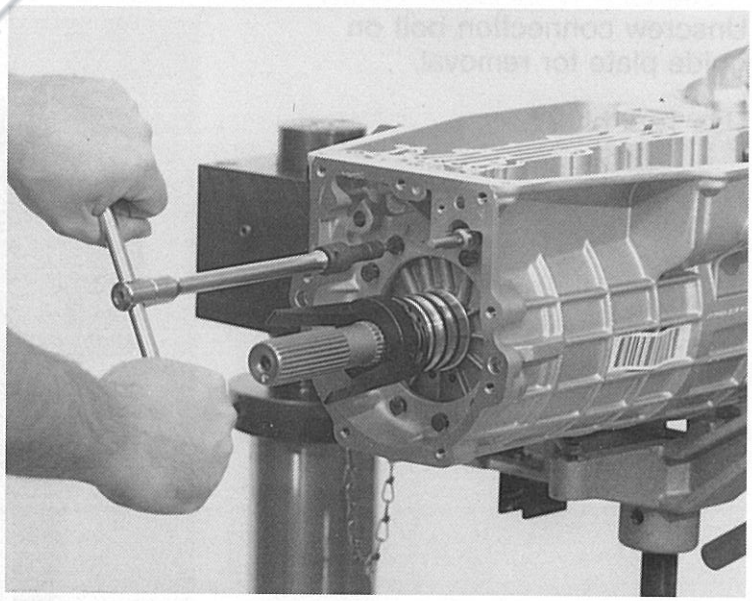


86 015

Unscrew 10 connection bolts of cylinder F.

Attention: Use torx bit 30

Turn transmission around, with bell housing pointing up.



86 016

Removal of bell housing and intermediate plate. Due to normal work procedure, unscrew only 12 hexagon connecting bolts on the inside diameter bolt pattern.

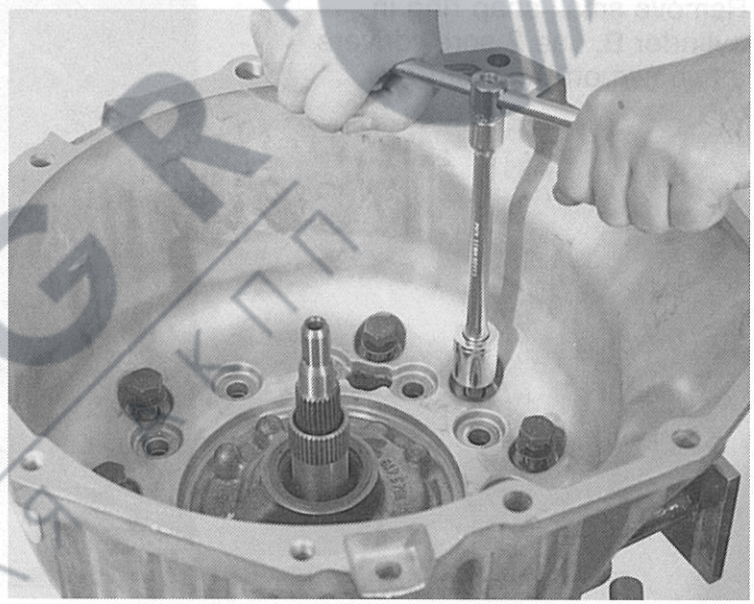
(Tool headsize = 17 mm)

86 017

If it is necessary to remove only bell housing due to damage, unscrew 6 remaining bolts and disconnect bell housing from intermediate plate.

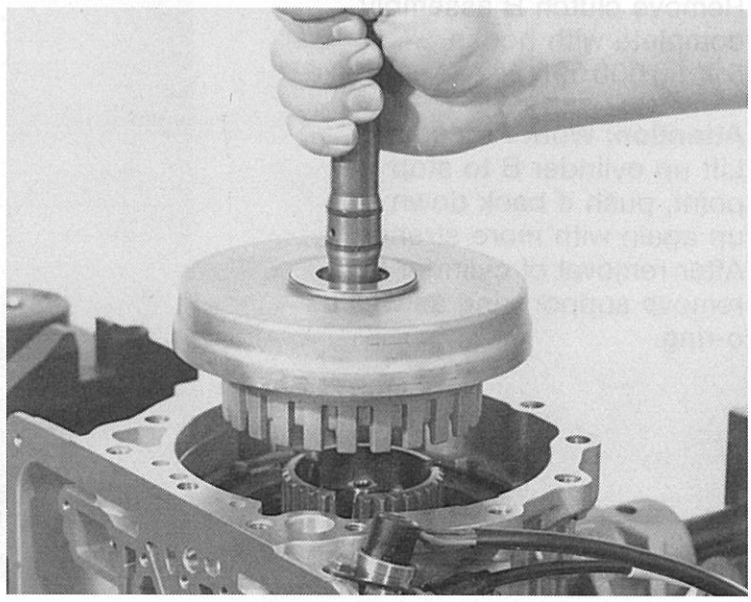
Intermediate plate is not removed from transmission housing.

(Tool headsize = 17 mm)



86 018

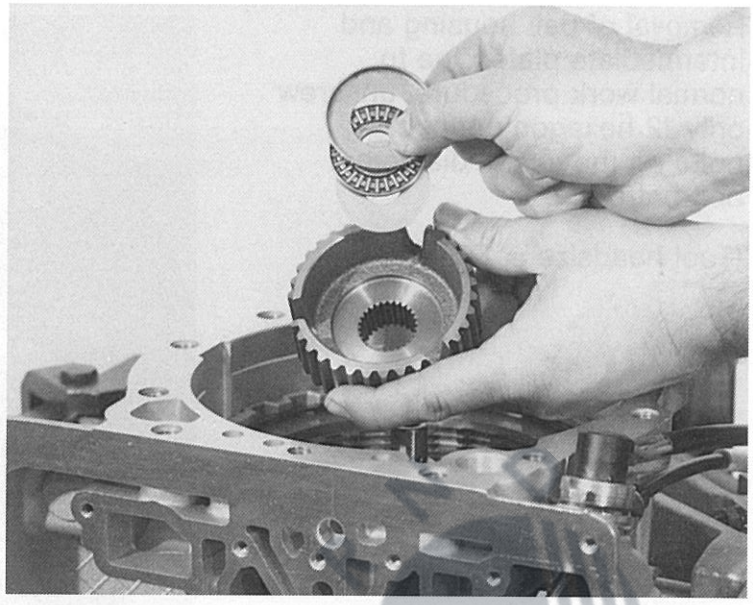
Remove input shaft together with clutch A assembly.



86 019

Remove inner carrier A from seat of intermediate shaft.

Remove also disc, axle bearing, and thrust washer.



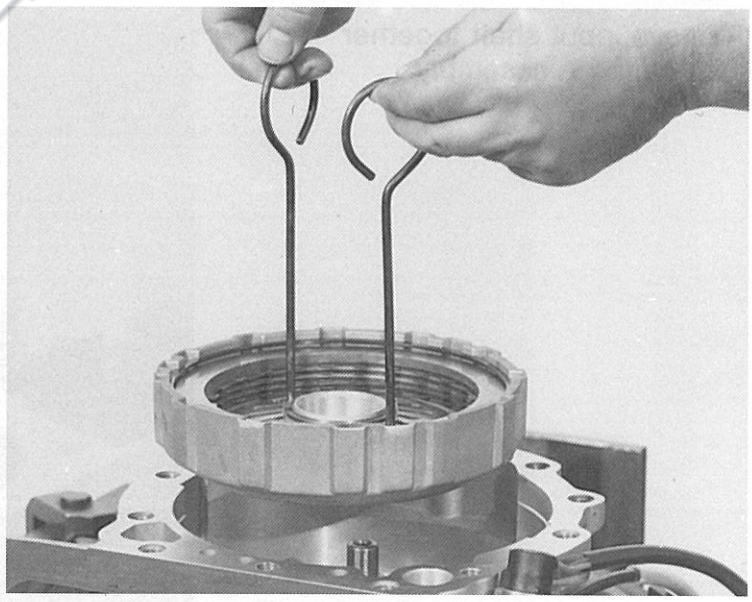
81 060

Remove small snap ring in cylinder B, use 2 screwdrivers as shown on the picture.

86 020

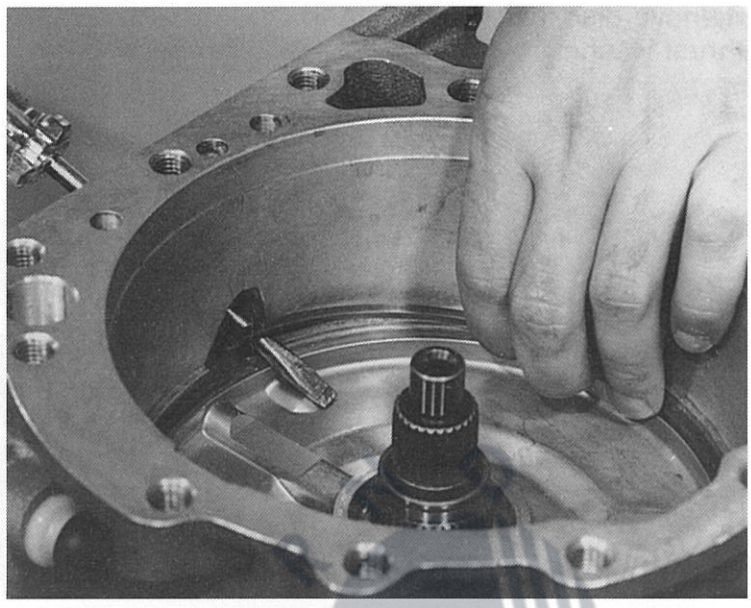
Remove clutch B assembly complete with hooks 5 X 56 000 095.

Attention: Work Procedure: Lift up cylinder B to stop point, push it back down, lift up again with more strength. After removal of cylinder B remove support ring as well as o-ring.



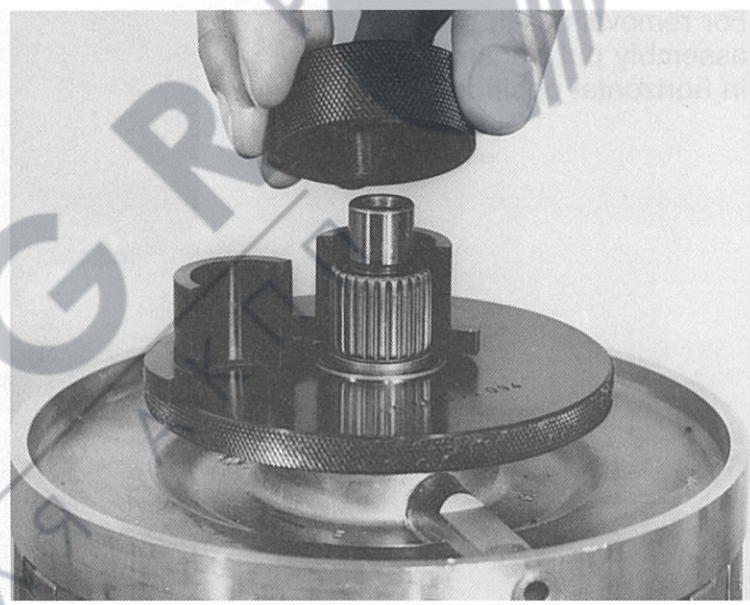
82 019

Remove snap ring of center plate with screwdriver as shown in the picture.



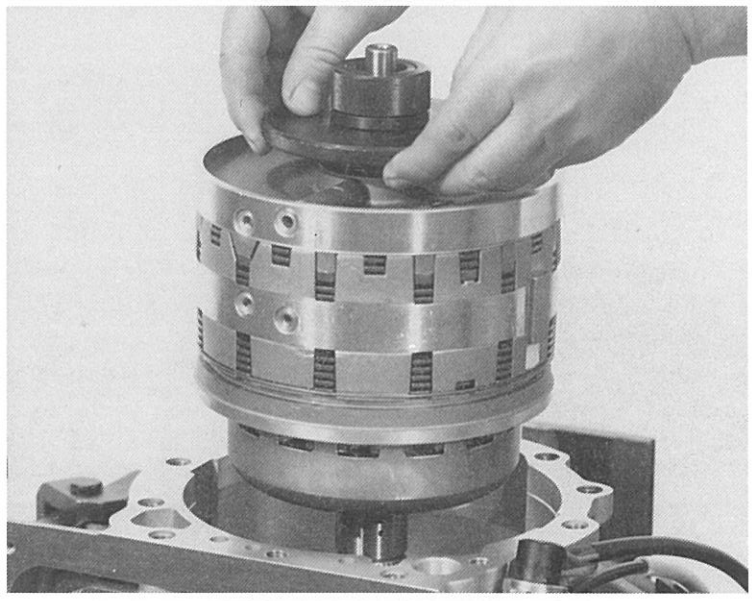
82 020

Attach mounting tool
5 X 56 000 094 to intermediate shaft seat as shown in picture.



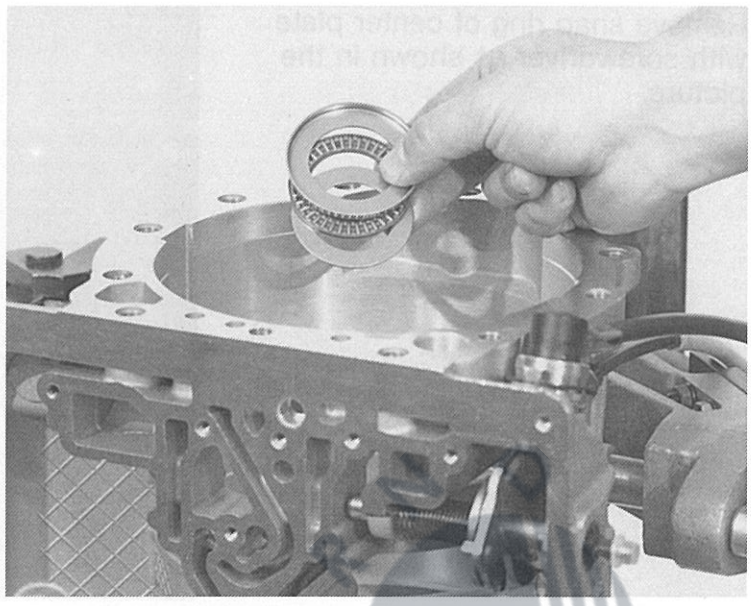
86 021

Remove C, C' and D clutch assembly out of transmission case.



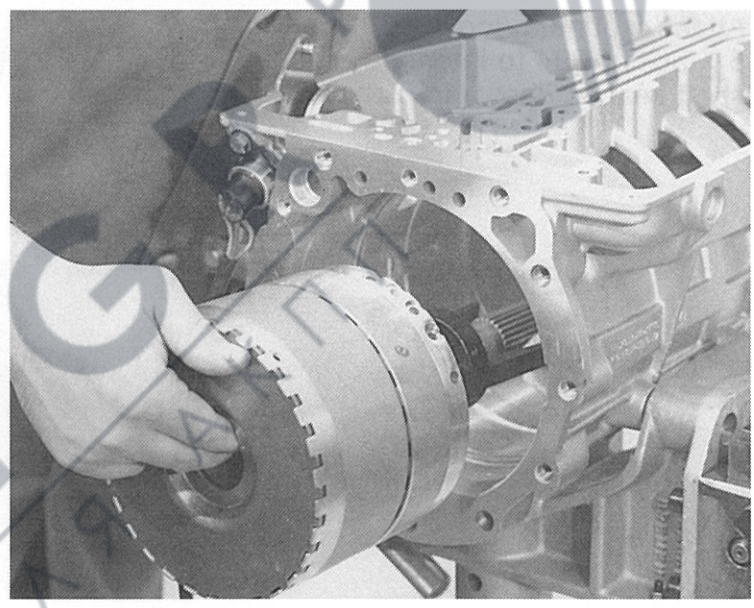
86 022

Remove disc, axle bearing, and thrust washer.



86 023

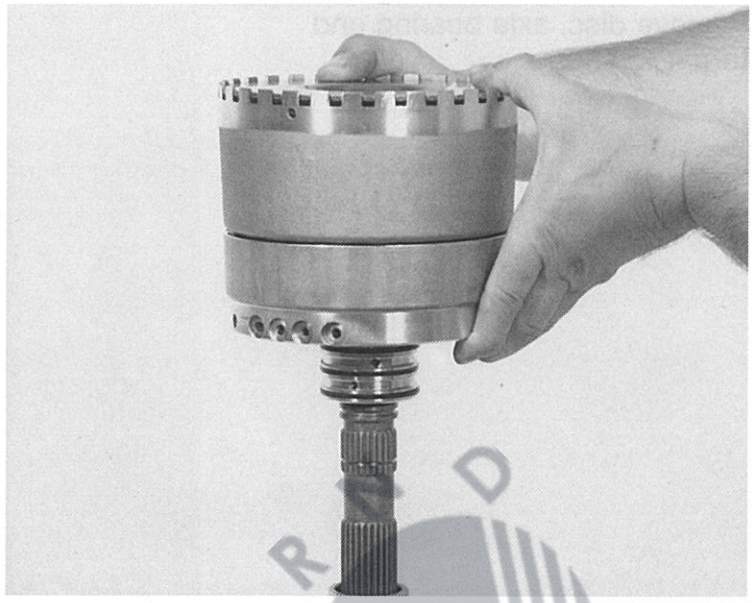
For removal of 4th gear assembly put transmission case in horizontal position.



2.2 4th Gear Assembly

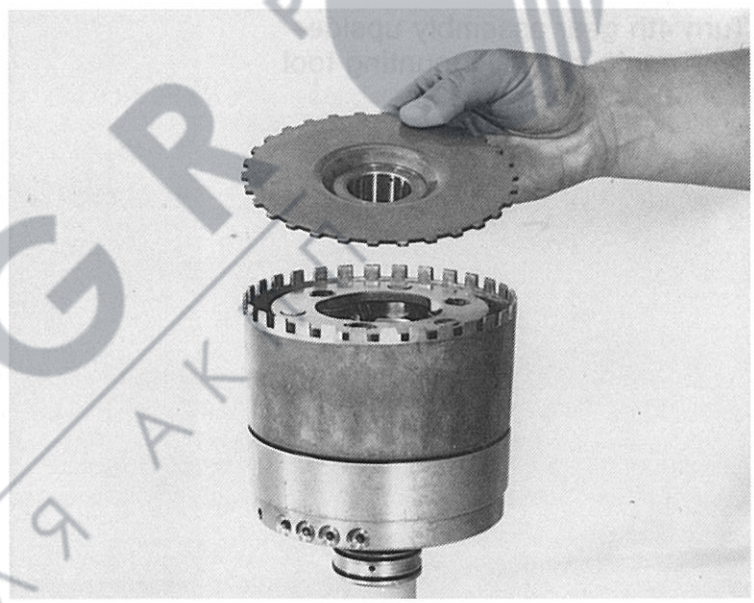
86 024

Remove pliers (mounting aid) from output shaft. Place whole 4th gear assembly into supporting device 5 X 56 000 072.



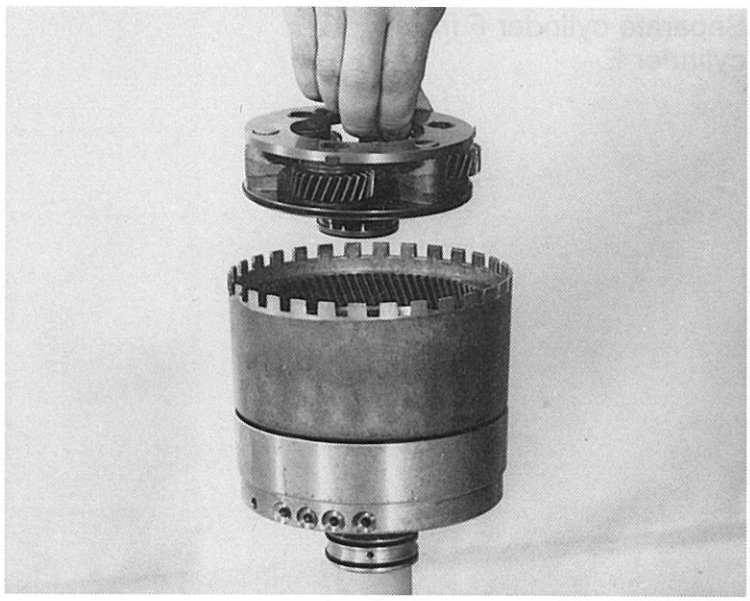
82 025

Remove sun gear.



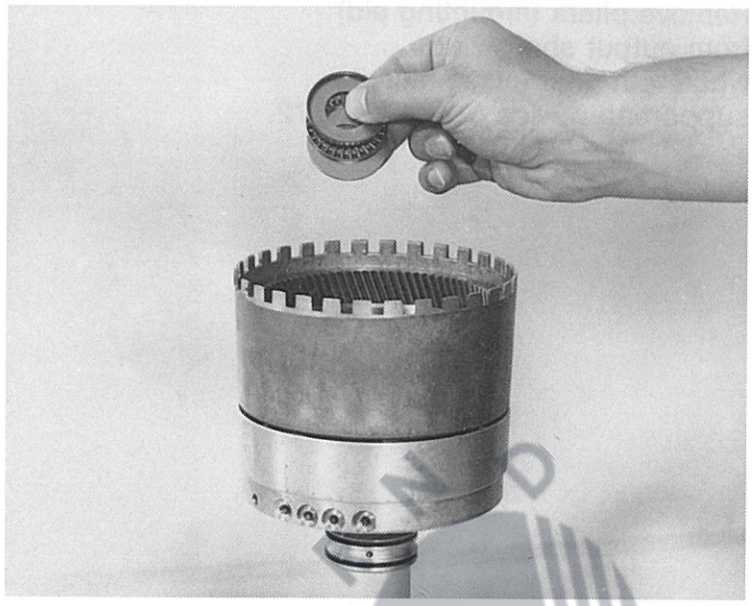
82 026

Remove planetary set
Removal of snap ring on planetary case not necessary.



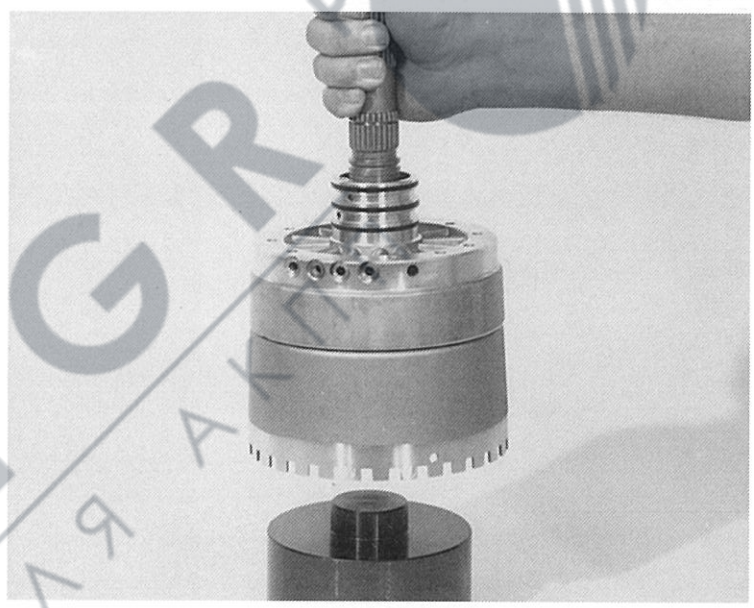
82 027

Remove disc, axle bearing and thrust washer.



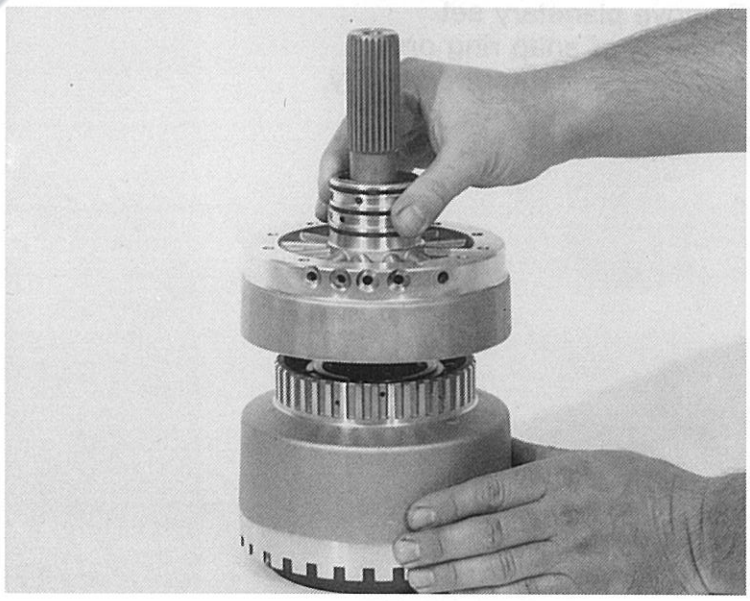
86 025

Turn 4th gear assembly upside-down onto special mounting tool 5 X 46 000 168.



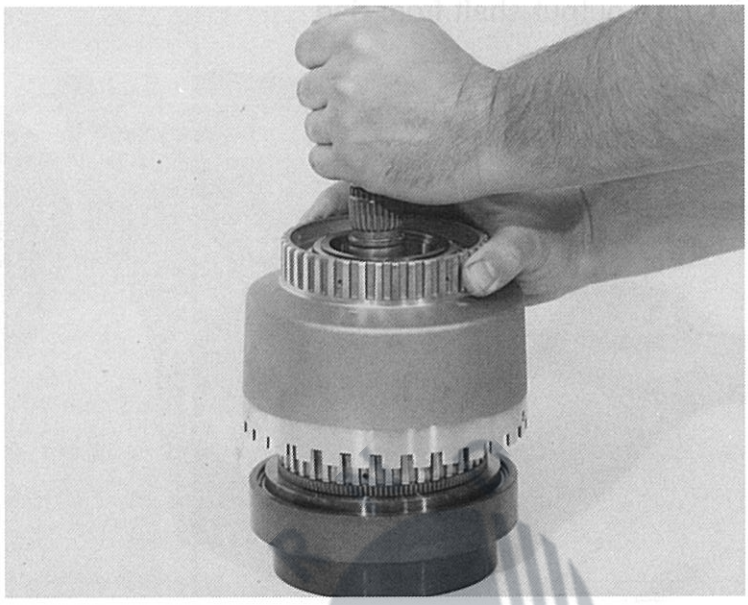
86 026

Separate cylinder F from cylinder E.



86 027

Remove cylinder E from output.



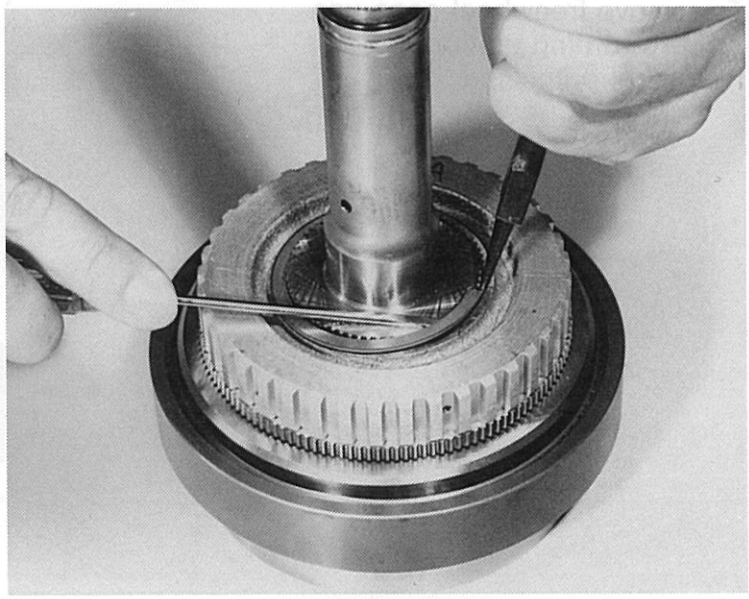
86 028

Remove axle disc and cage as well as 2 thrust washers.

82 033

2.2.1 Output with Freewheel

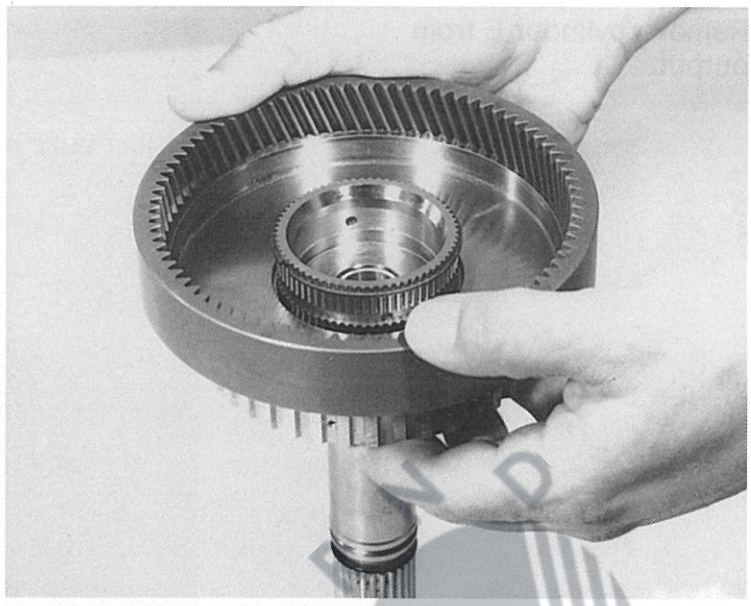
To remove snap ring on carrier E, use pliers and a screwdriver.



82 034

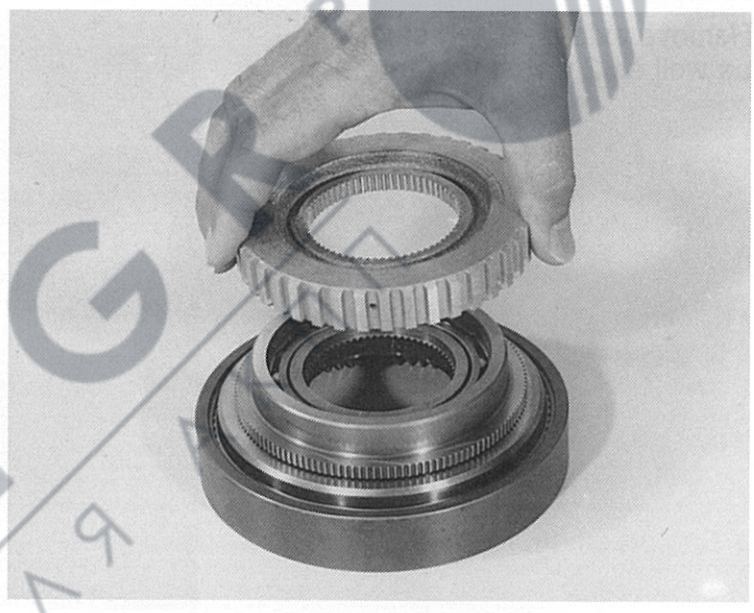
Remove output shaft from ring gear.

Do not remove snap ring on output shaft.



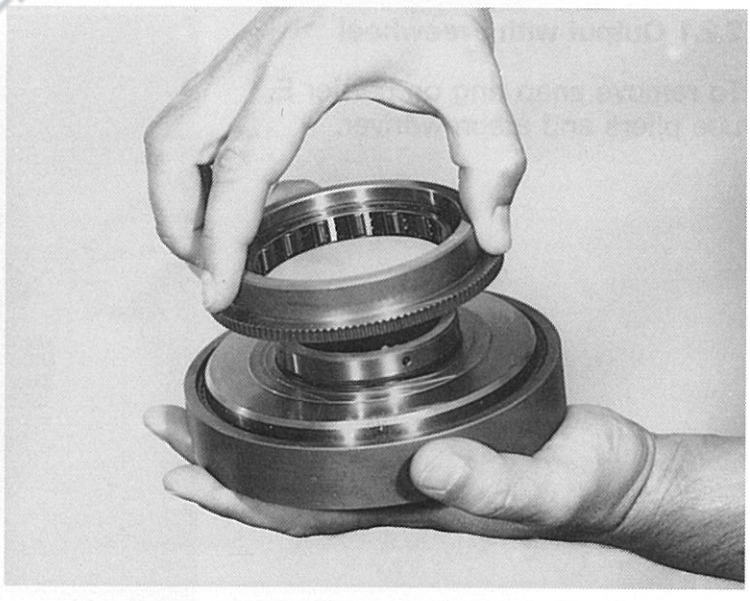
82 035

Remove carrier E.



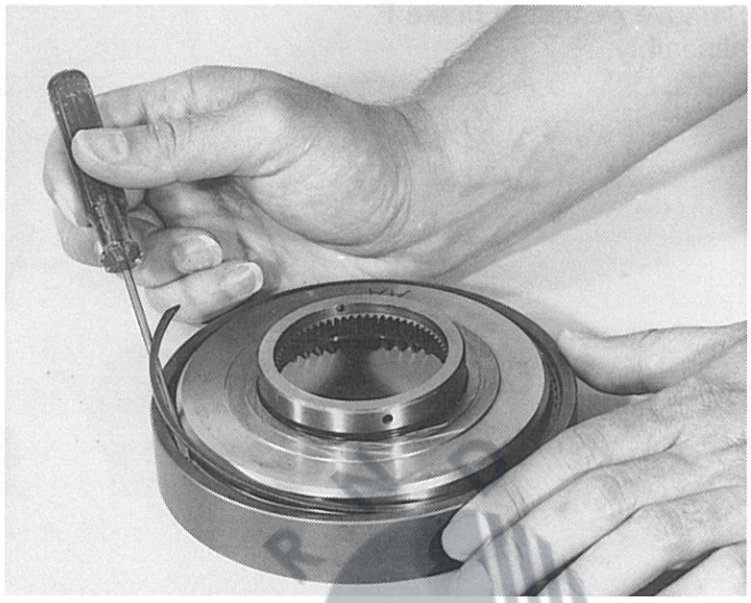
82 036

To remove freewheel cage use upward turning motion on freewheel outer ring.



82 037

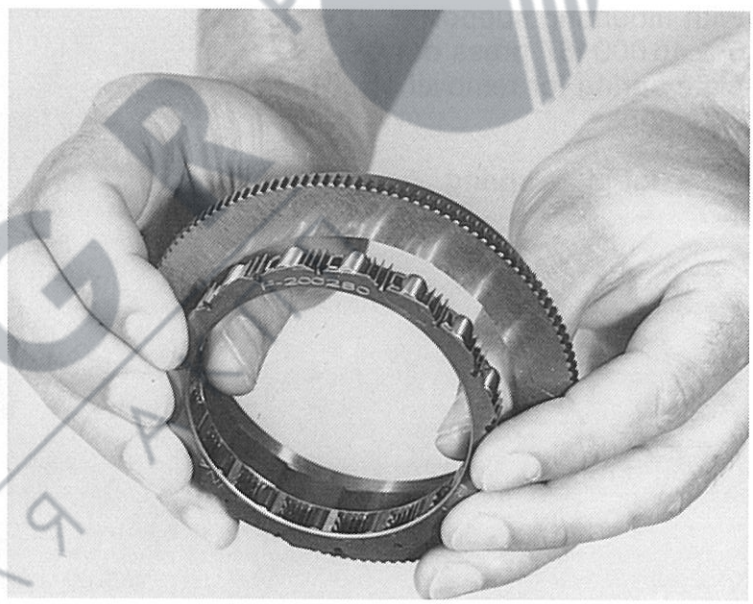
After removal of the snap ring disconnect freewheel inner ring from hollow gear.



82 038

Remove freewheel cage carefully out of freewheel outer ring.

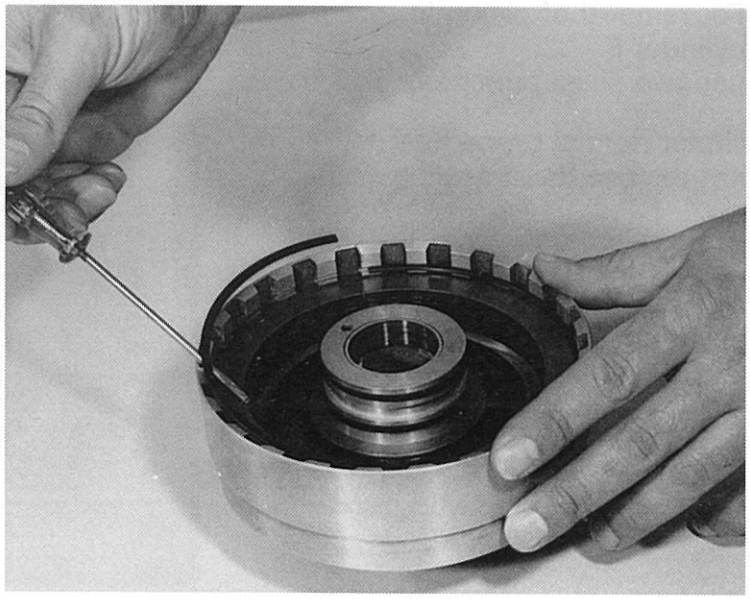
Attention! Freewheel rollers may fall out during removal of cage.



82 039

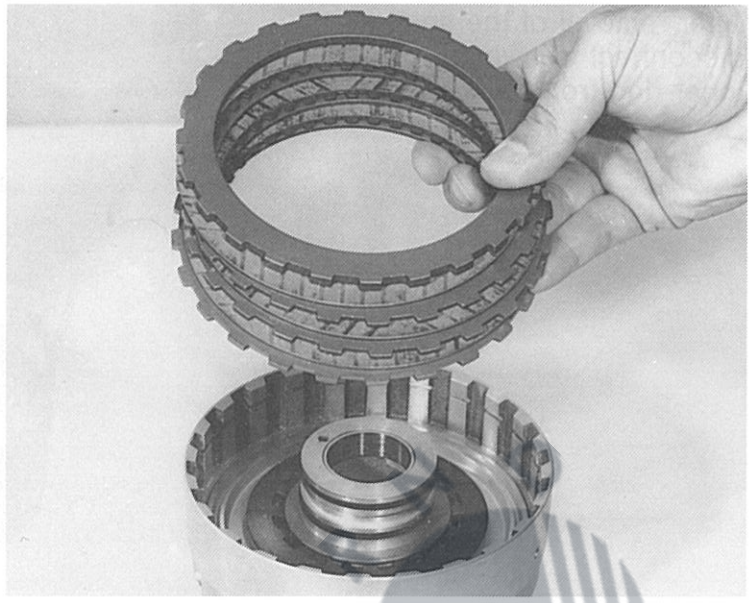
2.2.2 Brake F

Remove snap ring in clutch F.



82 040

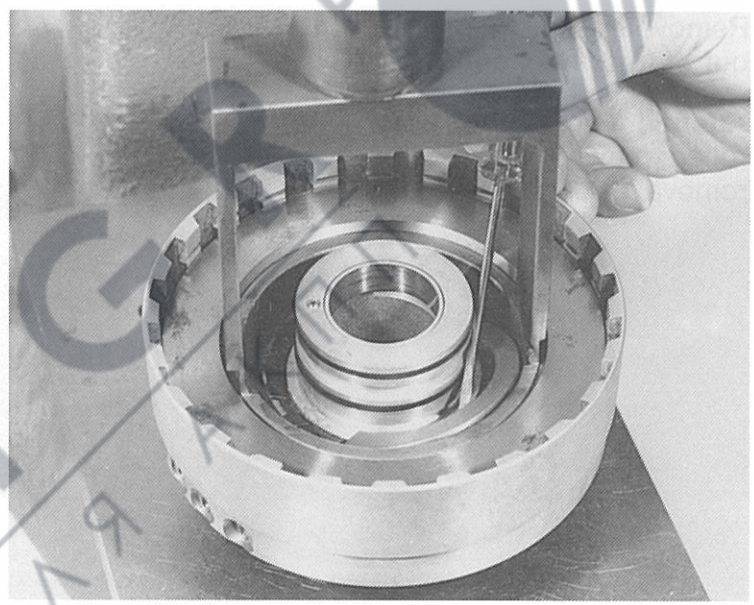
Remove complete brake F assembly.



82 042

With mounting support 5 X 46 000 167 press down plate spring for removal of split rings.

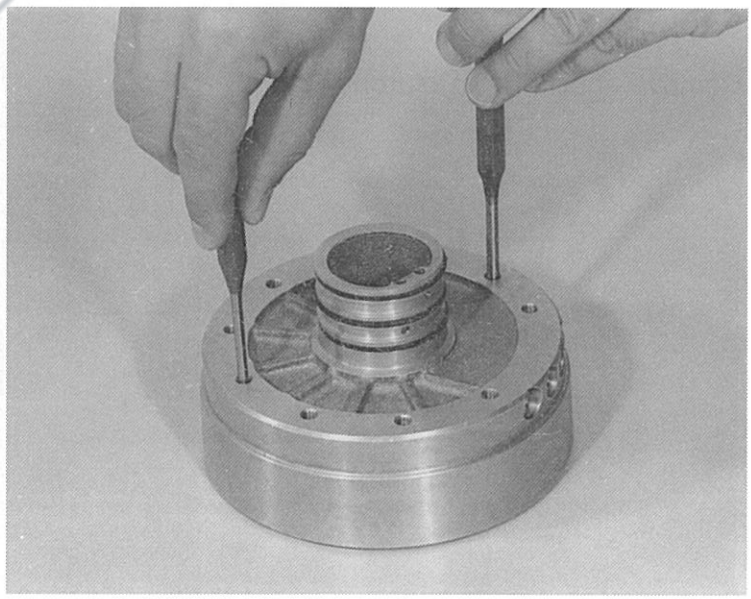
Take out plate spring.



82 043

For removal of piston in cylinder F use two small punches.

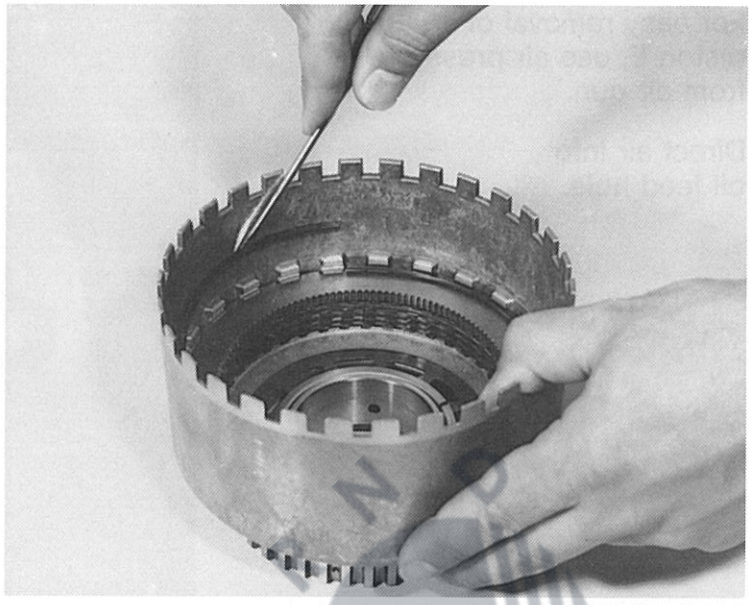
Under normal procedure do not remove the 5 sealing rings.



2.2.3 Clutch E

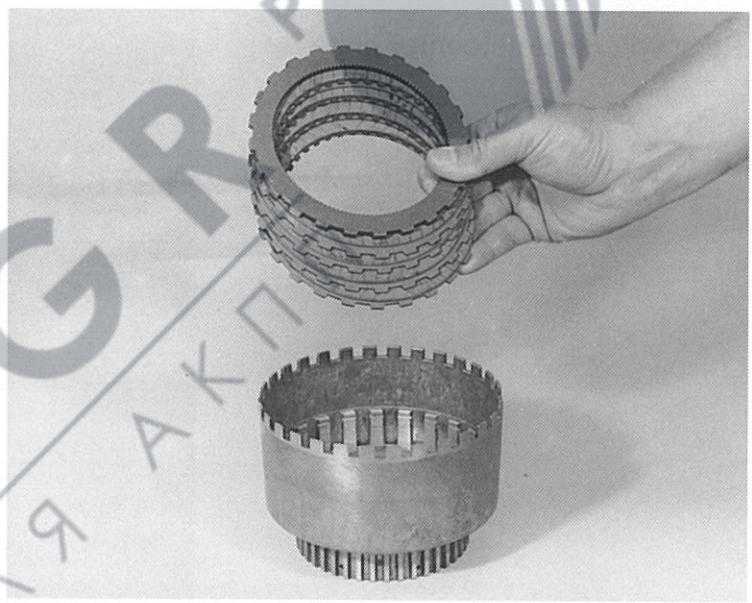
82 041

Remove snap ring from clutch E.



