

REPAIR MANUAL

4 HP - 22



ZF GETRIEBE GMBH SAARBRÜCKEN

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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.

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.

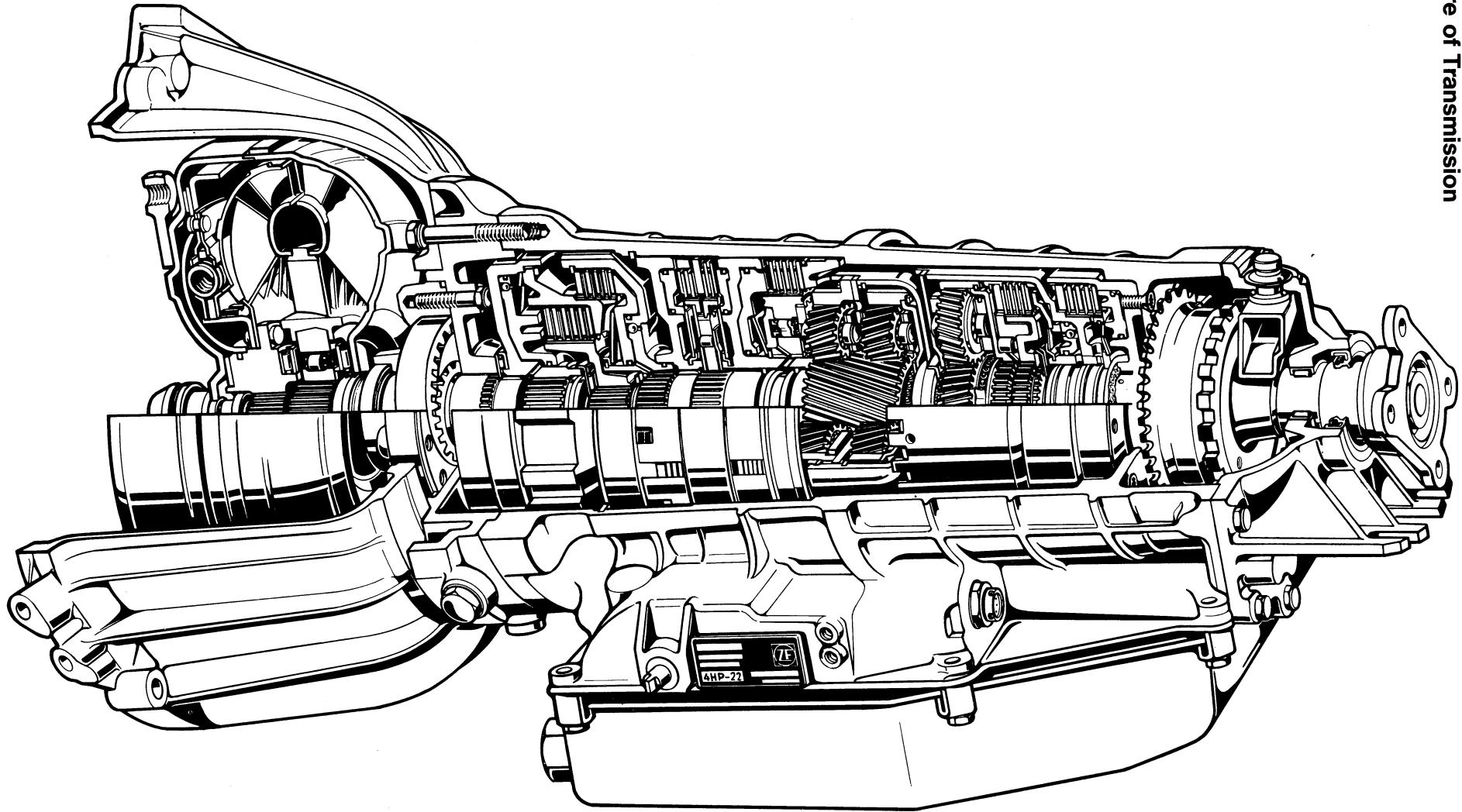
A separate repair manual is available for valve body repair.

Attention:

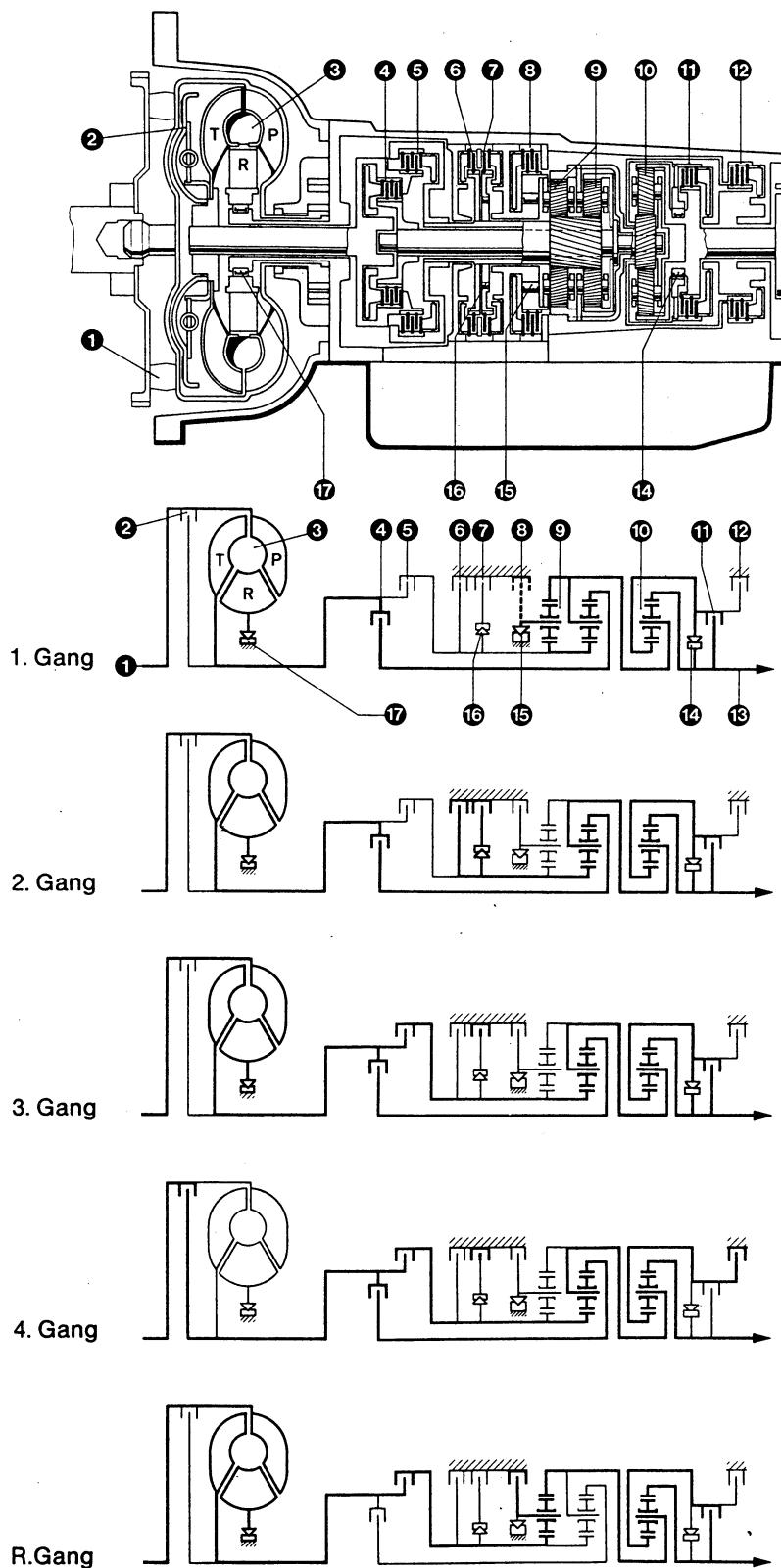
Transmission should only be shipped with the oil quantity listed in the respective part number listing (microfiche).

1. General notes

1.1 Picture of Transmission



1.2 Power Flow Schedule



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. Epicyclic 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 epicyclic gear set 9 is locked. Epicyclic gear set 10 also rotates, as a solid block.

Clutches 4,5,7 and 11 are engaged. Freewheels 15 and 16 are overrun. Epicyclic 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 and 16 are overrun. Epicyclic gear set 9 rotates as a solid block. The hollow shaft with the sun wheel of epicyclic 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 epicyclic gear set 9 is locked, the direction of output-shaft rotation is reversed. Epicyclic 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)



Insert 13 connecting bolts for tightening of valve body screw in loosely by hand.

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



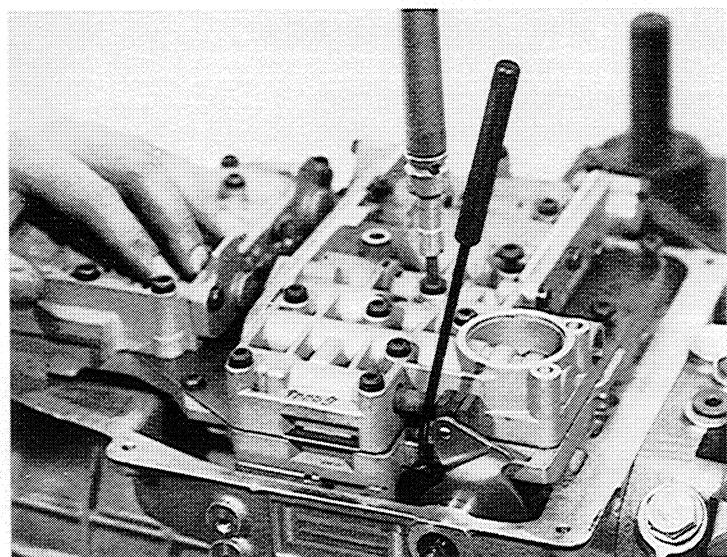
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Lightly press valve body unit against special tool.

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)



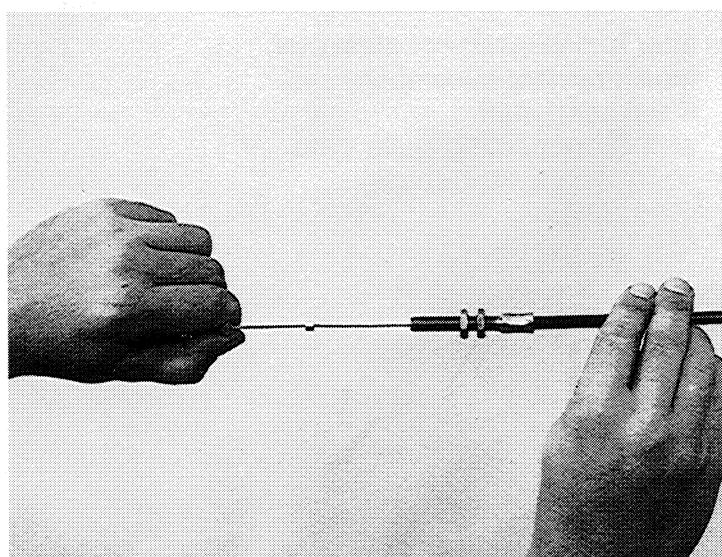
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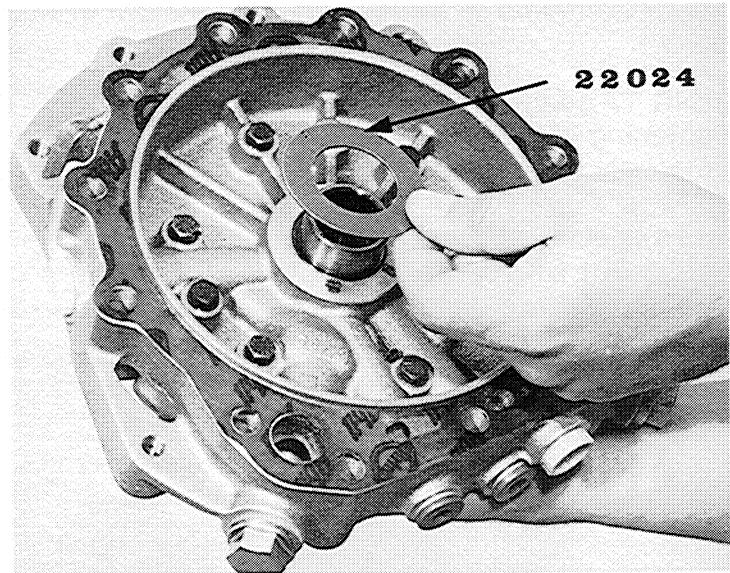
Straighten out kick-down cable. Pull cable through position full throttle. Do not pull kick-down.

Set seal X mm according to transmission types.

Alignment information available in ZF Technical Circular Letter (or microfiches).



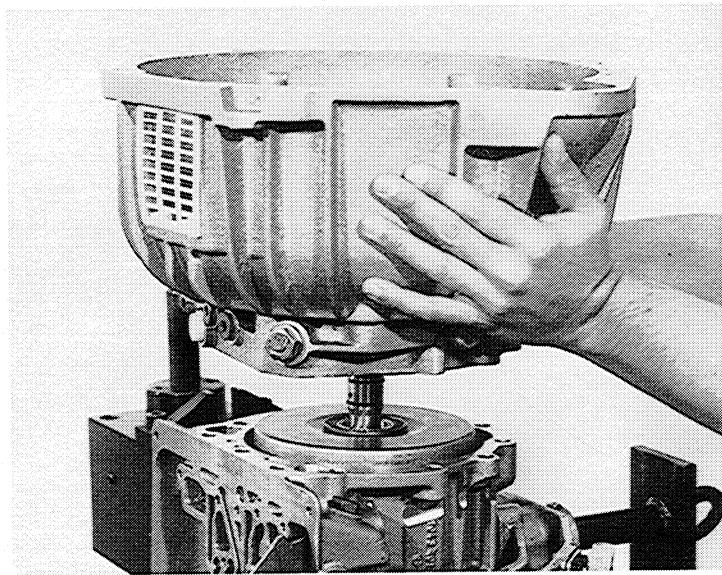
Install gasket and thrust washer 22 024 with grease (Vaseline) onto intermediate plate.



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

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



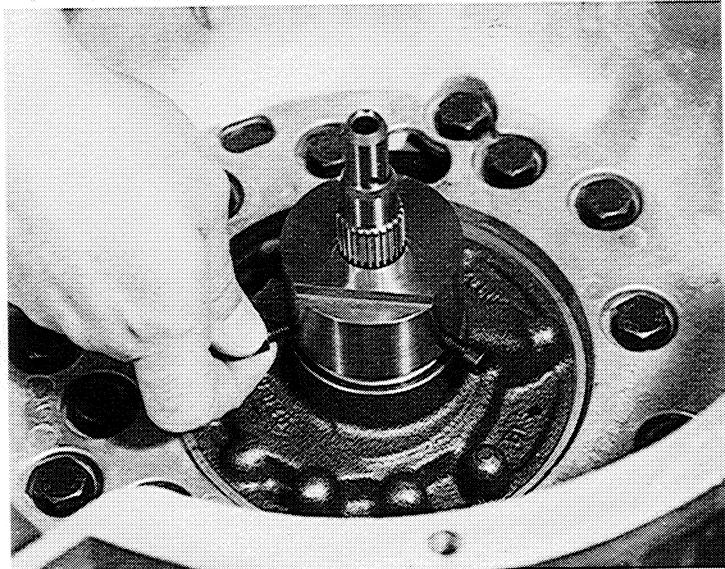
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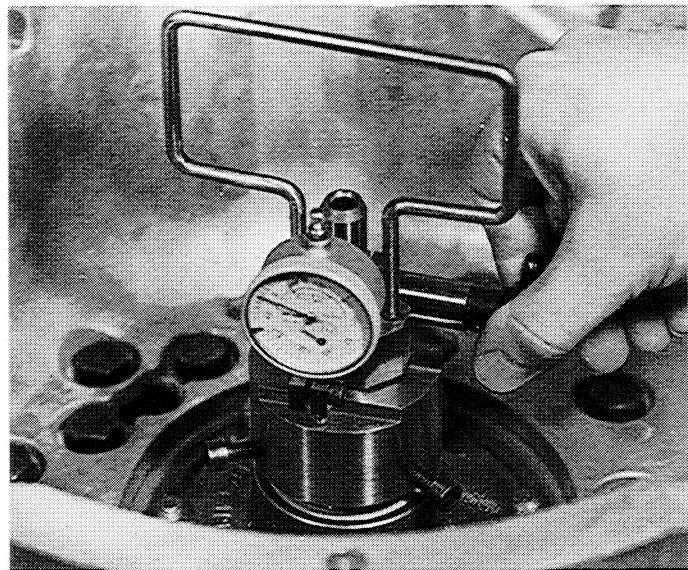
To determine the correct measurement it is absolutely necessary that

- all 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 01 001 415 with 3 connecting bolts onto stator shaft without any clearance.



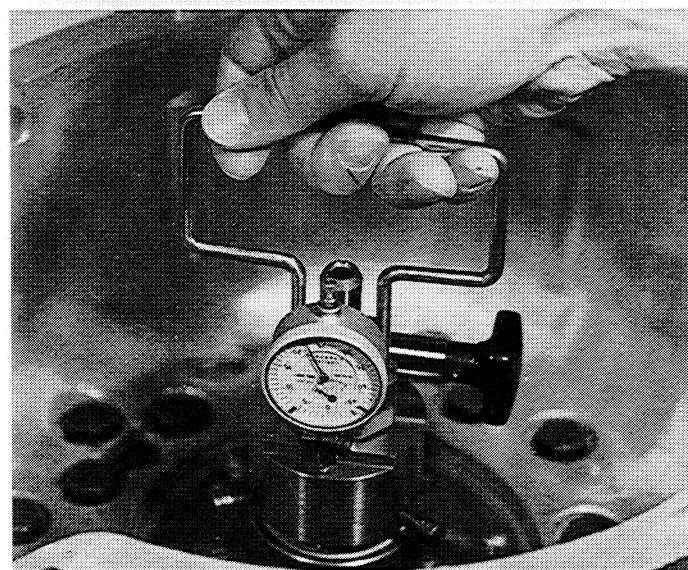
Also attach measurement gauge 5 P 01 001 415 onto teeth of input shaft and secure gauge with locking nut.



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
Counter Sunk Bolts of Cylinder F	- M6	55	10 Nm
Cylindrical Bolts of Park Assembly	- M6	56	10 Nm
Hexagon Bolts of Pump Assembly	- M6	78	10 Nm
Plugs of Intermediate Plate	- M20	78	50 Nm
Plugs of Intermediate Plate	- M14	78	40 Nm
Hexagon Bolts of Bell housing Assembly	- M10	80	46 Nm
Cylindrical Bolts of Governor Housing and Hub	- M6	82	10 Nm
Hexagon Bolts of Extension housing	- M8	85	23 Nm
Collar Nut for tightening of Output Flange	- M20	85	100 Nm
Cylindrical Bolts for tightening of Valve Body	- M6	88	6 Nm
Drain Plug for Oil Pan	- M10	89	15 Nm
Cap Nut of Oil Pan	- M24	89	20 Nm
Tightening Bolts of Oil Pan	- M6	89	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 may 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 technicals 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	<ul style="list-style-type: none"> - wrong setting of gear change rods between control lever and gearbox - too much friction in parking lock mechanism 	<ul style="list-style-type: none"> - correct setting - replace parts (cam and connection rod, eventually pawl)
1.2 Parking position does not hold	<ul style="list-style-type: none"> - wrong setting of gear change rods between control lever and gearbox 	<ul style="list-style-type: none"> - correct setting
1.3 Engine cannot be started	<ul style="list-style-type: none"> - starter inhibitor switch faulty - wrong setting of selector lever - faulty selector lever 	<ul style="list-style-type: none"> - replace switch - correct setting - replace lever
2. Position R 2.1 No reserve gear	<ul style="list-style-type: none"> - wrong setting of gear chance rods between control lever and gearbox - dirty oil filter - clutch B destroyed, in this case no 3rd gear - clutch D destroyed, no engine braking in Position 1, 1st gear - clutch E destroyed, no engine braking in 2nd + 3rd gear, also in Pos 1, 1st gear - reverse gear safety valve faulty 	<ul style="list-style-type: none"> - correct setting - see 11.2 - replace transmission - replace transmission - replace transmission - replace control unit
2.2 Slipping or shaking at start in reverse gear	<ul style="list-style-type: none"> - clutch B or E brake D defective 	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - damper B defective (will give the same symptoms when changing from 2nd to 3rd gear) 	<ul style="list-style-type: none"> - replace control unit
2.4 Reverse light does not illuminate (bulbs, fuses and cables ok)	<ul style="list-style-type: none"> - see 1.3 	<ul style="list-style-type: none"> - 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 – Change 1-2 – Change 2-3/3-2 – Change 2-3 – Change 3-4/4-3 – Change 3-4	– governor dirty – shift valve 1-2 sticking – brake C' and/or C faulty – governor dirty – shift valve 2-3 sticking – clutch B faulty – governor dirty – shift valve 3-4 sticking – brake F defektive	– replace governor – replace control unit – replace gearbox – replace governor – replace control unit – replace gearbox – replace governor – replace control unit – replace gearbox
4.5 Vehicle starts in 2nd gear Vehicle starts in 3rd gear Gearbox changes 1-3	– governor sleeve sticking – shift valve 1-2 sticking – governor sleeve sticking – shift valve 1-2 and 2-3 sticking – shift valve 2-3 sticking	– replace governor – replace control unit – replace governor – replace control unit – 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 - change points incorrect at full throttle setting - no changes at Kick-Down 1-2/2-1 - no changes at Kick-down 2-3/3-2 - no changes at Kick-Down 4-3	- dirty governor - shift valves sticking - throttle cable setting incorrect - throttle cable setting incorrect - throttle cable setting incorrect - 4-3 Kick-Down valve sticking	- replace governor - replace control unit - correct setting - correct setting - correkt setting - replace control unit
4.7 Gear change quality - harsh changes at low throttle - soft changes at full throttle and Kick-Down - harsh changes at full throttle and Kick-Down	- defective damper - modulation pressure too high - clutch plates damaged - defektive damper - modulation pressure too low - clutch plates damaged - incorrect modulation pressure - defective damper	- replace control unit - replace control unit - replace gearbox - replace control unit - replace control unit - replace gearbox - replace control unit - replace control unit
5. Position 3, 3rd Gear 5.1 No engine braking	- clutch E demaged	- 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	<ul style="list-style-type: none"> - WK safety valve sticking - no 4th gear - governor pressure incorrect 	<ul style="list-style-type: none"> - replace control unit - replace control unit - replace governor
8.2 Gear change too harsh	<ul style="list-style-type: none"> - WK-damper faulty - torque converter faulty 	<ul style="list-style-type: none"> - replace control - replace torque converter
8.3 No lock-up	<ul style="list-style-type: none"> - control unit faulty - WK faulty - no 4th gear 	<ul style="list-style-type: none"> - replace control unit - replace torque converter - replace control unit
9. General		
9.1 Throttle cable sticking	<ul style="list-style-type: none"> - nipple in throttle cam is worn - too much friction in sleeve of throttle cable - throttle pressure piston sticking 	<ul style="list-style-type: none"> - replace cable - replace cable - replace control unit
9.2 Noisy and no drive after long journey	<ul style="list-style-type: none"> - oil filter on control unit dirty 	<ul style="list-style-type: none"> - if there is no burnt lining on oil sump, then only replace filter, otherwise replace gearbox
9.3 Very noisy and no drive	<ul style="list-style-type: none"> - flexi plate is worn - pump drive worn 	<ul style="list-style-type: none"> - replace flexi-plate or torque converter - replace gearbox
10. Oil Leak		
10.1 Oil dripping from bell housing	<ul style="list-style-type: none"> - seal ring in pump housing damaged - pump housing porous - converter leaking from welded seam 	<ul style="list-style-type: none"> - replace seal - replace pump housing - replace converter
10.2 Leakage between gearbox and oil sump	<ul style="list-style-type: none"> - incorrect torque of bolts - sump gasket damaged 	<ul style="list-style-type: none"> - 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)	<ul style="list-style-type: none"> - bell housing bolts have worked loose 	<ul style="list-style-type: none"> - tighten bolts
10.4 Oil loss at tacho connection	<ul style="list-style-type: none"> - damaged 'O' ring on tacho - oil seal in tacho faulty 	<ul style="list-style-type: none"> - replace 'O' ring - replace tacho sleeve
10.5 Oil leak from throttle connection cable	<ul style="list-style-type: none"> - 'O' ring connection damaged 	<ul style="list-style-type: none"> - replace 'O' ring or complete cable
10.6 Oil leak at output	<ul style="list-style-type: none"> - output oil seal damaged 	<ul style="list-style-type: none"> - replace seal
10.7 Loss of oil through breather	<ul style="list-style-type: none"> - oil level too high - incorrect oil - no breather cap - 'O' ring breather damaged - securing clip faulty 	<ul style="list-style-type: none"> - check level - remove gearbox and ensure that it is completely 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	<ul style="list-style-type: none"> - loose connections - pipes damaged - cooler leaks 	<ul style="list-style-type: none"> - re-tighten - replace pipes - replace cooler
10.9 Oil leak at intermediate plate	<ul style="list-style-type: none"> - blanking plugs loose 	<ul style="list-style-type: none"> - tighten plugs - replace washers
10.10 Leakage between main housing and tail housing	<ul style="list-style-type: none"> - loose bolts - gasket damaged 	<ul style="list-style-type: none"> - re-tighten - replace gasket
11. Noises 11.1 High pitched noise in all positions, esp. if oil is cold	<ul style="list-style-type: none"> - low oil level - leaking control unit 	<ul style="list-style-type: none"> - top up as required - replace control unit

Fault Finding Table for Gearbox 4 HP 22

Fault	Possible Cause	Corrective Measures
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 control 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.
Dipstick must be marked between Min- and Max-mark.

Oil Level Too Low

Engine will spin, therefore no power flow in transmission (turbine cannot transmit power).

Transmission noisy when driving on curvy roads.

Correct Adjustment of Engine

Correct idle rpm, requirement of car manufacturer.

Power Flow Forward and Reverse

Correct linkage adjustment, requirement of car manufacturer.

Stall Speed

Explained under Group 21 Technical Data, Chart, Pressure, Circular Letter to ZF Service Stations.

Shift Points

Explained under Group 21 Technical Data, Chart, Pressure, Folder 401

Shift Quality

Correct kick-down cable adjustment information available under point 16 Function Description.

Correct adjustment, requirement of car manufacturer.

Noise

Checking Function of Torque Converter Lockup Clutch

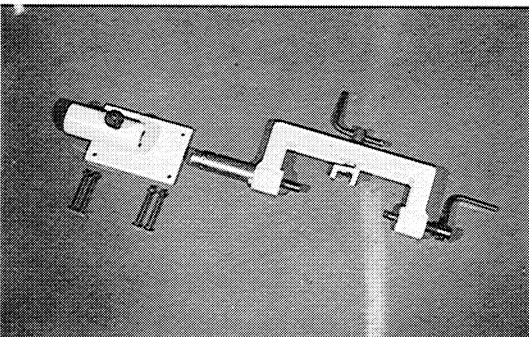
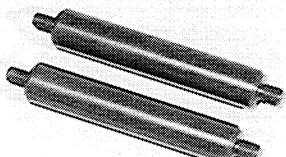
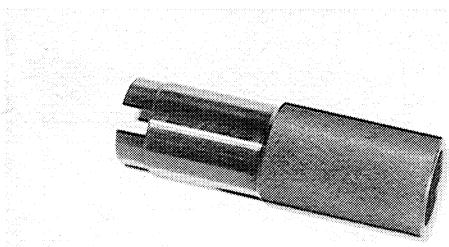
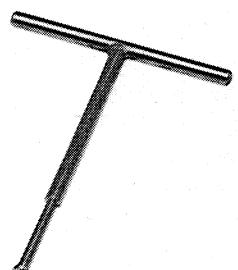
Upshifts 1-2, 2-3, 3-4 by one-quarter pulling of gas pedal.

The clutch in torque converter should be locked at 85 - 90 km/h when traveling, or 2000 rpm of engine speed. After lockup engine speed will go down approximately 400 rpm.

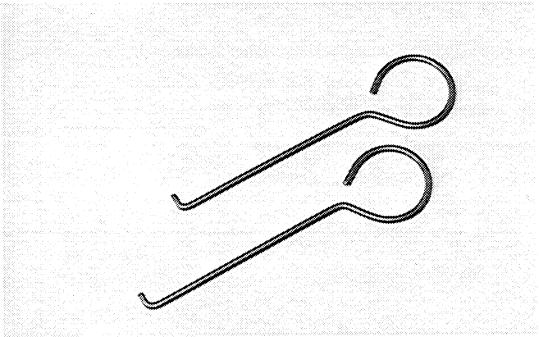
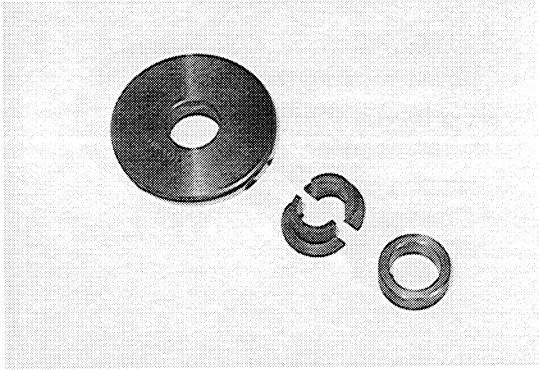
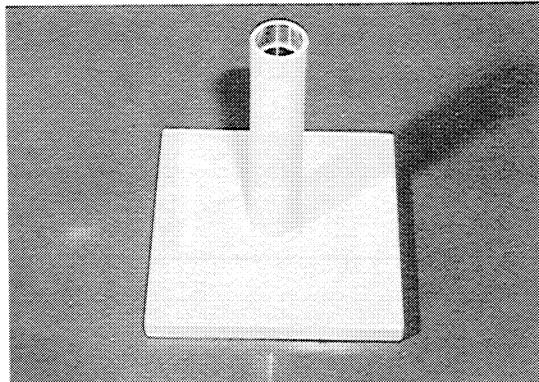
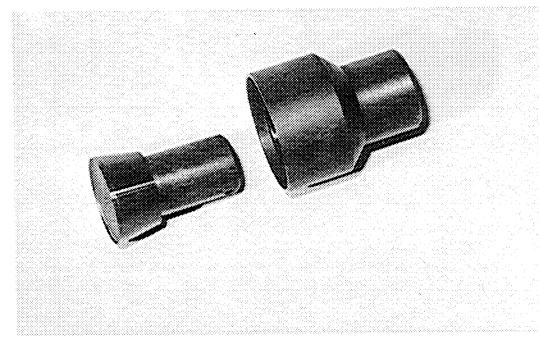
1.8 Spezialwerkzeuge 4 HP 22

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
76 051		<p>5 X 56 000 096</p> <ul style="list-style-type: none"> - 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
76 046		<p>5 X 56 000 090</p> <ul style="list-style-type: none"> - Wandlerausziehgriffe (2 St.) - Poignées de dépose/repose du convertisseur - Mounting grips (2) for removal and to install convertor 	identisch identique identical to 3 HP 22
76 047		<p>5 X 56 000 021</p> <ul style="list-style-type: none"> - 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
82 176		<p>5 X 46 000 170</p> <ul style="list-style-type: none"> - Ausziehgriff für Dichthülsen - Poignée de démontage des joints d'alimentation d'embrayage - Puller for removal of sealing bushings. 	

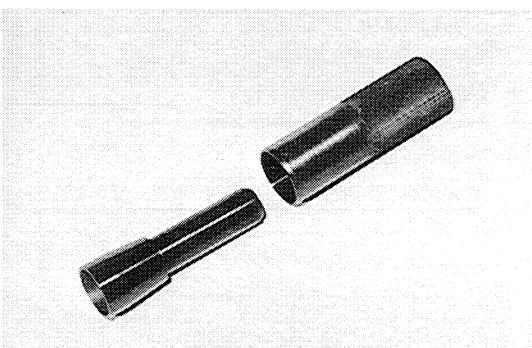
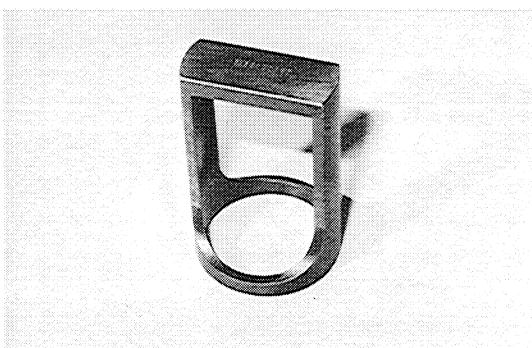
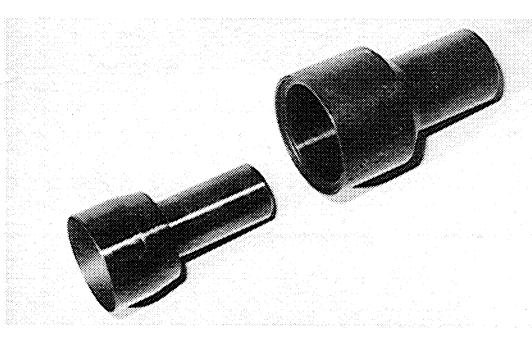
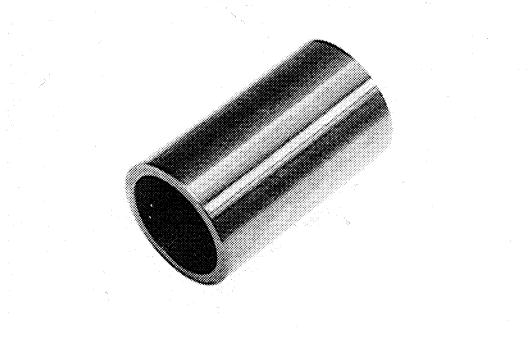
Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
76 045		<p>5 X 56 000 095</p> <ul style="list-style-type: none"> - Ausziehhaken 2 (St.) für Zylinder B kpl. - Poignées de dépose (2) du cylindre B complet - Puller hooks (2) for pulling of cylinder B assembly 	identisch identique identical to 3 HP 22
76 037		<p>5 X 56 000 094</p> <ul style="list-style-type: none"> - Haltevorrichtung für Abtrieb kpl. - 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
76 050		<p>5 X 56 000 072</p> <ul style="list-style-type: none"> - Aufnahmeverrichtung für Abtrieb kpl. - Support pour bloc arrière complet - Supporting device for brake C', C and D assembly, as well as 4.th gear assembly 	identisch identique identical to 3 HP 22
76 041		<p>5 X 56 000 092</p> <ul style="list-style-type: none"> - Montagehülse für Sprengring Tellerfeder Kupplung B - Douille de montage pour le circlips du diaphragme embrayage - Mounting sleeve to insert snapring onto plate spring 	identisch identique identical to 3 HP 22

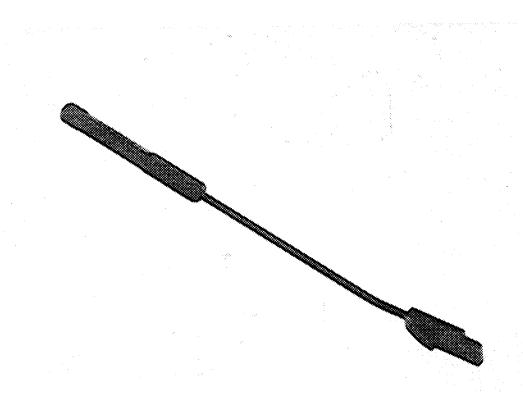
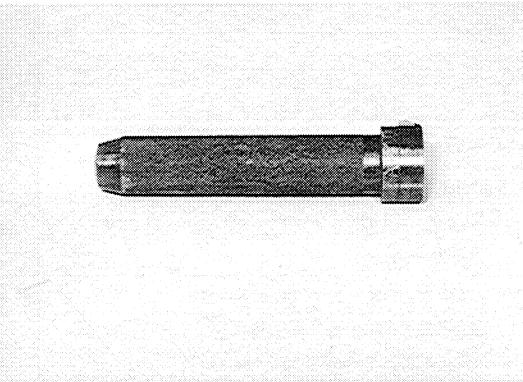
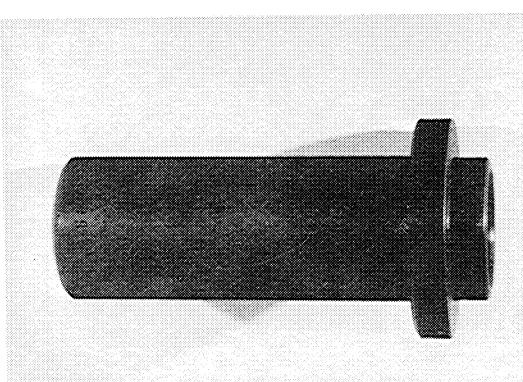
Spezialwerkzeuge 4 HP 22

Outils spéciaux 4 HP 22

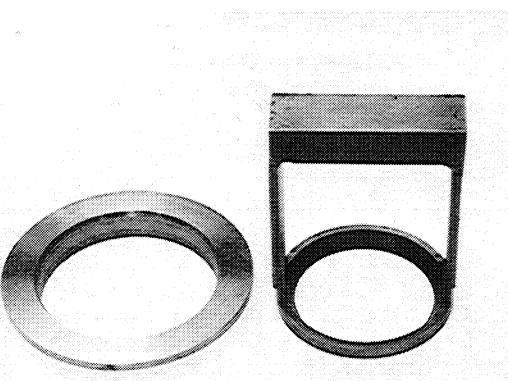
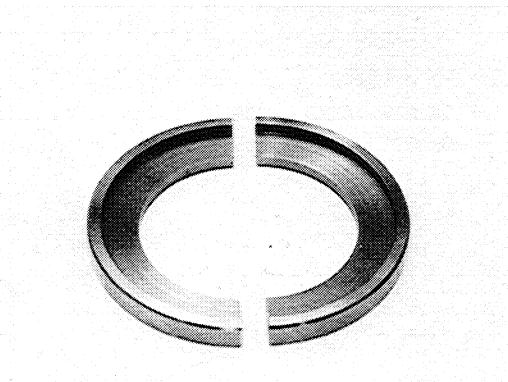
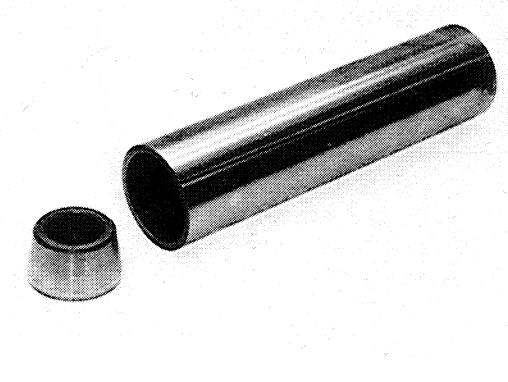
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
76 048		<p>5 x 56 000 075</p> <ul style="list-style-type: none"> - Montagehülse für O-Ring und Sprengring Sonnenradwelle - Douille de montage pour le joint torique et le cir-clips de l'arbre planétaire - Mounting sleeve to install o-ring and snap ring into sun shaft seat 	identisch identique identical to 3 HP 22
76 043		<p>5 X 56 000 093</p> <ul style="list-style-type: none"> - 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
76049		<p>5 X 56 000 058</p> <ul style="list-style-type: none"> - 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
82 177		<p>5 X 46 000 174</p> <ul style="list-style-type: none"> - Montagehülse für Turm 4. Gang - Douille de montage pour parts 4ième vitesse - Mounting sleeve for 4th gear assembly 	

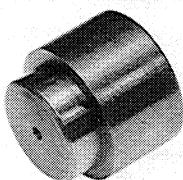
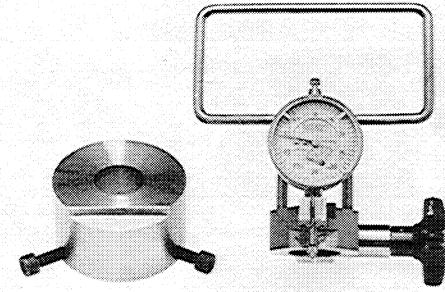
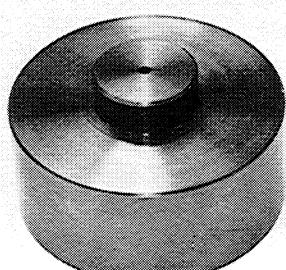
Spezialwerkzeuge 4 HP 22
Outils spéciaux 4 HP 22
Special Tools 4 HP 22

Bild Nr. Photo No Picture	GEGENSTAND OUTIL TOOL	Bestell-Nr. / Verwendungszweck No de commande / Application Part No / Application	Bemerkungen Observations Remarks
82 184		5 P 89 001 673 <ul style="list-style-type: none"> - Einstellehre für Steuer-gerät 11,5 mm breit - Pige de réglage du bloc hydraulique cote 11,5 mm - Tool for valve body adjustment head size 11,5 mm. 	
77 034		5 X 30 000 031 <ul style="list-style-type: none"> - 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
78 085		5 X 46 000 069 <ul style="list-style-type: none"> - Montagehülse für Wellendichtring - Douille de montage pour le joint à lèvre - Mounting sleeve for shaft sealing ring 	identisch identique identical to 3 HP 22

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
82 179		5 X 46 000 167 <ul style="list-style-type: none"> - Montagehilfe für Tellerfeder E+F - Outil de montage pour diaphragme E+F - Mounting support tools for spring plate E+F 	
82 180		5 x 46 000 169 <ul style="list-style-type: none"> - Montagering für Freilauf - Douille de montage pour roue libre - Split rings for assembly of freewheel cage 	
82 181		5 x 46 000 139 <ul style="list-style-type: none"> - Fügewerkzeug für Sprengring - Outil de montage pour circlips - Mounting tool for snap ring 	

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
82 181		<p>5 x 46 000 175</p> <ul style="list-style-type: none"> - Einpressdorn für Nadellager - Tampon pour l'emmancement du roulement à aiguilles - Insertion mandrel for needle bearing 	
82 183		<p>5 P 01 001 415</p> <ul style="list-style-type: none"> - Meßgerät für Axialspiel - Dispositif pour mesure de jeu axial - Gauge for internal axial clearance of transmission 	
82 178		<p>5 X 46 000 168</p> <ul style="list-style-type: none"> - Montageauflage für Abtrieb - Support pour montage de l'ensemble sortie-boîte - Mounting support for 4th gear assembly 	

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

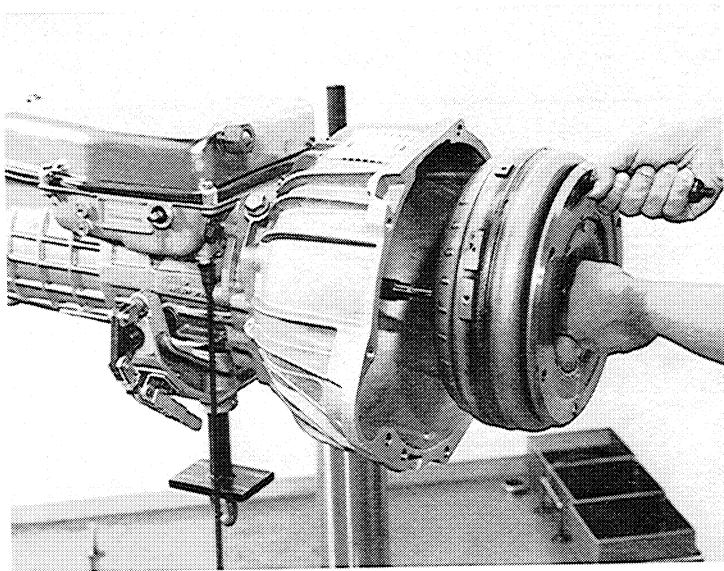
2.1 Disassembling after sequence

32 002



Clamping device 5 X 56 000 096
for transmission assembly and
disassembly. Removal of convertor
use special mounting tool
5 X 56 000 090 as shown on the
picture.

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

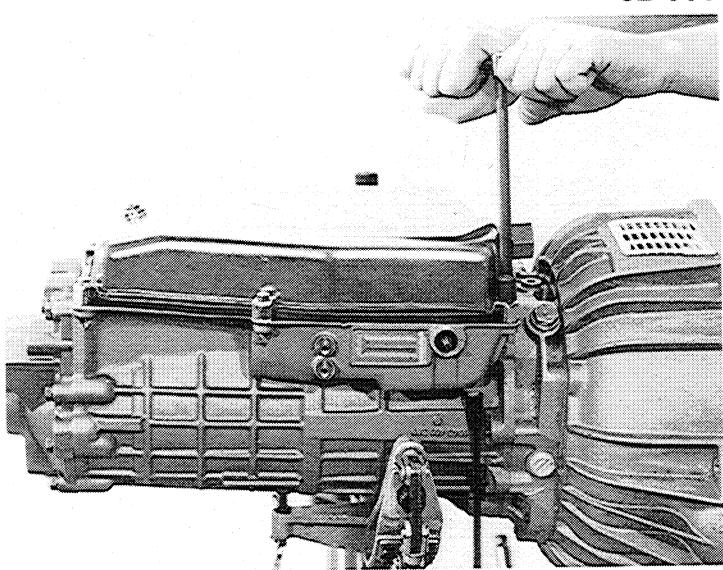


82 003



Unscrew bolts on oilpan
to remove oilpan

Screw head size 10 mm

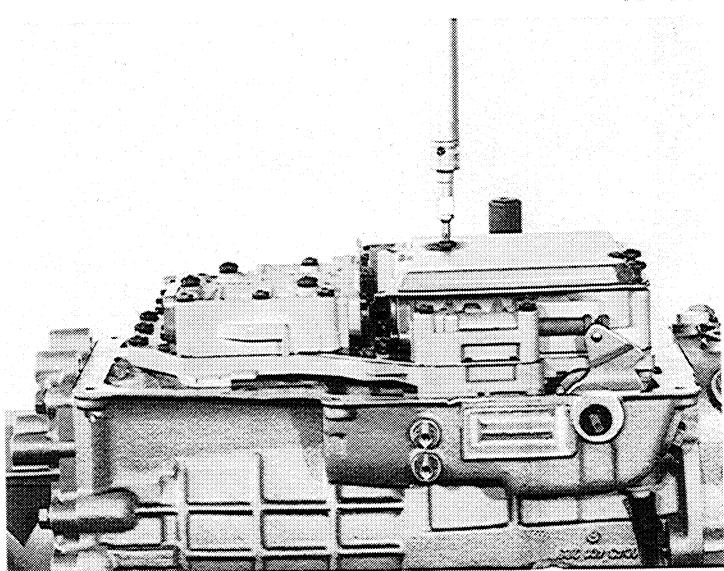


82 004



Unscrew three torx head bolts to
remove oil screen.

