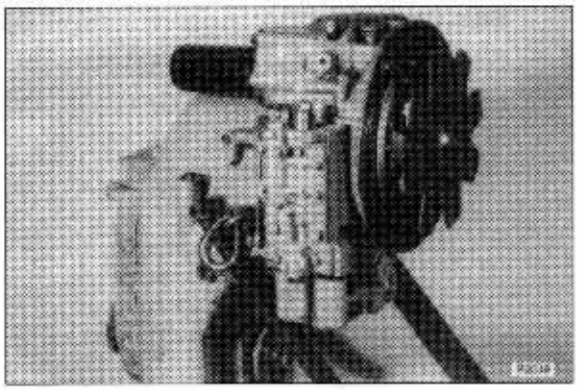
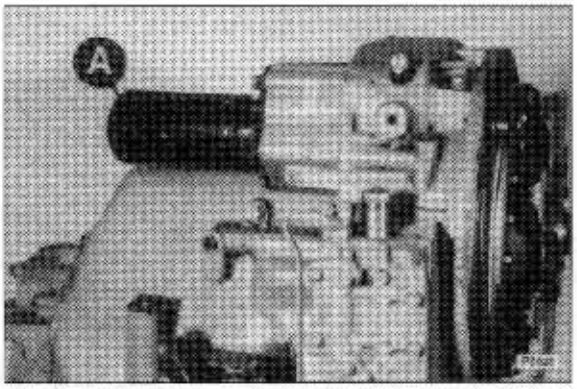
1. TRANSMISSION

1) 4 SPEED TRANSMISSION DISASSEMBLY

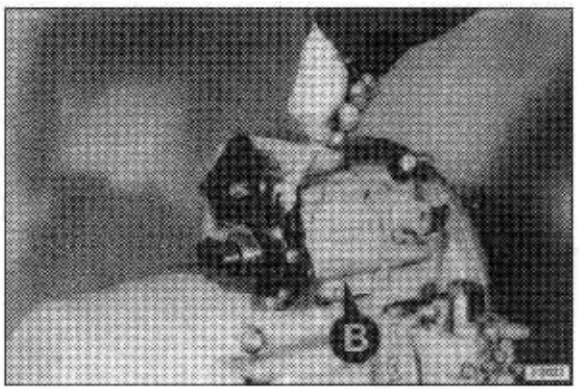
(1) It is recommended that a locally made stand is used to support the transmission as shown during disassembly.



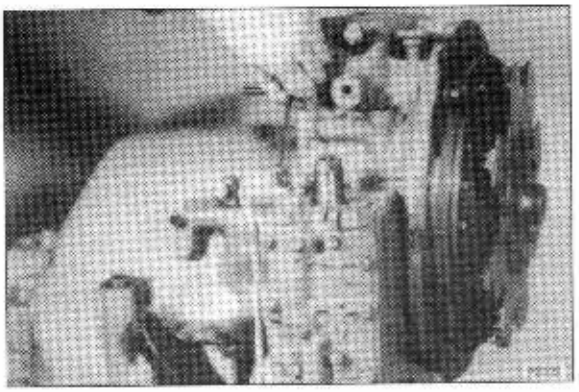
(2) Remove the filter cartridge **A** and dipstick/filler tube(Not shown).



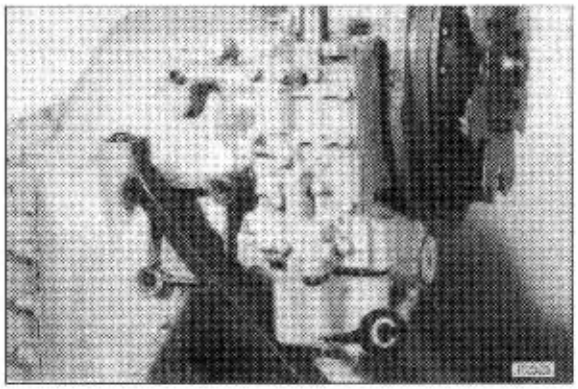
(3) Remove the charge pump **B** and the main hydraulic pump(Not shown).



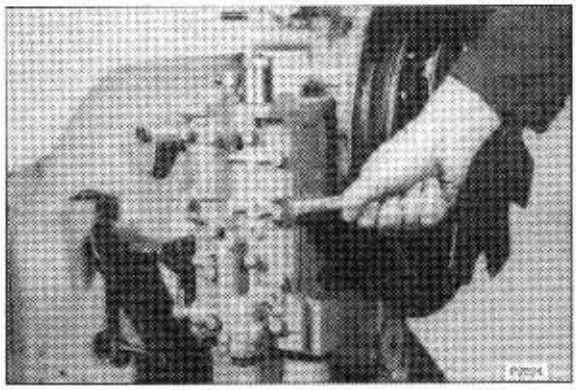
(4) Remove the cross-over pipe.



(5) Disconnect the shuttle valve solenoid wires **C**.

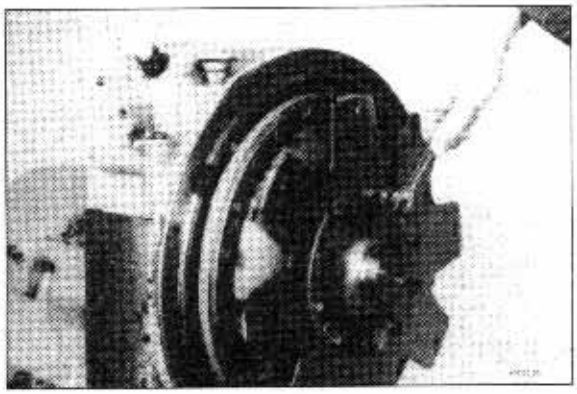


(6) Unscrew bolts and remove the valve block assemblies.

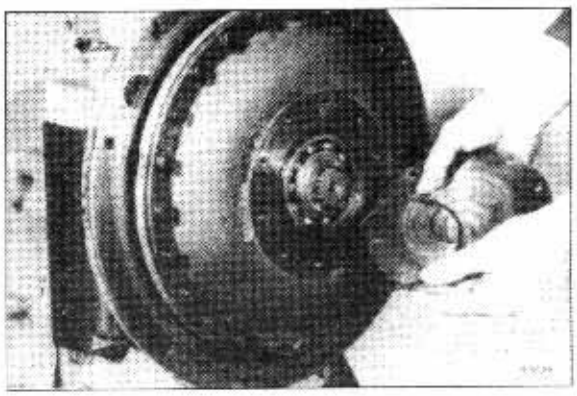


(7) Remove the drive plate group and backing ring.

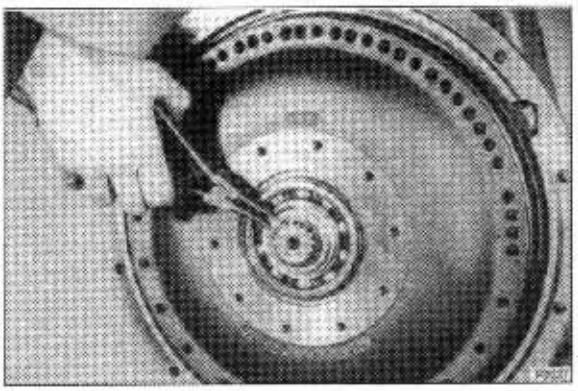
* Some units may have stud nuts and washers fitted.



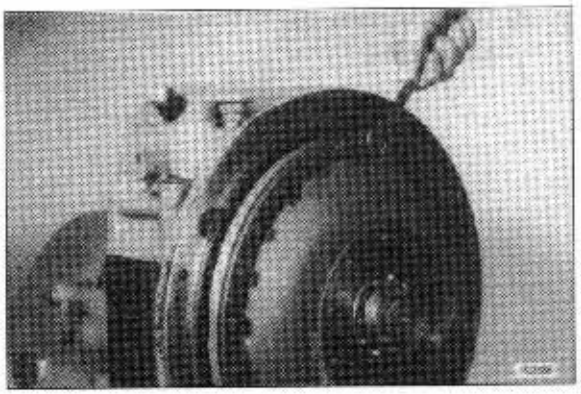
(8) Remove the bearing cap cover. Discard the O-ring. Use a small pan to catch the oil.



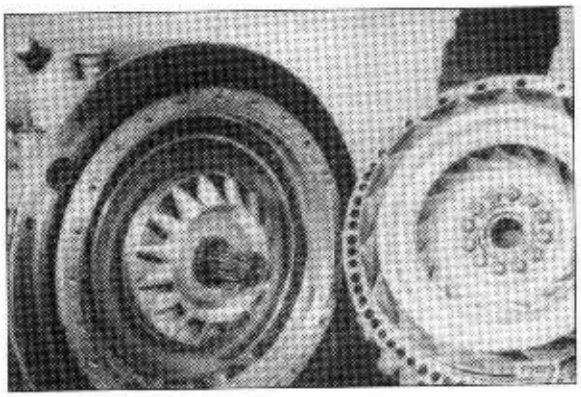
(9) Remove the turbine retaining circlip.



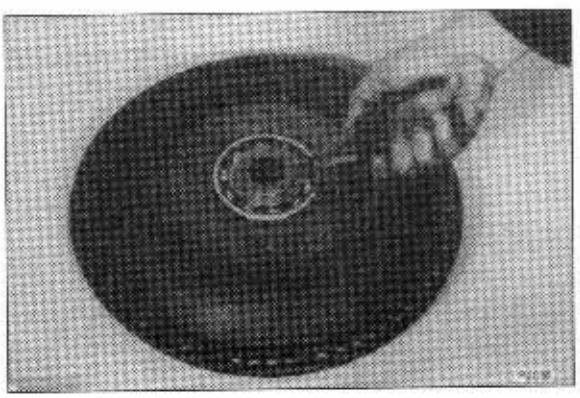
(10) Remove the cover bolts.



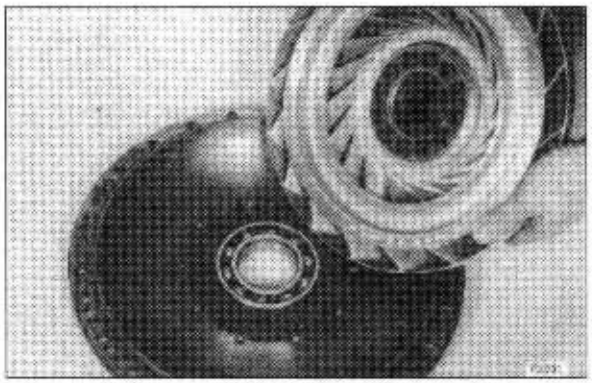
(11) Withdraw the impeller cover and turbine as an assembly.



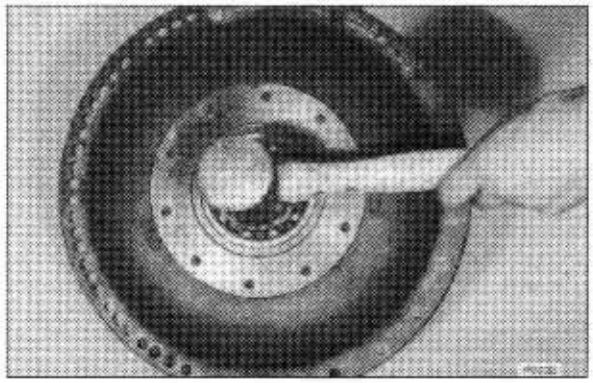
(12) Remove the turbine hub retaining circlip.



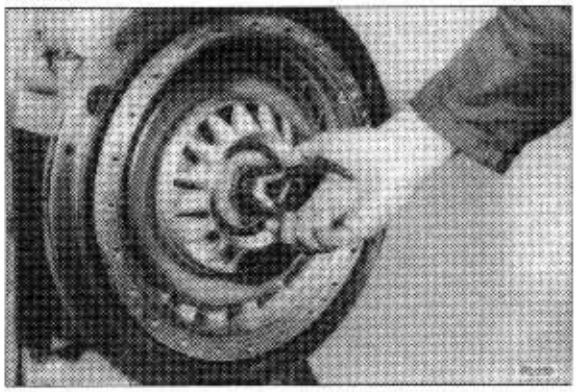
(13) Tap the turbine and hub from the impeller cover.



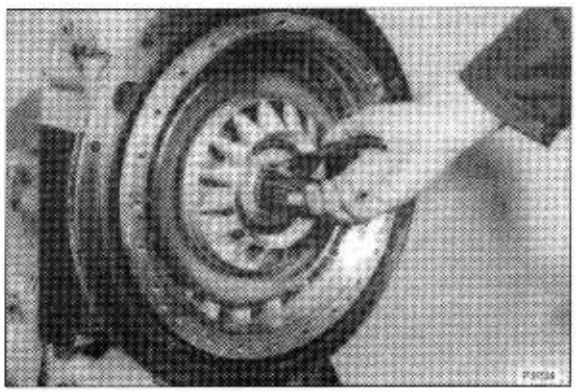
(14) Remove the cover bearing retaining circlip and tap the bearing out of the cover.



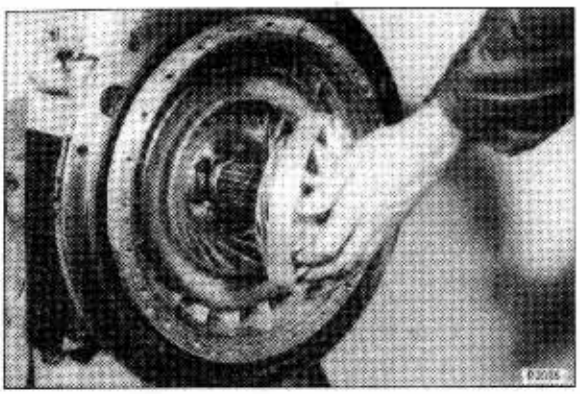
(15) Remove the turbine bearing circlip.



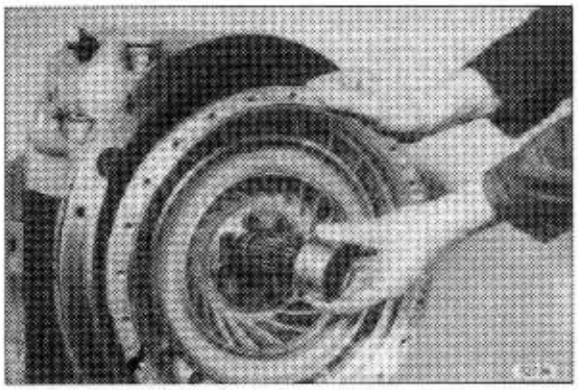
(16) Remove the reaction member retaining circlip.



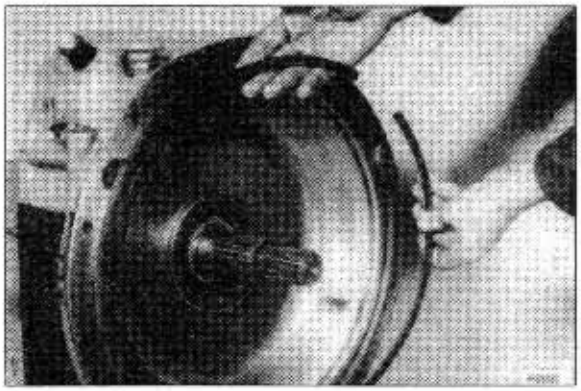
(17) Remove the reaction member.



(18) Withdraw the spacer and remove the impeller and hub assembly.

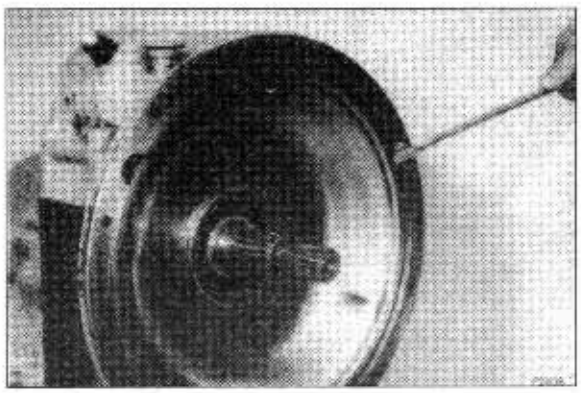


(19) Remove the oil baffle retaining ring.

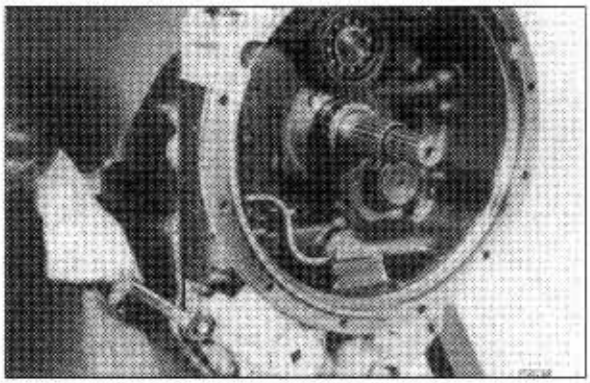


(20) Prise out the oil baffle and remove the seal.

※ A resistance will be felt due to the heavy oil sealing ring.

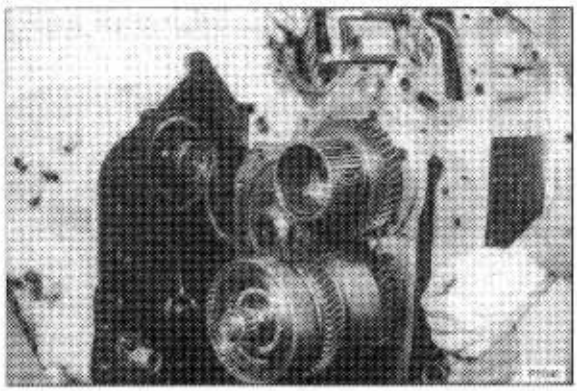


(21) Support the converter housing with a hoist and unscrew the converter housing bolts.

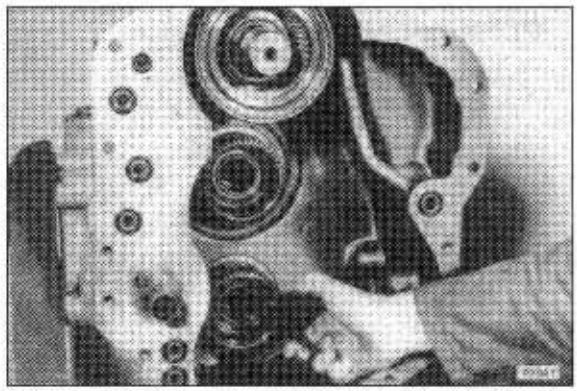


(22) Lift the converter housing clear.

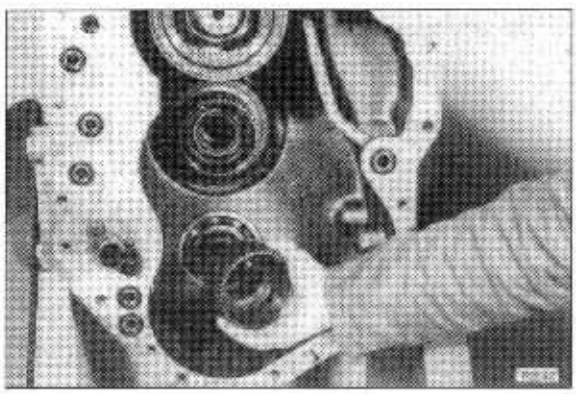
※ Reverse, 2nd, 3rd and 4th clutches will remain in the converter housing.



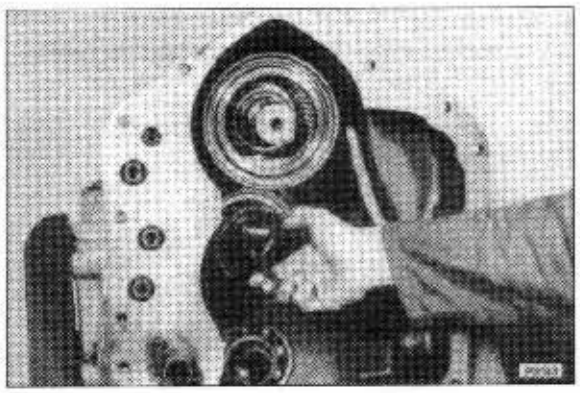
(23) Remove the 3rd gear hub circlip.



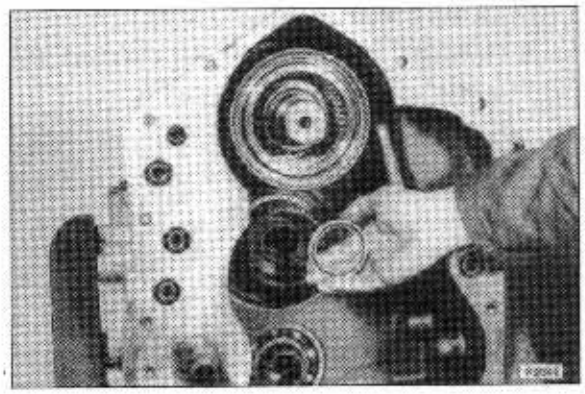
(24) Remove the 3rd gear hub.



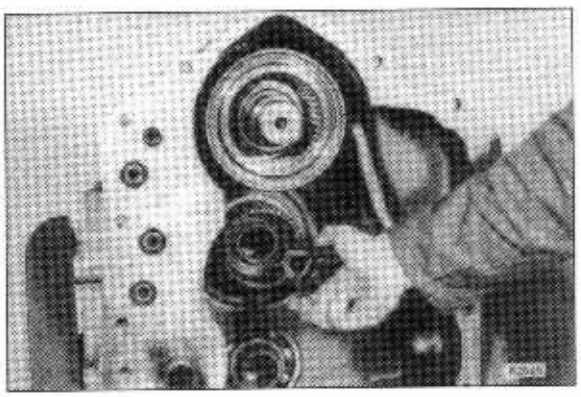
(25) Remove the 2nd gear retaining washer circlip.



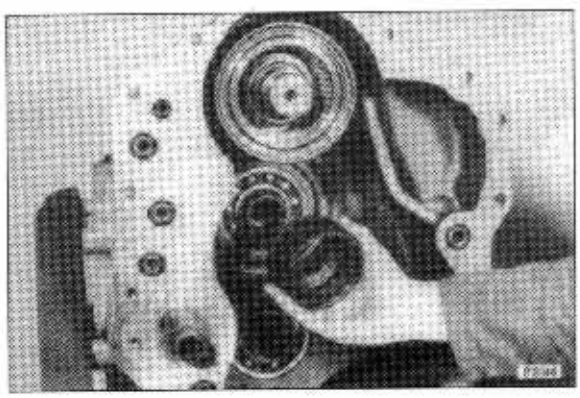
(26) Remove the 2nd gear hub circlip retaining washer.



(27) Remove the 2nd gear hub circlip.

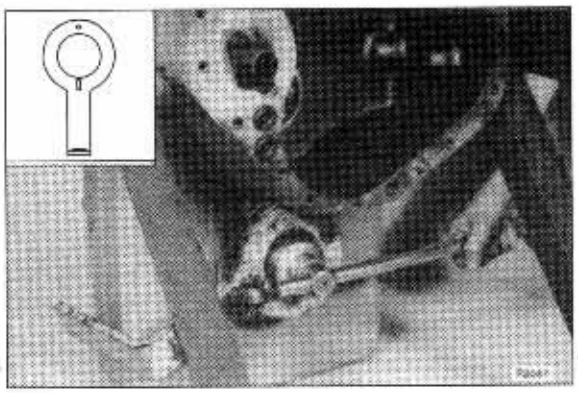


(28) Remove the 2nd gear hub.

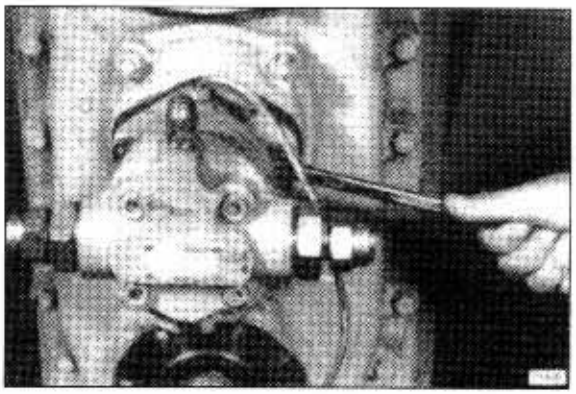


(29) Hold the output flange with tool No. 992/04800(Modified as shown) and unscrew nut, washer and O-ring.
Withdraw output flange.

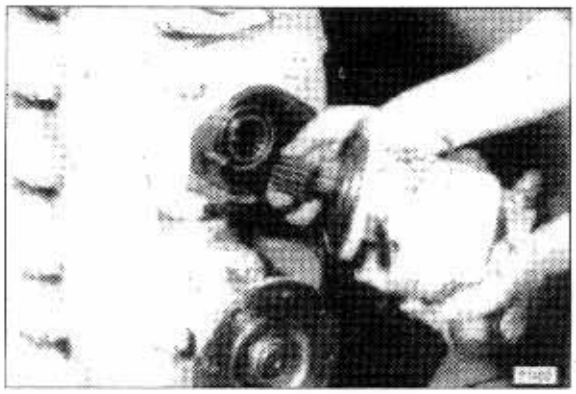
※ It is also possible to use an impact wrench for this operation.



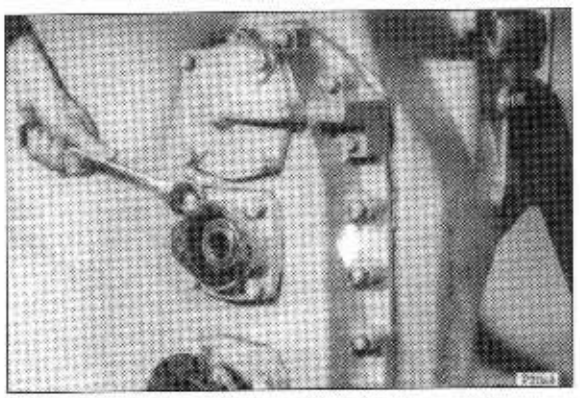
(30) On machines fitted with emergency steering, unscrew the pump mounting bolts.



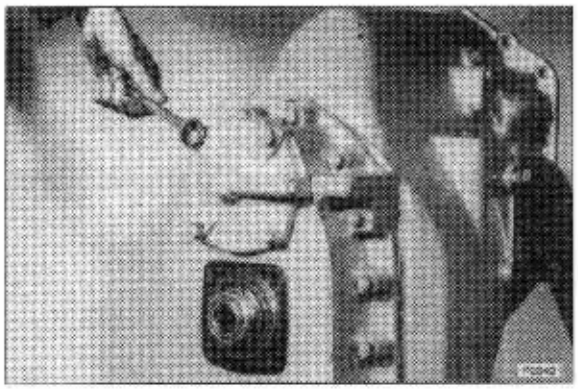
(31) Lift the emergency steering pump away and remove the muff coupling.