82 044

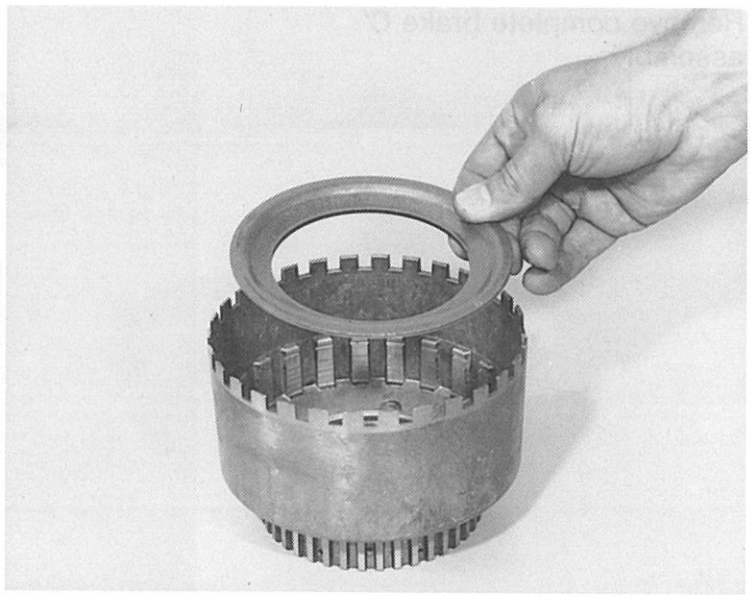
Remove complete clutch E assembly.



82 079

Remove plate spring in the same manner as explained for brake F.

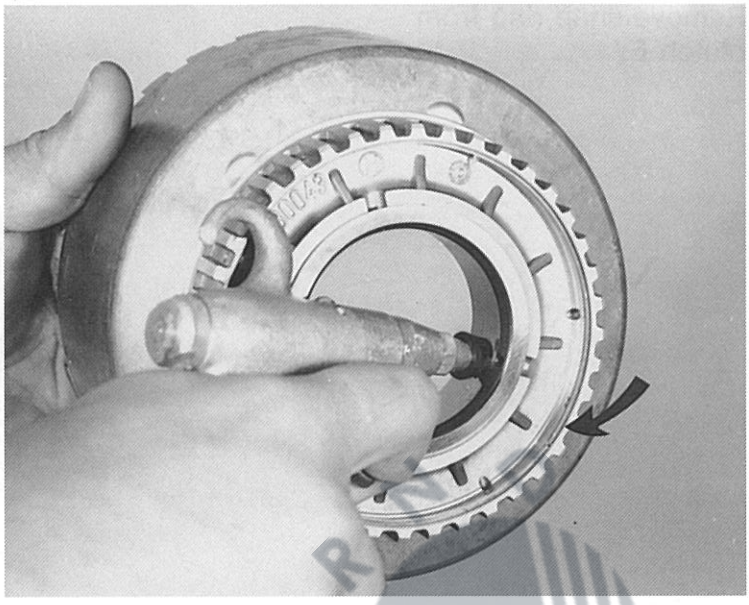
In addition, remove pressure plate.



82 045

For easy removal of piston E, use air pressure from air gun.

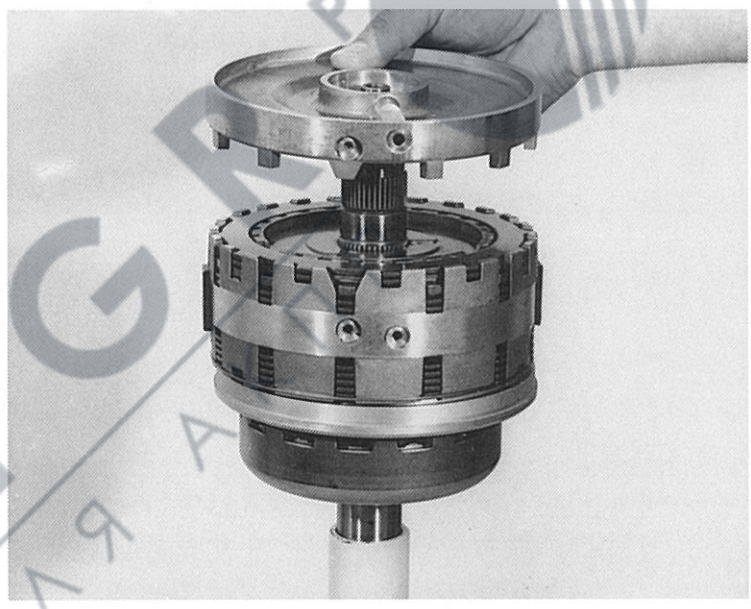
Direct air into oil feed hole.



2.3 Planetary Set with Web Shaft and Brakes C', C and D

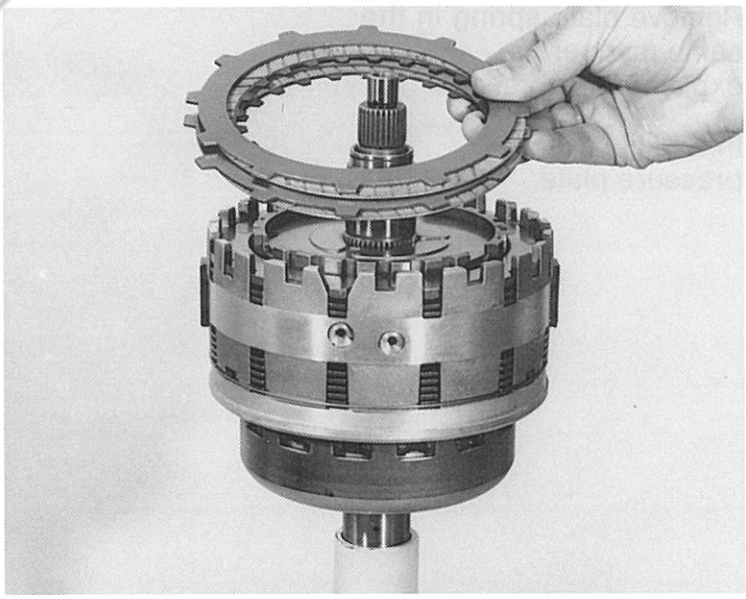
82 046

Remove complete center plate.



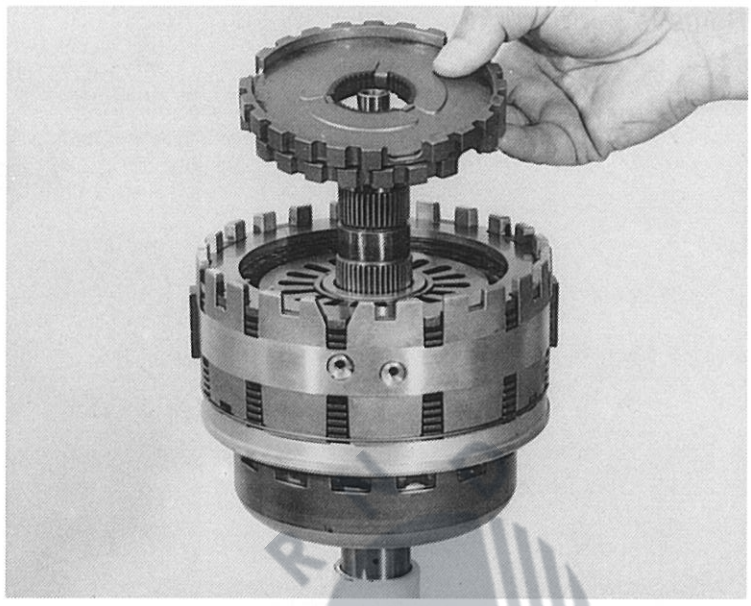
82 047

Remove complete brake C' assembly.



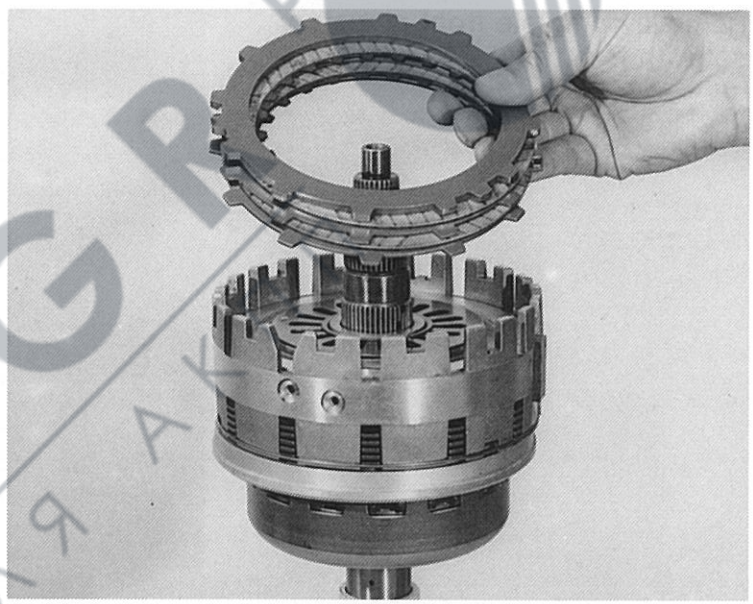
82 048

Remove complete 2nd gear freewheel.



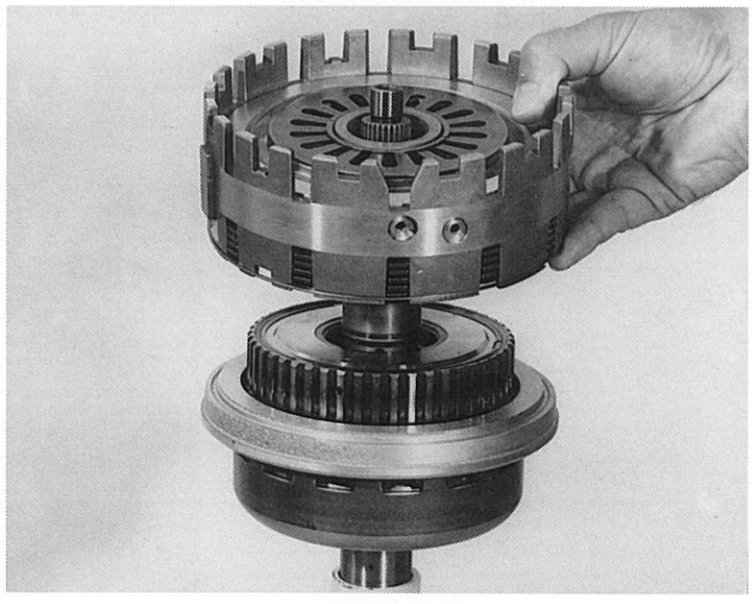
82 049

Remove complete brake C assembly.



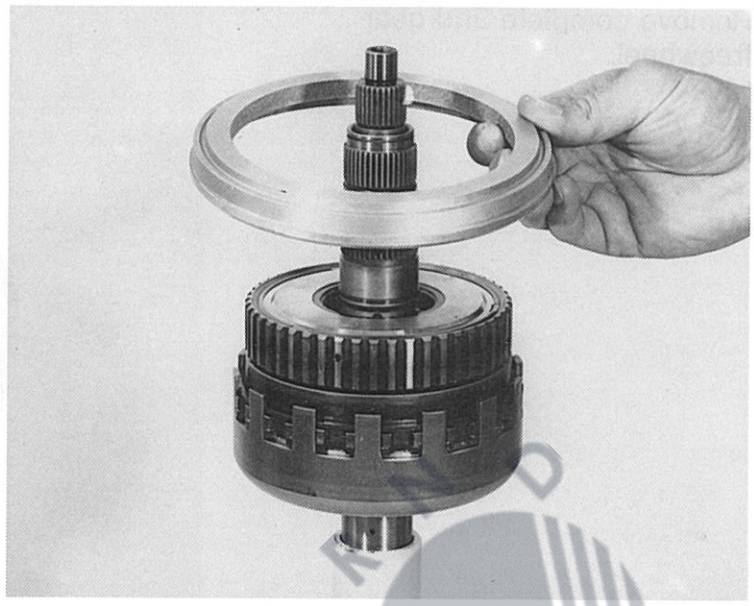
82 050

Remove complete cylinder C-D together with brake D assembly.



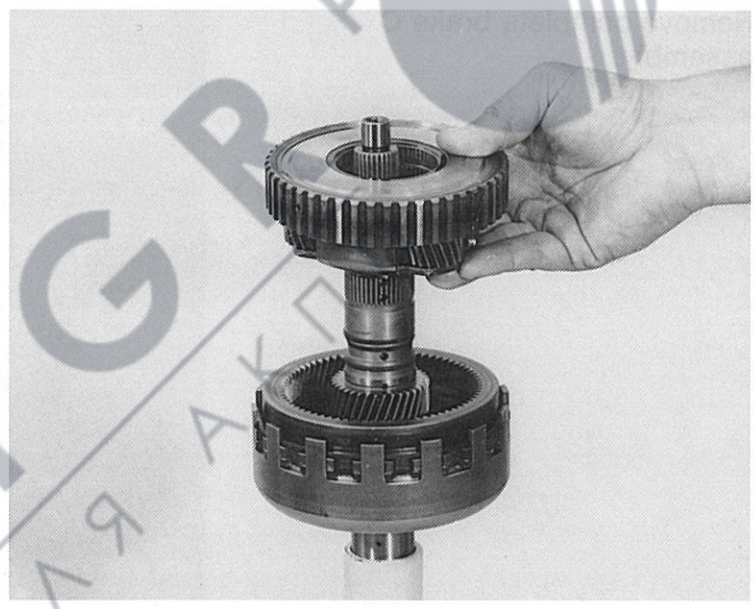
82 051

Remove support ring.



82 052

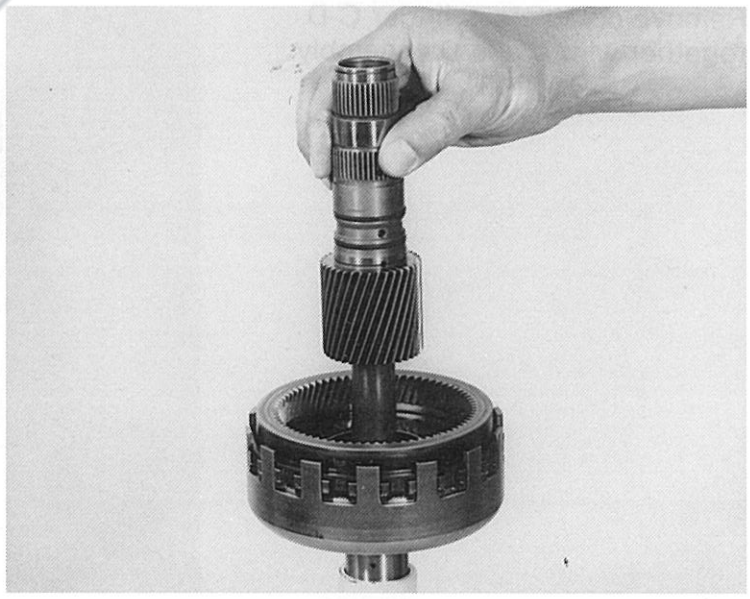
Remove complete front planetary set with freewheel.



82 053

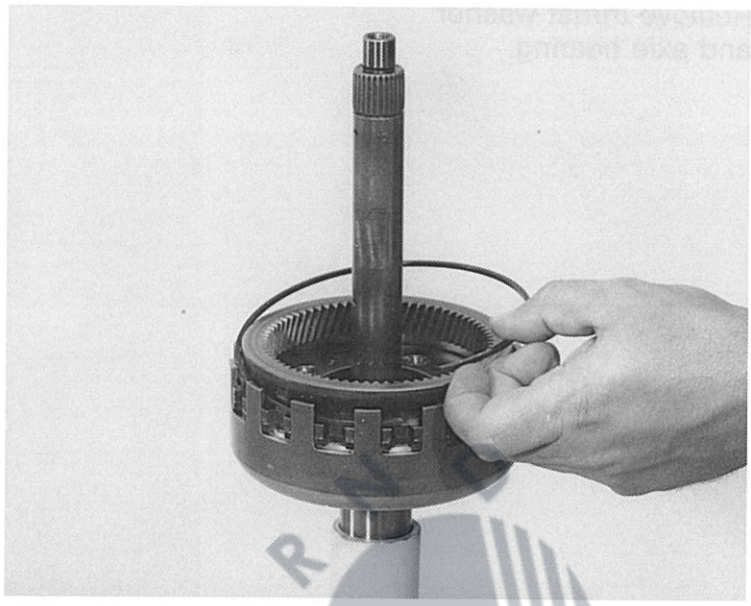
Remove sun shaft.

During normal work procedure do not remove seal rings on sun shaft.



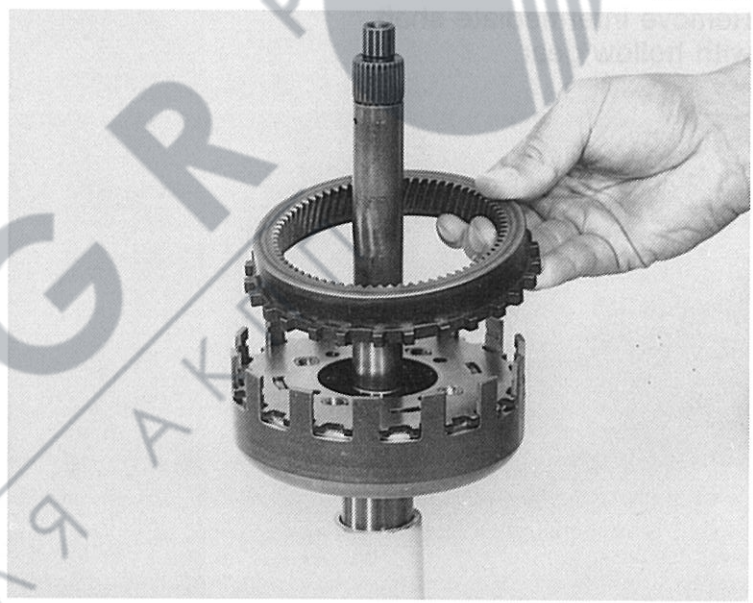
82 121

Remove snap ring from hollow gear.



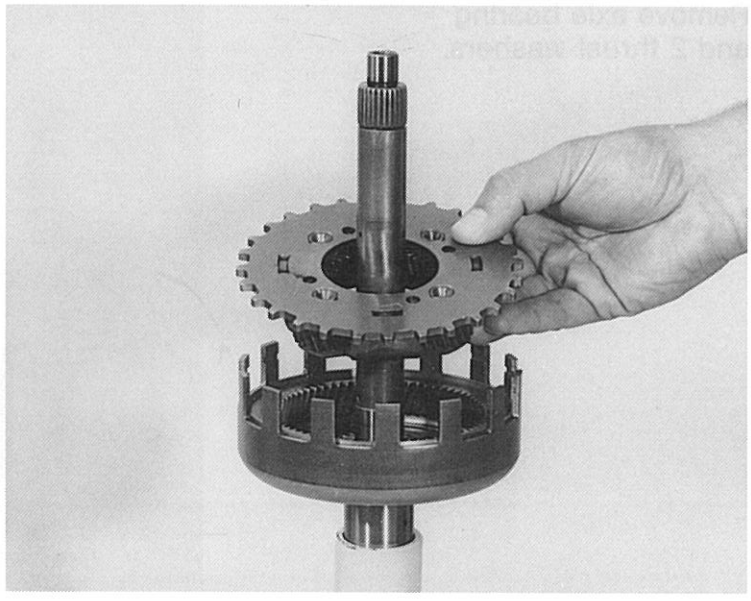
82 122

Remove hollow gear.



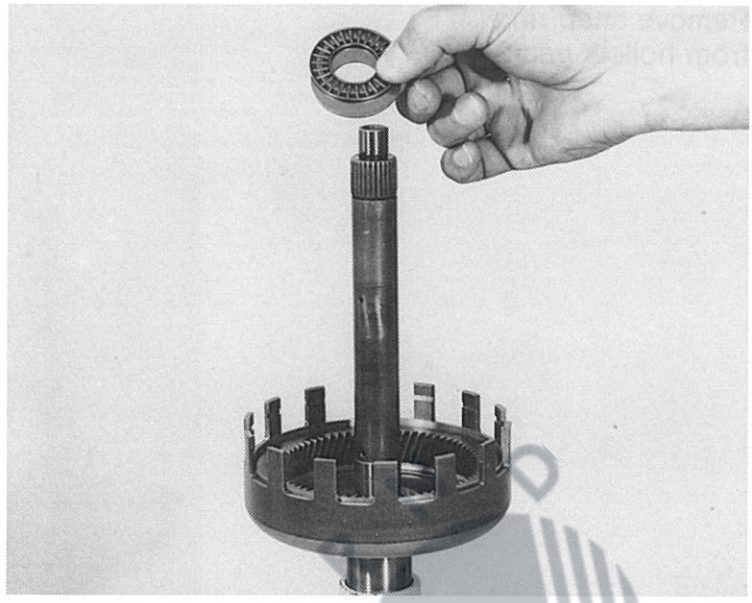
82 054

Remove complete rear planetary set.



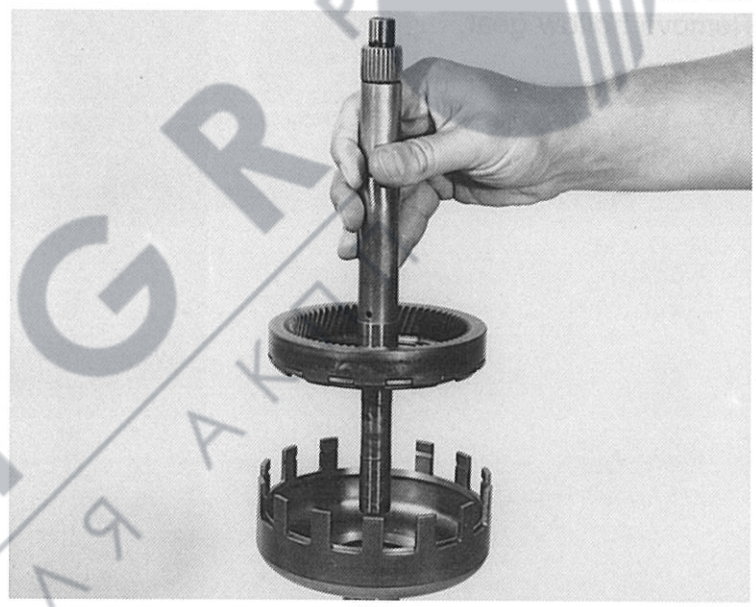
82 055

Remove thrust washer and axle bearing.



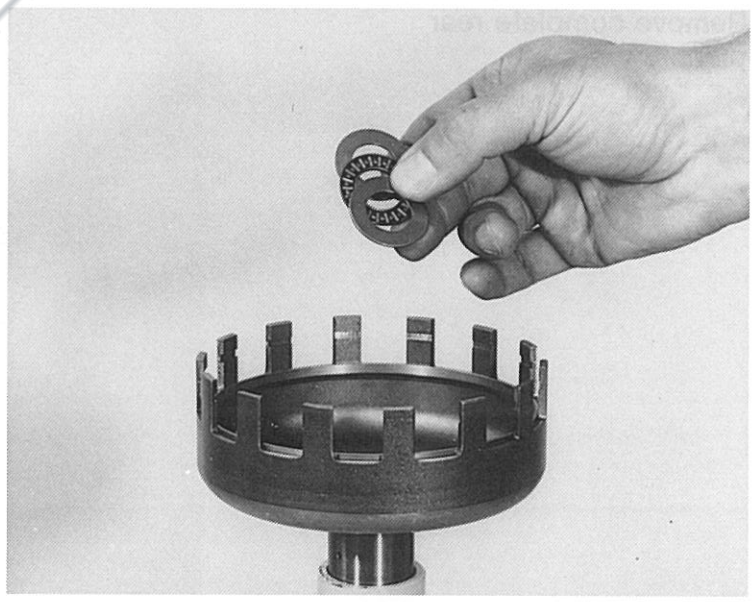
82 056

Remove intermediate shaft with hollow gear.



82 057

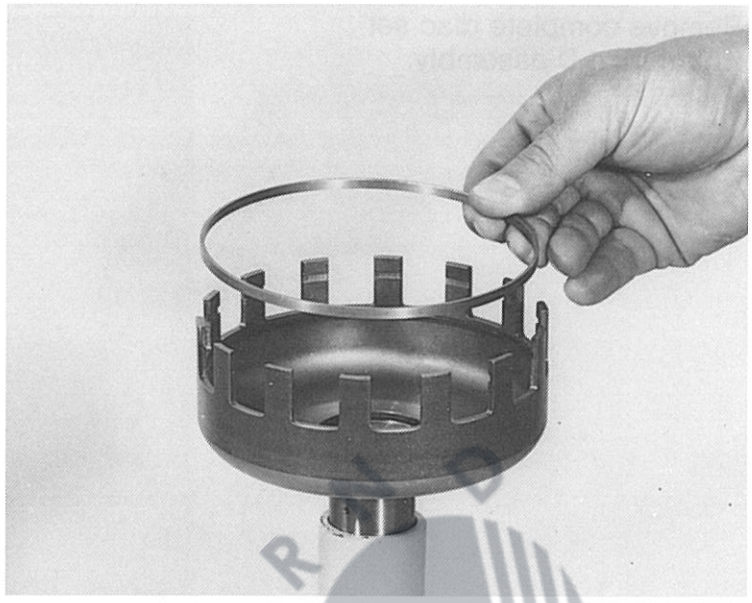
Remove axle bearing and 2 thrust washers.



82 058

Remove distance ring.

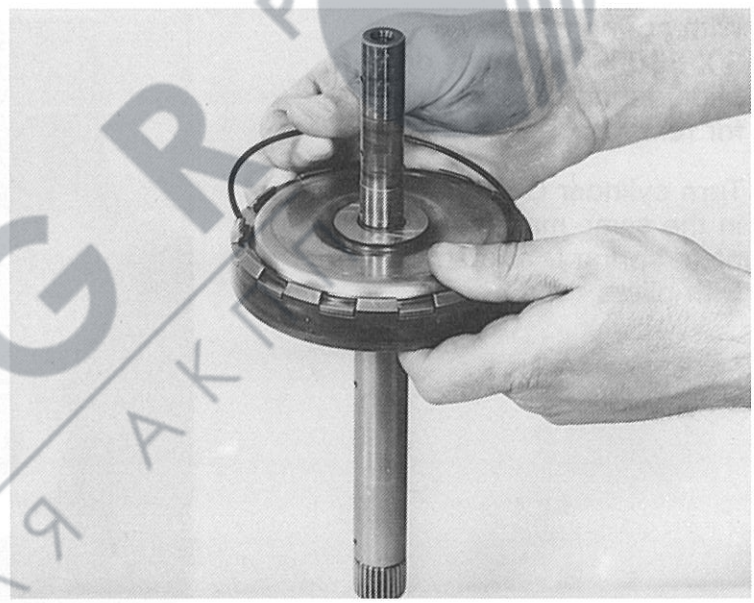
During normal work procedure, do not remove snap ring in output shaft.



82 059

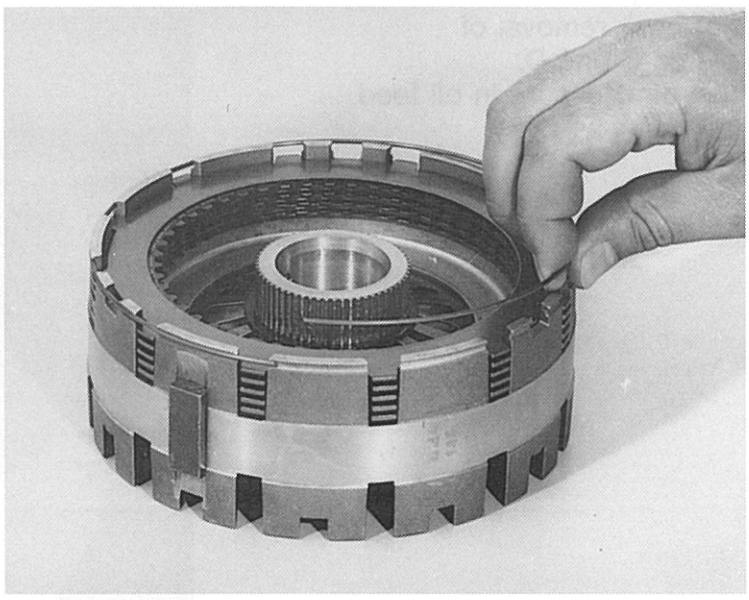
Remove snap ring from rear hollow gear.

After removal of snap ring, disconnect hollow gear from intermediate shaft.



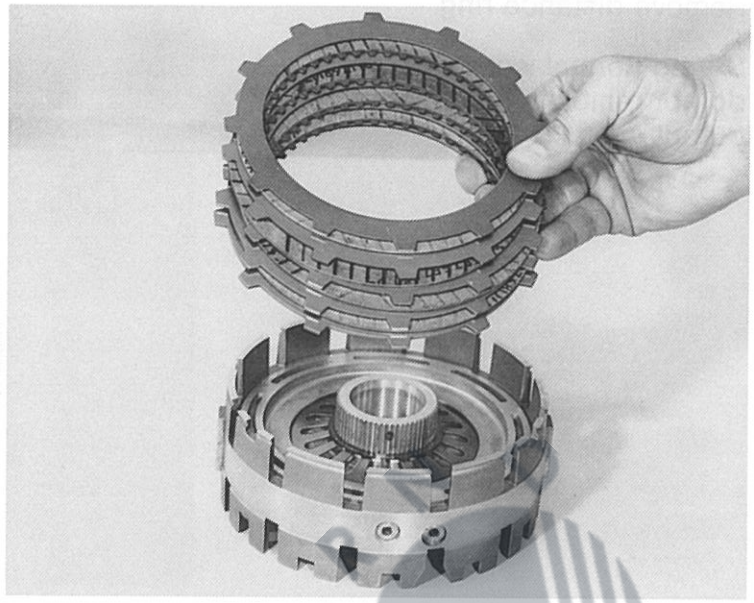
82 060

Remove outer snap ring from brake D assembly.



82 061

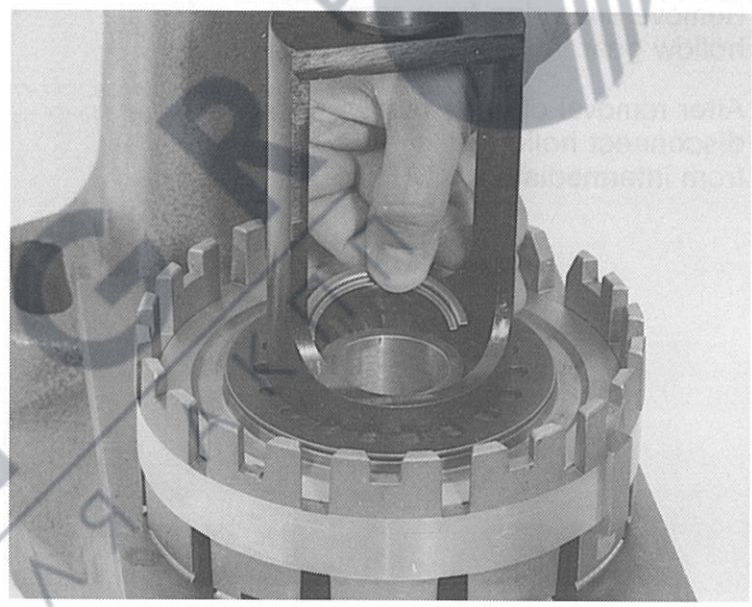
Remove complete disc set from brake D assembly.



81 112

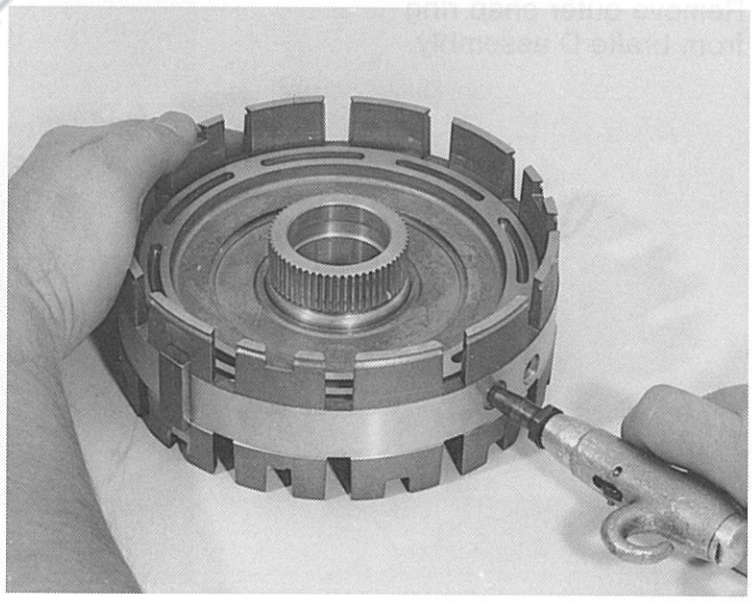
With spring device 5 X 56 000 093 press down plate spring C for removal of split rings.

Turn cylinder C-D upside-down; in the same manner remove plate spring D and snap ring with pliers.



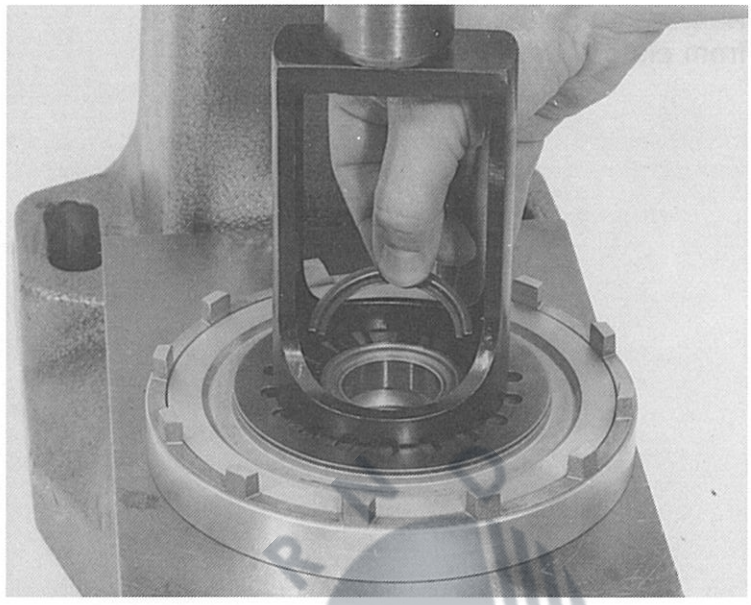
81 114

For easy removal of piston C and D, use air pressure in oil feed holes.



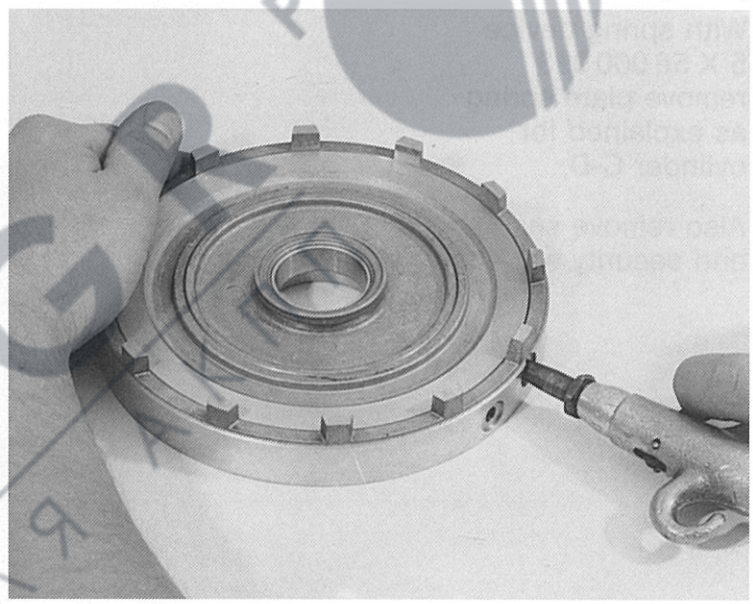
81 113

Removal of plate spring C'
in the same manner as explained
for cylinder C-D.



81 115

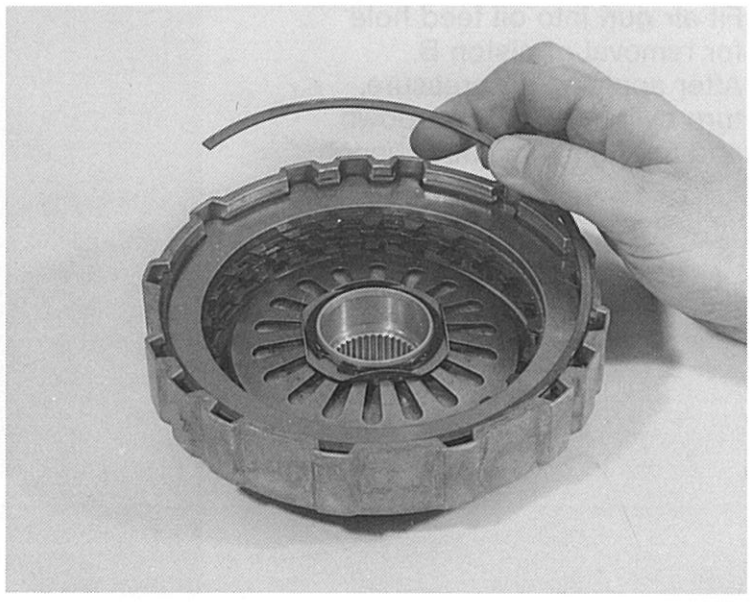
Use air gun for removal of
piston C'.



81 091

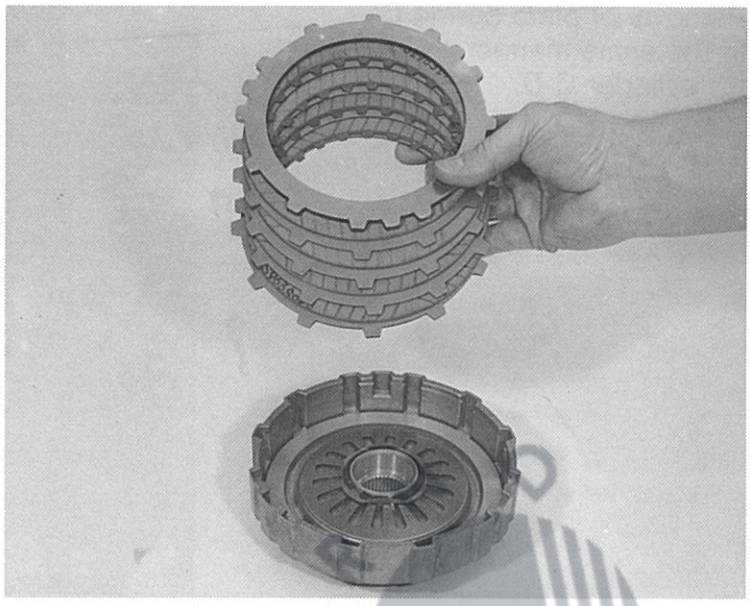
2.4 Clutch B

Remove snap ring out
of cylinder B.



81 092

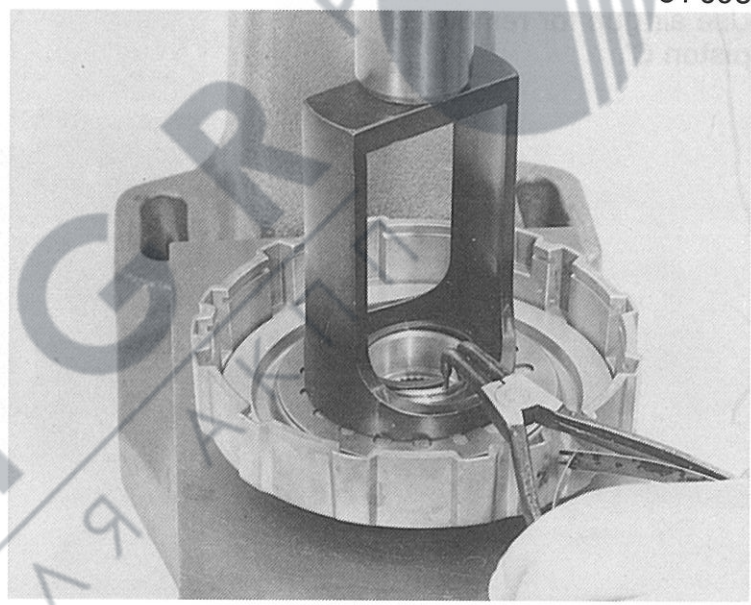
Remove complete disc set from clutch B assembly.



81 093

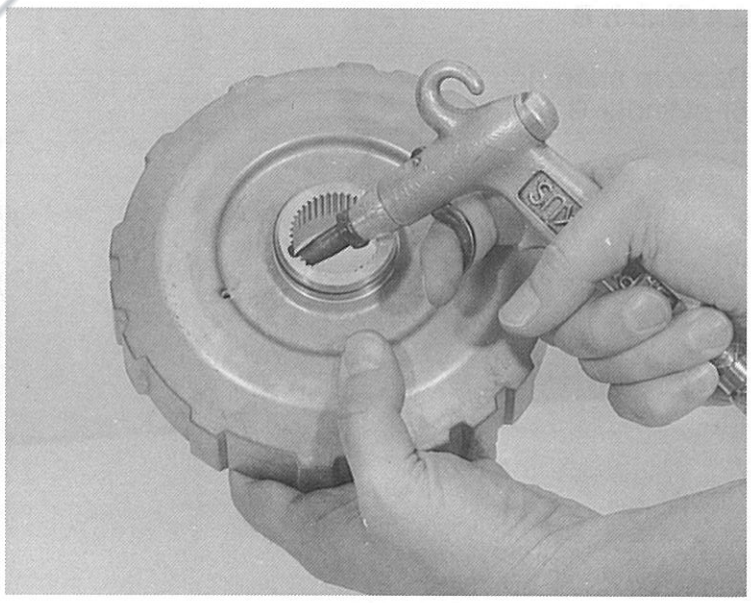
With spring device 5 X 56 000 093 remove plate spring as explained for cylinder C-D.

Also remove snap ring and security washer.



81 094

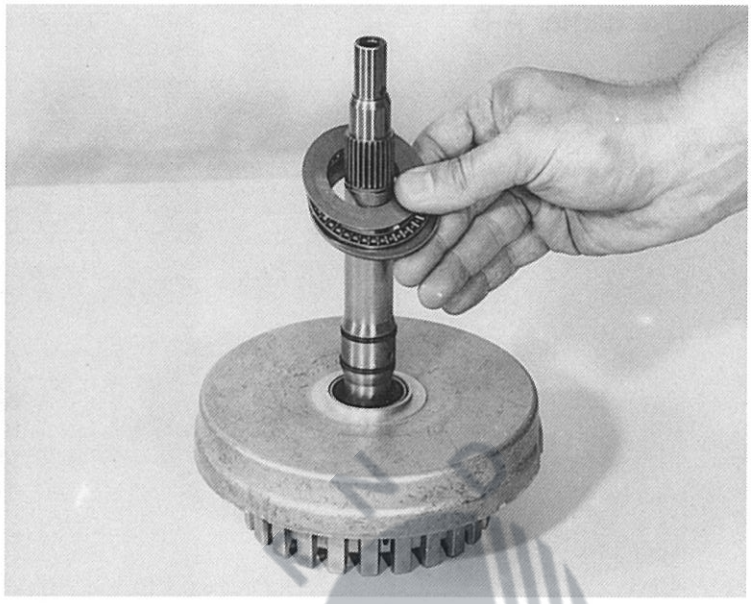
Fit air gun into oil feed hole for removal of piston B. After applying air pressure, turn cylinder B upside-down and tap lightly on work bench.