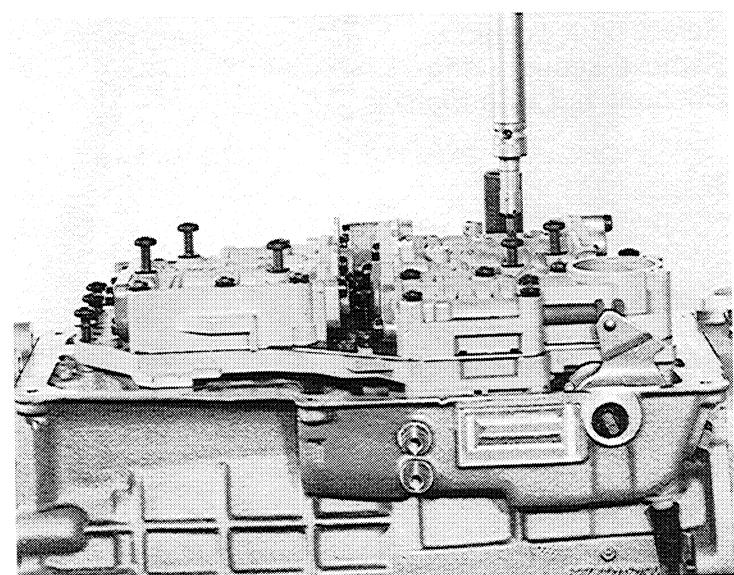
Use Torx bit 27



82 005

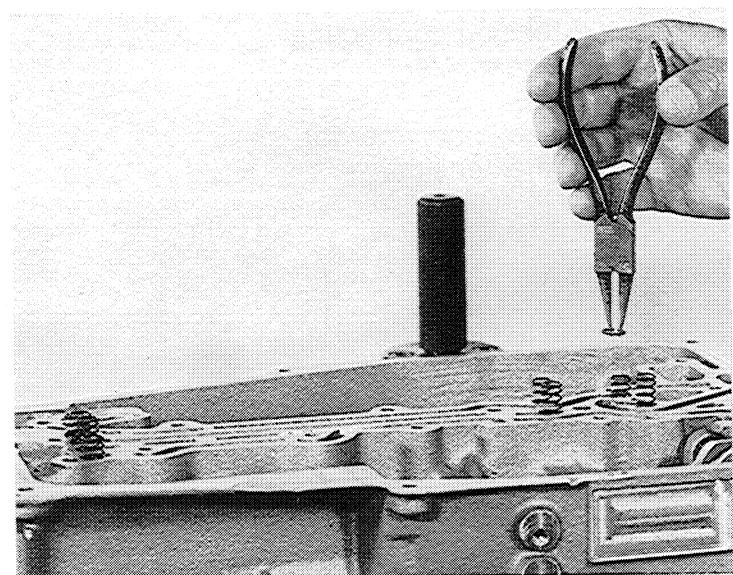
Unscrew valve body connecting bolts (large head only) to remove valve body assembly.

Use torx bit 27



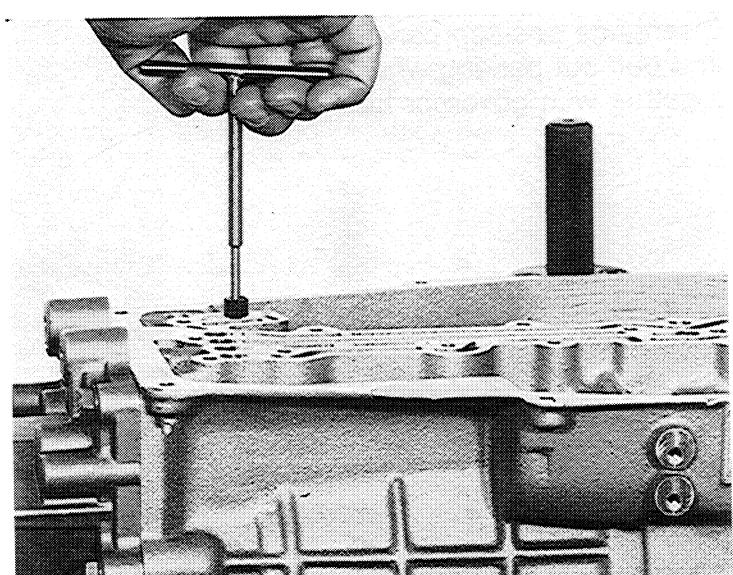
82 006

Remove 8 circlips and springs

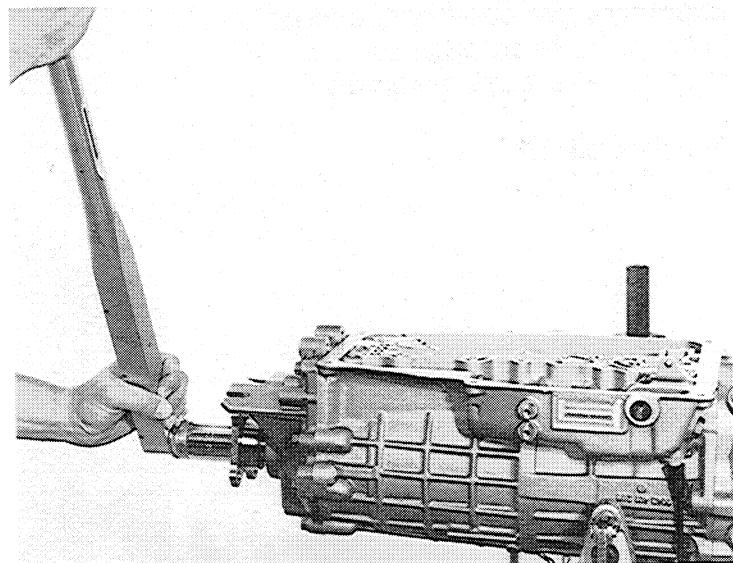


82 007

With puller (5 X 46 000 170)
screw in and pull out 8
sealing rubbers



Select park position
Remove security ring
Unscrew nut with toolsize
32mm

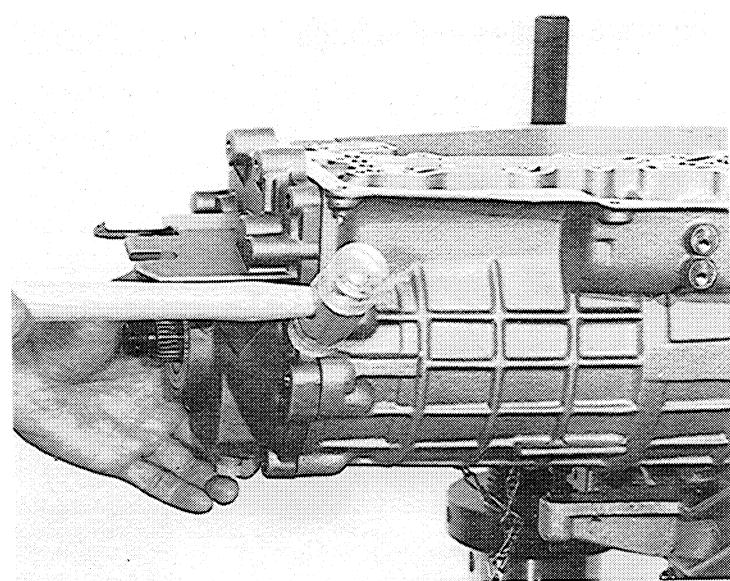


82 009

Unscrew extension connecting bolts (13mm headsize)

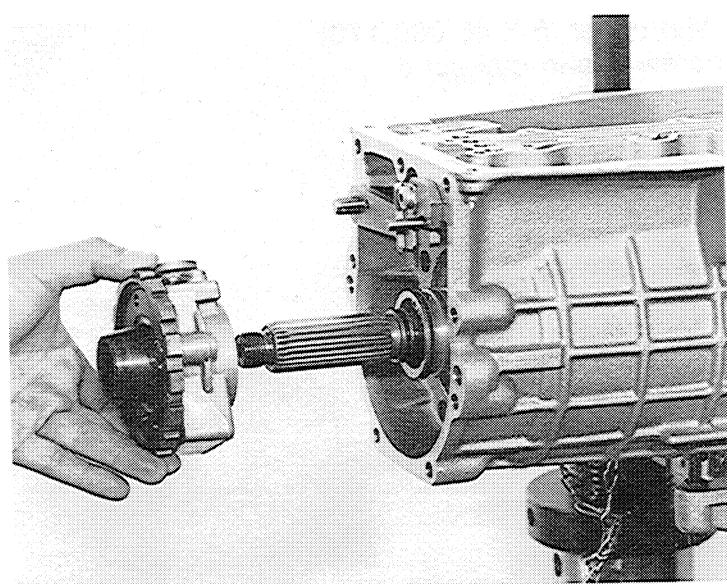
Use only a plastic hammer for
loosening the extension

Remove gasket



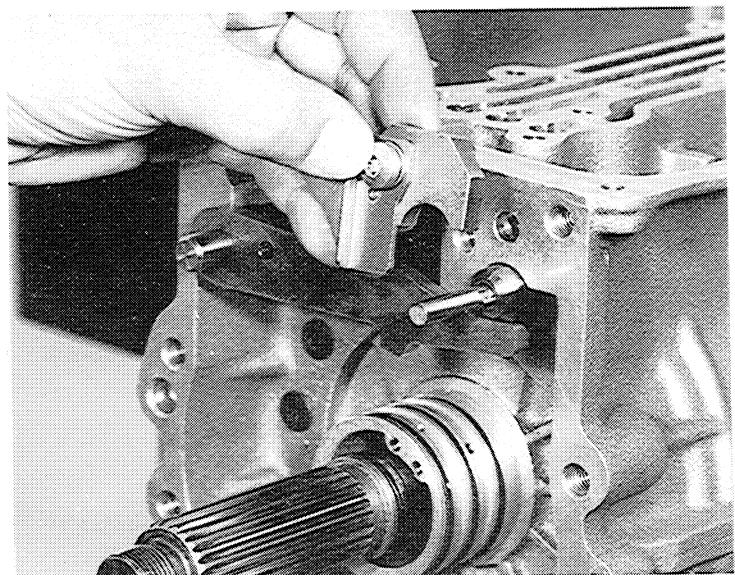
82 010

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



82 011

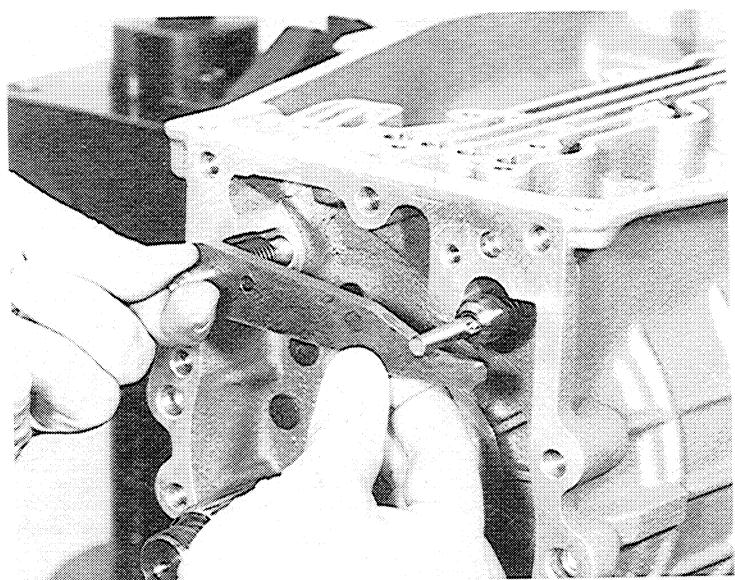
Unscrew connection bolt on
guide plate for removal.
Use Torx bit 27.



82 012

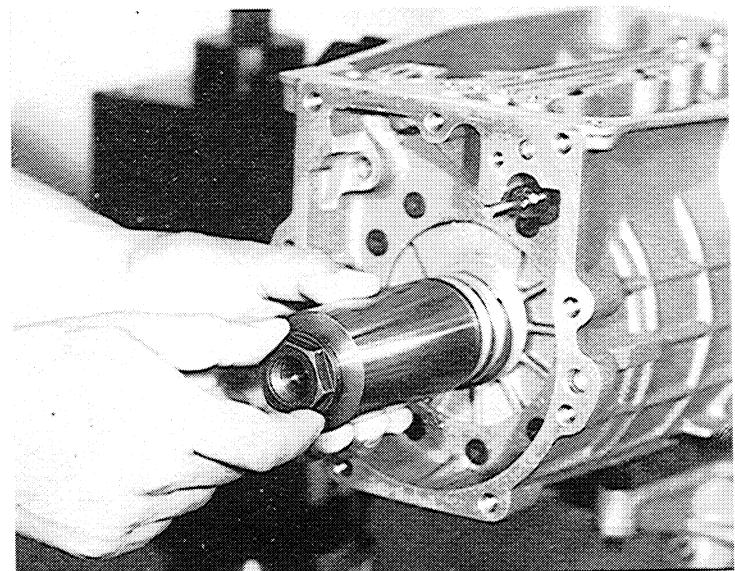
Remove pin, pawl, and leg
spring.

Attention: Spring tension
reduced upon removal of park
assembly



82 019

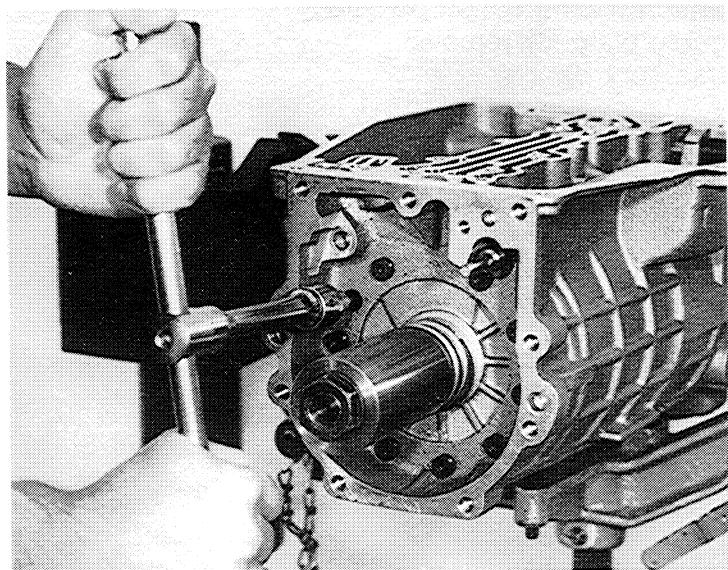
For simple removal of whole 4th
gear assembly - use mounting
tool (5 X 46 000 174) with
locking nut.



82 120

Unscrew 10 connection bolts of cylinder "F".

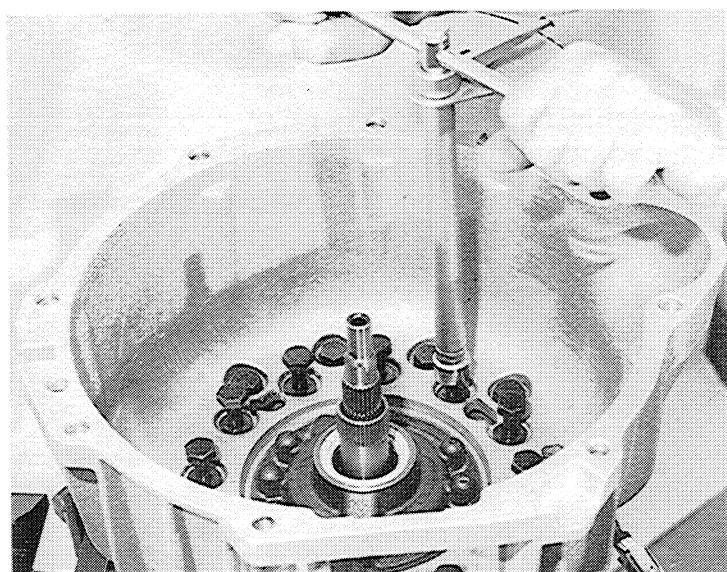
Attention: Use torx bit 30



82 013

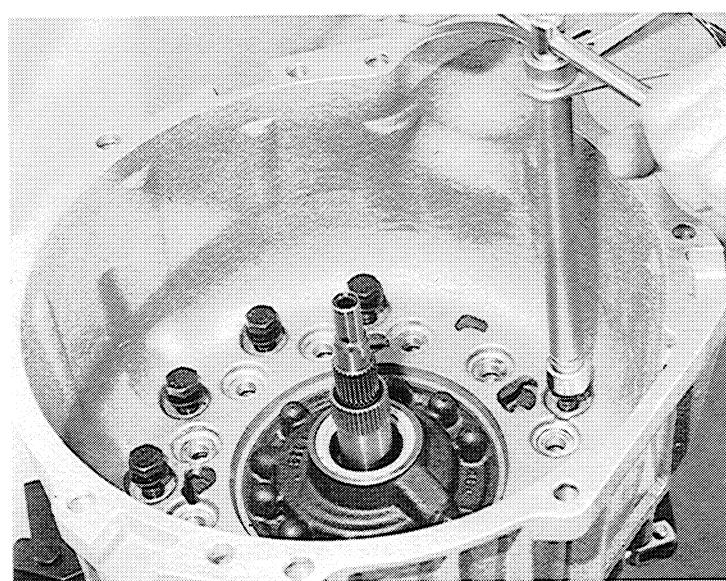
Removal of bellhousing and intermediate plate. Due to normal work procedure, unscrew only 12 hexagon connecting bolts on the inside diameter bolt pattern.

Tool headsize 17 mm.



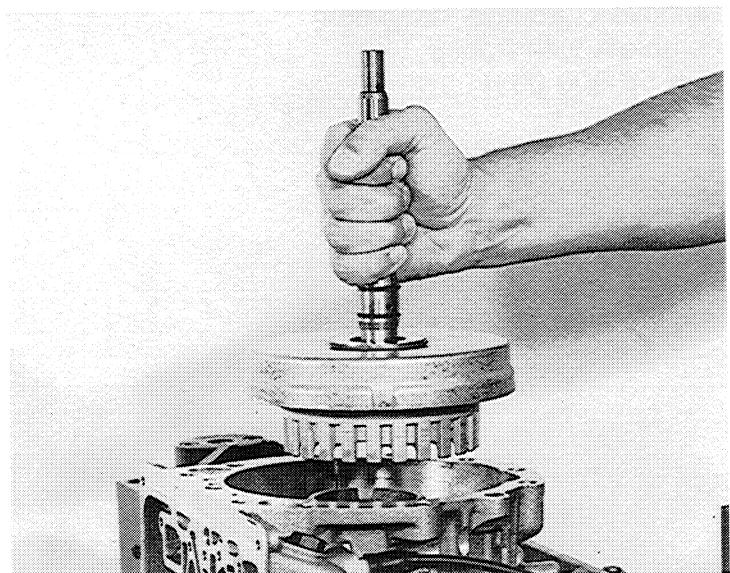
82 014

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



82 015

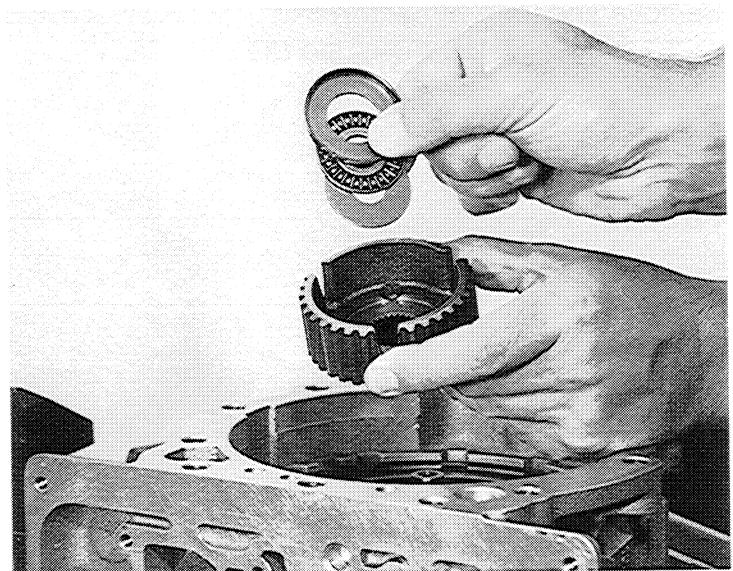
Remove input shaft together
with clutch "A" assembly.



82 016

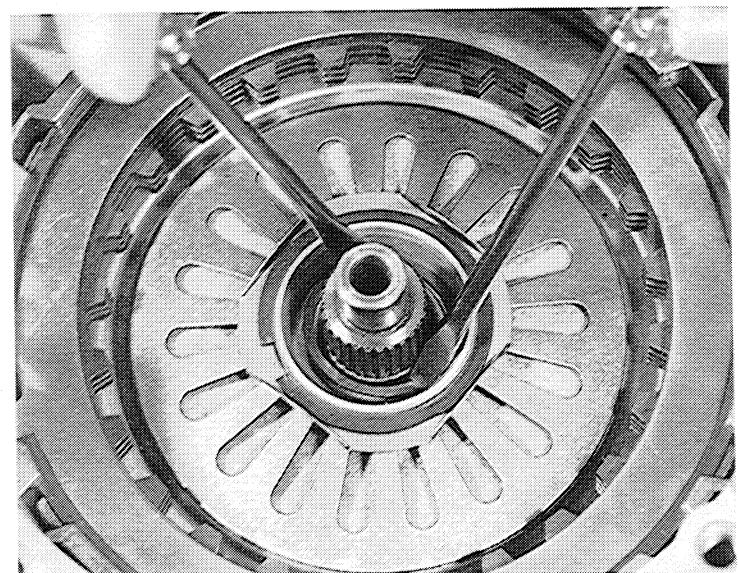
Remove inner carrier "A" from
seat of intermediate shaft.

Remove also disc, axle bearing,
and thrust washer.



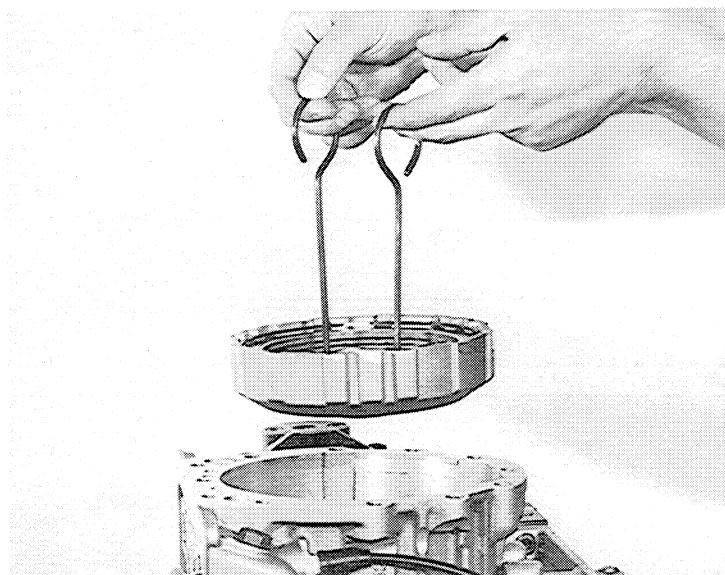
81 060

Remove small snapring in
cylinder „B”, use 2 screwdrivers
as shown on the picture.



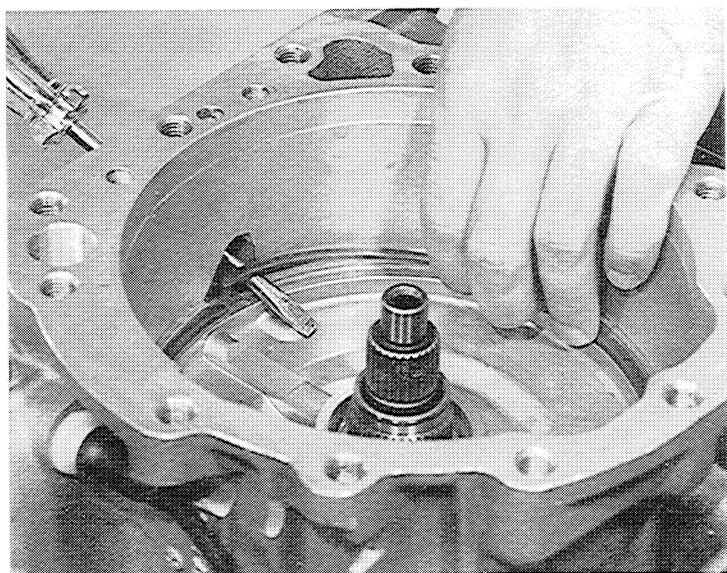
Remove clutch "B" assembly complete with hooks
(5 X 56 000 095)

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 supportring as well as o-ring.



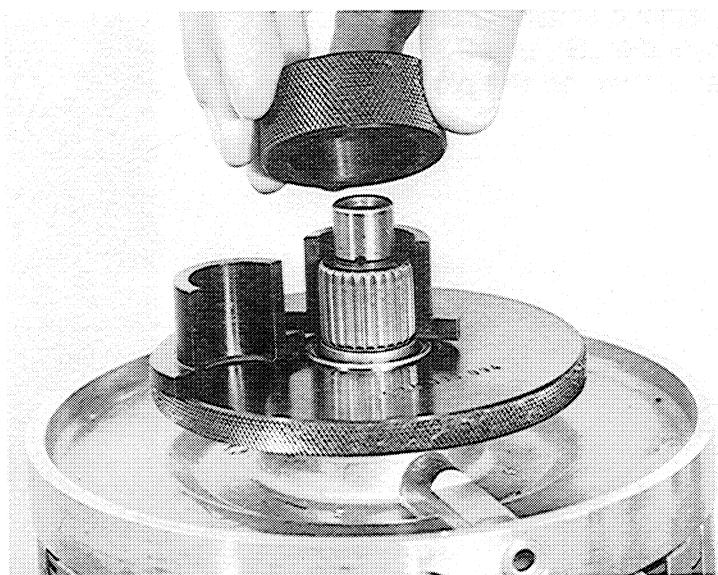
82 019

Remove snapring of centerplate with screwdriver as shown on the picture.



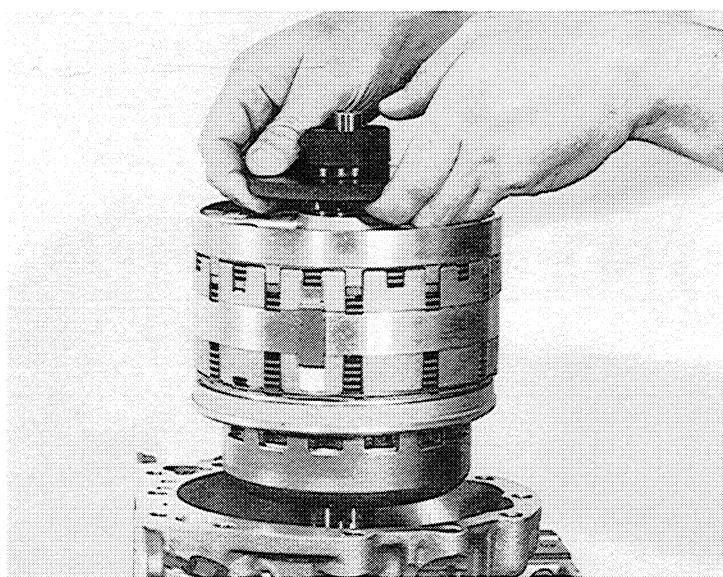
82 020

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



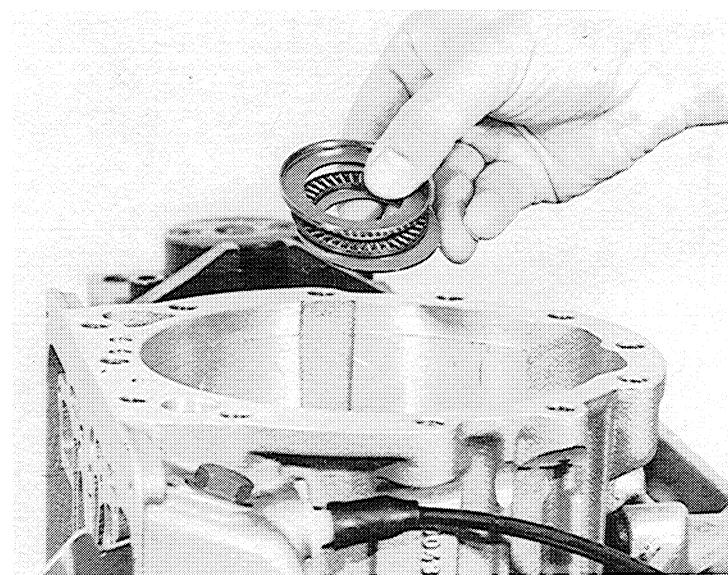
82 021

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



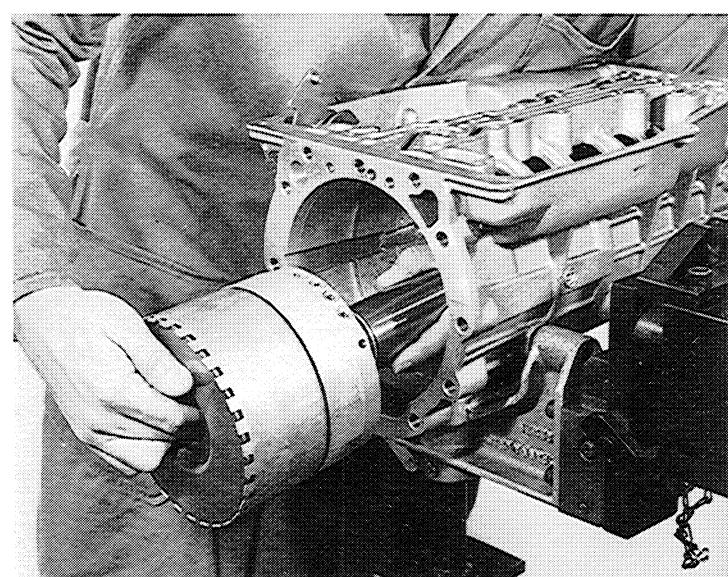
82 022

Remove disc, axle bearing, and thrust washer.



82 023

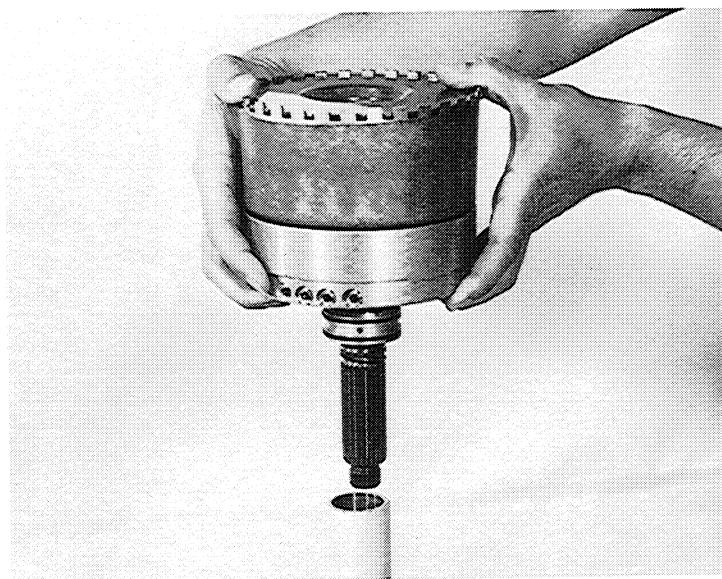
For removal of 4th gear assembly put transmission case in horizontal position.



2.2 4th Gear Assembly

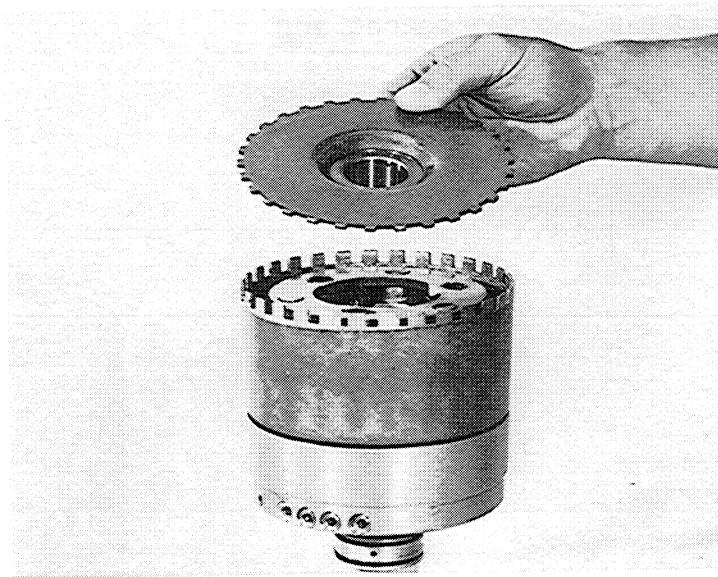
82 024

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



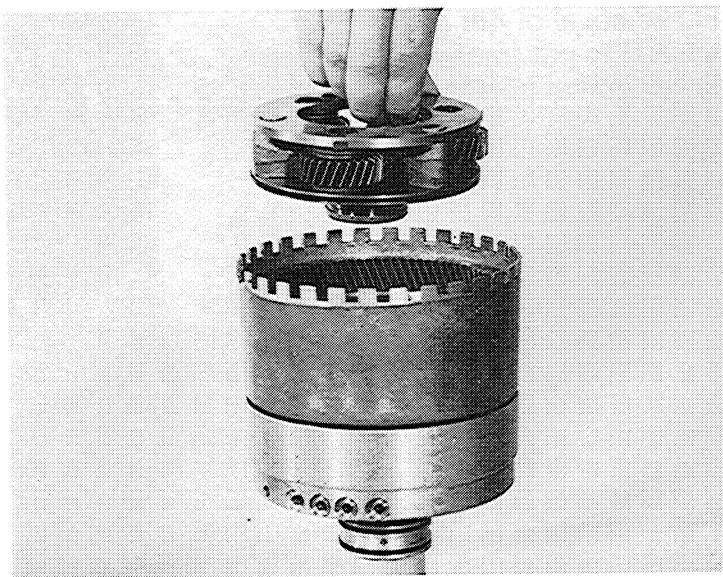
82 025

Remove sungear



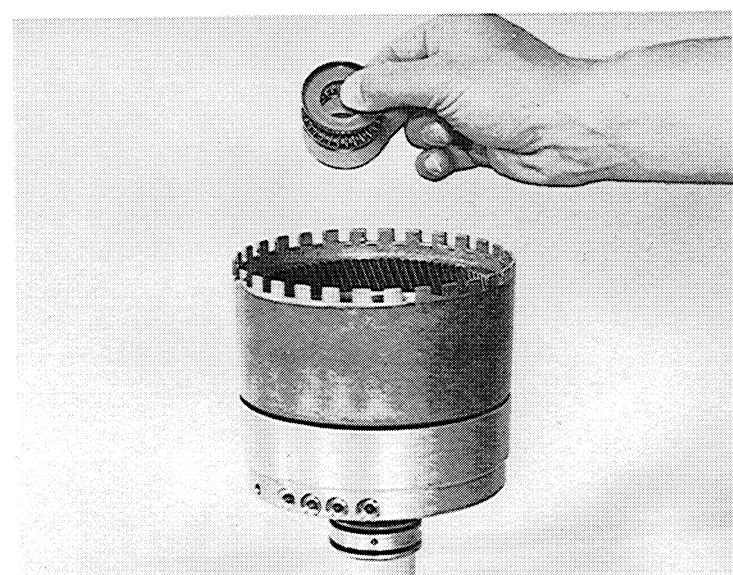
82 026

Remove planetary set
Removal of snapring on
planetary case not necessary



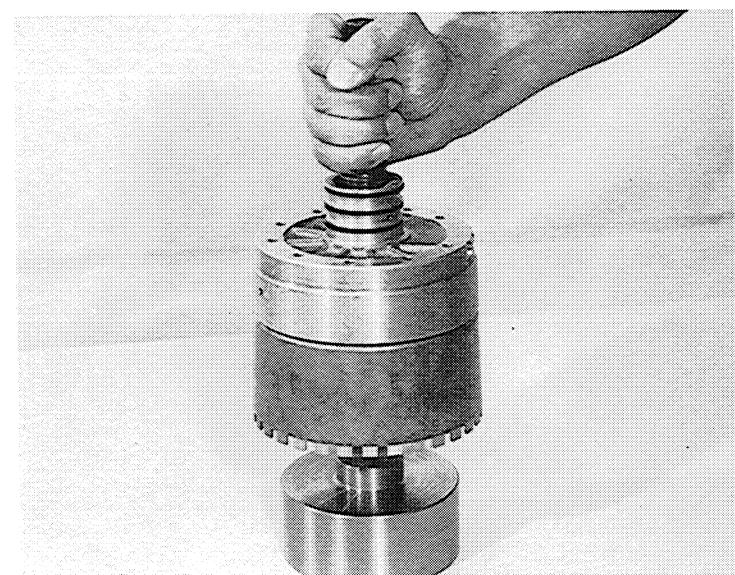
82 027

Remove disc, axle bearing and
thrust washer



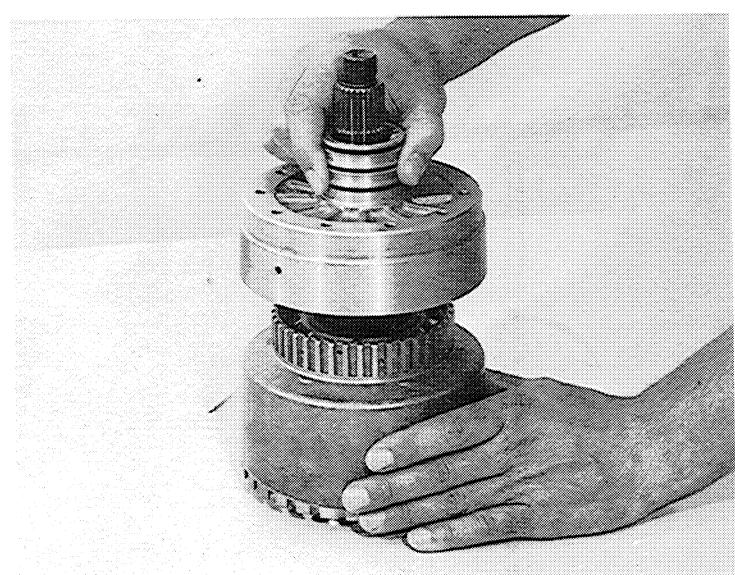
82 028

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



82 029

Separate cylinder F from
cylinder E



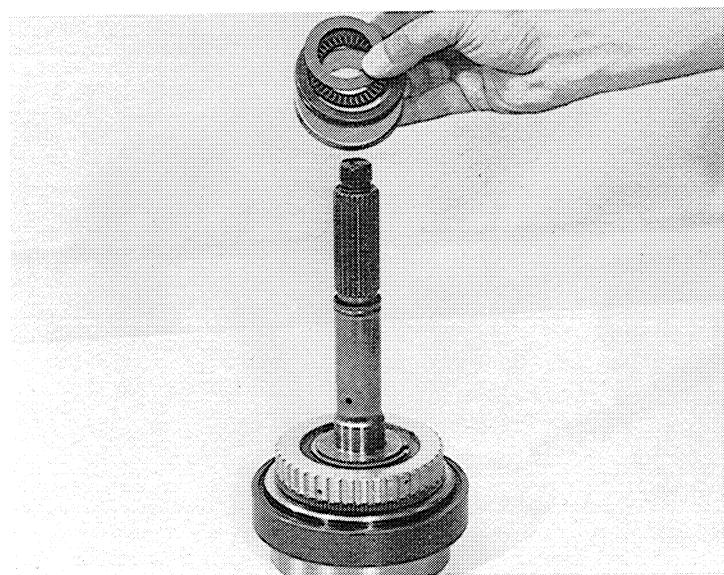
82 030

Remove cylinder E from
freewheel 3rd



82 032

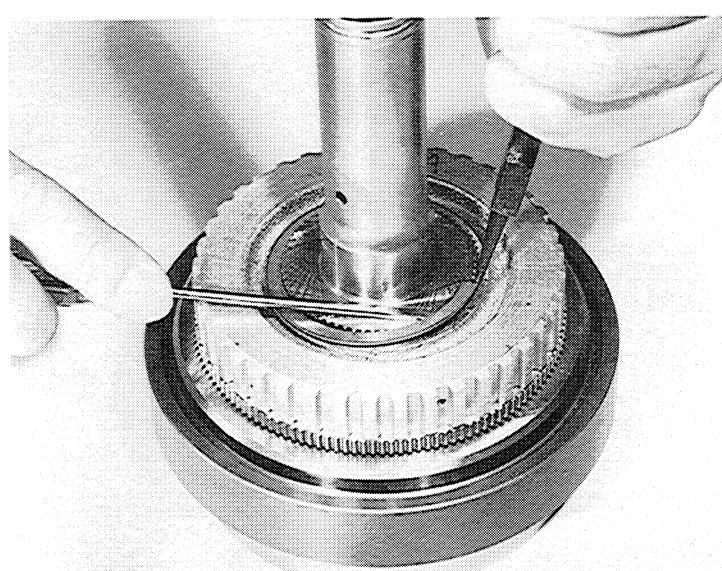
Remove axle disc and cage
as well as 2 thrust washers



82 033

2.2.1 Output with Freewheel

To remove snapring on carrier
E, use pliers and a screwdriver



82 034

Remove output shaft from ring gear

Do not remove snap ring on output shaft



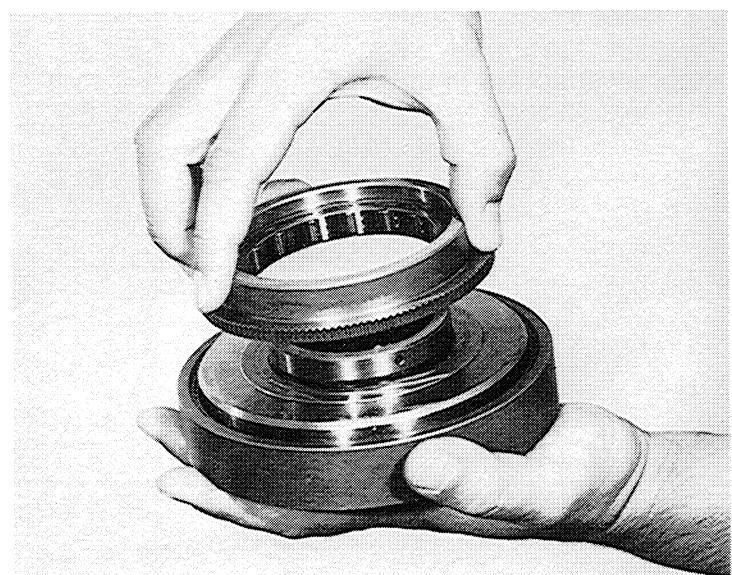
82 035

Remove carrier E



82 036

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

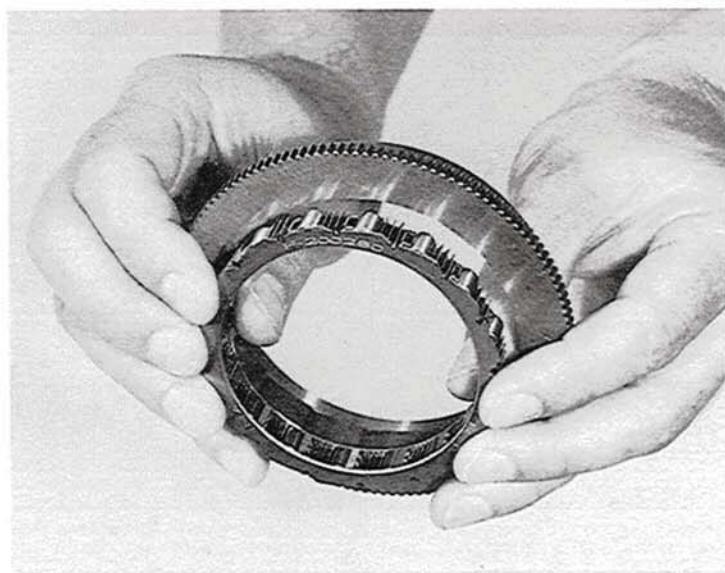


After removal of the snapring, disconnect freewheel inner ring from hollow gear



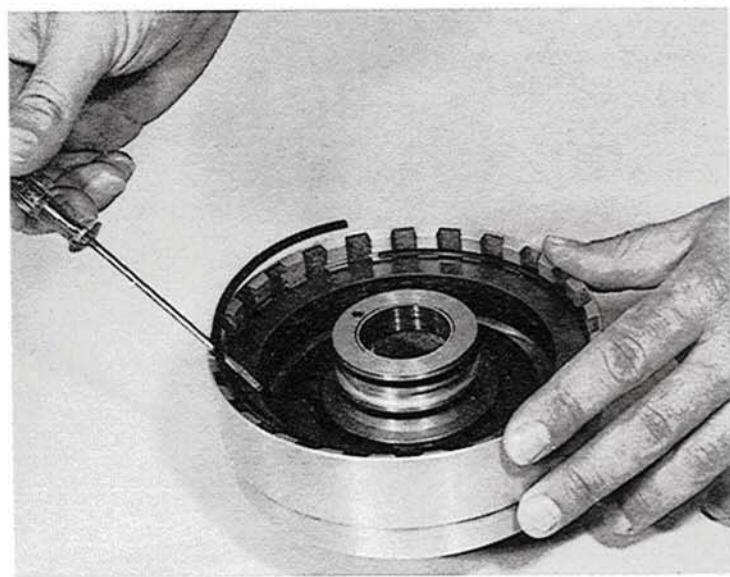
Remove freewheel cage carefully out of freewheel outer ring

Attention! Freewheel rollers may fall out during removal of cage



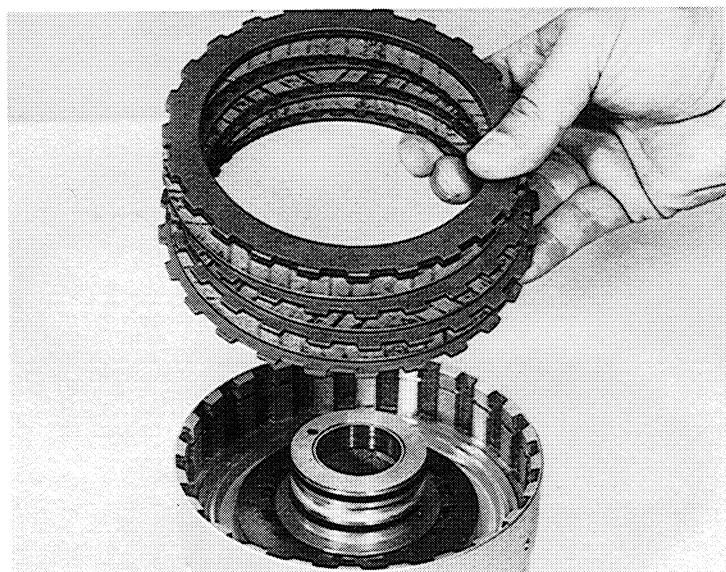
2.2.2 Brake F

Remove snapring in clutch F



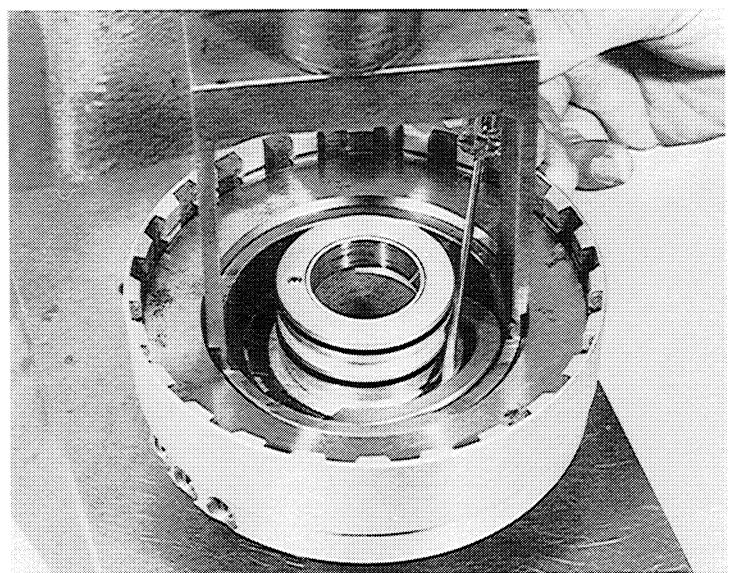
82 040

Remove clutch F
assembly complete



82 042

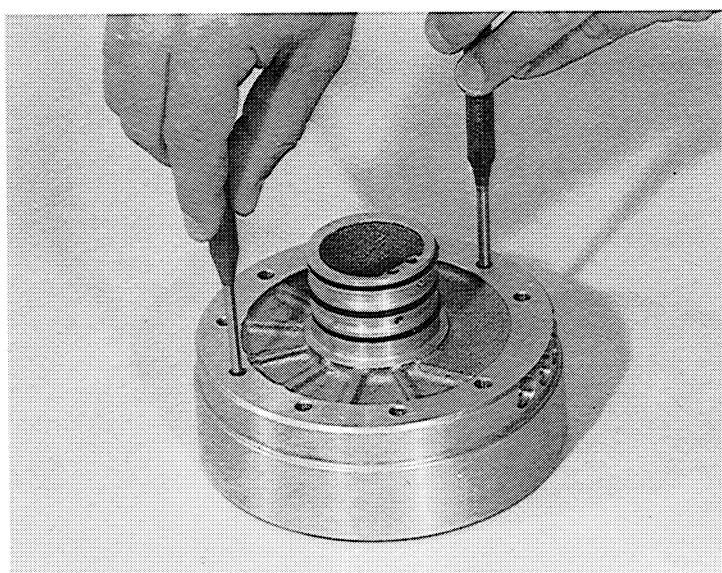
With mounting support
(5 X 46 000 167) press
down plate spring for removal of
split rings



82 043

For removal of piston in
cylinder F
use two small punches

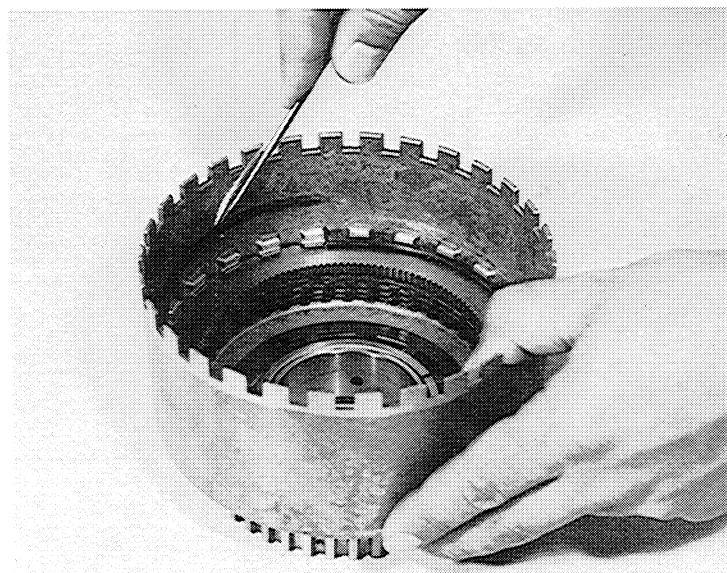
Under normal procedure do
not remove the 5 sealing rings



2.2.3 Clutch E

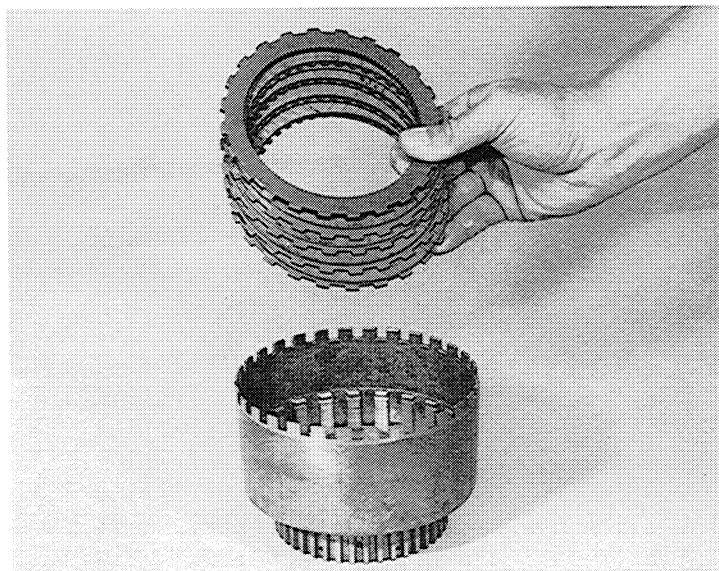
82 041

Remove snapring from clutch E.