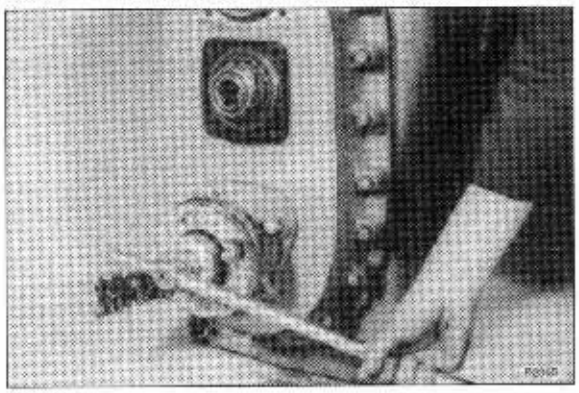
(32) Unscrew bolts and remove the idler shaft bearing cap.



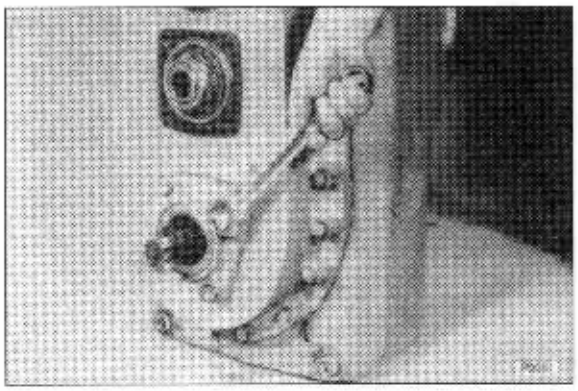
(33) Unscrew nuts and remove the low clutch shaft bearing cap.



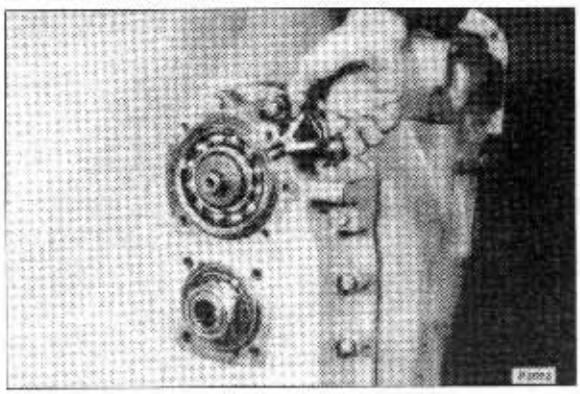
(34) Remove the rear output flange nut, washer, O-ring and flange.



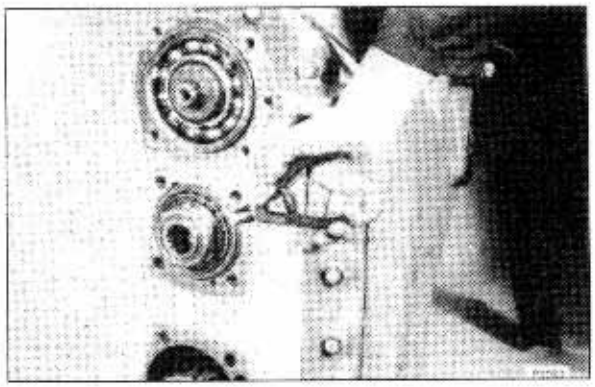
(35) Unscrew nuts and remove the output shaft bearing cap and O-ring.



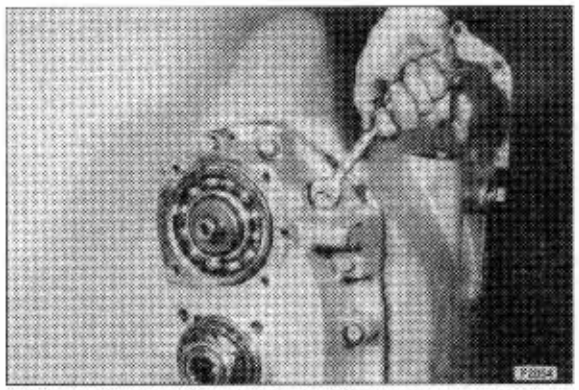
(36) Remove the rear bearing ring from the 1st clutch shaft.



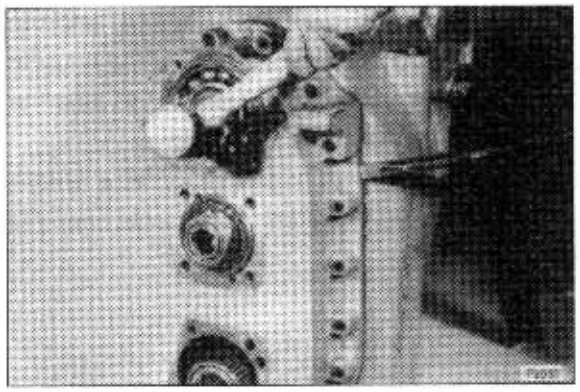
(37) Remove the rear bearing locating ring from the idler shaft.



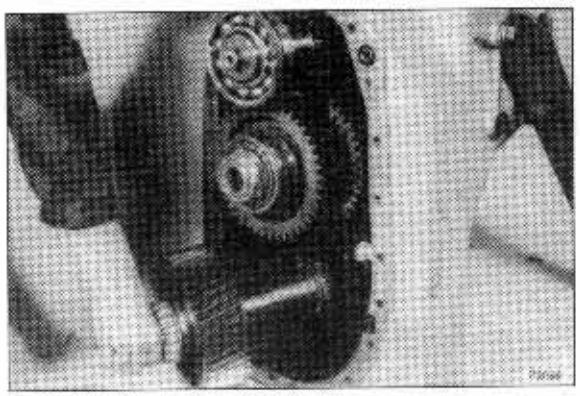
(38) Unscrew the rear cover bolts.



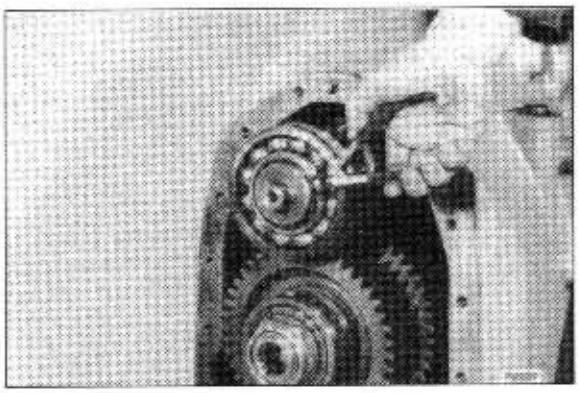
(39) Prise off the cover from the housing using the slots provided. Tap on the 1st clutch and idler shaft with a soft faced hammer to prevent the cover from binding.



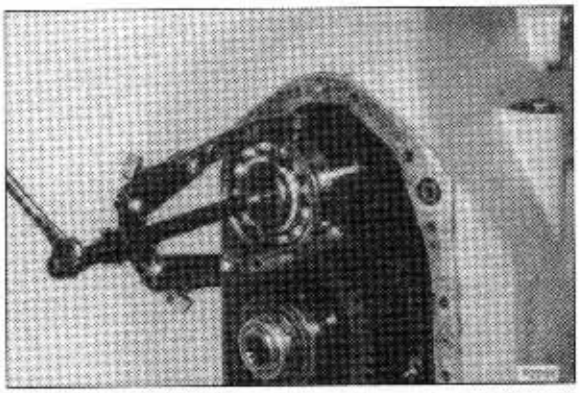
(40) Remove the output shaft assembly.



(41) Remove the 1st clutch rear bearing retaining ring.

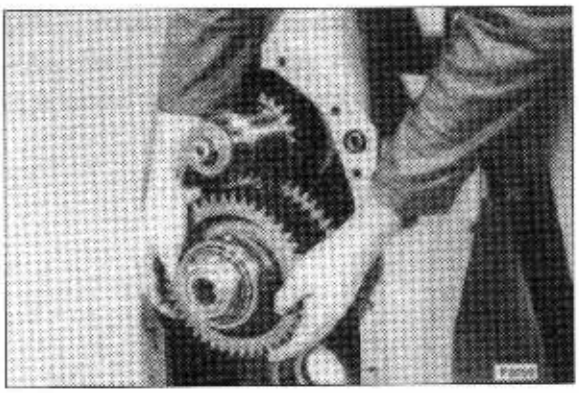


(42) Remove the 1st clutch rear bearing.

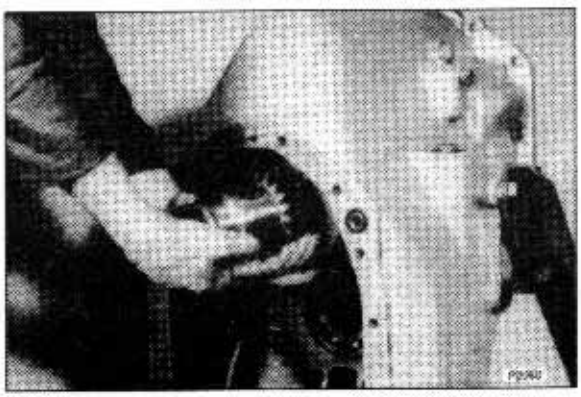


(43) Support the idler shaft assembly and tap the idler shaft from the front of the housing and remove. Take care not to lose the lock ball from the rear bearing.

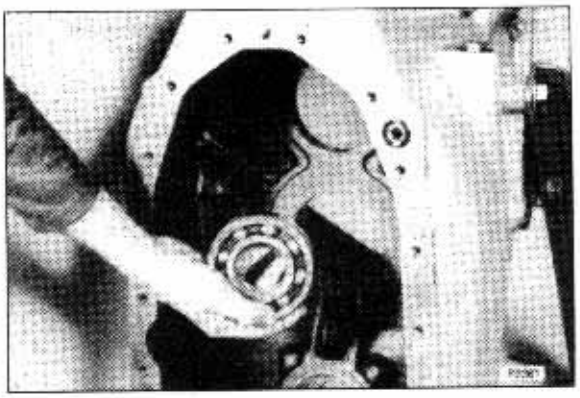
* Because of the weight of the idler shaft it is recommended that two people carry out this operation.



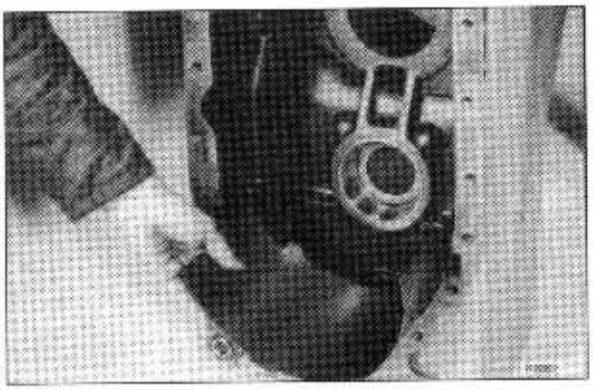
(44) Remove the 1st clutch assembly.



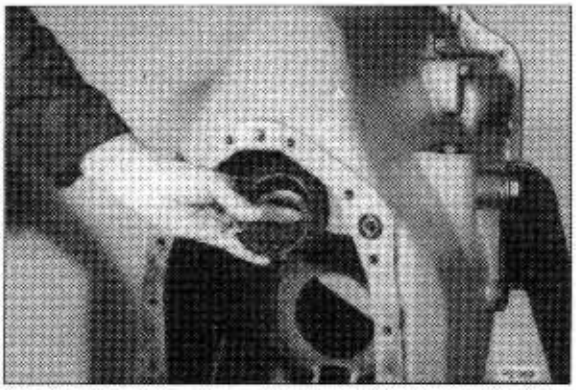
(45) Remove the idler shaft front bearing.

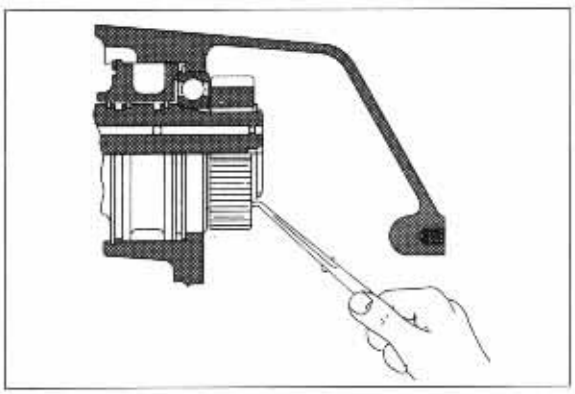


(46) Remove the oil sump baffle.

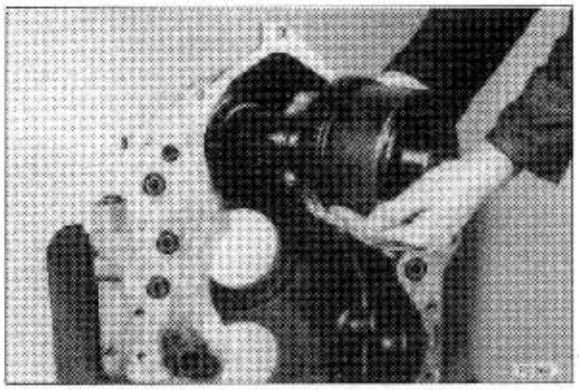


(47) Remove the forward shaft gear circlip and gear from the forward clutch shaft.

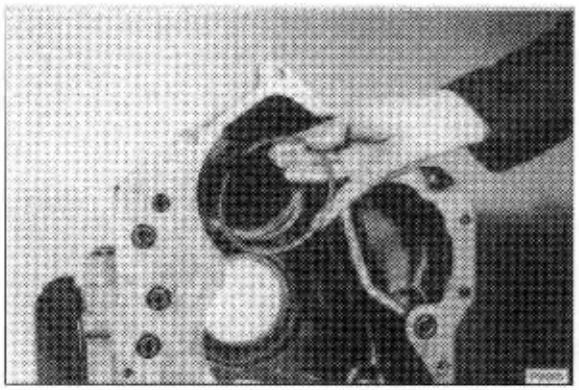




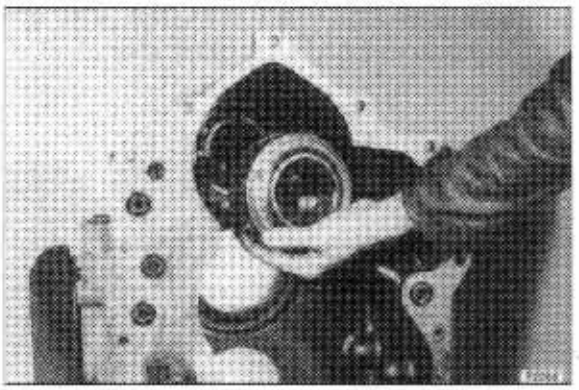
(48) Remove the forward clutch assembly.



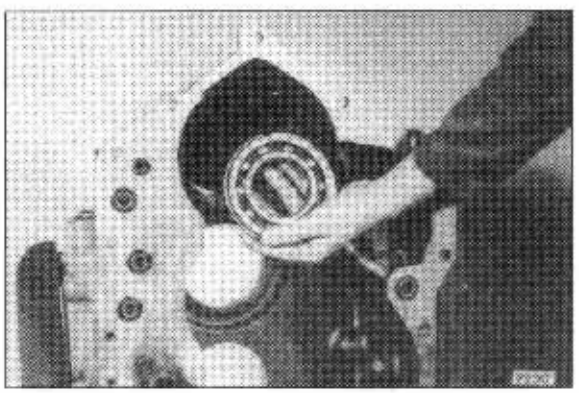
(49) Remove the retaining ring from the sealing ring sleeve.



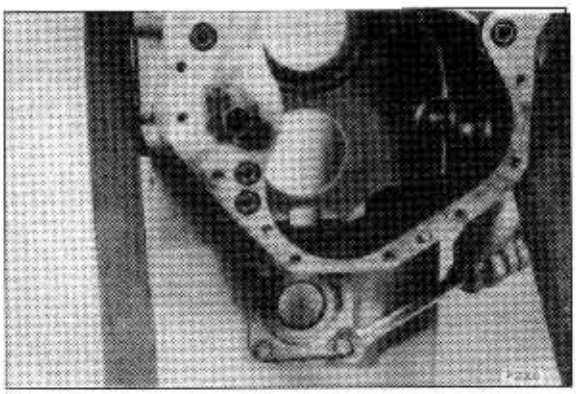
(50) Remove the sealing ring sleeve.



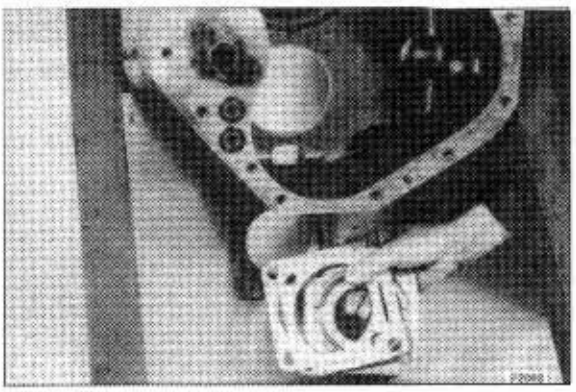
(51) Remove the forward clutch rear bearing.



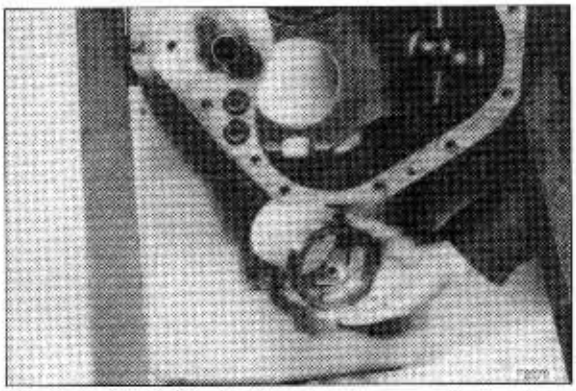
(52) Remove the bolts and washers from the output shaft front bearing cap.



(53) Remove the bearing cap, O-ring and shims.

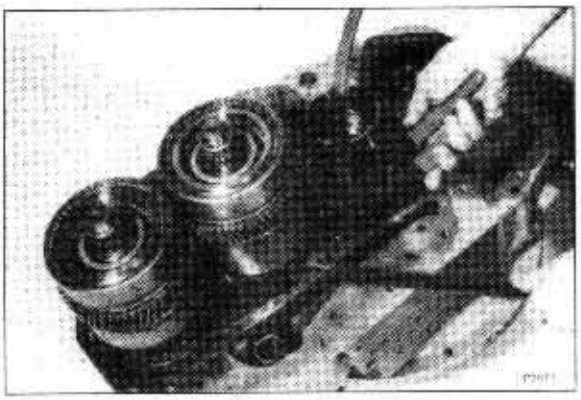


(54) Remove the taper bearing cup.

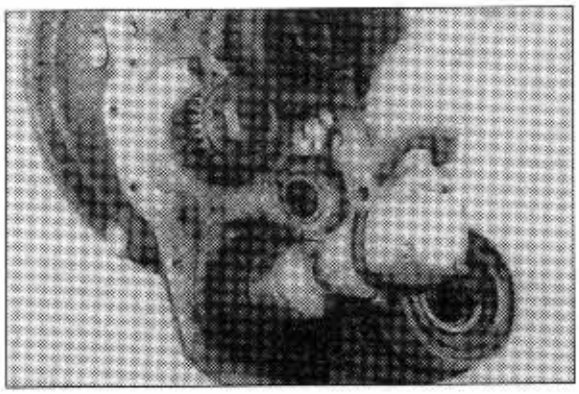


CONVERTER HOUSING DISASSEMBLY

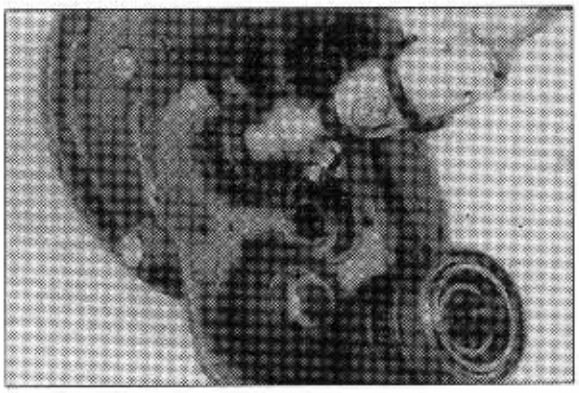
(55) Spread reverse clutch front bearing locating ring. Pry clutch assembly from housing.



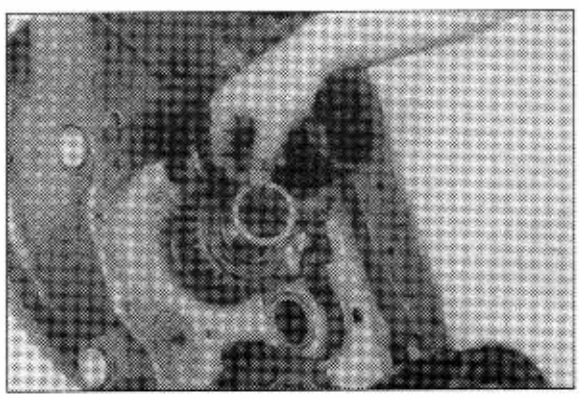
(56) Unclinch lock nut by straightening upset metal in notch in idler shaft. Remove shaft nut.



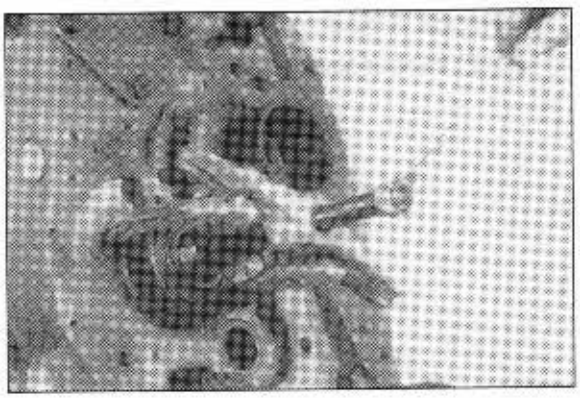
(57) Repeat procedure in a clause (56) for reverse idler shaft.



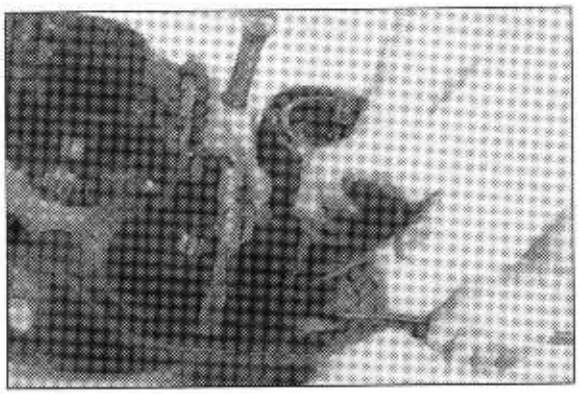
(58) Remove bearing spacers.



(59) Remove reverse idler gear and outer taper bearing.

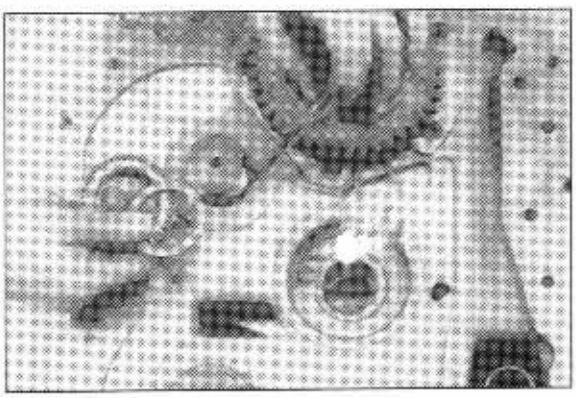


(60) With the help of an assistant, spread the 4th speed clutch front bearing locating ring and pry clutch from converter housing while the assistant removes the idler gear and outer taper bearing.

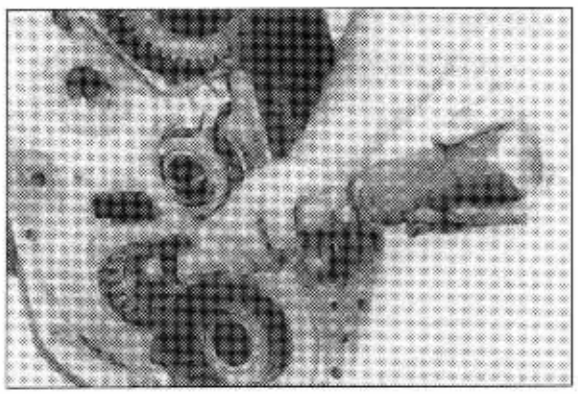


(61) Using a soft bar, drive reverse idler shaft from taper bearing.

(62) Remove taper bearing and thrust plate. Remove shaft. Use caution as not to lose lock ball.

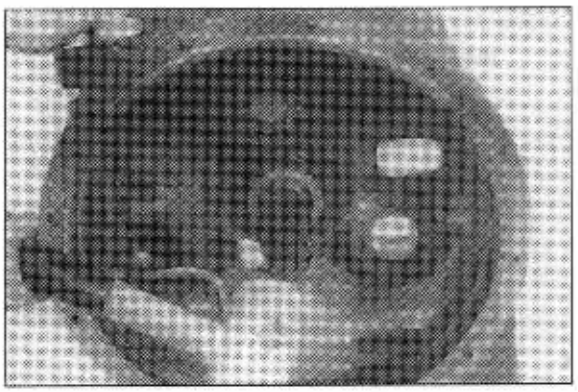


(63) Repeat procedures in the clause (61) and (62) for idler shaft removal.



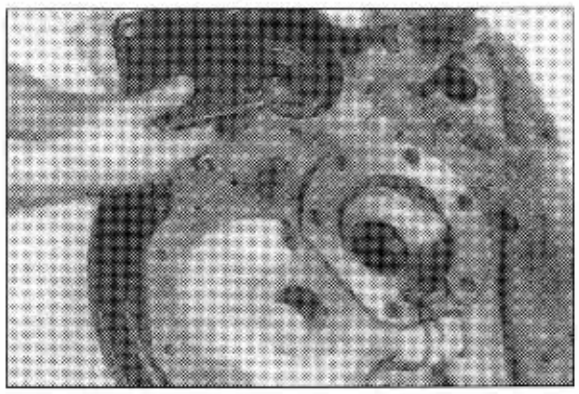
(64) Spread the turbine shaft bearing locating ring.

(65) Holding ring open, tap turbine shaft from stator support.

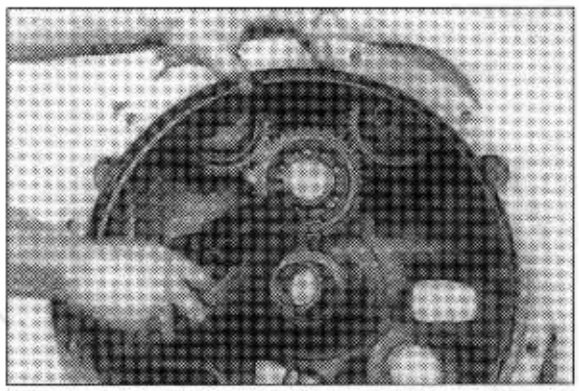


(66) Remove turbine shaft.