2.5 Clutch A

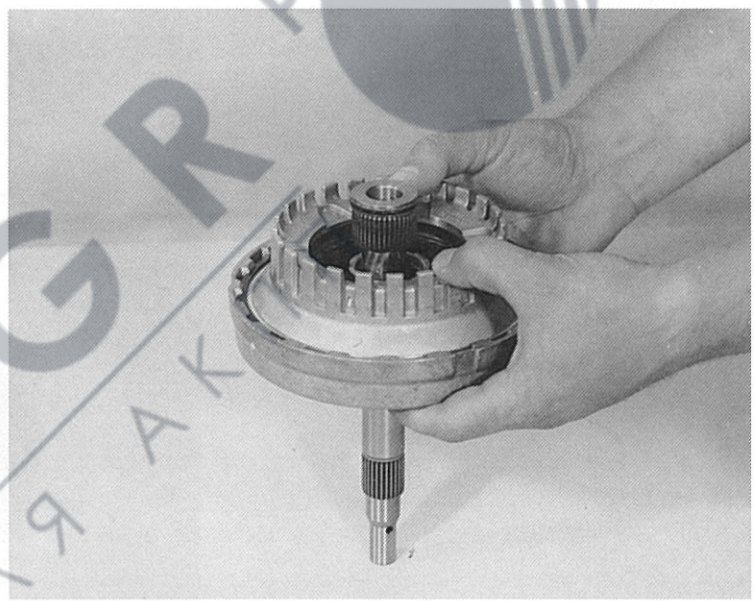
Remove disc, axle bearing, and thrust washer.

82 062



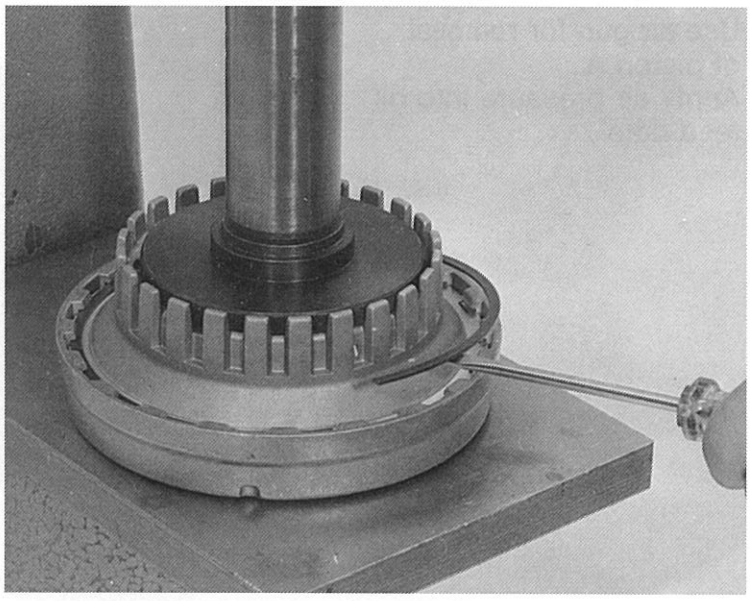
To remove input shaft from clutch A assembly, firmly hold clutch A assembly, push input shaft down against work bench.

82 063



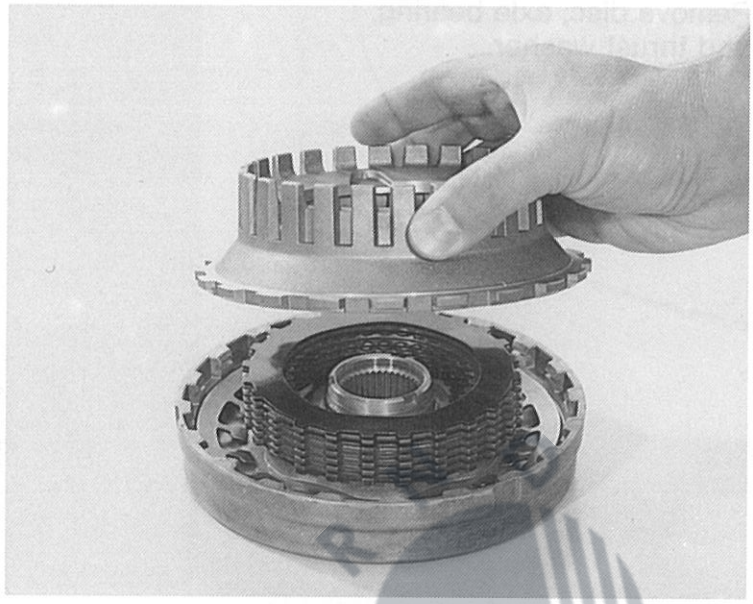
Using flat metal plate with mounting device 5 X 56 000 094, press down carrier A-B and remove snap ring.

81 097



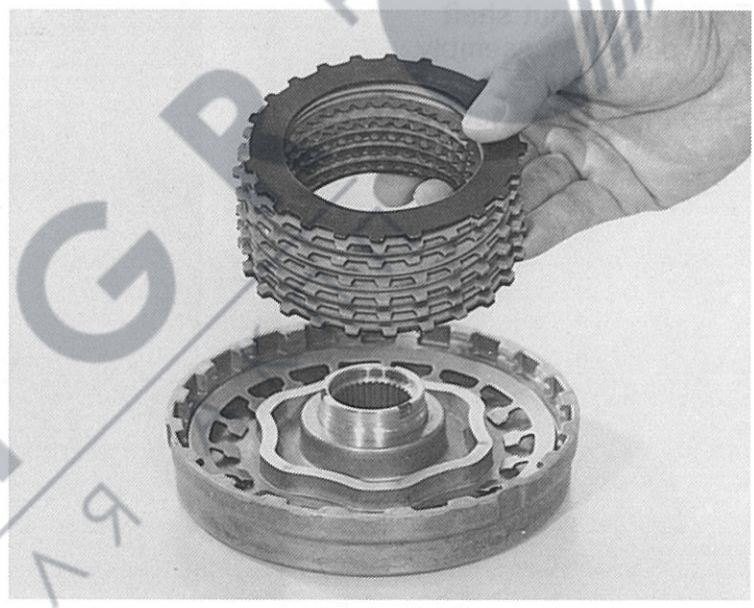
82 196

Remove carrier A-B



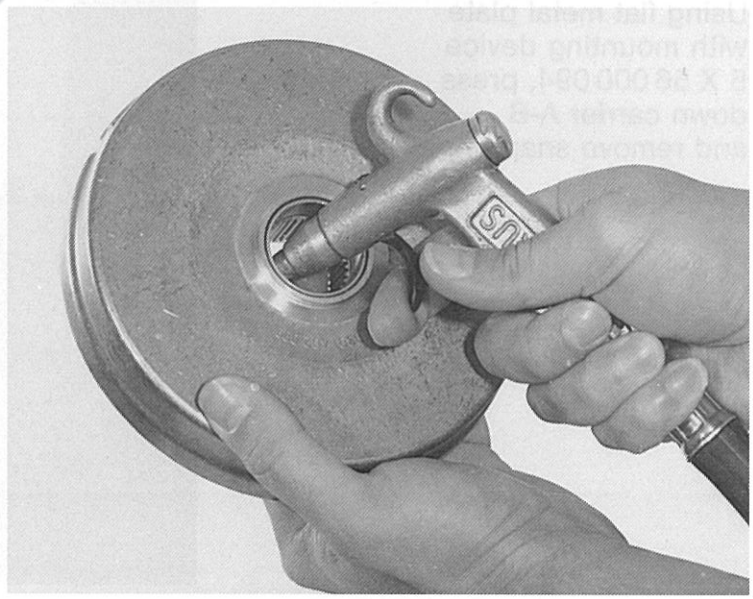
82 197

Remove clutch A assembly as well as plate spring A.



82 198

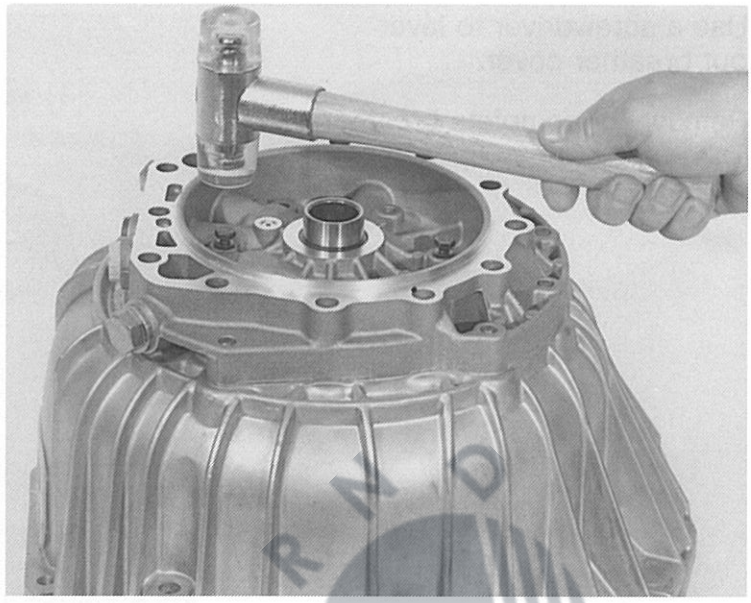
Use air gun for removal of piston A.
Apply air pressure into oil feed hole.



2.6 Bell Housing with Intermediate Plate and Pump

86 029

For removal of pump unscrew connection bolts. Select 2 connection bolts which are directly across from each other, screw in 2 turns and tap lightly with plastic hammer for removal at pump. Use tool head size 10 mm.

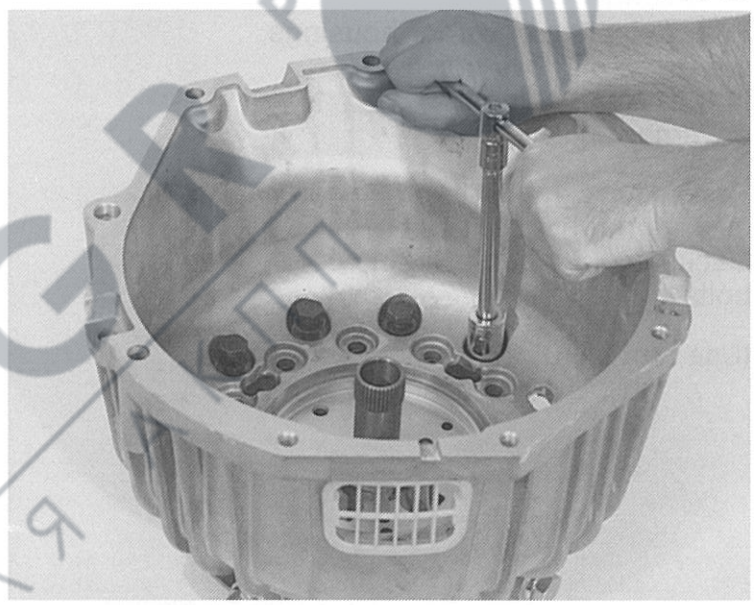


86 030

During normal work procedure do not remove bell housing from intermediate plate.

If it is necessary to remove intermediate plate, due to damage or leaking unscrew remaining bolts and remove bell housing from intermediate plate.

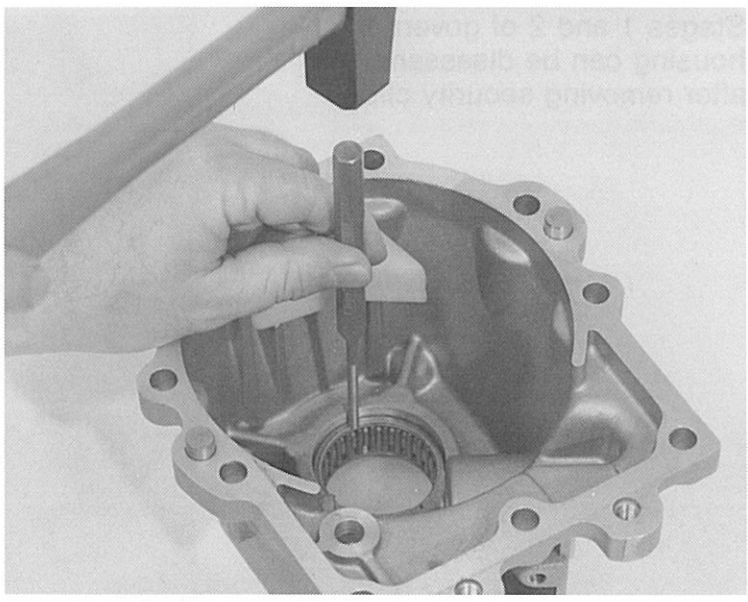
(Use tool head size 17 mm)



2.7 Transmission Extension and Centrifugal Governor

86 031

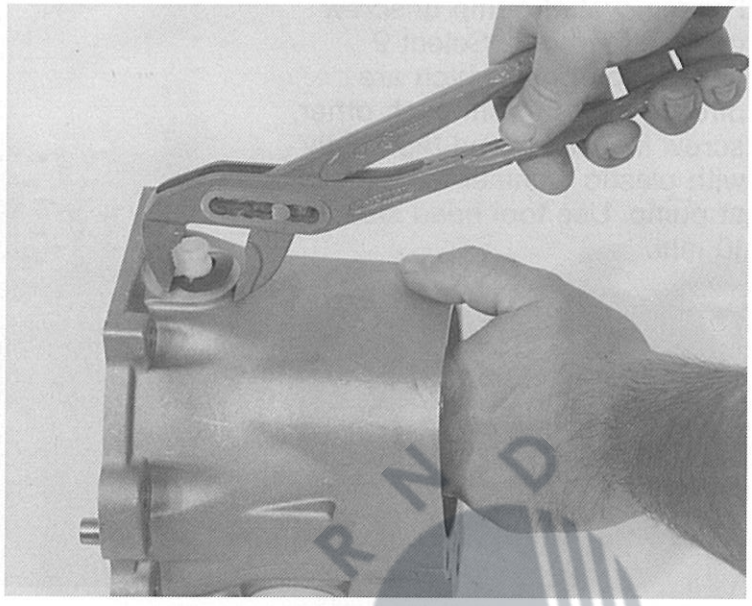
During normal work pocedure do not remove needle bearing. If it is necessary, use punch for removal, as shown in the picture.



86 033

Use a screwdriver to lever out breather cover.

Removal of complete breather. Take off security clip with pliers.

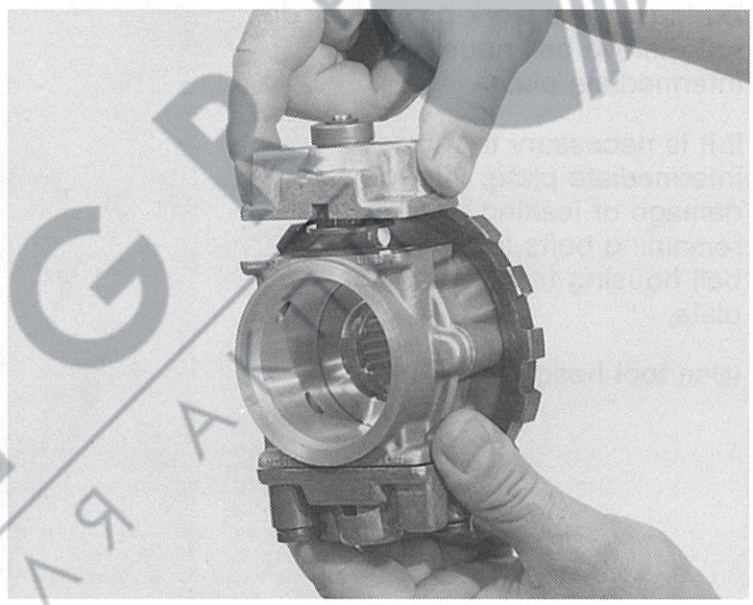


86 034

Both complete governor housings are taken off governor hub to clean complete governor unit.

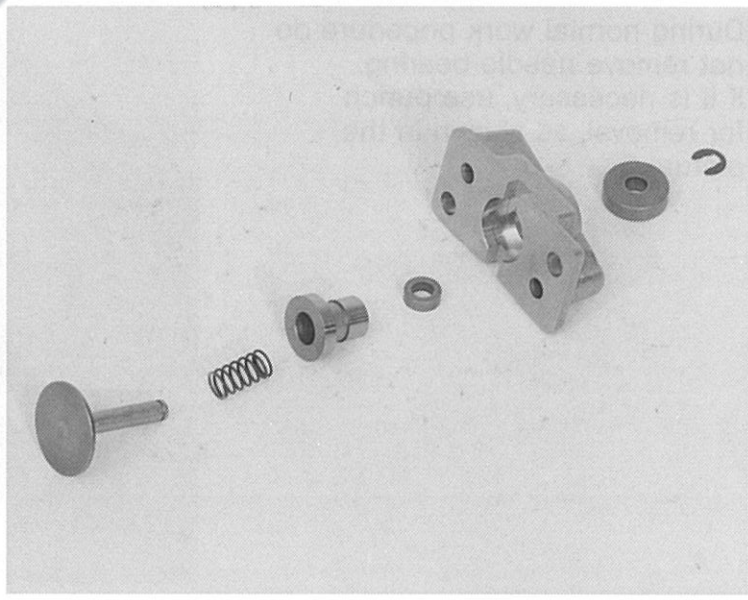
First remove 1st and 2nd stages of governor housing by slackening the two cylindrical bolts.

(Use torx bit TX 27)



86 032

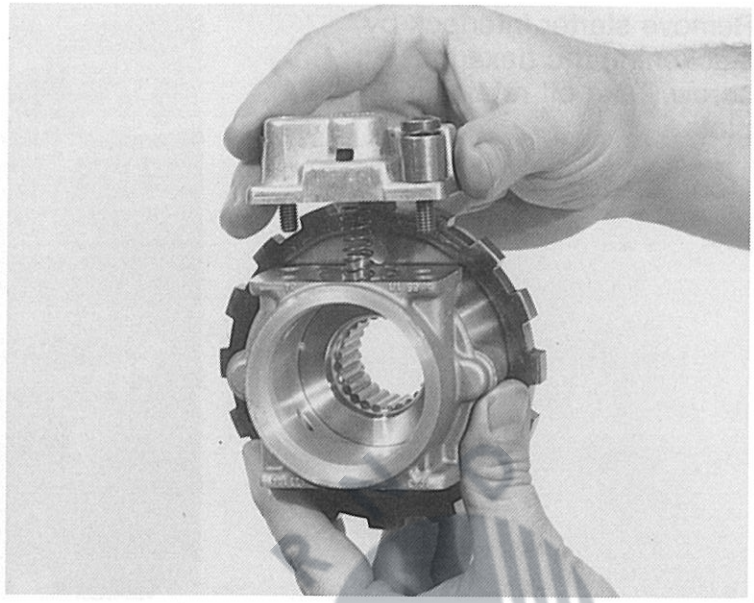
Stages 1 and 2 of governor housing can be disassembled after removing security clip.



86 035

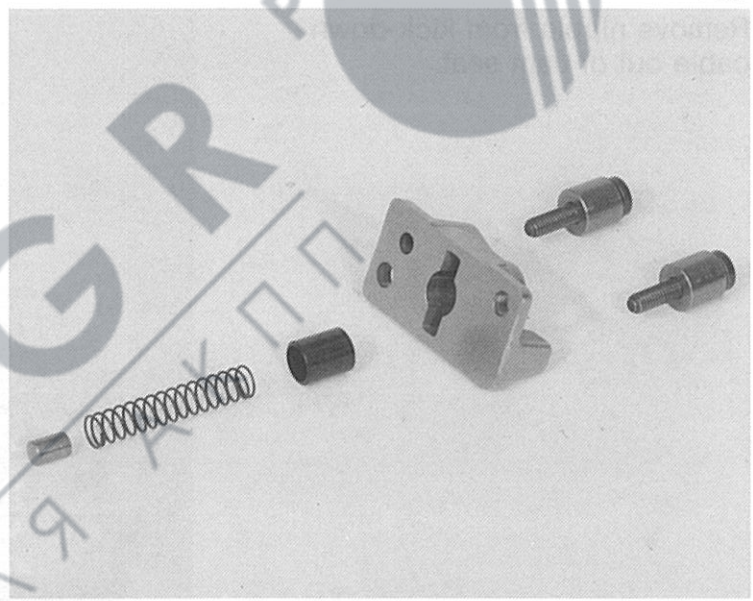
Remove 3rd stage of governor housing by slackening the two cylindrical bolts and lifting off distance bushes.

(Use torx bit TX 27)



86 036

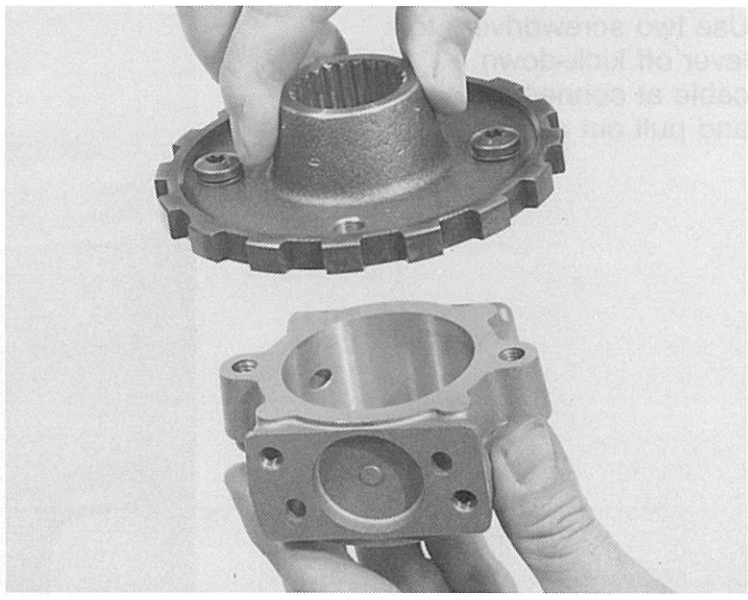
Disassembled 3rd stage of governor housing is shown in photo opposite.



86 037

During normal work procedure do not disconnect parking wheel at governor hub.
If necessary, unscrew 2 cylindrical bolts and take off parking wheel.

(Use torx bit TX 27)

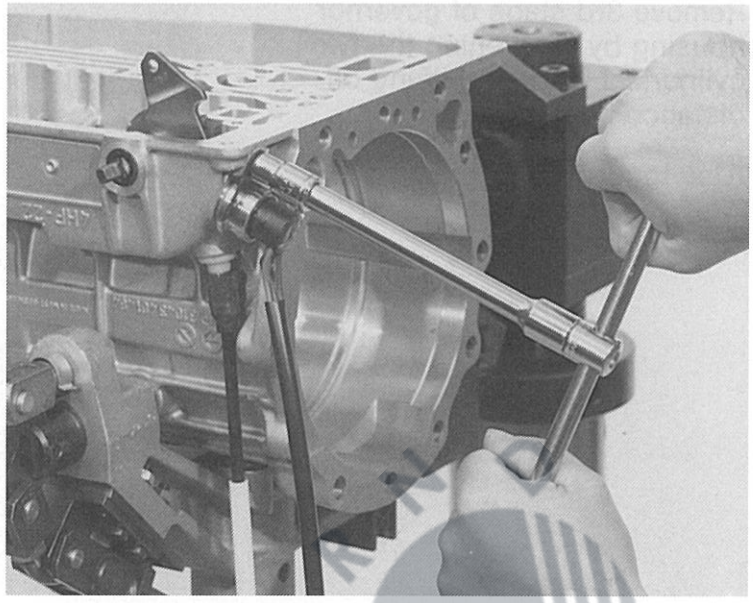


2.8 Transmission Case with shift selection

86 038

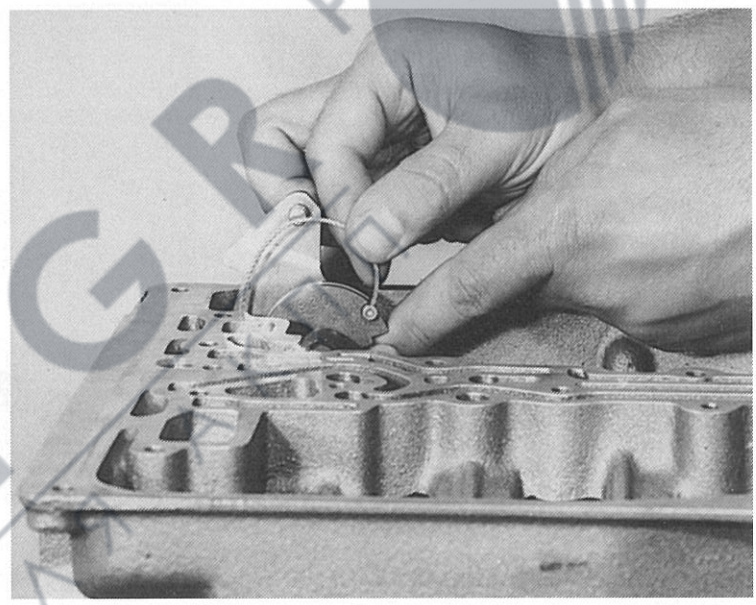
Remove starter interlock by slackening the hexagon screw. Take off retaining plate.

(Tool headsize = 10 mm)



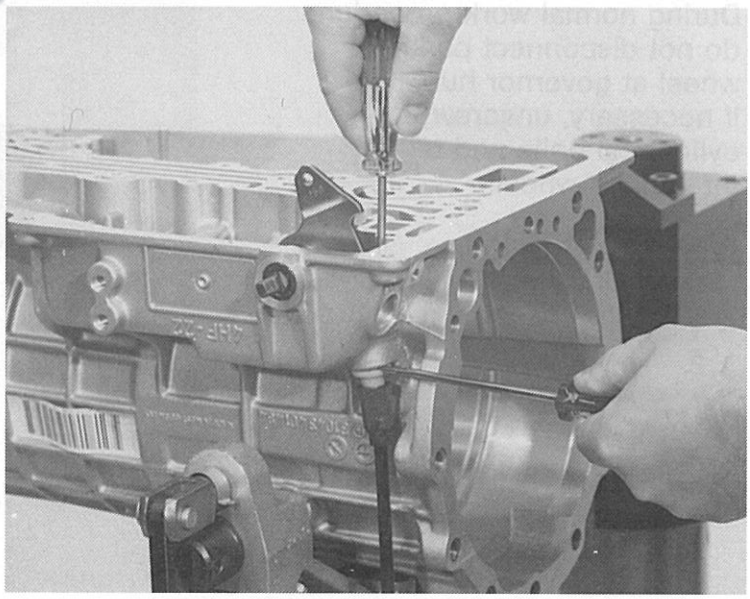
82 074

Remove nipple from kick-down cable out of cam seat.



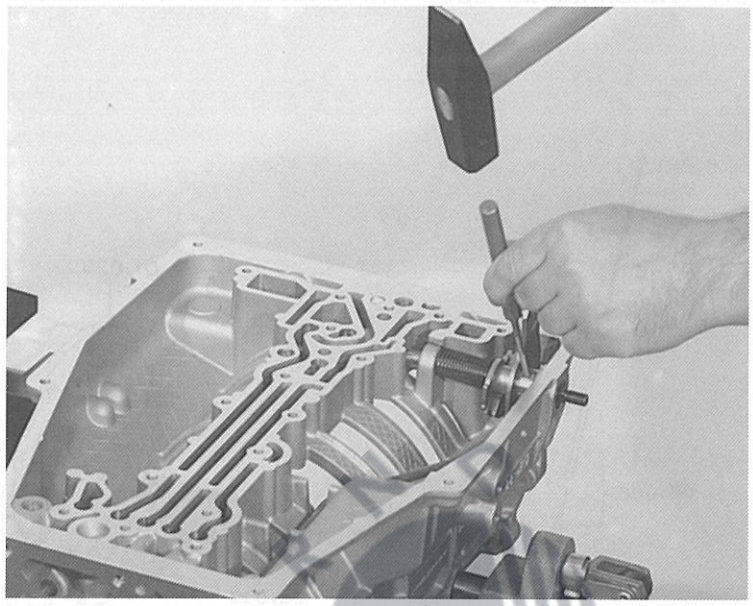
86 039

Use two screwdrivers to lever off kick-down cable at connection and pull out cable.



86 040

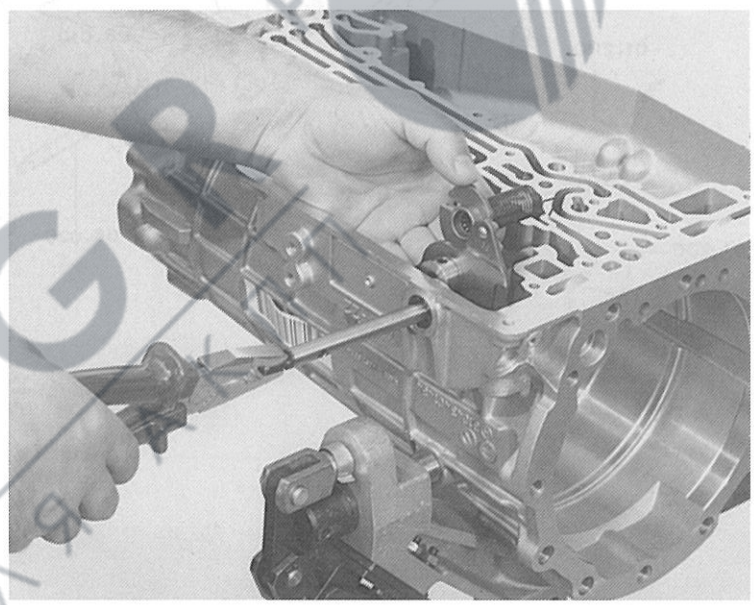
Normally, selector and park assembly are left in transmission housing. If removal is necessary use punch to remove roll pin in selector shaft.



86 041

After removal at selector shaft, take out stop washer, connection rod cam, and leg spring.

Also remove seal ring in transmission case with screwdriver.

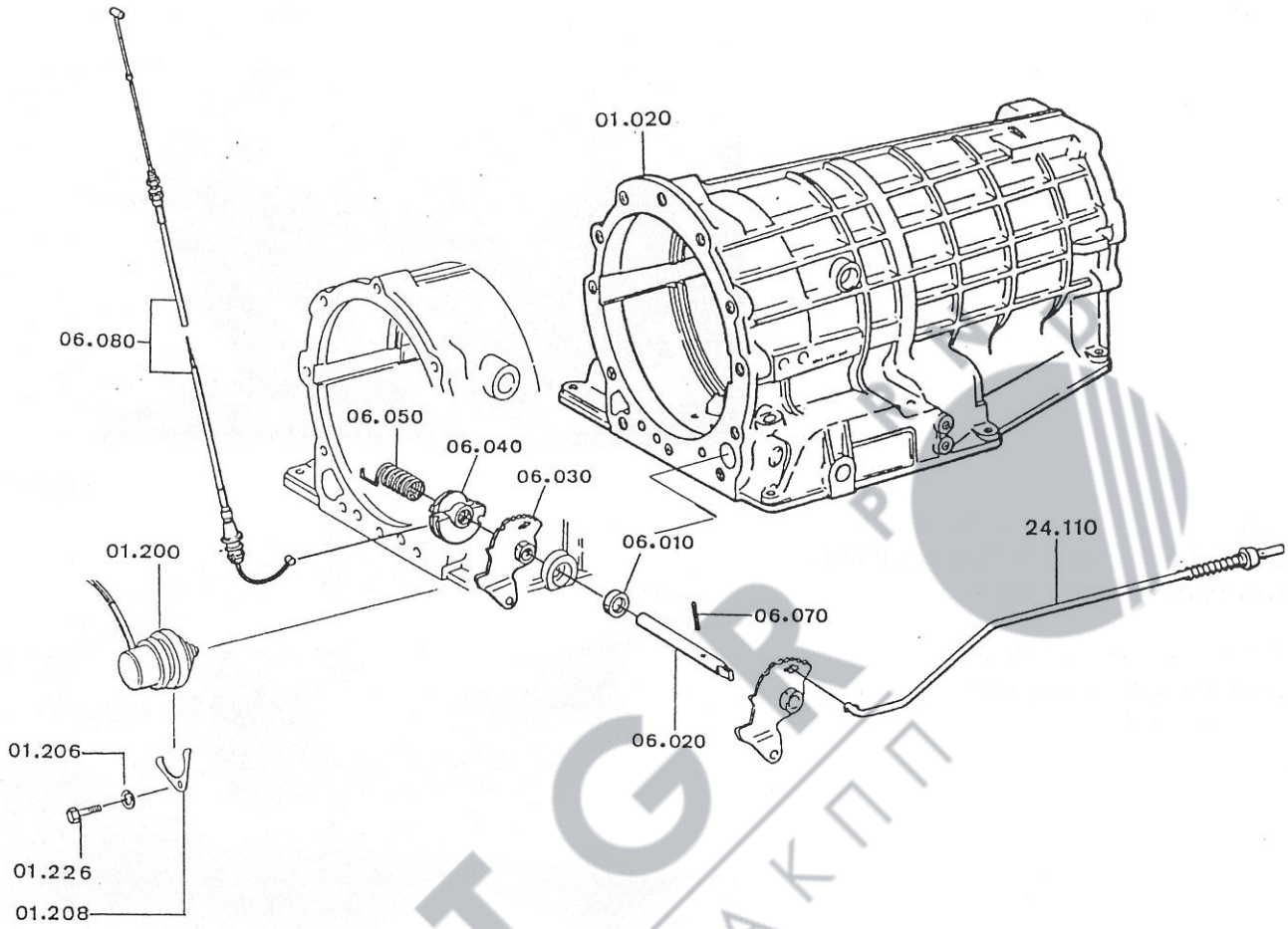


Following conditions are required prior to valve body disassembly.

Requirements

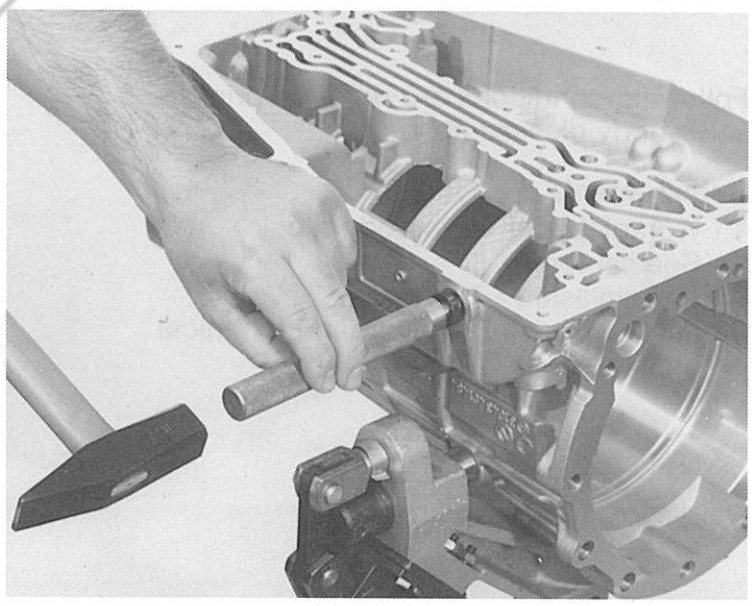
1.) Workplace for valve body repair
2.) Special tools
3.) Transmission - Teststand
4.) Part number information and technical updates

3. Assembly
3.1 Transmission Case with Selector and Park Assembly



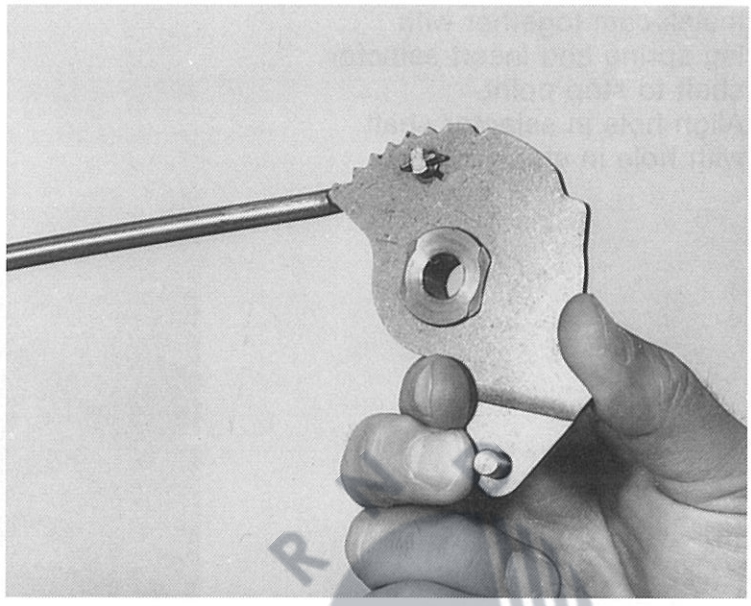
86 042

Fit in new seal ring 06.010 with suitable punch into transmission case 01.020.



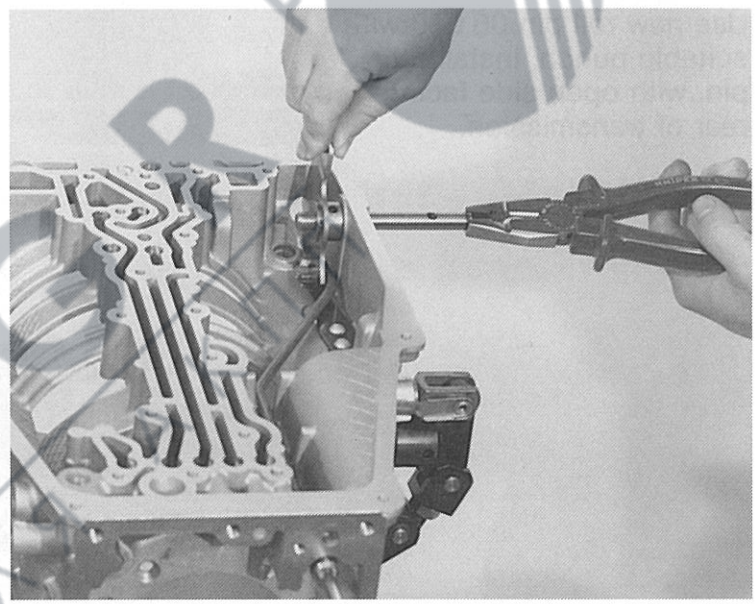
82 084

Fit connection rod 24.110 into stop washer 06.030 as shown.



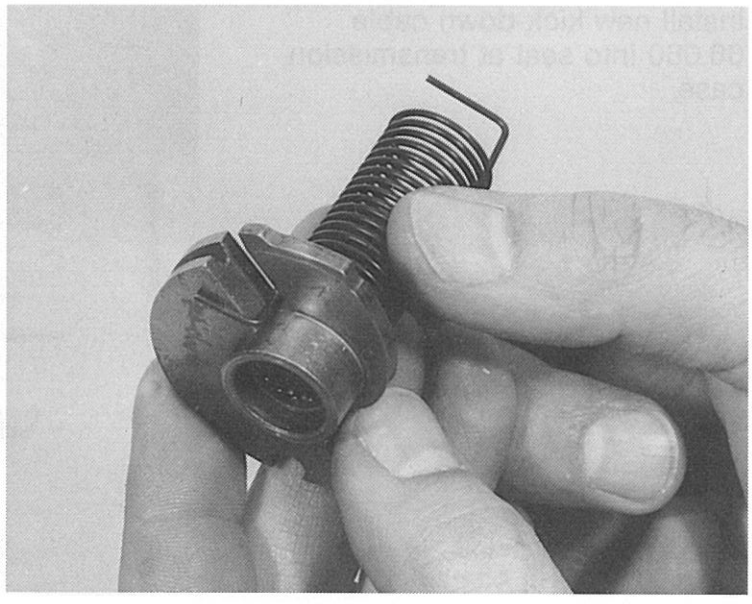
86 043

Place stopwasher with connection rod into transmission case, and put in selector shaft 06.020.



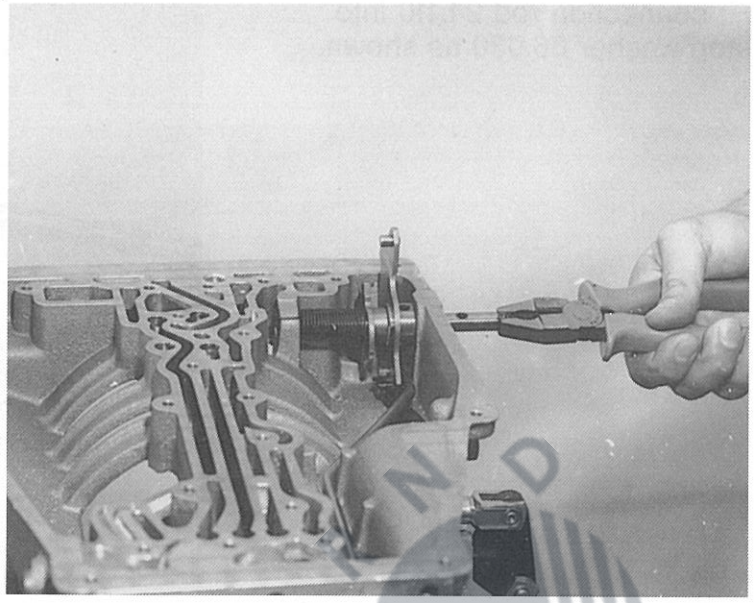
81 201

Fit leg spring 06.050 into cam as shown in the picture.



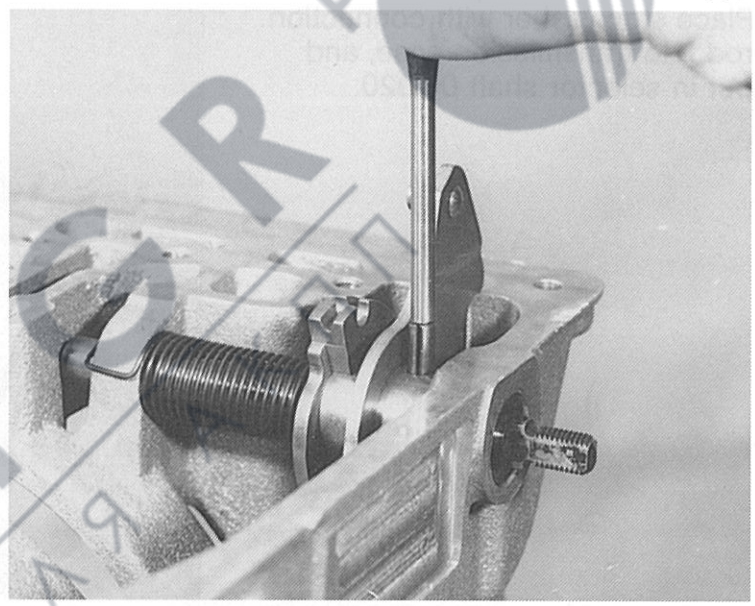
82 086

Install cam together with leg spring and insert selector shaft to stop point.
Align hole in selector shaft with hole in stop washer.



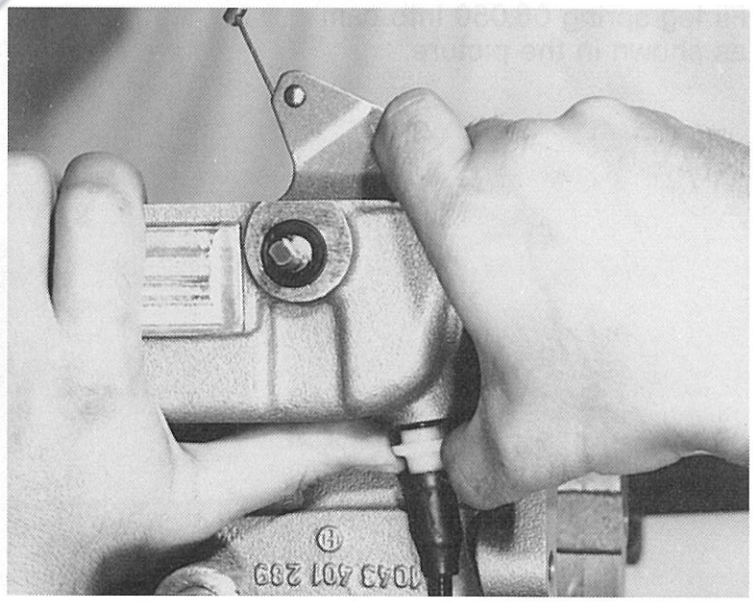
82 087

Use new roll pin 06.070 with suitable punch, install roll pin, with open side facing rear of transmission.