82 044

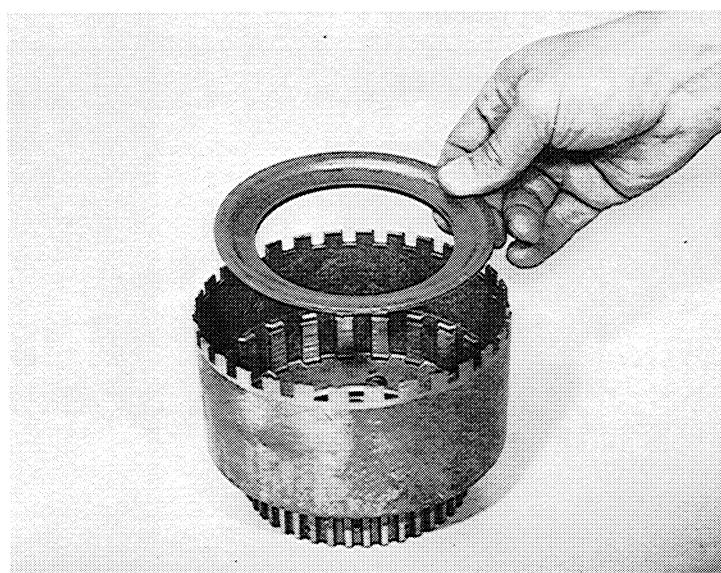
Remove clutch E assembly complete.



82 079

In the same manner as explained for brake F.

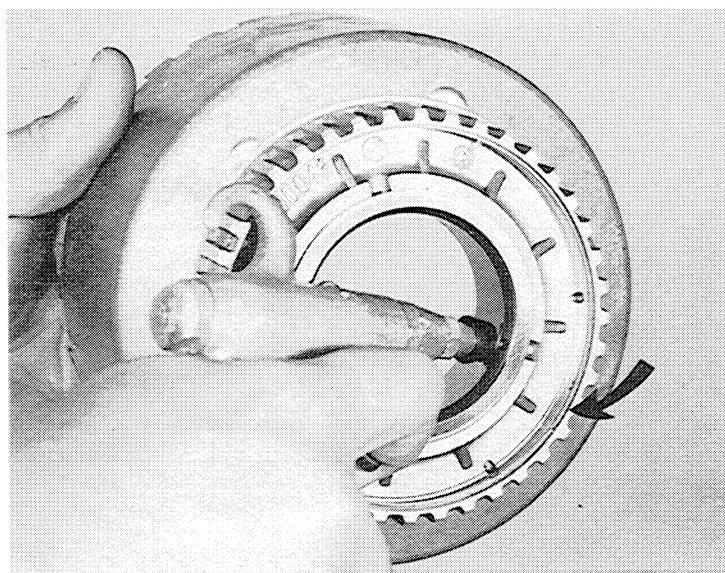
In addition, remove pressure plate.



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

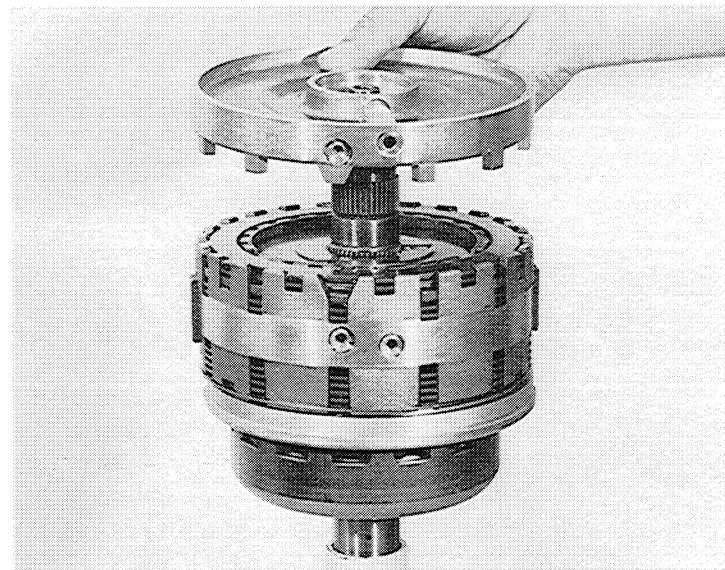
Direct air into oil feed hole.

If carrier F has snapring, do not remove during normal work procedure.

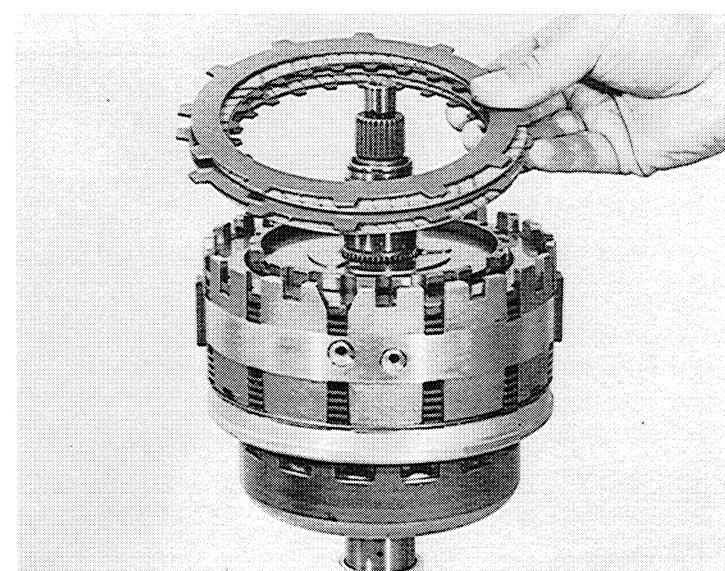


2.3 Planetary Set with Web Shaft and Brakes C', C and D

Remove center plate complete.

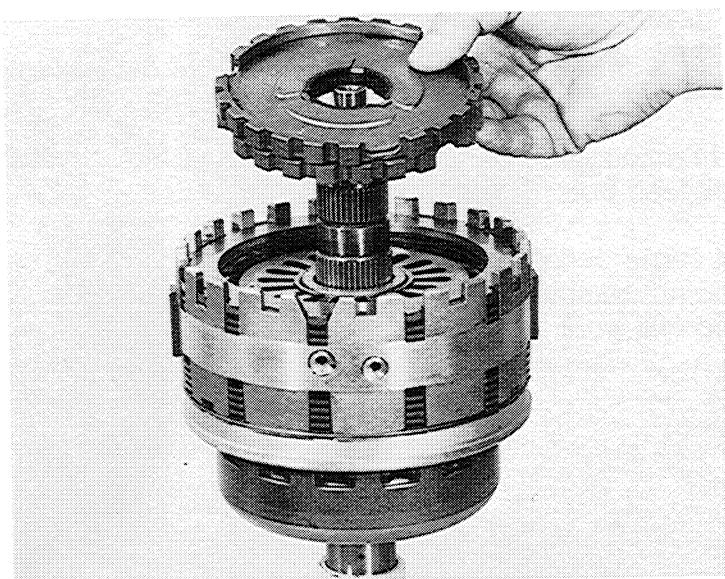


Remove brake C' assembly complete.



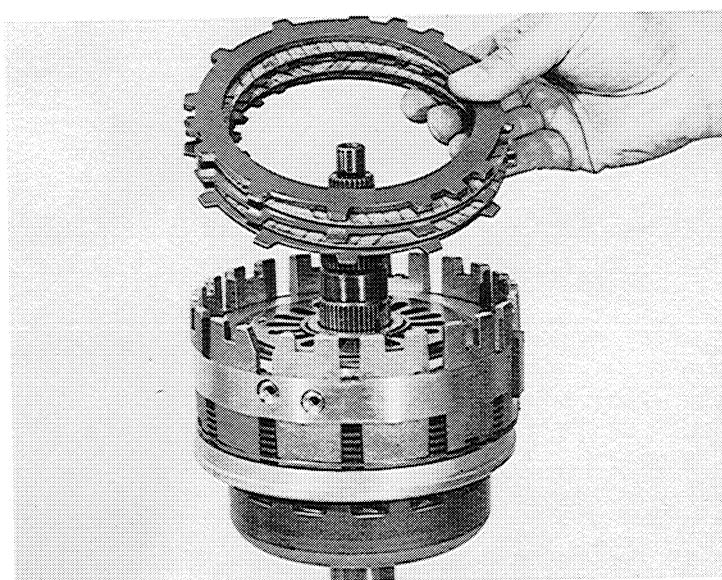
82 048

Remove freewheel 2nd
complete.



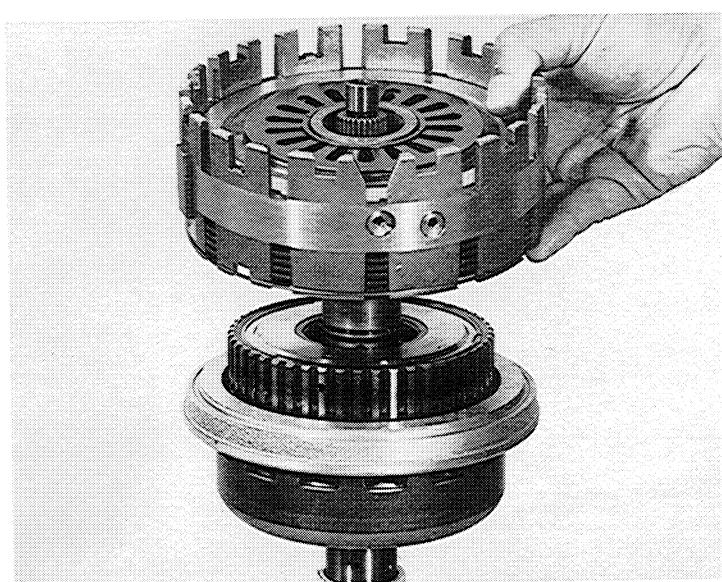
82 049

Remove brake C assembly
complete.



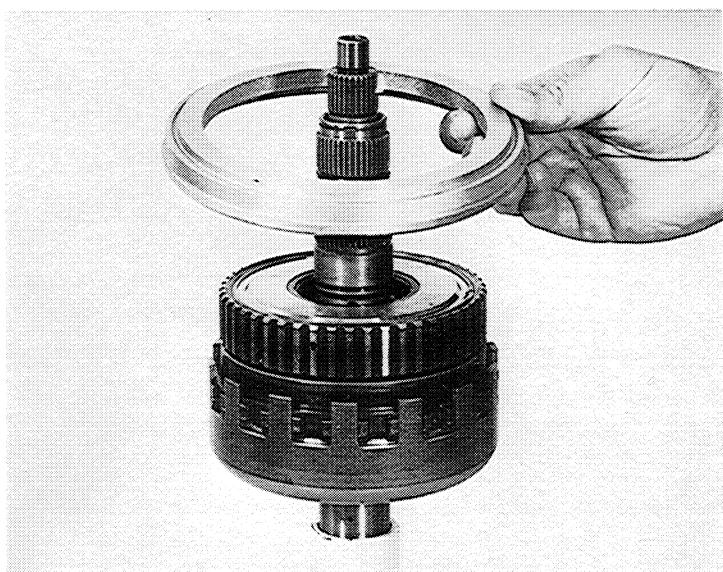
82 050

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



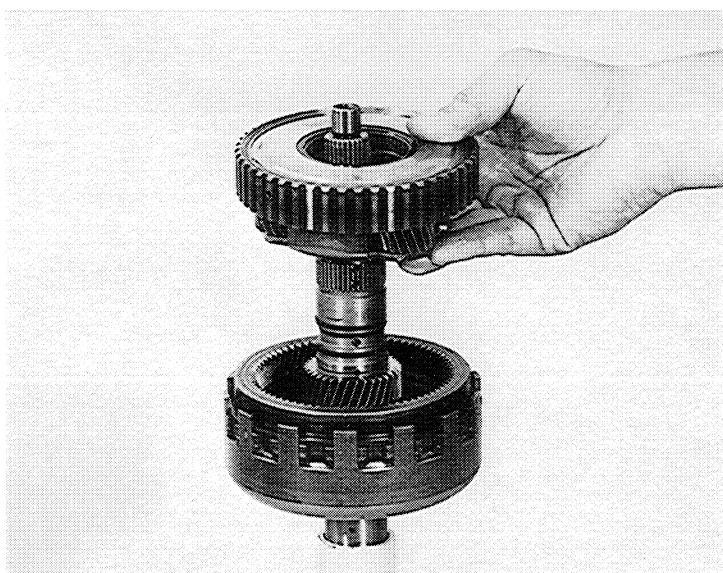
82 051

Remove support ring complete.



82 052

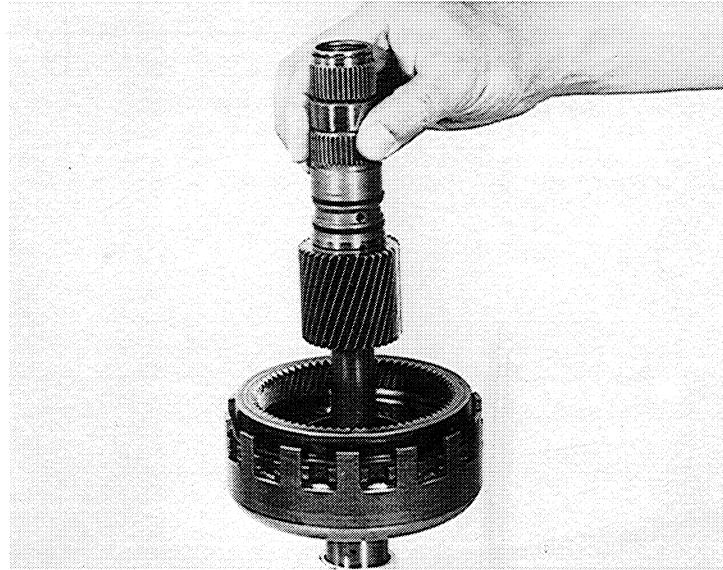
Remove front planetary set with freewheel complete.



82 053

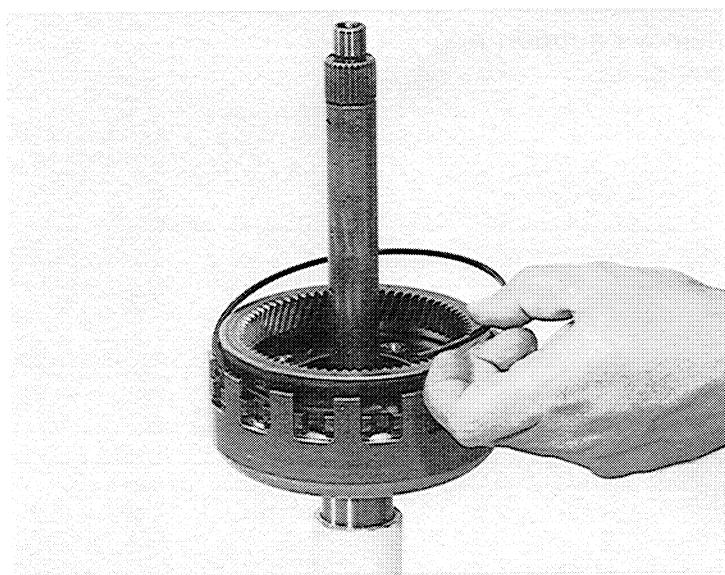
Remove sunshaft.

During normal work procedure do not remove seal rings on sunshaft.



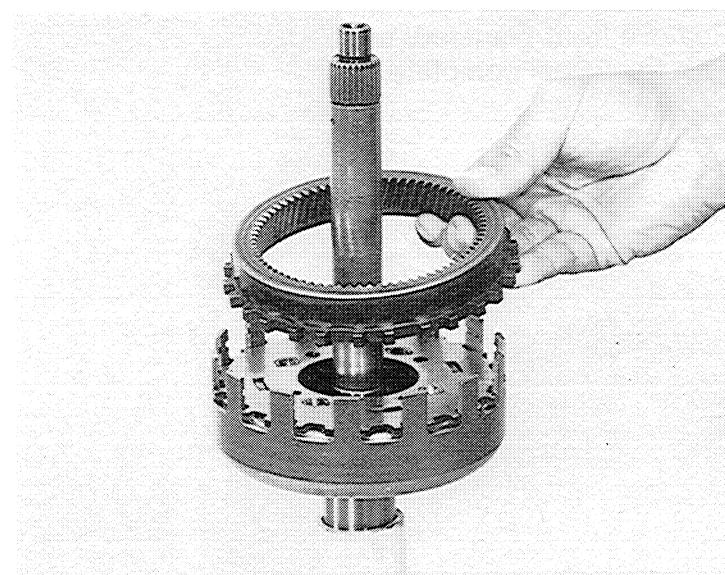
82 121

Remove snap ring
from hollow gear.



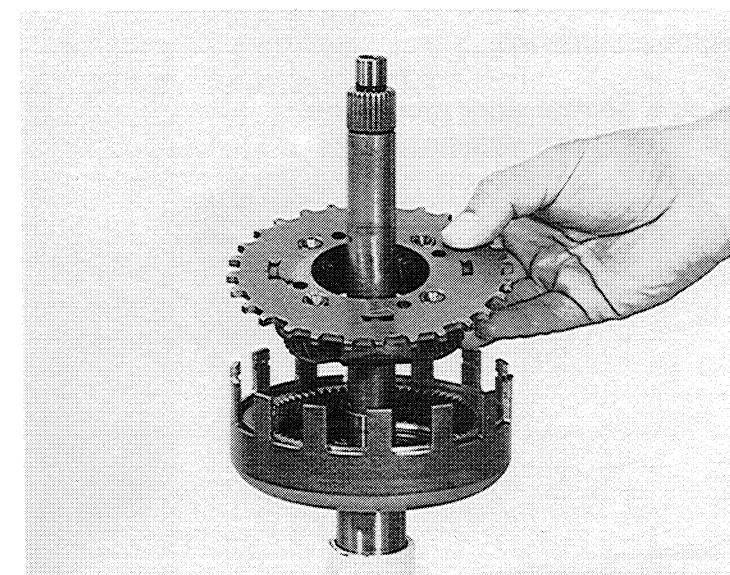
82 122

Remove hollow gear.



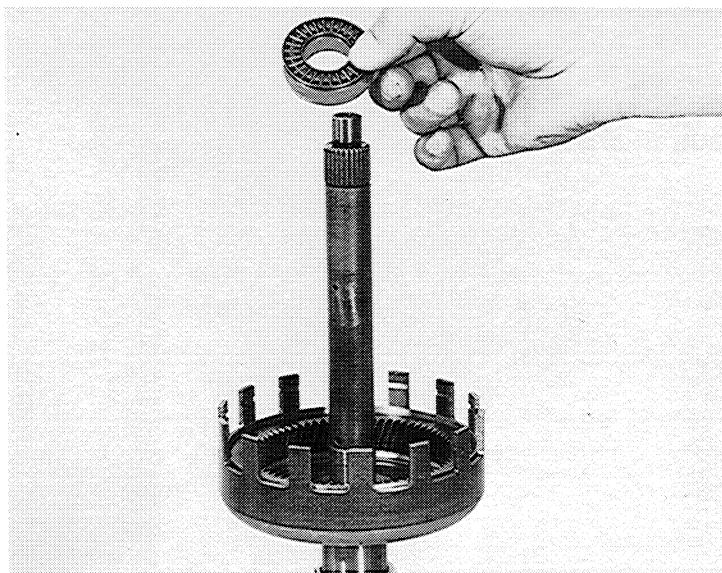
82 054

Remove rear planetary set
complete.



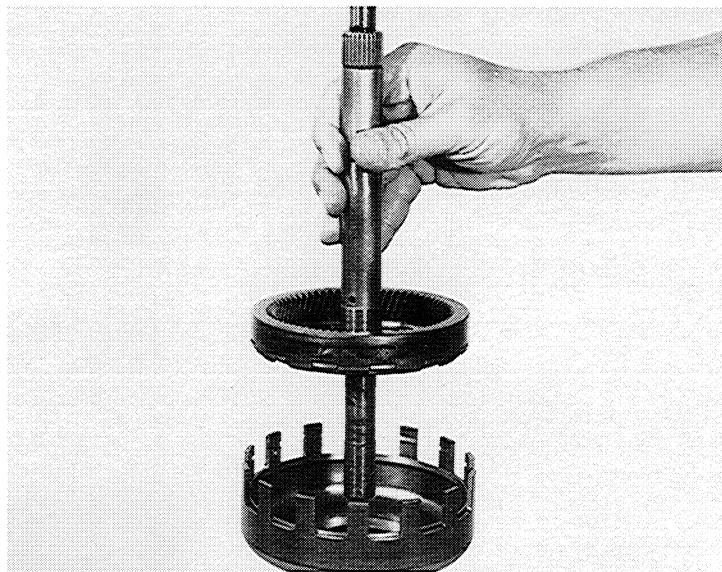
82 055

Remove thrust washer
and axle bearing.



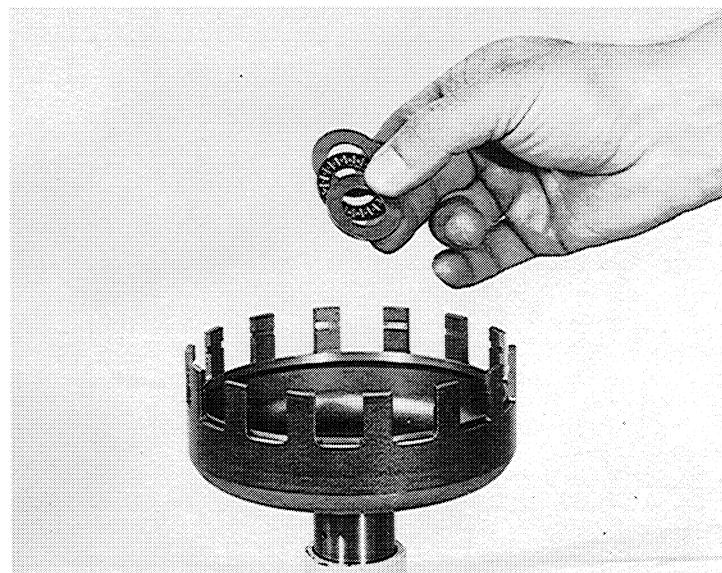
82 056

Remove intermediate shaft
with hollow gear complete.



82 057

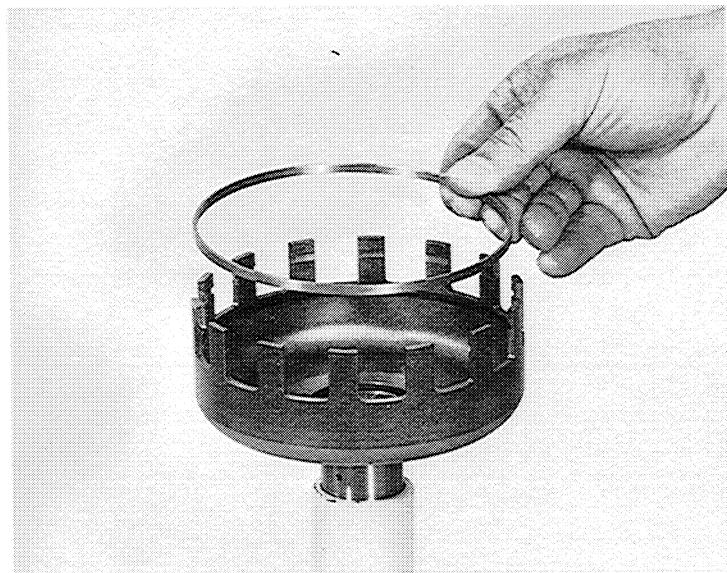
Remove axle bearing
and 2 thrust washers.



82 058

Remove distance ring.

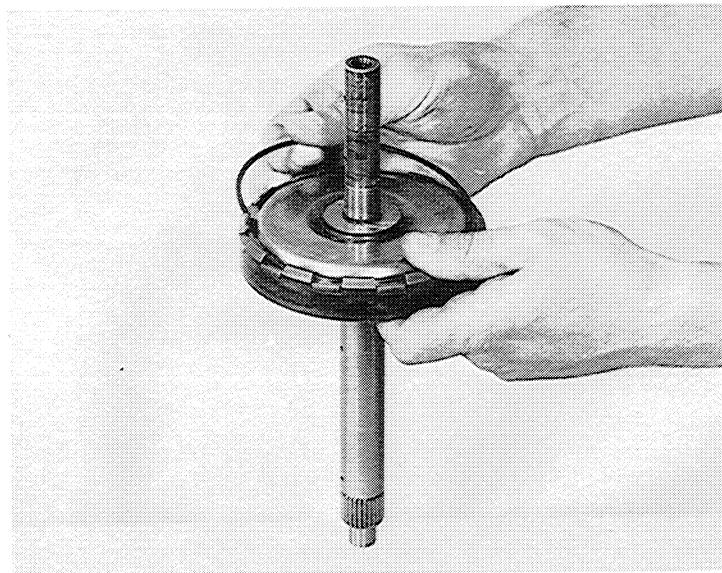
Due to normal work procedure,
do not remove snapring in
output shaft.



82 059

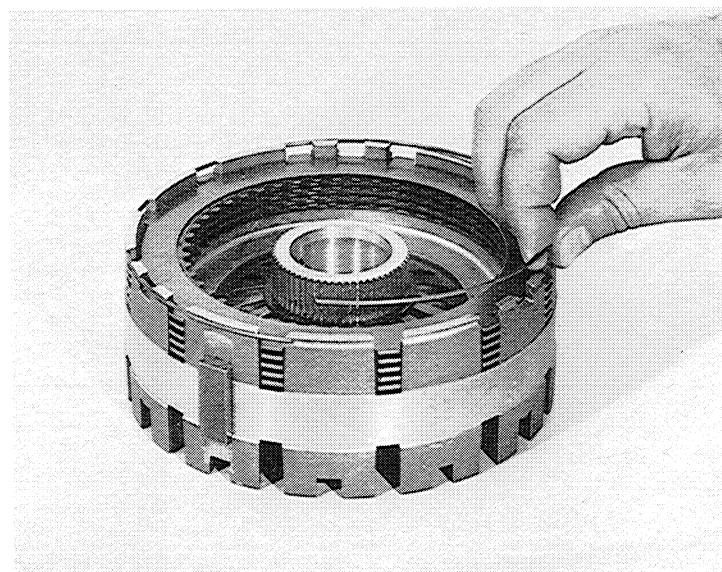
Remove snapring from rear
hollow gear.

After removal of snapring,
disconnect hollow gear
from intermediate shaft.



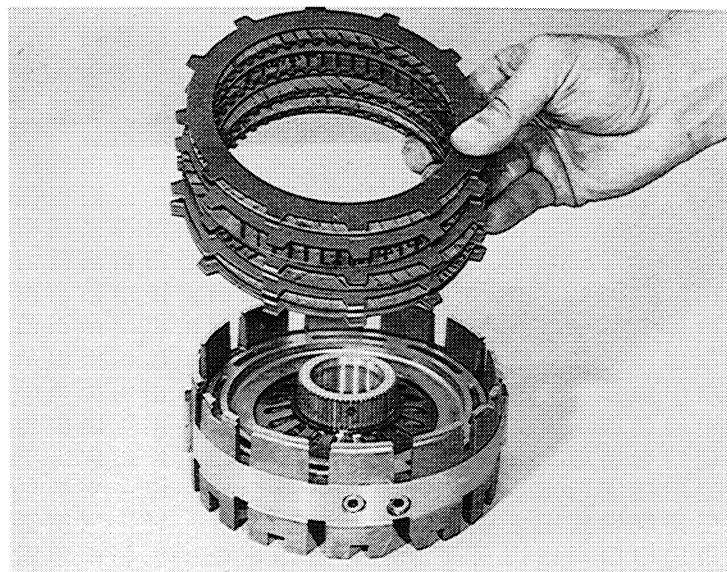
82 060

Remove outer snapring
from brake (D) assembly.



82 061

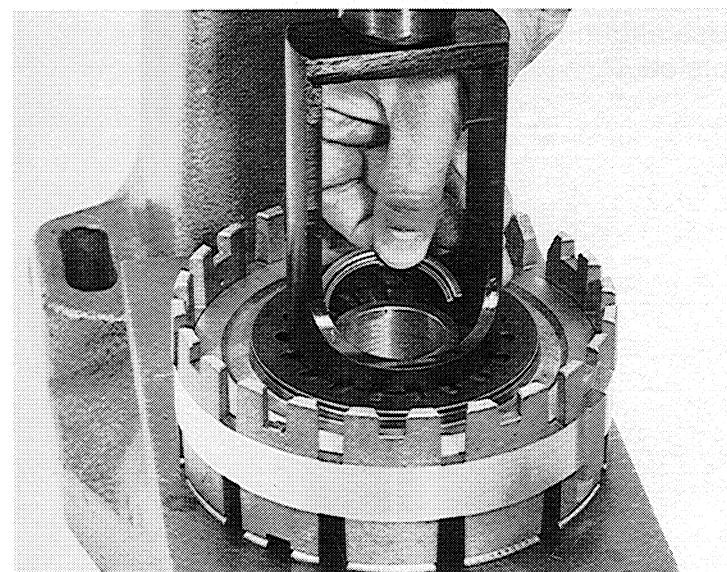
Remove brake D assembly complete.



81 112

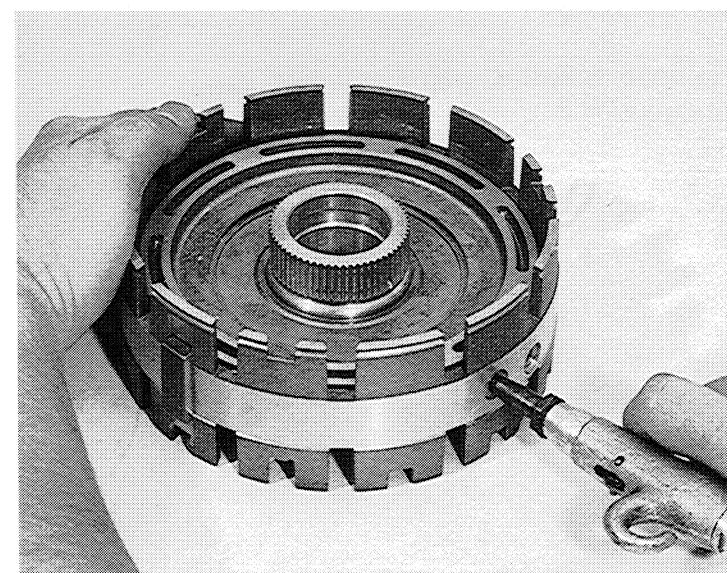
With spring device
(5 X 56 000 093) press down
plate spring C
for removal of split rings.

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



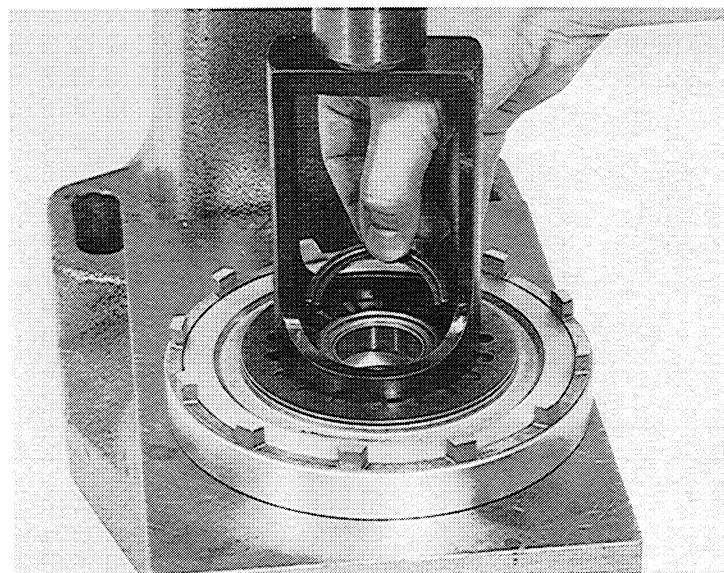
81 114

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



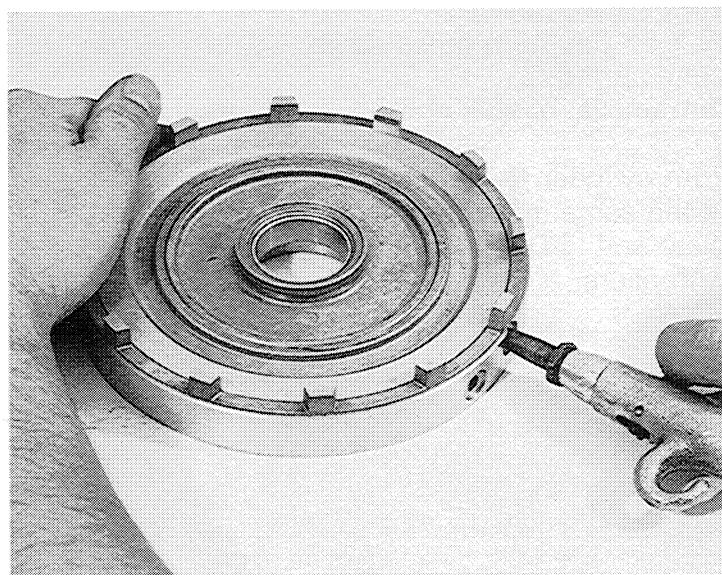
81 113

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



81 115

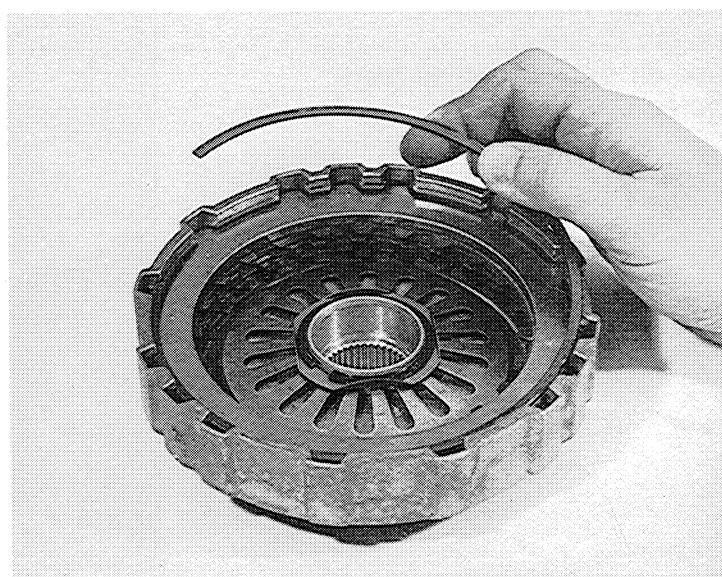
Use airgun for removal of piston C'.



81 091

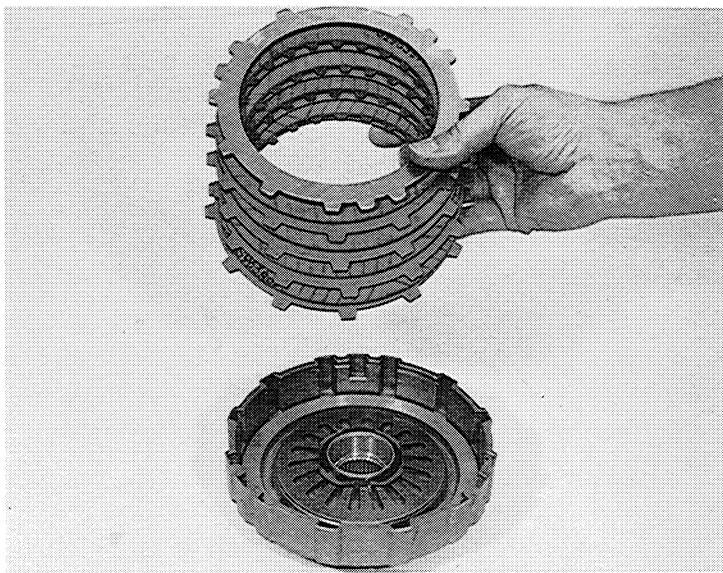
2.4 Clutch B

Remove snapring out of cylinder B.



81 092

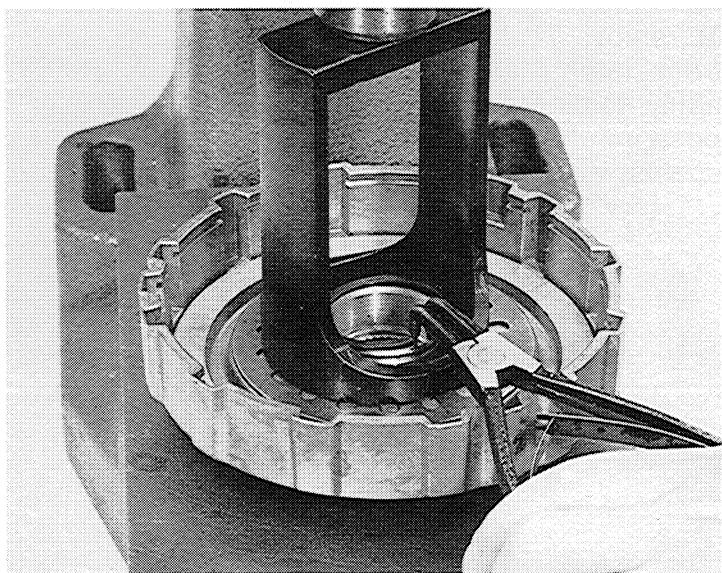
Remove clutch "B" assembly complete.



81 093

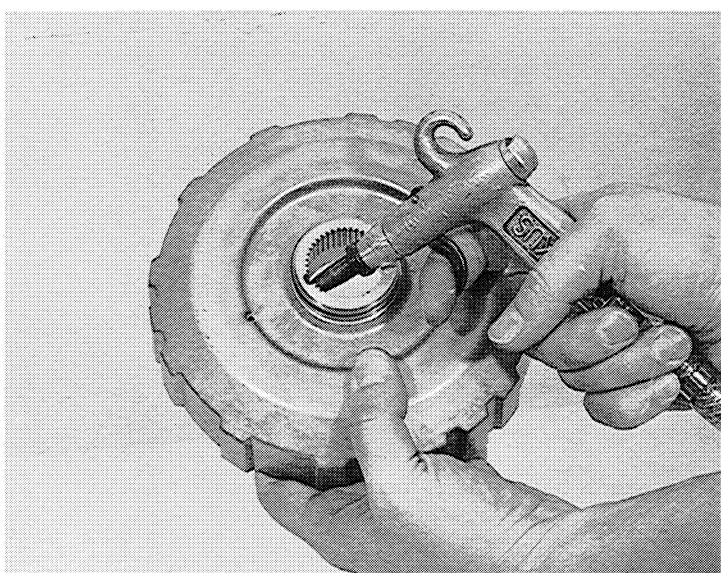
With spring device
(5 X 56 000 093)
remove plate spring
as explained for cylinder C-D.

Also remove snapring
and security washer.



81 094

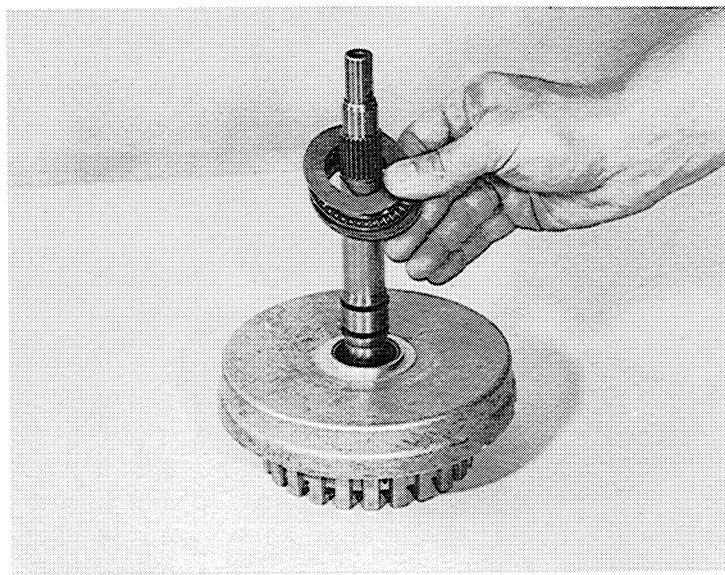
Fit airgun into oil feedhole
for removal of piston B.
After applying air pressure,
turn cylinder B upside-down
and tap lightly on work bench.