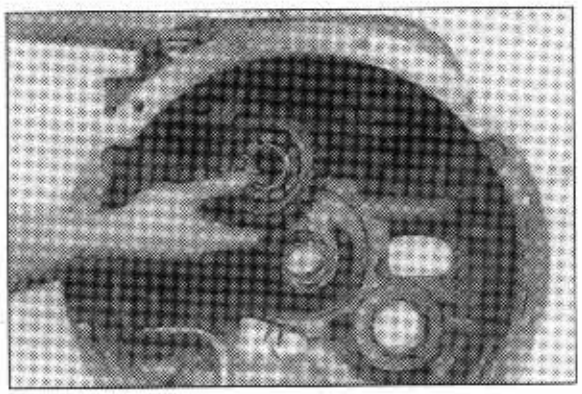
(67) If used, remove auxiliary pump drive gear cover and gasket.



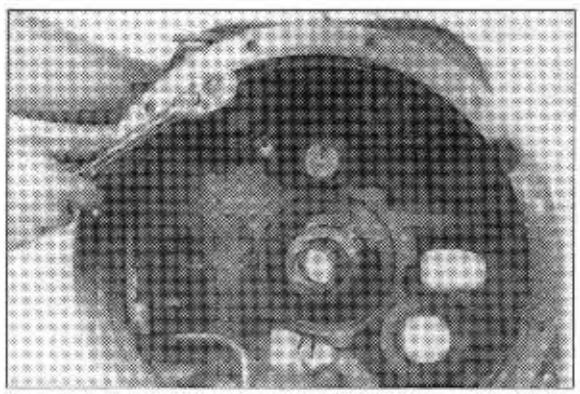
(68) Remove pump idler gear retainer ring.



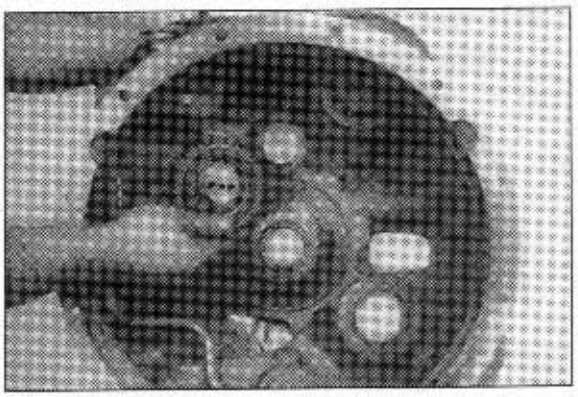
(69) Remove idler gear.



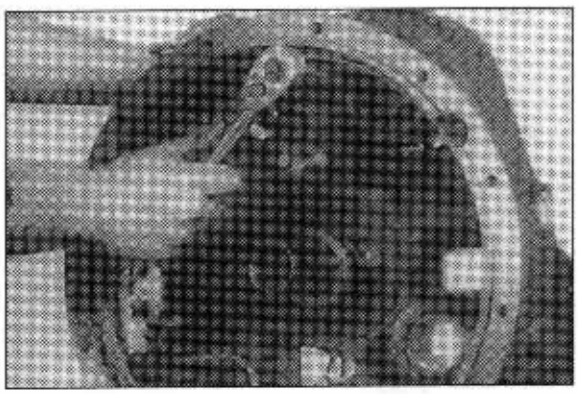
(70) Remove the charging pump drive gear support bolts.



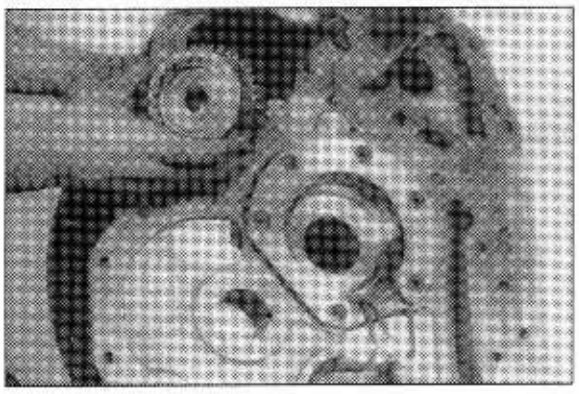
(71) Remove drive gear and support assembly.



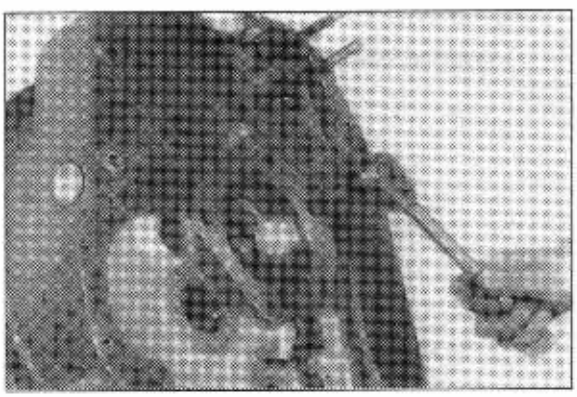
(72) Remove the auxiliary pump drive gear support bolts.



(73) Remove auxiliary pump drive gear.

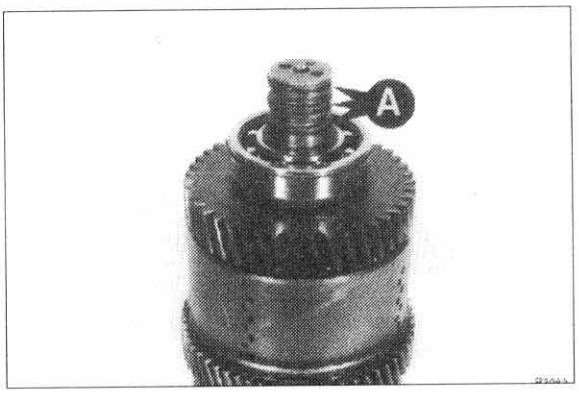


(74) If stator support is to be replaced, remove support screws and tap support from housing.

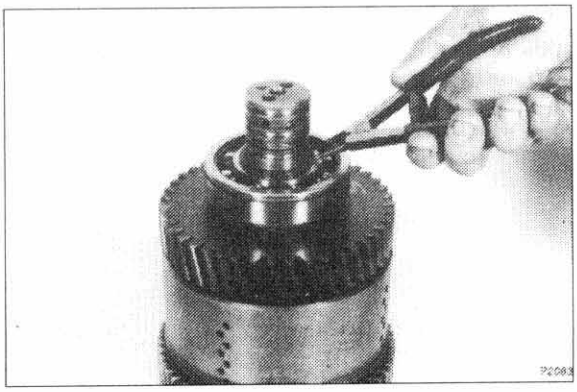


2) TYPICAL CLUTCH DISASSEMBLY(Reverse clutch shown)

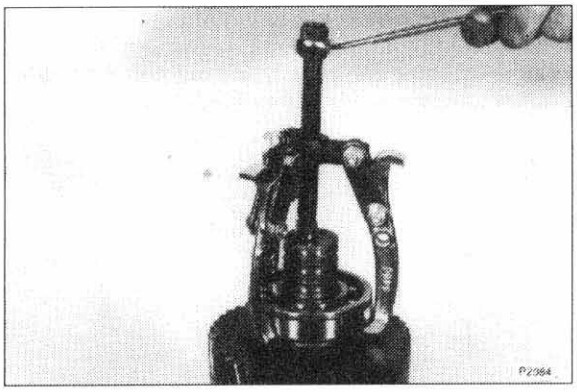
(1) Remove the oil sealing rings **A**.



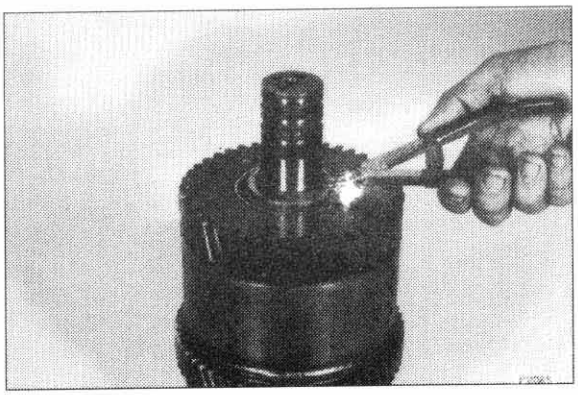
(2) Remove the bearing retaining circlip.



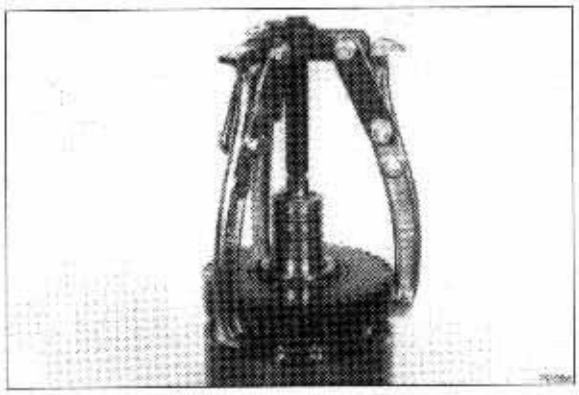
(3) Remove the front bearing.



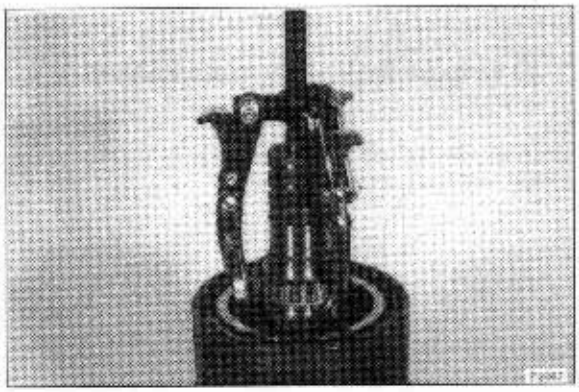
(4) Remove the clutch gear bearing retaining circlip.



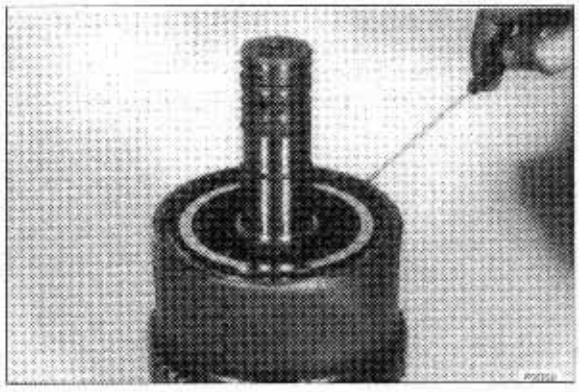
(5) Pry the reverse gear from clutch assembly far enough to use the gear puller then remove gear.



(6) Remove the spacer and the inner bearing.

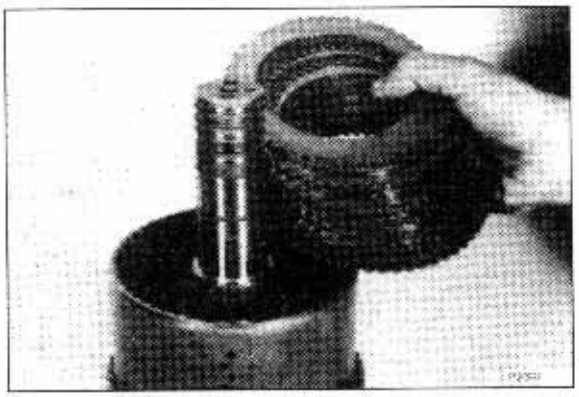


(7) Remove the clutch end plate retaining circlip.

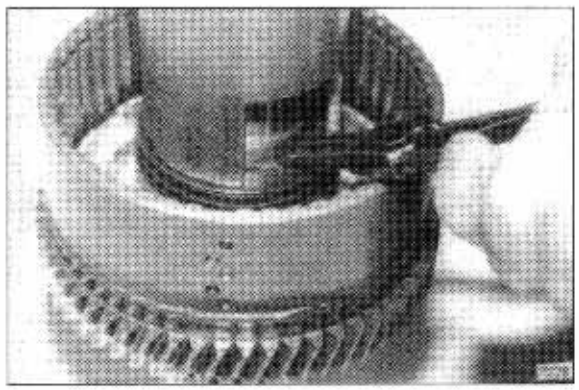


(8) Remove the end plate.

(9) Remove the inner and outer clutch discs.

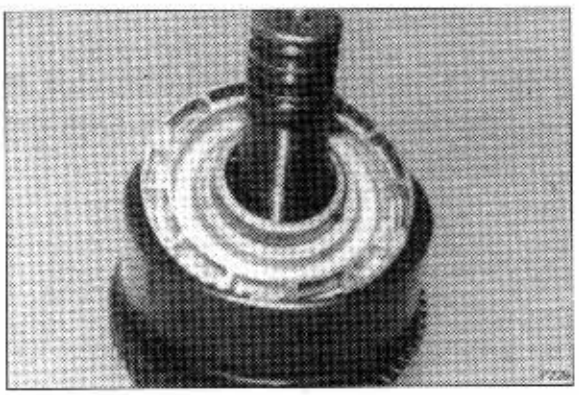


(10) Using a sleeve with cut-out as shown, compress the piston return spring (Belleville washers). Remove the ring retainer, spring retainer ring, piston return spring and spacer.



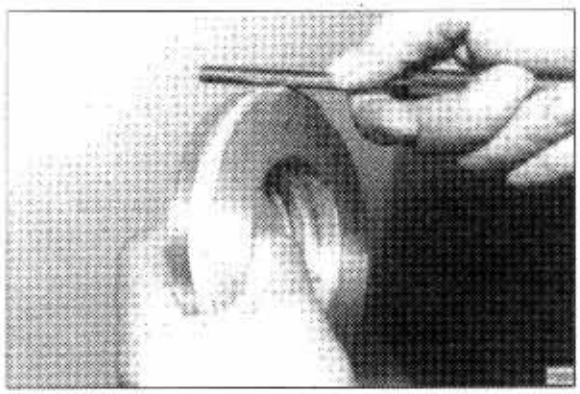
(11) Turn the clutch over and tap the shaft on a block of wood to remove piston.

Disassembly the remaining clutches in a similar manner.

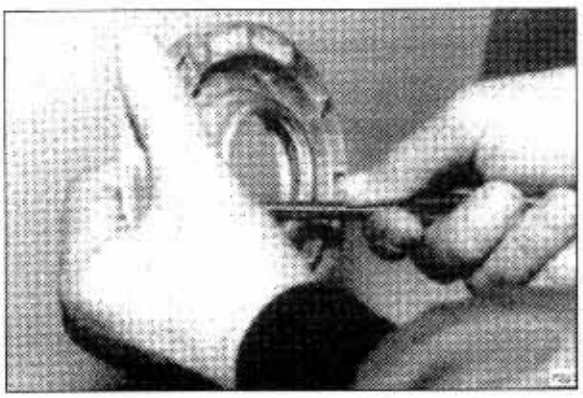


3) TYPICAL CLUTCH ASSEMBLY(Reverse clutch shown)

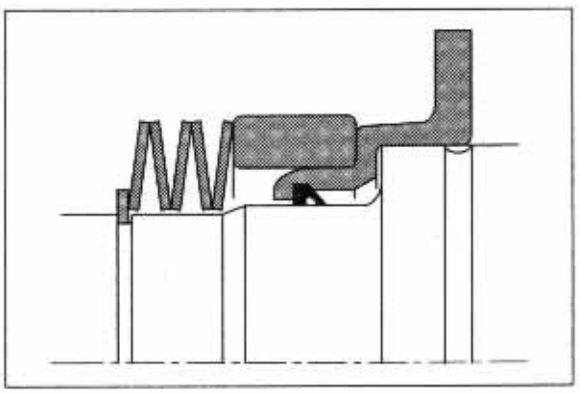
(1) Fit the clutch outer seal ring. Size ring by rotating piston whilst holding a round object against the seal. The seal must be flush with outer diameter of the piston.



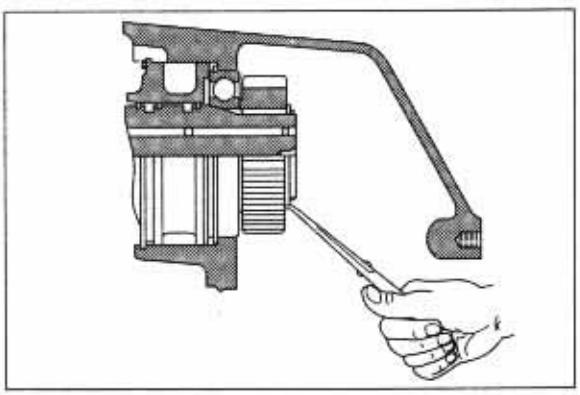
(2) Fit the piston inner seal ring and size. Assemble the piston into clutch drum taking care not to damage seal rings.



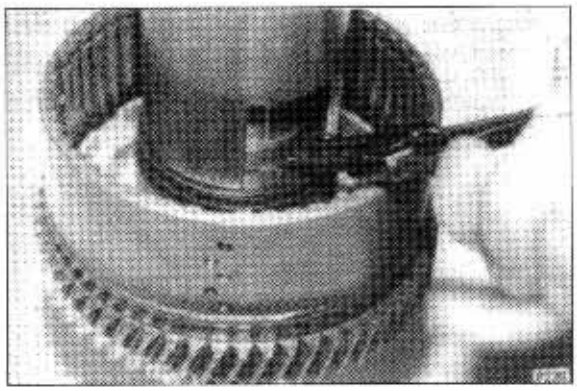
(3) On forward, reverse and low clutches, fit the belleville washers with spacers and secure with circlip.



(4) On ratio clutches, fit the return spring and spring retainer washer and secure with circlip.

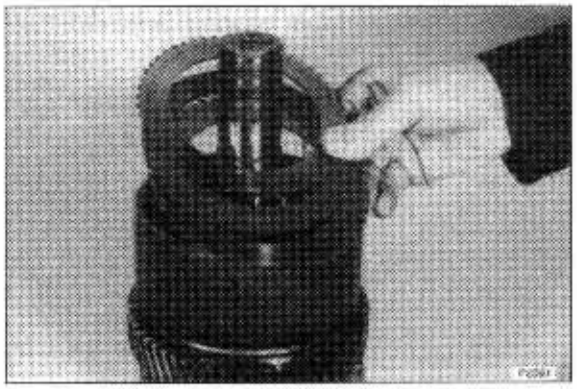


(5) Using a sleeve with a cut-out as shown, compress the spring/belleville washers to fit circlip.

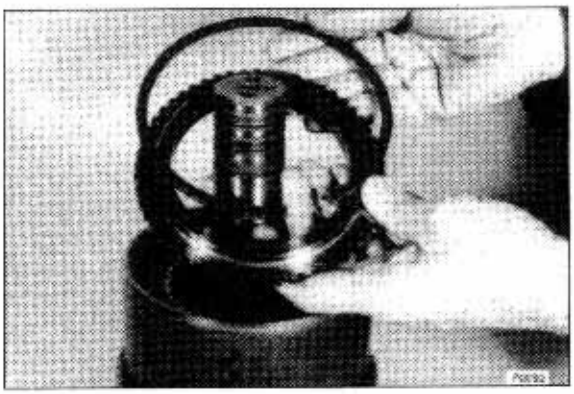


(6) Fit a steel disc first followed by alternate friction and steel discs. The last disc should be friction.

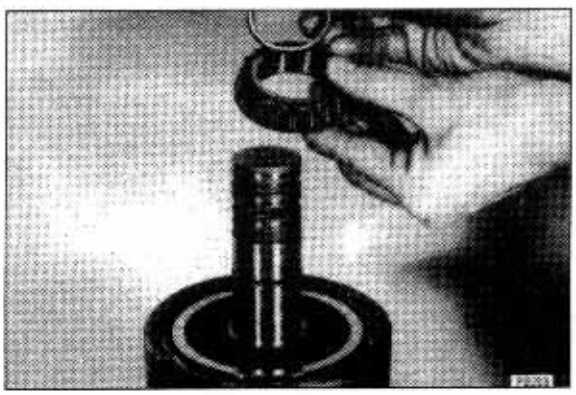
* The friction discs in the low clutch (Identified by a yellow mark) have a higher co-efficient rating than those fitted to other clutches.



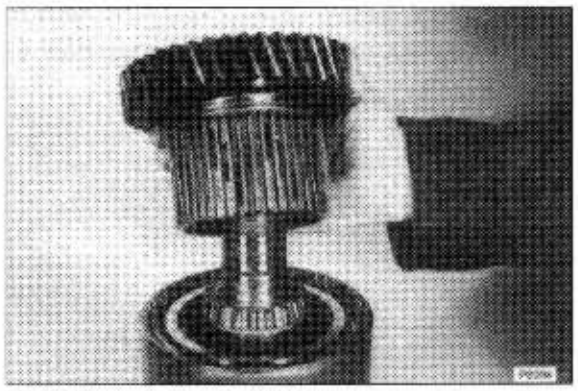
(7) Fit the end plate and retaining ring.



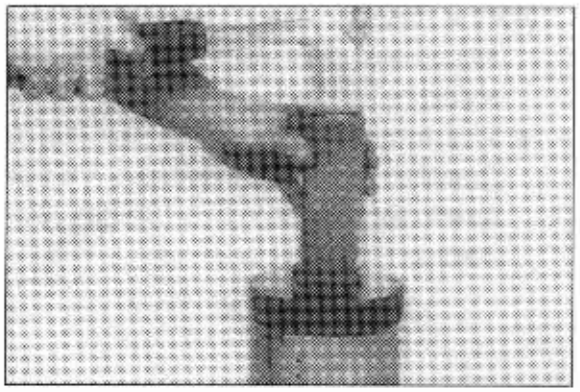
(8) Fit the inner bearing, spacer and circlip.



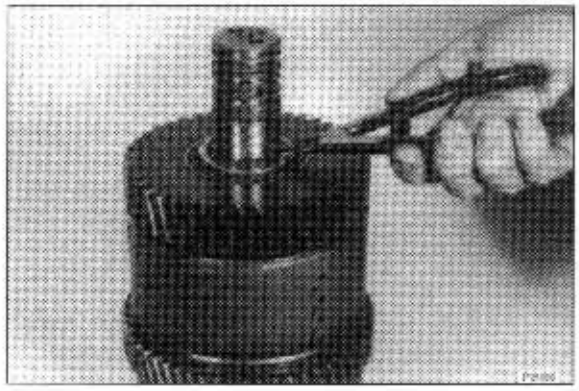
(9) Fit the gear hub into the clutch drum. **Do not force this operation.** The outer gear splines must be engaged with the internal teeth of all friction discs.



(10) Fit the outer taper bearing, large diameter up.

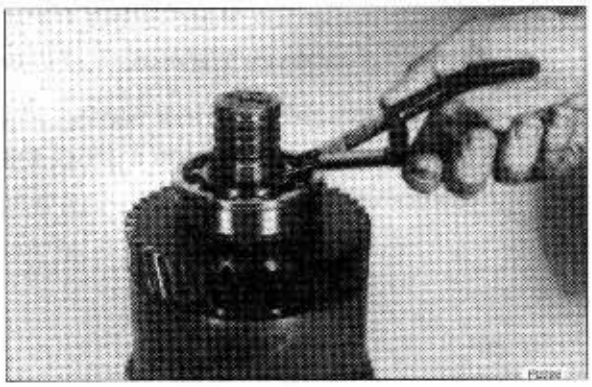


(11) Fit the bearing retaining ring.



(12) Fit the front bearing with the locating ring groove towards the top.

(13) Install the front bearing retaining ring.



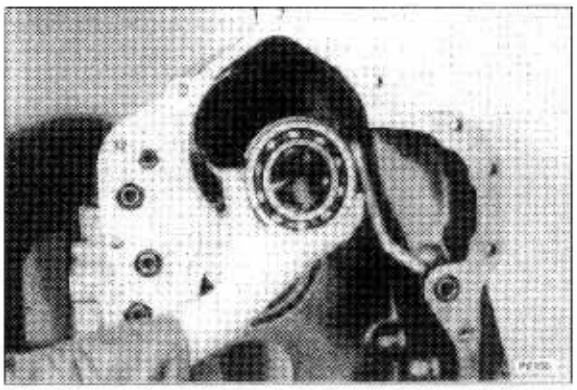
(14) Install new oil sealing rings. Grease rings to assist reassembly into housing.

Assemble remaining clutches in a similar manner.

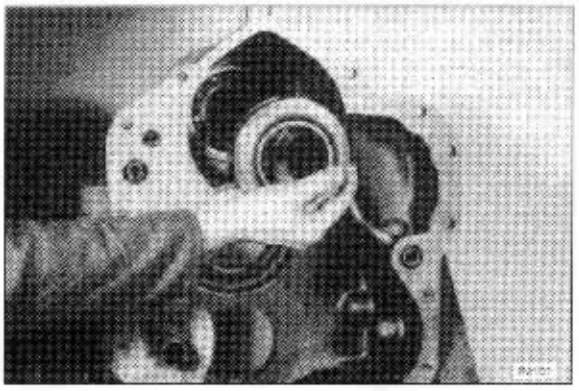
4) 4 SPEED TRANSMISSION ASSEMBLY

See previous pages for typical clutch disassembly and assembly

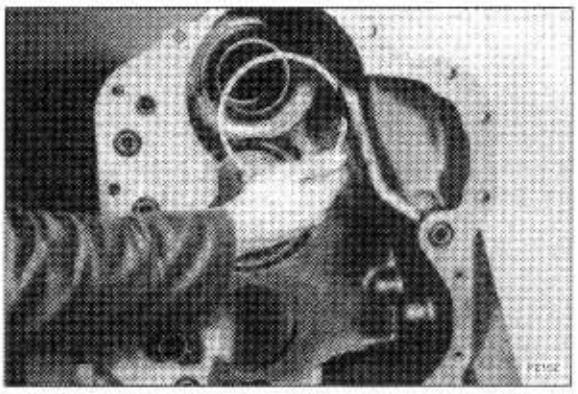
(1) Install the forward clutch rear bearing with the locating ring toward the front of the transmission housing.



(2) Align the clutch oil sealing ring sleeve with the notch in the housing. Tap the sleeve into position.

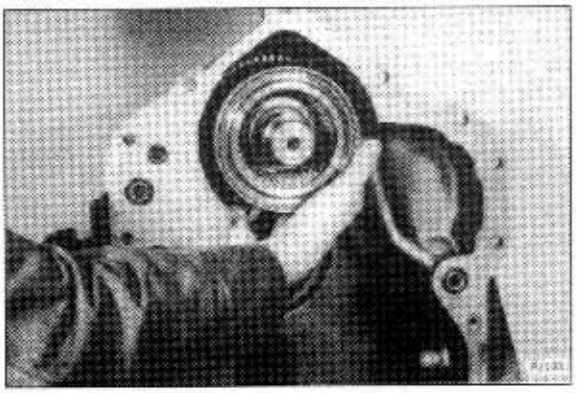


(3) Fit the sleeve retaining ring.