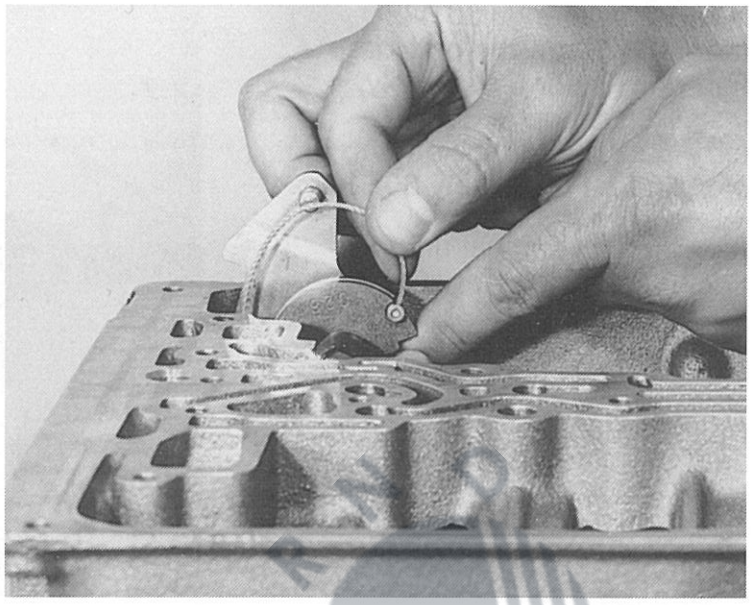
82 088

Install new kick-down cable 06.080 into seat at transmission case.



82 074

Turn cam once for springload.
Fit nipple of kick-down cable into cam seat.

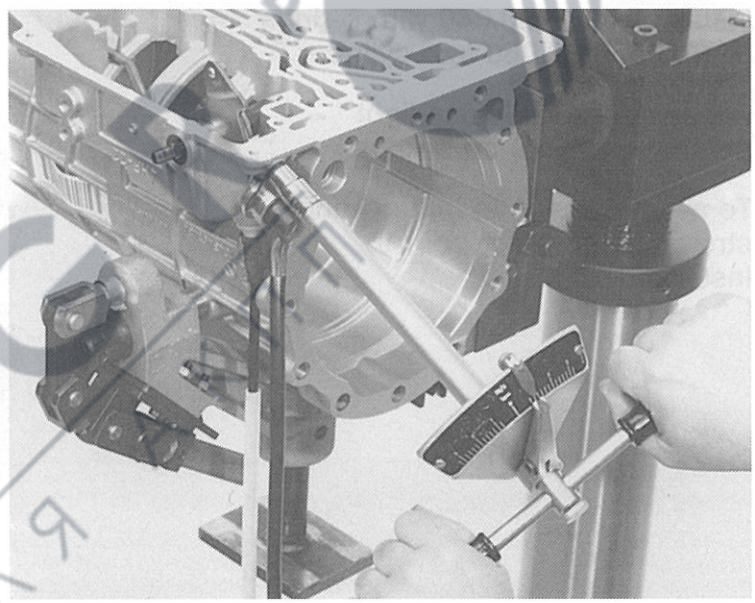


86 044

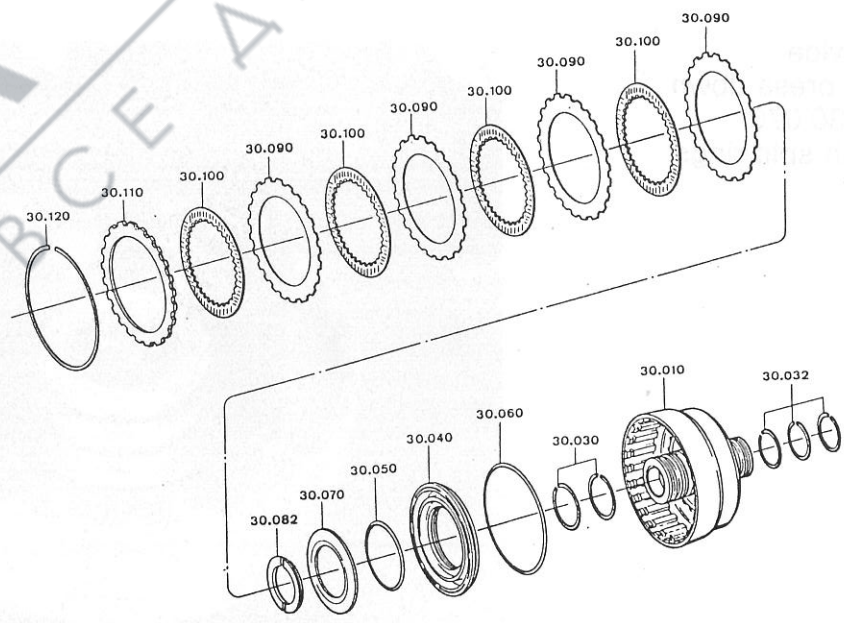
Install starter interlock 01.200 with retaining plate 01.208 as shown in picture.
This is done by screwing in hexagon screw 01.226 with spring lock washer 01.206.

(Tool headsize = 10 mm)

(To be torqued 10 Nm)



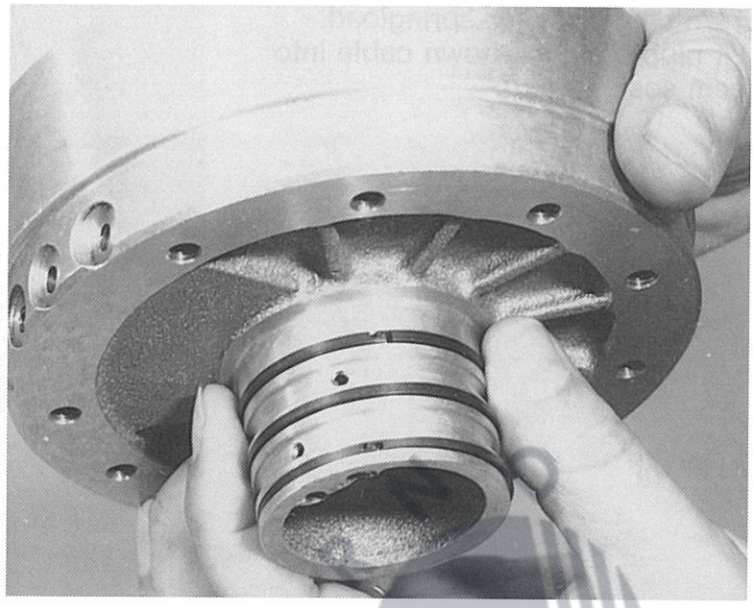
3.2 Brake F



82 089

Install 3 seal rings 30.032 (size 48 x 2) on the outside hub of cylinder F assembly. Install 2 seal rings 30.030 (size 52 x 2.5) on inside hub of cylinder F assembly 30.010.

Attention: Each seal ring must be snapped together.

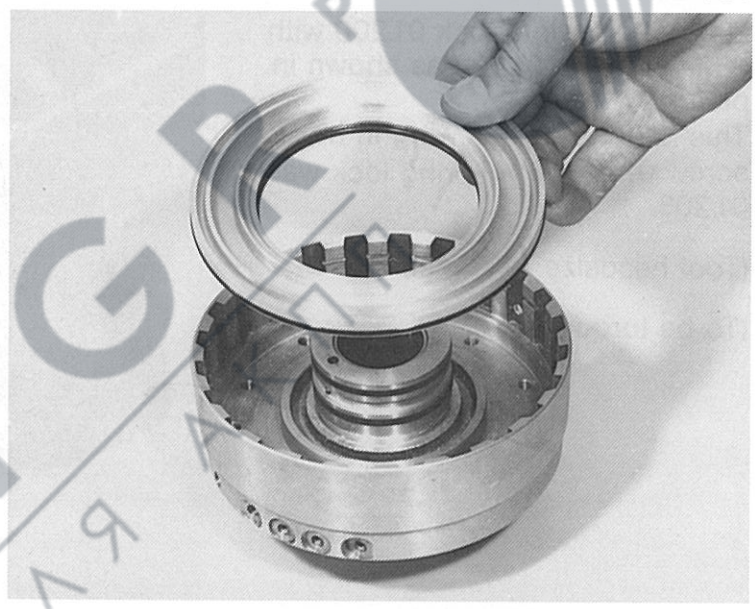


82 090

Install piston F 30.040 with o-rings 30.050 and 30.060 into cylinder F.

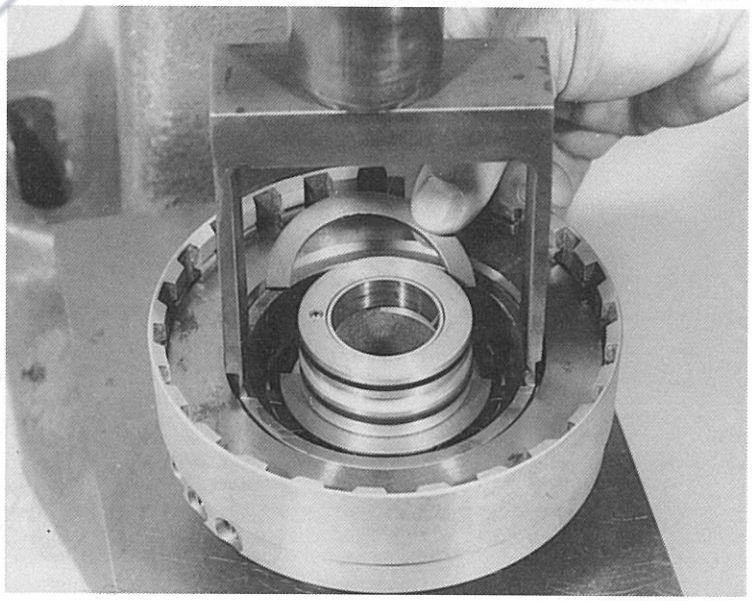
For easy assembly use light grease (Vaseline) on o-rings.

To avoid damage to inner o-ring stretch inner o-ring prior to installation.



82 078

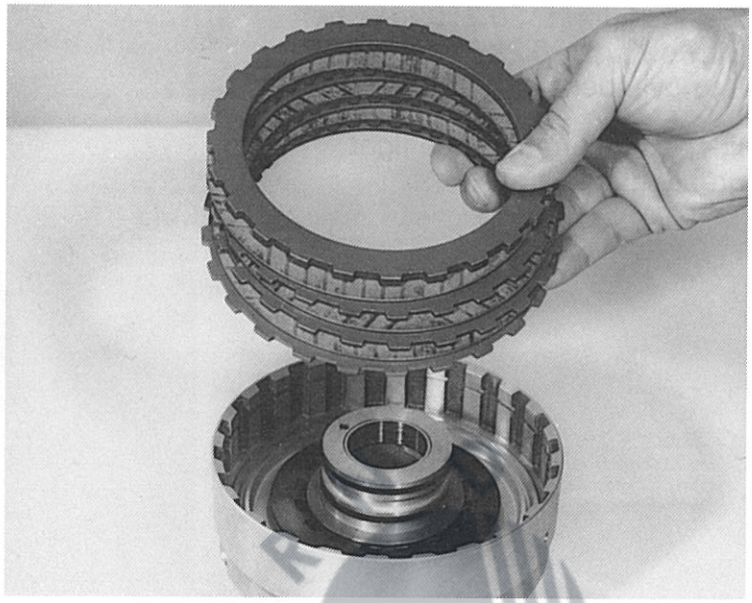
With spring device 5 X 46 000 167 press down plate spring F 30.070 and secure with split rings 30.082.



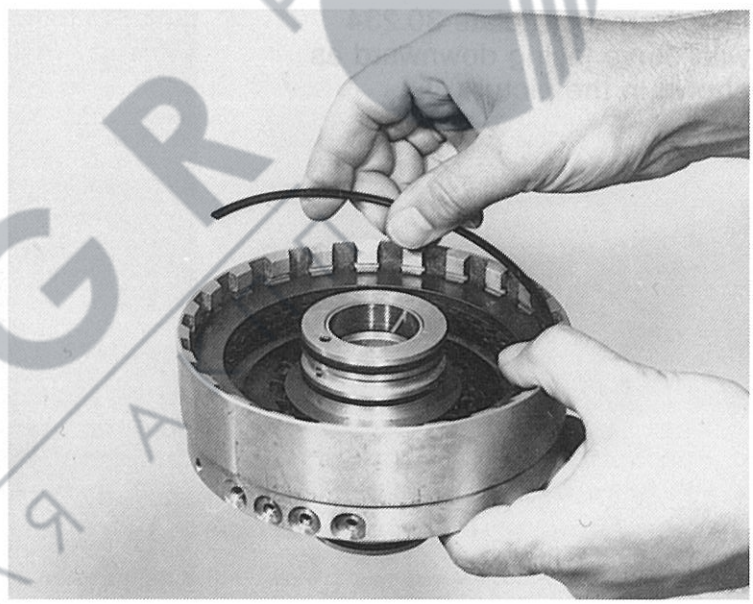
Install brake F assembly into cylinder F. Start with steel plate 30.090.

Attention: Do not mix up steel plates with those in clutch E.

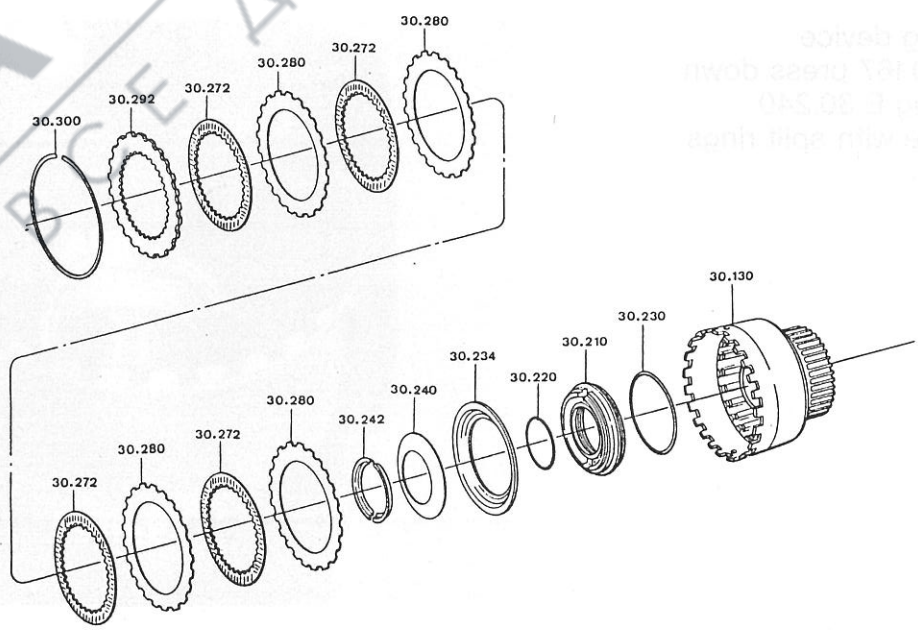
Difference:
30.090 - steel plates thicker
30.100 - clutch plates same
30.110 - end plate without inner teeth



Secure end plate with snap ring 30.120.



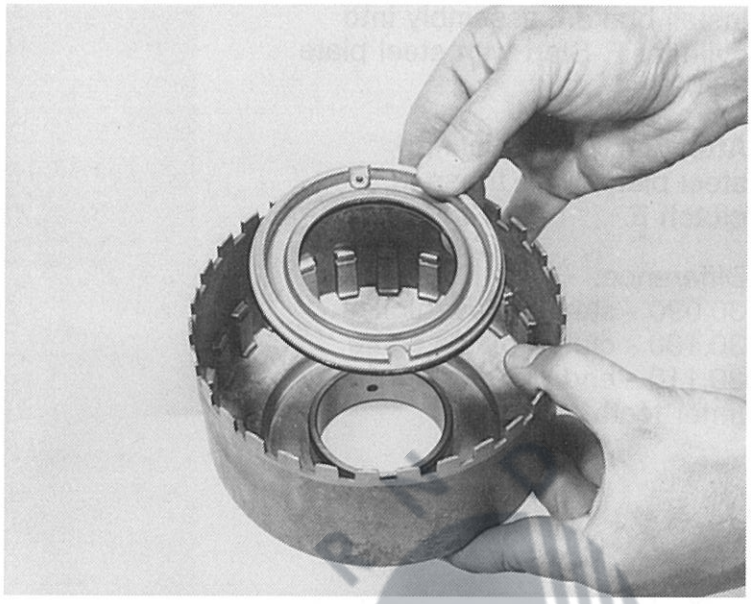
3.3 Clutch E



82 080

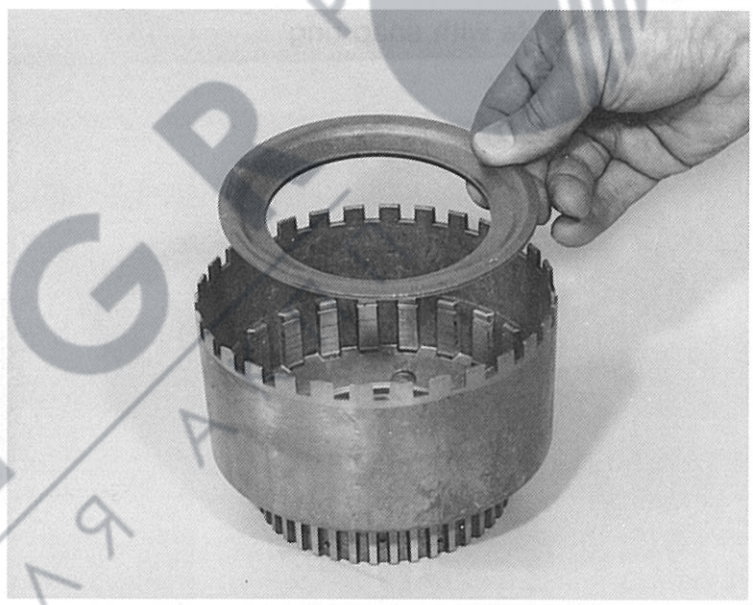
Install piston E 30.210 together with o-rings 30.220 and 30.230 into cylinder E.

For easy mounting use light grease (Vaseline).



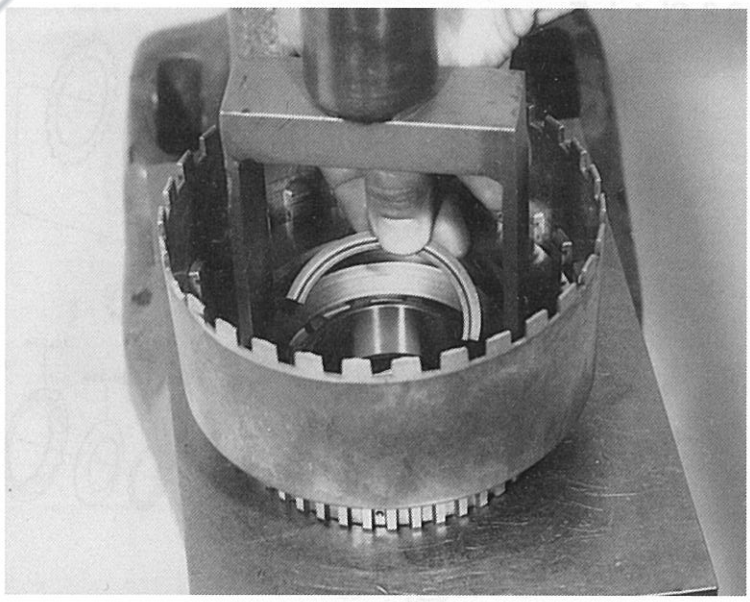
82 079

Install pressure plate 30.234 with curve facing downward as shown in the picture.



82 093

With spring device 5 X 46 000 167 press down plate spring E 30.240 and secure with split rings 30.242.



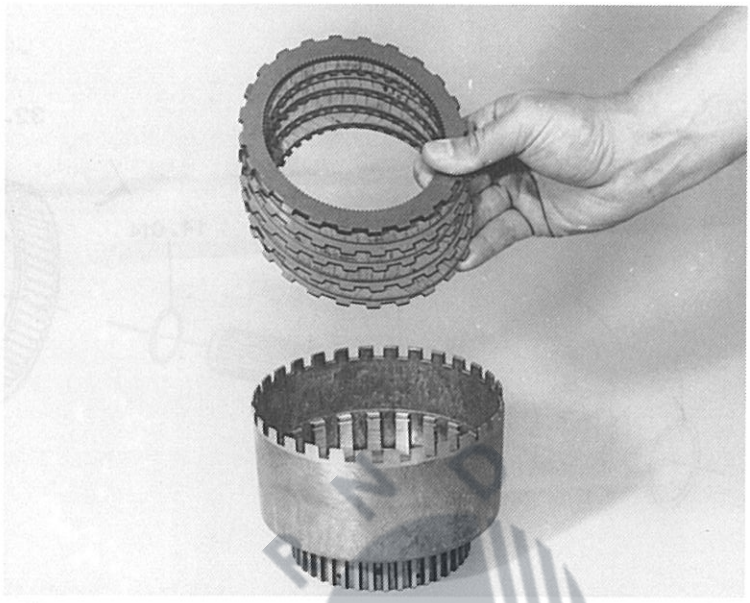
82 044

Install clutch E assembly into cylinder E.

Start with steel plate 30.280.

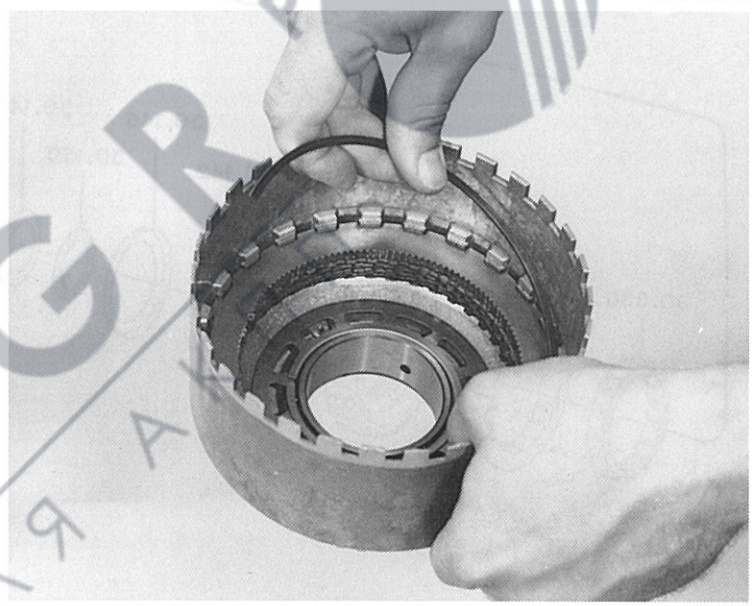
Attention: Do not mix up steel plates with those in brake F.

Difference:
30.270 - clutch plates same
30.280 - steel plates thinner
30.292 - end plate has inner teeth.

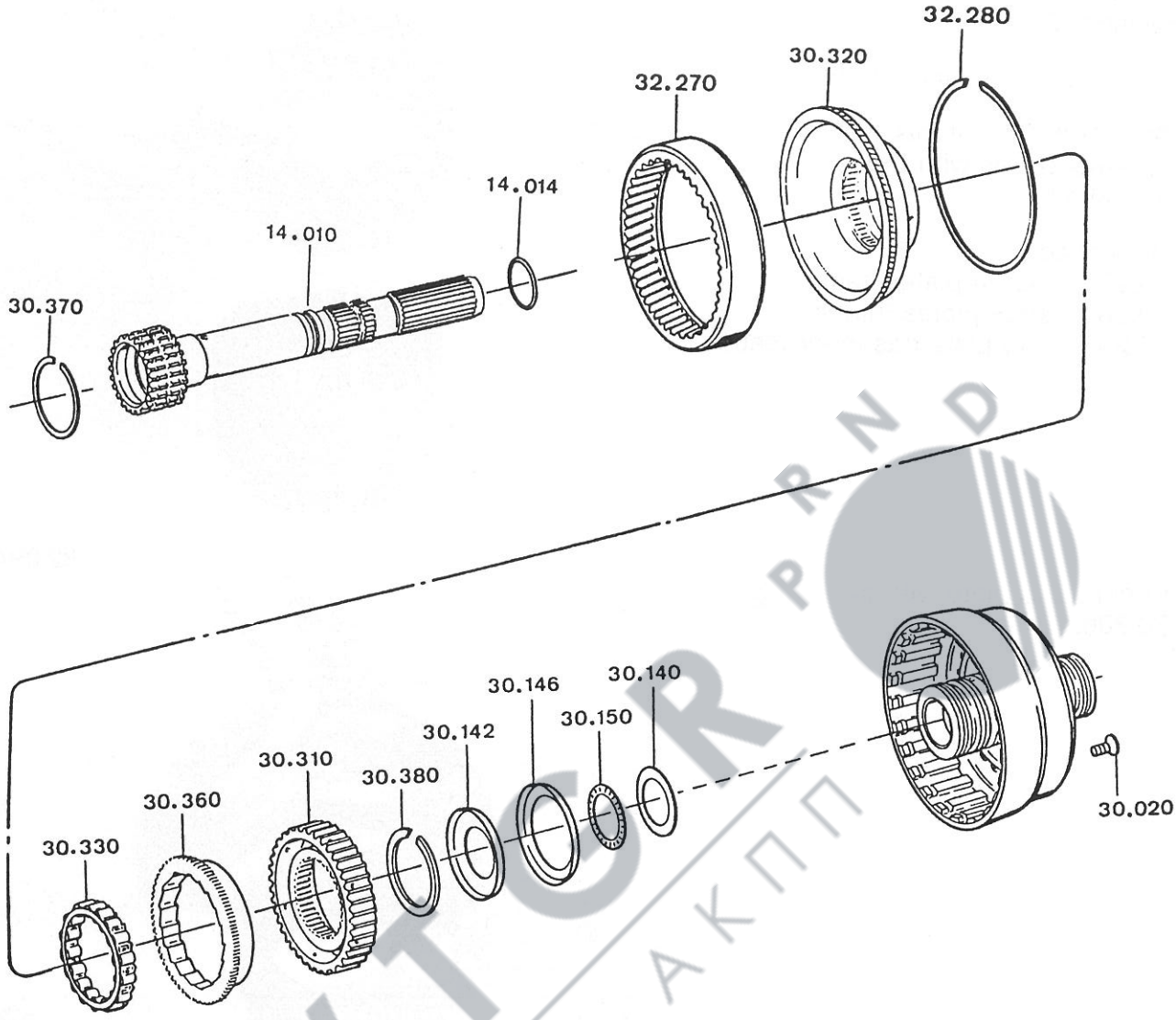


82 094

Secure end plate with snap ring 30.300.

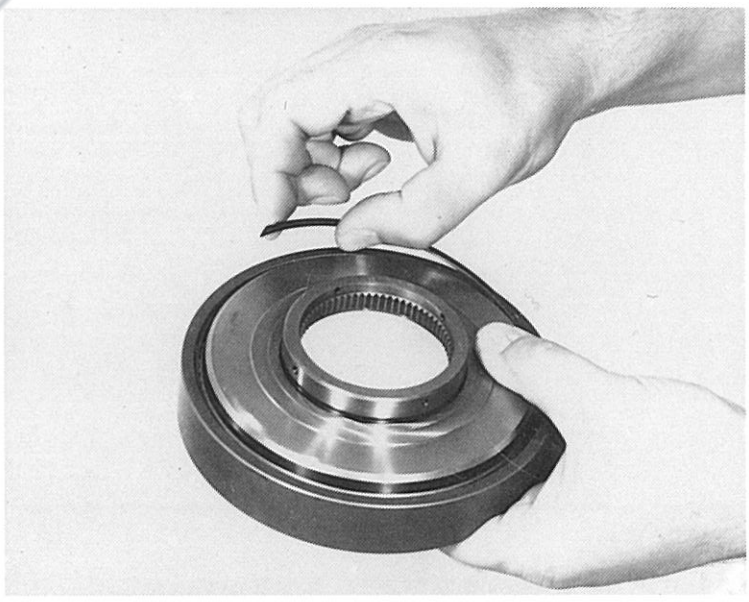


3.4 Mounting and Assembly of 4th Gear Complete



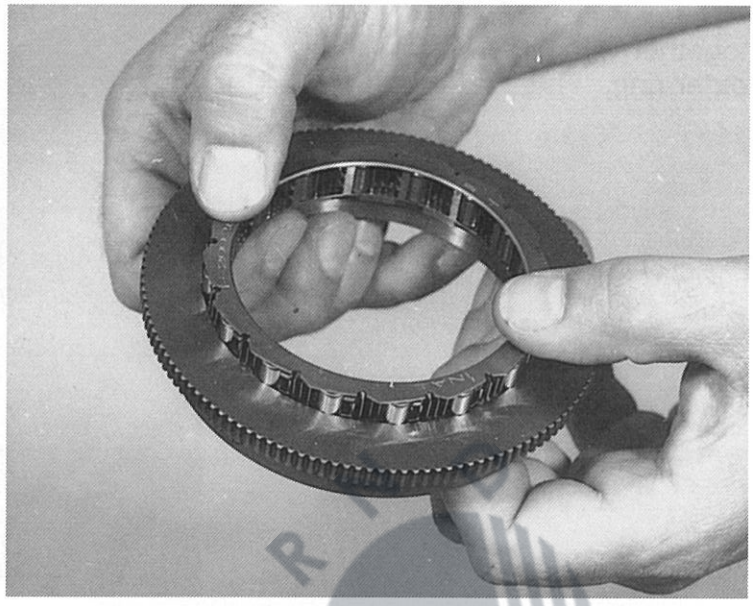
82 095

Connect freewheel inner ring 30.320 together with hollow gear 32.270 and secure with snap ring 32.280.



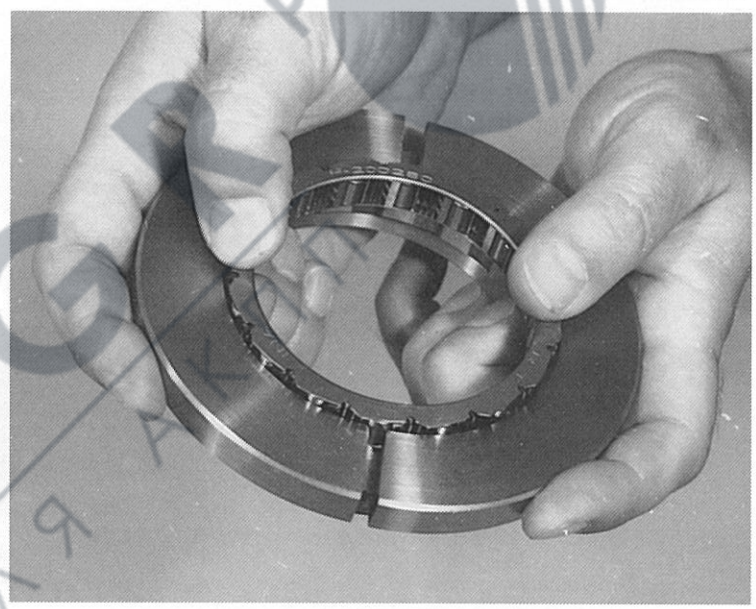
82 096

Line up freewheel cage 30.330 against freewheel outer ring 30.360.



82 097

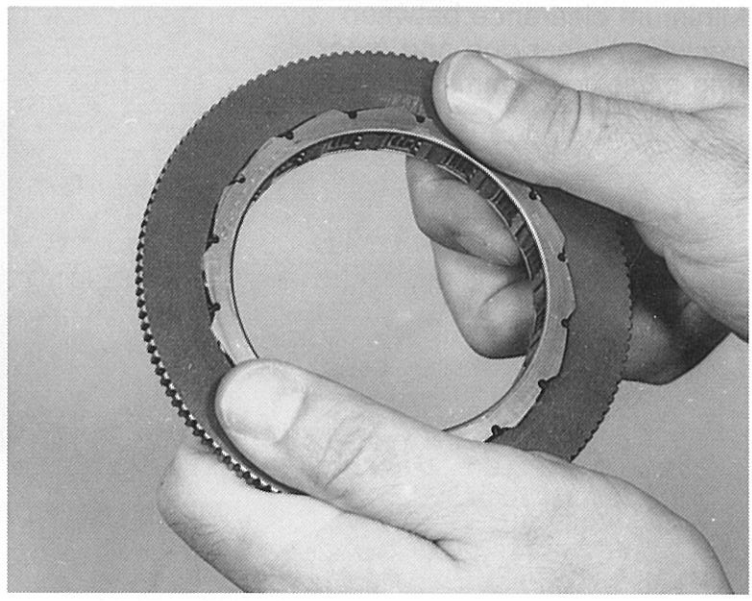
With mounting ring 5 X 46 000 169 press freewheel cage together and install into freewheel outer ring.



82 098

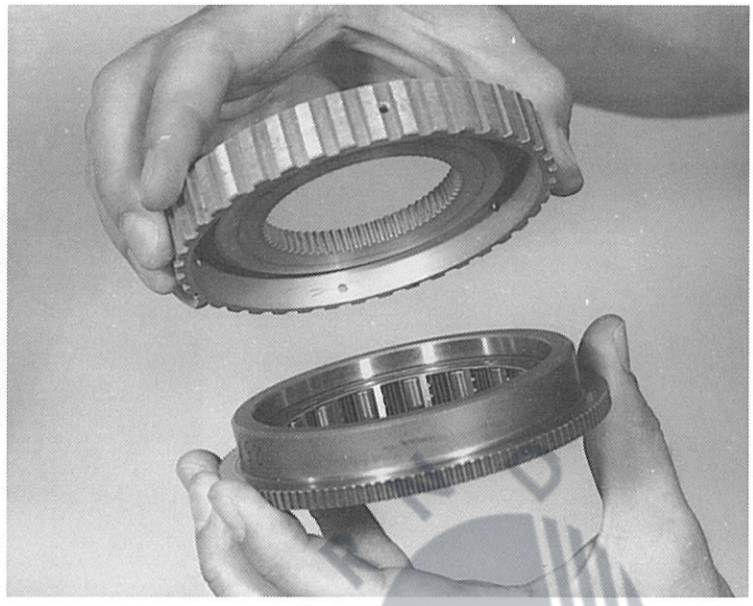
Remove mounting ring. Press in freewheel cage to stop point.

Turn cage until rim has been seated into freewheel outer rim.



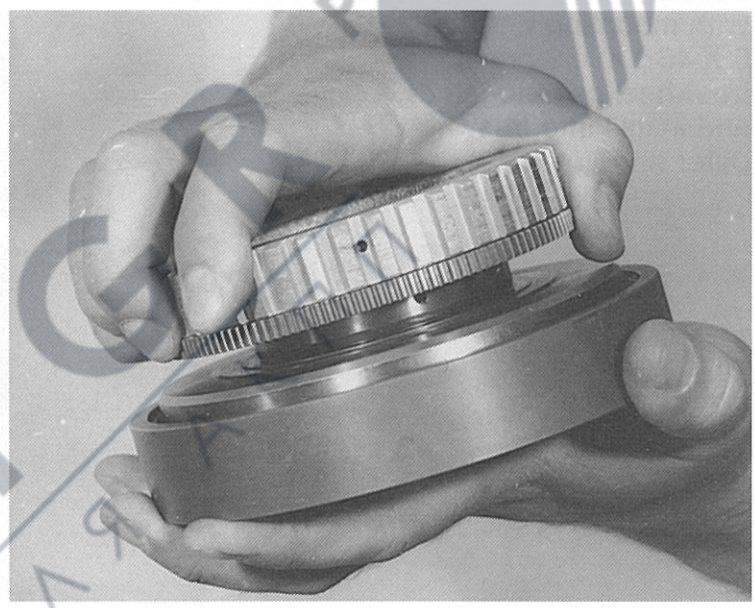
82 099

Place carrier E 30.310 together with freewheel outer ring.



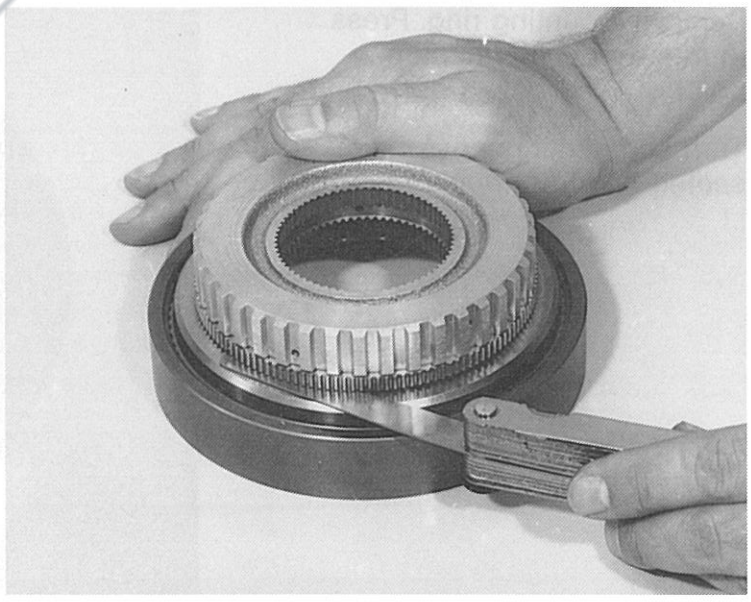
82 100

Grasp carrier E along with freewheel outer ring. With clockwise motion insert onto freewheel inner ring.



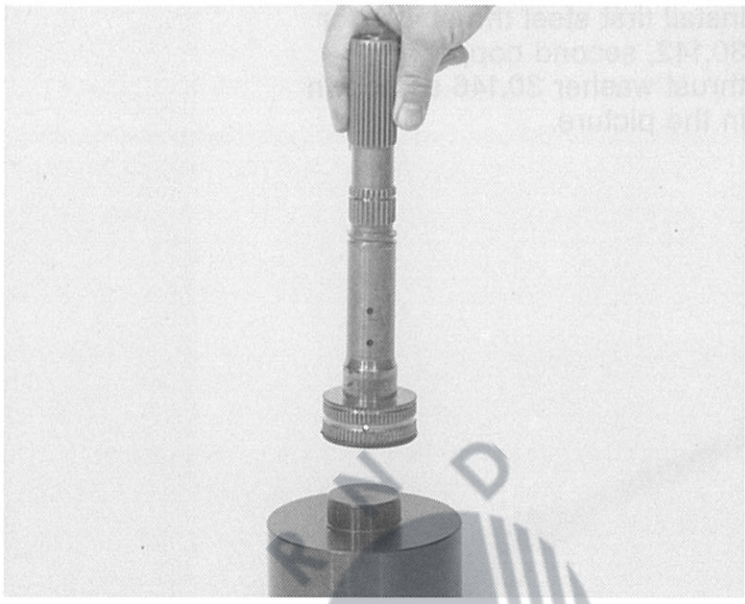
82 104

Minimum clearance between freewheel inner ring and outer ring must be 0.1 mm.



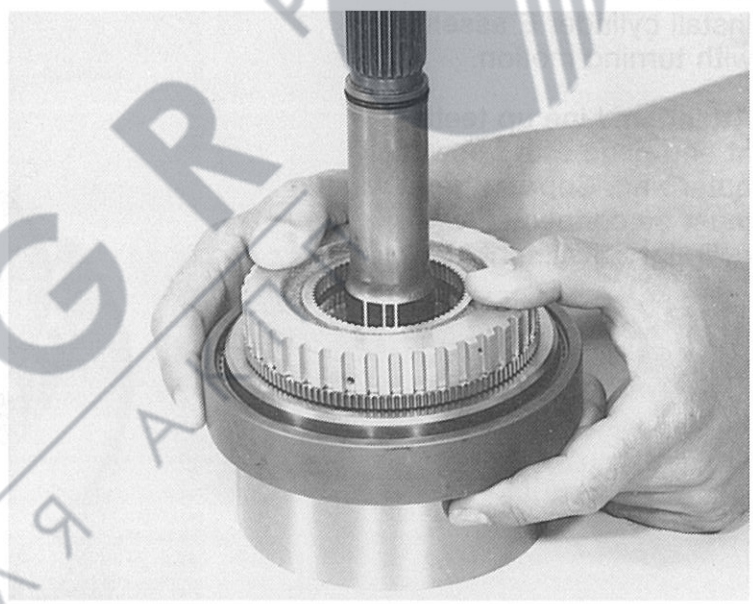
86 045

Fit rear snap ring 30.370 on to output shaft 14.010. Place output shaft on special mounting base 5 X 46 000 168.
Do not fit o-ring 14.014 at this stage.



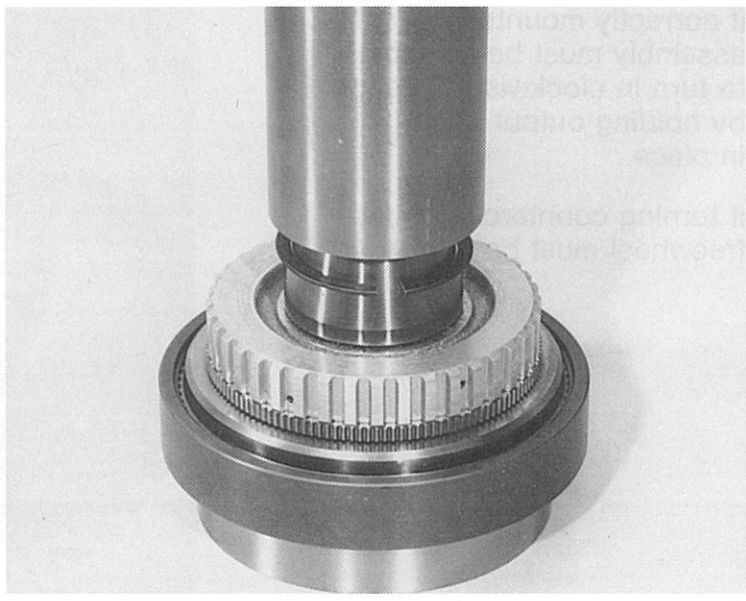
82 106

Align inner teeth of carrier E with freewheel inner ring. Insert freewheel assembly onto output shaft.



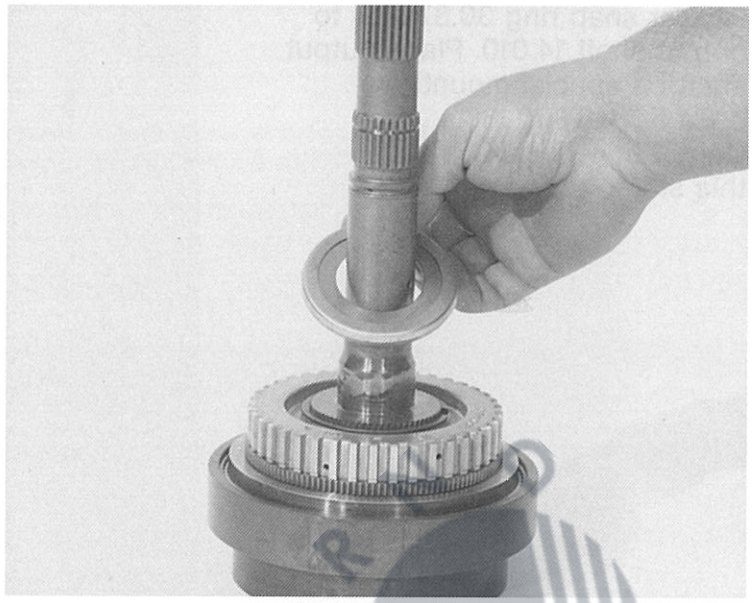
82 107

Place snap ring 30.380 onto mounting sleeve and push down with mounting tube.



Install first steel thrust washer 30.142, second copper thrust washer 30.146 as shown in the picture.