2.5 Clutch A

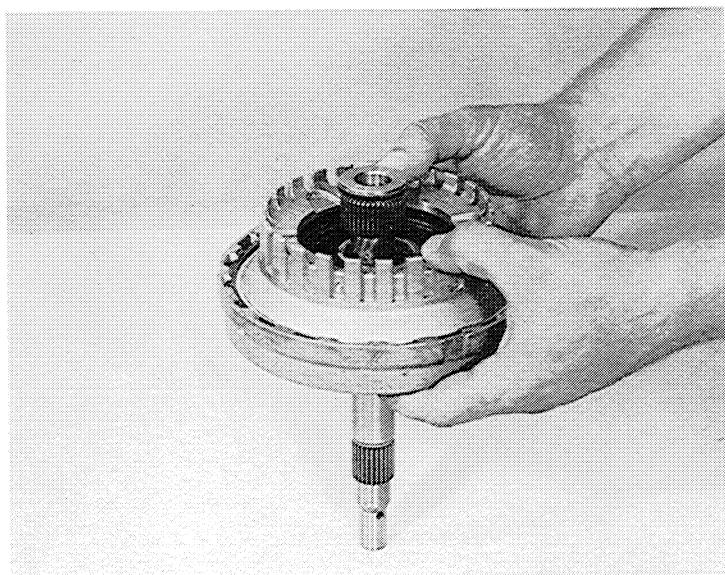
82 062

Remove disc, axle bearing, and thrust washer.



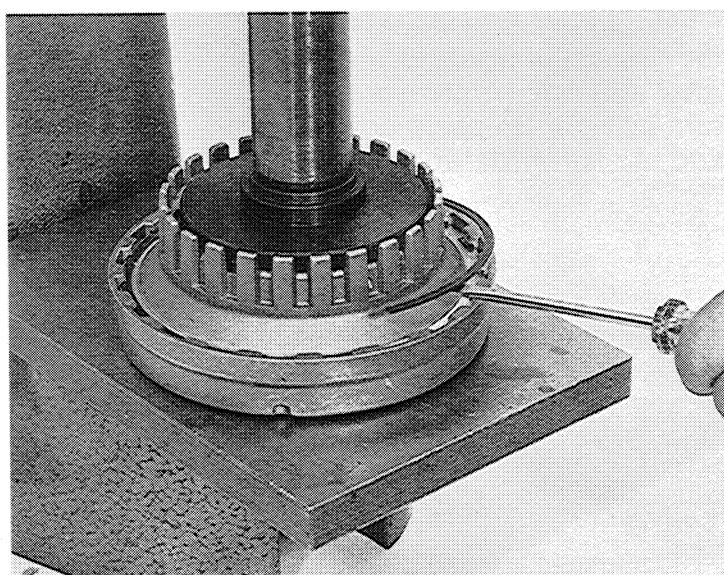
82 063

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



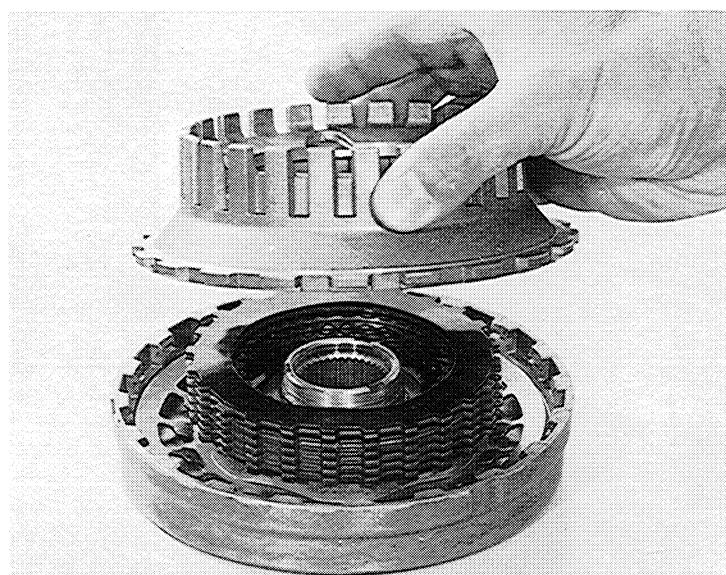
81 097

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



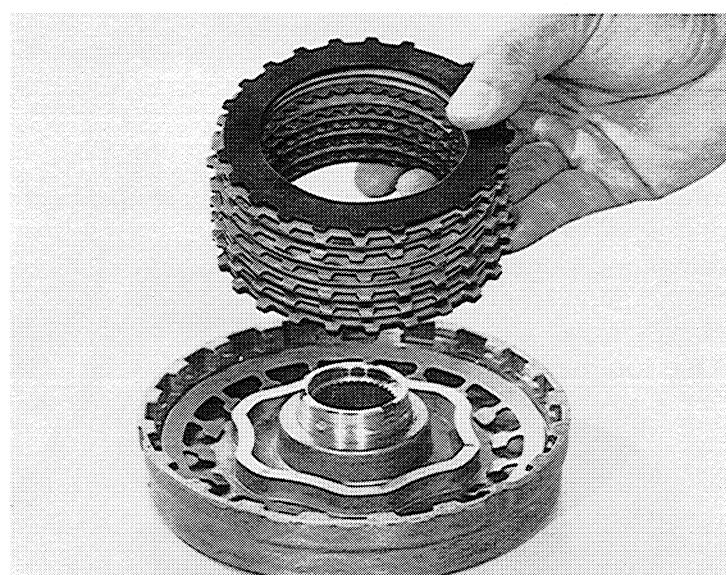
82 196

Remove carrier A-B



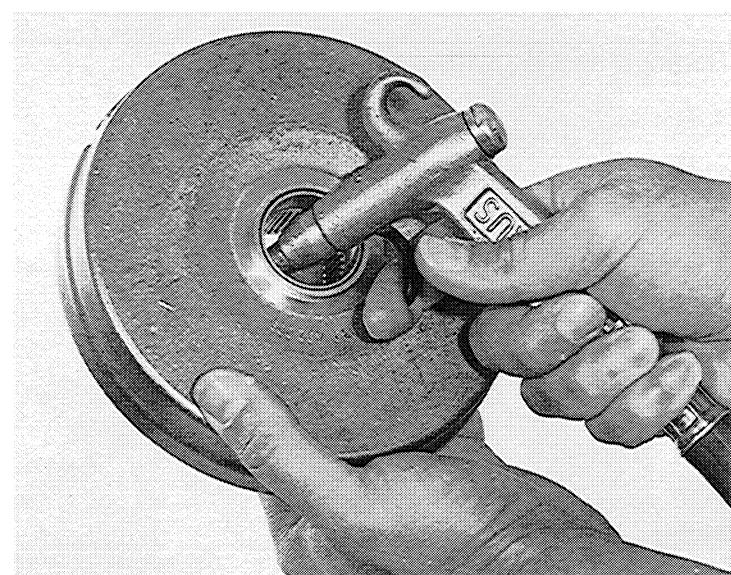
82 197

Remove clutch A assembly as well as plate spring A.



82 198

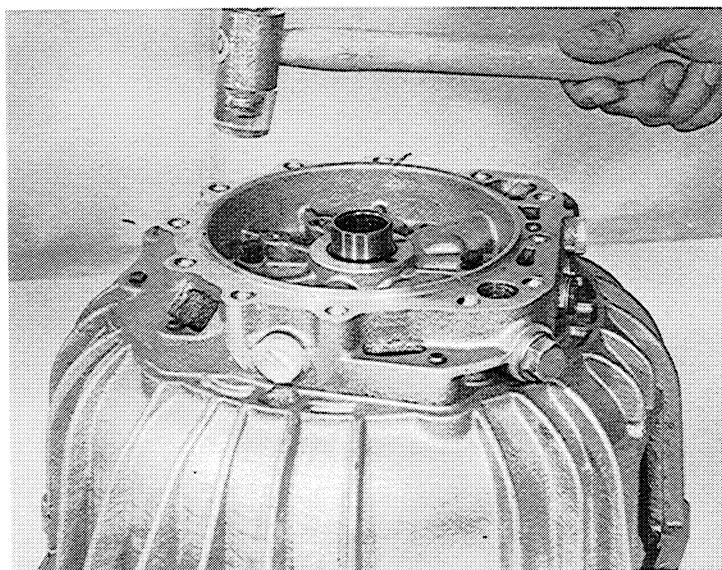
Use airgun for removal of piston A. Apply air pressure into oil feed hole.



2.6 Bellhousing with Intermediate Plate and Pump

82 064

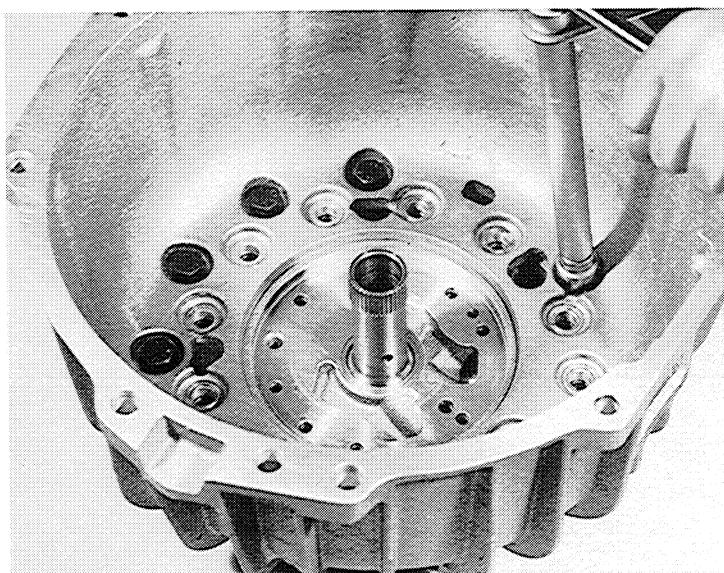
For removal of pump unscrew connection bolts. Select 2 connection bolts which are directly across from each other, screw in 2 turns and rap lightly with plastic hammer for removal at pump. Use tool head size 10mm.



82 065

During normal work procedure do not remove bellhousing from intermediate plate.

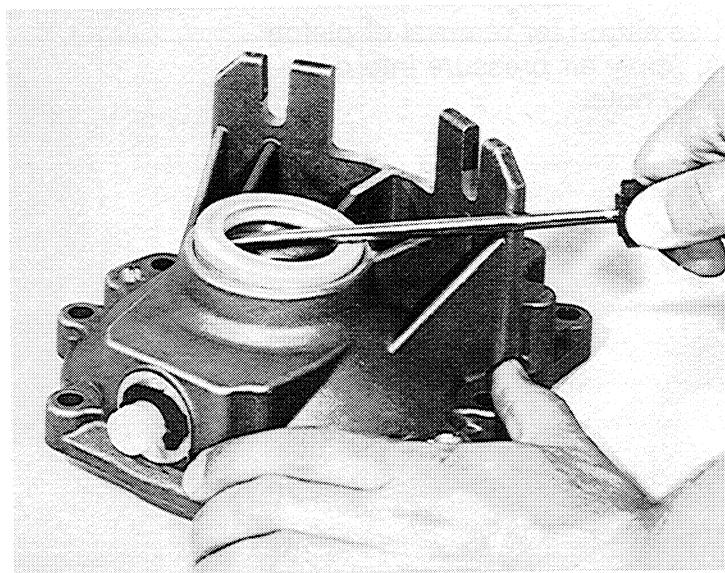
If it is necessary to remove intermediate plate, due to damaged or leaking unscrew remaining bolts and remove bellhousing from intermediate plate.
(Use tool head size 17 mm.)



2.7 Transmission Extension and Centrifugal Governor

82 066

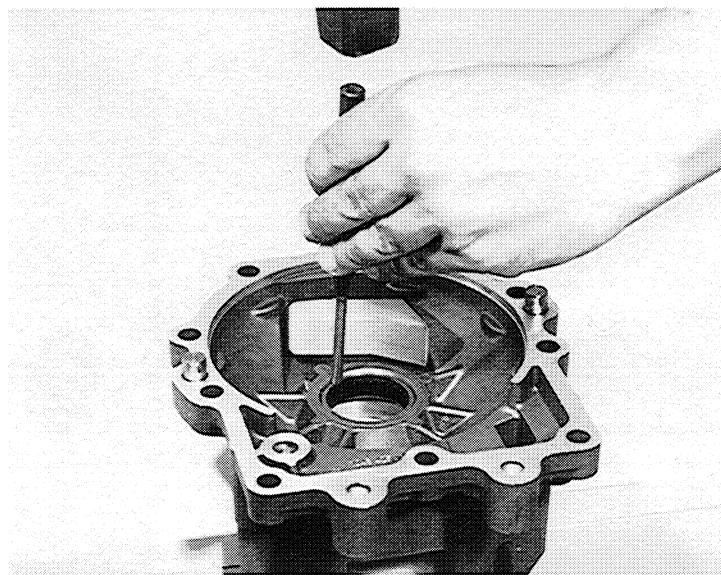
Remove sealing with screwdriver.



82 067

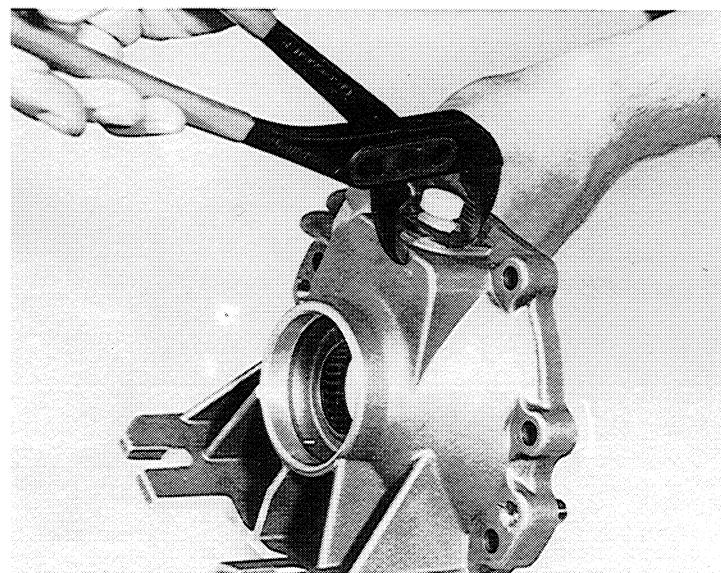
During normal work procedure do not remove needle bearing.

If it is necessary, use punch for removal, as shown in the picture.



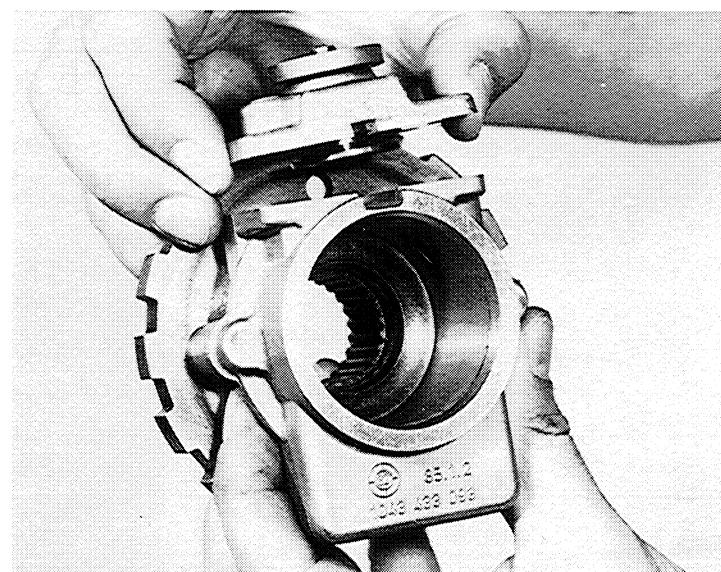
82 068

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

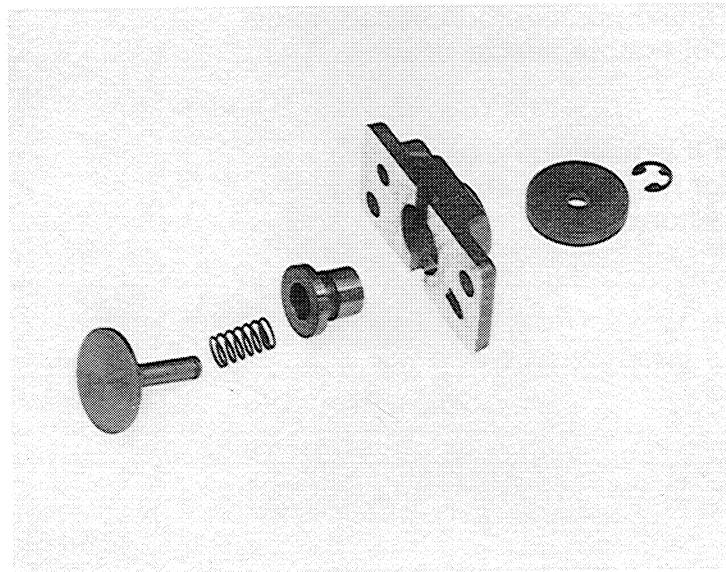


82 069

For cleaning of governor assembly, unscrew 2 cylindrical bolts, and remove governor housing complete. Use torx bit TX27.

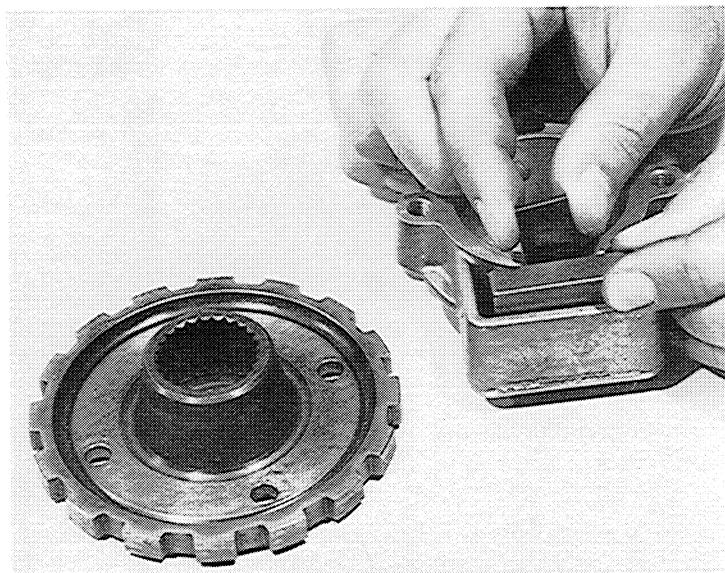


After removal of E clip,
disassemble governor housing
complete.



82 071

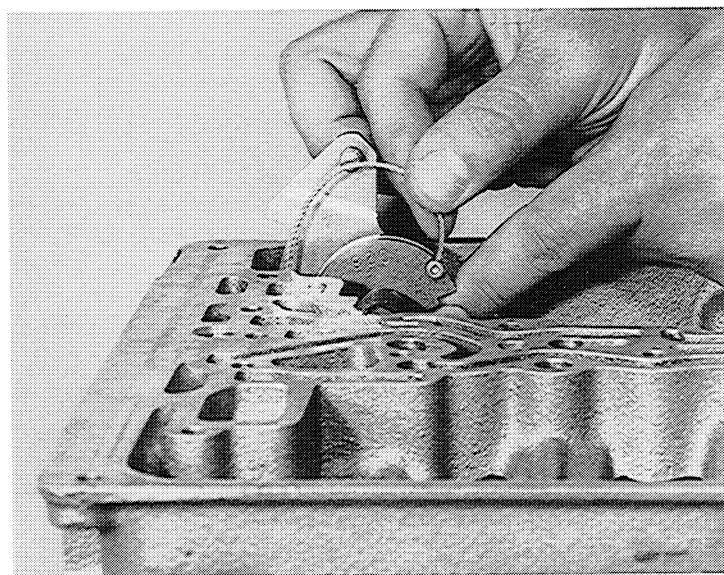
During normal work procedure
do not disconnect parking
wheel at governor hub.
If it is necessary unscrew 2
cylindrical bolts for disconnection
at parking wheel.
After removal at parking wheel
pull out security clip for removal
of counter weight.



82 074

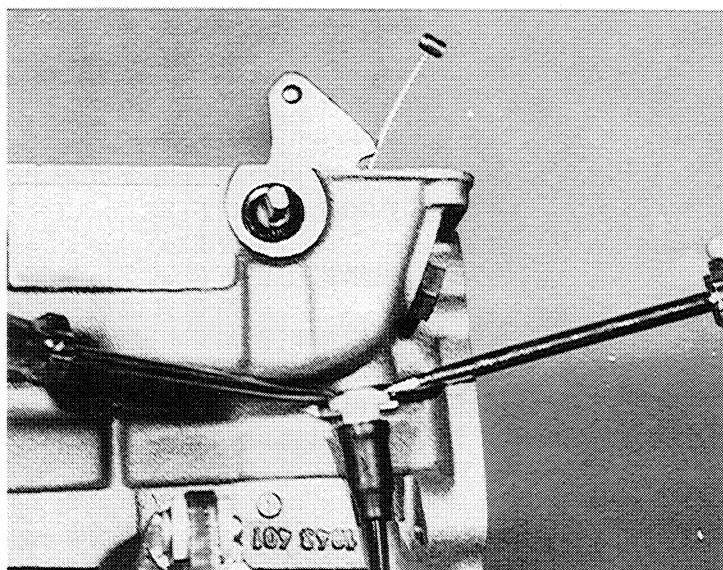
2.8 Transmission Case with shift selection

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



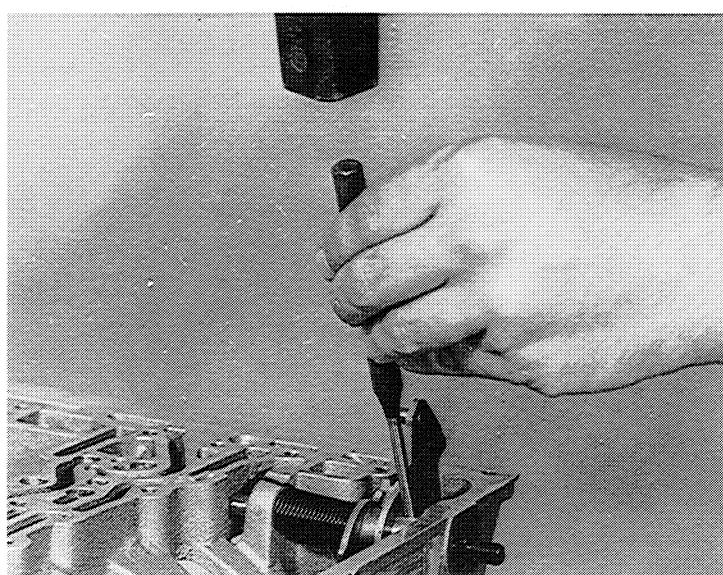
82 075

Removed kick-down cable from transmission case with 2 screw drivers as shown.



82 076

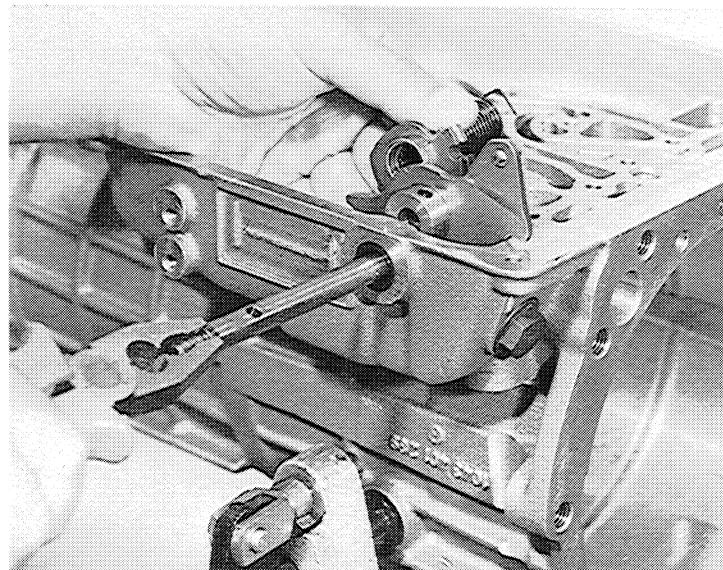
Normally selector and park assembly are left in transmission housing. If removal is necessary use punch to remove roll pin in selector shaft.



82 077

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

Also remove seal ring in transmission case with screwdriver.



Following conditions are required prior to valvebody disassembly.

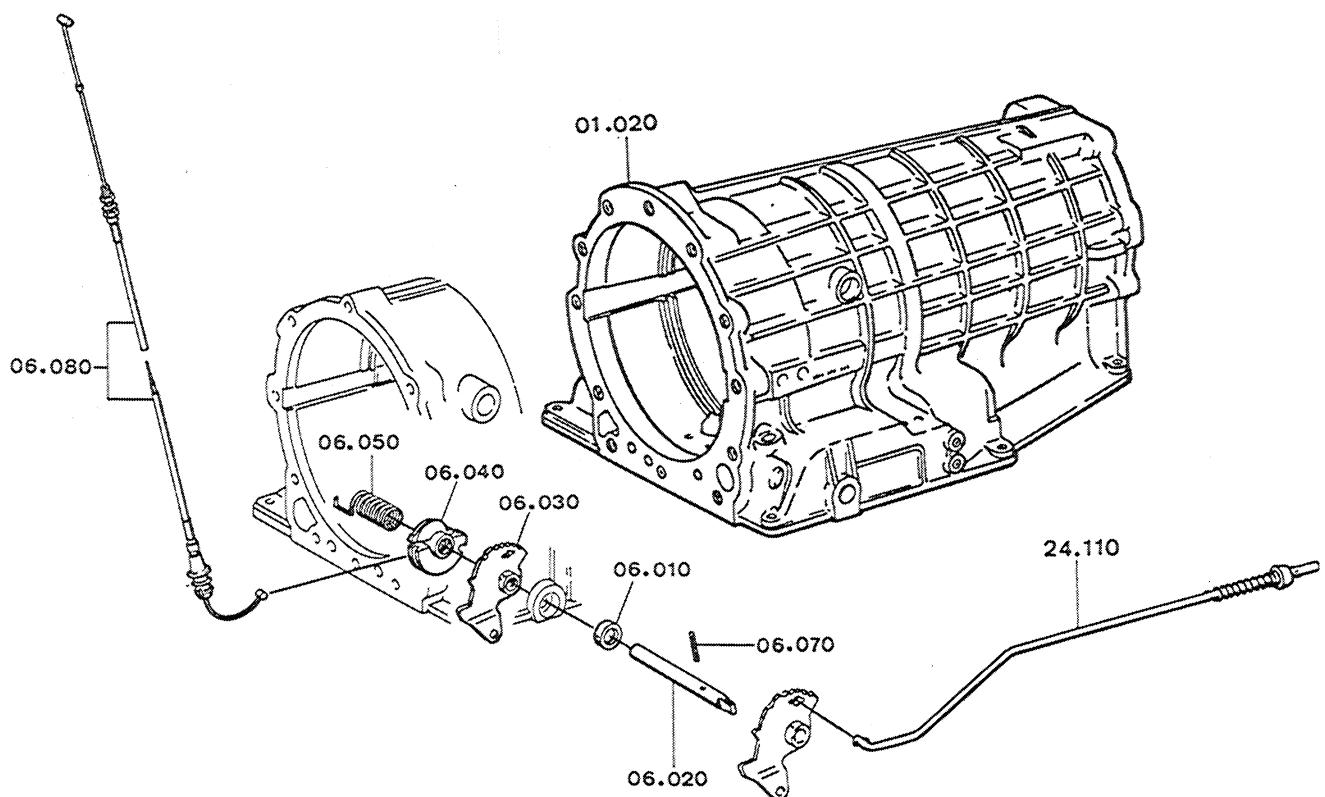
Requirements

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

Valve body repair manual will be available to insure proper repair procedure.

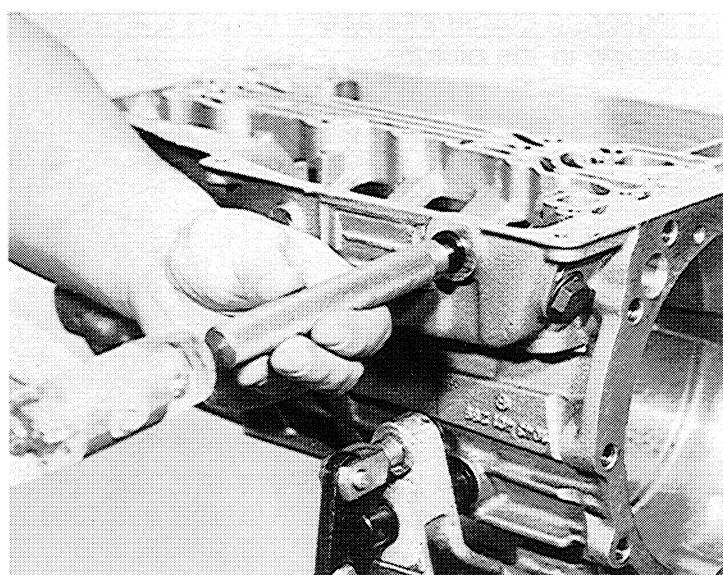
3. Assembly

3.1 Transmission Case with Selector and Park Assembly



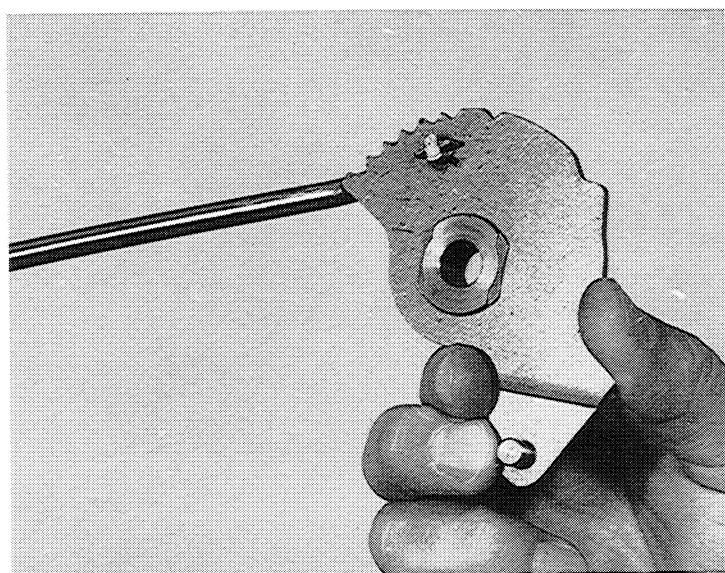
82 083

Fit in new sealing 06010
with suitable punch into
transmission case 01020.



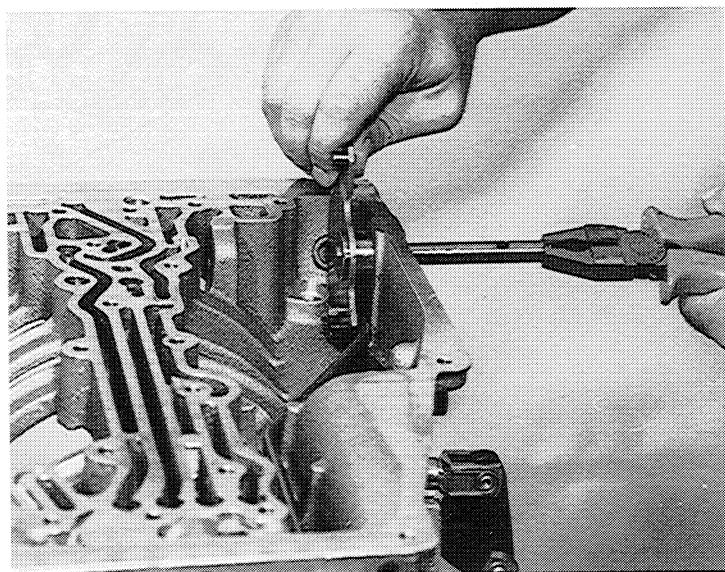
82 084

Fit connection rod 24110 into
stop washer 06030 as shown.



82 085

Place stopwasher with connection
rod into transmission case, and
put in selector shaft 06020.



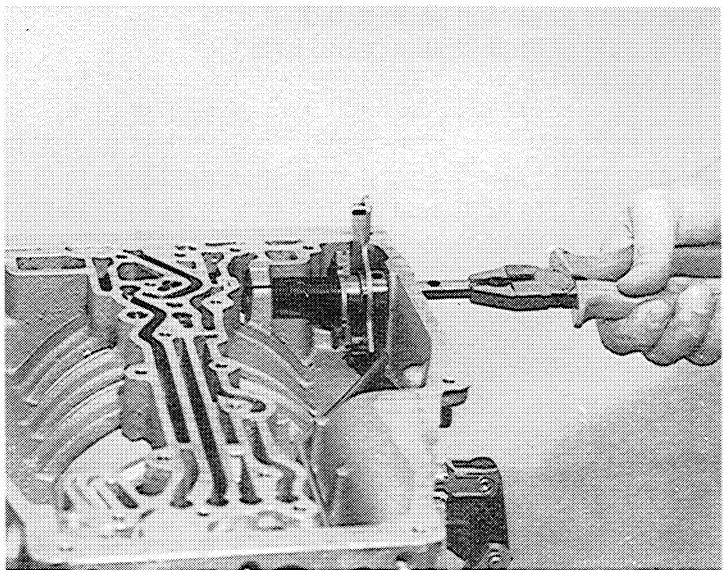
81 201

Fit legspring 06050 into cam
as shown in the picture.



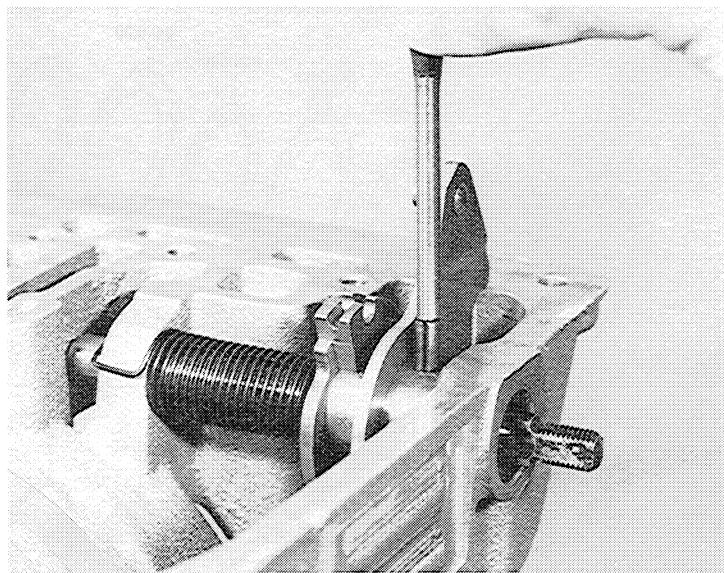
82 086

Install cam together with
legspring and insert selector
shaft to stop point.
Align hole in selector shaft
with hole in stopwasher.



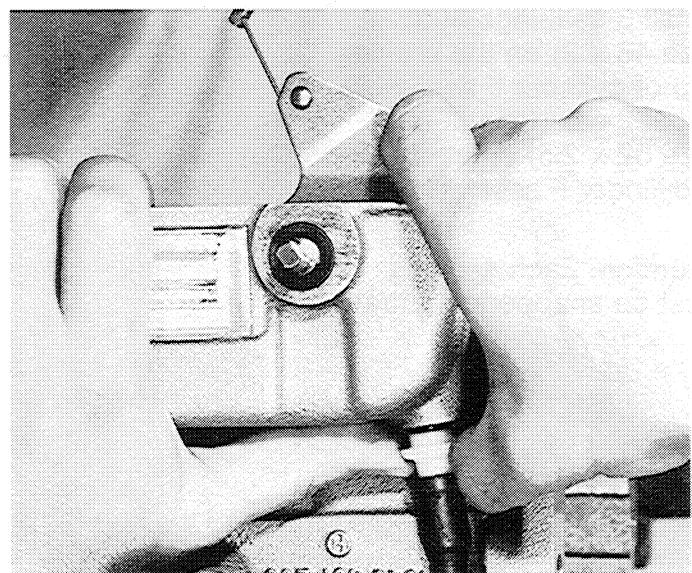
82 087

Use new roll pin 06070 with
suitable punch, install roll
pin, with open side facing
rear of transmission.

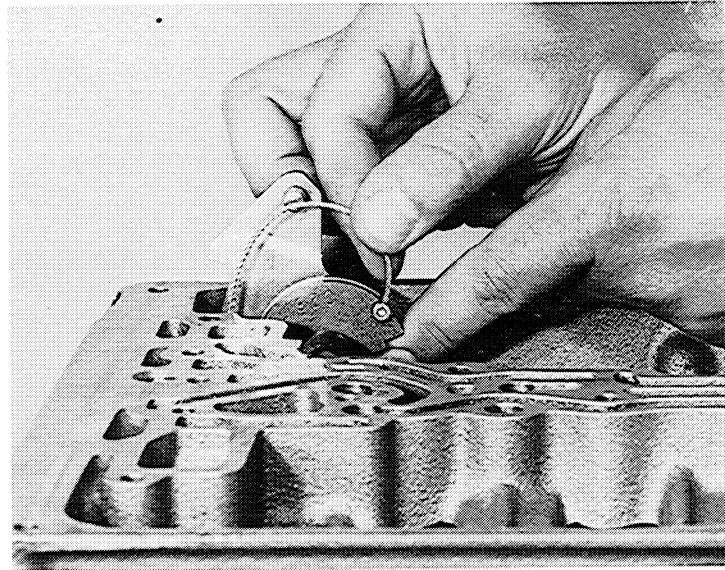


82 088

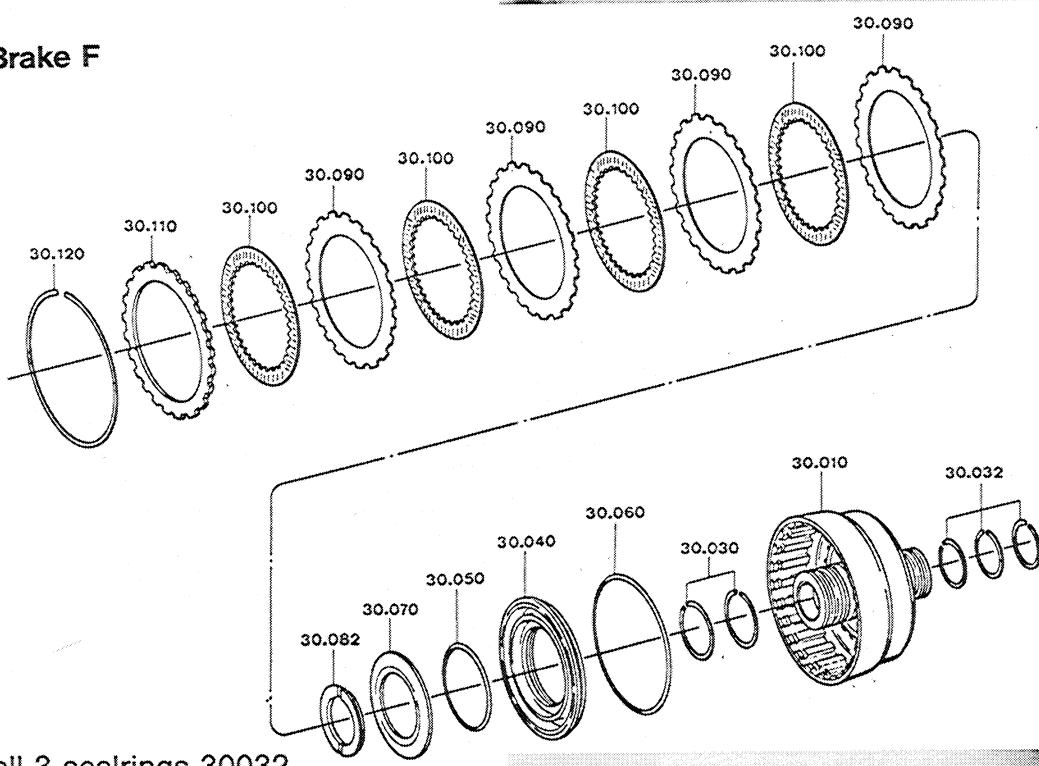
Install new kick-down cable
06080 into seat at transmission
case.



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

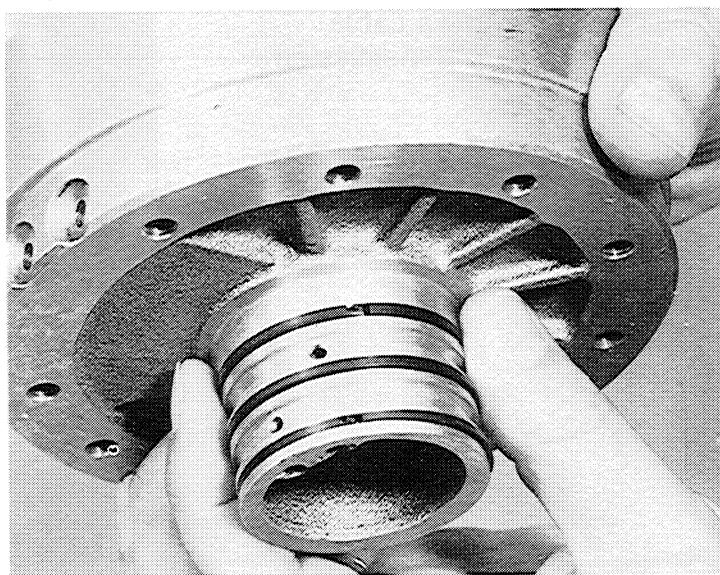


3.2 Brake F



Install 3 sealings 30032
(size 48 x 2) on the outside
hub of cylinder F assembly.
Install 2 sealings 30030
(size 52 x 2.5) on inside hub
of cylinder F assembly 30010.

Attention: Each sealing
must be snapped together.

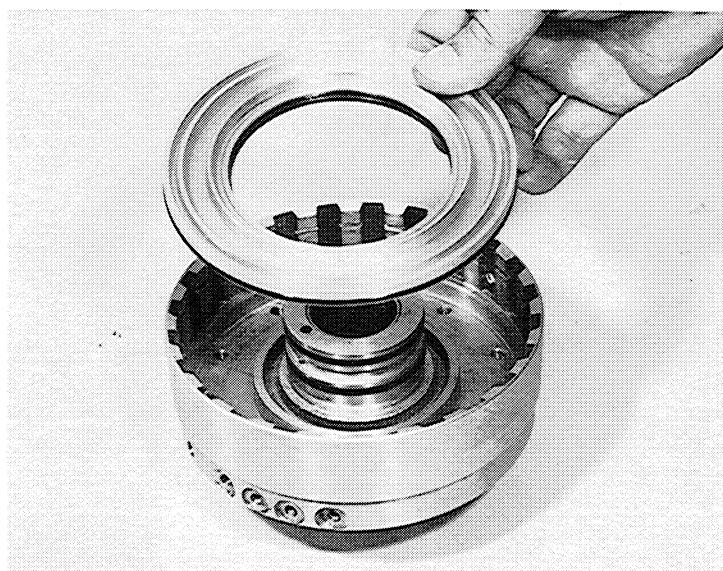


82 090

Install piston F 30040 with o-rings 30050 and 30060 into cylinder F.

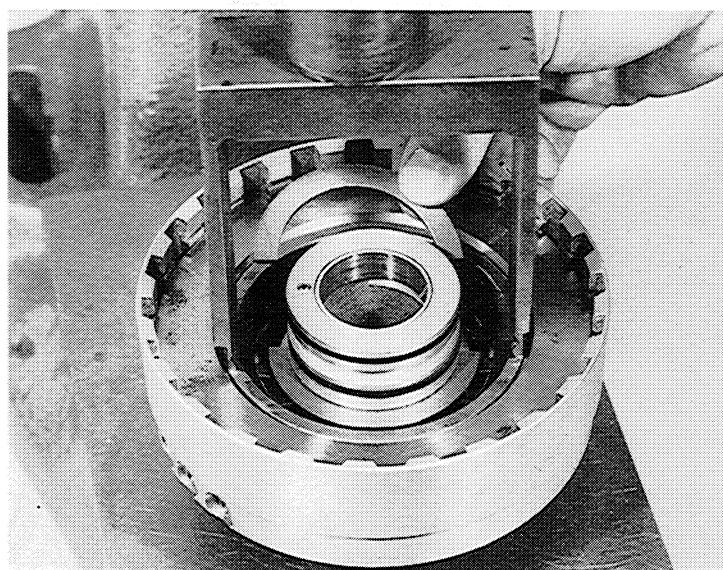
For easy assembly use light grease (Vaseline) on o-rings.

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 30070)
and secure with split rings (30082).

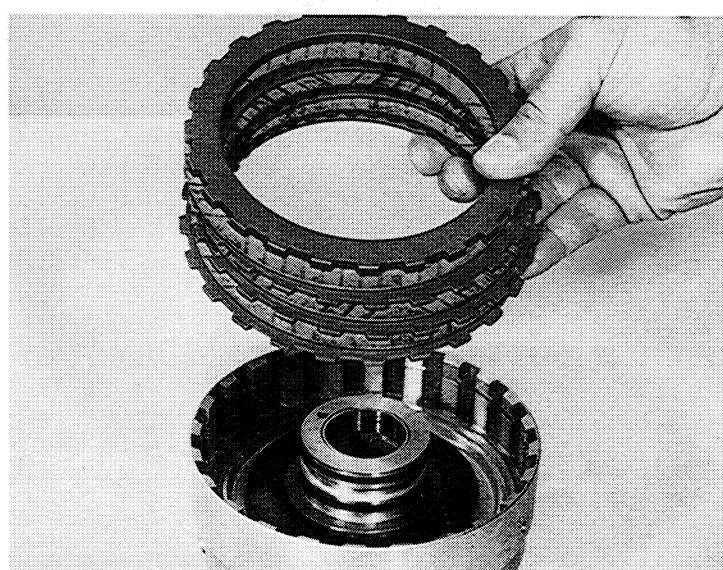


82 040

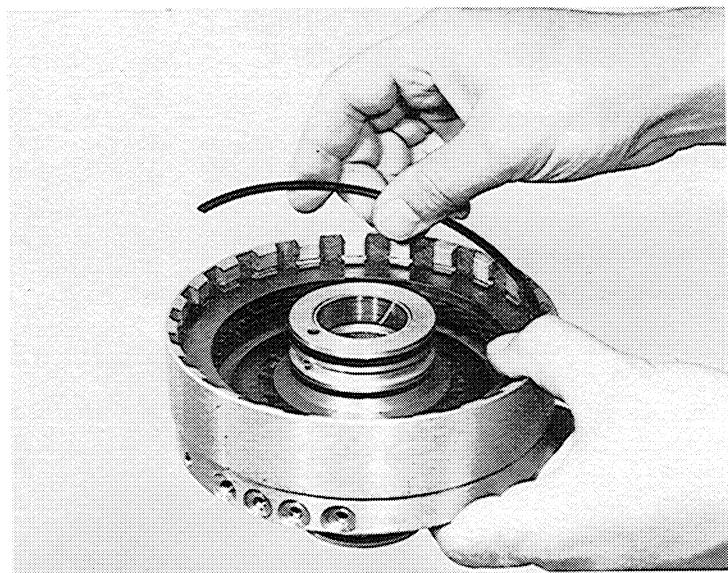
Install brake F assembly into cylinder F. Start with steel plate 30090.