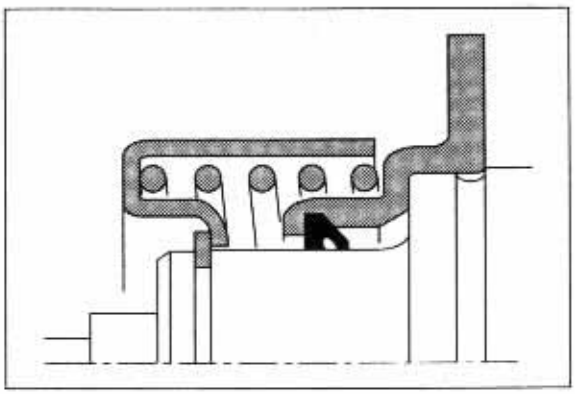


(4) Position the forward clutch assembly into the sleeve.

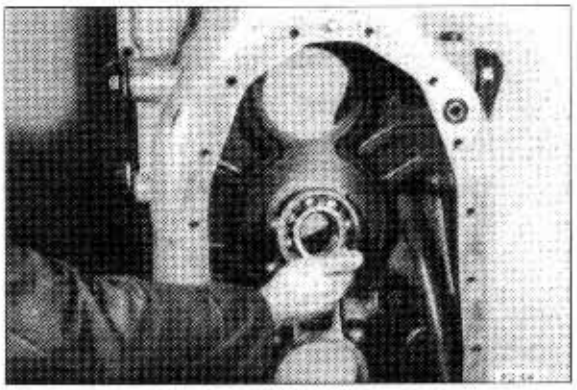
※ Take care not to damage the oil sealing rings on the clutch shaft.



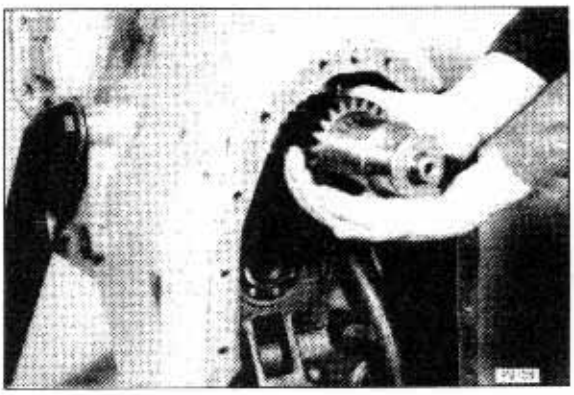
(5) Position the forward shaft gear on the rear of the clutch shaft with the long hub of the gear toward the bearing. Fit the shaft gear circlip.



(6) Fit the idler shaft front bearing.

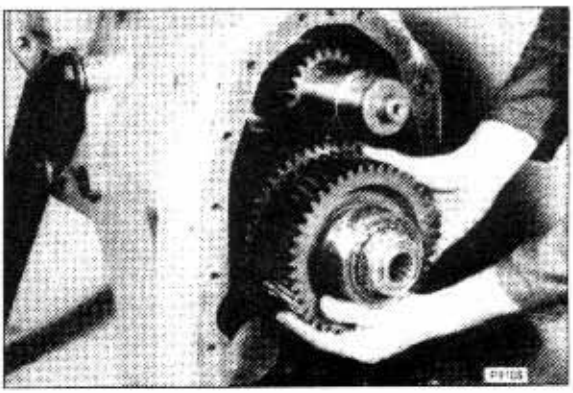


(7) Install the 1st clutch assembly in the housing.

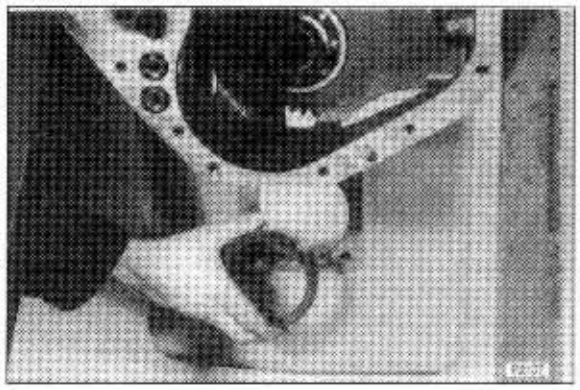


(8) Install the idler shaft assembly into the front bearing.

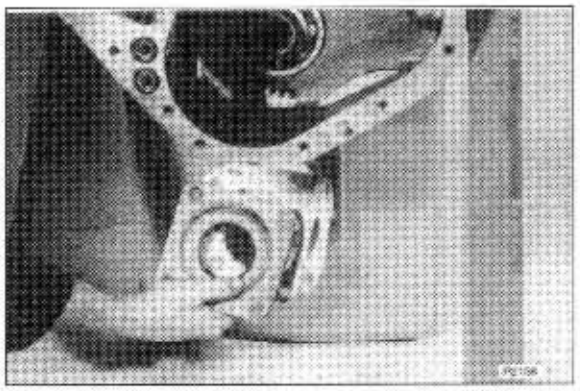
※ Because of the weight of the shaft it is recommended that two people carry out this operation.



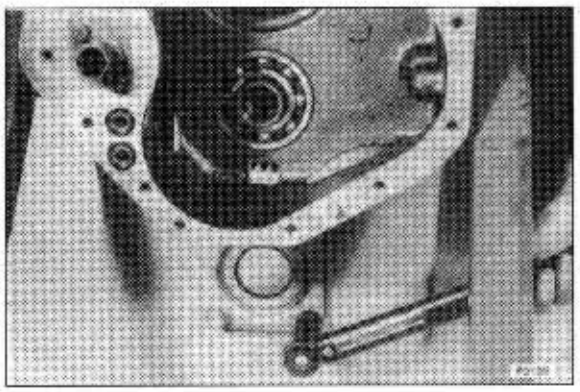
(9) Install the output shaft taper bearing cup with the taper facing inwards.



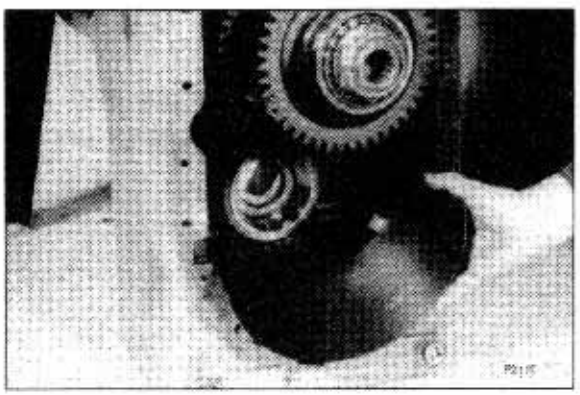
(10) Coat the outer diameter of the oil seal with JCB Multi-gasket and press the seal into the bearing cap with the lip of the seal facing inwards. Remove any excess sealant. Fit a new O-ring and shims on the bearing cap.



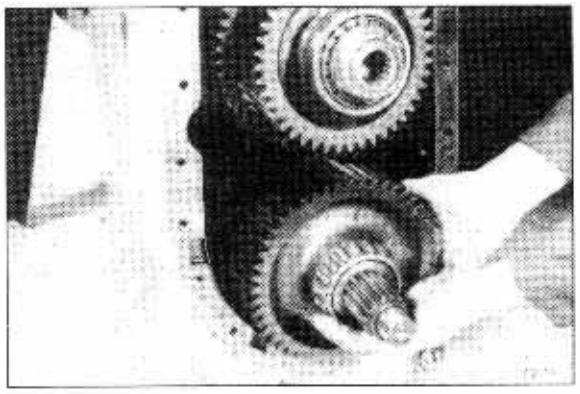
(11) Install the bearing cap, shims, capscrews and washers, tighten screws to 11.3-12.4kgf · m(82-90lbf · ft)



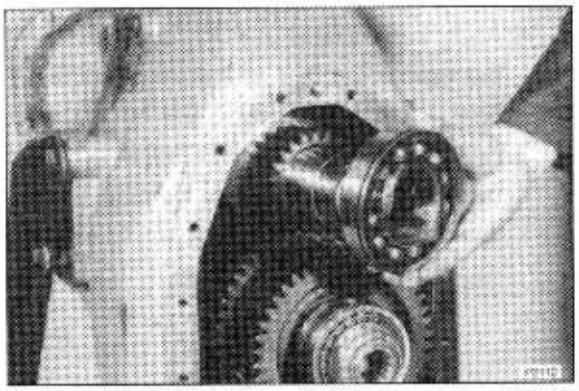
(12) Position the oil baffle in the transmission sump.



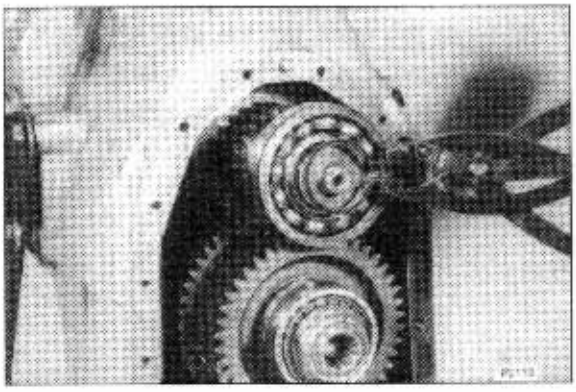
(13) Position the output shaft assembly in the front bearing bore, take care not to damage the front oil seal.



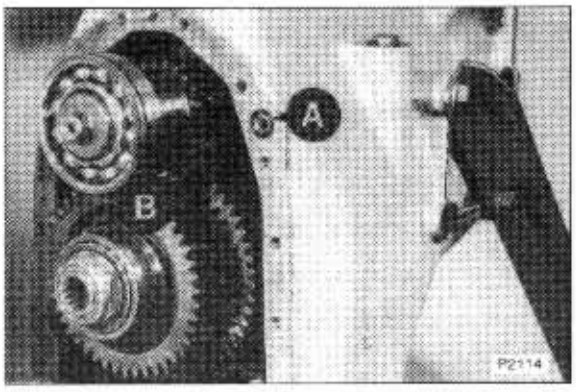
(14) Install the 1st clutch rear bearing with the retaining ring groove outwards.



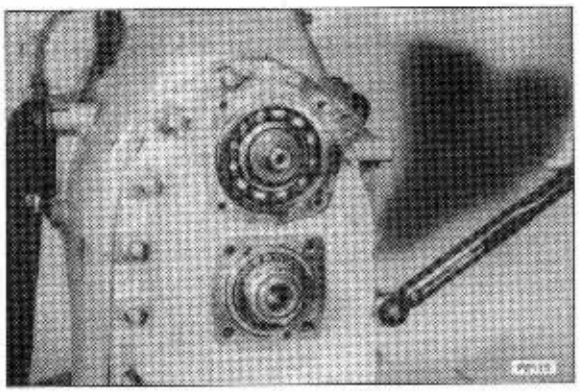
(15) Fit the bearing retainer ring.



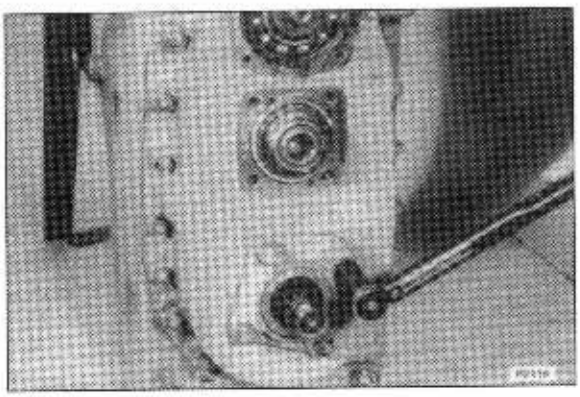
(16) Position a new gasket on the rear of the housing. A light coat of grease will hold the gasket in place. Install a new O-ring **A** in the housing and lockball **B** in the idler rear bearing.



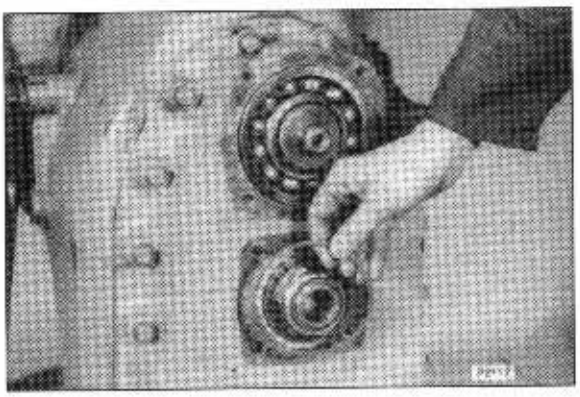
(17) Align the lock ball in the idler shaft rear bearing with the notch in the transmission rear cover. Tap the cover into place and secure with bolts and washers. Tighten cover bolts to 7.2-7.9kgf · m(52-57lbf · ft).



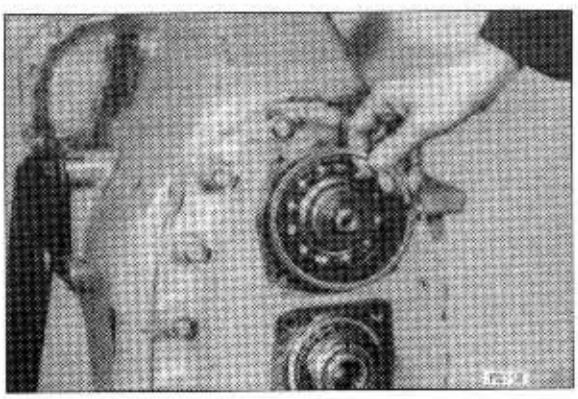
(18) Apply a light coat of JCB Multi-gasket to the outer diameter of the rear output oil seal. Press the seal in the bearing cap with the lip of the seal in. Install the taper bearing cup and O-ring. Install bolts and washers and tighten to 11.3-12.4kgf · m (82-90lbf · ft).



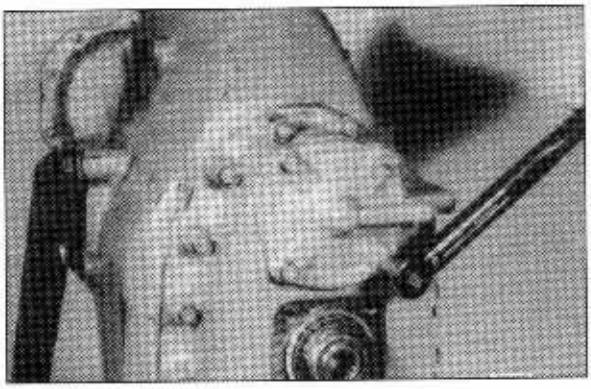
(19) From the front, tap the idler shaft to the rear until the rear bearing locating ring groove is exposed. Fit the locating ring.



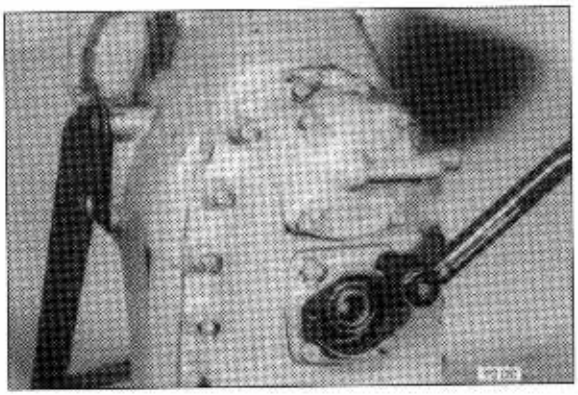
(20) From the front, tap the 1st clutch to the rear until the rear bearing locating ring groove is exposed. Fit the locating ring.



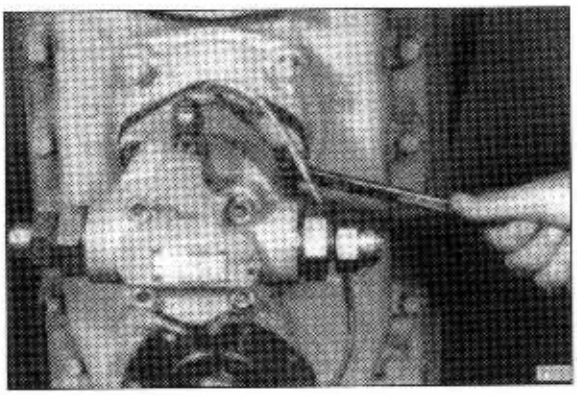
(21) Position a new O-ring and gasket on the 1st clutch rear bearing cap. Install cap screws and washers, tighten to 5.1-5.7kgf · m(37-41lbf · ft).



(22) Position a new gasket on the idler shaft bearing cap.
Install bearing cap, bolts and lockwashers, tighten to 11.3-12.4kgf · m(82-90lbf · ft).

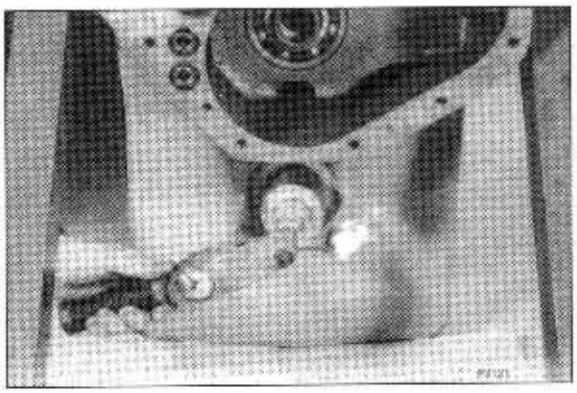


(23) Assembly the emergency steering pump and muff coupling(If fitted).

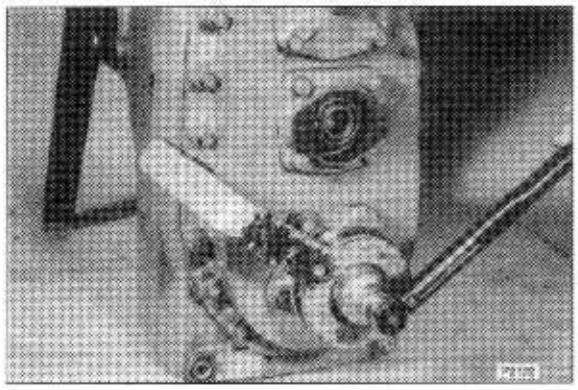


(24) Output shaft bearing preload

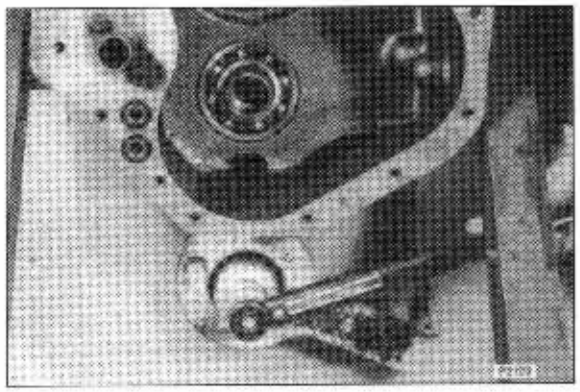
Tap the output shaft front and rear to seat the taper bearings. Loosen the front bearing cap bolts. Using a lbf · in torque wrench, record the rolling torque of the output shaft. Tighten the cap bolts to 11.3-12.4kgf · m(82-90lbf · ft). Check the rolling torque with the bolts tight. This must be 6.9-9.2kgf · cm(6-8lbf · in) greater than when the cap bolts were loose. Add or take off shims on the bearing cap to achieve the correct preload.



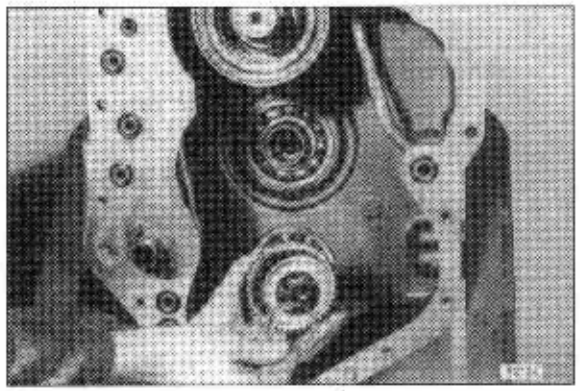
(25) Install the rear output flange, O-ring, washer and nut.
Using service tool No.992/04800 to prevent the shaft from turning. Tighten flange nut to 27.7-34.6kgf · m(200-250lbf · ft).



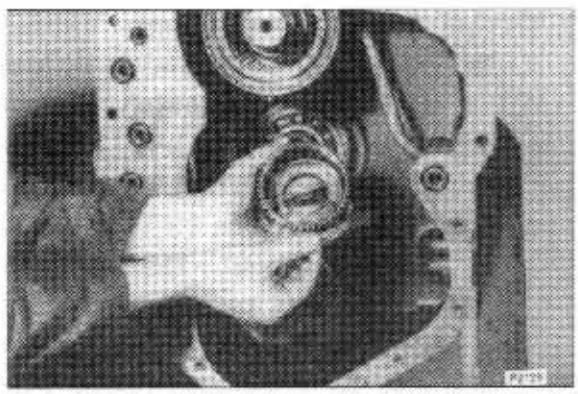
(26) Install the front output flange, O-ring, washer and nut, tighten flange nut to 27.7-34.6kgf · m(200-250lbf · ft).



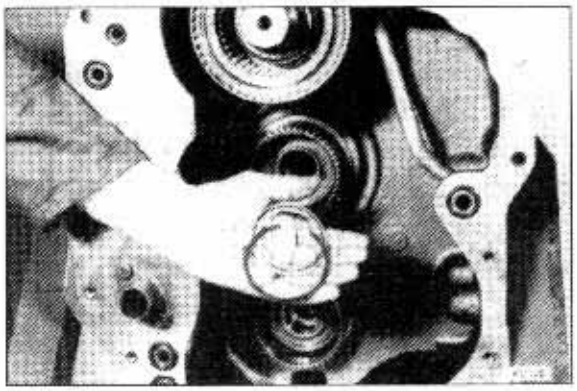
(27) Install the 3rd gear hub onto the idler shaft and fit the 3rd gear hub circlip.



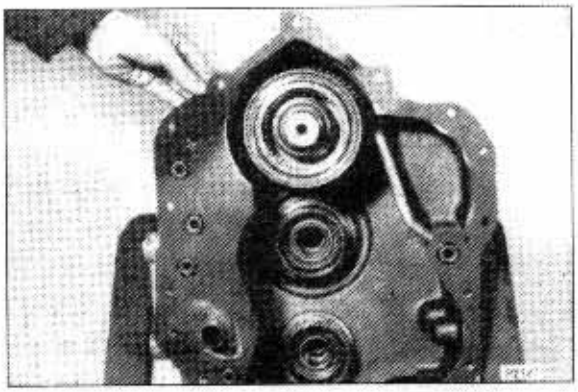
(28) Install the 2nd gear hub onto the 1st clutch shaft and fit the 2nd gear hub circlip.



(29) Install the 2nd gear hub retaining washer and fit the retaining washer circlip.



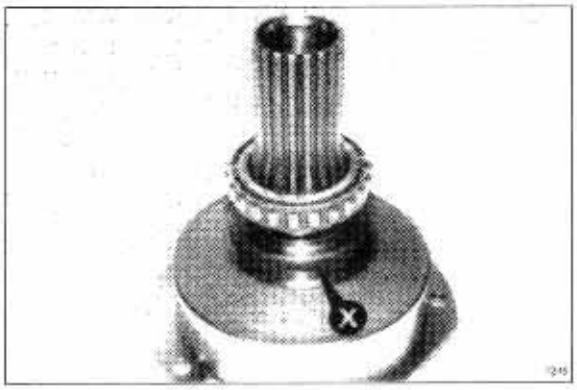
(30) Position new O-rings and gasket on the front of the housing. A light coat of grease will hold them in place.



CONVERTER HOUSING REASSEMBLY

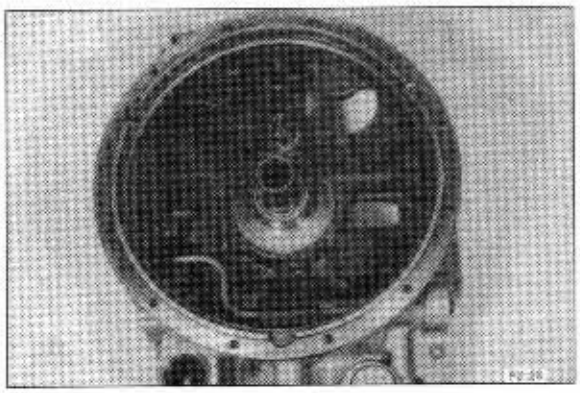
(31) Assemble new expander and sealing ring **X** onto stator support. Expander gap to be positioned 180 degrees from the seal ring hook joint. Press bearing into position.

※ Bearing part number must be up.

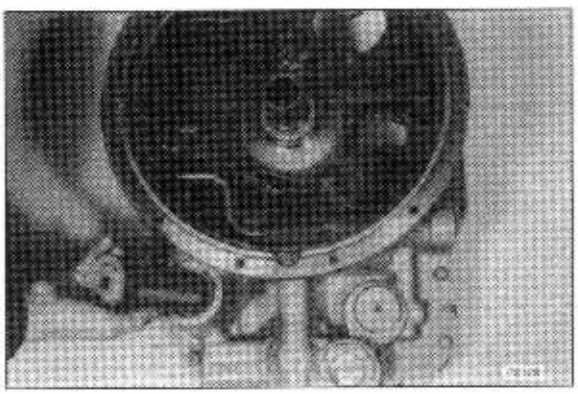


(32) Thoroughly clean the stator support mounting surface and tapped holes with solvent and allow to dry. Tap the stator support into position and install new specially coated screws. Tighten to 1.7-2.2kgf · m(12-16lbf · ft).

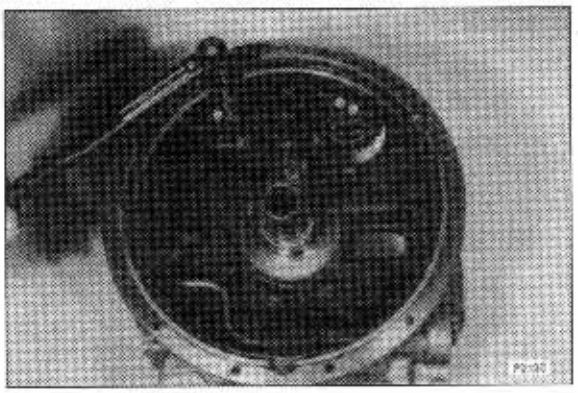
※ Assembly of the stator support to converter housing must be completed within 15 minutes from the start of screw installation. The special screw is to be used for one installation only. If the screw is removed for any reason, it must be replaced. The loctite left in the holes must be removed with the proper tap and cleaned with solvent. Dry hole thoroughly and use a new screw for reinstallation.