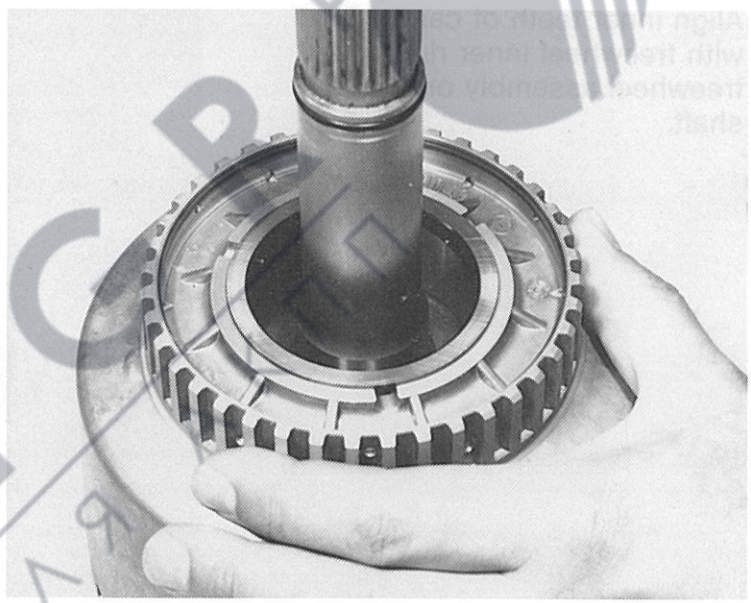
86 046



Install cylinder E assembly with turning motion.

Attention: Line up teeth at end plate with freewheel outer ring. Copper thrust washer must be connected with cylinder E assembly.

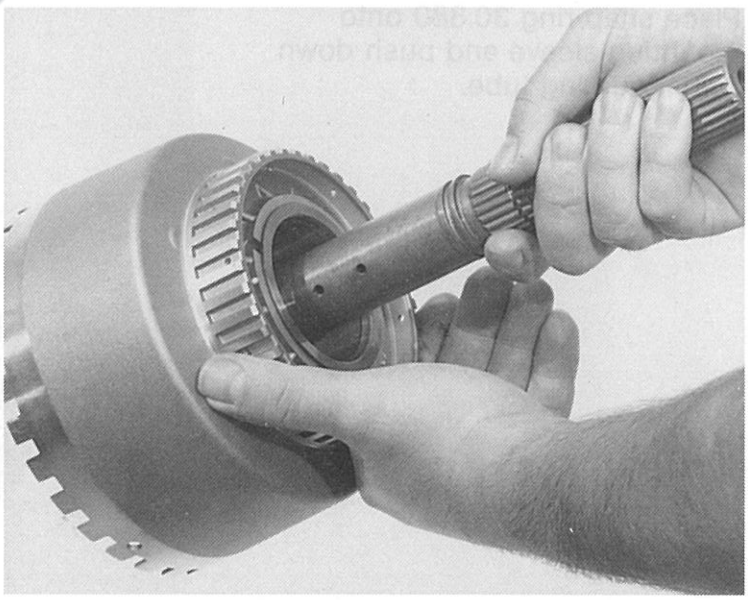
82 109



If correctly mounted cylinder E assembly must be possible to turn in clockwise direction by holding output shaft in place.

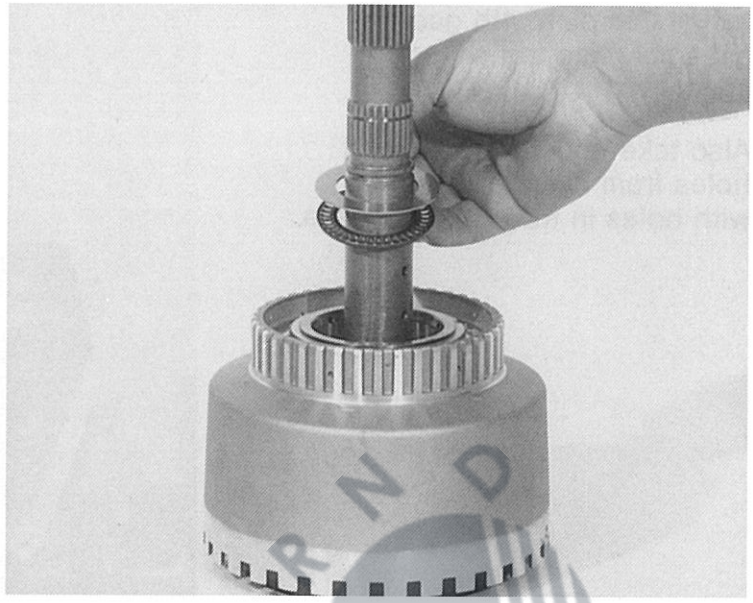
If turning counterclockwise freewheel must be locked up.

86 047



86 048

Insert axial cage 30.150 and axle disc 30.140.



86 049

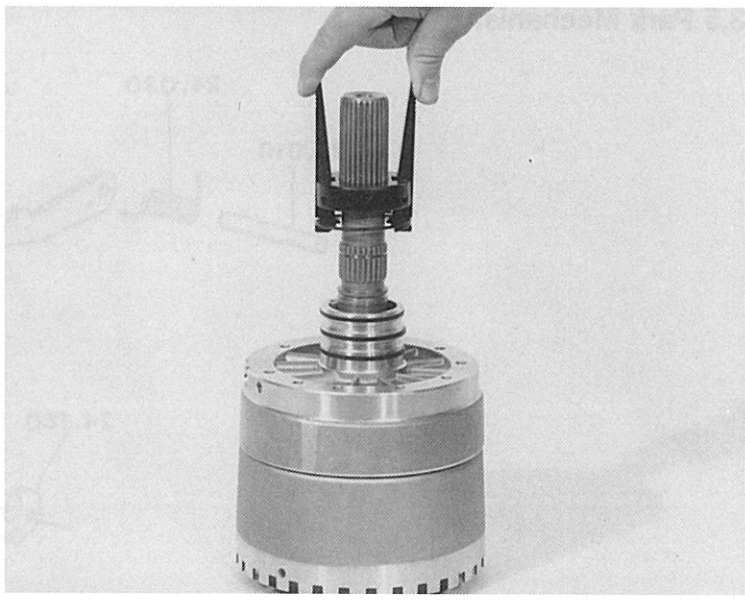
With turning motion install cylinder F assembly onto cylinder E.

If correctly mounted, the raised edge of output shaft will be 10 mm above top surface of cylinder F assembly as shown in the picture.

86 050

To avoid disengagement of 4th gear assembly, fit holding tool 5 X 46 000 209 over output shaft into groove for o-ring.

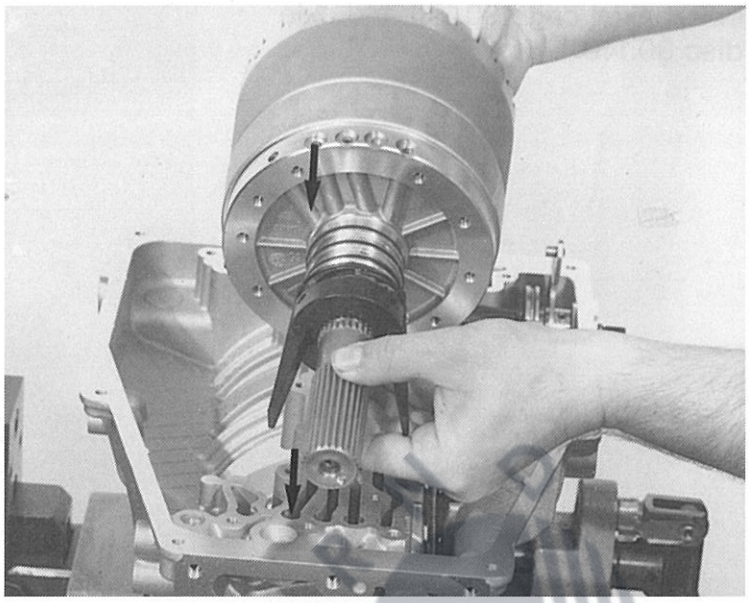
Attention: Disengagement of end plate and freewheel inner ring will occur if end plate exceeds 3 mm.



86 051

Install complete 4th gear assembly into transmission case.

Also take notice that oil feed holes from cylinder F line up with holes in transmission case.

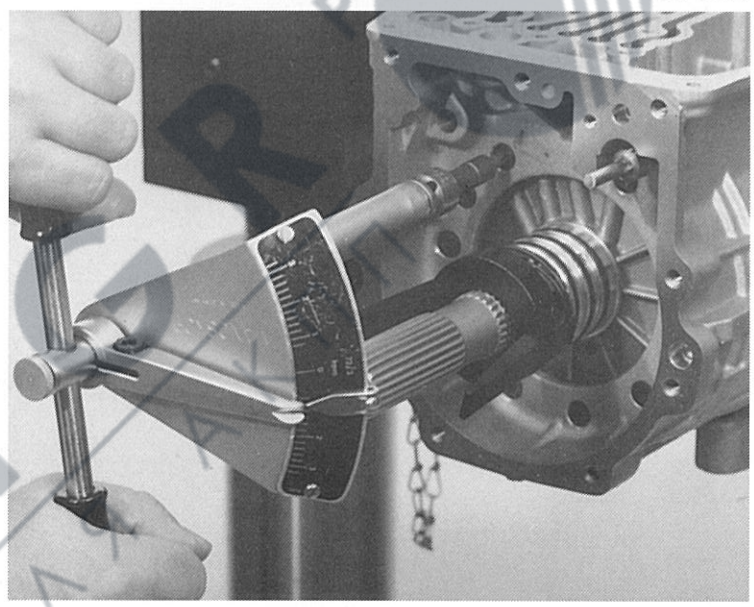


86 052

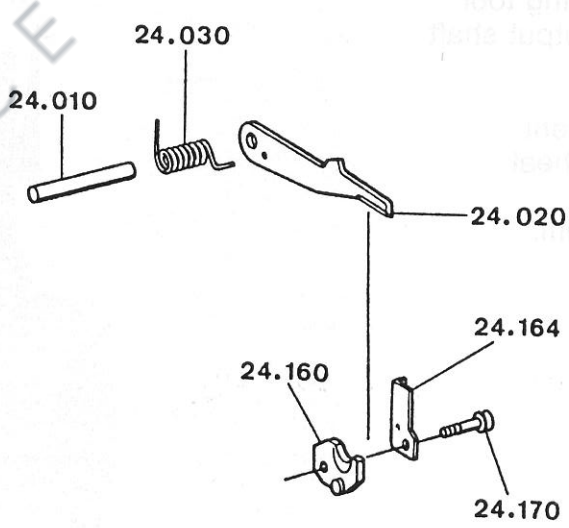
Use 10 counter sunk screws 30.020 for tightening of cylinder F.

Attention: If screws are not tightened up properly, clutch pressure will be lost in clutch F. Use torx bit TX 30

(To be torqued 10 Nm)

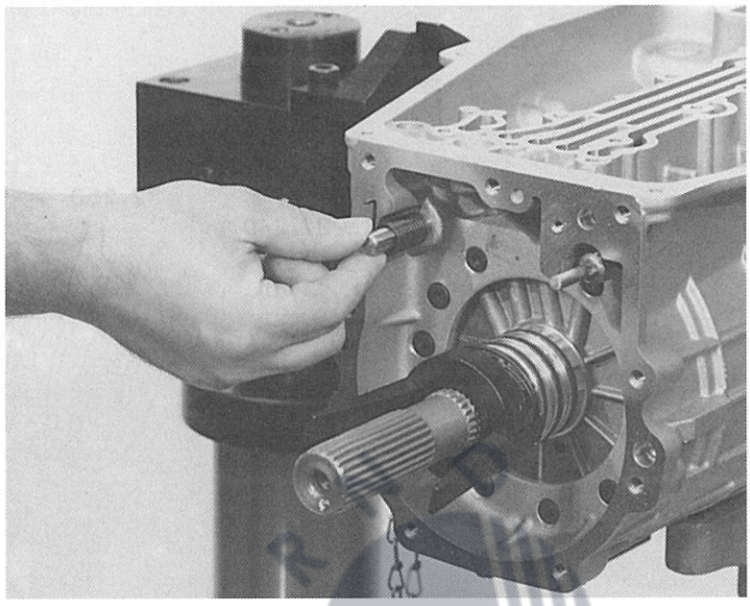


3.5 Park Mechanism



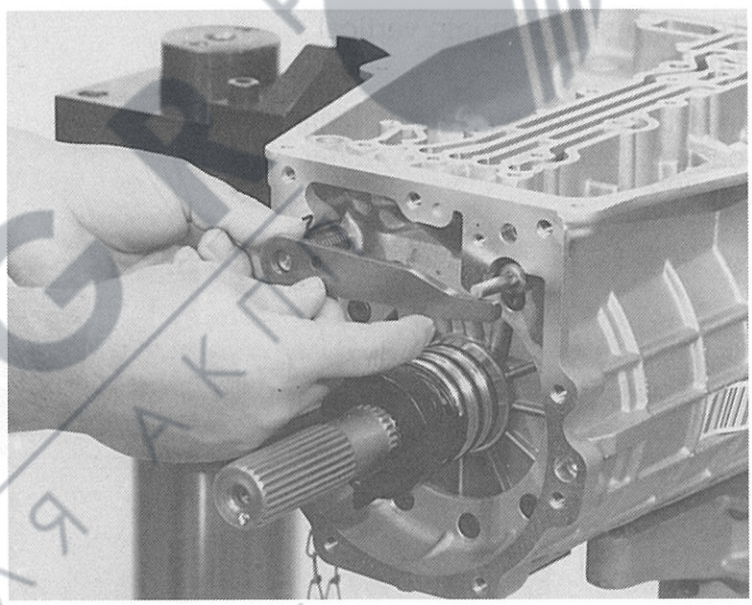
Install pin 24.010 and leg spring 24.030 as shown in the picture 86 053.

86 053



Install pawl onto pin. In order to tighten tension, fit leg from spring into hole of pawl.

86 054

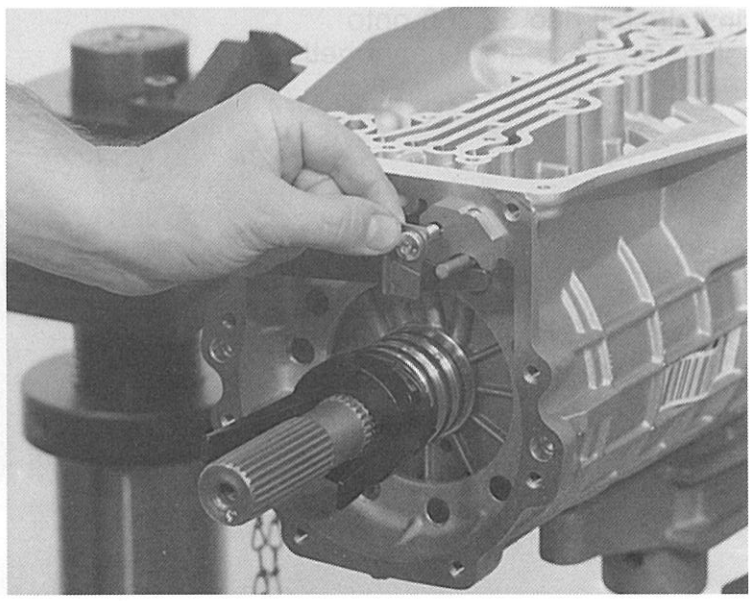


Install plate 24.160 together with guide plate 24.164. Use cylindrical bolt 24.170 for tightening.

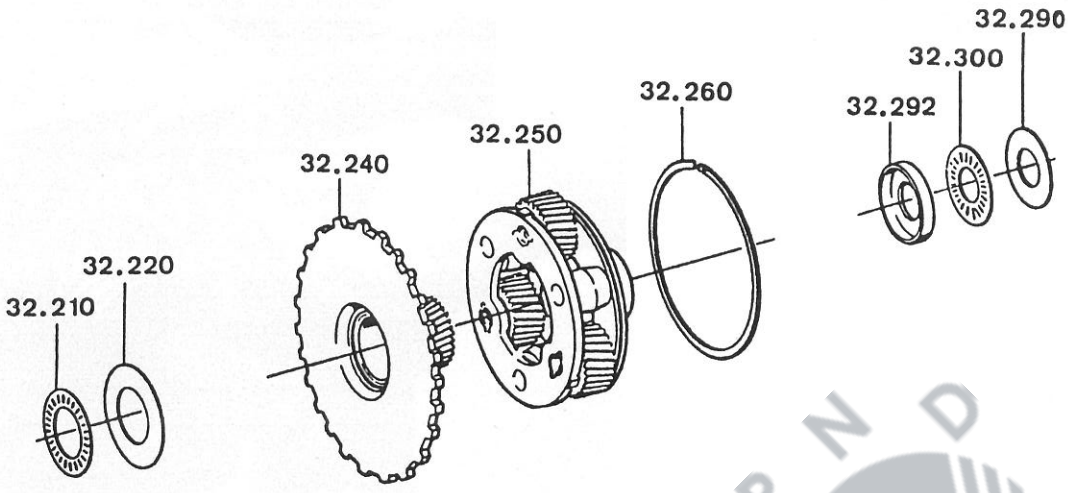
(Tool size torx bit 27)

(To be torqued 10 Nm).

86 055



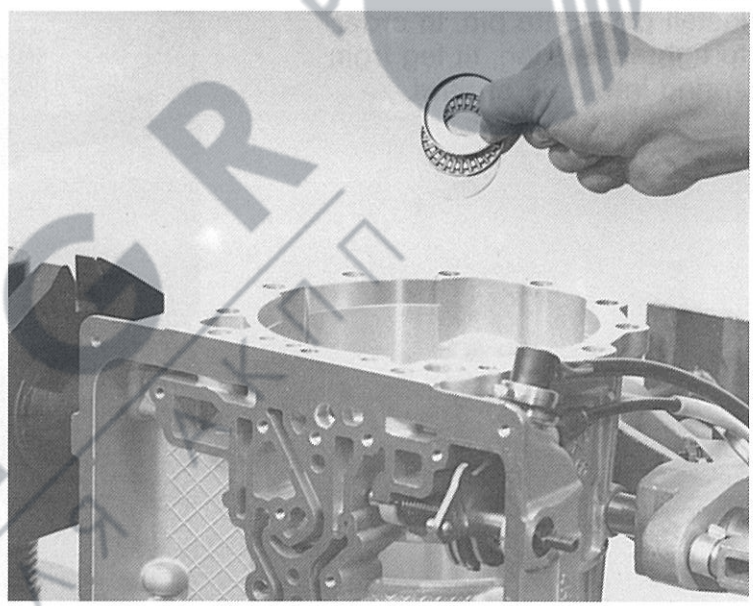
3.6 Planetary Set 4th Gear



86 056

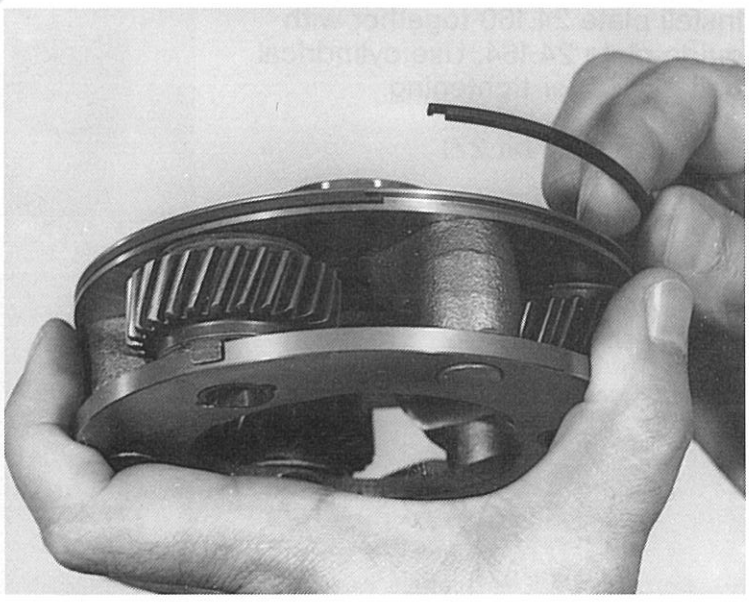
Turn transmission into vertical position.

Insert disc washer 32.290, axial cage 32.300 and thrust washer 32.292.



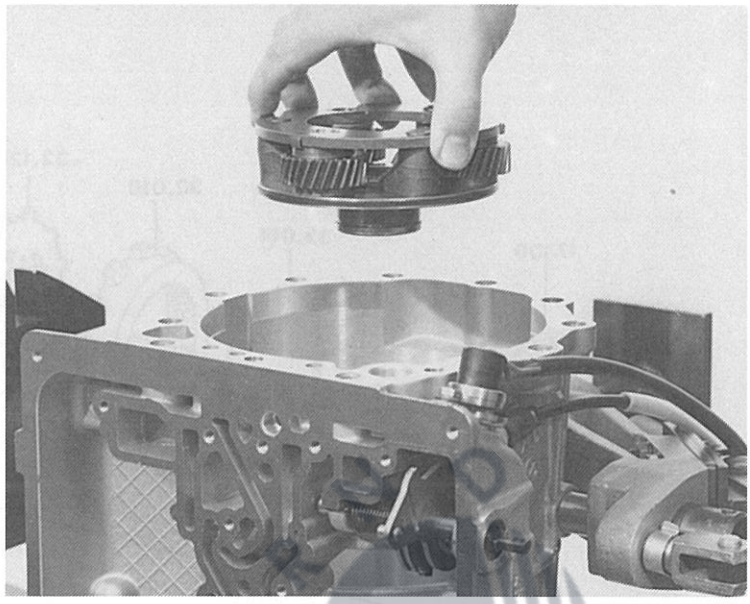
82 124

Install seal ring 32.260 onto planetary case and snap together.



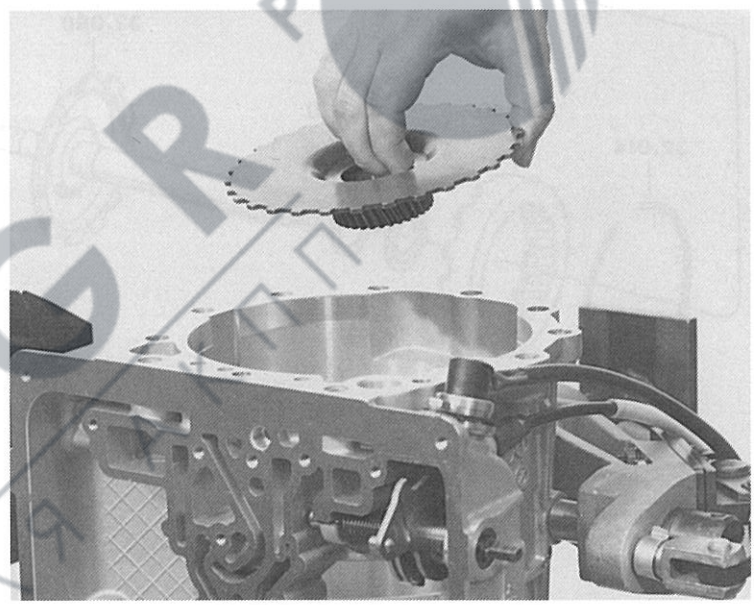
86 057

Install planetary set with turning motion into hollow gear.



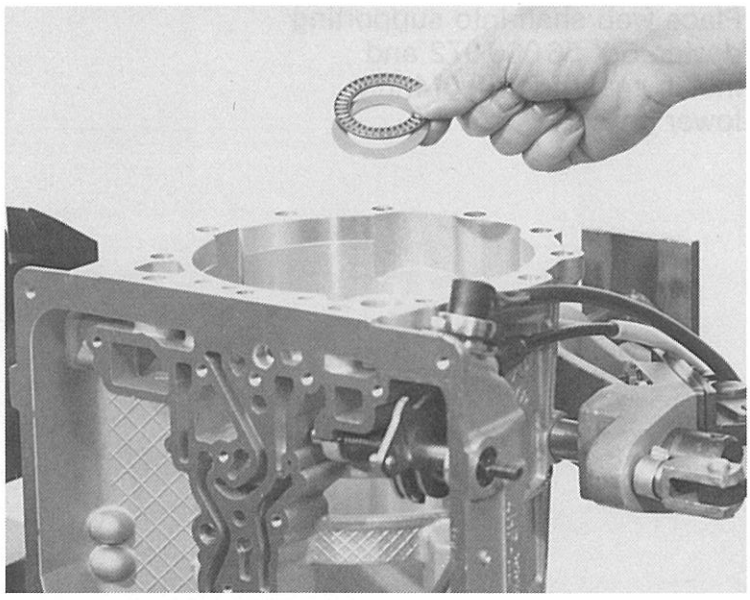
86 058

Install sun gear completly.

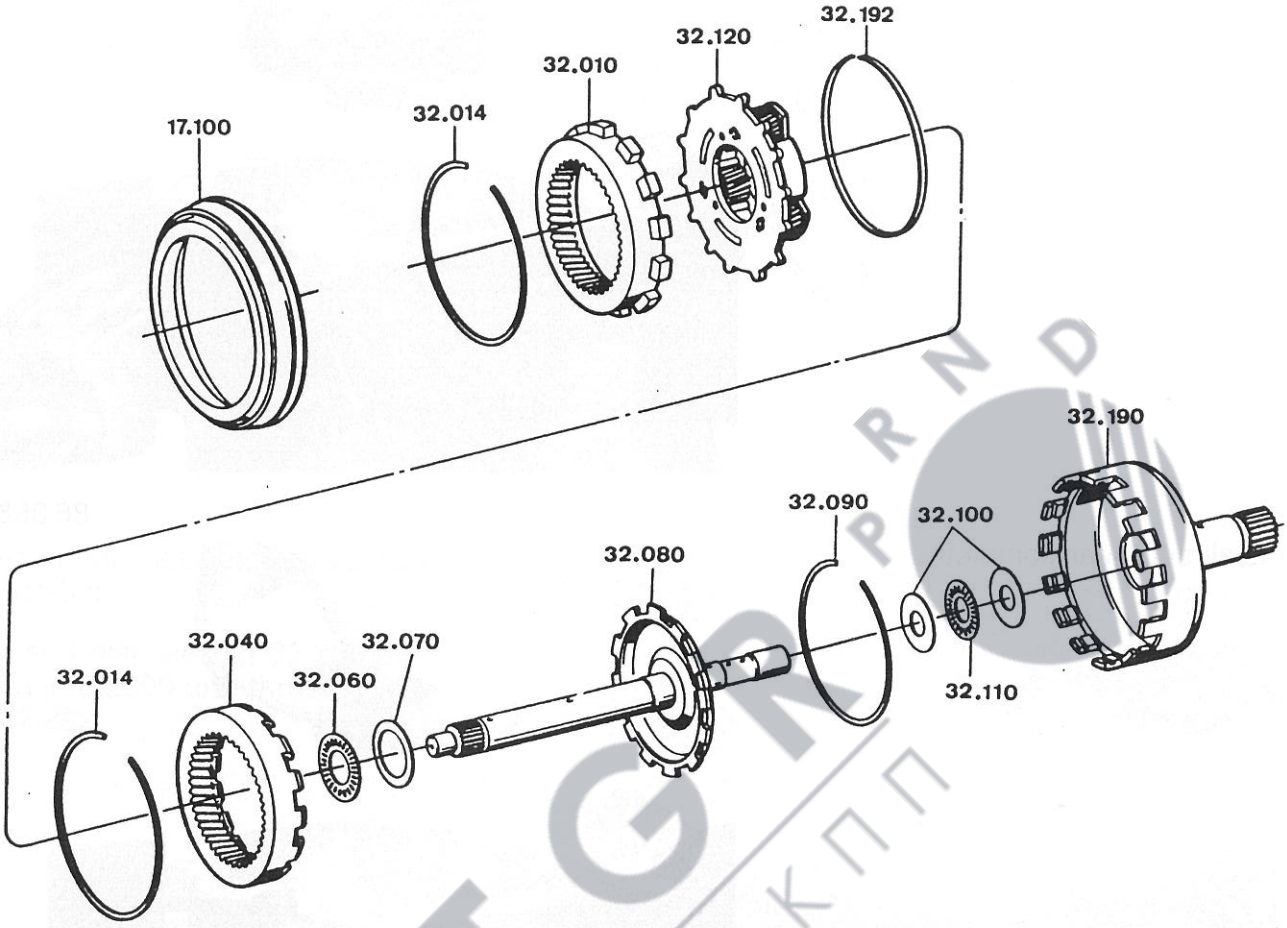


86 059

Insert disc 32.220 and axial cage 32.210.

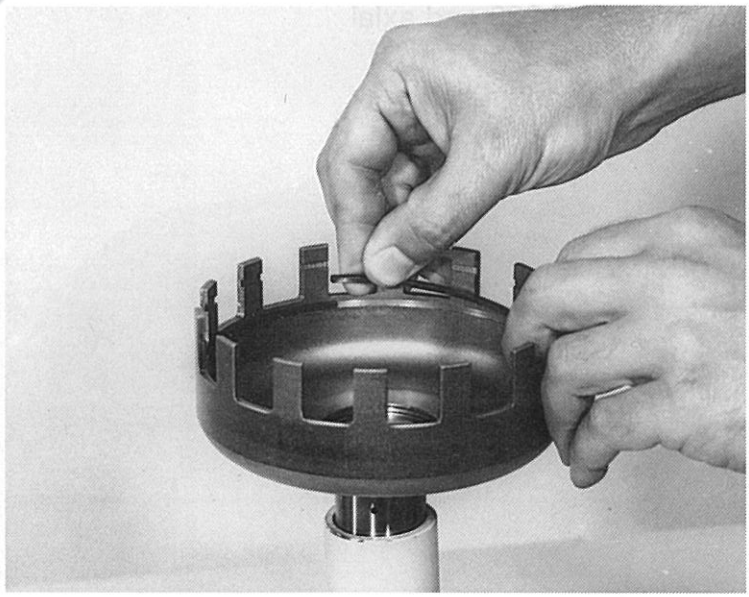


3.7 Web Shaft with Planetary Set



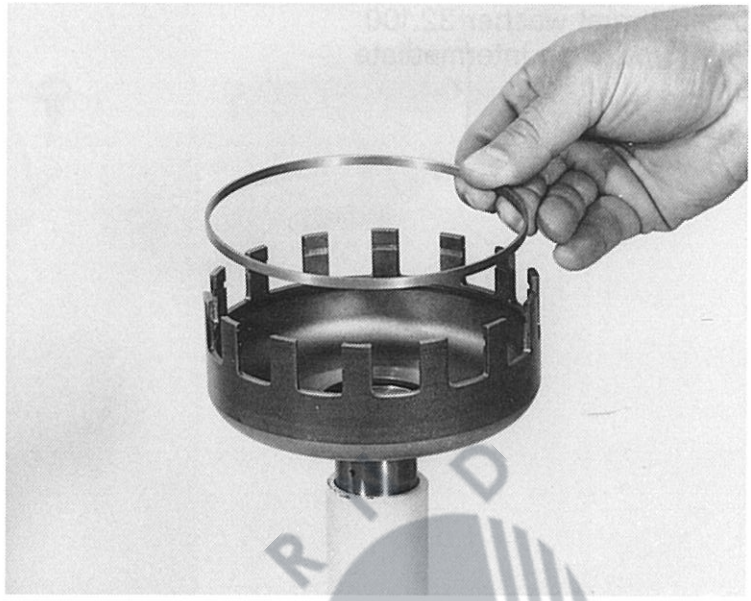
82 128

Place web shaft into supporting device 5 X 56 000 072 and install snap ring 32.014 into lower groove.



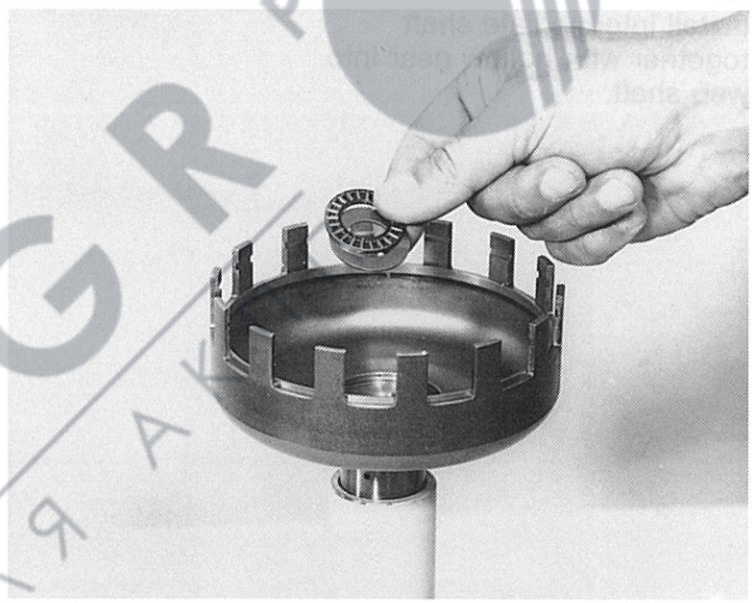
82 058

Install snap ring 32.192.



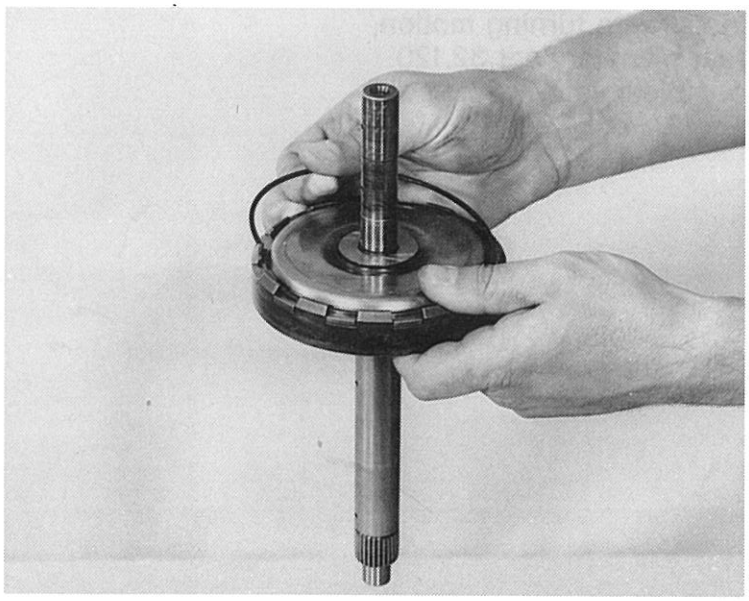
82 129

Insert 1 disc washer 32.100 and axle cage 32.110.



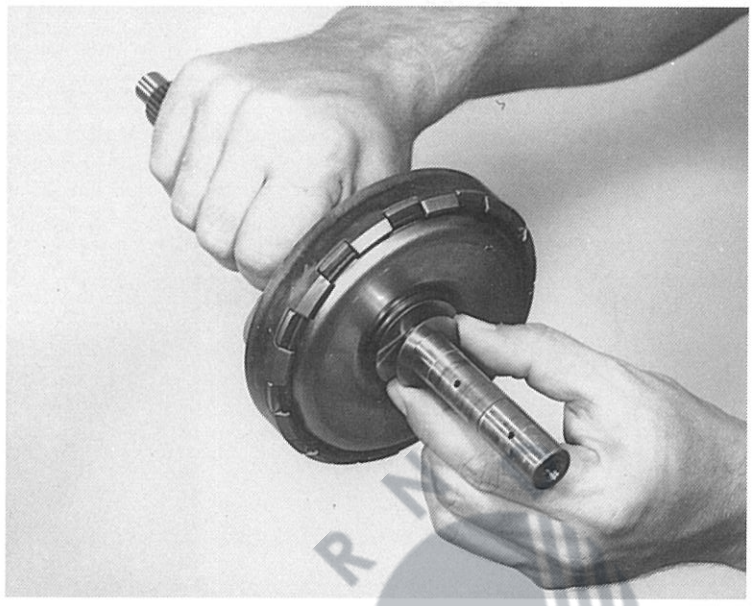
82 059

Connect intermediate shaft 32.080 with hollow gear 32.040 and secure with snap ring 32.090.



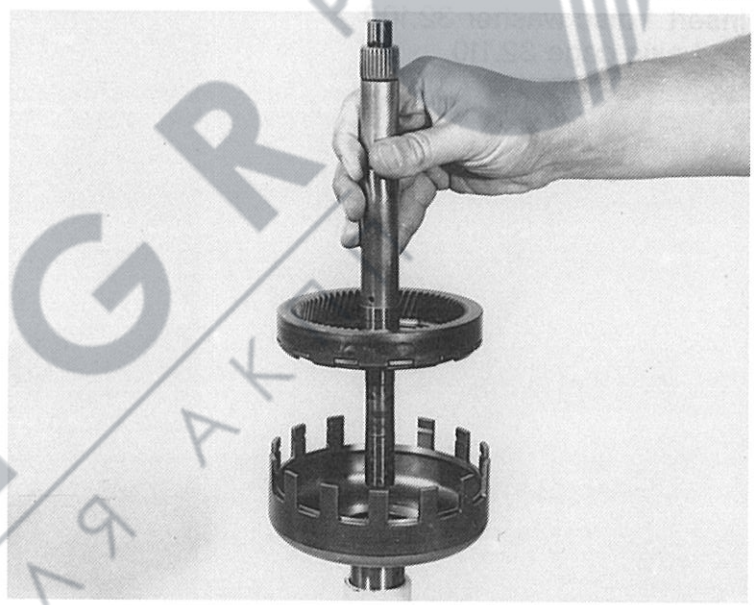
82 130

Insert thrust washer 32.100 with grease on intermediate shaft.



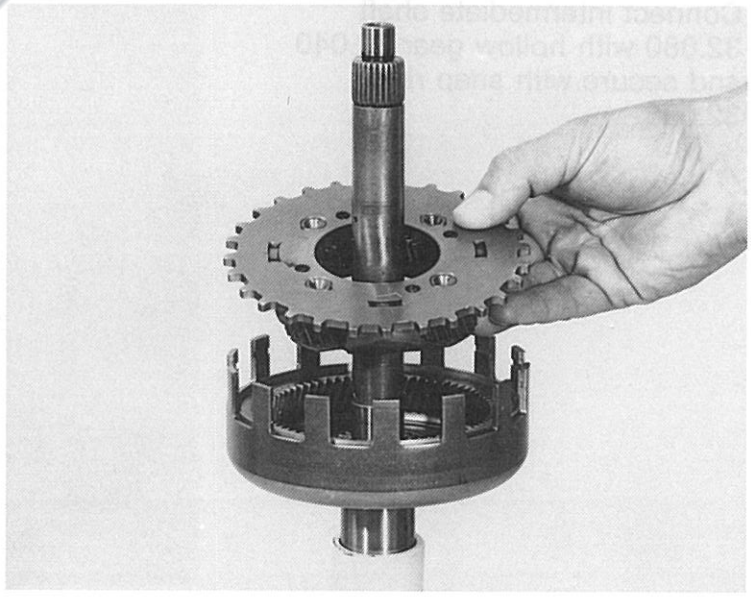
82 056

Install intermediate shaft together with hollow gear into web shaft.



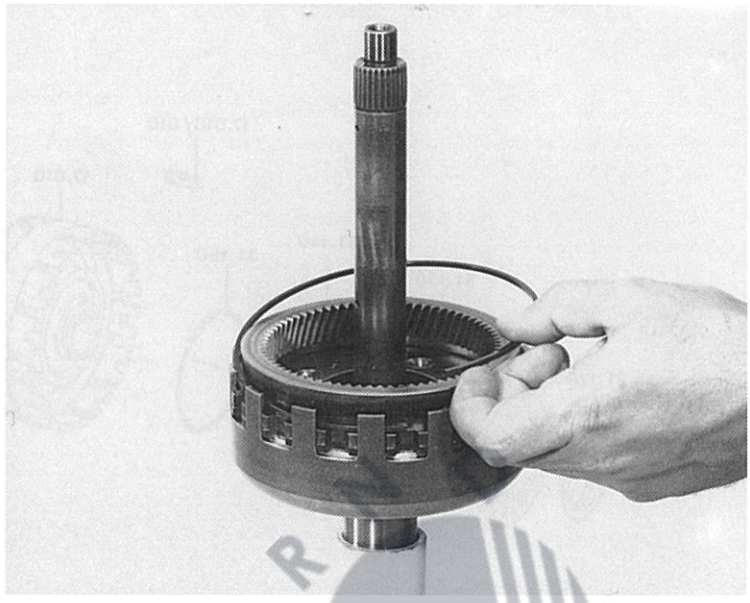
82 054

Install with turning motion, rear planetary set 32.120 completly into hollow gear.



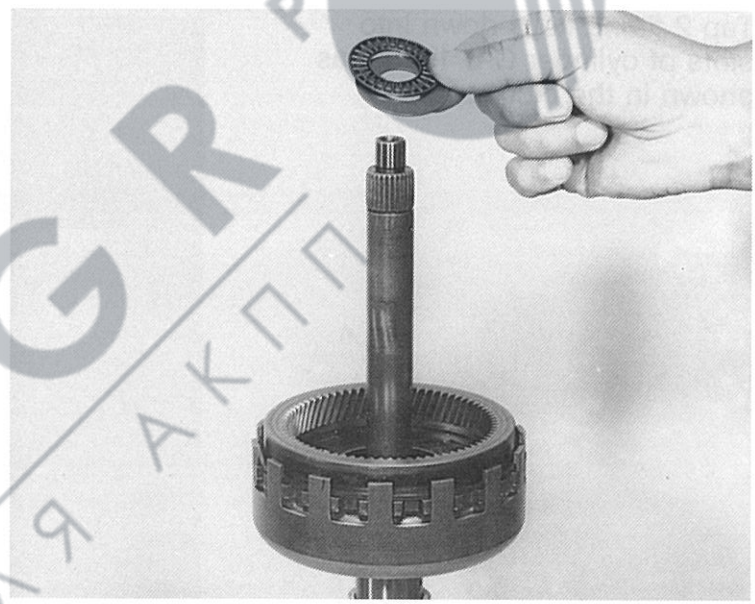
82 121

Install front hollow gear 32.010 and secure with snap ring 32.014.



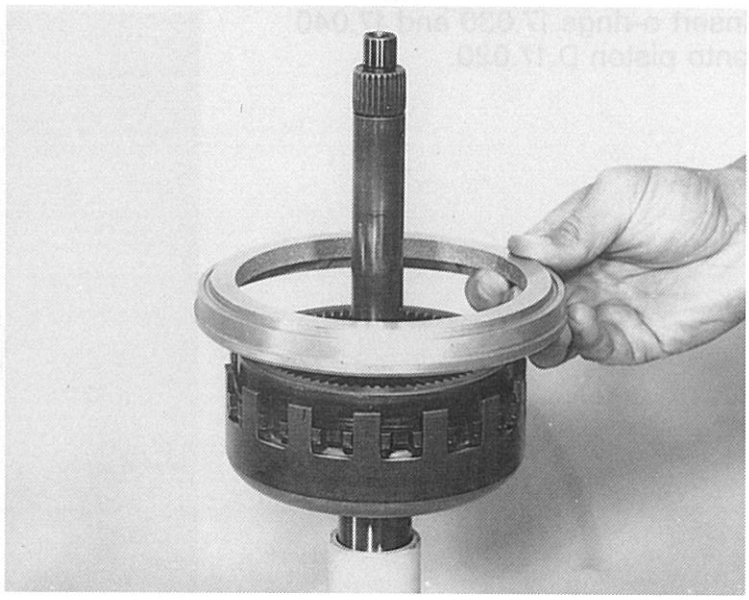
82 131

Insert disc washer 32.070 and seal cage 32.060.