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

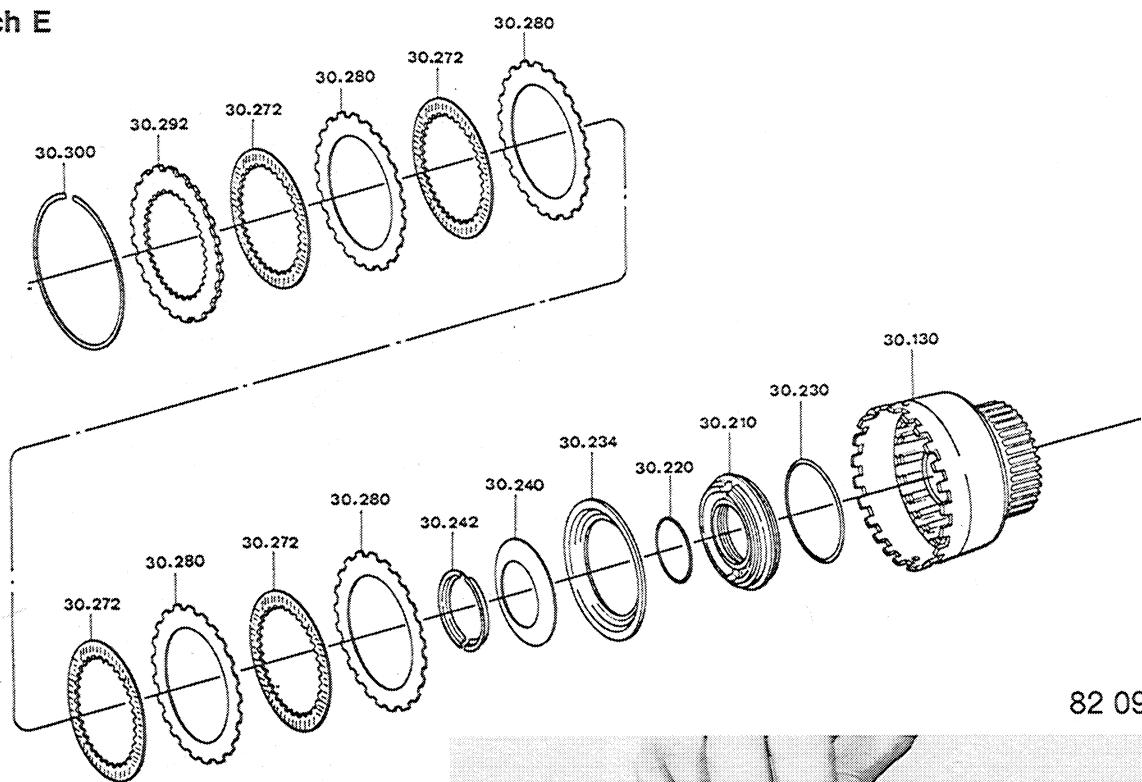
Difference
30090 - steel plates thicker
30100 - clutch plates same
30110 - end plate without inner teeth



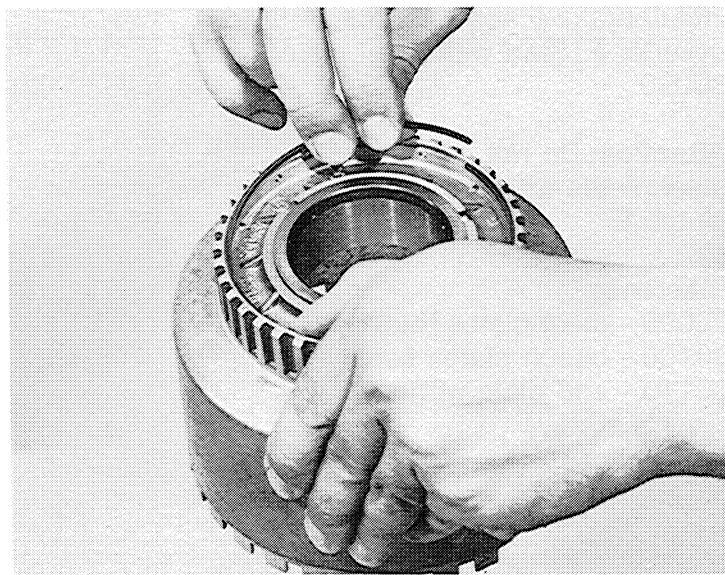
Secure endplate with snapring
30120.



3.3 Clutch E



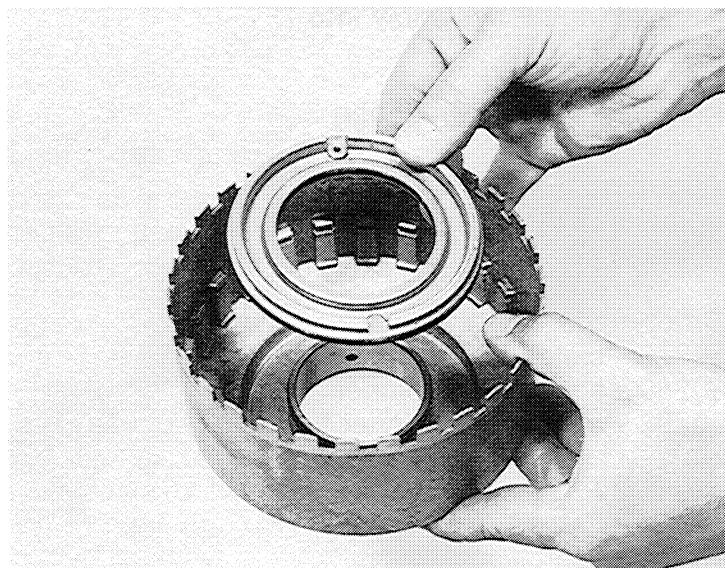
Install snapring 30311 with
cylinder E 30131 (version with
groove).



82 080

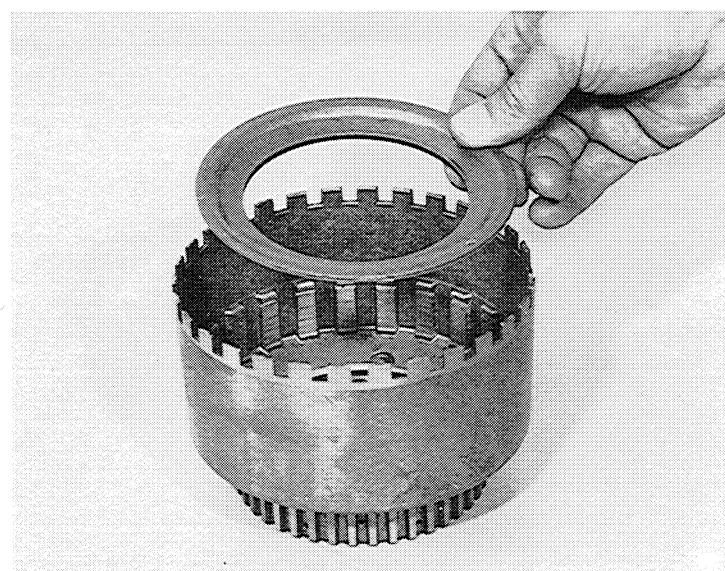
Install piston E 30210 together with o-rings 30220 and 30230 into cylinder E.

For easy mounting use light grease (Vaseline).



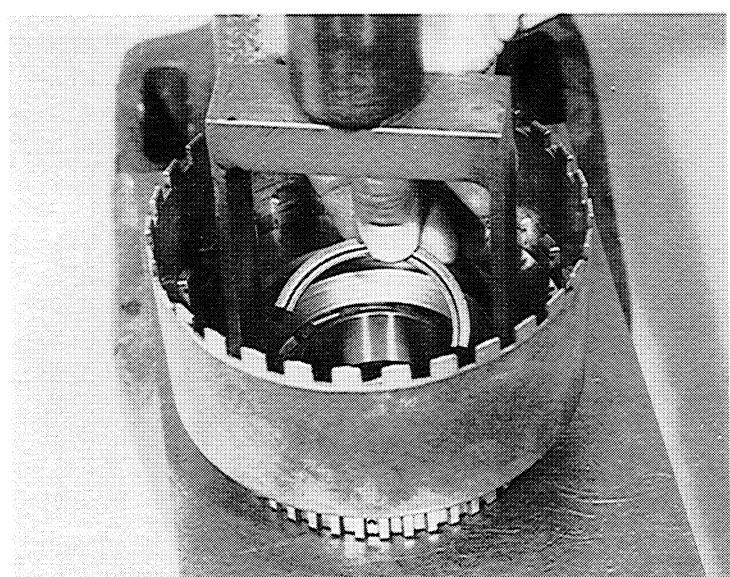
82 079

Install pressure plate 30234 with curve facing downward as shown in the picture.



82 093

With spring device (5 X 46 000 167) press down plate spring E 30240 and secure with split rings 30242.



82 044

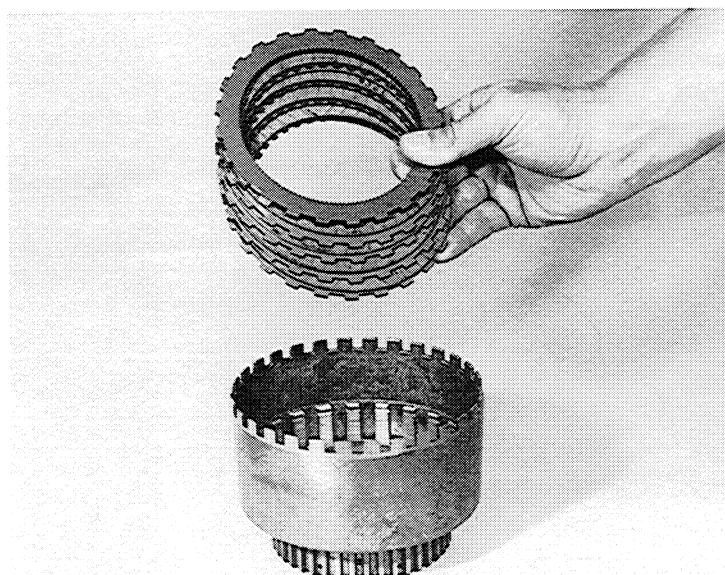
Install clutch E assembly into cylinder E.

Start with steel plate 30280

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

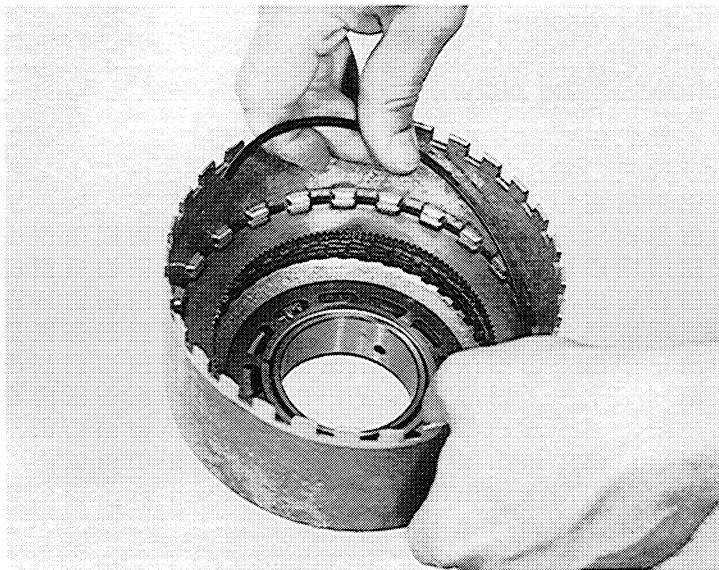
Difference

- 30270 - clutch plates same
- 30280 - steel plates thinner
- 30292 - endplate has inner teeth.

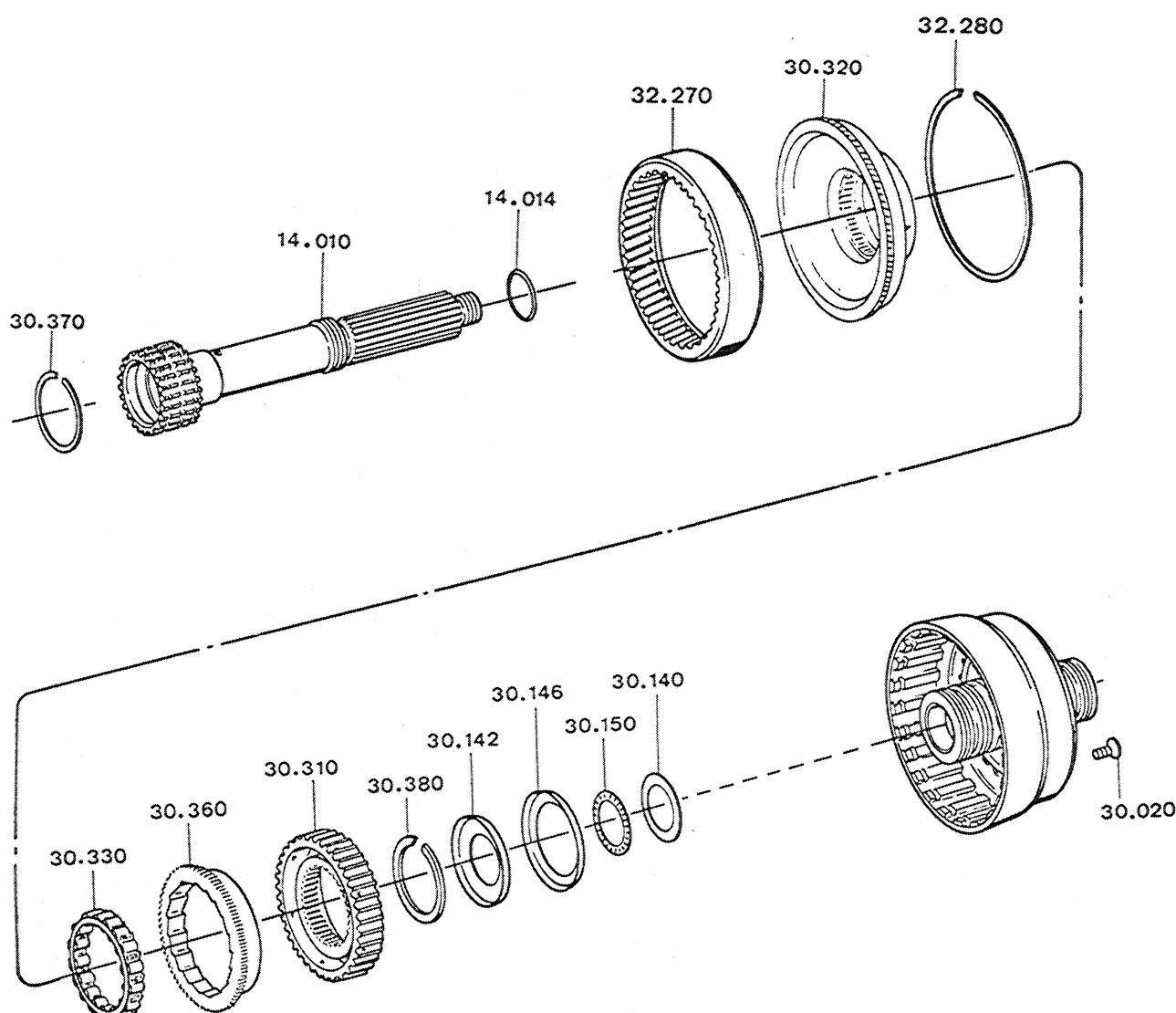


82 094

Secure endplate with snapring 30300.

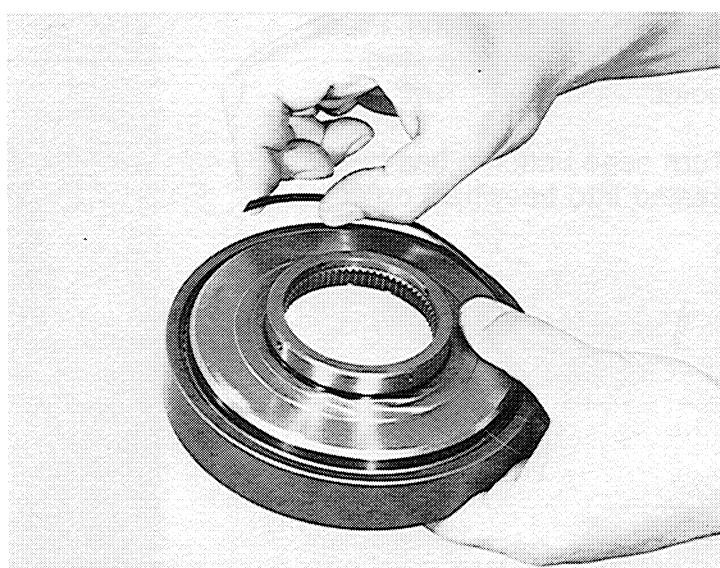


3.4 Mounting and Assembly of 4th Gear Complete



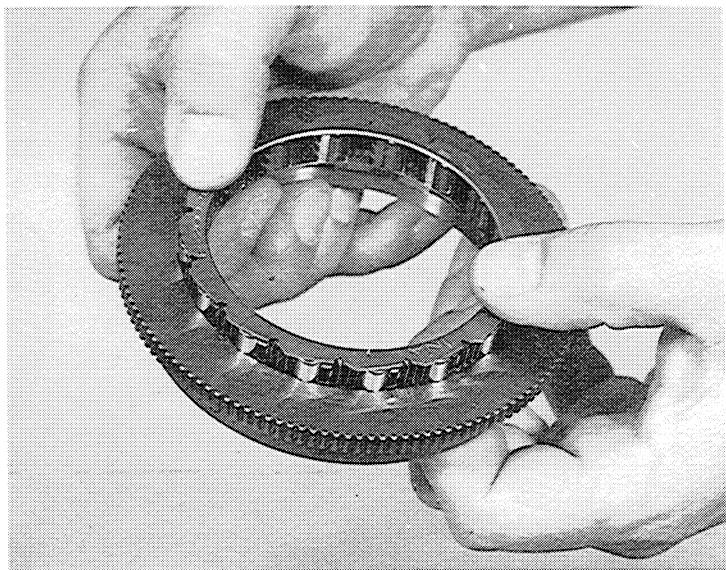
Connect freewheel inner ring
30320 together with hollow gear
32270 and secure with snapring
32280.

82 095



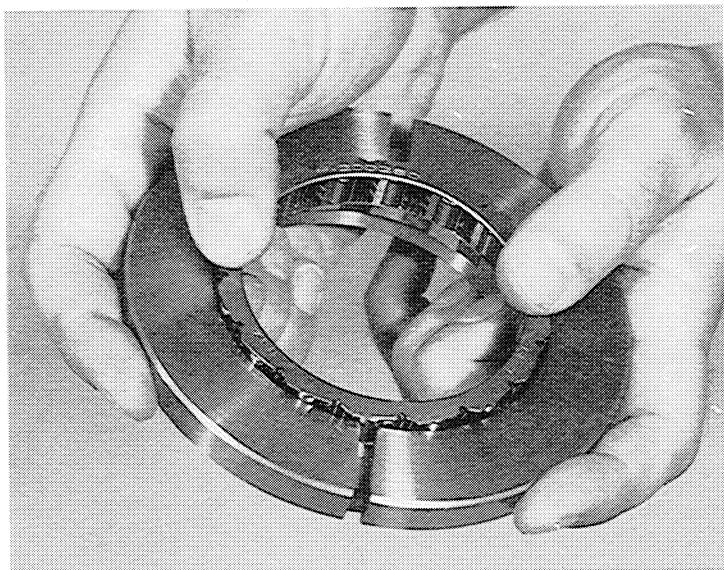
82 096

Line up freewheel cage 30330
against freewheel outer ring
30360.



82 097

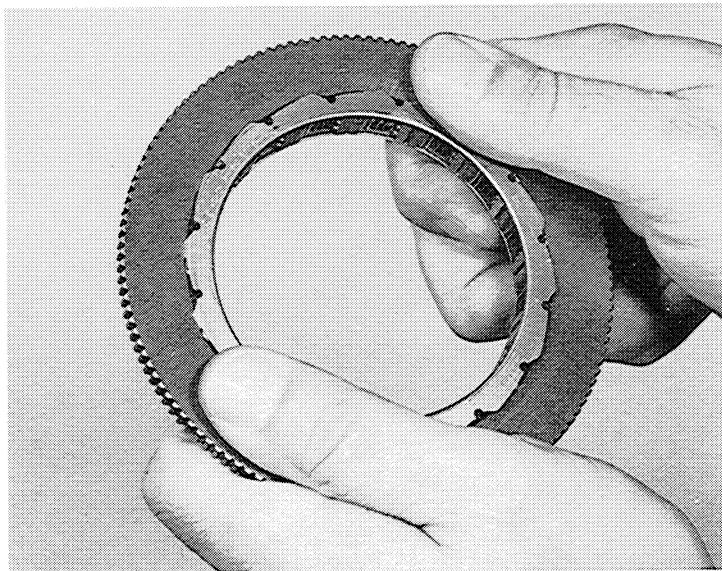
With mounting ring
(5 X 46 000 169) press
freewheel cage together and
install into freewheel outer
ring.



82 098

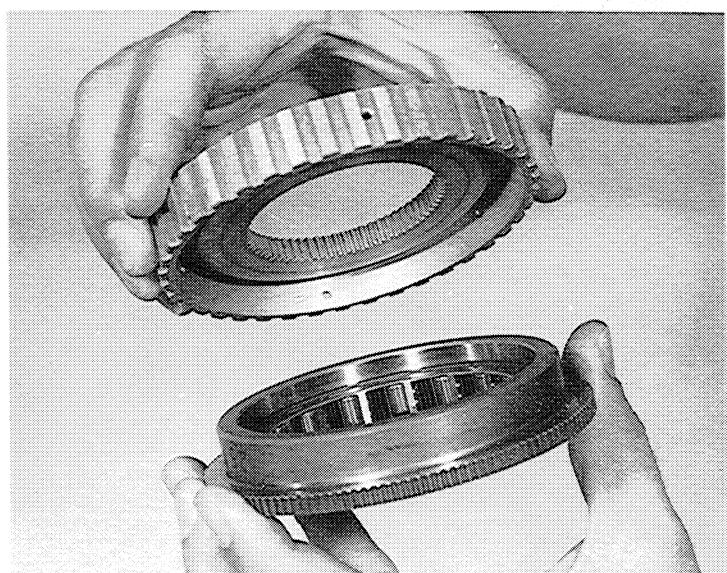
Remove mounting ring. Press
in freewheel cage to stop
point.

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



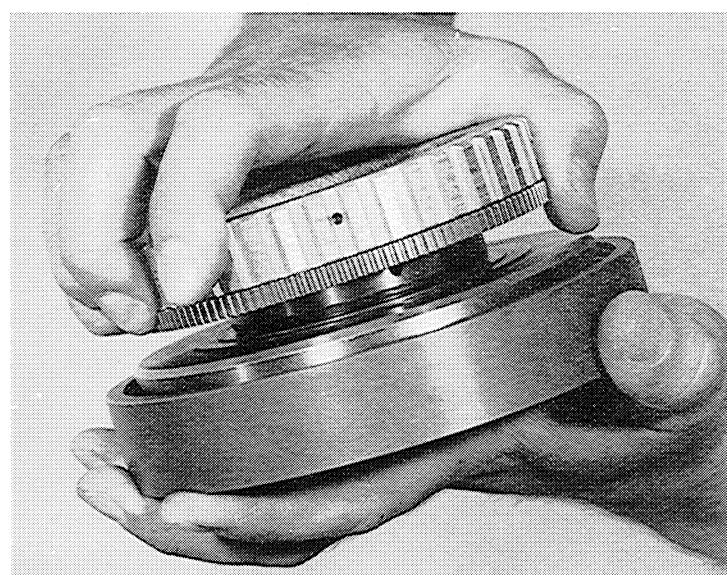
82 099

Place carrier E 30310
together with freewheel
outer ring.



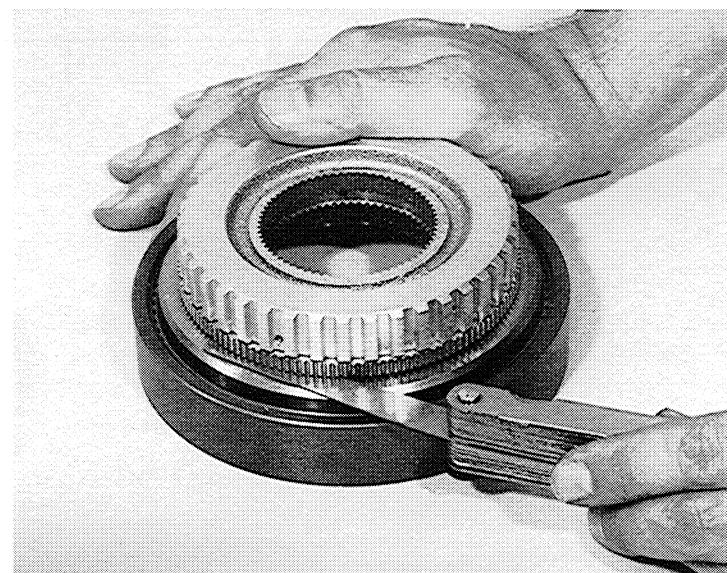
82 100

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

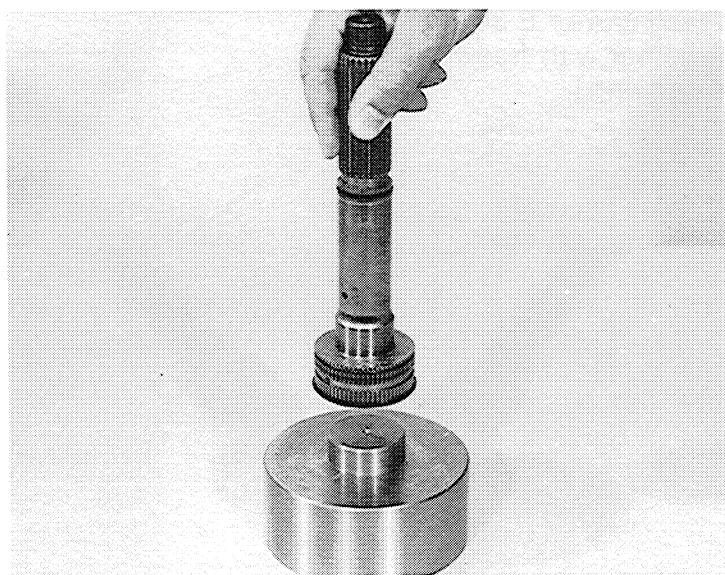


82 104

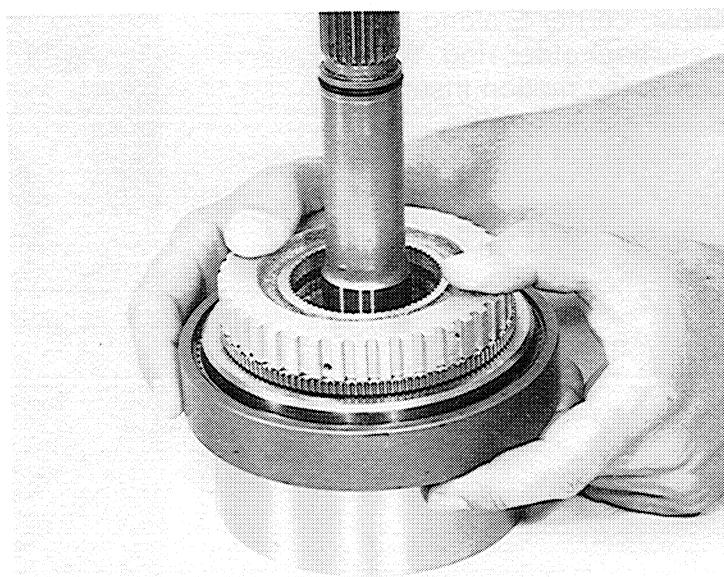
Minimum clearance between
freewheel inner ring and outer
ring must be 0.1 mm.



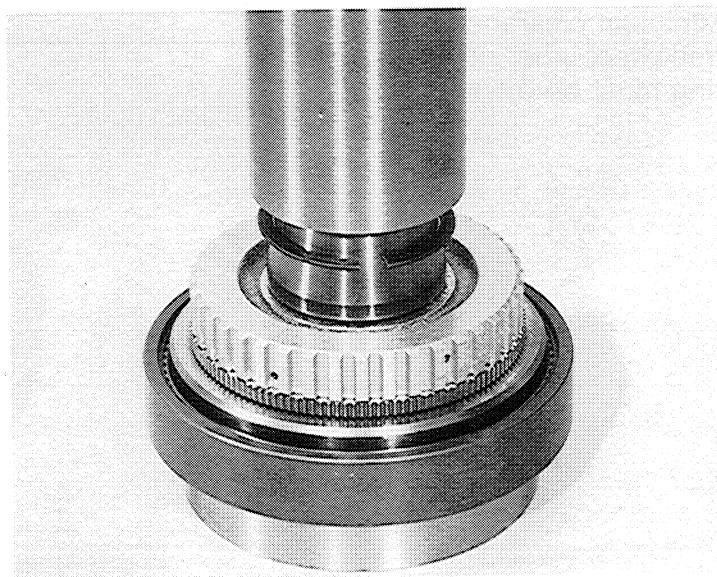
Place output shaft 14010 on special mounting tool (5 X 46 000 168). Also install o-ring 14014 and snapring 30370 on output shaft.



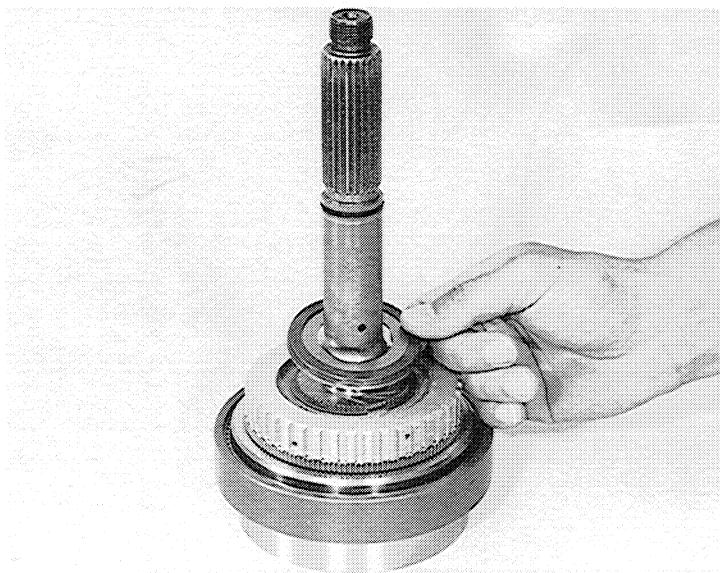
Align inner teeth of carrier E with freewheel inner ring. Insert freewheel assembly onto output shaft.



Place snapring 30380 onto mounting sleeve and push down with mounting tube.

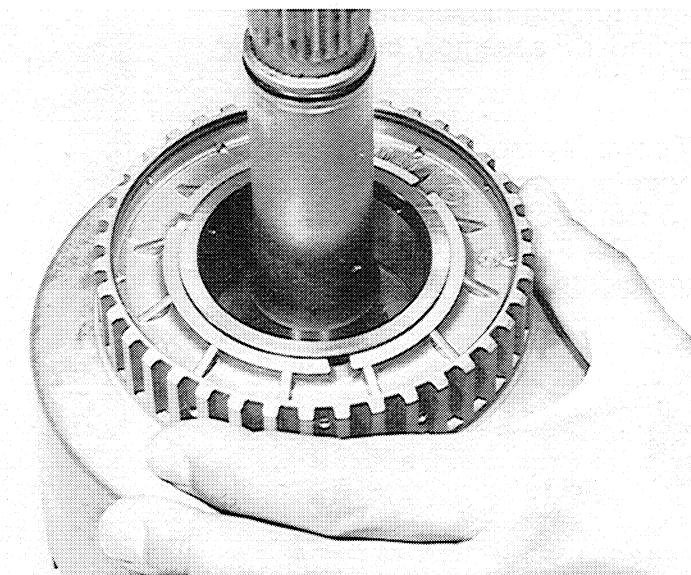


Install first steel thrustwasher 30142, second copper thrustwasher 30146 as shown in the picture.



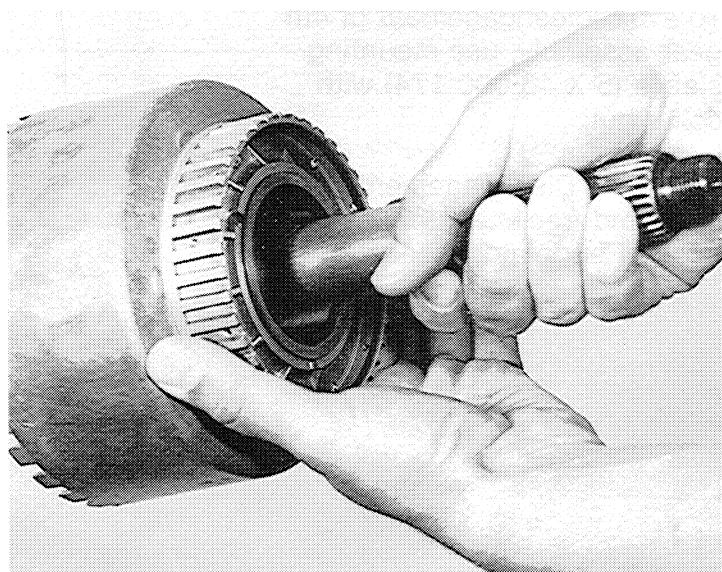
Install cylinder E assembly with turning motion.

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

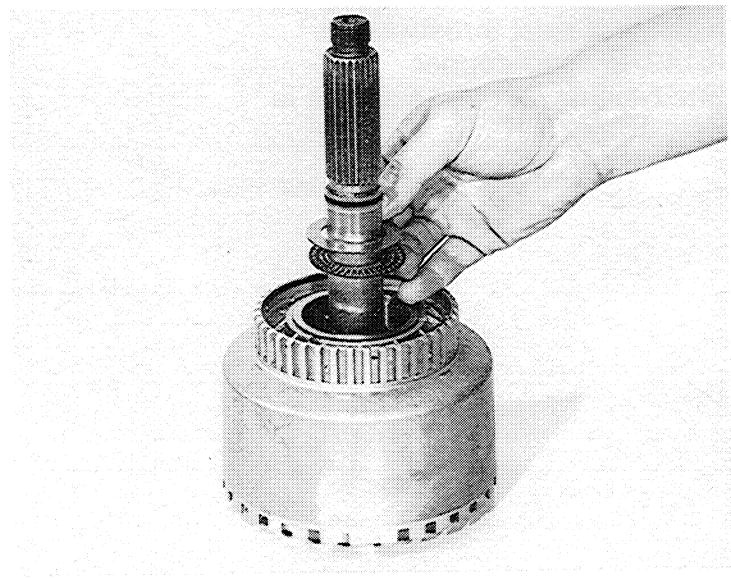


If correctly mounted cylinder E assembly must be turning in clockwise direction by holding output shaft in place.

If turning counterclockwise freewheel must be locked up.



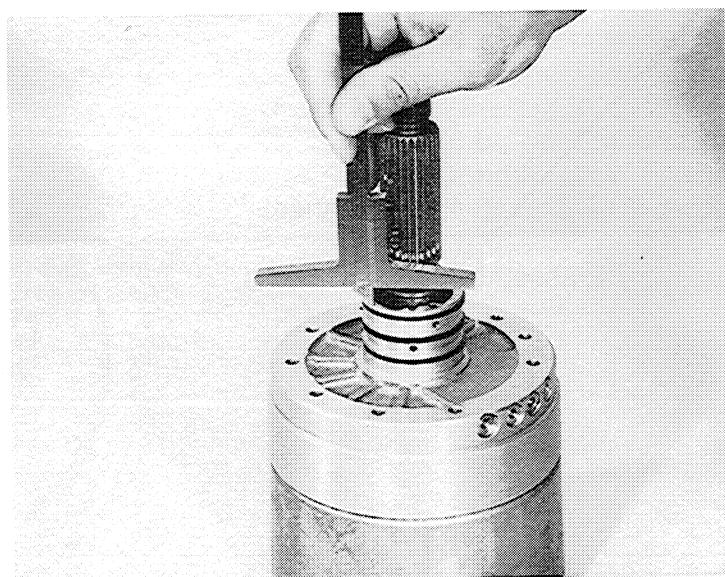
Insert axle cage 30150 and axle disc 30140.



82 112

With turning motion install cylinder F assembly onto cylinder E.

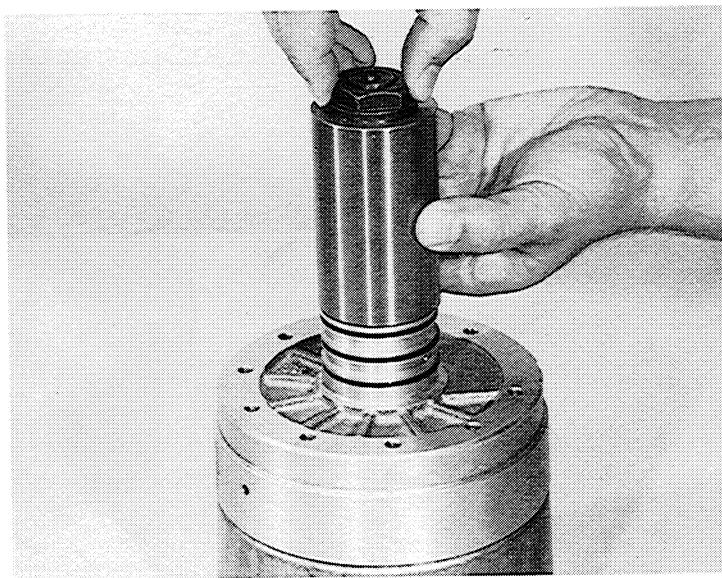
If correctly mounted, the raised edge of output shaft will be 10 mm above top surface of cylinder F assembly as shown in the picture.



82 113

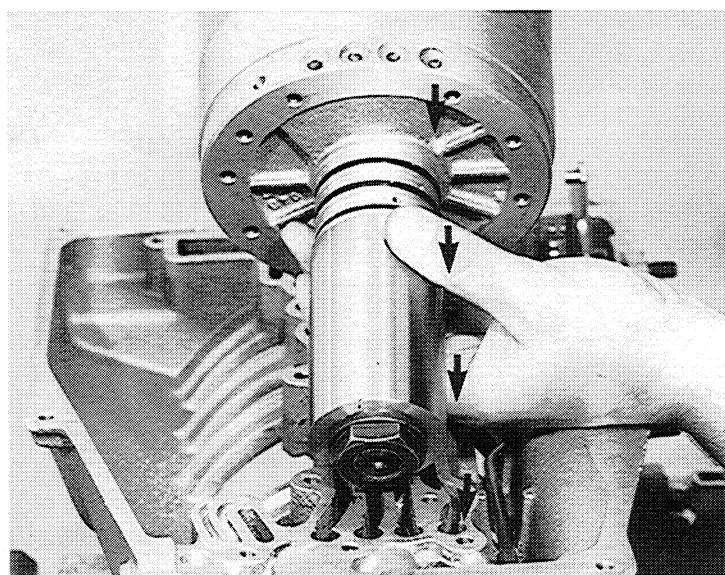
To avoid disengagement of 4th gear assembly, use mounting sleeve (5 X 46 000 174) with collar nut.

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



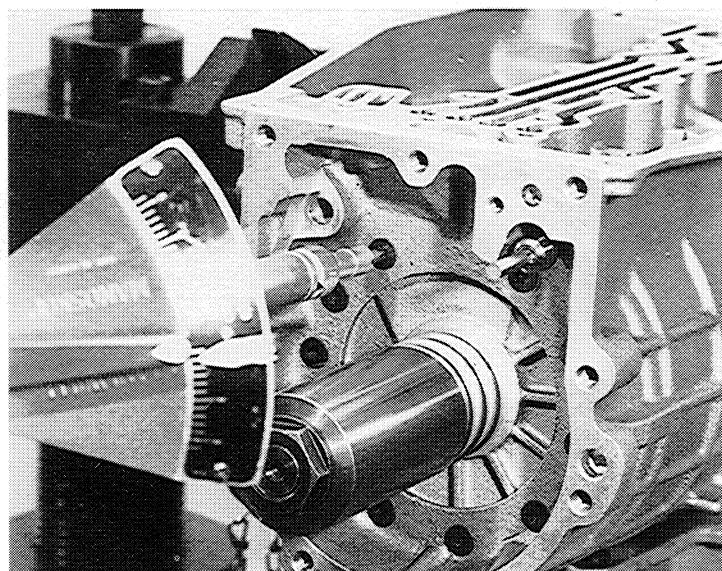
Install 4th gear assembly complete into transmission case.

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

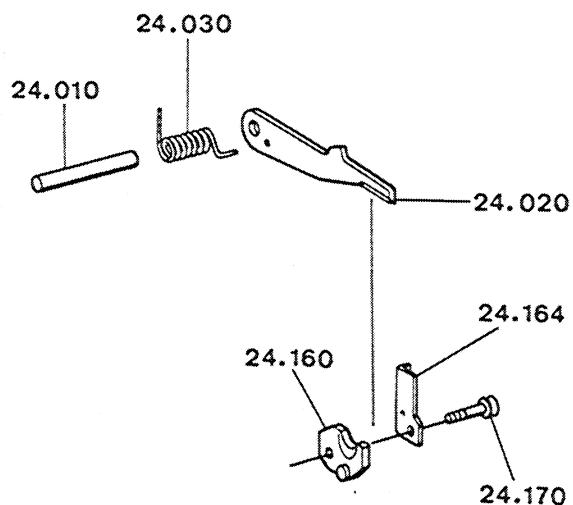


Use 10 counter sunk screws 30020 for tightening at cylinder F.

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.)

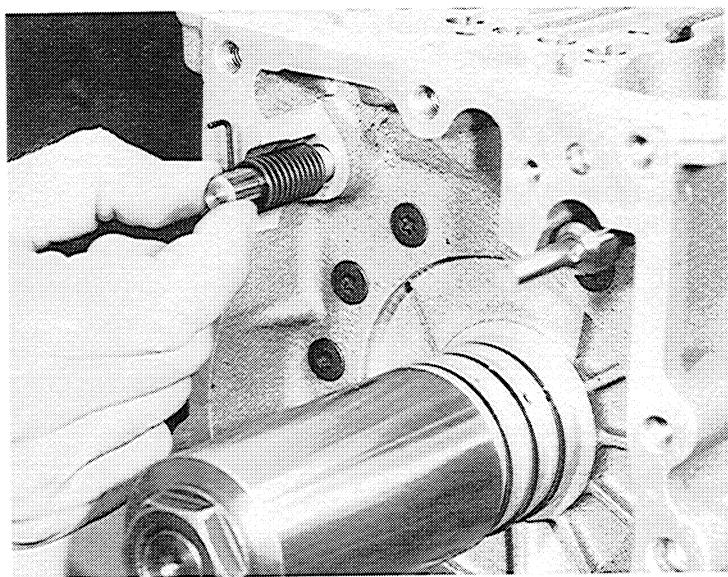


3.5 Park Mechanism



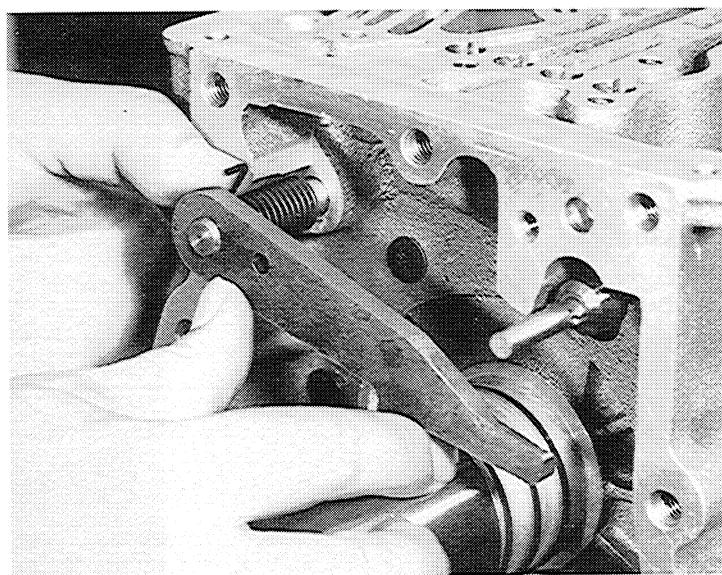
82 116

Install pin 24010 and leg spring 24030 as shown in the picture.



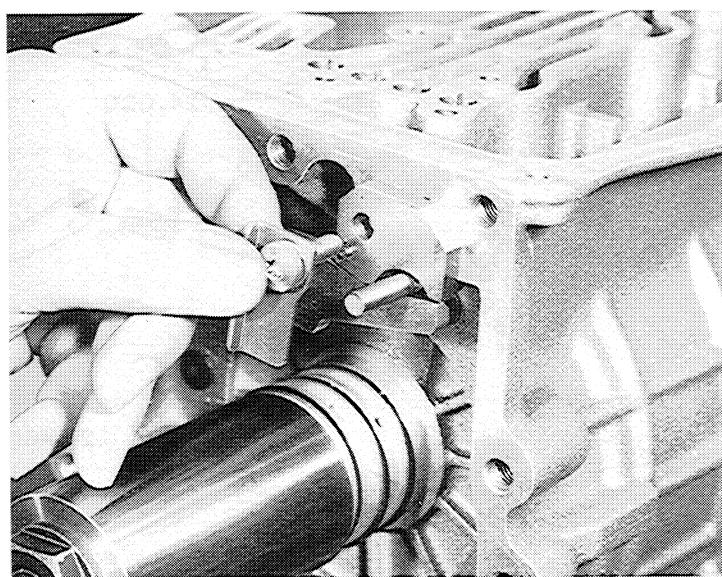
82 117

Install pawl onto pin. For tensioning, fit leg from spring into hole of pawl.