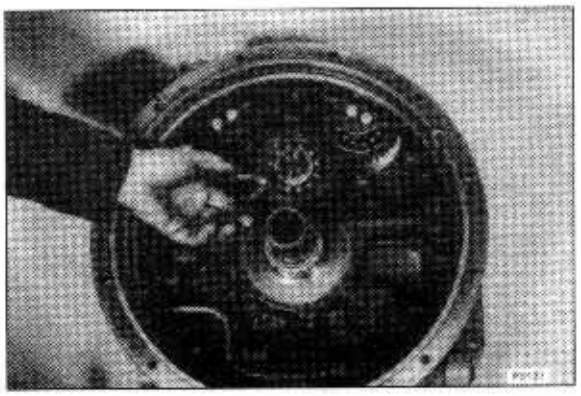
(33) Insert the sump strainer and seal.



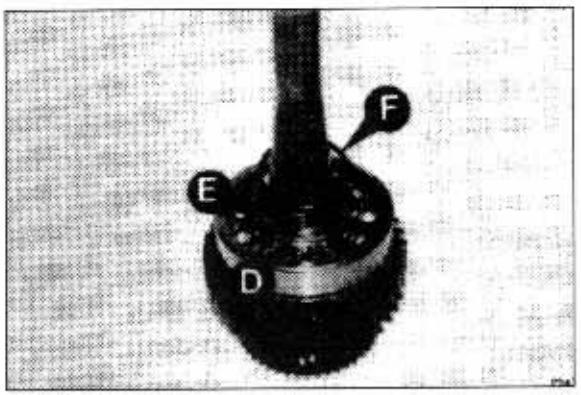
(34) Assemble the main and charging pump drive gears. Install support screws and washers.
Tighten bolts to 3.2-3.5kgf · m (23-25lbf · ft).



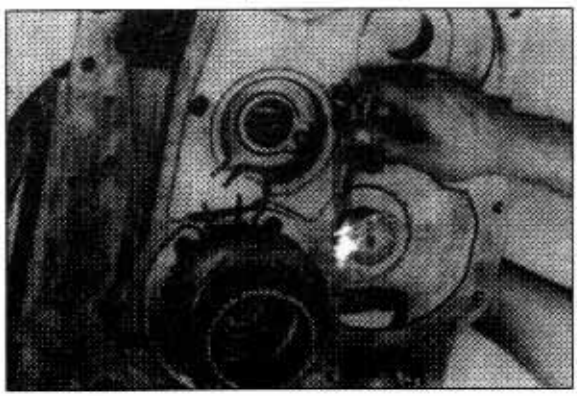
(35) Install the pump drive idler gear and bearing on the idler gear stub shaft. Fit the idler gear circlip.



(36) If the turbine shaft bearing was removed, press into position with the outer retaining ring groove down. Install bearing washer **D** and retaining ring **E**. Fit new piston ring **F** to the turbine shaft.

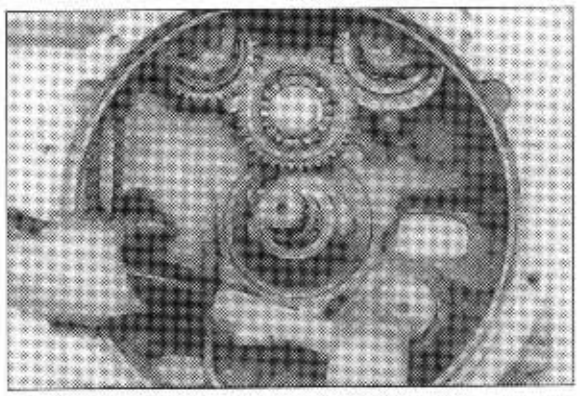


(37) Spread ears on turbine shaft bearing retainer ring located in reaction member support. Tap turbine shaft and bearing position, being certain bearing snap ring is in full position in snap ring groove.

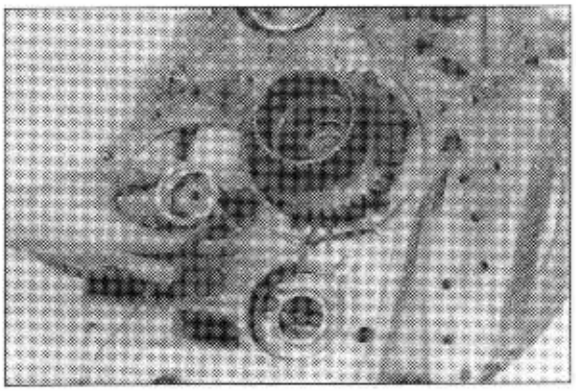


※ With new O-ring on shaft, position reverse idler shaft in housing. Align groove in shaft with notch in housing. Install lock ball.

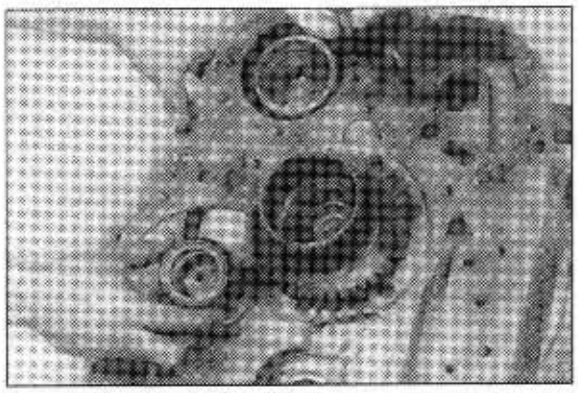
(38) Tap shaft into position, use caution as not to lose lock ball.



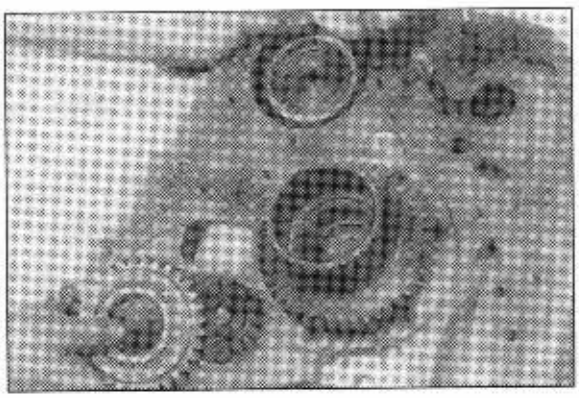
(39) Install shaft spacer.



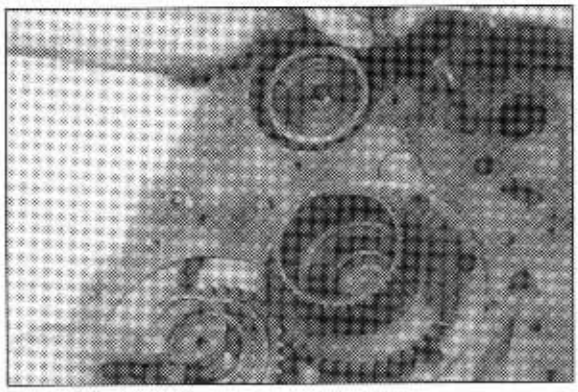
(40) Install inner taper bearing on shaft with large diameter of taper down. Position bearing spacer on shaft.



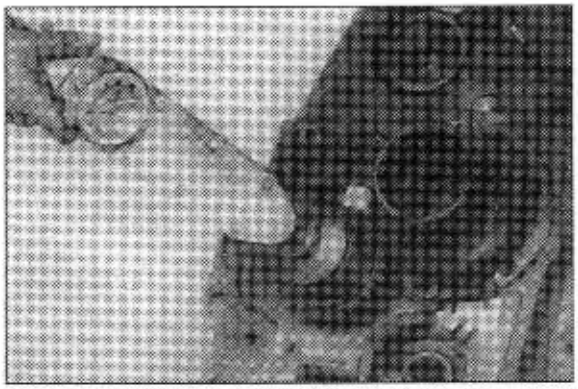
(41) Position reverse idler gear on shaft with hub of gear up. Install outer taper bearing in gear with large diameter of taper up.



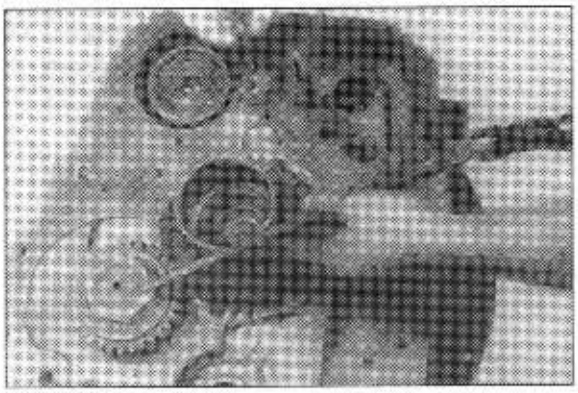
(42) Position outer spacer on shaft.



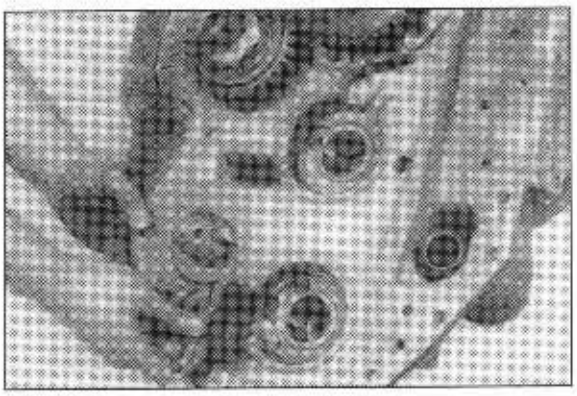
(43) Install shaft retainer nut. Tighten nut to 27.6-34.5kgf · m(200-250lbf · ft) torque.



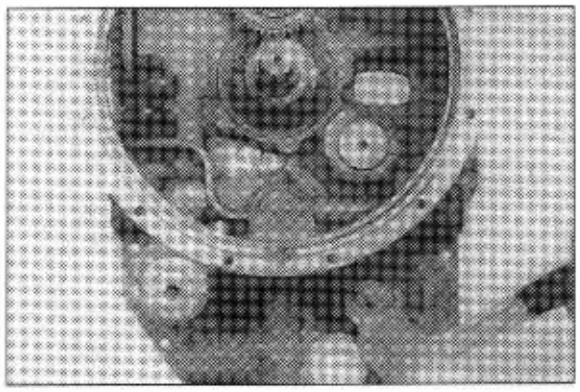
(44) Stake nut securely in shaft notch.



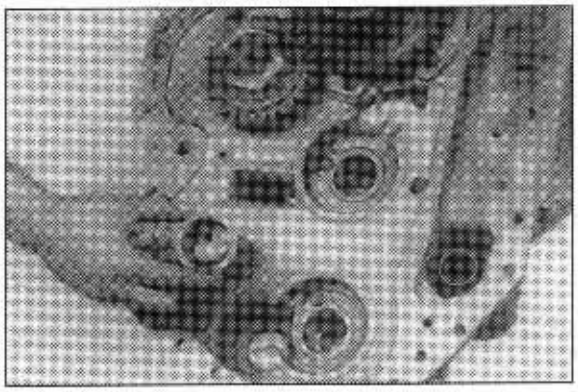
(45) With new O-ring on shaft, position idler shaft in housing.
Align groove in shaft with notch in housing. Install lock ball.



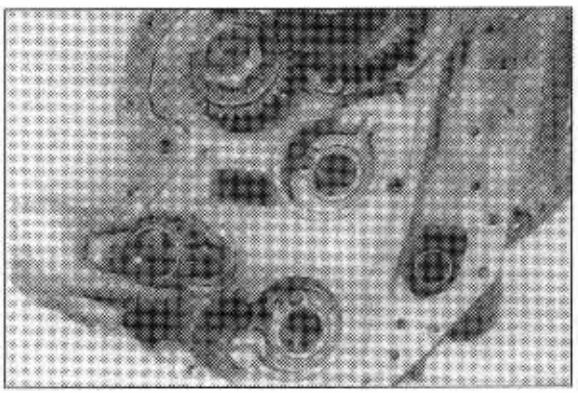
(46) Tap shaft into position, use caution as not to lose lock ball.



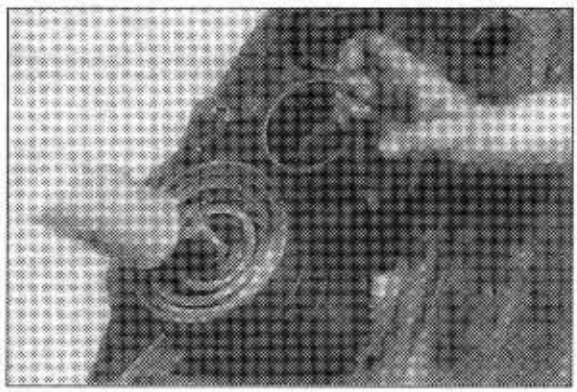
(47) Install idler shaft spacer.



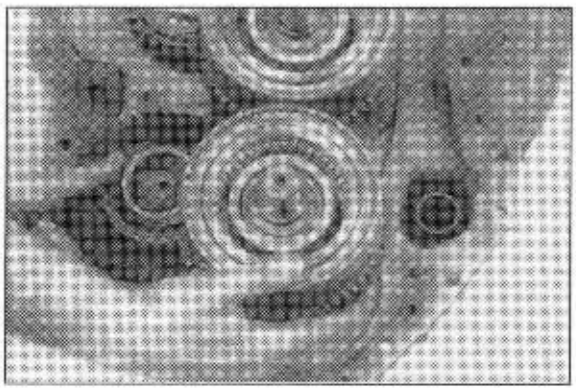
(48) Install idler gear inner taper bearing on shaft with large diameter of taper down. Position bearing spacer on shaft.



(49) Spread ears on reverse clutch front bearing locating ring. Tap reverse and 2nd clutch assembly into converter housing. Align the snap ring groove in the bearing with the snap ring in the housing, being certain bearing snap ring is in full position in snap ring groove.

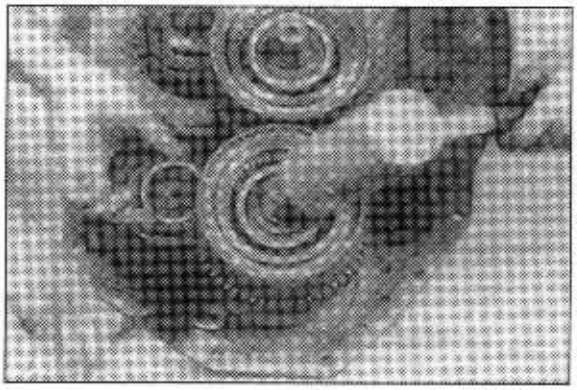


(50) Position idler gear on bearing with hub of gear up.

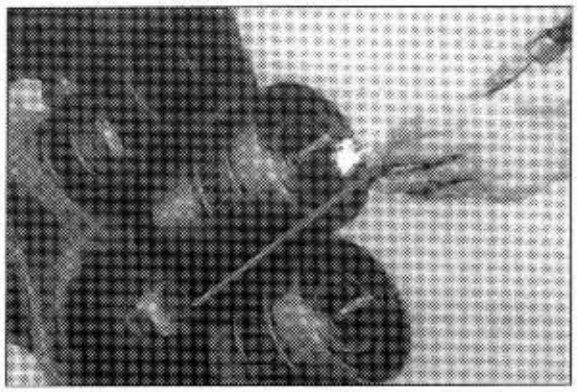


(51) Spread ears on 4th clutch front bearing locating ring.

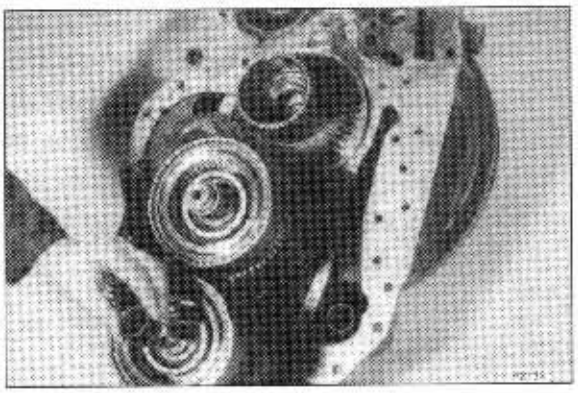
※ The idler gear and taper bearing cup assembly and the 4th clutch assembly must be installed in the converter housing at the same time as the idler gear must be positioned between the clutch front bearing and the clutch drum. Install the idler outer taper bearing with small diameter of taper down. Make sure locating ring is in full position in ring groove.



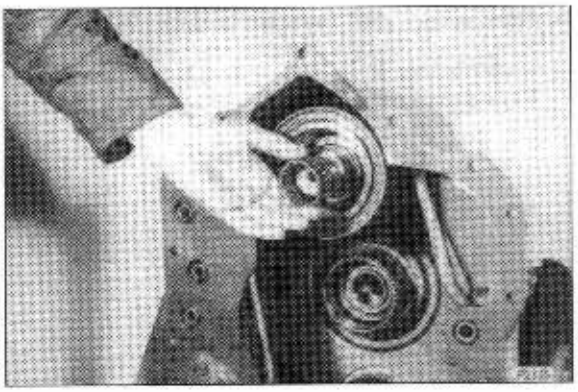
(52) Repeat procedures shown in the clause (42) thru (45).



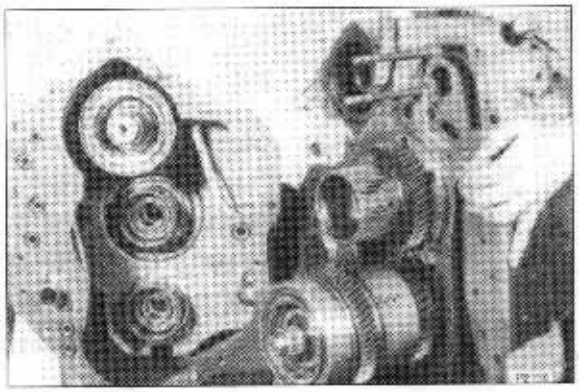
(53) Position the pilot bearings on the 2nd and 3rd clutch shafts, a light coat of grease will hold the bearings in place.



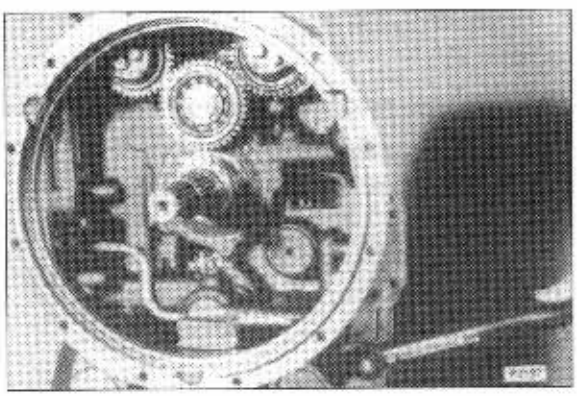
(54) Install forward clutch pilot bearing.



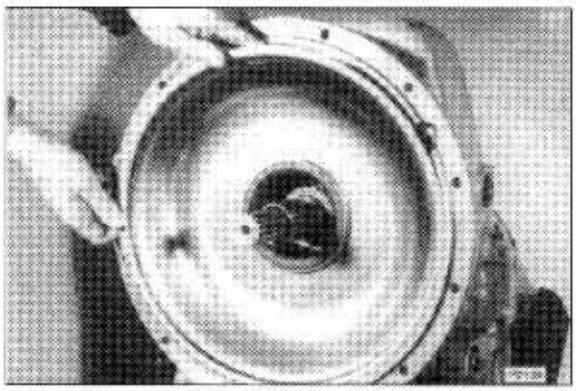
(55) Fit the converter housing to transmission casing taking care to align the clutch pilots into the clutch disc hubs.
Turn the turbine shaft back and forth to align the clutch discs with the hubs. **Do no force this operation.**
When all clutches are properly aligned the converter housing will be tight against the transmission housing.



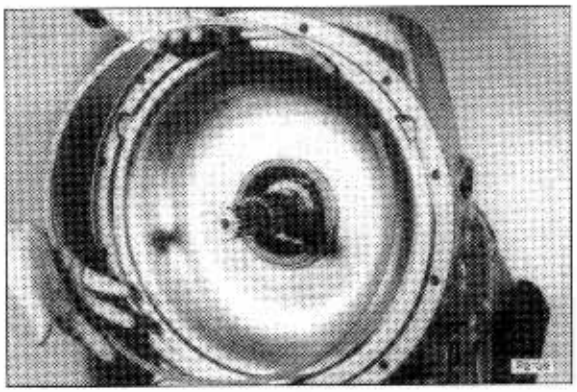
(56) Install bolts and washers and tighten to 5.1-5.7kgf · m(37-41lbf · ft).



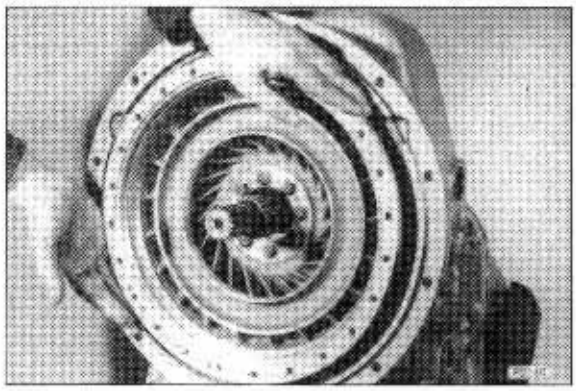
(57) Apply a light coat of JCB Multi-gasket to the outer diameter of the oil baffle inner oil seal and press the seal into the baffle with the lip facing towards impeller hub bearing. Position new outer sealing ring on to the baffle and fit to the housing.



(58) Fit the oil baffle retaining ring making sure it is fully in position.

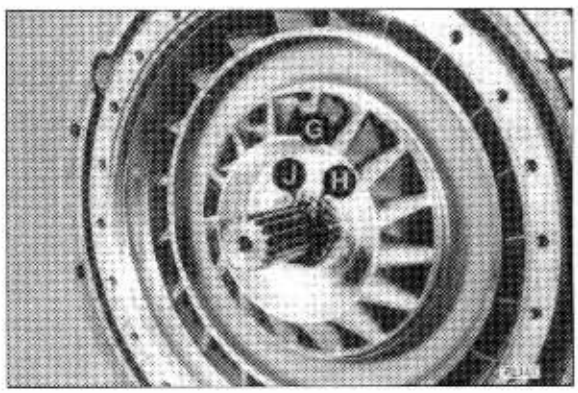


(59) Fit the impeller and hub assembly taking care not to damage the baffle oil seal. Take extreme care not to damage or unhook the sealing ring on the support. Fit the hub spacer.

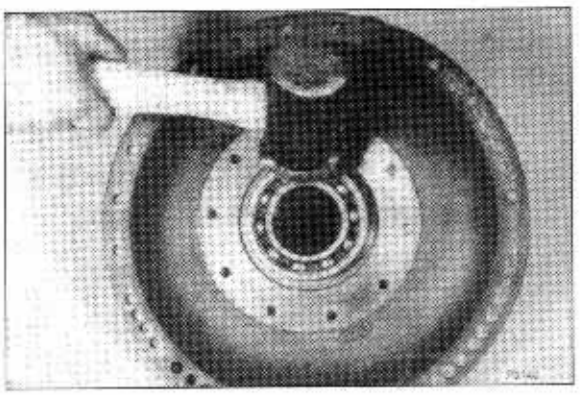


(60) Assemble the reaction member **G**, retaining ring **H** and turbine locating circlip **J** on the turbine shaft.

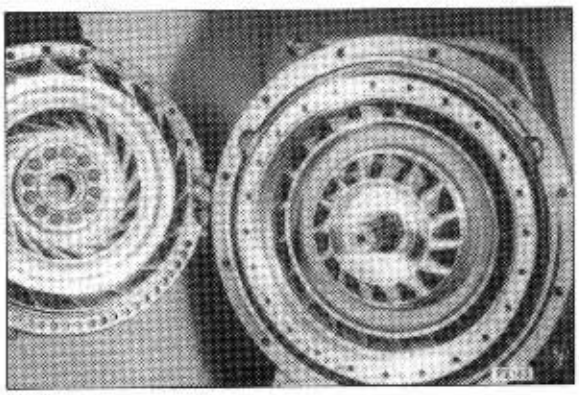
※ The thick sides of the reaction member blades must be out.



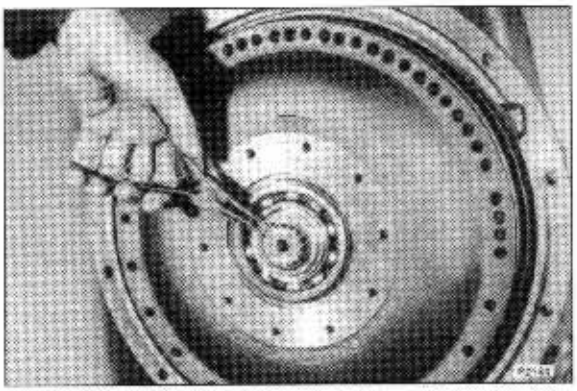
(61) Install the impeller cover bearing with the locating ring towards the top.



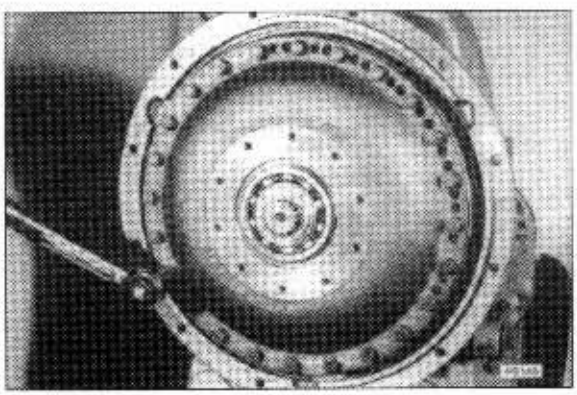
(62) Fit the oil baffle retaining ring making sure it is fully in position.



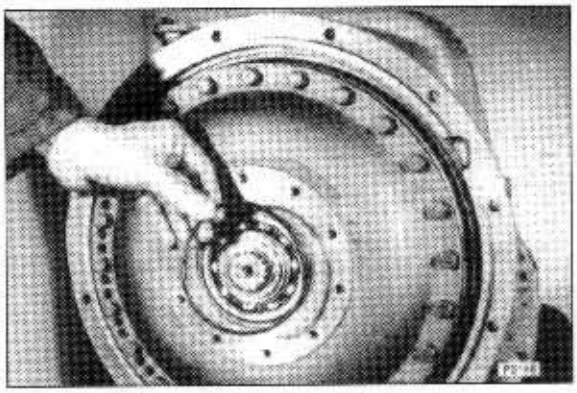
(63) Install the turbine hub retaining ring.



(64) Install cover bolts and tighten to 3.2-3.5kgf · m(23-25lbf · ft).