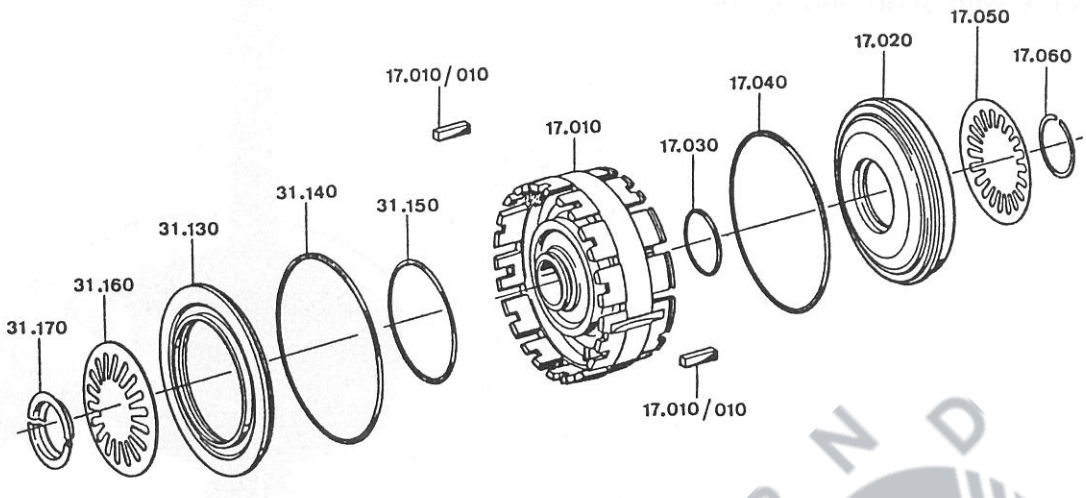


82 132

Install support ring 17.100.

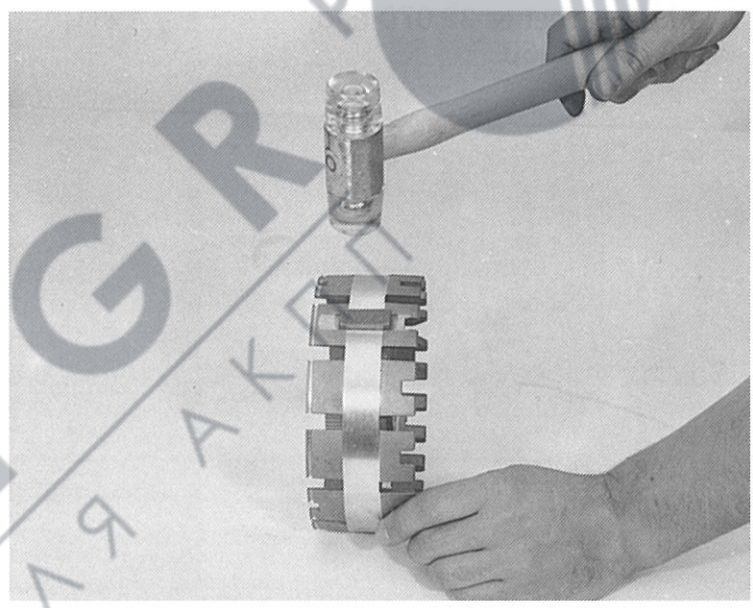


3.8 Cylinder C-D



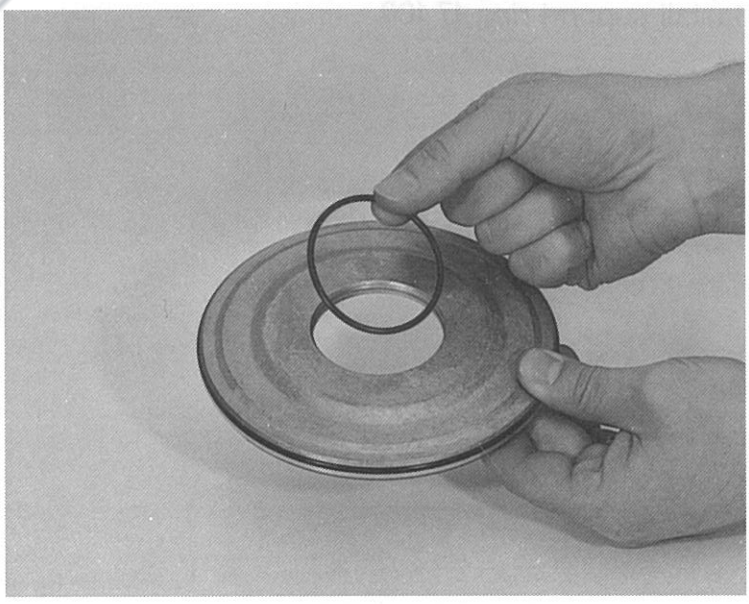
81 157

Tap 2 fitting keys down into slots of cylinder C-D 17.010, as shown in the picture.



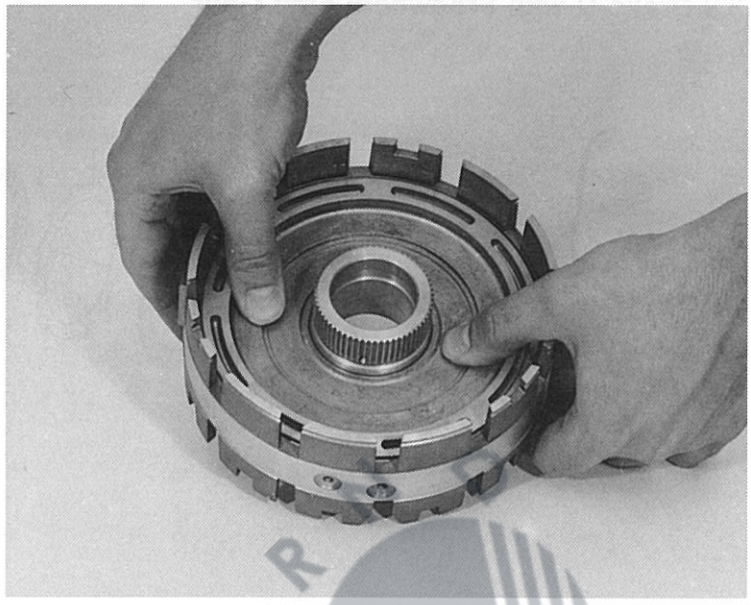
81 158

Insert o-rings 17.030 and 17.040 onto piston D 17.020.



81 159

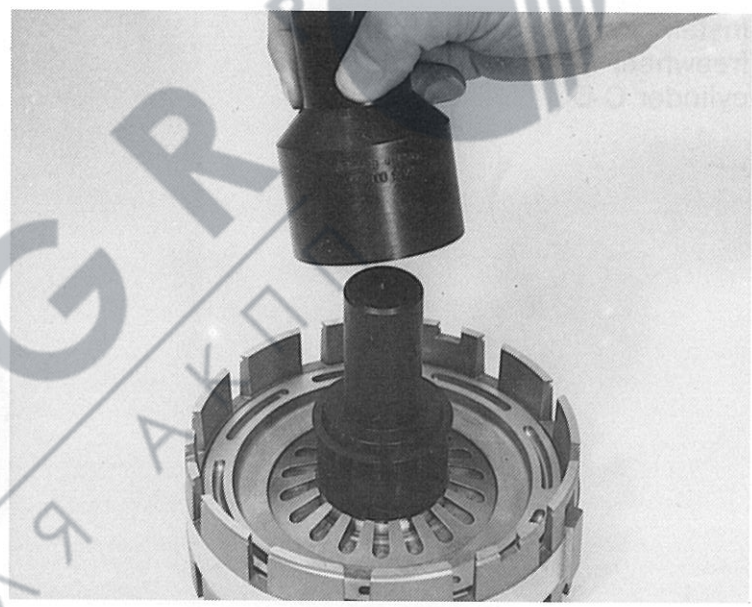
Install piston D into cylinder C-D as shown in the picture. For easy mounting of o-rings use light grease (Vaseline).



81 160

Place plate spring 17.050 into piston D. Insert mounting sleeve 5 X 56 000 058 on top of spring. Insert snap ring 17.060 on tapered sleeve seat.

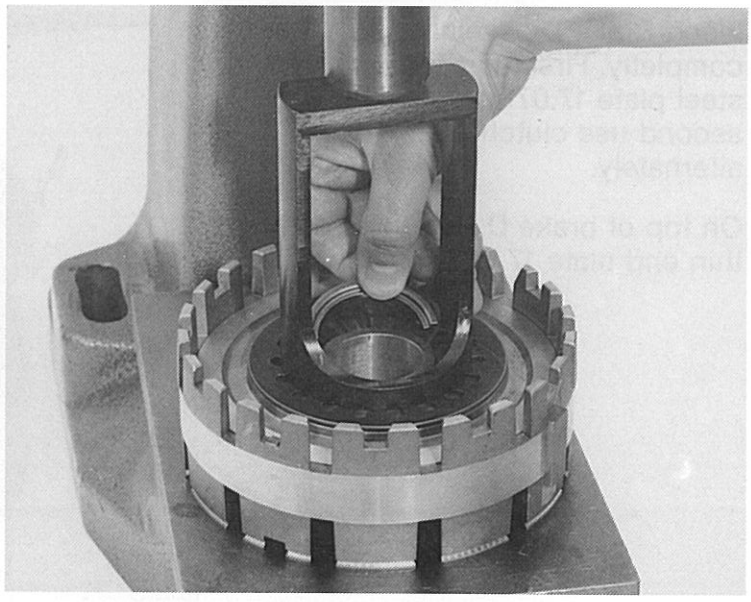
Use outside part of mounting sleeve and press snap ring downward into groove.



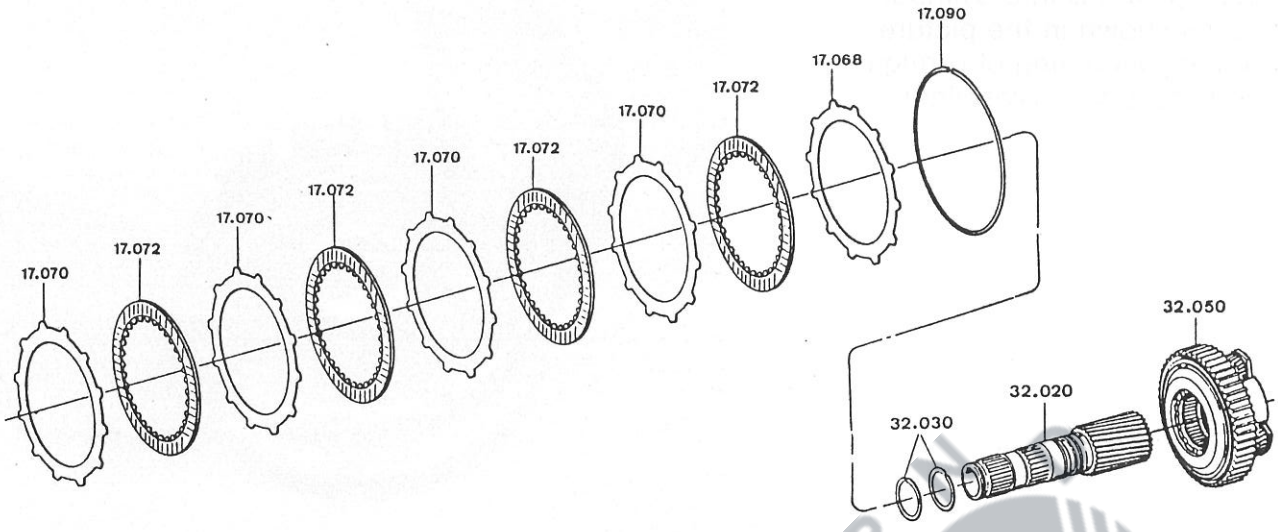
81 112

Install piston C 31.130 with o-ring 31.140 and 31.150 in the same manner as piston D. Insert plate spring 31.160 on top of piston C and use spring device 5 X 56 000 093 to press plate spring downward and insert split ring 31.170 as shown in the picture.

Important
Pistons C and C' are very similar. Distinguishing feature:
Piston C has a chambered cast face pointing toward inner o-ring.

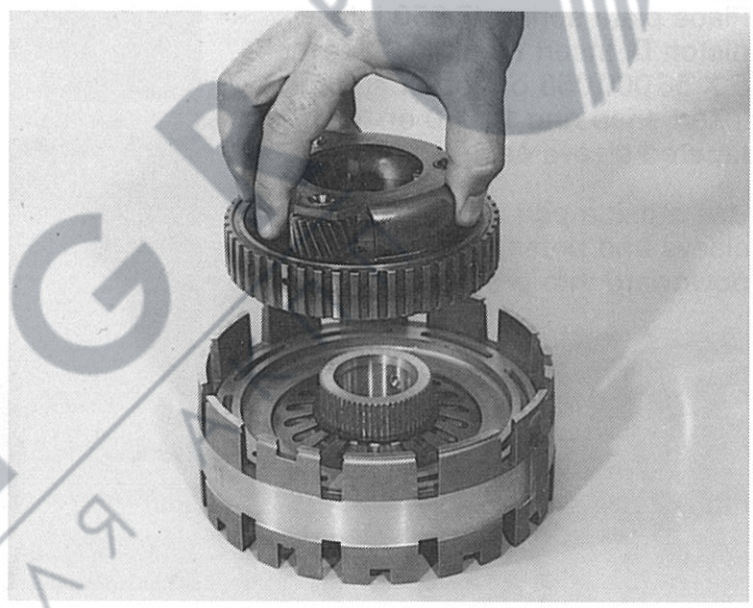


3.9 Brake D with Freewheel First Gear



82 133

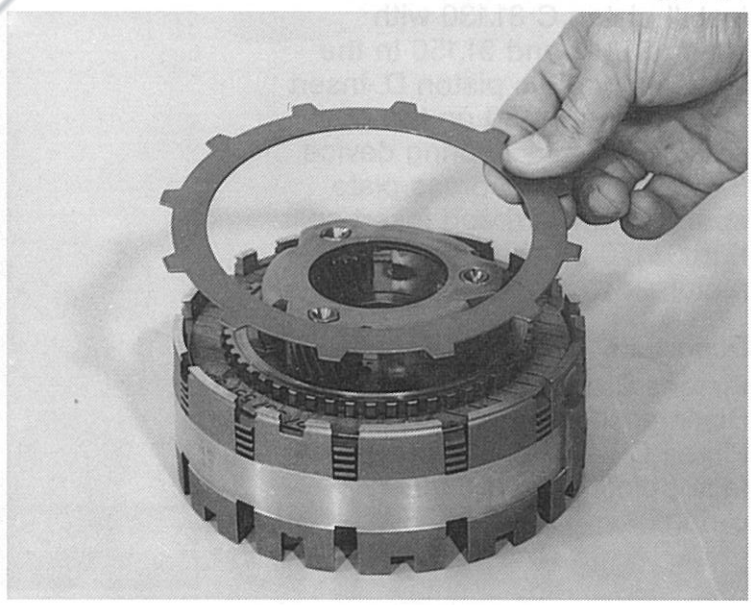
Install planetary set 32.050 with freewheel 1st gear on hub of cylinder C-D



82 134

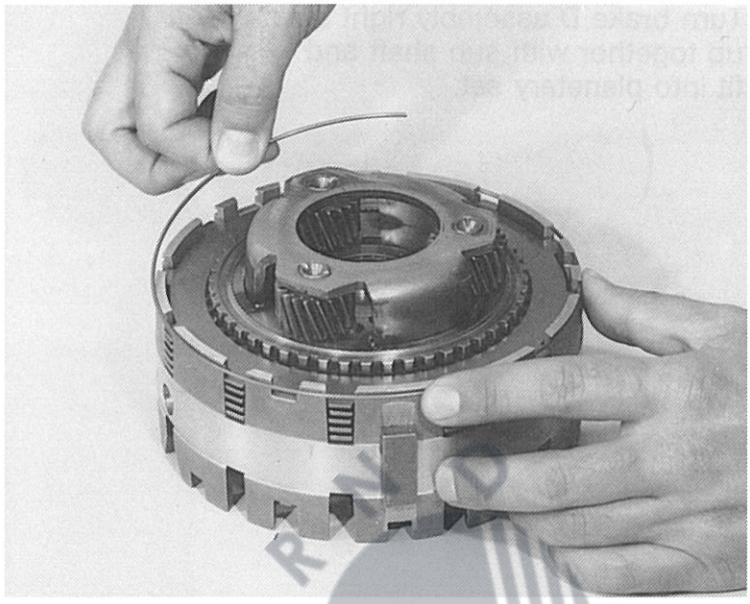
Insert Brake D assembly completly. First start with steel plate 17.070, second use clutch plate 17.072 alternately.

On top of brake D assembly use thin end plate 17.068.



82 135

Secure brake D assembly with snap ring 17.090.

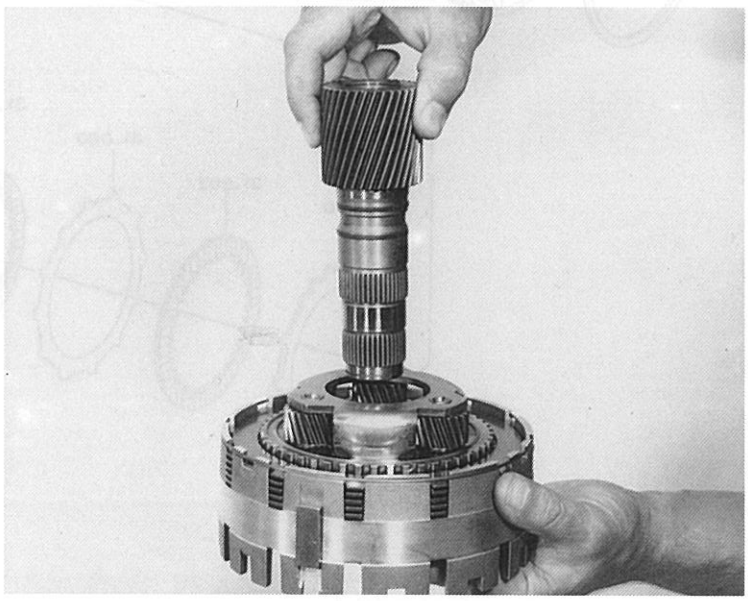


82 136

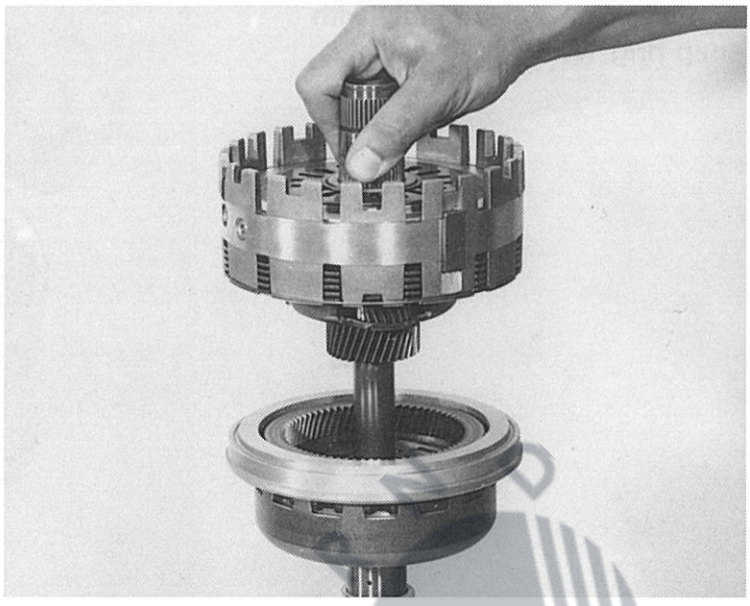
Install 2 seal rings 32.030 on sun shaft and snap together.

82 137

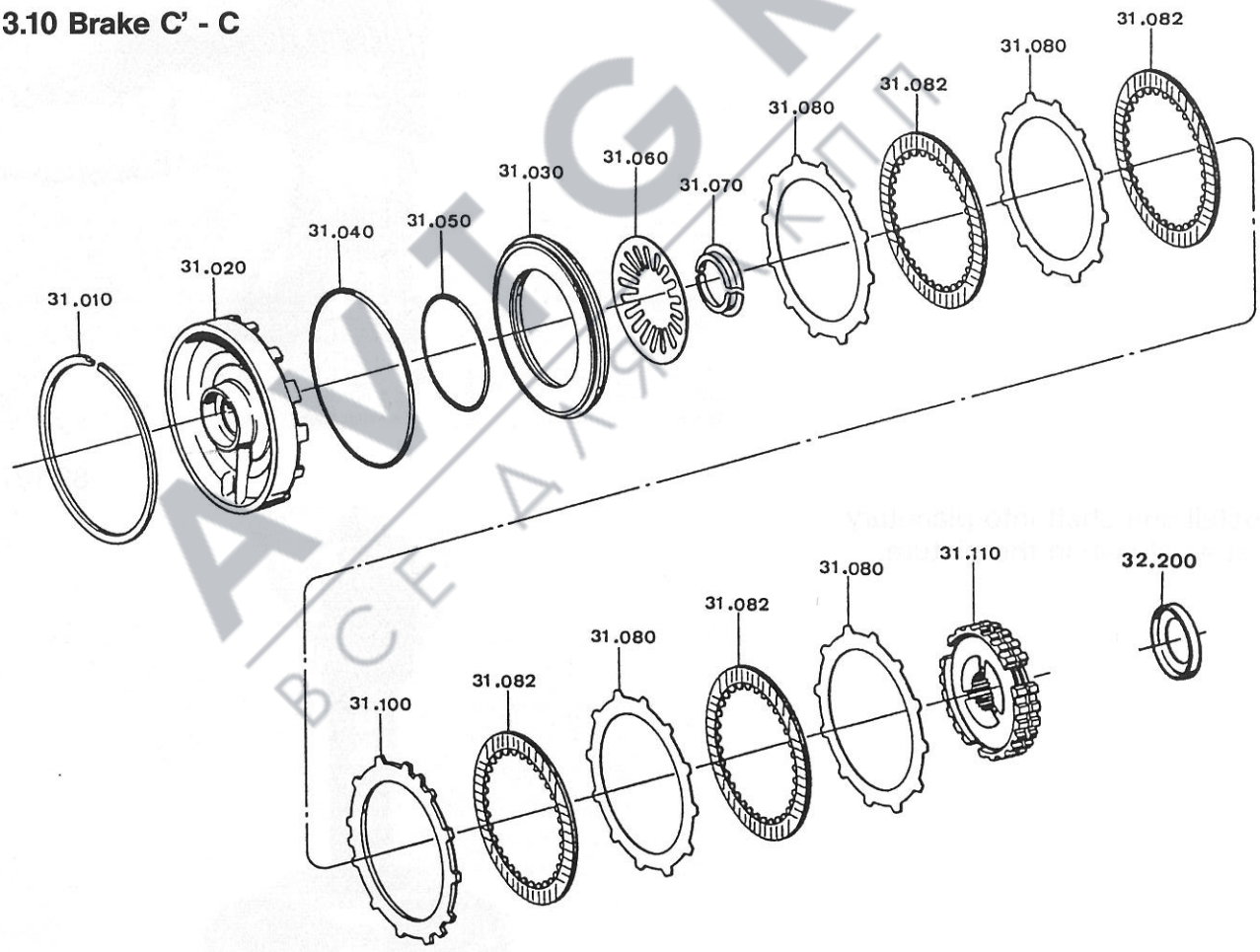
Install sun shaft into planetary set as shown in the picture.



Turn brake D assembly right side up together with sun shaft and fit into planetary set.



3.10 Brake C' - C

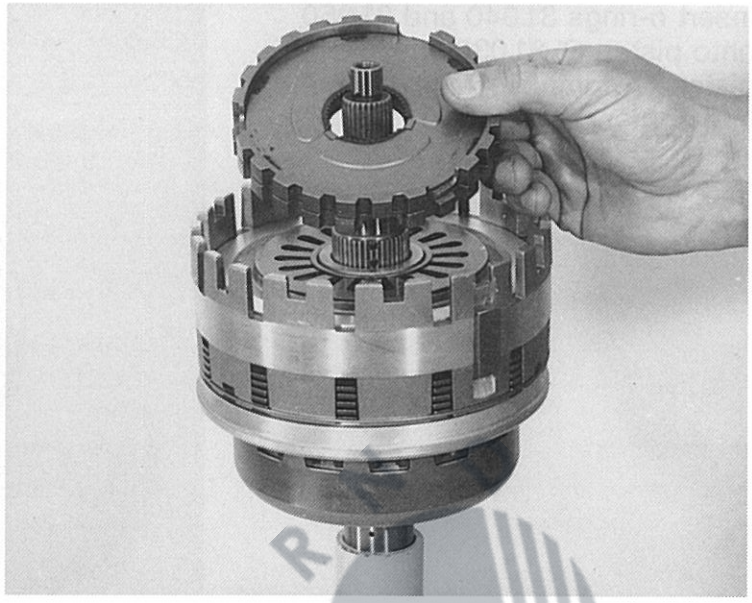


82 139

Install freewheel 2nd on sun shaft seat.

Attention: Top of freewheel 2nd can be identified by the letters „oben" stamped to surface.

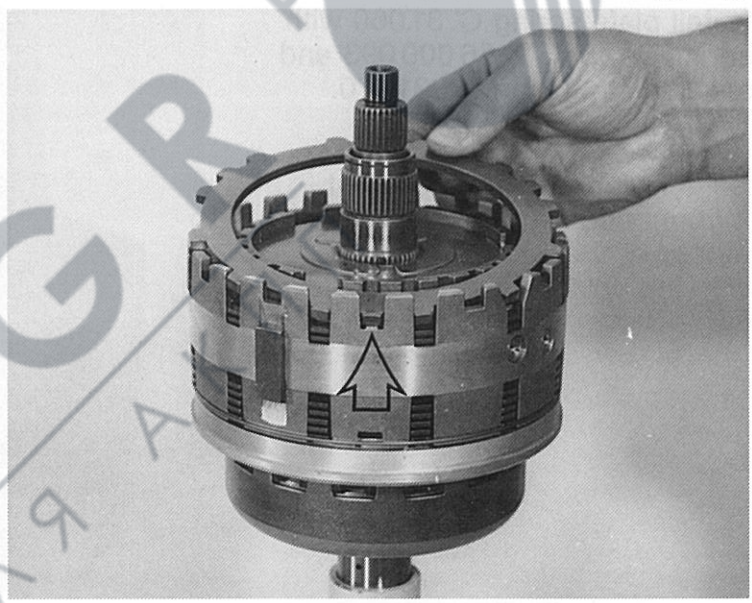
Align upper and lower halves of freewheel 2nd.



82 140

Insert brake C assembly and start with steel plate 31.080, alternating clutch plate 31.082 and 31.080.

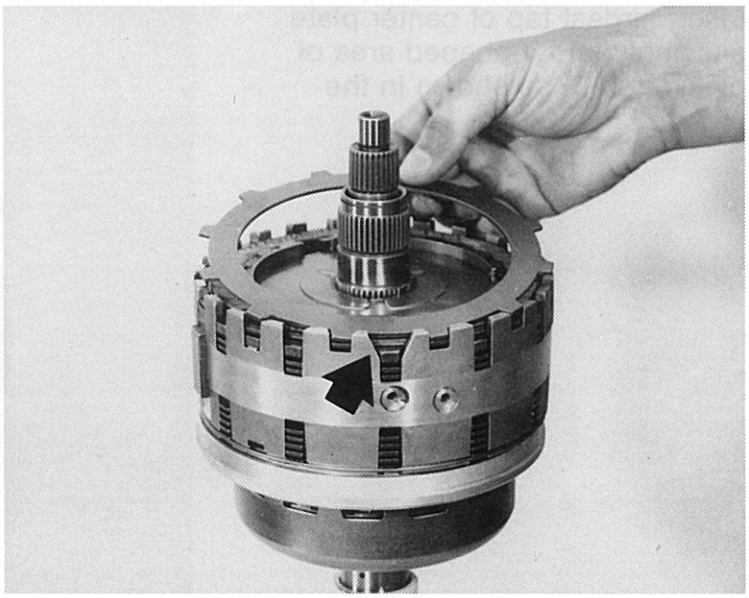
Install end plate of brake D assembly, narrow gap teeth of end plate must fit onto tabs in cylinder C-D shown in the picture.



82 141

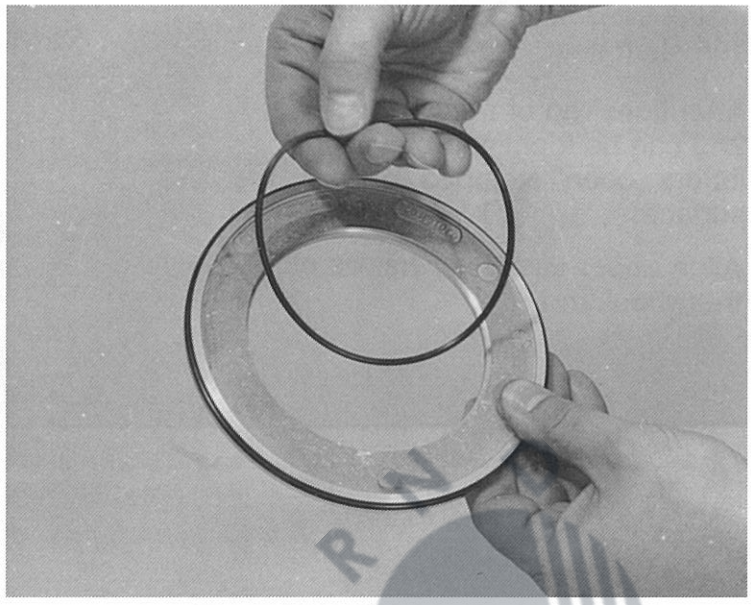
Insert brake C' assembly, and start with clutch plate 31.082.

Be careful not to insert outer teeth of steel plate into V-shaped area of cylinder C-D as shown in the picture.



81 161

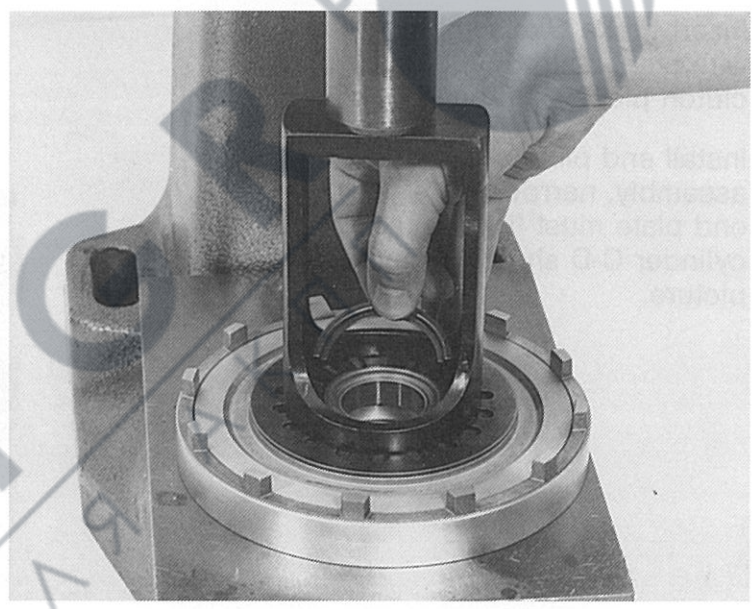
Insert o-rings 31.040 and 31.050 onto piston C' 31.030. Install piston C' complete with o-rings into center plate 31.020.



81 113

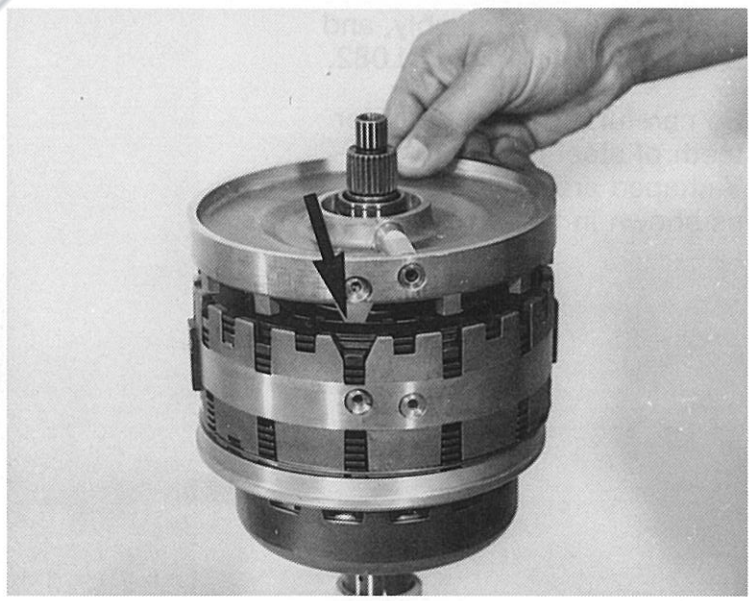
Install plate spring C' 31.060 with spring device 5 X 56 000 093 and secure with split rings 31.070.

Caution
Center plate spring to prevent it from becoming caught in the recess of the centering plate with the split ring.



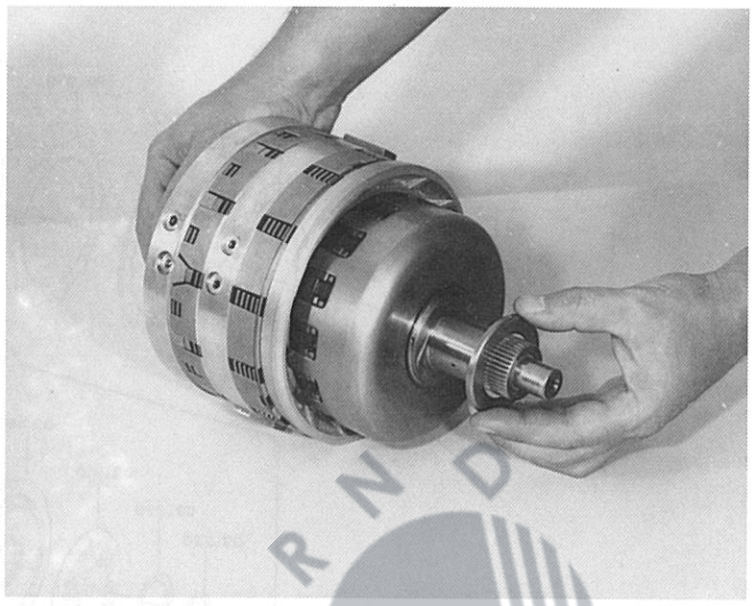
82 142

Insert largest tap of center plate assembly into V-shaped area of cylinder C-D, as shown in the picture.



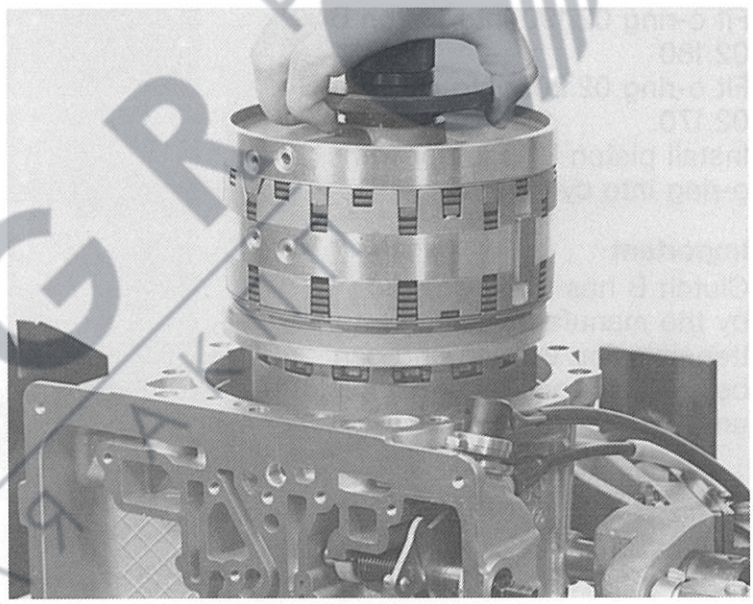
82 143

Remove complete C, C' and D clutch assembly from supporting device. Also insert thrust washer 32.200 with Vaseline onto web shaft seat.



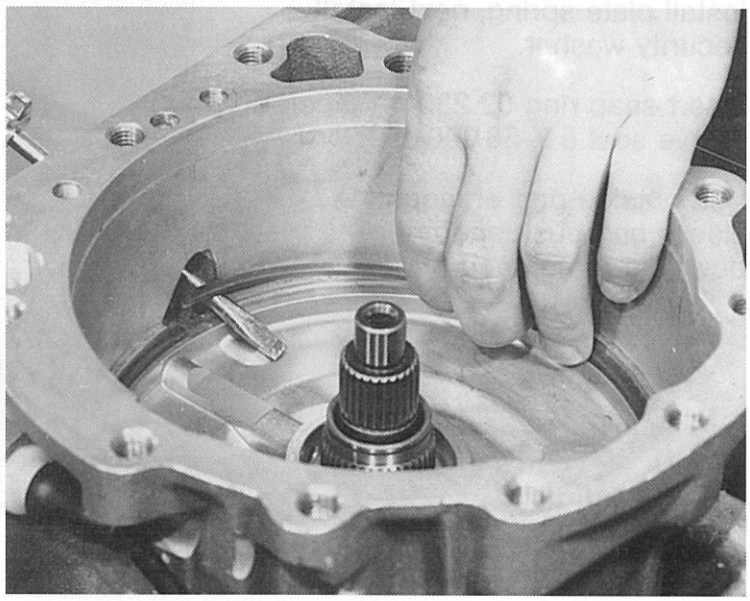
86 060

Install C, C' and D clutch assembly complete into transmission case.
Align oil feed holes in center plate and cylinder C-D with holes in transmission case.

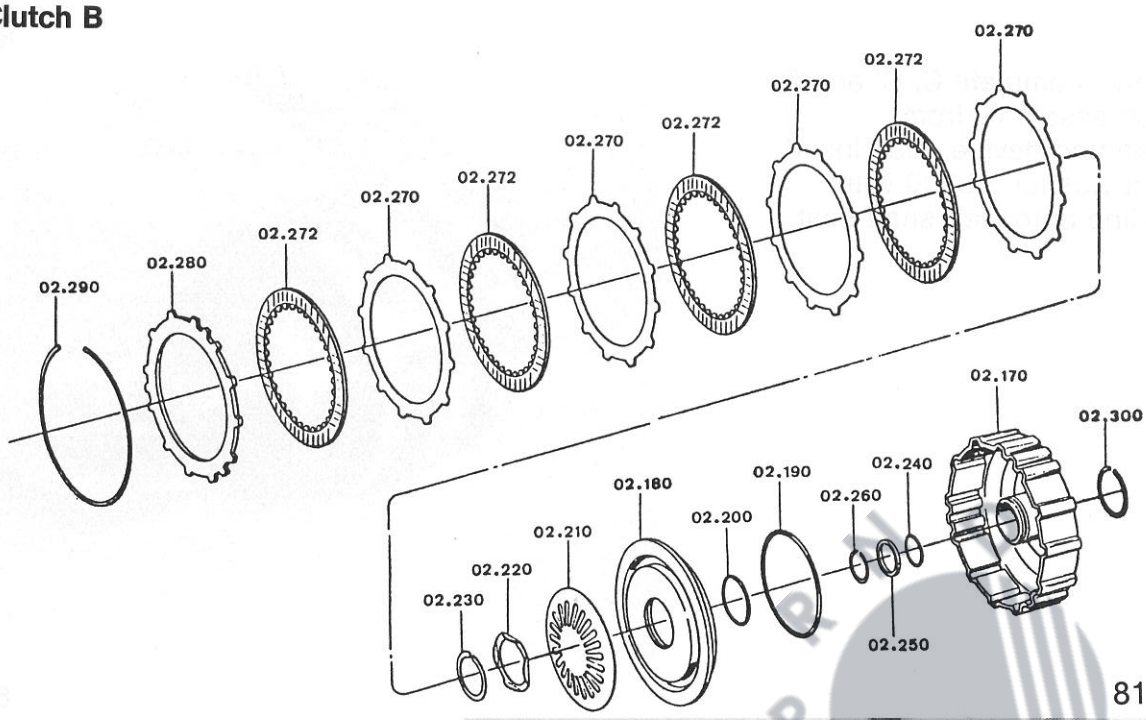


82 019

Secure center plate with snap ring 31.010.

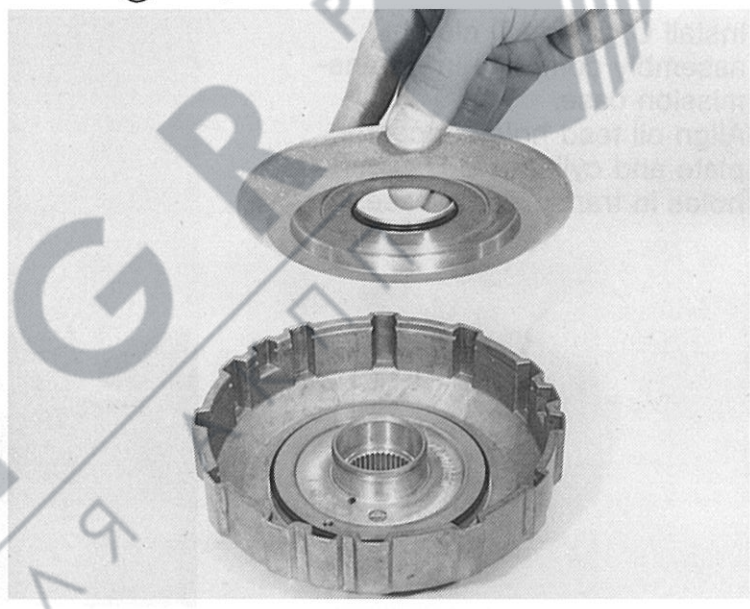


3.11 Clutch B



81 139

Fit o-ring 02.190 into piston B 02.180
Fit o-ring 02.200 into cylinder B 02.170.
Install piston B together with o-ring into cylinder B.



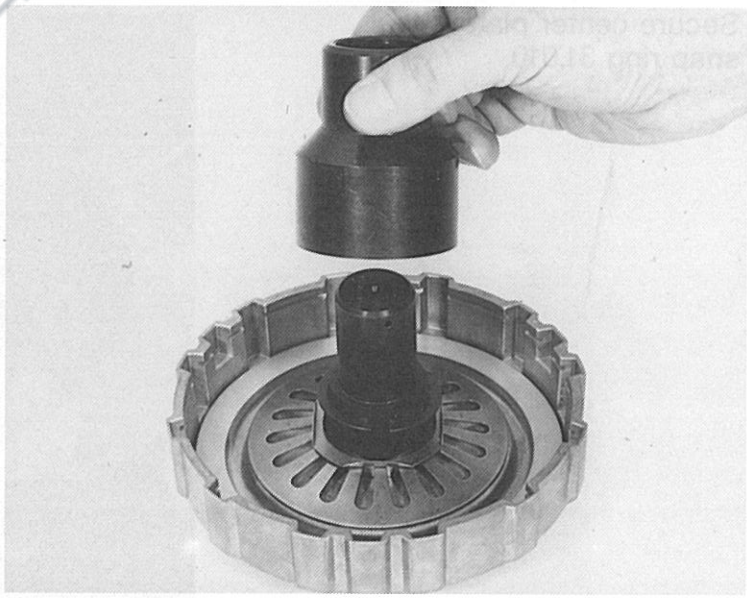
Important
Clutch B has to be gauged by the manufacturer on certain transmission version and can be replaced only as a complete unit.

81 140

Install plate spring, next install security washer.

Insert snap ring 02.230 on tapered sleeve seat 5 X 56 000 092.

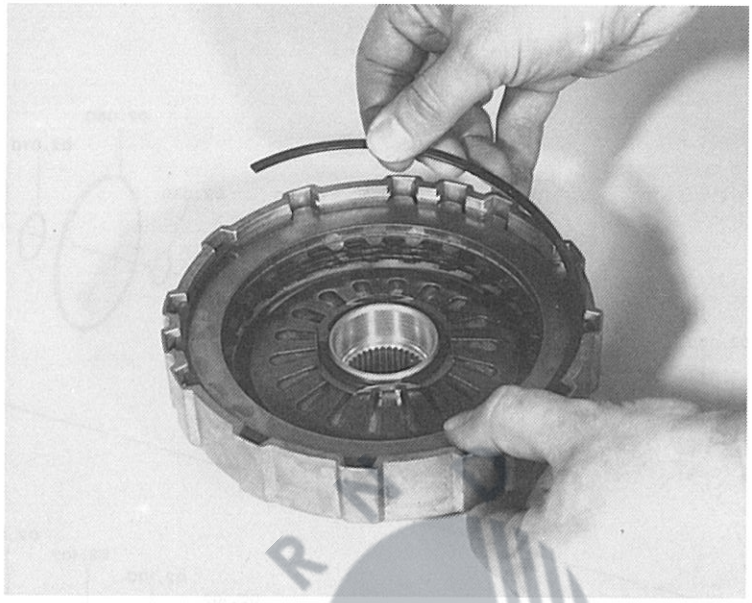
Use outside part of mounting sleeve and push snap ring downward into snap ring.