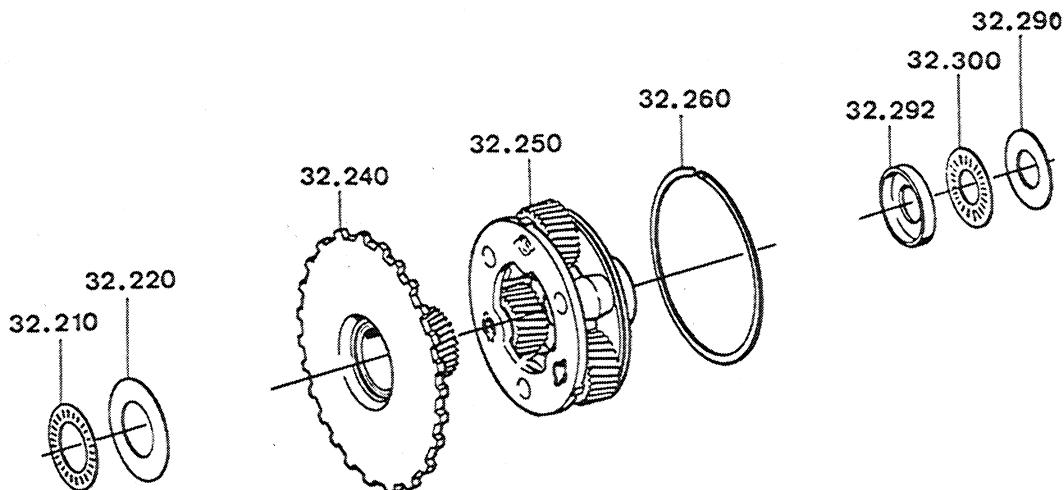


82 118

Install plate 24160 together with guide plate 24164. Use cylindrical bolt 24170 for tightening.
(Tool size torx bit 27)
(To be torqued 10 Nm.)



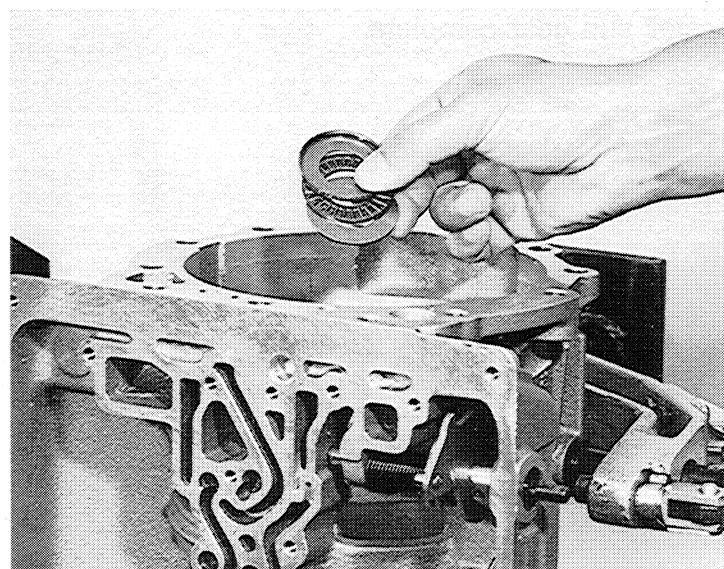
3.6 Planetary Set 4th Gear



82 123

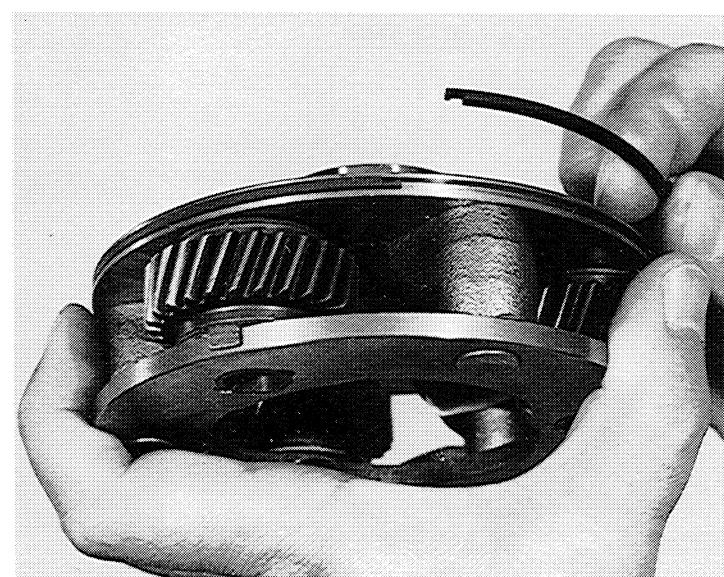
Turn transmission into vertical position.

Insert disc washer 32290, axle cage 32300 and thrust washer 32292.



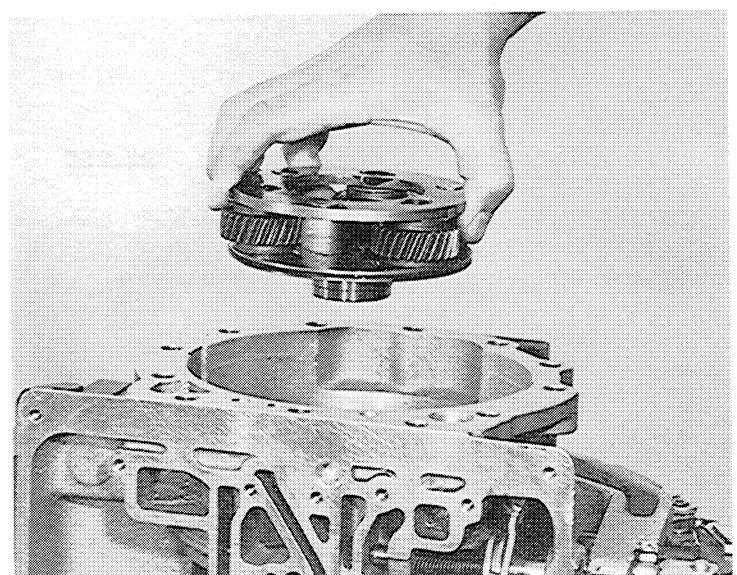
82 124

Install seal ring 32260 onto planetary case and snap together.



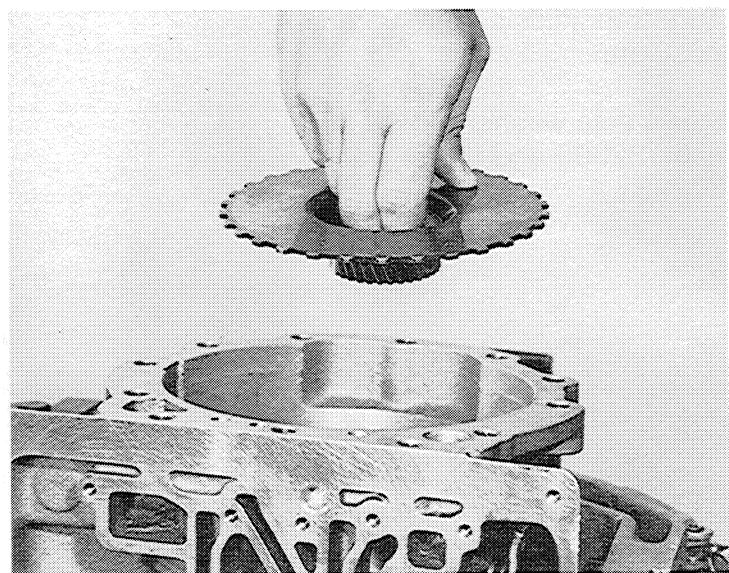
82 125

Install planetary set with turning motion into hollow gear.



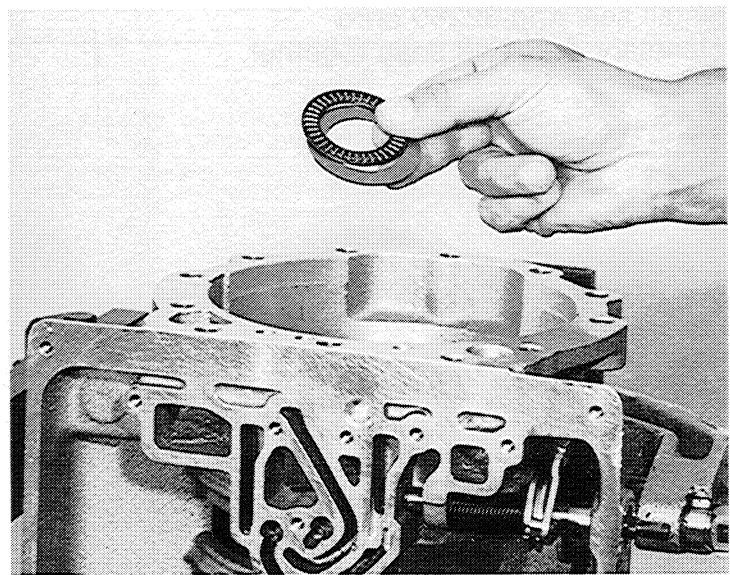
82 126

Install sun gear complete.

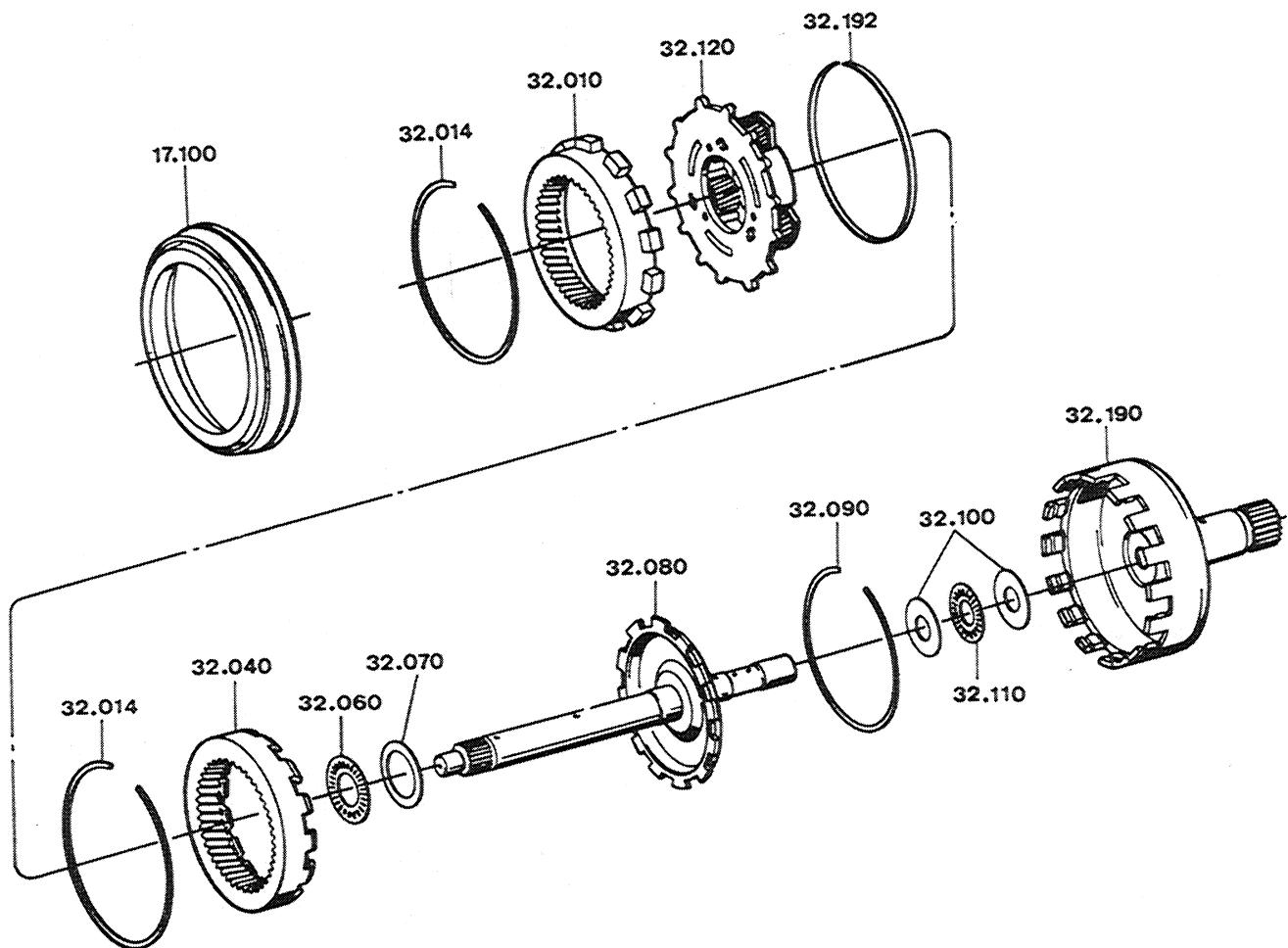


82 127

Insert disc 32220 and axle cage 32210.

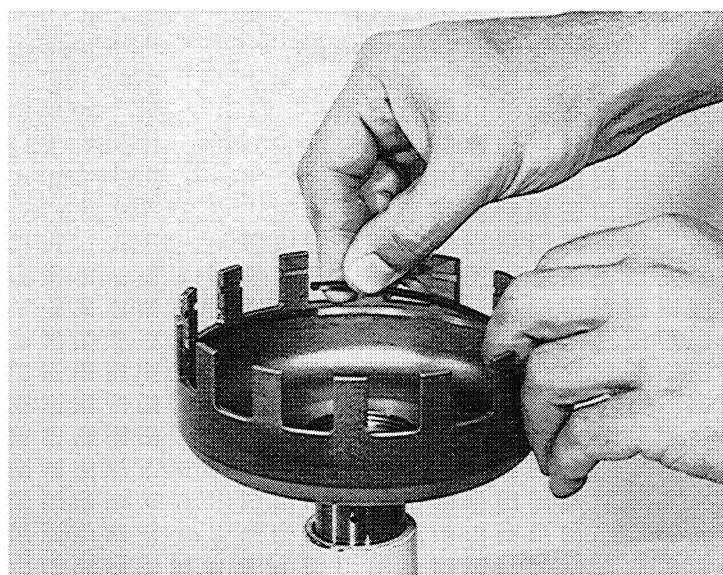


3.7 Web Shaft with Planetary Set



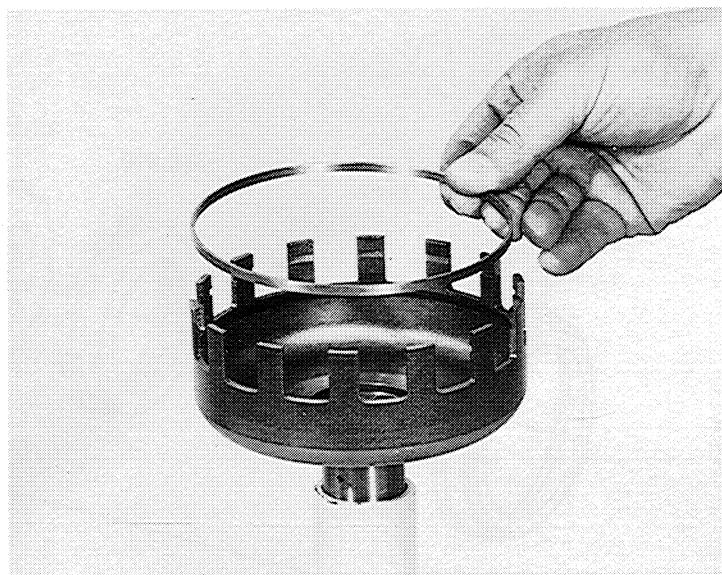
Place web shaft into supporting devise (5X56 000 072) and install snap ring 32014 into lower groove.

82 128



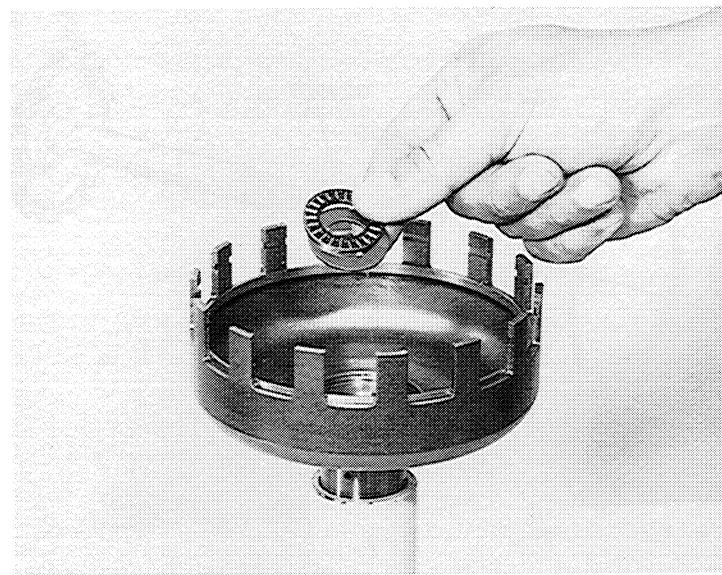
82 058

Install snap ring 32192.



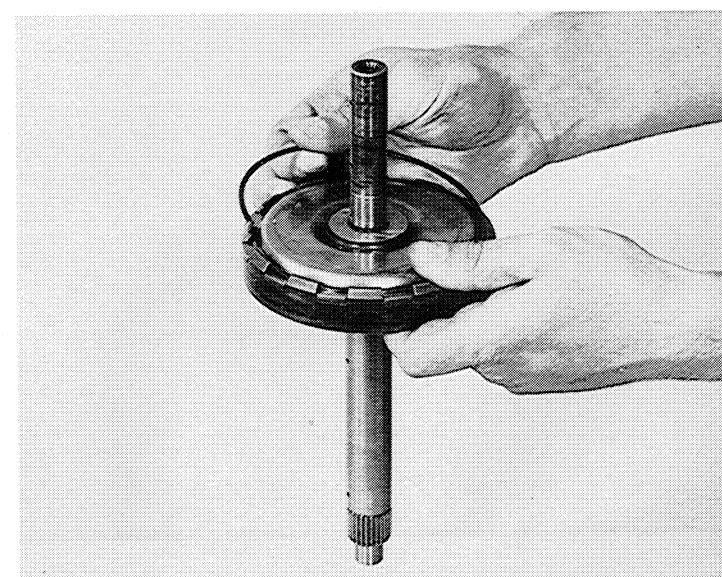
82 129

Insert 1 disc washer 32100 and
axle cage 32110.



82 059

Connect intermediate shaft
32080 with hollow gear 32040
and secure with snap ring
32090.



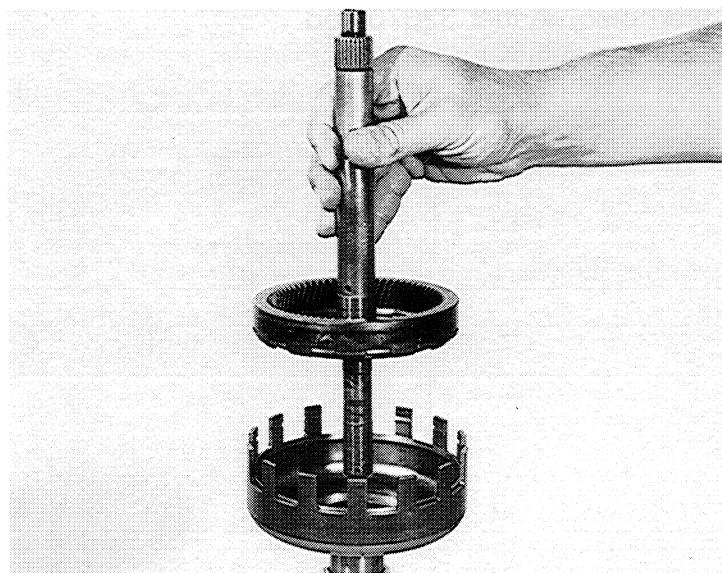
82 130

Insert thrust washer 32100
with grease on intermediate
shaft.



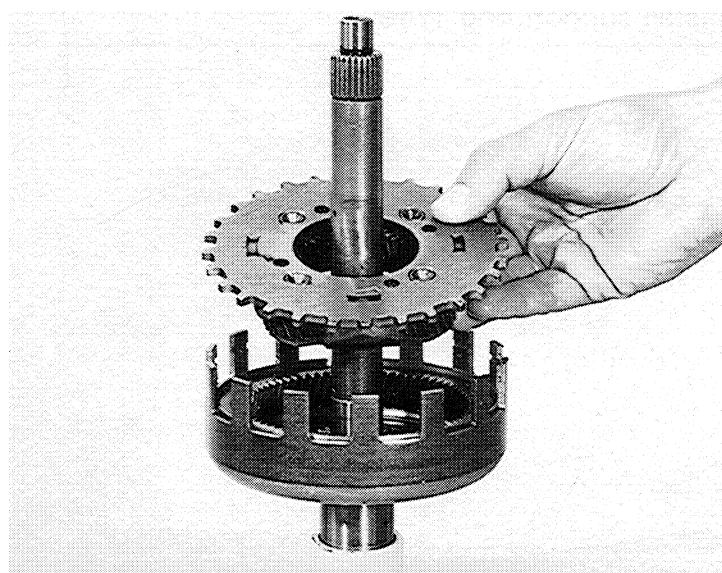
82 056

Install intermediate shaft together
with hollow gear into web shaft.

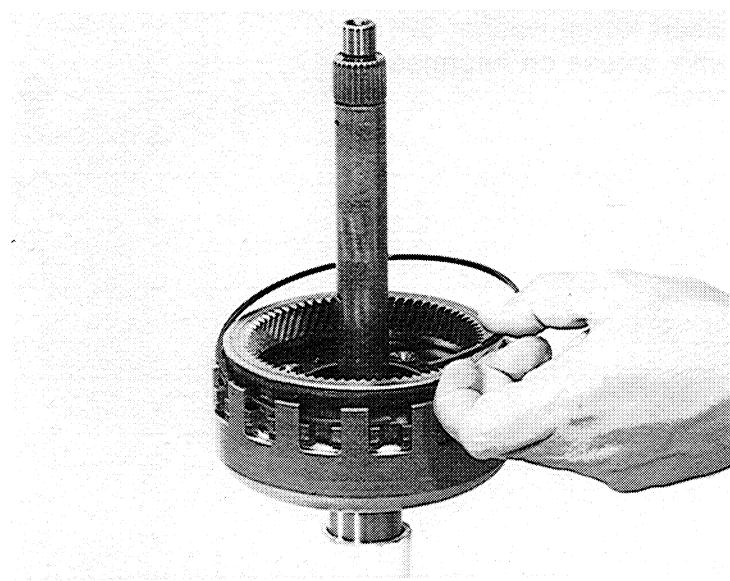


82 054

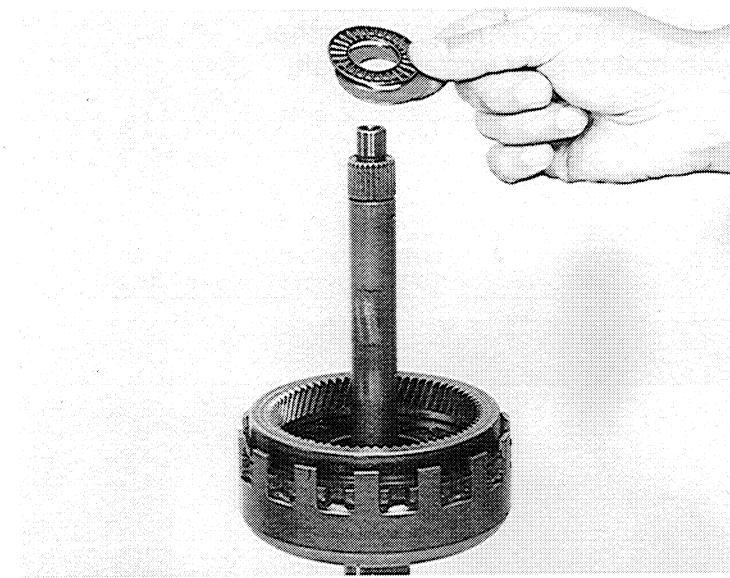
Install with turning motion,
rear planetary set 32120 complete
into hollow gear.



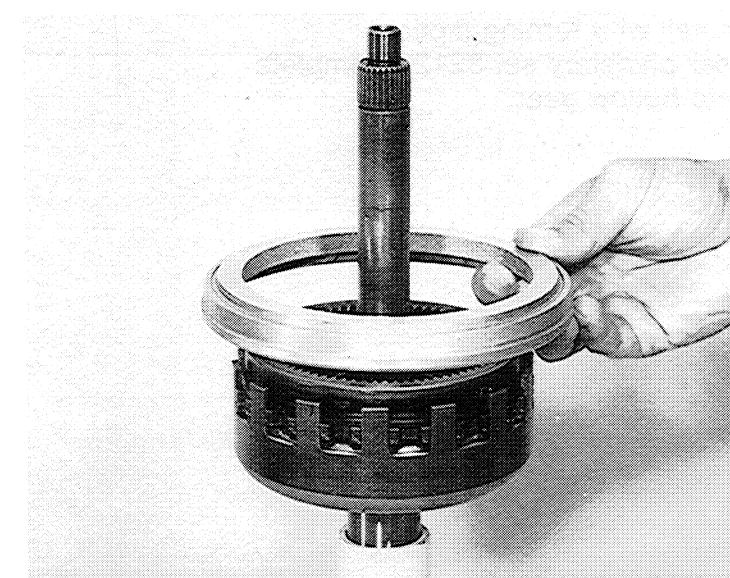
Install front hollow gear 32010
and secure with snap ring 32014.



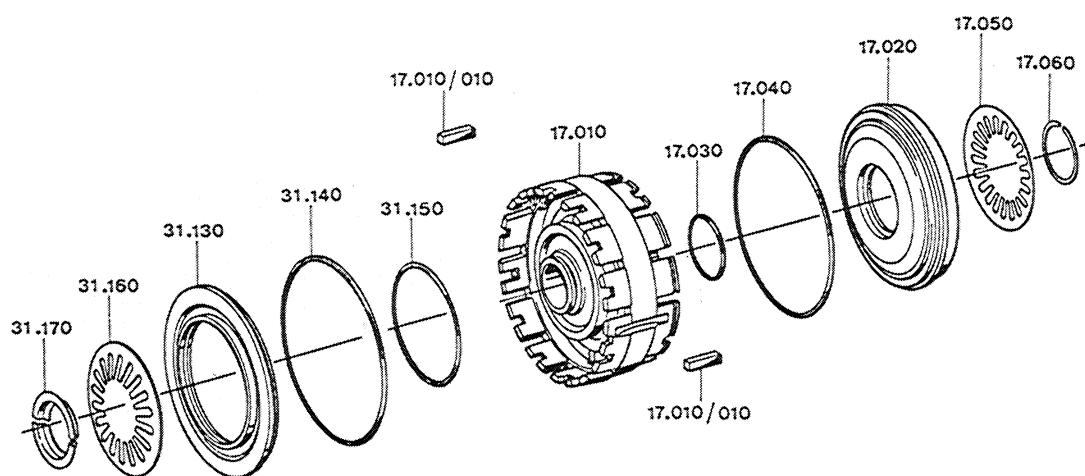
Insert disc washer 32070 and
seal cage 32060.



Install support ring 17100.

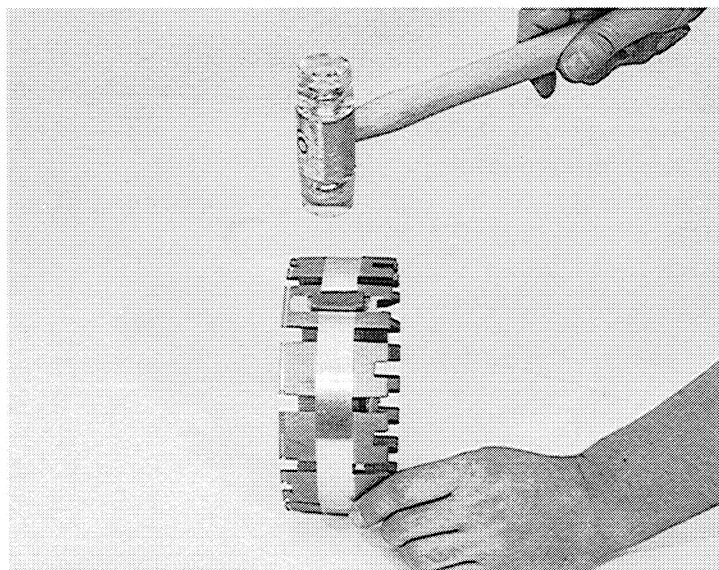


3.8 Cylinder C-D



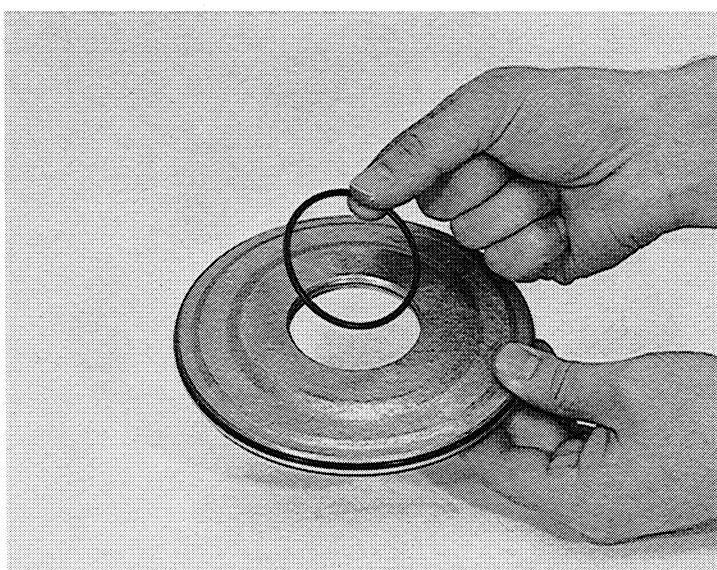
81 157

Tap 2 fitting keys down into slots of cylinder C-D 17010, as shown in the picture.

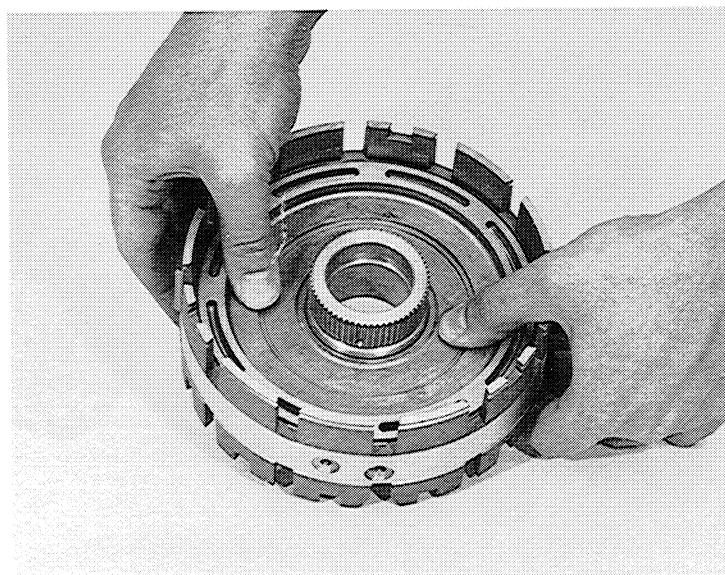


81 158

Insert o-rings 17030 and 17040 onto piston D 17020.

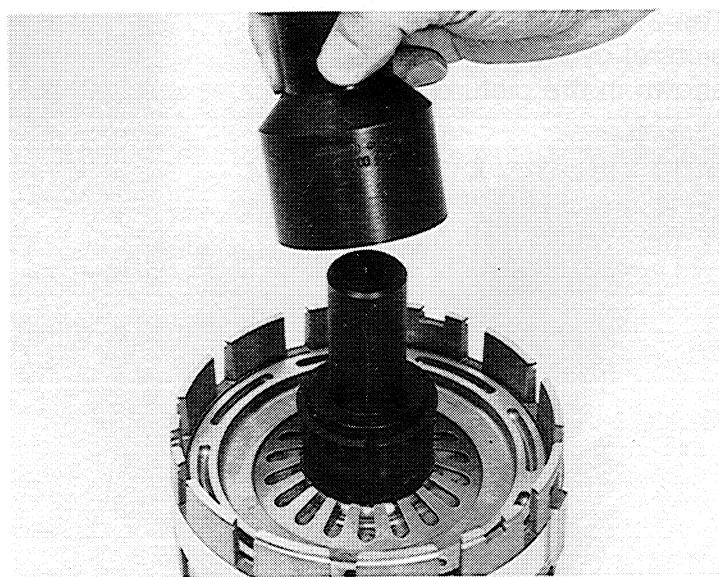


Install piston D into cylinder C-D as shown in the picture. For easy mounting of o-rings use light grease (Vaseline).

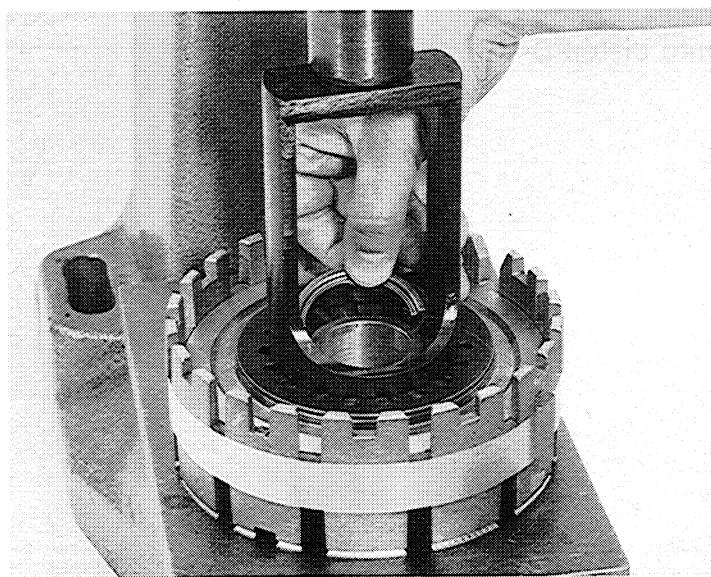


Place plate spring 17050 into piston D. Insert mounting sleeve (5X56 000 058) on top of spring. Insert snap ring 17060 on tapered sleeve seat.

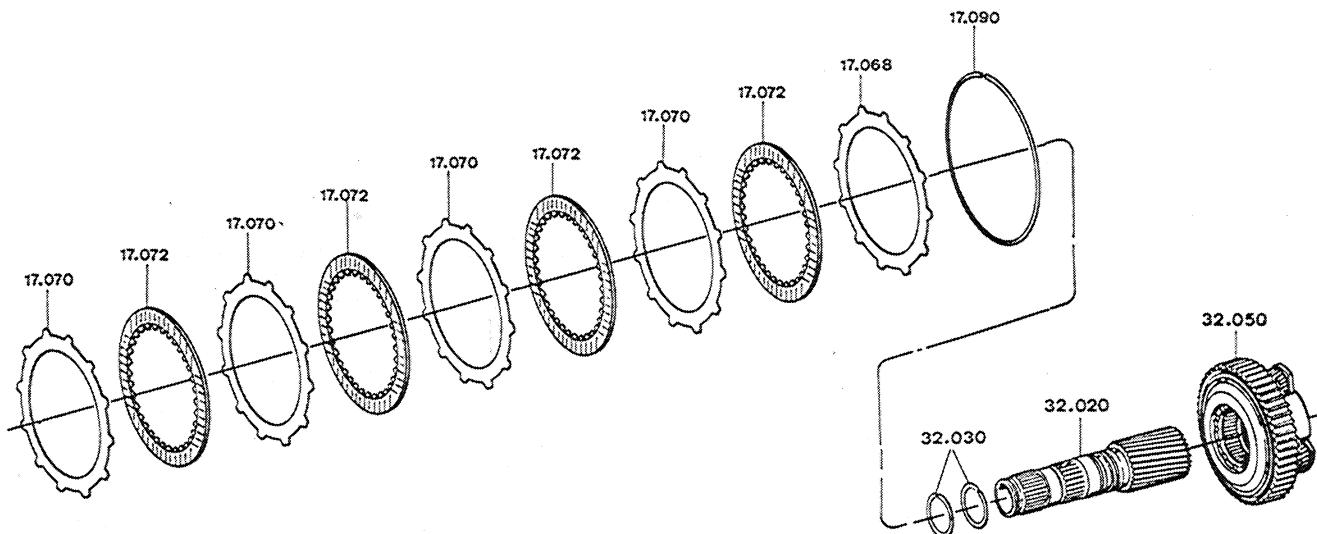
Use outside part of mounting sleeve and press snap ring downward into groove.



Install piston C 31130 with o-ring 31140 and 31150 in the same manner as piston D. Insert plate spring 31160 on top of piston C and use spring device (5 X 56 000 093) to press plate spring downward and insert split rings 31170 as shown in the picture.

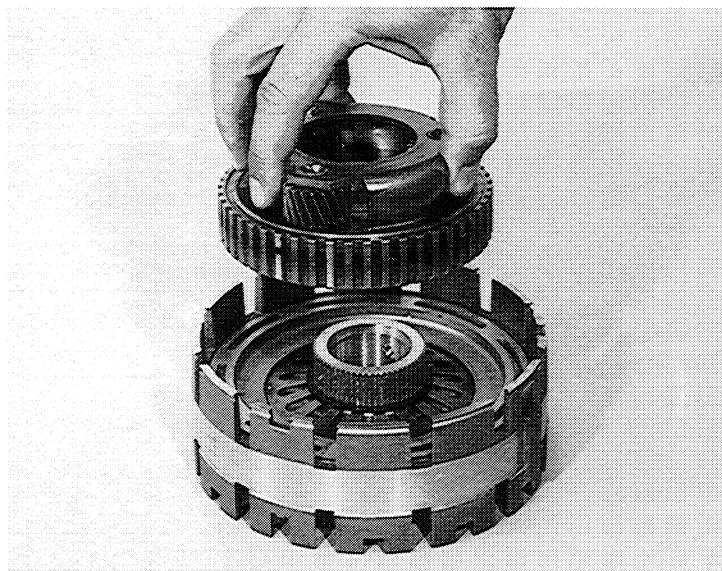


3.9 Brake D with Freewheel First Gear



82 133

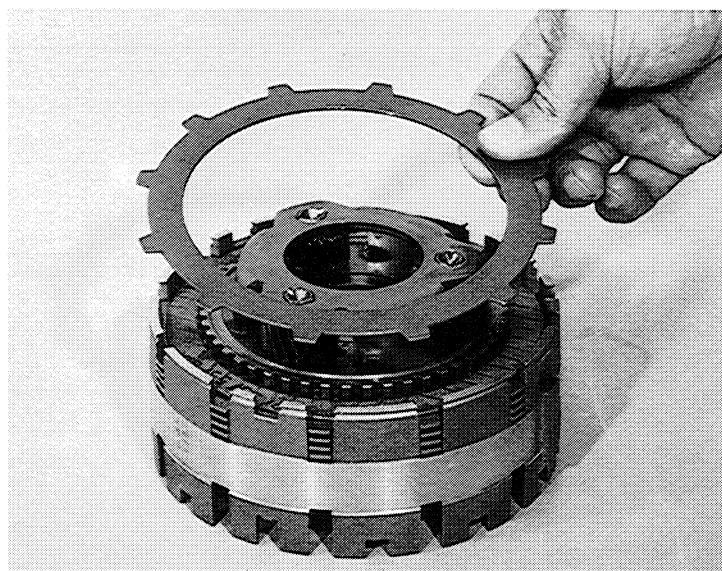
Install planetary set 32050 with freewheel 1st gear on hub of cylinder C-D.



82 134

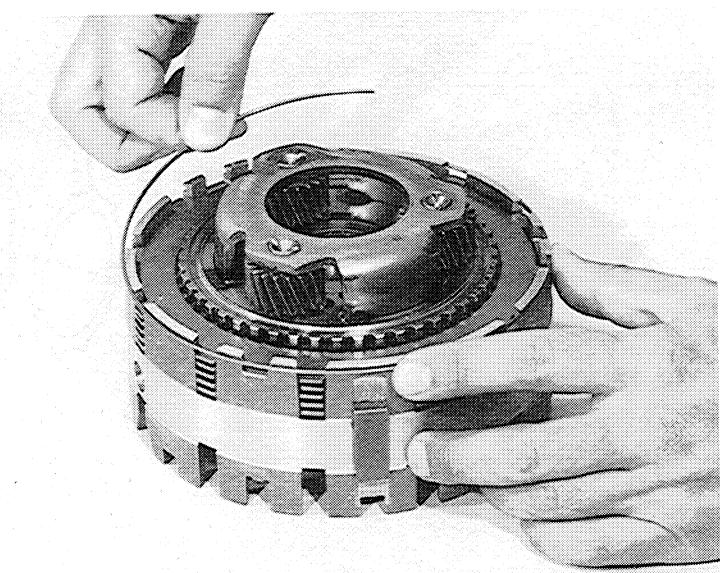
Insert Brake D assembly complete. First start with steel plate 17070, second use clutch plate 17072 alternately.

On top of brake D assembly use thin end plate 17068.



82 135

Secure brake D assembly with snap ring 17090.



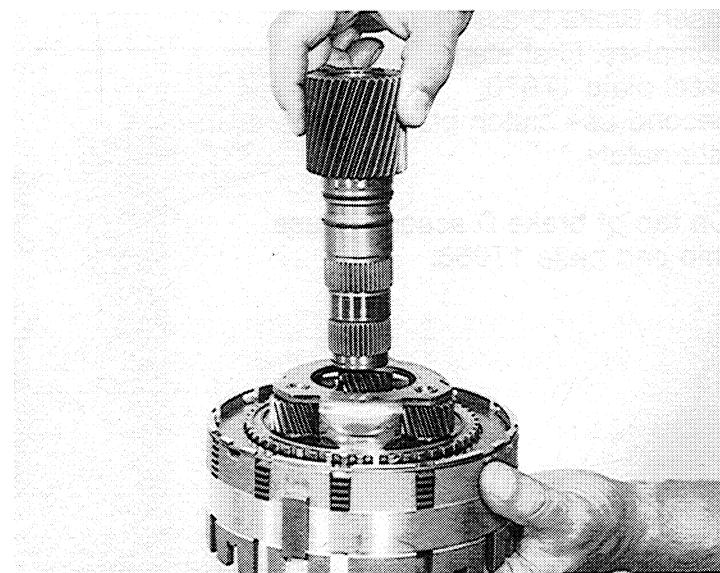
82 136

Install 2 seal rings 32030 on sun shaft and snap together.

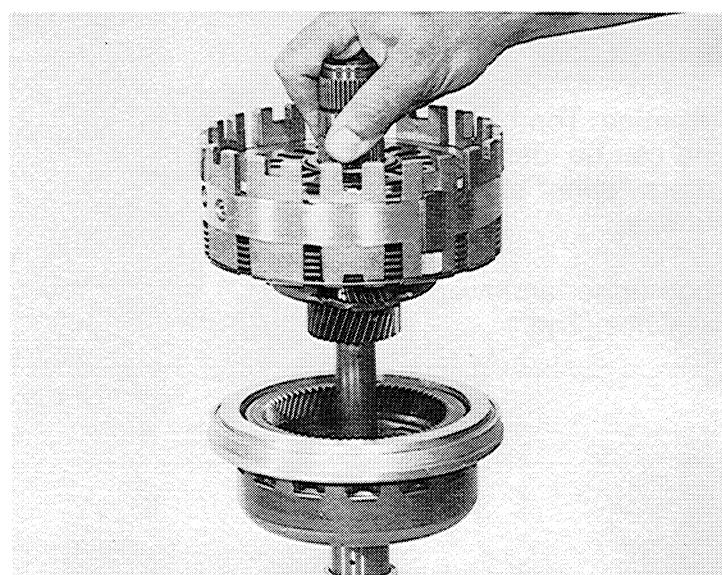


82 137

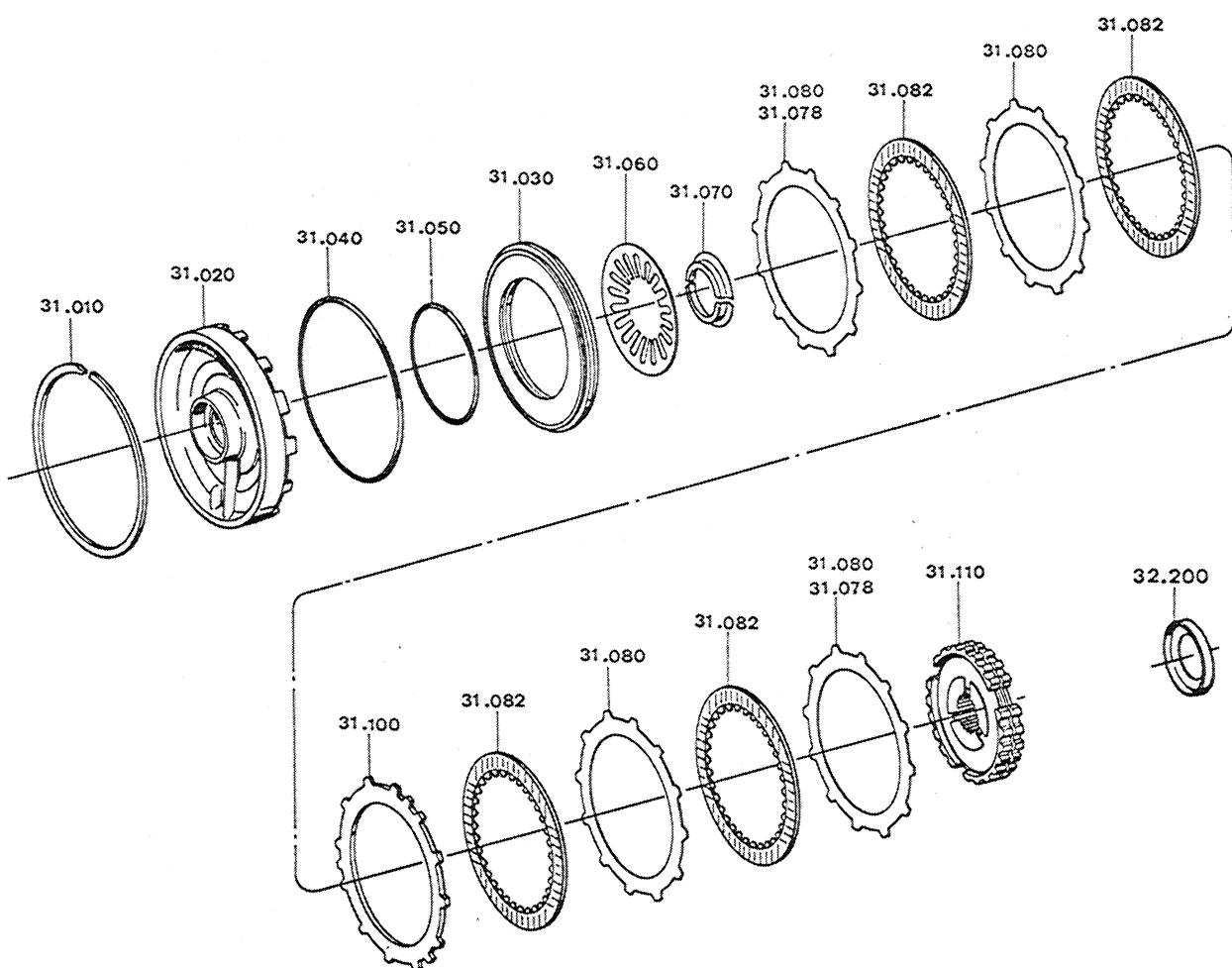
Install sun shaft into planetary set as shown in the picture.