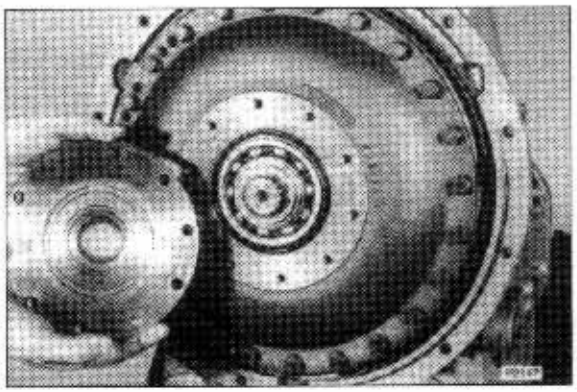


(65) Position a new O-ring over the impeller cover bearing.

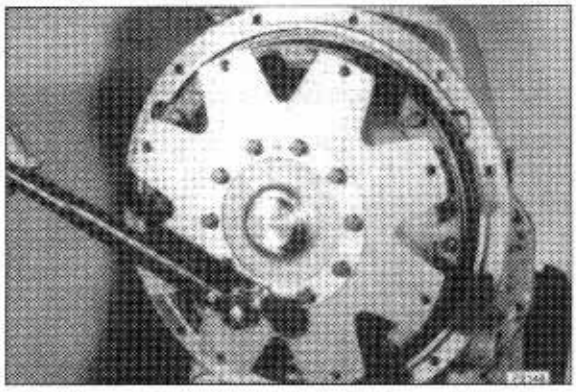


(66) Thoroughly clean tapped holes and studs (If fitted) with solvent. Apply loctite 262 to the holes and stud ends.
Position the impeller cover bearing cap and install studs.

※ Allow the loctite to cure fully before fitting transmission to engine.



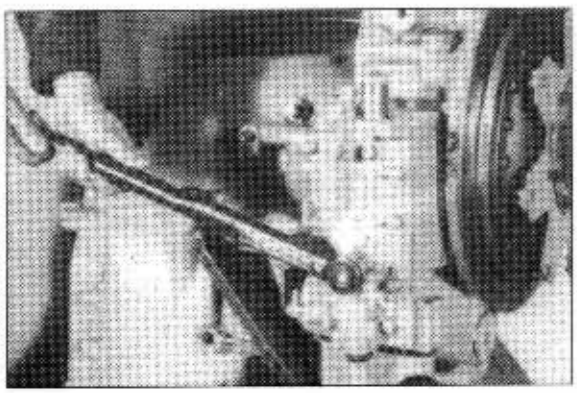
(67) Assemble the drive plate group and backing ring onto studs(If fitted), with the dimples on the backing ring out.
Install washers and stud nuts and tighten to 3.6-4.0kgf · m(26-29lbf · ft). If bolts are fitted, apply solvent and loctite in a similar way and tighten to 3.6-4.0kgf · m(26-29lbf · ft).



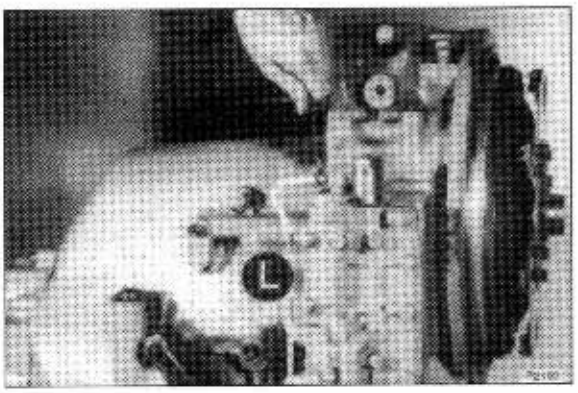
(68) Fit the control valve block using a new O-ring and gasket and tighten bolts to 3.2-3.5kgf · m(23-25lbf · ft).

※ See control valve disassembly and assembly for torque tightening sequence.

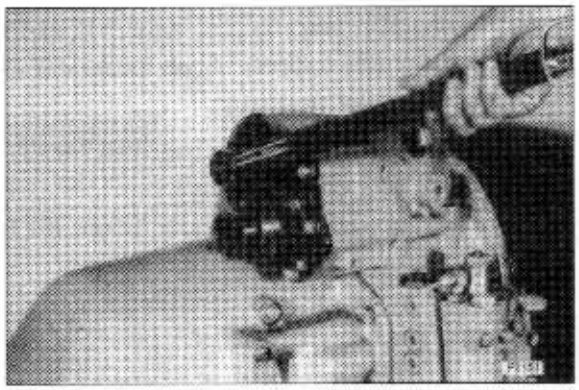
※ Connect the shuttle valve solenoid wires **K**. Apply loctite 262 on upper right-hand bolt.



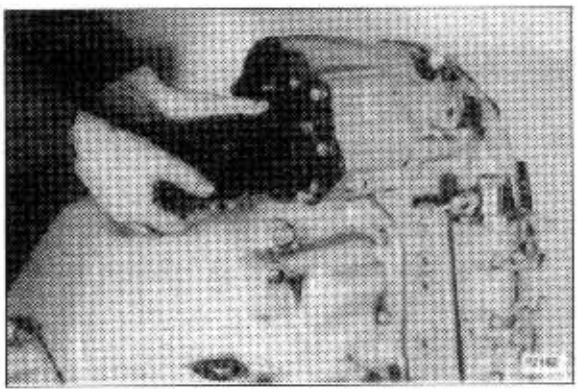
(69) Connect the cross-over pipe **L** and tighten the unions.



(70) Using a new gasket and O-ring install the charging pump. Tighten bolts to 5.2-5.7kgf · m(37-41lbf · ft).

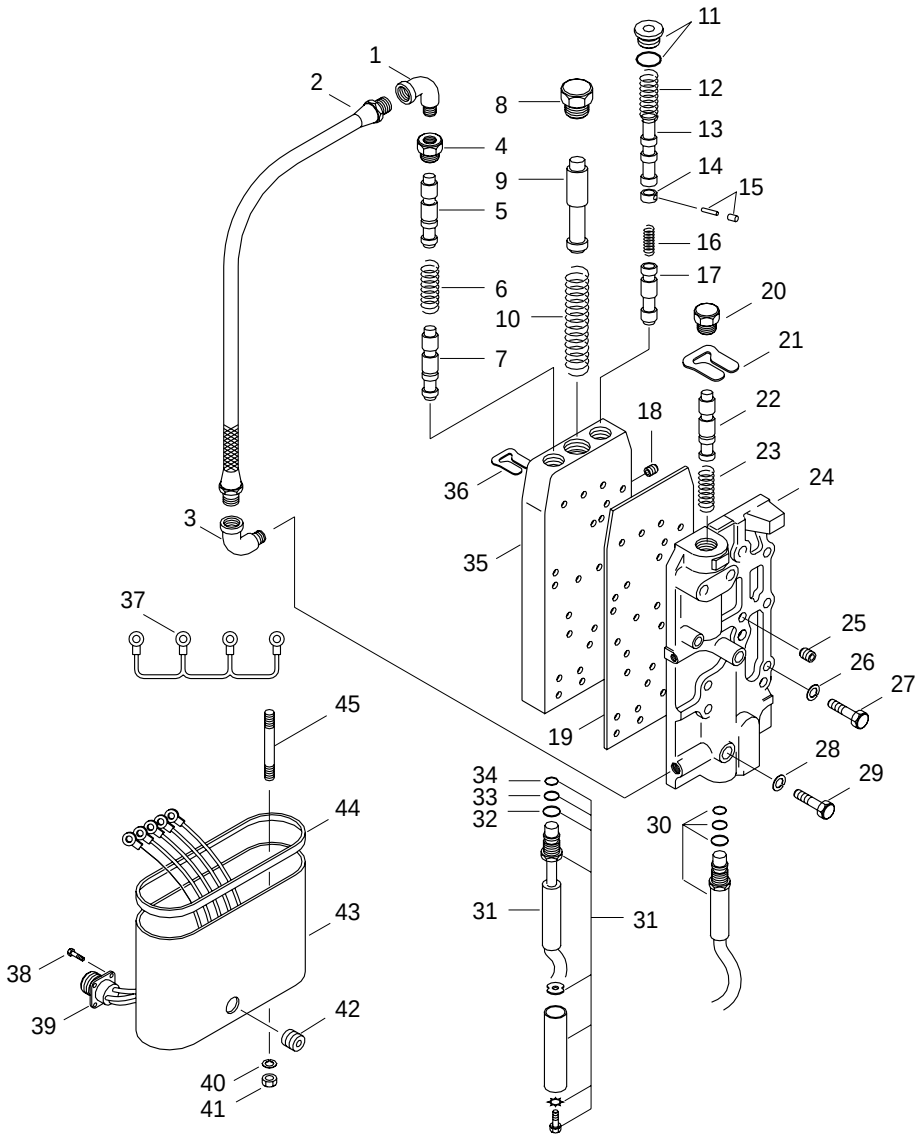


(71) Smear the seal of a new oil filter cartridge and fit to the pump housing. Fit the dipstick/filler tube(Not shown).



2. CONTROL VALVE

1) STRUCTURE



1	Elbow	16	Spring	31	Solenoid coil
2	Tube assy	17	Shift spool	32	O-ring
3	Elbow	18	Pipe plug	33	O-ring
4	Valve plug	19	Gasket	34	O-ring
5	Shift spool	20	Plug	35	Control valve housing
6	Spring	21	Spool stop	36	Spool stop
7	Shift spool	22	Spool	37	Ground wire harness
8	Plug	23	Spring	38	Screw
9	Valve spool	24	Valve body	39	Receptacle & wire assy
10	Spring	25	Pipe plug	40	Lock washer
11	Plug & O-ring	26	Lock washer	41	Nut
12	Spring	27	Screw	42	Grommet
13	Shift spool	28	Lock washer	43	Dust cover
14	Spool stop	29	Screw	44	Dust cover seal
15	Roll pin & plug stop	30	Shuttle valve solenoid	45	Mounting stud

2) DISASSEMBLY AND ASSEMBLY

The numerical sequence shown on the illustration is intended as a guide to disassembling.

For assembly the sequence should be reversed.

(1) When disassembly

Depress spool 22 to remove stop 21.

Renew oil seals when spools 5 and 13 are removed.

Depress spool 9 to remove stop 36.

(2) When assembly

Depress spool 9 to fit stop 36.

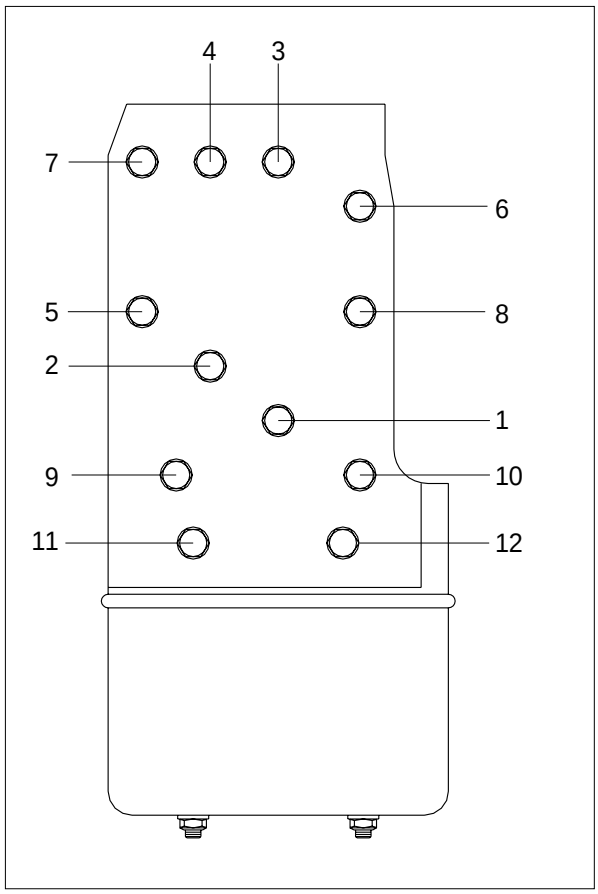
Take care not to cut lips of oil seals when refitting spools 5 and 13.

Depress spool 22 to fit stop 21.

※ Refer to tightening sequence as shown in the figure.

Torque settings

Item	N · m	kgf · m	lbf · ft
27, 29	31-33	3.2-3.4	23-25



3. AXLE

1) GENERAL INSTRUCTIONS

Before starting operations for disassembling, overhauling and reassembling the following points should be borne in mind.

(1) Cleaning components

△ **Never use gasoline, solvents or other inflammable fluids to clean components. Use approved commercial solvents that are uninflammable and non-toxic.**

① Maximum cleanness is recommended when working on an assembly, consequently, all components should be thoroughly cleaned before reassembly.

② Ambient where operations are carried out should be dust free and as clean as possible.

③ Make sure that tools and equipment are at hand, particularly those listed and shown in this manual. Components that have been misplaced may be cause of failures on assembly operations as well as chips or foreign matters.

④ When overhauling the assembly we suggest to replace the following parts with new ones:

- Seal rings
- Gaskets
- O-ring
- Threaded rings with notched collar
- Any component damaged during disassembly

⑤ In case of failure and breaking inside of assembly, all ducts and casings should be duly cleaned up so as to remove all material left to prevent further damage after assembling components.

⑥ In order to heat bearings use proper heating plates, pipings or suitable ovens.
Never heat parts by using a torch. Oil bath, heated by a torch, may be used to warm up components.

⑦ Lubricate all sections concerned when reassembling shafts, bearings, etc.

⑧ When mounting heat fitted components make sure of their proper position after they cooled off.

⑨ Lubricate O-ring seals before installing them in relevant seats to prevent kinking during assembly, such a position would impair proper sealing.

(2) Assembling leakproof components

Use of proper sealing compounds is recommended when assembling matched parts to be sealed against fluid leakages(Oil or water) and no sealing gasket is used.

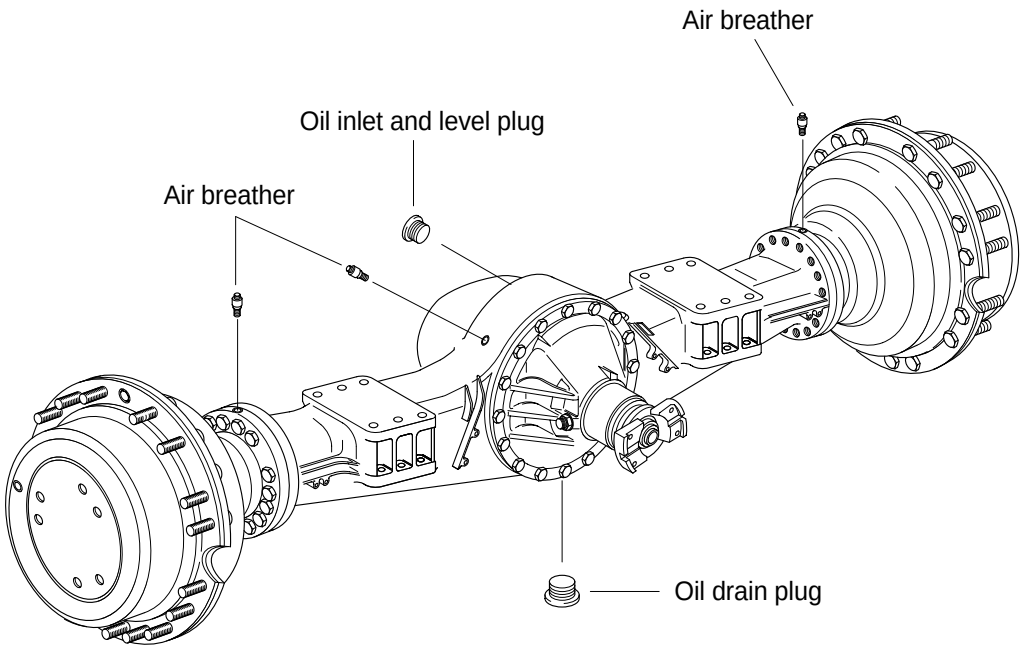
Best results are reached, with said compounds, if matching surfaces are duly cleaned and degreased prior a uniform coat is spread all over the contact area.

We suggests the following sealing compounds :

· RHODORSIL CAF 1

· LOCTITE PLASTIC GASKET

· SILASTIC 732 RTV



※ Use only **genuine spare parts** to warrant proper operations and prevent interchangeability problems.

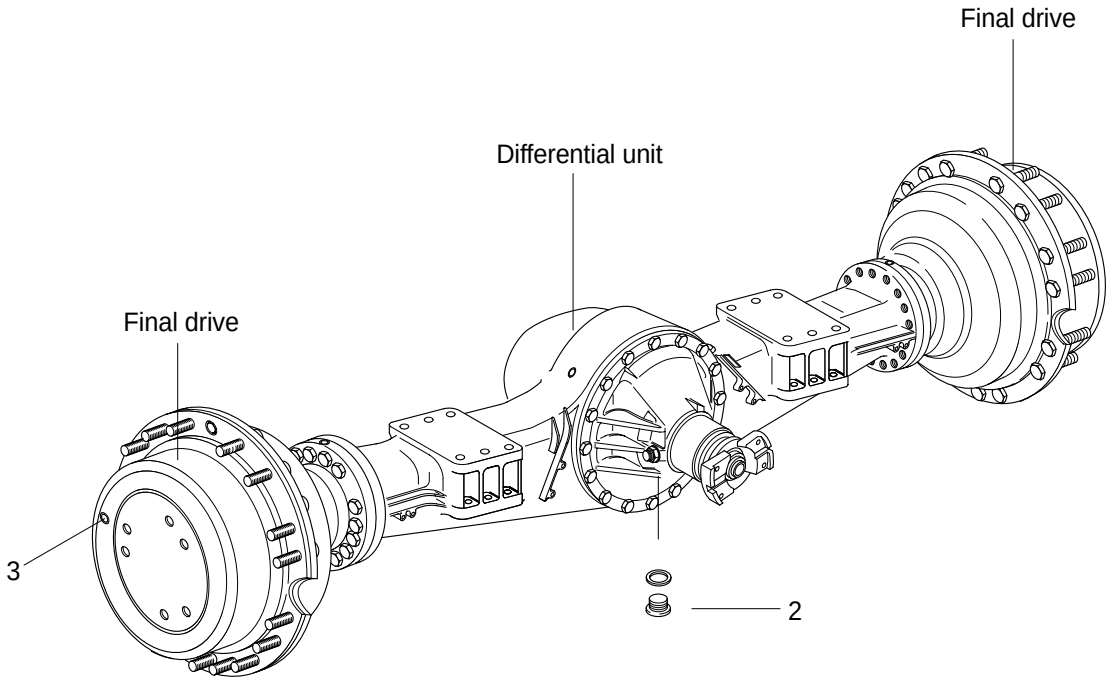
2) TIGHTENING TORQUES(Front and rear)

No.	Item	Torque	
		kgf · m	lbf · ft
1	Screws fixing sleeves to axle case	61.2 ±3.1	441.6 ±22.1
2	Screws securing bevel ring gear to differential case	33.7 ±1.7	243.2 ±12.2
3	Screws fixing differential half-cases	12.2 ±0.6	88.0 ±4.4
4	Screws securing differential caps	33.7 ±1.7	243.2 ±12.2
5	Screws securing differential to axle case	22.4 ±1.1	161.6 ±8.1
6	Screw securing pinion support	33.7 ±1.7	243.2 ±12.2
7	Screws fixing side gear carrier to wheel hub	7.1 ±0.4	51.2 ±2.6
8	Screws fixing side cover	3.6 ±0.2	26.0 ±1.3
9	Standard backlash of bevel gear set	0.20 ~ 0.28mm	

3) DISASSEMBLING AND ASSEMBLING AXLE UNITS

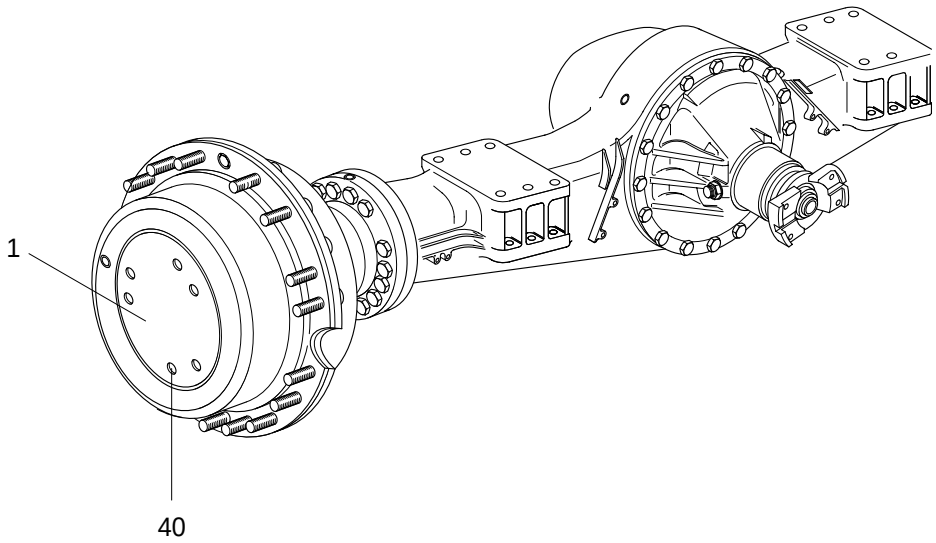
⚠ **Lift and handle all heavy components by using proper equipment.**
Make sure that assemblies or components be held up by proper slings close to the unit to be lifted.

Location of oil filling and draining plugs on axle casing and side final drives.



- Oil drain
  Drain oil from central section thru plug 2.
  Drain oil from side final drives thru plug 3.

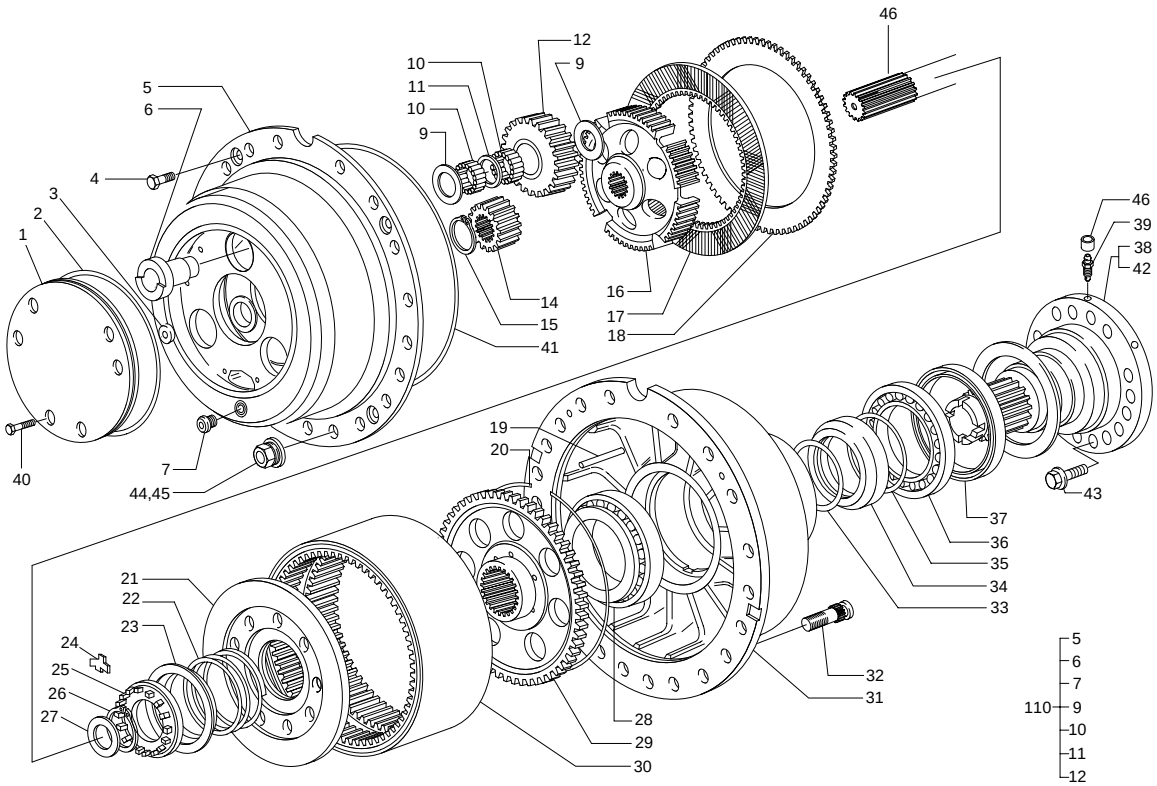
4) DISASSEMBLING SIDE FINAL DRIVES



(1) Remove final drive cover releasing the six screws(40).

※ Cover(1) is provided with three threaded holes for puller screws.

DISASSEMBLING SIDE FINAL DRIVES



(2) Remove O-ring seal(2).

(3) Pull out axle shaft backing plate(3) using puller screw.

(4) Undo screws(4) fixing side gear carrier(5) to wheel hub(31).

(5) Suitably support side gear carrier(5), pry it off to separate carrier from wheel hub(31).

(6) Pull out side gear carrier assy(5).

(7) Remove lockring(15) retaining sun gear(14) on wheel shaft(46).

(8) Pull out sun gear(14).

(9) Remove disk carrier hub(16) along with thrust washer(27) resting against wheel hub sleeve.

(10) Remove solid and lined disks(17,18) of brake.

(11) Remove wheel shaft(46).

(12) Pull out lockring(26), securing ring nut(25) and lock plates(24).

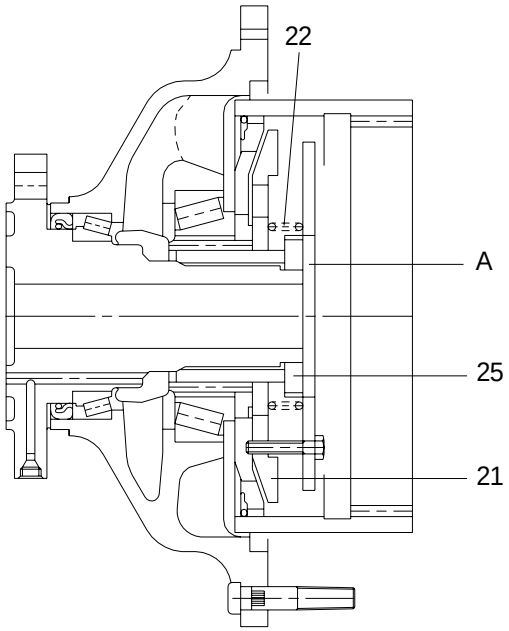
(13) Remove lock plates(24).

(14) Install the specific spring retainer.
Secured thru the three threaded holes of disk pressure plates(21) - to compress brake return spring(22) and allow ring nut (25) removal.

(15) Unlock and turn out ring nut(25) from sleeve(38).