81 141

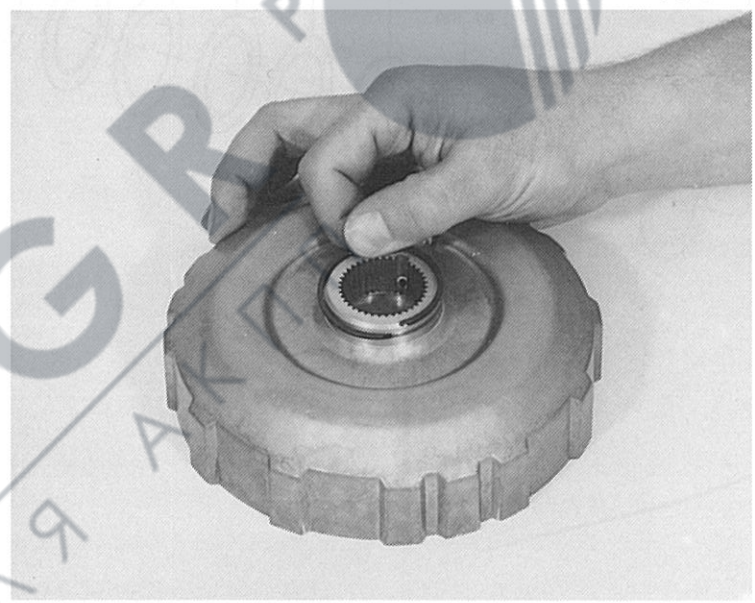
Install clutch B assembly, start with steel plate 02.270. Alternately, use clutch plate 02.272 steel plate 02.270.

Secure end plate 02.280 with snap ring 02.290.



81 142

Insert seal ring 02.300 into seal ring seat on cylinder B and snap together.

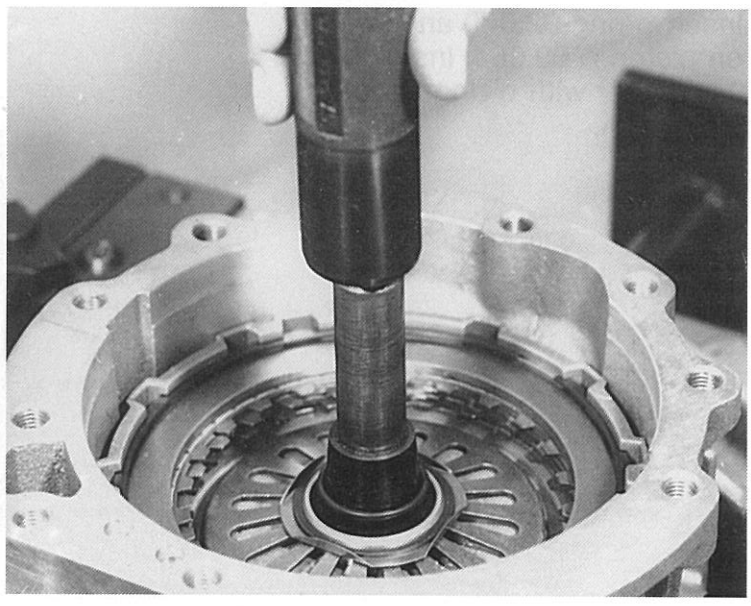


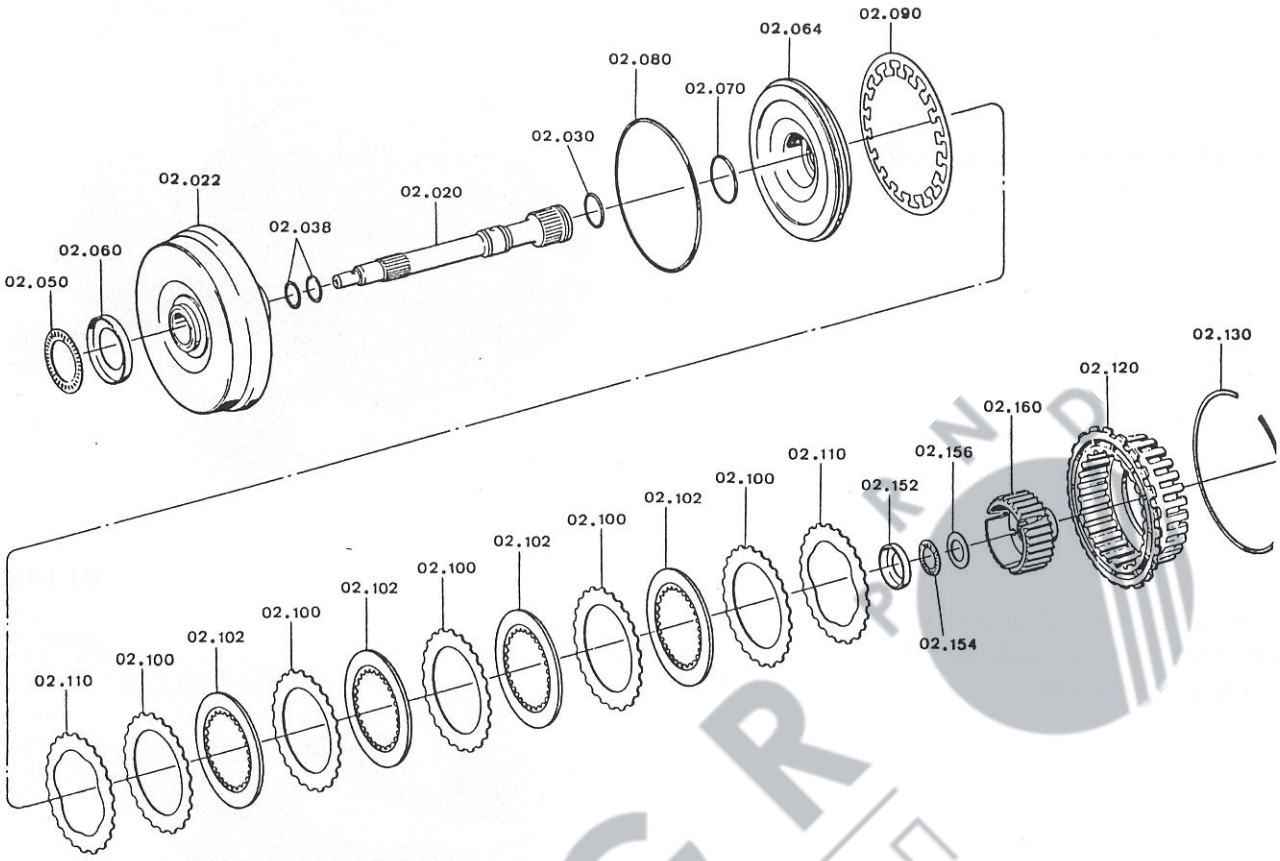
82 145

Install complete clutch B assembly into transmission case.

Insert o-ring 02.240 on tapered sleeve seat 5 X 56 000 075.

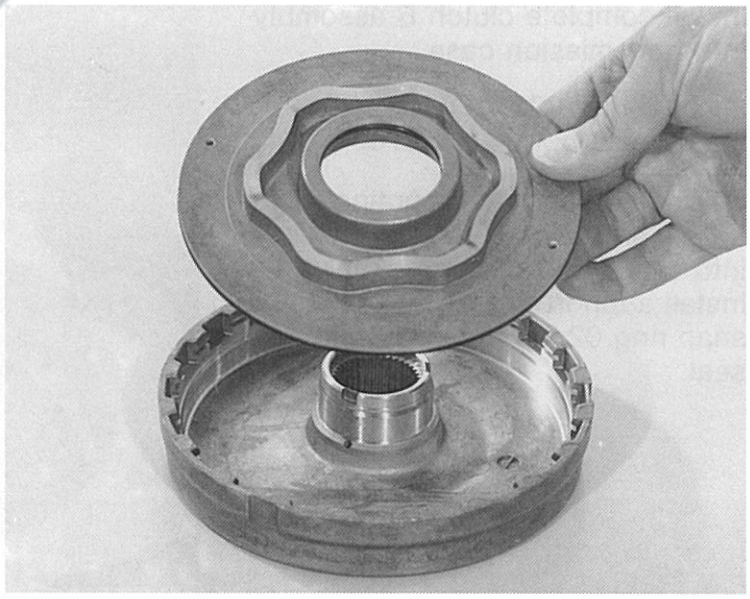
Use outside part at mounting sleeve and push o-ring downward into seat. In the same manner, install support ring 02.250 and snap ring 02.260 together into seat.





82 199

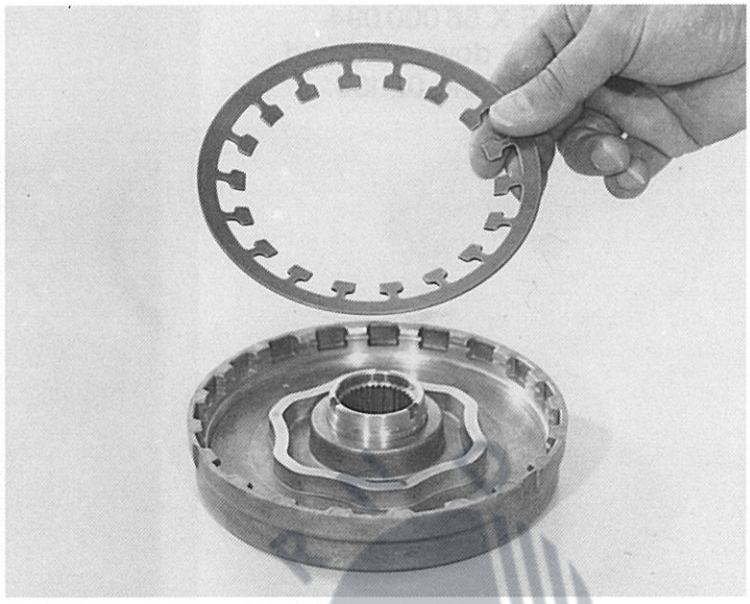
Insert o-ring 02.070 and 02.080 on piston A 02.064. Install piston A together with o-rings into cylinder A.



82 200

Insert plate spring 02.090 on top at piston A.

Convex side of spring plate must be facing the piston.



81 145

Install clutch A assembly complete.

Attention:

Order of plates -

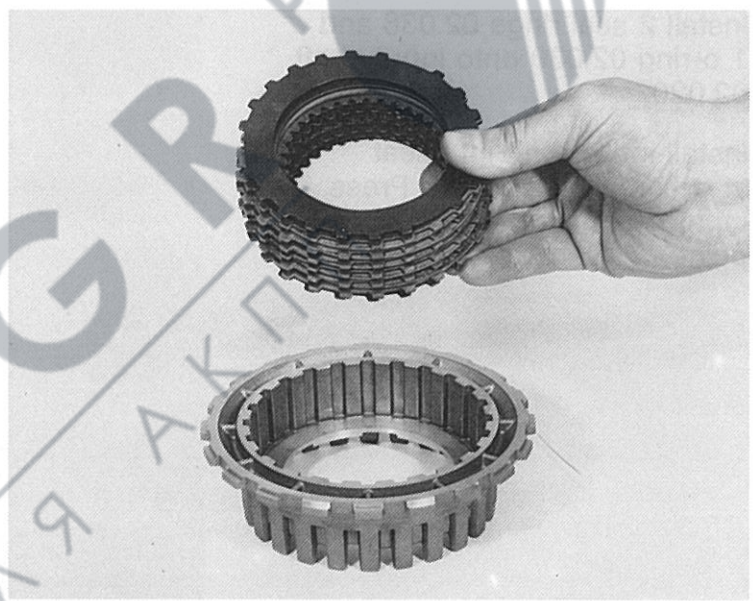
Start with

spring plate 02.110
steel plate 02.100
clutch plate 02.102

Finish with

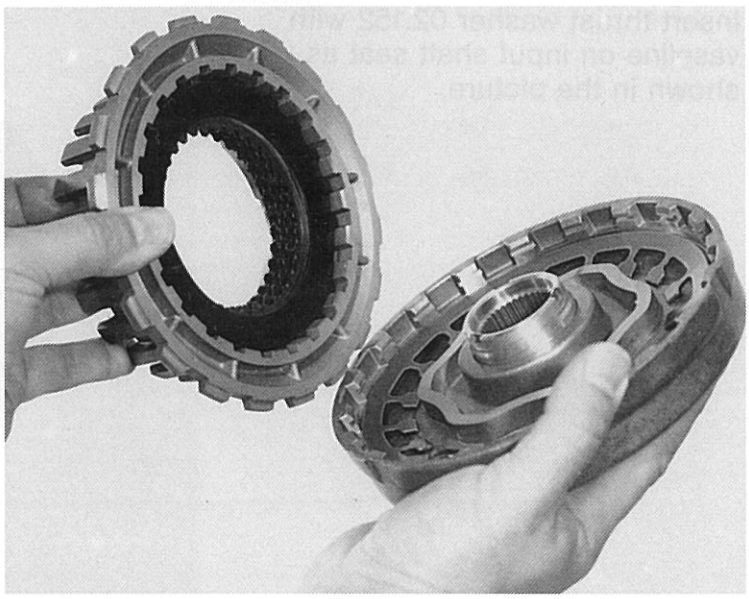
clutch plate 02.102
steel plate 02.100
spring plate 02.110

in between use alternating clutch and steel plates.



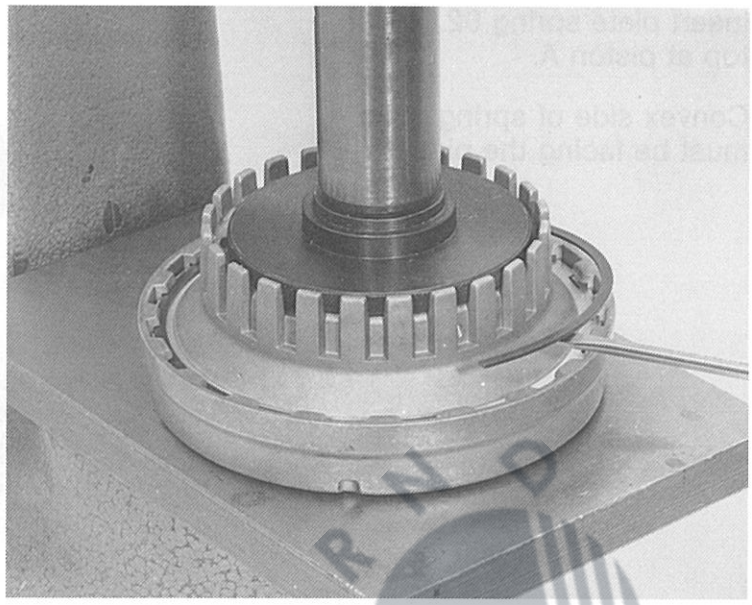
82 201

Install carrier A-B with clutch A assembly into cylinder A.



81 097

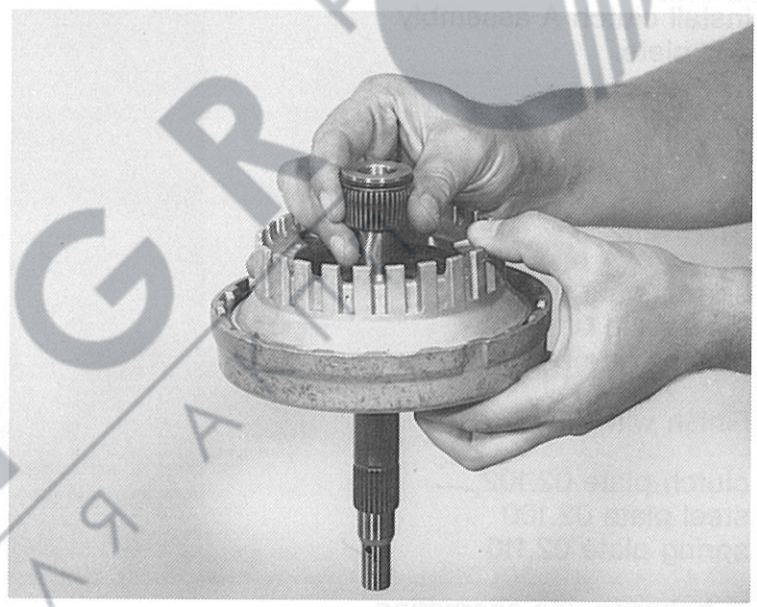
With flat plate 5 X 56 000 094 press carrier A-B downward and secure with snap ring 02.130.



82 146

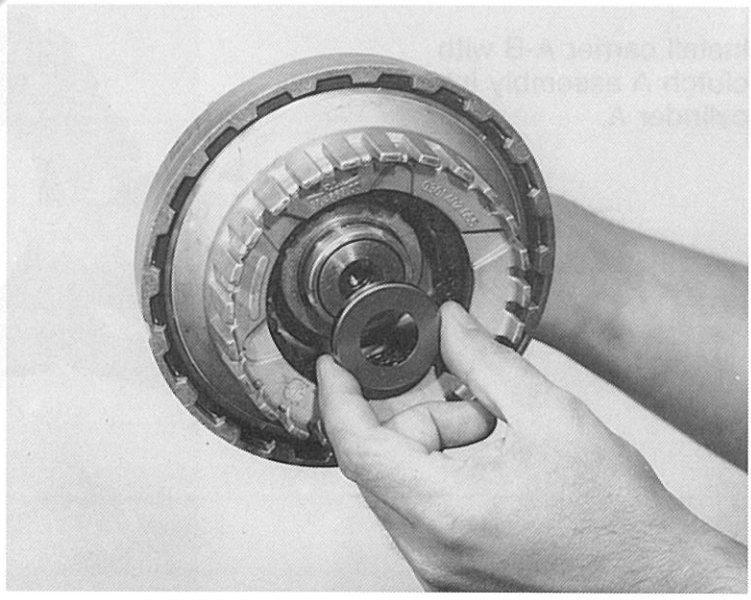
Install 2 seal rings 02.038 and 1 o-ring 02.030 onto input shaft 02.020.

Install input shaft into seat at cylinder A assembly. Press input shaft downward to stop point.



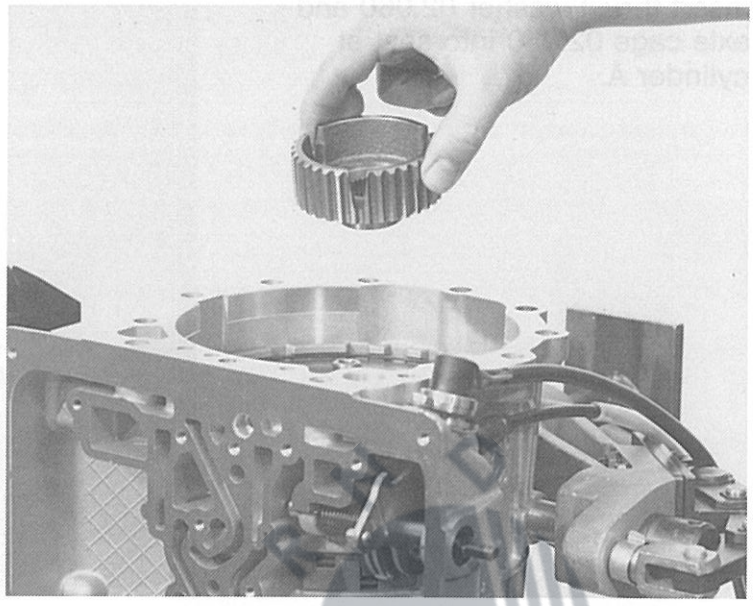
82 153

Insert thrust washer 02.152 with vaseline on input shaft seat as shown in the picture.



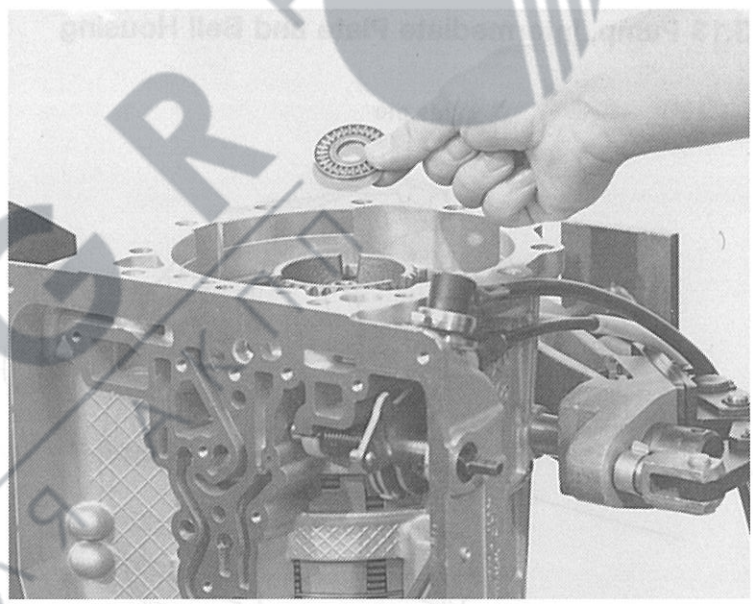
86 061

Install inner carrier A 02.160 onto intermediate shaft seat.



86 062

Insert disc washer 02.156 and axle cage 02.154.



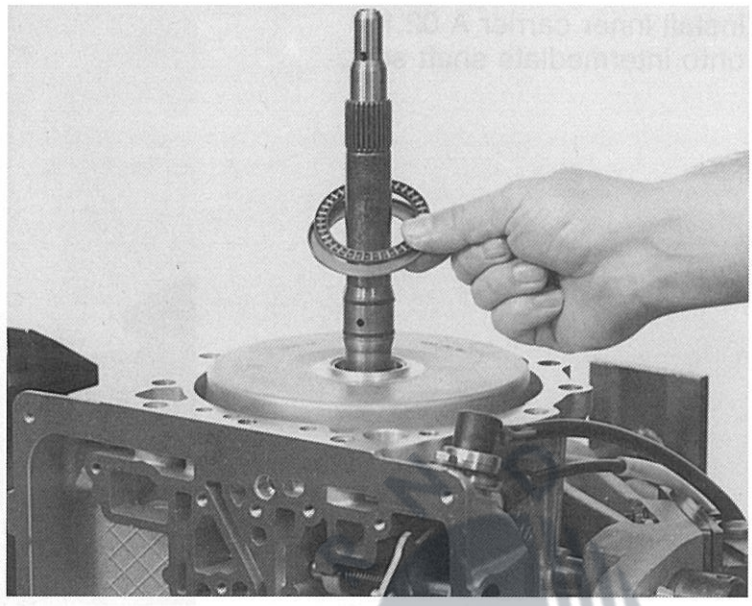
82 147

Install clutch A' assembly into transmission case.

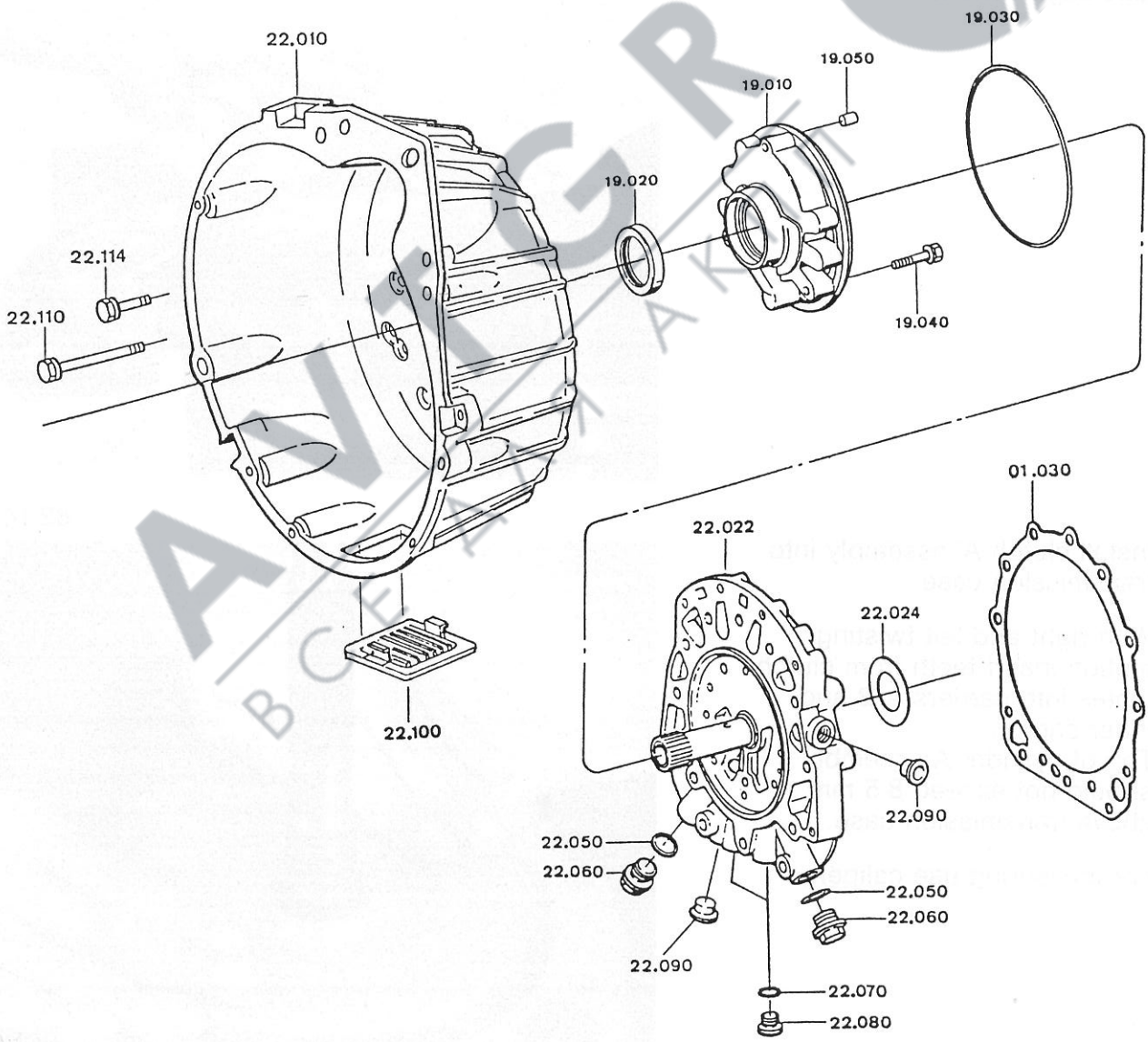
With right and left twisting motion insert teeth from clutch plates into carriers A-B and inner carrier.
Top of cylinder A assembly should not exceed 8.5 mm above transmission case.

For measuring use calipers.

Insert thrust washer 02.060 and axle cage 02.050 into seat at cylinder A.



3.13 Pump, Intermediate Plate and Bell Housing



82 149

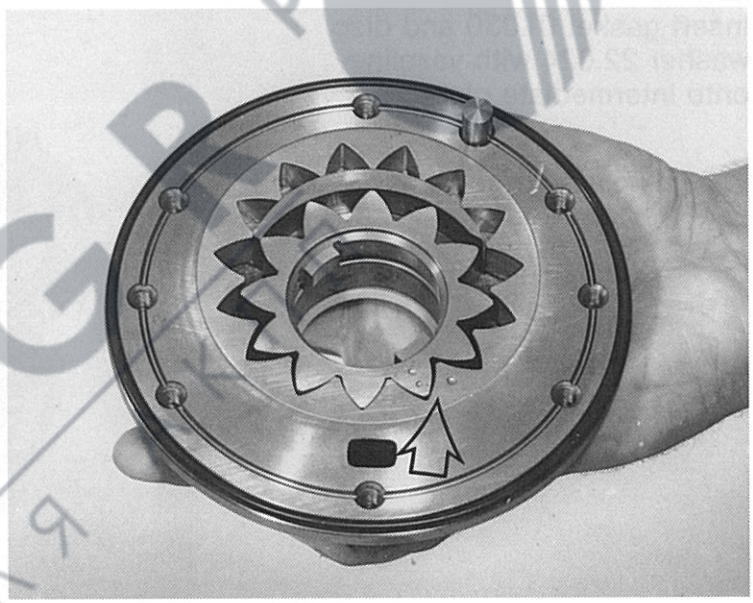
Insert o-ring 19.030 onto pump housing.

Also install seal ring 19.020 with mounting sleeve 5 X 46 000 069 as shown.

82 150

Install pump 19.010 hollow gear and pump gear into pump housing with marked side of gears facing upwards.

Tap alignment pin into pump housing.



82 151

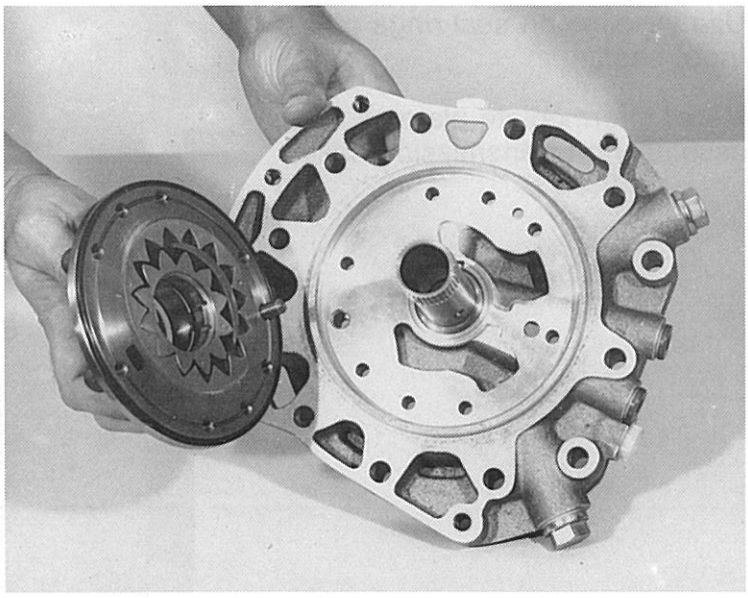
Insert pump into intermediate plate 22.022 and secure with 8 hexagon bolts 19.040.

(To be torqued 10 Nm)

(Tool head size = 10 mm)

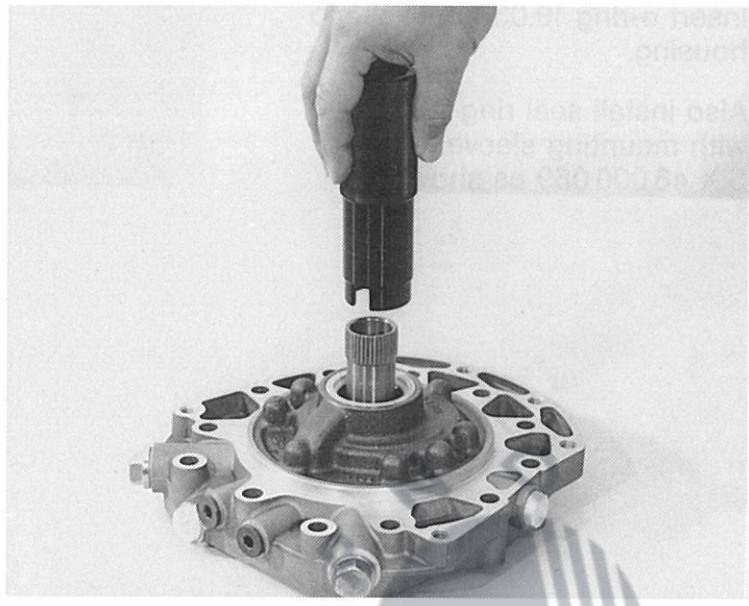
If a new intermediate plate is to be used, install sealing plugs with washers.

Torque information
refer to page 6.



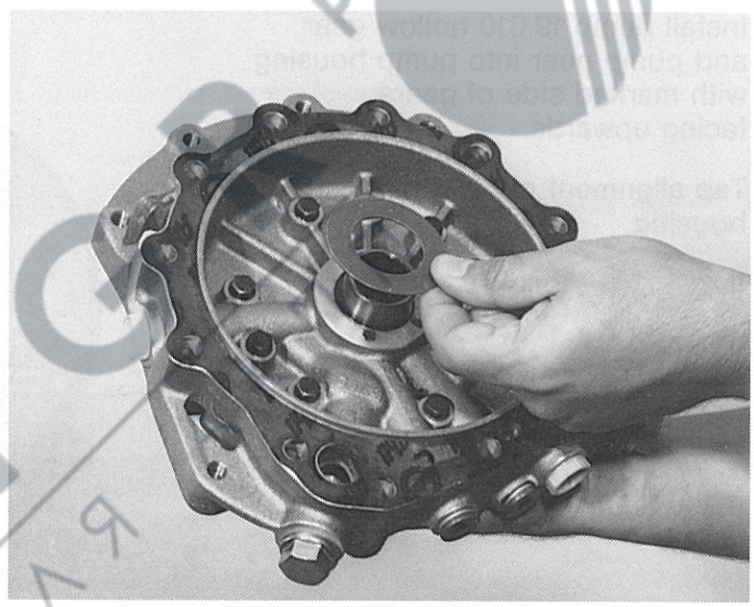
82 195

To check ease of rotation of pump gears use sleeve 5 X 56 000 021.



82 156

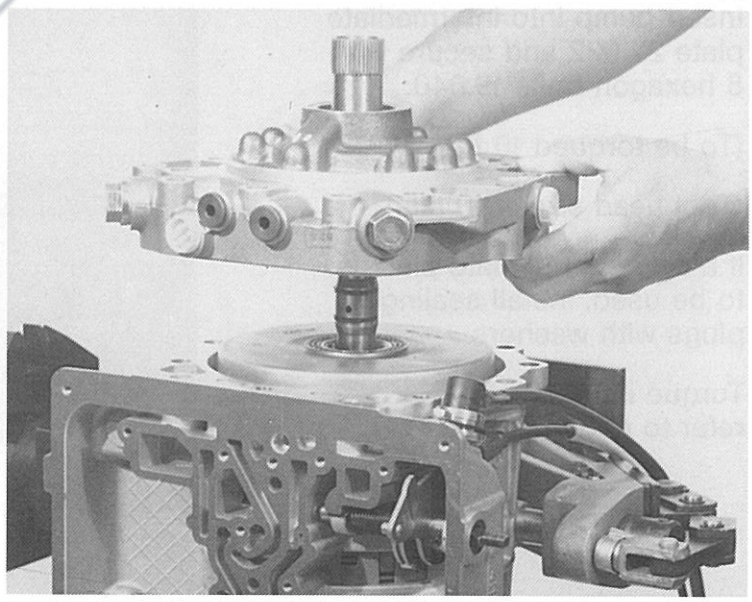
Insert gasket 01.030 and disc washer 22.024 with vaseline onto intermediate plate.



86 064

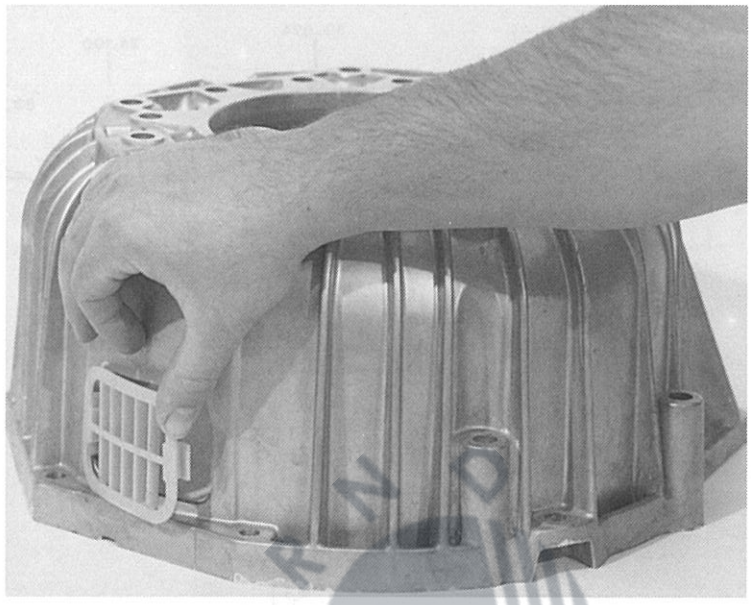
Use vaseline on seal rings of input shaft.

Install intermediate plate assembly on transmission case.



86 065

Install plastic grill 22.100 onto bell housing 22.010.



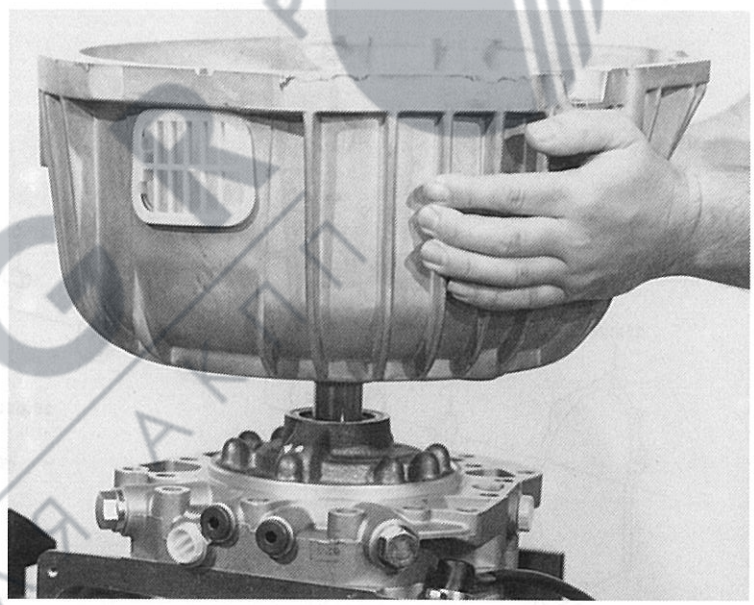
86 066

Install bell housing onto intermediate plate and use 18 hexagon head bolts as follows.

outside diameter 6 bolts
30 mm length - 22.114
inside diameter 12 bolts
70 mm length - 22.110

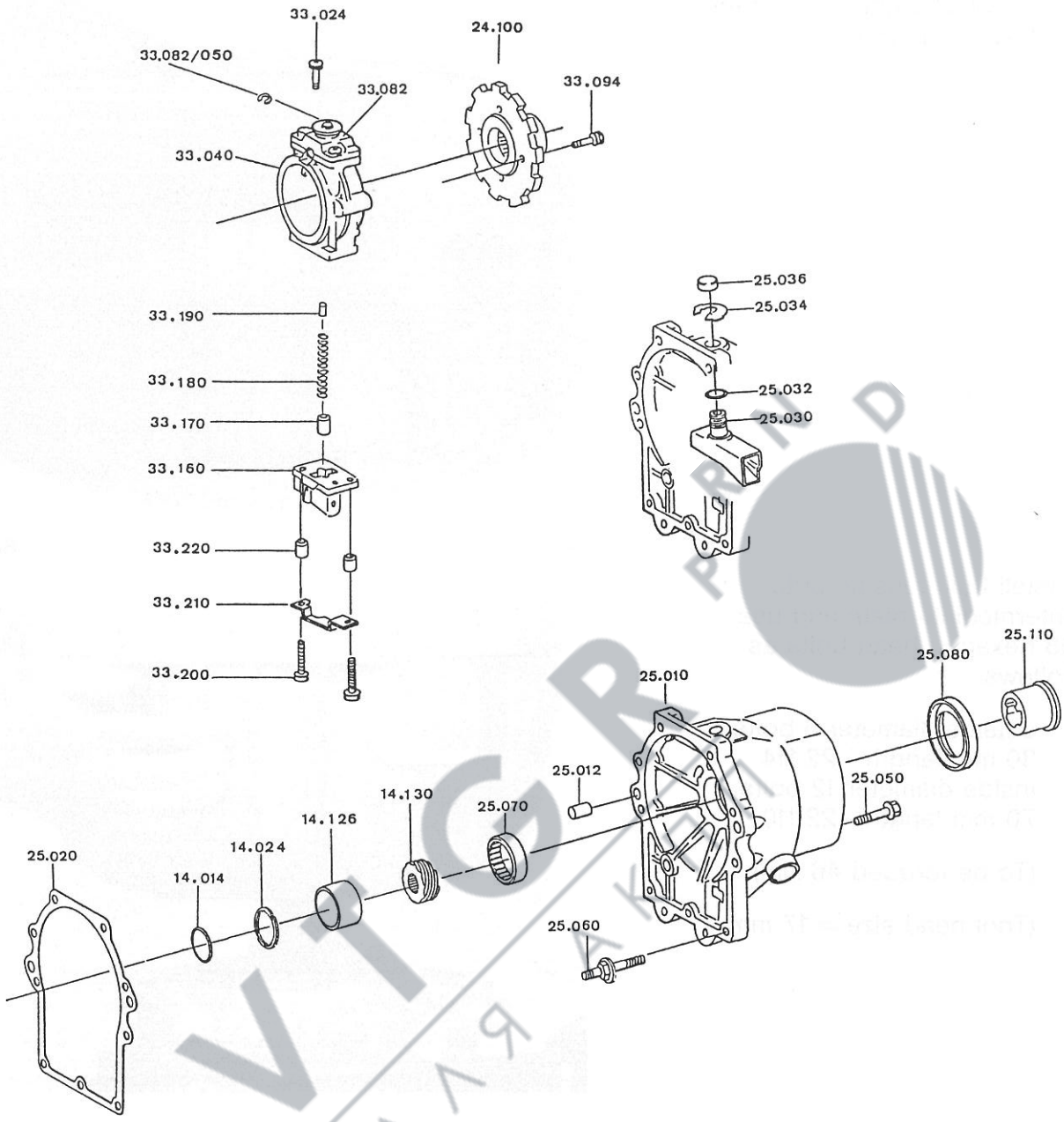
(To be torqued 46 Nm)

(Tool head size = 17 mm)



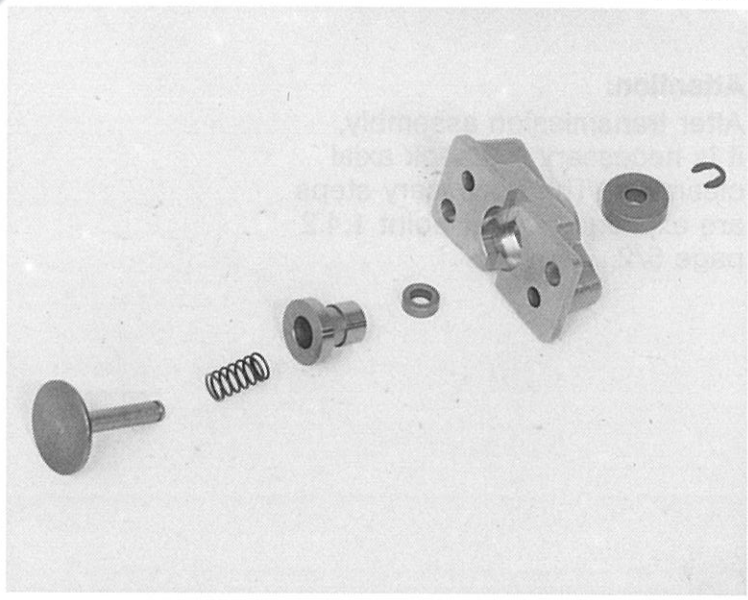
Attention:
After transmission assembly, it is necessary to check axial clearance. The necessary steps are explained under point 1.4.2 page 5/2.