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



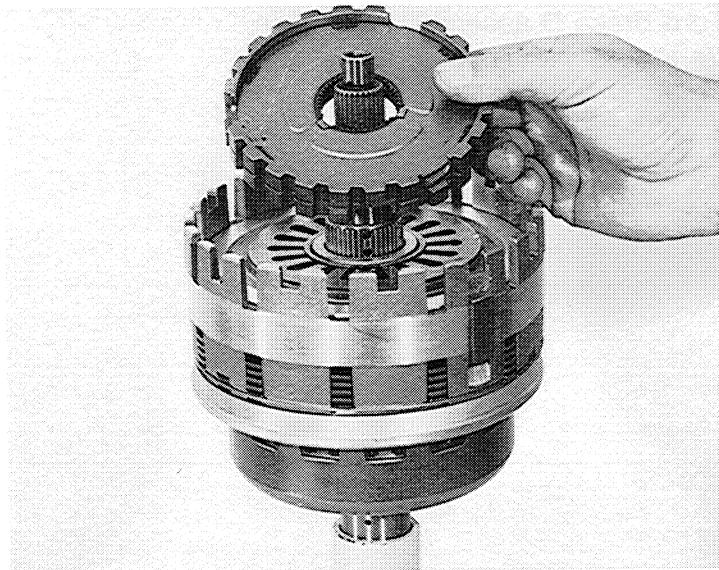
3.10 Brake C-C'



Install freewheel 2nd on sunshaft seat.

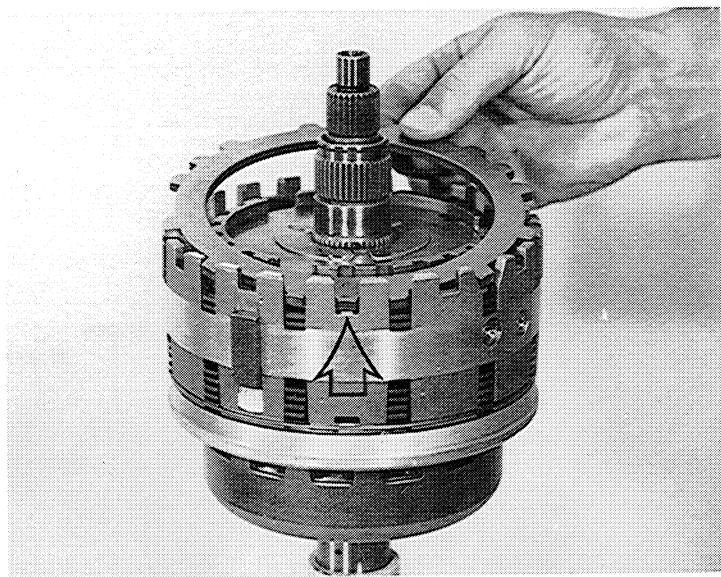
Attention: Top of freewheel 2nd can be identified by the letters "oben" stamped to surface.

Align upper an lower halves of freewheel 2nd.



Insert brake C assembly and start with steel plate 31080, alternating clutch plate 31082 and 31080.

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.

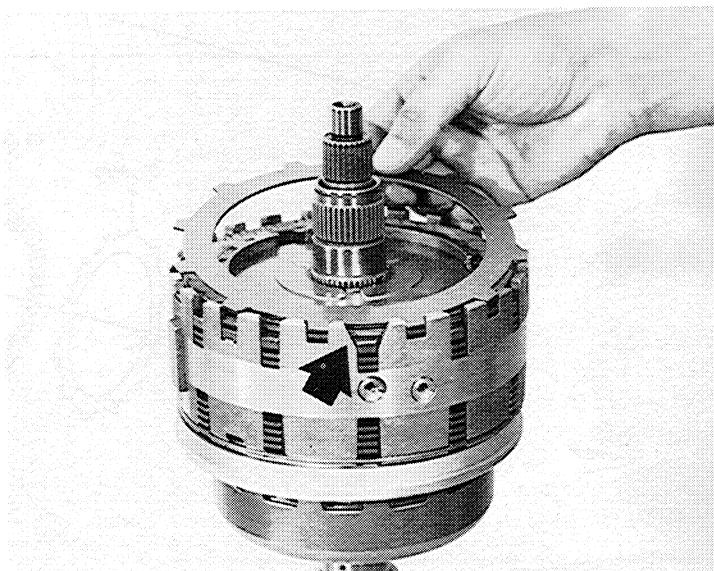


Insert brake C' assembly, and start with clutch plate 31082.

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

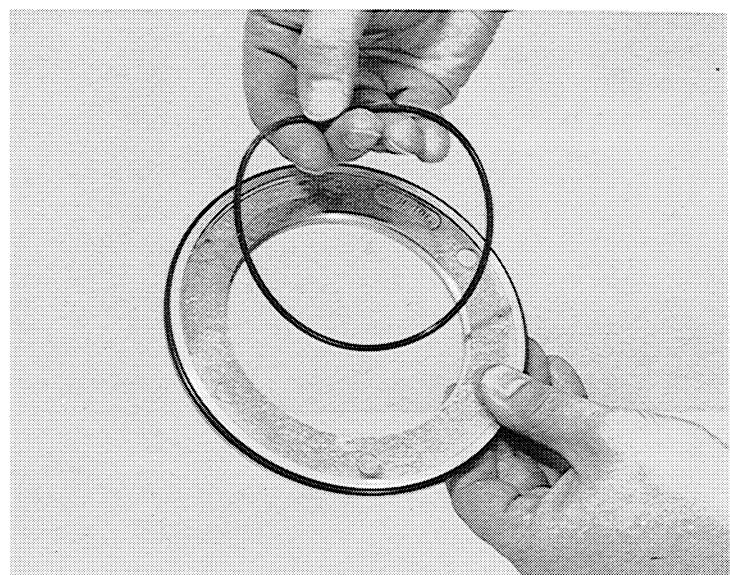
Attention: If it is necessary to insert steel plats 31078 into brake C and C' assembly.

Thinn steel plats must be always facing to piston side. Dependent to transmission part number.



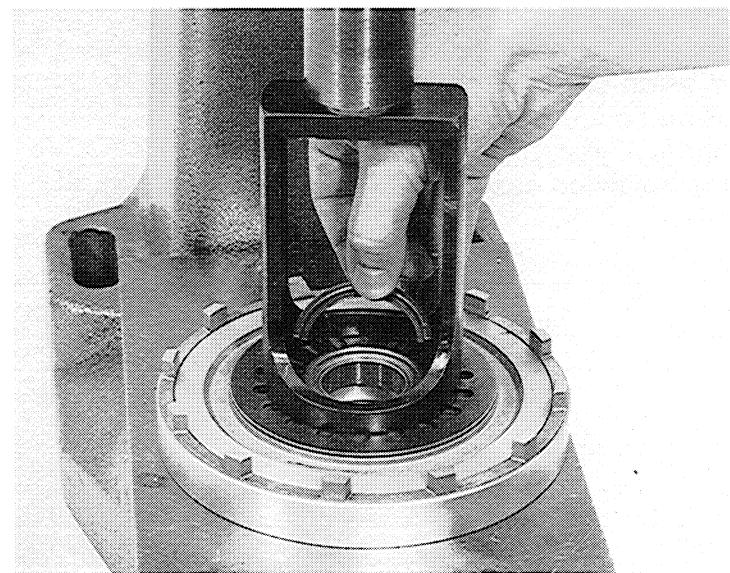
81 161

Insert o-rings 31040 and 31050 onto piston C' 31030. Install piston C' complete with o-rings into center plate 31020.



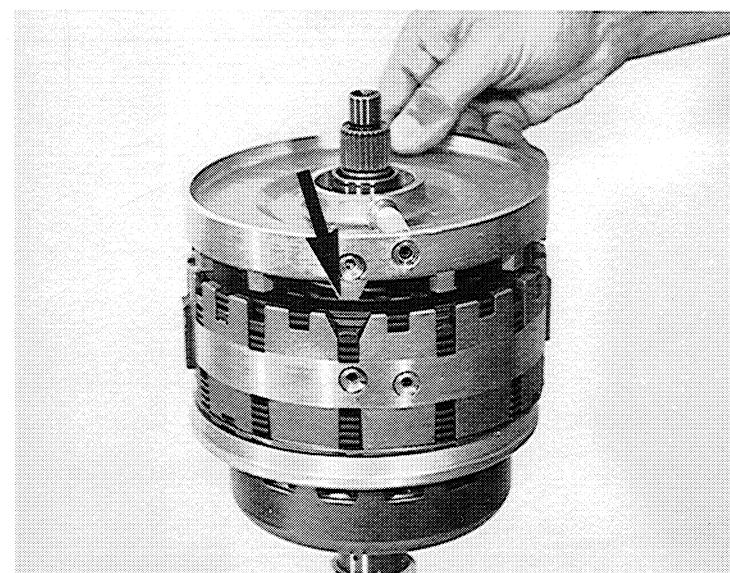
81 113

Install plate spring C' 31060 with spring device (5 X 56 000 093) and secure with split rings 31070.

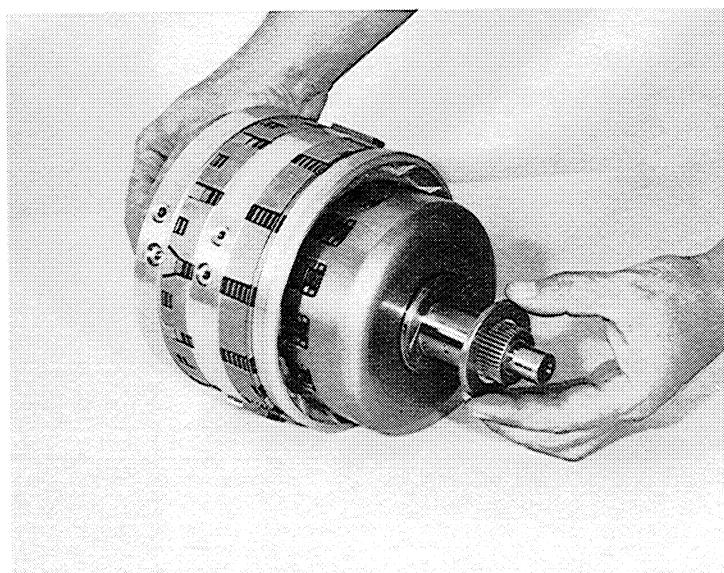


82 142

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

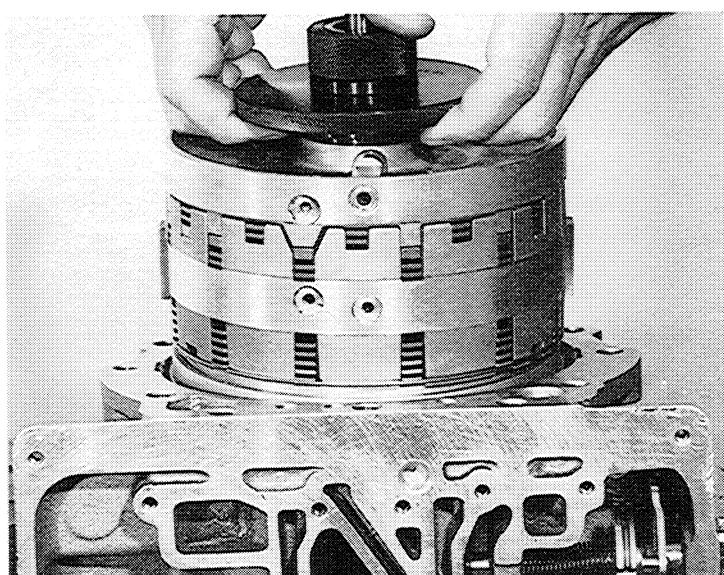


Remove C, C' and D clutch assembly complete from supporting device. Also insert thrust washer 32200 with Vaseline onto web shaft seat.



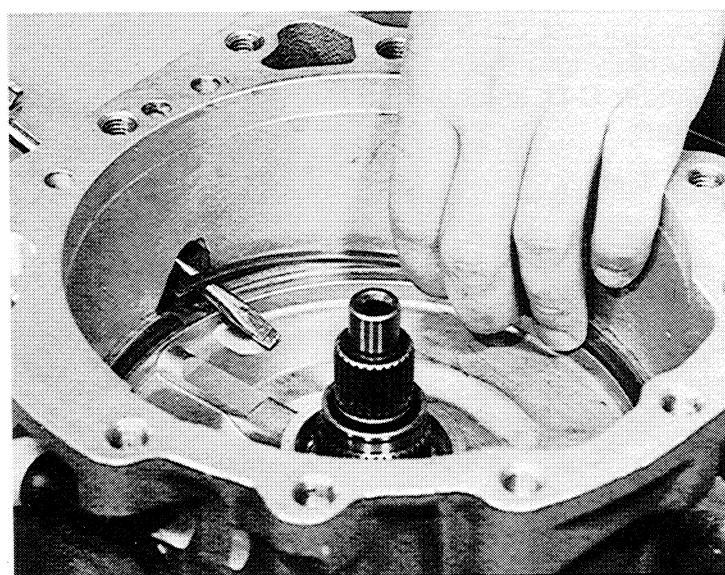
82 144

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.

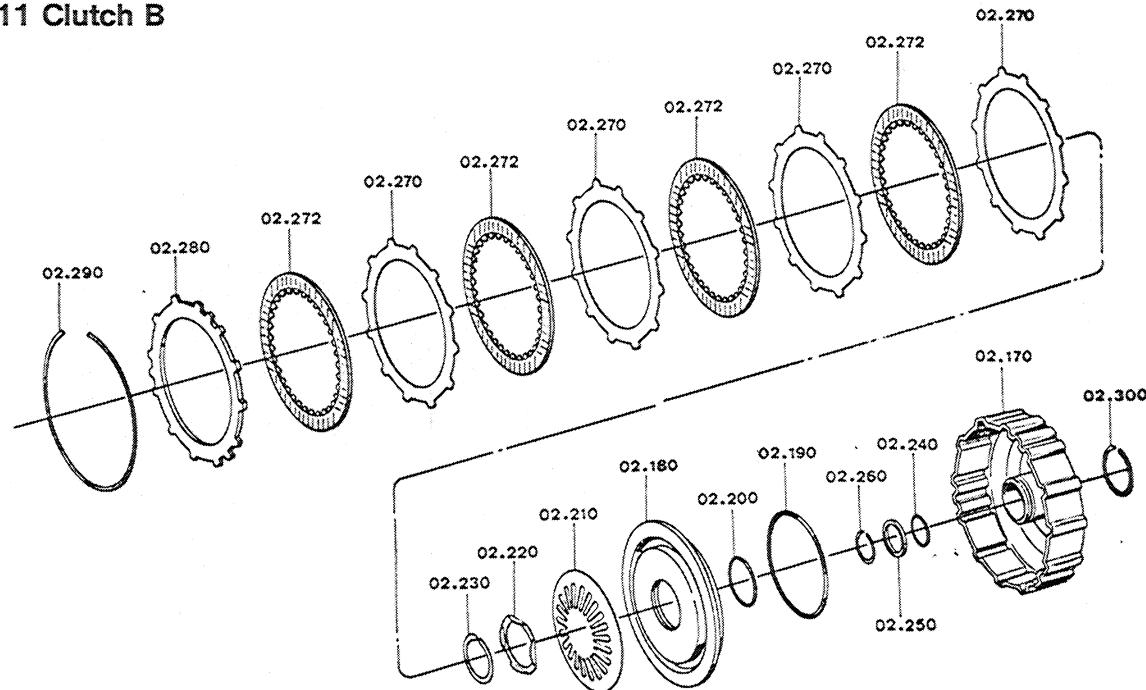


82 019

Secure center plate with snap ring 31010.



3.11 Clutch B



81 139

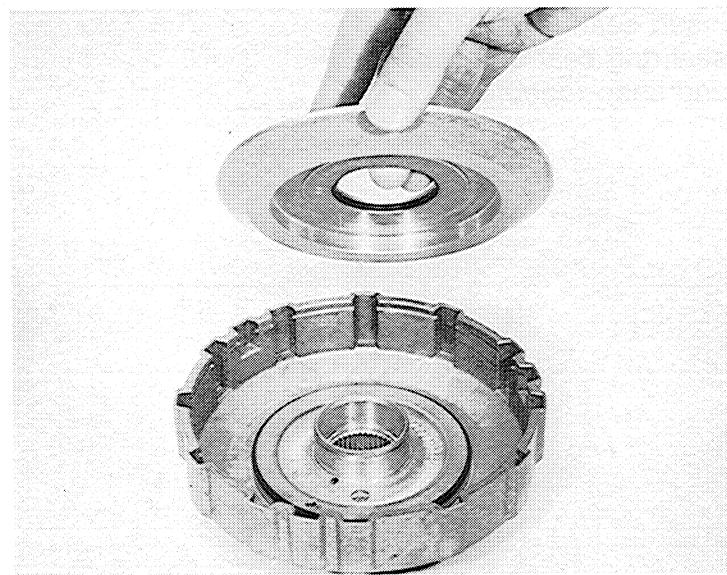
Fit o-ring 02190 into piston B

02180

Fit o-ring 02200 into cylinder B

02170.

Install piston B together with
o-ring into cylinder B.

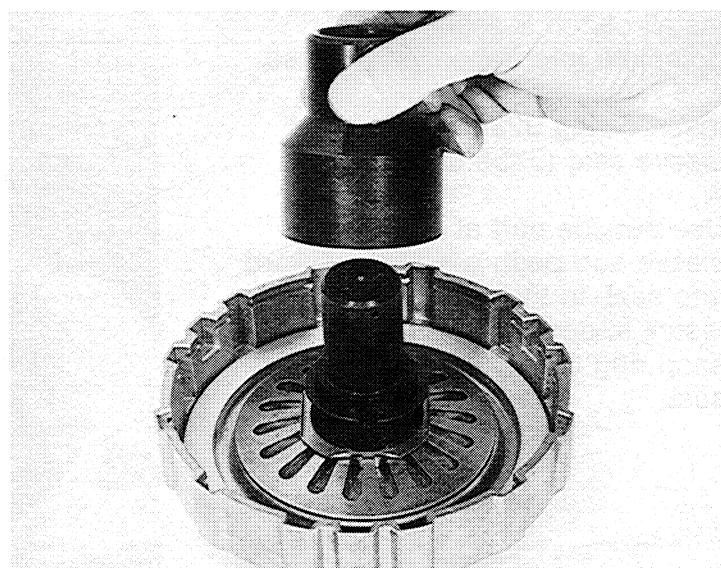


81 140

Install plate spring, next install
security washer.

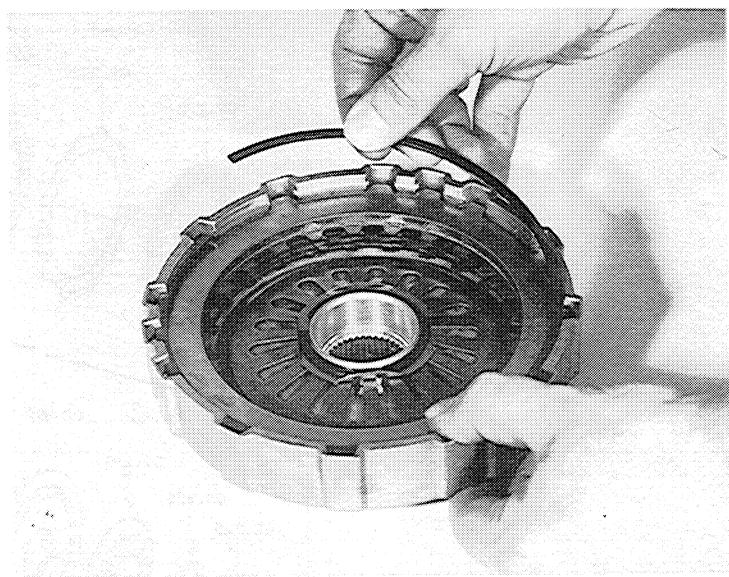
Insert snap ring 02230 on tapered
sleeve seat (5X56 000 092).

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



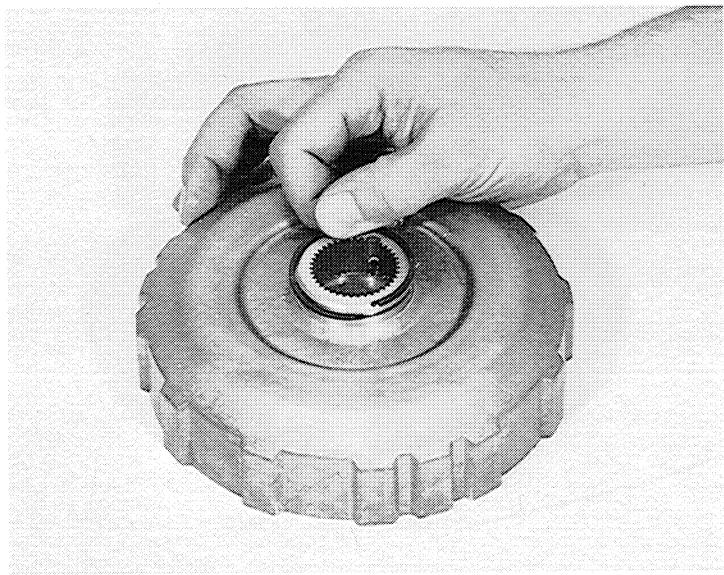
Install clutch B assembly,
start with steel plate 02270.
Alternately, use
clutch plate 02272
steel plate 02270

Secure end plate 02280 with
snap ring 02290.



81 142

Insert seal ring 02300 into
seal ring seat on cylinder B
and snap together.

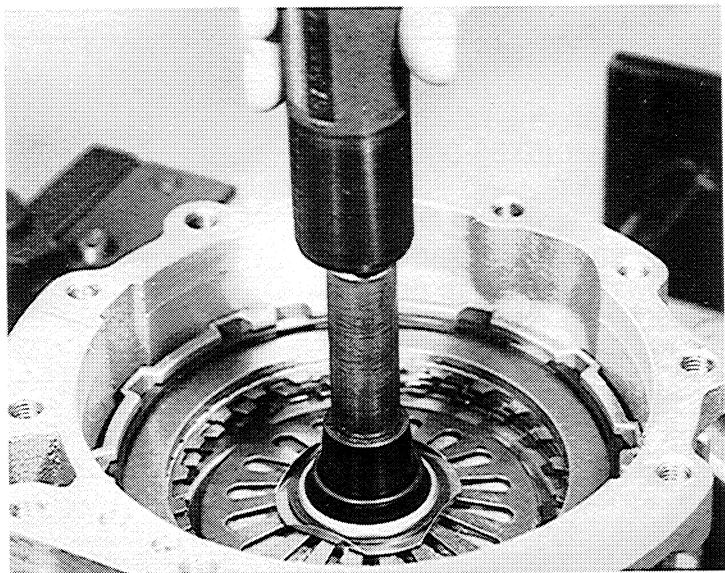


82 145

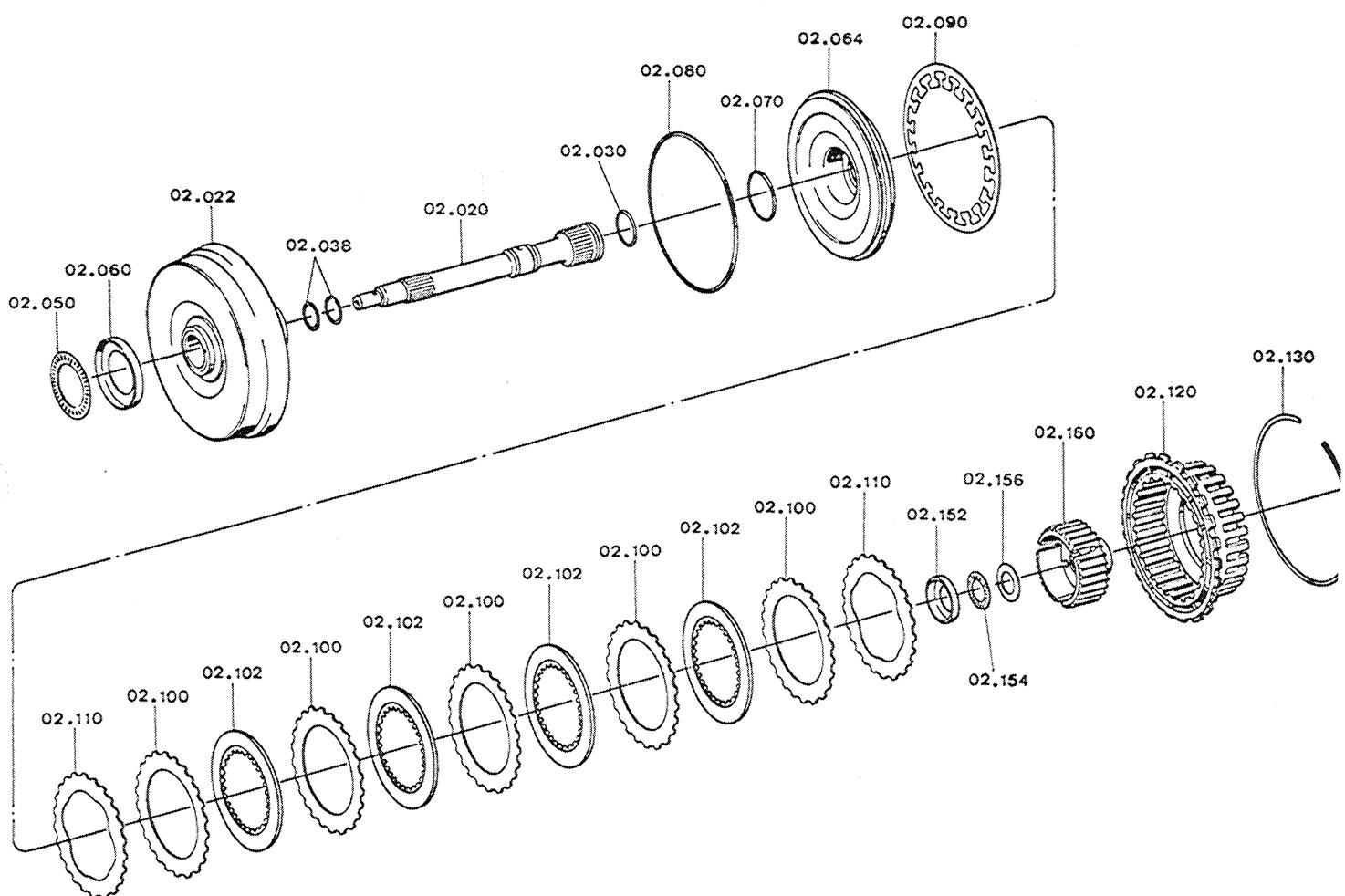
Install clutch B assembly
complete into transmission case.

Insert o-ring 02240 on tapered
sleeve seat (5X56 000 075).

Use outside part at mounting
sleeve and push o-ring downward
into seat. In the same manner,
install support ring 02250 and
snap ring 02260 together into
seat.

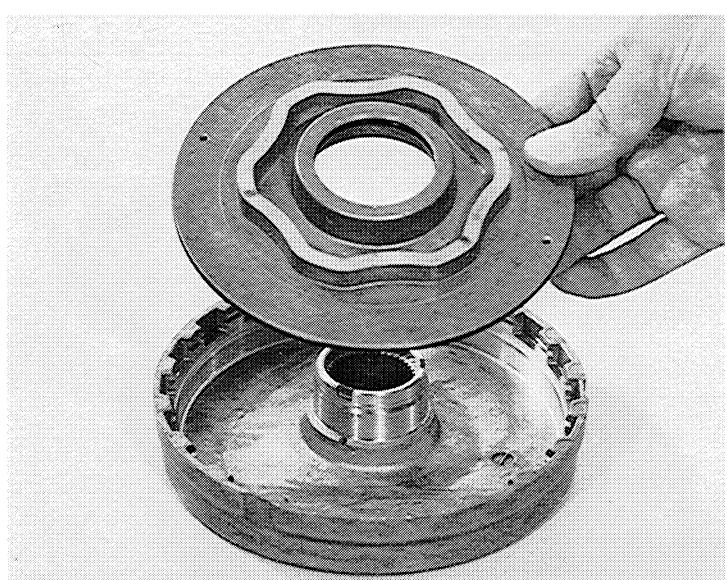


3.12 Clutch A



82 199

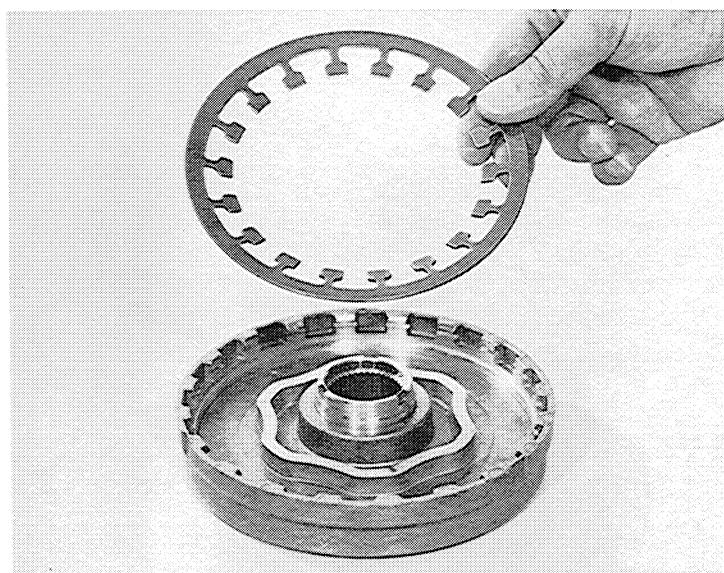
Insert o-ring 02070 and 02080 on piston A 02064. Install piston A together with o-rings into cylinder A.



82 200

Insert plate spring 02090 on top at piston A.

Convex side of spring plate must be facing to the piston.



81 145

Install clutch A assembly complete.

Attention:

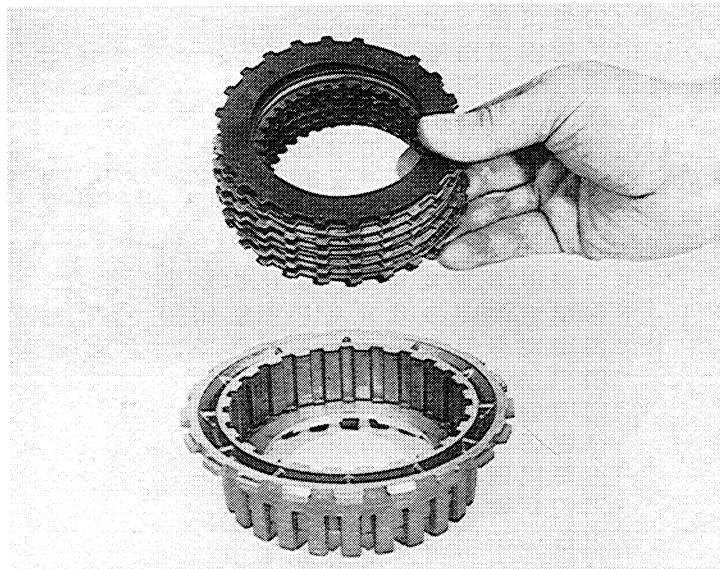
Order of plates -

Start with

spring plate 02110
steel plate 02100
clutch plate 02102

Finish with

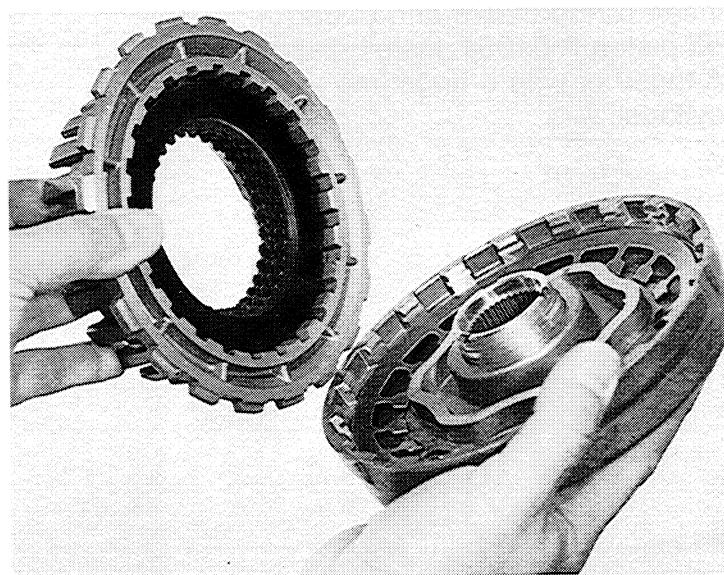
clutch plate 02102
steel plate 02100
spring plate 02110



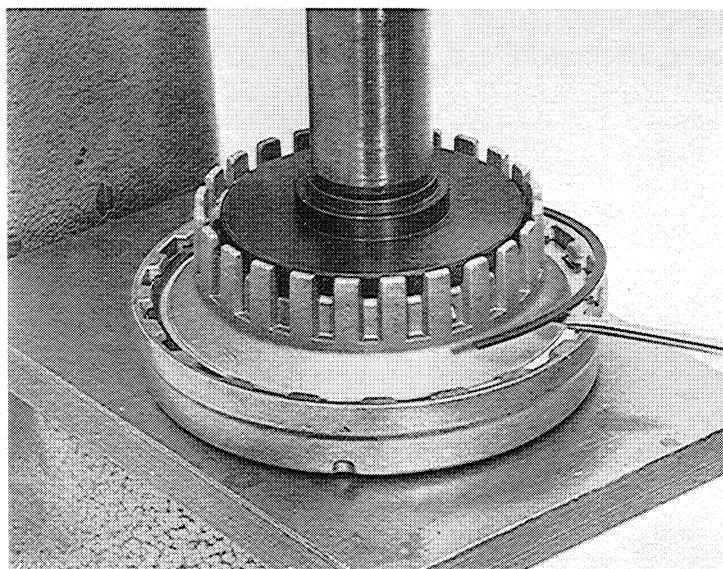
82 201

in between use alternating clutch and steel plates.

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

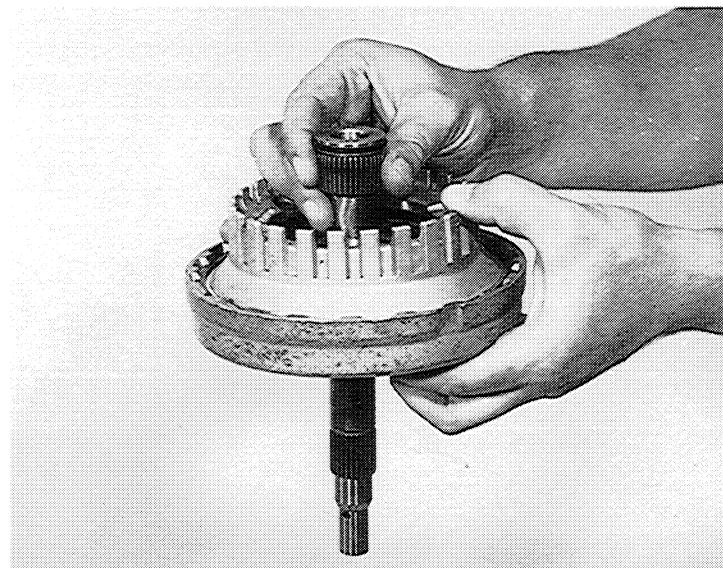


With flat plate (5 X 56 000 094) press carrier A-B downward and secure with snap ring 02130.

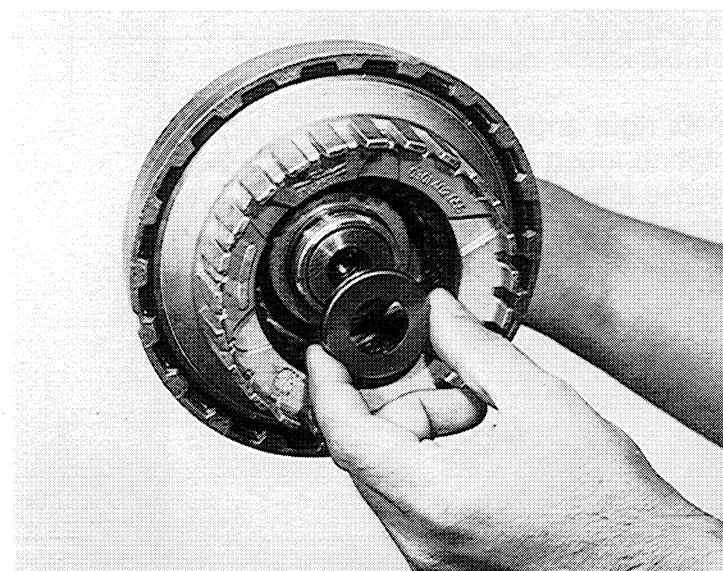


Install 2 seal rings 02038 and 1 o-ring 02030 onto input shaft 02020.

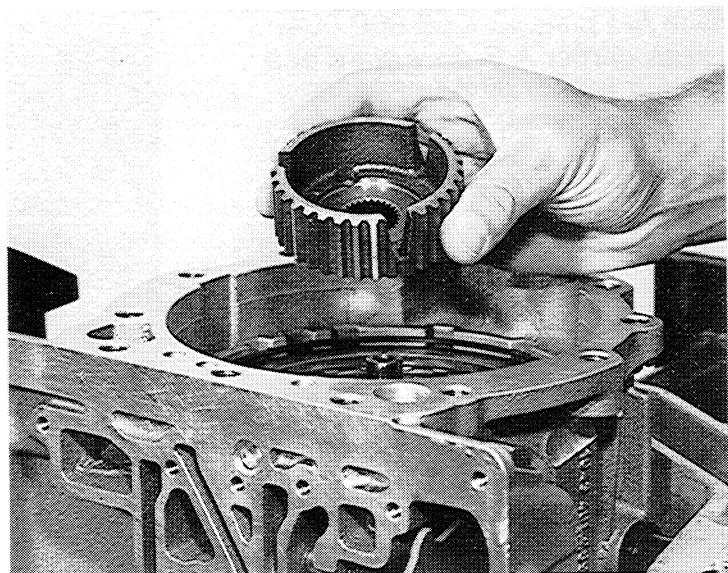
Install input shaft into seat at cylinder A assembly. Press input shaft downward to stop point.



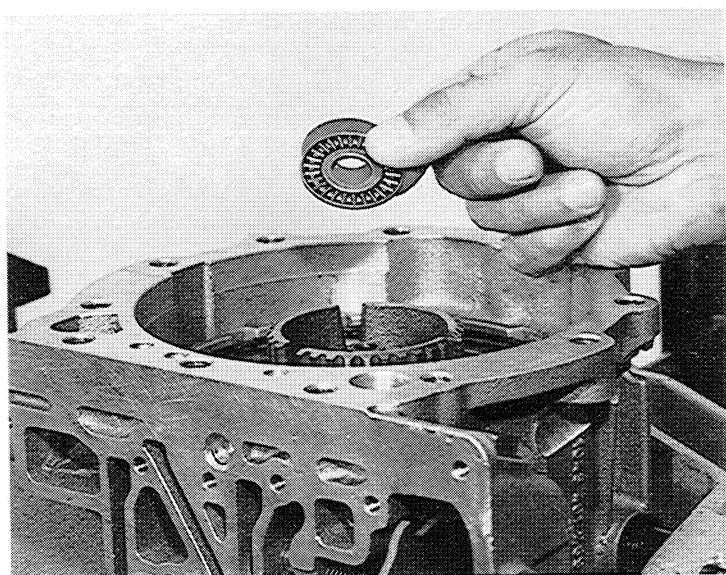
Insert thrust washer 02152 with vaseline on input shaft seat as shown in the picture.



Install inner carrier A 02160 onto intermediate shaft seat.



Insert disc washer 02156 and axle cage 02154.

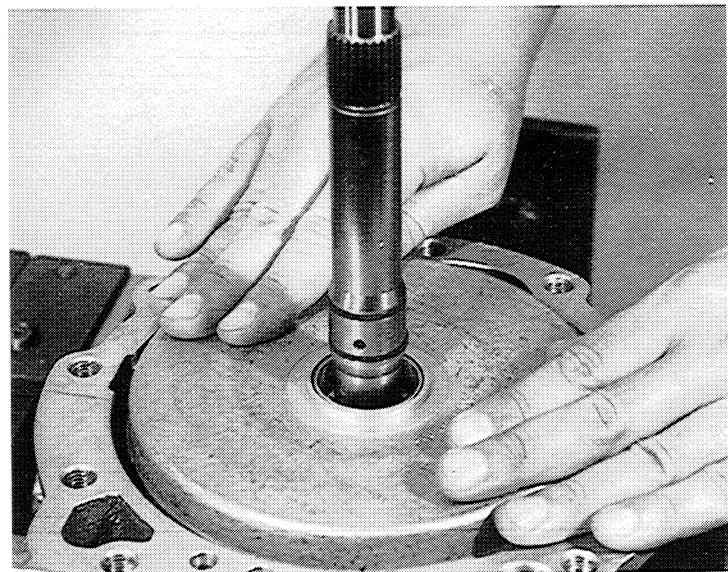


Install clutch A' assembly into transmission case.

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.

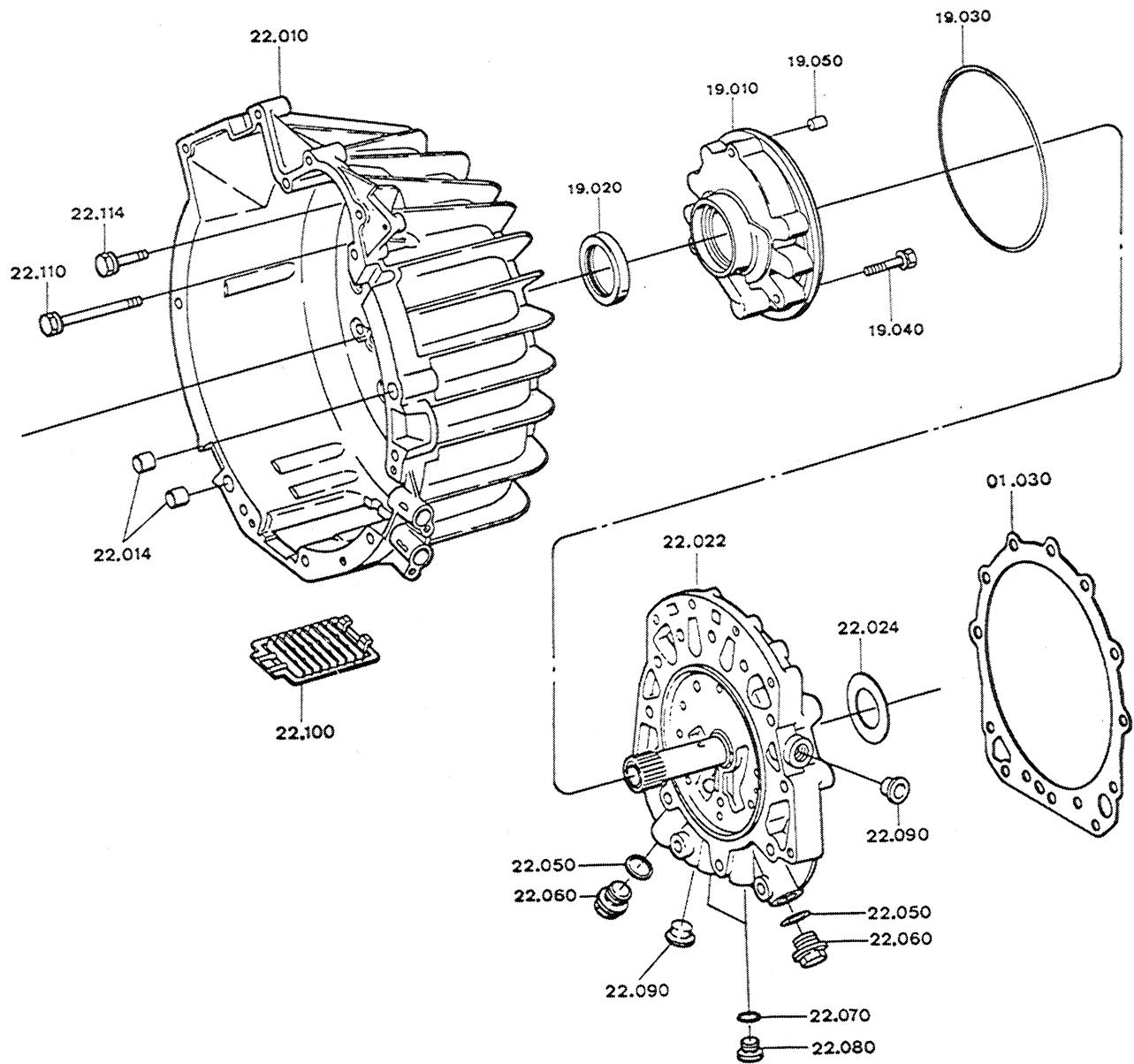
For measuring use caliber.



Insert thrust washer 02060 and axle cage 02050 into seat at cylinder A.