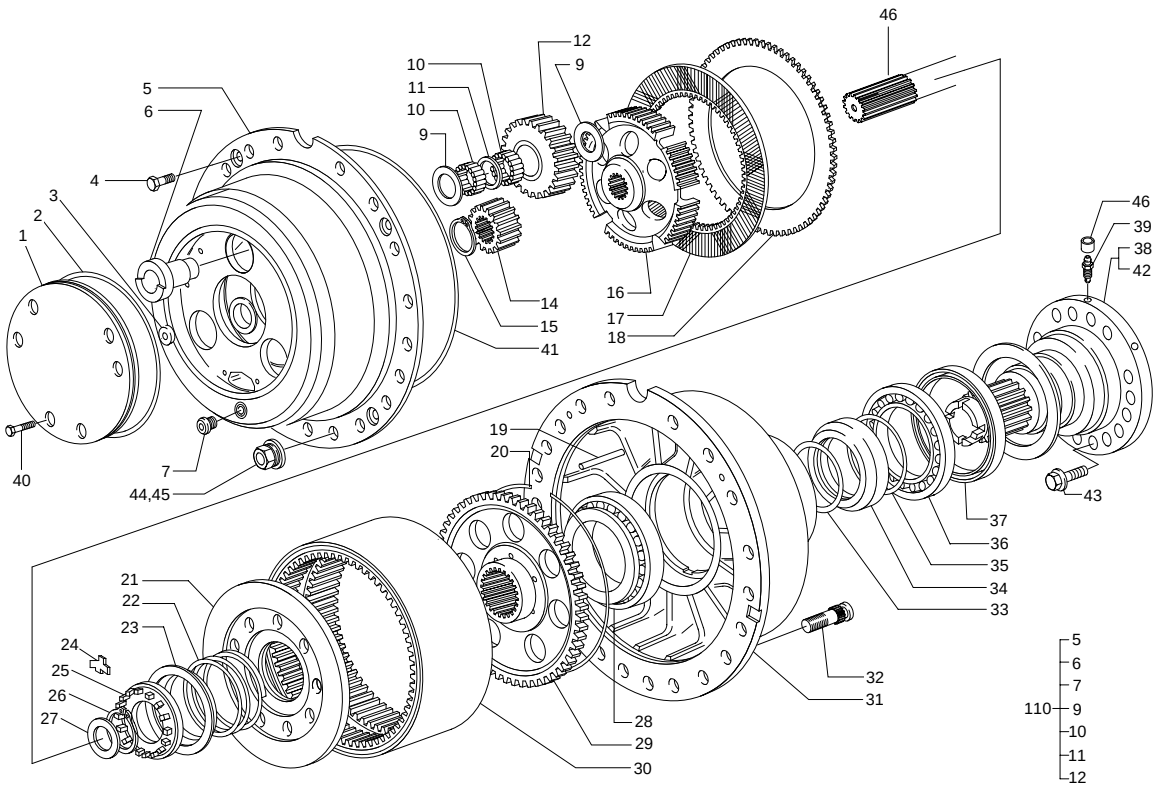
(16) Remove pressure plate(21) along brake return spring retainer.

Spring retainer installed



A	Spring retainer
21	Pressure plate
22	Return spring
25	Ring nut

DISASSEMBLING SIDE FINAL DRIVES



(17) Suitably support wheel hub(31) and pull out ring gear unit(30) and relevant support(29).

(18) Pick up the six rods(19) located in relevant seats on ring gear support(29).

(19) Pry off lockring(20) from ring gear(30) by using a screwdriver.

(20) Disassemble ring gear support(29) from ring gear(30).

(21) Should replacement of outer wheel bearing(28) inner race be mandatory, old part can be removed by a proper puller or by a remover that can be inserted in the specific holes of ring gear support (29).

(22) Remove retainer of brake unit spring, disassemble spring(22), retaining cup(23) and pressure plate(21).

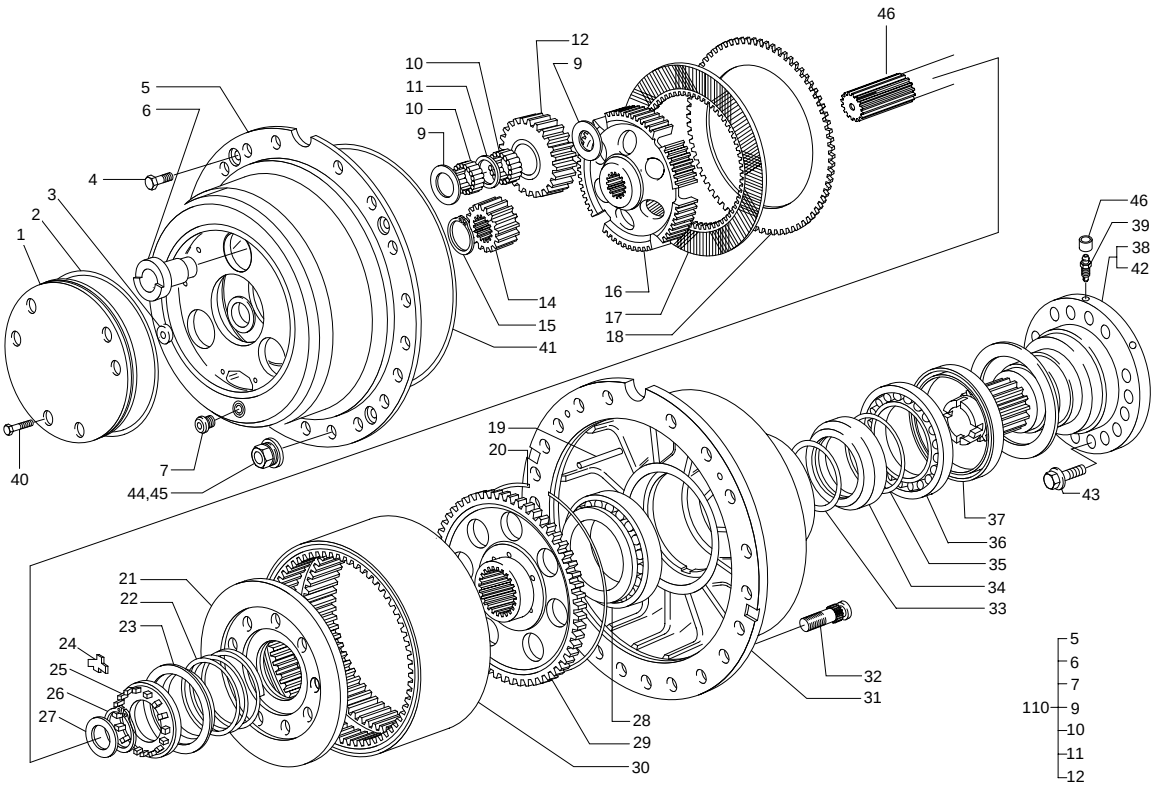
(23) Remove brake actuating piston(34) from wheel hub sleeve(38) by compressed air thru brake oil ducting.

(24) Remove and replace the two O-ring seals(33 and 35) in relevant seats on brake actuating piston.

(25) Pull out the complete wheel hub(31).

(26) Remove O-ring seal(41).

DISASSEMBLING SIDE FINAL DRIVES



(27) Pry off from wheel hub(31), seal(37) and remove inner race with roller cage of inner wheel bearing (36).

(28) Push out, by a proper remover, outer races of outer and inner wheel bearings(28 and 37) from hub(31).

(29) Should sleeve(38) be damaged, it can be removed by undoing relevant fixing screws(43). At reassembly, smear proper sealing compound on axle case joining flange and tighten screws with a torque of : See tightening torque No.1

(30) Mark side gear pins(6) and various components for identification of original position at reassembly.

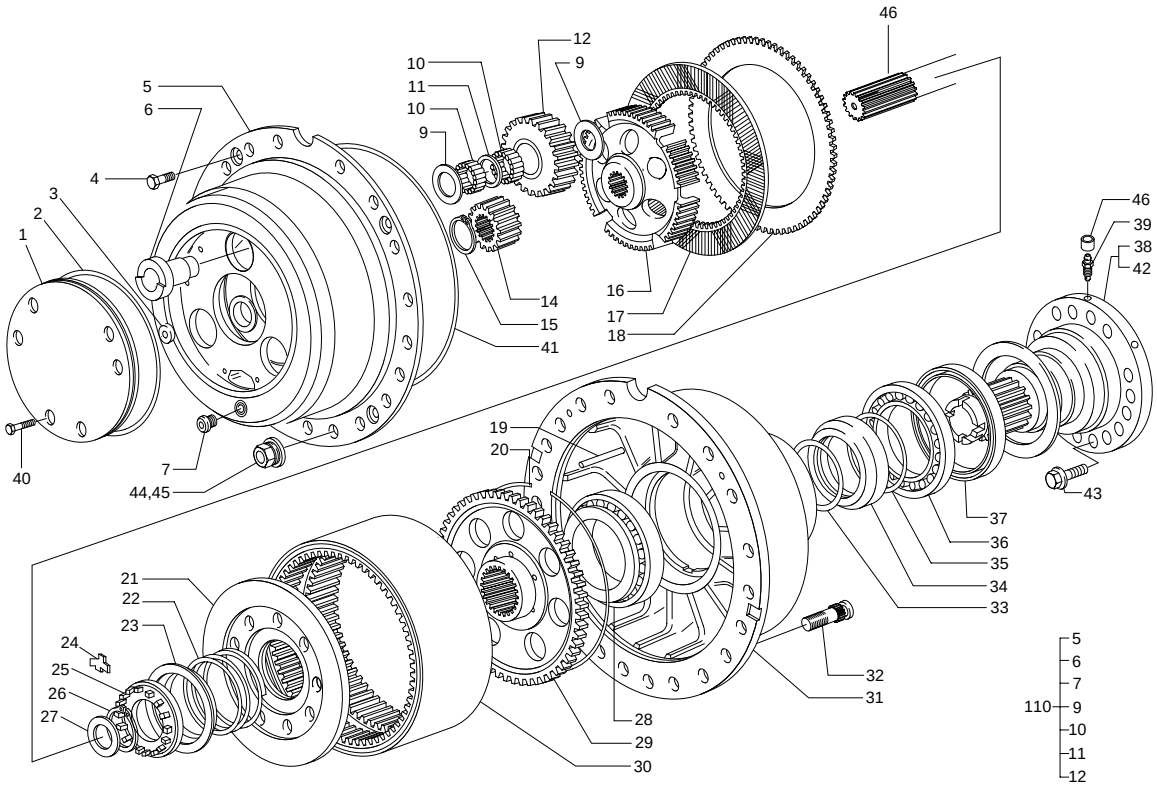
(31) Arrange side gear carrier(5) on wooden blocks and push out pins(6) with a proper remover.

(32) Pick up all needle rollers(10,11).

(33) It is important to keep matched needle rollers and thrust washers(9) with relevant pin(6), this is consequent to predetermined assembly tolerance limits.

(34) Remove side gears(12) and relevant thrust washers(9) no gear can be removed prior having released all of them.

5) ASSEMBLING SIDE FINAL DRIVE



(1) Reinstall wheel hub(31), first fit outer races of wheel inner and outer bearings(36 and 28), make sure they rest against relevant seats. Position inner race with roller cage of wheel inner side bearing(36) before fitting lip seal(37).

(2) Refit O-ring seal(41).

(3) Support suitably wheel hub(31) during the assembling stage to prevent seal damages, then, fit wheel inner bearing(36) in sleeve(38).

(4) Lubricate seals(33 and 35) on piston(34), insert it at travel end on wheel hub sleeve(38).

(5) Fit inner race of wheel outer bearing(28) on ring gear support(29), by heating equipment or proper installer ; Then, mount support(29) in ring gear(30) and secure by lockring(20).

(6) Mount ring gear and support unit(30 and 29) on sleeve(38).

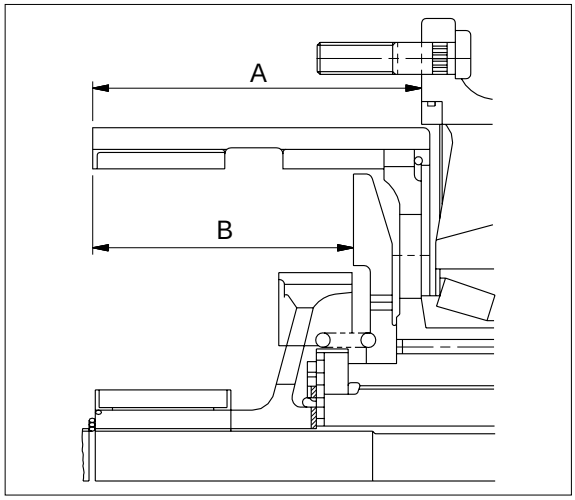
(7) Fit the six rods(19) in relevant seats on ring gear support(29).

(8) Install the spring retainer(Figure at page 3-100) and compress spring(22) with relevant retaining cup(23) on pressure plate(21).

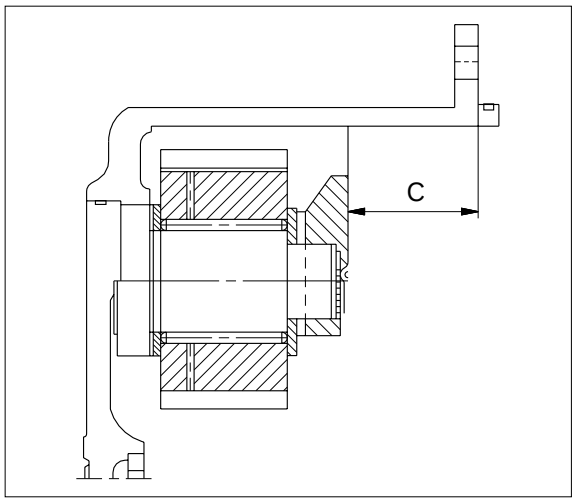
(9) Mount the pressure plate-spring assembly on ring gear support(29).

※ **Determining the space available to form the brake disk pack**

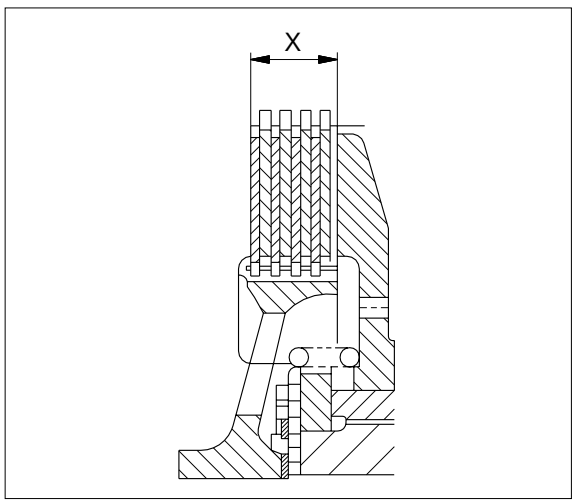
Record depth from seating surface of side gear carrier on wheel hub to outer edge of ring gear, identify said value as **A**.
Record depth from ring gear outer edge to brake pressure plate, identify said value as **B**. Subtract the value recorded from value **A** recorded on previous step, identify it a **D**.
i.e. : **A - B = D**



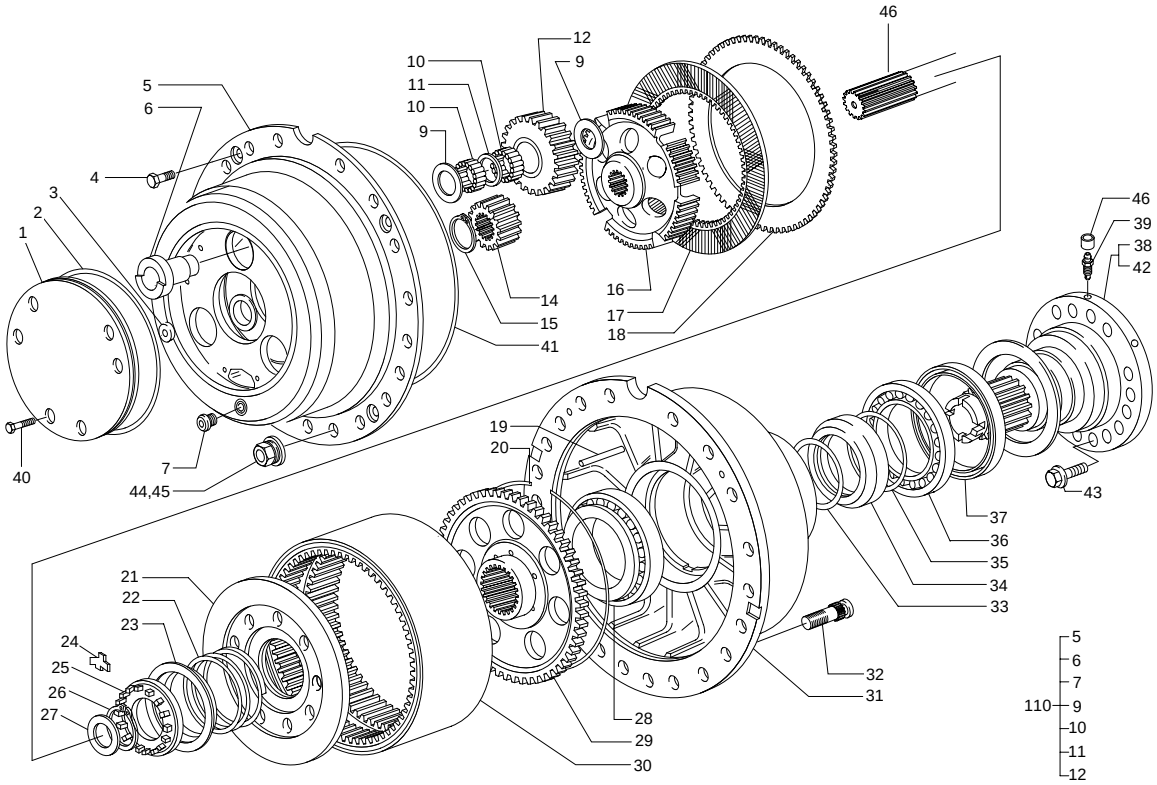
Record depth from disk reaction face to outer edge of side gear carrier.
Value recorded as **C** should be subtracted from value **D** previously recorded.
i.e. : **C + D = X**
This is the space available to form the brake disk pack.



Forming the disk pack
Computing thickness of disk pack(Solid + lined ones) it is necessary to subtract the clearance of 1㎜ for each brake disk plus the total thickness of the lined disks from the space available for the remaining clearance with solid disks(Outer teeth) of proper thickness with a tolerance of ± 0.25㎜.



ASSEMBLING SIDE FINAL DRIVE



(10) Hand screw ring nut(25) on wheel hub sleeve(38).

(11) Tighten ring nut(25) by the proper wrench so as to reach the prescribed pre-load for wheel bearings and corresponding to a revolving torque of 1.5-3.1kgf · m(10.8-22.4lbf · ft) checking alignment for the lockplates(24).

※ To prevent wrong recording of torque values, it is advisable to seat bearing properly before checks by revolving repeatedly the wheel hub.

(12) Remove spring retainer compressing brake actuator return spring.
Insert lockplates(24), securing ring nut(25) and fit lockring(26).

(13) Side gear carrier(5).

※ Arrange the three side gears(12) in proper carrier seat.

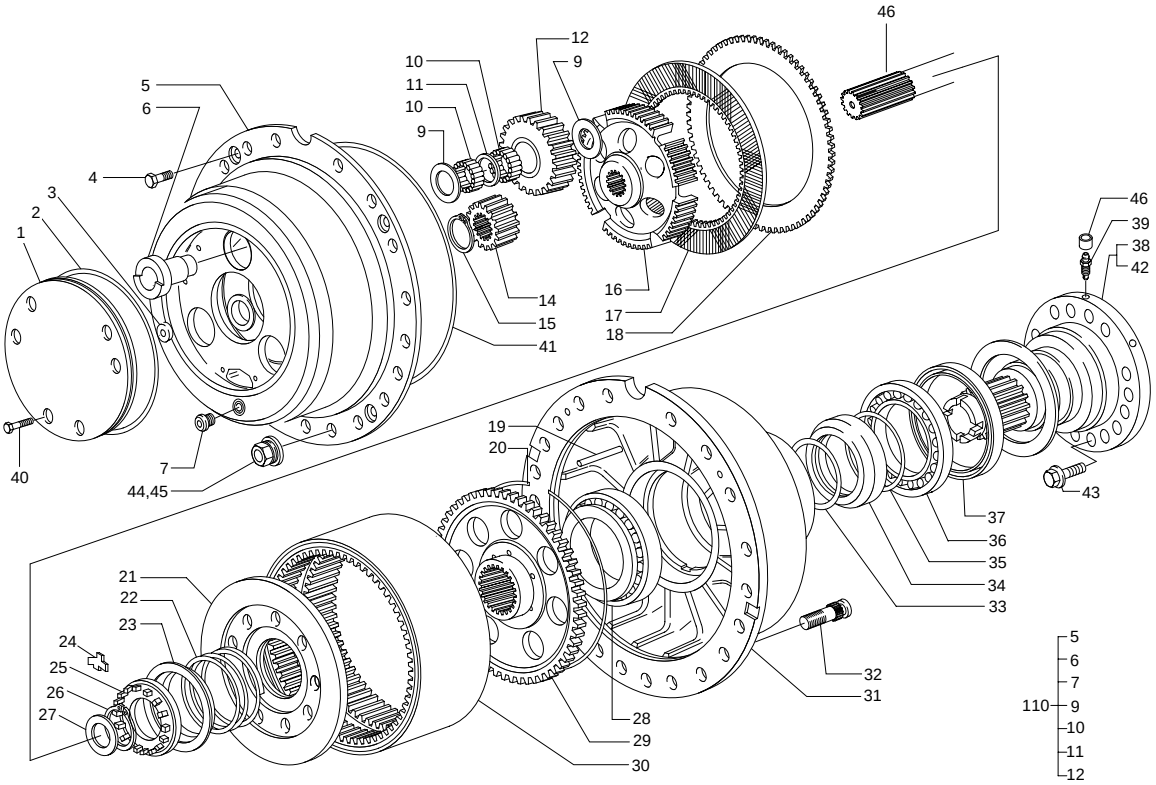
※ Two rows of needle rollers of the same selection class should be used for replacement in each single side gear pin.

(14) Insert outer thrust washers(9), smear with grease pin lower portion(Head end) and position the first row of needle rollers, fit spacer, smear with grease pin upper portion and position the second row of needle rollers(10,11).

(15) Position outer thrust washers(9) of side gear on side gear carrier and aline holes.

(16) Insert and force fit complete pins(6) and avoid any bump or knock that could cause roller fall.

ASSEMBLING SIDE FINAL DRIVE



(17) Insert wheel shaft(46).

(18) Insert thrust washer(48).

(19) Mount disk carrier hub(16) on wheel shaft(46).

(20) Mount alternately solid disks and lined disks.

※ Insert a solid disk(Outer teeth) facing the pressure plate(27).

(21) Insert sun gear(14) and secure with lockring(15).

(22) Mount the side gear carrier assembly (5) on side gear unit and secure on wheel hub(31) locking fixing screws(4) with a tightening torque of : See tightening torque No.7.

(23) Force fit wheel shaft backing plate(3).

(24) Mount O-ring seal(2) on edge.

(25) Rotate and aline pins (6) to allow mounting of cover(1) which act also as pin lock to prevent their rotation.

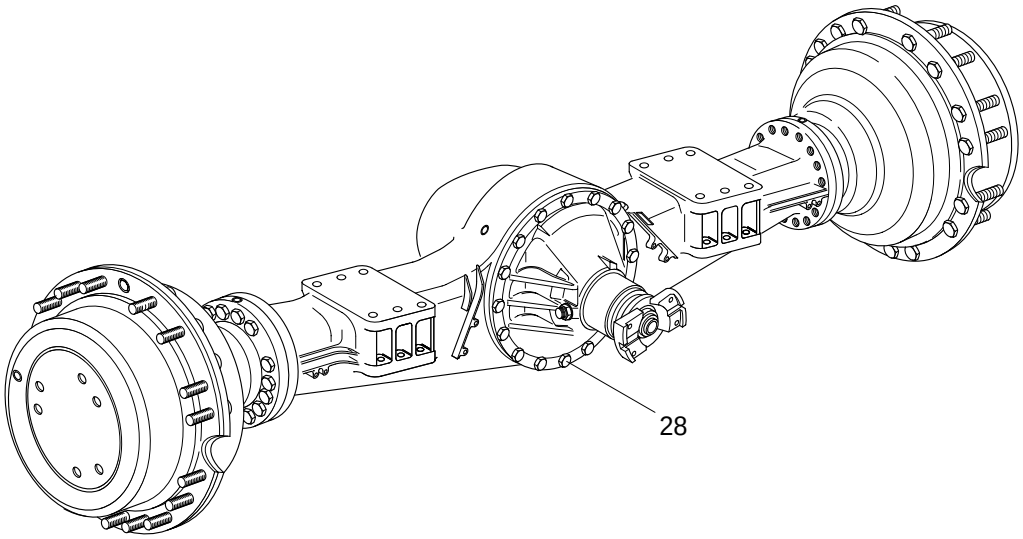
(26) Fit side final drive cover(1).

(27) Smear fixing screws(40) with sealing compound, then, lock with a tightening torque of : See tightening torque No.7.

6) DISASSEMBLING AND REASSEMBLING DIFFERENTIAL UNIT

(1) Disassembly

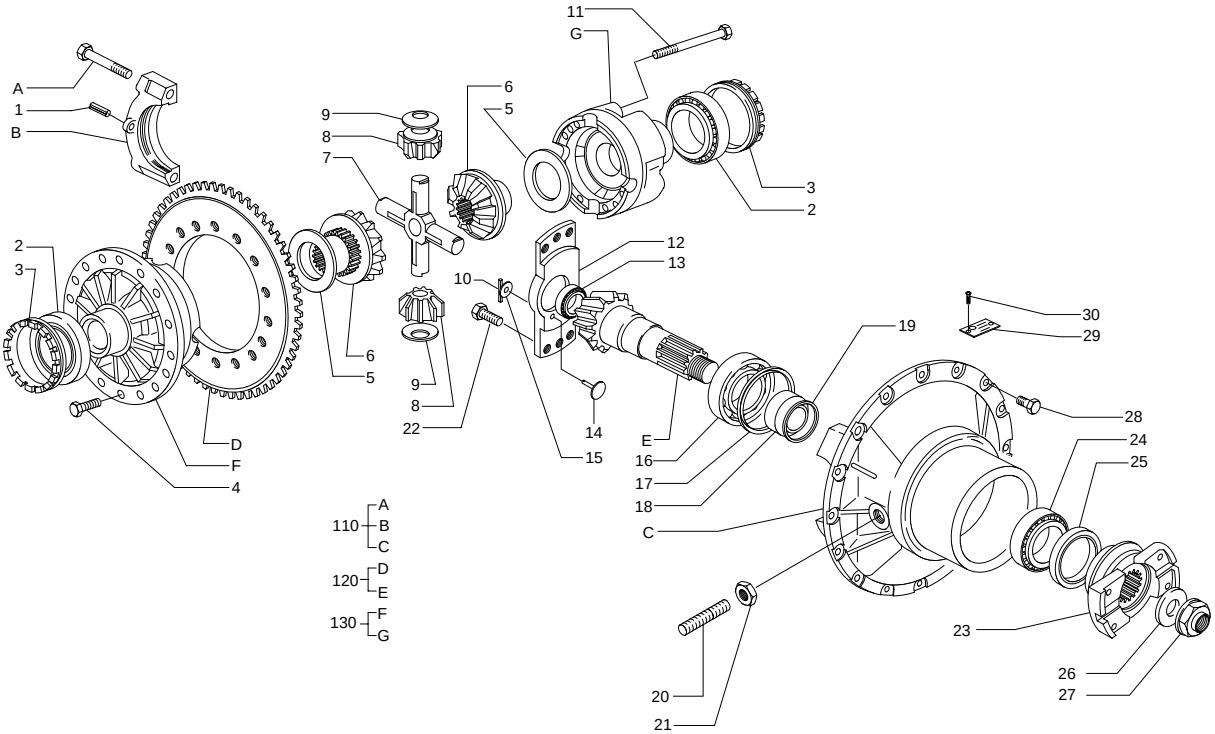
Unlock and undo screws(28) retaining differential unt then, remove it from axle case.