3.14 Governor and Transmission Extension.



86 067

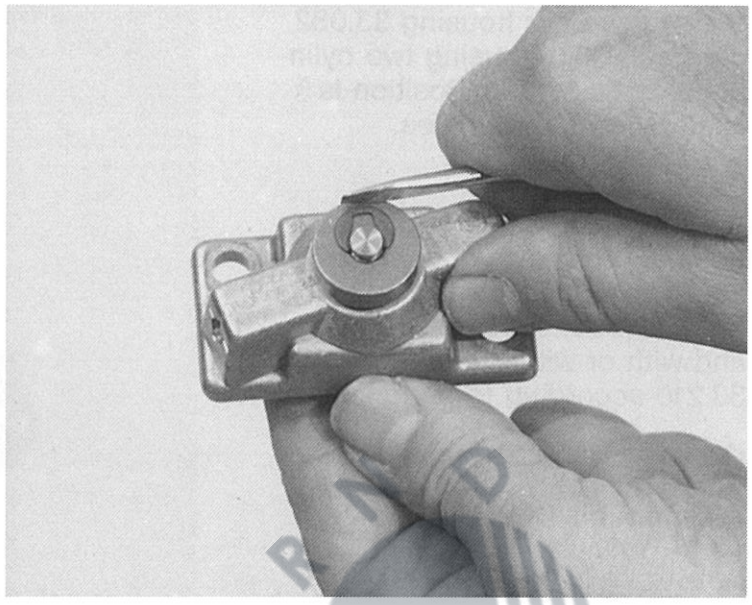
Picture shows disassembled stages 1 and 2 of governor housing in the order of assembly.



86 068

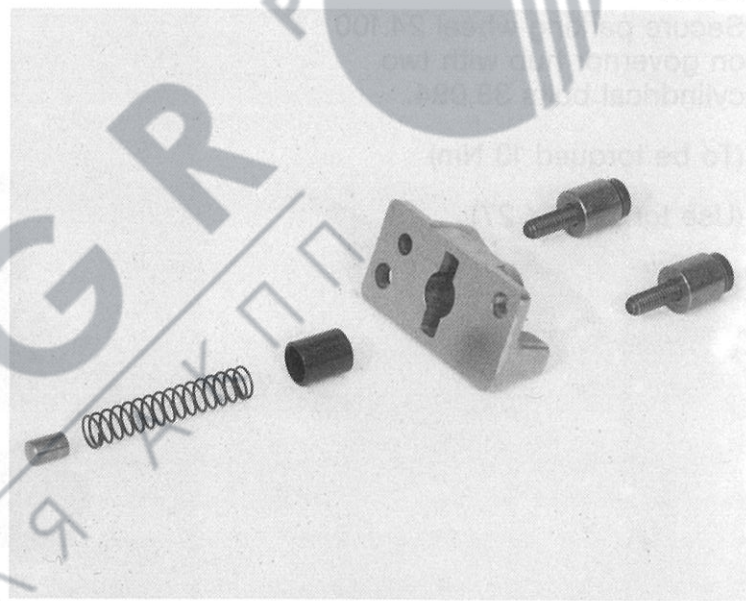
Assemble governor housing 33.082 by inserting pin, spring and bush in housing. Fit on distance ring and weight and secure with E clip 33.082/050.

Important
Always use new E clip.



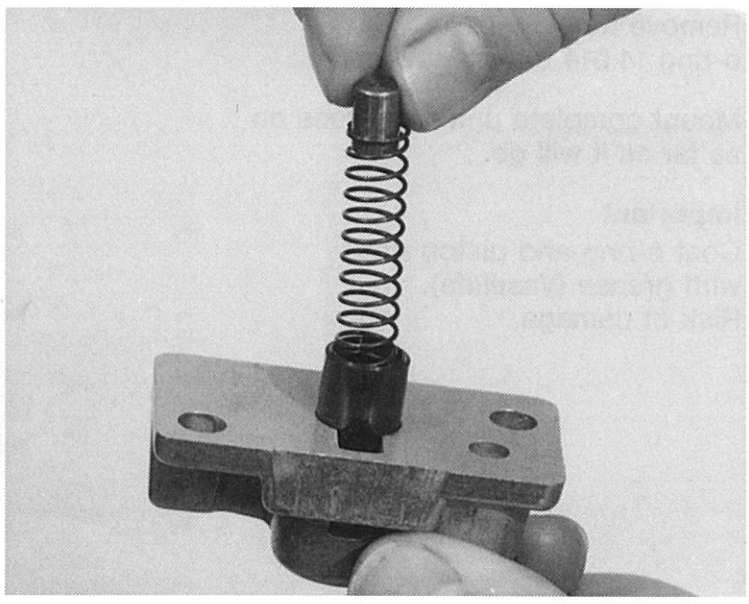
86 036

Picture shows the disassembled stage 3 of governor housing in order of assembly.



86 069

Insert governor piston 33.170, spring 33.180 and weight 33.190 into governor housing 33.160.



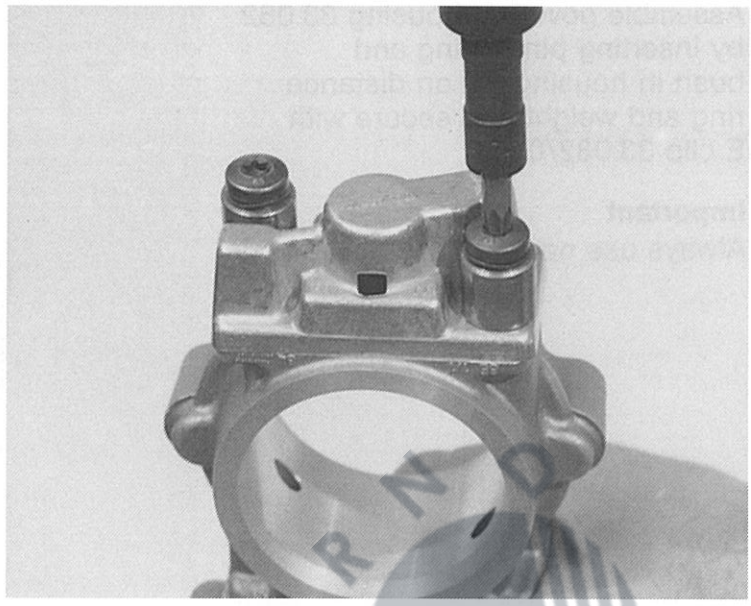
86 070

Screw governor housing 33.082 onto hub 33.040 using two cylindrical bolts 33.024. Position is fixed by pattern of holes.

Important
Assemble 3rd stage of governor housing as shown in picture (cast sections flush) with two cylindrical bolts 33.200, spacer bushes 33.220 and with or without retaining plate 33.210 according to parts list.

(To be torqued 10 Nm)

(Use torx bit TX 27)

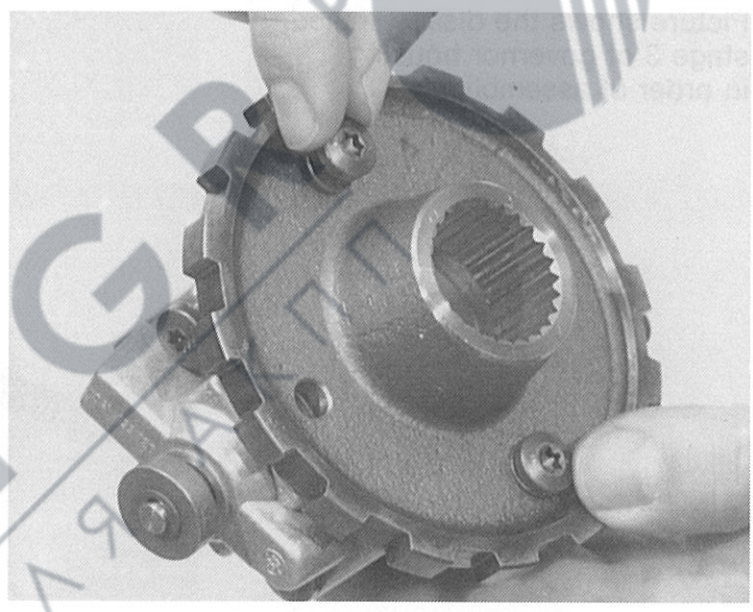


86 071

Secure parking wheel 24.100 on governor hub with two cylindrical bolts 33.094.

(To be torqued 10 Nm)

(Use torx bit TX 27)

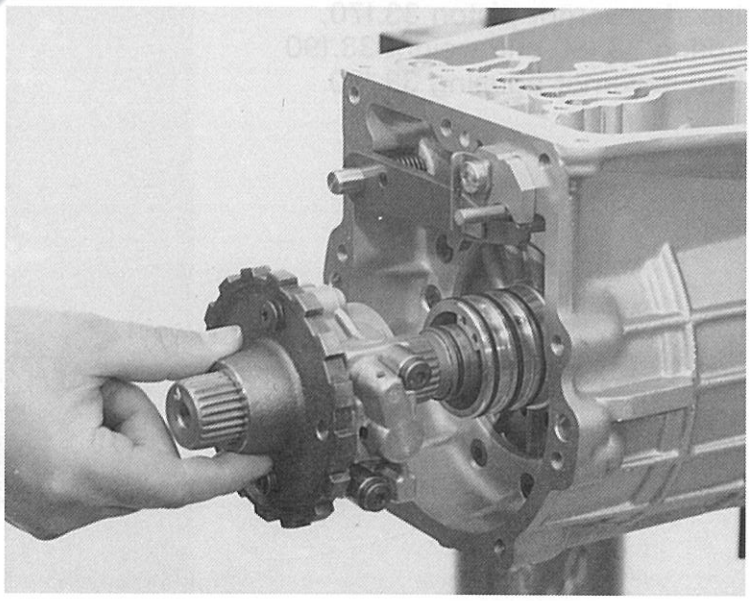


86 072

Remove holding tool and fit o-ring 14.014 onto output shaft.

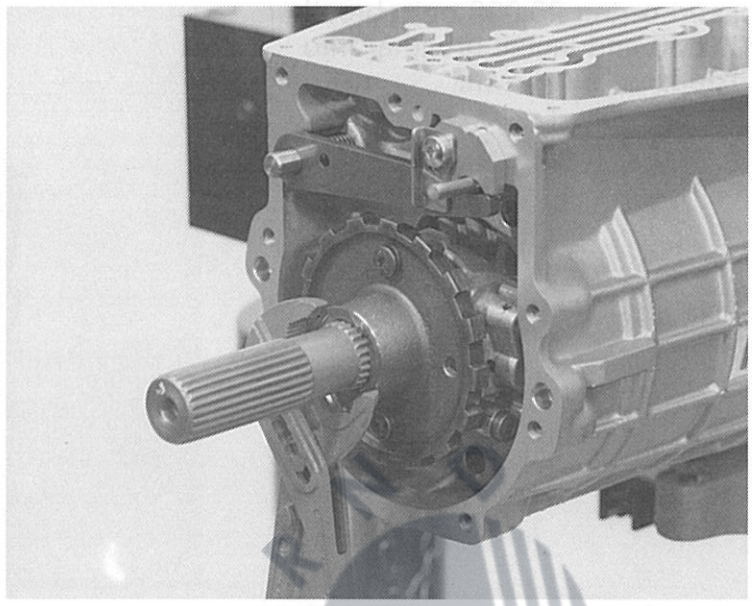
Mount complete unit and press on as far as it will go.

Important
Coat o-ring and piston rings with grease (Vaseline).
Risk of damage.



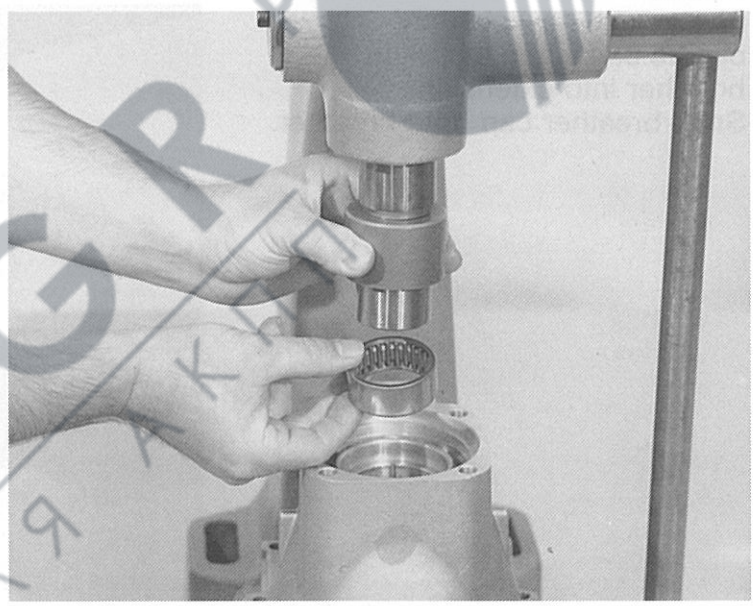
86 073

Use suitable pliers
to fit end ring 14.024.



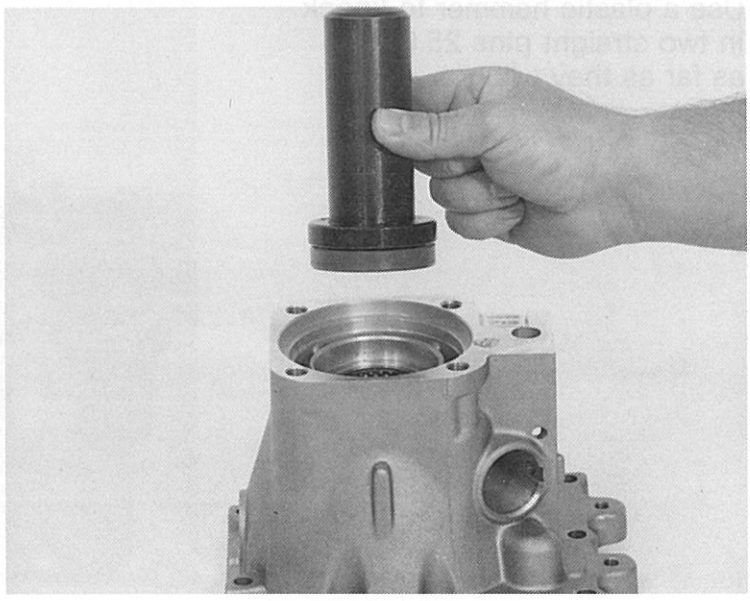
86 074

Install needle bearing 25.070
with mounting sleeve
5 X 46 000 413 into seat of
extension 25.010.



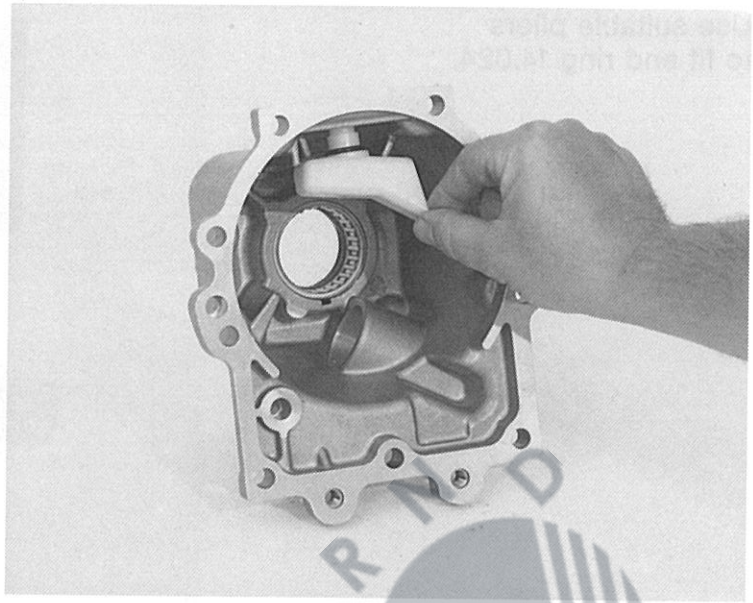
86 075

Press seal ring 25.080 with
mounting sleeve 5 X 46 000 069
into extension as shown.



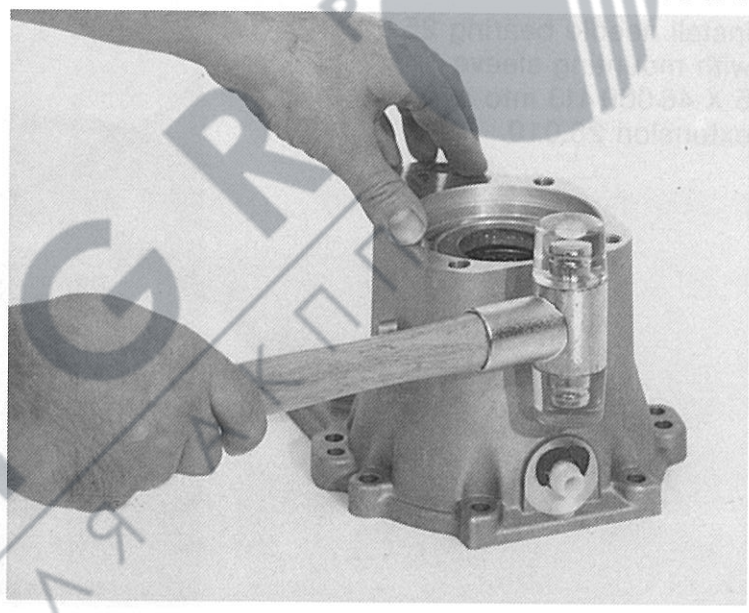
86 076

Insert o-ring 25.032 onto breather 25.030 and install breather into extension as shown.



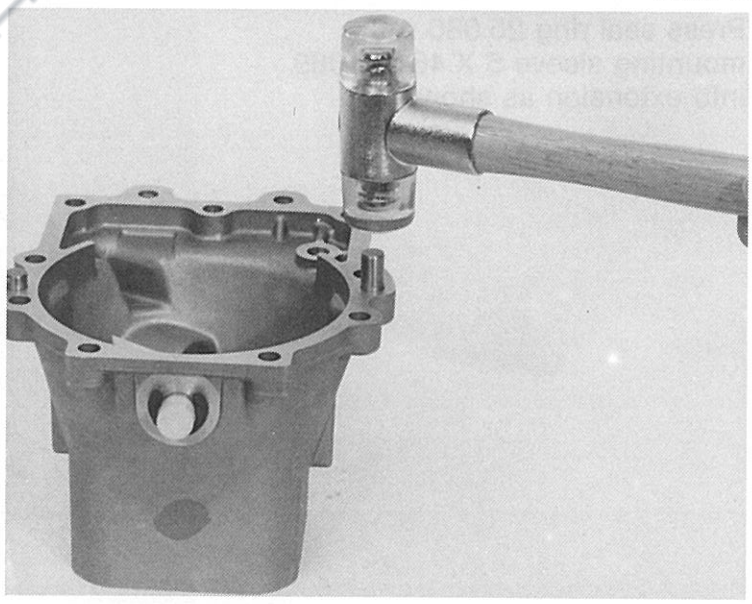
86 077

Always use new security clip 25.034 when installing breather into extension.
Snap breather cap onto breather.



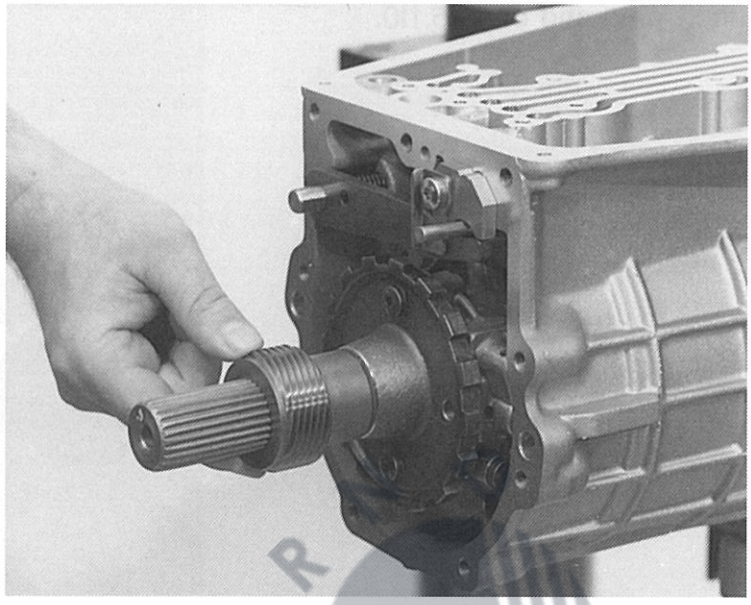
86 078

Use a plastic hammer to knock in two straight pins 25.012 as far as they will go.



86 079

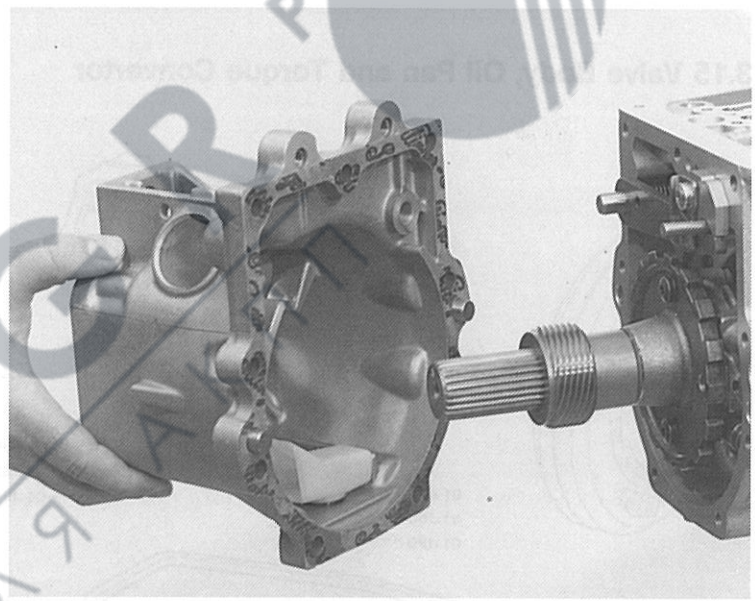
Slip distance bush 14.126 over output shaft, then fit on the speedometer worm 14.130 with collar to the rear.



86 080

Insert gasket with vaseline onto extension.

Fit extension onto transmission case. If it is necessary use plastic hammer to tap extension into place.

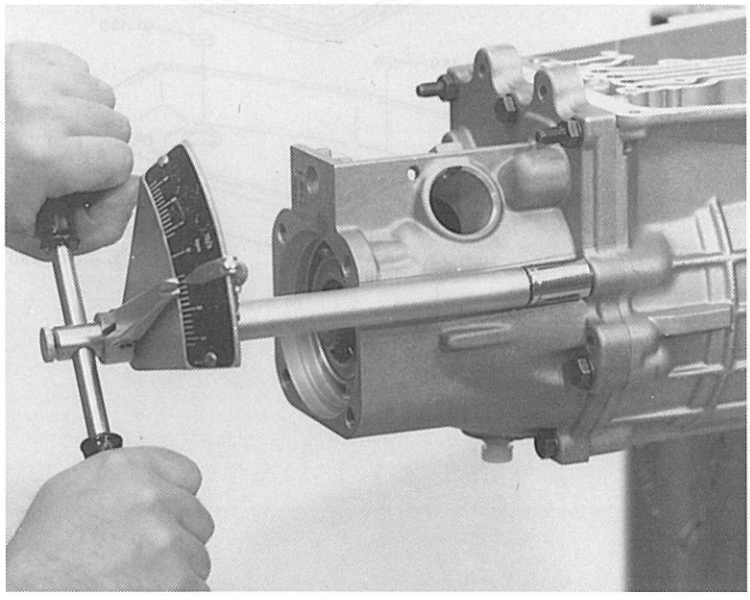


86 081

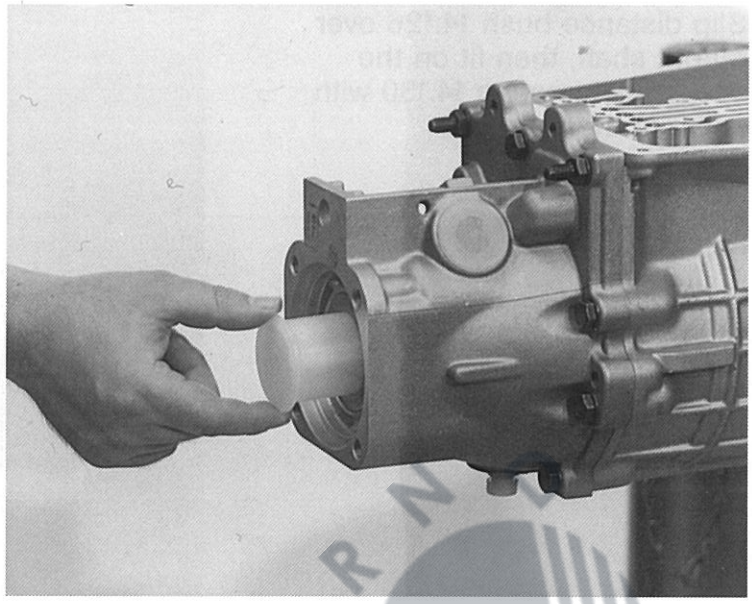
Secure transmission extension with 7x hex bolts 25.050 and 2x hex bolts 25.060 screwed into the corners.

(To be torqued 23 Nm)

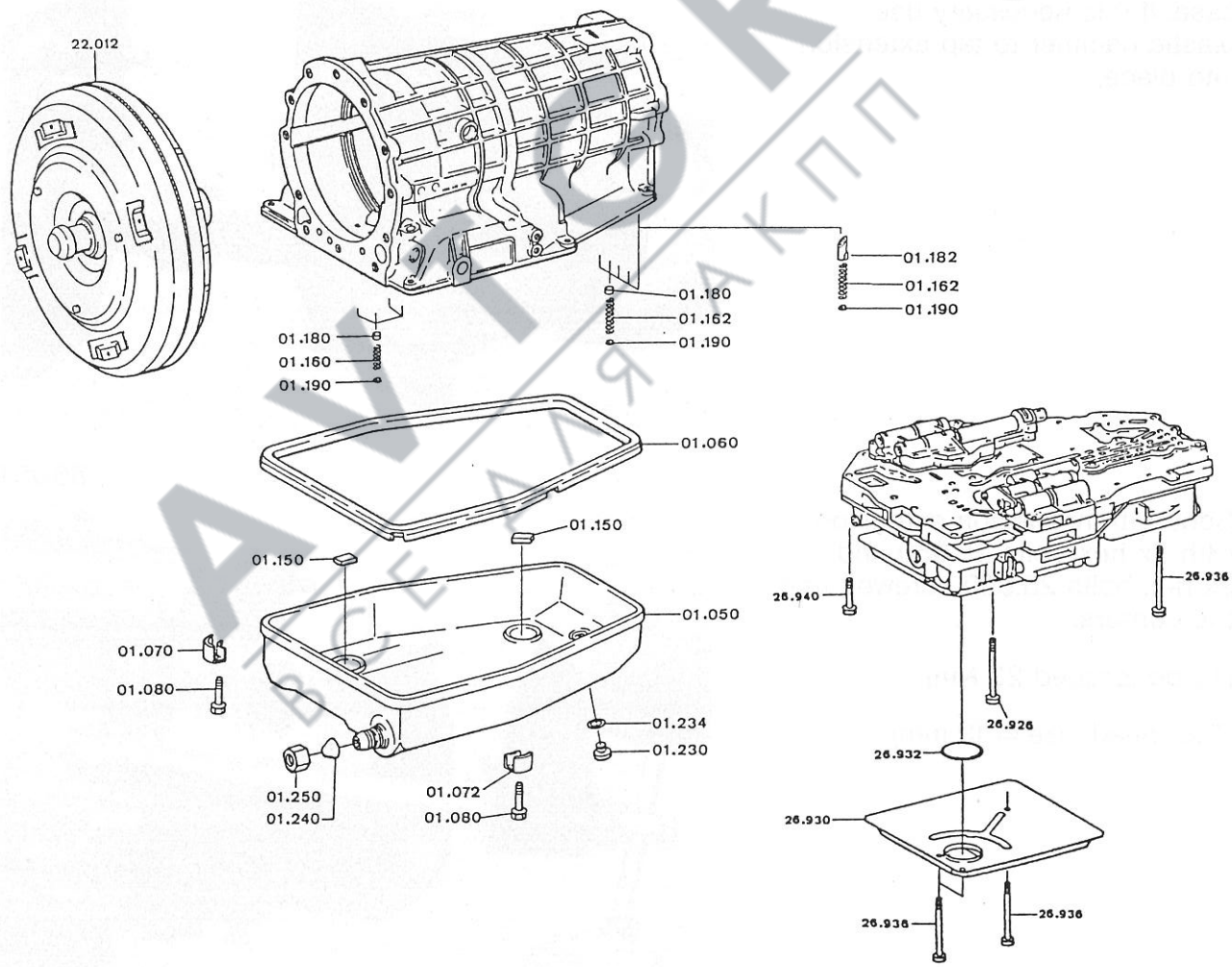
(Tool head size = 13 mm)



Insert plug and cap 25.110.

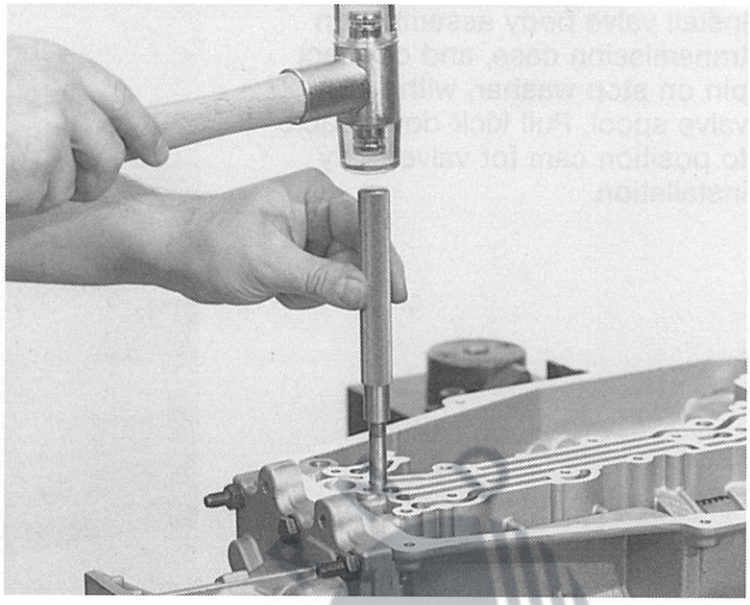


3.15 Valve Body, Oil Pan and Torque Convertor



86 083

Insert 8 sealing bushings 01.180 into oil feed holes, using suitable punch with plastic hammer to tap bushings into place. To check function of clutch and brake assemblies, insert air gun into oil feed holes (recommended air pressure 5-6 bar).

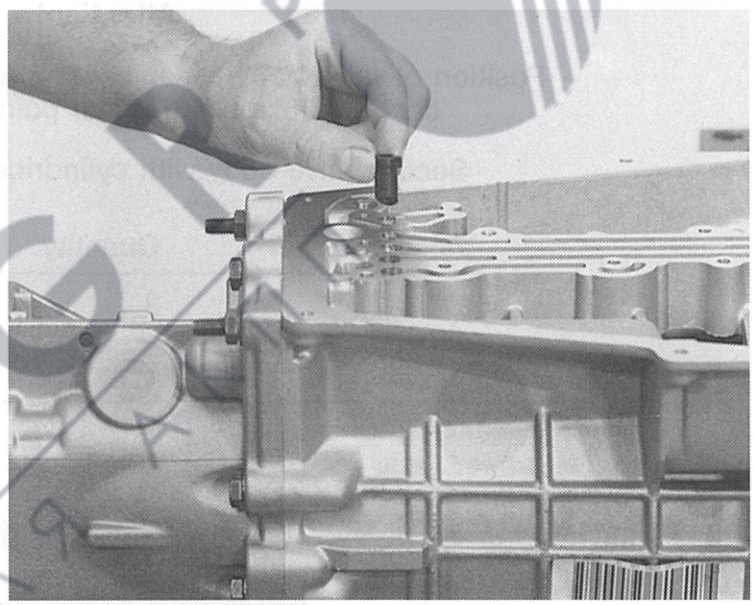


86 084

Insert sealing bushing 01.182 as shown in picture to seal the lubrication pressure feed.

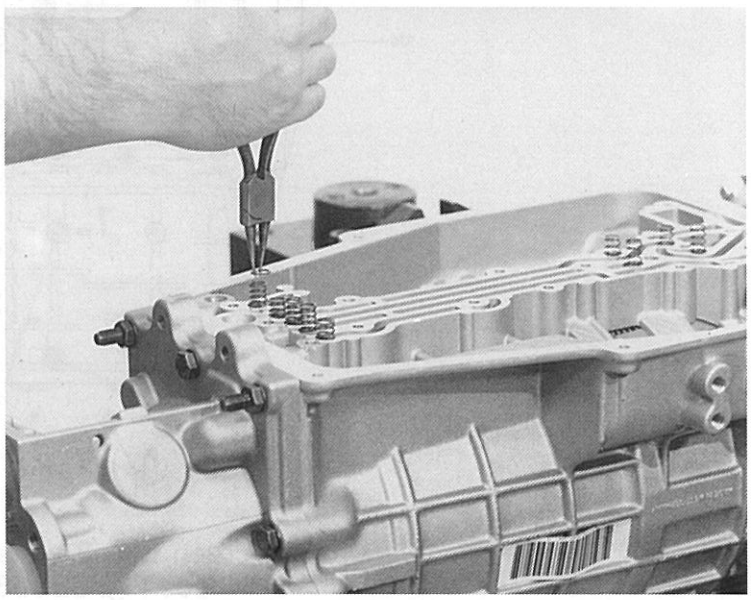
Four short springs 01.160 are to be inserted into oil feed holes located in the forward area of transmission case.

Also insert four long springs 01.162 into oil feed holes located in the rear area, and secure all springs with circlips 01.190.



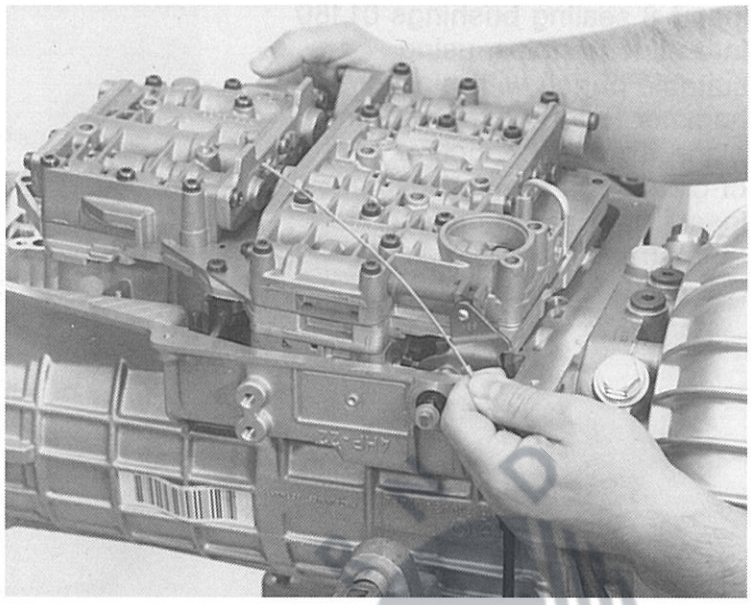
86 085

Insert the four shorter springs 01.160 into the oil feed holes of the 3-speed section, the five longer springs 01.162 into the oil feed holes to cylinder F of lubrication pressure feed and secure all springs with circlips 01.190.



86 086

Install valve body assembly on transmission case, and connect pin on stop washer, with valve spool. Pull kick-down cable to position cam for valve body installation.



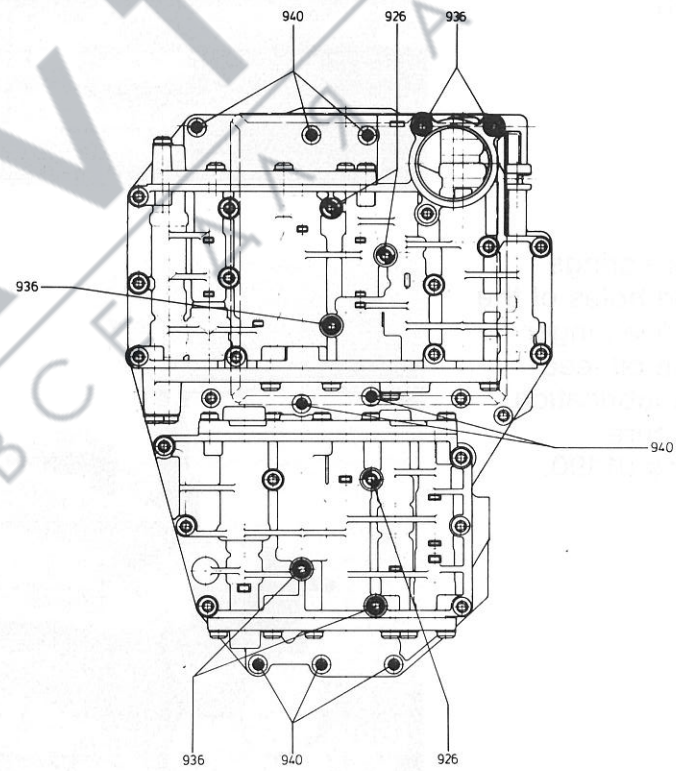
Attention!

Position of valve body assembly and adjustment of kick-down cable are explained under point 1.4.1, page 5/1.

Secure valve body with cylindrical bolts as follows:

Position	Quantity	Length (mm)
26.926	3	60
26.936	5	65
26.940	8	30

82 194



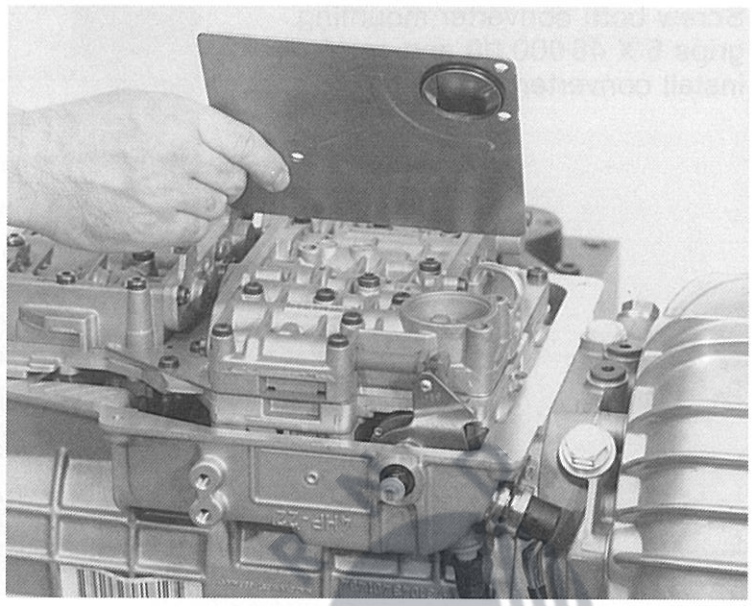
Secure oil screen with 3 bolts of item 26.936, see Fig. 86 088.

86 088

Insert o-ring 26.932 onto suction inlet on oil screen 26.930. Secure oil screen with 3 cylindrical bolts 26.936.

(To be torqued 8 Nm)

(Tool size torx bit 27)

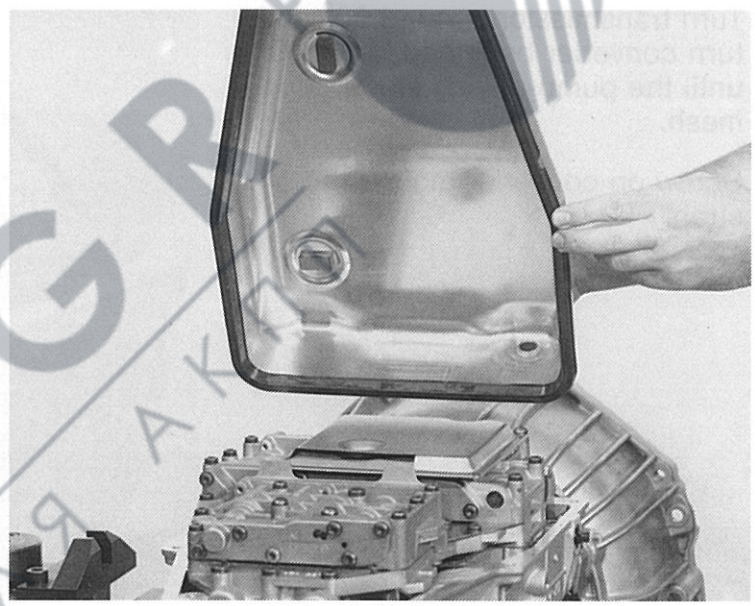


86 089

Place 1 magnet 01.150 each into 2 indentations in oil pan as shown.

Place gasket onto oil pan. If it is necessary install sealing plugs and sealing washers part numbers:
01.230 Plug
01.234 Washer
01.240 Plug
01.250 Nut

Torque information refer to page 6.



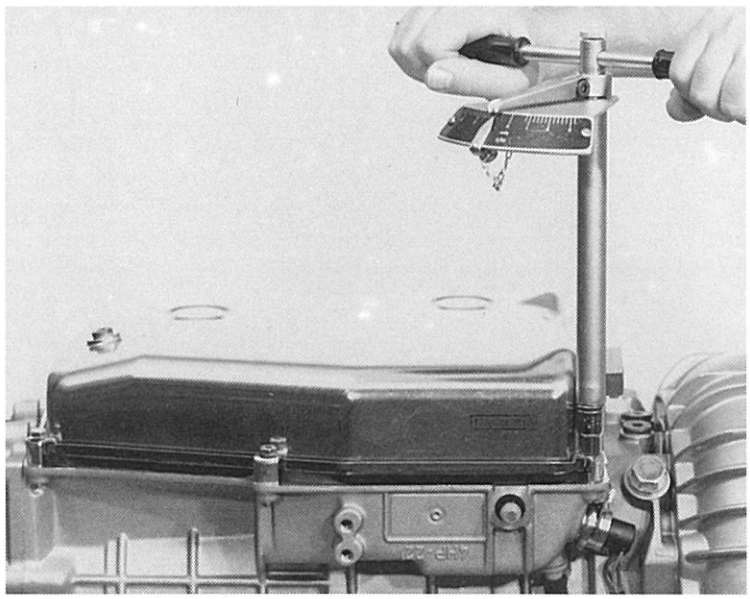
86 090

Secure oil pan on four corners with fixation plates 01.070. Next secure both sides of oil pan with fixation plates 01.072.

Use 6 hexagon bolts, part number 01.080, with each of the fixation plates.

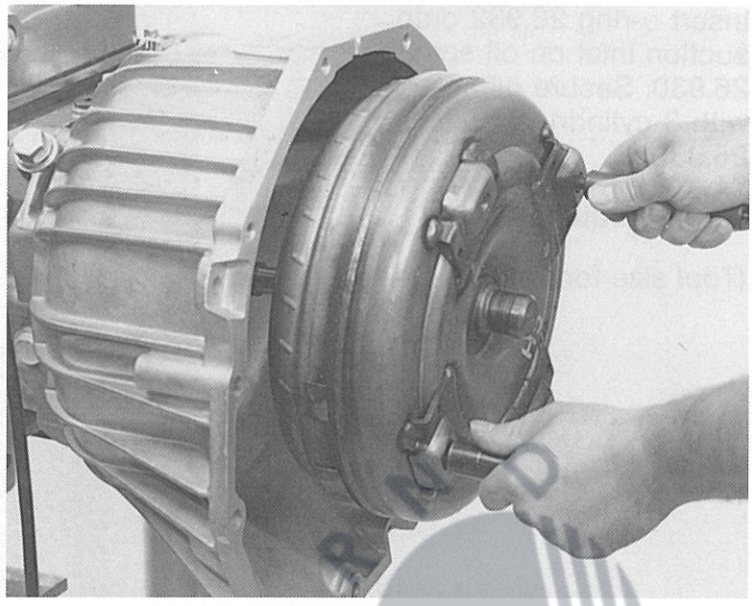
(To be torqued 8 Nm)

(Tool head size = 10 mm).



86 091

Screw both converter mounting grips 5 X 46 000 110 and carefully install converter 22.012.



86 092

Turn transmission around 90° and turn converter back and forward until the pump driving studs mesh.

Screw on converter mounting strap.