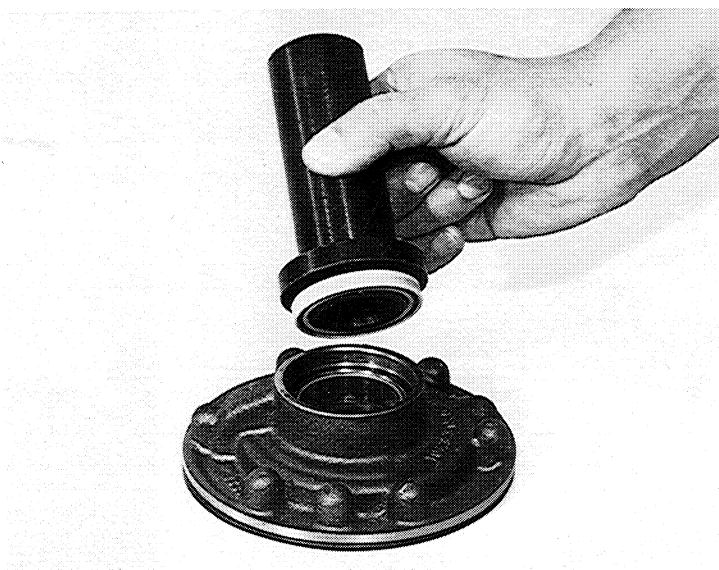


3.13 Pump, Intermediate Plate and Bell Housing.



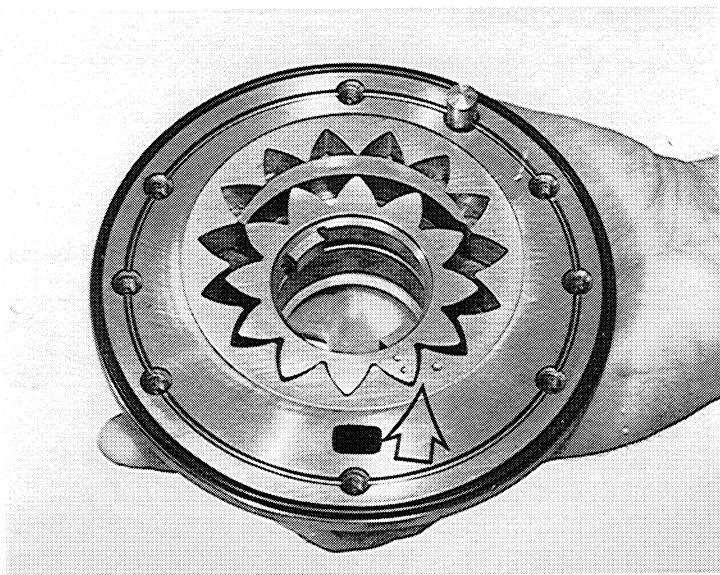
Insert o-ring 19030 onto pump housing.

Also install seal ring 19020 with mounting sleeve (5 X 46 000 069) as shown.



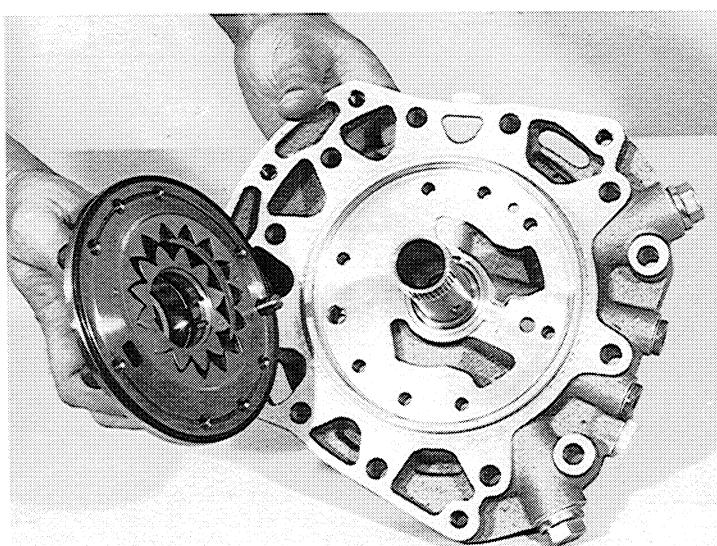
Install pump 19010 hollow gear and pump gear into pump housing with marked side of gears facing upwards.

Tap alignment pin into pump housing.

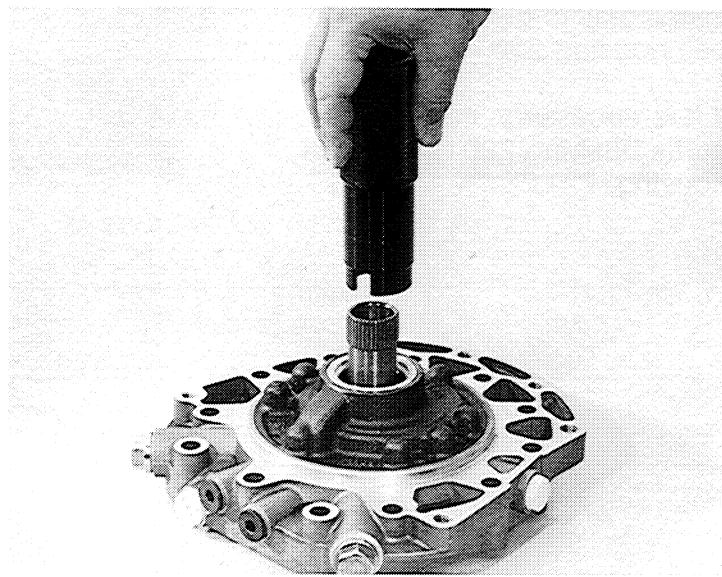


Insert pump into intermediate plate 22022 and secure with 8 hexagon bolts 19040.

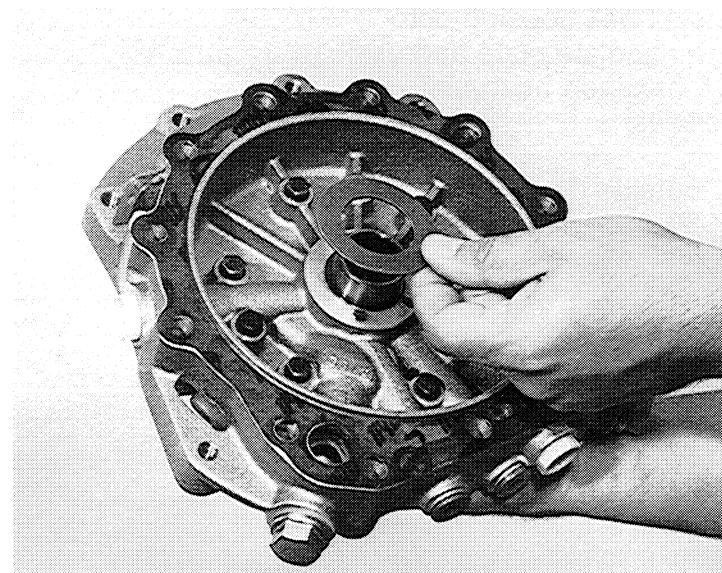
(To be torqued 10 Nm)
(Tool head size = 10 mm)
If a new intermediate plate is to be used, install sealing plugs with washers.



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

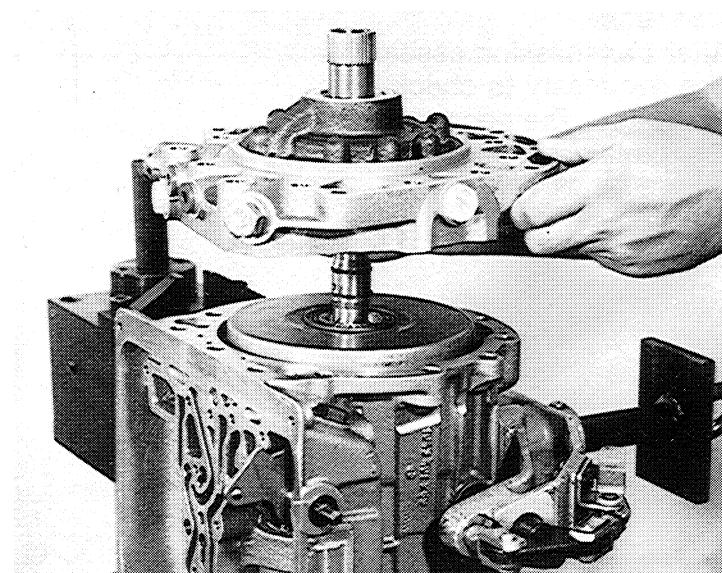


Insert gasket 01030 and disc washer 22024 with vaseline onto intermediate plate.



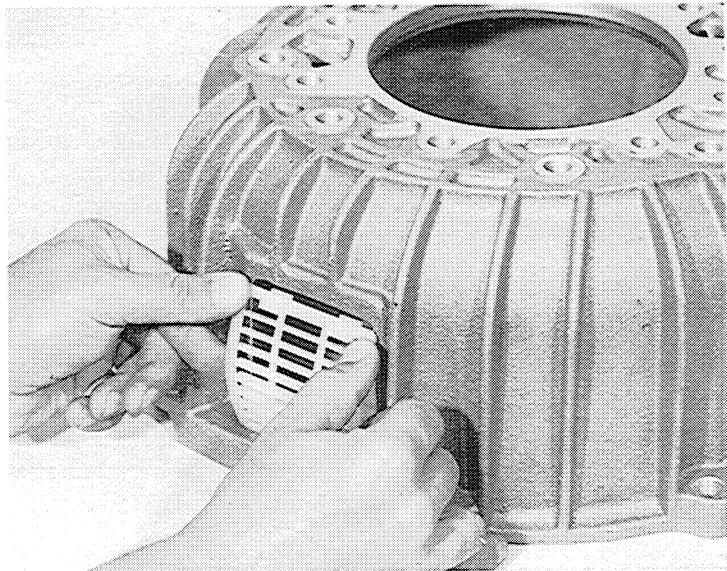
Use vaseline on seal rings of input shaft.

Install intermediate plate assembly on transmission case.



Install plastic grill 22100 onto bell housing 22010.

If it is necessary, install guide bushing 22014 into bell housing.

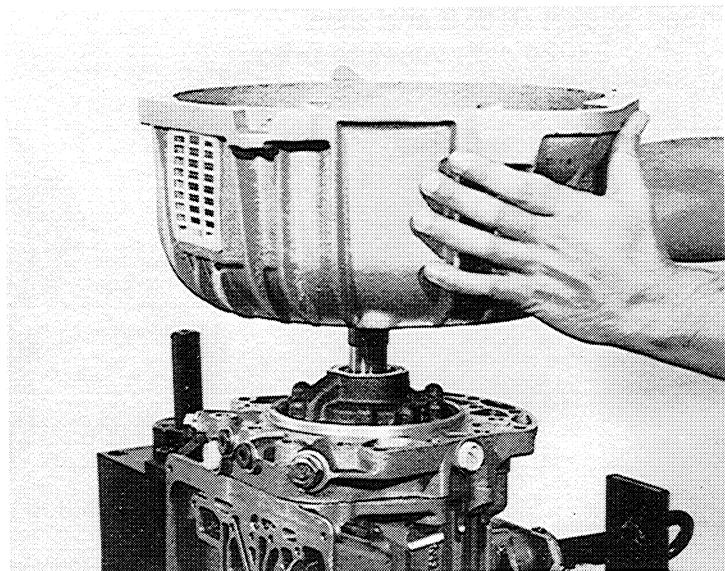


82 158

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

outside diameter 6 bolts
30 mm length - 022 114
inside diameter 12 bolts
70 mm length - 022 110

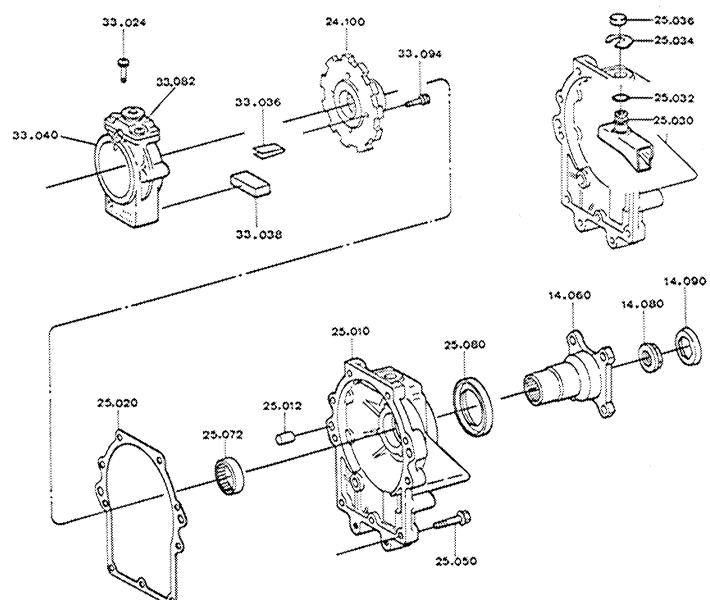
(To be torqued 46 Nm)
Tool head size = 17 mm.



Attention:

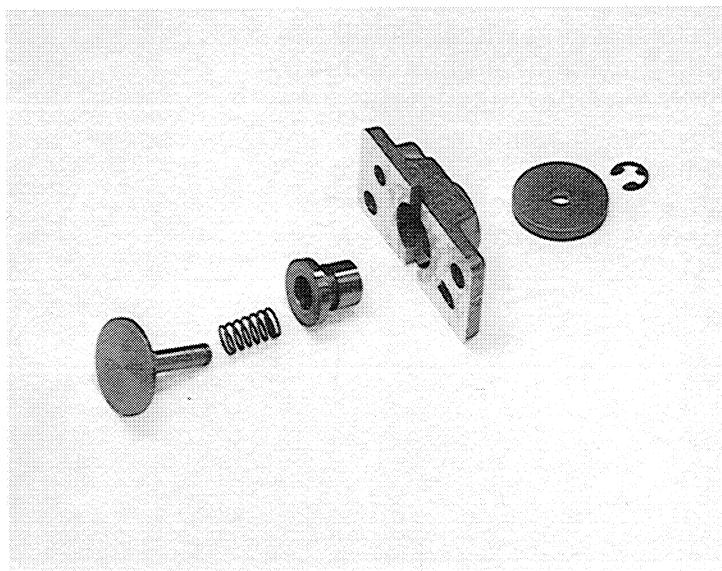
After transmission assembly, it is necessary to check axle clearance. The necessary steps are explained under point 1.4.2 Page 5/2.

3.14 Governor and Transmission Extension.



82 159

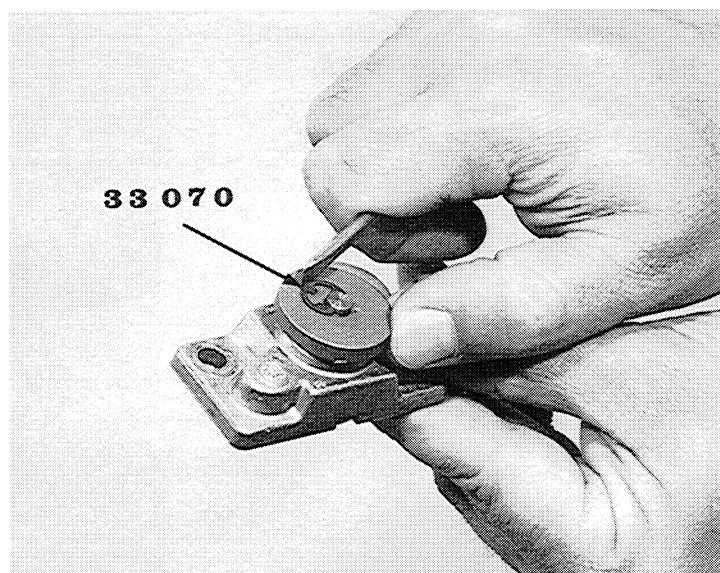
Picture show governor housing in order to be assembled.



82 160

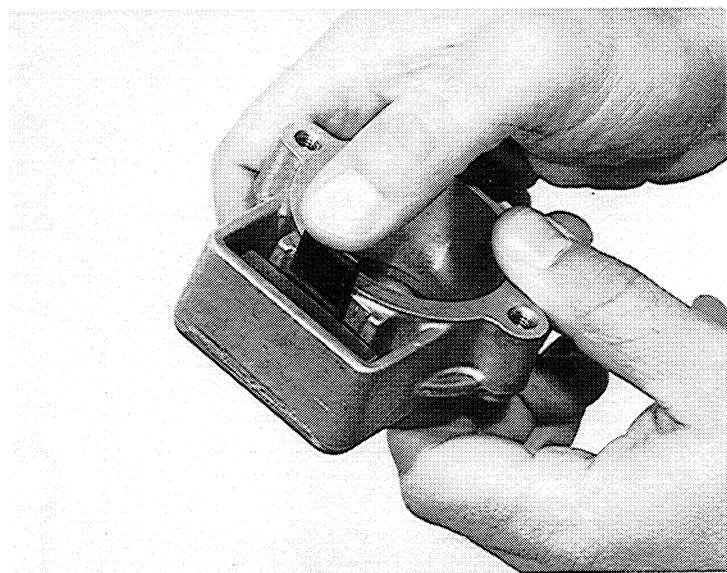
Assemble governor housing with pin, spring and piston. Insert also weight, and secure with E clip 33070.

Attention: always use a new E clip.



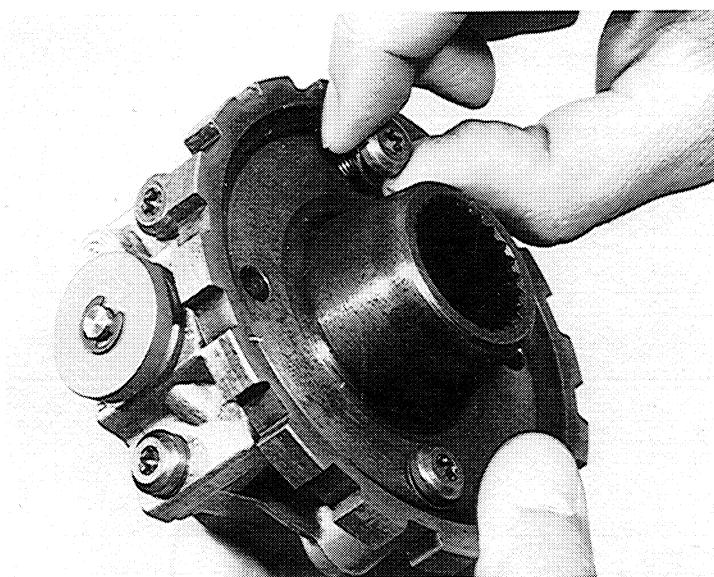
81

Insert counter weight 33038 into governor hub 33040 and secure with clip 33036.



82 162

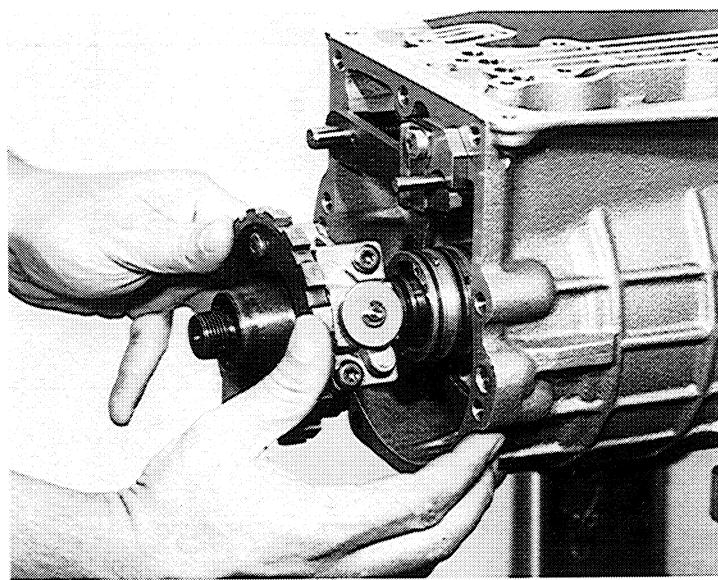
Install parking wheel 24100 with 2 cylindrical bolts 33094 onto governor hub. Install governor housing with 2 cylindrical bolts 33094 onto governor hub (to be torqued 10 Nm) tool size torx bit 27.



82 163

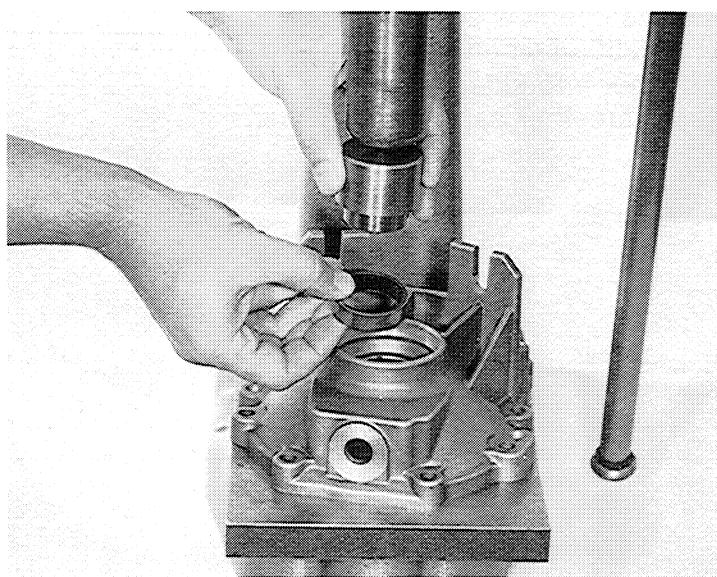
Fit governor assembly onto output shaft and push to stop point.

Attention: to avoid damage to o-ring use vaseline. Seal rings on cylinder F must be snapped together.



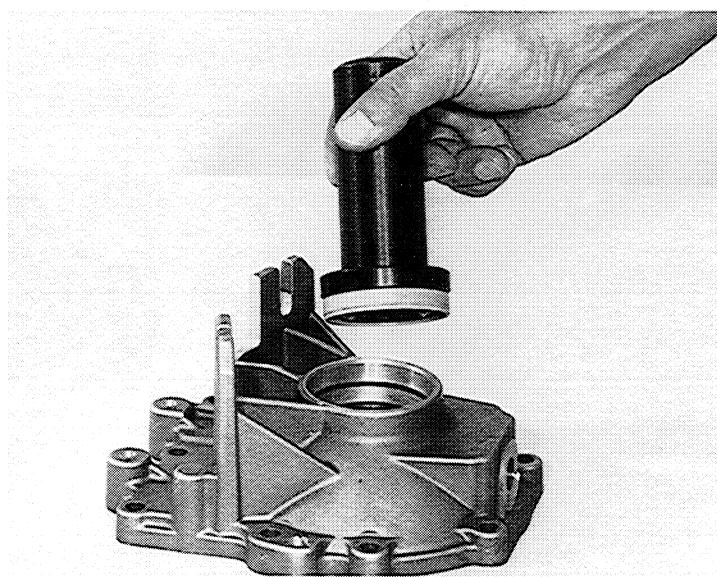
82 188

Install needle bearing 25072 with mounting sleeve (5 X 46 000 175) into seat of extension 25010.



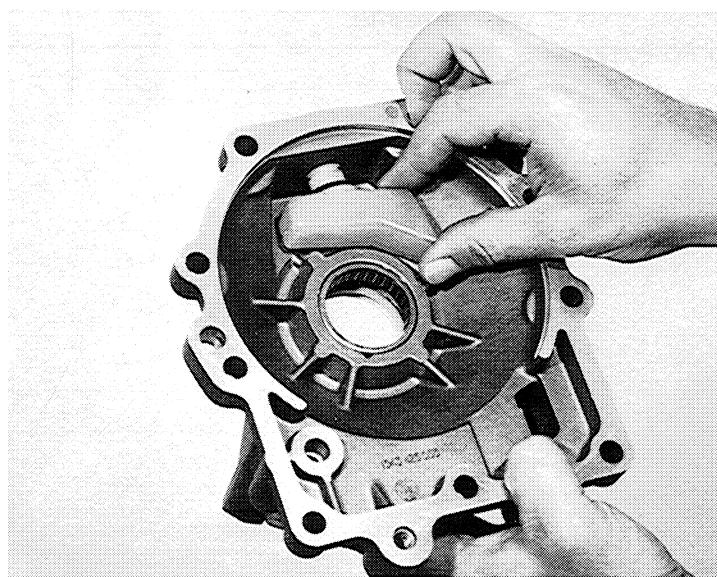
82 031

Press seal ring 25080 with mounting sleeve (5 X 46 000 069) into extension as shown.



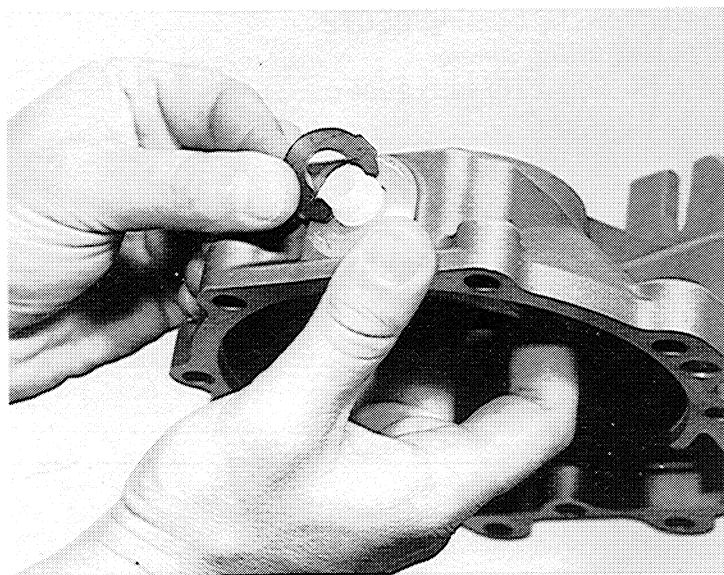
82 168

Insert o-ring 25032 onto breather 25030 and install breather into extension as shown.



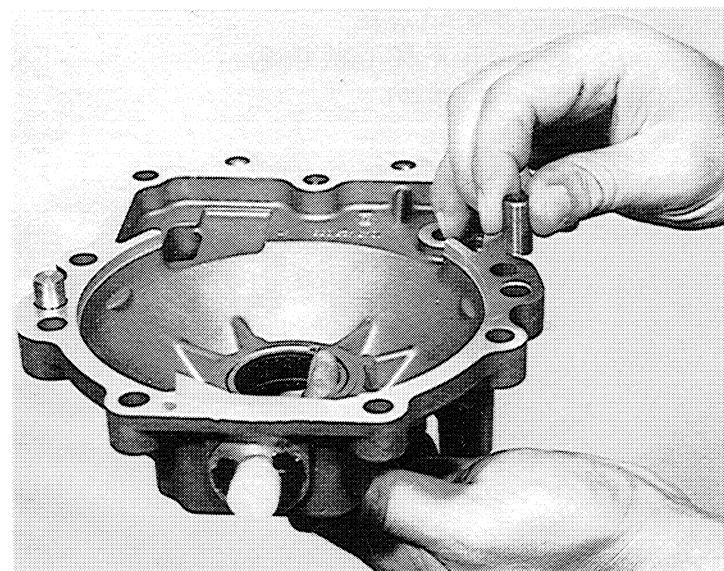
83

Always use new security
clip 025034 when installing
breather into extension.
Snap breather cap onto breather.



82 169

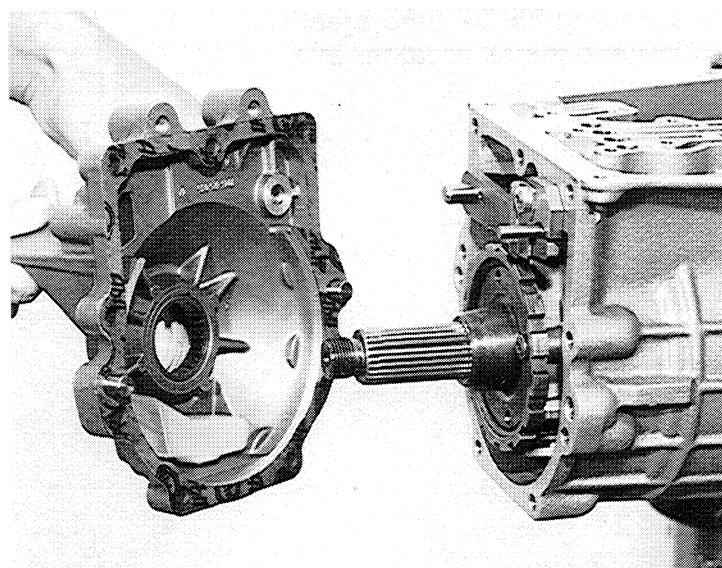
Insert alignment pins into
extension as shown.



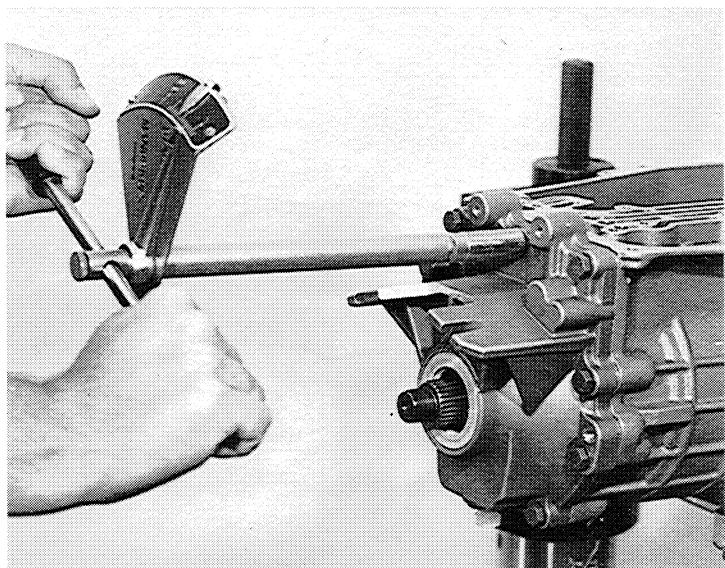
82 170

Insert gasket with vaseline
onto extension.

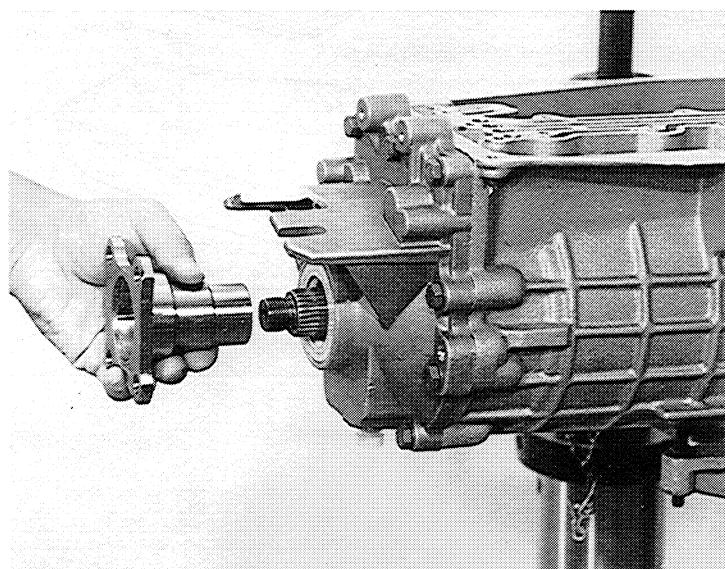
Fit extension onto transmission
case. If it is necessary use
plastic hammer to tap extension
into place.



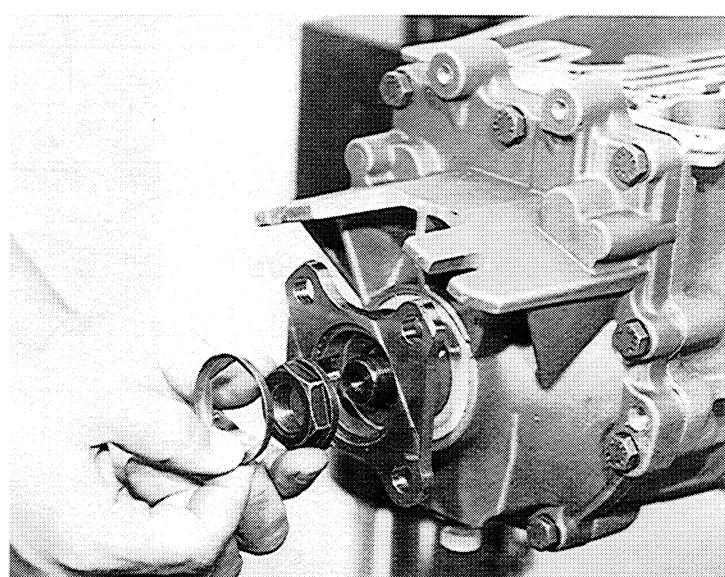
To secure extension onto transmission case, use 9 hexagon bolts 25050.
(To be torqued - 23 Nm)



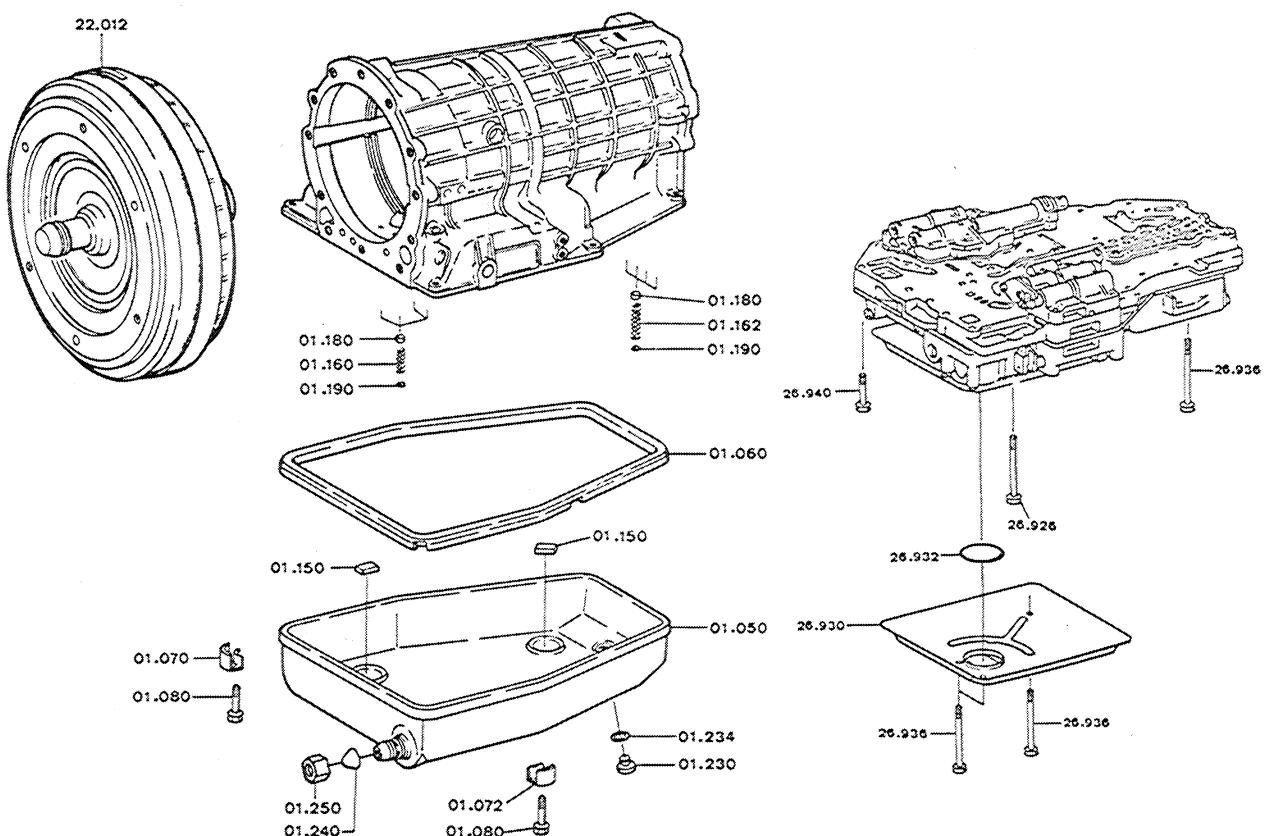
Insert output flange 14060 on output shaft.
Push in to stop point.



Screw on collar nut 14080 and secure with locking plate 14090.
(To be torqued 100 Nm)
(Tool size 32 mm)

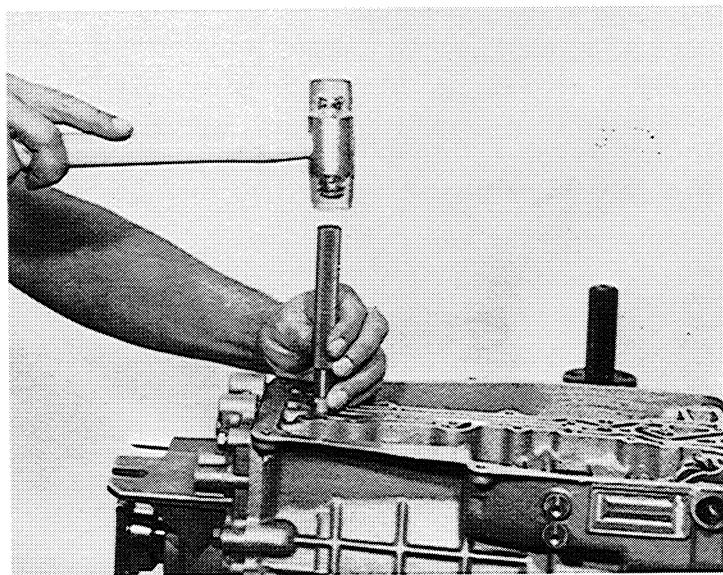


3.15 Valve Body, Oil Pan and Torque Convertor



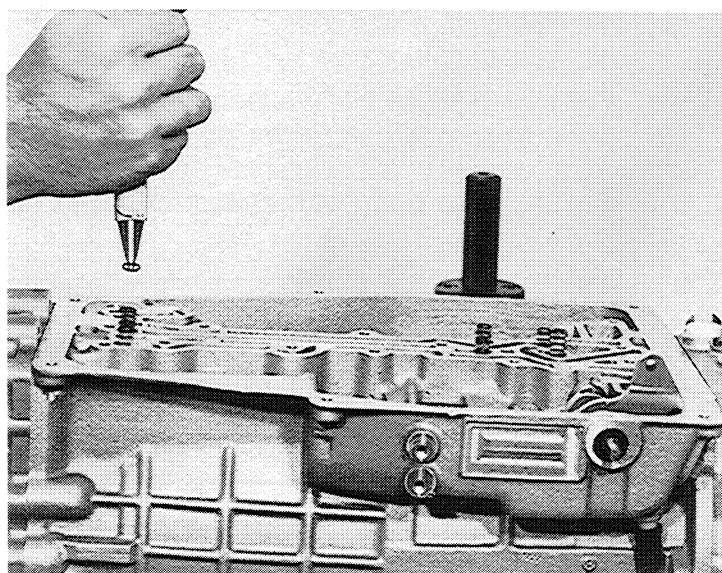
82 174

Insert 8 sealing bushings 01180 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).

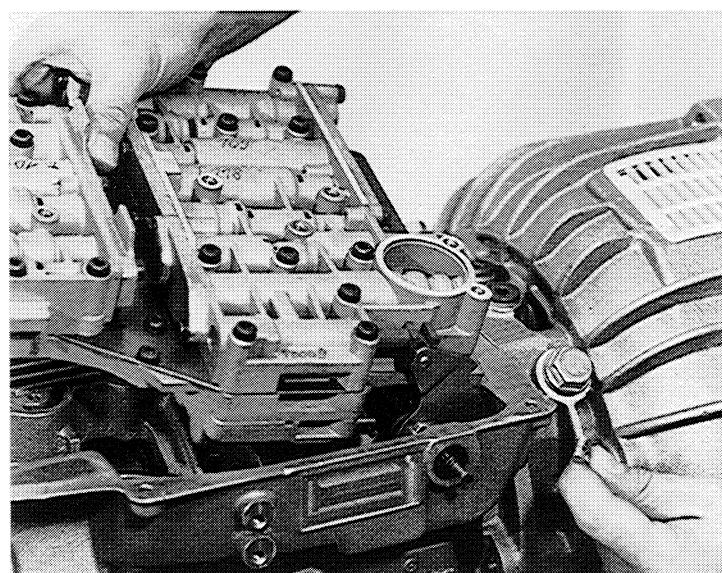


Four short springs 01160 are to be inserted into oil feed holes located in the forward area of transmission case.

Also insert four long springs 01162 into oil feed holes located in the rear area, and secure all springs with circlips 01190.



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



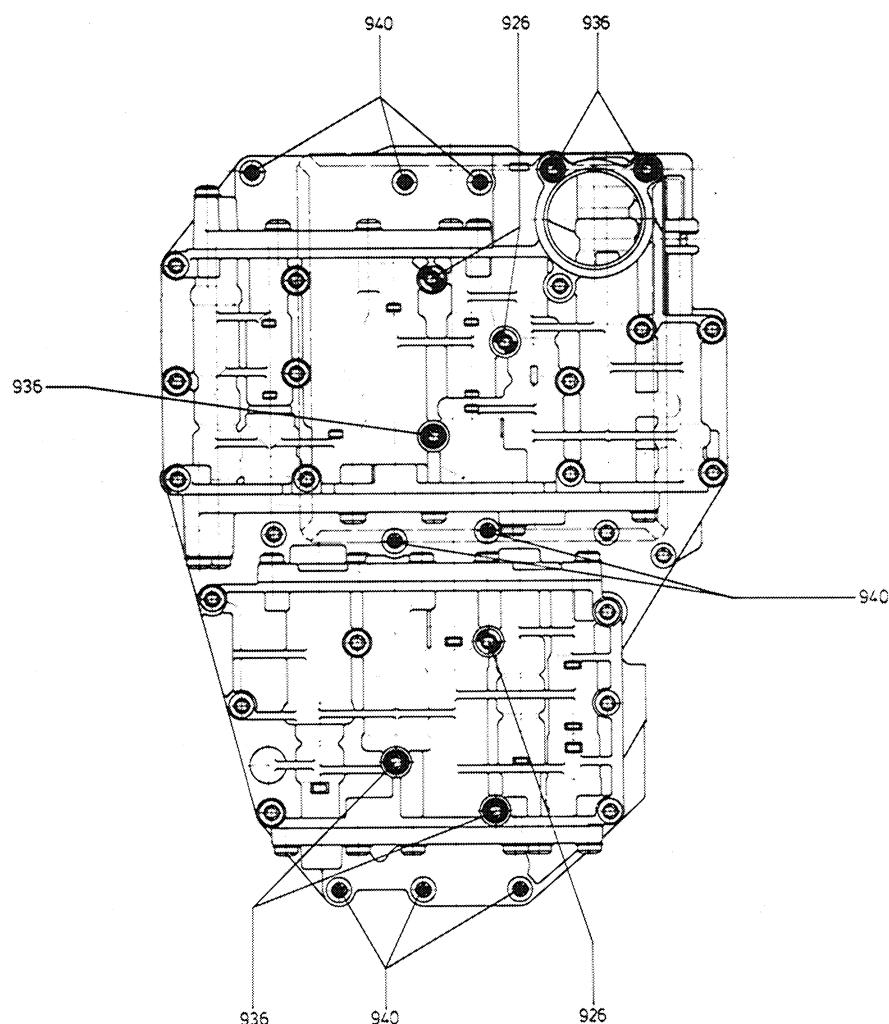
Attention!

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

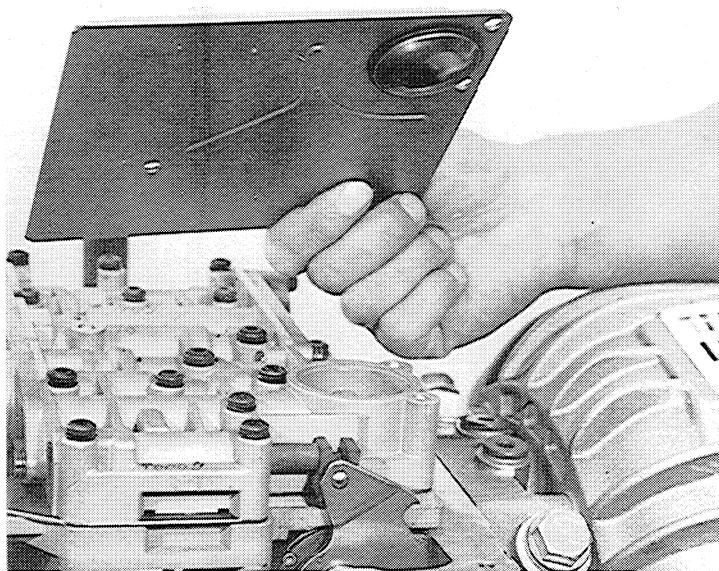
82 194



Secure oil screen with 3 bolts in position 26936.

Insert o-ring 26932 onto suction inlet on oil screen 26930. Secure oil screen with 3 cylindrical bolts 26936.

(To be torqued 8 Nm)
(Tool size torx bit 27)

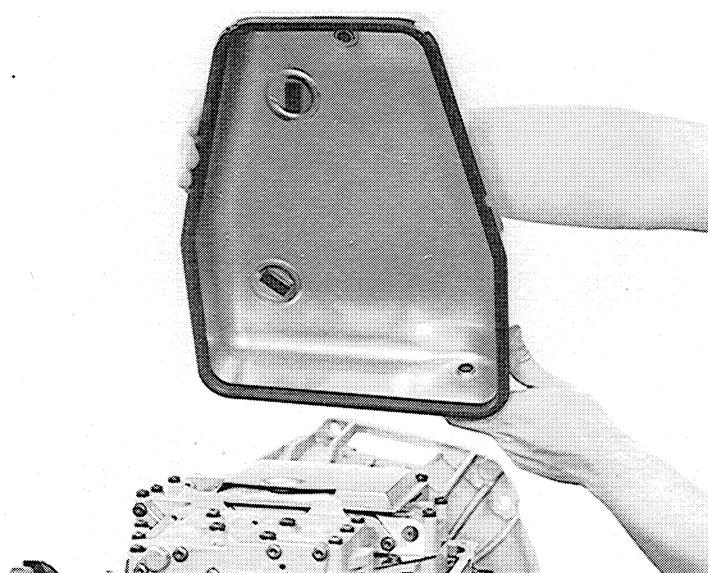


Place 1 magnet 01150 each into 2 indentations in oil pan as shown.

Place gasket onto oil pan. If it is necessary install sealing plugs and sealing washers part numbers:

01230 Plug
01234 Washer
01240 Plug
01250 Nut

Torque information refer to page 6.



Secure oil pan on four corners with fixation plates 01070. Next secure both sides of oil pan with fixation plates 01072.

Use 6 hexagon bolts, part number 01080, with each of the fixation plates.

(To be torqued 8 Nm)
(Tool head size 10 mm)



Attention:

With transmission in horizontal position install torque convertor as shown.

82 002

To aid installation of torque convertor use mounting grip (5 X 56 000 090).

Torque convertor shaft must be fitted into pump gear drive.