(2) Assembly

Clean throughly matching surfaces, apply selaling compund and mount differential unit on alxle case, lock the screws(28) with a tightening torque of : See tightening torque No. 5.

7) DISASSEMBLING DIFFERENTIAL UNIT



(1) Hammer out spring pins(1) locking slotted rings(3) and release then.

※ Mark caps(B) to match parts at reassembly.

(2) Release fixing screws(A) and remove caps(B) and relevant threaded rings(3).

(3) Release and remove screws(22) securing support(12) of bearing(13) of bevel pinion shank.

(4) Remove support(12) of bevel pinion bearing by means of puller screws.

(5) Lift up differential unit from differential support(C), along with bearing support(12).

(6) Remove ring gear deflection plunger(20) and relevant counternut(21).

(7) Insert a screw in the seat of plunger(20) to react against unscrewing torque of pinion ring nut(27).

※ This screw should have a threaded length of 100㎜, its tip should shaped so as not to be damaged when contacting pinion teeth.

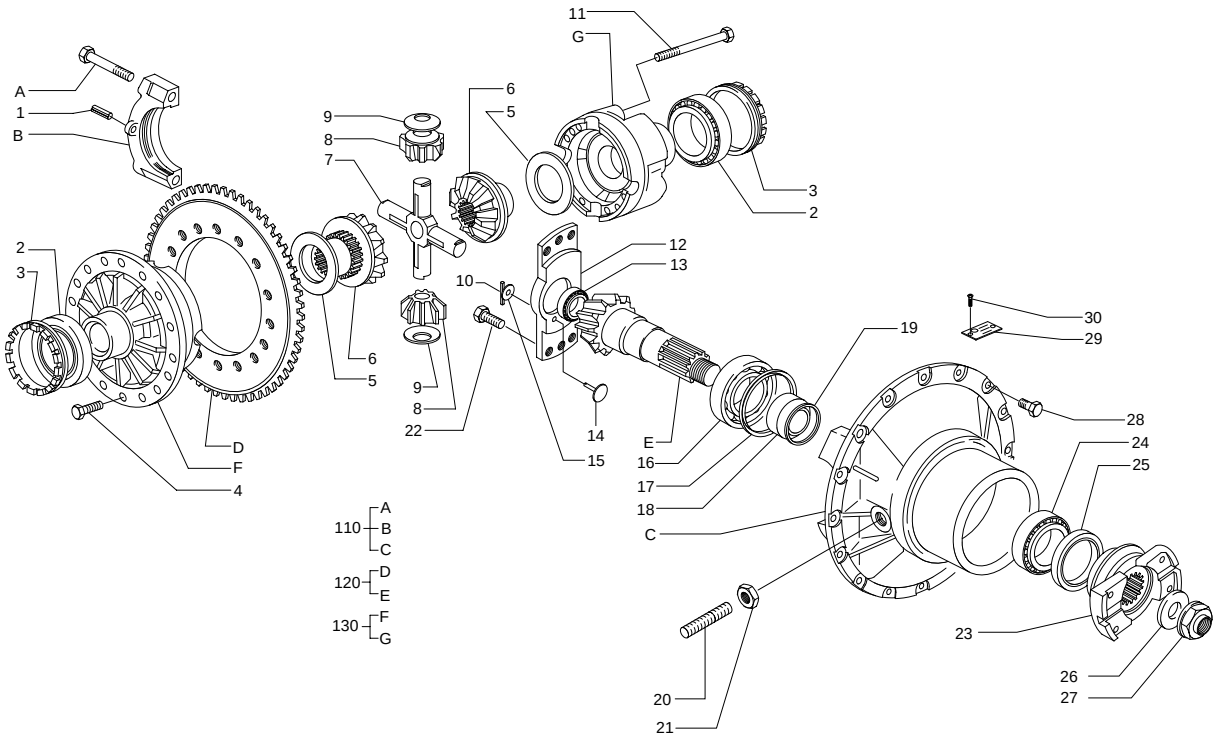
※ Make sure that screw be correctly engaged in pinion teeth.

(8) Straighten notches on pinion ring nut(27).

(9) Unlock and undo ring nut.

(10) Remove drive flange(23), washer and pinion ring nut, then, back up reaction screw.

DISASSEMBLING DIFFERENTIAL UNIT



(11) Pry off seal(25) from drive flange.

(12) Remove bevel pinion(E) from differential support(C), hammer pinion shank with a proper remover, care not to damage threads.

(13) Pick up inner race of pinion shank bearing(24).

(14) Remove from differential support(C) outer races of outer and inner pinion bearings(24 and 16). Pick up shims(17) for pinion axial position adjustment, spacer(18) and shim(19).

(15) Flatten notches retaining bearing(13) race on pinion(E) shank.

(16) Remove bearing(13) race from pinion(E) shank by a proper puller.

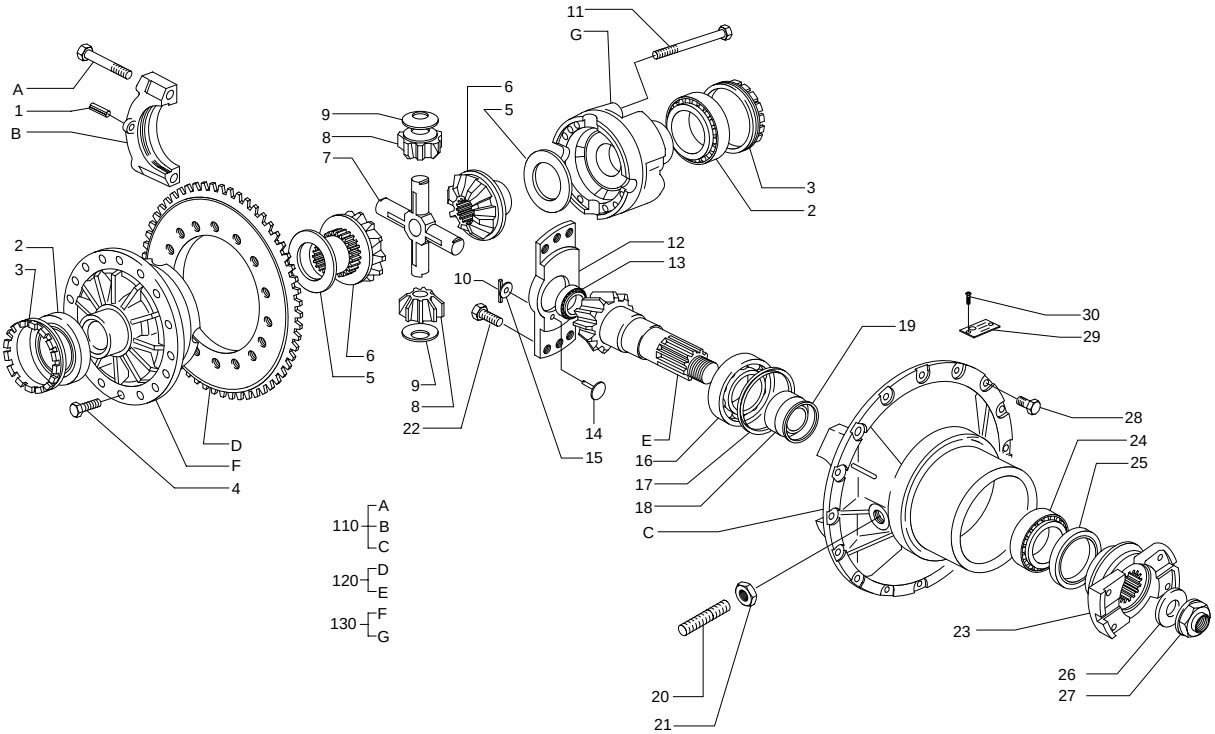
(17) Remove pinion underhead bearing (16) by a proper puller.
※ Mark differential half-cases(F and G) for reference at reassembly.

(18) Remove fixing screws(11) and separate half-cases(F and G).
※ Have a visual and dimensional check of wear on sun and side gears(6 and 8) relevant thrust washers(5 and 9) and spider(7).

(19) Remove bearings(2) from half-cases(F and G) by a proper puller.

(20) Fit inner races of differential bearings(2) on half-cases(F and G).

DISASSEMBLING DIFFERENTIAL UNIT



※ This operation should be carried out by heating equipment or proper installer.

(21) Clamp ring gear(D) in a vise fitted with soft caps and remove screws(4) securing ring gear(D) to case(F).

(22) Overhauling pinion bearing support(12).

(23) Remove split pin(10), washer(15) and pin(14).

(24) Remove bearing outer race from support(12) of pinion(E).

※ Check wear conditions of components, renew as required.

(25) Finally, press fit outer race of bearing(13) on support(12) of pinion(E).

(26) Finally, reassemble retaining washer(15), pin(14) and split pin(10) on support(12).

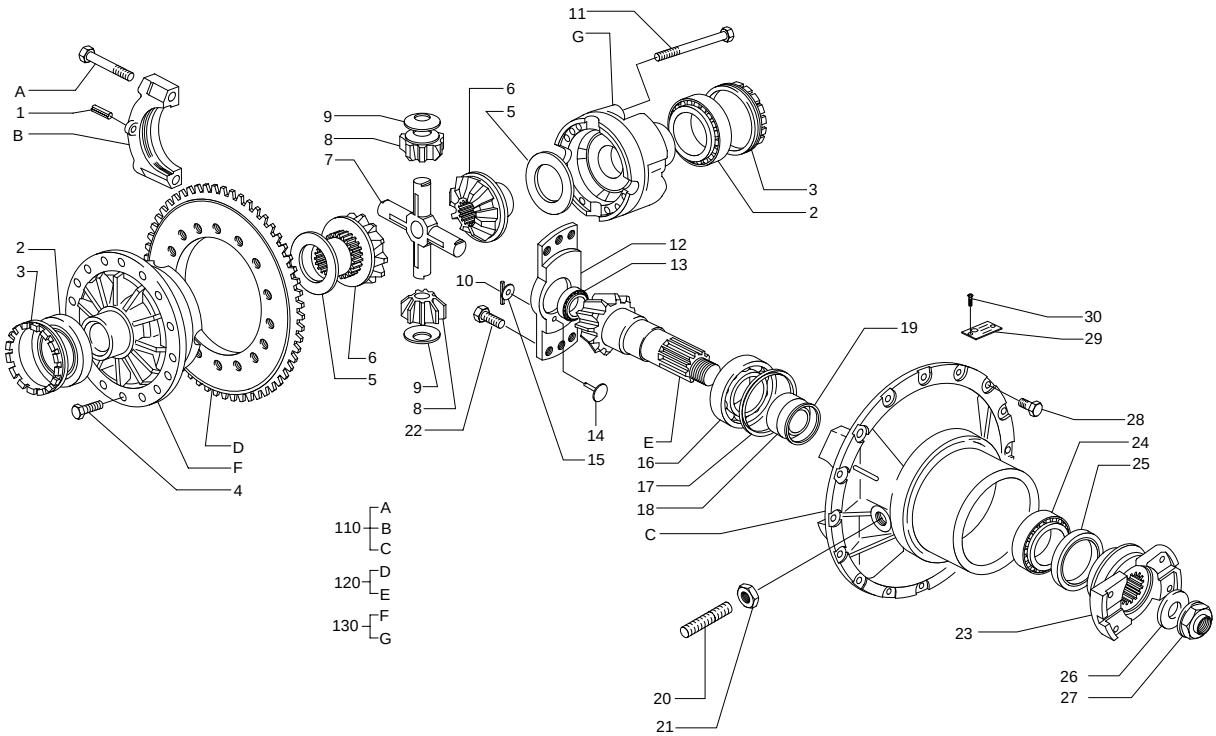
(27) Mount bevel ring gear(D) on case(F) lock relevant fixing screws(4) with a tightening torque of : See tightening torque No.2.

※ Position differential components in relevant seats, then, join half-cases(F and G) matching reference marked prior disassembly.

(28) Mount and lock half-cases fixing screws(11) with a tightening torque of : See tightening torque No.3.

8) ASSEMBLING DIFFERENTIAL UNIT

Determining thickness of adjustment shims(Axial position of bevel pinion) : See clause 9 at page 3-117.



(1) Press fit inner race of inner(Underhead) bearing(16) on pinion by heating equipment or proper installer.

(2) Position shim(17), computed as per clause 9 at page 3-114, in its seat and press fit outer races of inner(Underhead) and outer bearings(16 and 24) of pinion.

(3) Fit spacer(18) on pinion along with shims(19) for bearing pre-load adjustment; Then, mount inner race of pinion outer bearing(24).

※ To facilitate proper pre-load computation, it is advisable to mount as many shims as required to warrant a pinion end play and not a pre-load(That could be excessive) on bearings.

(4) Fit drive flange(23) on pinion(E), position the specific reaction screw and tighten nut(27) with a torque of 58.2~64.3kgf · m(420~464lbf · ft).

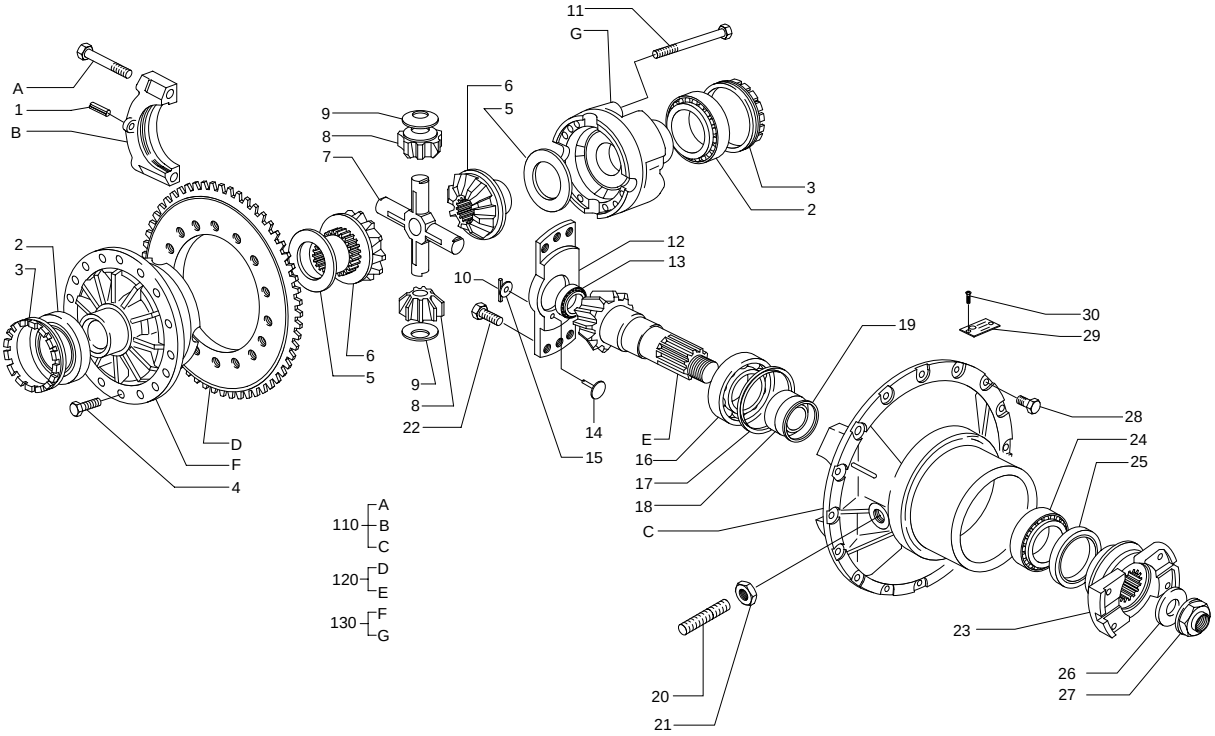
(5) Back up reaction screw from pinion.

※ Check pinion end play by means of a dial gauge; Then, disassemble parts and change shims so as to eliminate all end play and reach the intended pre-load.

※ Reassemble components, check that proper pre-load of bearing be corresponding to a revolving torque(No seal installed) of 0.2~0.4kgf · m(1.4~2.9lbf · ft).

(6) As the prescribed pre-load of bearings as been reached remove drive flange(23) and fit lip seal (25) in relevant seat.

ASSEMBLING DIFFERENTIAL UNIT



(7) Remount drive flange again and tighten a specified above.

(8) Remove definitively, reaction screw from differential support.

(9) Position differential assembly with ring gear on support(C).

(10) Insert support(12) of bearing(13) while differential is lowered and tighten fixing screw(22) with a torque of : See tightening torque No.6.

(11) Insert ring nut(3) and adjust temporarily backlash.

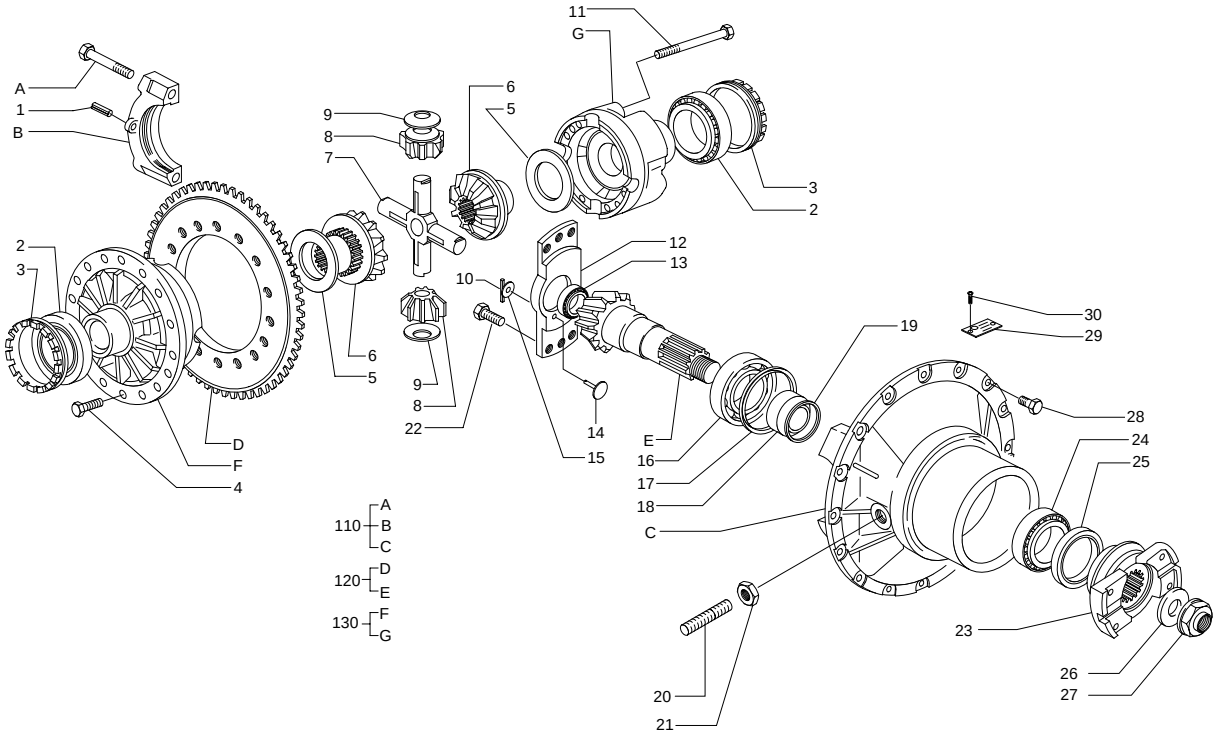
(12) Mount caps(B), minding not to invert position and lock screws(A) fixing support to differential with a torque of : See tightening torque No.4.

※ Check differential end play by a dial gauge.

※ Screw in a ring nut so as to have a notch aligned against the slot of lock plate and actuate the opposite nut up to eliminate end play.

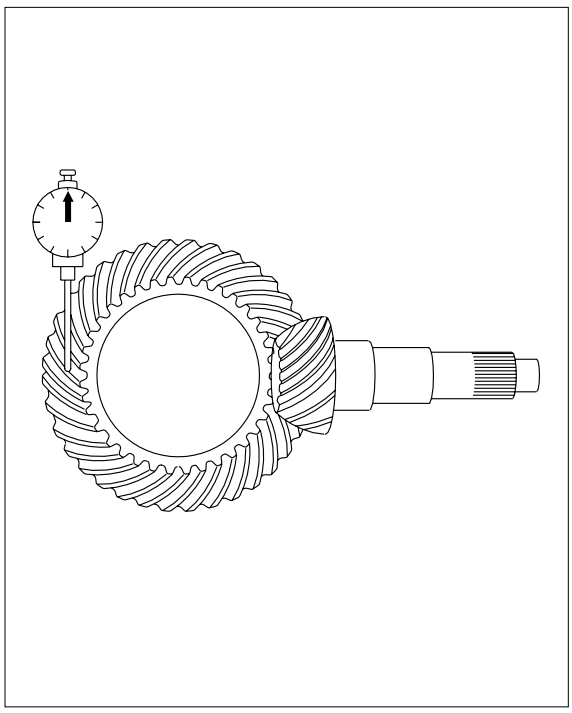
※ As such a condition has been reached go on with bearing pre-load by screwing in ring nut further one more notch.

ASSEMBLING DIFFERENTIAL UNIT



(13) Position a dial gauge perpendicular the ring gear(D) tooth(See figure) and check that, with pinion steady, backlash be of : See tightening torque No.9, otherwise rotate both ring nuts(3), displacing them of a same number of notches and nearing ring gear to pinion if backlash is excessive and moving away on the contrary.

※ Brush red lead on some ring gear teeth, rotate to mesh pinion and ring gear repeatedly so as to make evident tooth contact. Proper and correct tooth contact marks are visible on a new bevel gear set as a result of an optimum contact approached on the tester, consequently, a proper axial position of pinion against ring gear will emphasize remarking of previous tester contact marking.

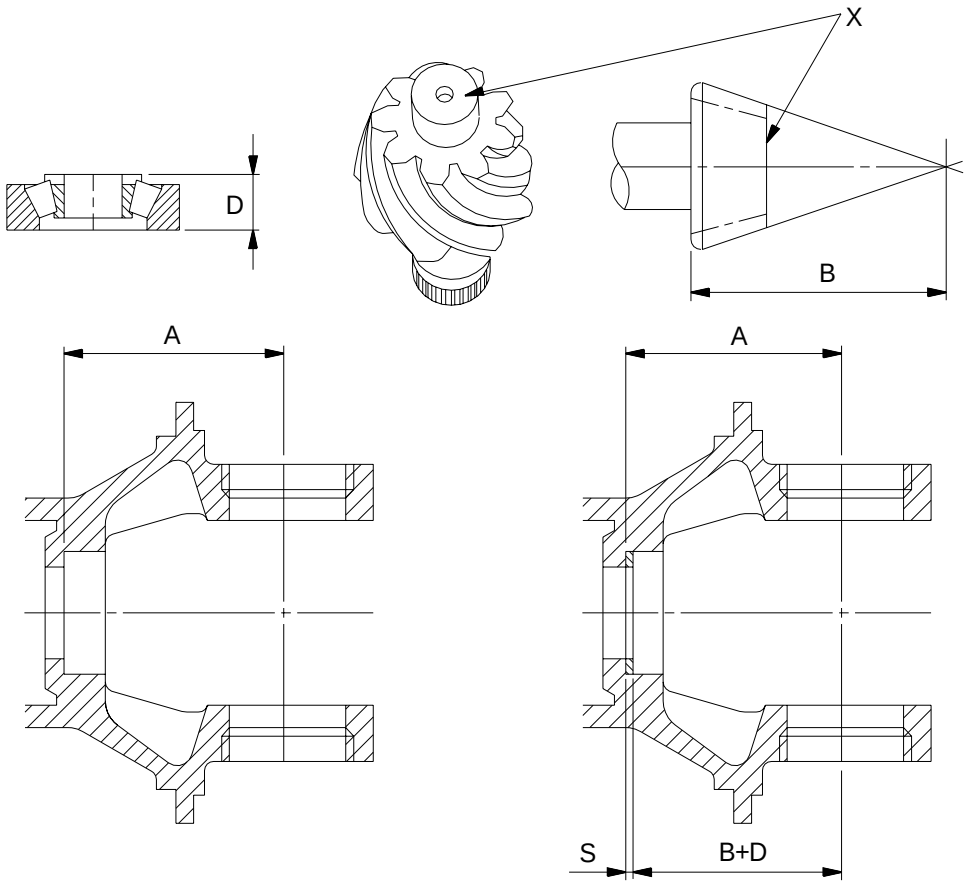


(14) Fit spring pins(1) to lock differential ring nuts.

(15) Make two lock notches on pinion nut collar(27).

※ Apply sealing compound to bevel ring gear deflection plunger(20), then, screw in up to contact ; Turn back by about 90 degree to leave the required clearance and lock counternut holding plunger steady.

9) DETERMINING THICKNESS OF ADJUSTMENT SHIMS



(1) Some dimensions should be recorded before starting reassembly of bevel pinion to determine thickness of spacer to be fitted between inner(Underhead) pinion bearing and backing of relevant seat in differential support.
Record dimension from ring gear axis to seat of inner(Underhead) pinion bearing(That will be identified as **A**).
Example : In our case **A** = 206.6㎜

(2) A number **X** prefixed by symbol ± is marked on bevel pinion face.
Said value, expressed in tenth of millimeter, indicate the deviation from the theoretical distance from pinion underhead to ring gear axis :
i.e. : + 1 = 0.1㎜
Consequently, the true distance(Identified as **B**) will be :
B = 168.5 ± Deviation
In our case : **B** = 168.5 + 0.1 = 184.1㎜

(3) Measure thickness of pinion head bearing and identify as **D**.
Example : In our case **D** = 34.15㎜

(4) Compute thickness of shim **S** for proper axial position of bevel pinion :
S = A - (B + D)
Example : In our case **S** = 206.6 - (168.6 + 34.15) = 3.85㎜

(5) Increase by 0.05mm the computed thickness value to compensate subsequent bearing pre-load.
Round off to the nearest tenth of millimeter to the computed thickness value :
i.e. : 4.02 Rounded off = 4㎜
3.88 Rounded off = 3.9㎜